REPORT NUMBER: SINCAP-MGA-20-016

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

GENERAL MOTORS LLC
2020 GMC Acadia SLE 5-Door SUV
NHTSA No.: M20200113

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: February 21, 2020

Final Report Date: May 19, 2020

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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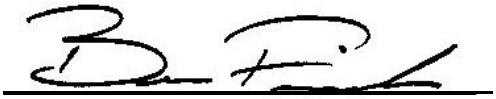
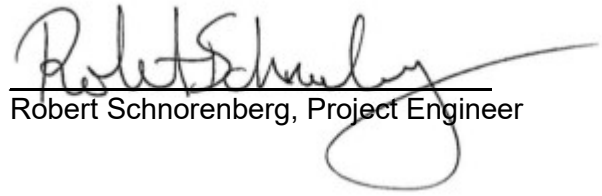
Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: May 19, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing of 2020 GMC Acadia SLE 5-Door SUV, NHTSA No.: M20200113	May 19, 2020
	6. Performing Organization Code MGA
7. Author(s) Ben Fischer, Project Engineer	**8. Performing Organization Report No.** SINCAP-MGA-20-016
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 21, 2020 to May 19, 2020
	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 subject 2020 GMC Acadia SLE 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB 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 21, 2020.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.98 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.7°C. The target vehicle post-test maximum crush was 239 mm at level 3. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	125
Maximum Thorax Rib Deflection	mm	44	24
Total Abdominal Force	N	2500	695
Pubic Symphysis Force	N	6000	1083
Resultant Lower Spine Acceleration	g	82*	24

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	276
Resultant Lower Spine Acceleration	g	82	51
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3553
Maximum Thoracic Rib Deflection	mm	38*	27
Maximum Abdomen Rib Deflection	mm	45*	28

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

19. Security Classification of Report	20. Security Classification of Page	21. No. of Pages	22. Price
Unclassified	Unclassified	225	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2020 GMC Acadia SLE 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 2018.

SUMMARY

A 2020 GMC Acadia SLE 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 61.98 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 21, 2020. Pre-test and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS NCAP Side Laboratory Test Procedure dated October 2018. 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
Head Triaxial 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

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	125
Maximum Thorax Rib Deflection	mm	44	24
Total Abdominal Force	N	2500	695
Pubic Symphysis Force	N	6000	1083
Resultant Lower Spine Acceleration	g	82*	24

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	276
Resultant Lower Spine Acceleration	g	82	51
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3553
Maximum Thoracic Rib Deflection	mm	38*	27
Maximum Abdomen Rib Deflection	mm	45*	28

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Struck Side Driver		Struck Side Left 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	No	
Side Airbag (Front Center Airbag)	Yes	Yes		
Seat Belt Pretensioner	Yes	Yes	No	
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

Left Lower B-Post Y was not installed.
Left Mid A-Post Y was not installed.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20200113	Traction Control System (TCS)	Yes
Model Year	2020	Auto-Leveling System	No
Make	GMC	Automatic Door Locks (ADL)	Yes
Model	Acadia SLE	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	No
VIN	1GKKNKLA0LZ154500	Driver Front Airbag	Yes
Body Color	Quicksilver Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	156 km / 97 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.5 L	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	9	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	No
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	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Front Center Airbag	Yes

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

DATA FROM CERTIFICATION LABEL

Manufactured By	GENERAL MOTORS LLC
Date of Manufacture	12/19
Vehicle Type	MPV

GVWR (kg)	2722
GAWR Front (kg)	1250
GAWR Rear (kg)	1545

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	2	2	6	
Capacity Weight (VCW) (kg)				891	(A)
DSC x 68.04 kg				408	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				136*	(A-B)

* Rated Cargo and Luggage Weight (RCLW) limited to maximum of 300 lbs (136 kg).

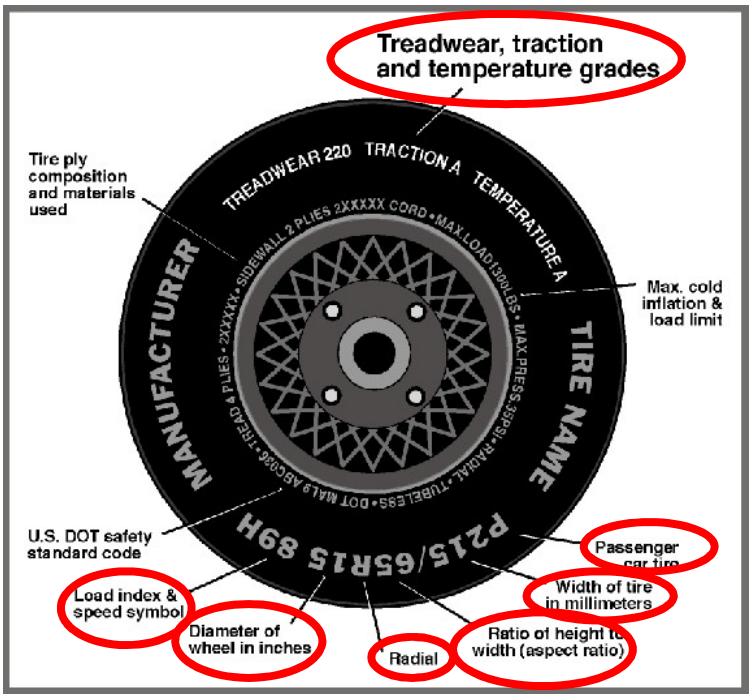
VEHICLE SEAT TYPE

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

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

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
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	106H	106H
Tire Material	Rubber	Rubber
DOT Safety Code Left	A3LM WD30 4019	A3LM WD30 3919
DOT Safety Code Right	A3LM WD30 4019	A3LM WD30 4119

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

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	240	250	240
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

MDB TIRE SPECIFICATIONS

	Requirement	Units	LF	RF	LR	RR
Tire Size	P205/75R15	N/A	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	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	506.5	516.5		547.0	514.5		528.5	544.5	
Right	kg	406.0	367.0		527.5	465.0		510.5	477.5	
Ratio	%	50.8%	49.2%		52.3%	47.7%		50.4%	49.6%	
Totals	kg	912.5	883.5	1796.0	1074.5	979.5	2054.0	1039.0	1022.0	2061.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1796.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	136	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2061.0	(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	842	844	Yes
Right Front	mm	846	840	Yes
Right Rear	mm	858	864	Yes
Left Rear	mm	852	850	Yes
Vehicle CG (Aft of Front Axle)	mm	1418	1364	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	34	27	

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)
*** 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: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	125
Components Removed: none	kg	

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	
Aft 25 mm Target	mm	
Pre-Impact Angle Line	mm	

Parallel Track Target	Units	X Location	Y Location
A	mm	0	0
B	mm		
C	mm		
D	mm		

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

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	14.2	9.8	12.0
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			

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	12.0	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			Max			
			Mid			
			Min			

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

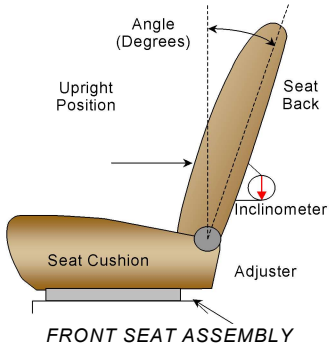
Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

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	140	15	140	14
Non-Struck Side Rear Seat	140	15	140	14
Rear Center Seat				

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 2018. 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	66.1	33	-17.0	9
Front Passenger Seat	66.1	33	-16.7	10
Front Center Seat				
Struck Side Rear Seat	12.4	7	14.1	0
Non-Struck Side Rear Seat	12.4	7	14.1	0
Rear Center Seat				

Seat back angles measured on outboard headrest post.

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

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

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

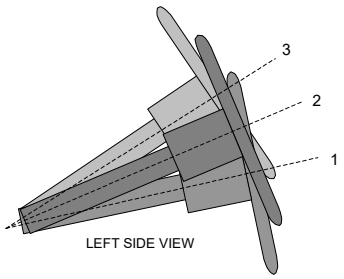
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	9	8 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	6	0 (Lowest as 0) / Fixed Fore-Aft

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.

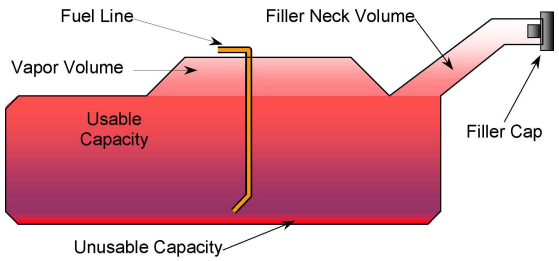
	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	70.0	
Geometric Center, Position 2	67.8	
Uppermost, Position 3	65.6	
Telescoping Steering Wheel Travel		60
Test Position	67.8	30



STEERING COLUMN ASSEMBLY

FUEL PUMP

The vehicle is equipped with an electronic fuel pump. Pump will run for about 3 seconds when the key is turned on and then will not run unless the engine is cranking or running. 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: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

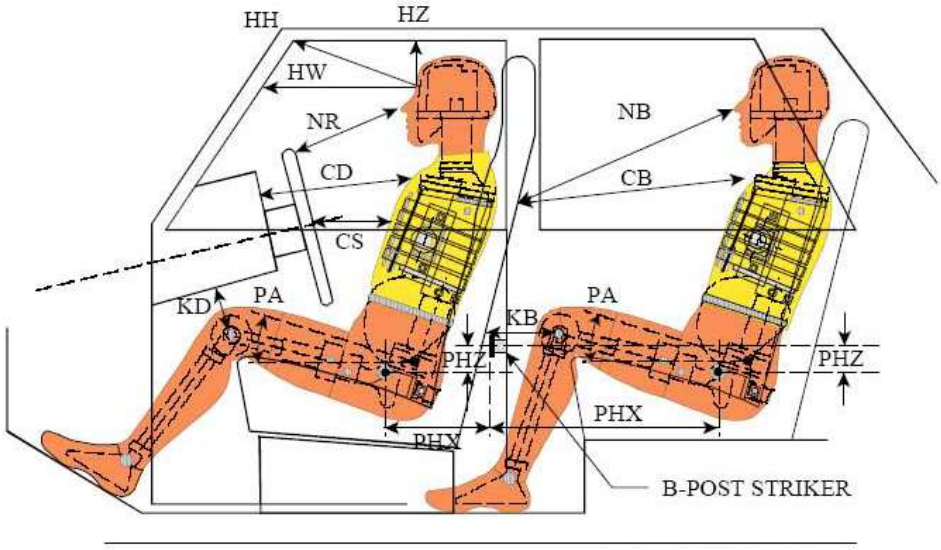
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	73.4
Usable Capacity of Optional Tank (see Form No. 1)	82.1
Usable Capacity of Standard Tank as Specified in Owner's Manual	73.4
Usable Capacity of Optional Tank as Specified in Owner's Manual	82.1
93% of Usable Capacity	68.3
Actual Amount of Solvent Used	68.1
1/3 of Usable Capacity	24.5

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: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

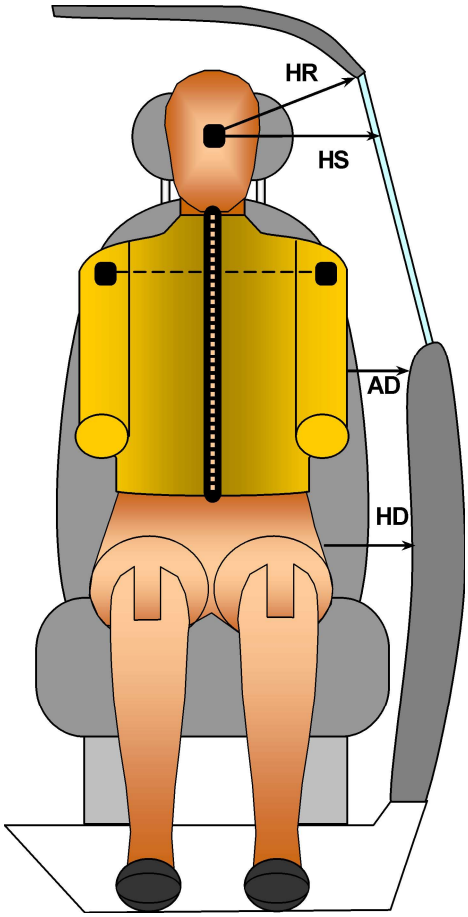


LEFT SIDE VIEW

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	451	17.3		
HW		Head to Windshield	717	0		
HZ	HZ	Head to Roof Liner	197	90	301	90
NR	NB	Nose to Rim/Seat Back	483	15.5	550	17.4
CD	CB	Chest to Dashboard/Seat Back	612	10.2	557	7.1
CS		Chest to Steering Wheel	423	7.8		
KDL	KBL	Left Knee to Dash/Seat Back	232	38.5	288	21.5
KDR	KBR	Right Knee to Dash/Seat Back	228	40.1	292	21.5
PAX	PAX	Pelvic Tilt Angle X		22.5		22.6
PAY	PAY	Pelvic Tilt Angle Y		-0.1		-0.6
PHX	PHX	Hip Point to Striker (X-Axis)	170		267	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	90		235	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020

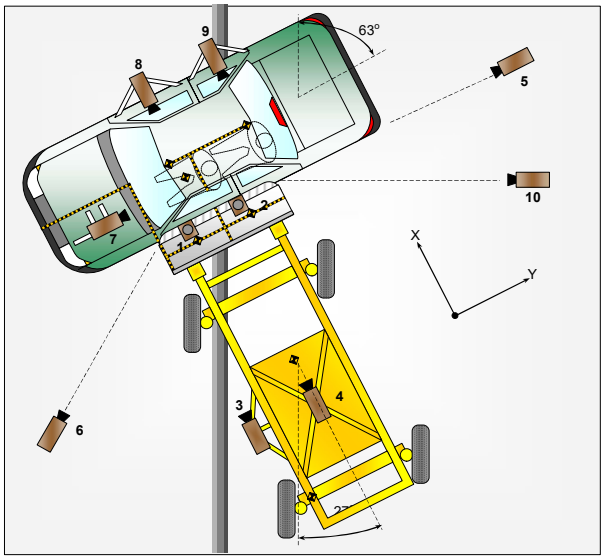


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	217	287
HS	Head to Side Window	356	388
AD	Arm to Door	112	172
HD	Hip Point to Door	159	157

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	960	410	-4995	8.5	1000
2	Overhead Close-Up	200	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	10	6940	-1570	24	1000
6	Left Front	-1830	-6830	-1660	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

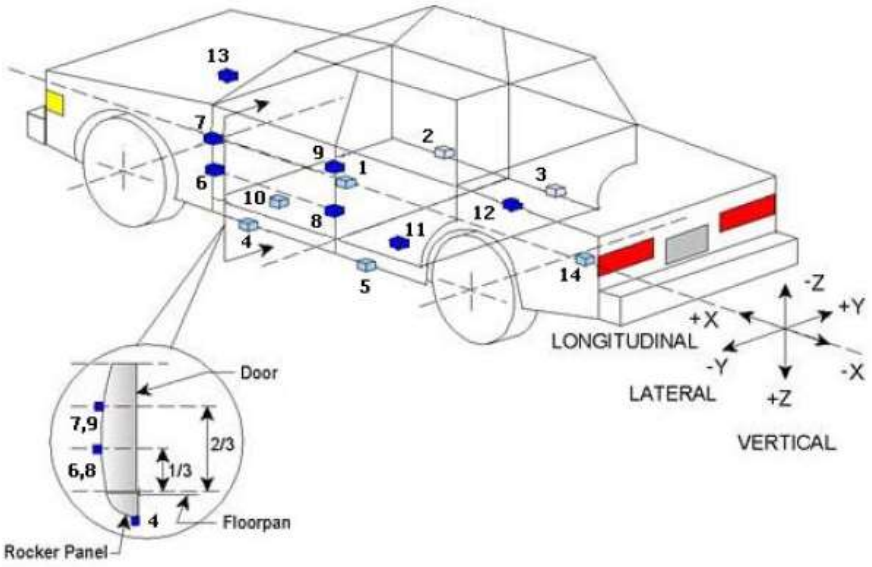
Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down
*All measurements accurate to ±6 mm

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: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020



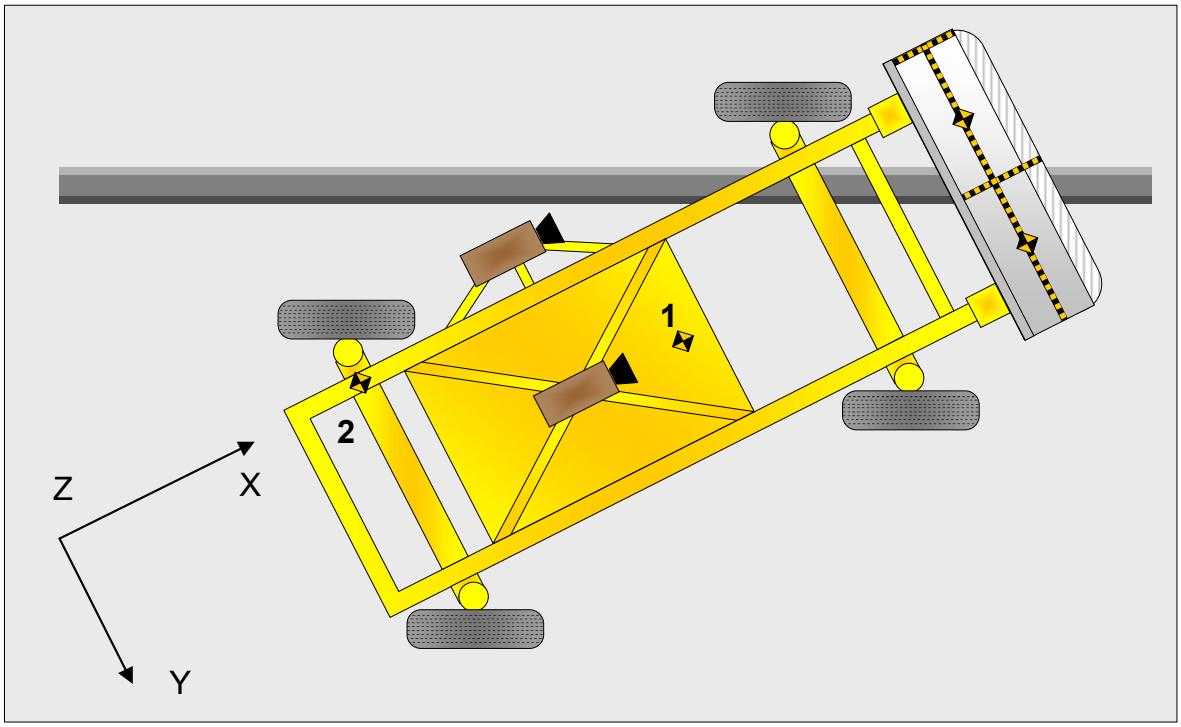
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2571	0	-375
2	Right Sill at Front Seat	2725	770	-290
3	Right Sill at Rear Seat	1538	770	-295
4	Left Sill at Front Door	2790	-770	-290
5	Left Sill at Rear Door	1860	-770	-295
6	Left Lower A-Post	3370	-860	-640
7	Left Middle A-Post	3378	-860	-920
8	Left Lower B-Post			
9	Left Middle B-Post			
10	Front Seat Track	2442	-345	-405
11	Rear Seat Structure	1996	-370	-415
12	Rt. Rear Occ. Compartment	2010	370	-395
13	Engine Block	4280	20	-825
14	Rear Above Axle	751	0	-490

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	-1105	0	-330
2	MDB Rear	-2580	-650	-625

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

Width between left and right MDB contact switches	mm	1400

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Inboard Armrest
Top of Head	Curtain Airbag, Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Headrest	Curtain Airbag
Left Shoulder	B-Pillar Trim	Door Panel
Upper Torso	Side Torso/Pelvis Airbag, Seatback	None
Lower Torso	Side Torso/Pelvis Airbag, Seatback	Door Panel
Left Hip	Side Torso/Pelvis Airbag	Door Panel, Seat Cushion
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch
	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

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	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: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Left 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	No	
Side Airbag (Front Center Airbag)	Yes	Yes		
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2860
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		490
Actual Impact Point (Aft of Front Axle)	mm		496
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: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2591
CG Location aft of Front Axle	1127

MDB WEIGHTS

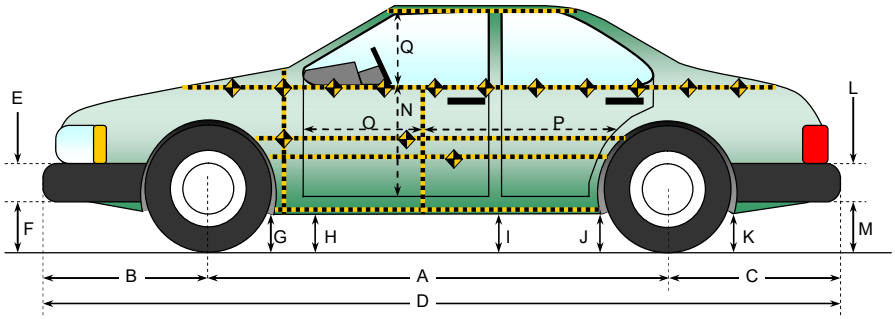
	Units	Front Axle	Rear Axle	Total
Left	kg	368.2	320.6	
Right	kg	400.7	271.4	
Ratio	%	56.5	43.5	
Totals	kg	768.9	592.0	1360.9

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.98
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.94
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.6
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.8
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.3

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



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

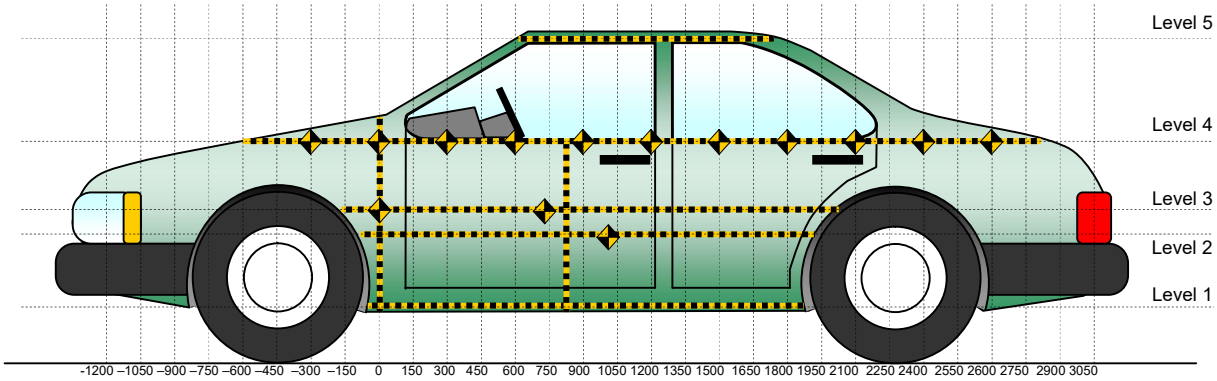
LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2860	2864	-4
B	Front Axle to FSOV	1002	980	22
C	Rear Axle to RSOV	1070	1075	-5
D	Total Length at Centerline	4932	4919	13
E	Front Bumper Thickness	160	160	0
F	Front Bumper Bottom to Ground	221	227	-6
G	Sill Height at Front Wheel Well	276	276	0
H	Sill Height at Front Door Leading Edge	276	273	3
I	Sill Height at B Pillar	270	270	0
J1	Sill Height at Rear Wheel Well	274	278	-4
J2	Pinch Weld Height at Rear Wheel Well	281	280	1
K	Sill Height Aft of Rear Wheel Well	283	285	-2
L	Rear Bumper Thickness	80	80	0
M	Rear Bumper Bottom to Ground	341	344	-3
N	Sill Height to Window Bottom Sill	865	780	85
O	Front Door Leading Edge to Impact CL	809	732	77
P	Rear Door Trailing Edge to Impact CL	1191	1138	53
Q	Front Window Opening	460	470	-10
R	Right Side Length	4000	4002	-2
S	Left Side Length	4000	3990	10
T	Vehicle Width at B Post	1875	1783	92
U	Front Wheel Track Width	2860	2864	-4
V	Rear Wheel Track Width	1002	980	22

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



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	571	219	1800
2	Occupant H-Point	698	236	1650
3	Mid Door	722	239	1650
4	Window Sill	1093	57	1200
5	Window Top	1635	7	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

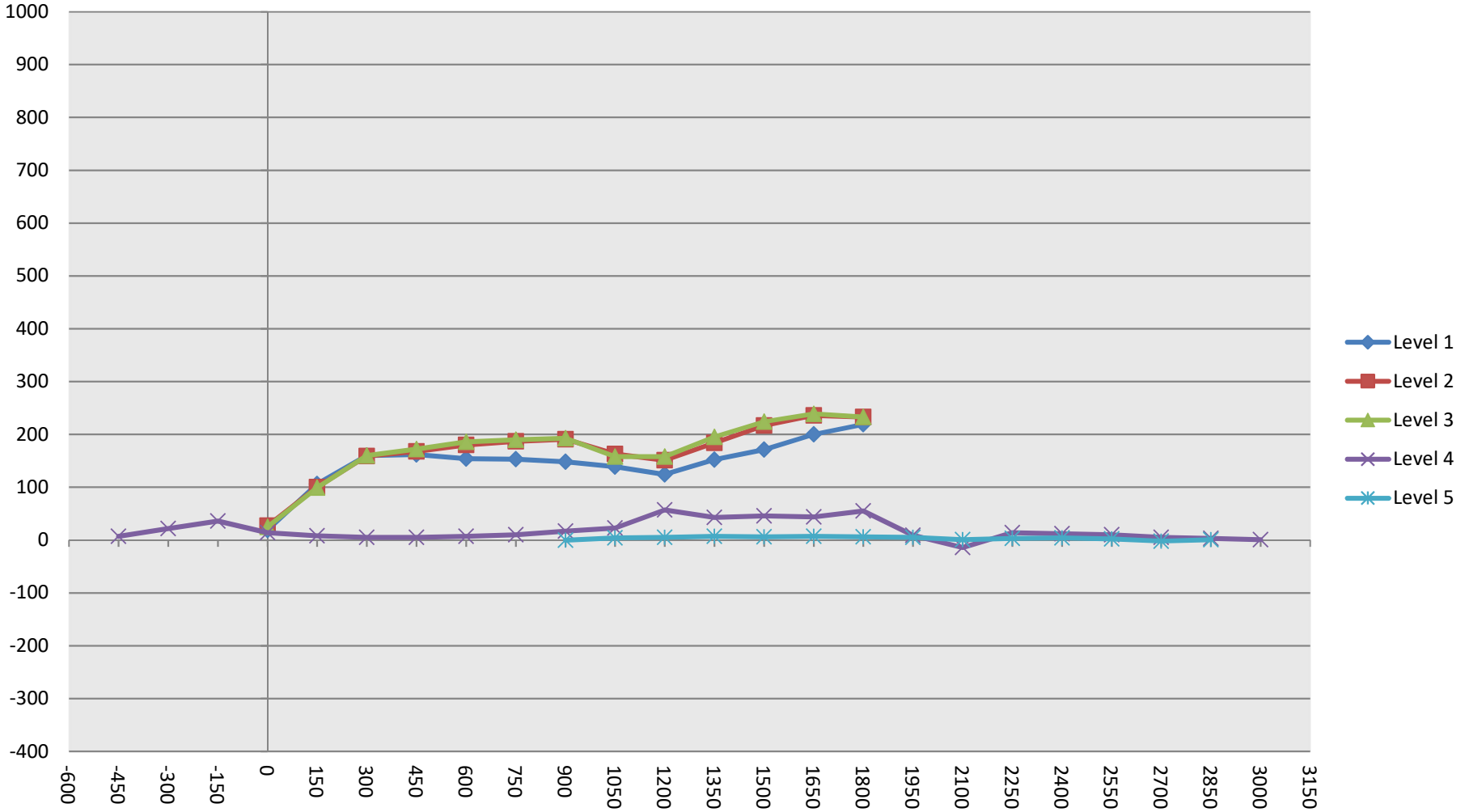
Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020

	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															
-450				282					289					7	
-300				268					290					22	
-150				258					294					36	
0	163	162	162	251		182	189	187	265		19	27	25	14	
150	172	172	172	245		278	272	271	253		106	100	99	8	
300	177	175	175	240		337	334	335	245		160	159	160	5	
450	176	175	176	234		338	343	348	239		162	168	172	5	
600	175	177	176	231		329	357	362	238		154	180	186	7	
750	173	77	176	228		326	364	366	238		153	287	190	10	
900	172	177	177	223	465	320	368	370	240	465	148	191	193	17	0
1050	172	178	177	222	457	311	341	335	245	461	139	163	158	23	4
1200	170	179	178	220	453	294	330	336	277	458	124	151	158	57	5
1350	168	179	178	220	453	320	363	373	263	460	152	184	195	43	7
1500	168	178	177	218	453	339	395	401	264	459	171	217	224	46	6
1650	166	173	172	214	455	366	409	411	258	462	200	236	239	44	7
1800	164	163	164	206	457	383	396	397	261	463	219	233	233	55	6
1950				197	461				206	466				9	5
2100				191	465				177	466				-14	1
2250				191	472				205	475				14	3
2400				191	479				203	483				12	4
2550				195	489				205	491				10	2
2700				208	505				213	503				5	-2
2850				230	521				233	522				3	1
3000				257					258					1	
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.

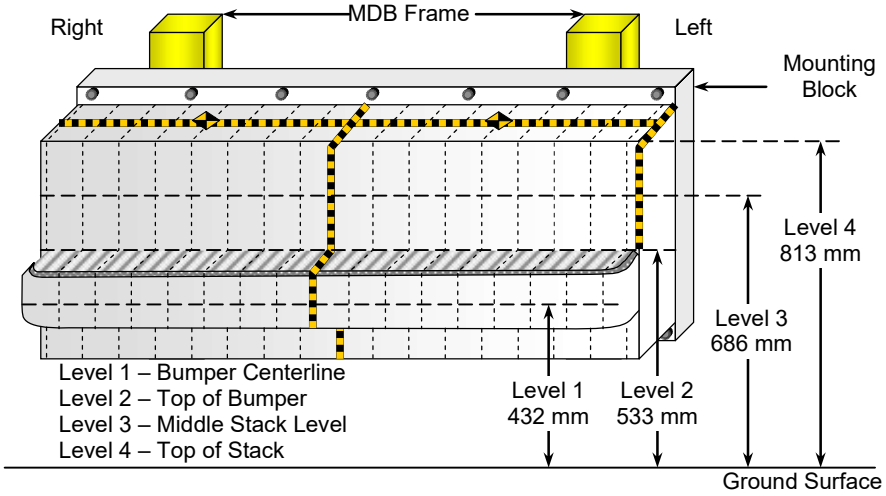
DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

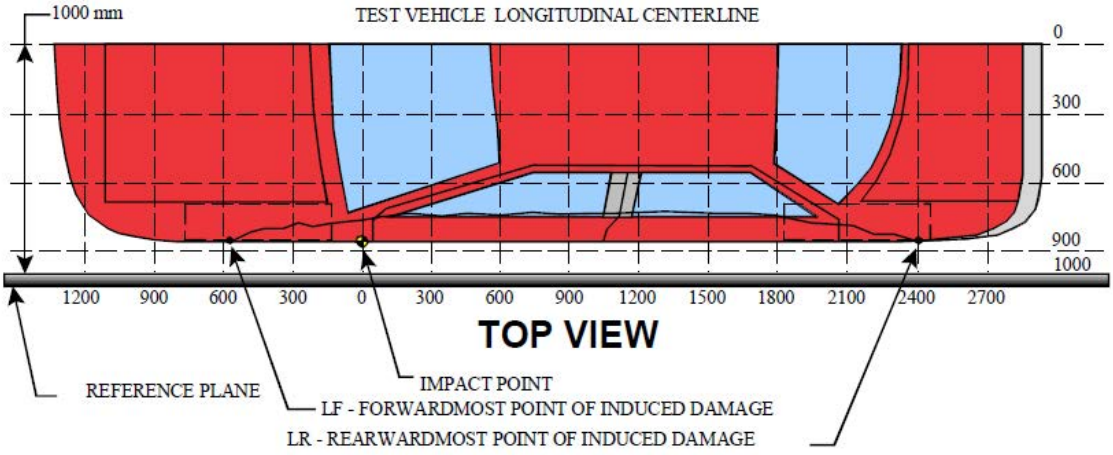
Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	700	Right	232
B	Top of Bumper	533	800	Right	145
C	Mid-Level	686	300	Right	125
D	Top of Stack	813	500	Left	128

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C_L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
4	65	45	33	30	35	49	65	83	83	55	60	64	70	128	85	95	121
3	56	41	43	53	63	125	91	82	61	38	39	38	44	47	65	77	100
2	145	143	140	139	137	130	125	120	129	125	122	120	118	115	114	111	112
1	231	232	227	224	220	219	217	218	214	212	210	208	206	204	201	203	201

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020



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

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	1960	3	261	175	86
2	1574	3	409	175	234
3	1188	3	344	178	166
4	802	3	368	176	192
5	416	3	346	176	170
6	30	3	165	164	1

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	707	476	231
2	480 mm right of center	1	689	463	226
3	160 mm right of center	1	678	463	215
4	160 mm left of center	1	672	463	209
5	480 mm left of center	1	670	463	207
6	800 mm left of center	1	677	476	201

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

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20200113
Test Date: 2/21/2020

Test Time: 11:00 am
Temperature: 21.7°C

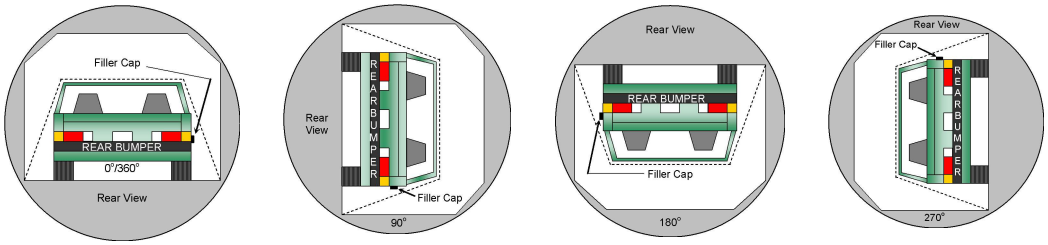
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.

B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.

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

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°	111	300	411
90° to 180°	111	300	411
180° to 270°	107	300	407
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

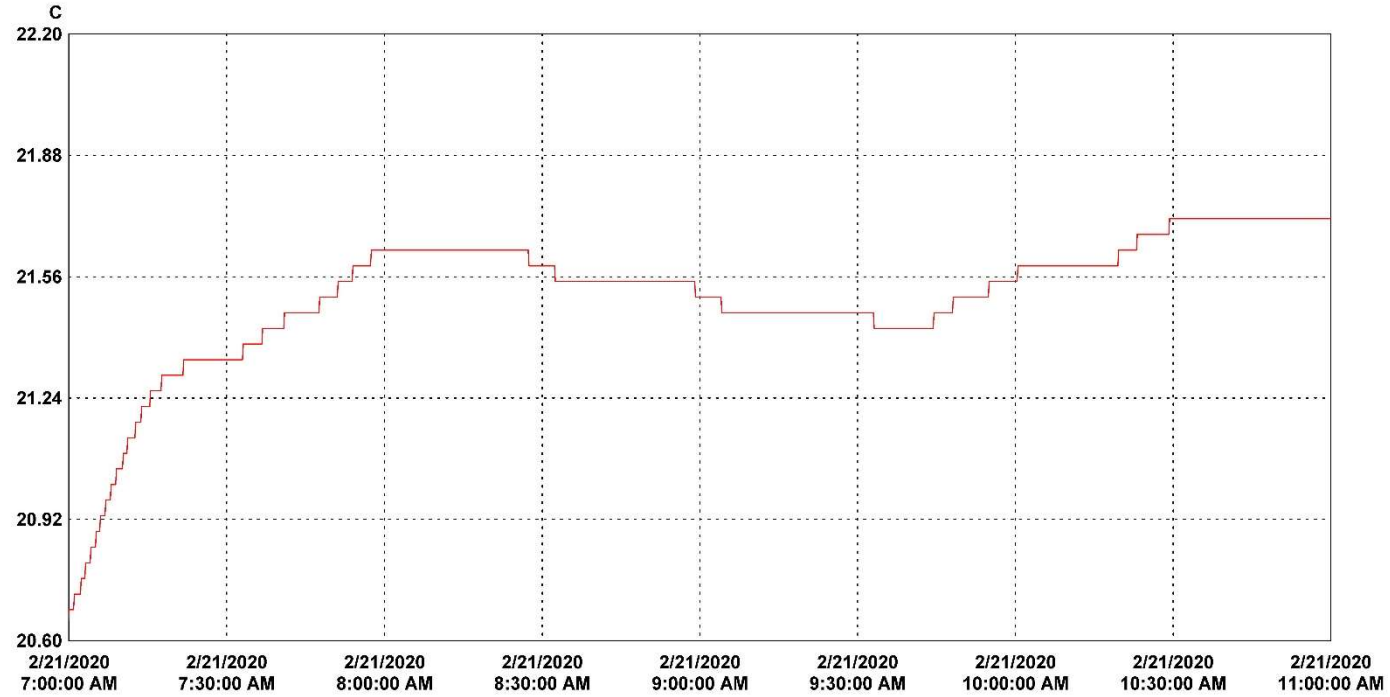
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0.0	0.0	0.0	
90° to 180°	0.0	0.0	0.0	
180° to 270°	0.0	0.0	0.0	
270° to 360°	0.0	0.0	0.0	

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 AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2020 GMC Acadia SLE 5-Door SUV NHTSA No.: M20200113
Test Program: NCAP Side MDB Impact Test Test Date: 2/21/2020



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352040	VSC_North_Hall	1		21.71	21.51	20.68	C	Temperature	18352040_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

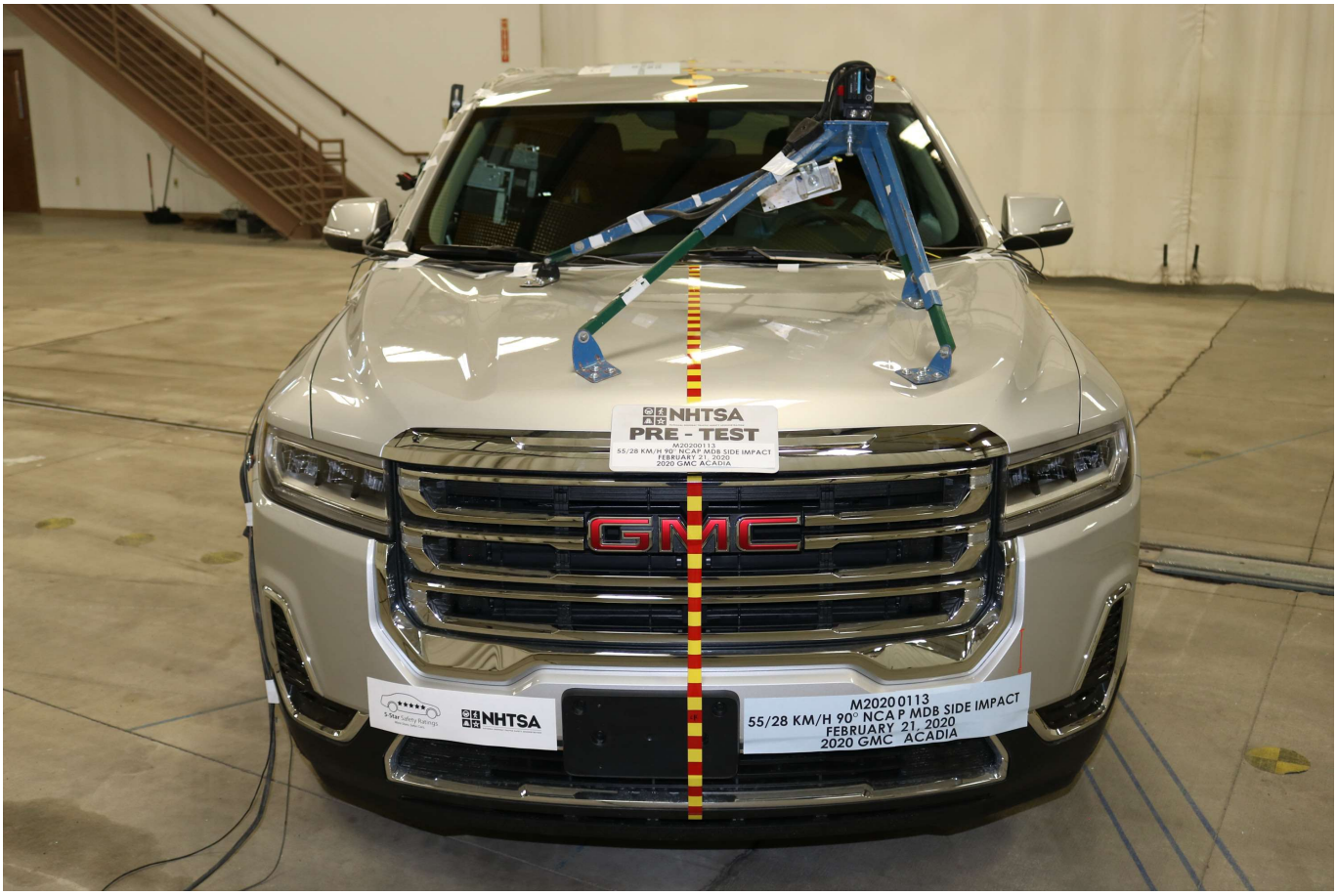


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

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

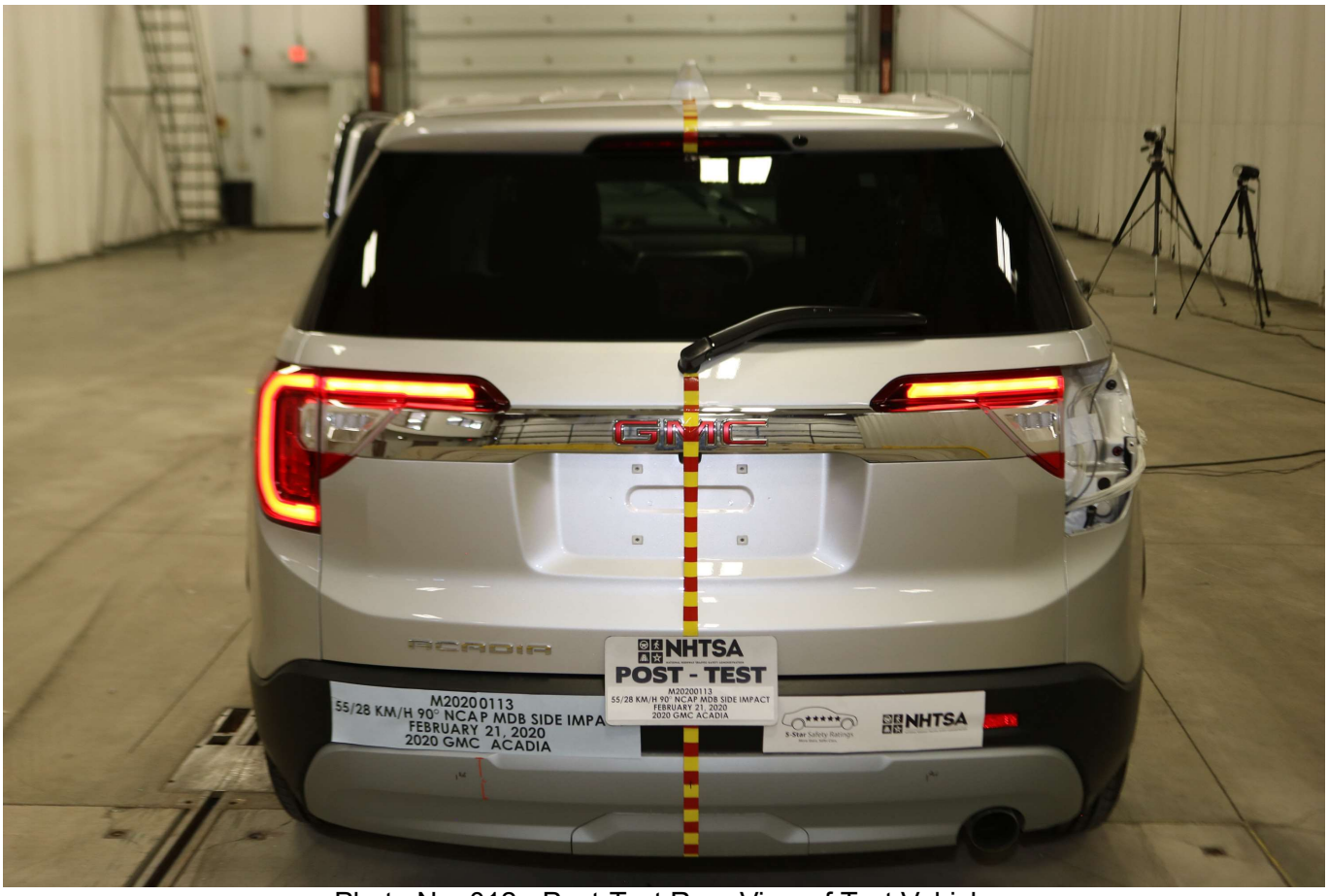


Photo No. 012 - Post-Test Rear View of Test Vehicle

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

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

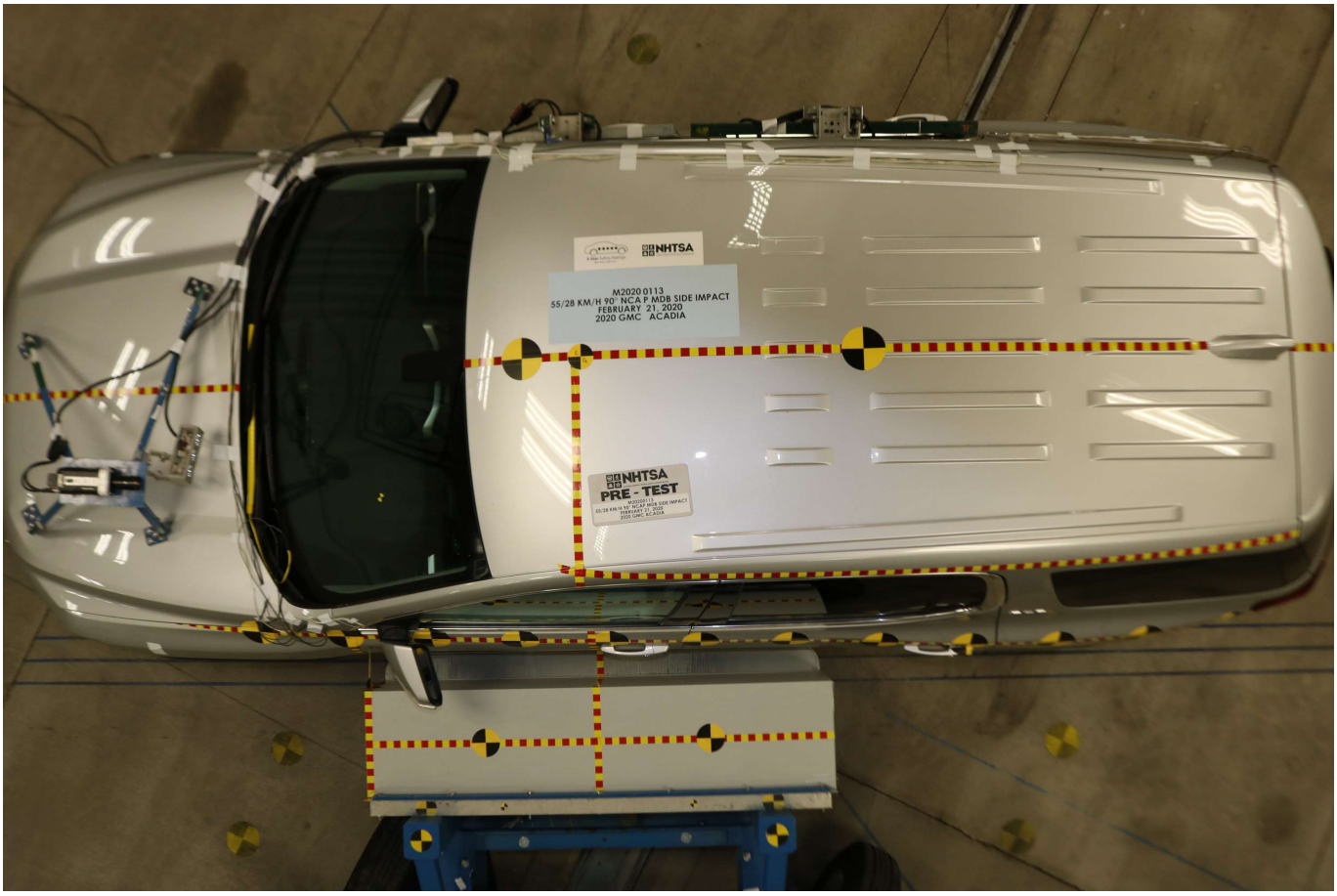


Photo No. 015 - Pre-Test Overhead View of Test Area

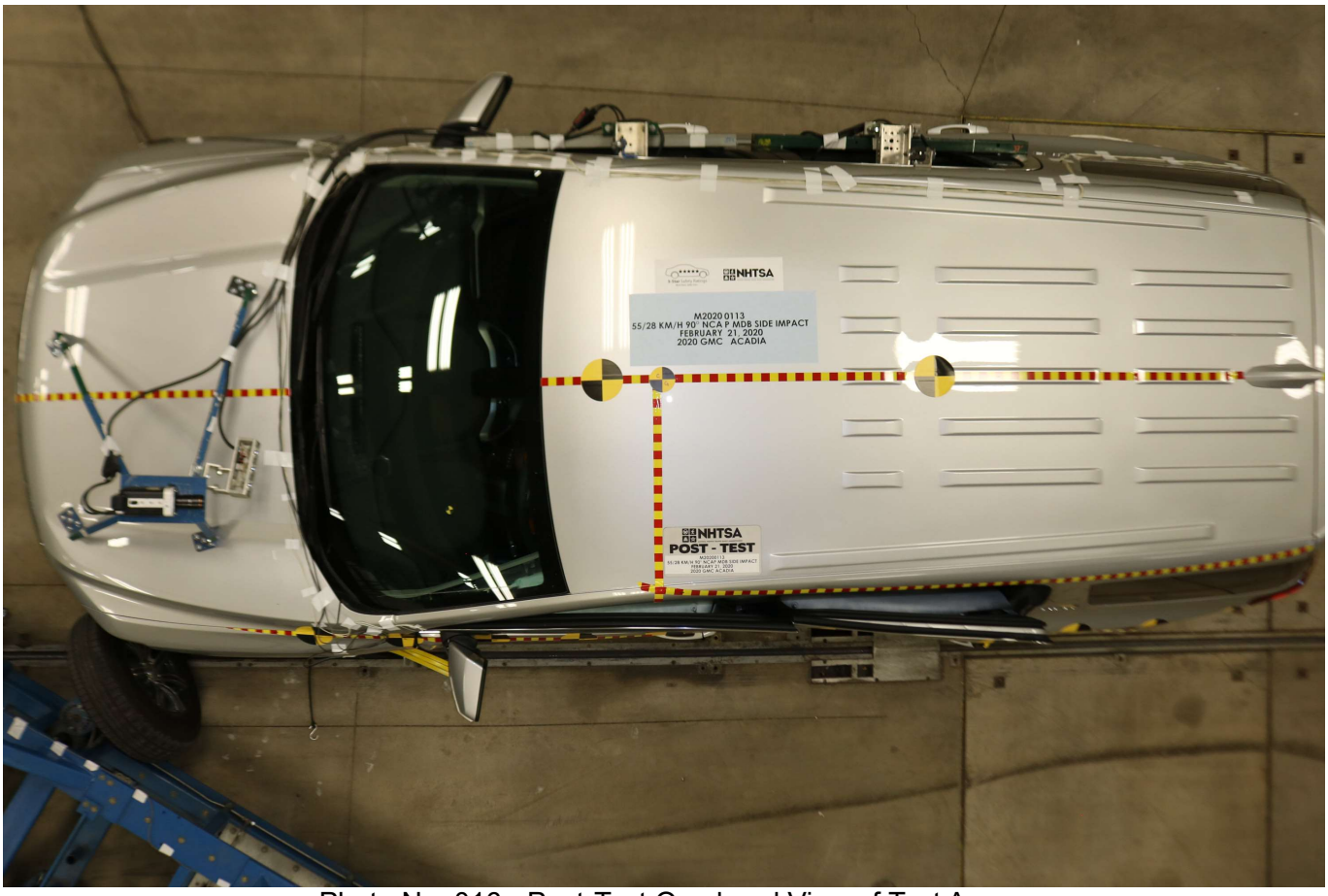


Photo No. 016 - Post-Test Overhead View of Test Area

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

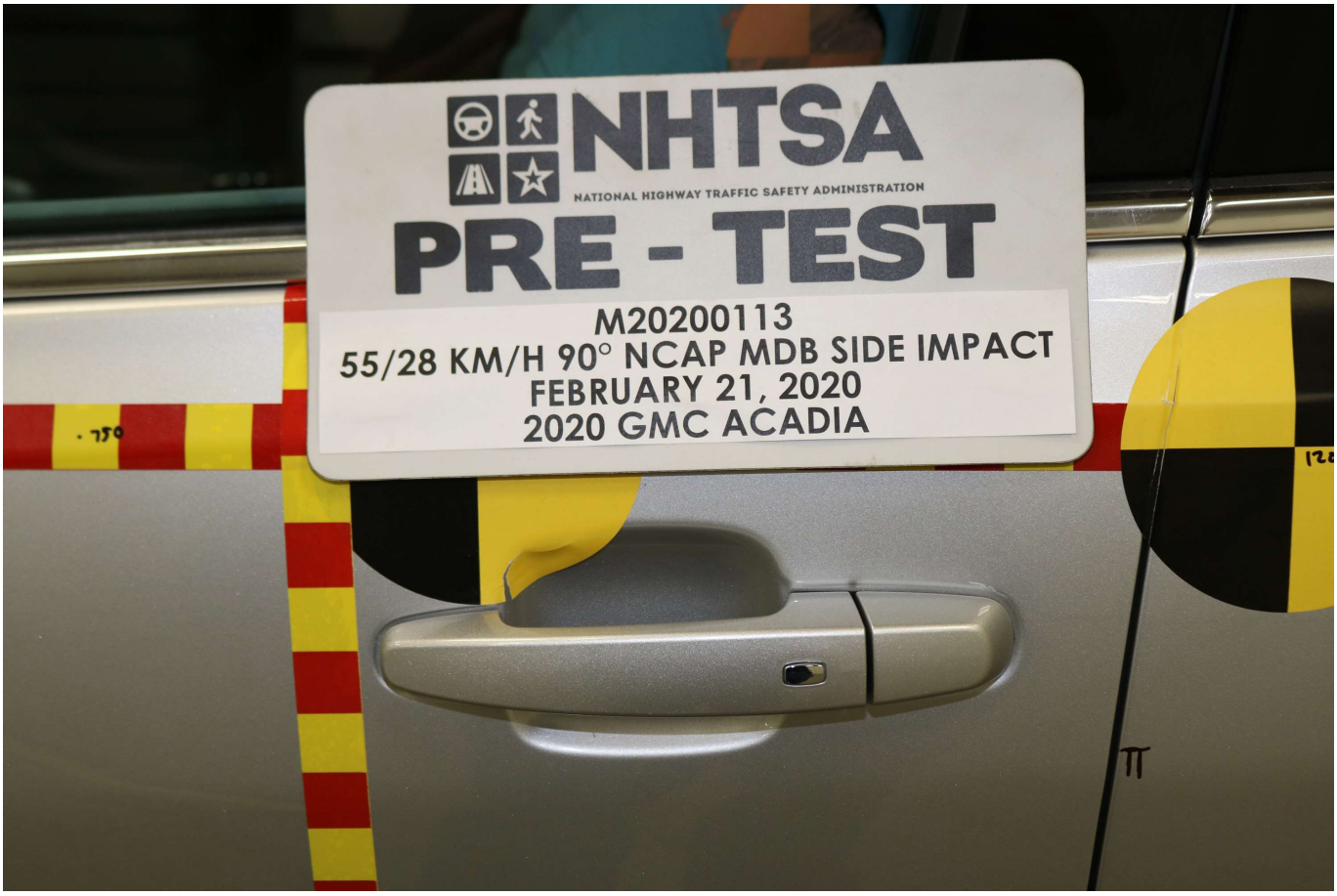


Photo No. 021 - Pre-Test Left Front Door Latch Close-Up

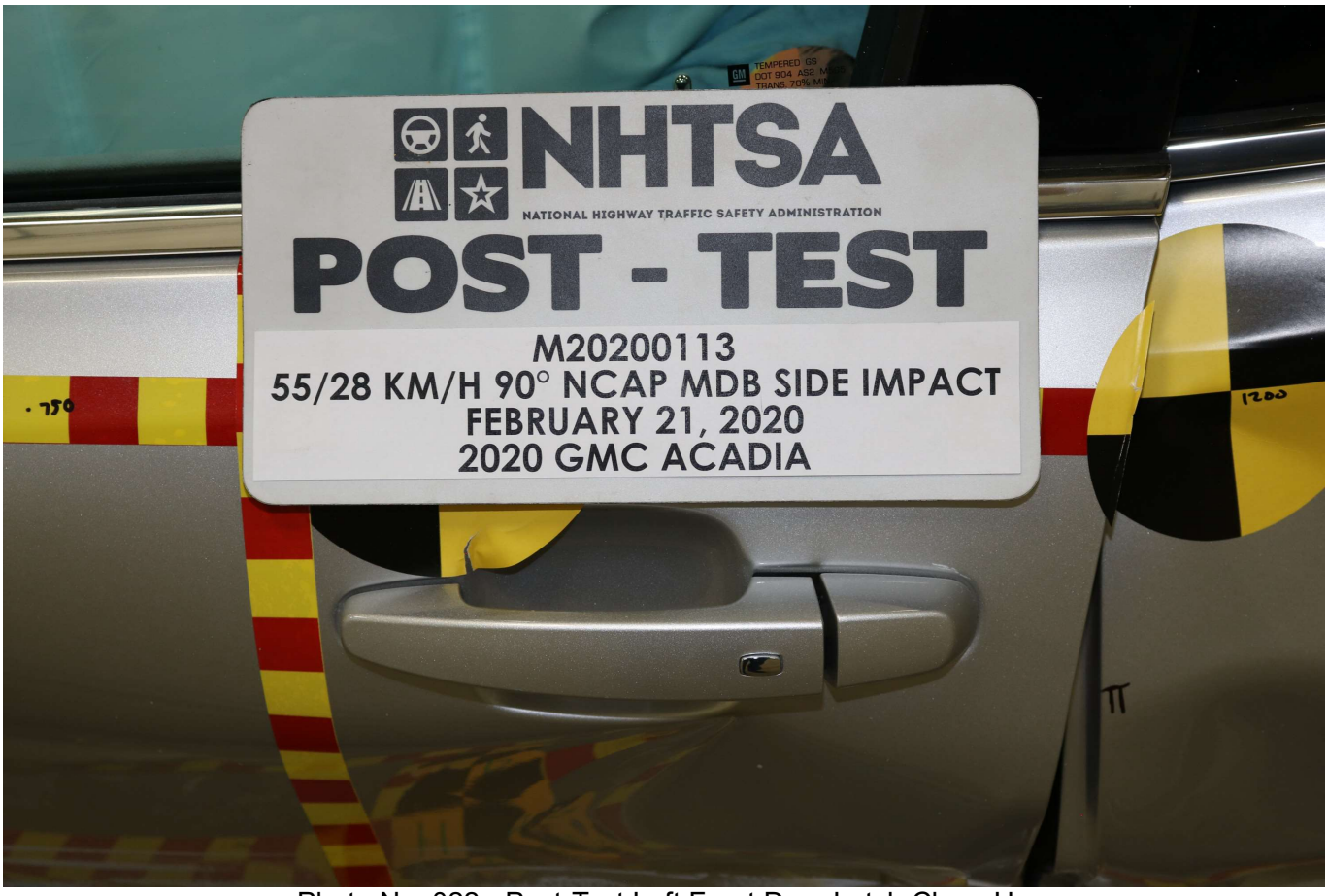


Photo No. 022 - Post-Test Left Front Door Latch Close-Up

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

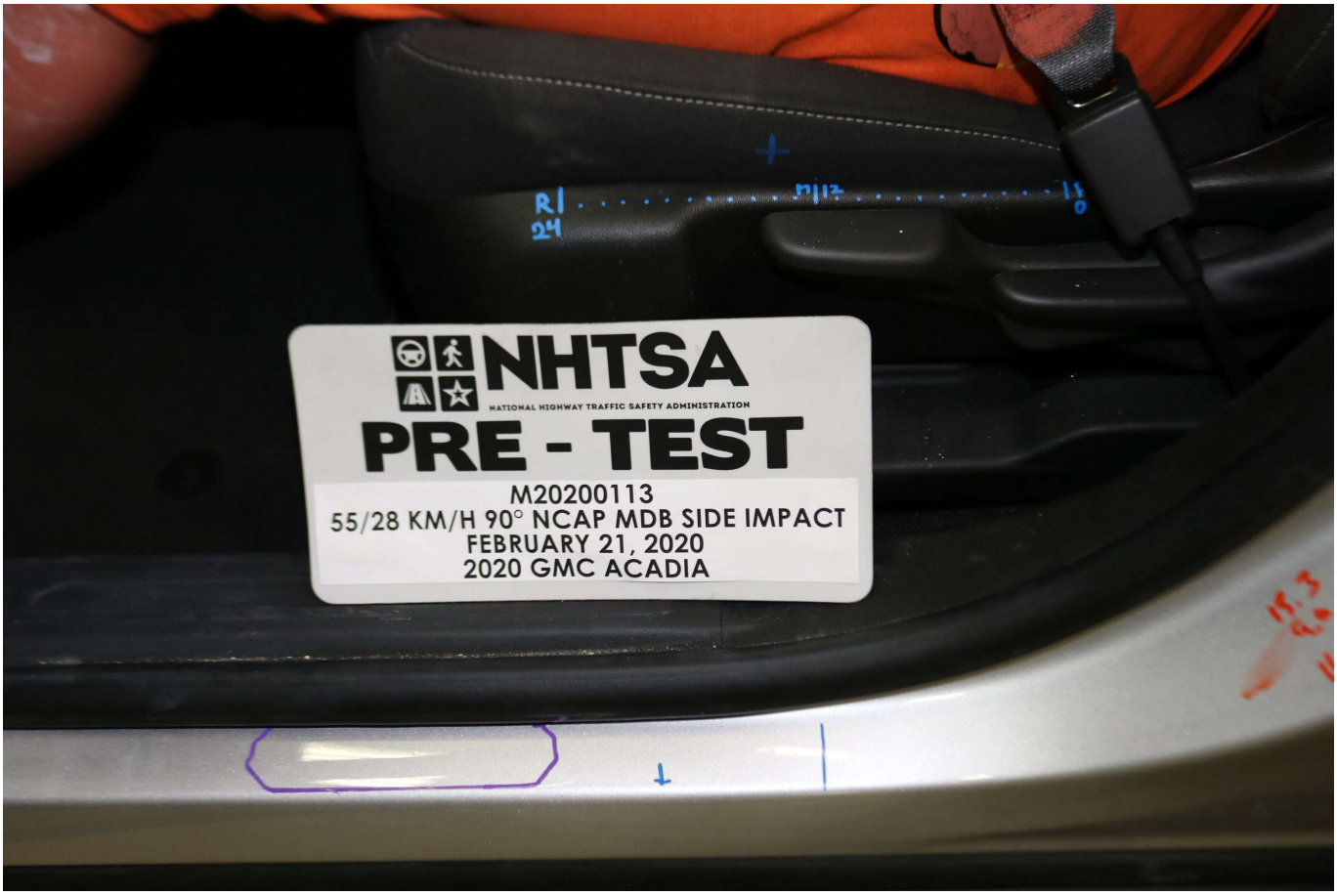


Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track

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

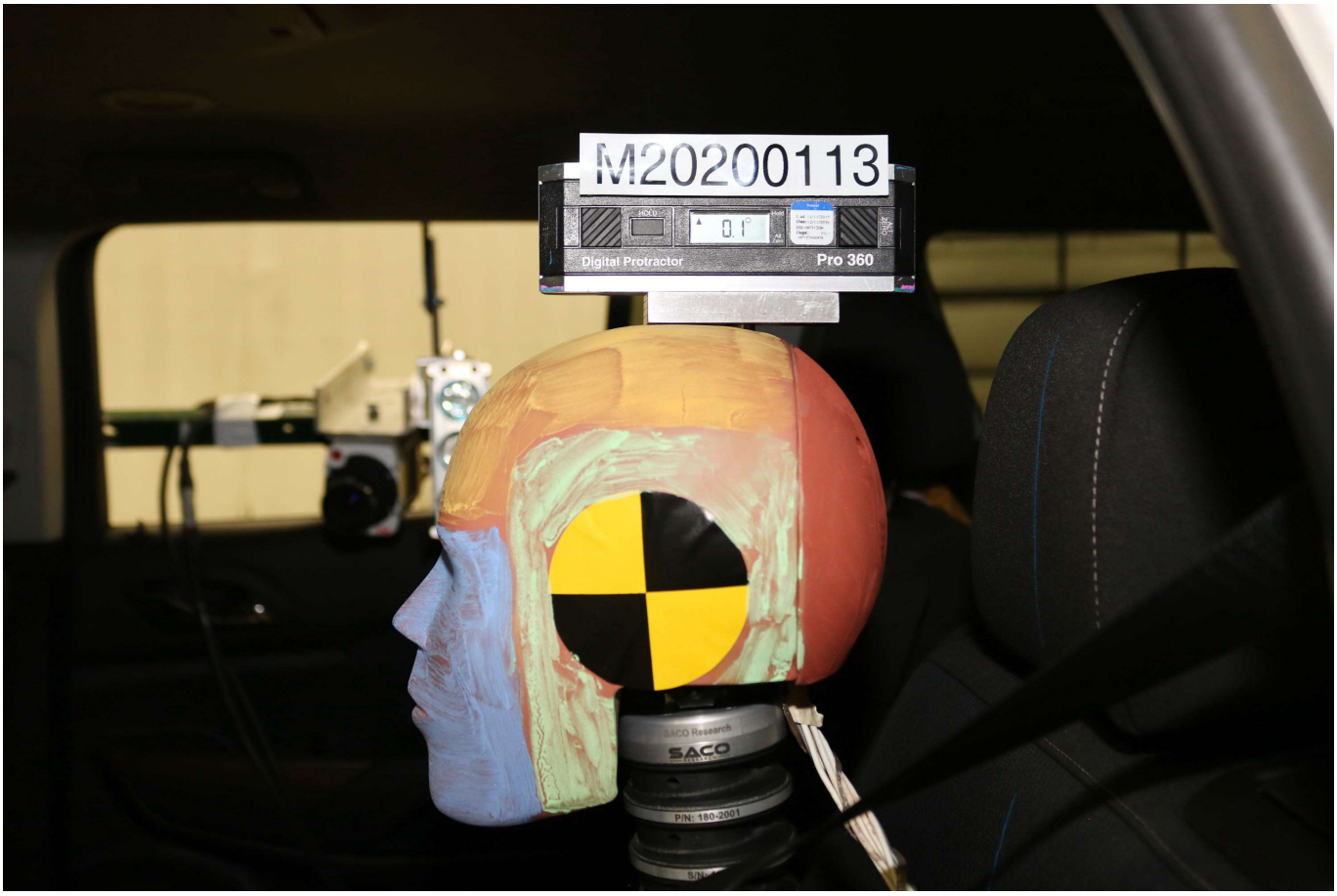


Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level

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

PHOTOGRAPH NOT APPLICABLE

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

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

PHOTOGRAPH NOT APPLICABLE

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

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

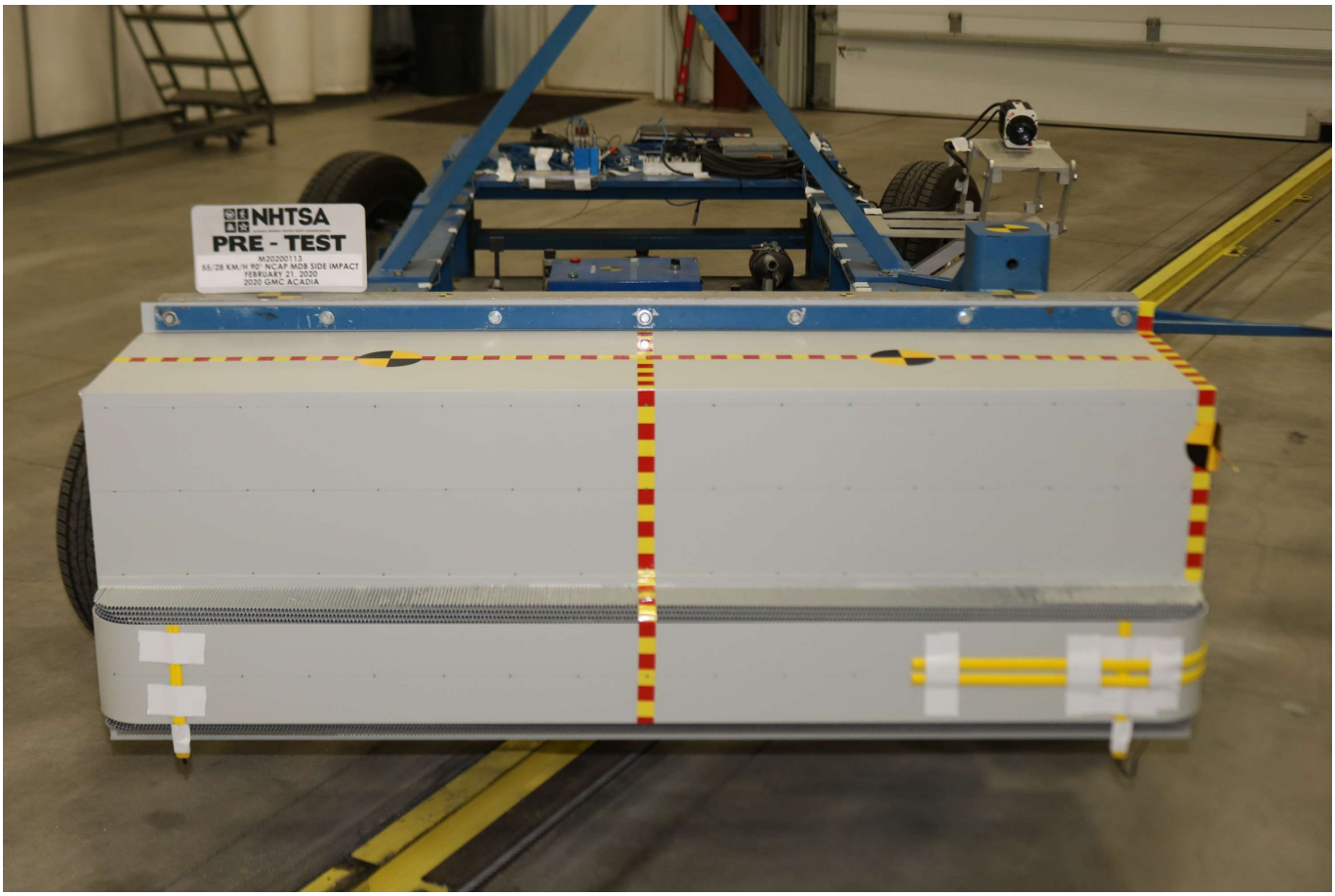


Photo No. 084 - Pre-Test Front View of MDB Impactor Face

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

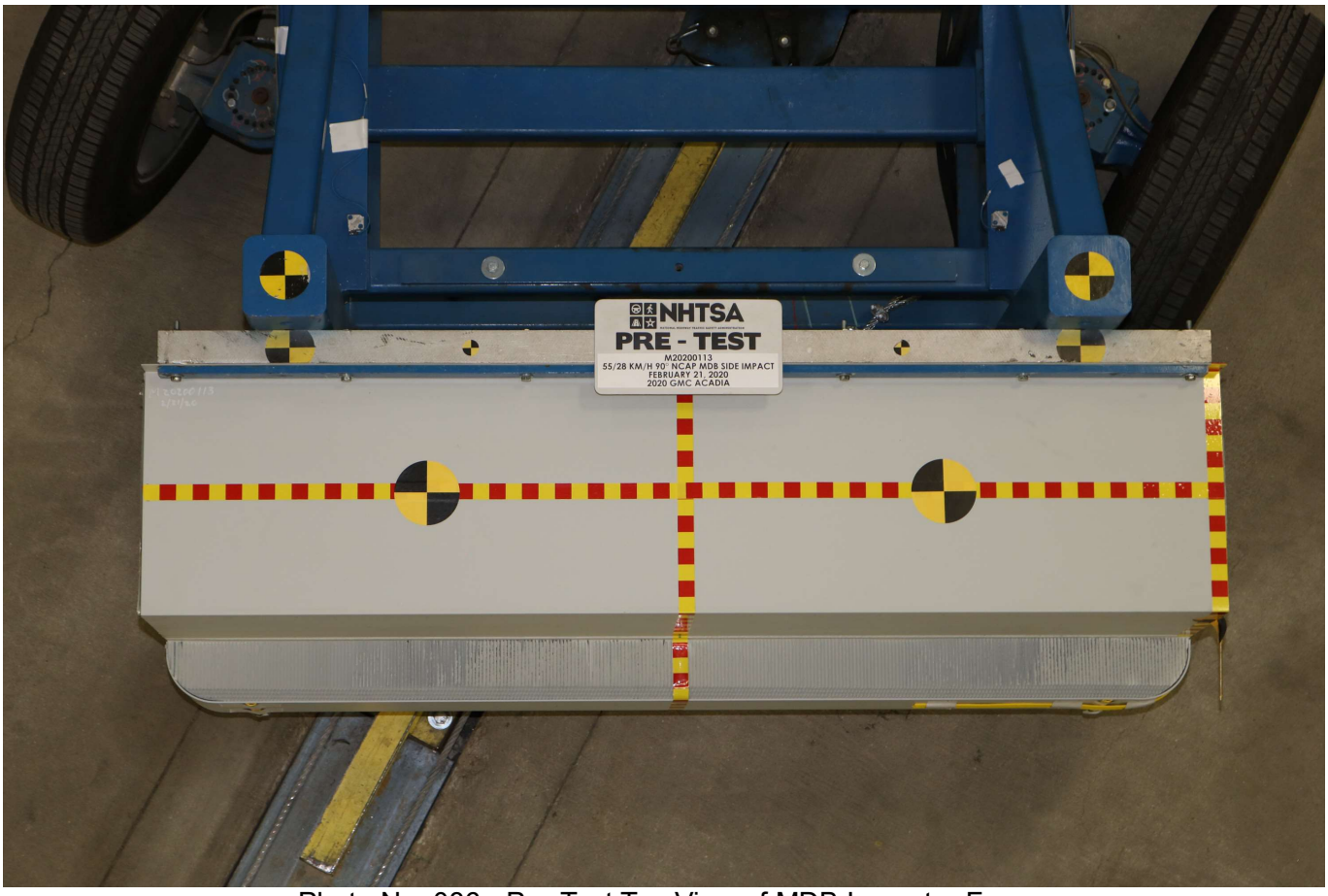


Photo No. 086 - Pre-Test Top View of MDB Impactor Face

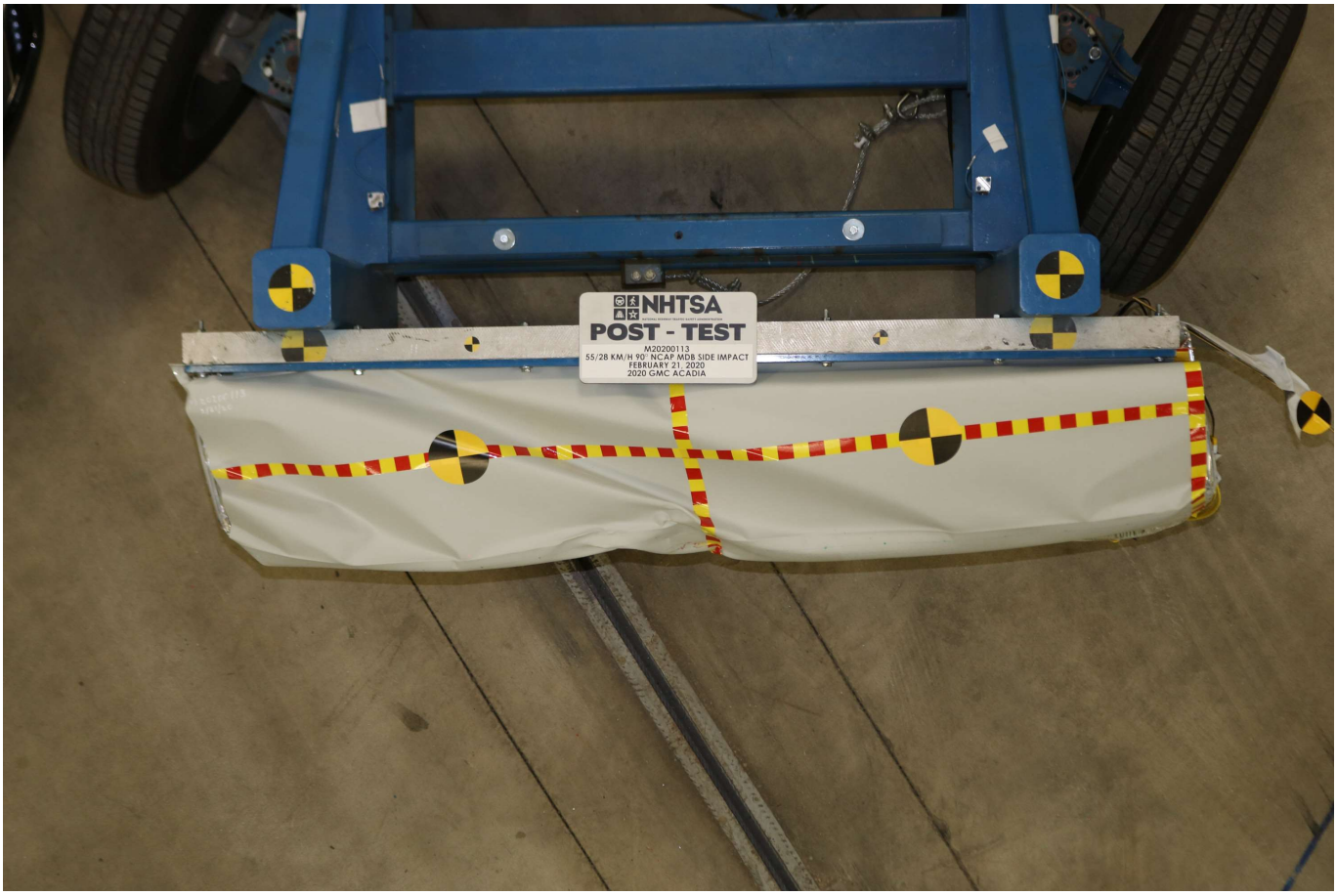


Photo No. 087 - Post-Test Top View of MDB Impactor Face

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

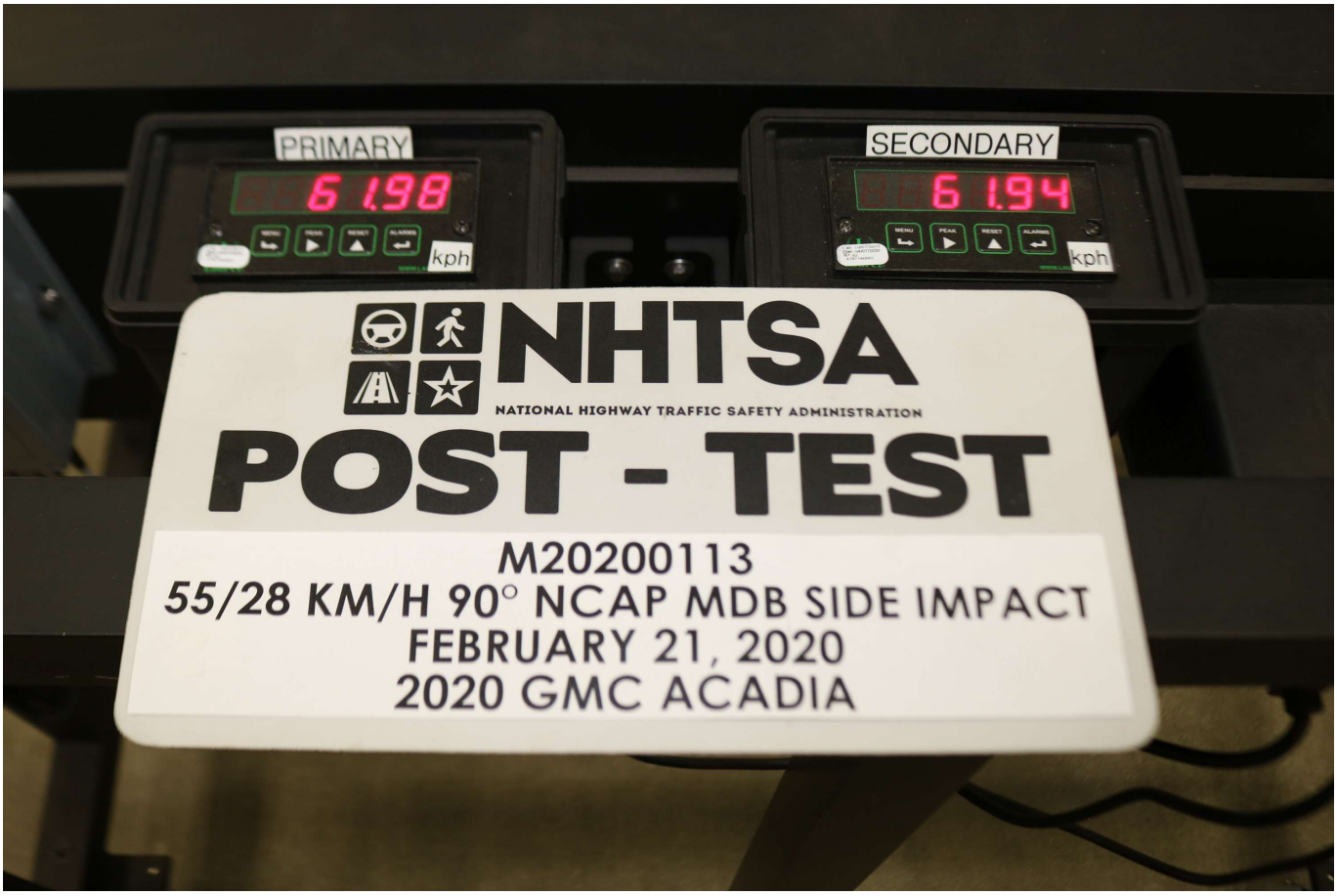


Photo No. 095 - Post-Test Primary and Redundant Speed Trap Read-Out

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

GMC

2020 ACADIA FWD SLE

EXTERIOR: QUICKSILVER METALLIC
INTERIOR: JET BLACK

ENGINE, 2.5L DOHC 4-CYL SIDI
TRANSMISSION, 9-SPD AUTOMATIC

Visit us at www.gmc.com

STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

OWNER BENEFITS
- 3 YEAR/36,000 MILE* BUMPER-TO-BUMPER LIMITED WARRANTY
- 5 YEAR/ 60,000 MILE* POWERTRAIN LIMITED WARRANTY, ROADSIDE ASSISTANCE & COURTESY TRANSPORTATION
- FIRST MAINTENANCE VISIT
- * WHICHEVER COME FIRST SEE GMC.COM OR DEALER FOR TEAMS, DETAILS & LIMITS

PERFORMANCE & MECHANICAL
- ANTILOCK BRAKE SYSTEM, 4 WHEEL DISC
- ENG CONTROL STOP/START SYS
- WHEELS, 18" ALUMINUM WITH DARK ACCENTS
- WHEEL, SPARE, 18" STEEL

CONNECTIVITY & TECHNOLOGY
- GMC INFOTAINMENT SYSTEM, 8" DIA. COLOR MULTI-TOUCH DISPLAY, BLUETOOTH STREAMING AUDIO, ANDROID AUTO AND APPLE CARPLAY CAPABILITY FOR COMPATIBLE PHONES
- DISPLAY, MULTI-COLOR DRIVER INSTRUMENT INFO ENHANCED
- ACTIVE NOISE CANCELLATION
- KEYLESS OPEN AND START
- REAR SEAT REMINDER
- SIRIUSXM RADIO CAPABLE, ALL ACCESS TRIAL W/ SUBSCRIPTION SOLD SEPARATELY
- ONSTAR (R) SERVICES & 4G LTE WI-FI (R) AVAILABLE; SEE ONSTAR.COM FOR TERMS

INTERIOR
- SEATING, 7-PASSENGER
- LEATHER WRAP STEERING WHEEL
- STEERING COLUMN, TILT & TELESCOPING
- SEAT ADJUSTER, DRIVER 4-WAY MANUAL
- SEAT ADJUSTER, PASSENGER 4-WAY MANUAL
- AIR CONDITIONING, TRI ZONE AUTO CLIMATE CONTROL
- WINDOWS, POWER, DRIVER WITH EXPRESS UP/DOWN, FRONT PASSENGER EXPRESS DOWN

EXTERIOR
- MIRRORS, OUTSIDE HEATED, POWER ADJUSTABLE, BODY COLOR TURN SIGNAL INDICATORS
- HEADLAMPS, LED
- DAYTIME RUNNING LAMPS, LED

SAFETY & SECURITY
- REAR PARK ASSIST
- REAR CROSS TRAFFIC ALERT
- LANE CHANGE ALERT WITH SIDE BLIND ZONE ALERT
- HD REAR VISION CAMERA
- TEEN DRIVER

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE	**$33,800.00**

OPTIONS & PRICING

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

QUICKSILVER METALLIC	495.00
GMC INTERIOR PROTECTION PACKAGE (DEALER INSTALLED)	315.00
• FLOOR MATS, ALL WEATHER FRONT AND REAR (DEALER INSTALLED)	
• 3RD ROW ALL WEATHER FLOOR MATS (DEALER INSTALLED)	
ALL-WEATHER REAR CARGO MAT	
SEATING, 6-PASSENGER	INC.
TOTAL OPTIONS	$810.00
TOTAL VEHICLE & OPTIONS	$34,610.00
DESTINATION CHARGE	1,195.00

TOTAL VEHICLE PRICE*	**$35,805.00**

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
23 MPG
combined city/hwy
21 city
27 highway
4.3 gallons per 100 miles

Standard SUVs range from 13 to 93 MPG.
The best vehicle rates 136 MPGe.

