REPORT NUMBER: SINCAP-CAL-17-001

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

Hyundai Motor Company
2017 Hyundai Elantra
Four Door Sedan

NHTSA No: M20174202

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

August 30, 2016

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
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Administration, in response to Contract Number DTNH22-14-D-00352.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: Vanessa Hansen Date: August 30, 2016
Vanessa Hansen, Project Engineer

Approved by: Edward Dutton Date: August 30, 2016
Edward Dutton, Test Engineer
Transportation Test Operations

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.	2. Government Accession No.	3. Recipient's Catalog No.
SINCAP-CAL-17-001		

4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of a 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202	August 30, 2016
	6. Performing Organization Code CAL
Vanessa Hansen, Test Engineer Edward Dutton , Senior Test Engineer	**8. Performing Organization Report No.** CAL-DOT-2017-001
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 June 23, 2016 - August 30, 2016
	14. Sponsoring Agency Code NRM-110

15. *Supplementary Notes*

16. *Abstract*

A 55/28, (61.90 kph / 38.5 mph), 90^0 Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2017 Hyundai Elantra four door sedan 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 June 23, 2016.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.94 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 197mm 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	252.607
Maximum Thoracic Rib Deflection	mm	44	16.609
Total Abdominal Force	N	2500	1147.789
Pubic Symphysis Force	N	6000	1811.391

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	572.888
Lower Spine Resultant Acceleration	G	82	99.268
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3630.544
Maximum Thoracic Rib Deflection	mm	38*	38.130
Maximum Abdominal Rib Deflection	mm	45*	51.745

* *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	18. Distribution Statement
New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833

19. Security Class. (of this report)	20. Security Class. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	188	

TABLE OF CONTENTS

SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2017 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 2017 Hyundai Elantra four door sedan. 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 2017 Hyundai Elantra four door sedan 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 61.94 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 June 23, 2016. 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	252.607
Maximum Thorax Rib Deflection	mm	44	16.609
Combined Abdominal Force	N	2500	1147.789
Pubic Symphysis Force	N	6000	1811.391

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	572.888
Lower Spine (T12) Resultant Acceleration	G	82	99.268
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3630.544
Maximum Thoracic Rib Deflection	mm	38*	38.130
Maximum Abdominal Rib Deflection	mm	45*	51.745

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

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

Data Anomalies:

The following channel was questionable for

- Left B-Pillar Middle Y Acceleration, Questionable spike around 9ms.

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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20174202
Model Year	2017
Make	Hyundai
Model	Elantra
Body Style	4 Dr. Sedan
VIN	KMHD74LF3HU058513
Body Color	Blue
Odometer Reading (km/mi)	25.7 km / 16 mi
Engine Displacement (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Auto
Transmission Speeds	6 – speed
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
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 Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioners	Yes
Rear Pass. Seat Belt Pretensioners	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	-

Does owner's manual provide instructions to turn off automatic door locks?	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company
Date of Manufacture	FEB/23/16
Vehicle Type	Passenger

GVWR (kg)	1780
GAWR Front (kg)	990
GAWR Rear (kg)	910

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	-	5	
Capacity Weight (VCW) (kg)				385	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				44.8	(A-B)

VEHICLE SEAT TYPE

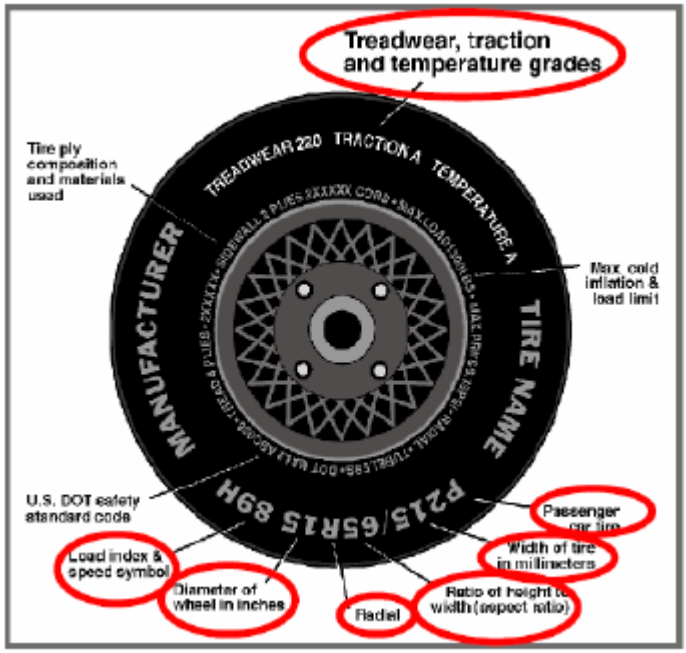
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable W/ Lever	Adjustable W/ Knob
Front Seat	X					X	
Rear or Second Row Seat		X			X		
Third Row seat							

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

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016

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)	350	350
Cold Pressure (kPa)	250	250
Recommended Tire Size	P195/65R15	P195/65R15
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadwear	540	540
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester	2 Steel, 1 Polyester
Load Index/Speed Symbol	91T	91T
Tire Material	Rubber	Rubber
DOT Safety Code Left	5MDH1BH4715	5MDH1BH4715
DOT Safety Code Right	5MDH1BH4715	5MDH1BH4715

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

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	324	324	323	322
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	420	236		435	330		460	317	
Right	kg	372	263		408	285		375	316	
Ratio	%	61	39		58	42		57	43	
Totals	kg	792	499	1291	843	615	1458	835	633	1468

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1291	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1462.8	(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	675	677	Yes
RF	mm	686	681	Yes
RR	mm	674	673	Yes
LR	mm	657	660	Yes
Vehicle CG (Aft of Front Axle)	mm	1164	1139	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	46.5	38.5	

*** 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:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	4
Spare Tire	11
Jack	3
Tail Light	1
Passenger Door Internals	5
Bumper Beam	3
Bumper Cover	7
Mirror	1
Hub caps	1
Ballast / Equipment Added	N/A

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

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016

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	15.9	13.2	14.5
Front Passenger Seat	15.8	13.0	14.4
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	14.5	35	Max	50	60	70
			Mid	25	35	45
			Min	0	10	20
Front Passenger Seat	14.9	35	Max	50	60	70
			Mid	25	35	45
			Min	0	10	20
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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

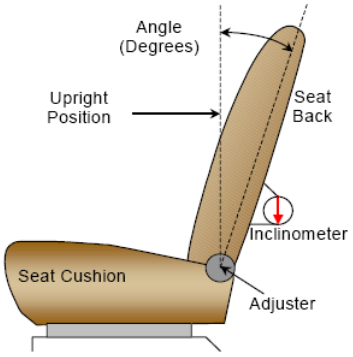
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	0-36	123	19
Front Passenger Seat	240	0-36	122	19
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	-12.4 to 45.4	N/A	1.7	N/A
Front Passenger Seat	-11.7 to 48.4	N/A	1.7	N/A
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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

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	3	0 – Uppermost
Rear Seat	FIXED	FIXED

HEAD RESTRAINT ADJUSTMENT

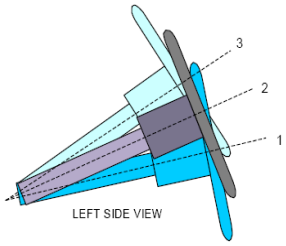
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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

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	20.3	
Geometric Center – Position 2	23.0	
Uppermost – Position 3	25.7	
Telescoping Steering Wheel Travel		50
Test Position	23	25

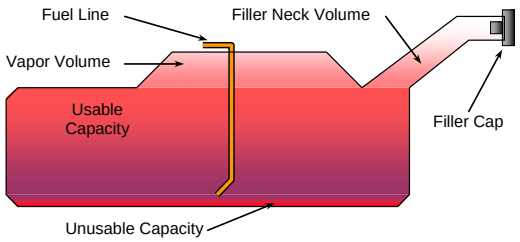


STEERING COLUMN ASSEMBLY

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 fuel pump. The fuel filler neck is on the left side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

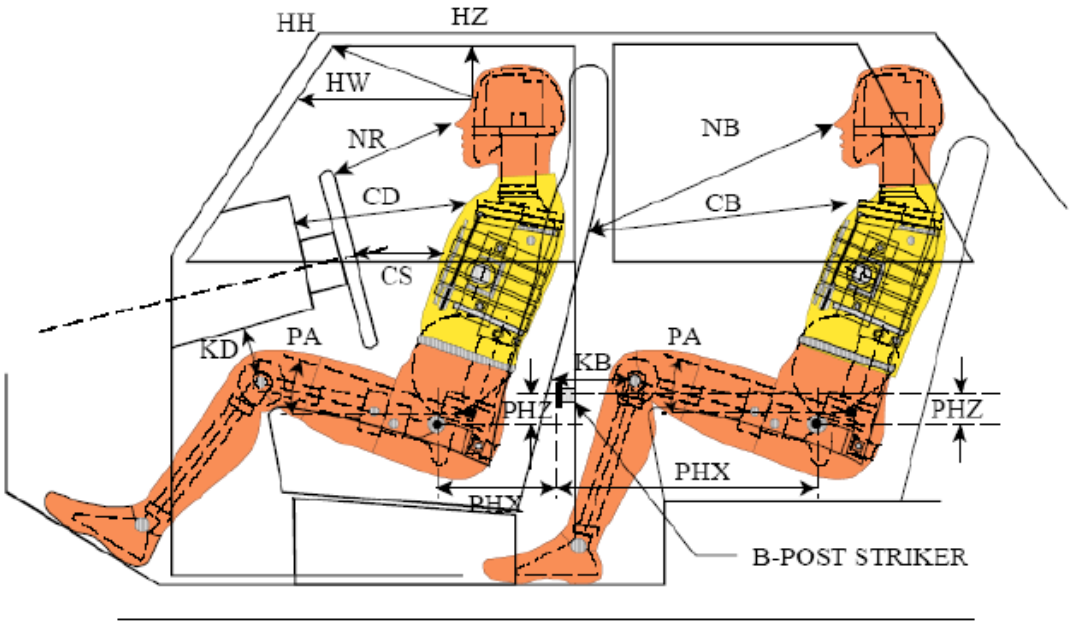
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	53
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of Standard Tank (see Owner's Manual)	53
Usable Capacity of Optional Tank (see Owner's Manual)	
93% of Usable Capacity	49.29
Actual Amount of Solvent Used in Test	49.29
1/3 of Usable Capacity	17.66

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:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



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

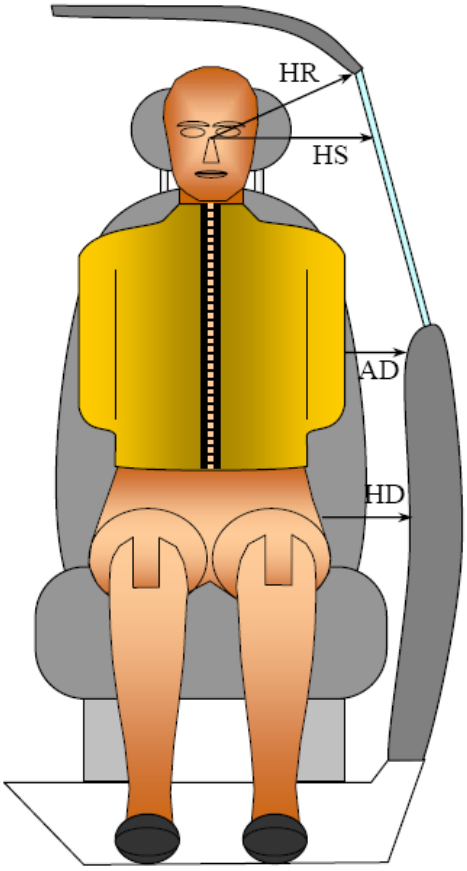
LEFT SIDE VIEW

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	350			
HW		Header to Windshield	687			
HZ	HZ	Head to Roof Liner	150		245	
NR	NB	Nose to Rim/Seat Back	423		559	
CD	CB	Chest to Dash/Seat Back	556		550	
CS		Chest to Steering Wheel	340			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	240	25.5	272	14.9
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	214	24.8	272	15.0
PAX°	PAX°	Pelvic Tilt Angle X		20		22.2
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	166		245	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	218		225	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



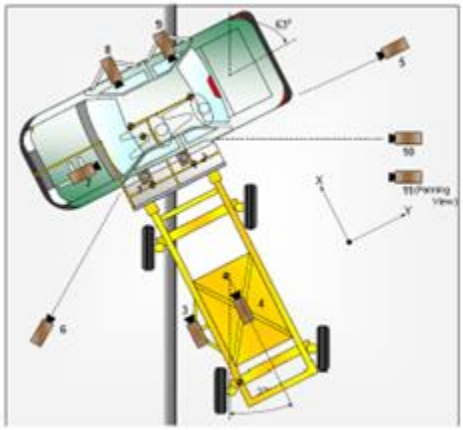
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F034)	Passenger (Serial No. 300)
HR	Head to Side Header	mm	193	265
HS	Head to Side Window	mm	320	398
AD	Arm to Door	mm	110	176
HD	Hip Point to Door	mm	153	185

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	-315	1070	-5326	14	1000
2	Overhead Close-up	0	1410	-5326	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	838	-1587	12.5	1000
5	Rear	0	9914	-950	24	1000
6	Left Front	-2345	-4860	-1060	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.*

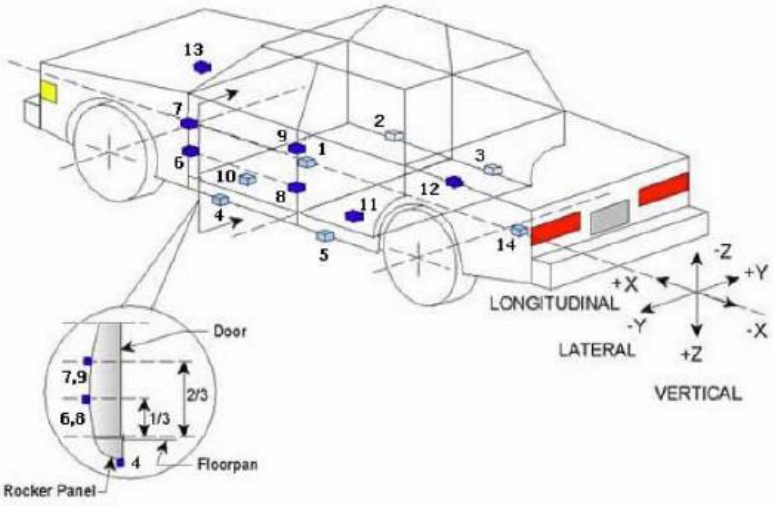
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016



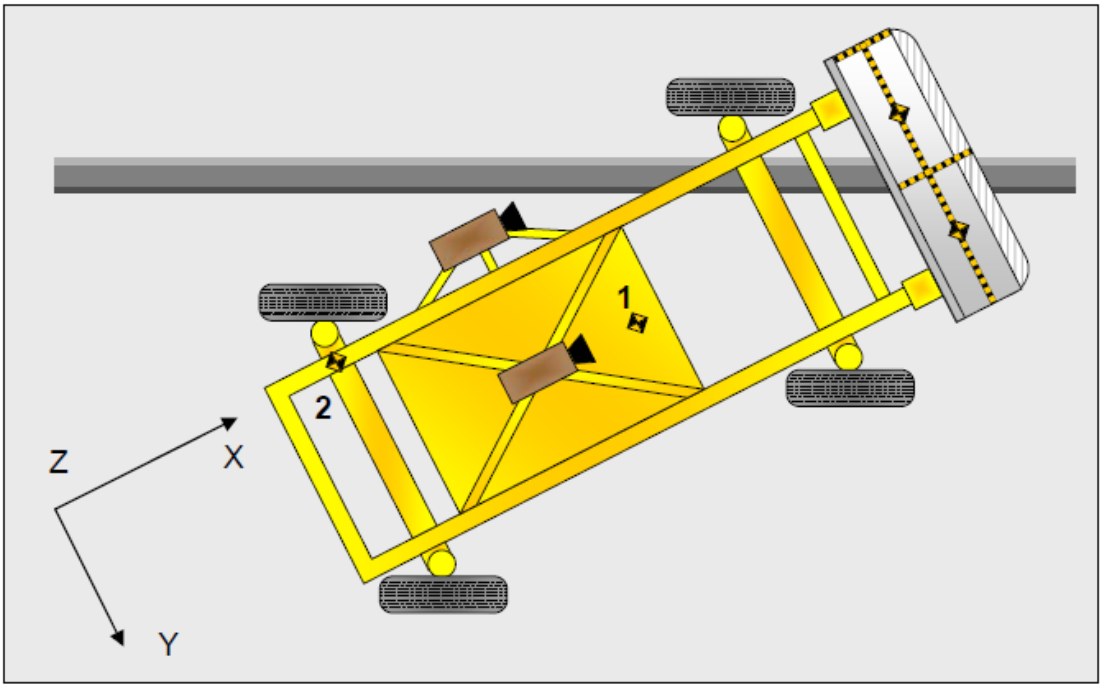
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2554	47	21
2	Right Sill at Front Seat	2794	671	-150
3	Right Sill at Rear Seat	1891	675	-141
4	Left Sill at Front Door	2855	-668	-159
5	Left Sill at Rear Door	1879	-671	-145
6	A-Post Lower	3307	-661	160
7	A-Post Middle	3233	-637	551
8	B-Post Lower	2169	-670	98
9	B-Post Middle	2142	-674	325
10	Front Seat Track	2377	-570	-158
11	Rear Seat Structure	1514	-620	-39
12	Rt. Rear Occ. Compartment	2019	397	-204
13	Engine Block	3715	89	328
14	Rear Above Axle	1173	16	72

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:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Air Bag	Curtain Air Bag
Top of Head	None	Headliner & Headrest
Left Side of Head	Curtain Air Bag & Side Headliner	Curtain Air Bag
Back of Head	Curtain Air Bag, Headliner & Headrest	None
Left Shoulder	Curtain Air Bag	Curtain Air Bag + Door
Upper Torso	Seatback & Torso/Pelvis Air Bag	Door
Lower Torso	Seatback	Door
Left Hip	Seatback & Torso/Pelvis Air Bag	Seat pan & Door
Left Knee	Driver's 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

*Tailgate opened during impact but is still operational.

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 & C Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Rear Passenger Window Shattered
Other Notable Effects	None

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

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2700
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		410
Actual Impact Point (Aft of Frontal Axle)	mm		422
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-12
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-5

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

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

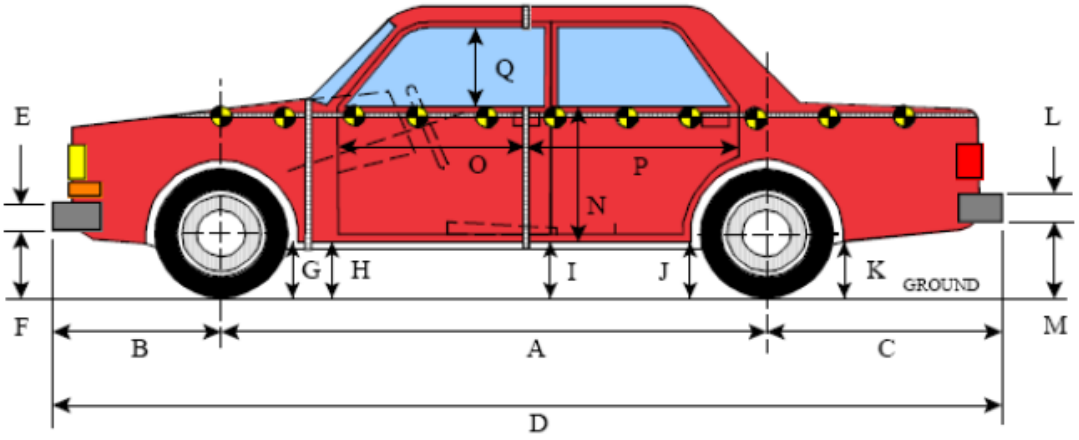
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	61.94
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.05
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.5
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle 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 of Center	204
B	Top of Bumper	533	800	Left of Center	121
C	Mid-Level	686	800	Left of Center	130
D	Top of Stack	813	800	Left of Center	124

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016



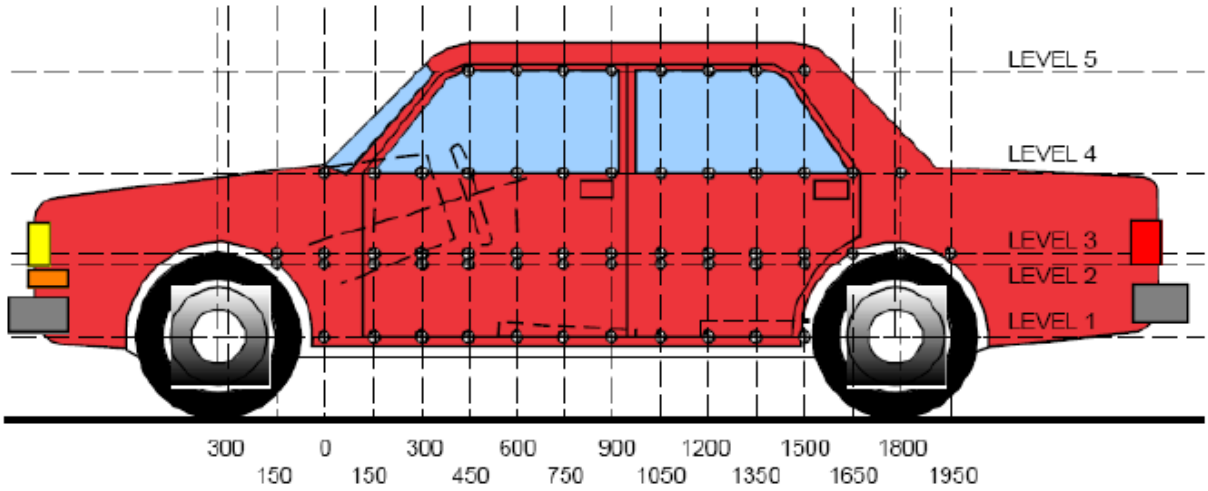
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2700	2698	-2
B	Front Axle to FSOV	882	876	-6
C	Rear Axle to RSOV	994	1004	10
D	Total Length at Centerline	4576	4578	2
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	390	394	4
G	Sill Height at Front Wheel Well	167	181	14
H	Sill Height at Front Door Leading Edge	173	190	17
I	Sill Height at B Pillar	173	193	20
J1	Sill Height at Rear Wheel Well	168	176	8
J2	Pinch Weld Height at Rear Wheel Well	147	157	10
K	Sill Height Aft of Rear Wheel Well	432	435	3
L	Rear Bumper Thickness	385	385	0
M	Rear Bumper Bottom to Ground	260	263	3
N	Sill Height to Window Bottom of Front Window Sill	797	765	-32
O	Front Door Leading Edge to Impact CL	772	765	-7
P	Rear Door Trailing Edge to Impact CL	1383	1344	-39
Q	Front Window Opening	391	394	3
R	Right Side Length	4450	4447	-4
S	Left Side Length	4448	4448	1
T	Maximum Vehicle Width	1782	1638	-145

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2017 Hyundai Elantra four door sedan
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20174202
Test Date: 6/23/2016



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	221	35	750
2	Driver Hip Point	mm	517	190	450
3	Mid-Door	mm	613	197	1500
4	Window Sill	mm	927	141	1650
5	Window Top	mm	1366	15	1500

*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: 2017 Hyundai Elantra four door sedan NHTSA No.: M20174202
Test Program: NCAP Side MDB Impact Test Test Date: 6/23/2016

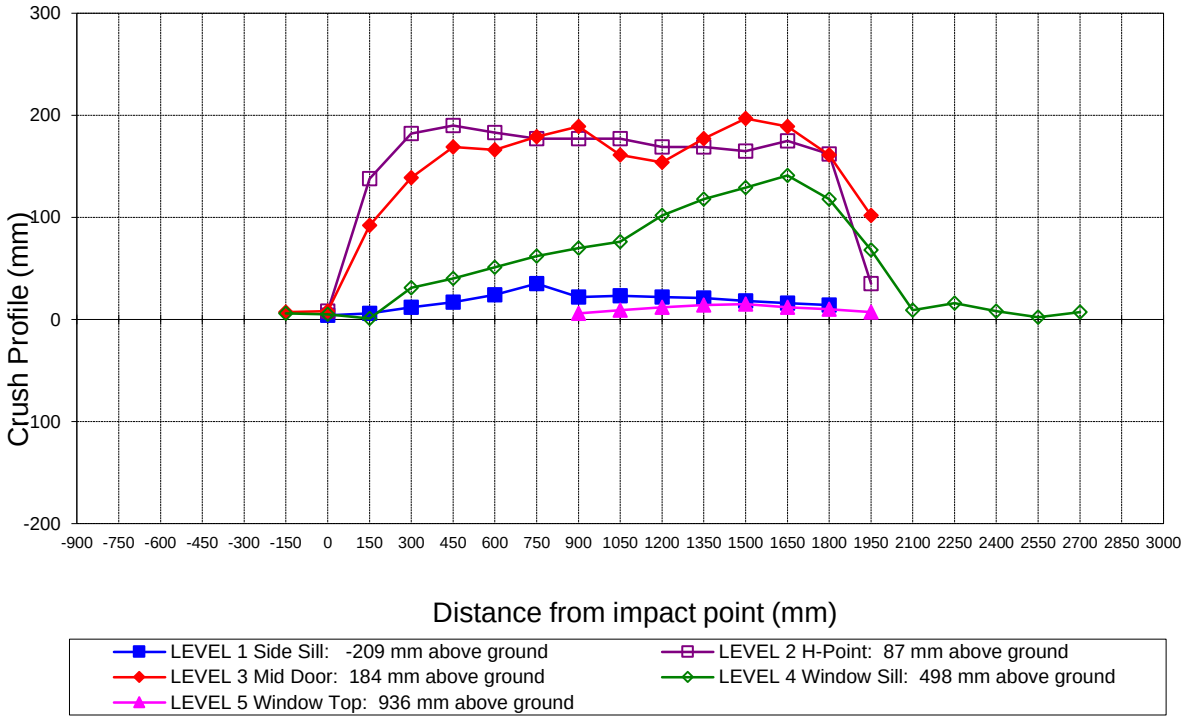
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150			891	754				884	748				7	6	
0	868	887	887	777		864	879	879	772		4	8	8	5	
150	856	880	883	789		850	742	791	788		6	138	92	1	
300	855	879	884	800		843	697	745	769		12	182	139	31	
450	854	879	885	814		837	689	716	774		17	190	169	40	
600	854	879	886	824		830	696	720	773		24	183	166	51	
750	853	879	887	832		818	702	708	770		35	177	179	62	
900	852	879	888	838	610	830	702	699	768	604	22	177	189	70	6
1050	851	879	888	842	619	828	702	727	766	610	23	177	161	76	9
1200	850	877	887	844	621	828	708	733	742	609	22	169	154	102	12
1350	849	875	885	845	622	828	706	708	727	608	21	169	177	118	14
1500	848	873	883	844	621	830	708	686	715	606	18	165	197	129	15
1650	848	872	881	844	616	832	697	692	703	604	16	175	189	141	12
1800	854	879	882	841	605	840	717	721	723	595	14	162	161	118	10
1950		890	891	836	531		855	789	768	524		35	102	68	7
2100				831					822					9	
2250				829					813					16	
2400				823					815					8	
2550				817					815					2	
2700				816					809					7	
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

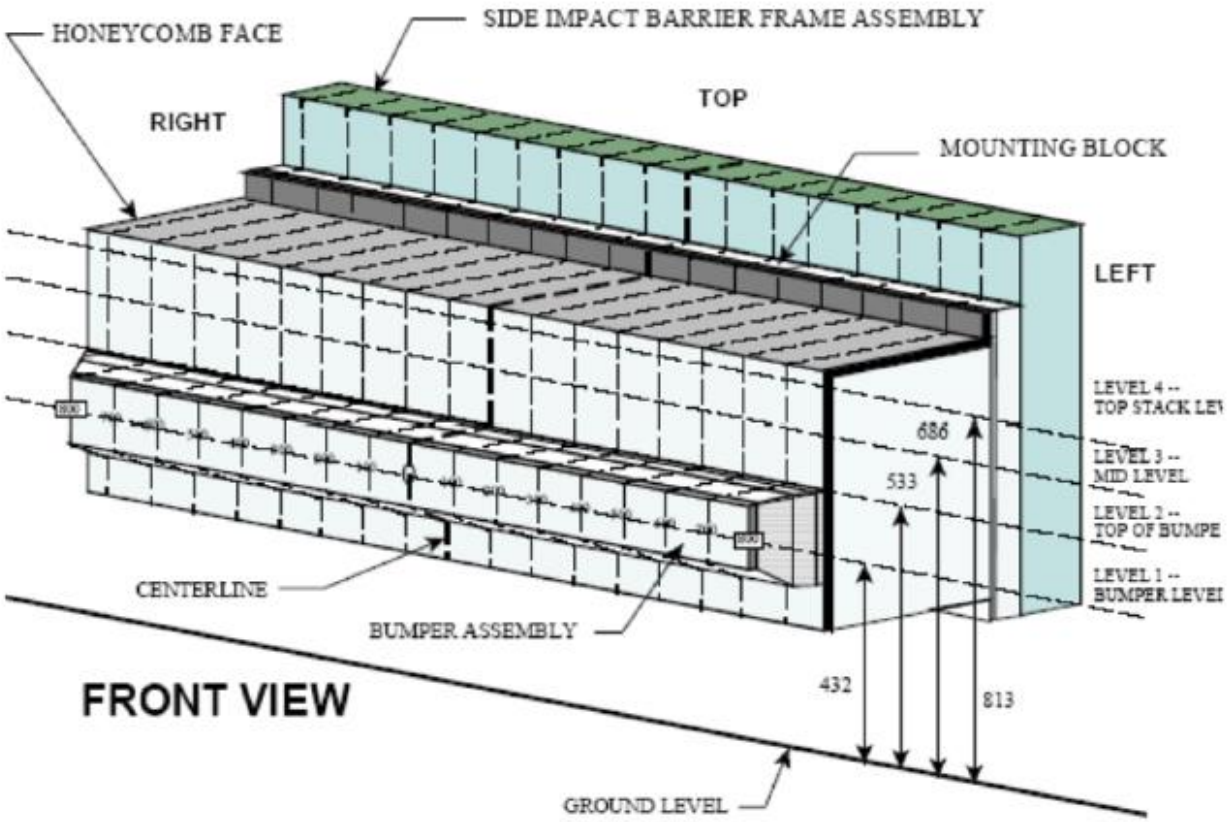
Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



NOTE: Dimensions are shown in millimeters, mm

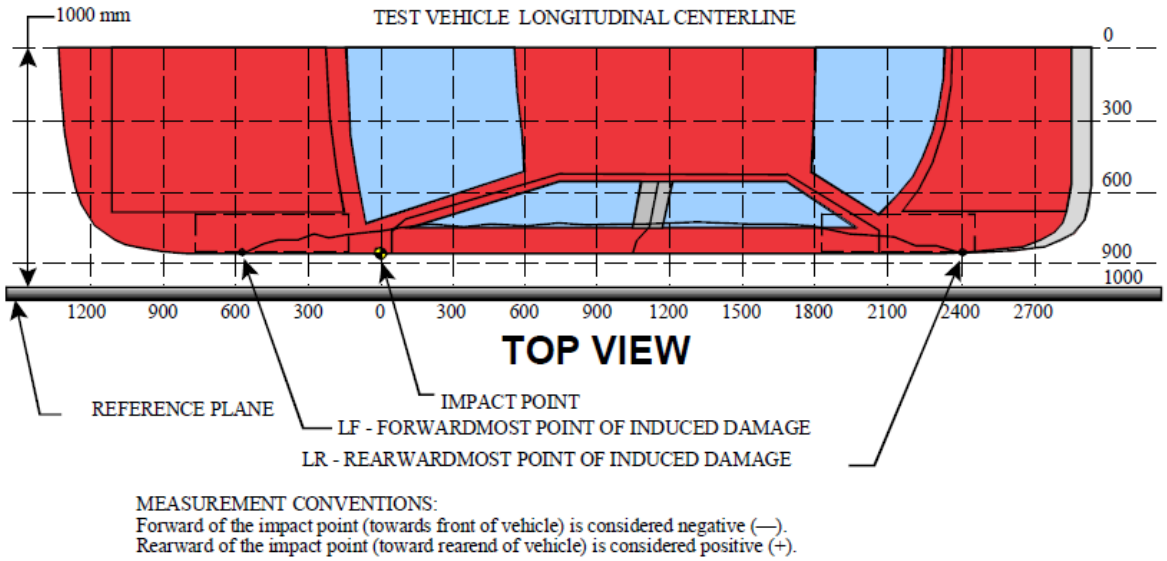
DEFORMABLE BARRIER STATIC CRUSH

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	182	169	164	163	161	164	162	162	159	154	149	147	146	146	148	158	204
2	88	96	96	88	85	84	93	92	89	86	91	92	95	99	100	107	121
3	57	30	24	29	25	32	63	79	54	32	25	27	31	39	56	89	130
4	41	14	5	9	21	39	81	80	58	41	42	50	62	72	85	102	124

DATA SHEET NO. 13
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016

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	116	109	7
2	270	3	246	116	130
3	690	3	287	113	174
4	1110	3	271	112	159
5	1530	3	313	117	196
6	1950	3	211	109	102

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)*
1	800 mm left of center	1	204
2	480 mm left of center	1	146
3	160 mm left of center	1	151
4	160 mm right of center	1	162
5	480 mm right of center	1	162
6	800 mm right of center	1	182

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

Test Vehicle:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016
Test Time:	12:26 PM	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°	60	300	360
270° to 360°	66	300	366

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

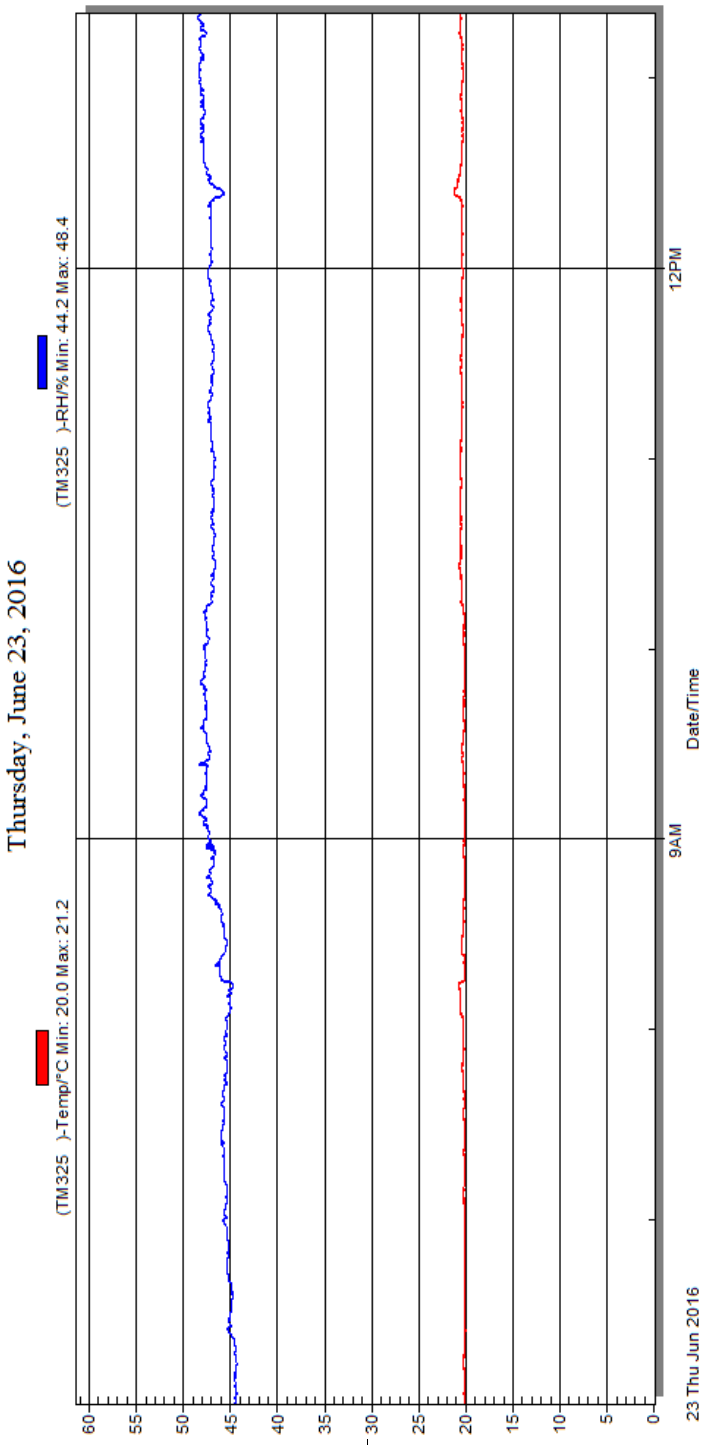
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	2017 Hyundai Elantra four door sedan	NHTSA No.:	M20174202
Test Program:	NCAP Side MDB Impact Test	Test Date:	6/23/2016



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure A-1: As-Delivered Right Front 3/4 View of Test Vehicle

Figure A-2: As-Delivered Left Rear 3/4 View of Test Vehicle

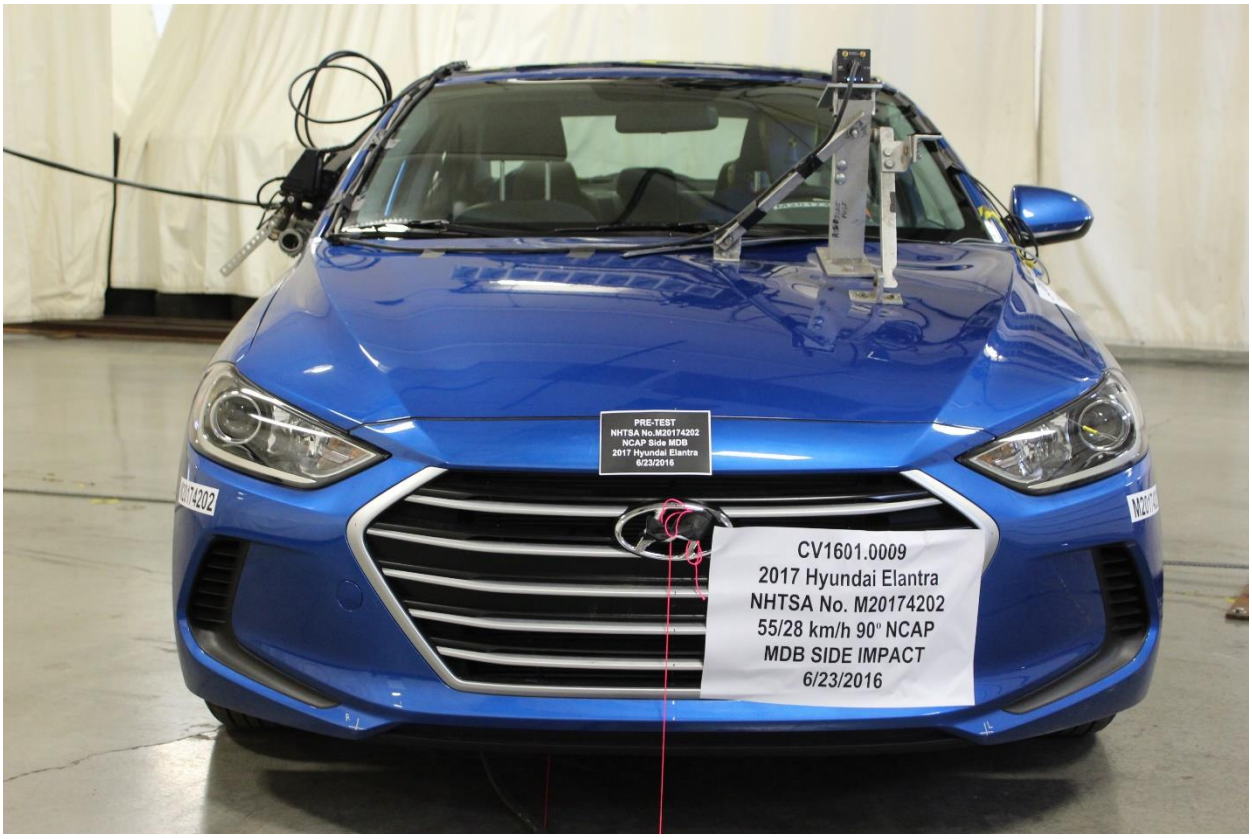


Figure A-3: Pre-Test Frontal View of Test Vehicle

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

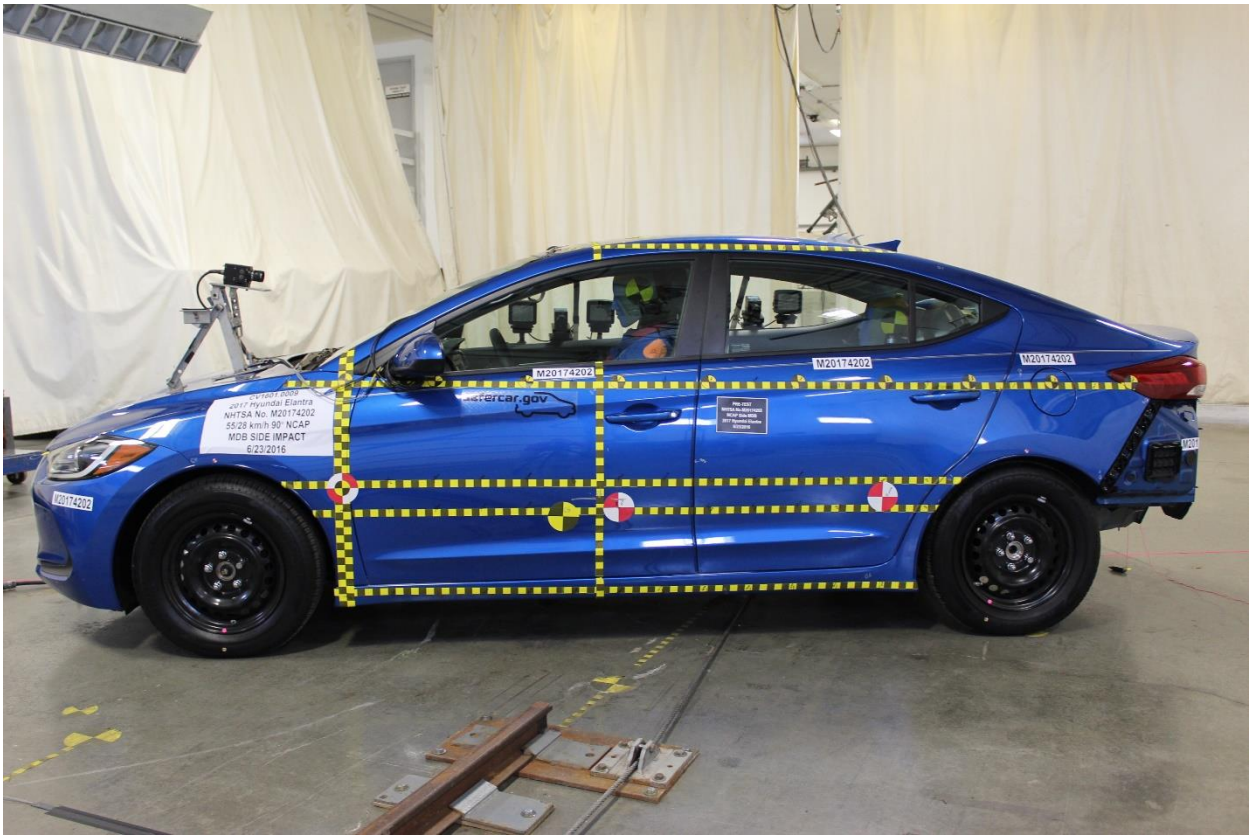


Figure A-7: Pre-Test Left Side View of Test Vehicle

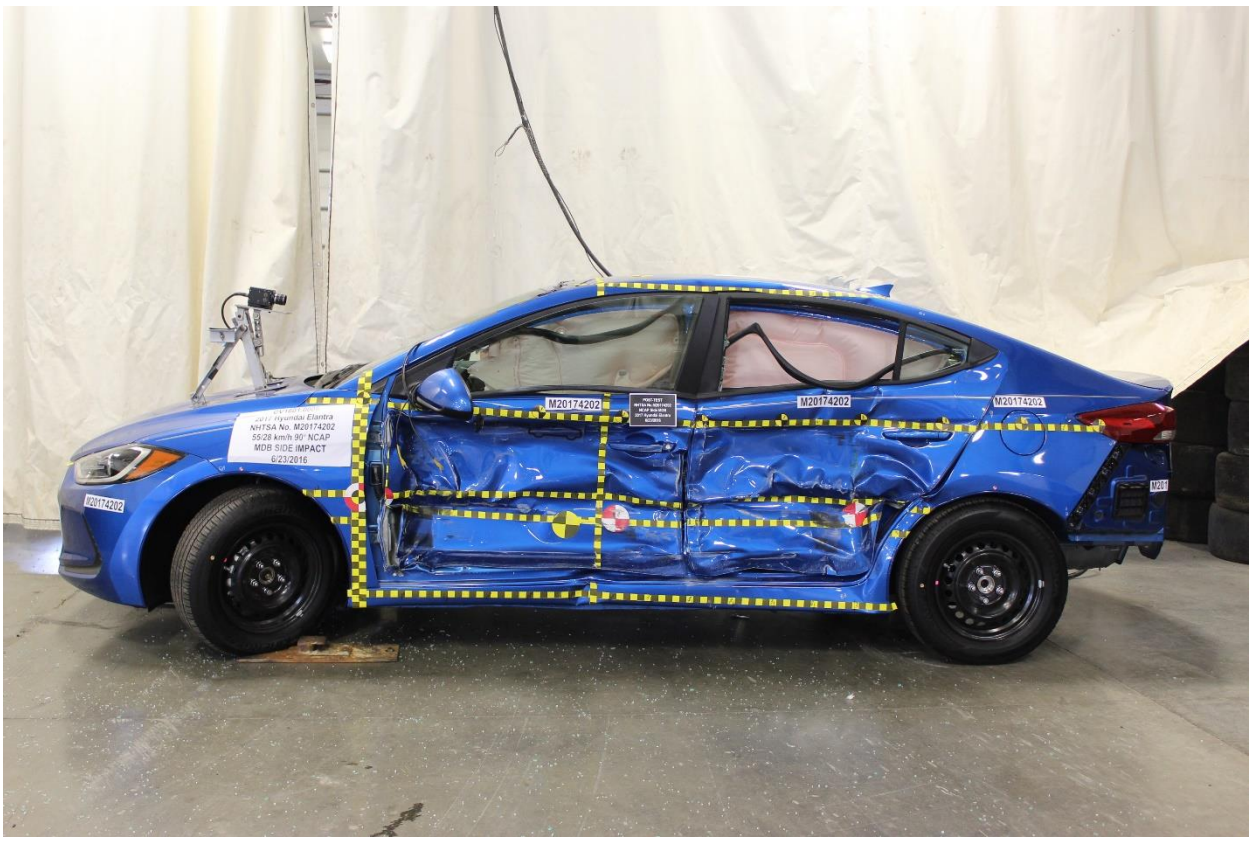


Figure A-8: Post-Test Left Side View of Test Vehicle

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

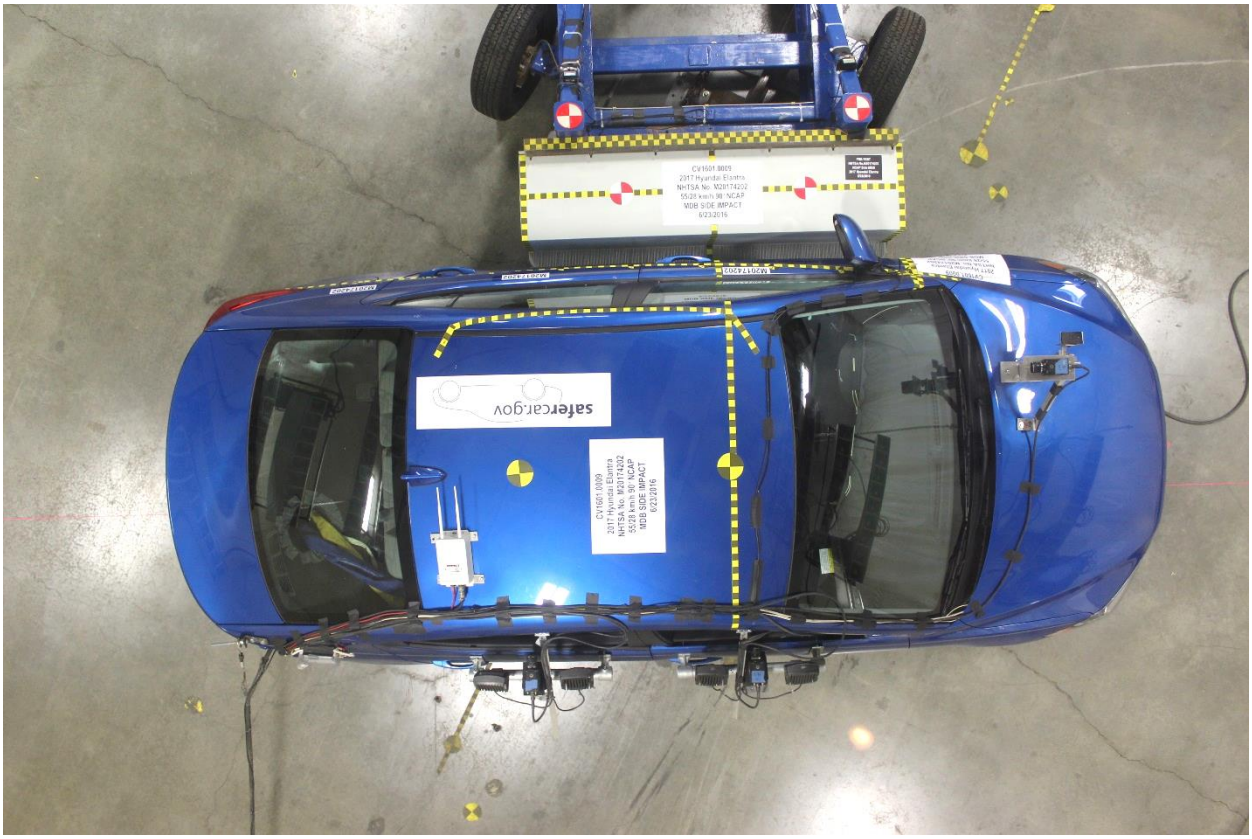


Figure A-15: Pre-Test Overhead View of the Test Area

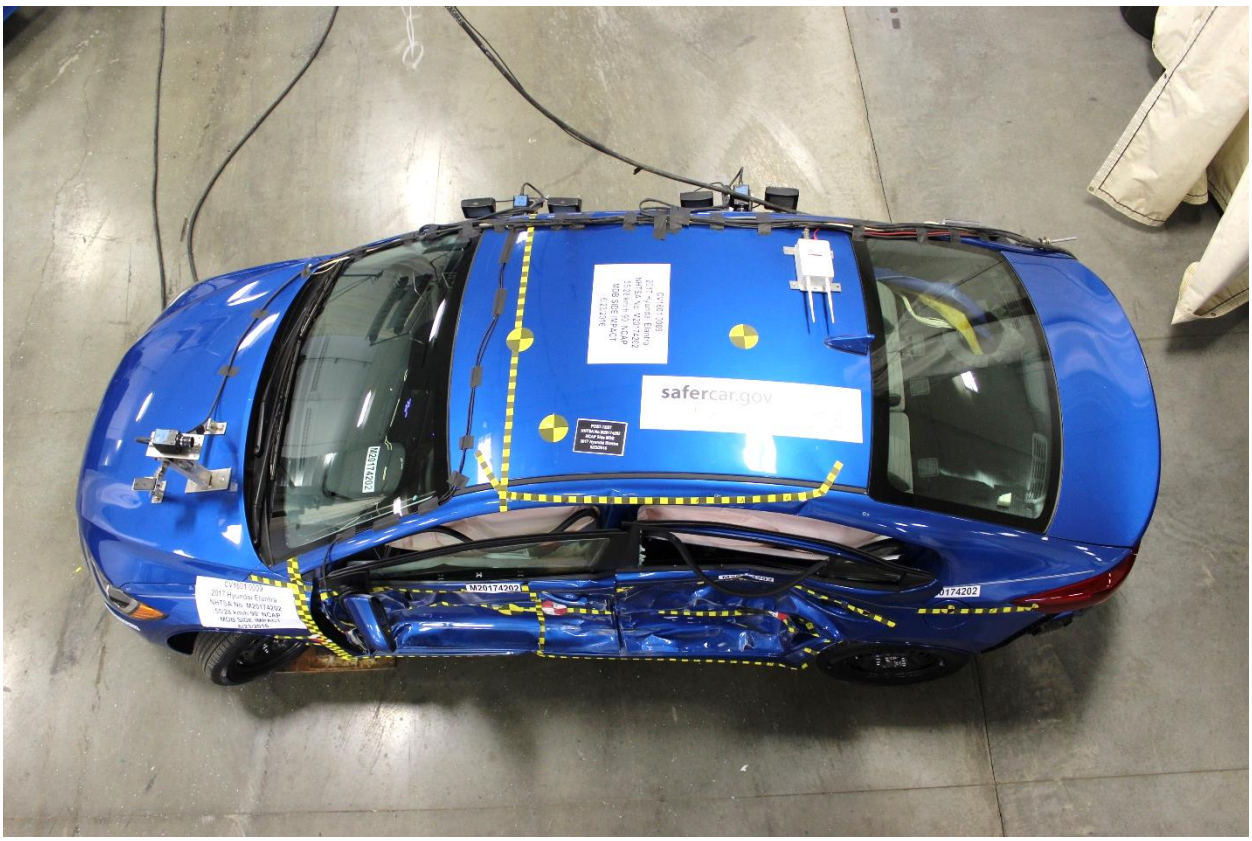


Figure A-16: Post-Test Overhead View of Test Area

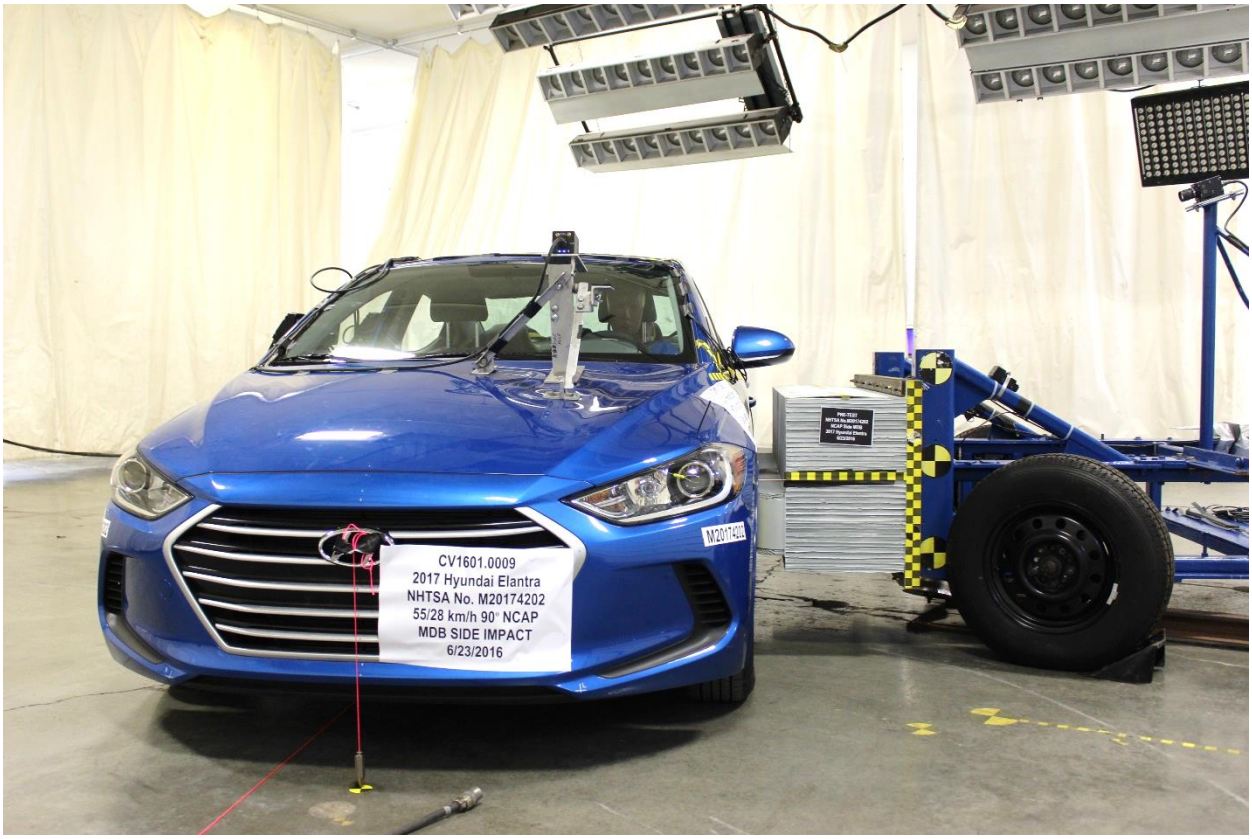


Figure A-17: Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle

Figure A-18: Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle

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

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

Figure A-21: Pre-Test Left Front Door Latch Close-Up

Figure A-22: Post-Test Left Front Door Latch Close-Up

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

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

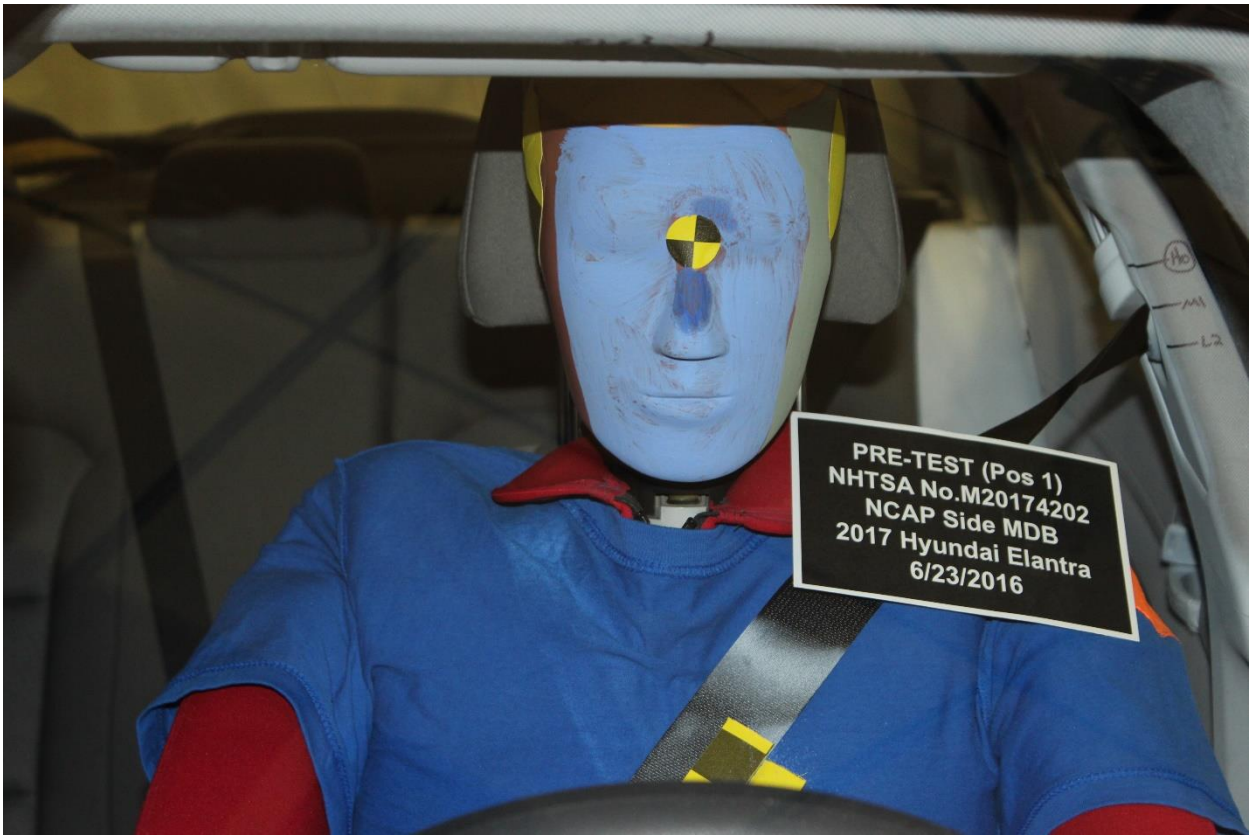


Figure A-25: Pre-Test Front Close-up View of Driver Dummy

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

Figure A-29: Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

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

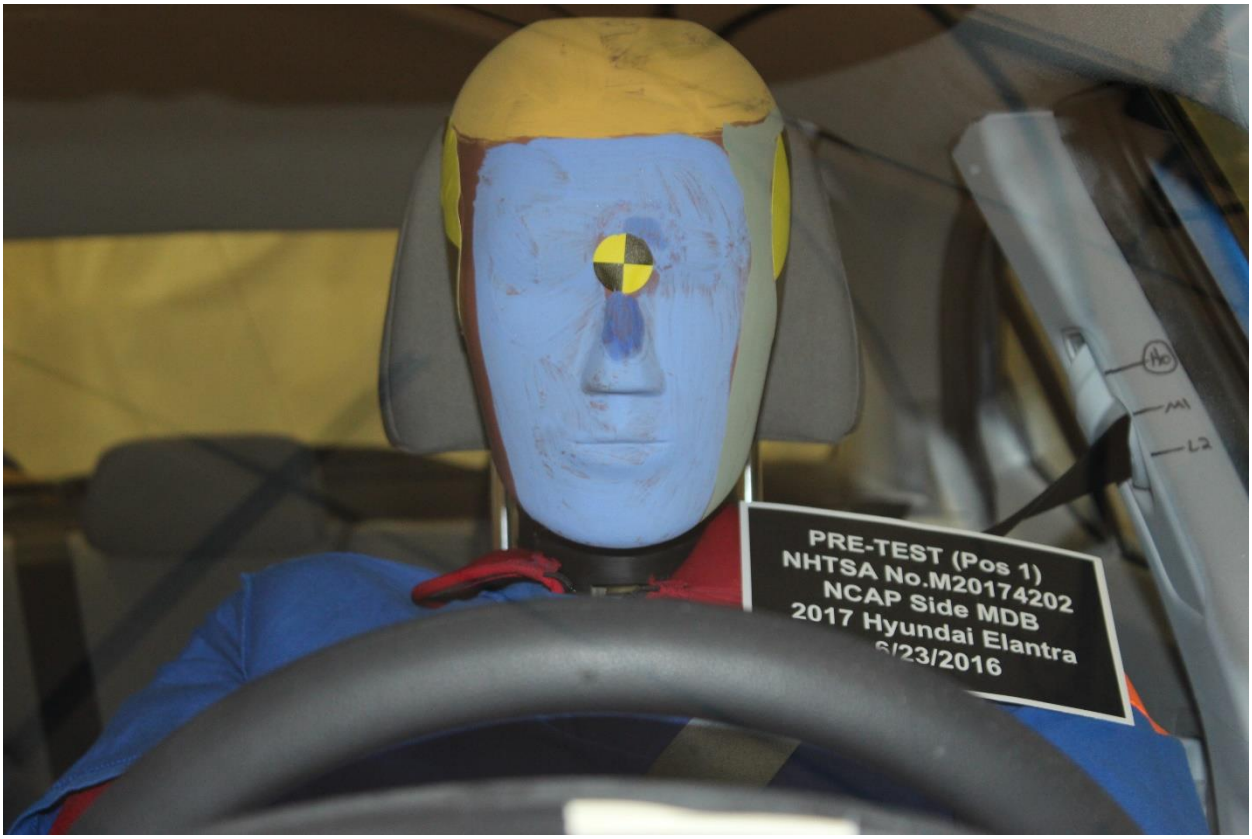


Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

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

Figure A-33: Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

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

Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy

Figure A-36: Pre-Test Left Side View of Steering Wheel

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

Figure A-42: Pre-Test Driver Dummy and Door Clearance View

Figure A-43: Post-Test Driver Dummy and Door Clearance View

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

Figure A-45: Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

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

Figure A-47: Post-Test Driver Inner Door Panel View

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

Figure A-49: Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View

Figure A-50: Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View

Figure A-51: Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact View

Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View

Figure A-55: Pre-Test Left Side View of Passenger Dummy Showing Belt and Chalking

