

REPORT NUMBER: SideNCAPMDB-MGA-21-012

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

**FORD MOTOR CO.
2021 Ford Transit Connect XLT Wagon LWB
NHTSA No.: M20210220**

**MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105**



Test Date: November 20, 2020

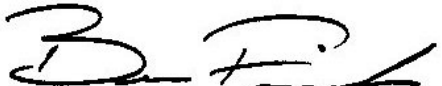
Final Report Date: March 2, 2021

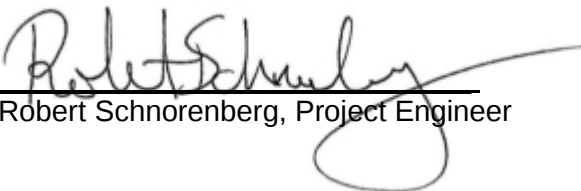
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-100
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

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Approval Date: March 2, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

COR, New Car Assessment Program
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TECHNICAL REPORT DOCUMENTATION PAGE

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15. Supplementary Notes

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Ford Transit Connect XLT Wagon LWB 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 the MGA Research Corporation facility in Burlington, Wisconsin on November 20, 2020.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.96 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.4°C. The target vehicle post-test maximum crush was 214 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	78
Maximum Thorax Rib Deflection	mm	44	28
Total Abdominal Force	N	2500	744
Pubic Symphysis Force	N	6000	1438
Resultant Lower Spine Acceleration	g	82*	25

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	265
Resultant Lower Spine Acceleration	g	82	57
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3476
Maximum Thoracic Rib Deflection	mm	38*	18
Maximum Abdomen Rib Deflection	mm	45*	22

*Proposed IARV

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

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2021 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 2021 Ford Transit Connect XLT Wagon LWB. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated March 2020.

SUMMARY

A 2021 Ford Transit Connect XLT Wagon LWB 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 61.96 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 November 20, 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 March 2020. 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	78
Maximum Thorax Rib Deflection	mm	44	28
Total Abdominal Force	N	2500	744
Pubic Symphysis Force	N	6000	1438
Resultant Lower Spine Acceleration	g	82*	25

Measurement Description	Units	Passenger ATD (SID-ILs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	265
Resultant Lower Spine Acceleration	g	82	57
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3476
Maximum Thoracic Rib Deflection	mm	38*	18
Maximum Abdomen Rib Deflection	mm	45*	22

*Proposed IARV

Supplemental restraint information is given below:

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

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

GENERAL COMMENTS

Test vehicle rolled onto passenger side (one-quarter turn) after impact.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20210220	Traction Control System (TCS)	Yes
Model Year	2021	Auto-Leveling System	No
Make	Ford	Automatic Door Locks (ADL)	Yes
Model	Transit Connect XLT Wagon LWB	Power Window Auto-Reverse	Yes
Body Style	Van	Other Optional Feature	No
VIN	NM0GE9F27M1486333	Driver Front Airbag	Yes
Body Color	Silver Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	146 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0 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	8	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	Yes
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

Does owner's manual provide instruction to turn off automatic door locks?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	FORD MOTOR CO.	GVWR (kg)	2459
Date of Manufacture	08/20	GAWR Front (kg)	1271
Vehicle Type	MPV	GAWR Rear (kg)	1304

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	2	7	
Capacity Weight (VCW) (kg)				612	(A)
DSC x 68.04 kg				476	(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

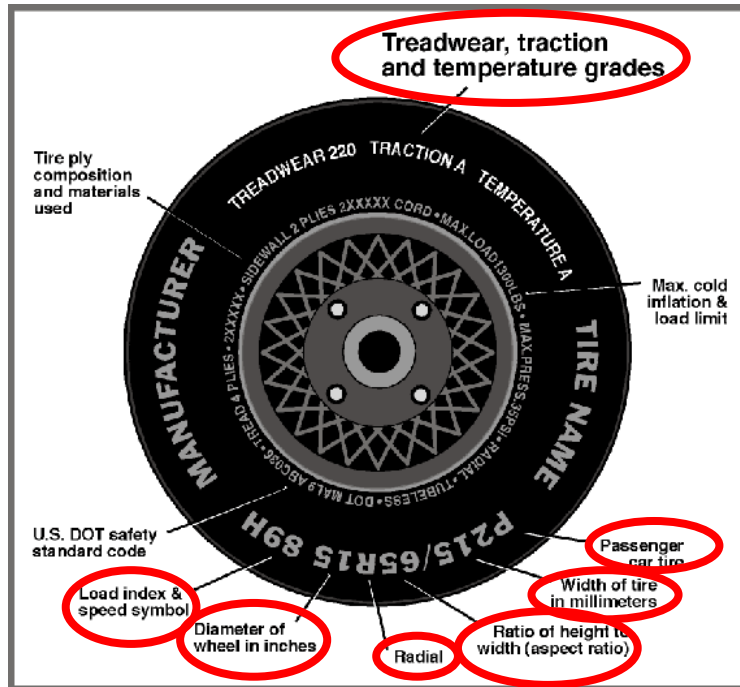
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row			X		X		
Third Row Seat			X		X		

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	280	290
Recommended Tire Size	215/55R16	215/55R16
Tire Size on Vehicle	215/55R16	215/55R16
Tire Manufacturer	Continental	Continental
Tire Model	ProContact TX	ProContact TX
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Rayon	1 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	97H	97H
Tire Material	Rubber	Rubber
DOT Safety Code Left	6GB3 WD3V	6GB3 WD3V
DOT Safety Code Right	6GB3 WD3V	6GB3 WD3V

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
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 Test Date: 11/20/2020

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	250	250	250	245
Tire Placard	kPa	280	280	290	290
Owner's Manual	kPa	285	285	290	290
As Tested	kPa	285	285	290	290

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	512.5	402.0		554.5	519.5		557.5	528.5	
Right	kg	493.5	392.5		503.5	482.0		493.0	486.5	
Ratio	%	55.9%	44.1%		51.4%	48.6%		50.9%	49.1%	
Totals	kg	1006.0	794.5	1800.5	1058.0	1001.5	2059.5	1050.5	1015.0	2065.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1800.5	(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 (TVTWT)	kg	2065.5	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement*
Left Front	mm	684	692	Yes
Right Front	mm	697	692	Yes
Right Rear	mm	716	717	Yes
Left Rear	mm	703	703	Yes
Vehicle CG (Aft of Front Axle)	mm	1508	1492	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	40	34	

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	83
Components Removed: none	kg	

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	891
Aft 25 mm Target	mm	908
Pre-Impact Angle Line	mm	100

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: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020

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	12.5	7.1	9.8
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid) (°)	As-Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear-Most	Mid	Forward- Most
Driver Seat	9.8	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

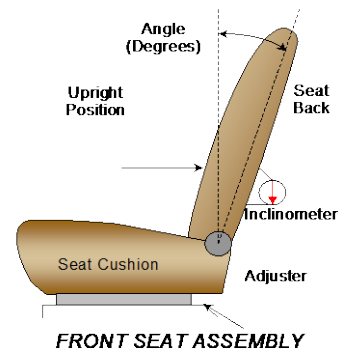
NHTSA No.: M20210220
 Test Date: 11/20/2020

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	228		114	
Front Passenger Seat	220	23	110	11
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	90.4		8.7	
Front Passenger Seat	72.3	38	9.2	14
Front Center Seat				
Struck Side Rear Seat	Fixed		4.9	
Non-Struck Side Rear Seat	Fixed		4.9	
Rear Center Seat	Fixed		4.9	

Seat back angles measured on outboard headrest post guide.

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
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SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on S1 - Vehicle Setup Information.

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

HEAD RESTRAINT ADJUSTMENT

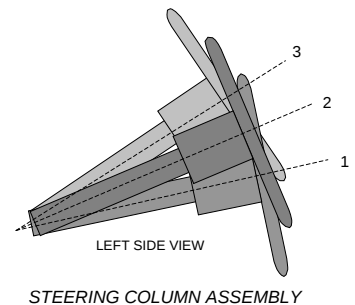
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	3	2 (Lowest as 0) / Forward
Rear Seat	2	0 (Lowest as 0) / Fixed Fore-Aft

STEERING COLUMN ADJUSTMENT

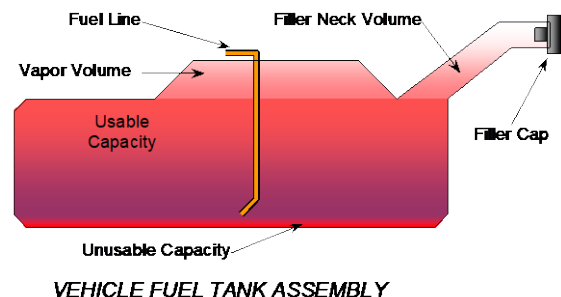
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	66.0	
Geometric Center, Position 2	63.0	
Uppermost, Position 3	60.0	
Telescoping Steering Wheel Travel		50
Test Position	63.0	25



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The electronic fuel pump operates for a prescribed amount of time to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls, the fuel pump is deactivated. The filler neck is located on the passenger's side.



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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
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FUEL TANK CAPACITY DATA

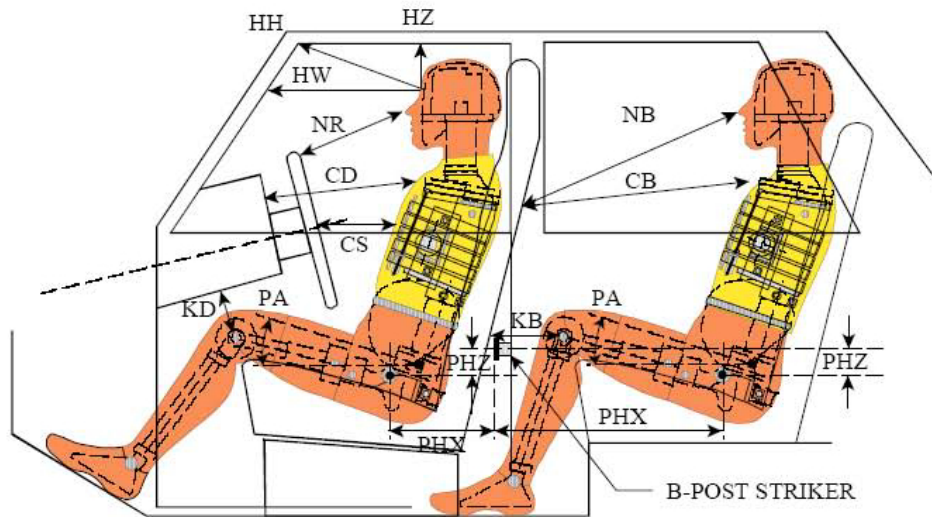
	Liters
Usable Capacity of Standard Tank (see S1 - Vehicle Setup Information)	60.0
Usable Capacity of Optional Tank (see S1 - Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	59.8
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	55.8
Actual Amount of Solvent Used	55.8
1/3 of Usable Capacity	20.0

Is the actual amount of solvent used in the test equal to $93\% \pm 1\%$
 of the Usable Capacity stated in S1 - Vehicle Setup Information? **YES**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



LEFT SIDE VIEW

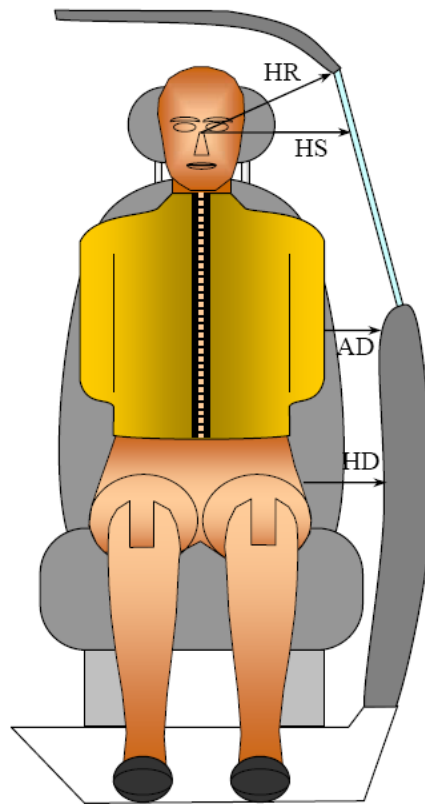
NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	595	21.5		
HW		Head to Windshield	873	0		
HZ	HZ	Head to Roof Liner	357	90	431	90
NR	NB	Nose to Rim/Seat Back	477	20.1	526	18.2
CD	CB	Chest to Dashboard/Seat Back	605	0.8	536	7.8
CS		Chest to Steering Wheel	417	11.9		
KDL	KBL	Left Knee to Dash/Seat Back	155	34.5	291	8.5
KDR	KBR	Right Knee to Dash/Seat Back	160	36.0	300	21.5
PAX	PAX	Pelvic Tilt Angle X		21.1		21.1
PAY	PAY	Pelvic Tilt Angle Y		-0.6		0.1
PHX	PHX	Hip Point to Striker (X-Axis)	193		338	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	49		159	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
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 Test Date: 11/20/2020

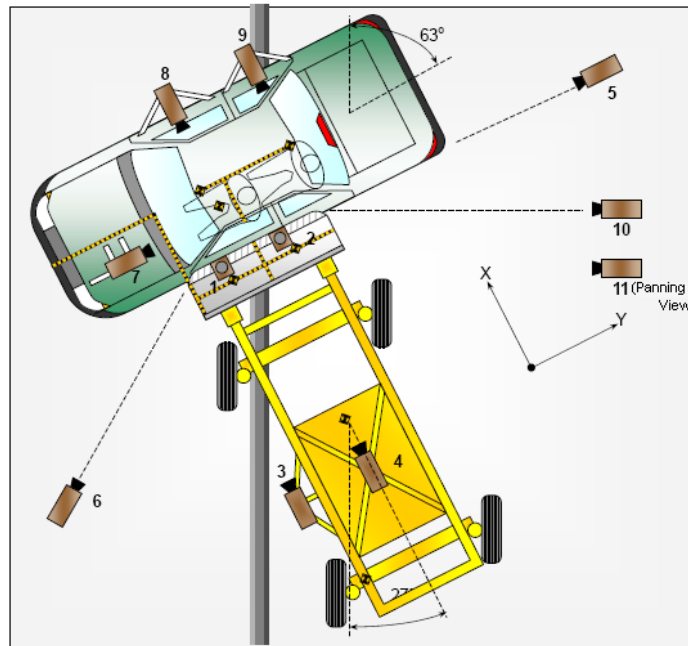


Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	310	295
HS	Head to Side Window	401	382
AD	Arm to Door	100	152
HD	Hip Point to Door	153	156

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020



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

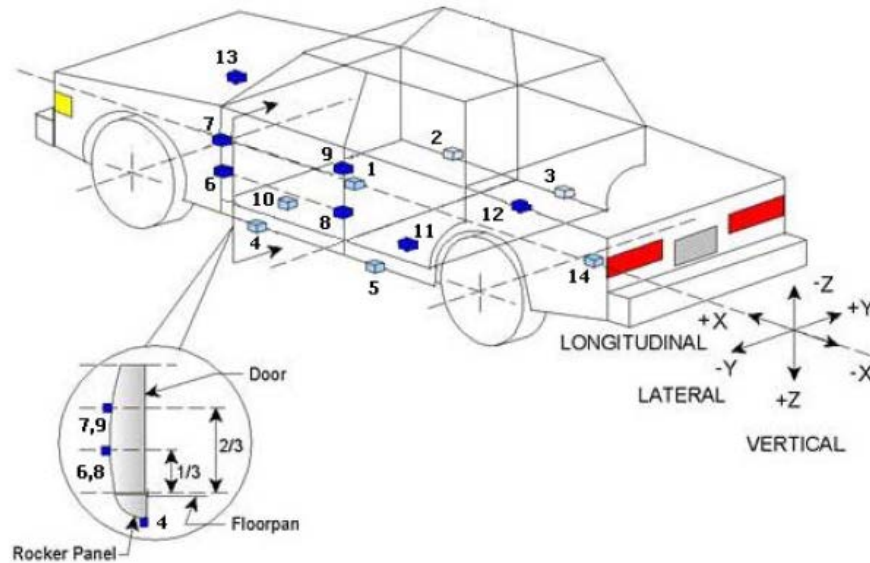
INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Passenger Dummy	19
Vehicle Structure	23
MDB Accelerometers	5
Total	63

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020



TEST VEHICLE ACCELEROMETER LOCATIONS

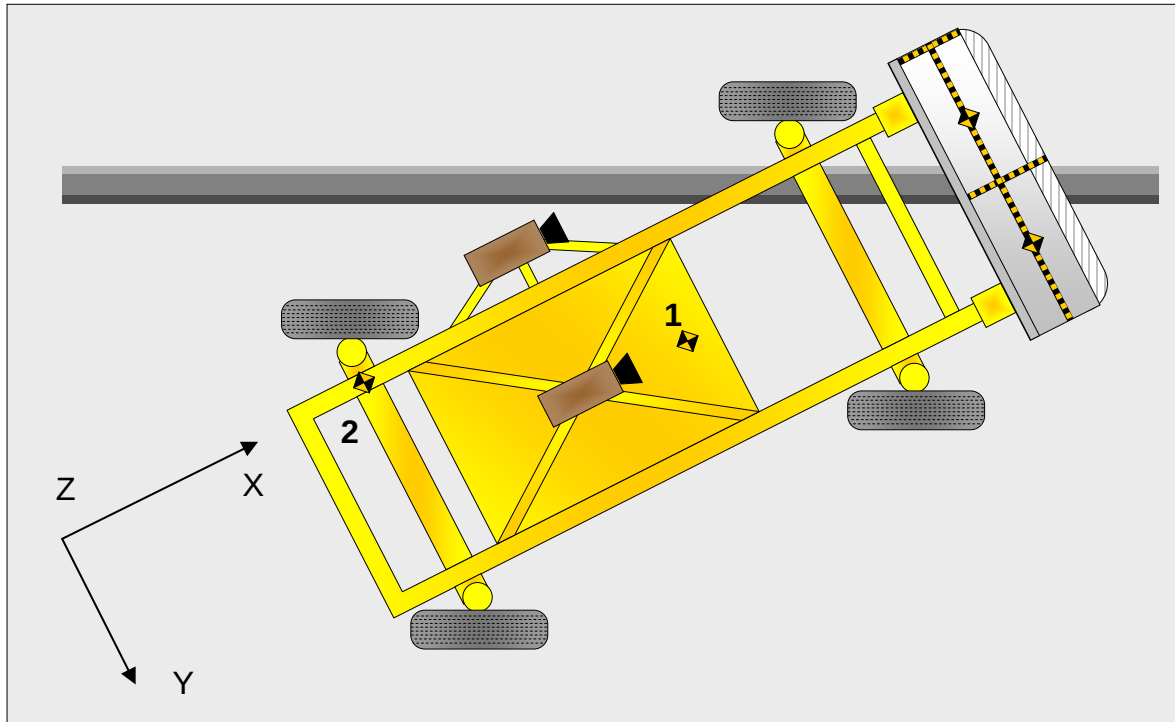
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2489	160	-210
2	Right Sill at Front Seat	2529	700	-215
3	Right Sill at Rear Seat	1609	700	-218
4	Left Sill at Front Door	2930	-700	-204
5	Left Sill at Rear Door	1781	-700	-201
6	Left Lower A-Post	3420	-820	-565
7	Left Middle A-Post	3415	-815	-790
8	Left Lower B-Post	2366	-725	-625
9	Left Middle B-Post	2371	-730	-820
10	Front Seat Track	2501	-220	-293
11	Rear Seat Structure	1666	-300	-464
12	Rt. Rear Occ. Compartment	1665	355	-415
13	Engine Block	4139	0	-822
14	Rear Above Axle	765	0	-540

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: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



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	1405
---	----	------

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag, Headliner	Curtain Airbag, Center Headrest
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headliner, Headrest	Curtain Airbag, Center Headrest
Left Shoulder	Curtain Airbag, Side Torso Airbag	Door Panel
Upper Torso	Side Torso/Pelvis Airbag, Seatback	None
Lower Torso	Side Torso/Pelvis Airbag, Seatback	Door Panel
Left Hip	Door Panel	Door Panel
Left Knee	None	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	
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	
Disengaged from Latched Position	No	No	No	No	
Latch Separated from Striker	No	No	No	No	
Jammed Shut	Yes	Yes	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	Vehicle rolled 90° onto passenger side

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020

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 (Other)				
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes		Yes	
Other:	No		No	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3068
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		508
Actual Impact Point (Aft of Front Axle)	mm		511
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-3
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	7

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020

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

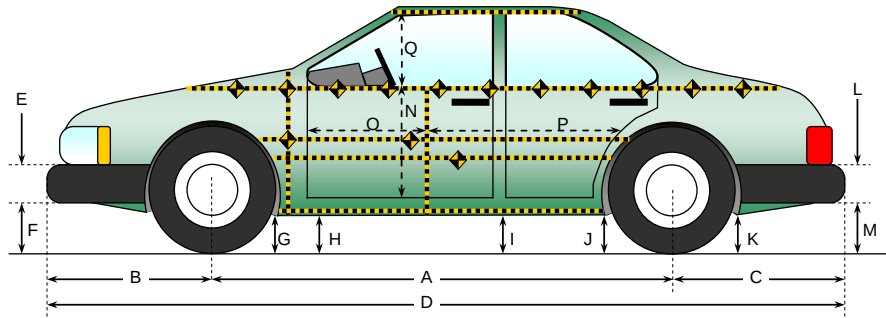
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.96
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.00
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.8
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	26.9

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
Test Date: 11/20/2020



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

LEFT SIDE VIEW

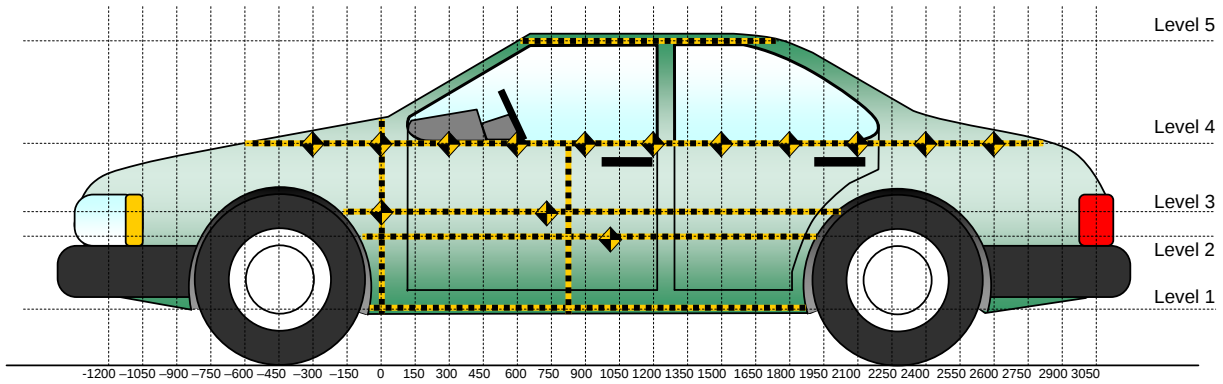
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3068	3072	-4
B	Front Axle to FSOV	885	789	96
C	Rear Axle to RSOV	915	965	-50
D	Total Length at Centerline	4868	4826	42
E	Front Bumper Thickness	140	140	0
F	Front Bumper Bottom to Ground	220	228	-8
G	Sill Height at Front Wheel Well	183	186	-3
H	Sill Height at Front Door Leading Edge	183	189	-6
I	Sill Height at B Pillar	189	193	-4
J1	Sill Height at Rear Wheel Well	198	200	-2
J2	Pinch Weld Height at Rear Wheel Well	199	200	-1
K	Sill Height Aft of Rear Wheel Well	230	236	-6
L	Rear Bumper Thickness	90	90	0
M	Rear Bumper Bottom to Ground	285	285	0
N	Sill Height to Window Bottom Sill	797	668	129
O	Front Door Leading Edge to Impact CL	899	857	42
P	Rear Door Trailing Edge to Impact CL	1335	1277	58
Q	Front Window Opening	544	552	-8
R	Right Side Length	4219	4238	-19
S	Left Side Length	4219	4213	6
T	Vehicle Width at B Post	1804	1668	136
U	Front Wheel Track Width	1560		
V	Rear Wheel Track Width	1574		

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	298	57	1050
2	Mid Door	634	210	1650
3	Occupant H-Point	659	214	1650
4	Window Sill	912	191	1500
5	Window Top	1645	13	900

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: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020

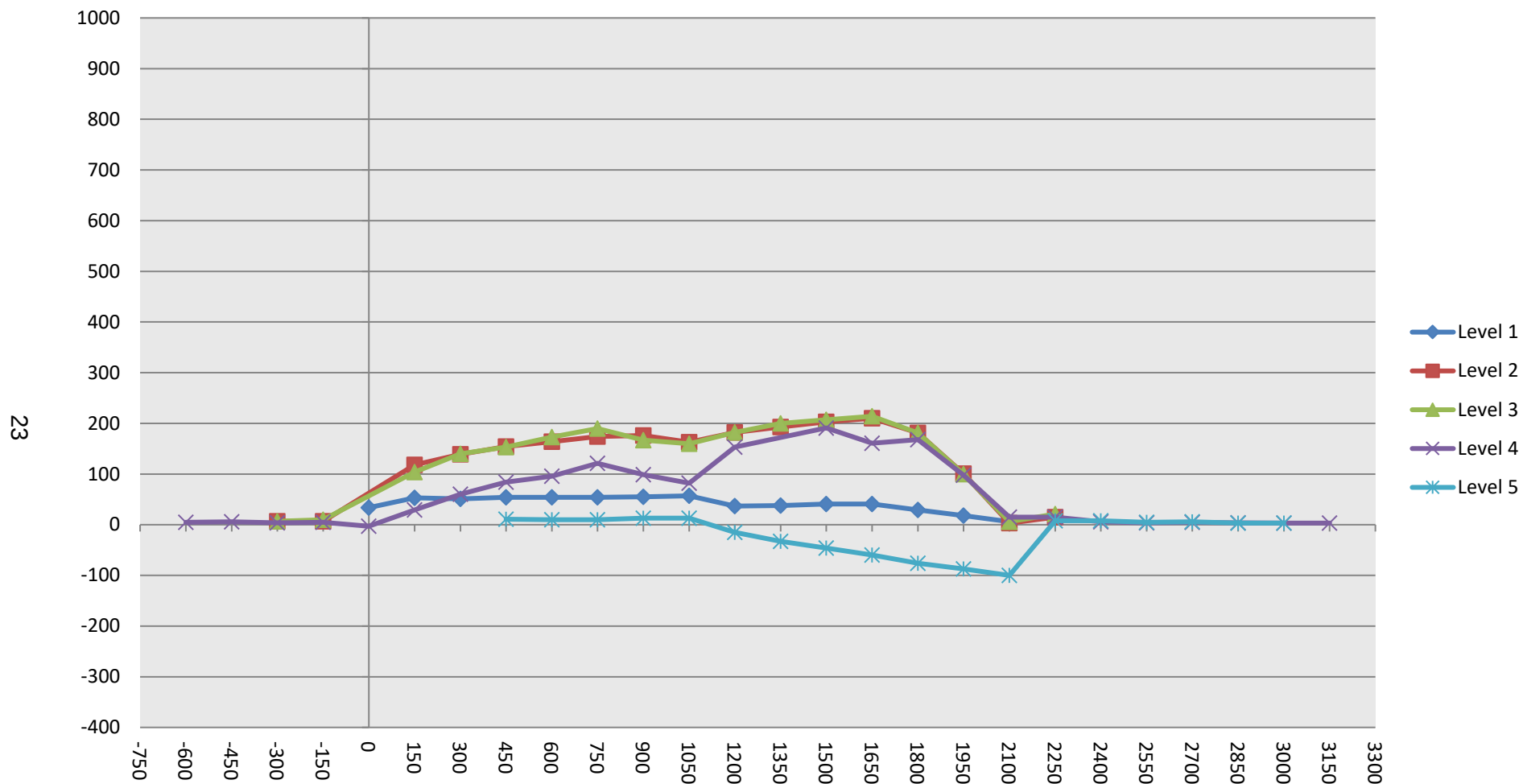
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600				295					300					5	
-450				285					291					6	
-300		190	188	272			197	195	276			7	7	4	
-150		205	205	260			212	215	265			7	10	5	
0	242			250		276			247		34			-3	
150	243	220	220	240		296	338	324	269		53	118	104	29	
300	243	218	217	233		294	357	357	293		51	139	140	60	
450	243	216	215	227	475	297	370	368	311	486	54	154	153	84	11
600	243	215	215	221	416	297	379	388	317	426	54	164	173	96	10
750	243	215	214	216	404	297	389	404	337	414	54	174	190	121	10
900	243	214	213	214	397	298	390	380	313	410	55	176	167	99	13
1050	243	214	213	210	392	300	377	373	292	405	57	163	160	82	13
1200	246	213	213	193	387	283	395	395	346	372	37	182	182	153	-15
1350	245	213	213		384	283	406	413		351	38	193	200		-33
1500	246	214	213	219	380	287	417	420	410	334	41	203	207	191	-46
1650	246	214	214	221	378	287	424	428	382	318	41	210	214	161	-60
1800	247	216	215	222	377	276	397	396	390	301	29	181	181	168	-76
1950	248	218	217	224	374	266	319	317	322	287	18	101	100	98	-87
2100	245	207	210	225	373	251	210	216	240	273	6	3	6	15	-100
2250		191	192	226	370		206	213	241	378		15	21	15	8
2400				227	368				233	376				6	8
2550				230	371				234	376				4	5
2700				235	370				240	376				5	6
2850				243	373				247	376				4	3
3000				255	374				258	377				3	3
3150				275					278					3	
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: 2021 Ford Transit Connect XLT Wagon LWB
Test Program: NCAP Side MDB Impact Test

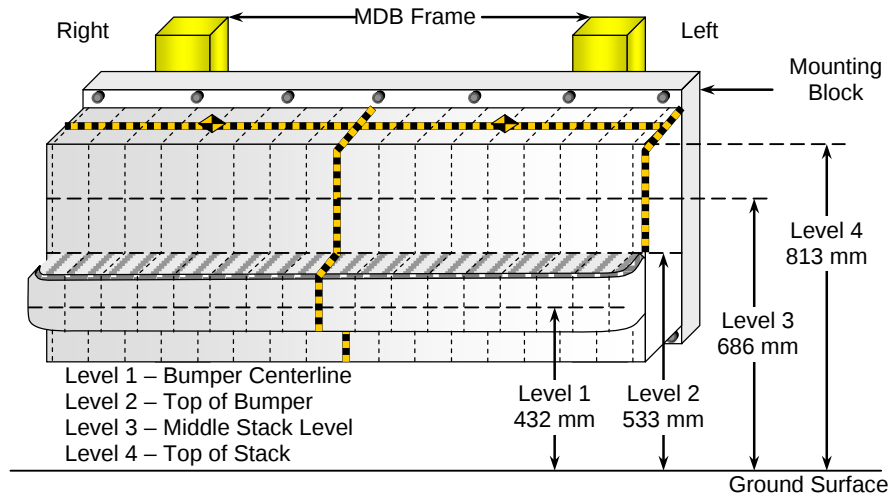
NHTSA No.: M20210220
Test Date: 11/20/2020



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



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	252
B	Top of Bumper	533	700	Right	135
C	Mid-Level	686	800	Left	155
D	Top of Stack	813	800	Left	180

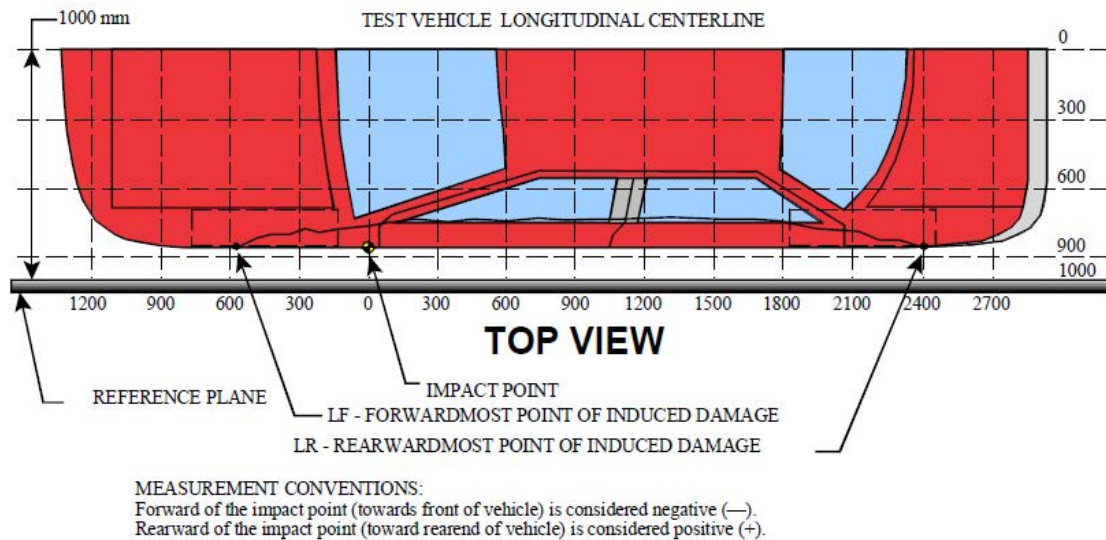
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C _L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
4	89	65	48	41	47	64	91	127	130	100	90	90	85	95	115	139	180
3	95	70	60	58	70	80	90	105	104	75	55	47	52	61	83	105	155
2	130	135	127	118	115	108	108	101	104	105	100	98	105	97	88	82	93
1	244	252	242	237	232	229	232	222	217	212	197	197	193	190	180	185	177

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2210	3	193	212	-19
2	1755	3	384	215	169
3	1300	3	362	213	149
4	845	3	343	213	130
5	390	3	306	216	90
6	-65	3	236	207	29

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	720	476	244
2	480 mm right of center	1	702	463	239
3	160 mm right of center	1	687	463	224
4	160 mm left of center	1	665	463	202
5	480 mm left of center	1	655	463	192
6	800 mm left of center	1	653	476	177

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

Test Vehicle: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

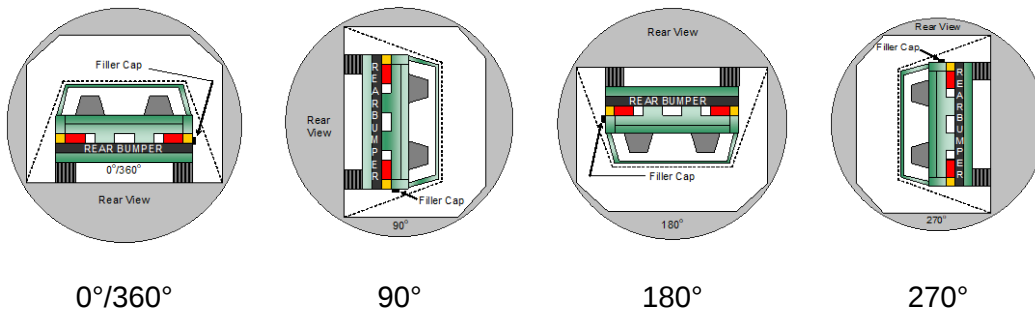
NHTSA No.: M20210220
 Test Date: 11/20/2020

Test Time: 11:19 am

Temperature: 21.4°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



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	112	300	412
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	

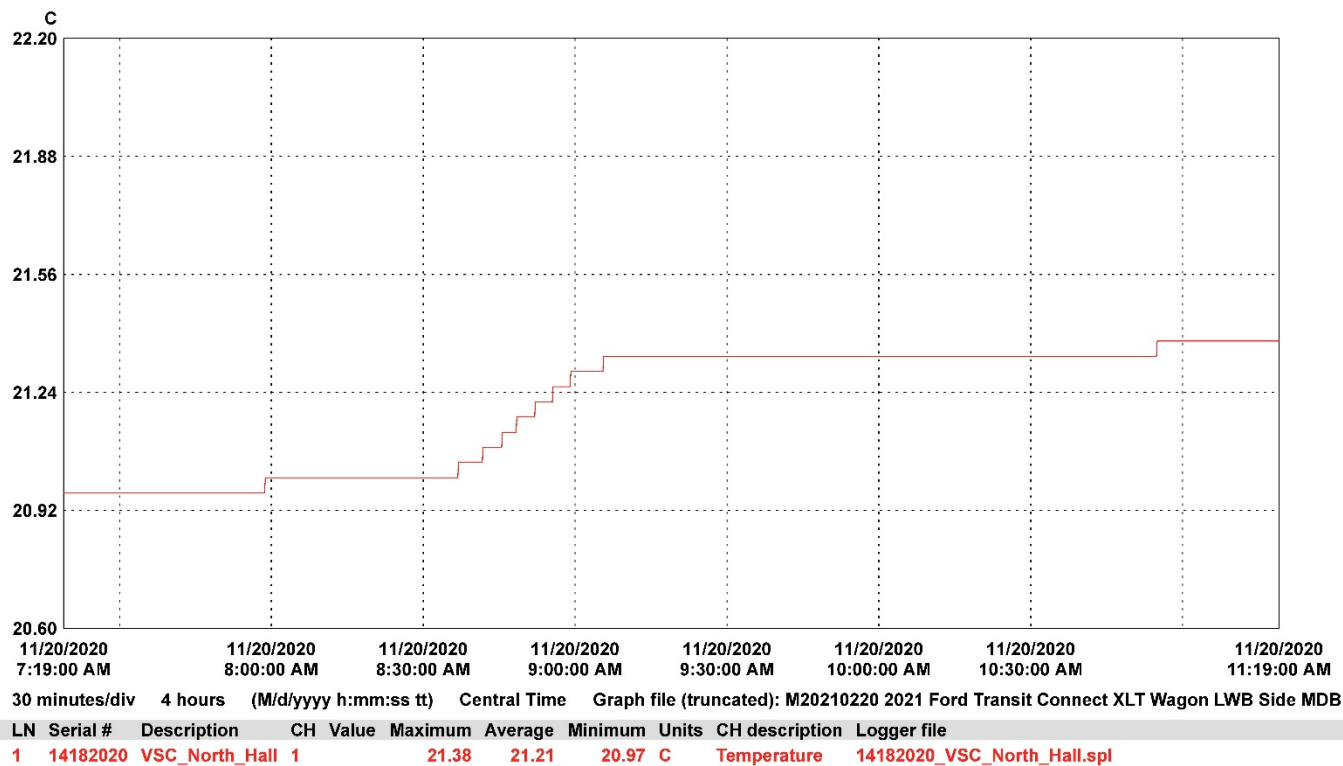
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2021 Ford Transit Connect XLT Wagon LWB
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20210220
 Test Date: 11/20/2020



APPENDIX A
PHOTOGRAPHS

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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

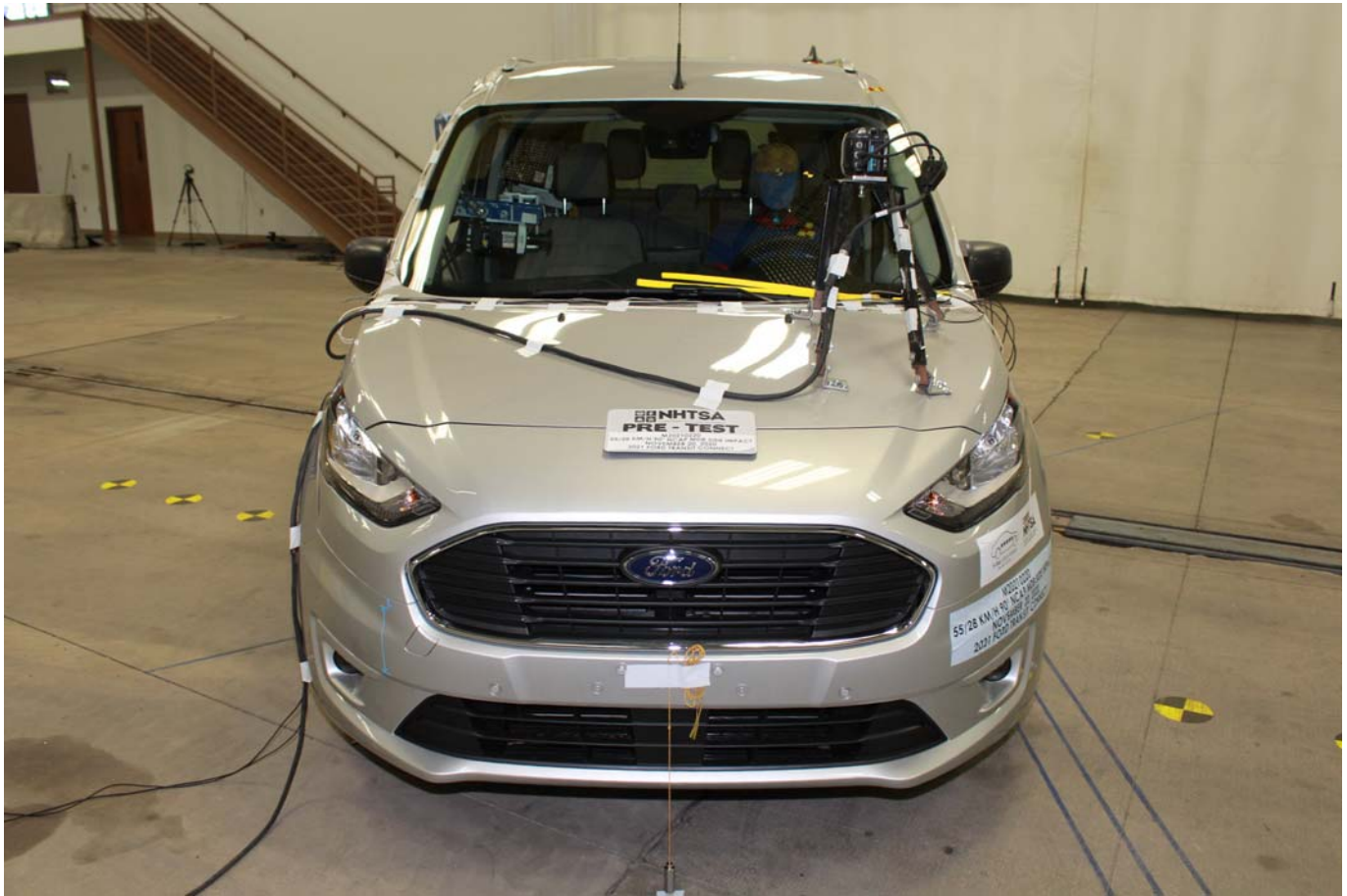


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

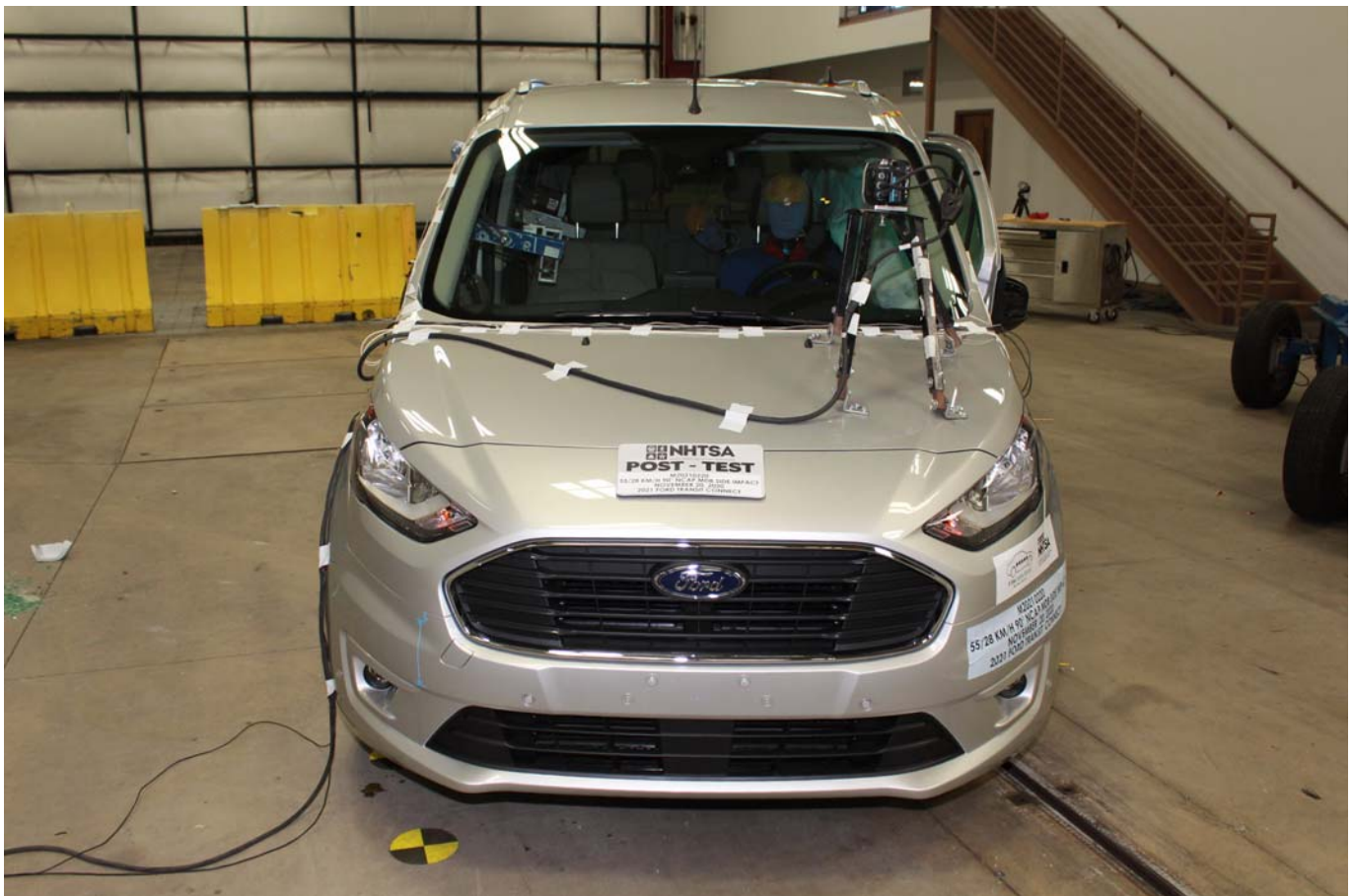


Photo No. 004 - Post-Test Frontal View of Test Vehicle



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

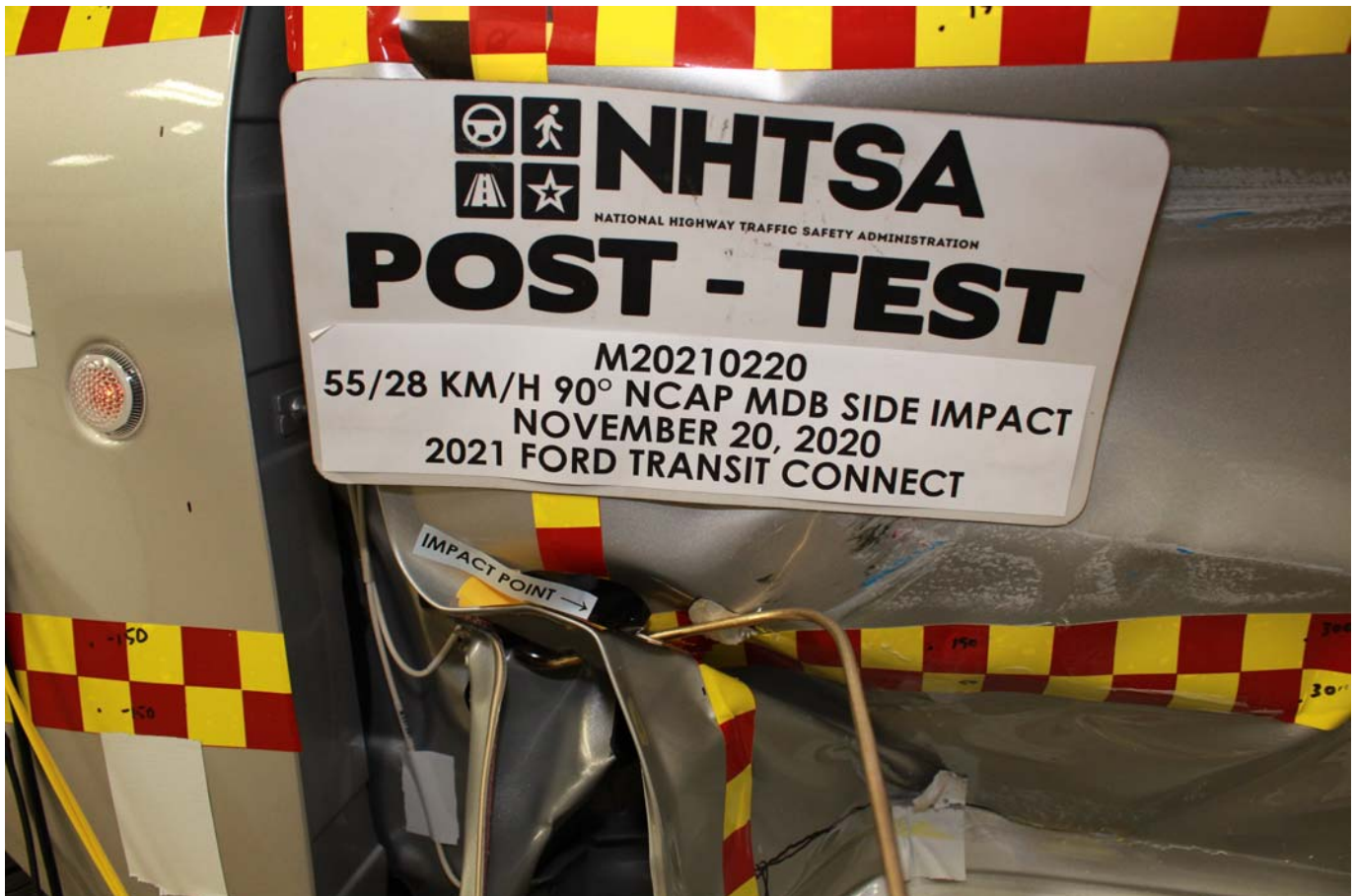


Photo No. 020 - Post-Test Close-Up View of Impact Point Target



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

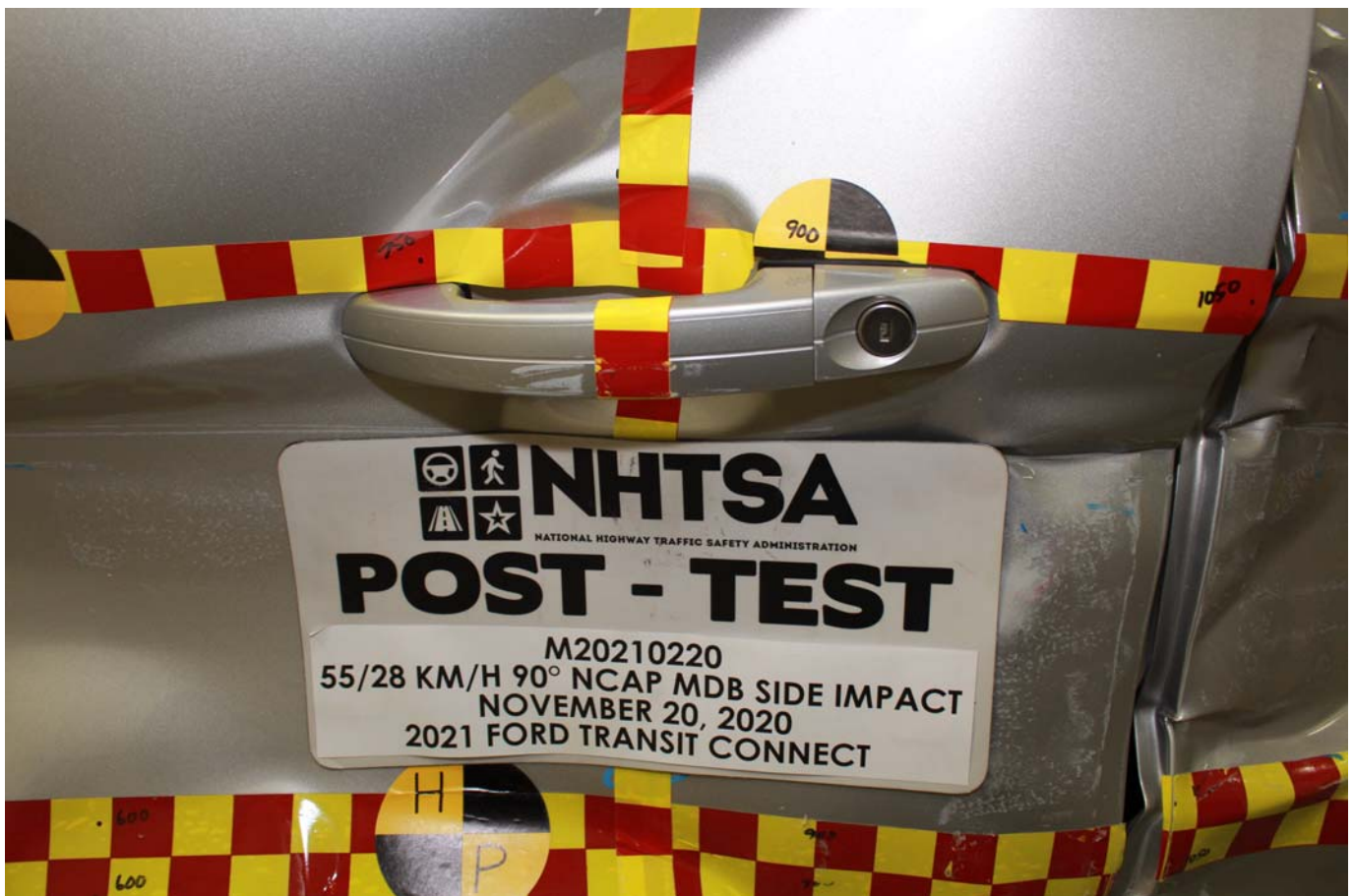


Photo No. 022 - Post-Test Left Front Door Latch Close-Up

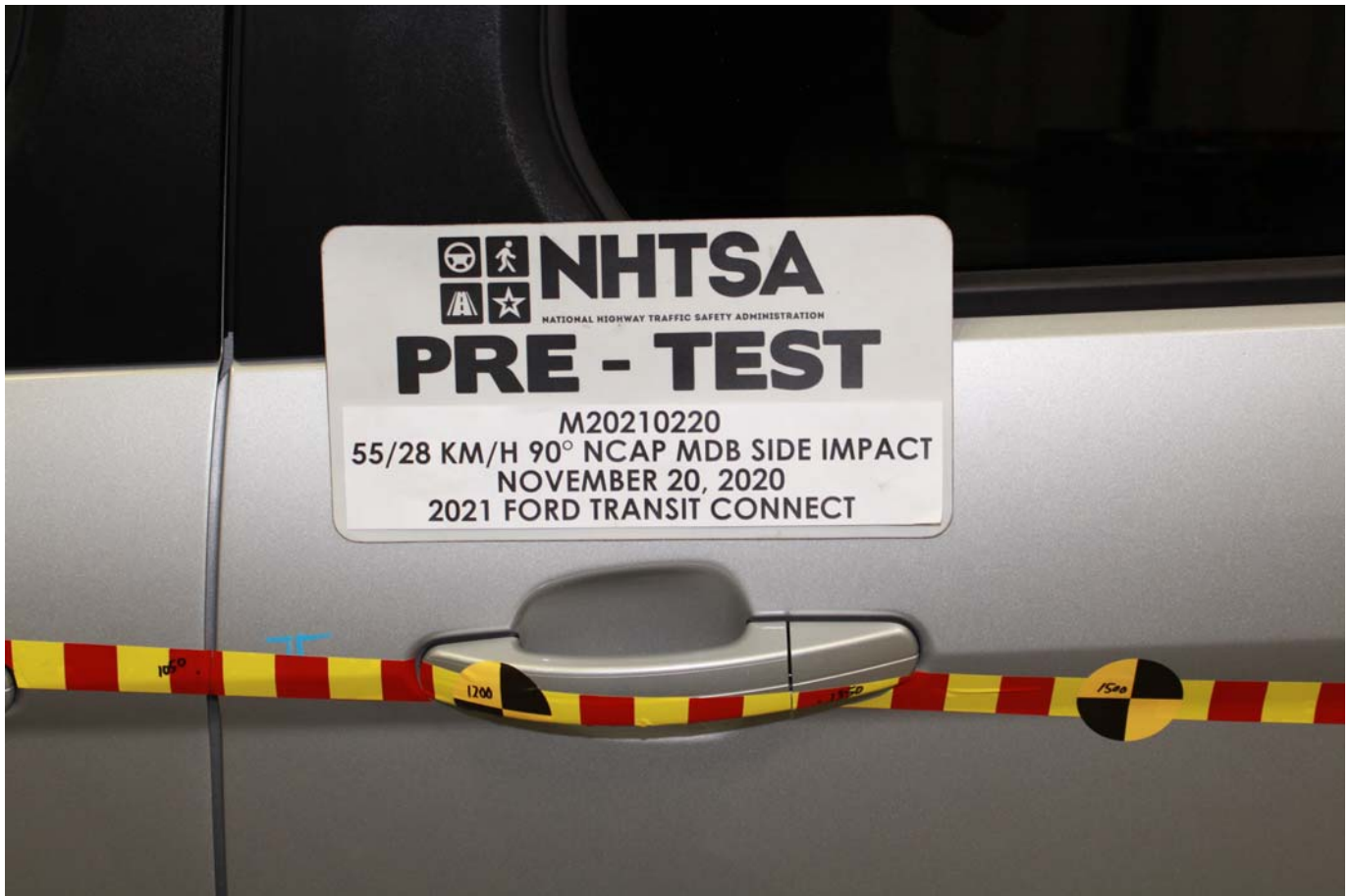


Photo No. 023 - Pre-Test Left Rear Door Latch Close-Up



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



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

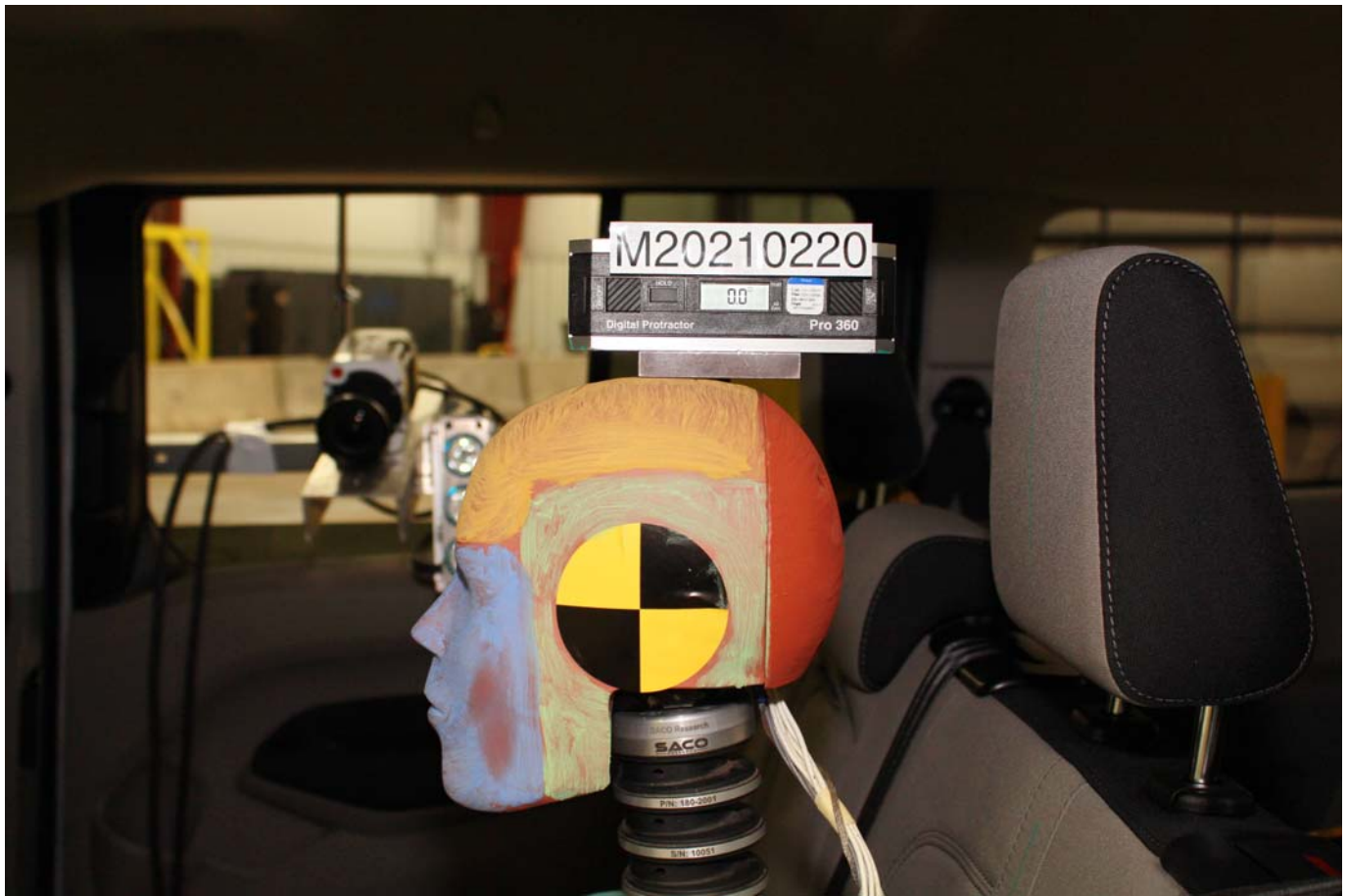


Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level



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

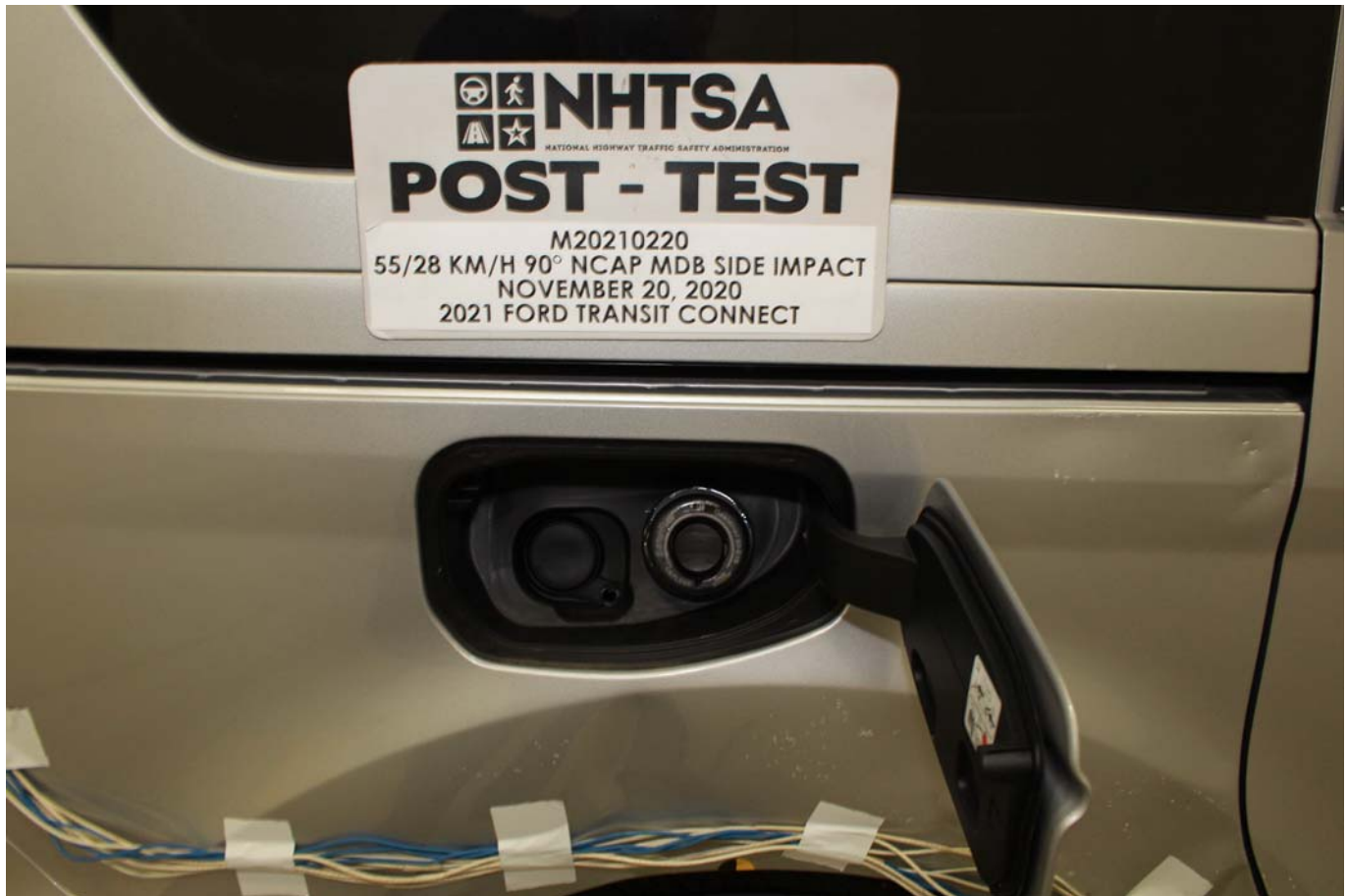


Photo No. 083 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



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

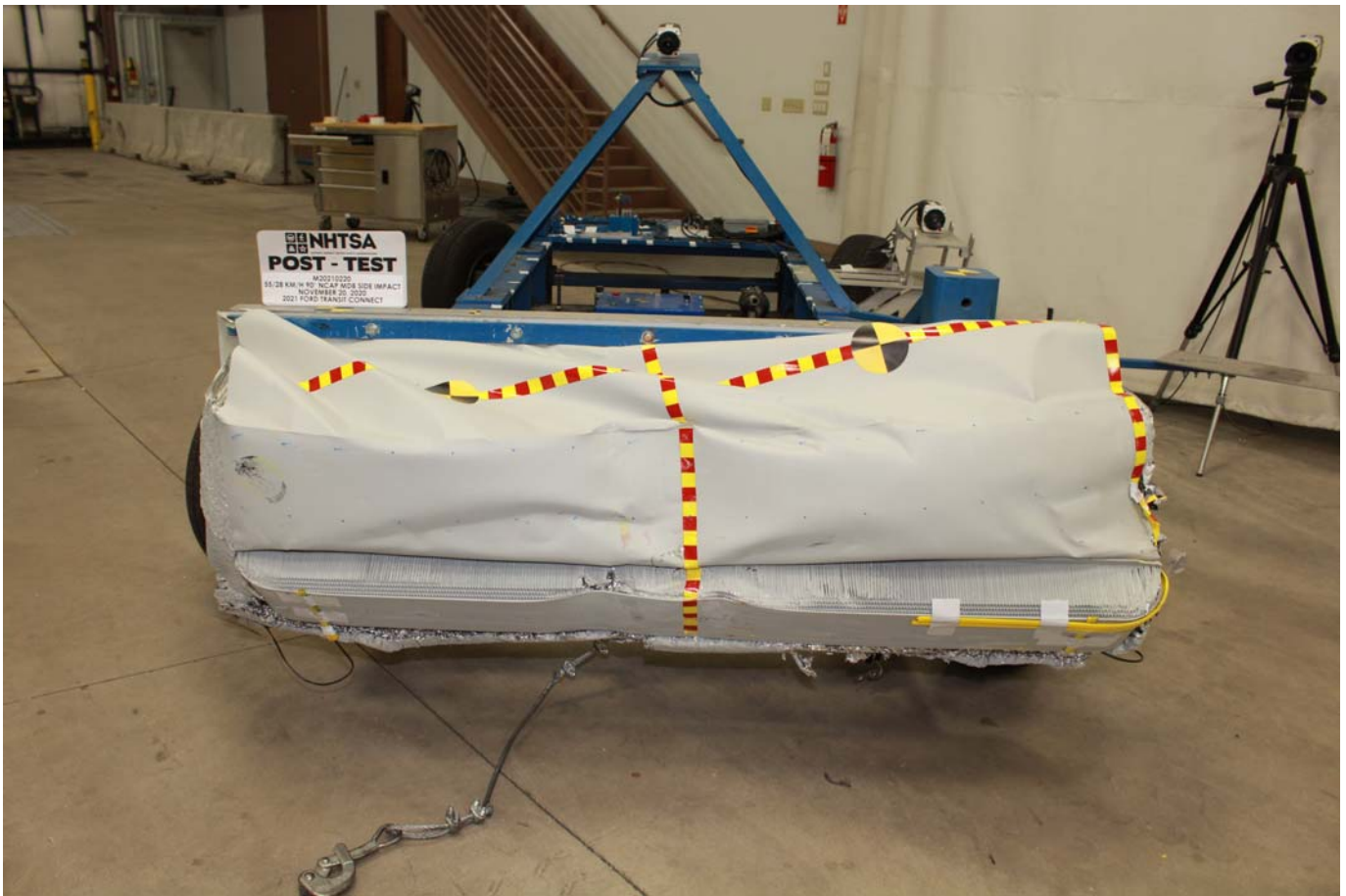


Photo No. 085 - Post-Test Front View of MDB Impactor Face



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

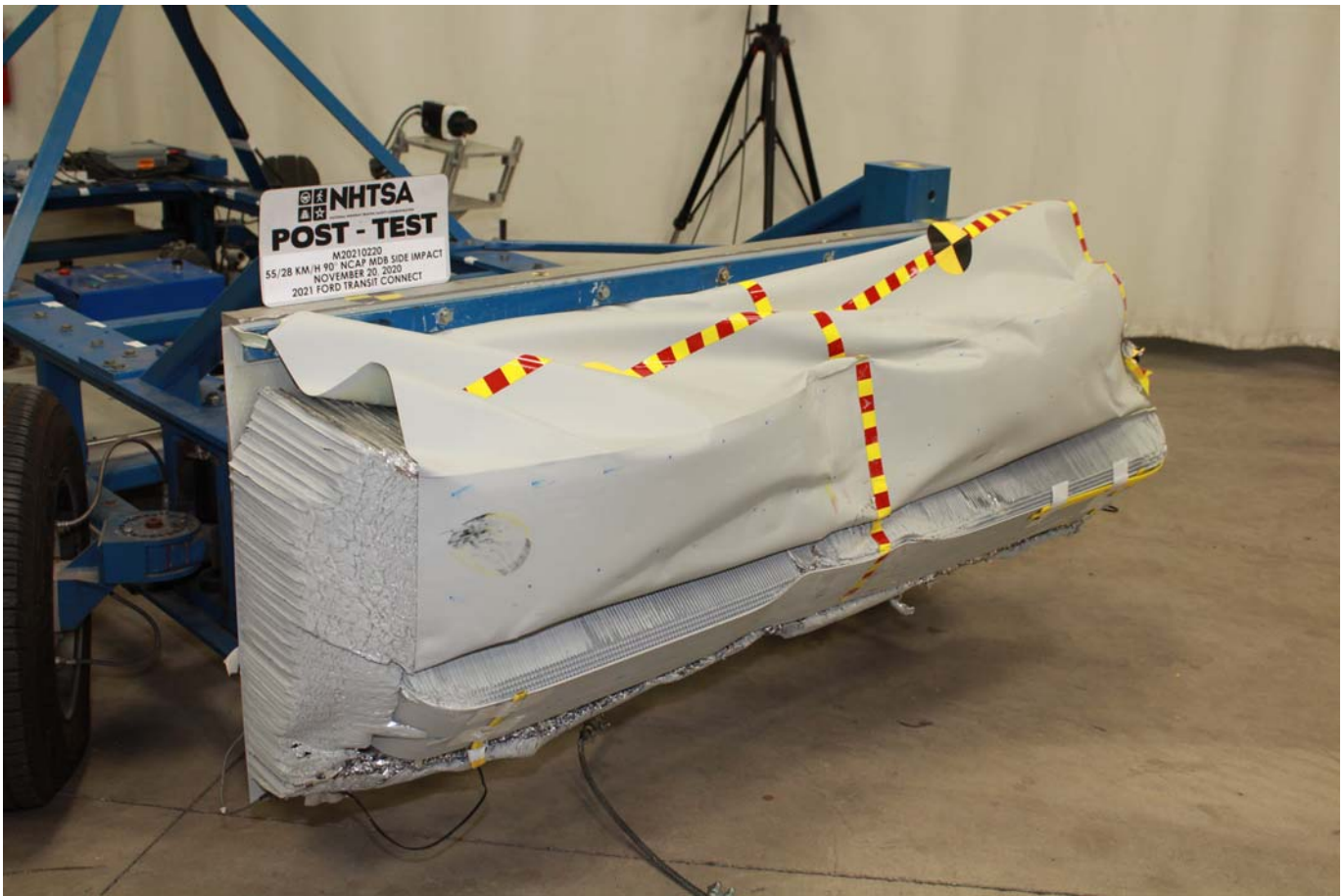


Photo No. 091 - Post-Test Right Side View of MDB Impactor Face



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

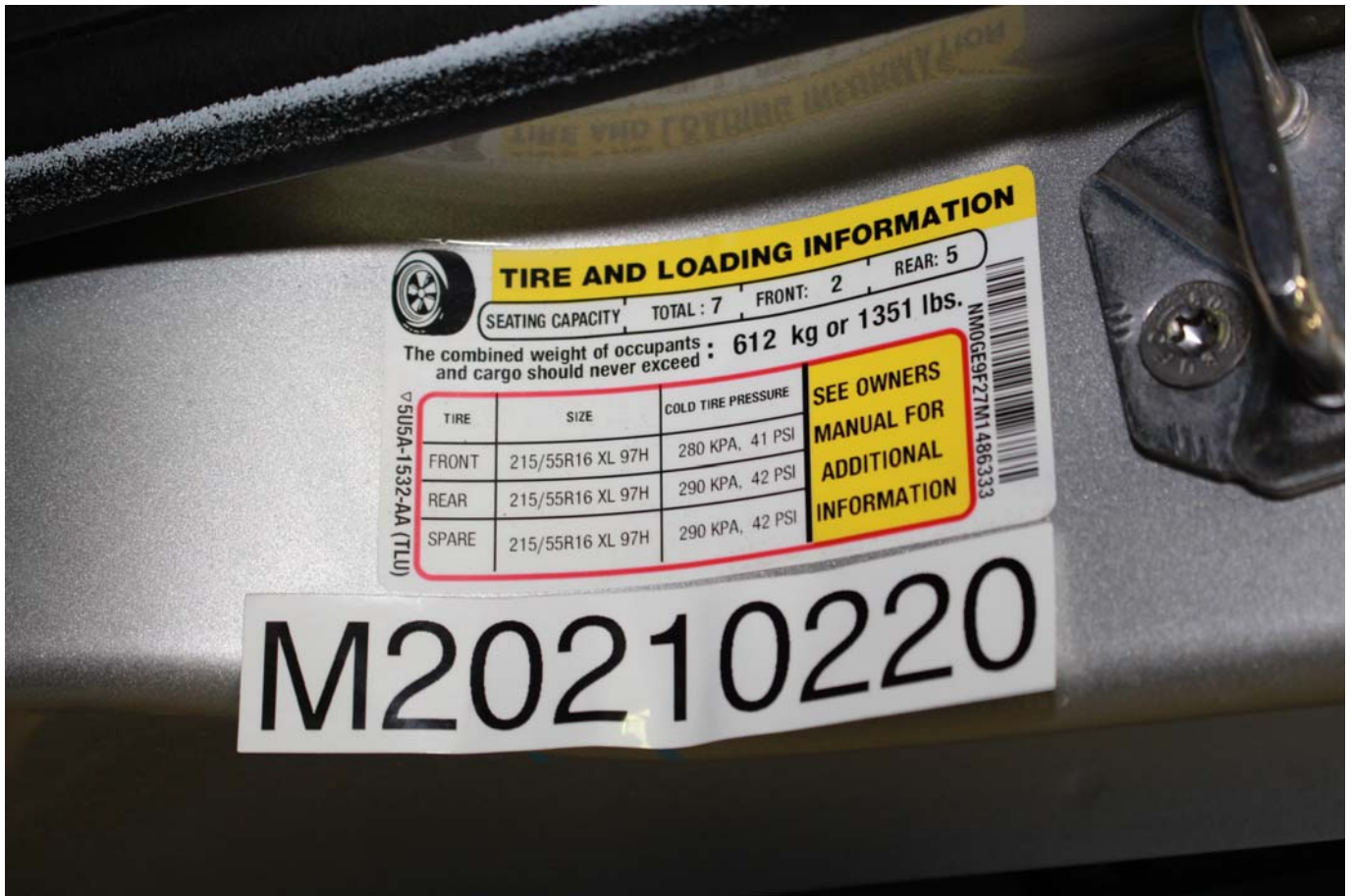


Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label



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

TRANSIT CONNECT M1 486333				EPA DOT Fuel Economy and Environment		Gasoline Vehicle
VEHICLE DESCRIPTION 2021 XLT WAGON LWB XLT 7 PASSENGER 2.0L GDI I4 ENGINE 8 SPD AUTO TRANSAXLE EXTERIOR SILVER METALLIC INTERIOR PALAZZO GREY CLOTH SEATS				Fuel Economy 26 MPG combined city/hwy 3.8 gallons per 100 miles		You spend \$250 more in fuel costs over 5 years compared to the average new vehicle.
STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE				Annual fuel cost \$1,550		Fuel Economy & Greenhouse Gas Rating (tailpipe only) 1 5 10 Best This vehicle emits 344 grams CO ₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fuelconomy.gov
EXTERIOR • BODY SIDE MOLDINGS - BODY COLOR • BUMPERS - BODY COLOR • DOOR HANDLES - BODY COLOR • DOORS - DUAL SLIDING SIDE LIFTGATE W/ FXD GLASS REAR • FOG LAMPS • GRILLE - 5 BAR, CHROME • HEADLAMPS - AUTO HIGH BEAM • POWER ADJUSTABLE POWER FOLD EXTERIOR MIRRORS • WIPERS - RAIN-SENSING				INTERIOR • 2ND AND 3RD ROW SEATS • 6-WAY POWER DRIVER/4-WAY MANUAL PASSENGER SEATS • AUTO-DIM REARVIEW MIRROR • CENTER CONSOLE W/ ARMREST, STORAGE & 2 CUPHOLDERS • DUAL-ZONE ELECTRONIC AUTO CLIMATE CONTROL • FLOOR COVERING - CARPETED • OVERHEAD STORAGE SHELF • POWERPOINTS - 12V (3) • SMART CHARGING USB PORT(2) • STEERING - TILT/TELESCOPIC • WINDOWS-1-TOUCH UP/DOWN FRONT/REAR		FUNCTIONAL • BLIS (BLIND SPOT INFO SYS) • BRAKES - 4-WHEEL DISCS • FORDPASS SM CONNECT 4GWI-FI HOTSPOT TELEMATICS MODEM • FRONT WHEEL DRIVE • FUEL TANK - 15.8 GAL • HILL START ASSIST • PHONE WIRELESS CHARGING PAD • PRE-COLLISION ASSIST W/AEB • REAR VIEW CAMERA • REMOTE KEYLESS ENTRY • REVERSE SENSING SYSTEM • SYNC ³
INCLUDED ON THIS VEHICLE ORDER CODE 210A				PRICE INFORMATION BASE PRICE \$29,515.00 TOTAL OPTIONS/OTHER 1,030.00 TOTAL VEHICLE & OPTIONS/OTHER DESTINATION & DELIVERY 30,545.00		Smog Rating (tailpipe only) 1 6 10 Best
OPTIONAL EQUIPMENT/OTHER 2ND ROW 3-PASS 60/40 BENCH 50 STATE EMISSIONS ROOF RACK INCLUDING CROSSBARS 16" ALUM WH/LUSTER NICKEL FRONT AND REAR SENSING SYSTEM 6-WAY POWER DRVR W/4WAY PSGR				WARRANTY • 3YR/36,000 BUMPER / BUMPER • 5YR/60,000 POWERTRAIN • 5YR/60,000 ROADSIDE ASSIST		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 Passenger Not Rated 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 Rear seat Not Rated 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				FordPass ConnectSM Download the FordPass SM app and you can: Access Vehicle Control Features: • Remotely start, lock and unlock your vehicle. • Locate your vehicle and check approximate fuel range. • Receive vehicle health alerts. Activate 4G LTE Wi-Fi Hotspot: • New vehicles include a 3-month or 3GB data (whichever comes first) Wi-Fi trial. • Connect up to ten Wi-Fi-equipped devices. *Not available with other companies' cellular. See FordPass.com for more details. The FordPass Connect SM modem is active and sending vehicle data (e.g., diagnostics) to Ford. See in-vehicle Settings for connectivity options.		
FORD PROTECTSM Insist on Ford Protect SM ! The only extended service plan fully backed by Ford and honored at every Ford dealership in the U.S., Canada and Mexico. See your Ford dealer or visit www.FordOwner.com .				WARNING: Operating, servicing and maintaining a passenger vehicle, pickup truck, van, or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.P65Warnings.ca.gov/passenger-vehicle .		
SOLD TO: Metro Ford, 5422 Wayne Terrace, Madison, WI 53718 SHIP TO: IF OTHER THAN SOLD TO SHIP THROUGH:				41A 102 RAMP ONE VALENCIA METHOD OF TRANSIT CONVOY ITEM #: 41-D101 Q/T 2 41-D101 Q/T 2 SHIP THROUGH:		TOTAL MSRP \$31,940.00 FORD CREDIT Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit www.ford.com/finance . LJ103 N RB32X 115 003156 09 10 20

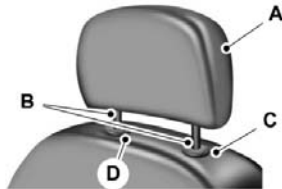
Photo No. 102 - Monroney Label

HEAD RESTRAINTS

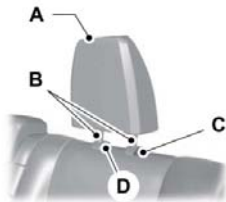
- WARNING:** Adjust the head restraints for all passengers before you drive your vehicle. This will help minimize the risk of neck injury in the event of a crash. Do not adjust the head restraints when your vehicle is moving.
- WARNING:** The head restraint is a safety device. Whenever possible it should be installed and properly adjusted when the seat is occupied. An improperly adjusted head restraint may not adequately protect an occupant during an impact from the rear.
- WARNING:** Install the head restraint properly to help minimize the risk of neck injury in the event of a crash.

