REPORT NUMBER: SINCAP-MGA-2019-028

NEW CAR ASSESSMENT PROGRAM (NCAP)
Moving Deformable Barrier Side Impact Test

NISSAN MOTOR CO., LTD.
2019 Nissan Murano S 5-Door SUV
NHTSA No.: M20195211

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: February 5, 2019

Final Report Date: May 6, 2019

FINAL REPORT

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, DC 20590

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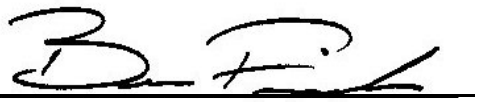
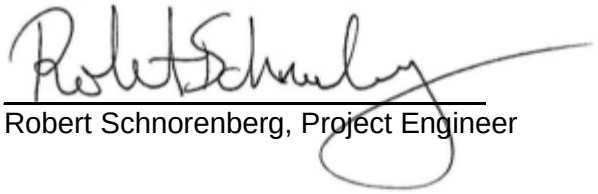
Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: May 6, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

1. Report No. SINCAP-MGA-2019-028	*2. Government Accession No.*	*3. Recipient's Catalog No.*
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of 2019 Nissan Murano S 5-Door SUV, NHTSA No.: M20195211		*5. Report Date* May 6, 2019 *6. Performing Organization Code* MGA
7. Author(s) Ben Fischer, Project Engineer		*8. Performing Organization Report No.* SINCAP-MGA-2019-028
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-14-D-00353
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 February 5, 2019 to May 6, 2019 *14. Sponsoring Agency Code* NRM-110

15. Supplementary Notes

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2019 Nissan Murano S 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on February 5, 2019.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.10 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.0°C. The target vehicle post-test maximum crush was 282 mm at level 3. The test vehicle's performance was as follows:

		Driver ATD (ES-2re)	
Measurement Description	**Units**	Threshold	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	101
Maximum Thorax Rib Deflection	mm	44	22
Total Abdominal Force	N	2500	586
Pubic Symphysis Force	N	6000	1743
Resultant Lower Spine Acceleration	Gs	82*	26

		Passenger ATD (SID-IIs)	
Measurement Description	**Units**	Threshold	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	148
Resultant Lower Spine Acceleration	Gs	82	31
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1331
Maximum Thoracic Rib Deflection	mm	38*	13
Maximum Abdomen Rib Deflection	mm	45*	14

*Proposed IARV

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

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833	
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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2019 Nissan Murano S 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated October 2015.

SECTION 2
SUMMARY OF TEST RESULTS

A 2019 Nissan Murano S 5-Door SUV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.10 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 MGA Research Corporation in Burlington, Wisconsin on February 5, 2019. 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 NCAP Side Laboratory Test Procedure dated October 2015. The side impact event was documented by eleven (11) 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 Triaxial 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) Triaxial Accelerometers
Pubic Symphysis Y-Axis Load Cell

PASSENGER ATD (SID-IIs)
Primary and Redundant Head CG Triaxial Accelerometers
Primary Head CG Angular Rate Sensors
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) Triaxial Accelerometers
Acetabulum and Iliac Wing Y-Axis Load Cells

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

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

	Driver ATD (ES-2re)		
Measurement Description	**Units**	Threshold	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	101
Maximum Thorax Rib Deflection	mm	44	22
Total Abdominal Force	N	2500	456
Pubic Symphysis Force	N	6000	1743
Resultant Lower Spine Acceleration	Gs	82*	26

	Passenger ATD (SID-IIs)		
Measurement Description	**Units**	Threshold	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	148
Resultant Lower Spine Acceleration	Gs	82	31
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1331
Maximum Thoracic Rib Deflection	mm	38*	13
Maximum Abdomen Rib Deflection	mm	45*	14

*Proposed IARV

Supplemental restraint information is given below:

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 Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

The test data can be found on the NHTSA website at www.nhtsa.gov

GENERAL COMMENTS

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MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 3
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20195211	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Nissan	Automatic Door Locks (ADL)	Yes
Model	Murano S	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	N/A
VIN	5N1AZ2MJ4KN103996	Driver Front Airbag	Yes
Body Color	Deep Blue Pearl	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	48km / 30mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	3.5 L	Driver Torso Airbag	No
Type/No. Cylinders	6	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds		Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	NISSAN MOTOR CO., LTD.	GVWR (kg)	2318
Date of Manufacture	12/18	GAWR Front (kg)	1272
Vehicle Type	MPV	GAWR Rear (kg)	1300

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				408	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				68	(A-B)

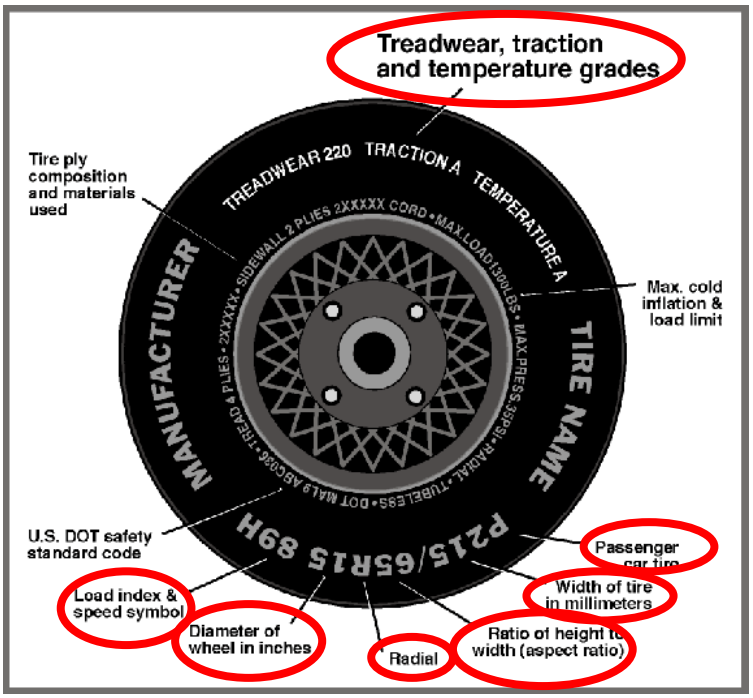
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X					w/ Lever	
Rear or Second Row Seat			X			w/ Lever	
Third Row Seat							

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	235/65R18	235/65R18
Tire Size on Vehicle	235/65R18	235/65R18
Tire Manufacturer	Continental	Continental
Tire Model	CrossContact	CrossContact
Treadwear	480	480
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	106T	106T
Tire Material	Rubber	Rubber
DOT Safety Code Left	VYLM D3V4 4318	VYLM D3V4 4318
DOT Safety Code Right	VYLM D3V4 4318	VYLM D3V4 4418

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	315	305	305	315
Tire Placard	kPa	230	230	230	230
Owner's Manual	kPa	230	230	230	230
As Tested	kPa	230	230	230	230

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	521.5	343.0		555.5	435.0		565.5	430.5	
Right	kg	516.0	341.0		513.0	408.0		518.5	404.0	
Ratio	%	60.3%	39.7%		55.9%	44.1%		56.5%	43.5%	
Totals	kg	1037.5	684.0	1721.5	1068.5	843.0	1911.5	1084.0	834.5	1918.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1721.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	68	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1918.5	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)? **YES**

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	826	825	Yes
Right Front	mm	835	826	Yes
Right Rear	mm	800	807	Yes
Left Rear	mm	792	792	Yes
Vehicle CG (Aft of Front Axle)	mm	1232	1249	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	31	30	

*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

Test height adjustable suspension setting, if applicable:	Not Applicable

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	59
None	

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

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 passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	17.2	13.2	15.2
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid)	As-Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	15.2	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

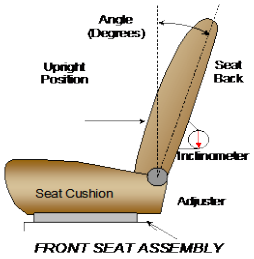
Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1st as 1)	mm	Detent (1st as 0)
Driver Seat	240	25	120	12
Front Passenger Seat	240	25	120	12
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is adjusted following Appendix C, "Positioning Dummies in the Test Vehicle" in the NCAP Laboratory Test Procedure dated October 2015. The rear center and non-struck side rear outboard seat backs are positioned to match the struck side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1st as 1)	Degrees	Detent (1st as 0)
Driver Seat	70.0	35	0.0	8
Front Passenger Seat	68.1	35	0.8	8
Front Center Seat				
Struck Side Rear Seat	24.0	13	-2.2	0
Non-Struck Side Rear Seat	23.8	13	-2.2	0
Rear Center Seat	23.8	13	-2.2	0

Driver and left rear passenger seat back angle measured on headrest post.

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

	Total # of Positions	Placed in Position #
Driver Seat	4	0 (Uppermost as 0)
Rear Seat	Fixed	

HEAD RESTRAINT ADJUSTMENT

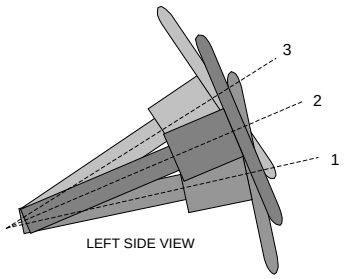
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	5	4 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	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.

	Wheel Angle (deg)	Fore/Aft Position (mm)
Lowermost, Position 1	66.9	222
Geometric Center, Position 2	64.1	202
Uppermost, Position 3	61.3	182
Telescoping Steering Wheel Travel		40
Test Position	64.1	202

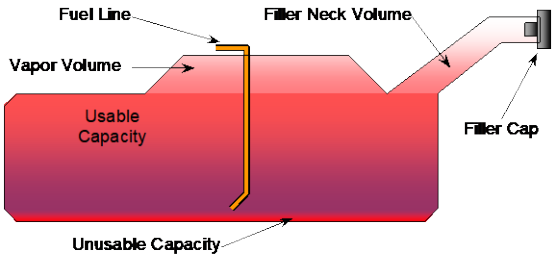


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is equipped with an electronic fuel pump. The fuel pump is activated when the ignition is turned on. The filler neck is located on the driver's side



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

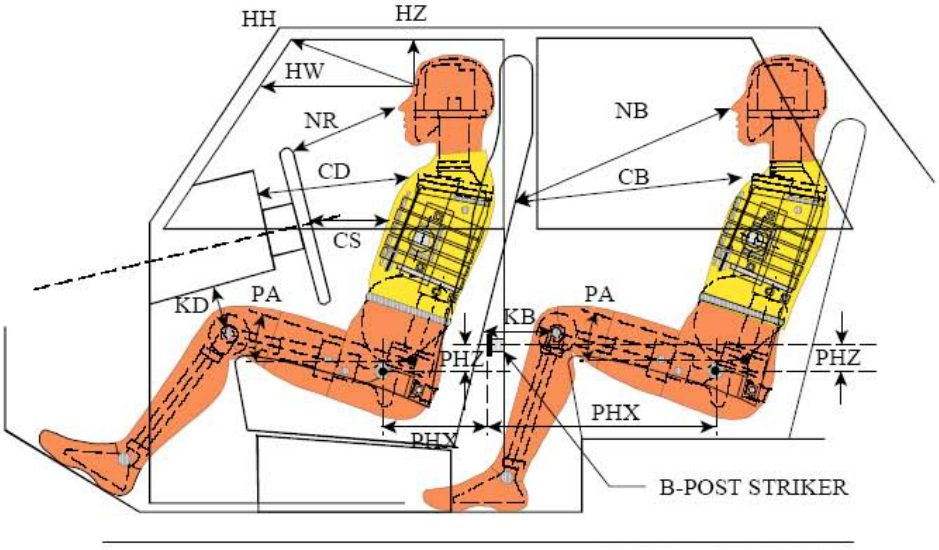
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	71.9
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	71.9
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	66.9
Actual Amount of Solvent Used	66.6
1/3 of Usable Capacity	24.0

Is the actual amount of solvent used in the test equal to 93% + 1% of the Usable Capacity stated in Form No. 1? **YES**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



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

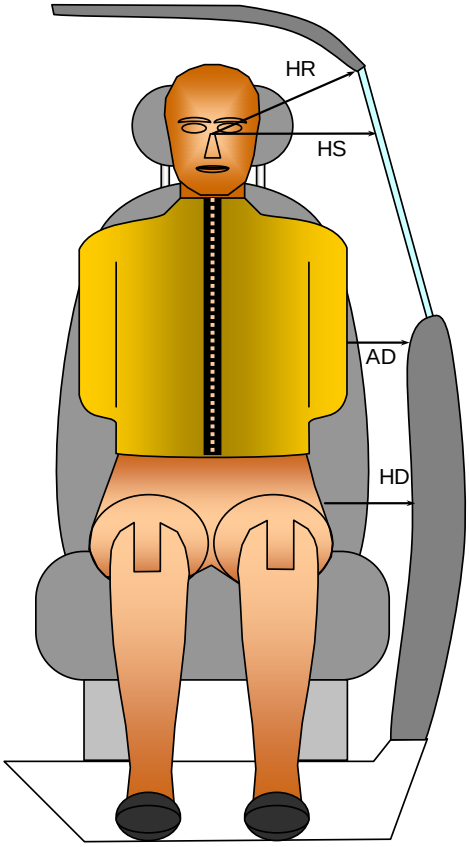
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	390	15.2		
HW		Head to Windshield	601	0		
HZ	HZ	Head to Roof Liner	139	90	301	90
NR	NB	Nose to Rim/Seat Back	445	19.0	558	8.1
CD	CB	Chest to Dashboard/Seat Back	575	13.6	563	13.0
CS		Chest to Steering Wheel	360	5.5		
KDL	KBL	Left Knee to Dash/Seat Back	140	42.1	314	27.5
KDR	KBR	Right Knee to Dash/Seat Back	108	44.9	312	27.5
PAX	PAX	Pelvic Tilt Angle X		22.1		22.1
PAY	PAY	Pelvic Tilt Angle Y		-1.2		-0.3
PHX	PHX	Hip Point to Striker (X-Axis)	246		262	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	75		245	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019



FRONT VIEW OF DUMMY

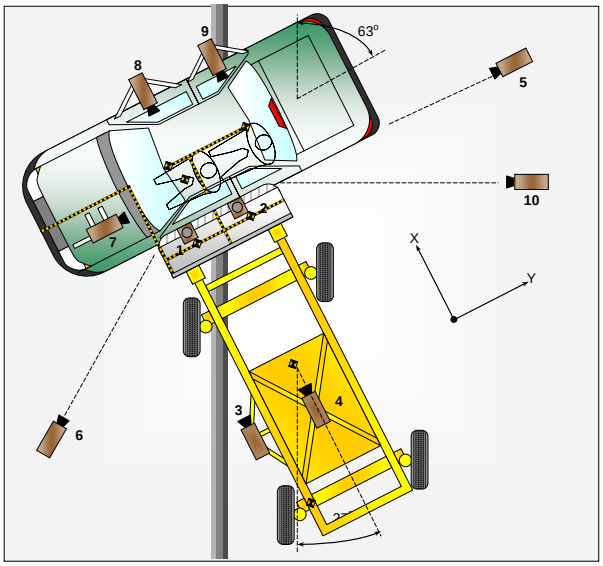
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	193	279
HS	Head to Side Window	mm	329	397
AD	Arm to Door	mm	125	194
HD	Hip Point to Door	mm	145	184

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	280	840	-4995	8.5	1000
2	Overhead Close-Up	0	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-200	6710	-1620	24	1000
6	Left Front	-1800	-6490	-1520	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

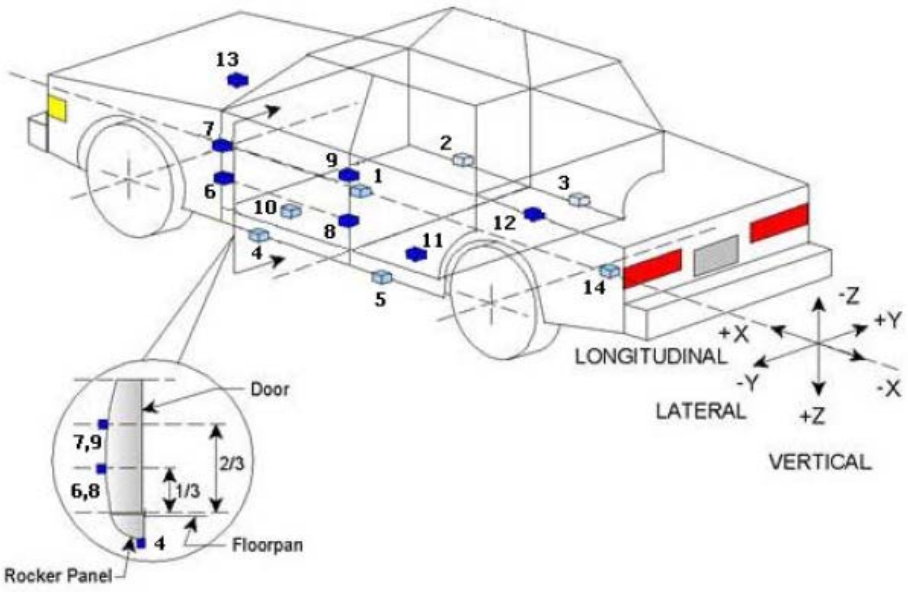
Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down
* All measurements accurate to ± 6 mm

INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Passenger Dummy	19
Vehicle Structure	23
MDB Accelerometers	5
MDB Contacts	2
Total	65

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

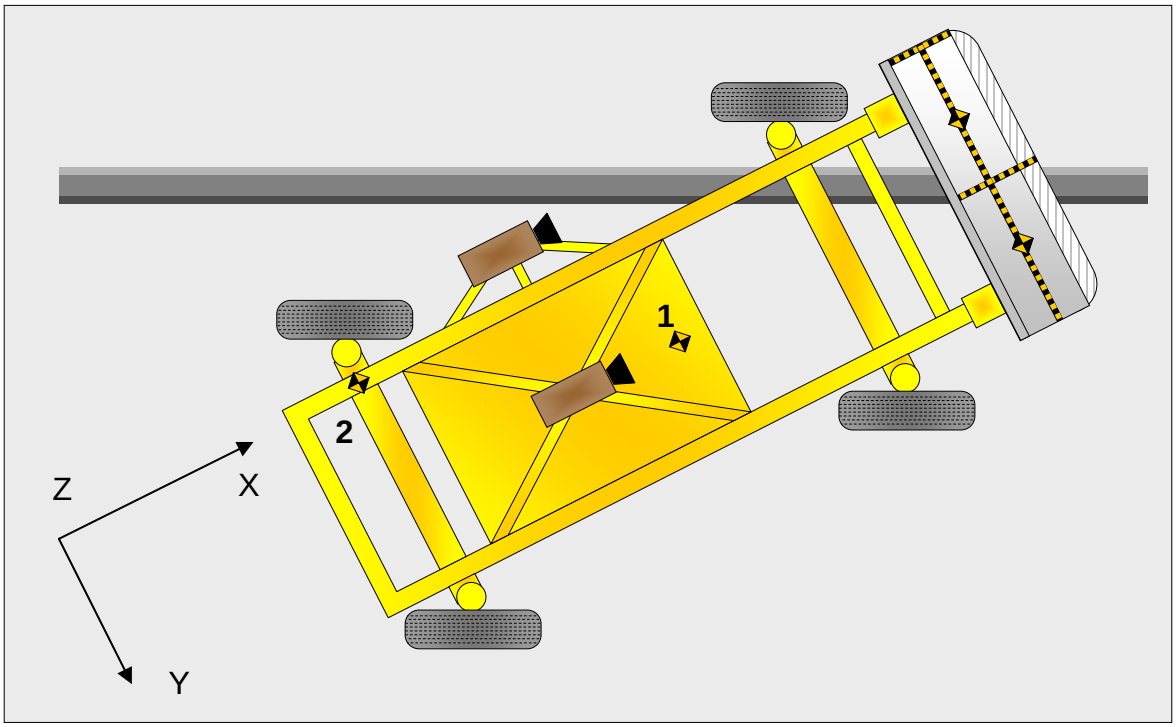
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2610	110	-320
2	Right Sill at Front Seat	2392	780	-300
3	Right Sill at Rear Seat	1463	780	-305
4	Left Sill at Front Door	2644	-780	-313
5	Left Sill at Rear Door	1766	-780	-310
6	Left Lower A-Post	3280	-879	-675
7	Left Middle A-Post	3280	-880	-868
8	Left Lower B-Post	2200	-760	-678
9	Left Middle B-Post	2190	-755	-880
10	Front Seat Track	2270	-415	-395
11	Rear Seat Structure	1800	-353	-491
12	Rt. Rear Occ. Compartment	1815	390	-350
13	Engine Block	3996	70	-930
14	Rear Above Axle	1080	0	-575

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: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	683	0	-330
2	MDB Rear	-2580	-650	-625

Reference: X – MDB Face (+ forward)
Y – MDB Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-lis)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Headrest
Left Shoulder	Side Torso/Pelvis Airbag	Side Torso/Pelvis Airbag
Upper Torso	Side Torso/Pelvis Airbag, Seat Back	Side Torso/Pelvis Airbag, Seat Back
Lower Torso	Side Torso/Pelvis Airbag, Seat Back	Side Torso/Pelvis Airbag, Seat Back
Left Hip	Side Torso/Pelvis Airbag	Side Torso/Pelvis Airbag
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch / Other Door
	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, Record Width of Opening at Striker (mm)					

POST-TEST SEAT PERFORMANCE

	Struck Side		Non-Struck Side	
Description	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	No Separation
Sill Separation	None
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

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 Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2832
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		476
Actual Impact Point (Aft of Front Axle)	mm		470
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	6
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2584
CG Location aft of Front Axle	1128

MDB WEIGHTS

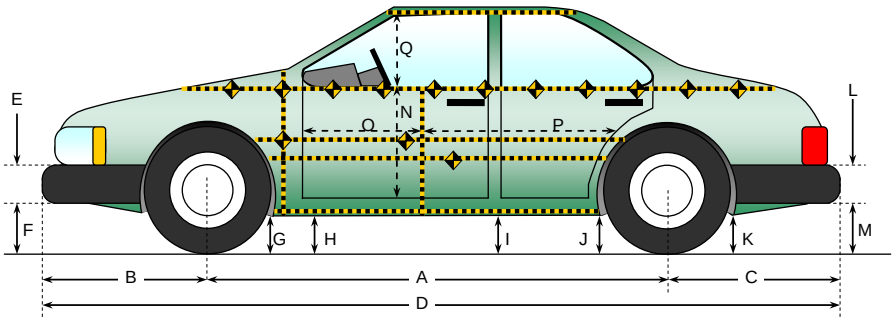
	Units	Front Axle	Rear Axle	Total
Left	kg	427.9	264.0	
Right	kg	340.6	331.2	
Ratio	%	56.4	43.6	
Totals	kg	768.5	595.2	1363.7

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.10
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.97
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.4
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 to 28	26.7

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



All measurements in (mm) with tolerance of ± 3 mm

LEFT SIDE VIEW

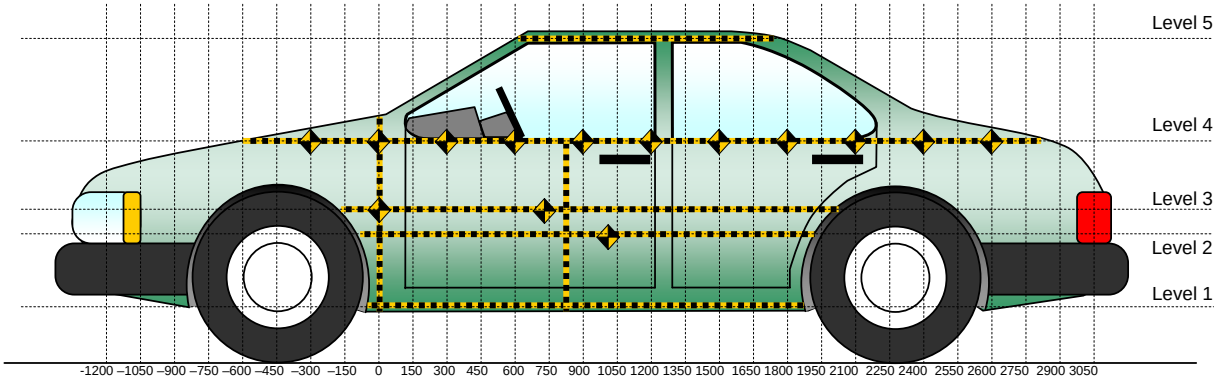
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2832	2819	13
B	Front Axle to FSOV	1044	1044	0
C	Rear Axle to RSOV	1015	1024	-9
D	Total Length at Centerline	4891	4887	4
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	270	229	41
G	Sill Height at Front Wheel Well	294	233	61
H	Sill Height at Front Door Leading Edge	291	234	57
I	Sill Height at B Pillar	285	262	23
J1	Sill Height at Rear Wheel Well	282	254	28
J2	Pinch Weld Height at Rear Wheel Well	282	248	34
K	Sill Height Aft of Rear Wheel Well	287	269	18
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	314	331	-17
N	Sill Height to Window Bottom Sill	888	764	124
O	Front Door Leading Edge to Impact CL	825	738	87
P	Rear Door Trailing Edge to Impact CL	1183	1096	87
Q	Front Window Opening	444	446	-2
R	Right Side Length	3980	3977	3
S	Left Side Length	3980	3954	26
T	Vehicle Width at B Post	1915	1779	136

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	467	232	1650
2	Mid Door	672	280	1500
3	Occupant H-Point	710	282	1500
4	Window Sill	1080	85	1200
5	Window Top	1590	-16	1350

Note: The measurements are 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: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019

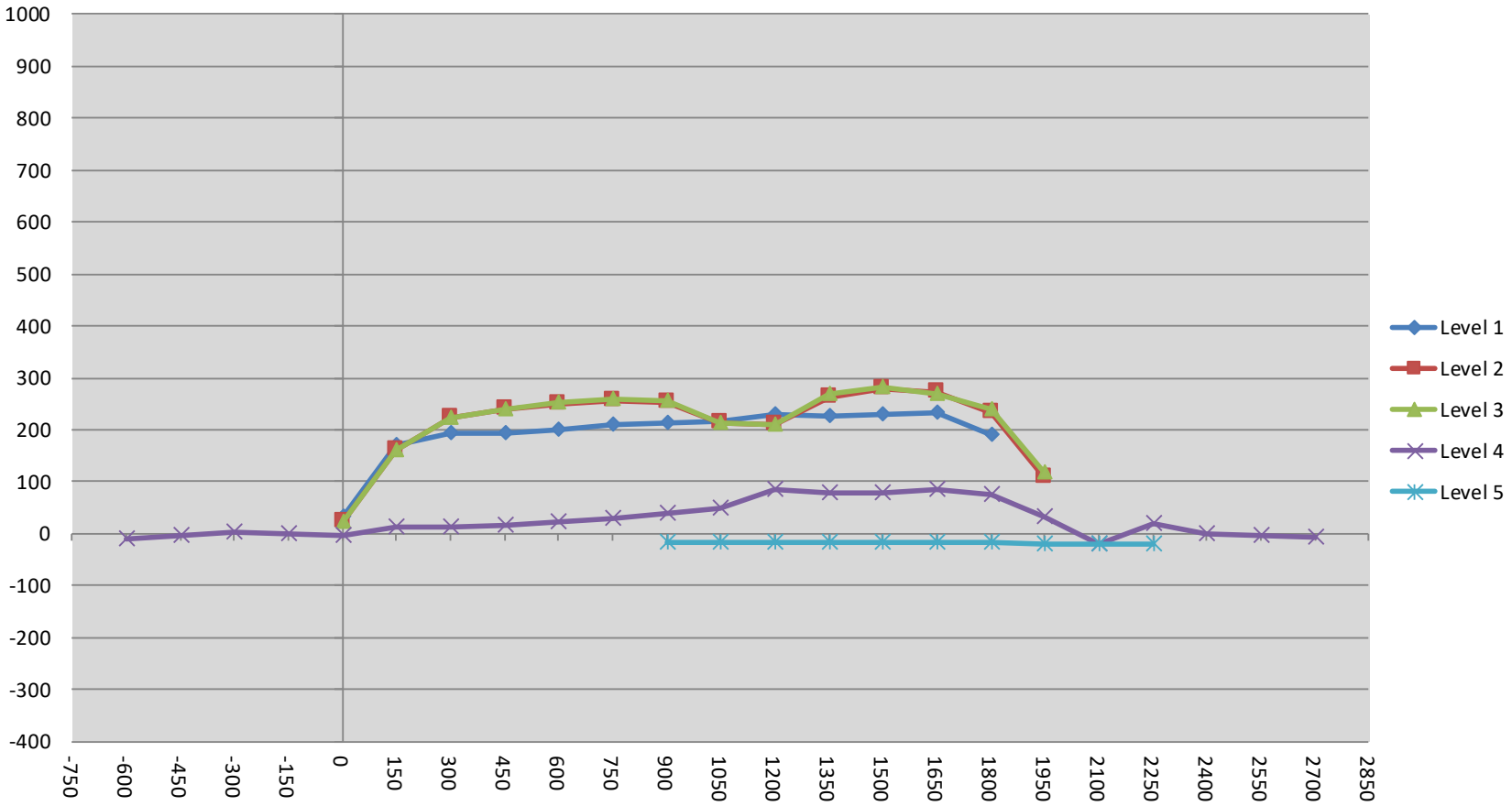
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600				288					279					-9	
-450				252					249					-3	
-300				228					231					3	
-150				227					228					1	
0	164	148	145	241		196	172	168	239		32	24	23	-2	
150	172	153	150	239		343	312	311	251		171	159	161	12	
300	185	158	155	230		380	382	378	243		195	224	223	13	
450	193	158	157	222		386	397	396	239		193	239	239	17	
600	192	156	155	215		393	405	407	237		201	249	252	22	
750	189	153	152	207		400	409	411	237		211	256	259	30	
900	189	150	148	200	472	401	404	403	238	455	212	254	255	38	-17
1050	189	149	146	193	463	404	362	359	243	446	215	213	213	50	-17
1200	191	148	144	190	461	419	357	355	275	444	228	209	211	85	-17
1350	193	148	143	186	460	420	410	413	266	444	227	262	270	80	-16
1500	192	148	143	186	462	420	428	425	265	445	228	280	282	79	-17
1650	182	147	143	192	464	414	419	412	276	448	232	272	269	84	-16
1800	170	145	142	198	468	360	377	380	274	450	190	232	238	76	-18
1950		149	146	208	476		258	264	239	457		109	118	31	-19
2100				211	486				191	466				-20	-20
2250				216	503				235	484				19	-19
2400				230					230					0	
2550				233					230					-3	
2700				248					242					-6	
2850															
3000															
3150															
3300															
3450															
3600															
3750															
3900															

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 the test based on an estimated impact point.

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

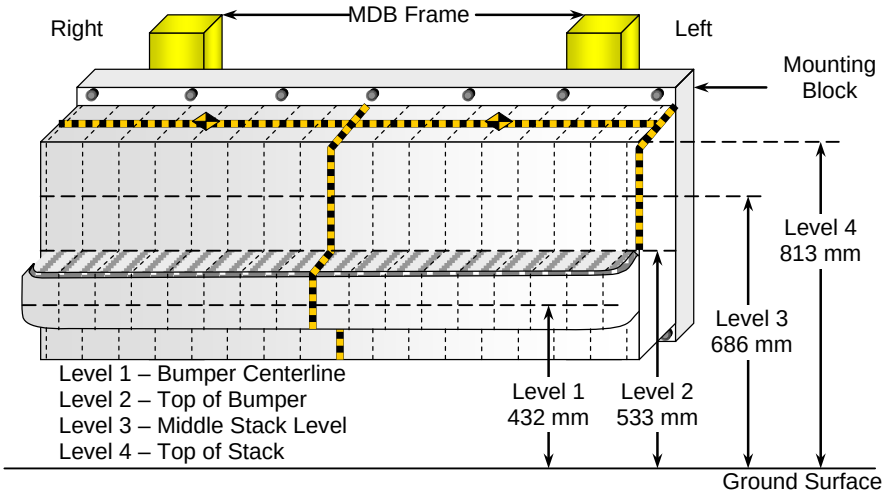
Test Vehicle: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

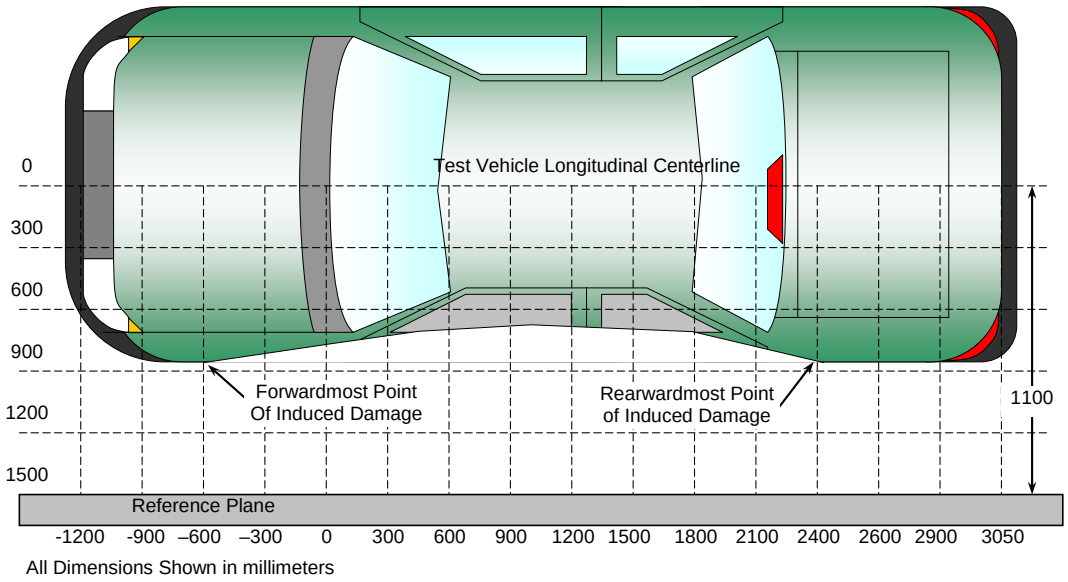
Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	400	Left	207
B	Top of Bumper	533	100	Right	110
C	Mid-Level	686	800	Left	110
D	Top of Stack	813	800	Left	149

DEFORMABLE BARRIER STATIC CRUSH

Stack	Distance Right of Center (mm)								C_L	Distance Left of Center (mm)							
Level	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
4	82	69	58	56	63	96	100	83	66	64	71	69	71	74	82	95	149
3	50	43	37	40	54	84	100	91	56	37	31	30	33	39	49	65	110
2	97	94	92	85	78	78	85	110	91	85	88	91	95	99	100	102	107
1	195	196	197	197	199	201	200	202	206	202	204	203	207	206	207	207	207

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2000	3	231	142	89
2	1603	3	415	143	272
3	1206	3	356	144	212
4	809	3	409	150	259
5	412	3	391	156	235
6	15	3	196	146	51

MDB DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	800 mm right of center	1	671	476	195
2	480 mm right of center	1	663	463	200
3	160 mm right of center	1	663	463	200
4	160 mm left of center	1	665	463	202
5	480 mm left of center	1	671	463	208
6	800 mm left of center	1	683	476	207

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

Test Vehicle: 2019 Nissan Murano S 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20195211
Test Date: 2/5/2019

Test Time: 12:32 pm

Temperature: 22.0 °C

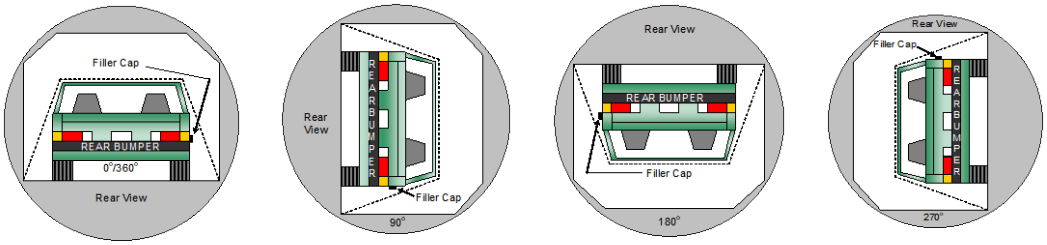
A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0.0 oz.

C. For the following 25 minutes: None
(Maximum Allowable = 1 ounce / minute)

D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



0°/360° 90° 180° 270°

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	111	300	411
180° to 270°	108	300	408
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

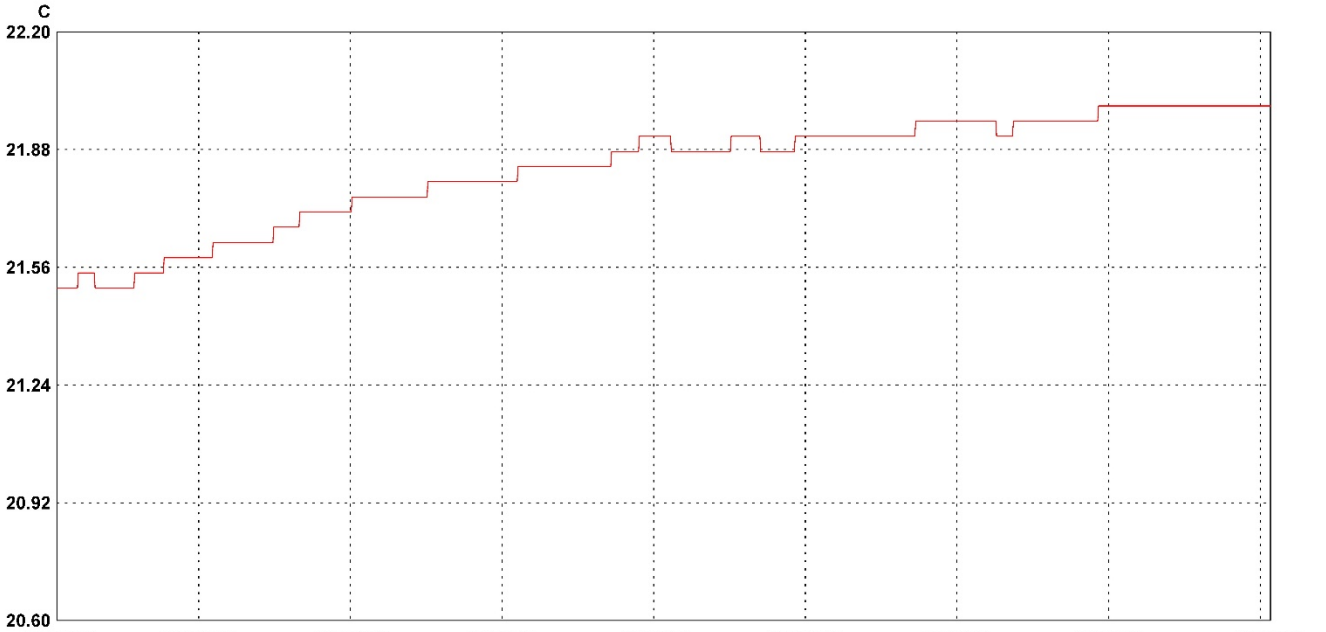
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0.0	0.0	0.0	
90° to 180°	0.0	0.0	0.0	
180° to 270°	0.0	0.0	0.0	
270° to 360°	0.0	0.0	0.0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2019 Nissan Murano S 5-Door SUV NHTSA No. M20195211
Test Program: NCAP Side MDB Impact Test Test Date: 2/5/2019



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	17012040	VSC_North_Hall	1		22.00	21.83	21.50	C	Temperature	17012040_VSC_North_Hall.spl

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Photo No. 001 - As Delivered Right Front Three-Quarter View of Test Vehicle

Photo No. 002 - As Delivered Left Rear Three-Quarter View of Test Vehicle

Photo No. 003 - Pre-Test Frontal View of Test Vehicle

Photo No. 004 - Post-Test Frontal View of Test Vehicle

Photo No. 005 - Pre-Test Left Front Three-Quarter View of Test Vehicle

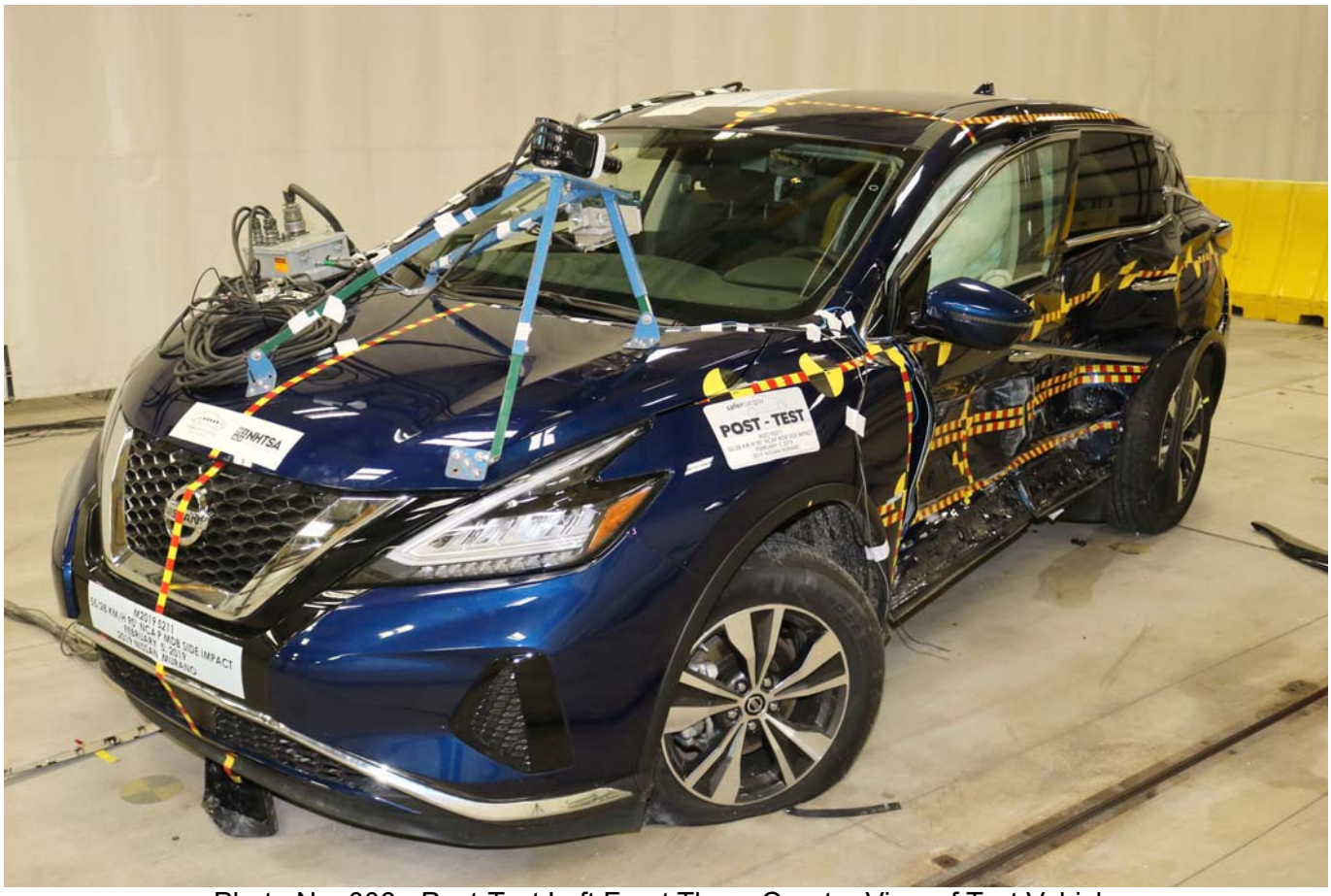


Photo No. 006 - Post-Test Left Front Three-Quarter View of Test Vehicle

Photo No. 007 - Pre-Test Left Side View of Test Vehicle

Photo No. 008 - Post-Test Left Side View of Test Vehicle

Photo No. 009 - Pre-Test Left Three-Quarter Rear View of Test Vehicle

Photo No. 010 - Post-Test Left Three-Quarter Rear View of Test Vehicle

Photo No. 011 - Pre-Test Rear View of Test Vehicle

Photo No. 012 - Post-Test Rear View of Test Vehicle

Photo No. 013 - Pre-Test Right Side View of Test Vehicle

Photo No. 014 - Post-Test Right Side View of Test Vehicle

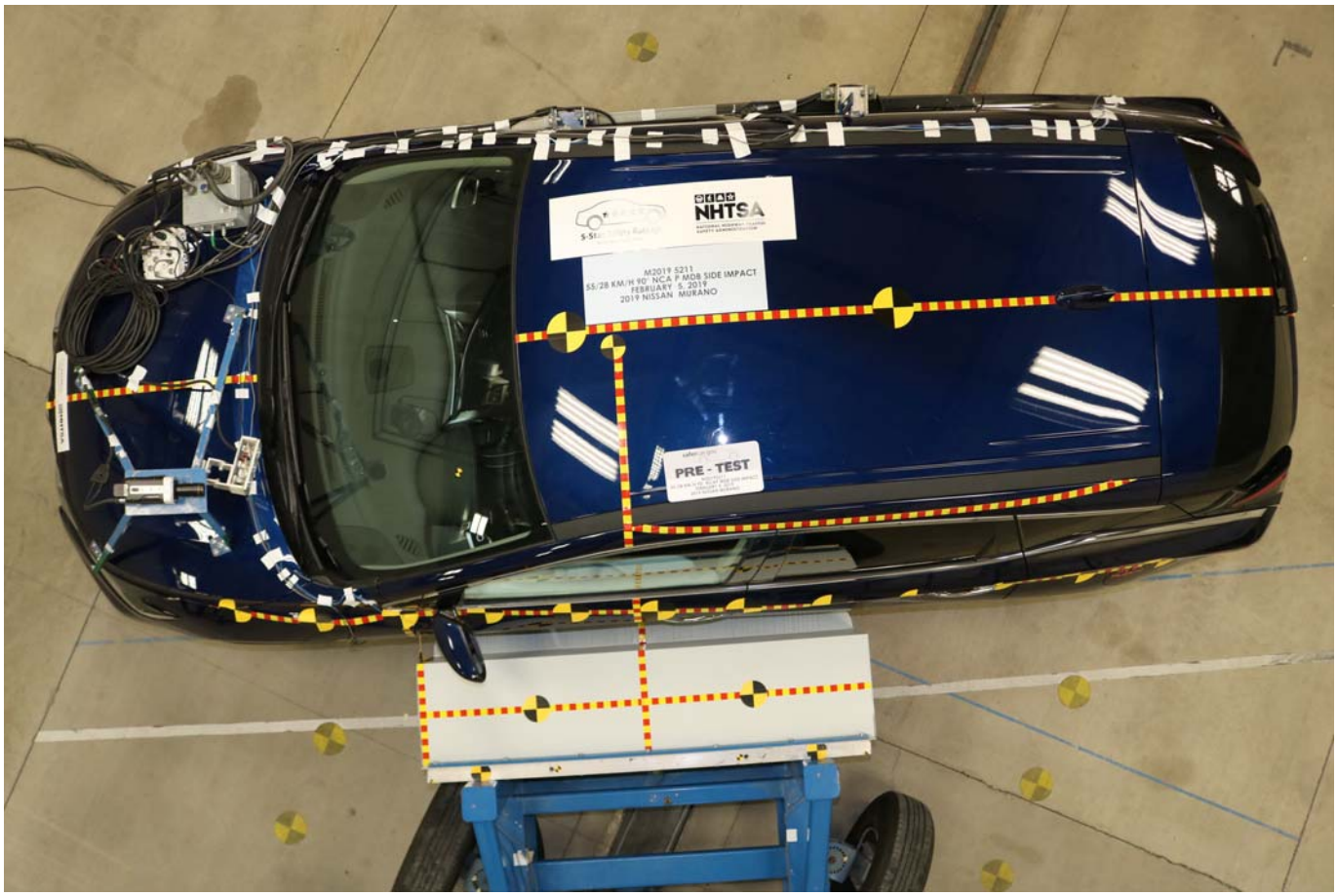


Photo No. 015 - Pre-Test Overhead View of Test Area

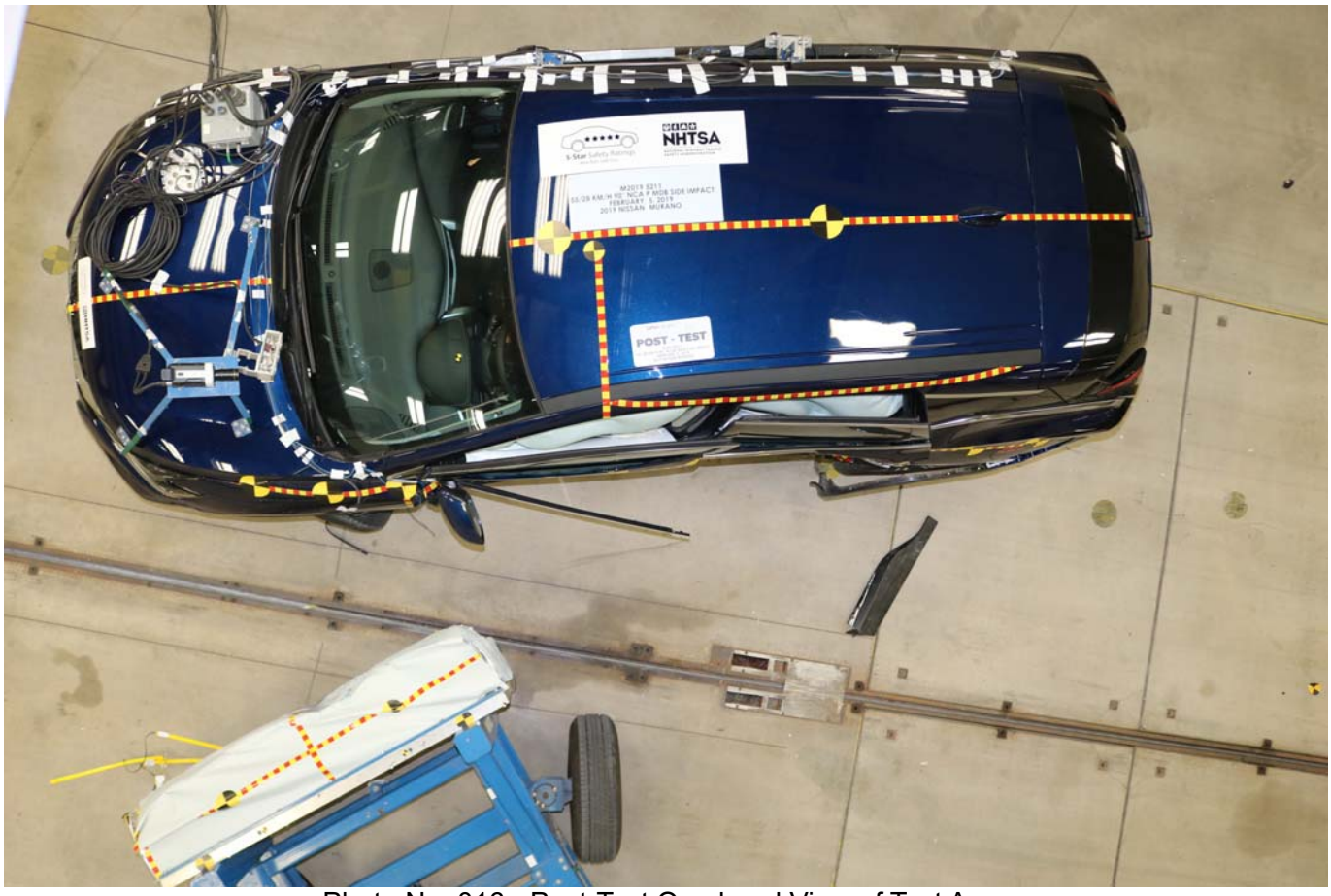


Photo No. 016 - Post-Test Overhead View of Test Area

Photo No. 017 - Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle

Photo No. 018 - Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle

Photo No. 019 - Pre-Test Close-Up View of Impact Point Target

Photo No. 020 - Post-Test Close-Up View of Impact Point Target

Photo No. 021 - Pre-Test Left Front Door Latch Close-Up

Photo No. 022 - Post-Test Left Front Door Latch Close-Up

Photo No. 023 - Pre-Test Left Rear Door Latch Close-Up

Photo No. 024 - Post-Test Left Rear Door Latch Close-Up

Photo No. 025 - Pre-Test Front Close-Up View of Driver Dummy

Photo No. 026 - Post-Test Front Close-Up View of Driver Dummy

Photo No. 027 - Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking

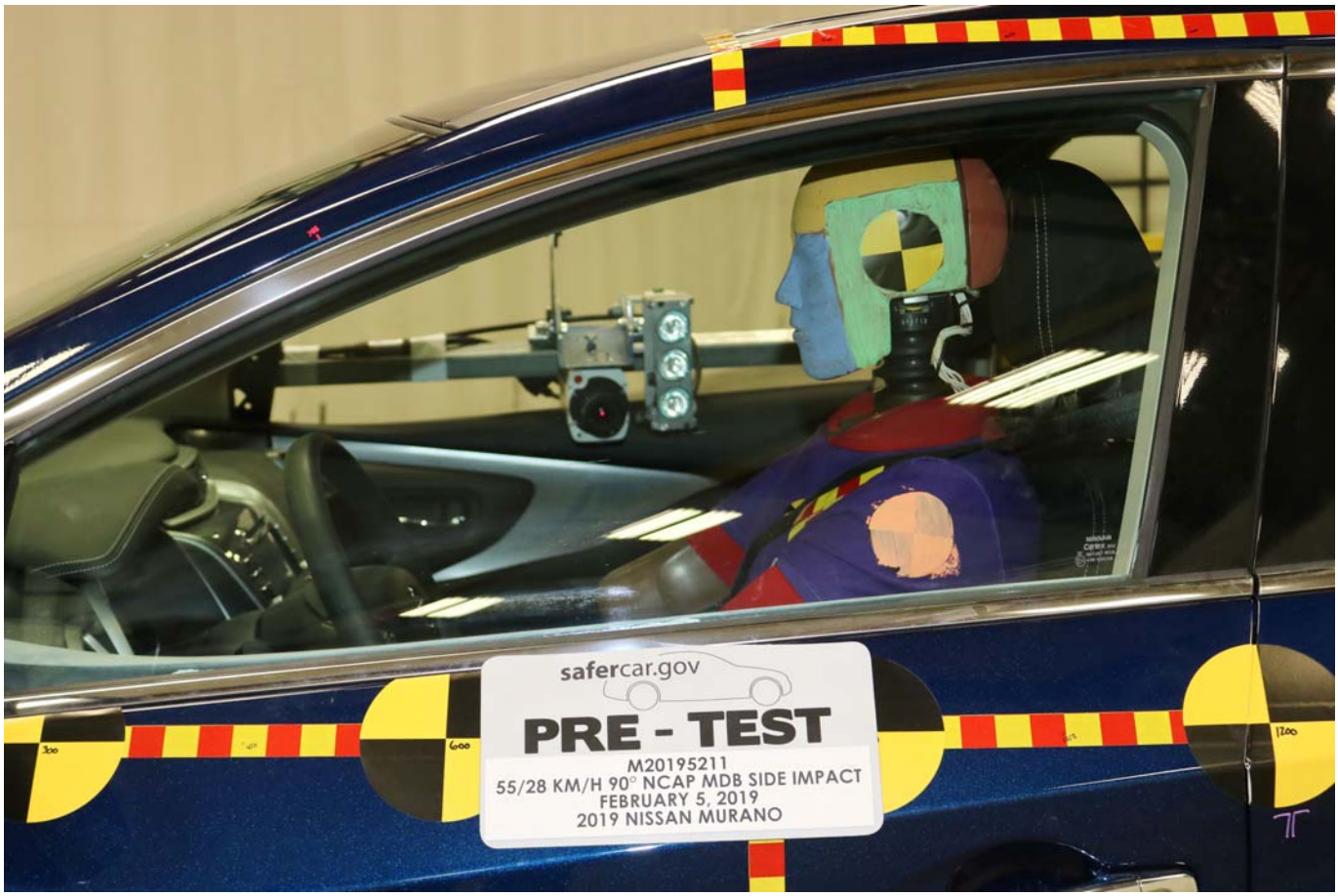


Photo No. 028 - Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

Photo No. 029 - Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

Photo No. 030 - Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

Photo No. 031 - Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

Photo No. 032 - Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

Photo No. 033 - Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

Photo No. 034 - Pre-Test Placement of Driver Dummy Feet

Photo No. 035 - Pre-Test View of Belt Anchorage for Driver Dummy

Photo No. 036 - Pre-Test Left Side View of Steering Wheel

Photo No. 037 - Pre-Test View of Disengaged Parking Brake

Photo No. 038 - Pre-Test View of Parking Brake

Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track

Photo No. 040 - Pre-Test Close-Up Left Side View of Driver Seat Back

Photo No. 041 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint

Photo No. 042 - Pre-Test Driver Dummy and Door Clearance View

Photo No. 043 - Post-Test Driver Dummy and Door Clearance View

Photo No. 044 - Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Photo No. 045 - Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Photo No. 046 - Pre-Test Driver Inner Door Panel View

Photo No. 047 - Post-Test Driver Inner Door Panel View

Photo No. 048 - Post-Test Driver Dummy Close-up Head Contact with Vehicle Interior View

Photo No. 049 - Post-Test Driver Dummy Close-up Head Contact with Side Airbag View

Photo No. 050 - Post-Test Driver Dummy Close-up Torso Contact with Vehicle Interior View

Photo No. 051 - Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 052 - Post-Test Driver Dummy Close-up Pelvis Contact with Vehicle Interior View

Photo No. 053 - Post-Test Driver Dummy Close-up Pelvis Contact with Side Airbag View

Photo No. 054 - Post-Test Driver Dummy Close-up Knee Contact View

Photo No. 055 - Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking

Photo No. 056 - Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

Photo No. 057 - Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

Photo No. 058 - Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

Photo No. 059 - Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

Photo No. 060 - Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

Photo No. 061 - Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

Photo No. 062 - Pre-Test View of Rear Passenger Dummy Neck Showing Position of Adjustable Neck Bracket

Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level

Photo No. 064 - Pre-Test Placement of Rear Passenger Dummy Feet

Photo No. 065 - Pre-Test View of Belt Anchorage for Rear Passenger Dummy

Photo No. 066 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

Photo No. 067 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

Photo No. 068 - Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint

Photo No. 069 - Pre-Test Rear Passenger Dummy and Door Clearance View

Photo No. 070 - Post-Test Rear Passenger Dummy and Door Clearance View

Photo No. 071 - Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

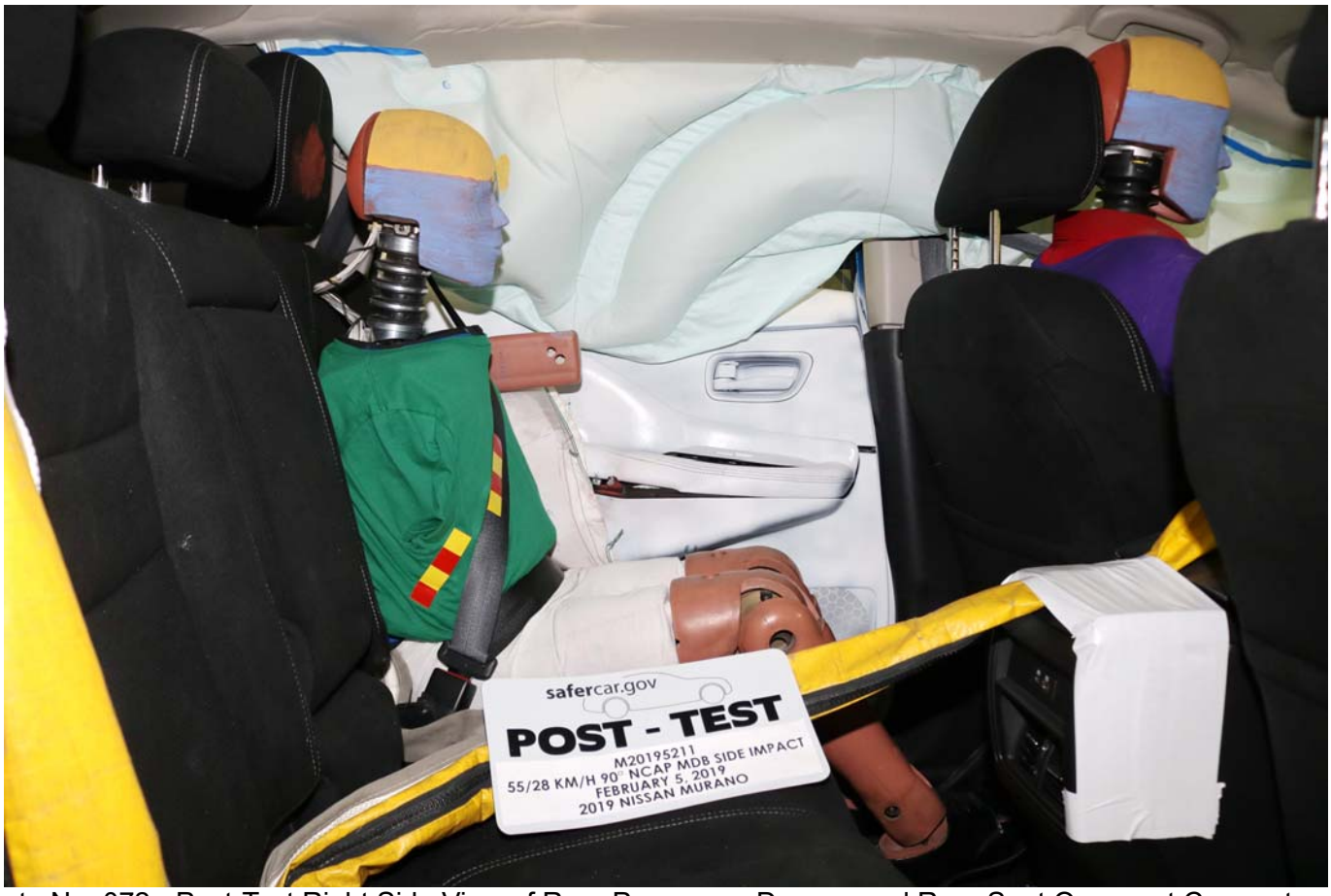


Photo No. 072 - Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Photo No. 073 - Pre-Test Rear Passenger Inner Door Panel View

Photo No. 074 - Post-Test Rear Passenger Inner Door Panel View

Photo No. 075 - Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View

Photo No. 076 - Post-Test Rear Passenger Dummy Close-up Head Contact with Side Airbag View

Photo No. 077 - Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View

Photo No. 078 - Post-Test Rear Passenger Dummy Close-up Torso Contact with Side Airbag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 079 - Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Vehicle Interior View

Photo No. 080 - Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Side Airbag View

PHOTOGRAPH NOT AVAILABLE

Photo No. 081 - Post-Test Rear Passenger Dummy Close-up Knee Contact View

Photo No. 082 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 083 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 084 - Pre-Test Front View of MDB Impactor Face