You **spend $1,250** more in fuel costs over 5 years compared to the average new vehicle.

G H W

Annual fuel cost $1,750

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 5 (1 – 10, Best)

Smog Rating (tailpipe only): 5 (1 – 10, Best)

This vehicle emits 382 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code*

GOVERNMENT 5-STAR SAFETY RATINGS

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

Frontal Crash	Driver	Not Rated
	Passenger	Not Rated

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

Side Crash	Front seat	Not Rated
	Rear seat	Not Rated

Based on the risk of injury in a side impact.

Rollover — ★★★★
Based on the risk of rollover in a single-vehicle crash.

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

Equipped with the safety and security of OnStar®
Visit onstar.com for details.
onstar.com/privacy

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 52%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 21%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
SPRING HILL, TN U.S.A.
COUNTRY OF ORIGIN:
ENGINE: UNITED STATES
TRANSMISSION: UNITED STATES

This label has been applied pursuant to Federal law – Do not remove prior to delivery to the ultimate purchaser. *Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

ORDER NO XGBV93 SALES CODE E
SALES MODEL CODE TNB26
DEALER NO 65221
FINAL ASSEMBLY:
SPRING HILL, TN U.S.A.

VIN 1GKKNKLA0LZ154500

DEALER TO WHOM DELIVERED
PALMEN BUICK GMC CADILLAC, INC.
7110 74TH PLACE
KENOSHA, WI 53142-3519

HL
1GA0761266

Photo No. 102 - Monroney Label

Head Restraints

Front Seats

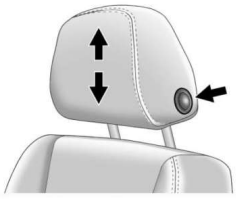
⚠ Warning

With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.

The vehicle's front seats have adjustable head restraints in the outboard seating positions.

Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

The height of the head restraint can be adjusted.



To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Seats

Second Row Seats

The vehicle's rear second row seats have adjustable head restraints in the outboard seating positions.

The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.

To lower the head restraint, press the button, located on the top of the seatback, and push the head restraint down. Try to move the head restraint after the button is released to make sure that it is locked in place.

The second row head restraints are not removable.

Third Row Seats

The vehicle's rear third row seats have head restraints in the outboard seating positions that cannot be adjusted up or down.

The rear third row outboard head restraints are not removable.

The rear third row outboard head restraints are designed to be folded.

The head restraint can be folded to allow for better visibility when the rear seat is unoccupied.

When folding the seatback down, the head restraint will automatically fold out of the way as the seat is folded down.

Return the lowered head restraint to the upright position until it locks into place. Push and pull on the head restraint to make sure it is locked.

Front Seats

Seat Adjustment

⚠ Warning

You can lose control of the vehicle if you try to adjust a driver seat while the vehicle is moving. Adjust the driver seat only when the vehicle is not moving.

To adjust a manual seat:

1. Lift the handle under the seat to unlock it.

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)

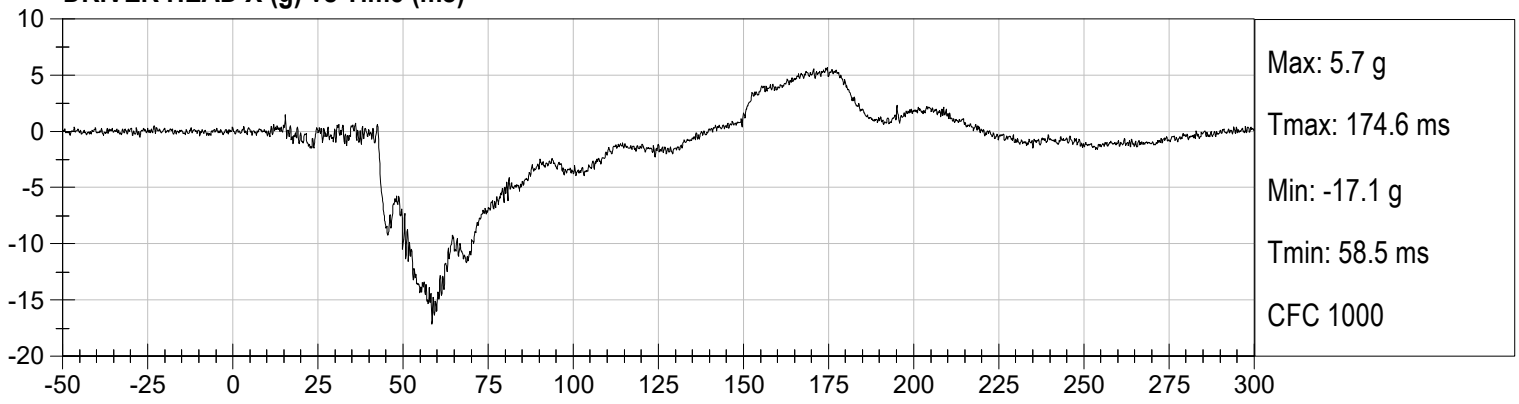
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

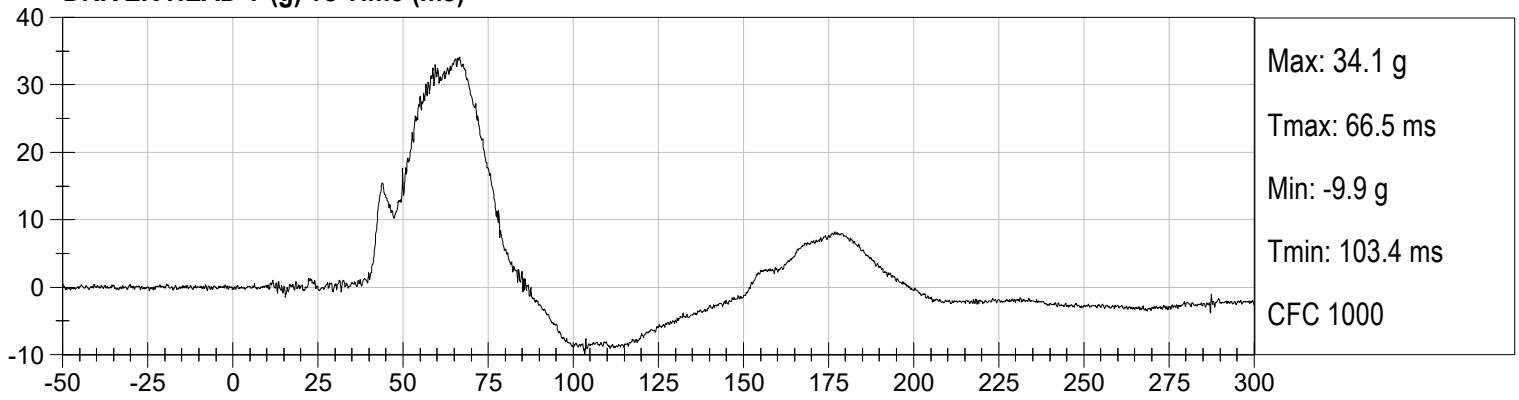
Left MDB Contact Switch

Right MDB Contact Switch

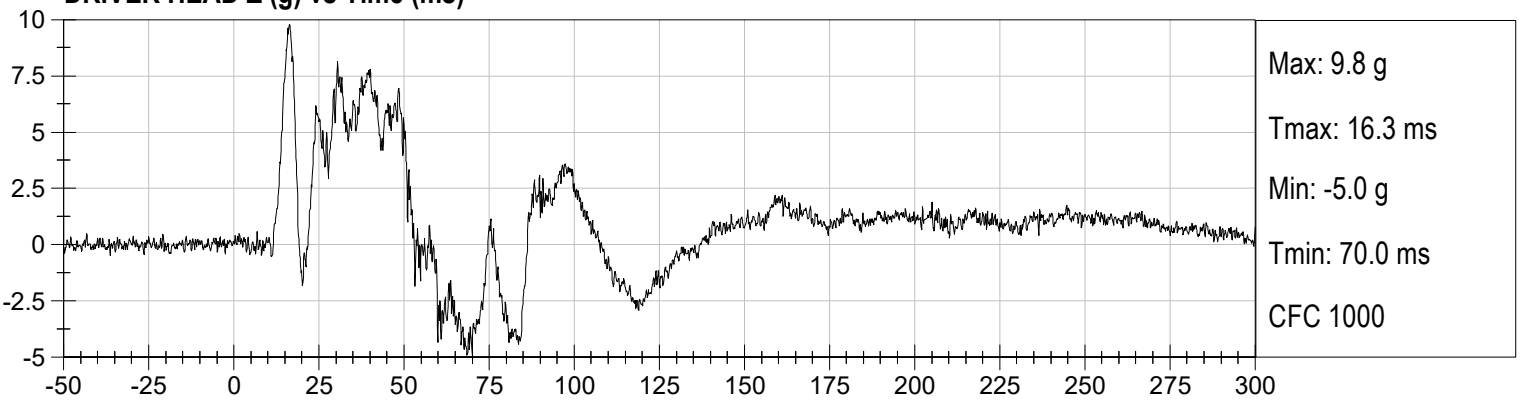
DRIVER HEAD X (g) vs Time (ms)



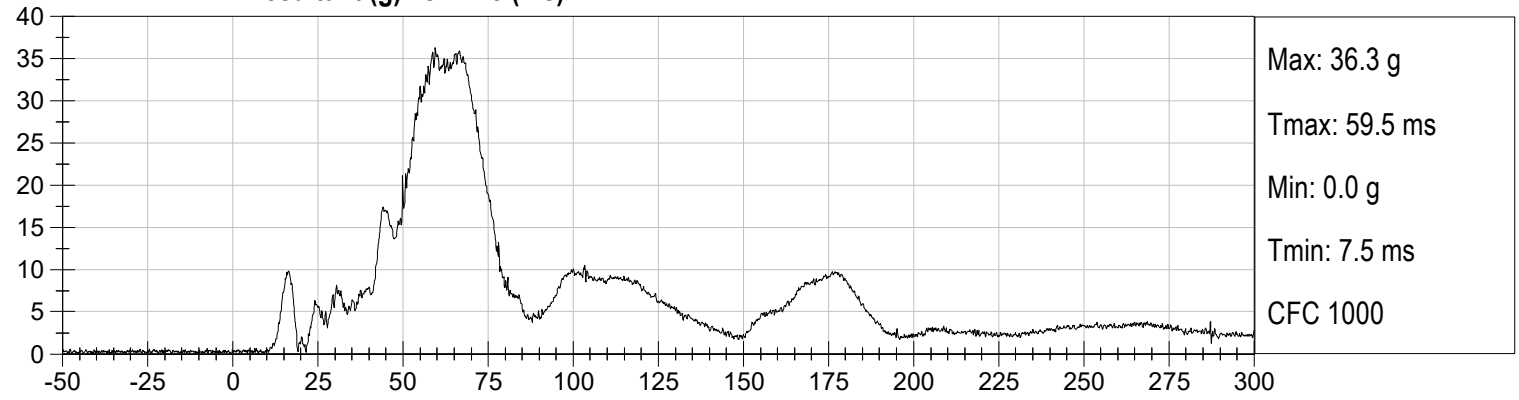
DRIVER HEAD Y (g) vs Time (ms)



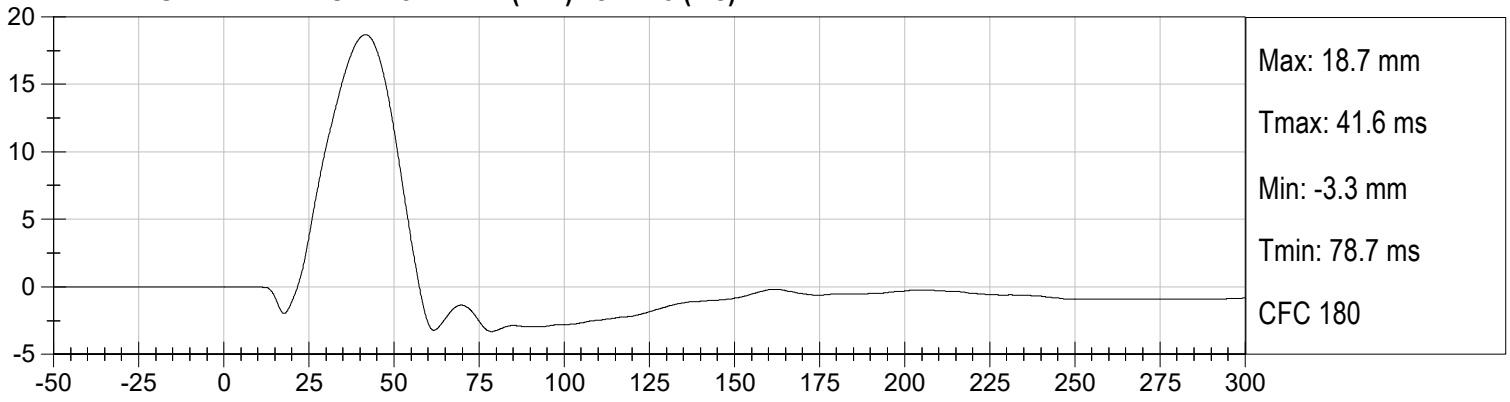
DRIVER HEAD Z (g) vs Time (ms)



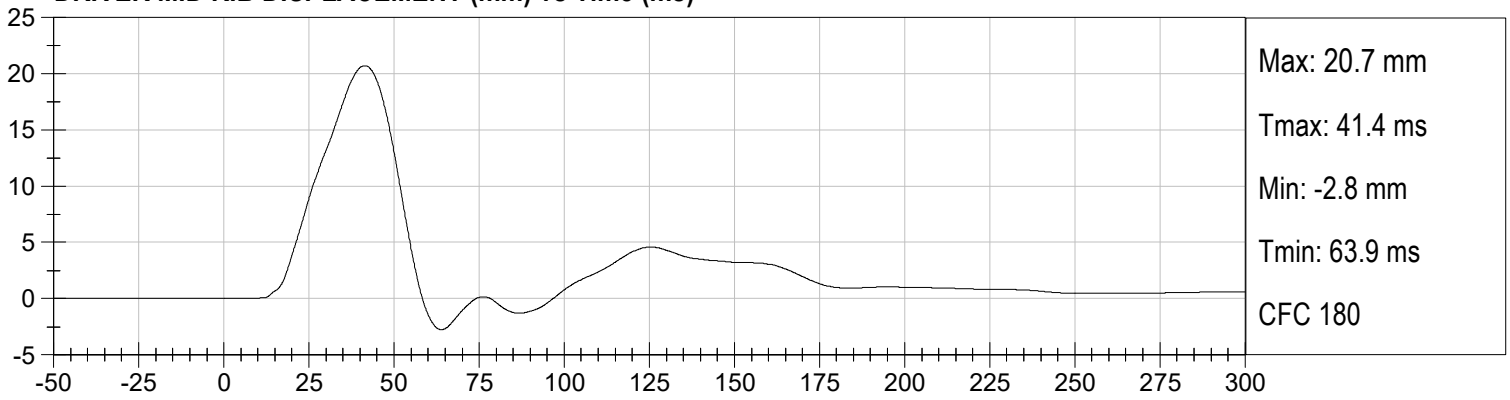
DRIVER HEAD Resultant (g) vs Time (ms)



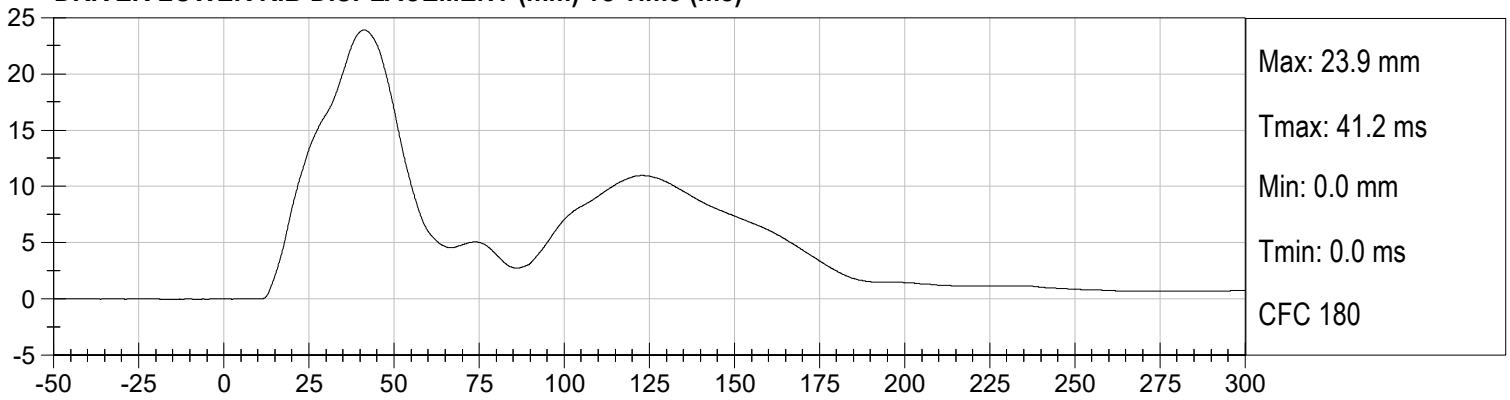
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



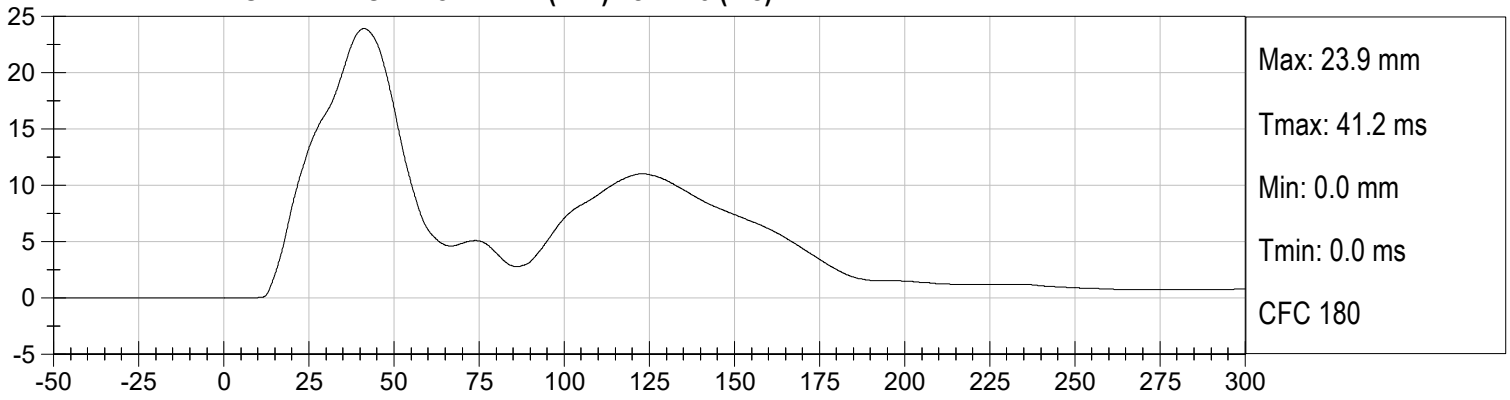
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



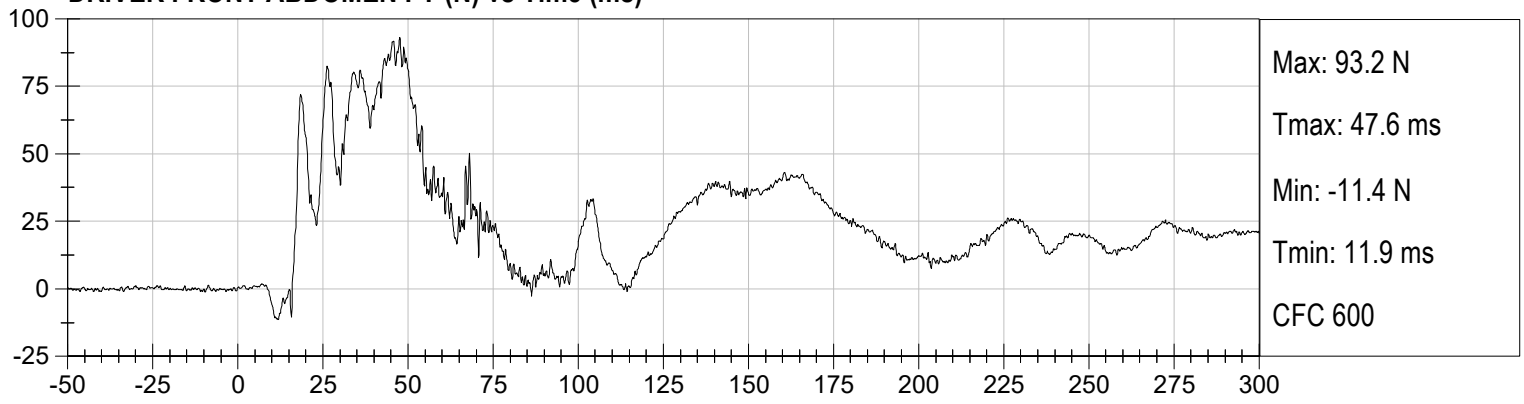
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



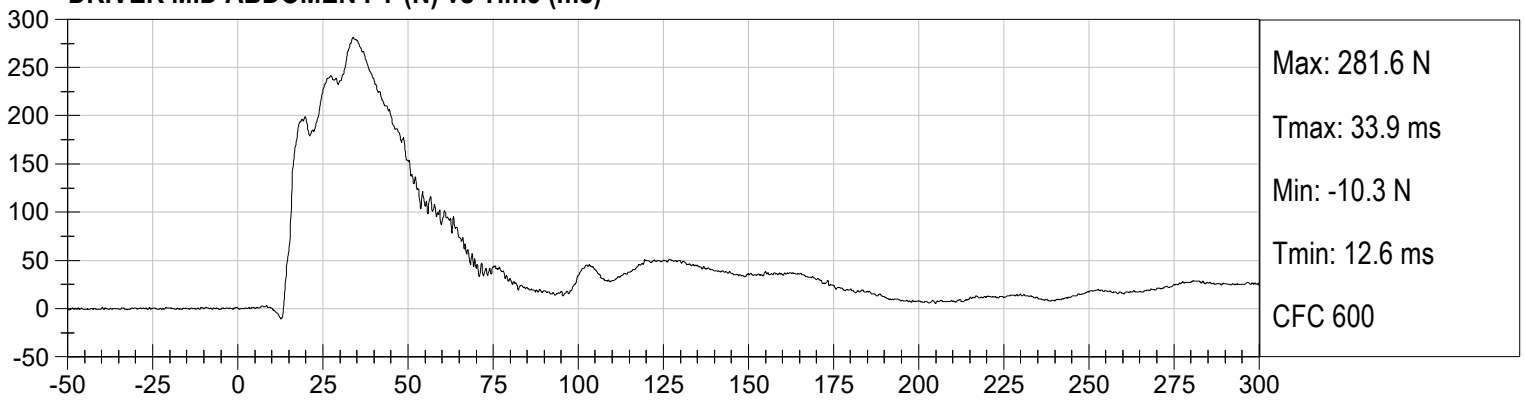
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



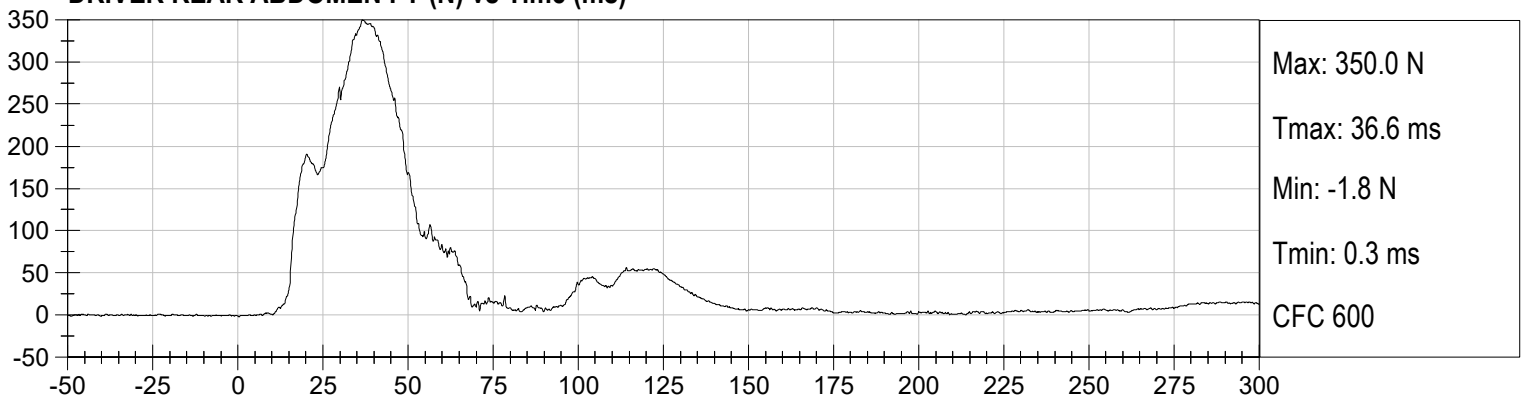
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



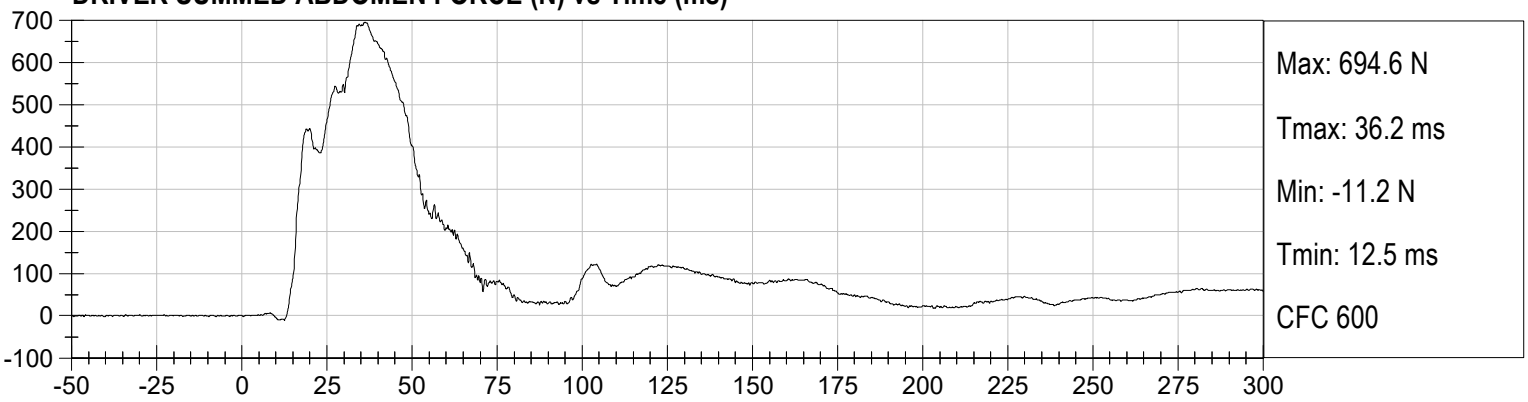
DRIVER MID ABDOMEN FY (N) vs Time (ms)



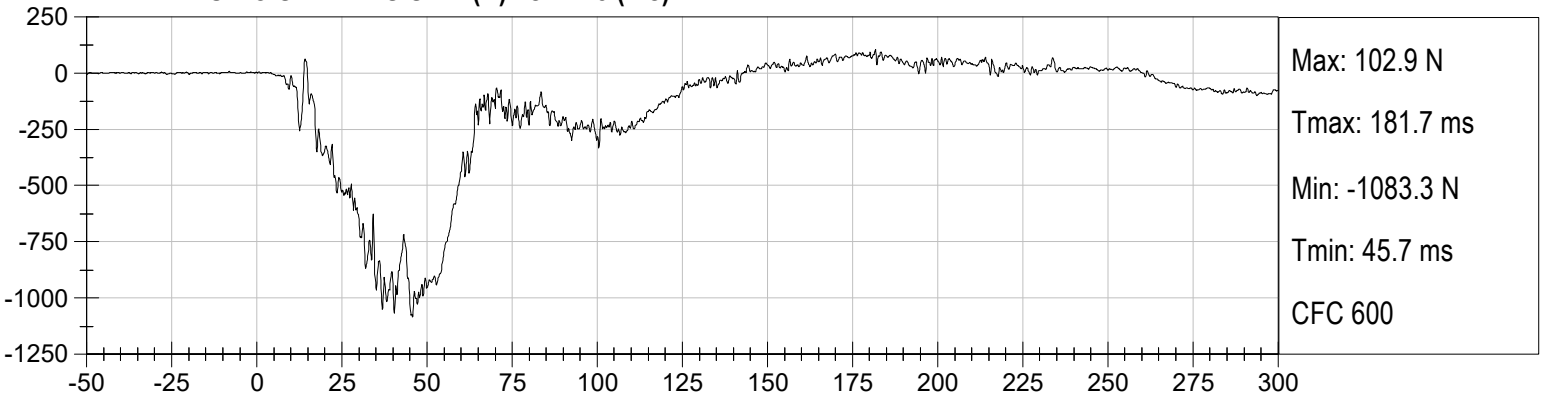
DRIVER REAR ABDOMEN FY (N) vs Time (ms)



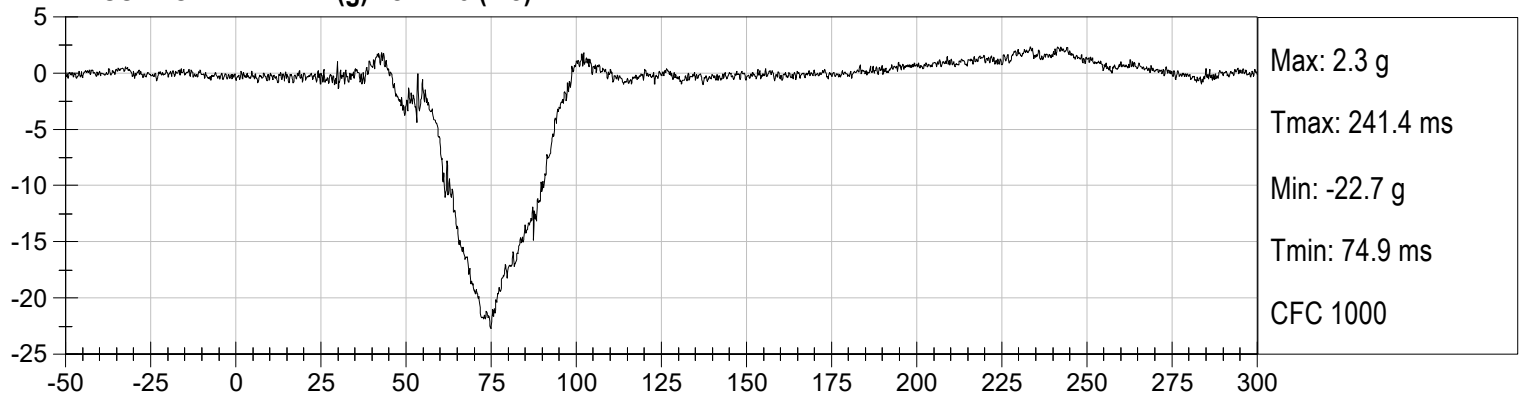
DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)



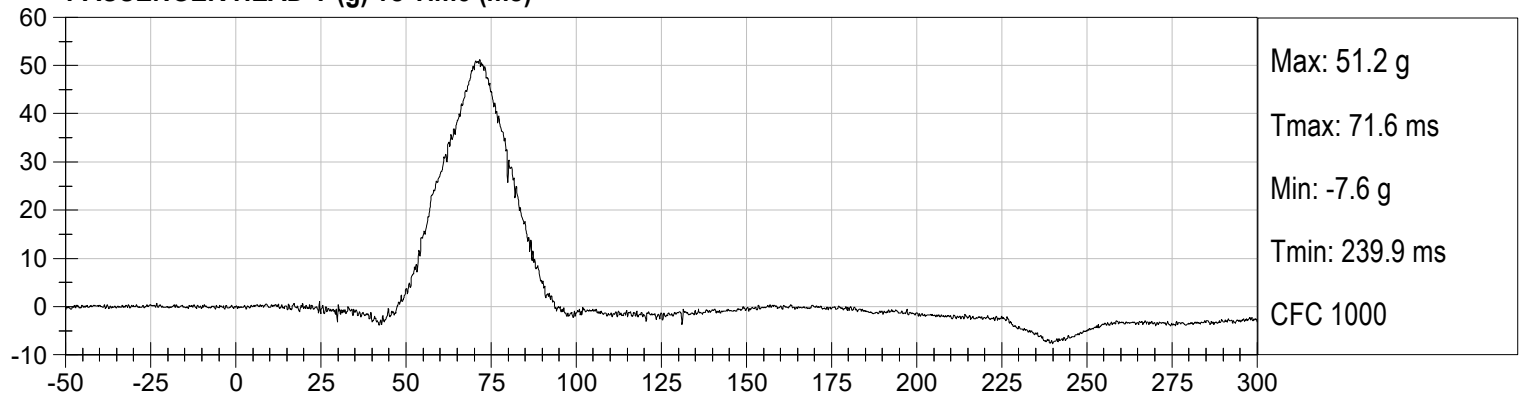
DRIVER PUBIC SYMPHYSIS FY (N) vs Time (ms)



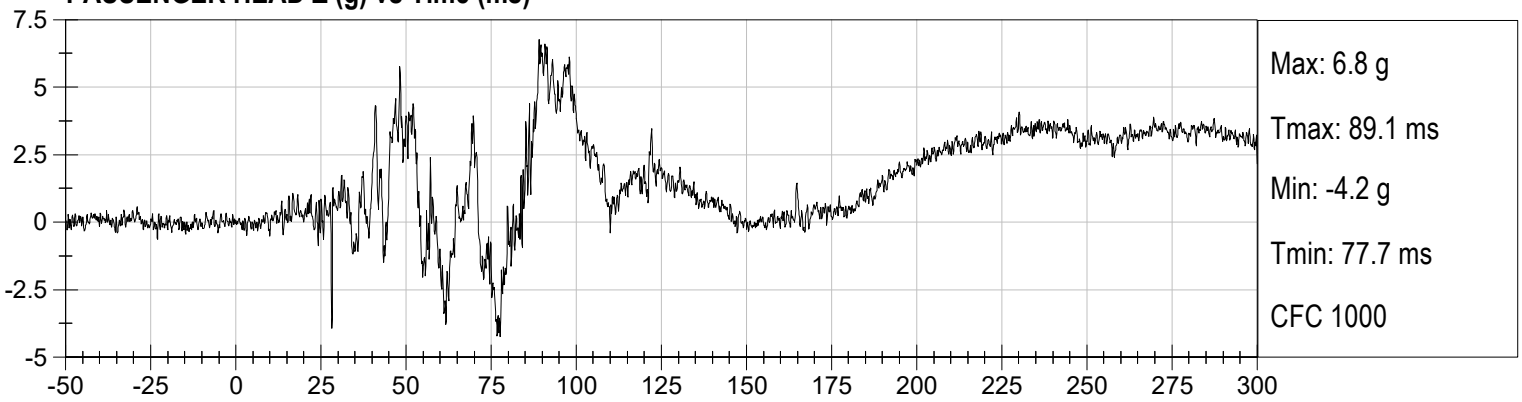
PASSENGER HEAD X (g) vs Time (ms)



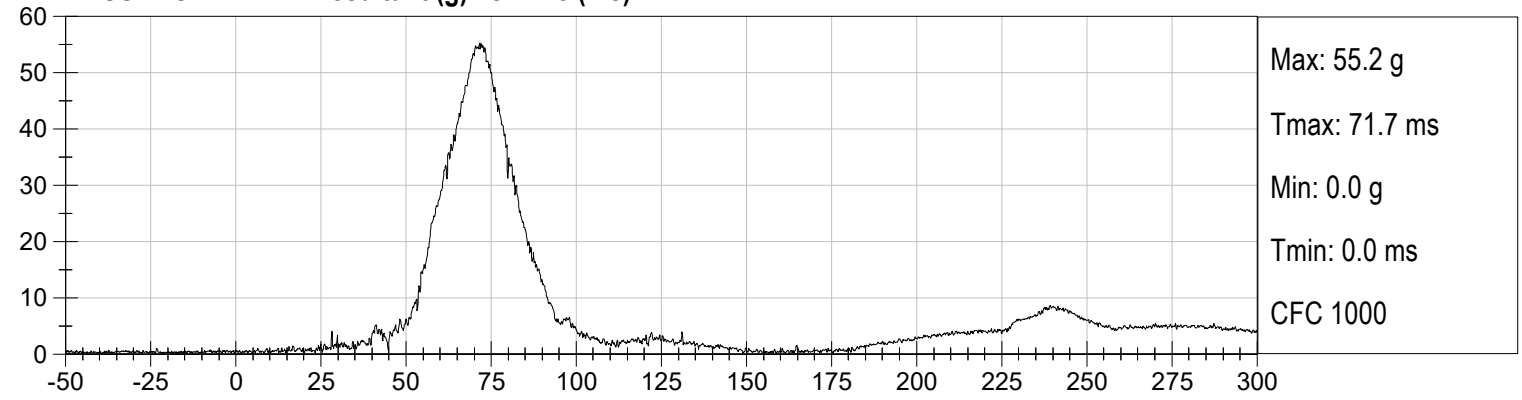
PASSENGER HEAD Y (g) vs Time (ms)



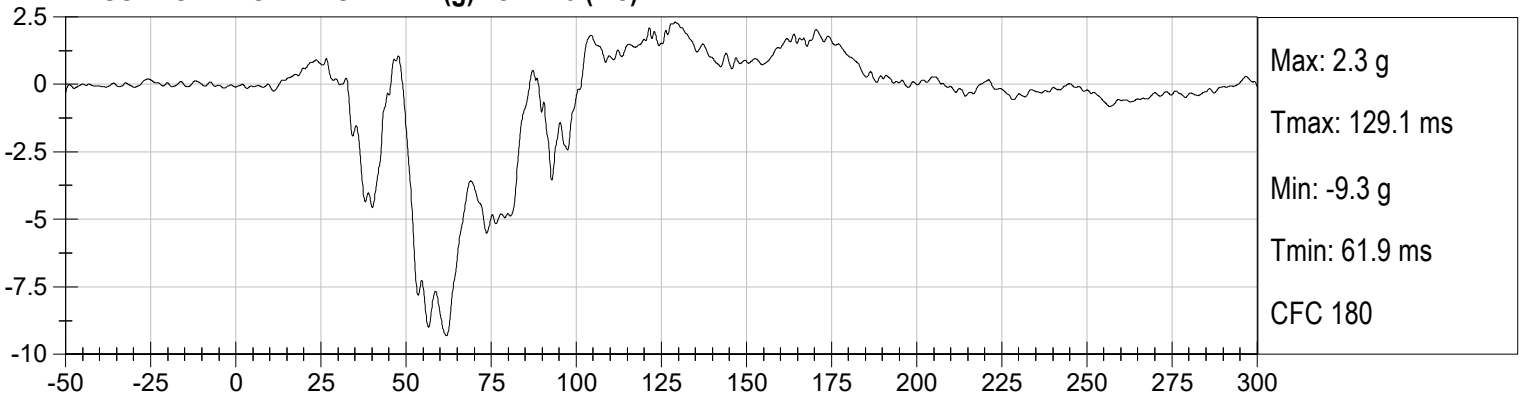
PASSENGER HEAD Z (g) vs Time (ms)



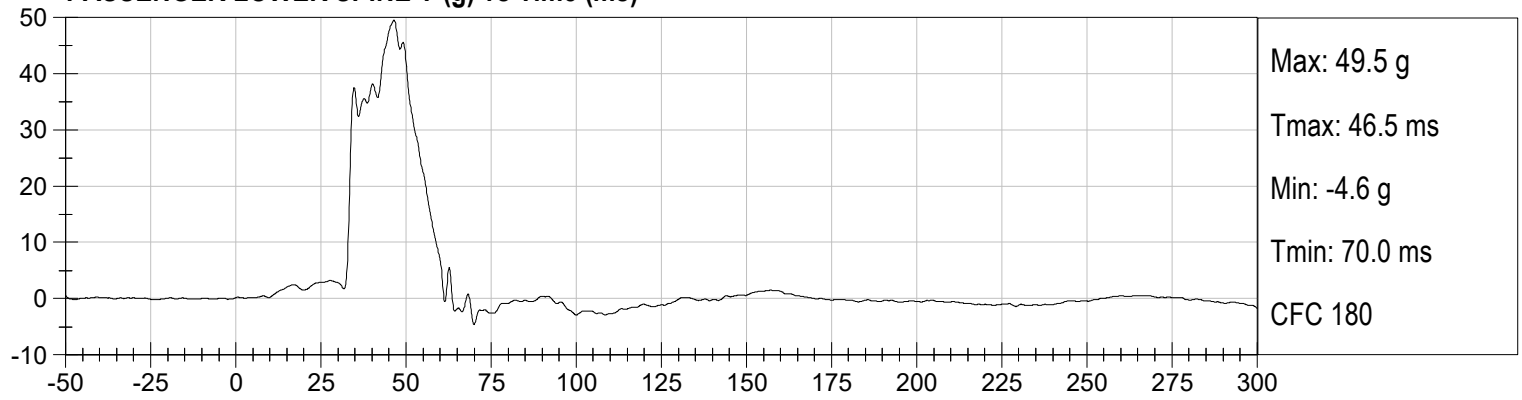
PASSENGER HEAD Resultant (g) vs Time (ms)



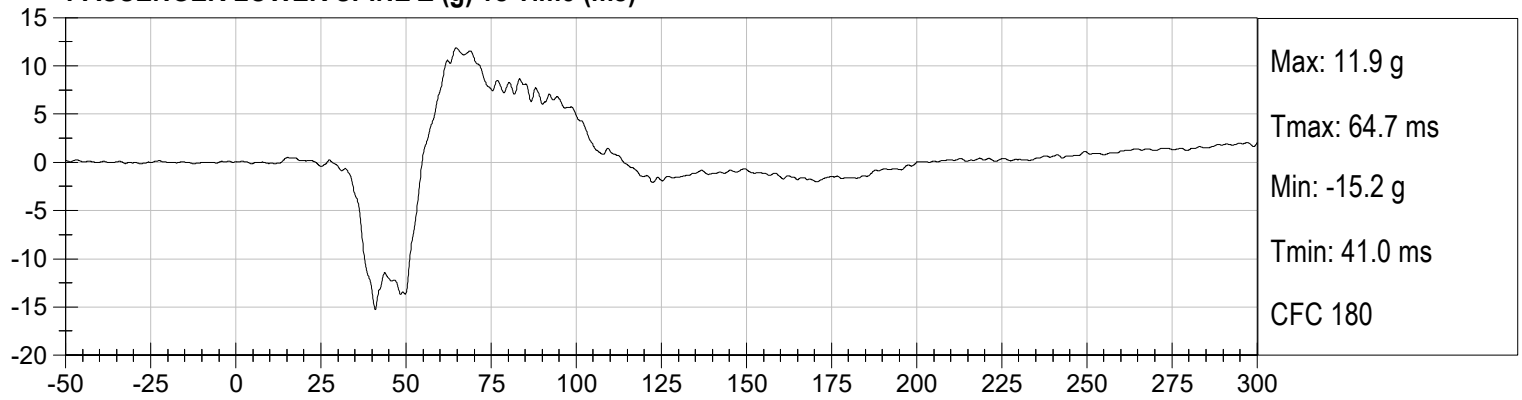
PASSENGER LOWER SPINE X (g) vs Time (ms)



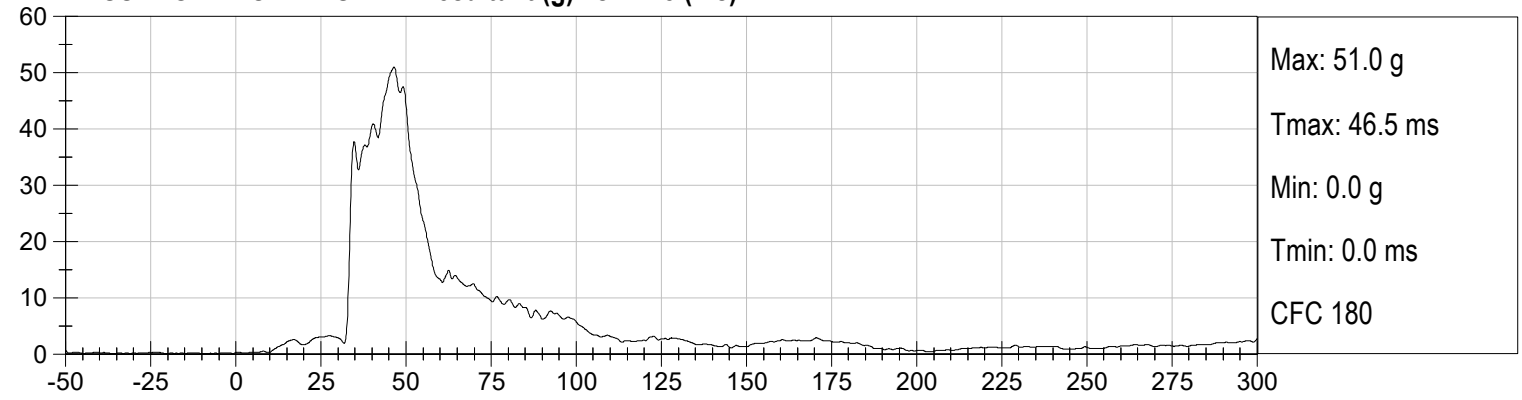
PASSENGER LOWER SPINE Y (g) vs Time (ms)



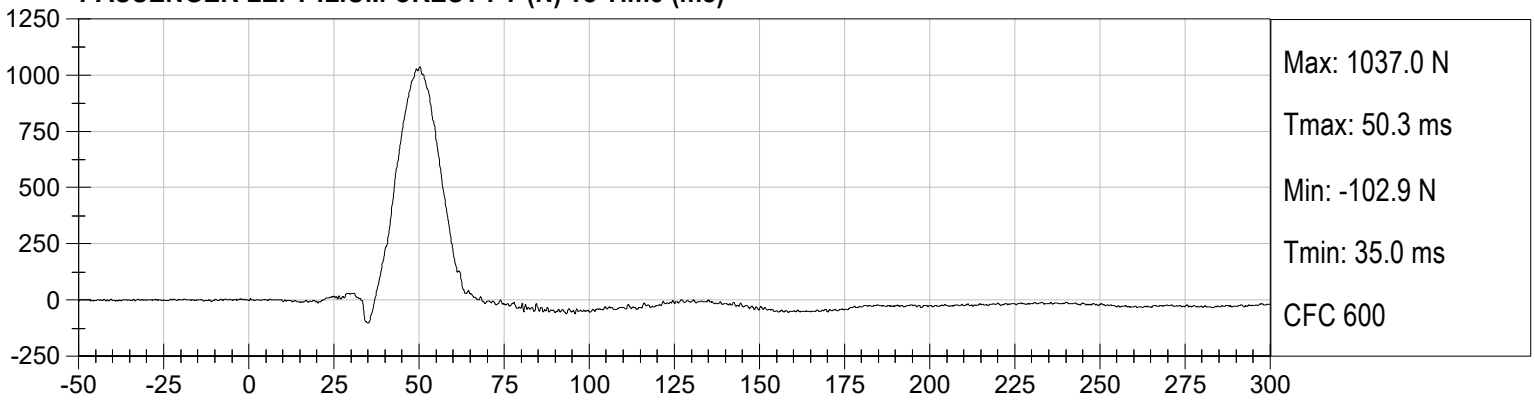
PASSENGER LOWER SPINE Z (g) vs Time (ms)



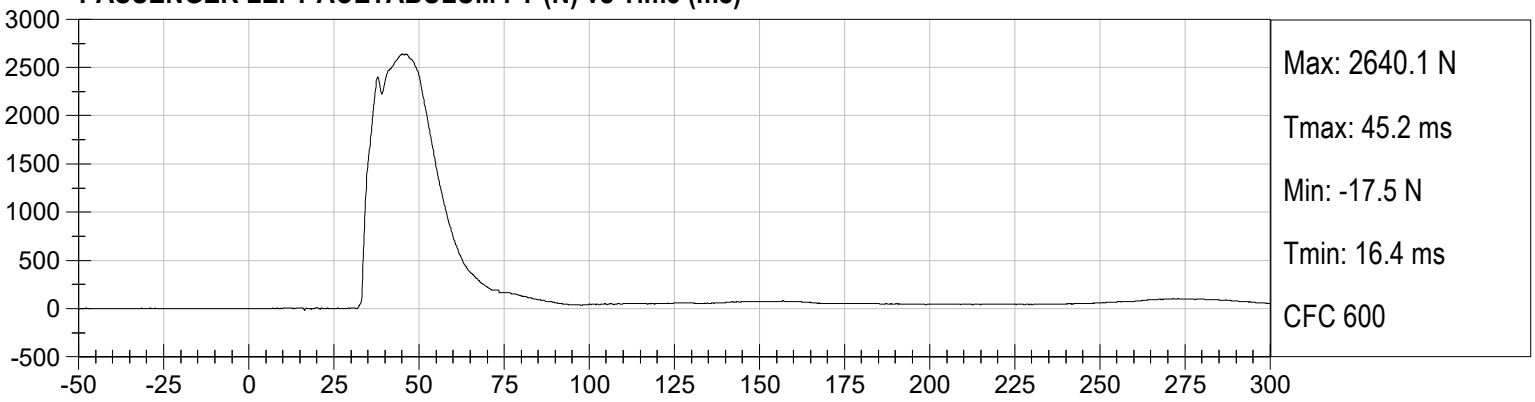
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



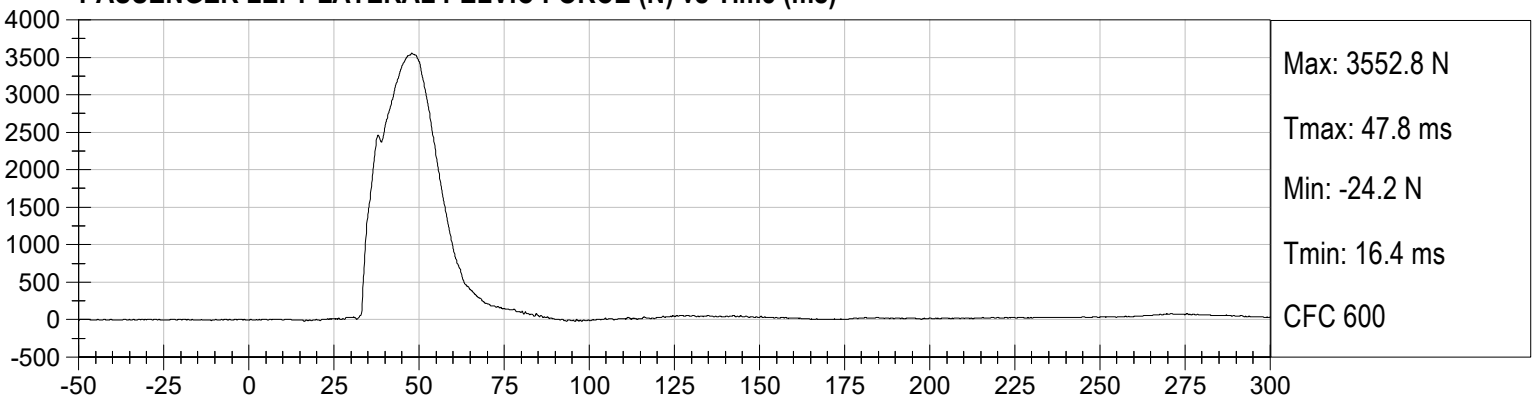
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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: F032 **Test ID:** D200381

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	25	Pass
Peak Resultant Acceleration	G's	125 to 155	135	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

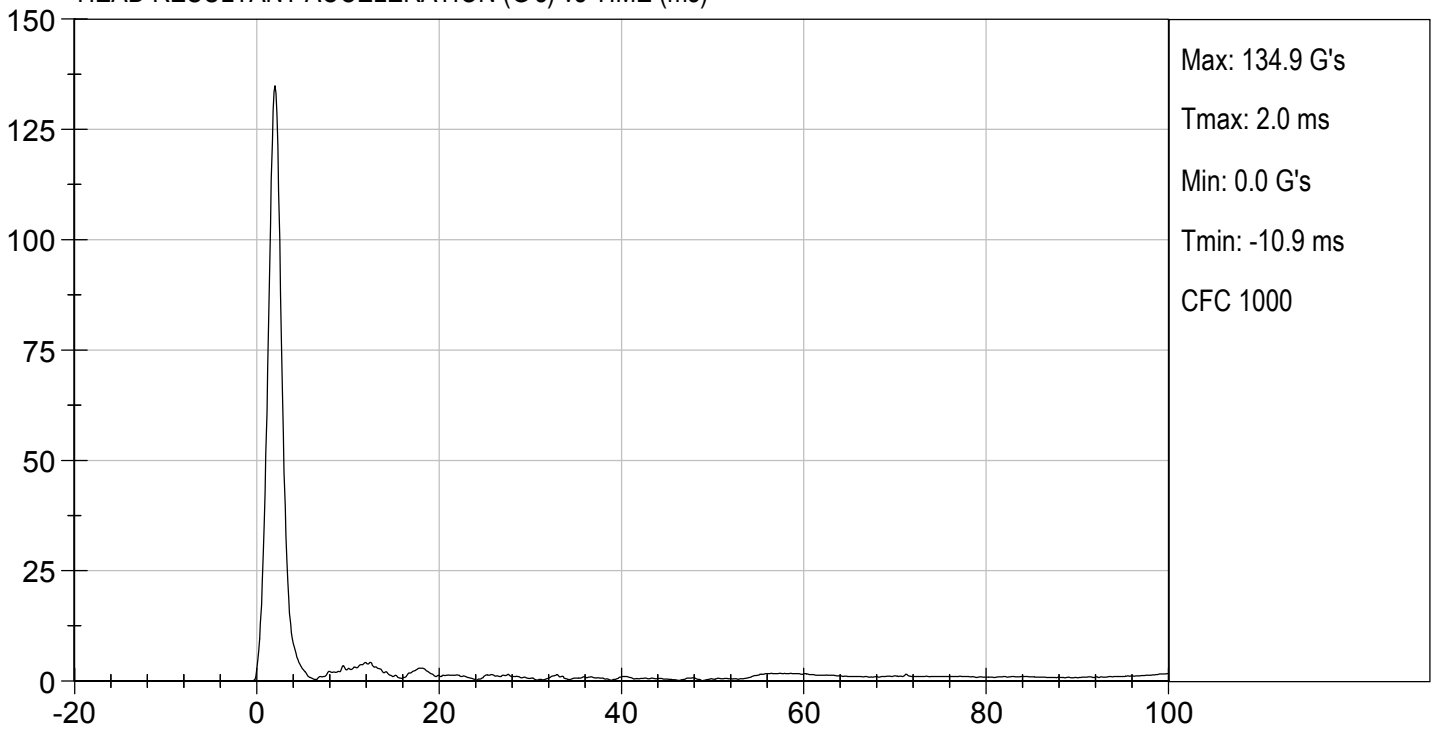
01/31/2020
Test Date

Approved By

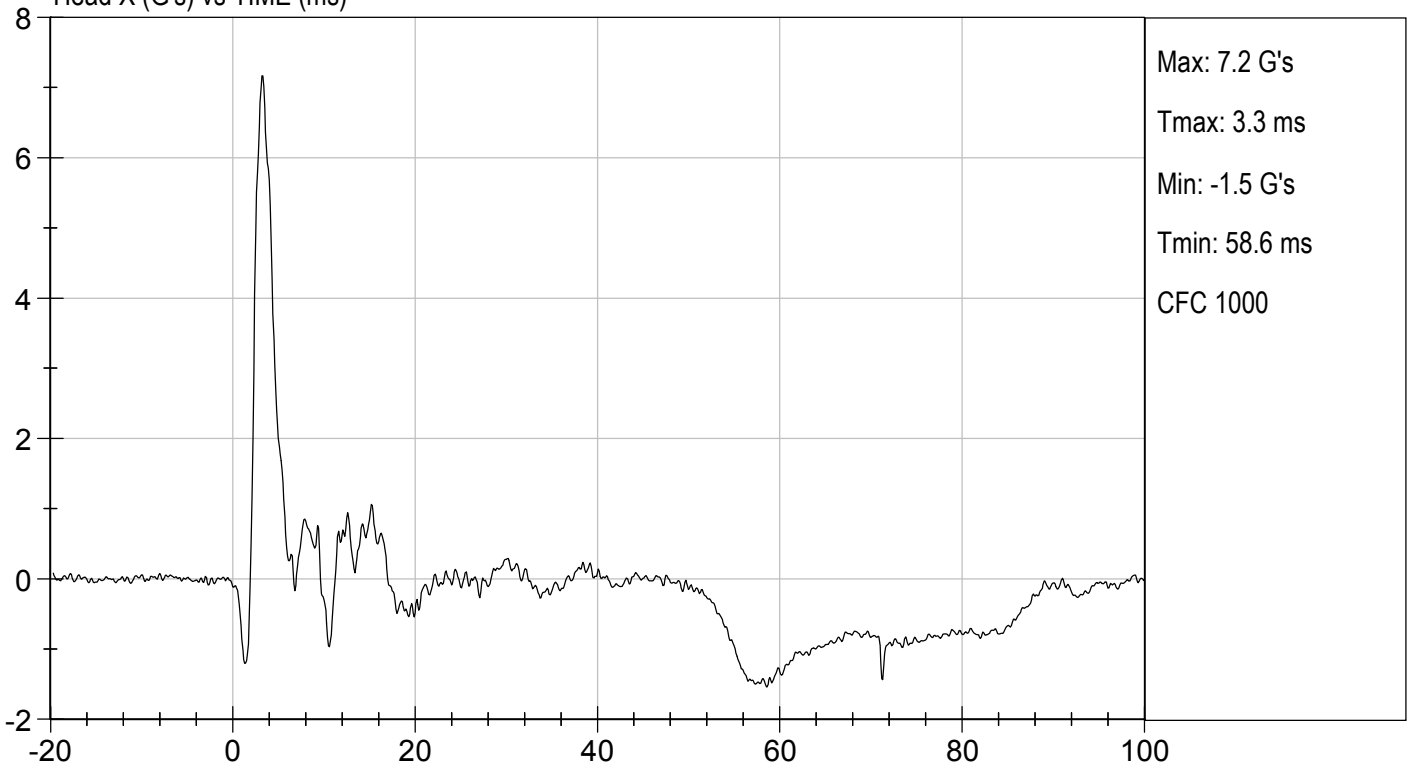
TEST DESC: HEAD DROP

TEST DATE: 01/31/2020
TEST #: D200381

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

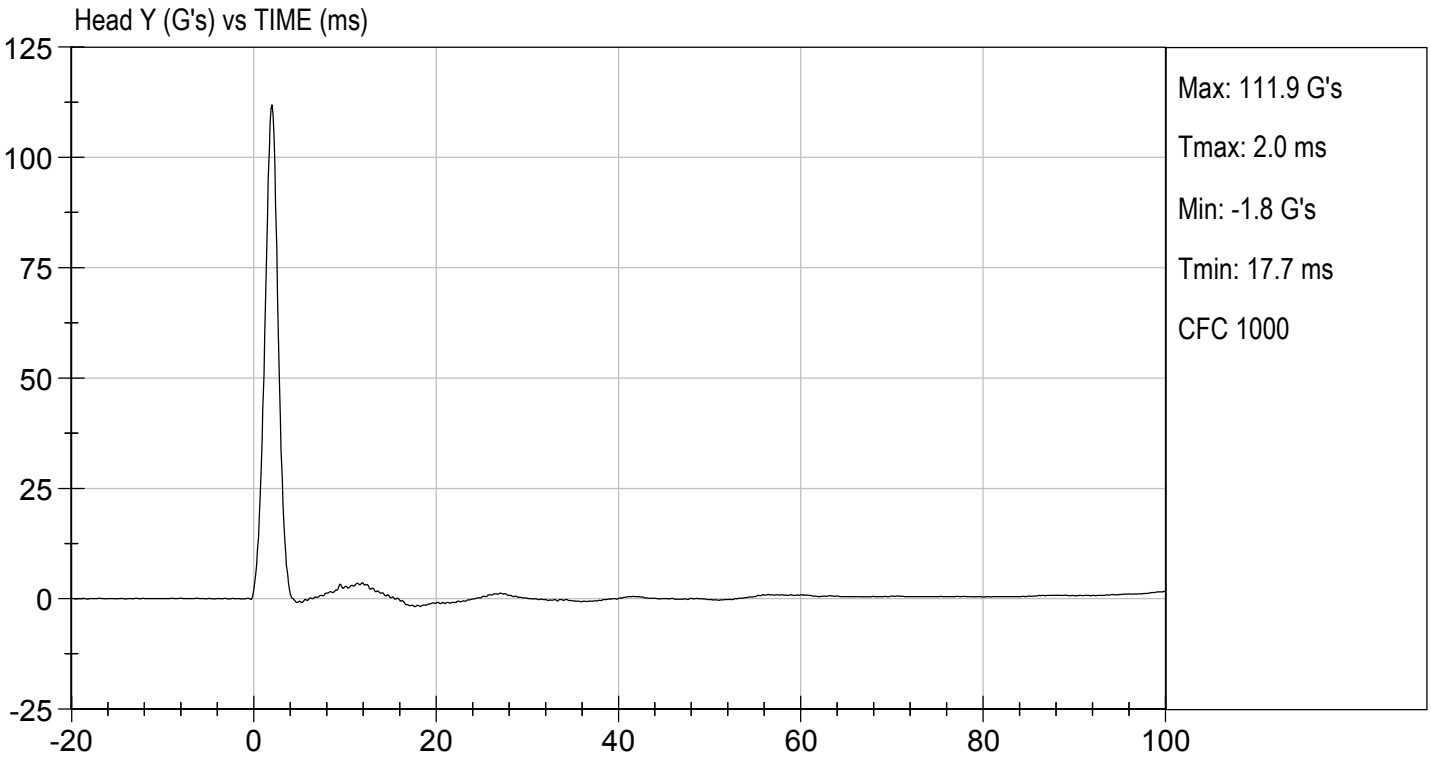


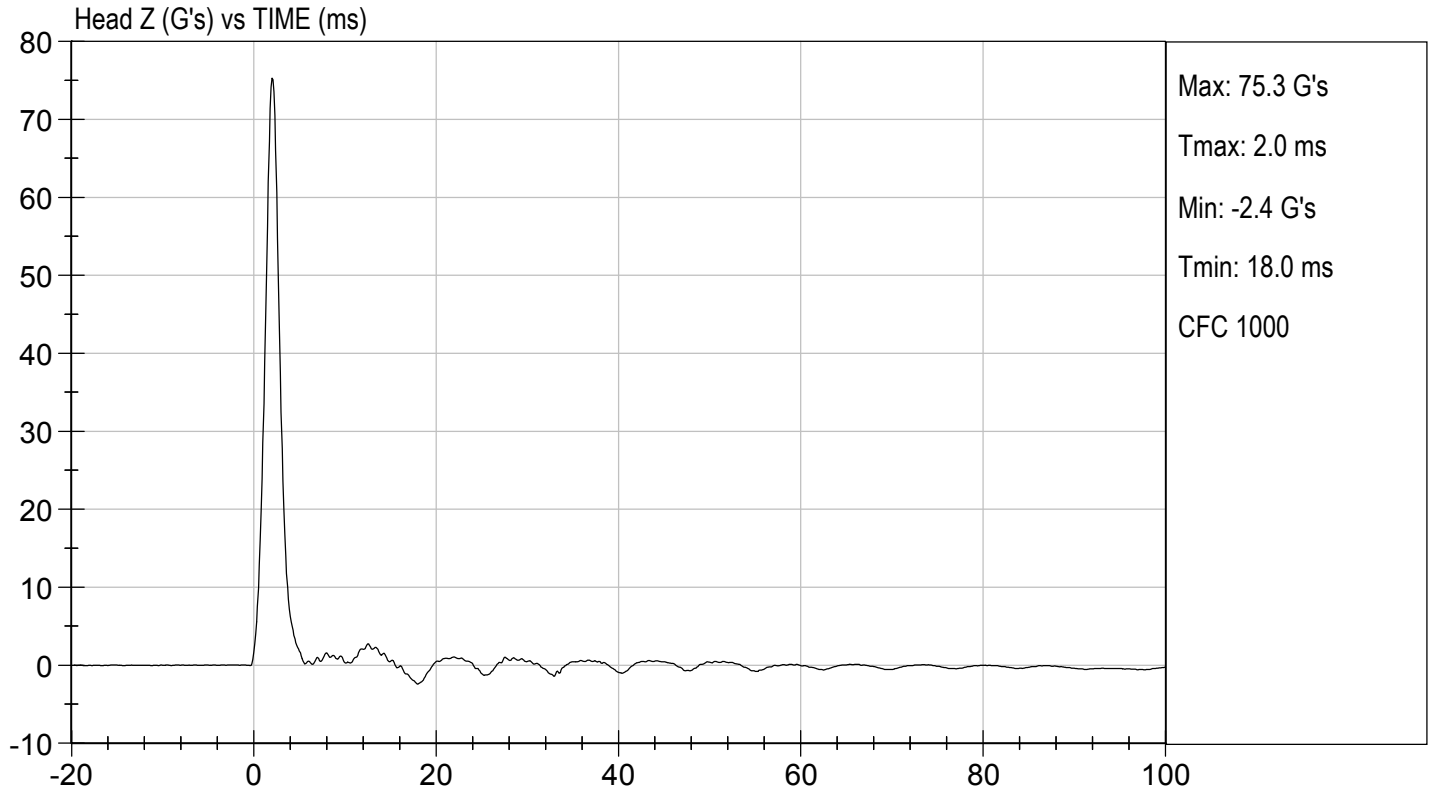
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/31/2020
TEST #: D200381