Figure A-56: Pre-Test Left Side View of Passenger Dummy Shoulder and Door Top View

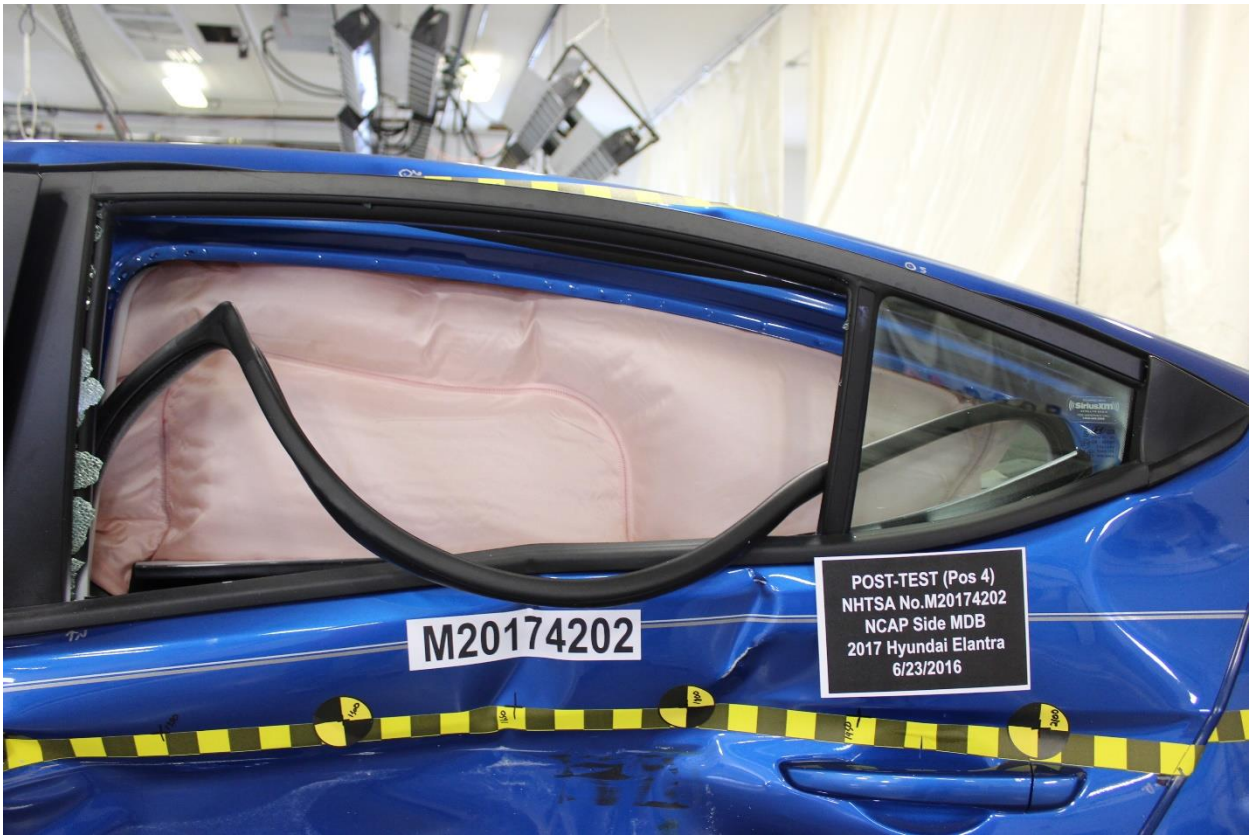


Figure A-57: Post-Test Left Side View of Passenger Dummy Shoulder and Door Top View

Figure A-58: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

Figure A-60: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

Figure A-61: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

Figure A-63: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level

Figure A-64: Pre-Test Placement of Rear Passenger Dummy's Feet

Figure A-65: Pre-Test View of Belt Anchorage for Rear Passenger Dummy

Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

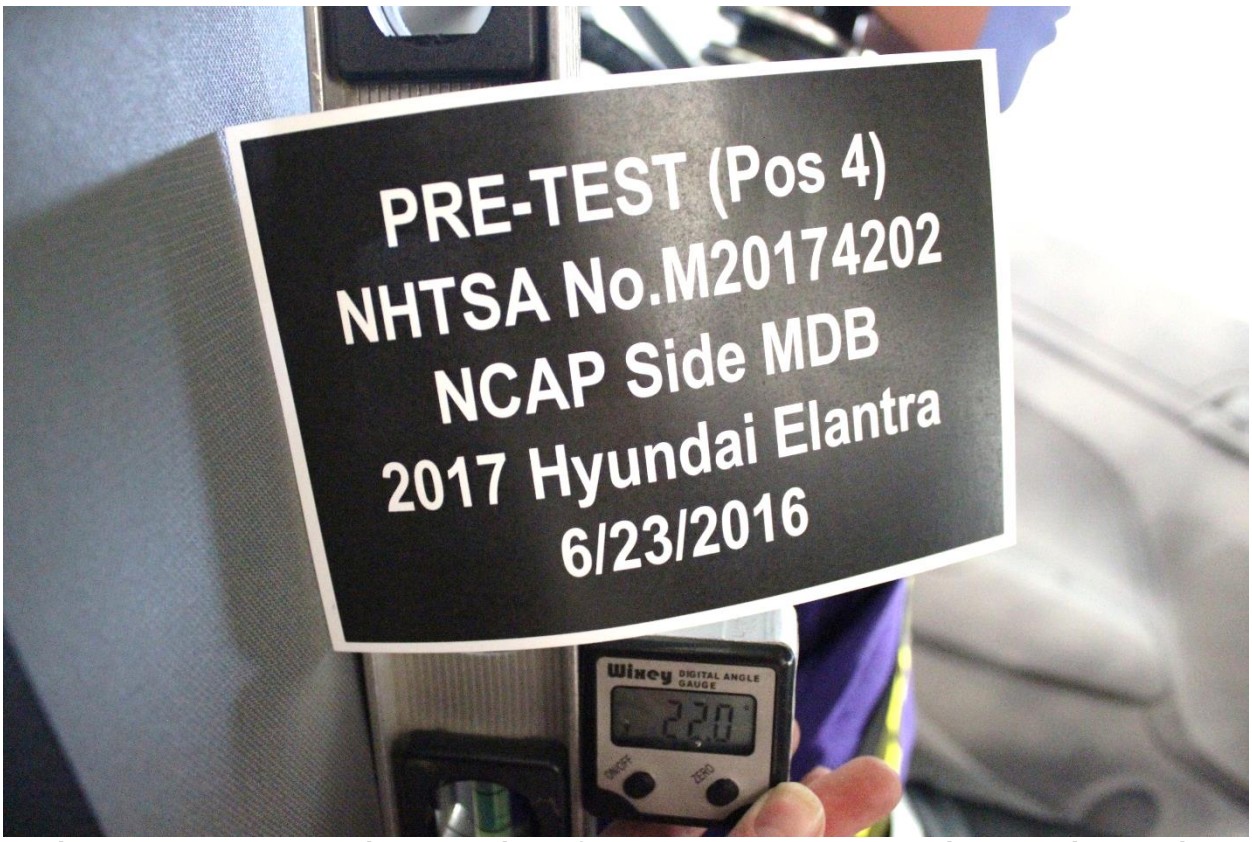


Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

Figure A-69: Pre-Test Passenger Dummy and Door Clearance View

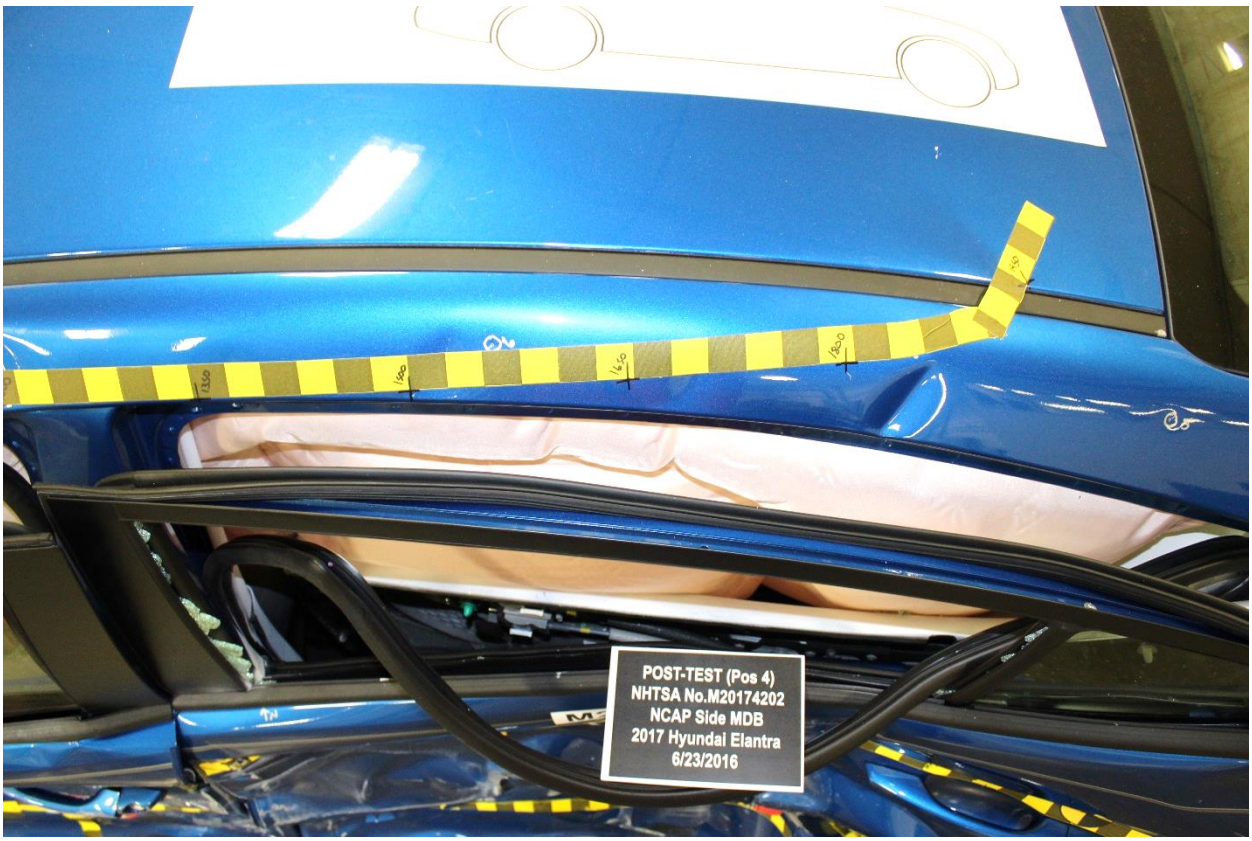


Figure A-70: Post-Test Passenger Dummy and Door Clearance View

Figure A-71: Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Figure A-72: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

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

Figure A-74: Post-Test Passenger Inner Door Panel View

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 Airbag View

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

Photo Not Applicable

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

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

Photo Not Applicable

Figure A-80: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View

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

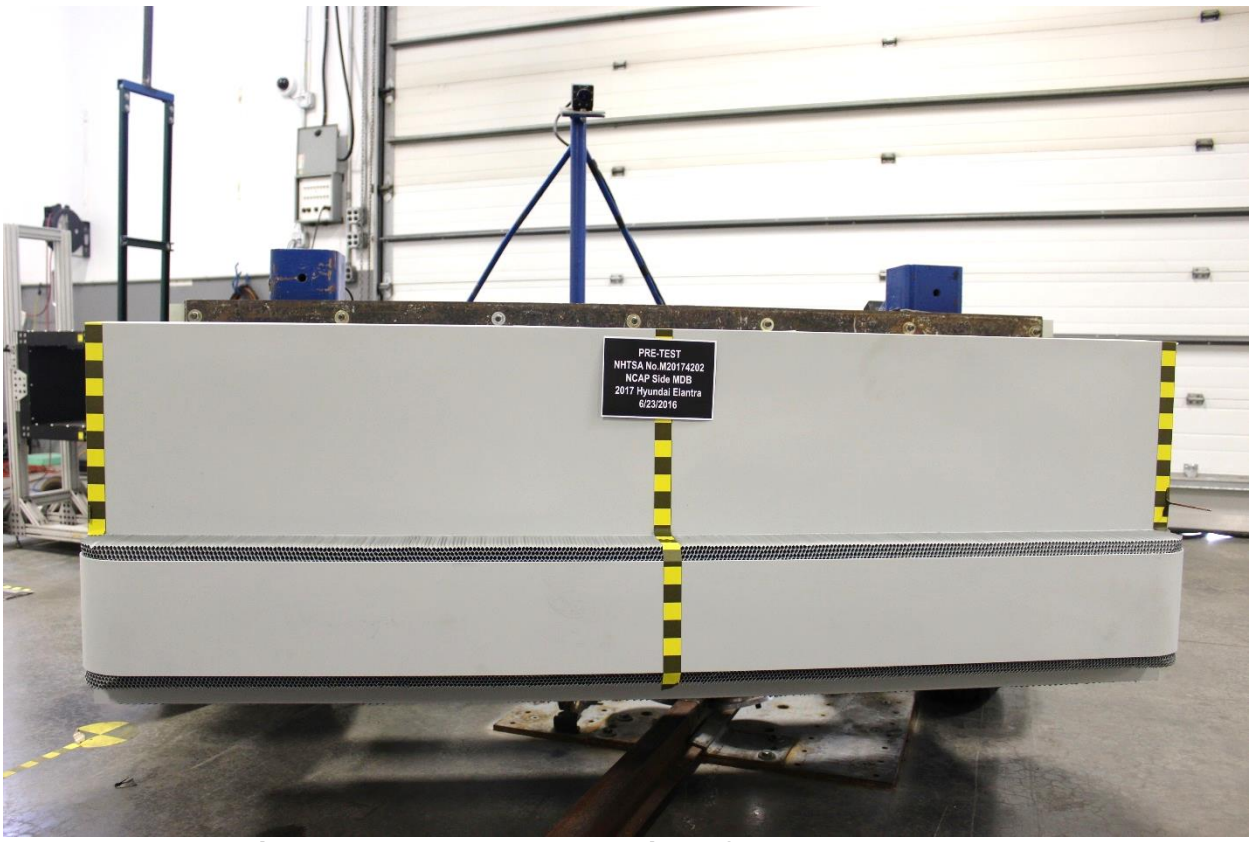


Figure A-84: Pre-Test Front View of MDB Impactor Face

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

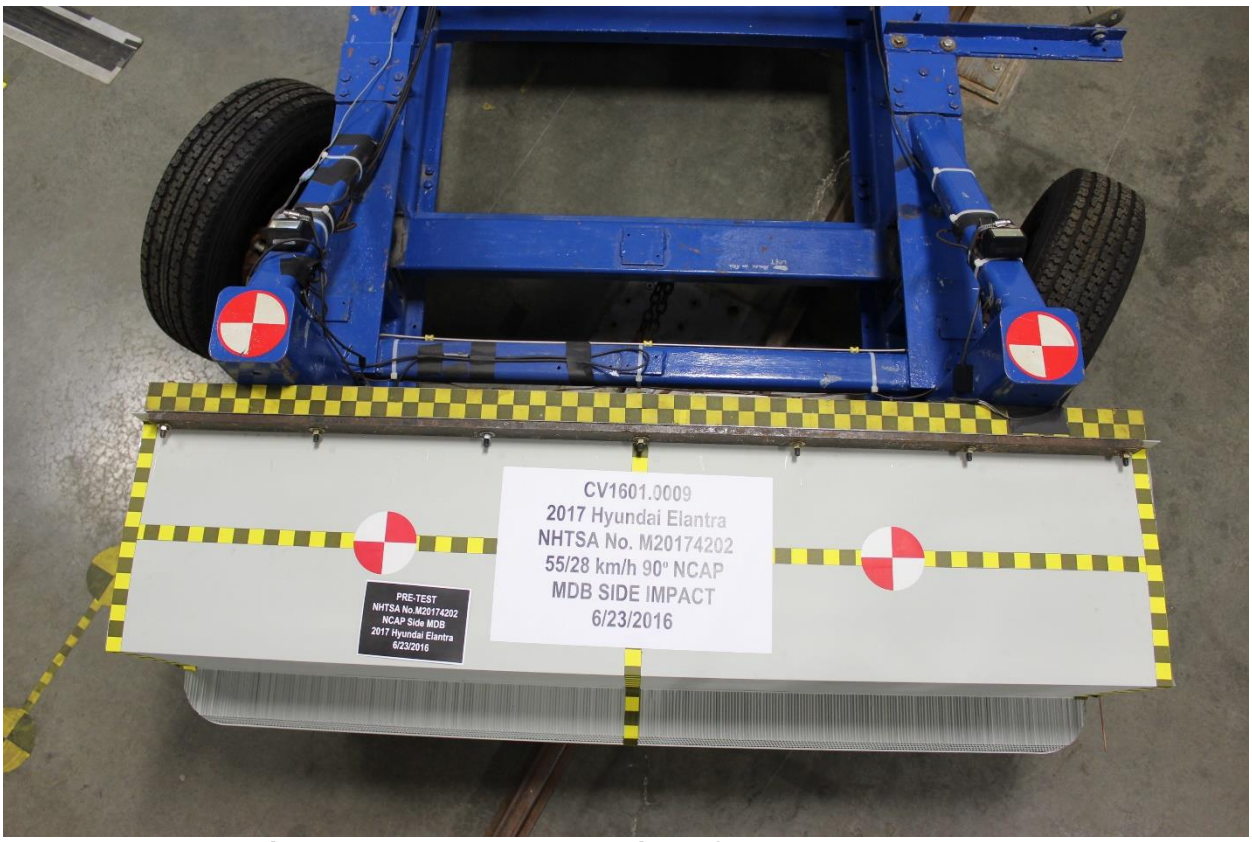


Figure A-86: Pre-Test Top View of MDB Impactor Face

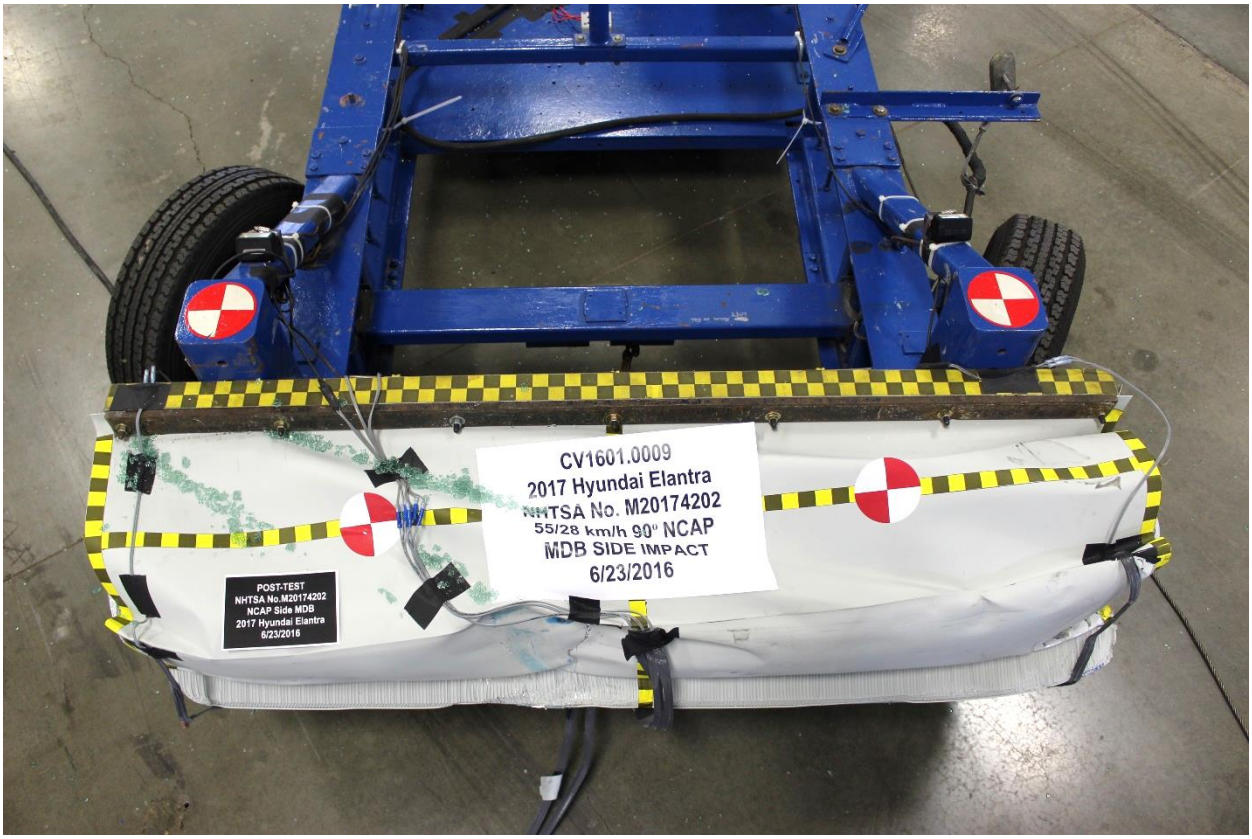


Figure A-87: Post-Test Top View of MDB Impactor Face

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

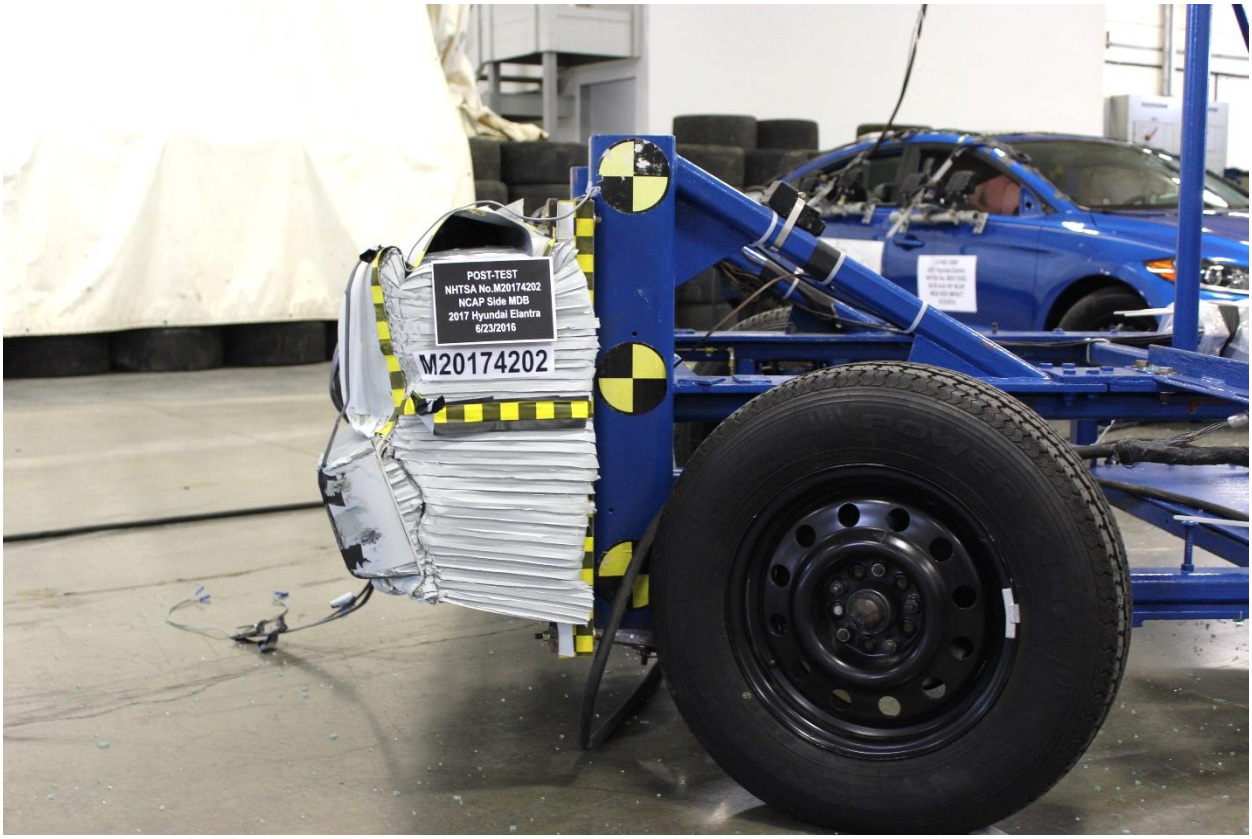


Figure A-89: Post-Test Left Side View of MDB Impactor Face

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

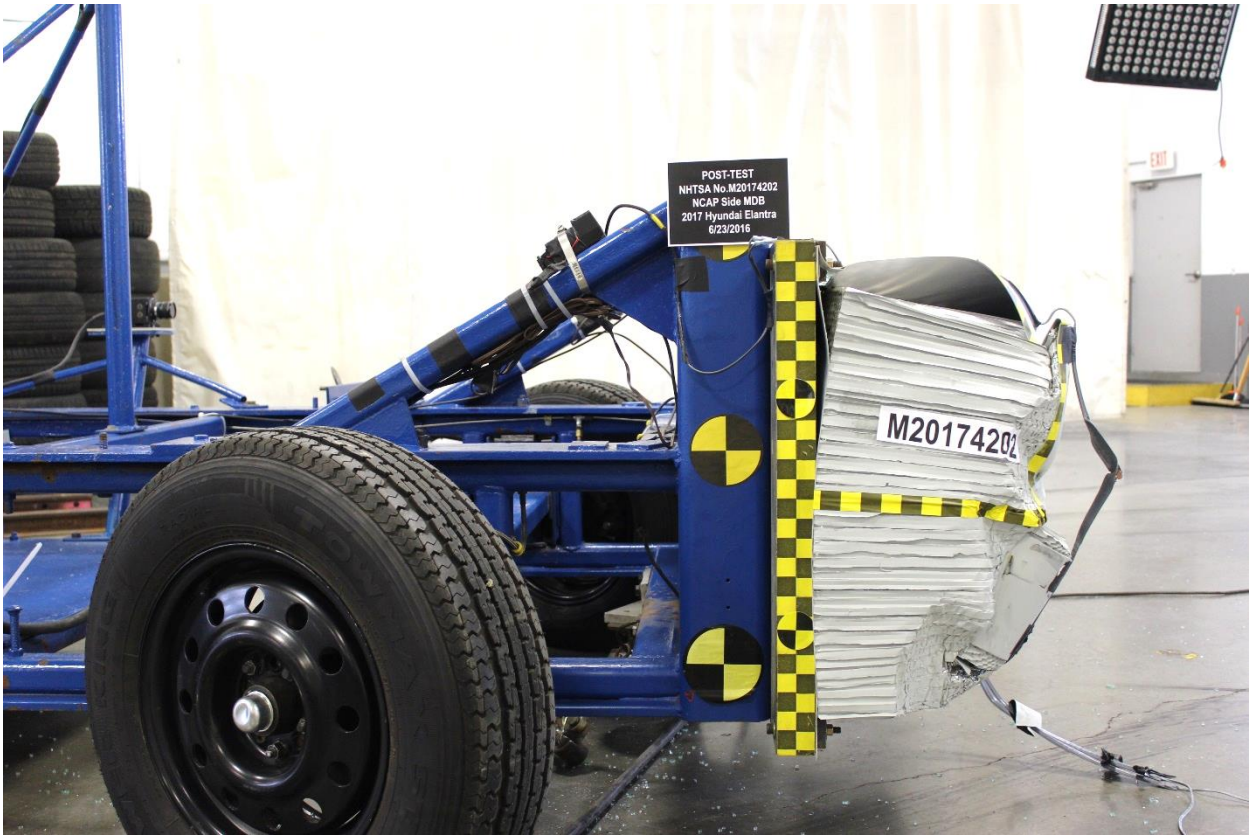


Figure A-91: Post-Test Right Side View of MDB Impactor Face

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

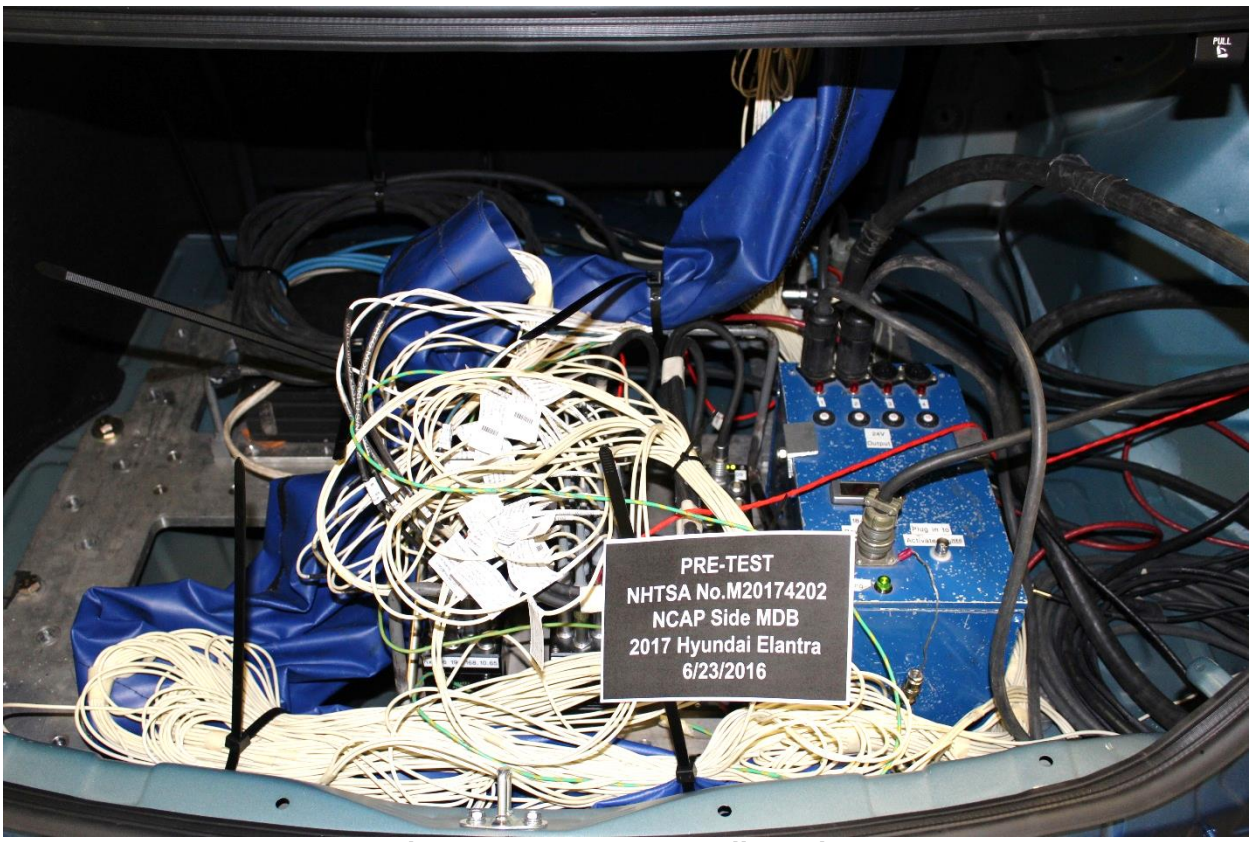


Figure A-94: Pre-Test Ballast View

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

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

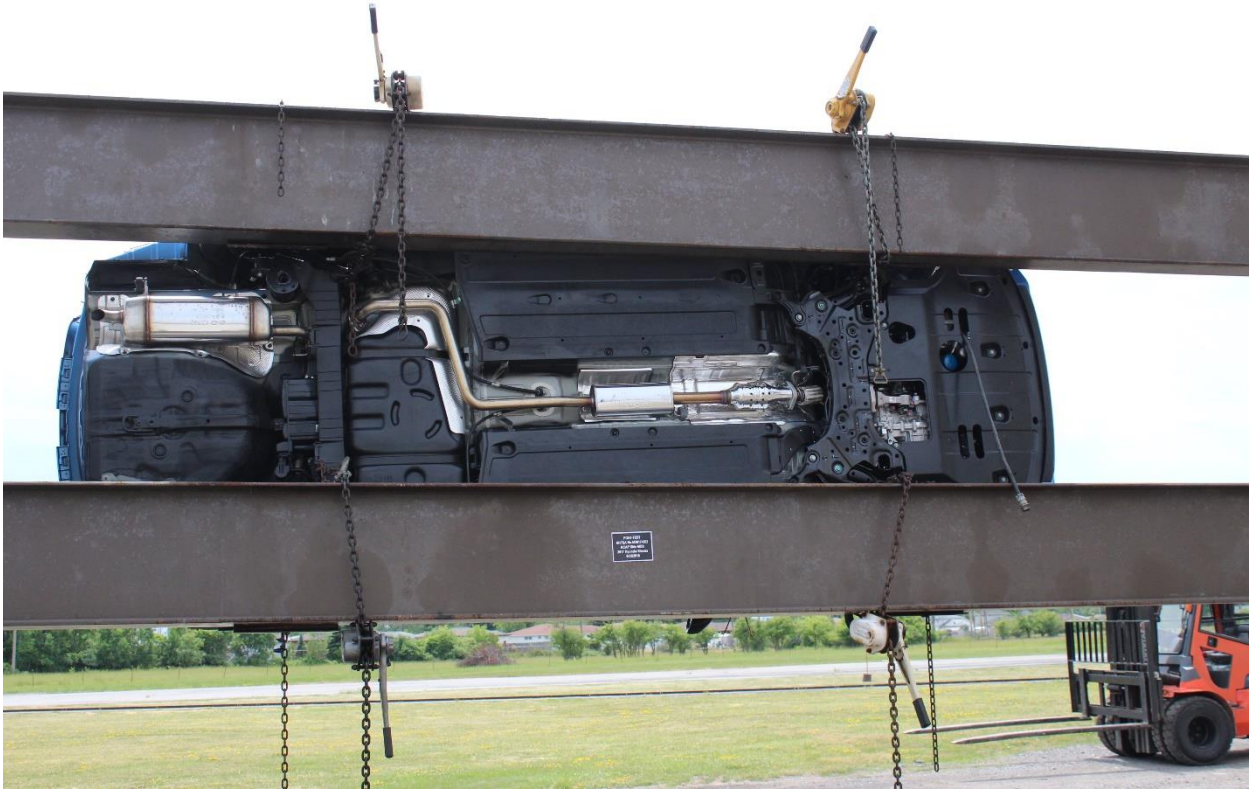


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

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

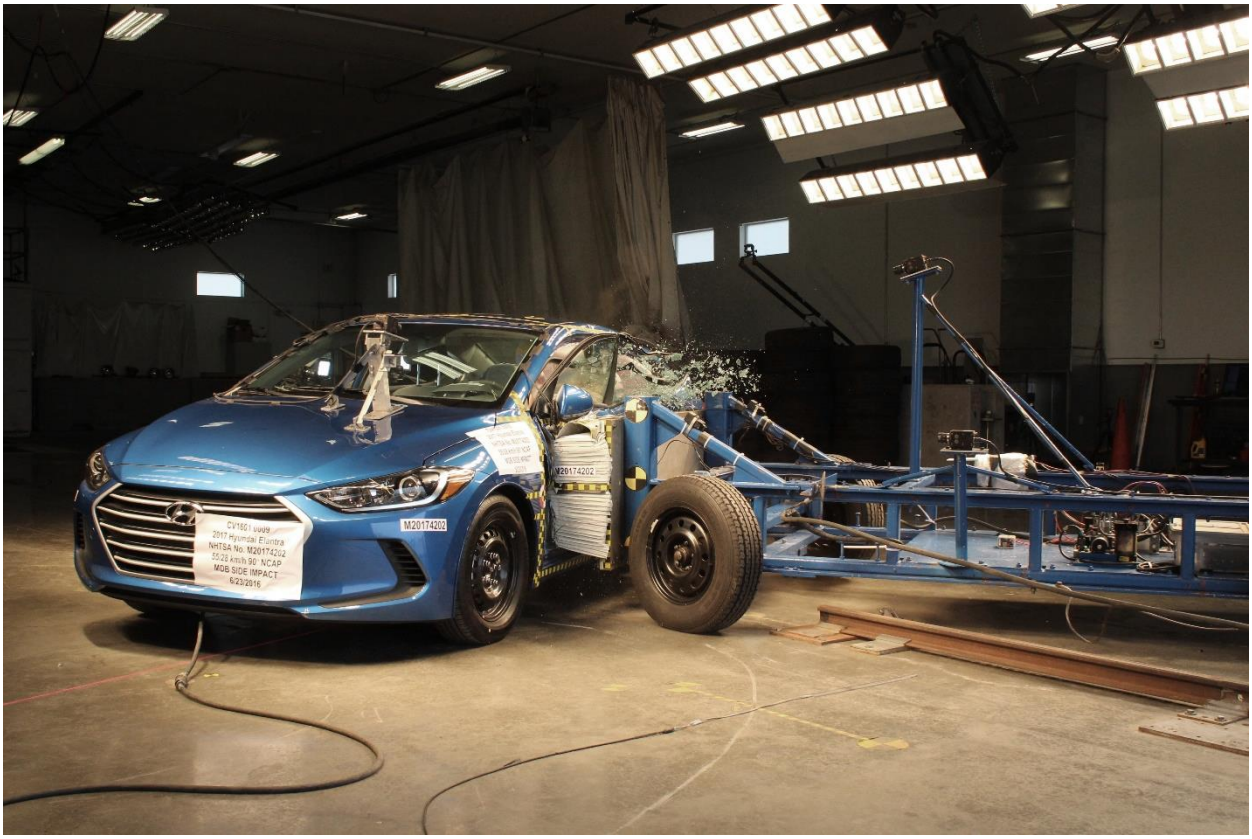


Figure A-101: Impact Event

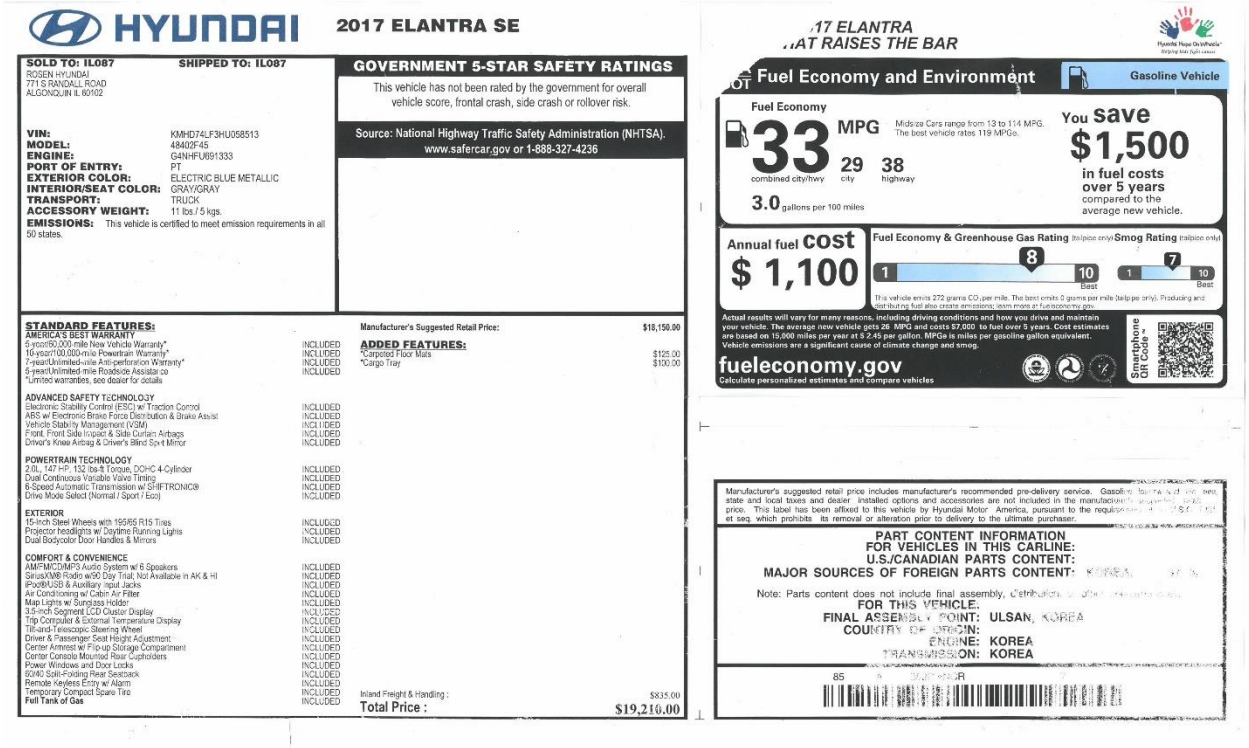
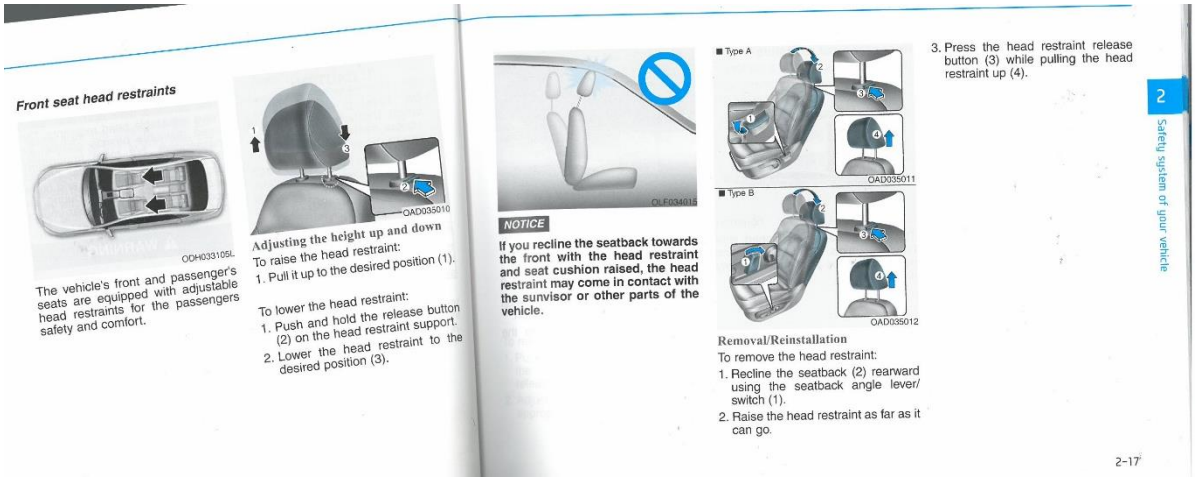


Figure A-102: Monroney Label



Front seat head restraints

ODH033105L

The vehicle's front and passenger's seats are equipped with adjustable head restraints for the passengers safety and comfort.

OAD035010

Adjusting the height up and down

To raise the head restraint:

1. Pull it up to the desired position (1).

To lower the head restraint:

1. Push and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

OLE034015

NOTICE

If you recline the seatback towards the front with the head restraint and seat cushion raised, the head restraint may come in contact with the sunvisor or other parts of the vehicle.

■ Type A

OAD035011

■ Type B

OAD035012

Removal/Reinstallation

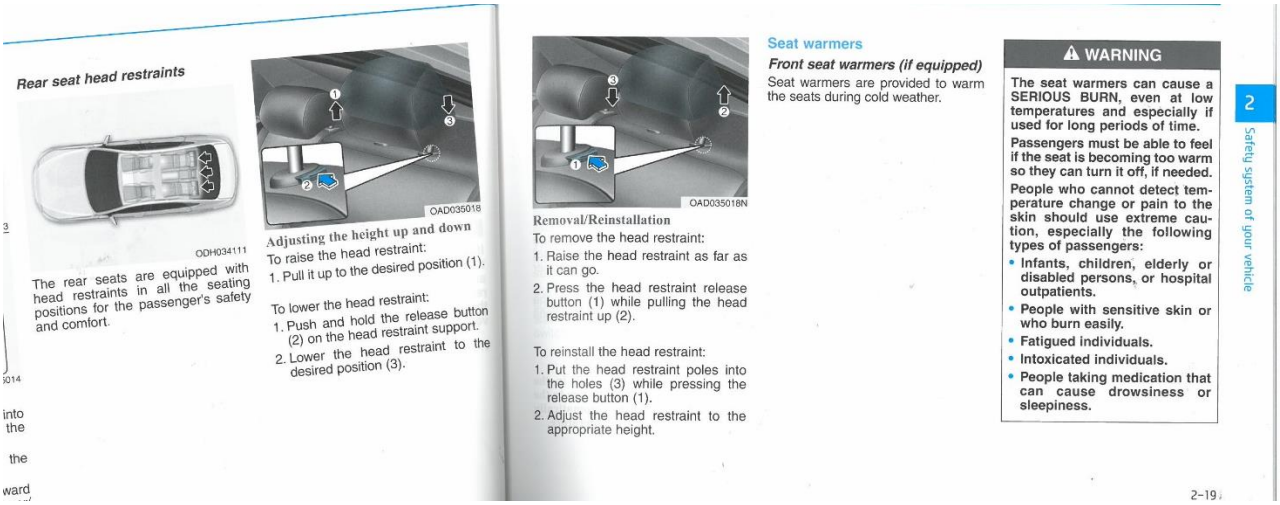
To remove the head restraint:

1. Recline the seatback (2) rearward using the seatback angle lever/ switch (1).
2. Raise the head restraint as far as it can go.
3. Press the head restraint release button (3) while pulling the head restraint up (4).

2 Safety system of your vehicle

2-17

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



Rear seat head restraints

ODH034111

The rear seats are equipped with head restraints in all the seating positions for the passenger's safety and comfort.

OAD035018

Adjusting the height up and down

To raise the head restraint:

1. Pull it up to the desired position (1).

To lower the head restraint:

1. Push and hold the release button (2) on the head restraint support.
2. Lower the head restraint to the desired position (3).

OAD035018N

Removal/Reinstallation

To remove the head restraint:

1. Raise the head restraint as far as it can go.
2. Press the head restraint release button (1) while pulling the head restraint up (2).

To reinstall the head restraint:

1. Put the head restraint poles into the holes (3) while pressing the release button (1).
2. Adjust the head restraint to the appropriate height.

Seat warmers

Front seat warmers (if equipped)

Seat warmers are provided to warm the seats during cold weather.

⚠ WARNING

The seat warmers can cause a SERIOUS BURN, even at low temperatures and especially if used for long periods of time.

Passengers must be able to feel if the seat is becoming too warm so they can turn it off, if needed.