Photo No. 085 - Post-Test Front View of MDB Impactor Face

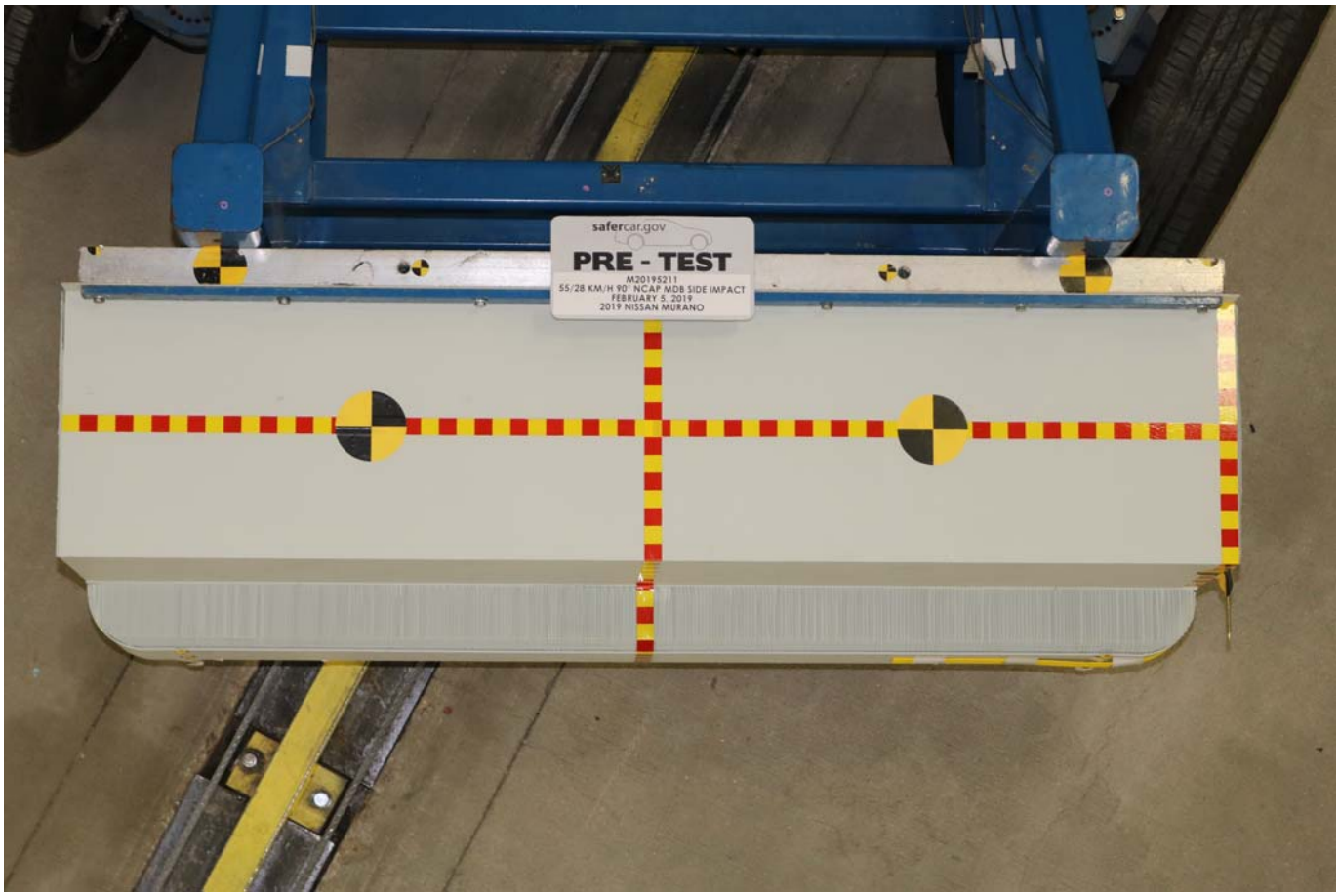


Photo No. 086 - Pre-Test Top View of MDB Impactor Face

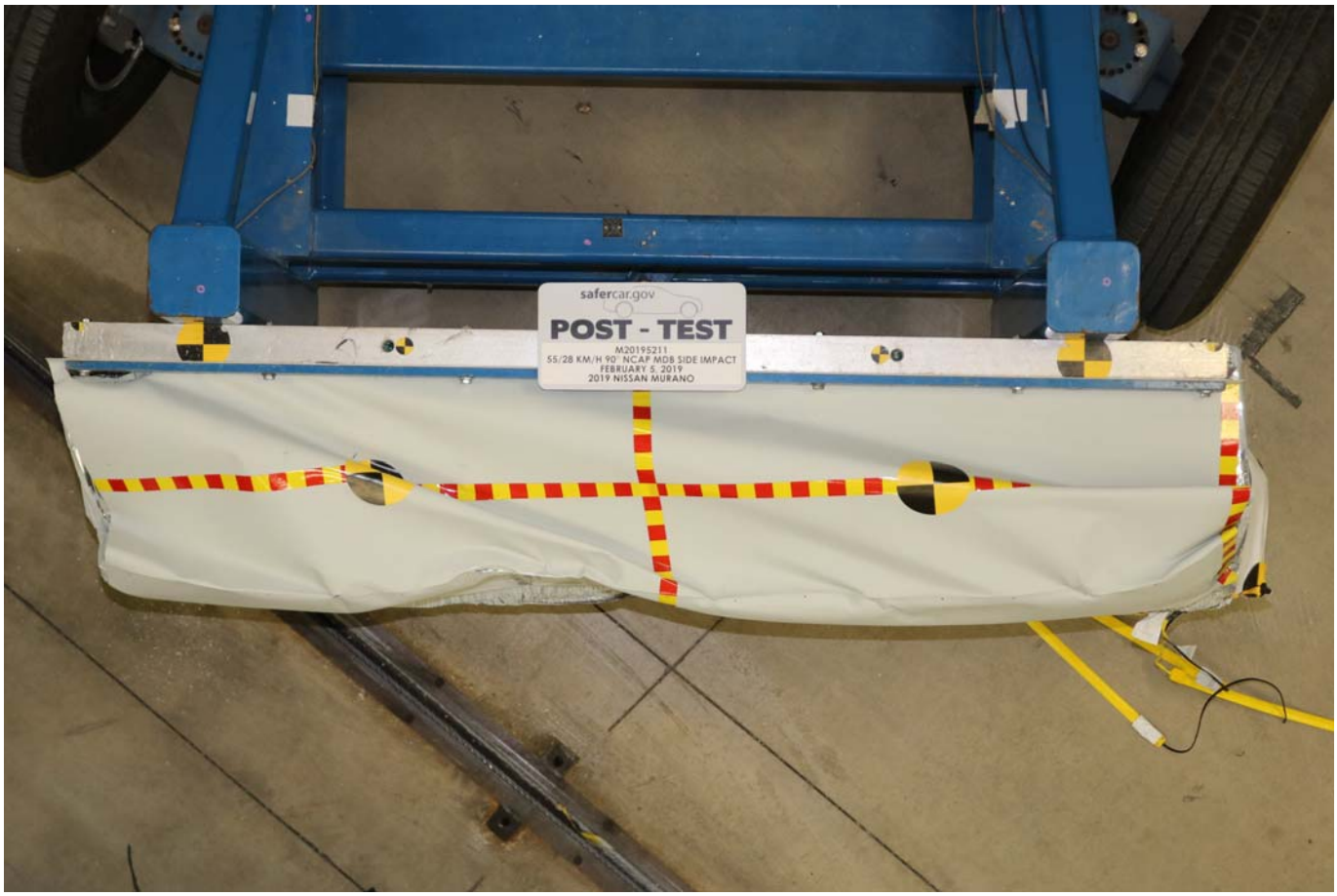


Photo No. 087 - Post-Test Top View of MDB Impactor Face

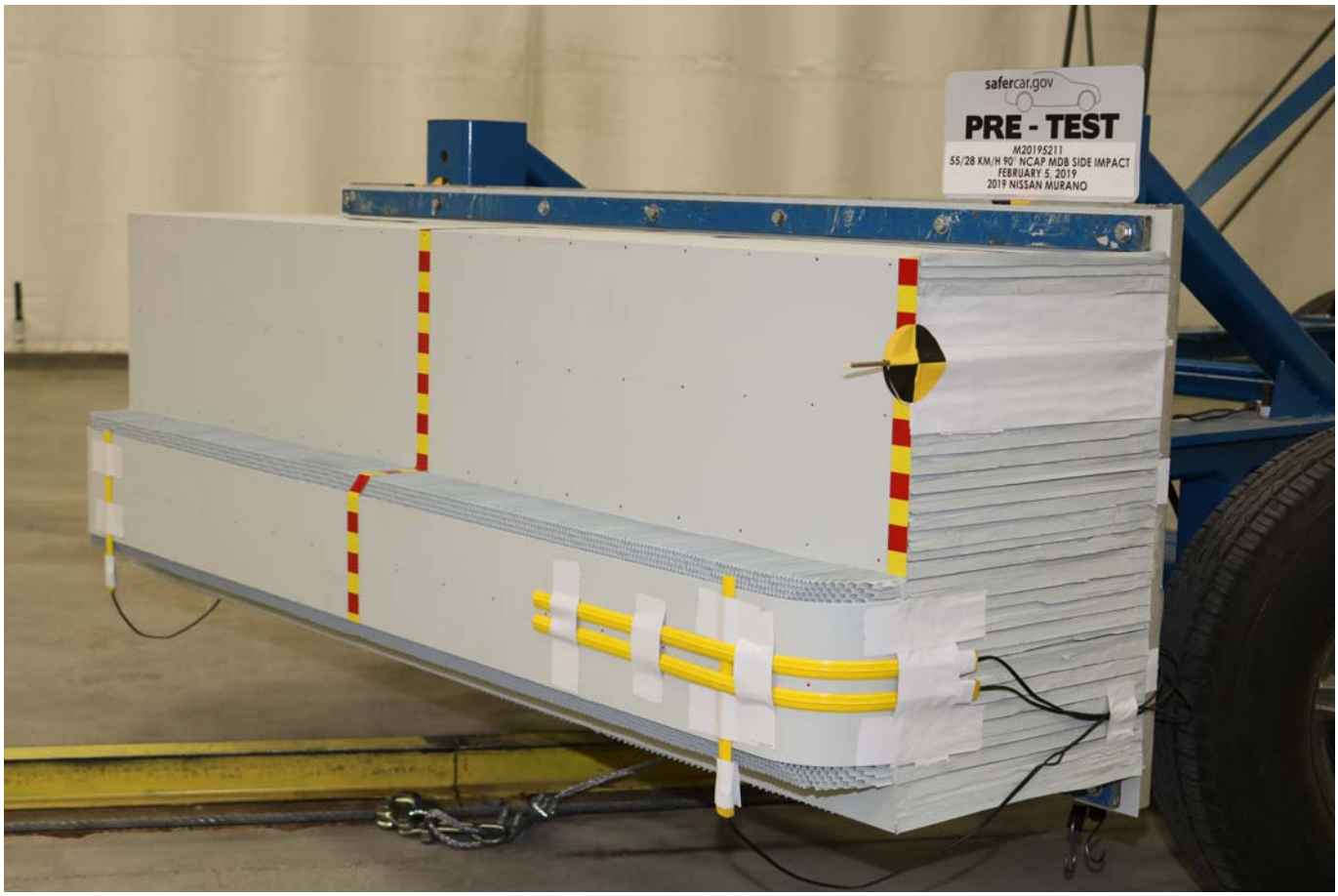


Photo No. 088 - Pre-Test Left Side View of MDB Impactor Face

Photo No. 089 - Post-Test Left Side View of MDB Impactor Face

Photo No. 090 - Pre-Test Right Side View of MDB Impactor Face

Photo No. 091 - Post-Test Right Side View of MDB Impactor Face

Photo No. 092 - Close-Up View of Vehicle Certification Label

Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label

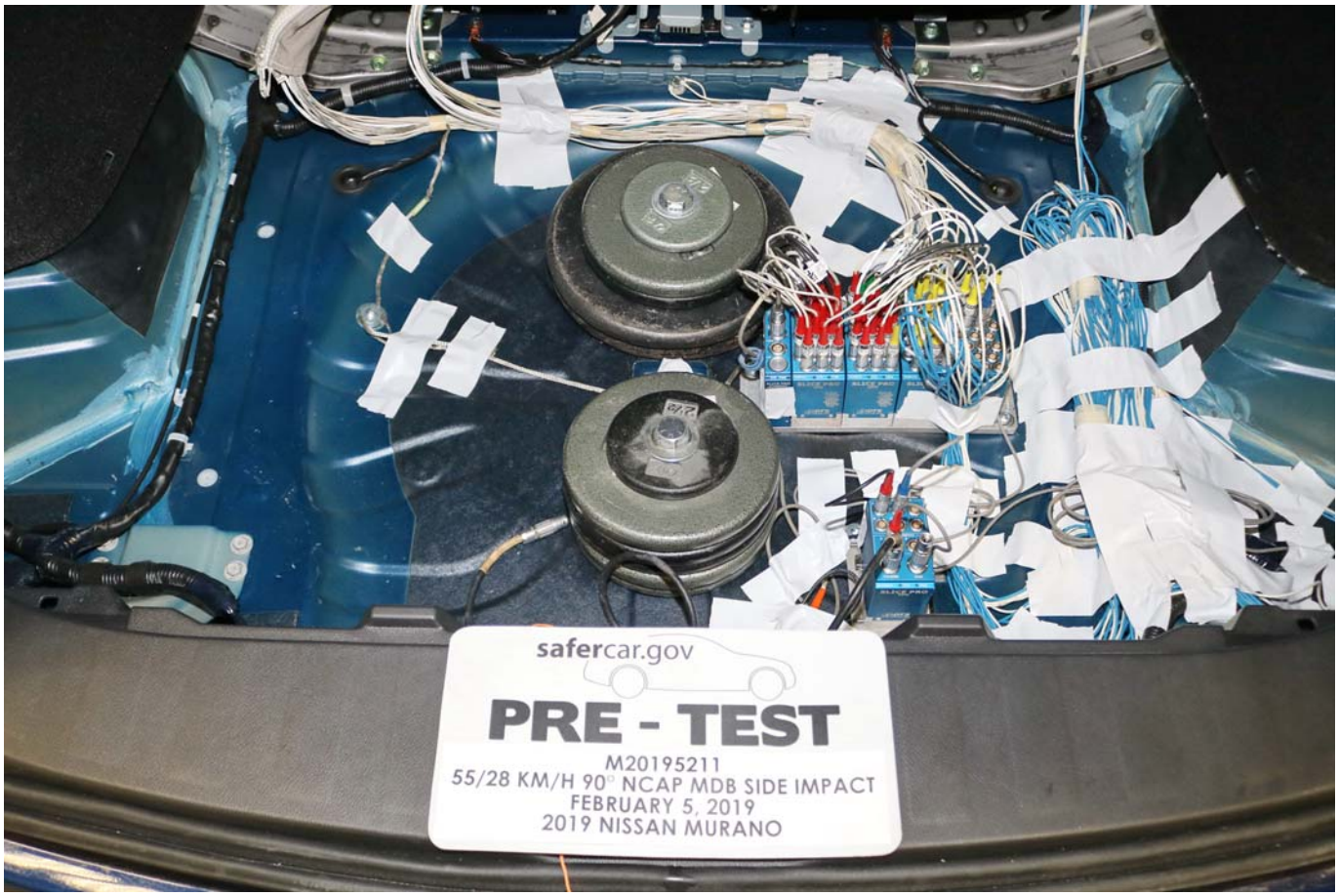


Photo No. 094 - Pre-Test Ballast View

Photo No. 095 - Post-Test Primary and Redundant Speed Trap Read-Out


Photo No. 096 - FMVSS Photo No. 301 Static Rollover 0 Degrees

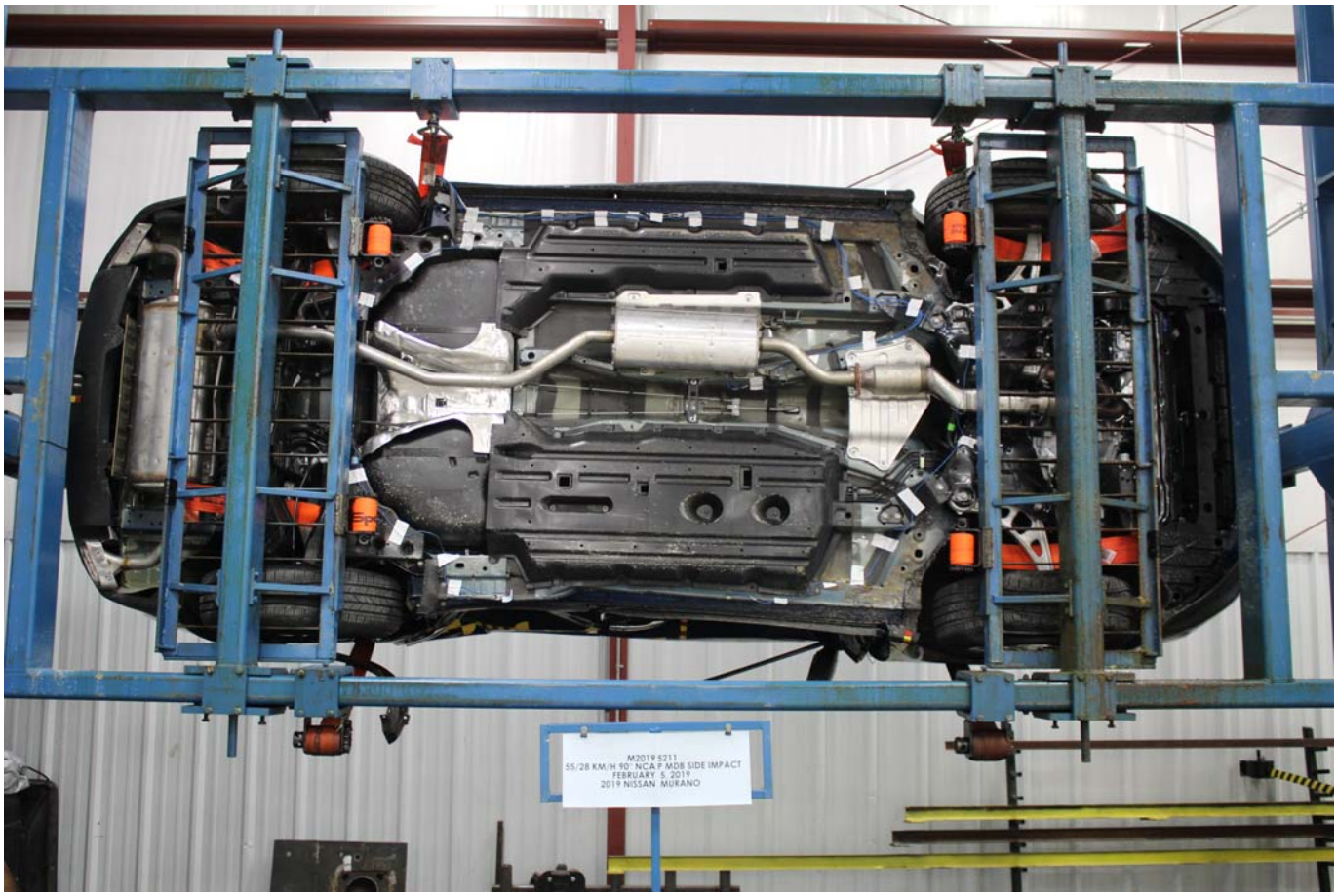


Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees

Photo No. 098 - FMVSS Photo No. 301 Static Rollover 180 Degrees

Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees

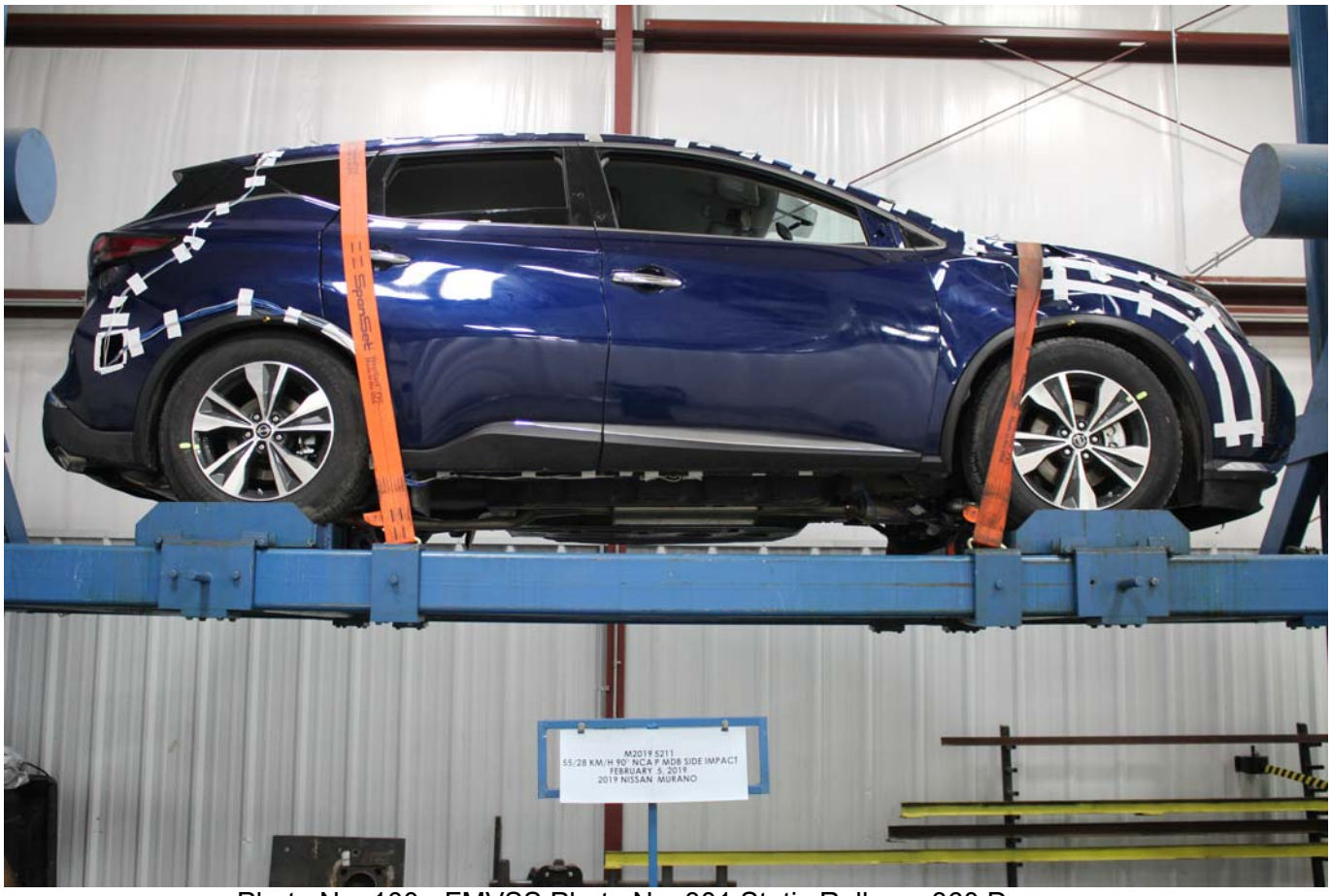


Photo No. 100 - FMVSS Photo No. 301 Static Rollover 360 Degrees

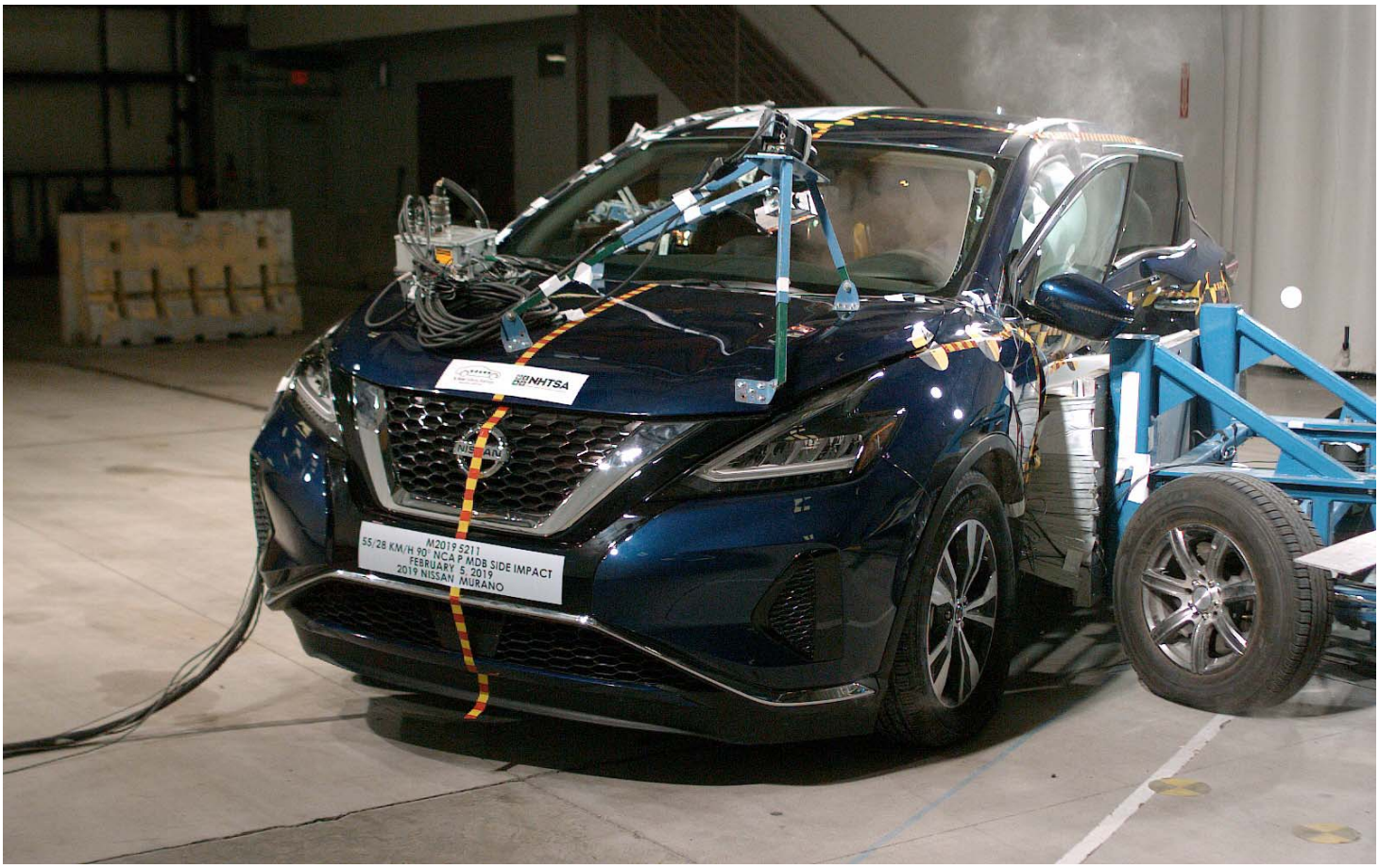


Photo No. 101 - Impact Event

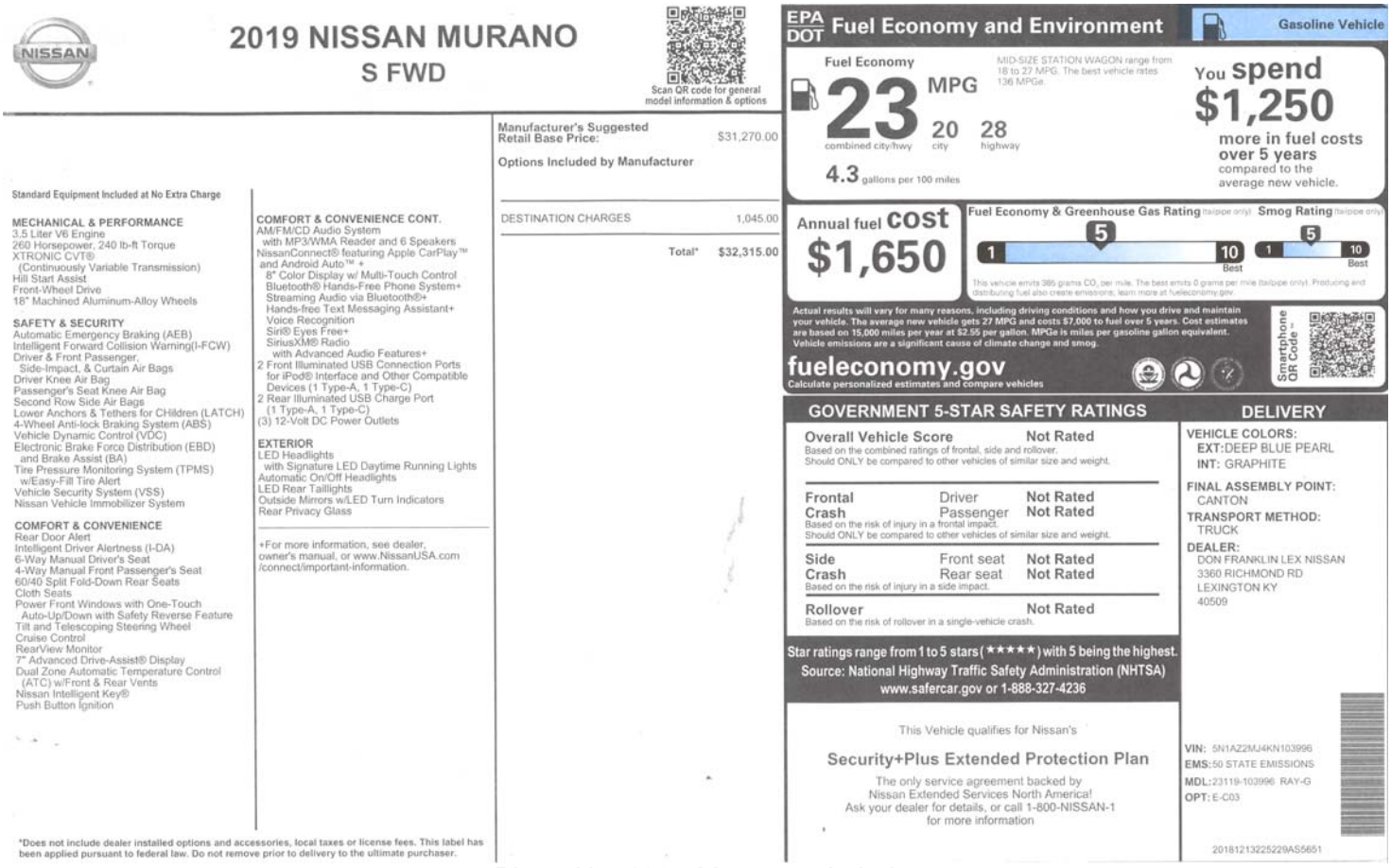
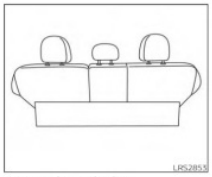


Photo No. 102 - Monroney Label


LRS2853

To return the seatbacks:

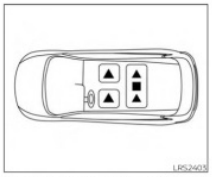
1. Lift up each seatback and push it to the upright position until it is latched.
2. Always reconnect the center seat belt when the seat is returned to the upright position.

⚠ WARNING

- **When returning the seatbacks, be sure to attach the rear center seat belt connector.**
- **Do not unfasten the rear center seat belt connector except when folding down the rear seat.**
- **When attaching the rear center seat belt connector, be certain that the seatbacks are completely secured in the latched position and the rear center seat belt connector is completely secured.**
- **If the rear center seat belt connector and the seatbacks are not secured in the correct position, serious personal injury may result in an accident or sudden stop.**

⚠ WARNING

Head restraints/headrests supplement the other vehicle safety systems. They may provide additional protection against injury in certain rear end collisions. Adjustable head restraints/headrests must be adjusted properly, as specified in this section. Check the adjustment after someone else uses the seat. Do not attach anything to the head restraint/headrest stalks or remove the head restraint/headrest. Do not use the seat if the head restraint/headrest has been removed. If the head restraint/headrest was removed, reinstall and properly adjust the head restraint/headrest before an occupant uses the seating position. Failure to follow these instructions can reduce the effectiveness of the head restraints/headrests. This may increase the risk of serious injury or death in a collision.


LRS2403

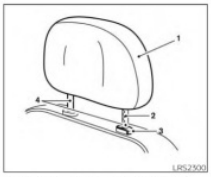
The illustration shows the seating positions equipped with head restraints/headrests.

▲ Indicates the seating position is equipped with a head restraint.

■ Indicates the seating position is equipped with a headrest.

+ Indicates the seating position is not equipped with a head restraint or headrest (if applicable).

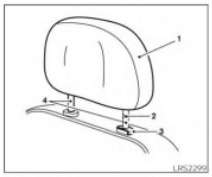
- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalk(s) to lock them in a desired adjustment position.
- Proper Adjustment:
  - For the adjustable type, align the head restraint/headrest so the center of your ear is approximately level with the center of the head restraint/headrest.
  - If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.
- If the head restraint/headrest has been removed, ensure that it is reinstalled and locked in place before riding in that designated seating position.



LRS2300

ADJUSTABLE HEAD RESTRAINT/ HEADREST COMPONENTS

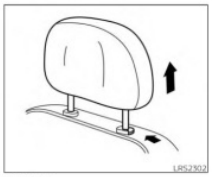
1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks



LRS2299

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

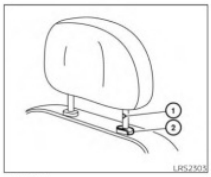
1. Removable head restraint/headrest
2. Single notch
3. Lock knob
4. Stalks


LRS2302

REMOVE

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

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



LRS2305

INSTALL

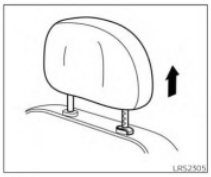
1. Align the head restraint/headrest stalks with the holes in the seat. Make sure that the head restraint/headrest is facing the correct direction. The stalk with the notch (notches) ① must be installed in the hole with the lock knob ②.
2. Push and hold the lock knob and push the head restraint/headrest down.
3. Properly adjust the head restraint/headrest before an occupant uses the seating position.


WRS0156

ADJUST

For adjustable head restraint/headrest

Adjust the head restraint/headrest so the center is level with the center of your ears. If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.


LRS2505

Raise

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

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

Photo No. 103 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

Additional Driver & Passenger Dummy Instrumentation Data

Passenger Head Angular Velocity (X)

Passenger Head Angular Velocity (Y)

Passenger Head Angular Velocity (Z)

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 Track 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)

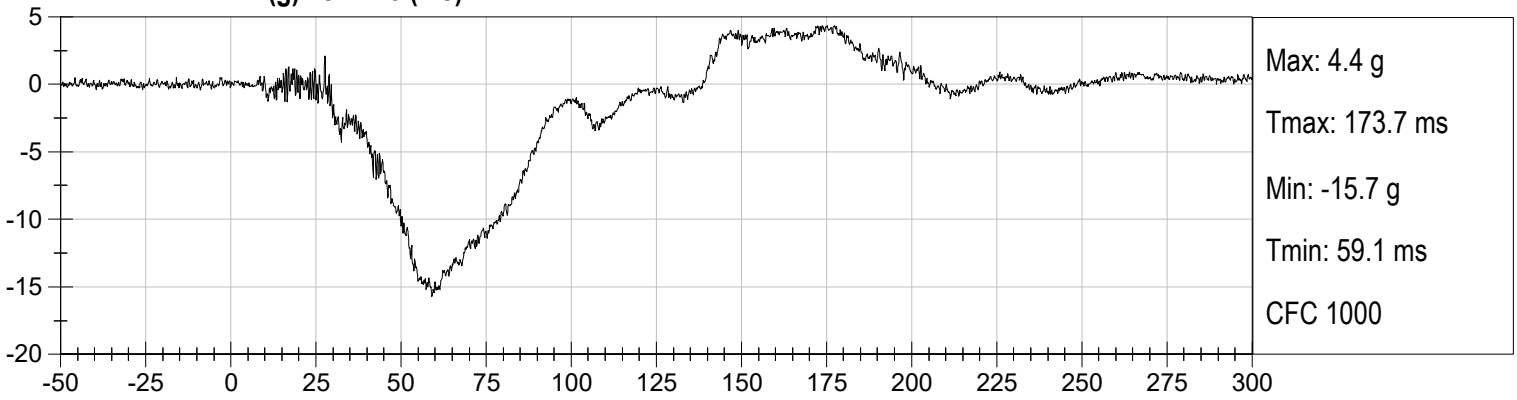
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

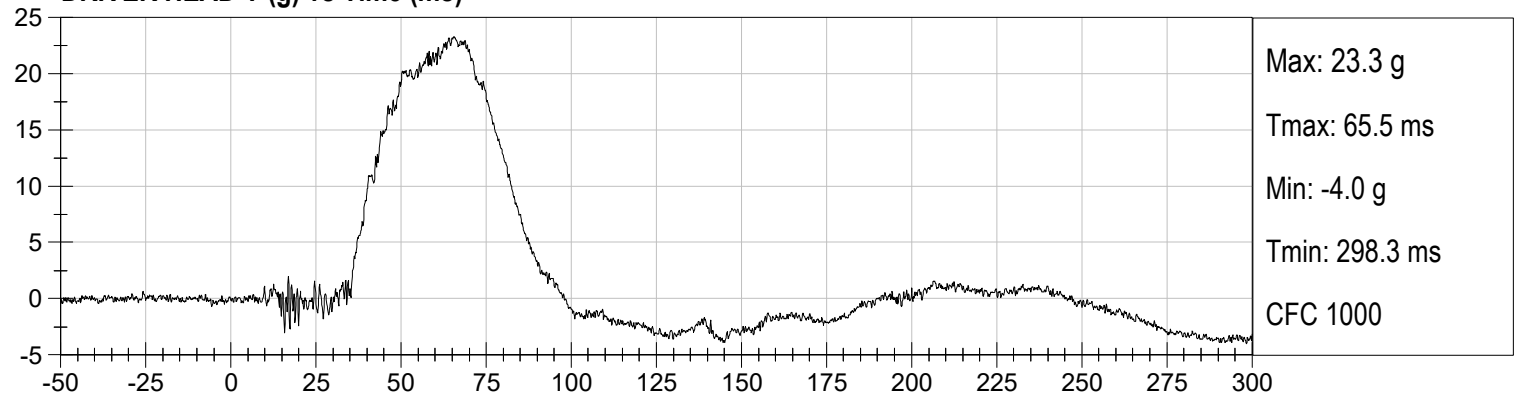
Left MDB Contact Switch

Right MDB Contact Switch

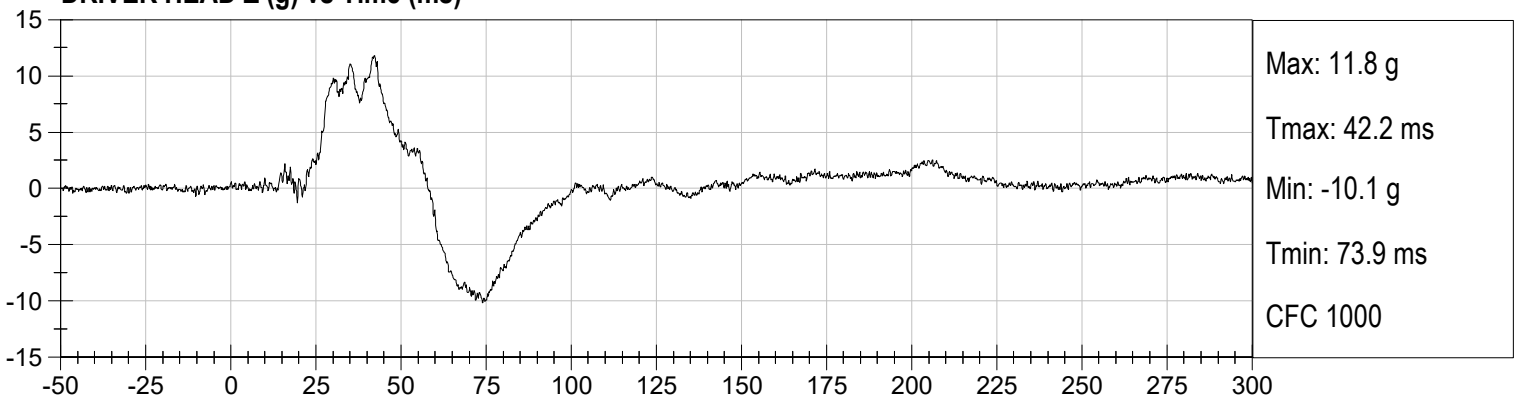
DRIVER HEAD X (g) vs Time (ms)



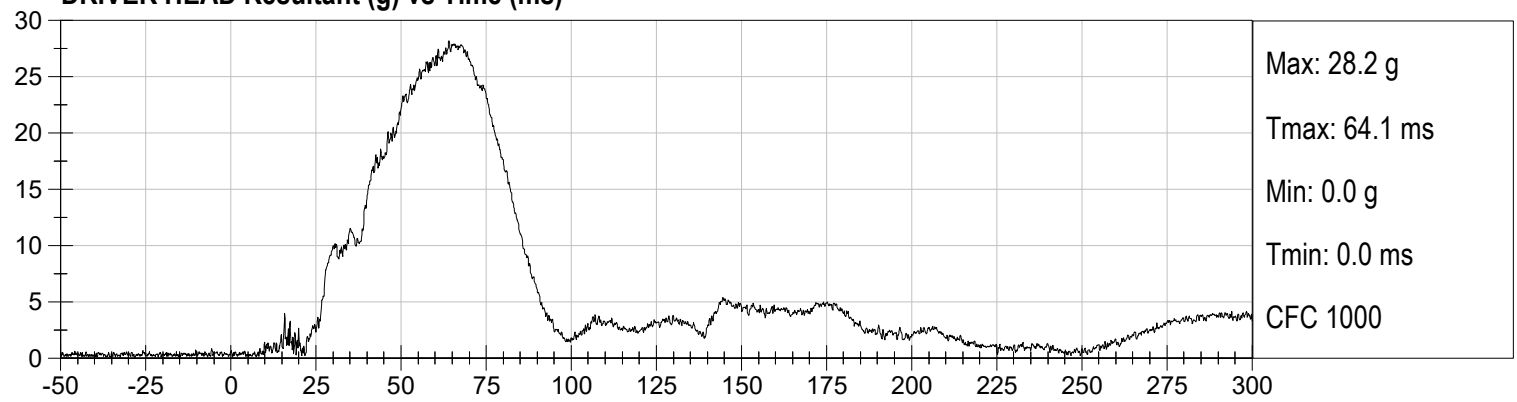
DRIVER HEAD Y (g) vs Time (ms)



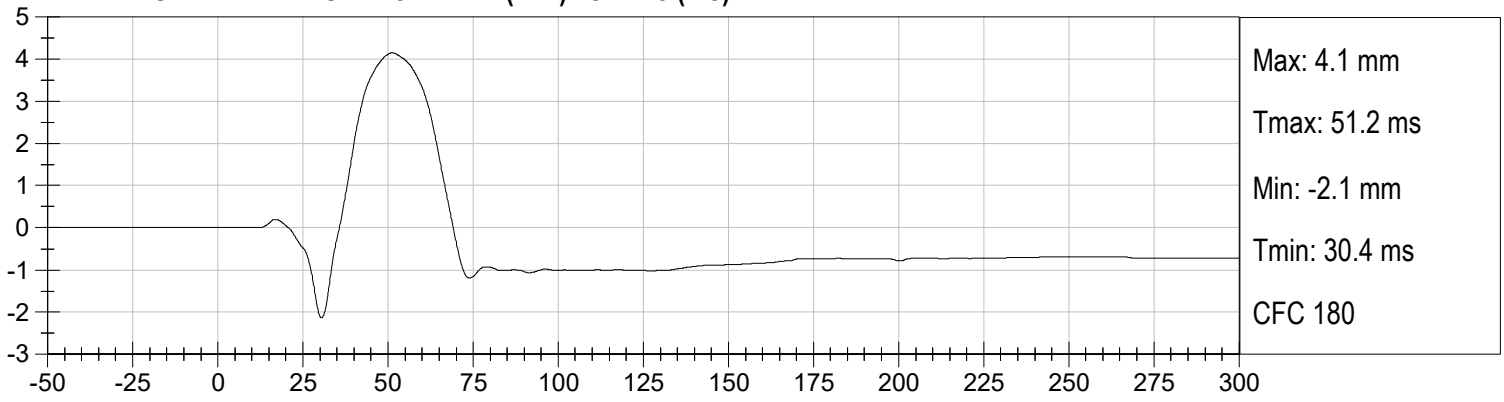
DRIVER HEAD Z (g) vs Time (ms)



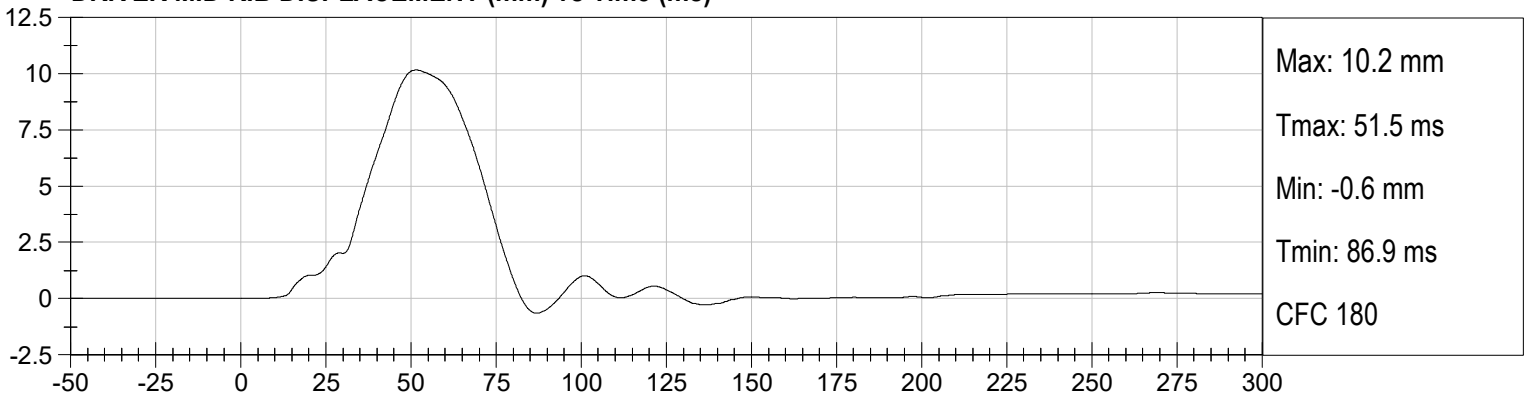
DRIVER HEAD Resultant (g) vs Time (ms)



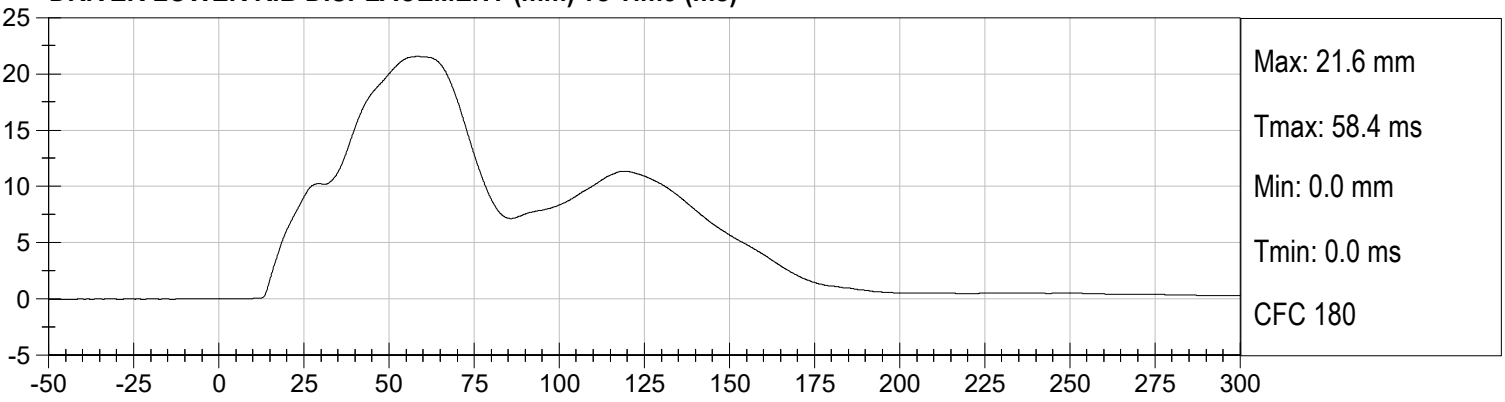
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



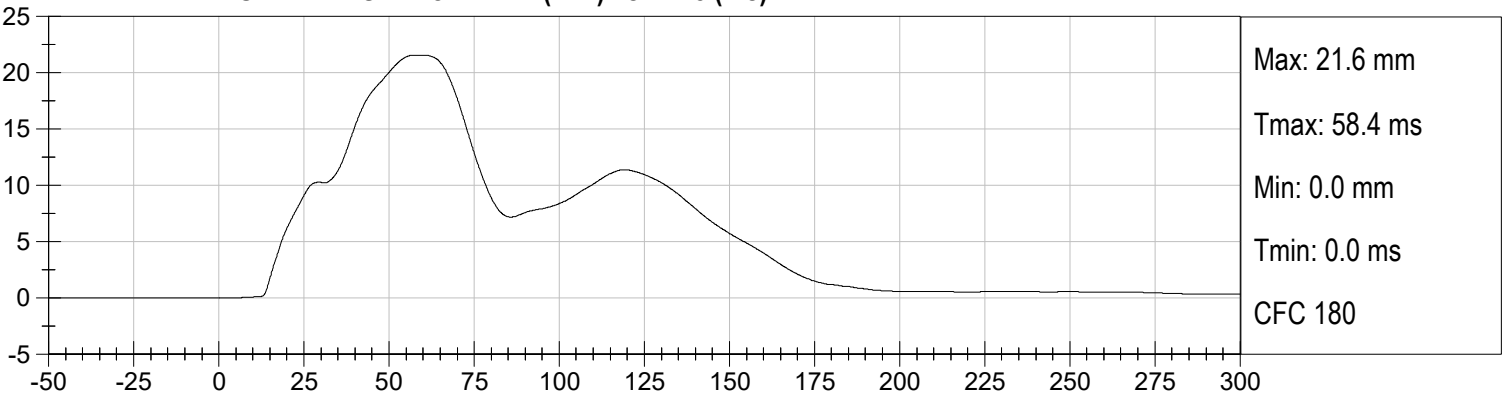
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



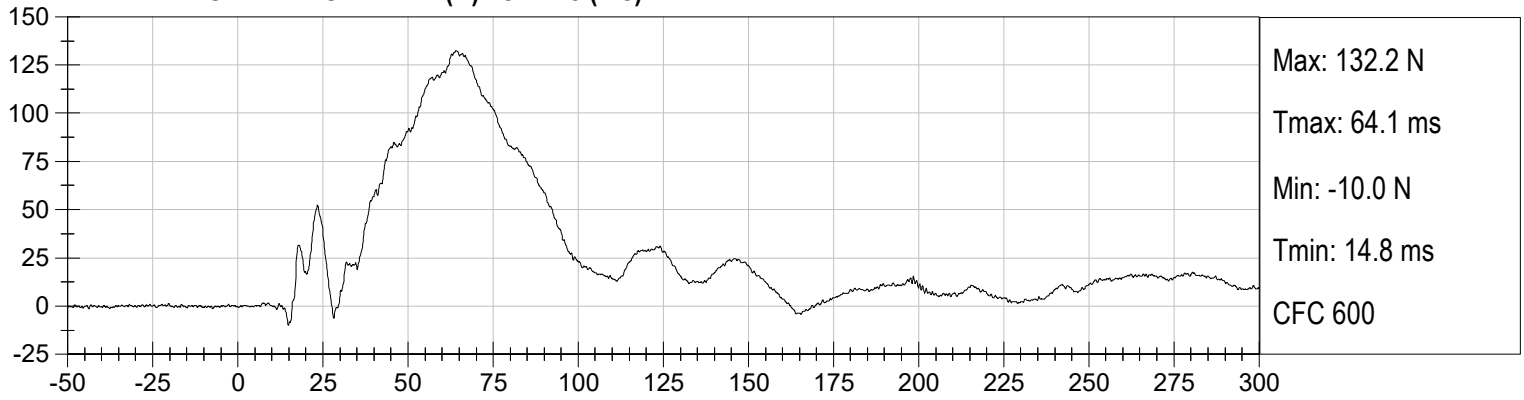
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



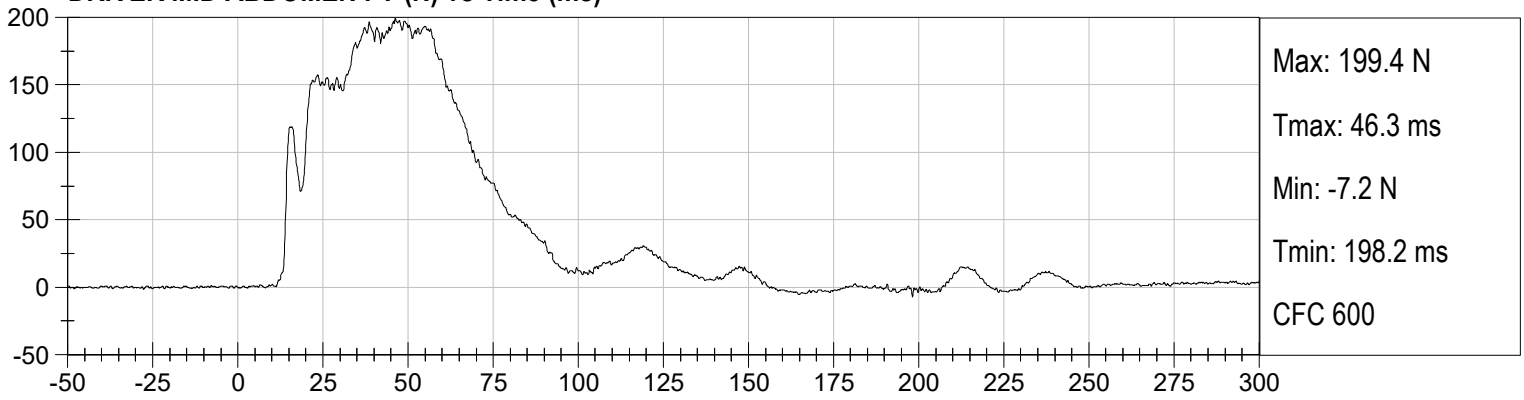
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



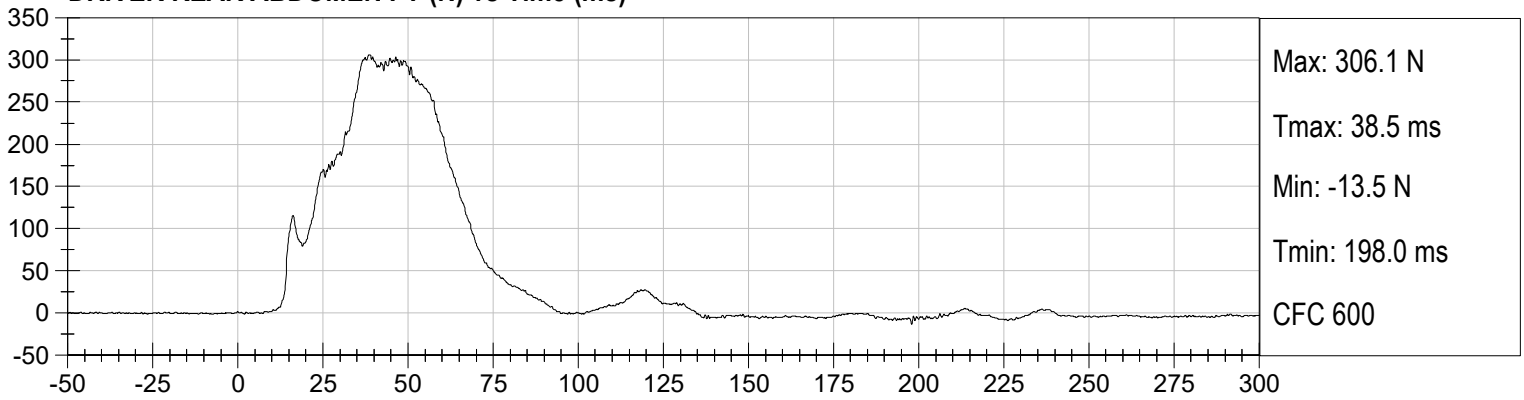
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



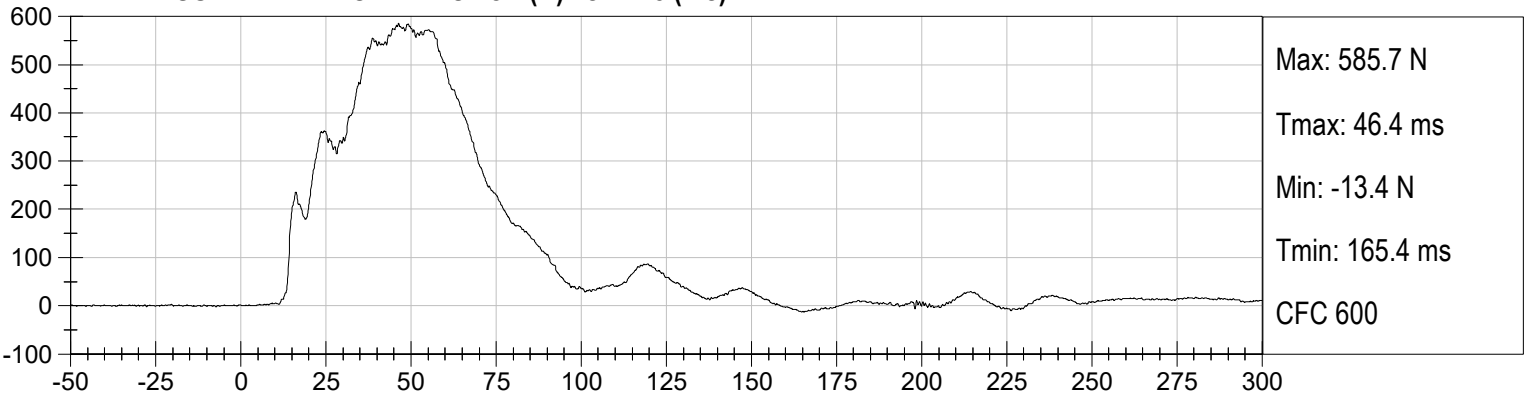
DRIVER MID ABDOMEN FY (N) vs Time (ms)



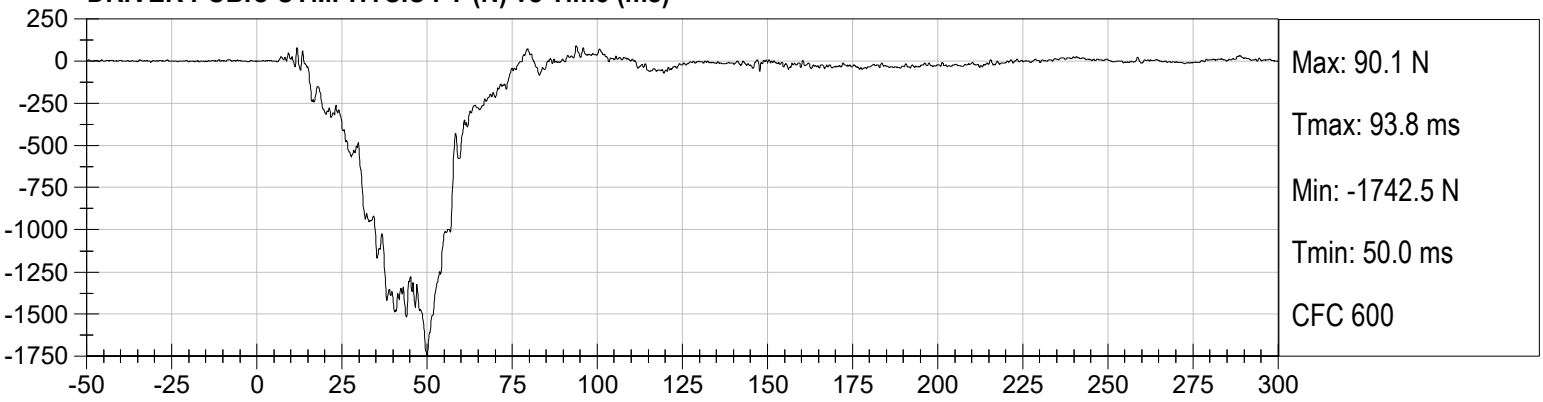
DRIVER REAR ABDOMEN FY (N) vs Time (ms)



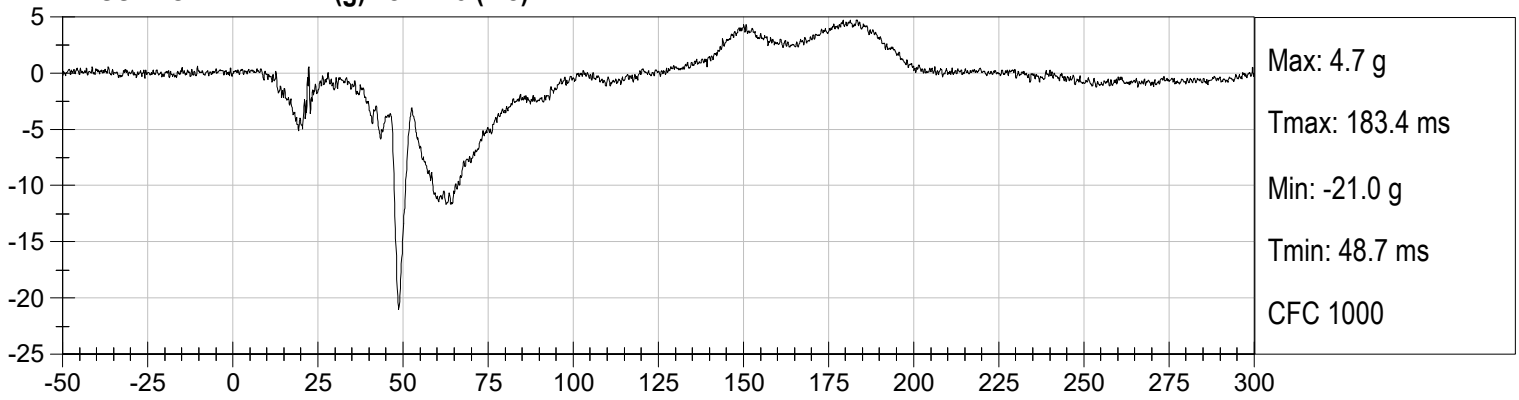
DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)



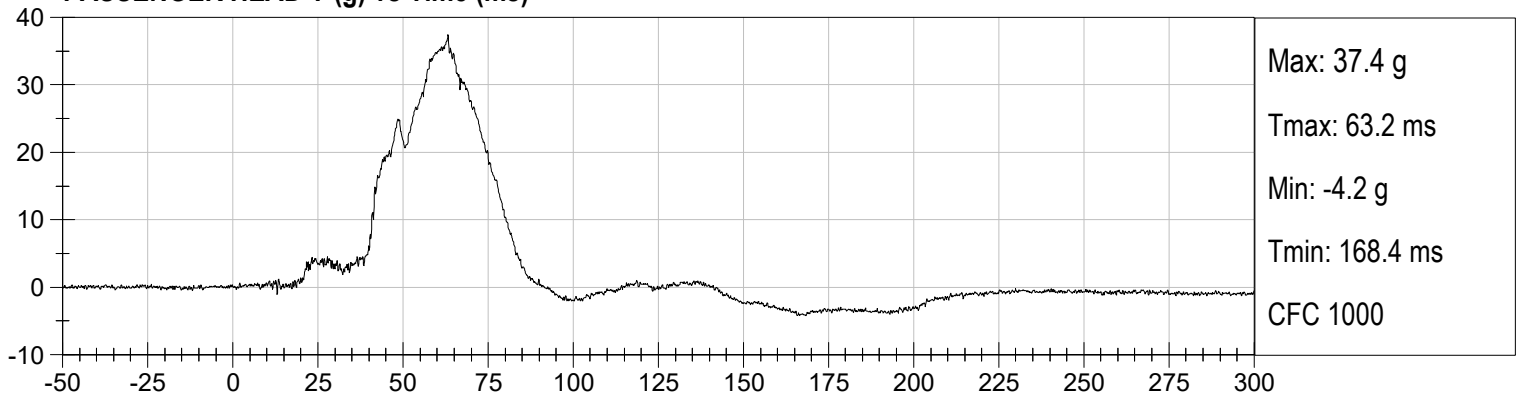
DRIVER PUBIC SYMPHYSIS FY (N) vs Time (ms)



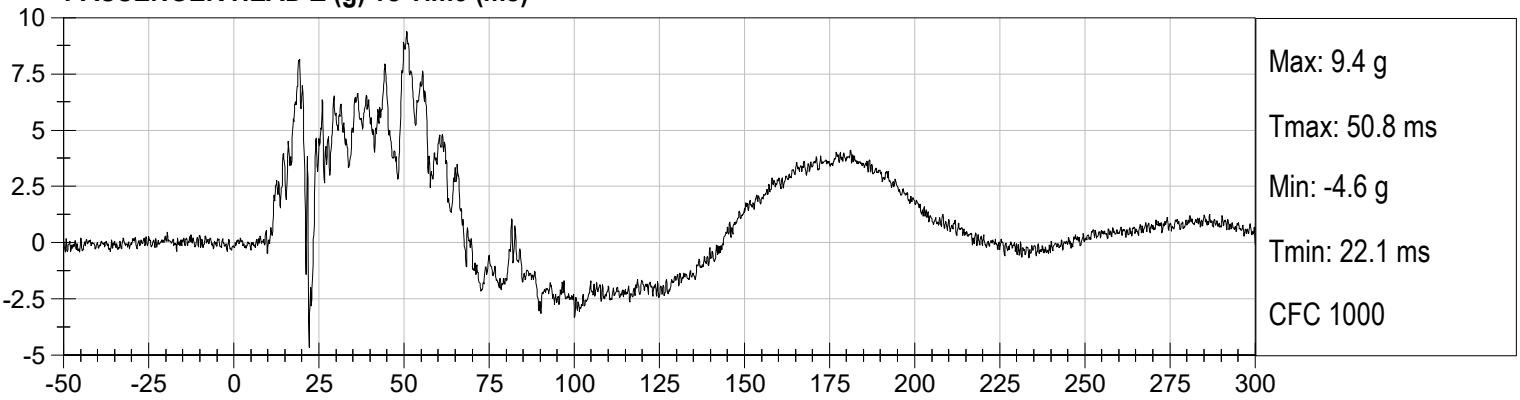
PASSENGER HEAD X (g) vs Time (ms)



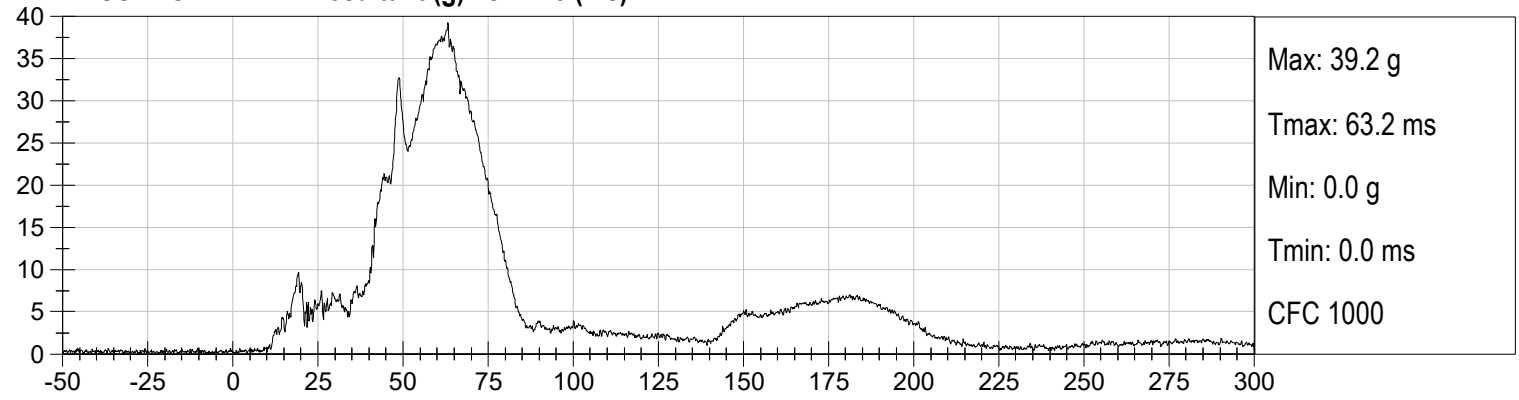
PASSENGER HEAD Y (g) vs Time (ms)



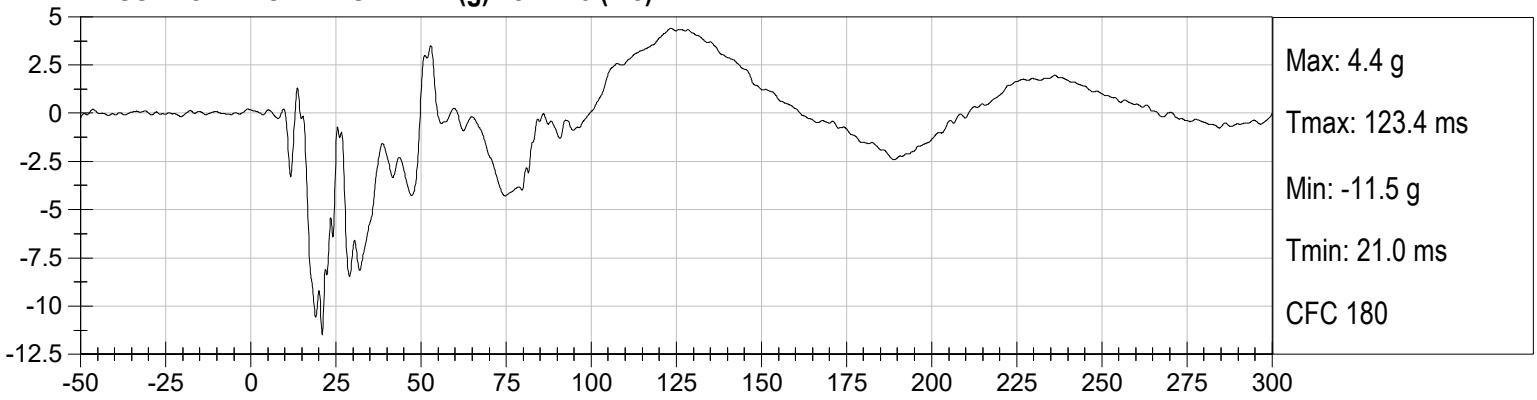
PASSENGER HEAD Z (g) vs Time (ms)



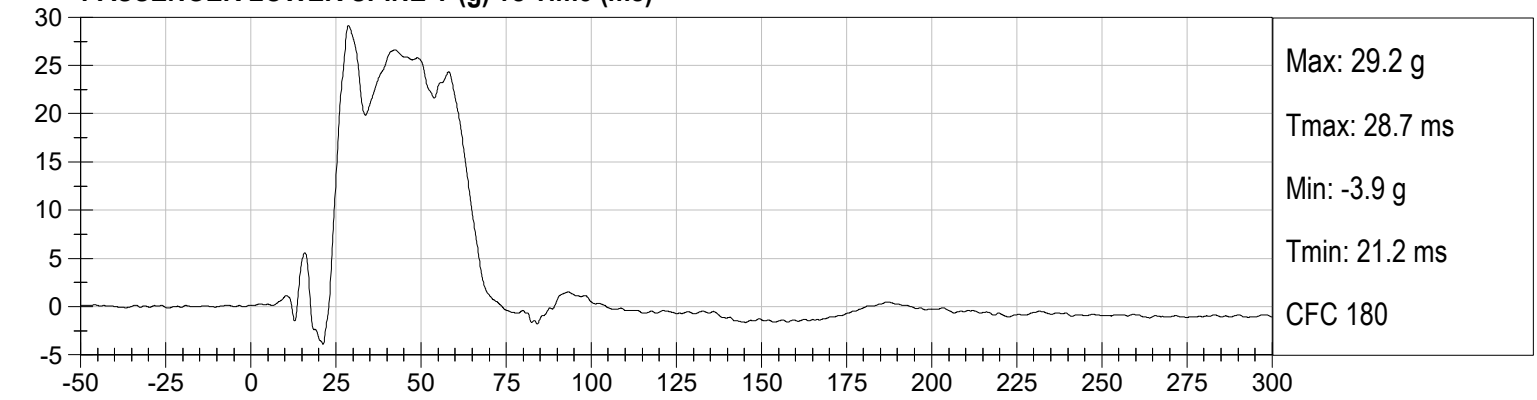
PASSENGER HEAD Resultant (g) vs Time (ms)



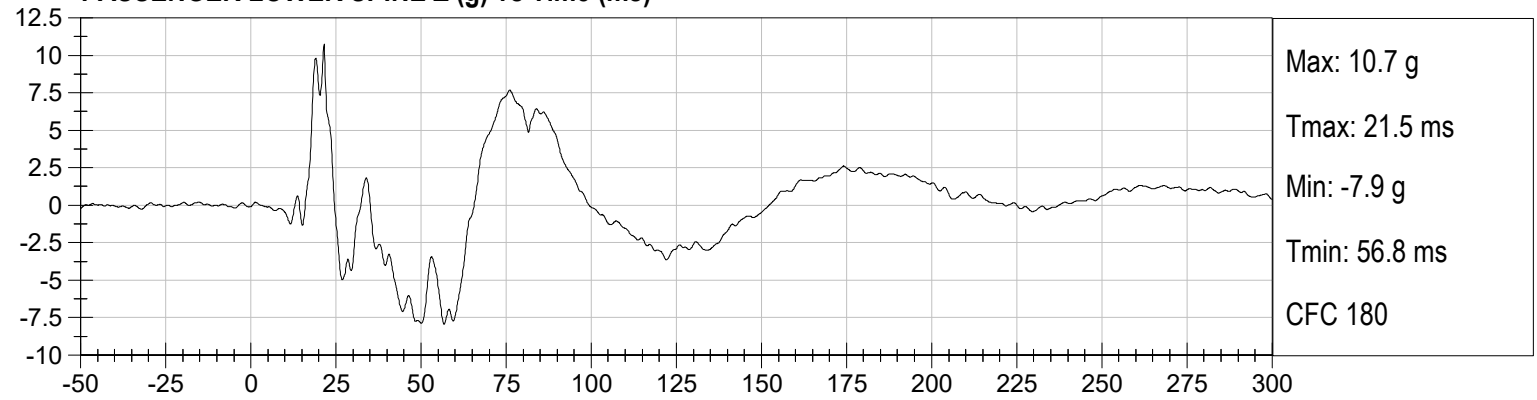
PASSENGER LOWER SPINE X (g) vs Time (ms)



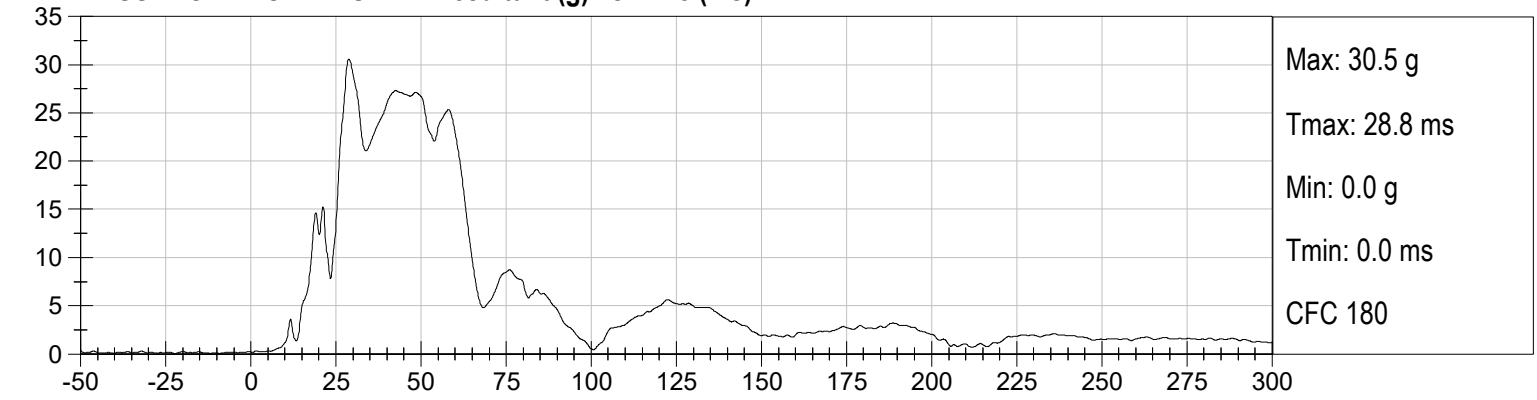
PASSENGER LOWER SPINE Y (g) vs Time (ms)



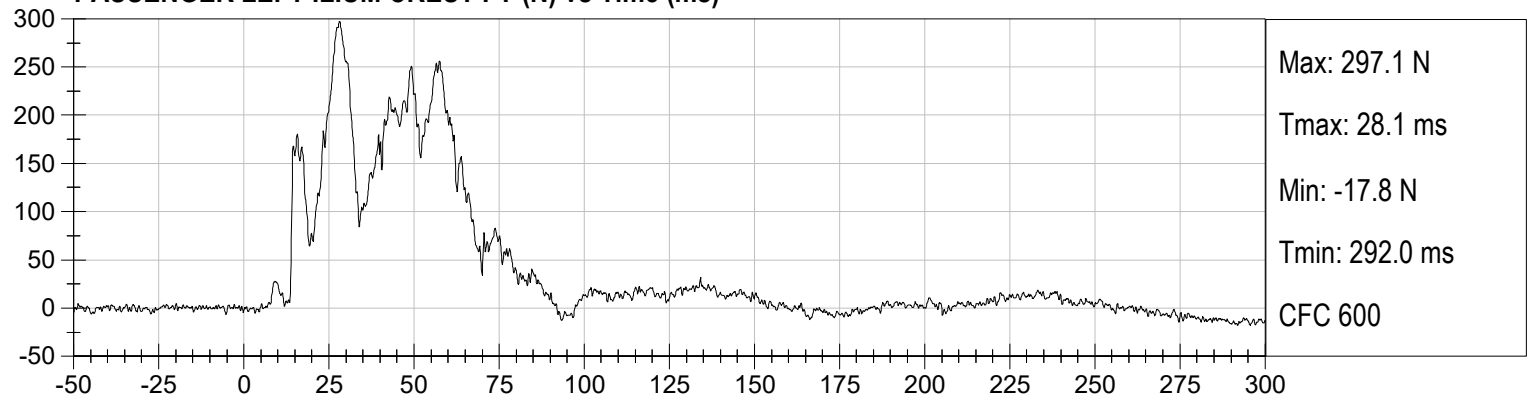
PASSENGER LOWER SPINE Z (g) vs Time (ms)



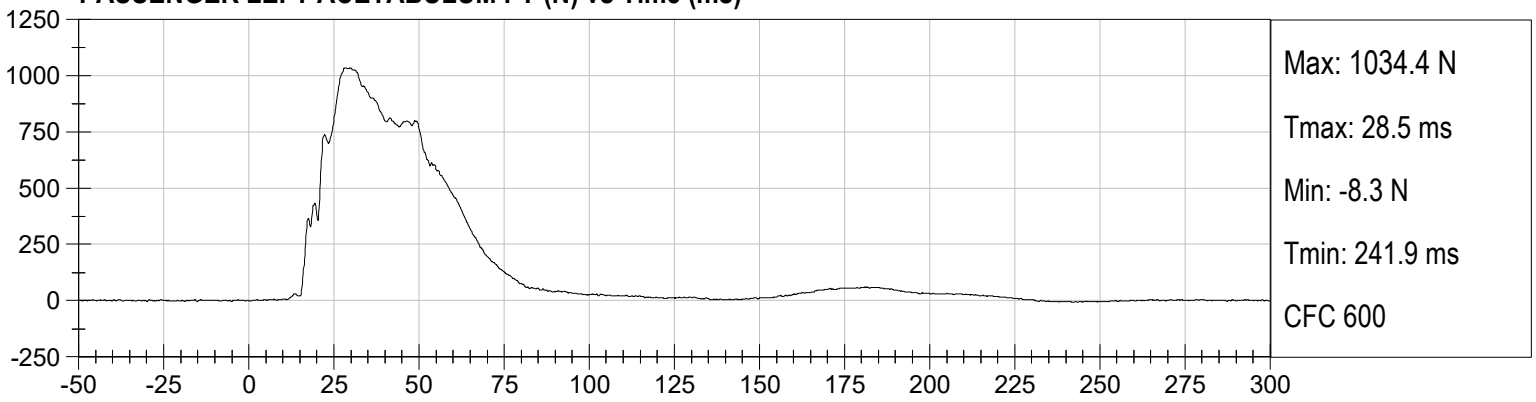
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



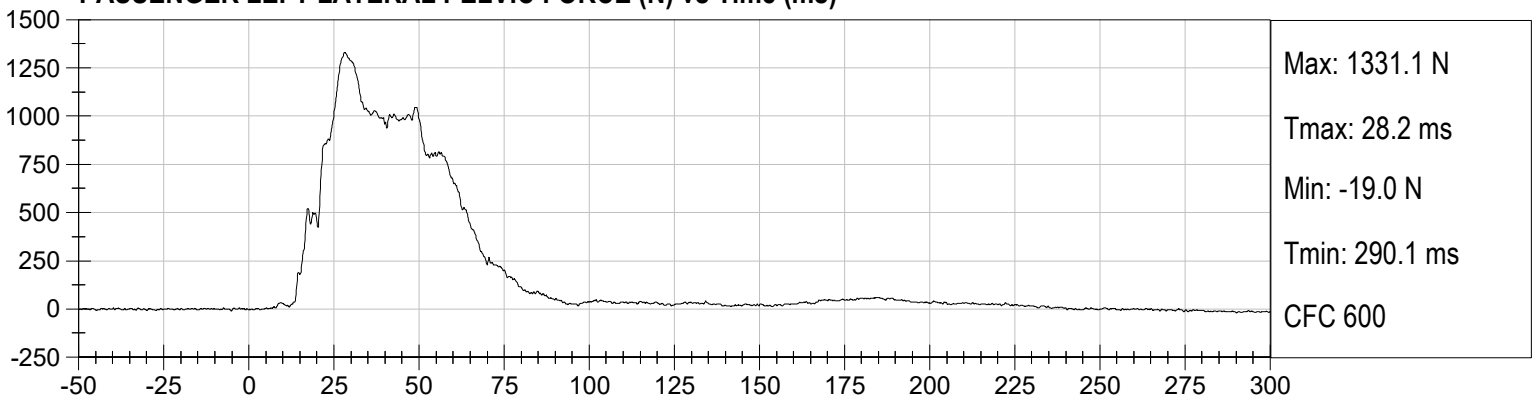
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



PASSENGER LEFT ACETABULUM FY (N) vs Time (ms)



PASSENGER LEFT LATERAL PELVIC FORCE (N) vs Time (ms)



APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 032

No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032 **Test ID:** D190391

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Peak Resultant Acceleration	G's	125 to 155	137	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	6.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

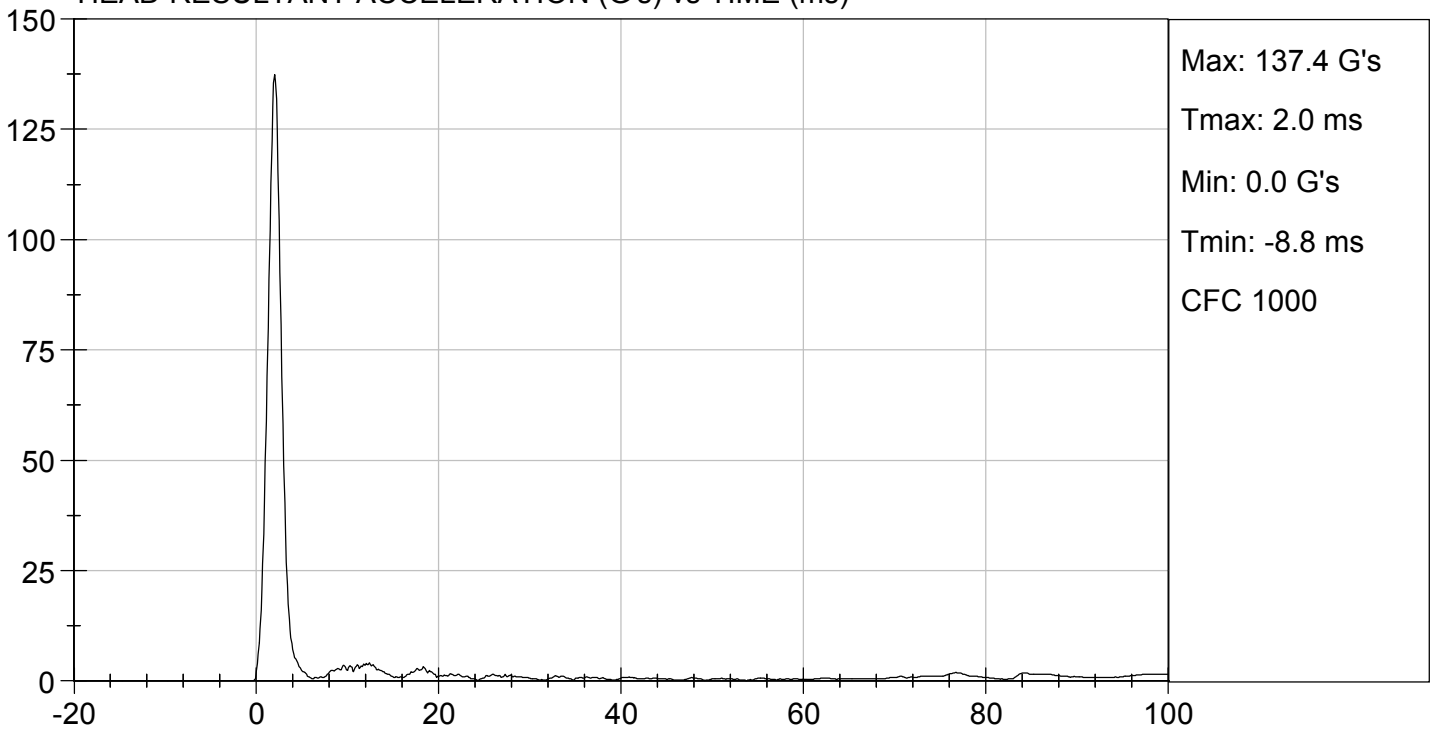
01/31/2019
Test Date

Robert Schmidt
Approved By

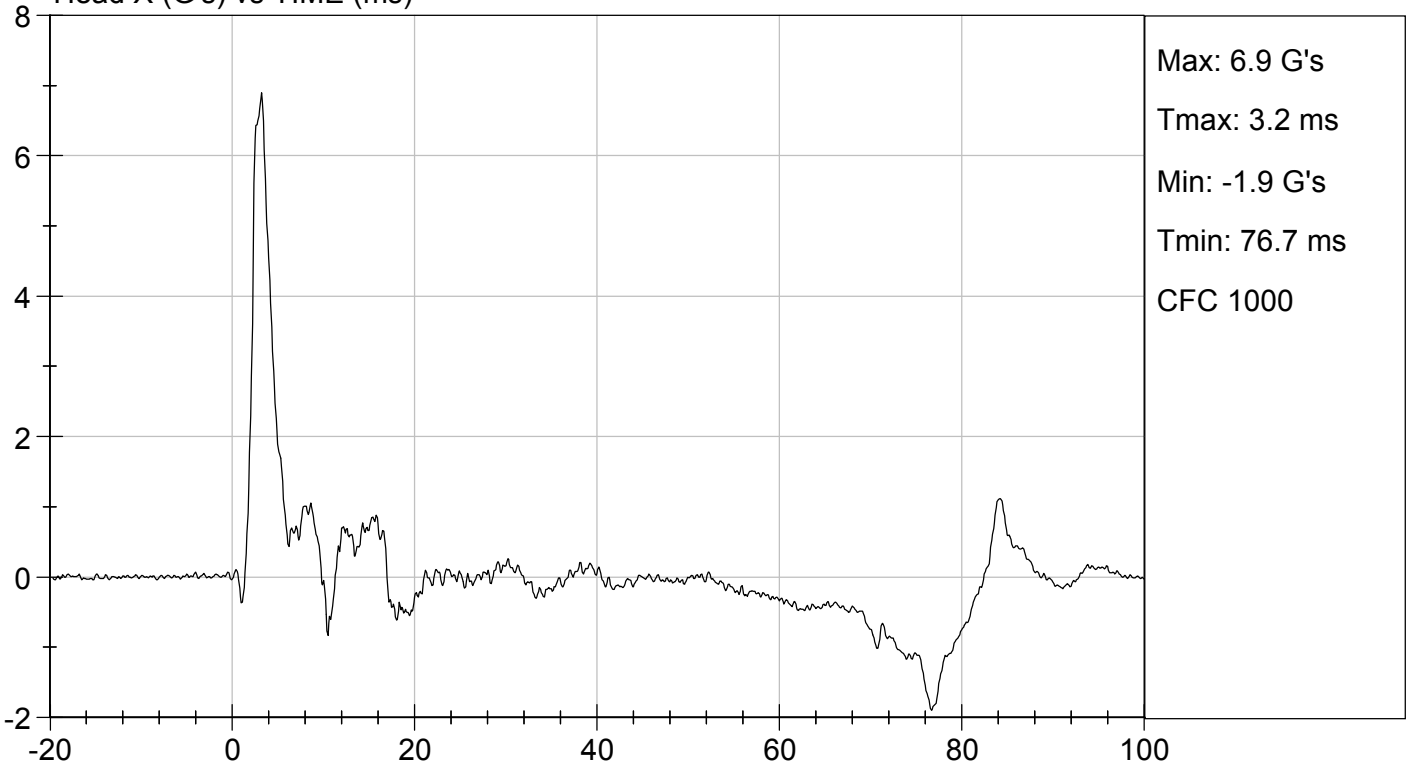
TEST DESC: HEAD DROP

TEST DATE: 01/31/2019
TEST #: D190391

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)