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200382

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.39	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.62	Pass
	17 ms	m/s	>= -3.70	-3.43	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.0	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	54.2	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	64.6	Pass
			Overall Results		Pass

Laboratory Technician

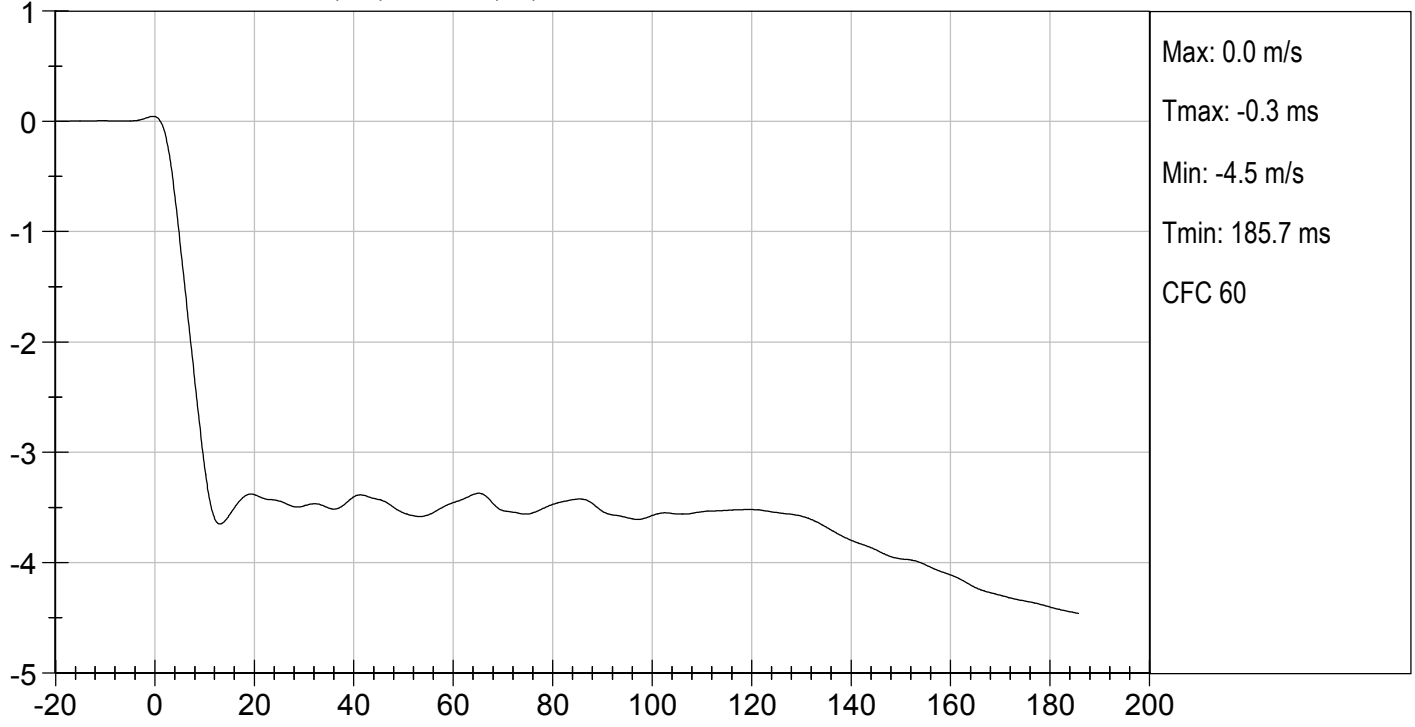
01/31/2020
Test Date

Approved By

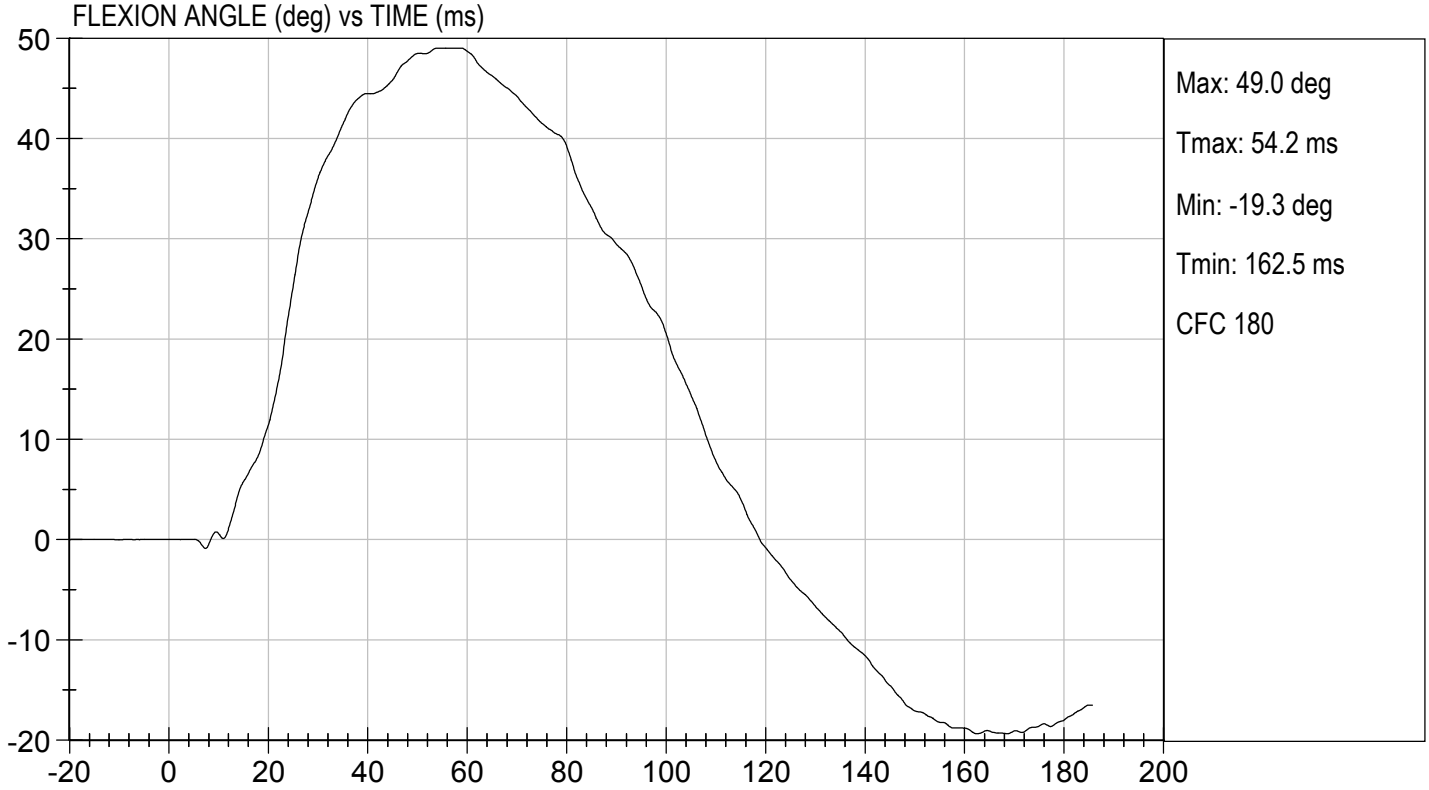
TEST DESC: NECK BENDING
VELOCITY: 11.11 ft/s, 3.39 m/s

TEST DATE: 01/31/2020
TEST #: D200382

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



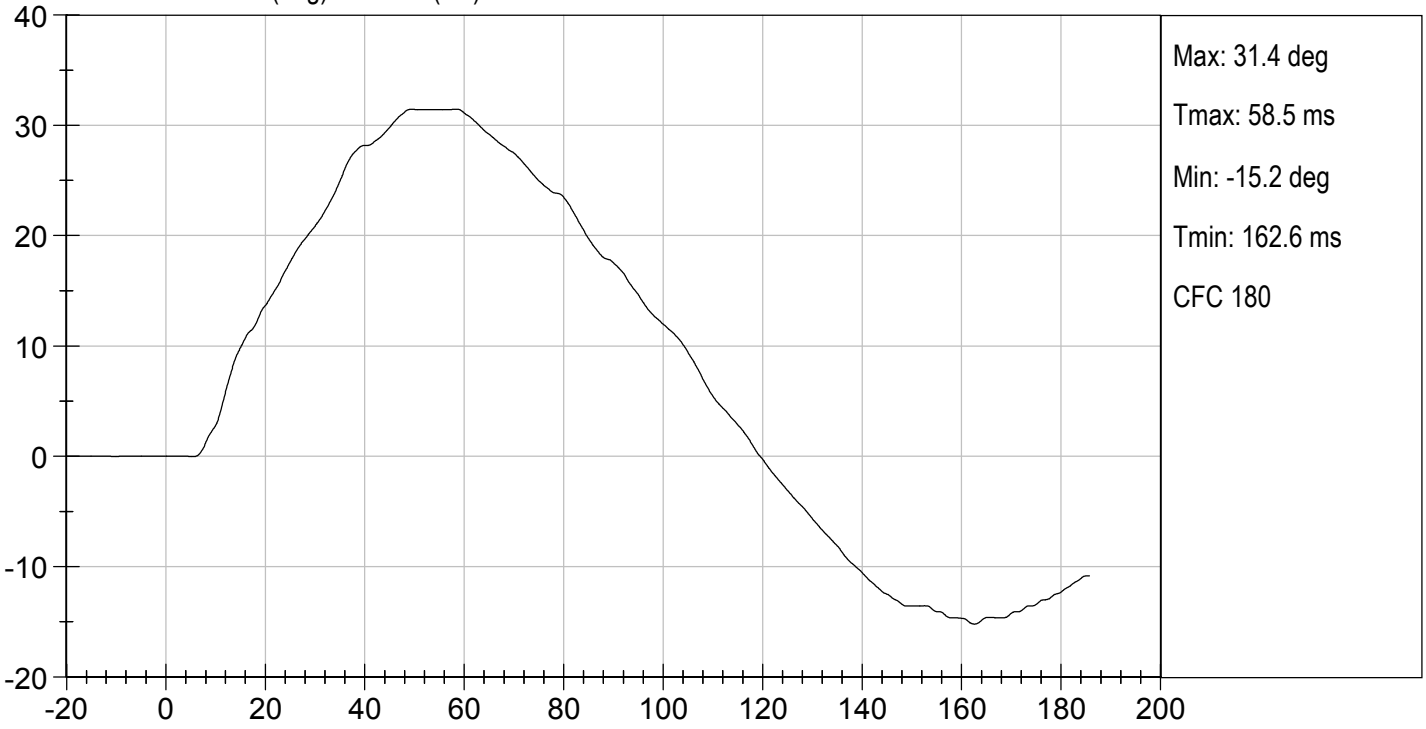
FLEXION ANGLE (deg) vs TIME (ms)



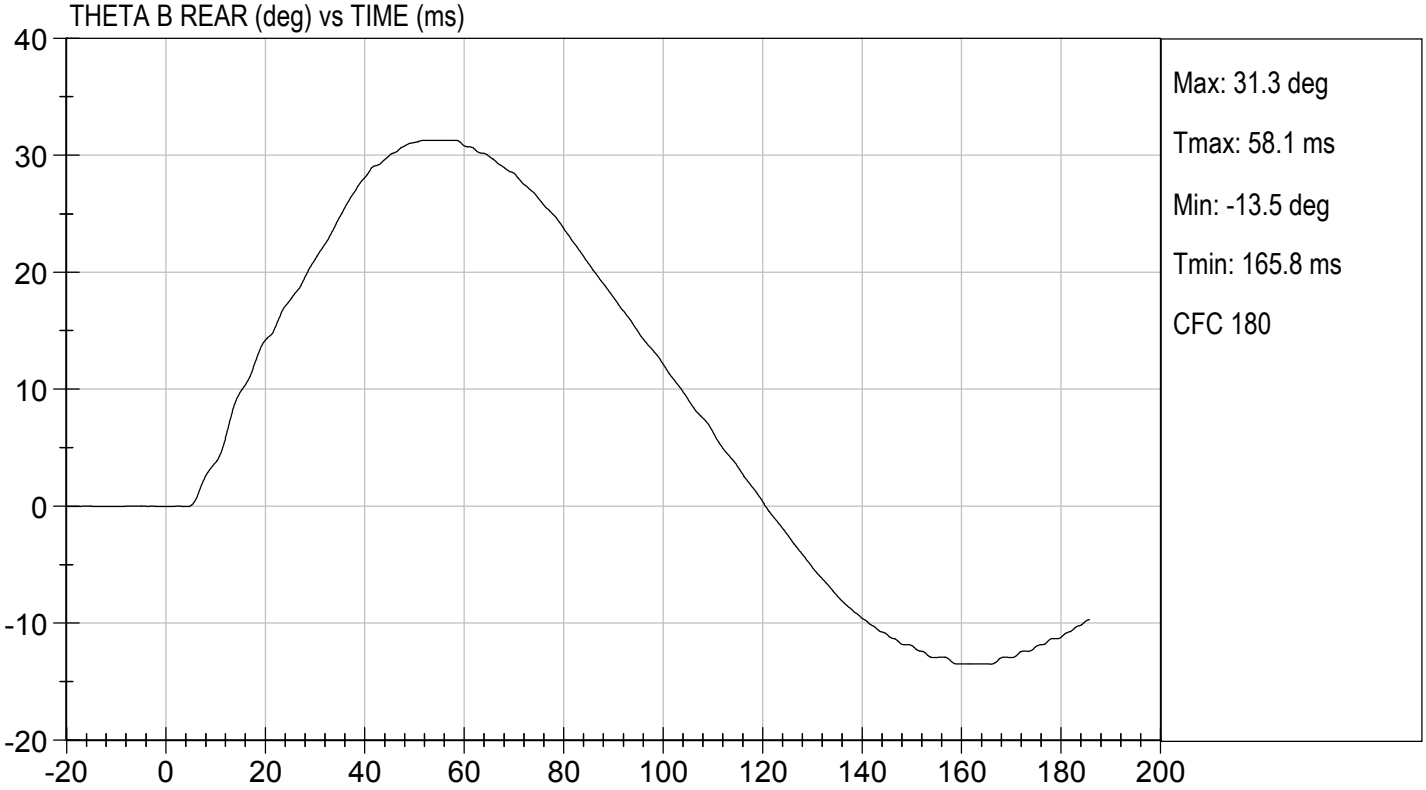
TEST DESC: NECK BENDING
VELOCITY: 11.11 ft/s, 3.39 m/s

TEST DATE: 01/31/2020
TEST #: D200382

THETA A FRONT (deg) vs TIME (ms)

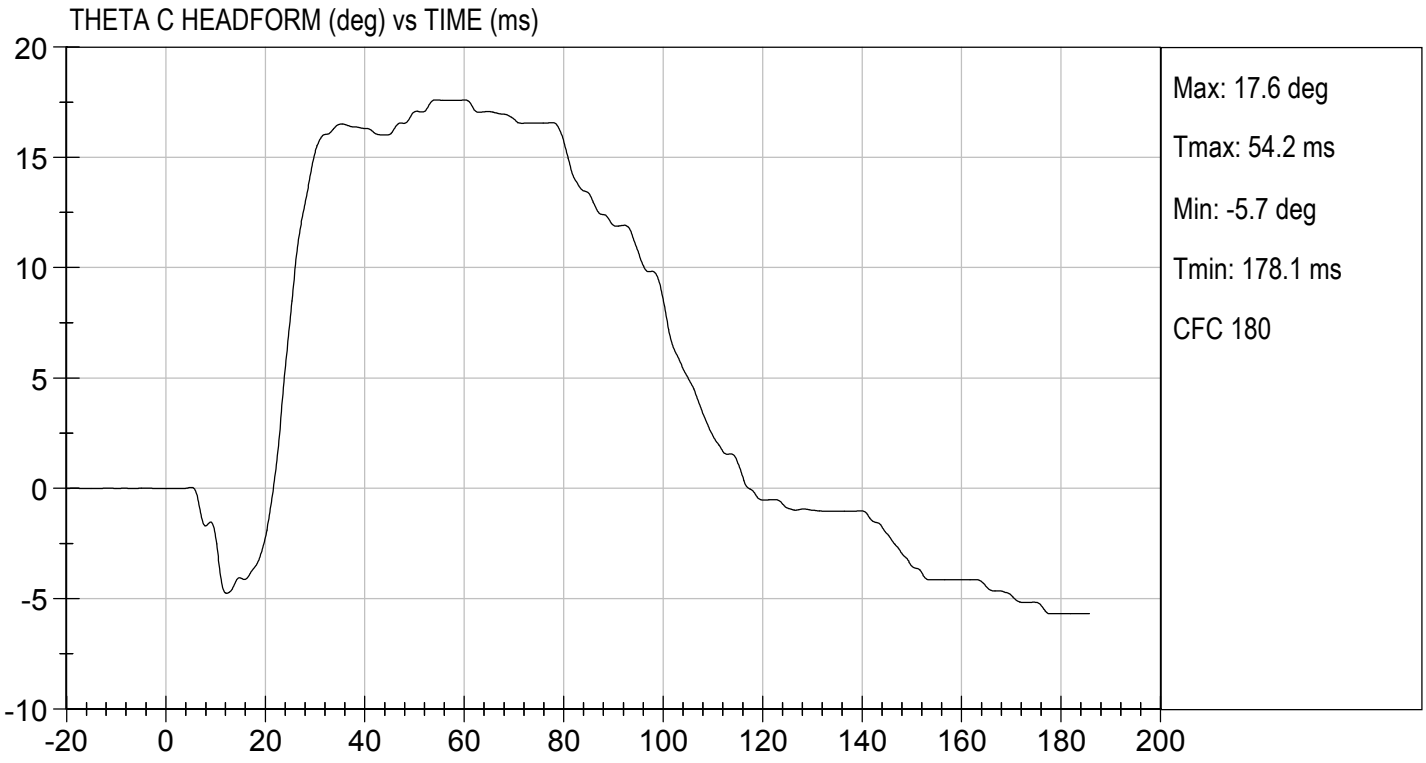


THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.11 ft/s, 3.39 m/s

TEST DATE: 01/31/2020
TEST #: D200382



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200383

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.7	Pass
		Overall Test Results		Pass

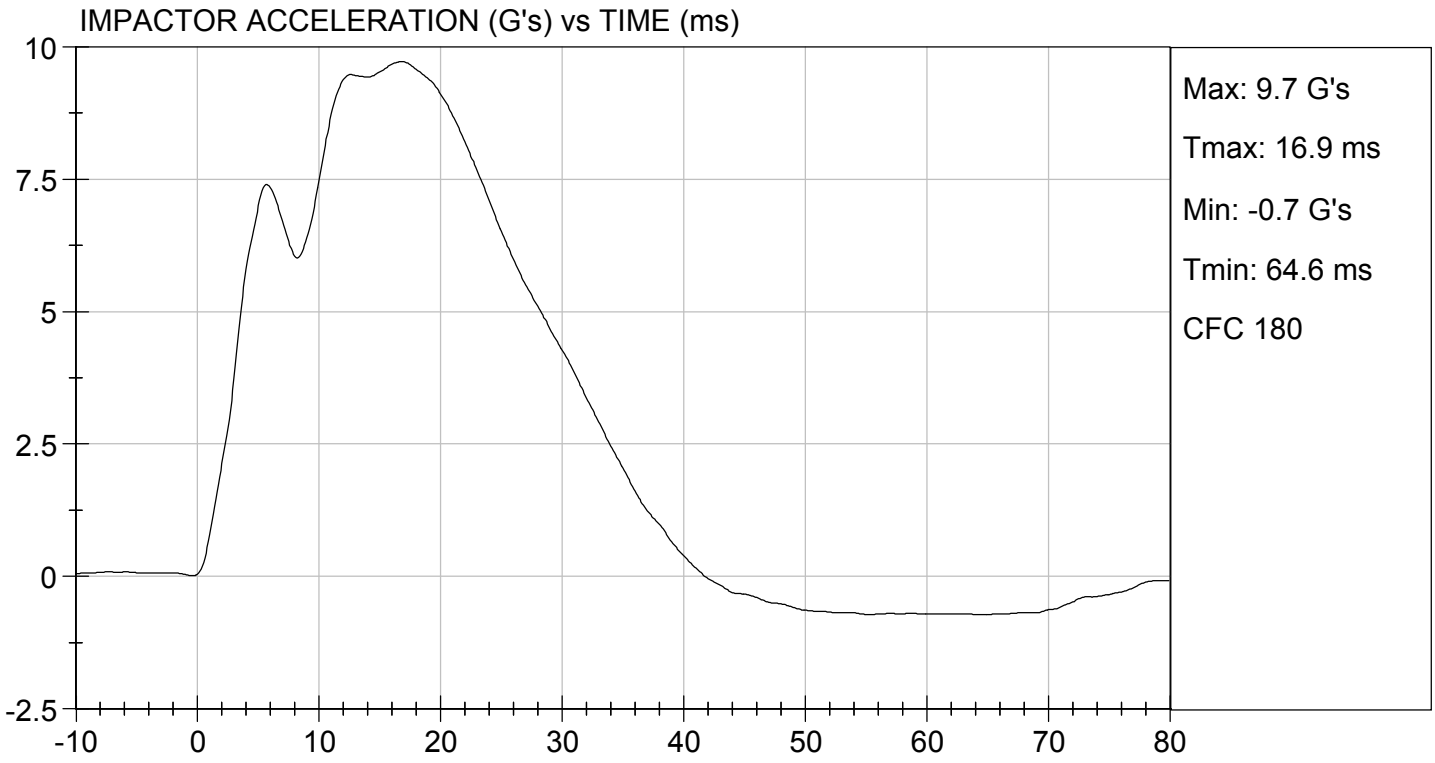
Jacob D Taylor
Laboratory Technician

01/31/2020
Test Date

Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 13.77 ft/s, 4.2 m/s

TEST DATE: 01/31/2020
TEST #: D200383



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200384

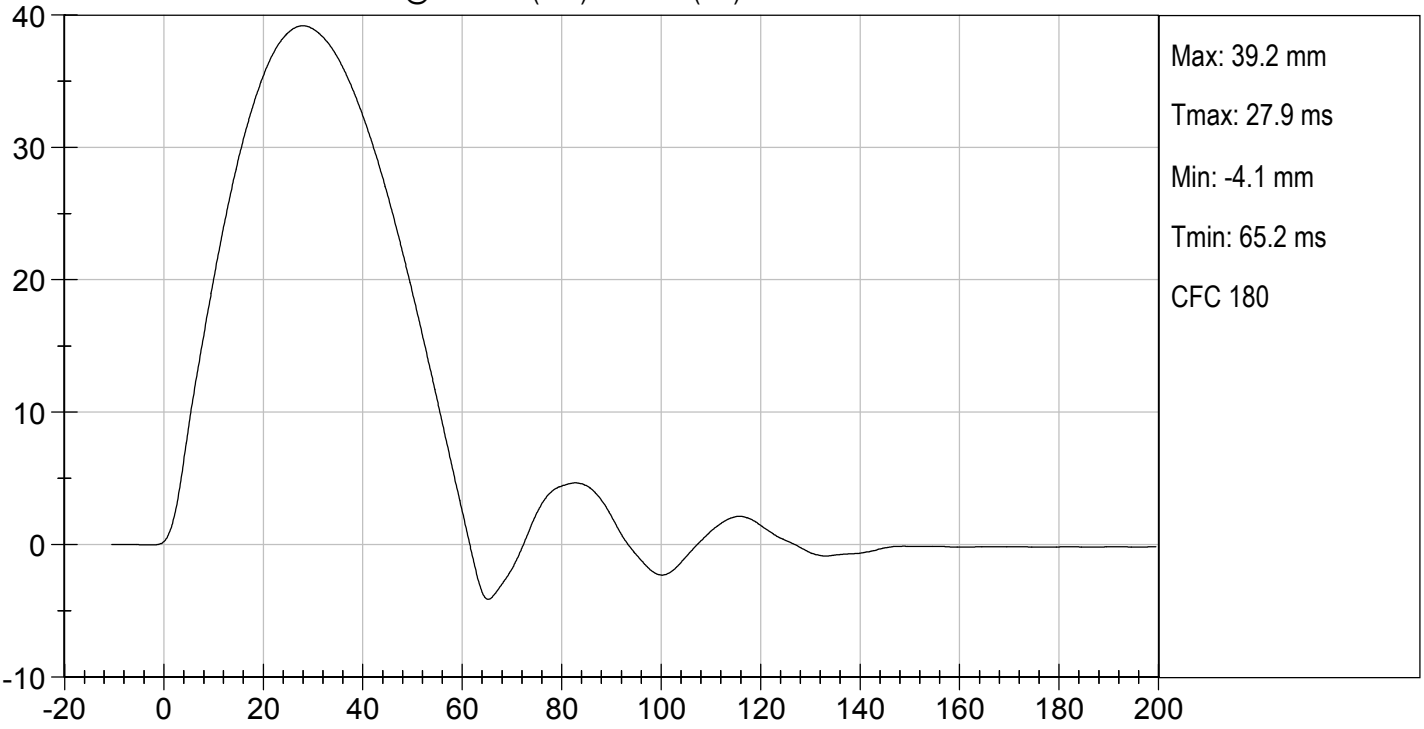
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.1	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

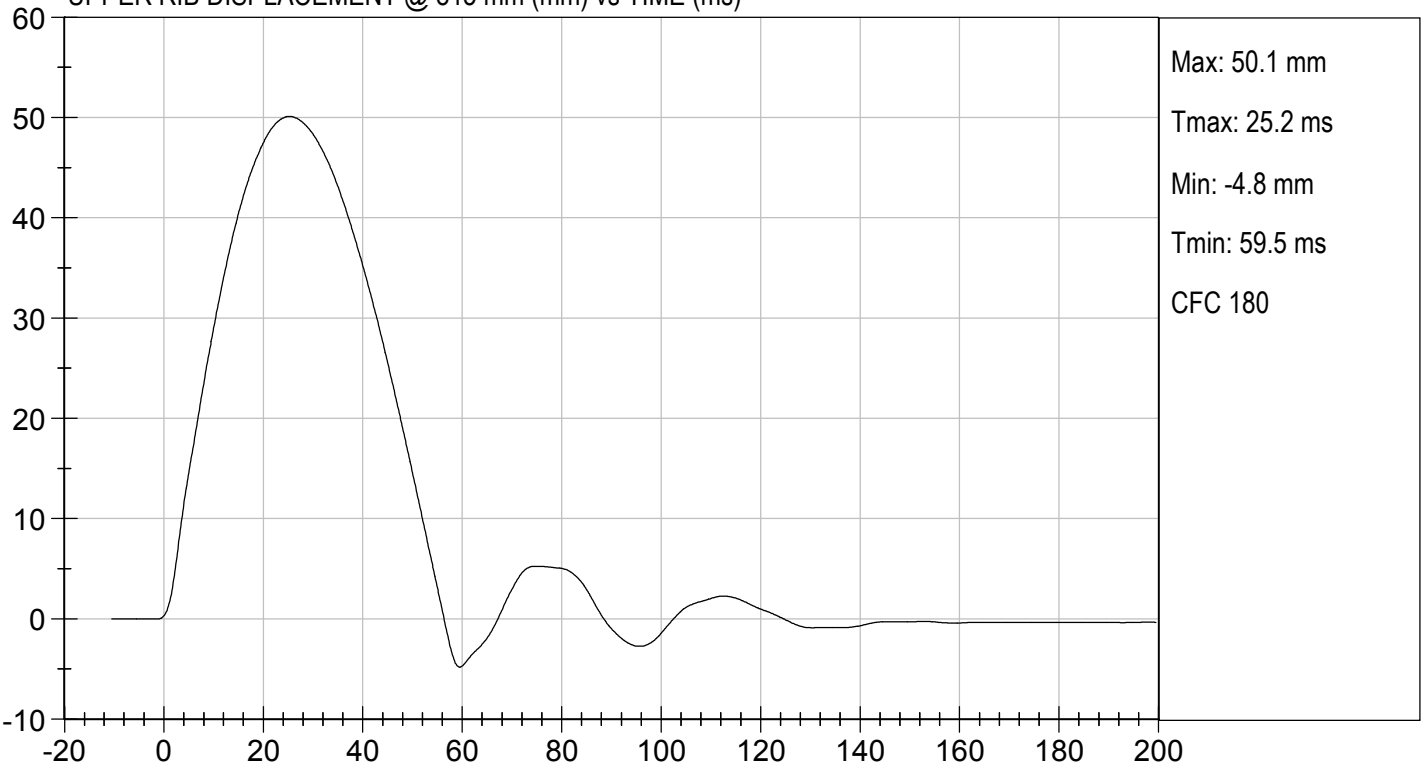
01/31/2020
Test Date

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: F032 **Test I.D:** D200385

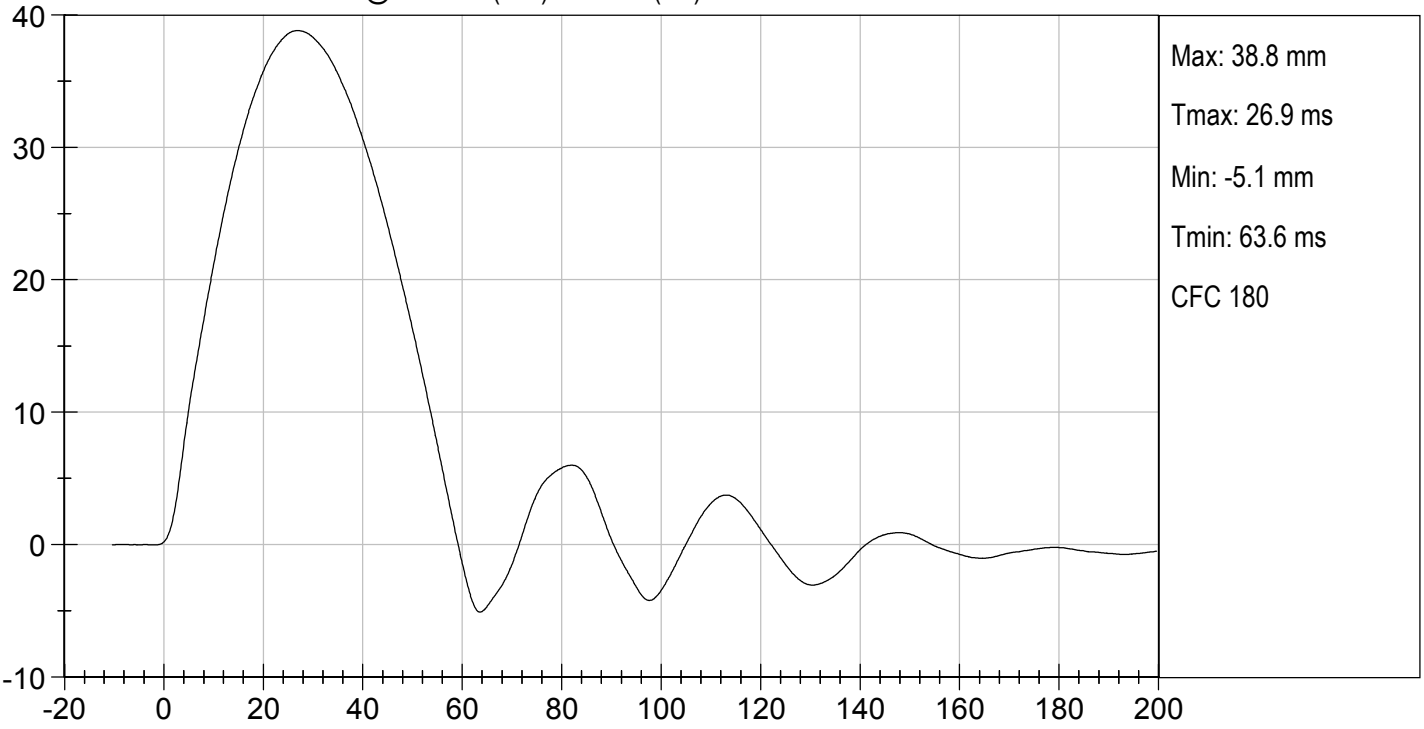
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.2	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

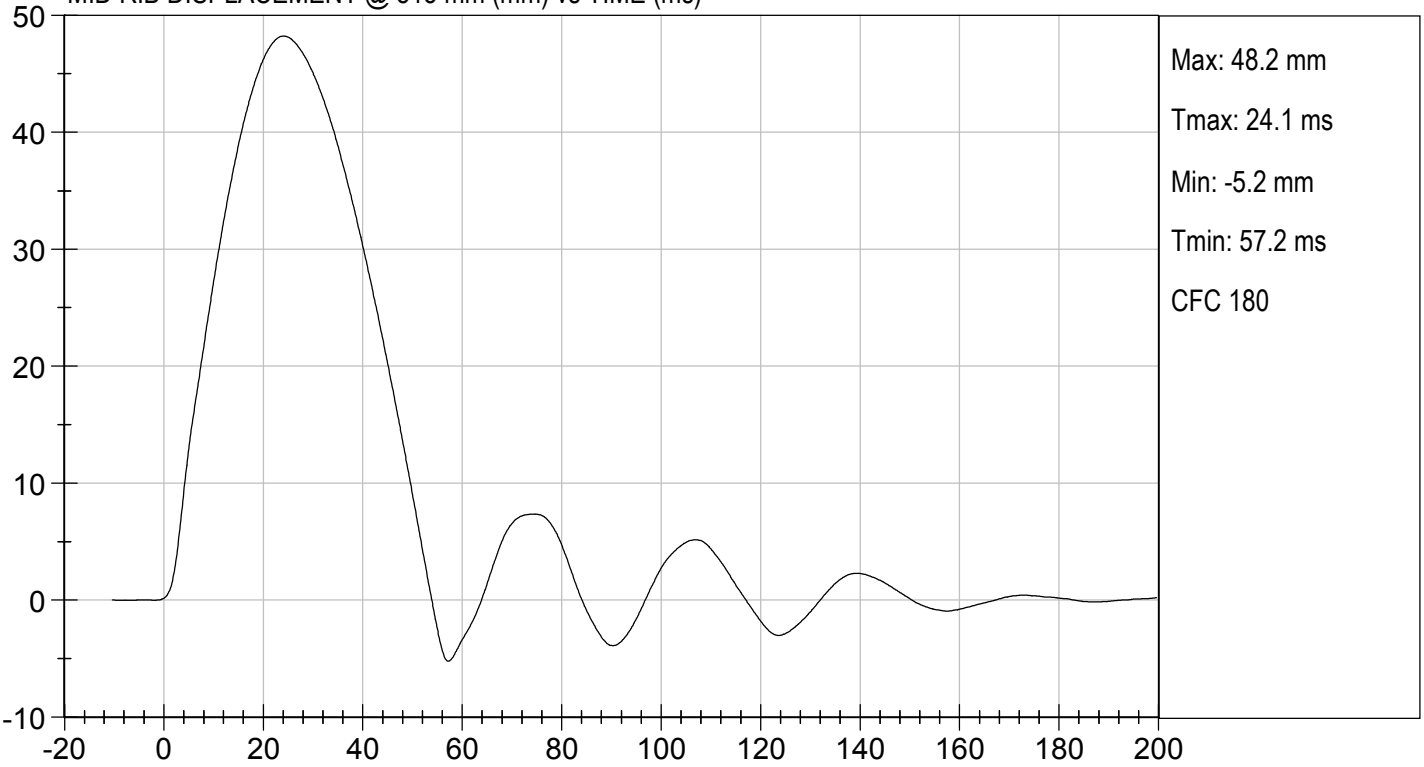
01/31/2020
Test Date

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: F032 **Test I.D:** D200386

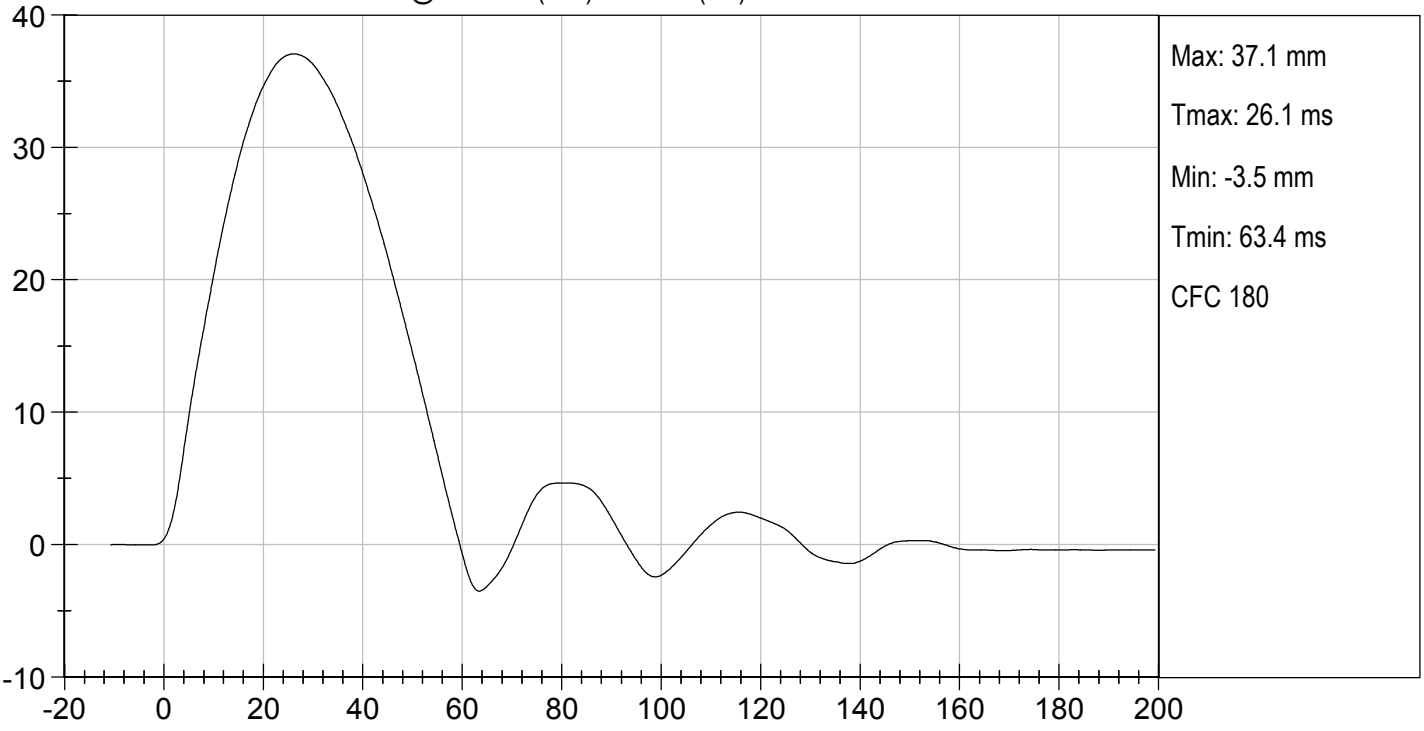
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.1	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.5	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

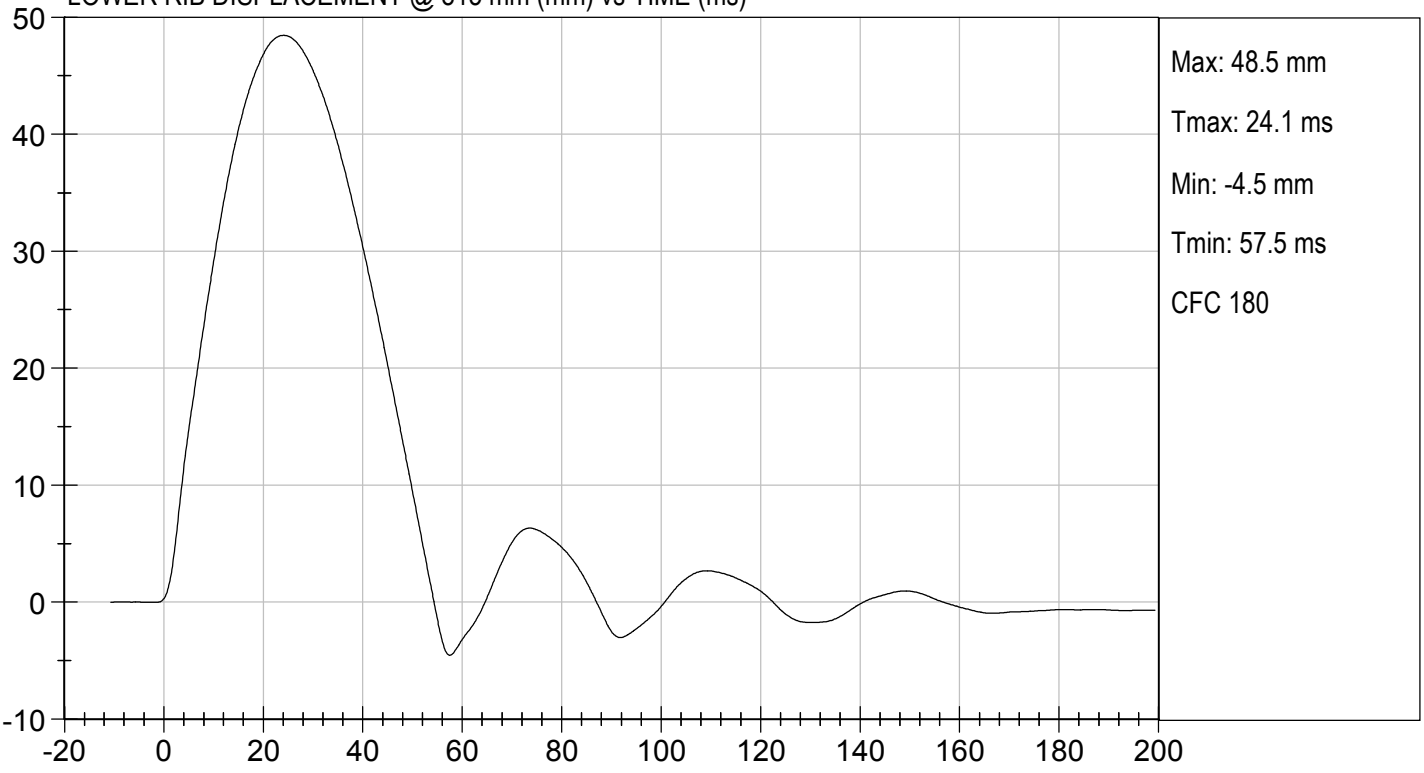
01/31/2020
Test Date

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: F032 **Test I.D:** D200387

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4311	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.2	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2417	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.5	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

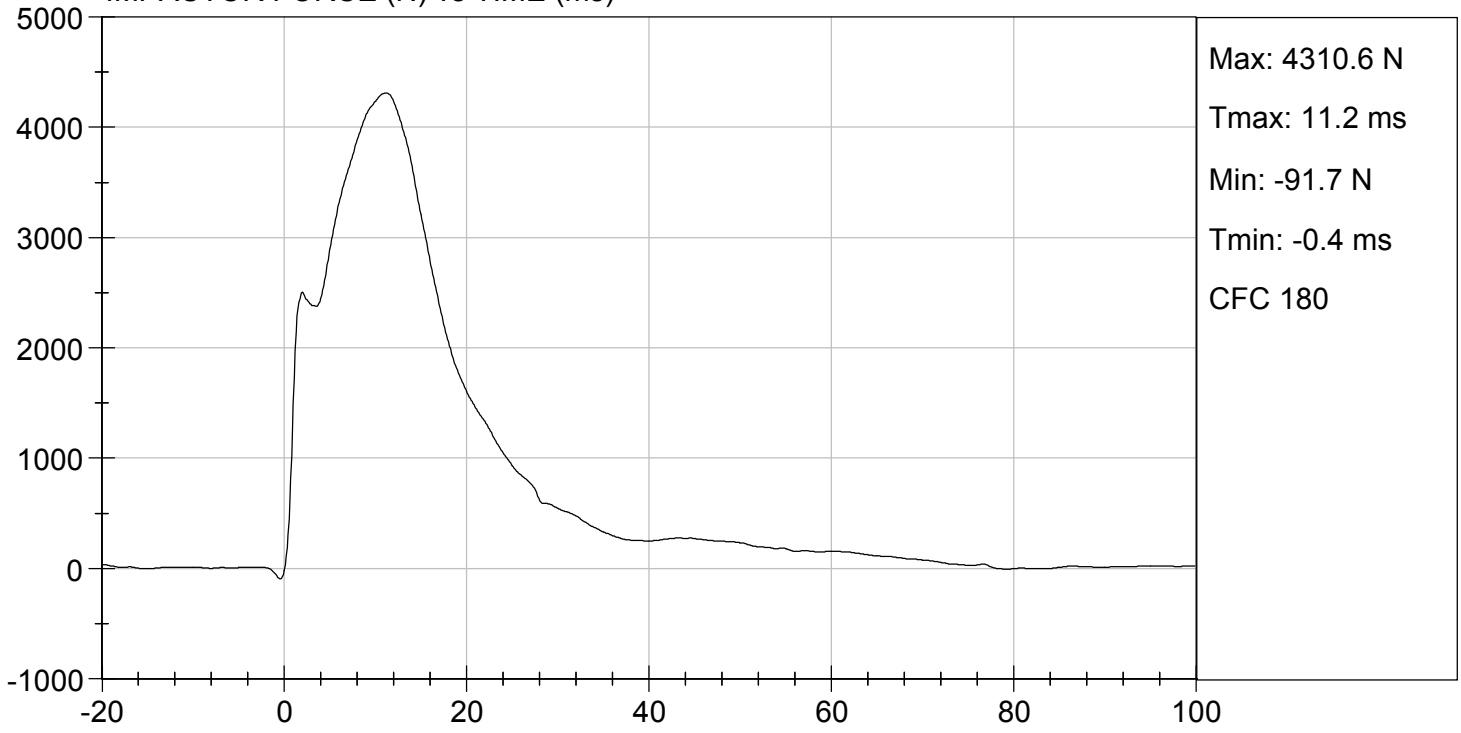
01/31/2020
Test Date

Approved By

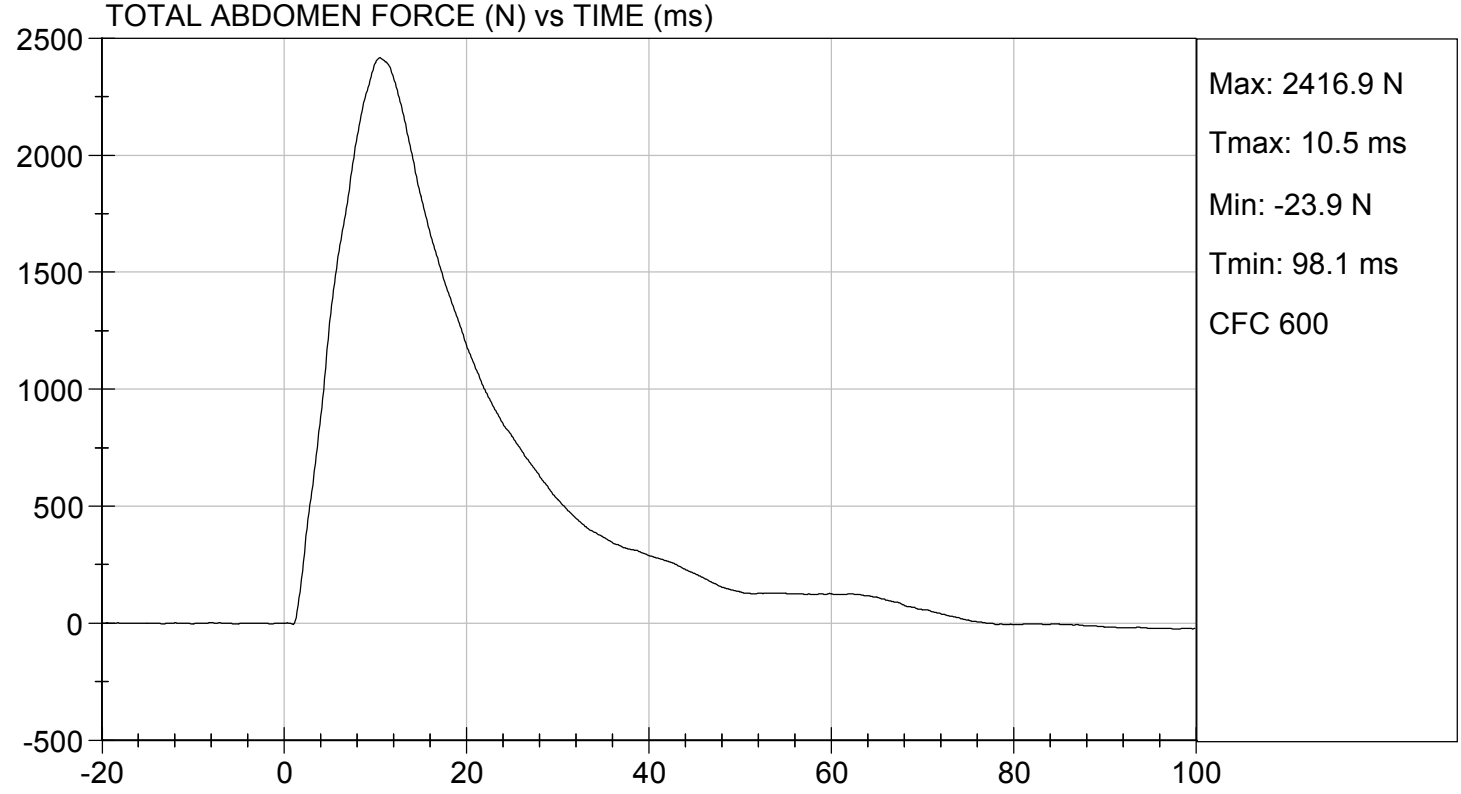
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/31/2020
TEST #: D200387

IMPACTOR FORCE (N) vs TIME (ms)



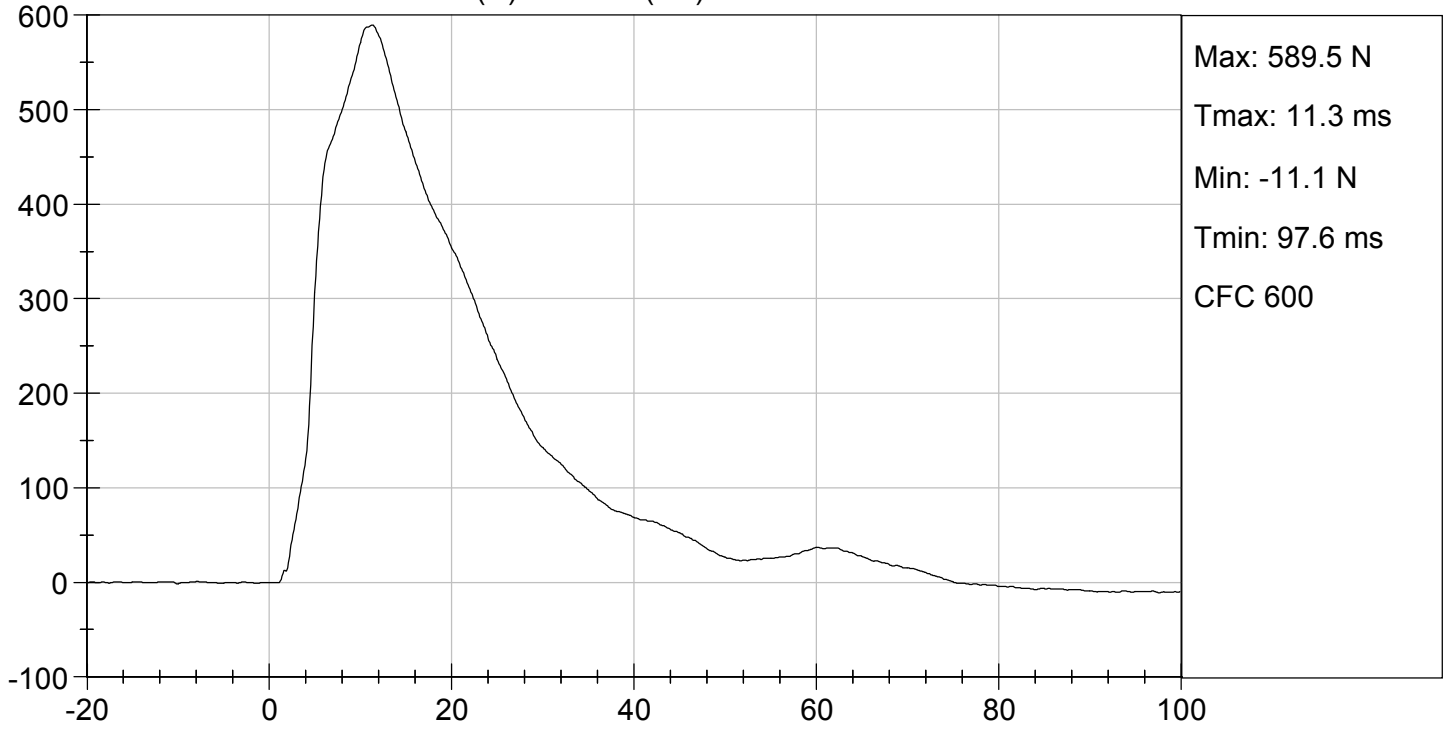
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



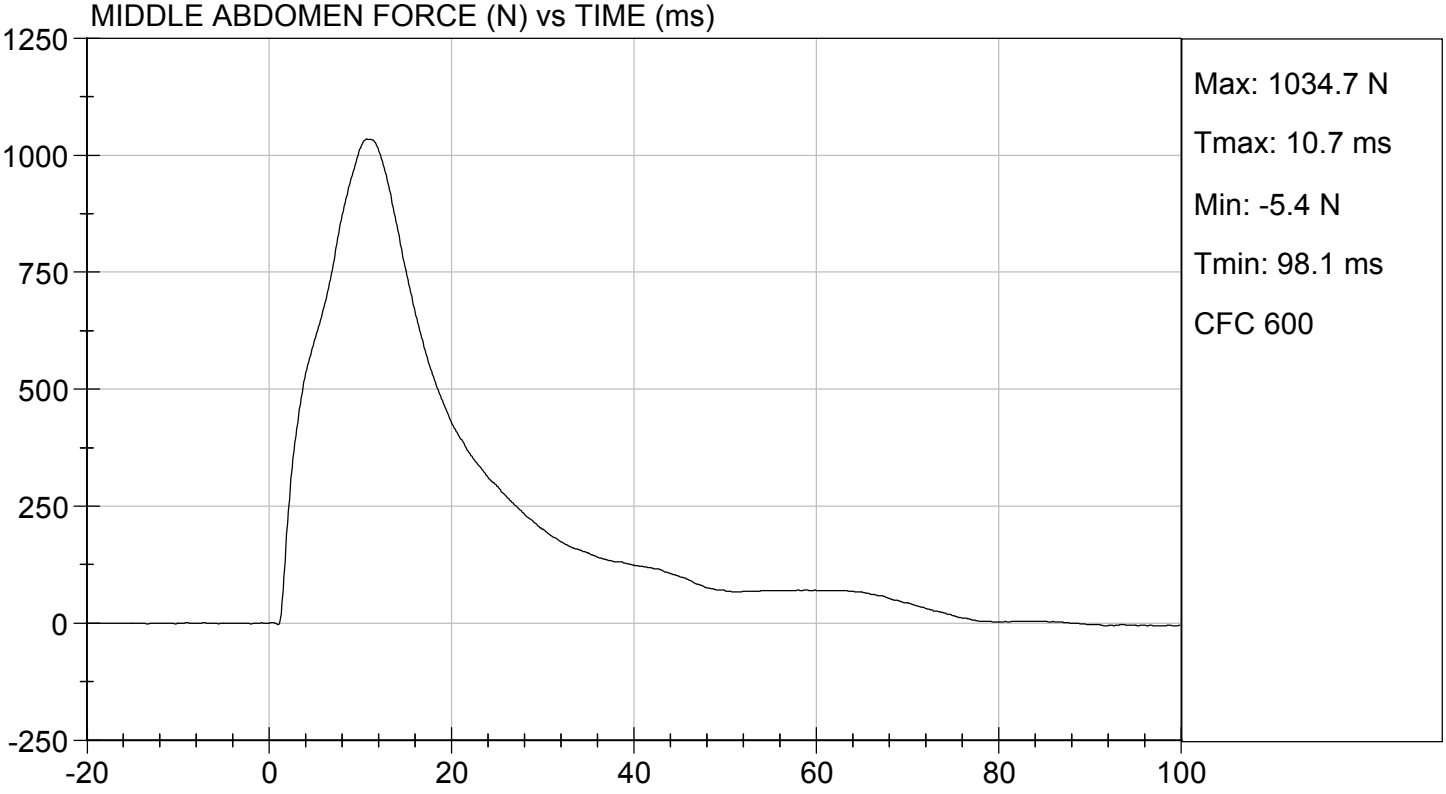
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/31/2020
TEST #: D200387

FRONT ABDOMEN FORCE (N) vs TIME (ms)



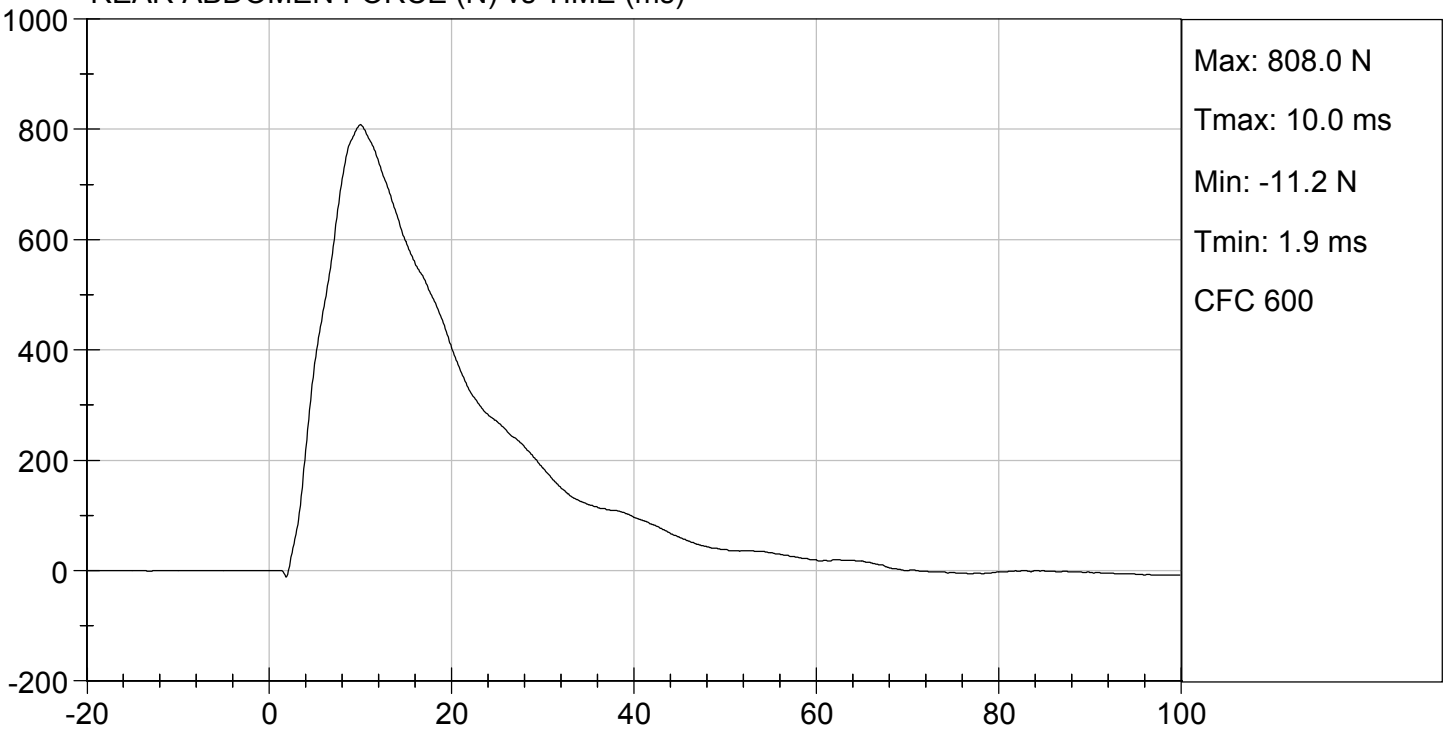
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/31/2020
TEST #: D200387

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200388

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.423	Pass
	27 ms	m/s	-6.50 to -5.80	-5.80	Pass
	30 ms	m/s	>= -6.50	-5.75	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	48.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	42.4	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	44	Pass
			Overall Results		Pass

Laboratory Technician

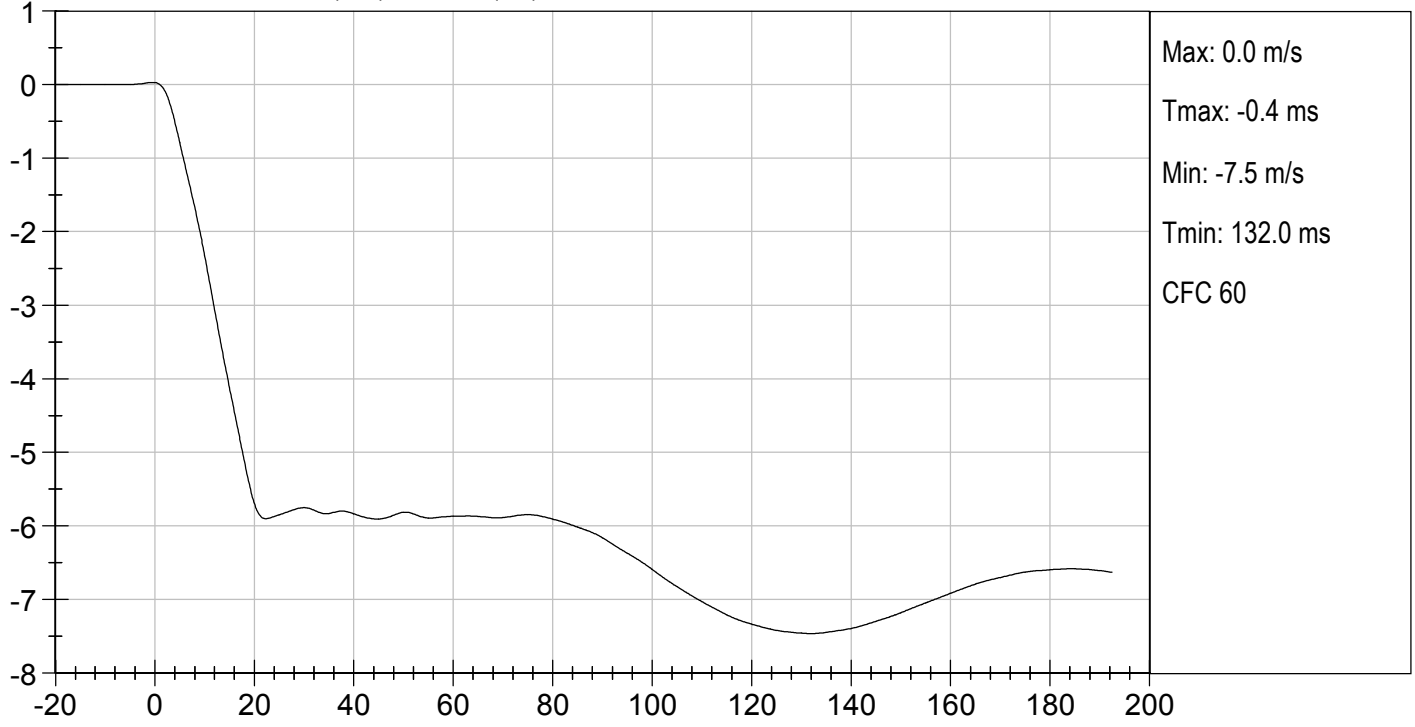
01/31/2020
Test Date

Approved By

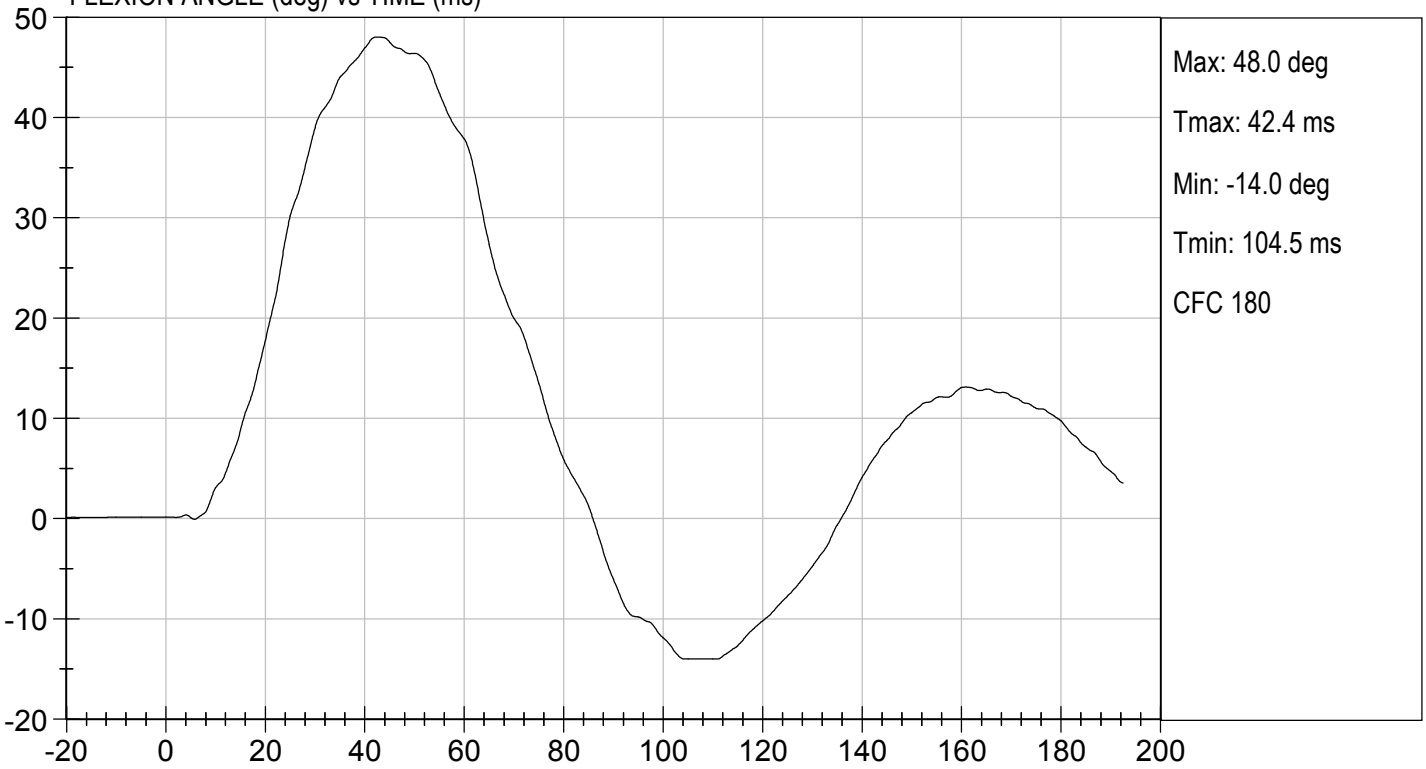
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/31/2020
TEST #: D200388

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



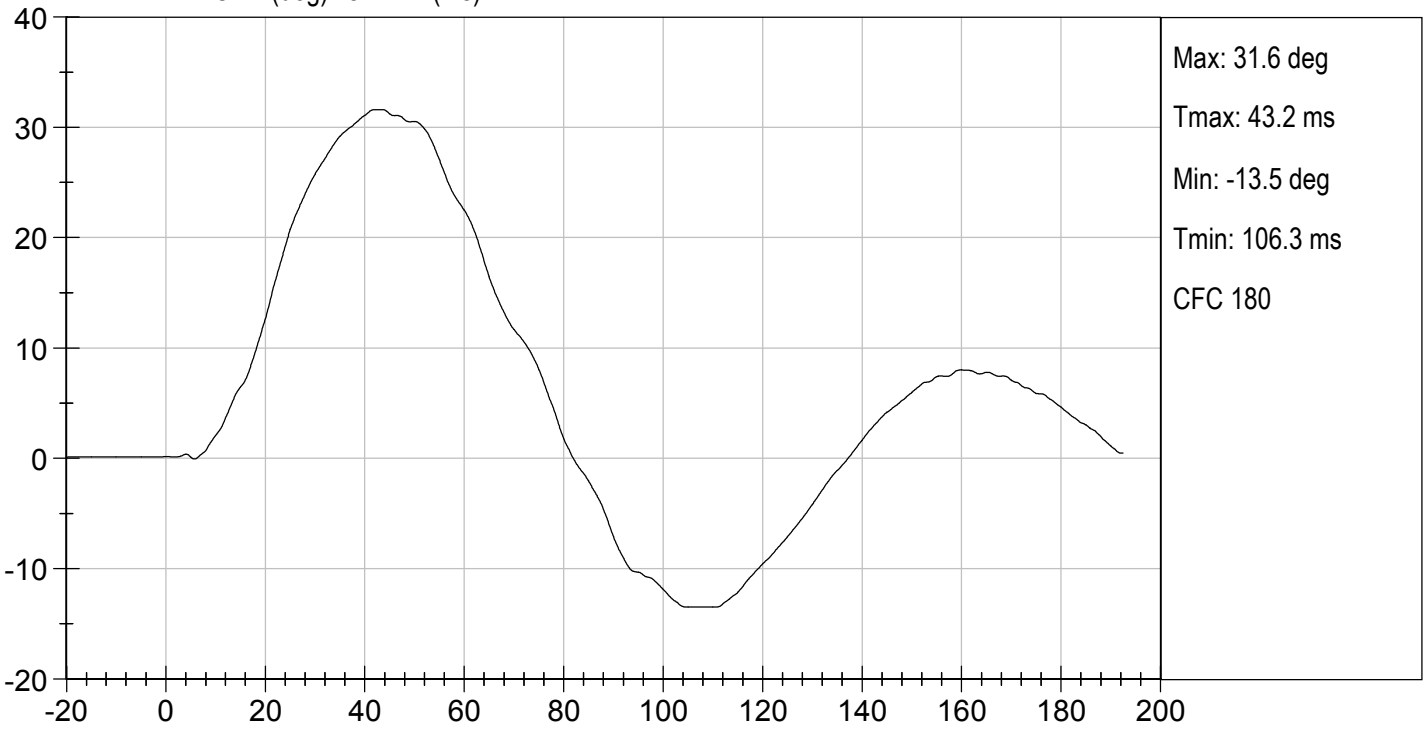
FLEXION ANGLE (deg) vs TIME (ms)



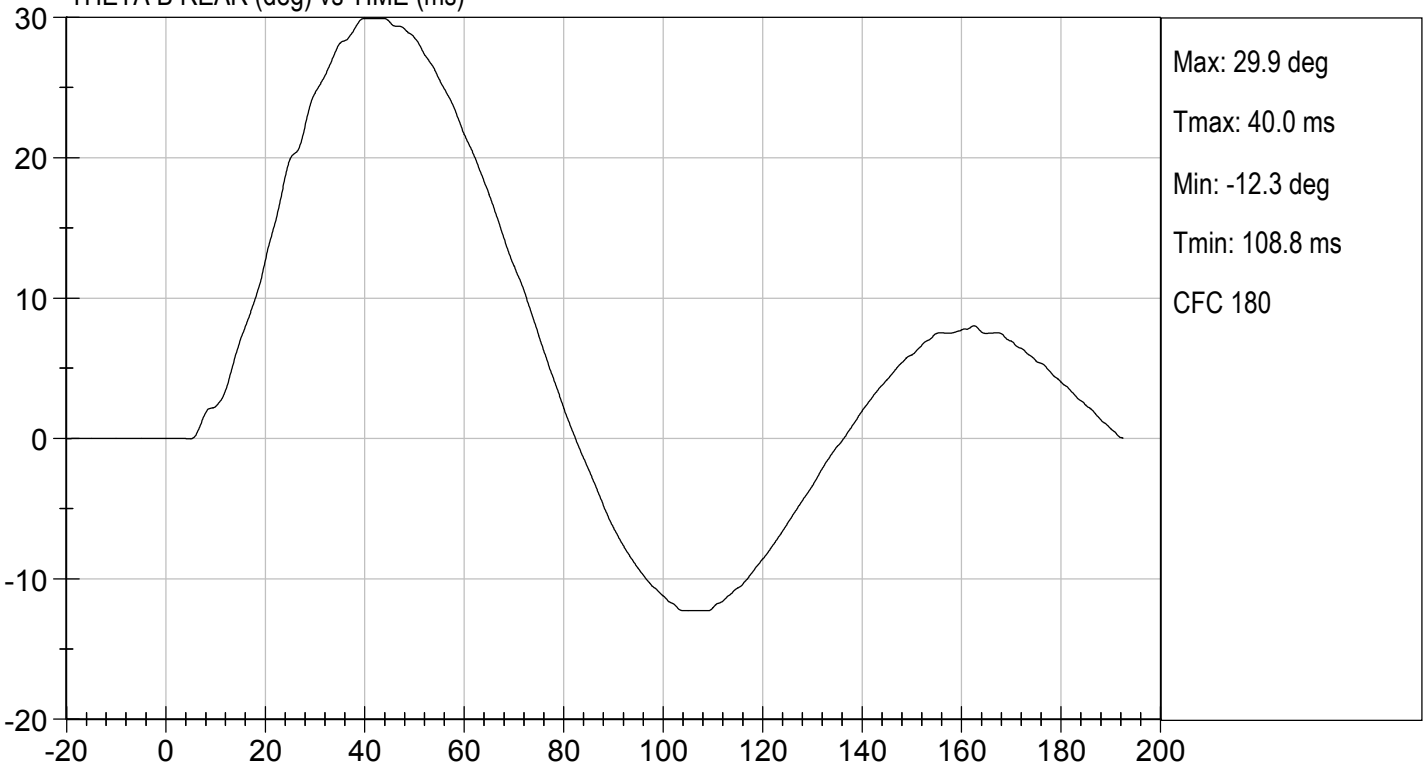
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/31/2020
TEST #: D200388

THETA A FRONT (deg) vs TIME (ms)

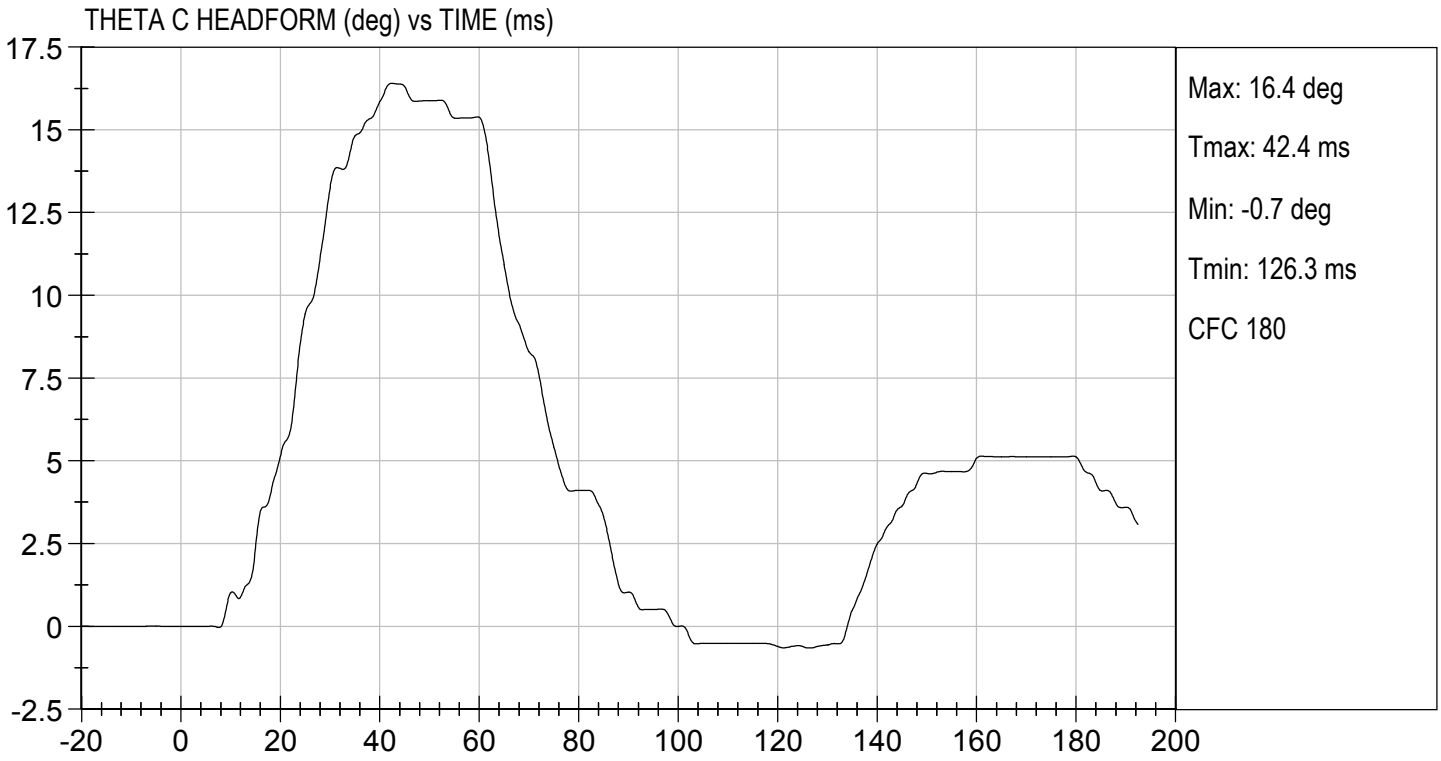


THETA B REAR (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 01/31/2020
TEST #: D200388