Note: Adjust the seat backrest to an upright driving position before adjusting the head restraint. Adjust the head restraint so that the top of it is level with the top of your head and as far forward as possible. Make sure that you remain comfortable. If you are extremely tall, adjust the head restraint to its highest position.

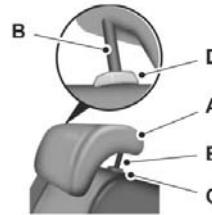
Front Seat Head Restraint



Second Row Outboard Head Restraints



Second Row Center Head Restraint and Third Row Head Restraints



The head restraints consist of:

- A Energy absorbing head restraint.
- B Steel stems.
- C Guide sleeve adjust and unlock button.
- D Guide sleeve unlock and remove button.

Adjusting the Head Restraint

Raising the Head Restraint

Pull the head restraint up.

Lowering the Head Restraint

1. Press and hold button C.
2. Push the head restraint down.

Removing the Head Restraint

1. Pull the head restraint up until it reaches its highest position.
2. Press and hold buttons C and D.
3. Pull the head restraint up.

Installing the Head Restraint

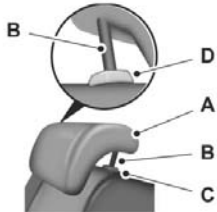
Align the steel stems into the guide sleeves and push the head restraint down until it locks.

Tilting Head Restraints (If Equipped)

The head restraints tilt for extra comfort. To tilt the head restraint, do the following:

Photo No. 103 - Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Second Row Center Head Restraint and Third Row Head Restraints



The head restraints consist of:

- A Energy absorbing head restraint.
- B Steel stems.
- C Guide sleeve adjust and unlock button.
- D Guide sleeve unlock and remove button.

Adjusting the Head Restraint

Raising the Head Restraint

Pull the head restraint up.

Lowering the Head Restraint

1. Press and hold button C.
2. Push the head restraint down.

Removing the Head Restraint

1. Pull the head restraint up until it reaches its highest position.
2. Press and hold buttons C and D.
3. Pull the head restraint up.

Installing the Head Restraint

Align the steel stems into the guide sleeves and push the head restraint down until it locks.

Tilting Head Restraints (If Equipped)

The head restraints tilt for extra comfort. To tilt the head restraint, do the following:



1. Adjust the seat backrest to an upright driving or riding position.
2. Pivot the head restraint forward toward your head to the desired position.

After the head restraint reaches the forward-most tilt position, pivot it forward again to release it to the rearward, un-tilted position.

Photo No. 104 - Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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Figure No. 3.	Driver Head Acceleration (Z) Primary vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
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Figure No. 16.	Passenger Head Acceleration (Z) Primary vs. Time	B-5
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Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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)

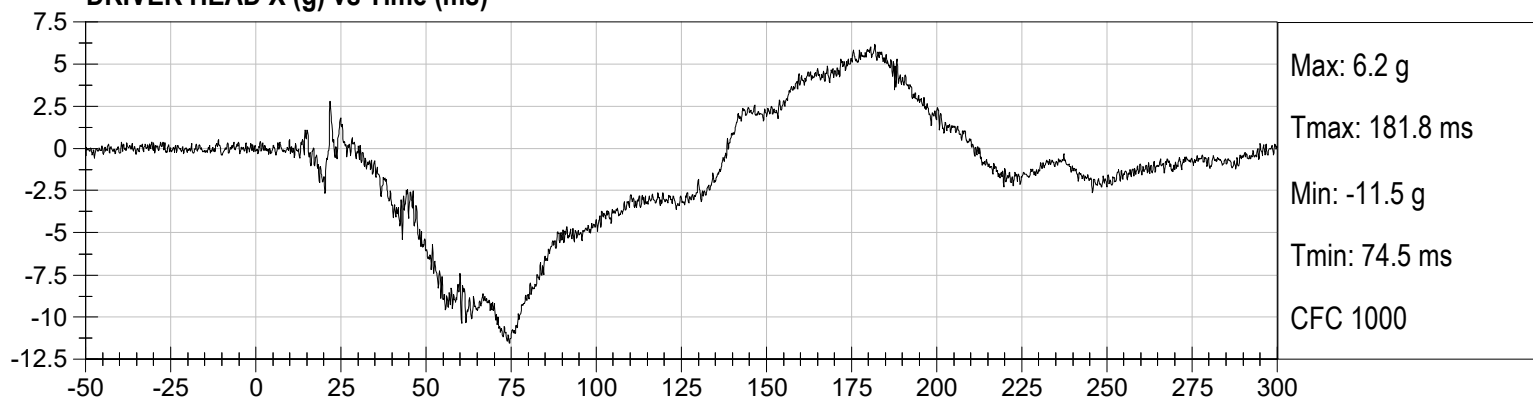
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

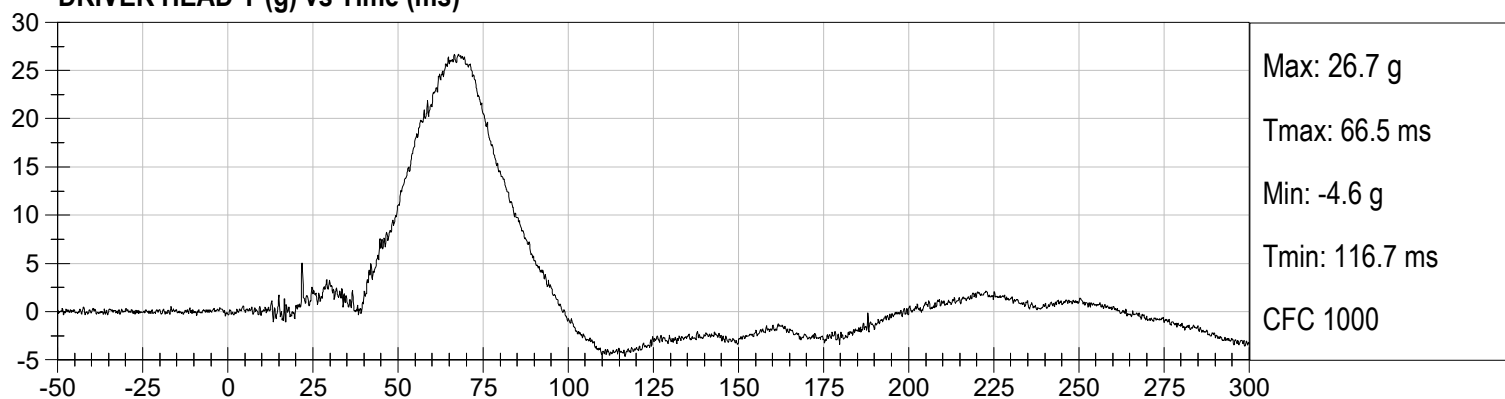
Left MDB Contact Switch

Right MDB Contact Switch

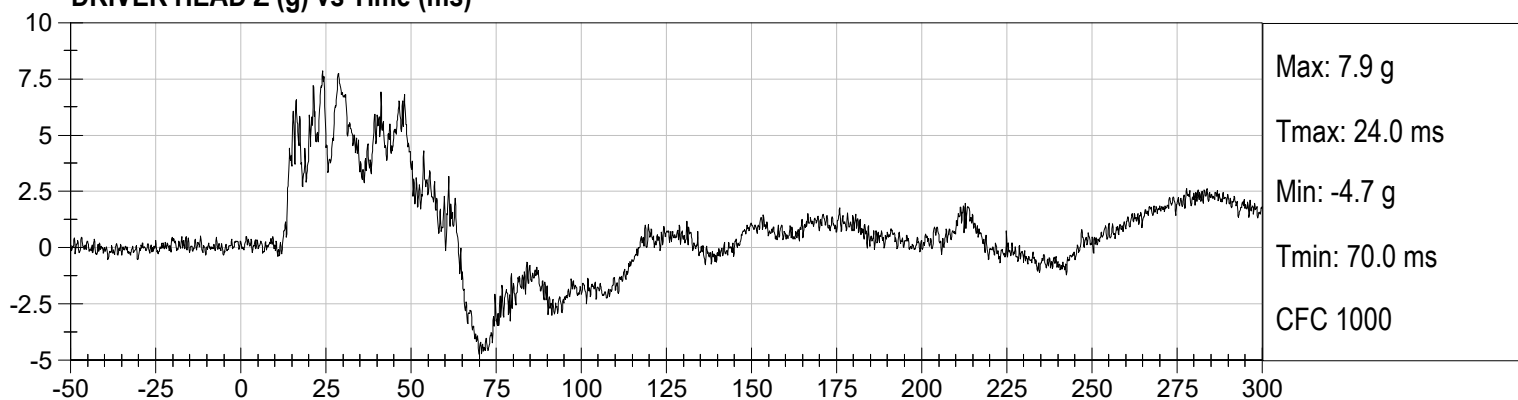
DRIVER HEAD X (g) vs Time (ms)



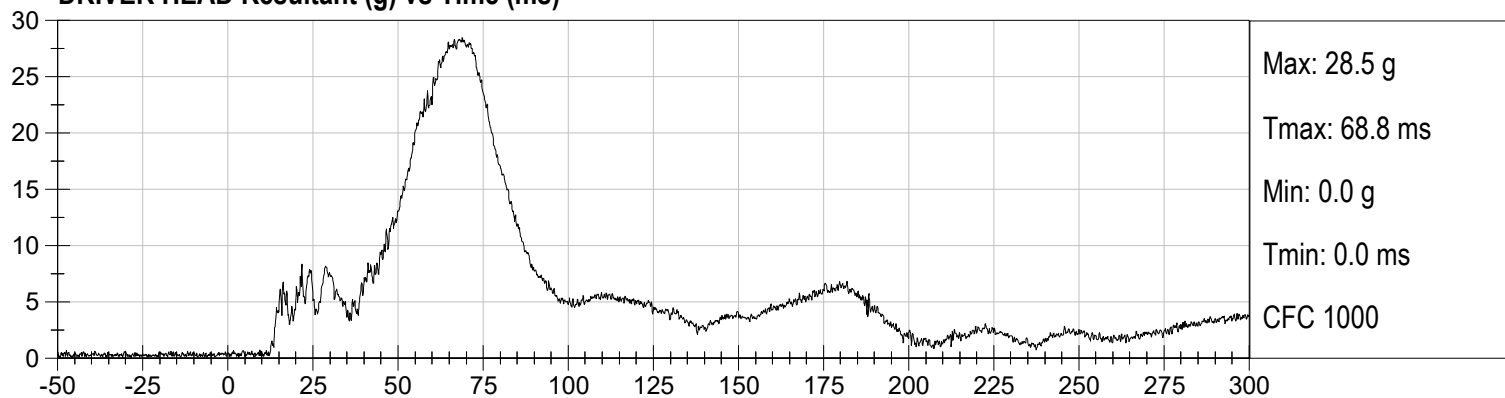
DRIVER HEAD Y (g) vs Time (ms)



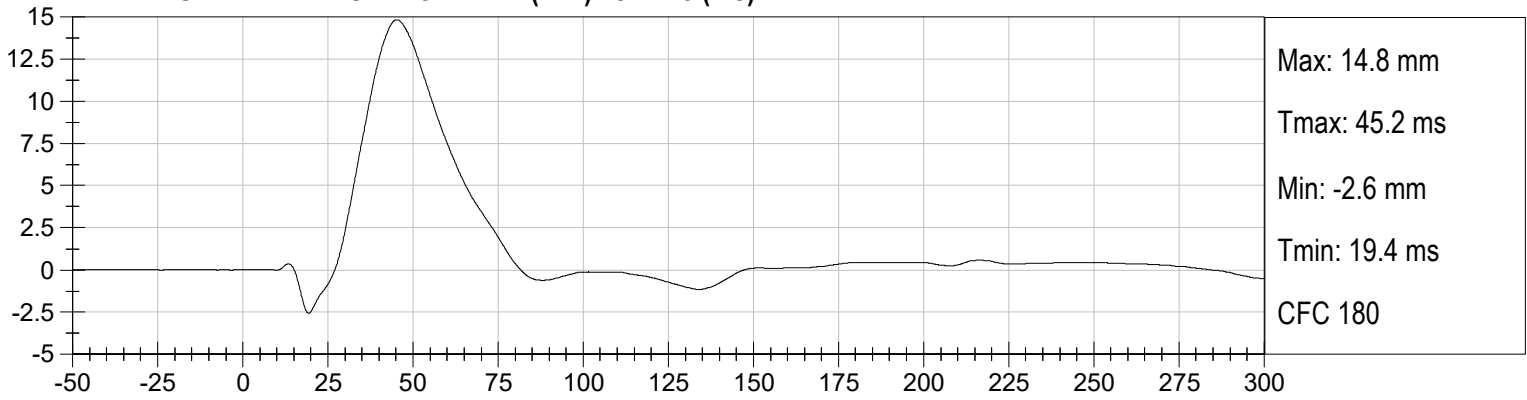
DRIVER HEAD Z (g) vs Time (ms)



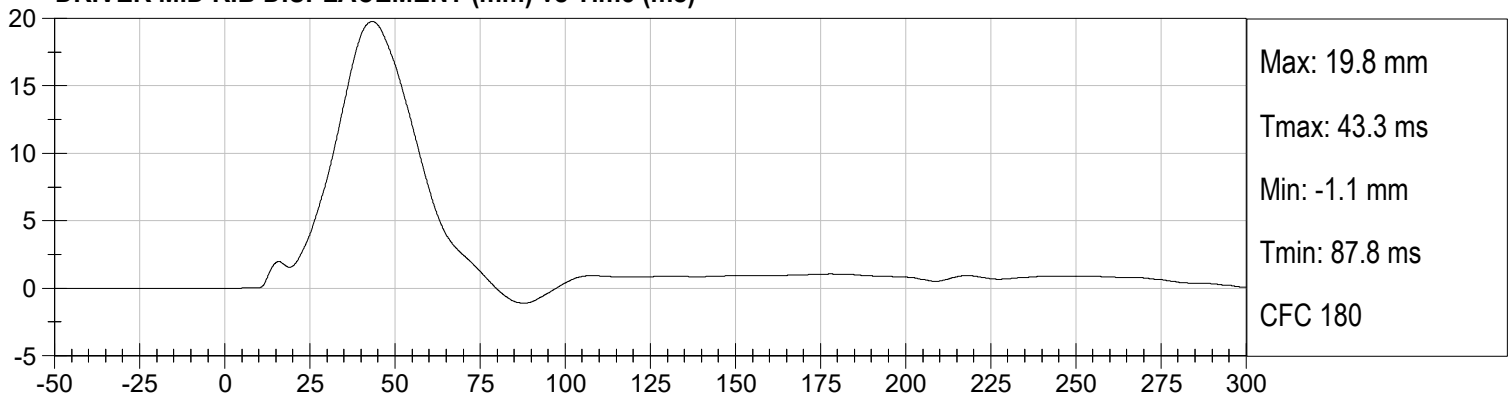
DRIVER HEAD Resultant (g) vs Time (ms)



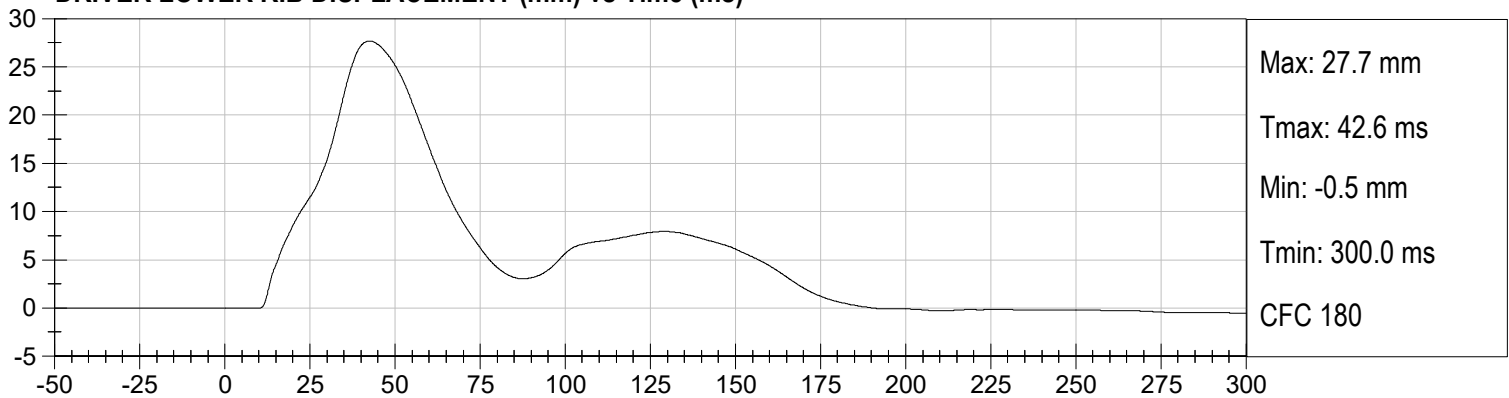
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



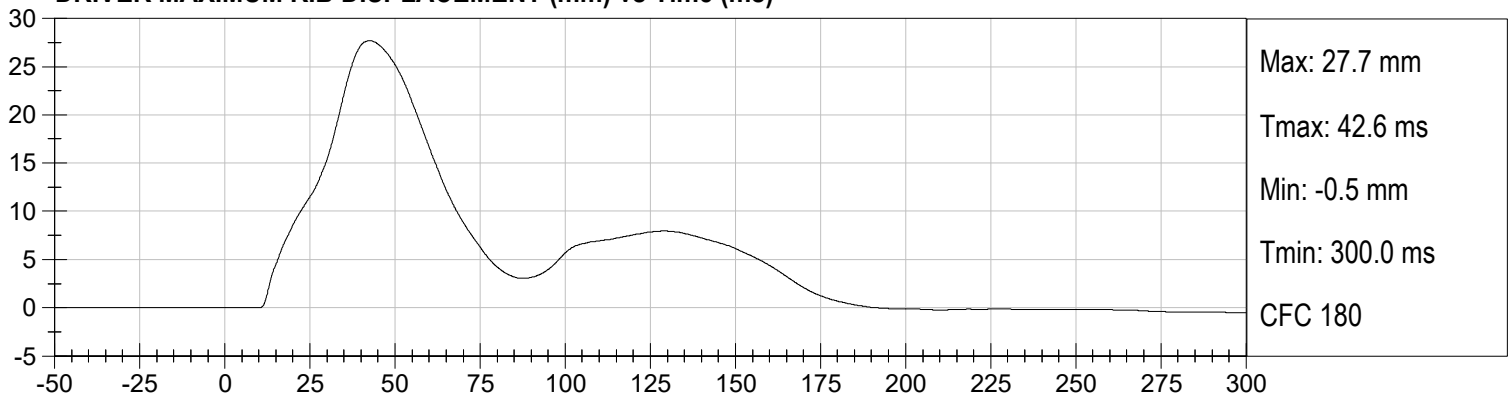
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



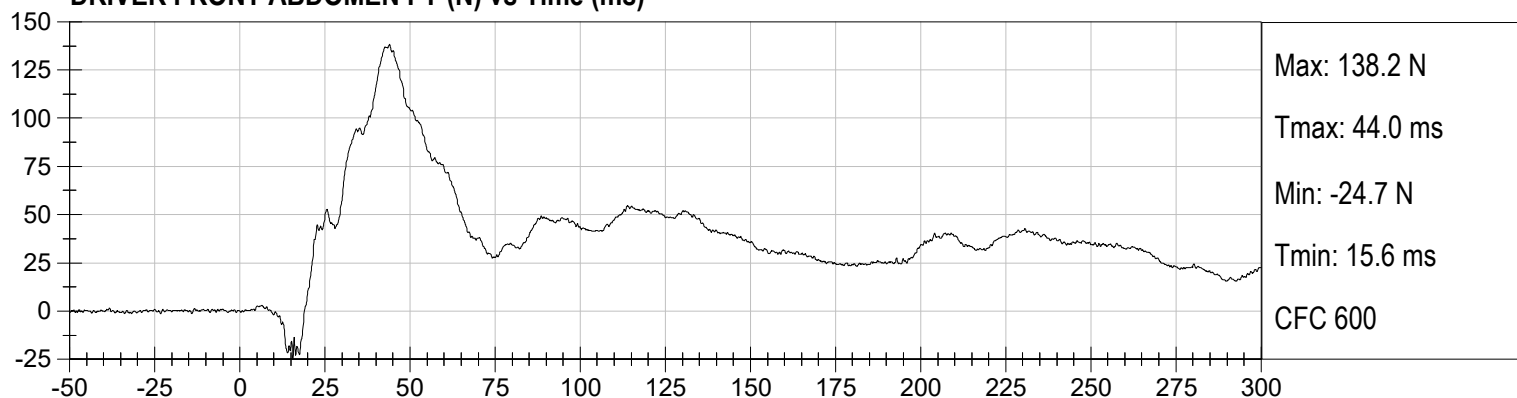
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



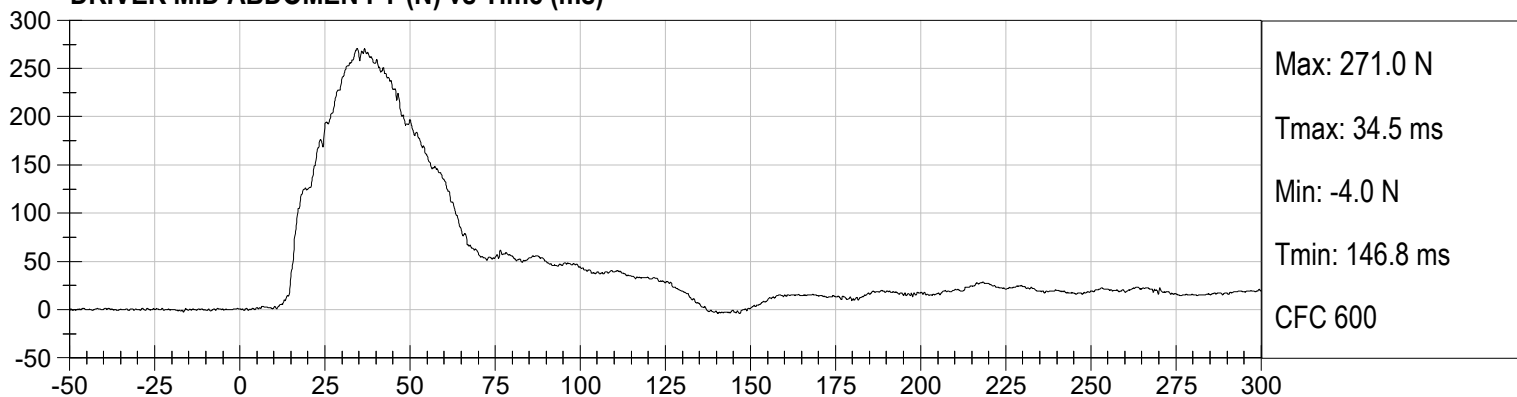
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



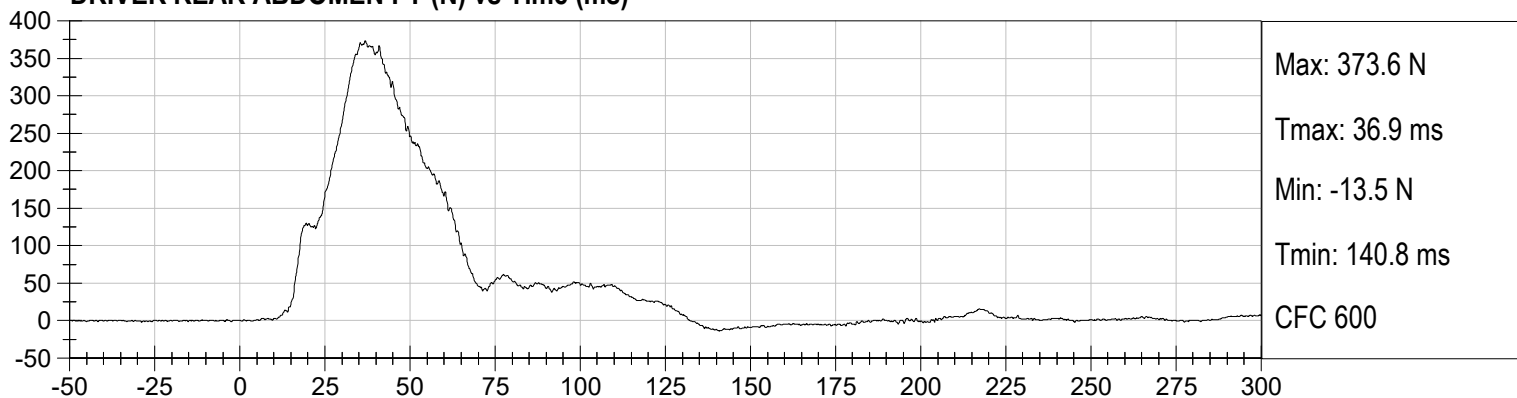
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



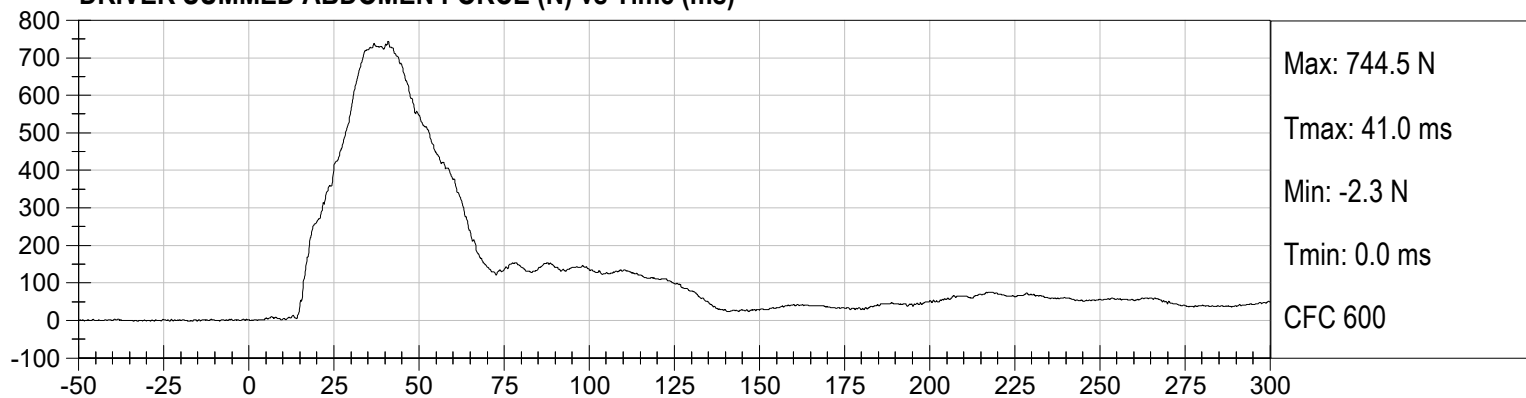
DRIVER MID ABDOMEN FY (N) vs Time (ms)

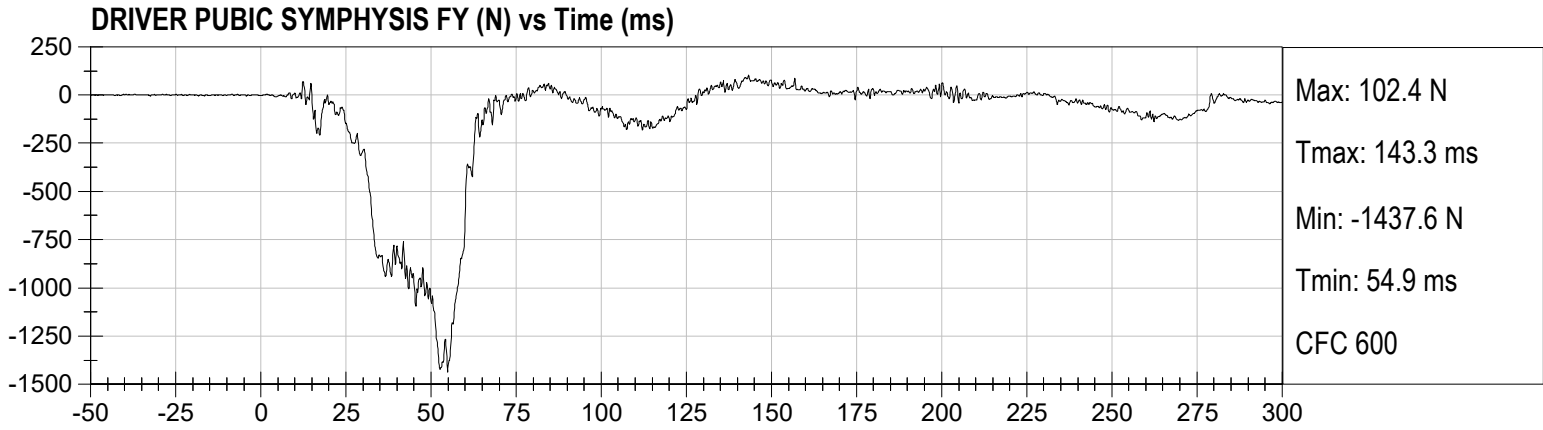


DRIVER REAR ABDOMEN FY (N) vs Time (ms)

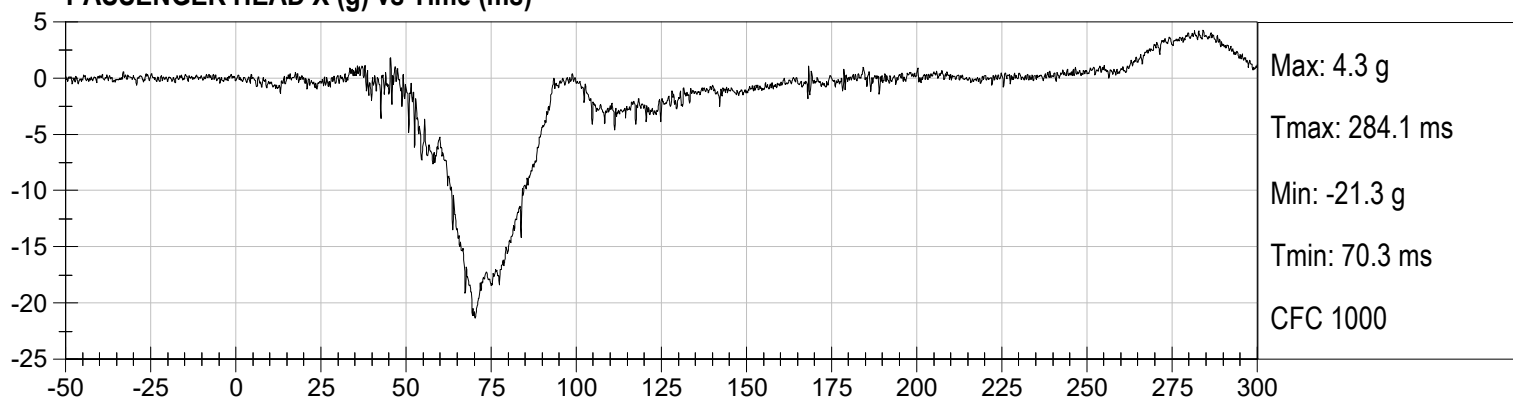


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

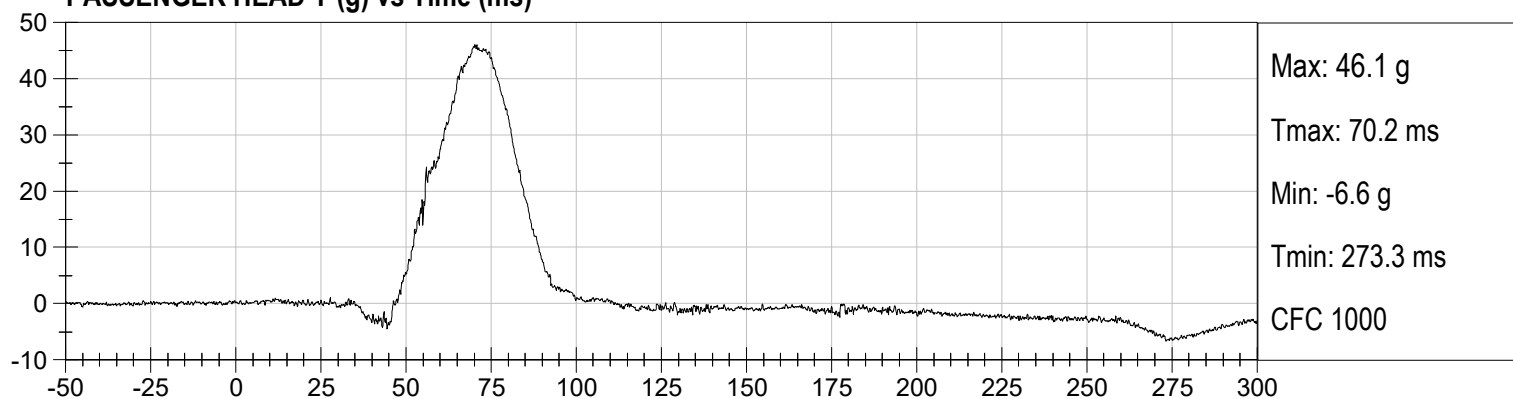




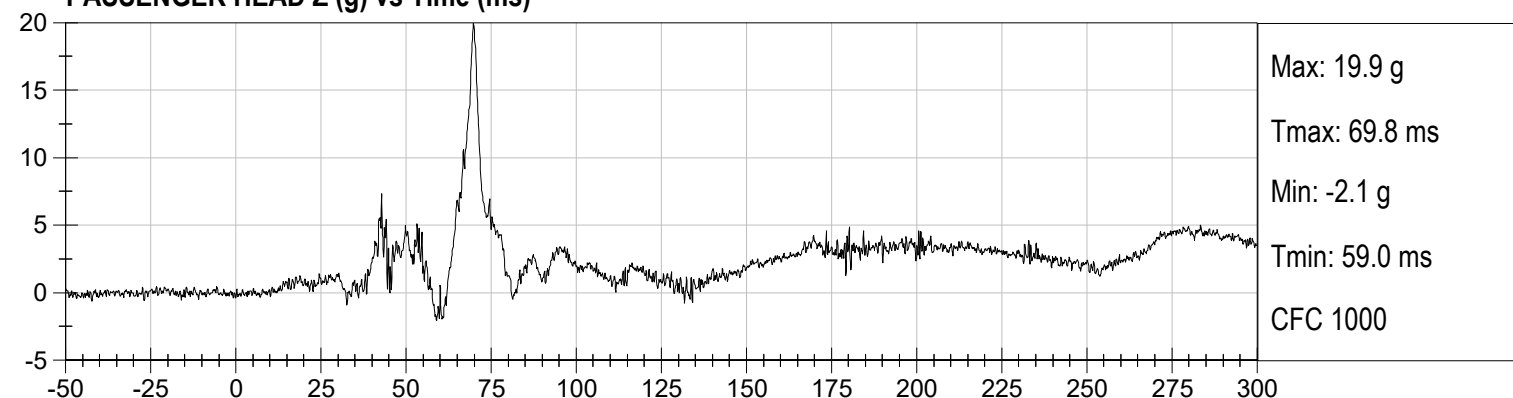
PASSENGER HEAD X (g) vs Time (ms)



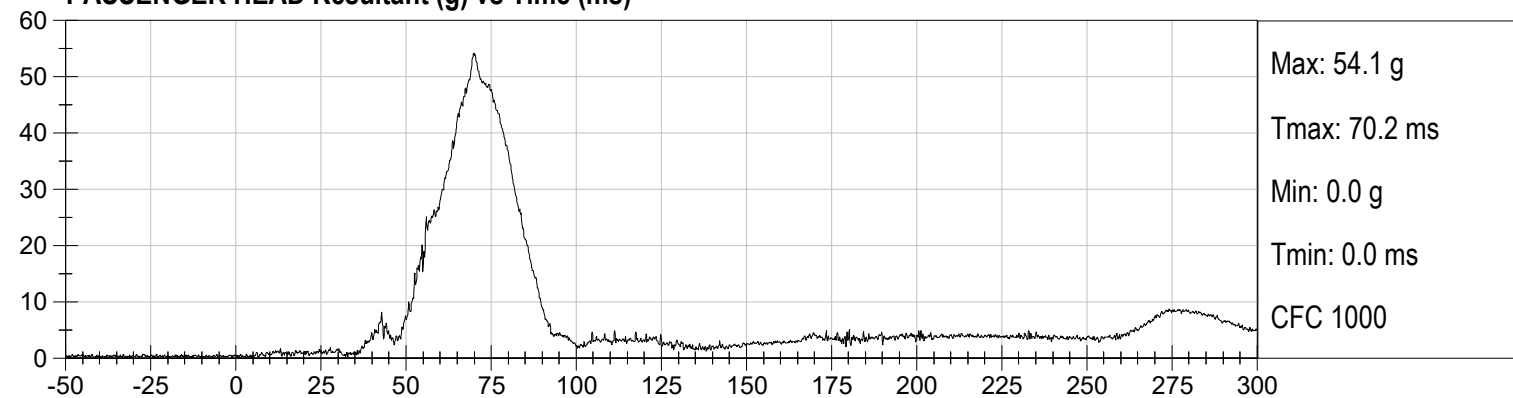
PASSENGER HEAD Y (g) vs Time (ms)



PASSENGER HEAD Z (g) vs Time (ms)



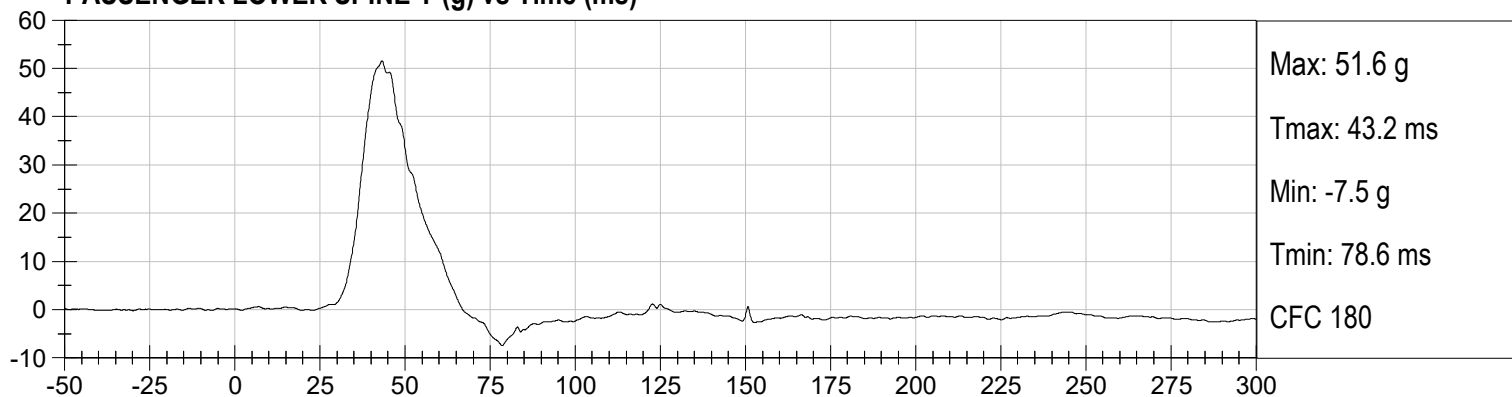
PASSENGER HEAD Resultant (g) vs Time (ms)



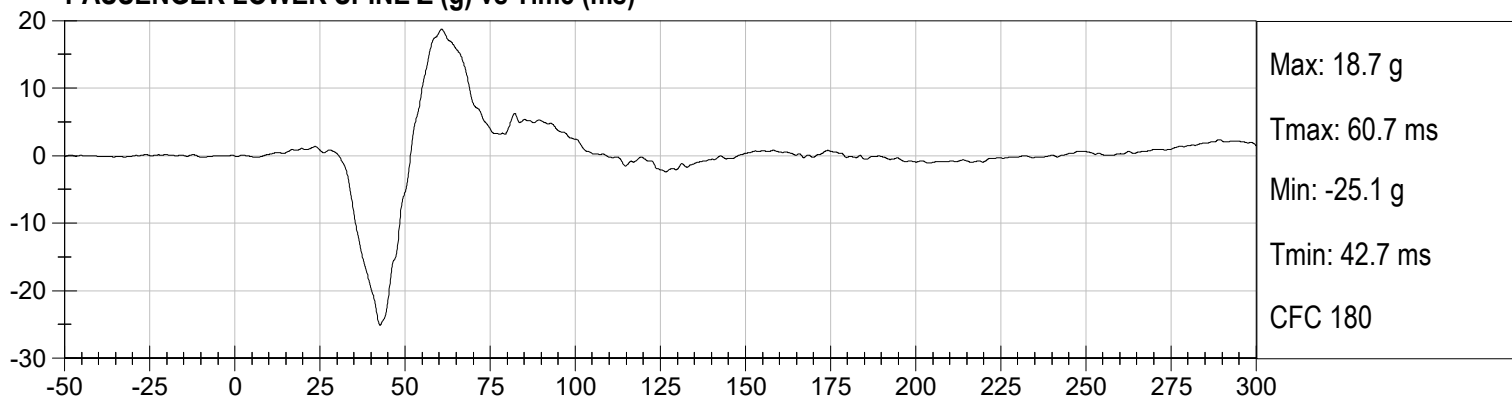
PASSENGER LOWER SPINE X (g) vs Time (ms)



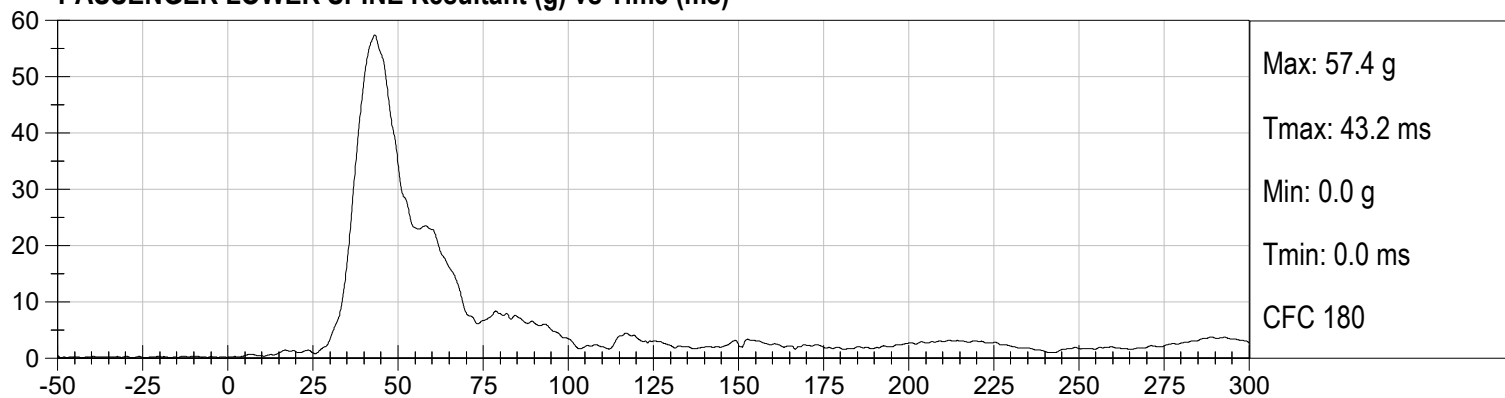
PASSENGER LOWER SPINE Y (g) vs Time (ms)



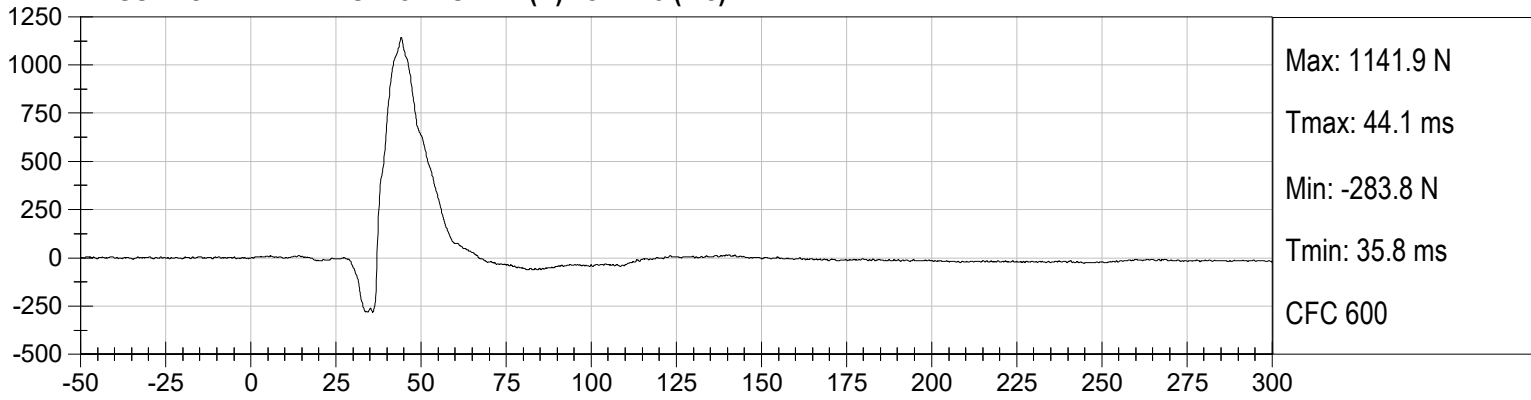
PASSENGER LOWER SPINE Z (g) vs Time (ms)



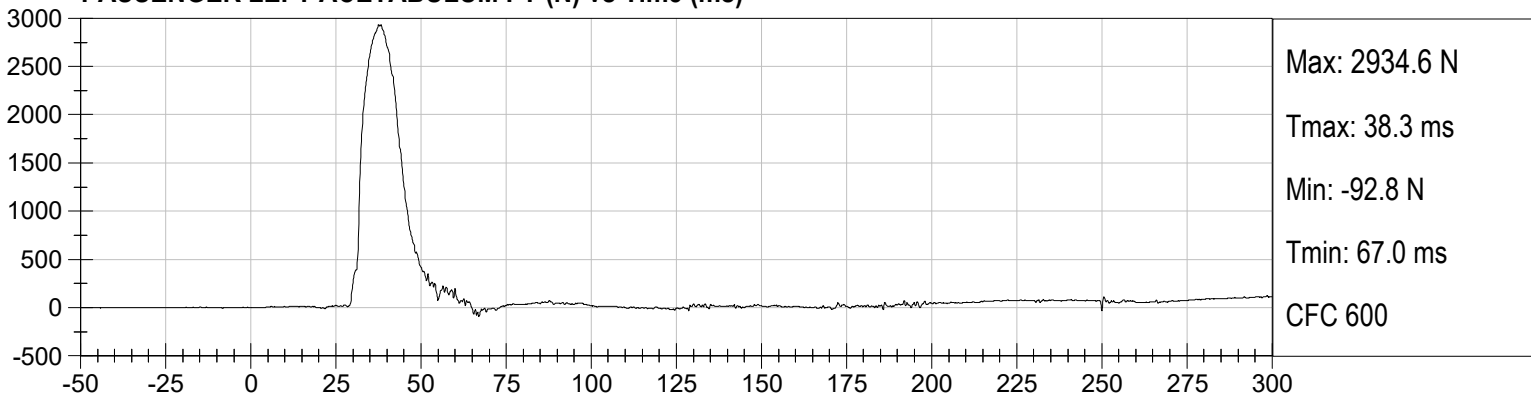
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



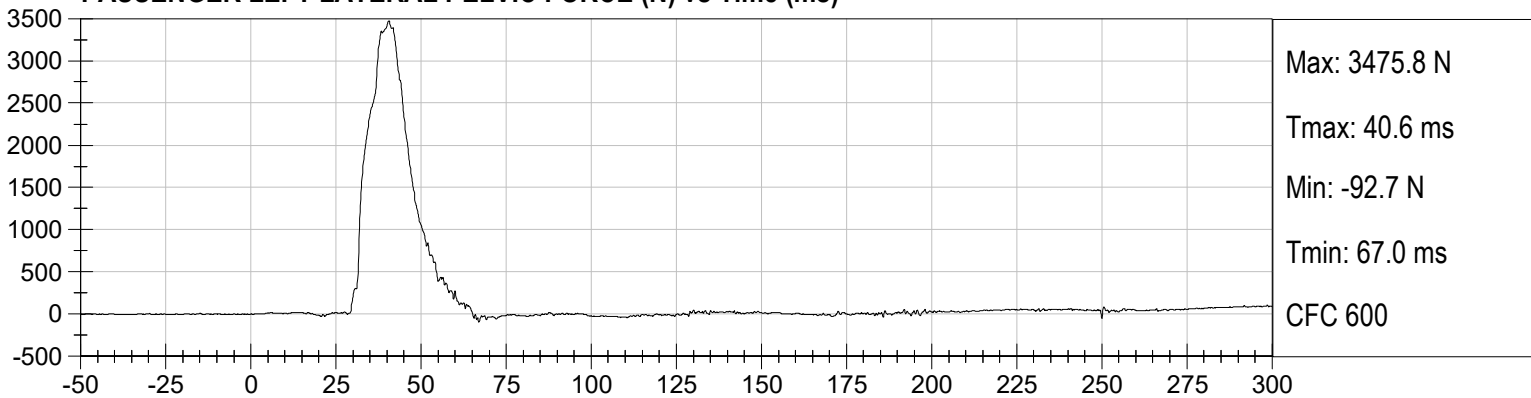
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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: F032

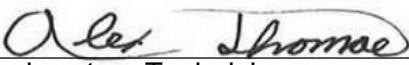
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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

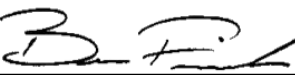
ATD Serial No: F032

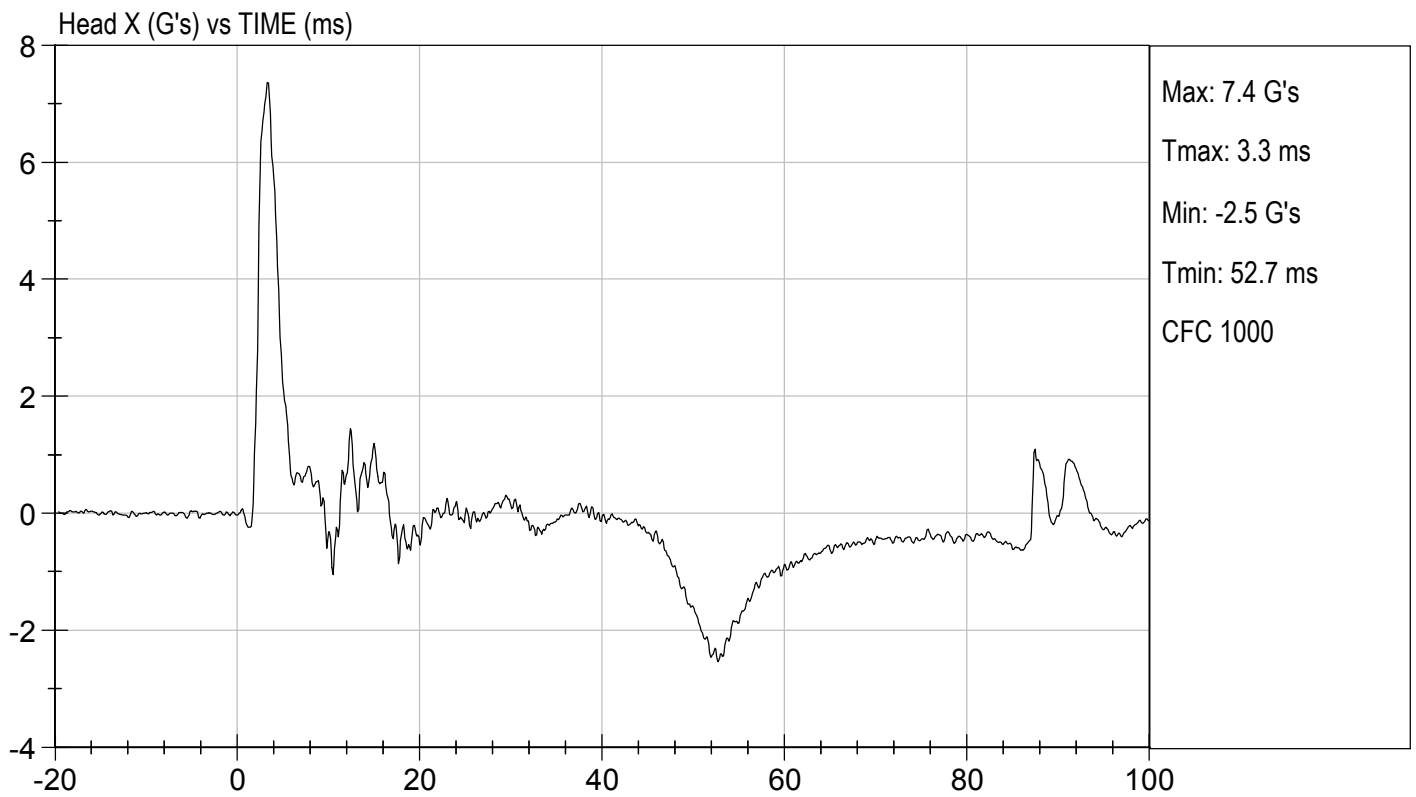
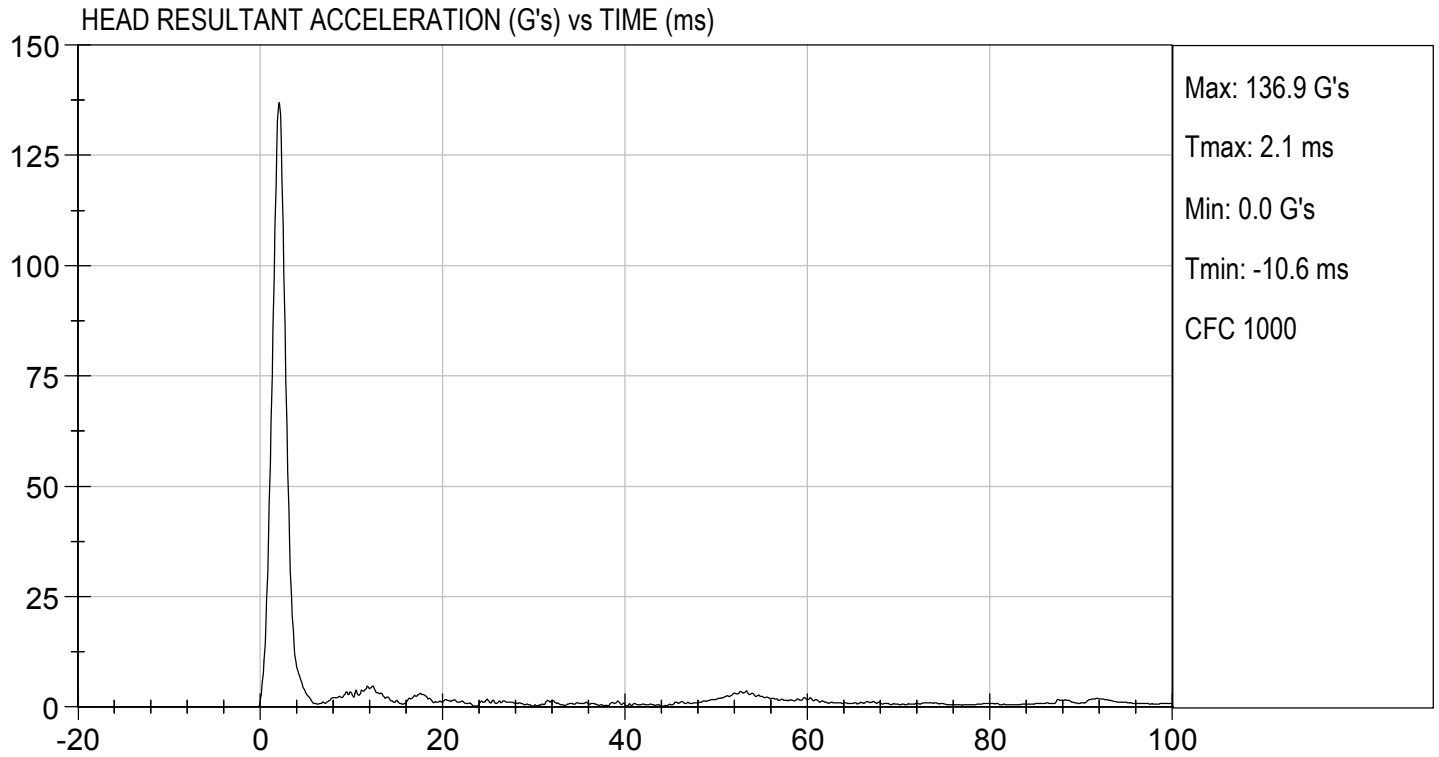
Test ID: D202981

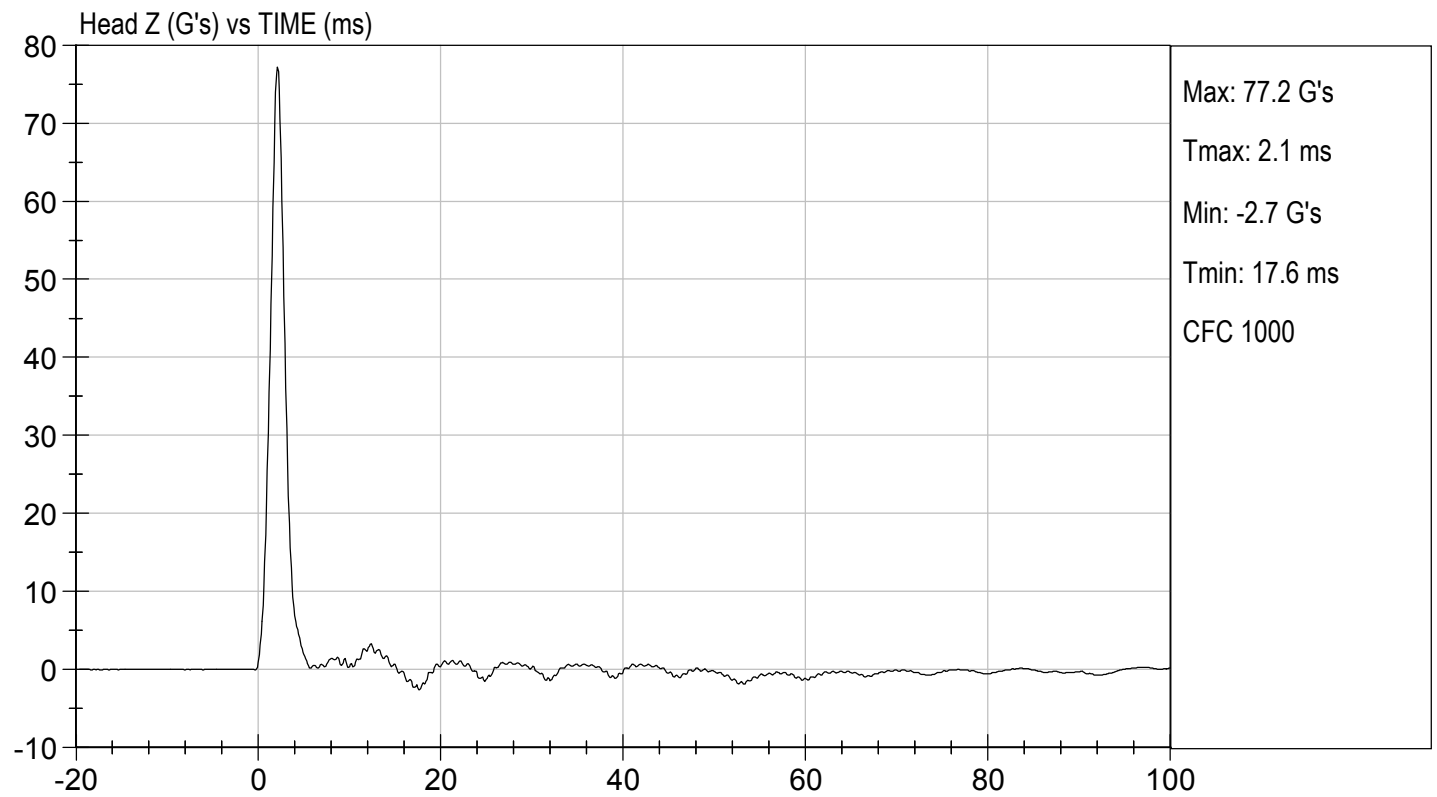
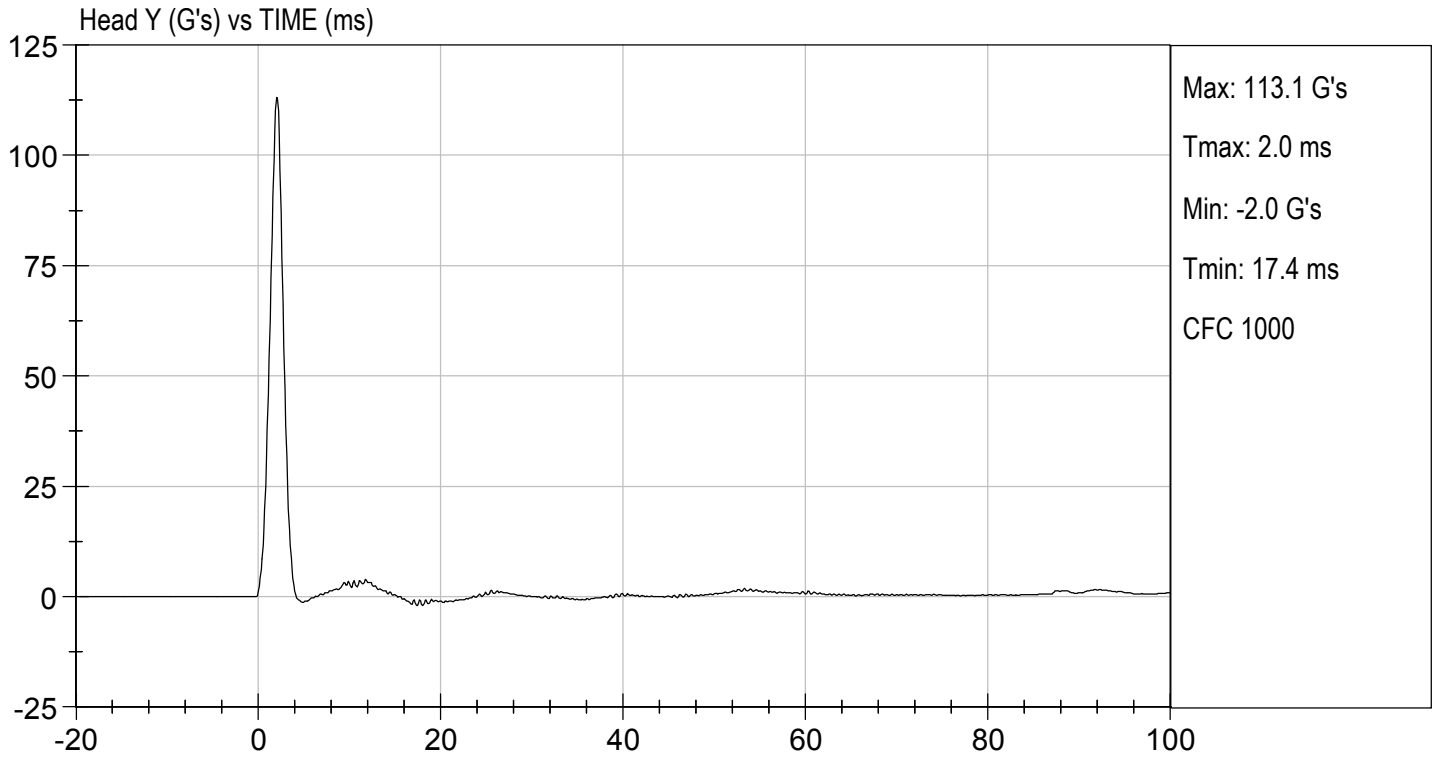
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	125 to 155	137	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

11/17/2020
Test Date


Approved By



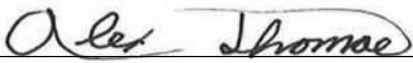


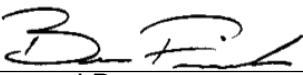
MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: F032

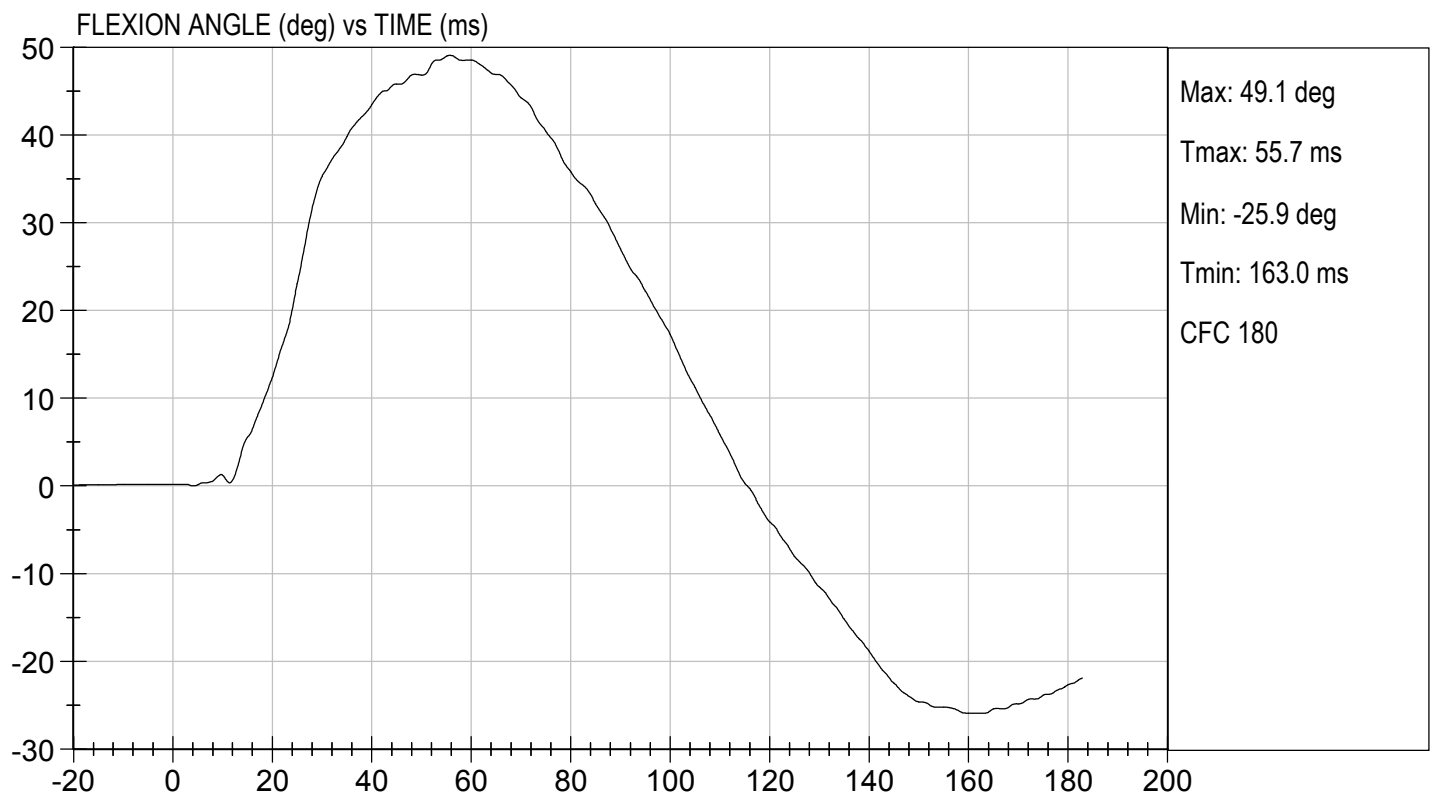
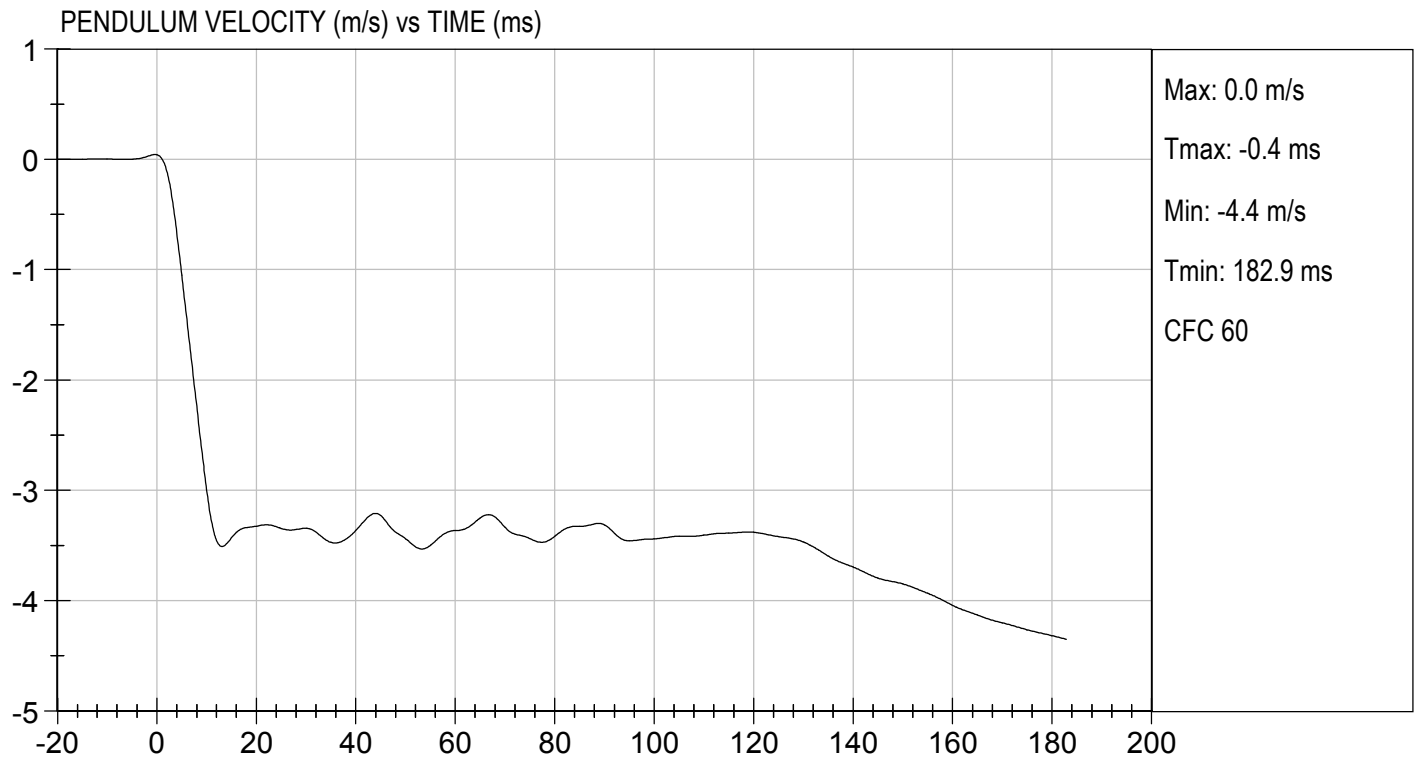
Test I.D: D202982

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.50	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.00	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.48	Pass
	17 ms	m/s	>= -3.70	-3.35	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	55.7	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	59.9	Pass
Overall Results					Pass