People who cannot detect temperature change or pain to the skin should use extreme caution, especially the following types of passengers:

- **Infants, children, elderly or disabled persons, or hospital outpatients.**
- **People with sensitive skin or who burn easily.**
- **Fatigued individuals.**
- **Intoxicated individuals.**
- **People taking medication that can cause drowsiness or sleepiness.**

2 Safety system of your vehicle

2-19

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

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.dot.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)

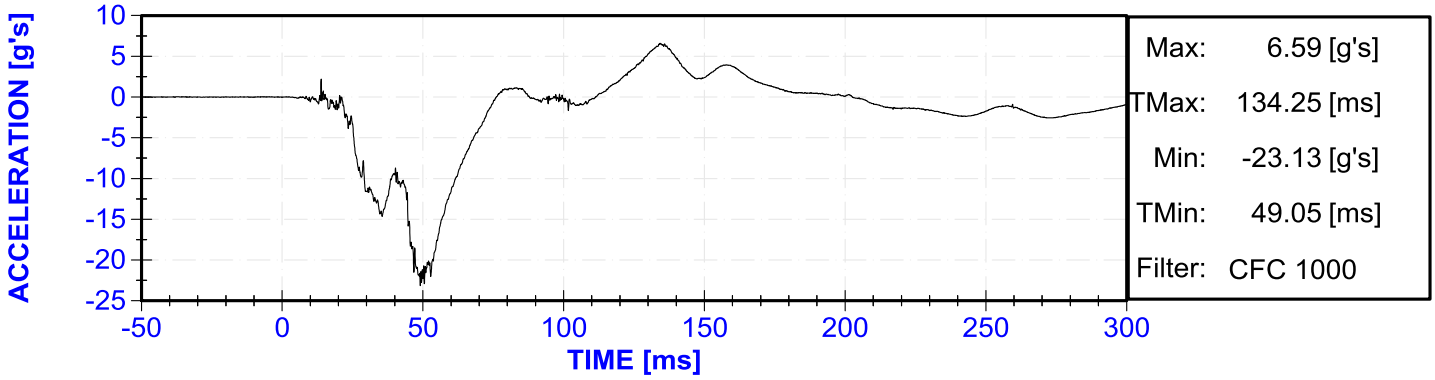
Vehicle Instrumentation Data

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)

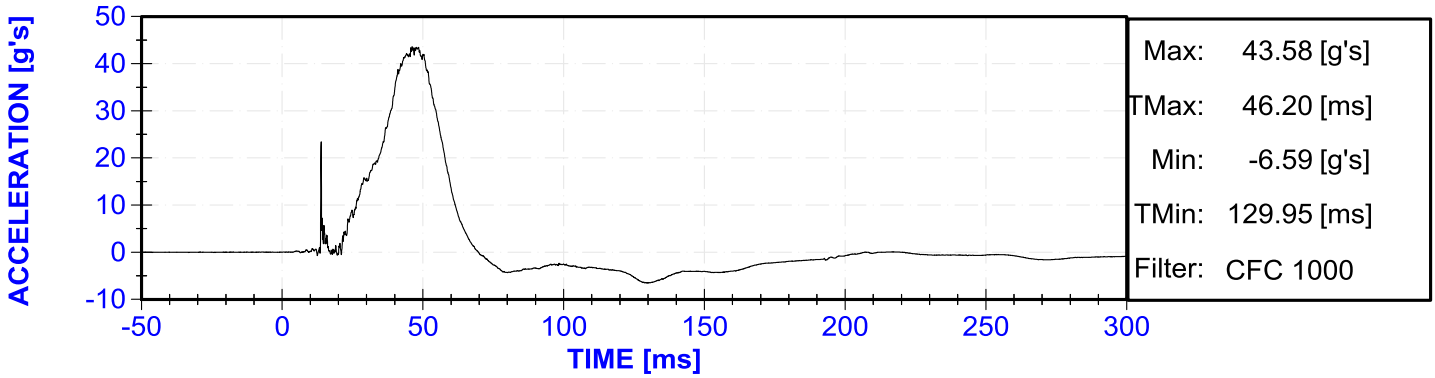
MDB Instrumentation Data

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

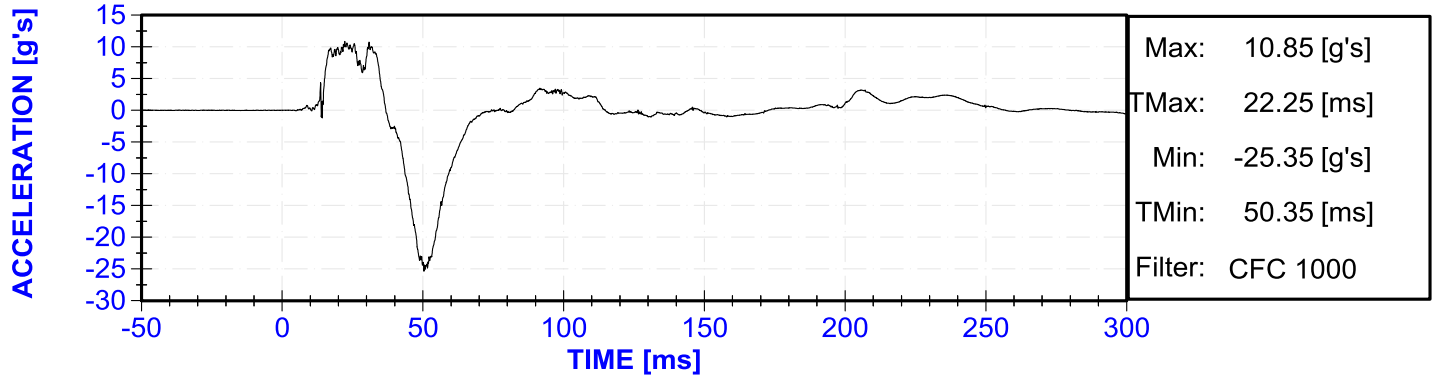
Driver Head Acceleration (X) Primary vs. Time



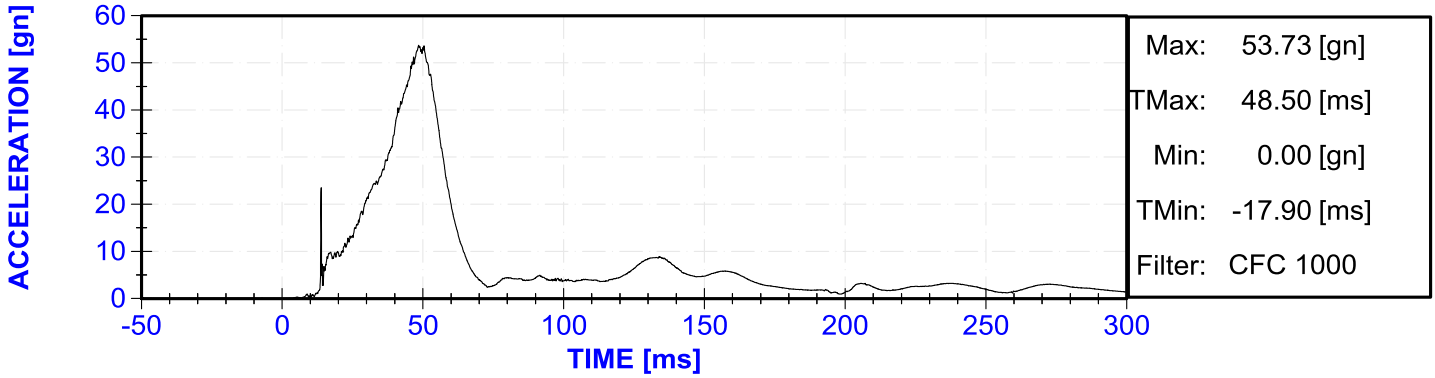
Driver Head Acceleration (Y) Primary vs. Time



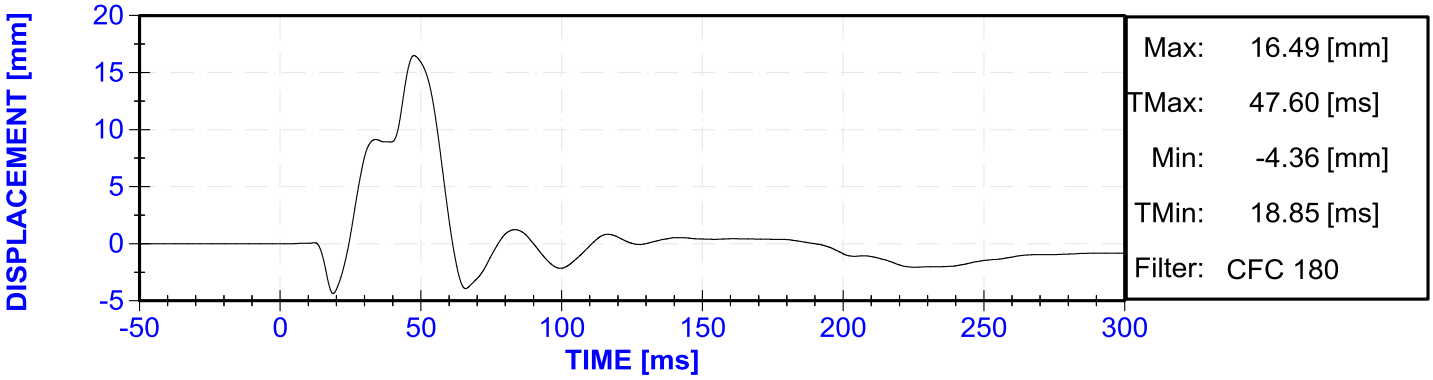
Driver Head Acceleration (Z) Primary vs. Time



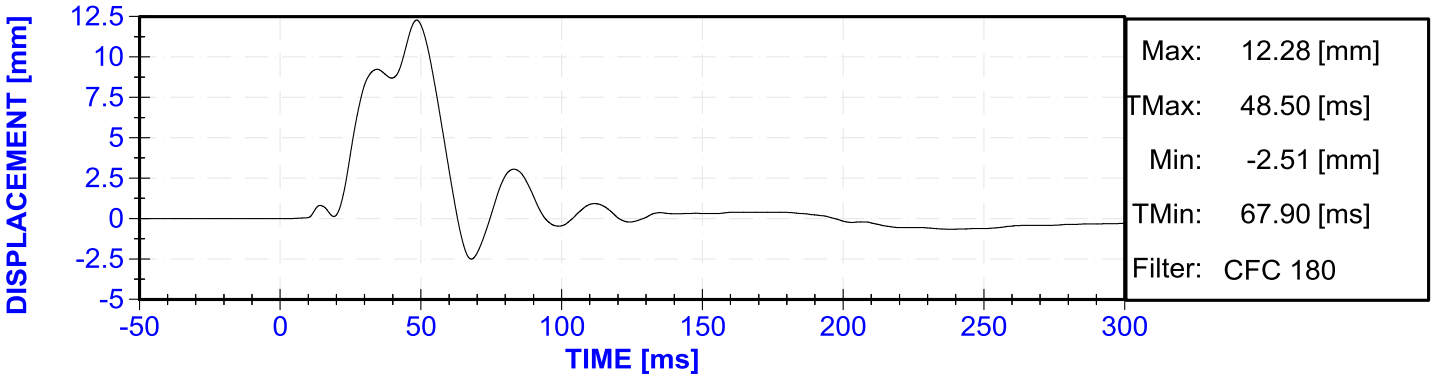
Driver Head Resultant Acceleration Primary vs. Time



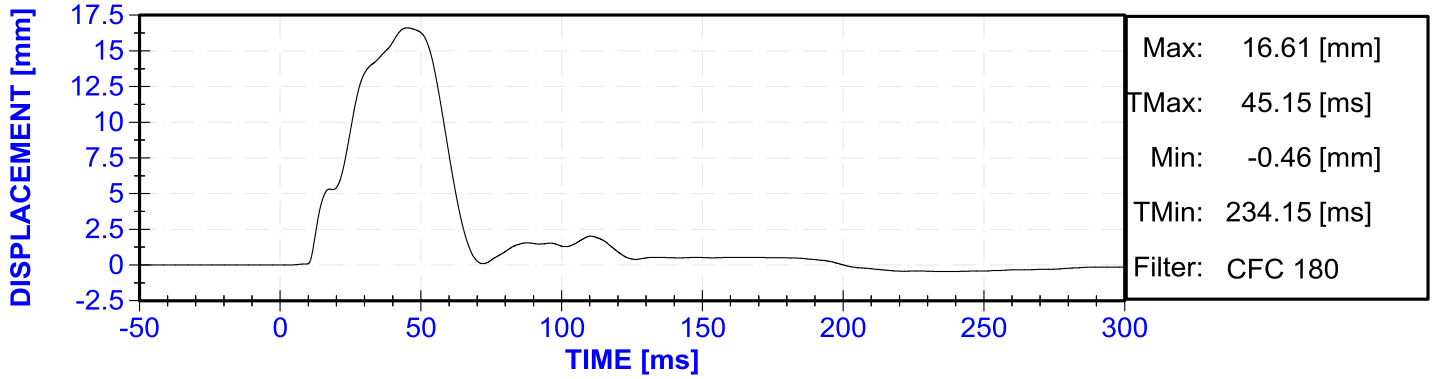
Driver Upper Thorax Rib Deflection (Y) vs. Time



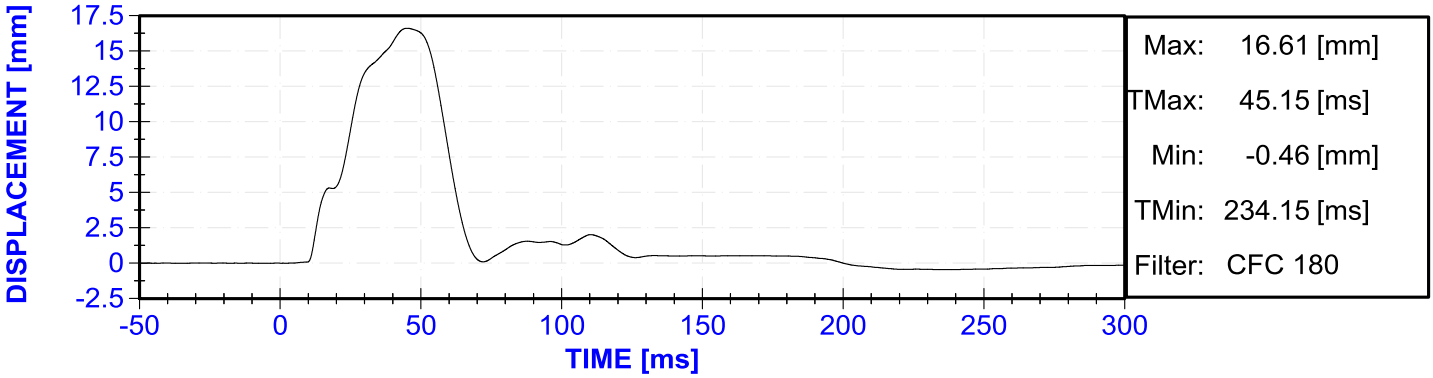
Driver Middle Thorax Rib Deflection (Y) vs. Time



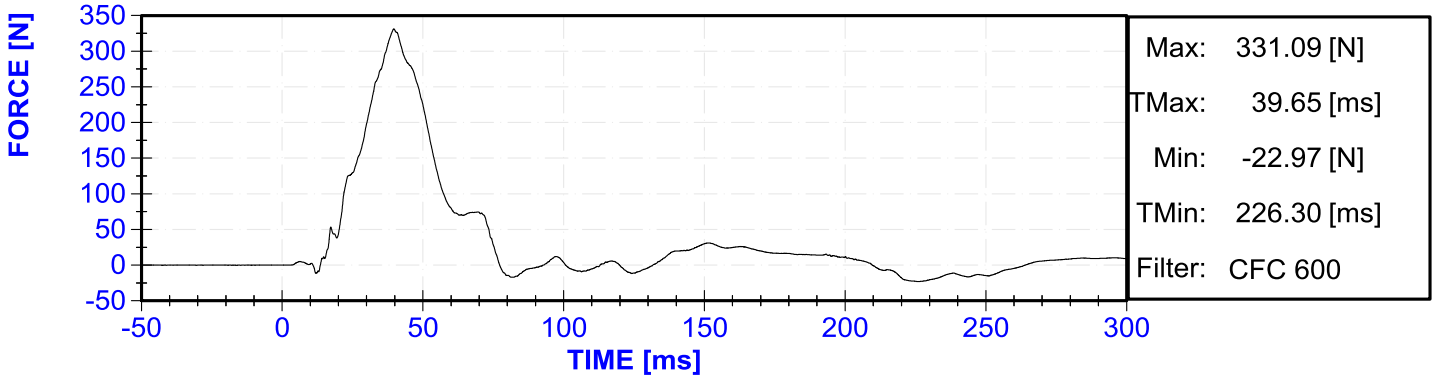
Driver Lower Thorax Rib Deflection (Y) vs. Time



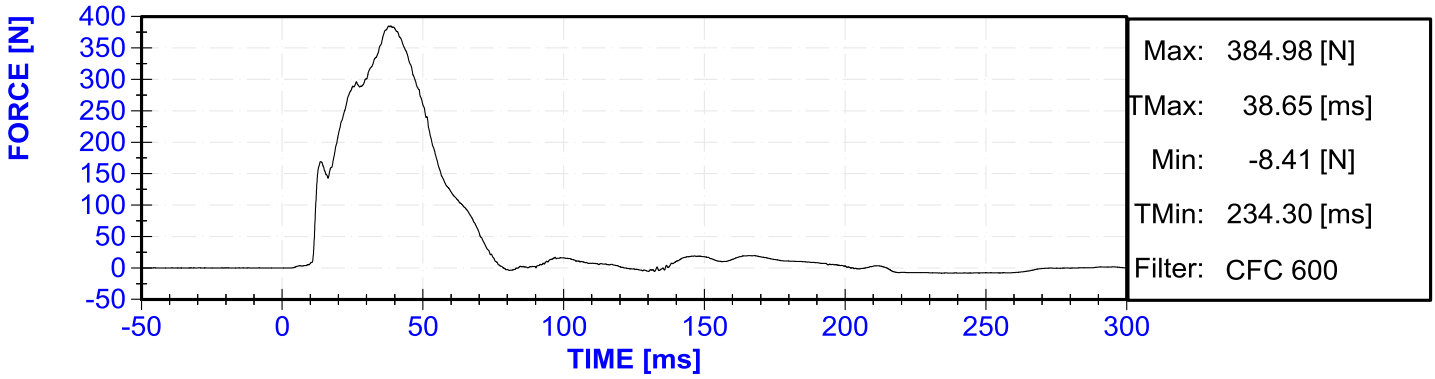
Driver Thorax Rib Deflection Maximum vs. Time



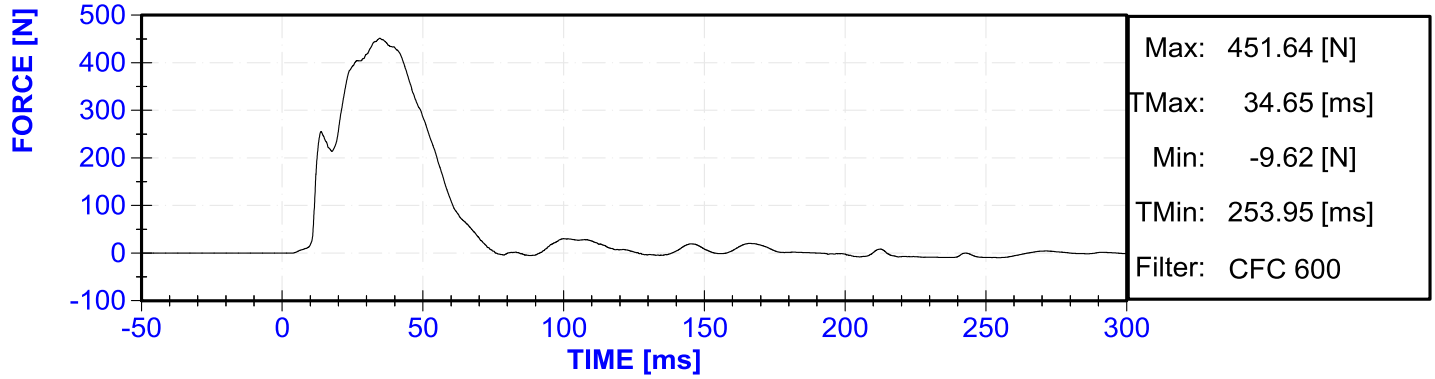
Driver Anterior Abdominal Force (Y) vs. Time



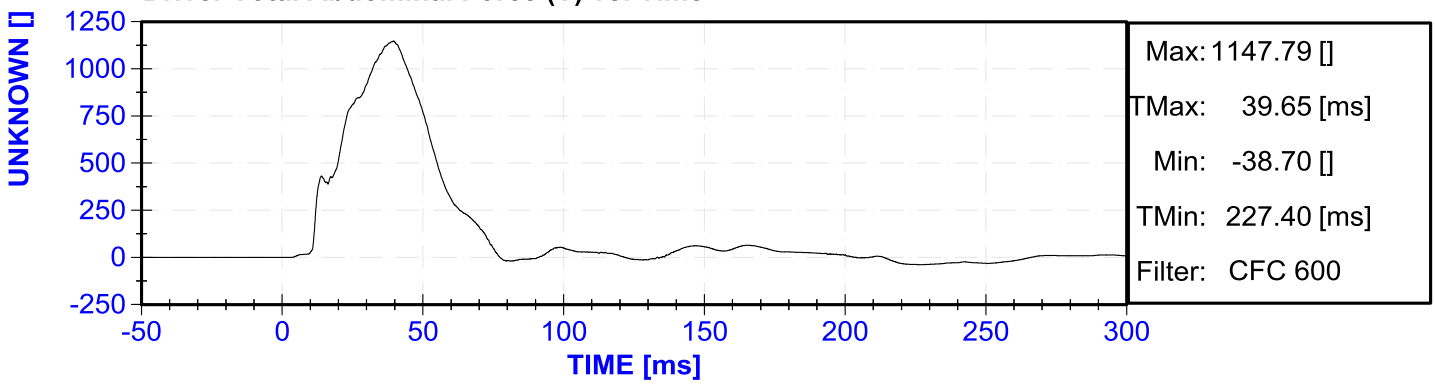
Driver Middle Abdominal Force (Y) vs. Time



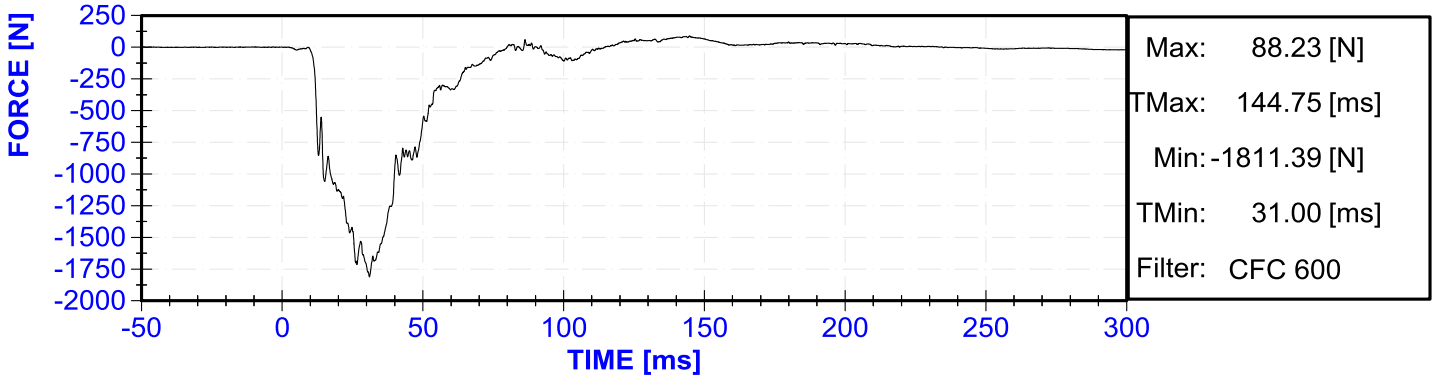
Driver Posterior Abdominal Force (Y) vs. Time



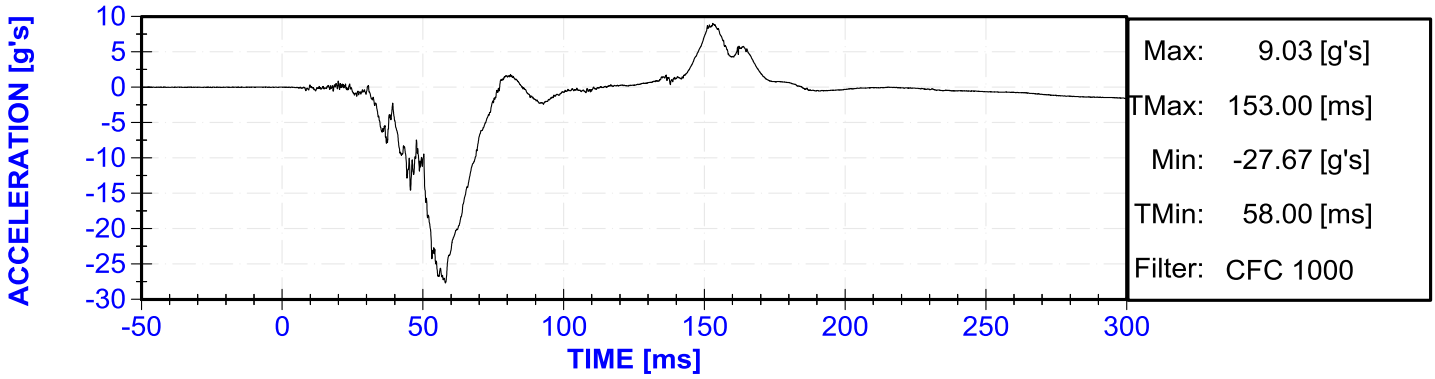
Driver Total Abdominal Force (Y) vs. Time



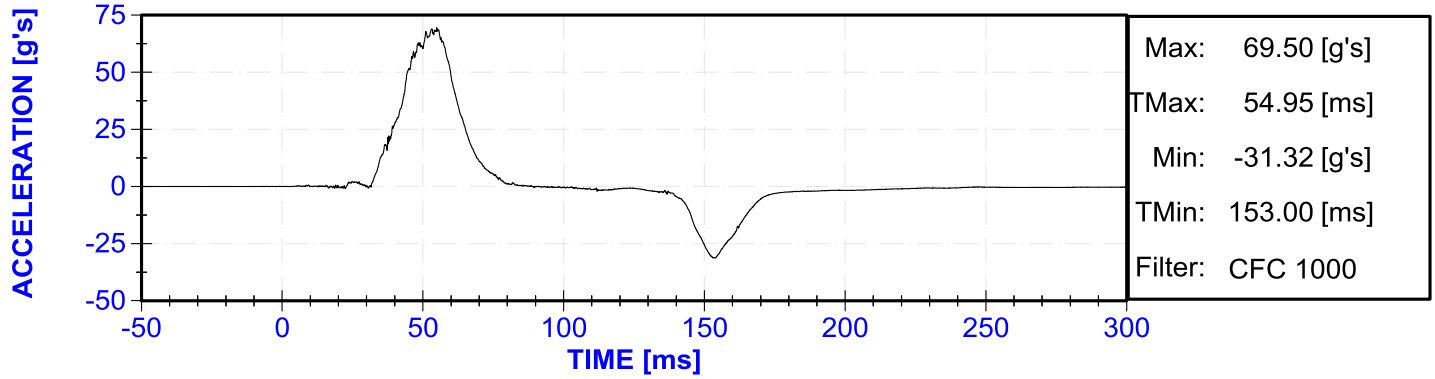
Driver Pubic Symphysis Force (Y) vs. Time



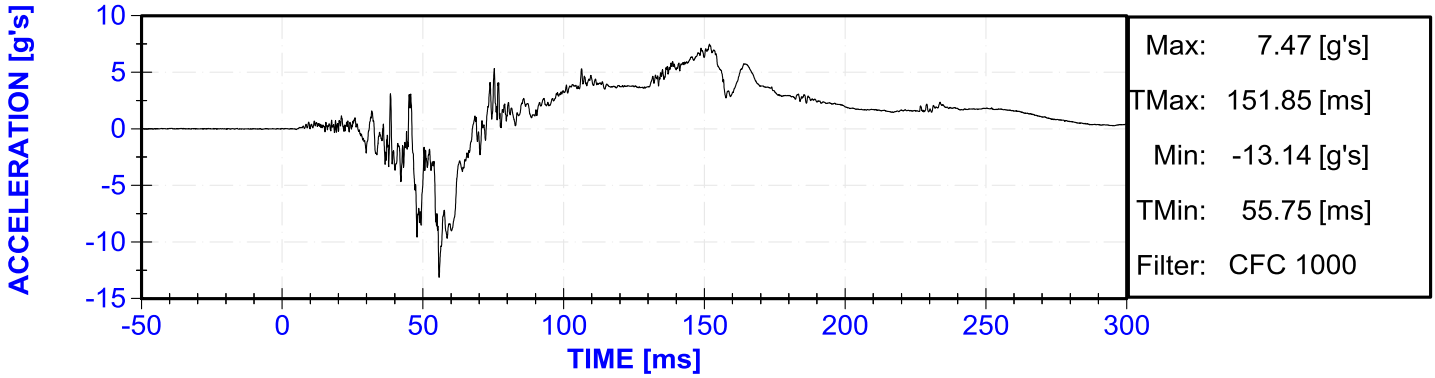
Passenger Head Acceleration (X) vs. Time Primary



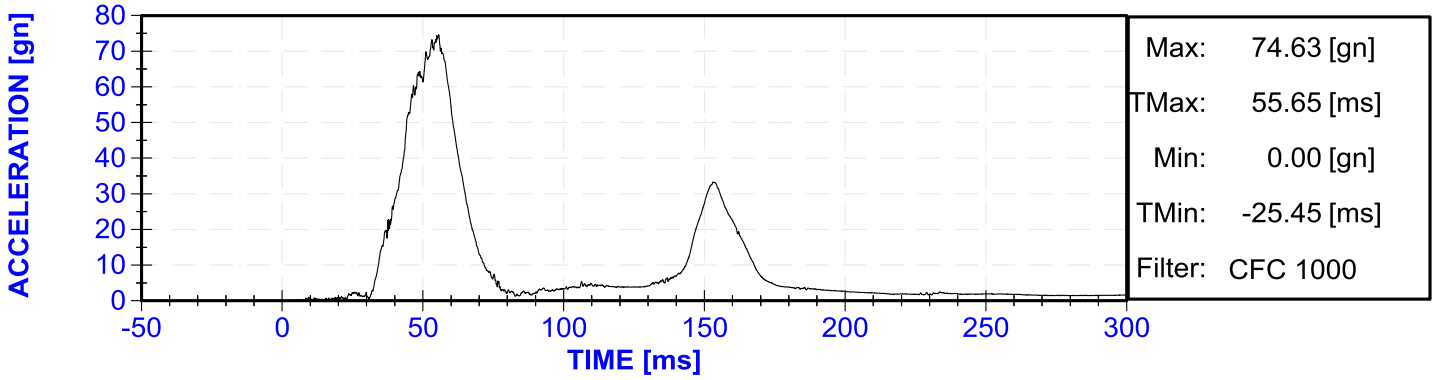
Passenger Head Acceleration (Y) vs. Time Primary



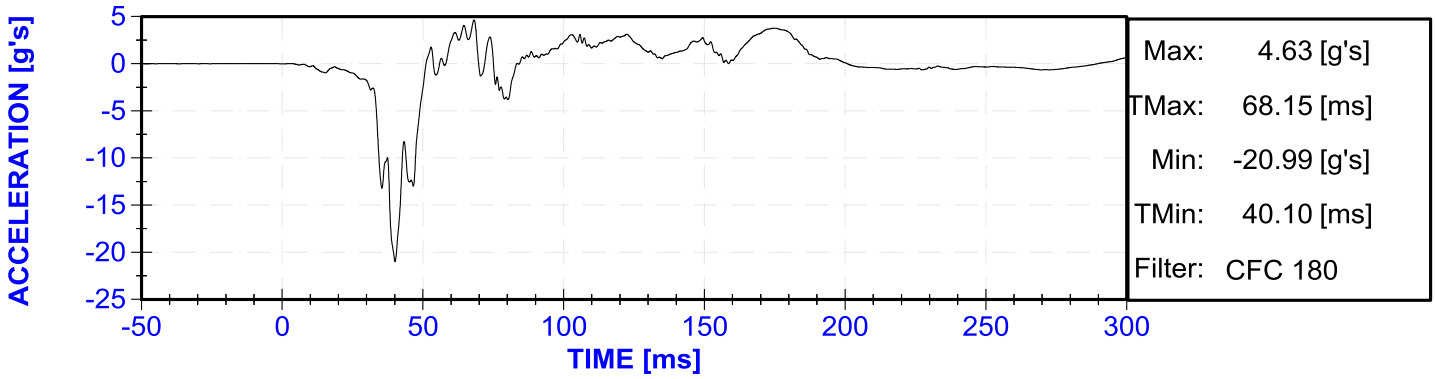
Passenger Head Acceleration (Z) vs. Time Primary



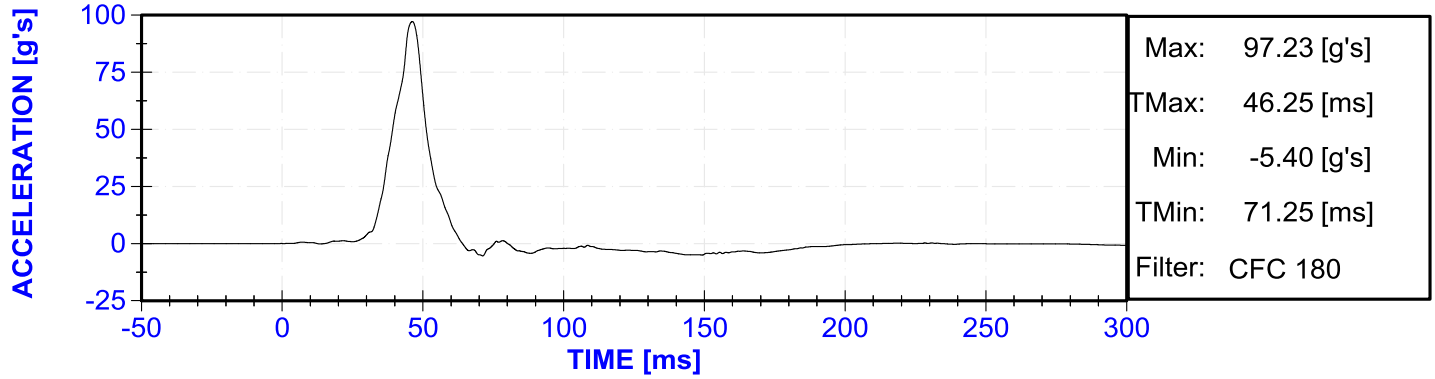
Passenger Head Resultant Acceleration Primary vs. Time



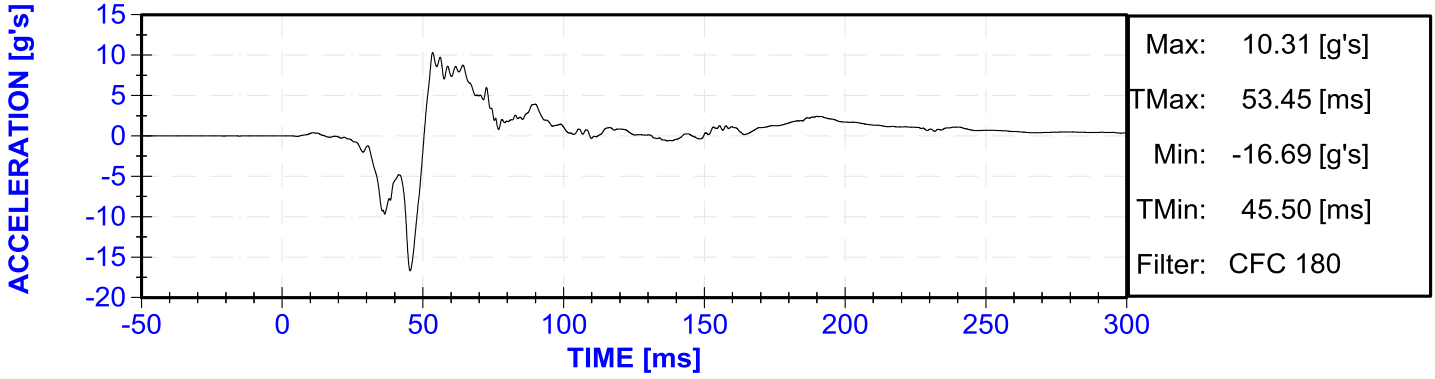
Passenger Lower Spine T12 Acceleration (X) vs. Time



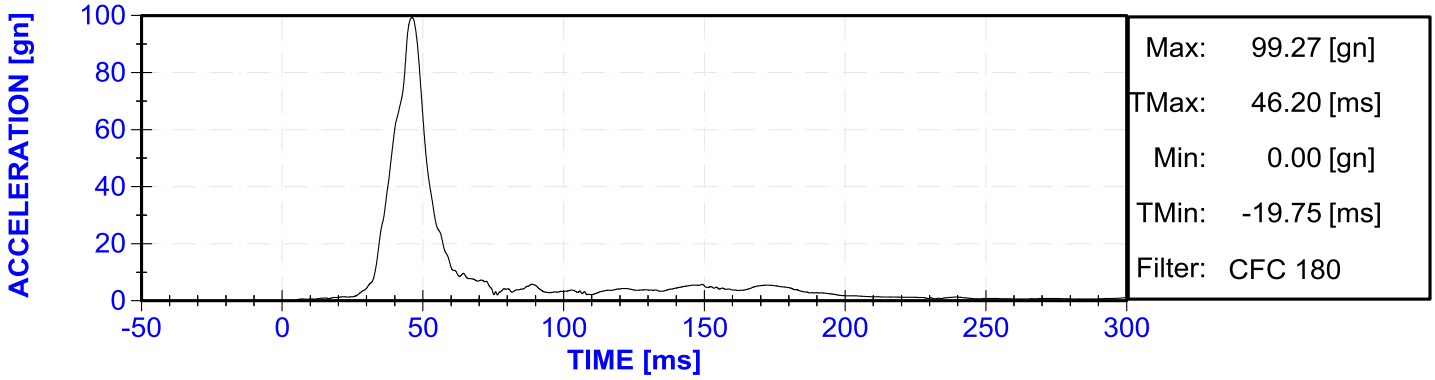
Passenger Lower Spine T12 Acceleration (Y) vs. Time



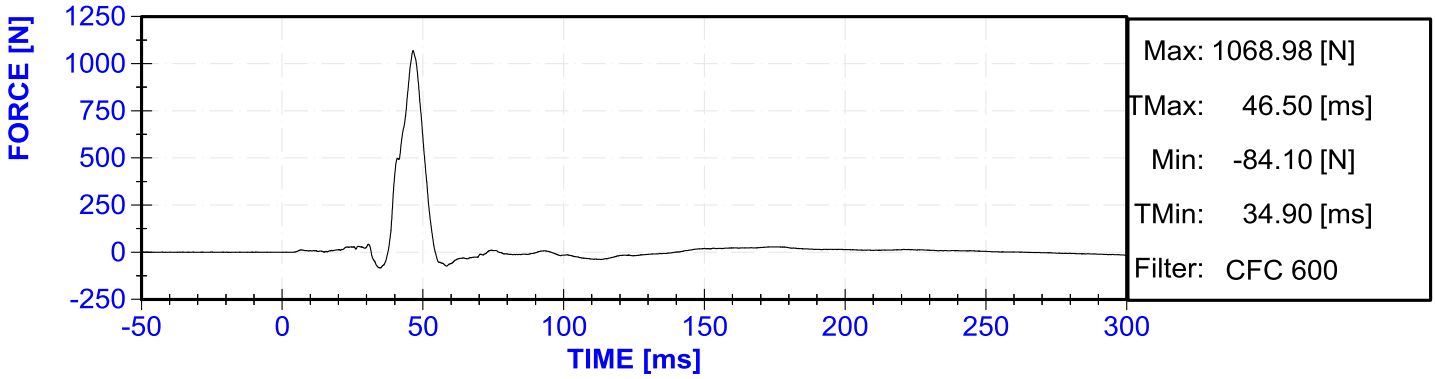
Passenger Lower Spine T12 Acceleration (Z) vs. Time



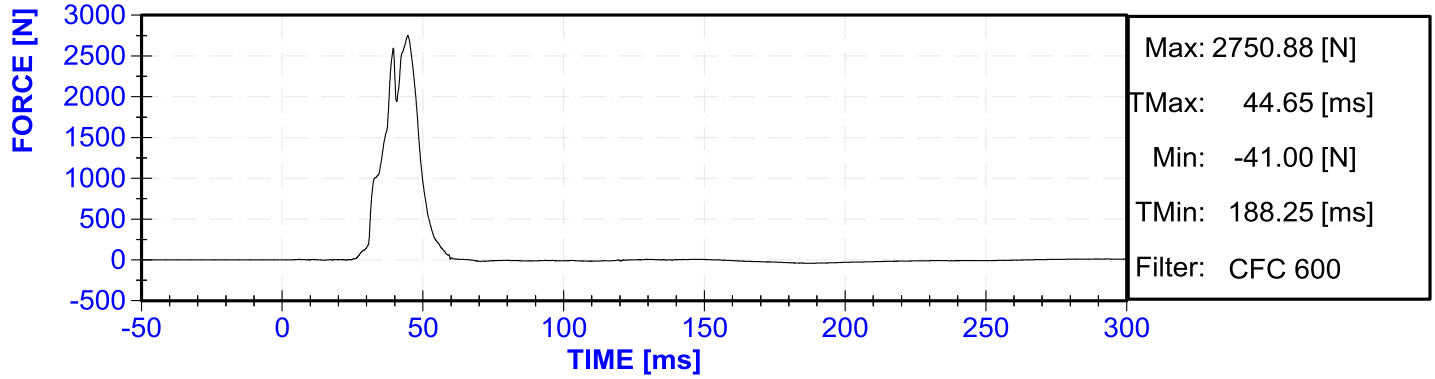
Passenger Lower Spine T12 Resultant Acceleration vs. Time



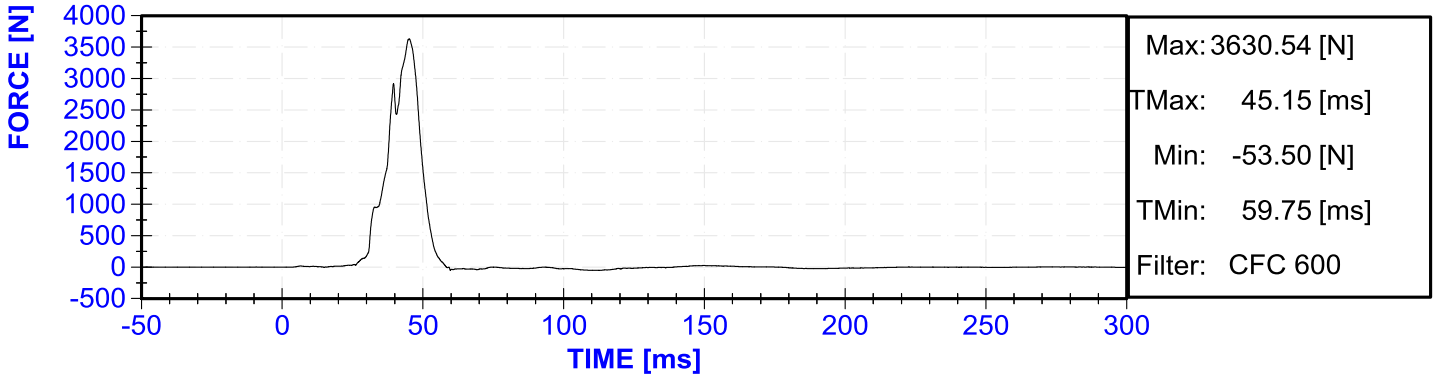
Passenger Iliac Force on Impact Side (Y) vs. Time



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

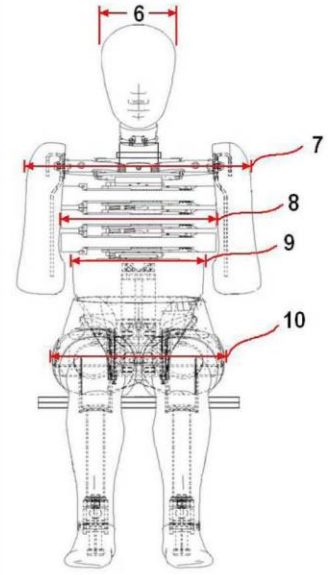
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

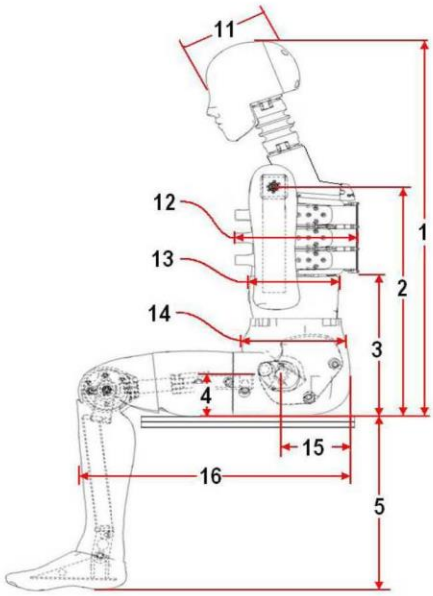
External Measurements - EuroSID-2re

Technician: M.Hartung Date: 6/21/2016

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	911	Pass
2	Seat to Shoulder Joint	558	572	562	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	349	Pass
4	Seat to Hip Joint (center of bolt)	97	103	101	Pass
5	Sole to Seat, Sitting	333	451	410	Pass
6	Head Width	152	158	154	Pass
7	Shoulder/Arm Width	461	479	475	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	283	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	266	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	605	Pass

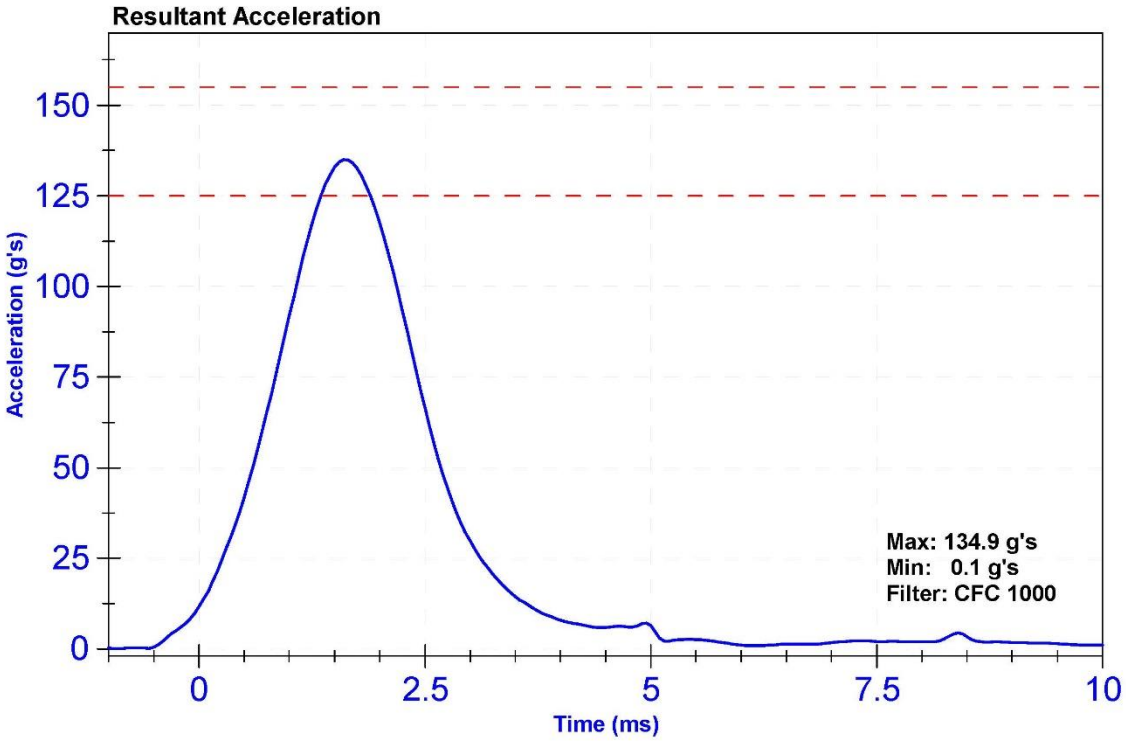
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

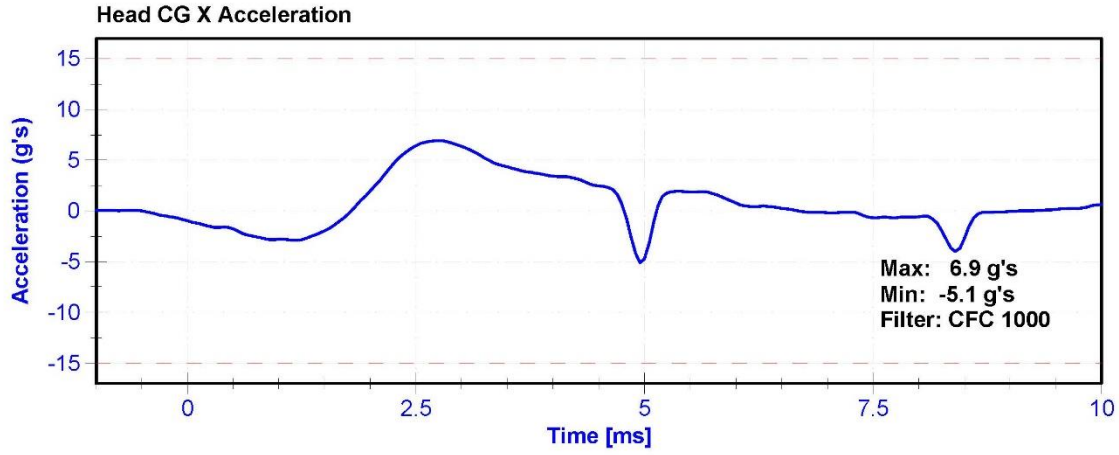
Results

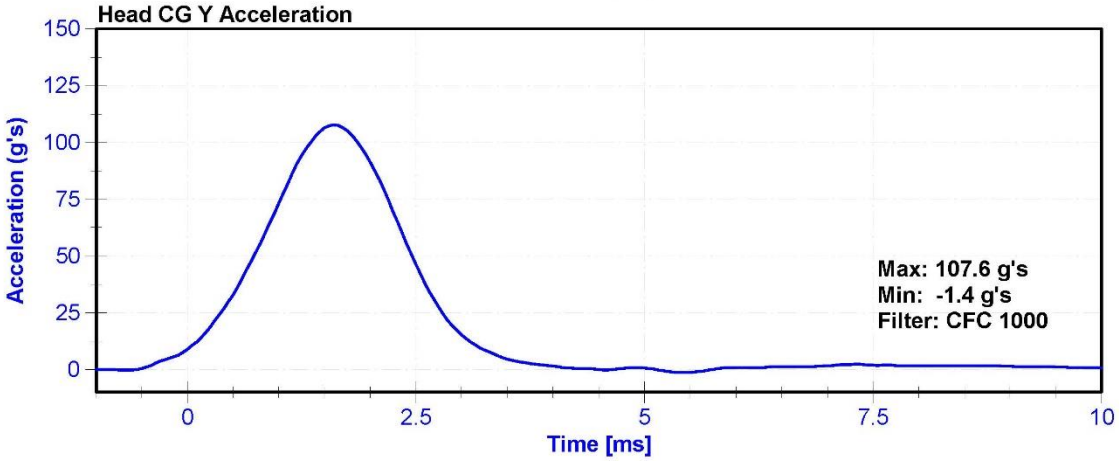
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	53.1	Pass
Resultant Acceleration	125	155	g's	134.9	Pass
Oscillation	0	15	%	5.32	Pass
Fore-Aft Acceleration	-15	15	g's	6.9	Pass

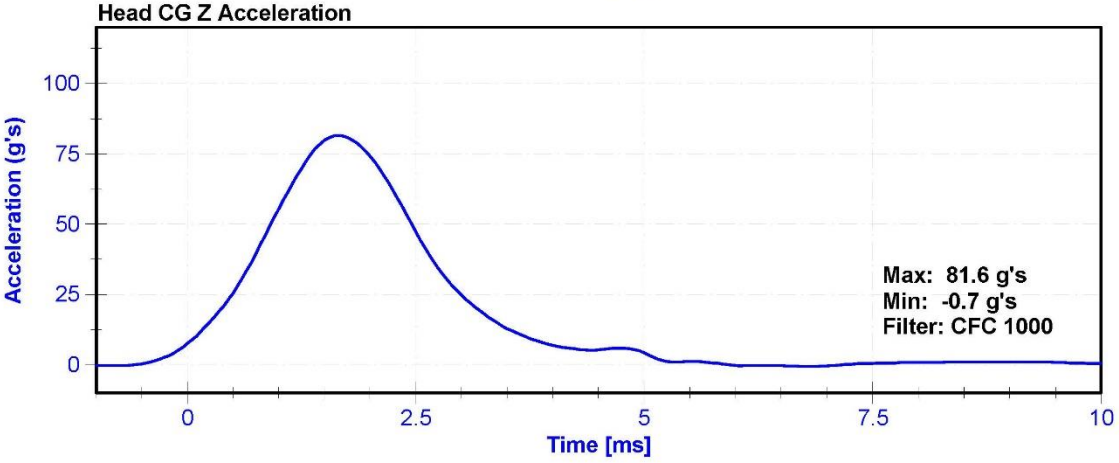
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58904	6/20/2016	12/19/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P58911	6/20/2016	12/19/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P58776	6/20/2016	12/19/2016




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 6.9 g's
Min: -5.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 107.6 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 81.6 g's
Min: -0.7 g's
Filter: CFC 1000

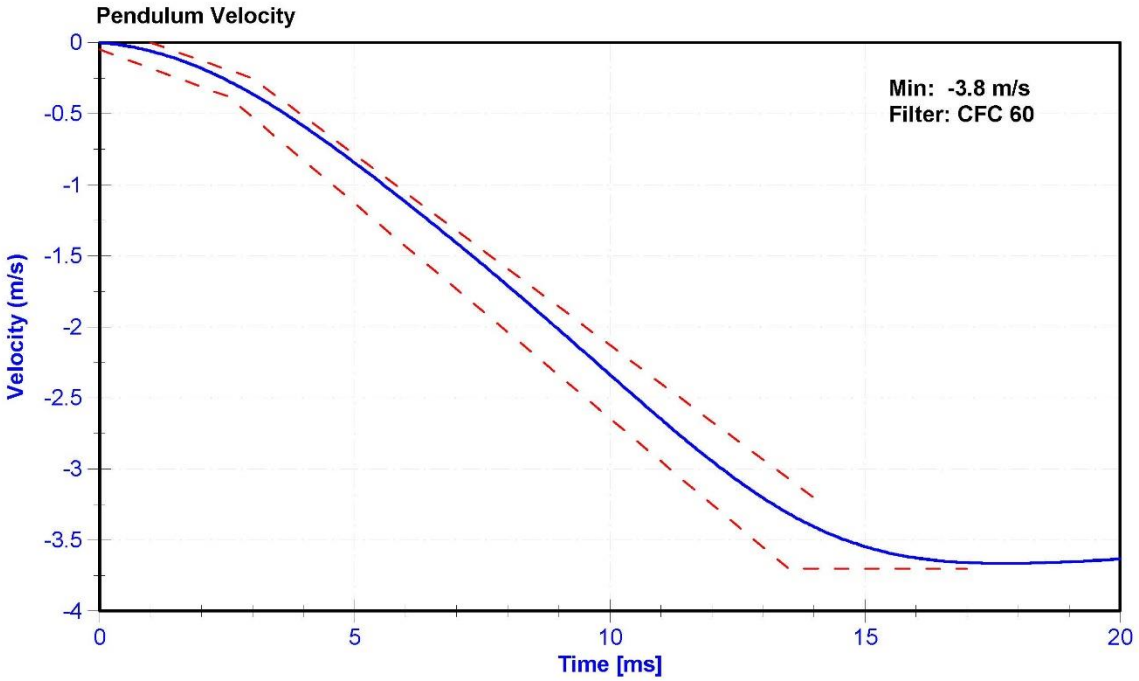
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

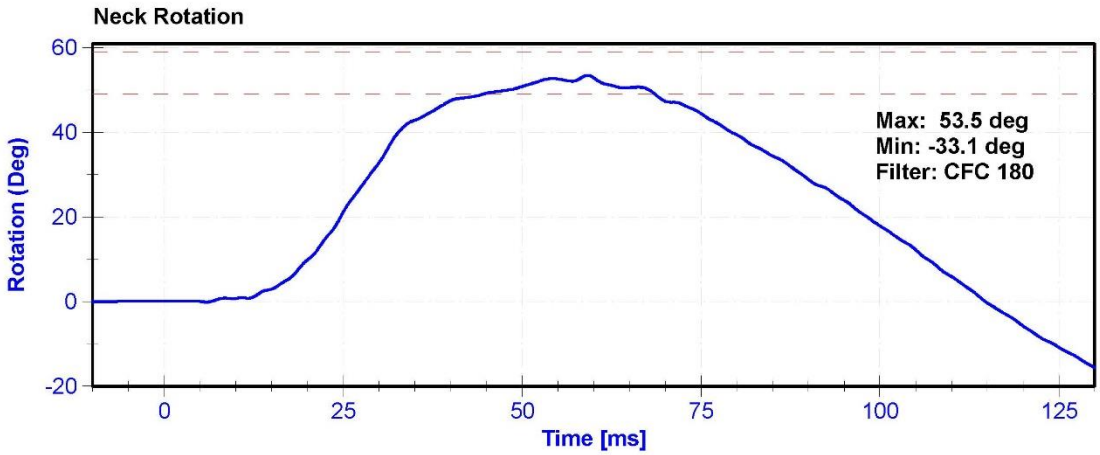
Results

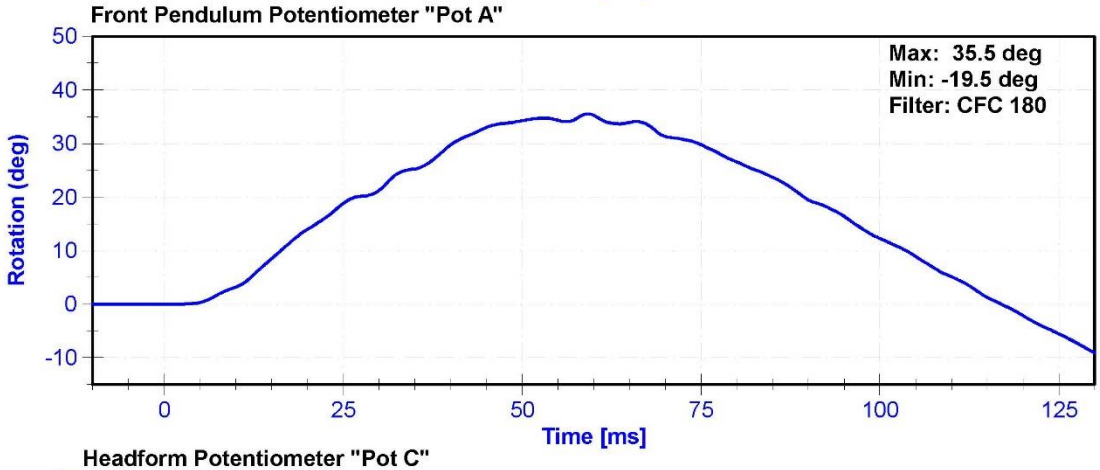
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	51.2	Pass
Velocity	3.3	3.5	m/s	3.47	Pass
Lateral Neck Rotation	49	59	deg	53.5	Pass
Time at Maximum Rotation	54	66	ms	59.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	55.6	Pass

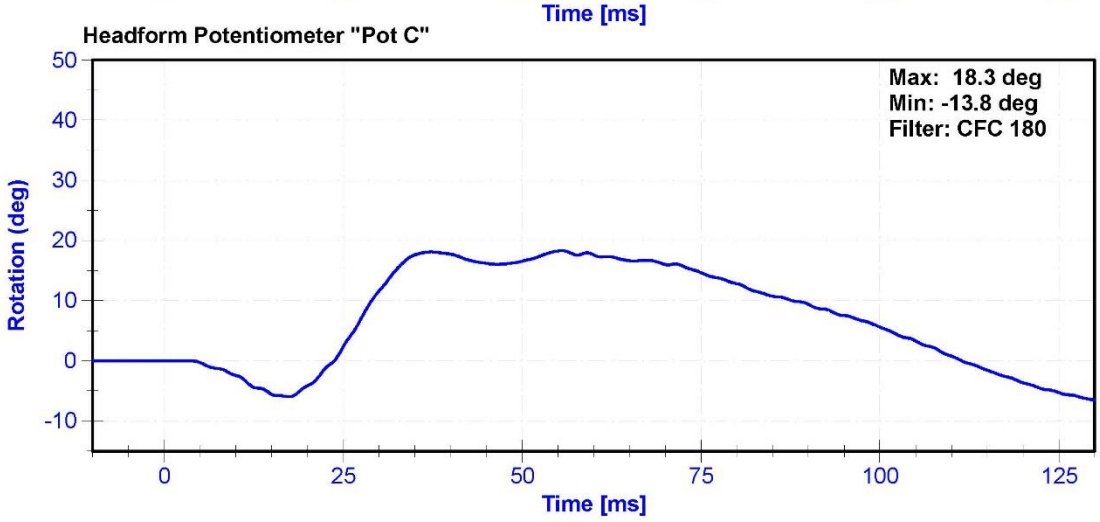
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Front Pendulum Potentiometer	SP22G	DS-094	9/24/2015	9/23/2016
Headform Potentiometer	SP22G	DS-095	9/24/2015	9/23/2016




Neck Rotation
Max: 53.5 deg
Min: -33.1 deg
Filter: CFC 180
Rotation (Deg)
Time [ms]


Front Pendulum Potentiometer "Pot A"
Max: 35.5 deg
Min: -19.5 deg
Filter: CFC 180
Rotation (deg)
Time [ms]


Headform Potentiometer "Pot C"
Max: 18.3 deg
Min: -13.8 deg
Filter: CFC 180
Rotation (deg)
Time [ms]

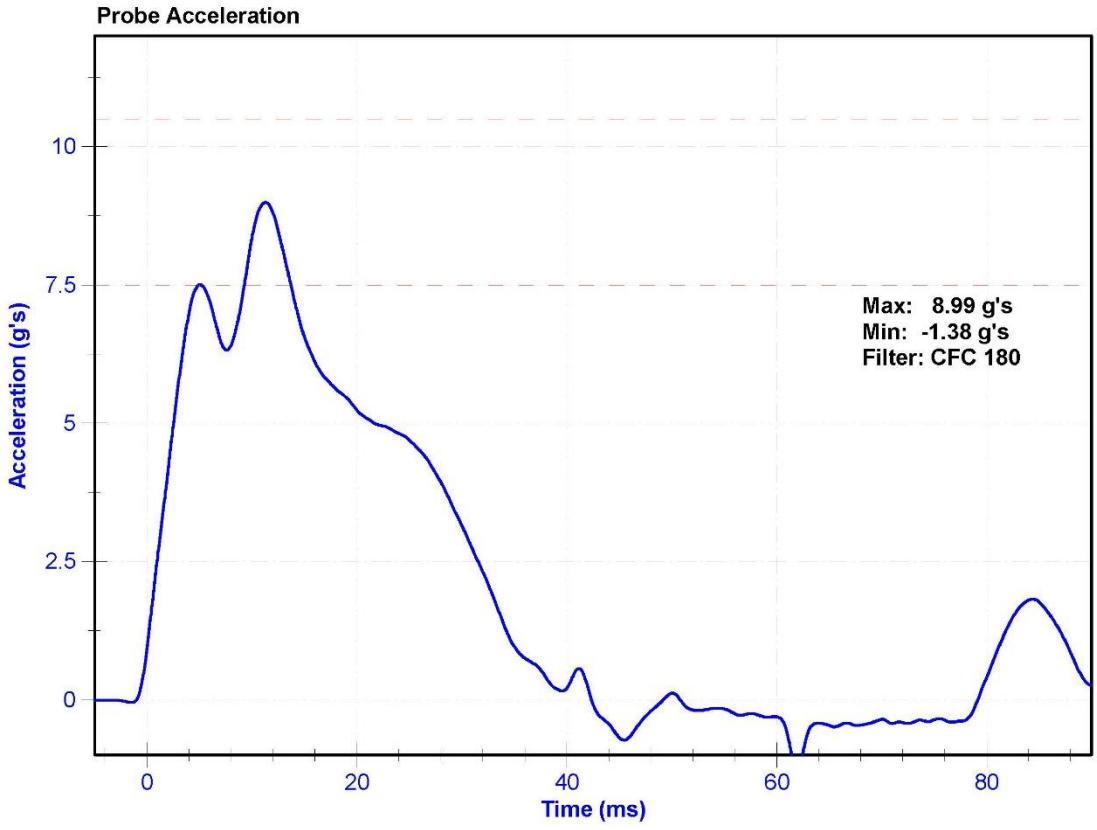
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	44.5	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	7.5	10.5	g's	8.99	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016