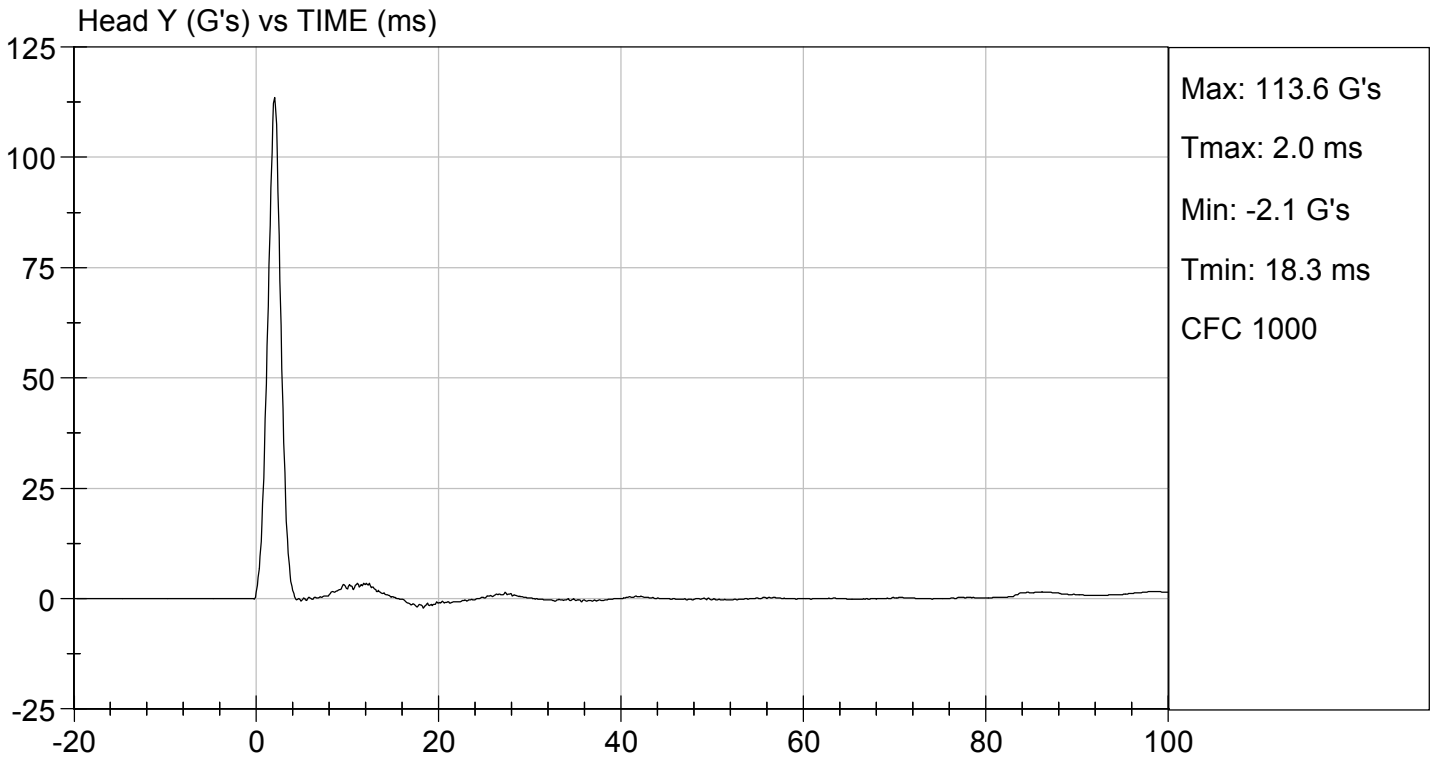


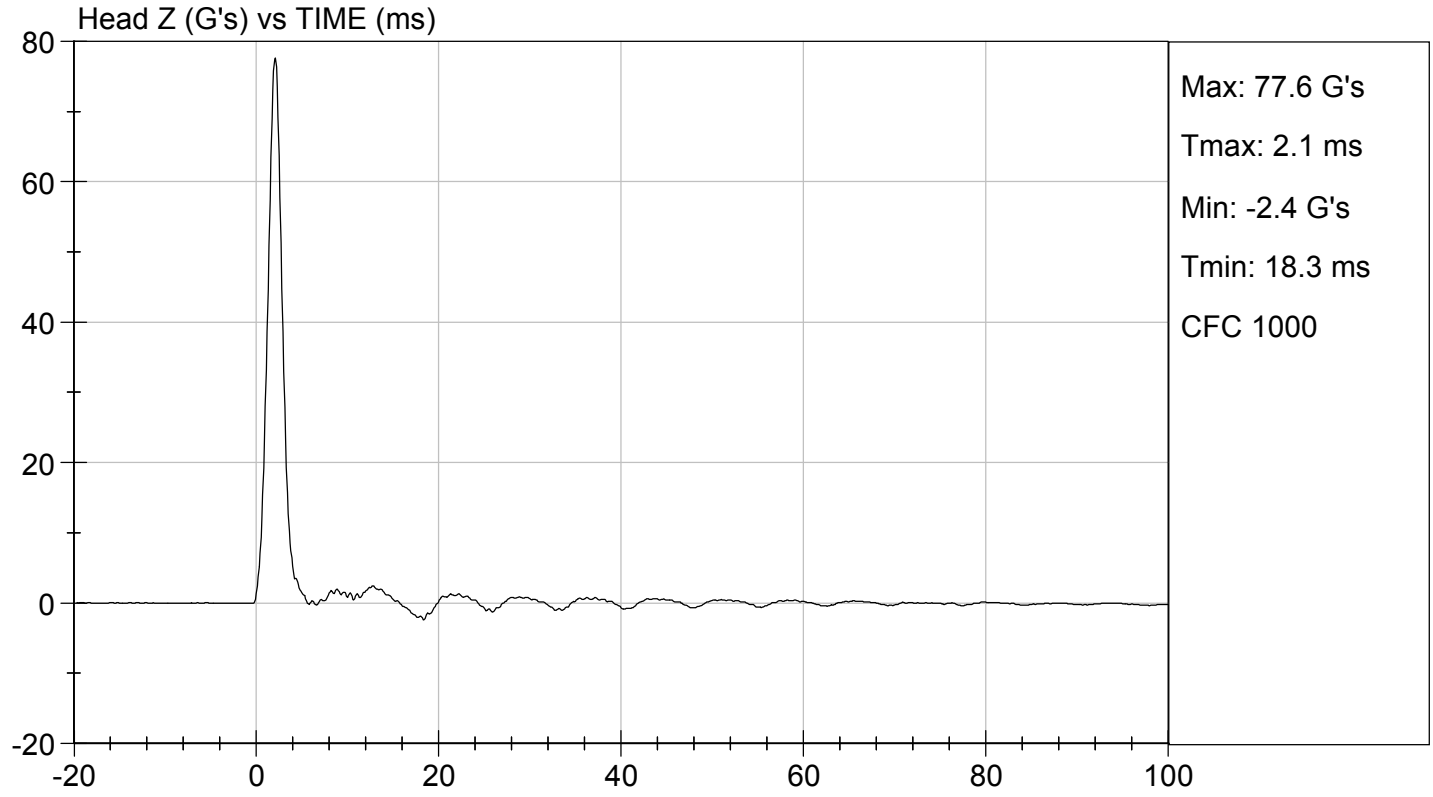
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/31/2019
TEST #: D190391





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190392

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.47	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.00	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.56	Pass
	17 ms	m/s	>= -3.70	-3.38	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.4	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	56.5	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	59.4	Pass
			Overall Results		Pass

Danielle Redinbaugh
Laboratory Technician

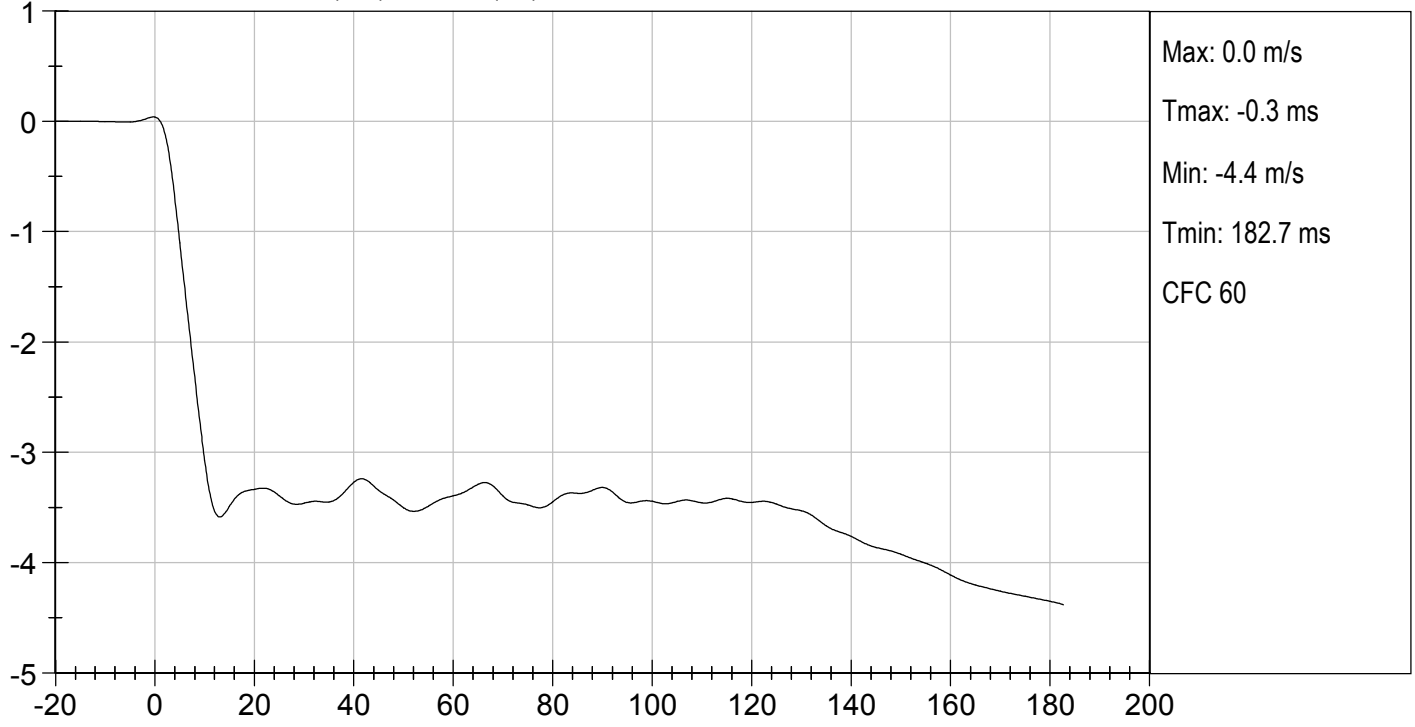
01/31/2019
Test Date

Robert Schmidt
Approved By

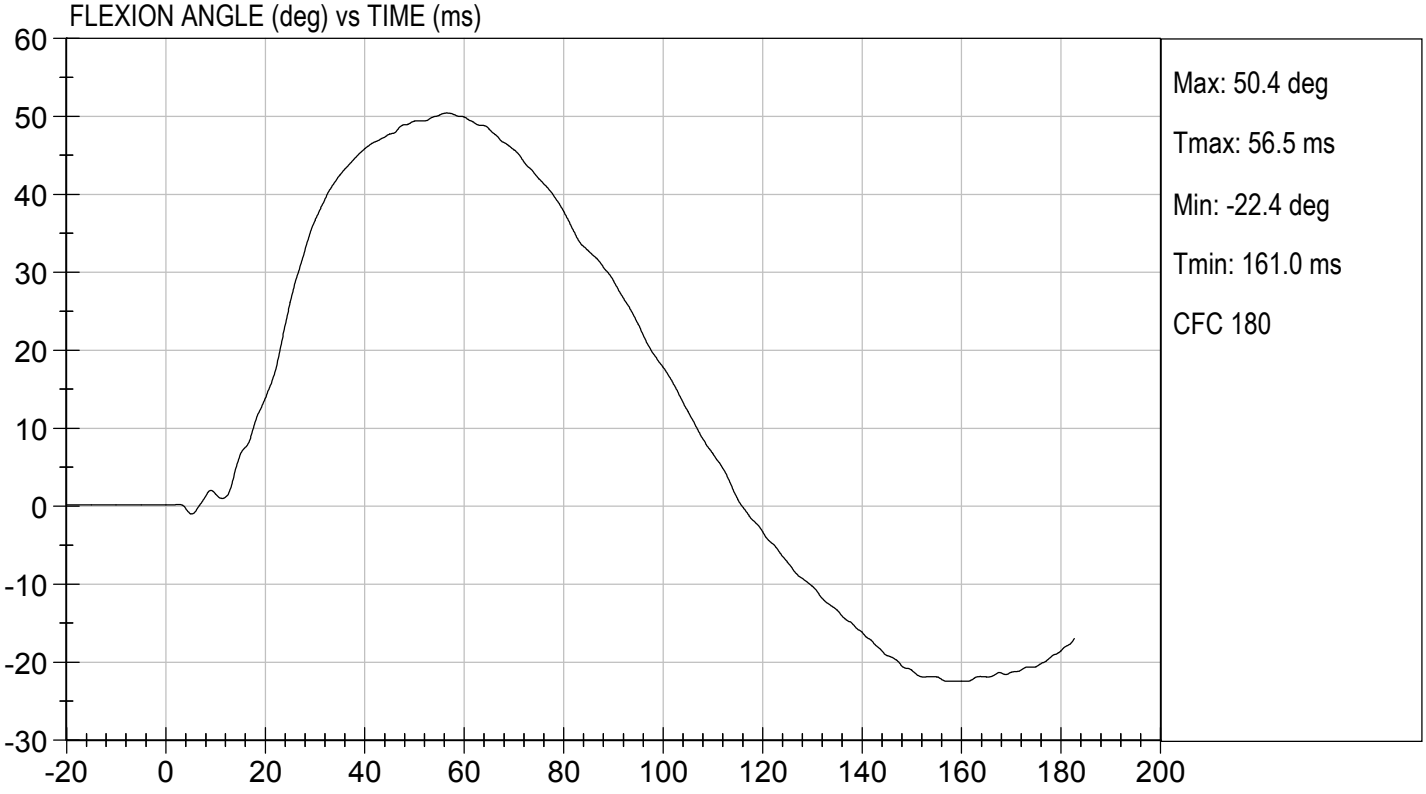
TEST DESC: NECK BENDING
VELOCITY: 11.40 ft/s, 3.47 m/s

TEST DATE: 01/31/2019
TEST #: D190392

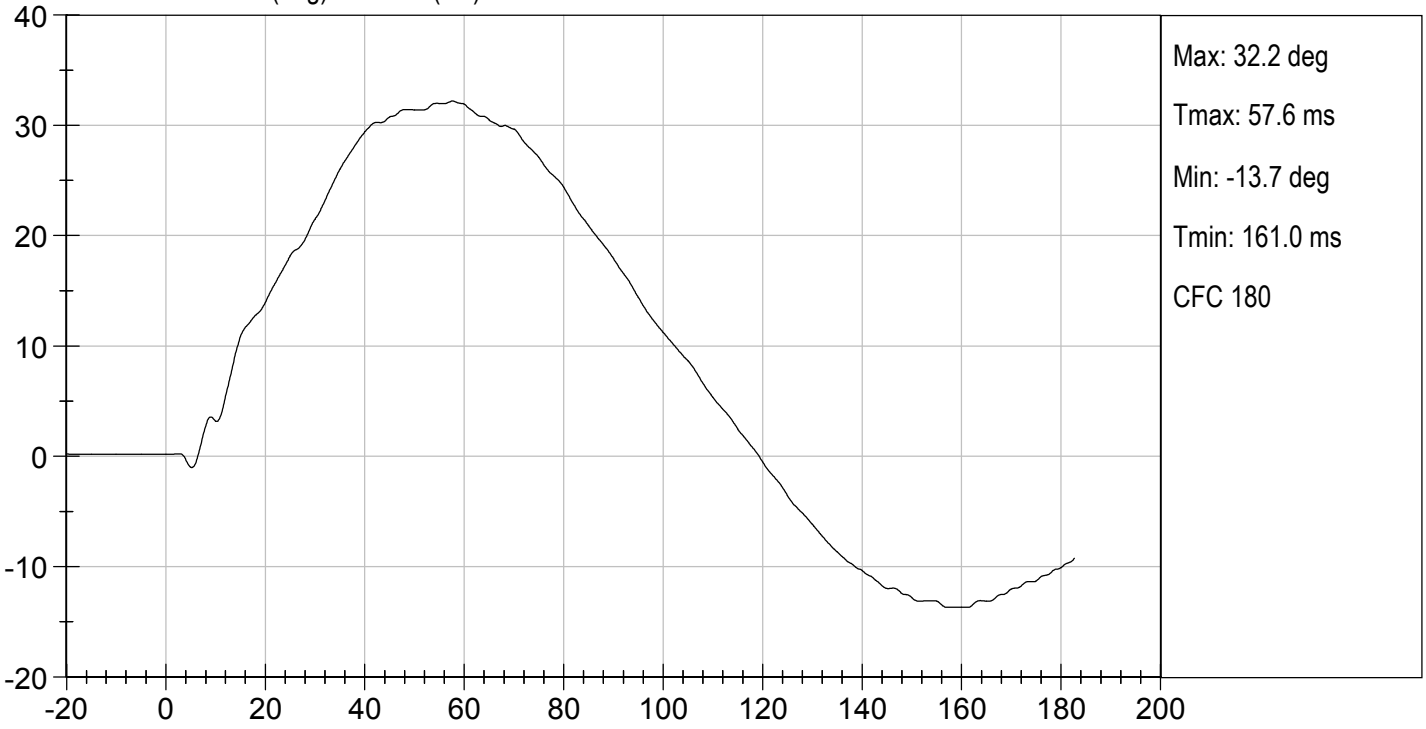
PENDULUM VELOCITY (m/s) vs TIME (ms)



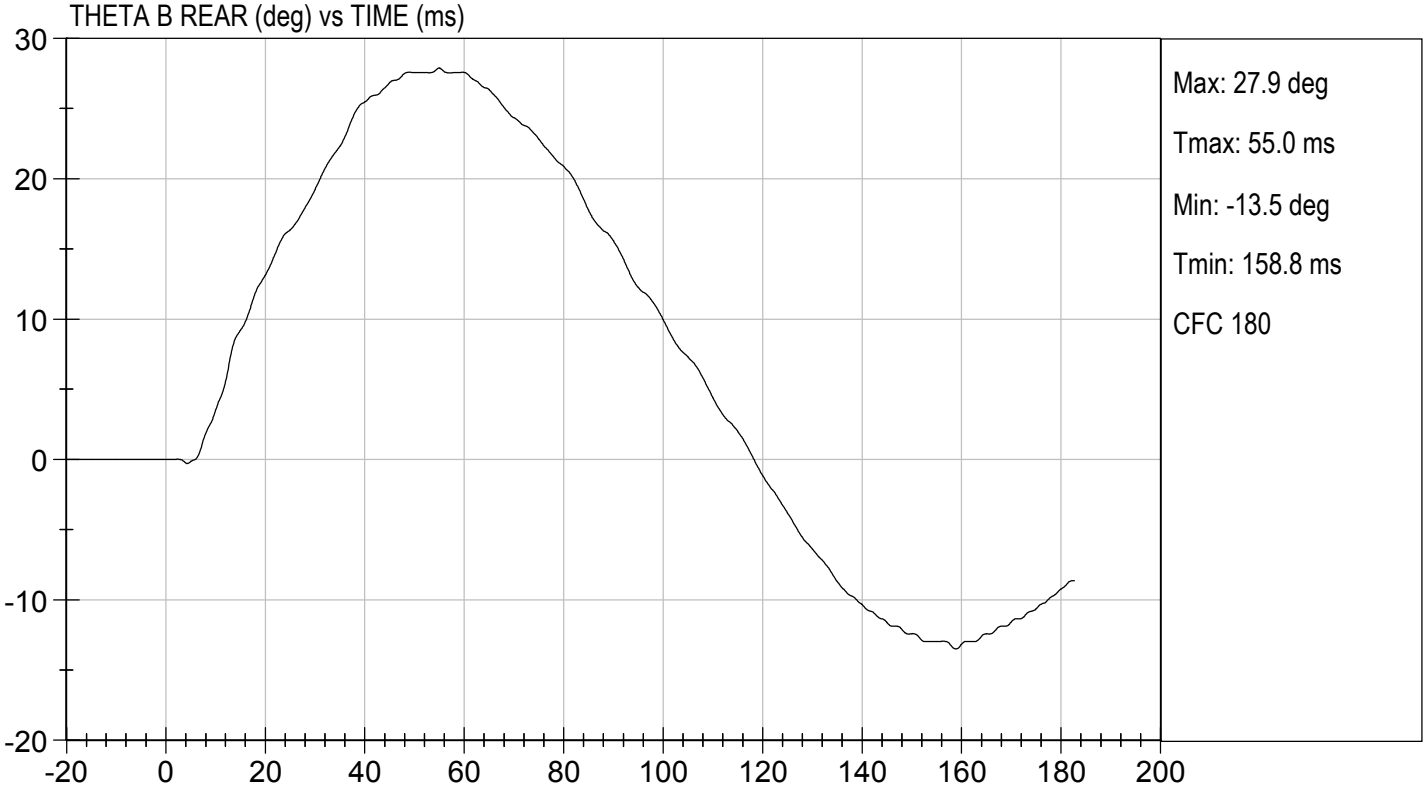
FLEXION ANGLE (deg) vs TIME (ms)



THETA A FRONT (deg) vs TIME (ms)

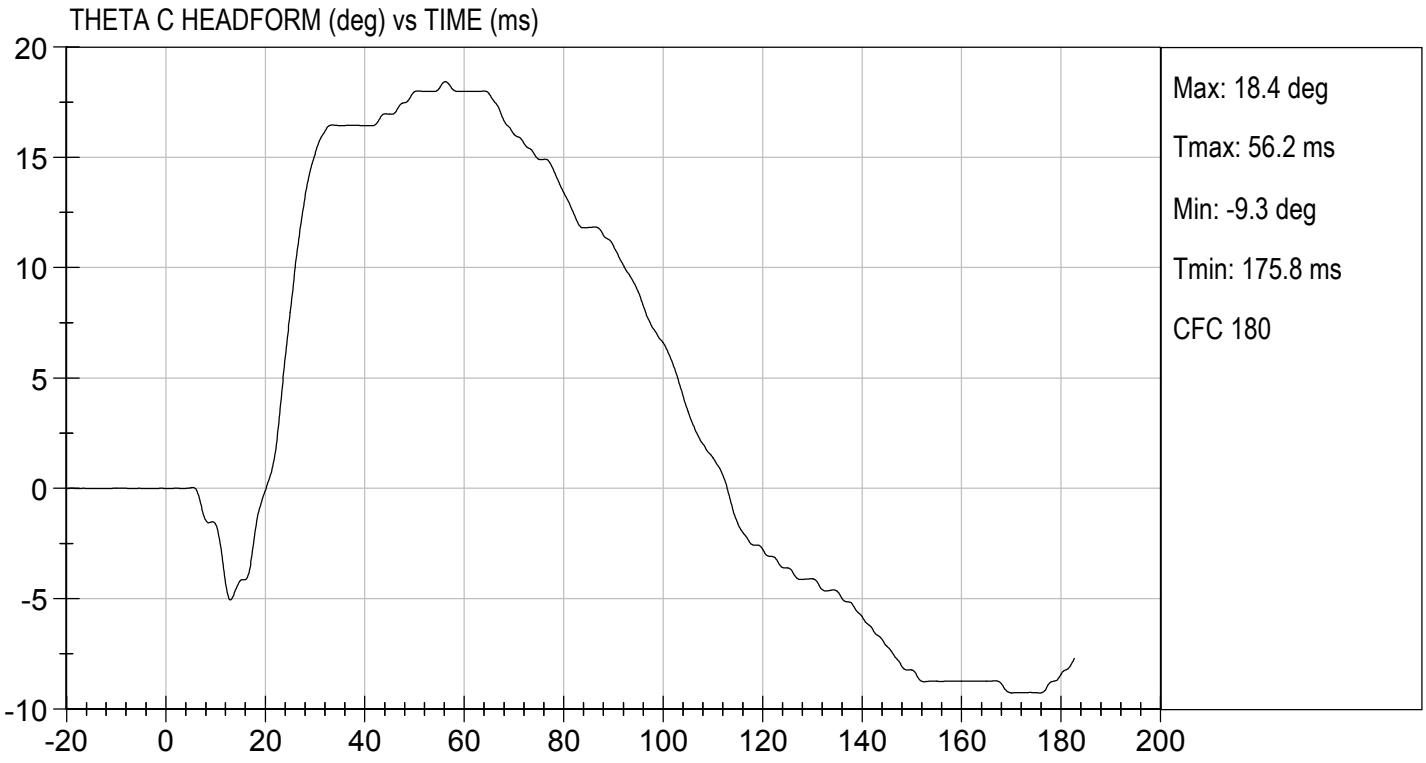


THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.40 ft/s, 3.47 m/s

TEST DATE: 01/31/2019
TEST #: D190392



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190393

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.23	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.5	Pass
		Overall Test Results		Pass

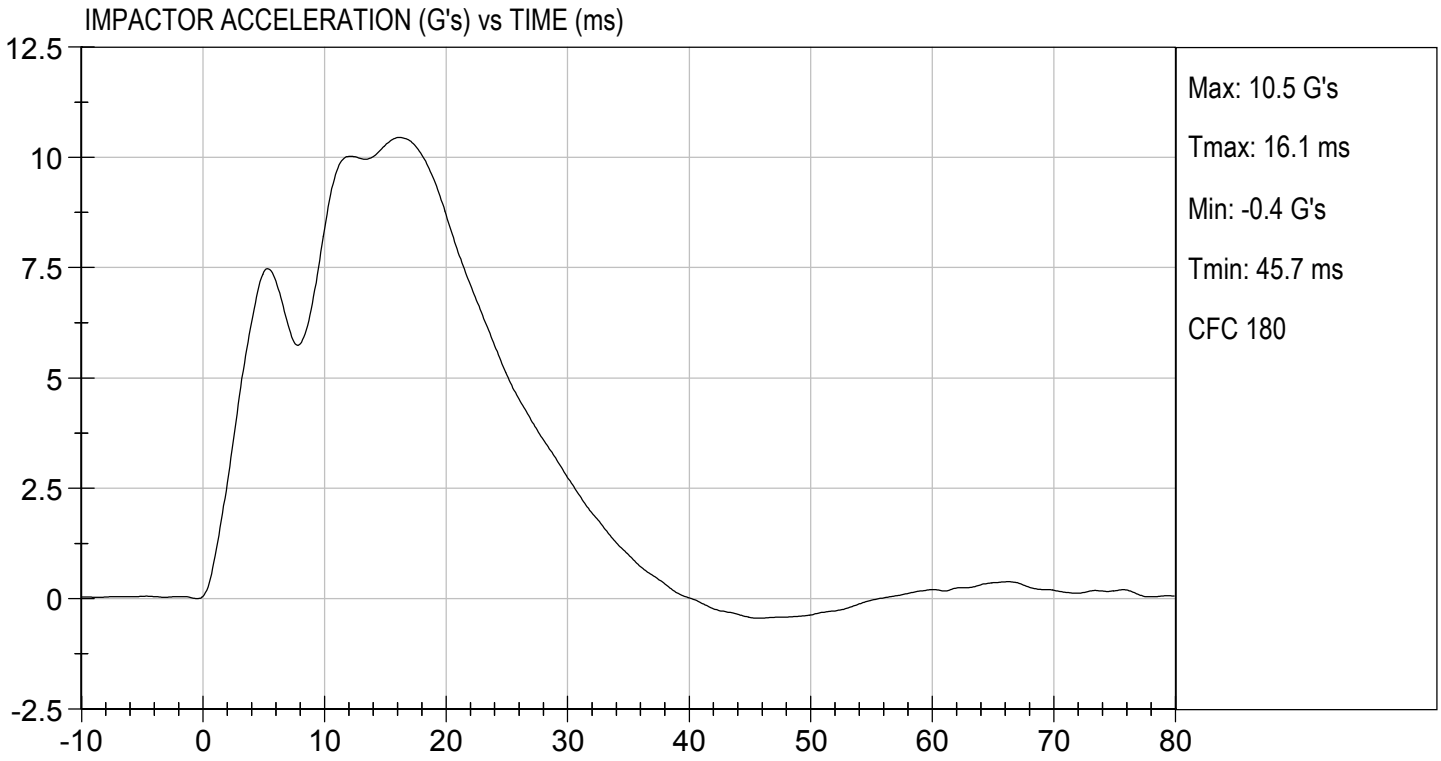
Jacob D Taylor
Laboratory Technician

01/31/2019
Test Date

Robert Schmalzy
Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 01/31/2019
TEST #: D190393



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190394

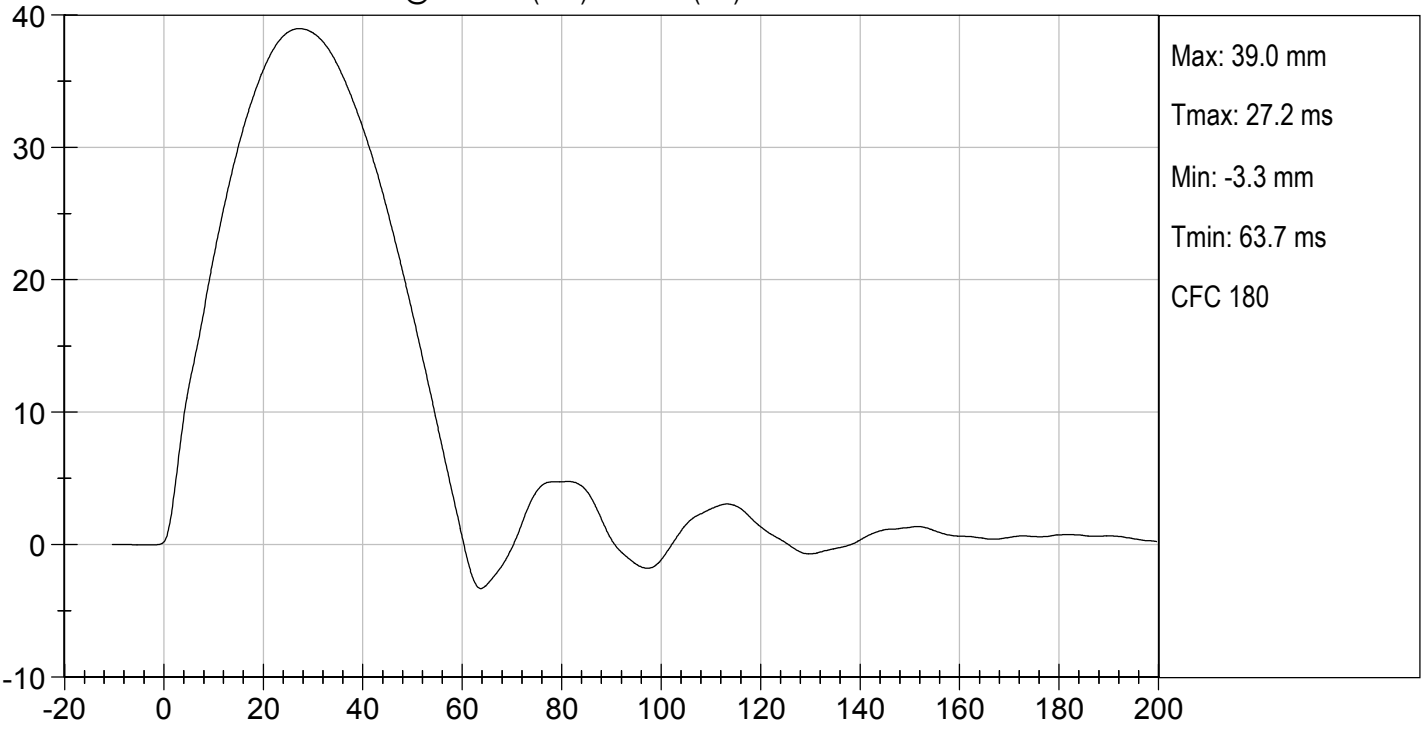
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.2	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

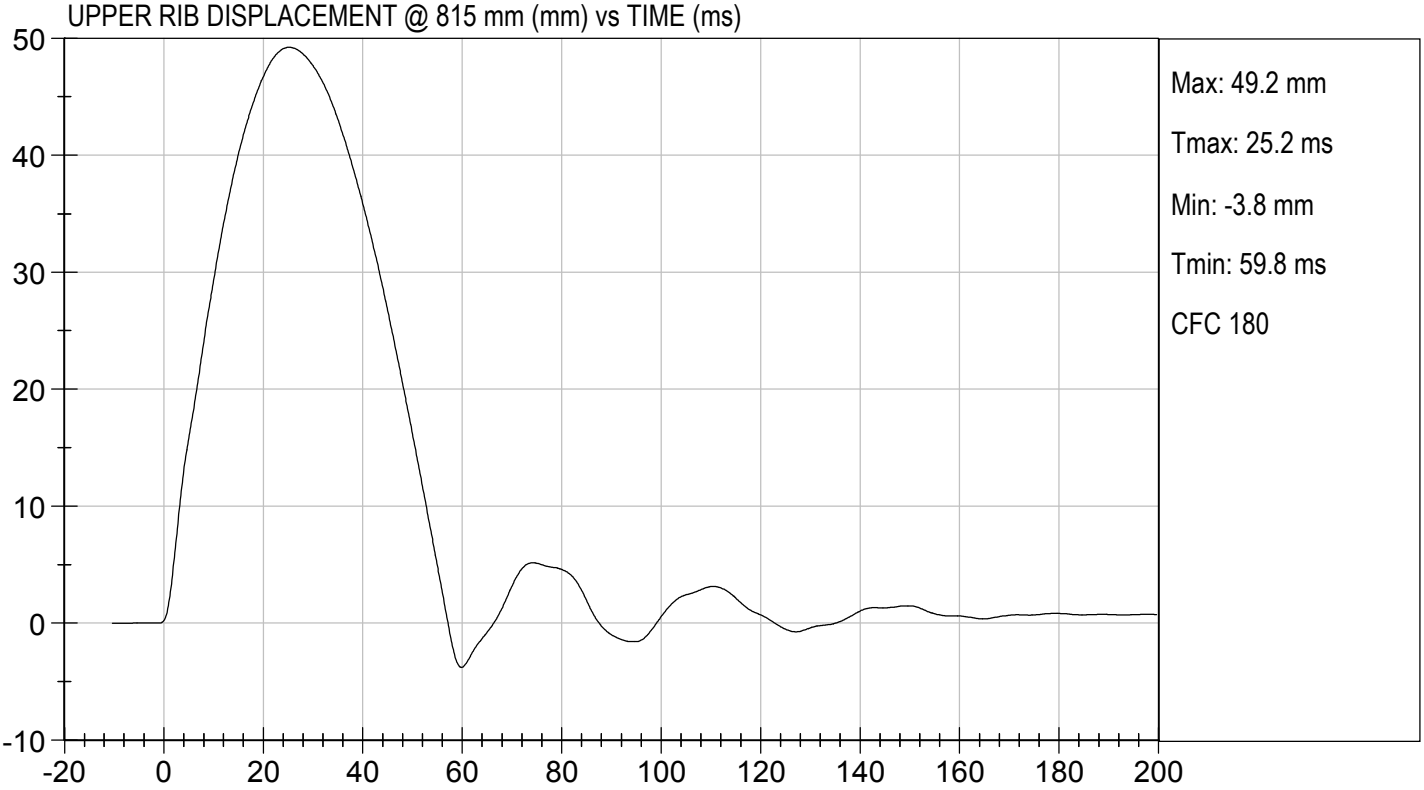
01/31/2019
Test Date

Robert Schmidt
Approved By

UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190395

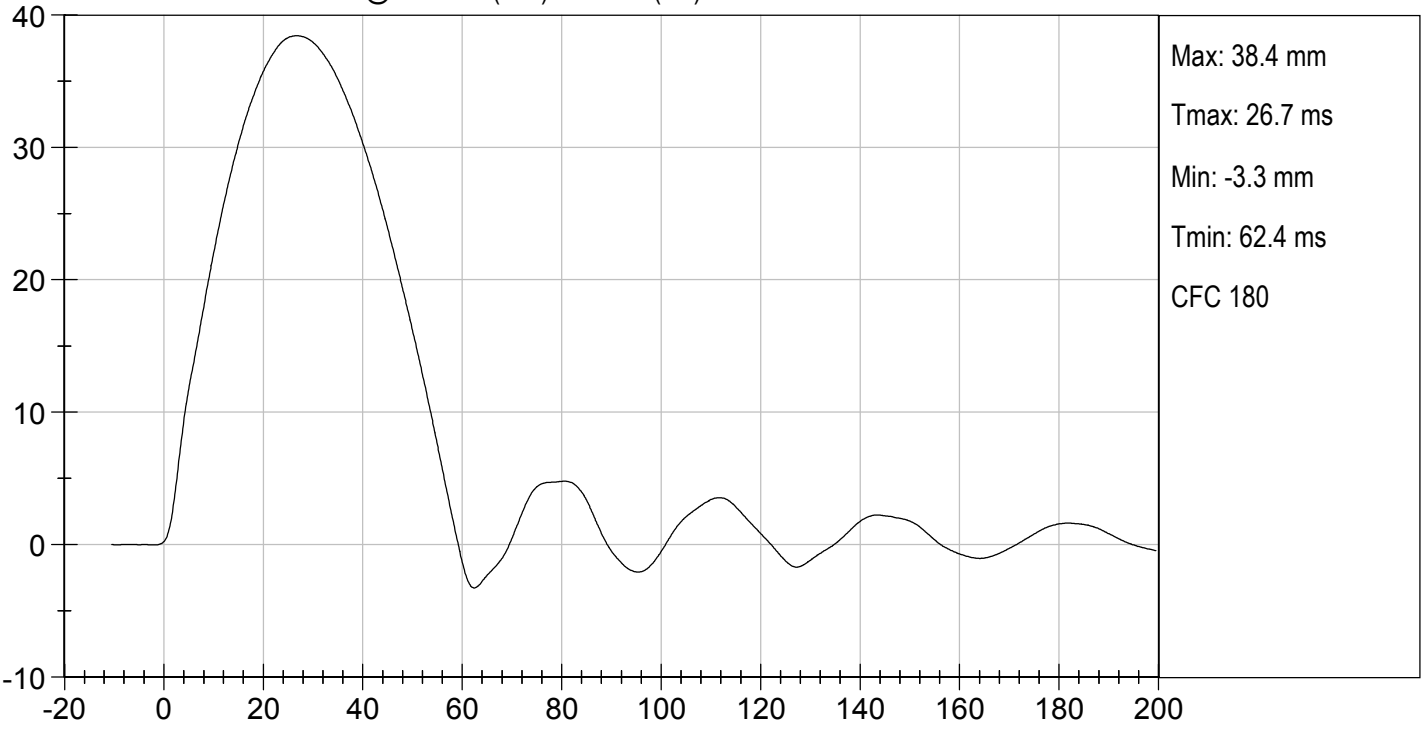
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.3	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

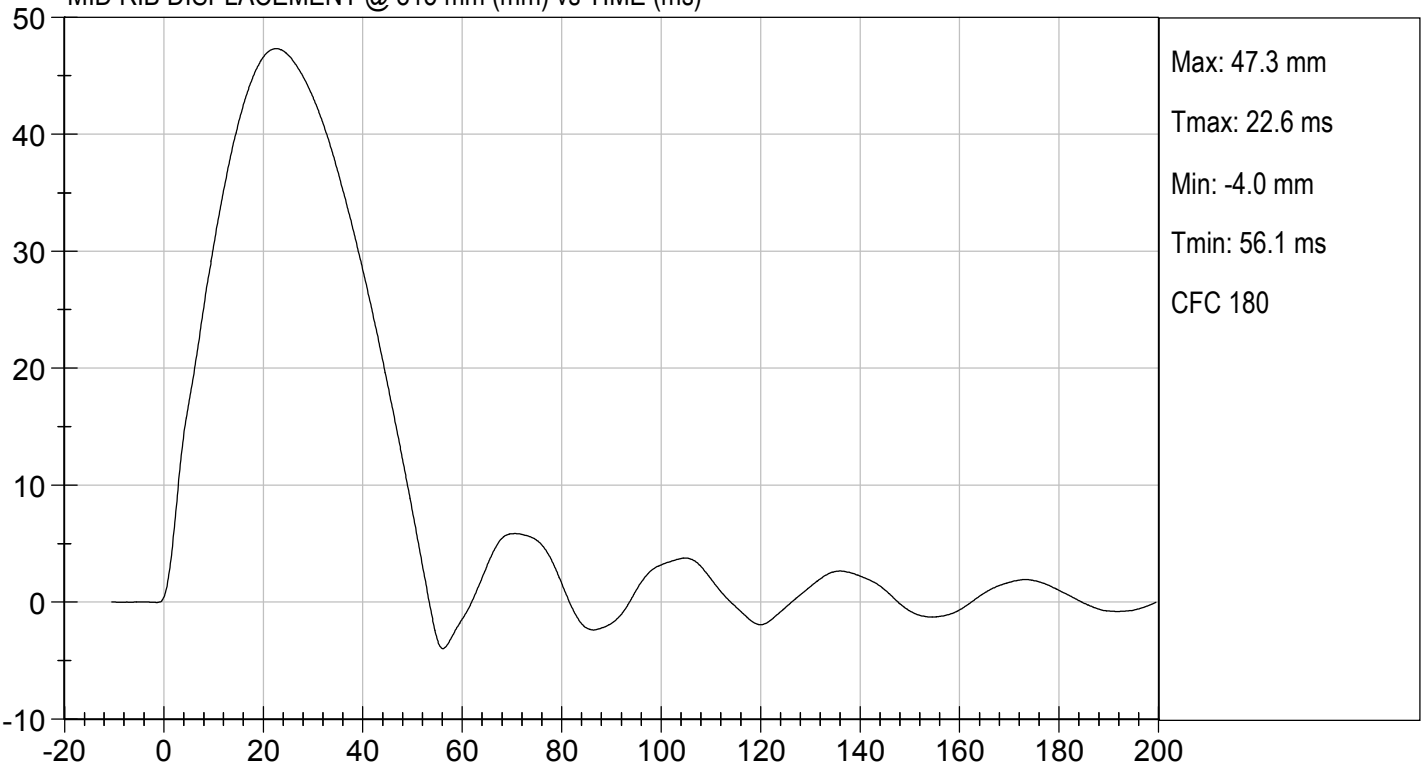
01/31/2019
Test Date

Robert Schmidt
Approved By

MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190396

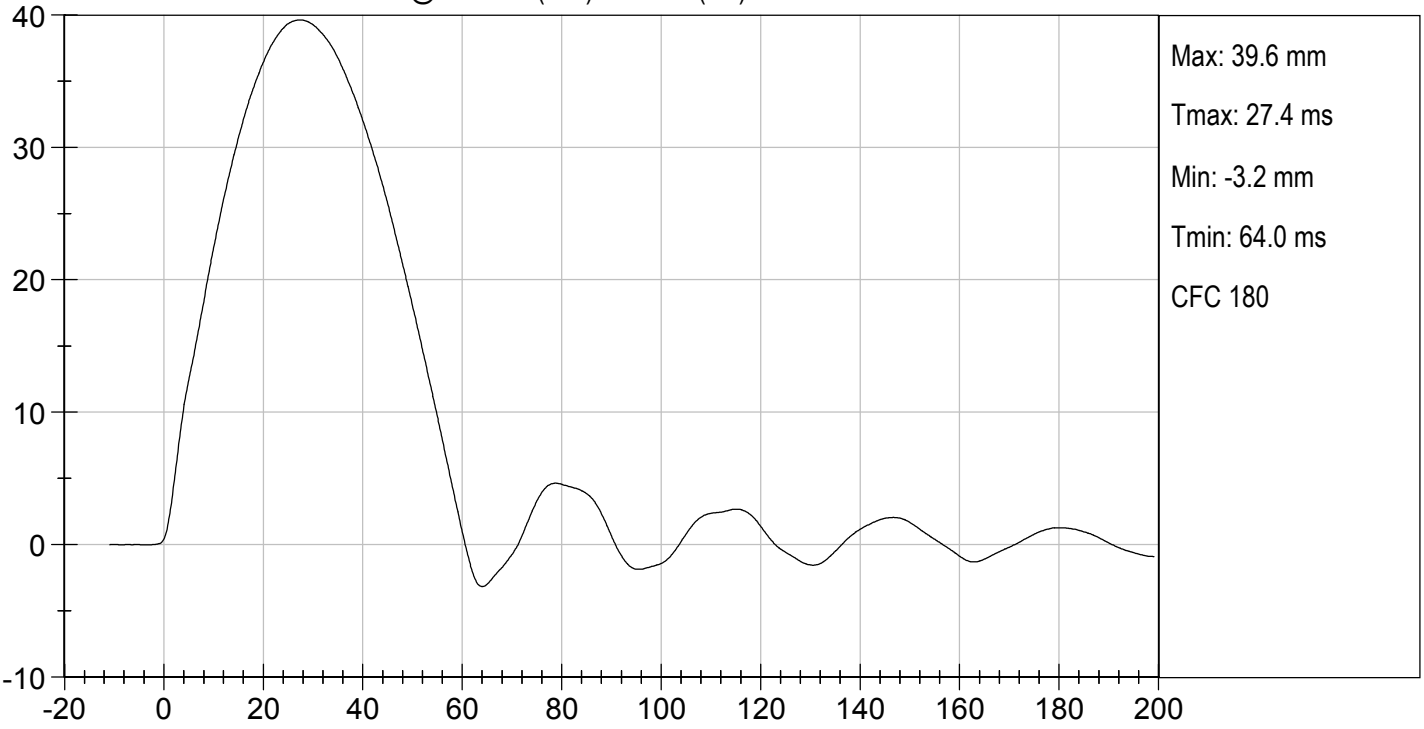
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.5	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

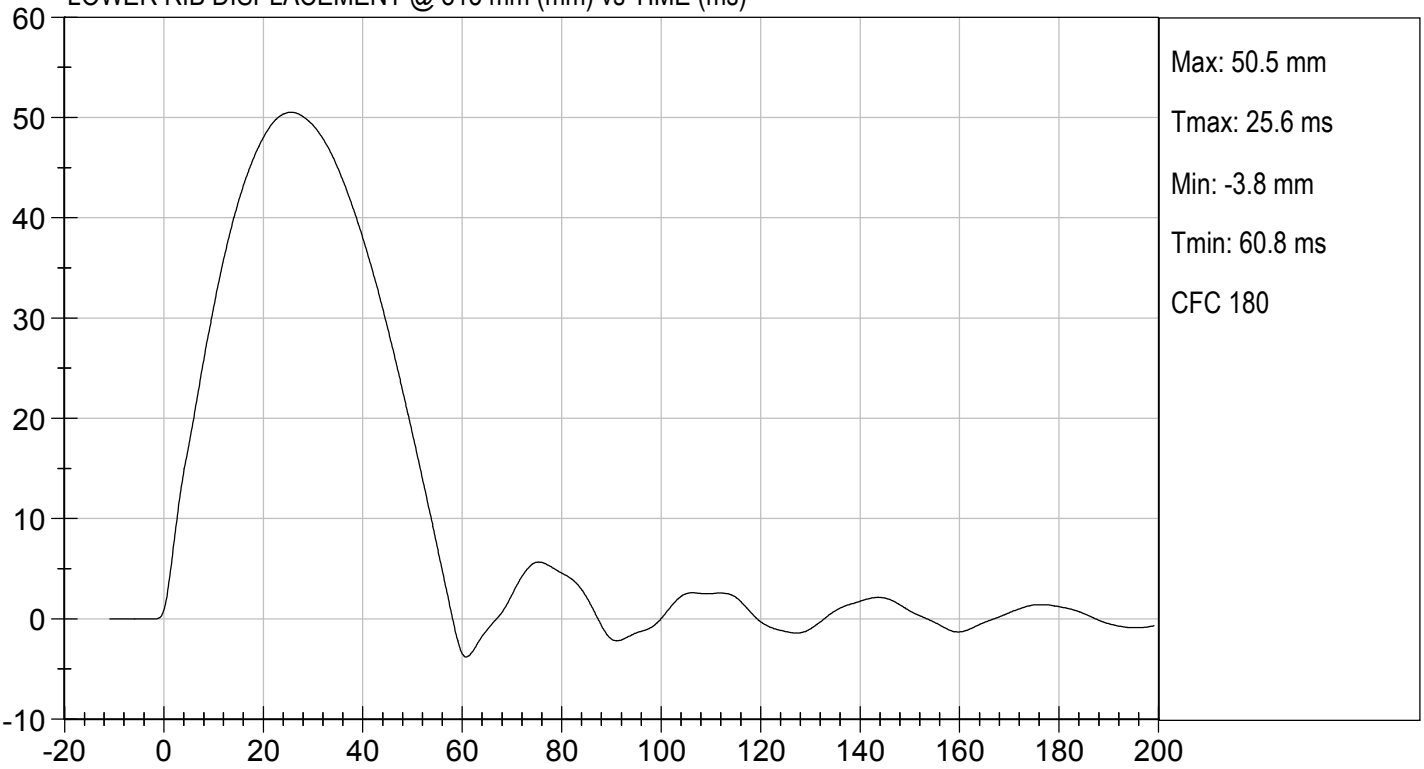
01/31/2019
Test Date

Robert Schmidt
Approved By

LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190397

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Speed	m/s	3.90 to 4.10	4.00	Pass
Maximum Impactor Force	N	4000 to 4800	4228	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	10.8	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2411	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.7	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

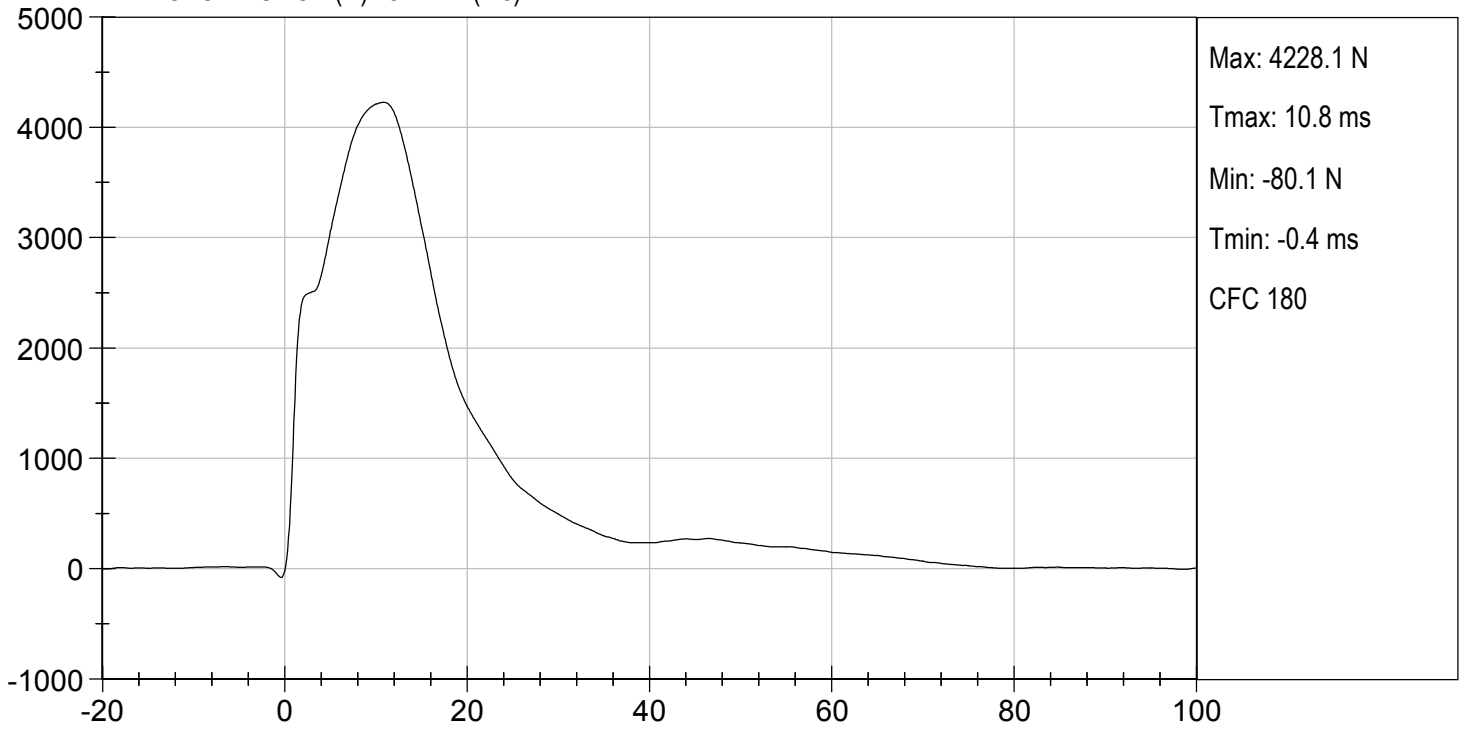
01/31/2019
Test Date

Approved By

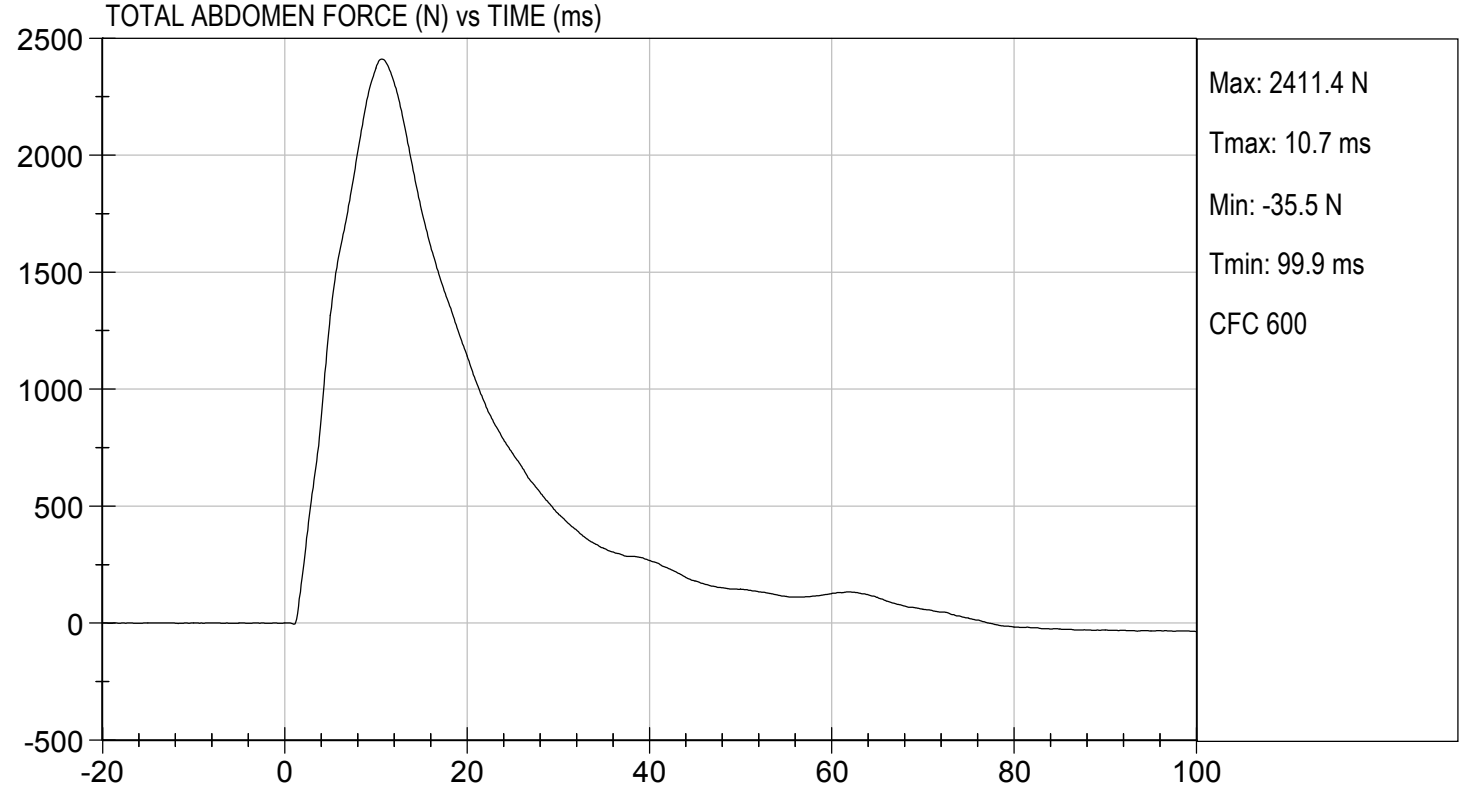
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

TEST DATE: 01/31/2019
TEST #: D190397

IMPACTOR FORCE (N) vs TIME (ms)



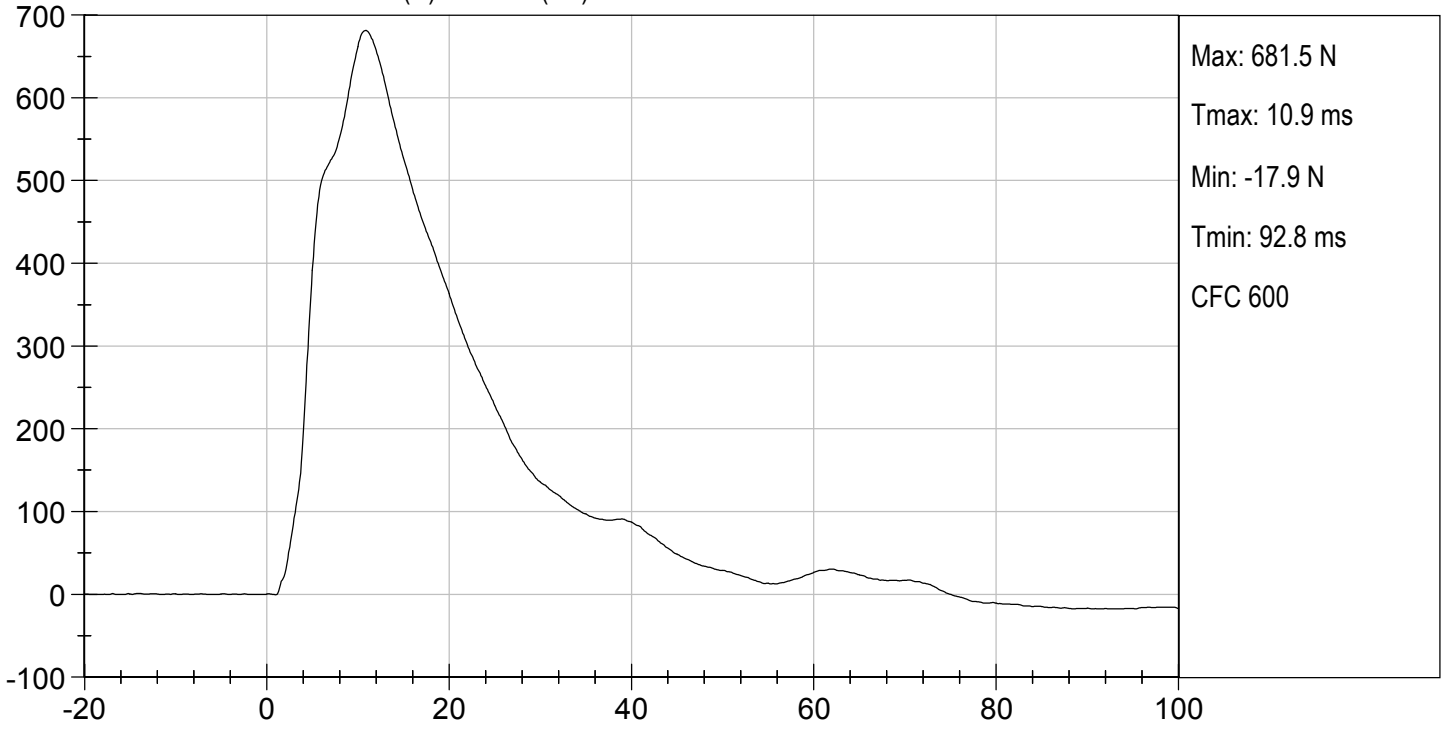
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



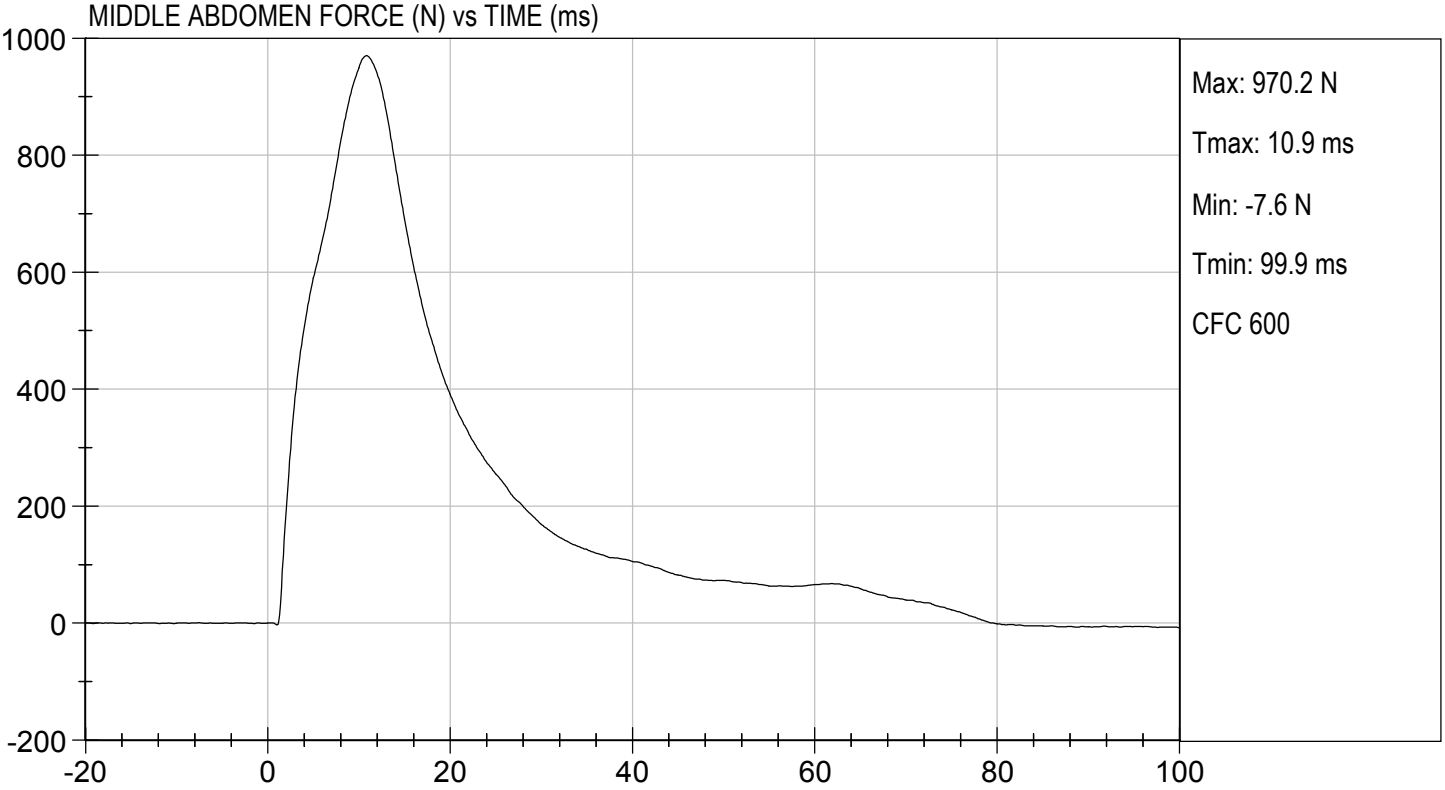
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

TEST DATE: 01/31/2019
TEST #: D190397

FRONT ABDOMEN FORCE (N) vs TIME (ms)



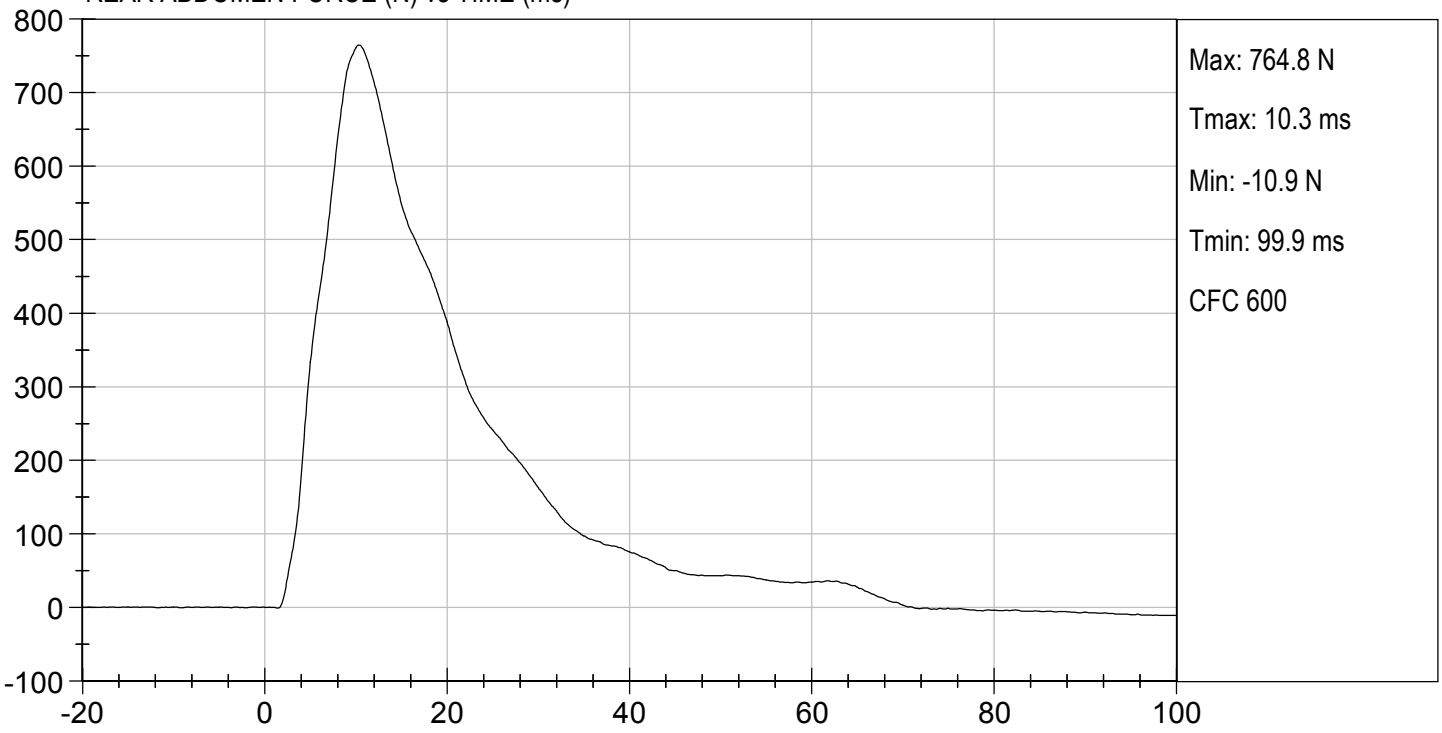
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

TEST DATE: 01/31/2019
TEST #: D190397

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190398

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.412	Pass
	27 ms	m/s	-6.50 to -5.80	-6.01	Pass
	30 ms	m/s	>= -6.50	-5.90	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.7	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	40.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	43	Pass
			Overall Results		Pass

Danielle Redinbaugh
Laboratory Technician

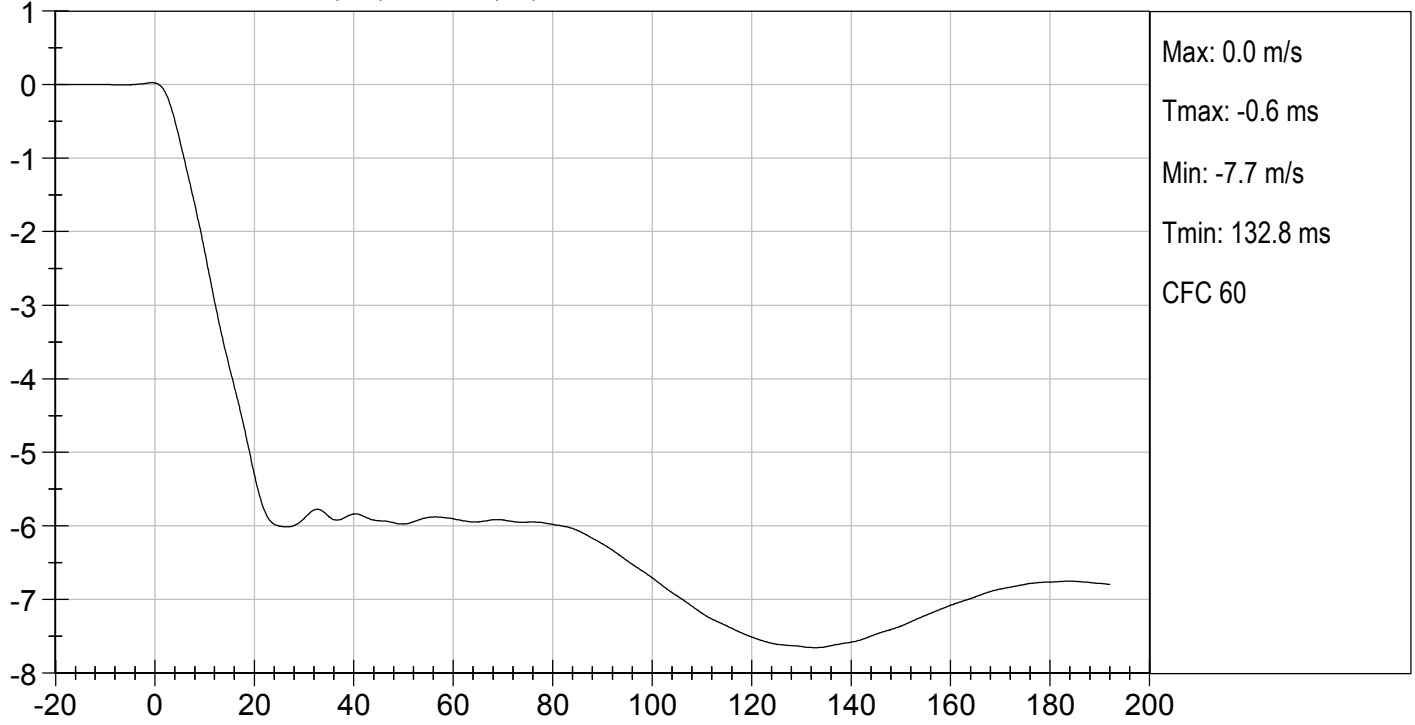
01/31/2019
Test Date

Robert Schneider
Approved By

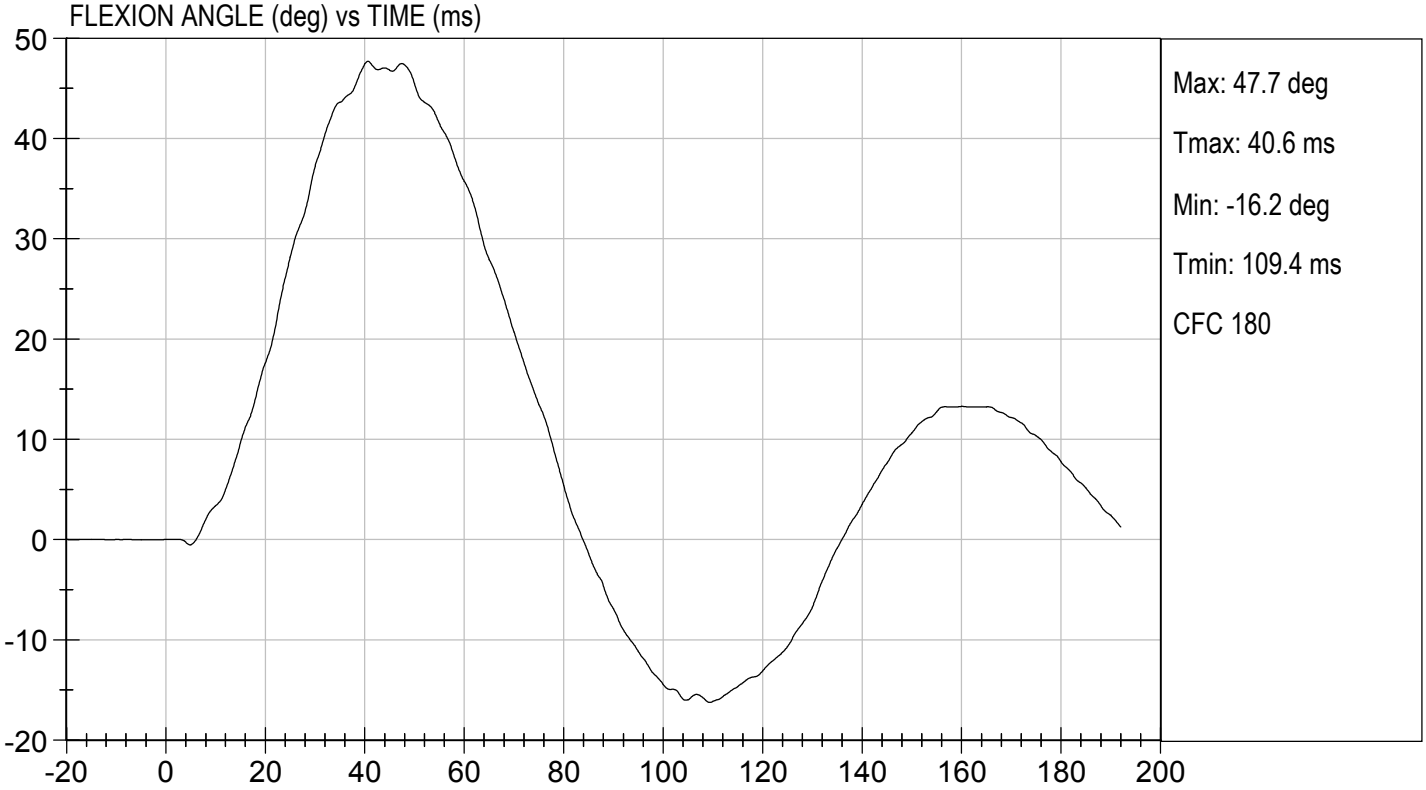
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 01/31/2019
TEST #: D190398

PENDULUM VELOCITY (m/s) vs TIME (ms)



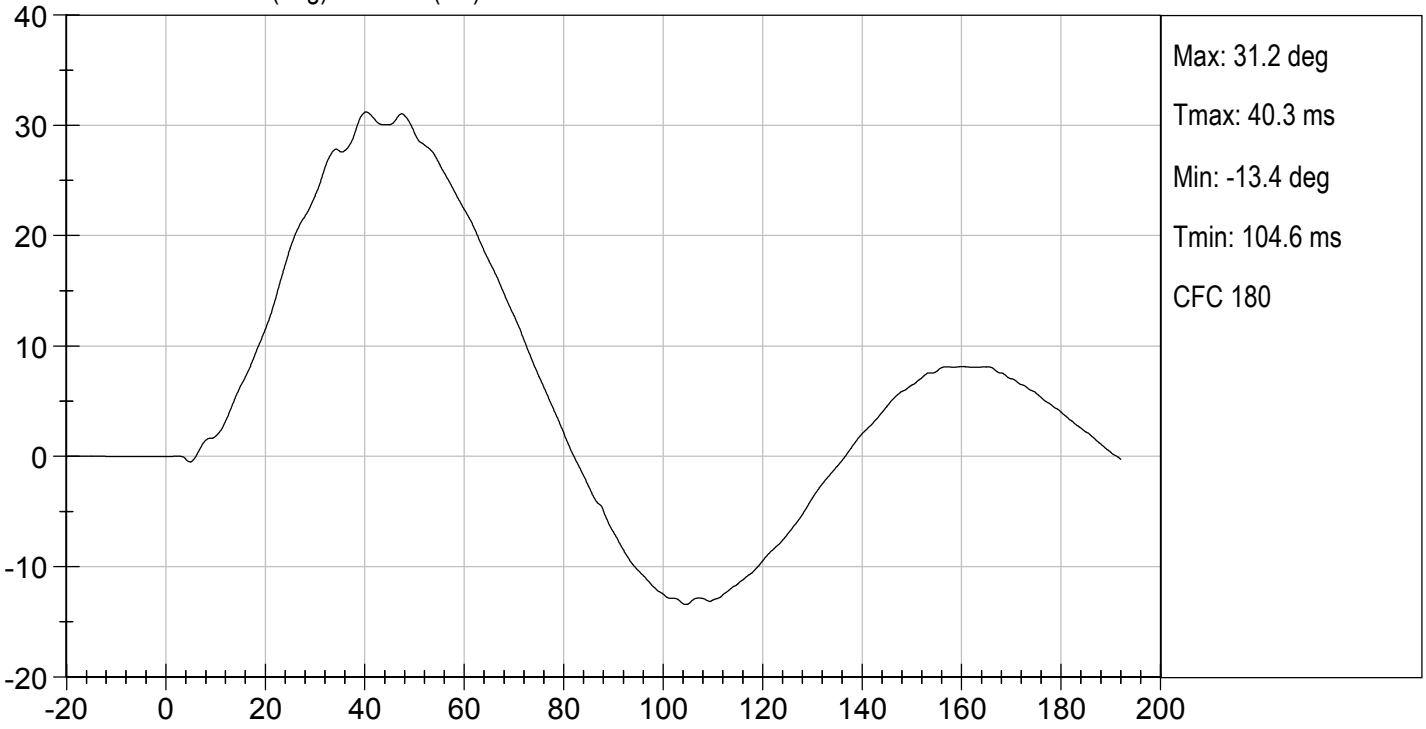
FLEXION ANGLE (deg) vs TIME (ms)