 Laboratory Technician


 Approved By

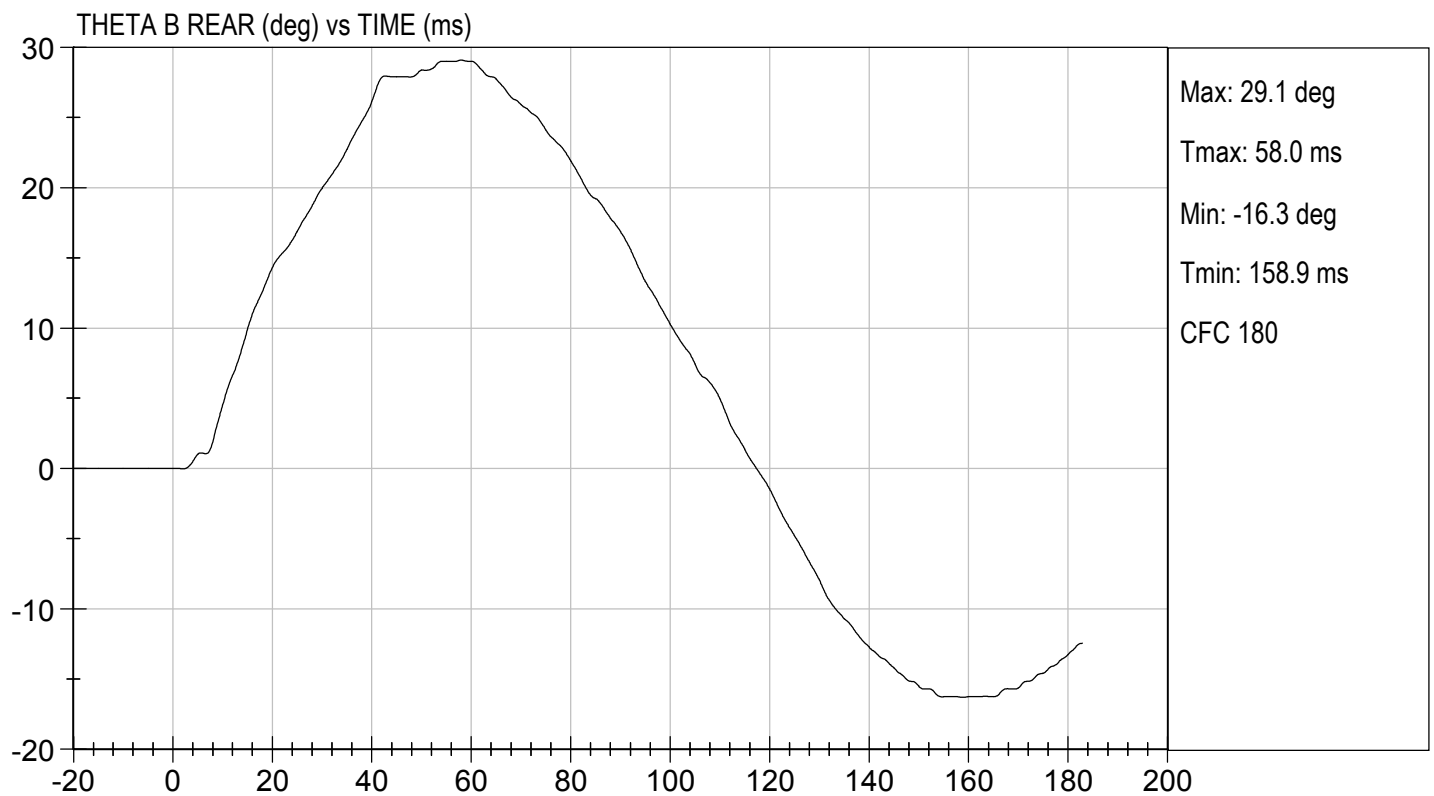
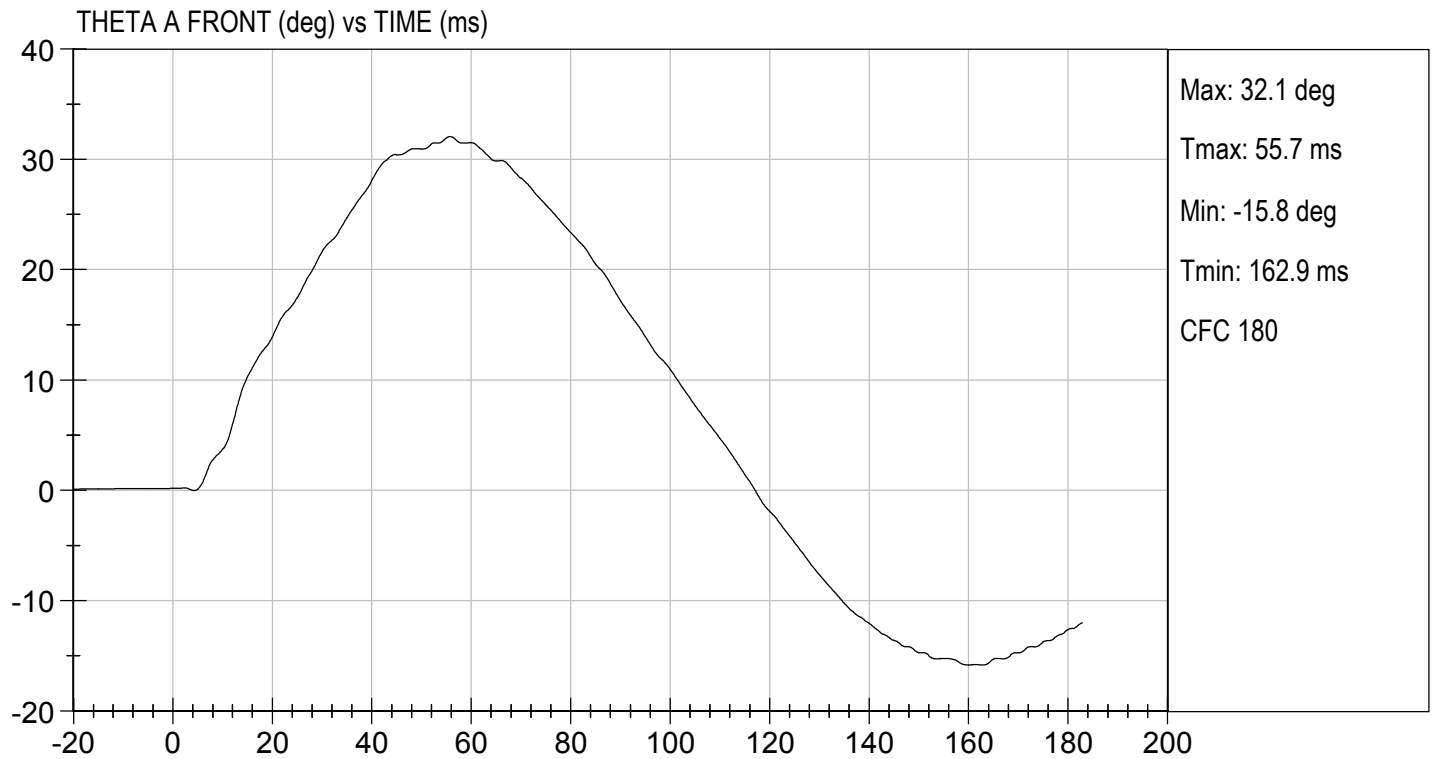
11/17/2020
 Test Date





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

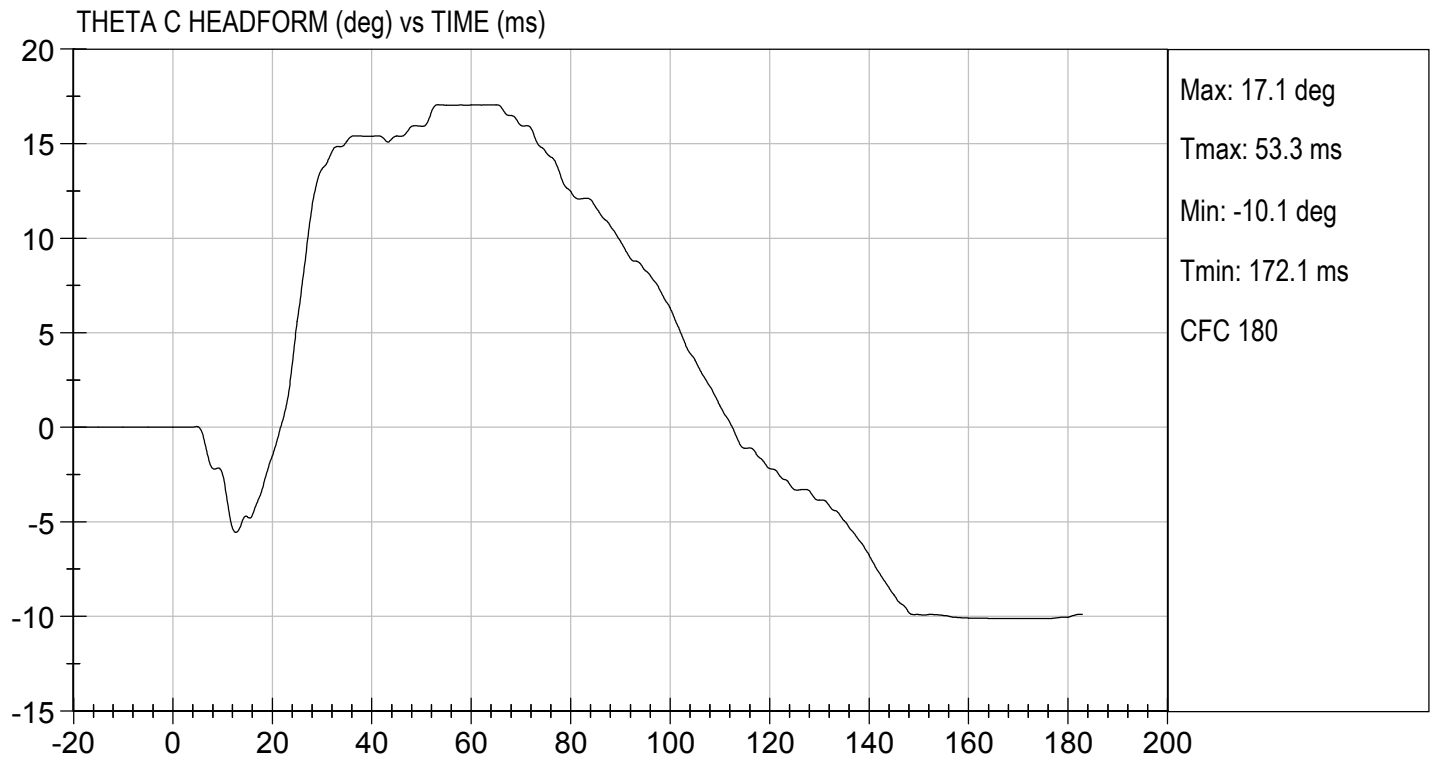
TEST DATE: 11/17/2020
TEST #: D202982





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

TEST DATE: 11/17/2020
TEST #: D202982



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

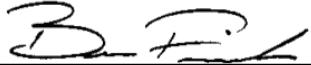
ATD Serial No: F032

Test I.D: D202983

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.23	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.5	Pass
Overall Test Results				Pass


Laboratory Technician

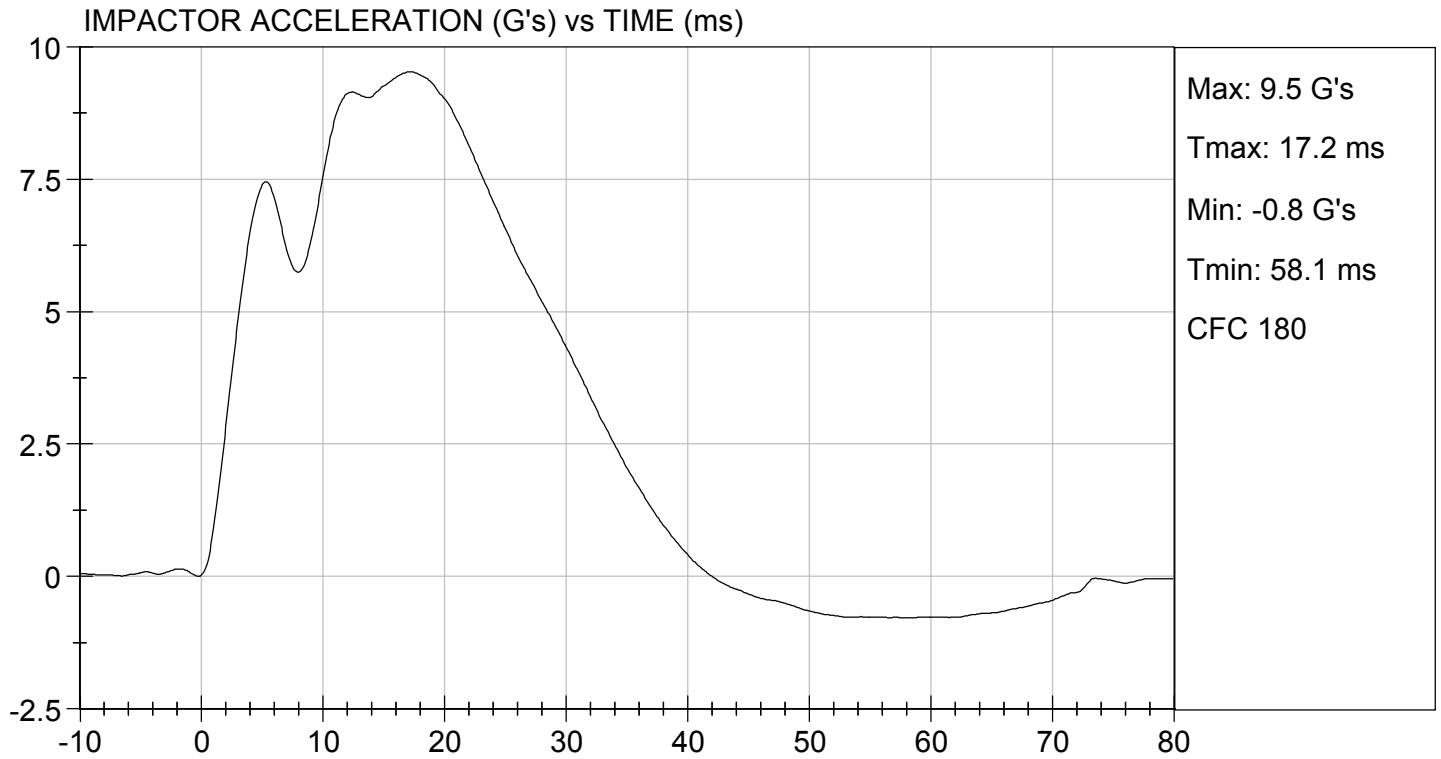
11/17/2020
Test Date


Approved By



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

TEST DATE: 11/17/2020
TEST #: D202983



MGA RESEARCH CORPORATION

UPPER RIB TEST

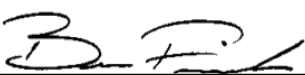
ES-2re DUMMY

ATD Serial No: F032

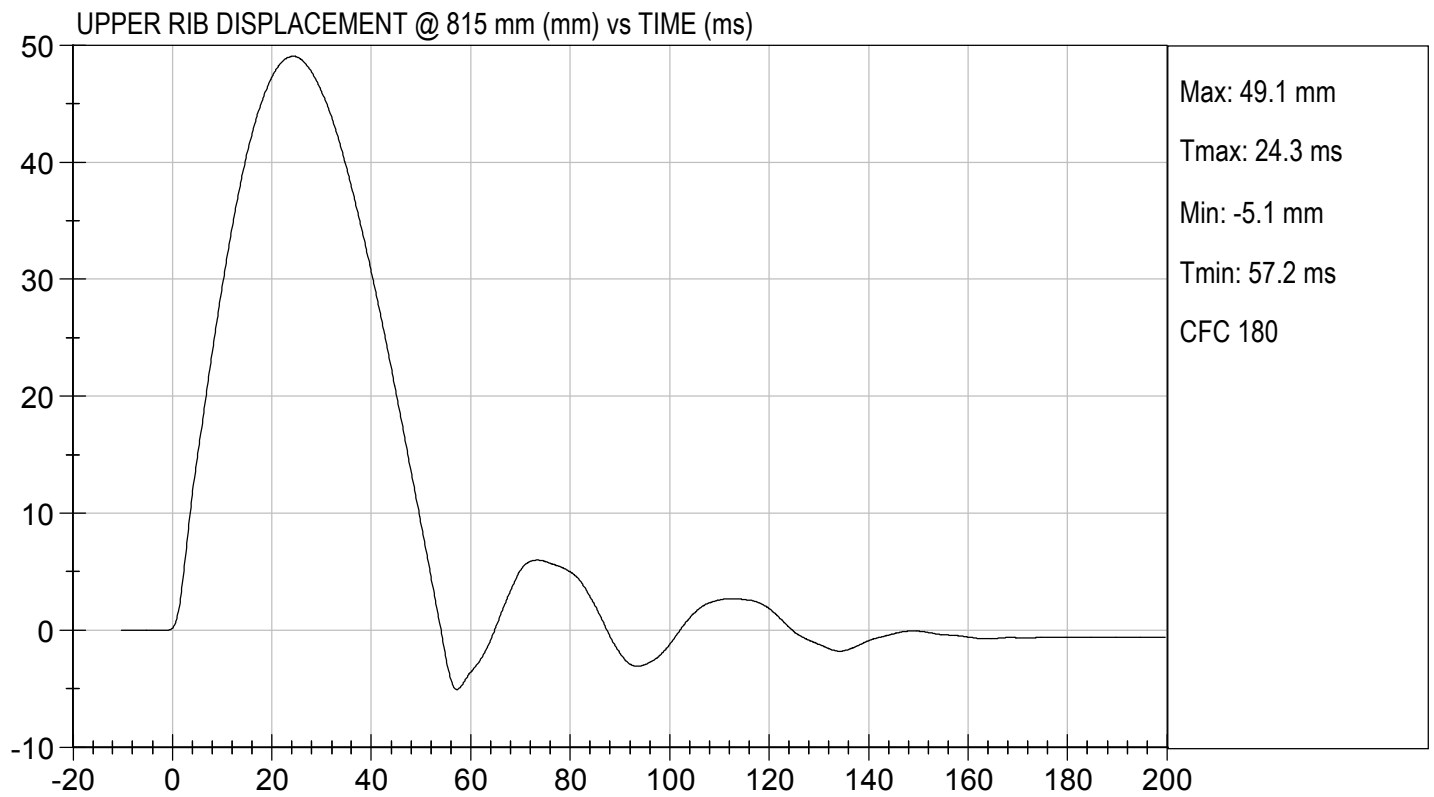
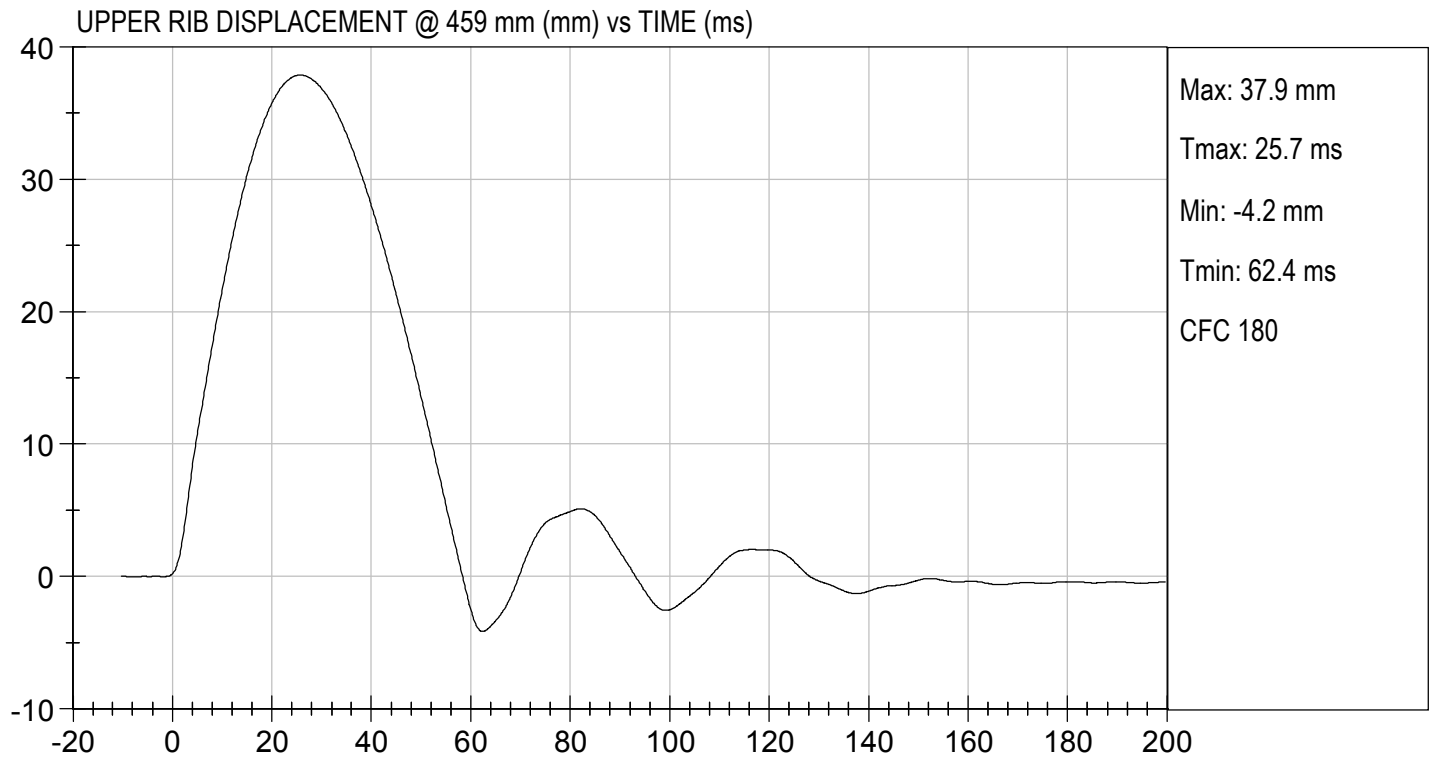
Test I.D: D202984

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	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.1	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

11/17/2020
Test Date



MGA RESEARCH CORPORATION

MID RIB TEST

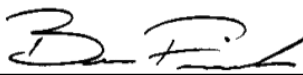
ES-2re DUMMY

ATD Serial No: F032

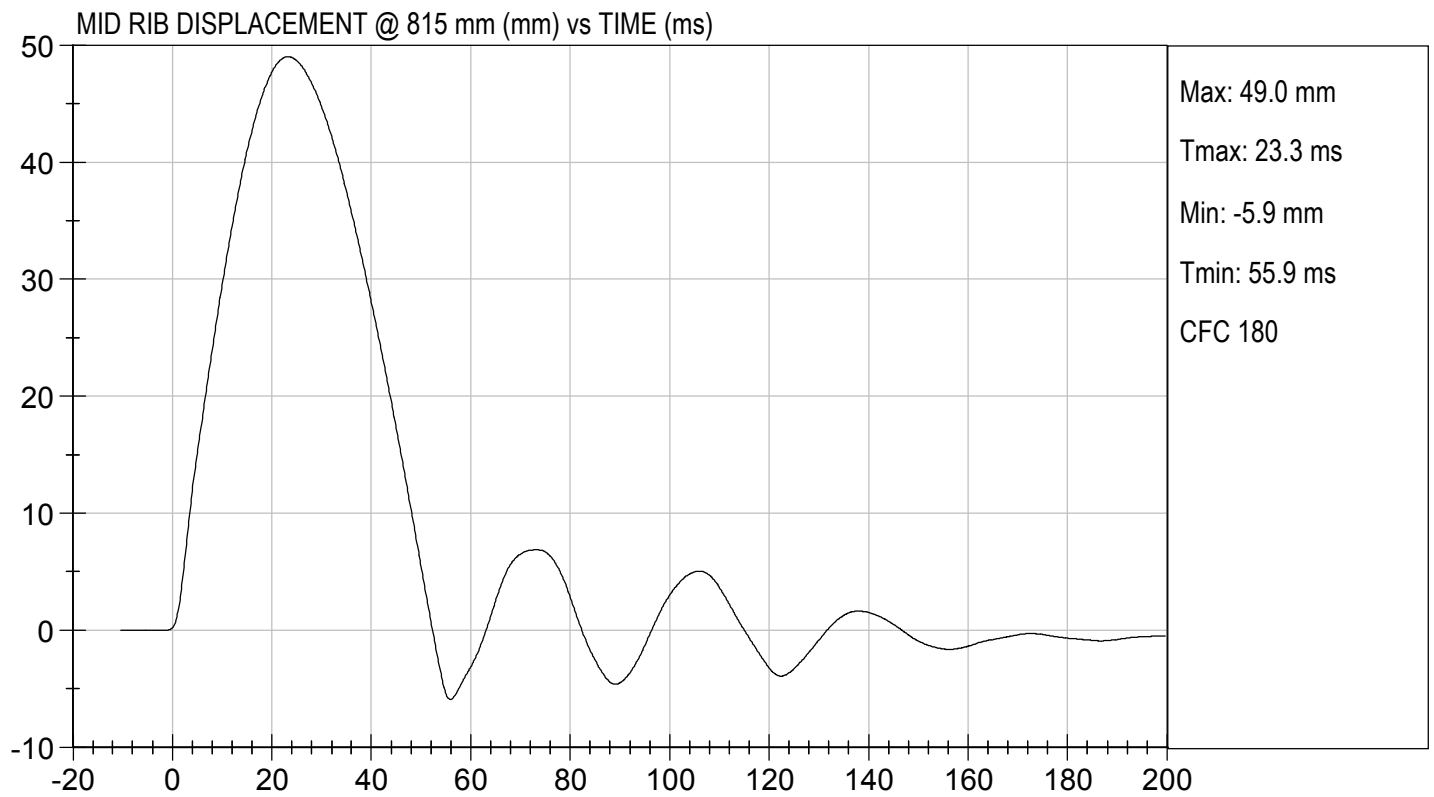
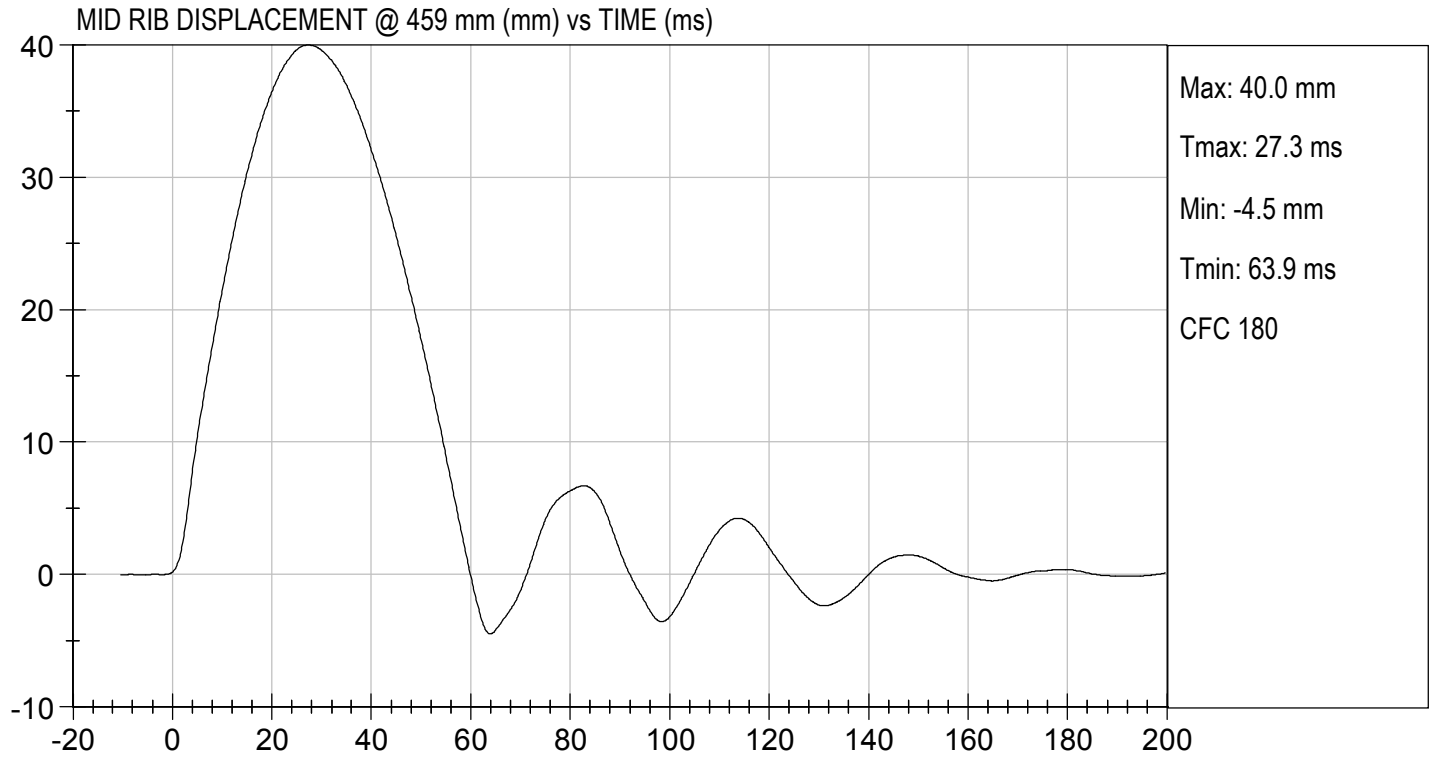
Test I.D: D202985

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	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	40.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.1	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

11/17/2020
Test Date



MGA RESEARCH CORPORATION

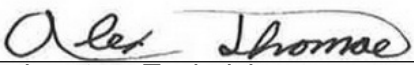
LOWER RIB TEST

ES-2re DUMMY

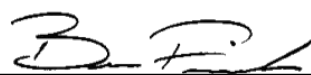
ATD Serial No: F032

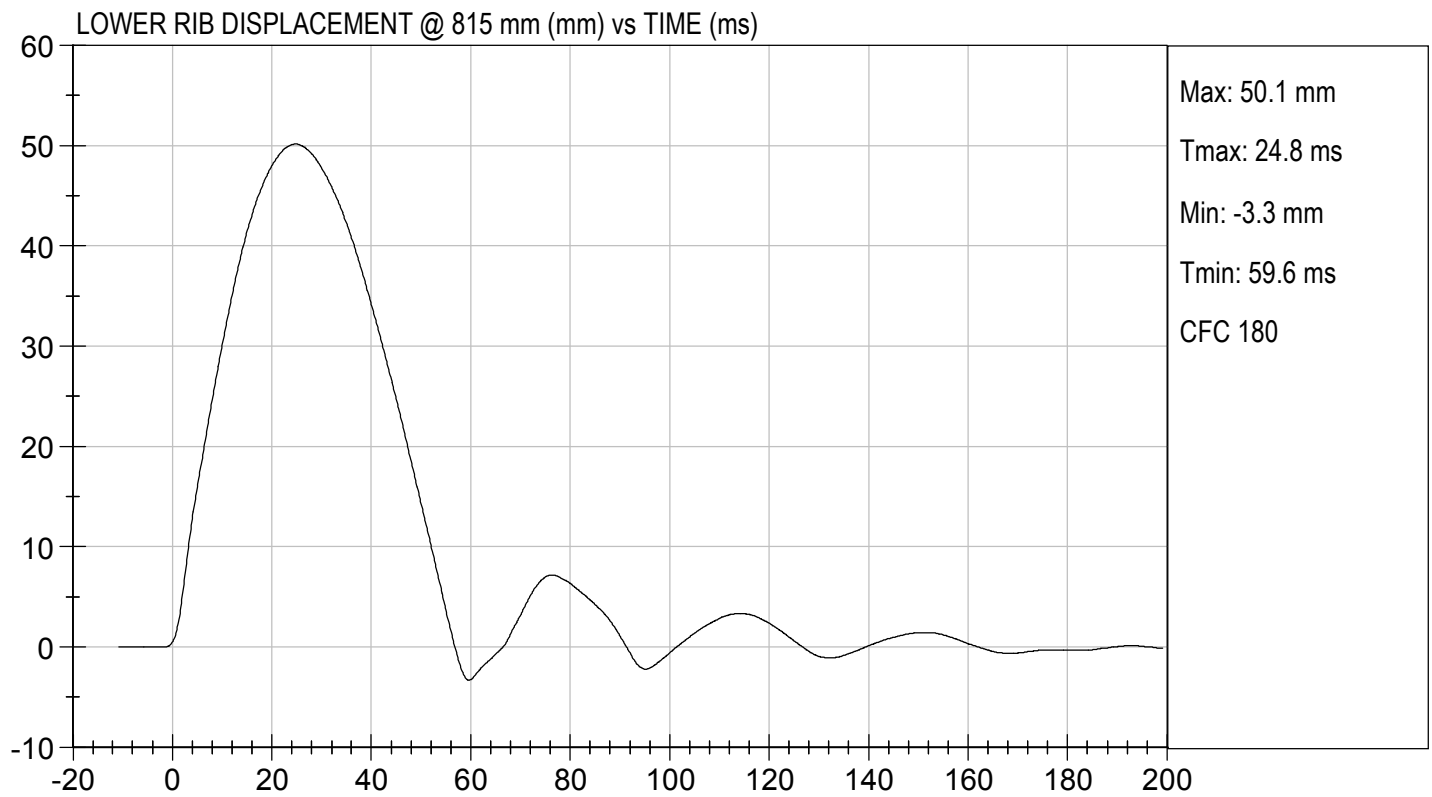
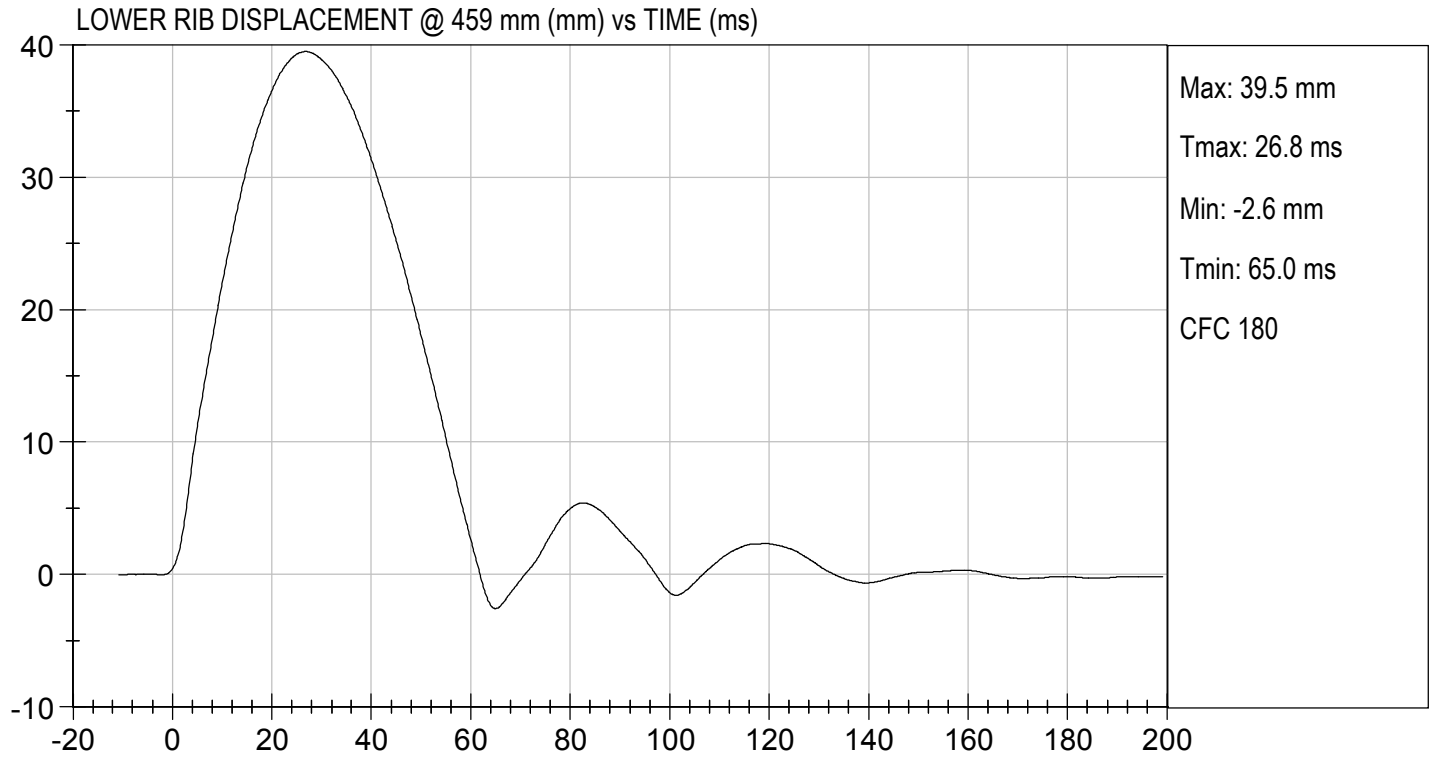
Test I.D: D202986

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	28	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.1	Pass
Overall Test Results				Pass


Laboratory Technician

11/17/2020
Test Date


Approved By



MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D202987

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4194	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.1	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2295	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass


Laboratory Technician

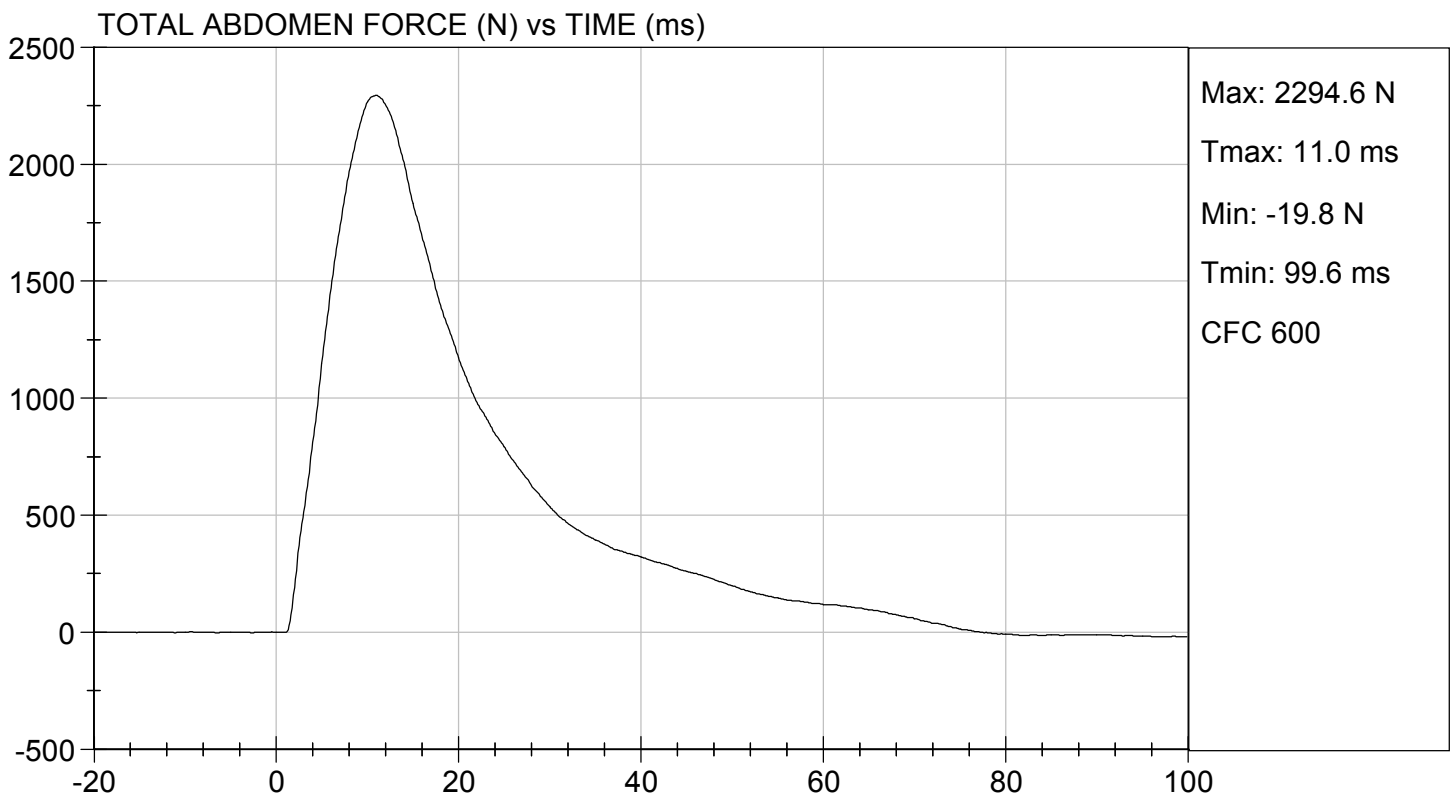
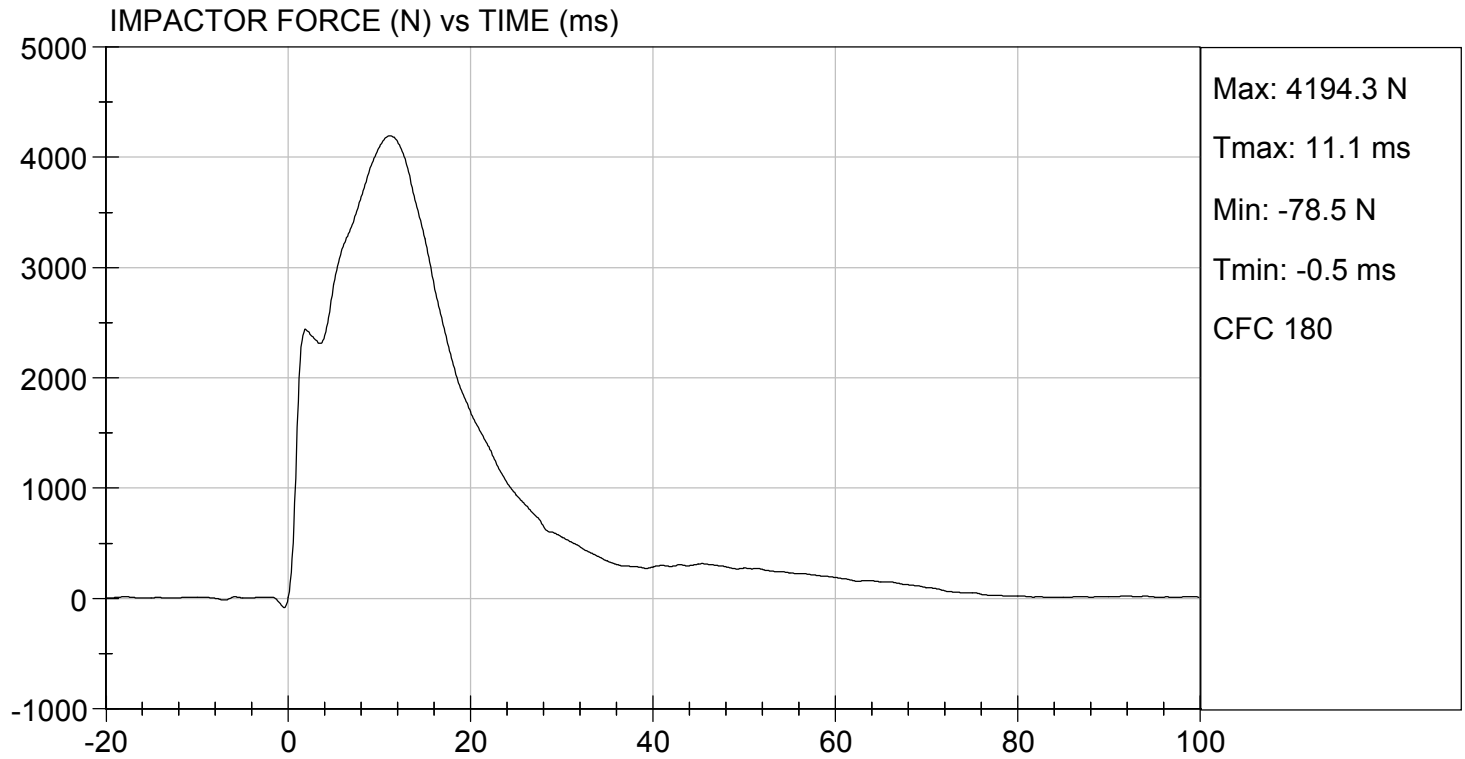
11/17/2020
Test Date


Approved By



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

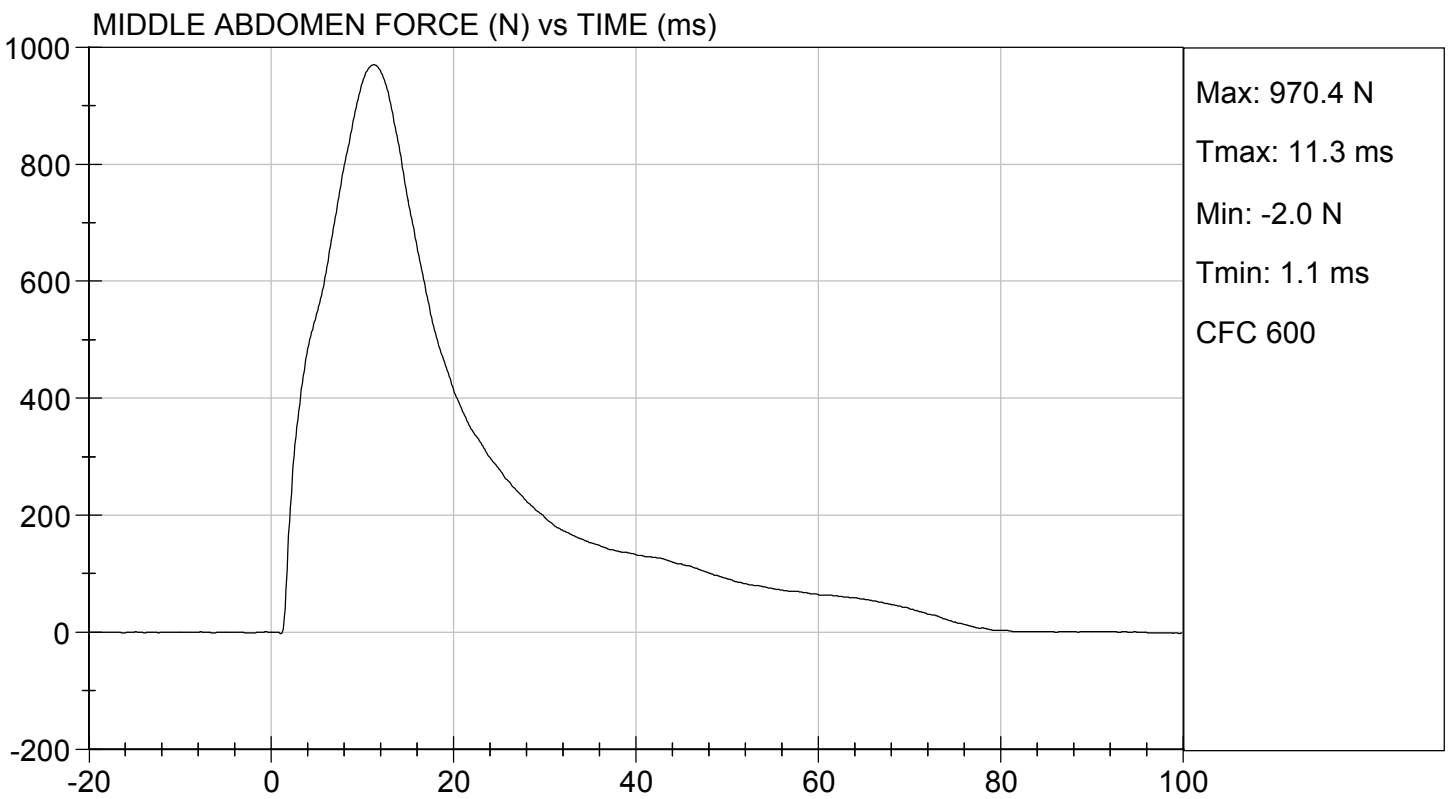
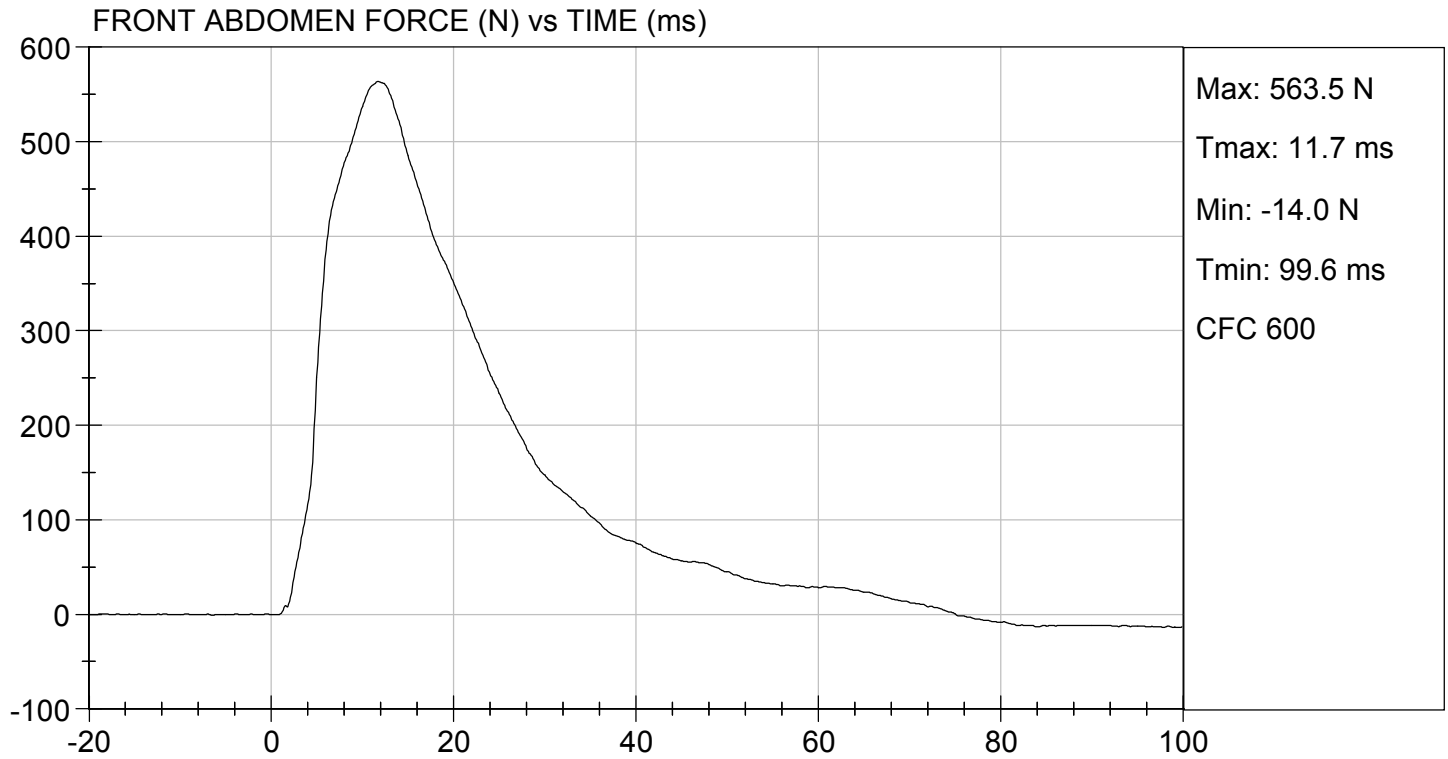
TEST DATE: 11/17/2020
TEST #: D202987





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

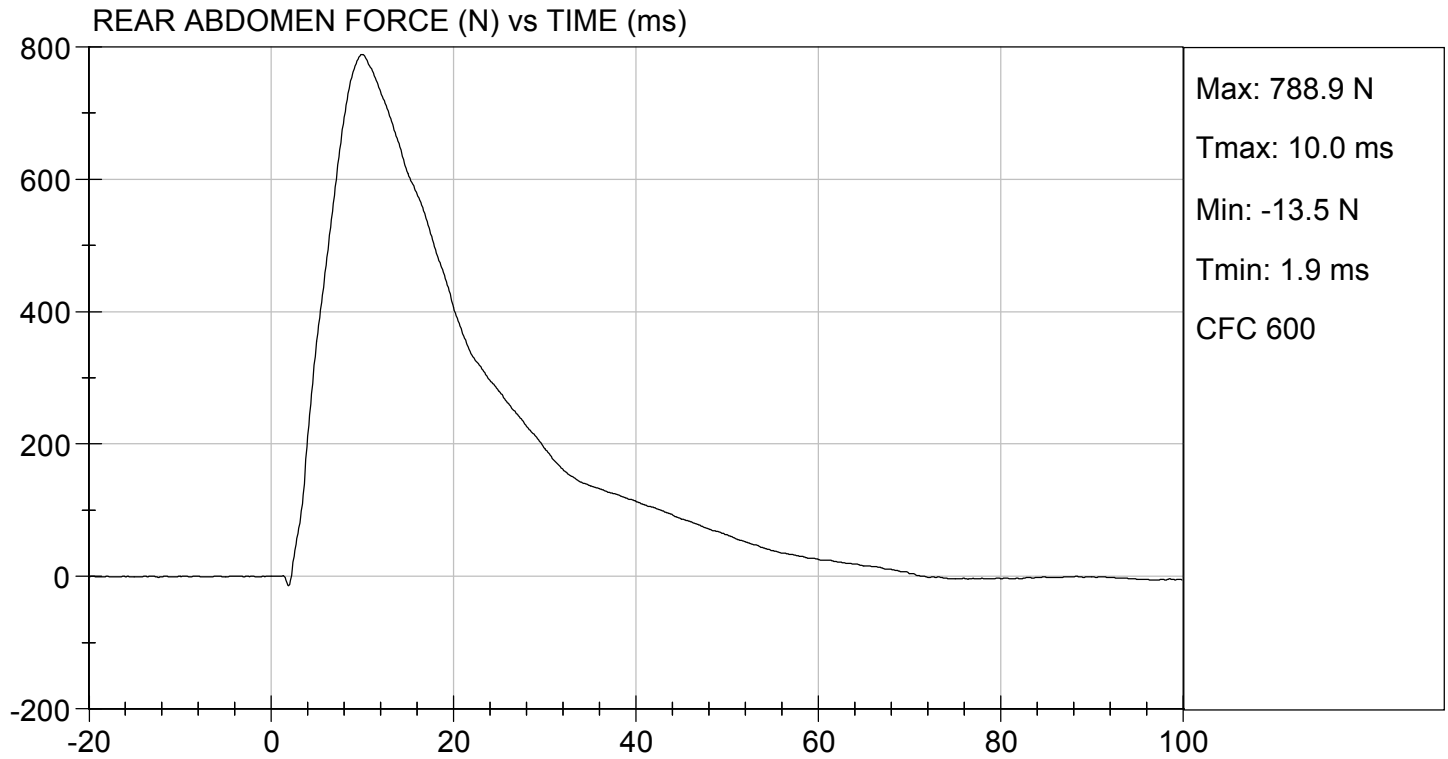
TEST DATE: 11/17/2020
TEST #: D202987





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

TEST DATE: 11/17/2020
TEST #: D202987



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

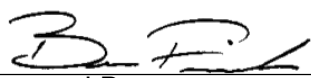
ATD Serial No: F032

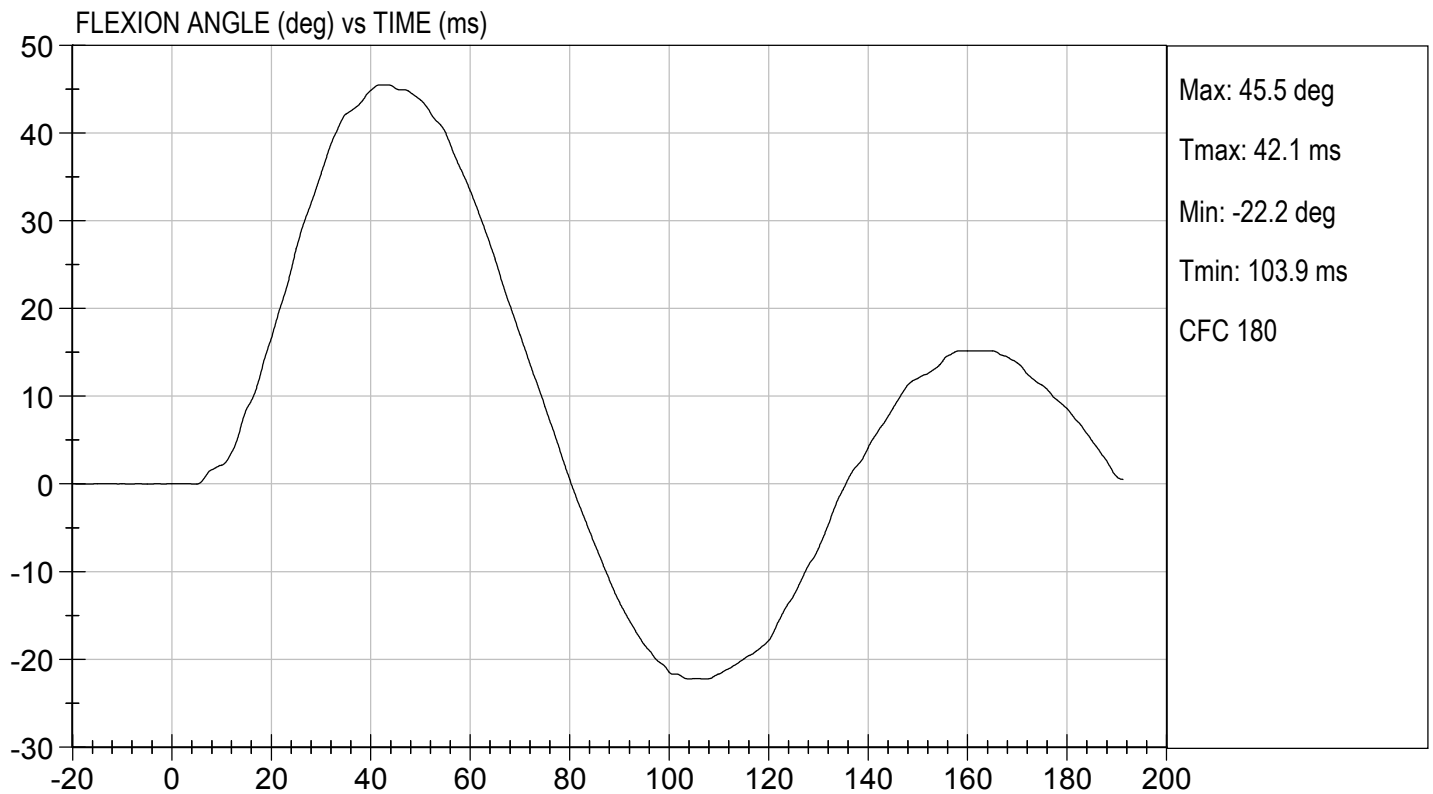
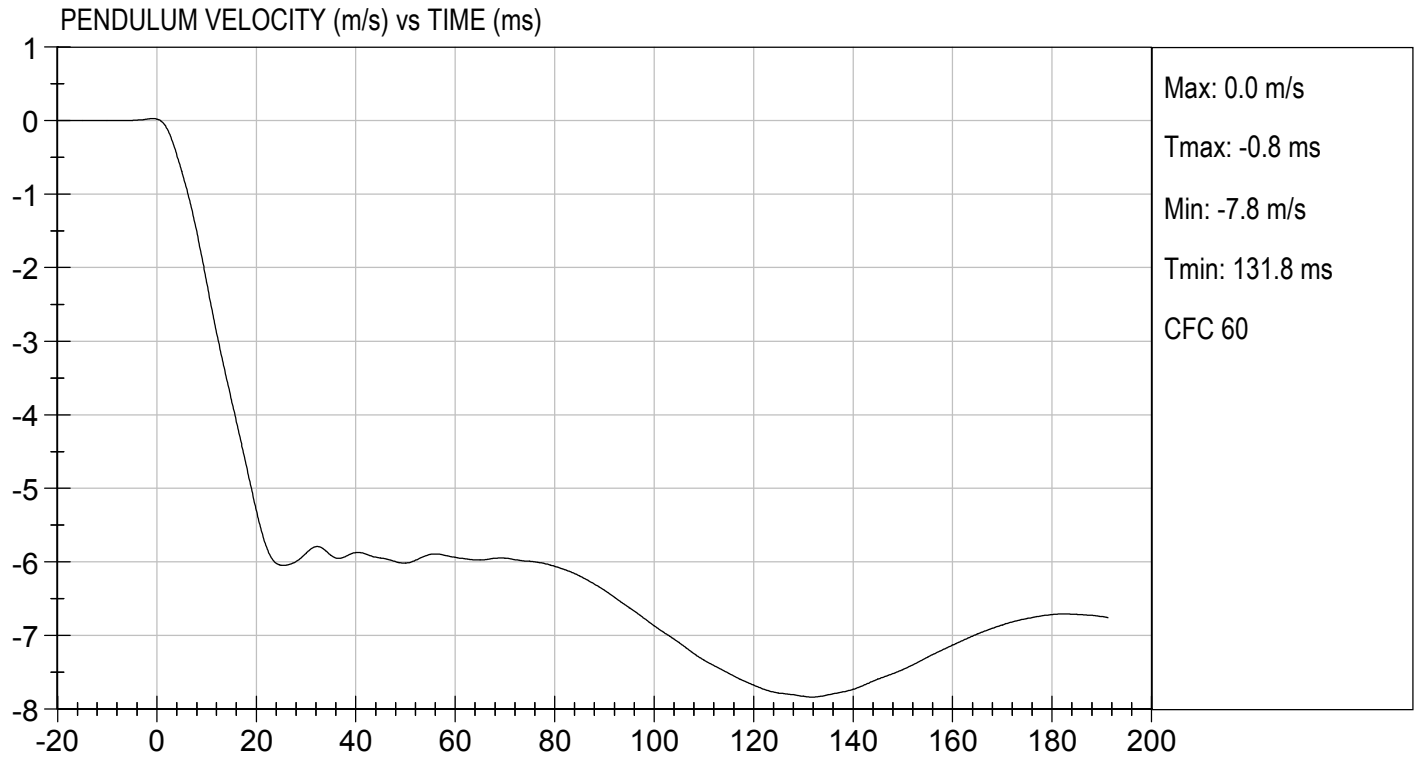
Test I.D: D202988

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.15	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	-0.401	Pass
	27 ms	m/s	-6.50 to -5.80	-6.03	Pass
	30 ms	m/s	>= -6.50	-5.88	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	45.5	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	42.1	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
Overall Results					Pass


 Laboratory Technician

11/17/2020
 Test Date

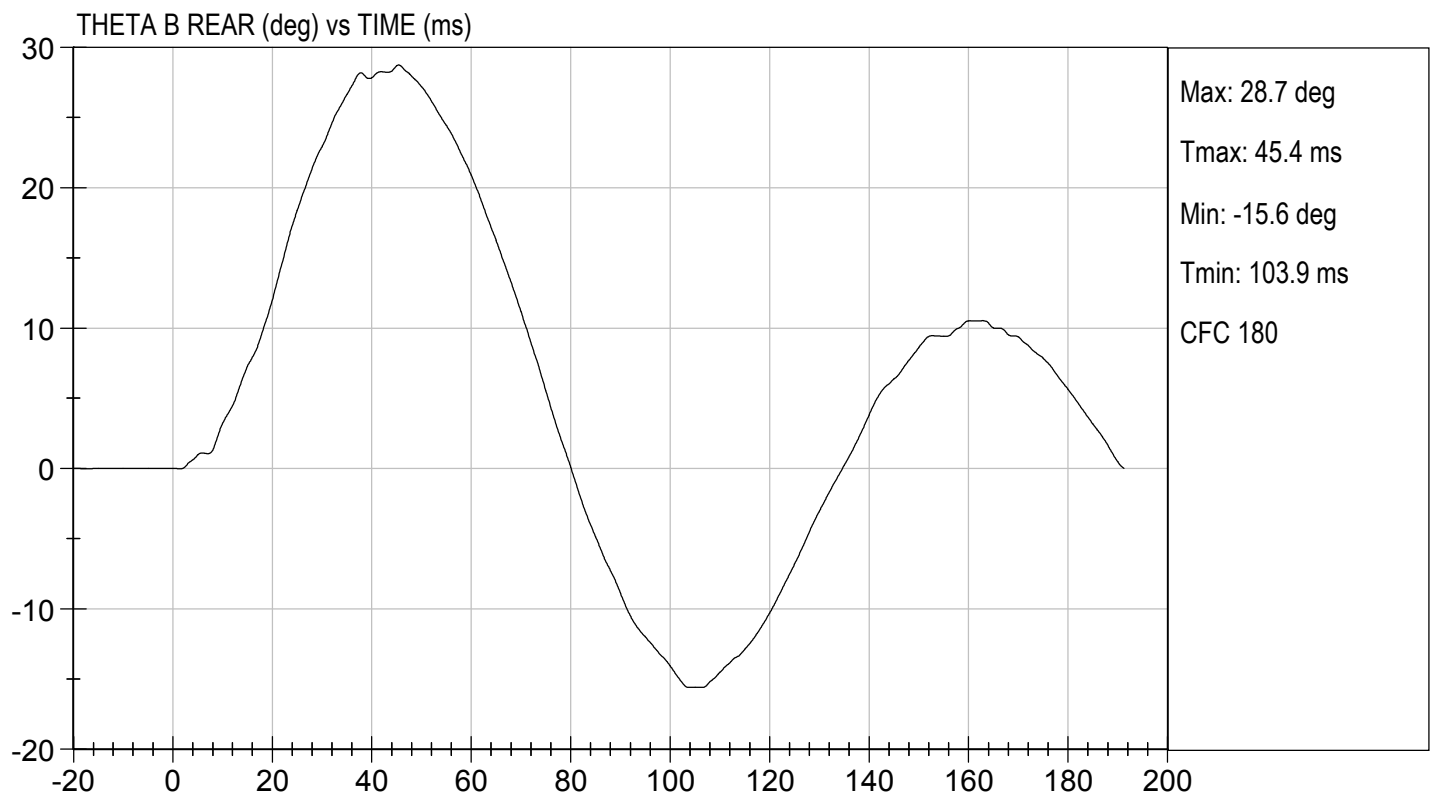
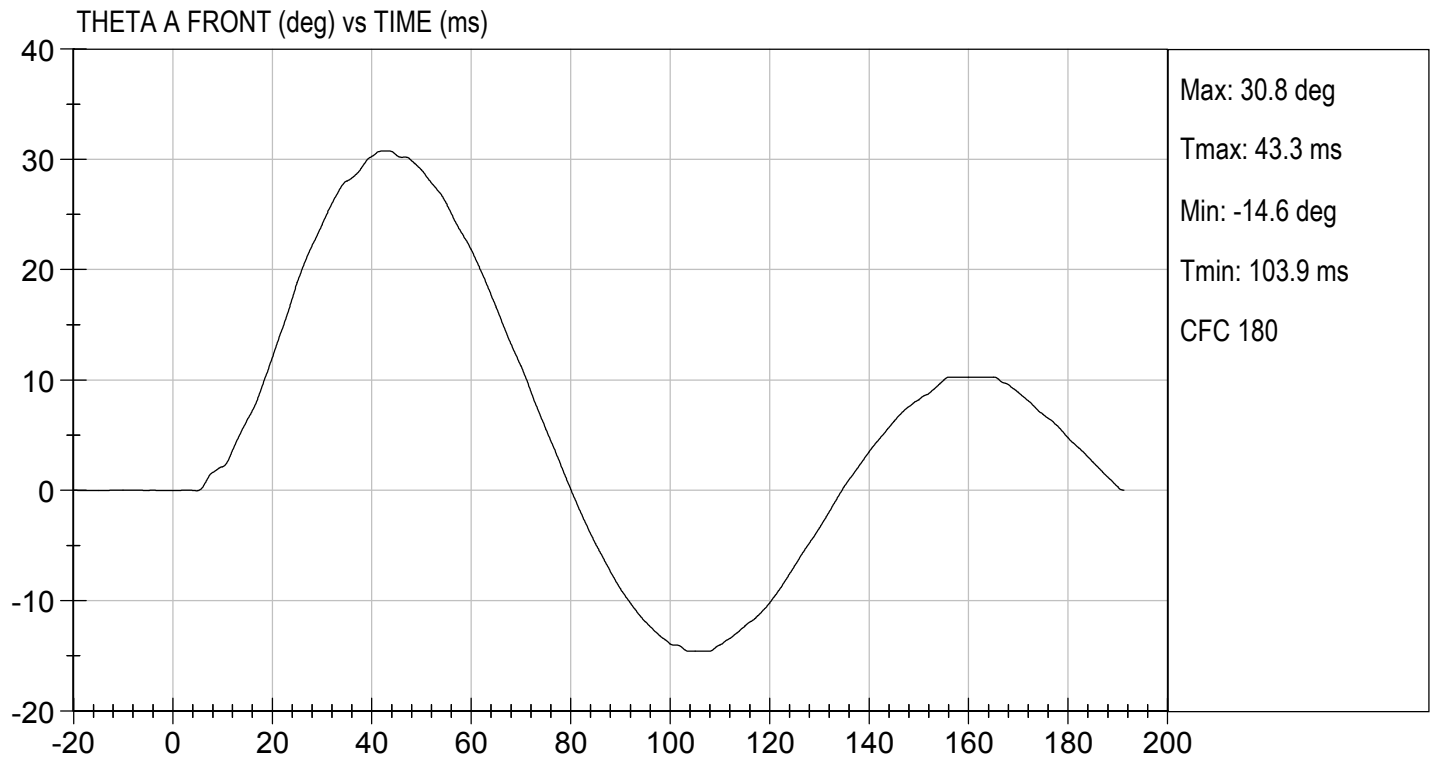

 Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 20.18 ft/s, 6.15 m/s

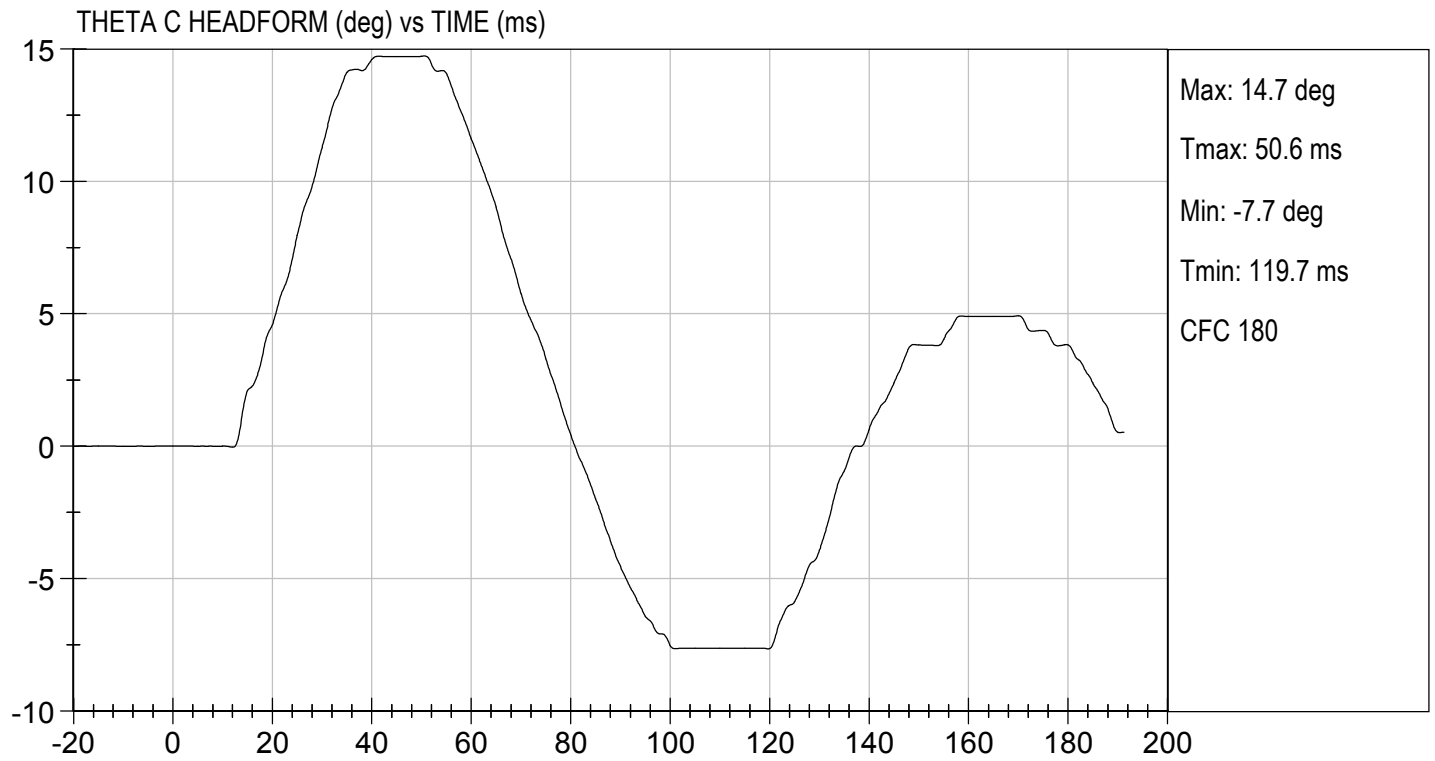
TEST DATE: 11/17/2020
TEST #: D202988





TEST DESC: LUMBAR BENDING
VELOCITY: 20.18 ft/s, 6.15 m/s

TEST DATE: 11/17/2020
TEST #: D202988

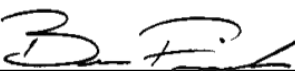


MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D202989

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	4.20 to 4.40	4.23	Pass
Maximum Impactor Force	N	4700 to 5400	5039	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.0	Pass
Maximum Pubic Force	N	1230 to 1590	1344	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.1	Pass
Overall Test Results				Pass