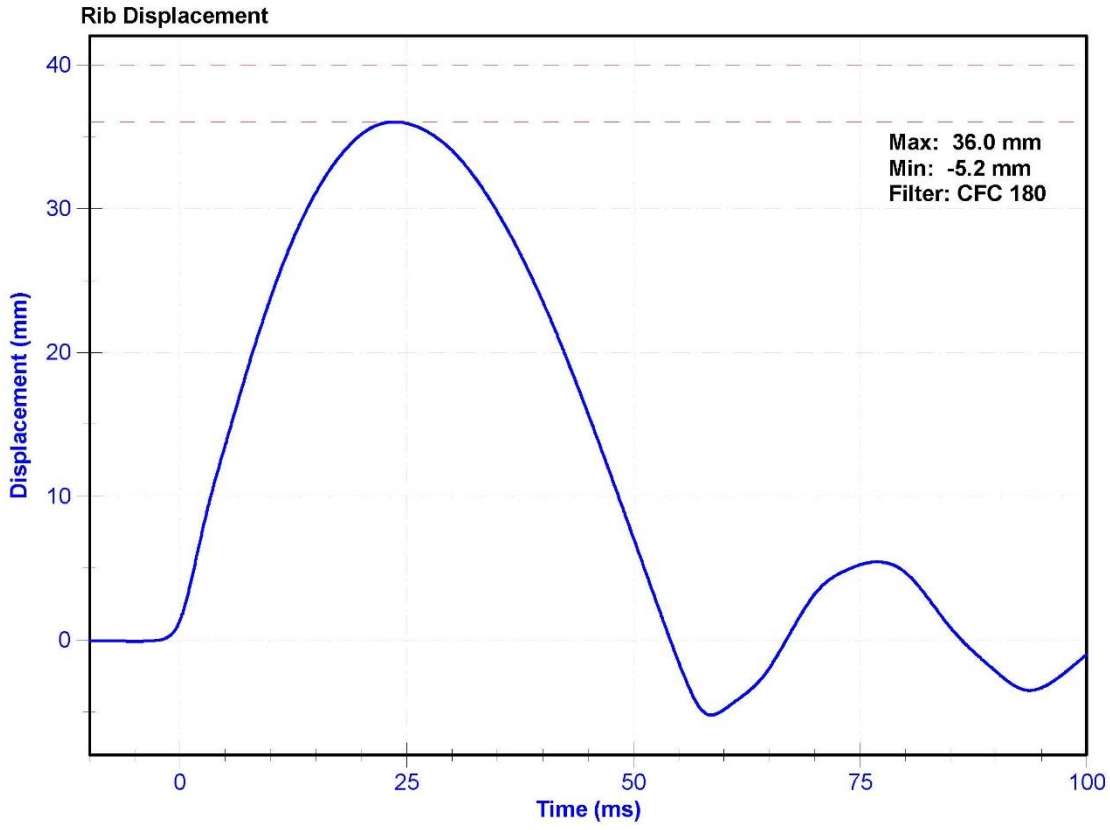
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	Pass
Rib Displacement	36	40	mm	36.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016



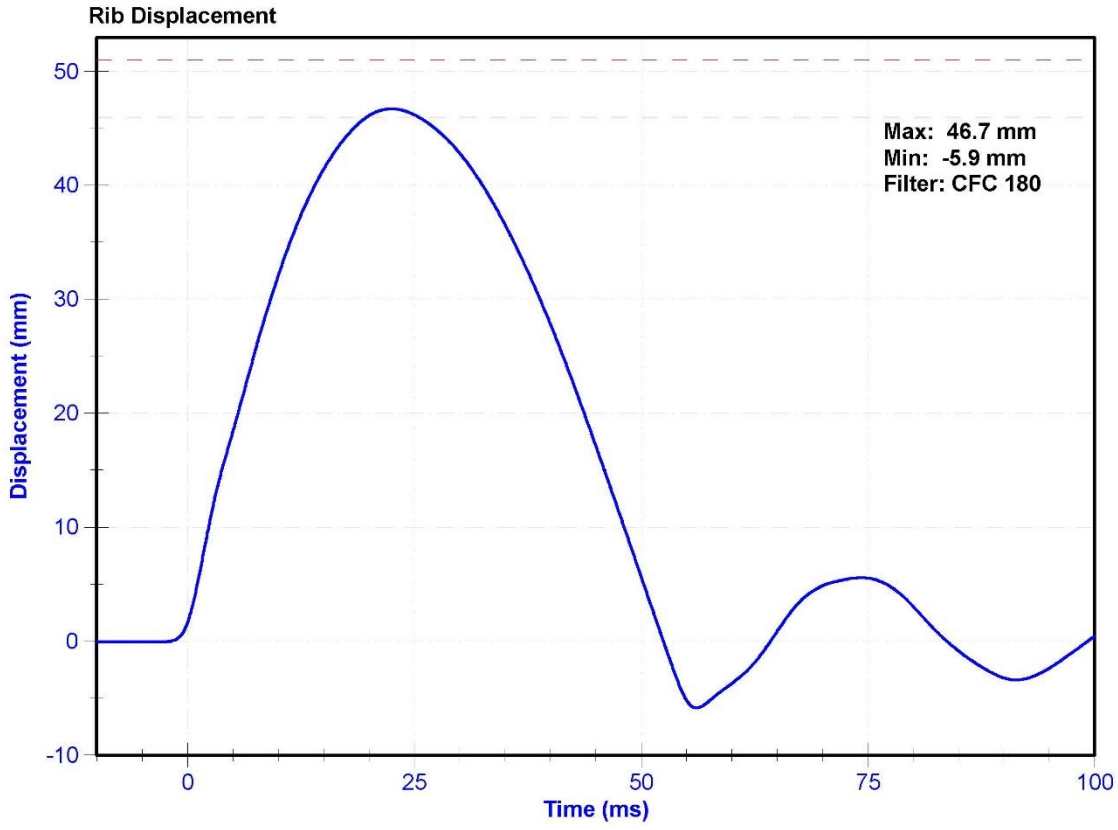
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	Pass
Rib Displacement	46	51	mm	46.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016



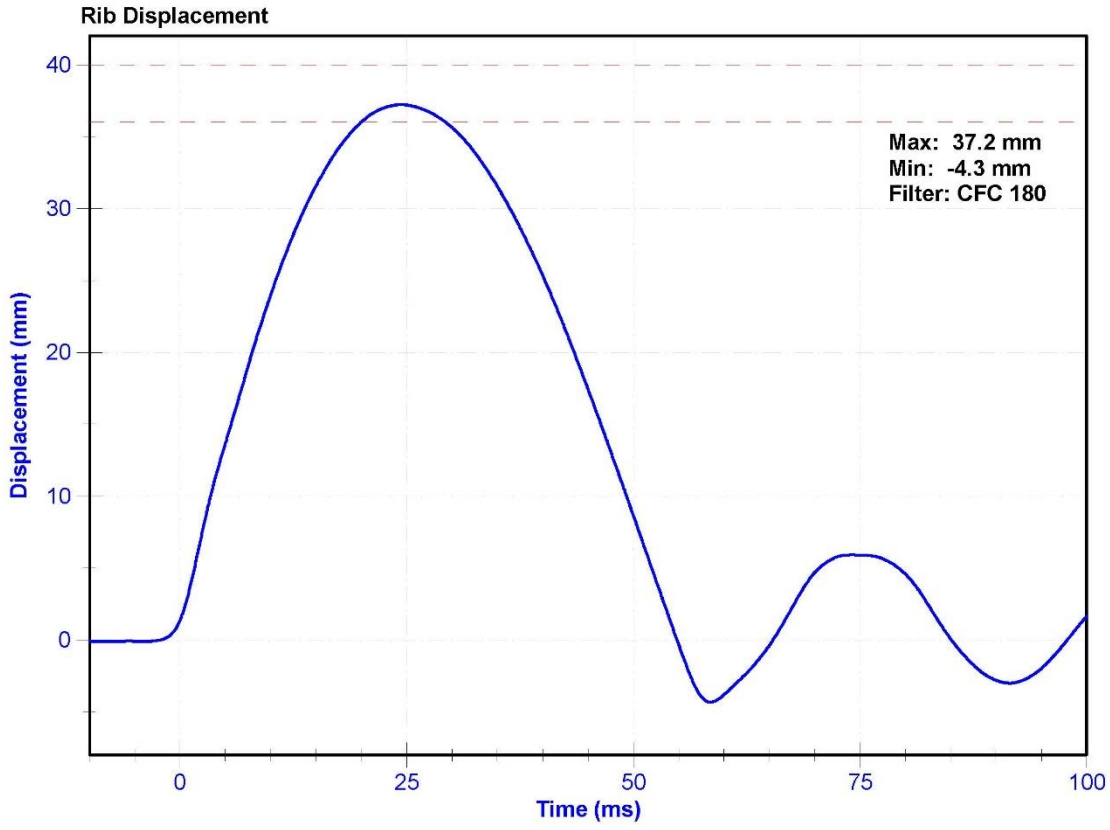
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	Pass
Rib Displacement	36	40	mm	37.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016



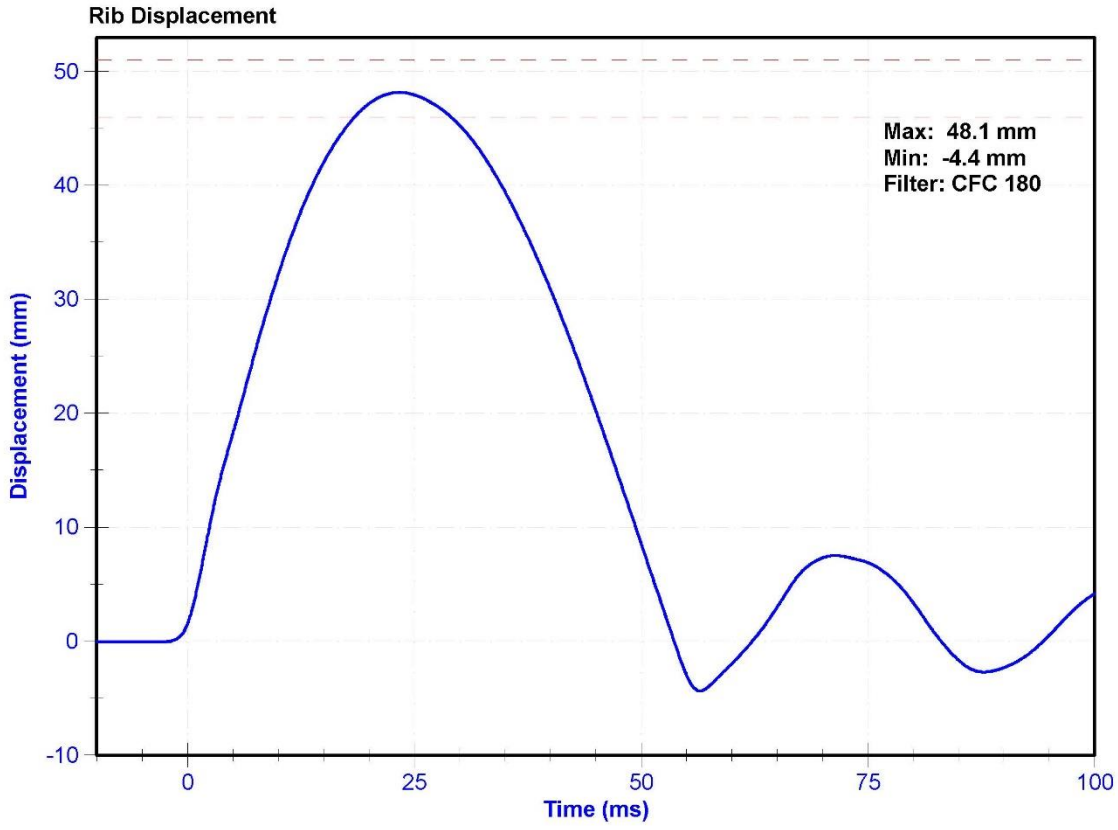
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	Pass
Rib Displacement	46	51	mm	48.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016



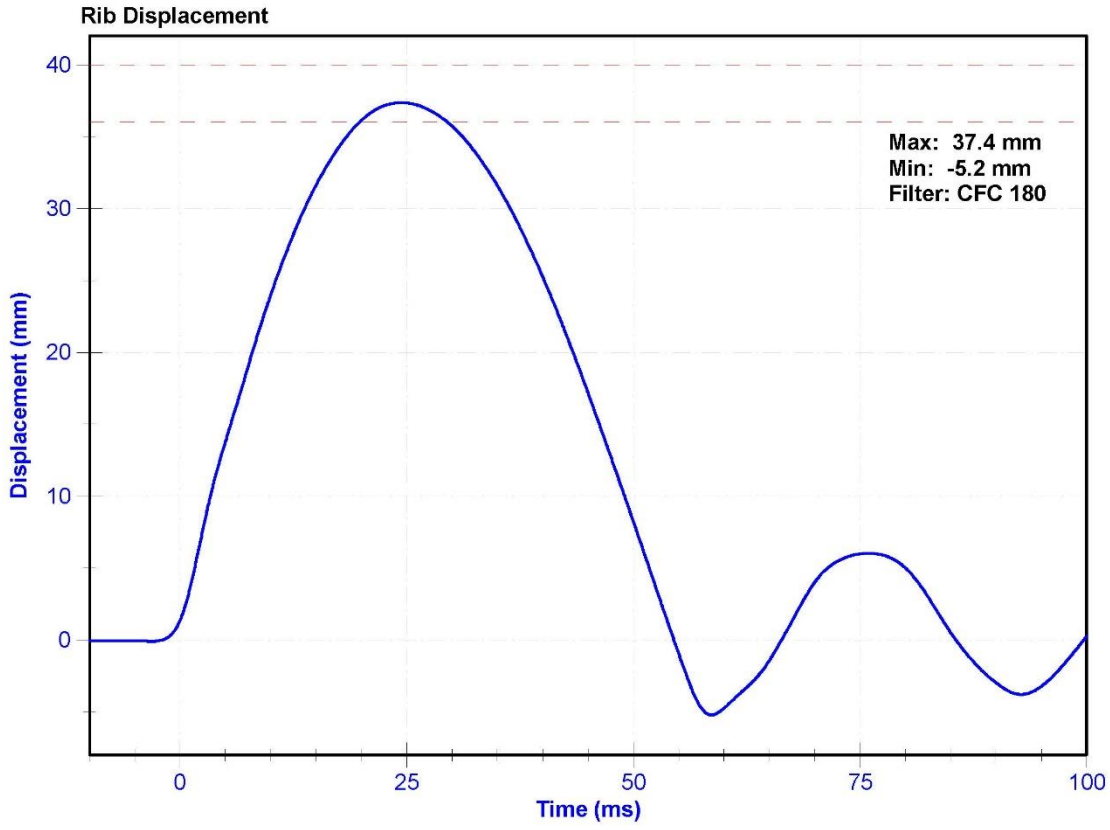
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/19/2015	10/18/2016



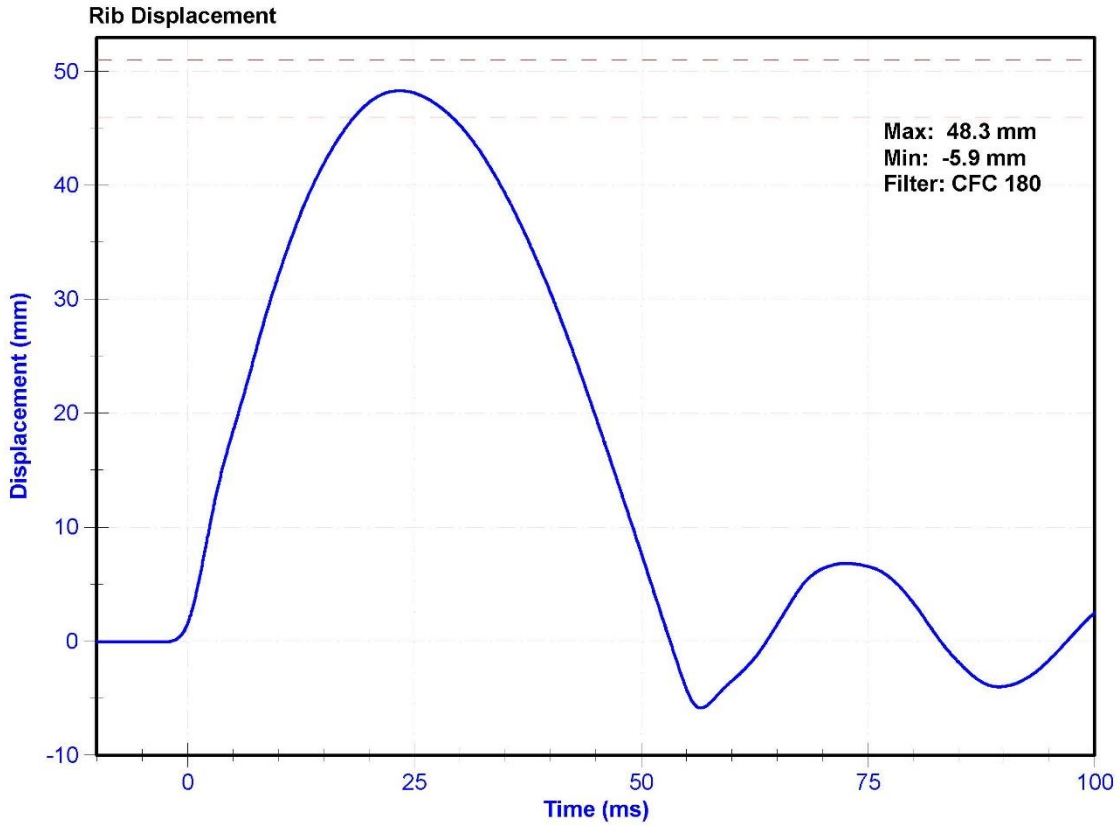
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	47.3	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-182GFE	10/19/2015	10/18/2016



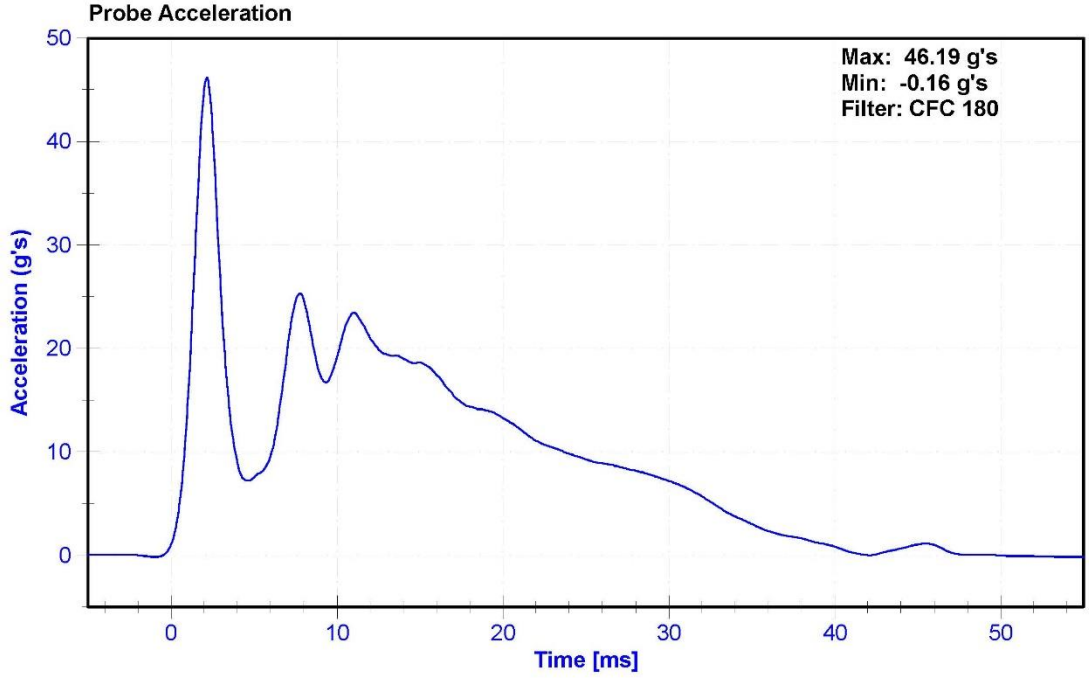
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

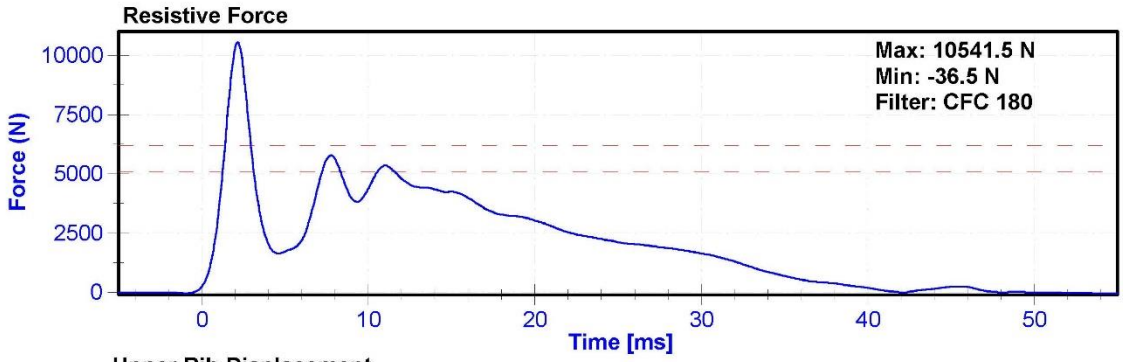
Results

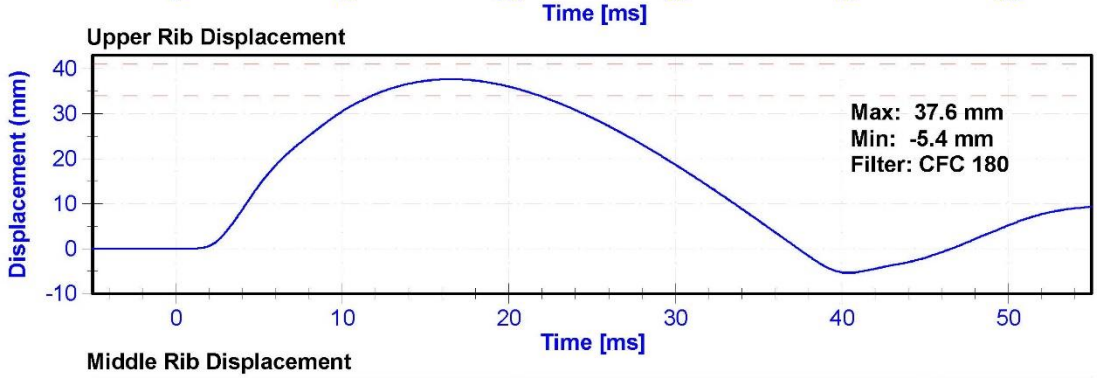
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	38.1	Pass
Velocity	5.4	5.6	m/s	5.40	Pass
Resistive Force after 6ms	5100	6200	N	5776.0	Pass
Upper Thorax Rib Deflection	34	41	mm	37.6	Pass
Mid Thorax Rib Deflection	37	45	mm	41.7	Pass
Lower Thorax Rib Deflection	37	44	mm	40.9	Pass

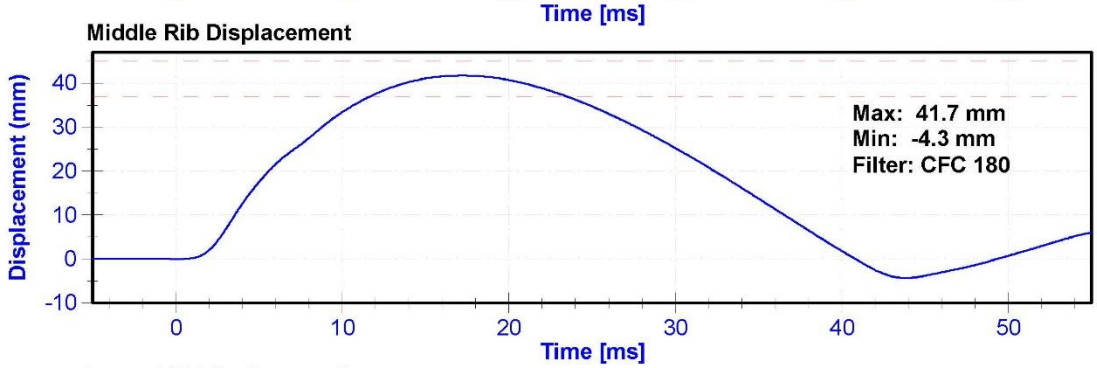
Transducer Calibrations

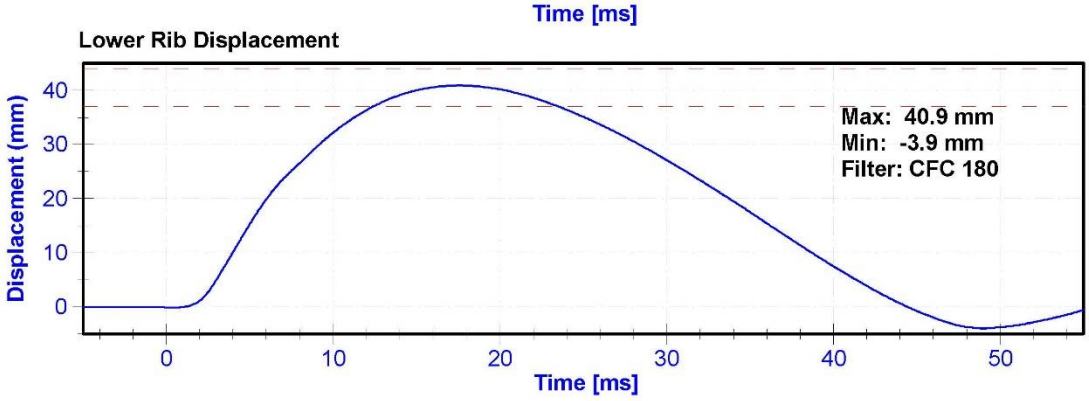
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/19/2015	10/18/2016




Resistive Force
Force (N)
10000
7500
5000
2500
0
0
10
20
30
40
50
Time [ms]
Max: 10541.5 N
Min: -36.5 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 37.6 mm
Min: -5.4 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.7 mm
Min: -4.3 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
40
30
20
10
0
0
10
20
30
40
50
Time [ms]
Max: 40.9 mm
Min: -3.9 mm
Filter: CFC 180

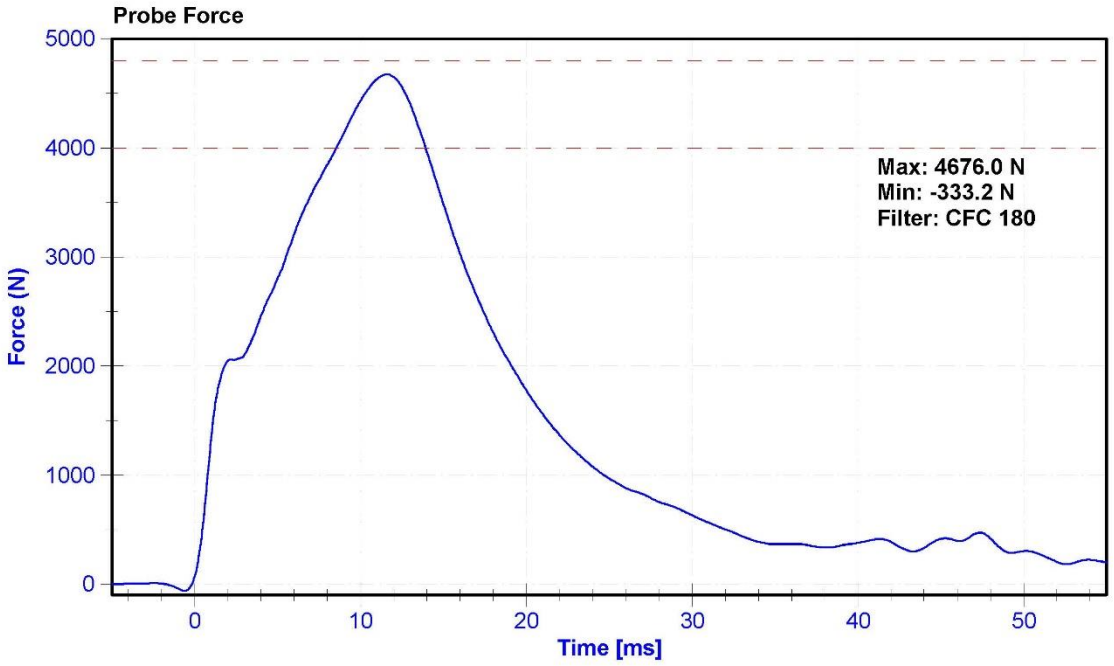
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

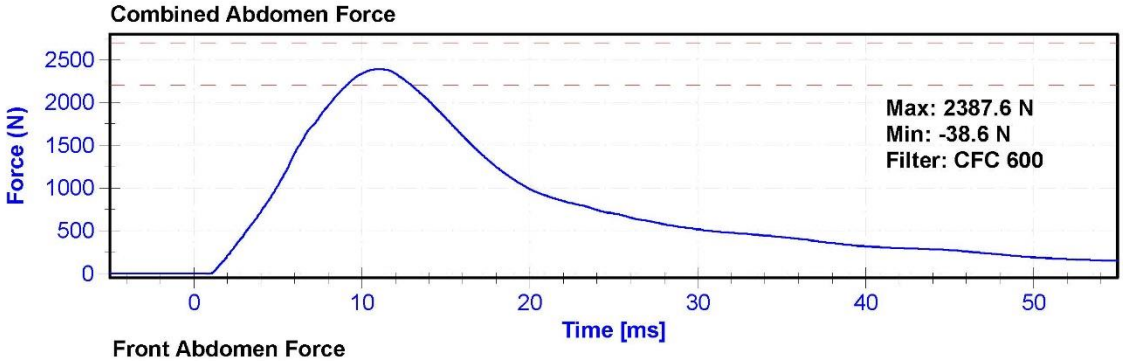
Results

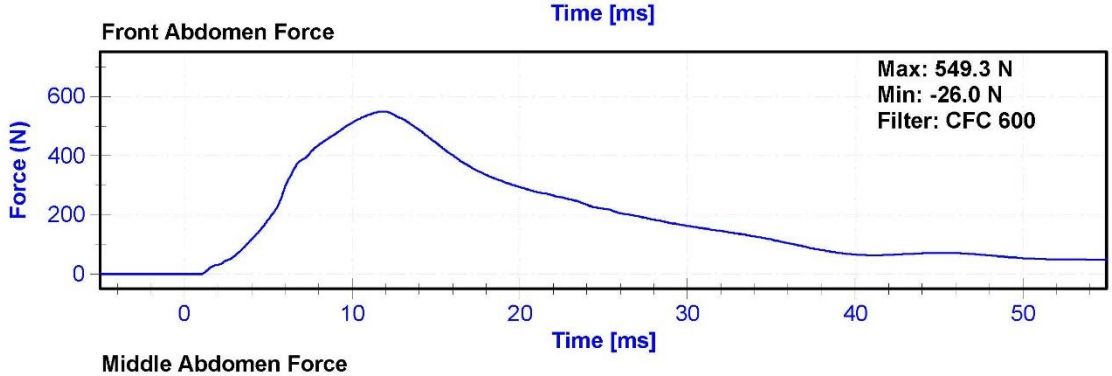
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	37.8	Pass
Velocity	3.9	4.1	m/s	4.02	Pass
Combined Abdomen Force	2200	2700	N	2387.6	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.95	Pass
Resistive Probe Force	4000	4800	N	4676.0	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.60	Pass

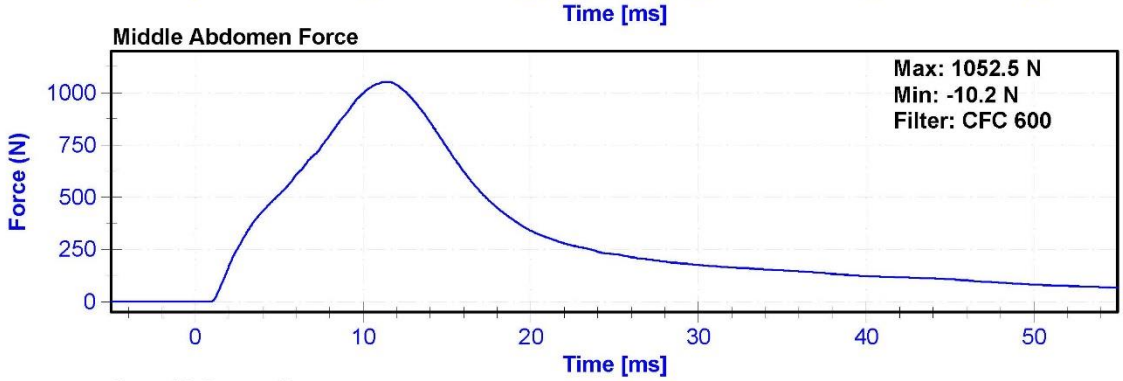
Transducer Calibrations

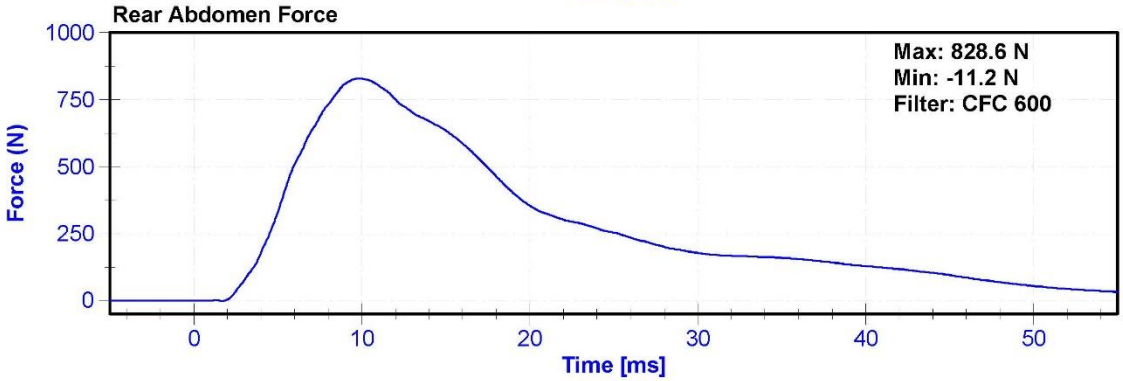
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Front Abdomen Load Cell	DENTON 2631	LC-1512	5/24/2016	5/24/2017
Middle Abdomen Load Cell	DENTON 2631	LC-1526	5/24/2016	5/24/2017
Rear Abdomen Load Cell	DENTON 2631	LC-1516	5/24/2016	5/24/2017




Combined Abdomen Force
Force (N)
2500
2000
1500
1000
500
0
0
10
20
30
40
50
Time [ms]
Max: 2387.6 N
Min: -38.6 N
Filter: CFC 600


Front Abdomen Force
Force (N)
600
400
200
0
0
10
20
30
40
50
Time [ms]
Max: 549.3 N
Min: -26.0 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
1000
750
500
250
0
0
10
20
30
40
50
Time [ms]
Max: 1052.5 N
Min: -10.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
1000
750
500
250
0
0
10
20
30
40
50
Time [ms]
Max: 828.6 N
Min: -11.2 N
Filter: CFC 600

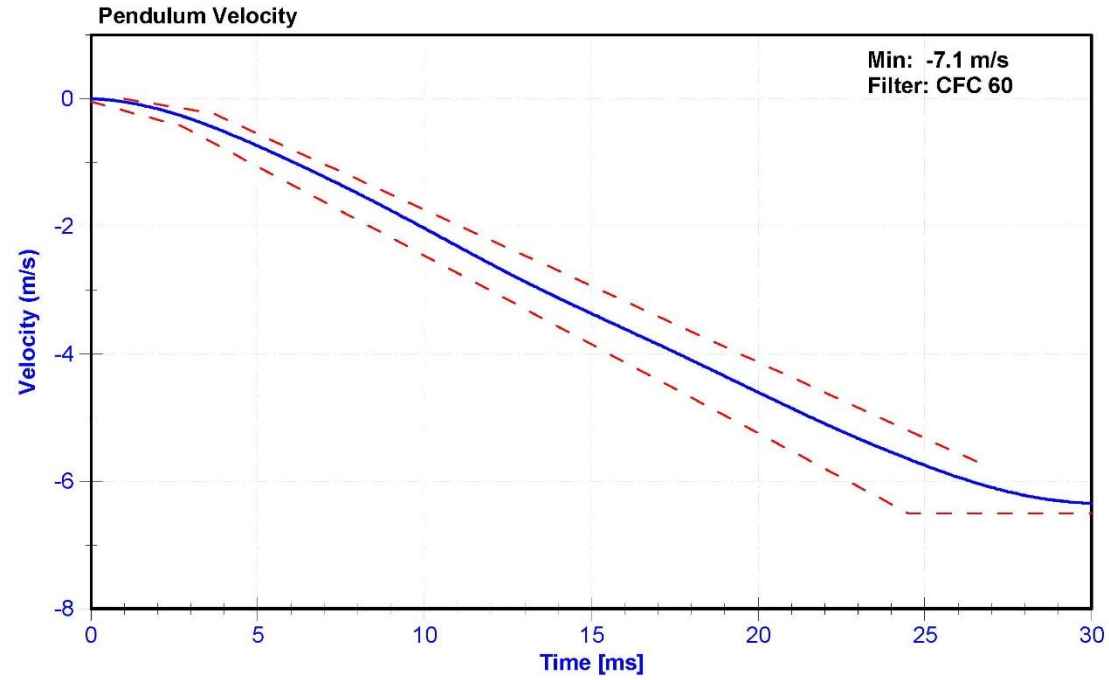
ATD Manufacturer	FTSS	Test Technician	M.Hatrung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

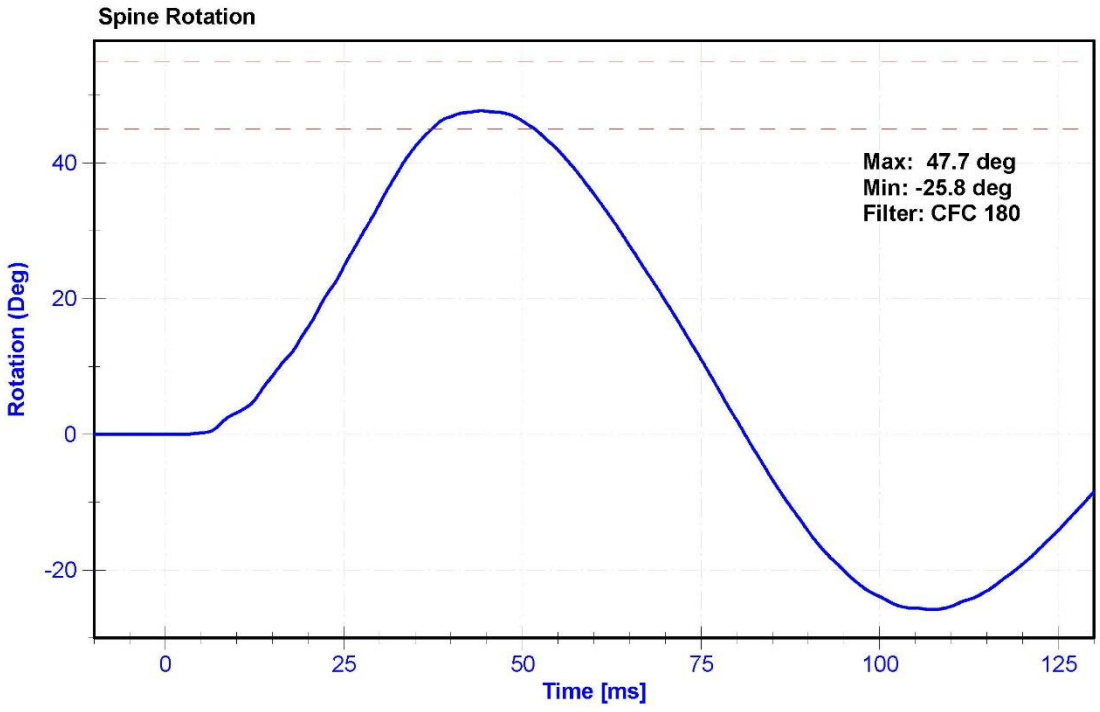
Results

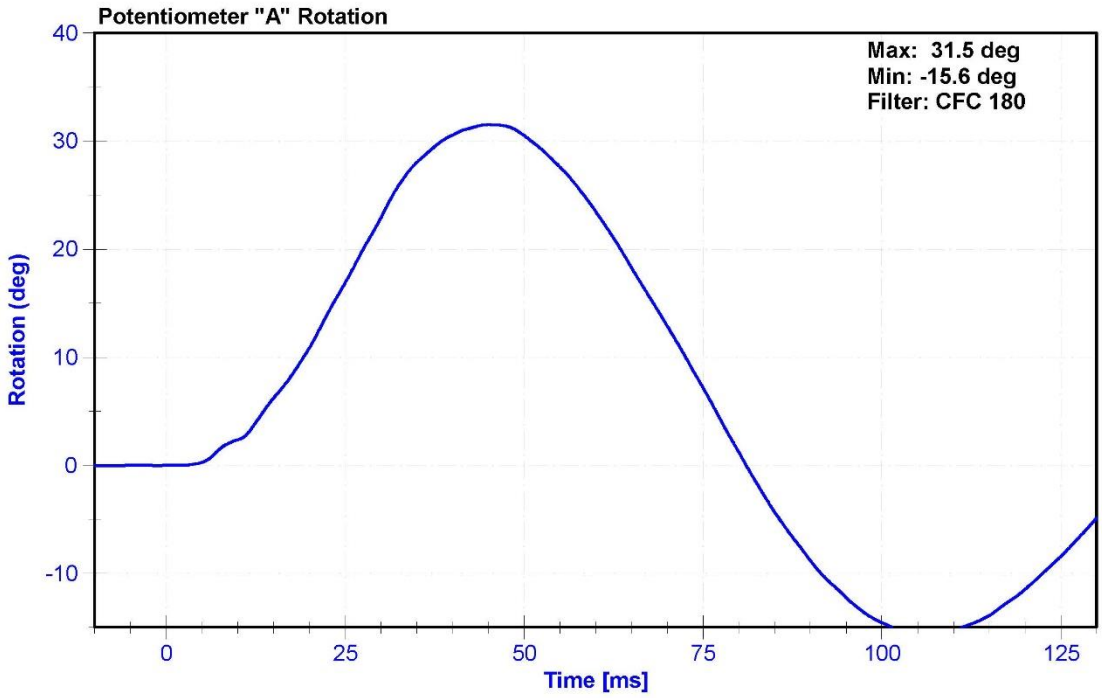
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	46.3	Pass
Velocity	5.95	6.15	m/s	6.068	Pass
Lateral Spine Rotation	45	55	deg	47.7	Pass
Time at Maximum Rotation	39	53	ms	44.2	Pass
Time of Decay to Zero Degrees	37	57	ms	37.0	Pass
Pulse within Corridor?	-	-	-		

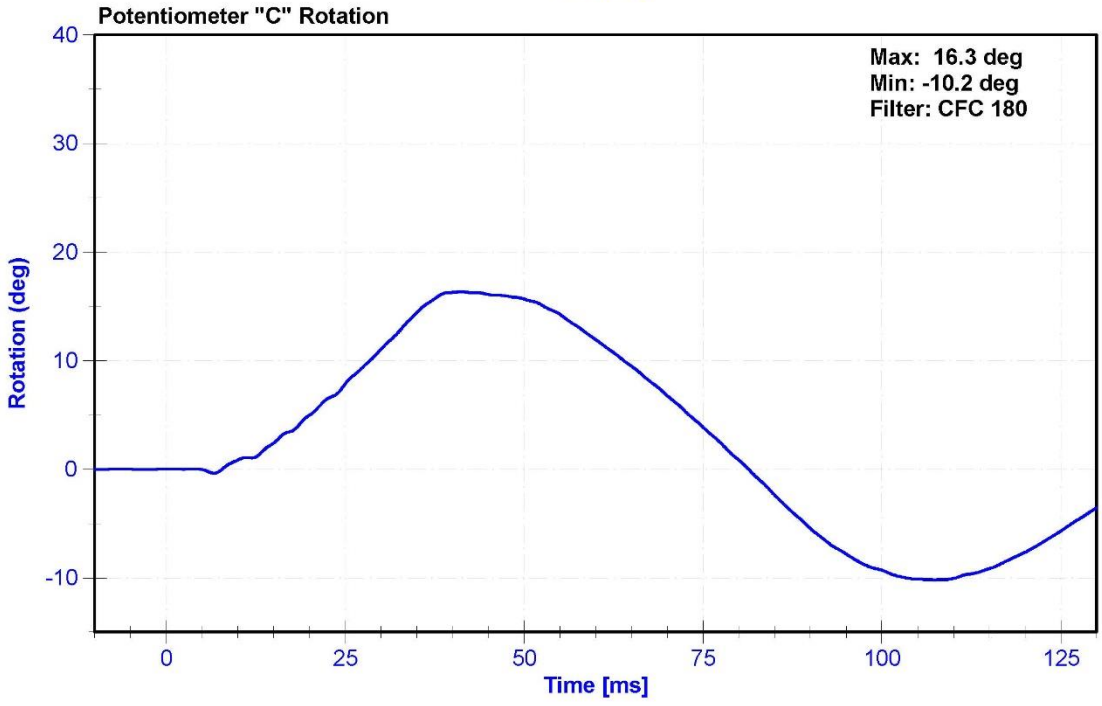
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Pendulum "A" Potentiometer	SP22G	DS-094	9/24/2015	9/23/2016
Condyle "B" Potentiometer	SP22G	DS-095	9/24/2015	9/23/2016


Pendulum Velocity
Min: -7.1 m/s
Filter: CFC 60
Velocity (m/s)
0
-2
-4
-6
-8
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 47.7 deg
Min: -25.8 deg
Filter: CFC 180
Rotation (Deg)
40
20
0
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 31.5 deg
Min: -15.6 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 16.3 deg
Min: -10.2 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]

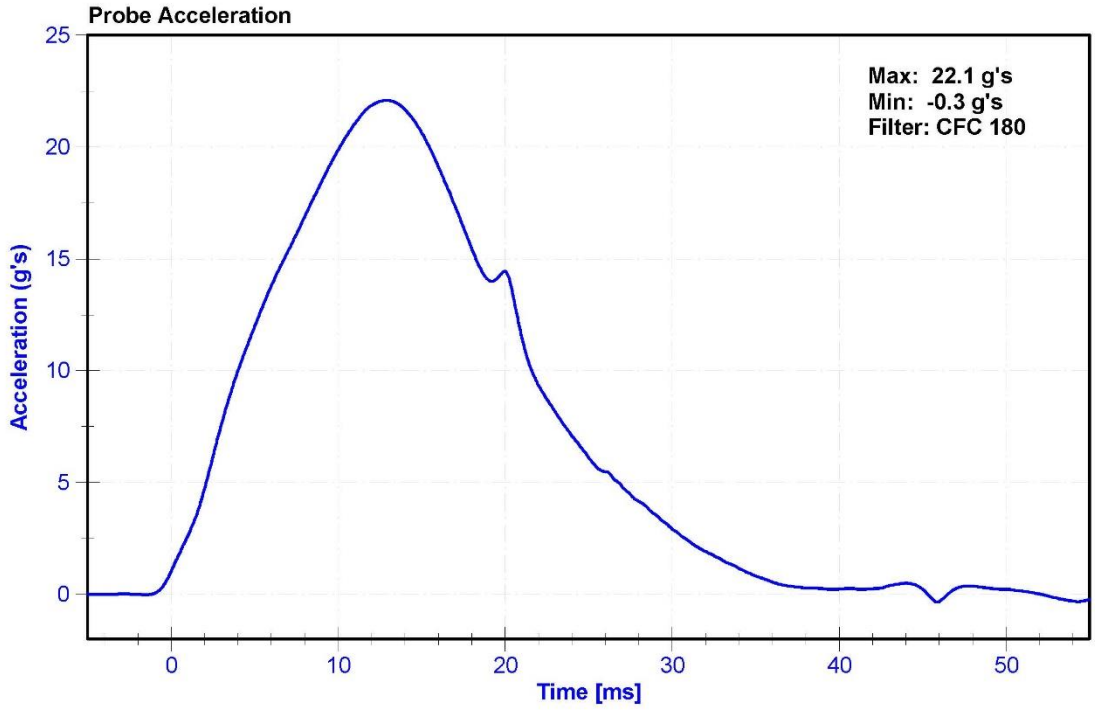
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

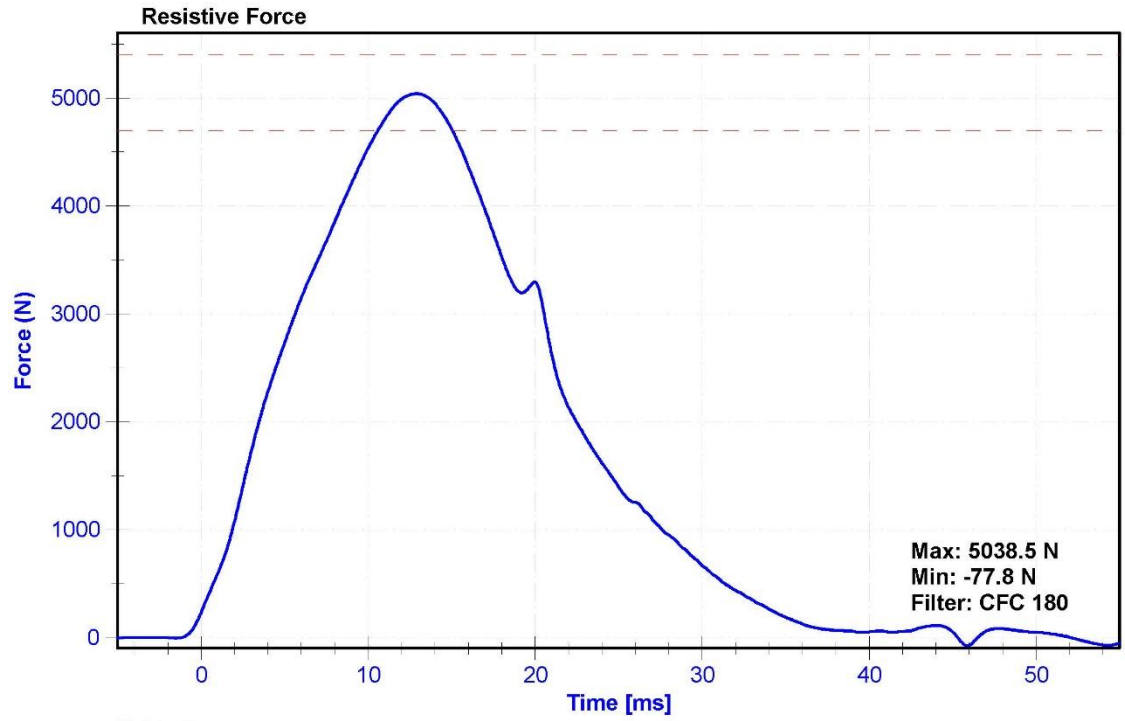
Results

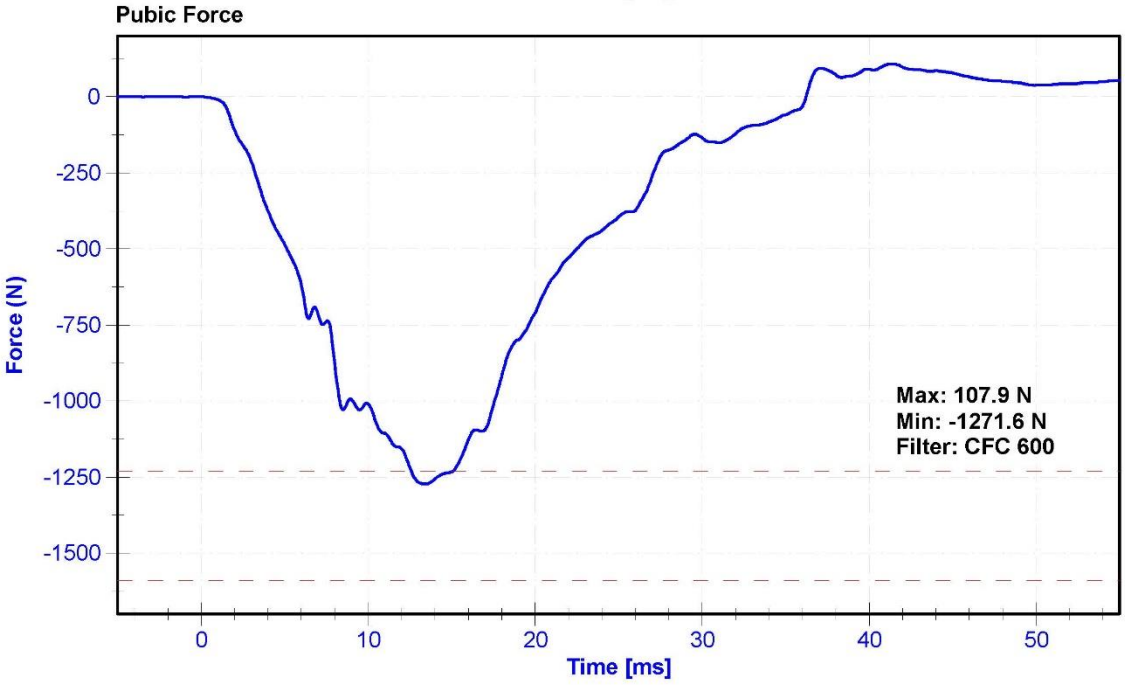
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	42.9	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	5038.5	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.90	Pass
Pubic Force	-1590	-1230	N	-1271.6	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.45	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pubic Load Cell	Denton 3096JFL	LC-465Fy	5/24/2016	5/24/2017




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 5038.5 N
Min: -77.8 N
Filter: CFC 180


Pubic Force
Force (N)
0
-250
-500
-750
-1000
-1250
-1500
0
10
20
30
40
50
Time [ms]
Max: 107.9 N
Min: -1271.6 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

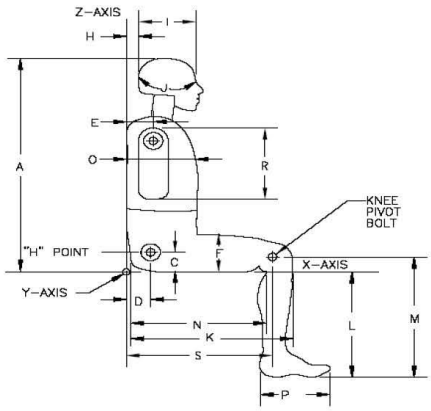
SERIAL No: 300

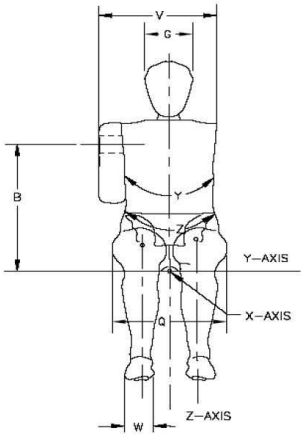
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: Steve Keller Date: 6/20/2016

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	448	Pass
C	H-point Height	79	89	88	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	122	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	549	Pass
K	Buttock to Knee Length	514	540	540	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	437	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	346	Pass
W	Foot Width	78	94	83	Pass
Y	Chest Circumference w/jacket	851	881	869	Pass
Z	Waist Circumference	761	791	770	Pass

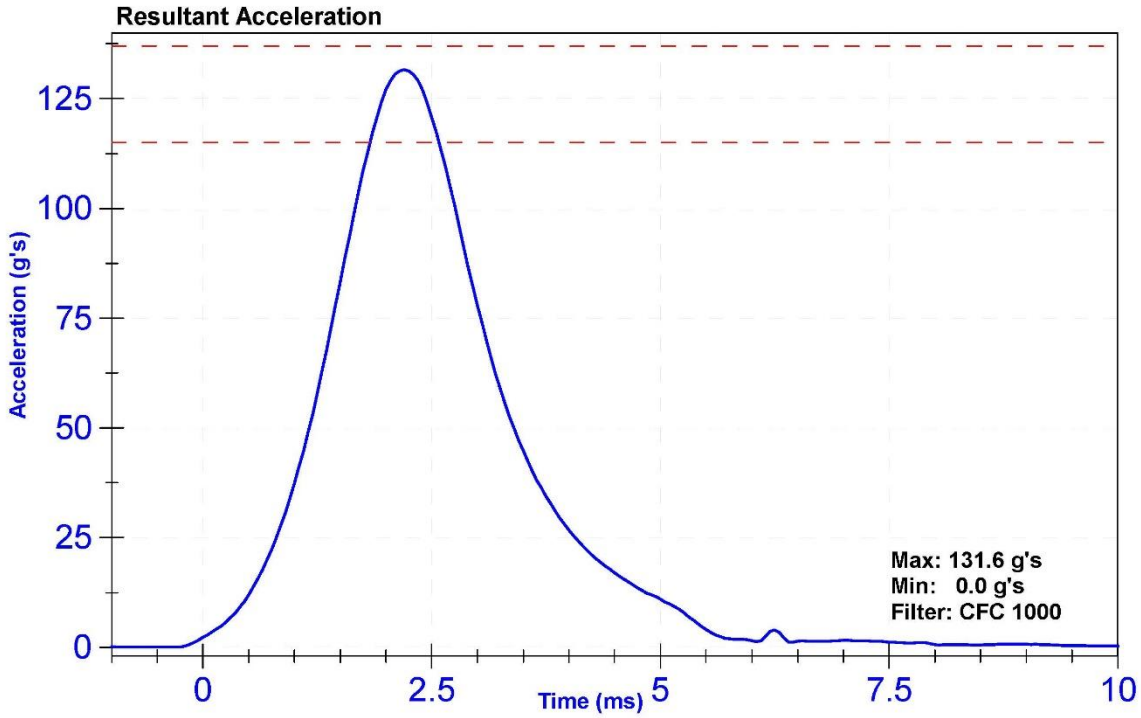
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

