REPORT NUMBER: SideNCAPMDB-MGA-20-029

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

NISSAN MOTOR CO., LTD.
2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback
NHTSA No.: M20205205

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: August 6, 2020

Final Report Date: November 4, 2020

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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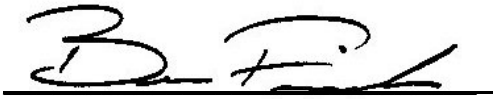
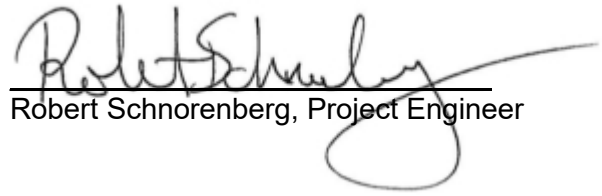
Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: November 4, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SideNCAPMDB-MGA-20-029		

4. Title and Subtitle	5. Report Date
Final Report of New Car Assessment Program Side Impact MDB Testing and FMVSS No. 305 indicant testing of 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback, NHTSA No.: M20205205	November 4, 2020
	6. Performing Organization Code MGA
7. Author(s) Ben Fischer, Project Engineer	**8. Performing Organization Report No.** SideNCAPMDB-MGA-20-029
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105	**10. Work Unit No.**
	11. Contract or Grant No. DTNH22-14-D-00353
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-100) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590	**13. Type of Report and Period Covered:** Final Test Report August 6, 2020 to November 4, 2020
	14. Sponsoring Agency Code NRM-100

15. Supplementary Notes

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback 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 August 6, 2020.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.11 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 212 mm at level 2. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	131
Maximum Thorax Rib Deflection	mm	44	20
Total Abdominal Force	N	2500	610
Pubic Symphysis Force	N	6000	1678
Resultant Lower Spine Acceleration	g	82*	30

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	257
Resultant Lower Spine Acceleration	g	82	48
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3945
Maximum Thoracic Rib Deflection	mm	38*	19
Maximum Abdomen Rib Deflection	mm	45*	29

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

19. Security Classification of Report	20. Security Classification of Page	21. No. of Pages	22. Price
Unclassified	Unclassified	251	

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback. 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 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.11 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 August 6, 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	131
Maximum Thorax Rib Deflection	mm	44	20
Total Abdominal Force	N	2500	610
Pubic Symphysis Force	N	6000	1678
Resultant Lower Spine Acceleration	g	82*	30

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	257
Resultant Lower Spine Acceleration	g	82	48
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3945
Maximum Thoracic Rib Deflection	mm	38*	19
Maximum Abdomen Rib Deflection	mm	45*	29

*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	Yes	Yes
Side Airbag (Other)				
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
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

Passenger Lower Abdominal Rib DY recorded intermittent noise spikes.
Left Mid A-Post Y recorded no valid data.
Left Lower B-Post Y recorded no valid data.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20205205	Traction Control System (TCS)	Yes
Model Year	2020	Auto-Leveling System	No
Make	Nissan	Automatic Door Locks (ADL)	Yes
Model	Leaf S	Power Window Auto-Reverse	Yes
Body Style	5-Door Hatchback	Other Optional Feature	No
VIN	1N4AZ1BP9LC301028	Driver Front Airbag	Yes
Body Color	Deep Blue Pearl	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	10 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)		Driver Torso Airbag	No
Type/No. Cylinders	Electric	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	1	Rear Pass. Curtain Airbag	Yes
Overdrive	No	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	NISSAN MOTOR CO., LTD.
Date of Manufacture	12/19
Vehicle Type	Passenger Car

GVWR (kg)	2035
GAWR Front (kg)	1070
GAWR Rear (kg)	985

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				390	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				50	(A-B)

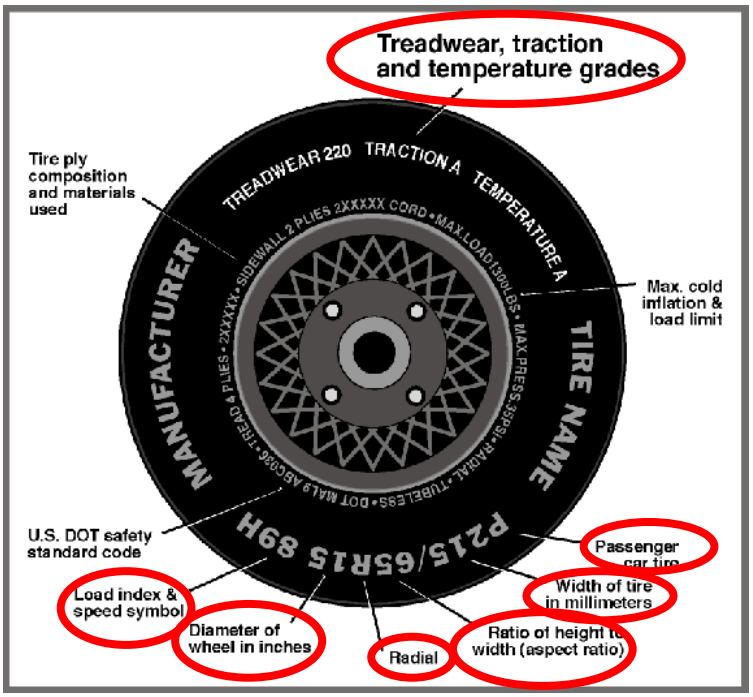
VEHICLE SEAT TYPE

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

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	250	250
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Ecopia	Ecopia
Treadwear	400	400
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	89 H	89 H
Tire Material	Rubber	Rubber
DOT Safety Code Left	EL8K JBC 5018	EL8K JBC 5018
DOT Safety Code Right	EL8K JBC 5018	EL8K JBC 5018

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	255	240	250
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

MDB TIRE SPECIFICATIONS

	Requirement	Units	LF	RF	LR	RR
Tire Size	P205/75R15	N/A	205/55R16	205/55R16	205/55R16	205/55R16
Tire Pressure	200 ± 21	kPa	300	300	300	300

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	458.0	347.5		509.0	409.0		501.5	426.5	
Right	kg	464.5	327.0		482.5	368.5		468.5	379.0	
Ratio	%	57.8%	42.2%		56.0%	44.0%		54.6%	45.4%	
Totals	kg	922.5	674.5	1597.0	991.5	777.5	1769.0	970.0	805.5	1775.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1597.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	50	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1776.0	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement*
Left Front	mm	663	663	Yes
Right Front	mm	667	664	Yes
Right Rear	mm	671	670	Yes
Left Rear	mm	660	663	Yes
Vehicle CG (Aft of Front Axle)	mm	1225	1187	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	35	29	

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

Test height adjustable suspension setting, if applicable:	Not Applicable

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	0
Components Removed: Cargo area carpet/trim/divider, RF/RR door trim panel, RF/RR floor mat, RF/RR headrest, LR/RR tail light	kg	20

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	880
Aft 25 mm Target	mm	886
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: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

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	11.8	9.5	10.7
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid) (°)	As-Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	10.7	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

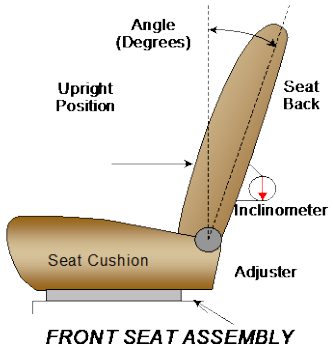
Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1st as 1)	mm	Detent (1st as 0)
Driver Seat	240	25	120	12
Front Passenger Seat	210	22	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 (1st as 1)	Degrees	Detent (1st as 0)
Driver Seat	55.4	29	7.2	5
Front Passenger Seat	55.5	28	8.0	5
Front Center Seat				
Struck Side Rear Seat	Fixed		11.8	
Non-Struck Side Rear Seat	Fixed		11.8	
Rear Center Seat	Fixed		11.8	

Seat back angles measured on outboard headrest post.

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

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

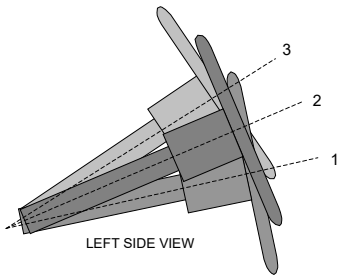
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	6	5 (Lowest as 0) / Fixed Fore-Aft
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.

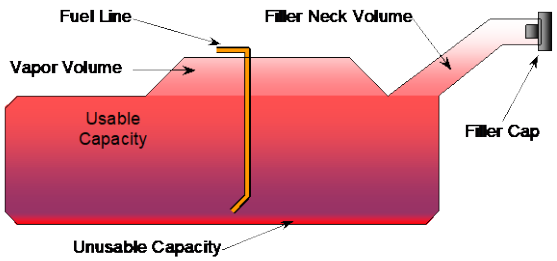
	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	67.4	
Geometric Center, Position 2	64.5	
Uppermost, Position 3	61.6	
Telescoping Steering Wheel Travel		30
Test Position	64.5	15



STEERING COLUMN ASSEMBLY

FUEL PUMP

The vehicle uses an electric propulsion system and does not have a fuel tank or fuel pump.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

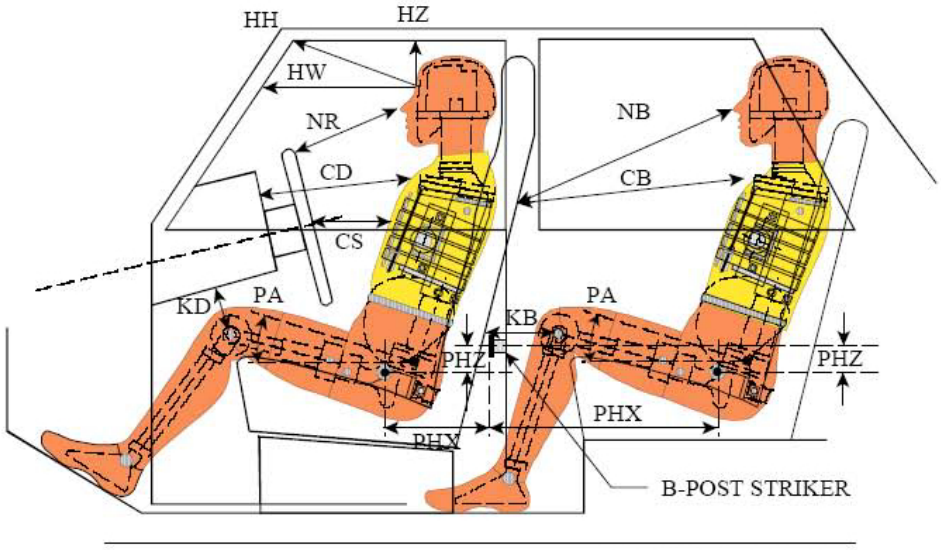
FUEL TANK CAPACITY DATA

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

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



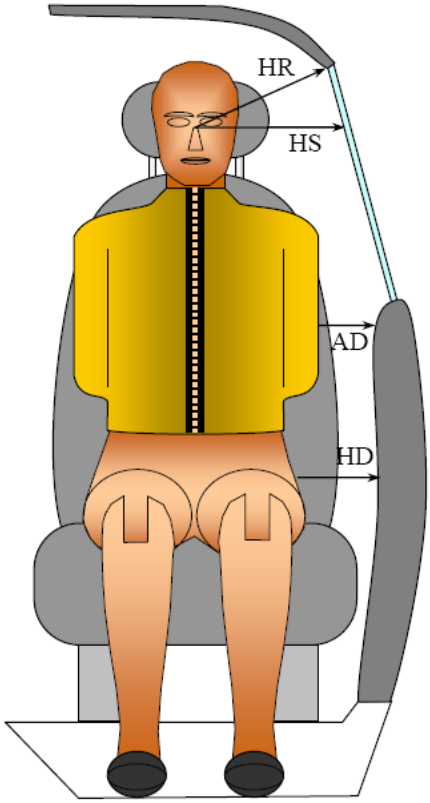
NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	395	10.7		
HW		Head to Windshield	648	0		
HZ	HZ	Head to Roof Liner	158	90	245	90
NR	NB	Nose to Rim/Seat Back	418	18.4	588	14.1
CD	CB	Chest to Dashboard/Seat Back	542	1.9	592	1.1
CS		Chest to Steering Wheel	325	21.0		
KDL	KBL	Left Knee to Dash/Seat Back	105	33.2	310	17.3
KDR	KBR	Right Knee to Dash/Seat Back	90	31.8	305	18.2
PAX	PAX	Pelvic Tilt Angle X		18.6		24.5
PAY	PAY	Pelvic Tilt Angle Y		0.5		-1.1
PHX	PHX	Hip Point to Striker (X-Axis)	272		301	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	145		333	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

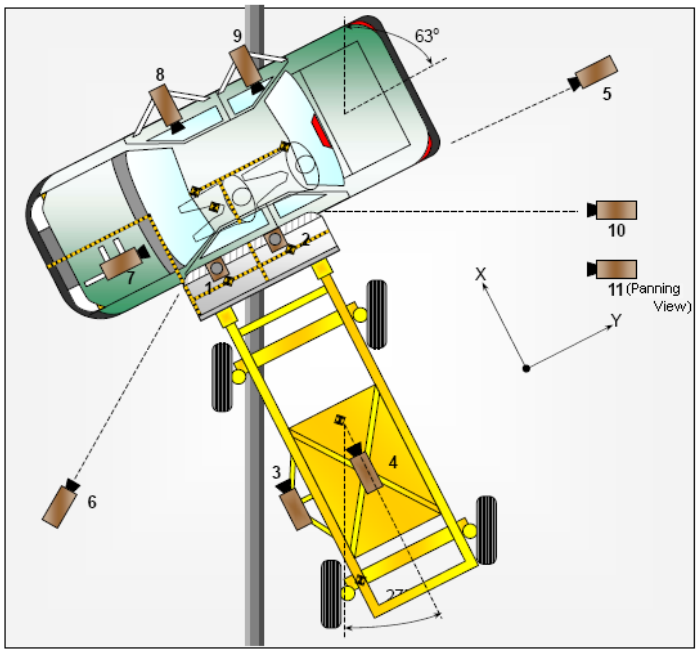
Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	202	235
HS	Head to Side Window	325	352
AD	Arm to Door	82	145
HD	Hip Point to Door	148	144

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	705	400	-4995	8.5	1000
2	Overhead Close-Up	125	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-250	6875	-1450	24	1000
6	Left Front	-2585	-6690	-1495	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

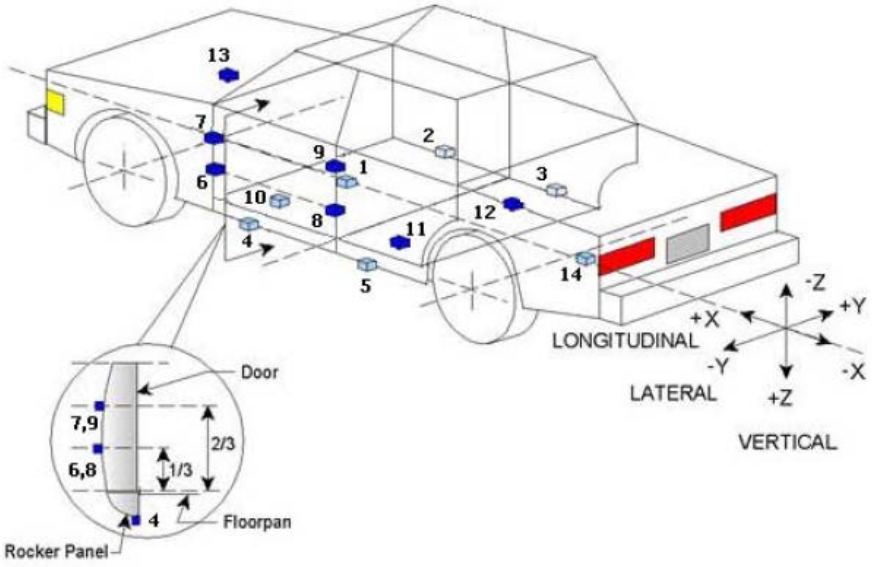
Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down
*All measurements accurate to ±6 mm

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: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



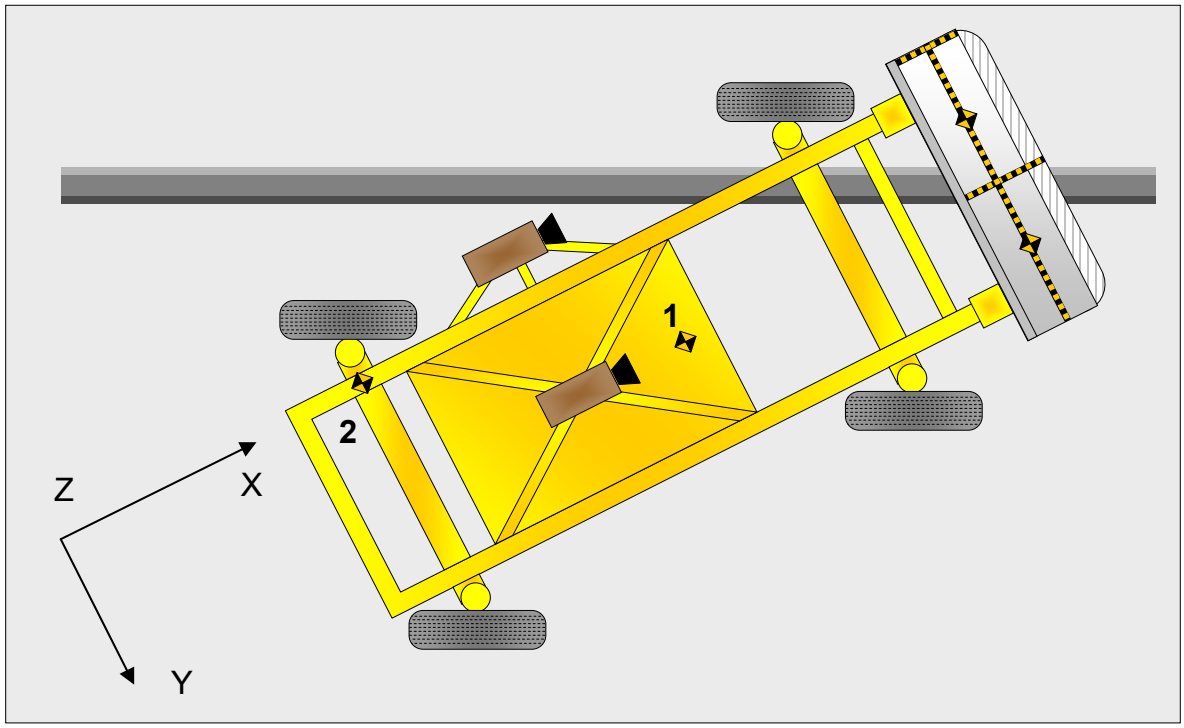
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2336	0	-156
2	Right Sill at Front Seat	2053	716	-169
3	Right Sill at Rear Seat	1241	716	-181
4	Left Sill at Front Door	2445	-716	-165
5	Left Sill at Rear Door	1363	-716	-182
6	Left Lower A-Post	2979	-810	-543
7	Left Middle A-Post	2954	-815	-765
8	Left Lower B-Post	1922	-709	-609
9	Left Middle B-Post	1916	-712	-830
10	Front Seat Track	2065	-357	-370
11	Rear Seat Structure	1625	-320	-385
12	Rt. Rear Occ. Compartment	1655	362	-310
13	Engine Block	3621	80	-813
14	Rear Above Axle	777	0	-465

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



MDB ACCELEROMETER LOCATIONS

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

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

Width between left and right MDB contact switches	mm	1400

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Center Seatback
Top of Head	Curtain Airbag, Headliner	Curtain Airbag, Headliner, Center Seatback
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag, Headliner
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Headliner, Center Seatback
Left Shoulder	Side Torso/Pelvis Airbag	Side Torso/Pelvis Airbag
Upper Torso	Side Torso/Pelvis Airbag	Side Torso/Pelvis Airbag, Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback	Side Torso/Pelvis Airbag, Seatback
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion	Side Torso/Pelvis Airbag
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	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)					

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	None
Windshield Damage	None
Side Window Damage	LF window broken
Other Notable Effects	None

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2700
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		410
Actual Impact Point (Aft of Front Axle)	mm		415
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-5
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	1

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

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

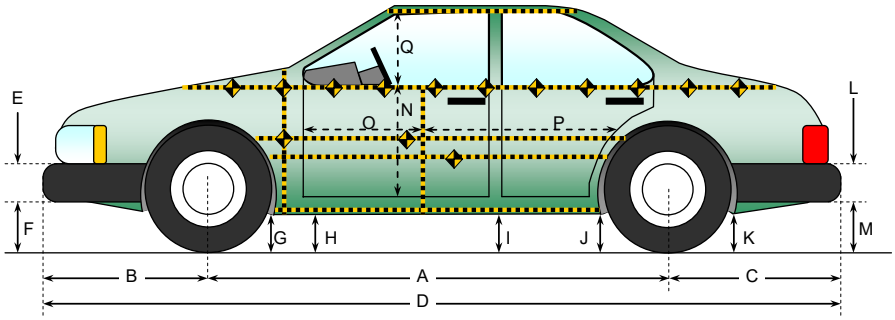
	Units	Front Axle	Rear Axle	Total
Left	kg	368.2	320.6	
Right	kg	400.7	271.4	
Ratio	%	56.5	43.5	
Totals	kg	768.9	592.0	1360.9

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.11
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.90
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.7
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.9
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.5

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



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

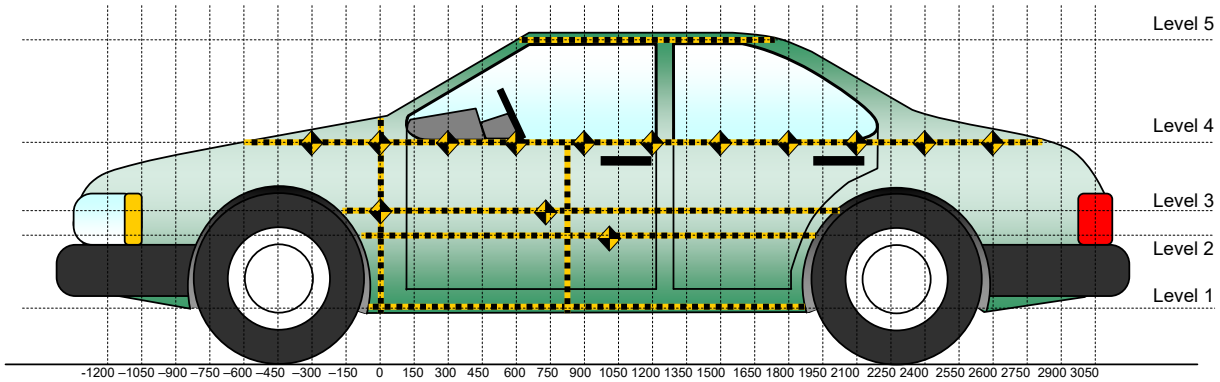
LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2700	2700	0
B	Front Axle to FSOV	1003	1011	-8
C	Rear Axle to RSOV	788	783	5
D	Total Length at Centerline	4491	4494	-3
E	Front Bumper Thickness	135	135	0
F	Front Bumper Bottom to Ground	226	224	2
G	Sill Height at Front Wheel Well	143	151	-8
H	Sill Height at Front Door Leading Edge	143	152	-9
I	Sill Height at B Pillar	150	170	-20
J1	Sill Height at Rear Wheel Well	157	174	-17
J2	Pinch Weld Height at Rear Wheel Well	156	173	-17
K	Sill Height Aft of Rear Wheel Well	242	190	52
L	Rear Bumper Thickness	141	141	0
M	Rear Bumper Bottom to Ground	274	290	-16
N	Sill Height to Window Bottom Sill	753	625	128
O	Front Door Leading Edge to Impact CL	809	708	101
P	Rear Door Trailing Edge to Impact CL	1155	1085	70
Q	Front Window Opening	477	472	5
R	Right Side Length	3671	3678	-7
S	Left Side Length	3671	3655	16
T	Vehicle Width at B Post	1773	1626	147
U	Front Wheel Track Width	1535		
V	Rear Wheel Track Width	1548		

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	320	130	450
2	Occupant H-Point	575	212	450
3	Mid Door	605	211	450
4	Window Sill	920	160	1650
5	Window Top	1445	44	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

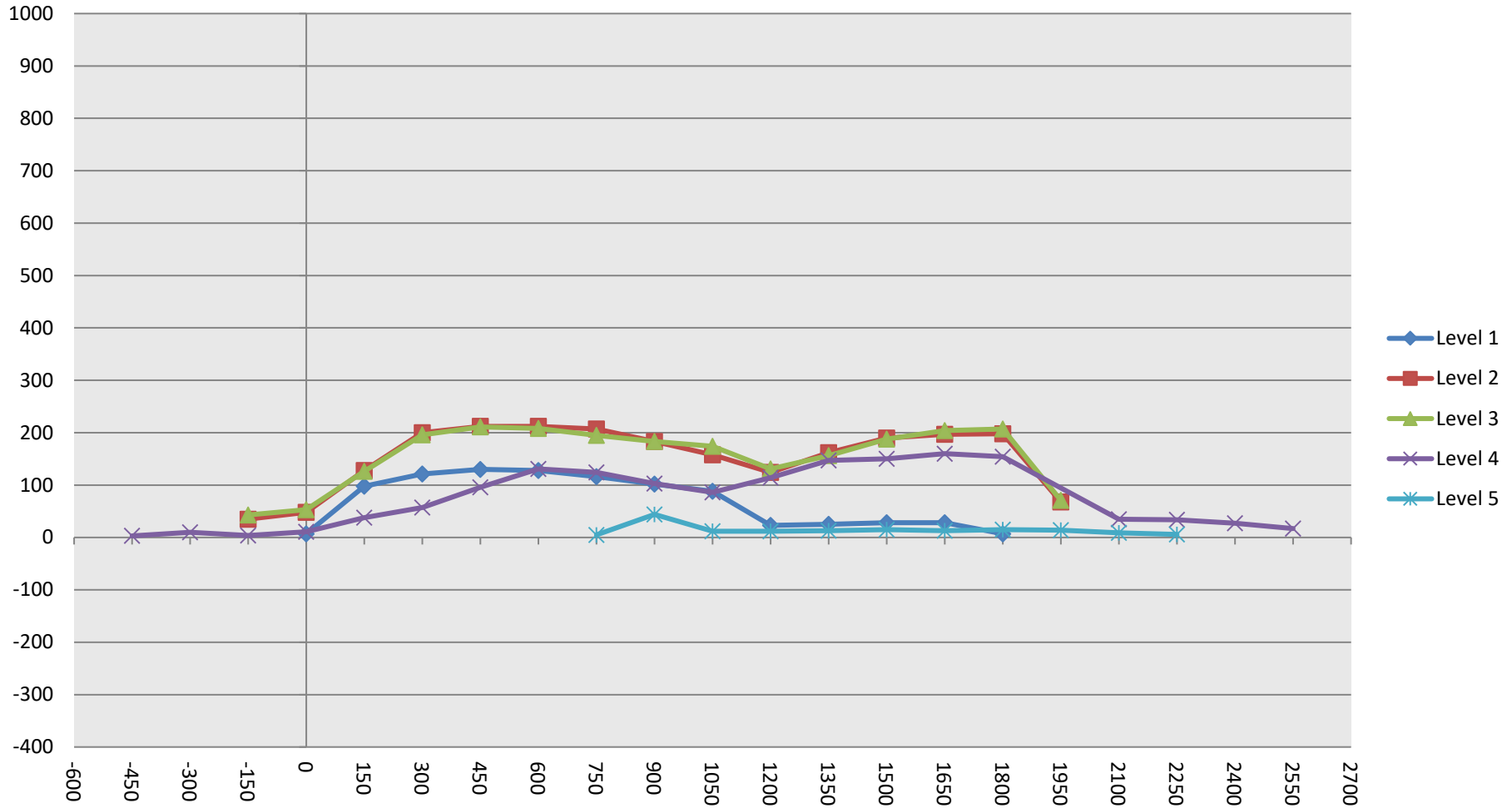
Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600															
-450				324					327					3	
-300				305					315					10	
-150		215	214	315			250	257	319			35	43	4	
0	231	218	220	305		238	266	273	316		7	48	53	11	
150	241	223	223	292		339	351	349	330		98	128	126	38	
300	245	222	221	282		366	422	417	339		121	200	196	57	
450	245	220	219	272		375	432	430	368		130	212	211	96	
600	245	218	217	263		373	430	425	394		128	212	208	131	
750	245	217	216	256	510	361	424	411	380	515	116	207	195	124	5
900	246	217	216	254	496	348	400	399	357	540	102	183	183	103	44
1050	250	217	216	252	492	338	375	390	338	504	88	158	174	86	12
1200	252	218	217	249	492	275	342	348	363	504	23	124	131	114	12
1350	254	220	219	247	491	279	382	375	394	504	25	162	156	147	13
1500	254	220	219	247	493	282	410	407	397	508	28	190	188	150	15
1650	250	216	215	246	500	278	413	419	406	513	28	197	204	160	13
1800	241	210	210	250	510	248	408	417	404	525	7	198	207	154	15
1950		207	206		527		275	277		541		68	71		14
2100				256	552				291	561				35	9
2250				255	591				289	597				34	6
2400				255					282					27	
2550				256					273					17	
2700															
2850															
3000															
3150															
3300															
3450															
3600															
3750															
3900															

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

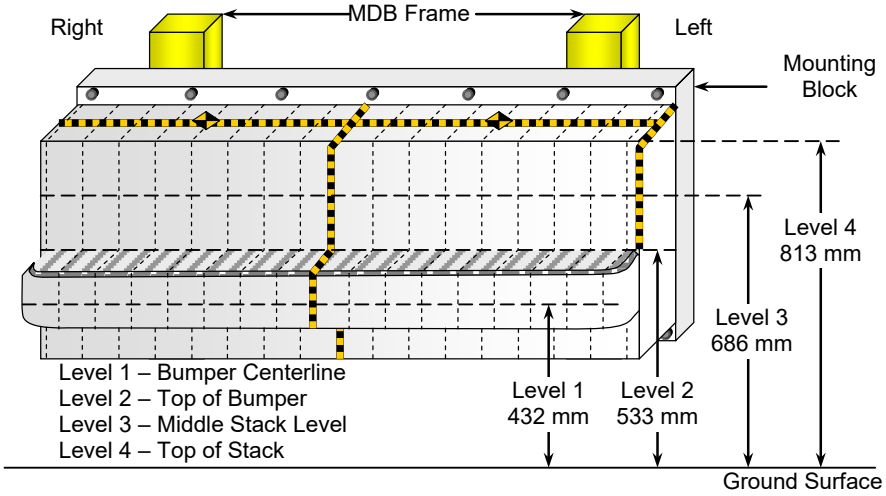
DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

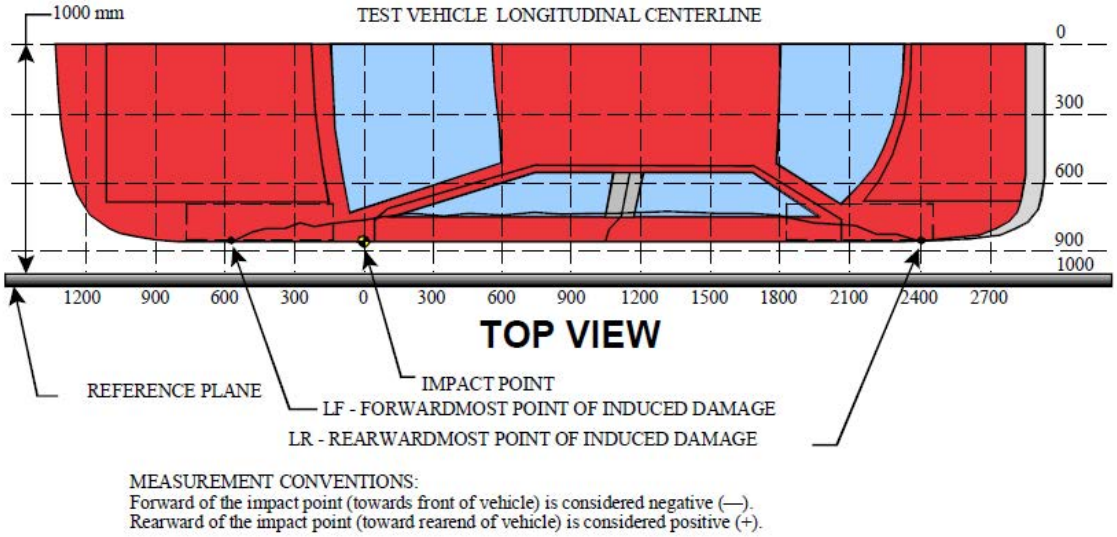
Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	188
B	Top of Bumper	533	800	Left	115
C	Mid-Level	686	800	Left	101
D	Top of Stack	813	800	Left	146

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C_L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
4	45	19	21	29	45	75	118	105	90	83	74	57	71	76	81	113	146
3	21	13	17	22	28	40	67	80	55	35	26	24	25	34	45	63	101
2	95	89	83	76	66	65	80	85	70	64	72	82	82	85	89	102	115
1	188	182	173	167	162	165	160	158	154	149	144	141	140	139	145	162	169

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



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

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	1980	3	263	212	51
2	1590	3	422	217	205
3	1200	3	348	217	131
4	810	3	402	216	186
5	420	3	431	219	212
6	30	3	246	221	25

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	664	476	188
2	480 mm right of center	1	636	463	173
3	160 mm right of center	1	619	463	156
4	160 mm left of center	1	602	463	139
5	480 mm left of center	1	614	463	151
6	800 mm left of center	1	645	476	169

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

Test Time: 12:36 pm Temperature: 21.4°C

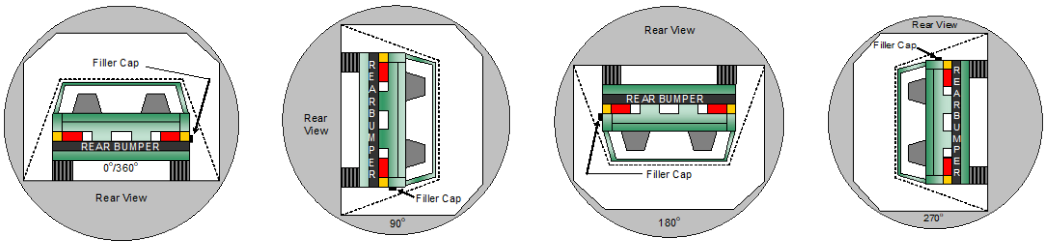
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) N/A oz.

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

C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) N/A

D. Spillage Details: N/A

FMVSS 301 STATIC ROLLOVER DATA



0°/360° 90° 180° 270°

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

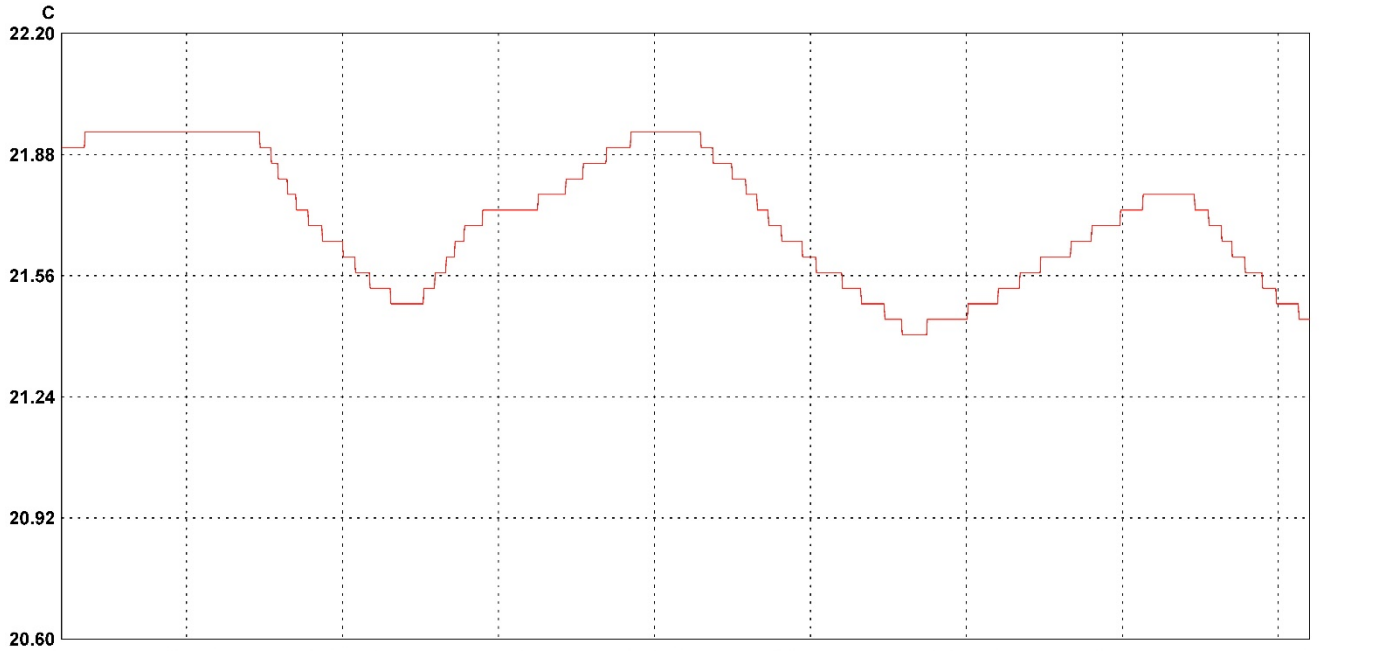
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352040	VSC_North_Hall	1		21.94	21.71	21.40	C	Temperature	18352040_VSC_North_Hall.spl

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

ELECTRIC VEHICLE PROPULSION SYSTEM

	Units	Observations and Conclusions
Type of Electric Vehicle		Electric
Propulsion Battery Type		Laminated Lithium Ion
Nominal Voltage	V	360
Physical Location of Automatic Propulsion Battery Disconnect		Inside of the Battery Pack System
Auxiliary Battery Type		Lead Acid

PROPULSION BATTERY SYSTEM DATA

	Units		Observations and Conclusions
Electrolyte Fluid Type			Organic Electrolyte
Electrolyte Fluid Specific Gravity	g/L		1.206
Electrolyte Fluid Kinematic Viscosity	cSt		4.6
Electrolyte Fluid Color			Clear
Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable)			Air-Cooled
Location of Battery Modules			Inside Passenger Compartment
		X	Outside Passenger Compartment
			The high-voltage battery is located below the occupant compartment.

PROPULSION BATTERY STATE OF CHARGE

For all battery types:	
Voltage range corresponding to **useable energy** of the battery:	
Minimum State of Charge	
Maximum State of Charge	403 V
95% of Maximum State of Charge	383 V
Test Voltage - No less than 95% of maximum State of Charge	399.9 V
For batteries that are rechargeable ONLY by an energy source on the vehicle:	
Voltage range corresponding to **useable energy** of the battery:	
Minimum State of Charge	
Maximum State of Charge	
Test Voltage – Maximum practicable State of Charge within Normal Operating Range	

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Date: 8/6/2020

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

Details of Vehicle Chassis Ground Point(s) & Location(s)	Vehicle underbody center tunnel area holding bracket

PROPULSION BATTERY SYSTEM

Details of Electric Energy Storage/Conversion System Test Points	Connected at + and – lines of main propulsion battery harness
Additional Comments	None

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		10/13/2019

PROPULSION BATTERY VOLTAGE

Measurement shall be made with Energy Storage/Conversion System connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion system energized) position.

NOTE: If voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.

Vb	V	399.9

ELECTRIC ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

Vehicle chassis point(s) determined and supplied to contractor by COR.

V1	V	269.9
V2	V	151.0

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

The known resistance Ro (in ohms) should be approximately 500 times the normal operating voltage of the vehicle (in volts) per SAE J1766.

Ro	Ω	193,200

V1' Pre-Impact	V	25.5
V2' Pre-Impact	V	24.7

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

Test Vehicle:	2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback	NHTSA No.:	M20205205
Test Program:	NCAP Side MDB Impact Test Test	Test Date:	8/6/2020

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record “Zero Volts”.
This “zero voltage” condition is considered as being compliant.

Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]		
Ri1 Pre-Impact	Ω	2,887,648
Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’]		
Ri2 Pre-Impact	Ω	2,753,693
Ri = The lesser of Ri1 and Ri2		
Ri Pre-Impact	Ω	2,753,693
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage		
Ri / Vb Pre-Impact	Ω	6,886

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		10/13/2019

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	5.1

V1 Post-Impact	V	3.9	Impact Time	0	Minutes	56	Seconds
V2 Post-Impact	V	1.1		1	Minutes	01	Seconds
V1' Post-Impact	V	0.0		1	Minutes	06	Seconds
V2' Post-Impact	V	0.0		1	Minutes	08	Seconds

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

Test Vehicle:	2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback	NHTSA No.:	M20205205
Test Program:	NCAP Side MDB Impact Test Test	Test Date:	8/6/2020

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record “Zero Volts”. This “zero voltage” condition is considered as being compliant.

Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’]							
Ri1 Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	06	Seconds
Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’]							
Ri2 Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	08	Seconds
Ri = The lesser of Ri1 and Ri2							
Ri Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	08	Seconds
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	08	Seconds

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

PROPULSION BATTERY SYSTEM COMPONENTS

Describe any Propulsion Battery Module movement within the passenger compartment [Supply photographs as appropriate]:
Not Applicable

	Yes (Fail)	No
Has the Propulsion Battery Module moved within the passenger compartment?		X

Describe intrusion of an outside Propulsion Battery Component into the passenger compartment [Supply photographs as appropriate]:
No Intrusion

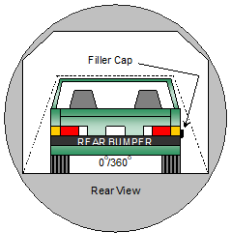
	Yes (Fail)	No
Has an outside Propulsion Battery Component intruded into the passenger compartment?		X

	Yes (Fail)	No
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

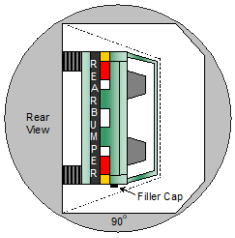
DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback
NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test
Test Date: 8/6/2020

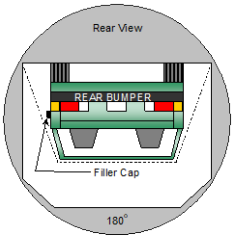
PROPULSION BATTERY SYSTEM COMPONENTS



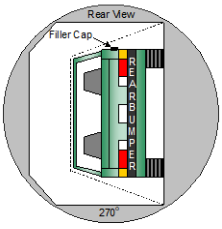
0°/360°



90°



180°



270°

PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Test Phase	Rotation Time (spec. 1-3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°	1	min	52	sec	5	min	6	min	52	sec	7	min
90° - 180°	1	min	50	sec	5	min	6	min	50	sec	7	min
180° - 270°	1	min	46	sec	5	min	6	min	46	sec	7	min
270° - 360°	1	min	52	sec	5	min	6	min	52	sec	7	min

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

NOTE: The maximum allowable Propulsion Battery Electrolyte Spillage is 5.0 Liters.

Test Phase	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0° to 90°	0	Not Applicable
90° to 180°	0	Not Applicable
180° to 270°	0	Not Applicable
270° to 360°	0	Not Applicable
Total Spillage	0	

	Yes (Fail)	No
Is the total Propulsion Battery Electrolyte Spillage greater than 5.0 Liters?		X
Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment?		X

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

VOLTMETER INFORMATION

	Units	Observations and Conclusions
Make		Fluke
Model		177
Serial Number		17210161
Internal Impedance Value	MΩ	> 10 MΩ < 100 pF
Resolution	V	0.001
Last Calibration Date		10/13/2019

ELECTRICAL ISOLATION MEASUREMENTS

Vb Post-Impact	V	5.1

Record V1, V2, V1', V2' voltage measurements at the start of each successive increment of 90°, 180°, 270°, and 360° of the static rollover test.

	Voltage	Units	Test Phase	Time			
V1	0.0	V	0°		min		sec
	0.0		90°	2		48	
	0.0		180°	2		34	
	0.0		270°	2		25	
	0.0		360°	2		16	
V2	0.0	V	0°		min		sec
	0.0		90°	2		51	
	0.0		180°	2		37	
	0.0		270°	2		29	
	0.0		360°	2		20	
V1'	0.0	V	0°		min		sec
	0.0		90°	2		56	
	0.0		180°	2		41	
	0.0		270°	2		33	
	0.0		360°	2		24	
V2'	0.0	V	0°		min		sec
	0.0		90°	3		00	
	0.0		180°	2		44	
	0.0		270°	2		36	
	0.0		360°	2		29	

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

Test Vehicle: 2020 Nissan Leaf S (40kWh Battery) 5-Door Hatchback NHTSA No.: M20205205
Test Program: NCAP Side MDB Impact Test Test Test Date: 8/6/2020

ELECTRICAL ISOLATION CALCULATIONS

NOTE: If measured voltage is zero and results in a division by zero, record "Zero Volts". This "zero voltage" condition is considered as being compliant.

	Voltage	Units	Test Phase	Time			
Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']							
Ri1	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		56	
	Zero Volts		180°	2		41	
	Zero Volts		270°	2		33	
	Zero Volts		360°	2		24	
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	3		00	
	Zero Volts		180°	2		44	
	Zero Volts		270°	2		36	
	Zero Volts		360°	2		29	
Ri = The lesser of Ri1 and Ri2							
Ri	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	3		00	
	Zero Volts		180°	2		44	
	Zero Volts		270°	2		36	
	Zero Volts		360°	2		29	
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb	Zero Volts	Ω/V	0°		min		sec
	Zero Volts		90°	3		00	
	Zero Volts		180°	2		44	
	Zero Volts		270°	2		36	
	Zero Volts		360°	2		29	

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

	Yes	No (Fail)
Is the measured Electrical Isolation Value ≥ 500 Ω/V?	X	
Additional Comments	None	