Laboratory Technician

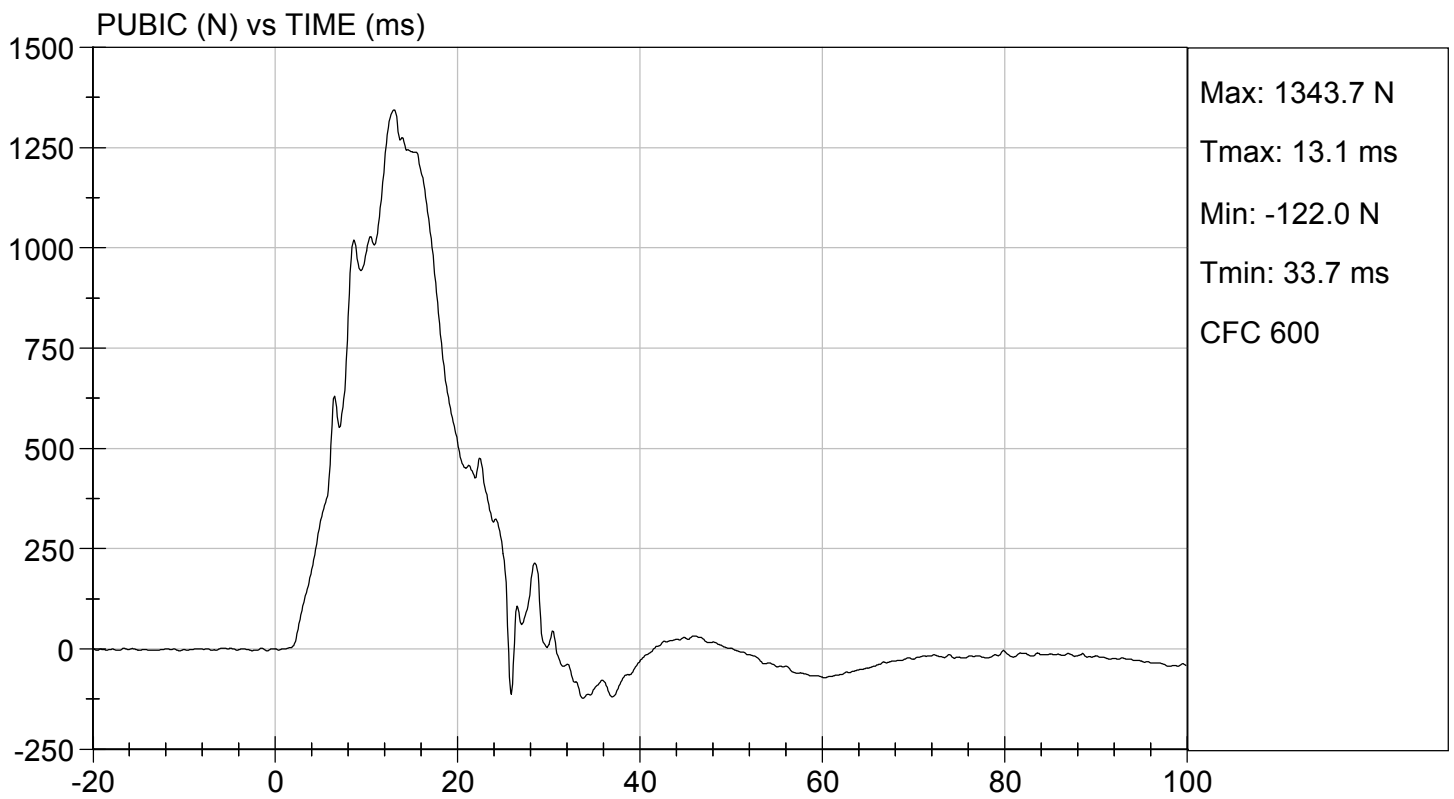
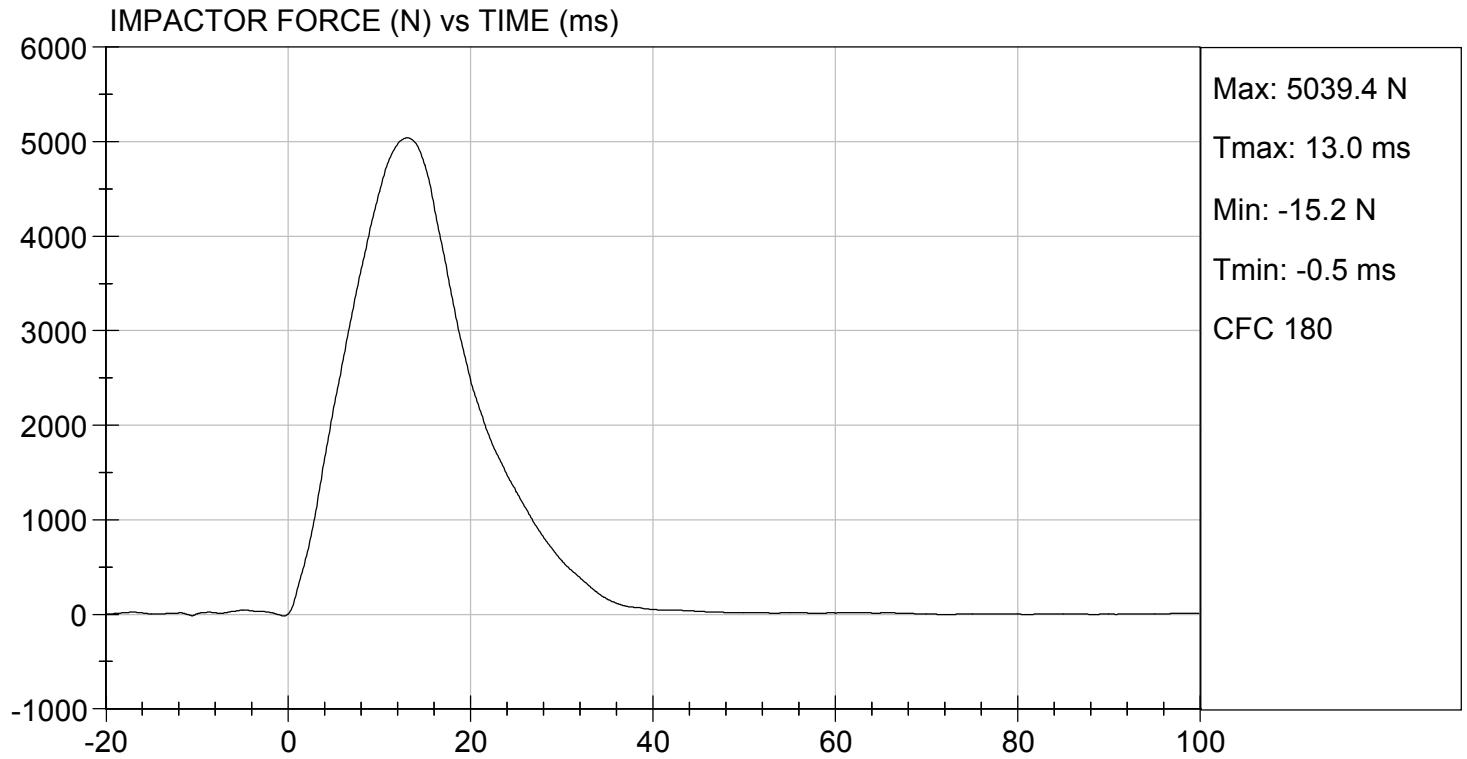
11/17/2020
Test Date


Approved By



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

TEST DATE: 11/17/2020
TEST #: D202989



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: F032

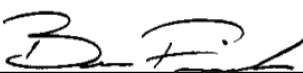
Test I.D: D202980

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	5.40 to 5.60	5.52	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5872	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.6	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.2	Pass
Lower Rib Displacement	mm	37.0 to 44.0	42.2	Pass
			Overall Test Results	Pass



Laboratory Technician

11/17/2020
Test Date

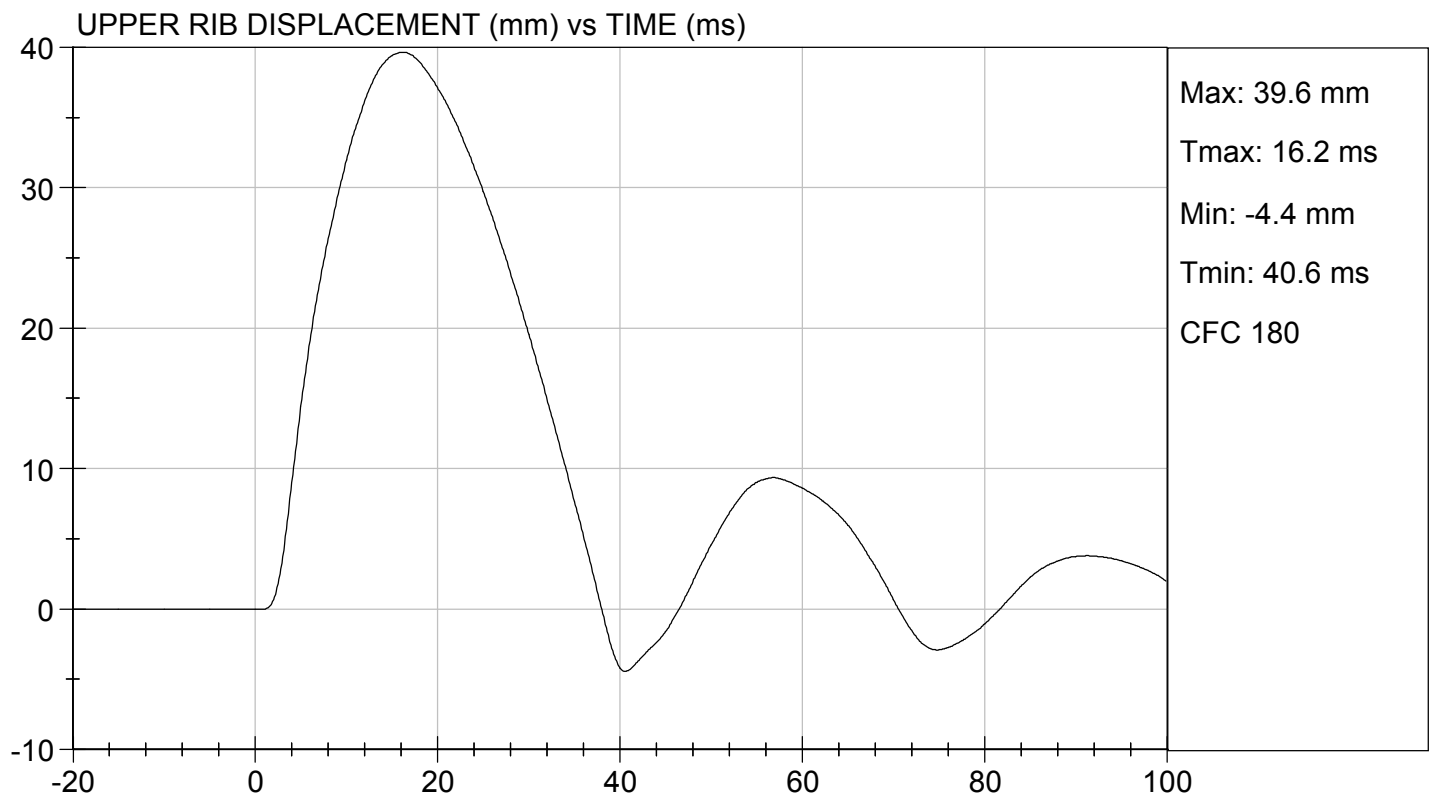
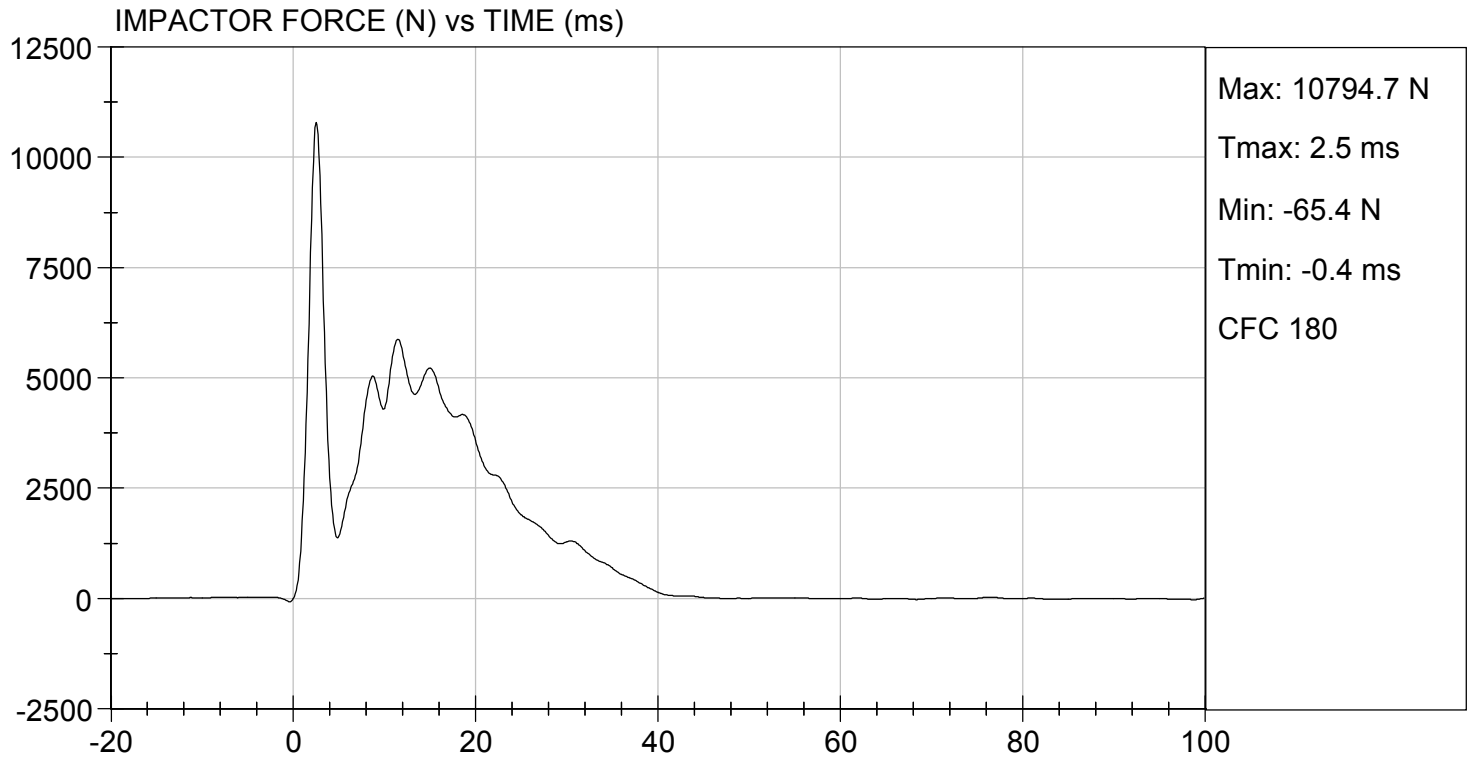


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 11/17/2020
TEST #: D202980

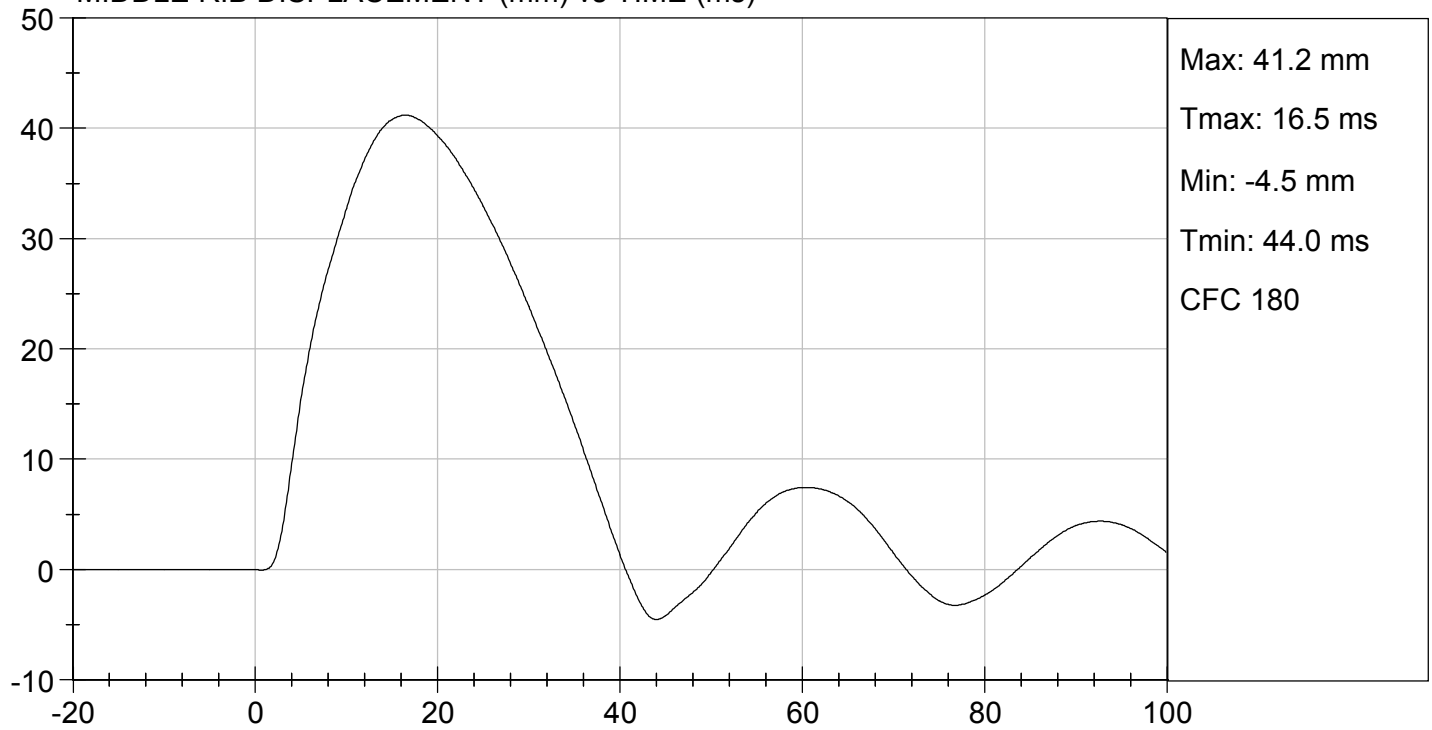




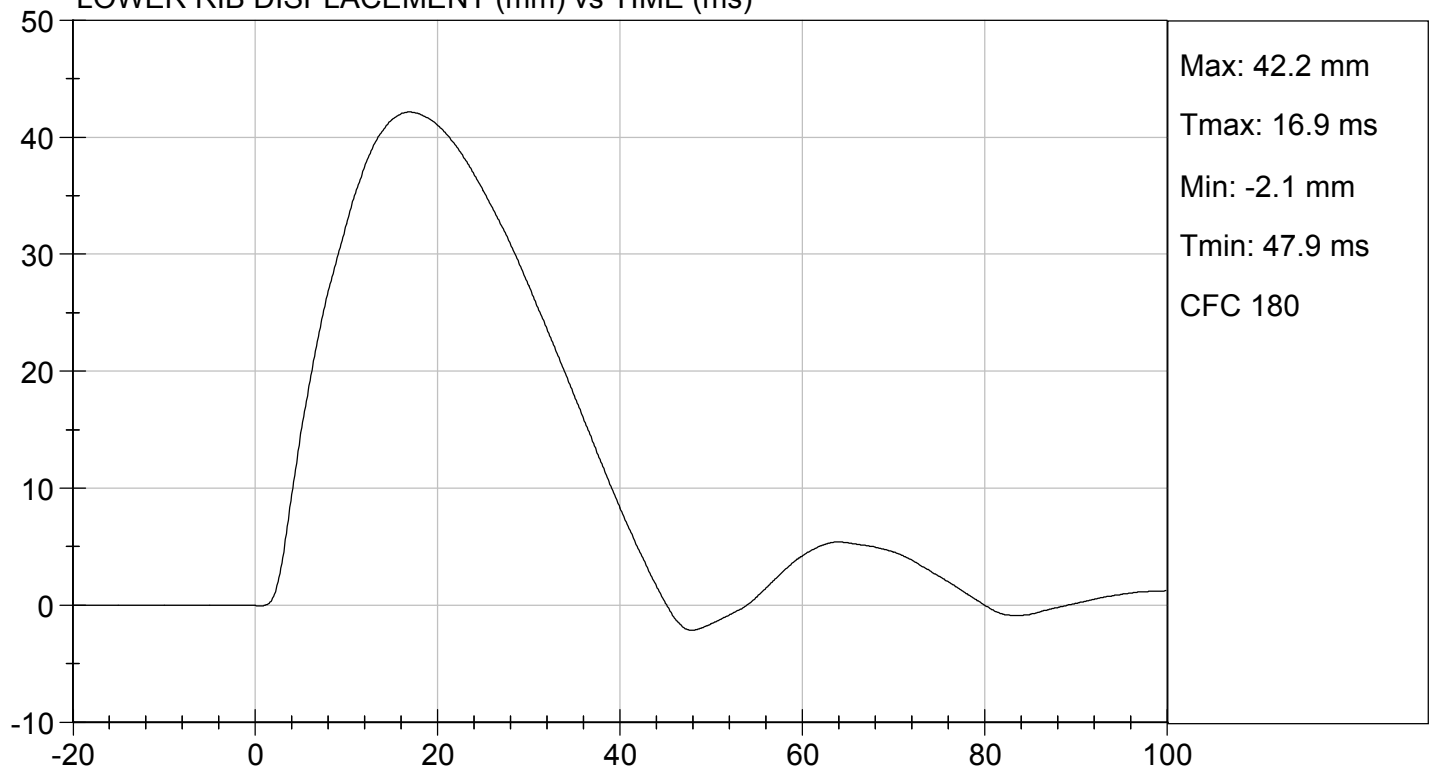
TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 11/17/2020
TEST #: D202980

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: F032

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

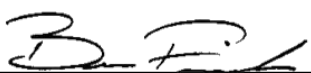
ATD Serial No: F032

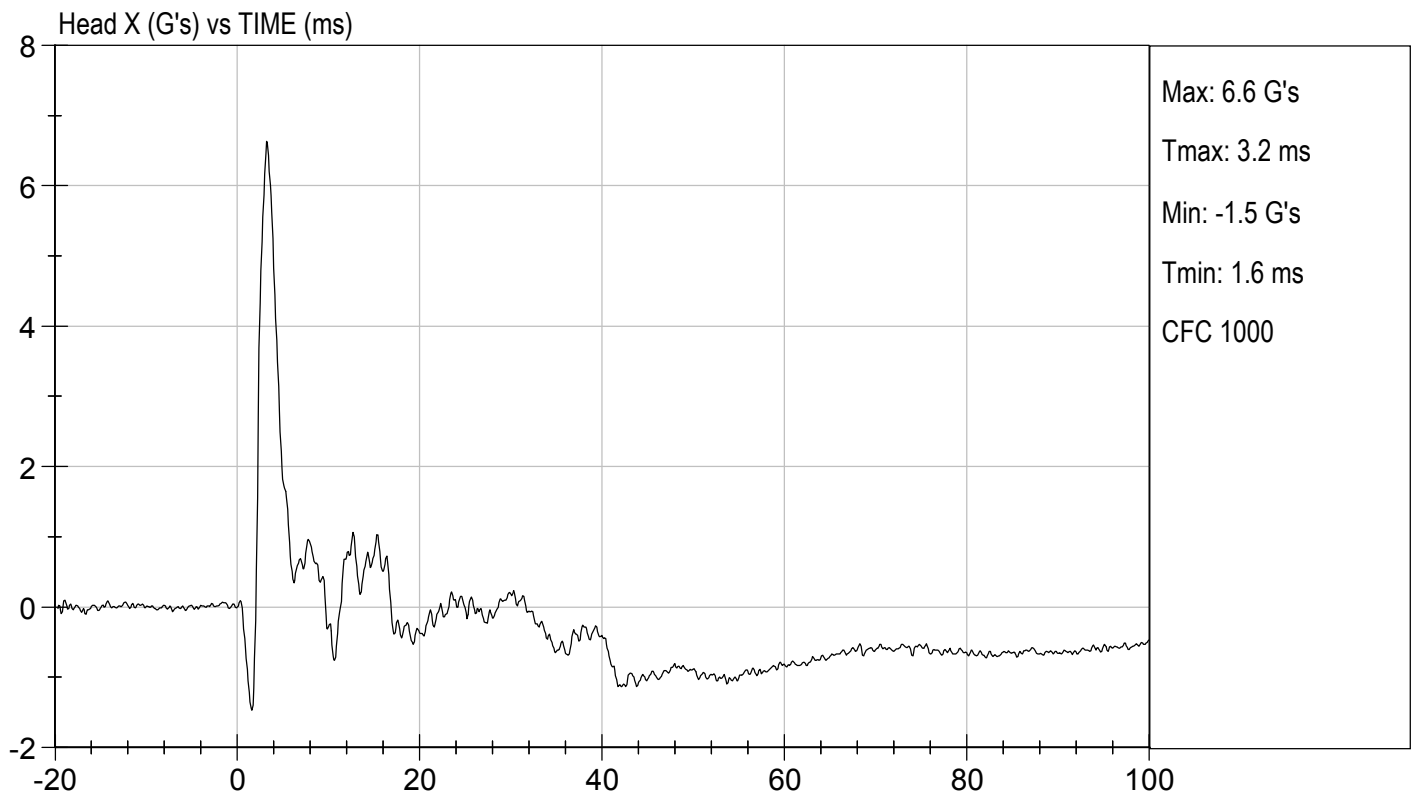
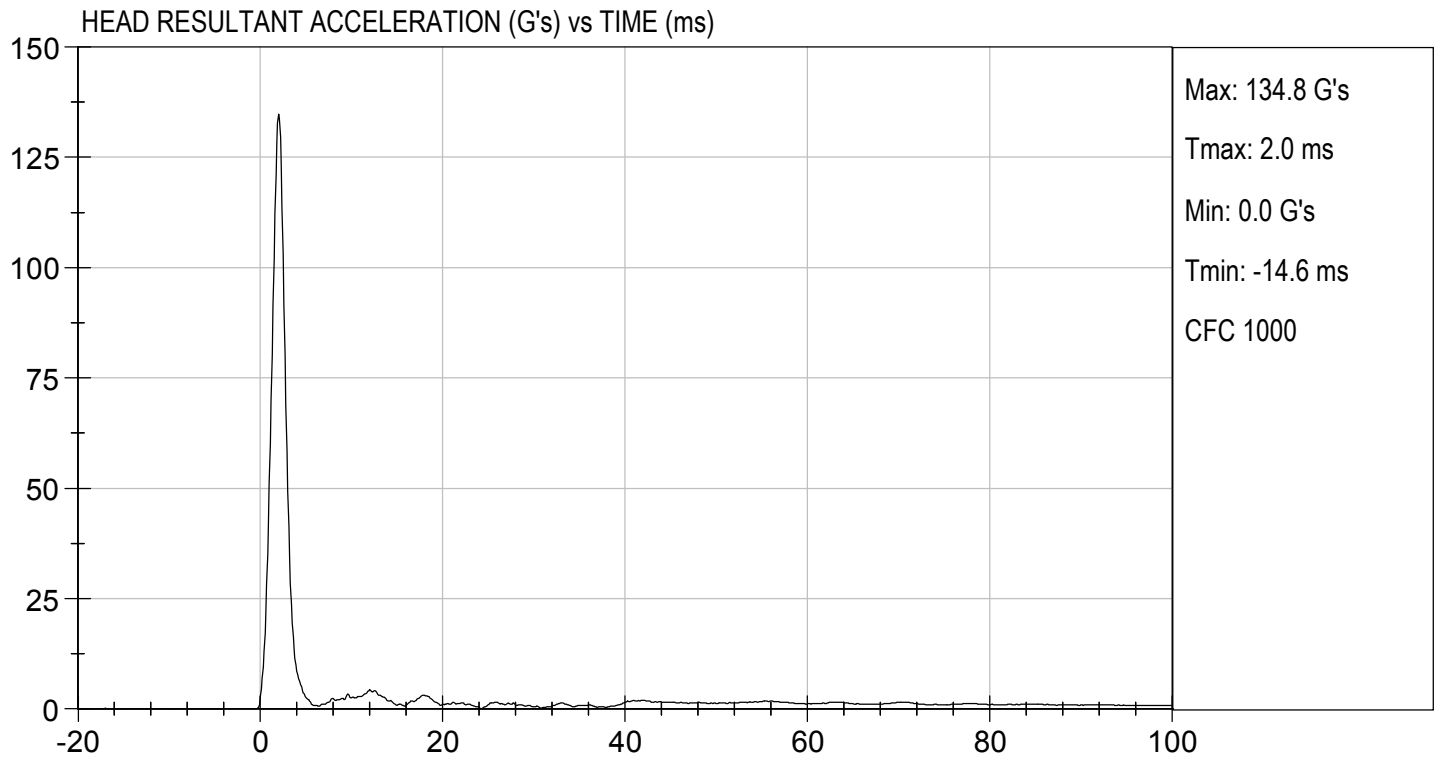
Test ID: D203031

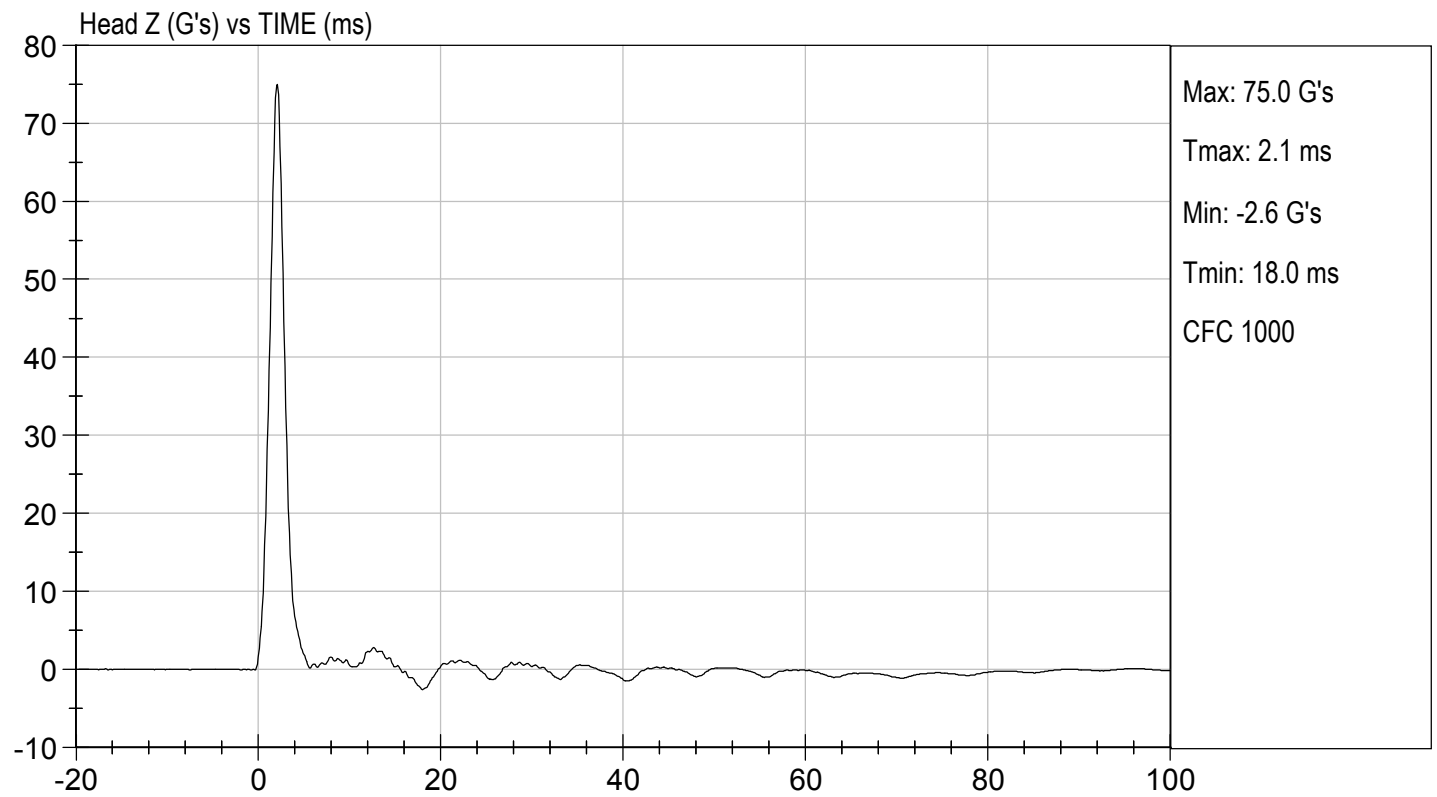
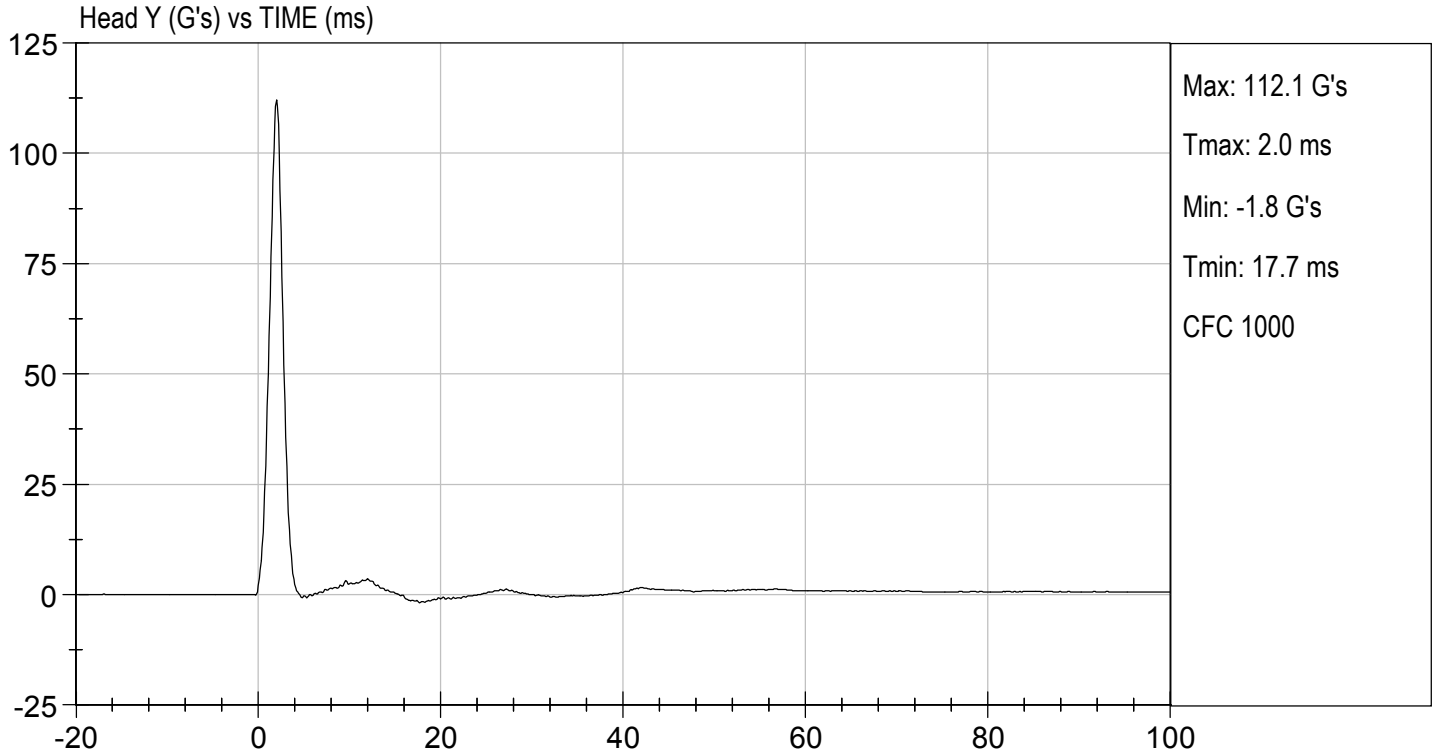
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Peak Resultant Acceleration	G's	125 to 155	135	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	6.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

11/23/2020
Test Date


Approved By





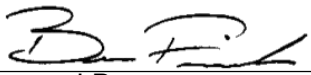
MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: F032

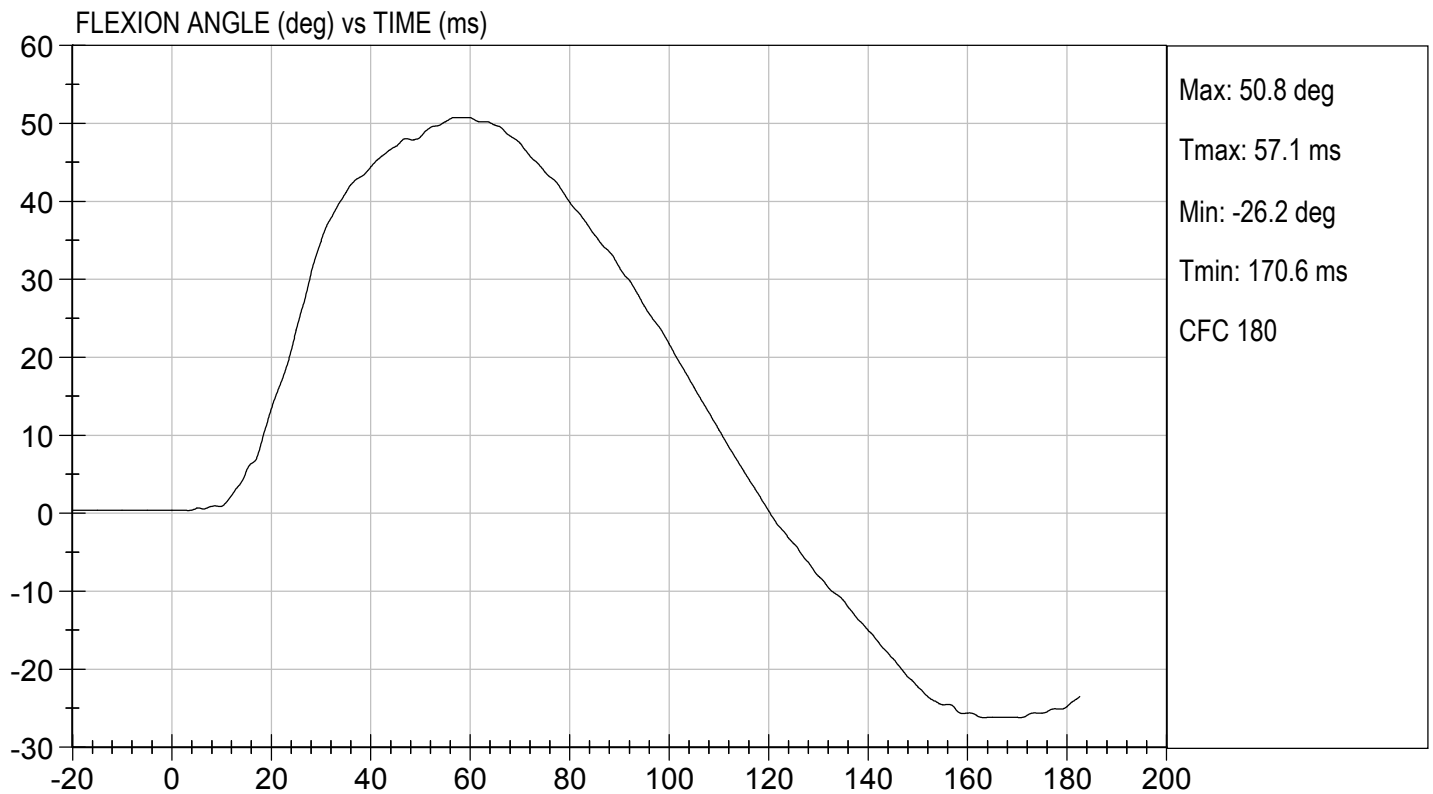
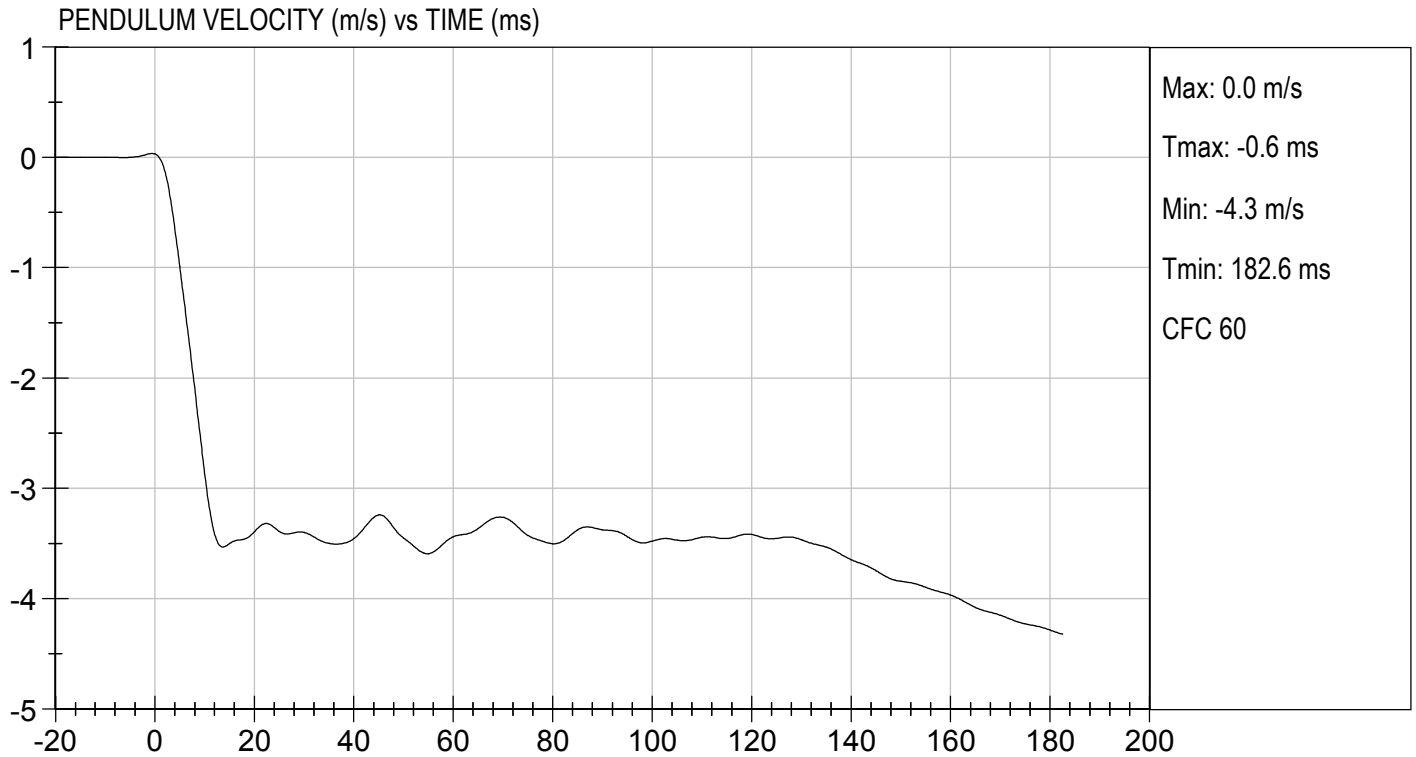
Test I.D: D203032

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	24	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.48	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	-3.53	Pass
	17 ms	m/s	>= -3.70	-3.47	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.8	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.1	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	63.2	Pass
Overall Results					Pass


 Laboratory Technician


 Approved By

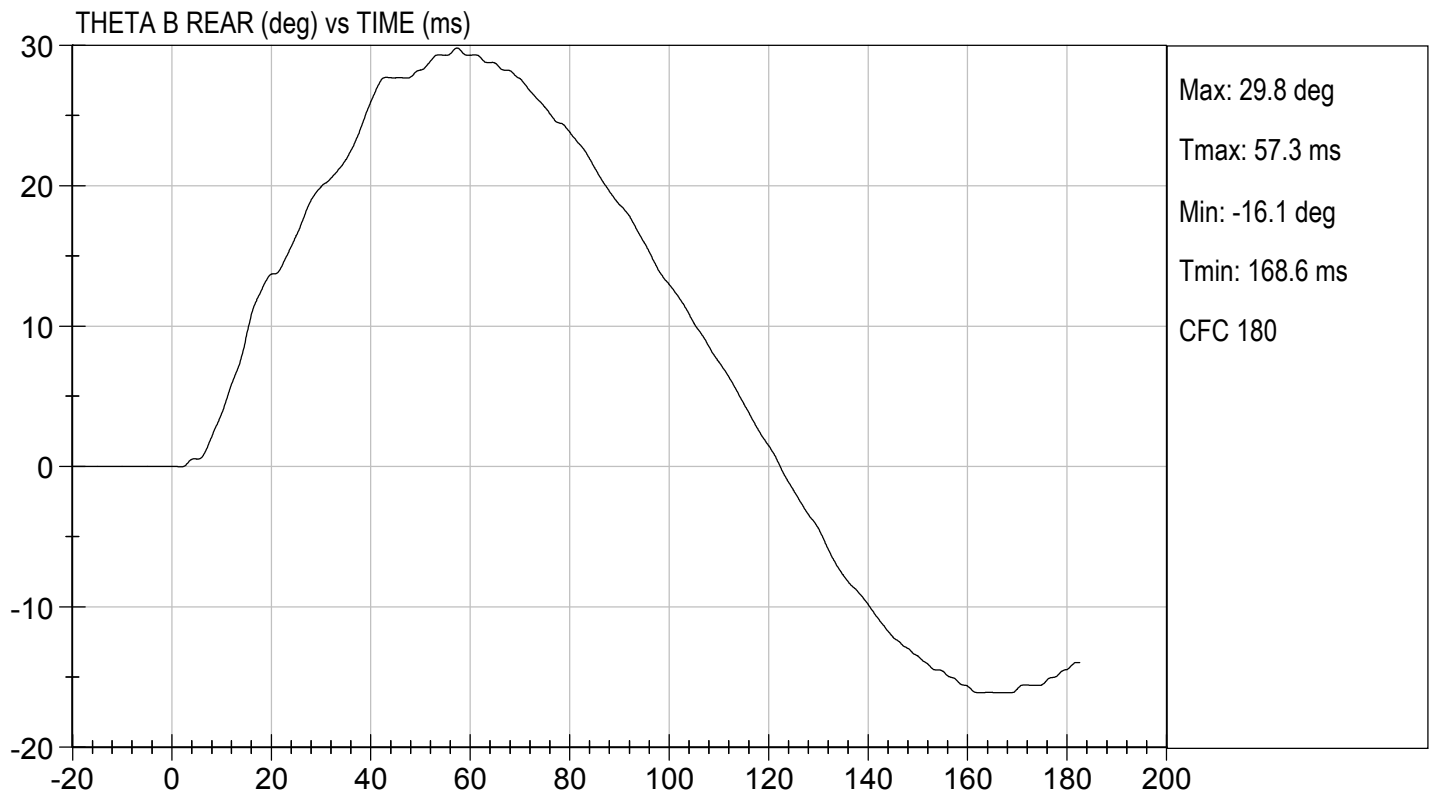
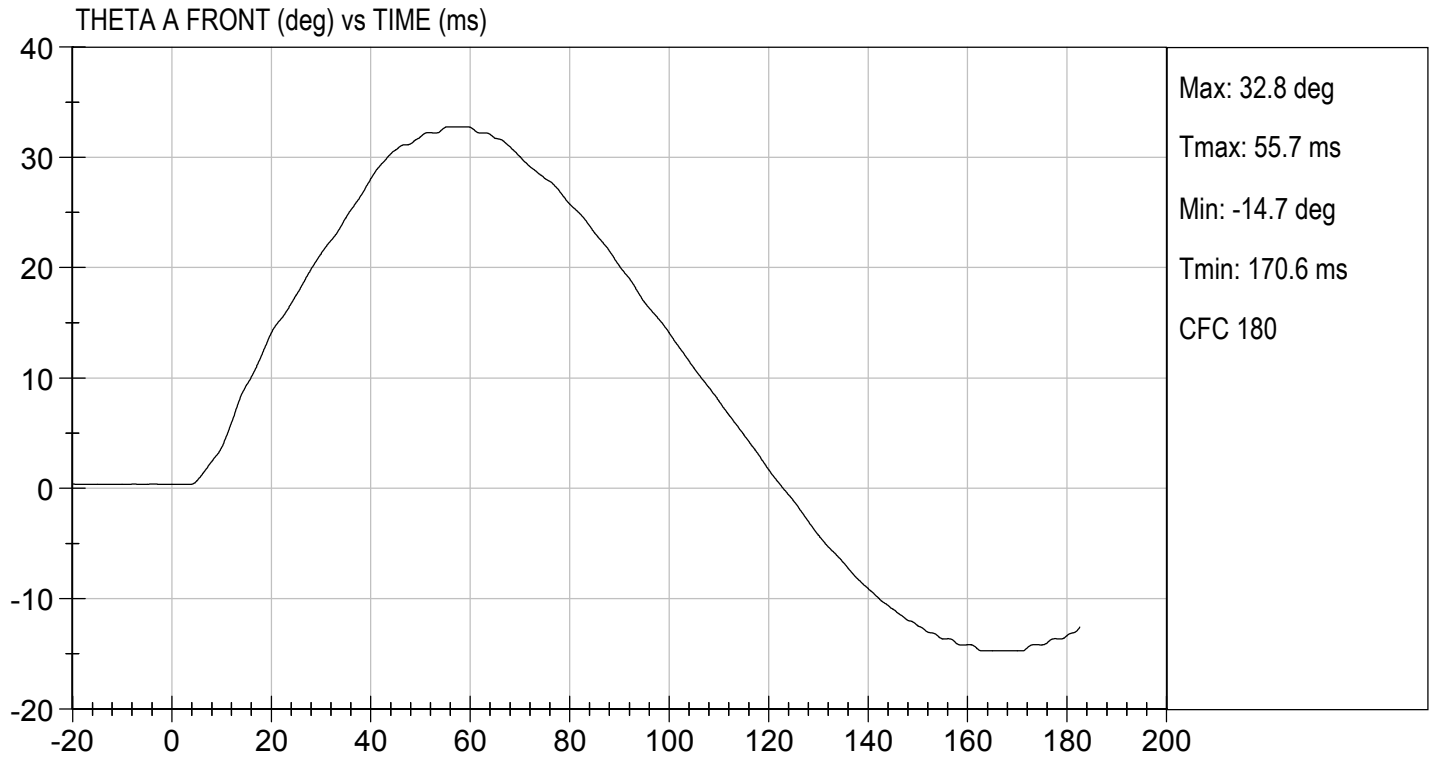
11/23/2020
 Test Date





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

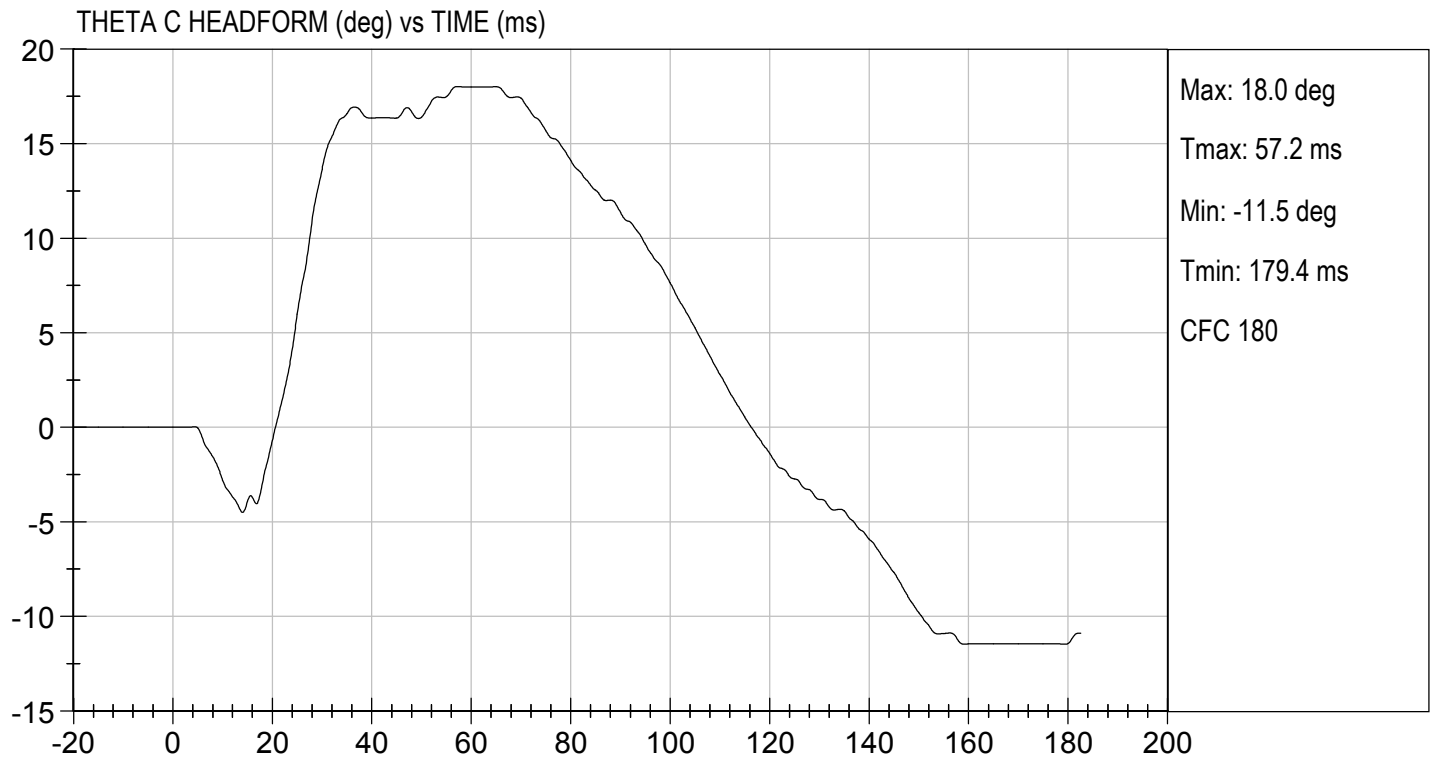
TEST DATE: 11/23/2020
TEST #: D203032





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

TEST DATE: 11/23/2020
TEST #: D203032



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D203033

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	24	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.23	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.8	Pass
Overall Test Results				Pass


Laboratory Technician

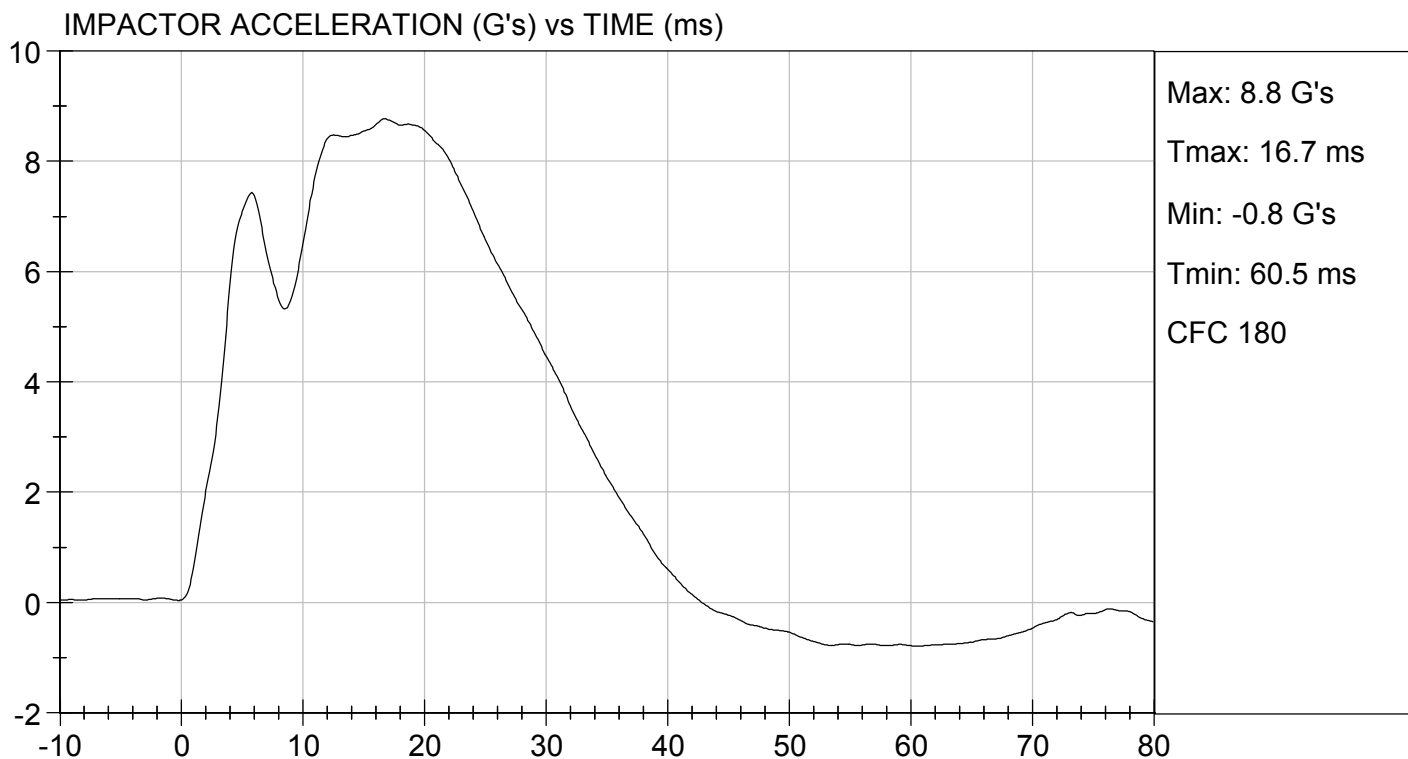
11/23/2020
Test Date


Approved By



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

TEST DATE: 11/23/2020
TEST #: D203033



MGA RESEARCH CORPORATION

UPPER RIB TEST

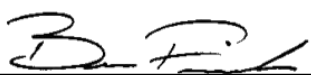
ES-2re DUMMY

ATD Serial No: F032

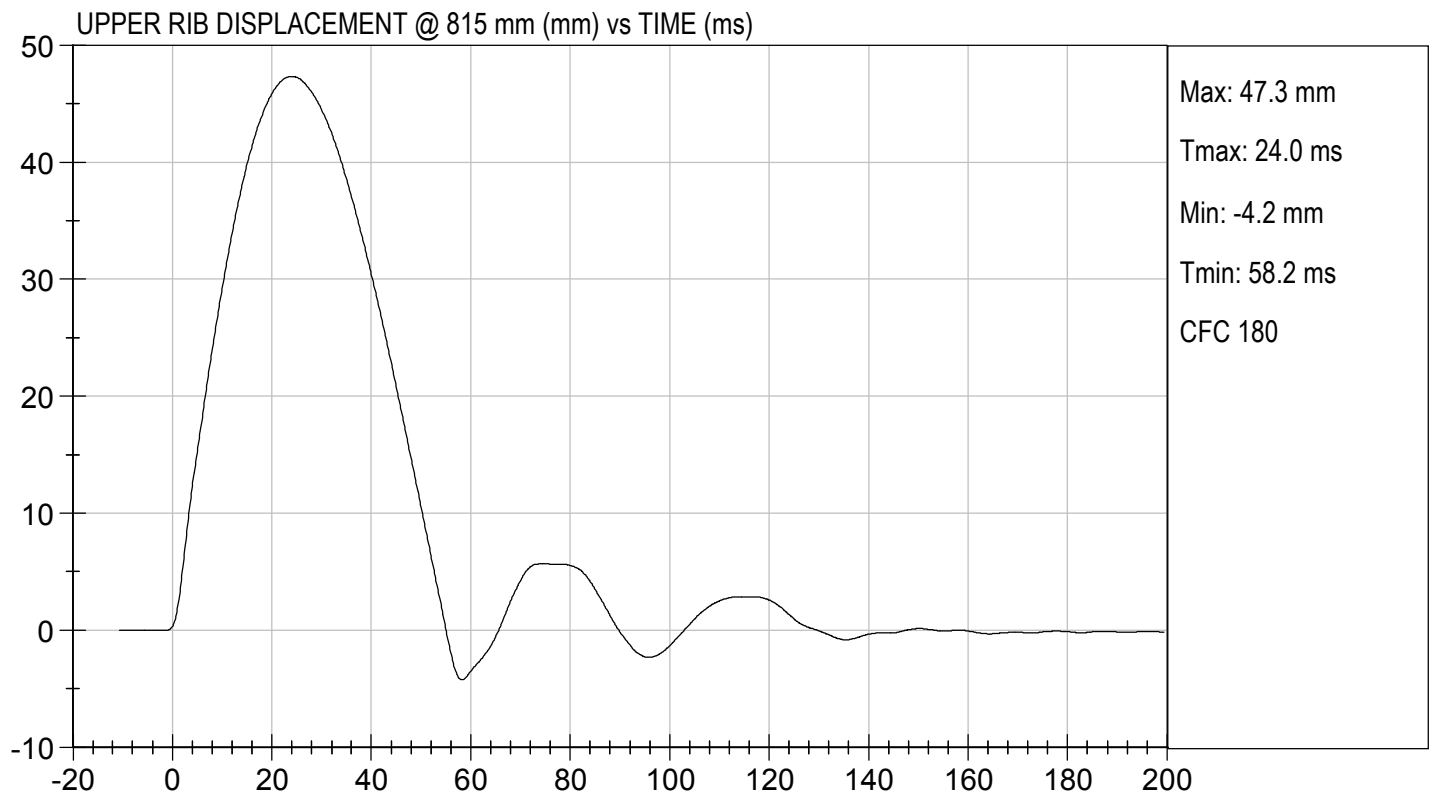
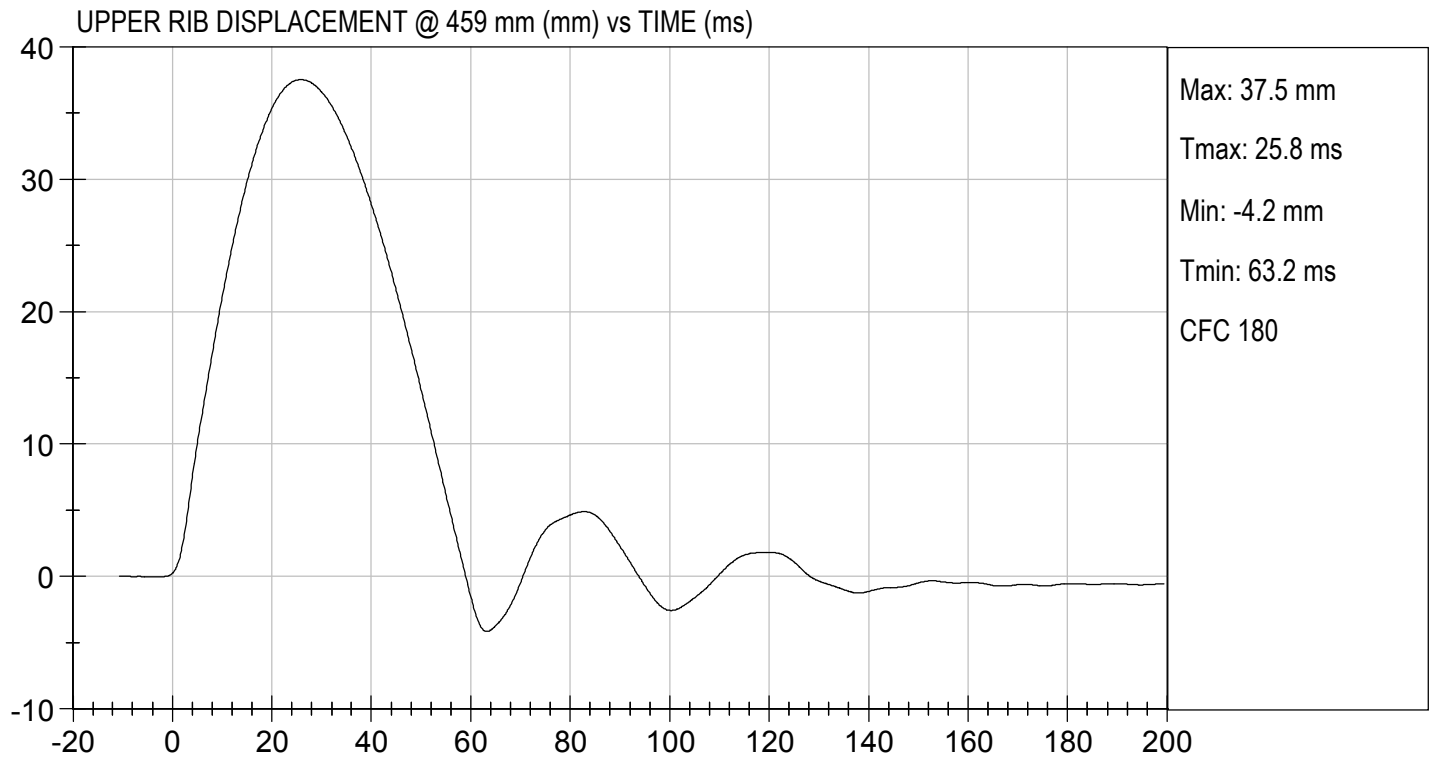
Test I.D: D203034

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	24	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.3	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

11/23/2020
Test Date



MGA RESEARCH CORPORATION

MID RIB TEST

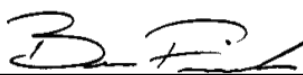
ES-2re DUMMY

ATD Serial No: F032

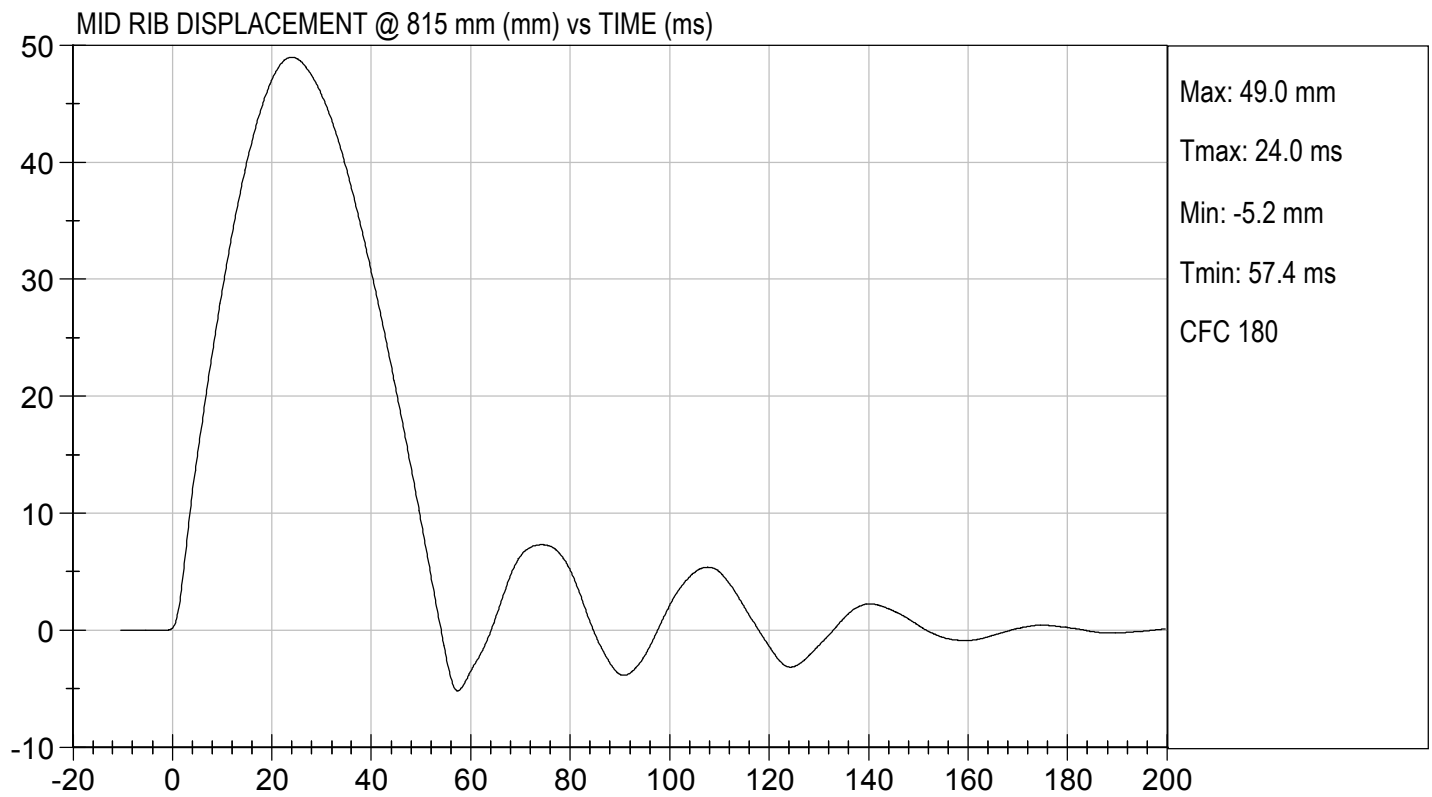
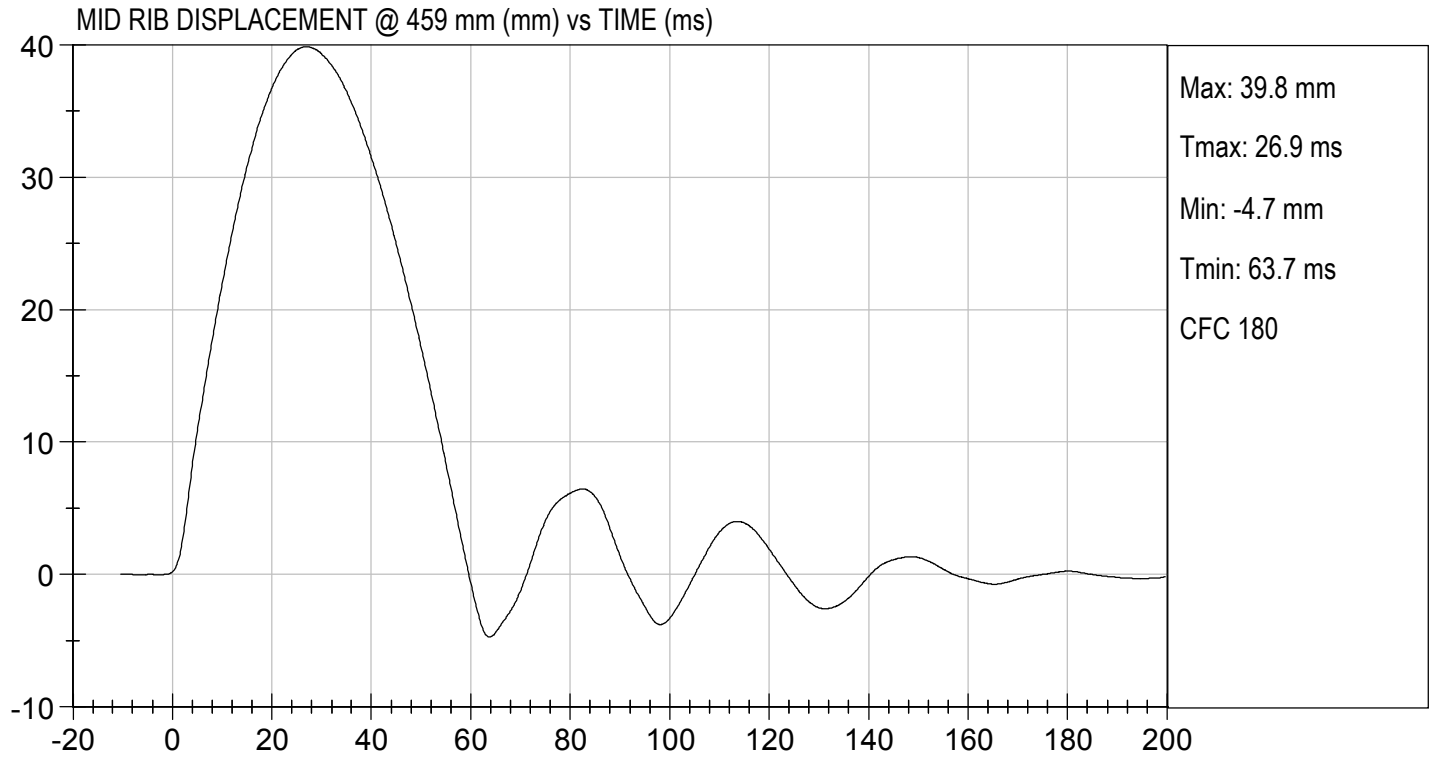
Test I.D: D203035

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	24	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

11/23/2020
Test Date



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: F032

Test I.D: D203036

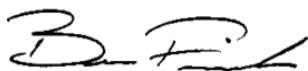
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.9	Pass
Overall Test Results				Pass



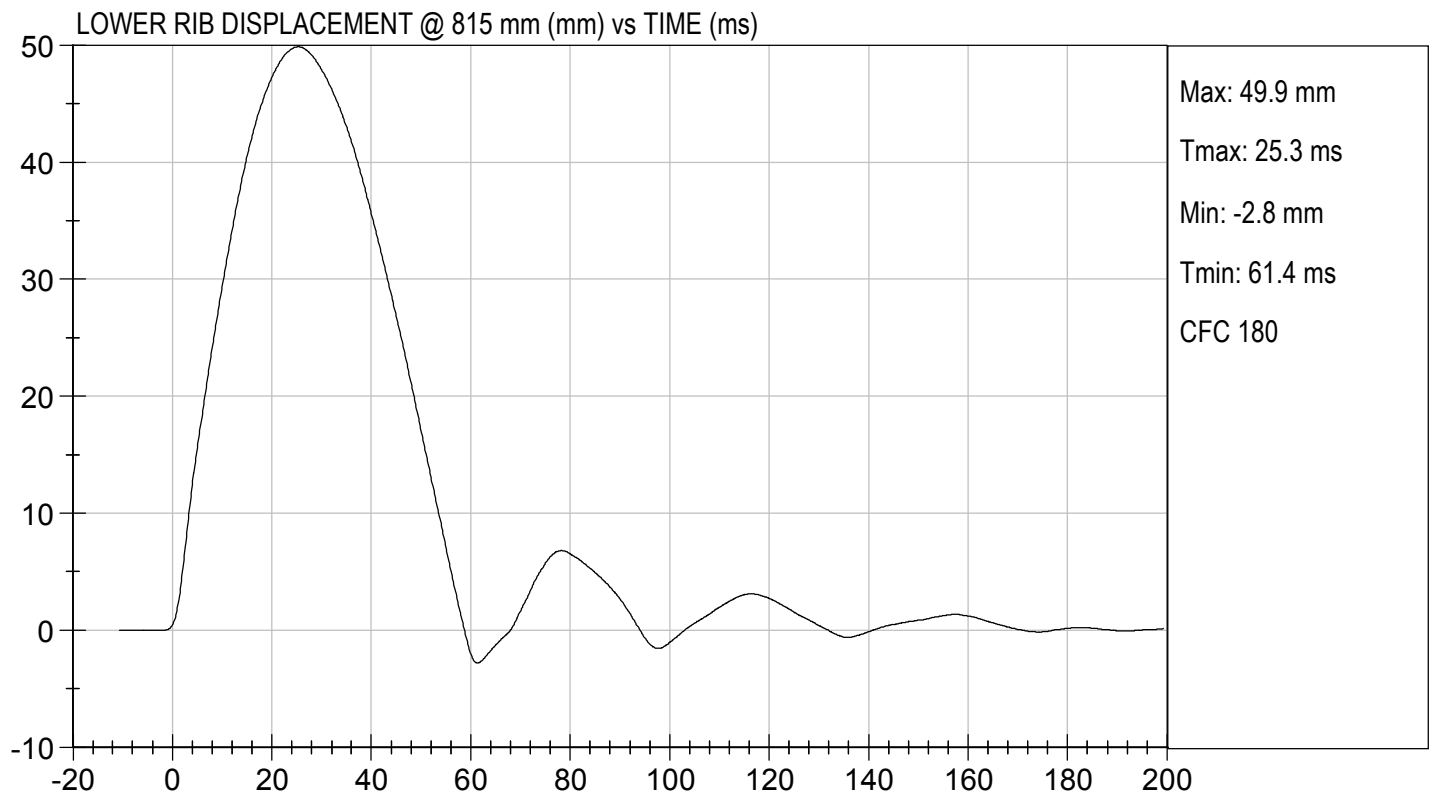
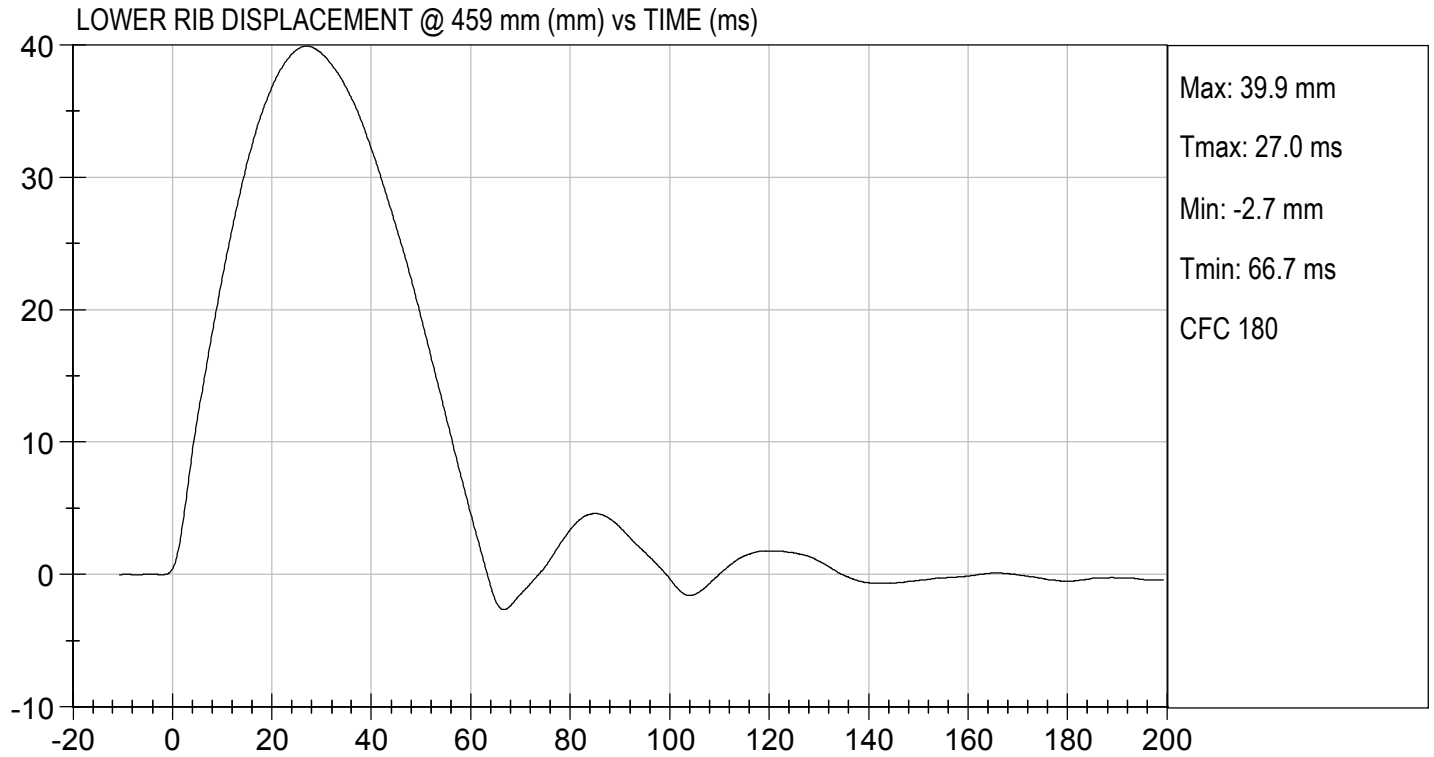
Laboratory Technician

11/23/2020

Test Date



Approved By

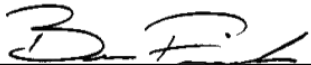


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D203037

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	24	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4278	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.4	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2237	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass