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200389

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	5074	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.4	Pass
Maximum Pubic Force	N	1230 to 1590	1414	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.6	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

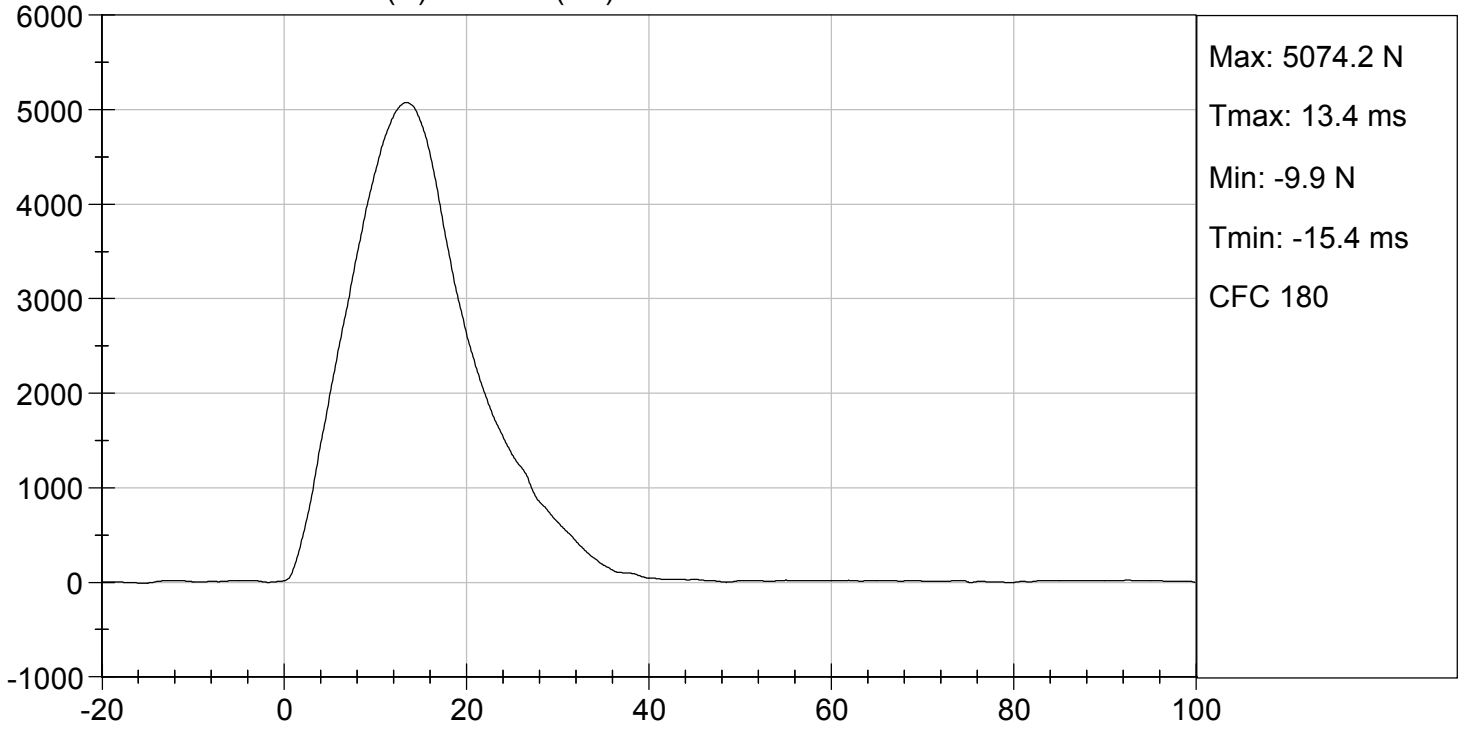
01/31/2020
Test Date

Approved By

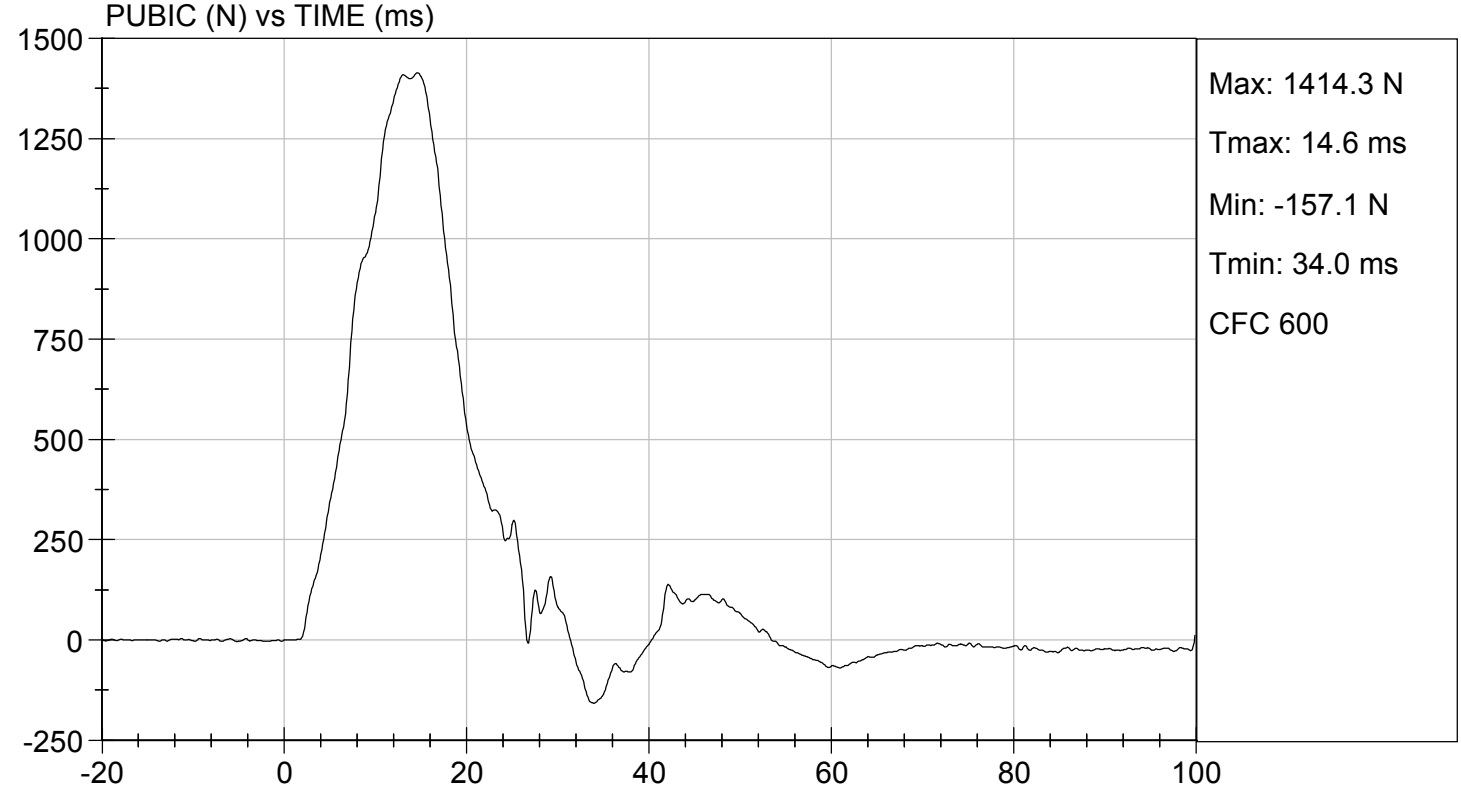
TEST DESC: PELVIS IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 01/31/2020
TEST #: D200389

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200380

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5887	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.3	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.5	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.7	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

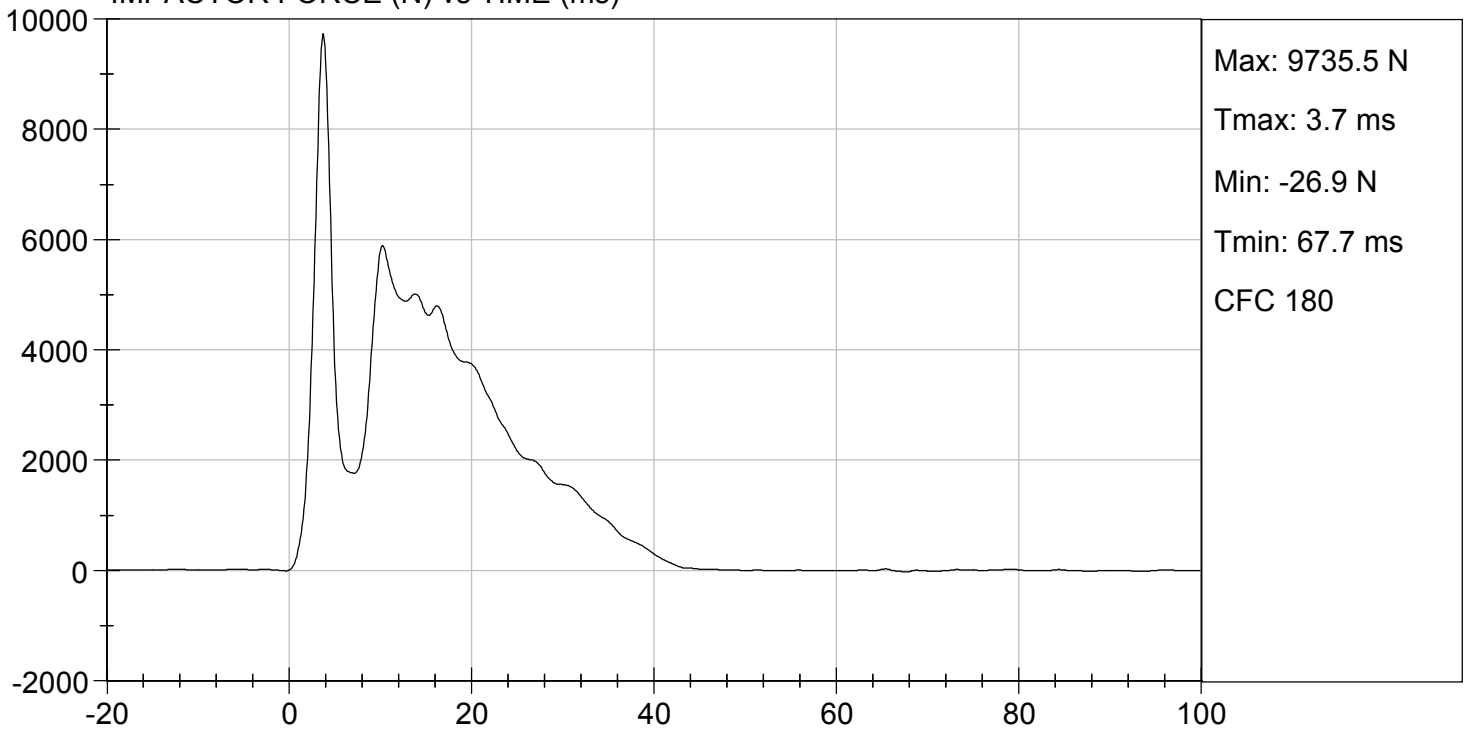
01/31/2020
Test Date

Approved By

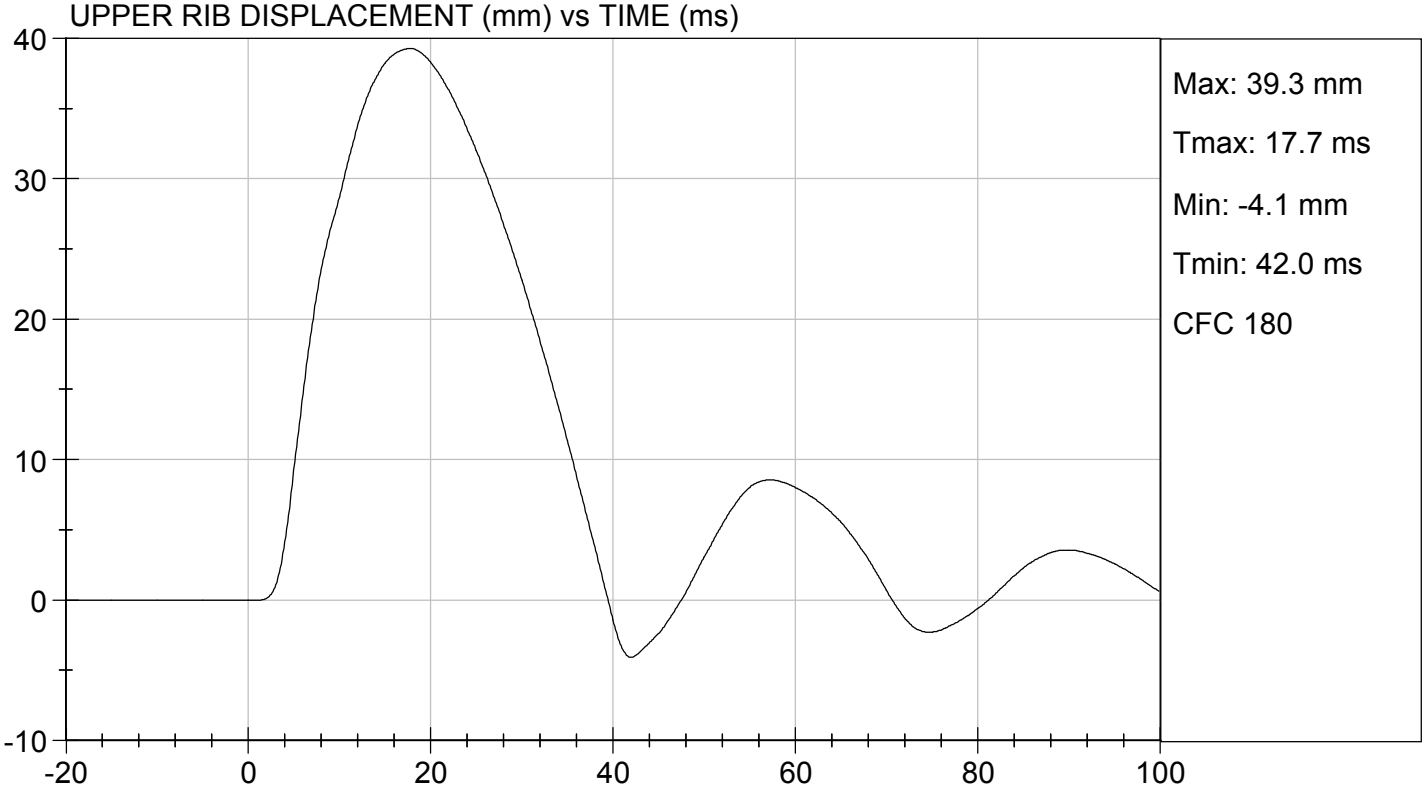
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 01/31/2020
TEST #: D200380

IMPACTOR FORCE (N) vs TIME (ms)



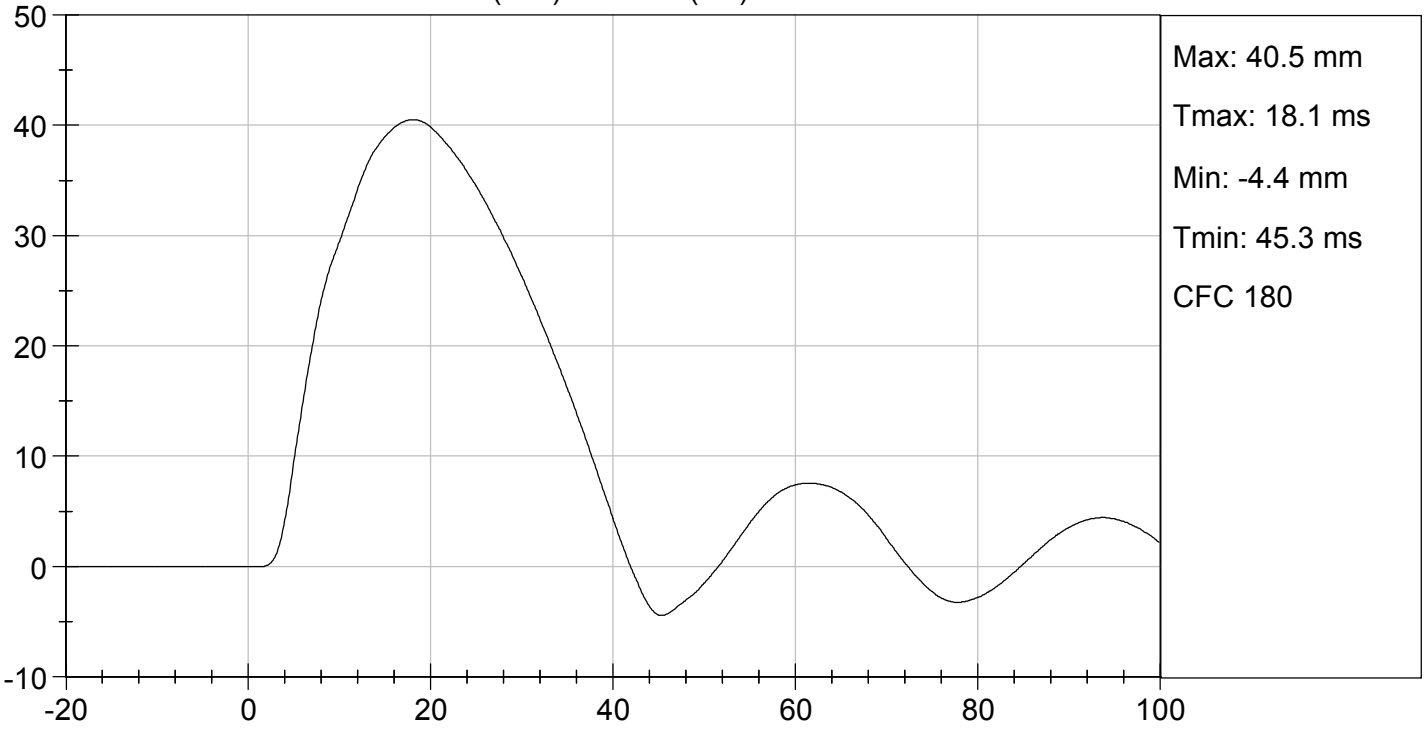
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



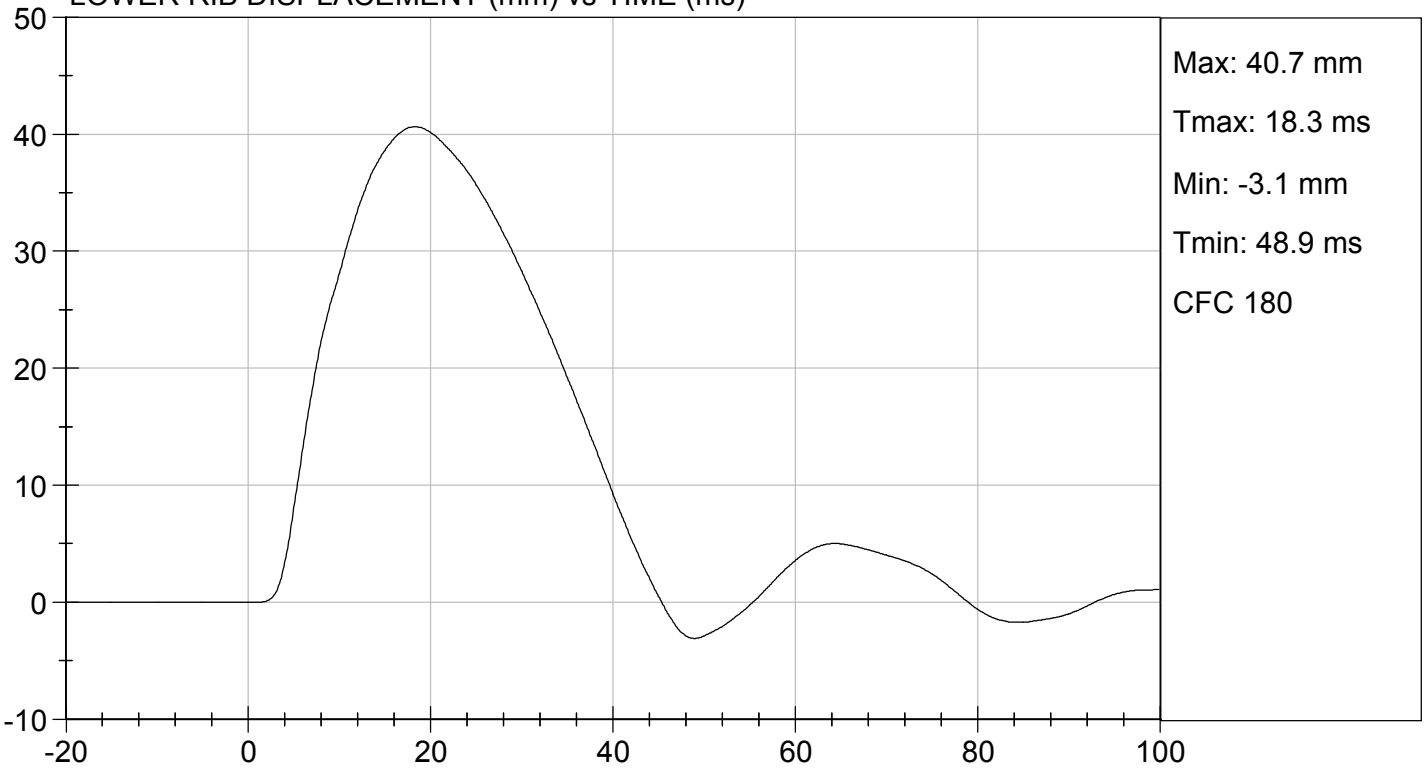
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 01/31/2020
TEST #: D200380

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: F032 **Test ID:** D200661

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	125 to 155	133	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	6.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

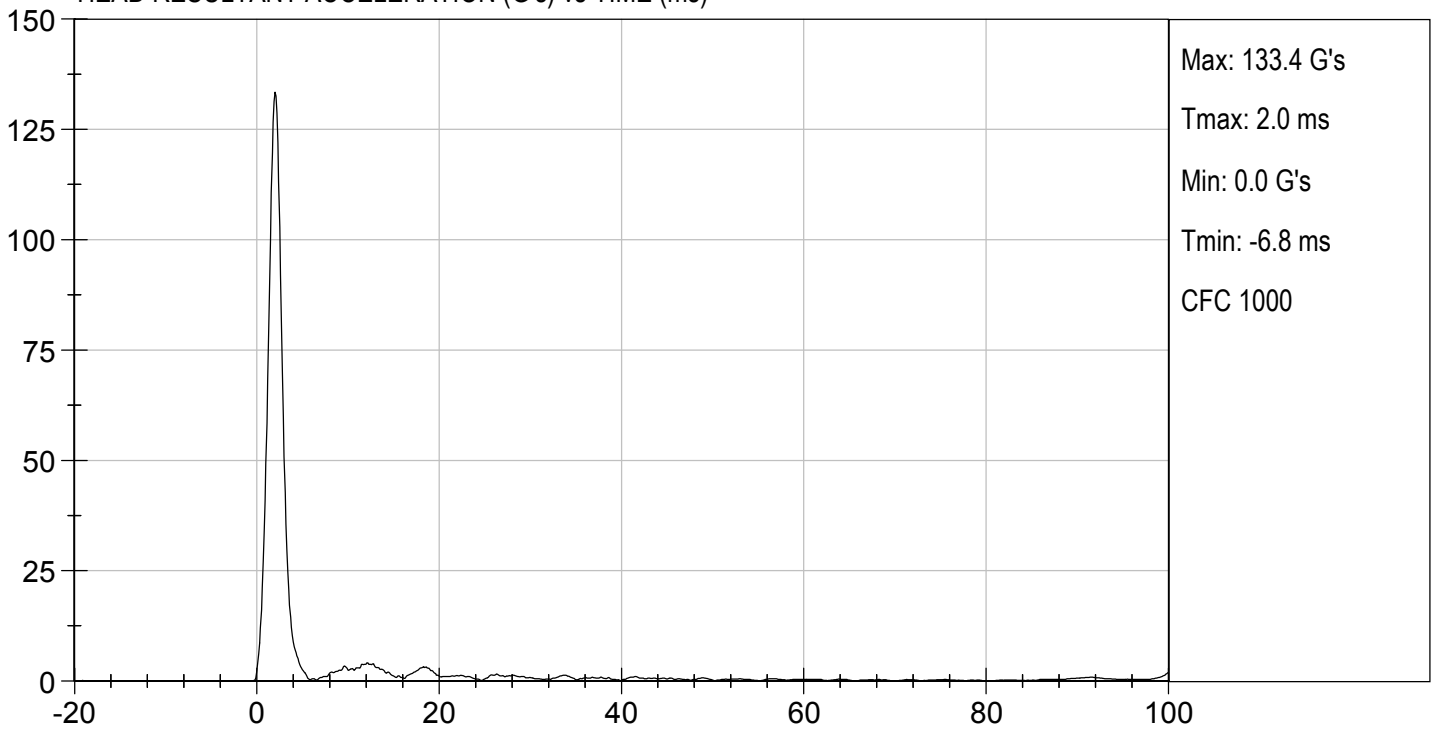
02/24/2020
Test Date

Approved By

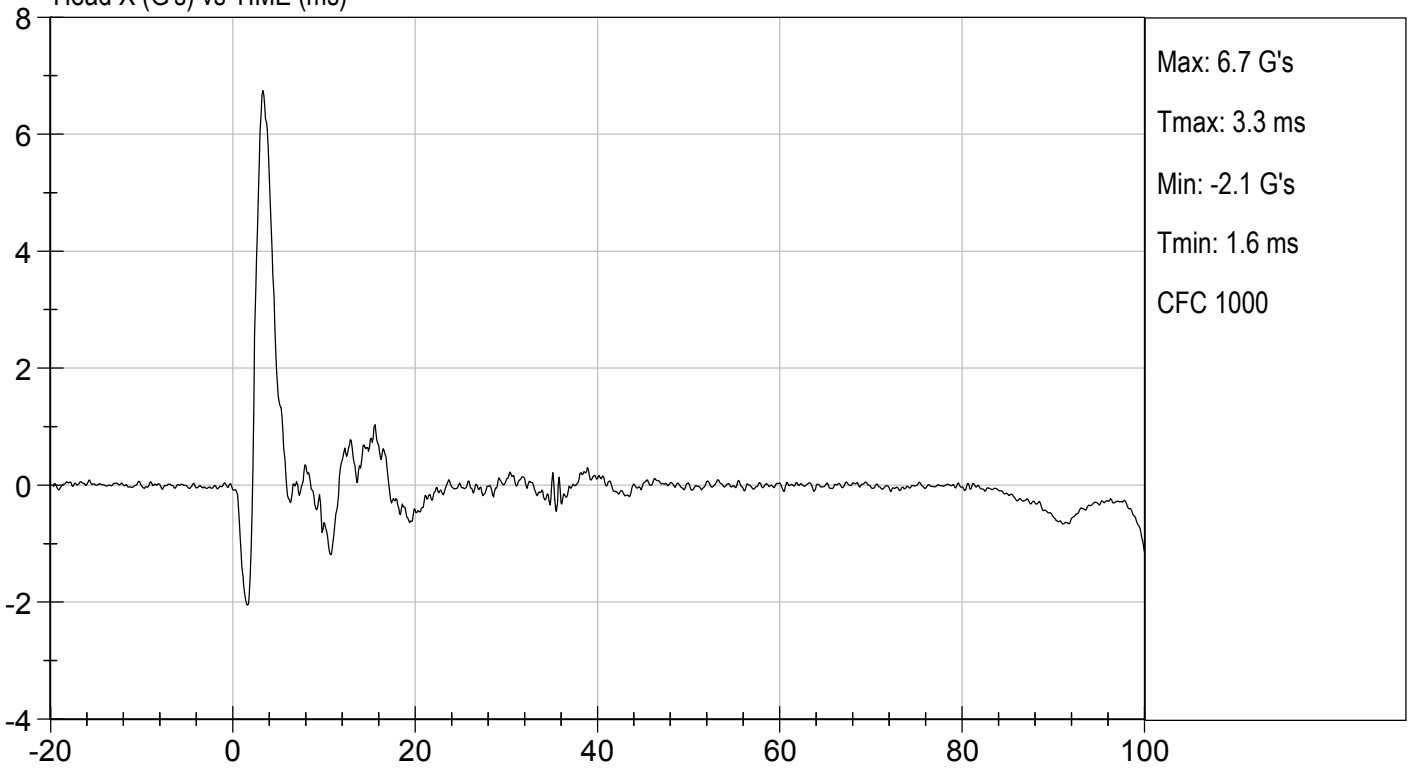
TEST DESC: HEAD DROP

TEST DATE: 02/24/2020
TEST #: D200661

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

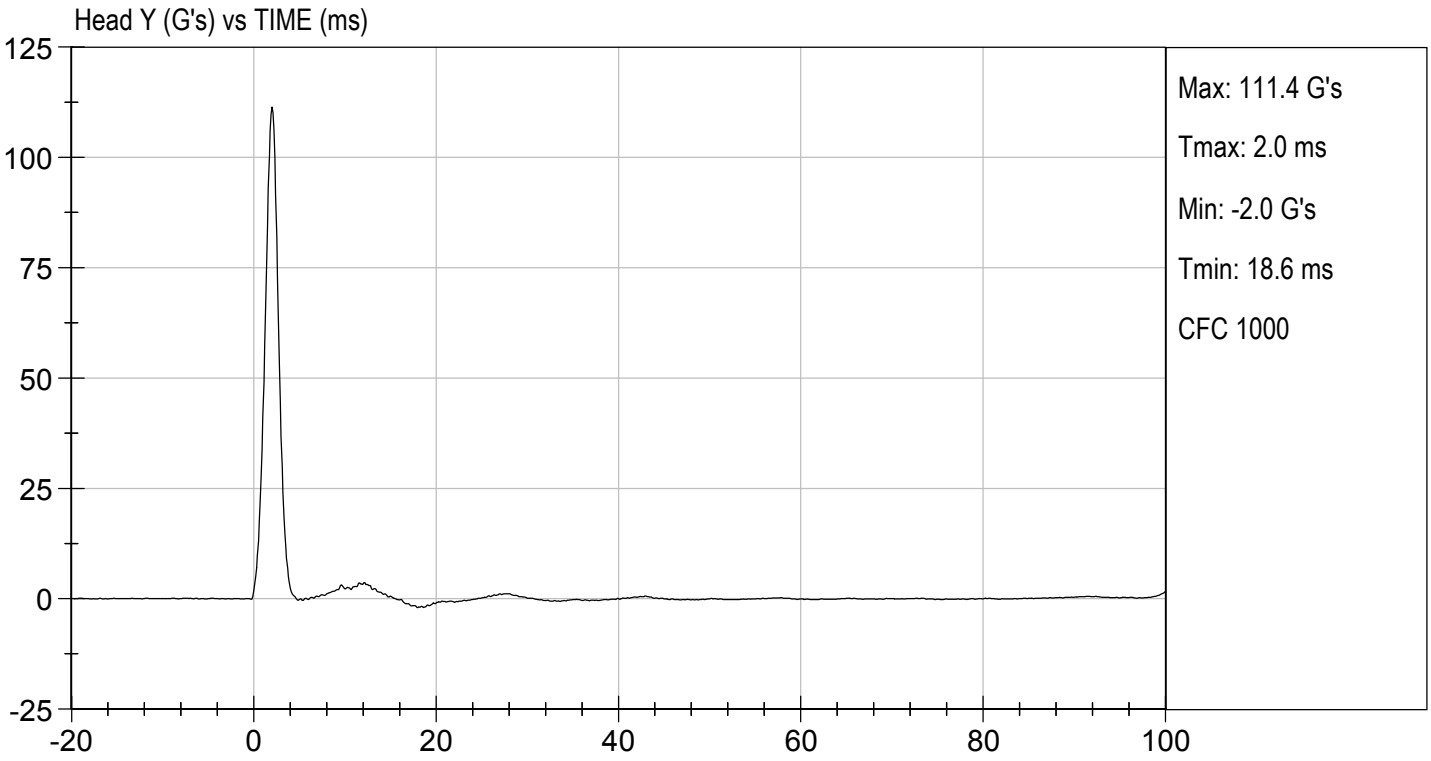


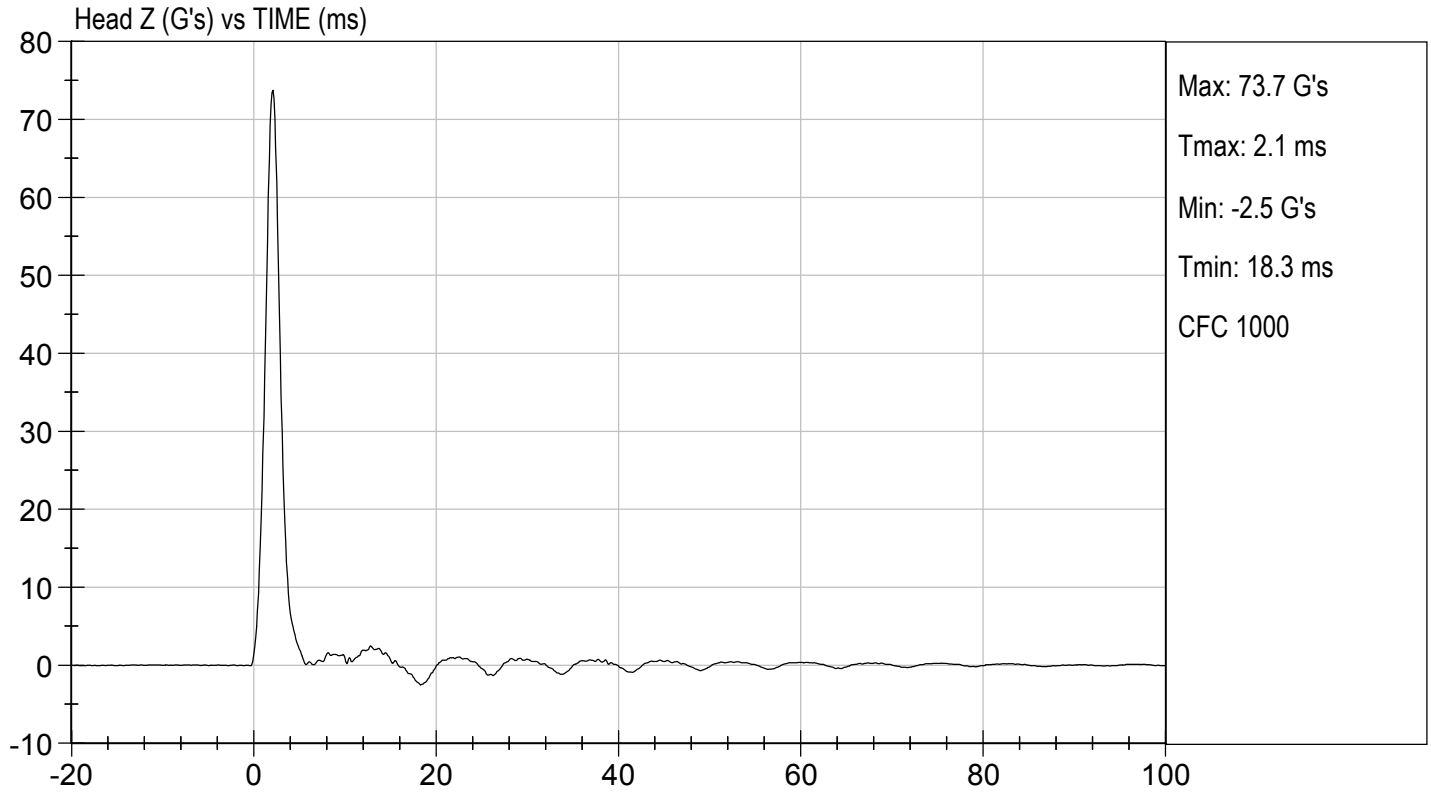
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 02/24/2020
TEST #: D200661





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200662

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	14	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.49	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	-3.54	Pass
	17 ms	m/s	>= -3.70	-3.51	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.8	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	61.3	Pass
			Overall Results		Pass

Alex Thomas
Laboratory Technician

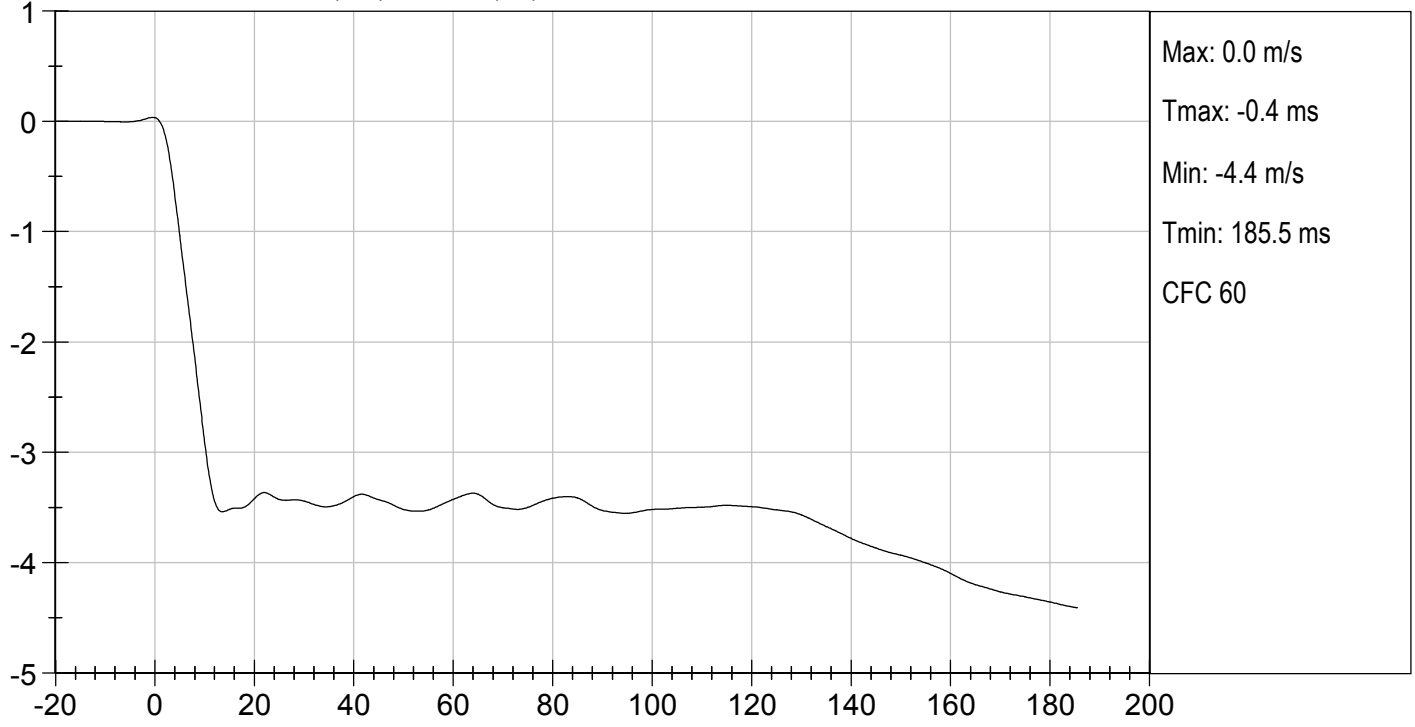
02/25/2020
Test Date

Approved By

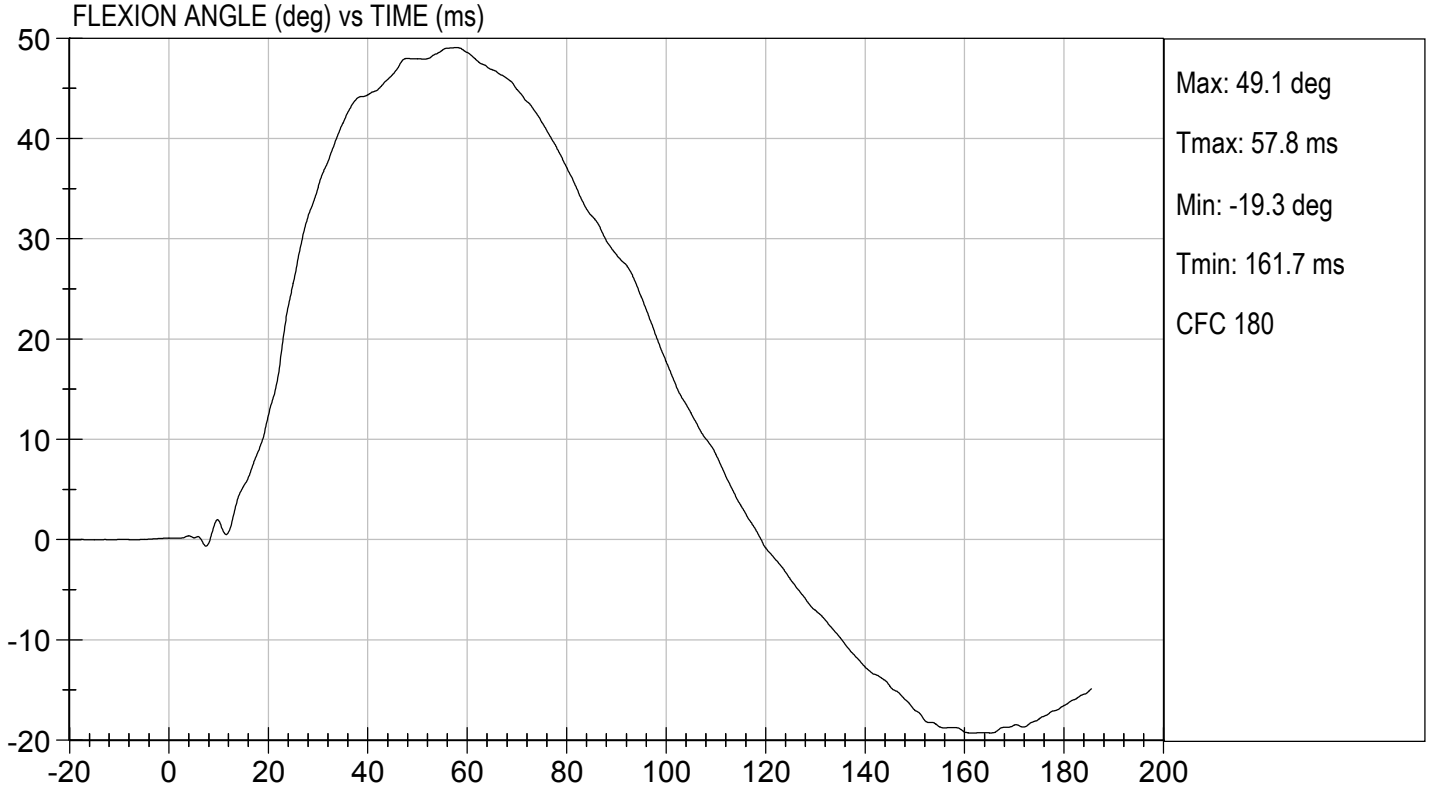
TEST DESC: NECK BENDING
VELOCITY: 11.45 ft/s, 3.49 m/s

TEST DATE: 02/25/2020
TEST #: D200662

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

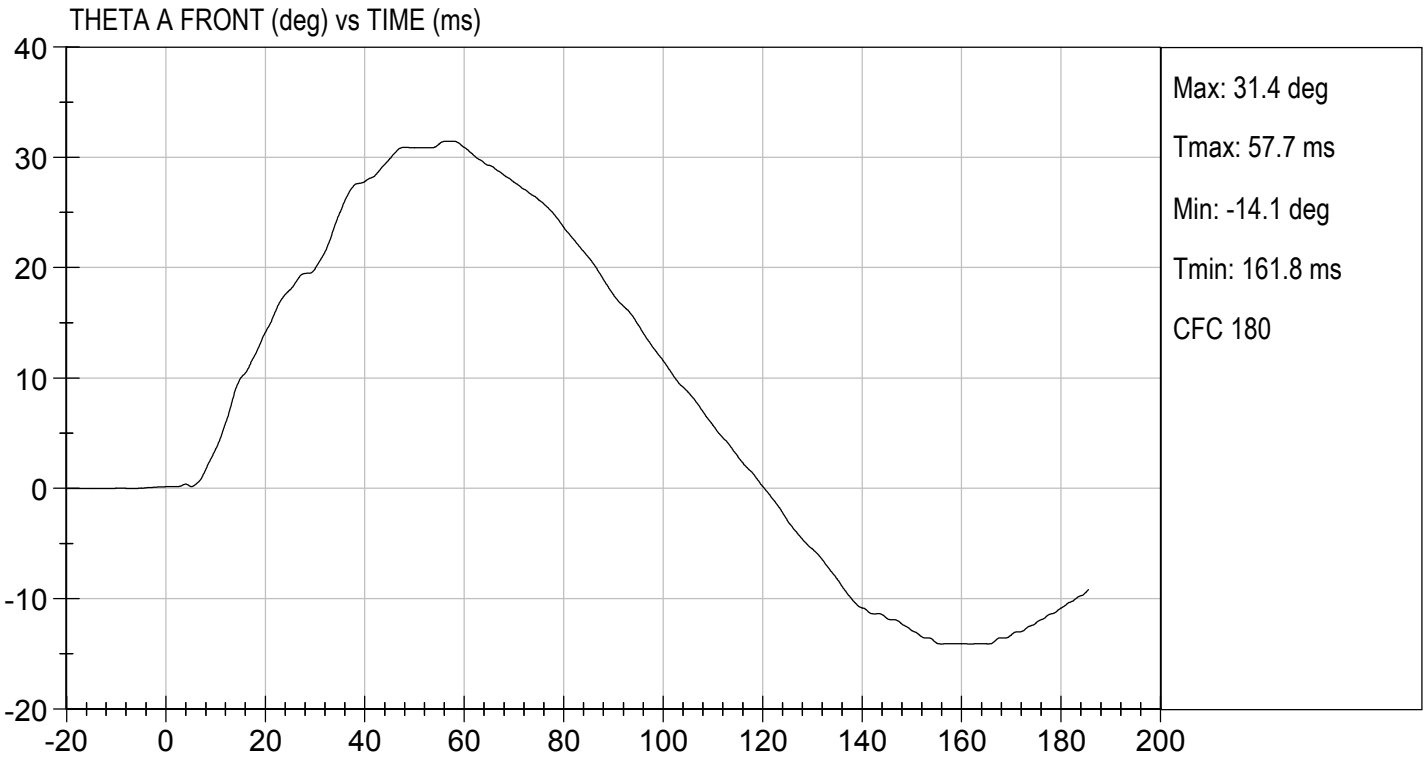


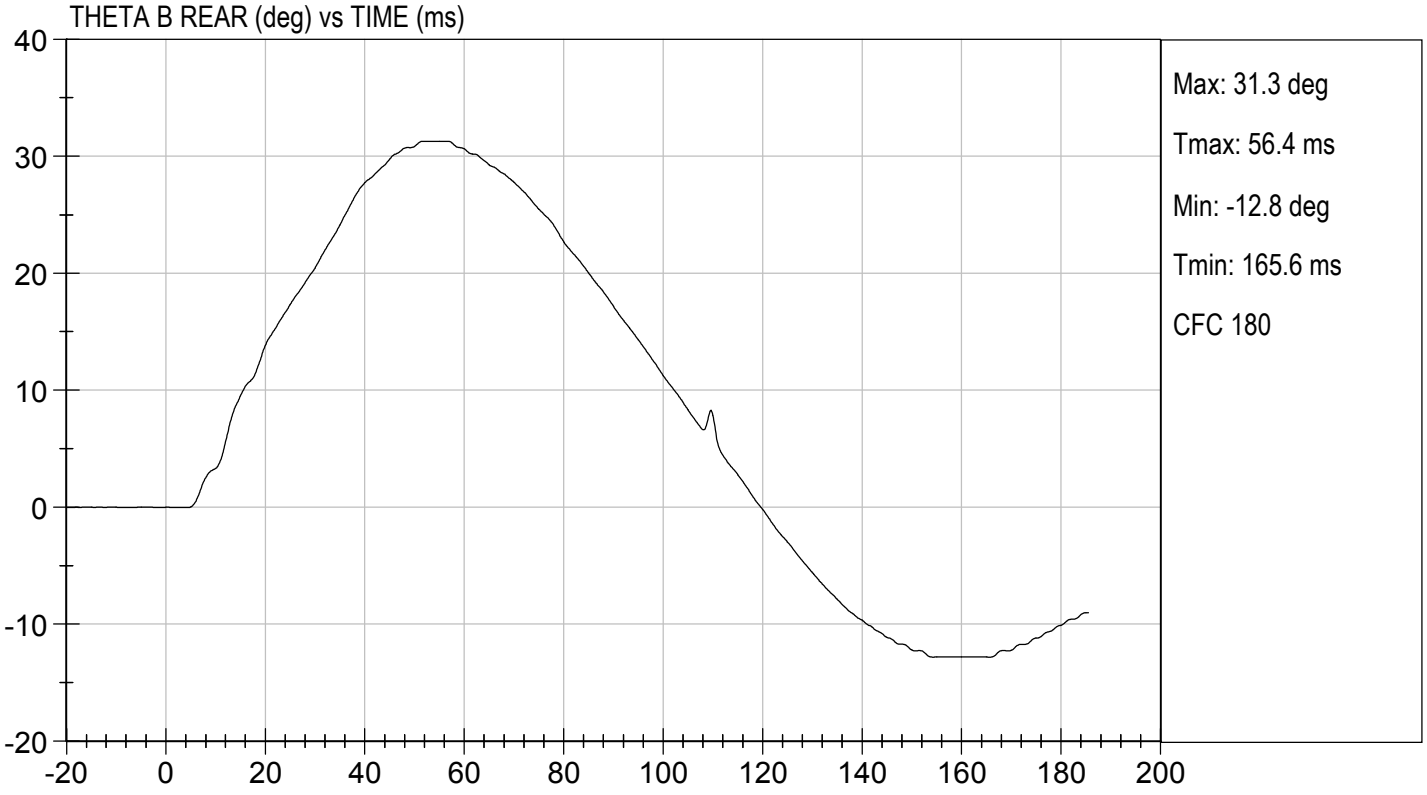
FLEXION ANGLE (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.45 ft/s, 3.49 m/s

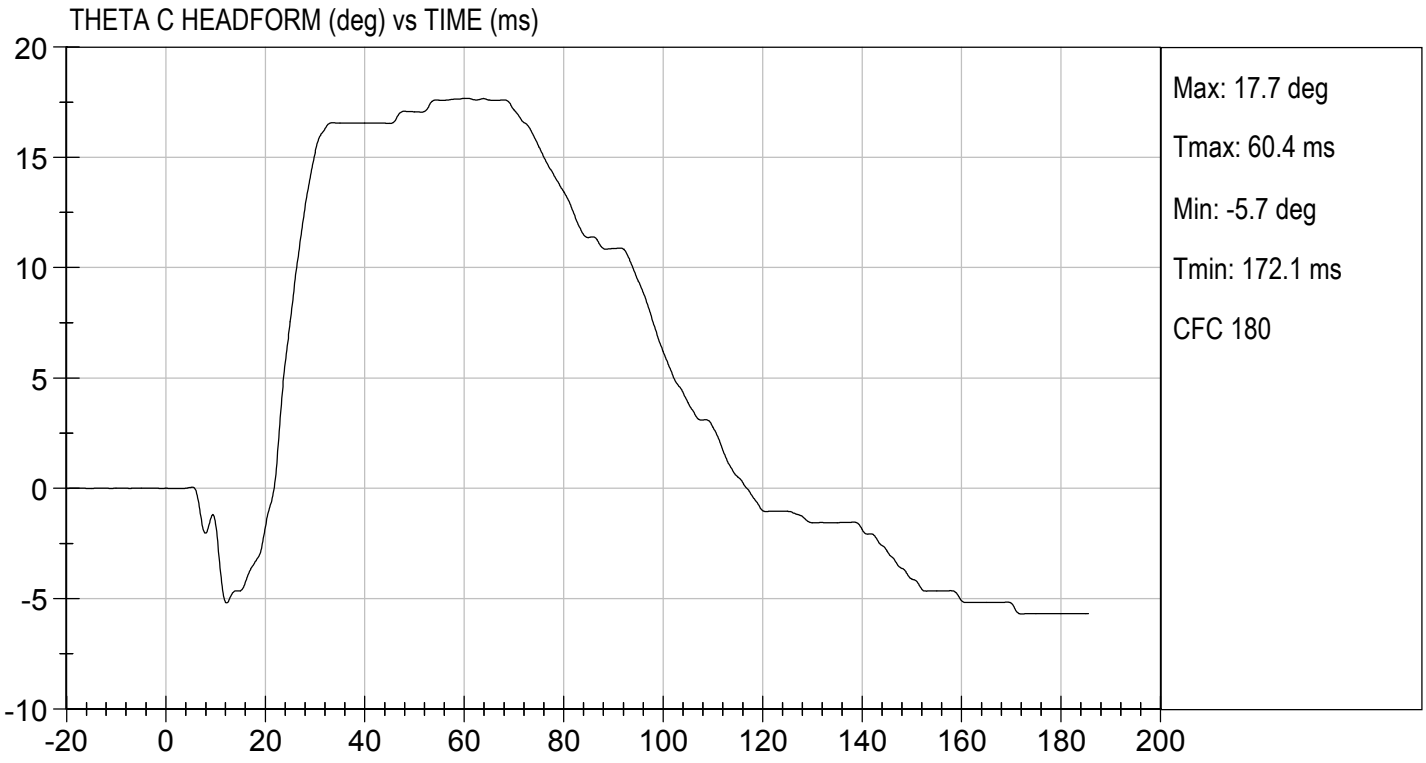
TEST DATE: 02/25/2020
TEST #: D200662





TEST DESC: NECK BENDING
VELOCITY: 11.45 ft/s, 3.49 m/s

TEST DATE: 02/25/2020
TEST #: D200662



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200663

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.3	Pass
		Overall Test Results		Pass

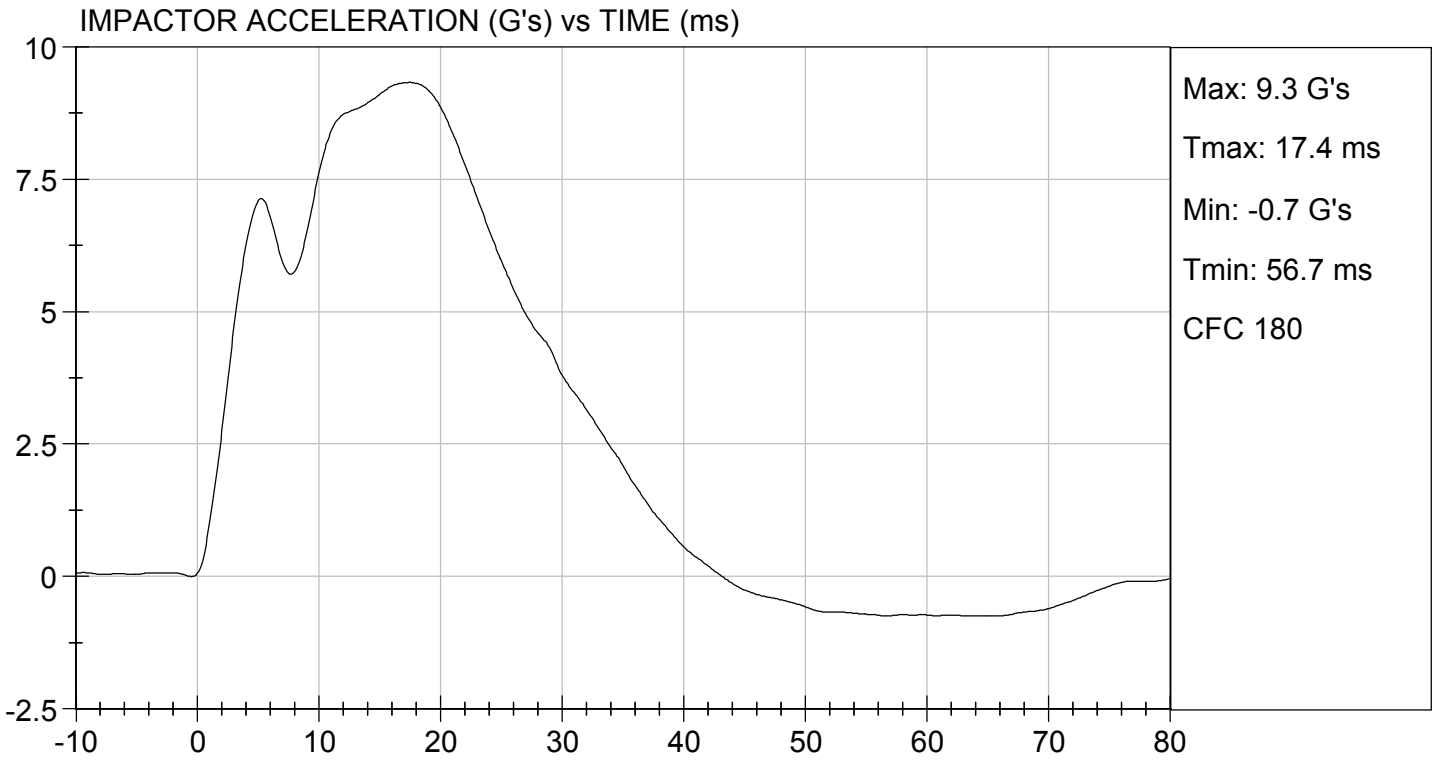
Jacob D Taylor
Laboratory Technician

02/27/2020
Test Date

Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 13.77 ft/s, 4.2 m/s

TEST DATE: 02/27/2020
TEST #: D200663



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200664

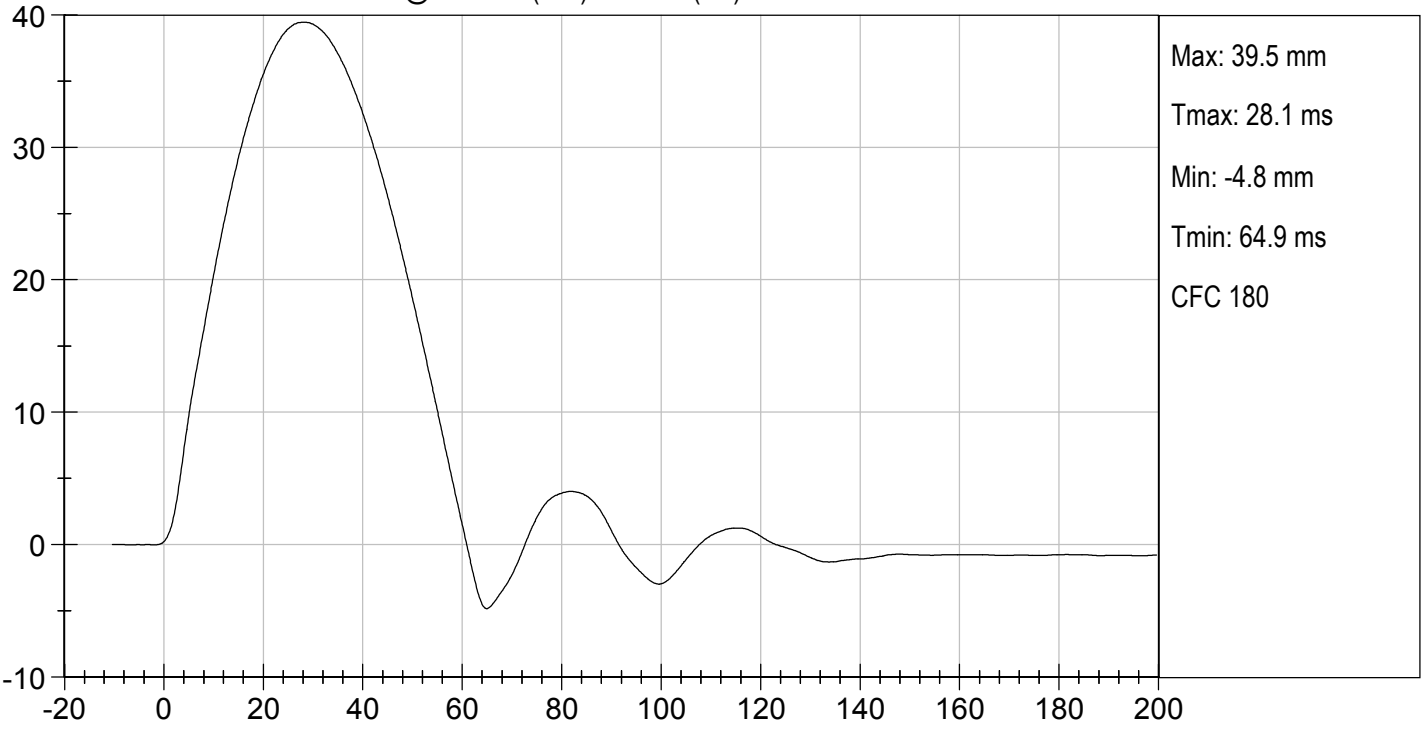
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.0	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

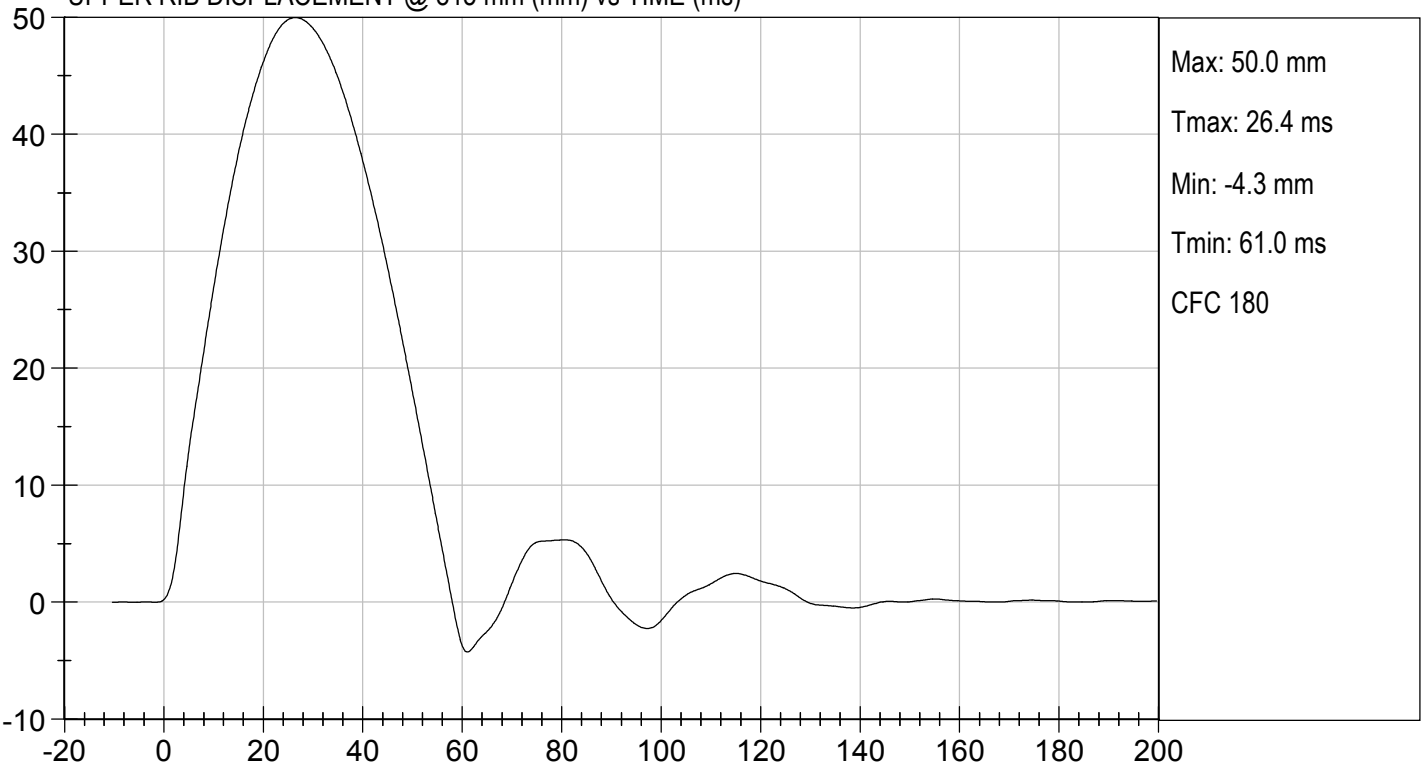
02/27/2020
Test Date

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: F032 **Test I.D:** D200665

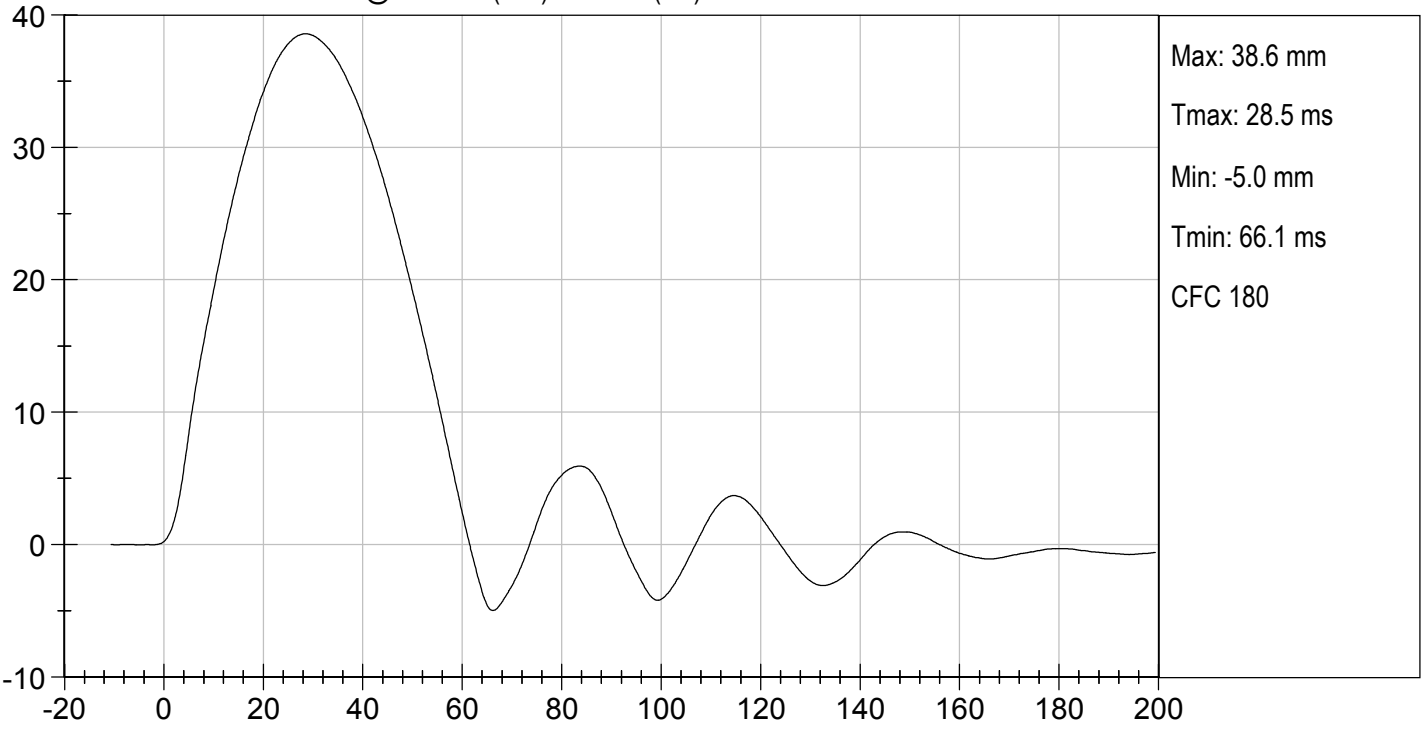
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.5	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

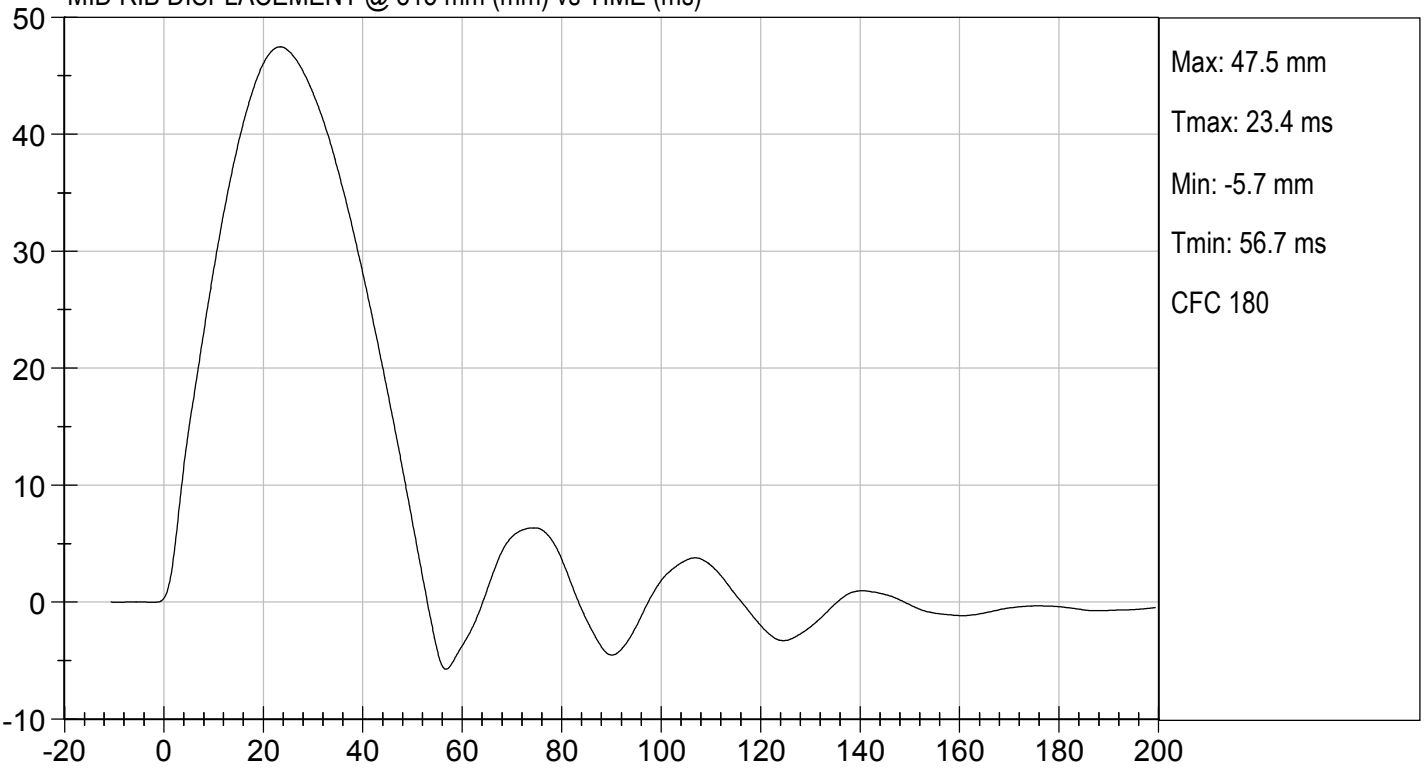
02/27/2020
Test Date

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: F032 **Test I.D:** D200666

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.1	Pass
		Overall Test Results		Pass