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

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

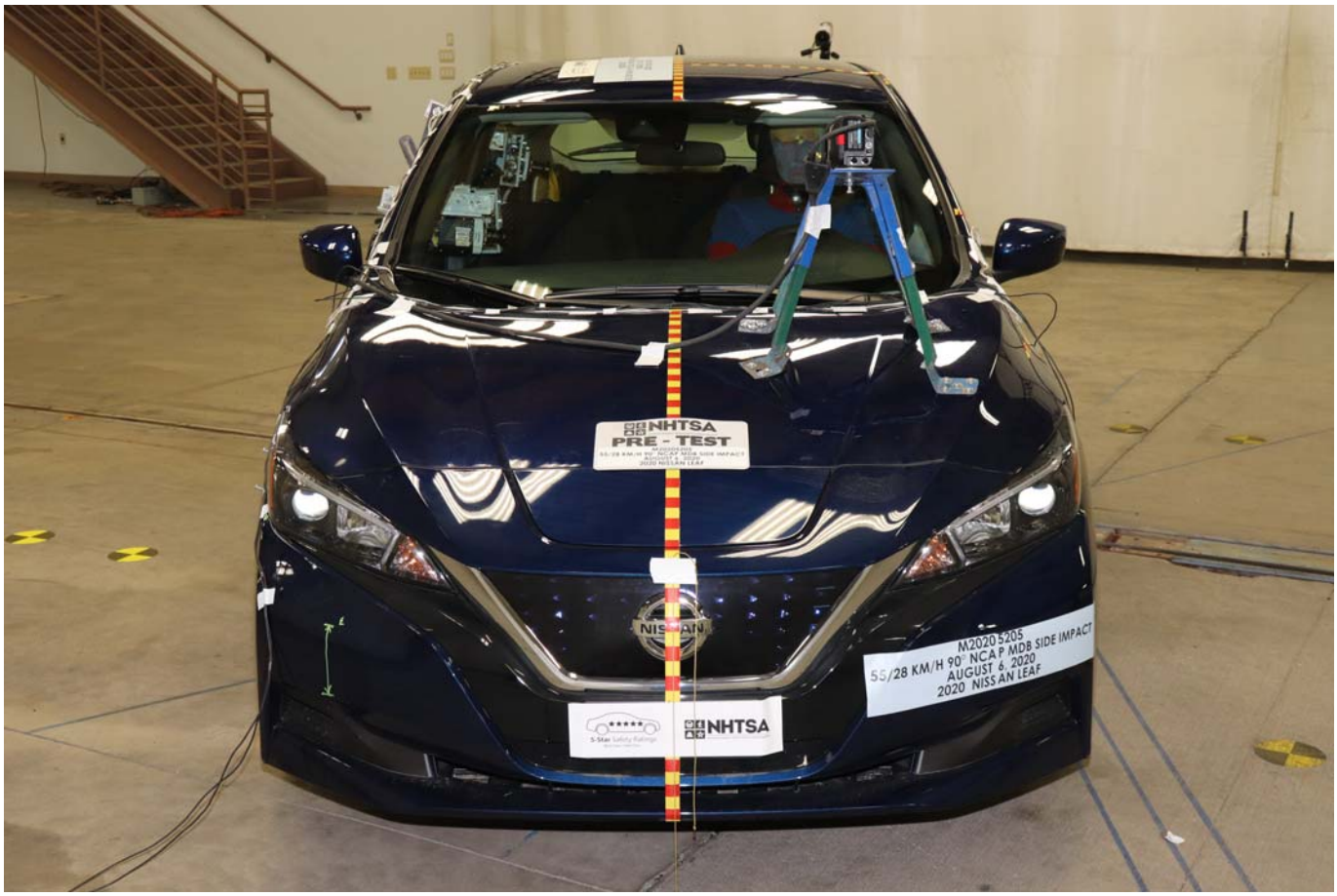


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

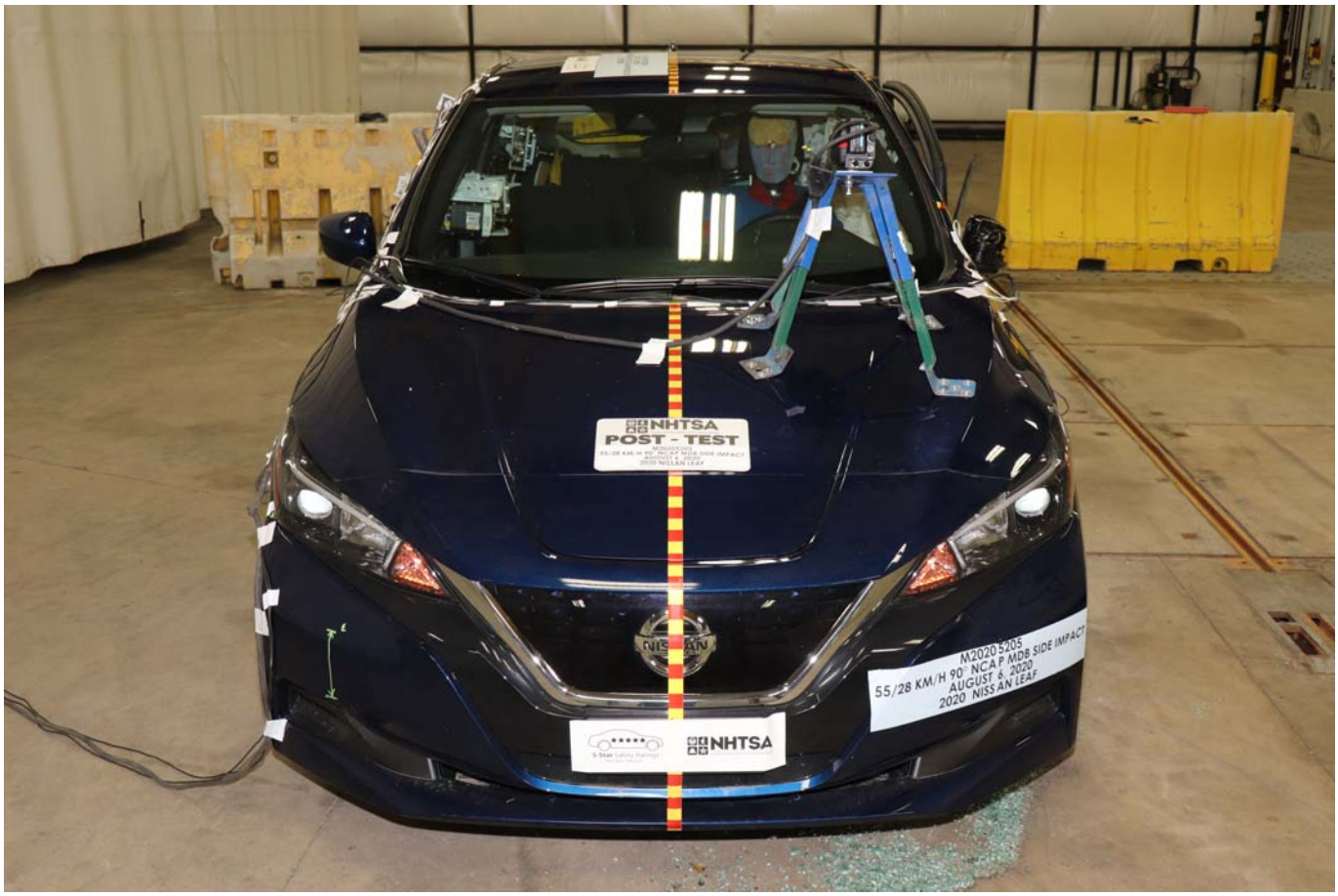


Photo No. 004 - Post-Test Frontal View of Test Vehicle

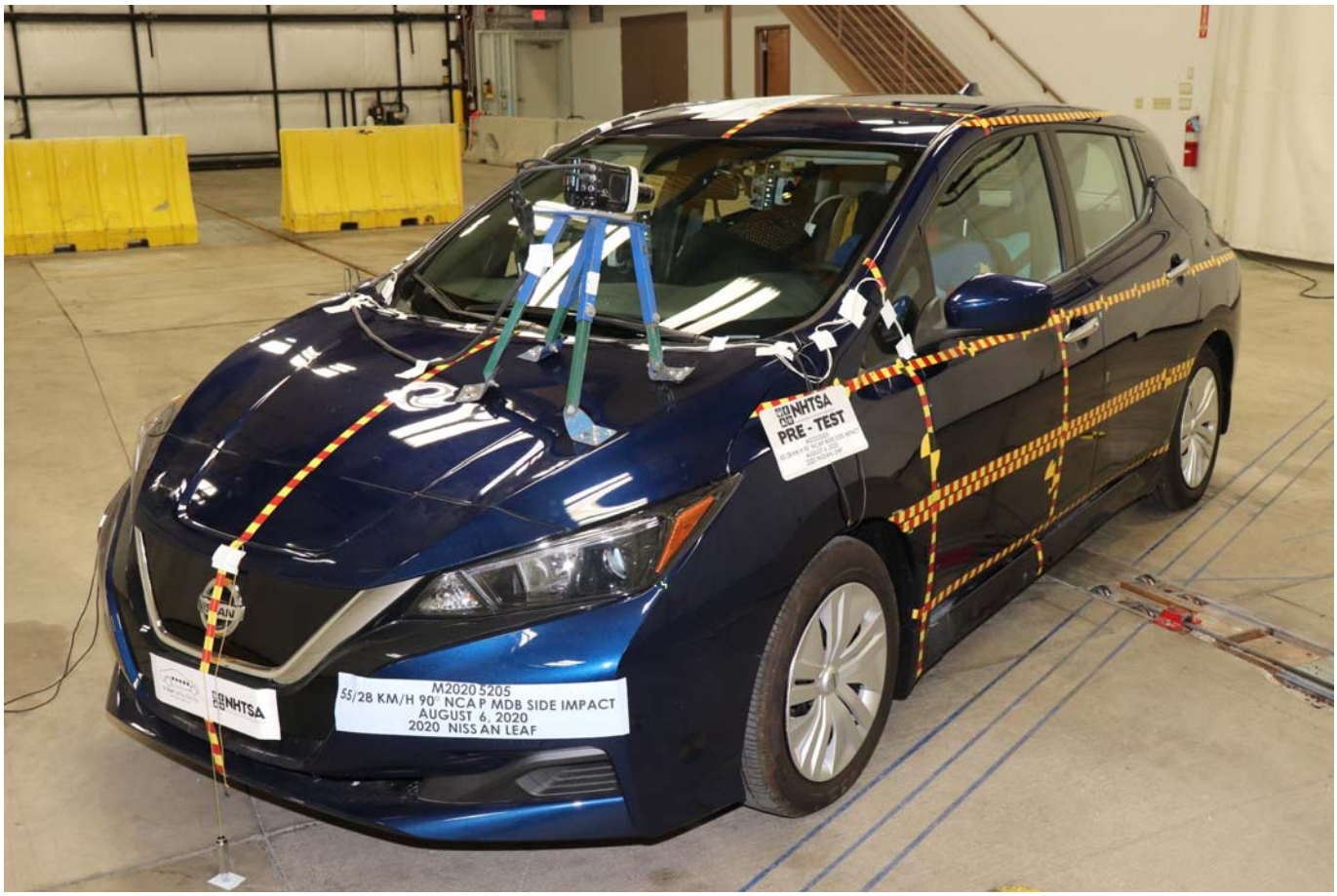


Photo No. 005 - Pre-Test Left Front Three-Quarter View of Test Vehicle

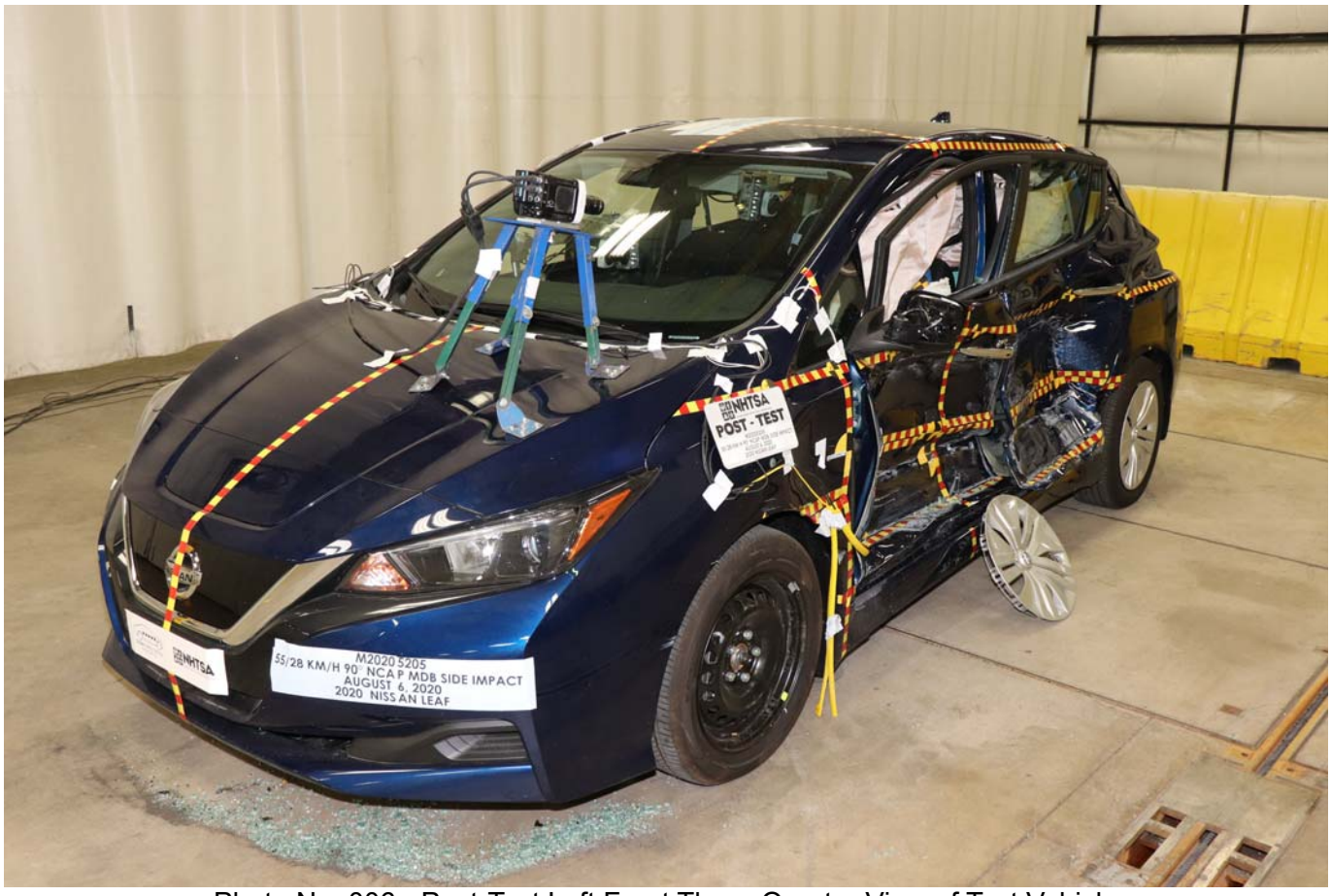


Photo No. 006 - Post-Test Left Front Three-Quarter View of Test Vehicle

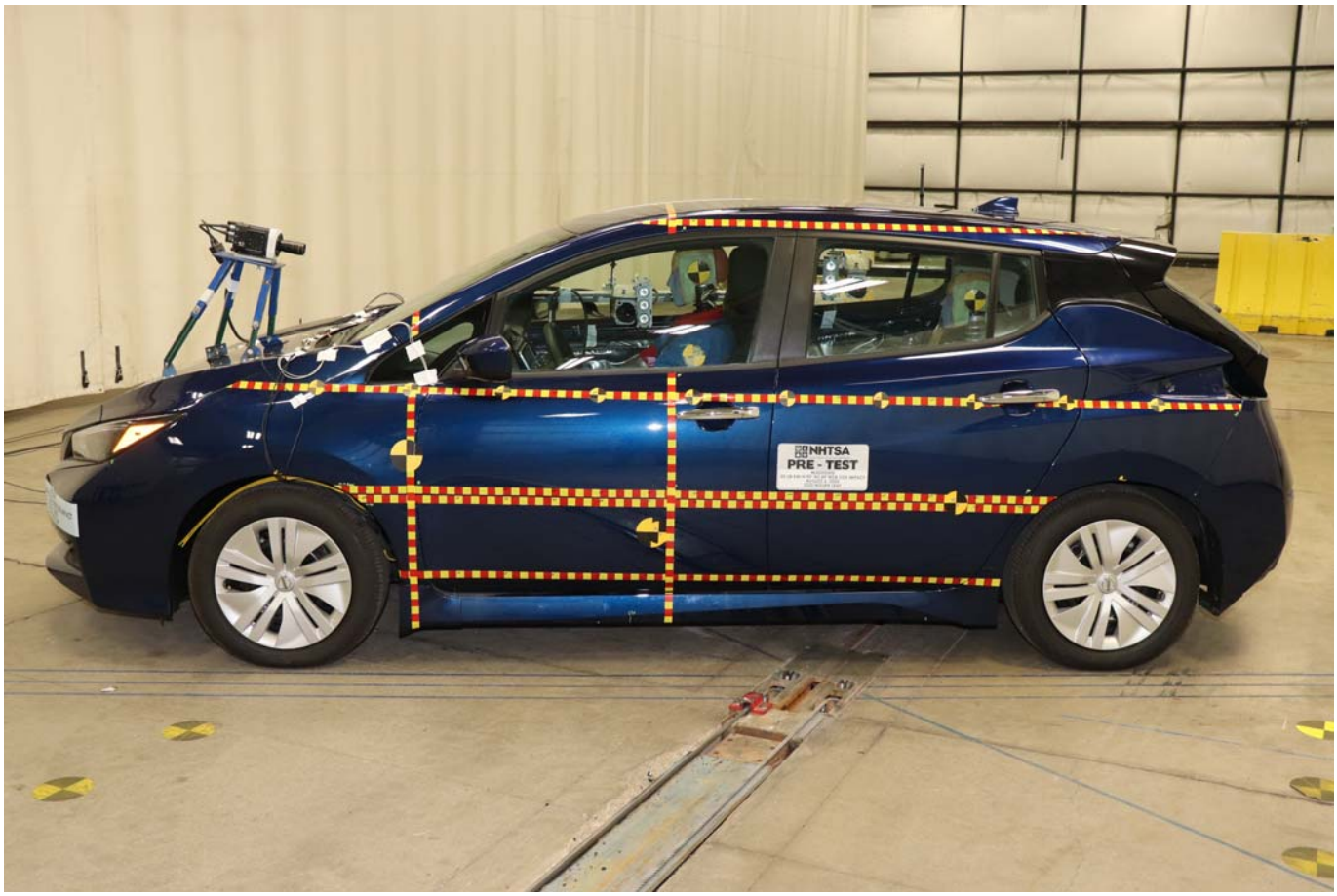


Photo No. 007 - Pre-Test Left Side View of Test Vehicle

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

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

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

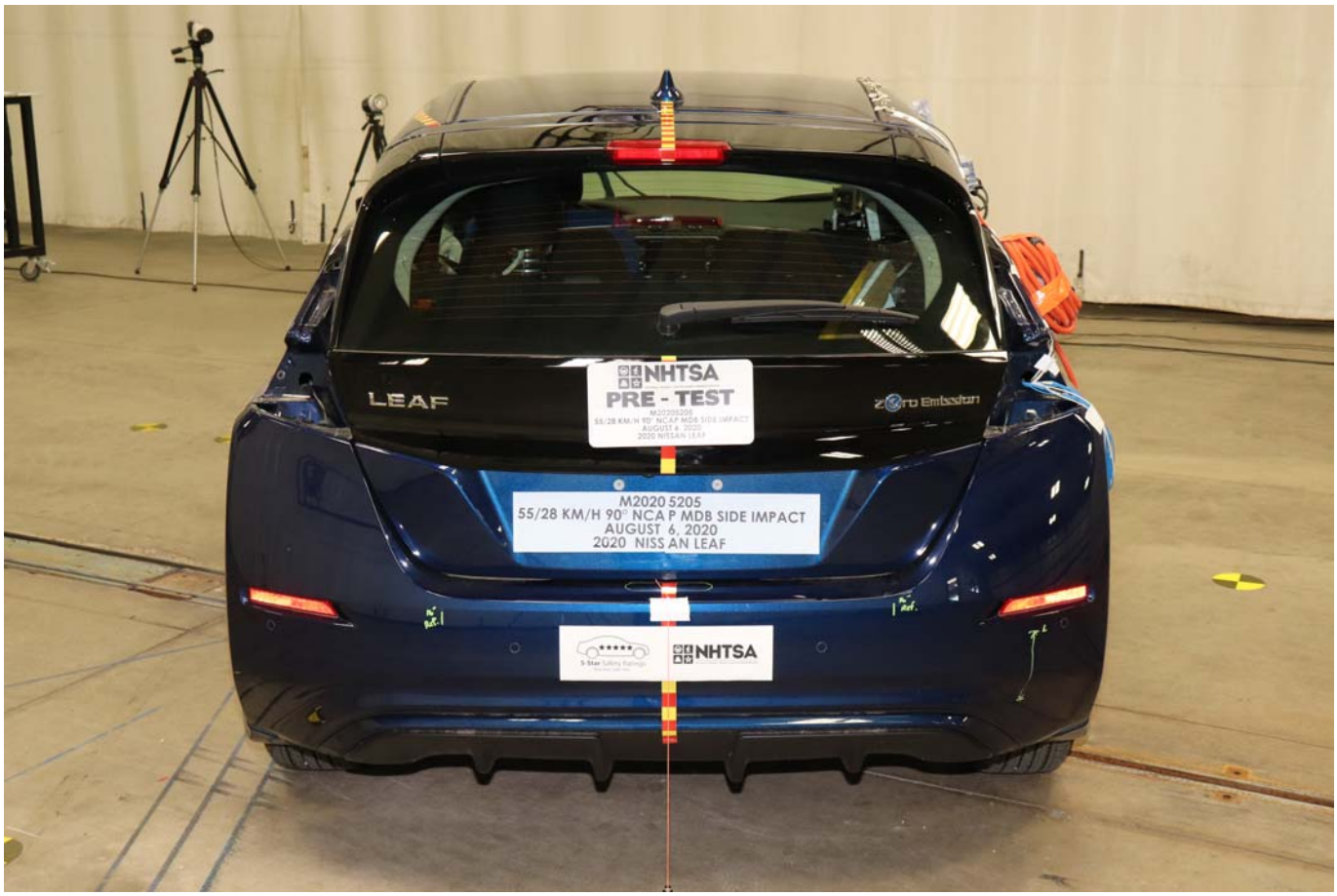


Photo No. 011 - Pre-Test Rear View of Test Vehicle

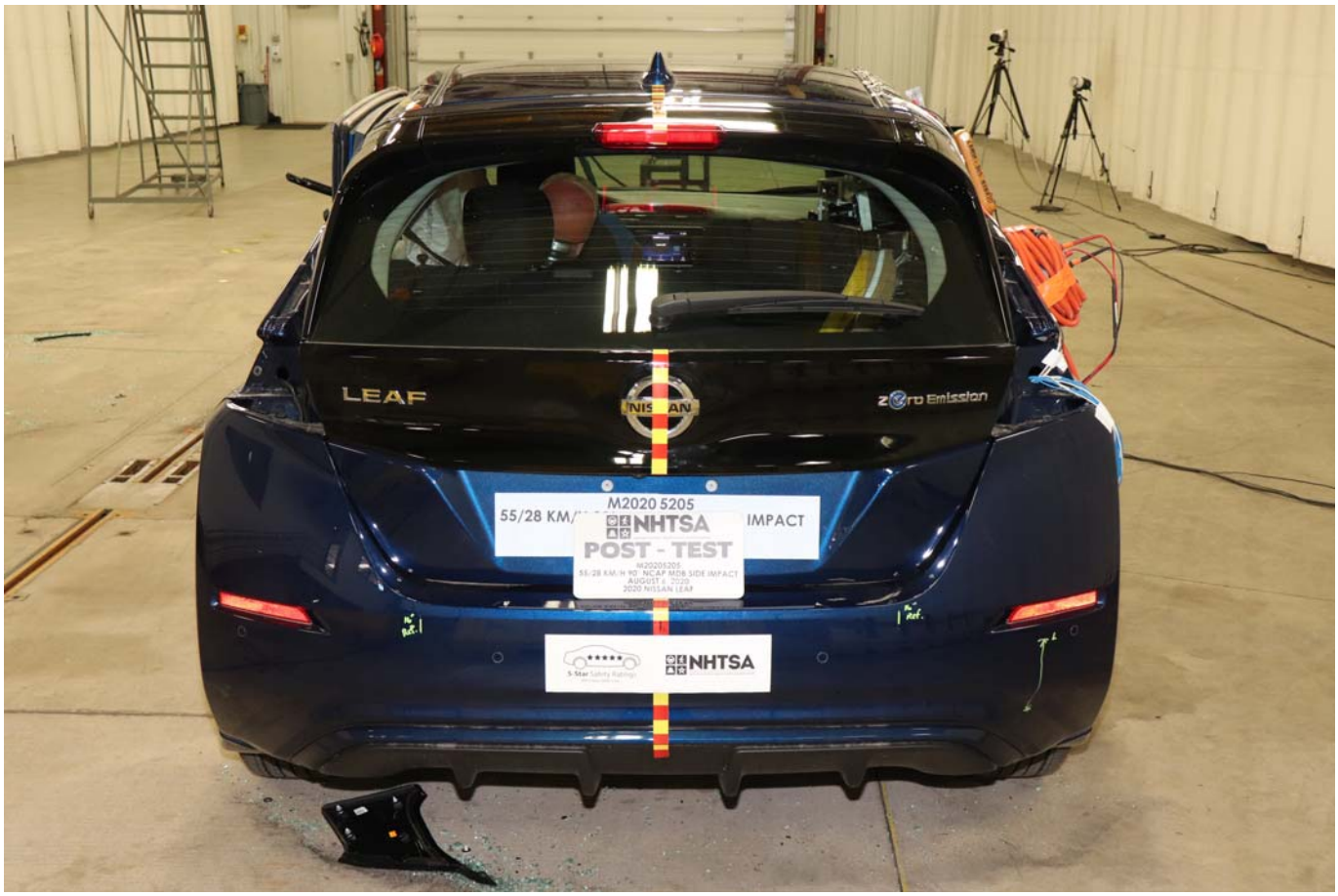


Photo No. 012 - Post-Test Rear View of Test Vehicle

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

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

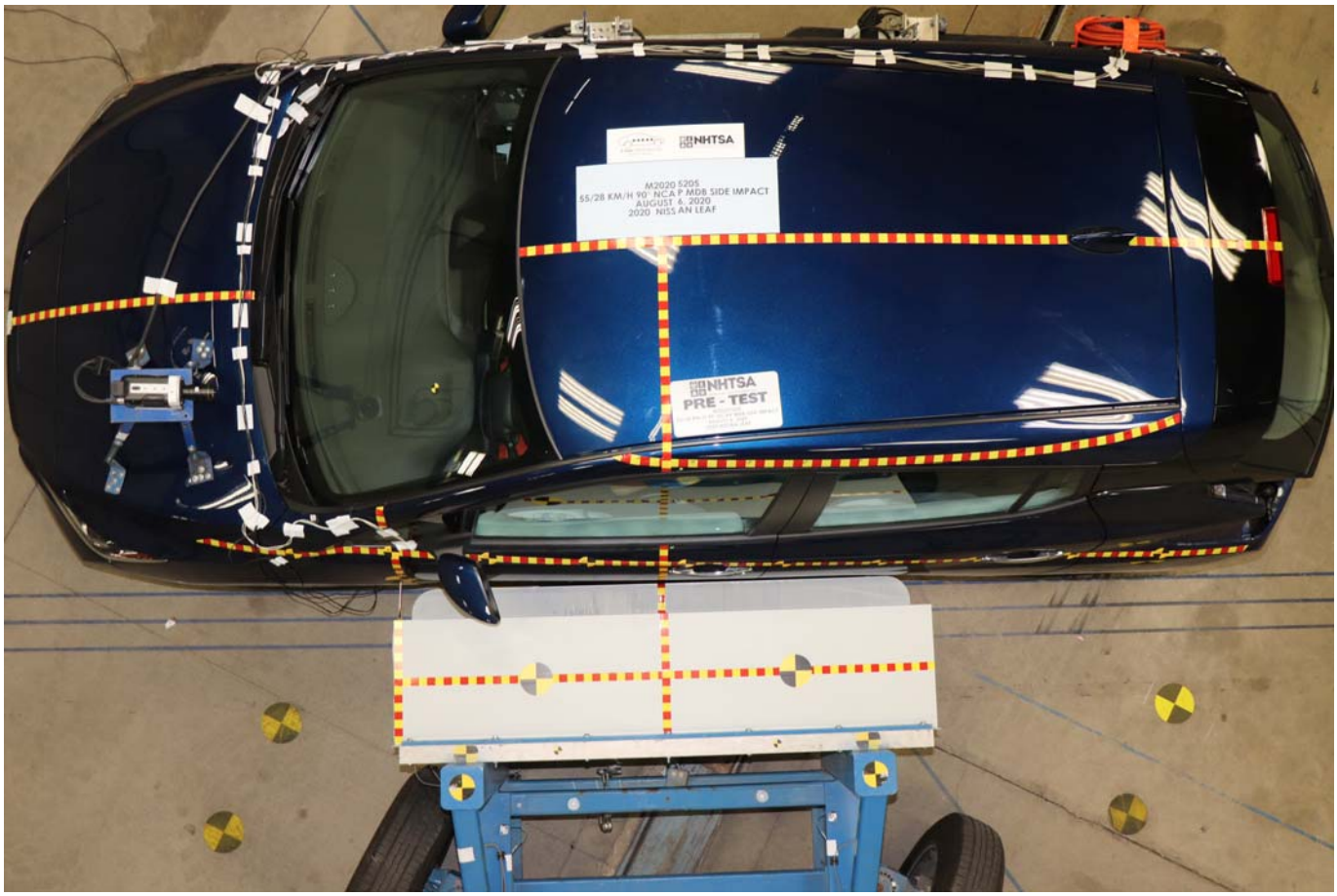


Photo No. 015 - Pre-Test Overhead View of Test Area

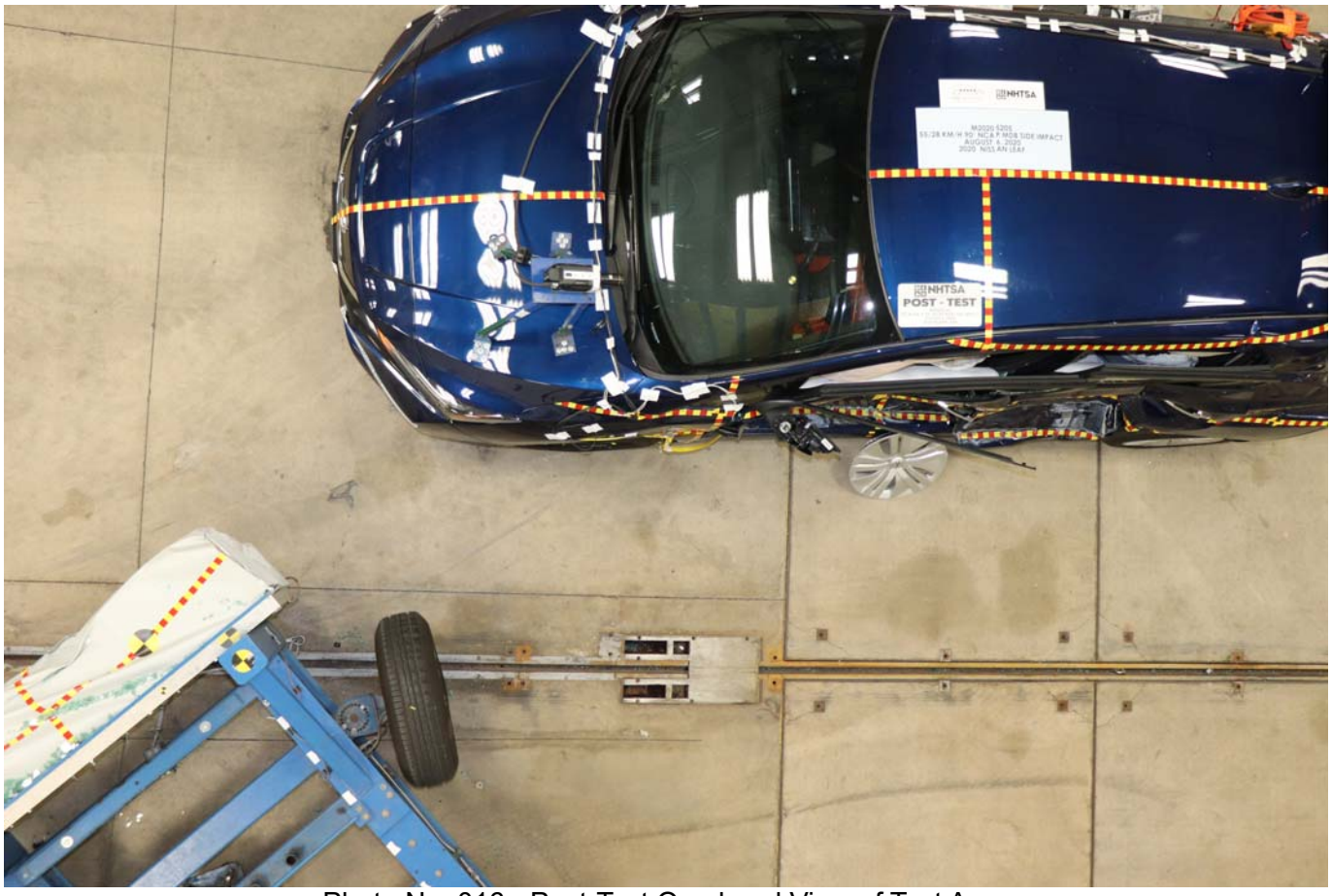


Photo No. 016 - Post-Test Overhead View of Test Area

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

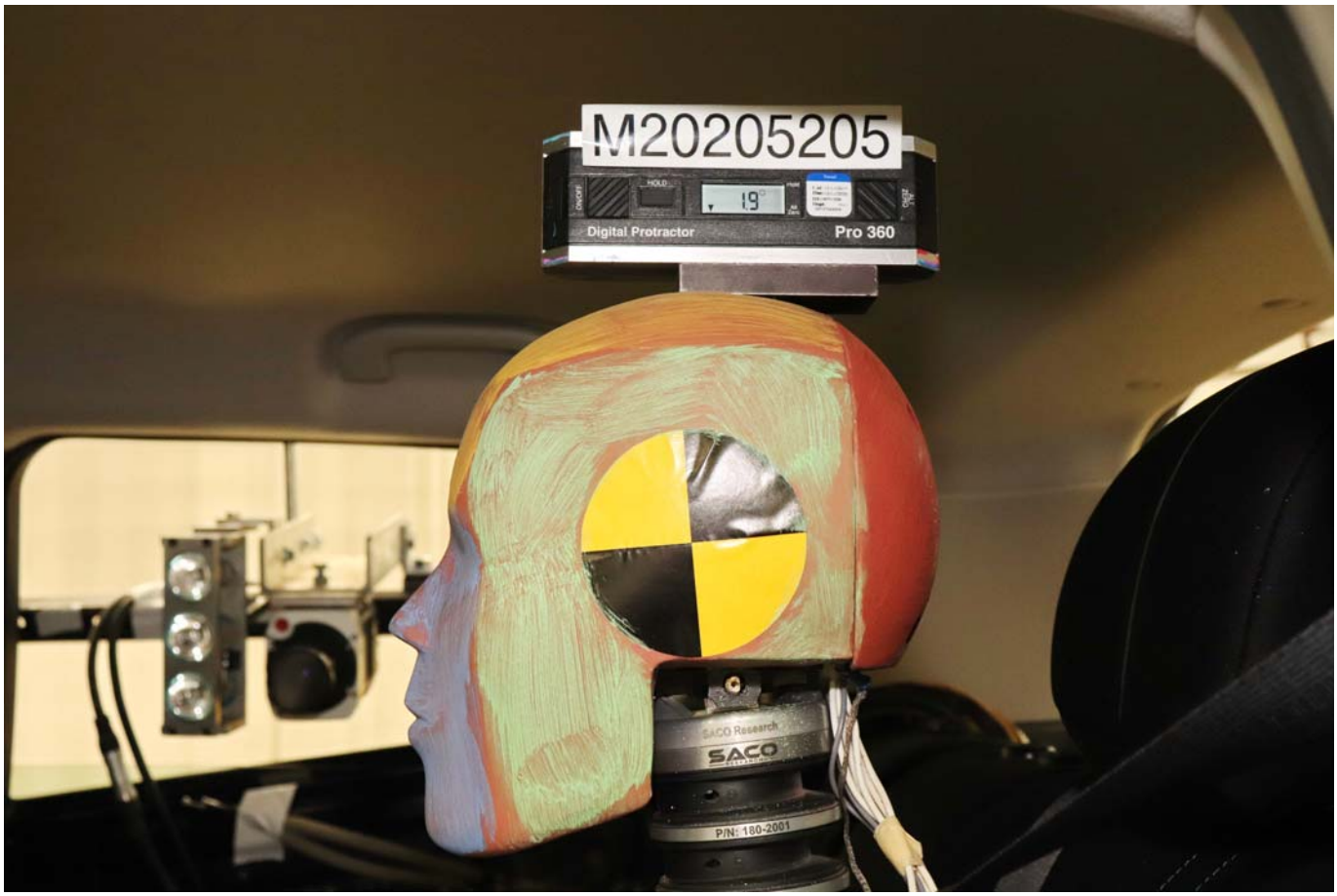


Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level

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

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

PHOTOGRAPH NOT APPLICABLE

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

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

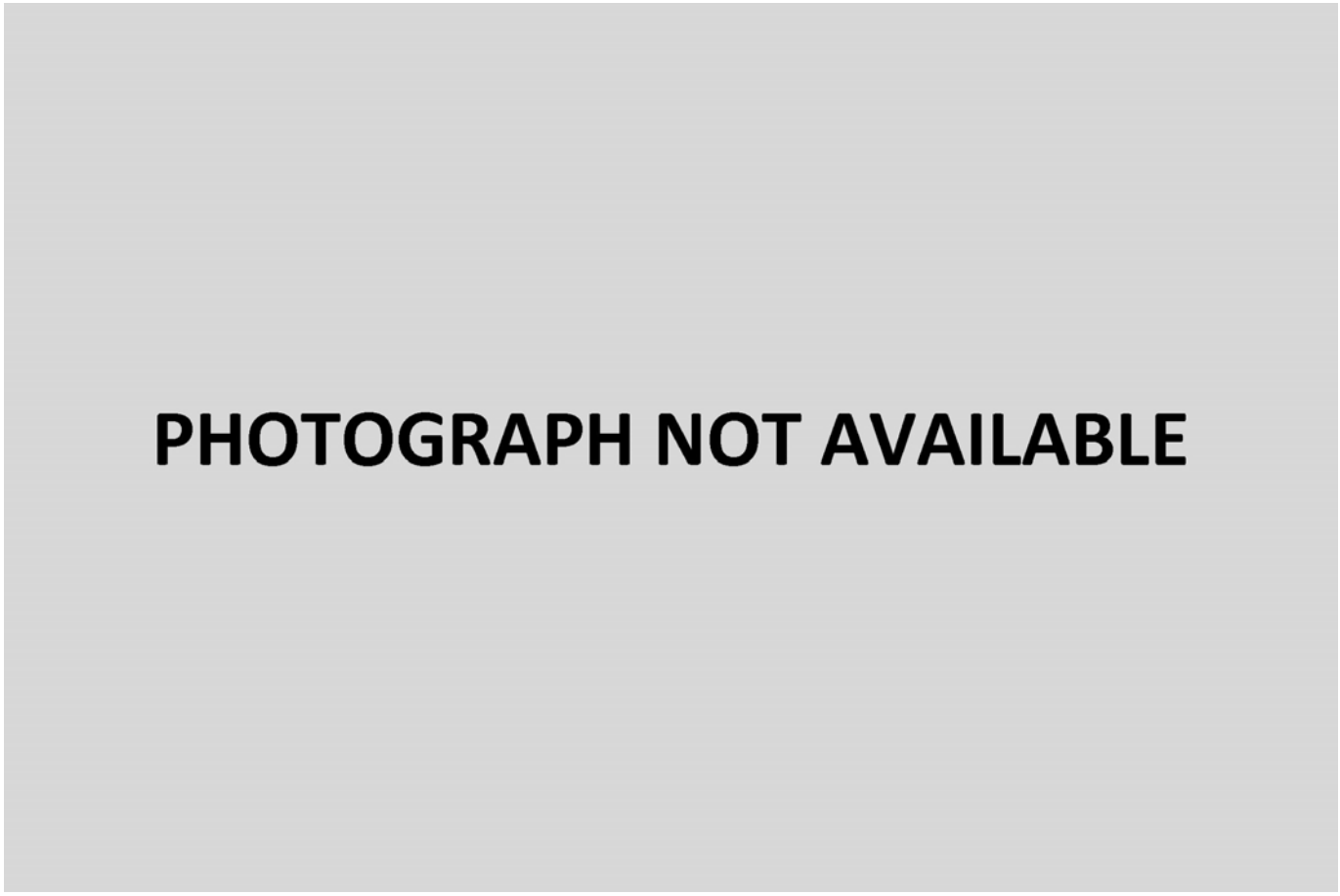


Photo No. 081 - Post-Test Rear Passenger Dummy Close-up Knee Contact View

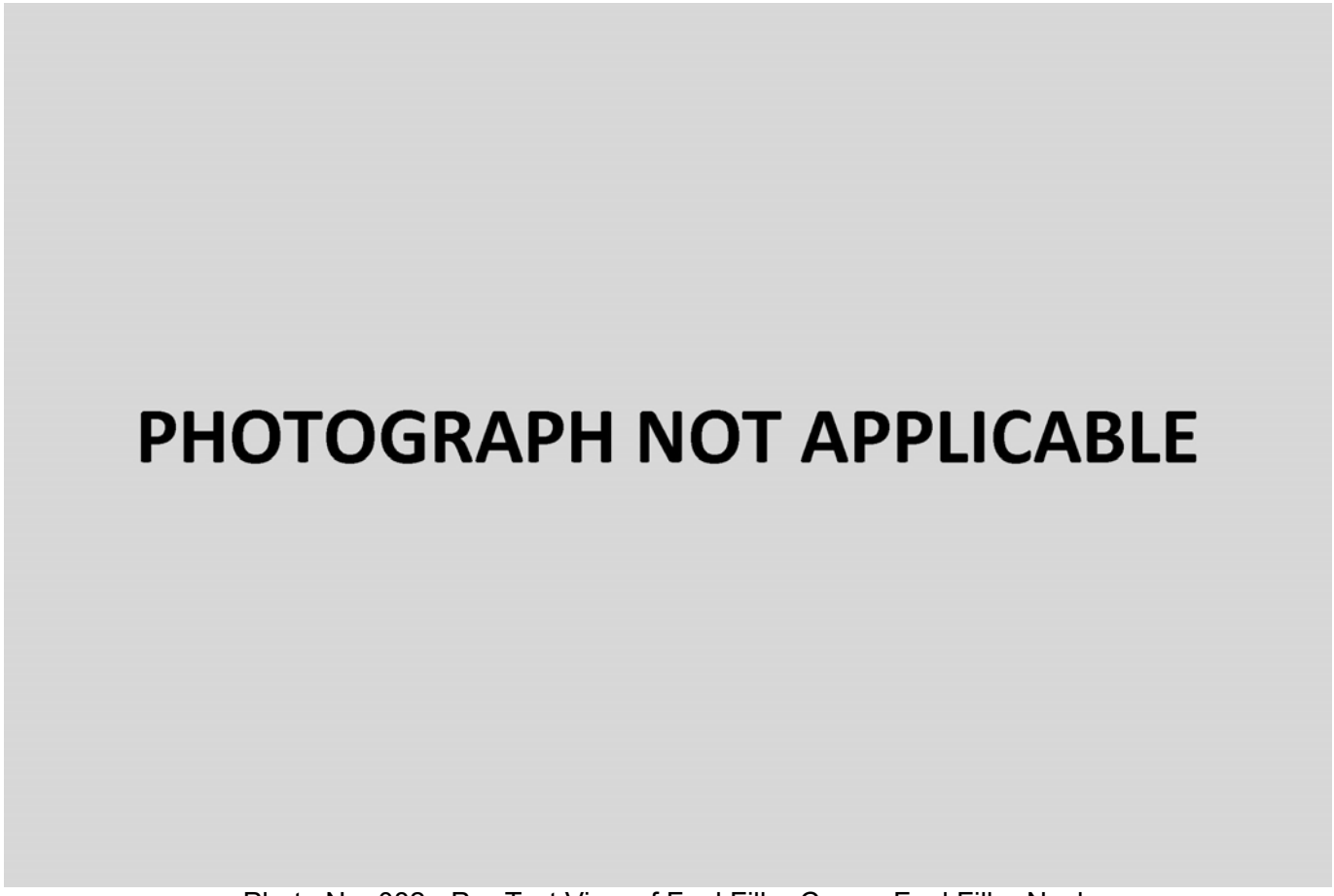


Photo No. 082 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

PHOTOGRAPH NOT APPLICABLE

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

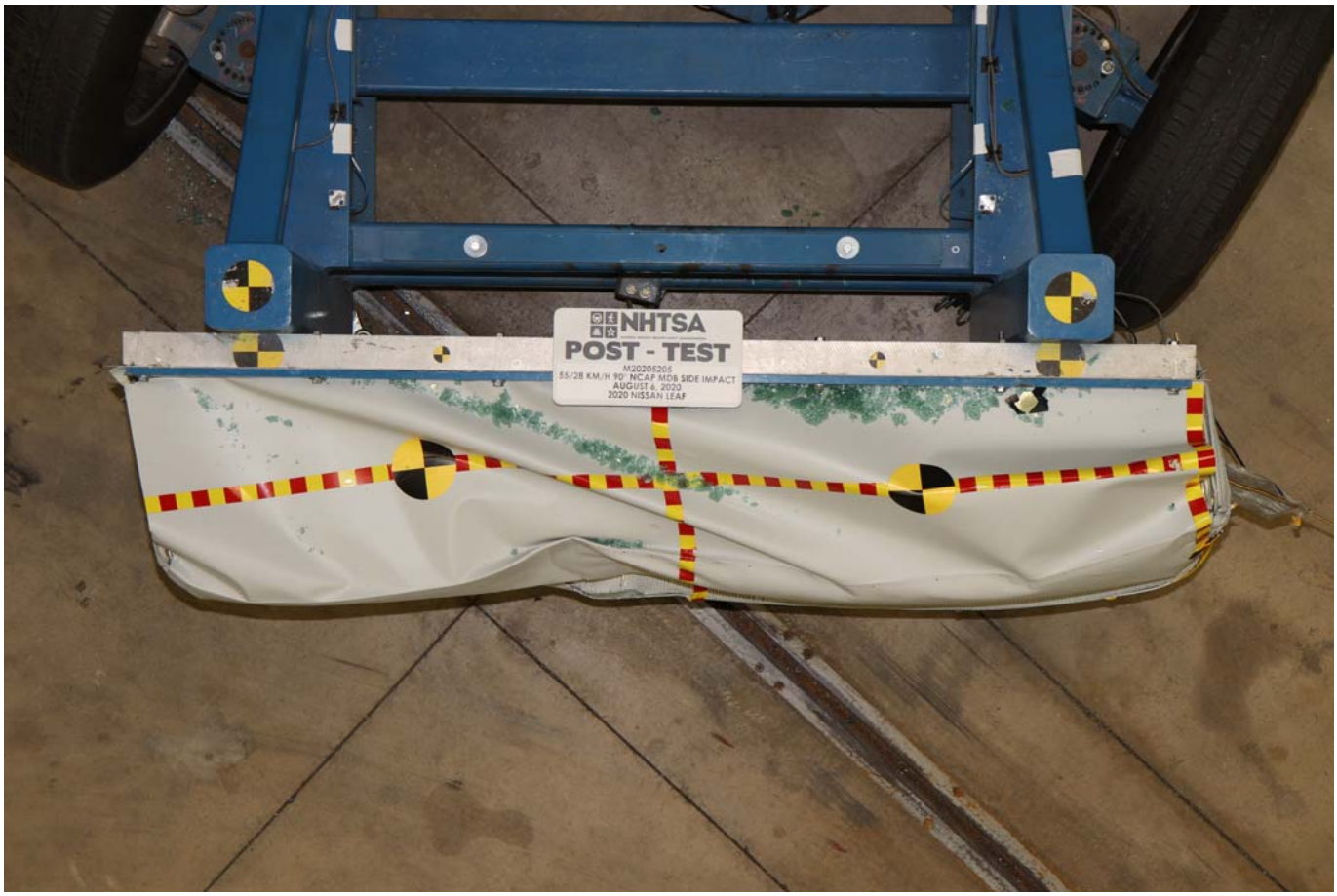


Photo No. 087 - Post-Test Top View of MDB Impactor Face

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

PHOTOGRAPH NOT APPLICABLE

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

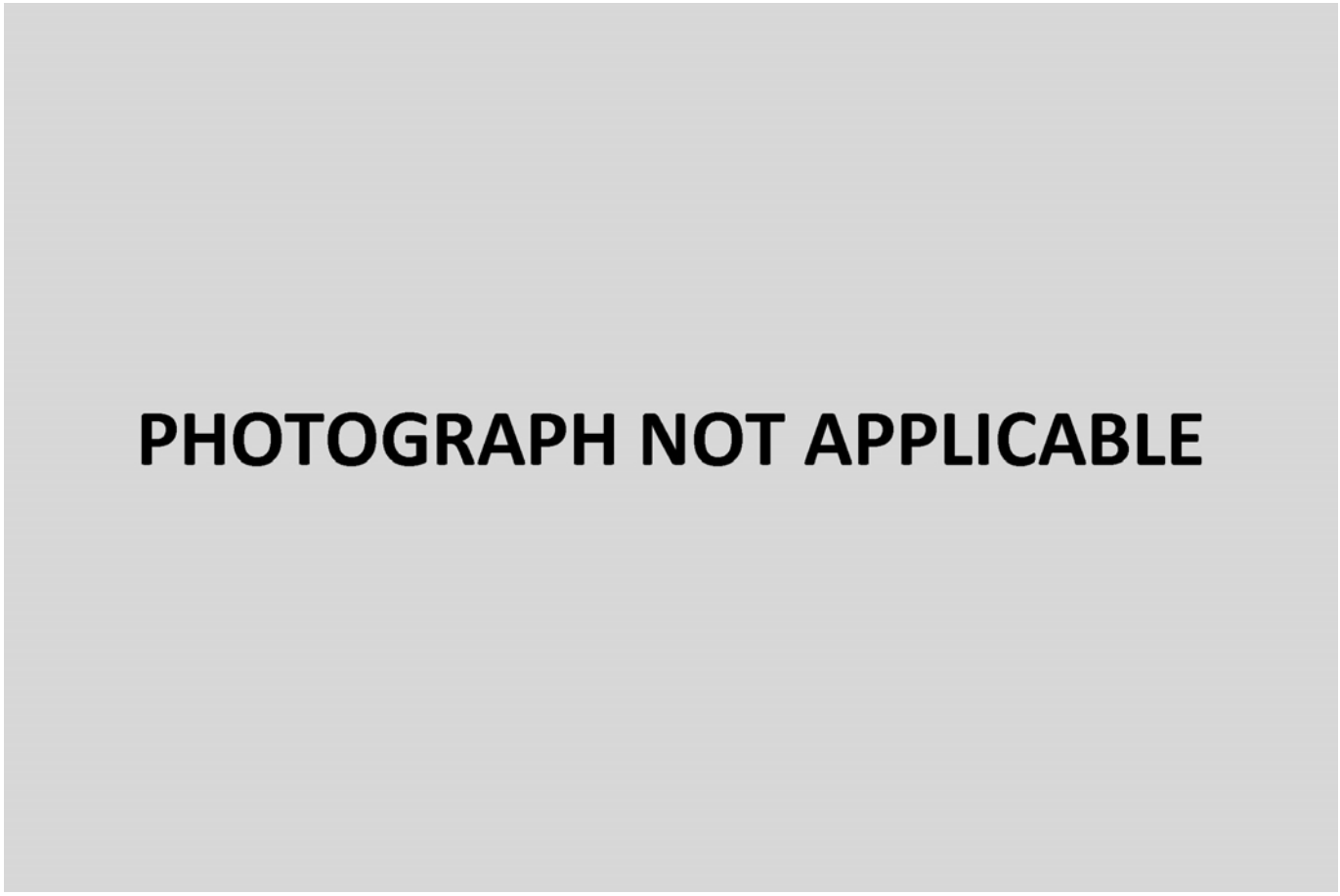


Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees

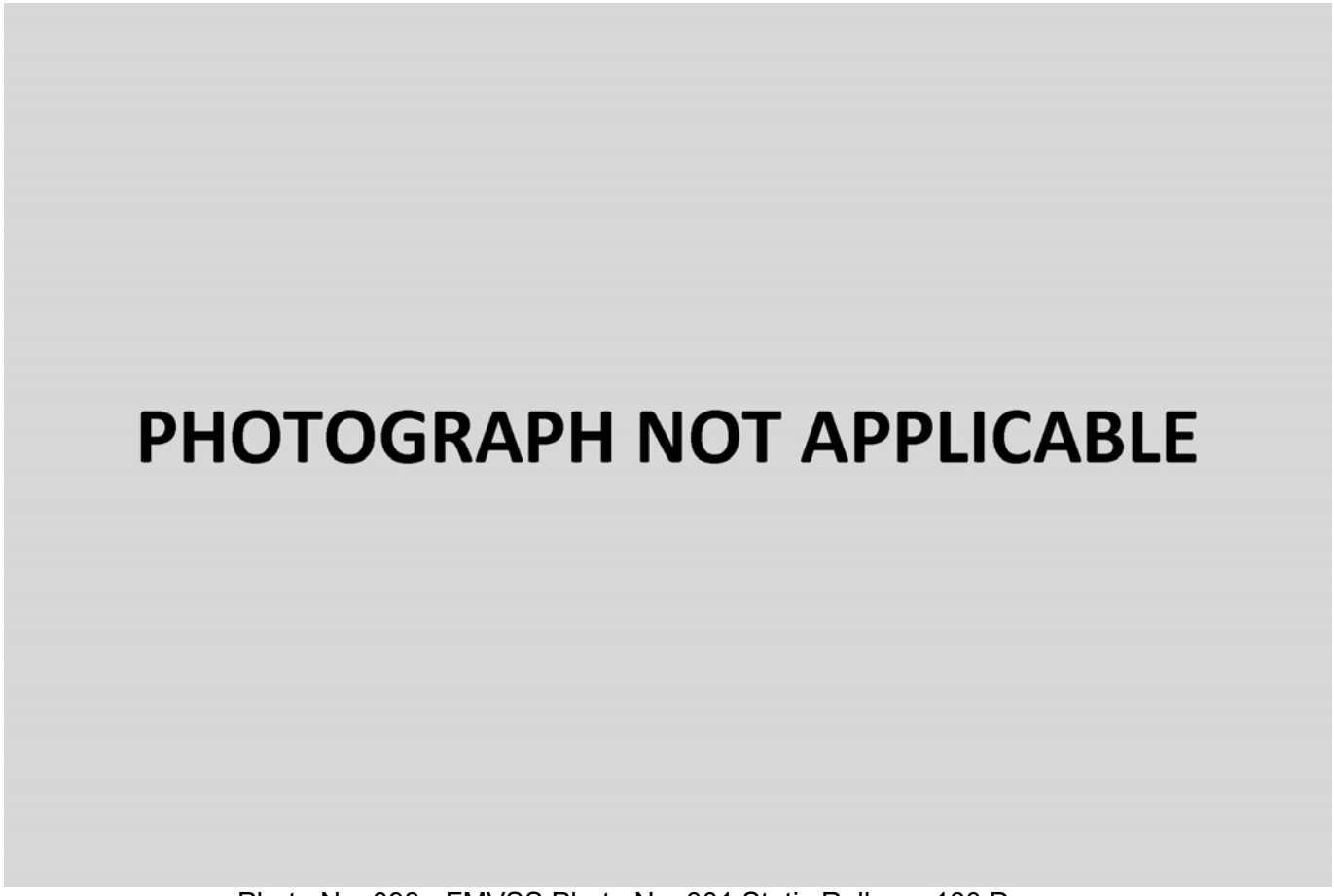


Photo No. 098 - FMVSS Photo No. 301 Static Rollover 180 Degrees

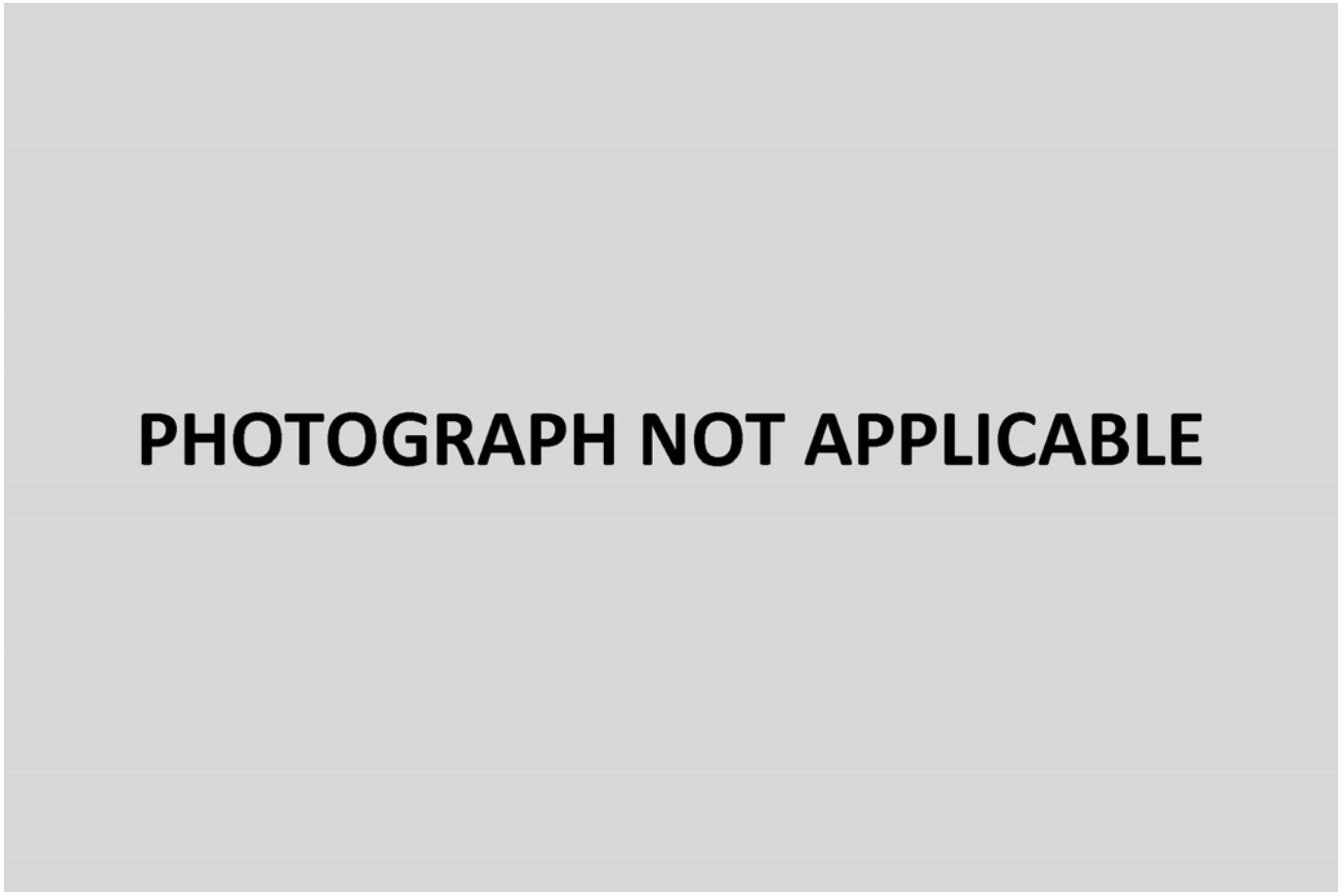


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees

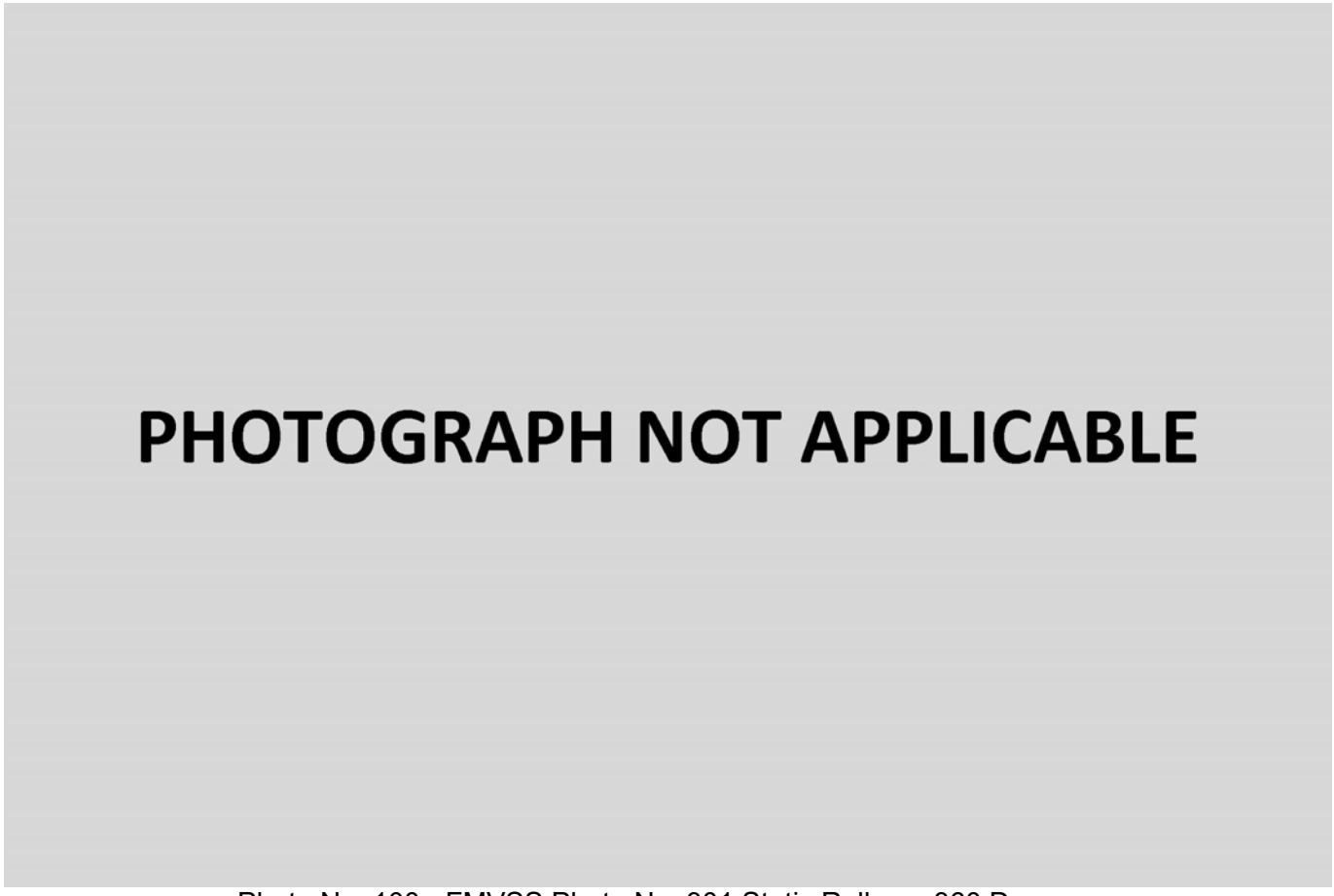


Photo No. 100 - FMVSS Photo No. 301 Static Rollover 360 Degrees

Photo No. 101 - Impact Event

NISSAN

2020 NISSAN LEAF S
(40kWh)

Scan QR code for general model information & options

SIMPLY AMAZING. 100% ELECTRIC.