Laboratory Technician

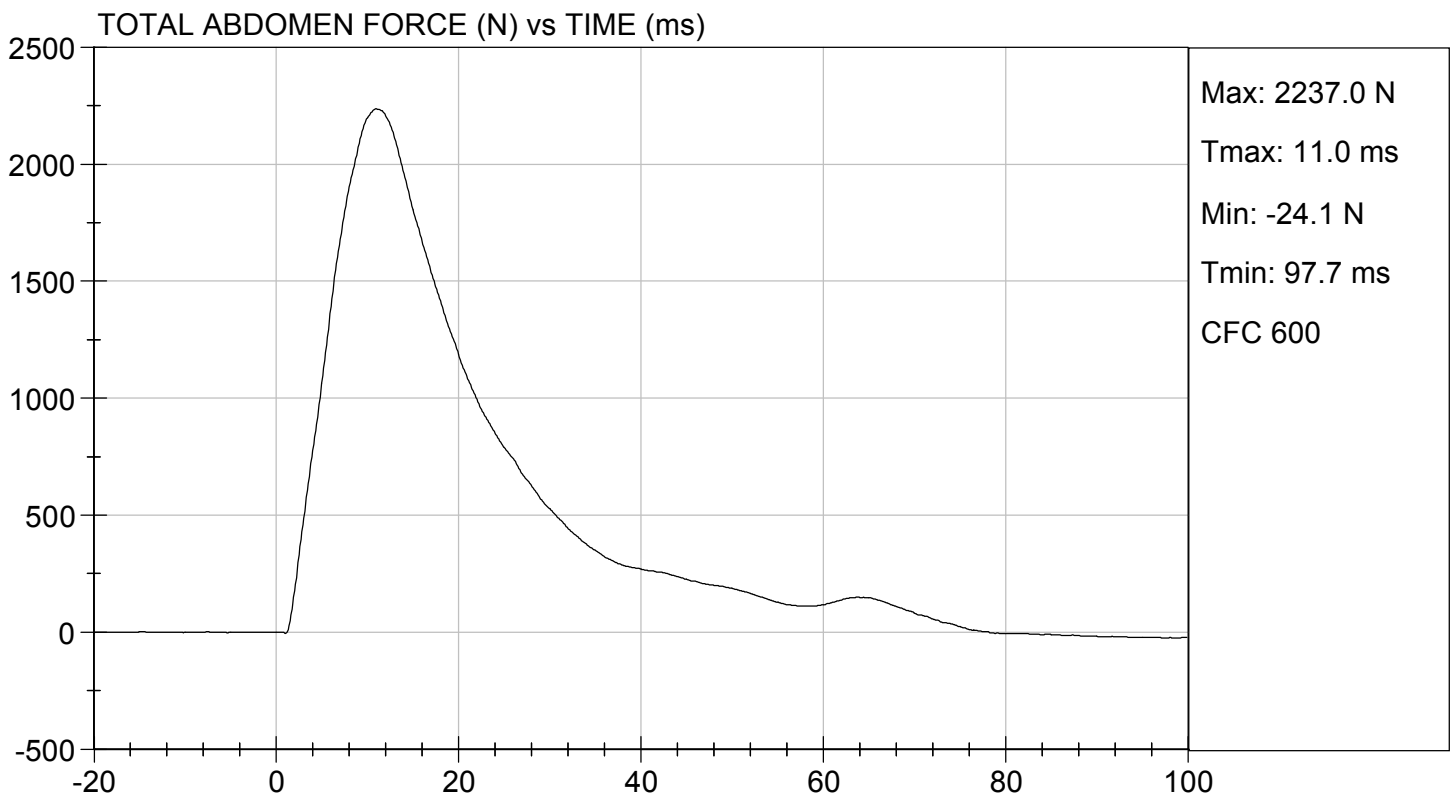
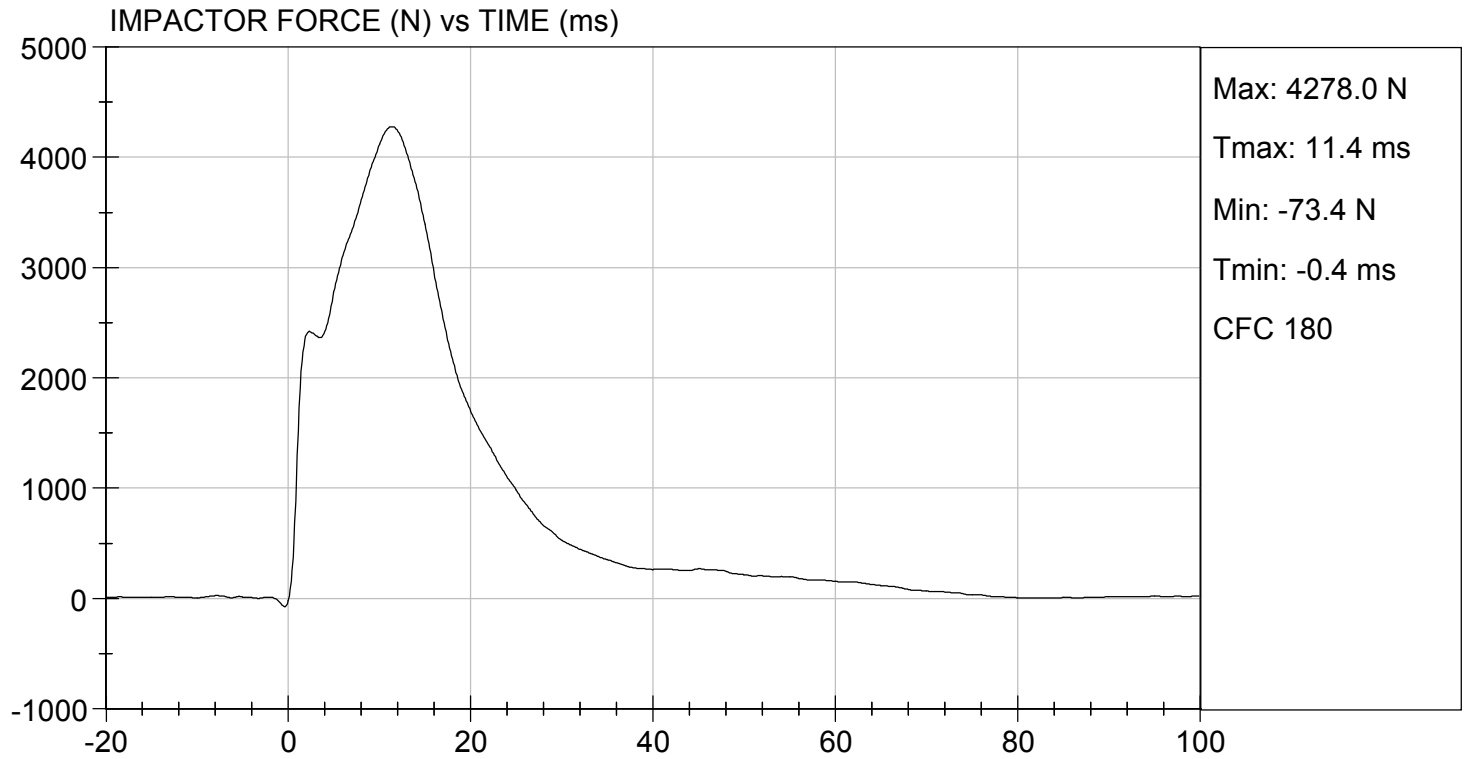
11/23/2020
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

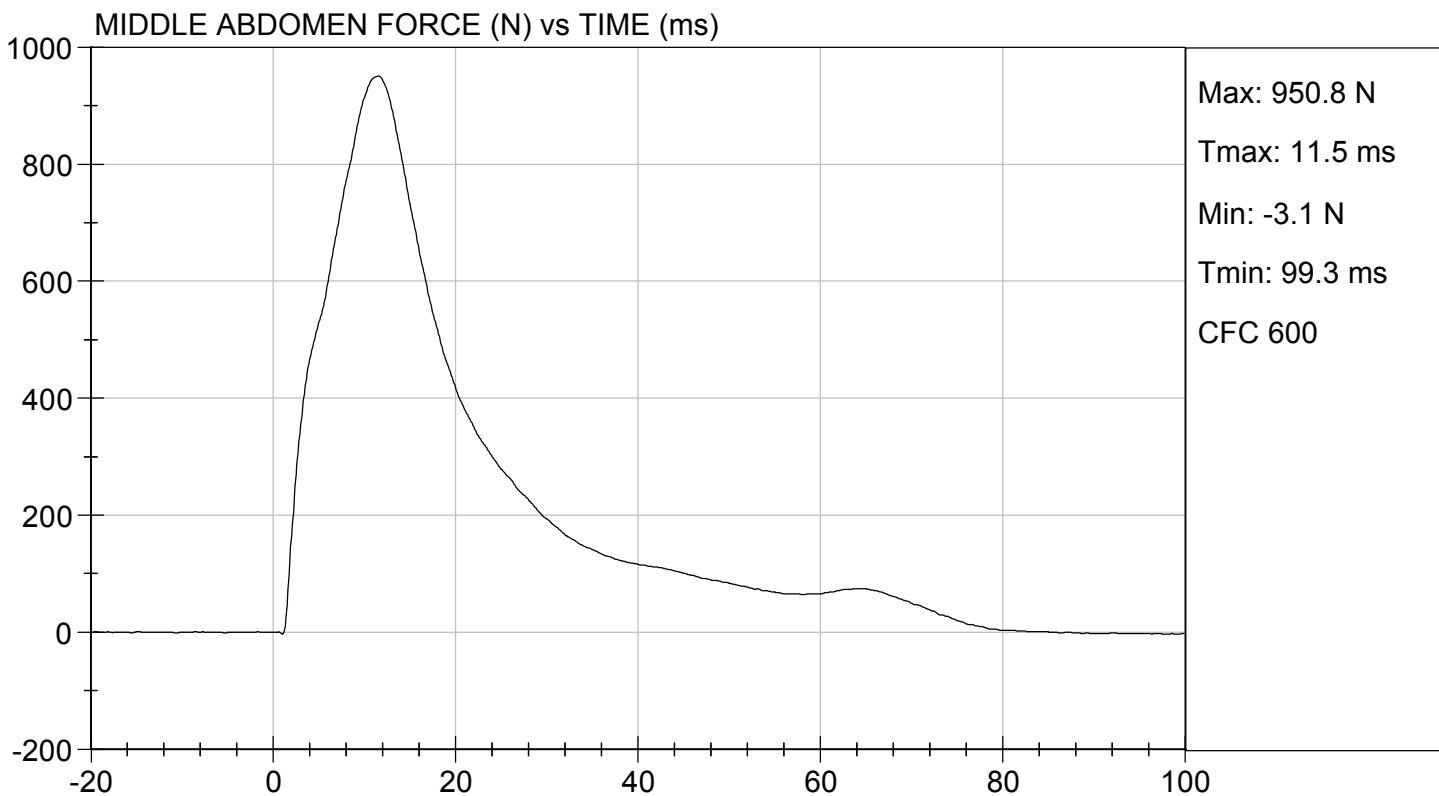
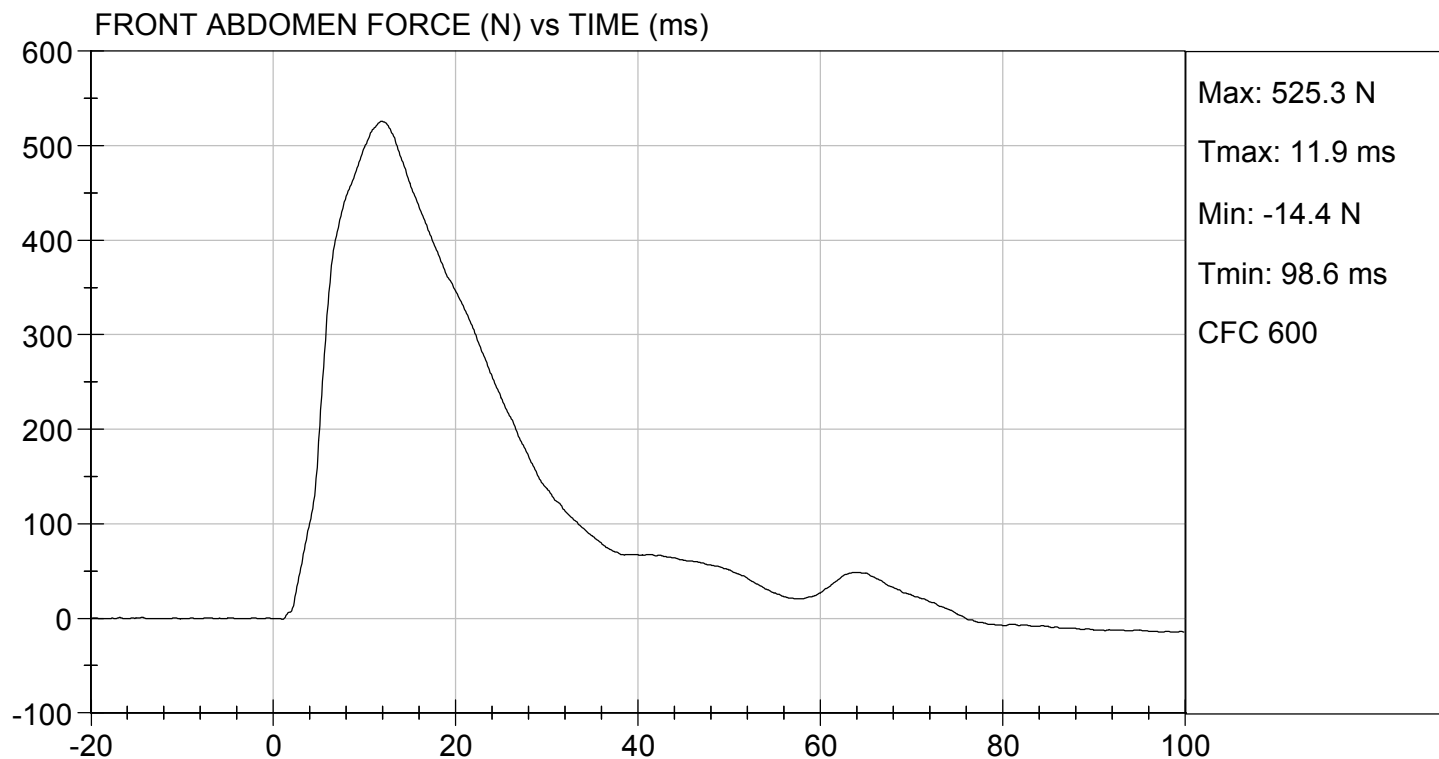
TEST DATE: 11/23/2020
TEST #: D203037





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

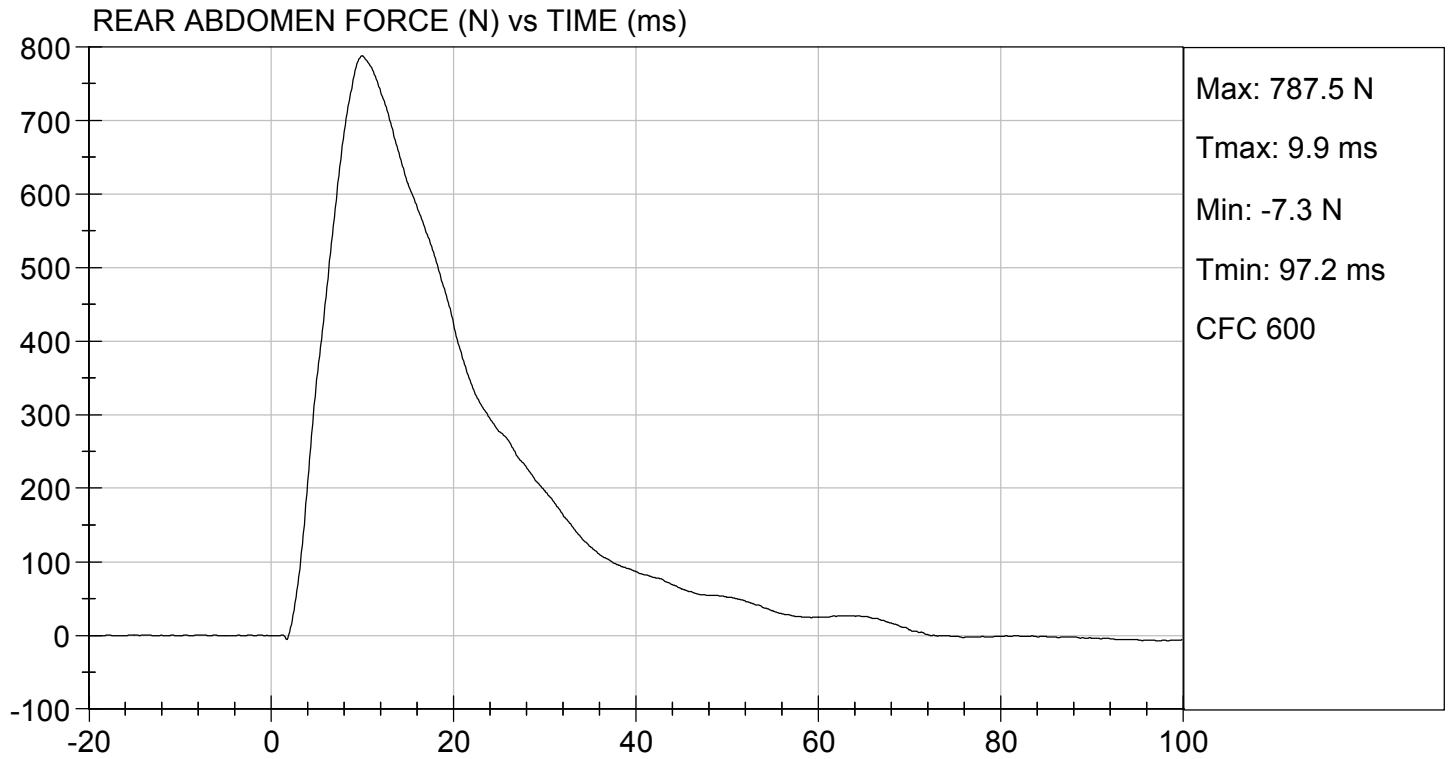
TEST DATE: 11/23/2020
TEST #: D203037





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 11/23/2020
TEST #: D203037



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

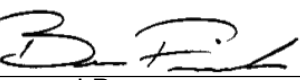
ATD Serial No: F032

Test I.D: D203038

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	24	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.03	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.403	Pass
	27 ms	m/s	-6.50 to -5.80	-6.10	Pass
	30 ms	m/s	>= -6.50	-5.99	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	48.2	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	46.0	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	37	Pass
Overall Results					Pass


 Laboratory Technician

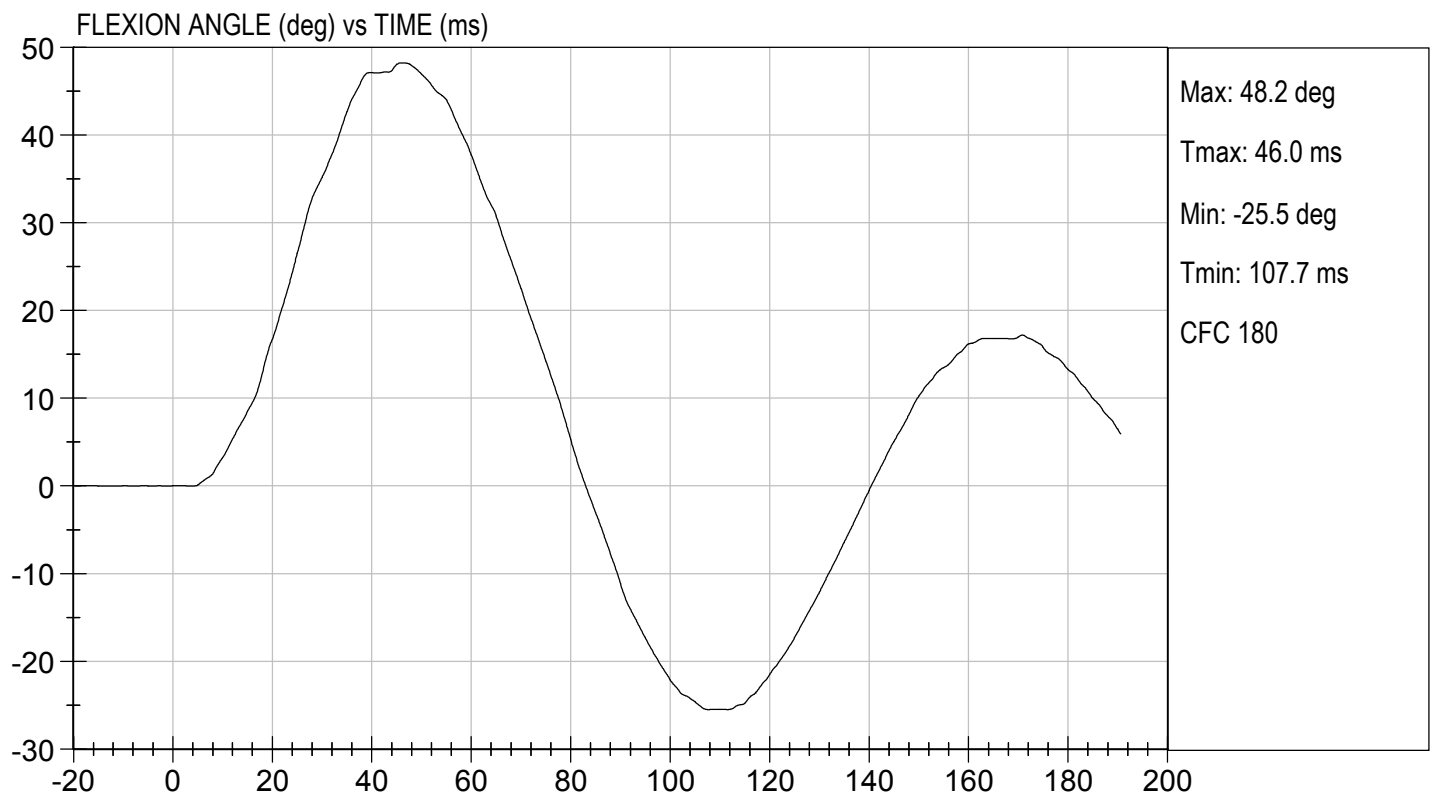
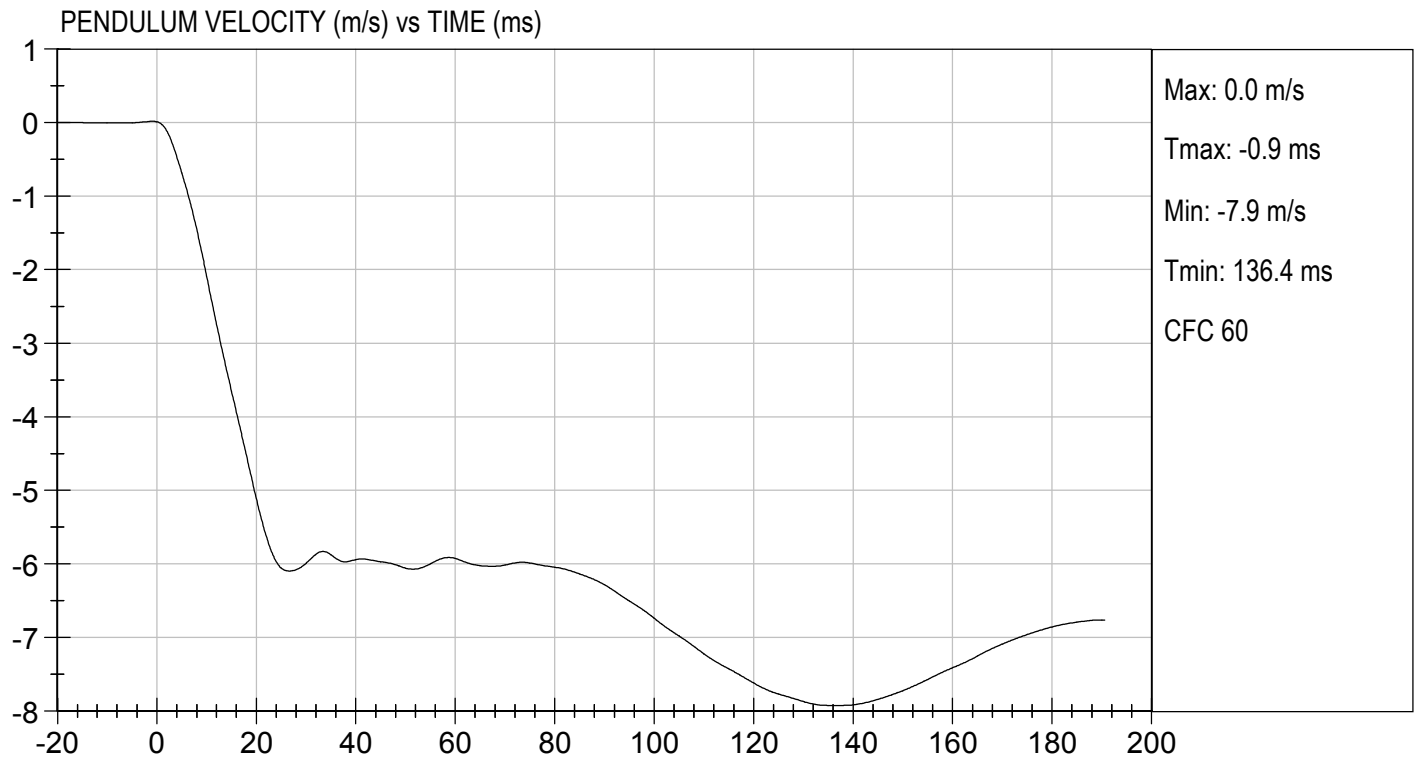
11/23/2020
 Test Date


 Approved By



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

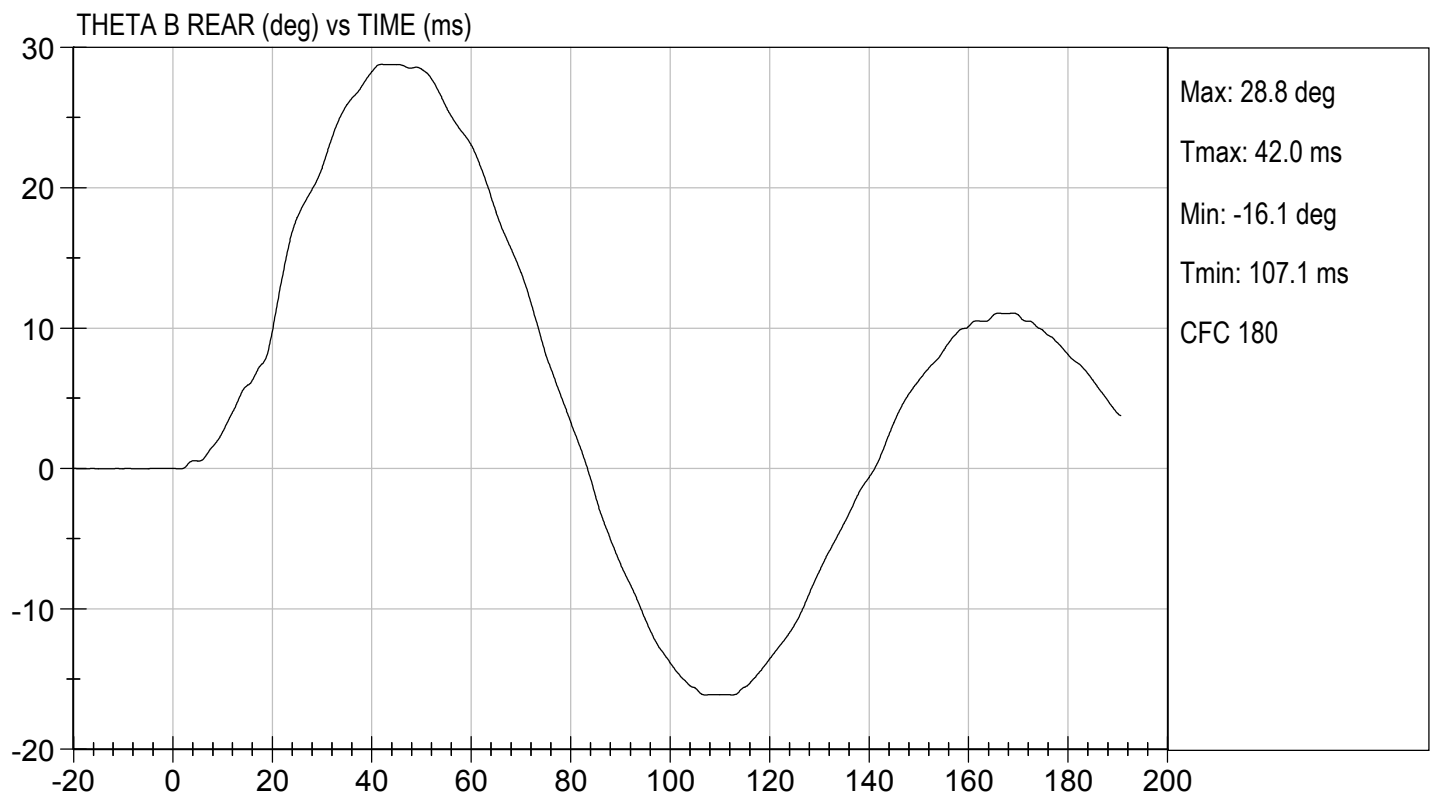
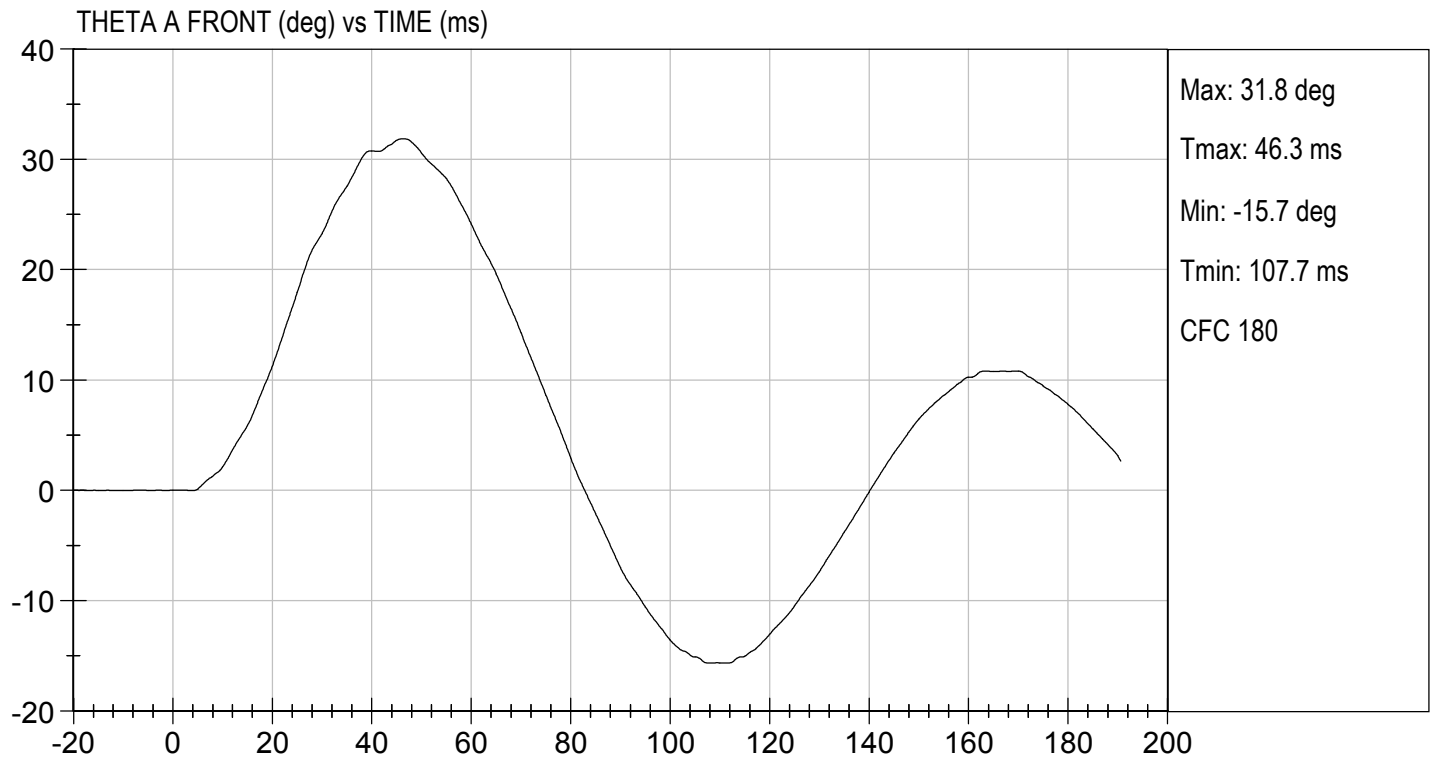
TEST DATE: 11/23/2020
TEST #: D203038





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

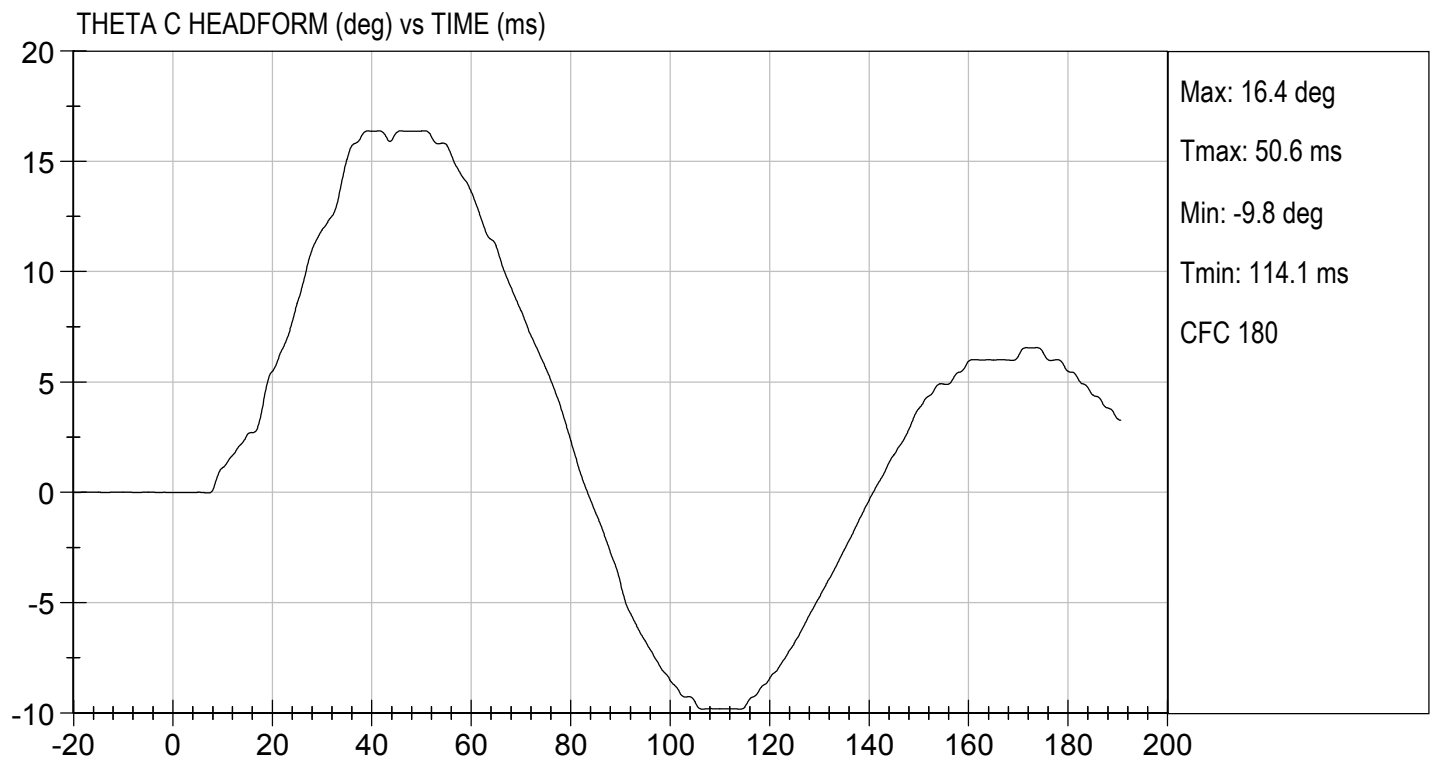
TEST DATE: 11/23/2020
TEST #: D203038





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

TEST DATE: 11/23/2020
TEST #: D203038

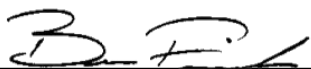


MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D203039

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	24	Pass
Probe Speed	m/s	4.20 to 4.40	4.23	Pass
Maximum Impactor Force	N	4700 to 5400	5135	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.5	Pass
Maximum Pubic Force	N	1230 to 1590	1398	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.5	Pass
Overall Test Results				Pass


Laboratory Technician

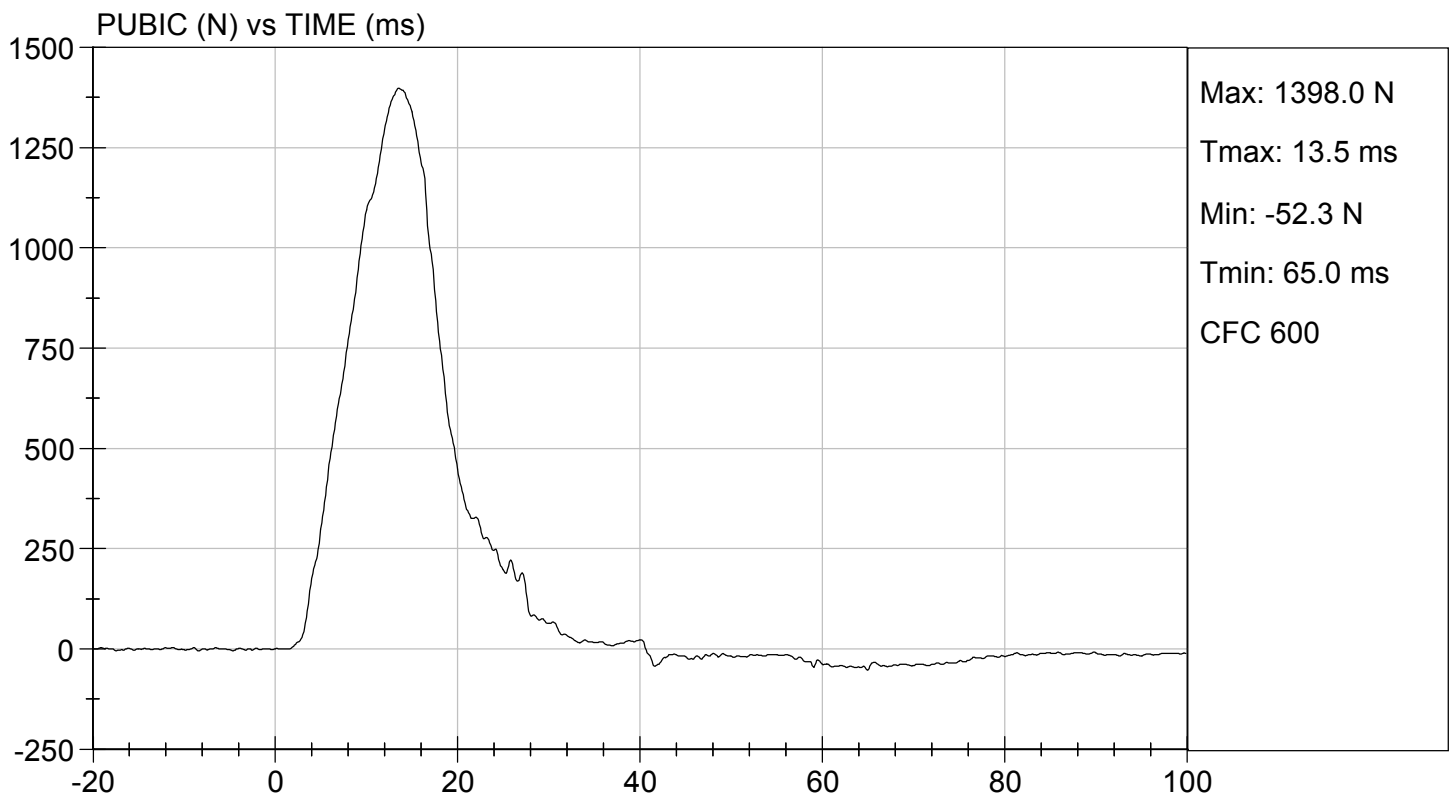
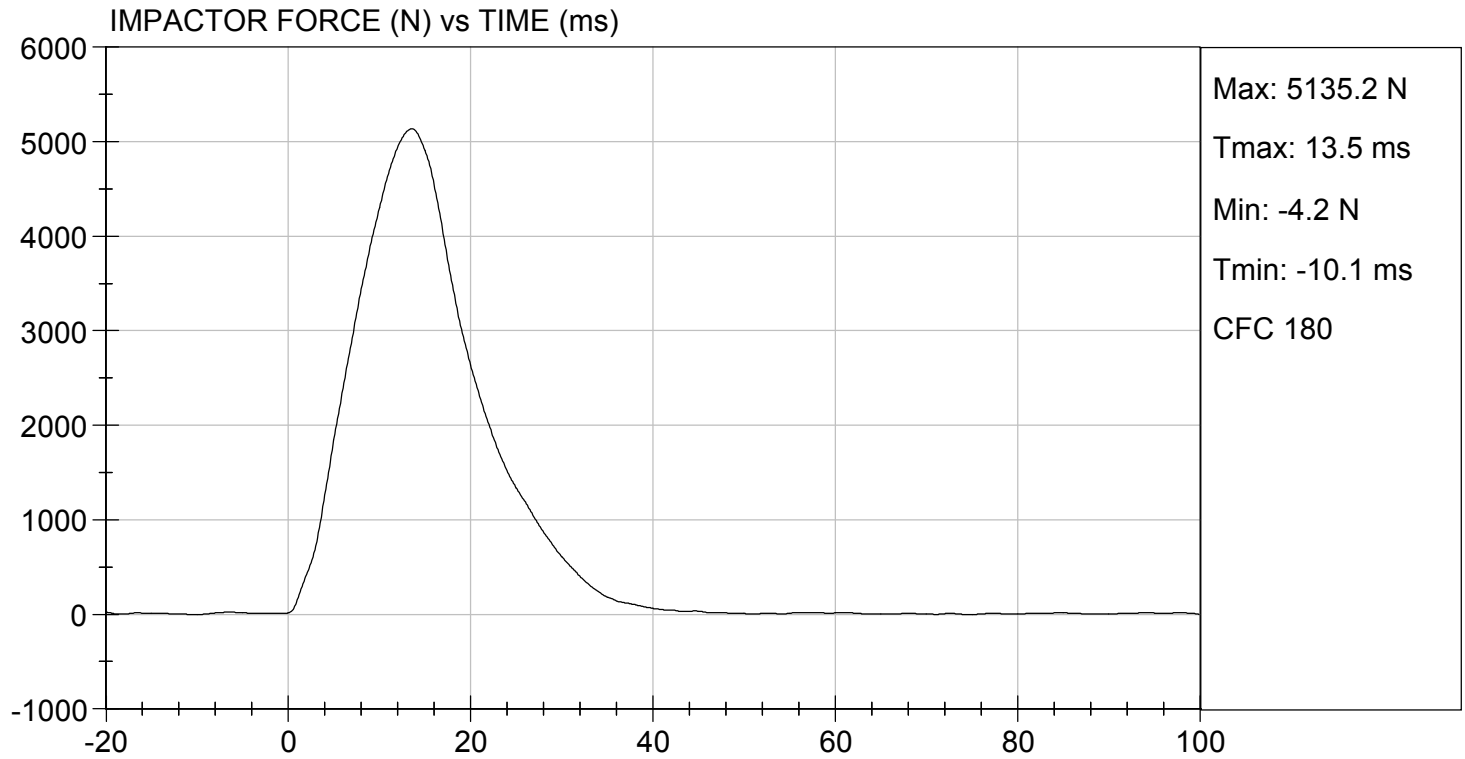
11/23/2020
Test Date


Approved By



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

TEST DATE: 11/23/2020
TEST #: D203039



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

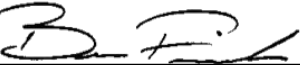
ATD Serial No: F032

Test I.D: D203030

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5607	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.0	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.7	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.5	Pass
Overall Test Results			Pass	


Laboratory Technician

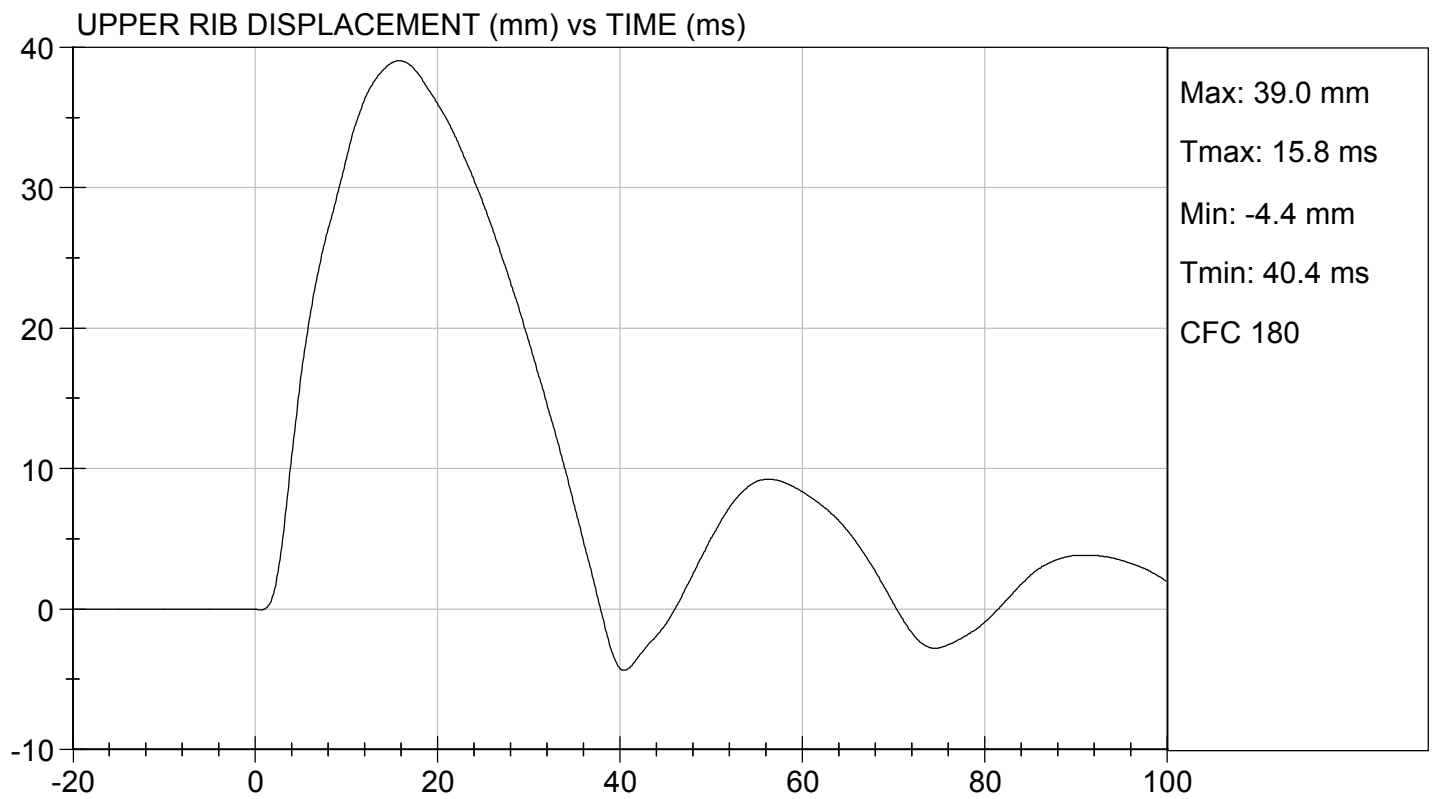
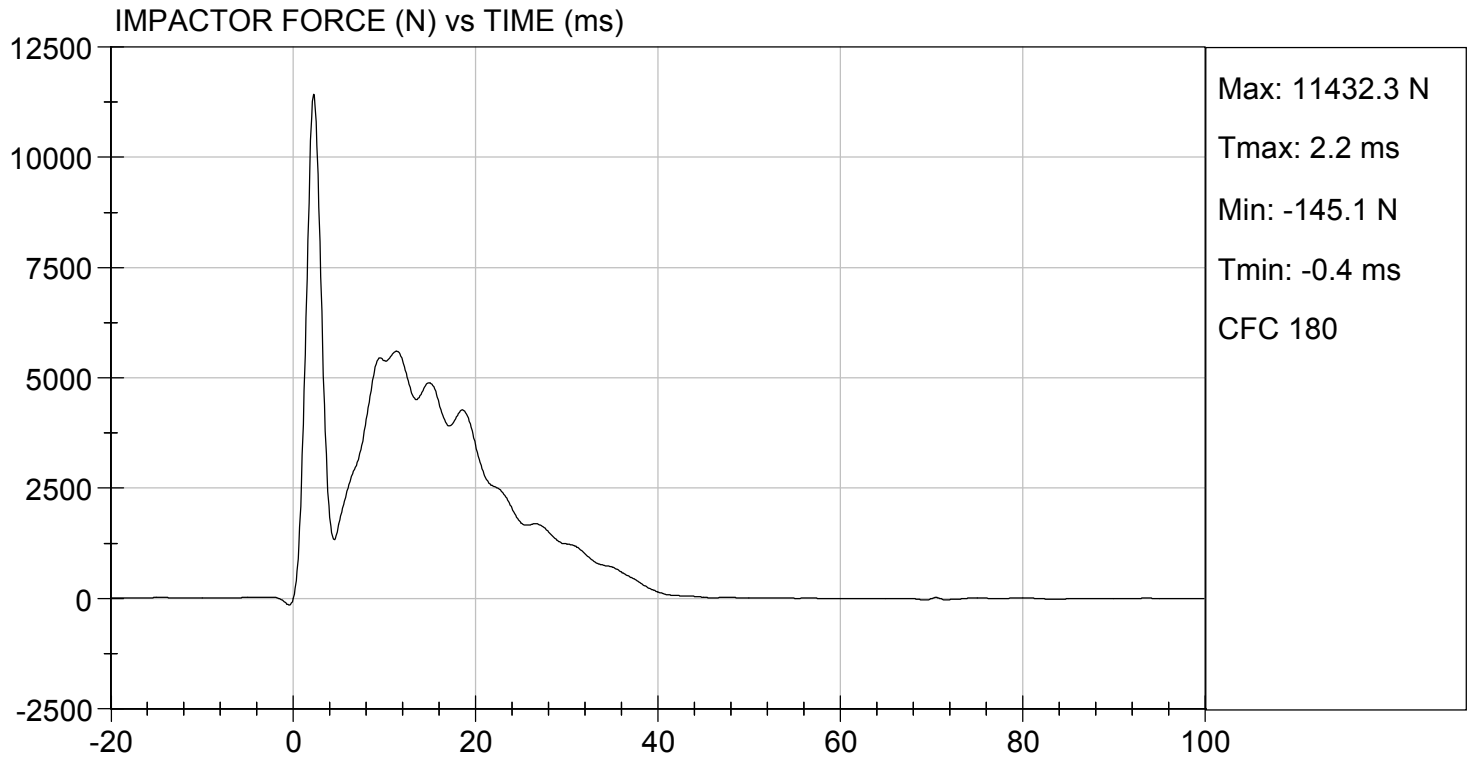
11/23/2020
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

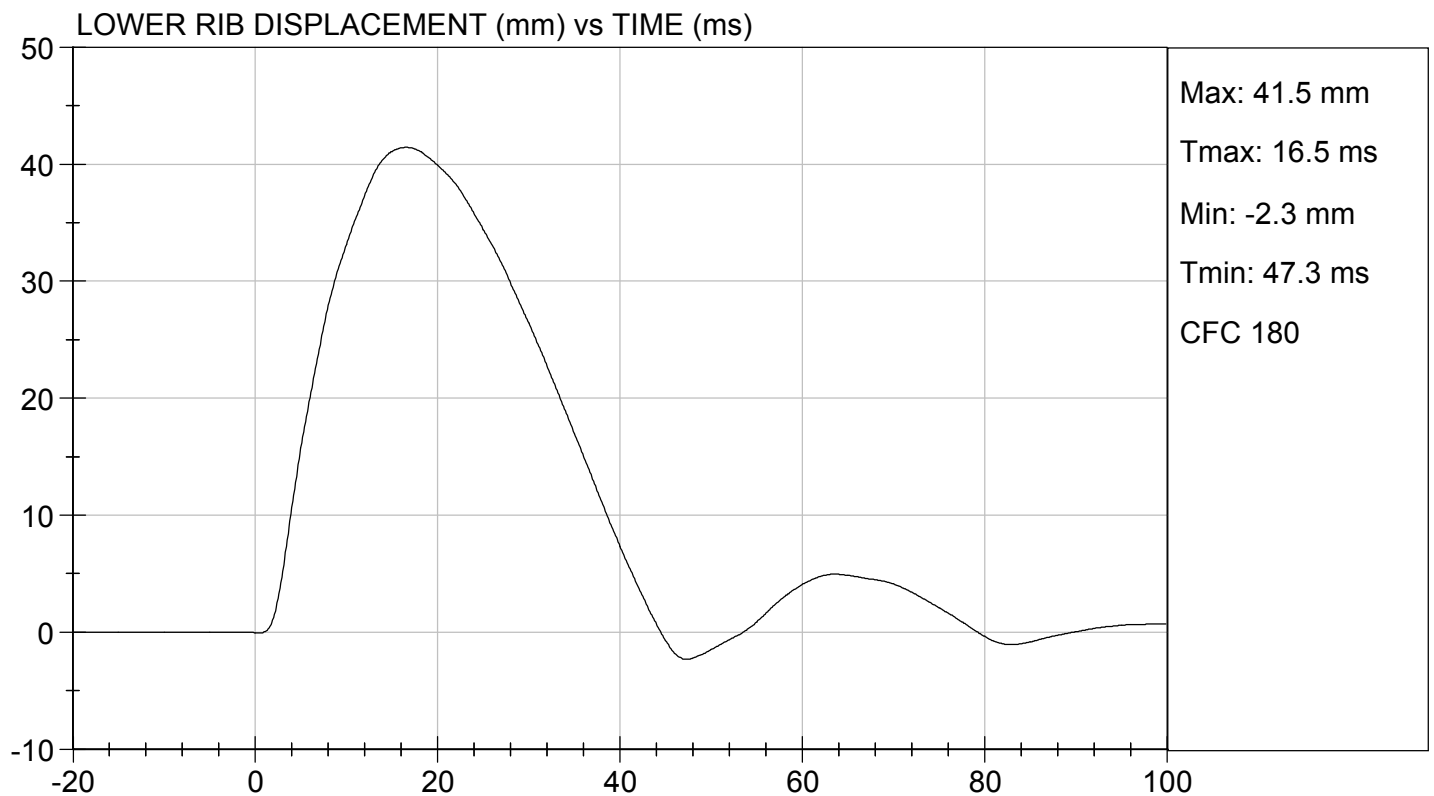
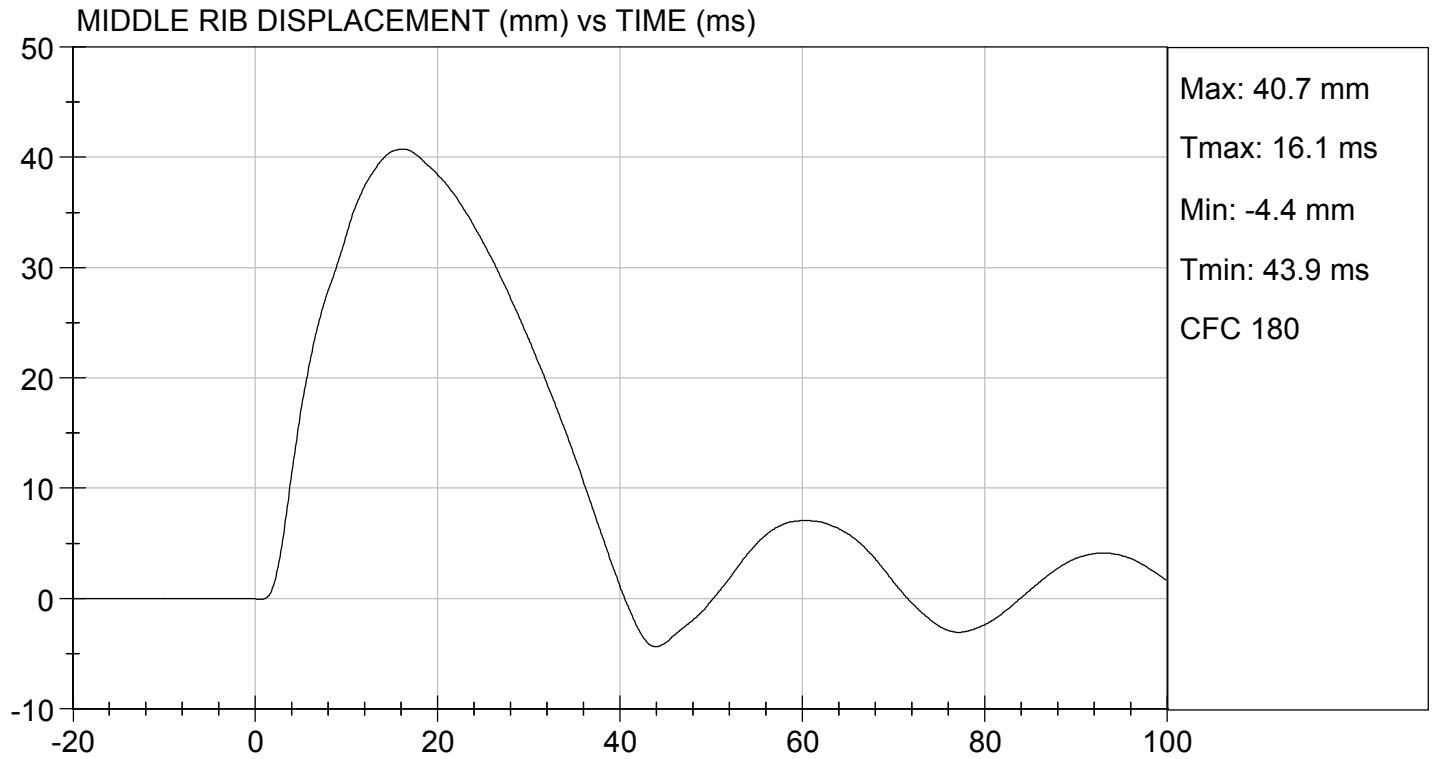
TEST DATE: 11/23/2020
TEST #: D203030





TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 11/23/2020
TEST #: D203030



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

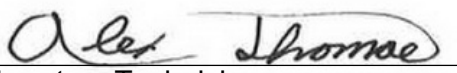
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	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

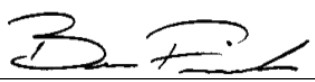
Test ID: D202961

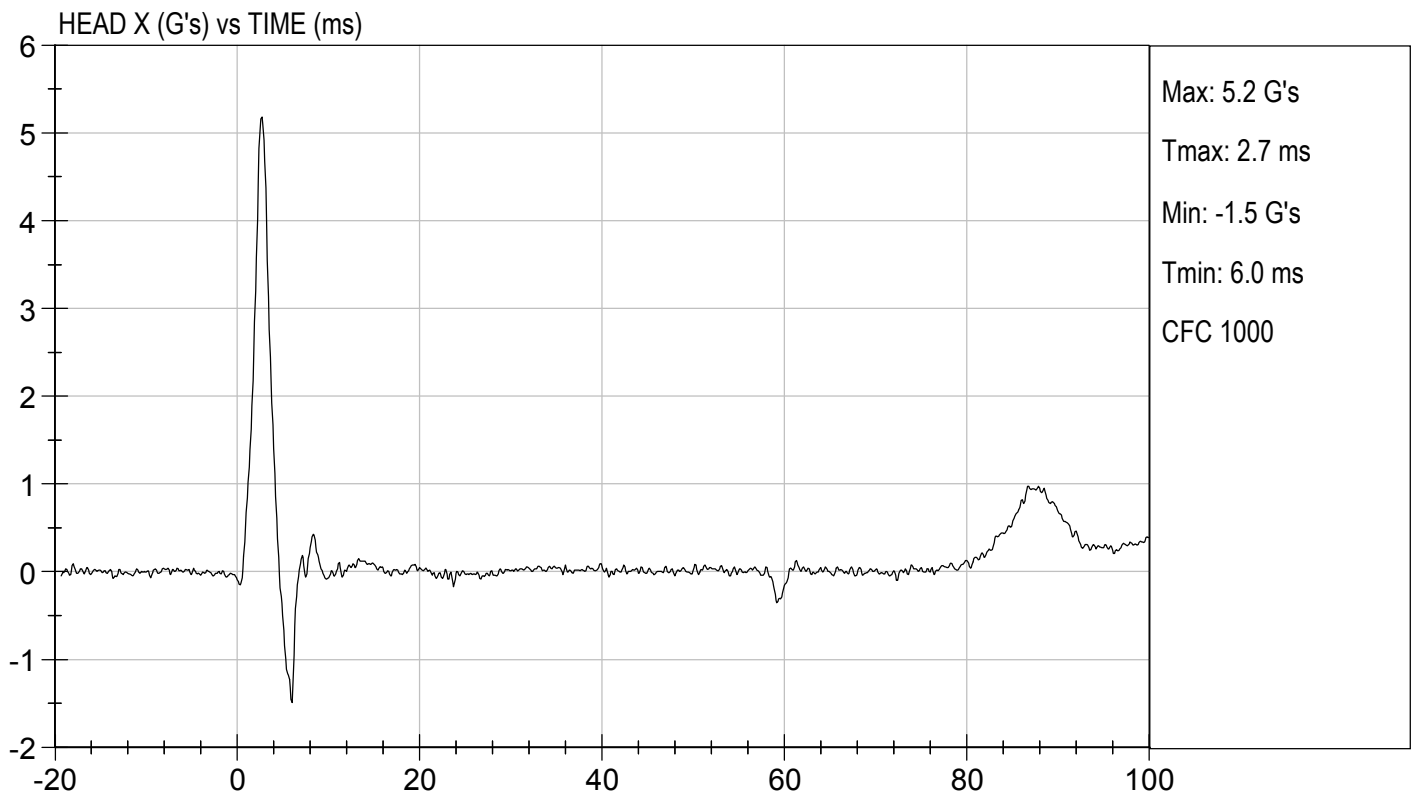
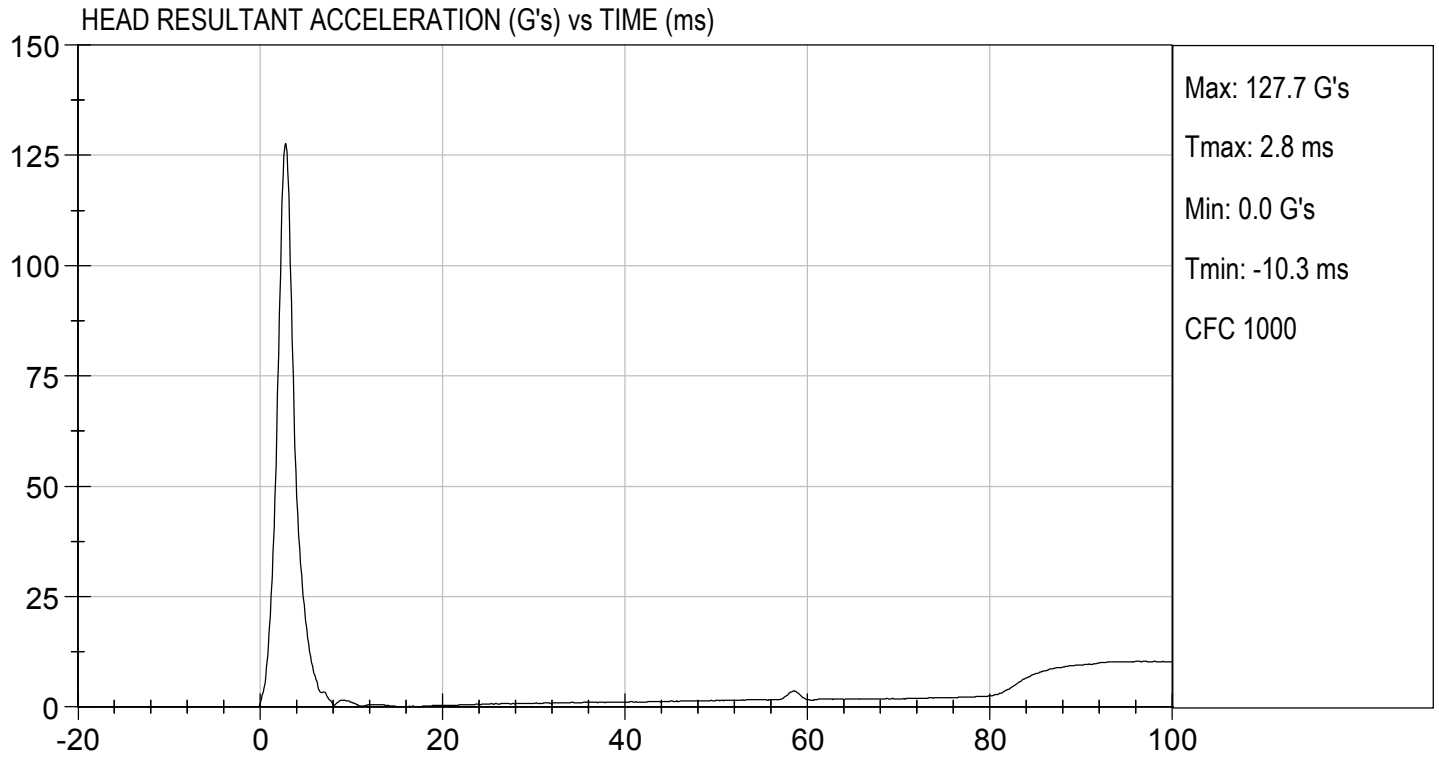
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	115 to 137	128	Pass
Peak Longitudinal Acceleration	G's	+/- 15	5.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	

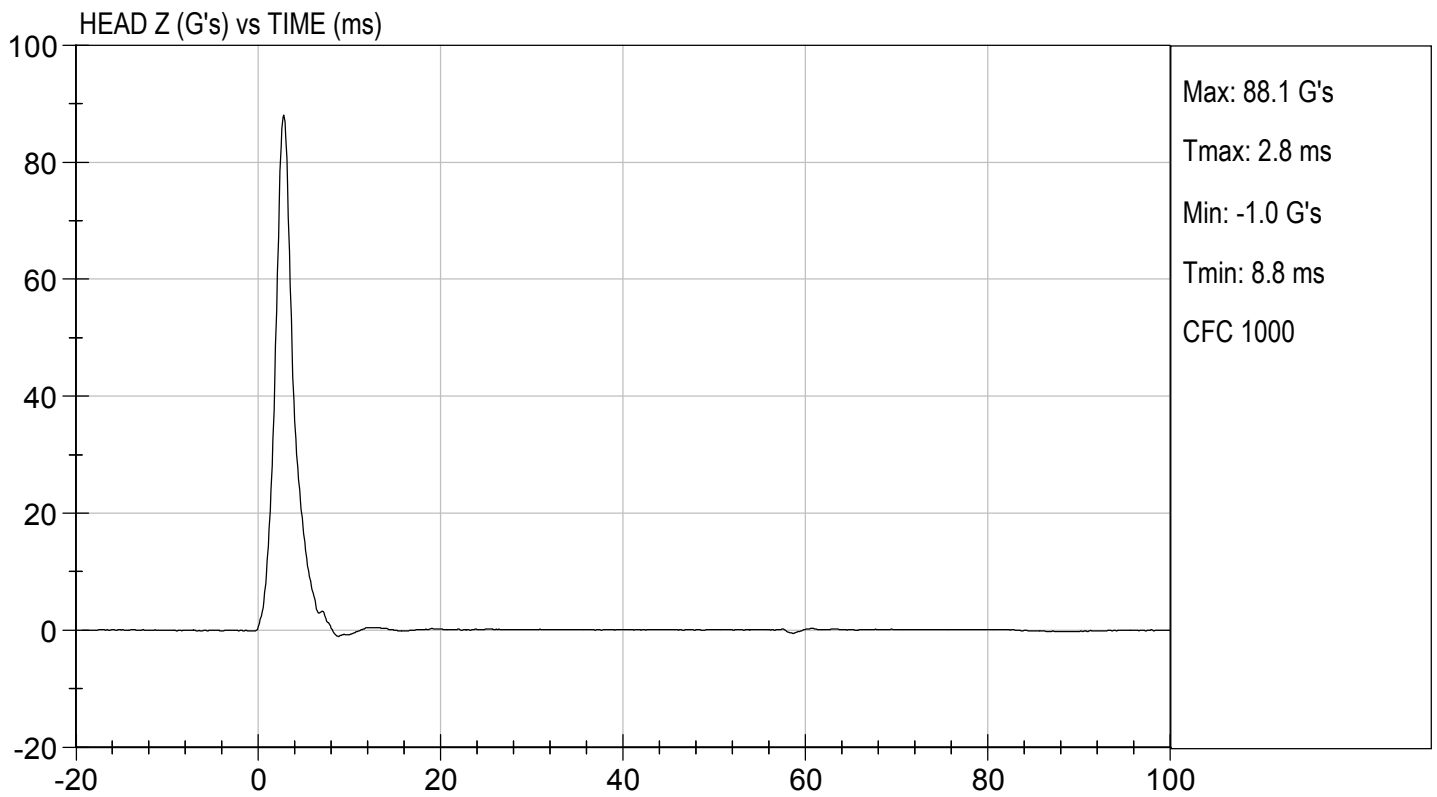
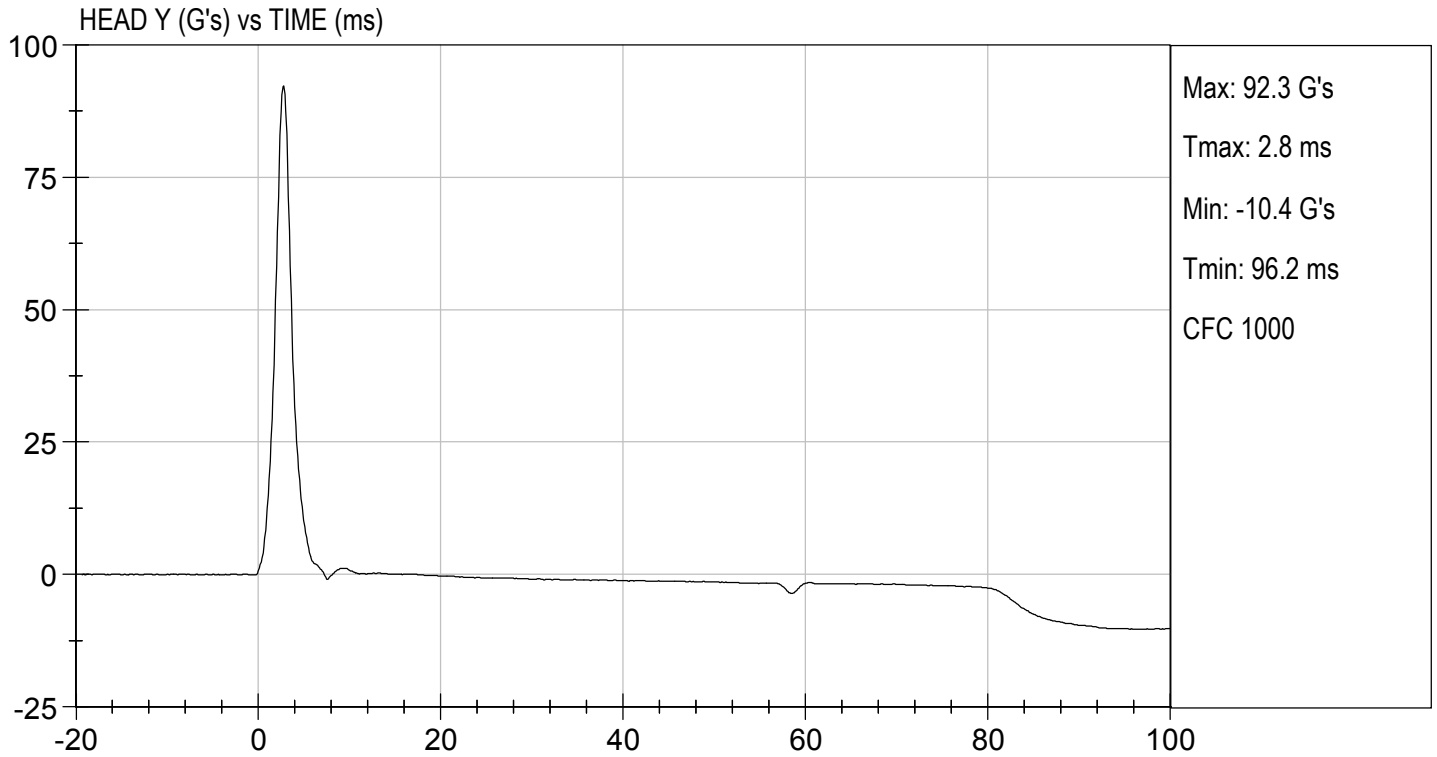

Laboratory Technician

11/18/2020

Test Date


Approved By





MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

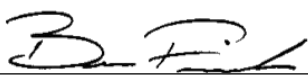
Test I.D: D202962

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.4	Pass
Humidity		%	10 to 70	20	Pass
Impact Velocity		m/s	5.51 to 5.63	5.61	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.79	Pass
	15 ms	m/s	3.30 to 4.10	3.91	Pass
	20 ms	m/s	4.40 to 5.40	5.25	Pass
	25 ms	m/s	5.40 to 6.10	5.61	Pass
	25-100 ms	m/s	5.50 to 6.20	5.63	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-38	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	119	Pass
Overall Test Results					Pass