Jacob D Taylor

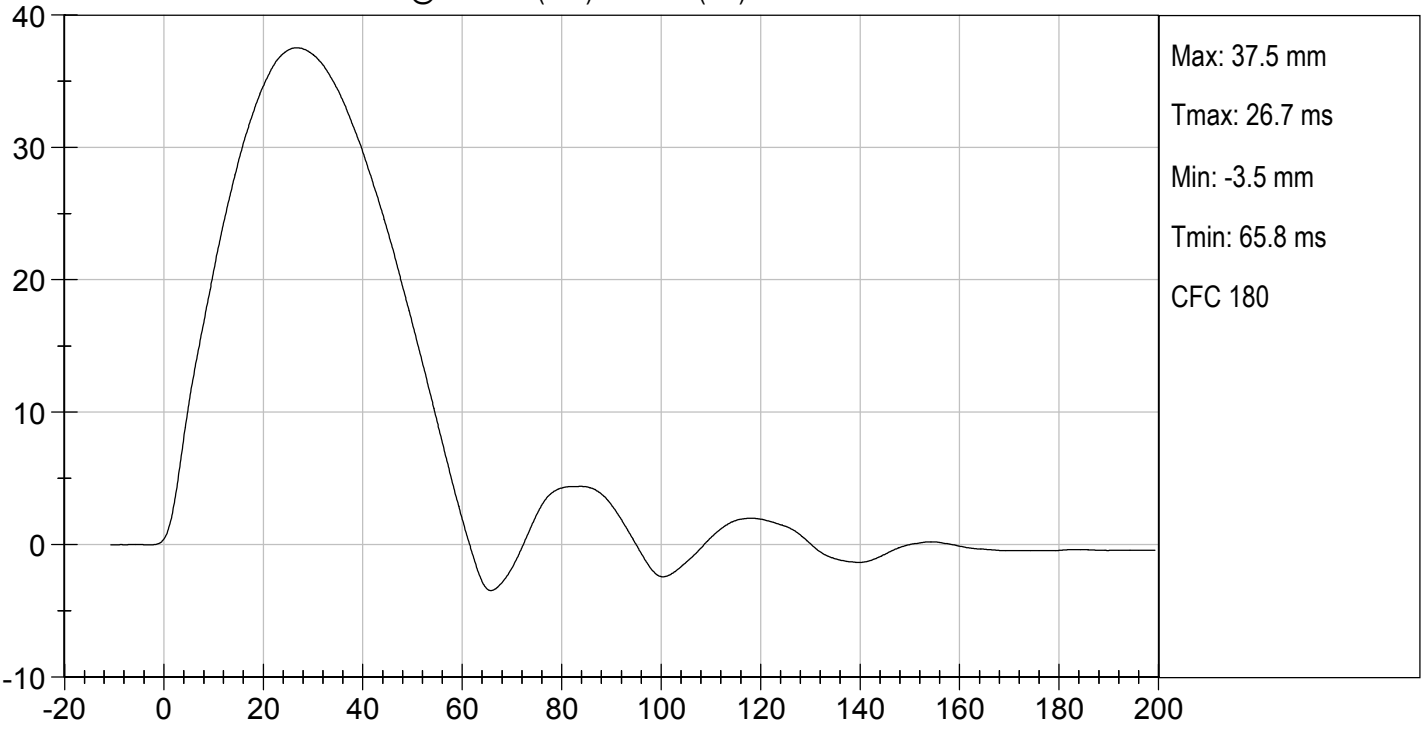
Laboratory Technician

02/27/2020

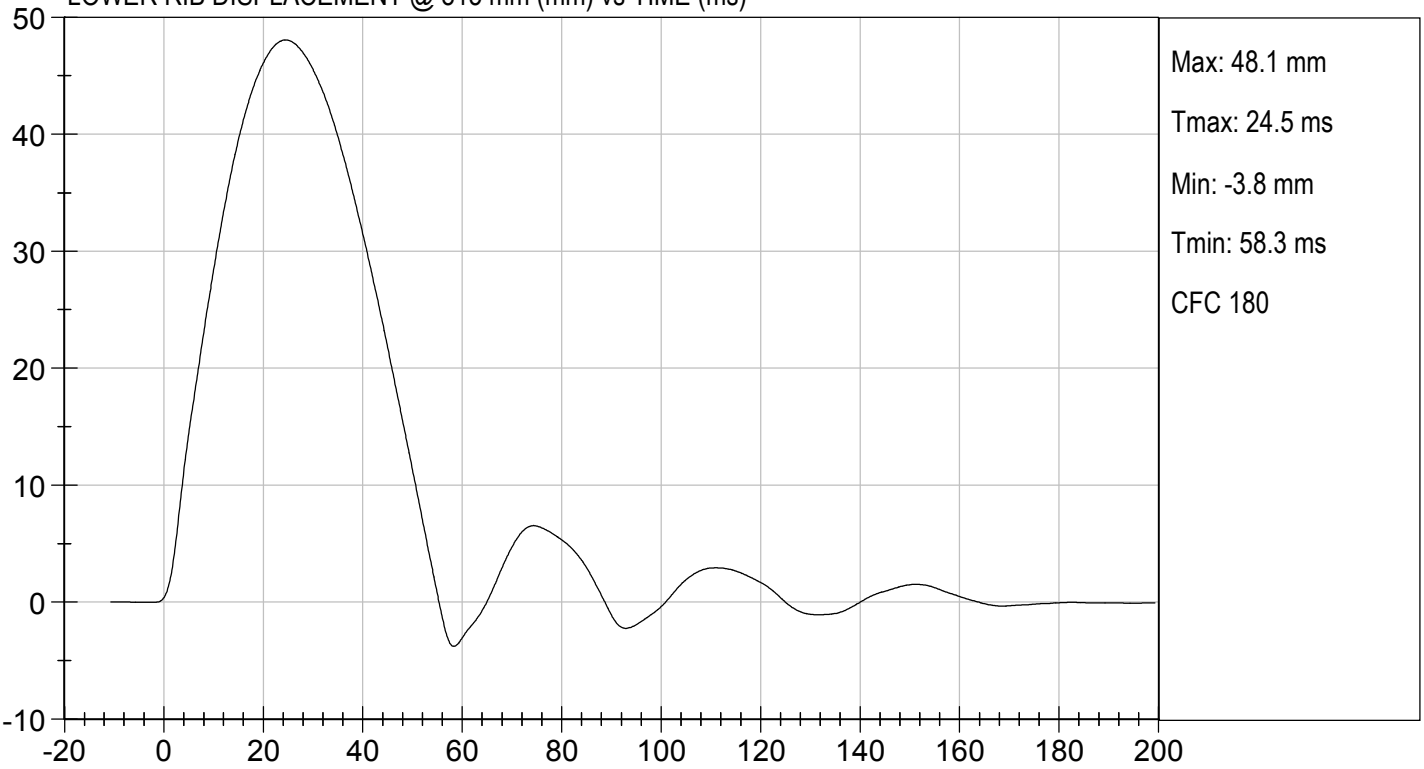
Test Date

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: F032 **Test I.D:** D200667

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4284	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2455	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.8	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

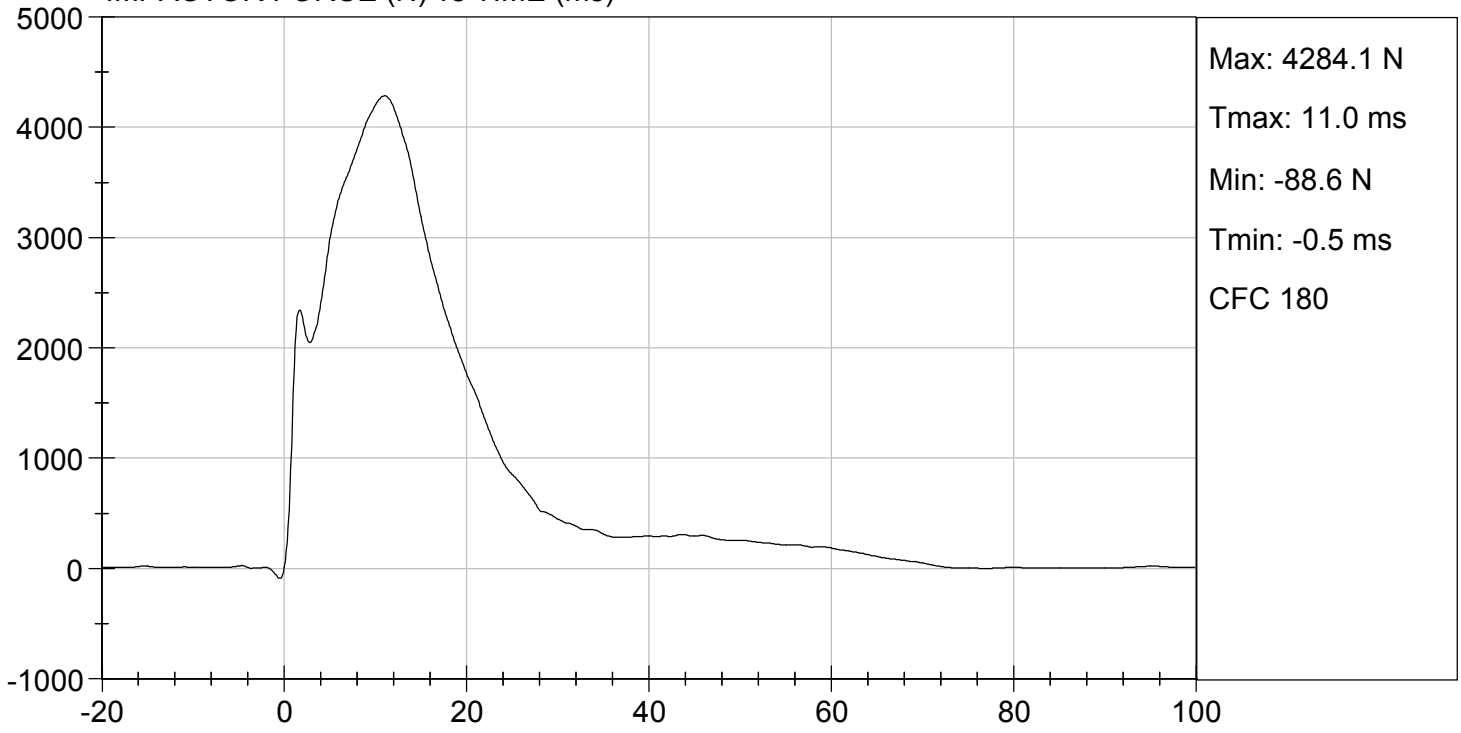
02/27/2020
Test Date

Approved By

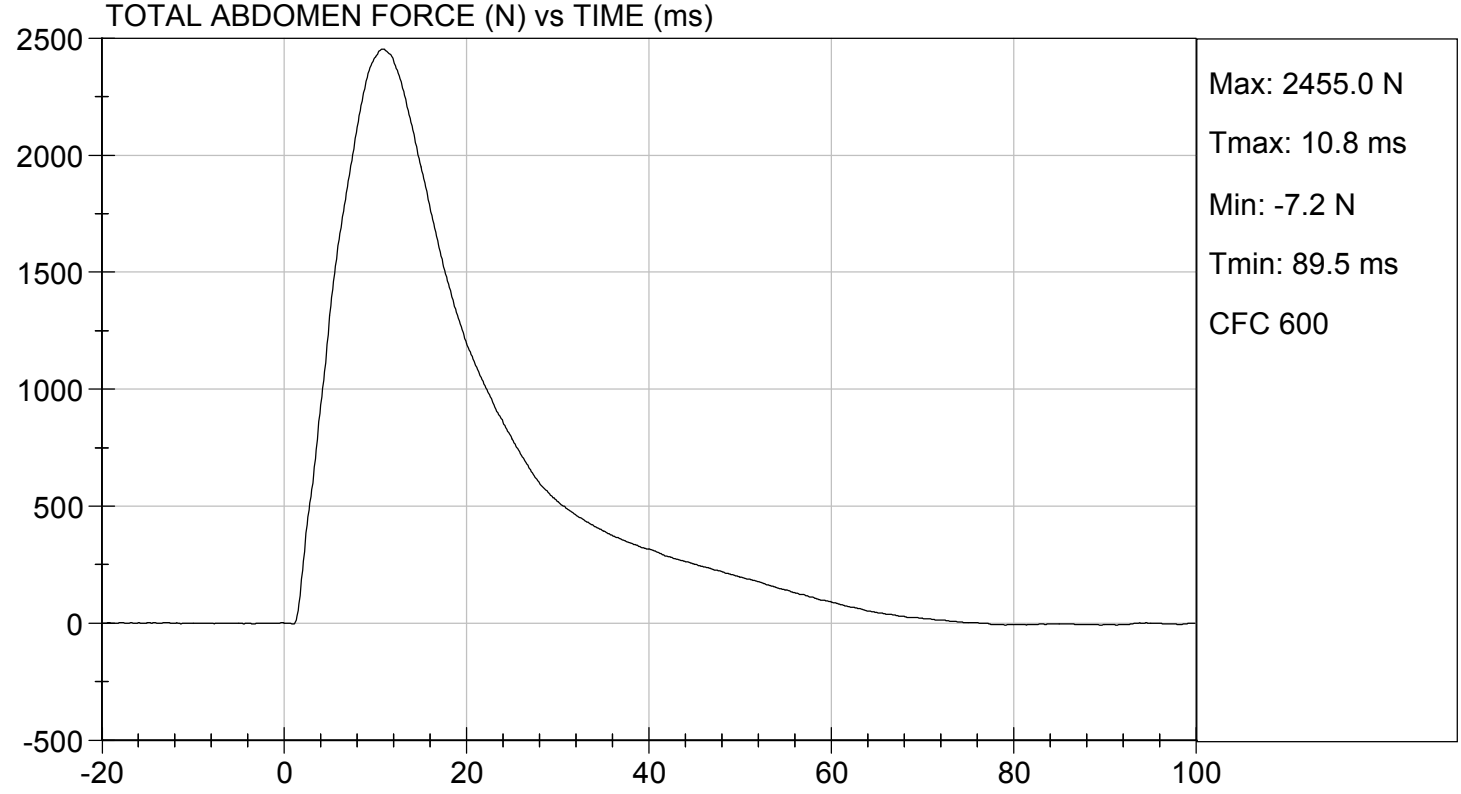
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 02/27/2020
TEST #: D200667

IMPACTOR FORCE (N) vs TIME (ms)



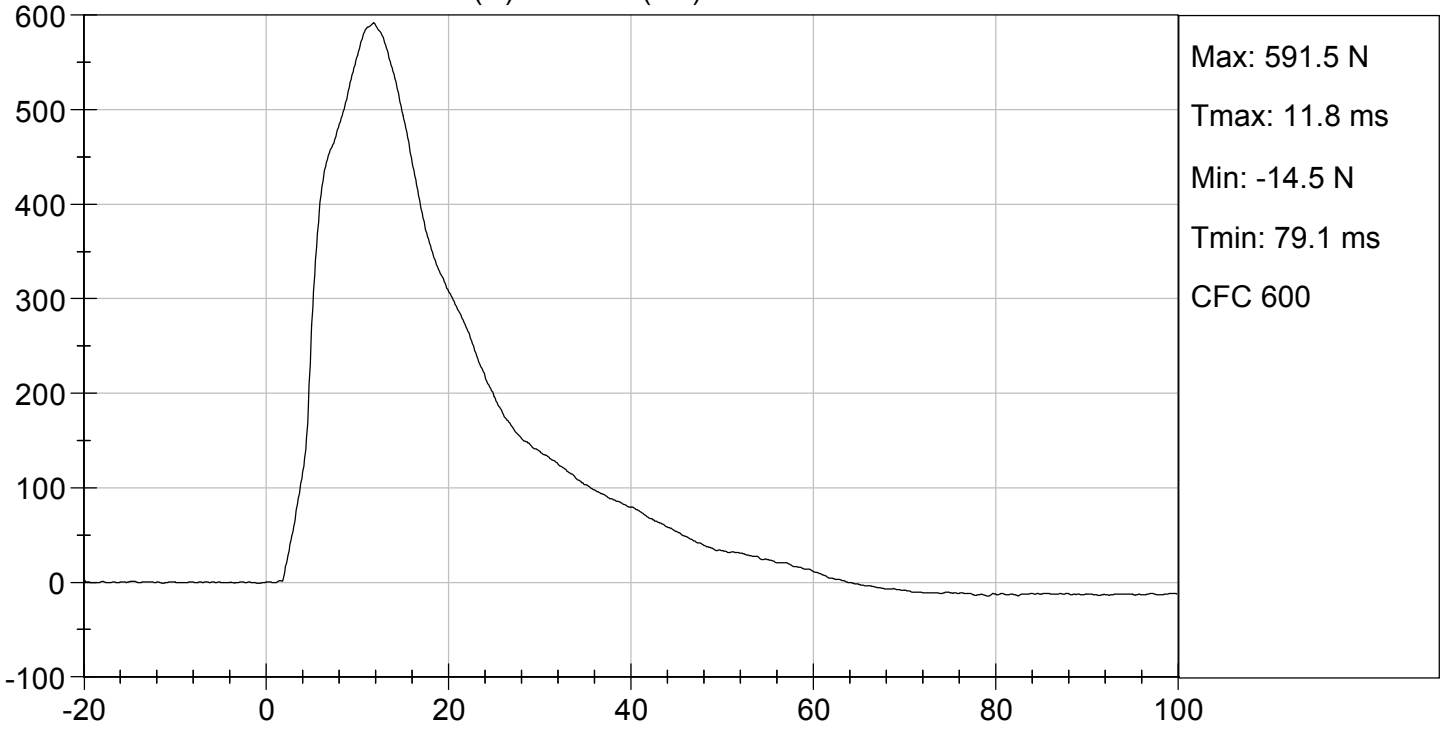
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



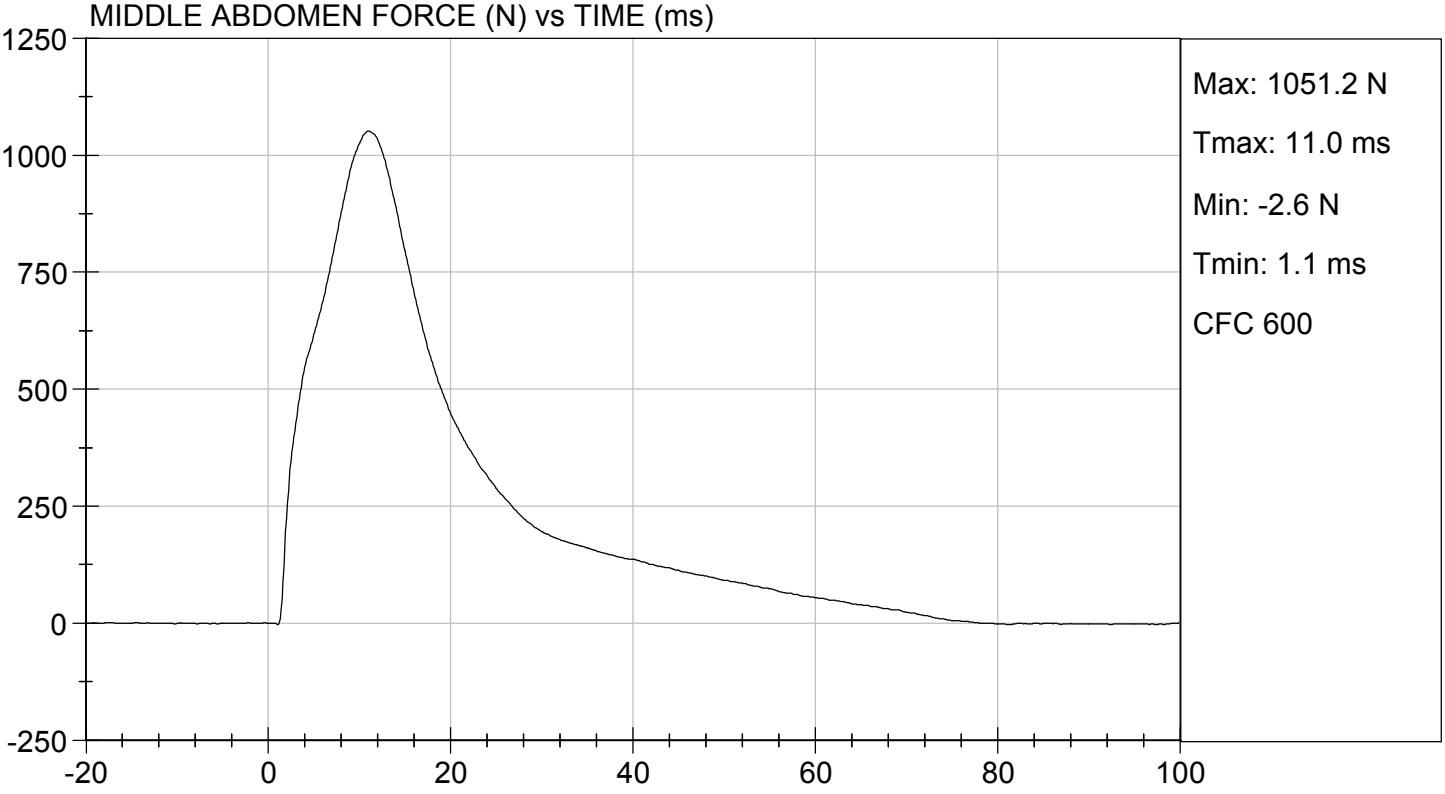
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 02/27/2020
TEST #: D200667

FRONT ABDOMEN FORCE (N) vs TIME (ms)



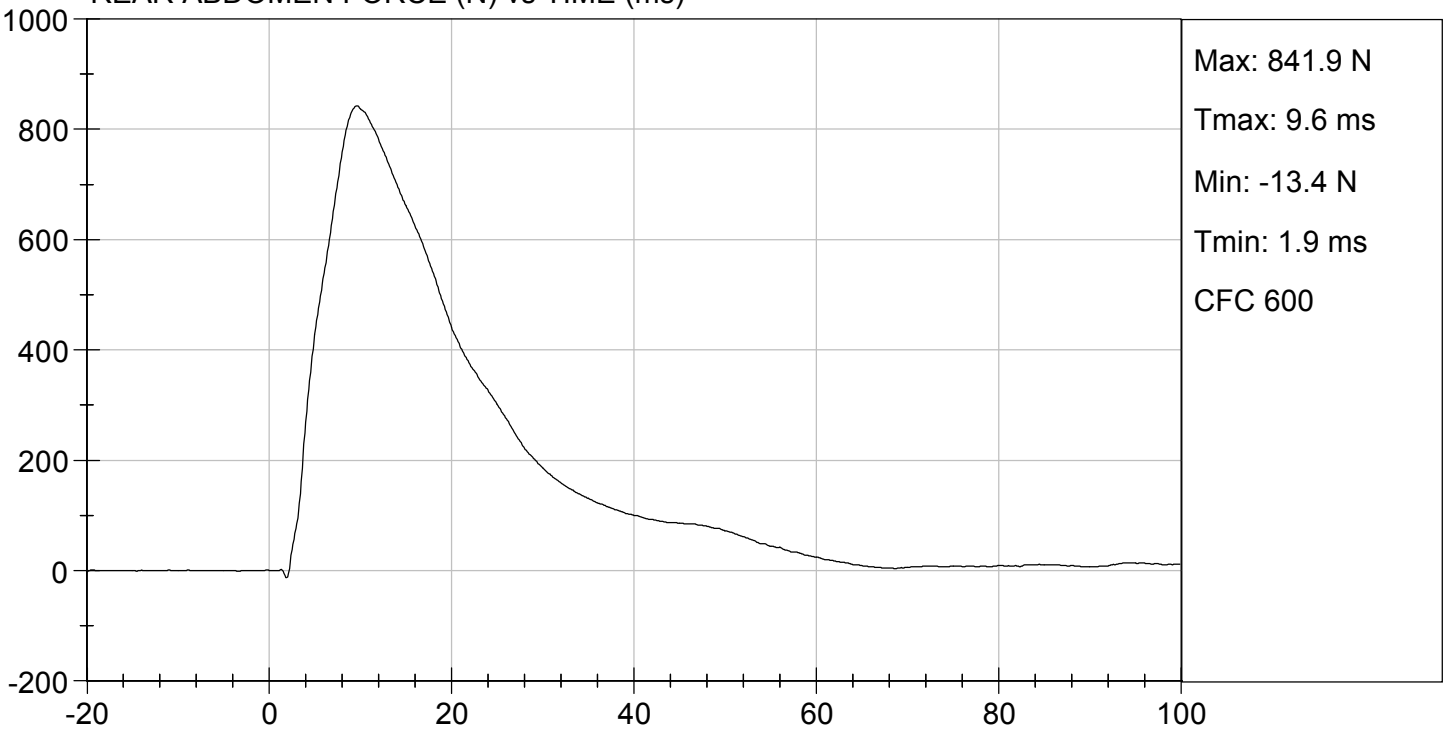
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 02/27/2020
TEST #: D200667

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200668

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.424	Pass
	27 ms	m/s	-6.50 to -5.80	-6.12	Pass
	30 ms	m/s	>= -6.50	-6.01	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	43.046	Fail
Time of Maximum Flexion Angle		ms	39.0 to 53.0	50.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	44	Pass
			Overall Results		Fail

Laboratory Technician

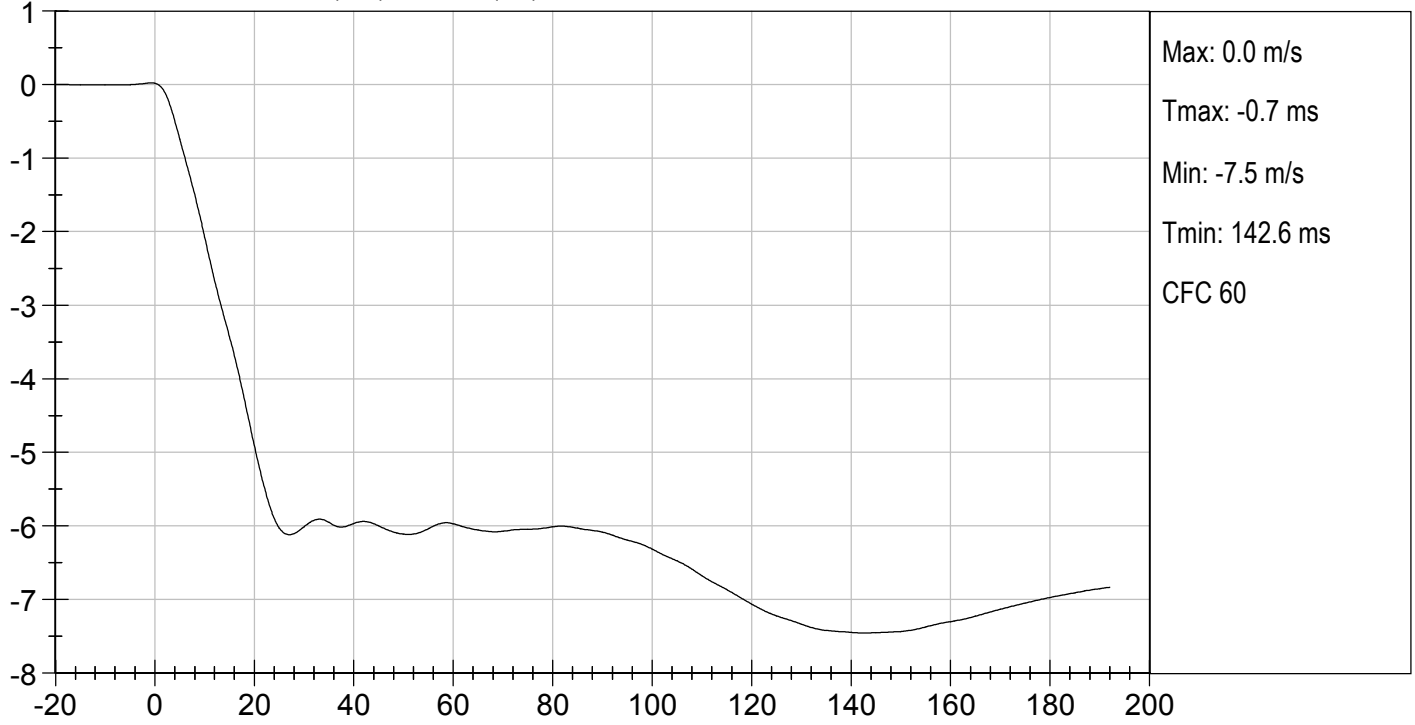
02/27/2020
Test Date

Approved By

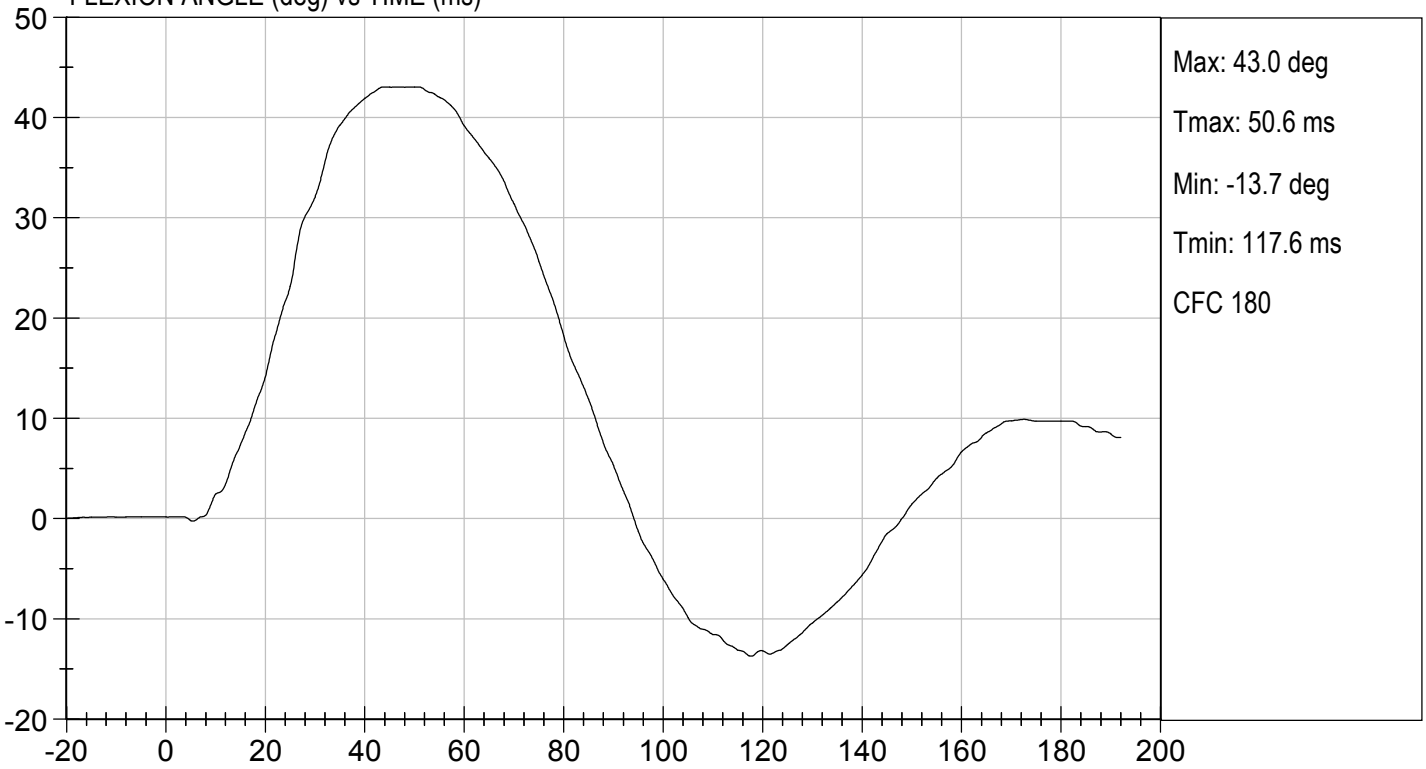
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 02/27/2020
TEST #: D200668

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



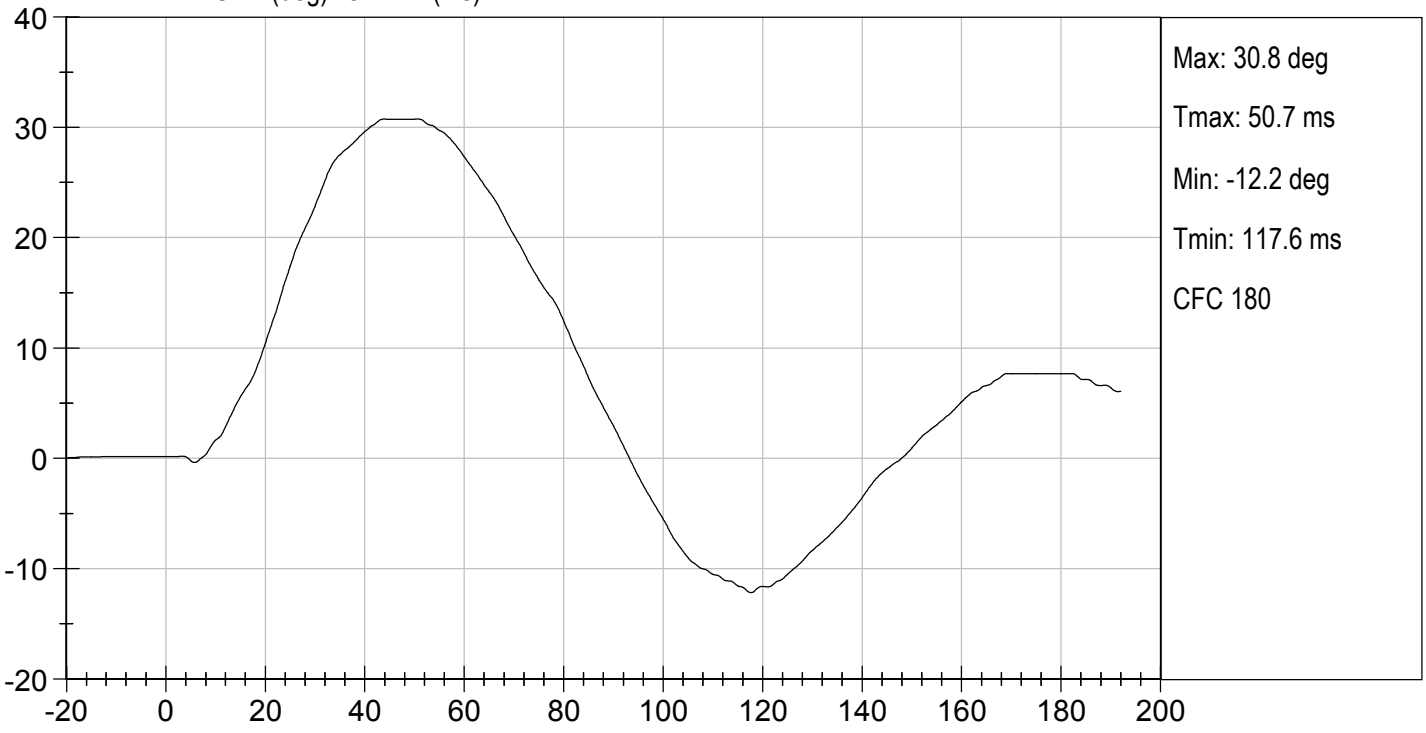
FLEXION ANGLE (deg) vs TIME (ms)



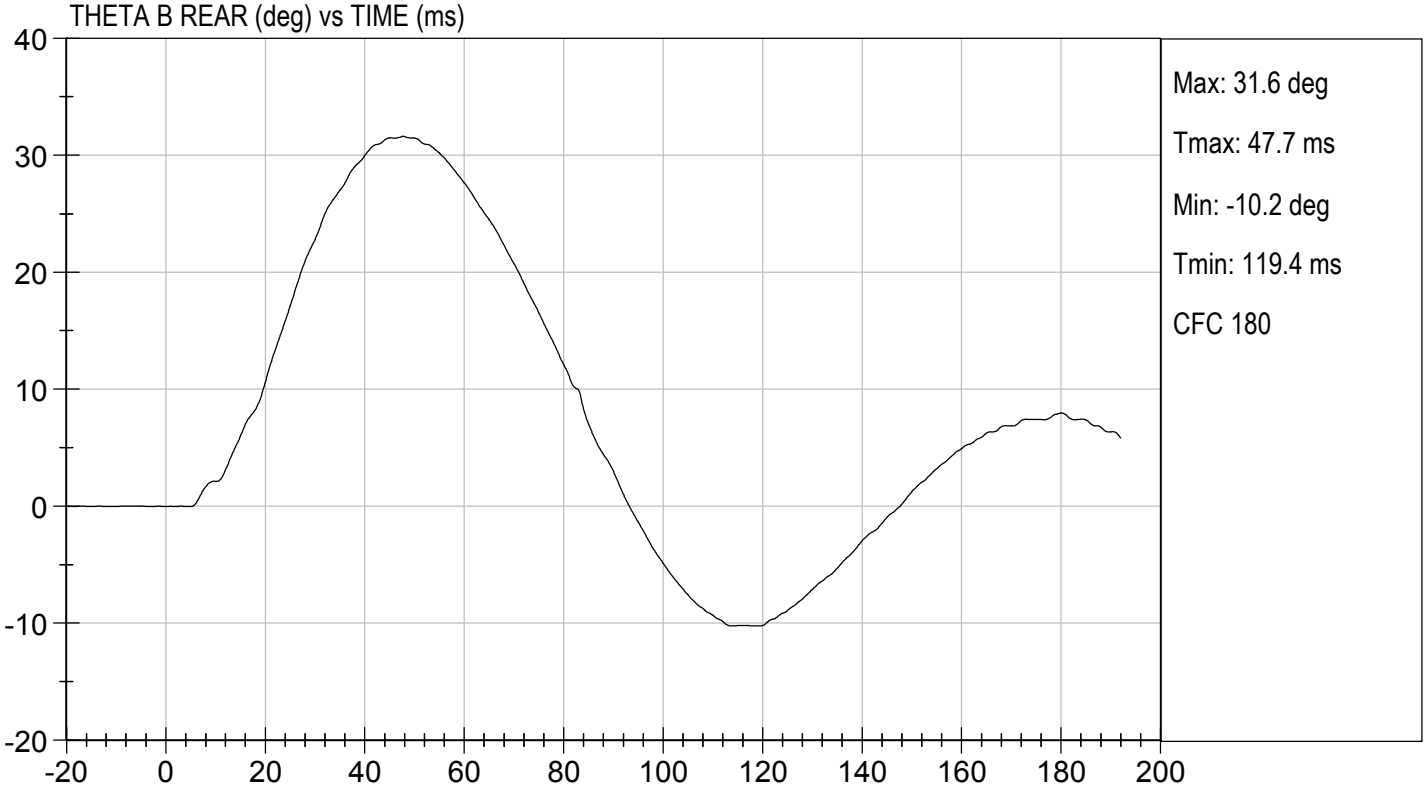
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 02/27/2020
TEST #: D200668

THETA A FRONT (deg) vs TIME (ms)

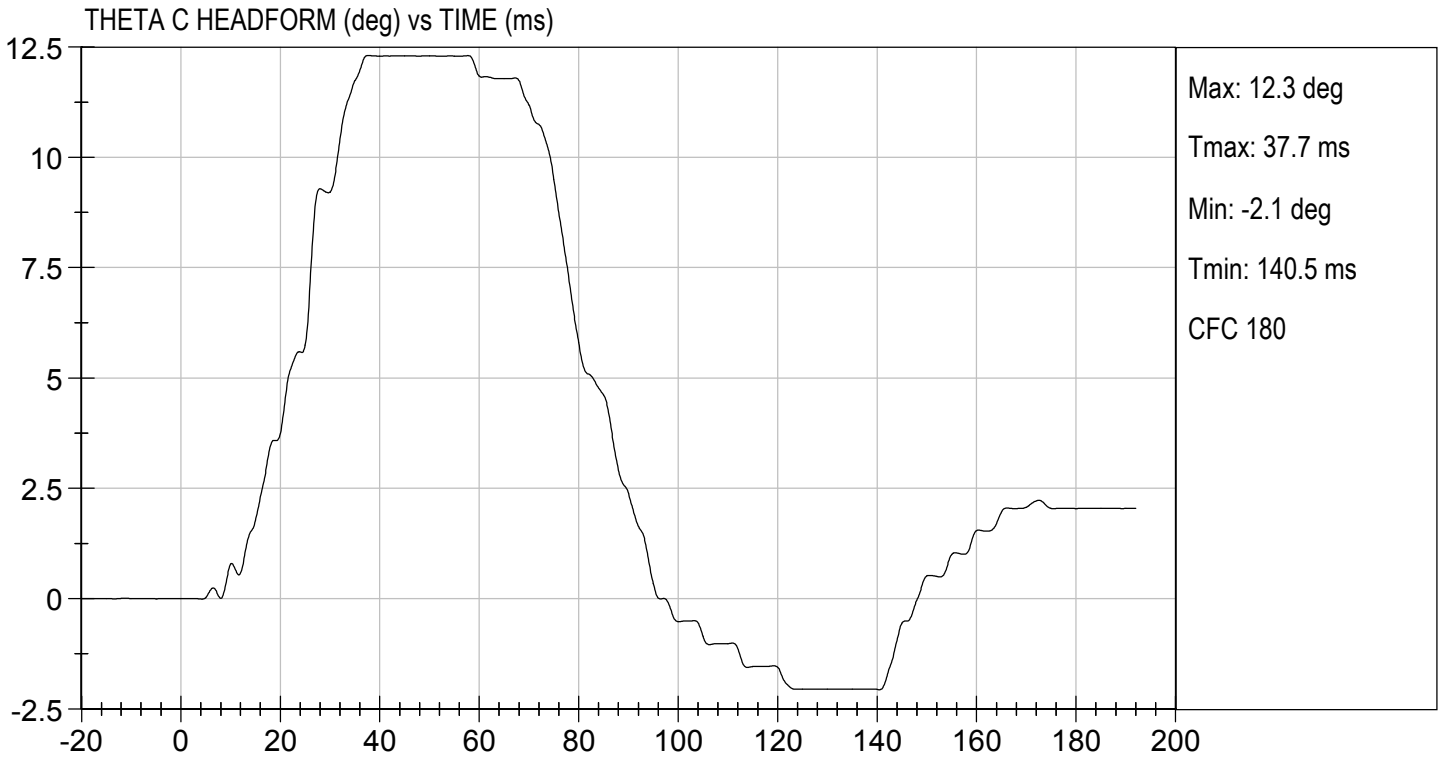


THETA B REAR (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 02/27/2020
TEST #: D200668



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200669

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	5057	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.5	Pass
Maximum Pubic Force	N	1230 to 1590	1362	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	12.4	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

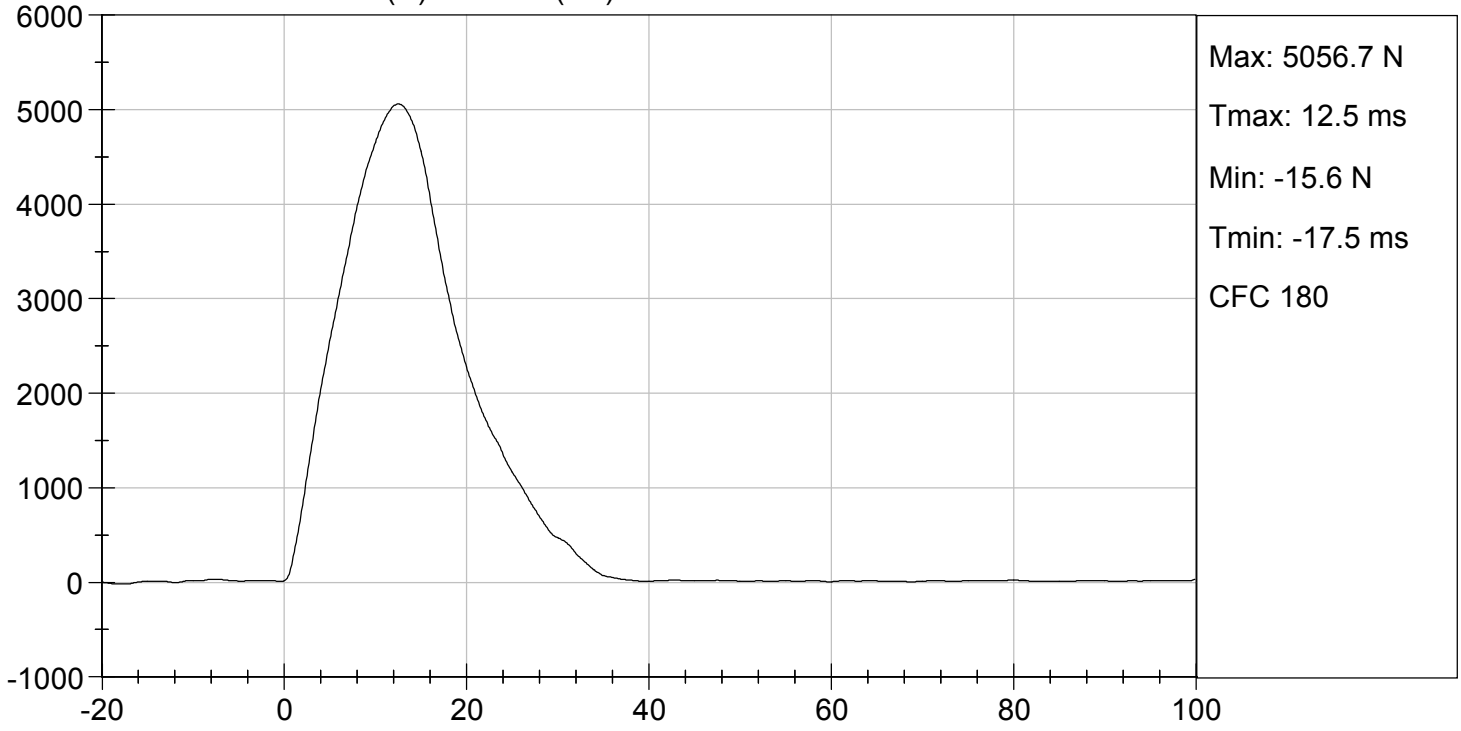
02/27/2020
Test Date

Approved By

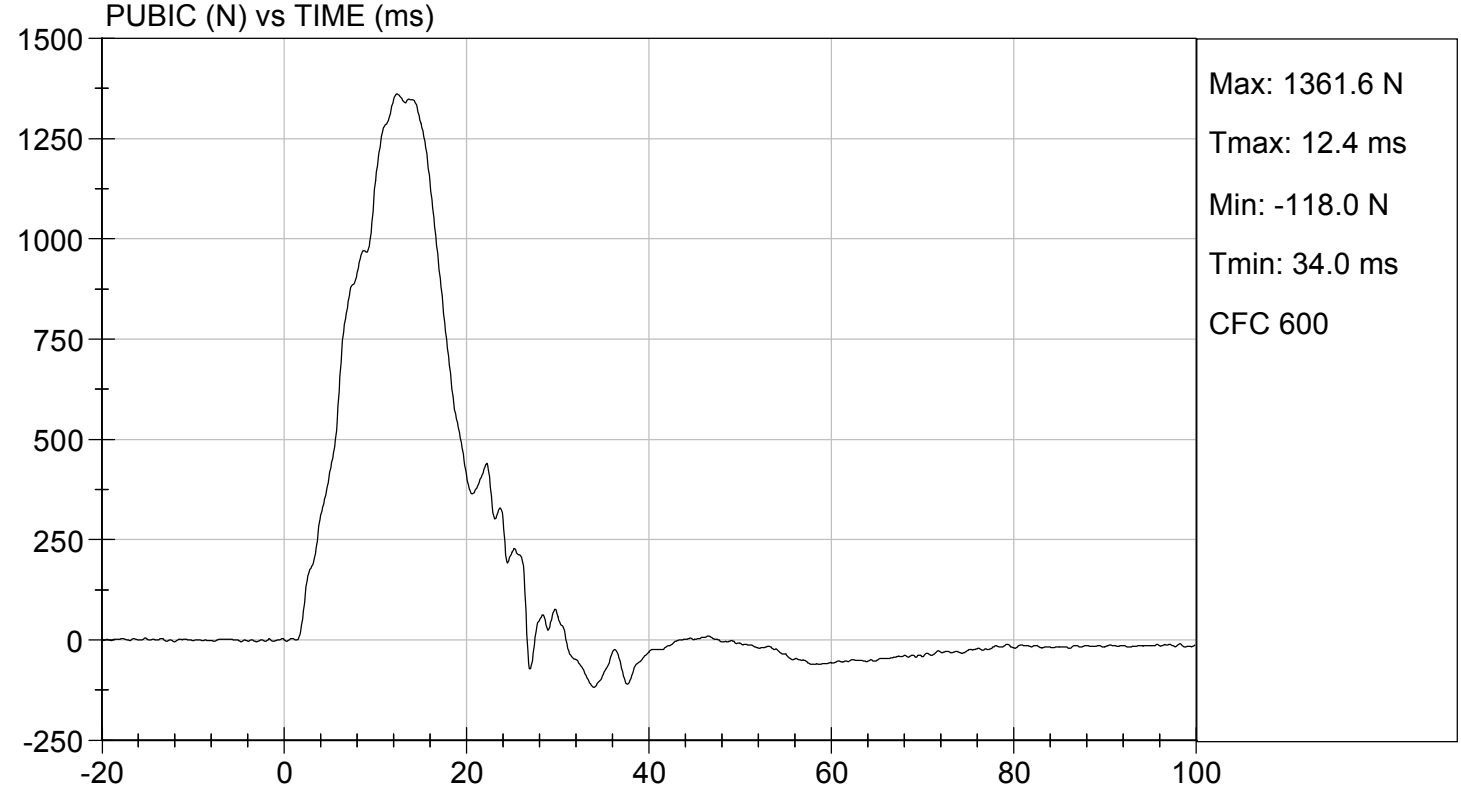
TEST DESC: PELVIS IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/27/2020
TEST #: D200669

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D200660

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	15	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5393	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.0	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.6	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.3	Pass
		Overall Test Results		Pass

Jacob D Taylor
Laboratory Technician

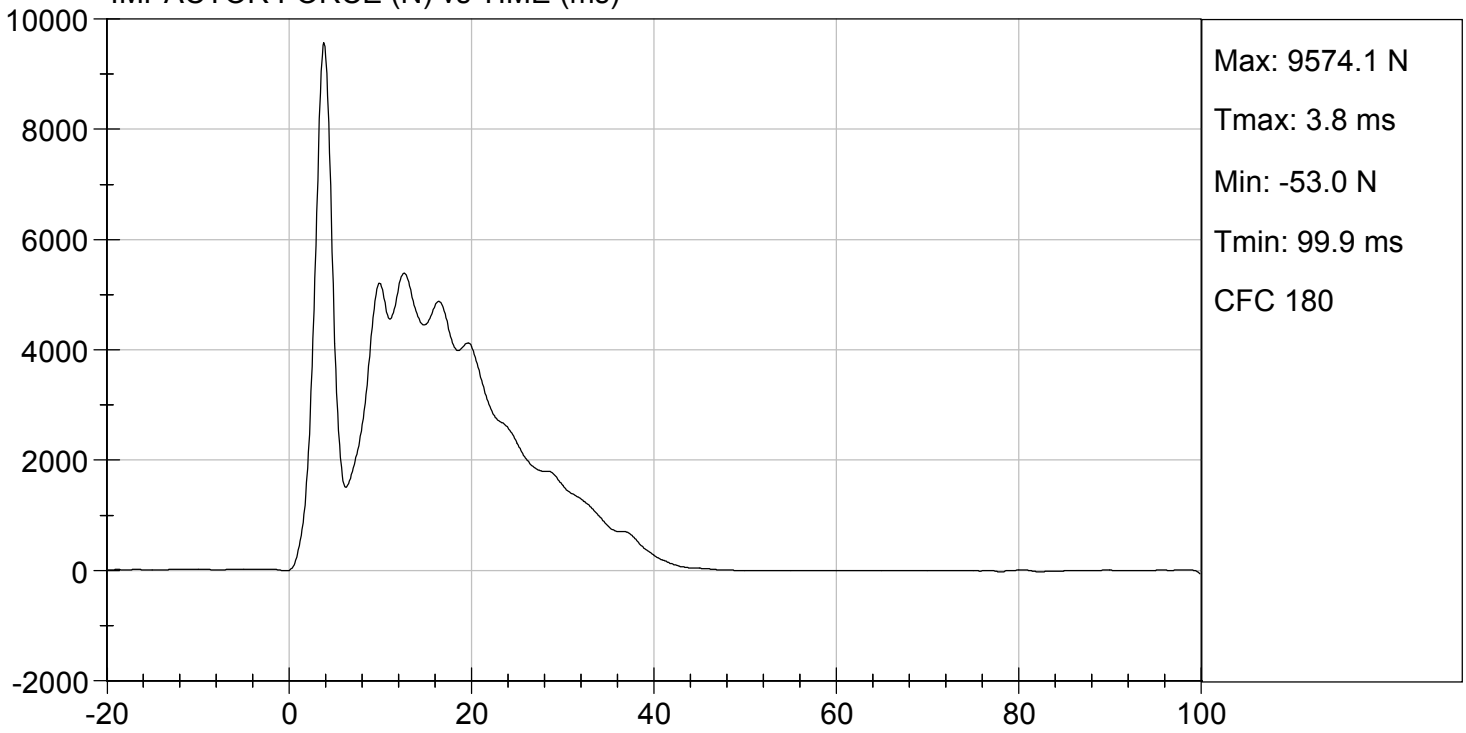
02/27/2020
Test Date

Approved By

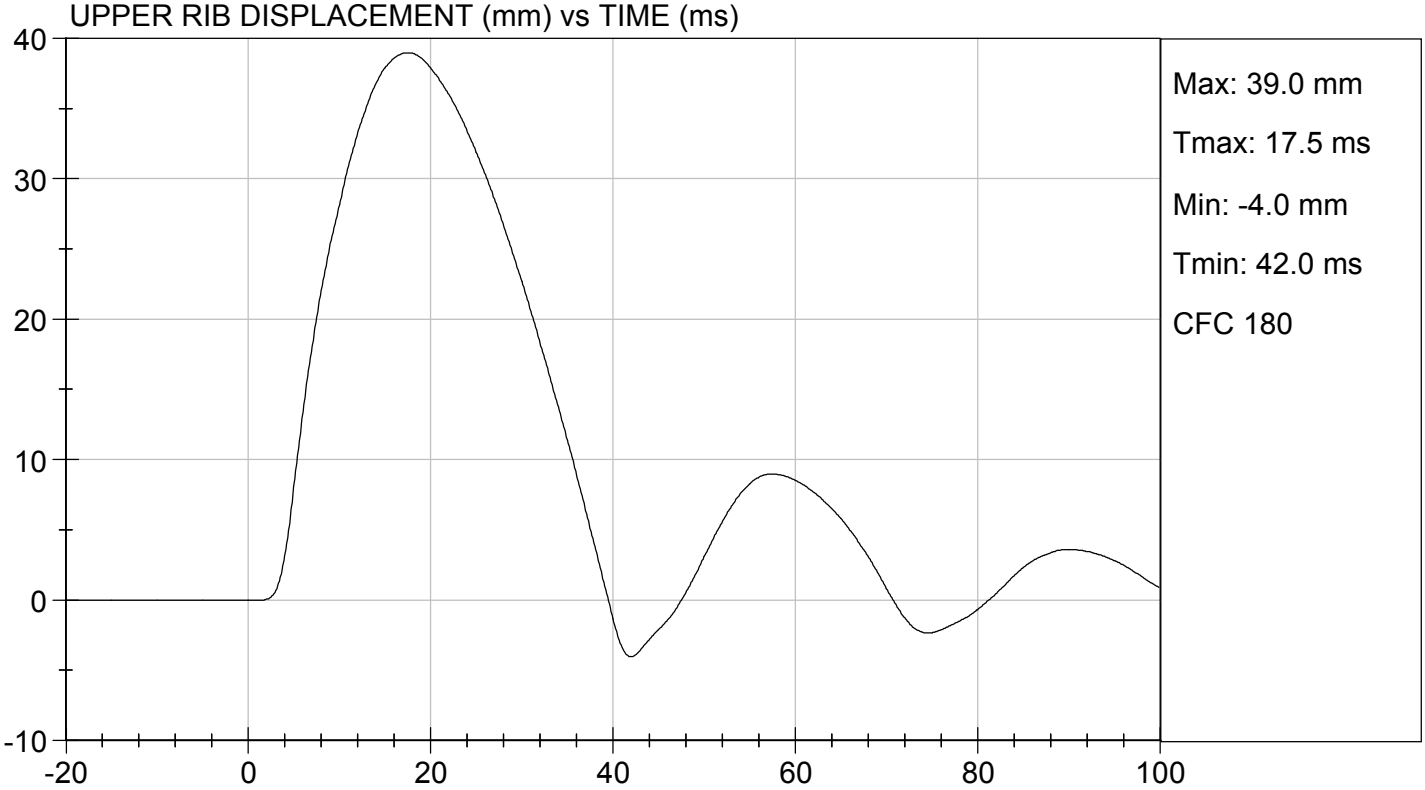
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 02/27/2020
TEST #: D200660

IMPACTOR FORCE (N) vs TIME (ms)



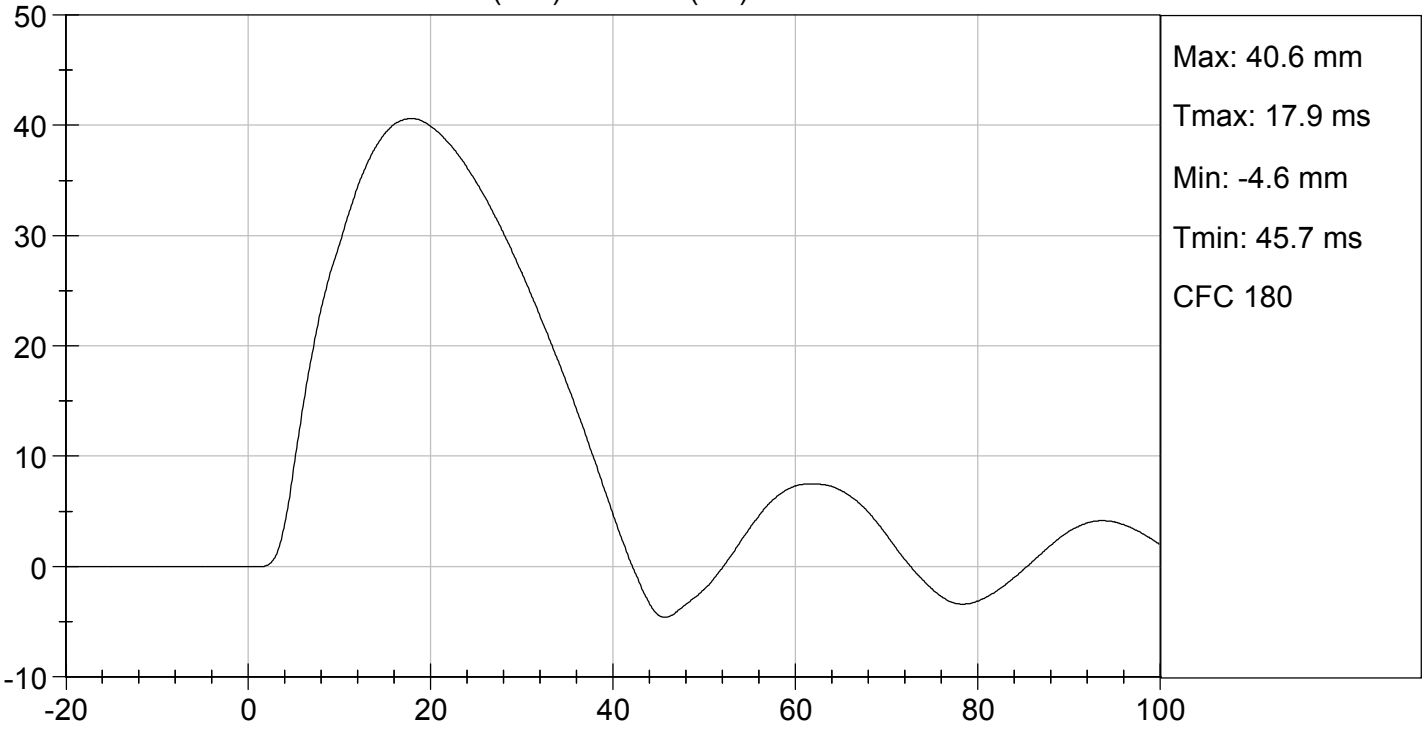
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



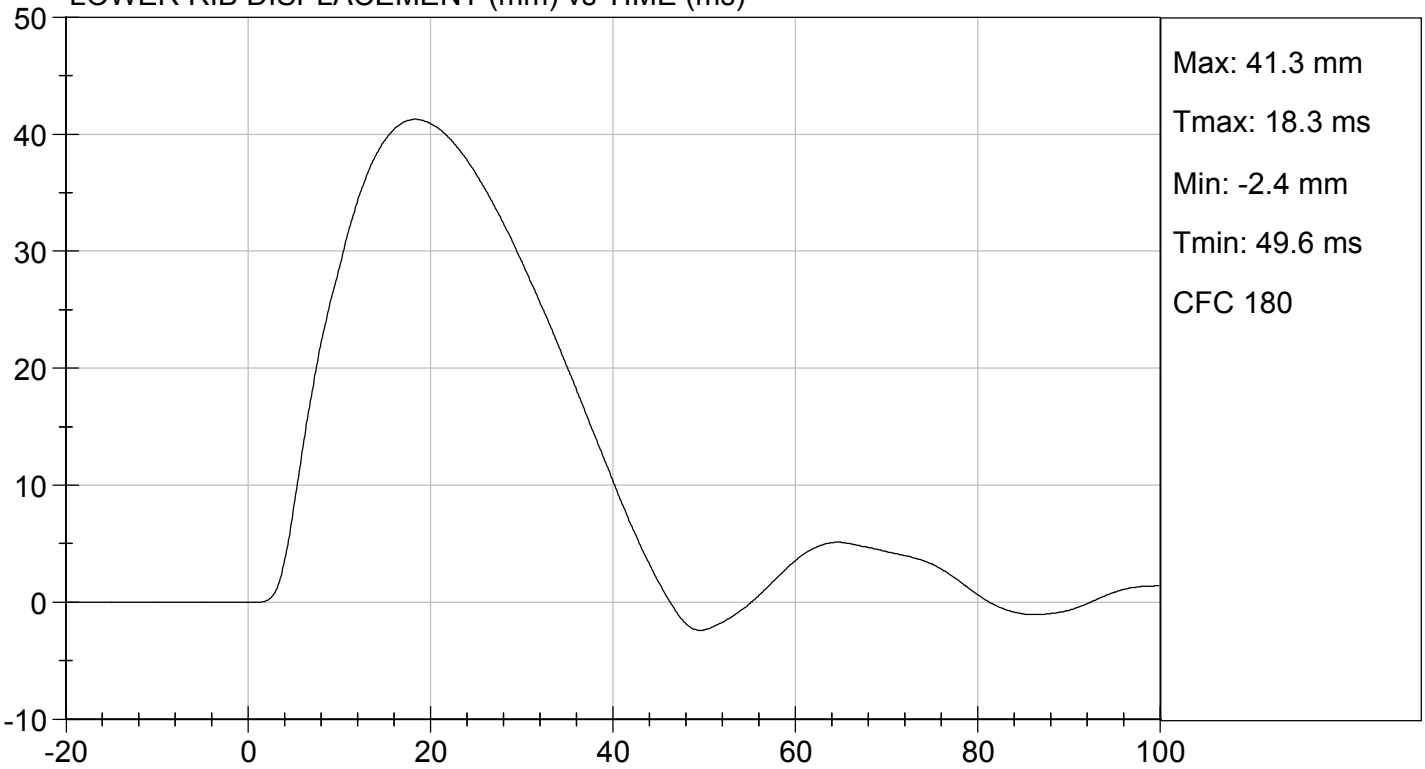
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 02/27/2020
TEST #: D200660

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: 296

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	142	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	180	Pass
J	Head Circumference	541 - 551	548	Pass
K	Buttock to Knee Length	514 - 540	535	Pass
L	Popliteal Height	343 - 369	358	Pass
M	Knee Pivot to Floor Height	392 - 409	404	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	206	Pass
P	Foot Length	216 - 232	219	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	316	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	481	Pass
V	Shoulder Width	341 - 357	346	Pass
W	Foot Width	78 - 94	85	Pass
Y	Chest Circumference w/ jacket	851 - 881	870	Pass
Z	Waist Circumference	761 - 791	772	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D200371

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	115 to 137	126	Pass
Peak Longitudinal Acceleration	G's	+/- 15	7.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Jacob D Taylor

Laboratory Technician

01/31/2020

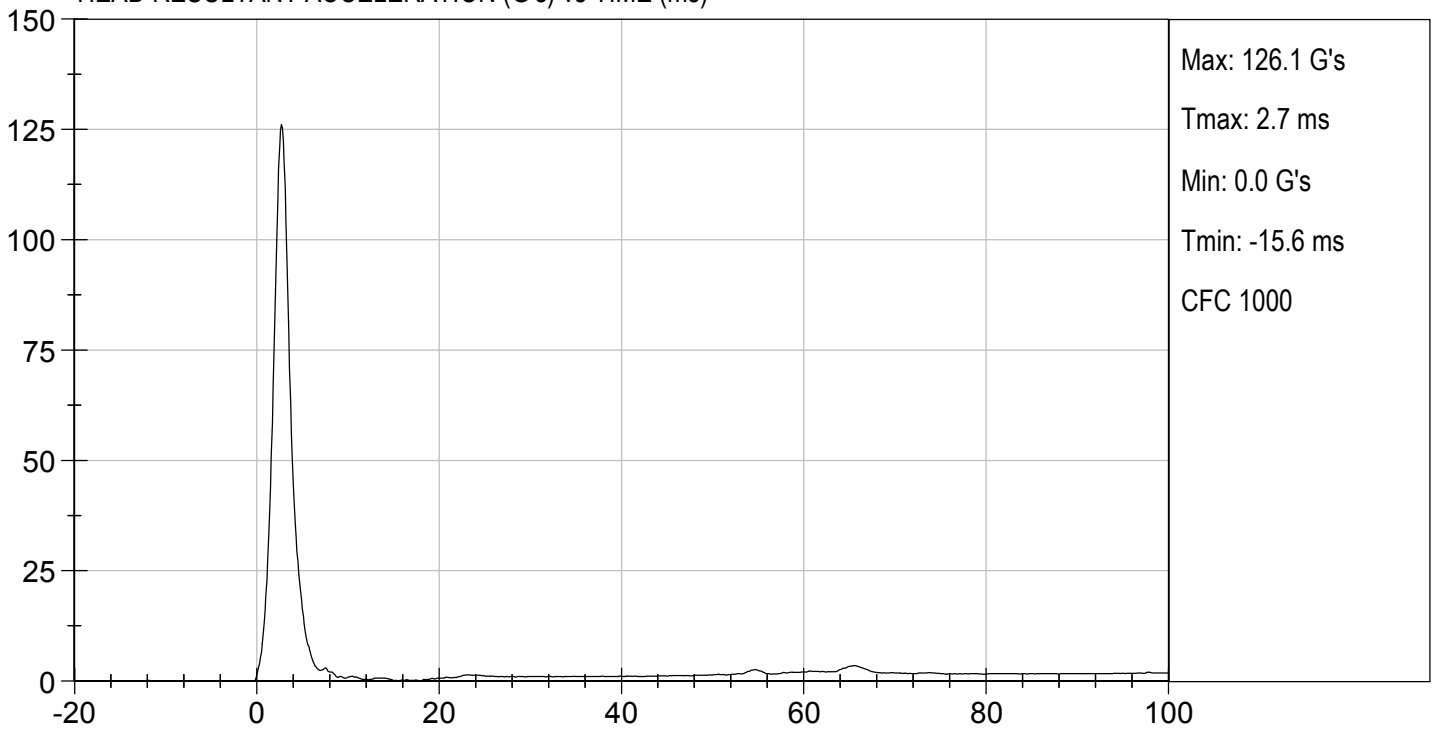
Test Date

Approved By

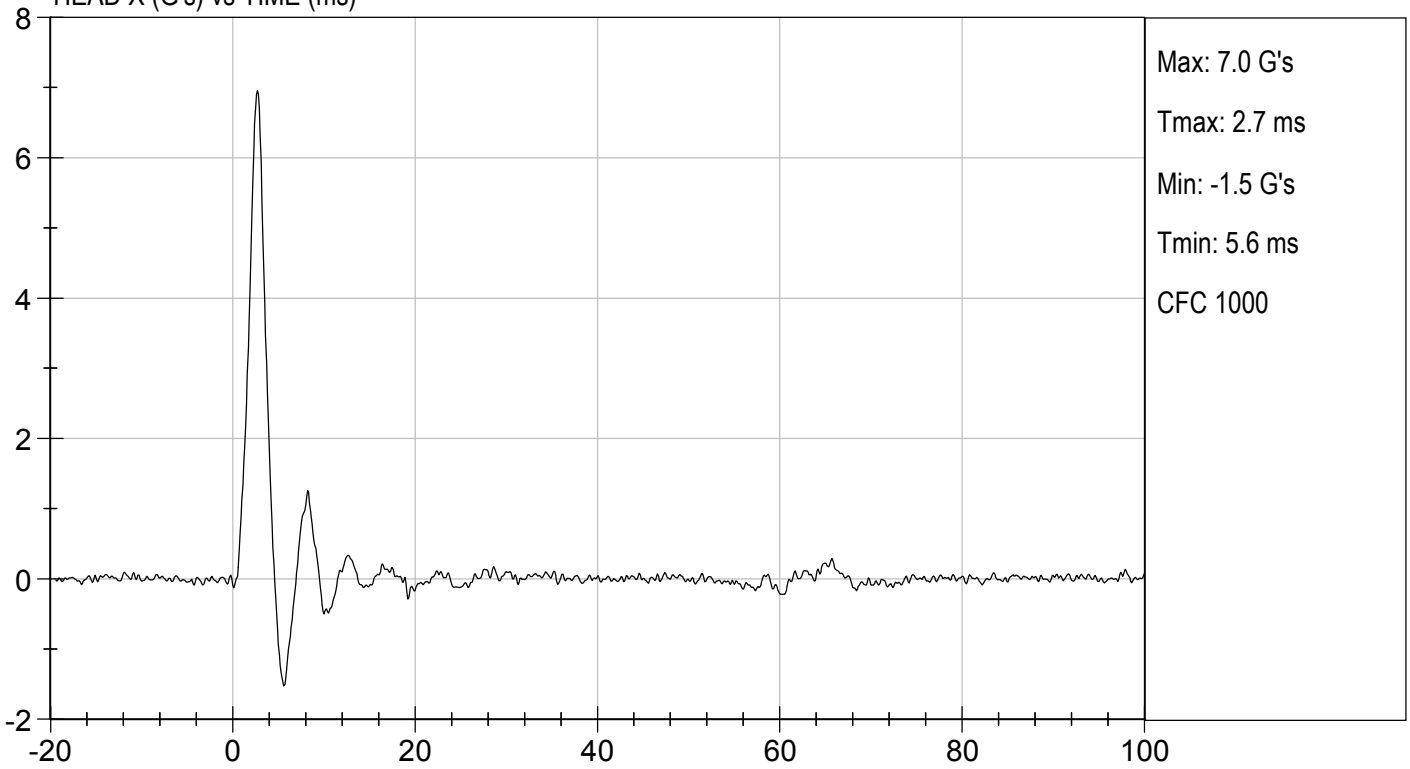
TEST DESC: HEAD DROP

TEST DATE: 01/31/2020
TEST #: D200371

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



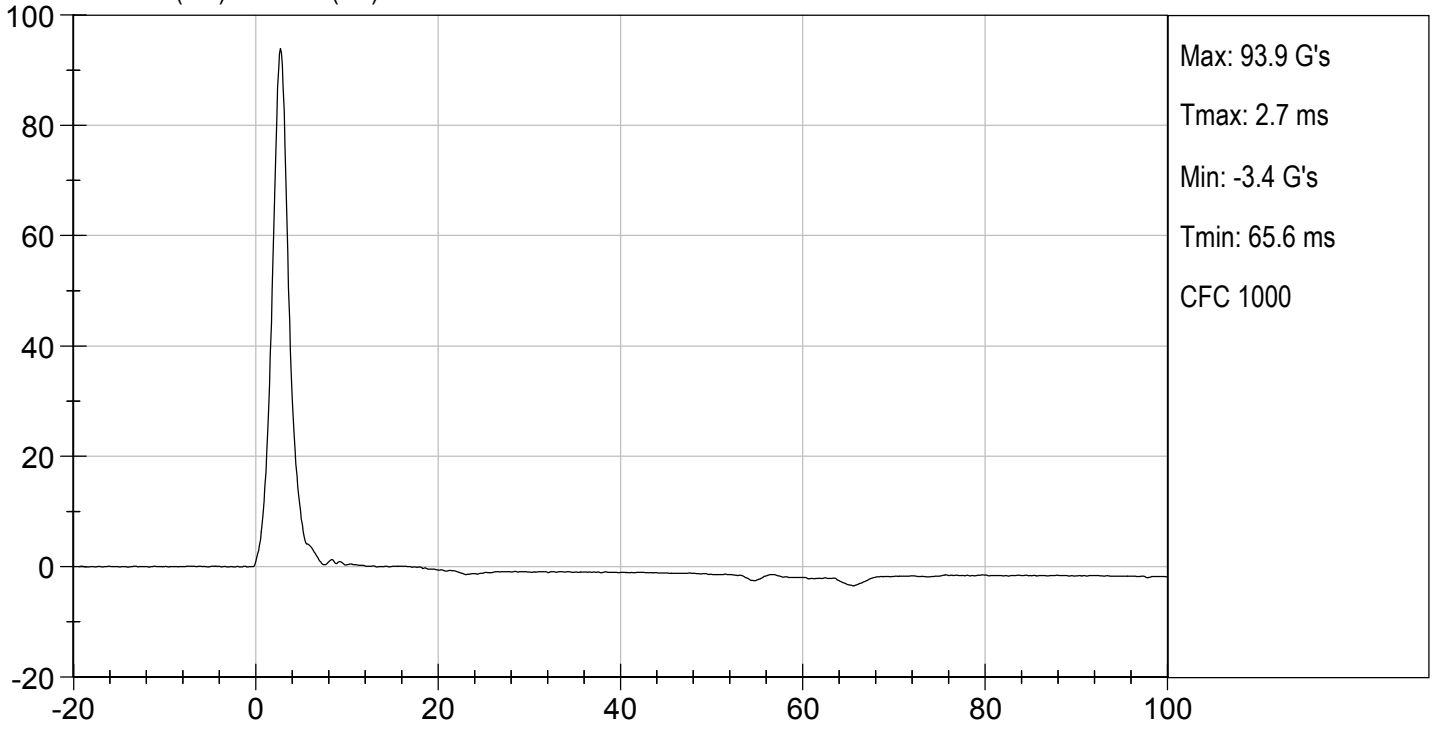
HEAD X (G's) vs TIME (ms)



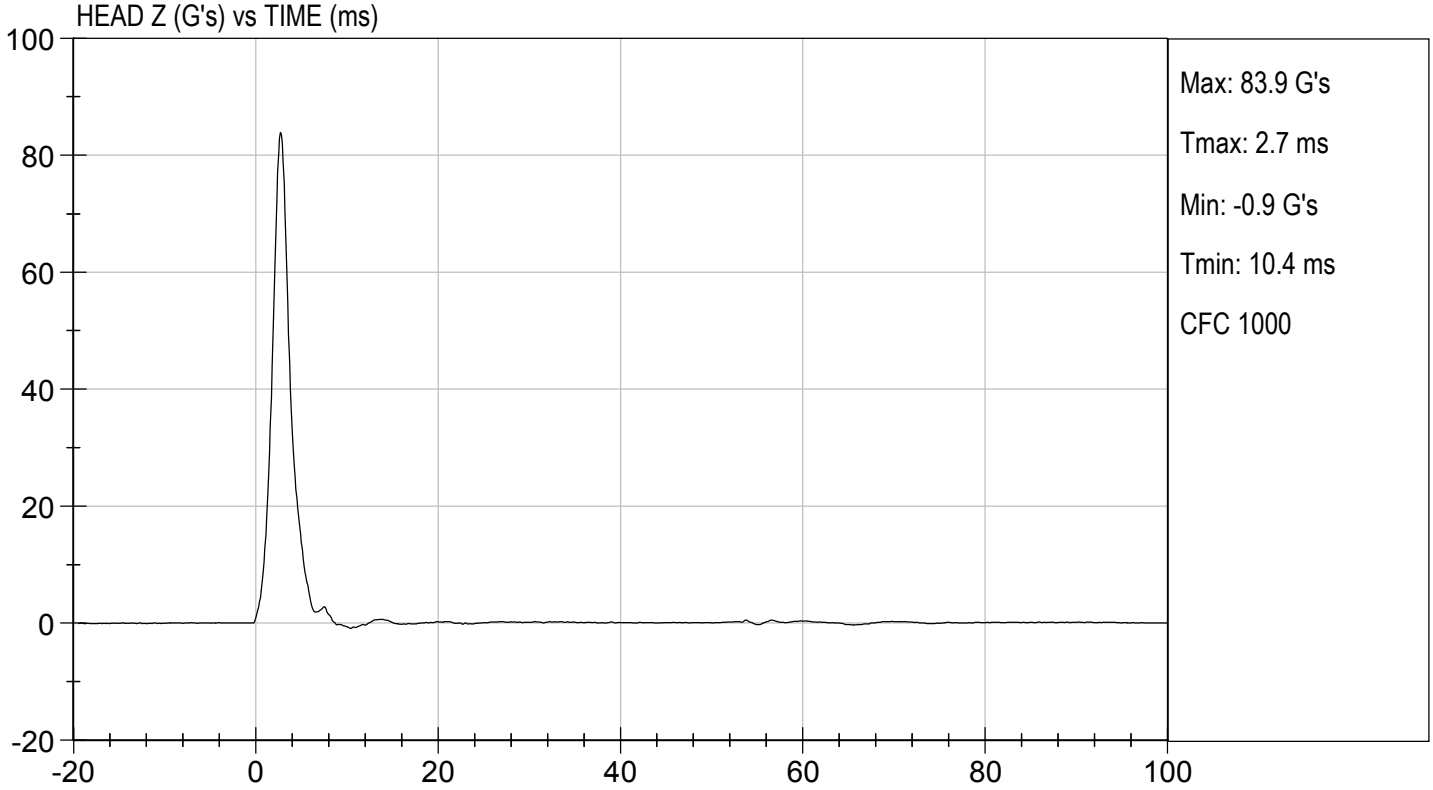
TEST DESC: HEAD DROP

TEST DATE: 01/31/2020
TEST #: D200371

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



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



MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200372

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.6	Pass
Humidity		%	10 to 70	23	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.53	Pass
	15 ms	m/s	3.30 to 4.10	3.75	Pass
	20 ms	m/s	4.40 to 5.40	5.11	Pass
	25 ms	m/s	5.40 to 6.10	6.12	Pass
	25-100 ms	m/s	5.50 to 6.20	6.19	Pass
Maximum D-Plane Rotation		deg	71 to 81	75	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	112	Pass
			Overall Test Results		Pass