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE
147HP (110kW) AC Synchronous Motor
40 kWh Lithium-Ion Battery
6.6 kW Onboard Charger
Power Assisted Vented Front And Rear Disc Brakes
Regenerative Braking System
e-Pedal Mode
Hill Start Assist
Portable Trickle Charge Cable (120V EVSE)

SAFETY & SECURITY
Safety Shield 360
Automatic Emergency Braking with Pedestrian Detection
Rear Automatic Braking (RAB)
Rear Cross Traffic Alert (RCTA)
Blind Spot Warning (BSW)
Lane Departure Warning (LDW)
High Beam Assist (HBA)
Nissan Advanced Airbag System (AABS)
Seat-Mounted Driver and Front-Passenger Side-Impact Supplemental Airbags
Seat-Mounted Rear Outboard Passenger Side-Impact Supplemental Airbags
Roof-Mounted Curtain Side-Impact Supplemental Airbags For Front & Rear-Seat Outboard Occupant Head Protection
Driver & Front Passenger Knee Supplemental Airbags
Tire Pressure Monitoring System (TPMS) w/ Easy-Fill Tire Alert
Lower Anchors and Tethers For CHildren (LATCH)
Nissan Vehicle Immobilizer System
Vehicle Security System (VSS)
Vehicle Dynamic Control (VDC)
Traction Control System (TCS)
Electronic Brake Force Distribution (EBD) and Brake Assist (BA)
Intelligent Forward Collision Warning(I-FCW)
Intelligent Lane Intervention (I-LI)
Blind Spot Intervention (BSI)

COMFORT & CONVENIENCE
Power Windows w/ Driver One-Touch Auto-Up/Down and Auto-Reverse Feature
Automatic On/Off Headlights
RearView Monitor (RVM)
Rear Door Alert (RDA)
Nissan Intelligent Key® System w/ Charge Port Door Release

COMFORT & CONVENIENCE CONTINUED...
Cruise Control
6-Way Manual Bucket Driver Seat
4-Way Manual Bucket Front Passenger Seat
60/40 Split Fold Down Rear Seats
Manual Telescopic Steering Wheel
HVAC Timer - Preheat/Precool Cabin
Charging Timer - Set Desired Charge Time
4 USB5 (TYPE A & C)
4 Speakers
NissanConnect®
8" Color Touch Display
Apple CarPlay®**
Android Auto™ **
SiriusXM® Radio w/ Advanced Audio Features**
Siri® Eyes Free**
Bluetooth® Hands-Free Phone System**
Streaming Audio Via Bluetooth®**
Hands-Free Text Messaging Assistant

EXTERIOR FEATURES
Dual Power Outside Mirrors
Aerodynamic Under Body Cover and Rear Diffuser
16" Steel Wheels w/ Wheel Covers
P205/55R16 Tires
Charge Port Light and Lock

**Owner's Manual, or www.NissanUSA.com/connect/ Important-Information

***Replaces Standard Equipment

Manufacturer's Suggested Retail Base Price:	$31,600.00
Options Included by Manufacturer	
SPLASH GUARDS	200.00
CHARGE PACKAGE	1,690.00
Quick Charge Port	
Portable Charge Cable (120V/240V EVSE)***	
CARPETED FLOOR MATS AND CARGO AREA MAT	195.00
DESTINATION CHARGES	925.00
Total*	$34,610.00

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

EPA DOT **Fuel Economy and Environment** — Electric Vehicle

Fuel Economy: **111** MPGe (combined city/hwy) — 123 city, 99 highway, 30 kW-hrs per 100 miles

Midsize Cars range from 12 to 136 MPGe. The best vehicle rates 136 MPGe.

You save **$4,500** in fuel costs over 5 years compared to the average new vehicle.

Driving Range: When fully charged, vehicle can travel about... 149 miles

Charge Time: 8 hours (240V)

Annual fuel cost **$600**

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

This vehicle emits 0 grams CO2 per mile. The best emits 0 grams per mile (tailpipe only). Does not include emissions from generating electricity; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $0.13 per kW-hr. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		
Frontal Crash	Driver	Not Rated
	Passenger	Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat	Not Rated
	Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover		Not Rated
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

This Vehicle qualifies for Nissan's

Security+Plus Extended Protection Plan

The only service agreement backed by Nissan Extended Services North America!
Ask your dealer for details, or call 1-800-NISSAN-1 for more information

DELIVERY

VEHICLE COLORS:
EXT: DEEP BLUE PEARL
INT: BLACK

FINAL ASSEMBLY POINT:
SMYRNA

TRANSPORT METHOD:
TRUCK

DEALER:
MICHAEL JORDAN NISSAN
3930 CHAPEL HILL BLVD
DURHAM NC
27707

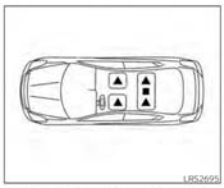
VIN: 1N4AZ1BP9LC301028
EMS: 50 STATE EMISSIONS
MDL: 17010-301028 RAY-G
OPT: D-B93F01L92C03

20191218224953AS2923

Photo No. 102 - Monroney Label

⚠WARNING

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


LRS2695

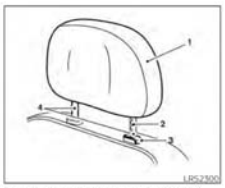
The illustration shows the seating positions equipped with head restraints/headrests.

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

■ Indicates the seating position is equipped with a headrest.

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

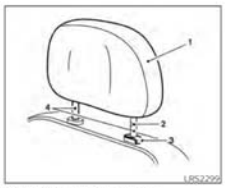
- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalks to lock them in a desired adjustment position.
- The non-adjustable head restraints/headrests have a single locking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



LRS2300

ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

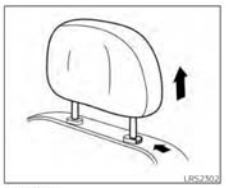
1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks



LRS2299

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

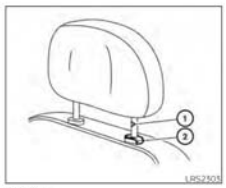
1. Removable head restraint/headrest
2. Single notch
3. Lock knob
4. Stalks


LRS2302

REMOVE

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

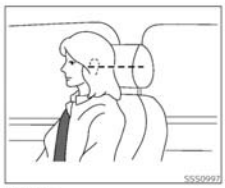
1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not loose in the vehicle.
5. Reinstall and properly adjust the head restraint/headrest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



LRS2303

INSTALL

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

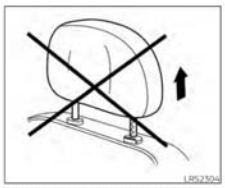

SSS0997

ADJUST

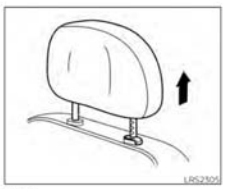
For adjustable head restraint/headrest

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

For non-adjustable head restraint/headrest


LRS2304

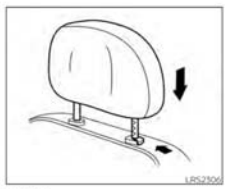
Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.


LRS2305

Raise

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

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


LRS2306

Lower

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

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

PRECAUTIONS ON SEAT BELT USAGE

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

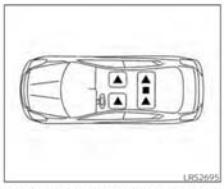
Most U.S. states and Canadian provinces or territories specify that seat belts be worn at all times when a vehicle is being driven.

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

HEAD RESTRAINTS/HEADRESTS

⚠WARNING

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


LRS2695

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

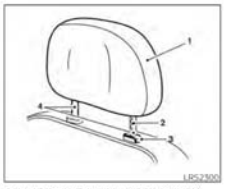
▲ Indicates the seating position is equipped with a head restraint.

■ Indicates the seating position is equipped with a headrest.

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

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

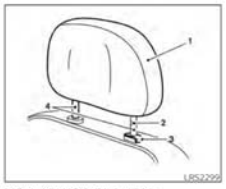
Safety–Seats, seat belts and supplemental restraint system 1-7



LRS2300

ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

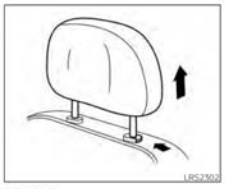
1. Removable head restraint/headrest
2. Multiple notches
3. Lock knob
4. Stalks



LRS2299

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

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

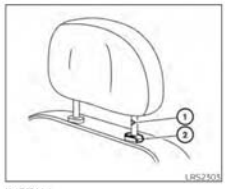

LRS2302

REMOVE

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

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

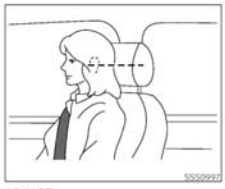
1-8 Safety–Seats, seat belts and supplemental restraint system



LRS2303

INSTALL

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

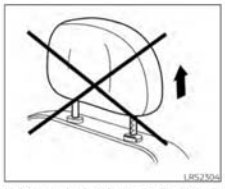

SSS0997

ADJUST

For adjustable head restraint/headrest

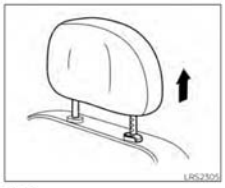
Adjust the head restraint/headrest so the center is level with the center of your ears. If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.

For non-adjustable head restraint/headrest


LRS2304

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

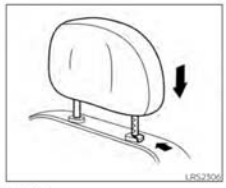
Safety–Seats, seat belts and supplemental restraint system 1-9


LRS2305

Raise

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

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


LRS2306

Lower

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

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

SEAT BELTS

PRECAUTIONS ON SEAT BELT USAGE

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

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

1-10 Safety–Seats, seat belts and supplemental restraint system

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

Photo No. 305-01 - Auxiliary Power Module Warning Label

Photo No. 305-02 - Power Inverter Warning Label

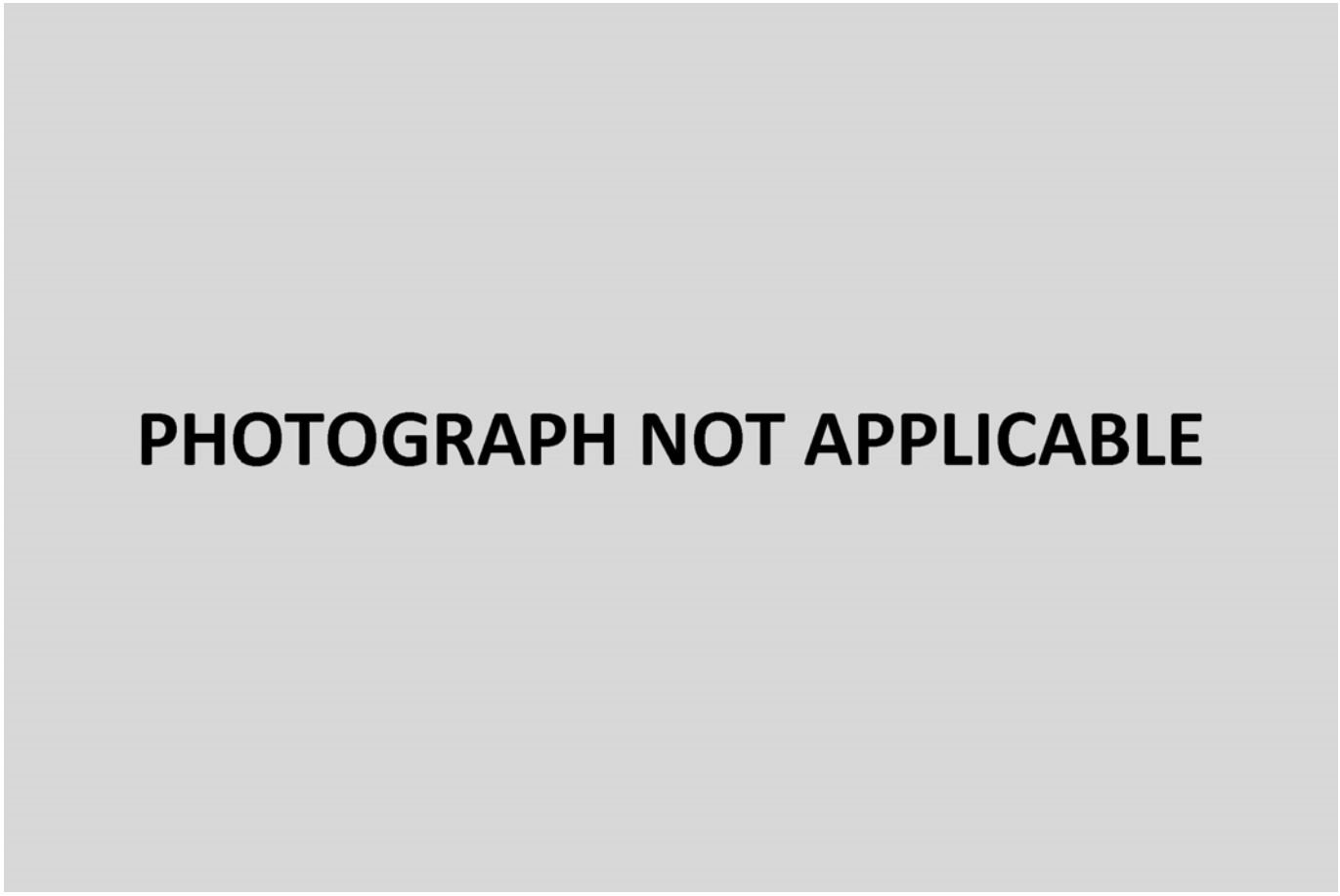


Photo No. 305-03 - First Responder Warning Label

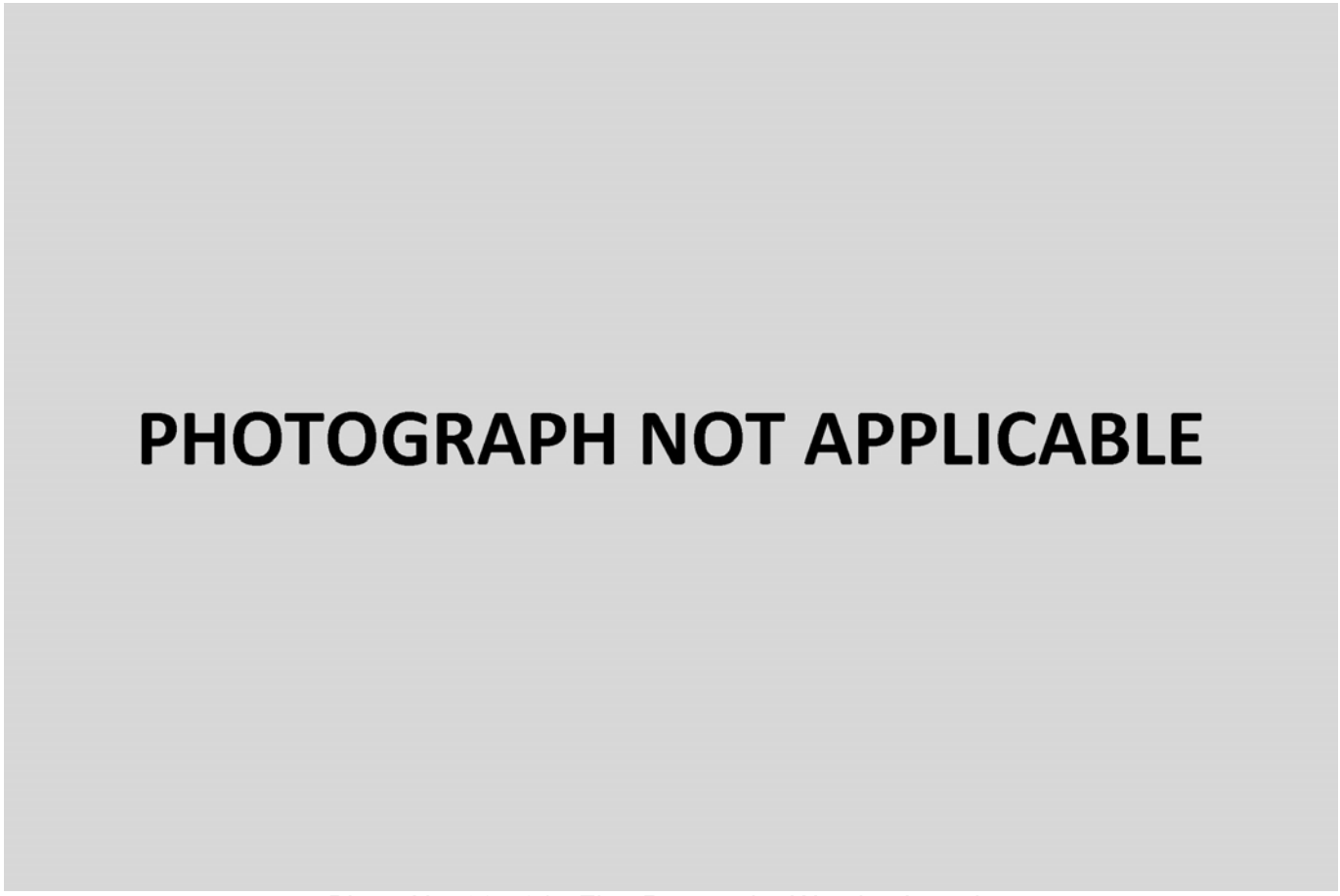


Photo No. 305-04 - First Responder Warning Location

Photo No. 305-05 - Other Vehicle Label(s) Related to Electrical Propulsion System

Photo No. 305-06 - Manual High Voltage Service Disconnect in Place

Photo No. 305-07 - Manual High Voltage Service Disconnect Removed

Photo No. 305-08 - Manual High Voltage Service Disconnect Removed

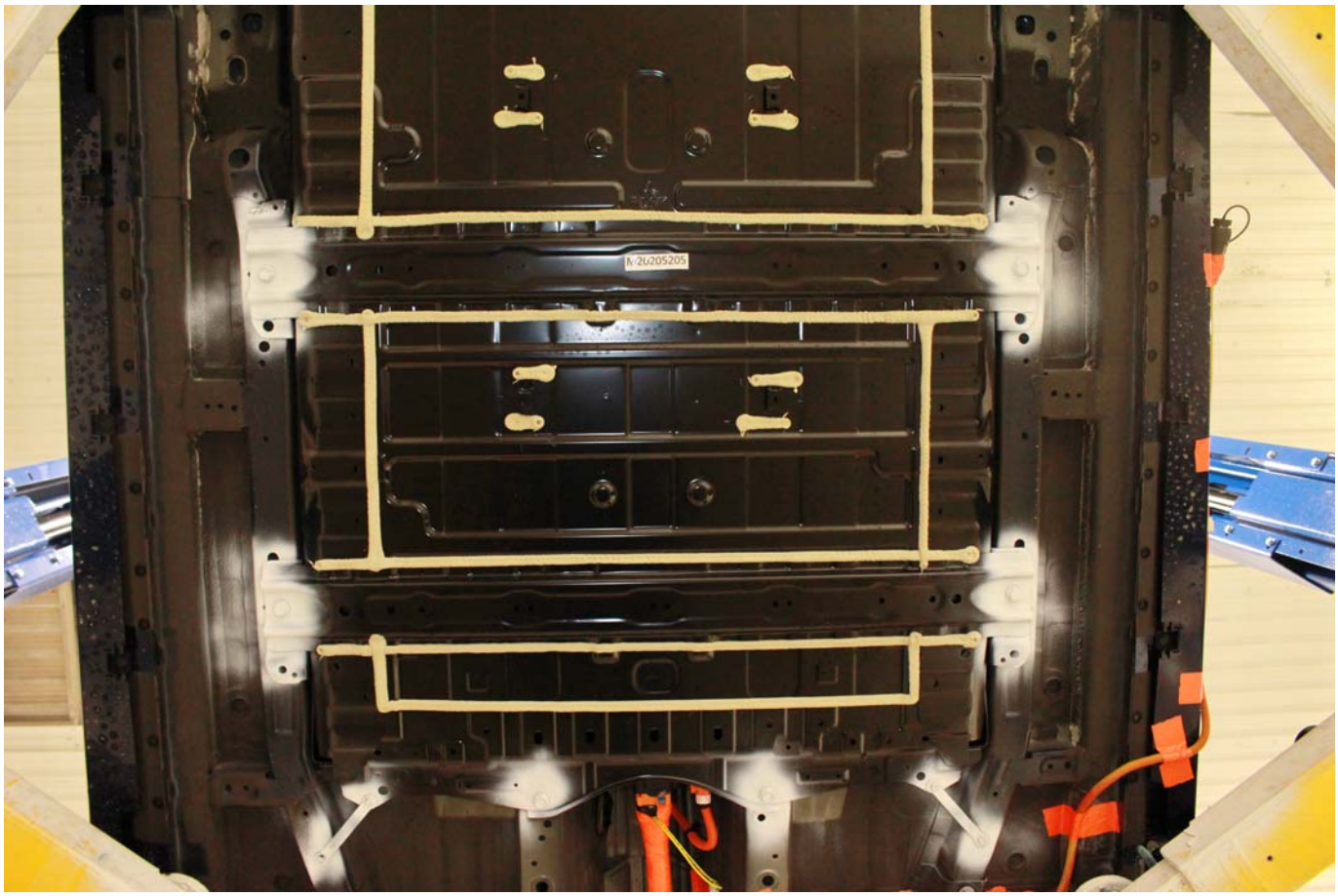


Photo No. 305-09 - Pre-Impact View of Propulsion Battery

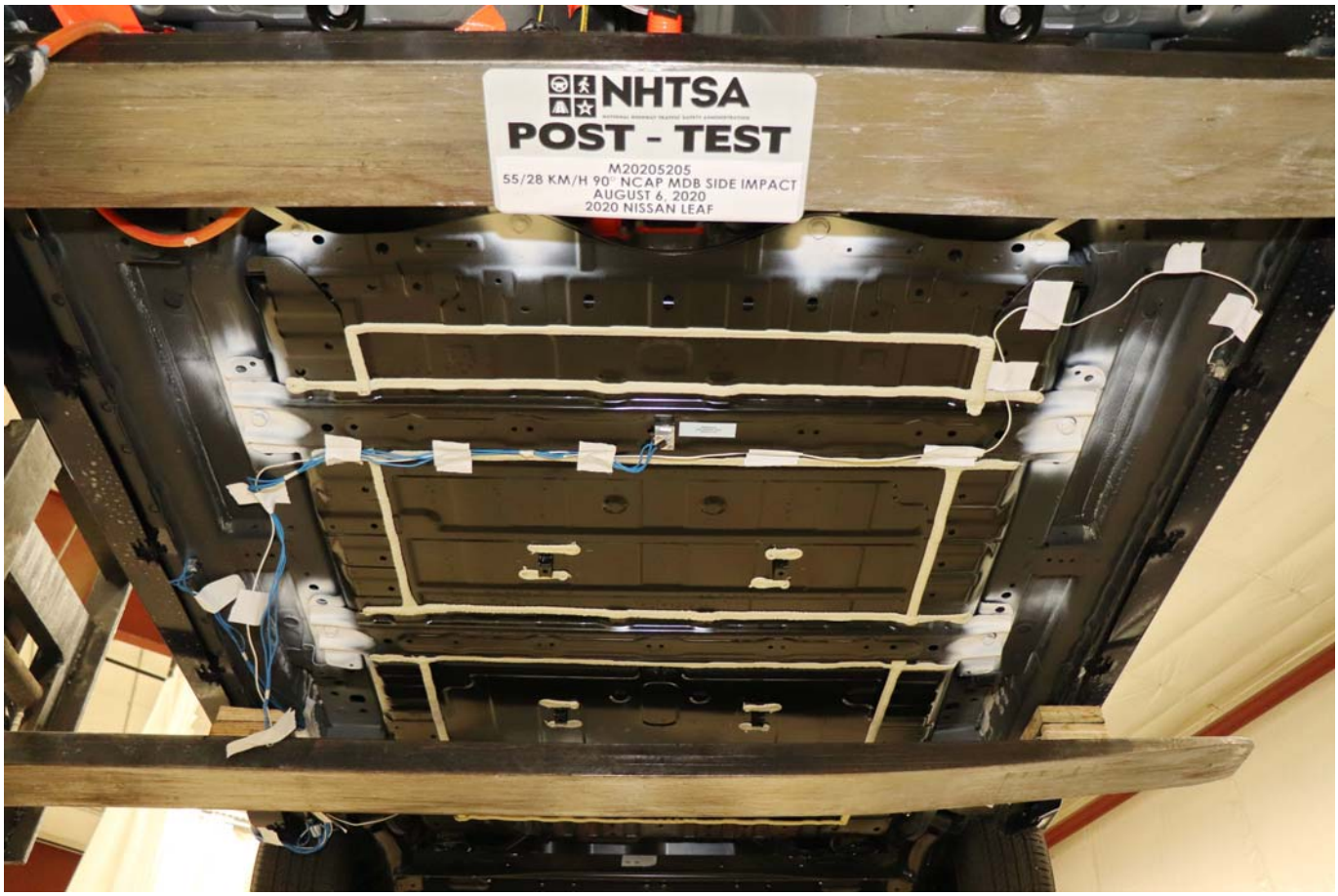


Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

Photo No. 305-11 - Post-Impact Rear View of Propulsion Battery

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

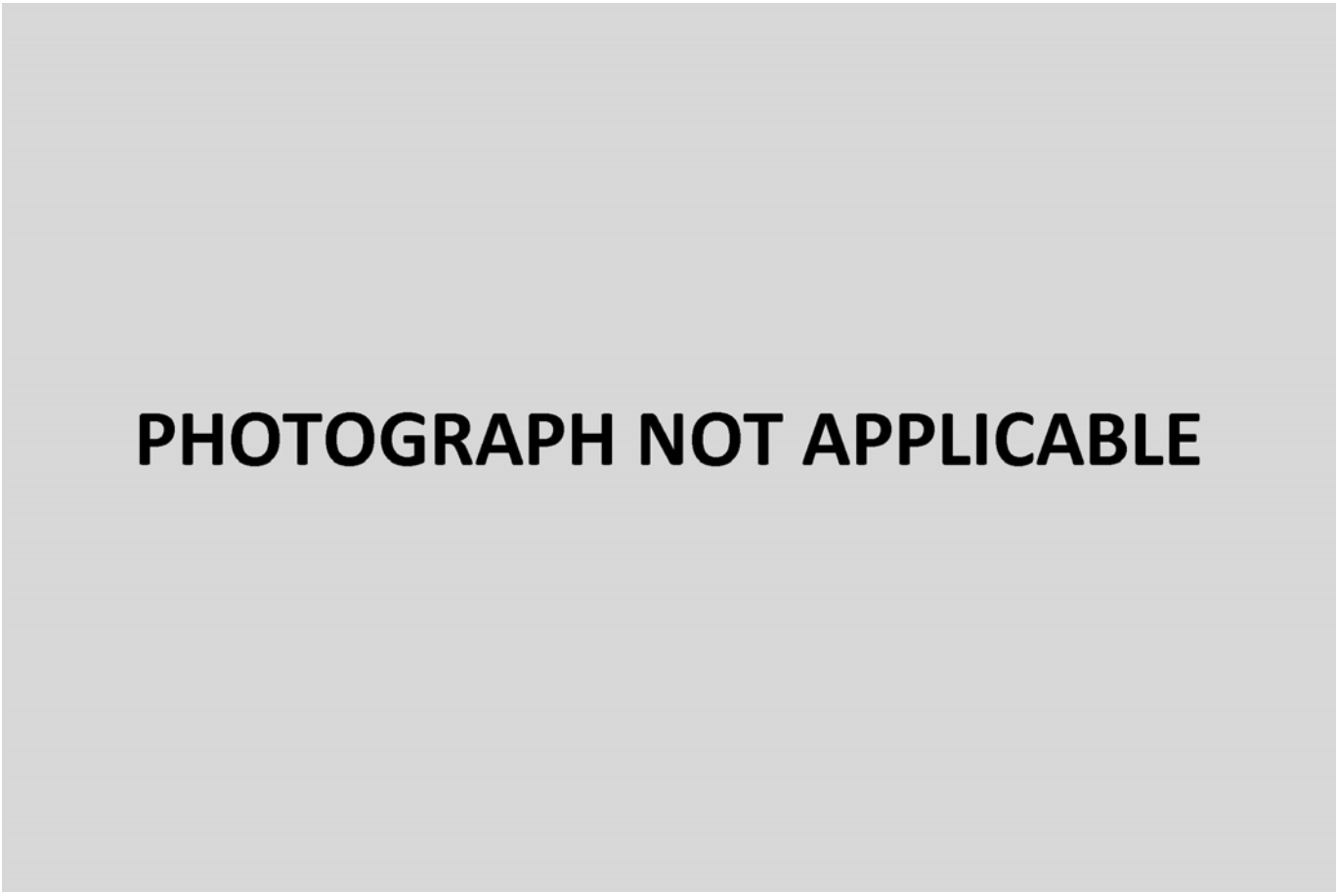


Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

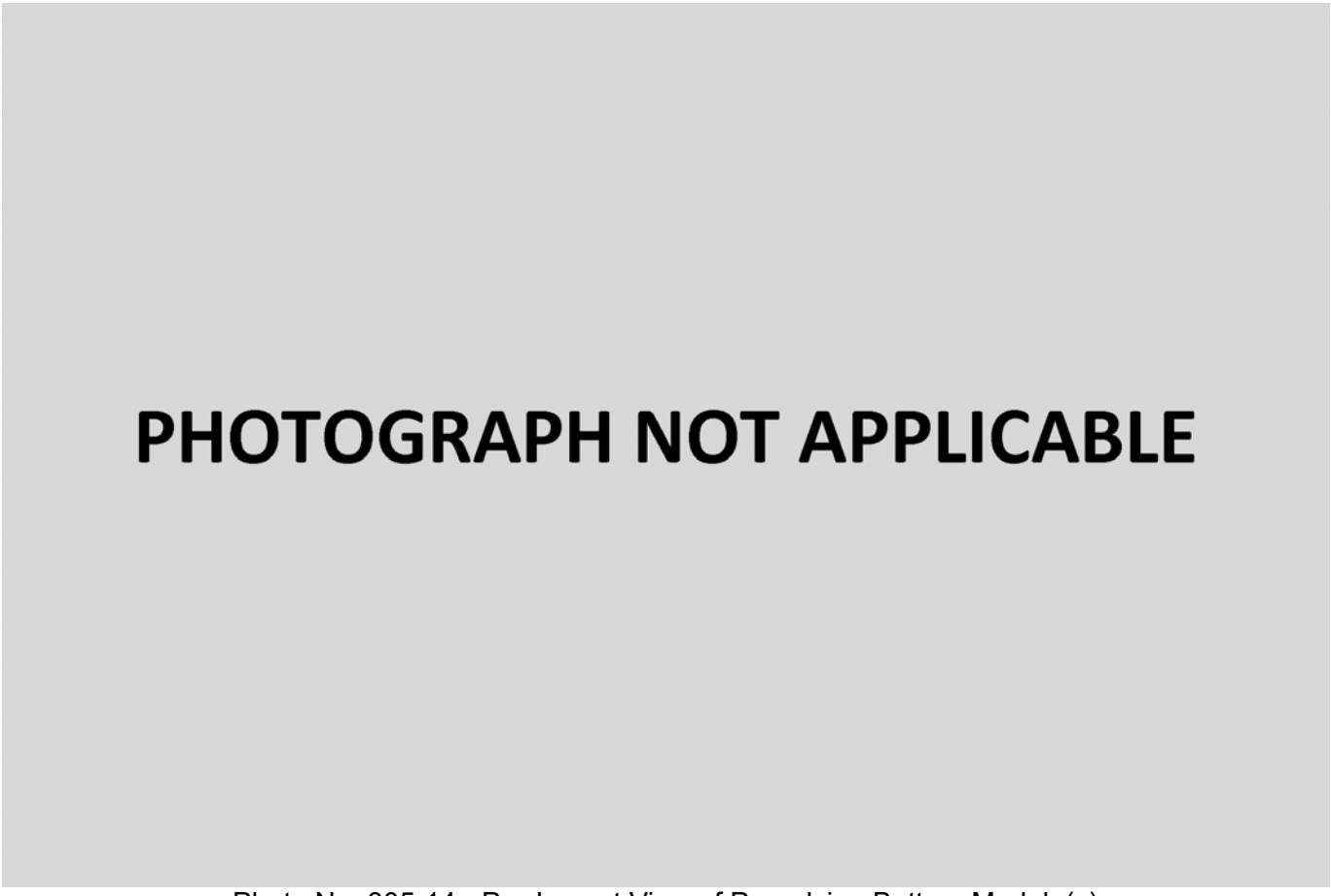


Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive

Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-19 - Pre-Impact View Propulsion Battery Venting System(s)

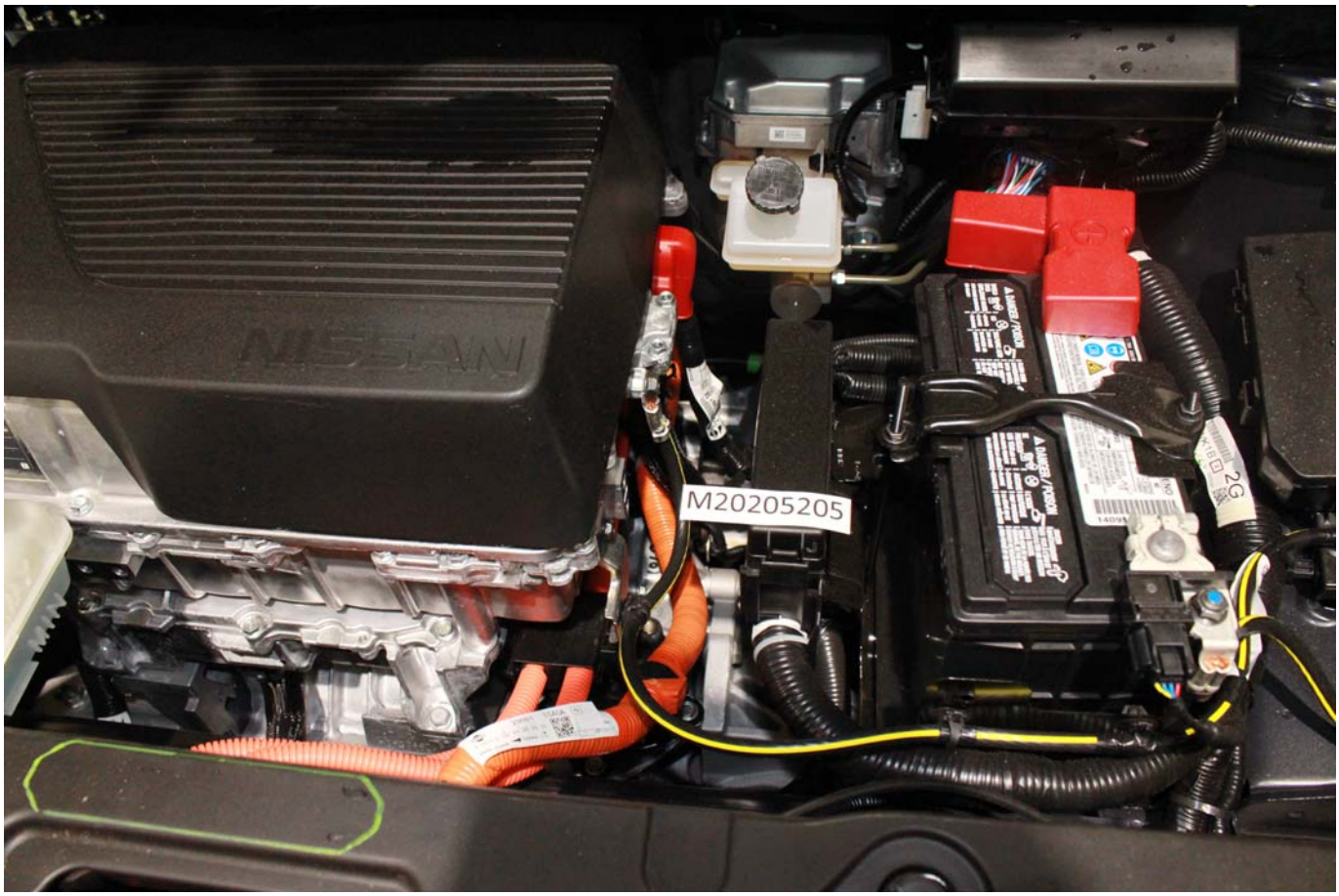


Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components

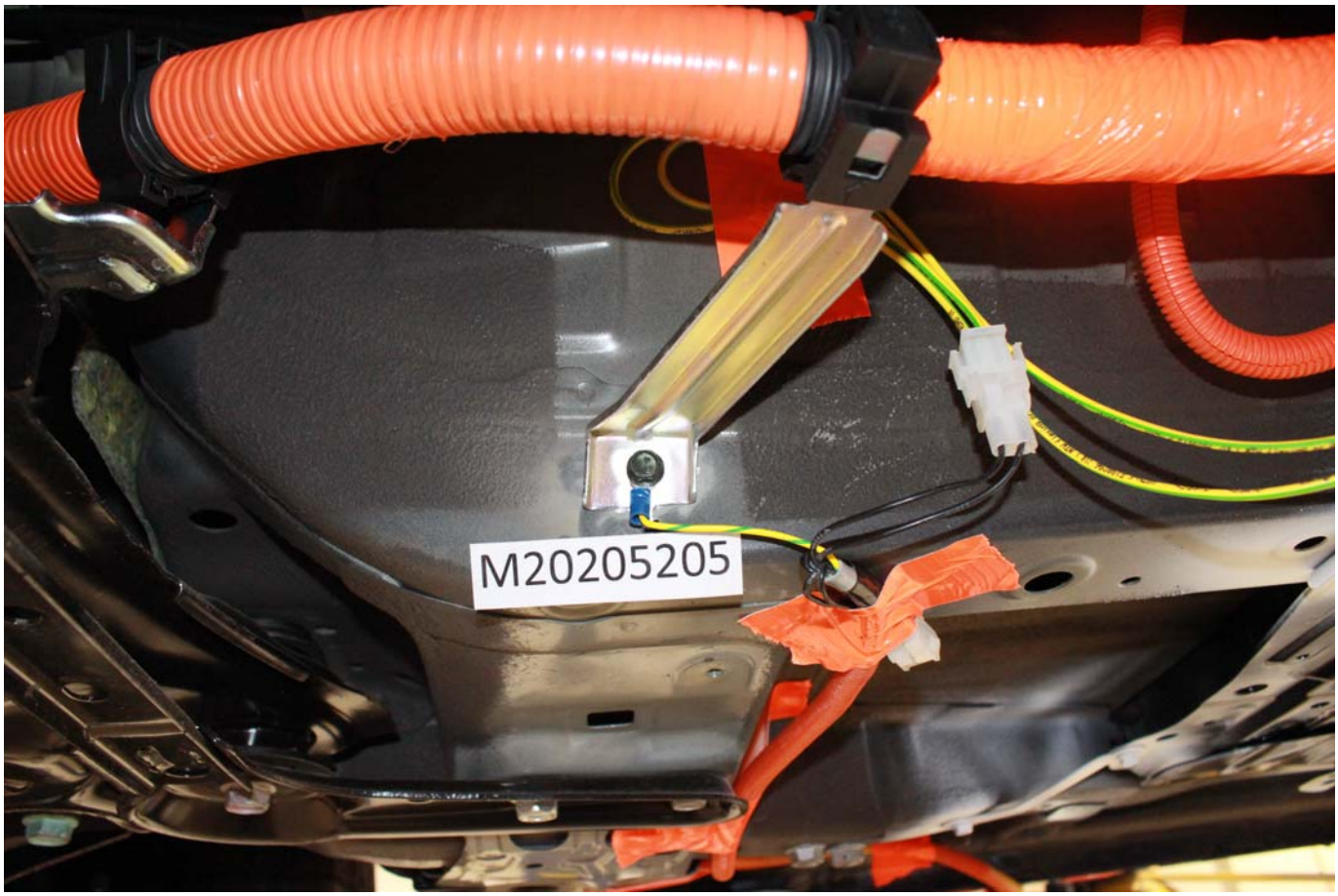


Photo No. 305-21 - Pre-Impact View of Ground Lead Attached

Photo No. 305-22 - Pre-Impact View of High Voltage Leads Attached

Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached

Photo No. 305-24 - Pre-Impact View of Installed Test Interface Port

Photo No. 305-25 - Post-Impact View of Installed Test Interface Port

Photo No. 305-26 - Pre-Impact View of Other Test Devices

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-27 - Post-Impact View of Other Test Devices

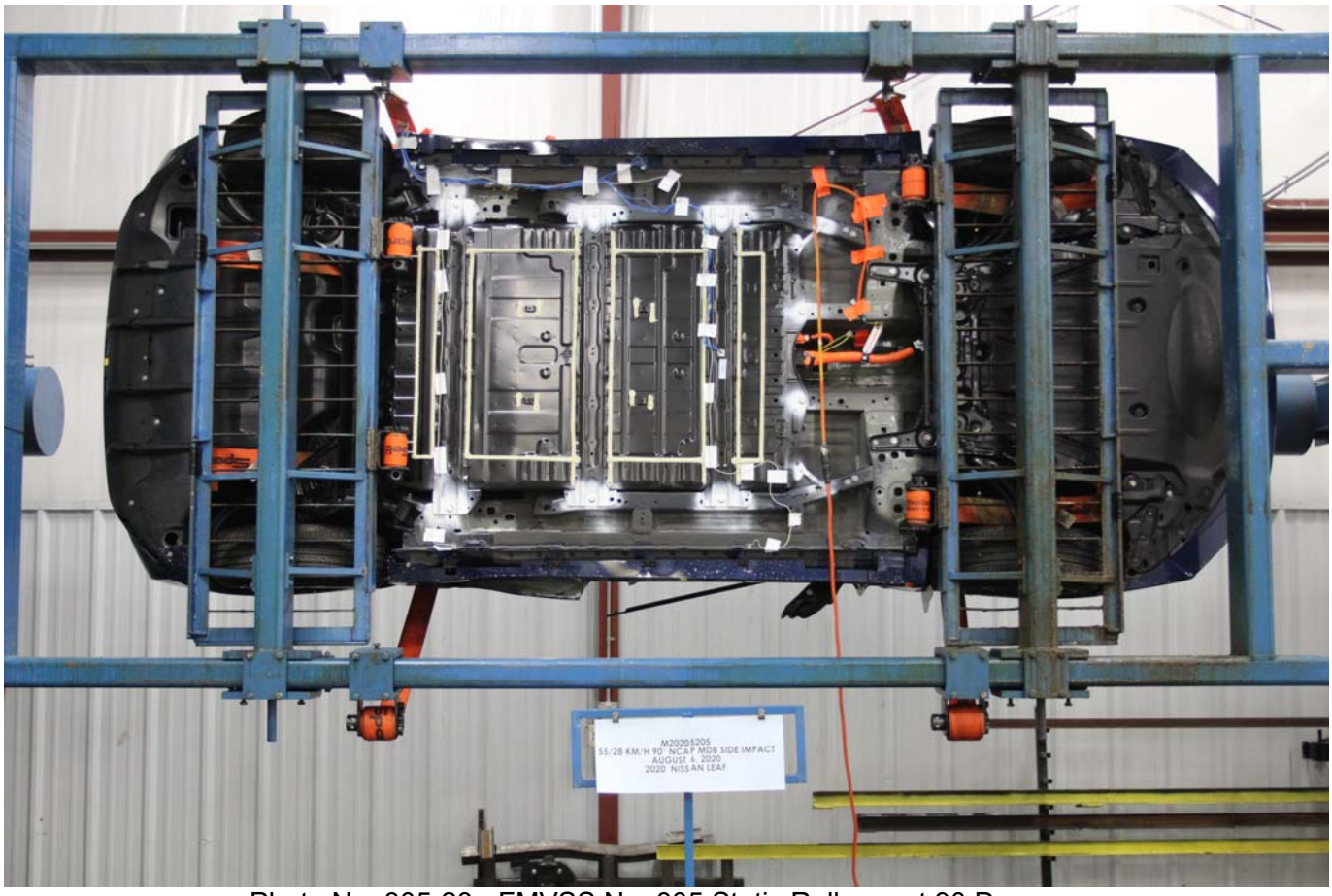


Photo No. 305-28 - FMVSS No. 305 Static Rollover at 90 Degrees

Photo No. 305-29 - FMVSS No. 305 Static Rollover at 180 Degrees

Photo No. 305-30 - FMVSS No. 305 Static Rollover at 270 Degrees

Photo No. 305-31 - FMVSS No. 305 Static Rollover at 360 Degrees

Photo No. 305-32 - Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photo No. 305-33 - Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