 Laboratory Technician

11/18/2020

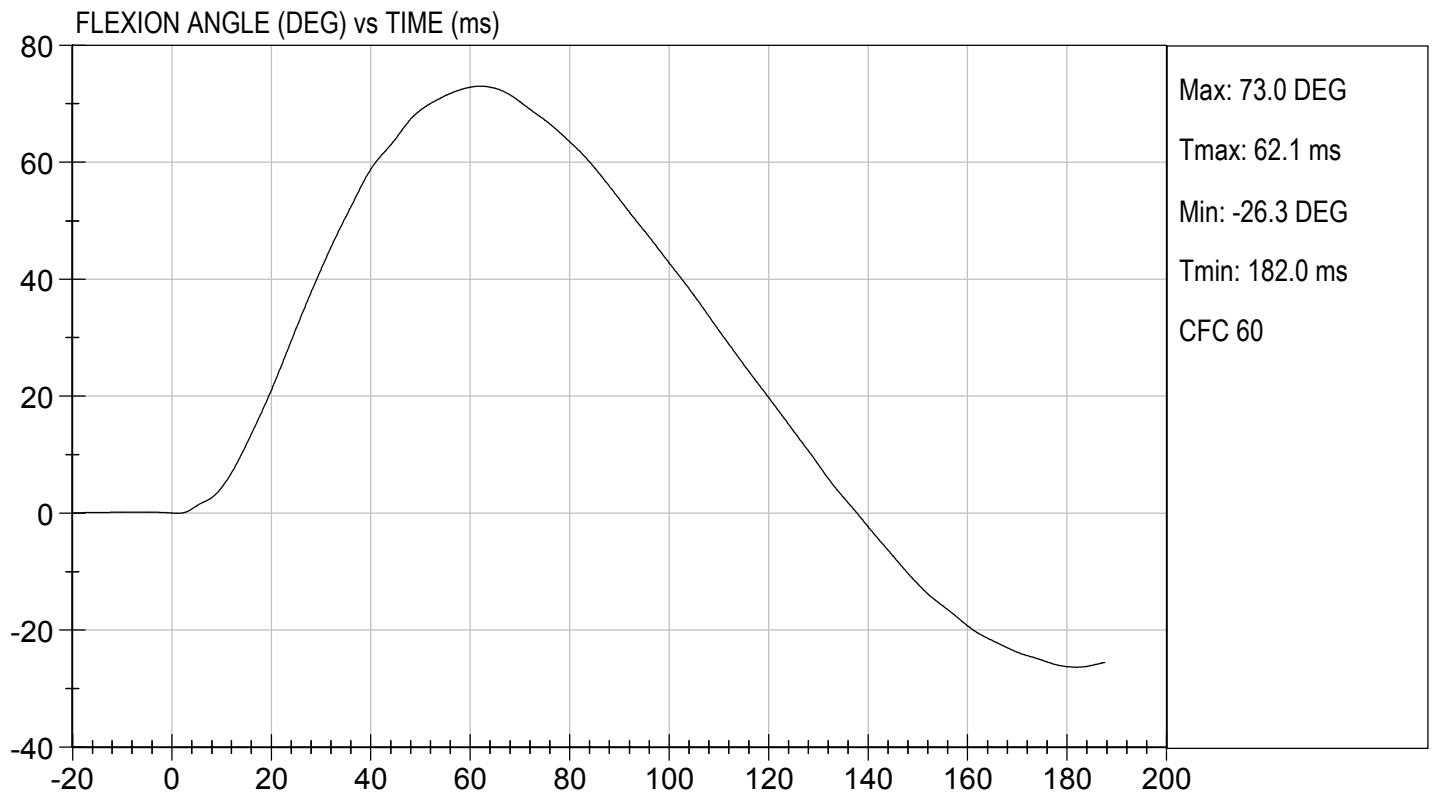
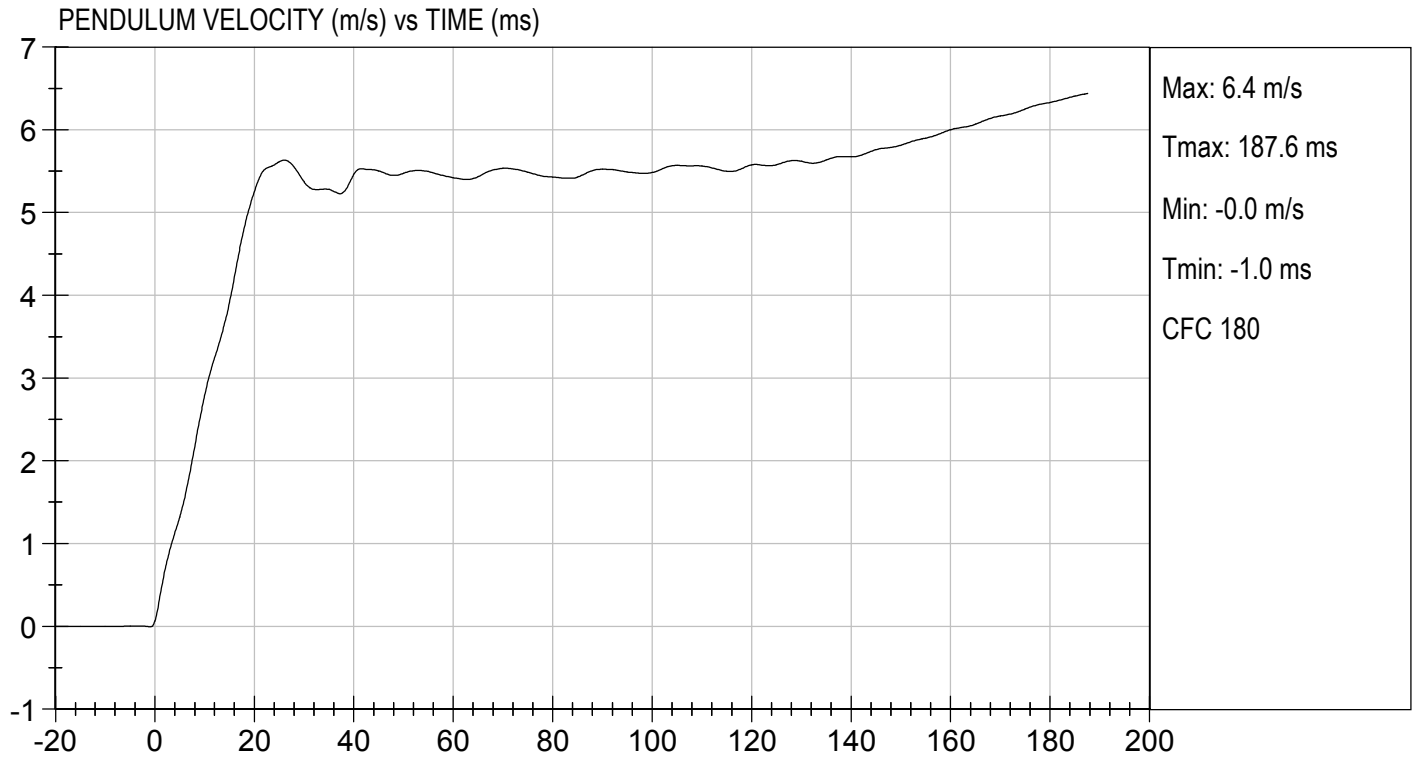
Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.42 ft/s, 5.61 m/s

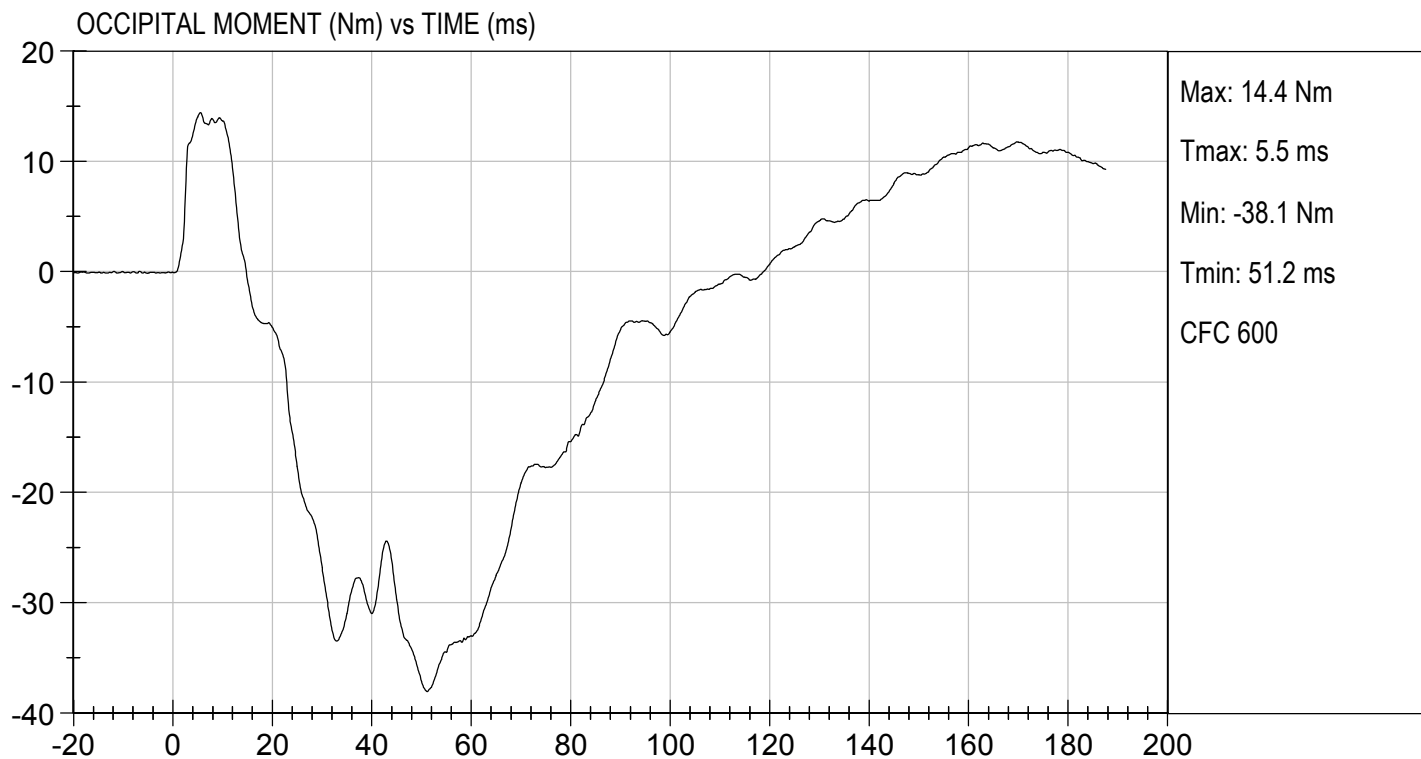
TEST DATE: 11/18/2020
TEST #: D202962





TEST DESC: NECK BENDING
VELOCITY: 18.42 ft/s, 5.61 m/s

TEST DATE: 11/18/2020
TEST #: D202962



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D202963

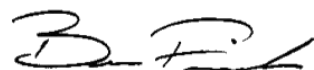
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	32	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results			Pass	



Laboratory Technician

11/17/2020

Test Date

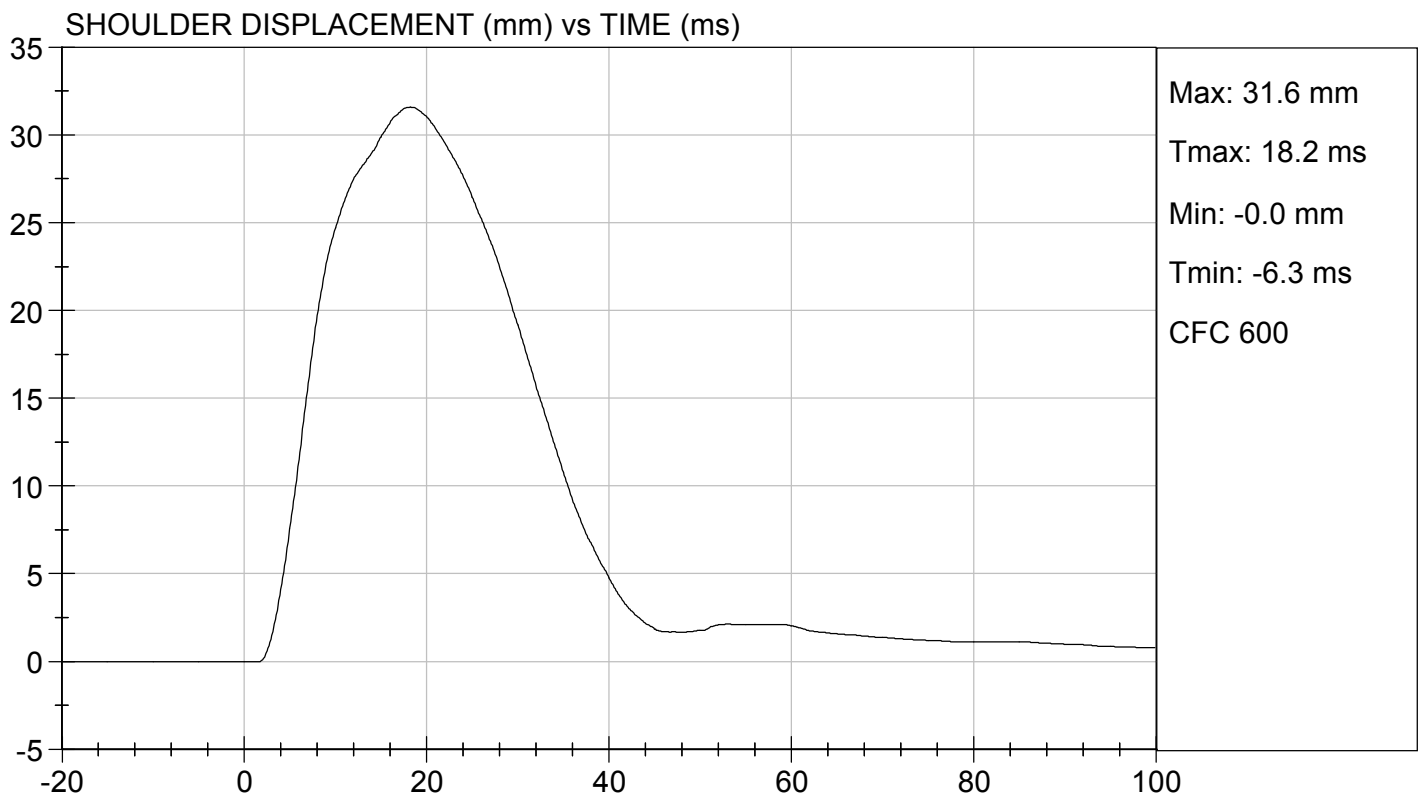
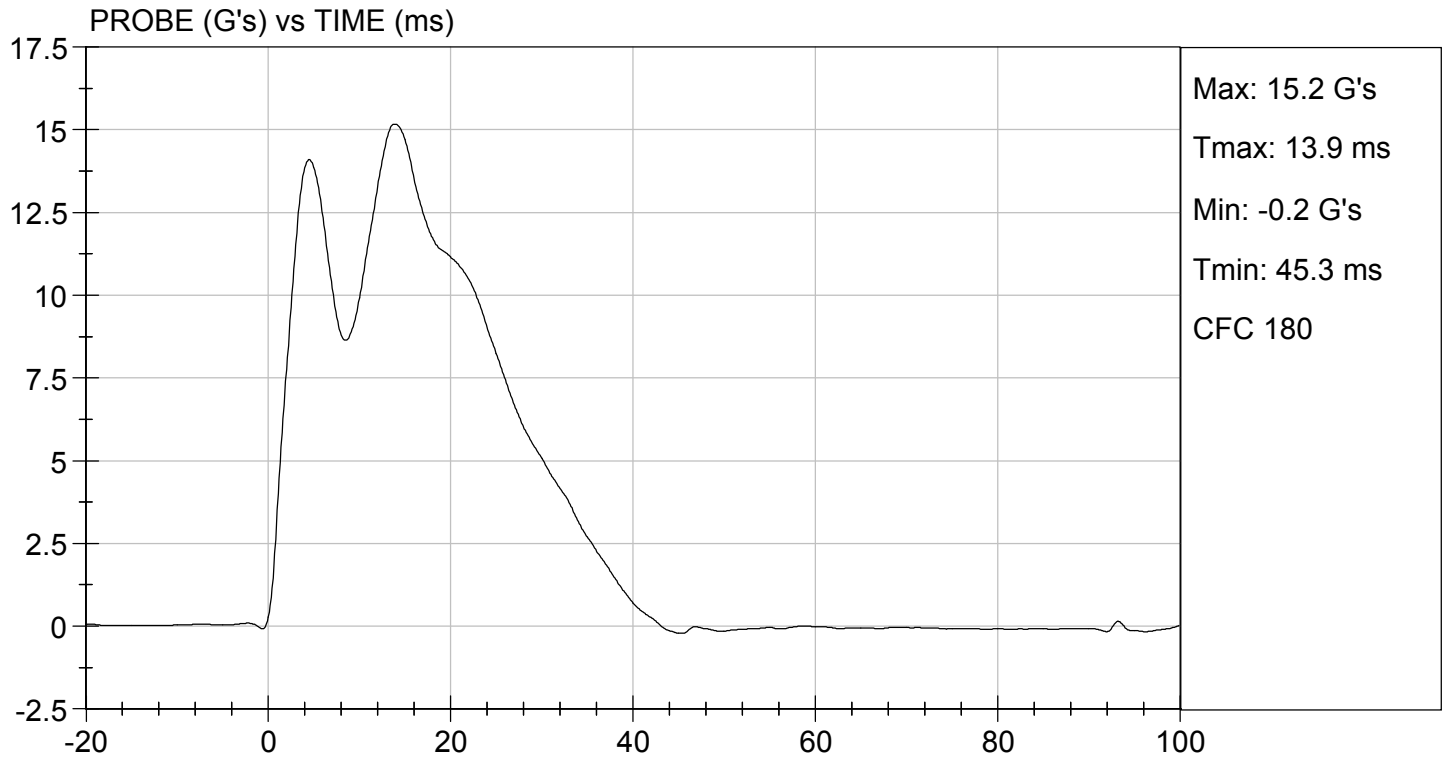


Approved By



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

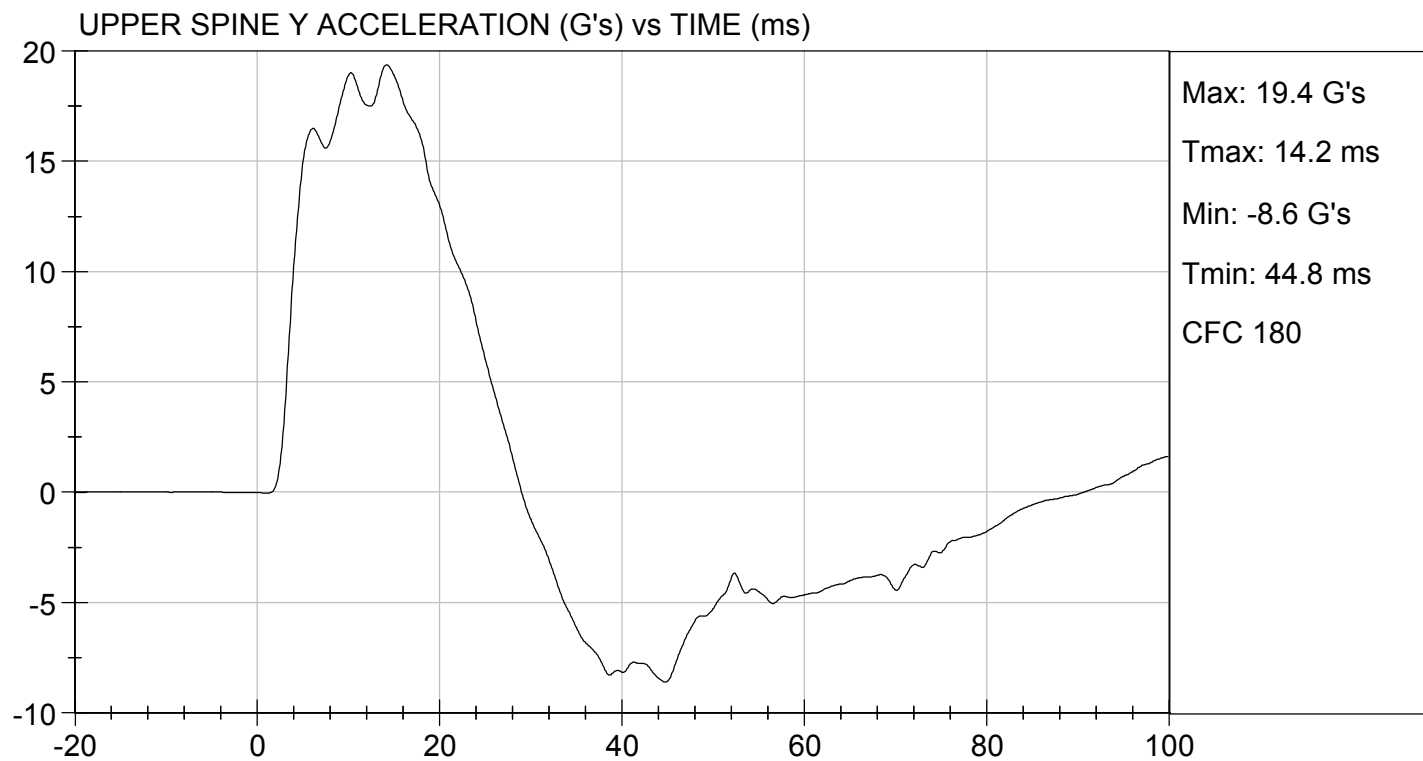
TEST DATE: 11/17/2020
TEST #: D202963





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

TEST DATE: 11/17/2020
TEST #: D202963



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

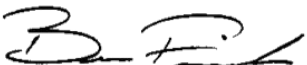
ATD Serial No: 296

Test I.D: D202964

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	29	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	37	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
Overall Test Results				Pass


Laboratory Technician

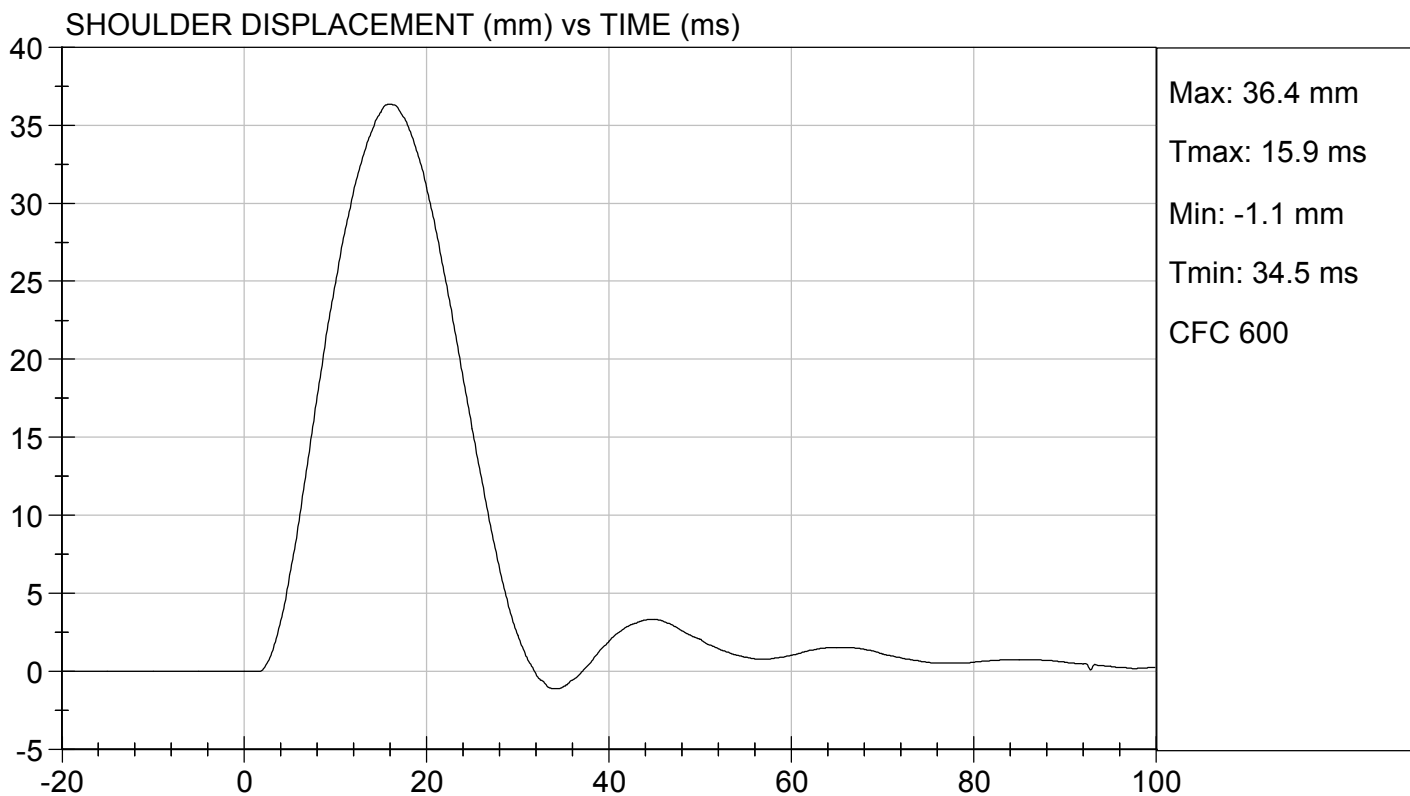
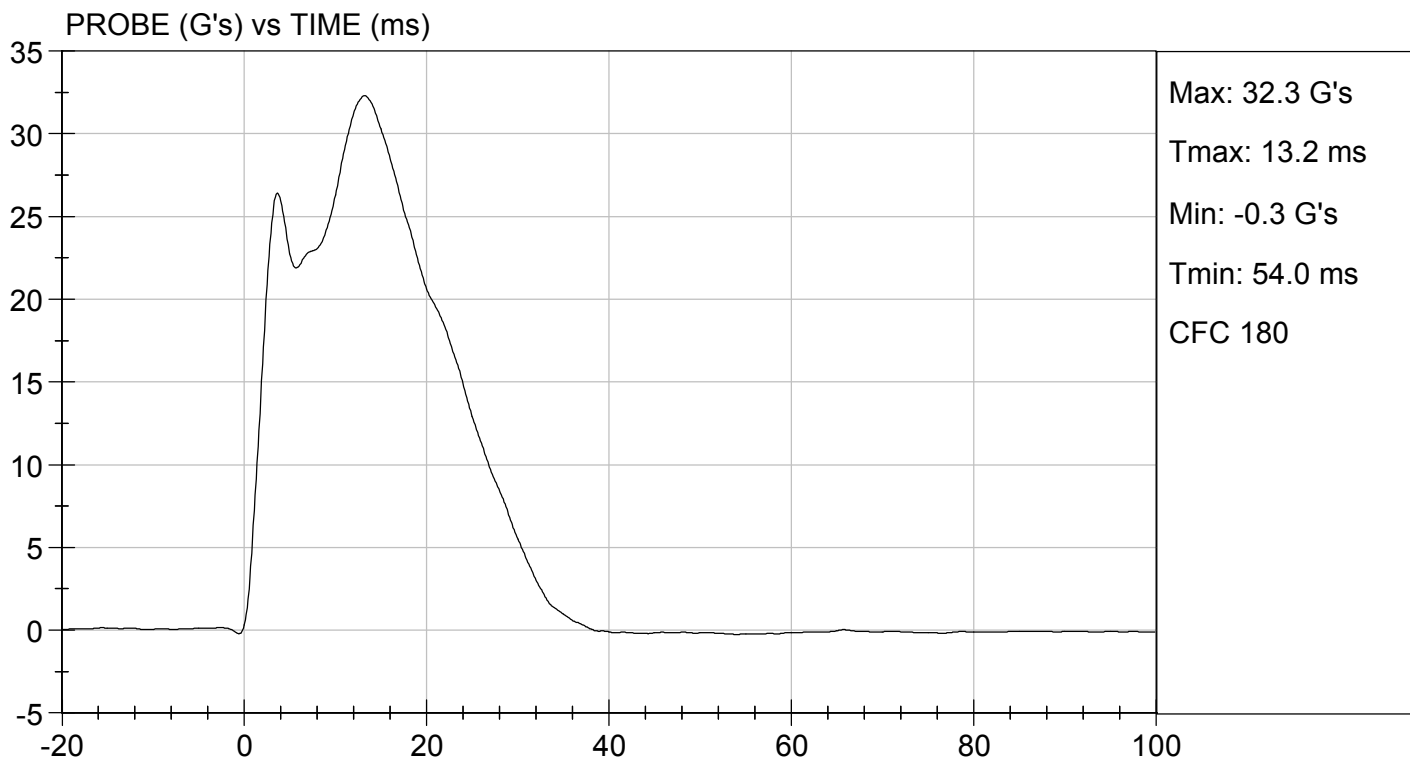
11/17/2020
Test Date

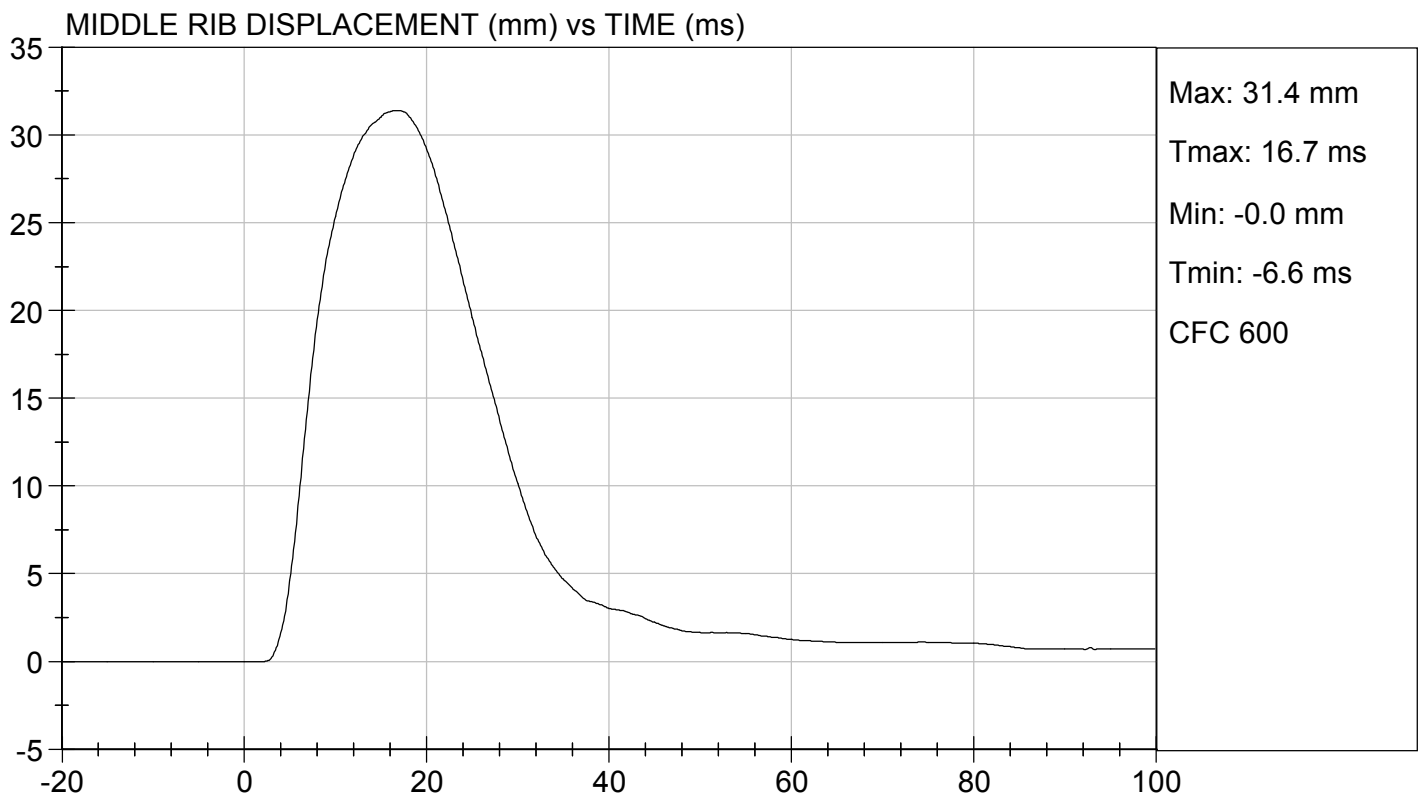
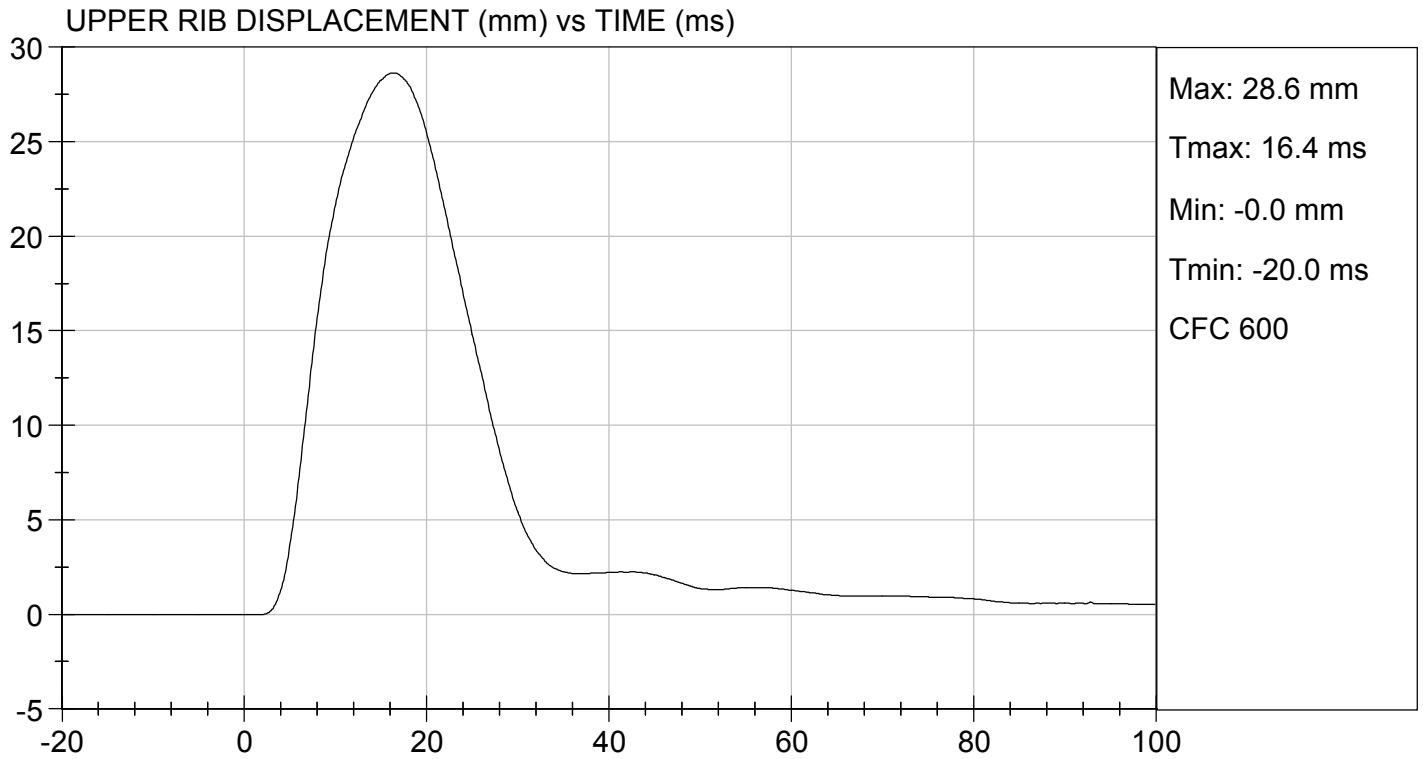

Approved By



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

TEST DATE: 11/17/2020
TEST #: D202964

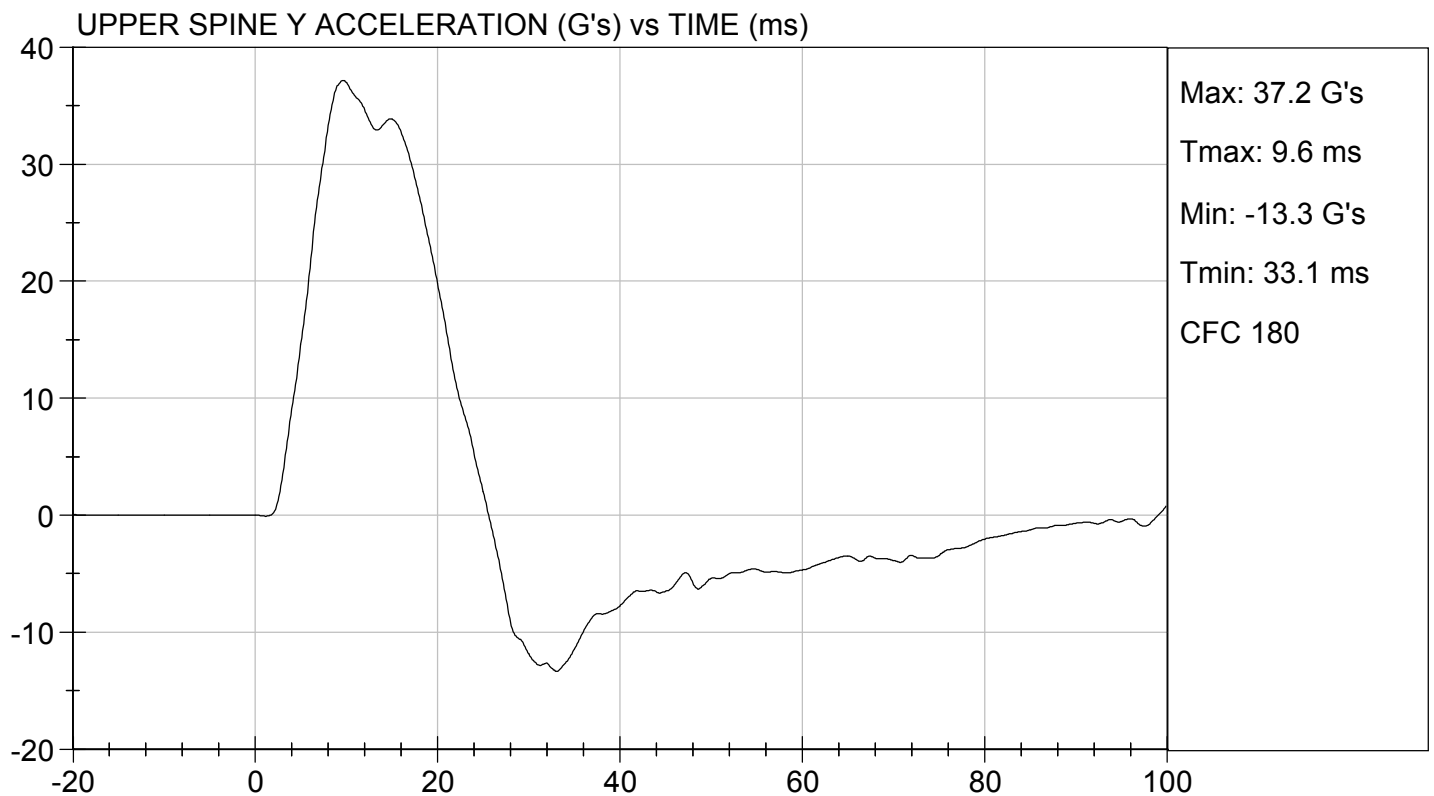
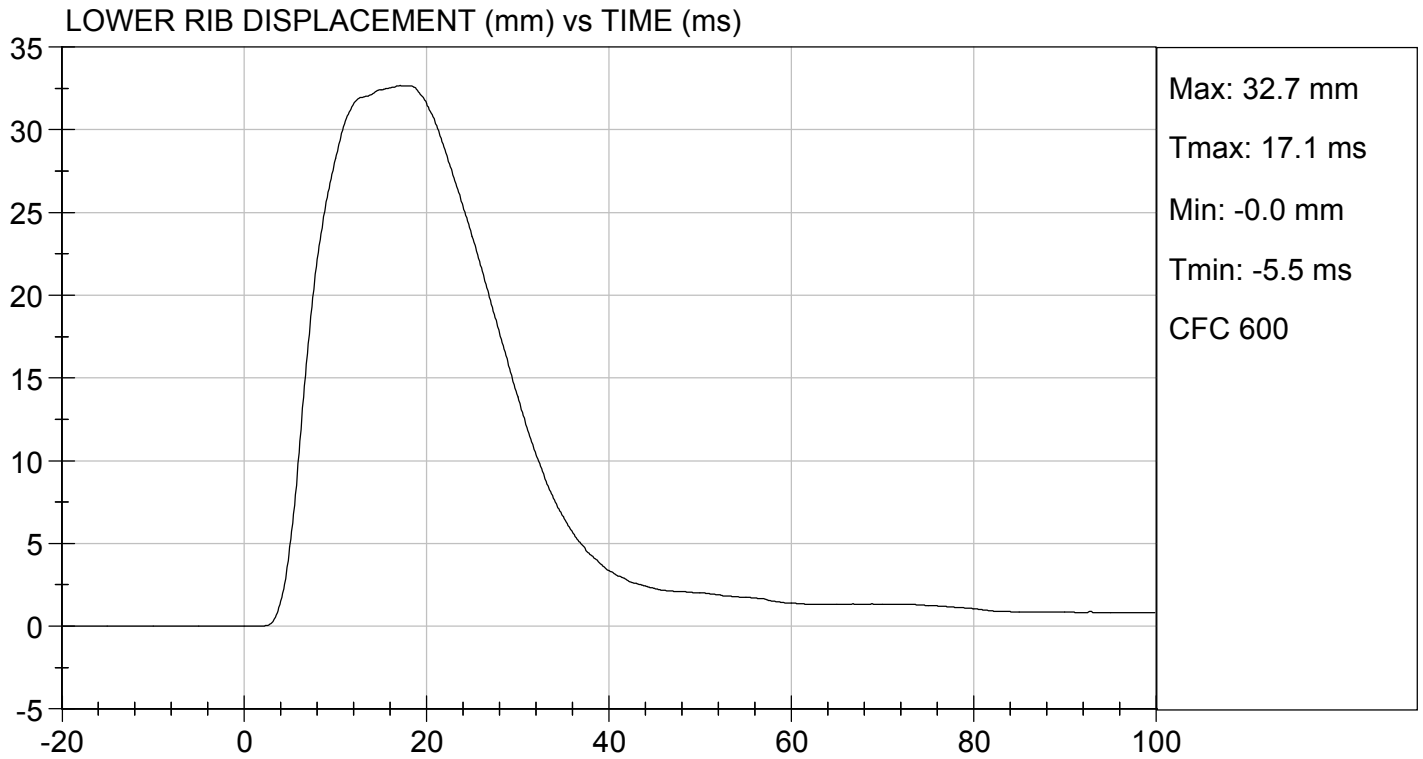






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

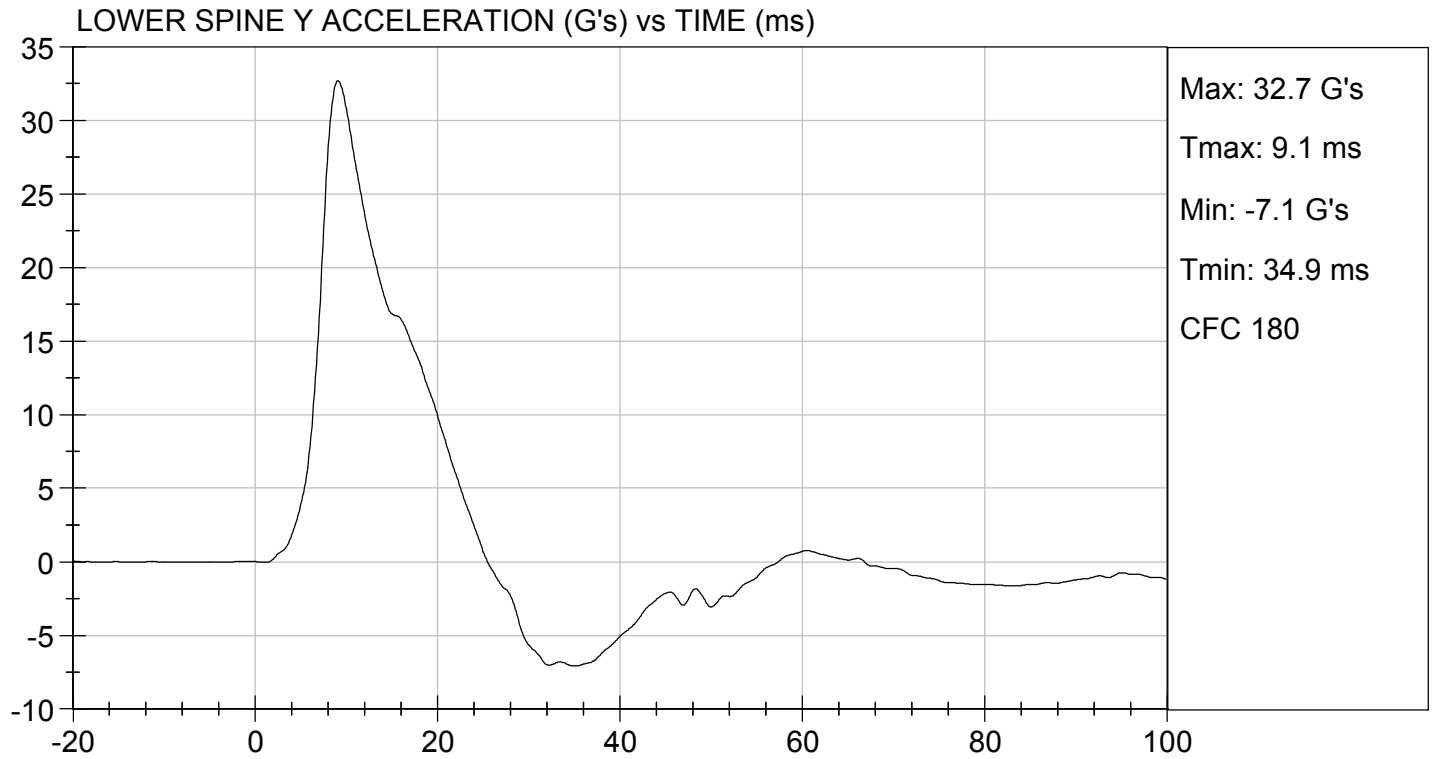
TEST DATE: 11/17/2020
TEST #: D202964





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

TEST DATE: 11/17/2020
TEST #: D202964



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

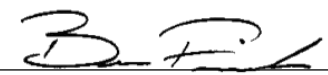
ATD Serial No: 296

Test I.D: D202965

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	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

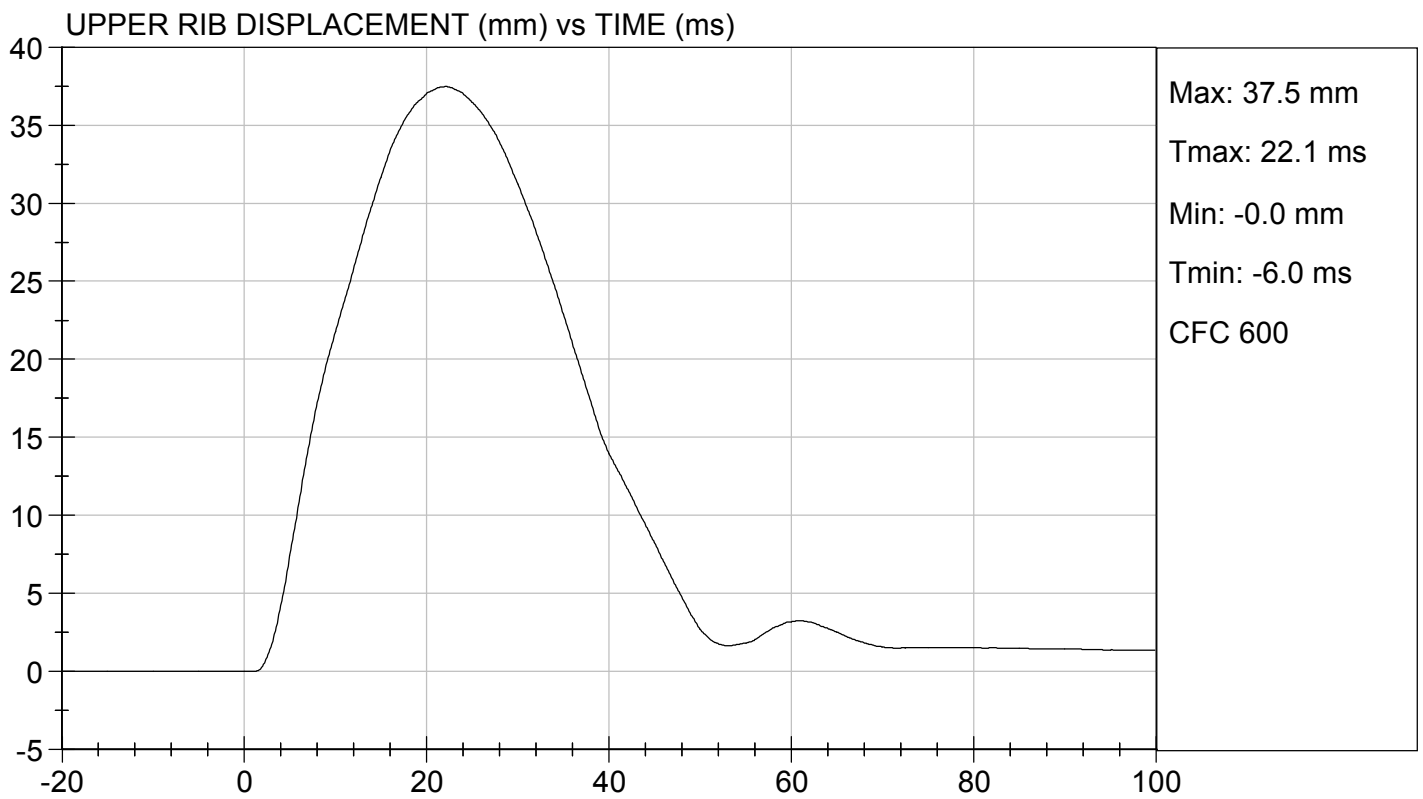
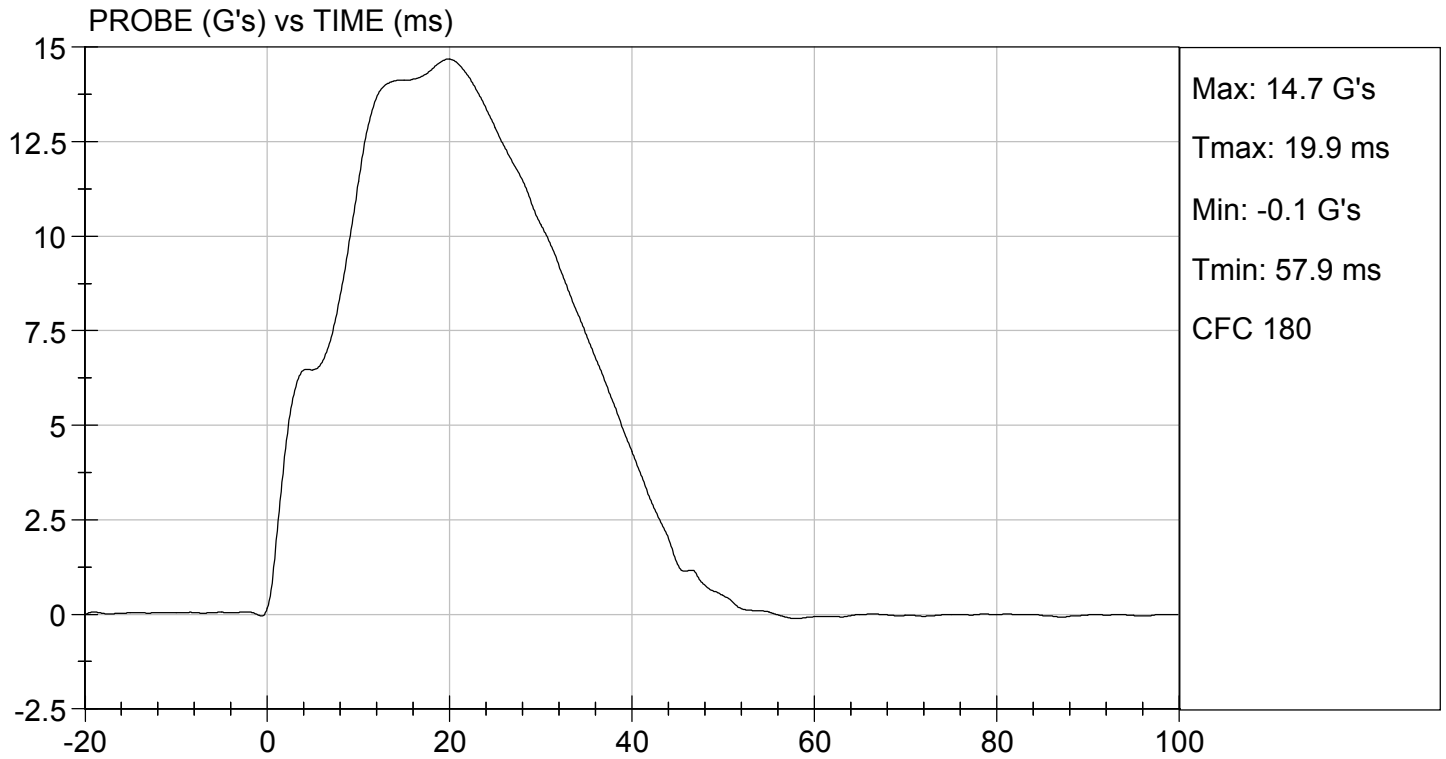
11/17/2020
Test Date

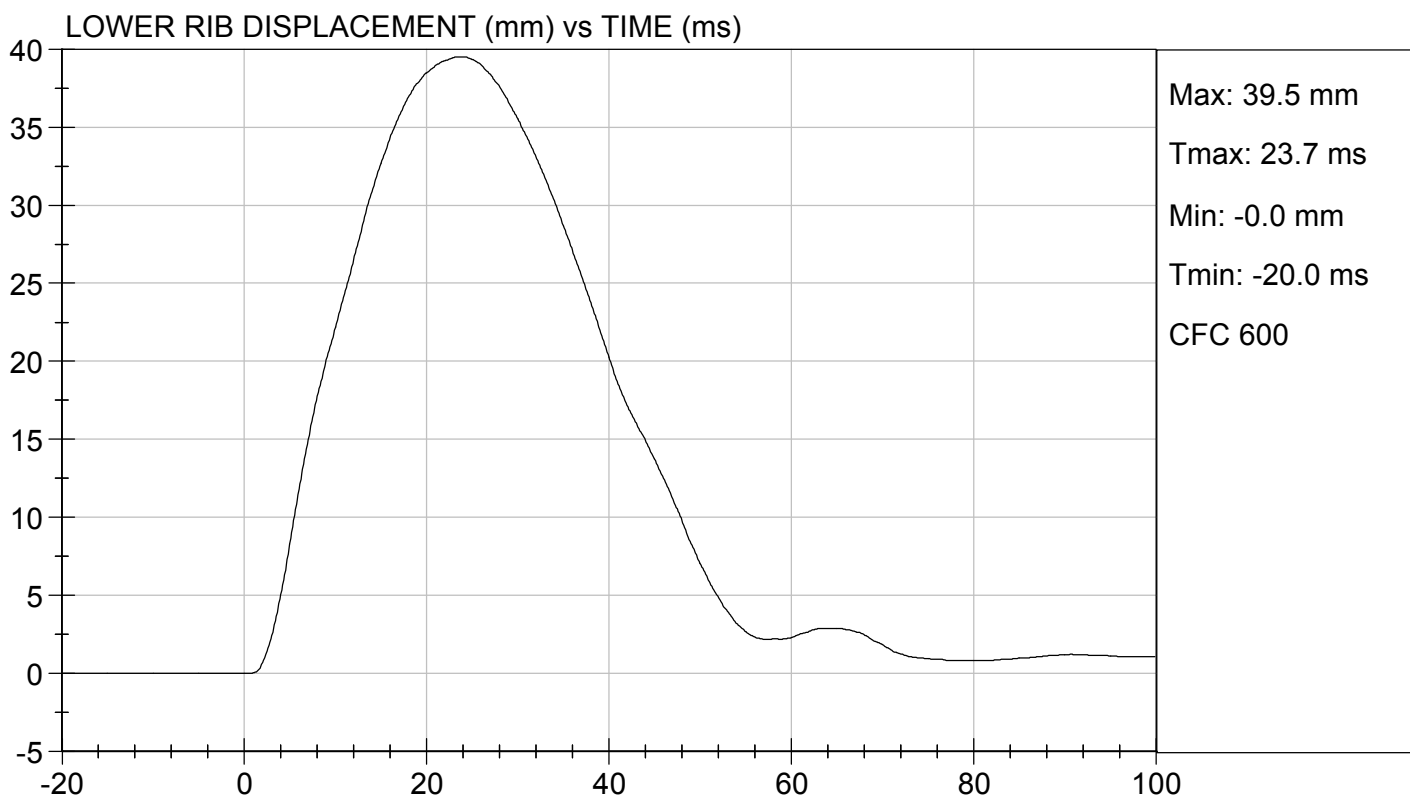
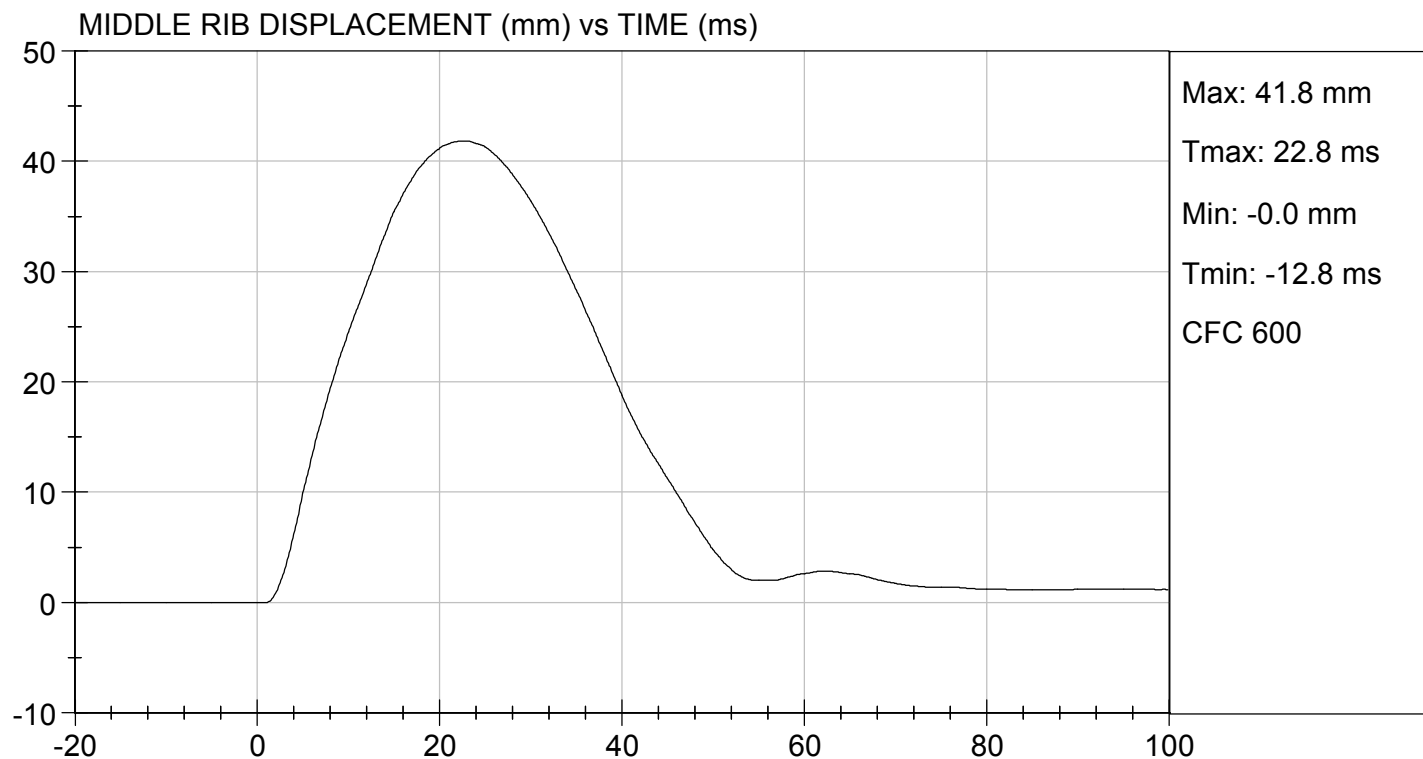

Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.77 ft/s, 4.20 m/s

TEST DATE: 11/17/2020
TEST #: D202965

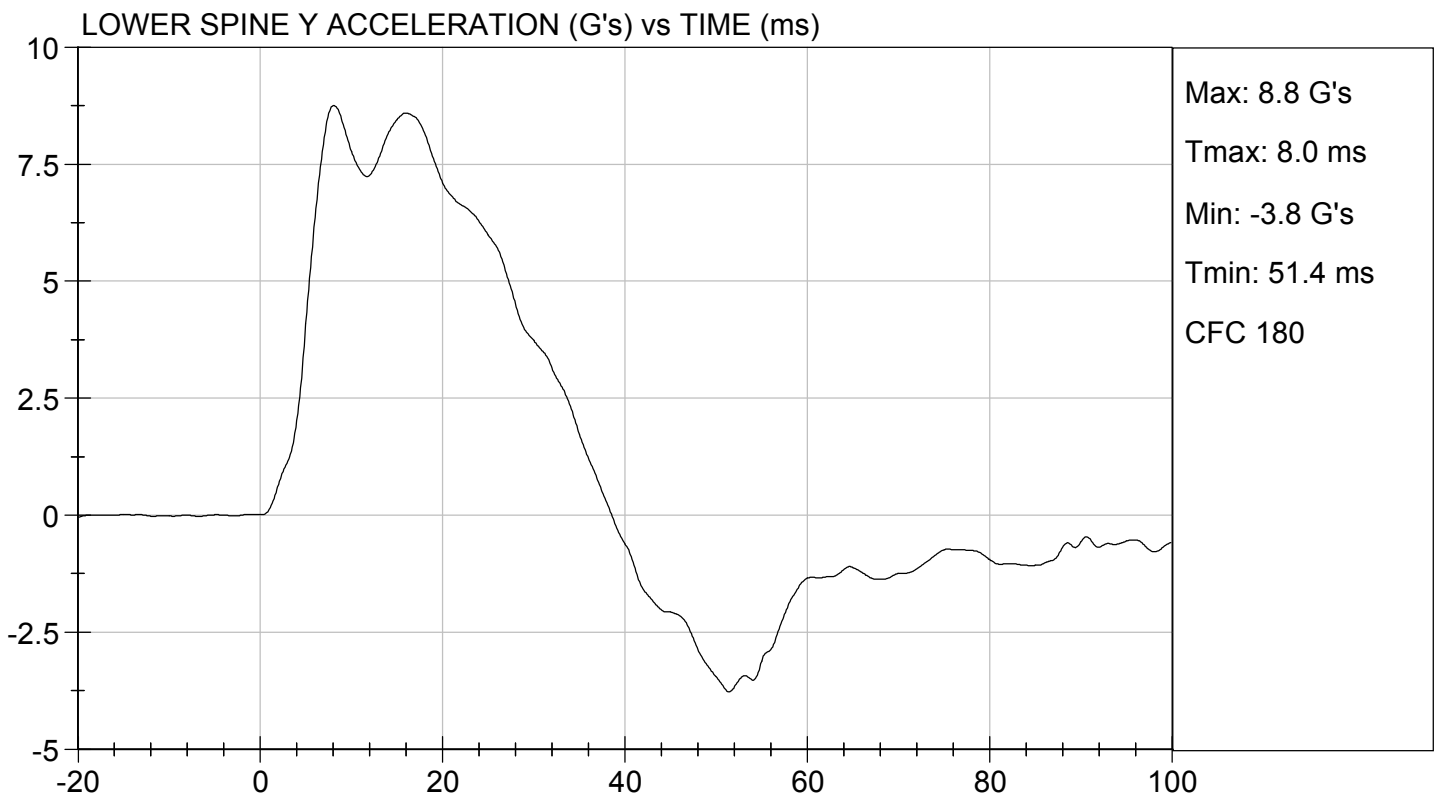
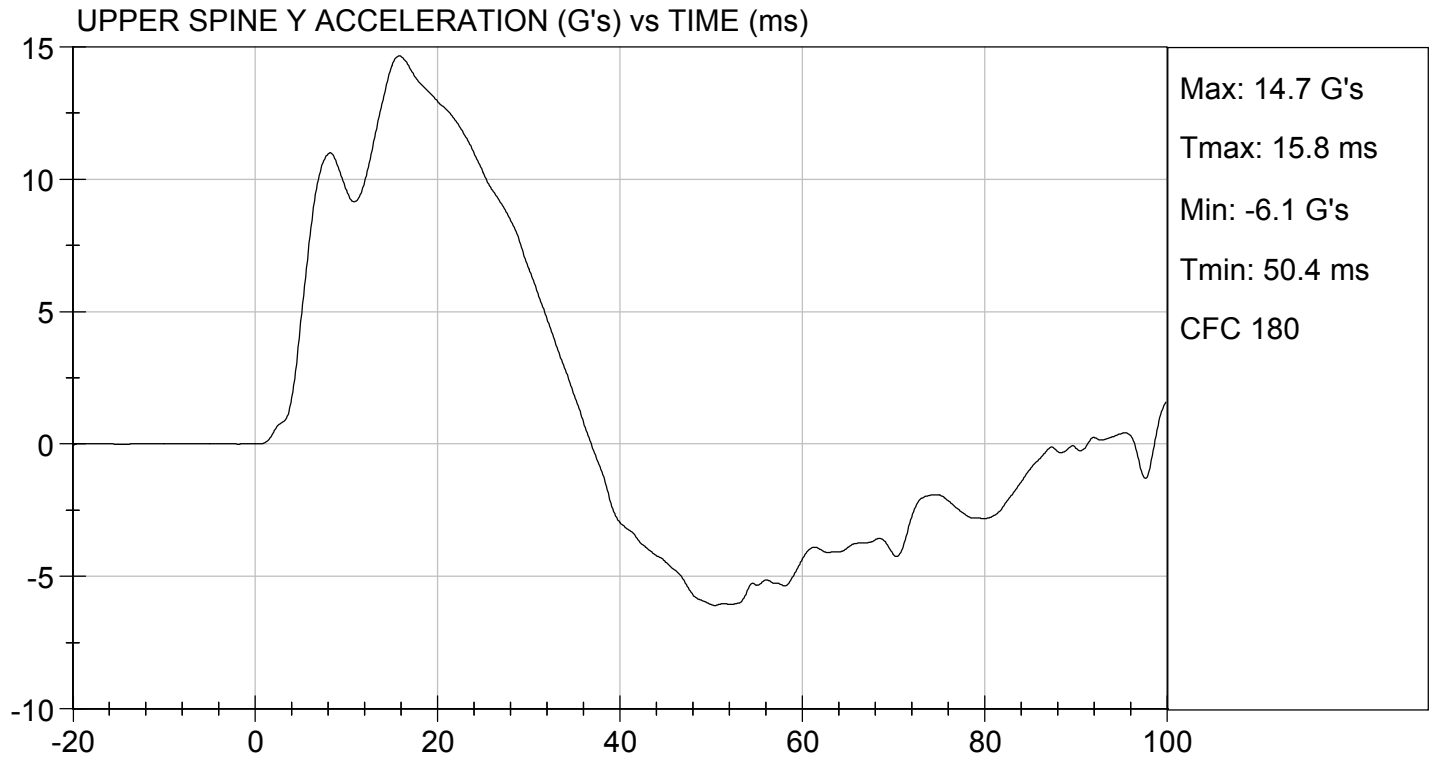






TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.77 ft/s, 4.20 m/s

TEST DATE: 11/17/2020
TEST #: D202965



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

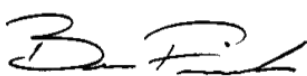
Test I.D: D202966

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

11/17/2020

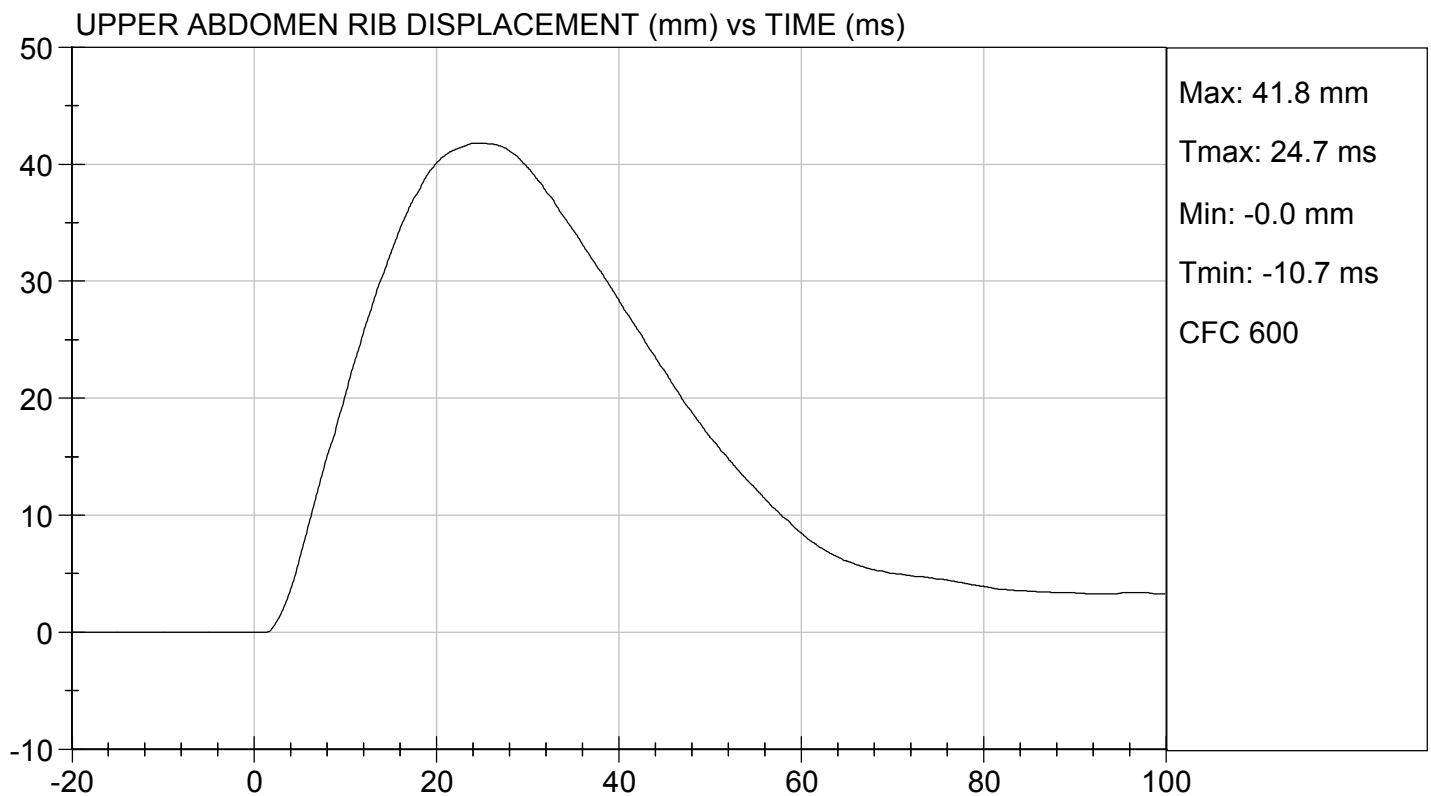
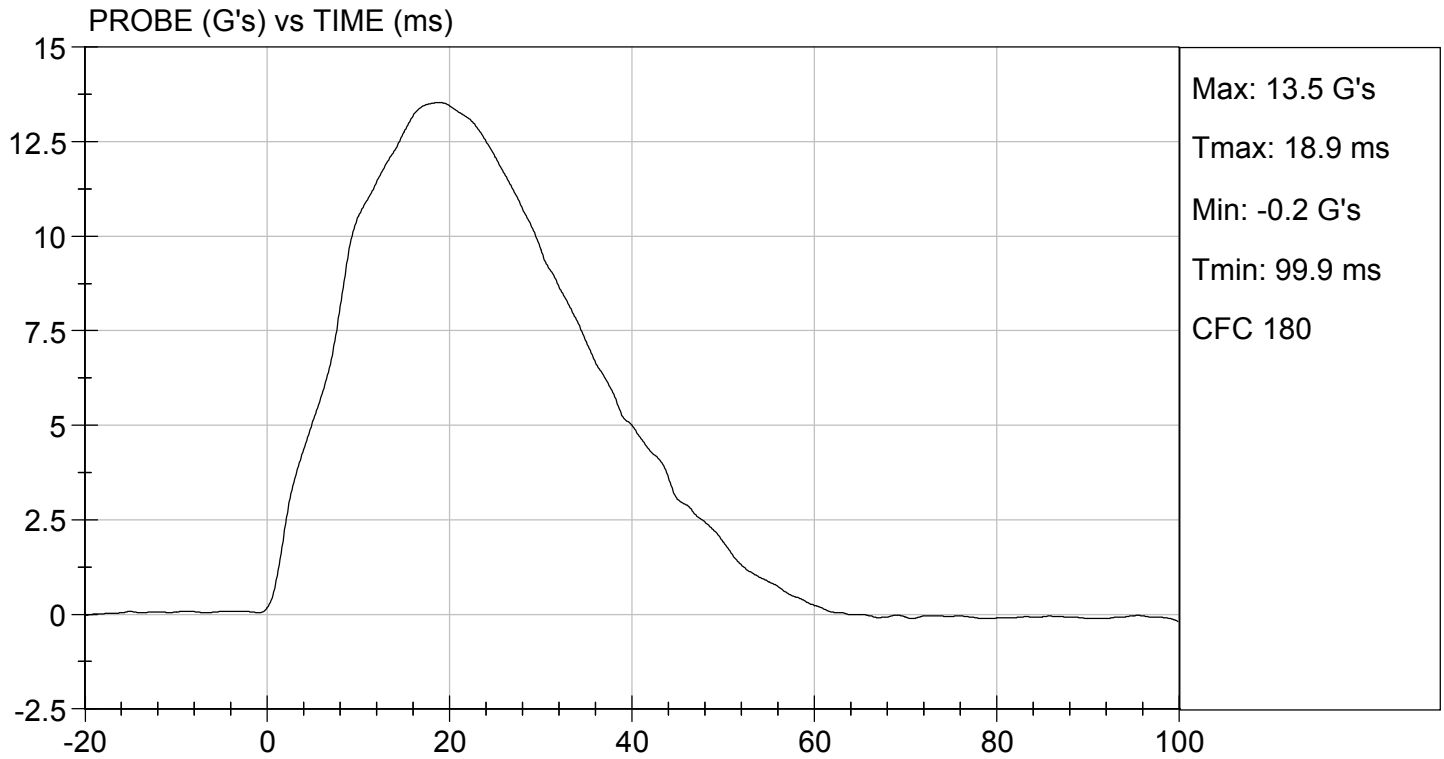
Test Date


Approved By



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

TEST DATE: 11/17/2020
TEST #: D202966

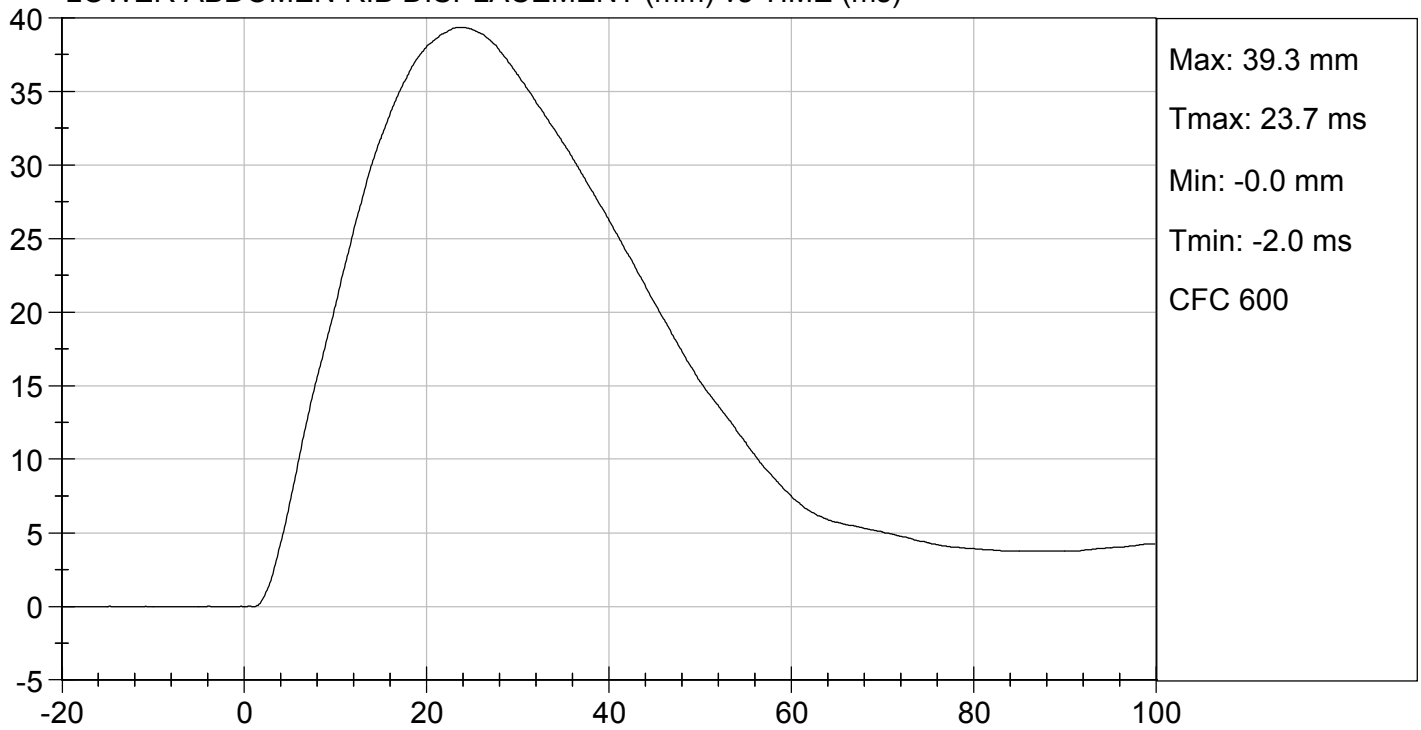




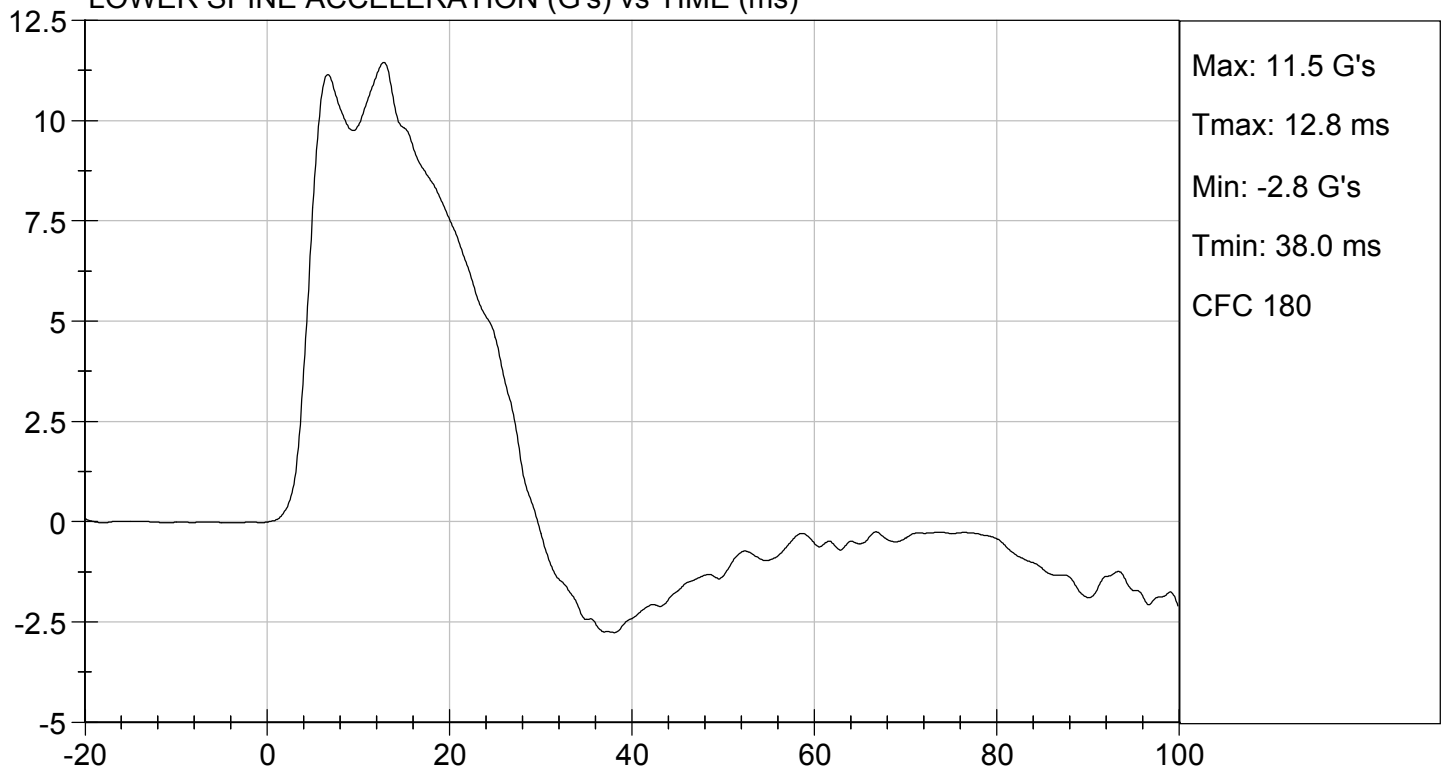
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 11/17/2020
TEST #: D202966