Alex Thomas

Laboratory Technician

01/31/2020

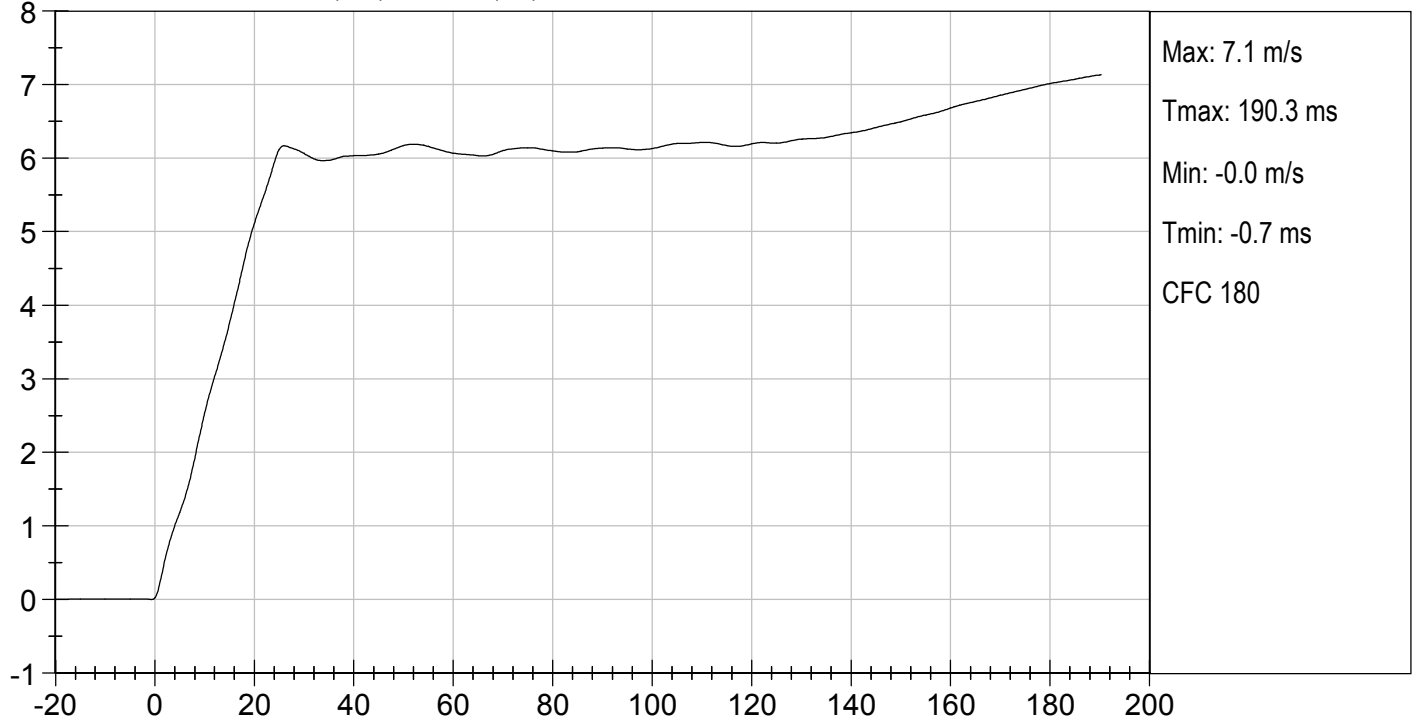
Test Date

Approved By

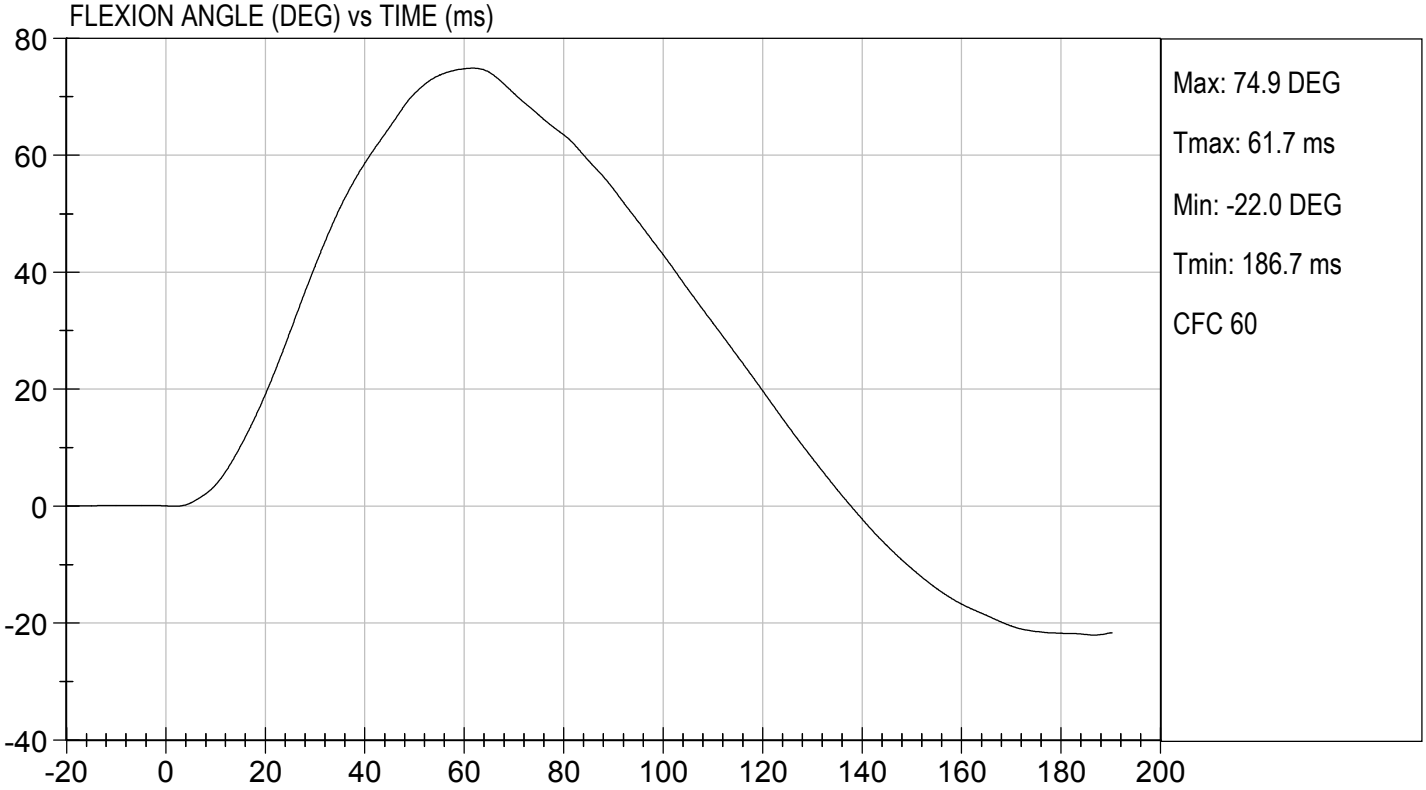
TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

TEST DATE: 01/31/2020
TEST #: D200372

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

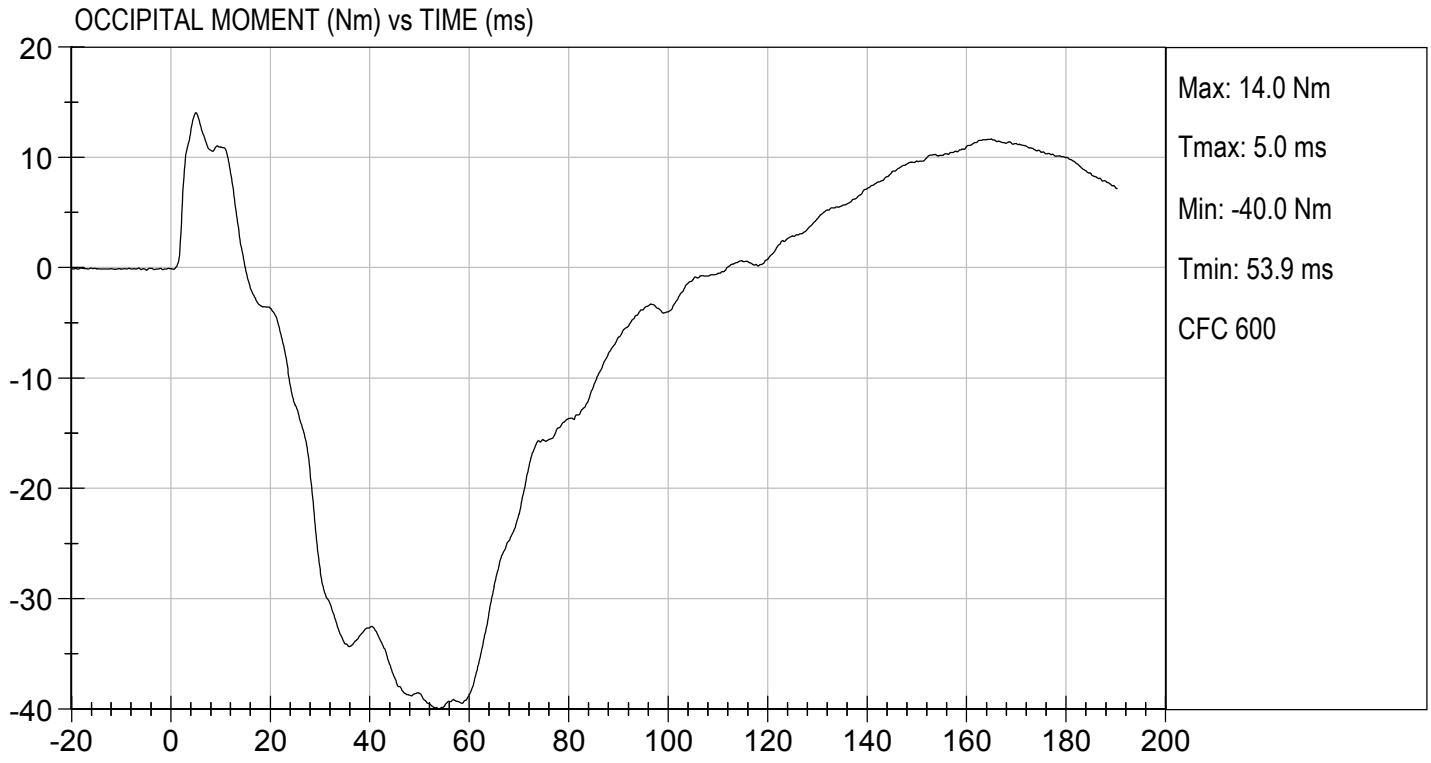


FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

TEST DATE: 01/31/2020
TEST #: D200372



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D200373

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	34	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	13 to 18	18	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

Laboratory Technician

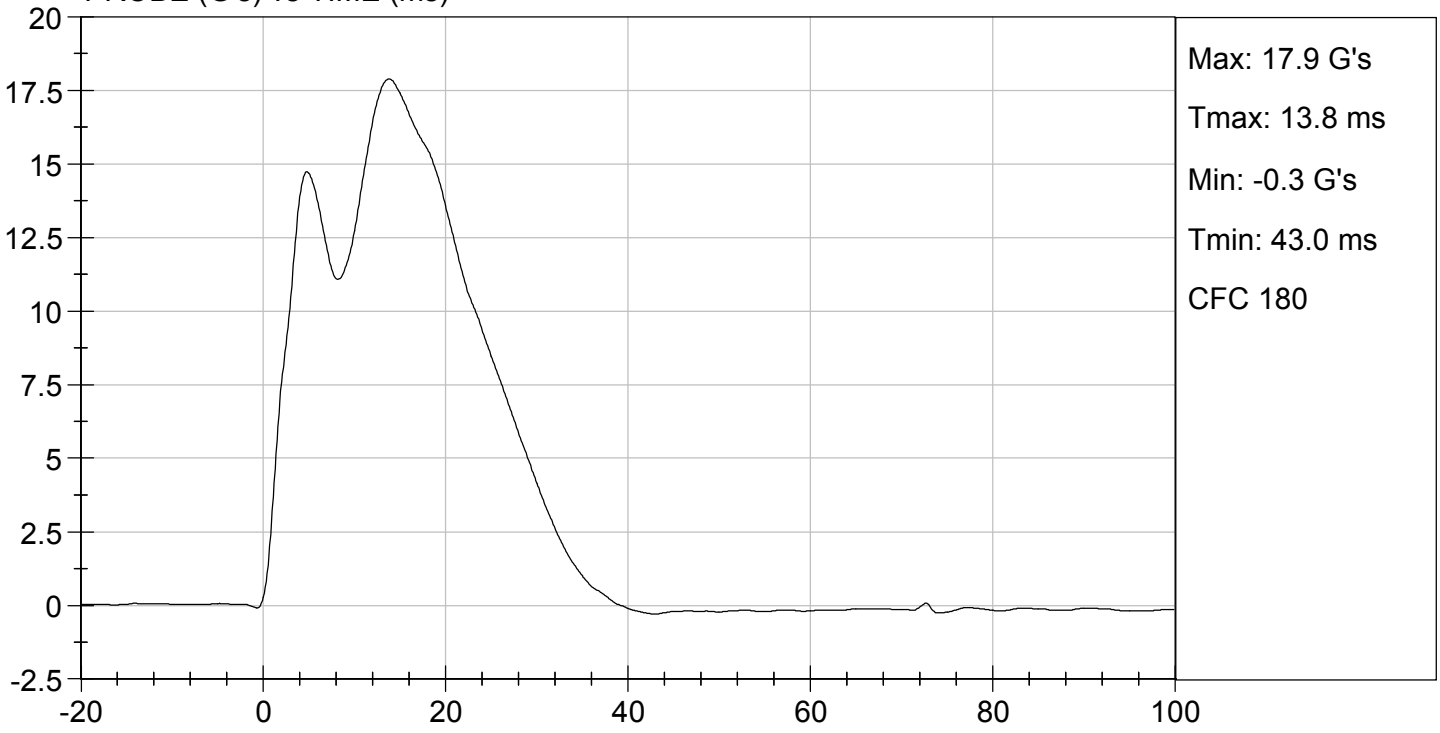
01/30/2020
Test Date

Approved By

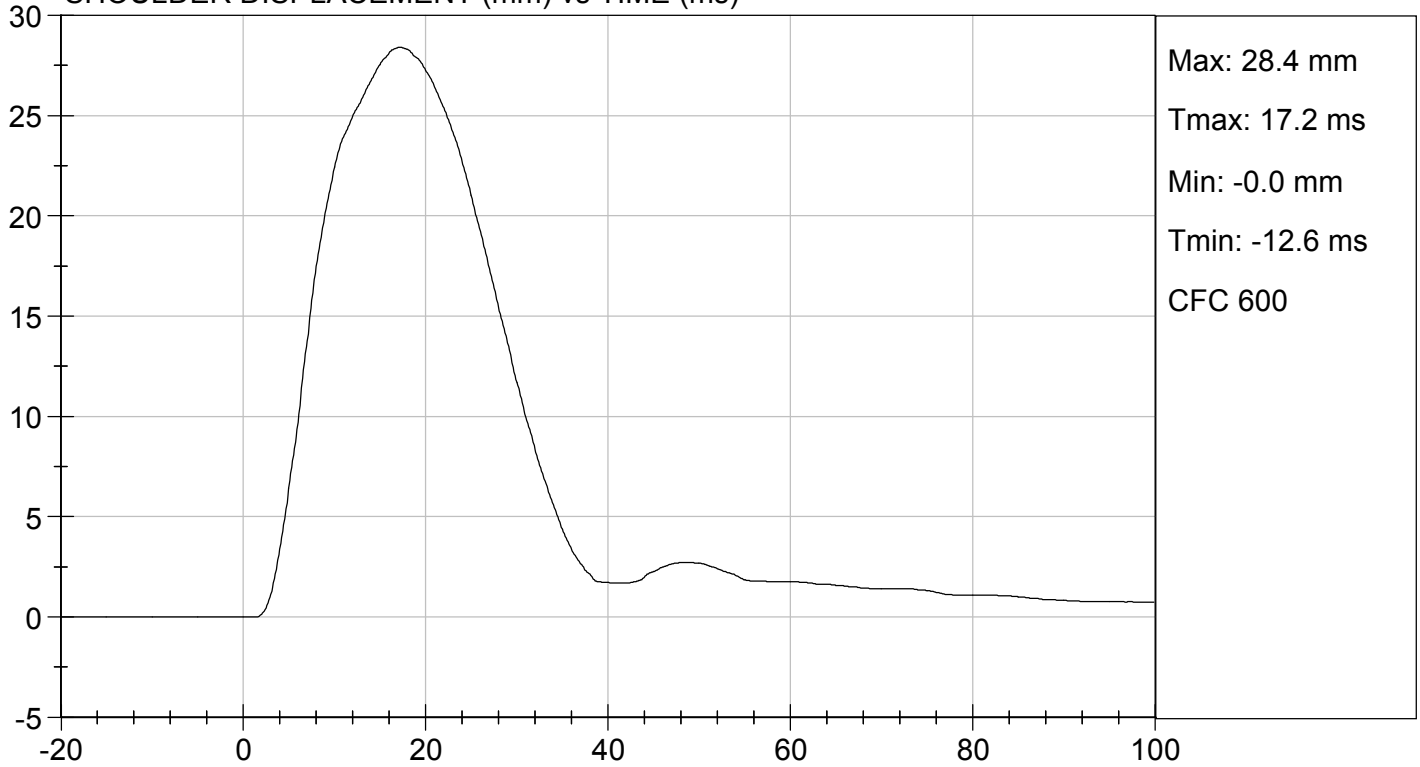
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 01/30/2020
TEST #: D200373

PROBE (G's) vs TIME (ms)



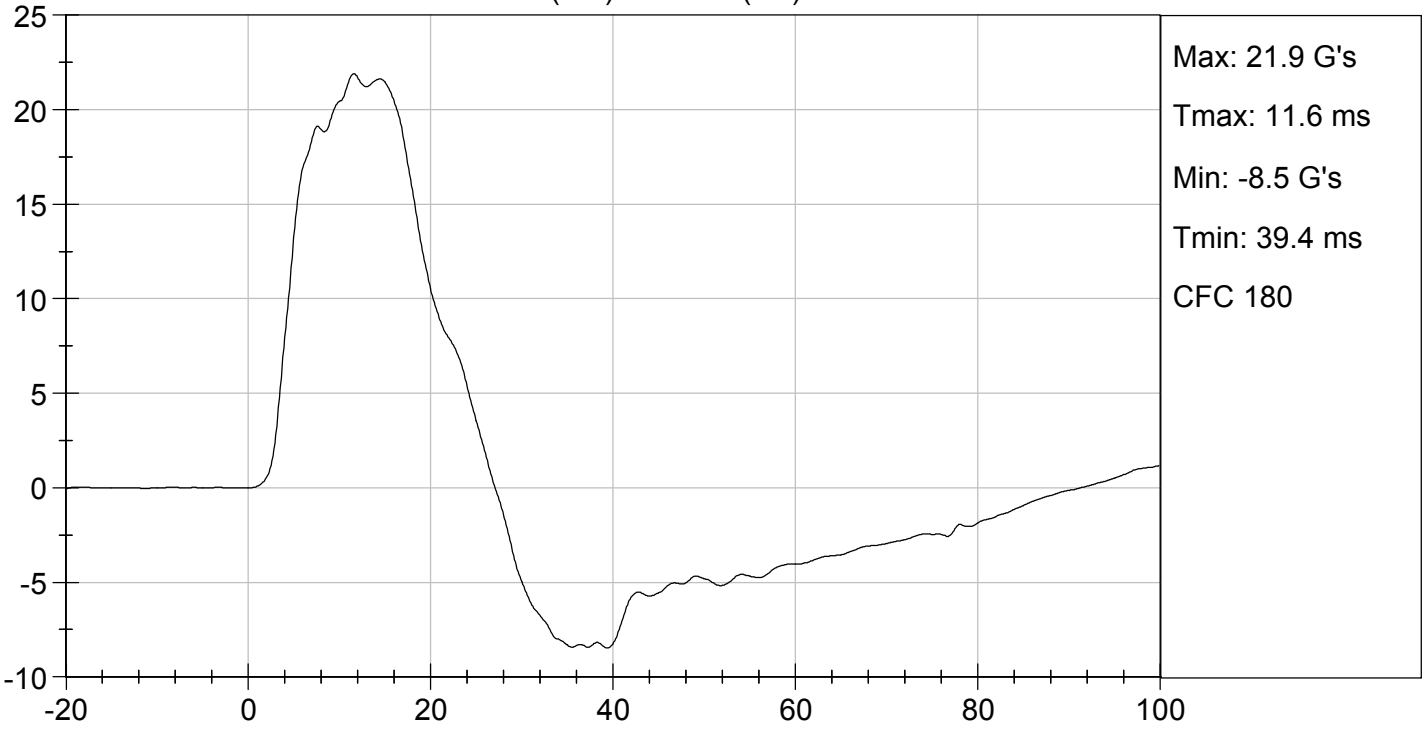
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 01/30/2020
TEST #: D200373

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



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200374

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

Laboratory Technician

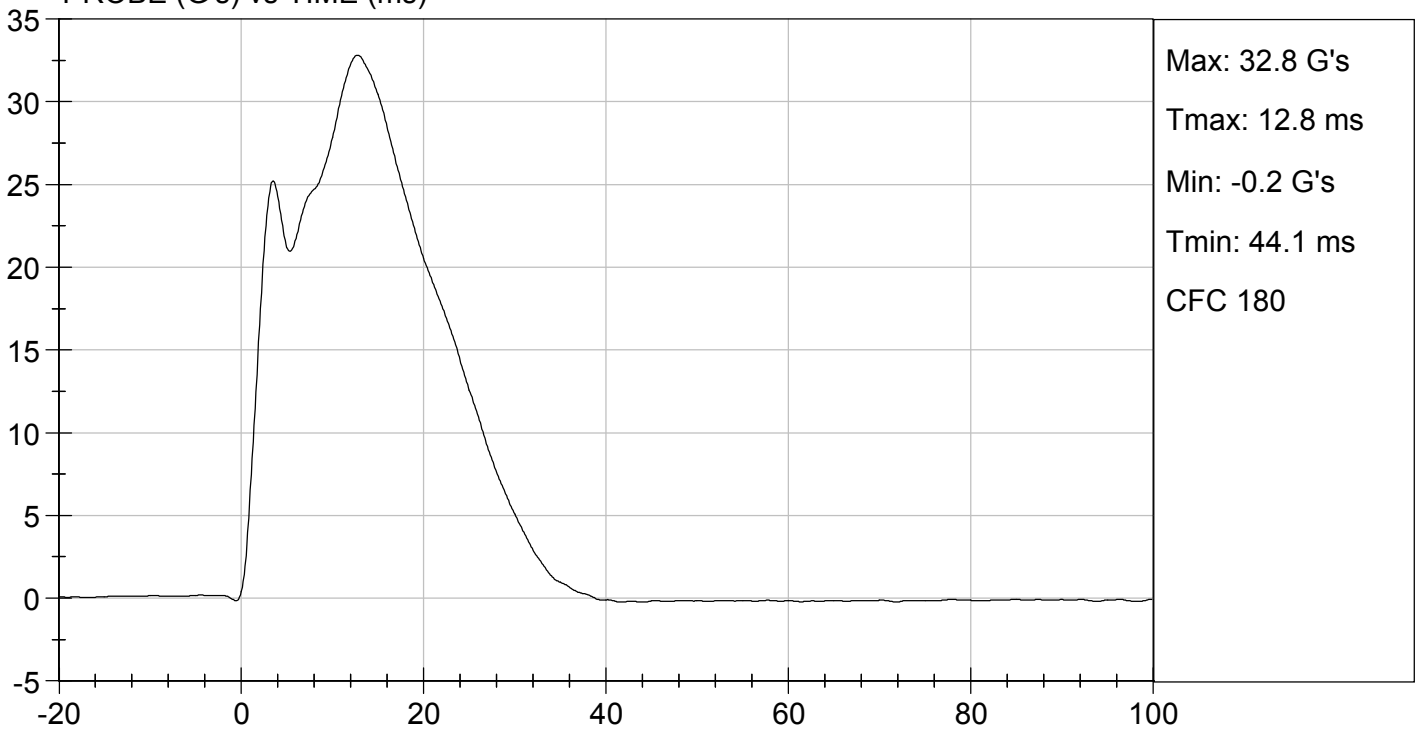
01/30/2020
Test Date

Approved By

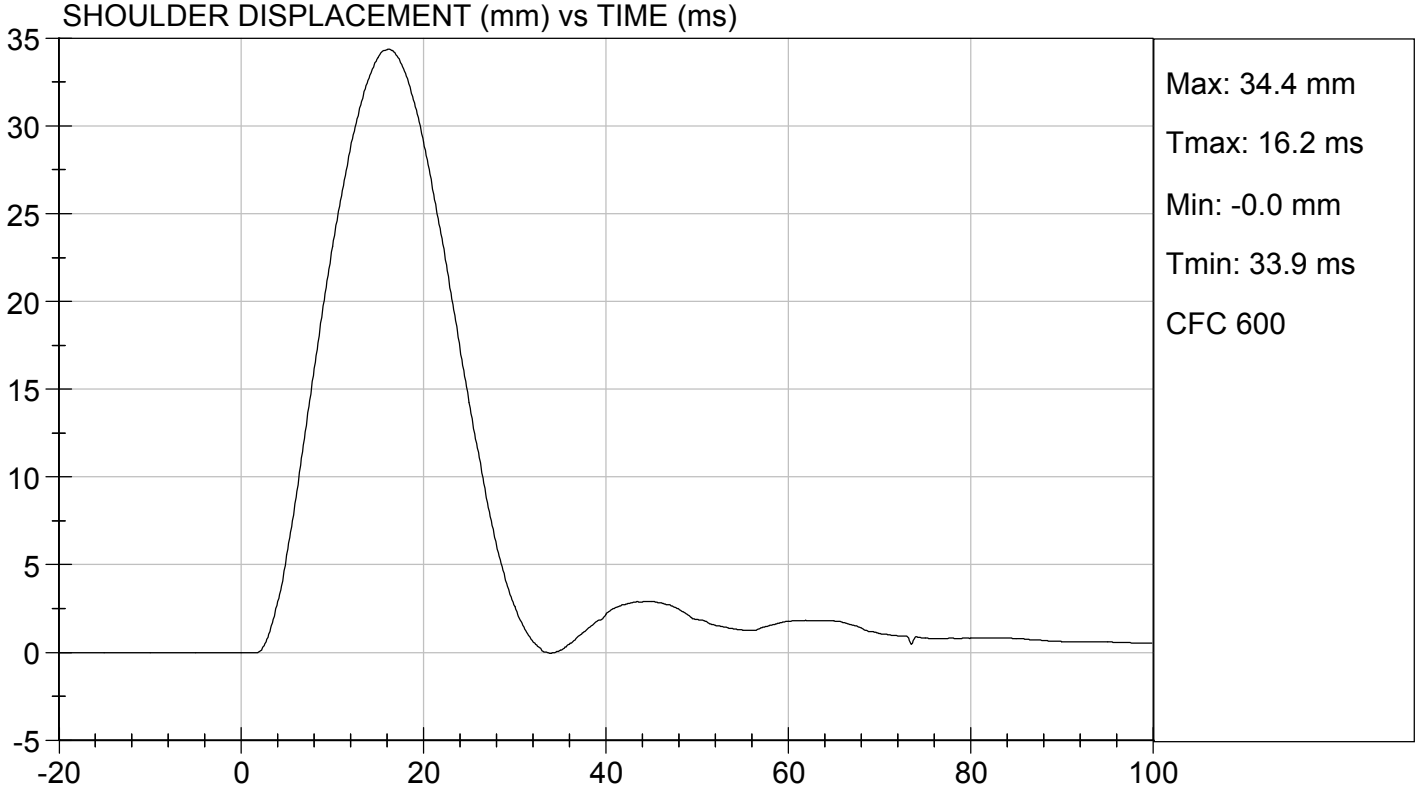
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/30/2020
TEST #: D200374

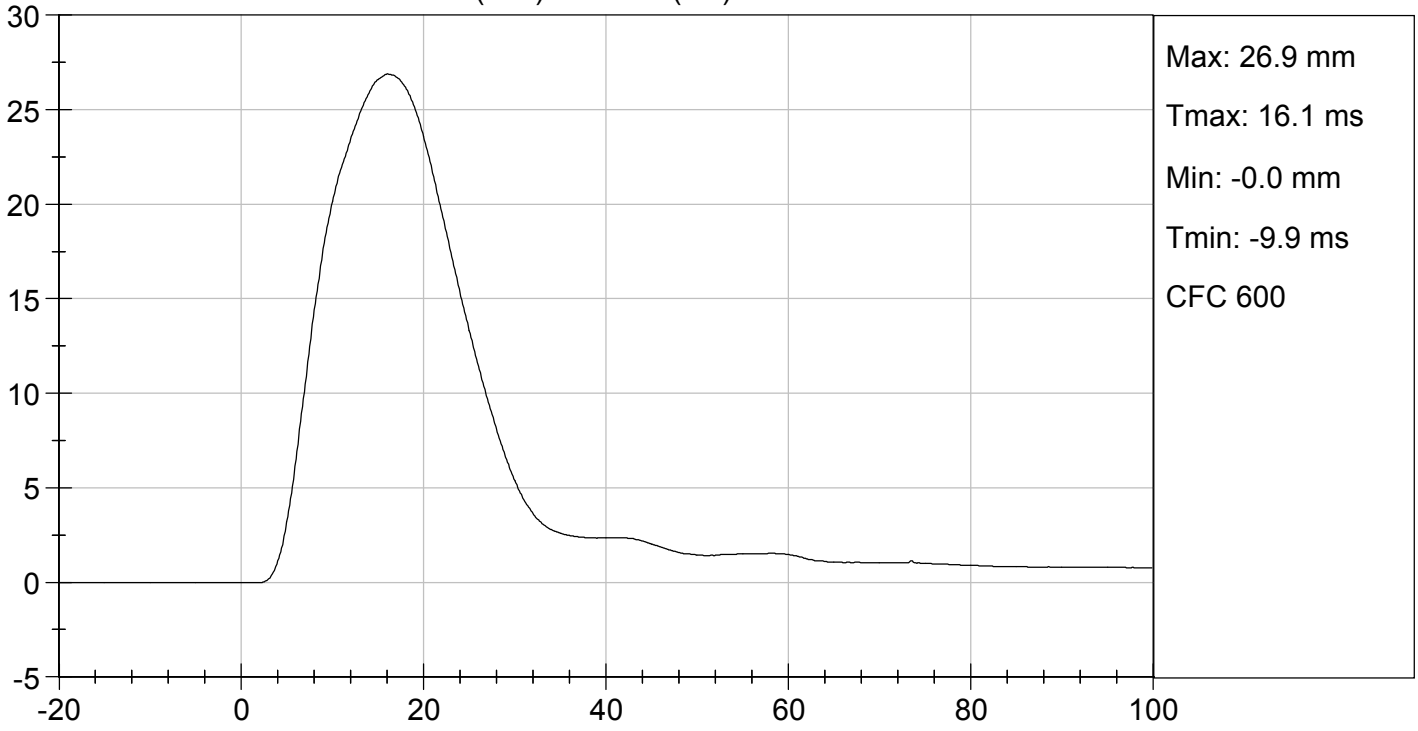
PROBE (G's) vs TIME (ms)



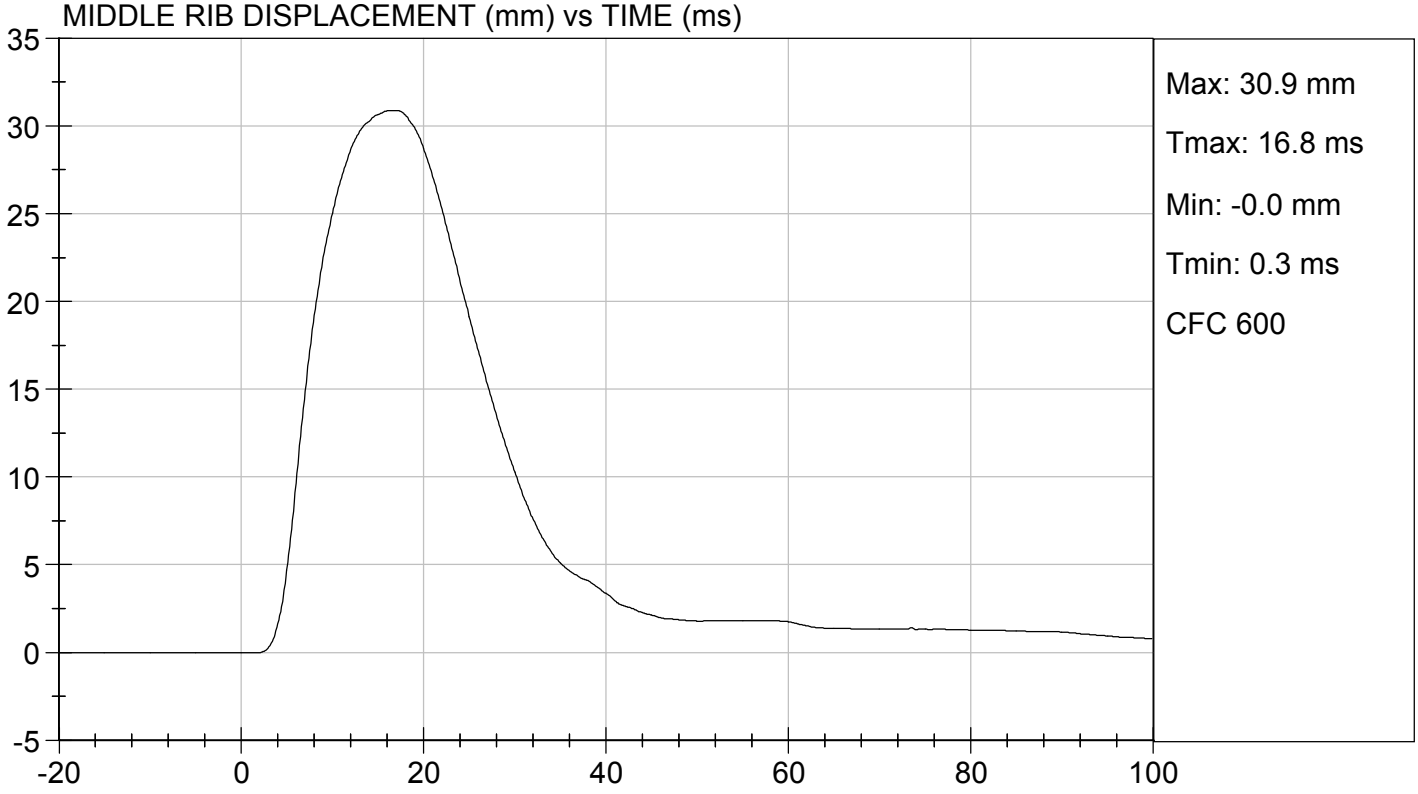
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



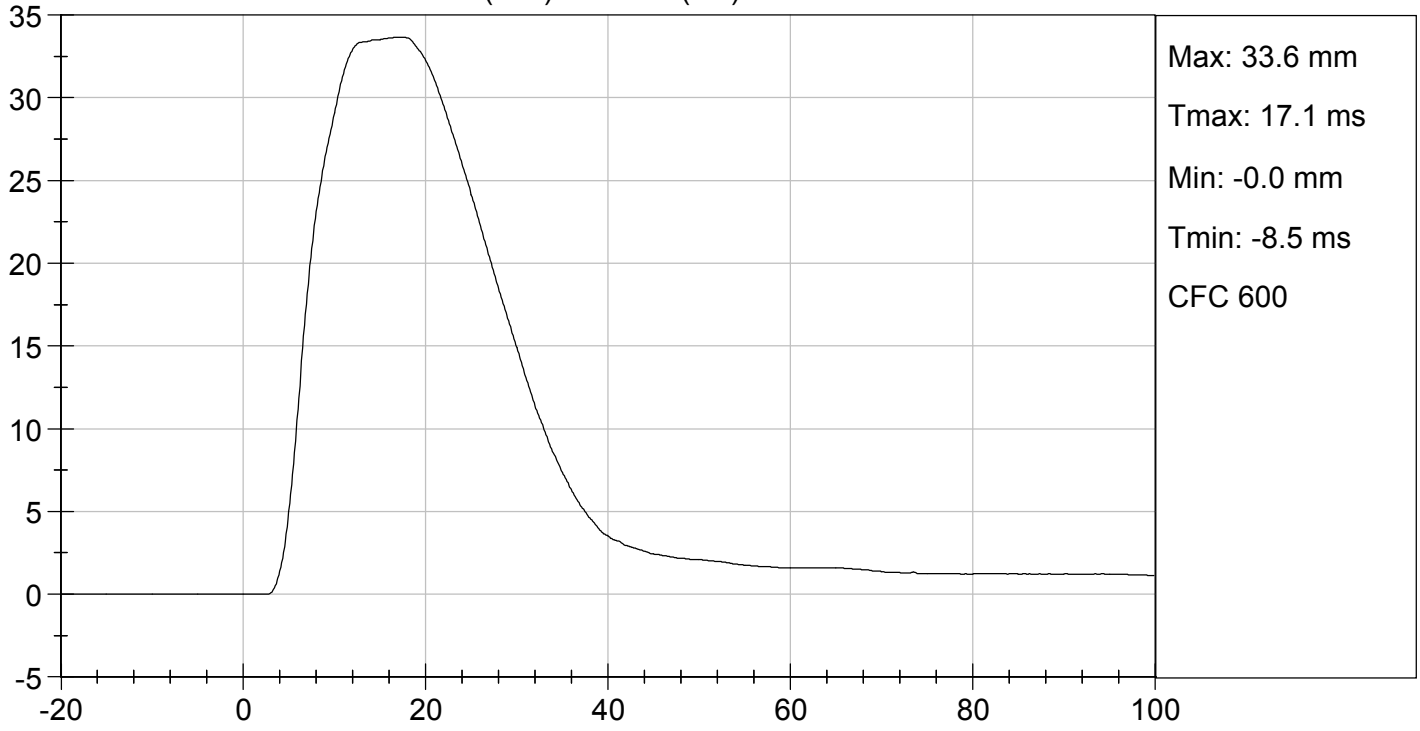
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



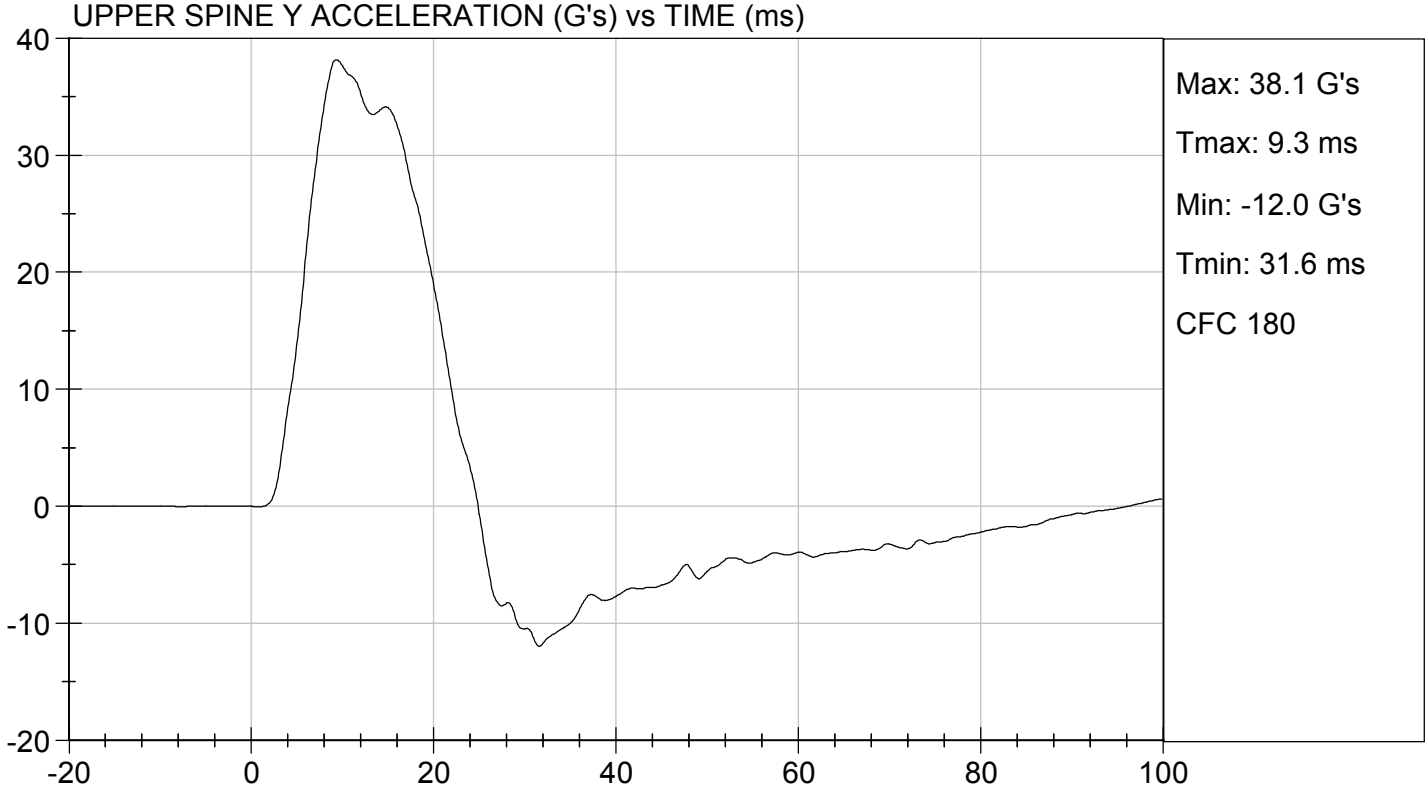
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/30/2020
TEST #: D200374

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

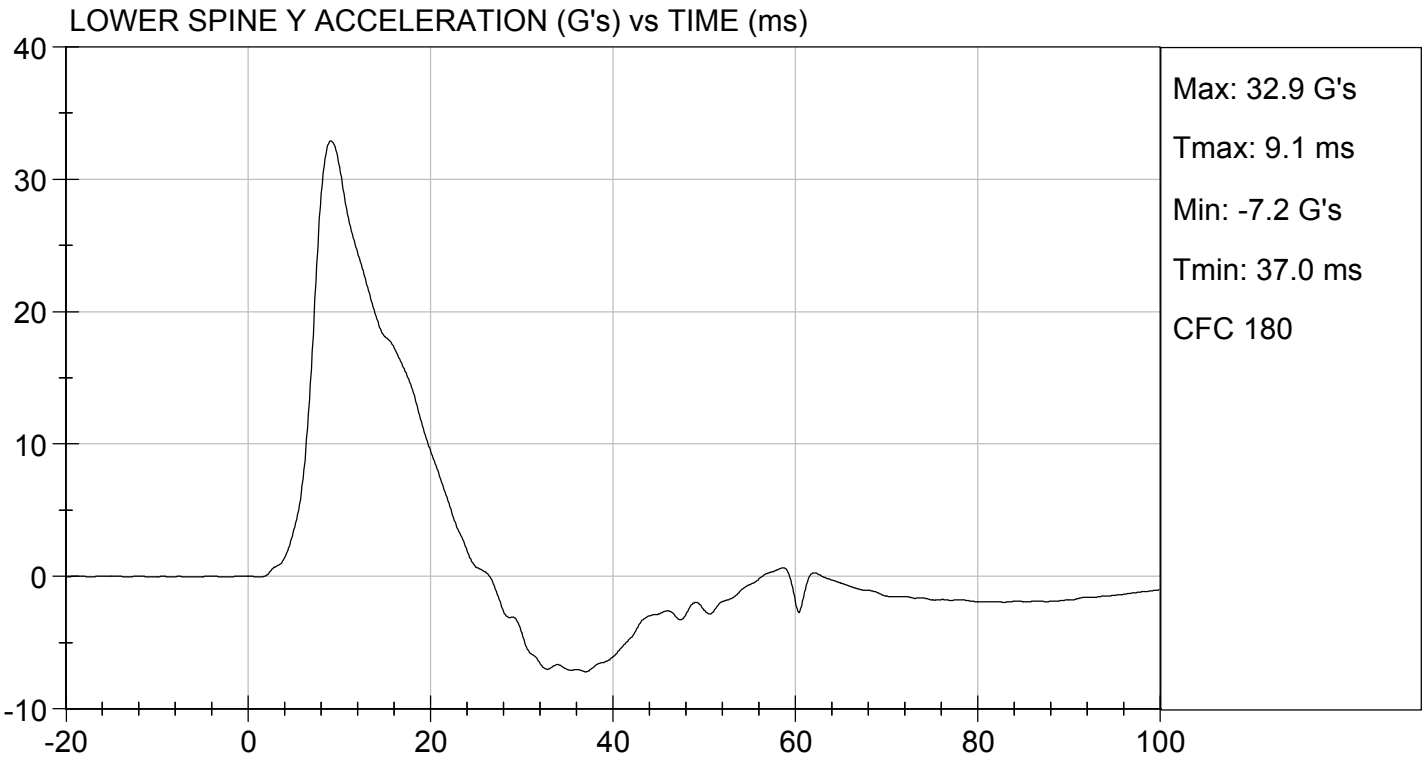


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 01/30/2020
TEST #: D200374



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200375

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	34	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	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

Laboratory Technician

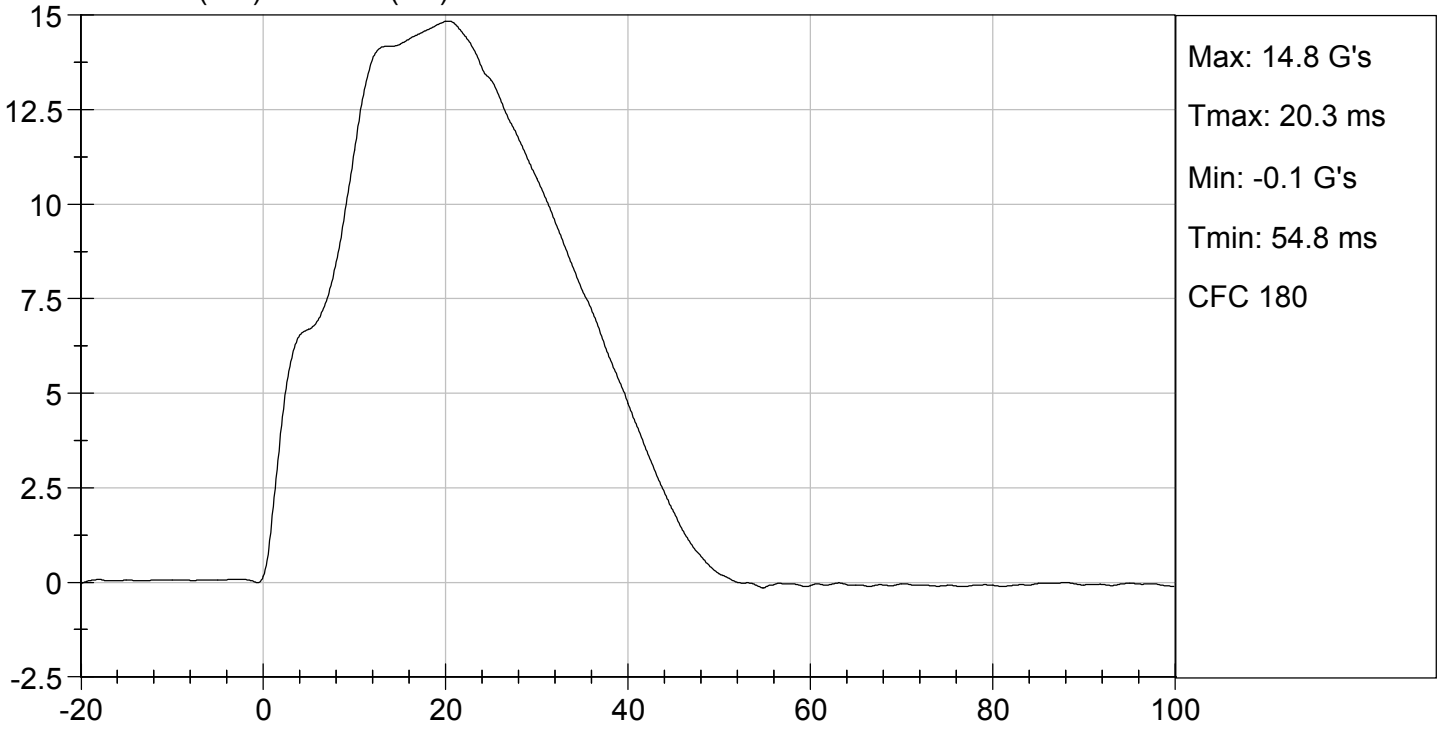
01/30/2020
Test Date

Approved By

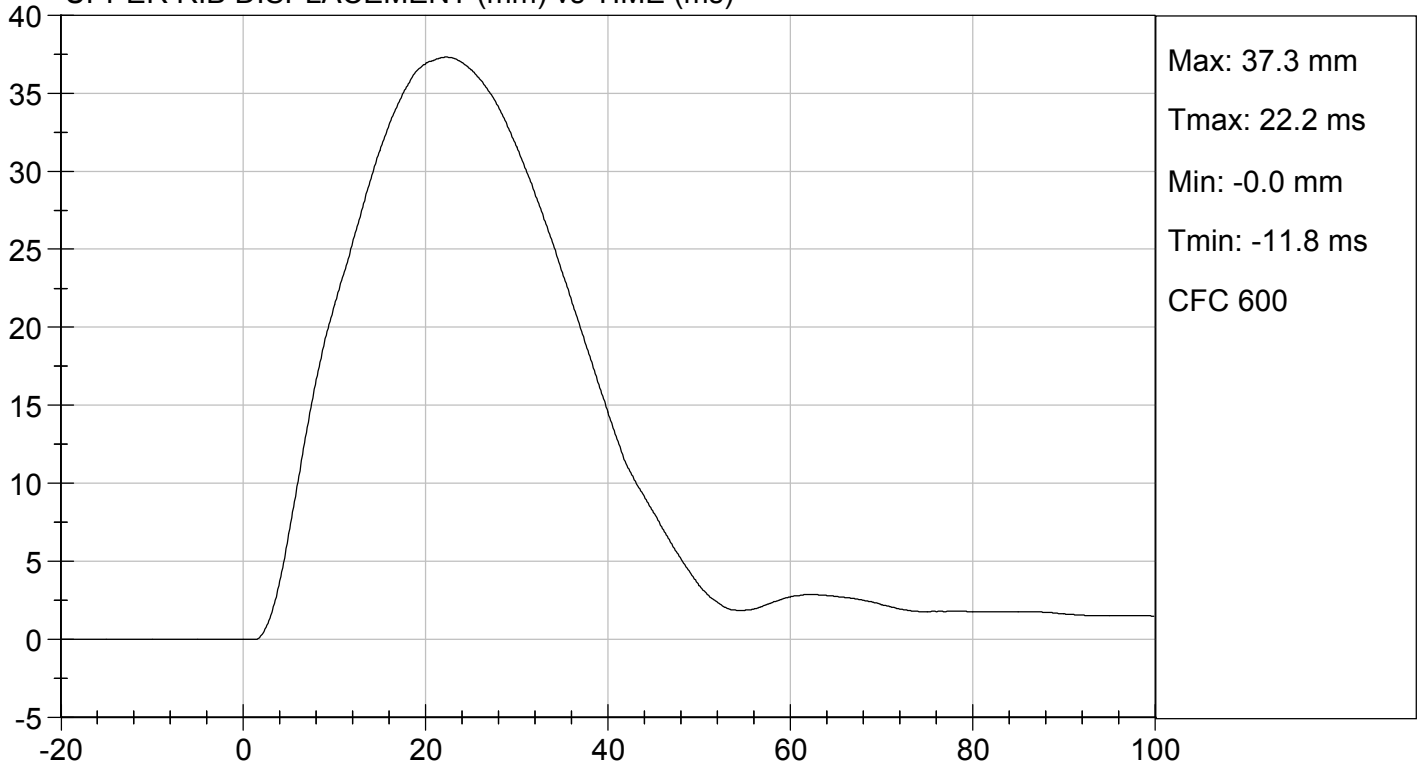
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/30/2020
TEST #: D200375

PROBE (G's) vs TIME (ms)



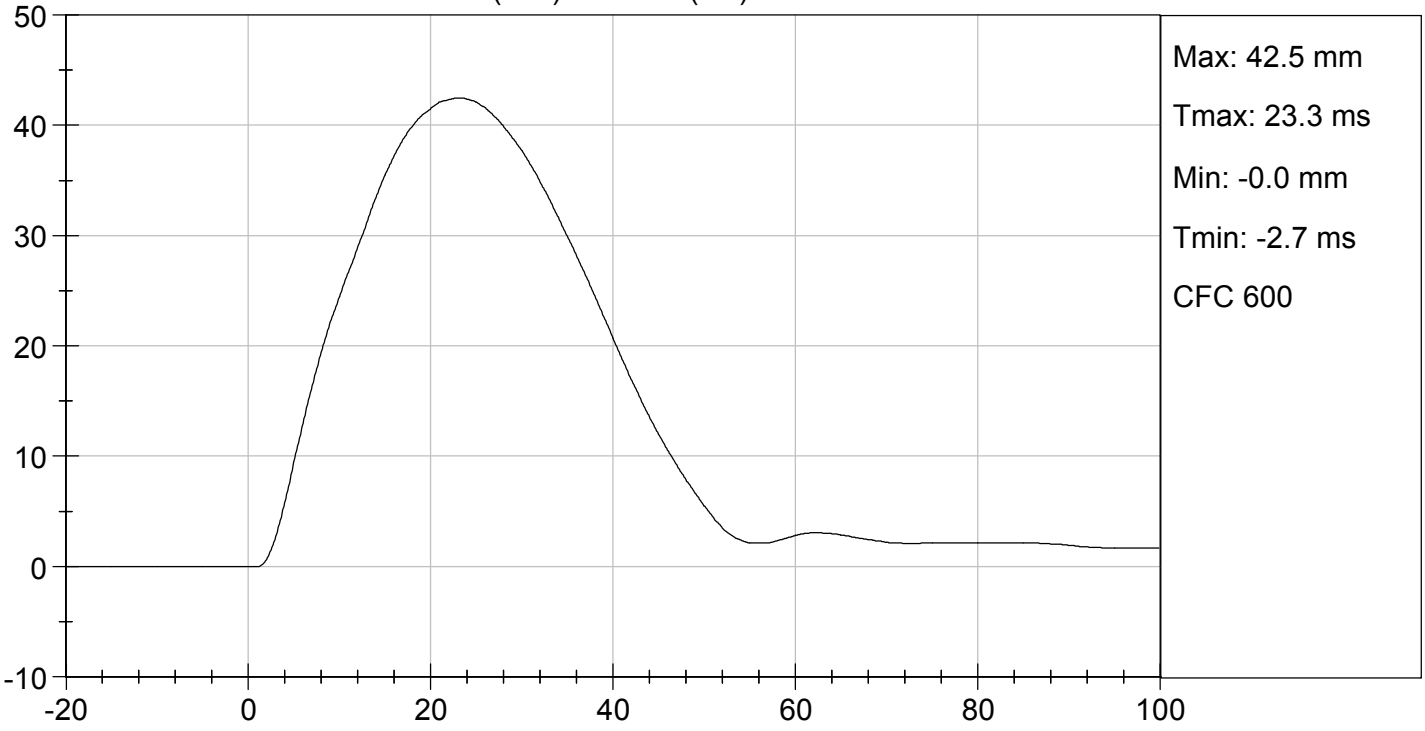
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



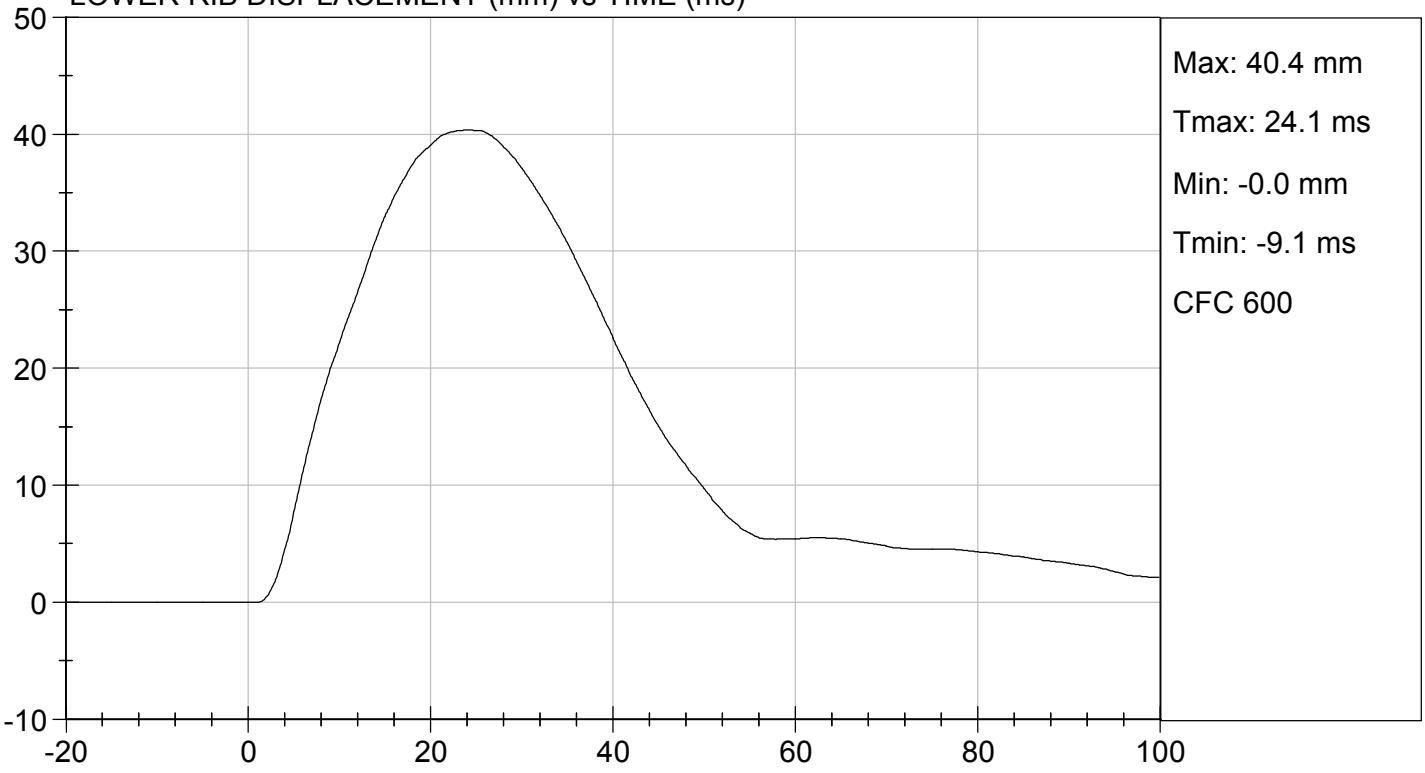
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/30/2020
TEST #: D200375

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



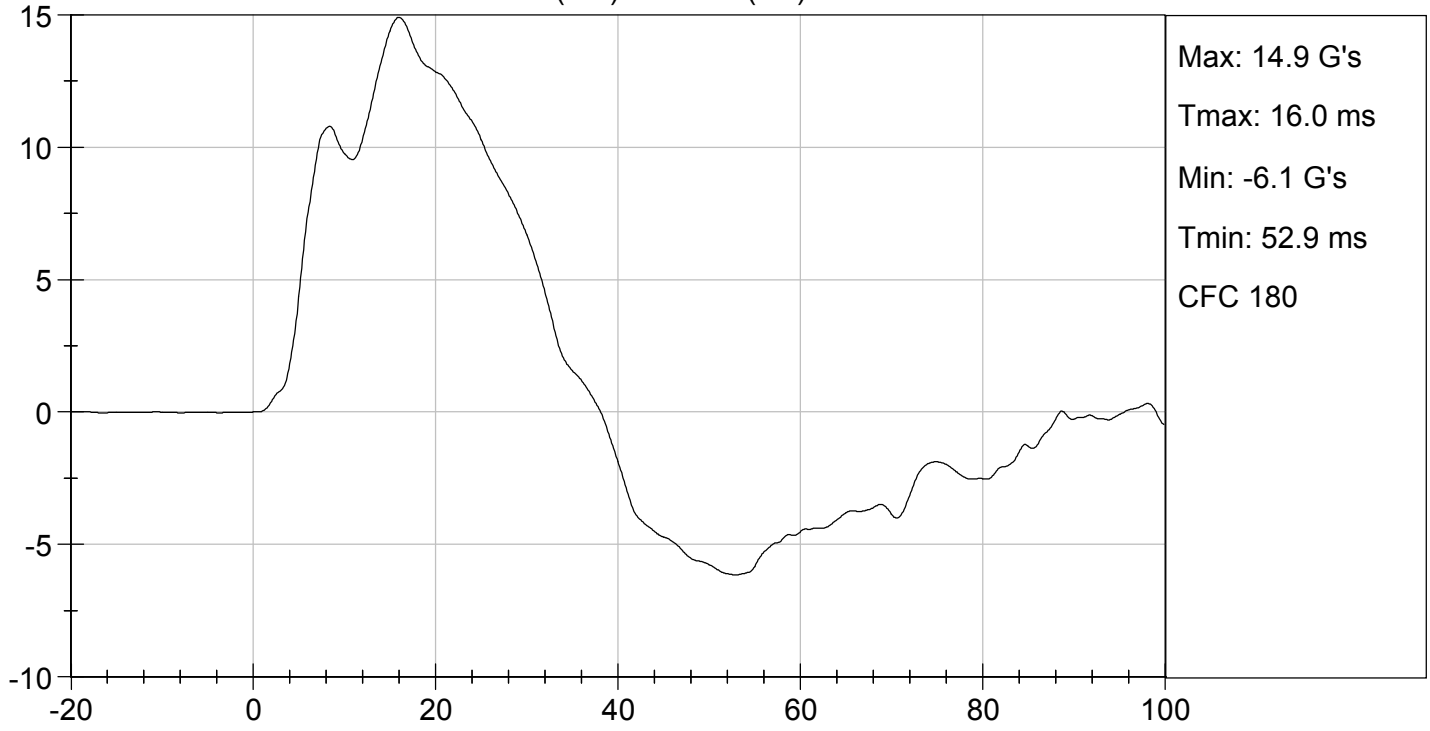
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



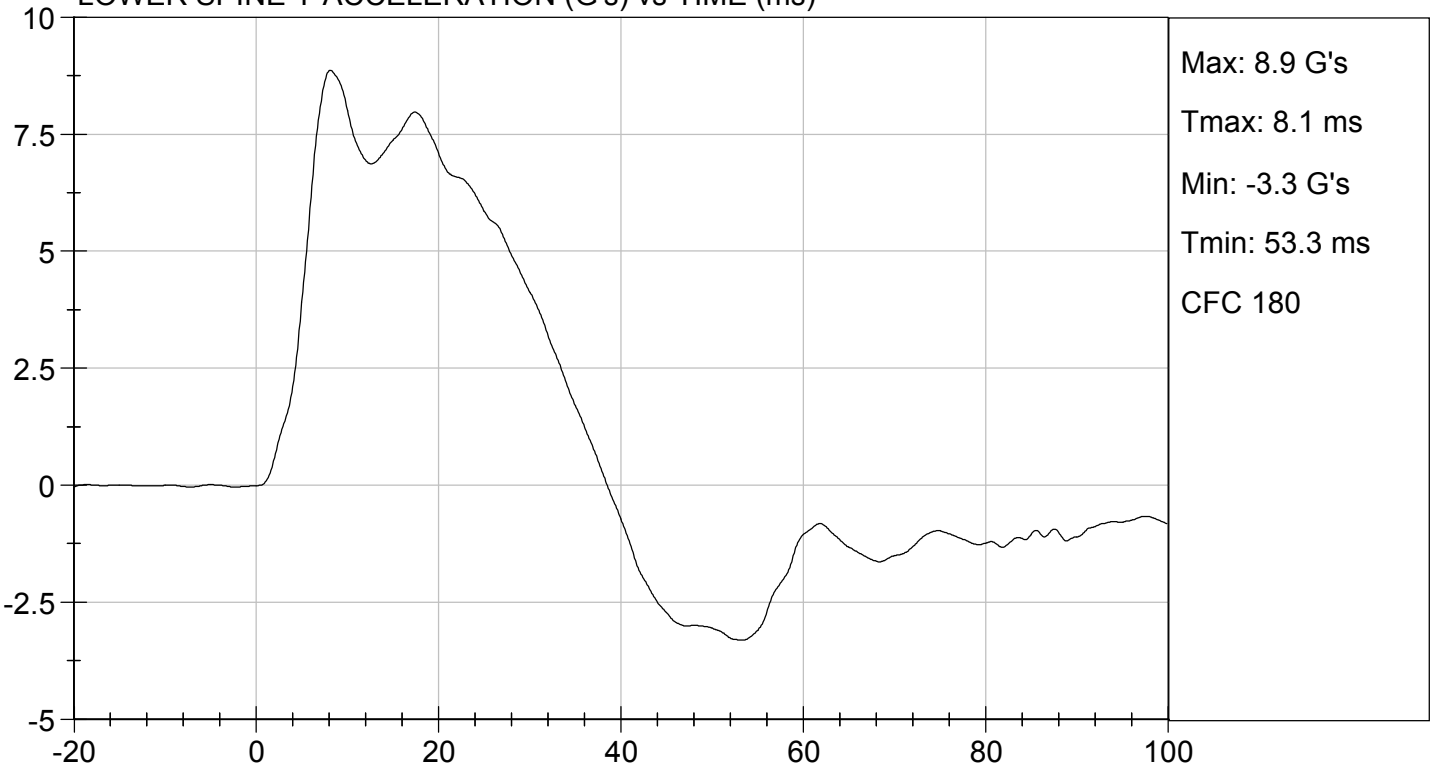
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/30/2020
TEST #: D200375

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: 296 **Test I.D:** D200376

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	34	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	39	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

Laboratory Technician

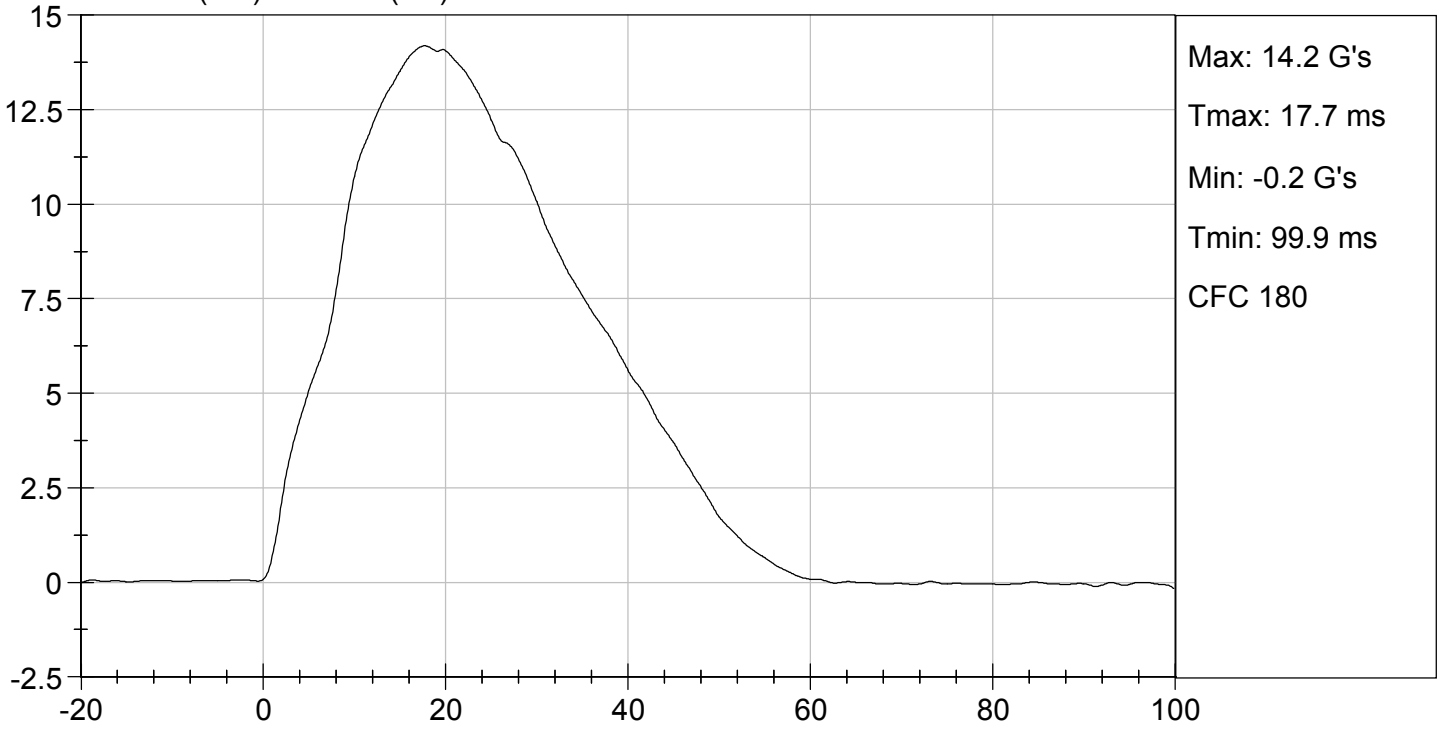
01/30/2020
Test Date

Approved By

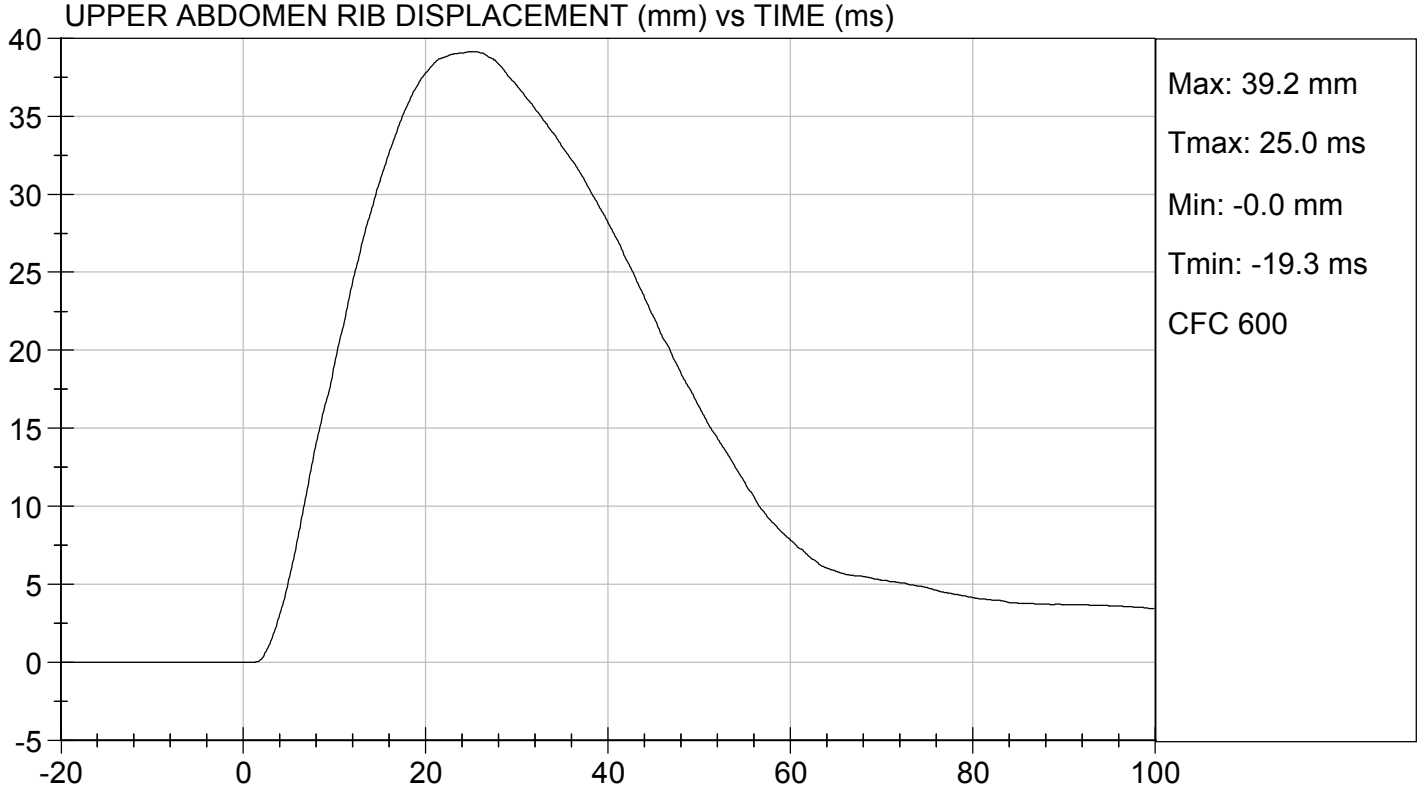
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 01/30/2020
TEST #: D200376

PROBE (G's) vs TIME (ms)



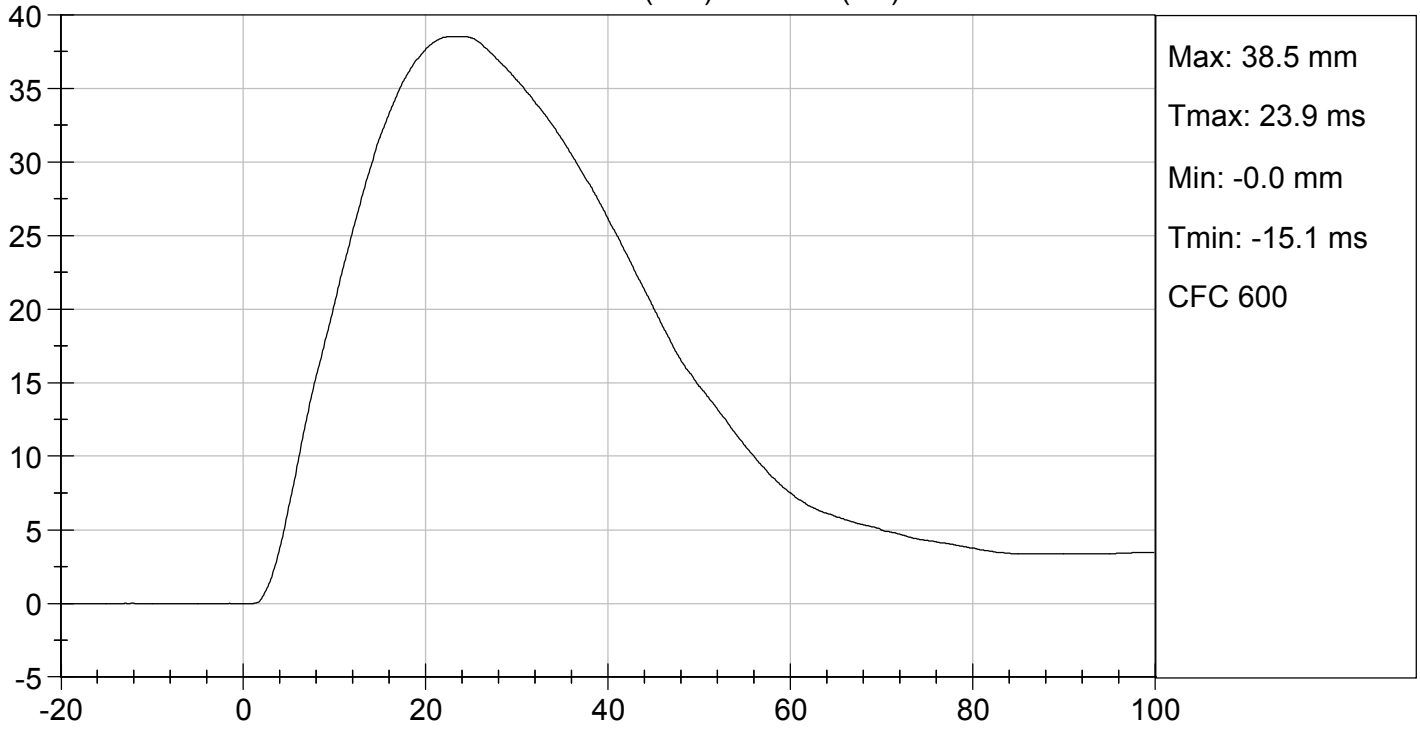
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