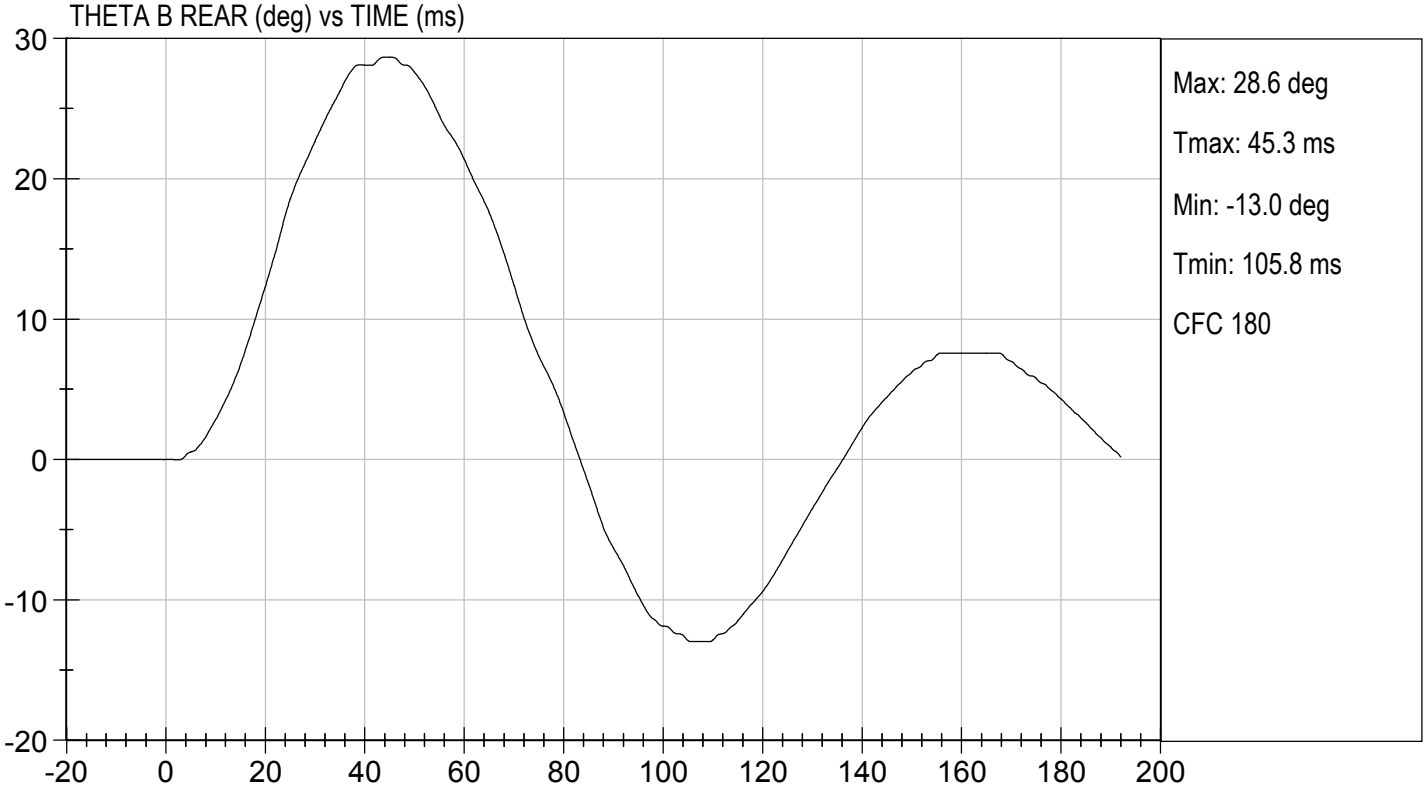
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 01/31/2019
TEST #: D190398

THETA A FRONT (deg) vs TIME (ms)

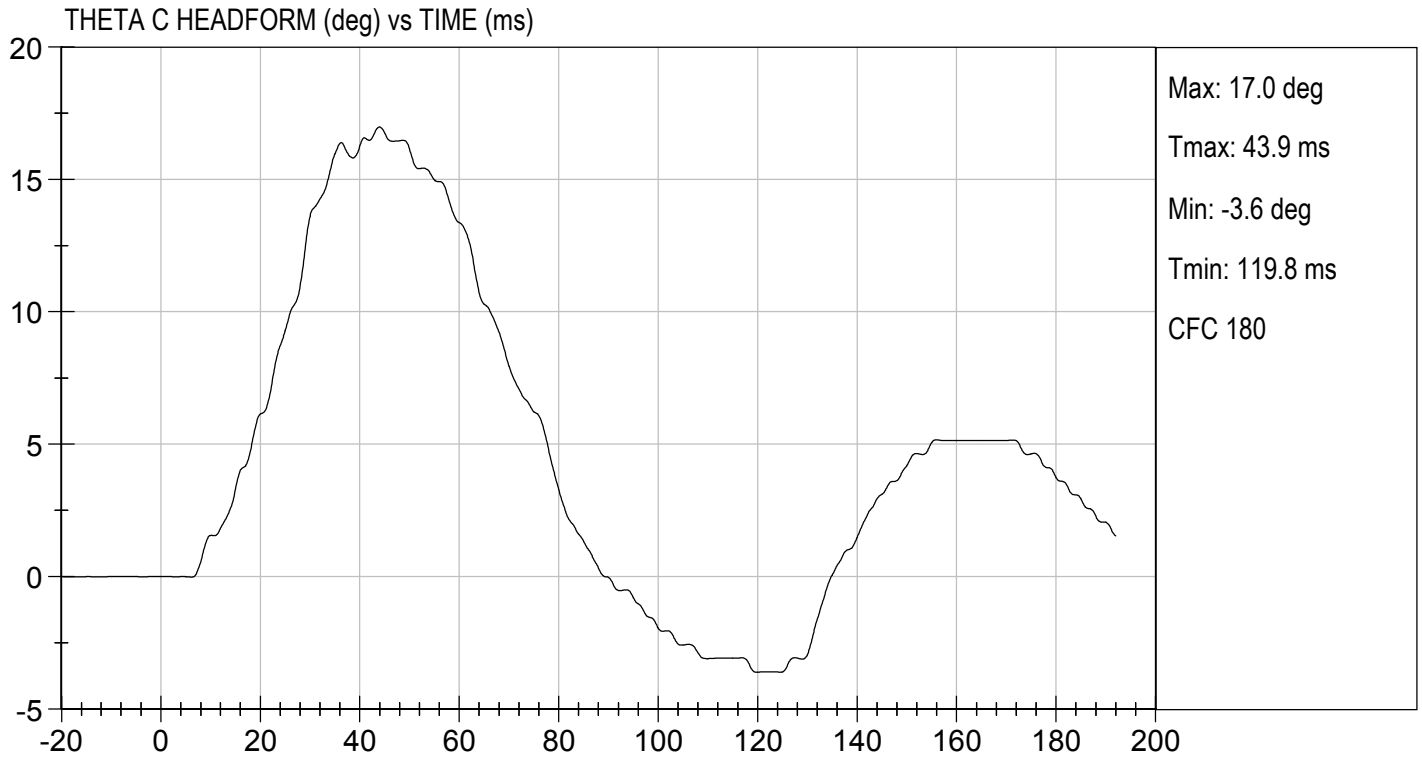


THETA B REAR (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 01/31/2019
TEST #: D190398



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190399

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Speed	m/s	4.20 to 4.40	4.40	Pass
Maximum Impactor Force	N	4700 to 5400	5376	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.5	Pass
Maximum Pubic Force	N	1230 to 1590	1418	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	12.6	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

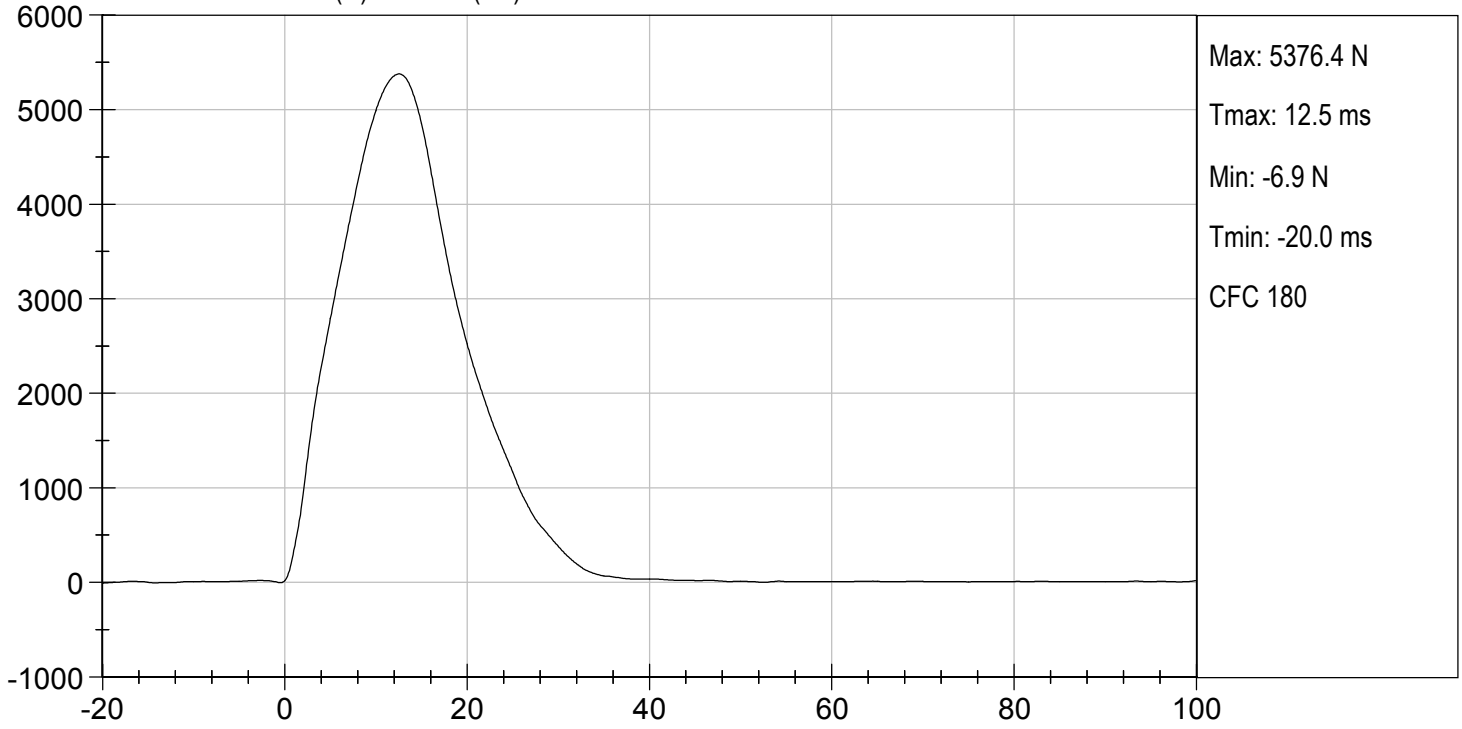
01/31/2019
Test Date

Robert Schmidt
Approved By

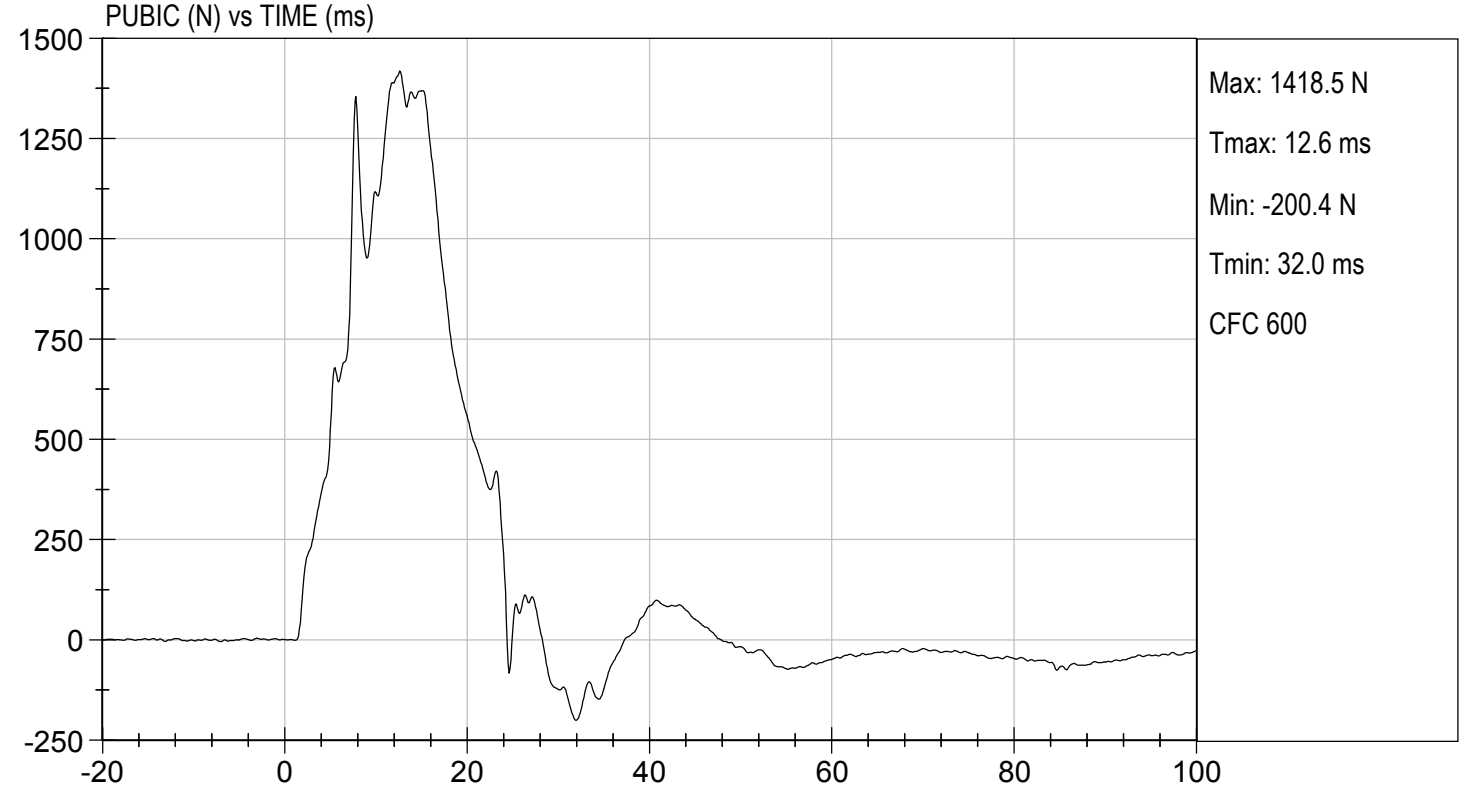
TEST DESC: PELVIS IMPACT
VELOCITY: 14.45 ft/s, 4.4 m/s

TEST DATE: 01/31/2019
TEST #: D190399

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190390

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5583	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.1	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.9	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.5	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

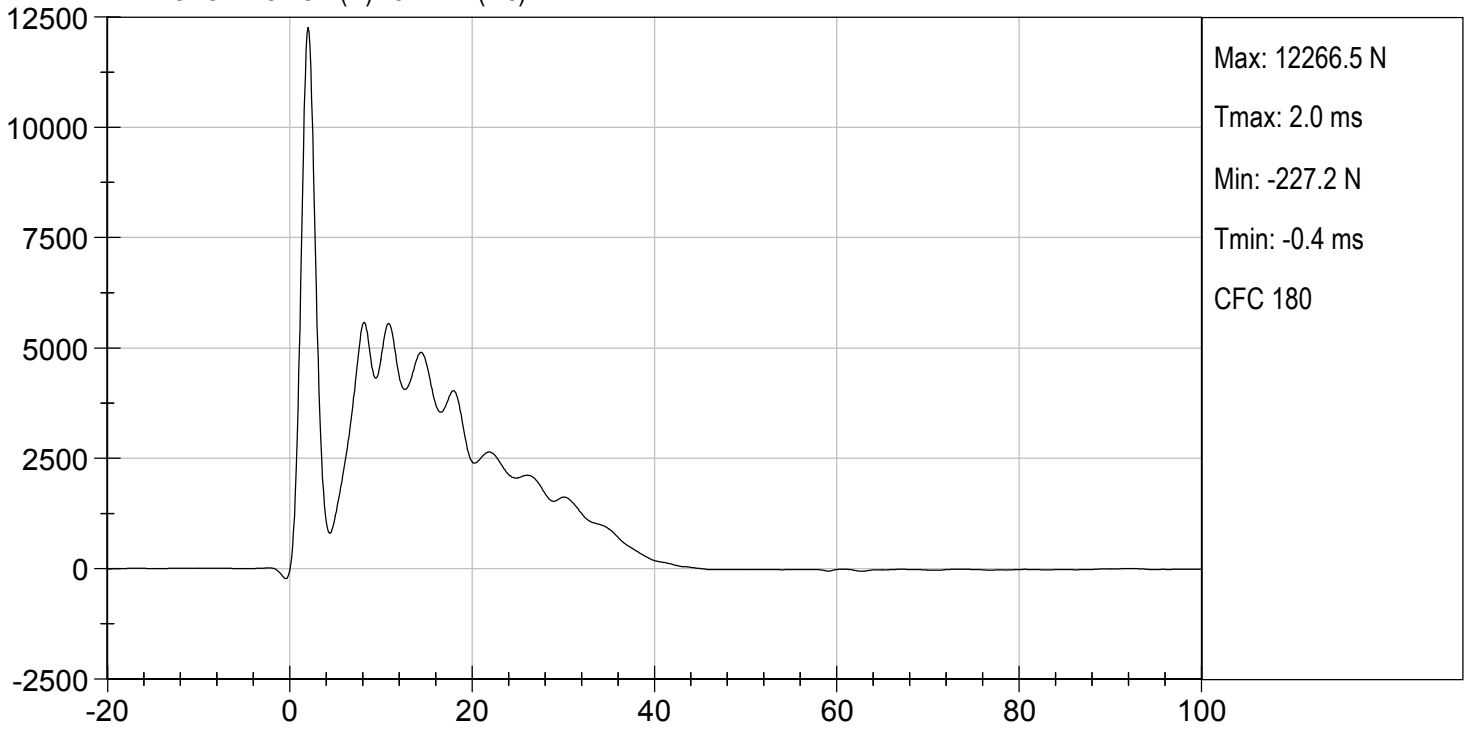
01/31/2019
Test Date

Robert Schmidt
Approved By

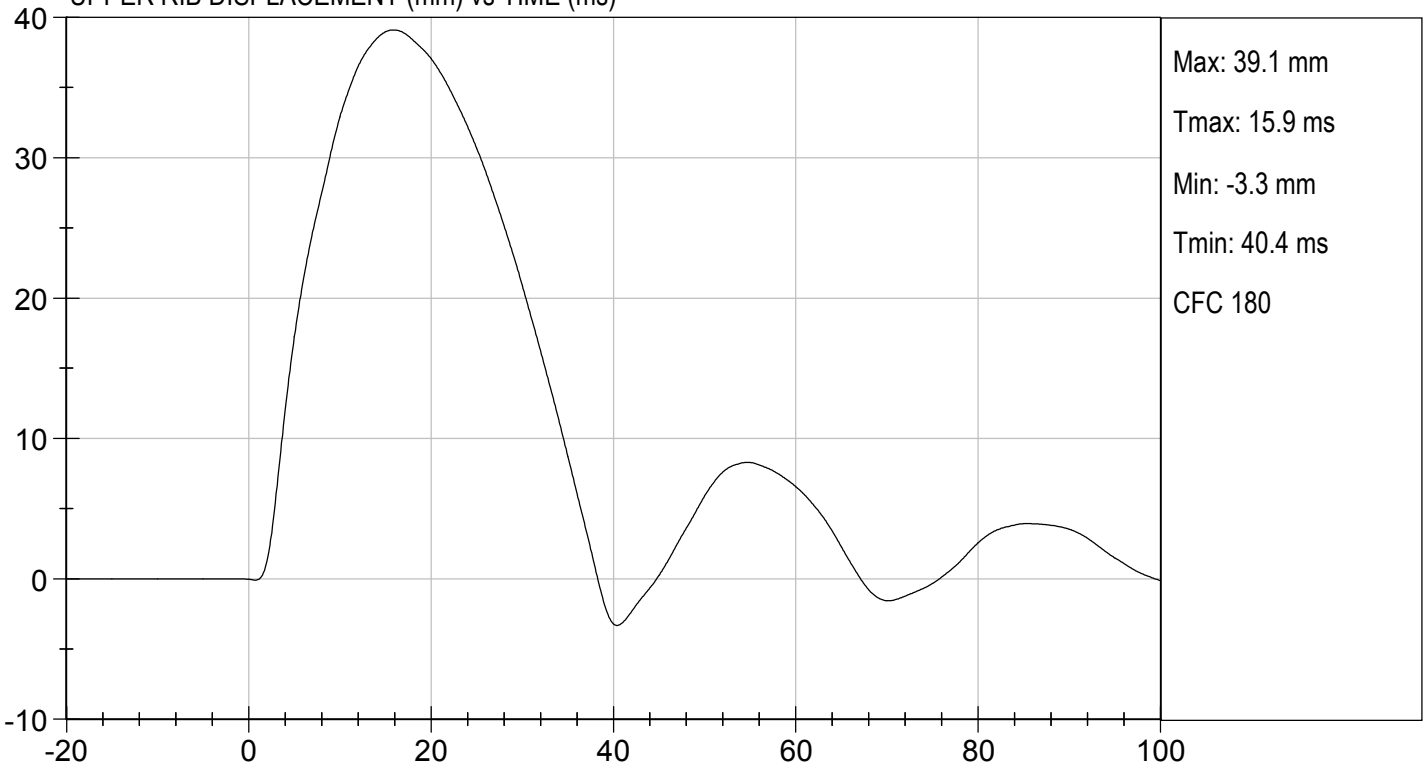
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 01/31/2019
TEST #: D190390

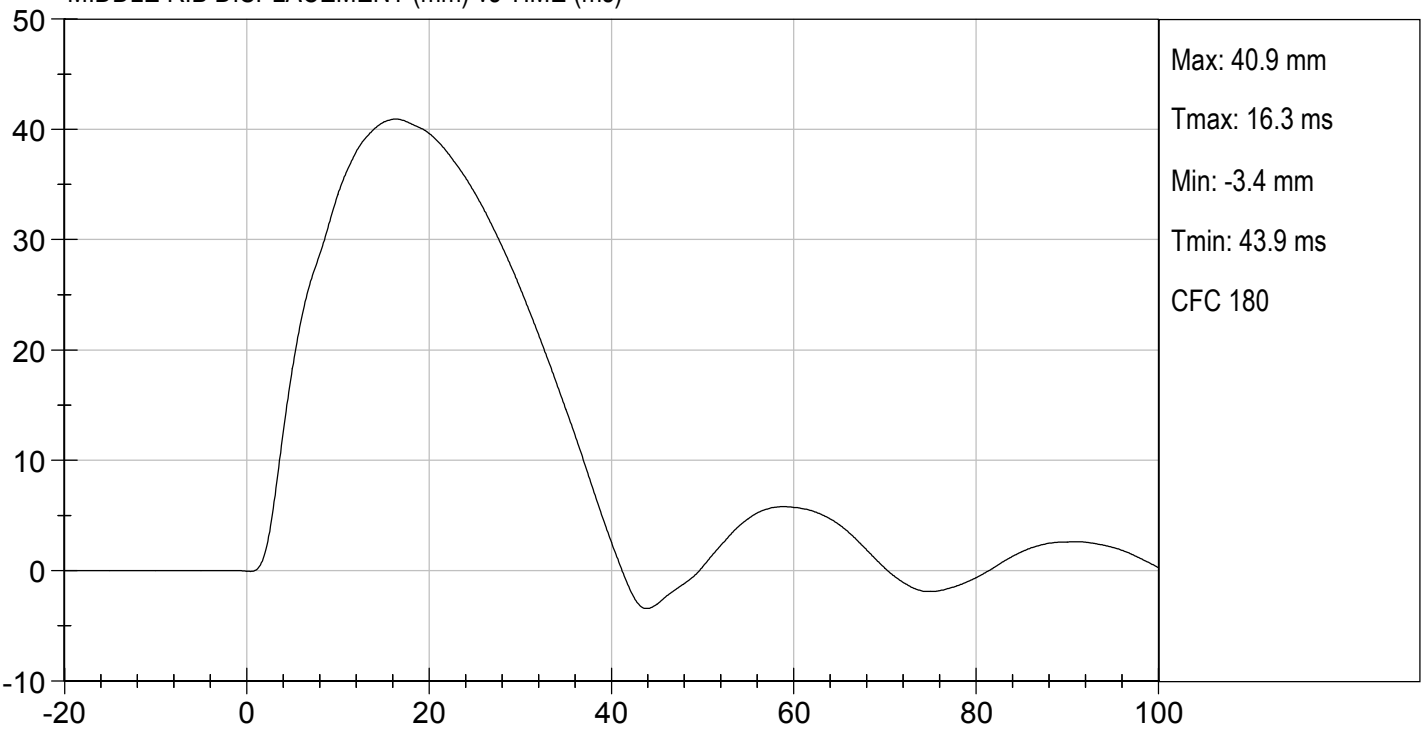
IMPACTOR FORCE (N) vs TIME (ms)



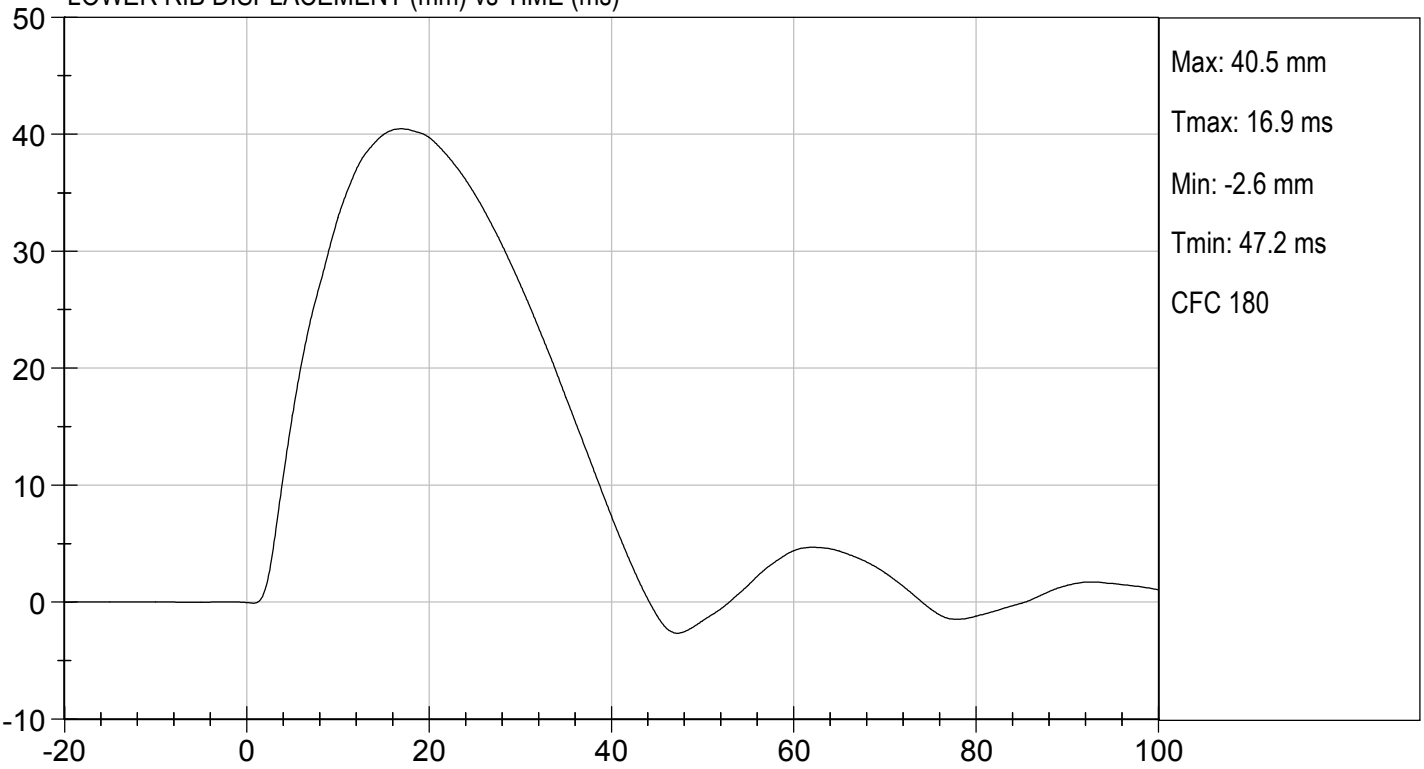
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 032

No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032 **Test ID:** D190521

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	125 to 155	138	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Danielle Redenbaugh
Laboratory Technician

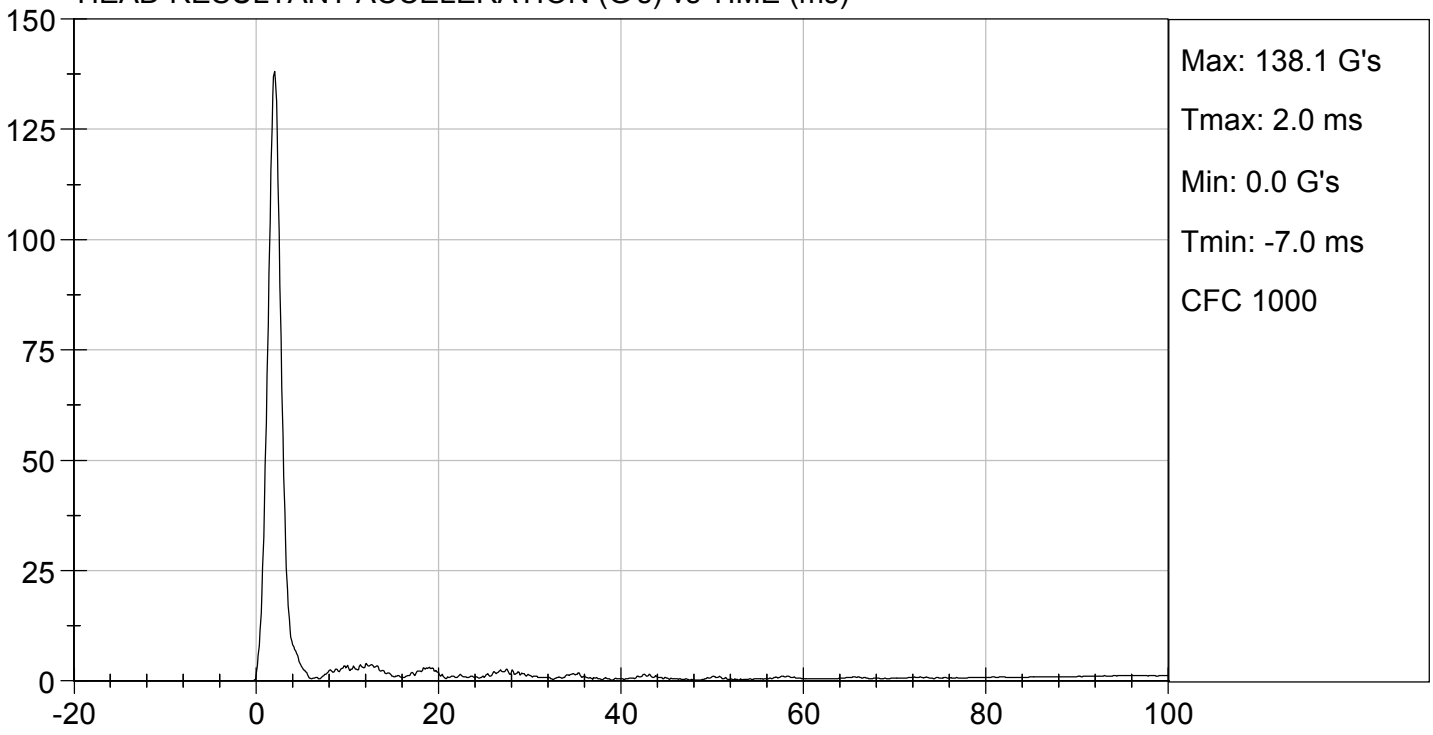
02/07/2019
Test Date

Robert Schmidt
Approved By

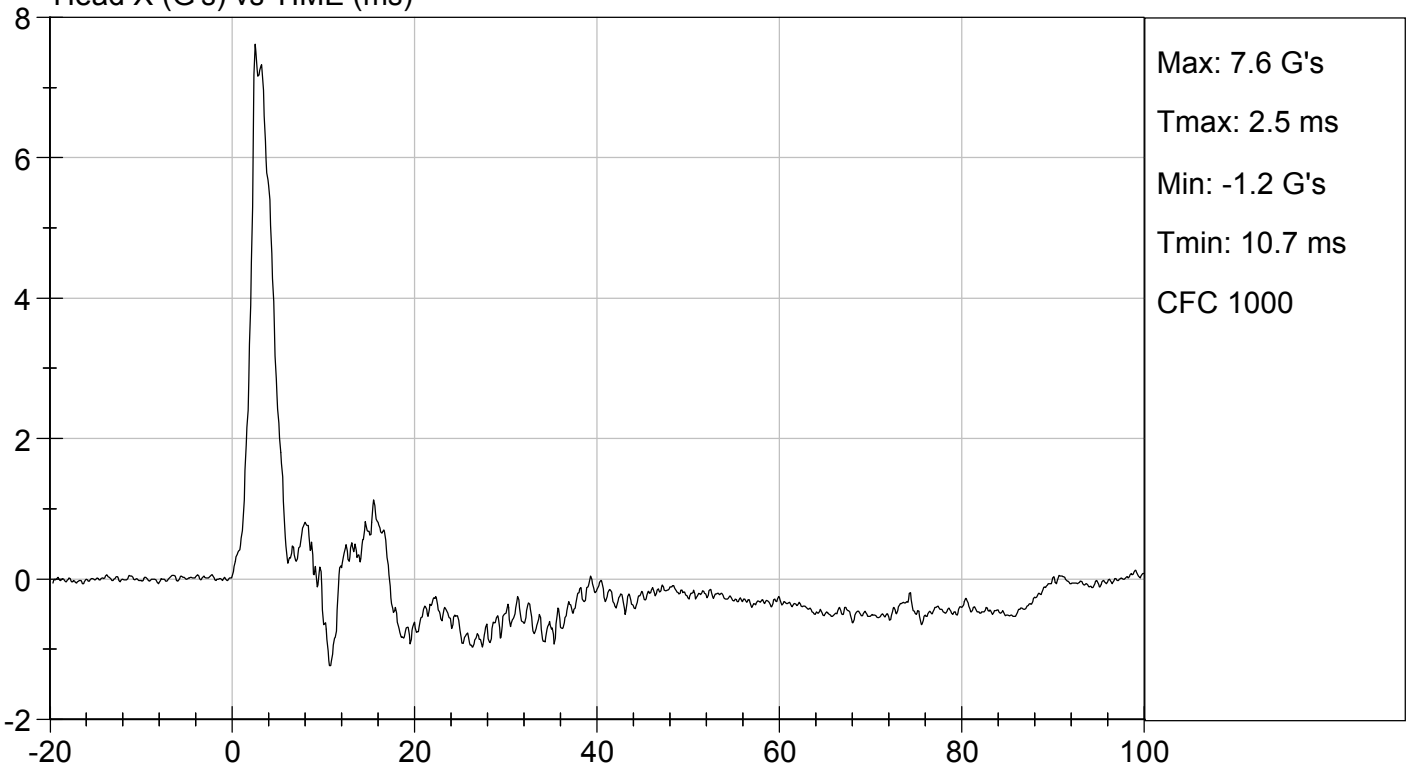
TEST DESC: HEAD DROP

TEST DATE: 02/07/2019
TEST #: D190521

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)

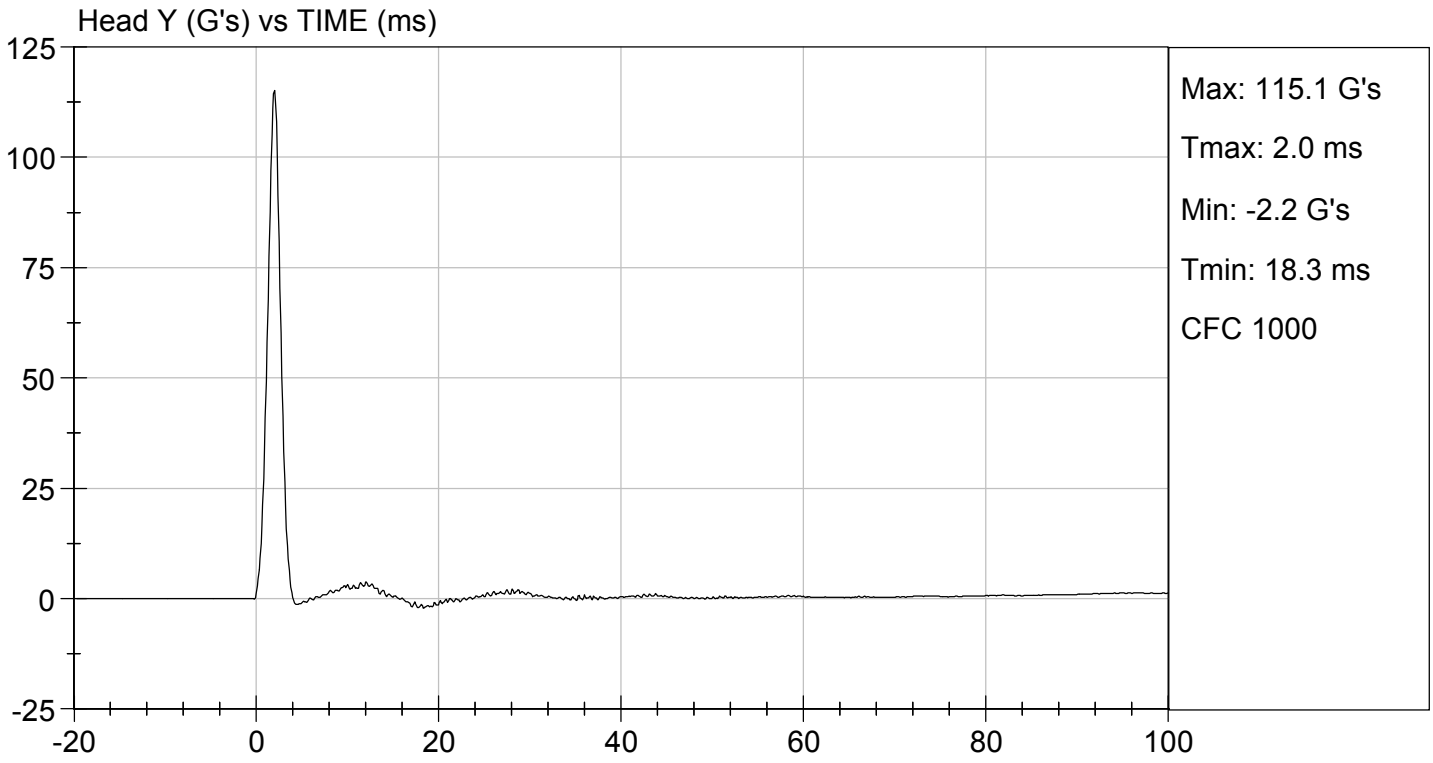


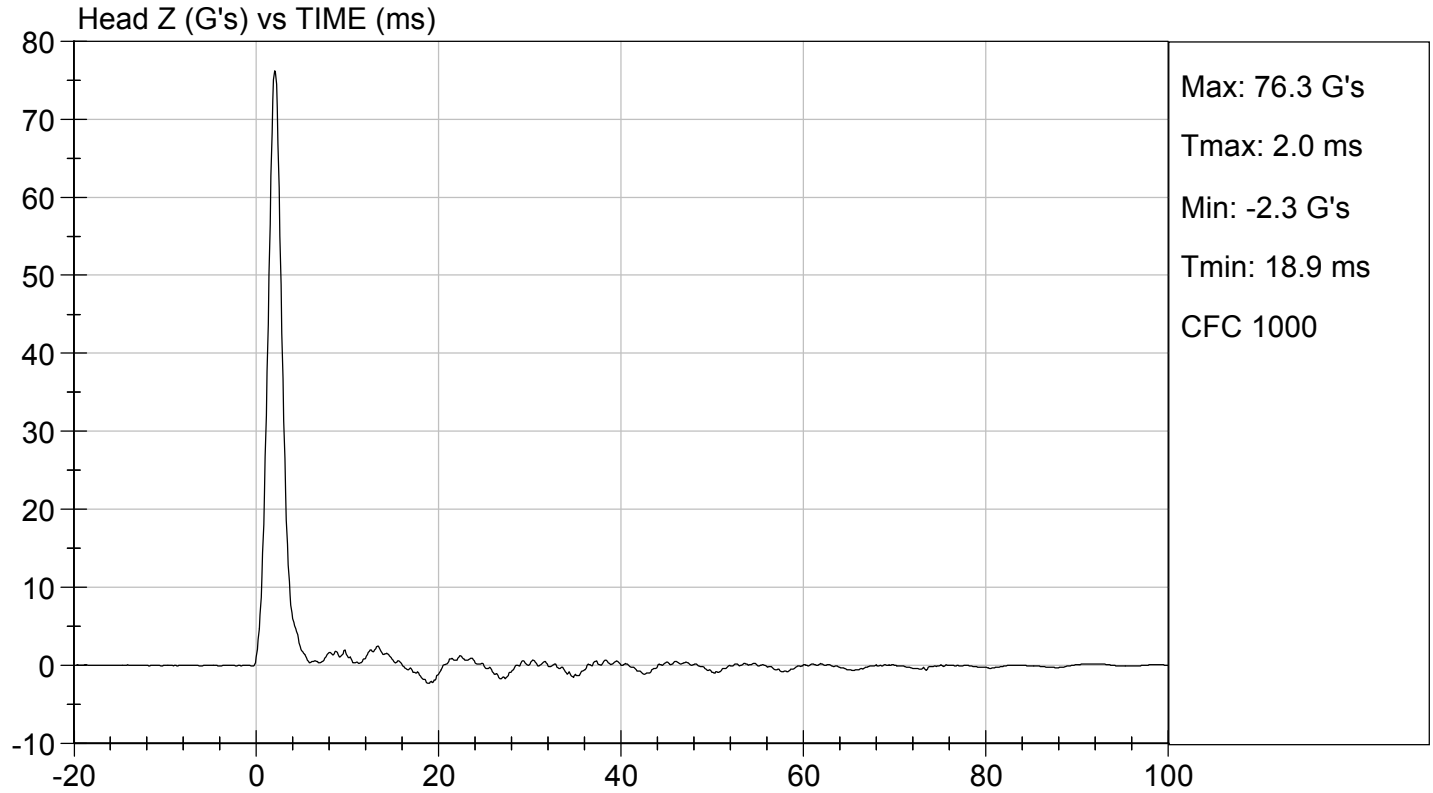
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 02/07/2019
TEST #: D190521





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190522

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.50	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.35	Pass
	14 ms	m/s	-3.20 to -3.70	-3.65	Pass
	17 ms	m/s	>= -3.70	-3.45	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.9	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	61.1	Pass
			Overall Results		Pass

Danielle Redinbaugh
Laboratory Technician

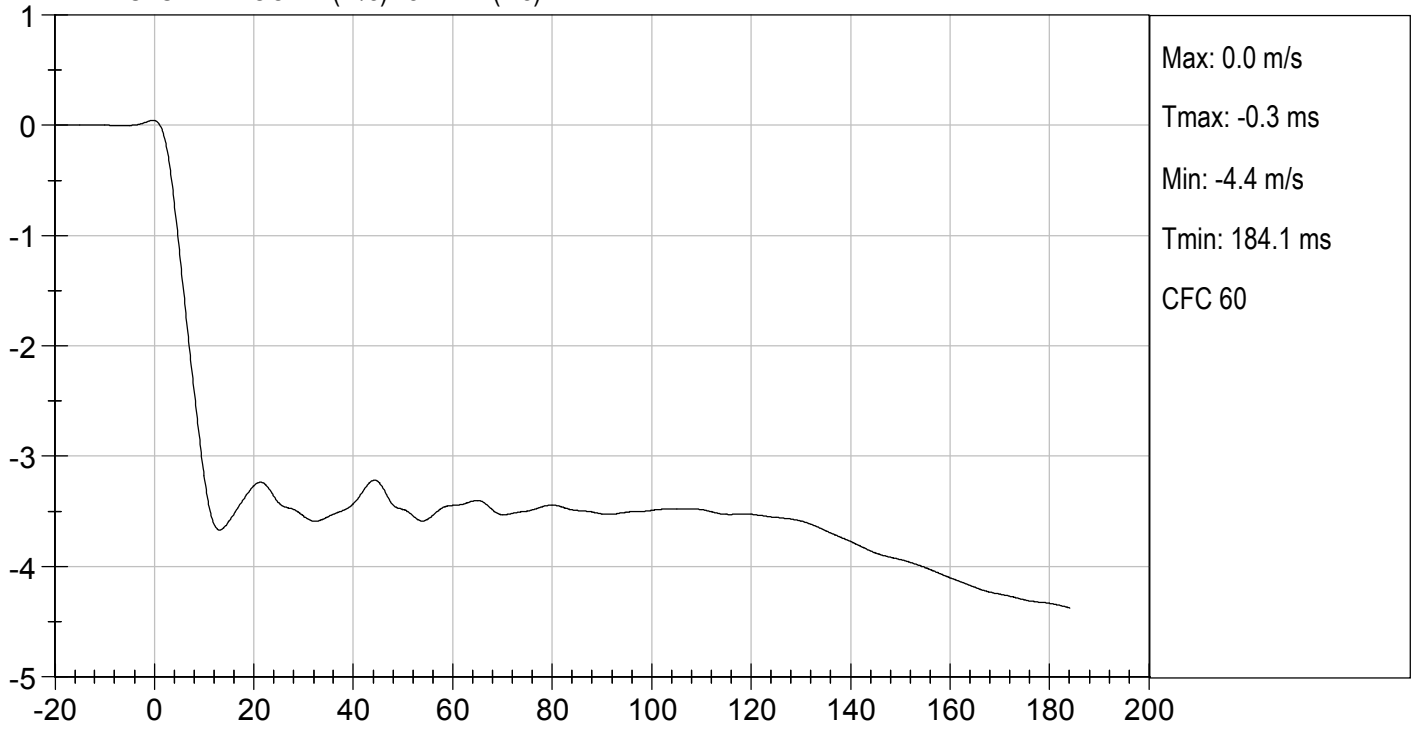
02/06/2019
Test Date

Approved By

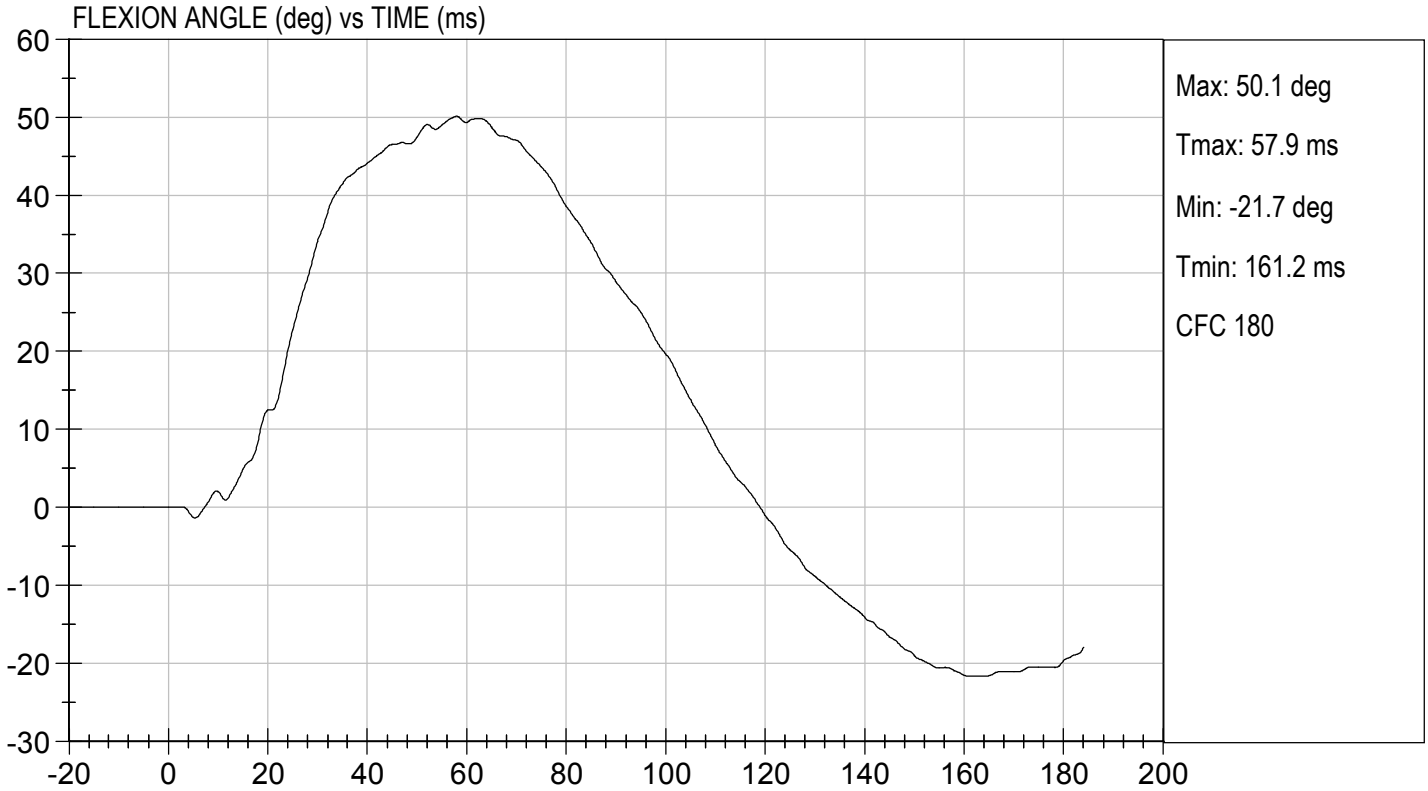
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 02/06/2019
TEST #: D190522

PENDULUM VELOCITY (m/s) vs TIME (ms)



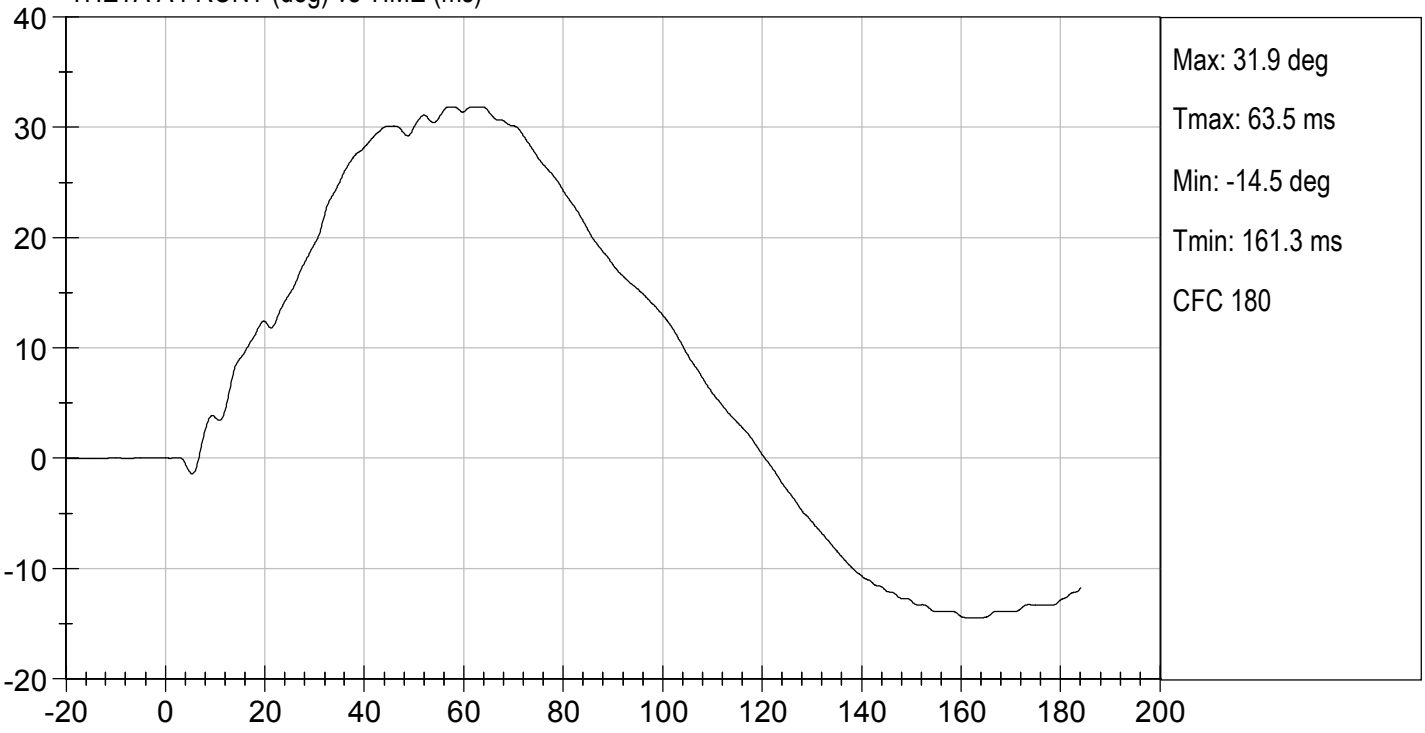
FLEXION ANGLE (deg) vs TIME (ms)



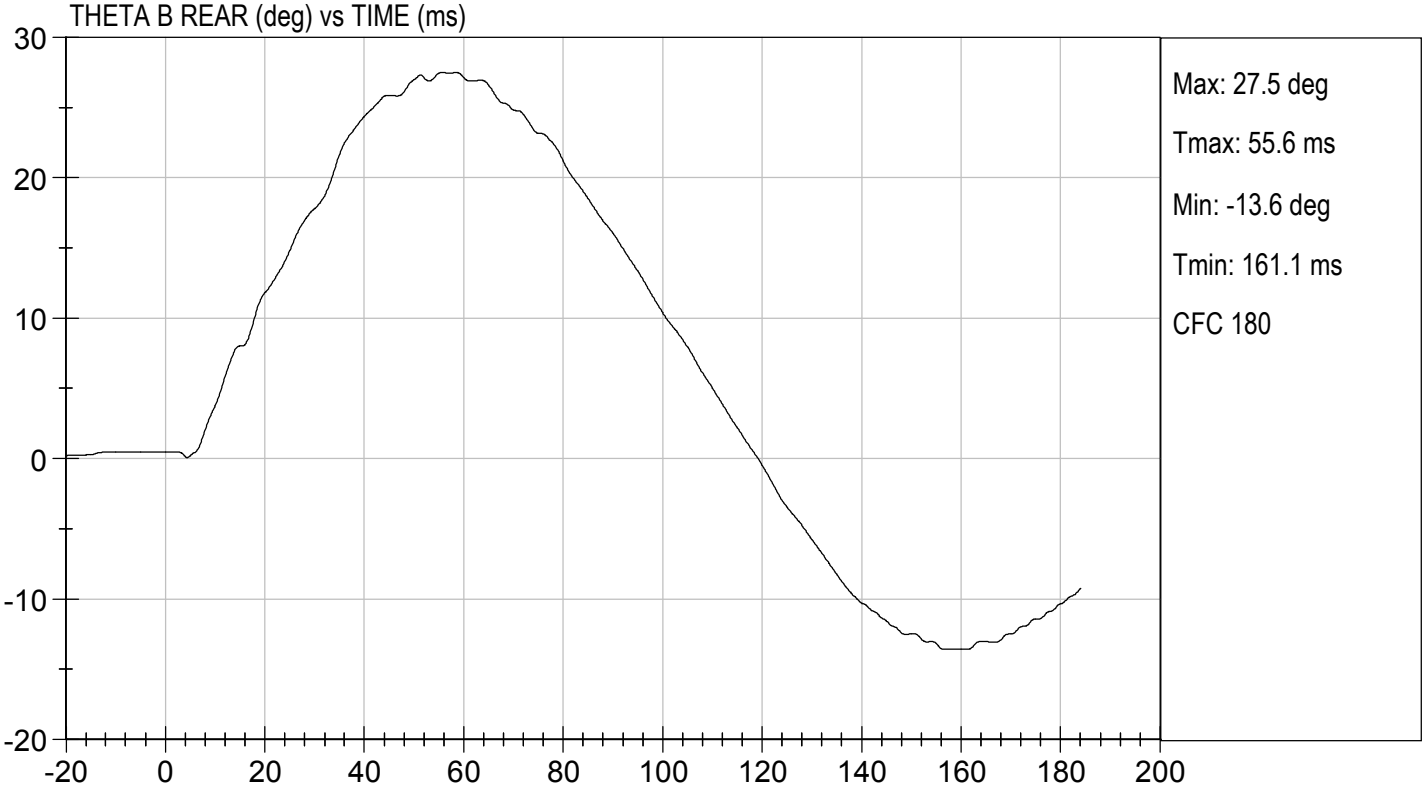
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 02/06/2019
TEST #: D190522

THETA A FRONT (deg) vs TIME (ms)

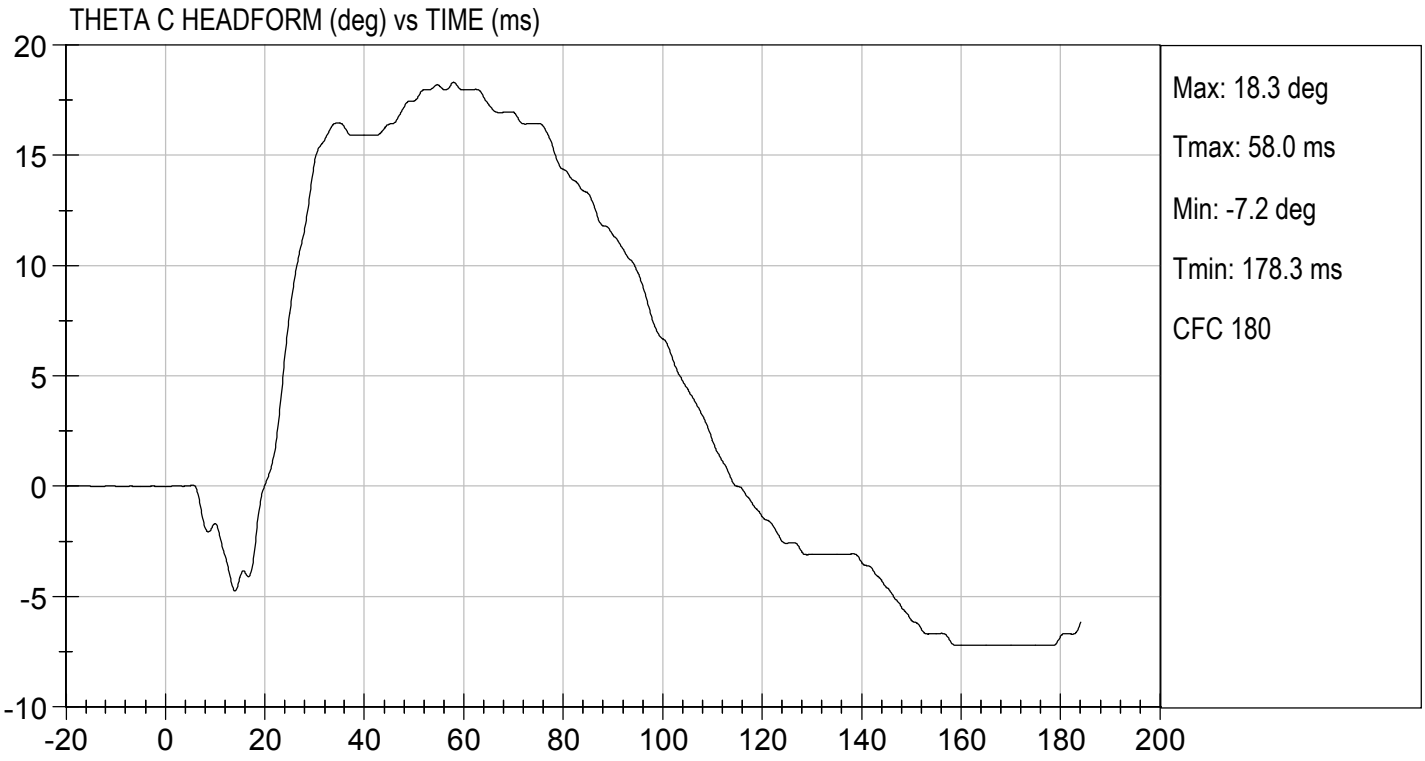


THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 02/06/2019
TEST #: D190522



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190523

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.21	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.3	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

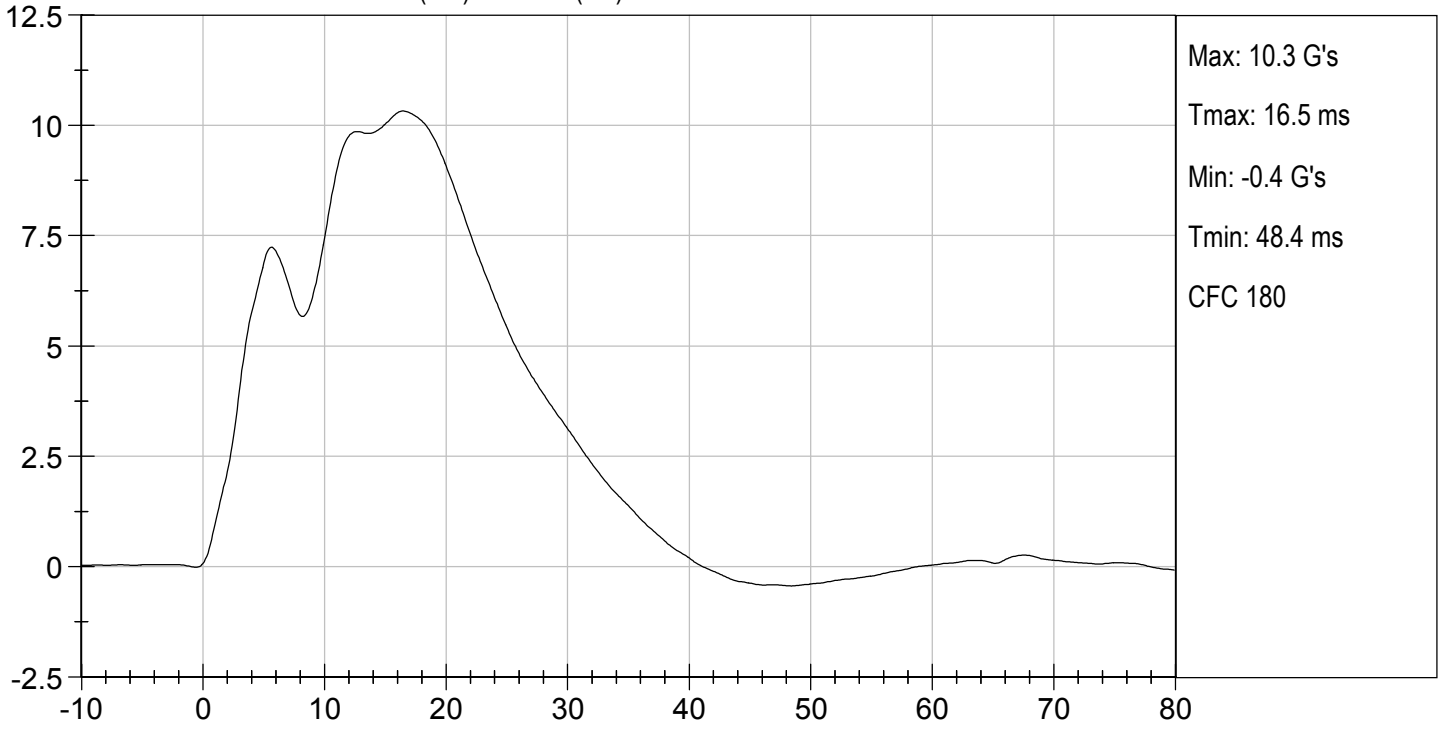
02/07/2019
Test Date

Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 13.80 ft/s, 4.21 m/s

TEST DATE: 02/07/2019
TEST #: D190523

IMPACTOR ACCELERATION (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

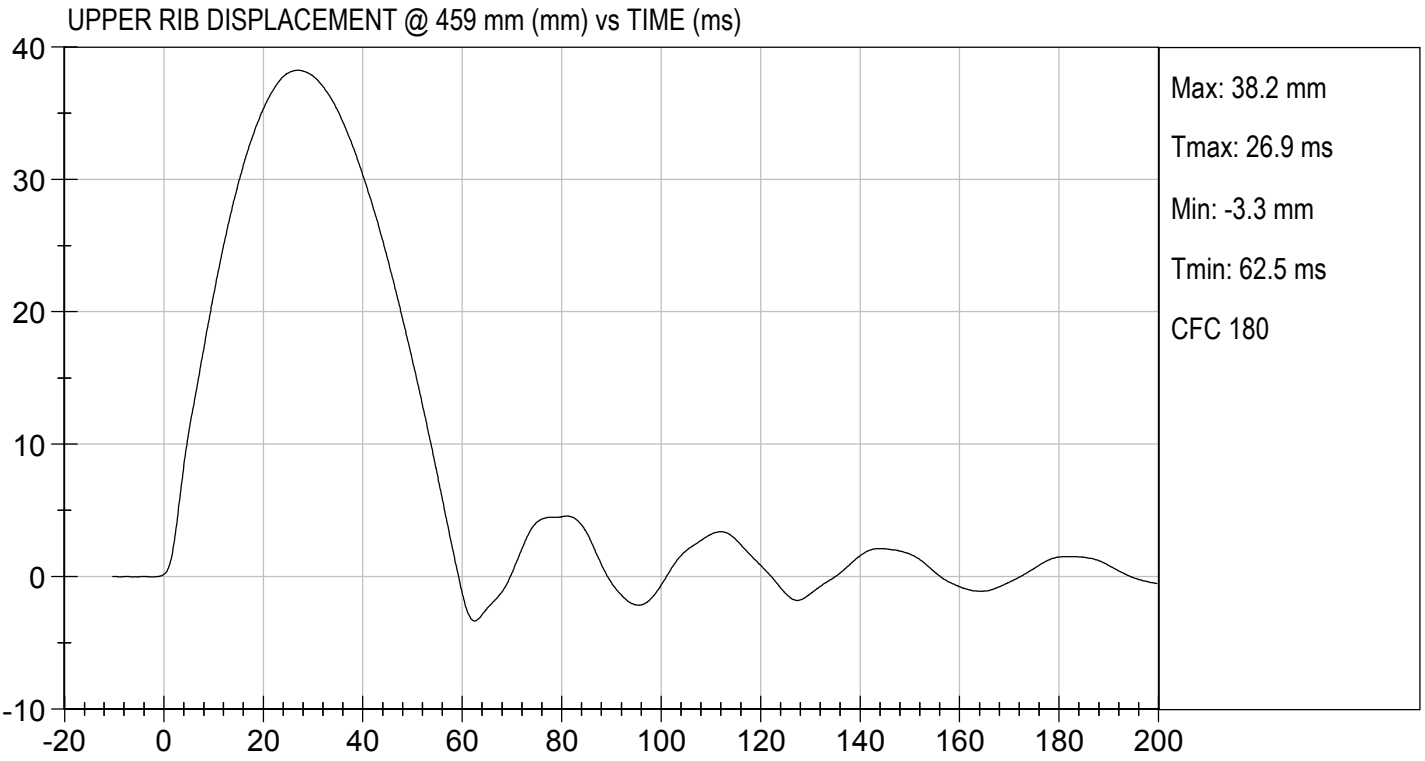
ATD Serial No: 032 **Test I.D:** D190524

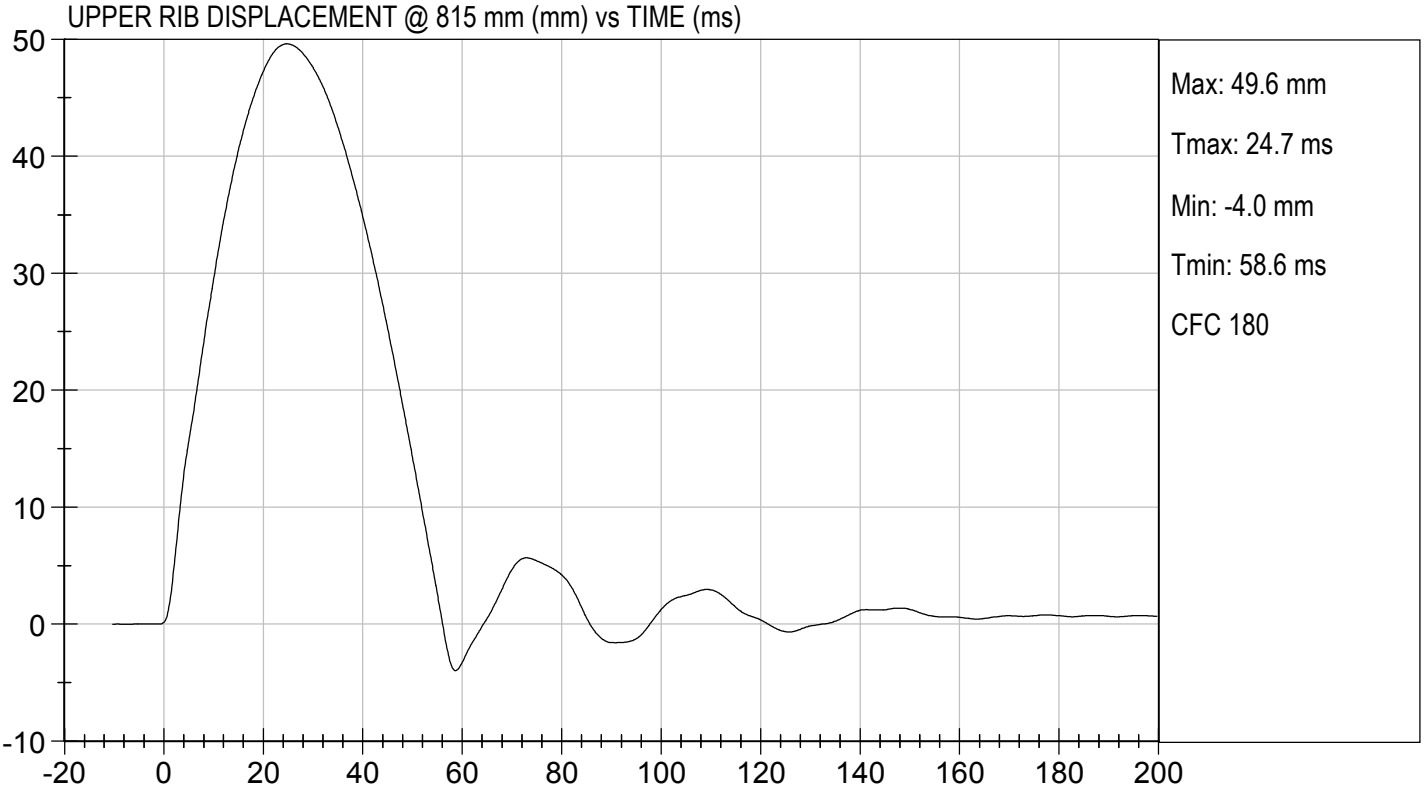
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.6	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

02/07/2019
Test Date

Robert Schmidt
Approved By


UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 38.2 mm
Tmax: 26.9 ms
Min: -3.3 mm
Tmin: 62.5 ms
CFC 180


UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 49.6 mm
Tmax: 24.7 ms
Min: -4.0 mm
Tmin: 58.6 ms
CFC 180

MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190525

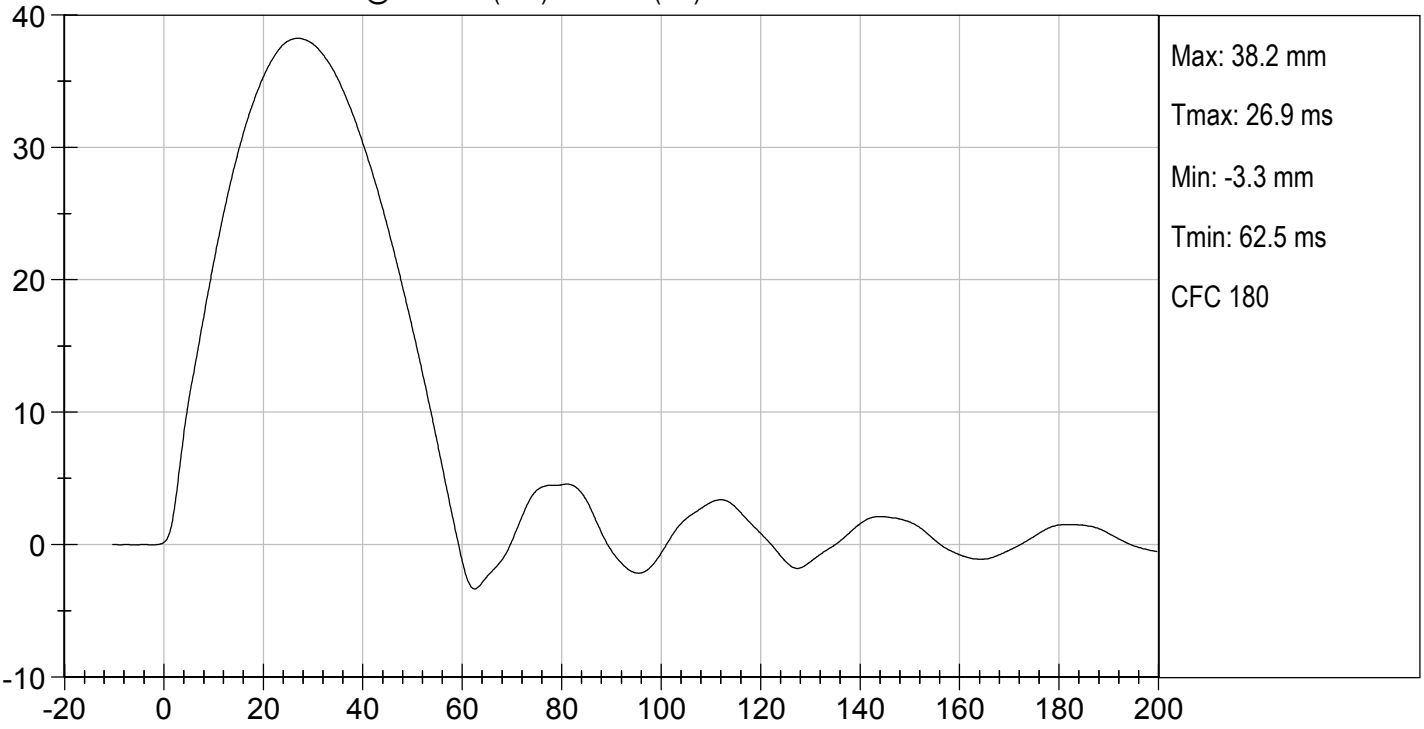
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.5	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