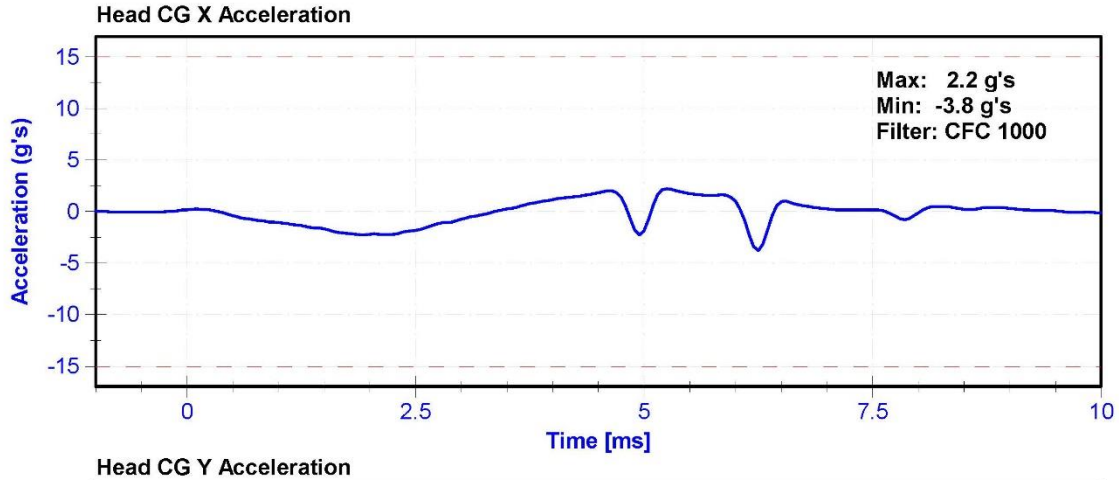
Results

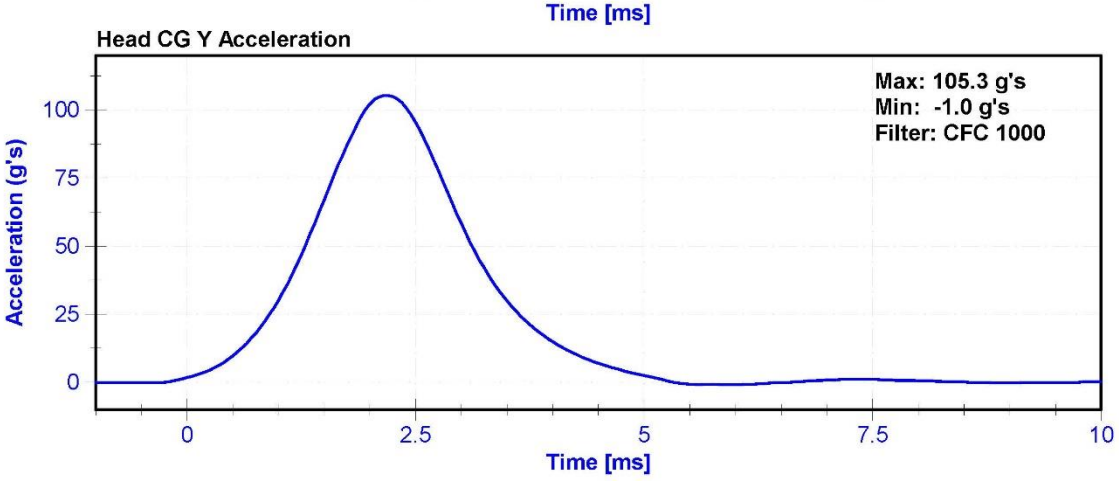
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	45.2	Pass
Resultant Acceleration	115	137	g's	131.6	Pass
Oscillation	0	15	%	3.0	Pass
Fore-Aft Acceleration	-15	15	g's	-3.8	Pass

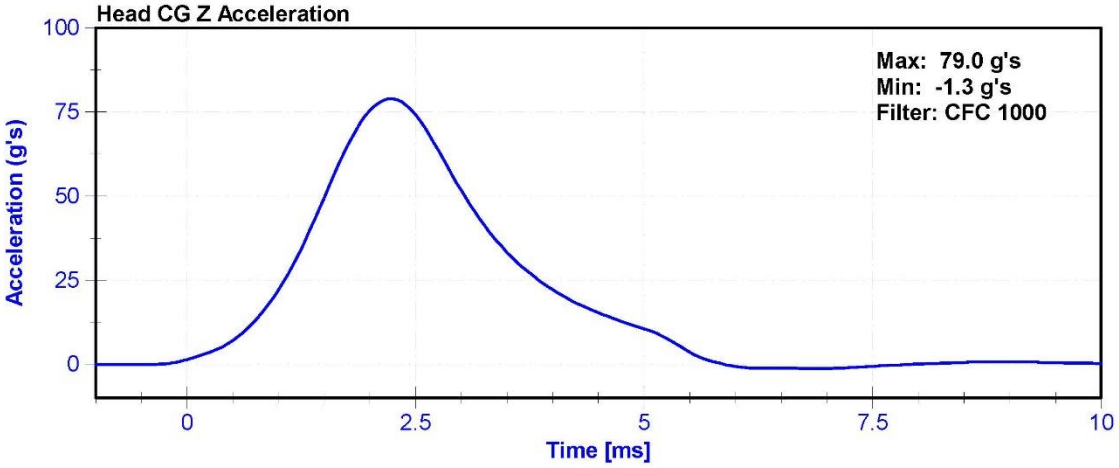
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58777	2016/06/16	2016/12/15
Y Accelerometer	ENDEVCO 7264CT	AC-P59018	2016/06/16	2016/12/15
Z Accelerometer	ENDEVCO 7264CT	AC-P68608	2016/06/16	2016/12/15




Head CG X Acceleration
Max: 2.2 g's
Min: -3.8 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: 105.3 g's
Min: -1.0 g's
Filter: CFC 1000
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 79.0 g's
Min: -1.3 g's
Filter: CFC 1000
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]

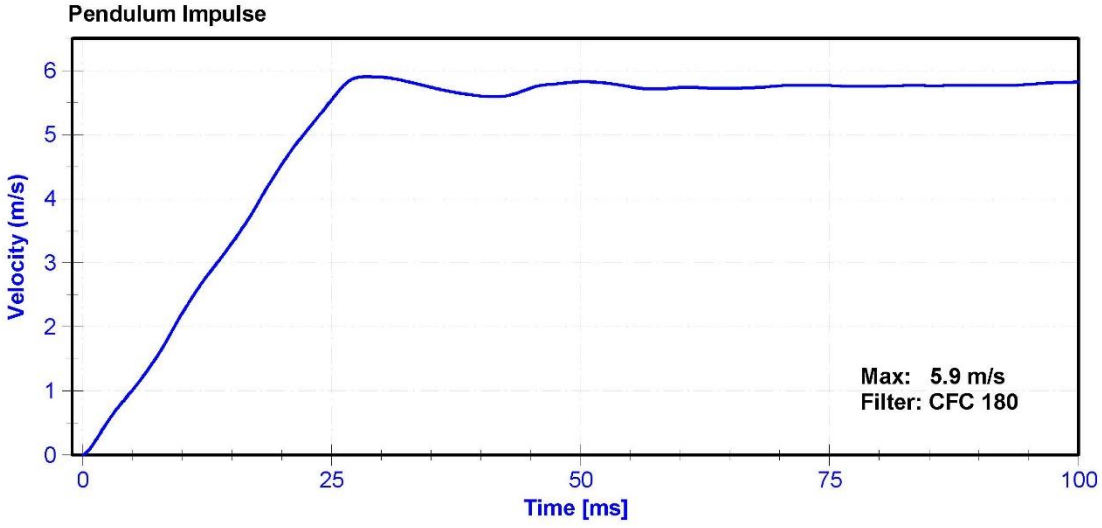
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

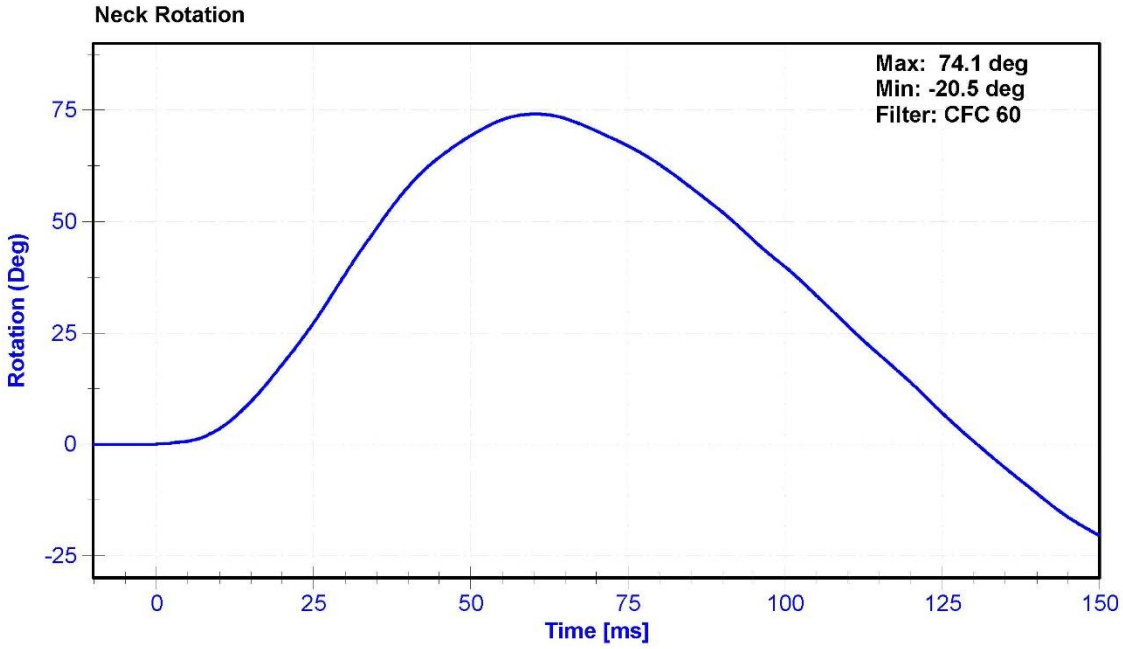
Results

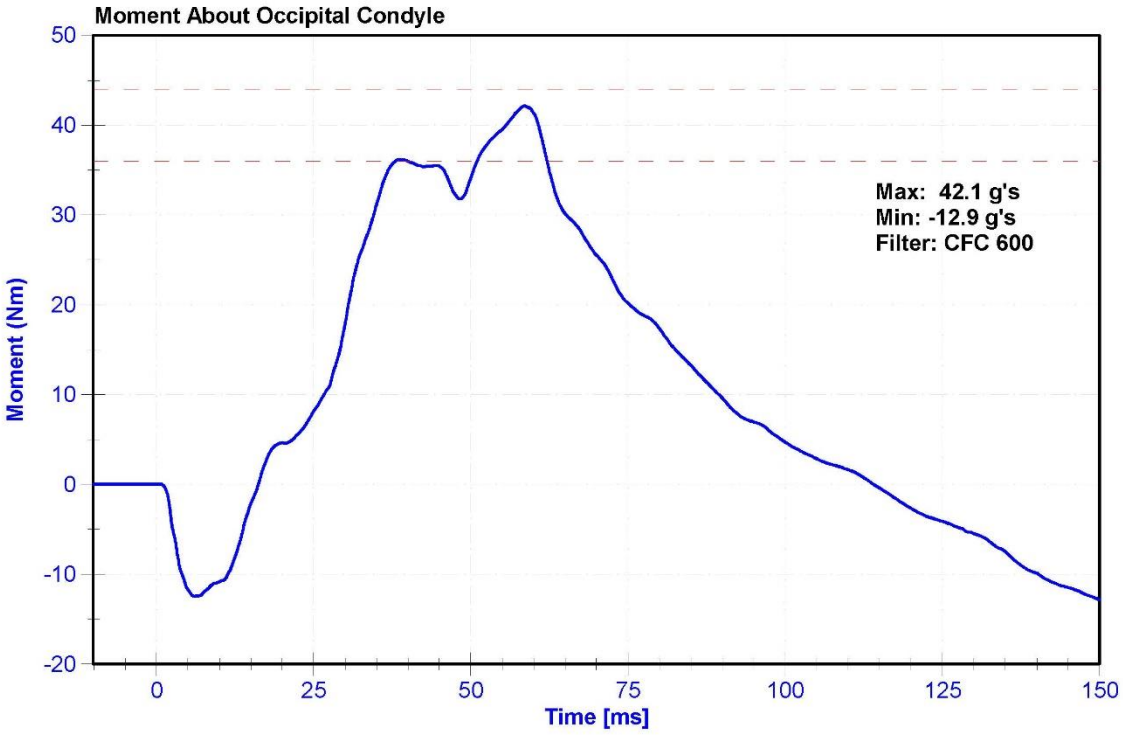
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	48.1	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.21	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.31	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.54	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.54	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.90	Pass
Neck Rotation	71	81	deg	74.1	Pass
Time at Maximum Rotation	50	70	ms	60.3	Pass
Moment about the OC	36	44	Nm	42.1	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-AH5F3	5/10/2016	5/10/2017
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-440Fy	5/24/2016	5/24/2017




Neck Rotation
Max: 74.1 deg
Min: -20.5 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.1 g's
Min: -12.9 g's
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

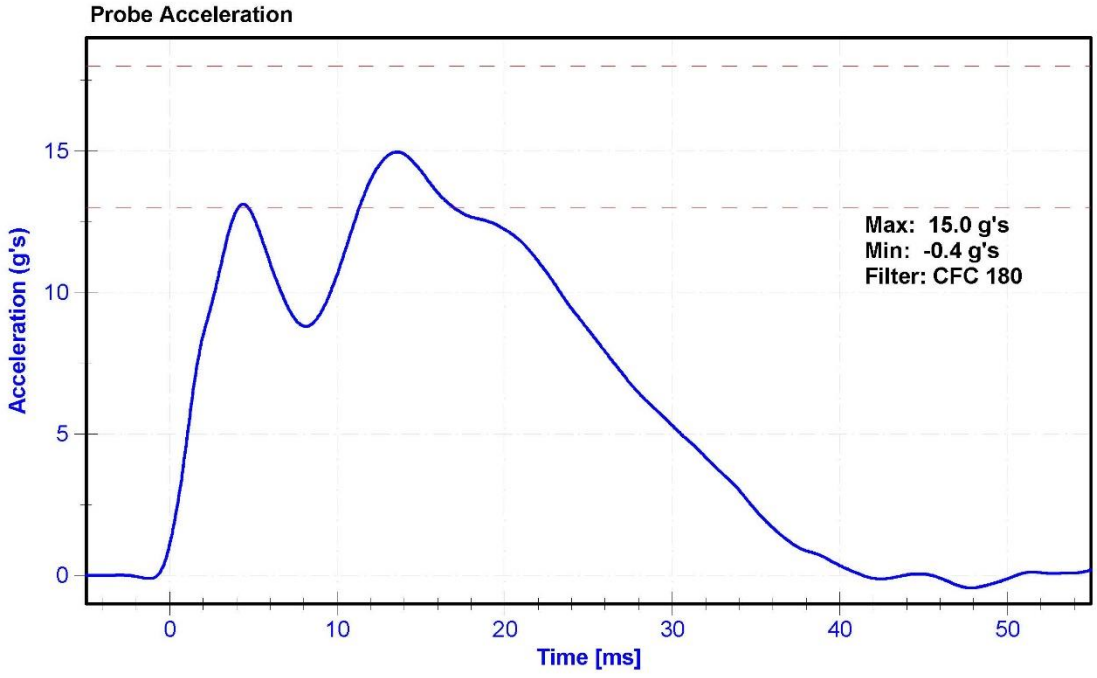
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

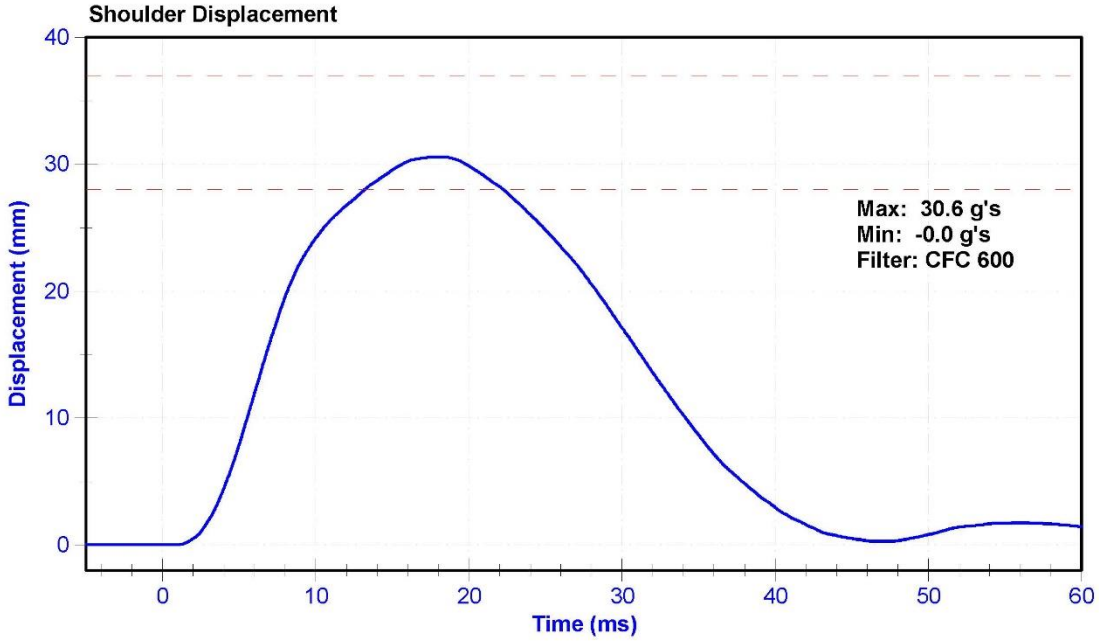
Results

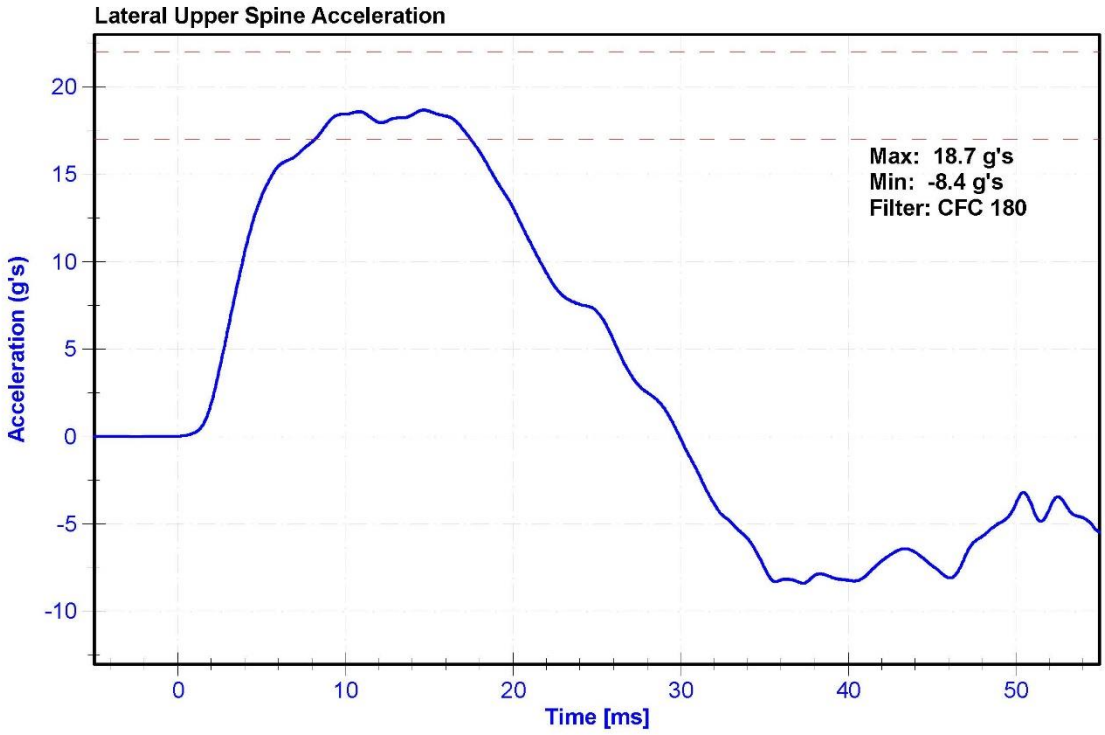
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	41	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	13	18	g's	15.0	Pass
Shoulder Deflection	28	37	mm	30.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	6/16/2016	6/16/2017
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.6 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 18.7 g's
Min: -8.4 g's
Filter: CFC 180

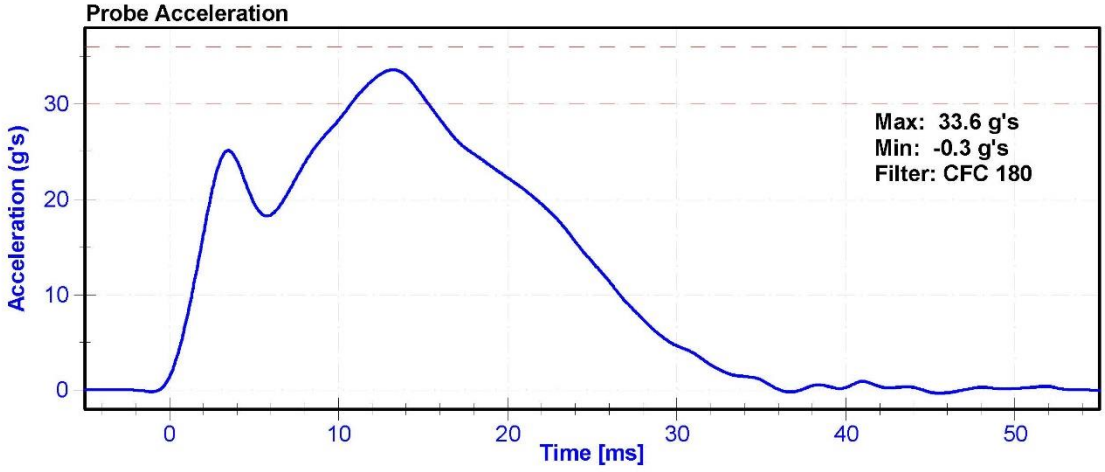
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

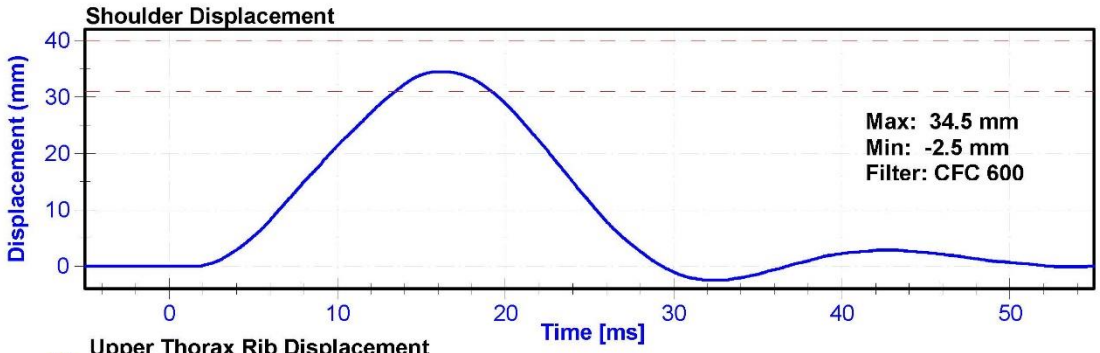
Results

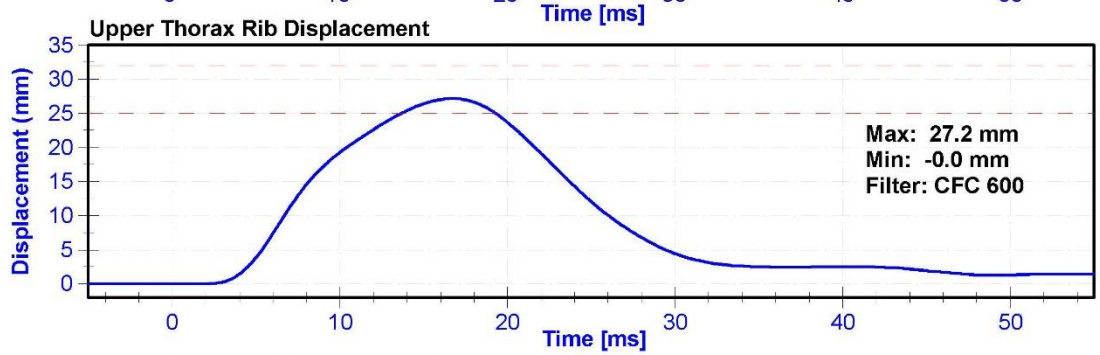
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	43.5	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	33.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.9	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.8	Pass
Shoulder Deflection	31	40	mm	34.5	Pass
Upper Thorax Rib Deflection	25	32	mm	27.2	Pass
Mid Thorax Rib Deflection	30	36	mm	31.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.2	Pass

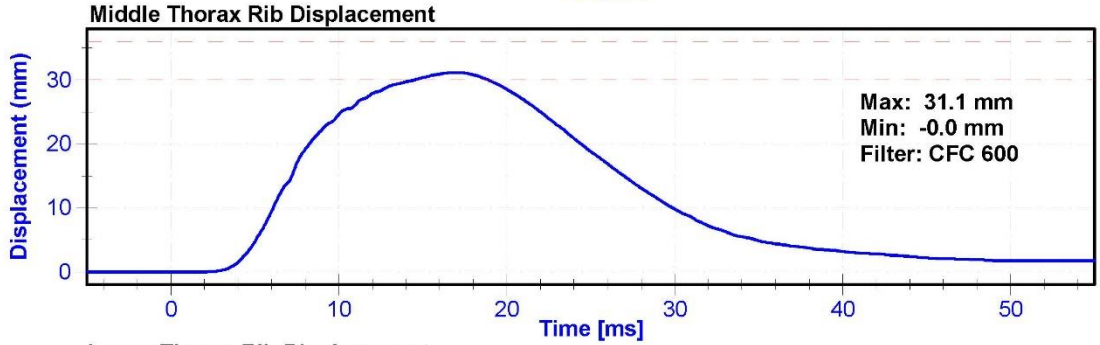
Transducer Calibrations

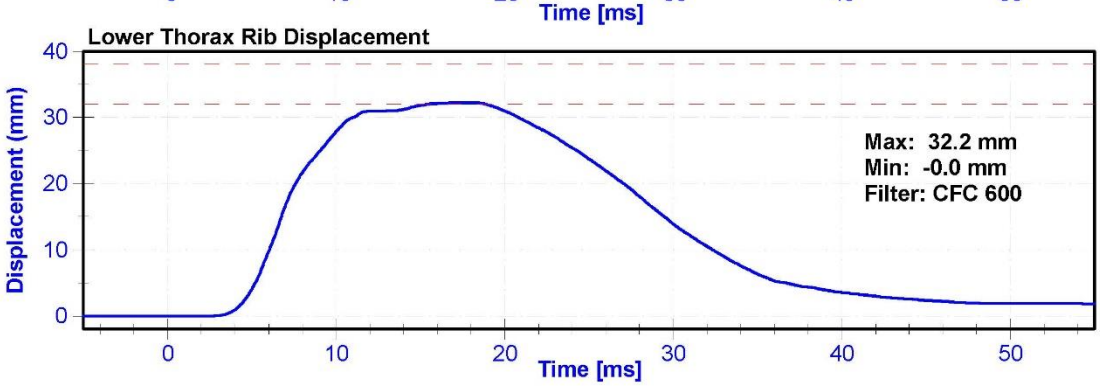
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	6/16/2016	6/16/2017
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	6/16/2016	6/16/2017
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	6/16/2016	6/16/2017
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	6/16/2016	6/16/2017

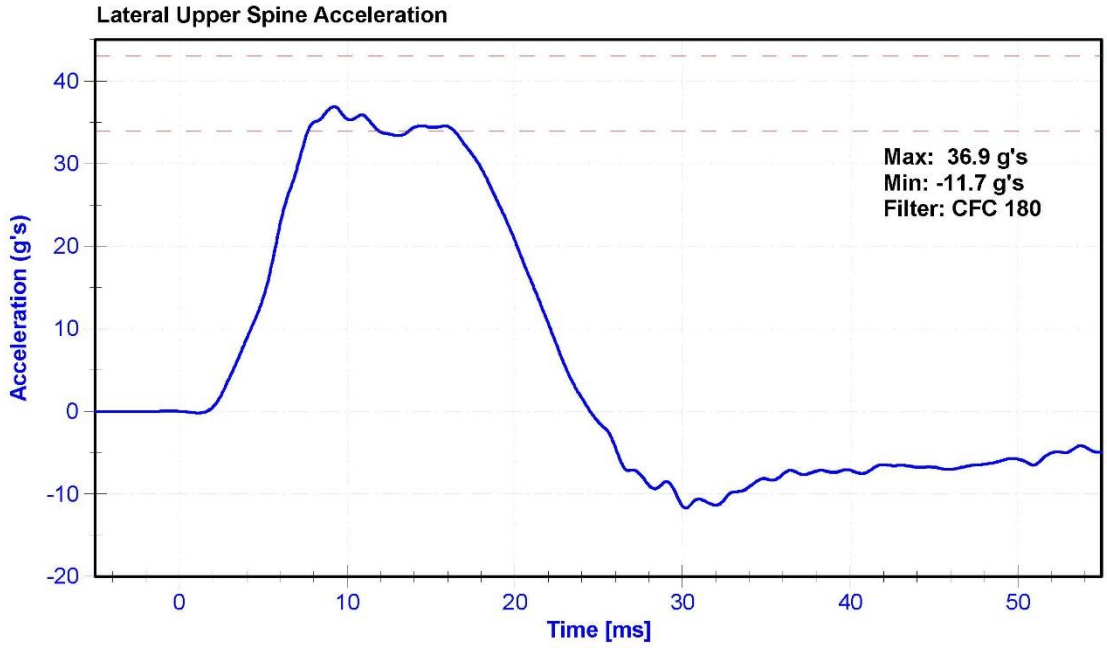


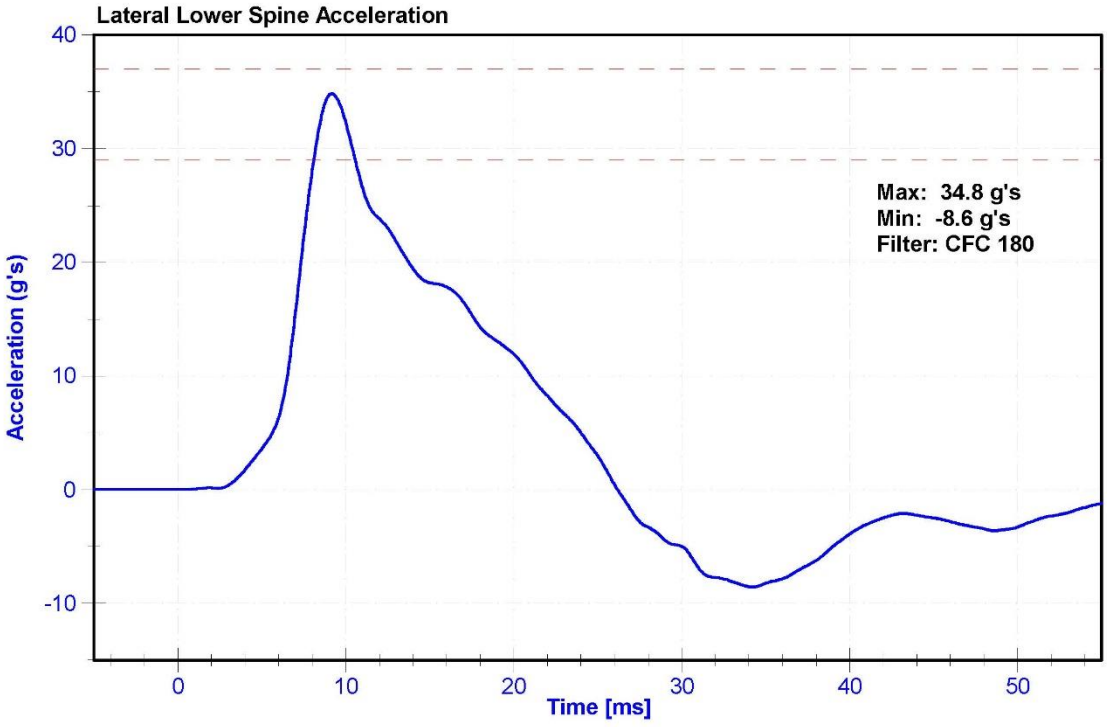

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.5 mm
Min: -2.5 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 27.2 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.1 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: 36.9 g's
Min: -11.7 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 34.8 g's
Min: -8.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

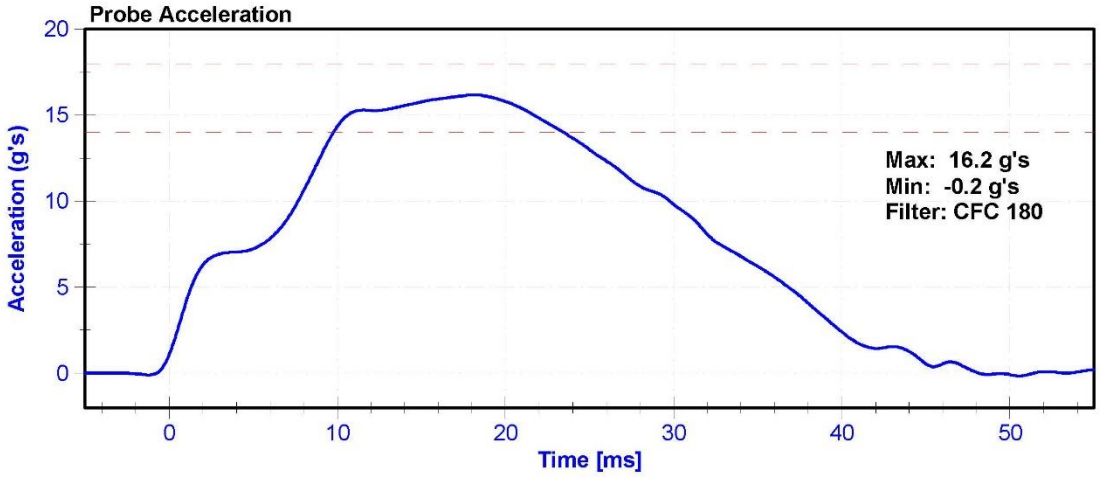
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

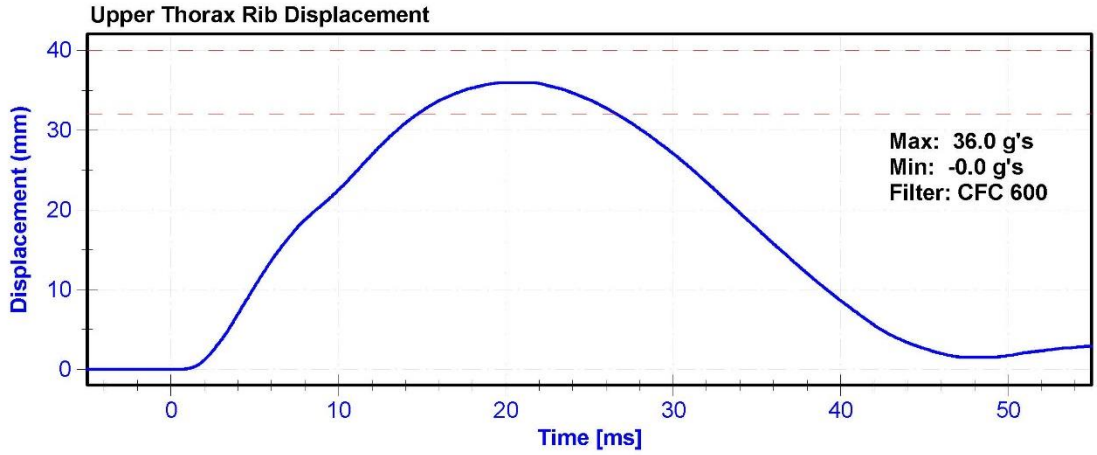
Results

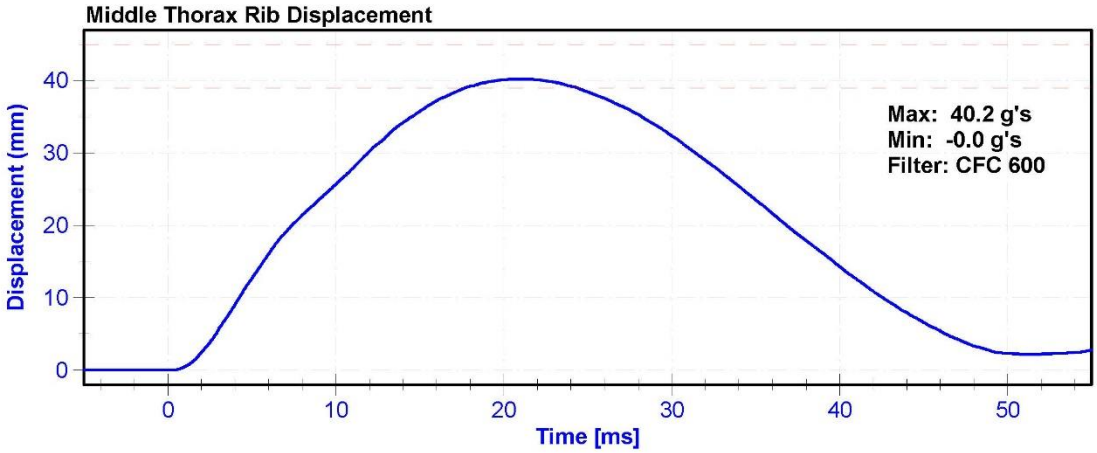
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	43.5	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.2	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.5	Pass
Upper Thorax Rib Deflection	32	40	mm	36.0	Pass
Middle Thorax Rib Deflection	39	45	mm	40.2	Pass
Lower Thorax Rib Deflection	35	43	mm	35.4	Pass

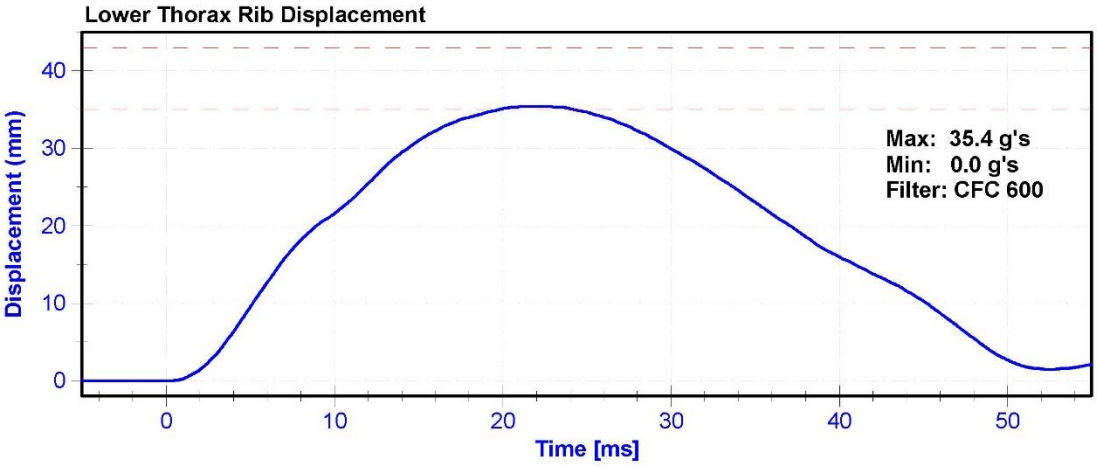
Transducer Calibrations

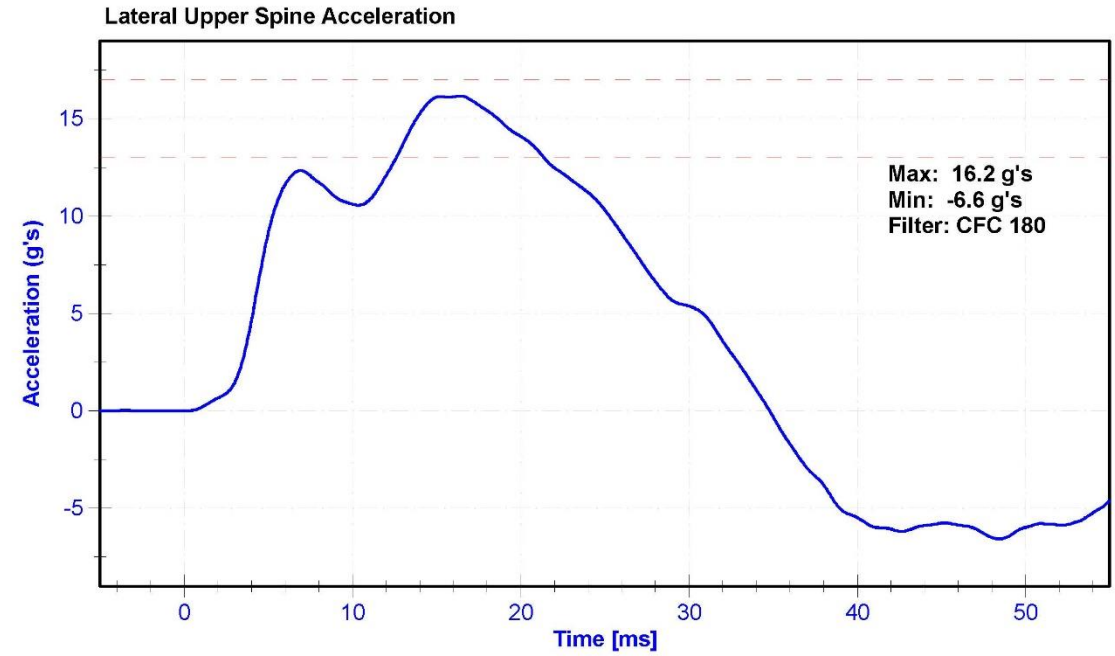
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	6/16/2016	6/16/2017
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	6/16/2016	6/16/2017
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	6/16/2016	6/16/2017

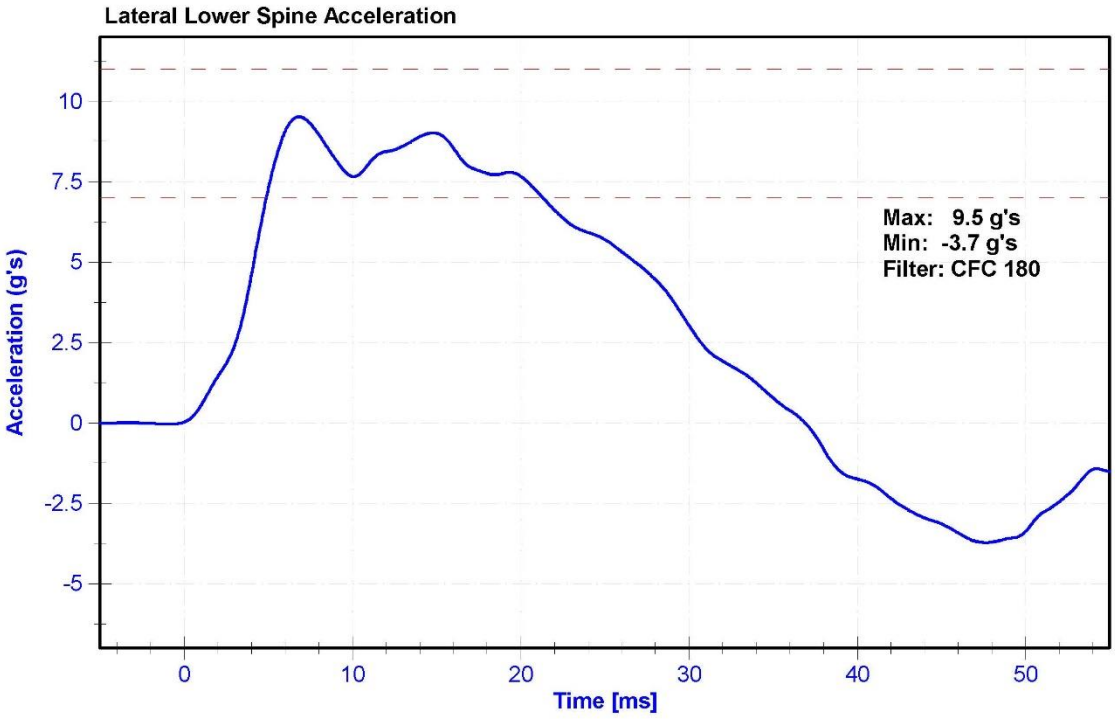



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.0 g's
Min: -0.0 g's
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.2 g's
Min: -0.0 g's
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.4 g's
Min: 0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 16.2 g's
Min: -6.6 g's
Filter: CFC 180
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]


Lateral Lower Spine Acceleration
Max: 9.5 g's
Min: -3.7 g's
Filter: CFC 180
Acceleration (g's)
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
Time [ms]

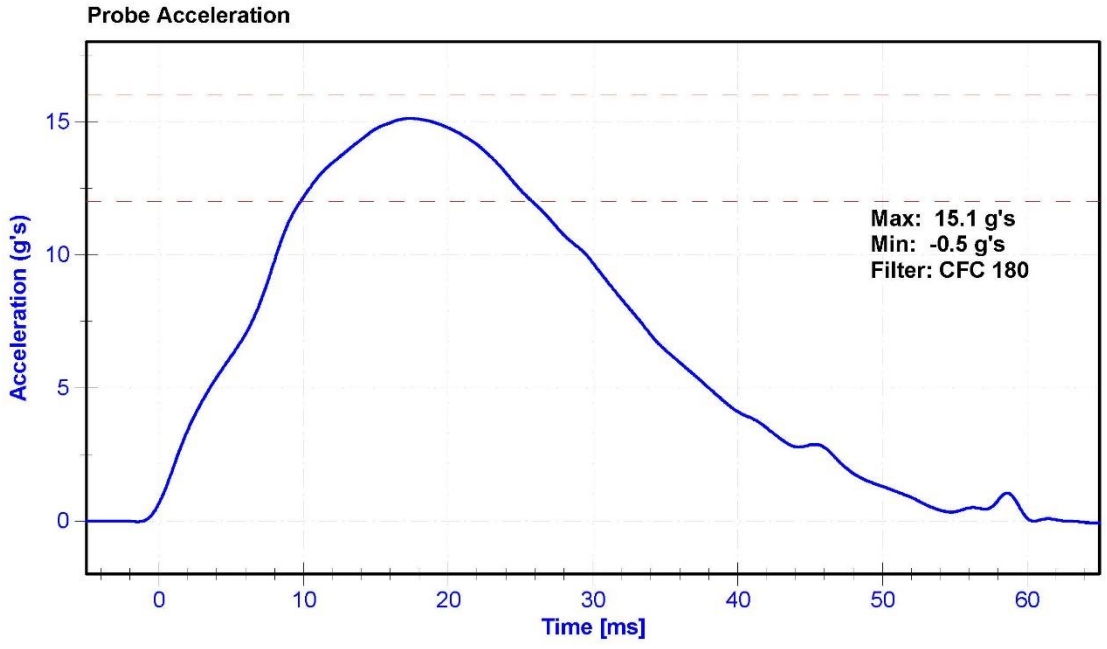
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

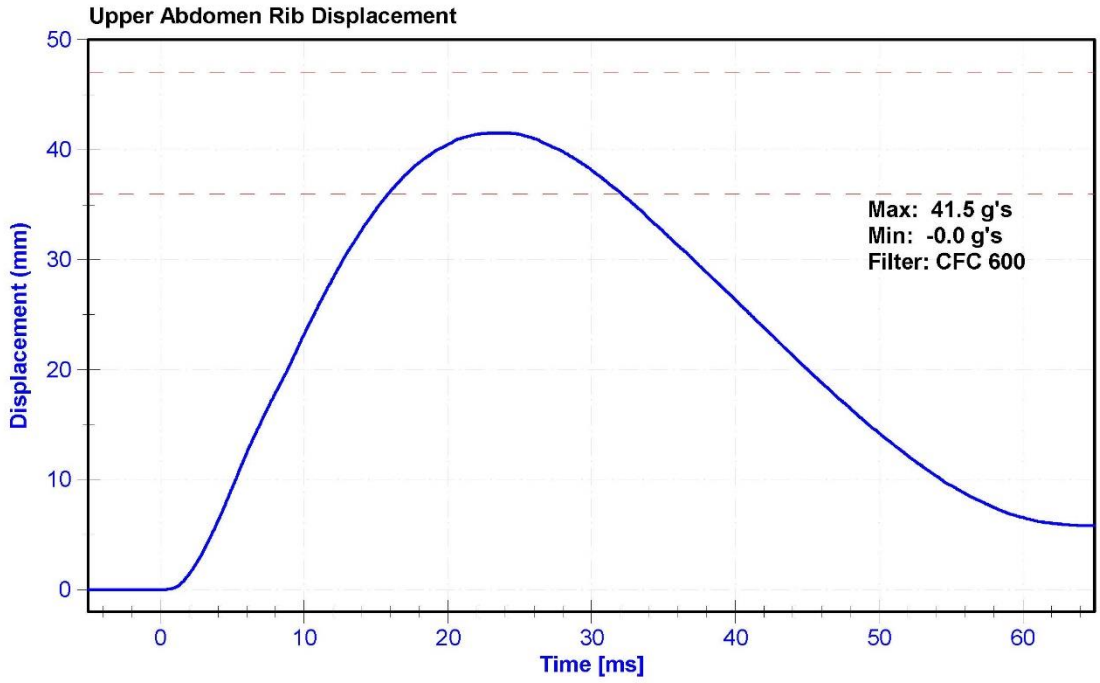
Results

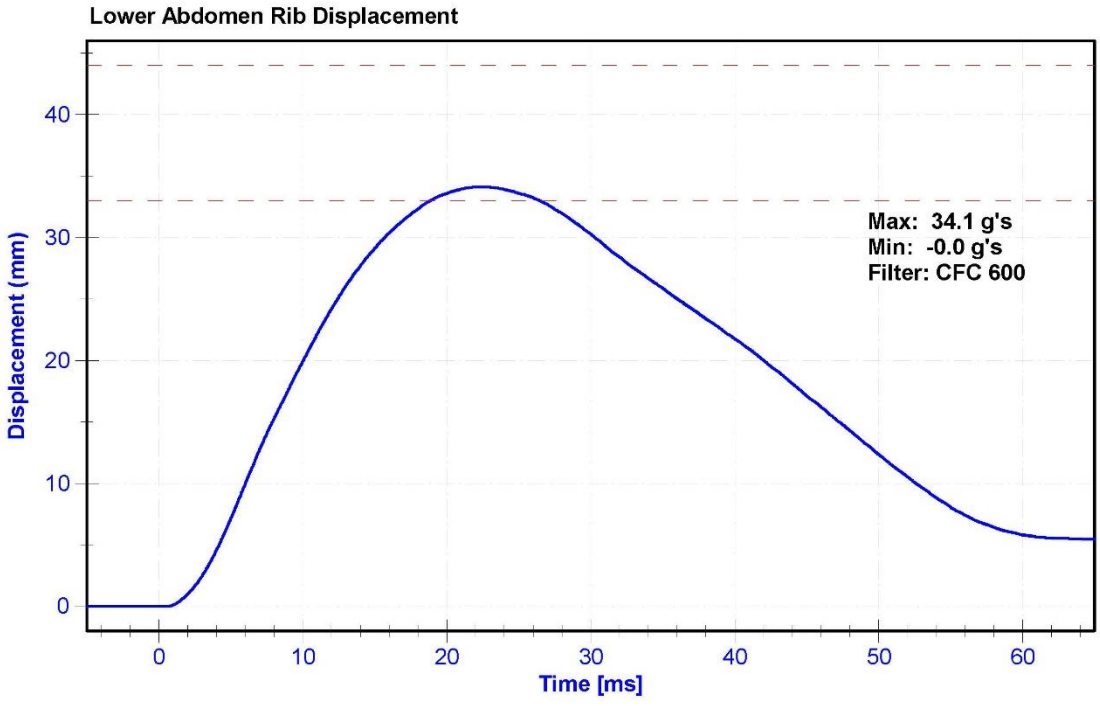
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	43.5	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	12	16	g's	15.1	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.5	Pass
Lower Abdomen Rib Deflection	33	44	mm	34.1	Pass

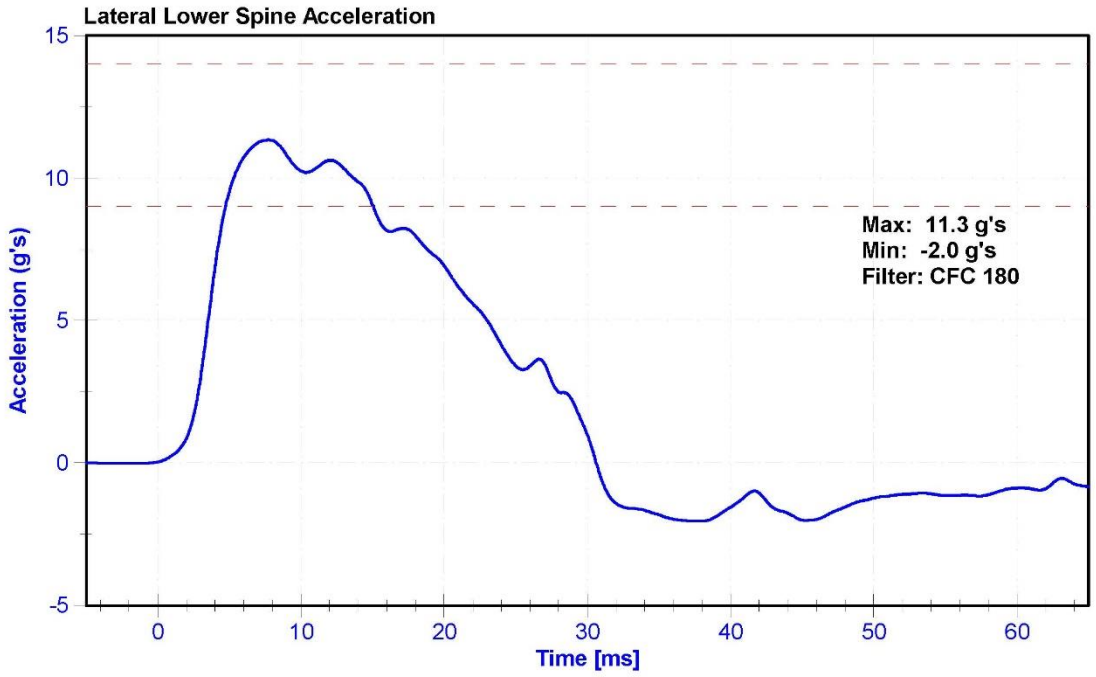
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	6/16/2016	6/16/2017
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	6/16/2016	6/16/2017

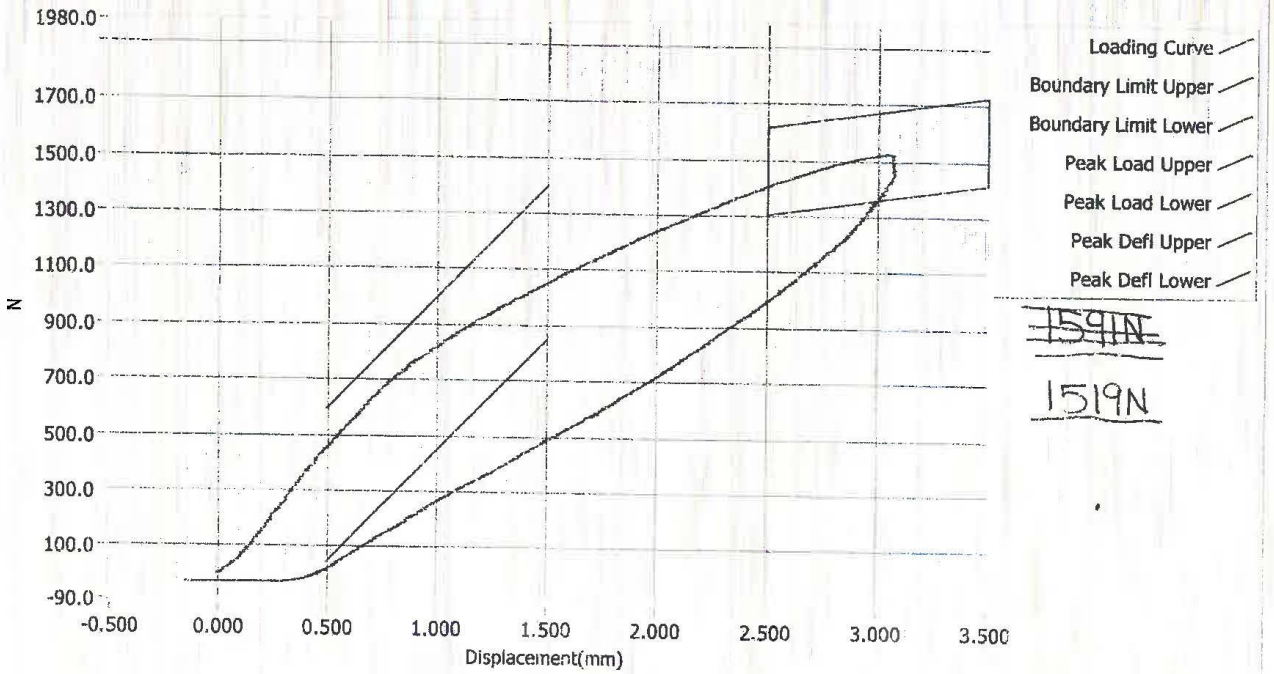



Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.5 g's
Min: -0.0 g's
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.1 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.3 g's
Min: -2.0 g's
Filter: CFC 180

Resultant Data - SIDIIs Plug Compression



~~1591N~~

1519N

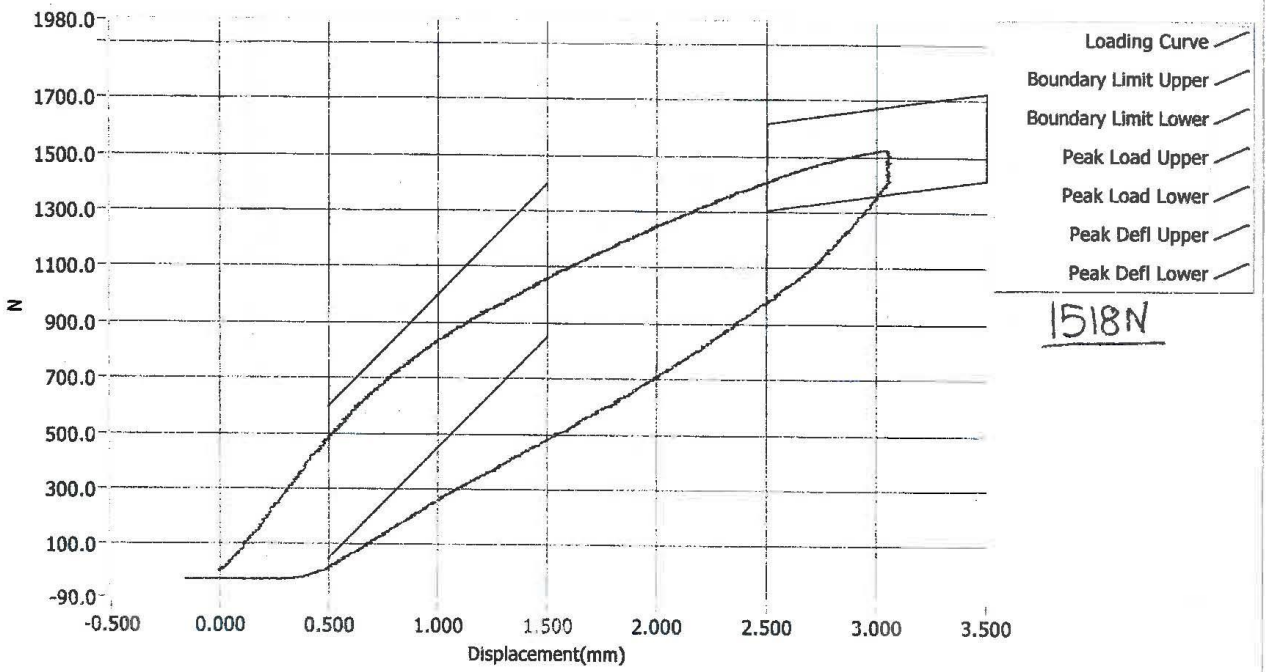
ATD Calibration Lab

CRASH

Test ID	Part Serial Number	Test Date	Test Time
	70763	12/13/2013	3:46 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/13/2013 Current Time : 15:46:36