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



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

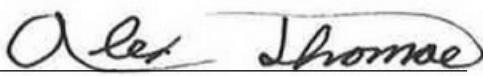


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

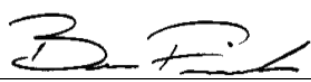
ATD Serial No: 296

Test I.D: D202967

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	3,883	Pass
Overall Test Results				Pass


Laboratory Technician

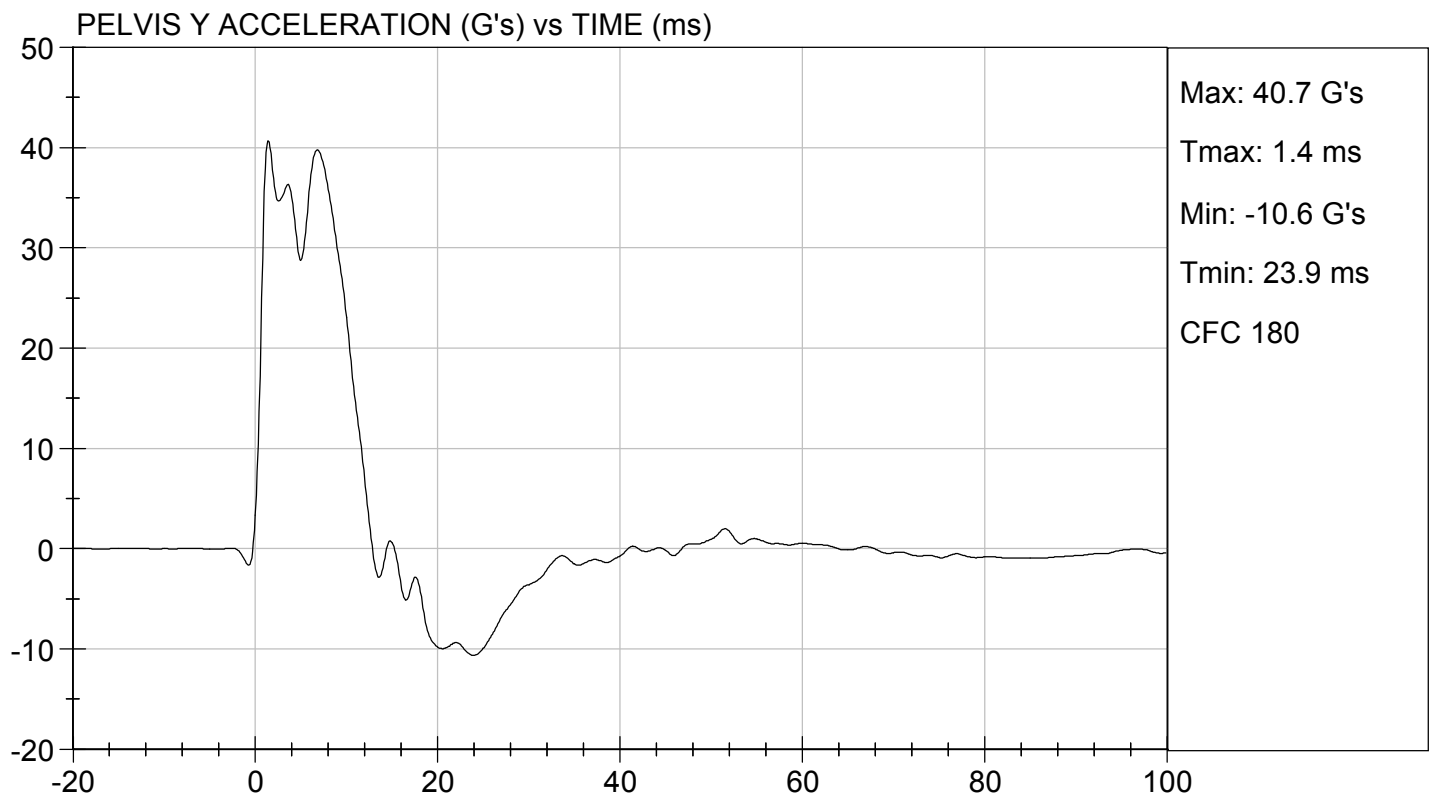
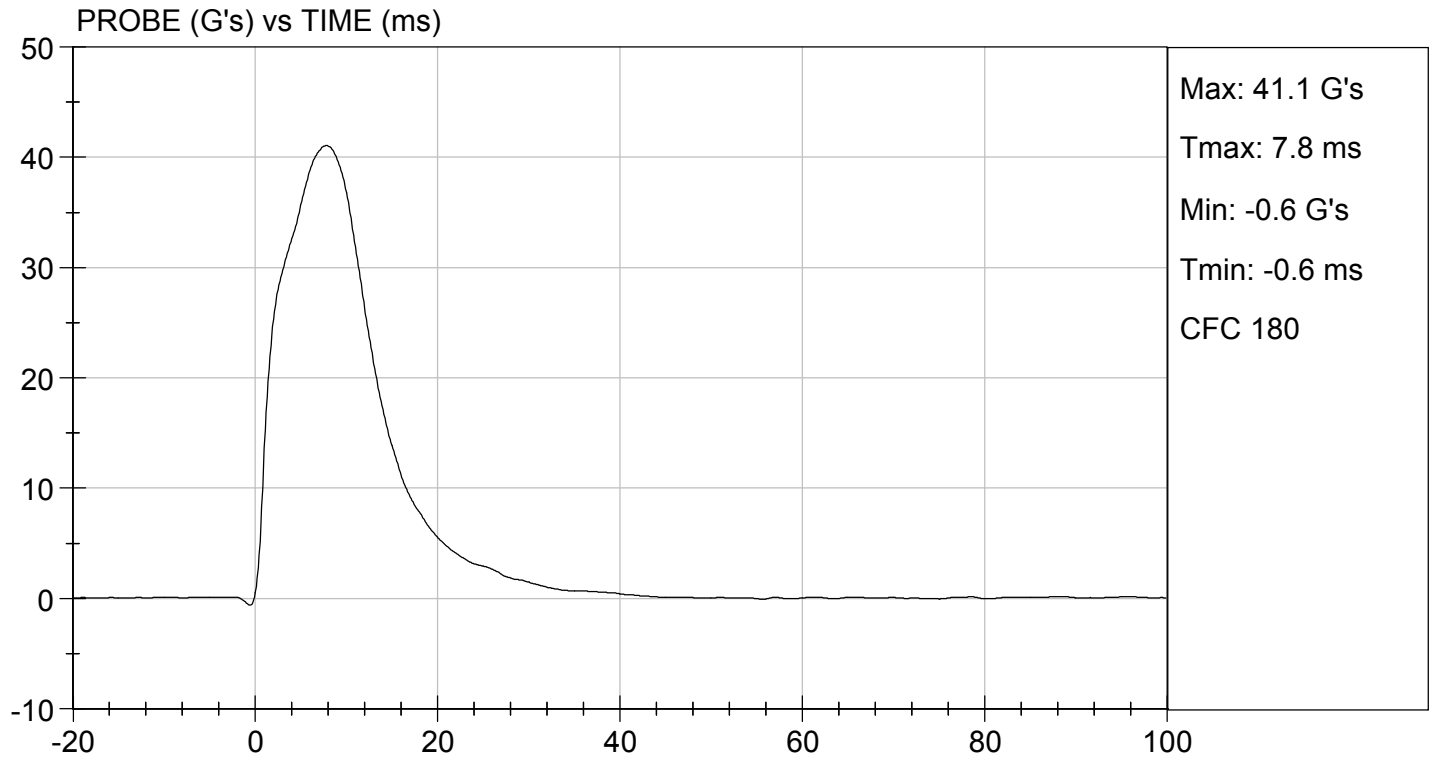
11/17/2020
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

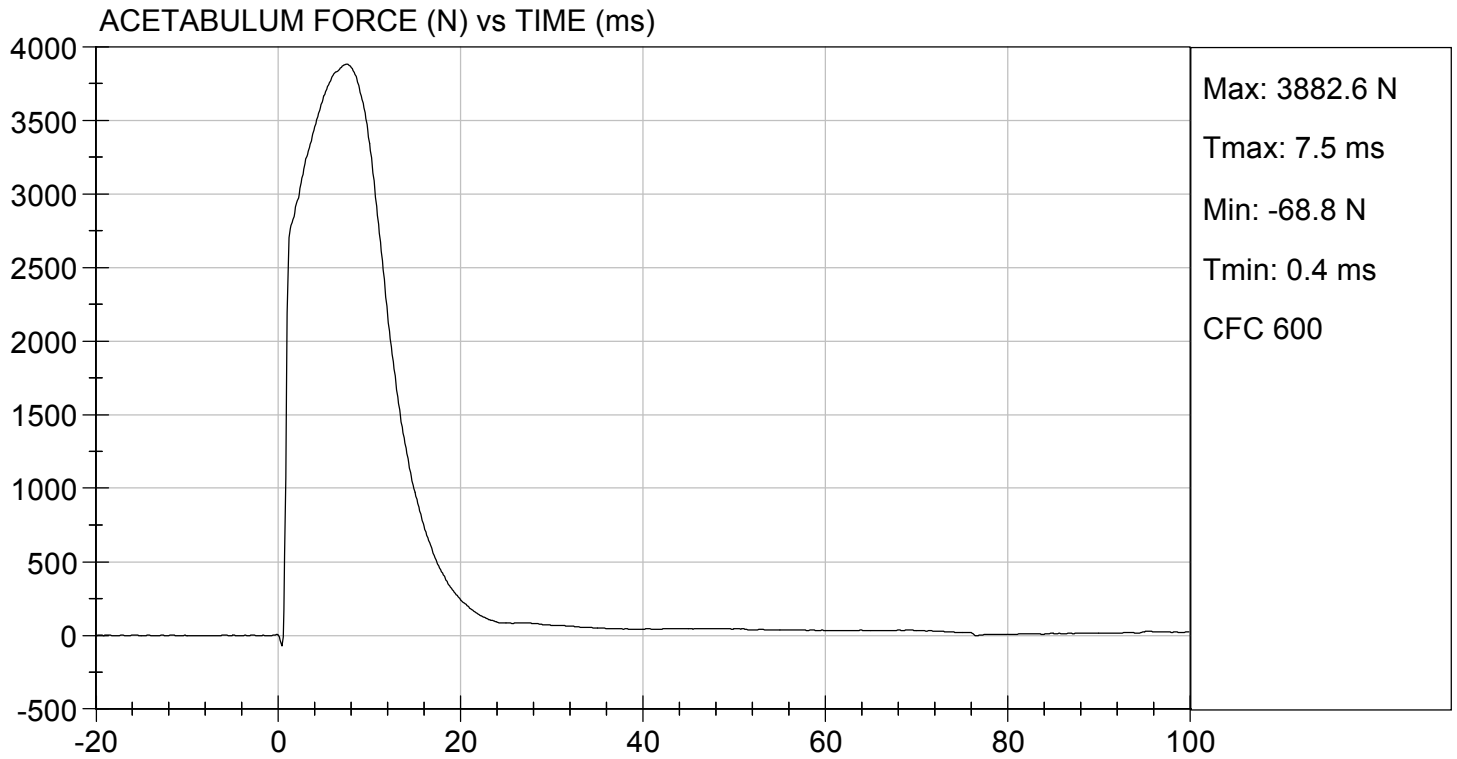
TEST DATE: 11/17/2020
TEST #: D202967





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 11/17/2020
TEST #: D202967



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D202968

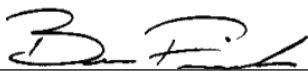
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	36	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,997	Pass
Overall Test Results				Pass



Laboratory Technician

11/17/2020

Test Date

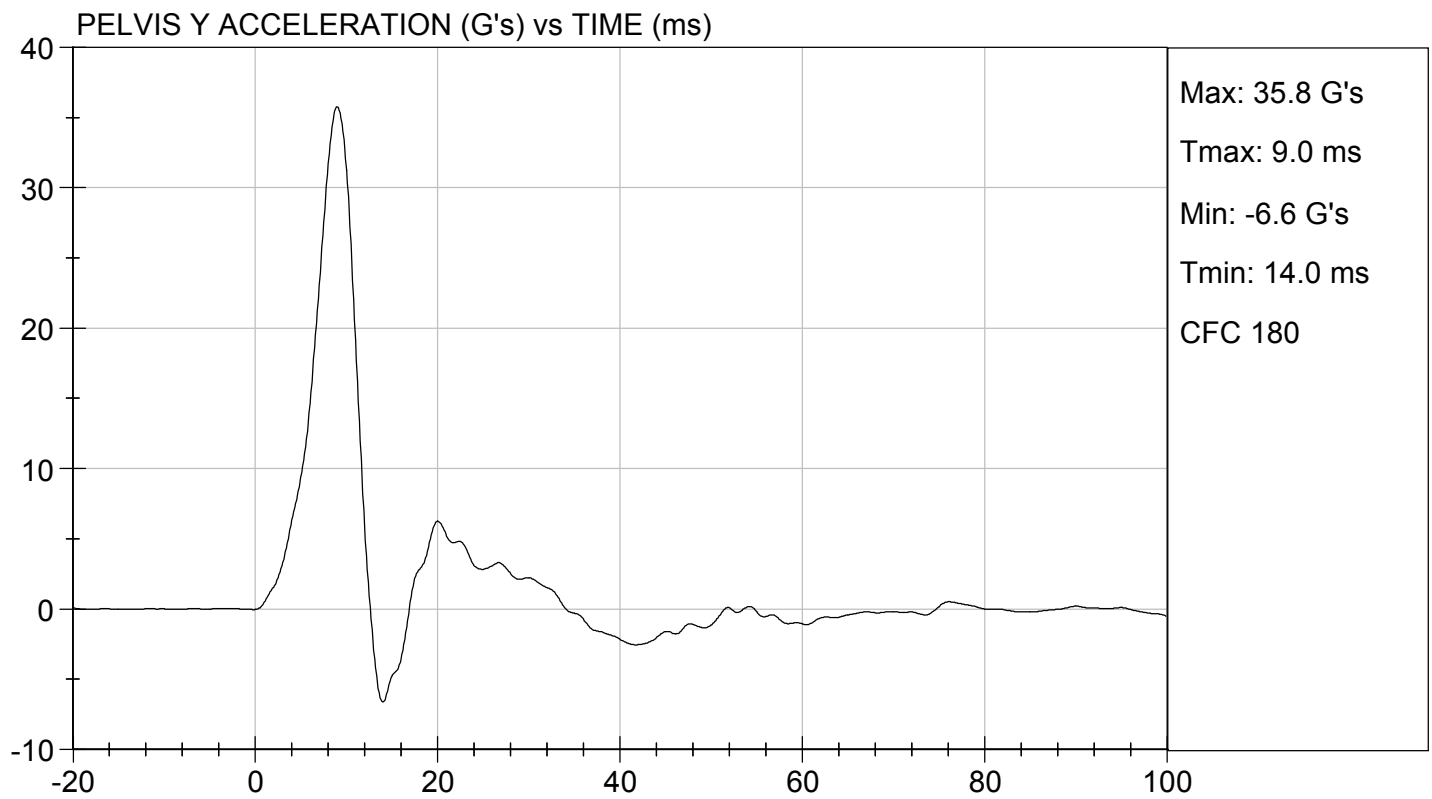
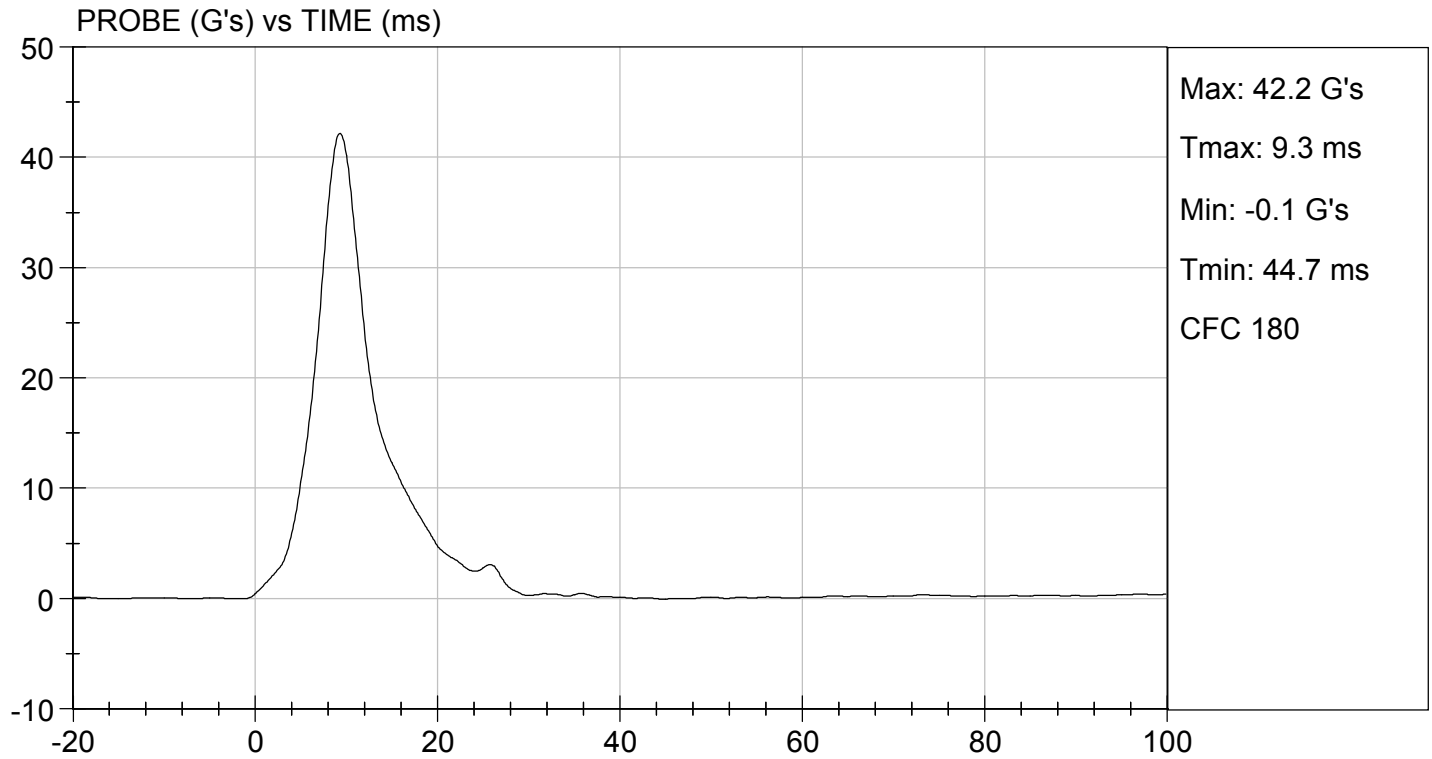


Approved By



TEST DESC: ILLIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

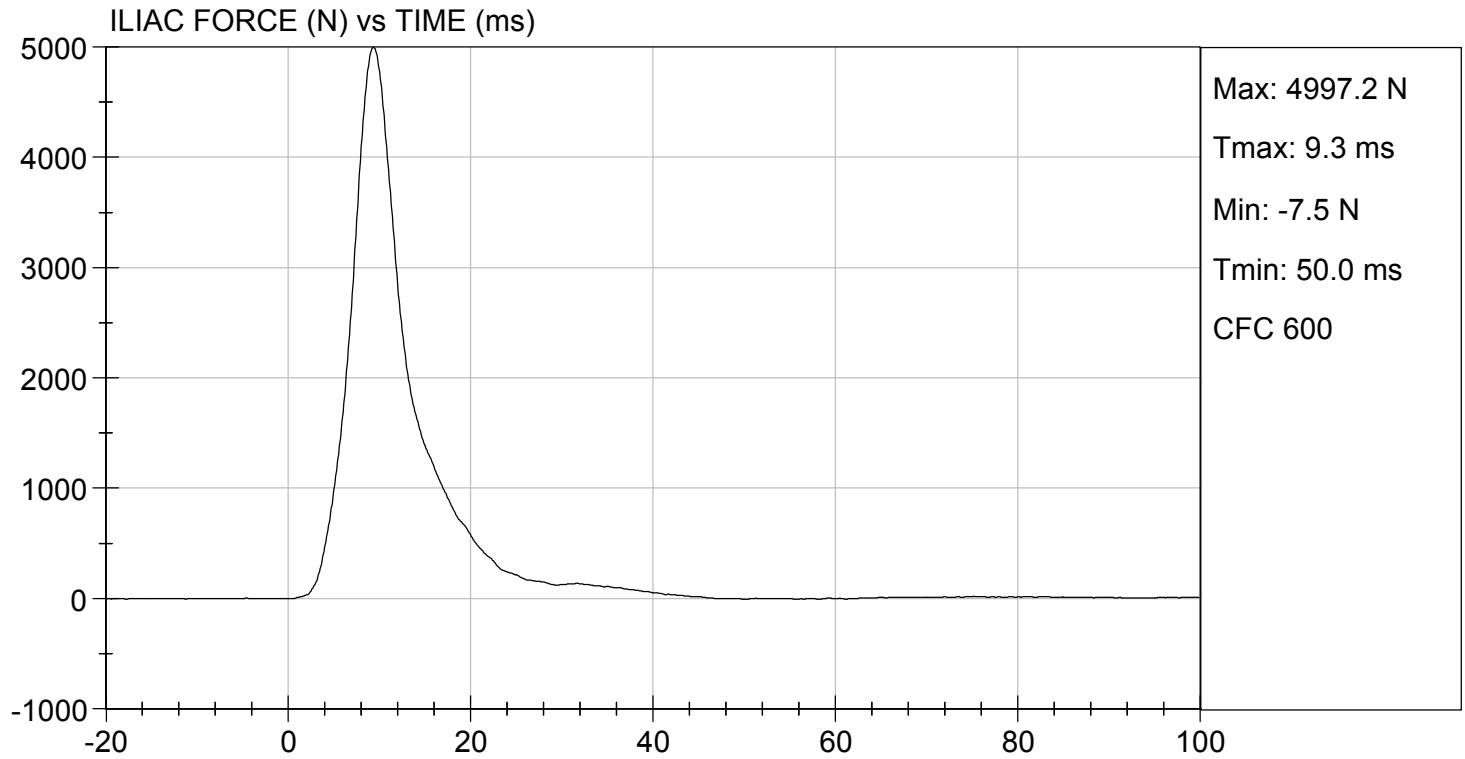
TEST DATE: 11/17/2020
TEST #: D202968





TEST DESC: ILLIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 11/17/2020
TEST #: D202968



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

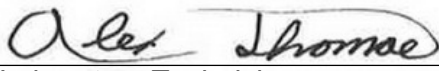
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	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: D203041

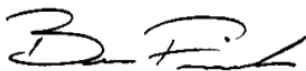
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	115 to 137	128	Pass
Peak Longitudinal Acceleration	G's	+/- 15	6.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	



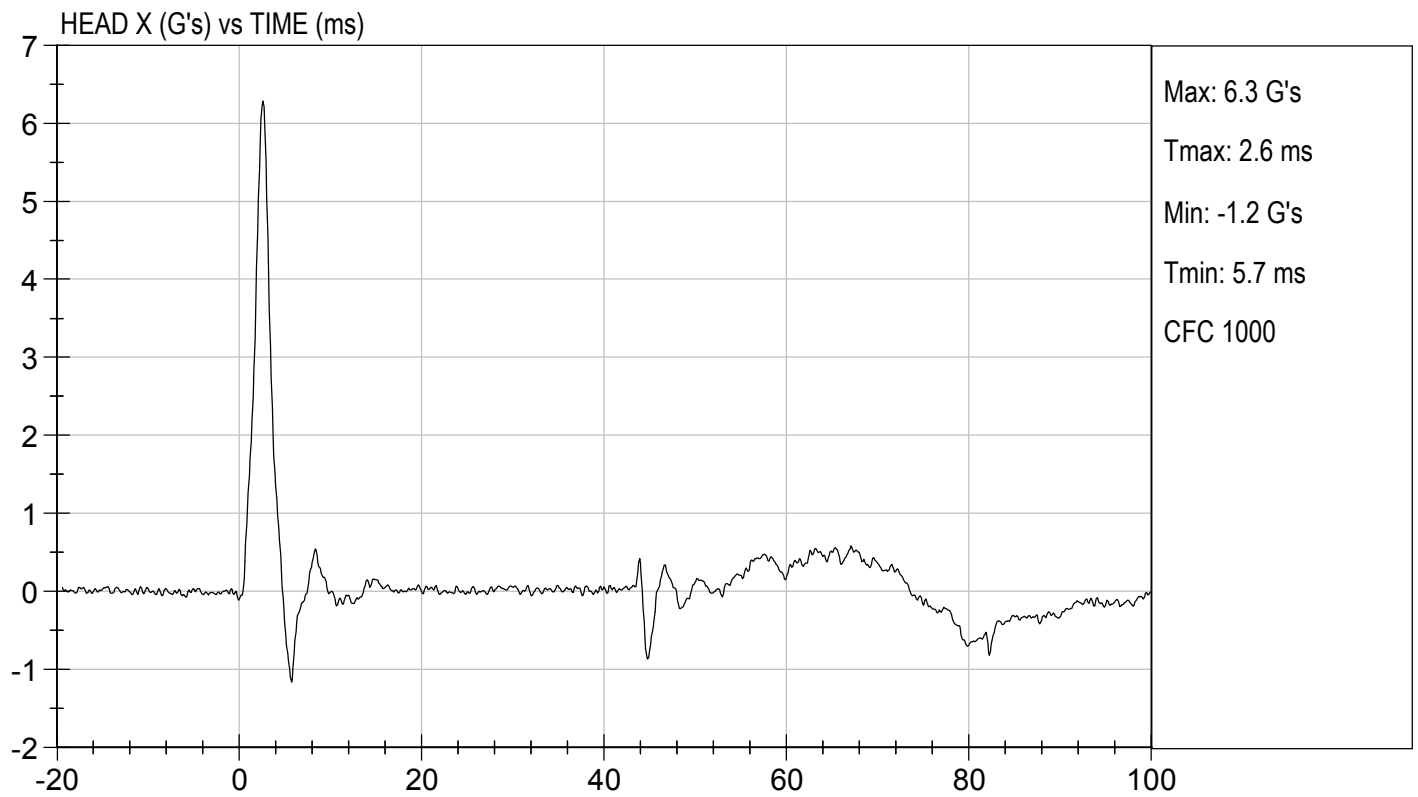
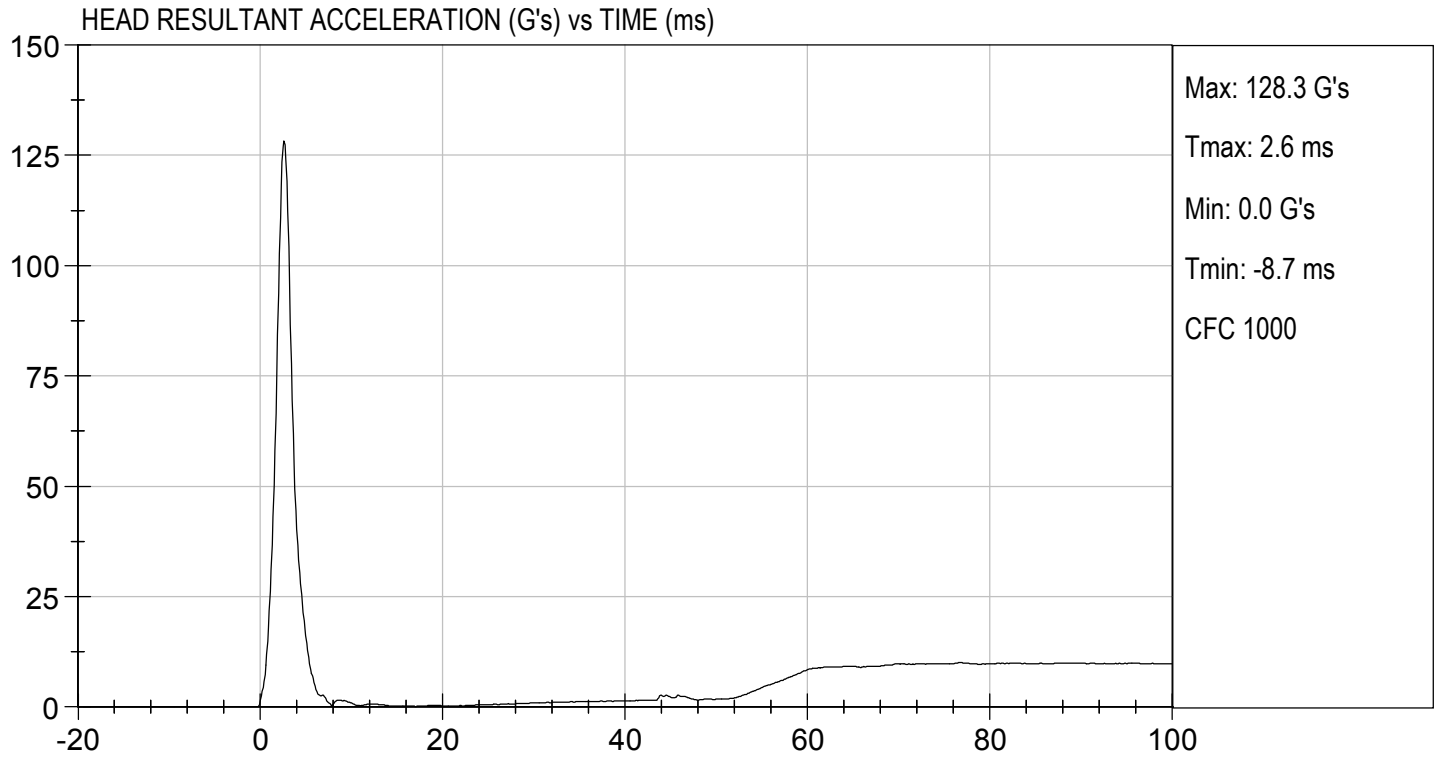
Laboratory Technician

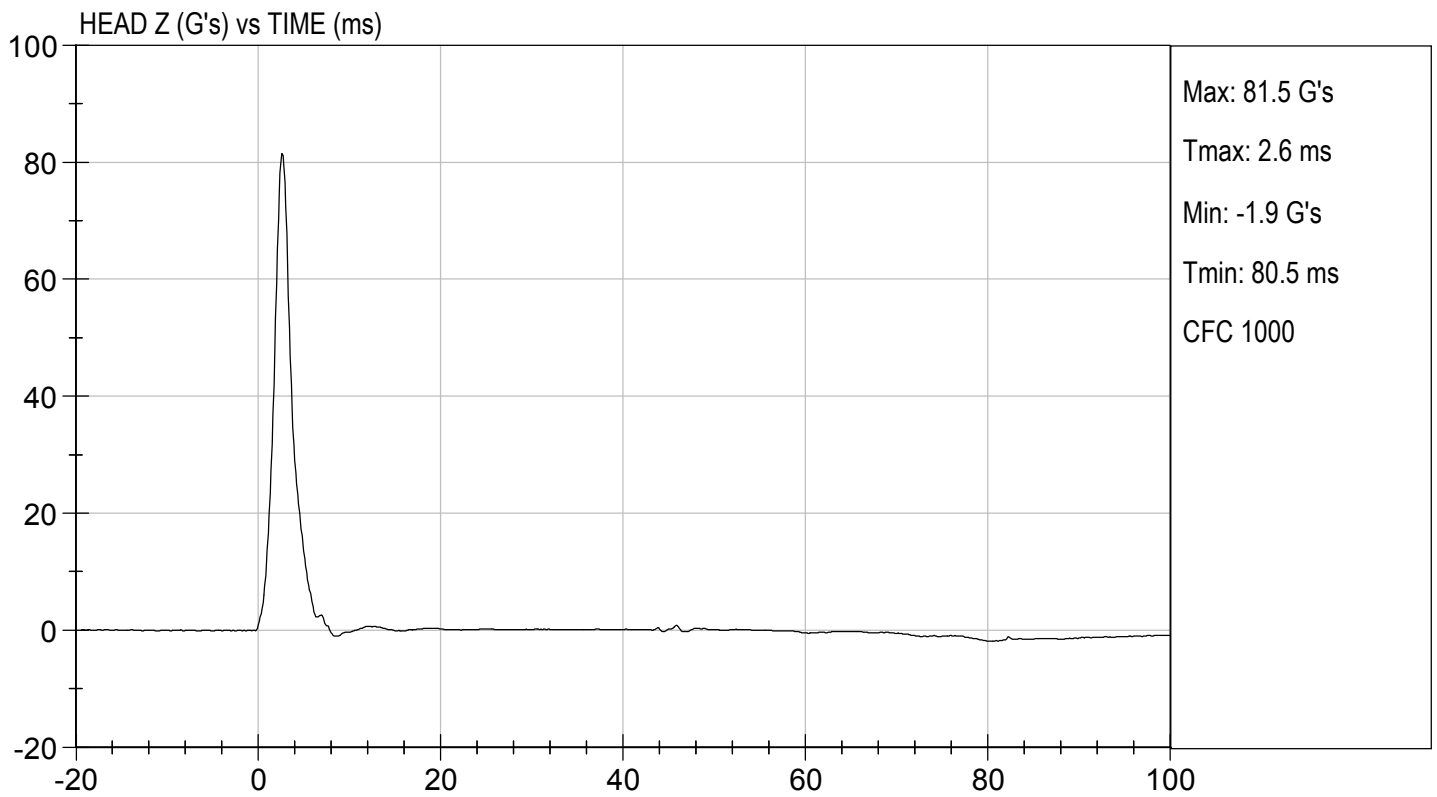
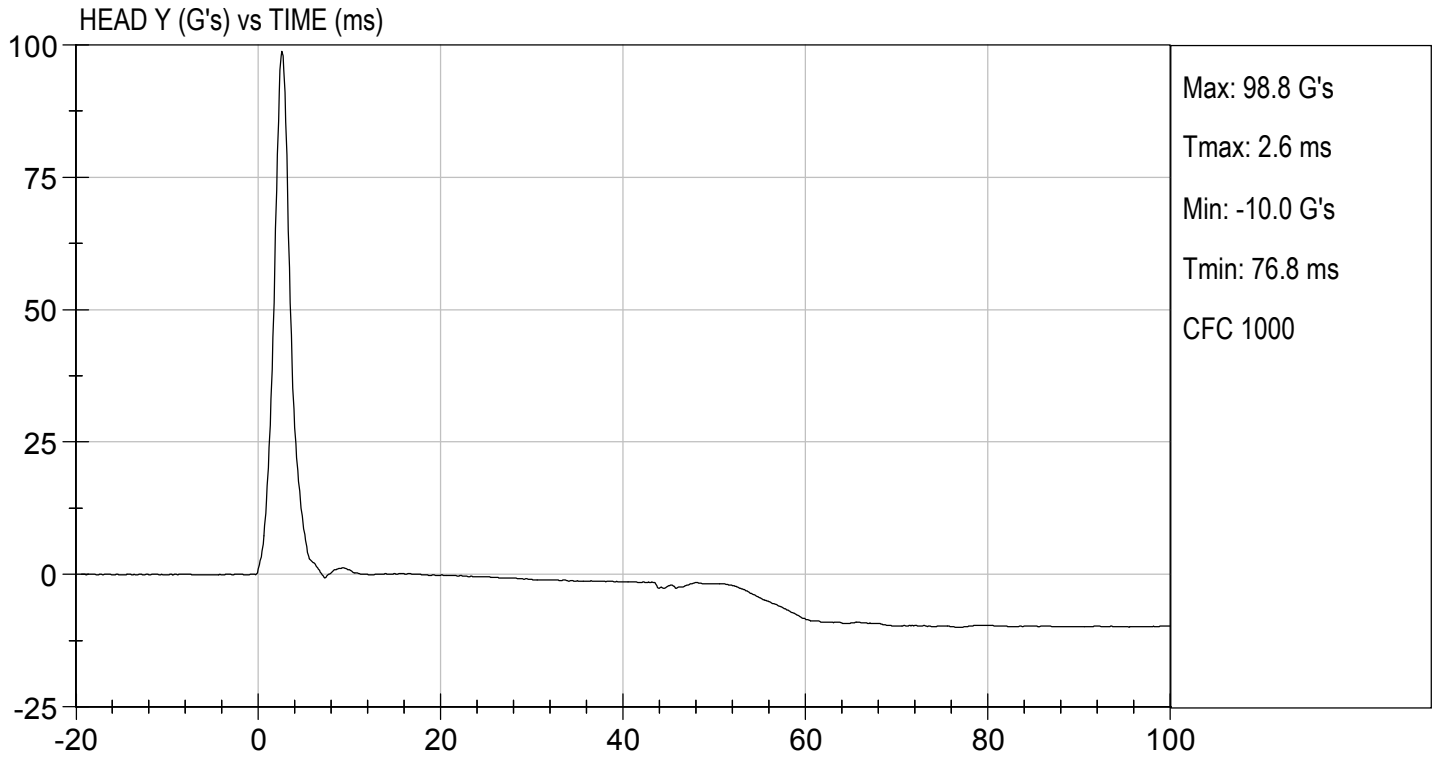
11/24/2020

Test Date



Approved By





MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D203042

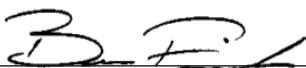
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	26	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.73	Pass
	15 ms	m/s	3.30 to 4.10	3.84	Pass
	20 ms	m/s	4.40 to 5.40	5.14	Pass
	25 ms	m/s	5.40 to 6.10	6.04	Pass
	25-100 ms	m/s	5.50 to 6.20	6.04	Pass
Maximum D-Plane Rotation		deg	71 to 81	74	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	111	Pass
Overall Test Results					Pass



Laboratory Technician

11/24/2020

Test Date

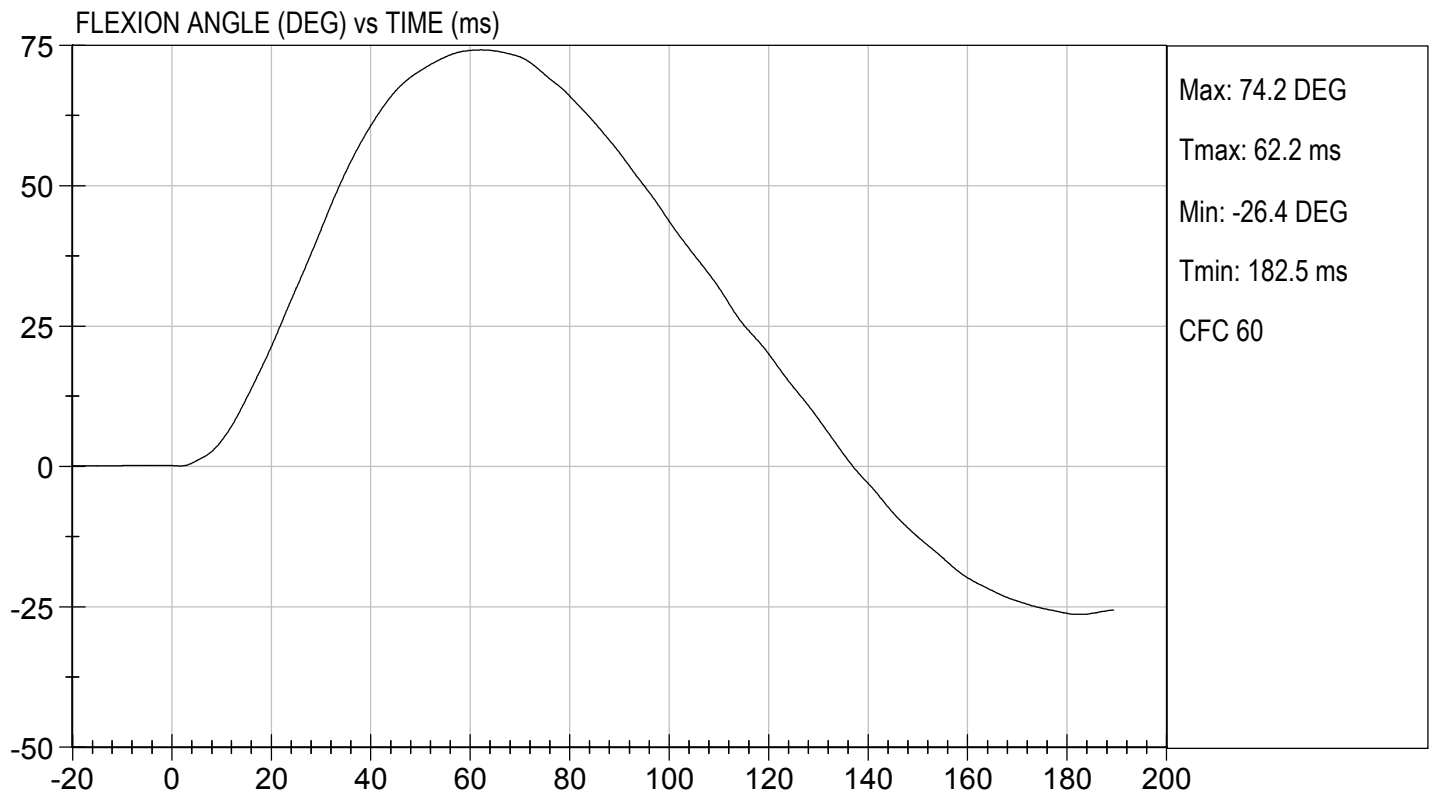
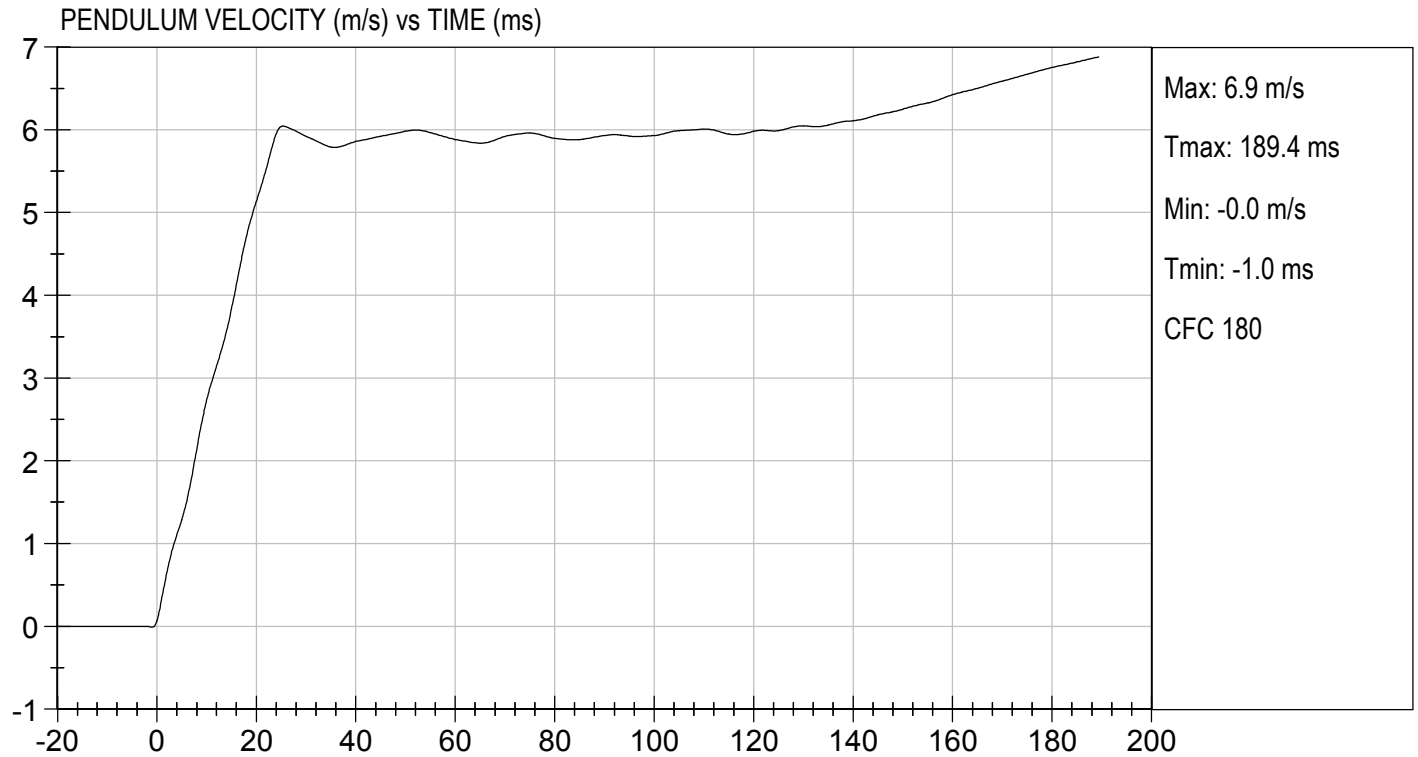


Approved By



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

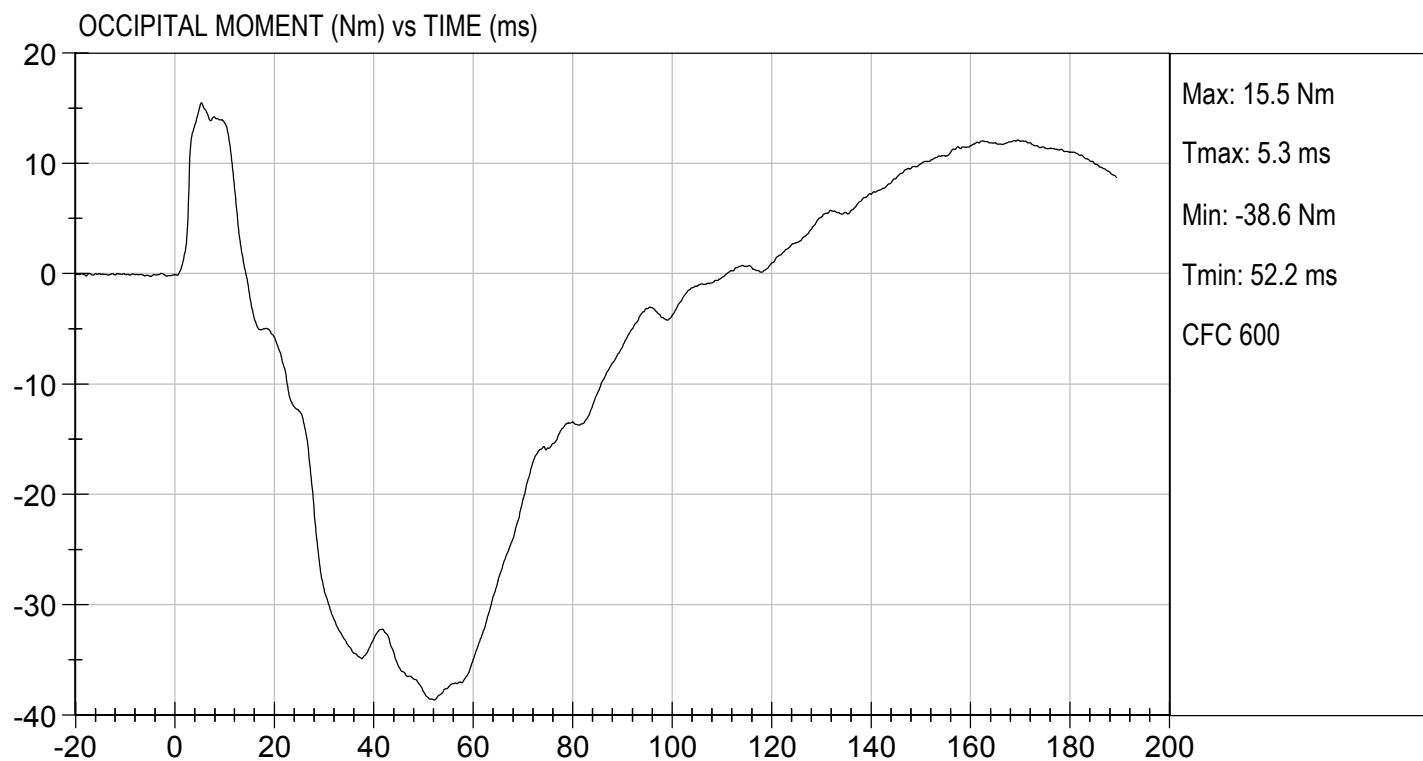
TEST DATE: 11/24/2020
TEST #: D203042





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

TEST DATE: 11/24/2020
TEST #: D203042

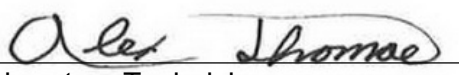


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

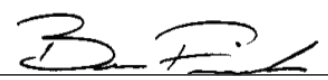
Test ID: D203043

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	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	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	19	Pass
Overall Test Results				Pass


Laboratory Technician

11/23/2020

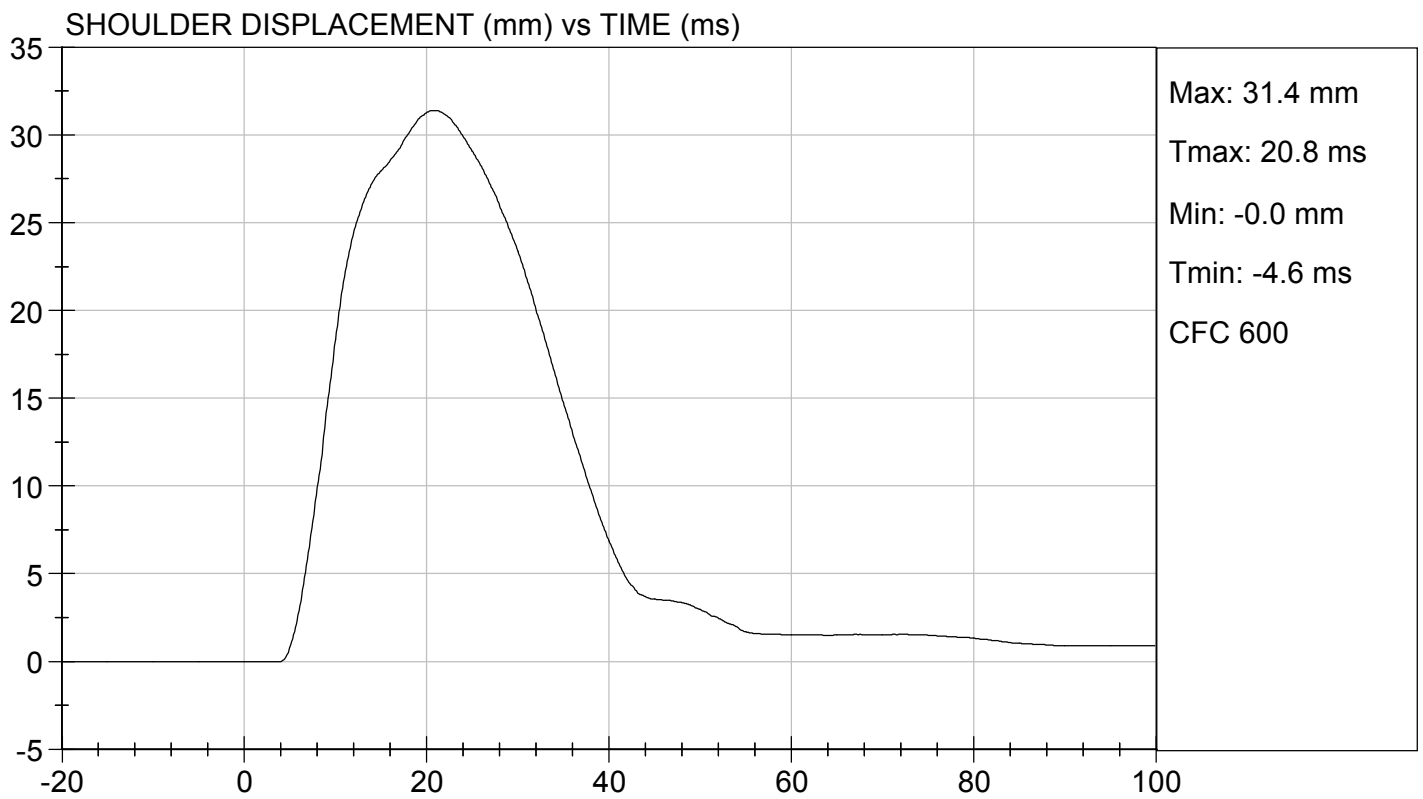
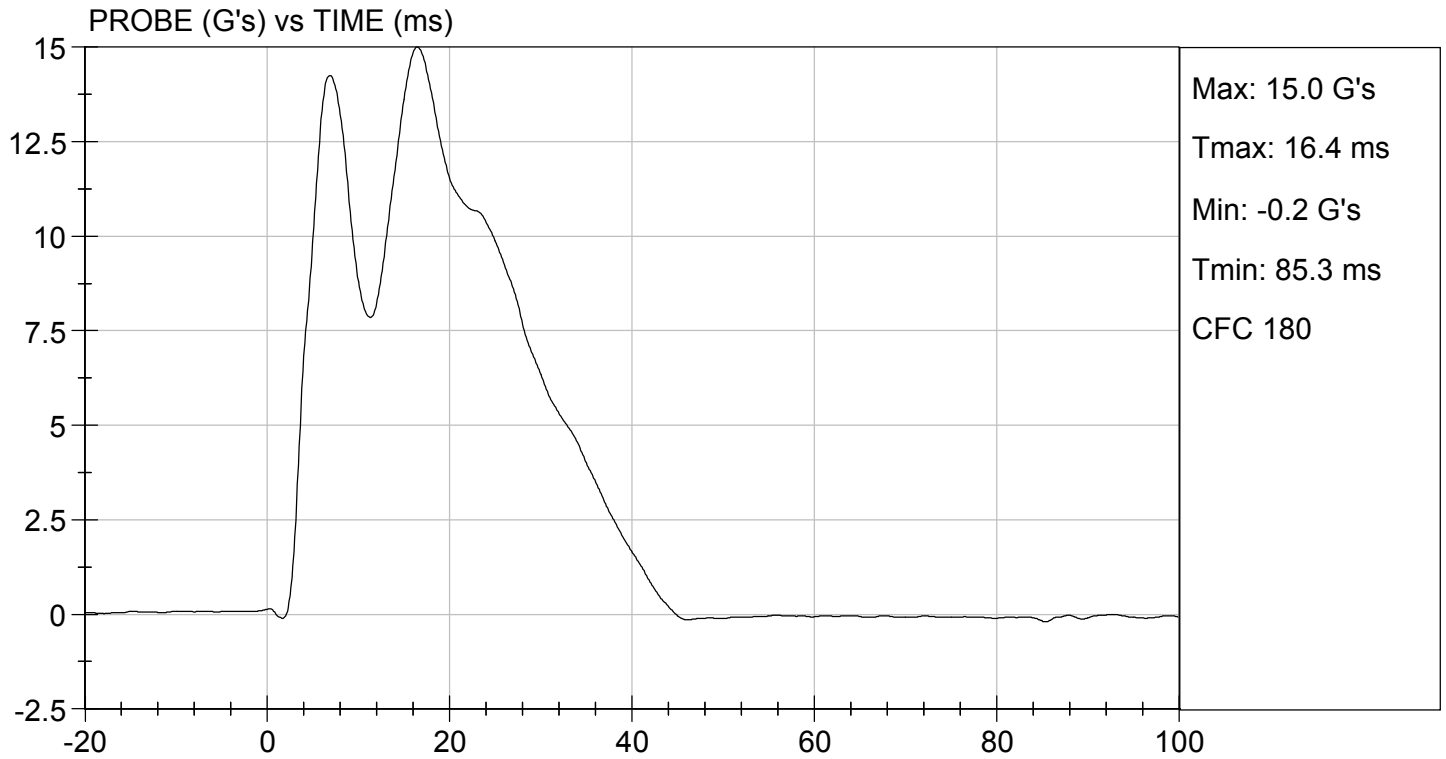
Test Date


Approved By



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

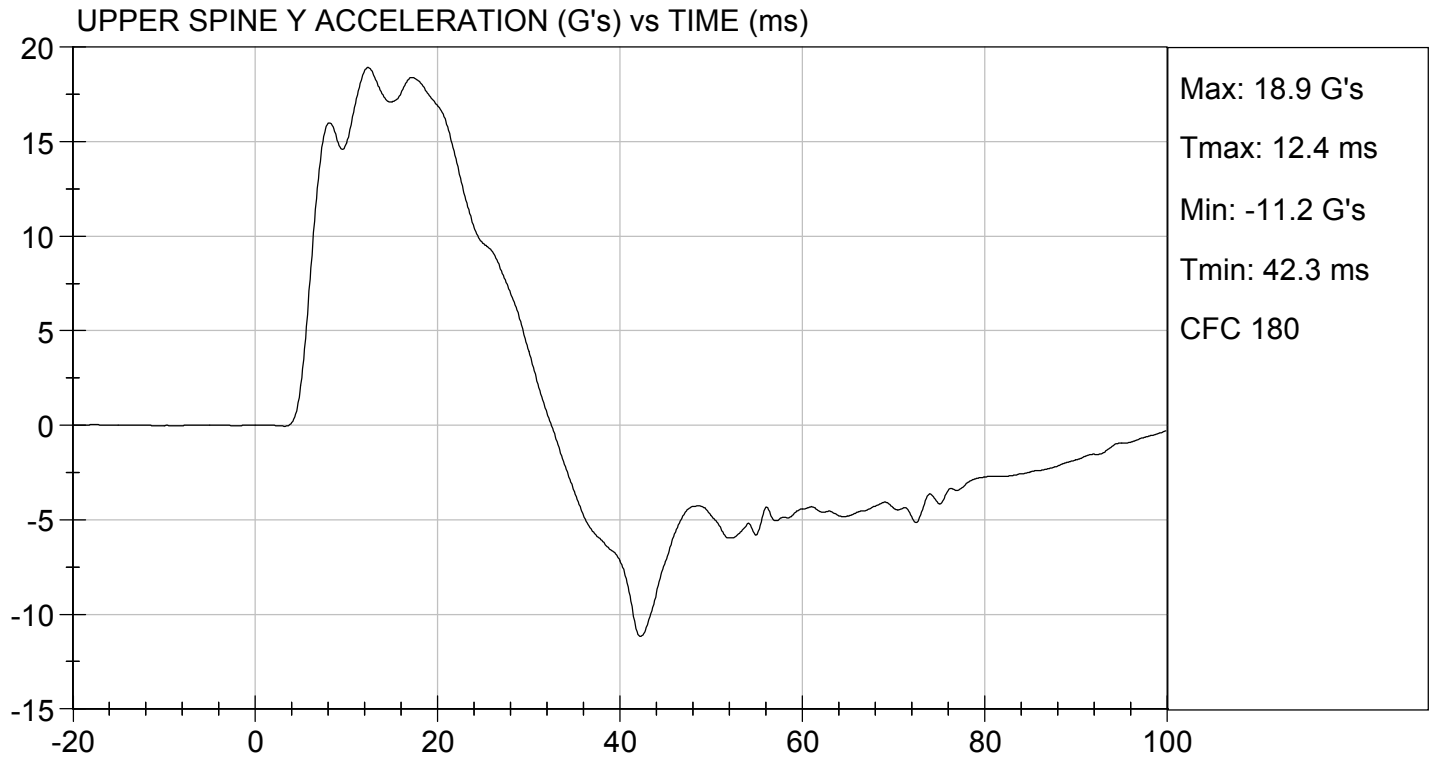
TEST DATE: 11/23/2020
TEST #: D203043





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

TEST DATE: 11/23/2020
TEST #: D203043



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D203044

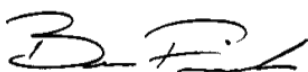
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	37	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	37	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
Overall Test Results				Pass



Laboratory Technician

11/23/2020

Test Date

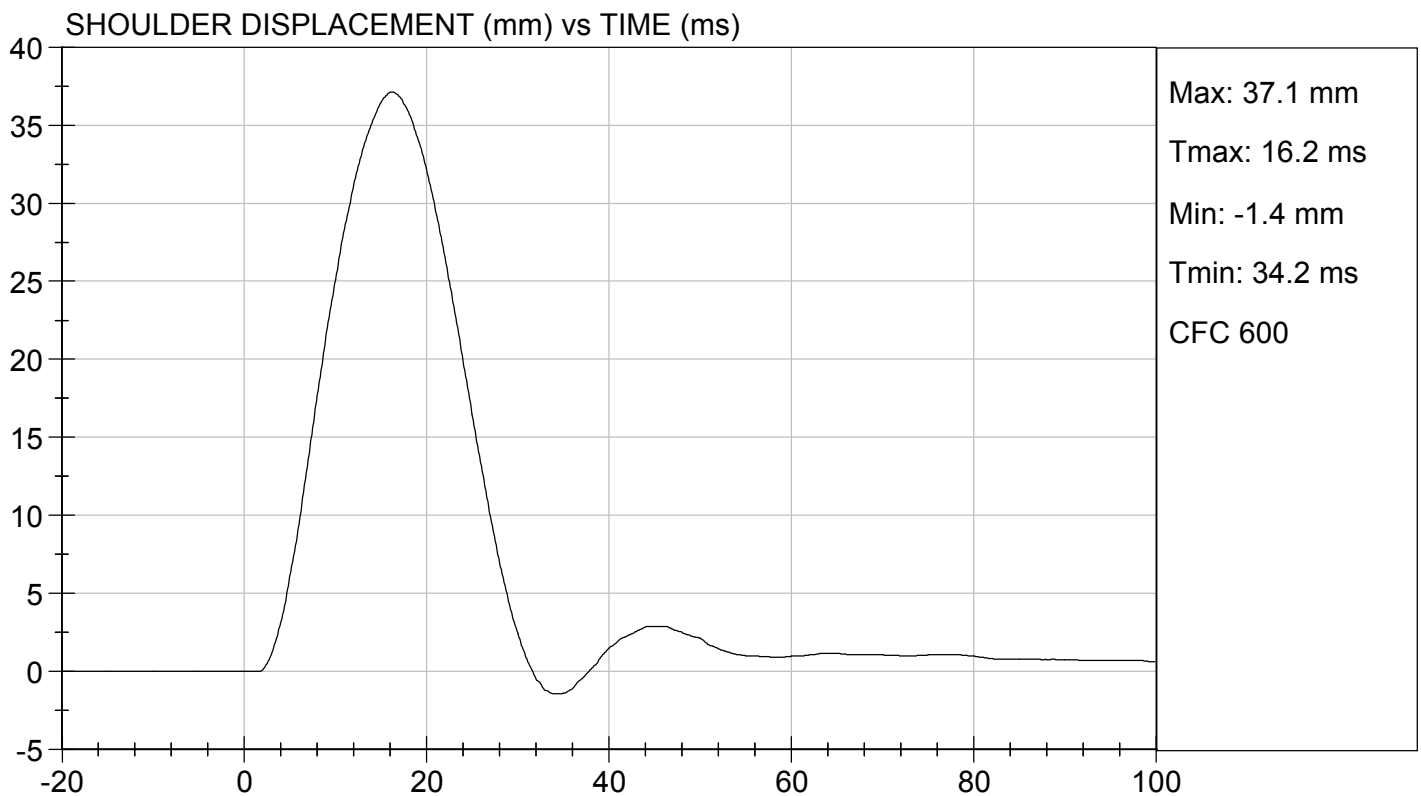
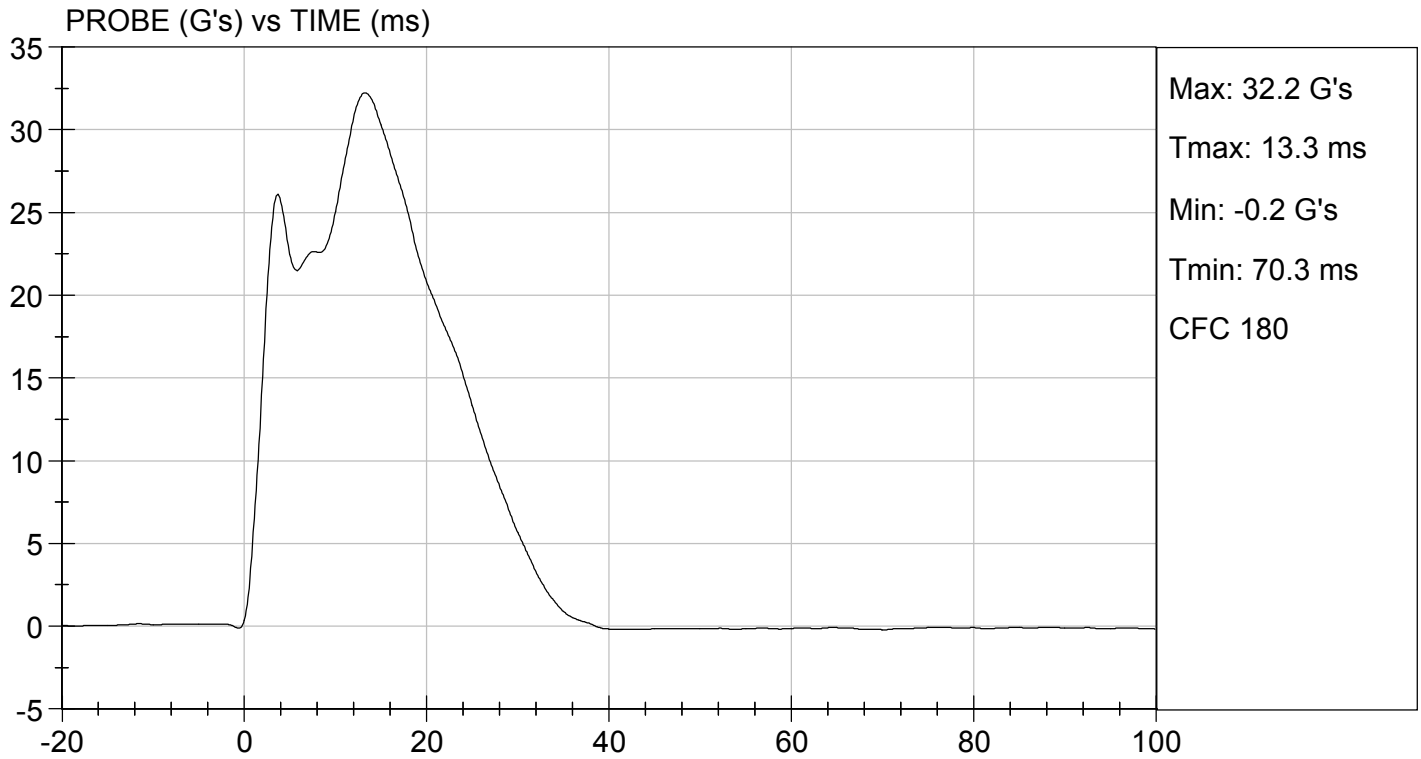


Approved By



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

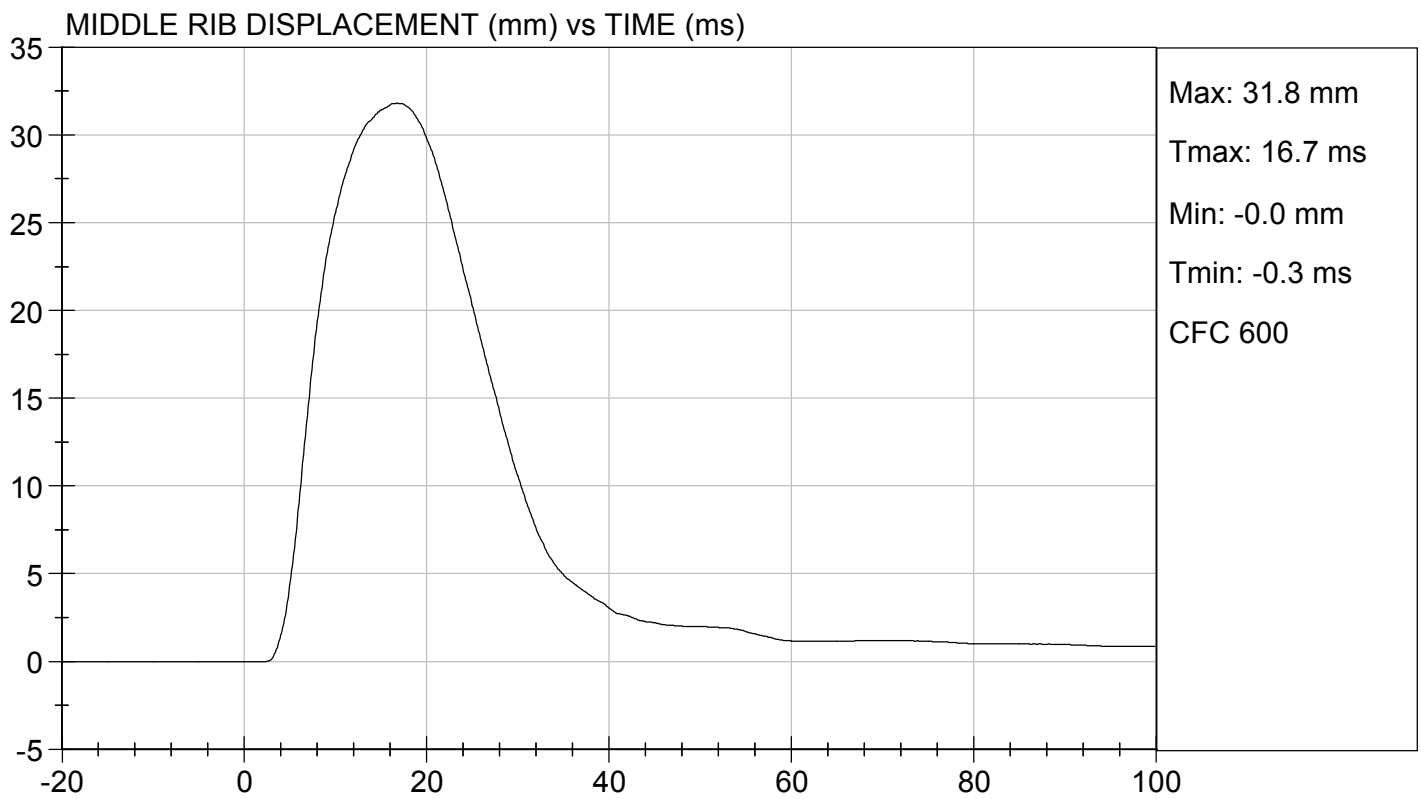
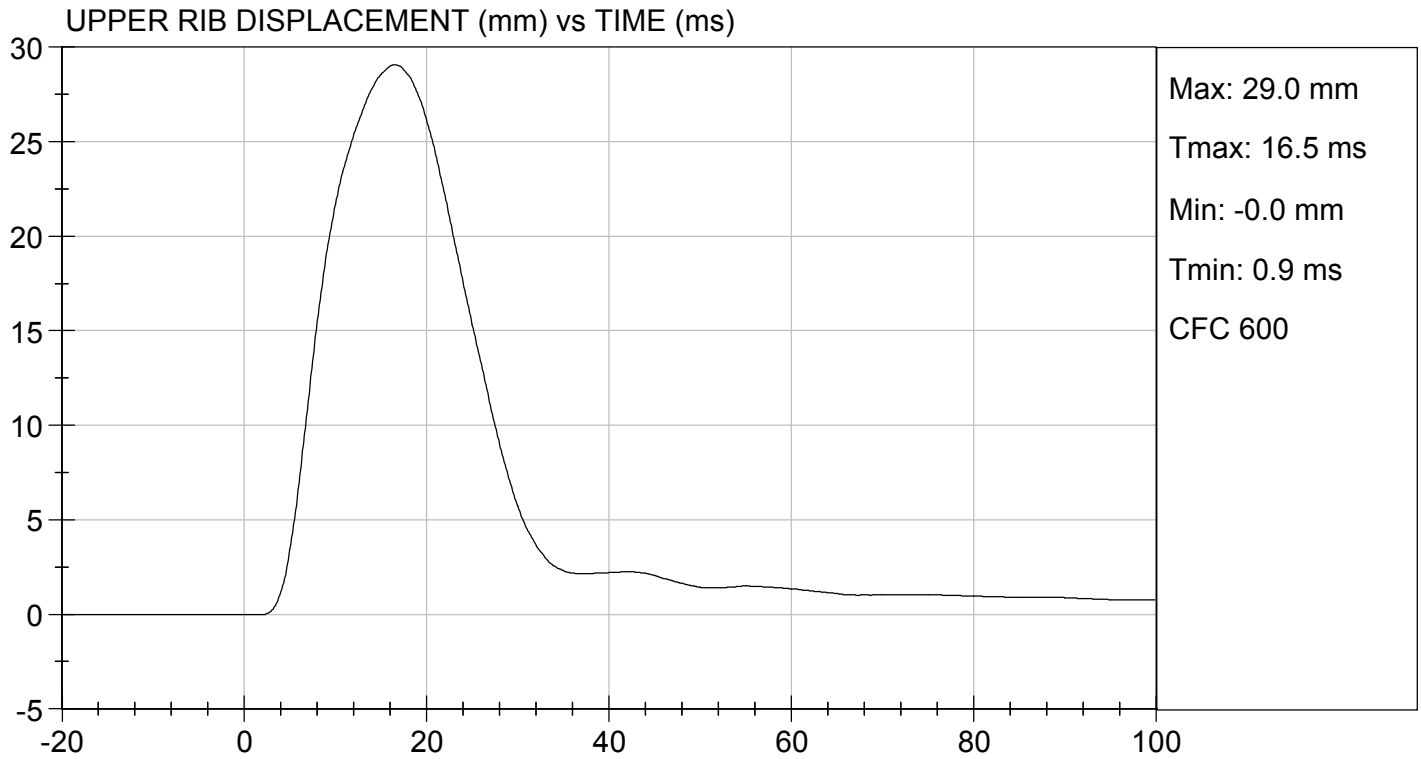
TEST DATE: 11/23/2020
TEST #: D203044