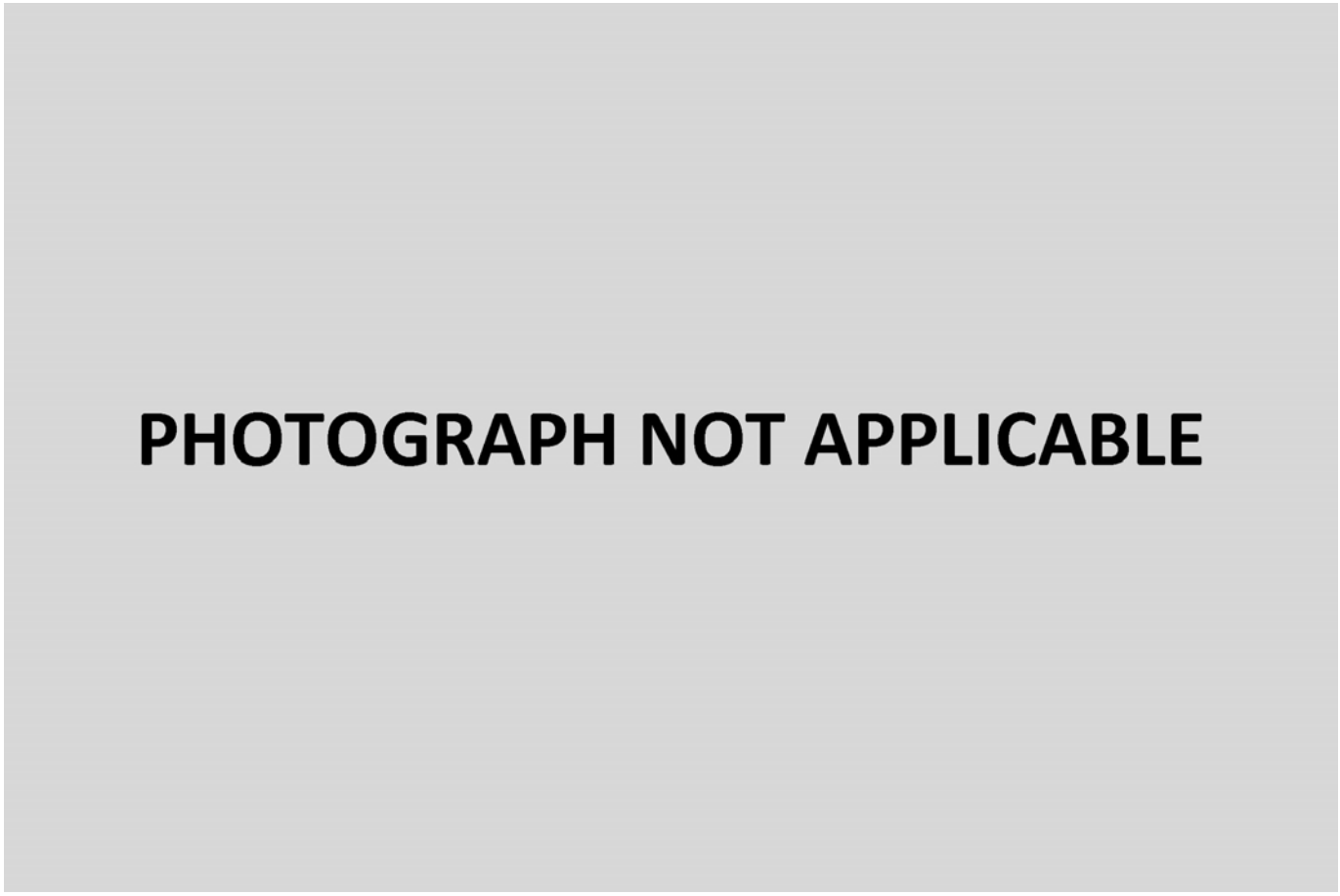


Photo No. 305-35 - Post-Impact View of Battery Component Intrusion

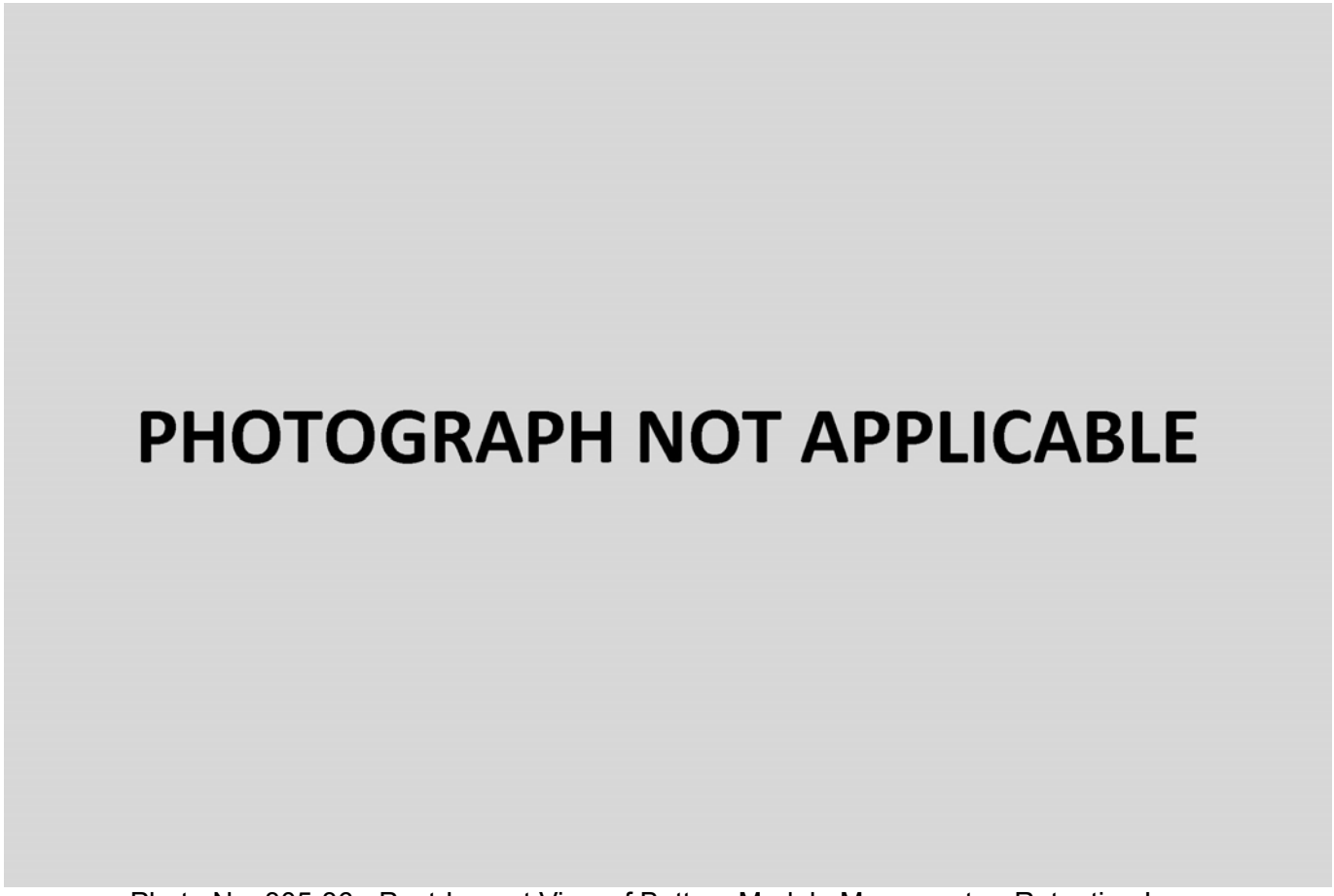


Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

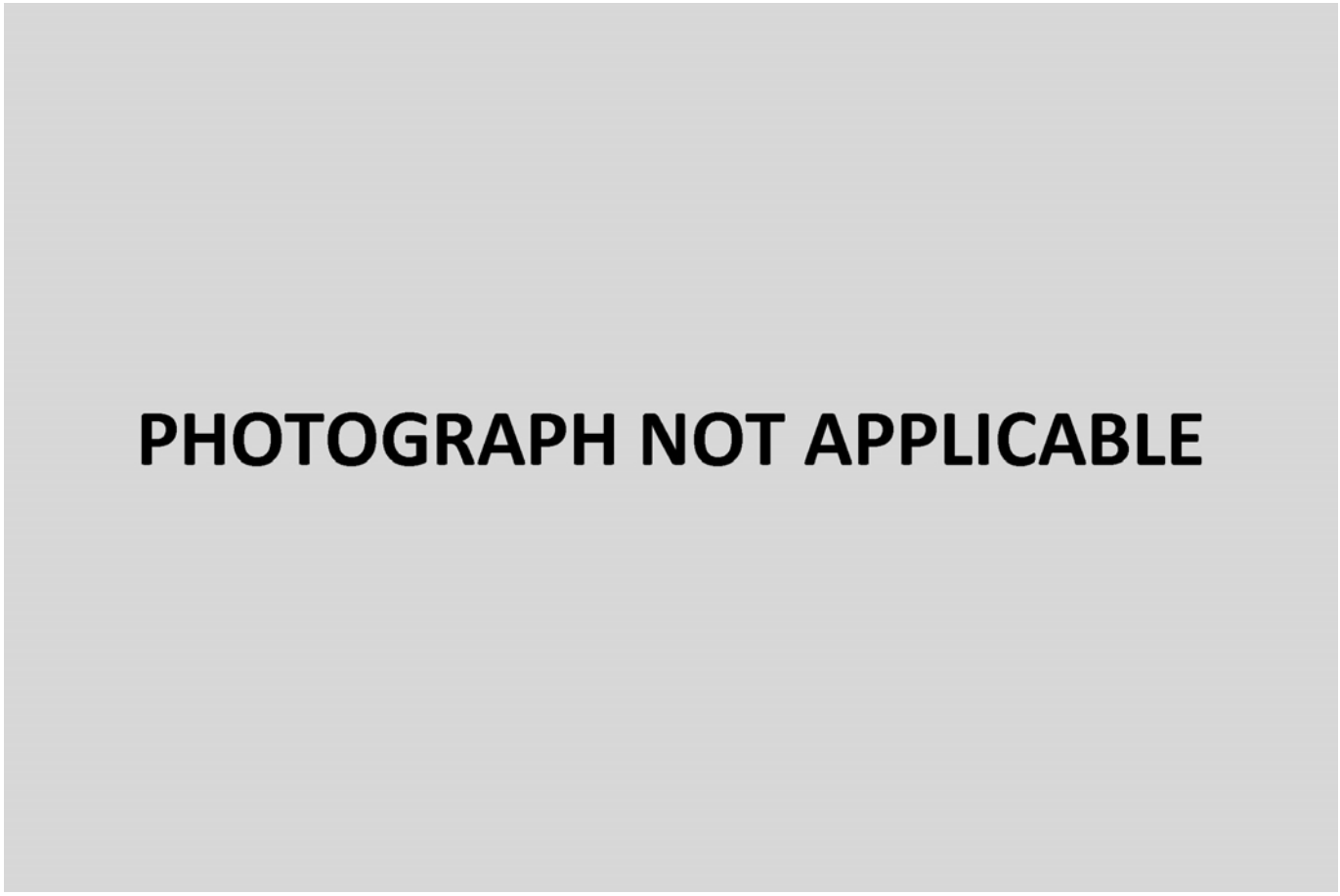


Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

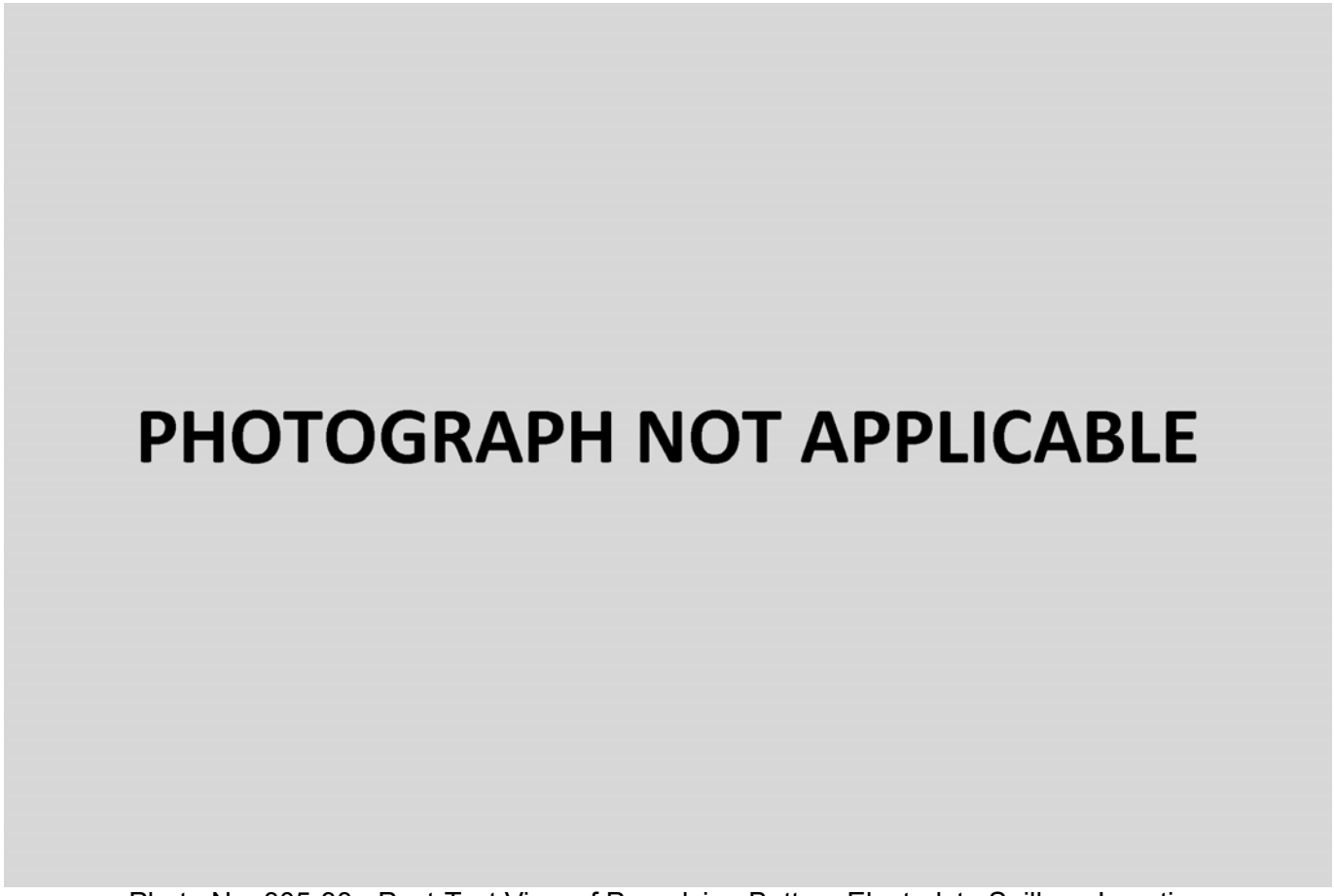


Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

Additional Driver & Passenger Dummy Instrumentation Data

Passenger Head Angular Velocity (X)

Passenger Head Angular Velocity (Y)

Passenger Head Angular Velocity (Z)

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)

Passenger Lower Abdomen Rib Deflection (Y)

Driver Head Acceleration Redundant (X)

Driver Head Acceleration Redundant (Y)

Driver Head Acceleration Redundant (Z)

Passenger Head Acceleration Redundant (X)

Passenger Head Acceleration Redundant (Y)

Passenger Head Acceleration Redundant (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Lower A-Post Acceleration (Y)

Middle A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Middle B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Track Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

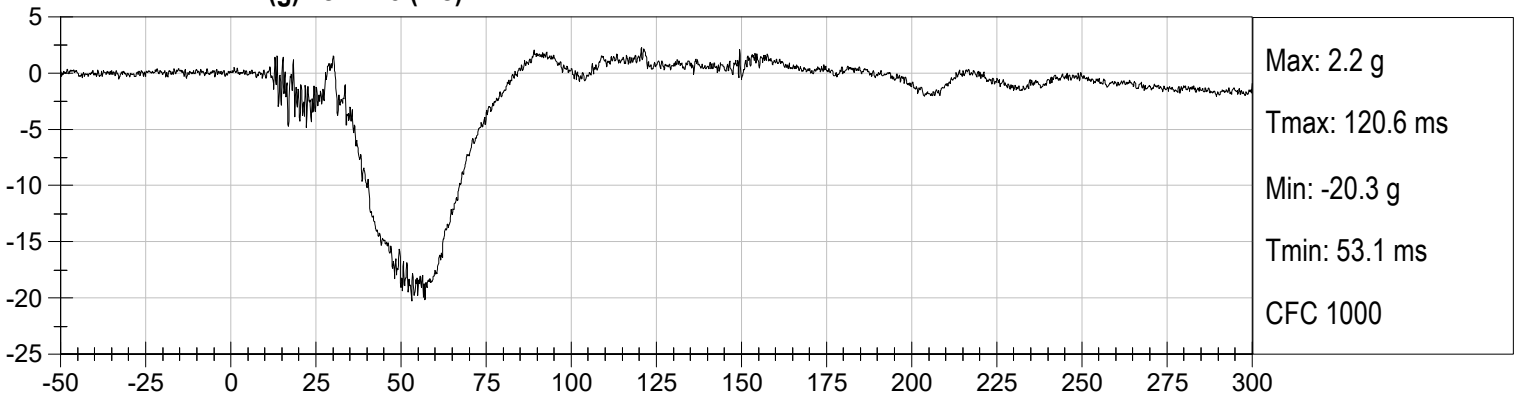
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

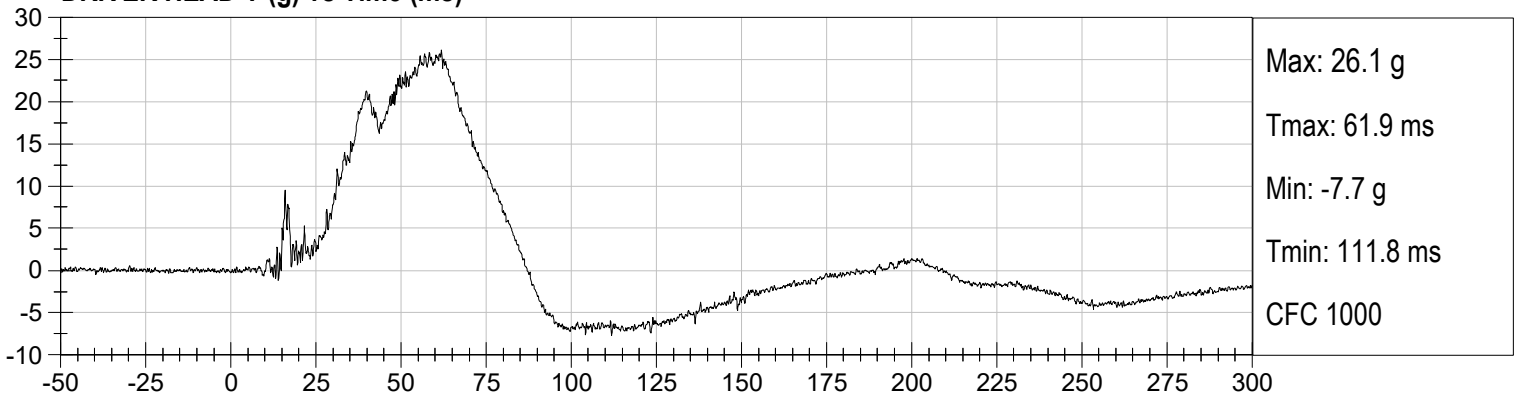
Left MDB Contact Switch

Right MDB Contact Switch

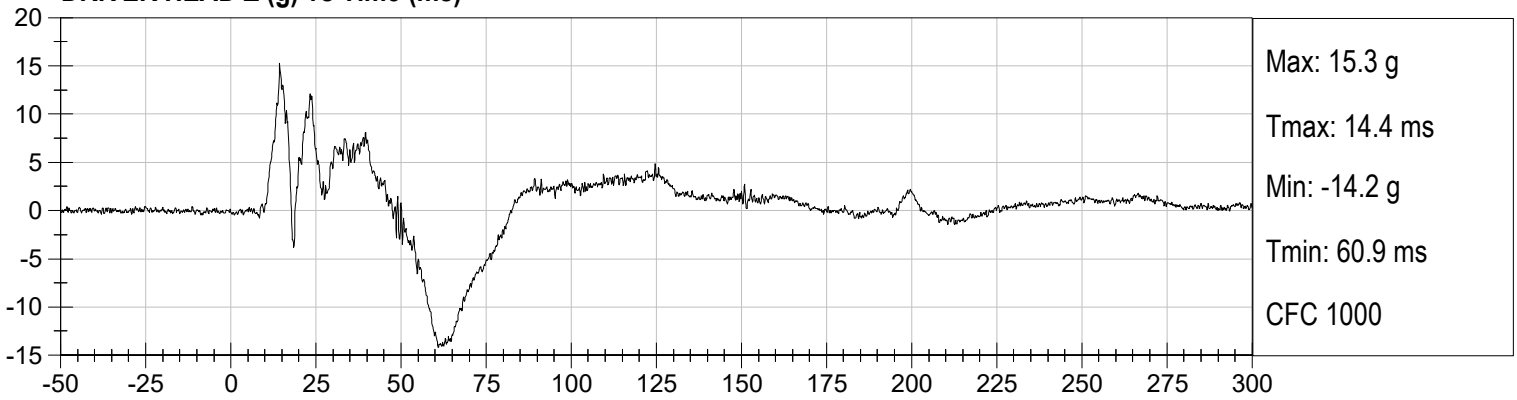
DRIVER HEAD X (g) vs Time (ms)



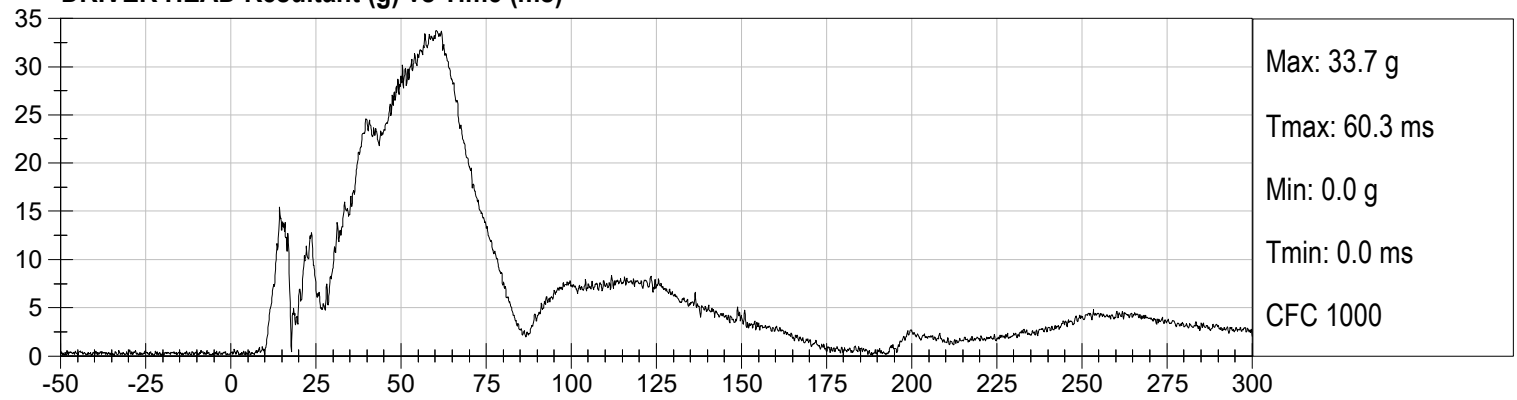
DRIVER HEAD Y (g) vs Time (ms)



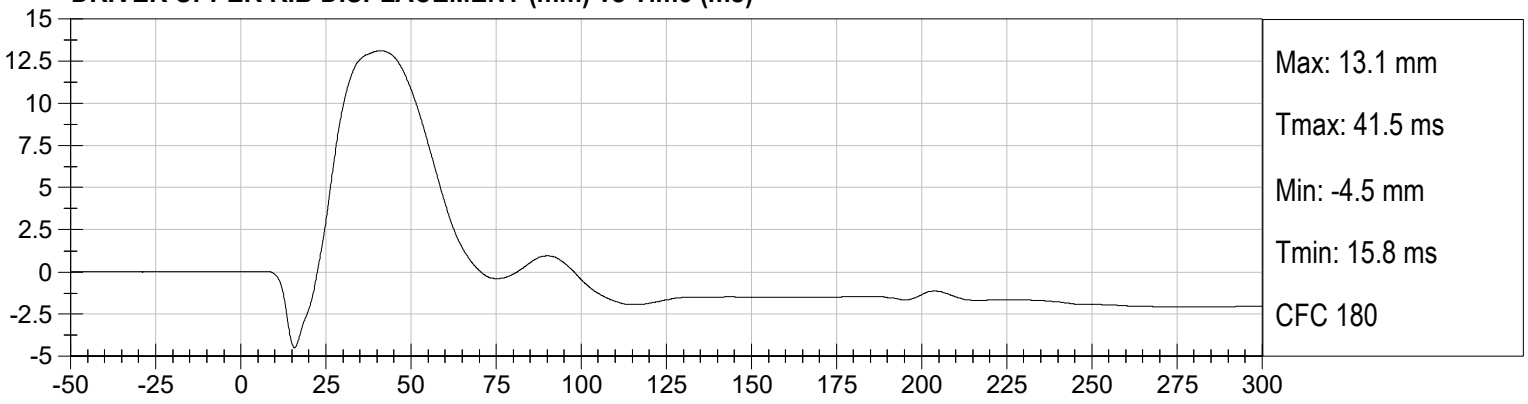
DRIVER HEAD Z (g) vs Time (ms)



DRIVER HEAD Resultant (g) vs Time (ms)

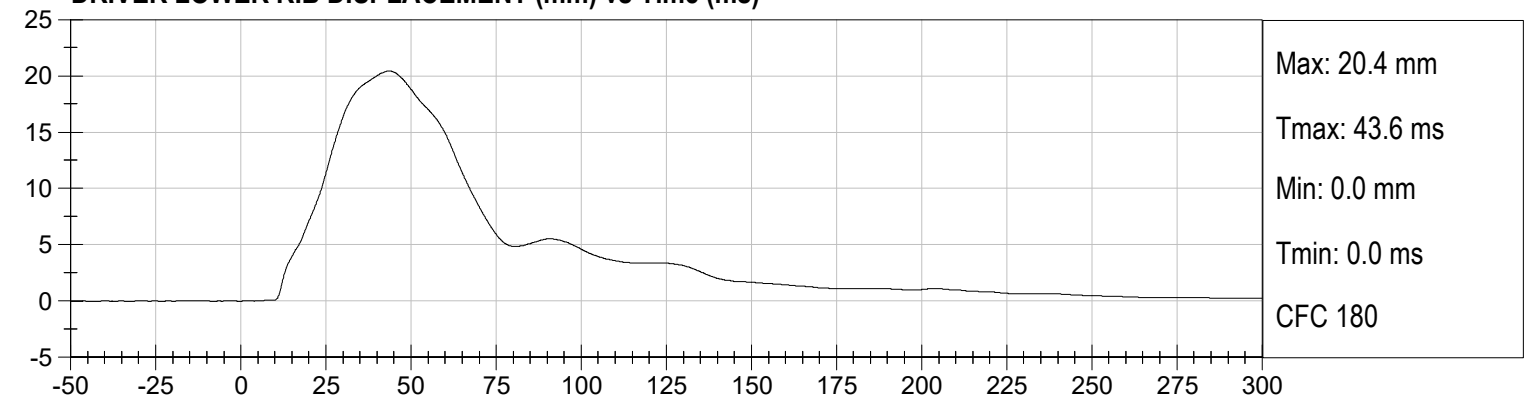


DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)

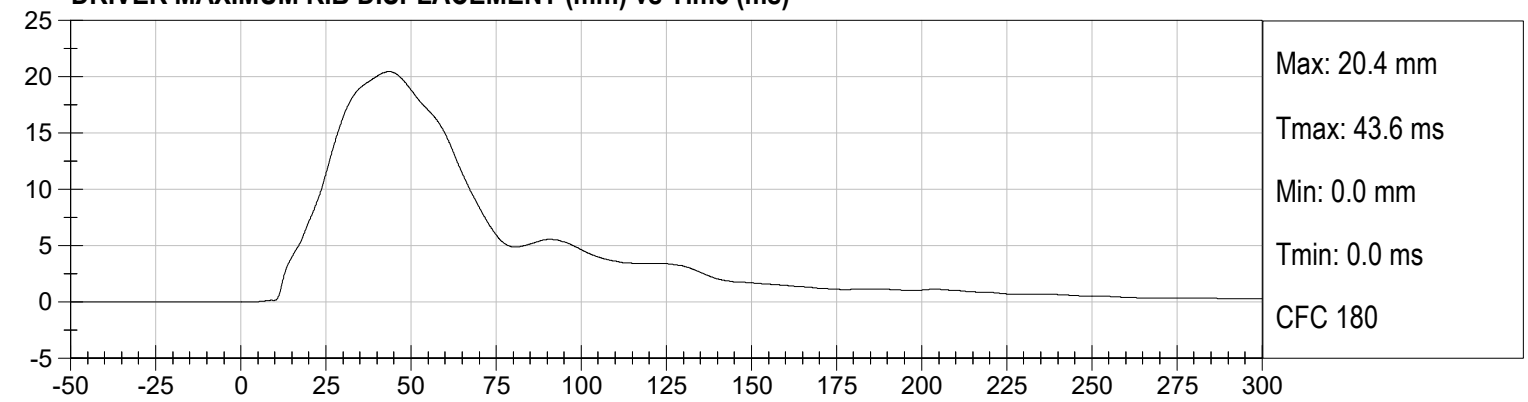


DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)

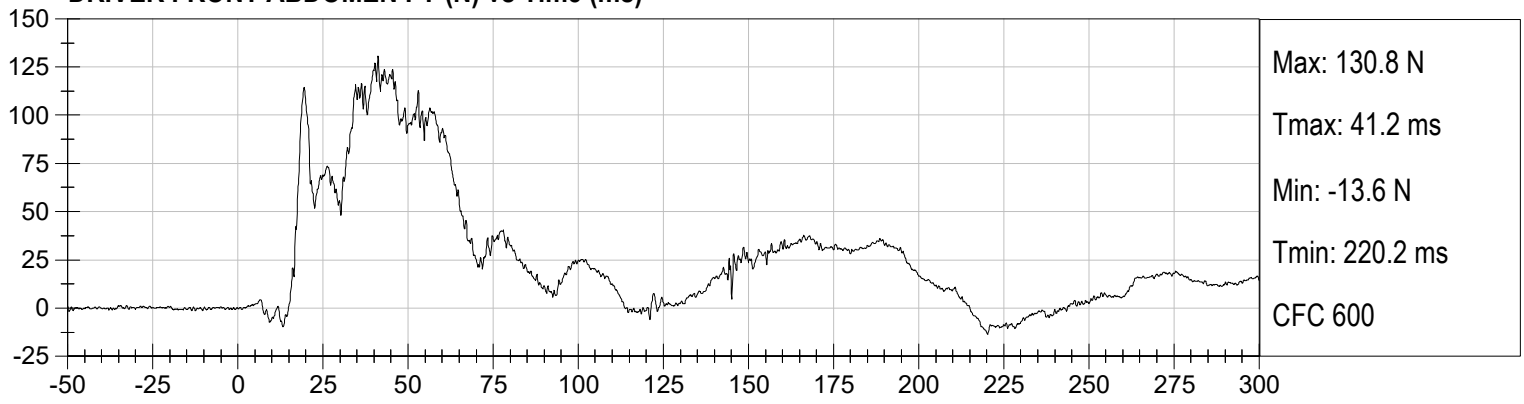
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



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

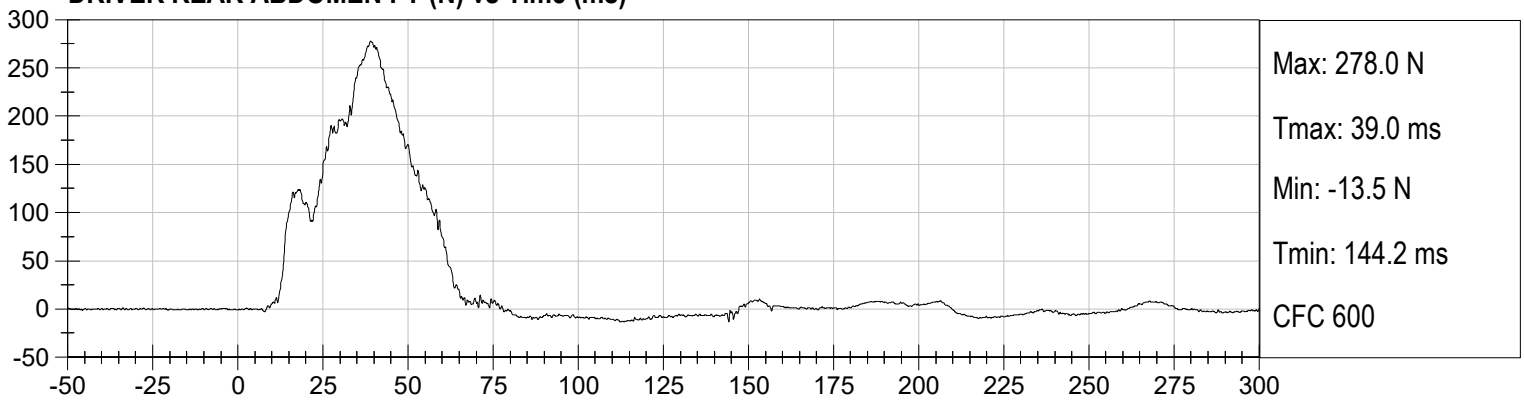


DRIVER FRONT ABDOMEN FY (N) vs Time (ms)

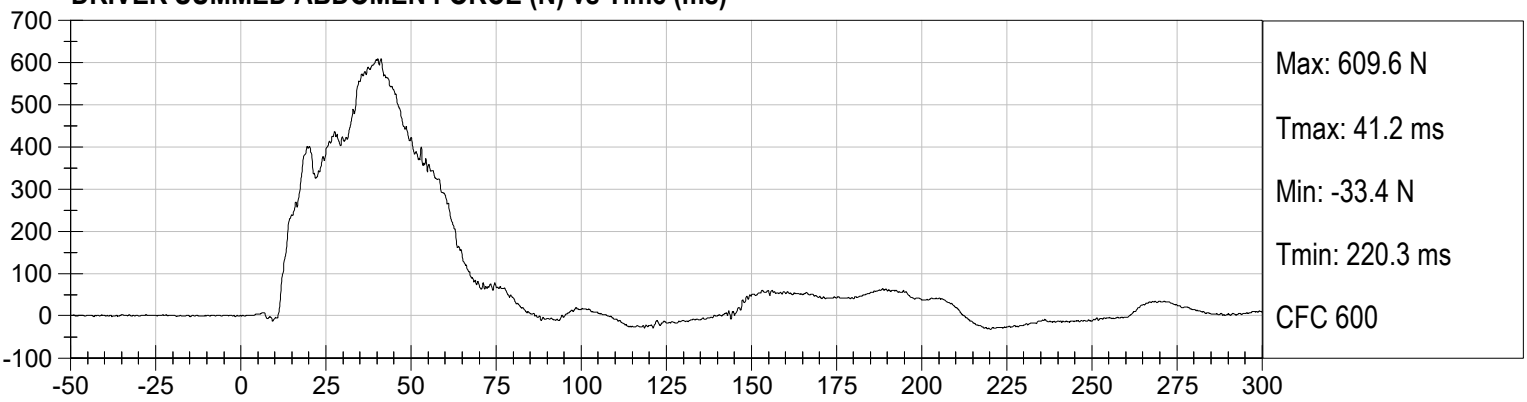


DRIVER MID ABDOMEN FY (N) vs Time (ms)

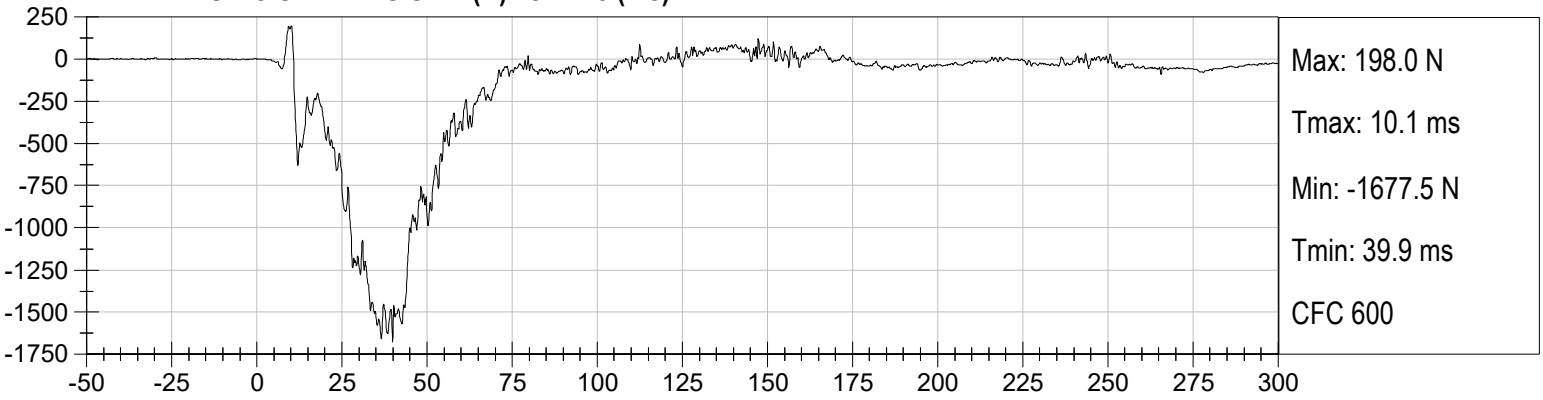
DRIVER REAR ABDOMEN FY (N) vs Time (ms)



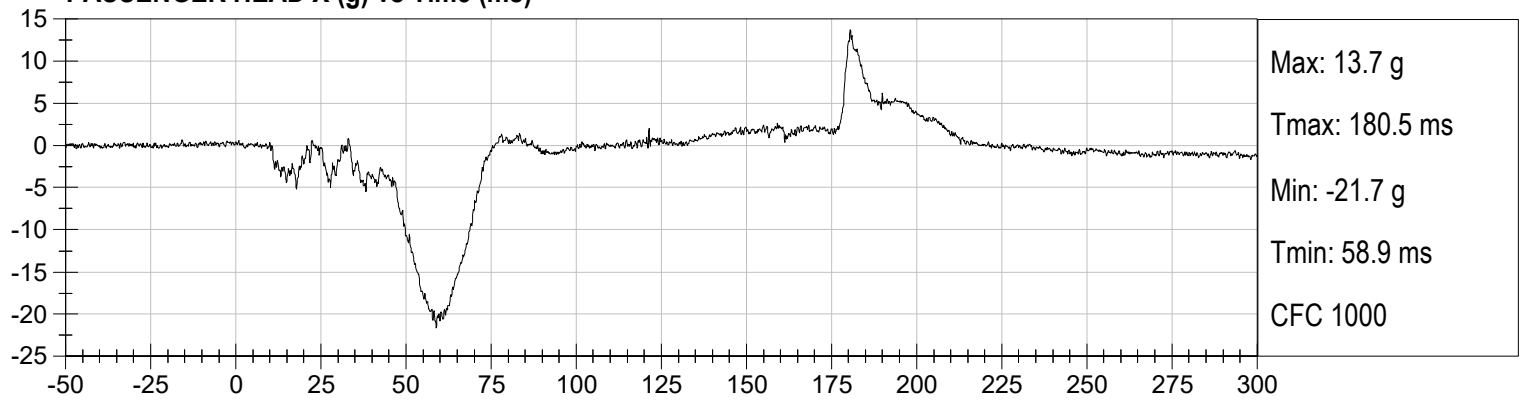
DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)



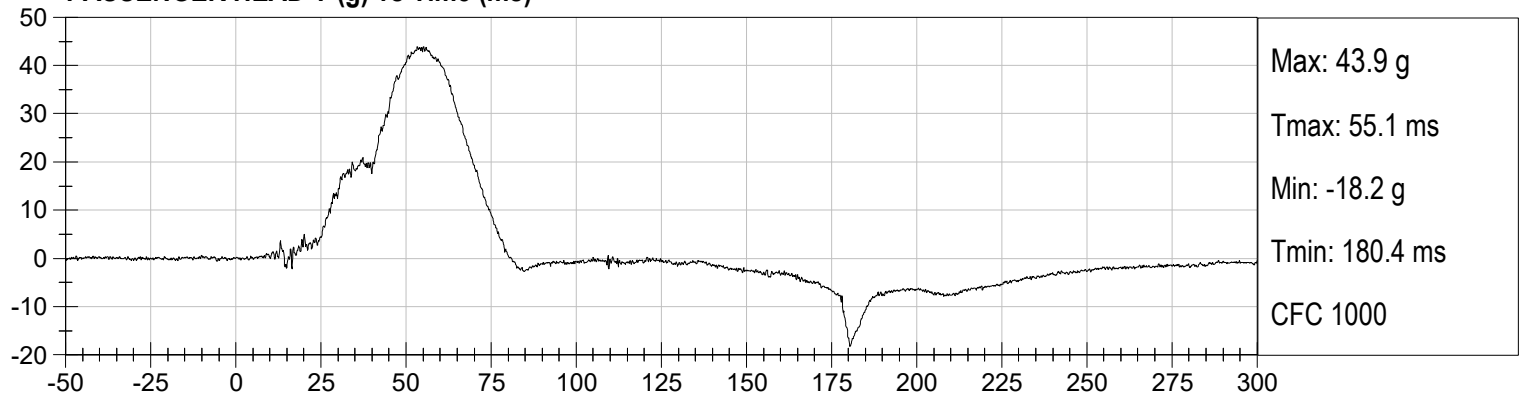
DRIVER PUBIC SYMPHYSIS FY (N) vs Time (ms)



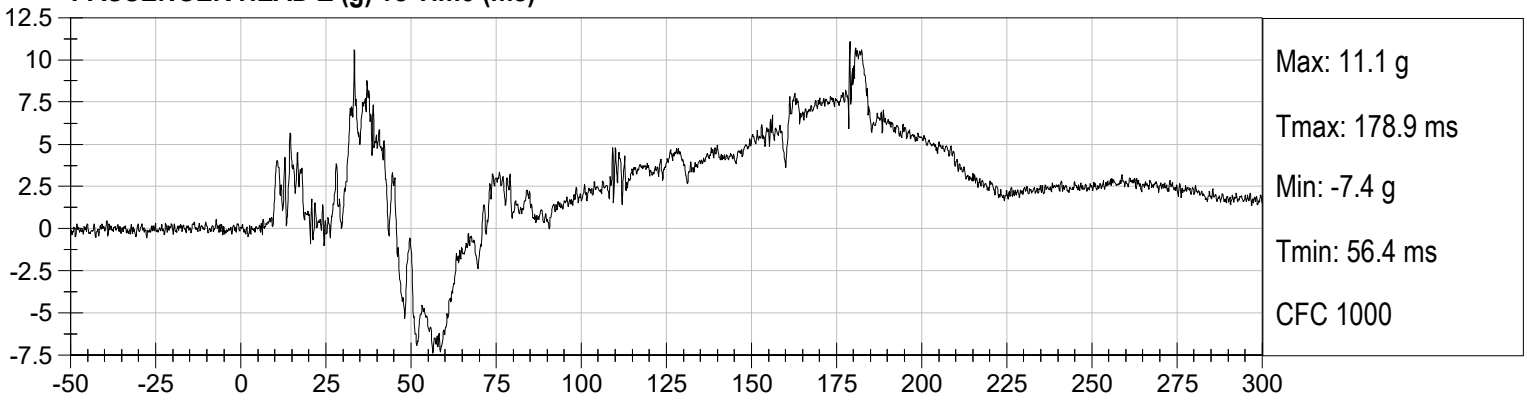
PASSENGER HEAD X (g) vs Time (ms)



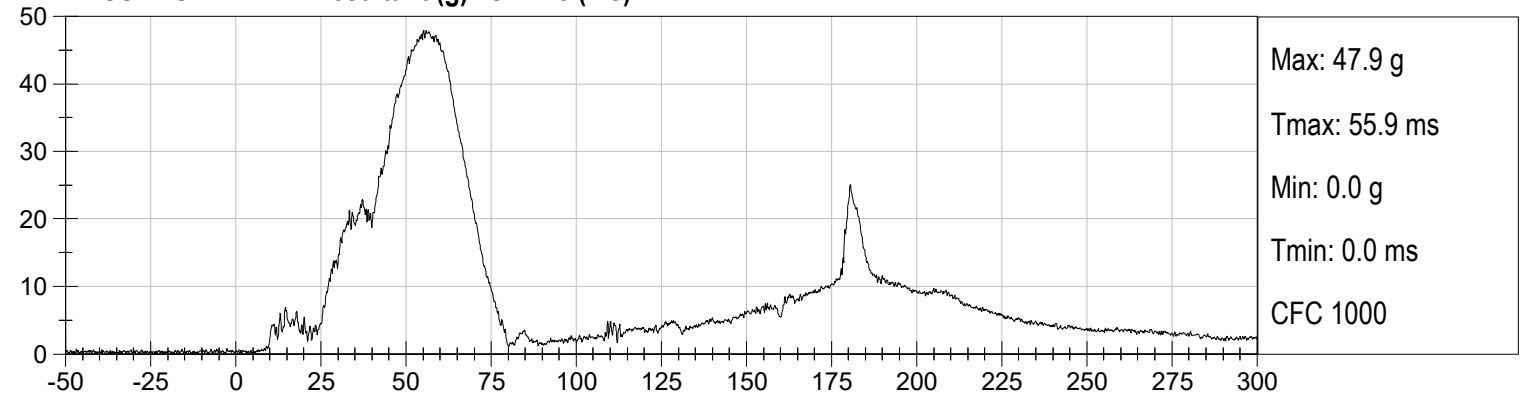
PASSENGER HEAD Y (g) vs Time (ms)



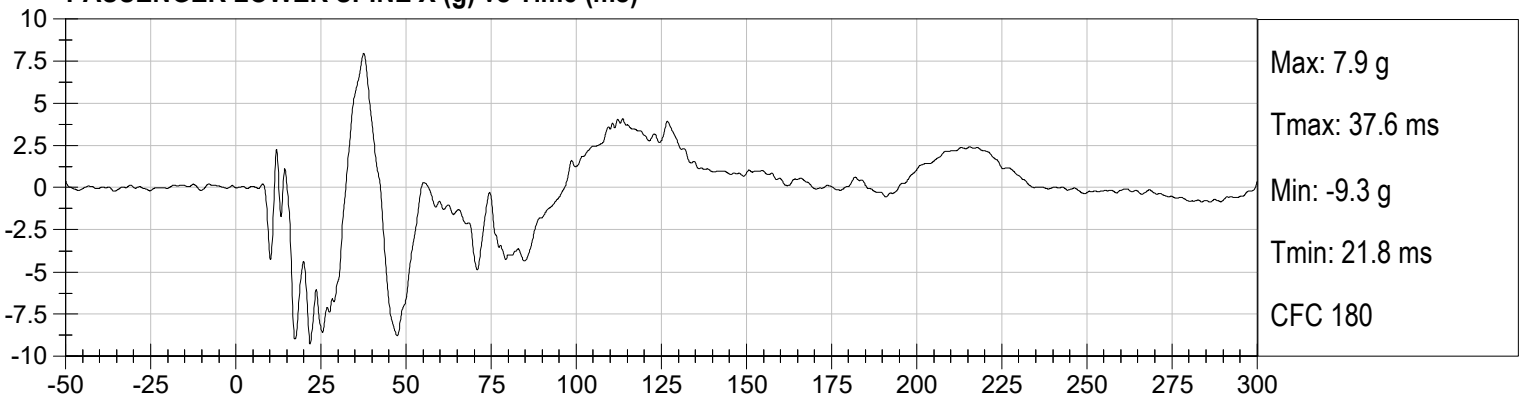
PASSENGER HEAD Z (g) vs Time (ms)



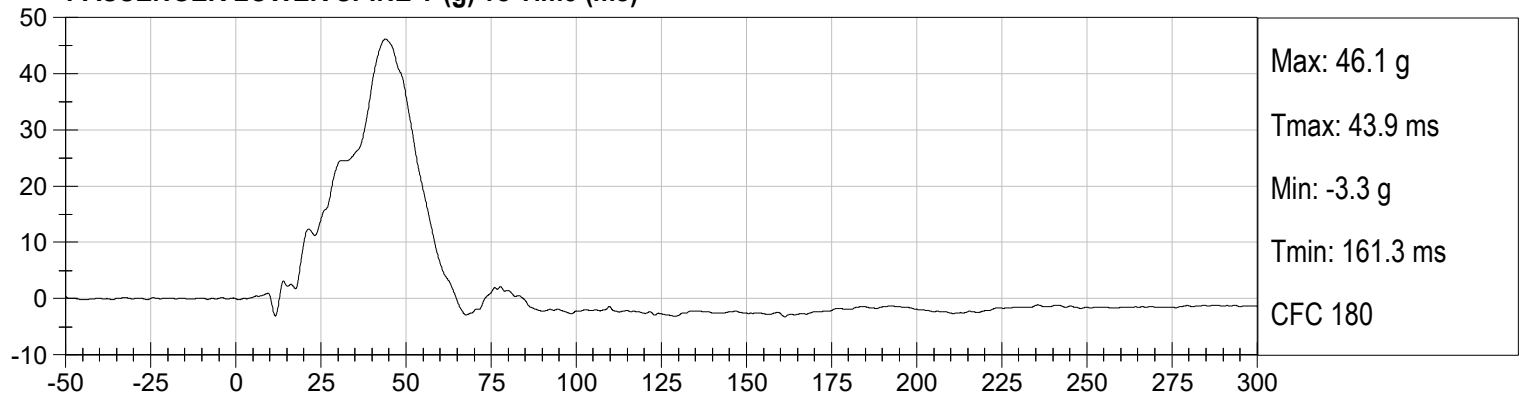
PASSENGER HEAD Resultant (g) vs Time (ms)



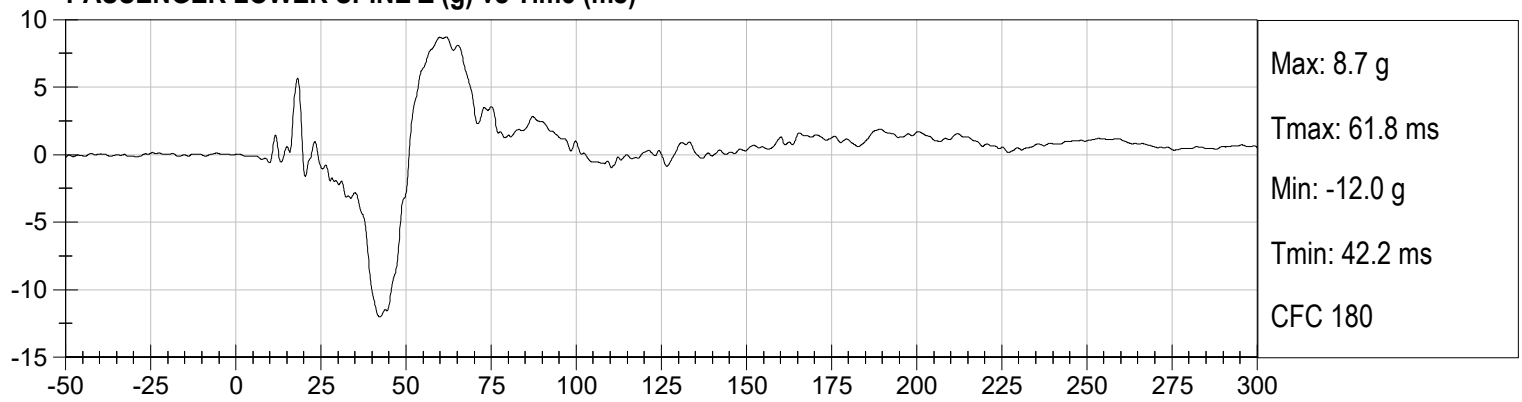
PASSENGER LOWER SPINE X (g) vs Time (ms)



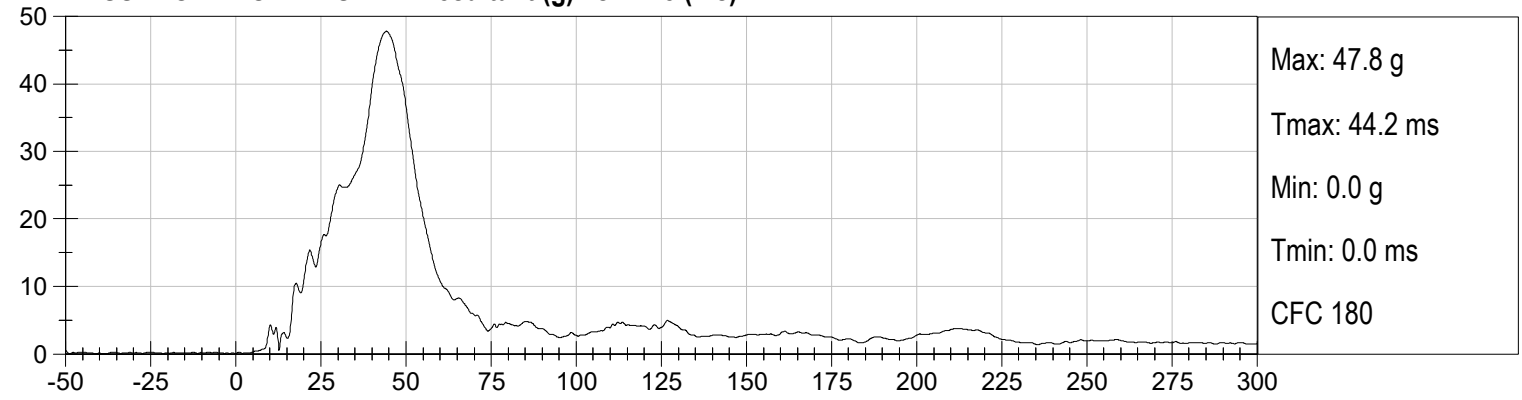
PASSENGER LOWER SPINE Y (g) vs Time (ms)



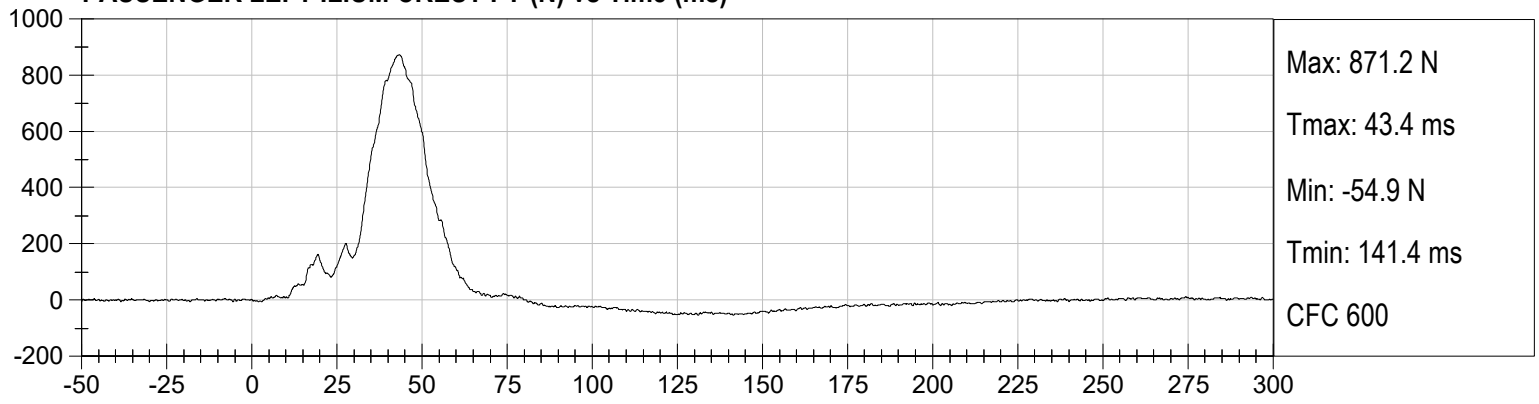
PASSENGER LOWER SPINE Z (g) vs Time (ms)



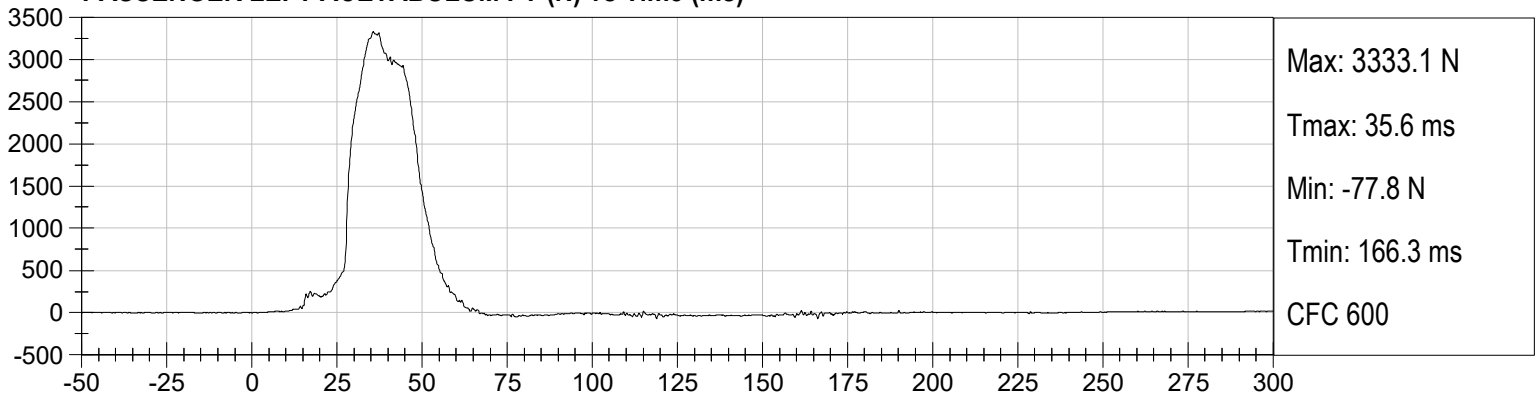
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



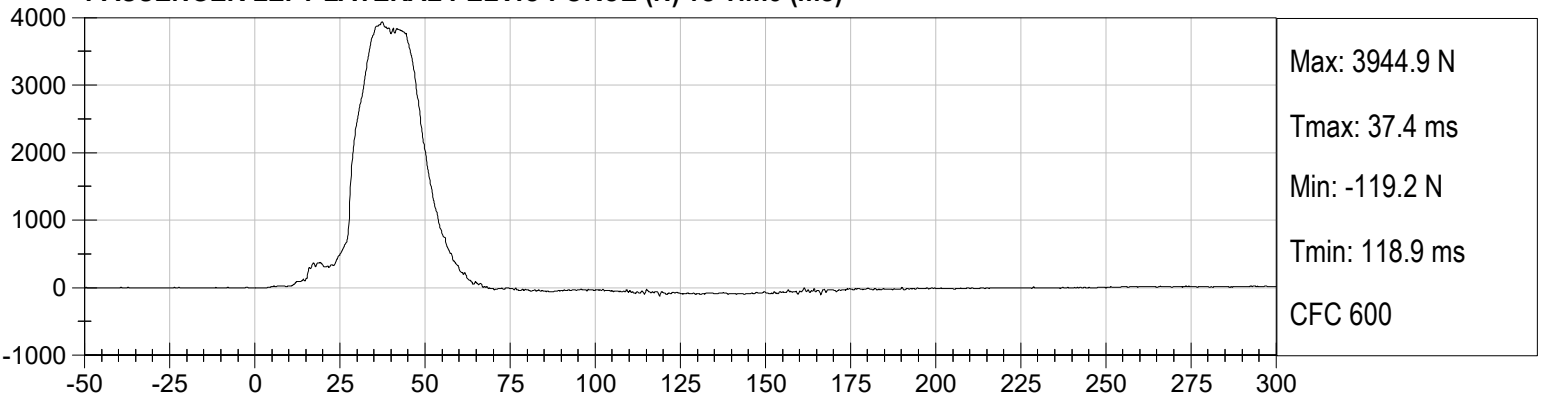
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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



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



APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 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:** D201721

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	125 to 155	139	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