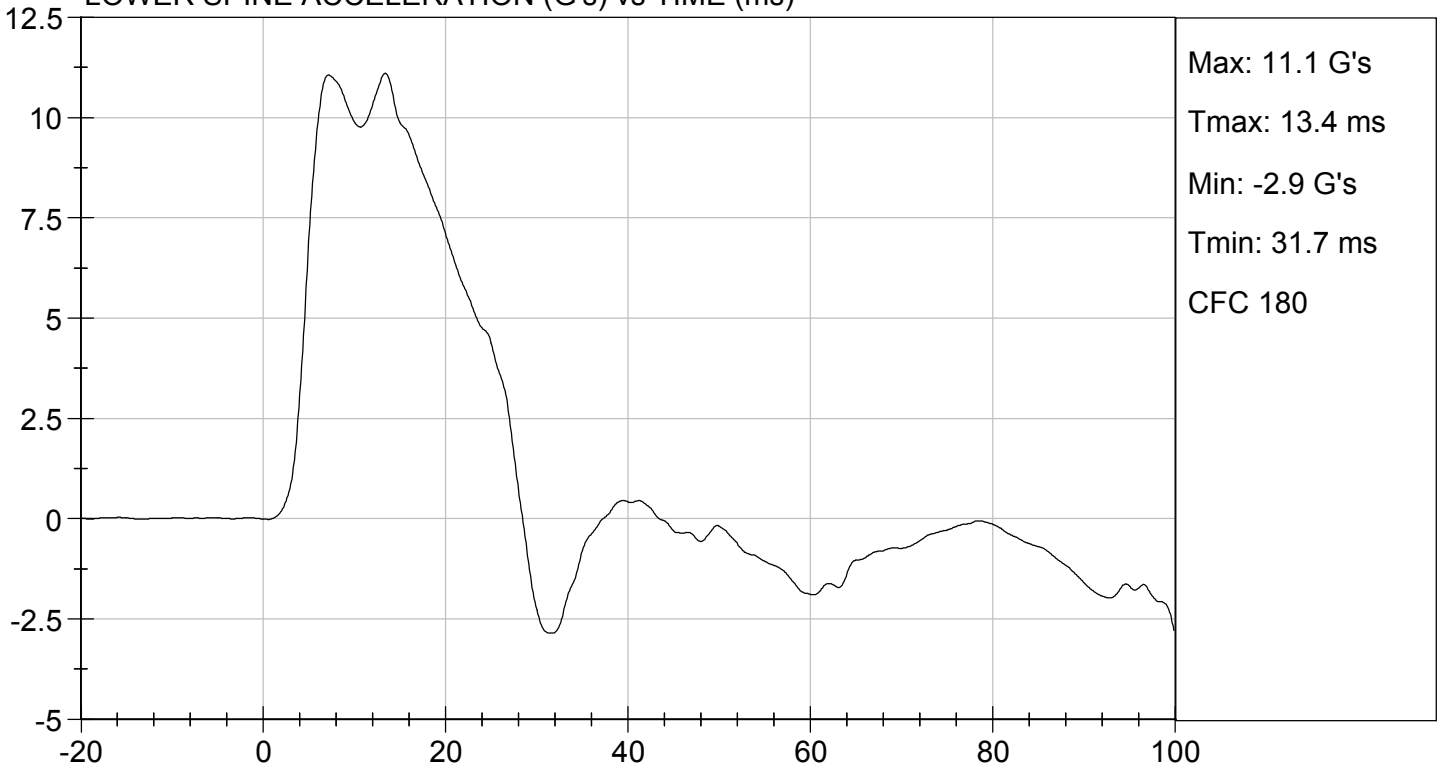
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 01/30/2020
TEST #: D200376

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: 296 **Test I.D:** D200377

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	34	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	46	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	3,948	Pass
		Overall Test Results		Pass

Laboratory Technician

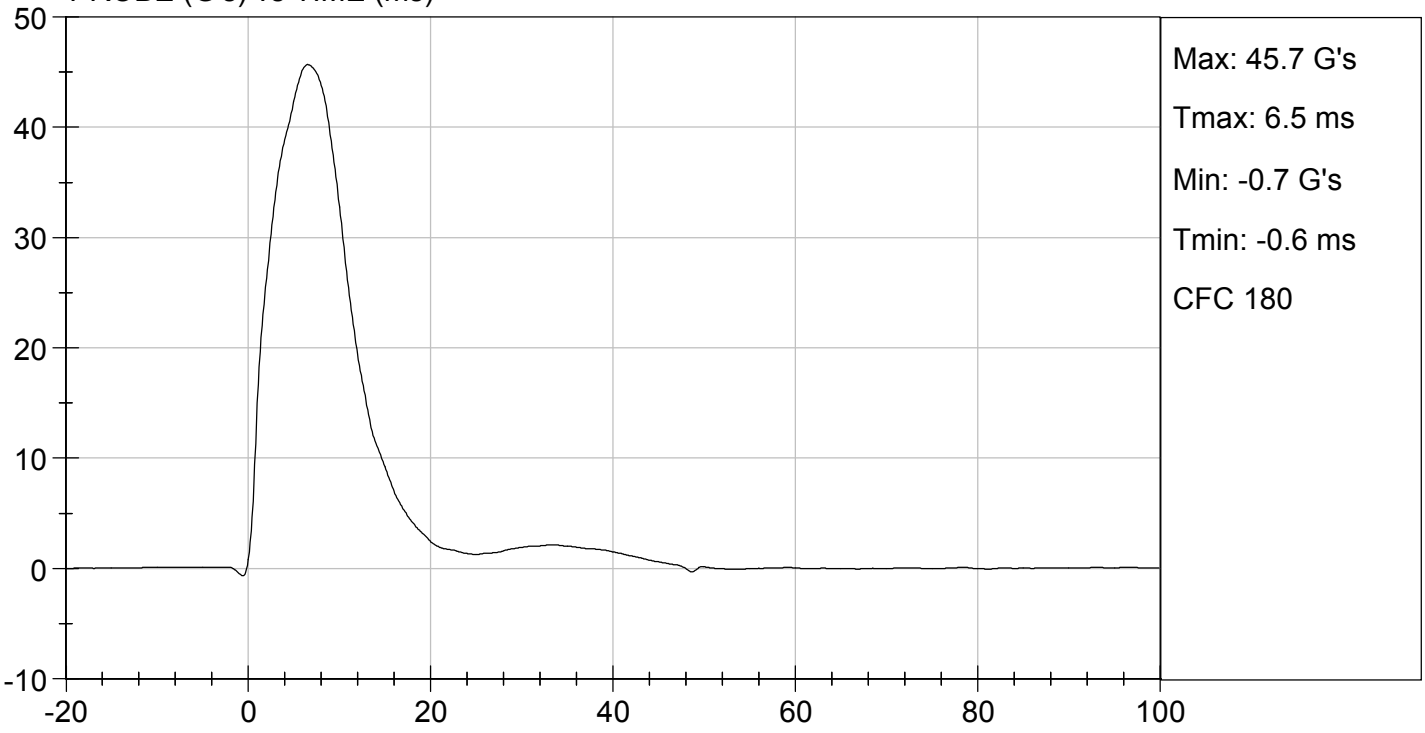
01/30/2020
Test Date

Approved By

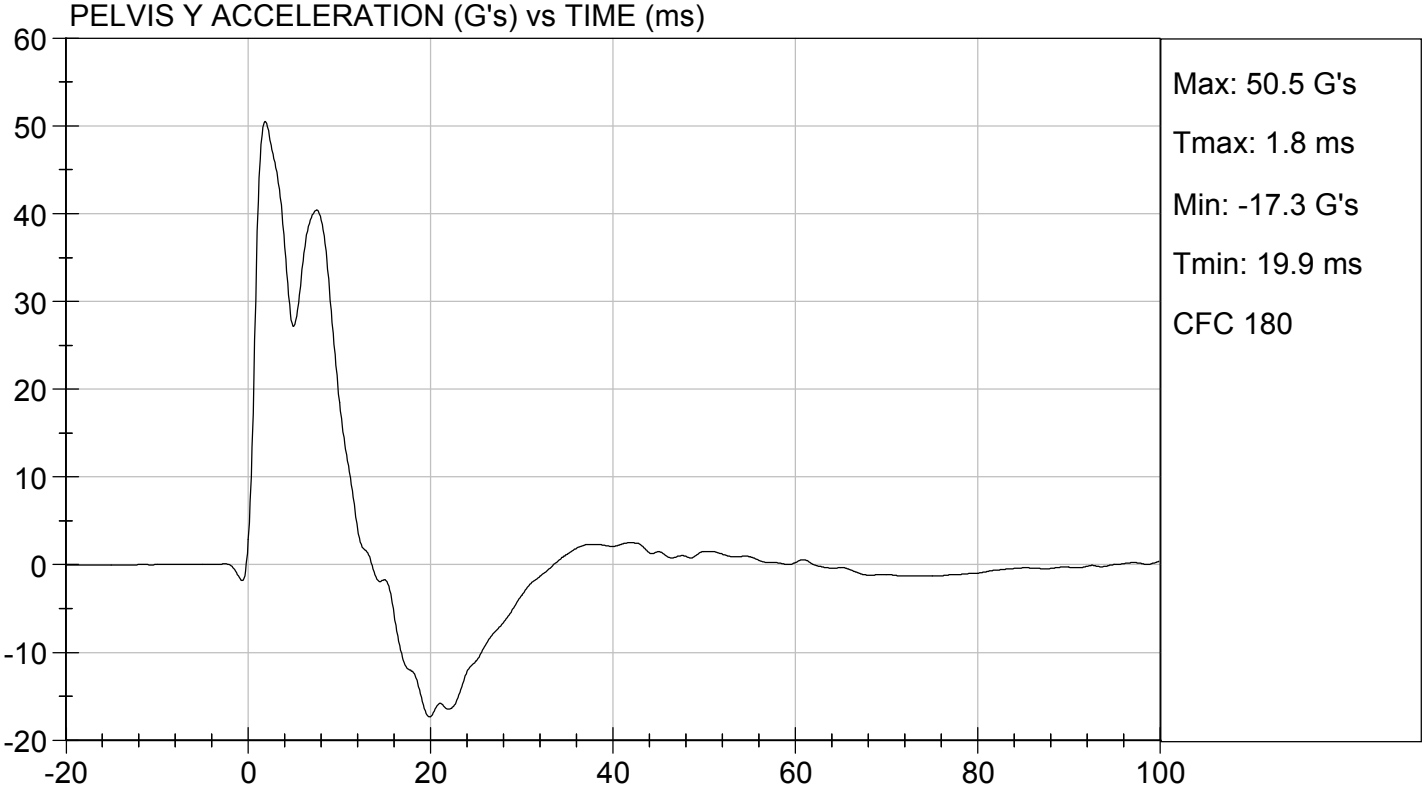
TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

TEST DATE: 01/30/2020
TEST #: D200377

PROBE (G's) vs TIME (ms)

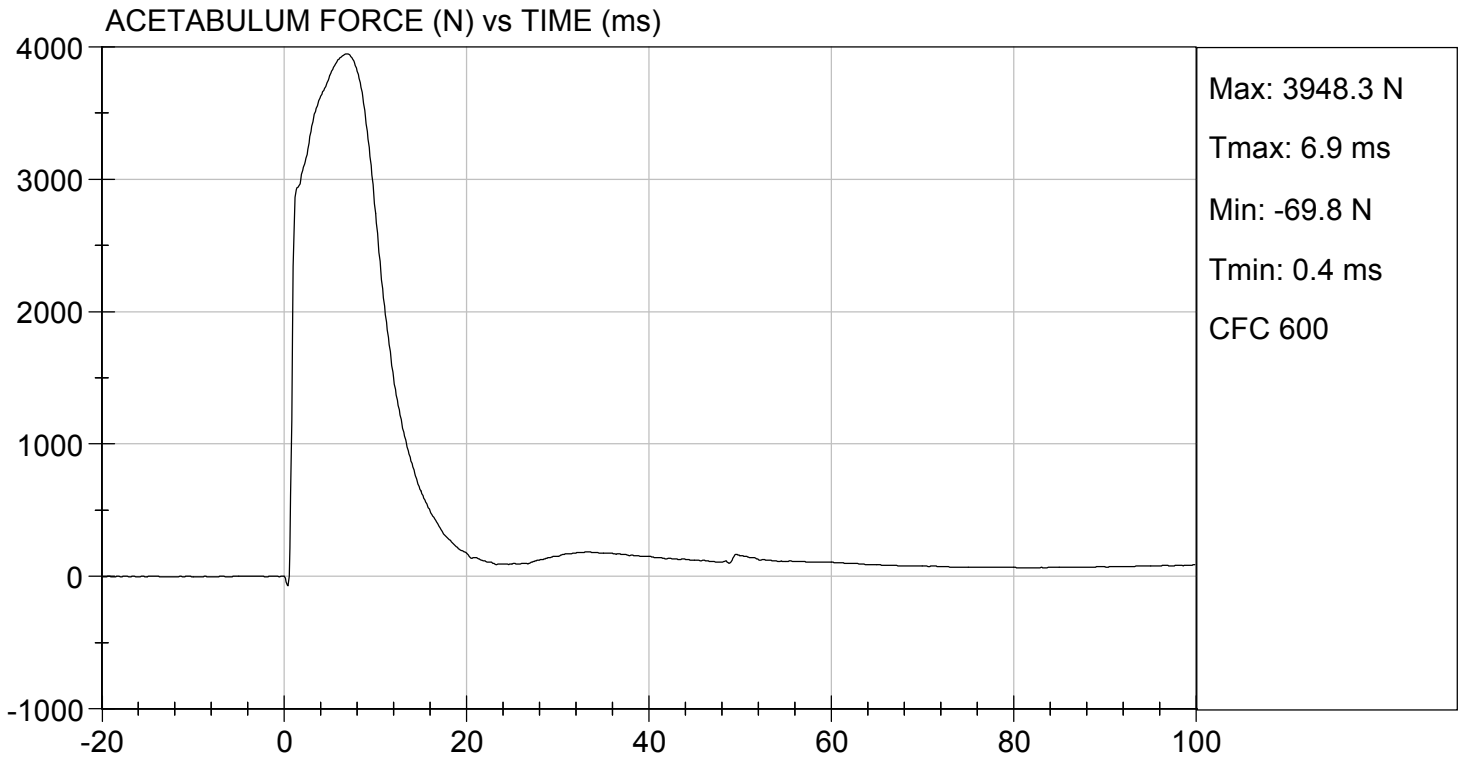


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 01/30/2020
TEST #: D200377



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200378

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	4.20 to 4.40	4.40	Pass
Maximum Probe Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,133	Pass
		Overall Test Results		Pass

Laboratory Technician

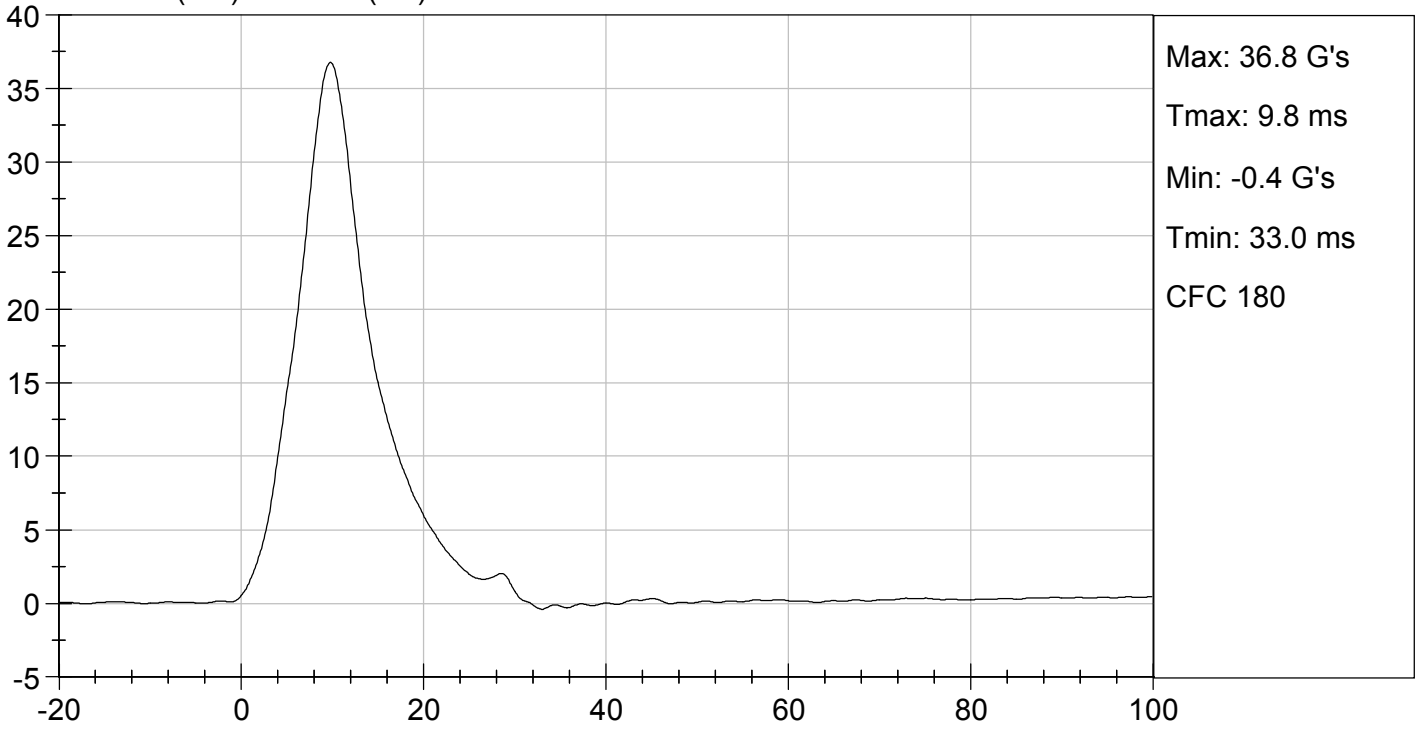
01/31/2020
Test Date

Approved By

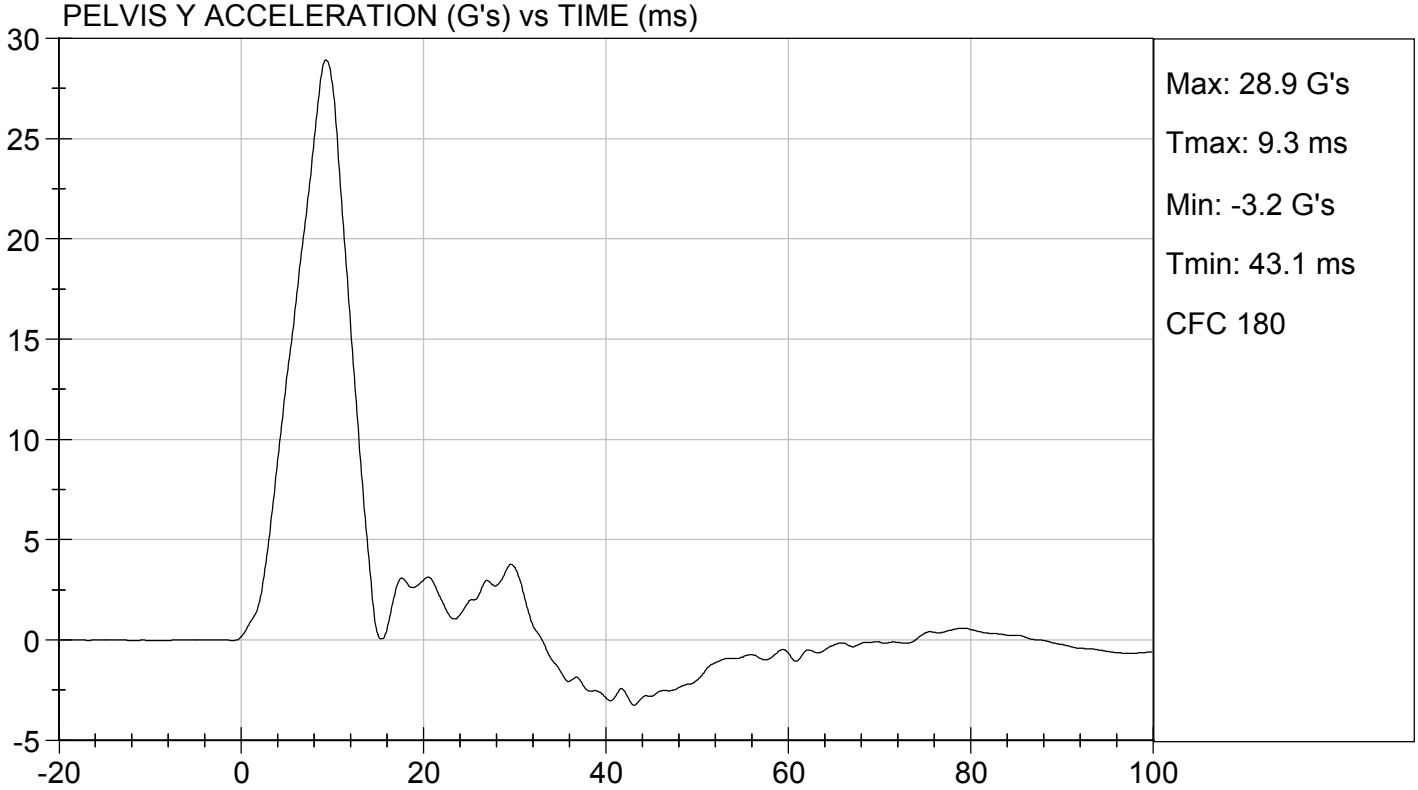
TEST DESC: ILLIAC
VELOCITY: 14.44 ft/s, 4.40 m/s

TEST DATE: 01/31/2020
TEST #: D200378

PROBE (G's) vs TIME (ms)

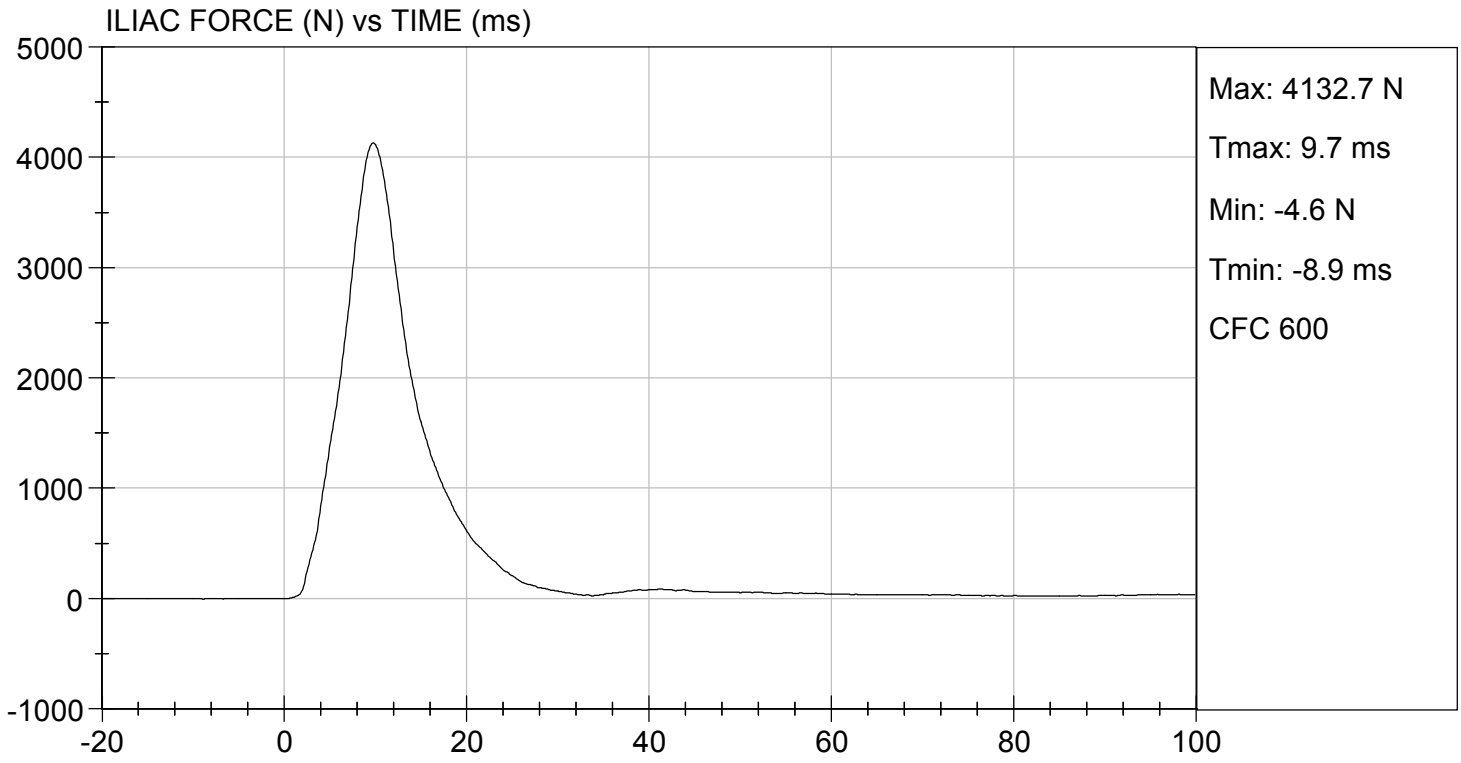


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.44 ft/s, 4.40 m/s

TEST DATE: 01/31/2020
TEST #: D200378



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	142	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	180	Pass
J	Head Circumference	541 - 551	548	Pass
K	Buttock to Knee Length	514 - 540	535	Pass
L	Popliteal Height	343 - 369	358	Pass
M	Knee Pivot to Floor Height	392 - 409	404	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	206	Pass
P	Foot Length	216 - 232	219	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	316	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	481	Pass
V	Shoulder Width	341 - 357	346	Pass
W	Foot Width	78 - 94	85	Pass
Y	Chest Circumference w/ jacket	851 - 881	870	Pass
Z	Waist Circumference	761 - 791	772	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D200671

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	115 to 137	130	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

Laboratory Technician

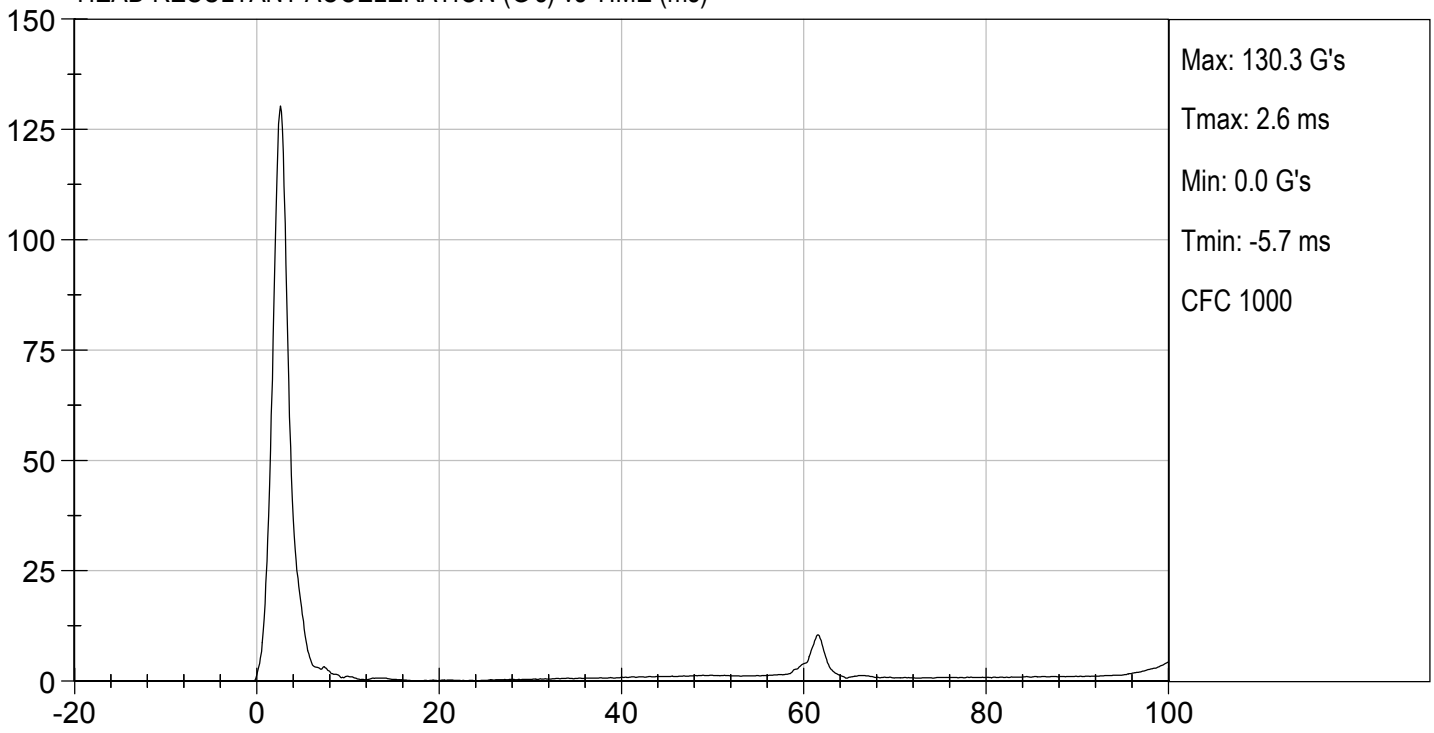
02/24/2020
Test Date

Approved By

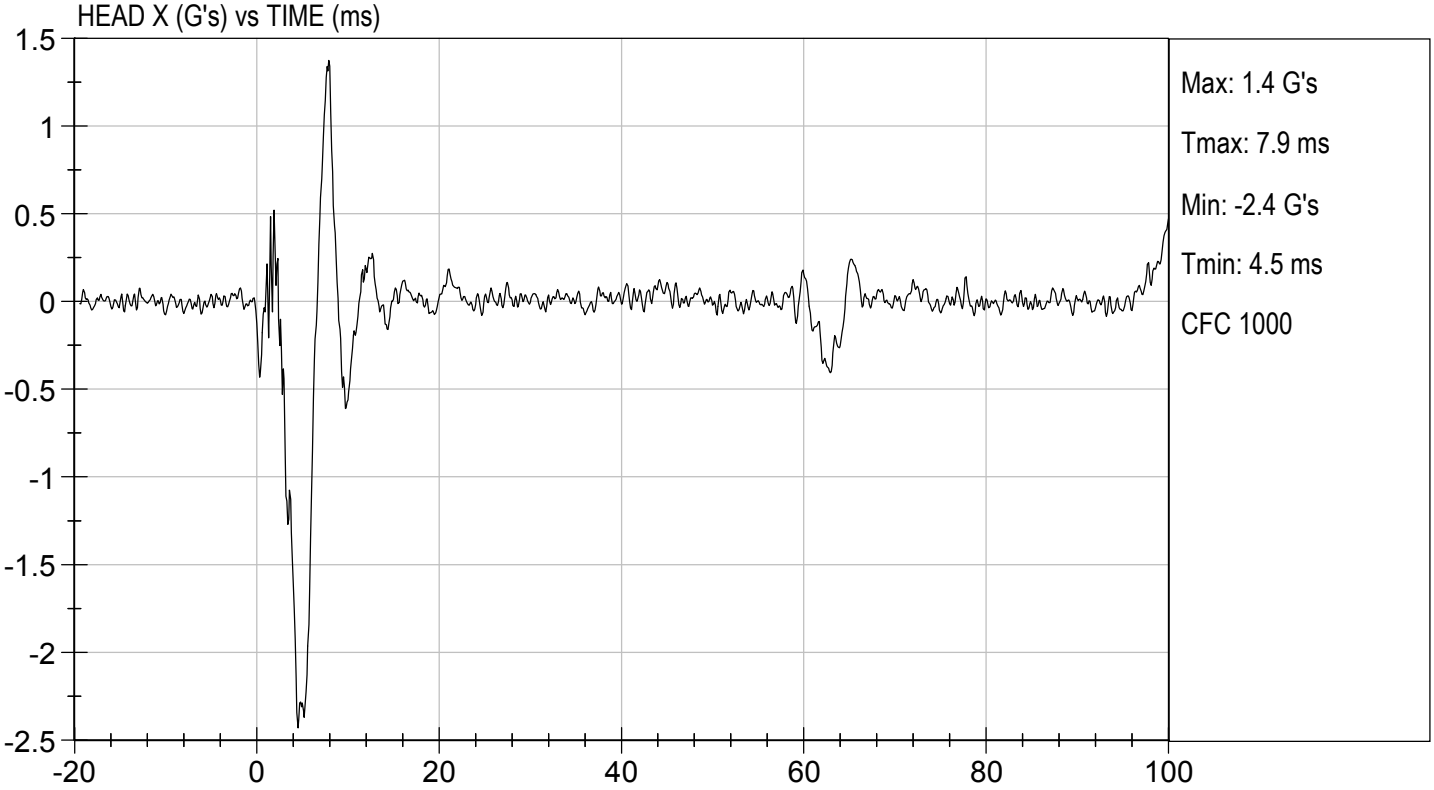
TEST DESC: HEAD DROP

TEST DATE: 02/24/2020
TEST #: D200671

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



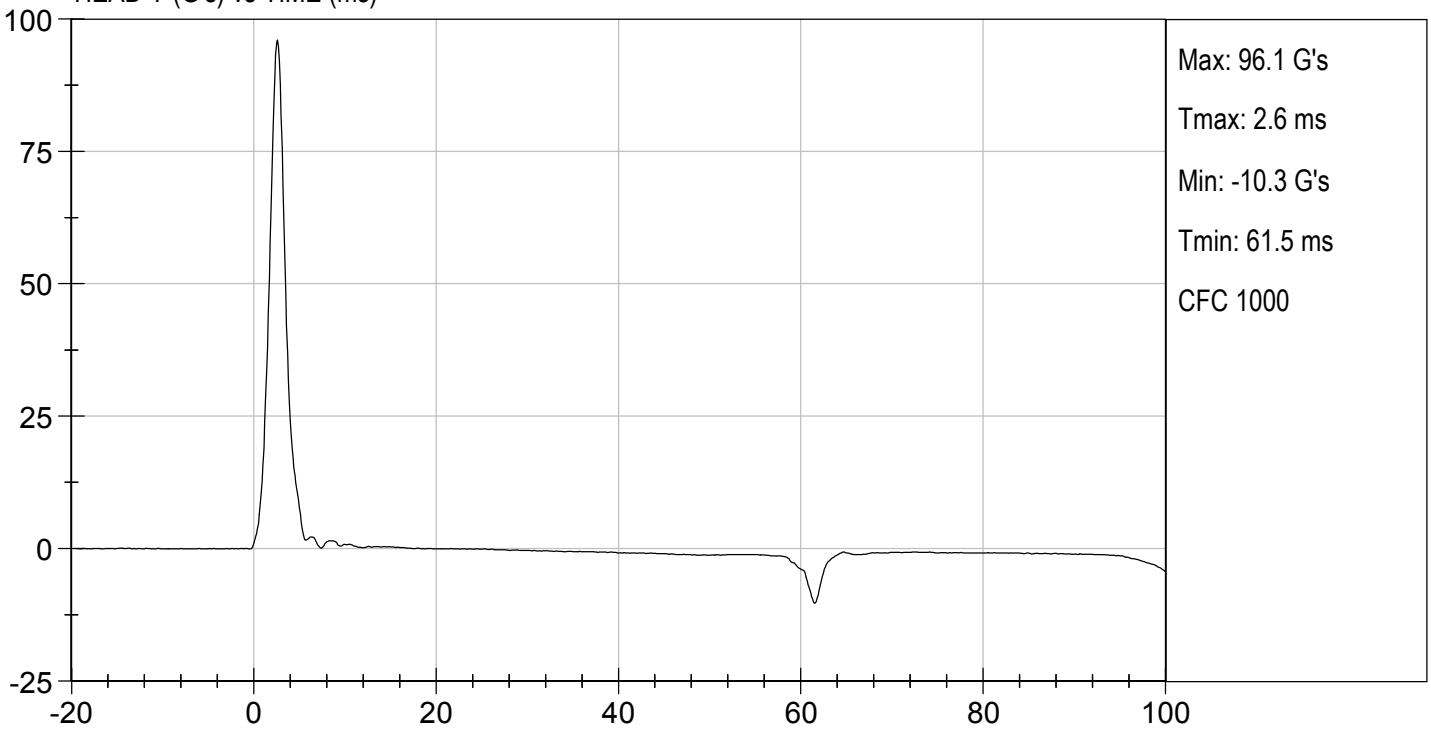
HEAD X (G's) vs TIME (ms)



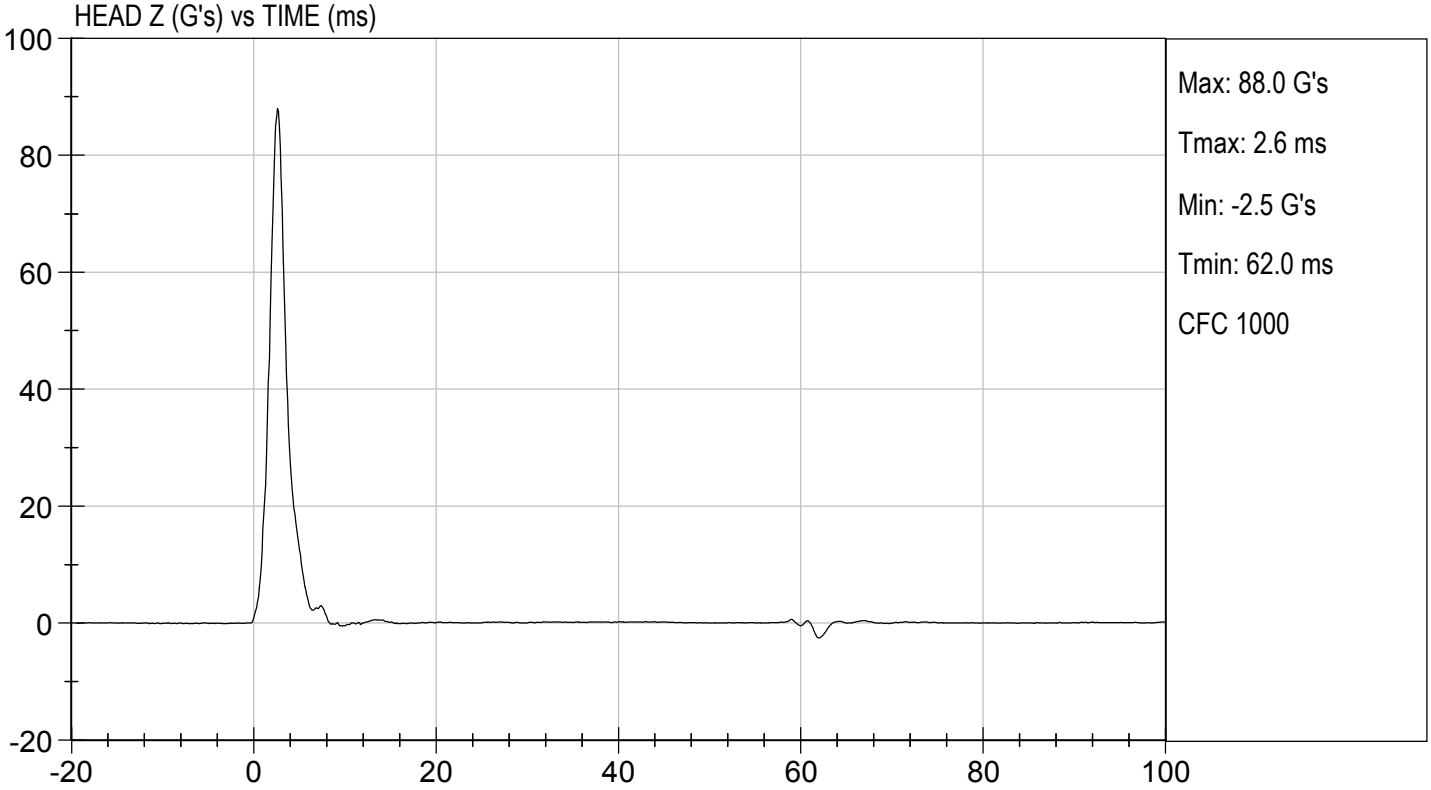
TEST DESC: HEAD DROP

TEST DATE: 02/24/2020
TEST #: D200671

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



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



MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200672

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	20	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.29	Pass
	15 ms	m/s	3.30 to 4.10	3.39	Pass
	20 ms	m/s	4.40 to 5.40	4.69	Pass
	25 ms	m/s	5.40 to 6.10	5.67	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	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-36	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	120	Pass
			Overall Test Results		Pass

Laboratory Technician

02/26/2020

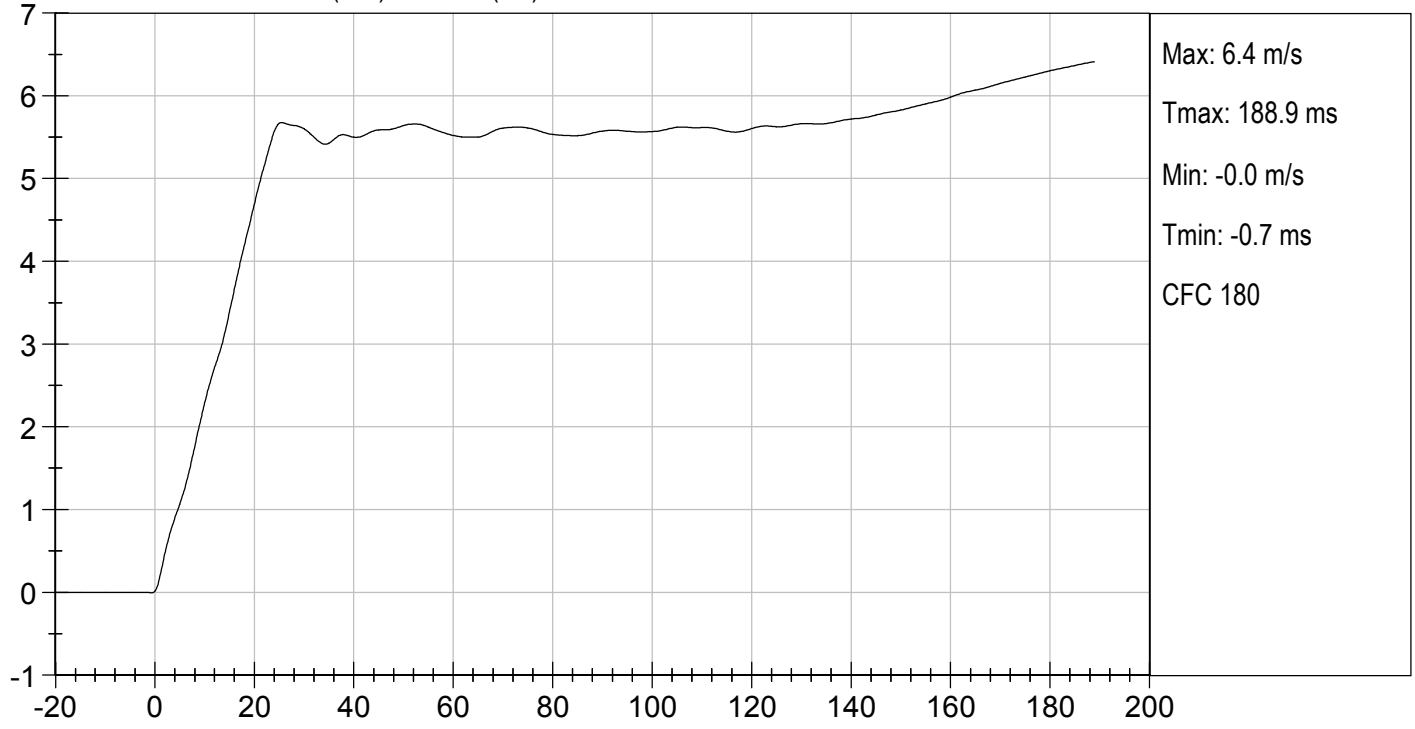
Test Date

Approved By

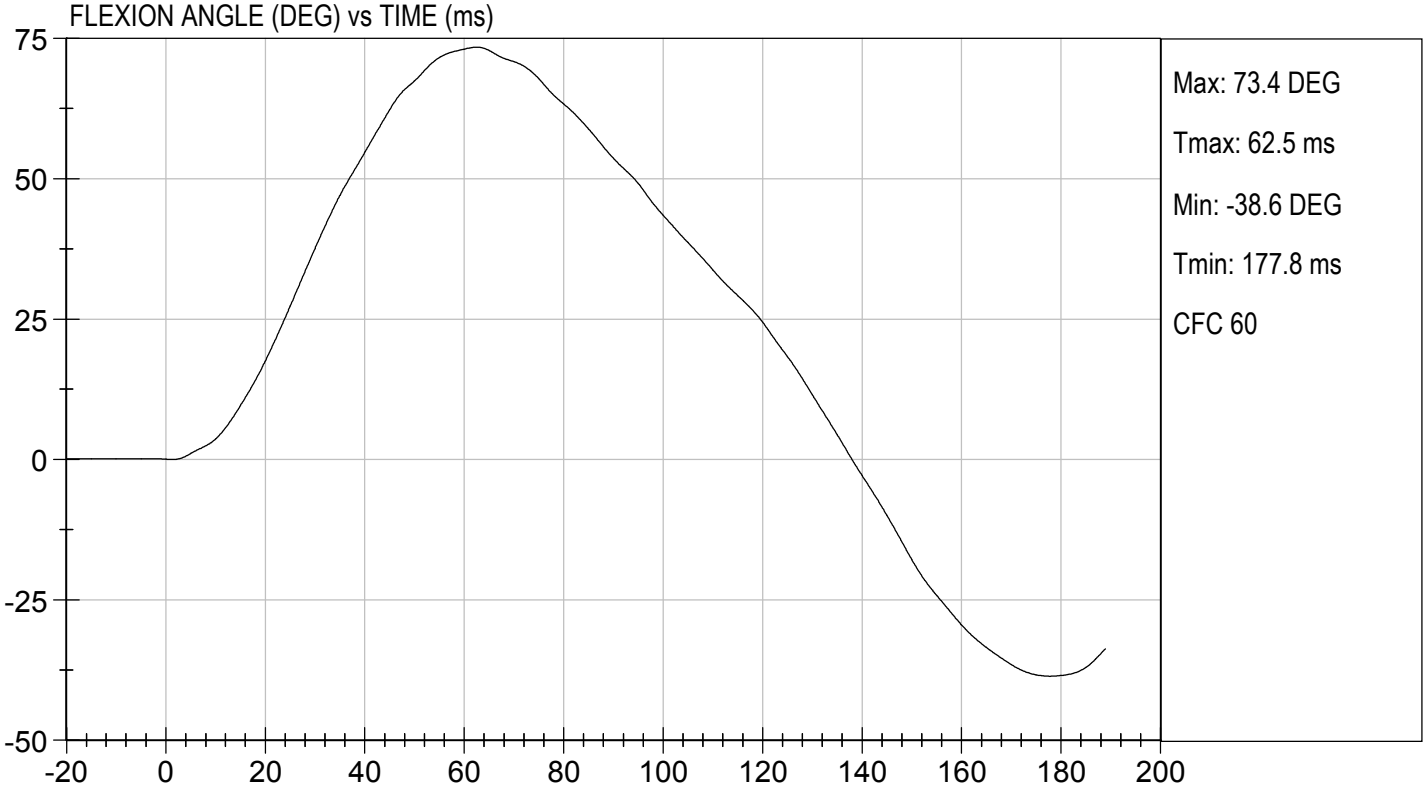
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 02/26/2020
TEST #: D200672

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

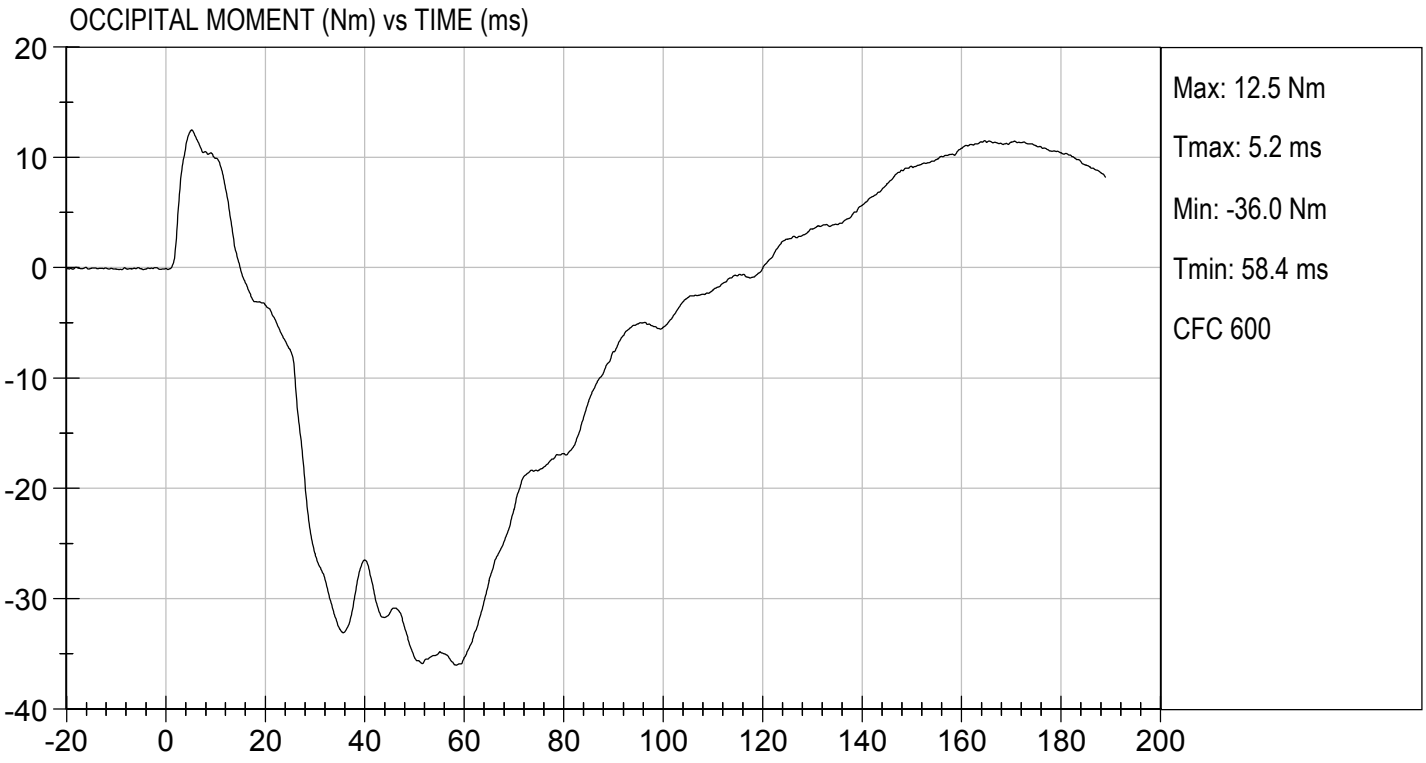


FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 02/26/2020
TEST #: D200672



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D200673

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
		Overall Test Results		Pass

Laboratory Technician

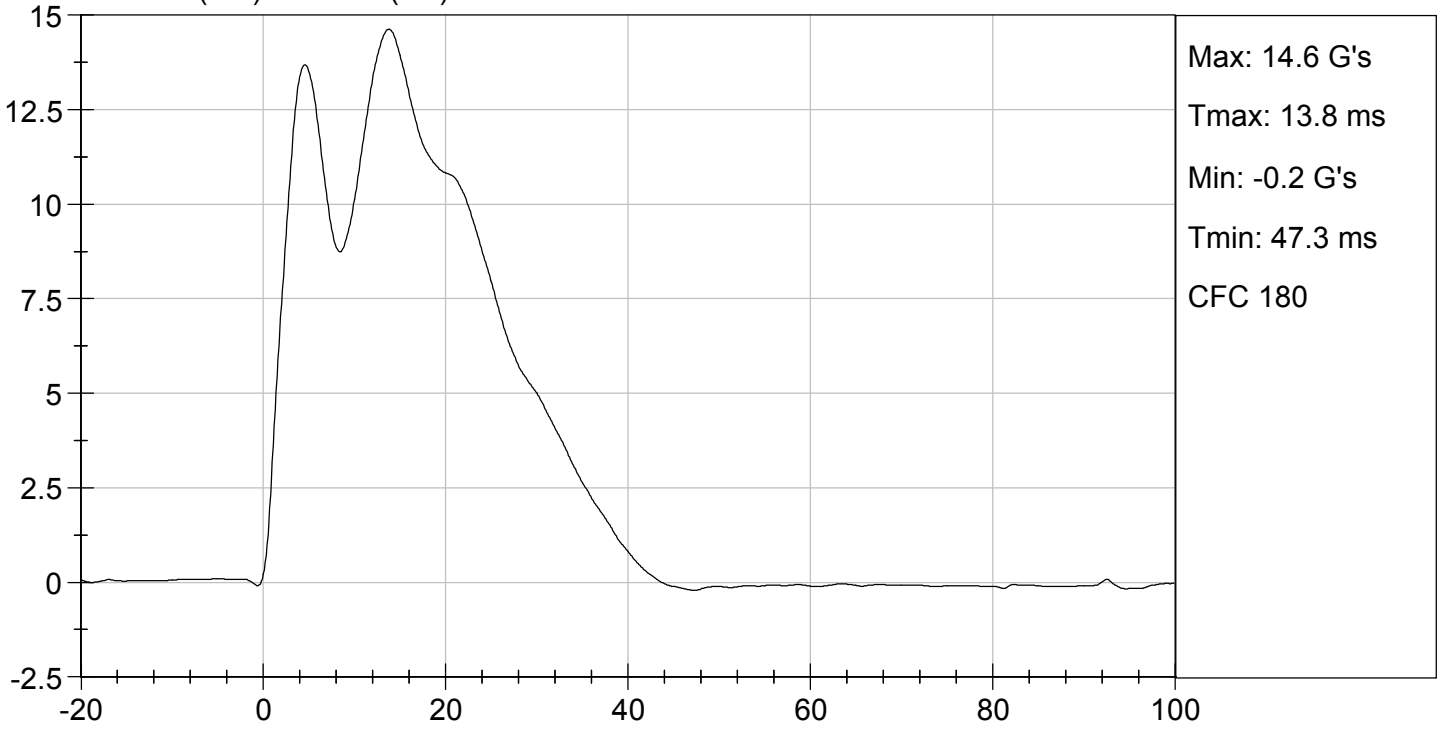
02/25/2020
Test Date

Approved By

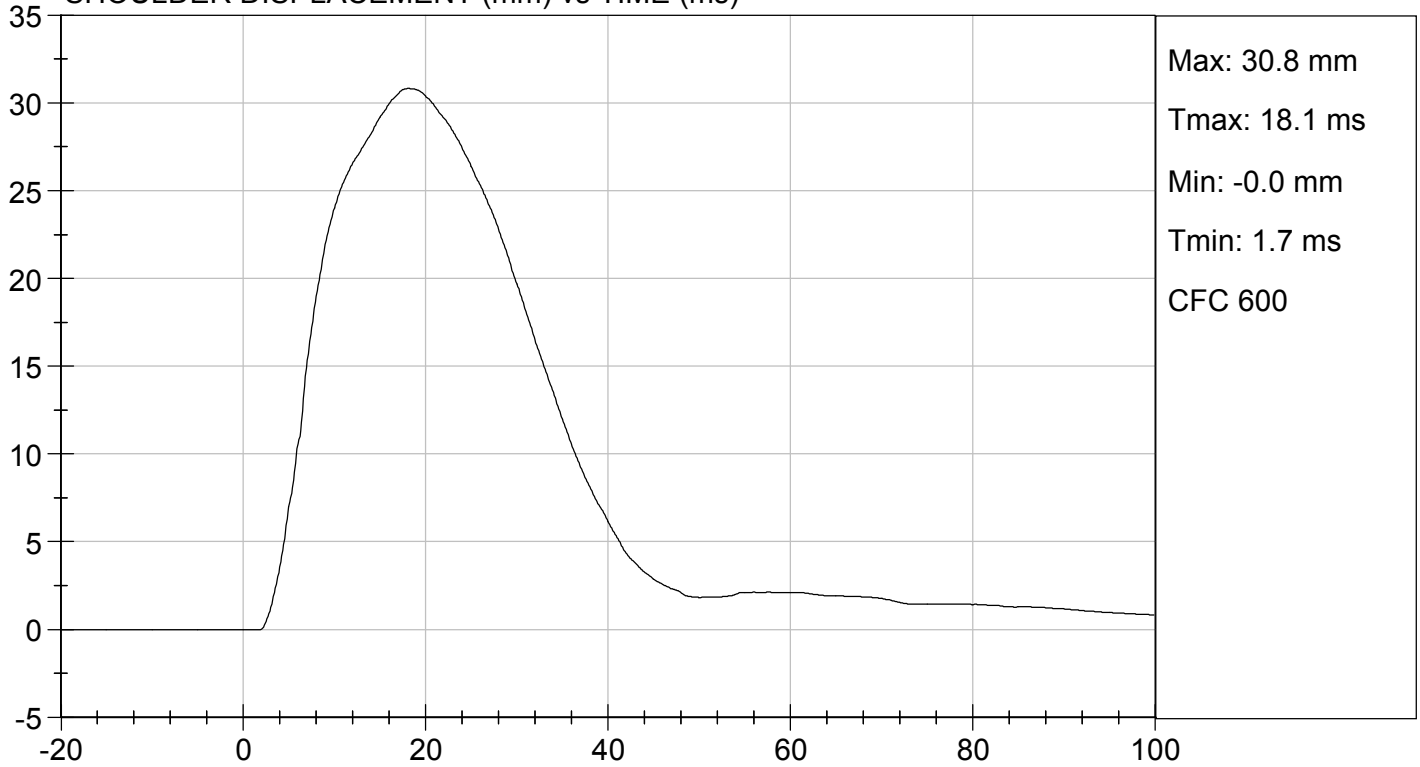
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/25/2020
TEST #: D200673

PROBE (G's) vs TIME (ms)

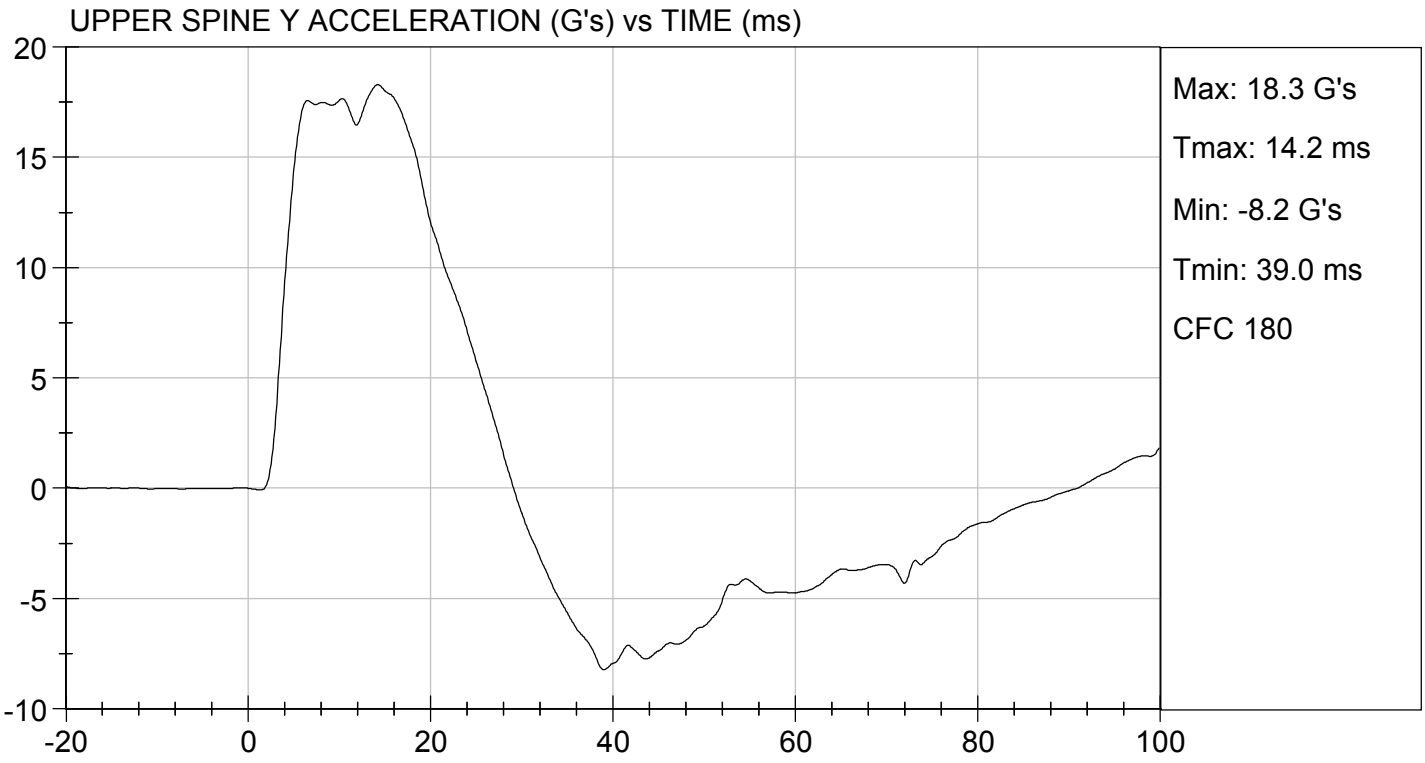


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/25/2020
TEST #: D200673



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200674

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	28	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
		Overall Test Results		Pass

Laboratory Technician

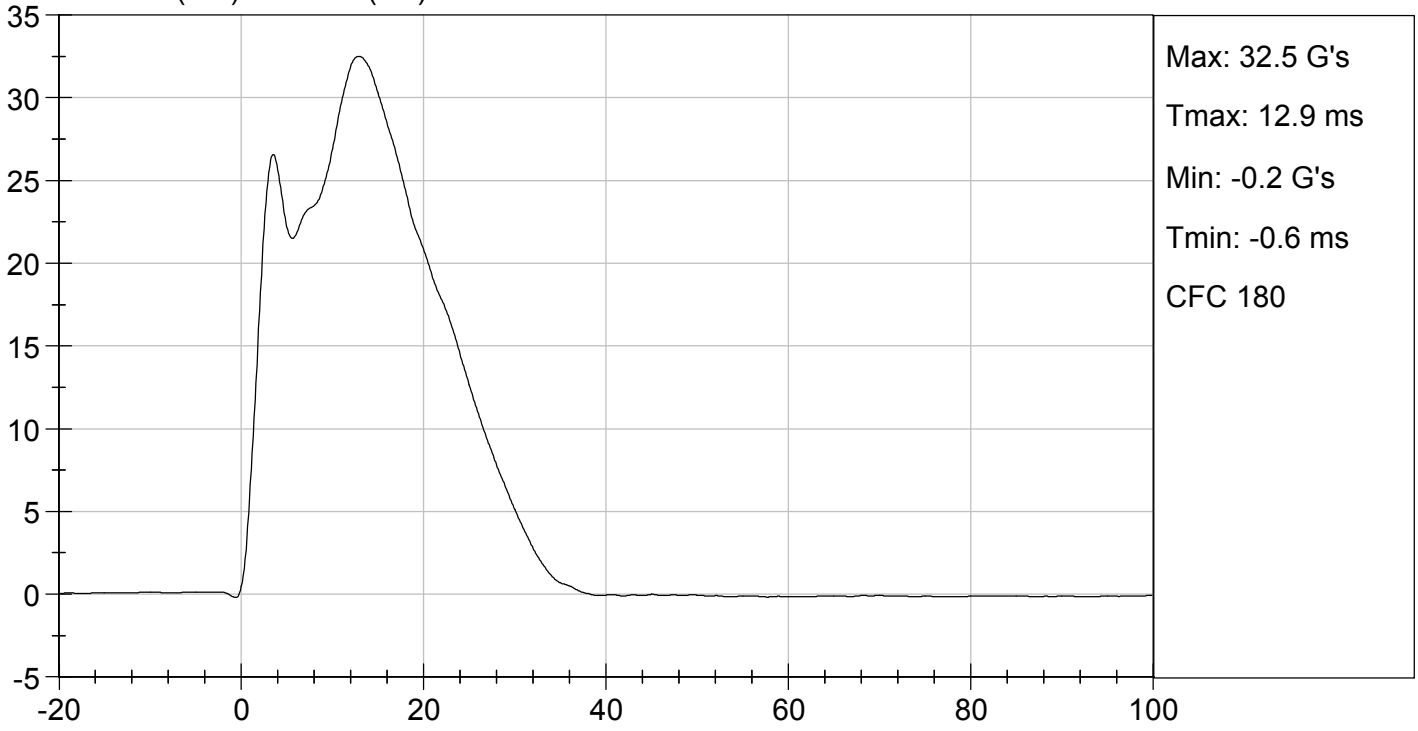
02/25/2020
Test Date

Approved By

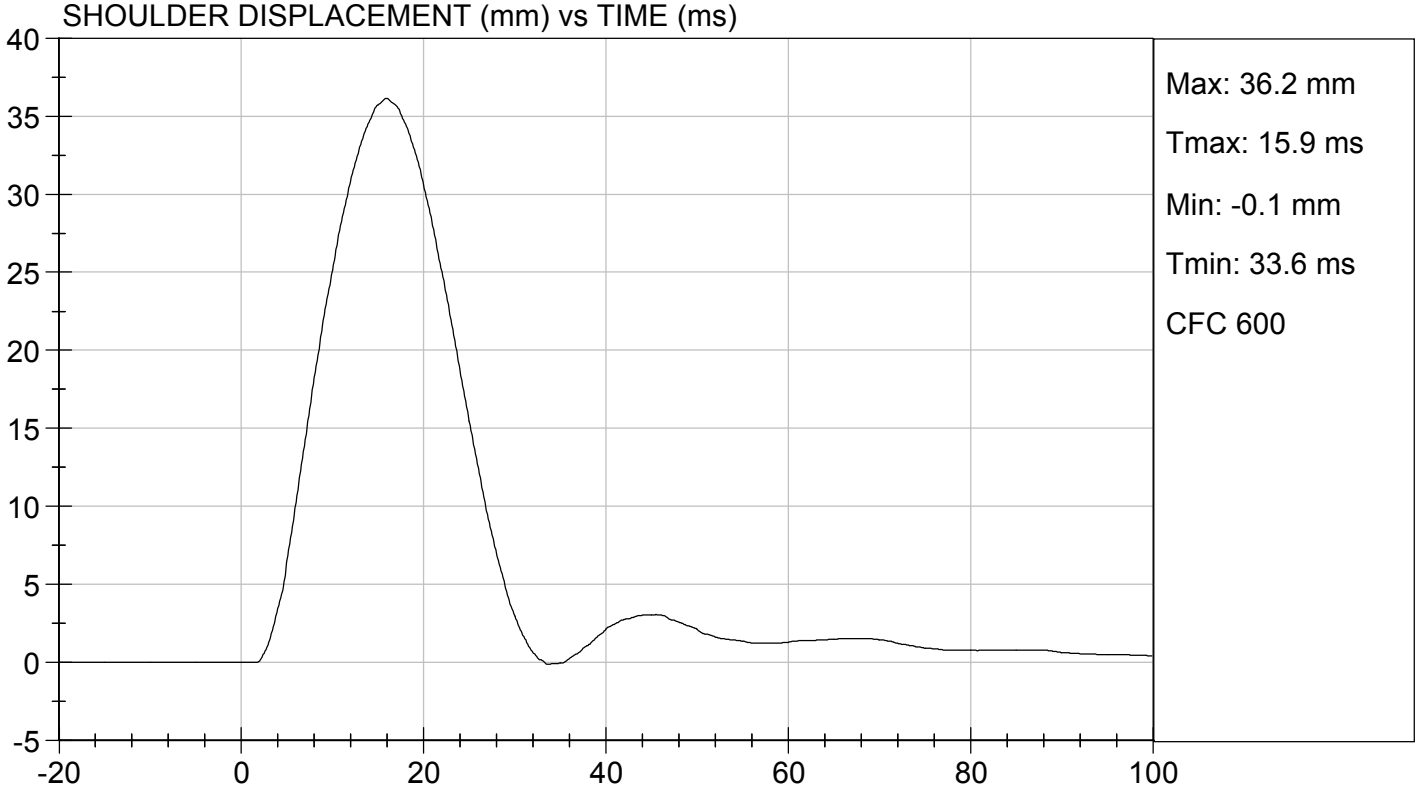
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/25/2020
TEST #: D200674

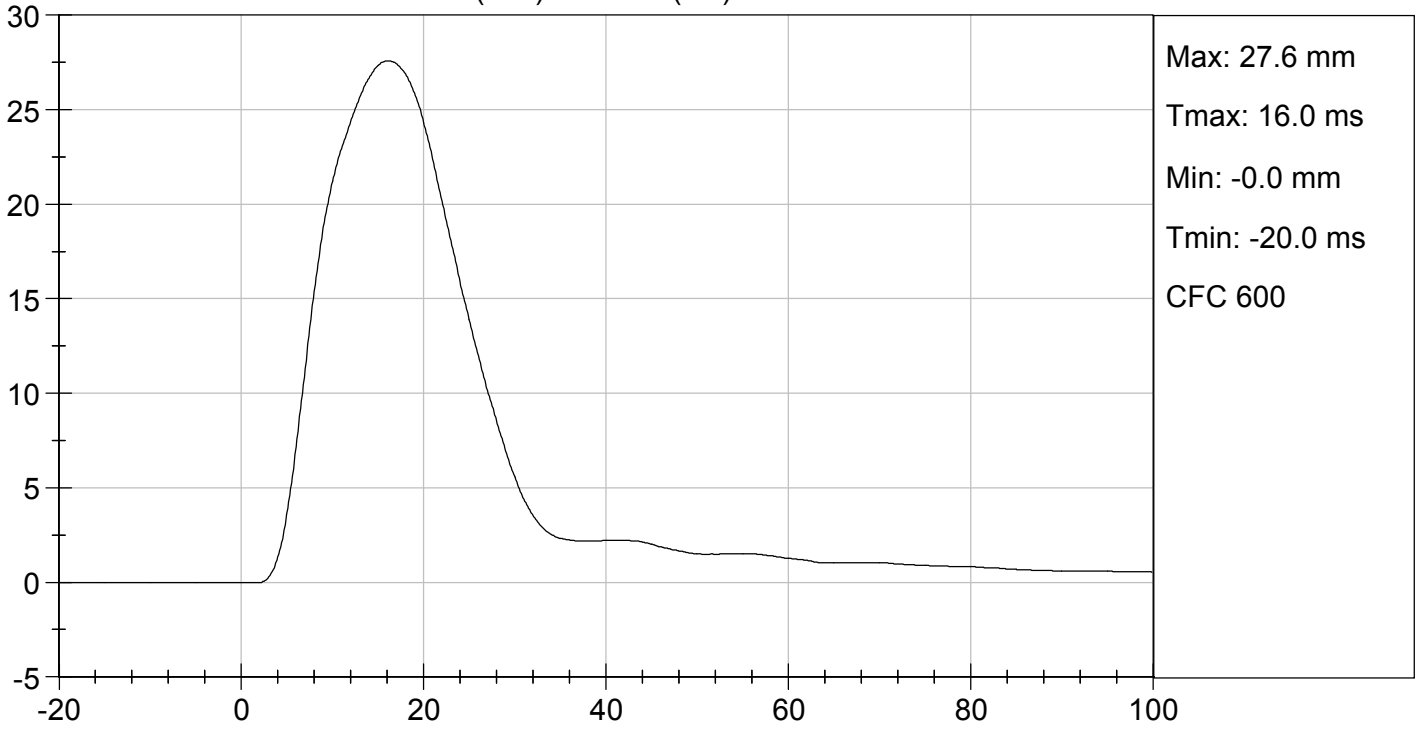
PROBE (G's) vs TIME (ms)



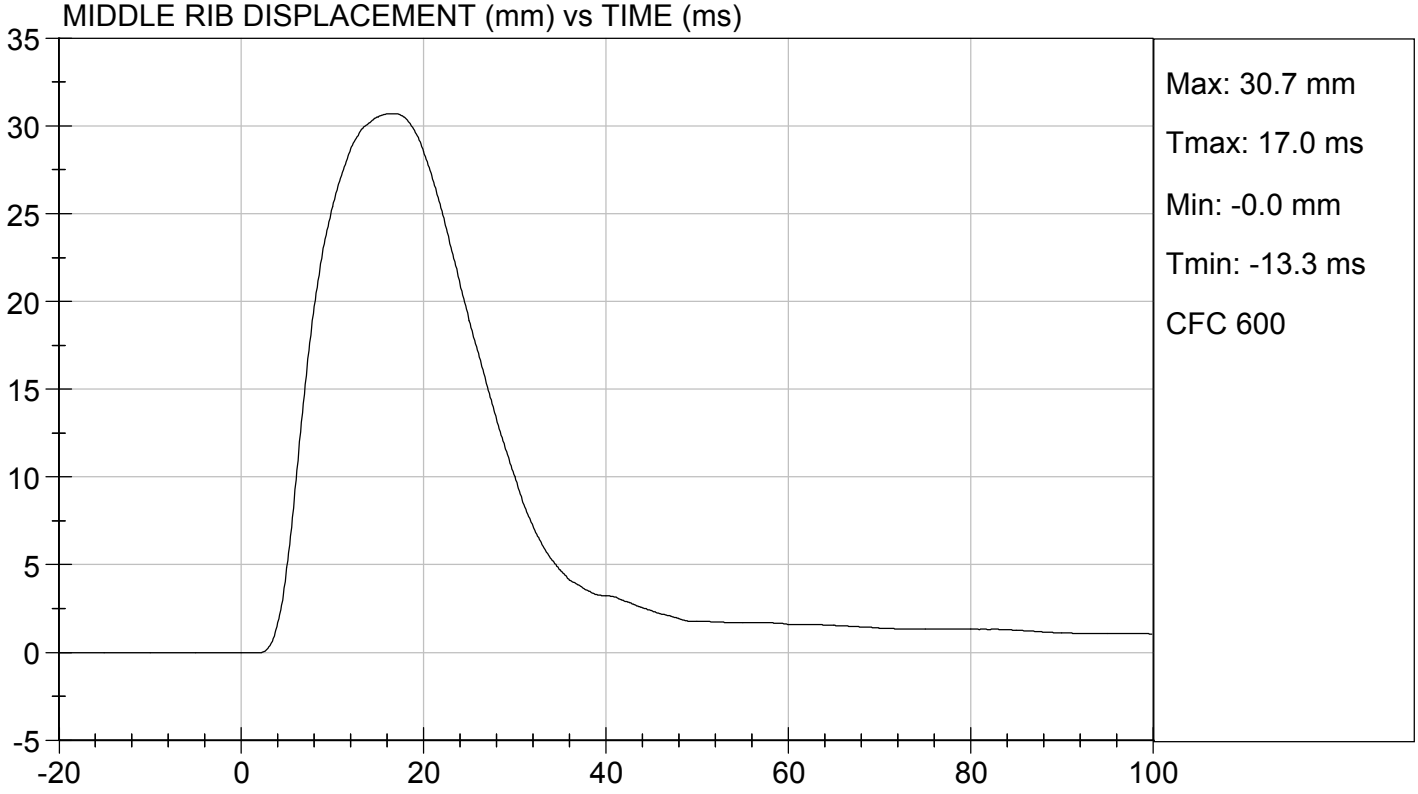
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