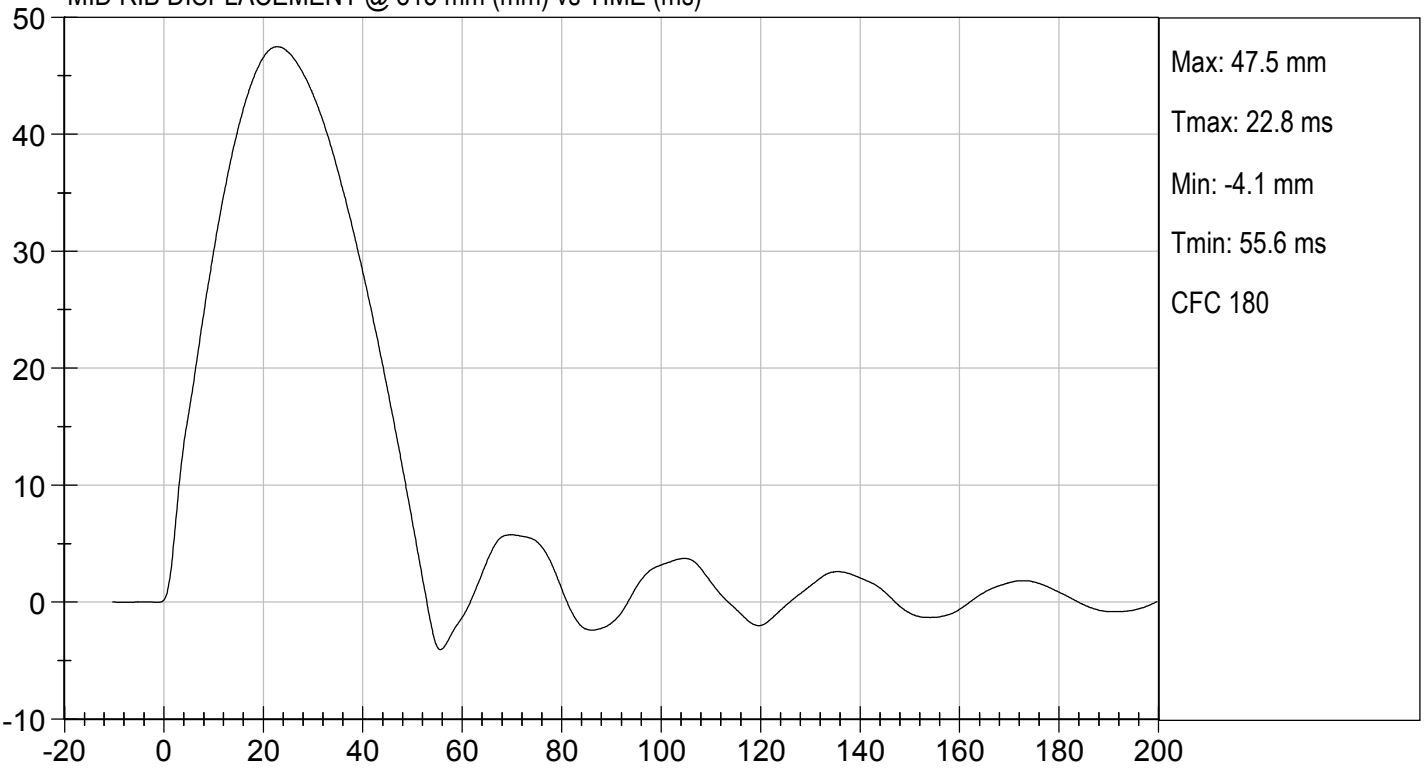
02/07/2019
Test Date

Robert Schneider
Approved By

MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190526

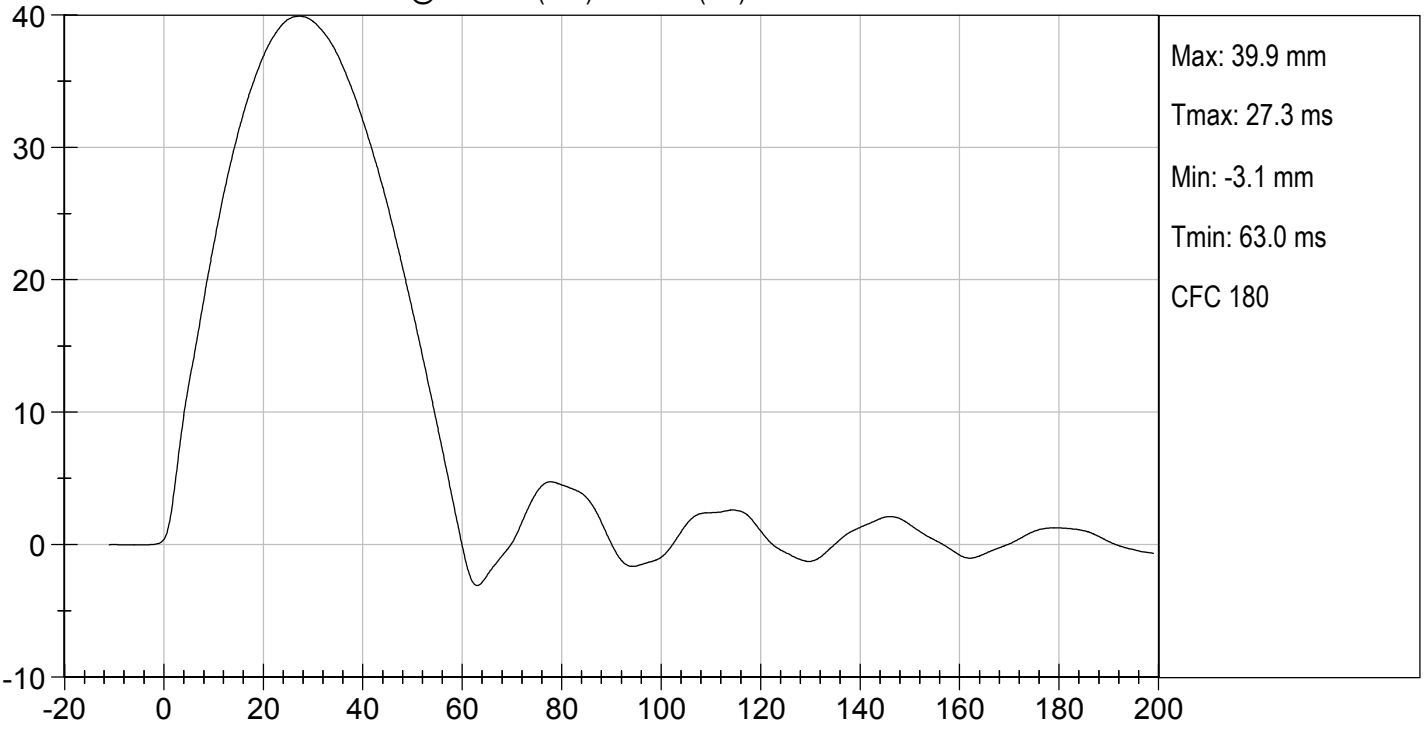
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	51.0	Pass
		Overall Test Results		Pass

Danielle Redenbaugh
Laboratory Technician

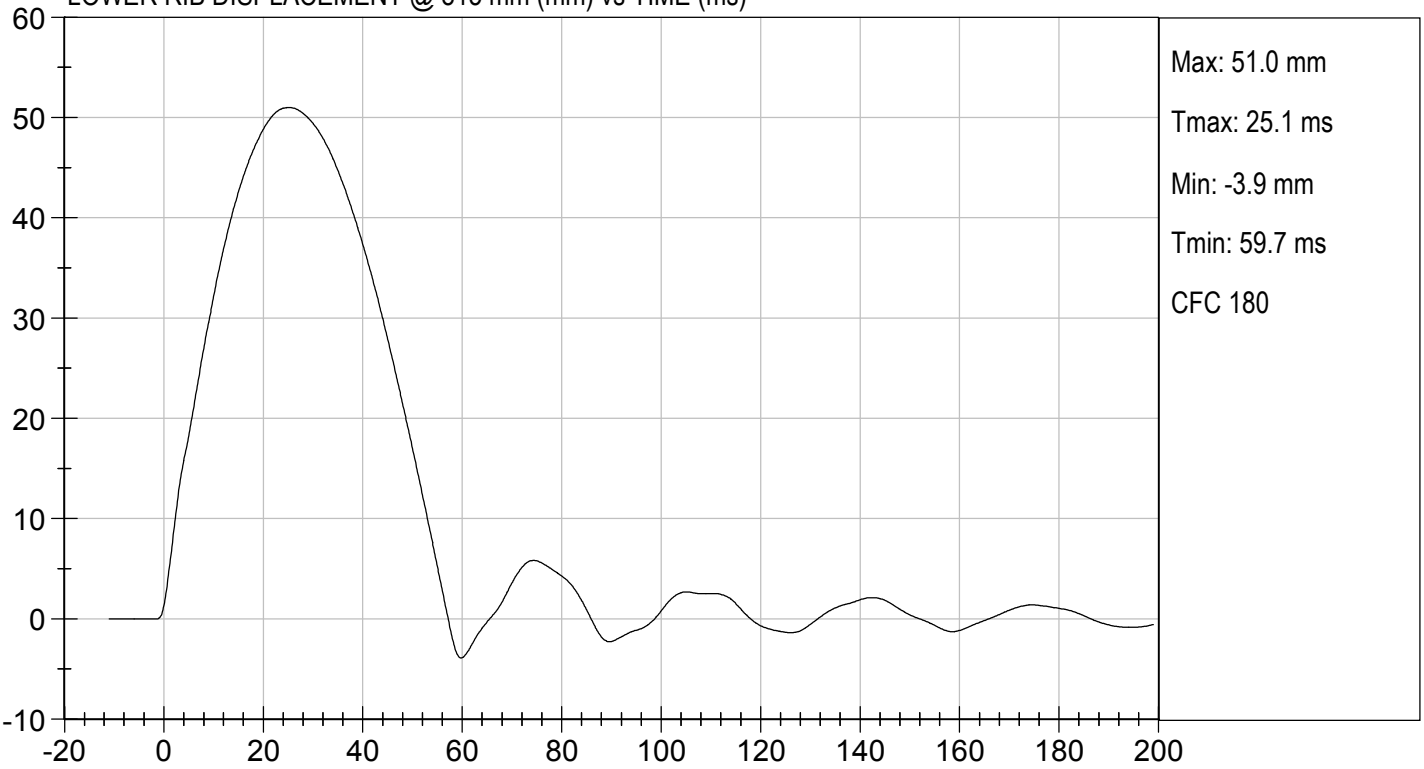
02/07/2019
Test Date

Robert Schneider
Approved By

LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190527

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	3.90 to 4.10	4.08	Pass
Maximum Impactor Force	N	4000 to 4800	4258	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2417	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.0	Pass
		Overall Test Results		Pass

Danielle Redenbaugh
Laboratory Technician

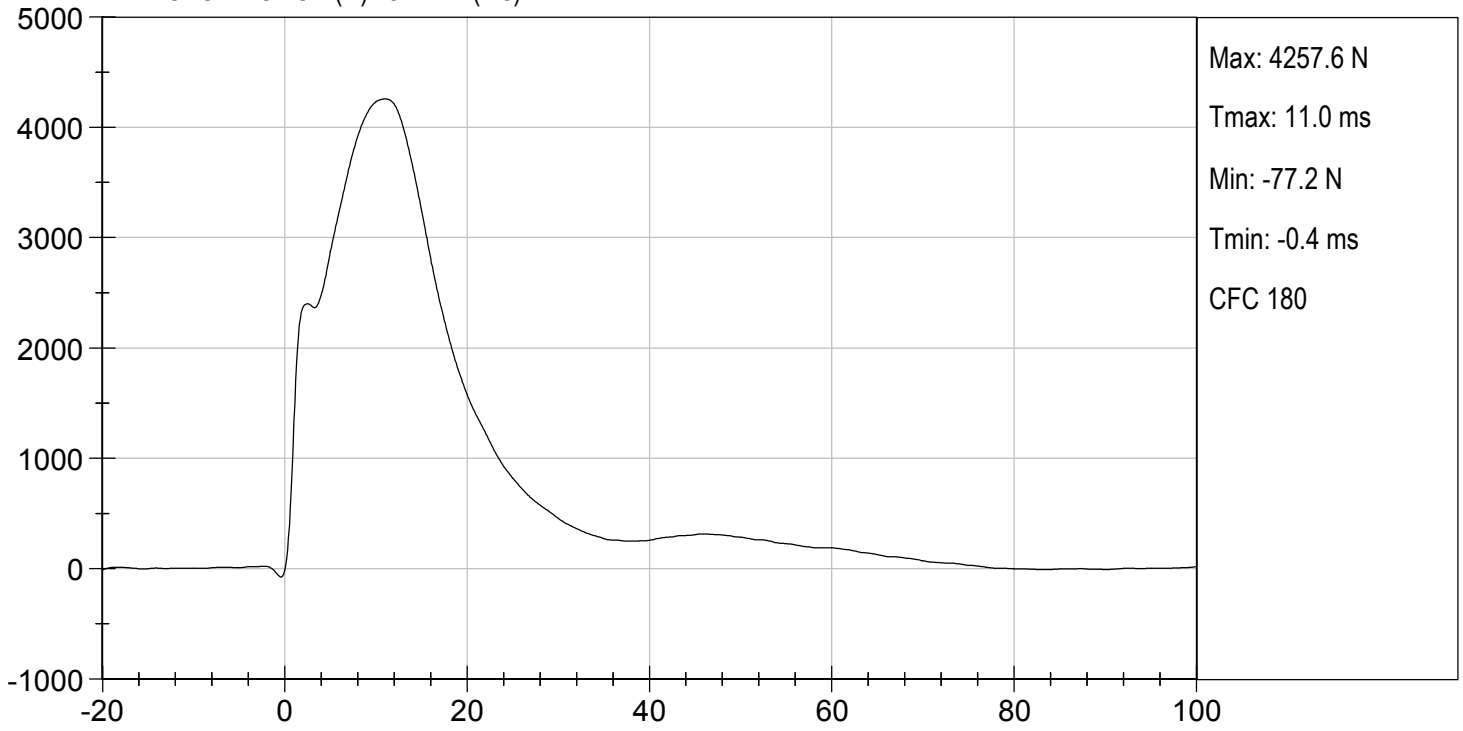
02/07/2019
Test Date

Robert Schmidt
Approved By

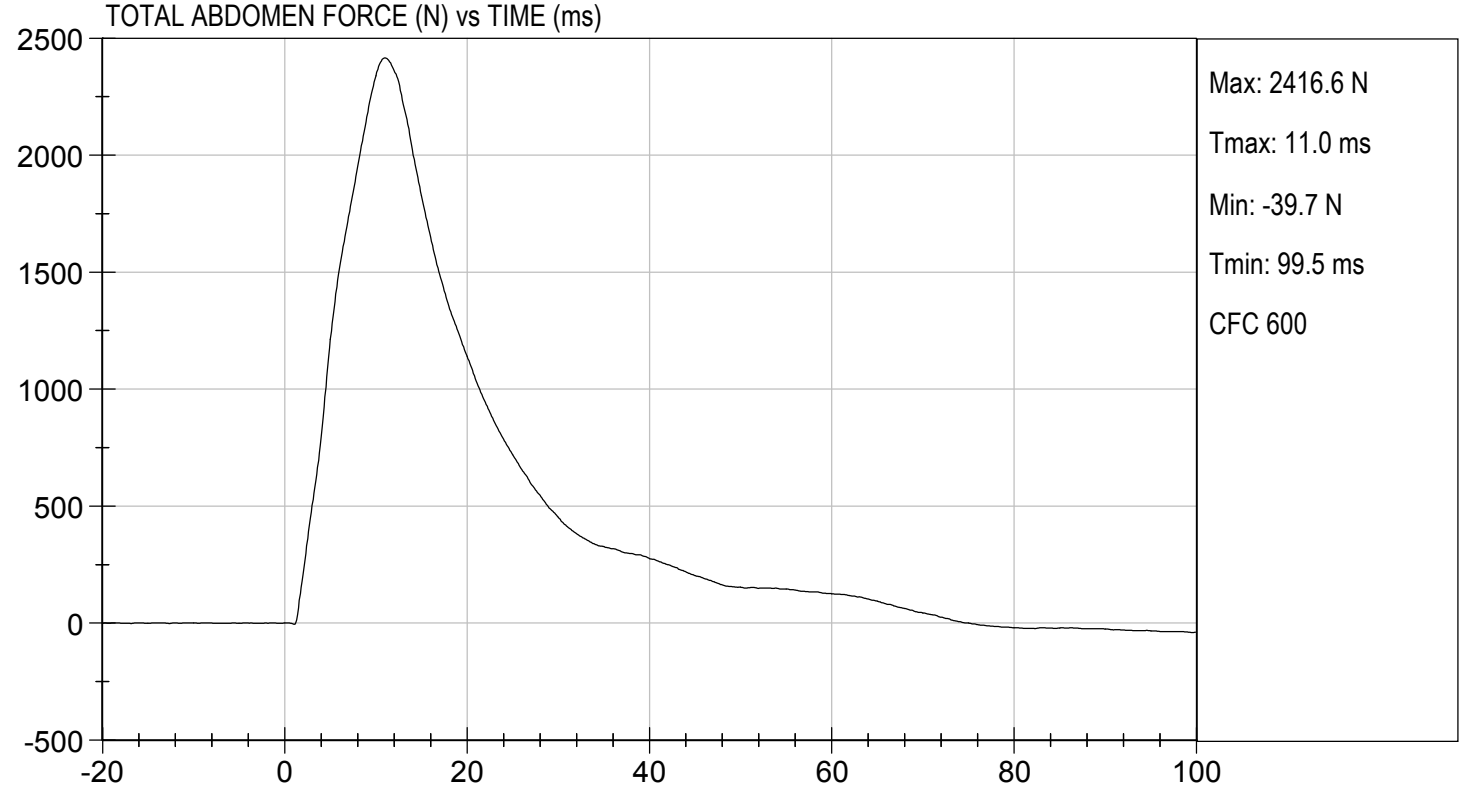
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 02/07/2019
TEST #: D190527

IMPACTOR FORCE (N) vs TIME (ms)



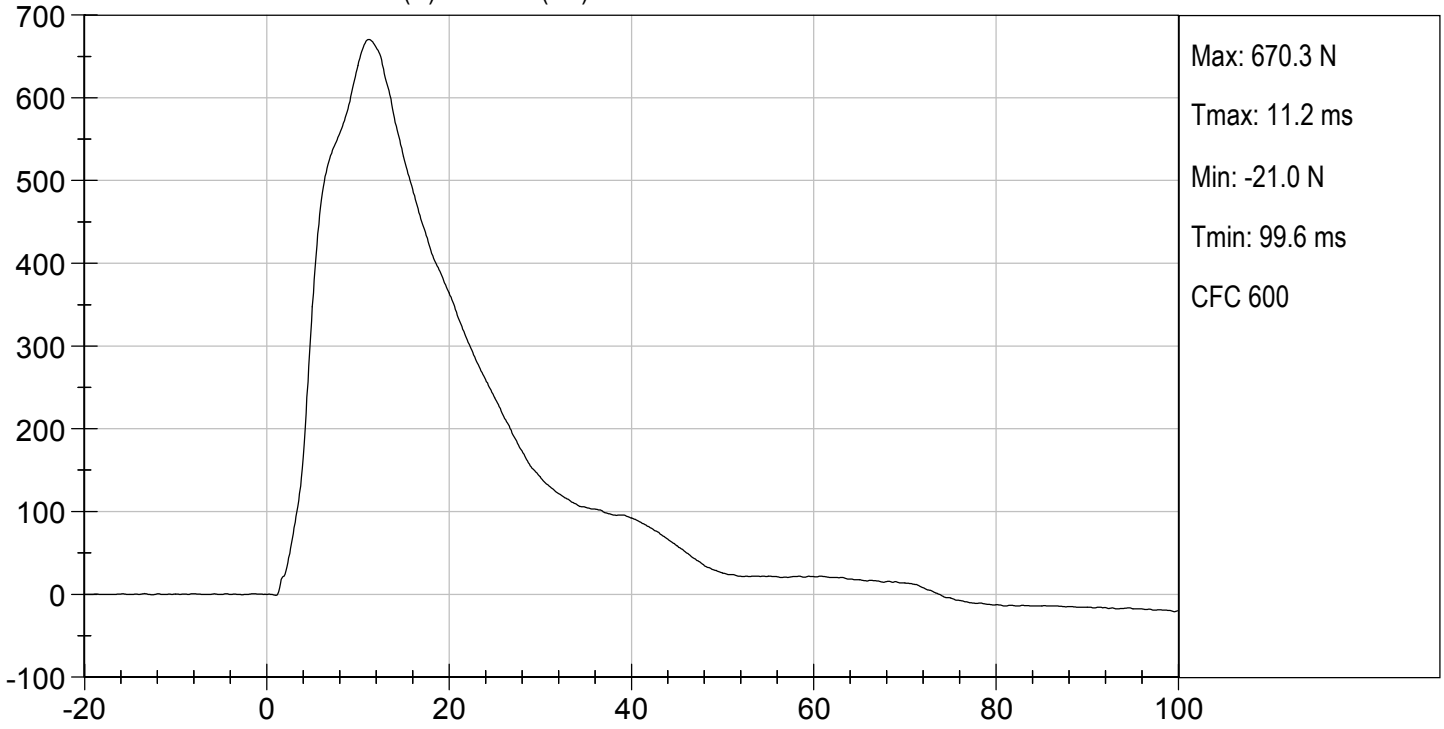
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



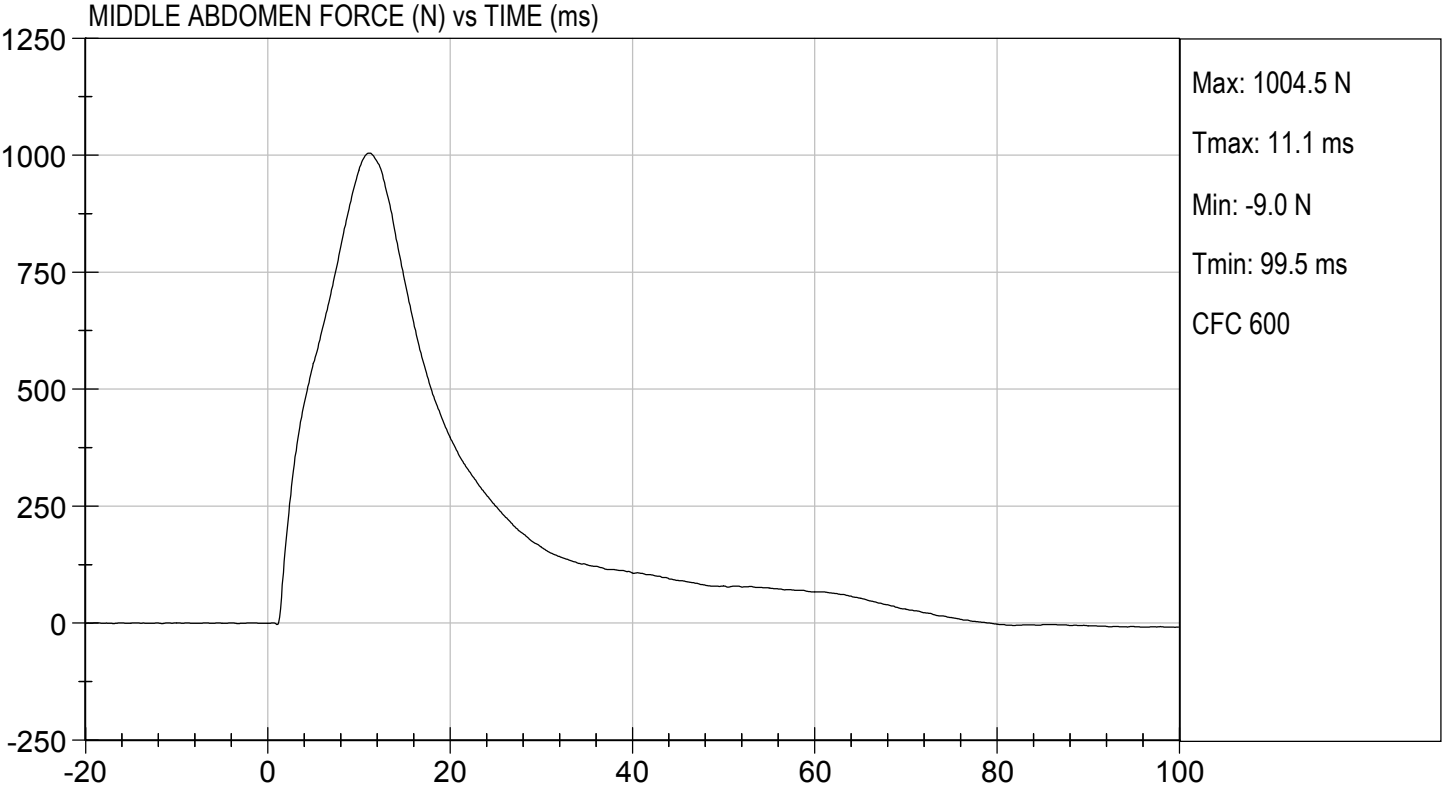
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 02/07/2019
TEST #: D190527

FRONT ABDOMEN FORCE (N) vs TIME (ms)



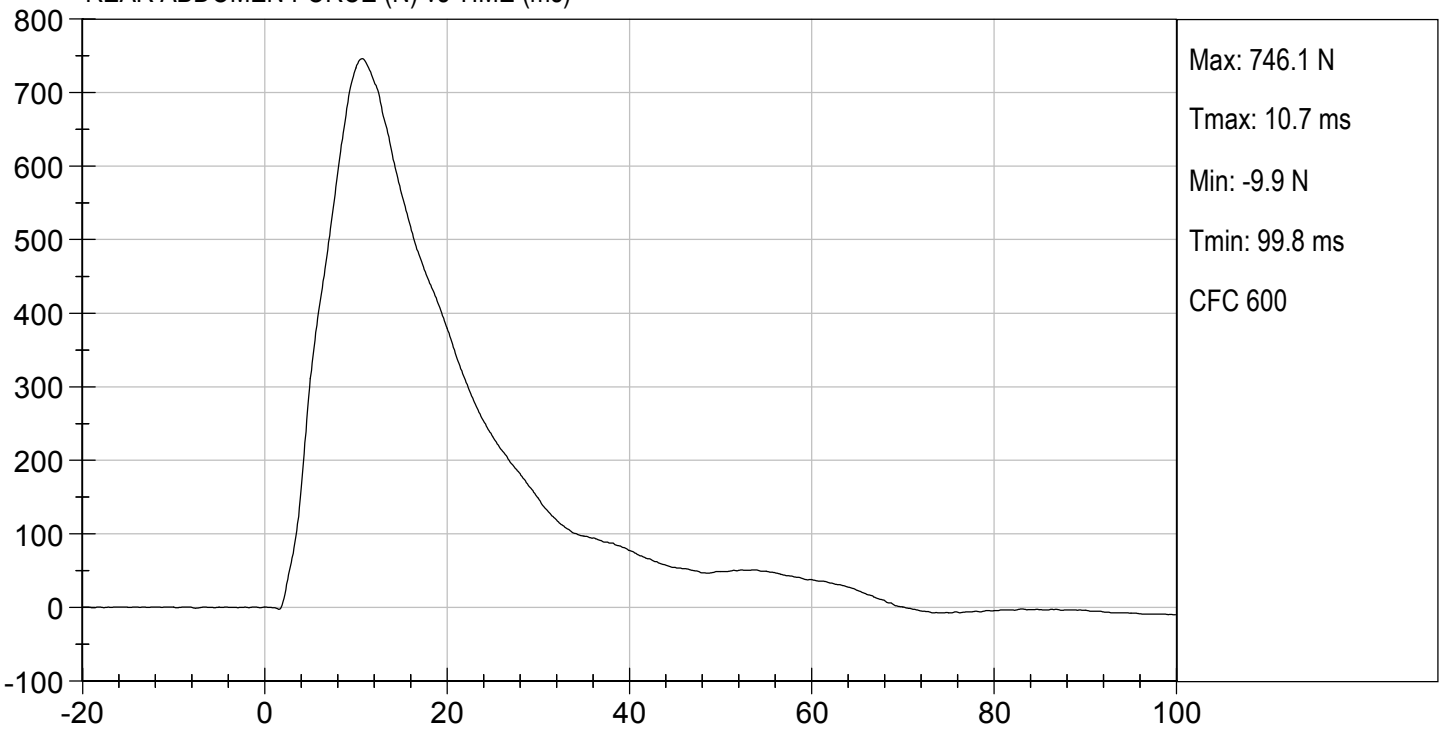
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 02/07/2019
TEST #: D190527

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190528

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.415	Pass
	27 ms	m/s	-6.50 to -5.80	-5.81	Pass
	30 ms	m/s	>= -6.50	-5.71	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.1	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
			Overall Results		Pass

Danielle Redinbaugh
Laboratory Technician

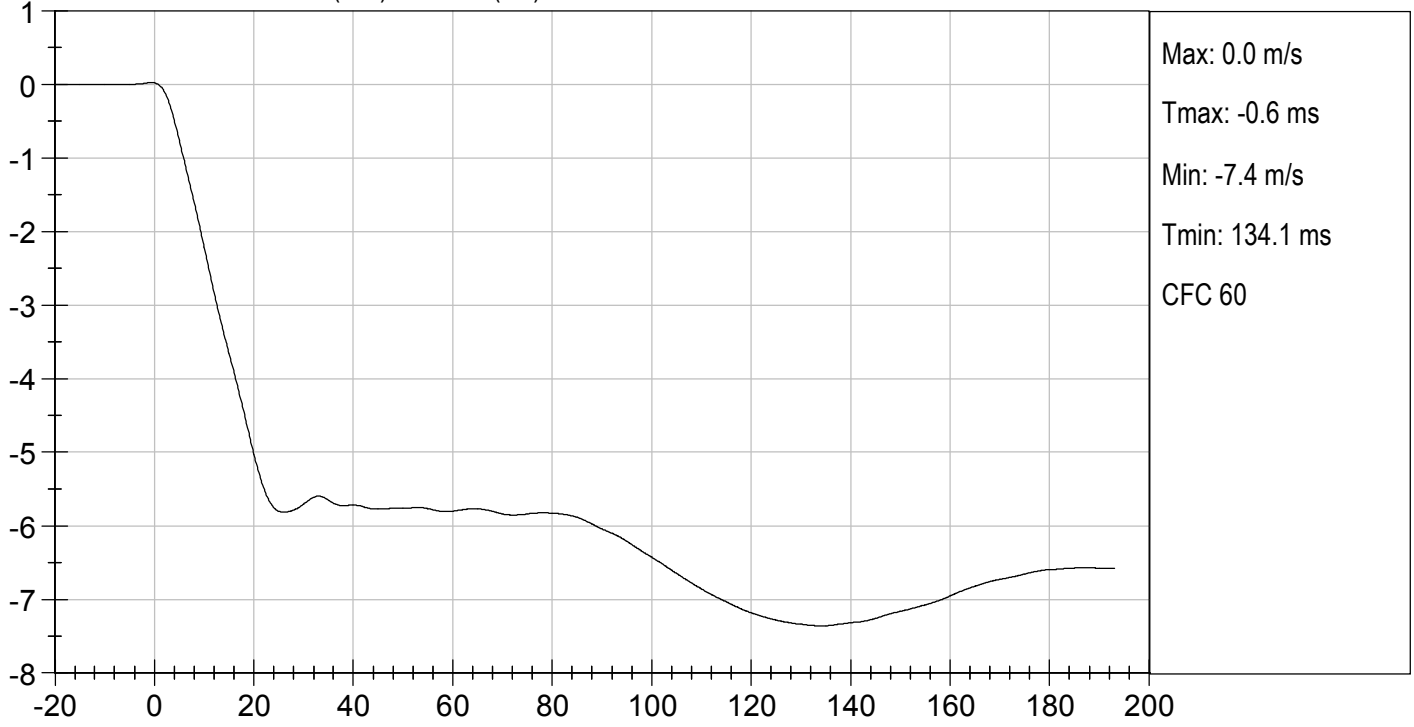
02/06/2019
Test Date

Robert Schnabel
Approved By

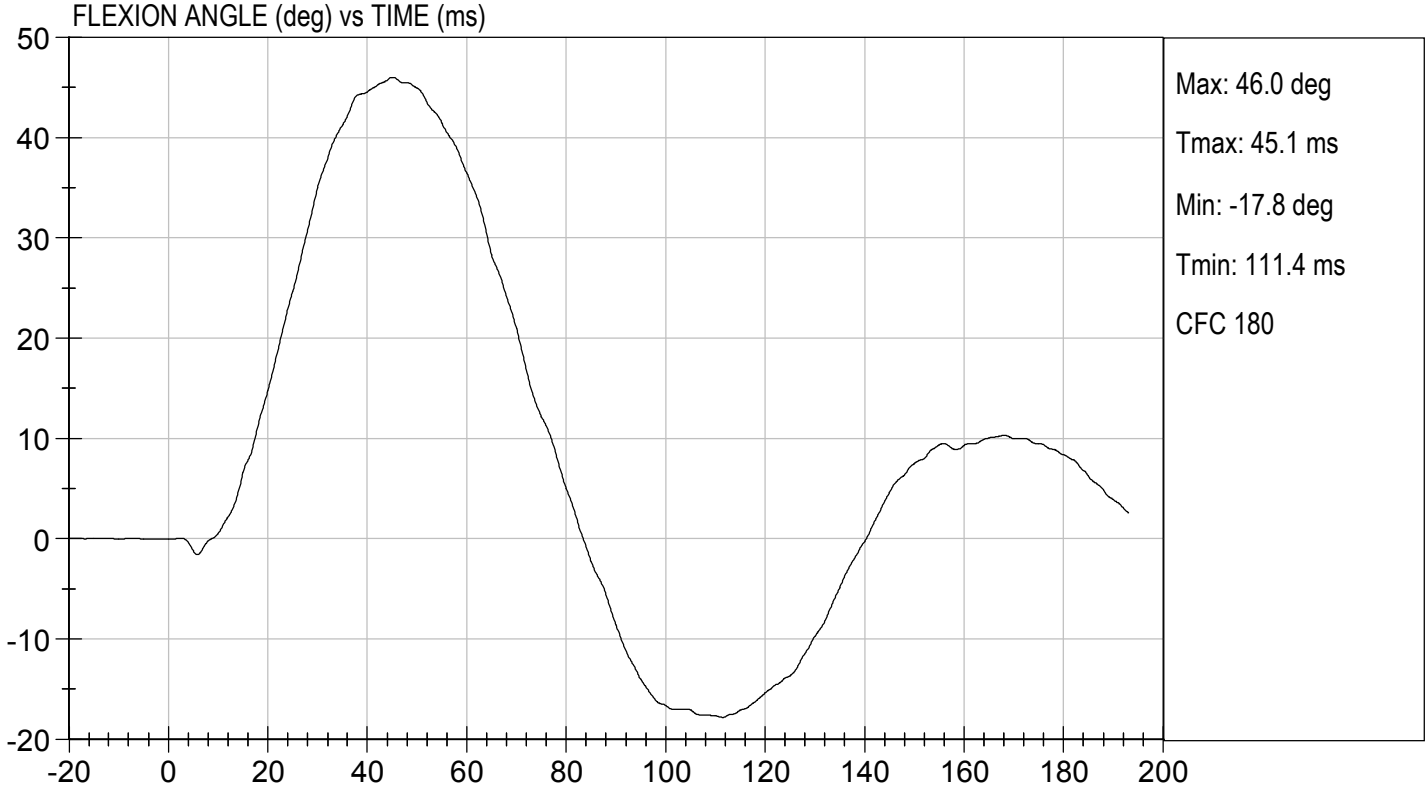
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 02/06/2019
TEST #: D190528

PENDULUM VELOCITY (m/s) vs TIME (ms)

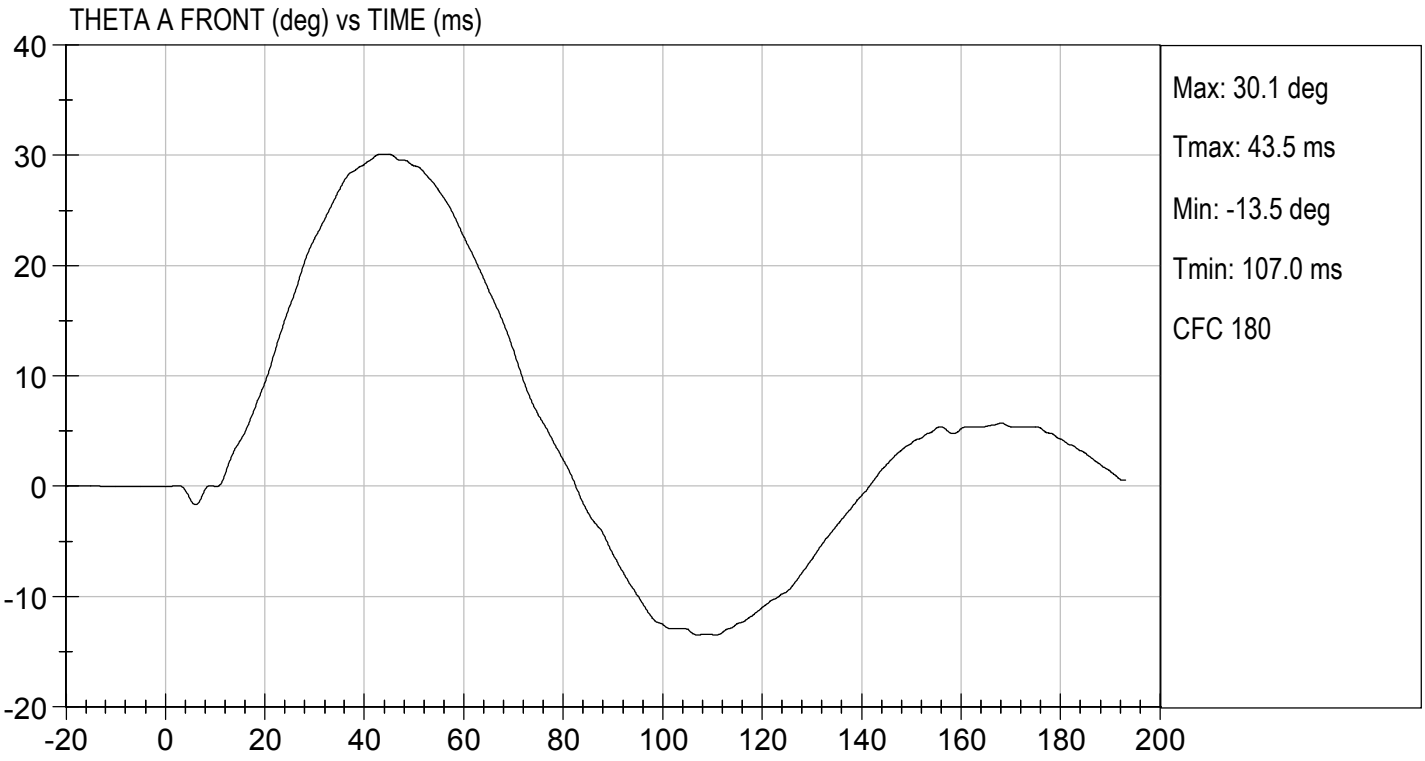


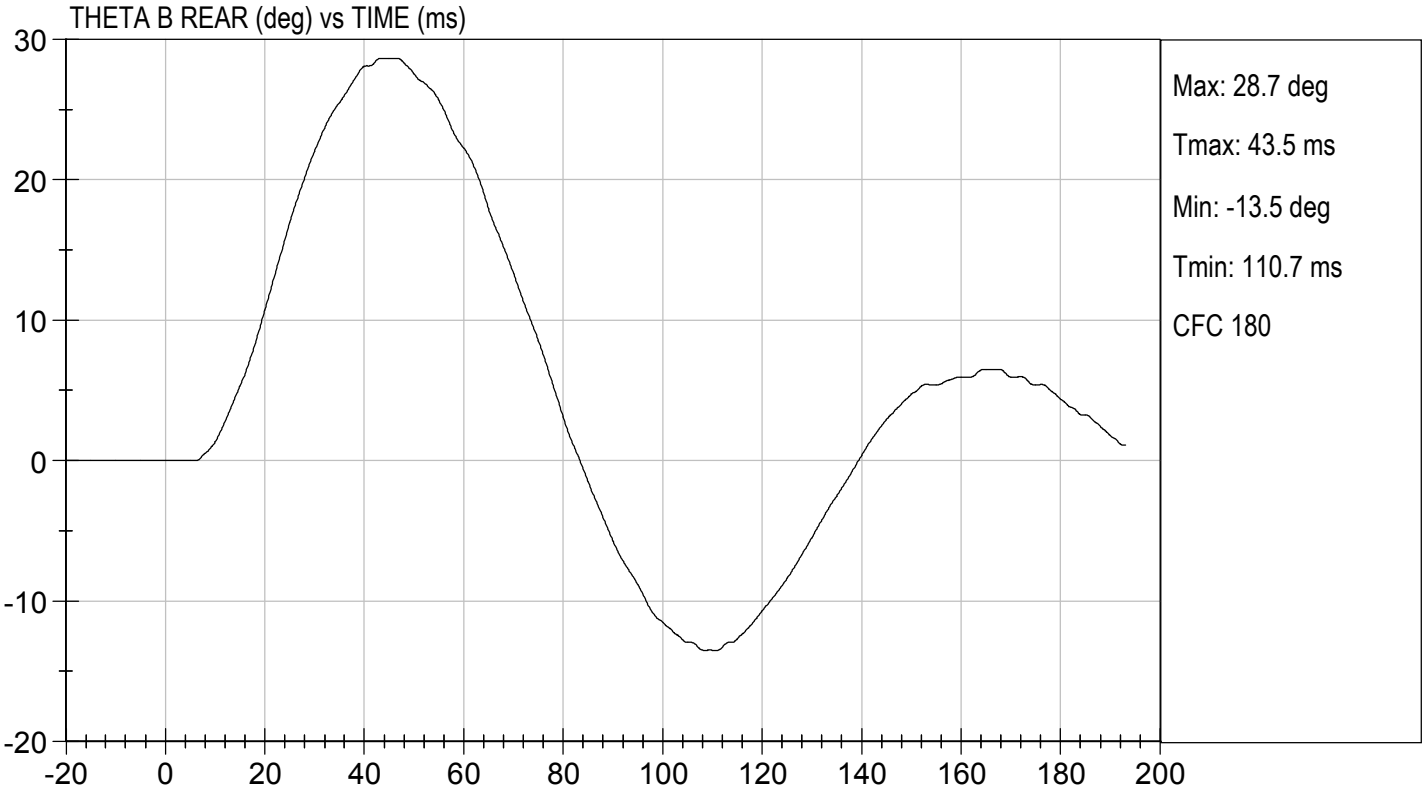
FLEXION ANGLE (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

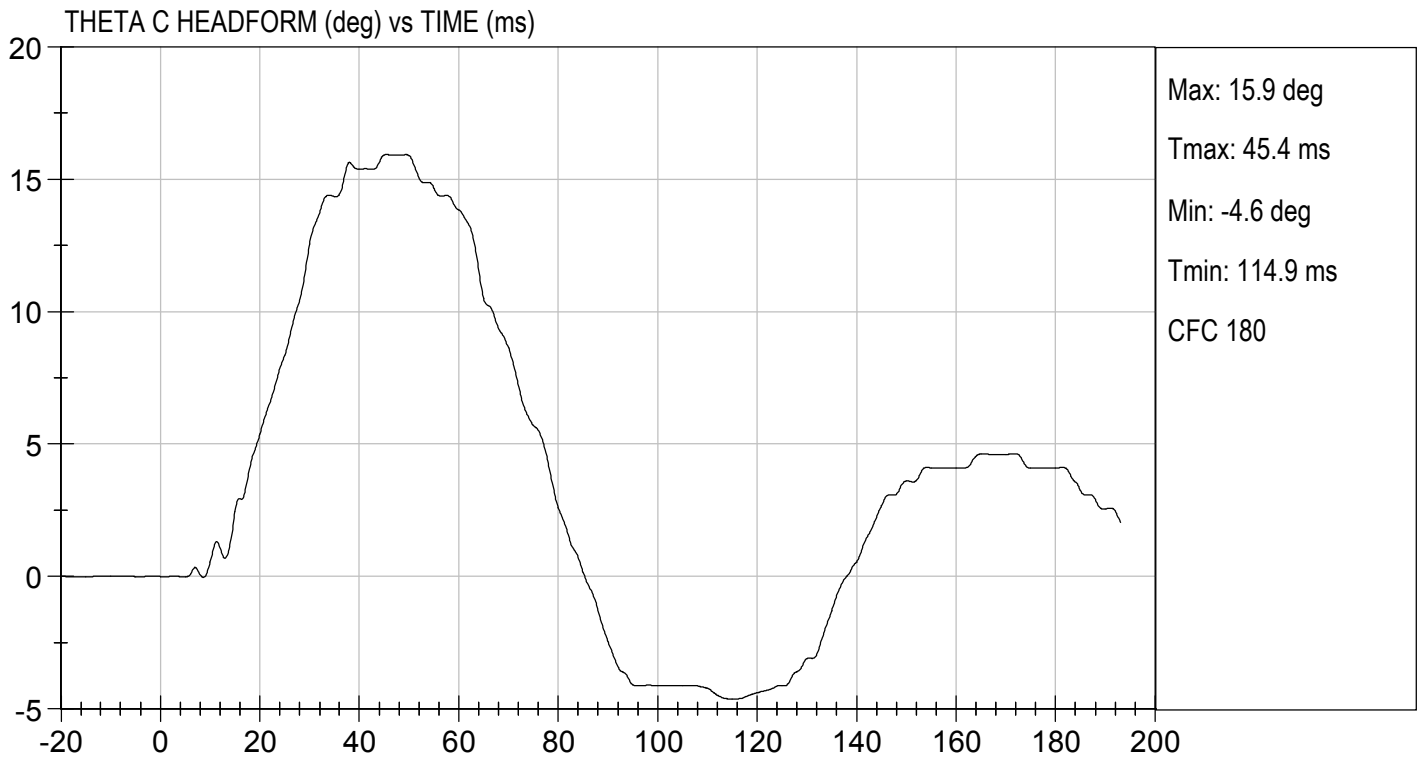
TEST DATE: 02/06/2019
TEST #: D190528





TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 02/06/2019
TEST #: D190528



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190529

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	4.20 to 4.40	4.39	Pass
Maximum Impactor Force	N	4700 to 5400	5317	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.6	Pass
Maximum Pubic Force	N	1230 to 1590	1372	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.7	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

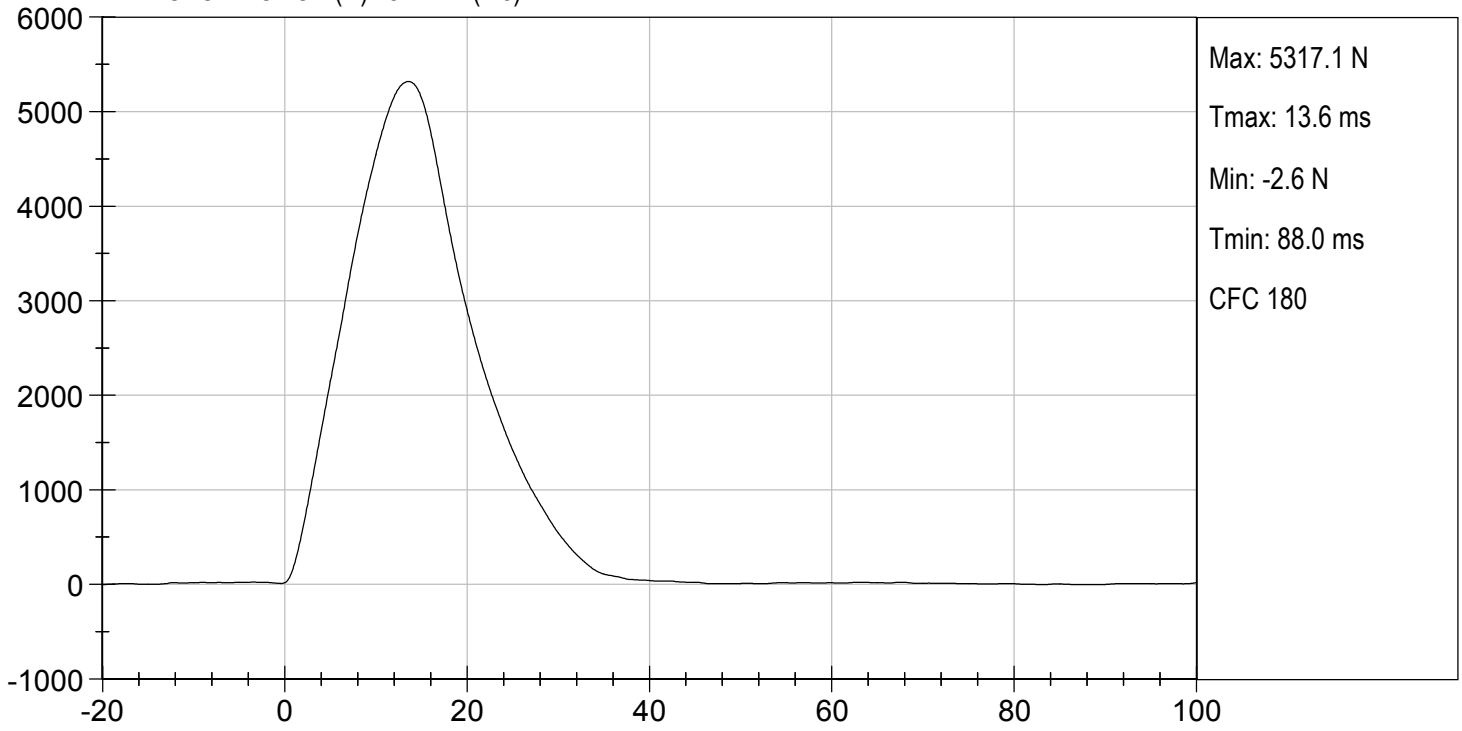
02/07/2019
Test Date

Robert Schmidt
Approved By

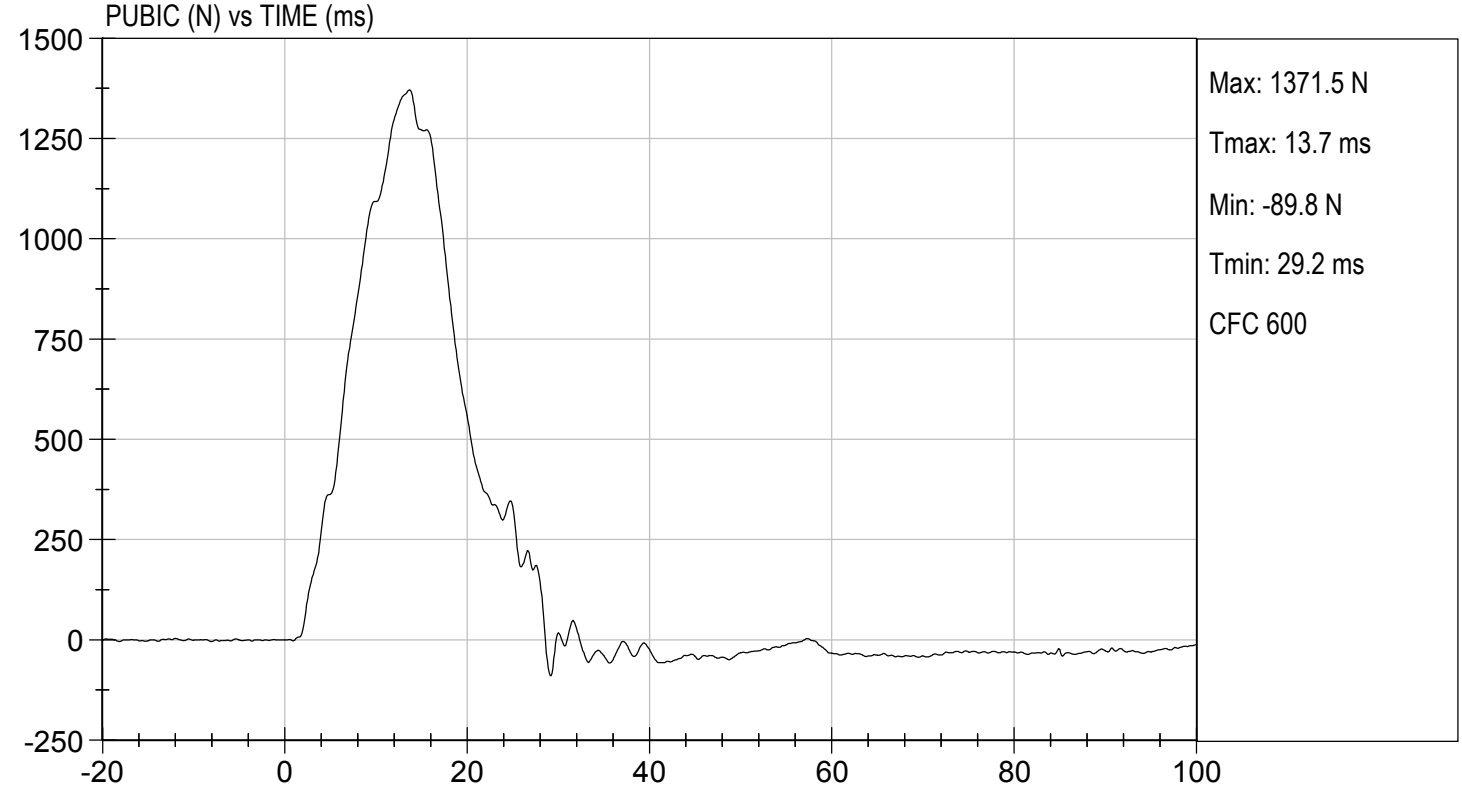
TEST DESC: PELVIS IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 02/07/2019
TEST #: D190529

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032 **Test I.D:** D190520

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	5.40 to 5.60	5.41	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5736	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.7	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.4	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

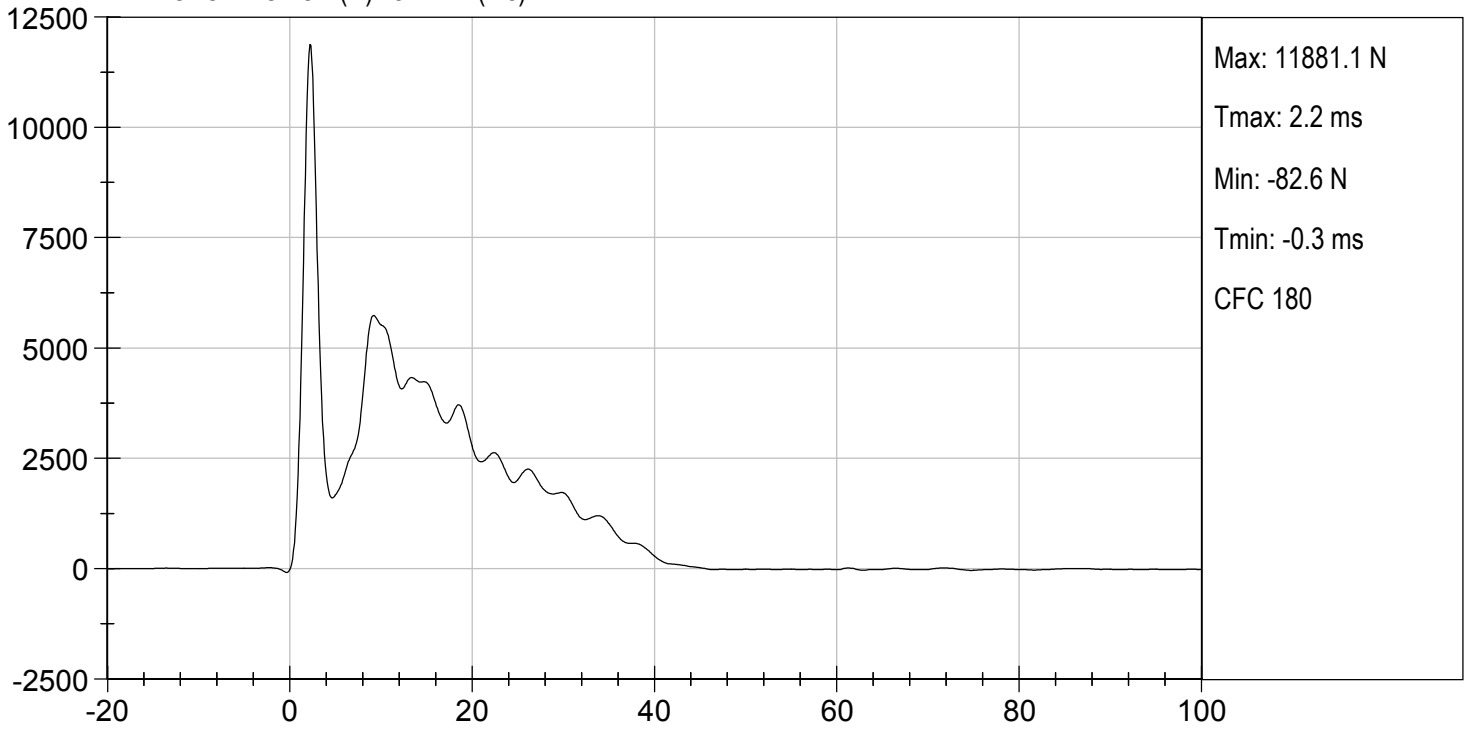
02/07/2019
Test Date

Robert Schmidt
Approved By

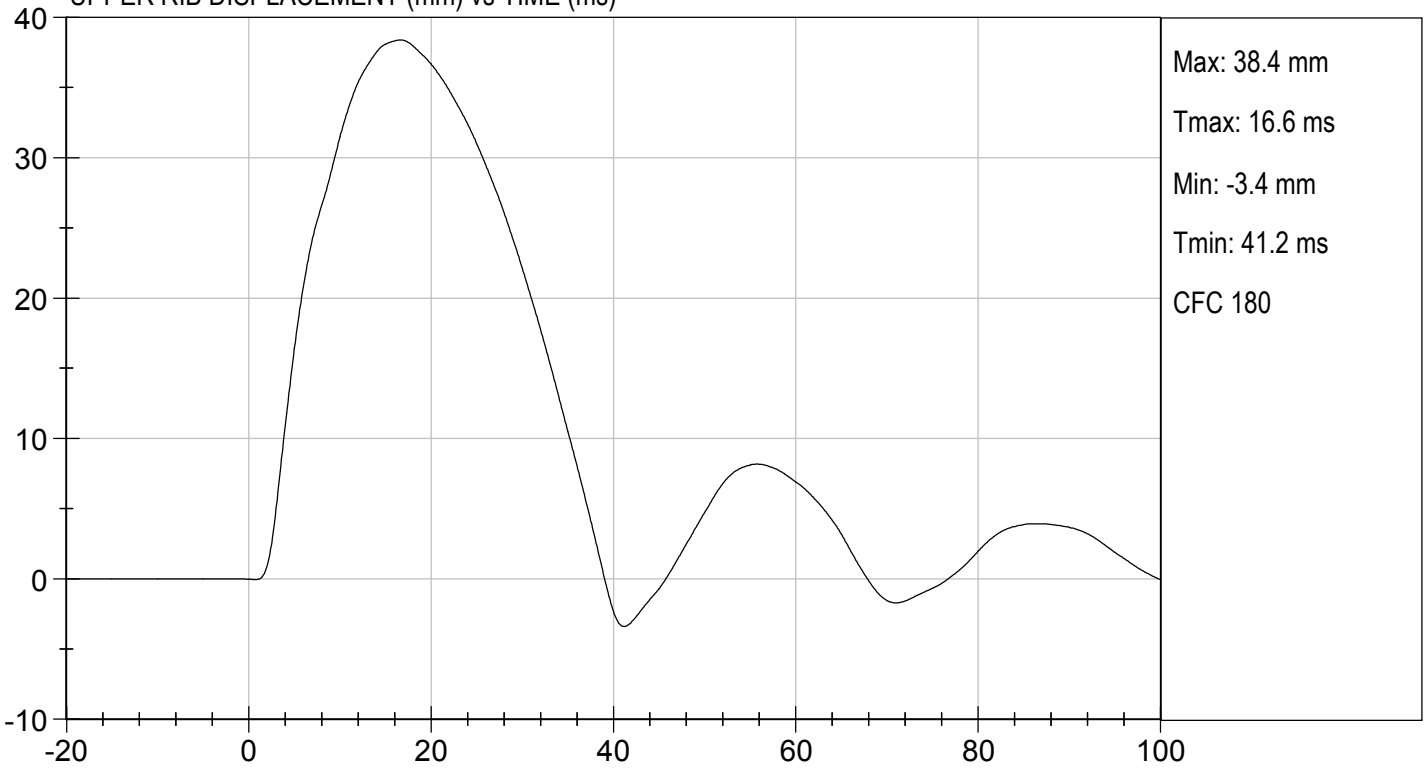
TEST DESC: THORAX IMPACT
VELOCITY: 17.75 ft/s, 5.41 m/s

TEST DATE: 02/07/2019
TEST #: D190520

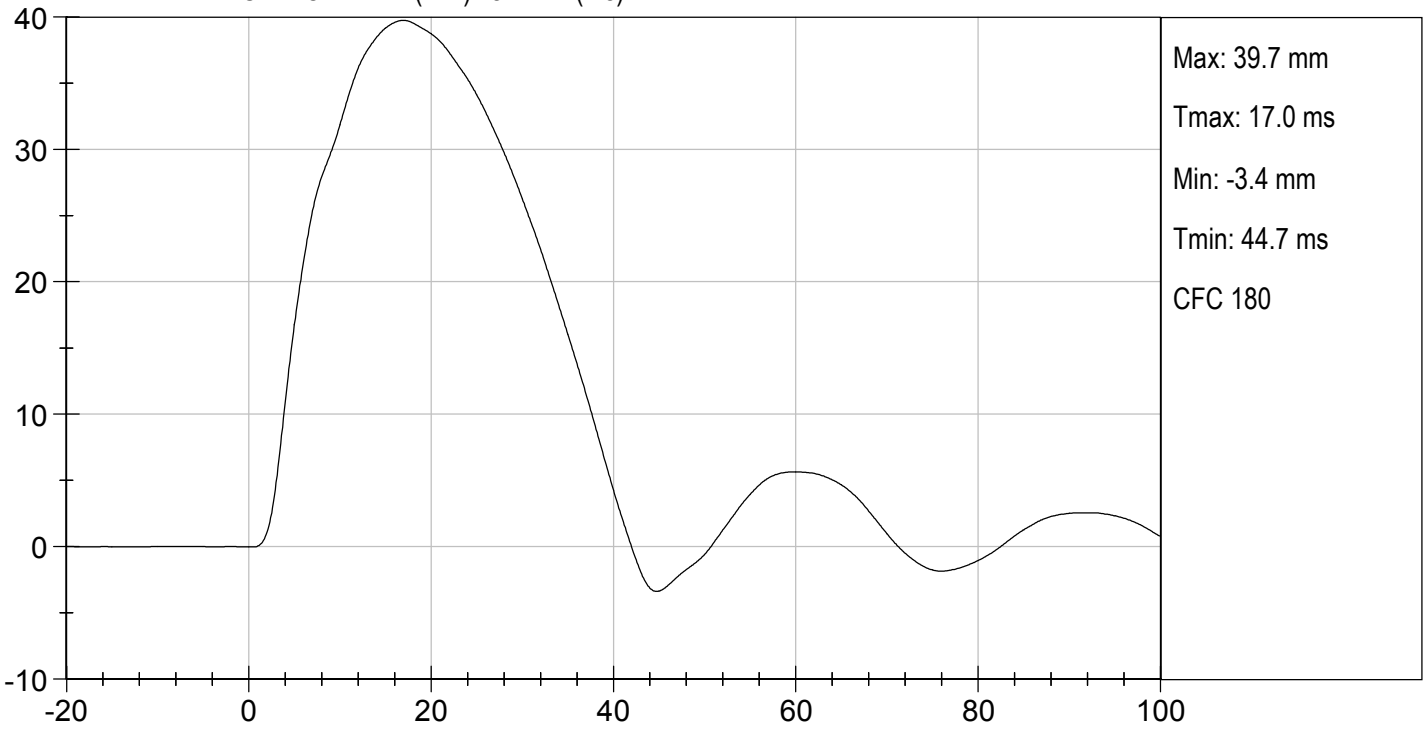
IMPACTOR FORCE (N) vs TIME (ms)



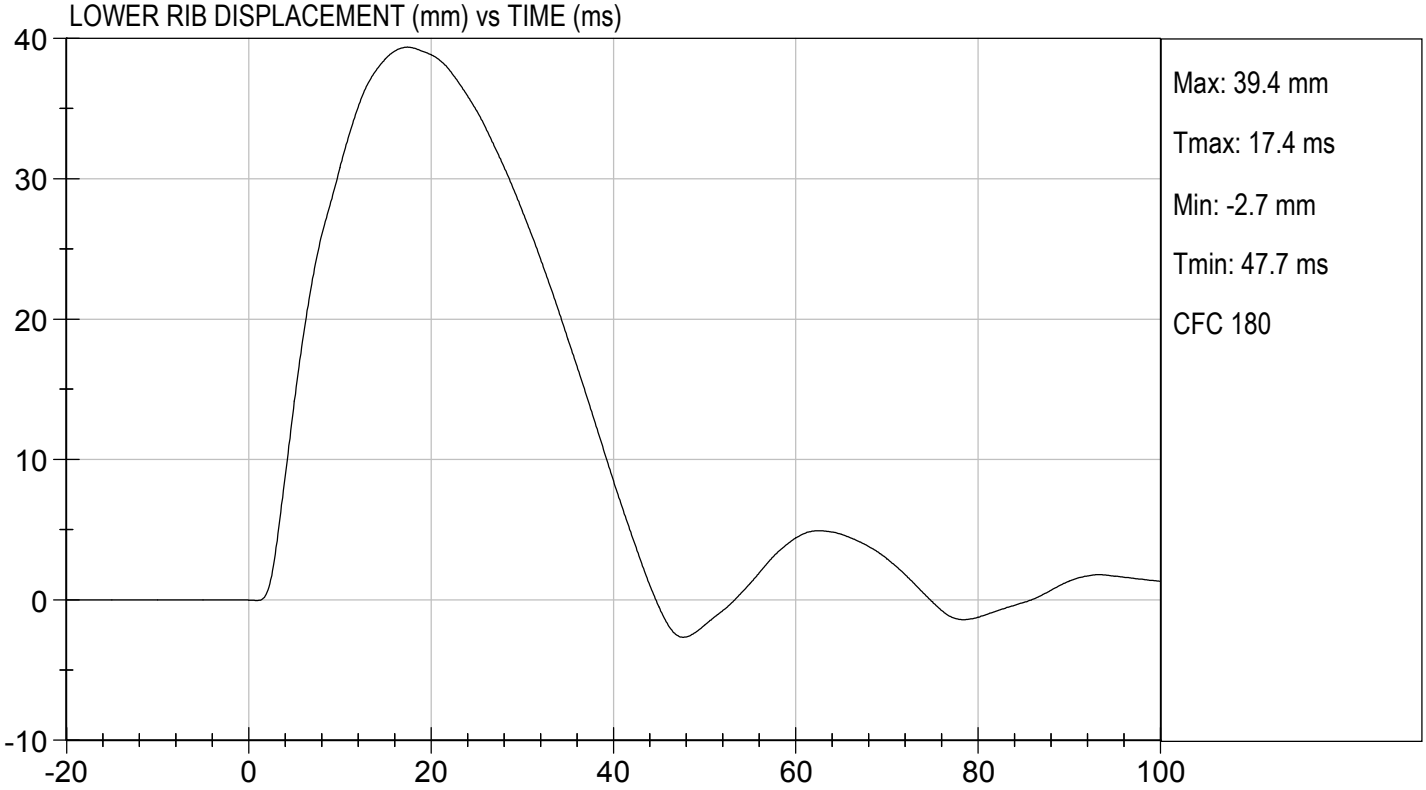
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148	141	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	182	Pass
J	Head Circumference	541 - 551	550	Pass
K	Buttock to Knee Length	514 - 540	538	Pass
L	Popliteal Height	343 - 369	349	Pass
M	Knee Pivot to Floor Height	392 - 409	394	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	198	Pass
P	Foot Length	216 - 232	222	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	317	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	483	Pass
V	Shoulder Width	341 - 357	351	Pass
W	Foot Width	78 - 94	82	Pass
Y	Chest Circumference w/ jacket	851 - 881	863	Pass
Z	Waist Circumference	761 - 791	782	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D190411

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Peak Resultant Acceleration	G's	115 to 137	127	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

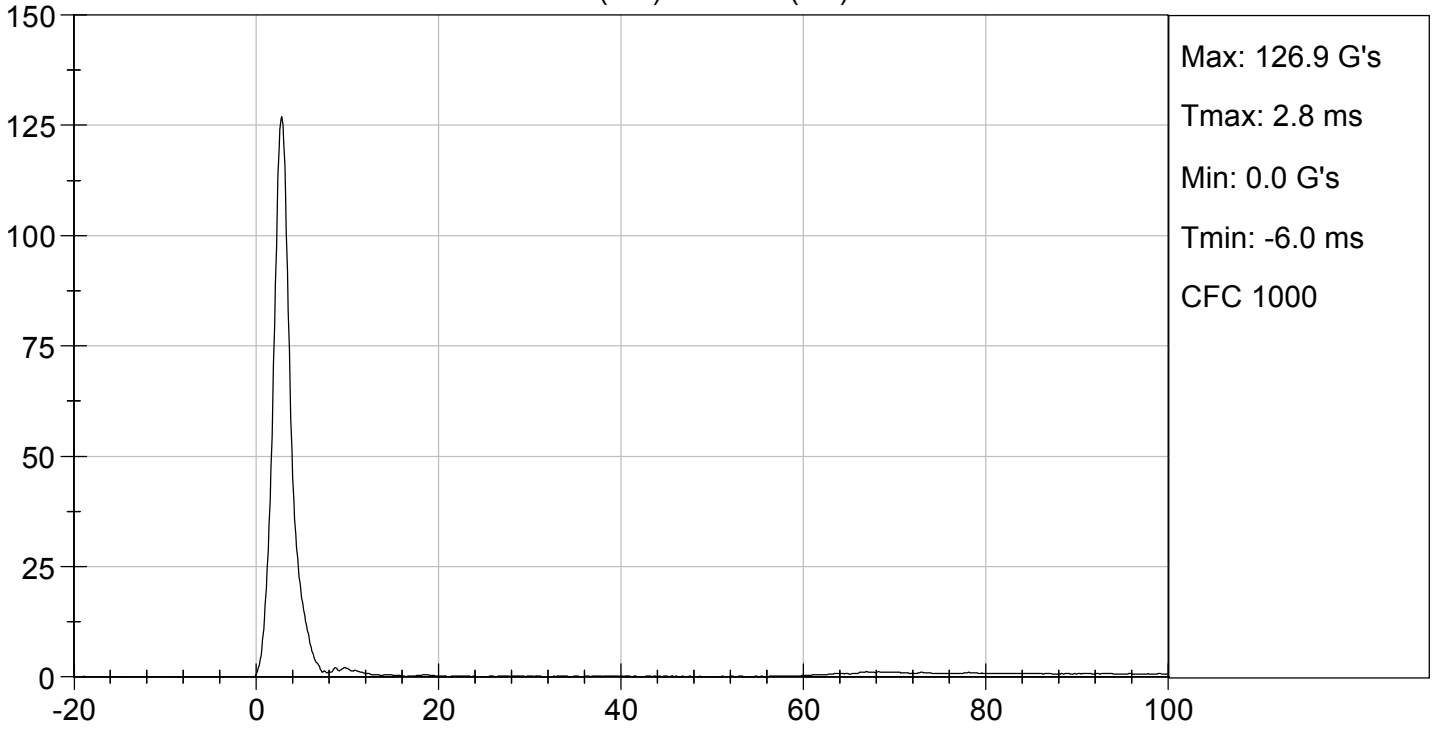
01/31/2019
Test Date

Robert Schmidt
Approved By

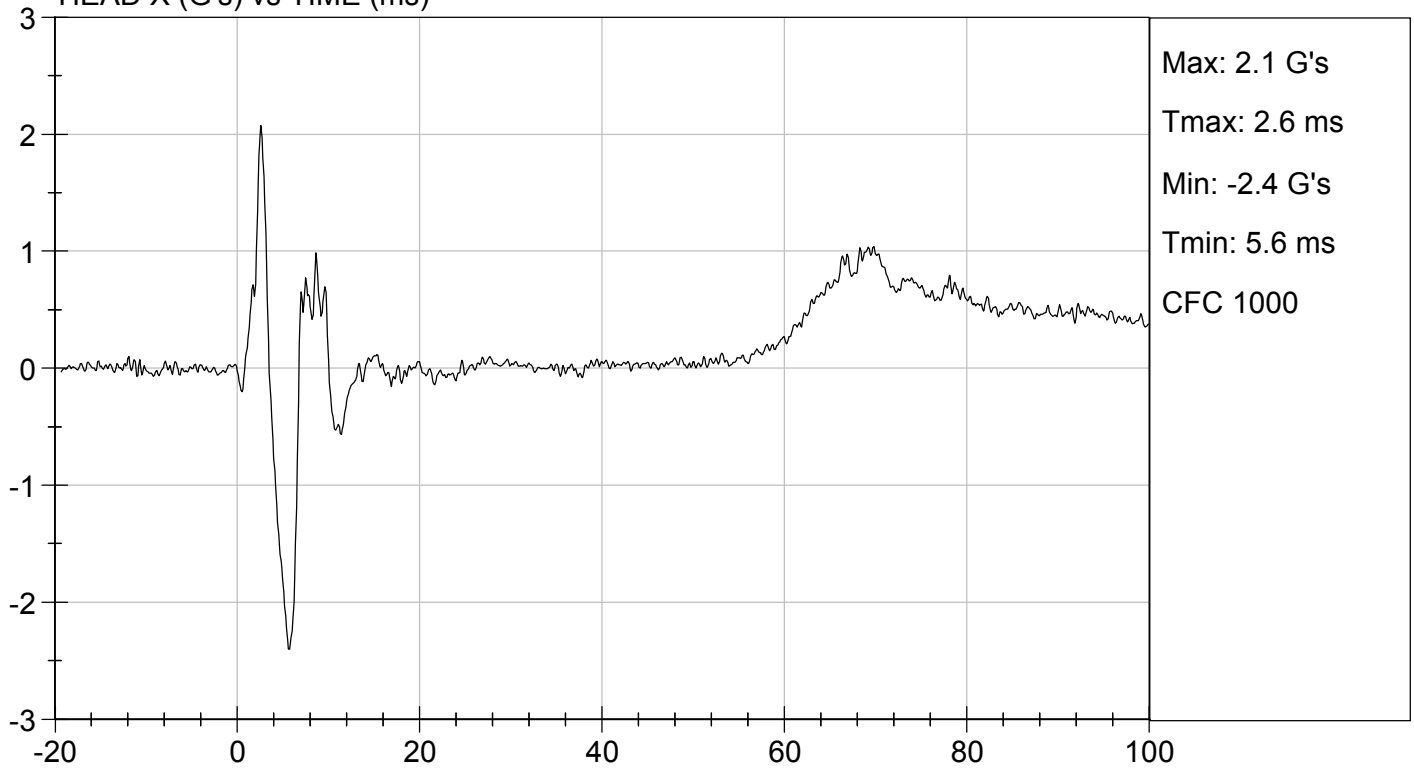
TEST DESC: HEAD DROP

TEST DATE: 01/31/2019
TEST #: D190411

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)

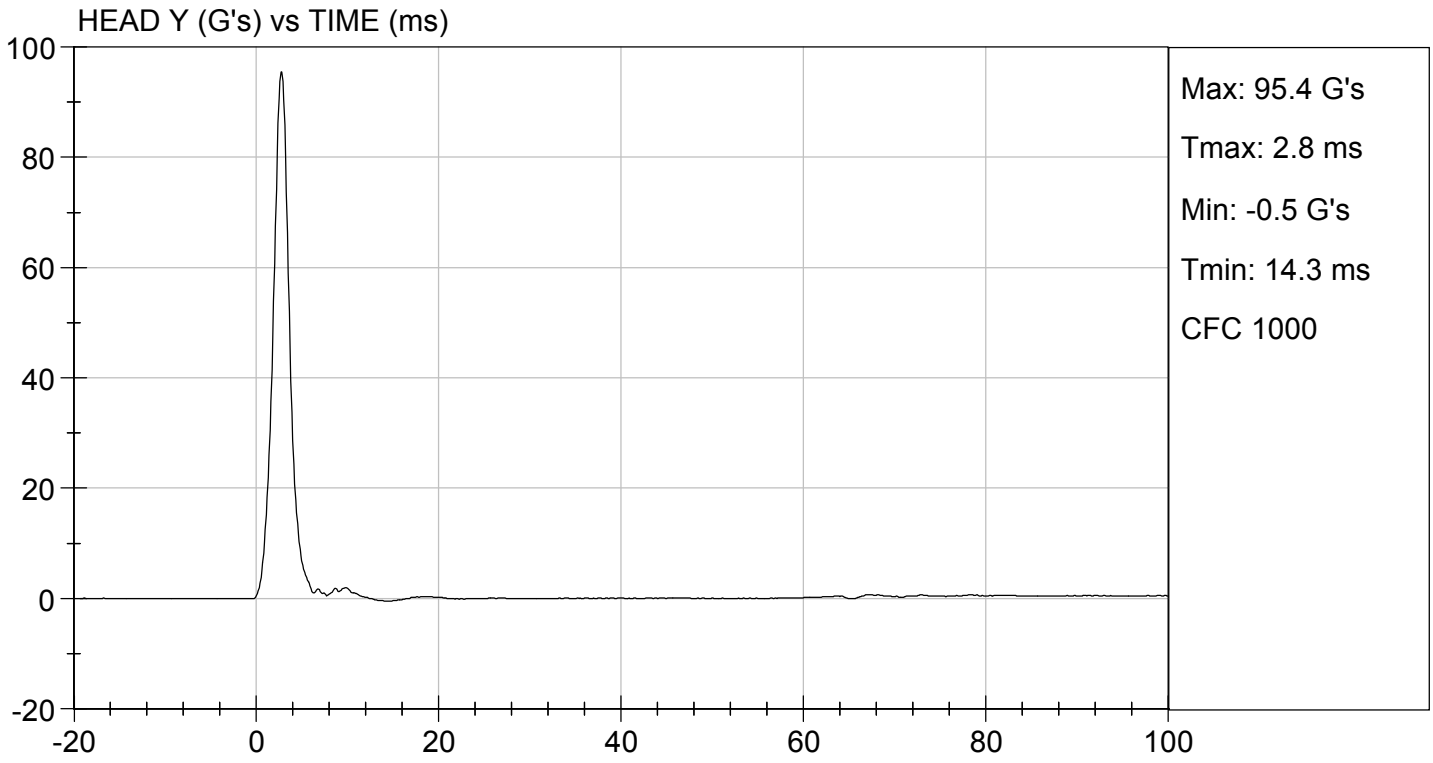


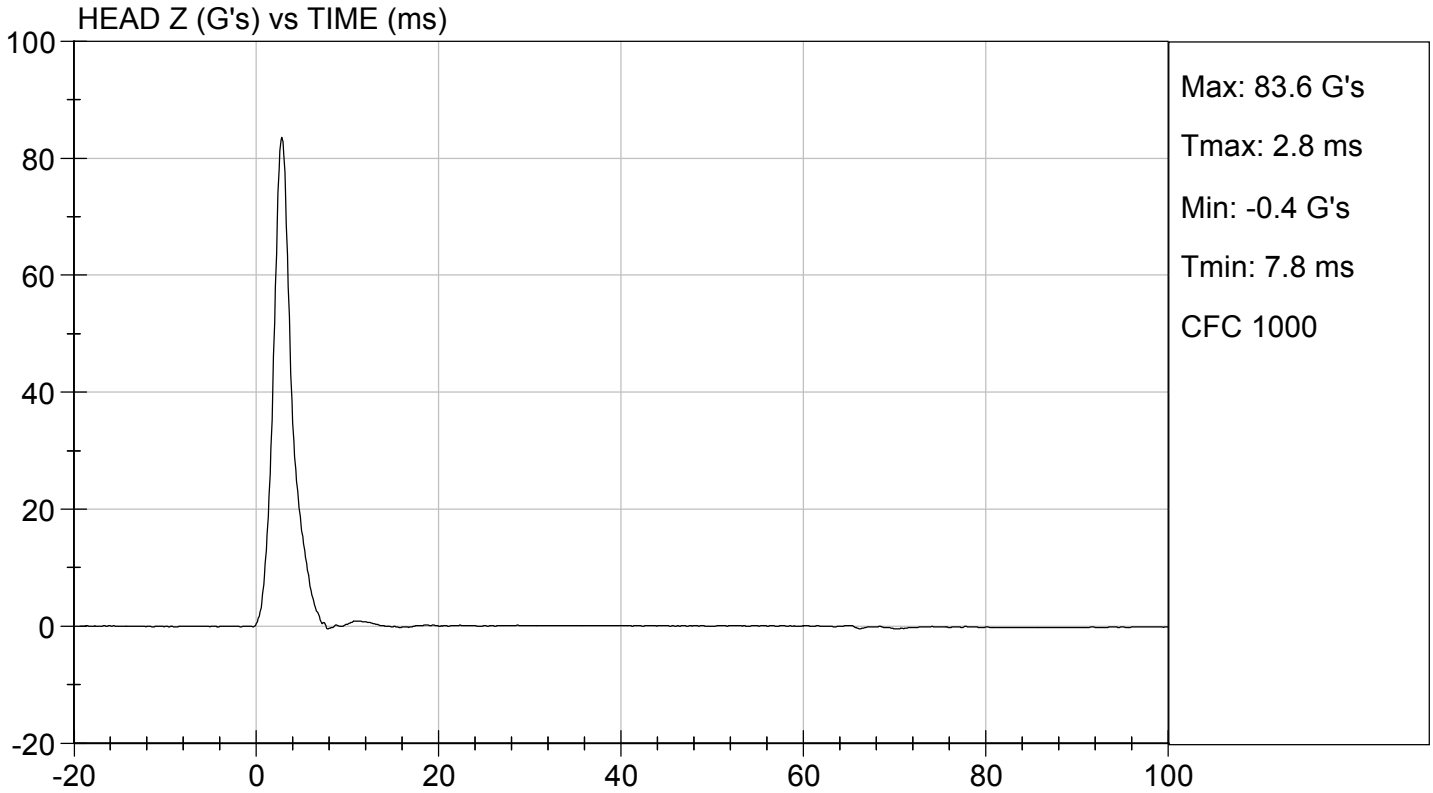
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/31/2019
TEST #: D190411