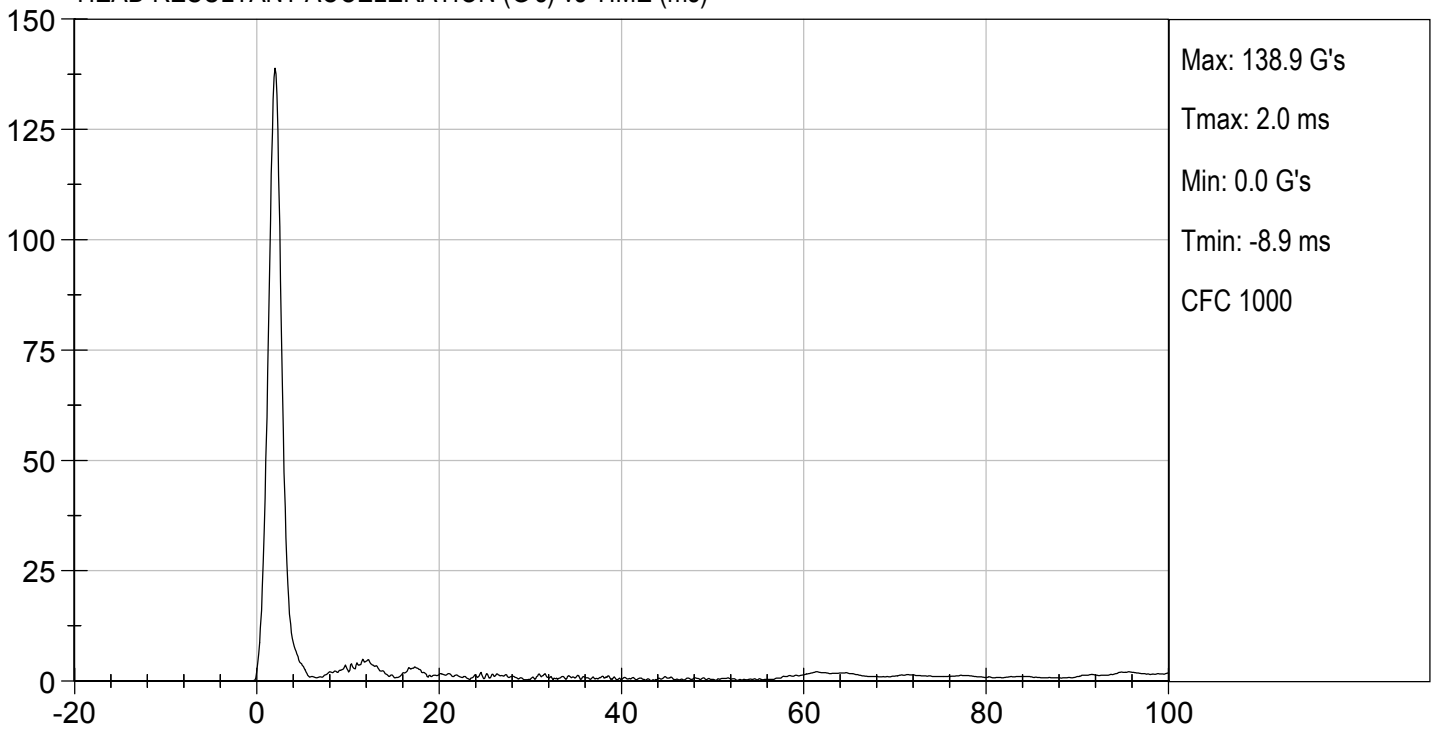
07/14/2020
Test Date

Approved By

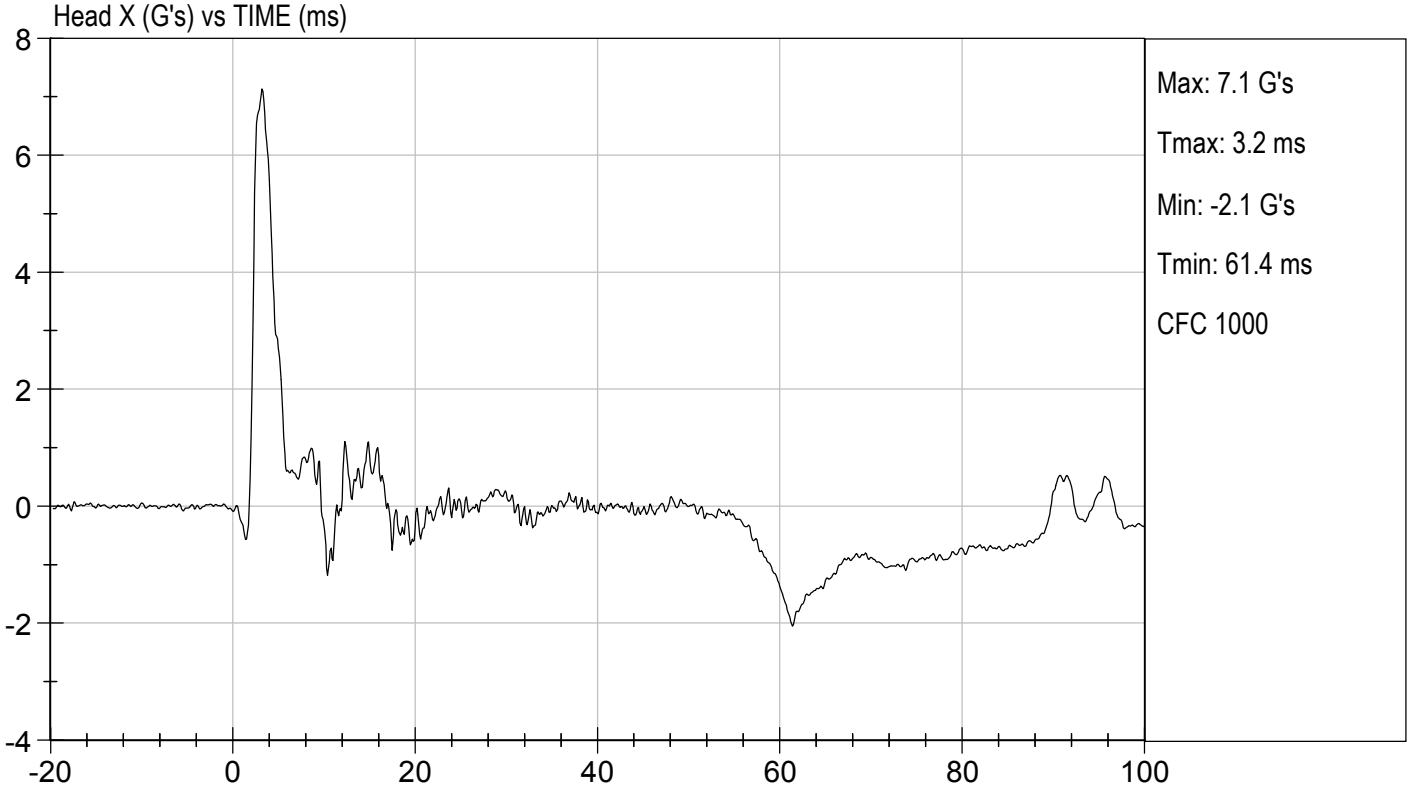
TEST DESC: HEAD DROP

TEST DATE: 07/14/2020
TEST #: D201721

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

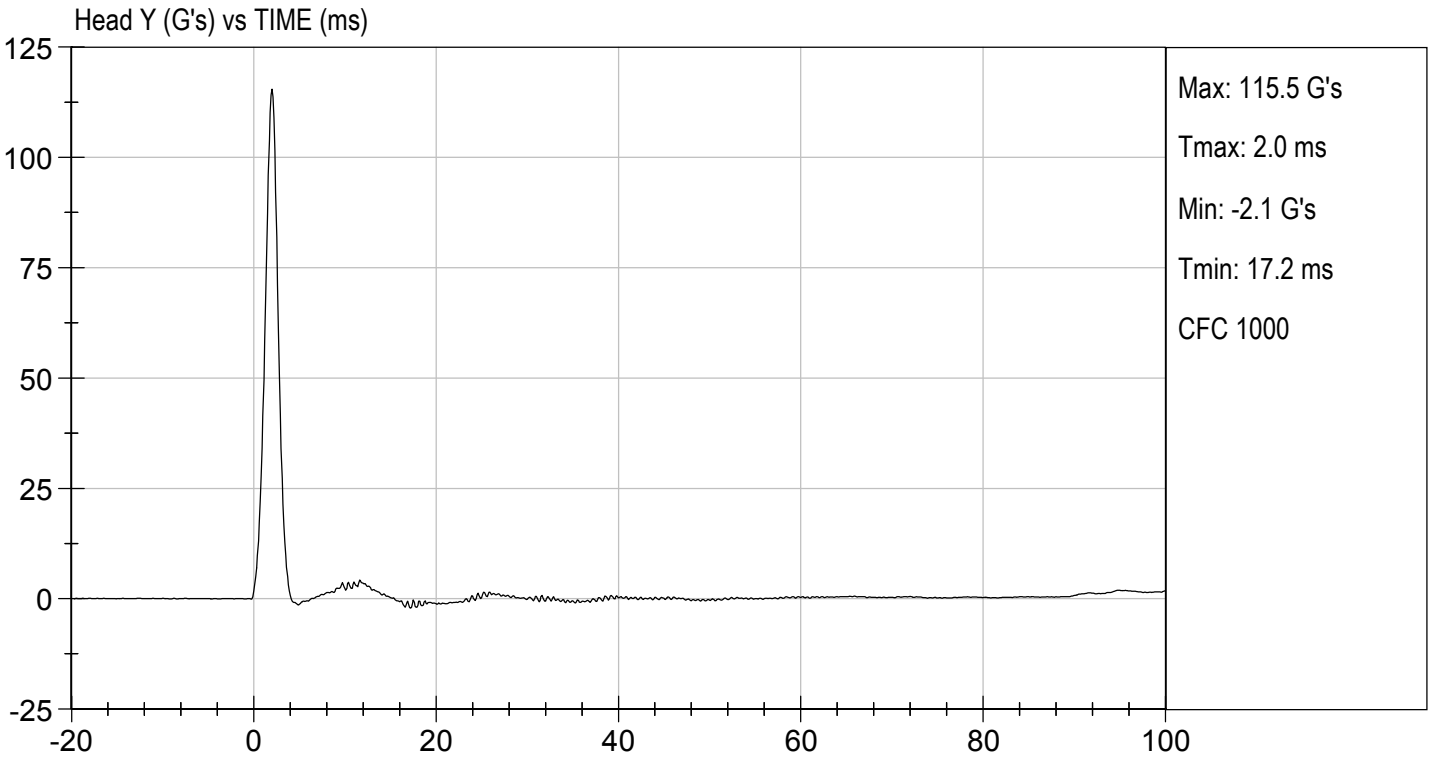


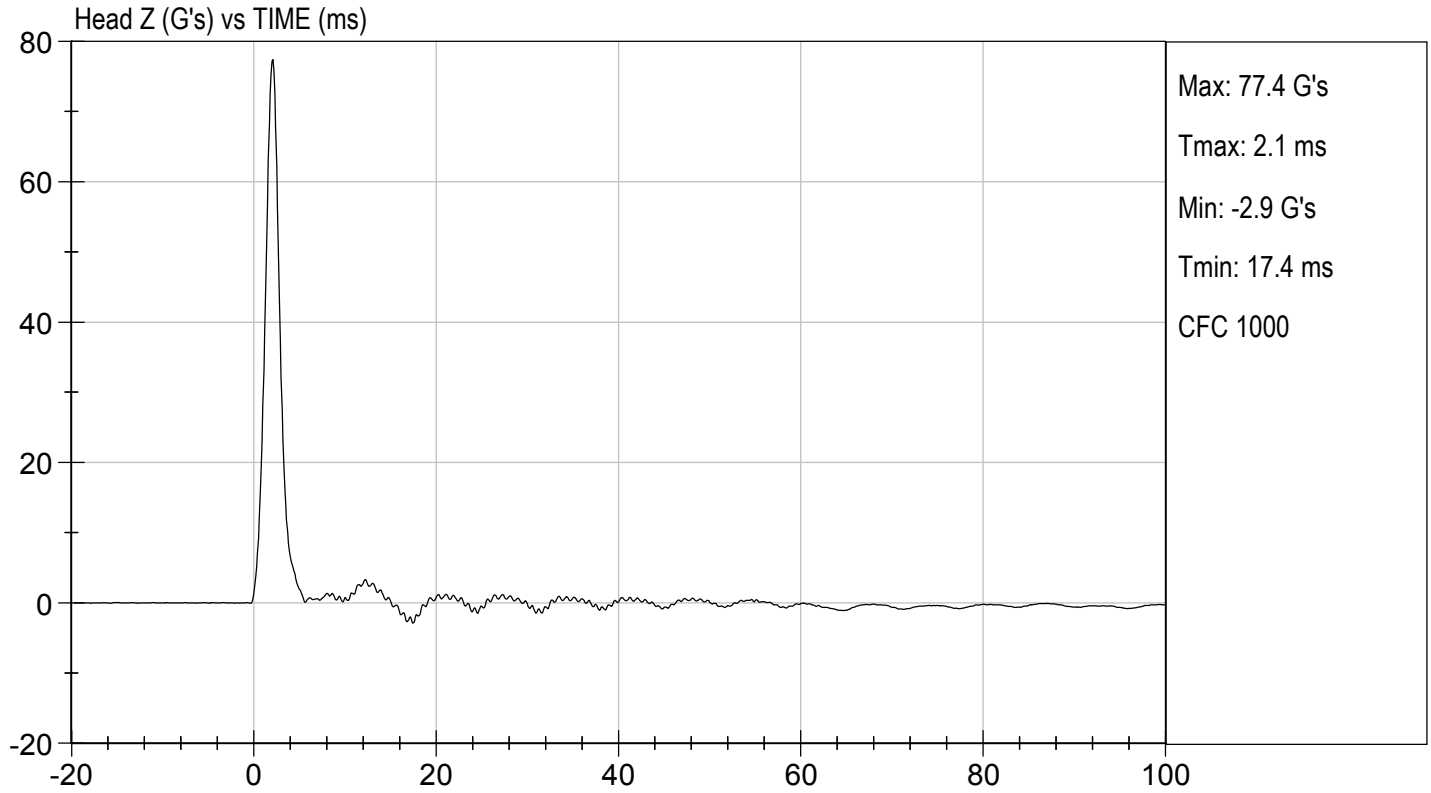
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 07/14/2020
TEST #: D201721





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201722

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	45	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	-3.53	Pass
	17 ms	m/s	>= -3.70	-3.43	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.9	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.2	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	58.6	Pass
			Overall Results		Pass

Laboratory Technician

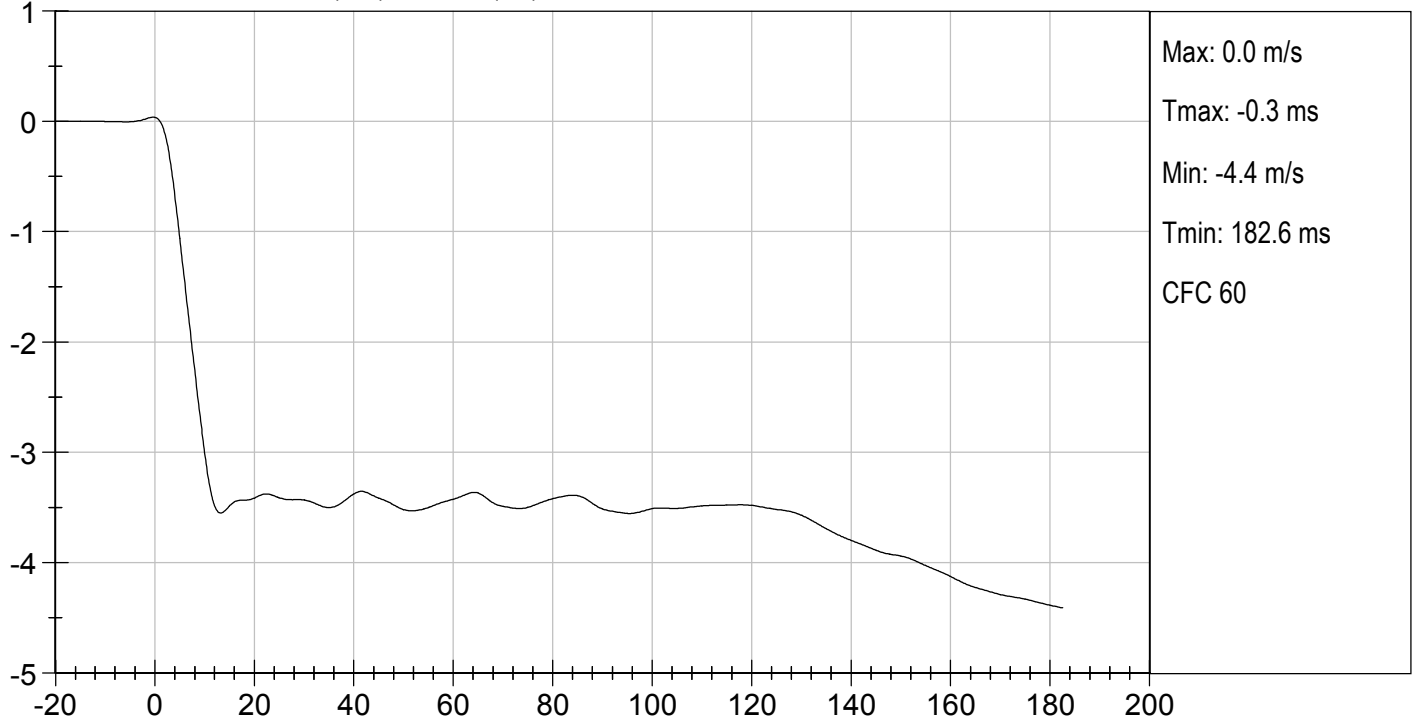
07/15/2020
Test Date

Approved By

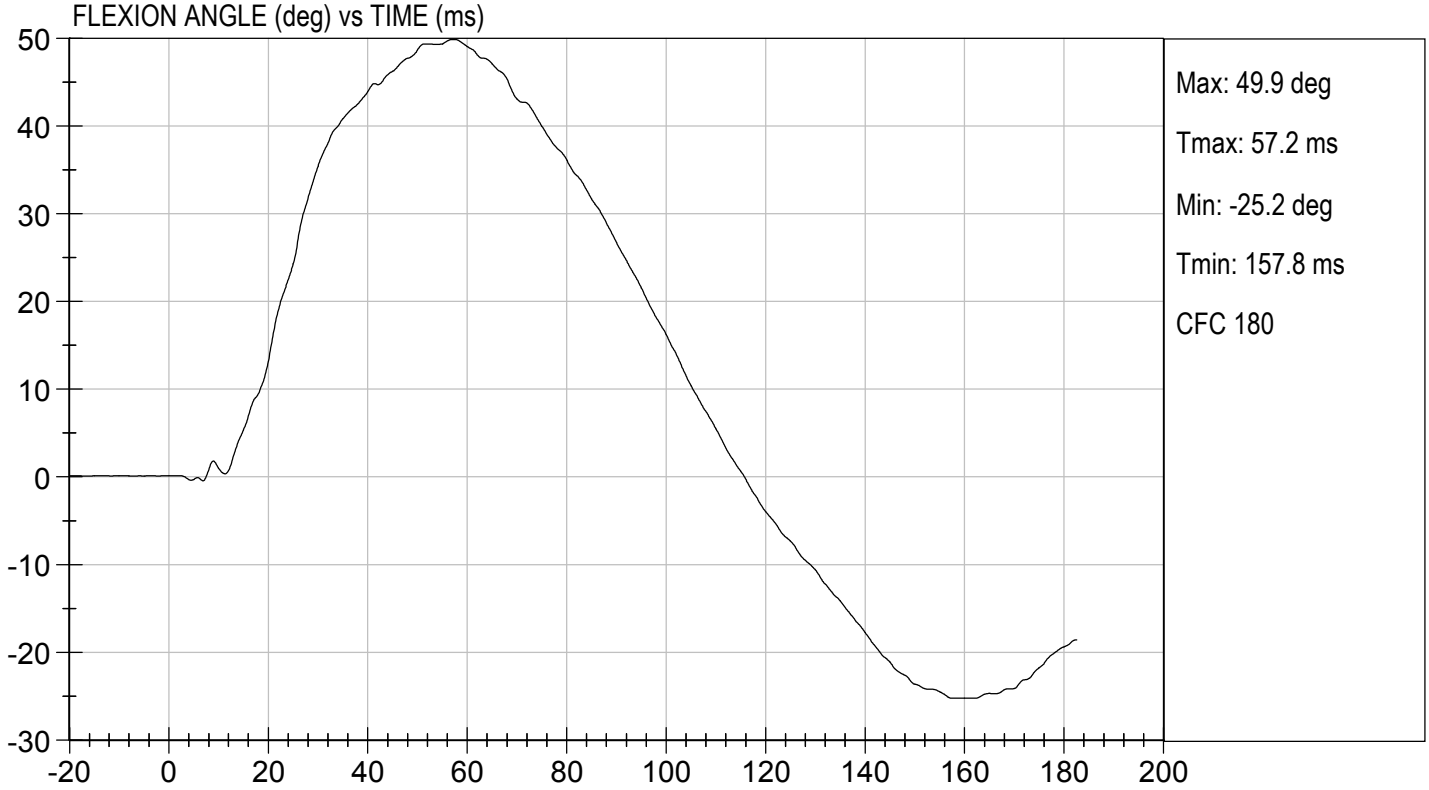
TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

TEST DATE: 07/15/2020
TEST #: D201722

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



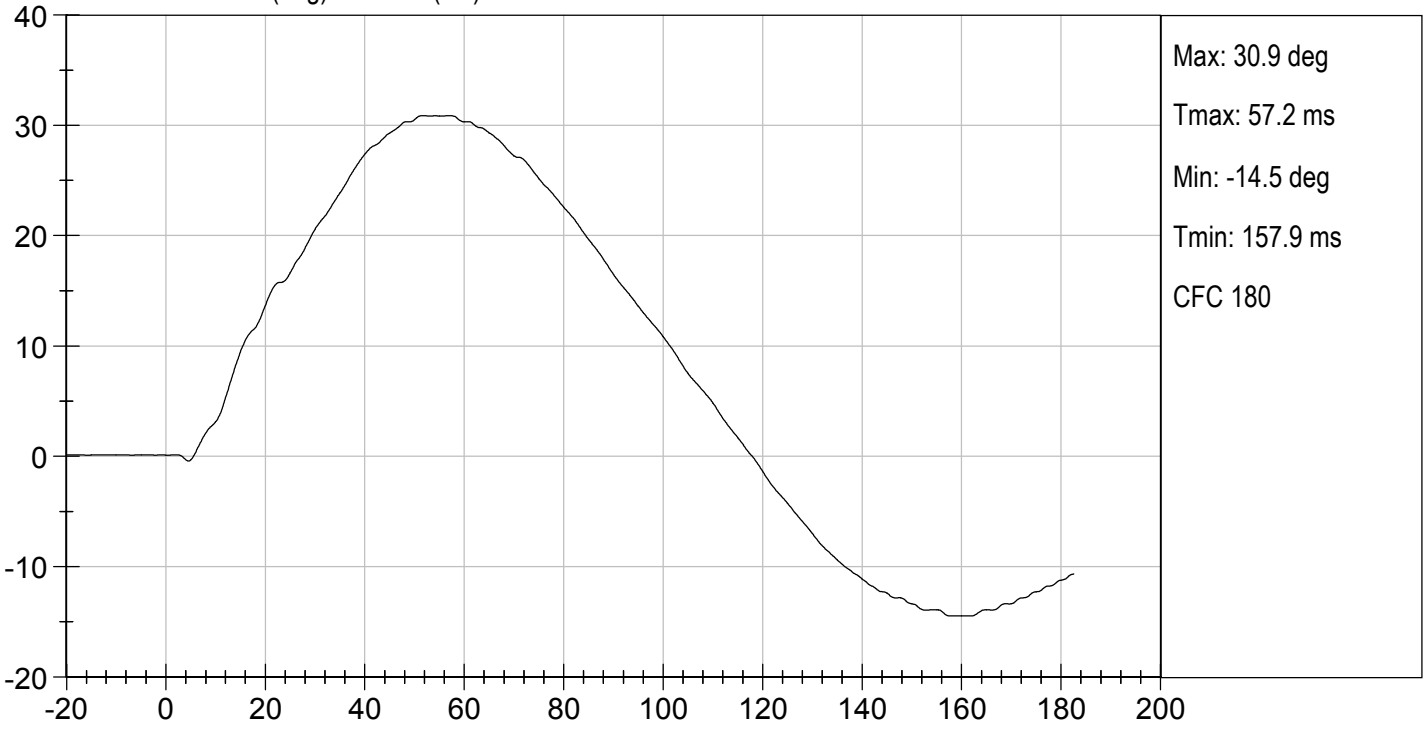
FLEXION ANGLE (deg) vs TIME (ms)



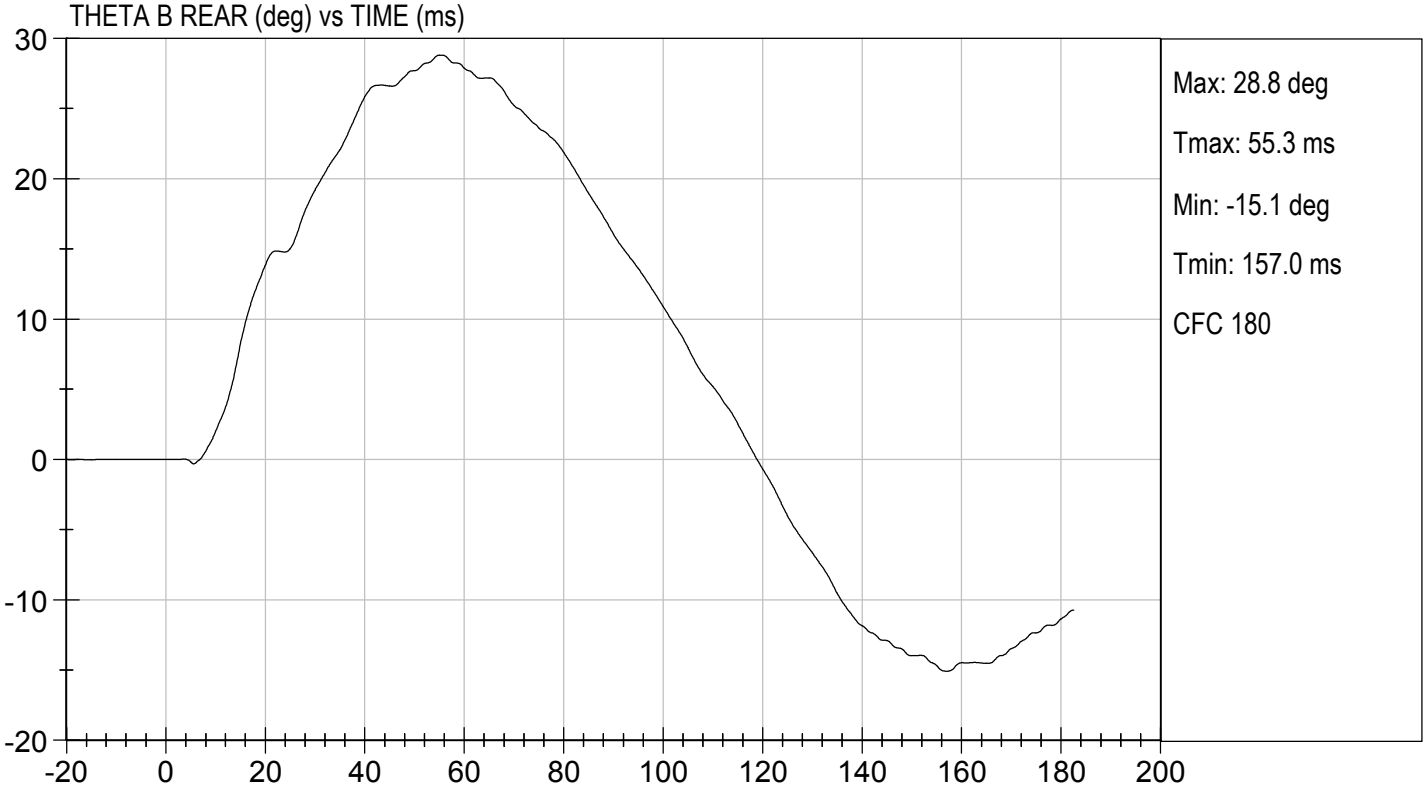
TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

TEST DATE: 07/15/2020
TEST #: D201722

THETA A FRONT (deg) vs TIME (ms)

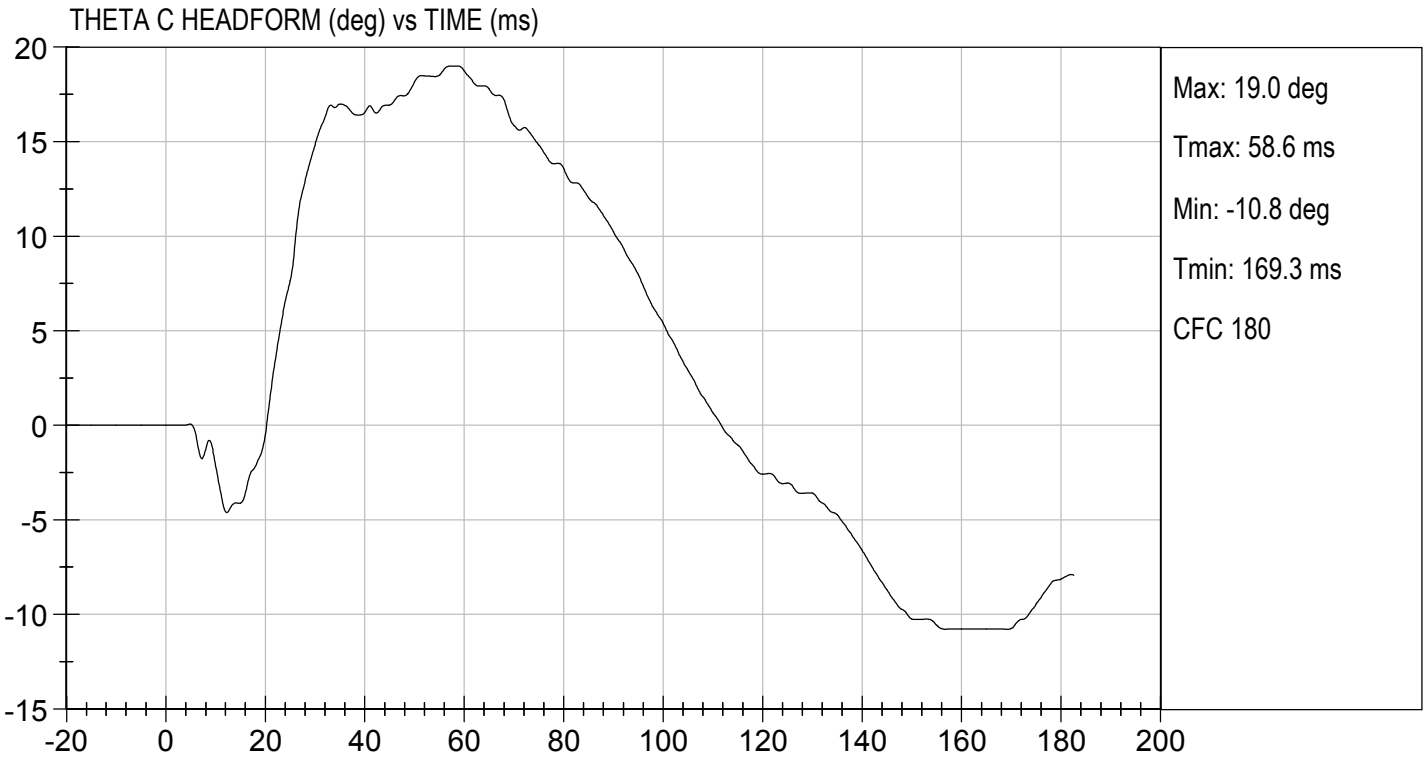


THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

TEST DATE: 07/15/2020
TEST #: D201722



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201723

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.2	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.6	Pass
		Overall Test Results		Pass

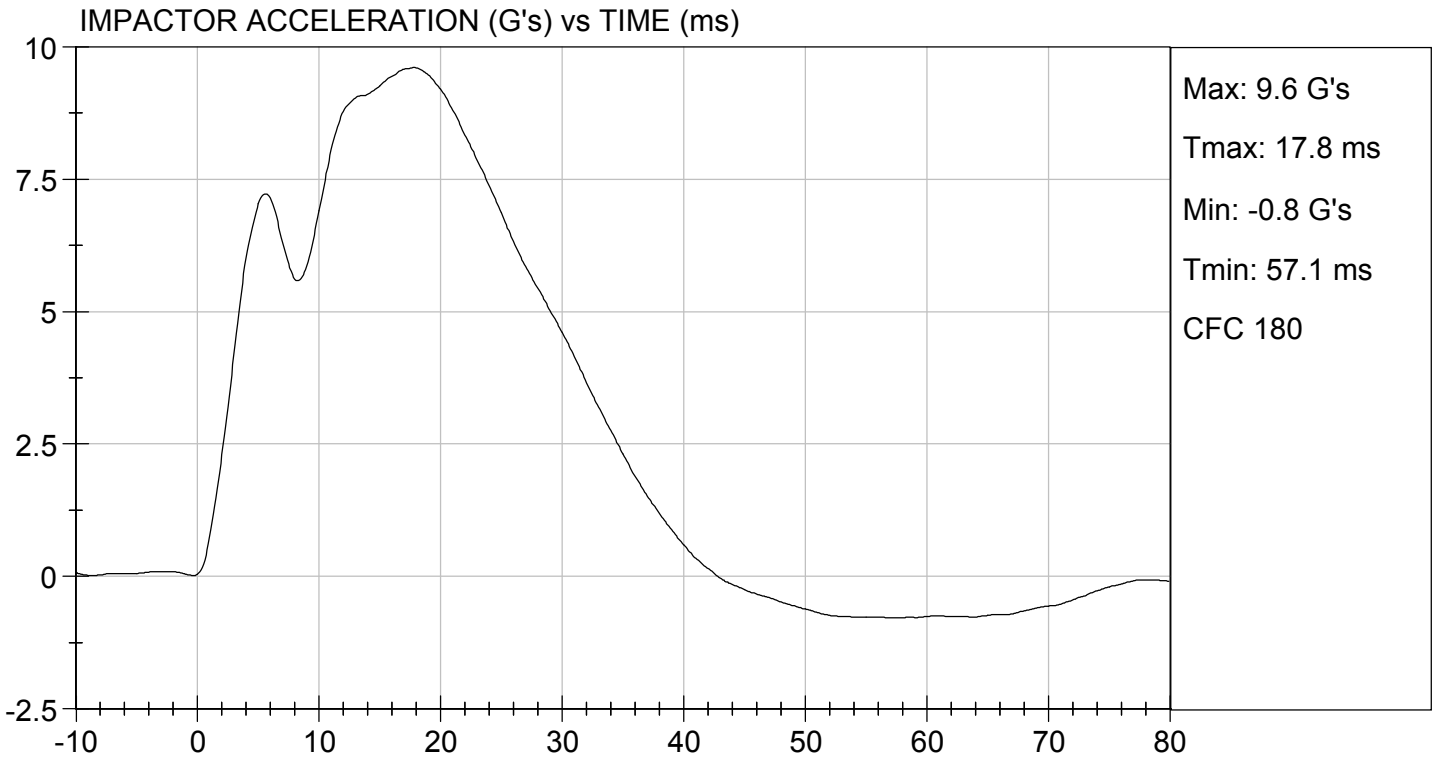
Laboratory Technician

07/15/2020
Test Date

Approved By

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

TEST DATE: 07/15/2020
TEST #: D201723



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201724

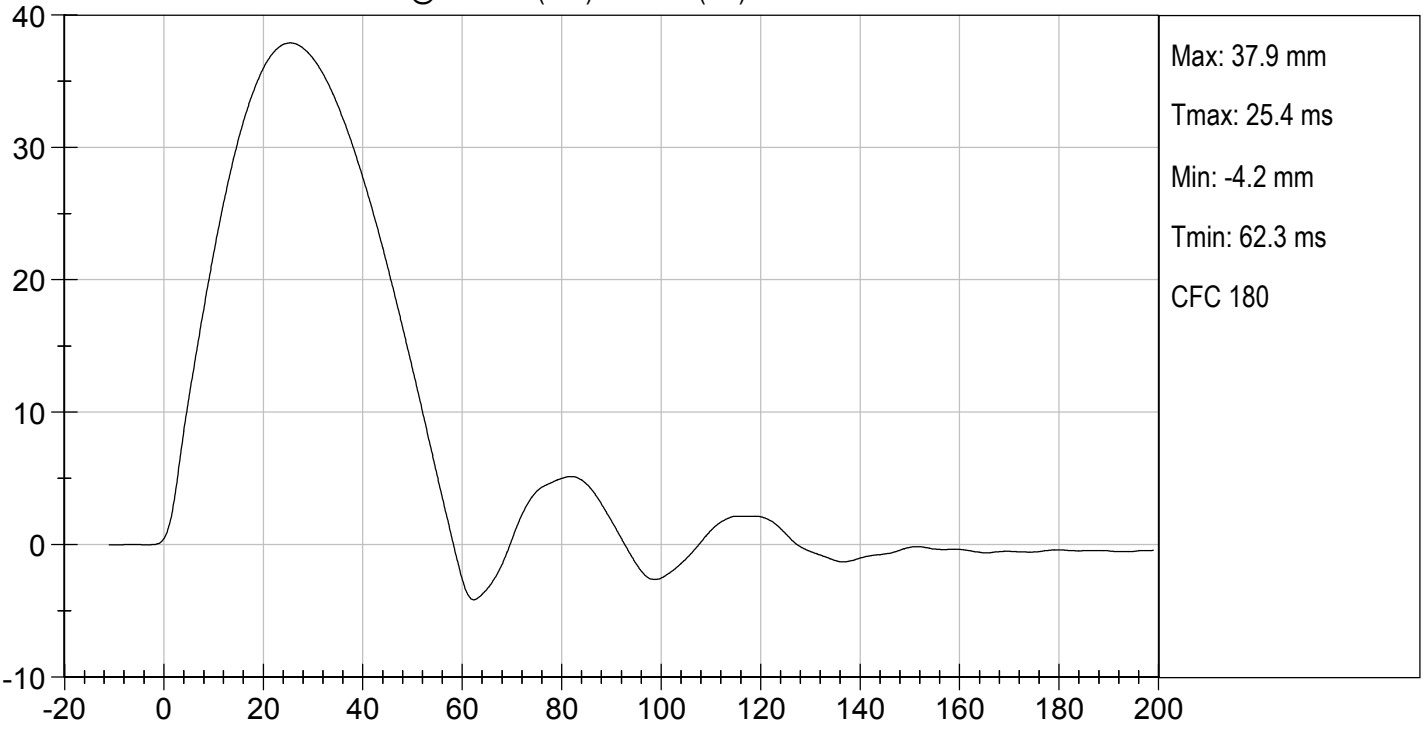
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.5	Pass
		Overall Test Results		Pass

Laboratory Technician

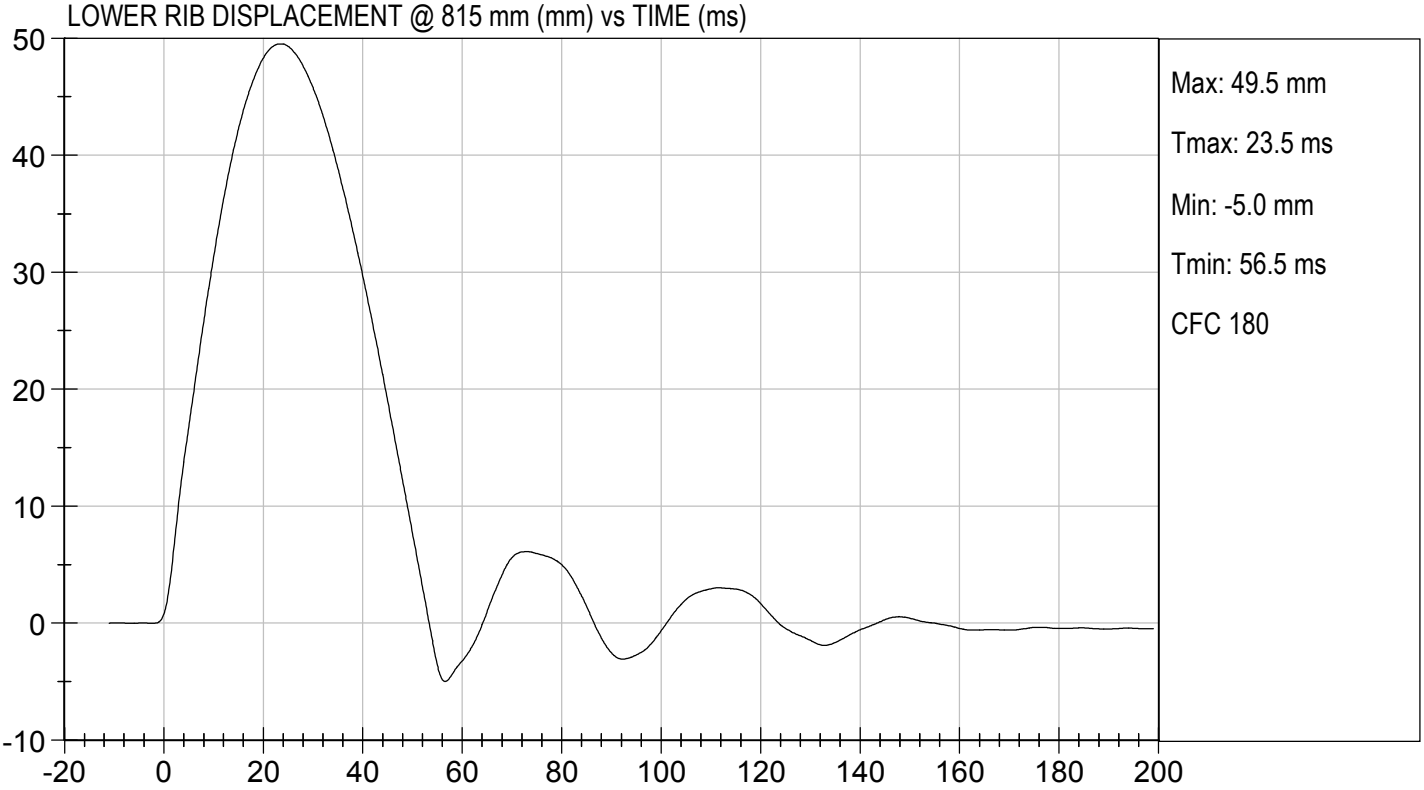
07/14/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201725

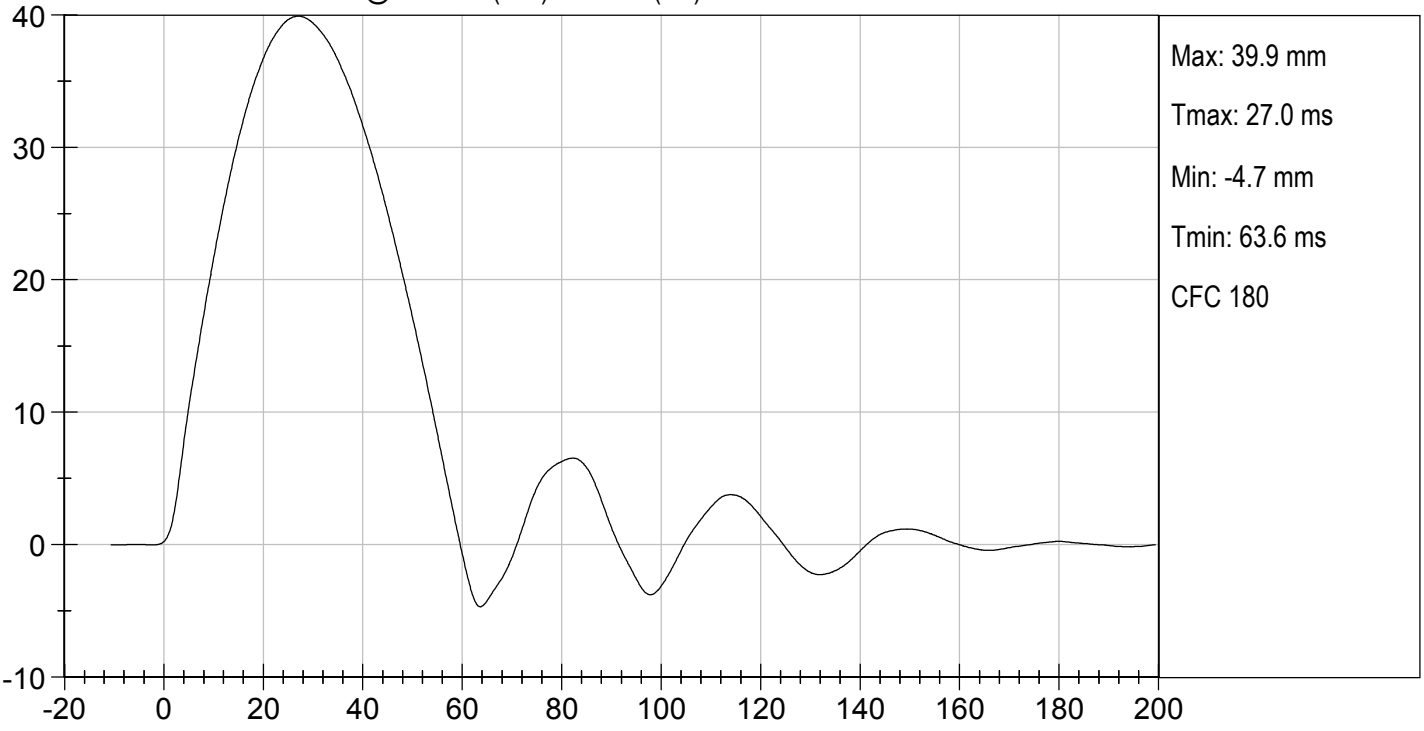
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.9	Pass
		Overall Test Results		Pass

Laboratory Technician

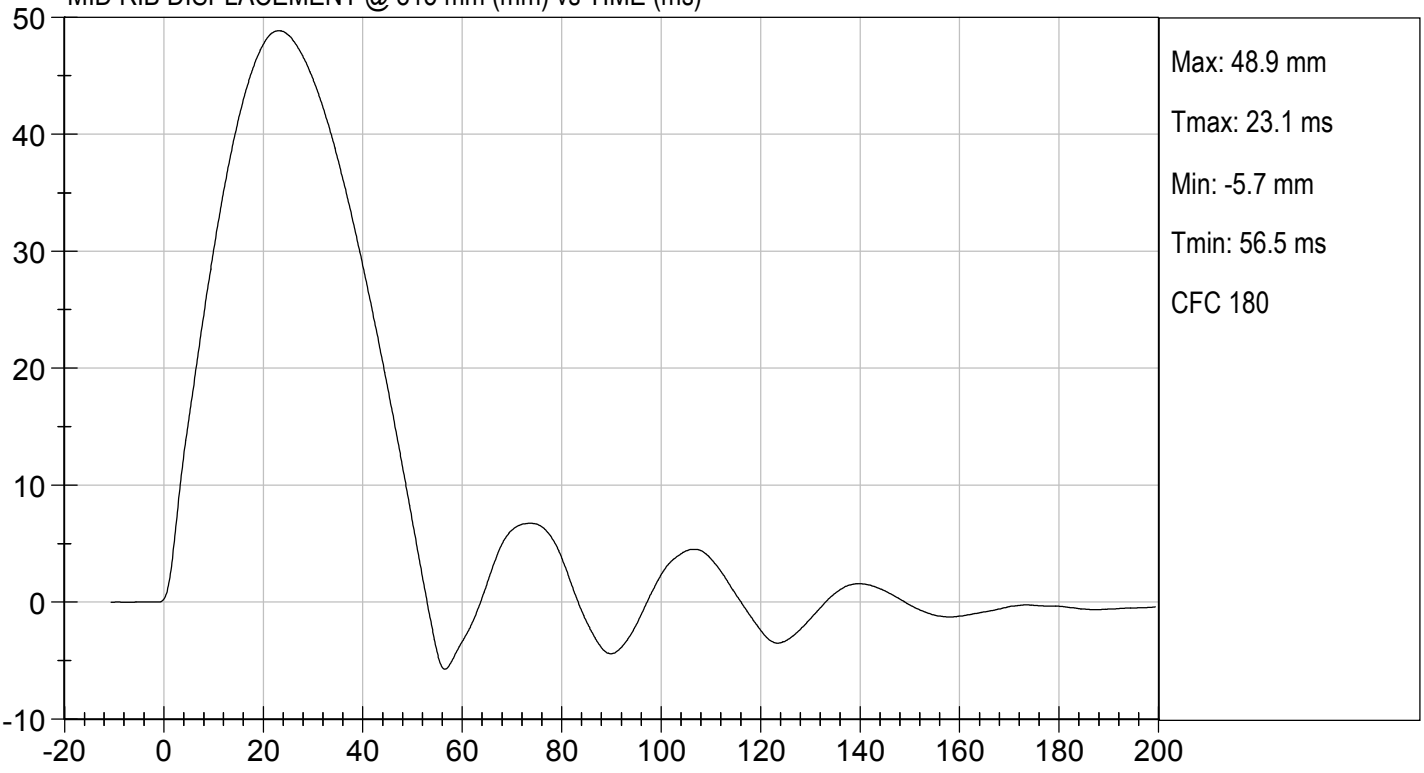
07/14/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201726

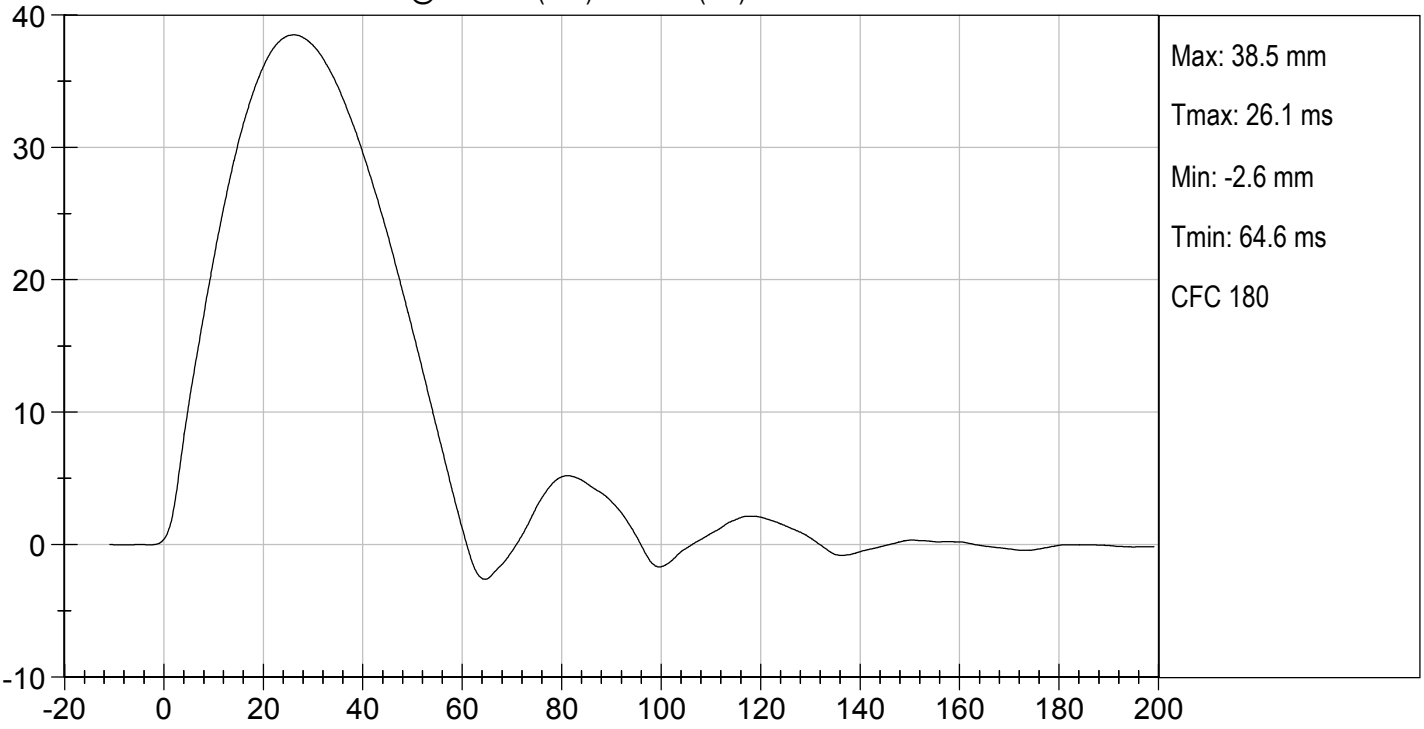
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.5	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.0	Pass
		Overall Test Results		Pass

Laboratory Technician

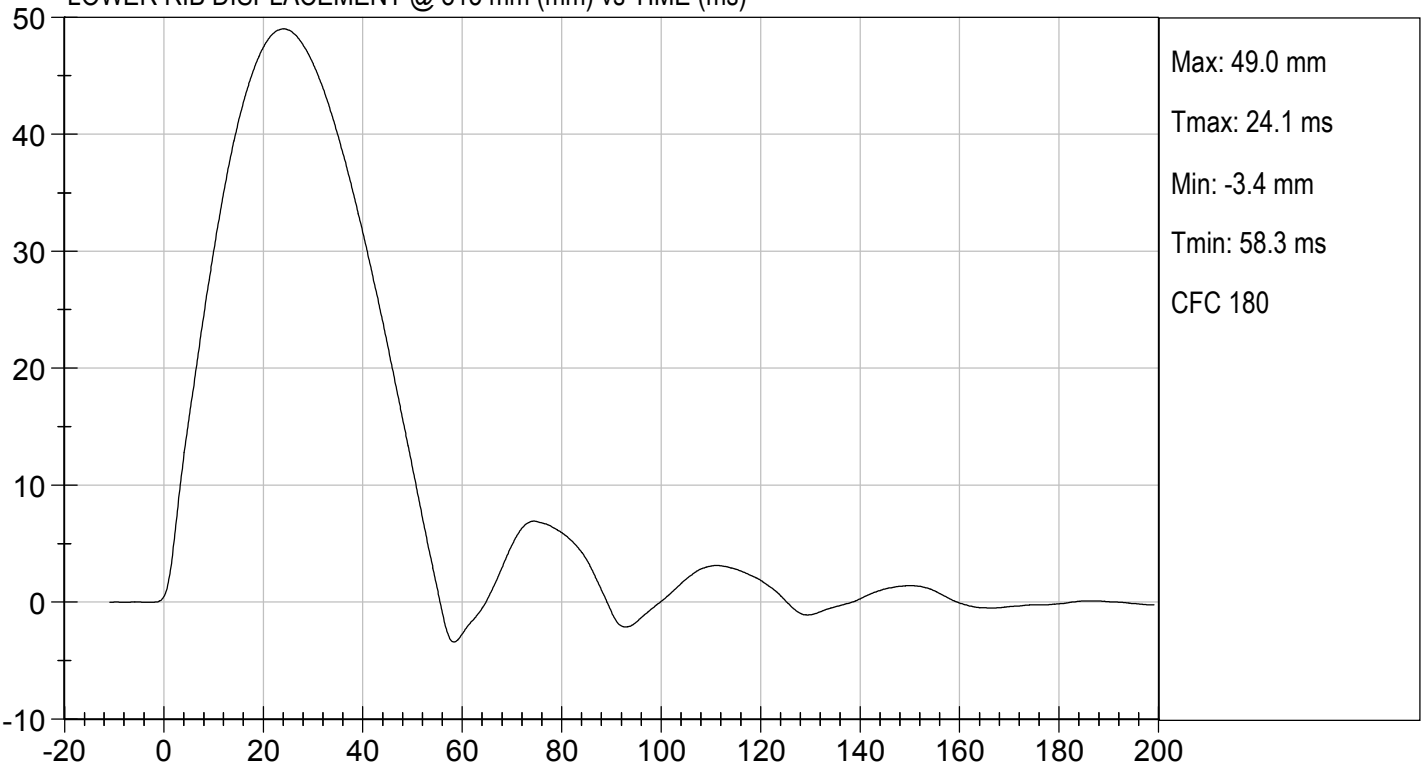
07/14/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201727