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

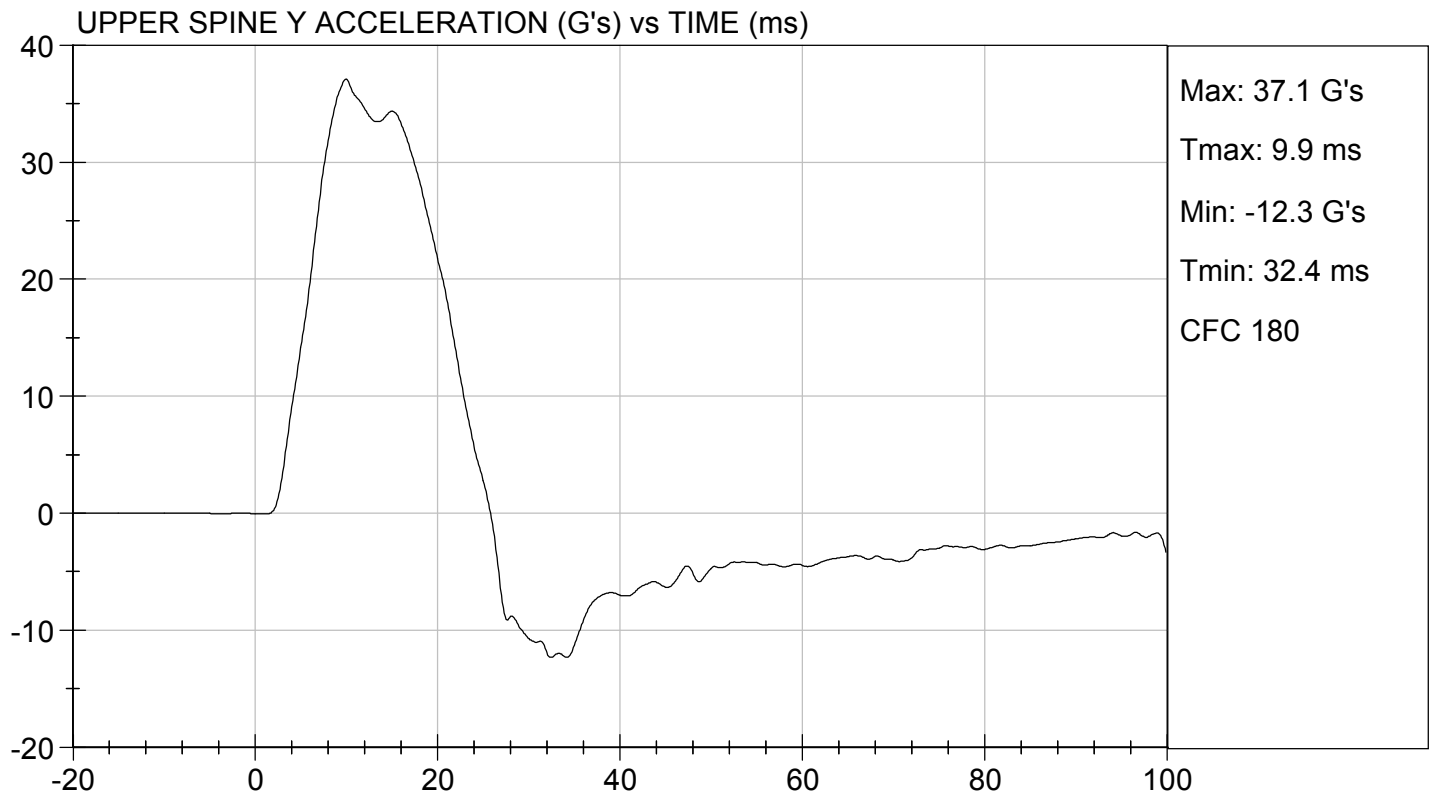
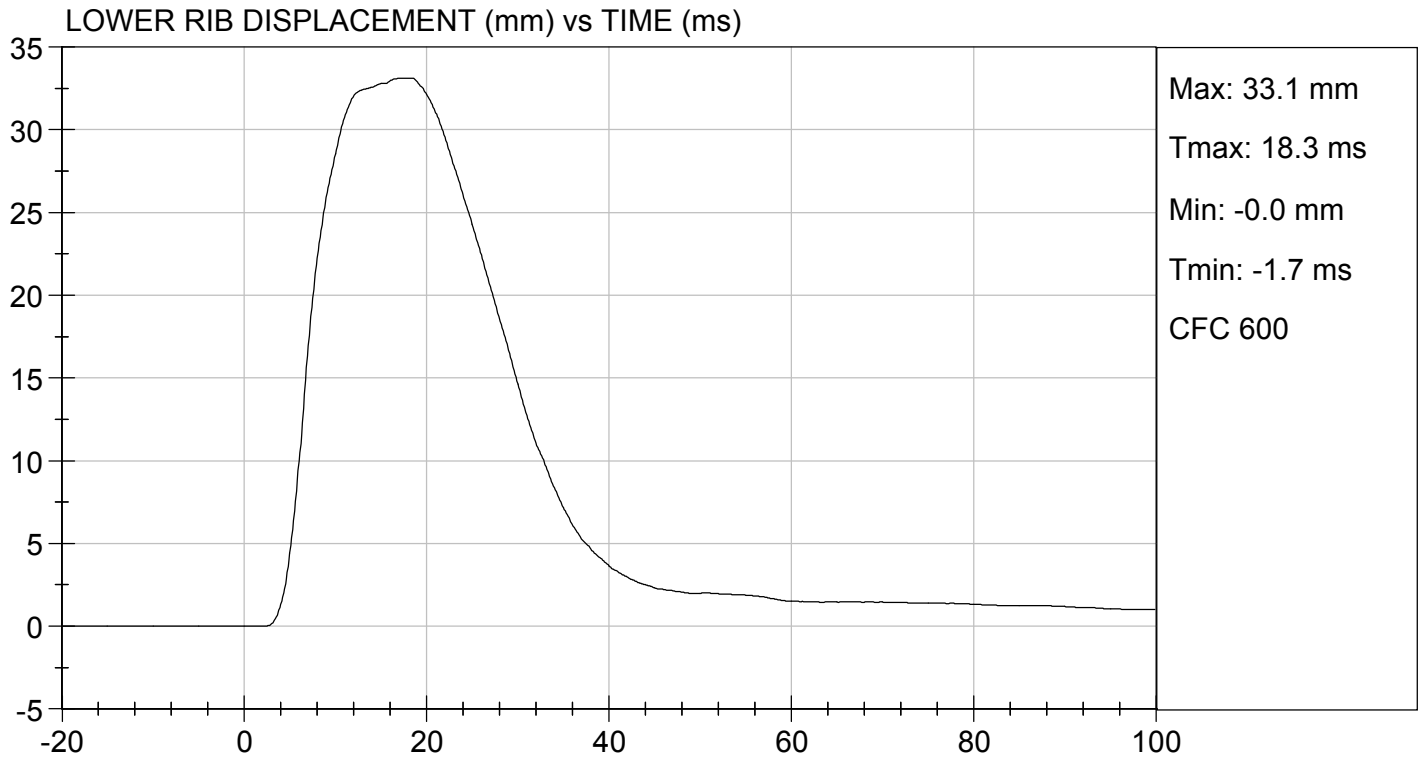
TEST DATE: 11/23/2020
TEST #: D203044





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

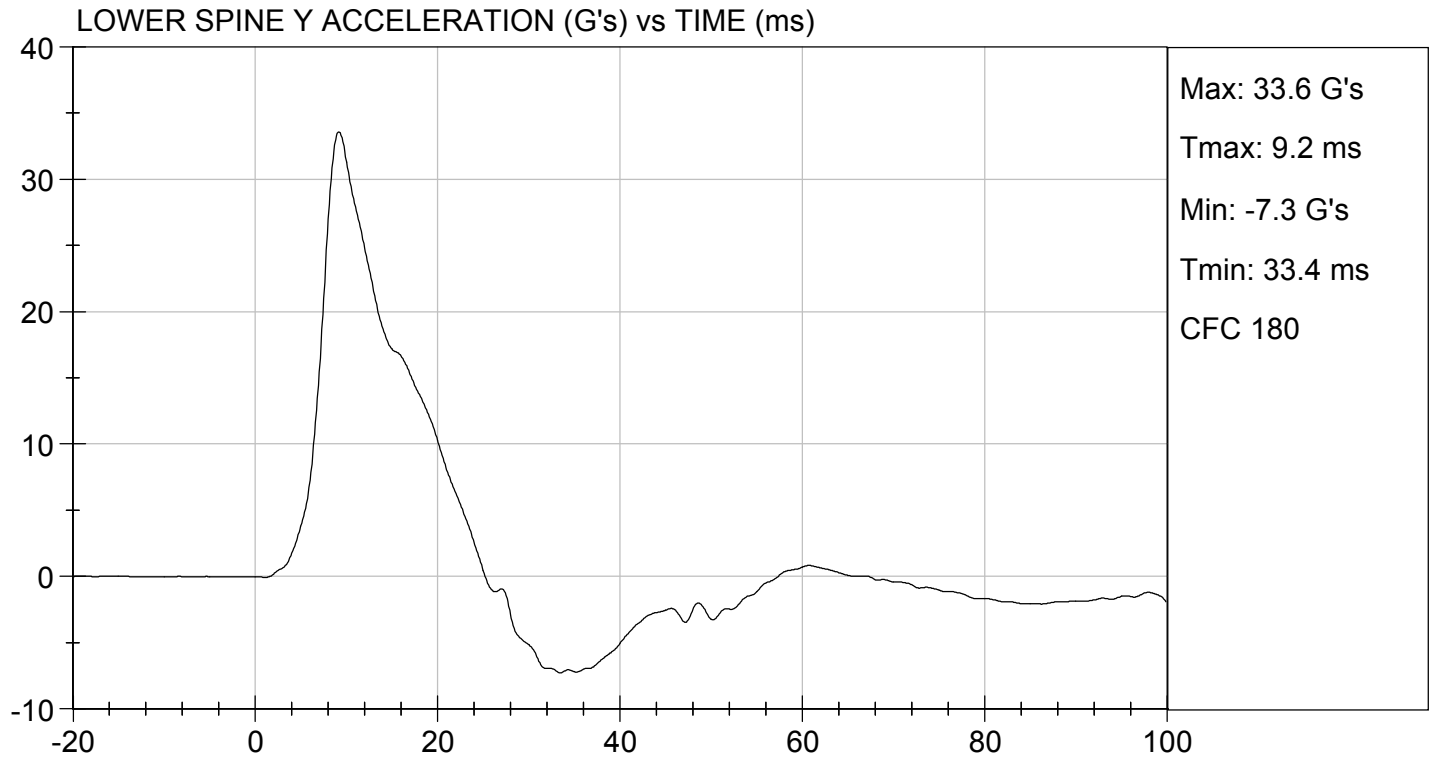
TEST DATE: 11/23/2020
TEST #: D203044





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

TEST DATE: 11/23/2020
TEST #: D203044



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

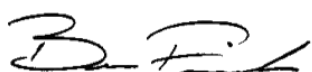
ATD Serial No: 296

Test I.D: D203045

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	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	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

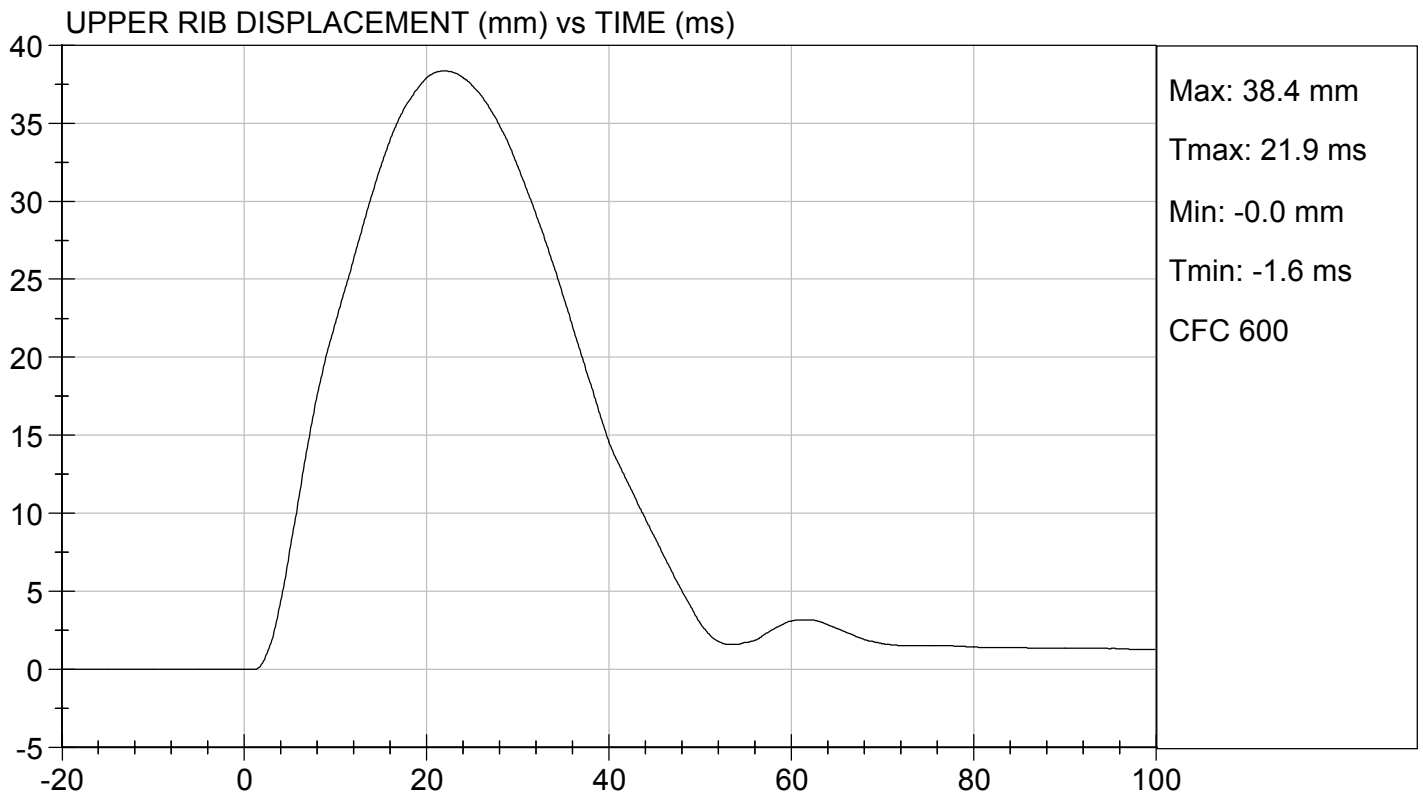
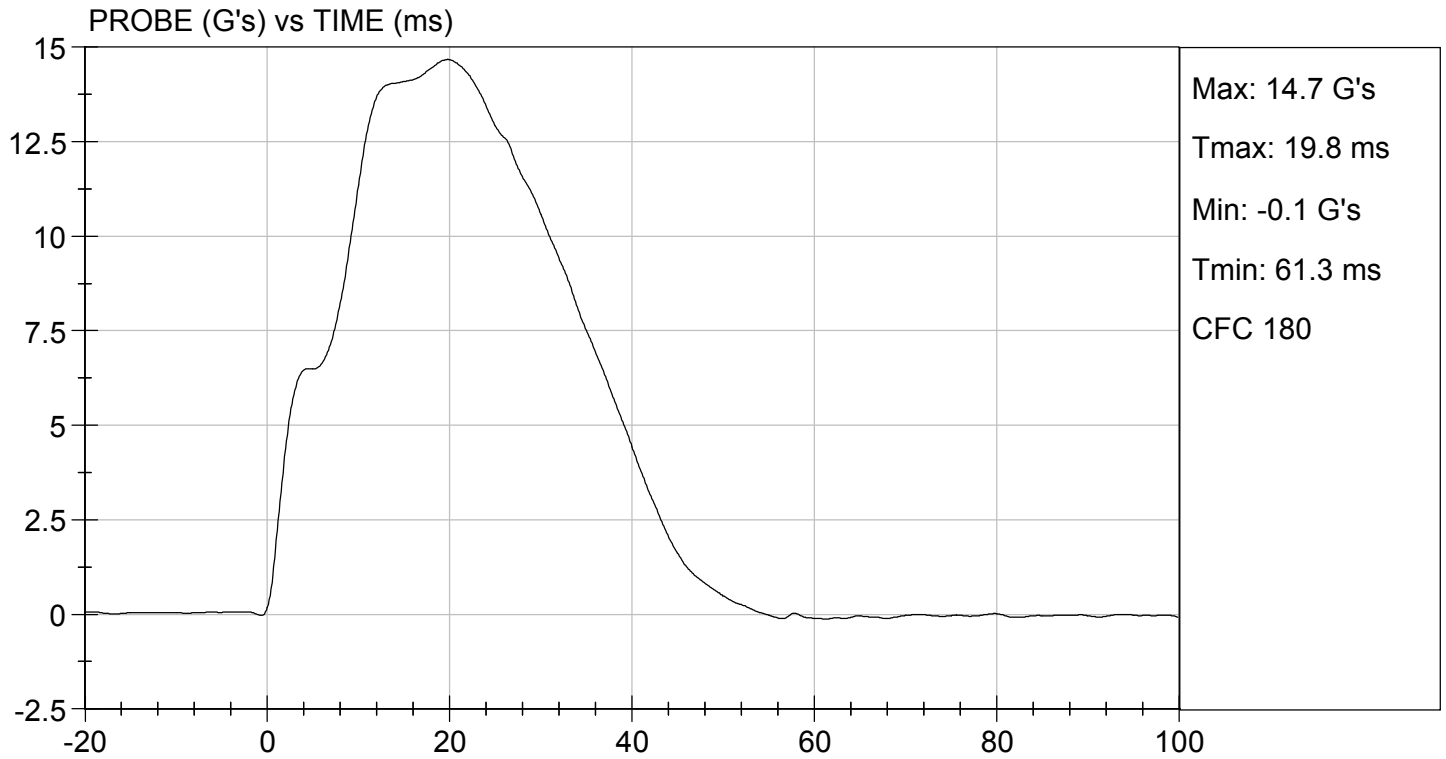
11/23/2020
Test Date


Approved By



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

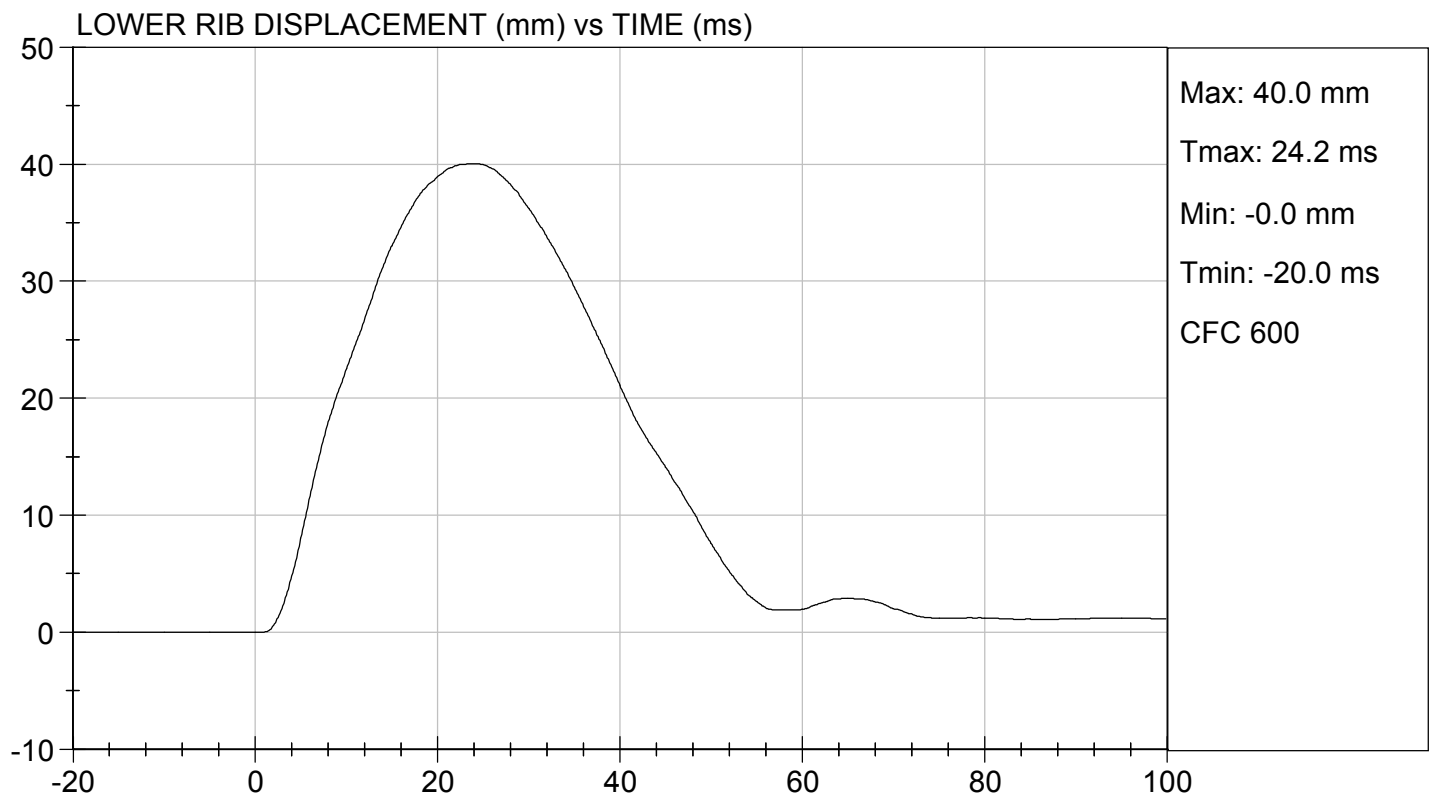
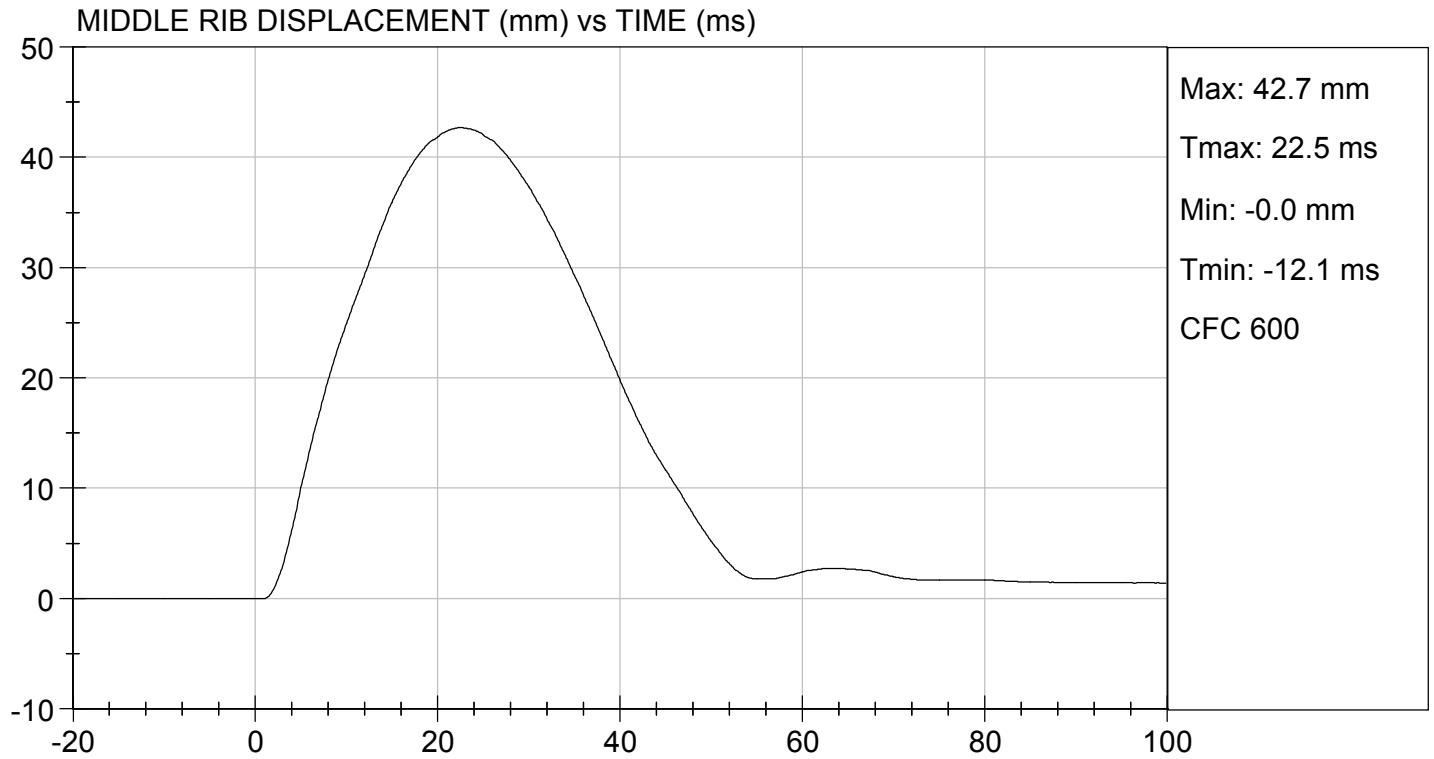
TEST DATE: 11/23/2020
TEST #: D203045





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

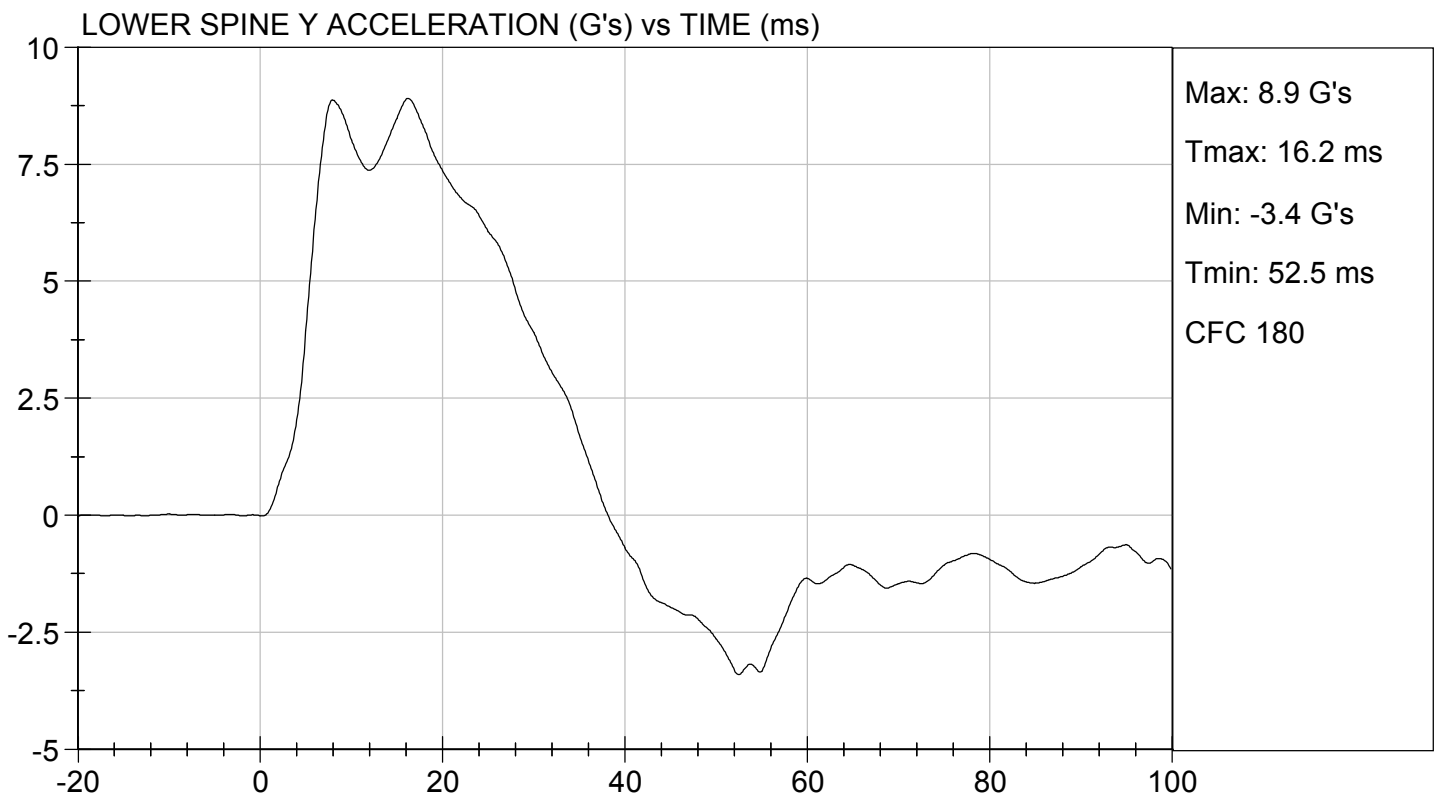
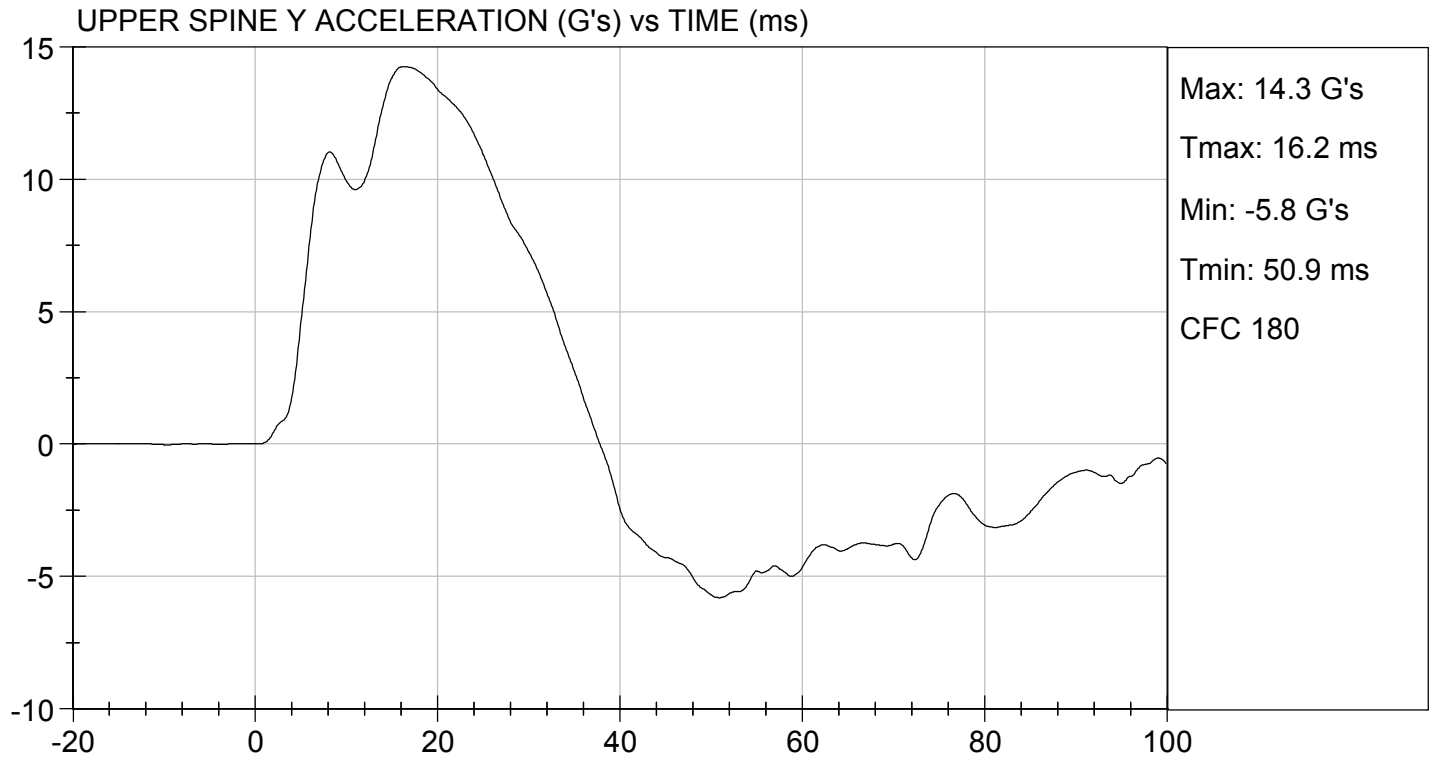
TEST DATE: 11/23/2020
TEST #: D203045





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

TEST DATE: 11/23/2020
TEST #: D203045



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-III BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D203046

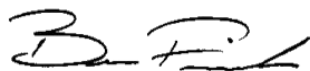
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass



Laboratory Technician

11/24/2020

Test Date

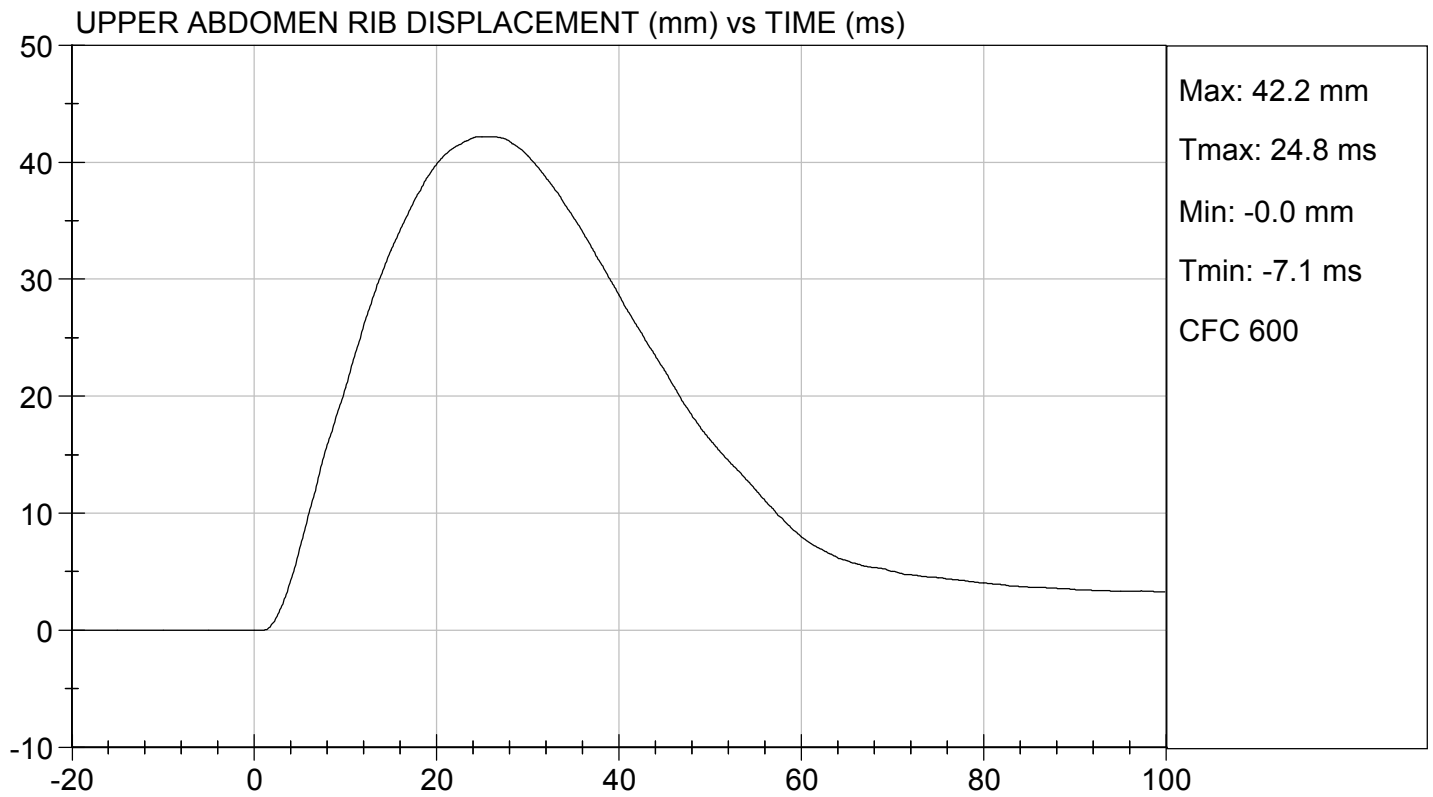
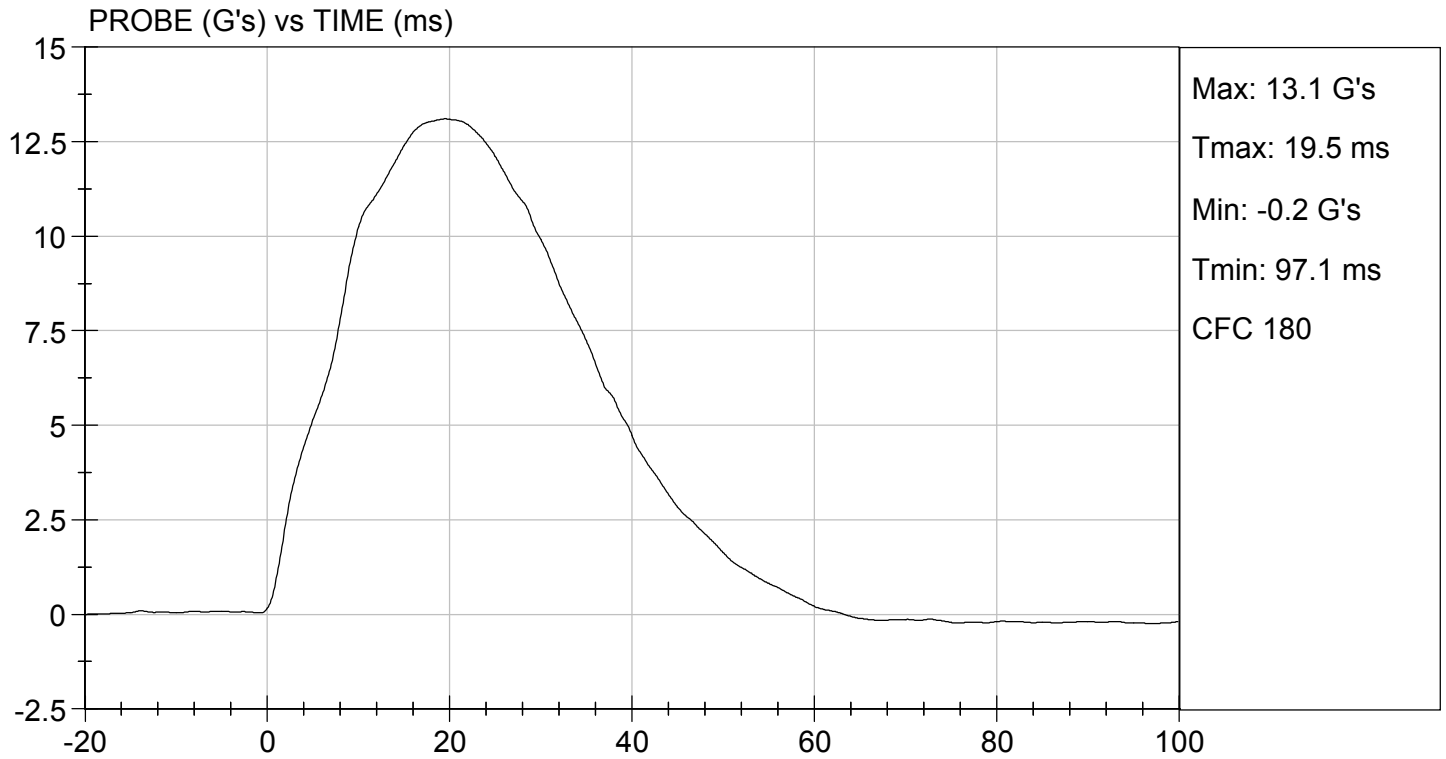


Approved By



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

TEST DATE: 11/24/2020
TEST #: D203046

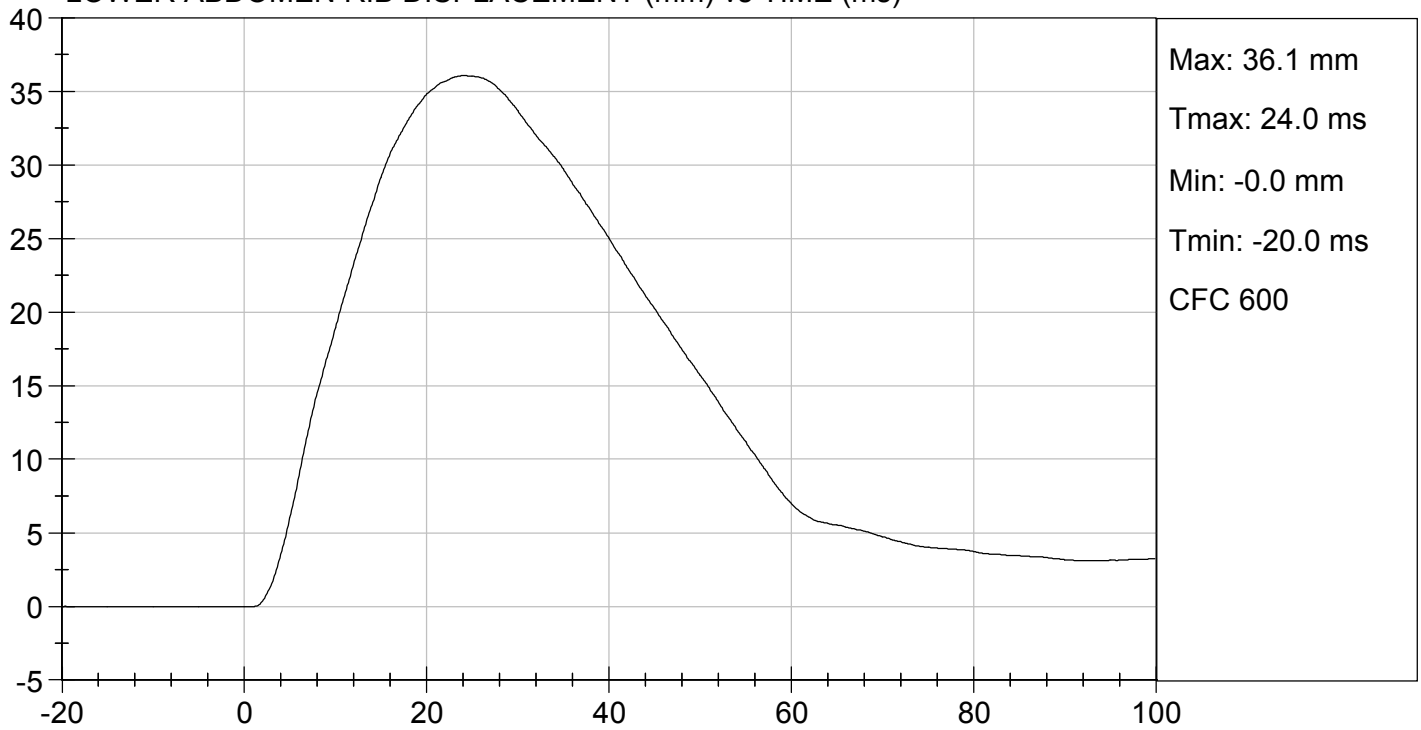




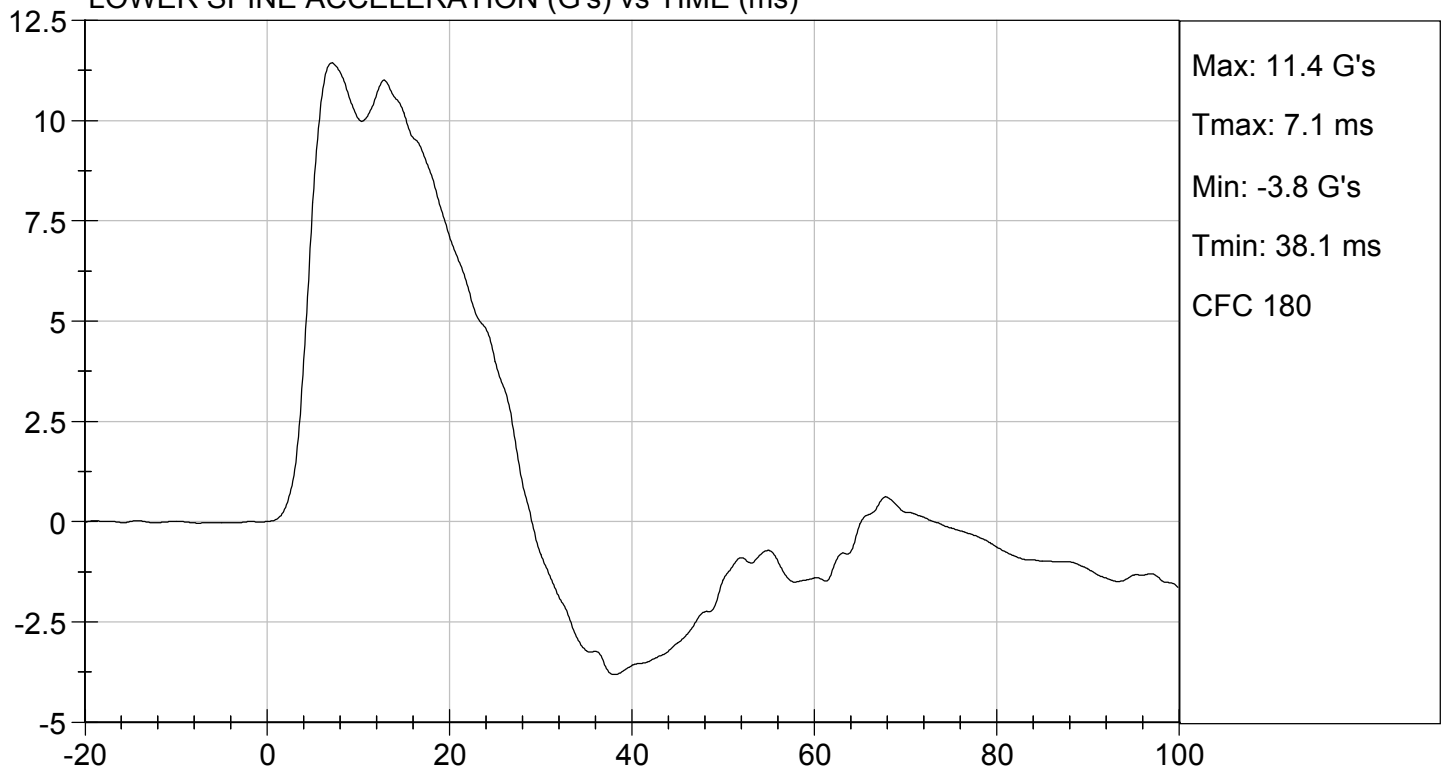
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 11/24/2020
TEST #: D203046

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: D203047

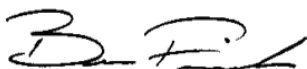
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,866	Pass
Overall Test Results				Pass



Laboratory Technician

11/24/2020

Test Date

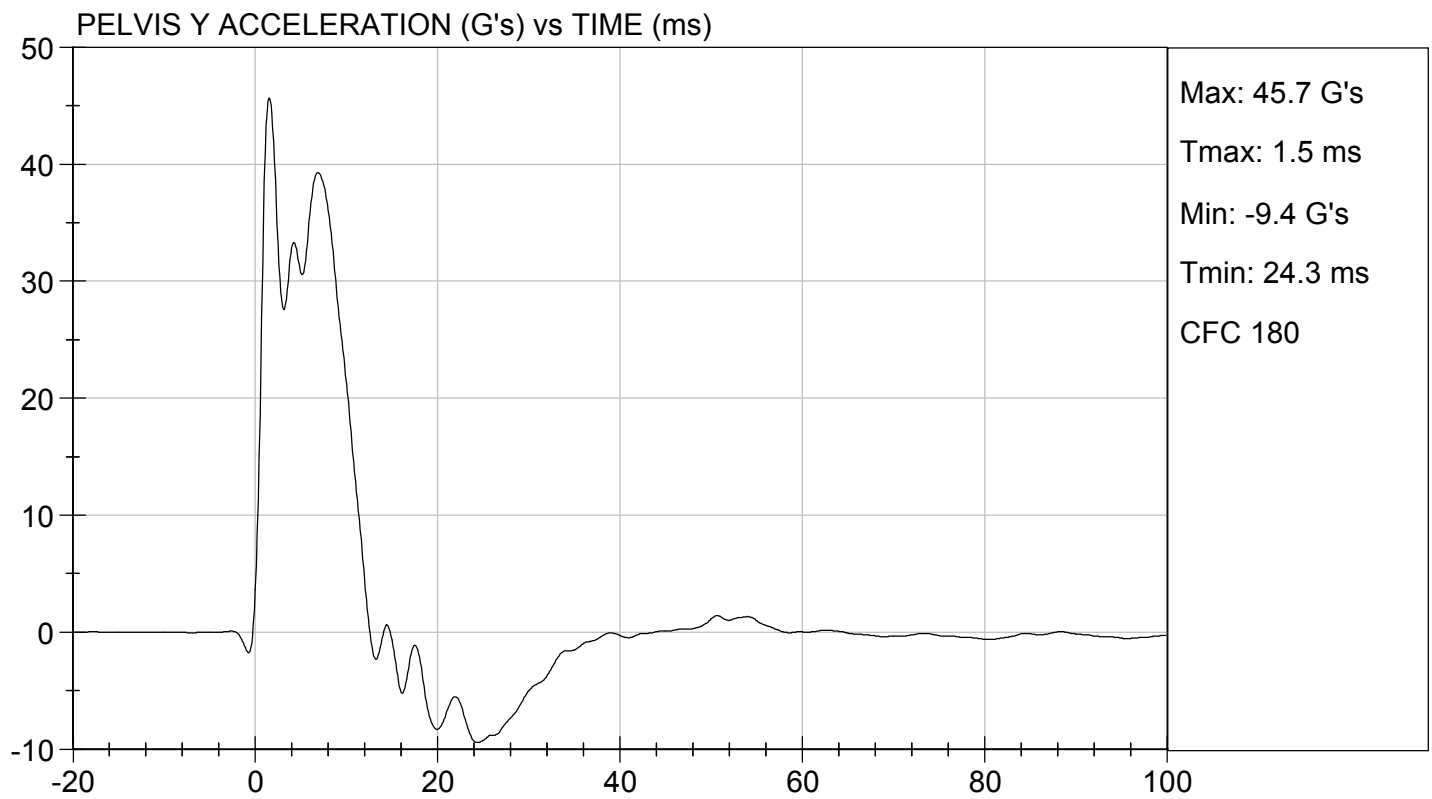
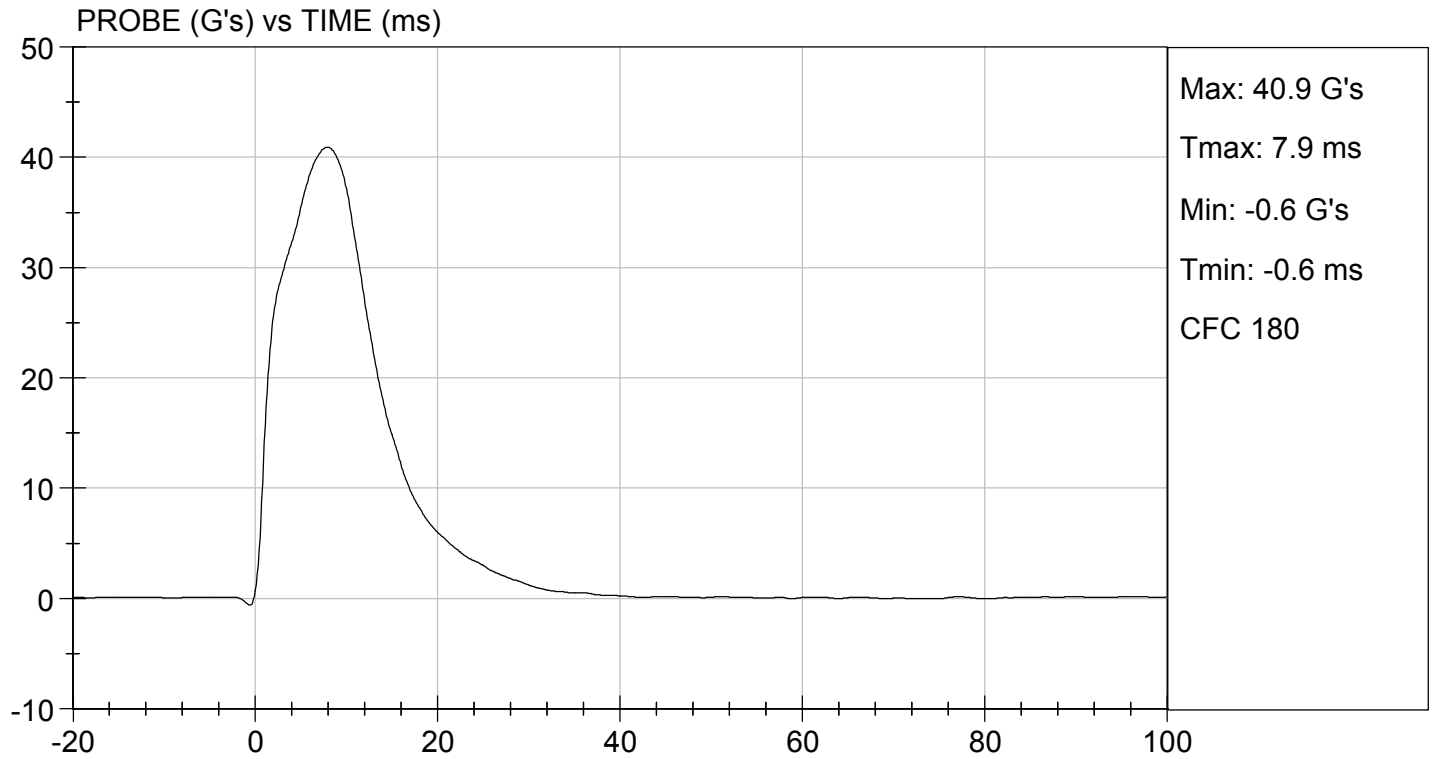


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

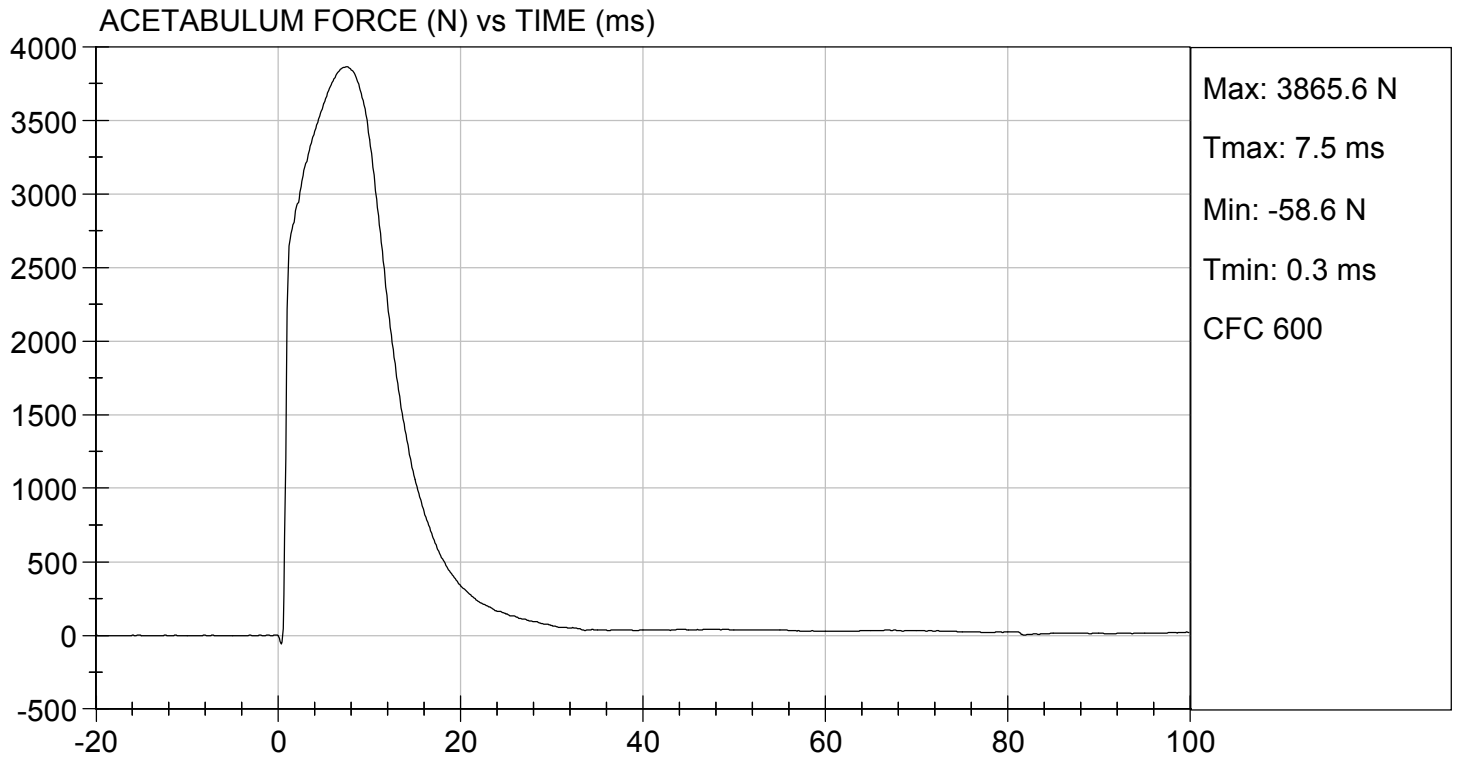
TEST DATE: 11/24/2020
TEST #: D203047





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 11/24/2020
TEST #: D203047



MGA RESEARCH CORPORATION

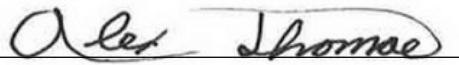
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

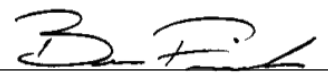
Test I.D: D203048

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	33	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,870	Pass
Overall Test Results				Pass


Laboratory Technician

11/23/2020

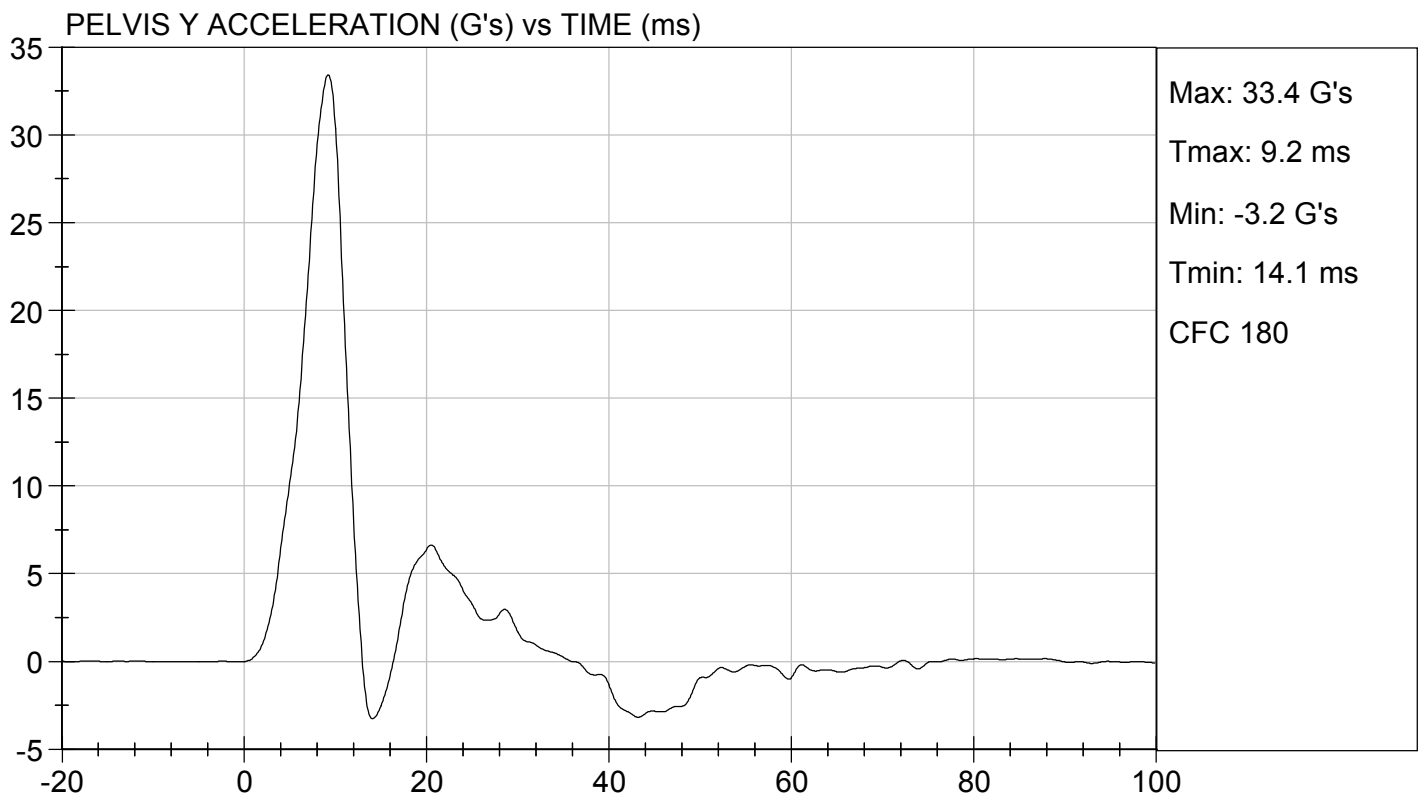
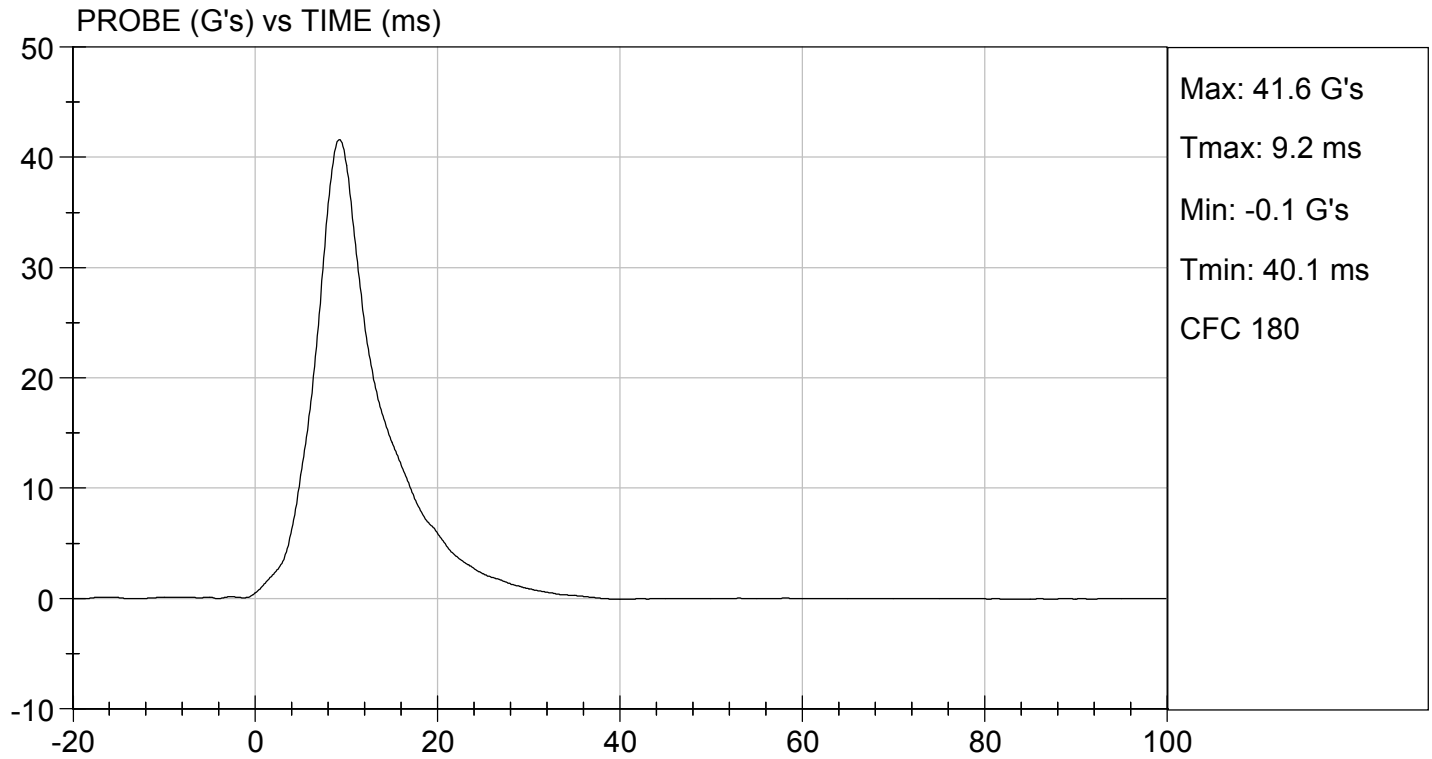
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.24 ft/s, 4.34 m/s

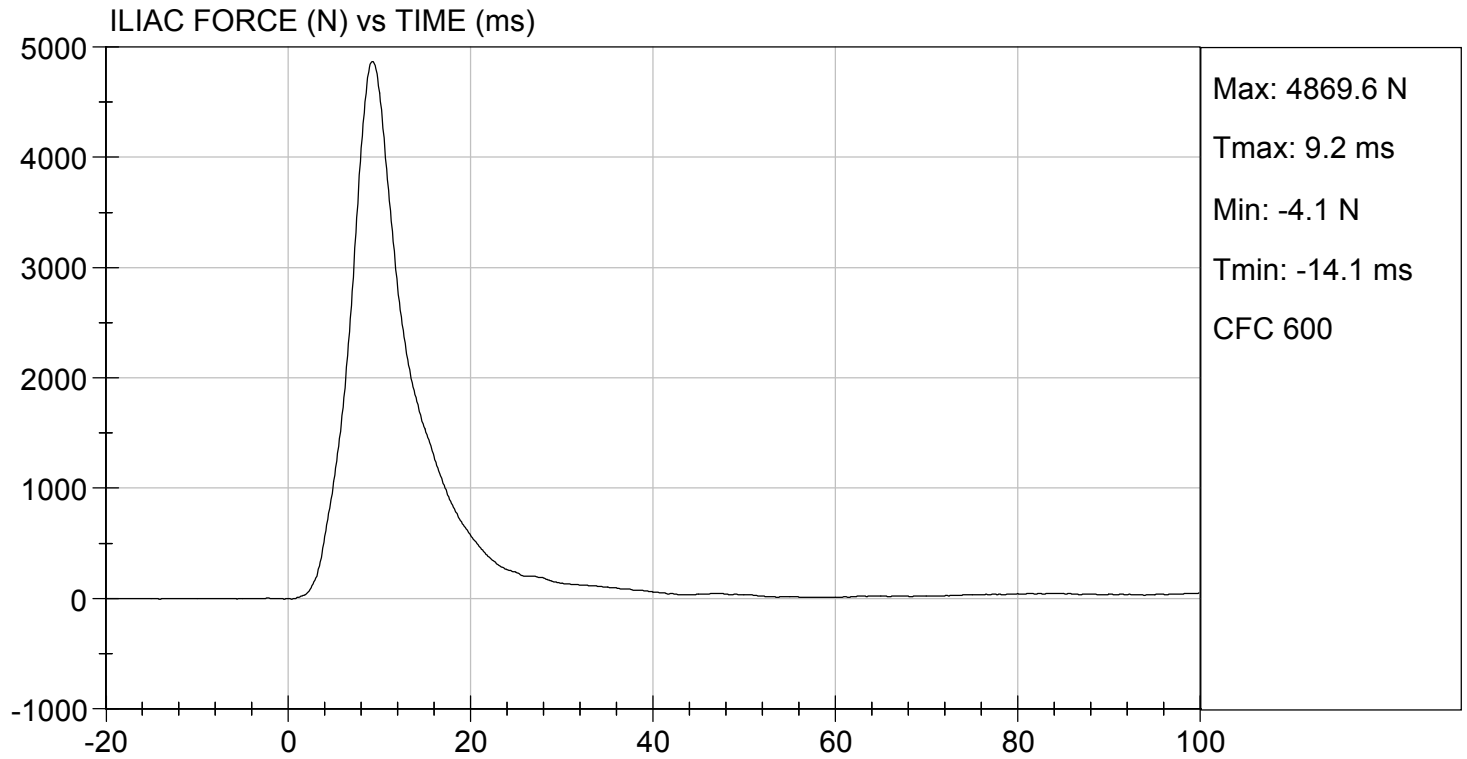
TEST DATE: 11/23/2020
TEST #: D203048





TEST DESC: ILLIAC
VELOCITY: 14.24 ft/s, 4.34 m/s

TEST DATE: 11/23/2020
TEST #: D203048





SID-IIs Pelvis Plug Certification Test

Plug S/N 13703

Test Number 12331

Report Number 12374

Test Date 2/6/2020 12:19:39 PM

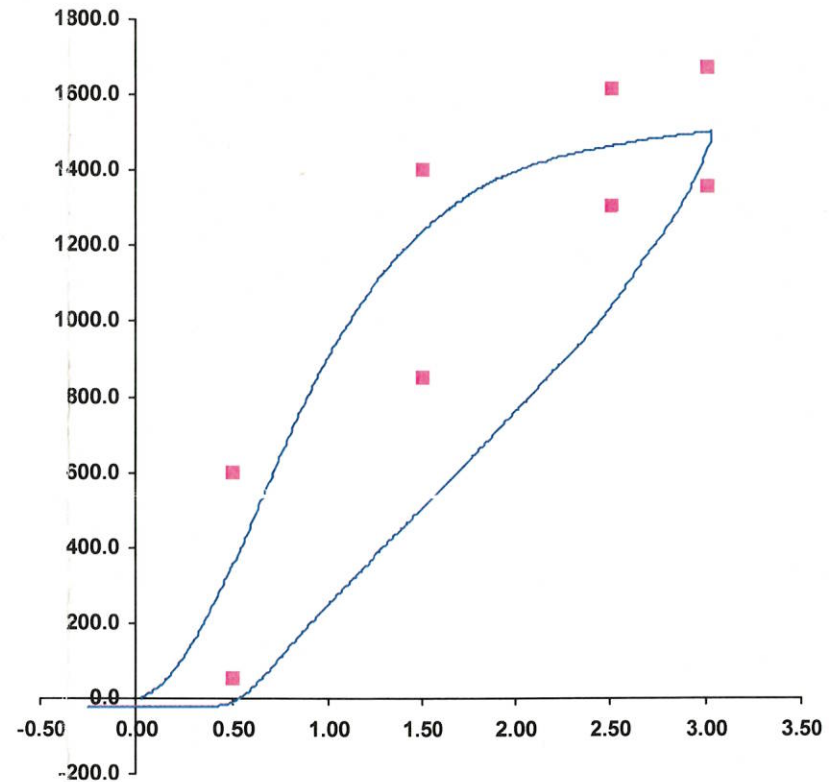
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	352.93	50.00	600.00
Force @ 1.5 mm (N)	1,236.79	850.00	1,400.00
Force @ 2.5 mm (N)	1,466.57	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,502.86	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), 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
SACO Research

06-Feb-20

By: DC

Date: 2/6/2020



SID-IIs Pelvis Plug Certification Test

Plug S/N 13702

Test Number 12330

Report Number 12373

Test Date 2/6/2020 12:18:31 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	380.52	50.00	600.00
Force @ 1.5 mm (N)	1,297.79	850.00	1,400.00
Force @ 2.5 mm (N)	1,494.51	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,521.10	1,361.00	1,673.00

Testing Machine STM-20 5965542

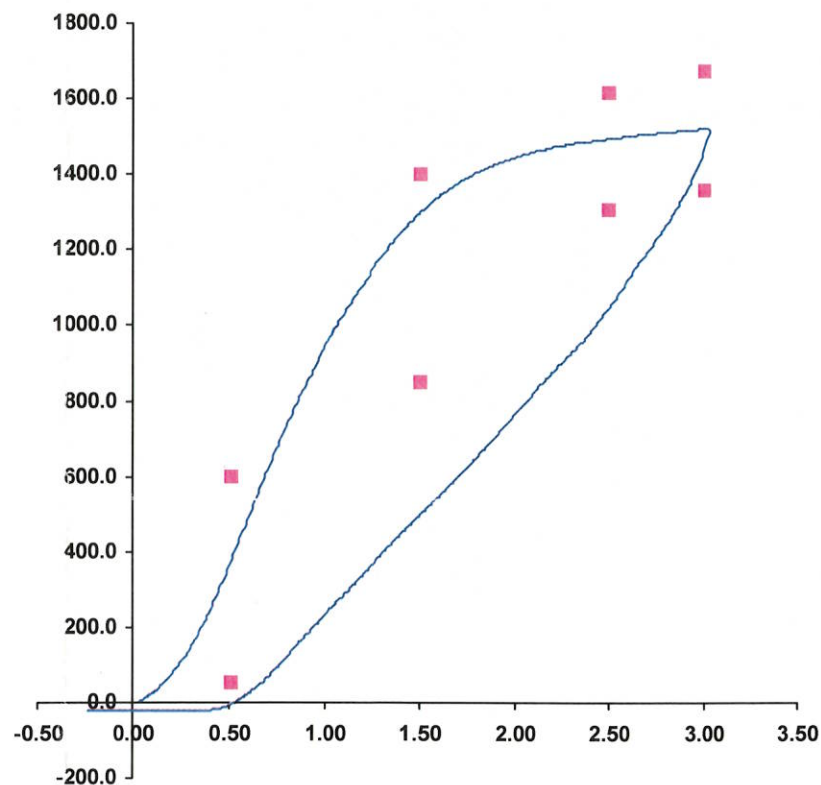
Load Cell S/N (TI240813), Units (LBS) 1000

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

06-Feb-20

SACO Research

By: *DC*

Date: *2/6/2020*

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N F032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79711	Endevco	06/12/2020
		Y	P79712	Endevco	06/12/2020
		Z	P79750	Endevco	06/12/2020
		Xr	P79751	Endevco	06/12/2020
		Yr	P79753	Endevco	06/12/2020
		Zr	P88170	Endevco	06/12/2020
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	06/12/2020
	Middle	Y	G169	Honeywell	06/12/2020
	Lower	Y	G164	Honeywell	06/12/2020
Abdomen Load Cells	Forward	Y	ABG1513FY	Denton	07/27/2020
	Middle	Y	ABG1531FY	Denton	07/27/2020
	Rear	Y	ABG1536FY	Denton	07/27/2020
Lower Spine Accelerometers (T12)		X	P79574	Endevco	06/12/2020
		Y	P82603	Endevco	06/12/2020
		Z	P82097	Endevco	06/12/2020
Public Symphysis Load Cell		Y	PG462FY	Denton	07/27/2020

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P85003	Endevco	06/30/2020
				Y	P94783	Endevco	06/30/2020
				Z	P94786	Endevco	06/30/2020
				Xr	P94938	Endevco	06/30/2020
				Yr	P96854	Endevco	06/30/2020
				Zr	P97386	Endevco	06/30/2020
Head Angular Rate Sensors				X	ARS7325	DTS	09/14/2020
				Y	ARS7354	DTS	08/04/2020
				Z	ARS7371	DTS	09/14/2020
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	06/30/2020	
		Middle	Y	G1163	Servo	06/30/2020	
		Lower	Y	G1158	Servo	06/30/2020	
	Abdominal Rib	Upper	Y	G1146	FTSS	06/30/2020	
		Lower	Y	G1126	FTSS	06/30/2020	
Lower Spine Accelerometers (T12)				X	P79418	Endevco	06/30/2020
				Y	P79439	Endevco	06/30/2020
				Z	P79614	Endevco	06/30/2020
Acetabulum Load Cell				Y	ACG111FY	FTSS	02/24/2020
Iliac Wing Load Cell				Y	IWG226FY	FTSS	02/24/2020
Pelvis Plug (struck side)					13703	SACO	02/06/2020
Pelvis Plug (non-struck side)					13702	SACO	02/06/2020

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T22667	Endevco	09/17/2020
	Vehicle Center of Gravity	Y	T22615	Endevco	09/17/2020
	Vehicle Center of Gravity	Z	T22853	Endevco	09/17/2020
2	Right Sill at Front Seat	X	PCB695	PCB	08/05/2020
	Right Sill at Front Seat	Y	PCB1348	PCB	08/05/2020
	Right Sill at Front Seat	Z	PCB688	PCB	08/05/2020
3	Right Sill at Rear Seat	X	A340713	MSI	10/07/2020
	Right Sill at Rear Seat	Y	A340732	MSI	10/09/2020
	Right Sill at Rear Seat	Z	A340690	MSI	10/06/2020
4	Left Sill at Front Door	Y	A337236	MSI	09/22/2020
5	Left Sill at Rear Door	Y	T22775	Endevco	08/17/2020
6	Left A-Post Lower	Y	A337201	MSI	11/12/2020
7	Left A-Post Middle	Y	A337202	MSI	11/12/2020
8	Left B-Post Lower	Y	A337191	MSI	11/12/2020
9	Left B-Post Middle	Y	A337187	MSI	11/12/2020
10	Front Seat Track	Y	A337215	MSI	11/12/2020
11	Rear Seat Track or Structure	Y	A337235	MSI	11/12/2020
12	Right Rear Occ. Compartment	Y	A337171	MSI	11/12/2020
13	Engine Block	X	A337195	MSI	09/21/2020
	Engine Block	Y	T22780	Endevco	10/16/2020
14	Rear Floorpan Above Axle	X	PCB1250	PCB	08/05/2020
	Rear Floorpan Above Axle	Y	PCB1272	PCB	08/05/2020
	Rear Floorpan Above Axle	Z	PCB1269	PCB	08/05/2020

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB796D	PCB	06/03/2020
MDB Center of Gravity	Y	PCB246D	PCB	06/03/2020
MDB Center of Gravity	Z	PCB794D	PCB	06/03/2020
Left Frame at Rear Axle Centerline	X	PCB1653D	PCB	06/03/2020
Left Frame at Rear Axle Centerline	Y	PCB1423D	PCB	06/03/2020