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190412

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.7	Pass
Humidity		%	10 to 70	13	Pass
Impact Velocity		m/s	5.51 to 5.63	5.61	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.47	Pass
	15 ms	m/s	3.30 to 4.10	3.57	Pass
	20 ms	m/s	4.40 to 5.40	4.99	Pass
	25 ms	m/s	5.40 to 6.10	5.68	Pass
	25-100 ms	m/s	5.50 to 6.20	5.68	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	59	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	109	Pass
			Overall Test Results		Pass

Danielle Redinbaugh

Laboratory Technician

01/31/2019

Test Date

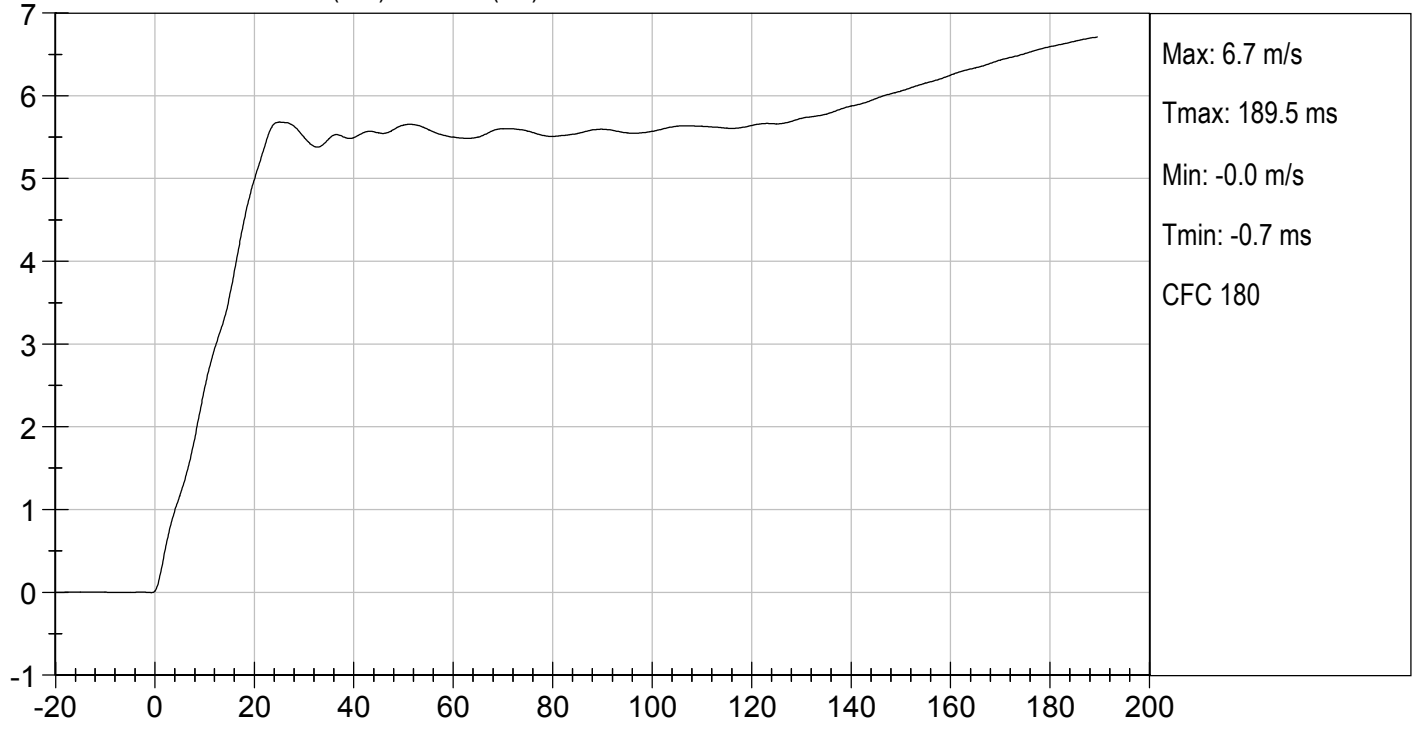
Robert Schmidt

Approved By

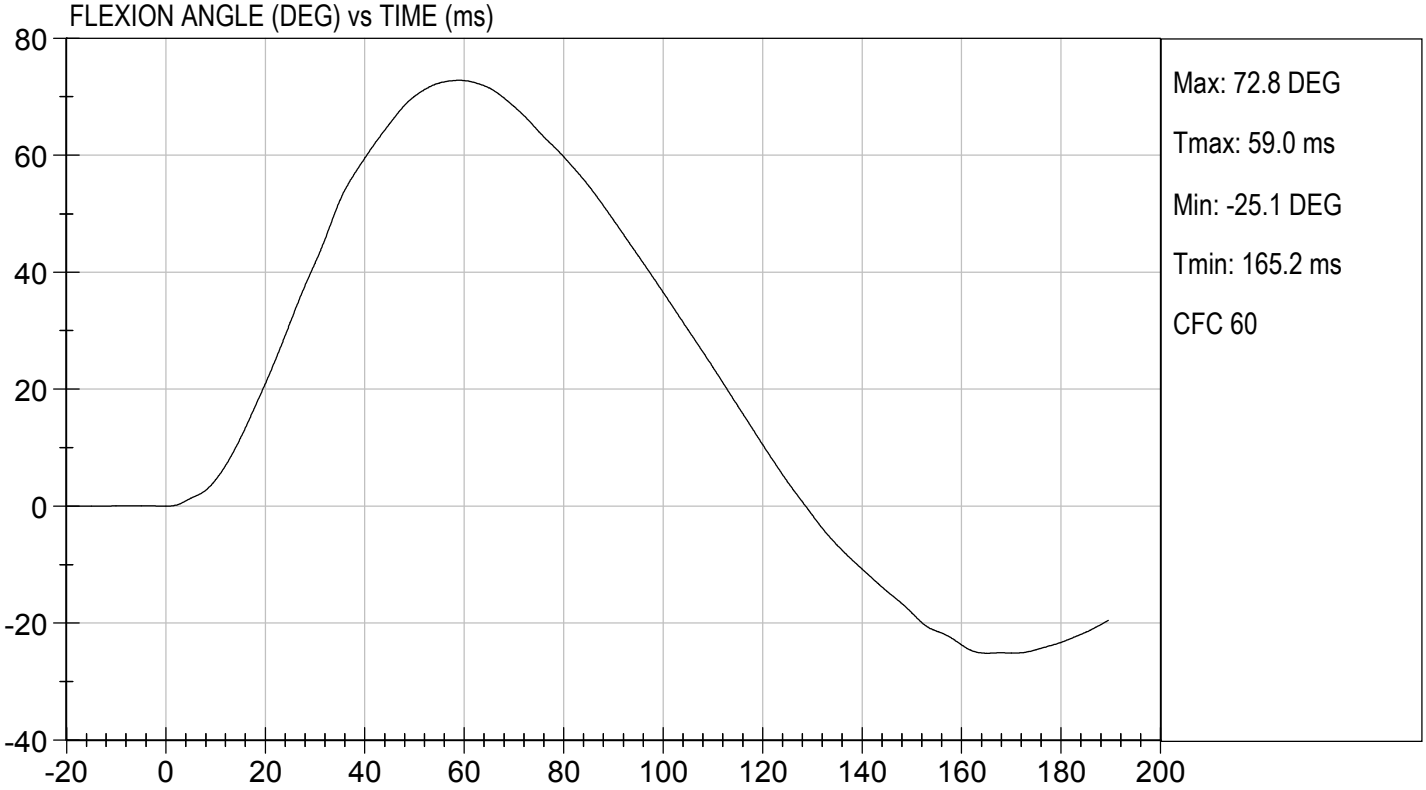
TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 01/31/2019
TEST #: D190412

PENDULUM VELOCITY (m/s) vs TIME (ms)

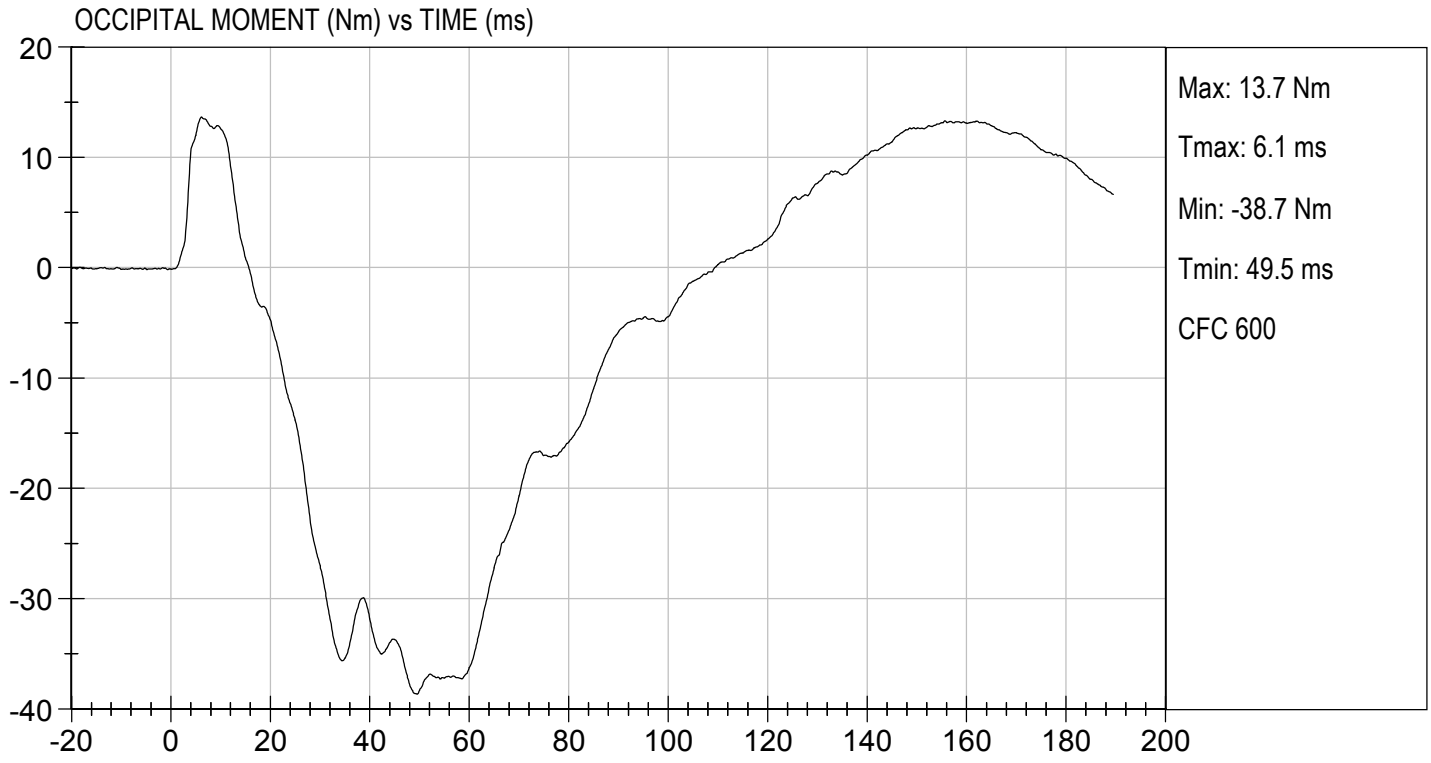


FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 01/31/2019
TEST #: D190412



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D190413

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	22	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

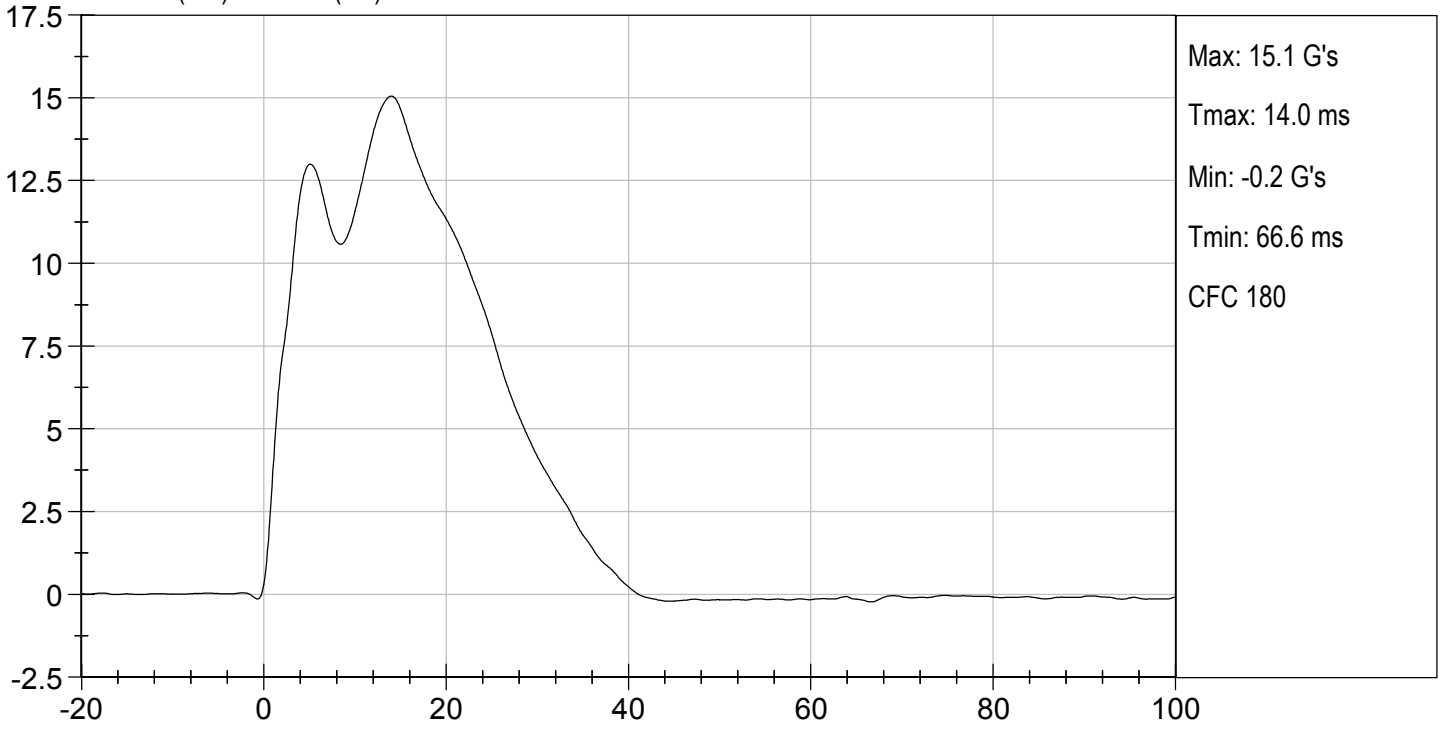
01/31/2019
Test Date

Robert Schmalz
Approved By

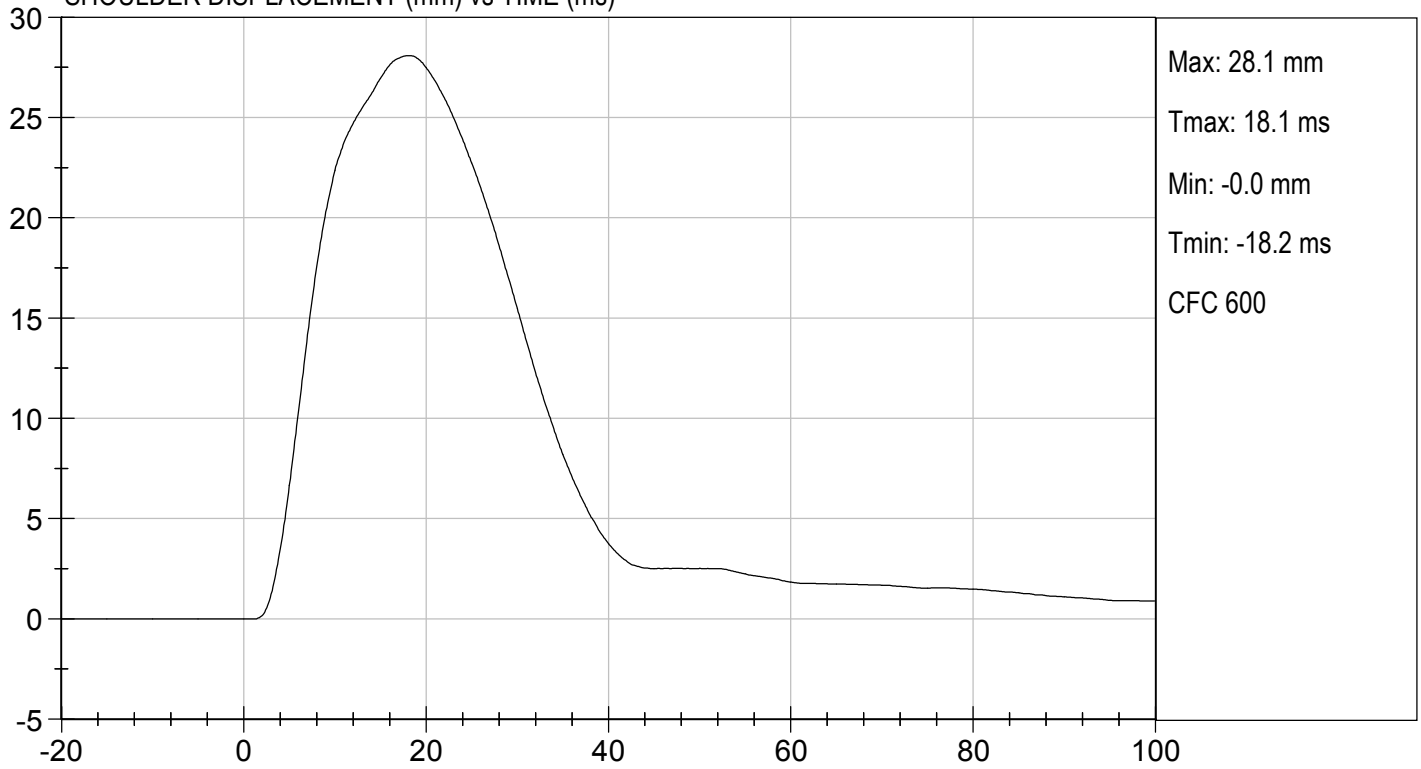
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190413

PROBE (G's) vs TIME (ms)

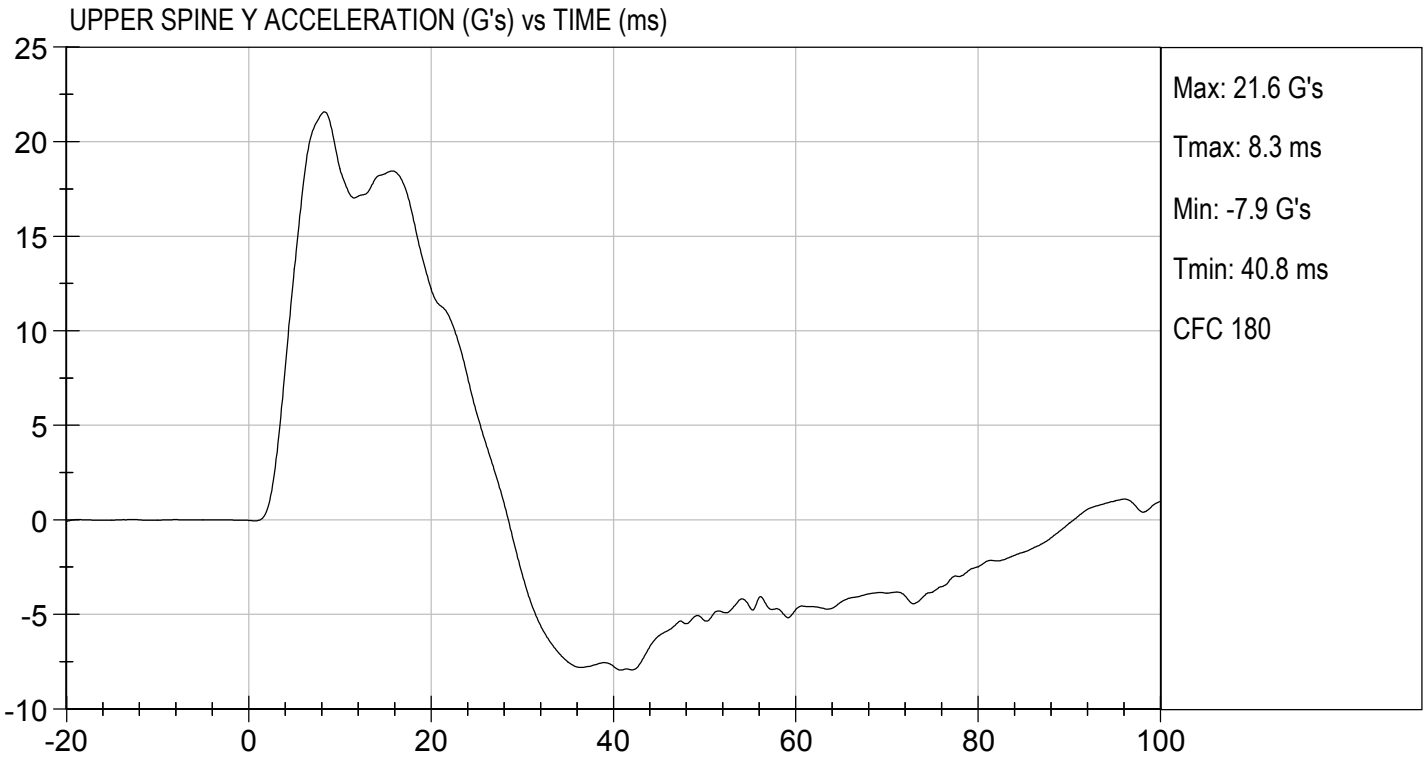


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190413



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190414

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	41	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

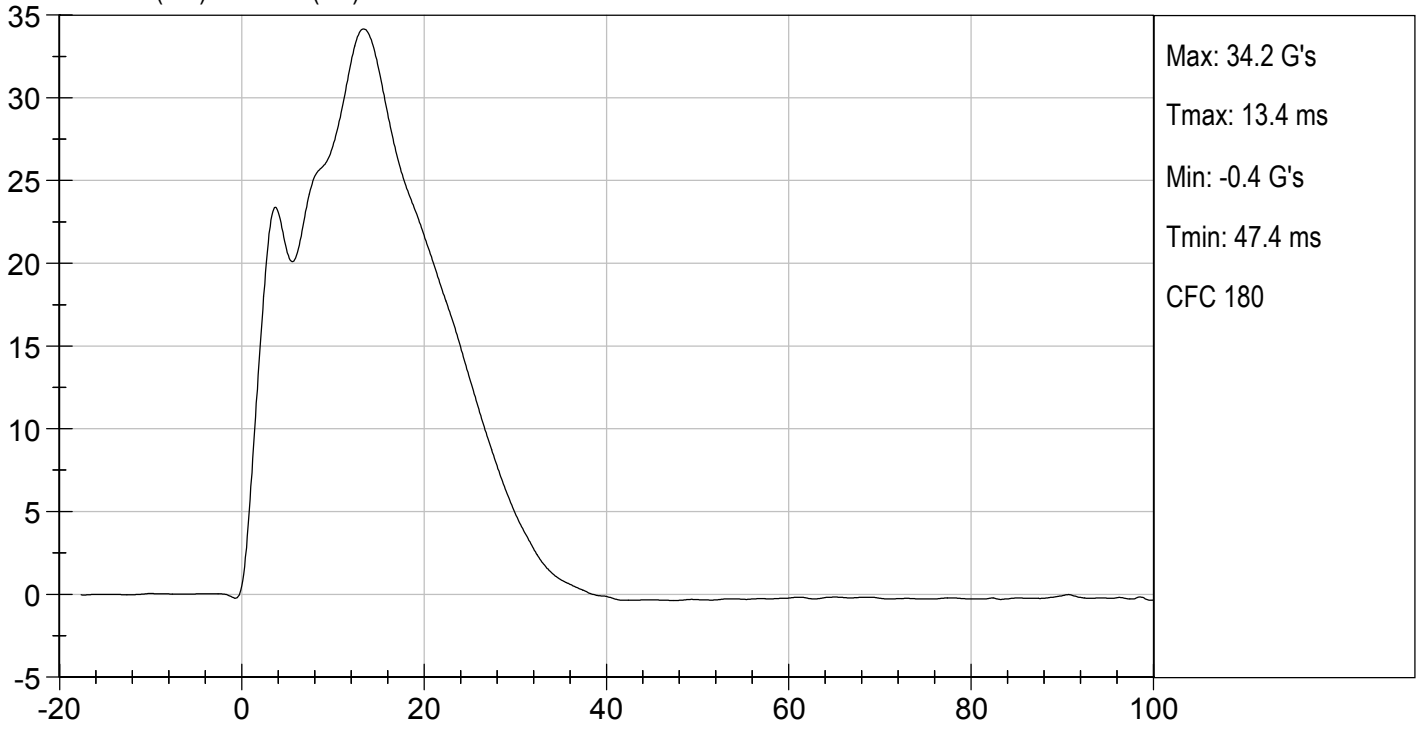
01/31/2019
Test Date

Robert Schmidt
Approved By

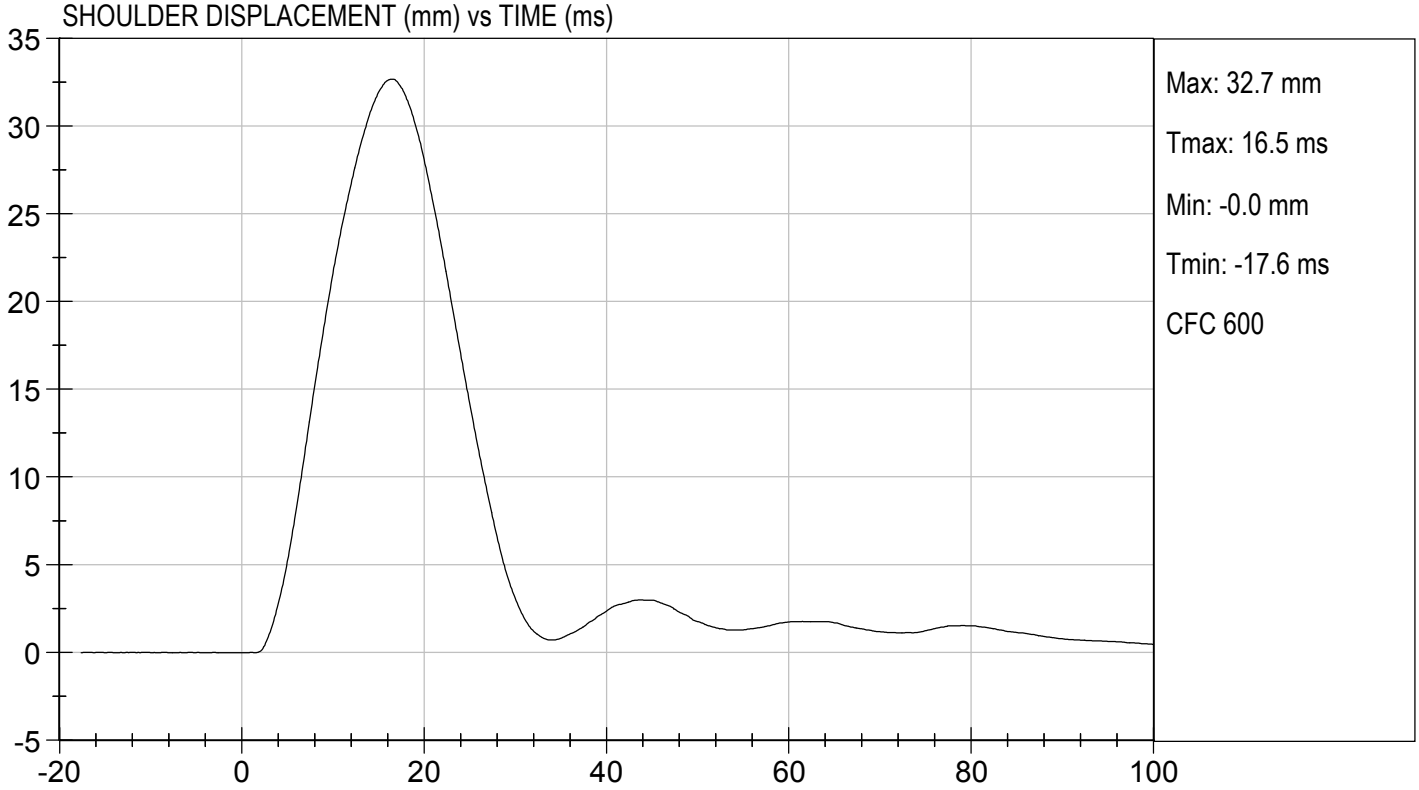
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/31/2019
TEST #: D190414

PROBE (G's) vs TIME (ms)



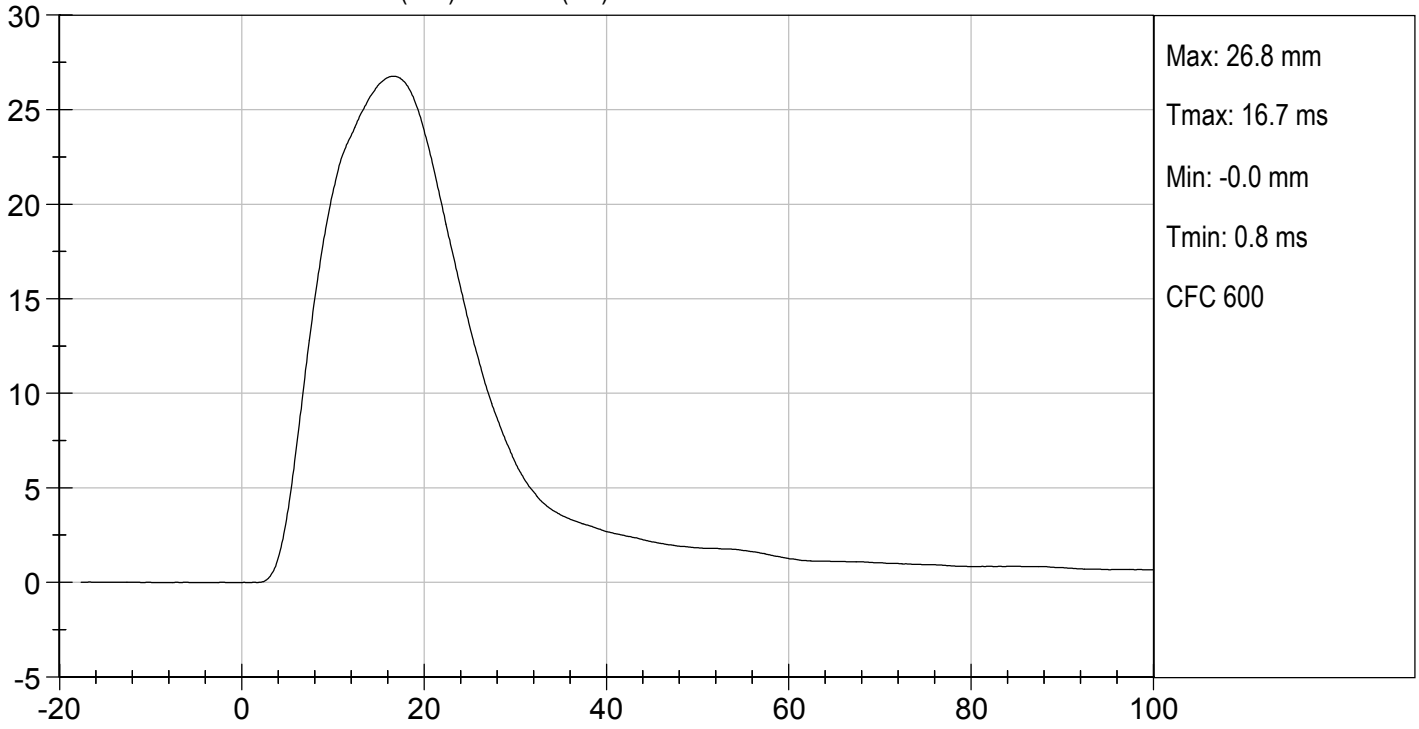
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



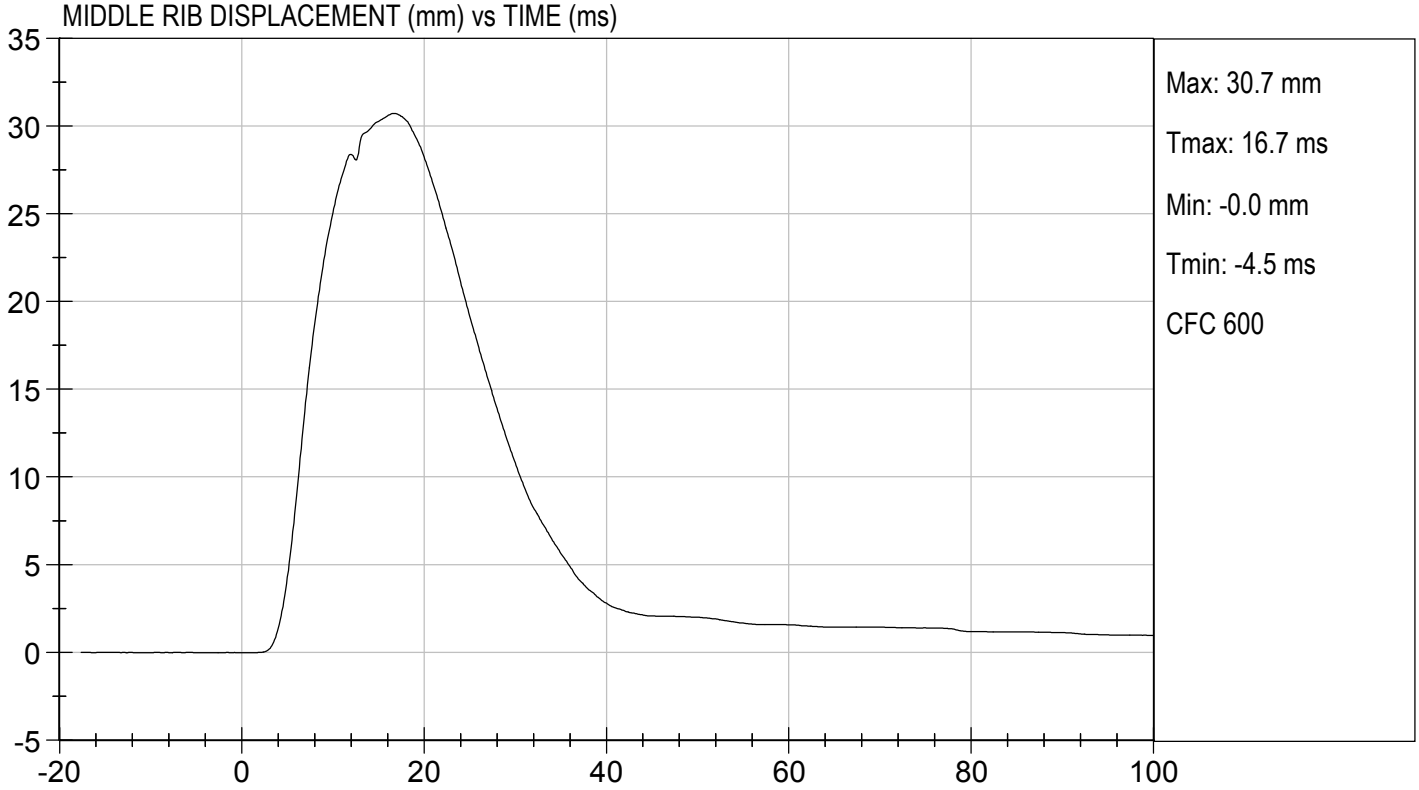
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/31/2019
TEST #: D190414

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



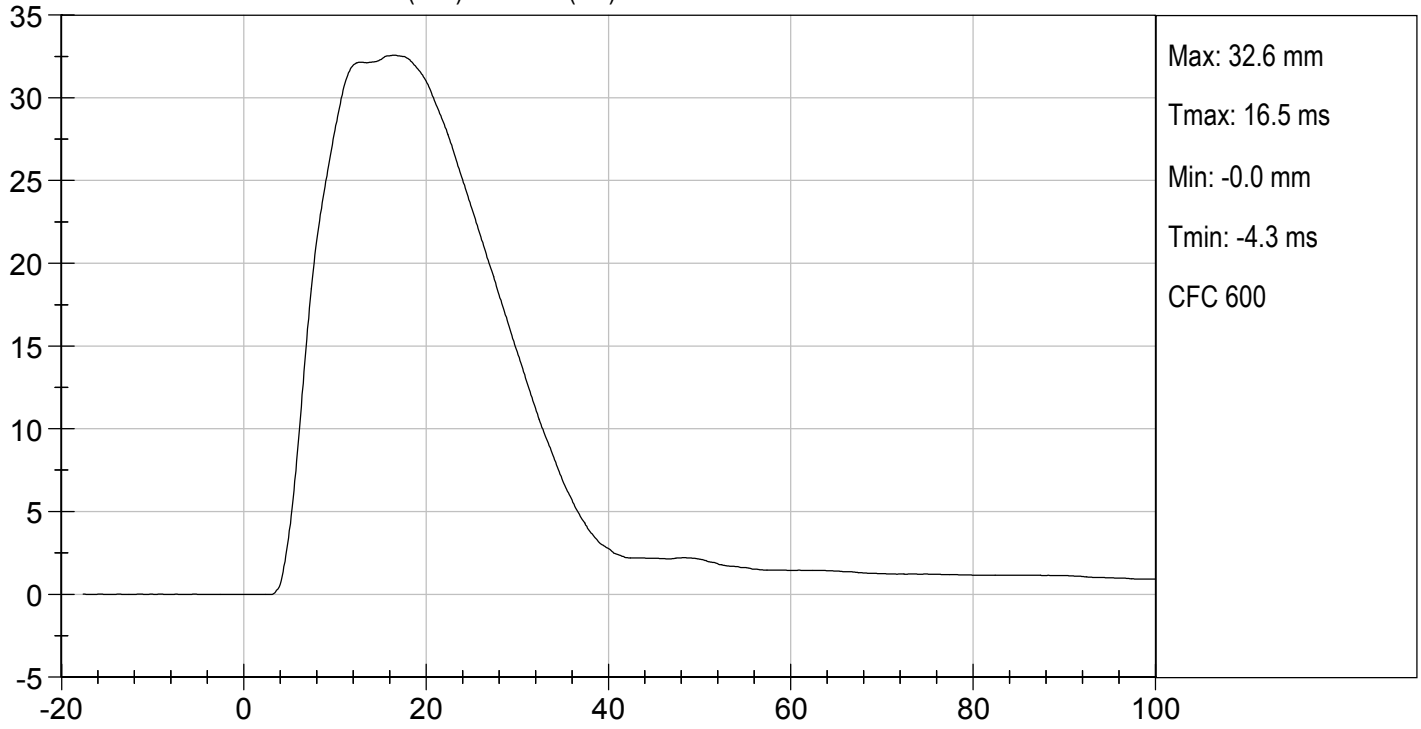
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



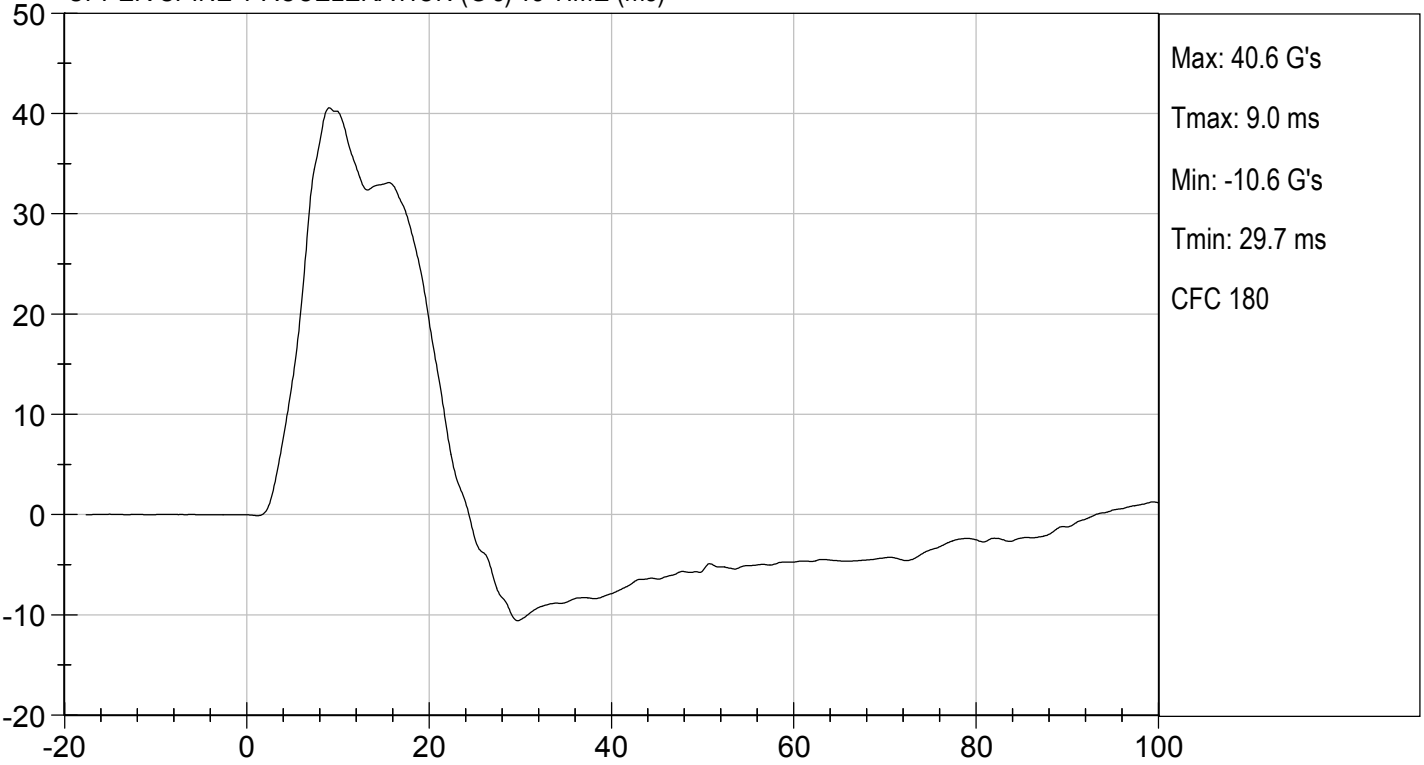
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/31/2019
TEST #: D190414

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



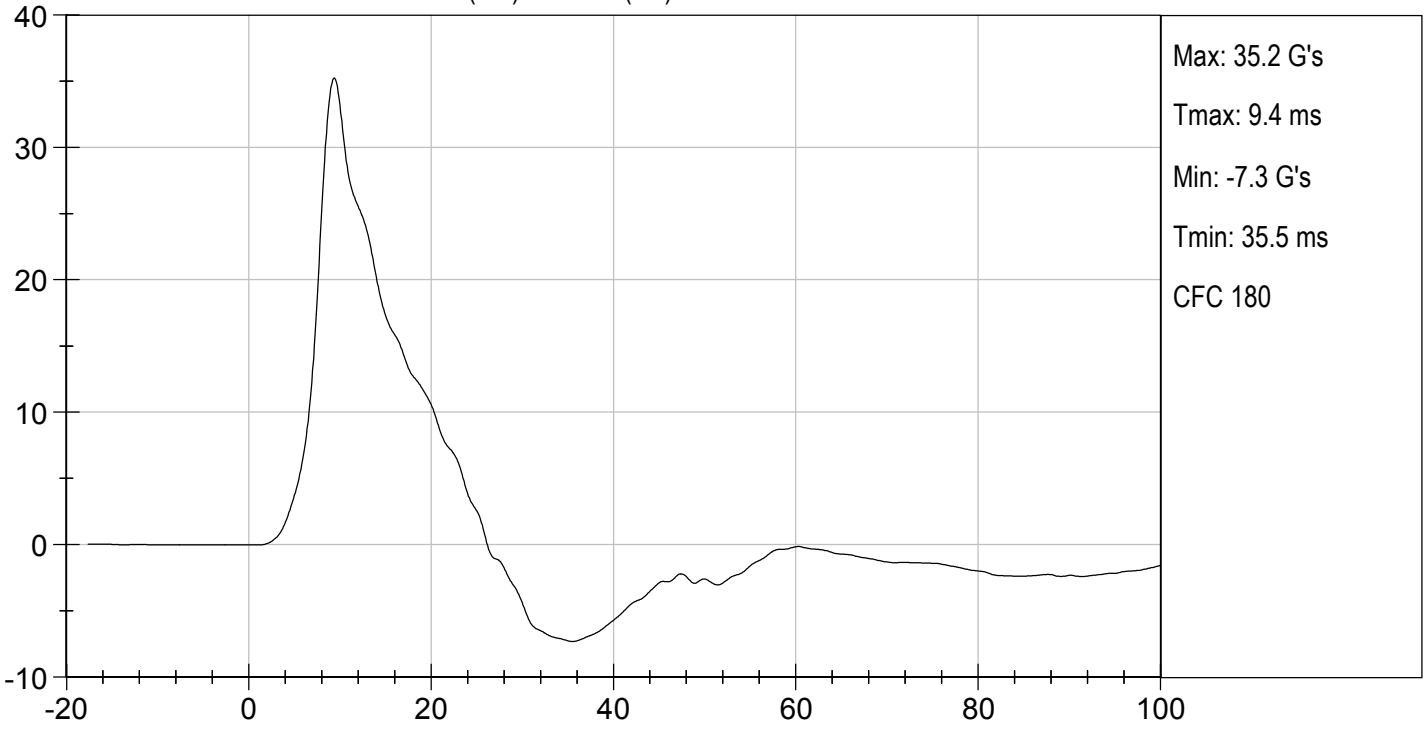
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/31/2019
TEST #: D190414

LOWER SPINE Y ACCELERATION (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190415

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

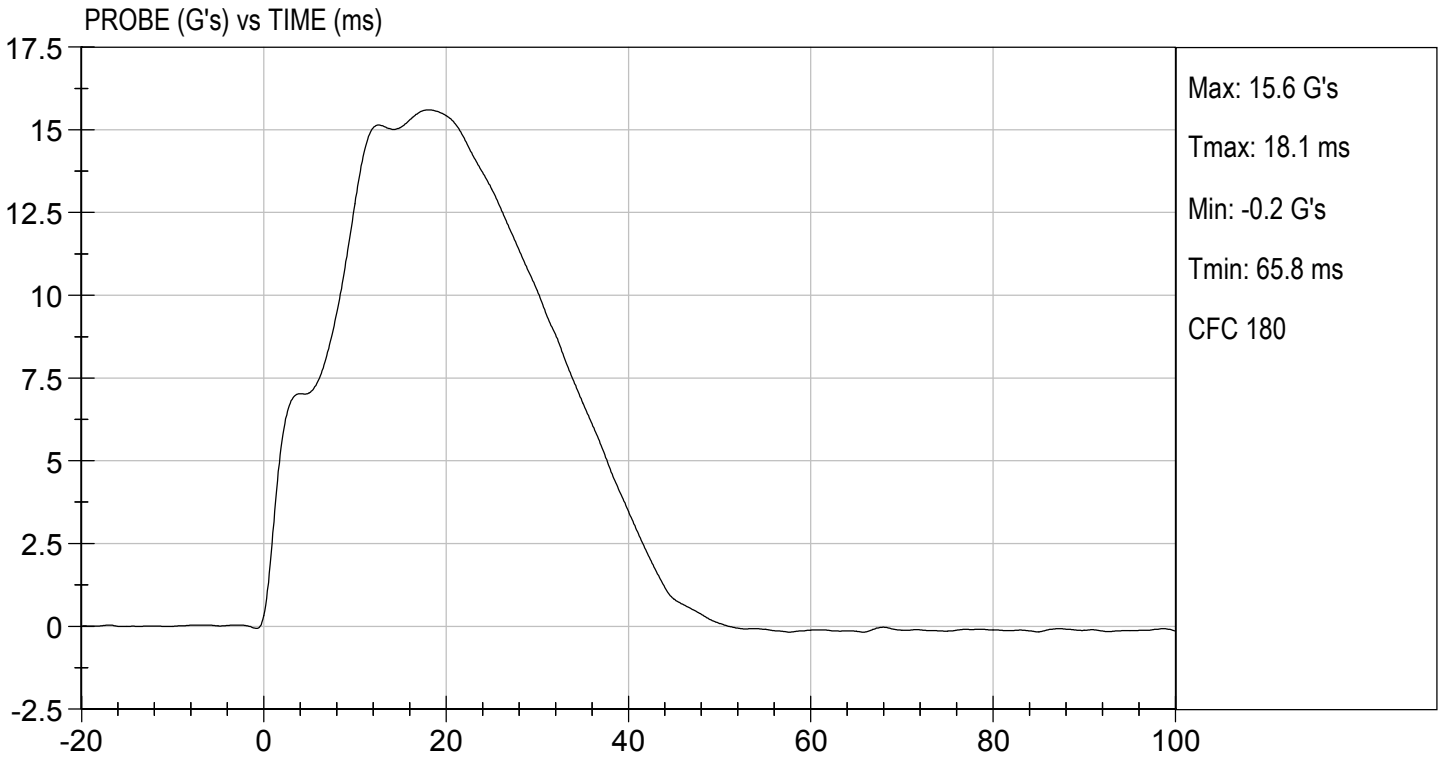
Jacob D Taylor
Laboratory Technician

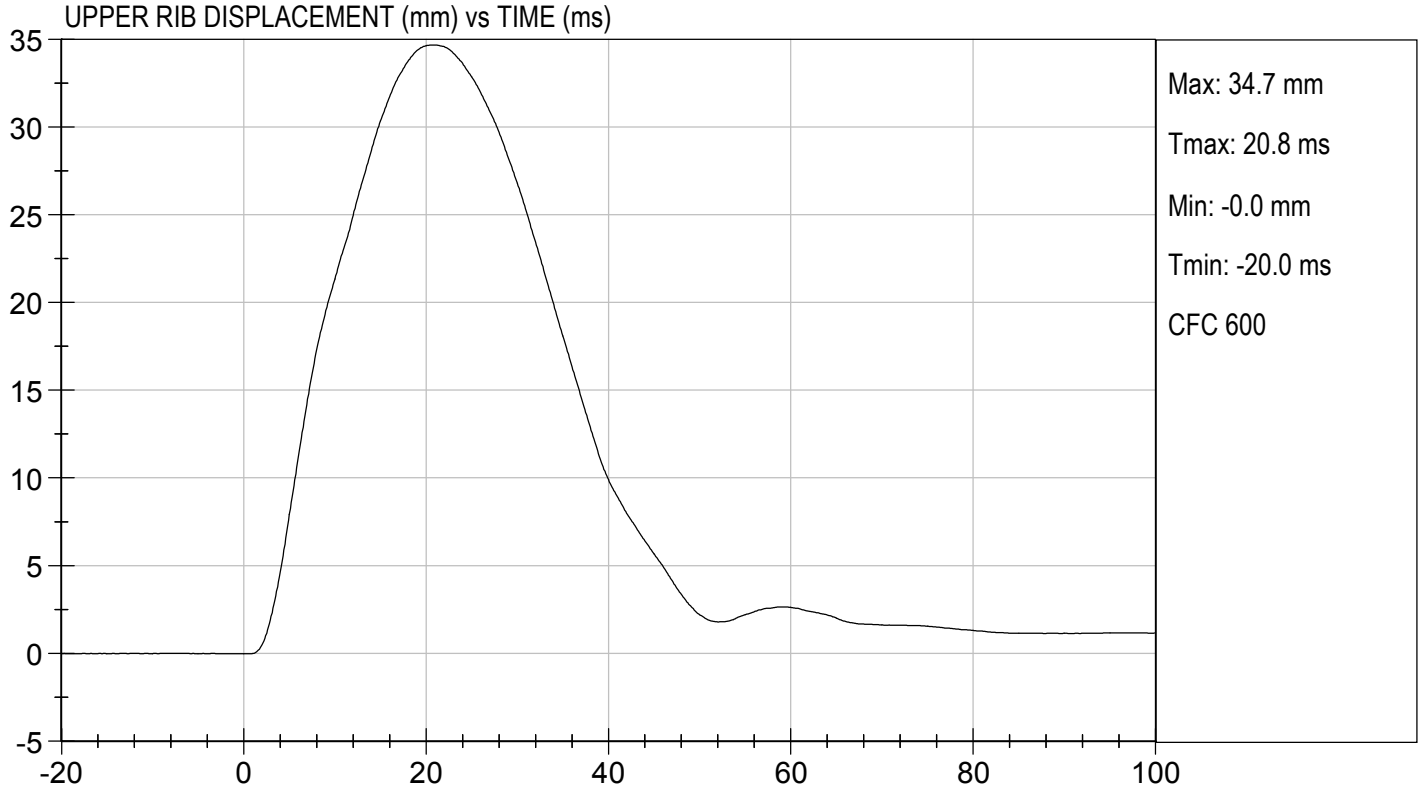
01/31/2019
Test Date

Robert Schmidt
Approved By

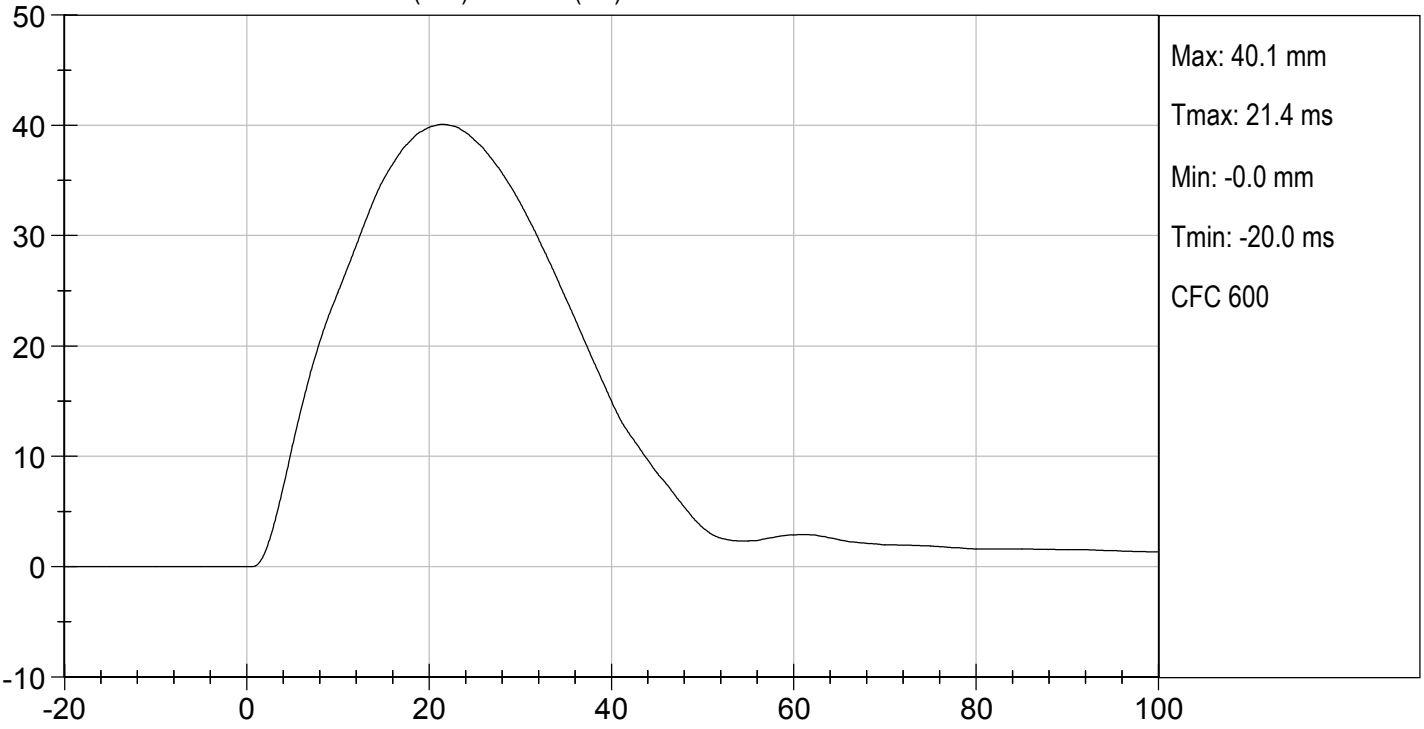
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/31/2019
TEST #: D190415

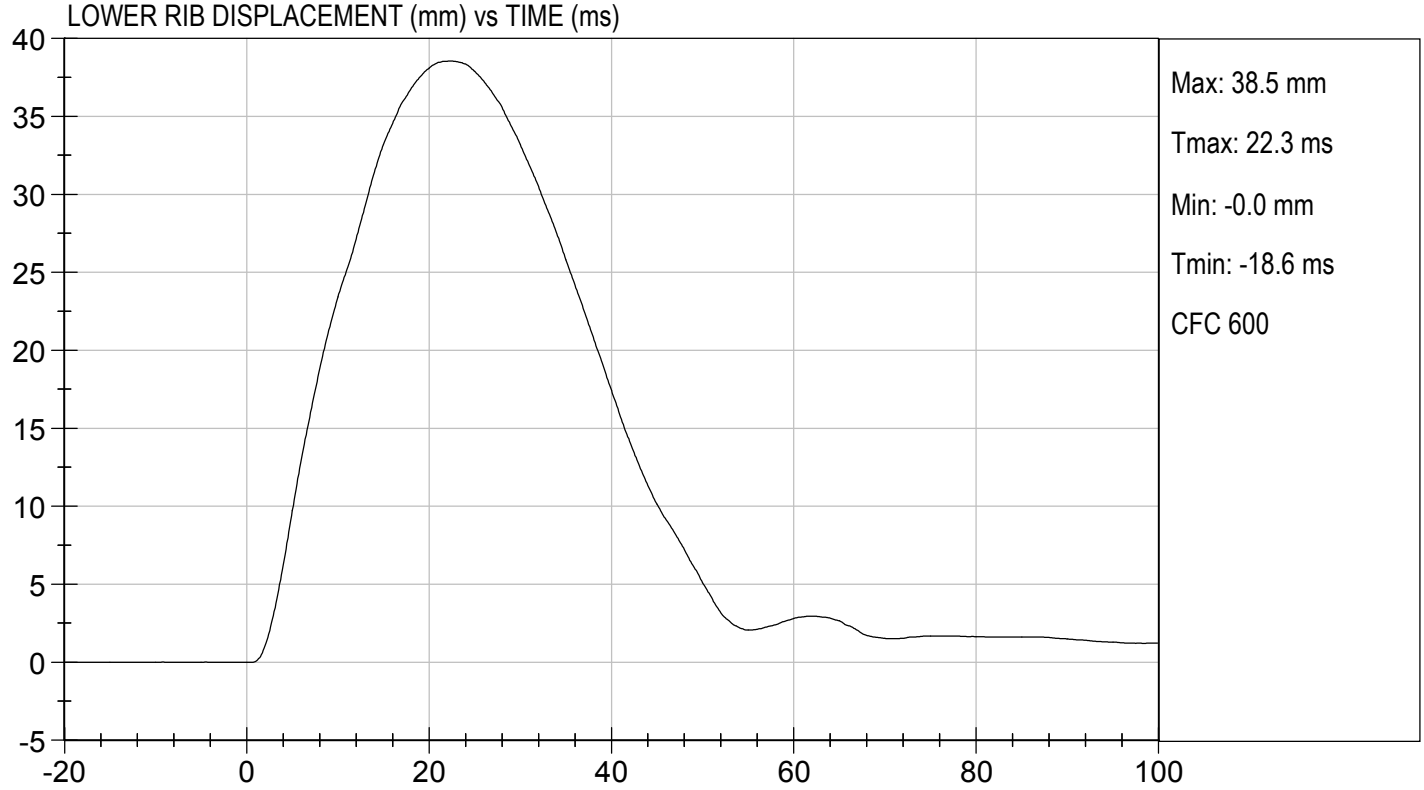




MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)

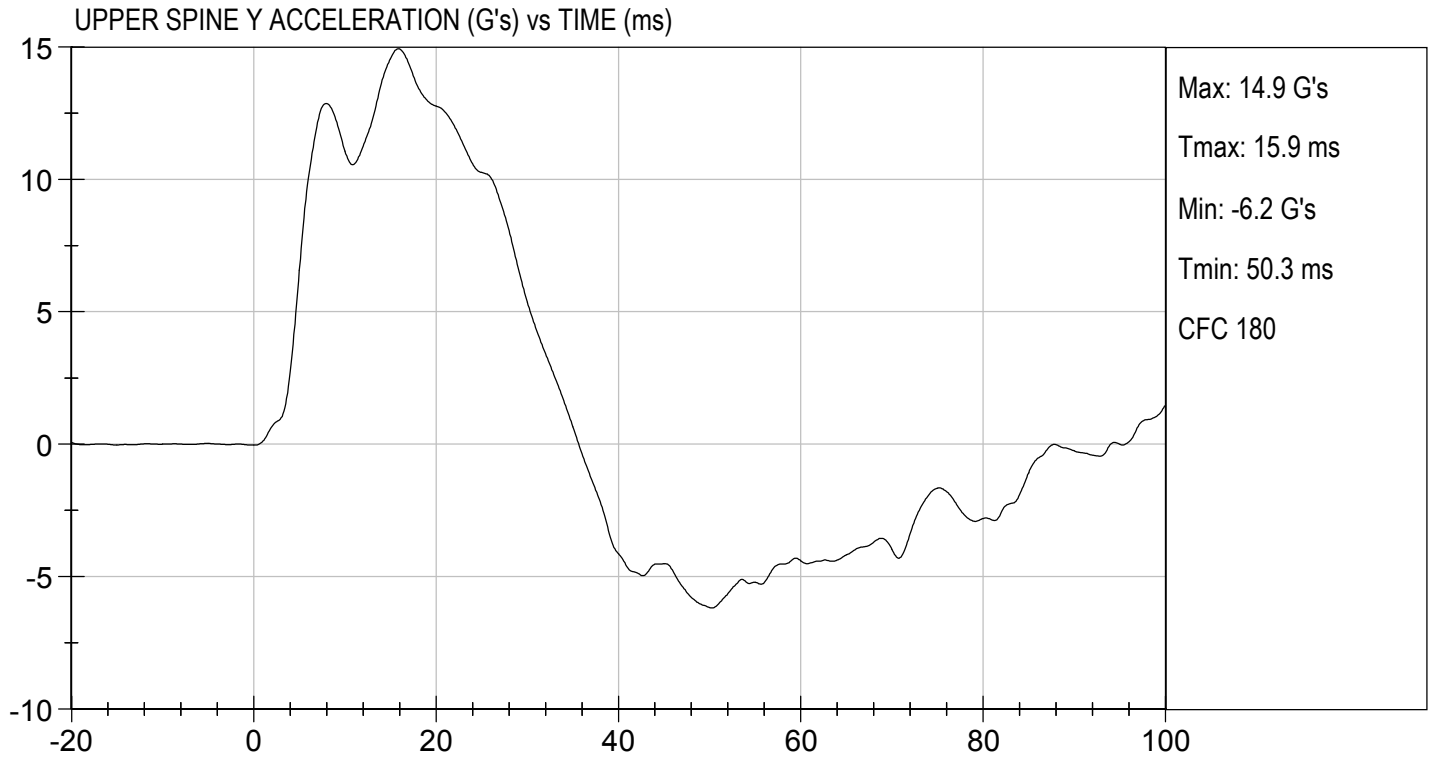


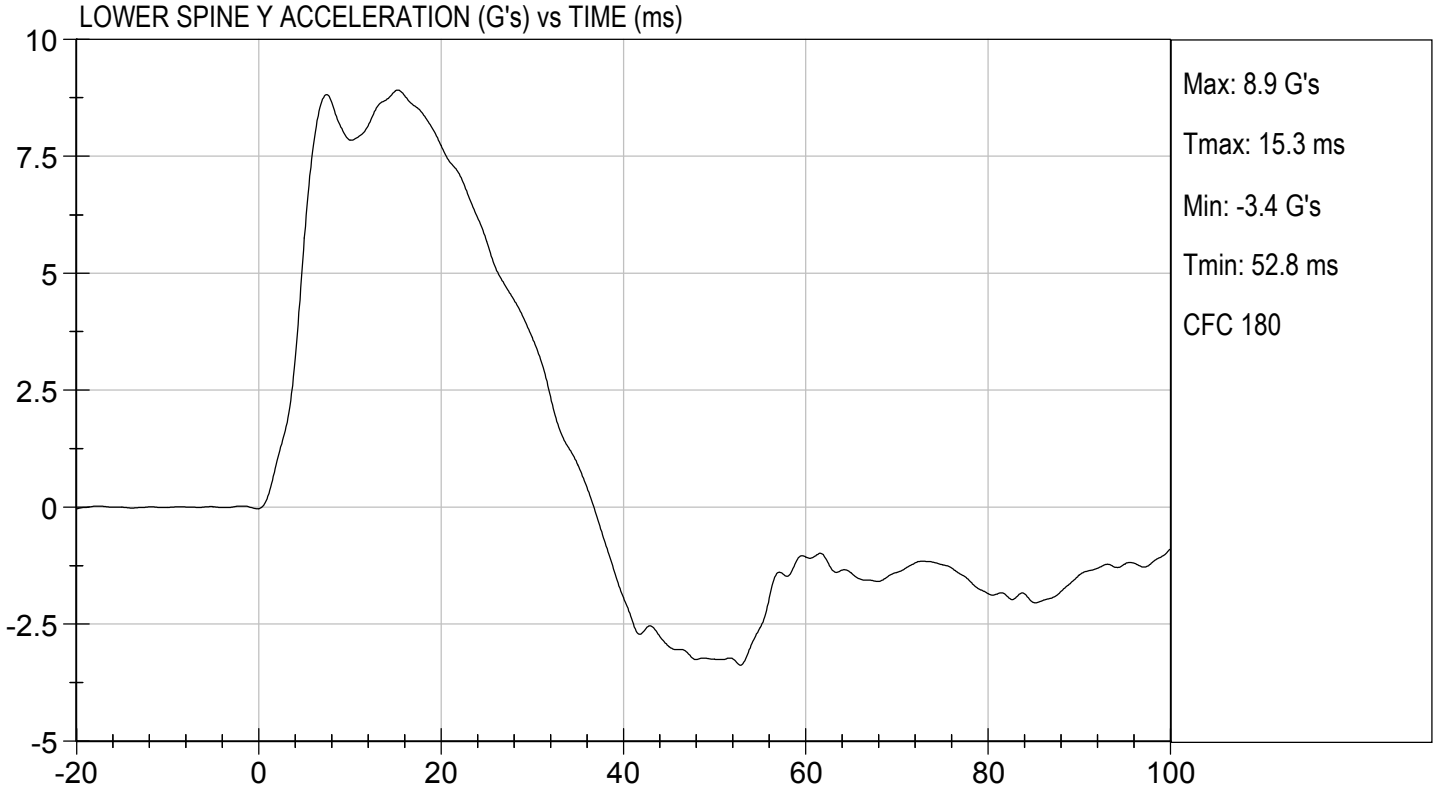
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/31/2019
TEST #: D190415





MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190416

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Jacob D Taylor

Laboratory Technician

01/31/2019

Test Date

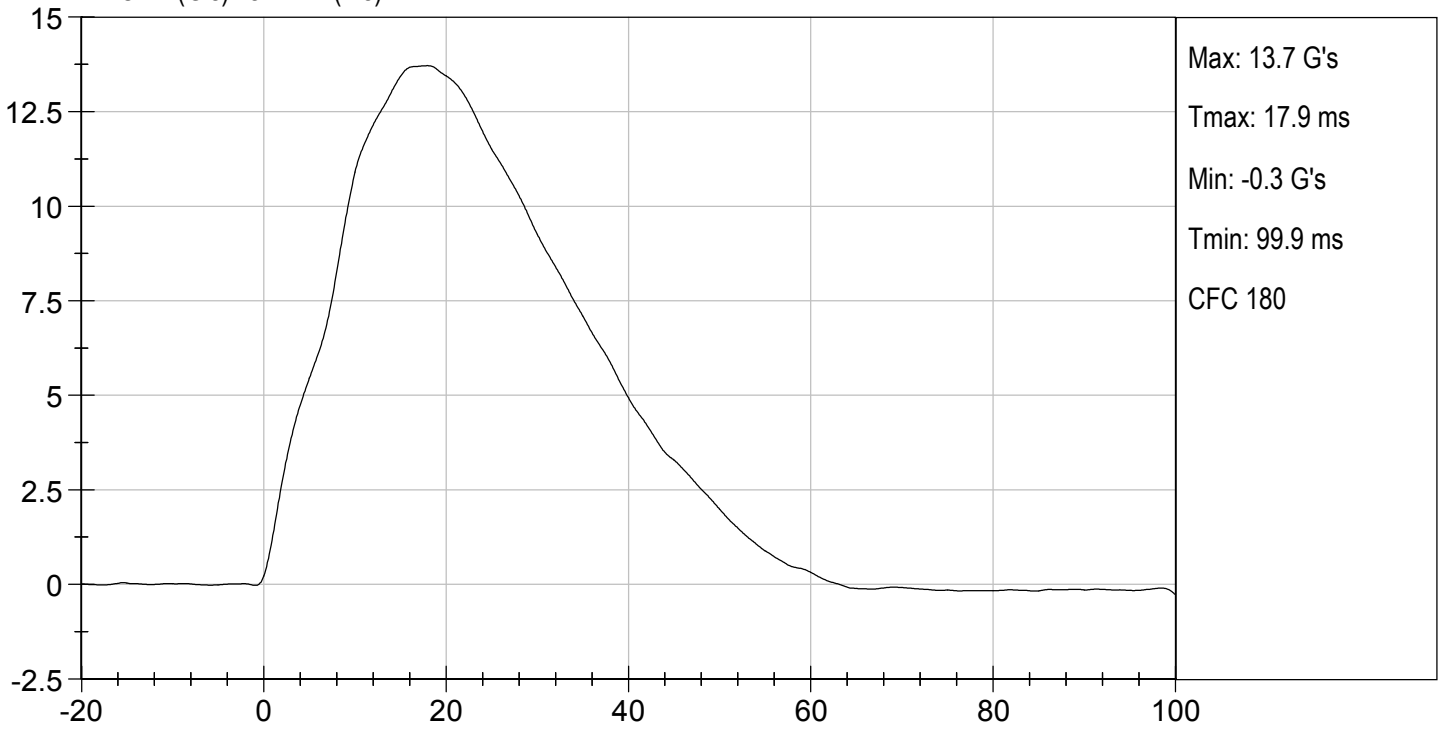
Robert Schmidt

Approved By

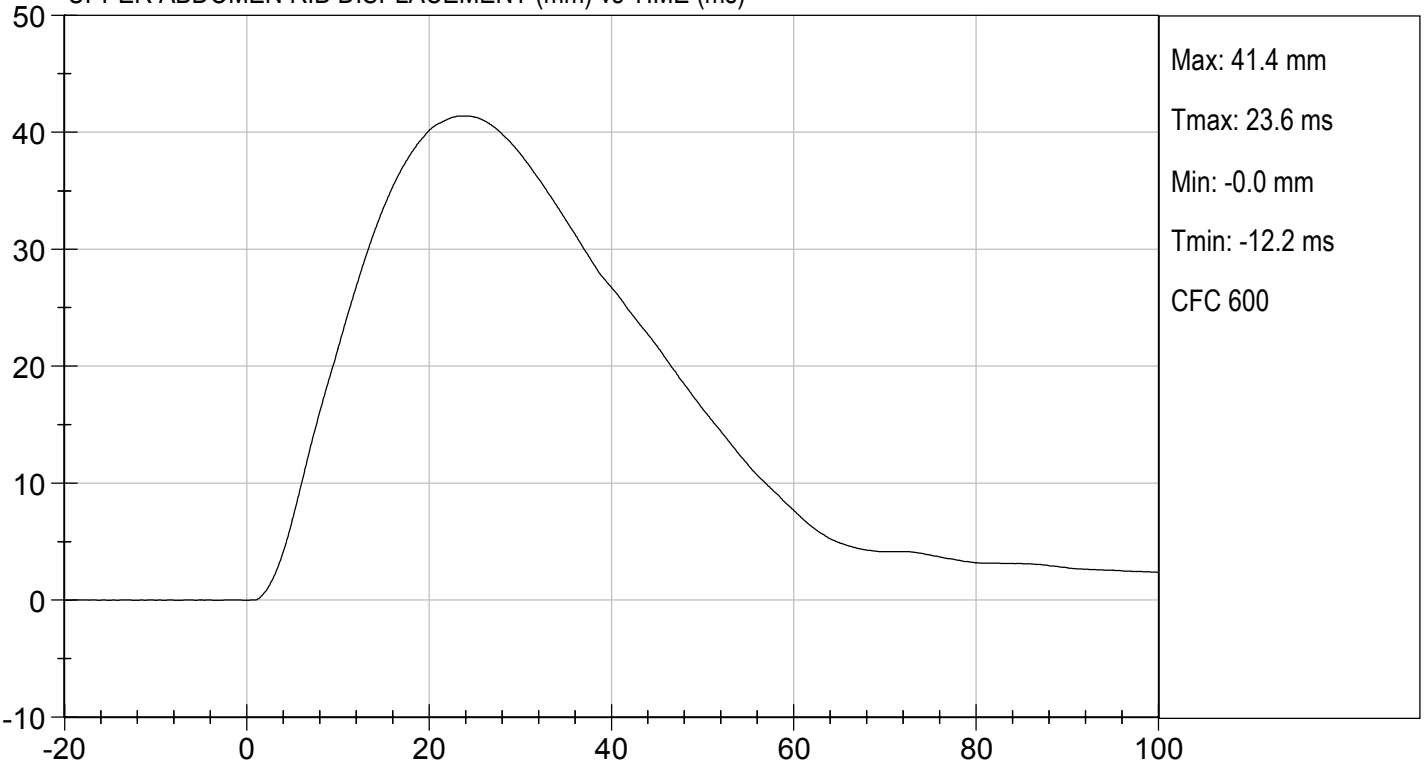
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190416

PROBE (G's) vs TIME (ms)