Resultant Data - SIDIIs Plug Compression



1518N

ATD Calibration Lab

CERTIFICATION

Test ID	Part Serial Number	Test Date	Test Time
	70838	12/13/2013	5:19 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/13/2013 Current Time : 17:20:02

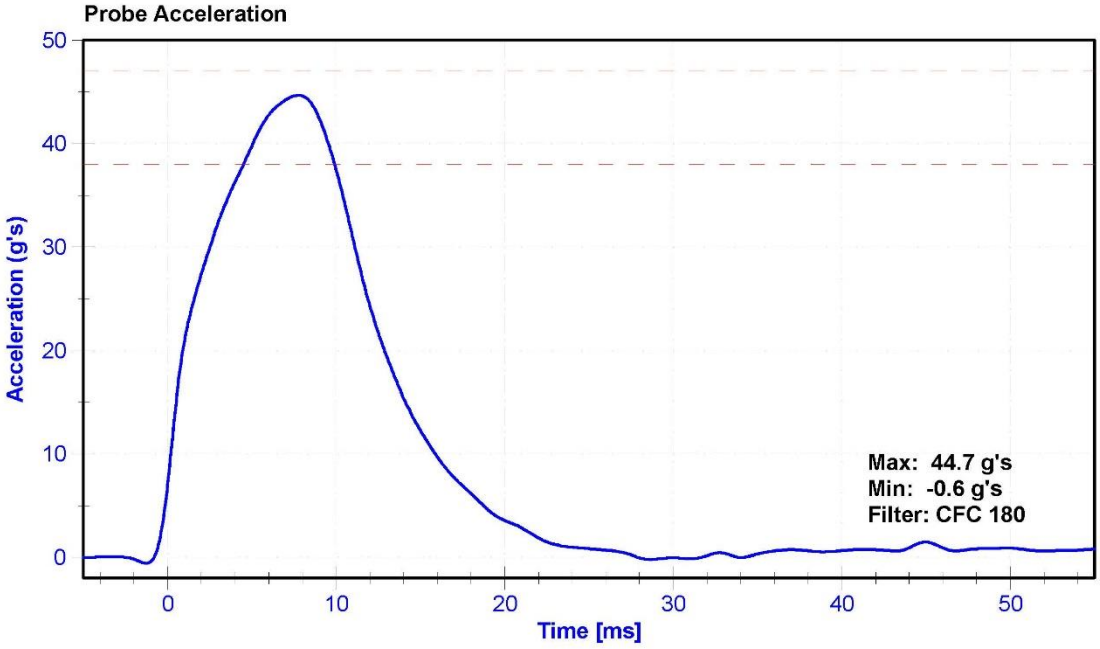
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

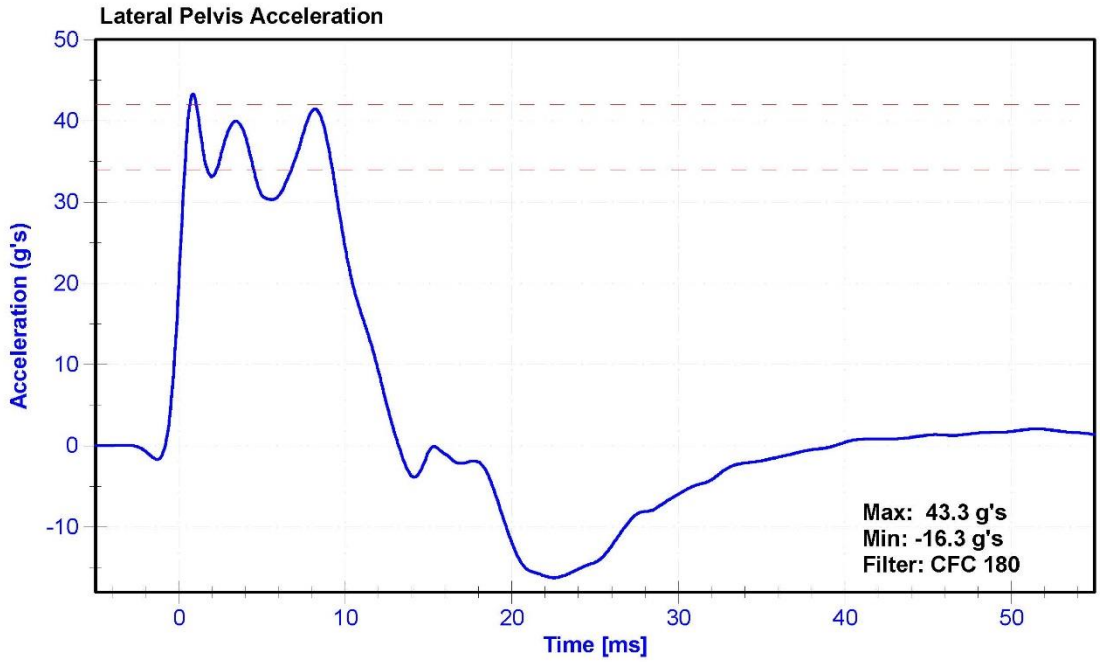
Results

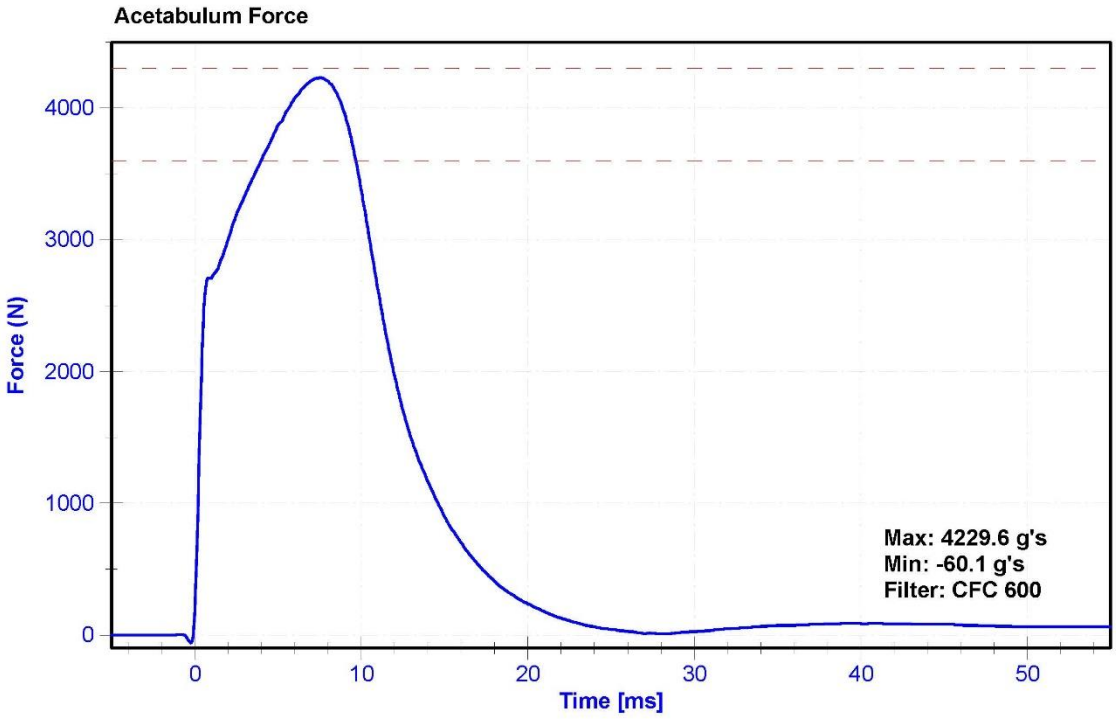
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	40.2	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration	38	47	g's	44.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.4	Pass
Acetabulum Force	3600	4300	N	4229.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P35797	6/16/2016	12/15/2016
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	5/24/2016	5/24/2017
Certification Plug	Humanetics	70838	12-13-2013	N/A
Crash Test Plug	Humanetics	70763	12-13-2013	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 43.3 g's
Min: -16.3 g's
Filter: CFC 180


Acetabulum Force
Force (N)
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 4229.6 g's
Min: -60.1 g's
Filter: CFC 600

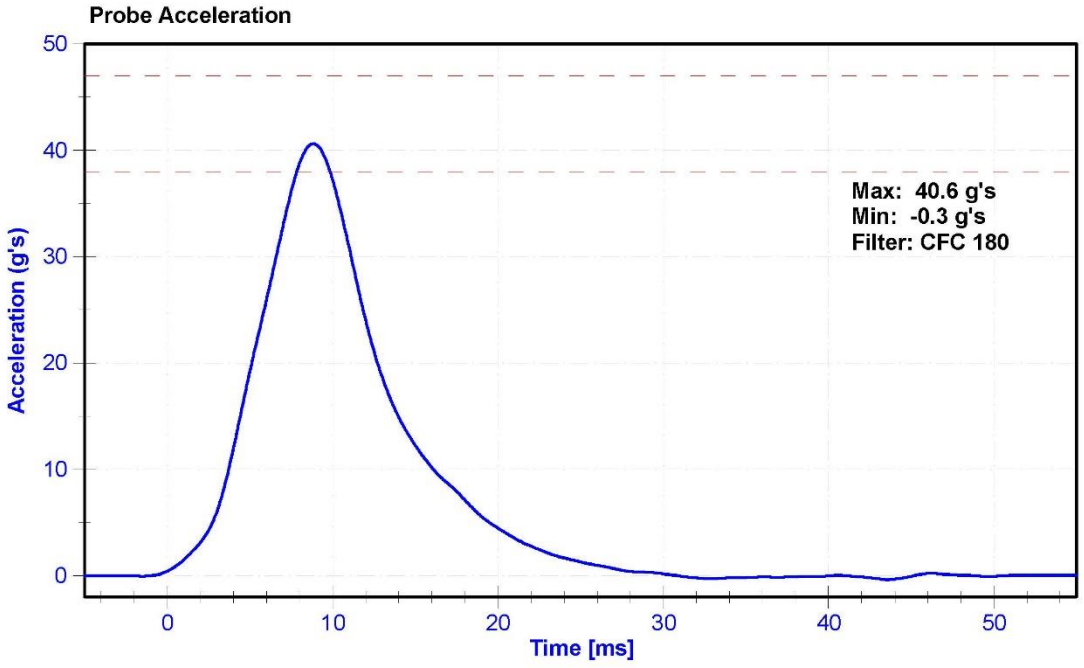
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

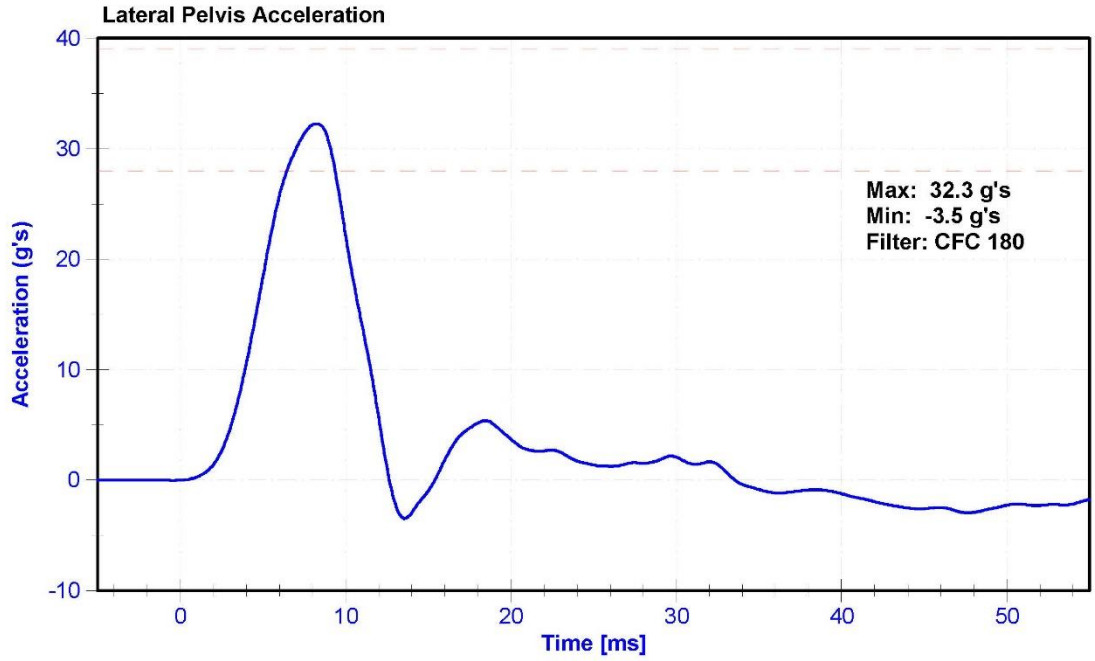
Results

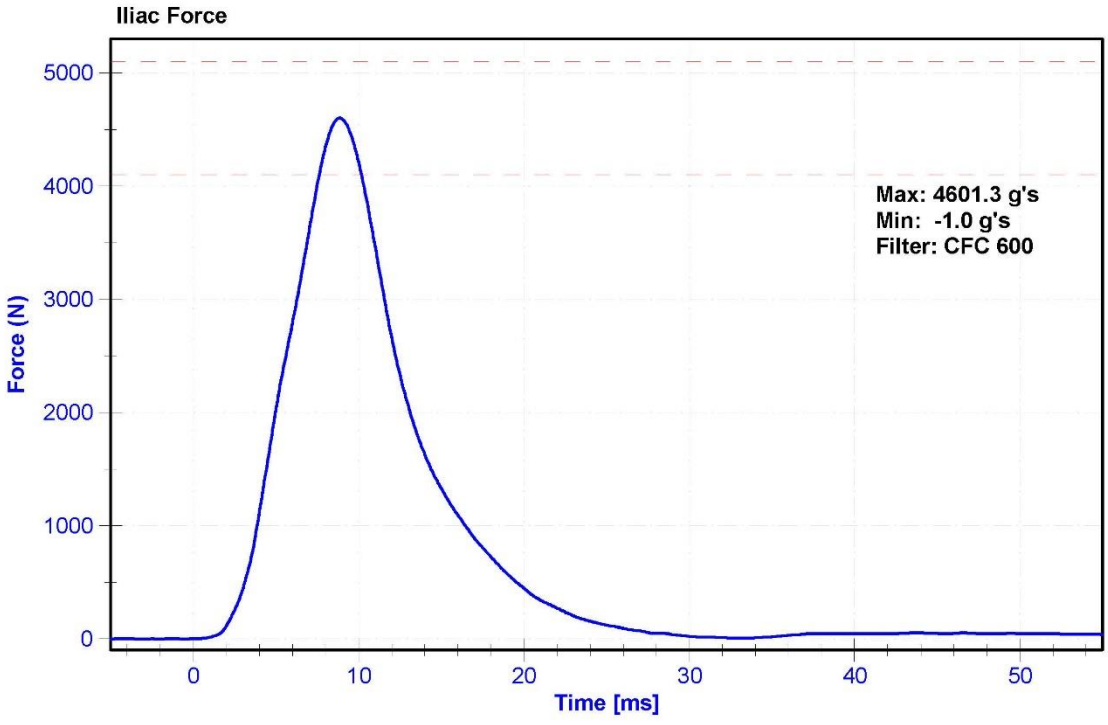
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	42.8	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	36	45	g's	40.6	Pass
Lateral Pelvis Acceleration	28	39	g's	32.3	Pass
Iliac Force	4100	5100	N	4601.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P35797	6/16/2016	12/15/2016
Iliac Load Cell	DENTON 3228J	LC-279Fy	5/24/2016	5/24/2017




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 32.3 g's
Min: -3.5 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4601.3 g's
Min: -1.0 g's
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

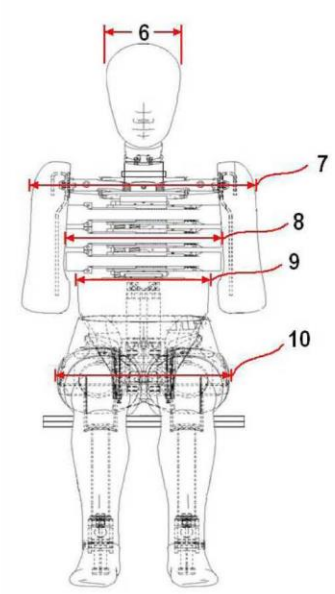
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

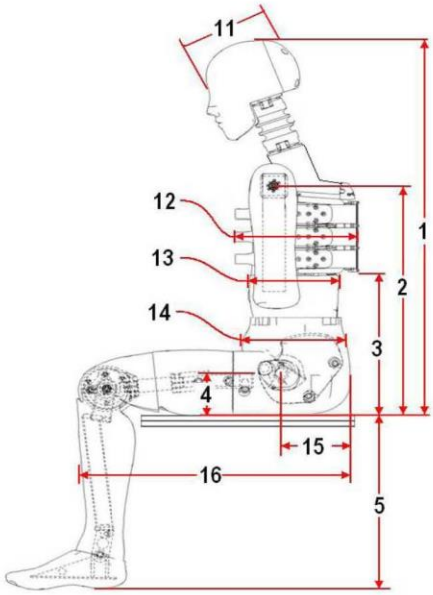
External Measurements - EuroSID-2re

Technician: M.Hartung Date: 6/28/2016

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	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	351	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	408	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	474	Pass
8	Thorax Width	322	332	327	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	366	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	201	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	606	Pass

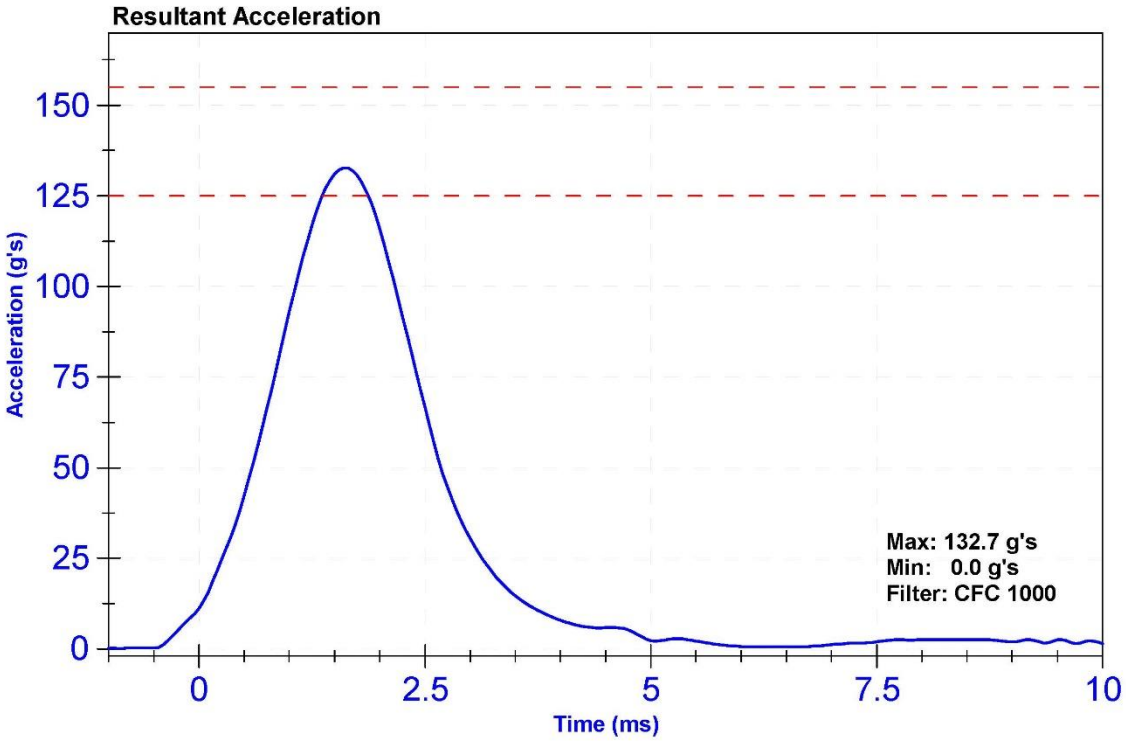
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	F034	Laboratory Supervisor	M. Goehle

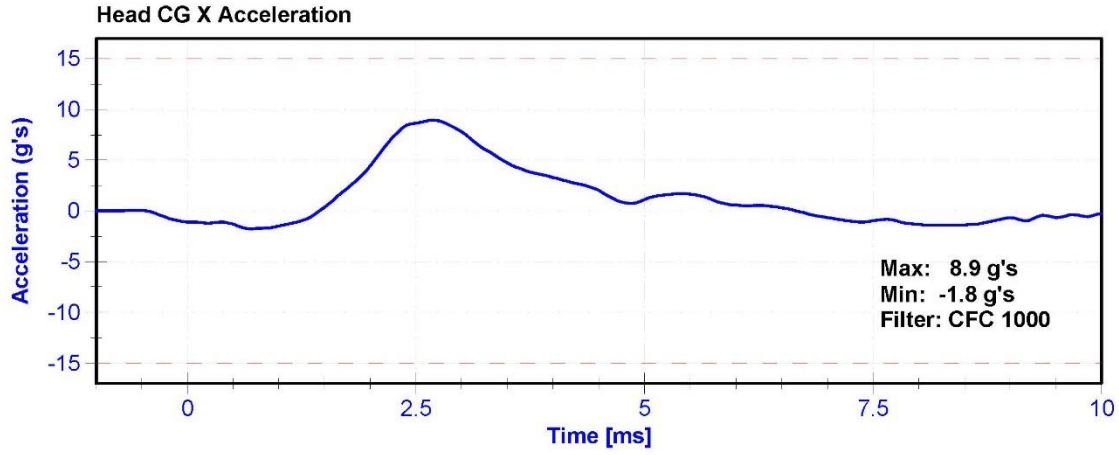
Results

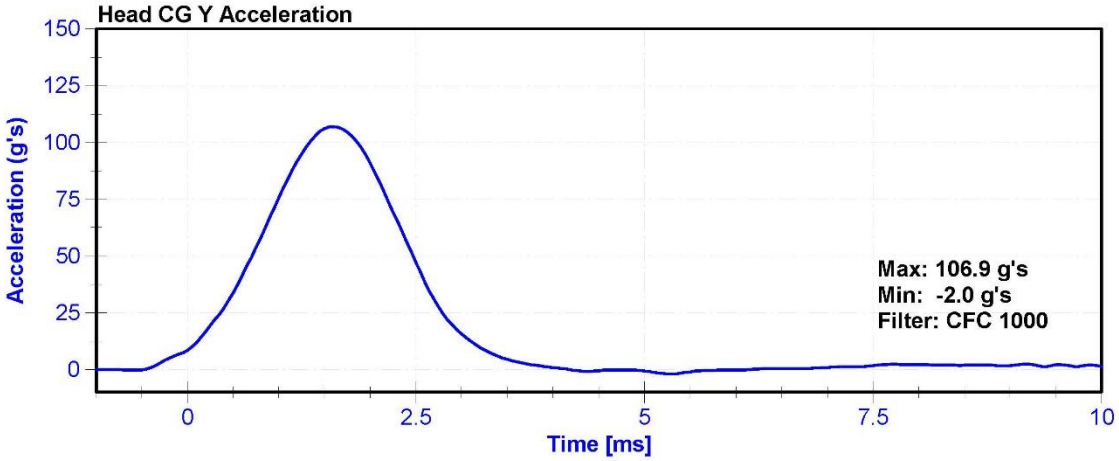
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	58.0	Pass
Resultant Acceleration	125	155	g's	132.7	Pass
Oscillation	0	15	%	1.94	Pass
Fore-Aft Acceleration	-15	15	g's	8.9	Pass

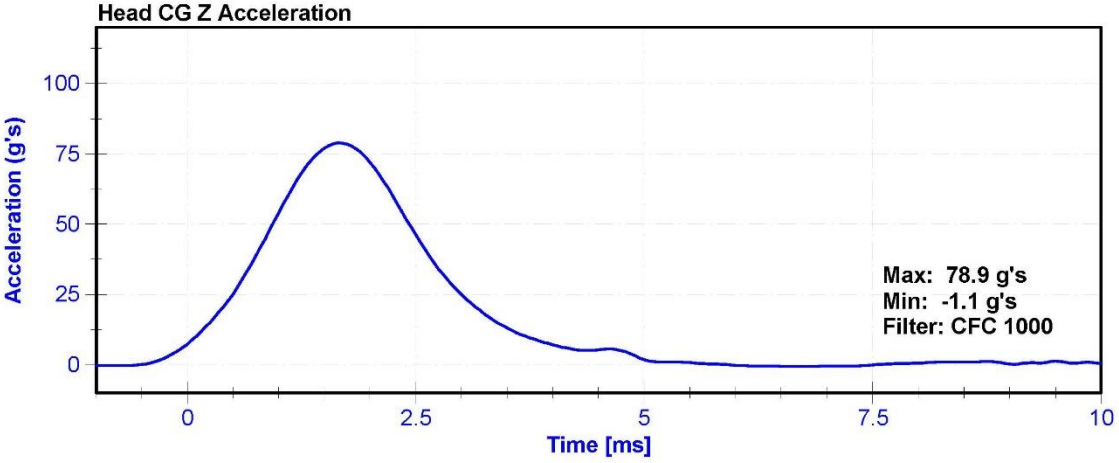
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58904	10/19/2016	4/19/2017
Y Accelerometer	ENDEVCO 7264CT	AC-P58911	10/19/2016	4/19/2017
Z Accelerometer	ENDEVCO 7264CT	AC-P58776	10/19/2016	4/19/2017




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 8.9 g's
Min: -1.8 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 106.9 g's
Min: -2.0 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 78.9 g's
Min: -1.1 g's
Filter: CFC 1000

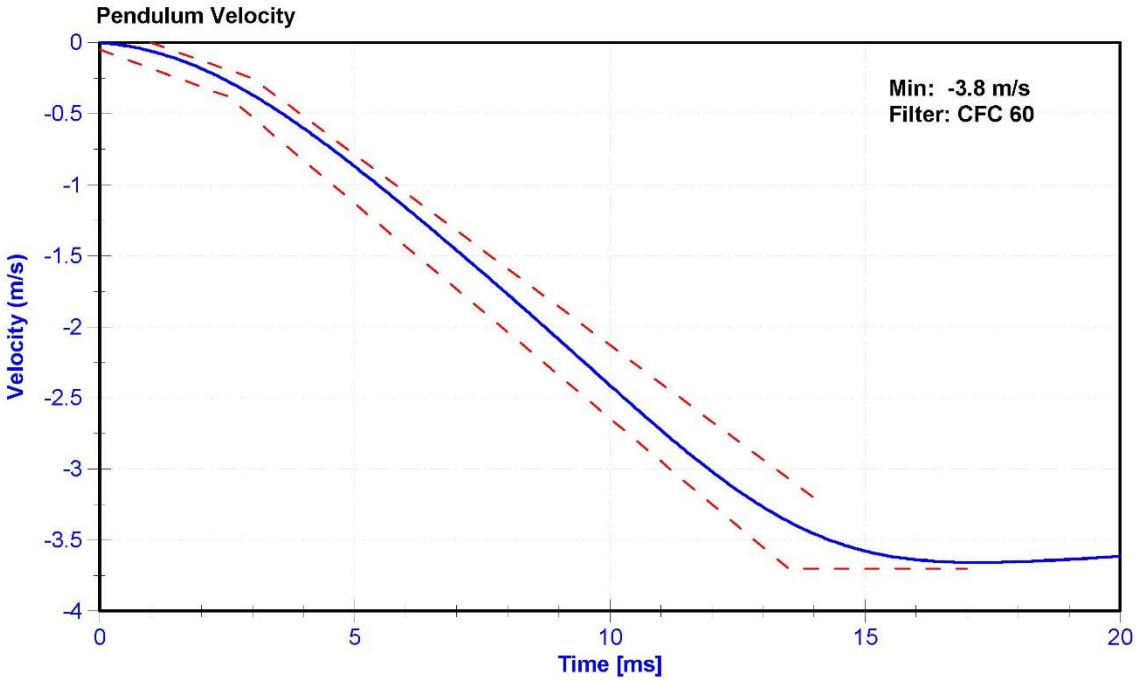
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

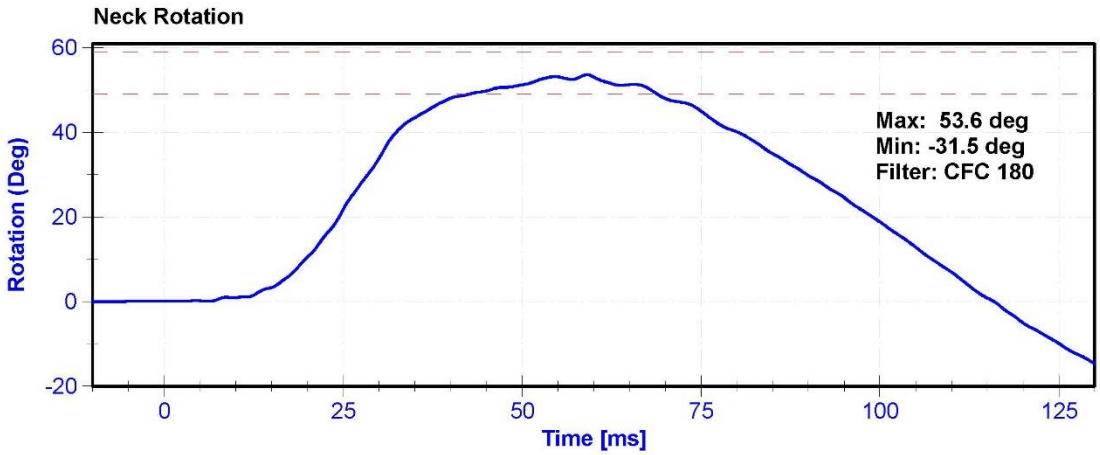
Results

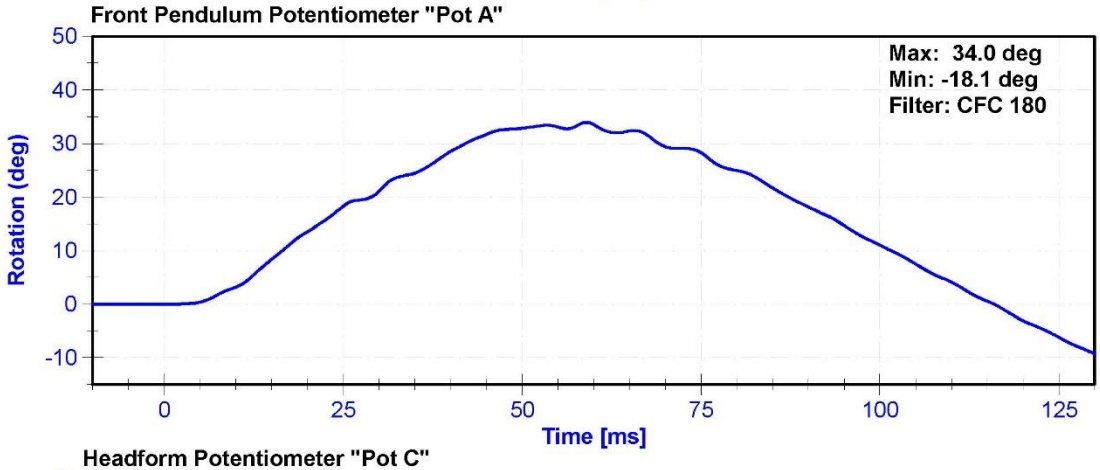
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	52.2	Pass
Velocity	3.3	3.5	m/s	3.47	Pass
Lateral Neck Rotation	49	59	deg	53.6	Pass
Time at Maximum Rotation	54	66	ms	59.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	56.9	Pass

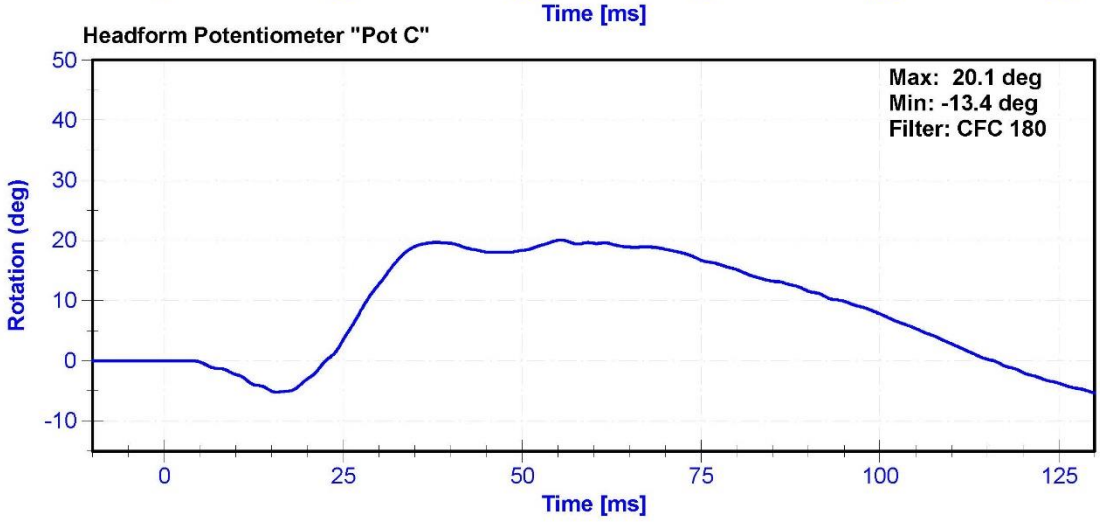
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Front Pendulum Potentiometer	SP22G	DS-094	9/24/2015	9/23/2016
Headform Potentiometer	SP22G	DS-095	9/24/2015	9/23/2016




Neck Rotation
Rotation (Deg)
60
40
20
0
-20
0
25
50
75
100
125
Time [ms]
Max: 53.6 deg
Min: -31.5 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
50
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]
Max: 34.0 deg
Min: -18.1 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
50
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]
Max: 20.1 deg
Min: -13.4 deg
Filter: CFC 180

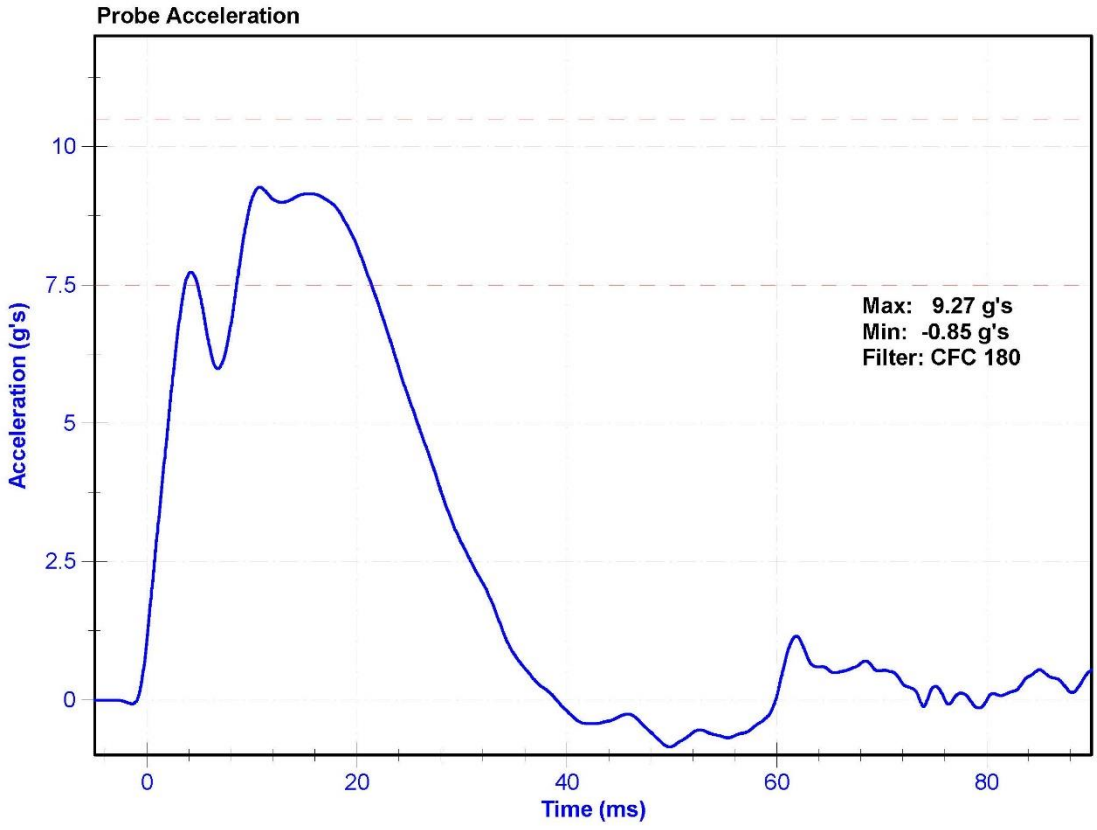
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	52.3	Pass
Velocity	4.2	4.4	m/s	4.22	Pass
Probe Acceleration	7.5	10.5	g's	9.27	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016



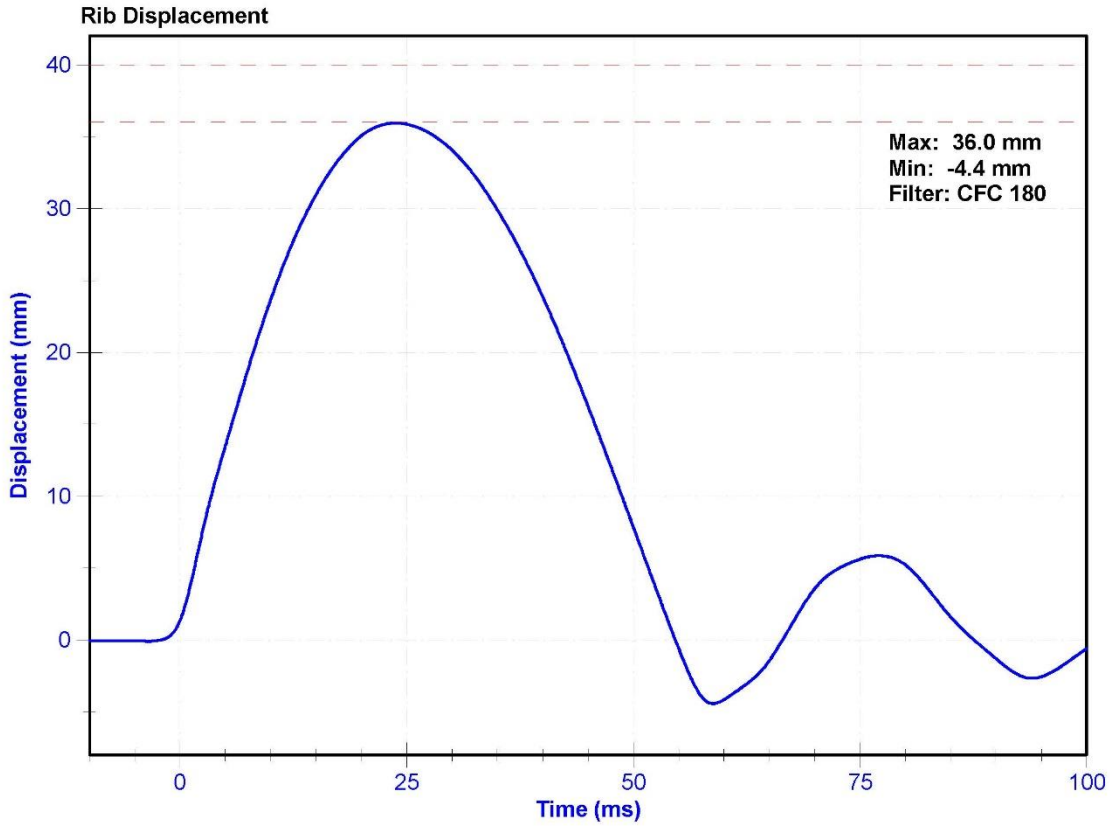
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	Pass
Rib Displacement	36	40	mm	36.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016



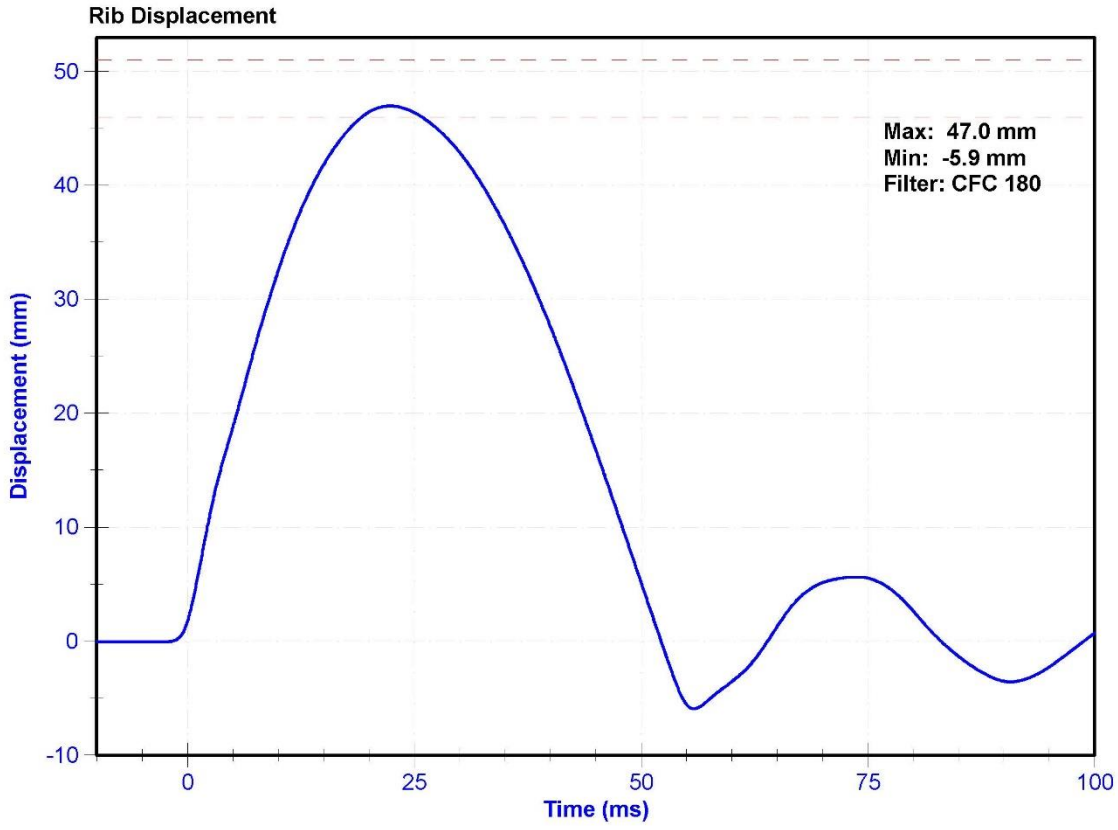
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	Pass
Rib Displacement	46	51	mm	47.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016



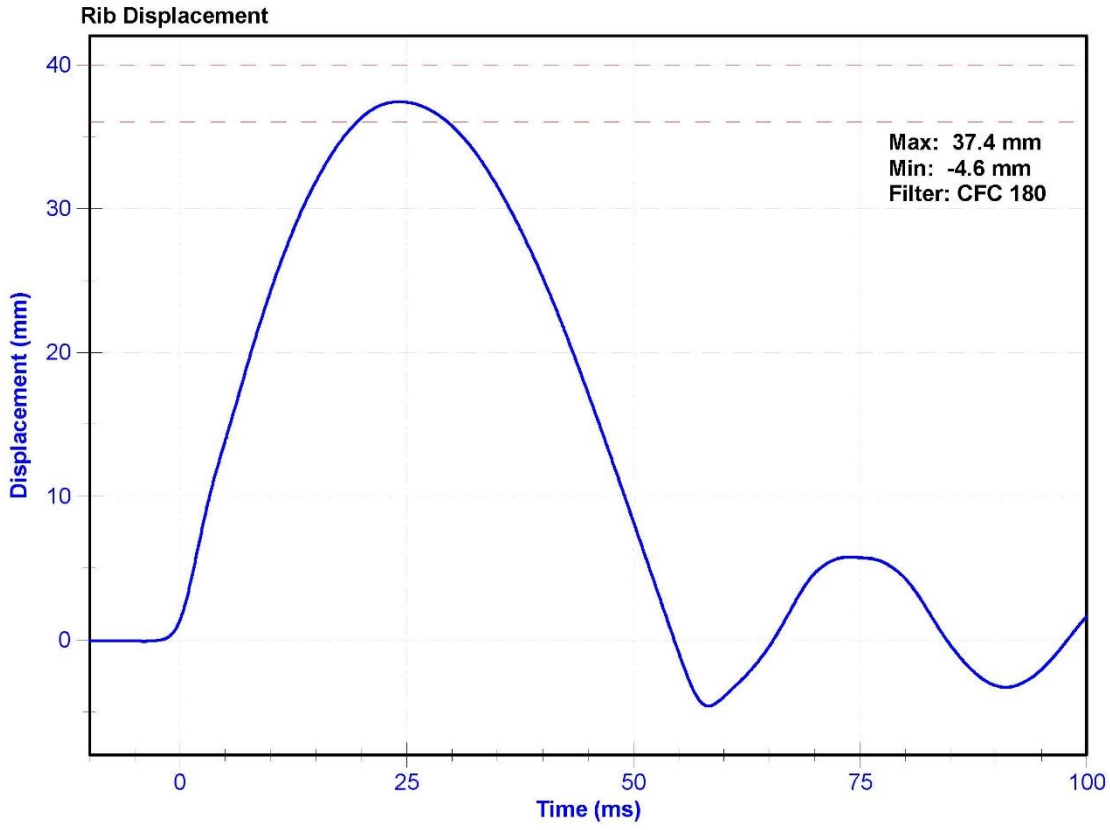
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016



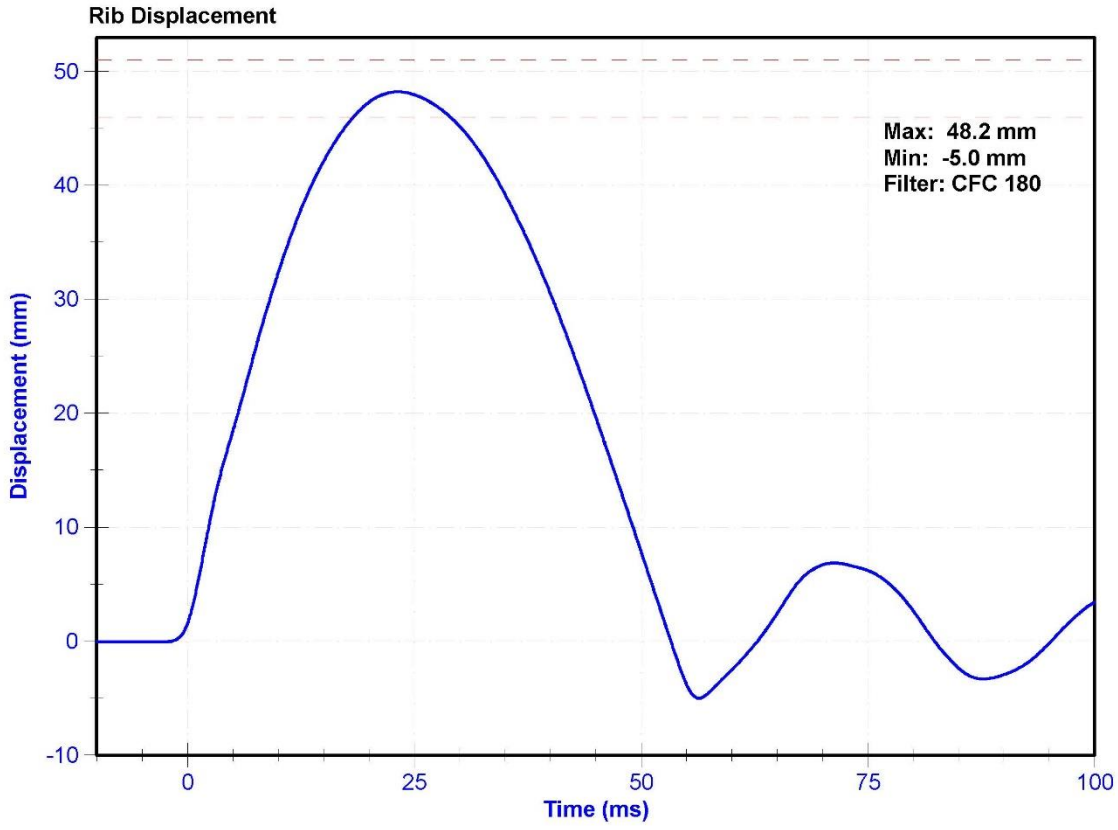
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	Pass
Rib Displacement	46	51	mm	48.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016



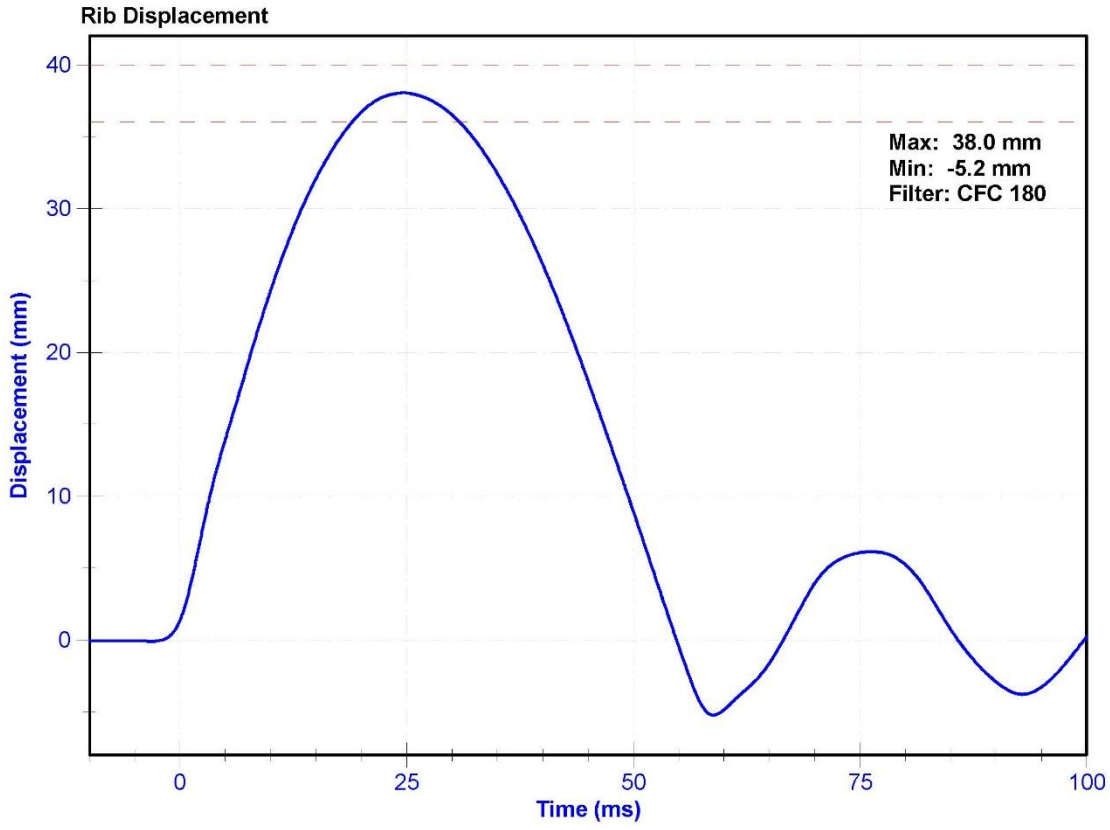
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	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-182GFE	10/19/2015	10/18/2016



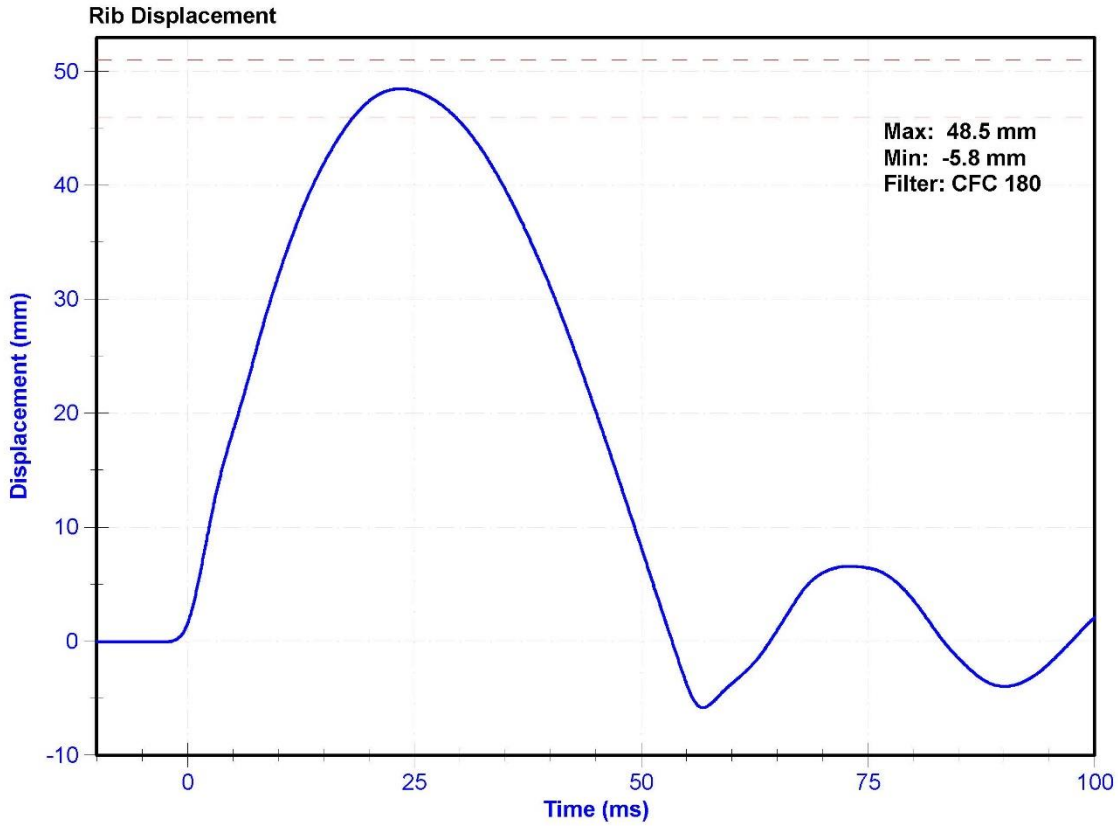
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	58.8	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/19/2015	10/18/2016



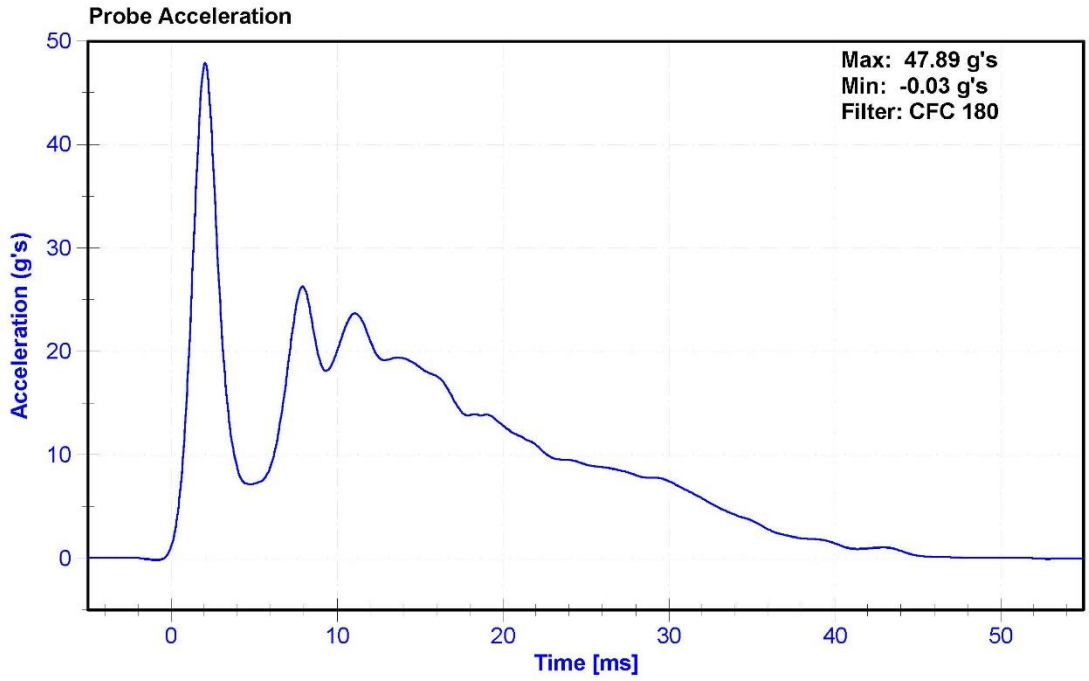
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

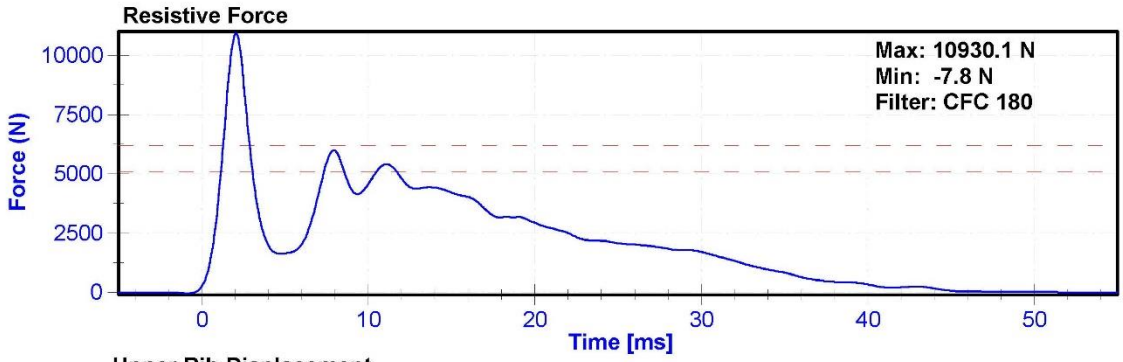
Results

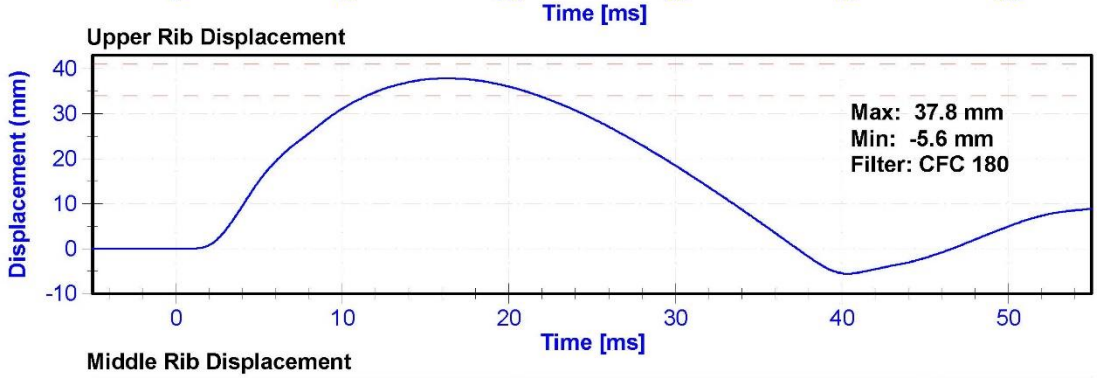
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	45.2	Pass
Velocity	5.4	5.6	m/s	5.41	Pass
Resistive Force after 6ms	5100	6200	N	5994.4	Pass
Upper Thorax Rib Deflection	34	41	mm	37.8	Pass
Mid Thorax Rib Deflection	37	45	mm	41.5	Pass
Lower Thorax Rib Deflection	37	44	mm	40.7	Pass