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4314	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.4	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2448	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.9	Pass
		Overall Test Results		Pass

Laboratory Technician

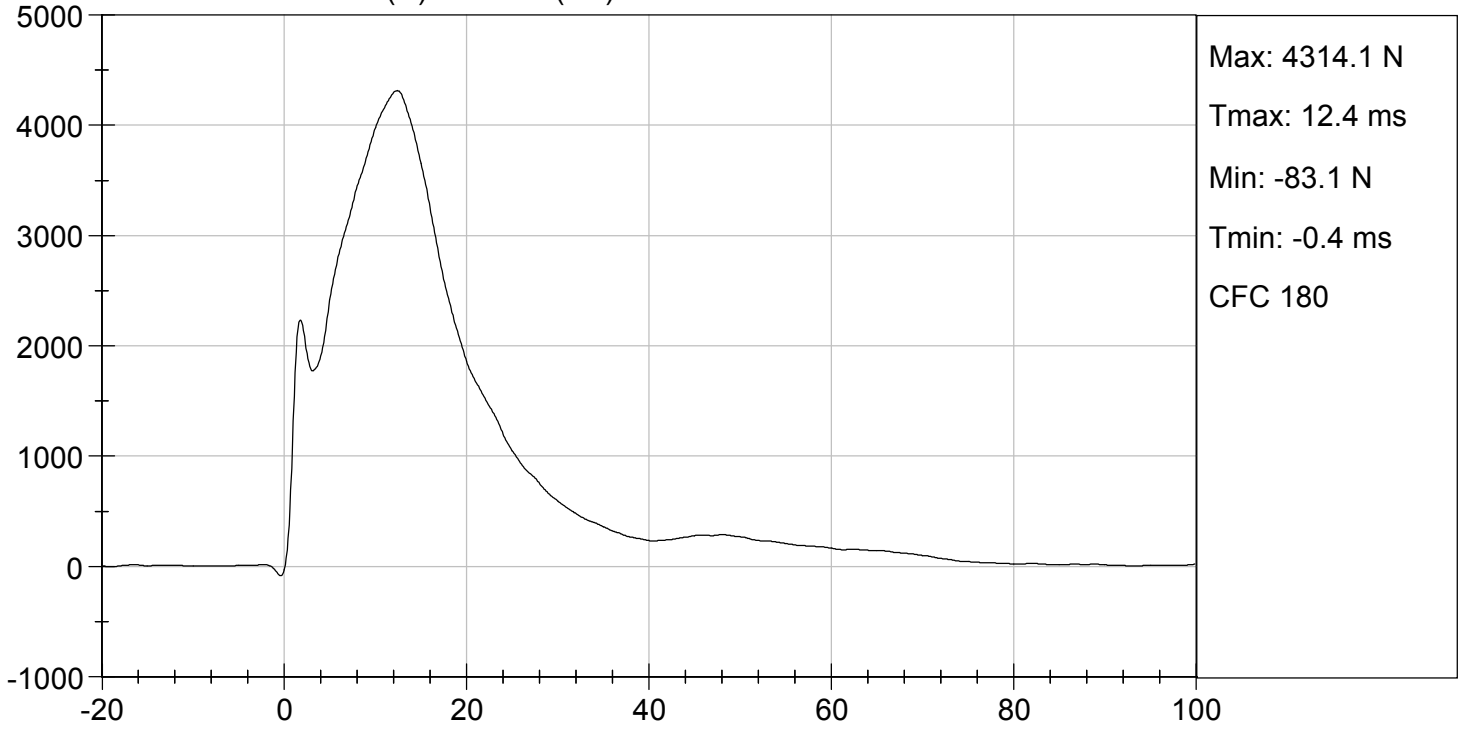
07/15/2020
Test Date

Approved By

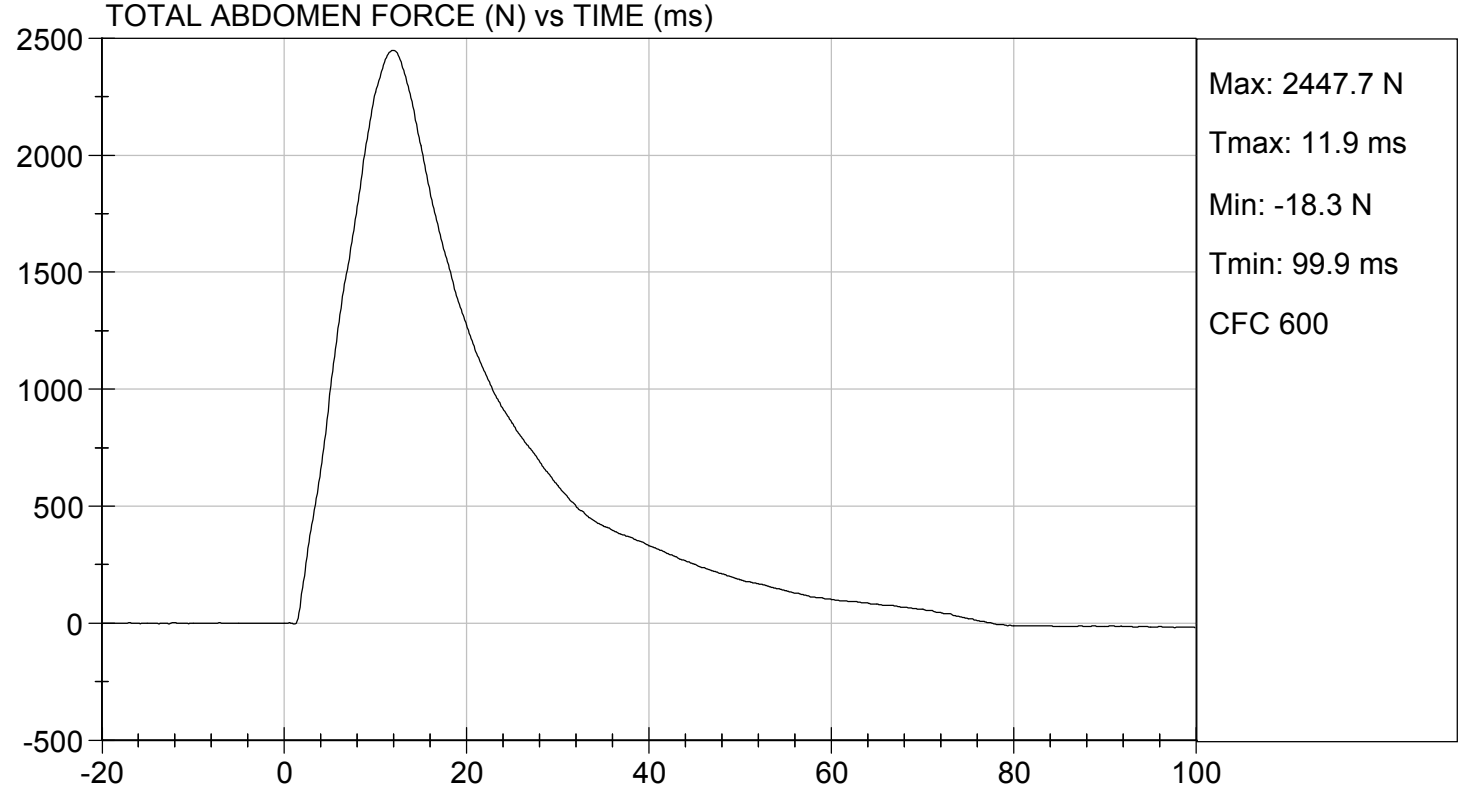
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.45 ft/s, 4.10 m/s

TEST DATE: 07/15/2020
TEST #: D201727

IMPACTOR FORCE (N) vs TIME (ms)



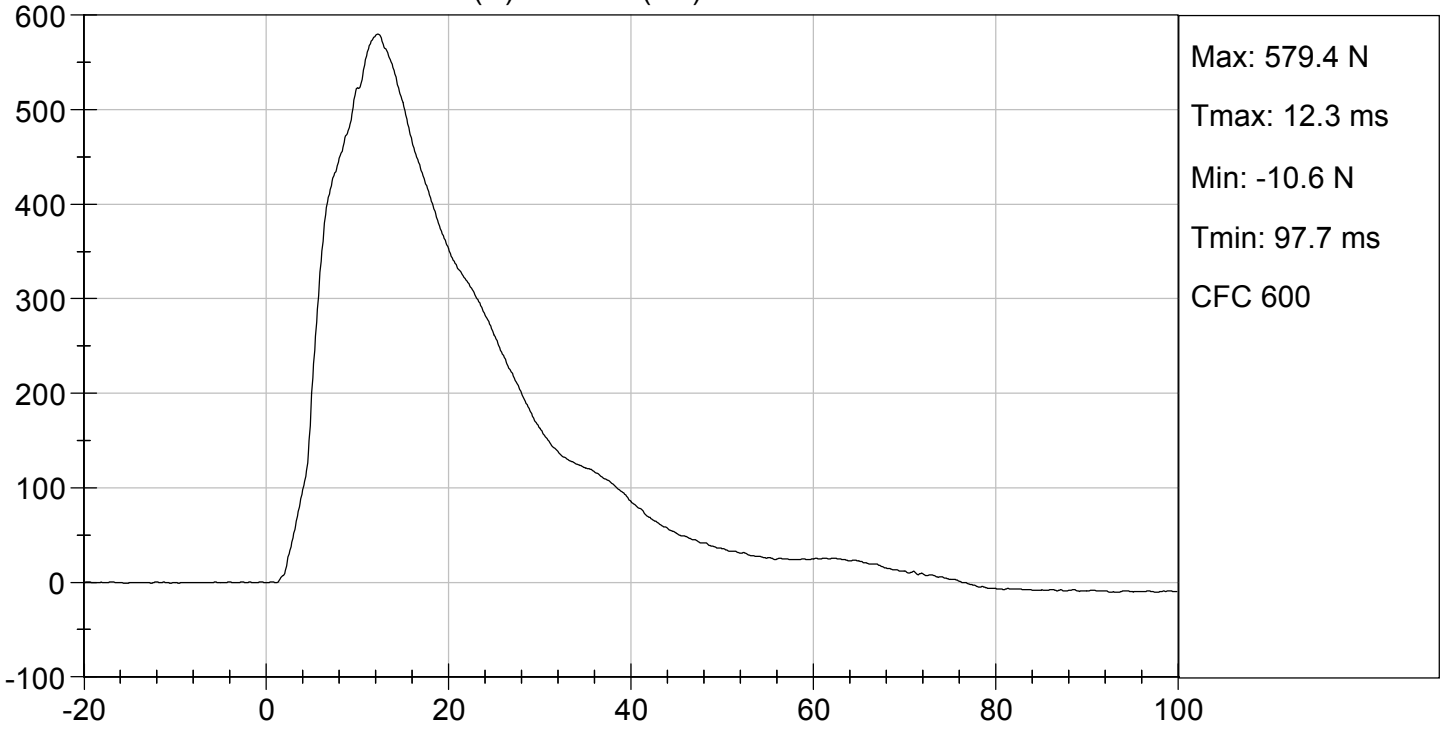
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



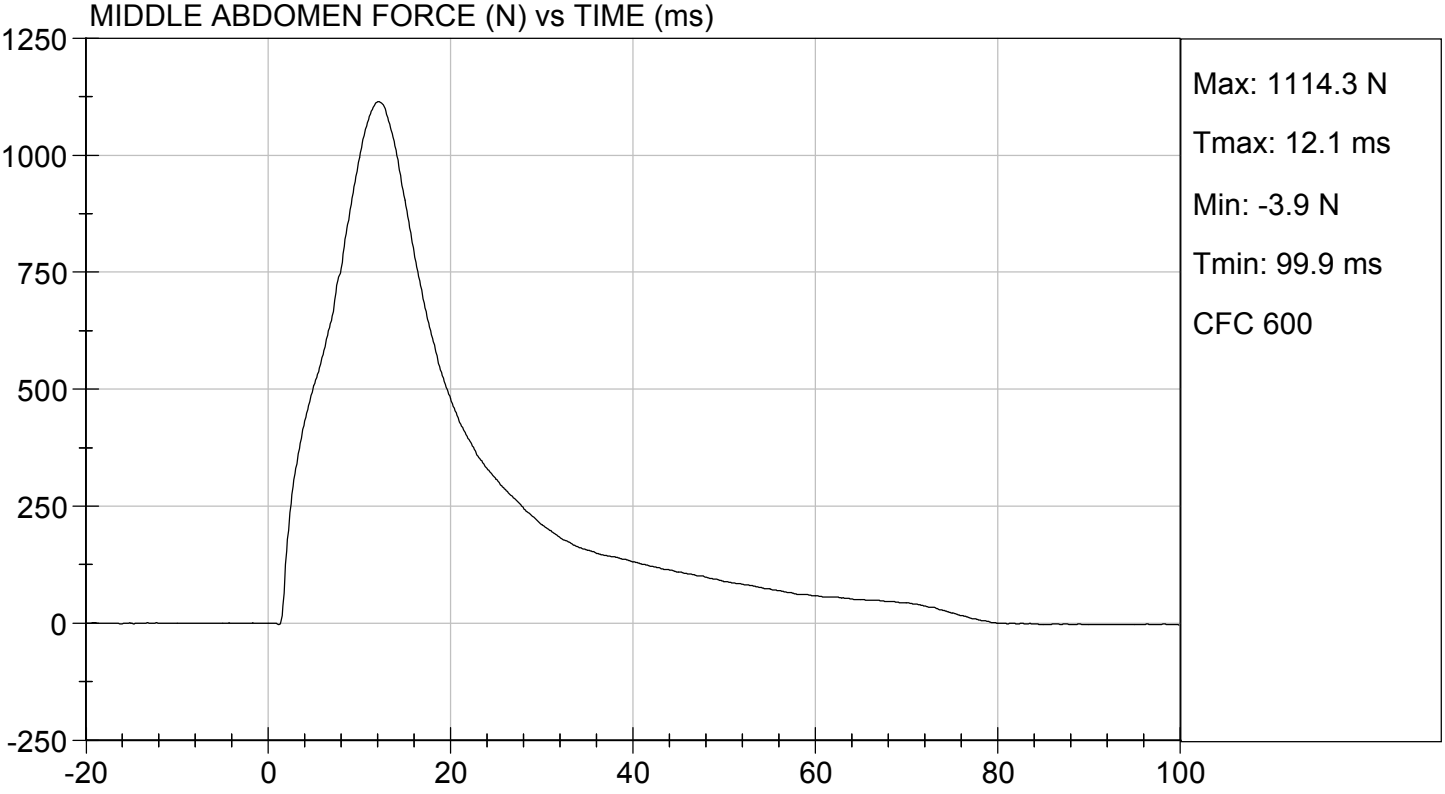
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.45 ft/s, 4.10 m/s

TEST DATE: 07/15/2020
TEST #: D201727

FRONT ABDOMEN FORCE (N) vs TIME (ms)



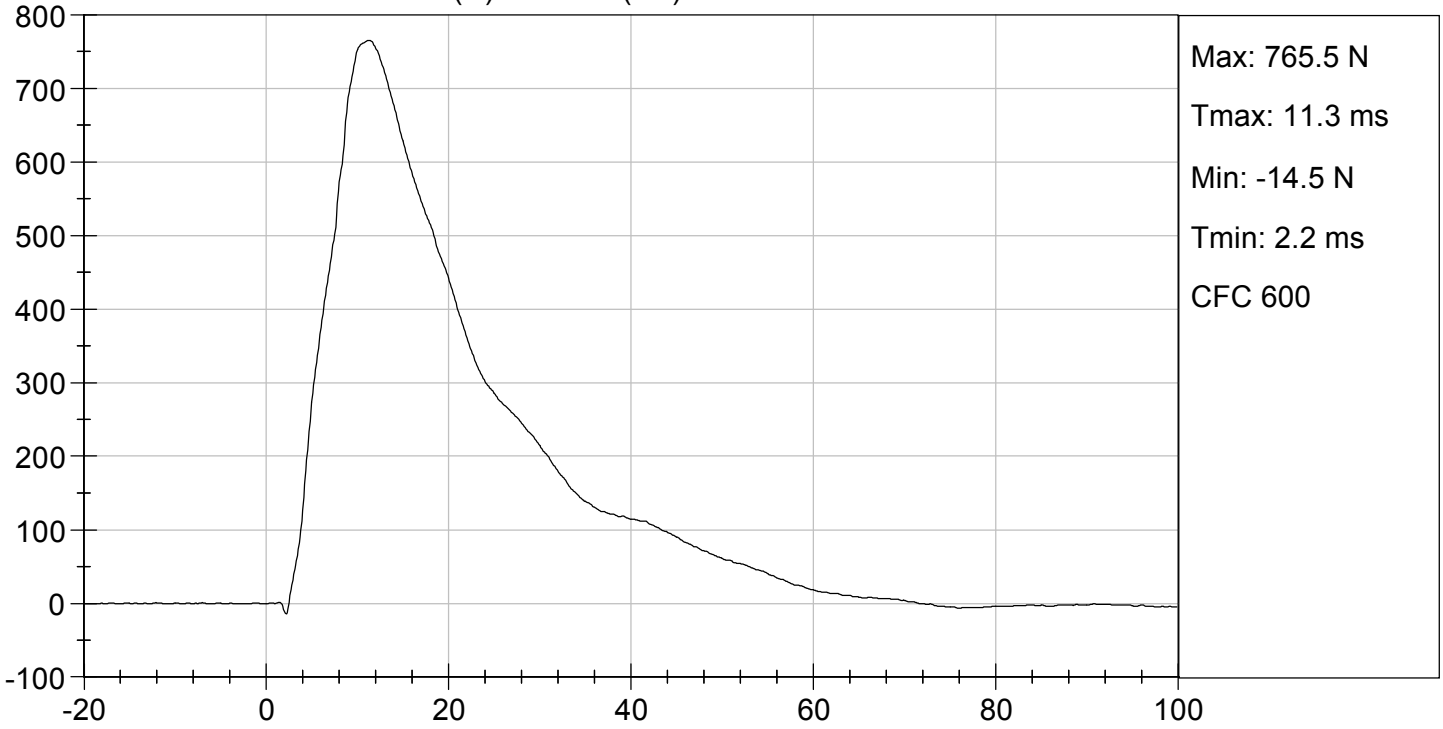
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.45 ft/s, 4.10 m/s

TEST DATE: 07/15/2020
TEST #: D201727

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

LUMBAR SPINE TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201728

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	45	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	-0.402	Pass
	27 ms	m/s	-6.50 to -5.80	-6.15	Pass
	30 ms	m/s	>= -6.50	-6.03	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	45.1	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	42.3	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
			Overall Results		Pass

Laboratory Technician

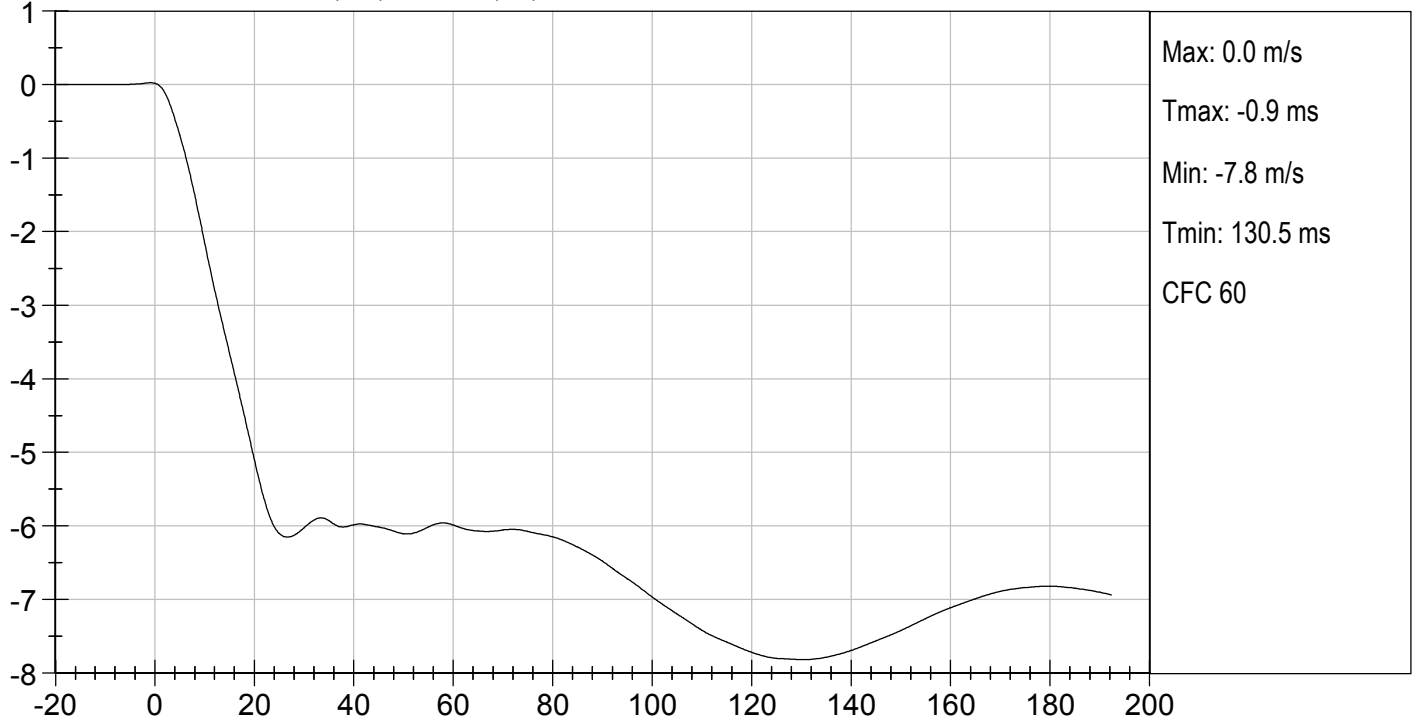
07/15/2020
Test Date

Approved By

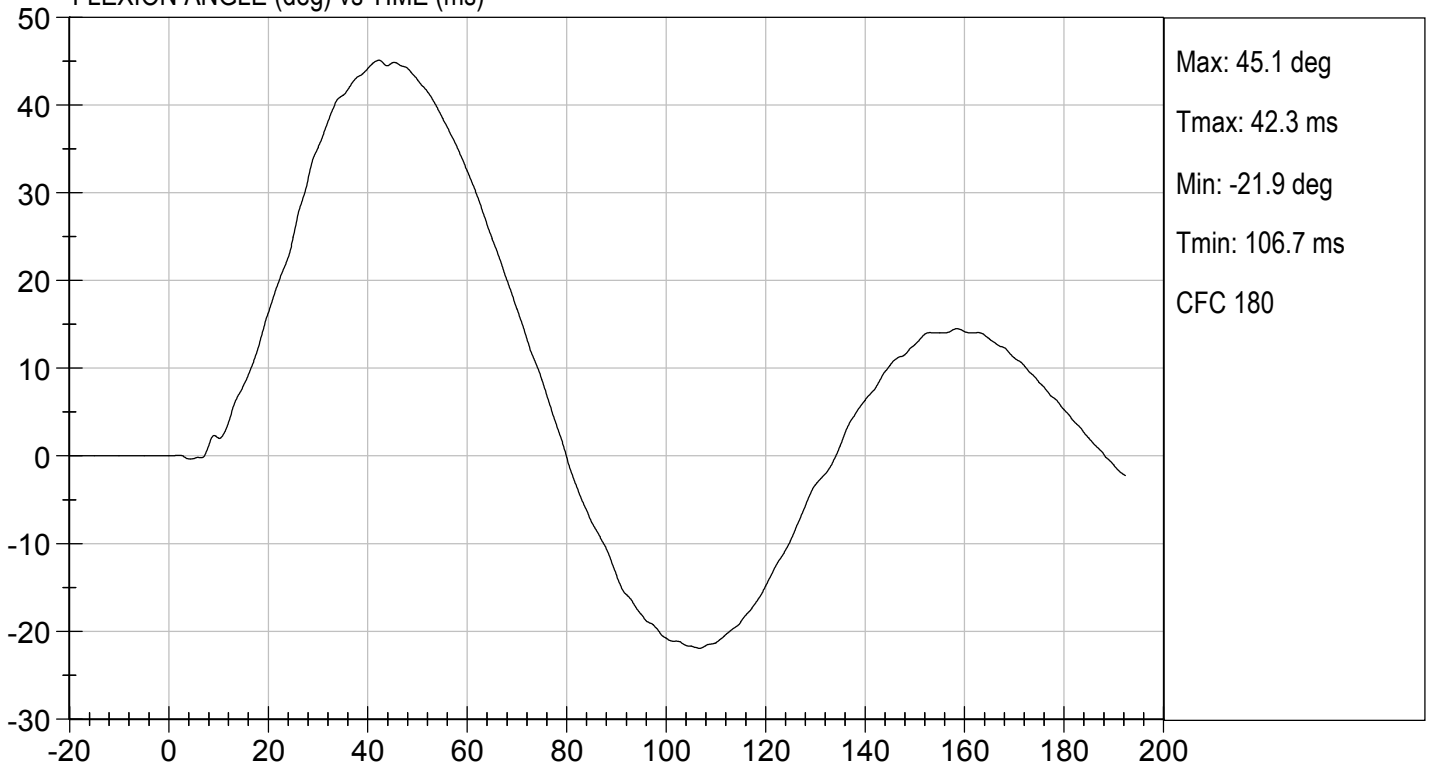
TEST DESC: LUMBAR BENDING
VELOCITY: 20.18 ft/s, 6.15 m/s

TEST DATE: 07/15/2020
TEST #: D201728

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



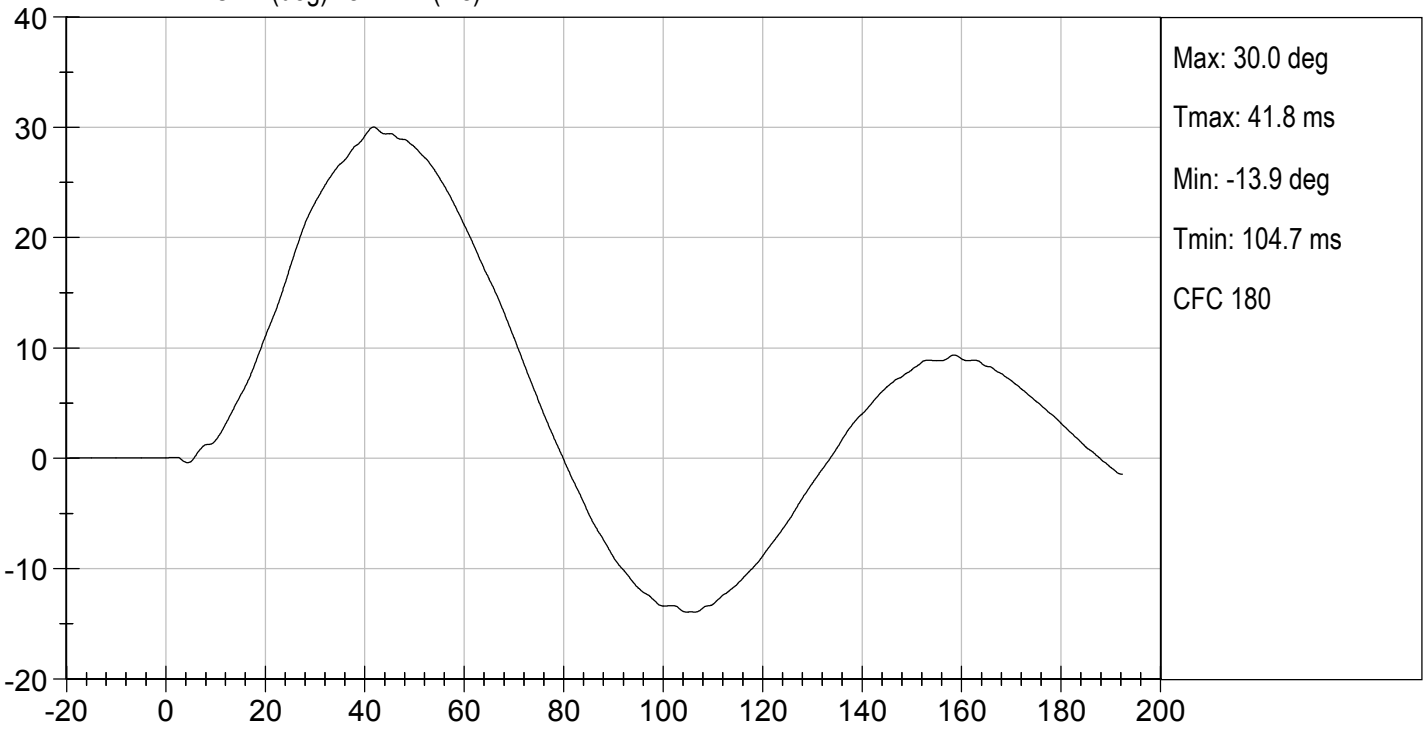
FLEXION ANGLE (deg) vs TIME (ms)



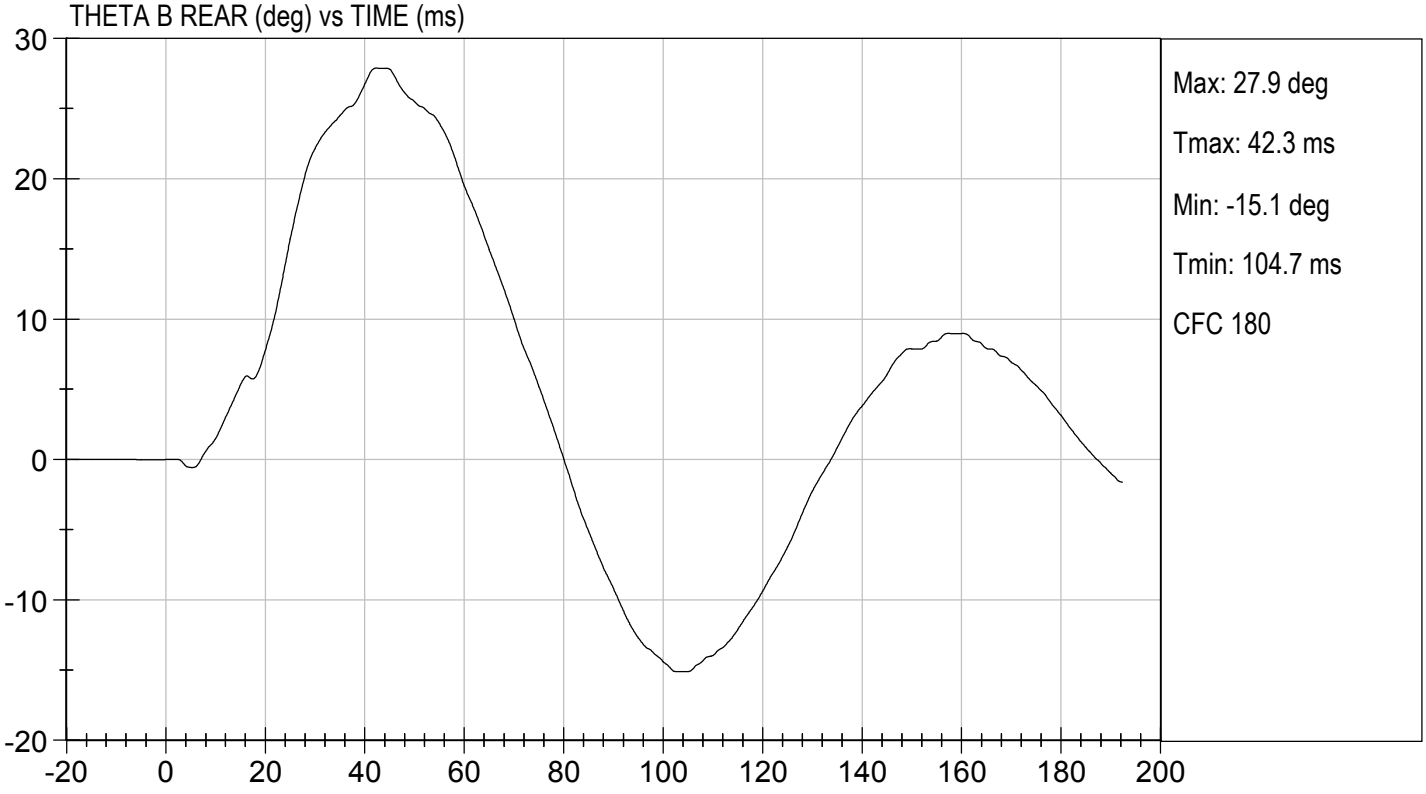
TEST DESC: LUMBAR BENDING
VELOCITY: 20.18 ft/s, 6.15 m/s

TEST DATE: 07/15/2020
TEST #: D201728

THETA A FRONT (deg) vs TIME (ms)

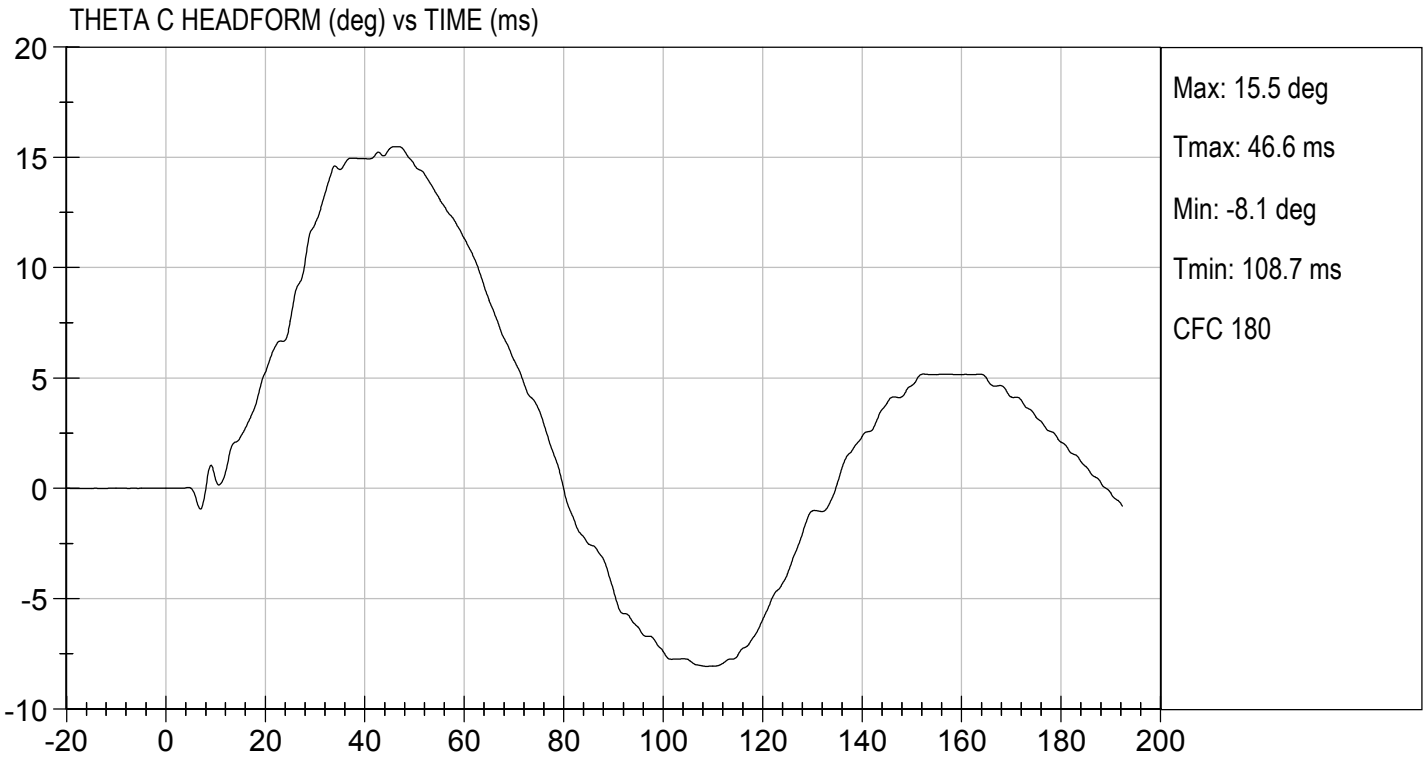


THETA B REAR (deg) vs TIME (ms)



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

TEST DATE: 07/15/2020
TEST #: D201728



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201729

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	N	4700 to 5400	5120	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.1	Pass
Maximum Pubic Force	N	1230 to 1590	1378	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	12.6	Pass
		Overall Test Results		Pass

Laboratory Technician

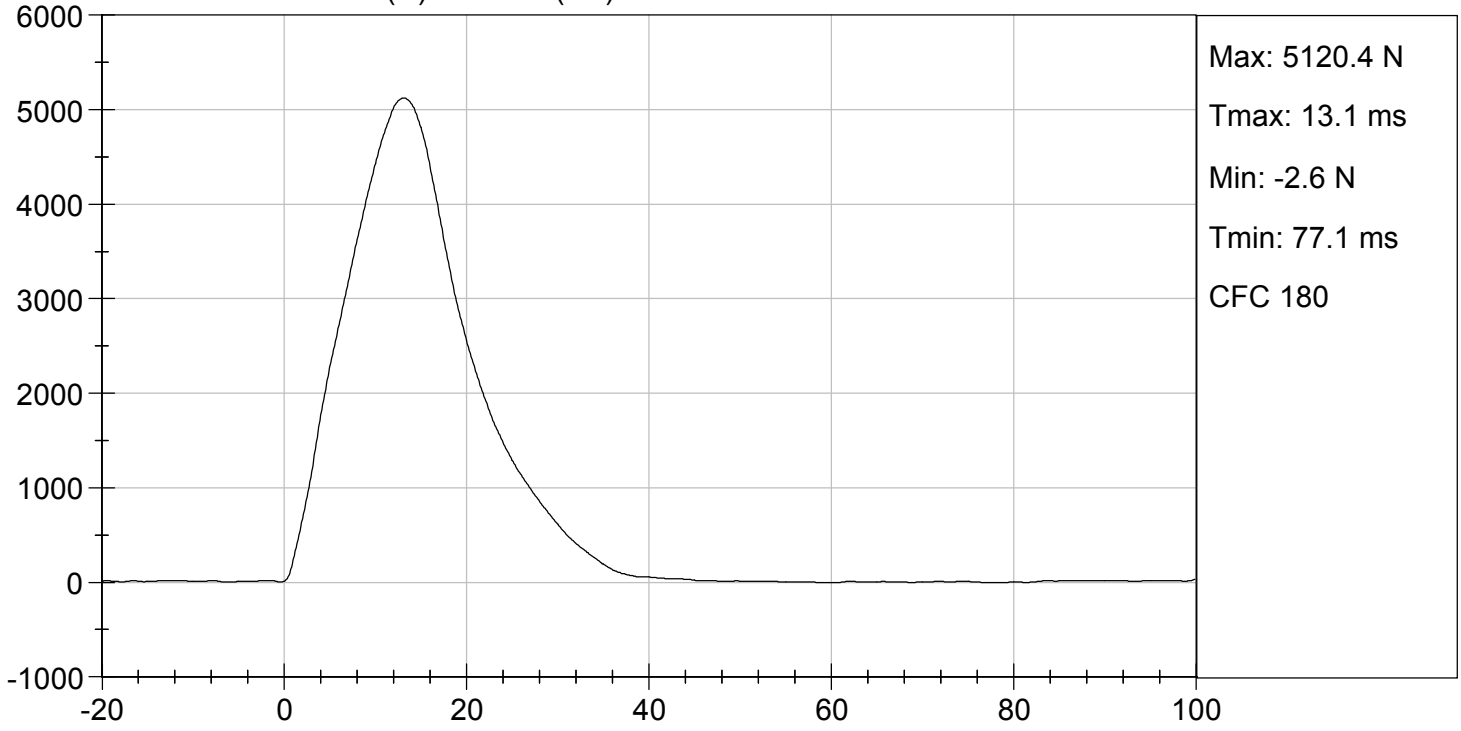
07/15/2020
Test Date

Approved By

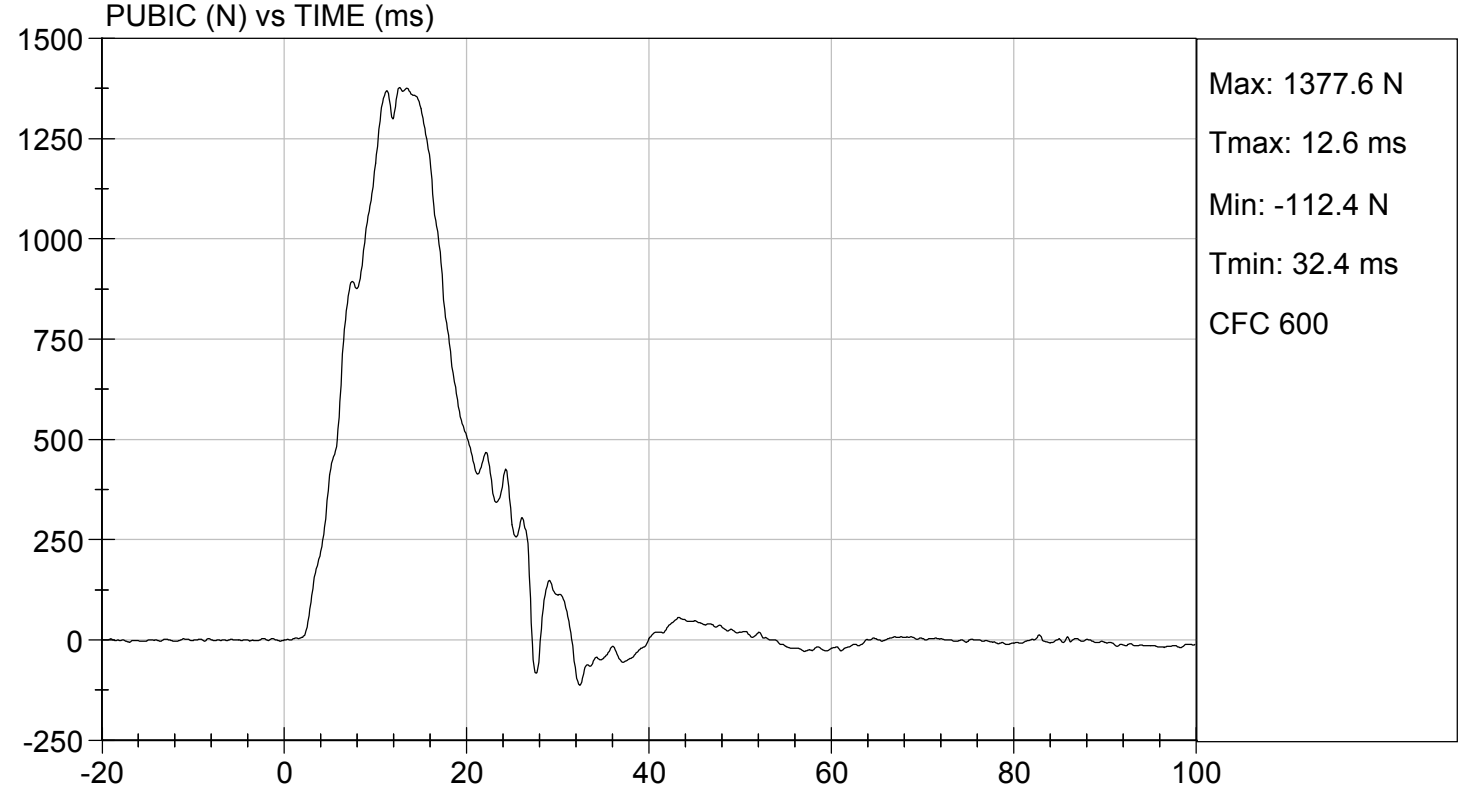
TEST DESC: PELVIS IMPACT
VELOCITY: 14.12 ft/s, 4.3 m/s

TEST DATE: 07/15/2020
TEST #: D201729

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201720

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	43	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5962	Pass
Upper Rib Displacement	mm	34.0 to 41.0	40.0	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.8	Pass
Lower Rib Displacement	mm	37.0 to 44.0	42.8	Pass
		Overall Test Results		Pass

Laboratory Technician

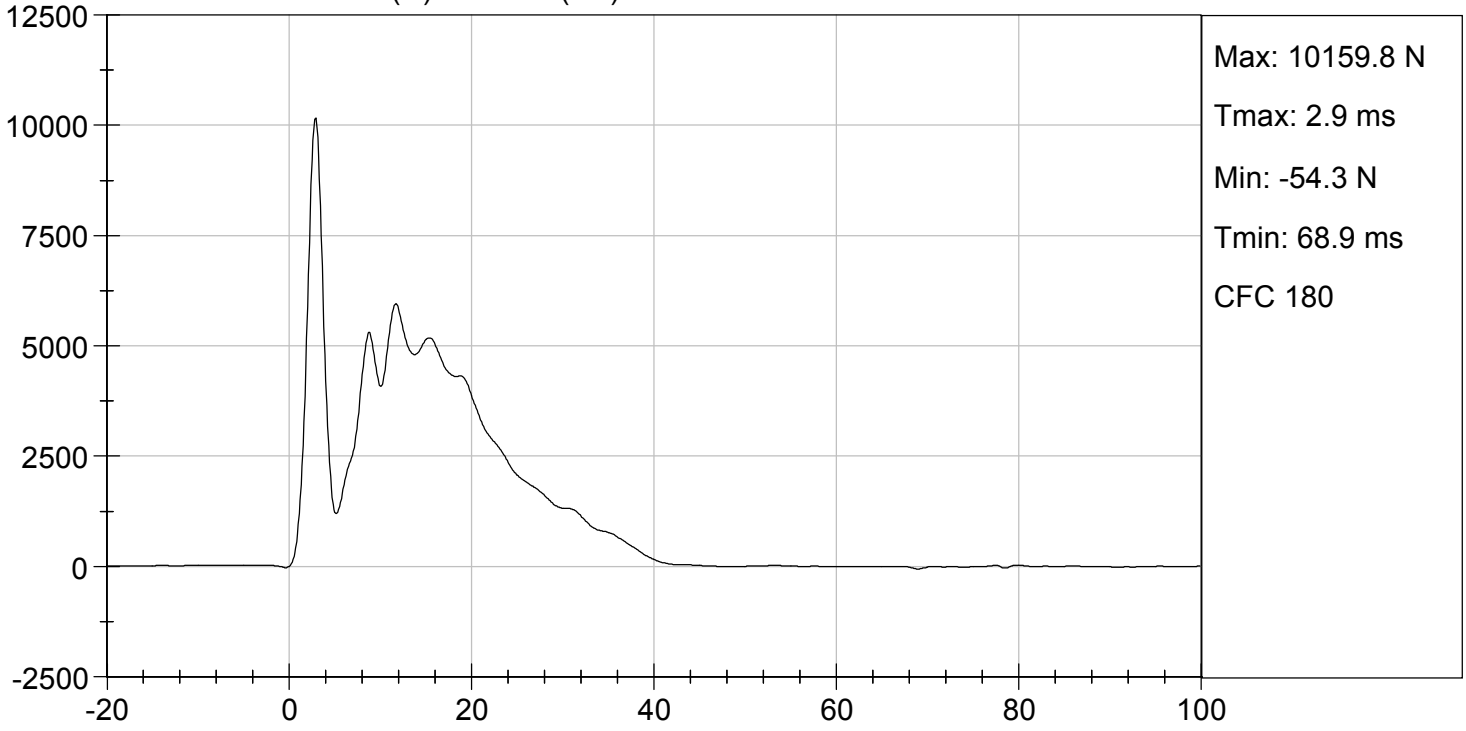
07/15/2020
Test Date

Approved By

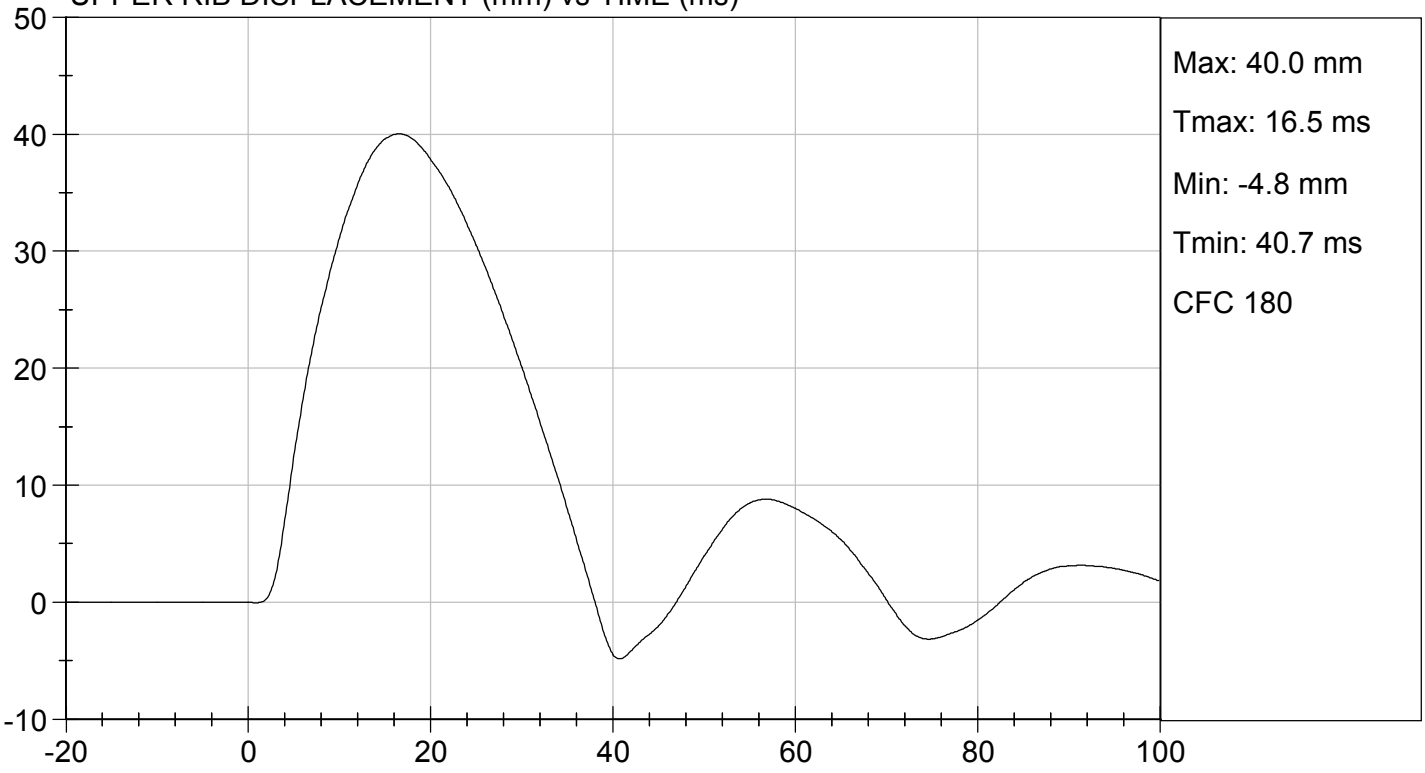
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 07/15/2020
TEST #: D201720

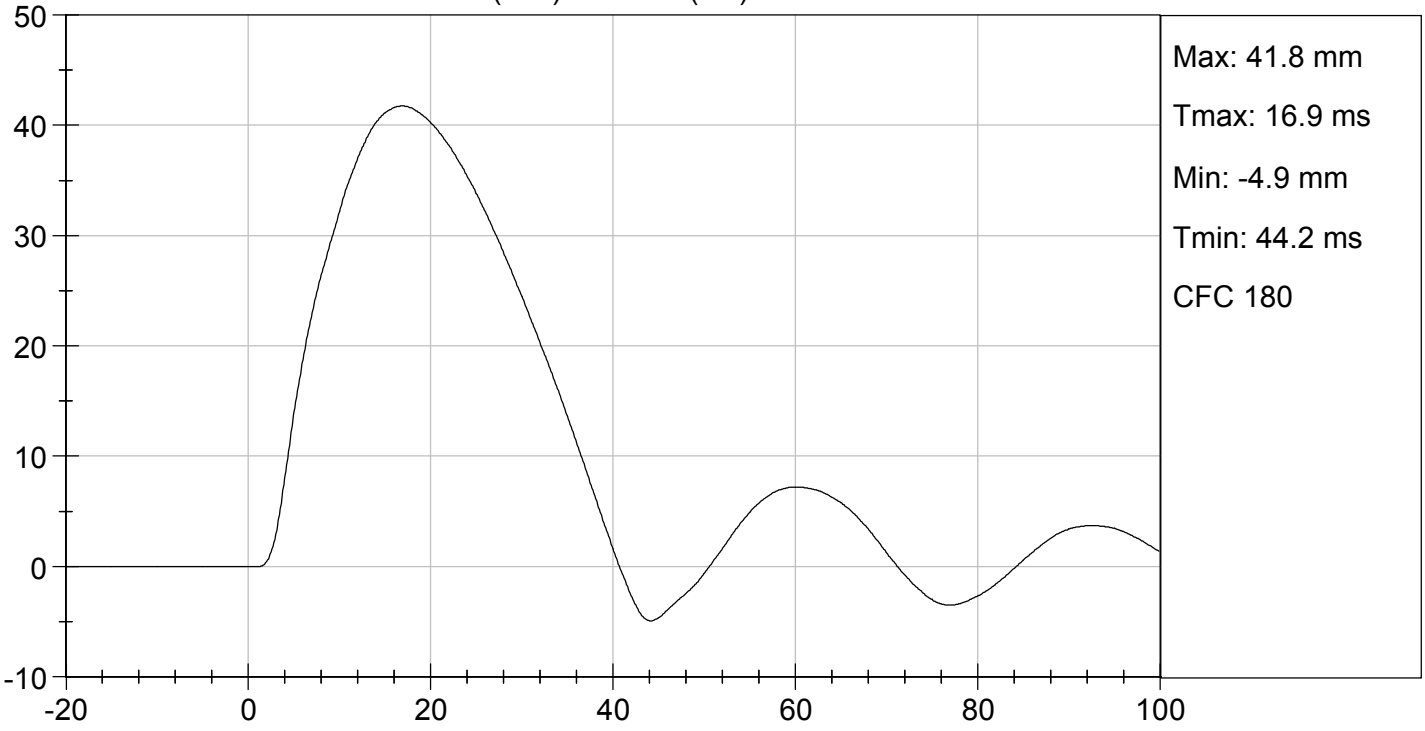
IMPACTOR FORCE (N) vs TIME (ms)