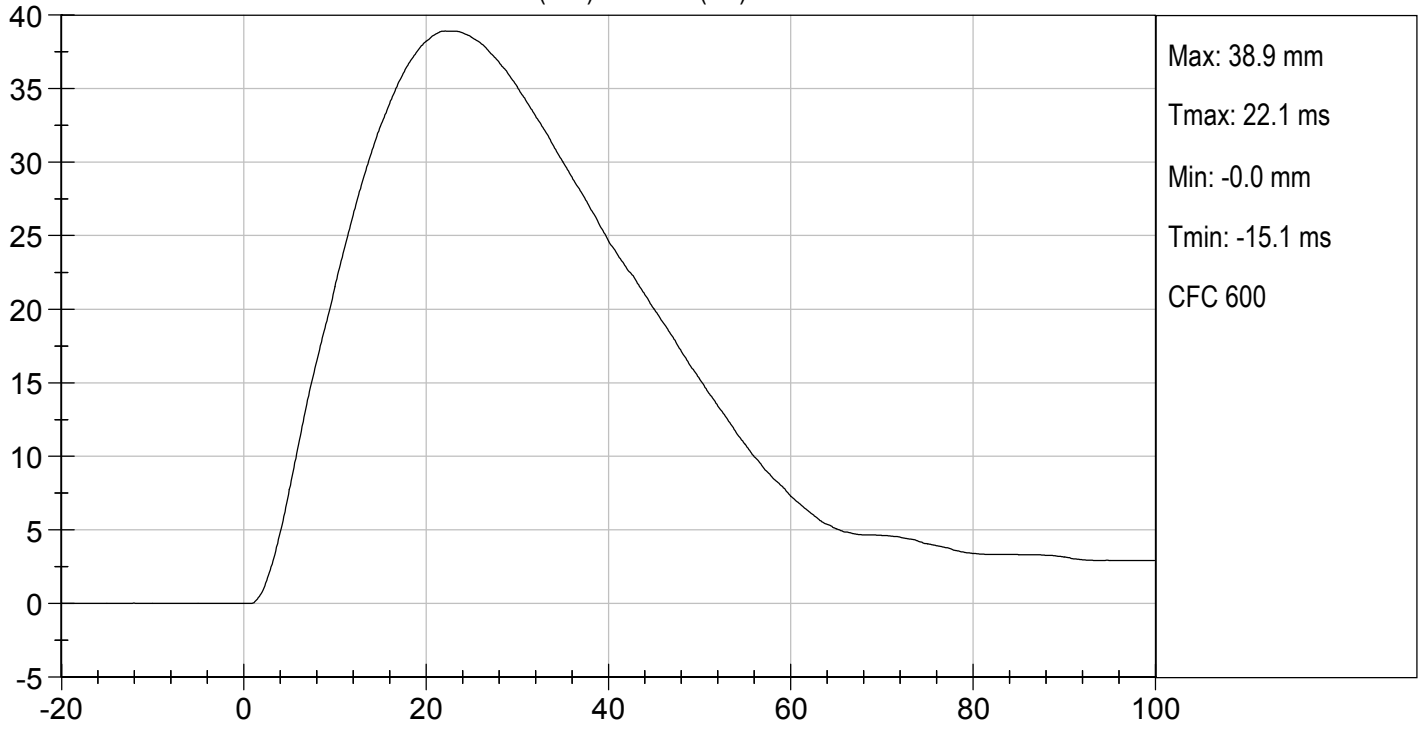
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



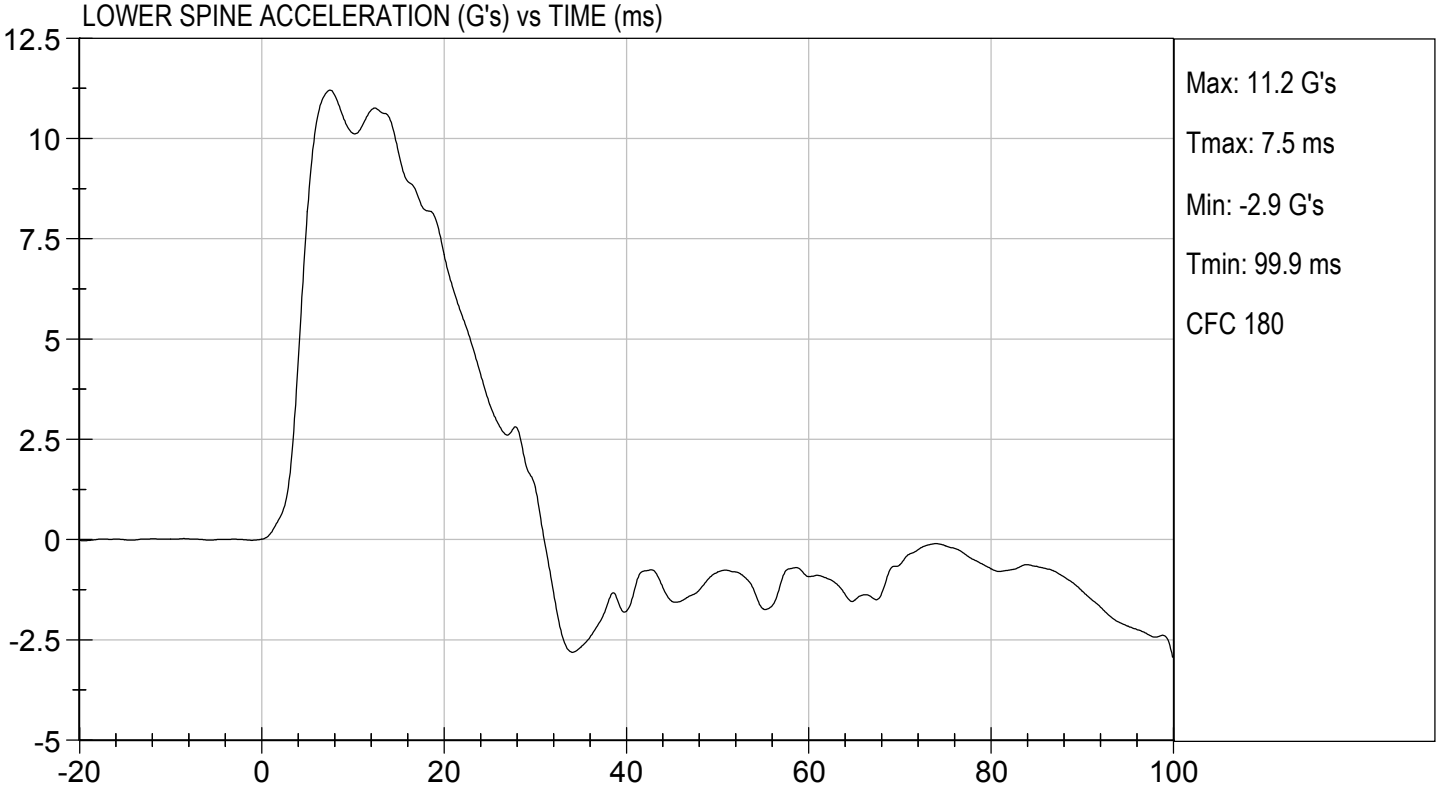
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190416

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190417

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	4,139	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

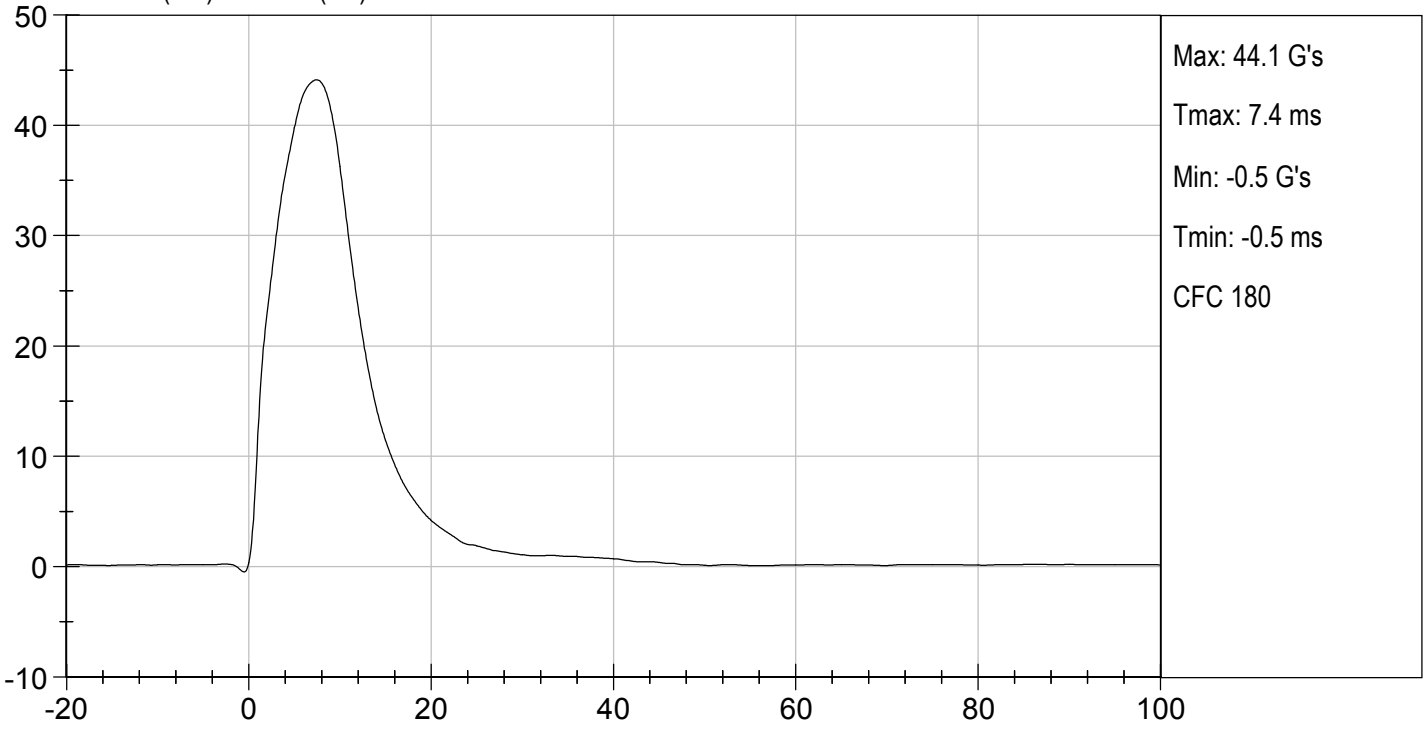
01/31/2019
Test Date

Robert Schmalz
Approved By

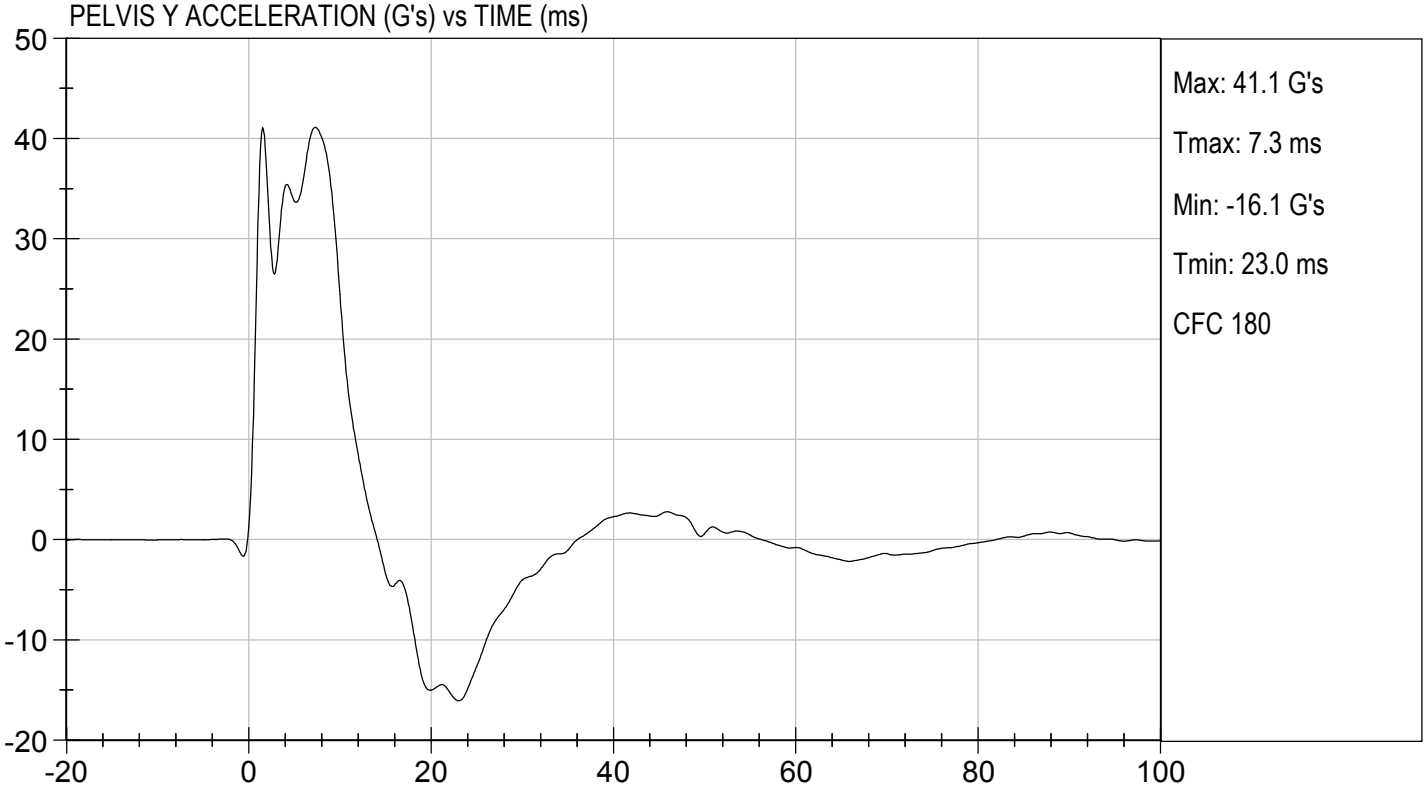
TEST DESC: PELVIS IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 01/31/2019
TEST #: D190417

PROBE (G's) vs TIME (ms)

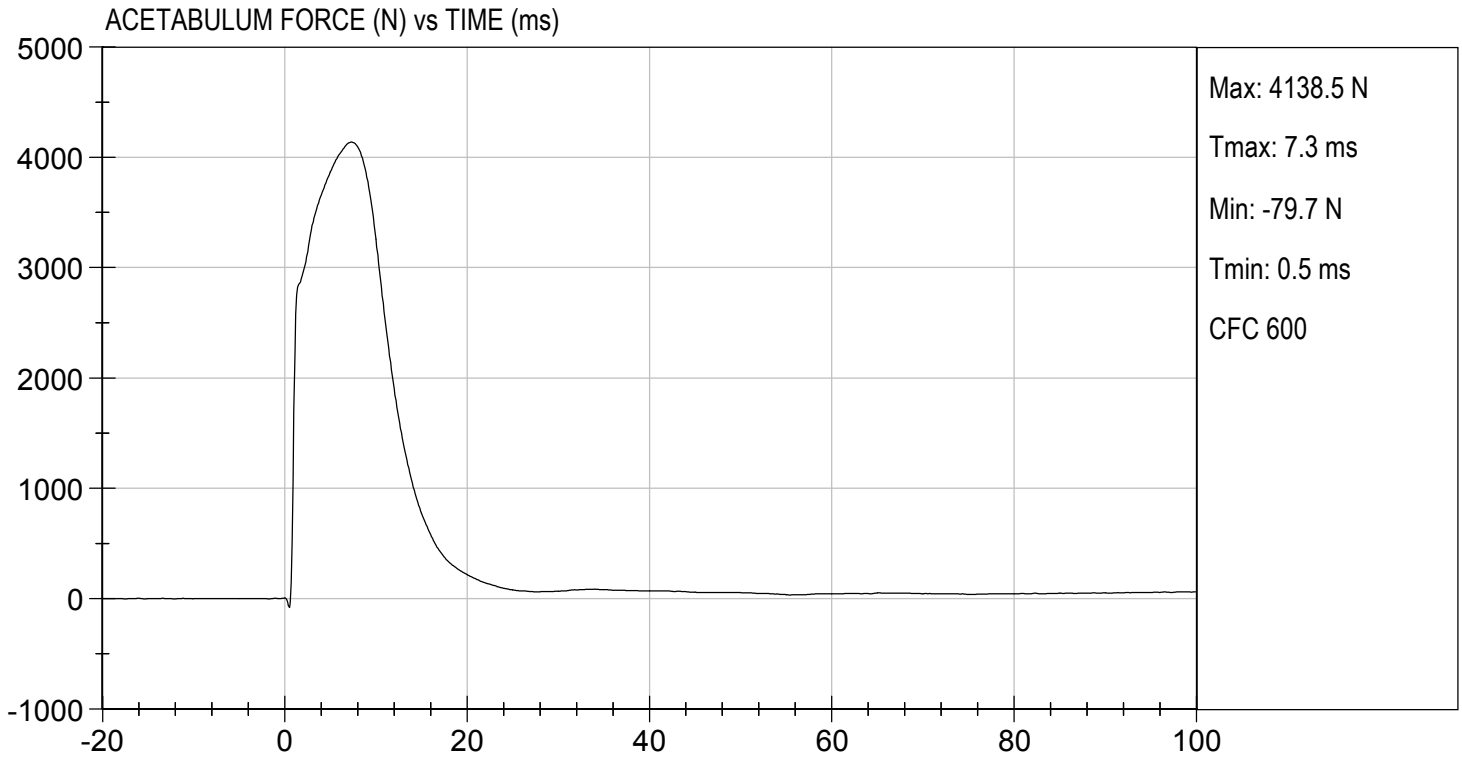


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: PELVIS IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 01/31/2019
TEST #: D190417



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190418

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	36 to 45	43	Pass
Pelvis Y Acceleration	G's	28 to 39	32	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,816	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

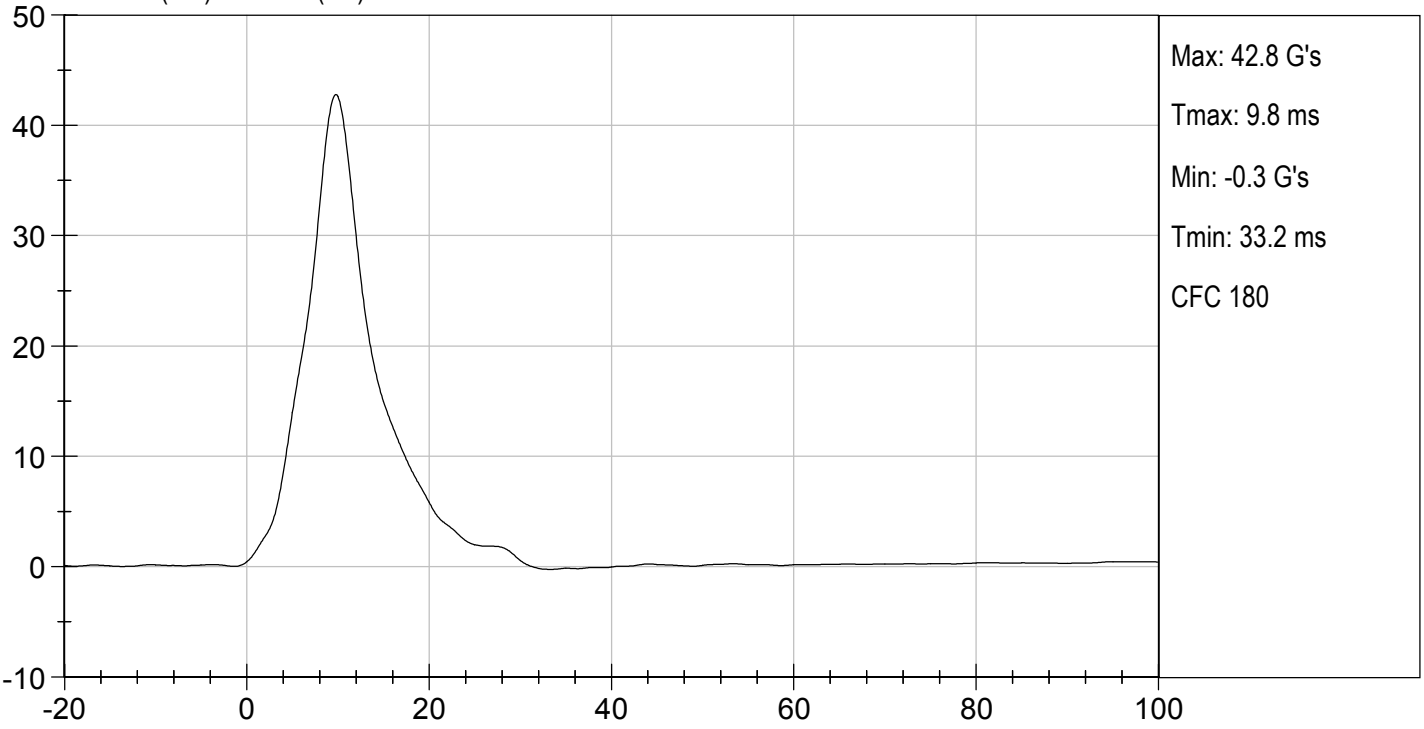
01/31/2019
Test Date

Robert Schmidt
Approved By

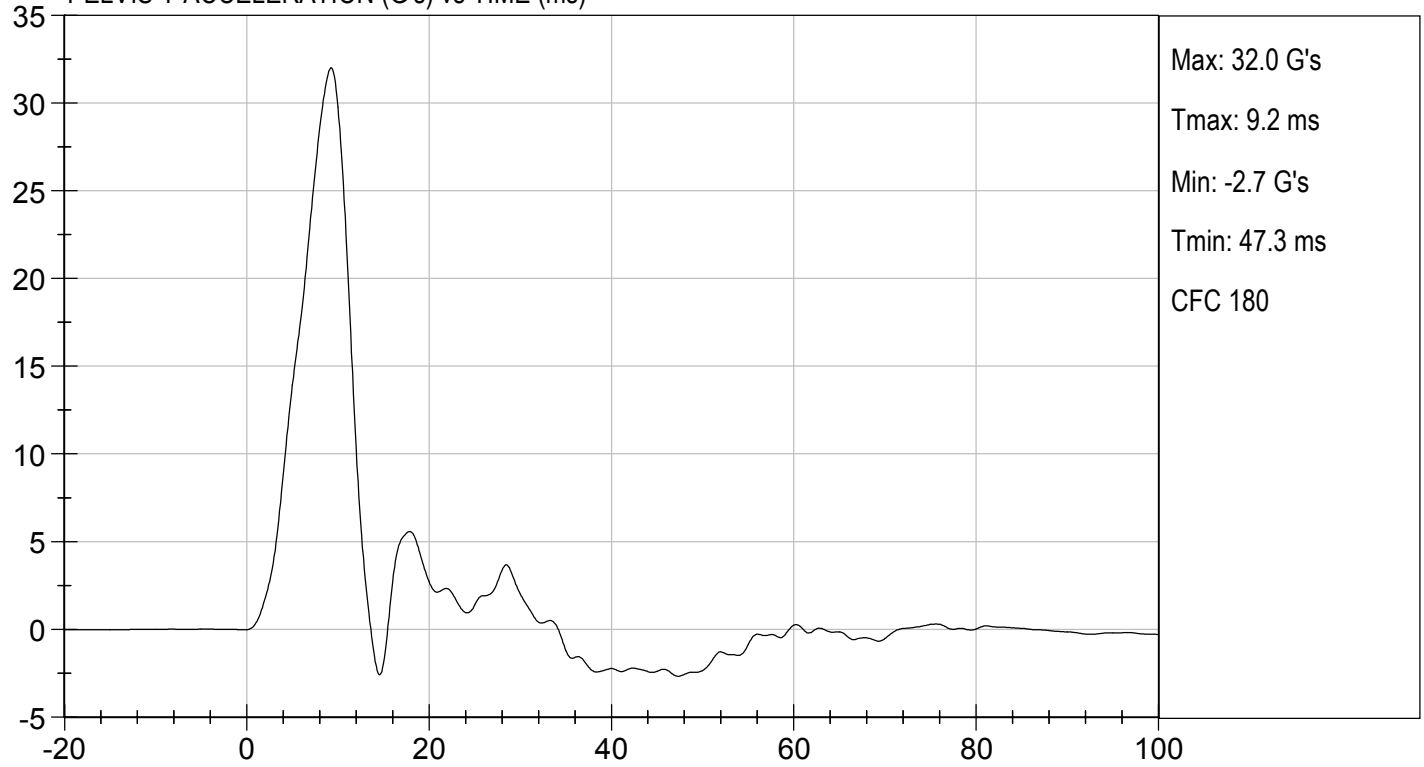
TEST DESC: ILLIAC
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190418

PROBE (G's) vs TIME (ms)

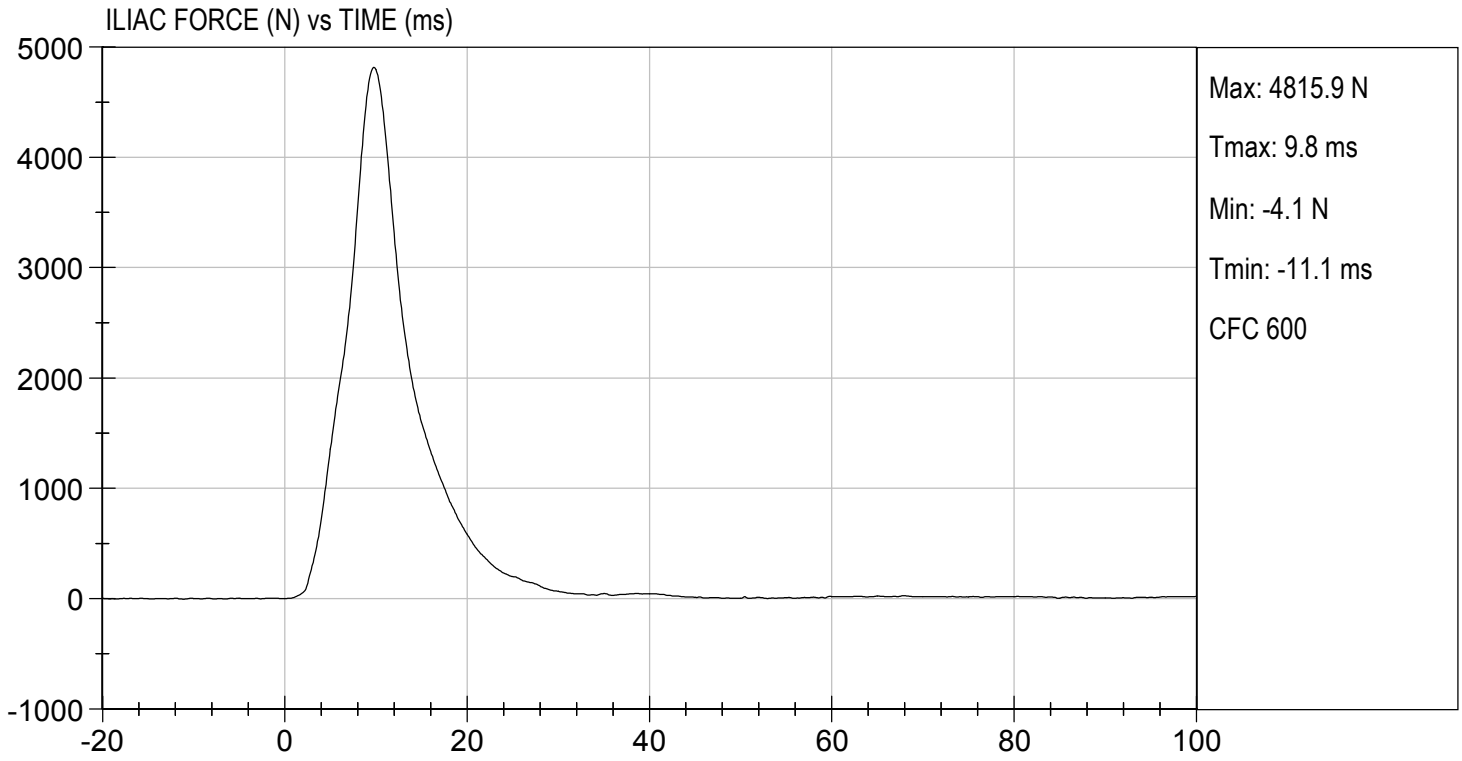


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 01/31/2019
TEST #: D190418



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148	141	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	182	Pass
J	Head Circumference	541 - 551	550	Pass
K	Buttock to Knee Length	514 - 540	538	Pass
L	Popliteal Height	343 - 369	349	Pass
M	Knee Pivot to Floor Height	392 - 409	394	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	198	Pass
P	Foot Length	216 - 232	222	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	317	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	483	Pass
V	Shoulder Width	341 - 357	351	Pass
W	Foot Width	78 - 94	82	Pass
Y	Chest Circumference w/ jacket	851 - 881	863	Pass
Z	Waist Circumference	761 - 791	782	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D190531

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Danielle Redinbaugh
Laboratory Technician

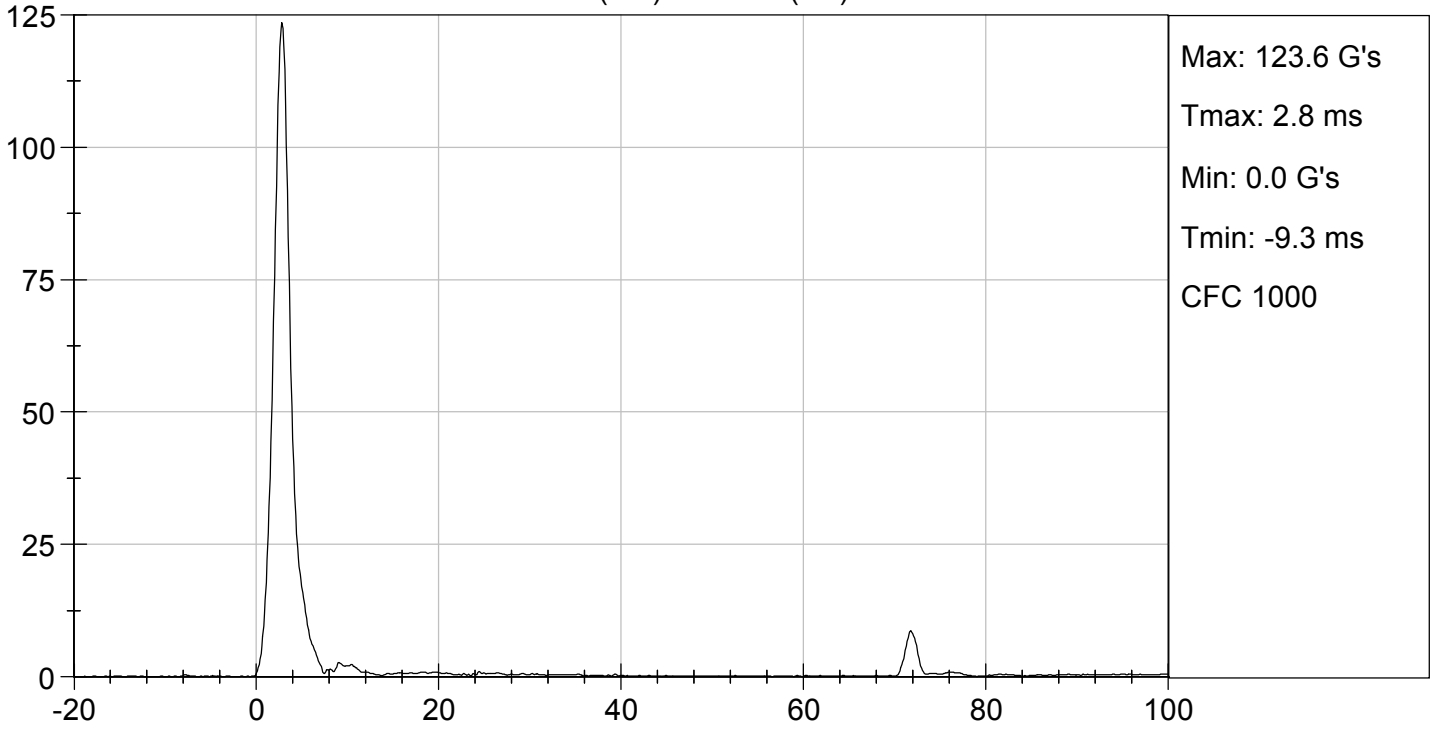
02/06/2019
Test Date

Robert Schmidt
Approved By

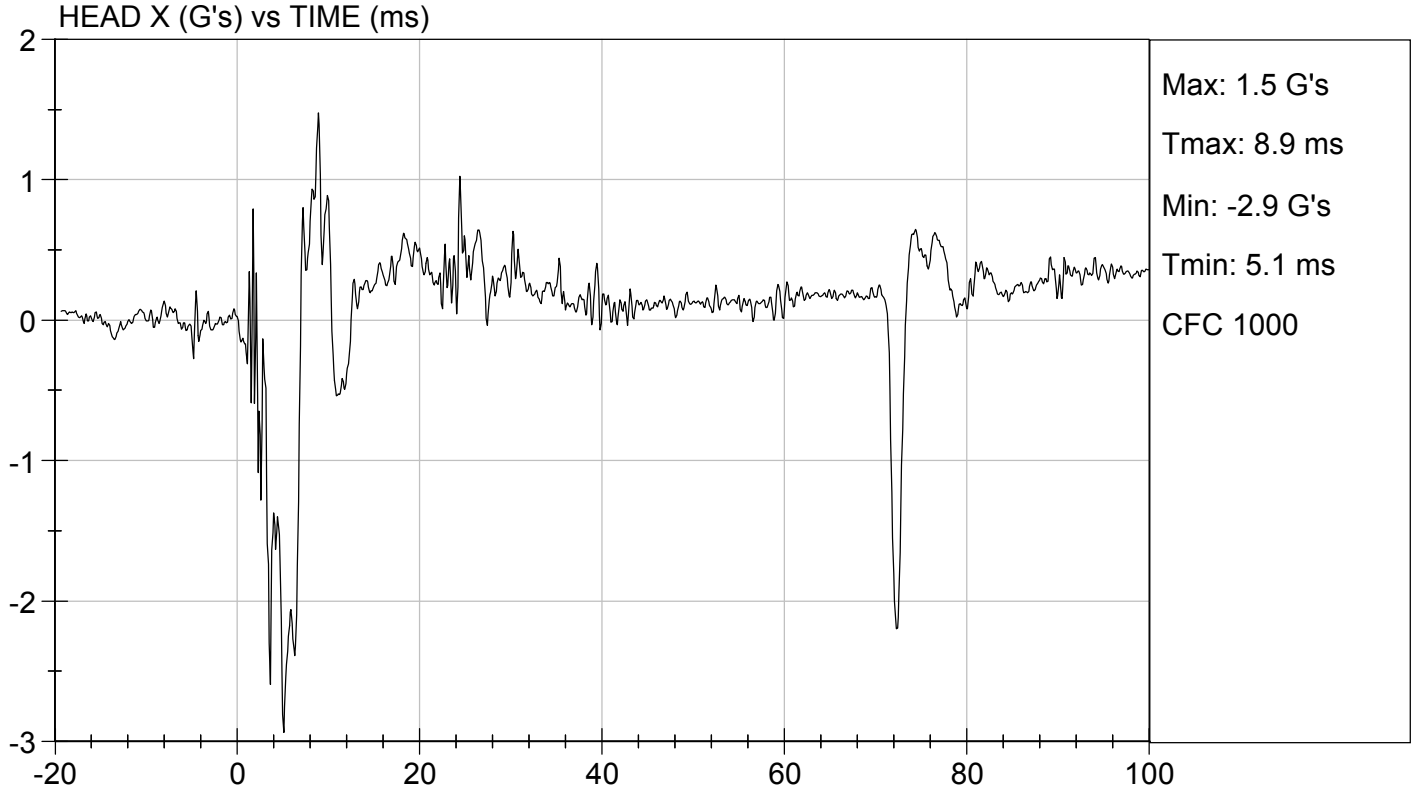
TEST DESC: HEAD DROP

TEST DATE: 02/06/2019
TEST #: D190531

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)

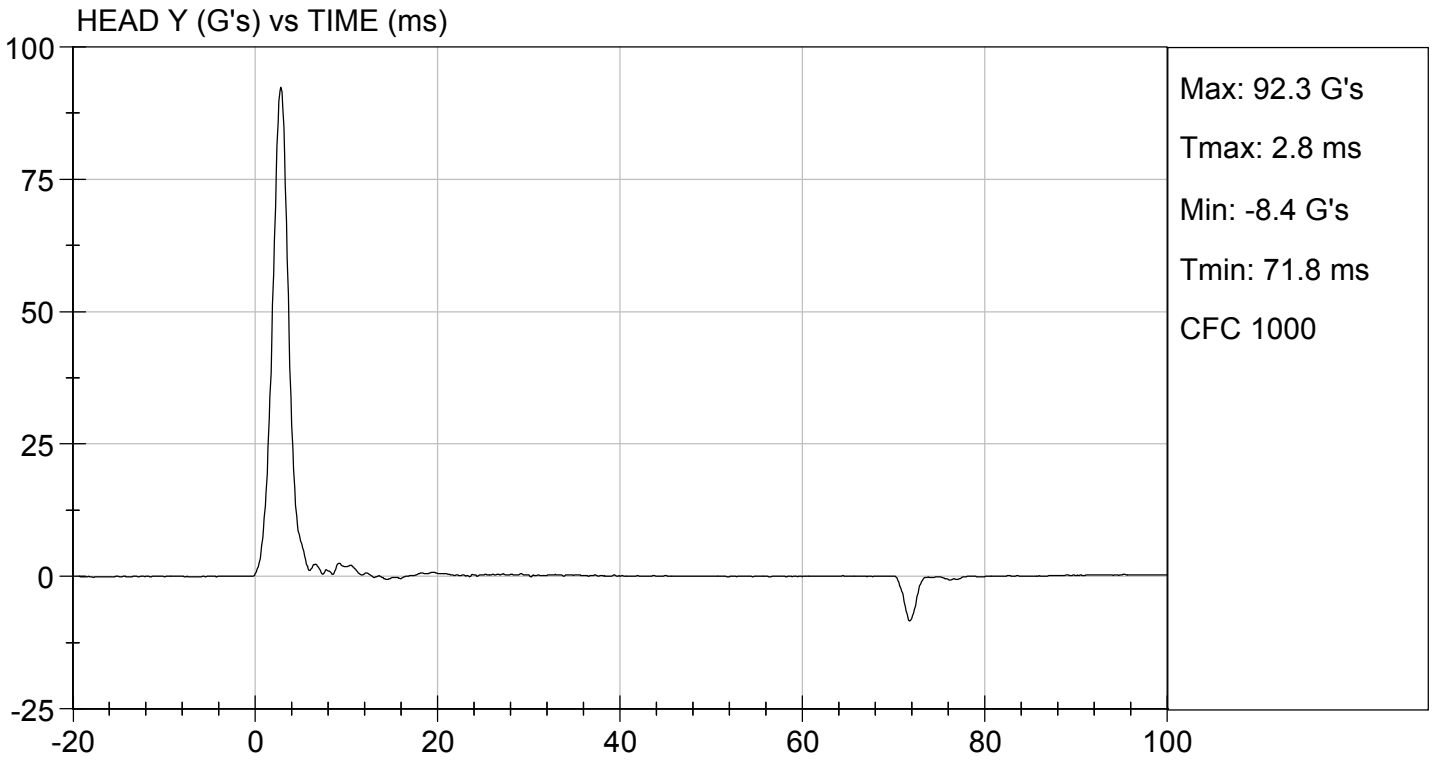


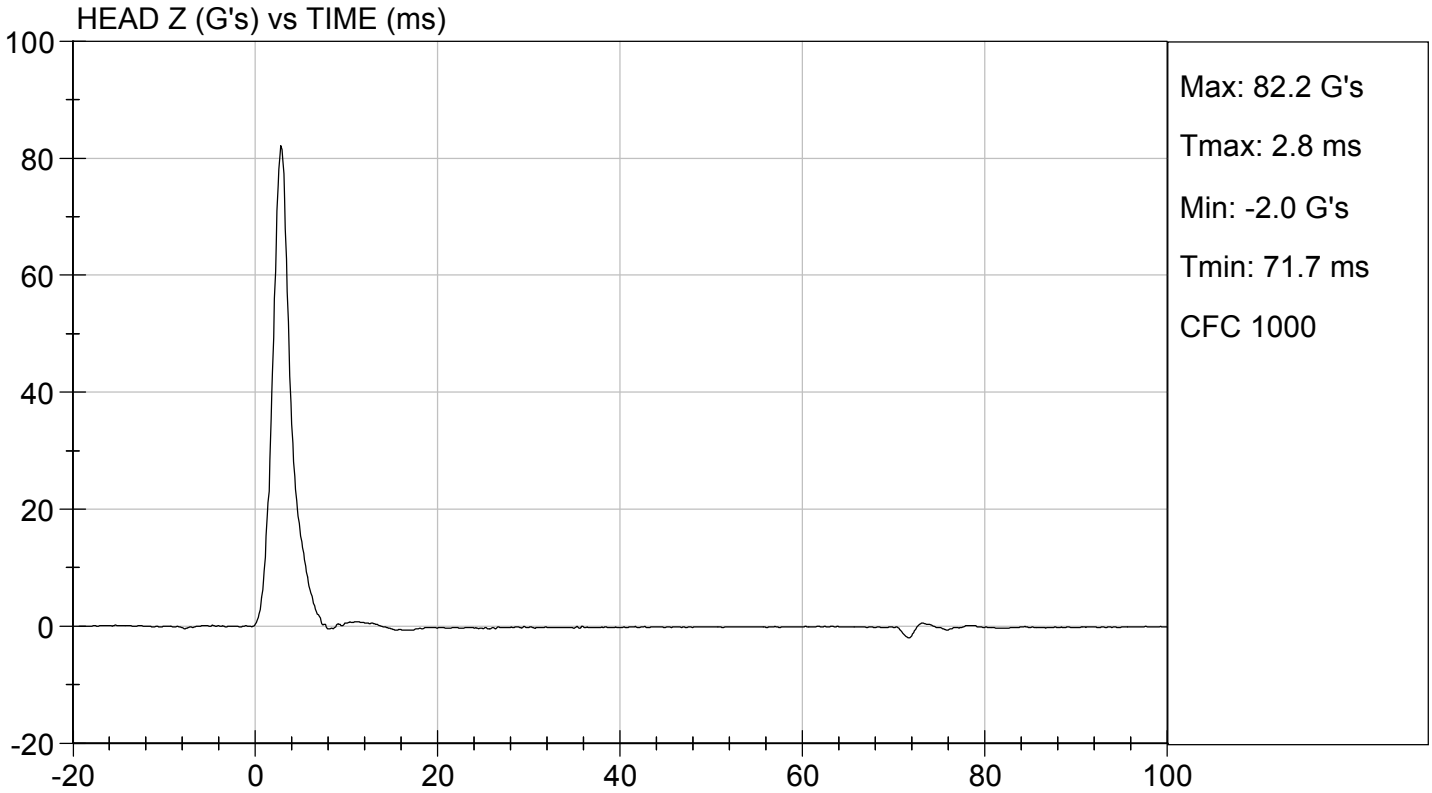
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 02/06/2019
TEST #: D190531





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190532

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21	Pass
Humidity		%	10 to 70	32	Pass
Impact Velocity		m/s	5.51 to 5.63	5.61	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.33	Pass
	15 ms	m/s	3.30 to 4.10	3.50	Pass
	20 ms	m/s	4.40 to 5.40	5.02	Pass
	25 ms	m/s	5.40 to 6.10	5.71	Pass
	25-100 ms	m/s	5.50 to 6.20	5.73	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	59	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	110	Pass
			Overall Test Results		Pass

Danielle Redinbaugh

Laboratory Technician

02/06/2019

Test Date

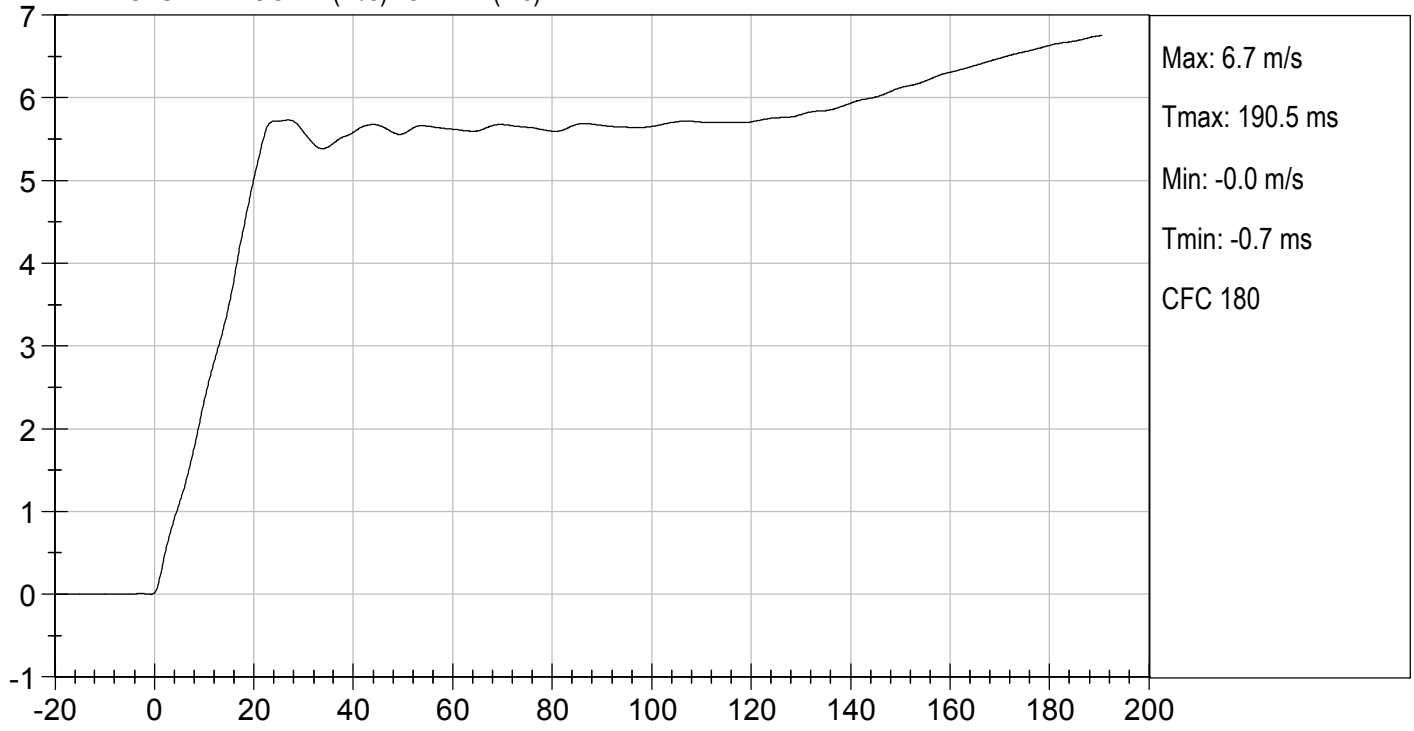
Robert Schmalz

Approved By

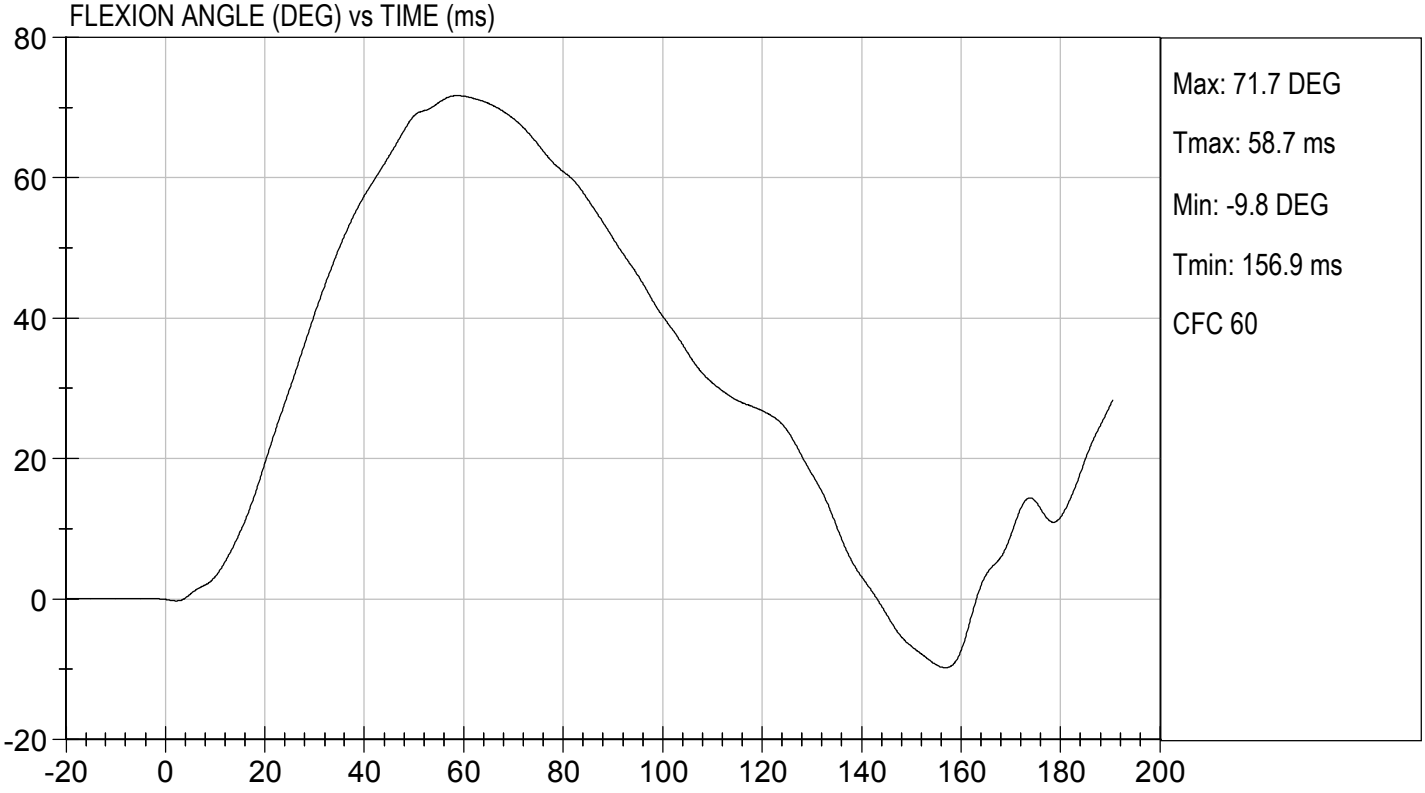
TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 02/06/2019
TEST #: D190532

PENDULUM VELOCITY (m/s) vs TIME (ms)

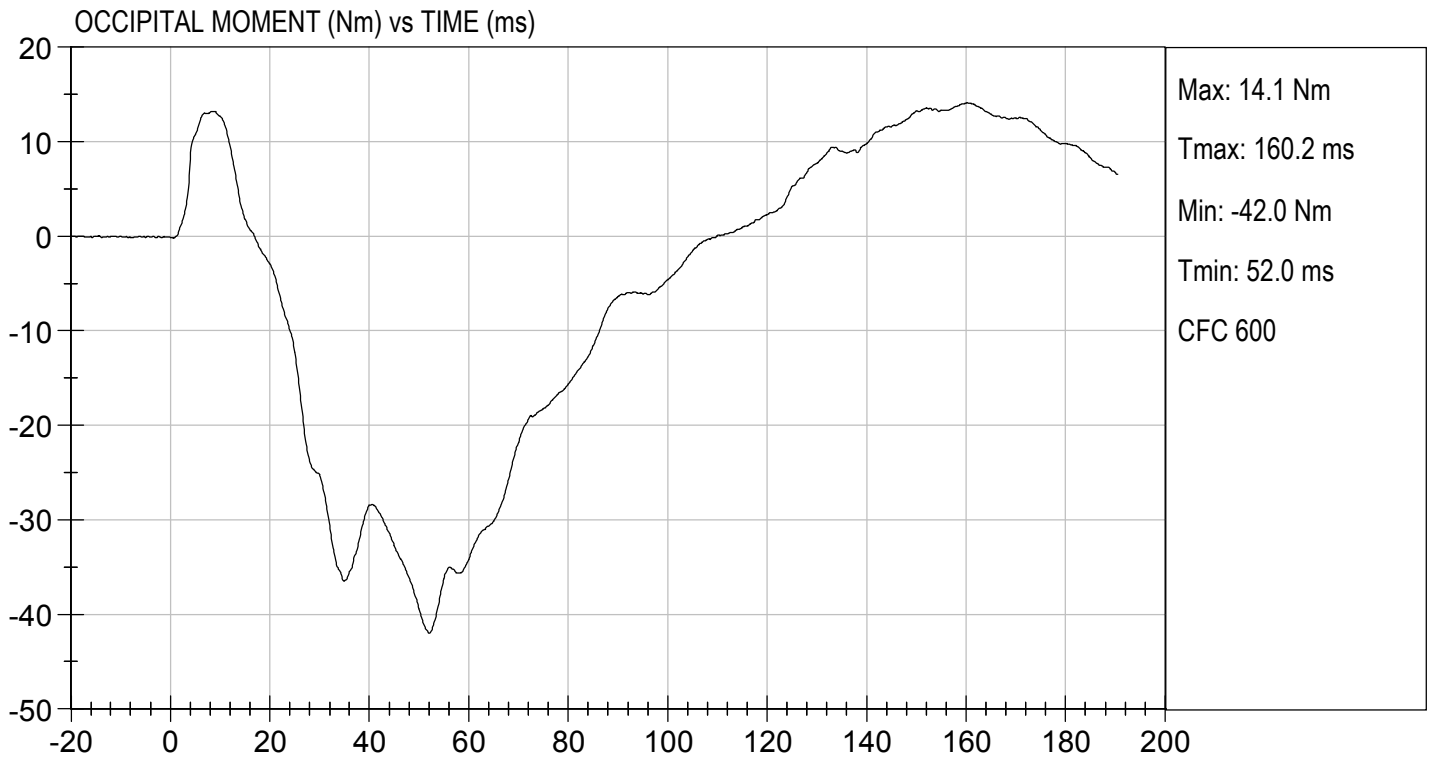


FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 02/06/2019
TEST #: D190532



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D190533

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	22	Pass
		Overall Test Results		Pass

Jacob D Taylor

Laboratory Technician

02/08/2019

Test Date

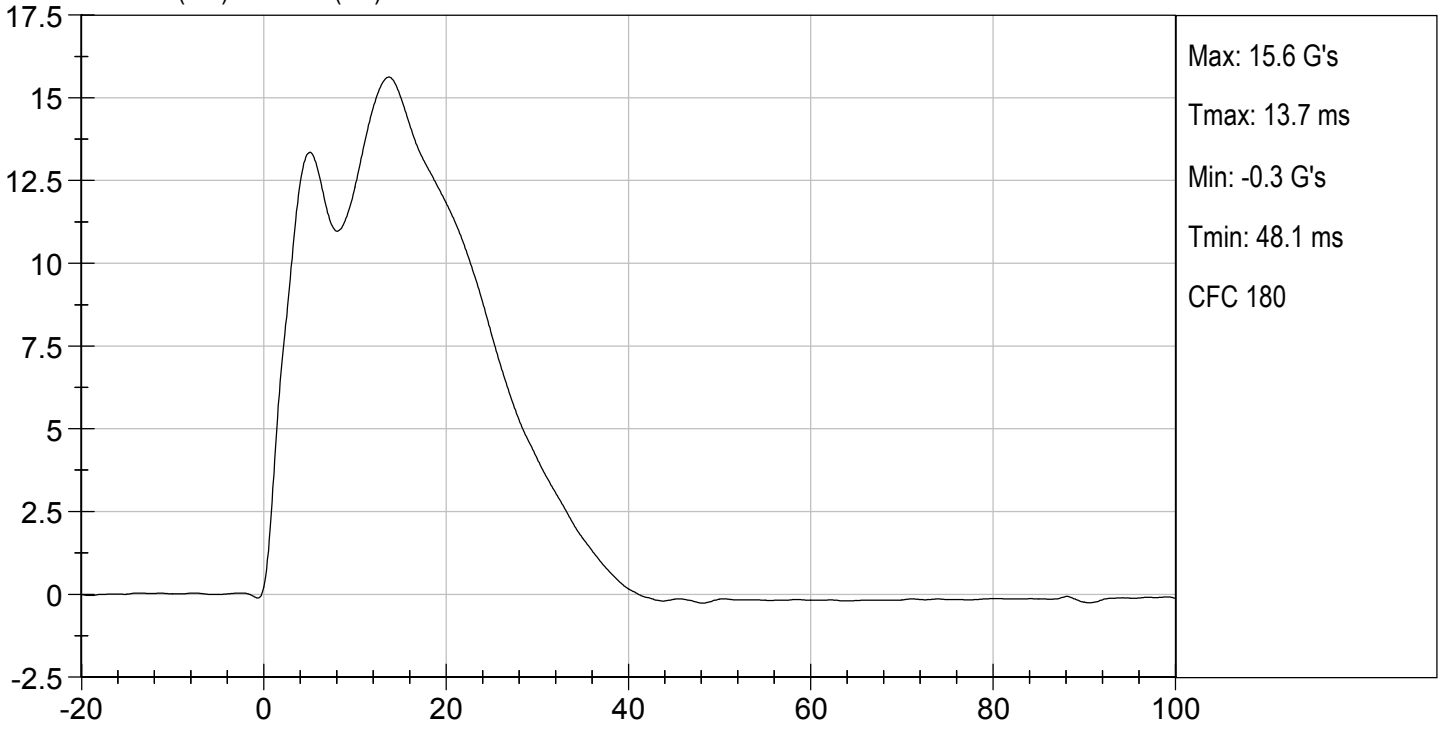
Robert Schmidt

Approved By

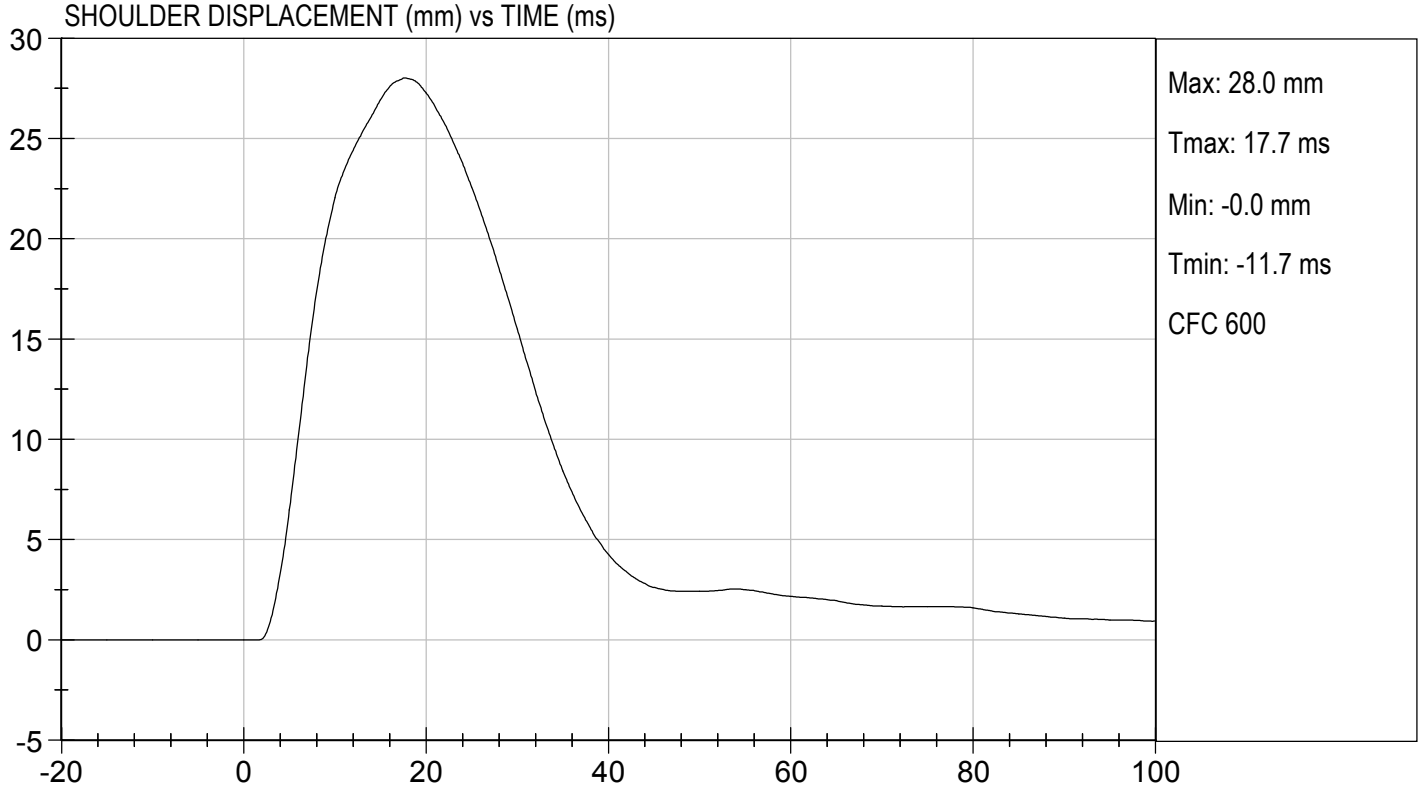
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 02/08/2019
TEST #: D190533

PROBE (G's) vs TIME (ms)

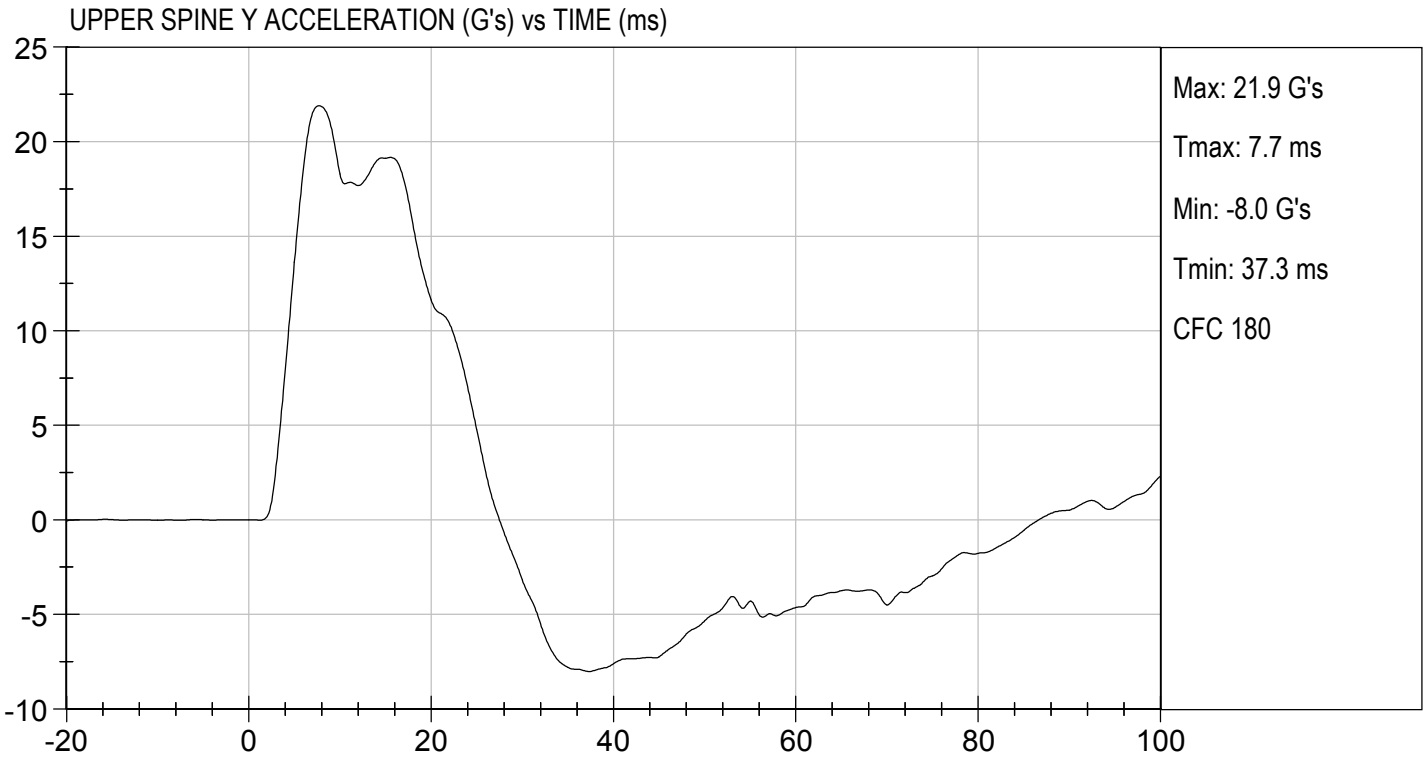


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 02/08/2019
TEST #: D190533



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190534

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	35	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	43	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

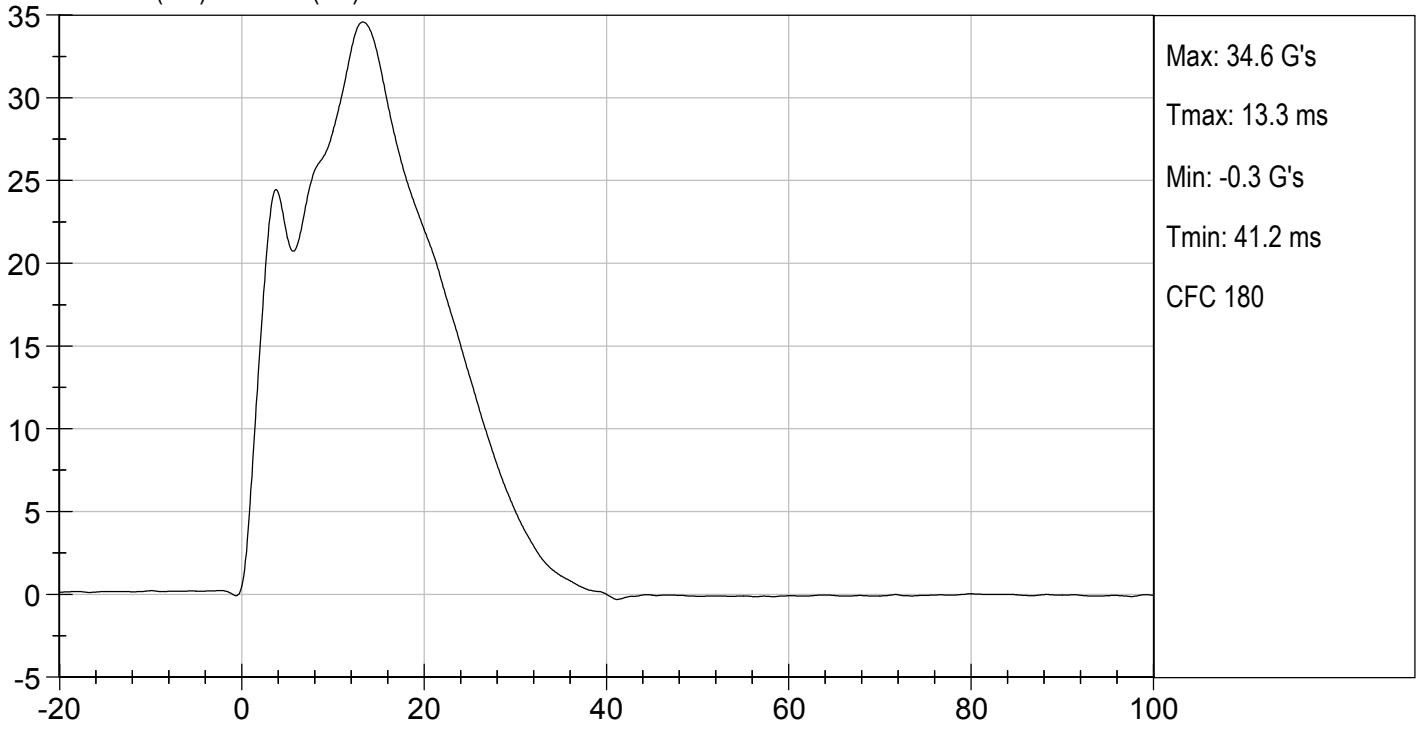
02/08/2019
Test Date

Robert Schmidt
Approved By

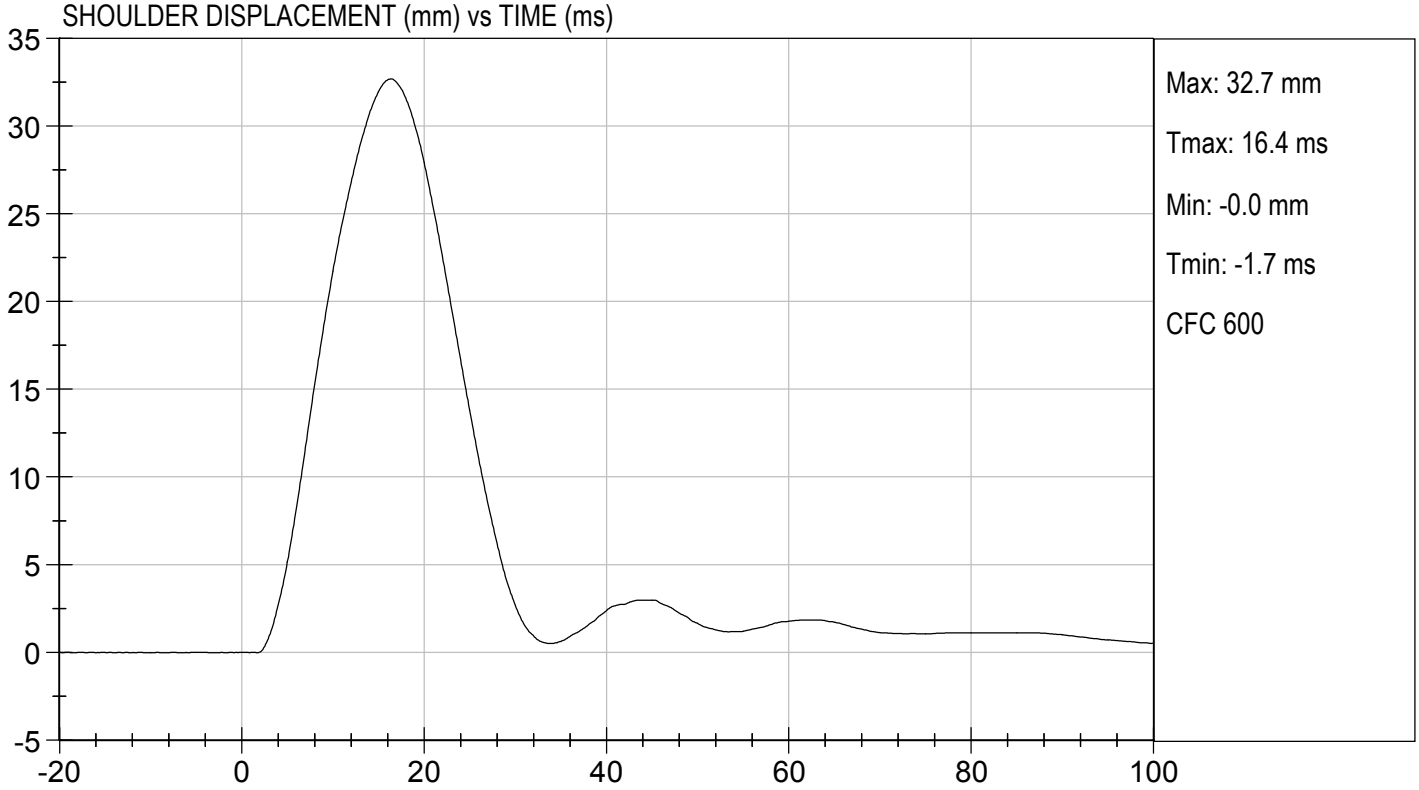
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/08/2019
TEST #: D190534

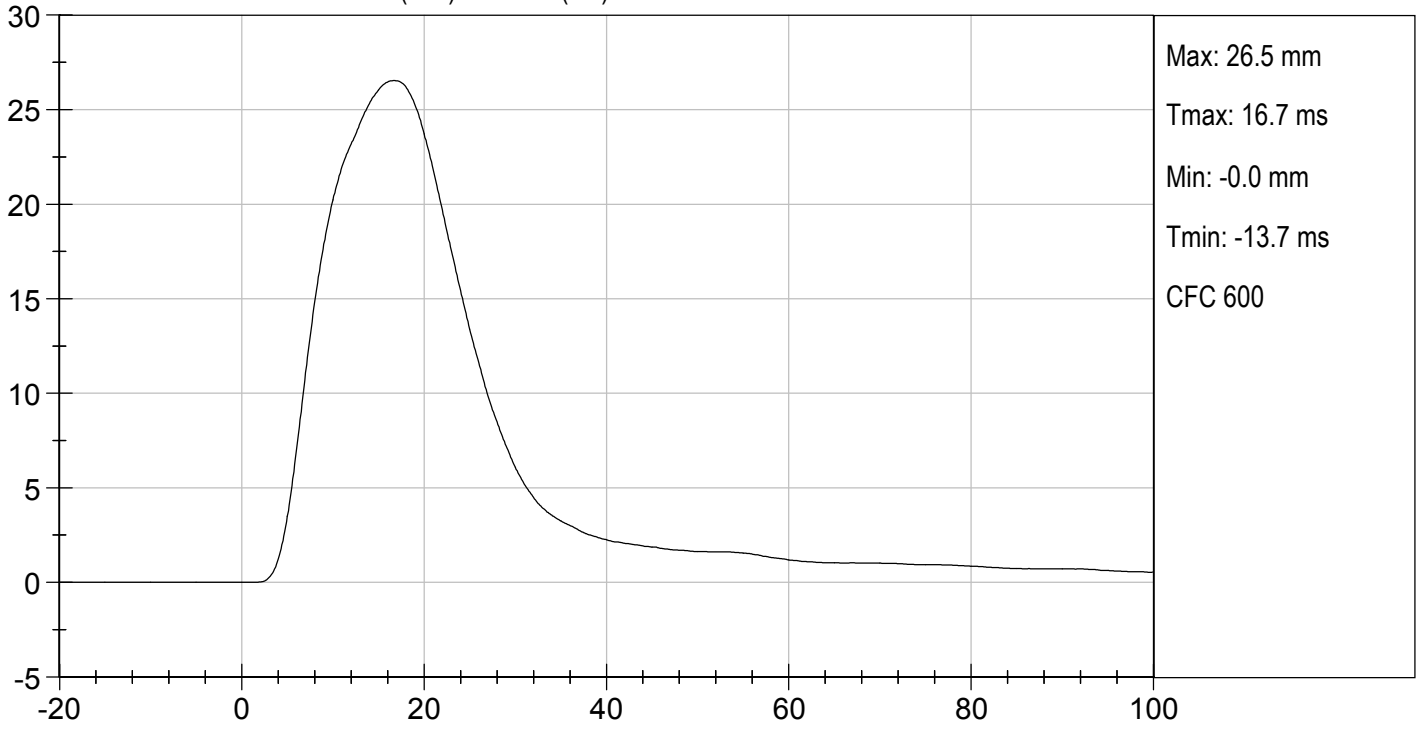
PROBE (G's) vs TIME (ms)



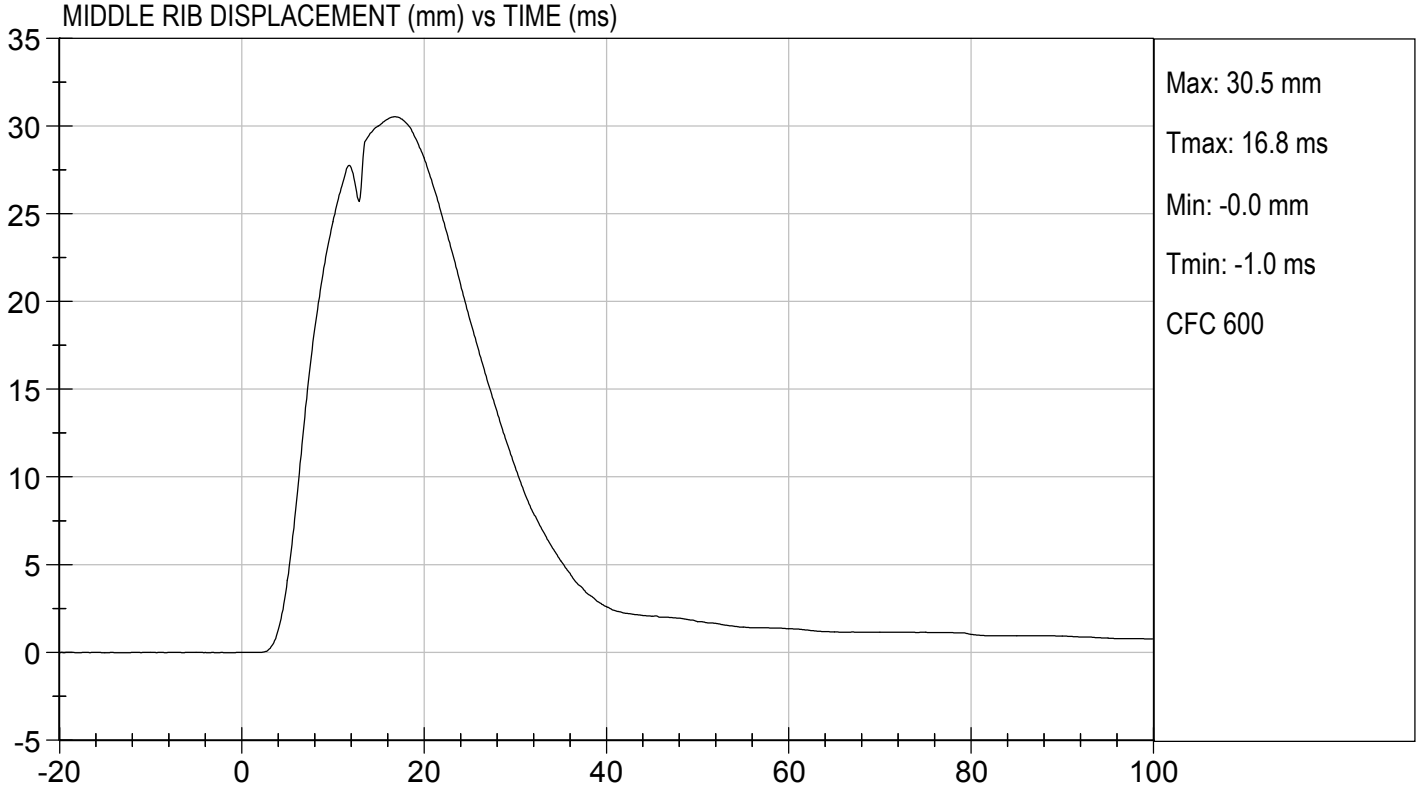
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