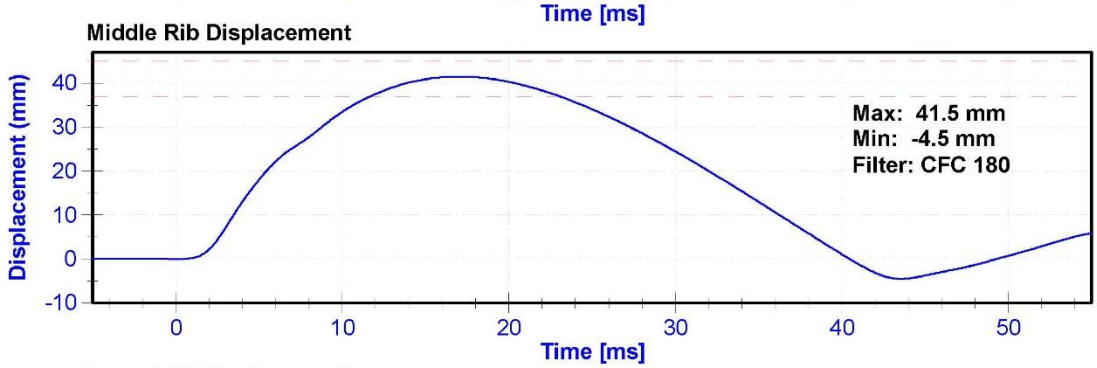
Transducer Calibrations

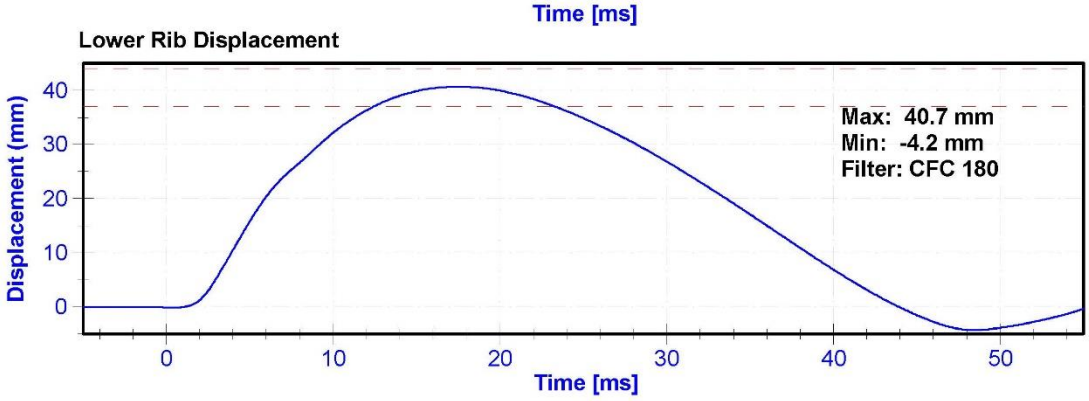
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	10/19/2015	10/18/2016
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	10/19/2015	10/18/2016
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	10/19/2015	10/18/2016




Resistive Force
Force (N)
10000
7500
5000
2500
0
0
10
20
30
40
50
Time [ms]
Max: 10930.1 N
Min: -7.8 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 37.8 mm
Min: -5.6 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.5 mm
Min: -4.5 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
40
30
20
10
0
0
10
20
30
40
50
Time [ms]
Max: 40.7 mm
Min: -4.2 mm
Filter: CFC 180

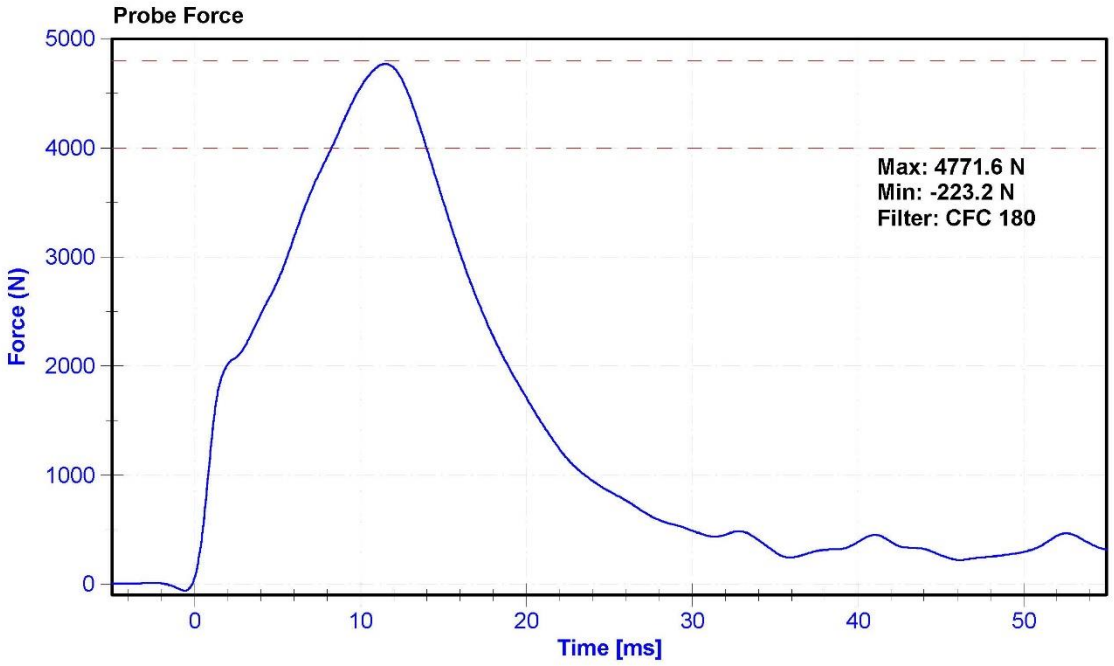
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

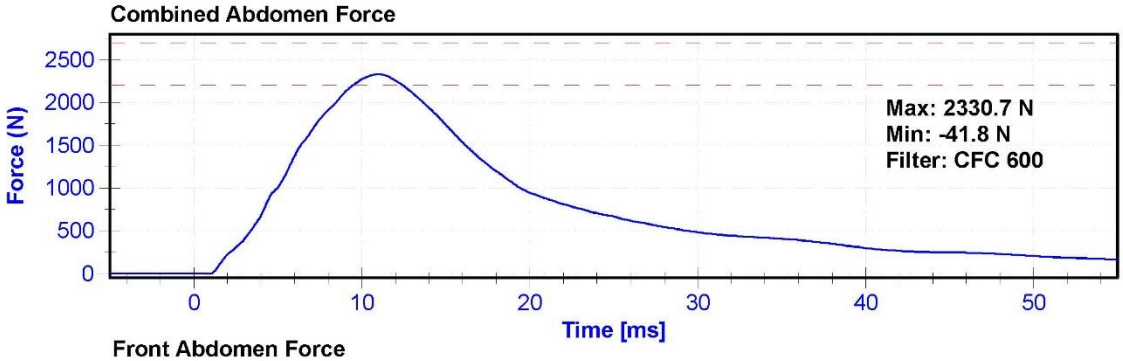
Results

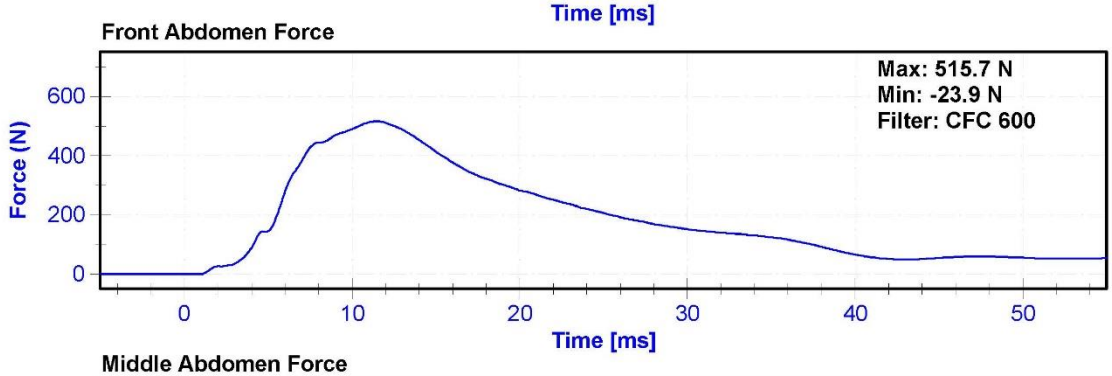
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	56.8	Pass
Velocity	3.9	4.1	m/s	4.02	Pass
Combined Abdomen Force	2200	2700	N	2330.7	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.00	Pass
Resistive Probe Force	4000	4800	N	4771.6	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.50	Pass

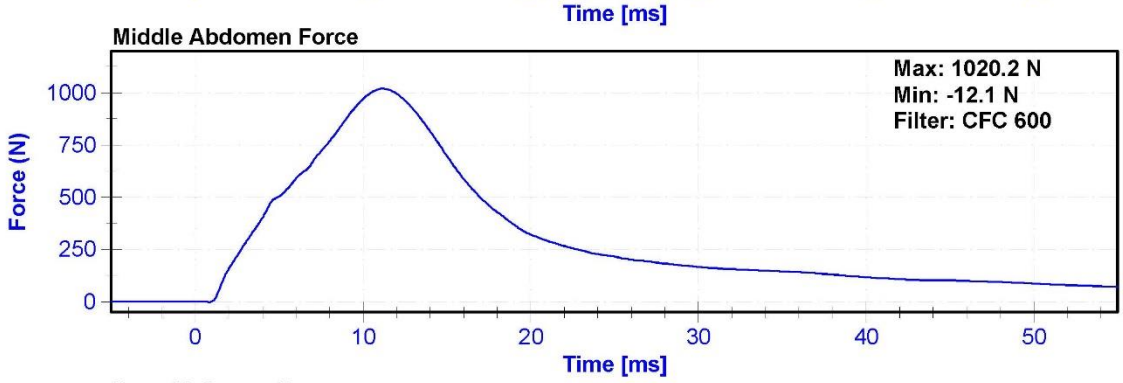
Transducer Calibrations

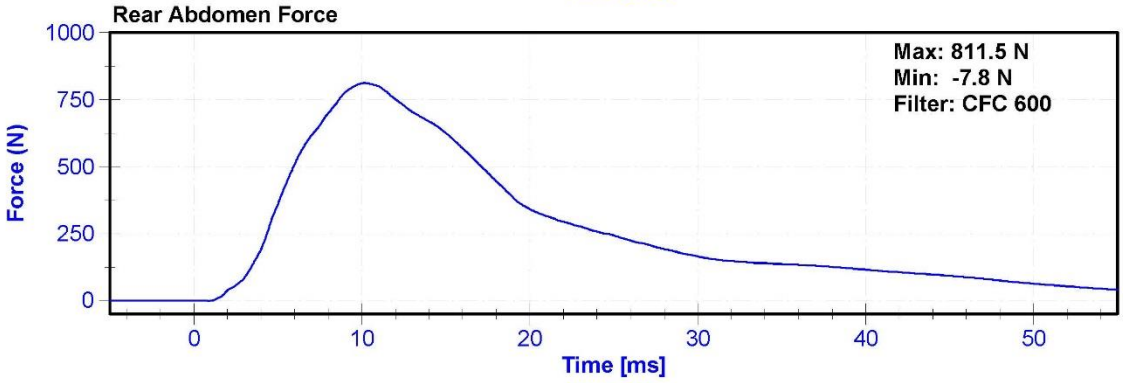
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Front Abdomen Load Cell	DENTON 2631	LC-1512	5/24/2016	5/24/2017
Middle Abdomen Load Cell	DENTON 2631	LC-1526	5/24/2016	5/24/2017
Rear Abdomen Load Cell	DENTON 2631	LC-1516	5/24/2016	5/24/2017




Combined Abdomen Force
Force (N)
2500
2000
1500
1000
500
0
Max: 2330.7 N
Min: -41.8 N
Filter: CFC 600
0
10
20
30
40
50
Time [ms]


Front Abdomen Force
Force (N)
600
400
200
0
Max: 515.7 N
Min: -23.9 N
Filter: CFC 600
0
10
20
30
40
50
Time [ms]


Middle Abdomen Force
Force (N)
1000
750
500
250
0
Max: 1020.2 N
Min: -12.1 N
Filter: CFC 600
0
10
20
30
40
50
Time [ms]


Rear Abdomen Force
Force (N)
1000
750
500
250
0
Max: 811.5 N
Min: -7.8 N
Filter: CFC 600
0
10
20
30
40
50
Time [ms]

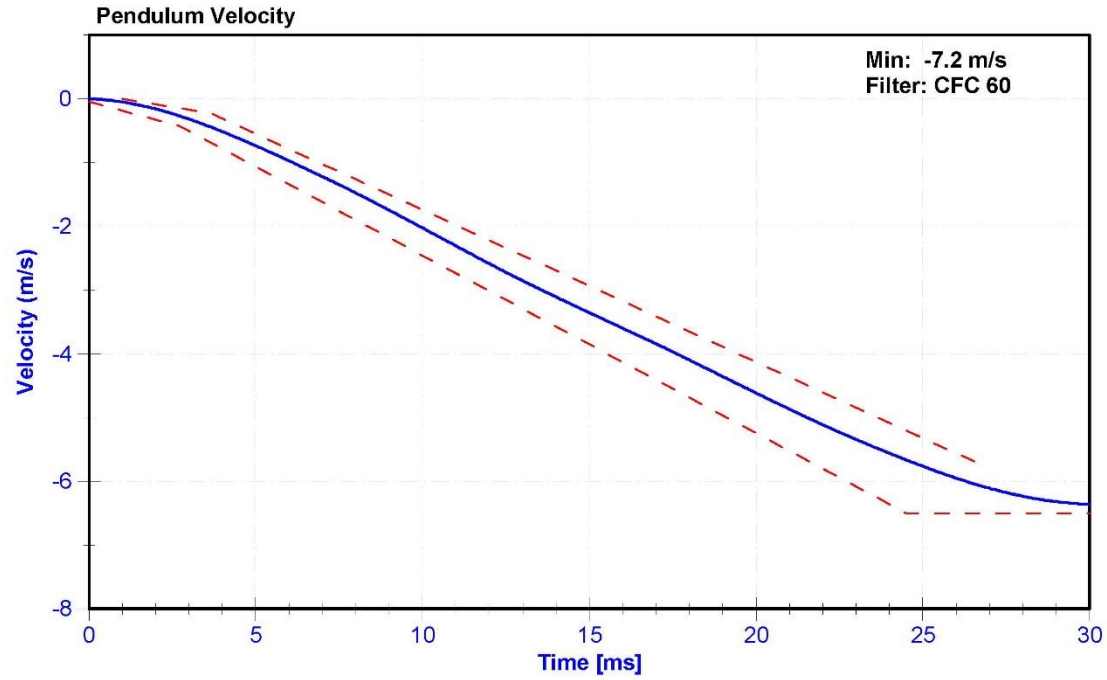
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

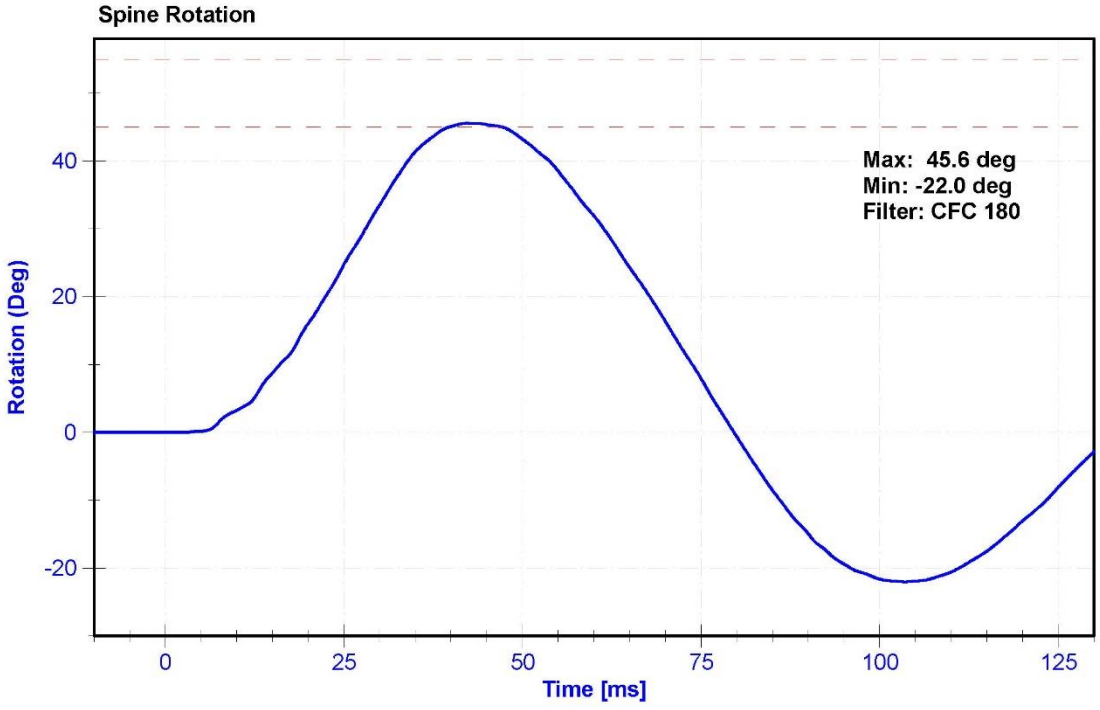
Results

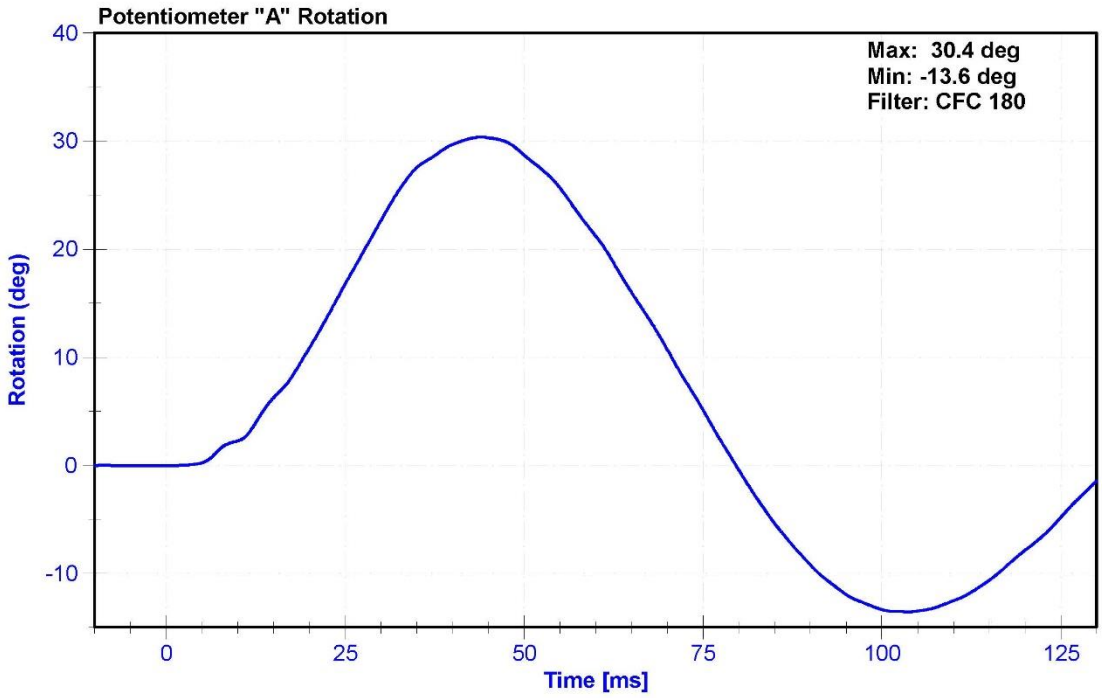
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	53.6	Pass
Velocity	5.95	6.15	m/s	6.113	Pass
Lateral Spine Rotation	45	55	deg	45.6	Pass
Time at Maximum Rotation	39	53	ms	42.2	Pass
Time of Decay to Zero Degrees	37	57	ms	37.5	Pass
Pulse within Corridor?	-	-	-		

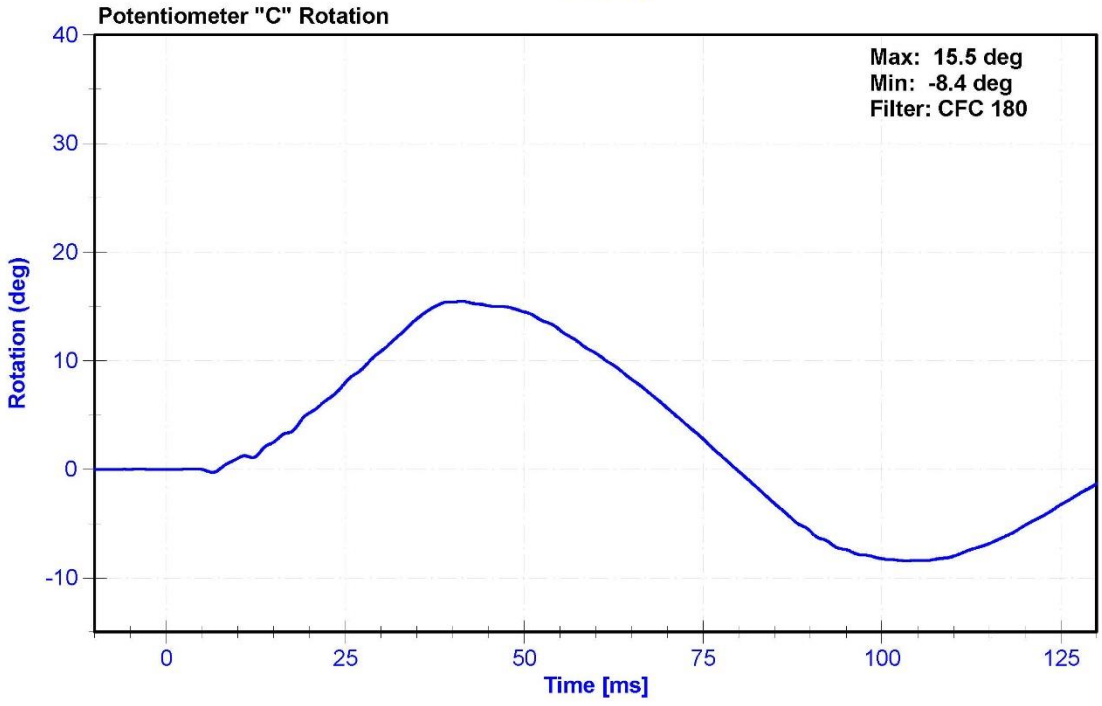
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Pendulum "A" Potentiometer	SP22G	DS-094	9/24/2015	9/23/2016
Condyle "B" Potentiometer	SP22G	DS-095	9/24/2015	9/23/2016


Pendulum Velocity
Min: -7.2 m/s
Filter: CFC 60
Velocity (m/s)
0
-2
-4
-6
-8
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 45.6 deg
Min: -22.0 deg
Filter: CFC 180
Rotation (Deg)
40
20
0
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 30.4 deg
Min: -13.6 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 15.5 deg
Min: -8.4 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
0
25
50
75
100
125
Time [ms]

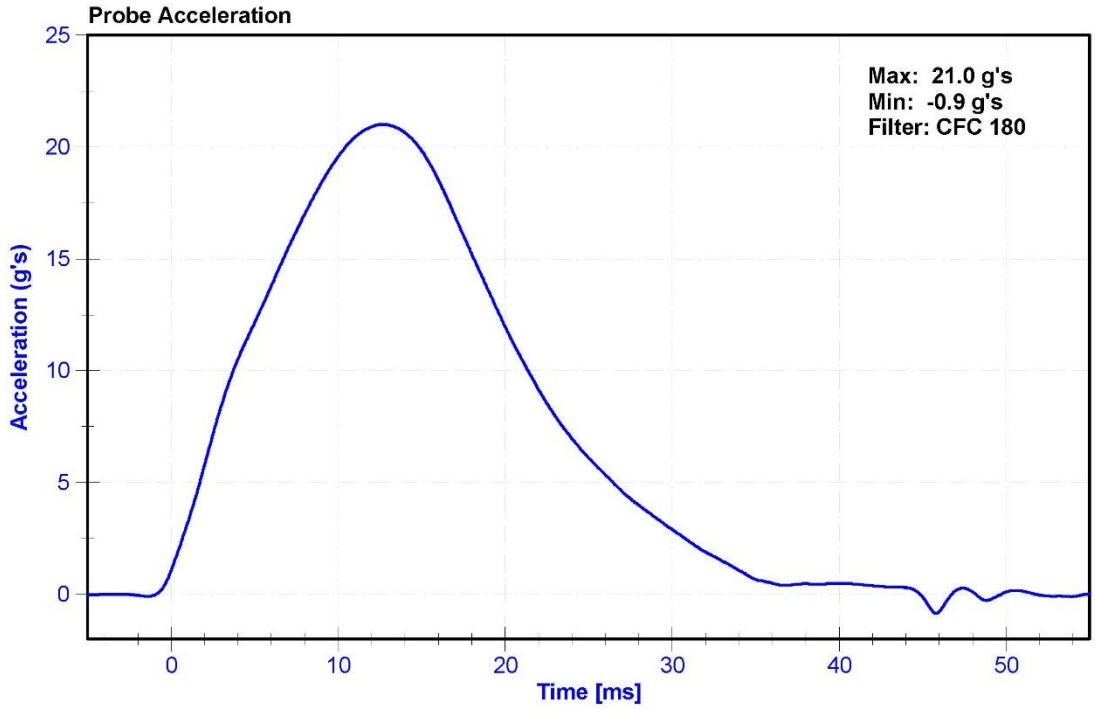
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	F034	Laboratory Supervisor	M.Goehle

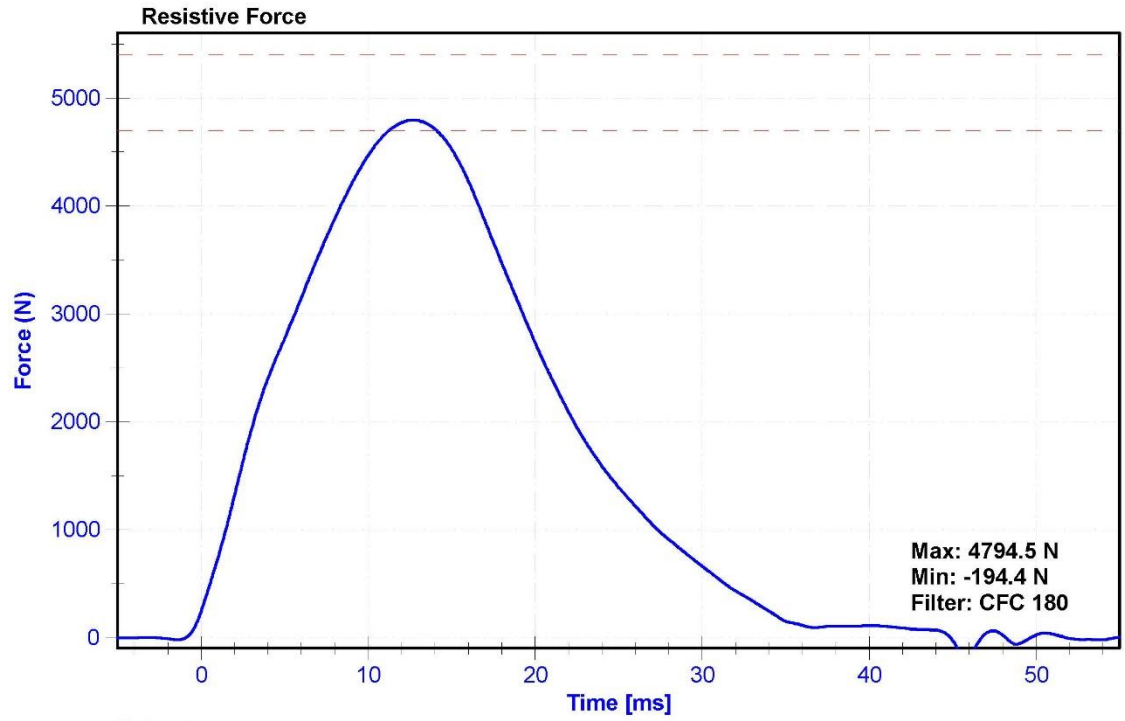
Results

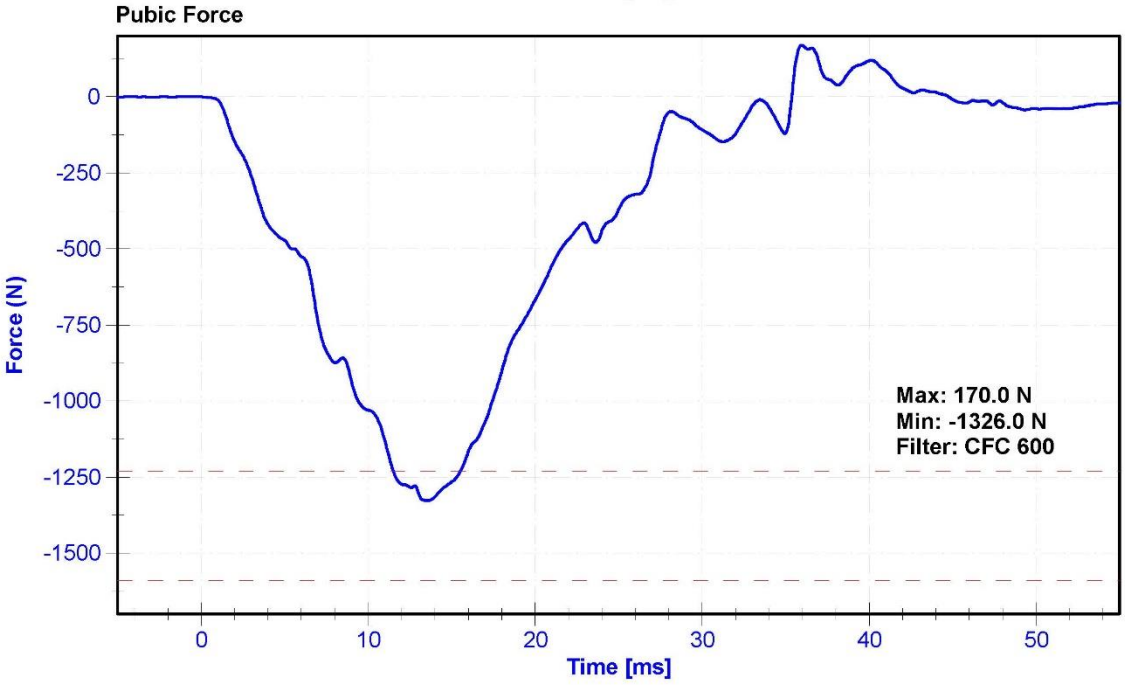
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	41.8	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Resistive Force	4700	5400	N	4794.5	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.70	Pass
Pubic Force	-1590	-1230	N	-1326.0	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.60	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pubic Load Cell	Denton 3096JFL	LC-465Fy	5/24/2016	5/24/2017




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 4794.5 N
Min: -194.4 N
Filter: CFC 180


Pubic Force
Force (N)
0
-250
-500
-750
-1000
-1250
-1500
0
10
20
30
40
50
Time [ms]
Max: 170.0 N
Min: -1326.0 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

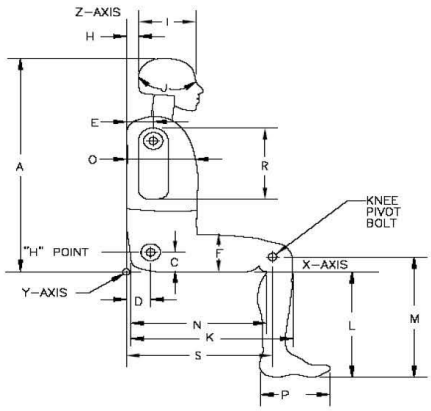
SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

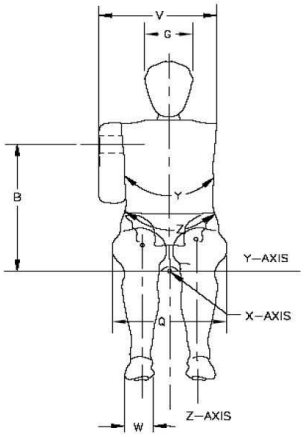
SERIAL No: 300

External Measurements - SID-IIs

Technician: M. Geesey Date: 6/28/2016

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	448	Pass
C	H-point Height	79	89	87	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	539	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	404	Pass
N	Buttock Popliteal Length	416	442	438	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	219	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	251	Pass
S	Knee Joint to seatback	477	493	486	Pass
V	Shoulder Width	341	357	347	Pass
W	Foot Width	78	94	82	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	770	Pass

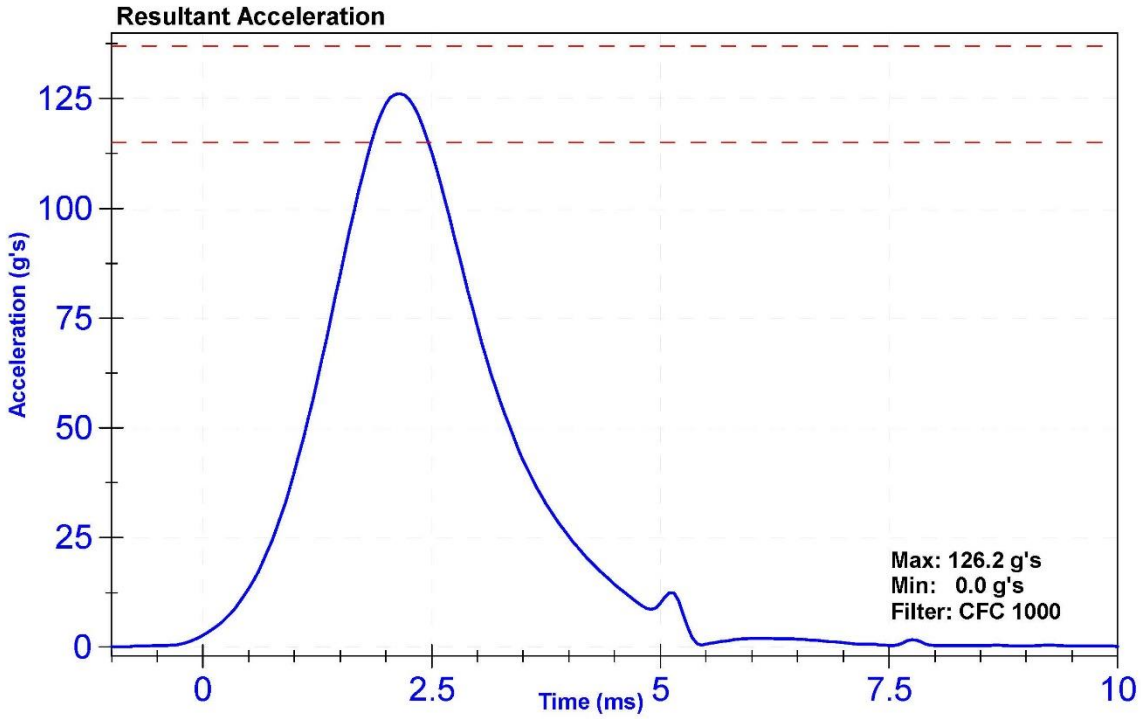
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

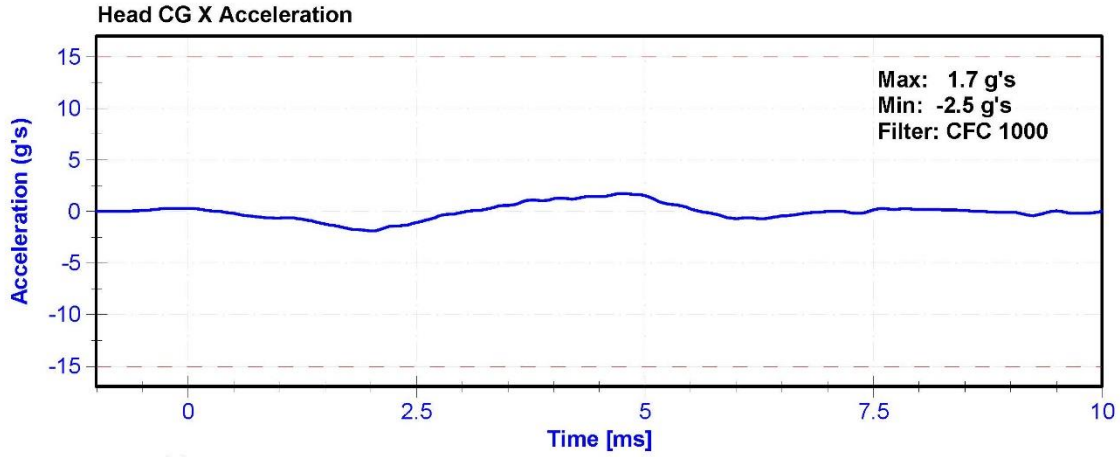
Results

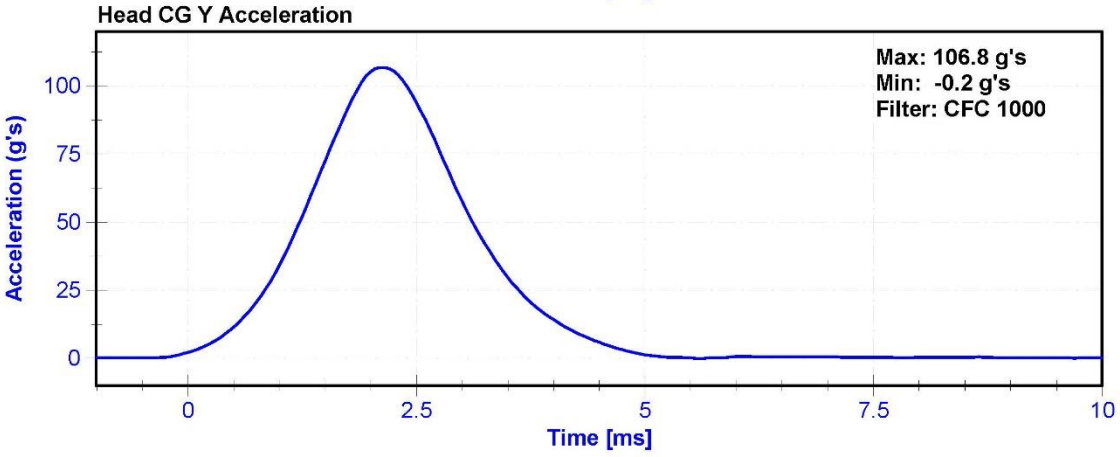
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	48.6	Pass
Resultant Acceleration	115	137	g's	126.2	Pass
Oscillation	0	15	%	10.	Pass
Fore-Aft Acceleration	-15	15	g's	-2.5	Pass

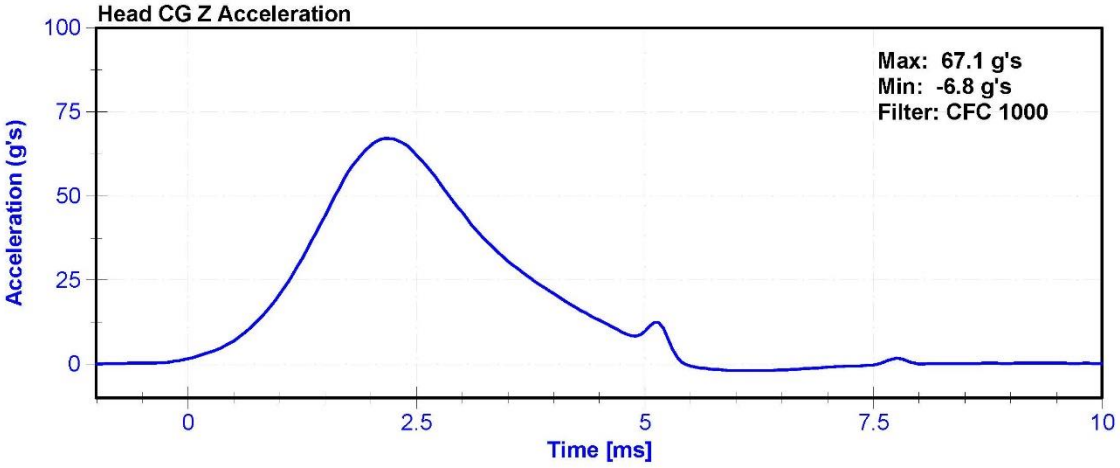
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58777	6/16/2016	12/15/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P59018	6/16/2016	12/15/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P68608	6/16/2016	12/15/2016




Head CG X Acceleration
Max: 1.7 g's
Min: -2.5 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: 106.8 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 67.1 g's
Min: -6.8 g's
Filter: CFC 1000
Acceleration (g's)
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]

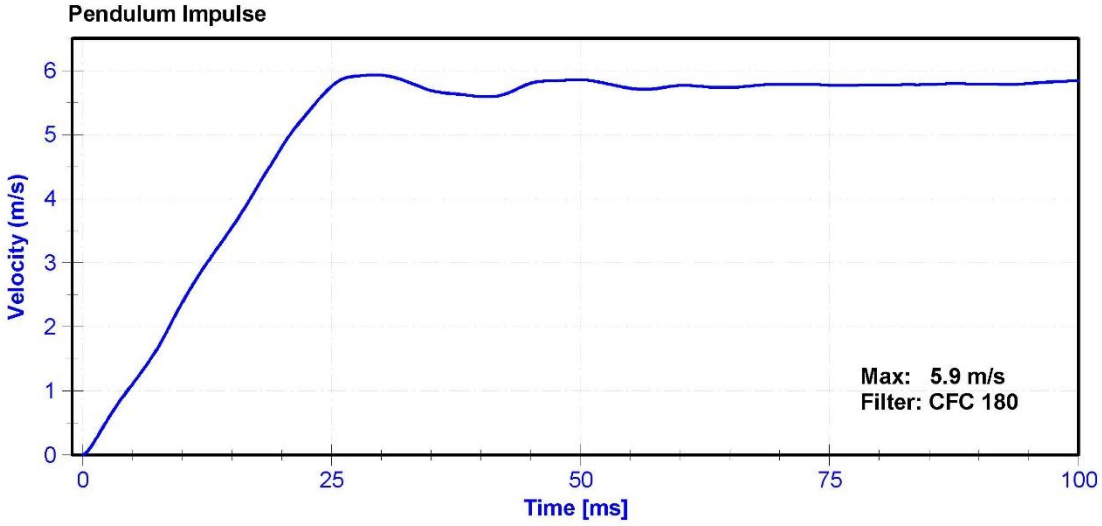
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

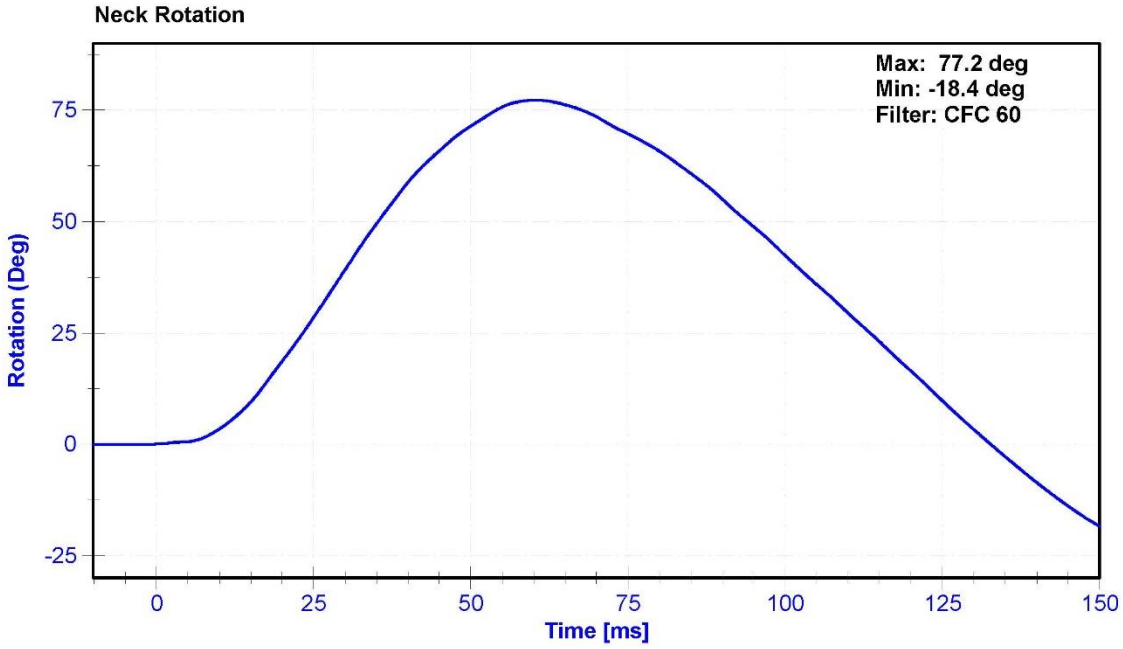
Results

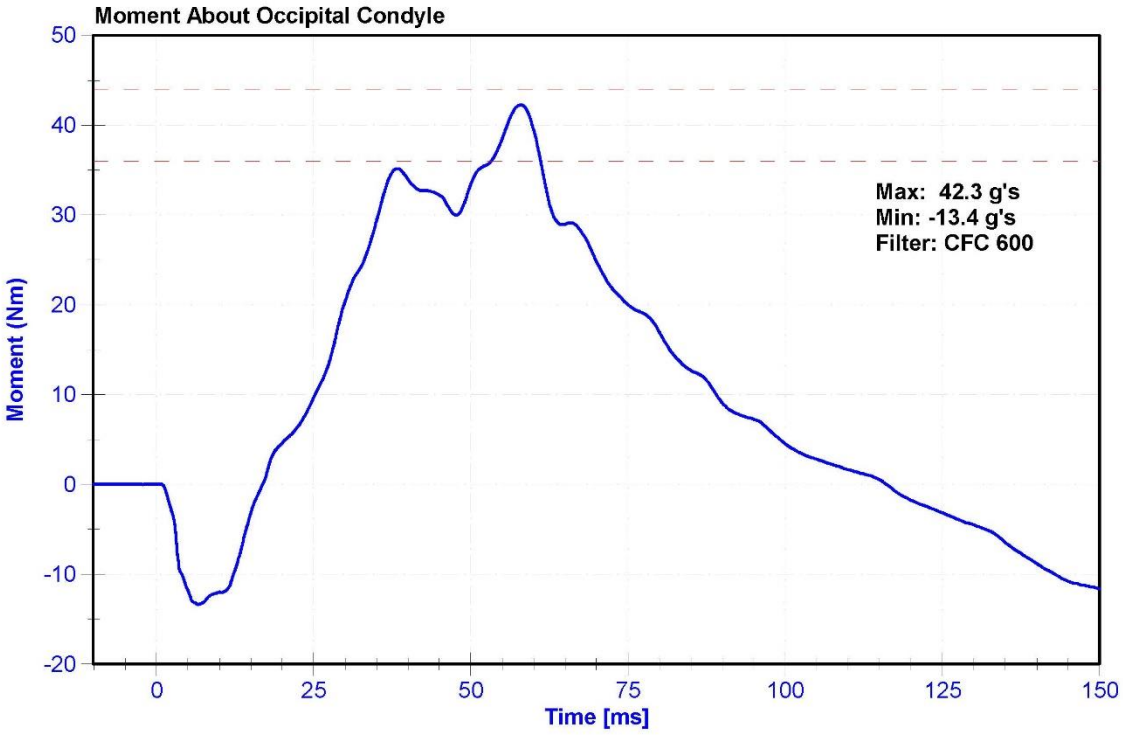
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	49.3	Pass
Velocity	5.51	5.63	m/s	5.620	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.38	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.55	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.81	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.75	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.93	Pass
Neck Rotation	71	81	deg	77.2	Pass
Time at Maximum Rotation	50	70	ms	60.2	Pass
Moment about the OC	36	44	Nm	42.3	Pass
Moment Decay to 0 Nm	102	126	ms	116.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/10/2016	5/10/2017
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-440Fy	5/24/2016	5/24/2017




Neck Rotation
Max: 77.2 deg
Min: -18.4 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.3 g's
Min: -13.4 g's
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

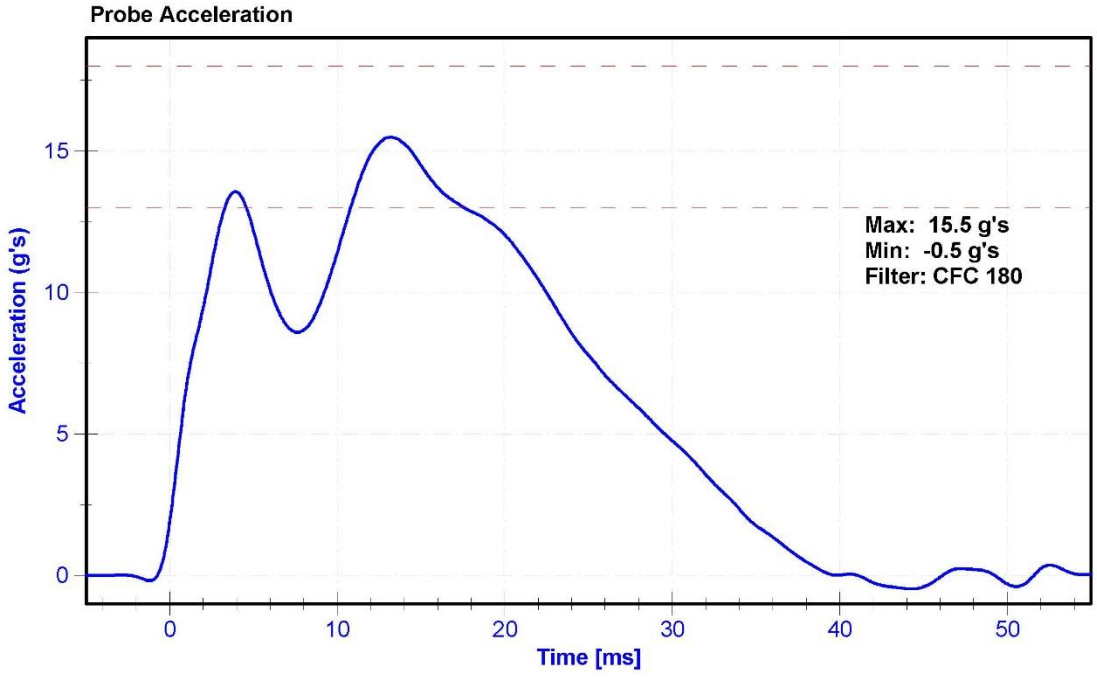
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

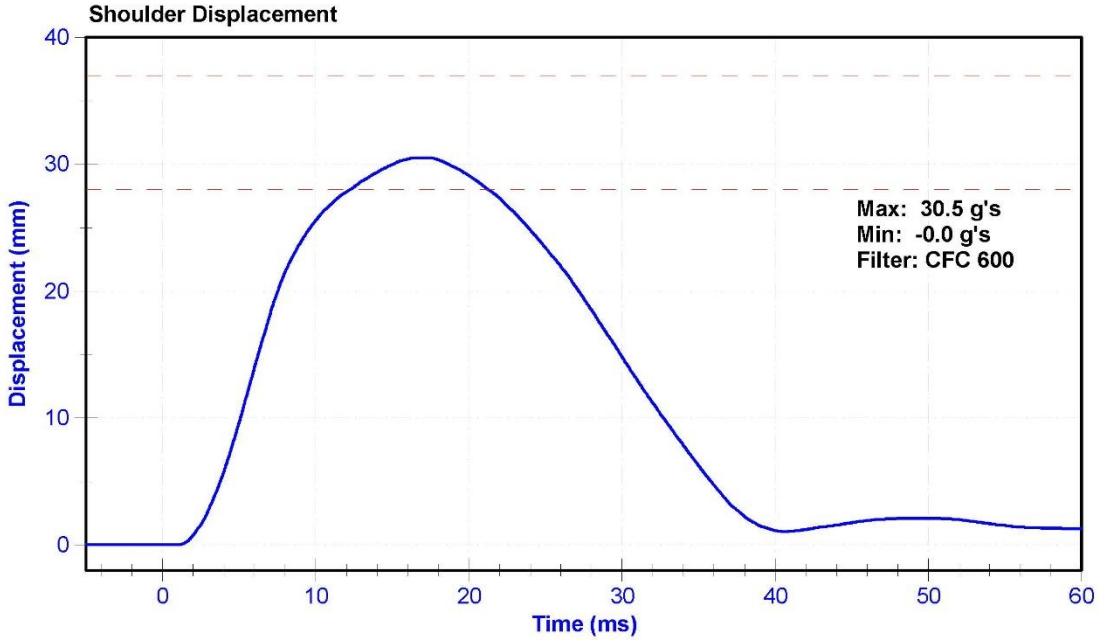
Results

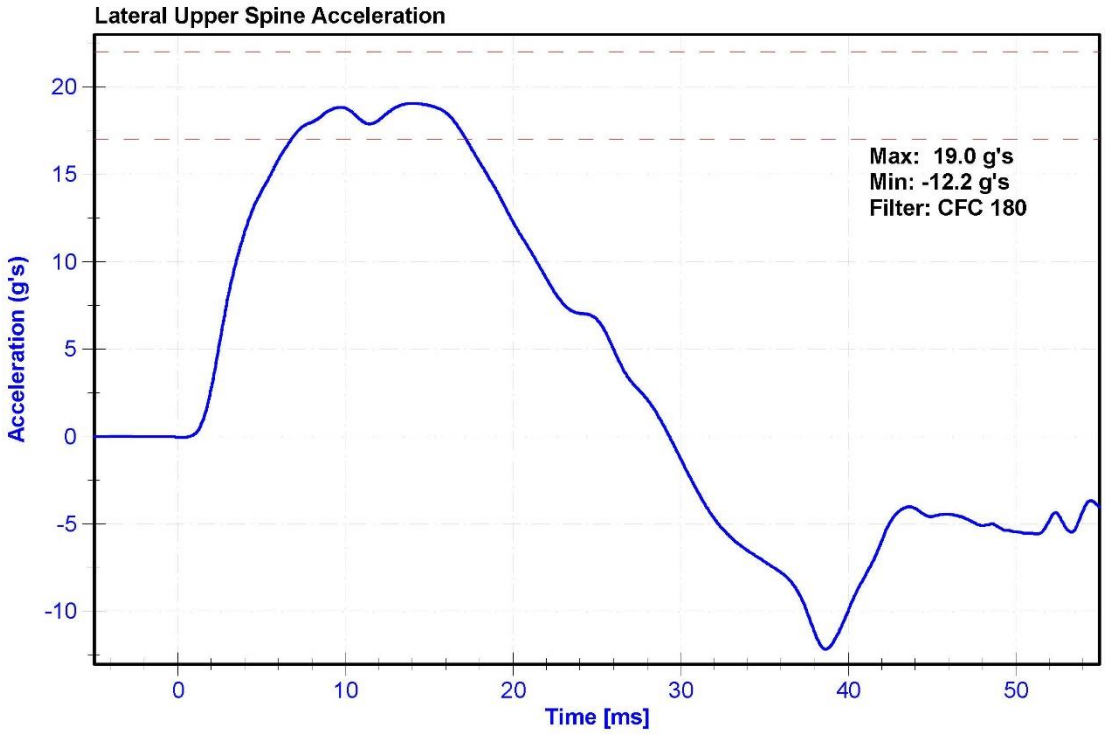
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	43.3	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	13	18	g's	15.5	Pass
Shoulder Deflection	28	37	mm	30.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	6/16/2016	6/16/2017
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.5 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.0 g's
Min: -12.2 g's
Filter: CFC 180

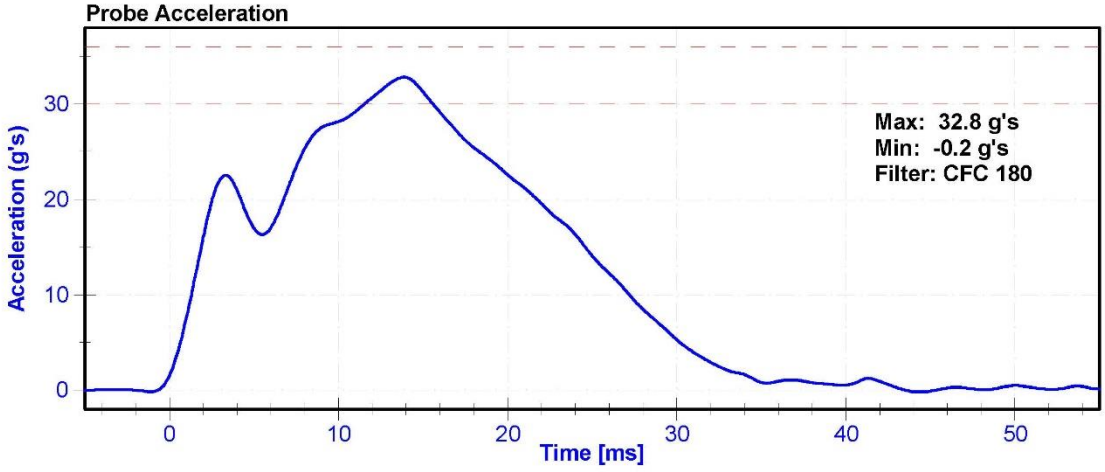
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