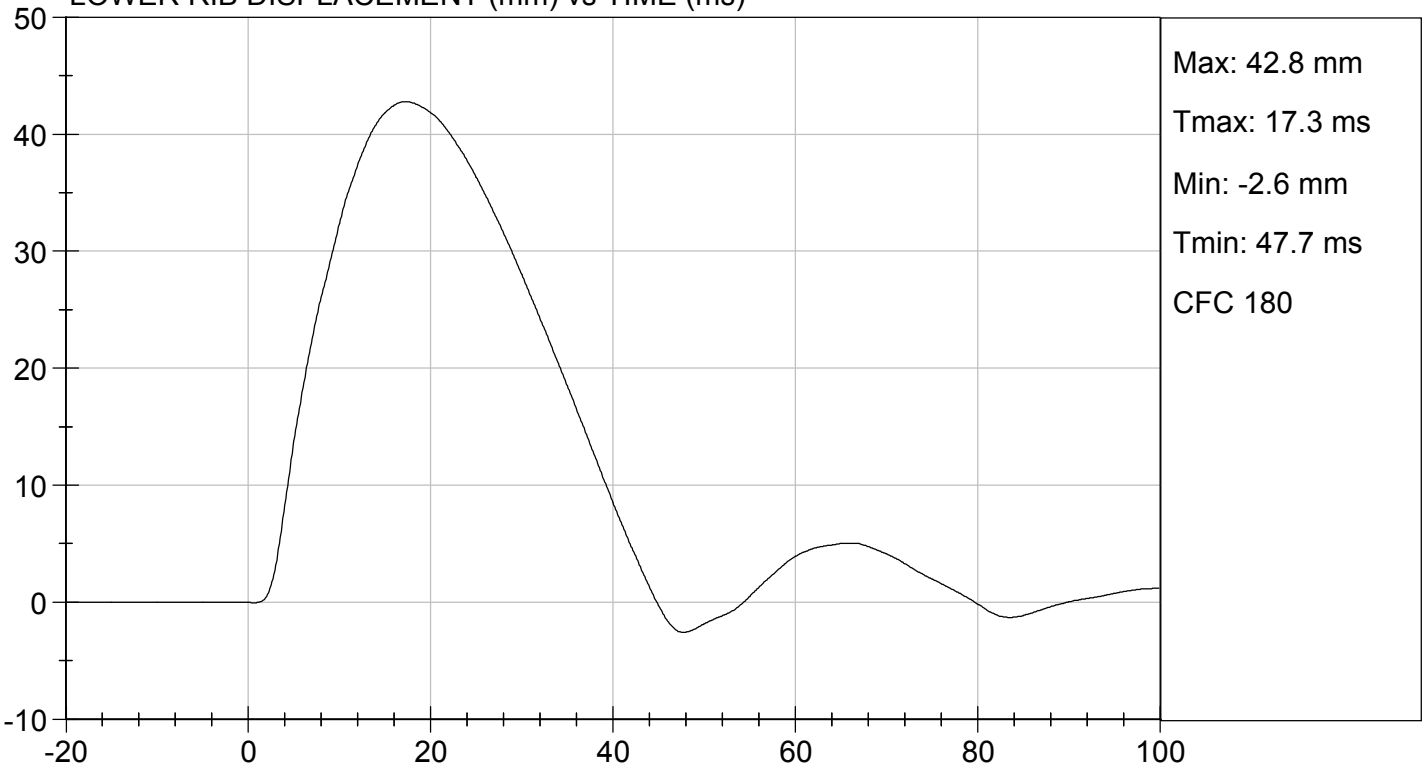
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 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:** D201961

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	125 to 155	134	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	6.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

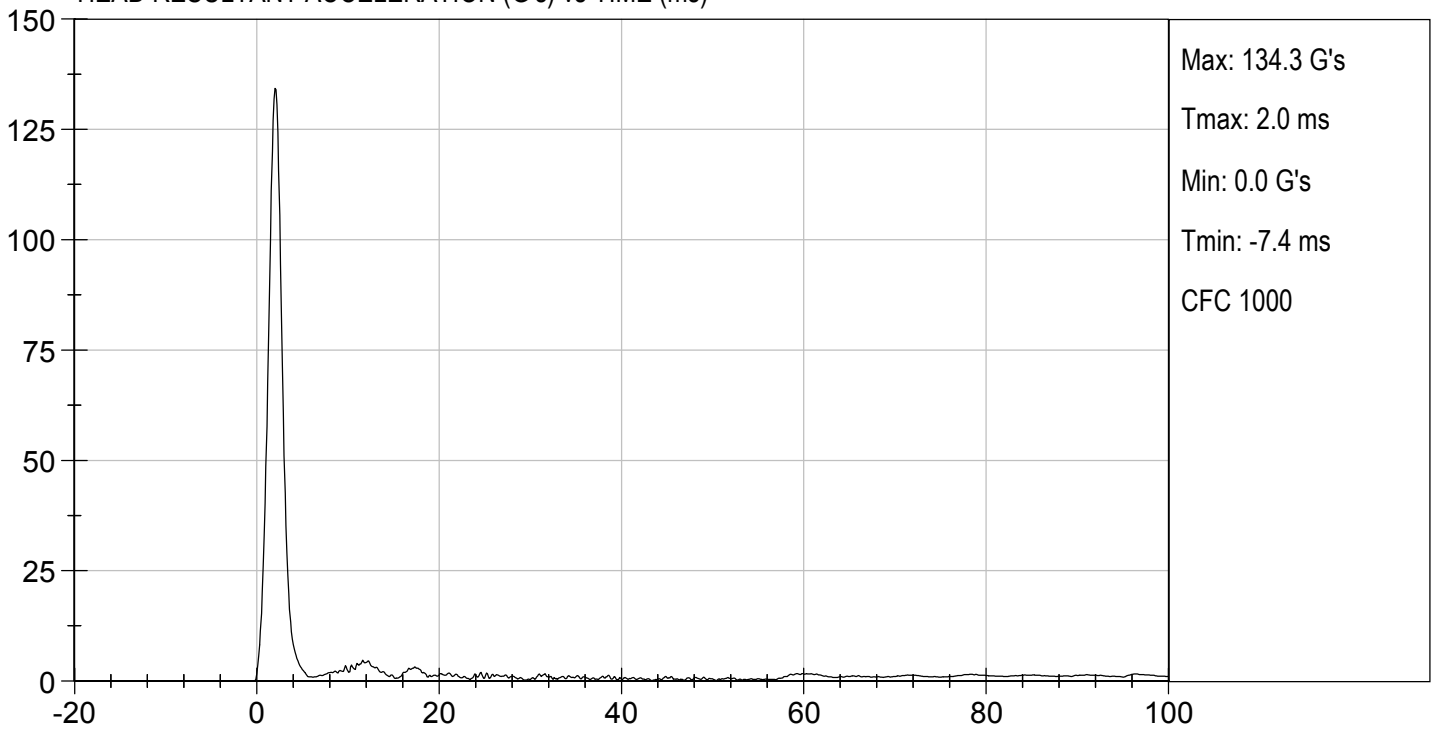
08/07/2020
Test Date

Approved By

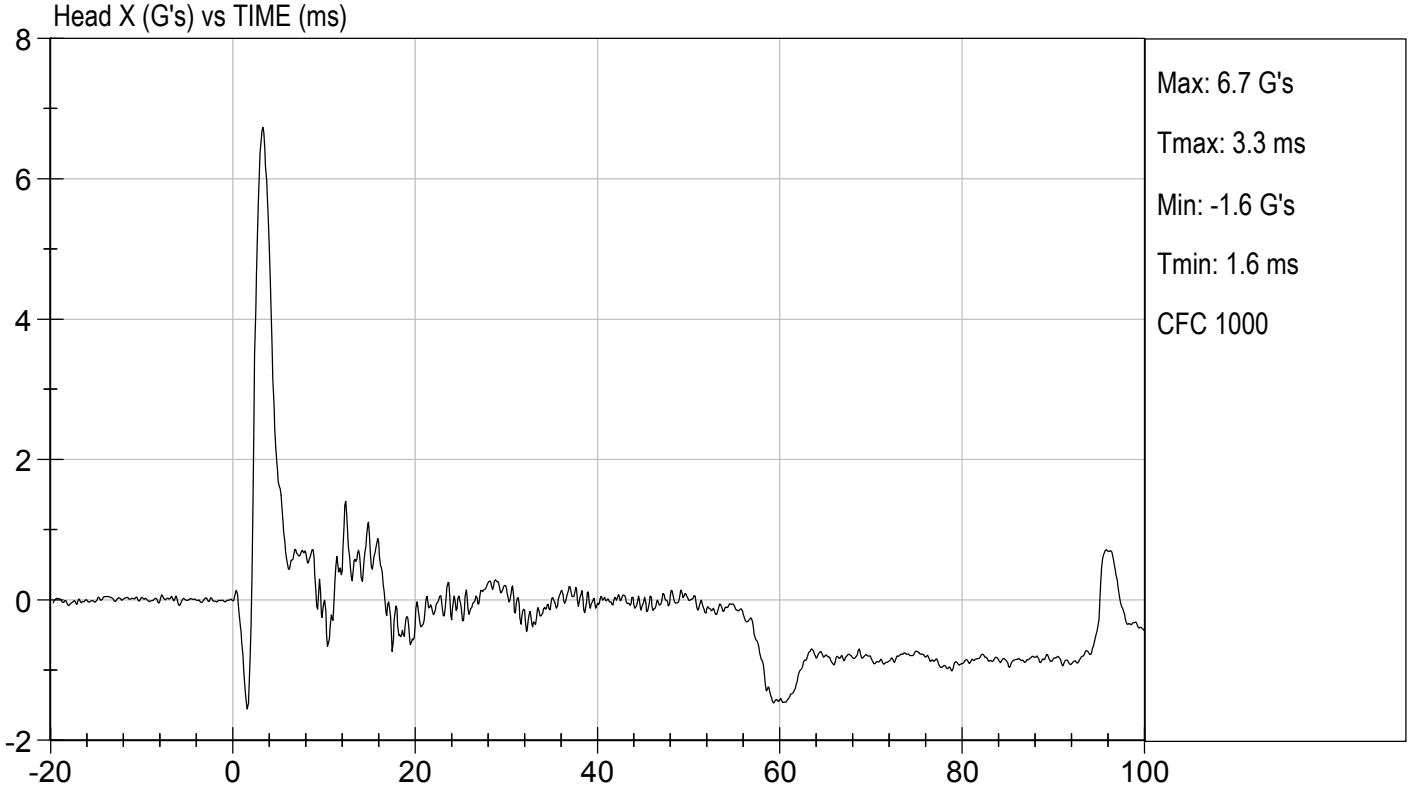
TEST DESC: HEAD DROP

TEST DATE: 08/07/2020
TEST #: D201961

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

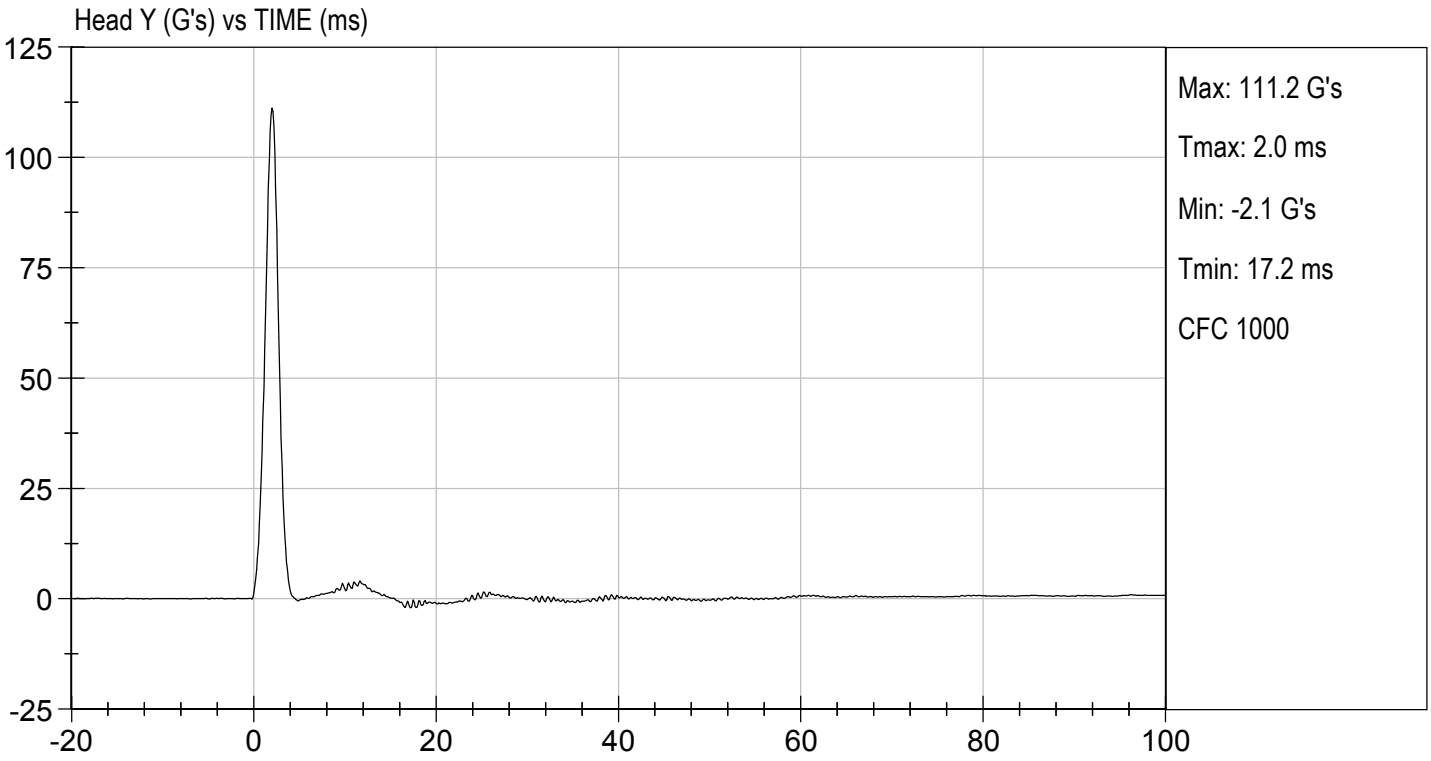


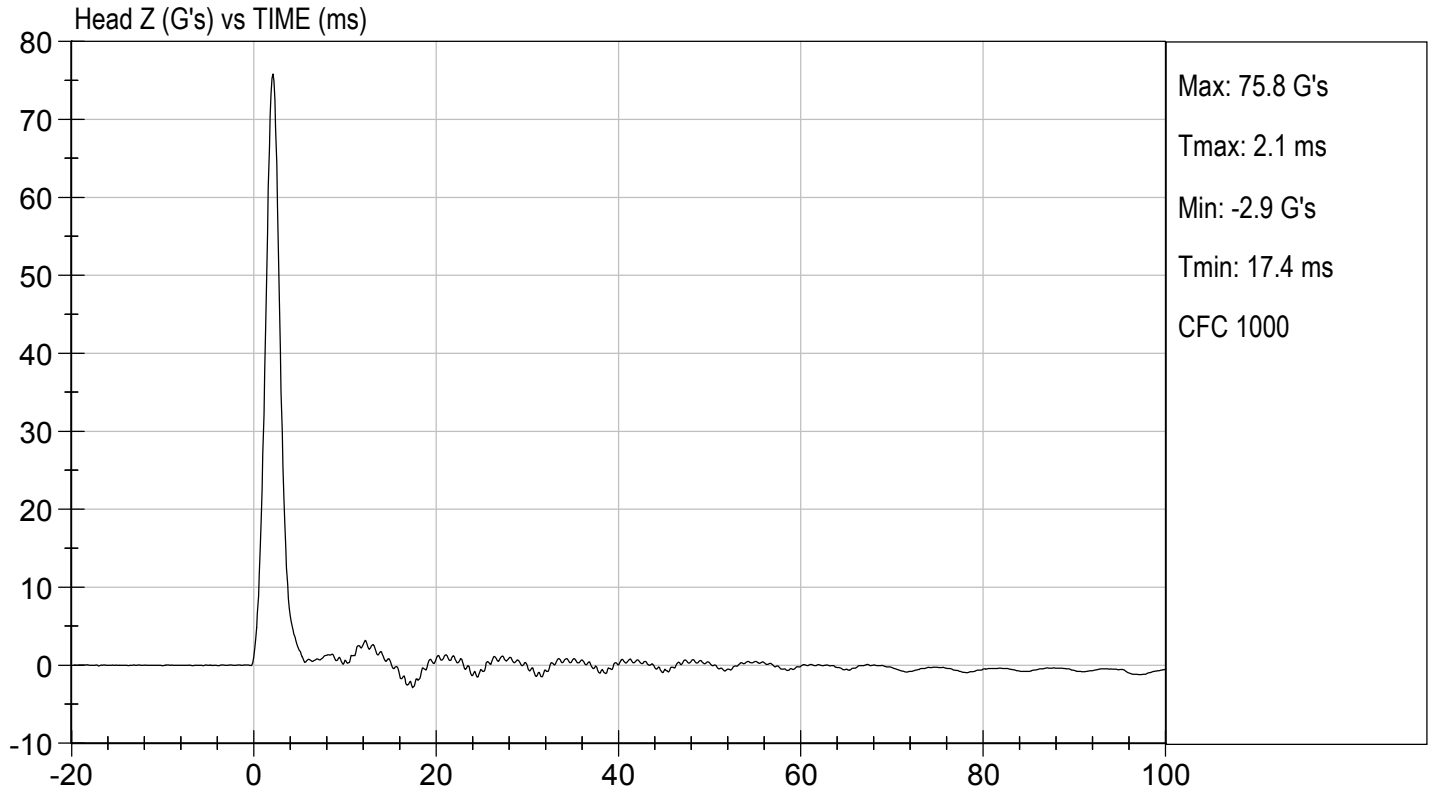
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 08/07/2020
TEST #: D201961





MGA RESEARCH CORPORATION

NECK PENDULUM TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201962

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.50	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.50	Pass
	17 ms	m/s	>= -3.70	-3.40	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.0	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	55.8	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	60.5	Pass
			Overall Results		Pass

Gerald Guerrero
Laboratory Technician

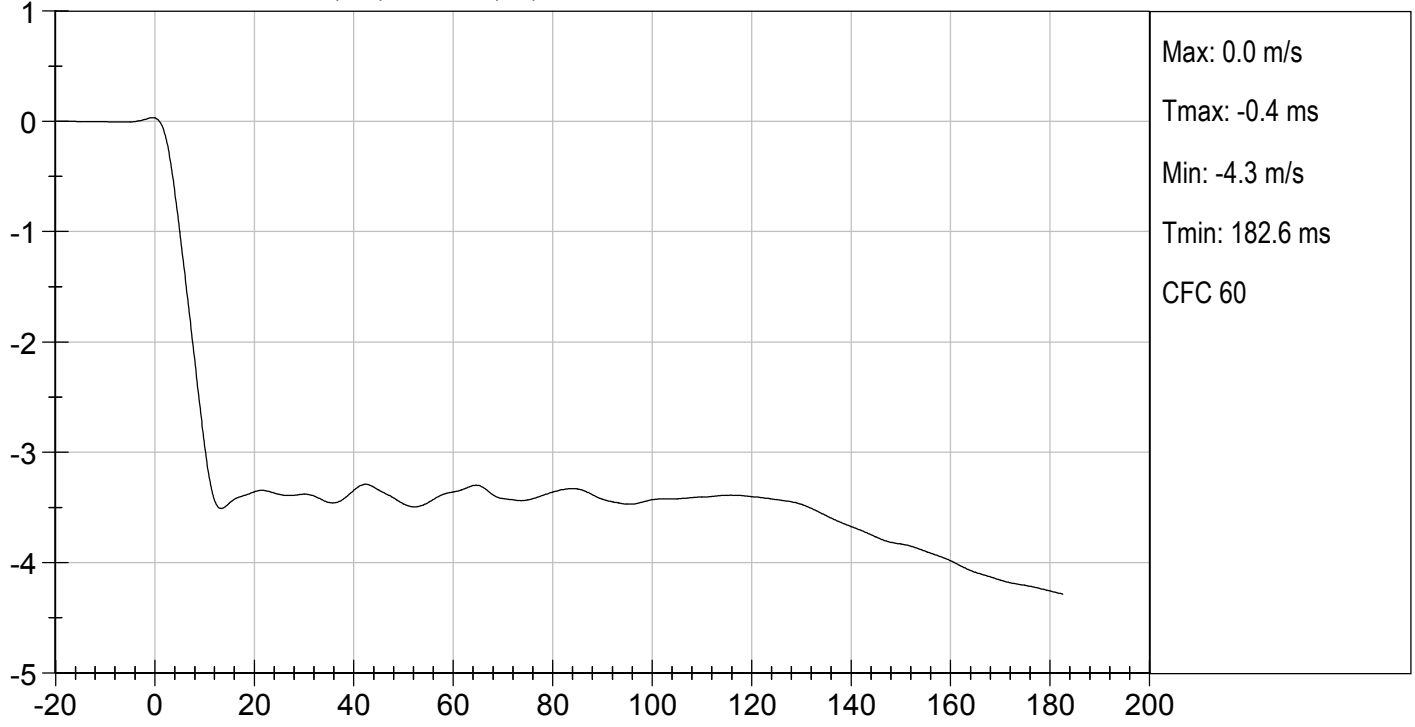
08/10/2020
Test Date

Approved By

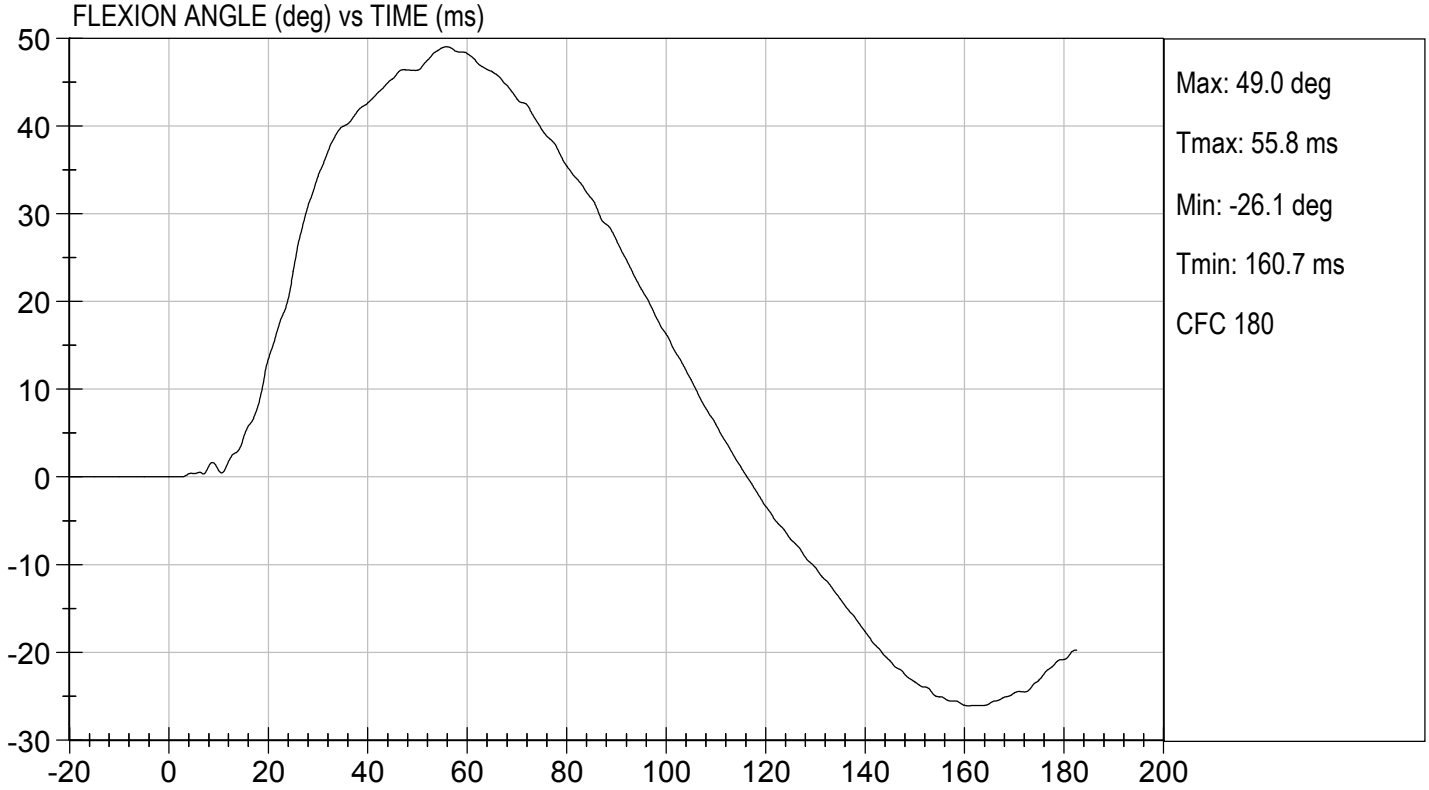
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 08/10/2020
TEST #: D201962

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



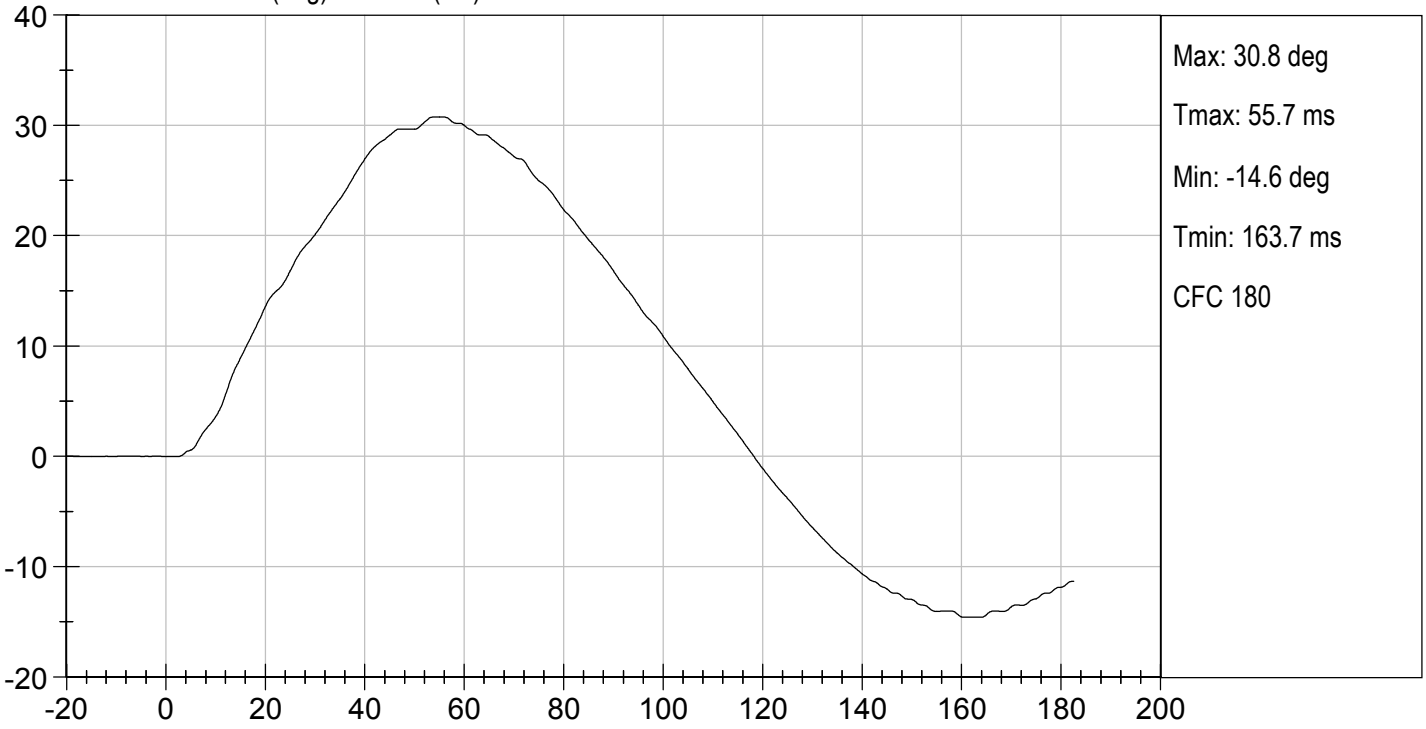
FLEXION ANGLE (deg) vs TIME (ms)



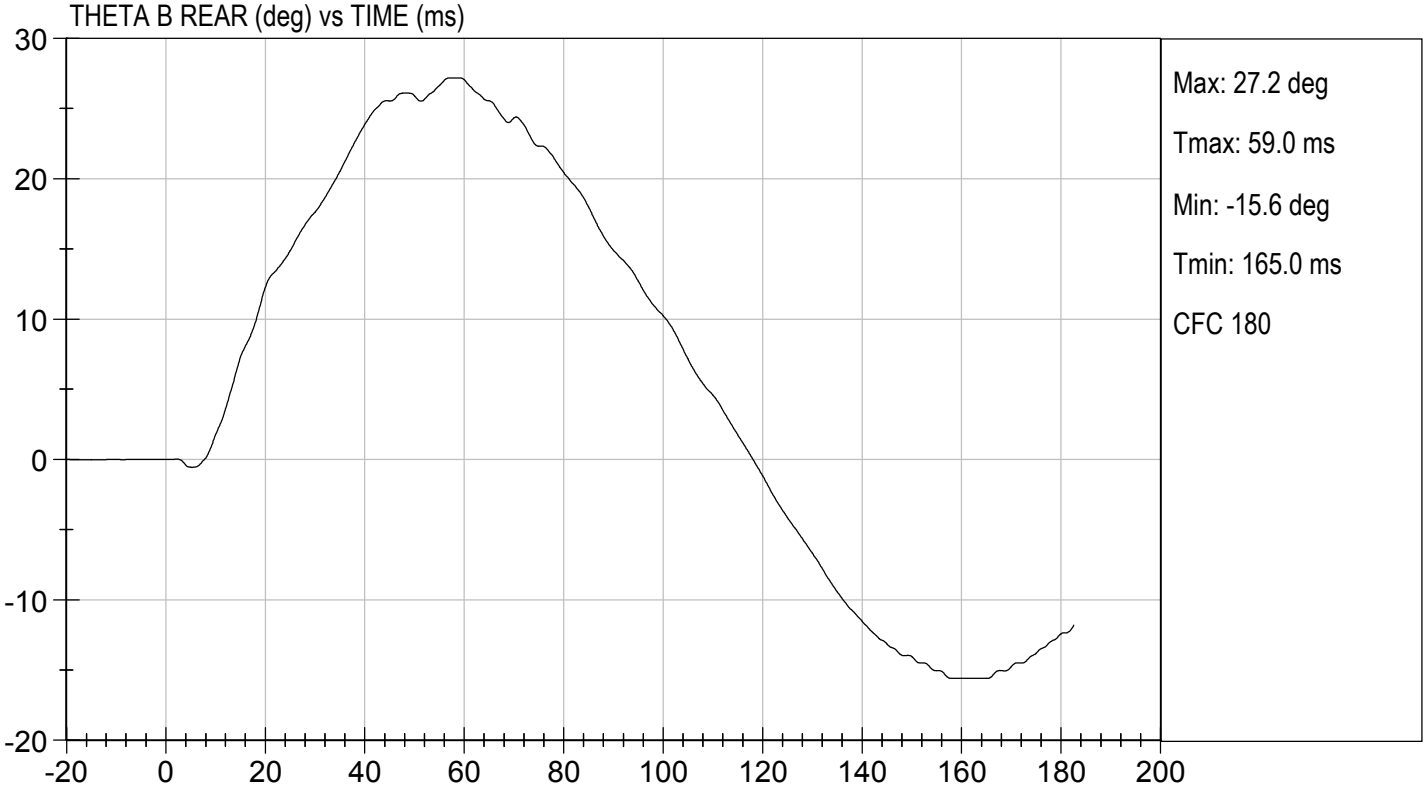
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 08/10/2020
TEST #: D201962

THETA A FRONT (deg) vs TIME (ms)

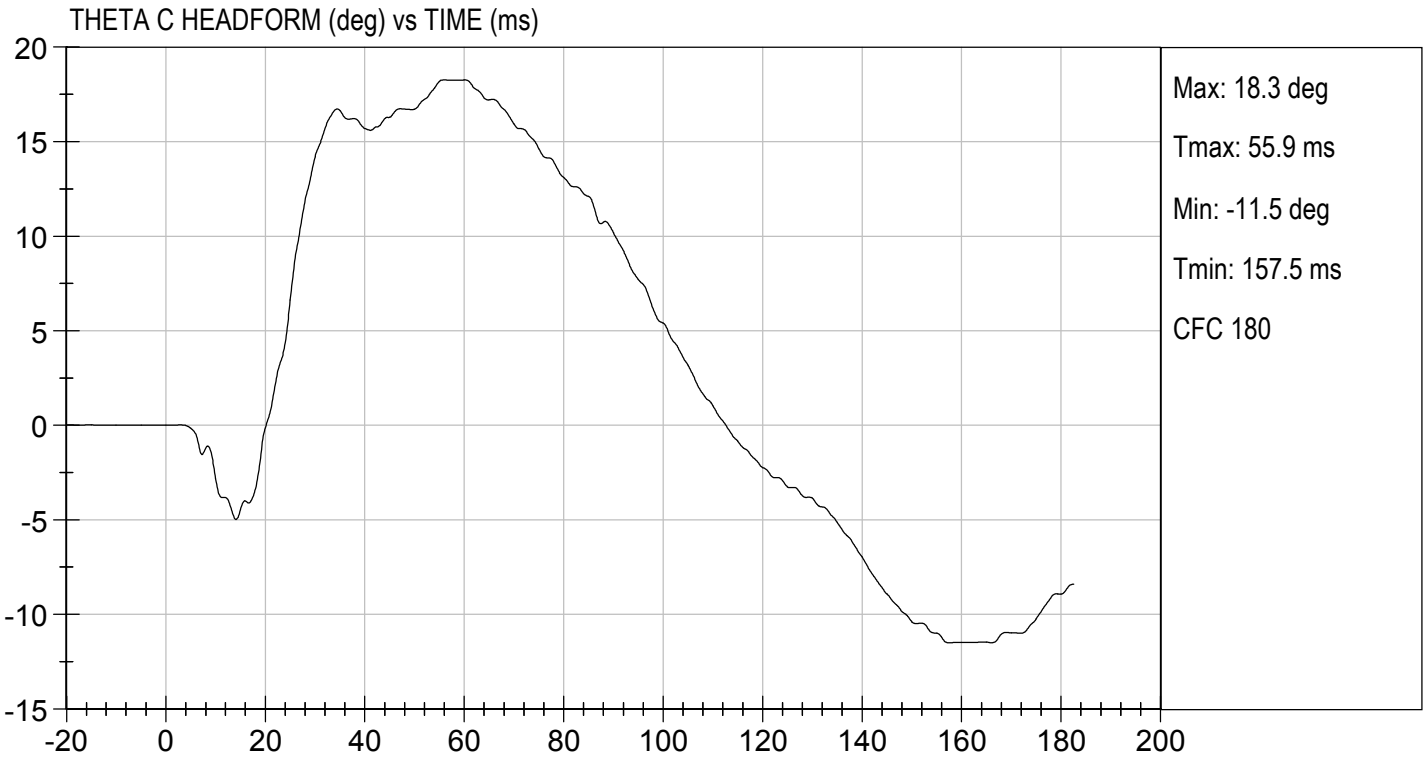


THETA B REAR (deg) vs TIME (ms)



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

TEST DATE: 08/10/2020
TEST #: D201962



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201963

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.9	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

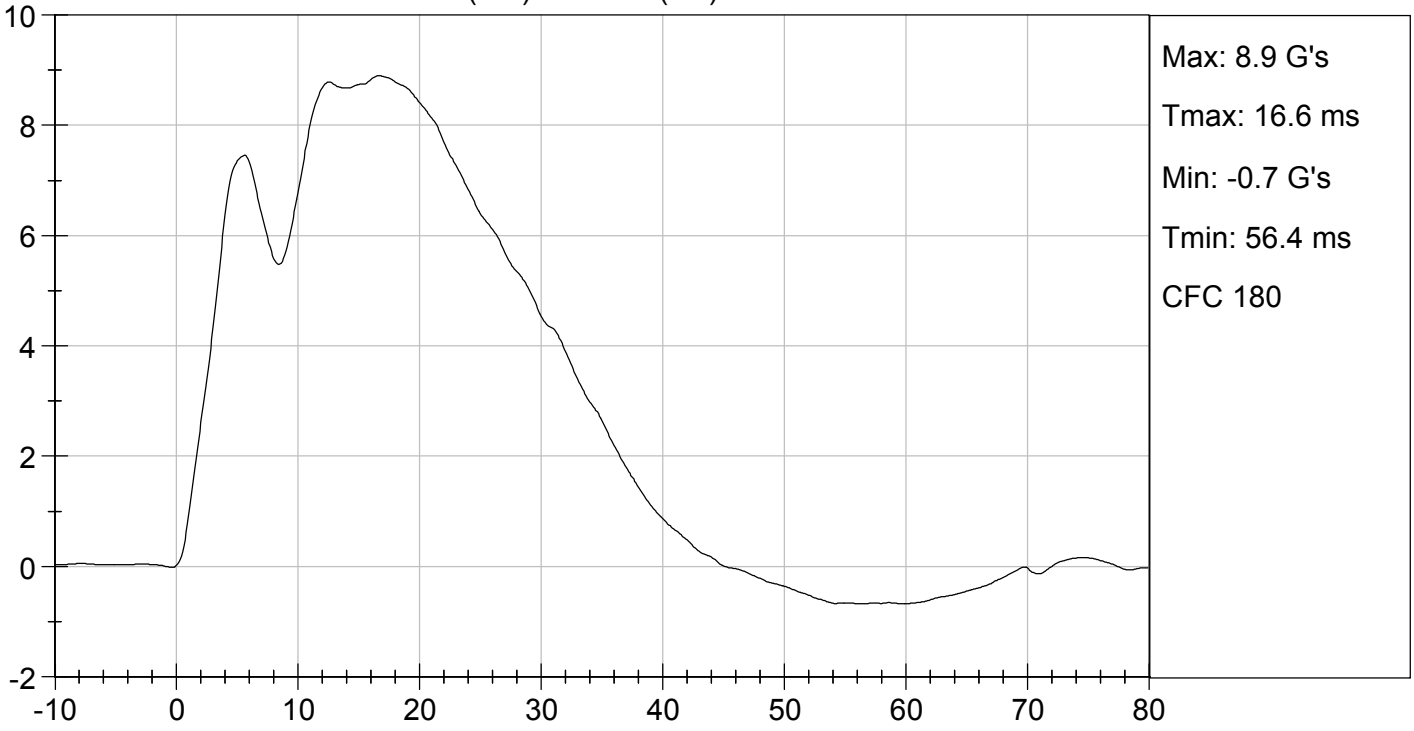
08/11/2020
Test Date

Approved By

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

TEST DATE: 08/11/2020
TEST #: D201963

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



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201964

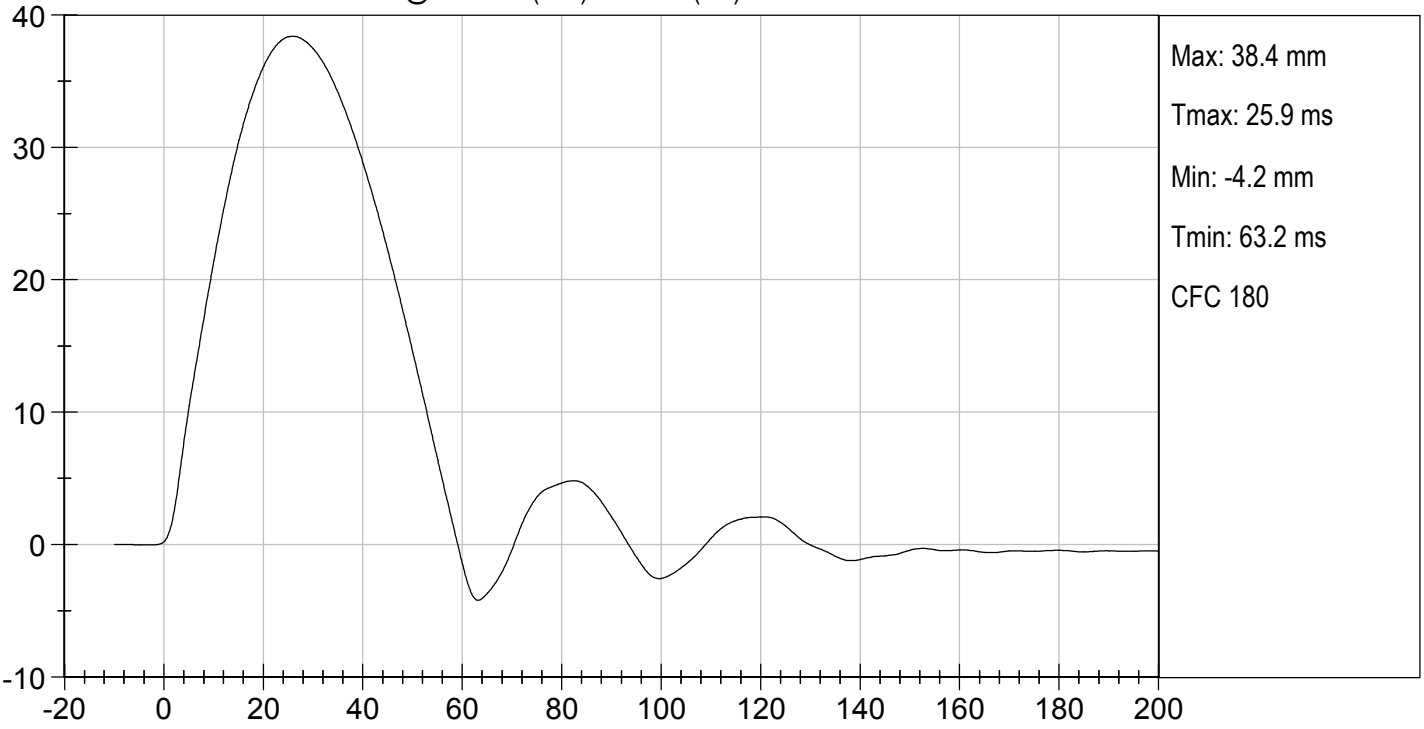
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.2	Pass
		Overall Test Results		Pass

Laboratory Technician

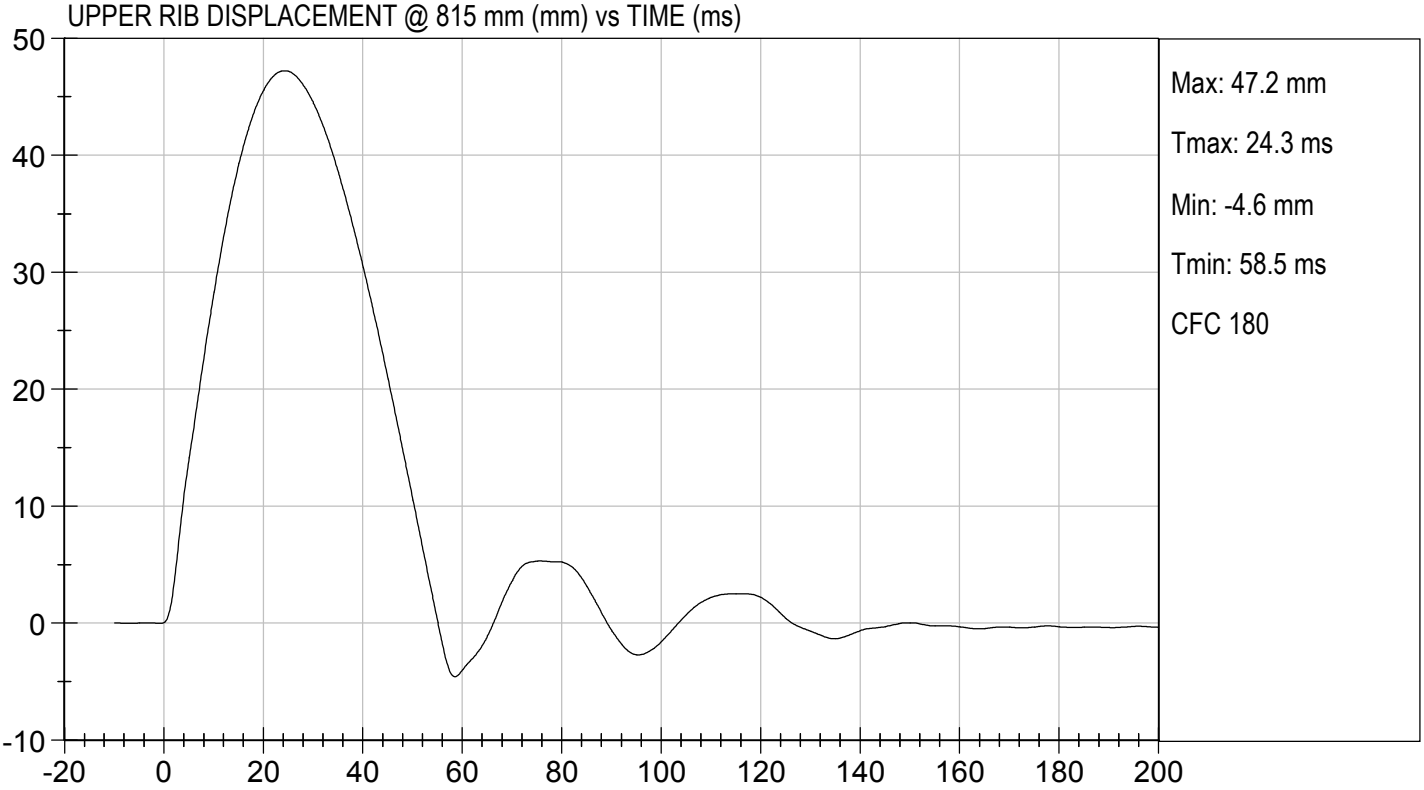
08/07/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201965

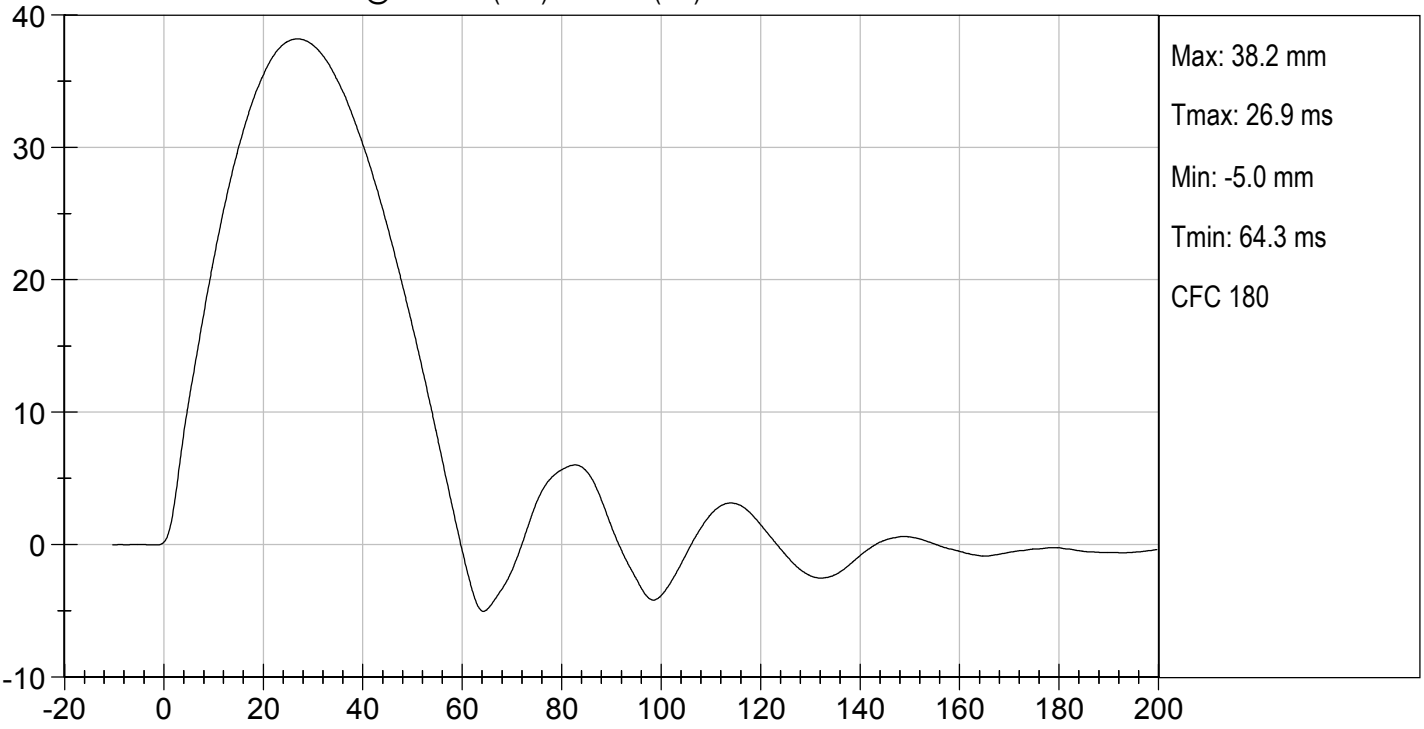
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.4	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

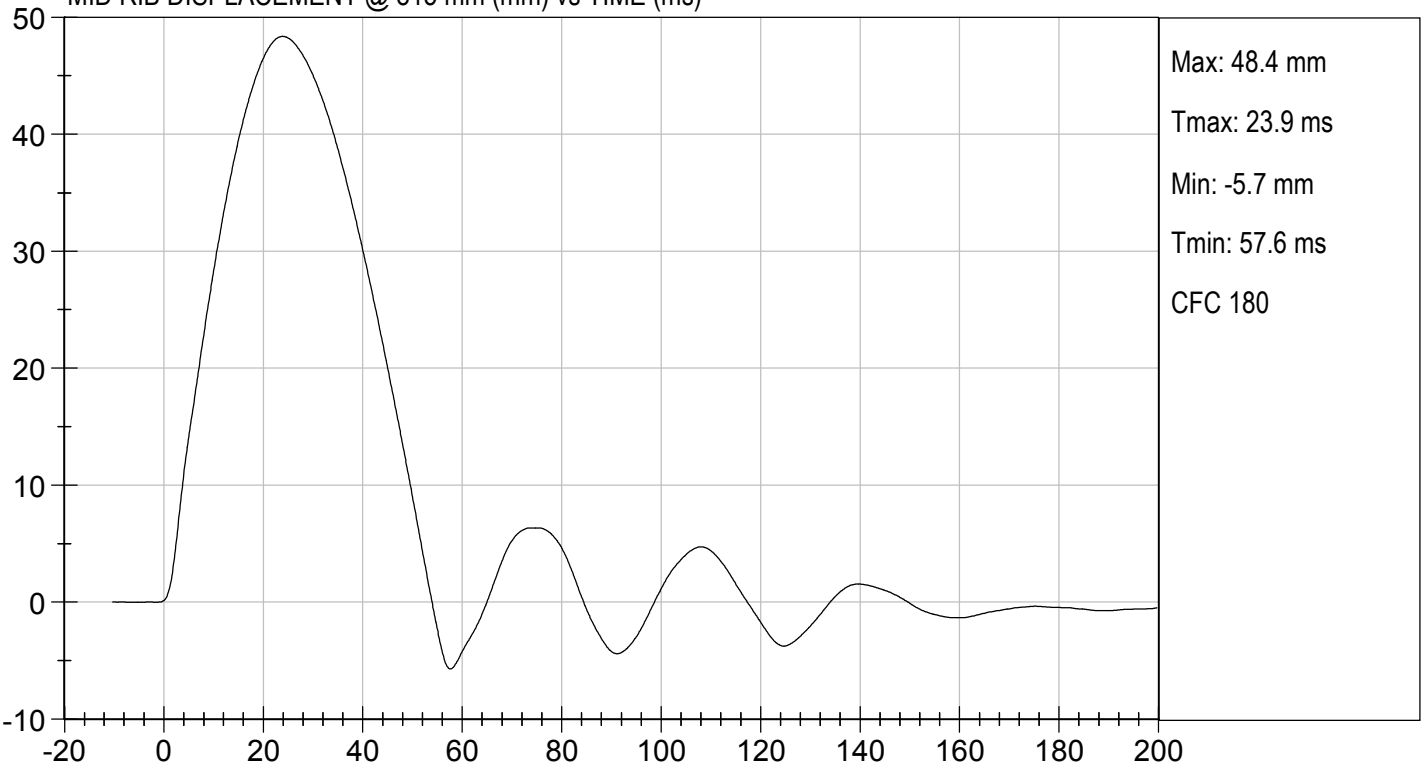
08/07/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201966