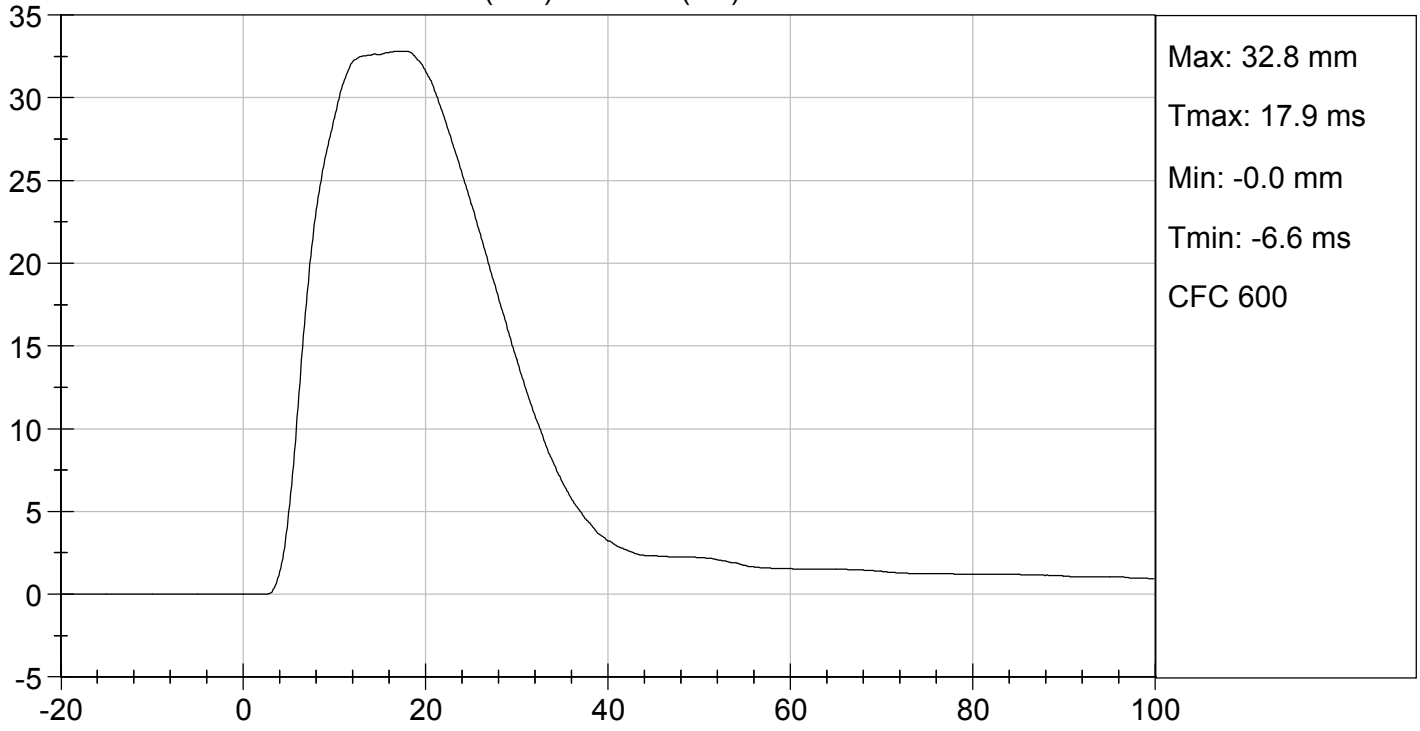
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



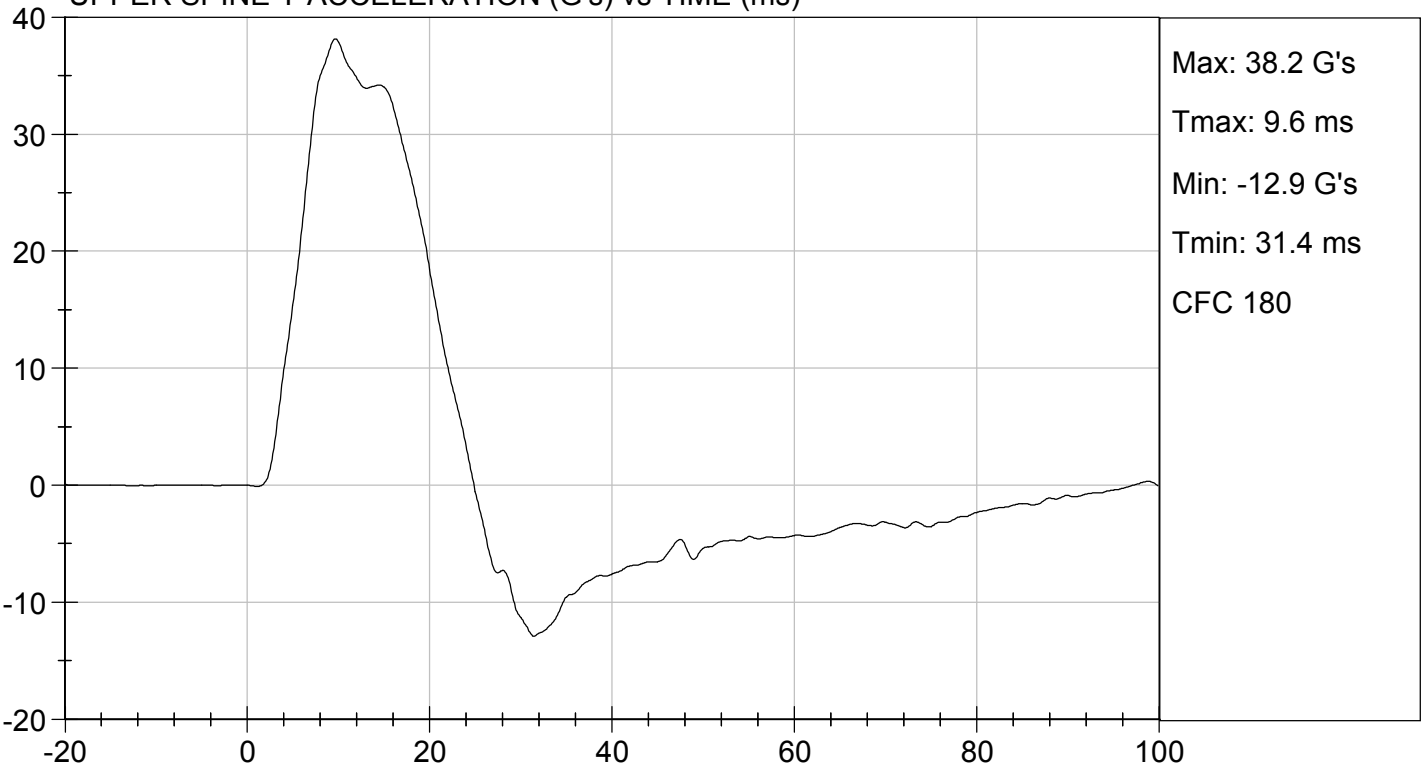
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/25/2020
TEST #: D200674

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



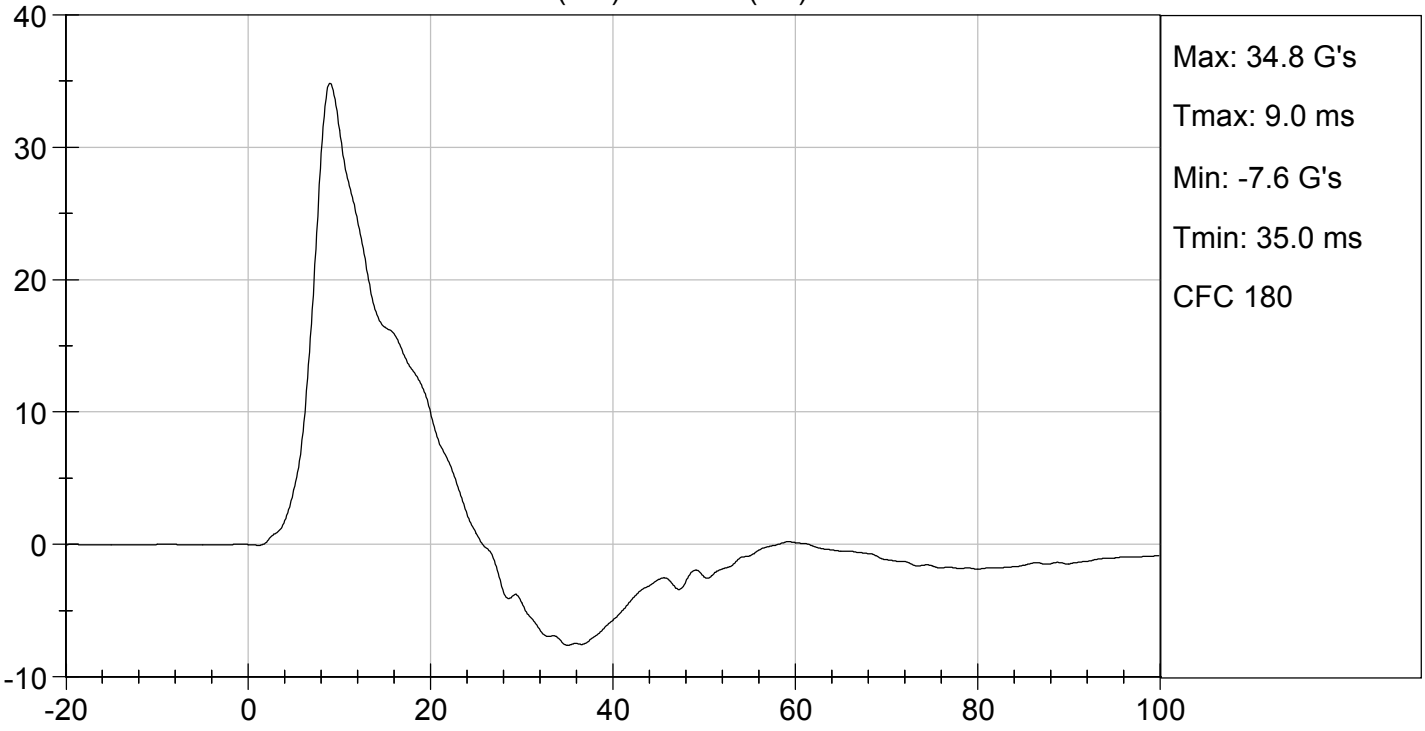
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 02/25/2020
TEST #: D200674

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: 296 **Test I.D:** D200675

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	41	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

Alex Thomas
Laboratory Technician

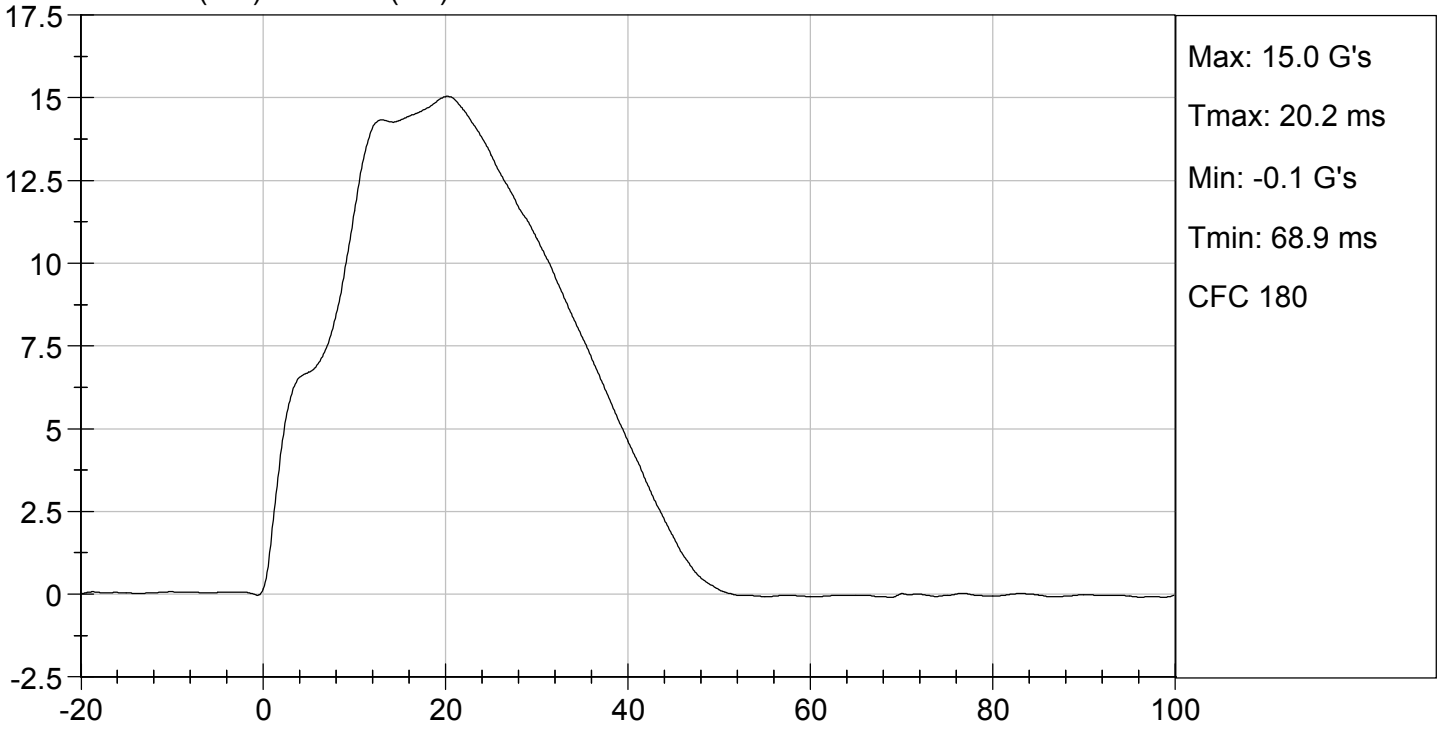
02/25/2020
Test Date

Approved By

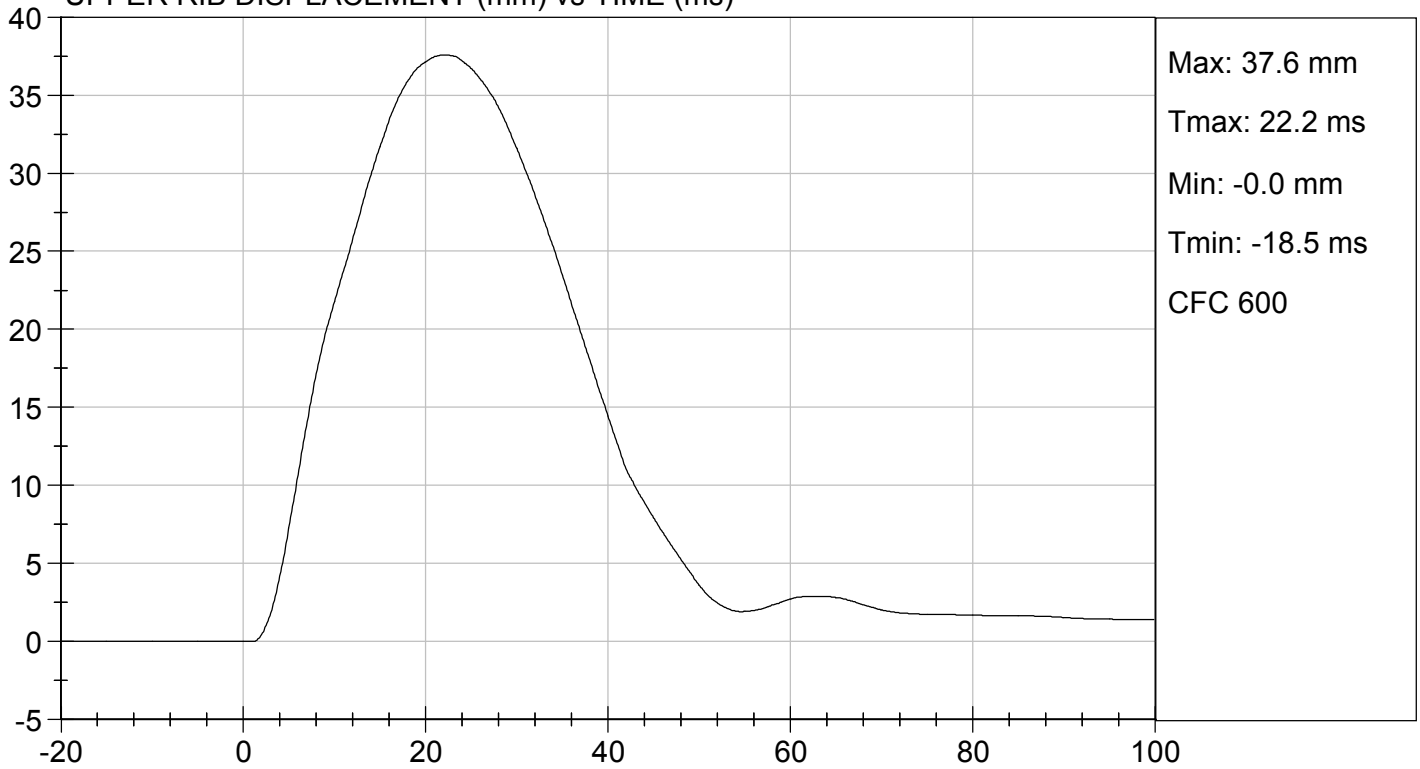
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/25/2020
TEST #: D200675

PROBE (G's) vs TIME (ms)



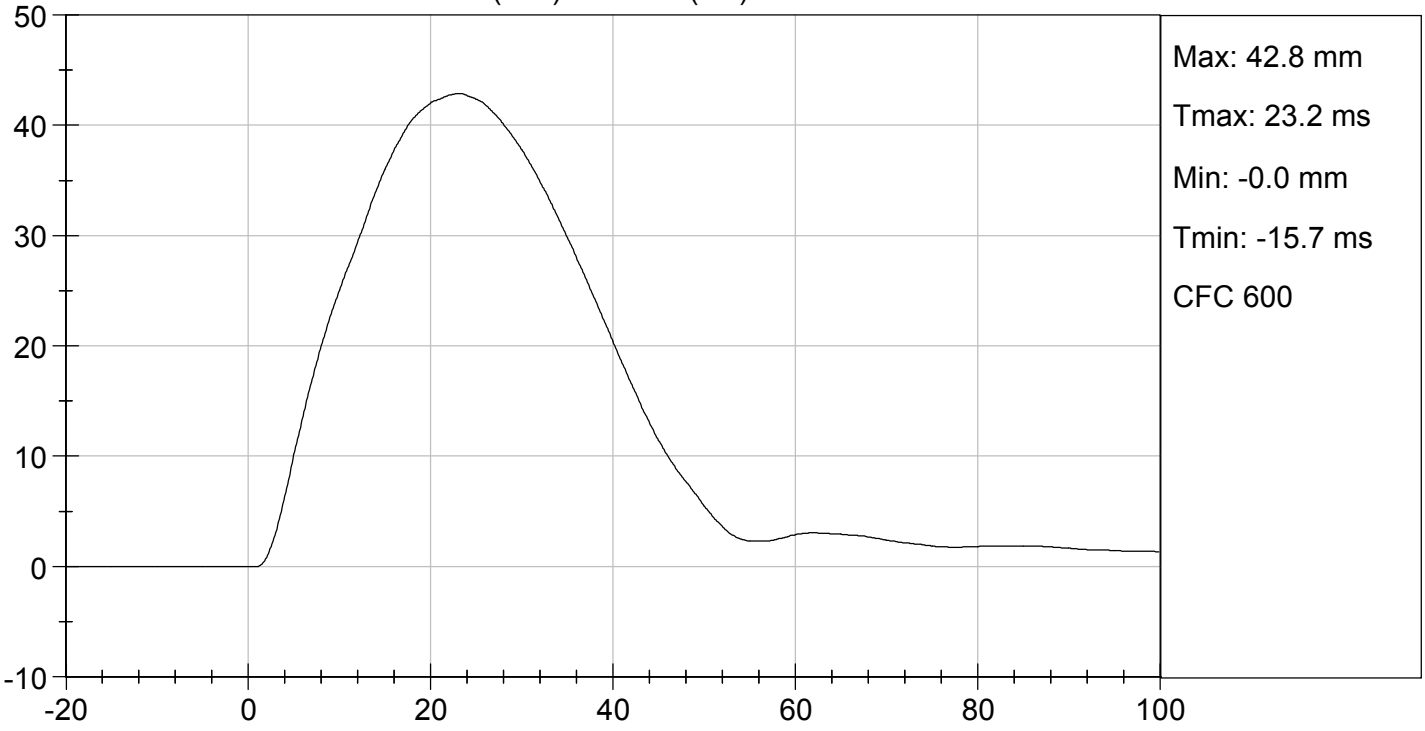
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



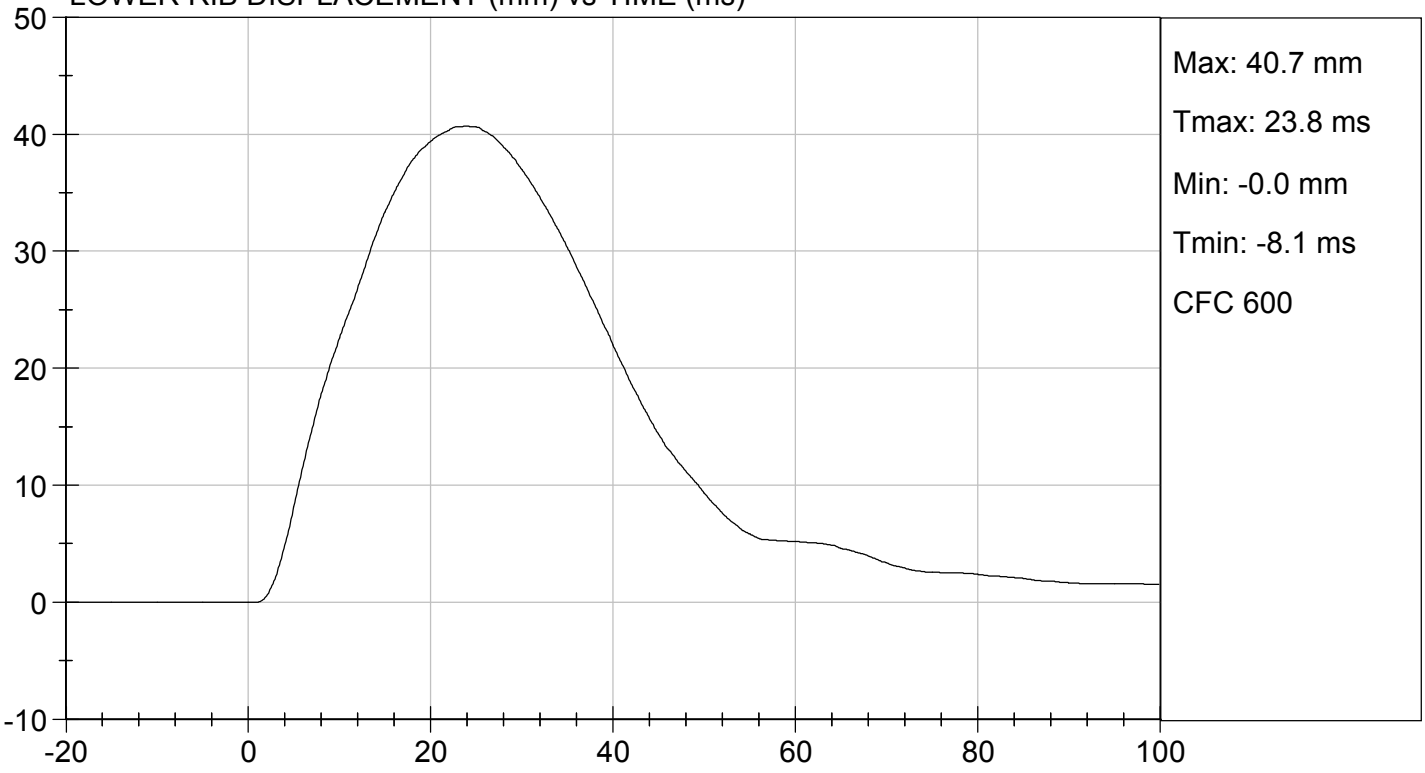
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/25/2020
TEST #: D200675

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



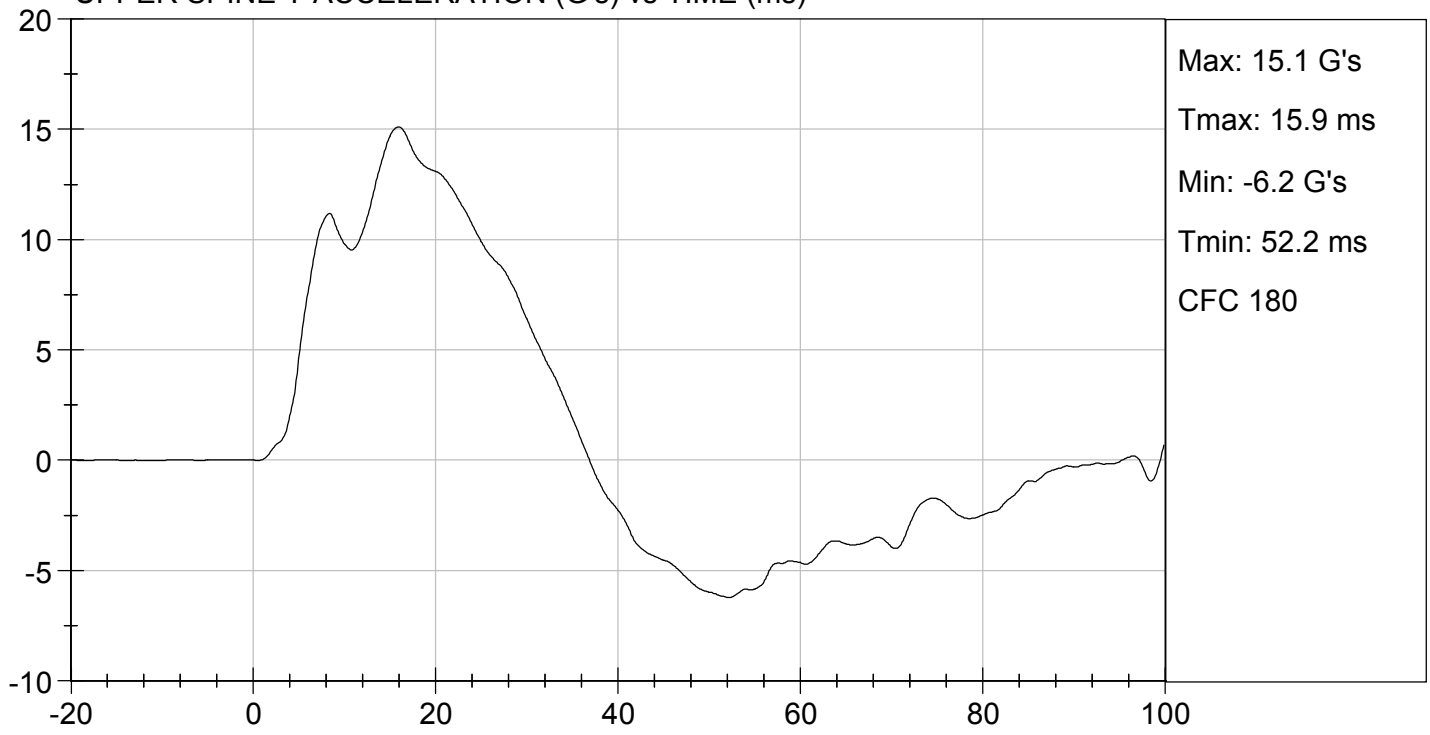
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



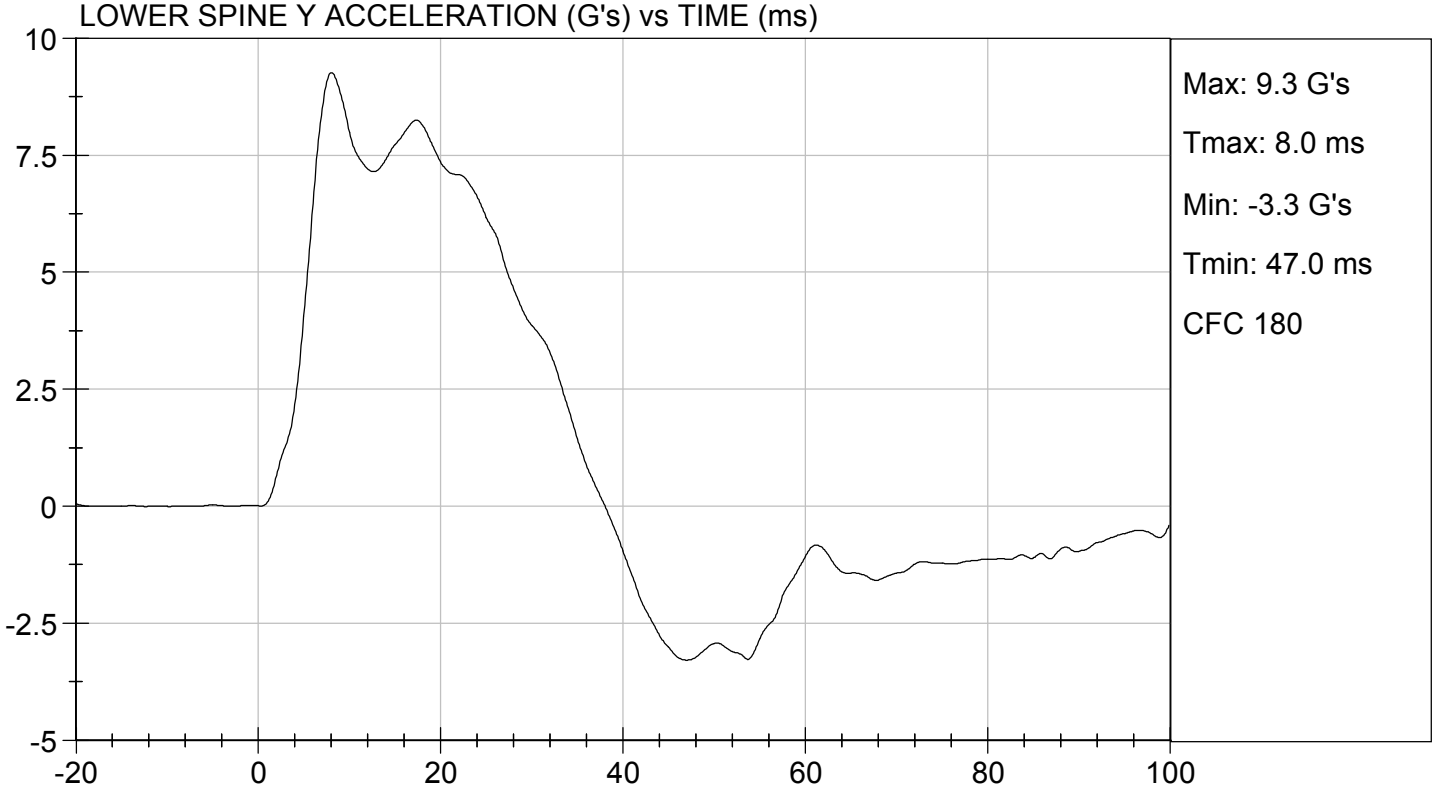
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/25/2020
TEST #: D200675

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: 296 **Test I.D:** D200676D

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	4.20 to 4.40	4.40	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	39	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	41	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Laboratory Technician

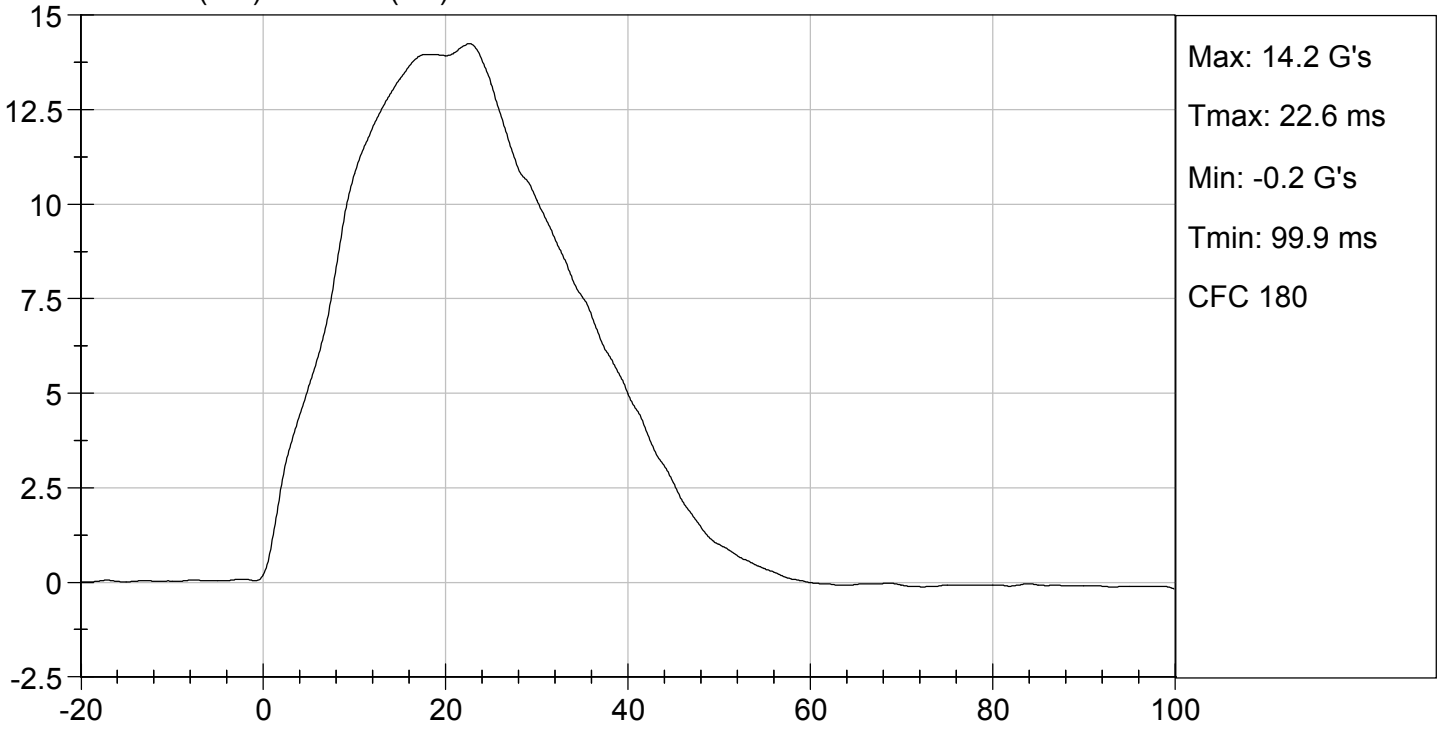
02/25/2020
Test Date

Approved By

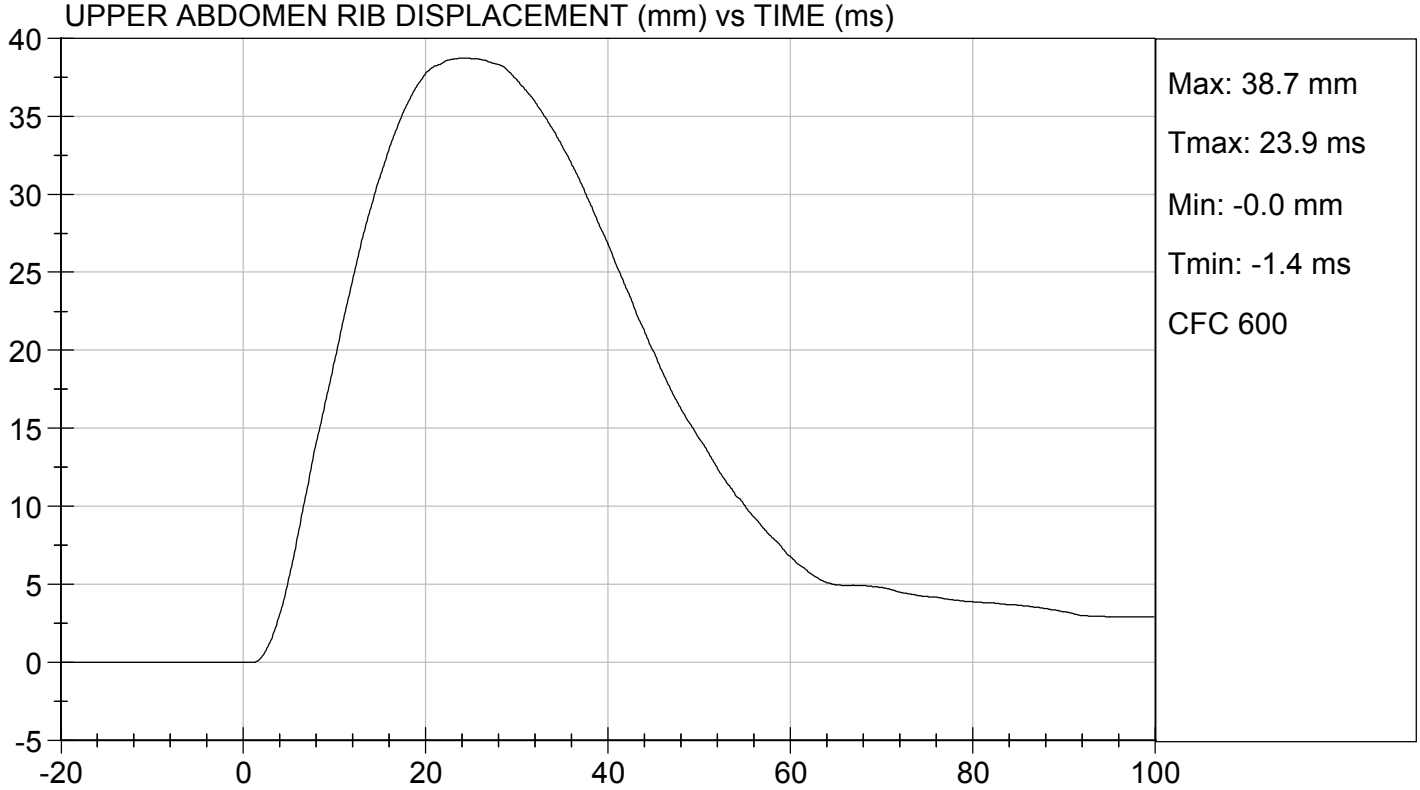
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.43 ft/s, 4.40 m/s

TEST DATE: 02/25/2020
TEST #: D200676D

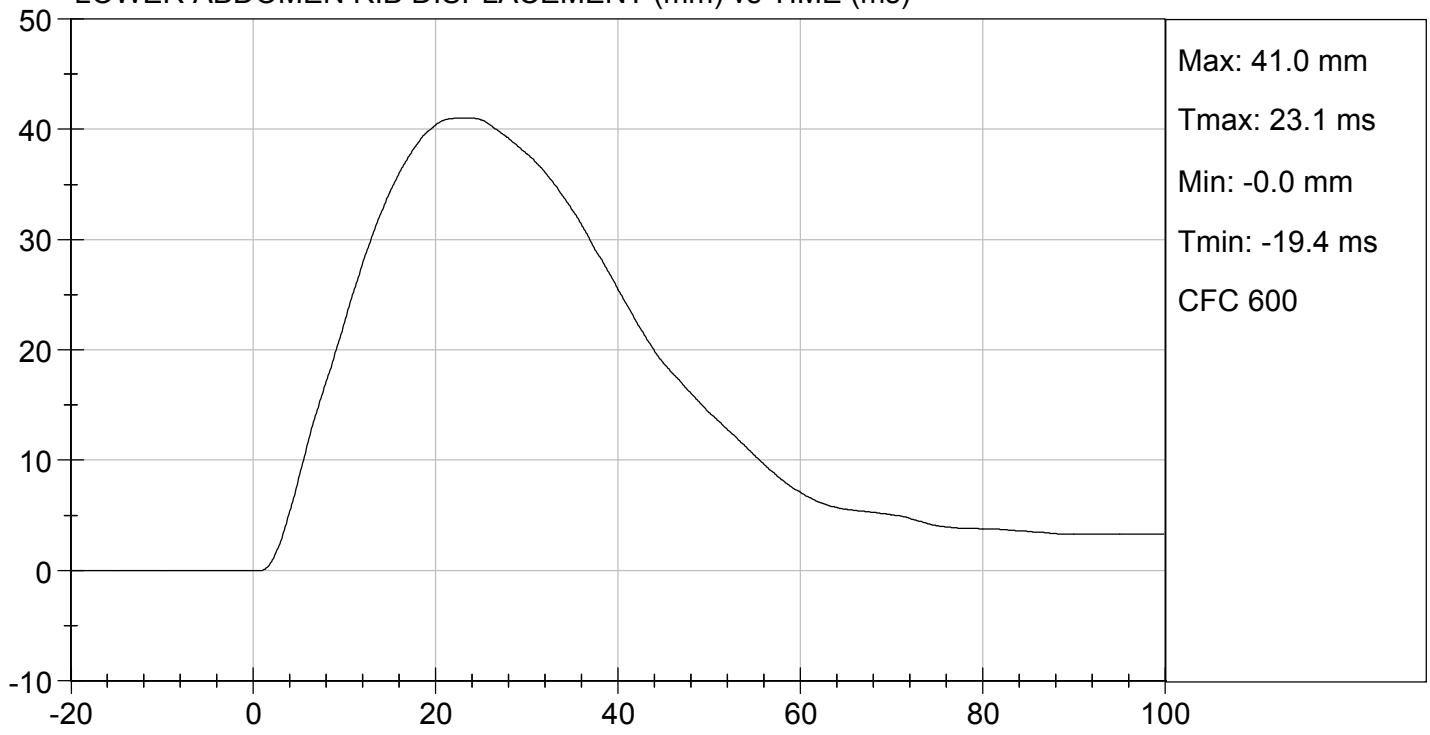
PROBE (G's) vs TIME (ms)



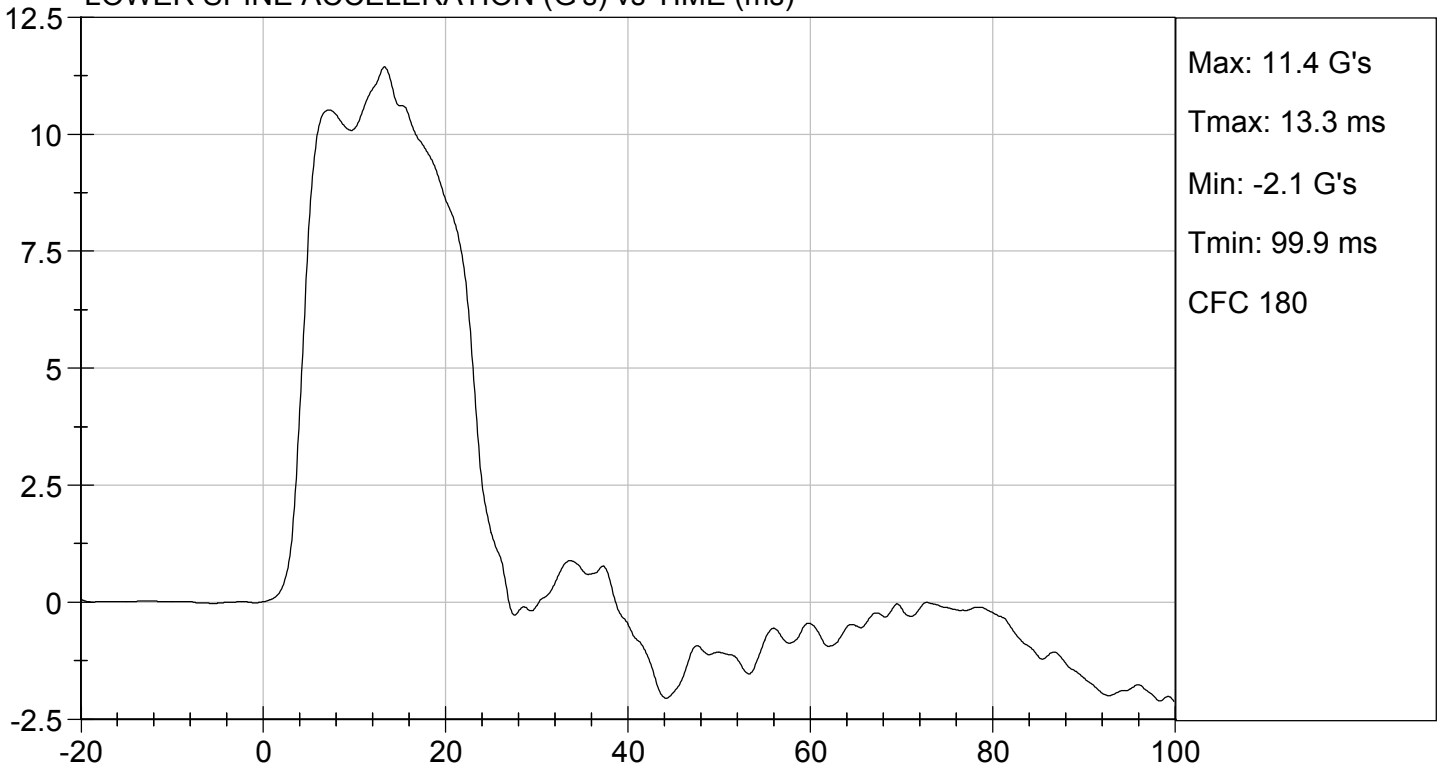
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



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: 296 **Test I.D:** D200677

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	16	Pass
Impact Velocity	m/s	6.60 to 6.80	6.61	Pass
Maximum Probe Acceleration	G's	38 to 47	47	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4,131	Pass
		Overall Test Results		Pass

Laboratory Technician

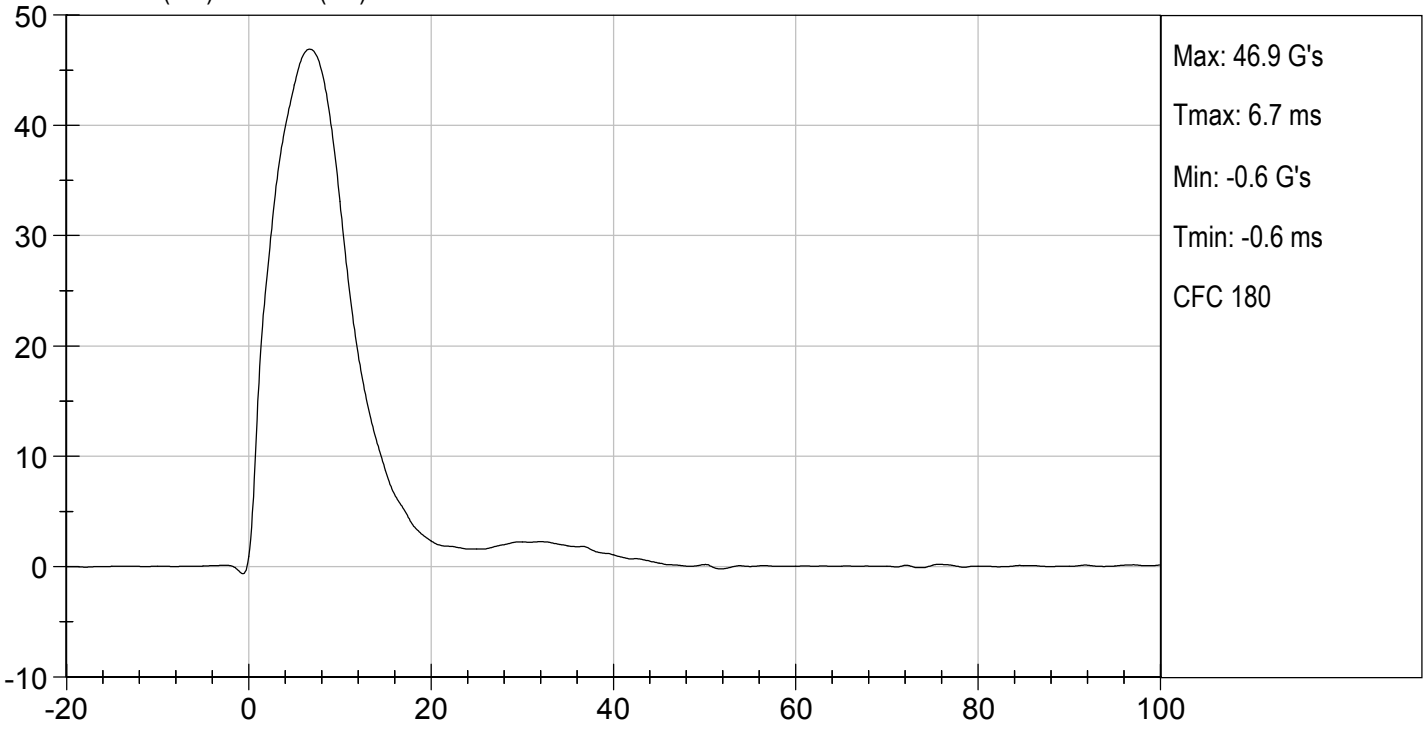
02/28/2020
Test Date

Approved By

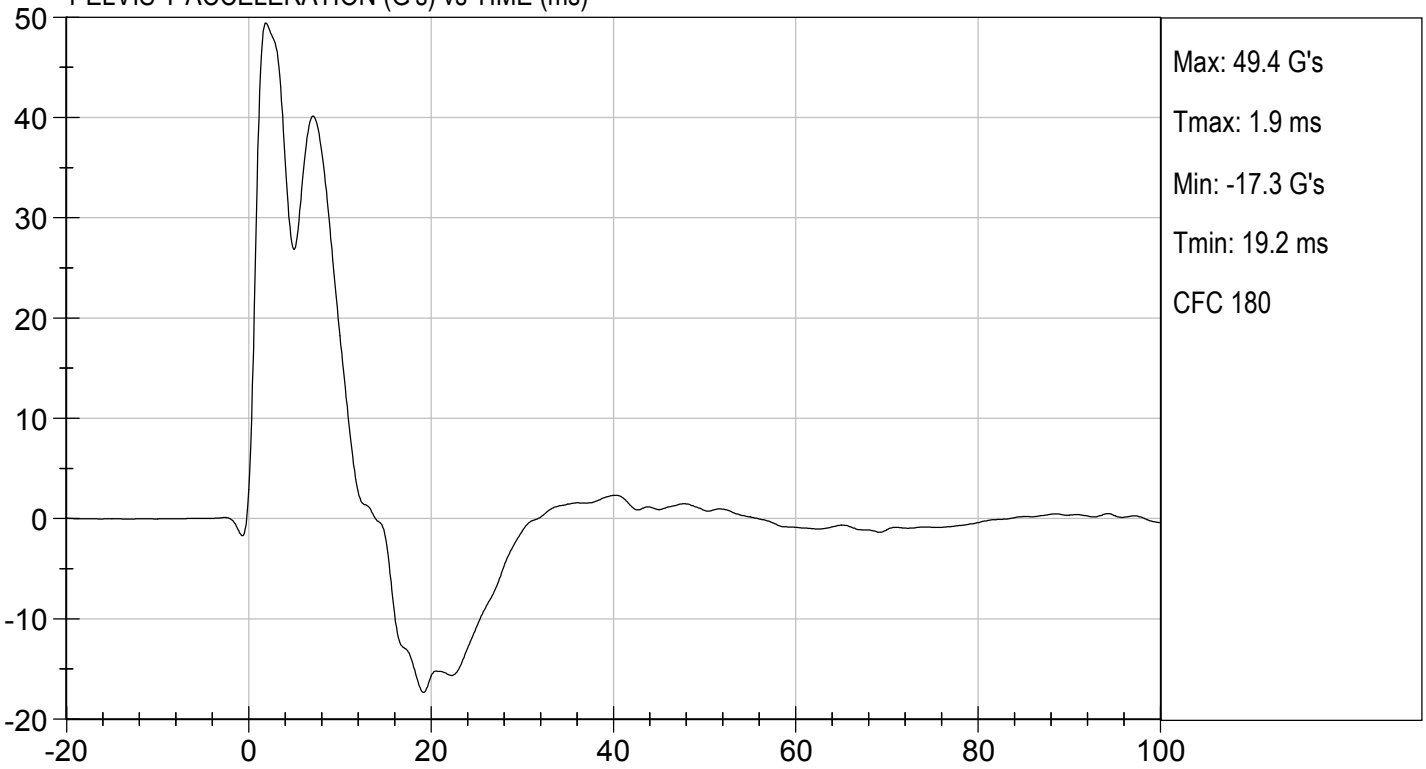
TEST DESC: PELVIS IMPACT
VELOCITY: 21.70 ft/s, 6.61 m/s

TEST DATE: 02/28/2020
TEST #: D200677

PROBE (G's) vs TIME (ms)

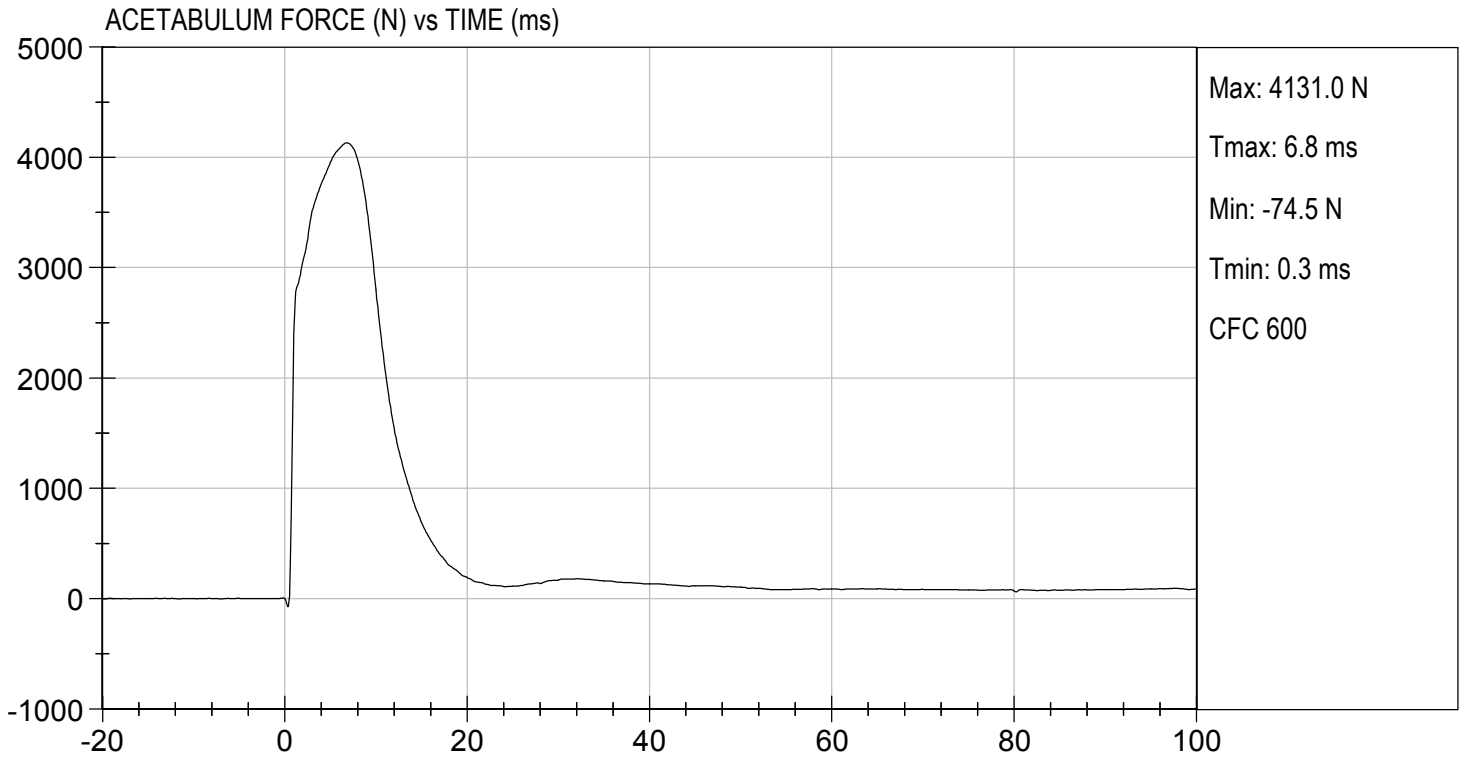


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: PELVIS IMPACT
VELOCITY: 21.70 ft/s, 6.61 m/s

TEST DATE: 02/28/2020
TEST #: D200677



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D200678

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	16	Pass
Impact Velocity	m/s	4.20 to 4.40	4.40	Pass
Maximum Probe Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,230	Pass
		Overall Test Results		Pass

Laboratory Technician

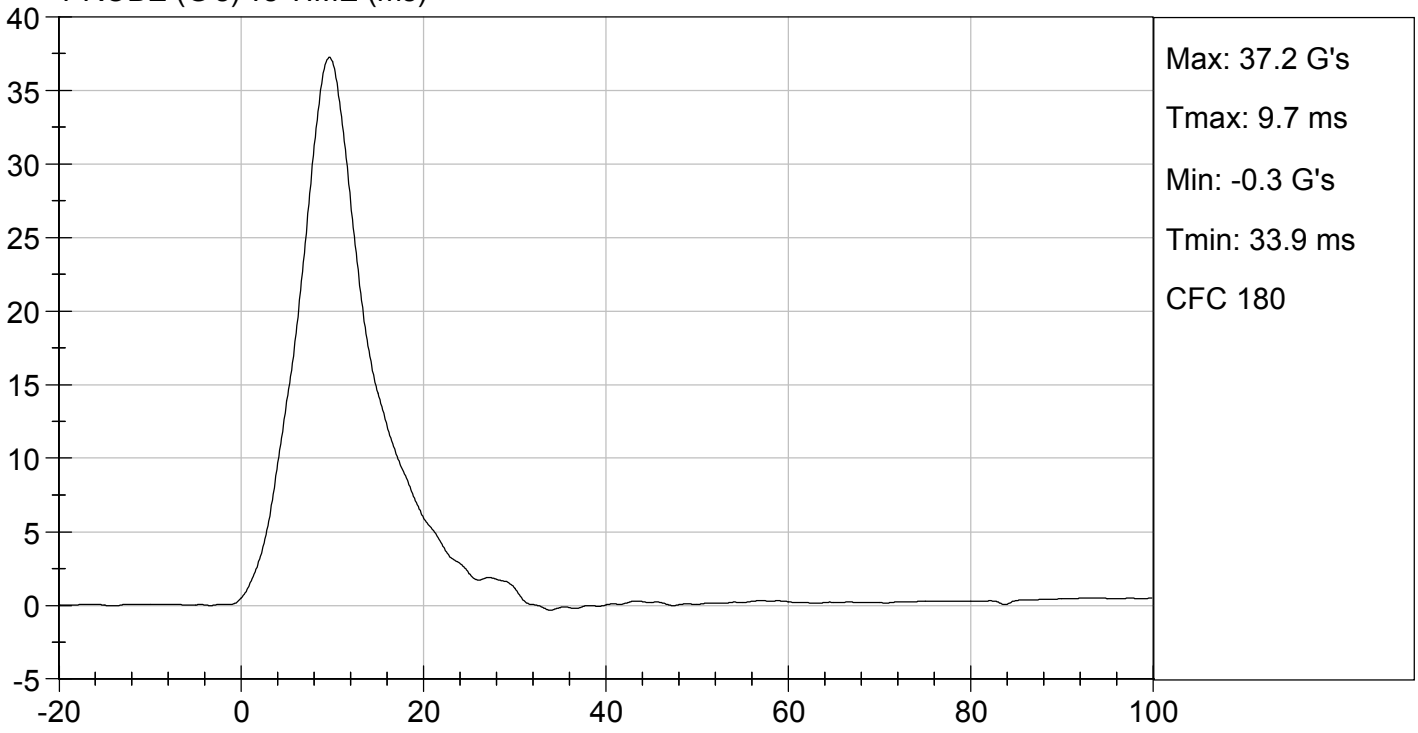
02/27/2020
Test Date

Approved By

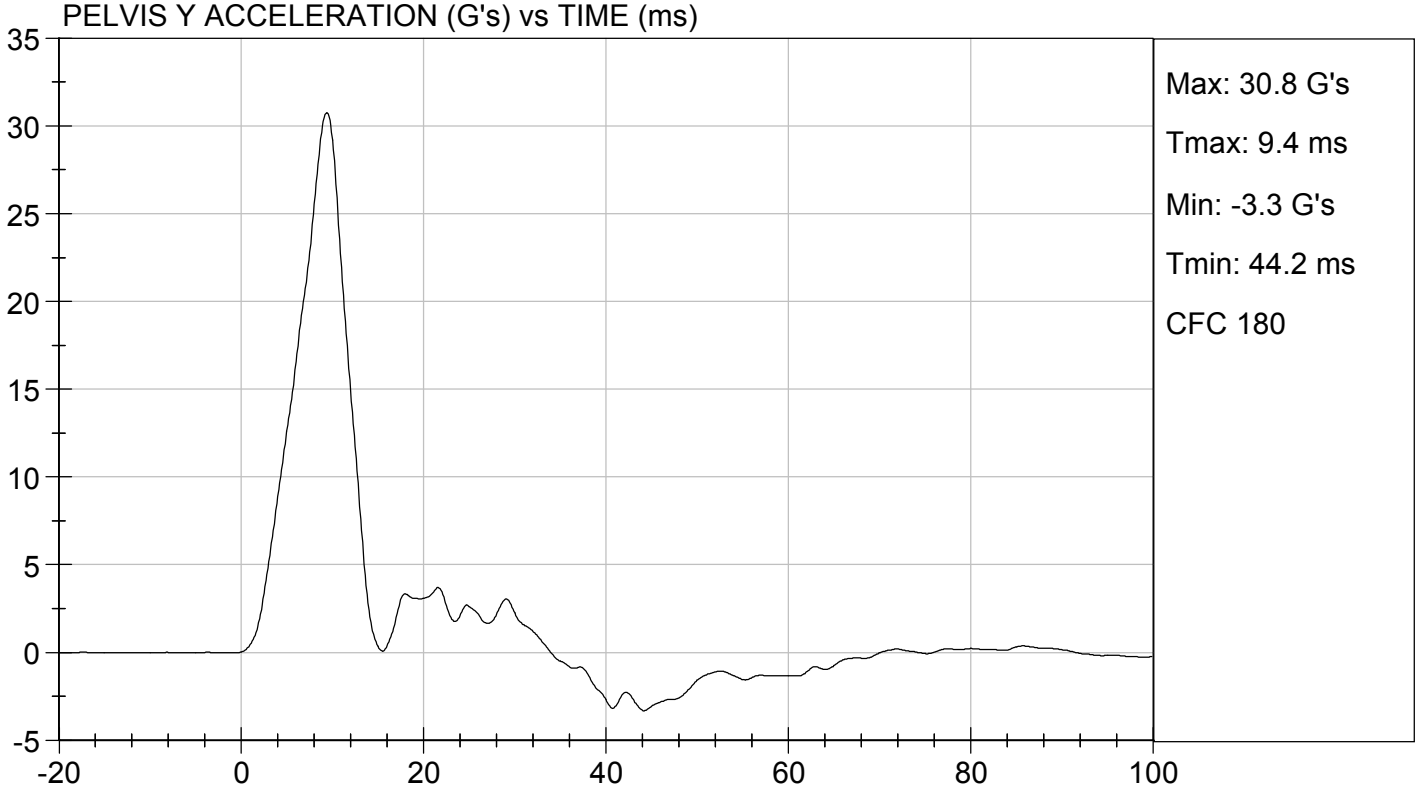
TEST DESC: ILLIAC
VELOCITY: 14.44 ft/s, 4.40 m/s

TEST DATE: 02/27/2020
TEST #: D200678

PROBE (G's) vs TIME (ms)

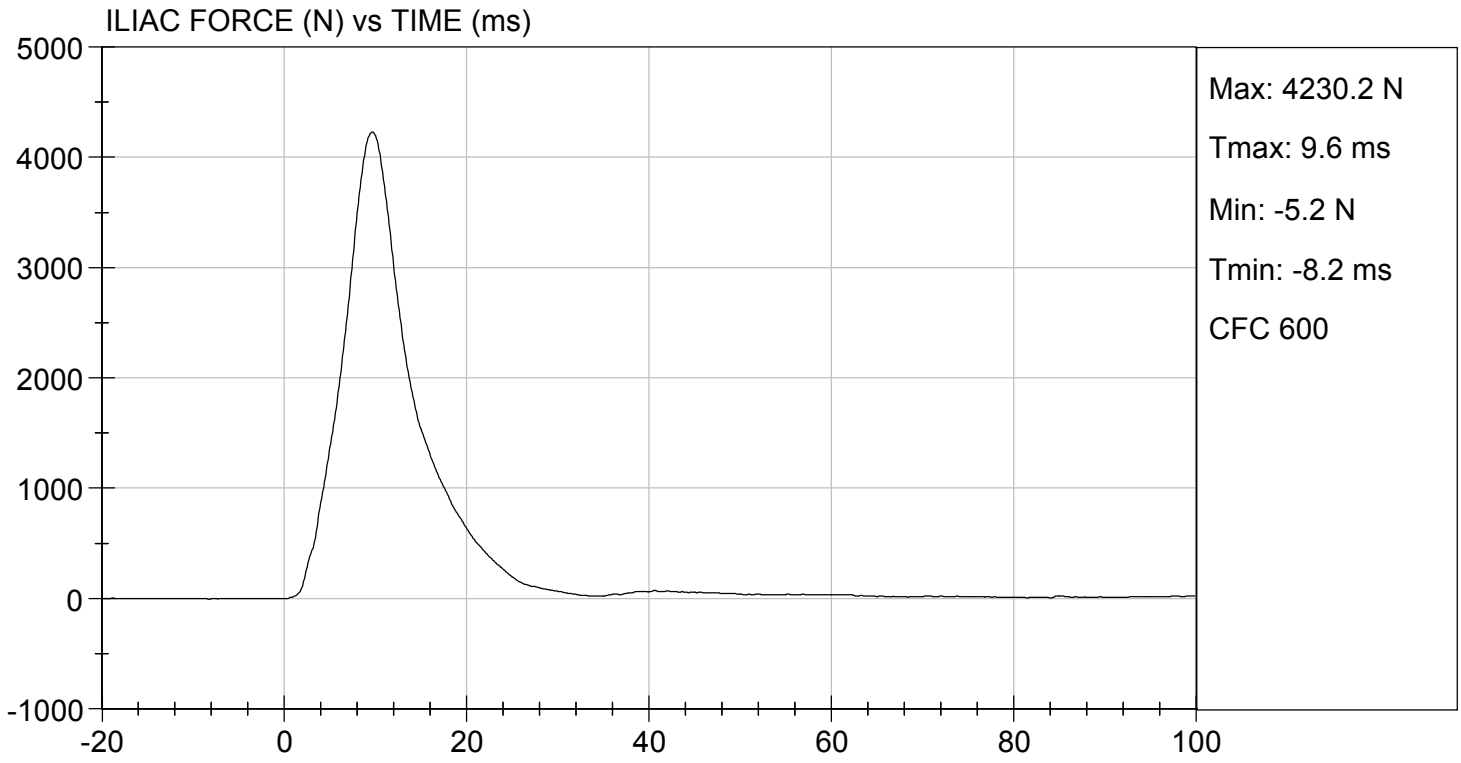


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.44 ft/s, 4.40 m/s

TEST DATE: 02/27/2020
TEST #: D200678

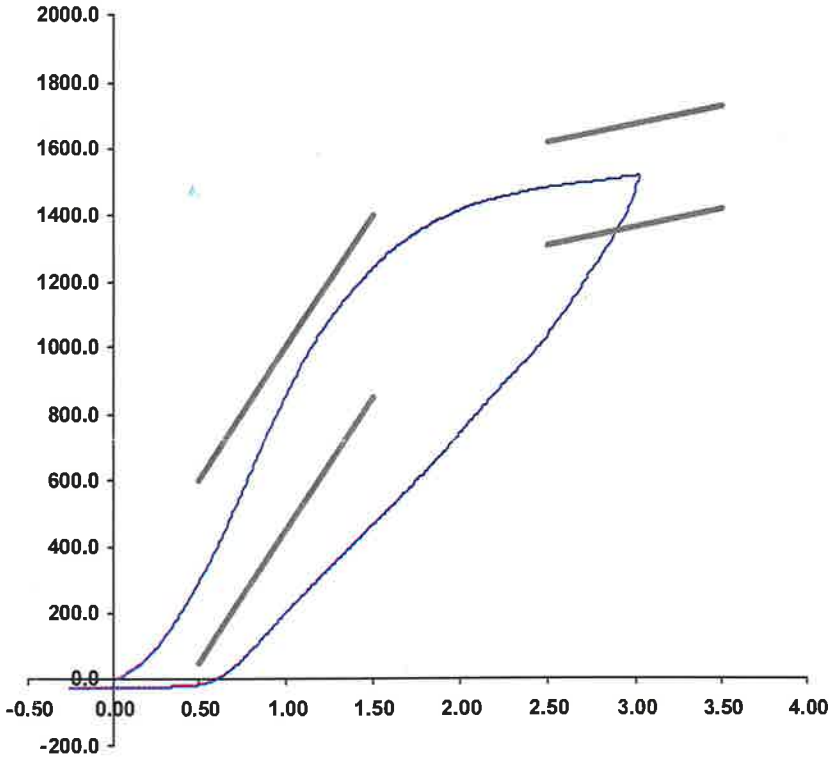


SID-IIs Pelvis Plug Certification Test

Plug S/N 13176
Test Number 10571
Report Number 10606
Test Date 8/8/2019 11:16:46 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	306.65	50.00	600.00
Force @ 1.5 mm (N)	1,241.46	850.00	1,400.00
Force @ 2.5 mm (N)	1,482.88	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,517.01	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator 131

Part Number 180-4450

Template No 107 **08-Aug-19**
SACO Research

By : DC Date : 8/8/2019

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

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 12585`
Test Number 7515
Report Number 7530
Test Date 10/3/2018 10:21:15 AM

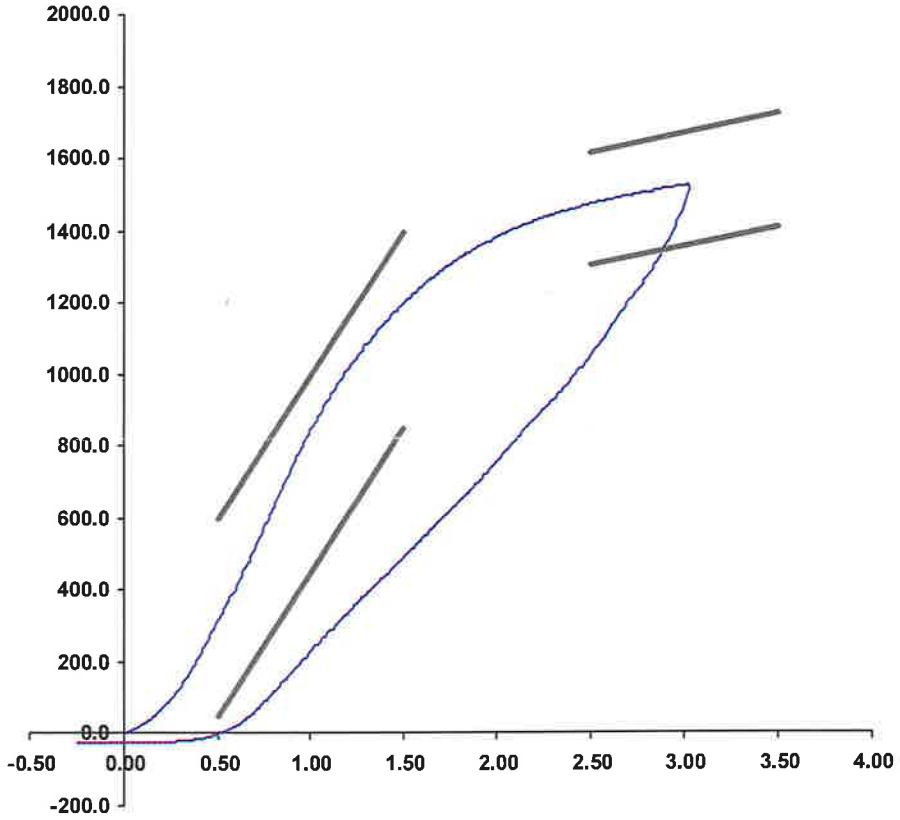
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	315.58	50.00	600.00
Force @ 1.5 mm (N)	1,202.26	850.00	1,400.00
Force @ 2.5 mm (N)	1,478.25	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,528.04	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 **03-Oct-18**
SACO Research

By : DC Date : 10/3/18

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

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	12/23/2019
		Y	P79712	Endevco	12/23/2019
		Z	P79750	Endevco	12/23/2019
		Xr	P79751	Endevco	12/23/2019
		Yr	P79753	Endevco	12/23/2019
		Zr	P88170	Endevco	12/23/2019
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	12/23/2019
	Middle	Y	G169	Honeywell	12/23/2019
	Lower	Y	G164	Honeywell	12/23/2019
Abdomen Load Cells	Forward	Y	ABG1532	Denton	8/13/2019
	Middle	Y	ABG1534	Denton	8/13/2019
	Rear	Y	ABG1535	Denton	8/13/2019
Lower Spine Accelerometers (T12)		X	P79574	Endevco	12/23/2019
		Y	P82097	Endevco	12/23/2019
		Z	P82603	Endevco	12/23/2019
Public Symphysis Load Cell		Y	PG461	Denton	8/13/2019

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296		
				Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers			X	P85003	Endevco	12/31/2019
			Y	P94783	Endevco	12/31/2019
			Z	P94786	Endevco	12/31/2019
			Xr	P94938	Endevco	12/31/2019
			Yr	P96854	Endevco	12/31/2019
			Zr	P97386	Endevco	12/31/2019
Head Angular Rate Sensors			X	ARS7421	DTS	7/8/2019
			Y	ARS7413	DTS	7/8/2019
			Z	ARS7423	DTS	7/8/2019
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	12/31/2019
		Middle	Y	G1163	FTSS	12/31/2019
		Lower	Y	G1158	FTSS	1/2/2020
	Abdominal Rib	Upper	Y	G1146	FTSS	1/2/2020
		Lower	Y	G1126	FTSS	1/2/2020
Lower Spine Accelerometers (T12)			X	P79418	Endevco	12/31/2019
			Y	P79439	Endevco	12/31/2019
			Z	P79614	Endevco	12/31/2019
Acetabulum Load Cell			Y	ACG269	Denton	3/15/2019
Iliac Wing Load Cell			Y	IWG282	Denton	3/15/2019
Pelvis Plug (struck side)				13176	SACO	8/8/2019
Pelvis Plug (non-struck side)				12585	SACO	10/3/2018

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T22804	Endevco	2/11/2020
	Vehicle Center of Gravity	Y	T22649	Endevco	2/11/2020
	Vehicle Center of Gravity	Z	T22600	Endevco	2/11/2020
2	Right Sill at Front Seat	X	T20764	Endevco	12/20/2019
	Right Sill at Front Seat	Y	T20790	Endevco	12/20/2019
	Right Sill at Front Seat	Z	T20717	Endevco	10/29/2019
3	Right Sill at Rear Seat	X	T20781	Endevco	12/31/2019
	Right Sill at Rear Seat	Y	T20786	Endevco	12/31/2019
	Right Sill at Rear Seat	Z	T20778	Endevco	12/20/2019
4	Left Sill at Front Door	Y	T22691	Endevco	2/11/2020
5	Left Sill at Rear Door	Y	T22609	Endevco	2/11/2020
6	Left A-Post Lower	Y	T17835	Endevco	11/6/2019
7	Left A-Post Middle	Y	T20382	Endevco	9/27/2019
8	Left B-Post Lower	Y			
9	Left B-Post Middle	Y			
10	Front Seat Track	Y	T19018	Endevco	8/28/2019
11	Rear Seat Track or Structure	Y	T20354	Endevco	9/13/2019
12	Right Rear Occ. Compartment	Y	T22659	Endevco	2/11/2020
13	Engine Block	X	T19991	Endevco	12/17/2019
	Engine Block	Y	T19997	Endevco	12/3/2019
14	Rear Floorpan Above Axle	X	T20751	Endevco	1/2/2020
	Rear Floorpan Above Axle	Y	T20739	Endevco	1/2/2020
	Rear Floorpan Above Axle	Z	T20737	Endevco	1/2/2020

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB660D	PCB	9/23/2019
MDB Center of Gravity	Y	PCB659D	PCB	9/23/2019
MDB Center of Gravity	Z	PCB661D	PCB	9/23/2019
Left Frame at Rear Axle Centerline	X	PCB557D	PCB	9/23/2019
Left Frame at Rear Axle Centerline	Y	PCB753D	PCB	9/23/2019