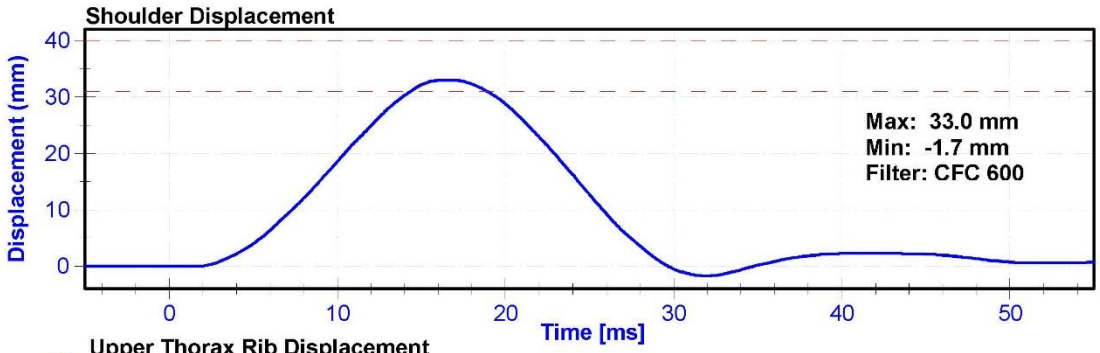
Results

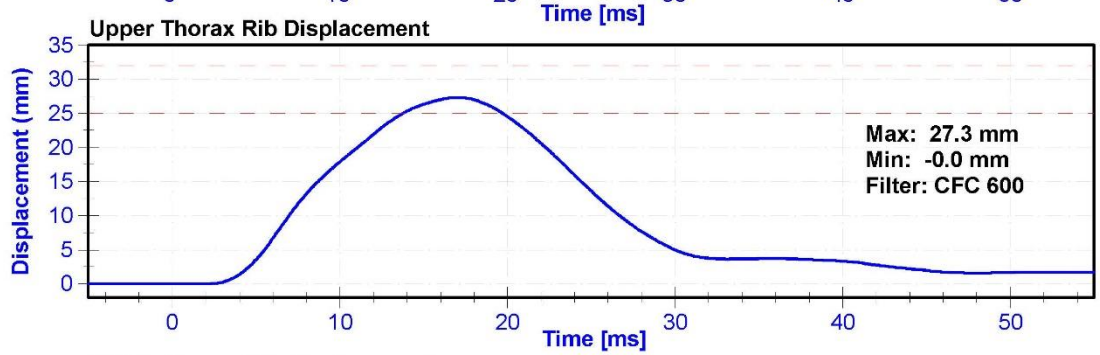
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	41.8	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	32.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.6	Pass
Shoulder Deflection	31	40	mm	33.0	Pass
Upper Thorax Rib Deflection	25	32	mm	27.3	Pass
Mid Thorax Rib Deflection	30	36	mm	32.9	Pass
Lower Thorax Rib Deflection	32	38	mm	35.0	Pass

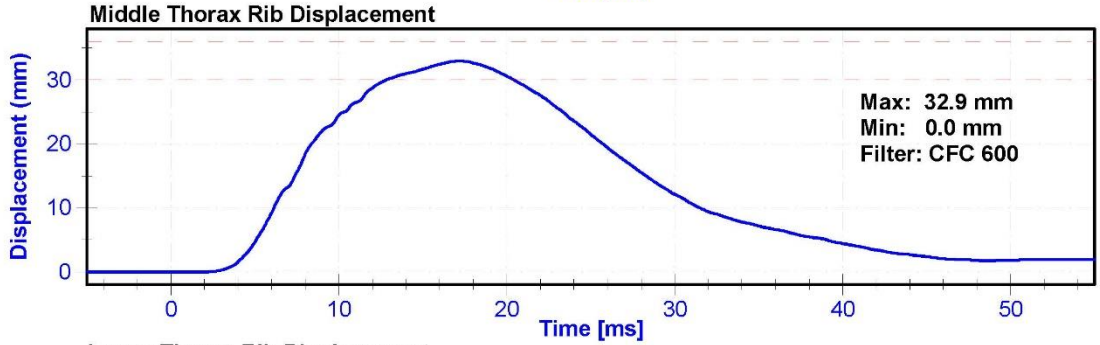
Transducer Calibrations

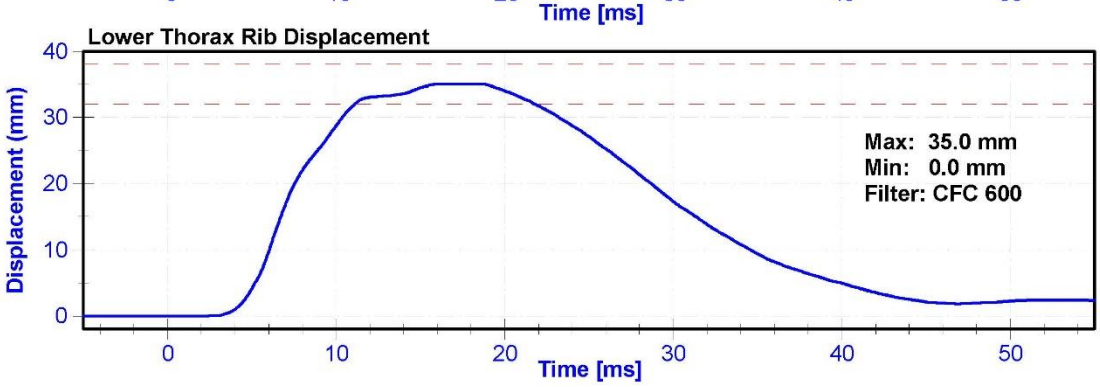
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	6/16/2016	6/16/2017
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	6/16/2016	6/16/2017
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	6/16/2016	6/16/2017
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	6/16/2016	6/16/2017



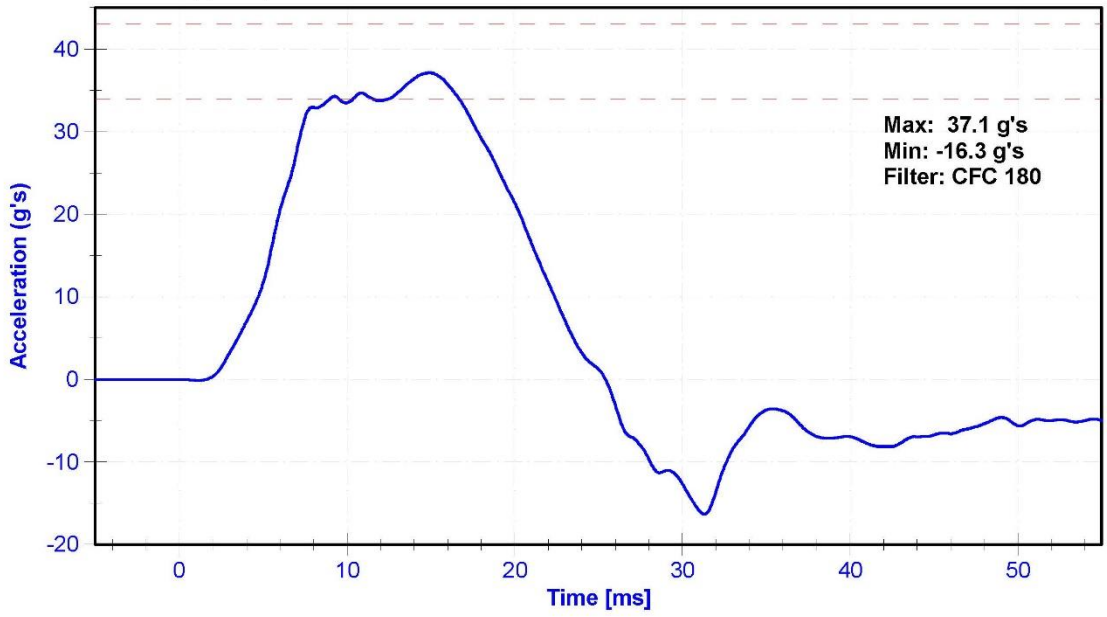

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.0 mm
Min: -1.7 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 27.3 mm
Min: -0.0 mm
Filter: CFC 600

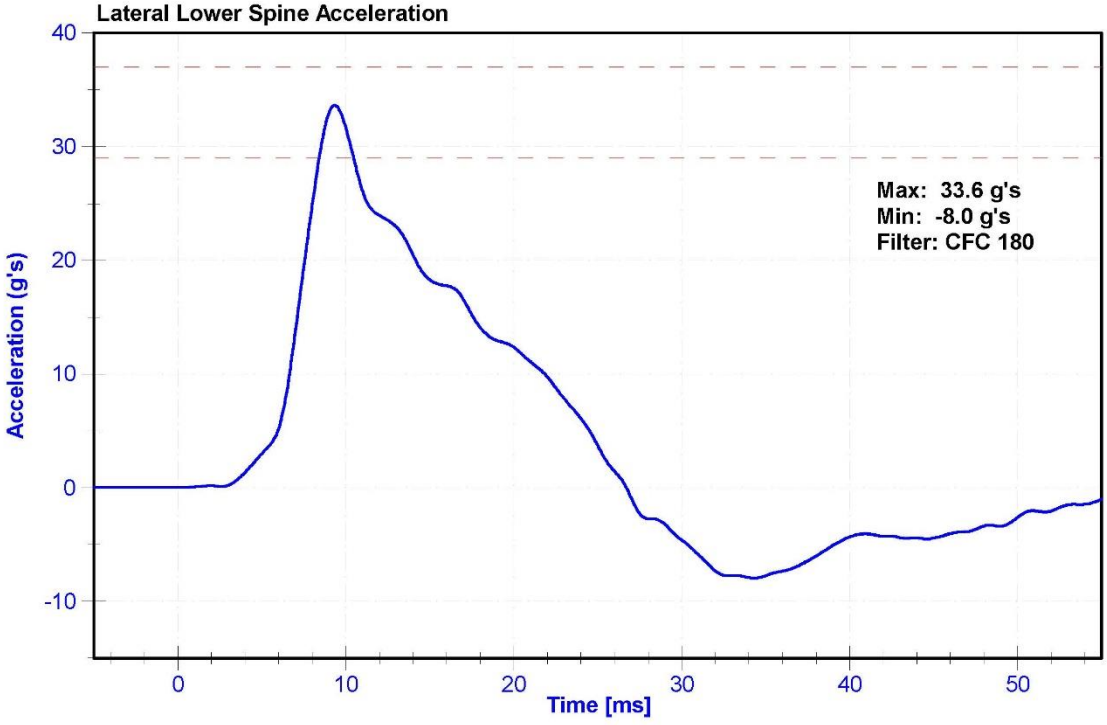

Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.0 mm
Min: 0.0 mm
Filter: CFC 600

Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



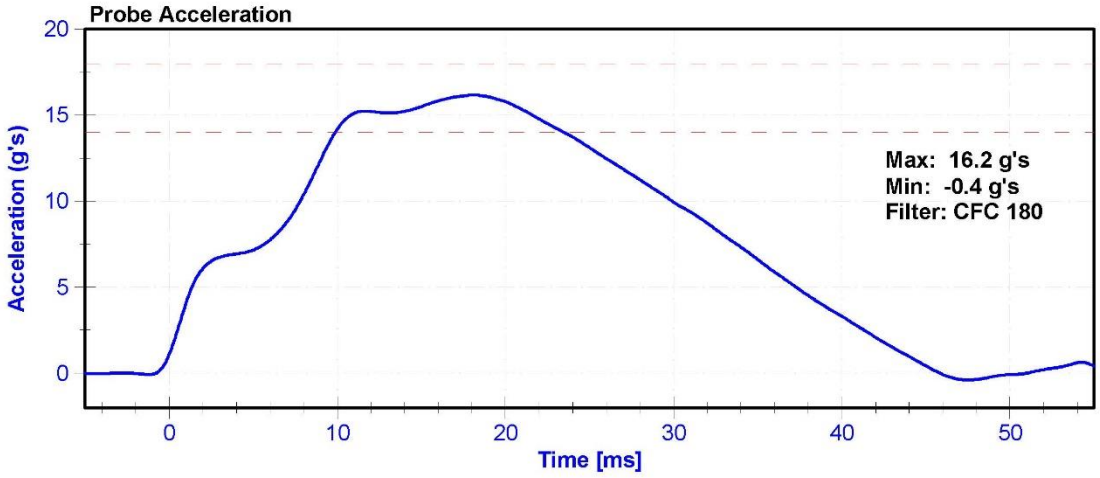
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

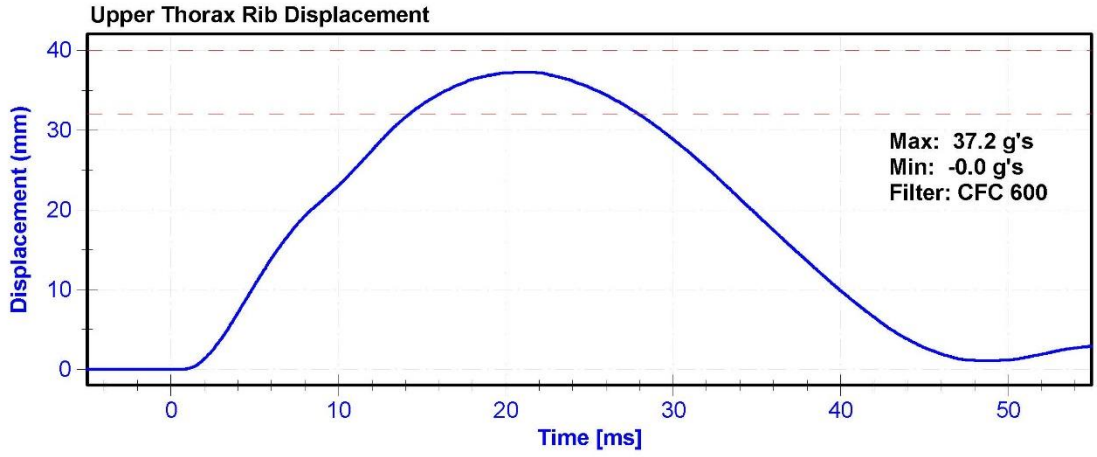
Results

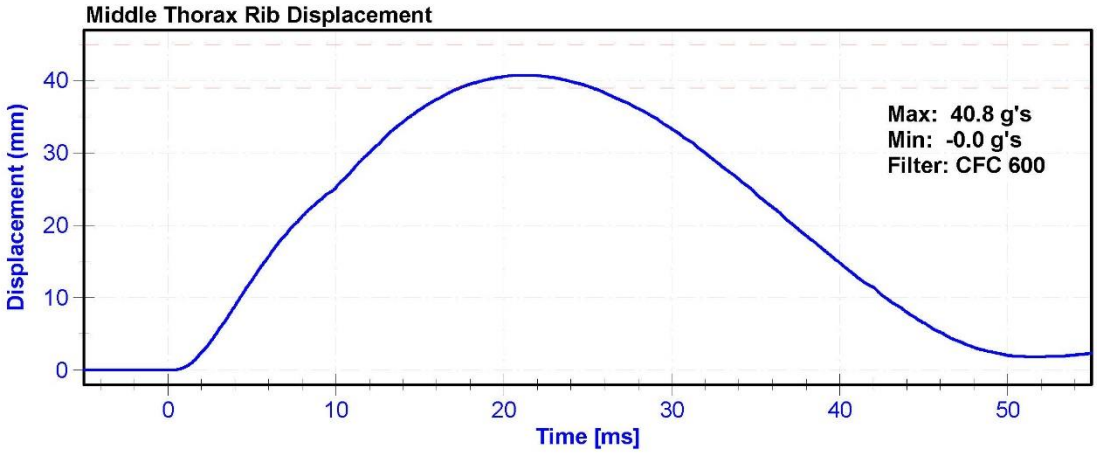
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	50	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.6	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	37.2	Pass
Middle Thorax Rib Deflection	39	45	mm	40.8	Pass
Lower Thorax Rib Deflection	35	43	mm	35.1	Pass

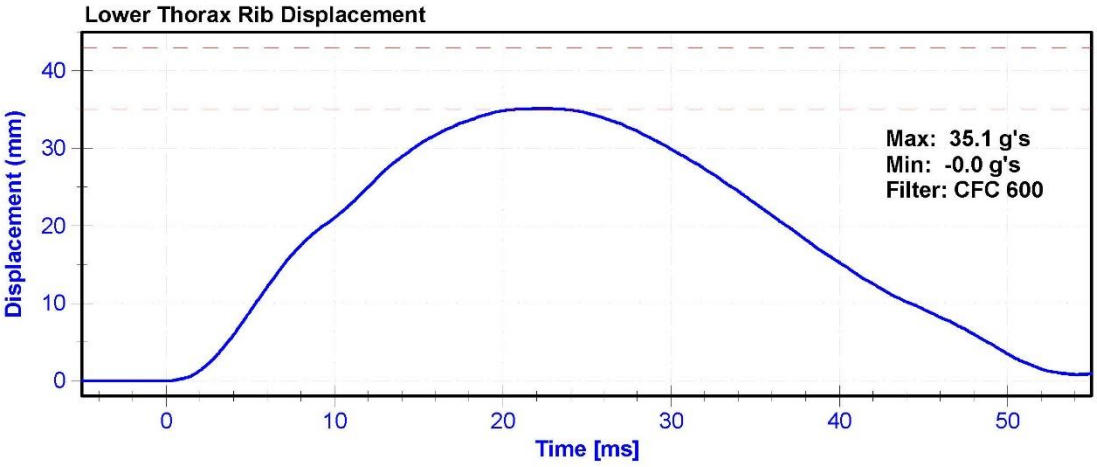
Transducer Calibrations

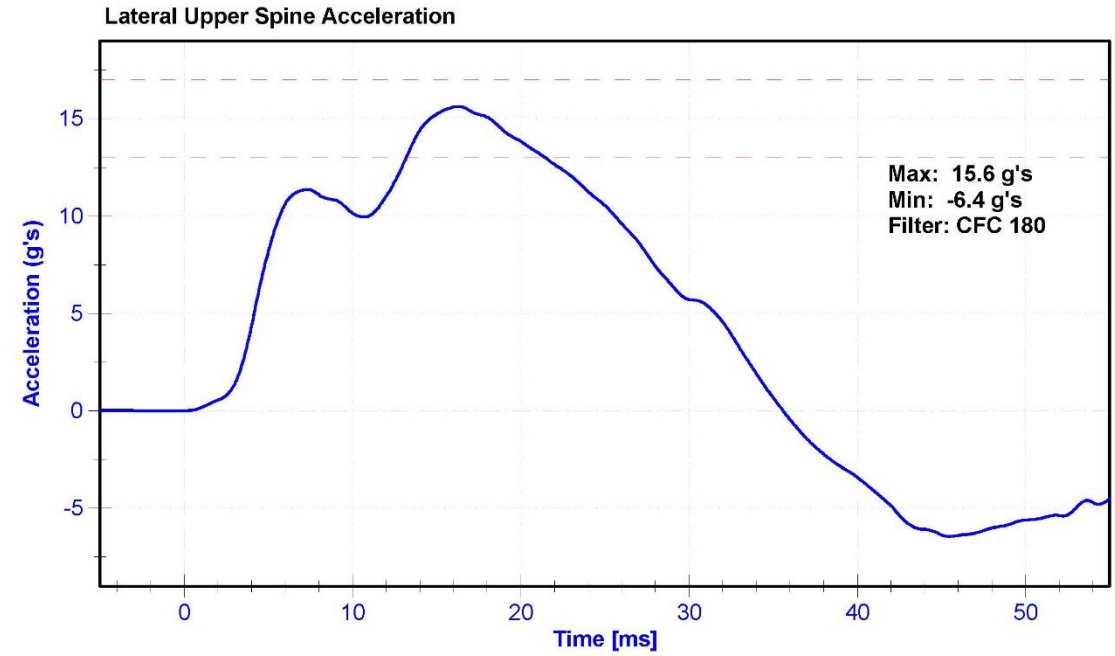
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	6/16/2016	12/15/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	6/16/2016	6/16/2017
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	6/16/2016	6/16/2017
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	6/16/2016	6/16/2017

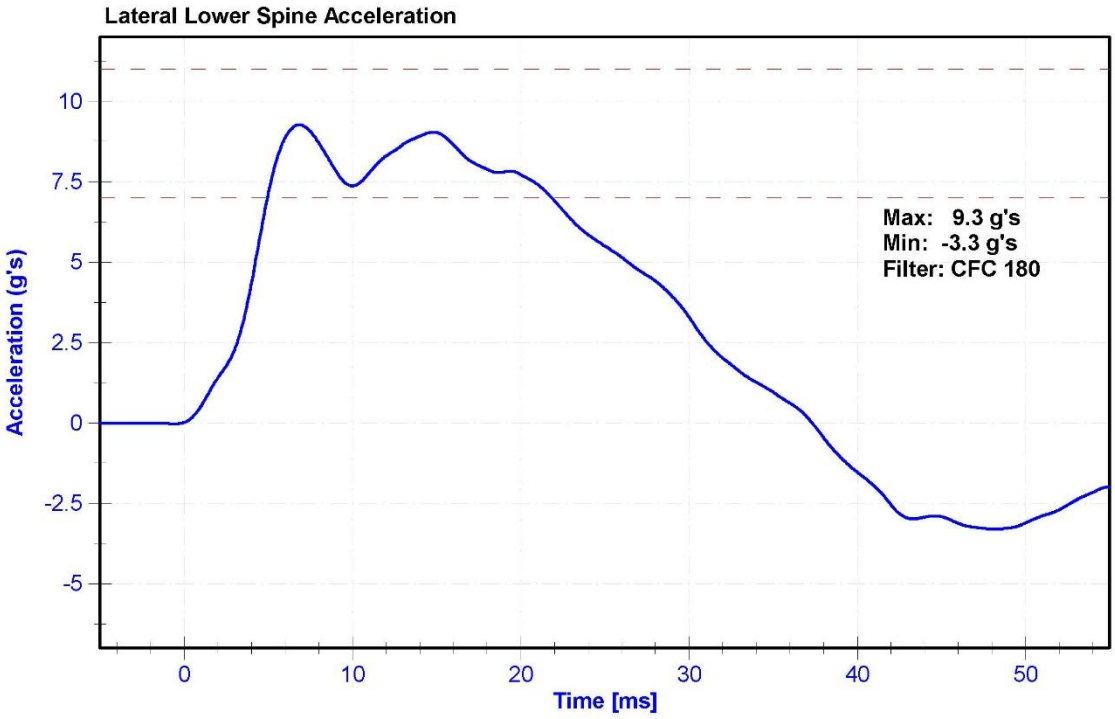



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.2 g's
Min: -0.0 g's
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.8 g's
Min: -0.0 g's
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.1 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 15.6 g's
Min: -6.4 g's
Filter: CFC 180
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]


Lateral Lower Spine Acceleration
Max: 9.3 g's
Min: -3.3 g's
Filter: CFC 180
Acceleration (g's)
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
Time [ms]

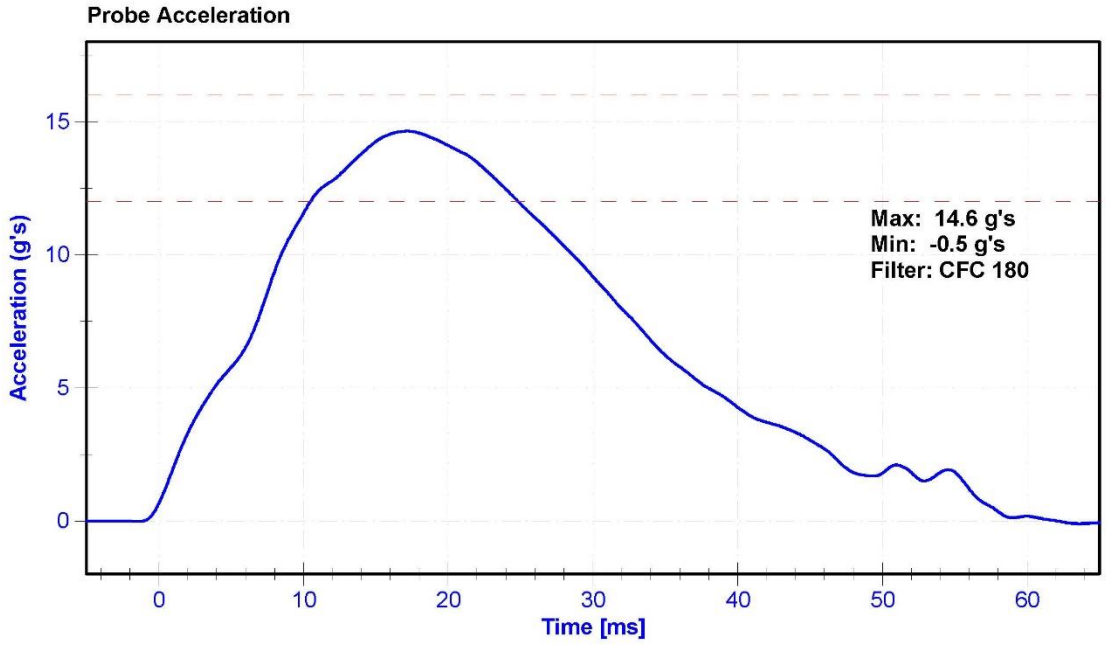
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

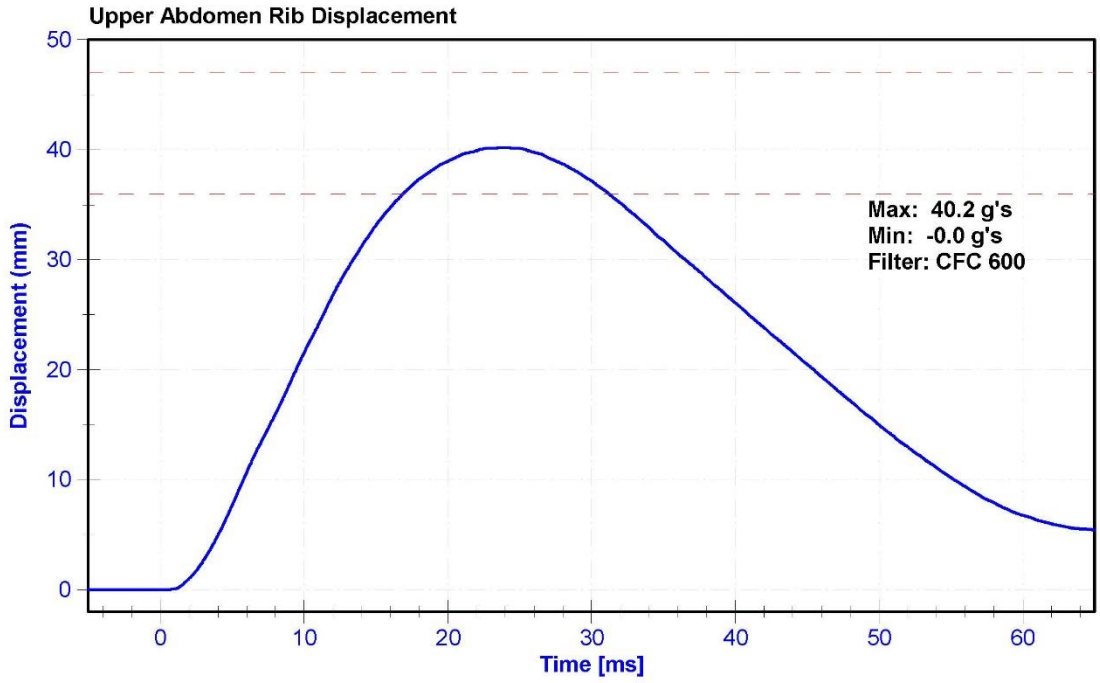
Results

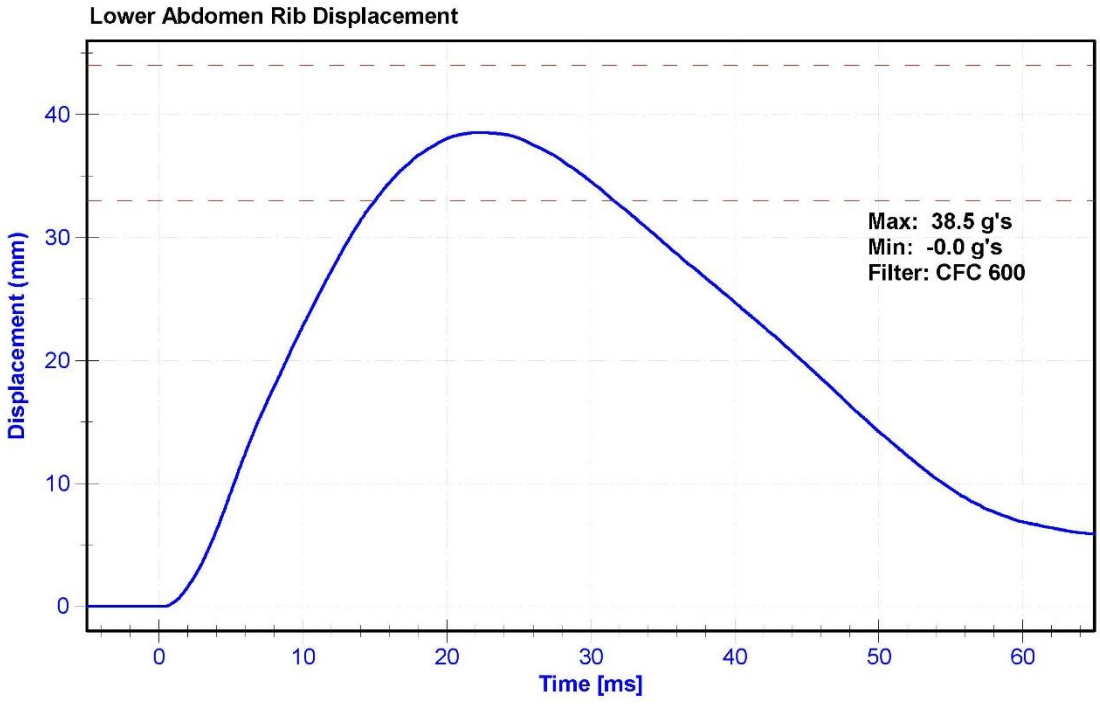
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	48.6	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.6	Pass
Upper Abdomen Rib Deflection	36	47	mm	40.2	Pass
Lower Abdomen Rib Deflection	33	44	mm	38.5	Pass

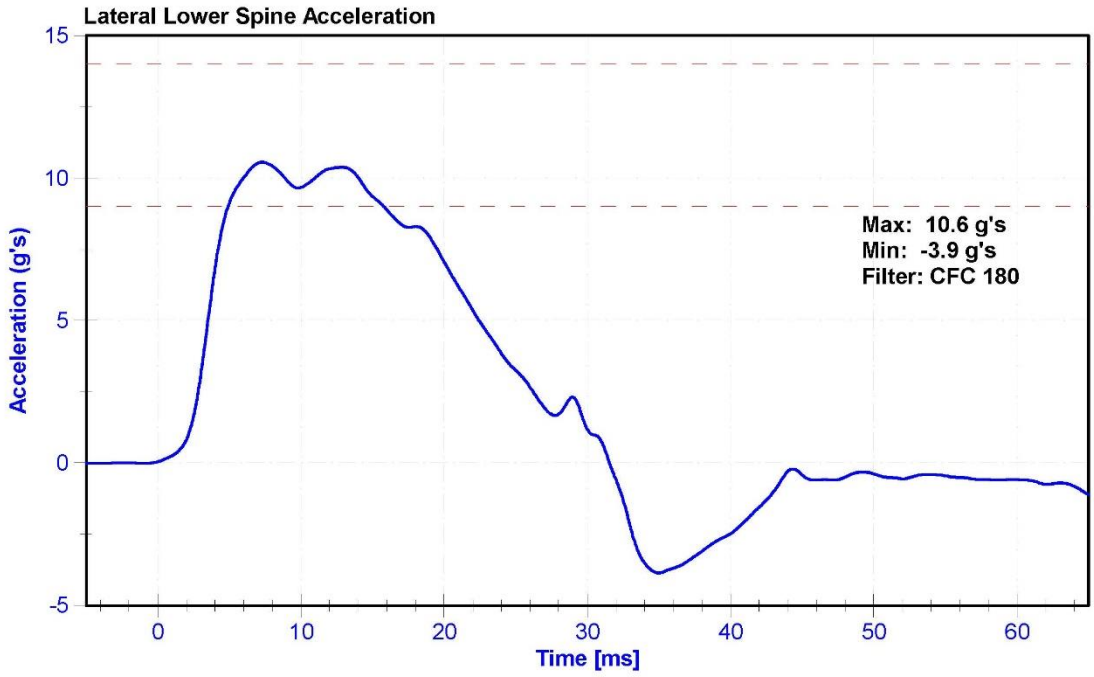
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	6/16/2016	12/15/2016
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	6/16/2016	6/16/2017
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	6/16/2016	6/16/2017

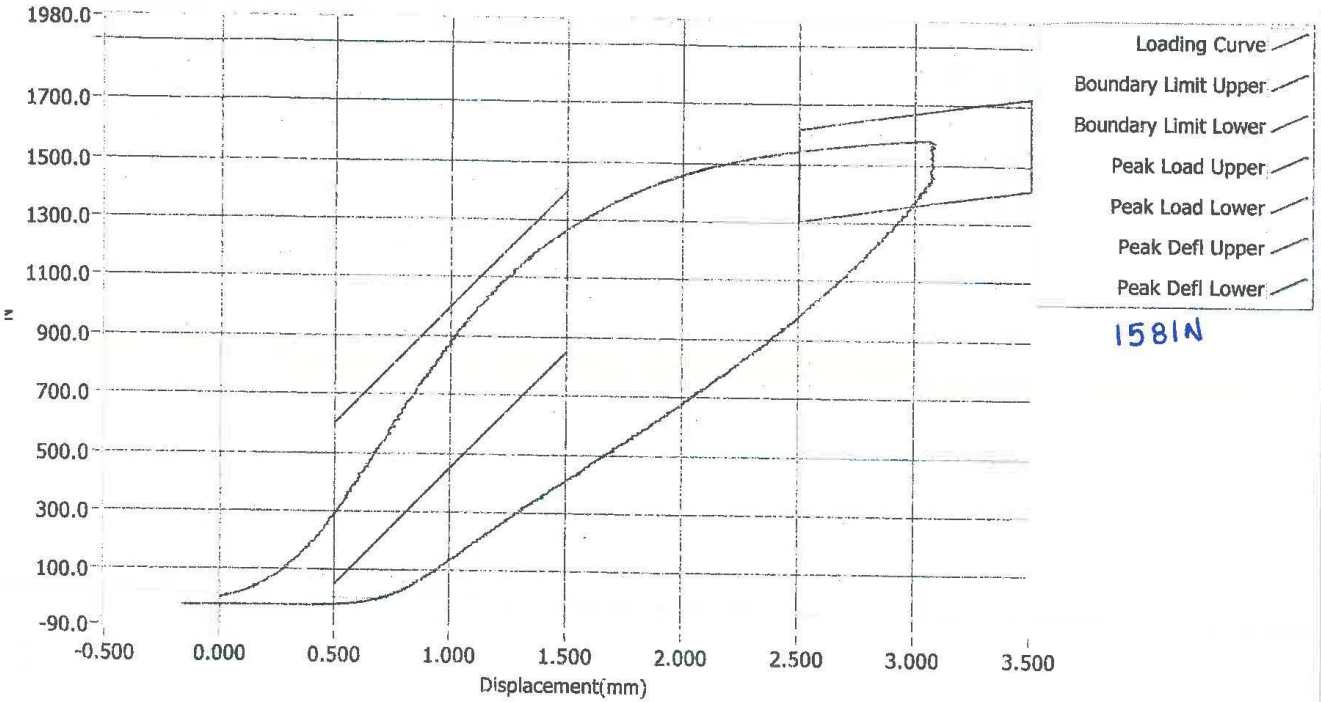



Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.2 g's
Min: -0.0 g's
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.5 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
60
Time [ms]
Max: 10.6 g's
Min: -3.9 g's
Filter: CFC 180

Resultant Data - SIDIIs Plug Compression



1581N

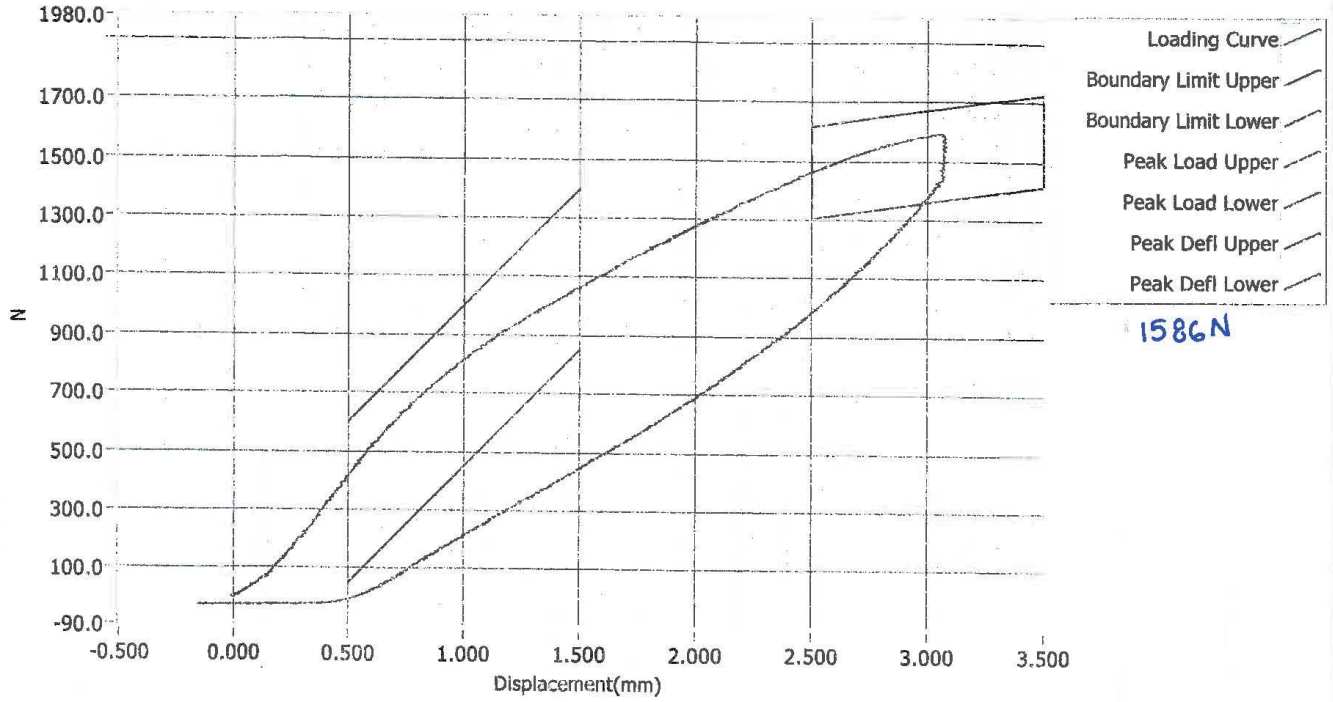
ATD Calibration Lab

CERTIFICATION

Test ID	Part Serial Number	Test Date	Test Time
	79513	11/5/2014	5:26 PM
Cert ID	**ATD Serial Number**	**ATD Type**	
	N/A	SIDIIs	

Current Date : 11/5/2014 Current Time : 17:29:49

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab
CRASH

Test ID	Part Serial Number	Test Date	Test Time
	79615	11/5/2014	10:35 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 11/5/2014 Current Time : 22:37:06

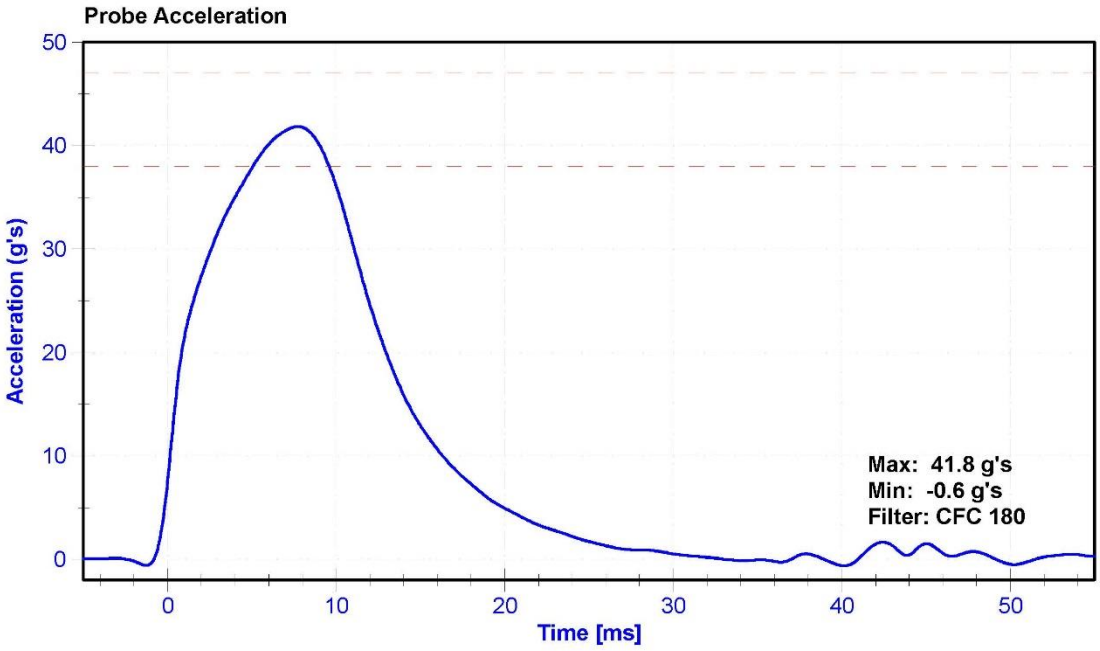
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

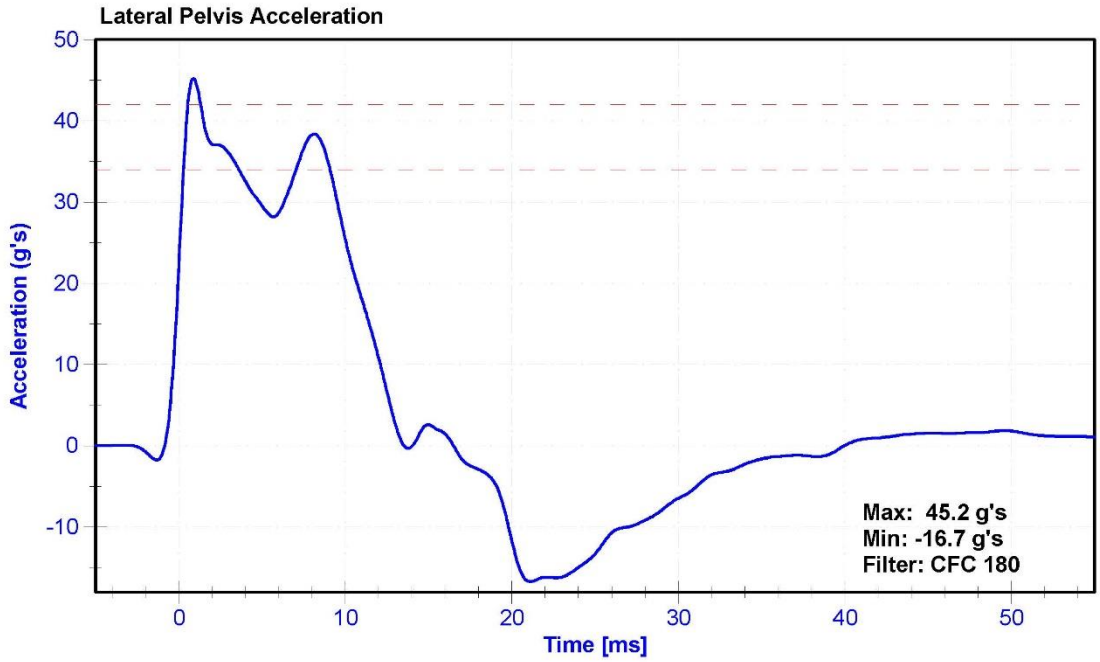
Results

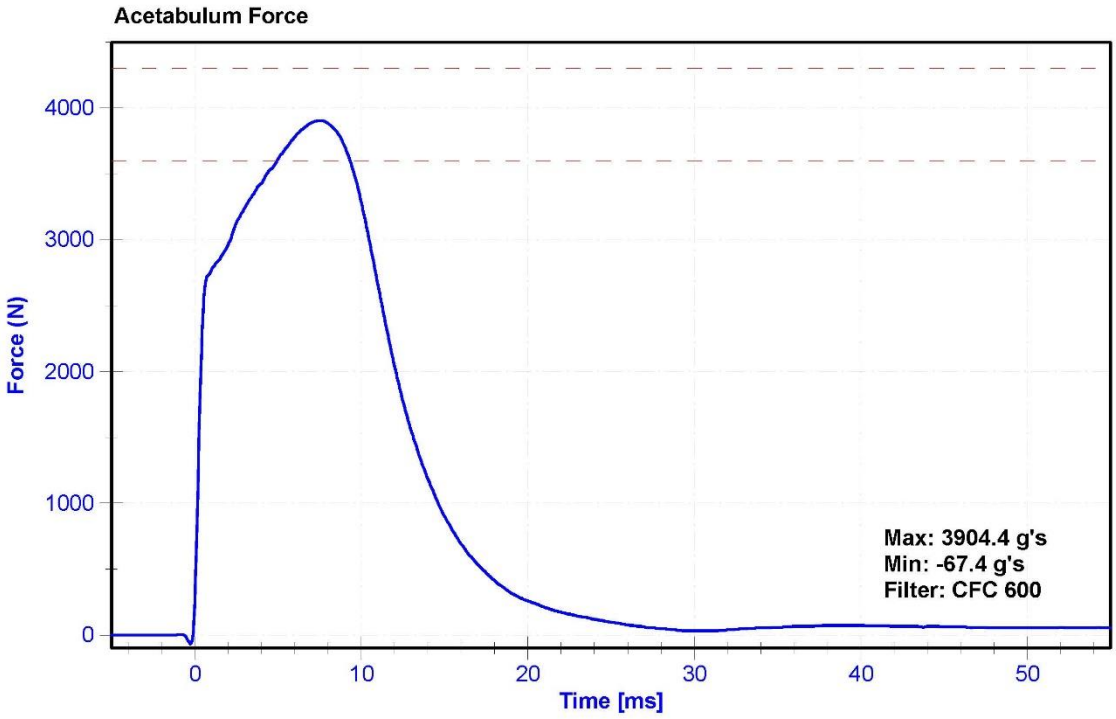
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	54.6	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	41.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.4	Pass
Acetabulum Force	3600	4300	N	3904.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P35797	6/16/2016	12/15/2016
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	5/24/2016	5/24/2017
Certification Plug	Humanetics	79513	11/05/2014	N/A
Crash Test Plug	Humanetics	79615	11/05/2014	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 45.2 g's
Min: -16.7 g's
Filter: CFC 180


Acetabulum Force
Force (N)
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 3904.4 g's
Min: -67.4 g's
Filter: CFC 600

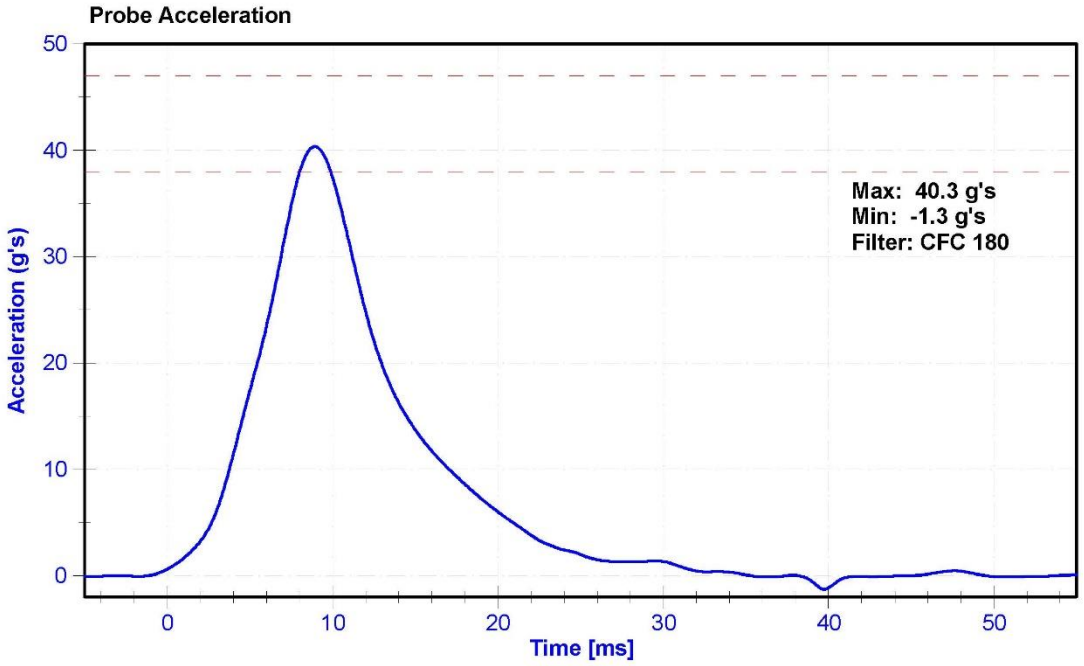
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

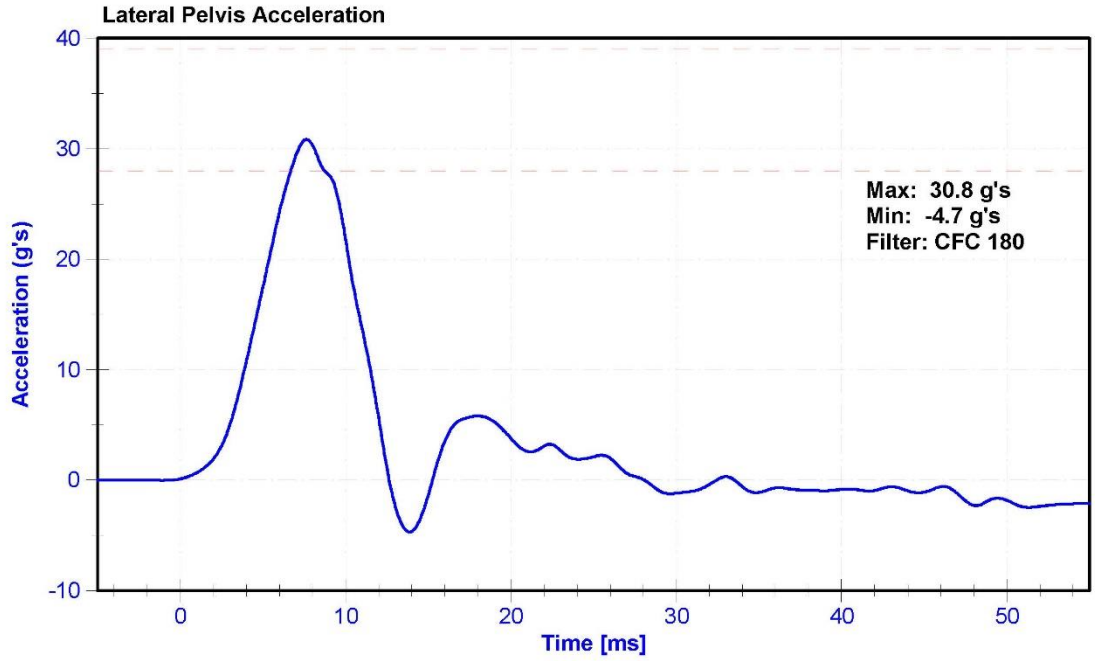
Results

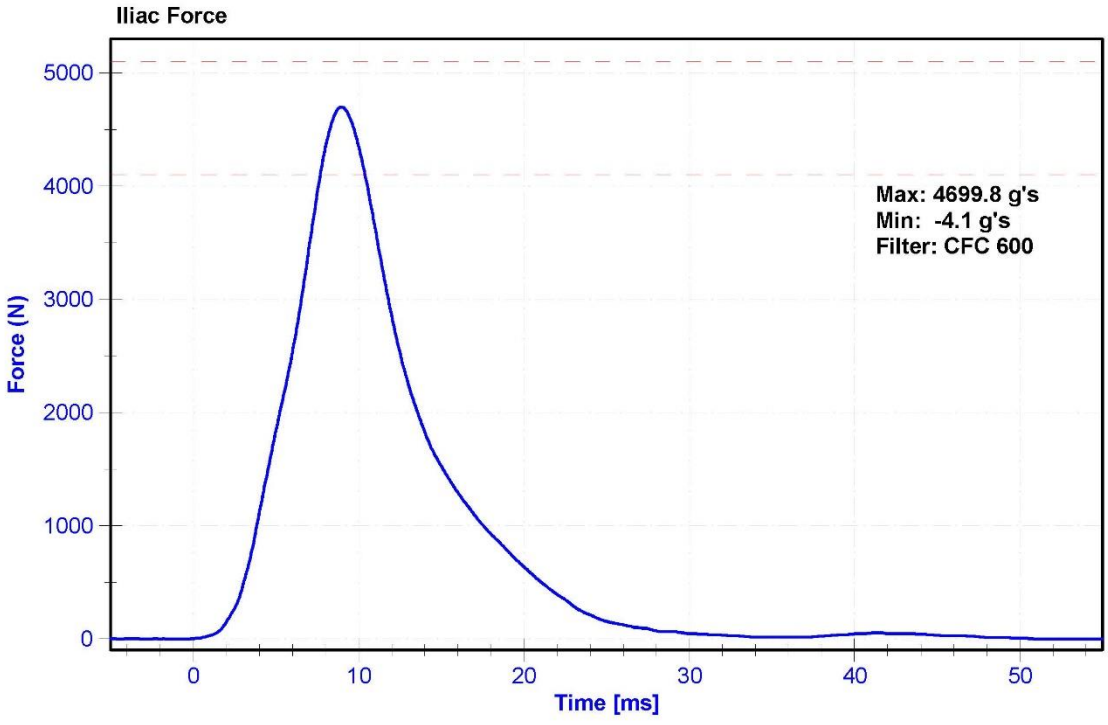
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	53.7	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	36	45	g's	40.3	Pass
Lateral Pelvis Acceleration	28	39	g's	30.8	Pass
Iliac Force	4100	5100	N	4699.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P35797	6/16/2016	12/15/2016
Iliac Load Cell	DENTON 3228J	LC-279Fy	5/24/2016	5/24/2017




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 30.8 g's
Min: -4.7 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4699.8 g's
Min: -4.1 g's
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-P58904	ENDEVCO	10/19/2016
		Y	AC-P58911	ENDEVCO	10/19/2016
		Z	AC-P58776	ENDEVCO	10/19/2016
	Redundant	X	AC-P58887	ENDEVCO	10/19/2016
		Y	AC-P58888	ENDEVCO	10/19/2016
		Z	AC-P51734	ENDEVCO	10/19/2016
Thorax Rib Displacement Potentiometers	Upper	Y	DS-183GFE	HONEYWELL	10/19/2016
	Middle	Y	DS-184GFE	HONEYWELL	10/19/2016
	Lower	Y	DS-182GFE	HONEYWELL	10/19/2016
Abdomen Load Cells	Forward	Y	LC-1512	DENTON	5/24/2016
	Middle	Y	LC-1526	DENTON	5/24/2016
	Rear	Y	LC-1516	DENTON	5/24/2016
Lower Spine Accelerometers (T12)		X	AC-P52079	ENDEVCO	10/16/2016
		Y	AC-P51948	ENDEVCO	10/16/2016
		Z	AC-P51269	ENDEVCO	10/16/2016
Pubic Symphysis Load Cell		Y	LC-465Fy	DENTON	5/24/2016

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	AC-P58777	ENDEVCO	6/16/2016
			Y	AC-P59018	ENDEVCO	6/16/2016
			Z	AC-P68608	ENDEVCO	6/16/2016
		Redundant	X	AC-P52095	ENDEVCO	6/16/2016
			Y	AC-P58986	ENDEVCO	6/16/2016
			Z	AC-P68057	ENDEVCO	6/16/2016
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-451GFE	SERVO	6/16/2016
		Middle	Y	DS-1151GFE	SERVO	6/16/2016
		Lower	Y	DS-1156GFE	SERVO	6/16/2016
	Abdominal Rib	Upper	Y	DS-308GFE	SERVO	6/16/2016
		Lower	Y	DS-307GFE	SERVO	6/16/2016
Lower Spine Accelerometers (T12)			X	AC-P58883	ENDEVCO	6/16/2016
			Y	AC-P64147	ENDEVCO	6/16/2016
			Z	AC-P58786	ENDEVCO	6/16/2016
Acetabulum Load Cell			Y	LC-275Fy	DENTON	5/24/2016
Iliac Wing Load Cell			Y	LC-279Fy	DENTON	5/24/2016
Pelvis Plug (struck side)				79615	HUMANETICS	11/5/2014
Pelvis Plug (non-struck side)				-	-	-

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	AC-A197001	MSI 1201-1000	5/17/2016
	Vehicle Center of Gravity	Y	AC-A197018	MSI 1201-1000	5/17/2016
	Vehicle Center of Gravity	Z	AC-A197003	MSI 1201-1000	5/17/2016
2	Right Sill at Front Seat	X	AC-A196993	MSI 1201-1000	5/17/2016
	Right Sill at Front Seat	Y	AC-A197029	MSI 1201-1000	5/17/2016
	Right Sill at Front Seat	Z	AC-A197019	MSI 1201-1000	5/17/2016
3	Right Sill at Rear Seat	X	AC-A196978	MSI 1201-1000	5/17/2016
	Right Sill at Rear Seat	Y	AC-A196986	MSI 1201-1000	5/17/2016
	Right Sill at Rear Seat	Z	AC-A197004	MSI 1201-1000	5/17/2016
4	Left Sill at Front Door	Y	AC-A196996	MSI 1201-1000	5/17/2016
5	Left Sill at Rear Door	Y	AC-A197033	MSI 1201-1000	5/17/2016
6	Left A-Post Lower	Y	AC-A197021	MSI 1201-1000	5/17/2016
7	Left A-Post Middle	Y	AC-A196982	MSI 1201-1000	5/17/2016
8	Left B-Post Lower	Y	AC-A196979	MSI 1201-1000	5/17/2016
9	Left B-Post Middle	Y	AC-A196988	MSI 1201-1000	5/17/2016
10	Front Seat Track	Y	AC-A196994	MSI 1201-1000	5/17/2016
11	Rear Seat Track or Structure	Y	AC-A197000	MSI 1201-1000	5/17/2016
12	Right Rear Occ. Compartment	Y	AC-A196998	MSI 1201-1000	5/17/2016
13	Engine Block	X	AC-A197008	MSI 1201-1000	5/17/2016
	Engine Block	Y	AC-A196985	MSI 1201-1000	5/17/2016
14	Rear Floorpan Above Axle	X	AC-A197016	MSI 1201-1000	5/17/2016
	Rear Floorpan Above Axle	Y	AC-A197020	MSI 1201-1000	5/17/2016
	Rear Floorpan Above Axle	Z	AC-A196984	MSI 1201-1000	5/17/2016

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	AC-C14901	ENDEVCO	1/27/2016
MDB Center of Gravity	Y	AC-CP30	ENDEVCO	1/27/2016
MDB Center of Gravity	Z	AC-C16680	ENDEVCO	1/27/2016
Left Frame at Rear Axle Centerline	X	AC-AH5M8	ENDEVCO	1/28/2016
Left Frame at Rear Axle Centerline	Y	AC-C16499	ENDEVCO	1/28/2016