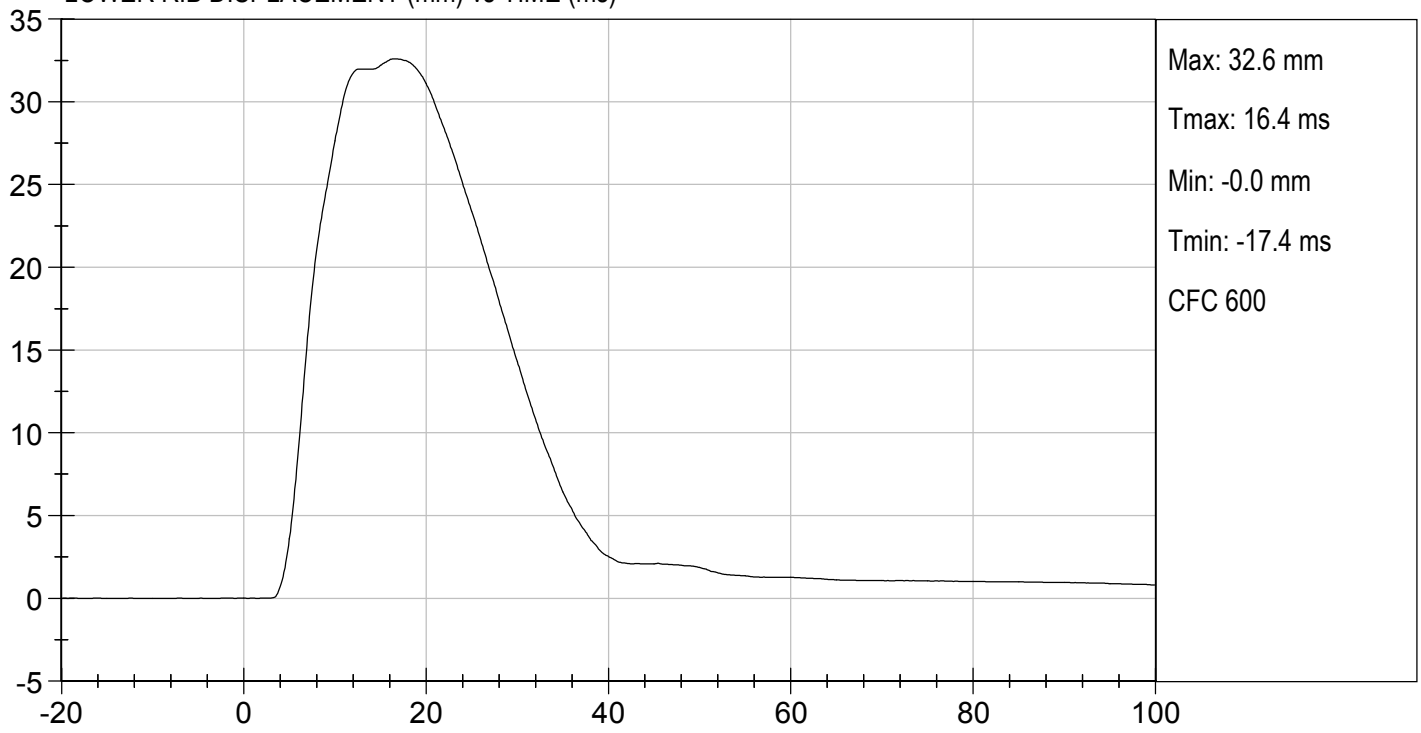
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



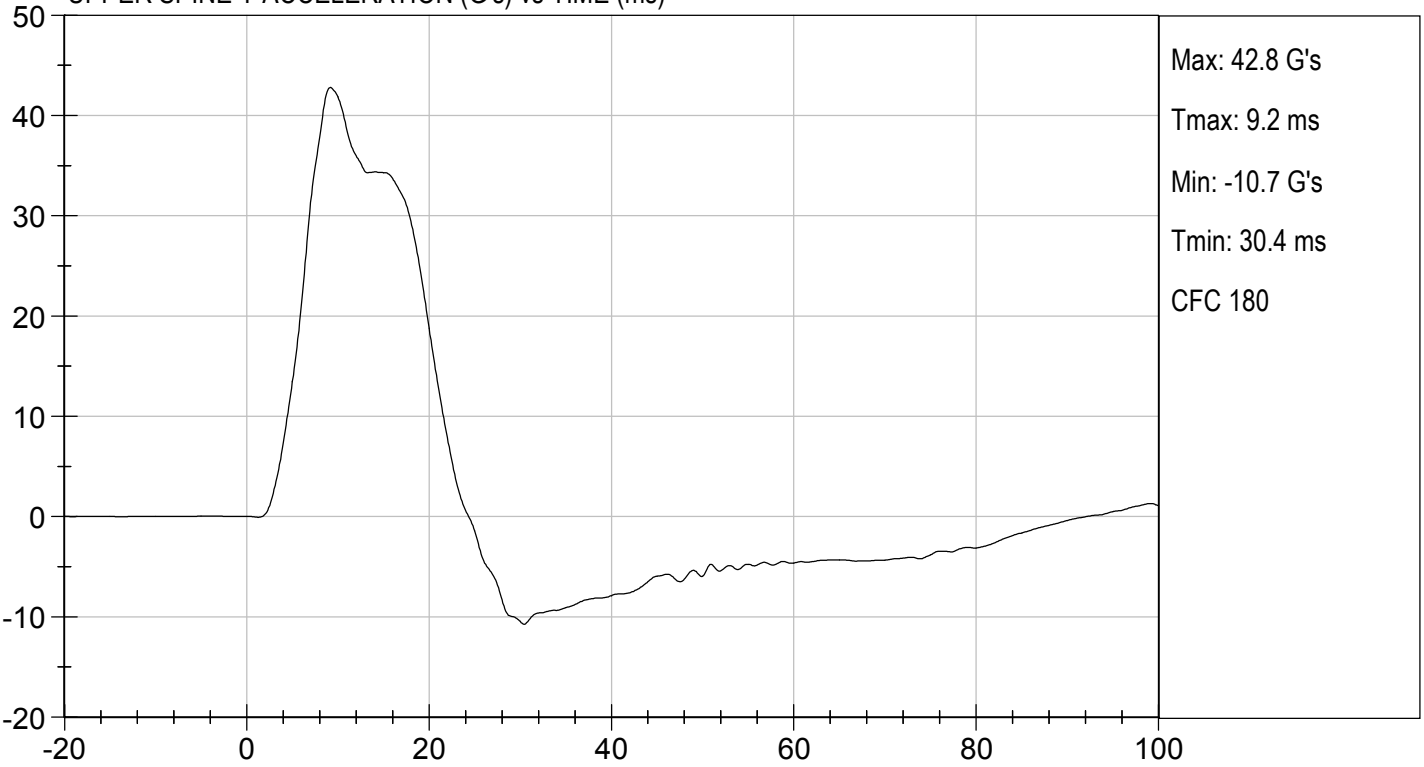
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/08/2019
TEST #: D190534

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

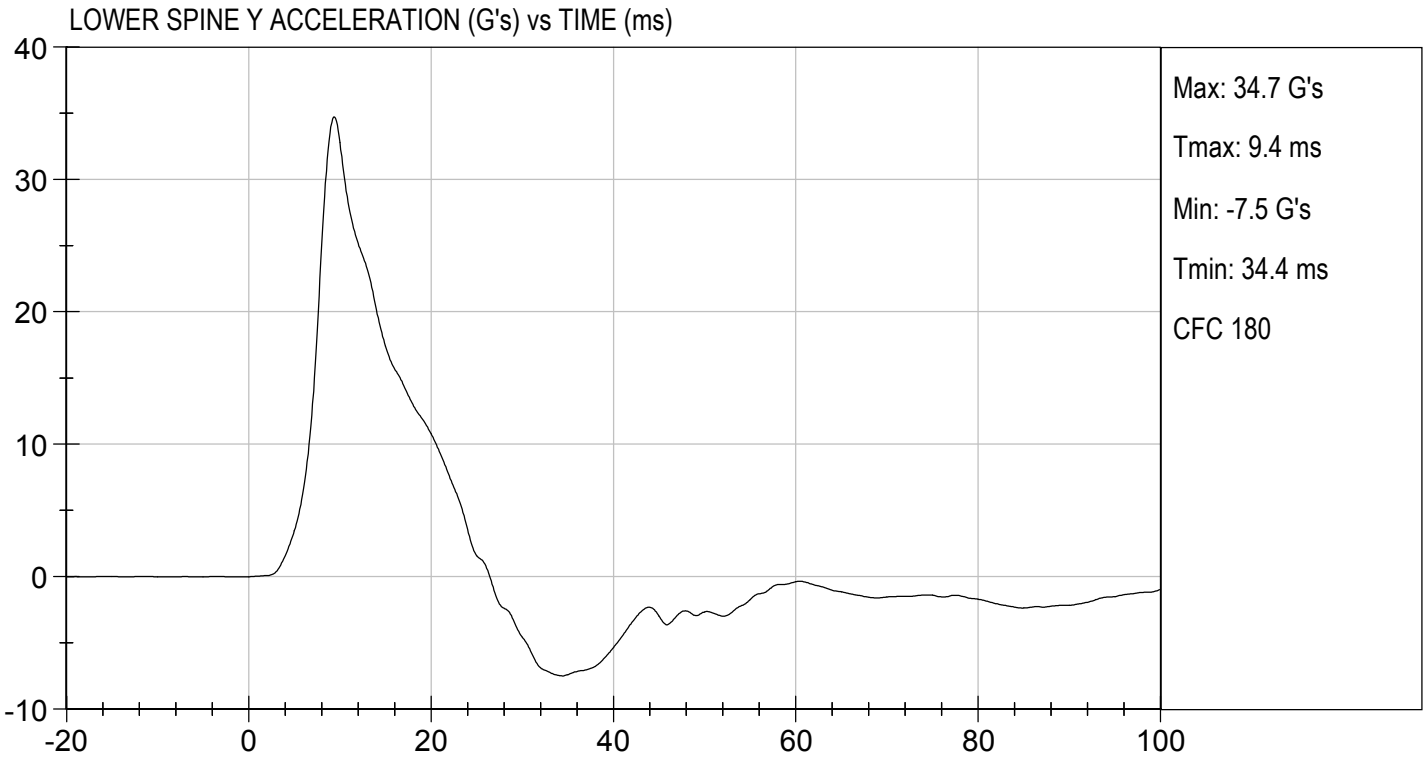


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/08/2019
TEST #: D190534



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190535

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

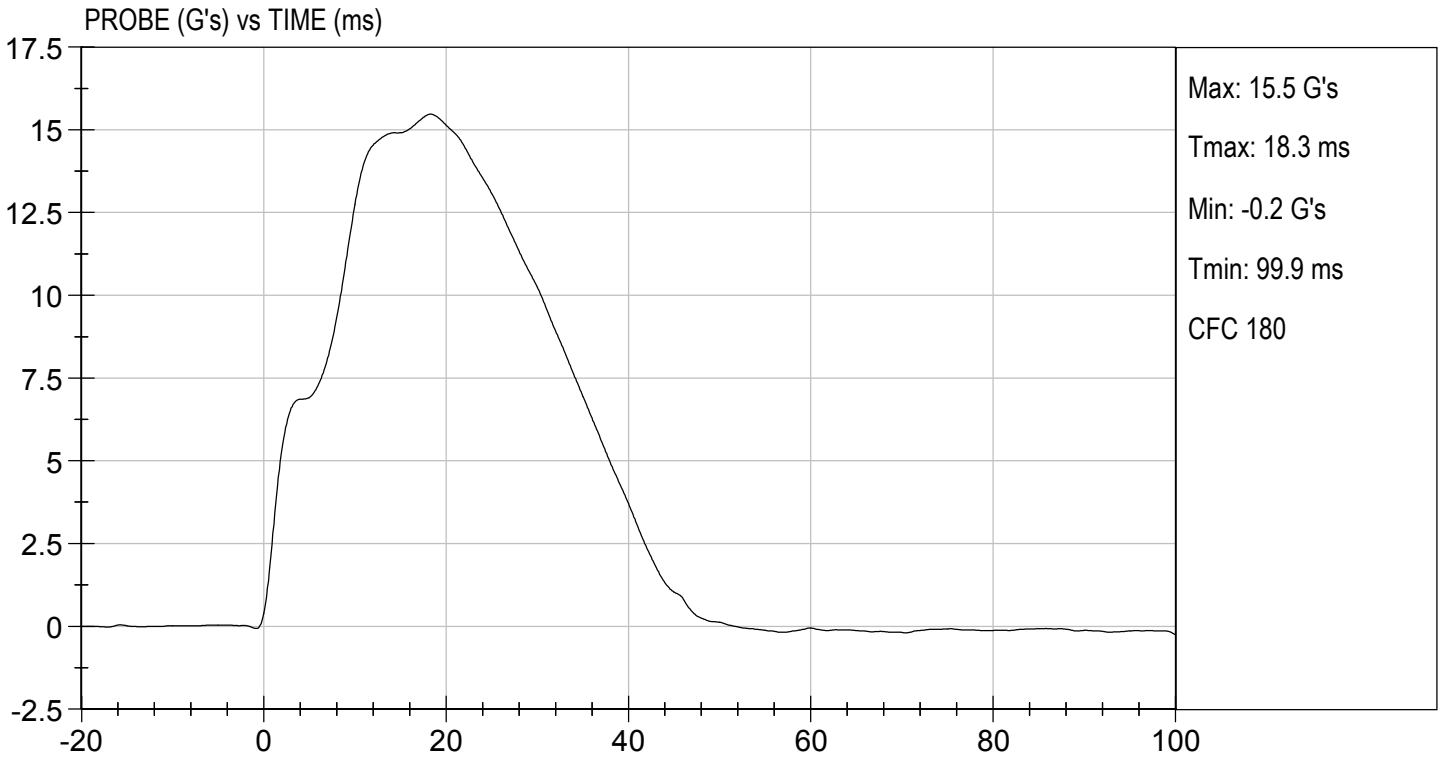
Jacob D Taylor
Laboratory Technician

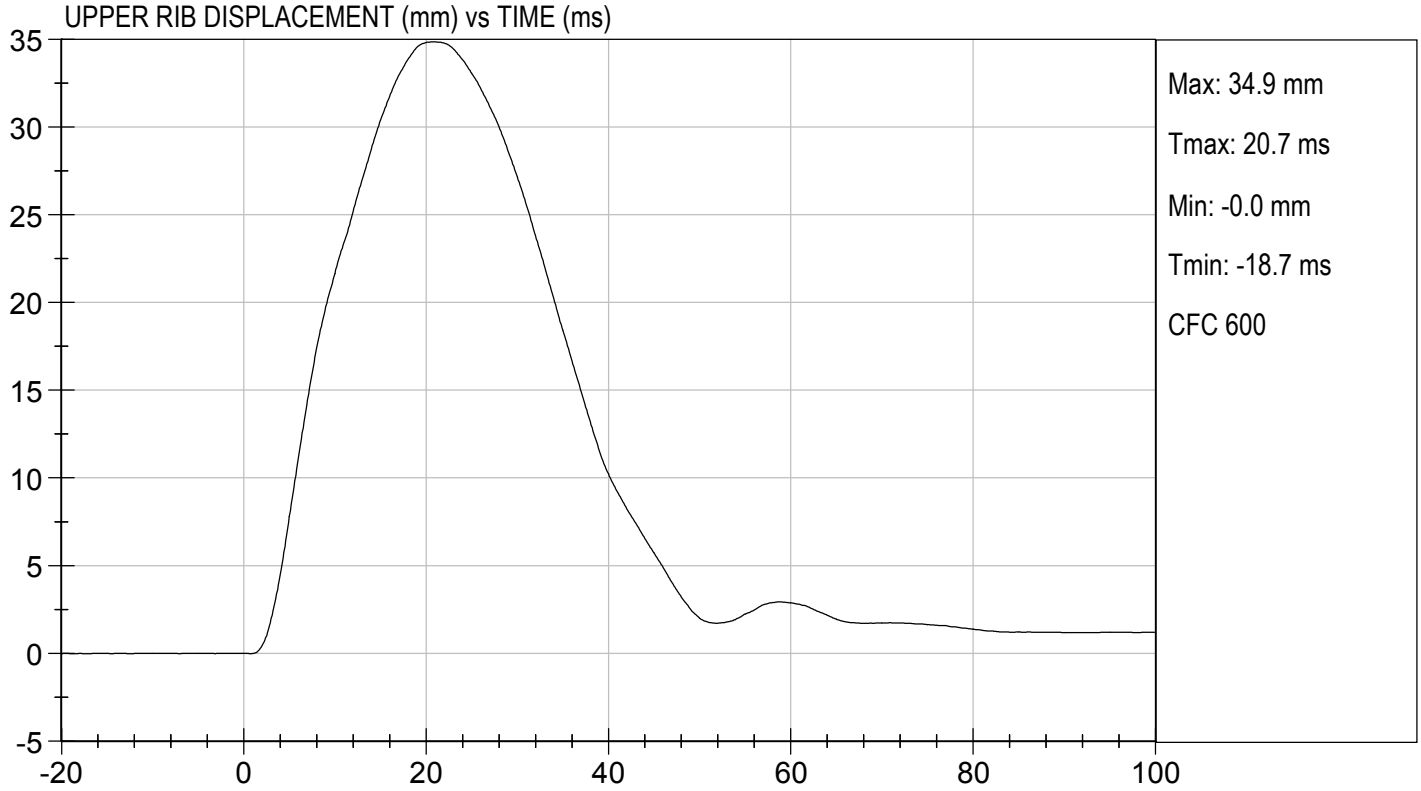
02/08/2019
Test Date

Robert Schmulen
Approved By

TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/08/2019
TEST #: D190535

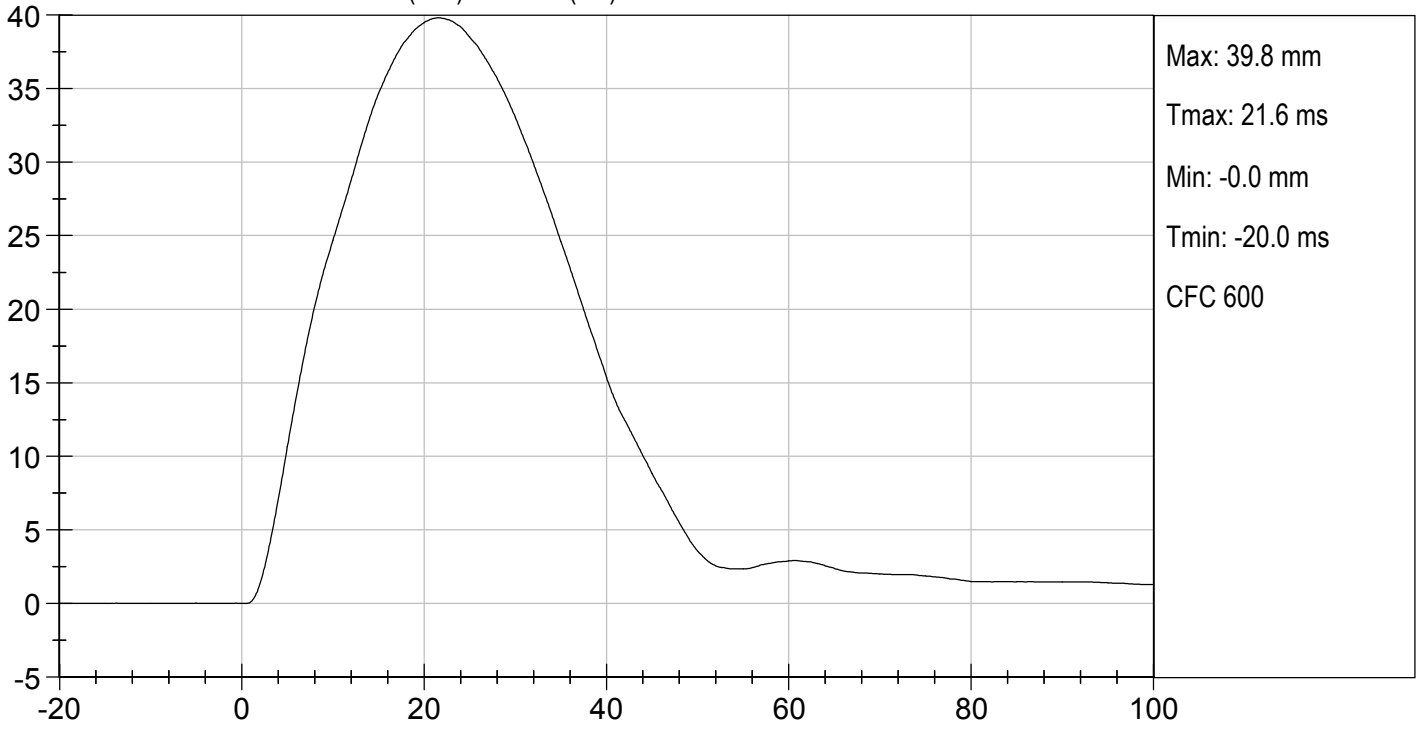




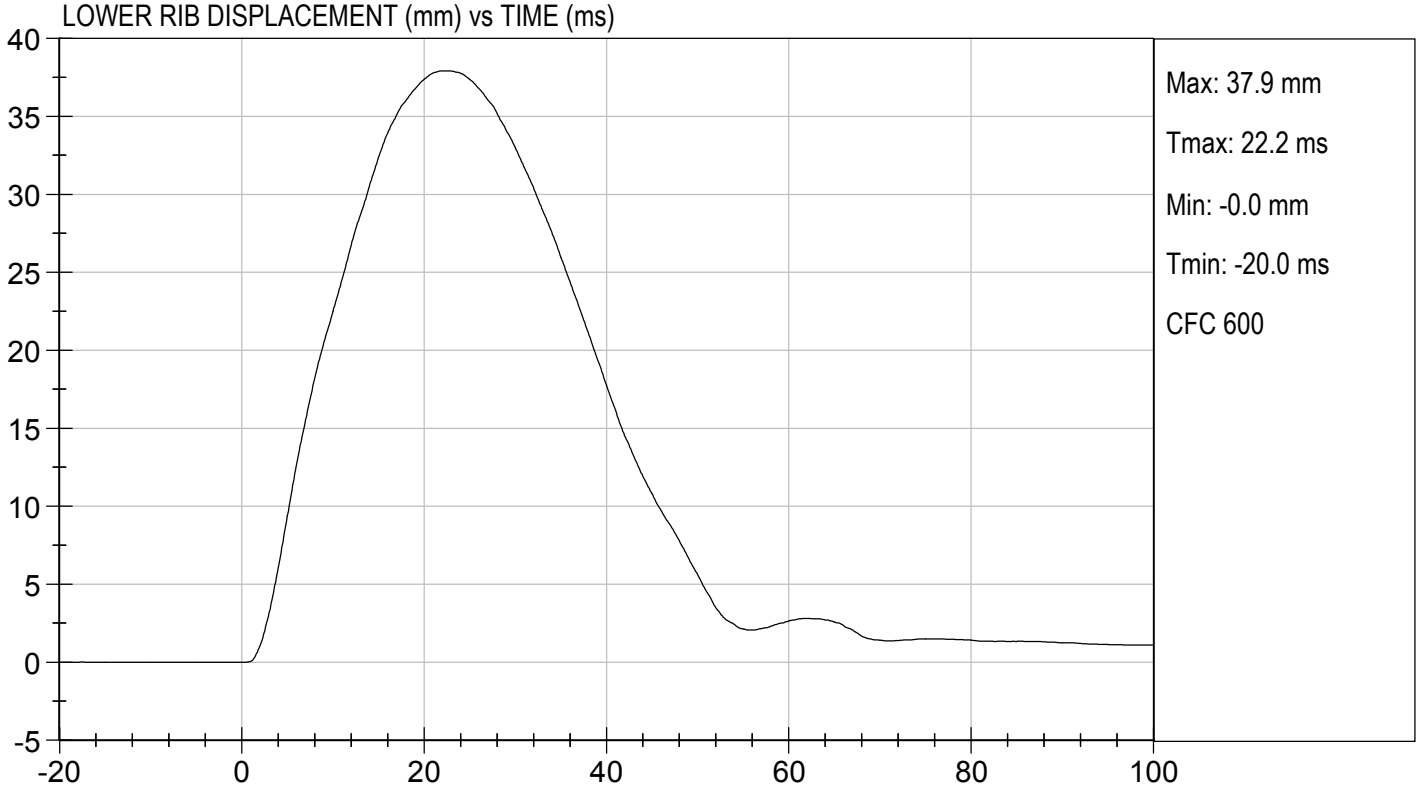
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/08/2019
TEST #: D190535

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



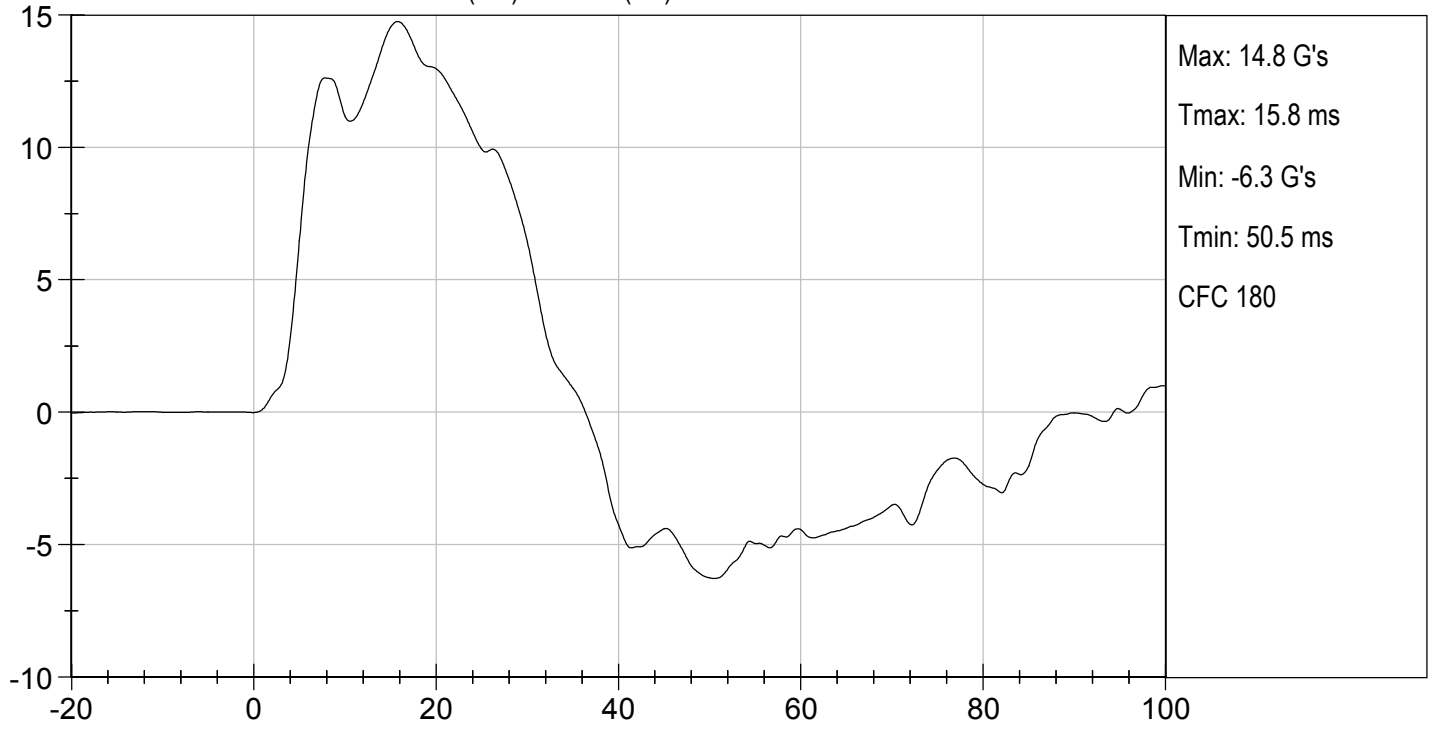
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



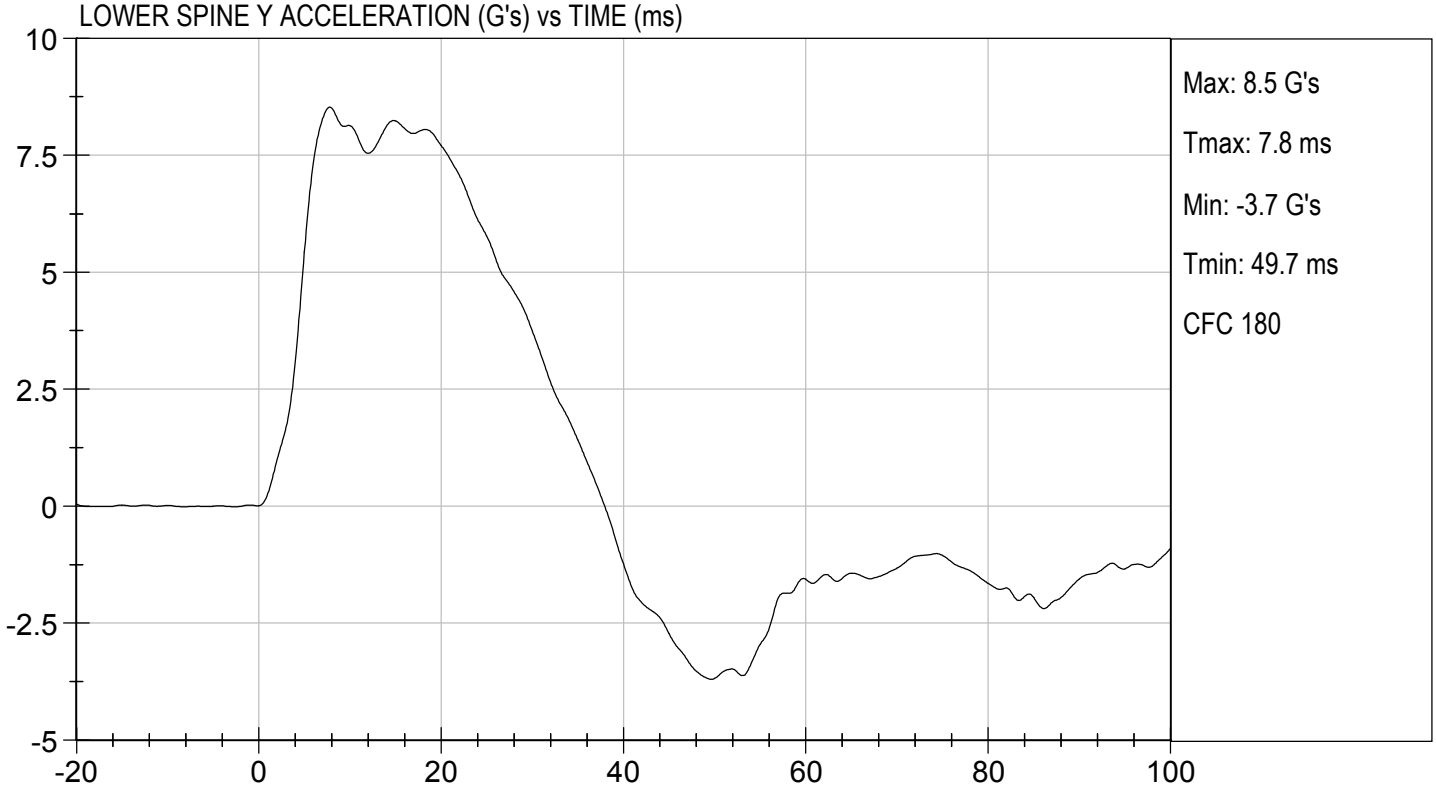
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/08/2019
TEST #: D190535

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



LOWER SPINE Y ACCELERATION (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190536

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Jacob D Taylor

Laboratory Technician

02/08/2019

Test Date

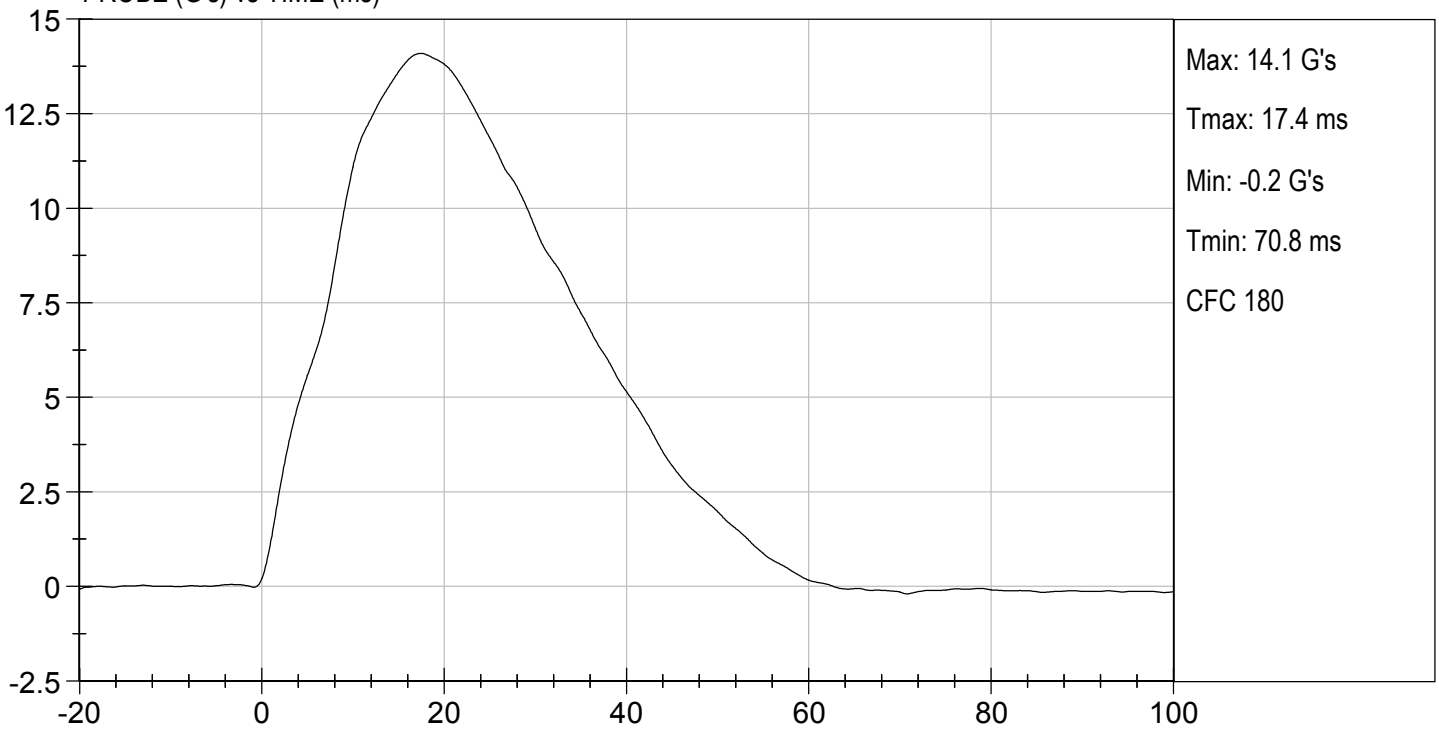
Robert Schmidt

Approved By

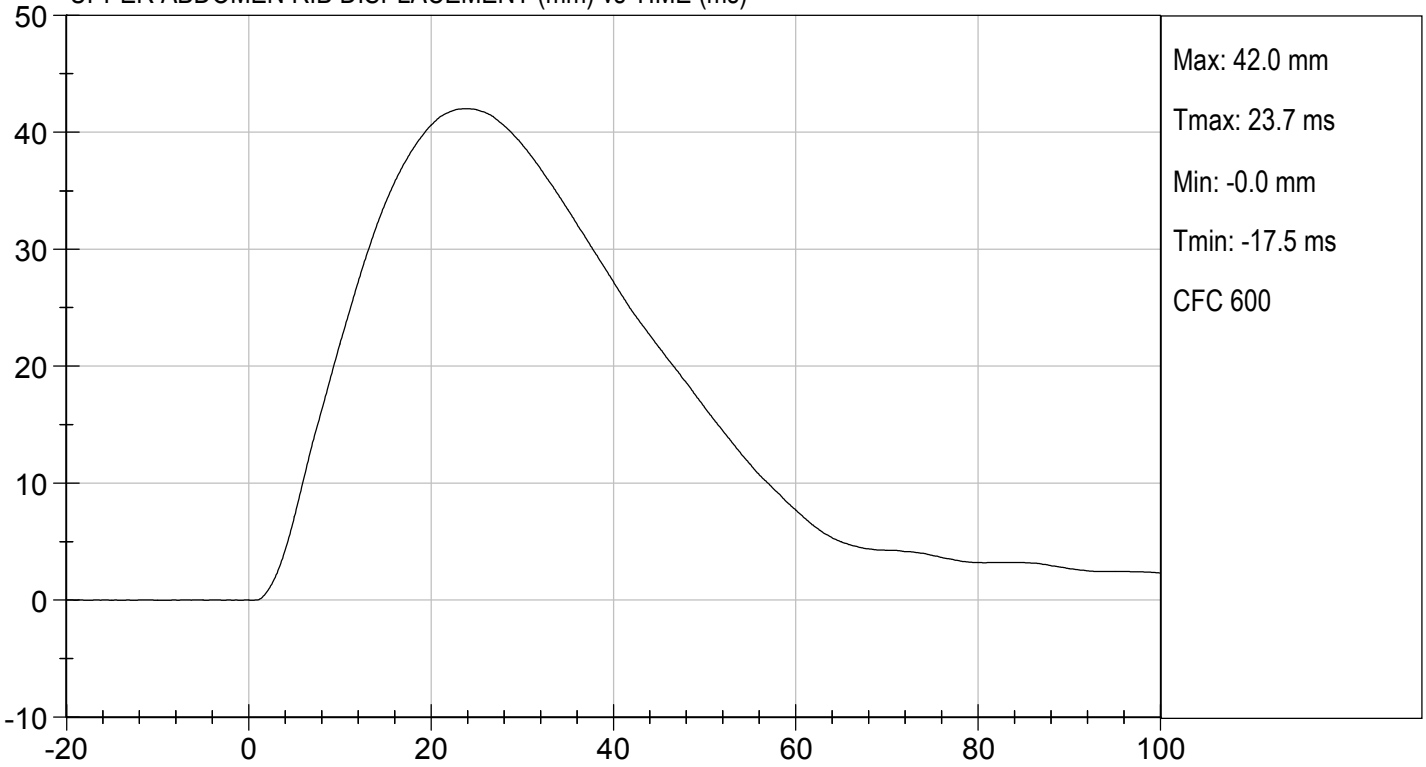
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/08/2019
TEST #: D190536

PROBE (G's) vs TIME (ms)



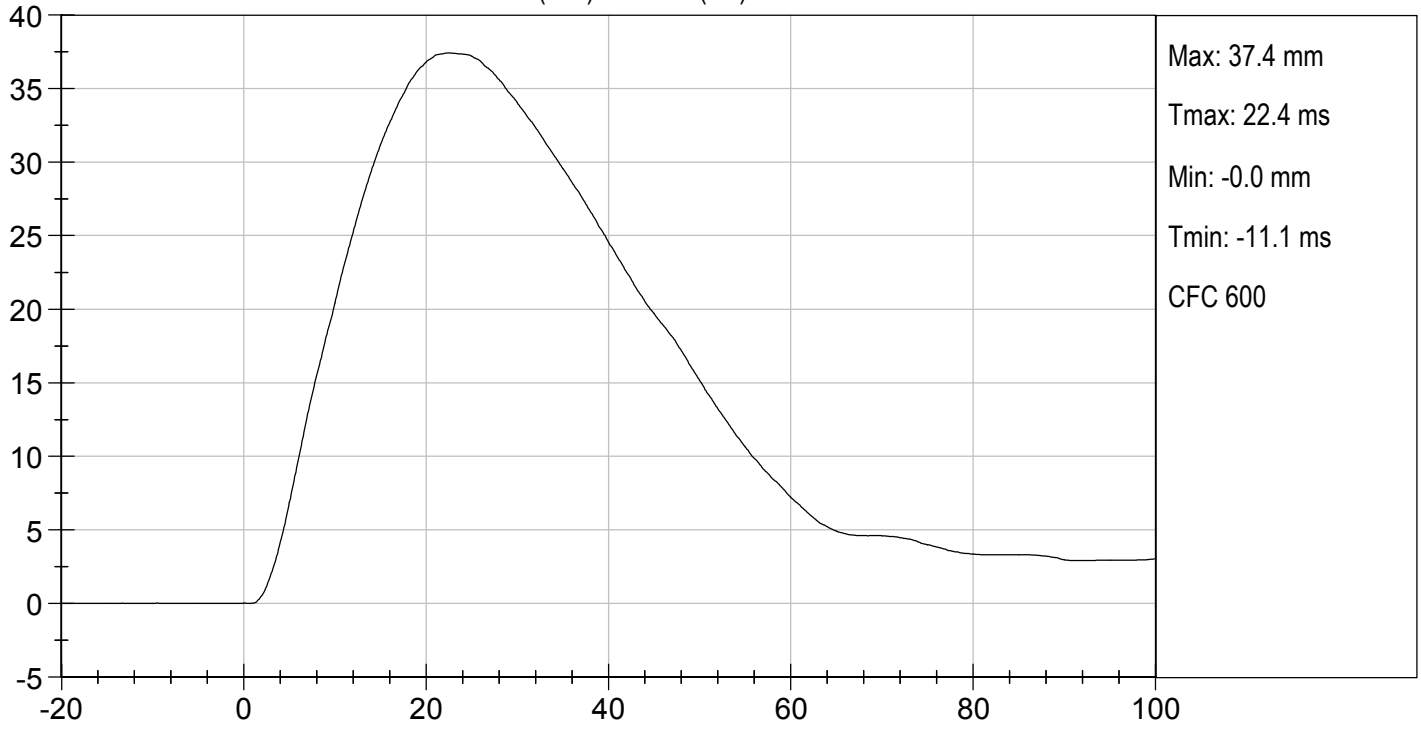
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



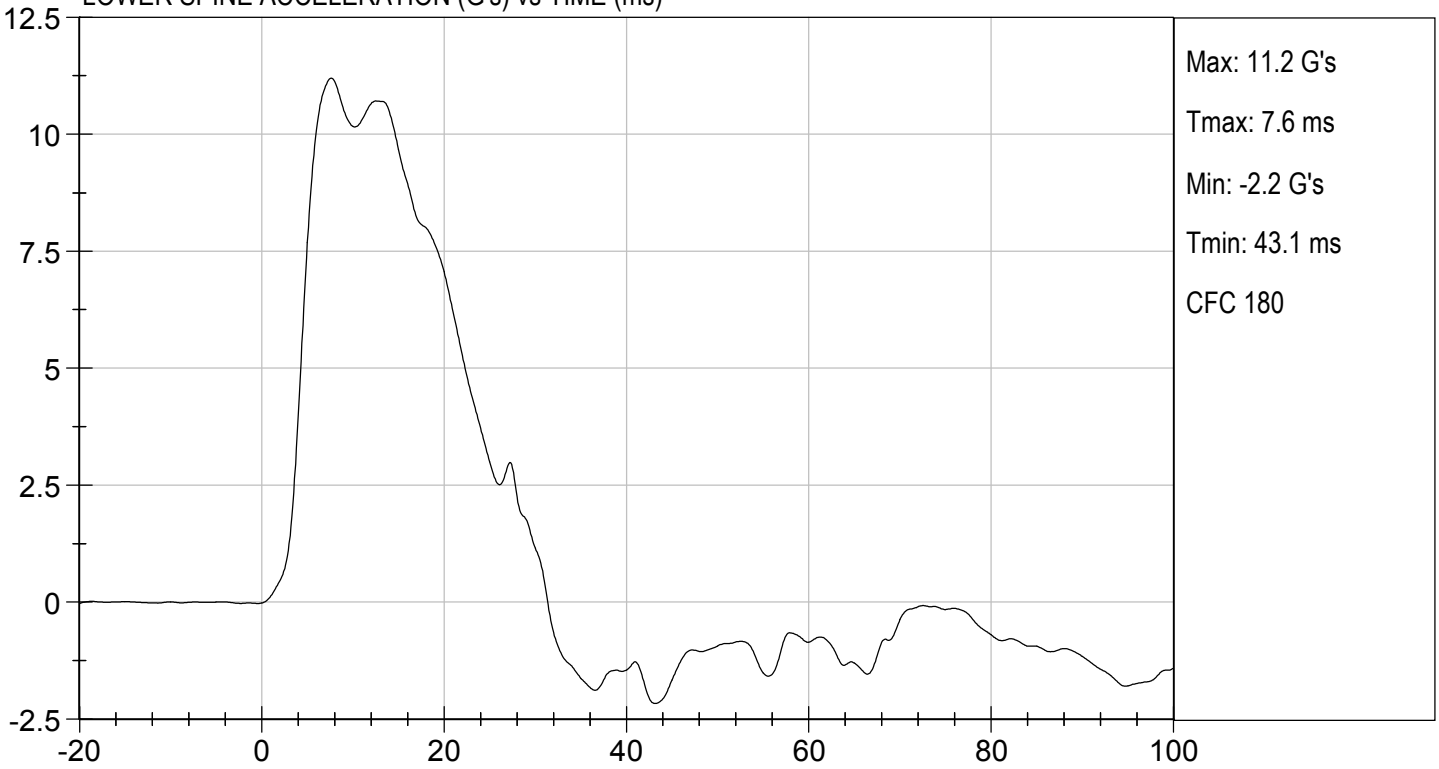
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/08/2019
TEST #: D190536

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190537

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	35	Pass
Peak Acetabulum Force	N	3600 to 4300	4,209	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

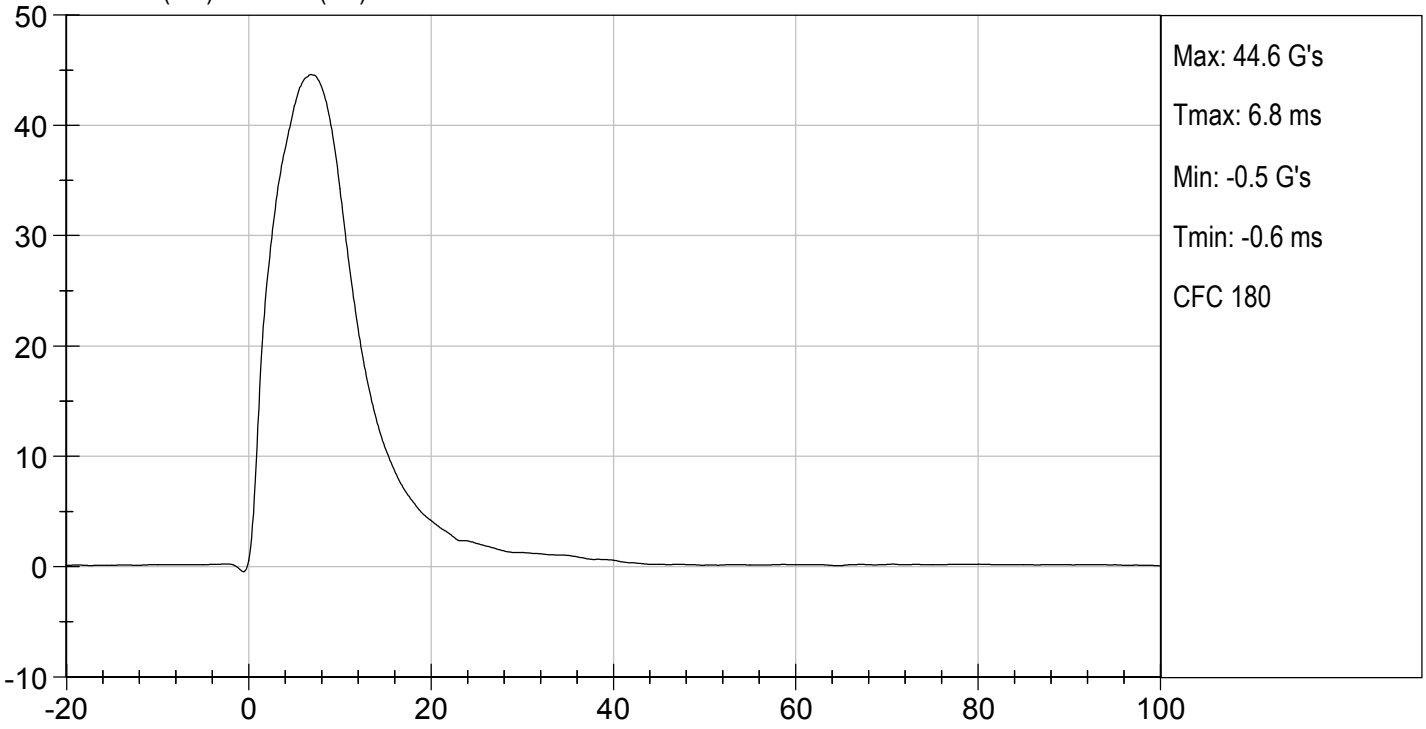
02/08/2019
Test Date

Robert Schmidt
Approved By

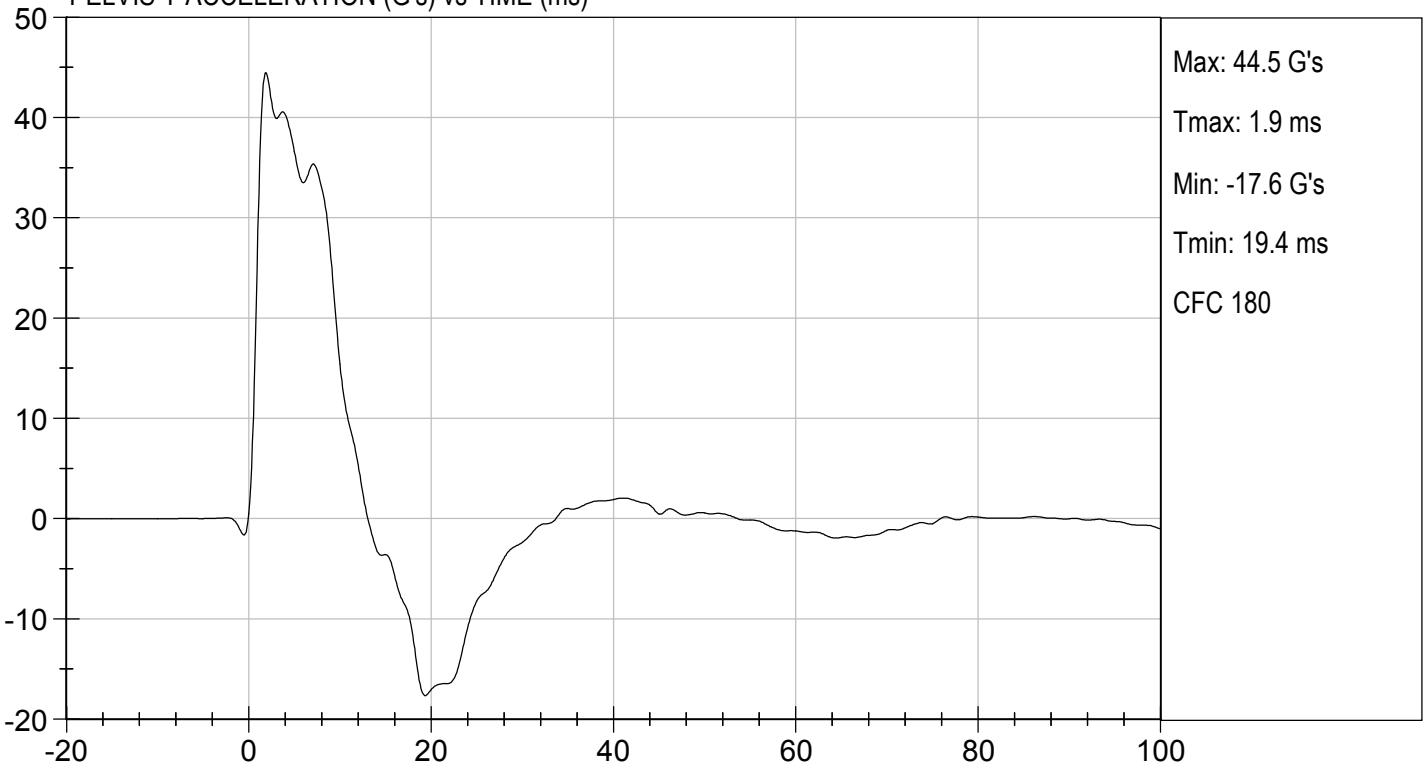
TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

TEST DATE: 02/08/2019
TEST #: D190537

PROBE (G's) vs TIME (ms)

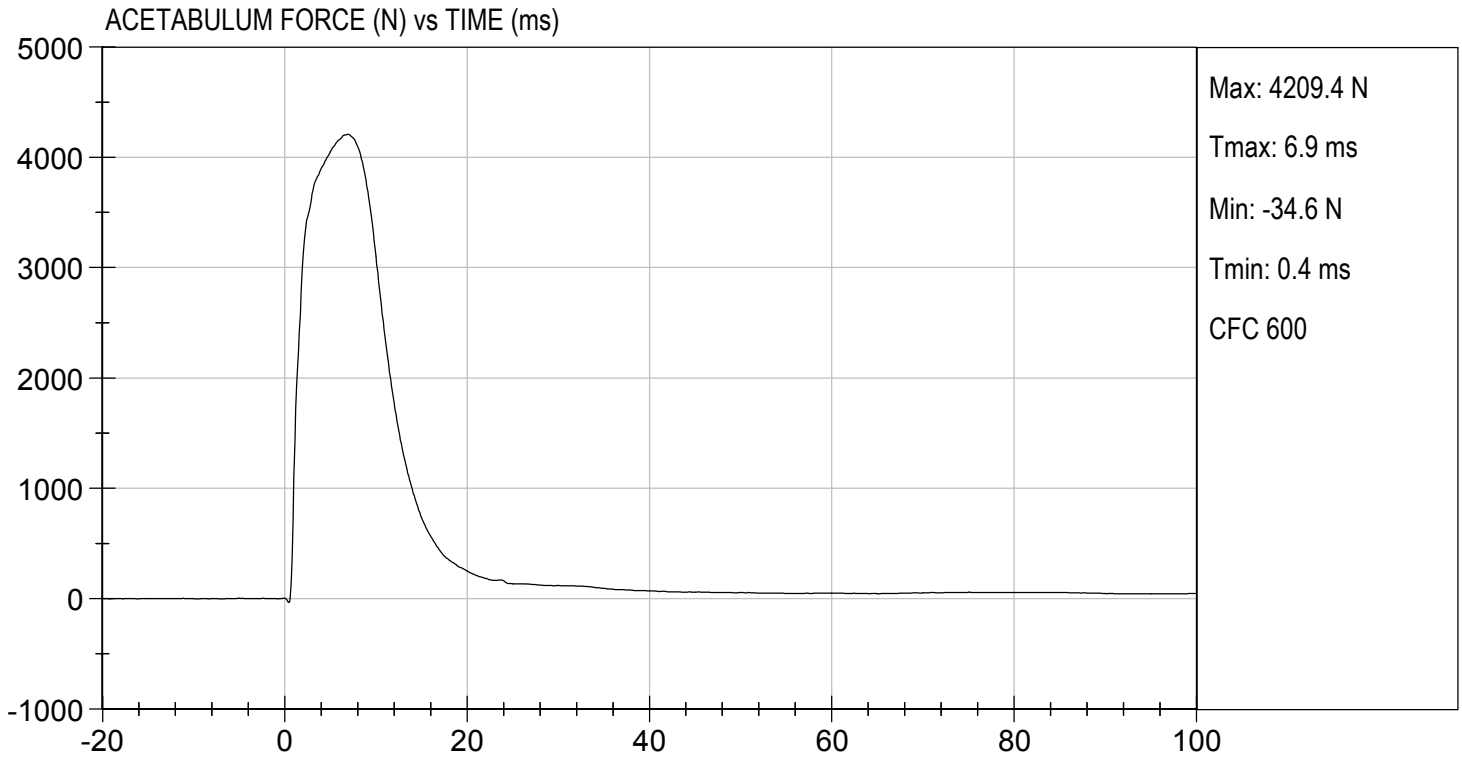


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

TEST DATE: 02/08/2019
TEST #: D190537



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D190538

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	33	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,833	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

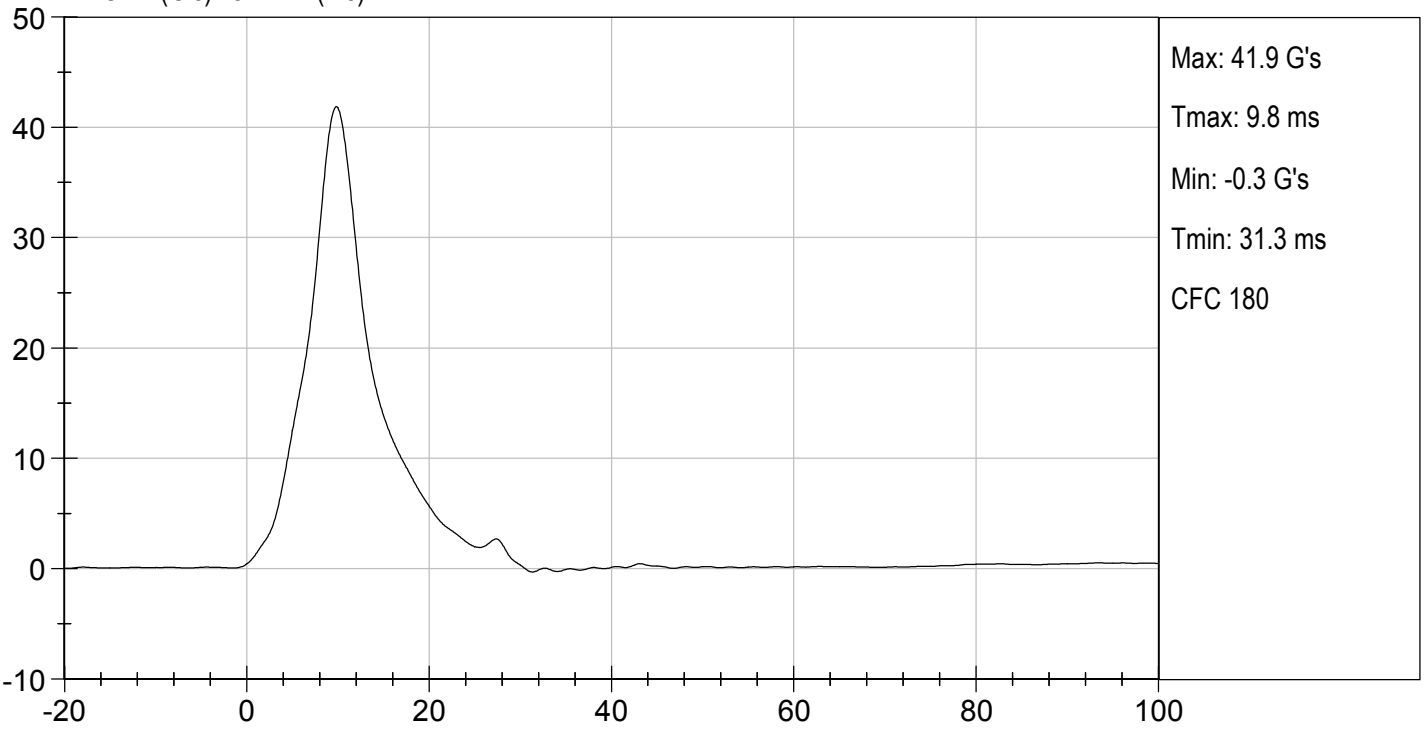
02/07/2019
Test Date

Robert Schmulen
Approved By

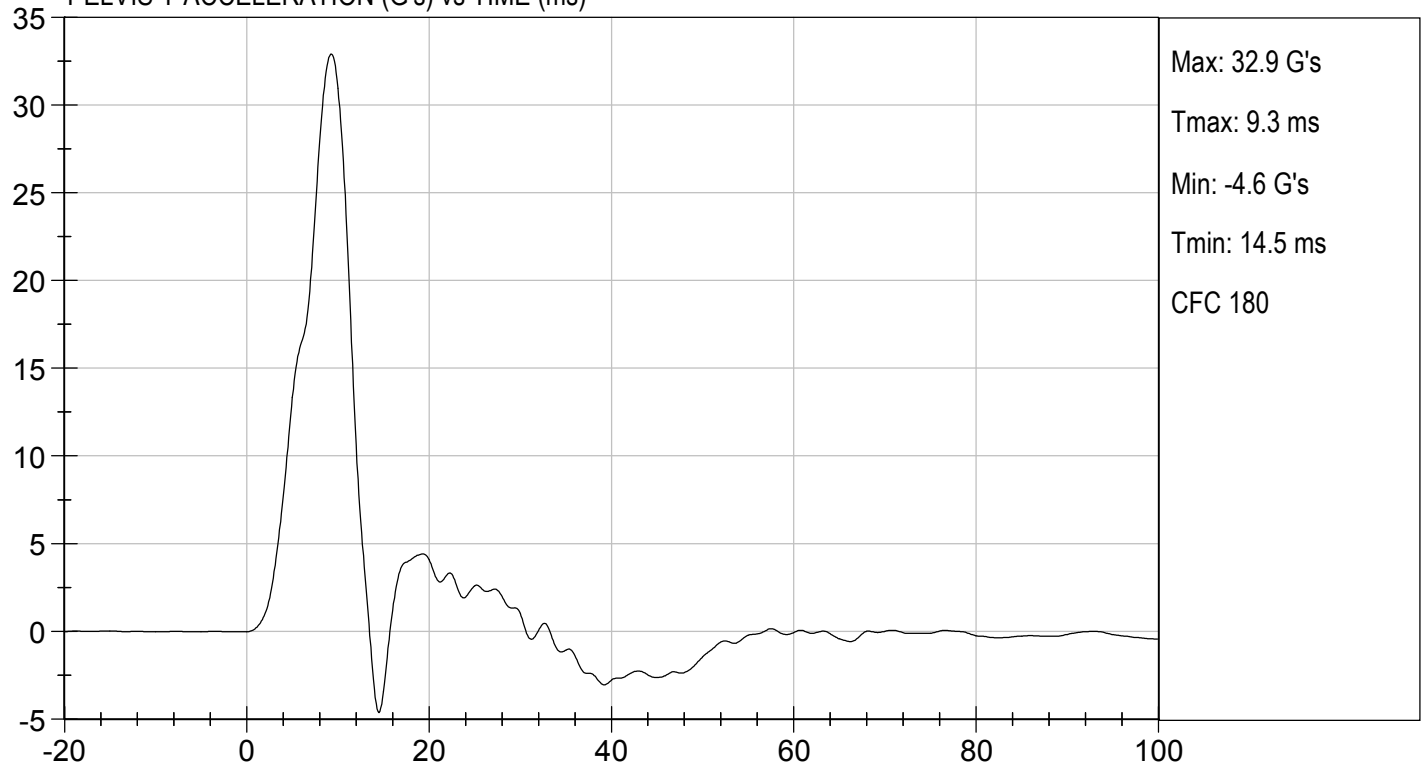
TEST DESC: ILLIAC
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/07/2019
TEST #: D190538

PROBE (G's) vs TIME (ms)



PELVIS Y ACCELERATION (G's) vs TIME (ms)



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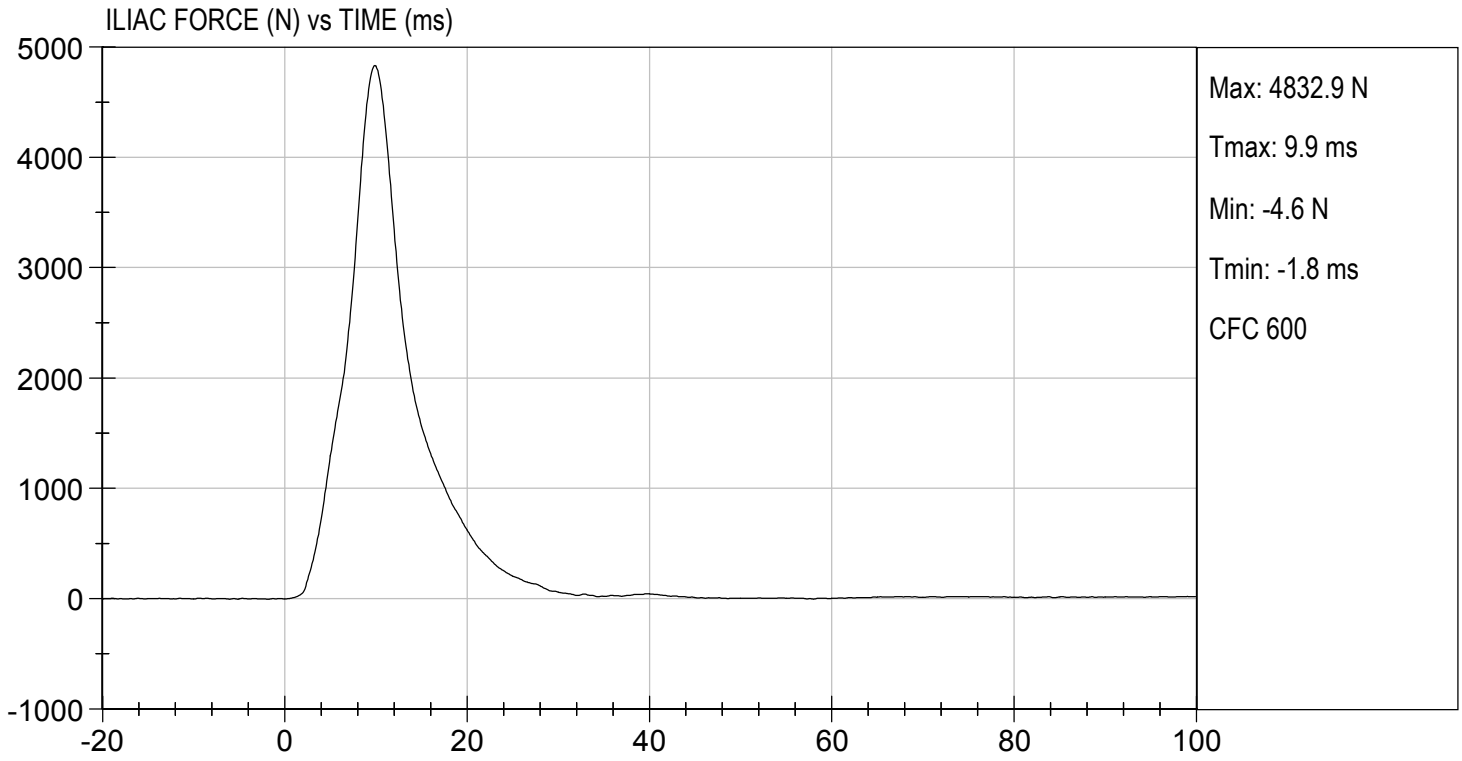
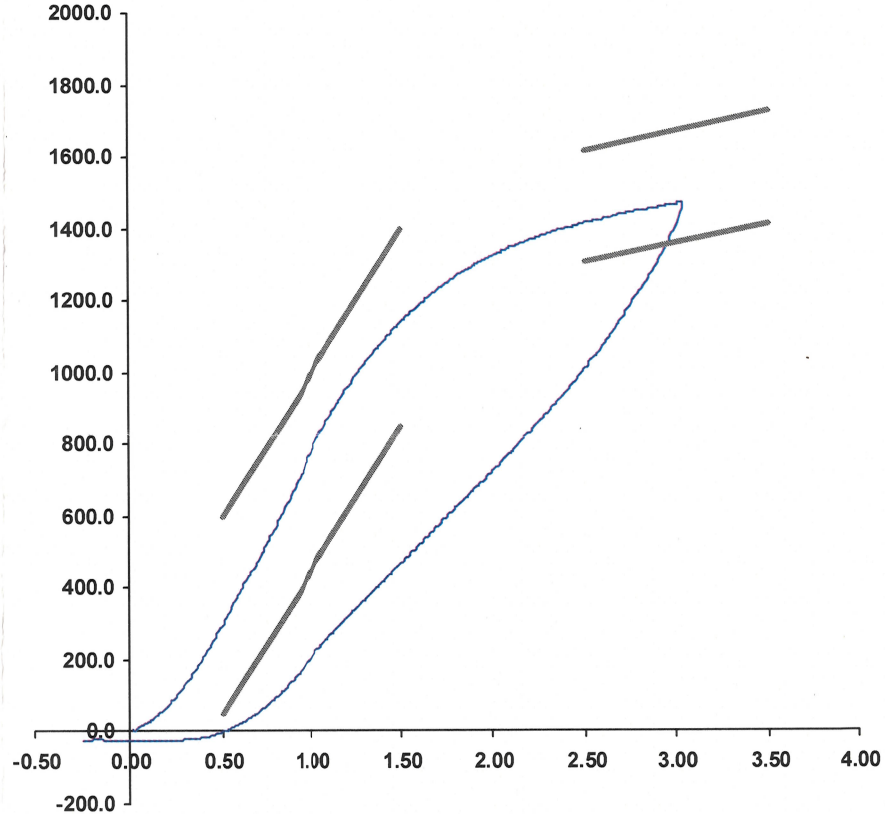


SID-IIs Pelvis Plug Certification Test

Plug S/N 12179
Test Number 6539
Report Number 6554
Test Date 3/1/2018 9:09:56 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	295.05	50.00	600.00
Force @ 1.5 mm (N)	1,145.22	850.00	1,400.00
Force @ 2.5 mm (N)	1,417.42	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,469.06	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 **01-Mar-18**
SACO Research

By : DC Date : 3/1/18

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

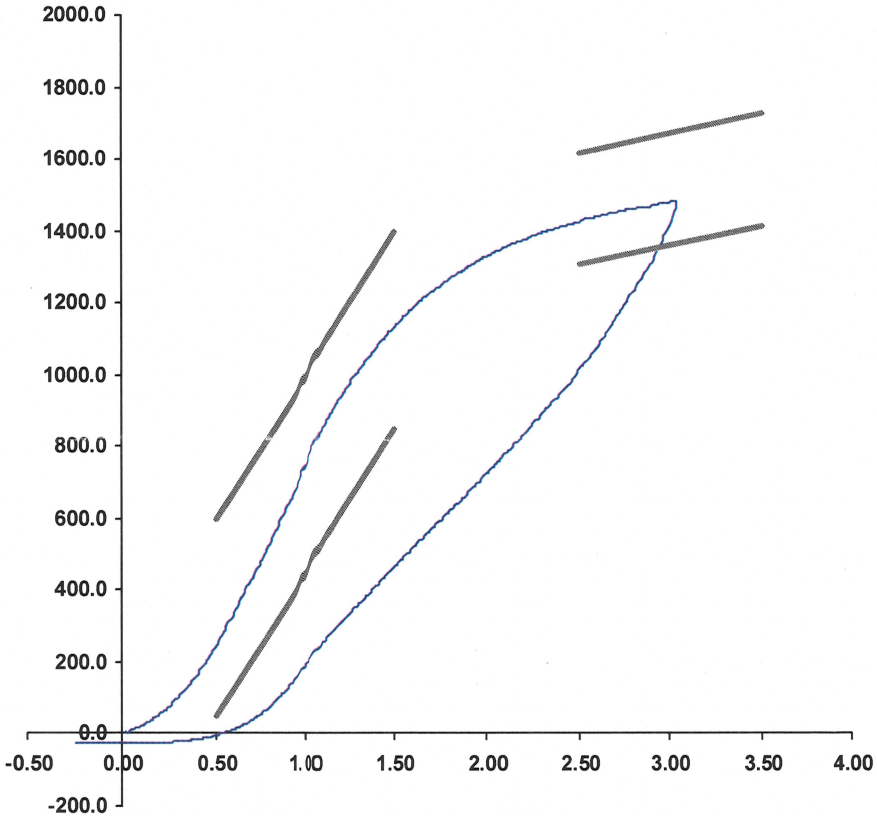
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 12186
Test Number 6546
Report Number 6561
Test Date 3/1/2018 9:17:22 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	245.98	50.00	600.00
Force @ 1.5 mm (N)	1,136.34	850.00	1,400.00
Force @ 2.5 mm (N)	1,427.29	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,480.98	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 **01-Mar-18**
SACO Research

By : DC Date : 3/1/18

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APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N 032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79711	Endevco	01/18/19
		Y	P79712	Endevco	01/18/19
		Z	P88170	Endevco	01/18/19
		Xr	P79750	Endevco	01/18/19
		Yr	P79751	Endevco	01/18/19
		Zr	P79753	Endevco	01/18/19
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	01/18/19
	Middle	Y	G169	Honeywell	01/18/19
	Lower	Y	G164	Honeywell	01/18/19
Abdomen Load Cells	Forward	Y	ABG1513FY	Denton	09/12/18
	Middle	Y	ABG1531FY	Denton	09/12/18
	Rear	Y	ABG1536FY	Denton	09/12/18
Lower Spine Accelerometers (T12)		X	P79574	Endevco	01/18/19
		Y	P82097	Endevco	01/18/19
		Z	P82603	Endevco	01/18/19
Public Symphysis Load Cell		Y	PG462FY	Denton	09/12/18

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 306		
				Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers			X	P79445	Endevco	01/11/19
			Y	P79721	Endevco	01/11/19
			Z	P79724	Endevco	01/11/19
			Xr	P84999	Endevco	01/11/19
			Yr	P85000	Endevco	01/11/19
			Zr	P85001	Endevco	01/11/19
Head Angular Rate Sensors			X	ARS7416	DTS	07/15/14
			Y	ARS7442	DTS	07/15/14
			Z	ARS7475	DTS	07/08/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	01/11/19
		Middle	Y	G1261	FTSS	01/11/19
		Lower	Y	G1270	FTSS	01/11/19
	Abdominal Rib	Upper	Y	G032	FTSS	01/11/19
		Lower	Y	G1304	FTSS	01/11/19
Lower Spine Accelerometers (T12)			X	P96332	Endevco	01/11/19
			Y	P96335	Endevco	01/11/19
			Z	P96341	Endevco	01/11/19
Acetabulum Load Cell			Y	ACG268FY	Denton	12/04/18
Iliac Wing Load Cell			Y	IWG273FY	Denton	12/04/18
Pelvis Plug (struck side)				12179	SACO	03/01/18
Pelvis Plug (non-struck side)				12186	SACO	03/01/18

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	PCB1340	PCB	08/14/18
	Vehicle Center of Gravity	Y	PCB1339	PCB	08/14/18
	Vehicle Center of Gravity	Z	PCB1359	PCB	08/14/18
2	Right Sill at Front Seat	X	T17564	Endevco	12/19/18
	Right Sill at Front Seat	Y	T17570	Endevco	12/19/18
	Right Sill at Front Seat	Z	T17579	Endevco	12/19/18
3	Right Sill at Rear Seat	X	PCB1289	PCB	12/28/18
	Right Sill at Rear Seat	Y	PCB1230	PCB	12/28/18
	Right Sill at Rear Seat	Z	PCB914	PCB	12/28/18
4	Left Sill at Front Door	Y	PCB1377	PCB	08/20/18
5	Left Sill at Rear Door	Y	PCB897	PCB	01/09/19
6	Left A-Post Lower	Y	PCB1259	PCB	12/21/18
7	Left A-Post Middle	Y	PCB1254	PCB	12/21/18
8	Left B-Post Lower	Y	T17918	Endevco	01/14/19
9	Left B-Post Middle	Y	T19038	Endevco	01/23/19
10	Front Seat Track	Y	PCB1109	PCB	09/25/18
11	Rear Seat Track or Structure	Y	PCB1200	PCB	10/18/18
12	Right Rear Occ. Compartment	Y	PCB1366	PCB	08/20/18
13	Engine Block	X	T17926	Endevco	01/04/19
	Engine Block	Y	T18386	Endevco	01/03/19
14	Rear Floorpan Above Axle	X	T18342	Endevco	01/14/19
	Rear Floorpan Above Axle	Y	T18344	Endevco	01/14/19
	Rear Floorpan Above Axle	Z	T18391	Endevco	01/14/19

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB511D	PCB	9/24/2018
MDB Center of Gravity	Y	PCB753D	PCB	9/24/2018
MDB Center of Gravity	Z	PCB557D	PCB	9/24/2018
Left Frame at Rear Axle Centerline	X	PCB660D	PCB	9/26/2018
Left Frame at Rear Axle Centerline	Y	PCB659D	PCB	9/26/2018