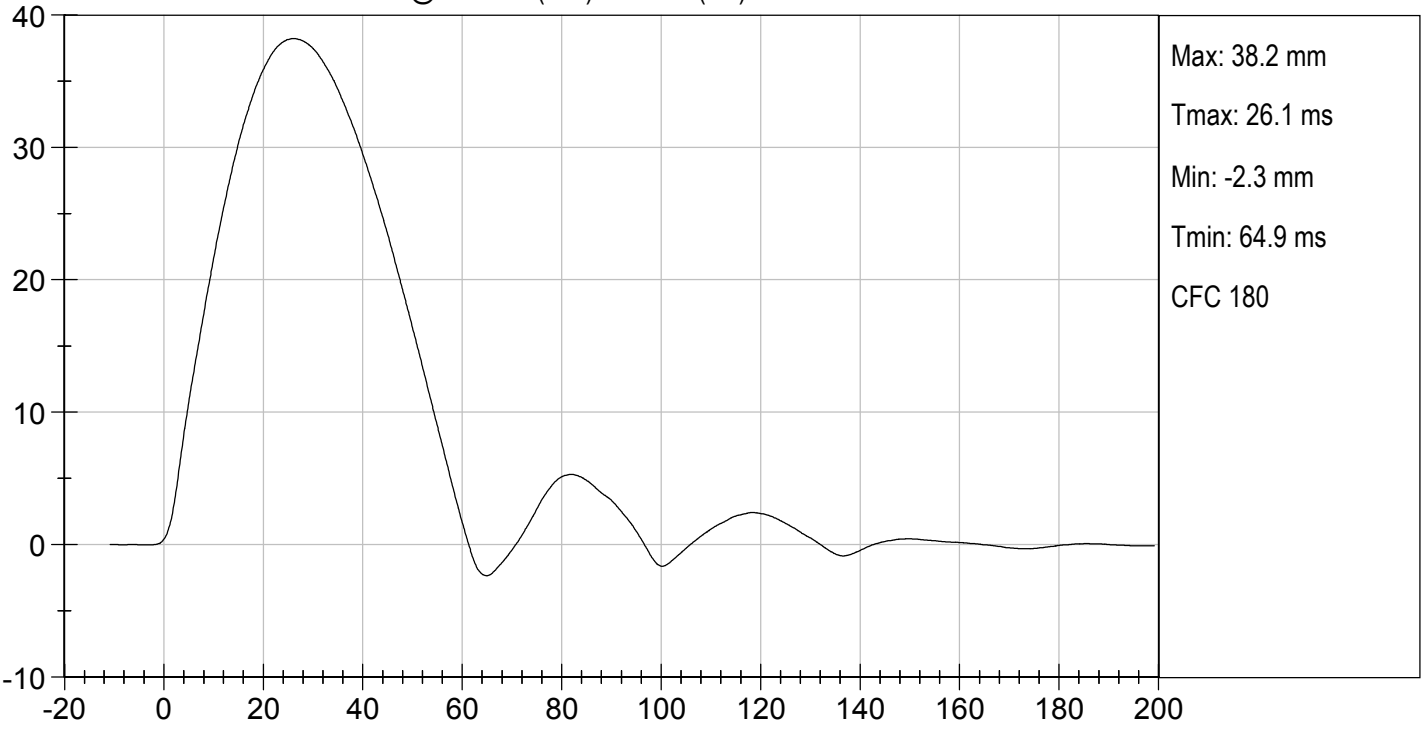
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.0	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

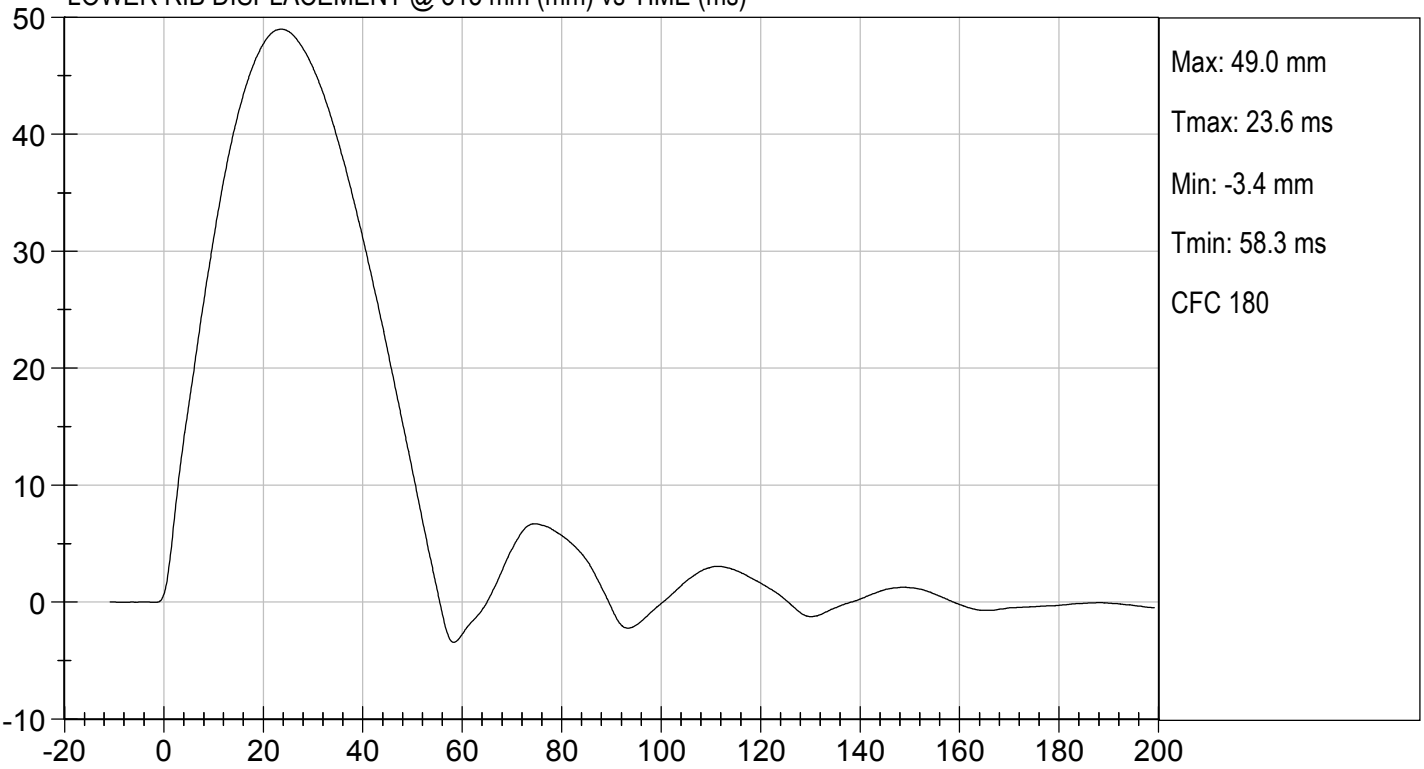
08/07/2020
Test Date

Approved By

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



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



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201967

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4385	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.2	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2435	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.5	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

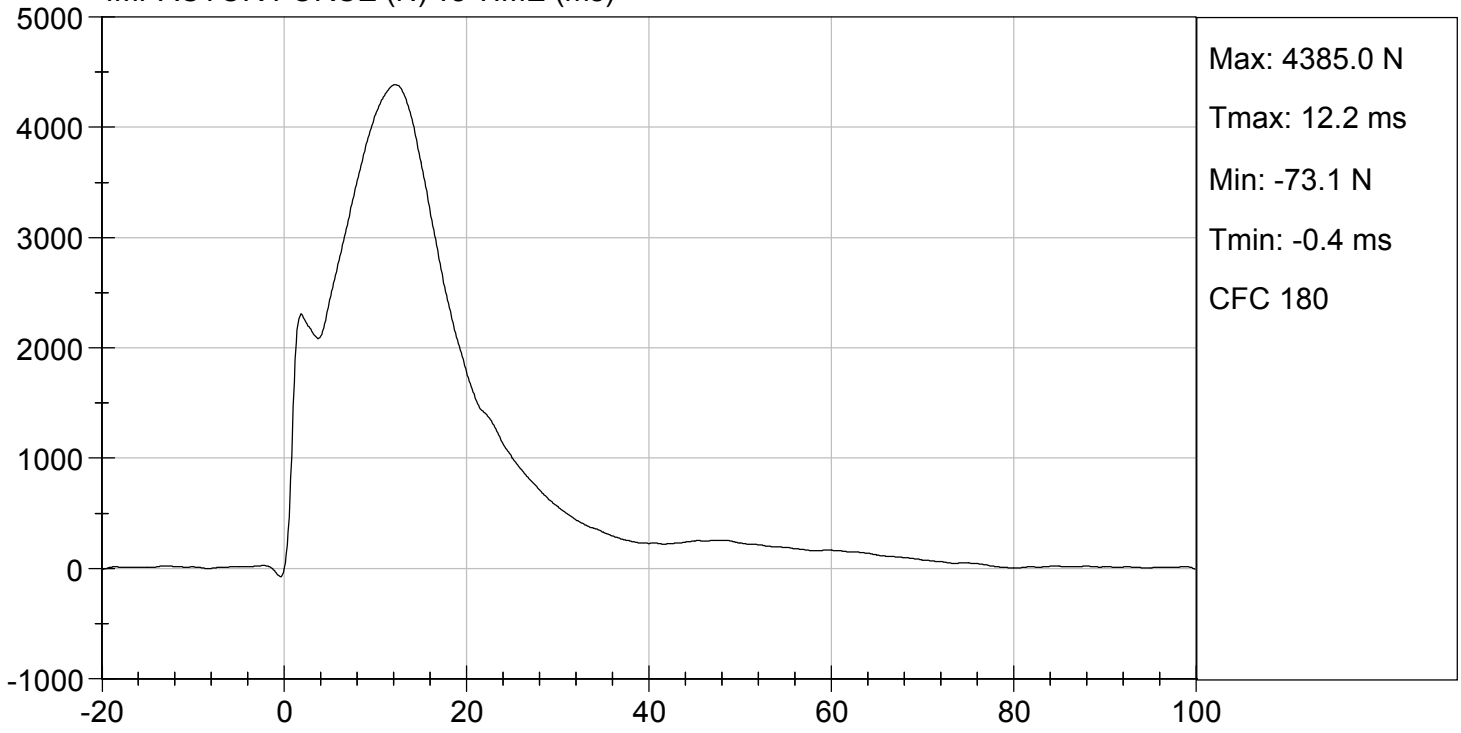
08/11/2020
Test Date

Approved By

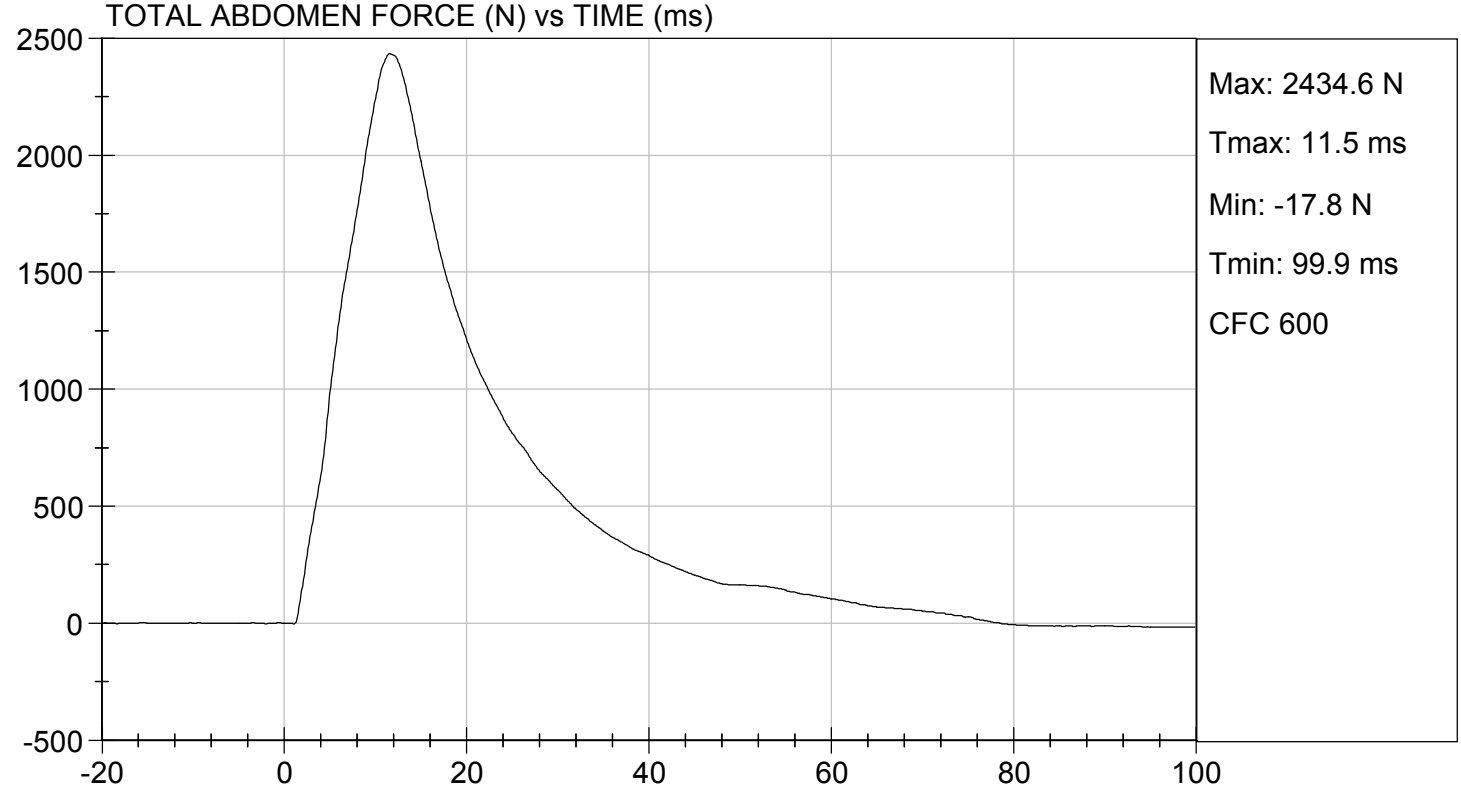
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 08/11/2020
TEST #: D201967

IMPACTOR FORCE (N) vs TIME (ms)



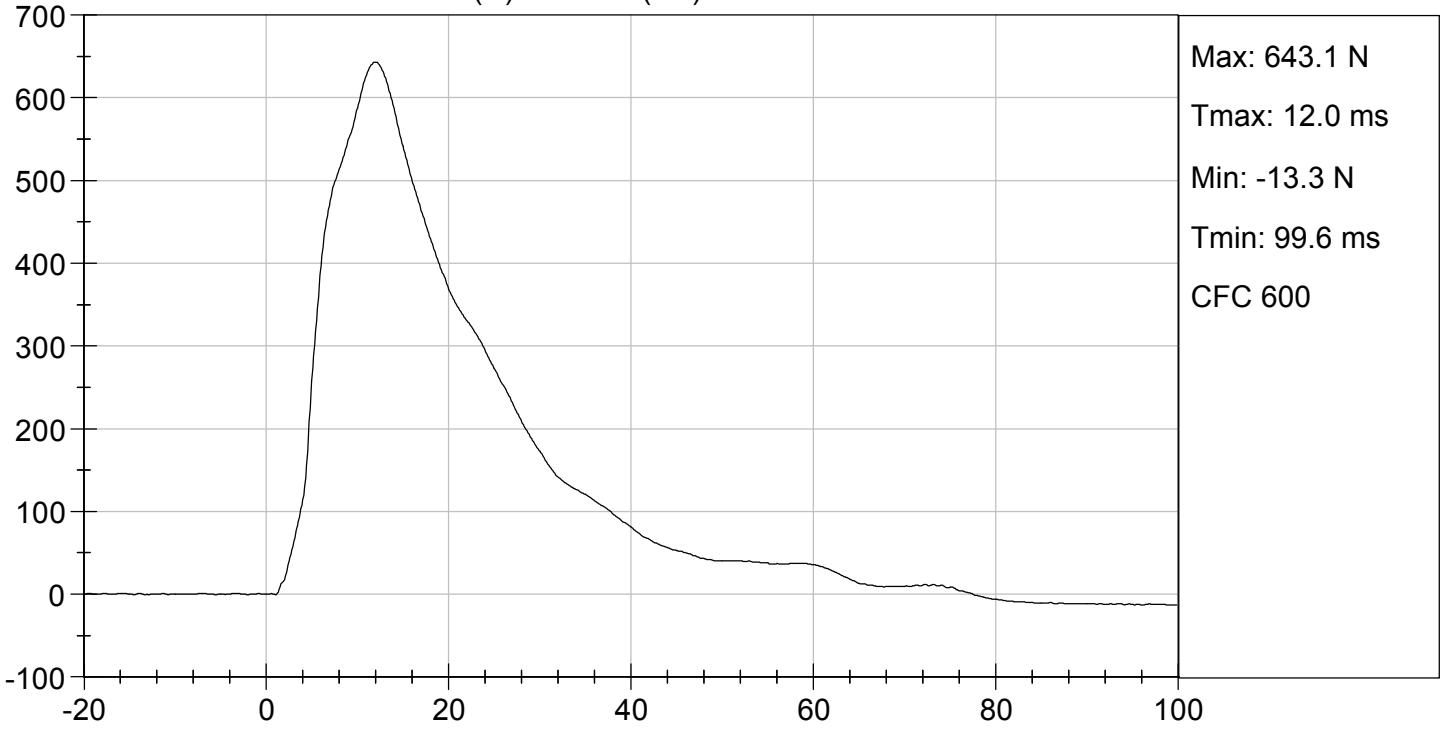
TOTAL ABDOMEN FORCE (N) vs TIME (ms)



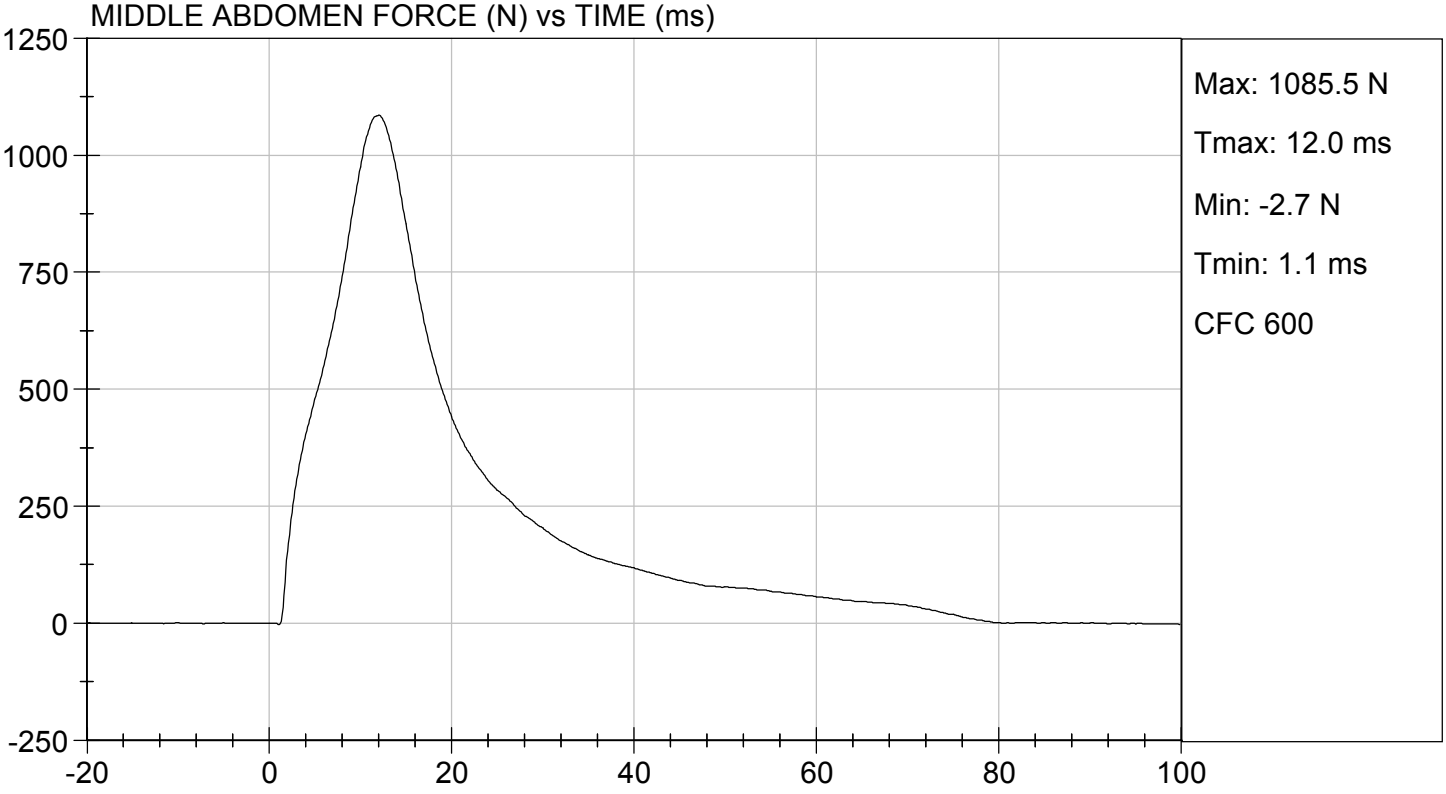
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 08/11/2020
TEST #: D201967

FRONT ABDOMEN FORCE (N) vs TIME (ms)



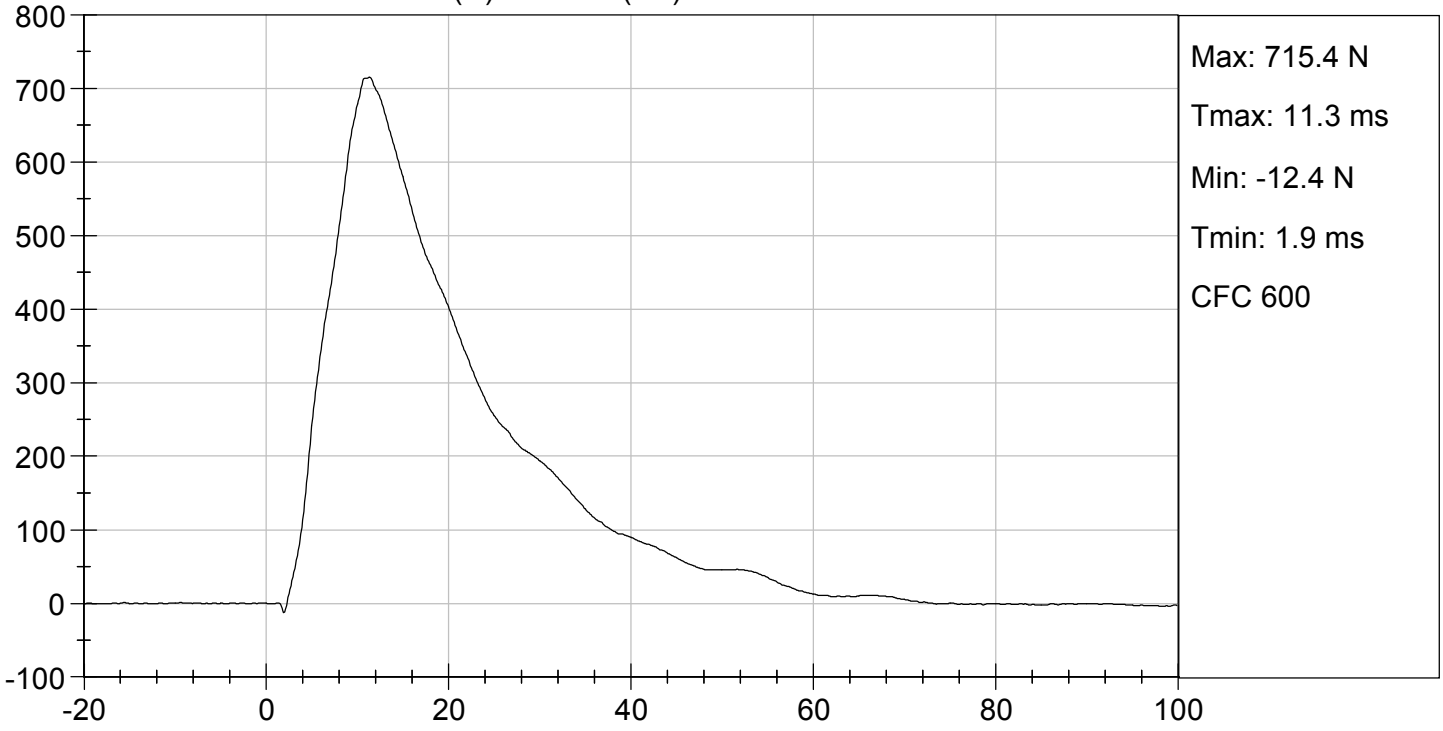
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



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

TEST DATE: 08/11/2020
TEST #: D201967

REAR ABDOMEN FORCE (N) vs TIME (ms)



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201969

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	5091	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.7	Pass
Maximum Pubic Force	N	1230 to 1590	1461	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.0	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

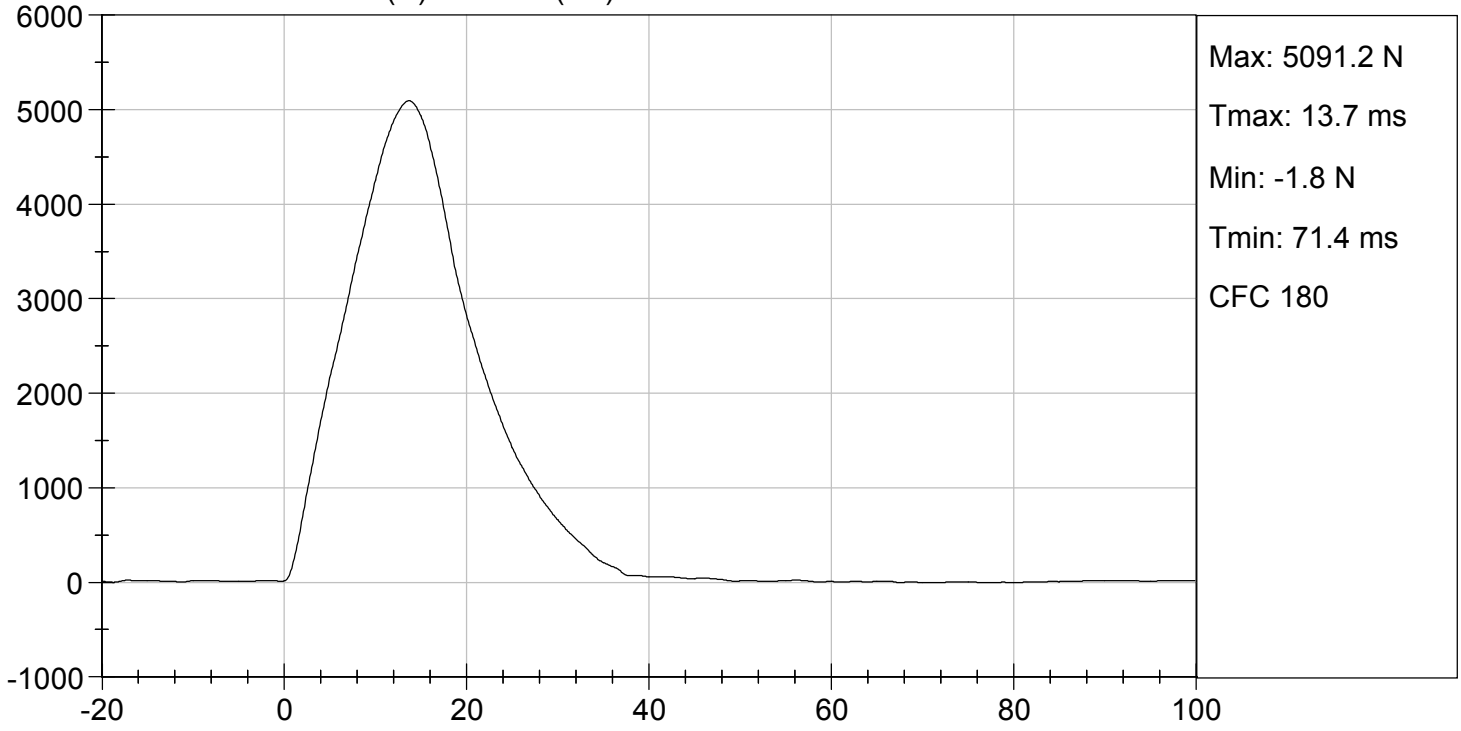
08/11/2020
Test Date

Approved By

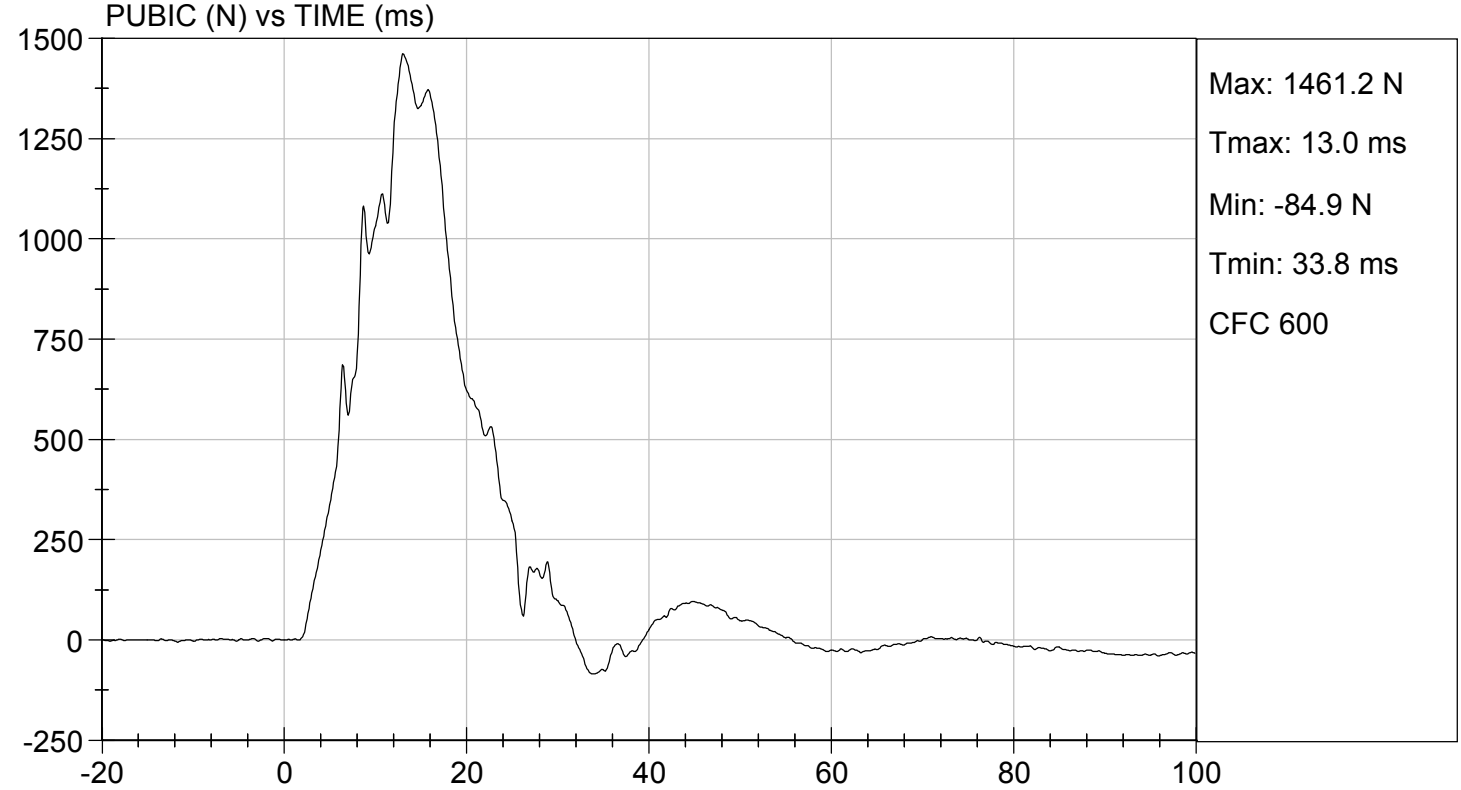
TEST DESC: PELVIS IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 08/11/2020
TEST #: D201969

IMPACTOR FORCE (N) vs TIME (ms)



PUBIC (N) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: F032 **Test I.D:** D201960

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5627	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.2	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.0	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.9	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

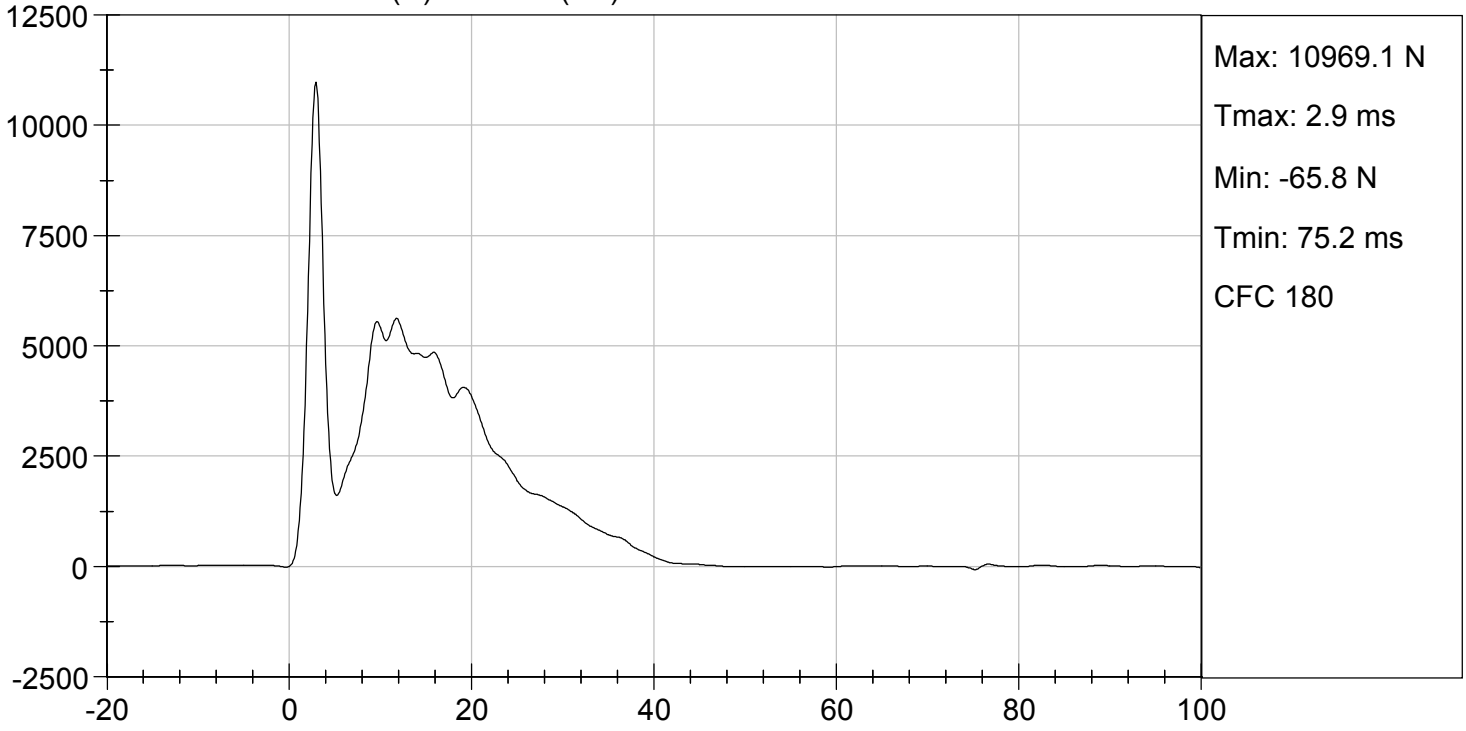
08/11/2020
Test Date

Approved By

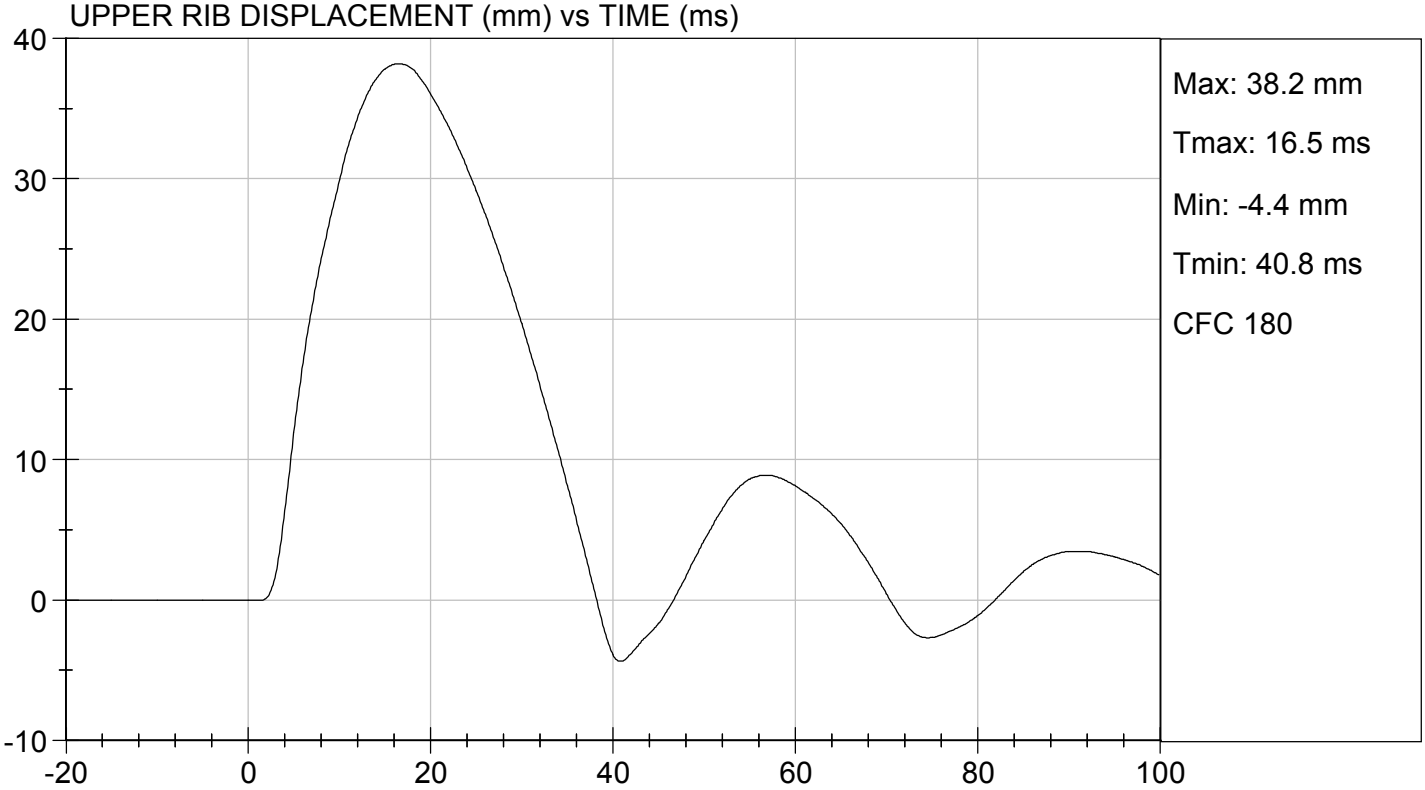
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 08/11/2020
TEST #: D201960

IMPACTOR FORCE (N) vs TIME (ms)



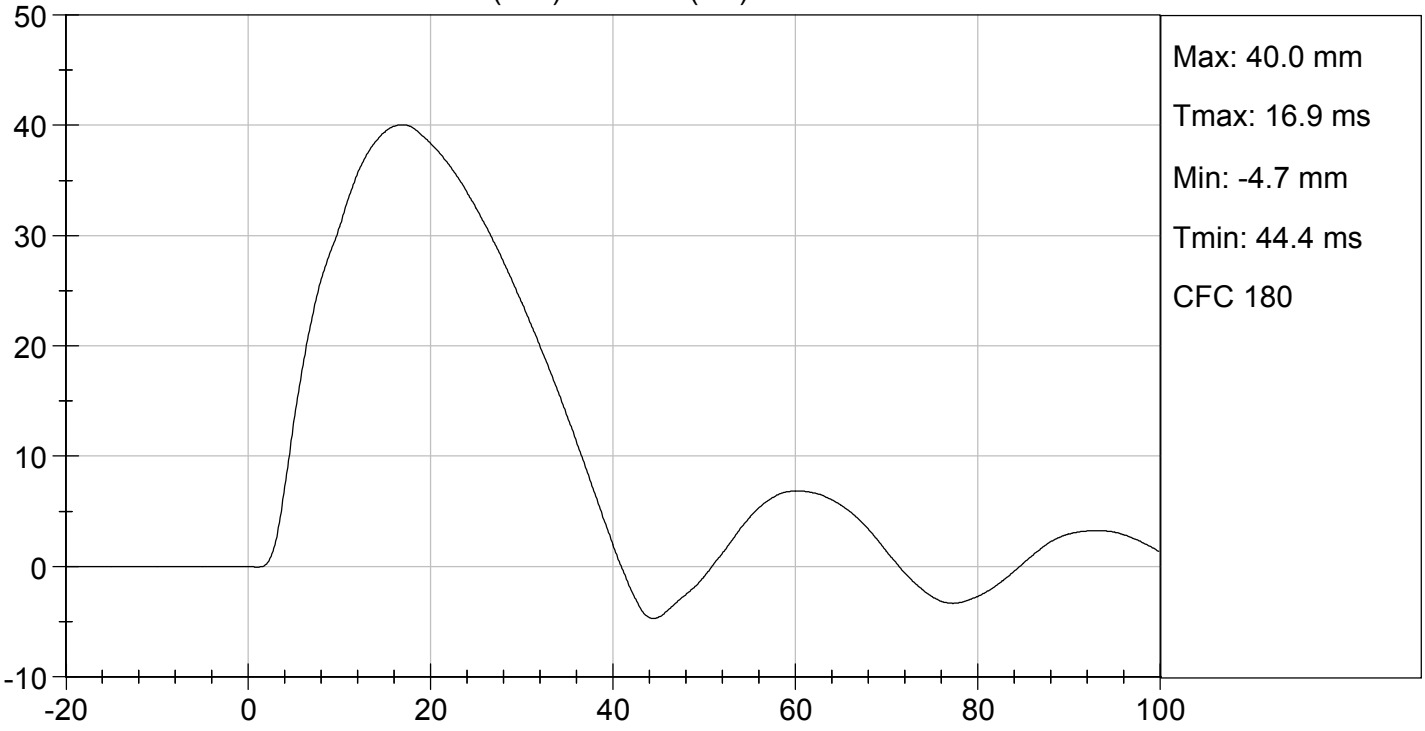
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



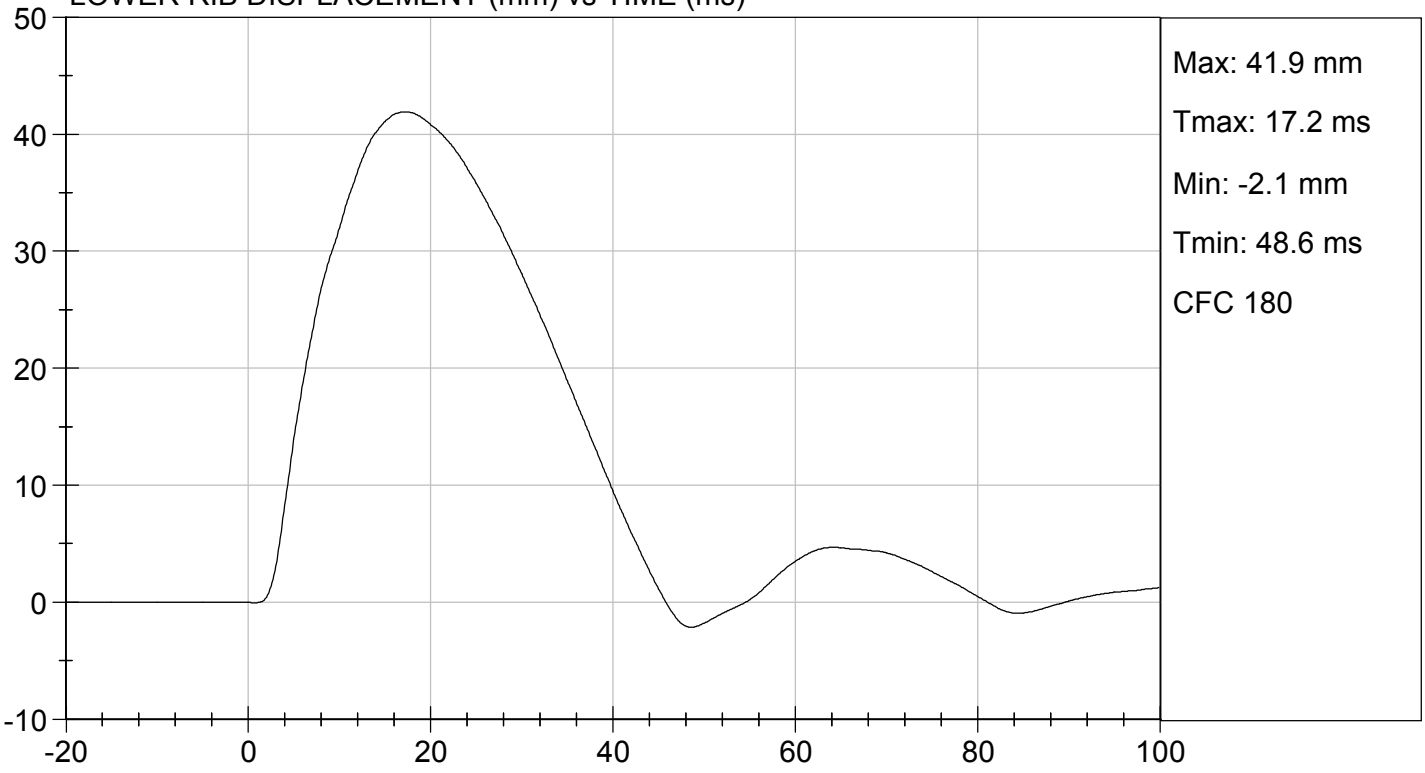
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 08/11/2020
TEST #: D201960

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

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

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D201731

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	115 to 137	131	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-3.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

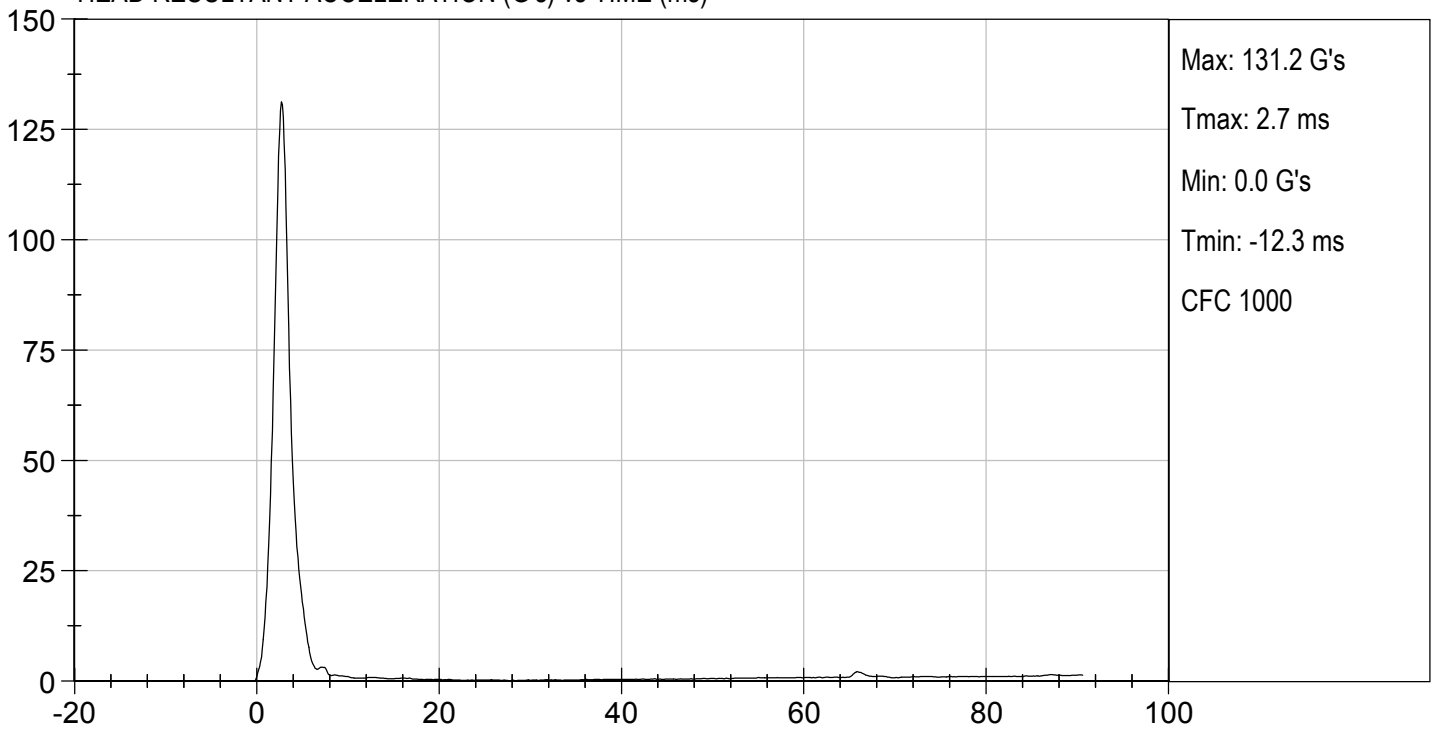
07/15/2020
Test Date

Approved By

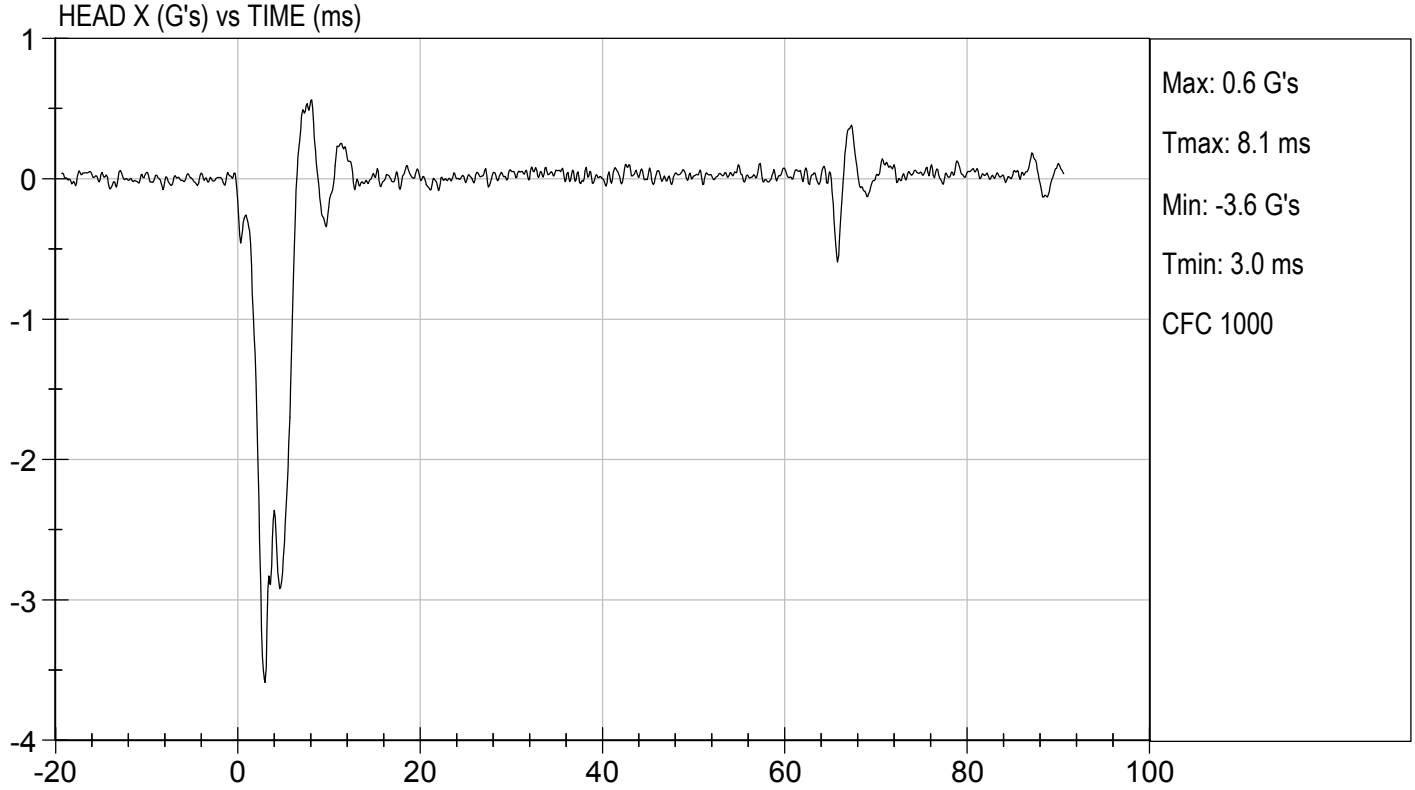
TEST DESC: HEAD DROP

TEST DATE: 07/15/2020
TEST #: D201731

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



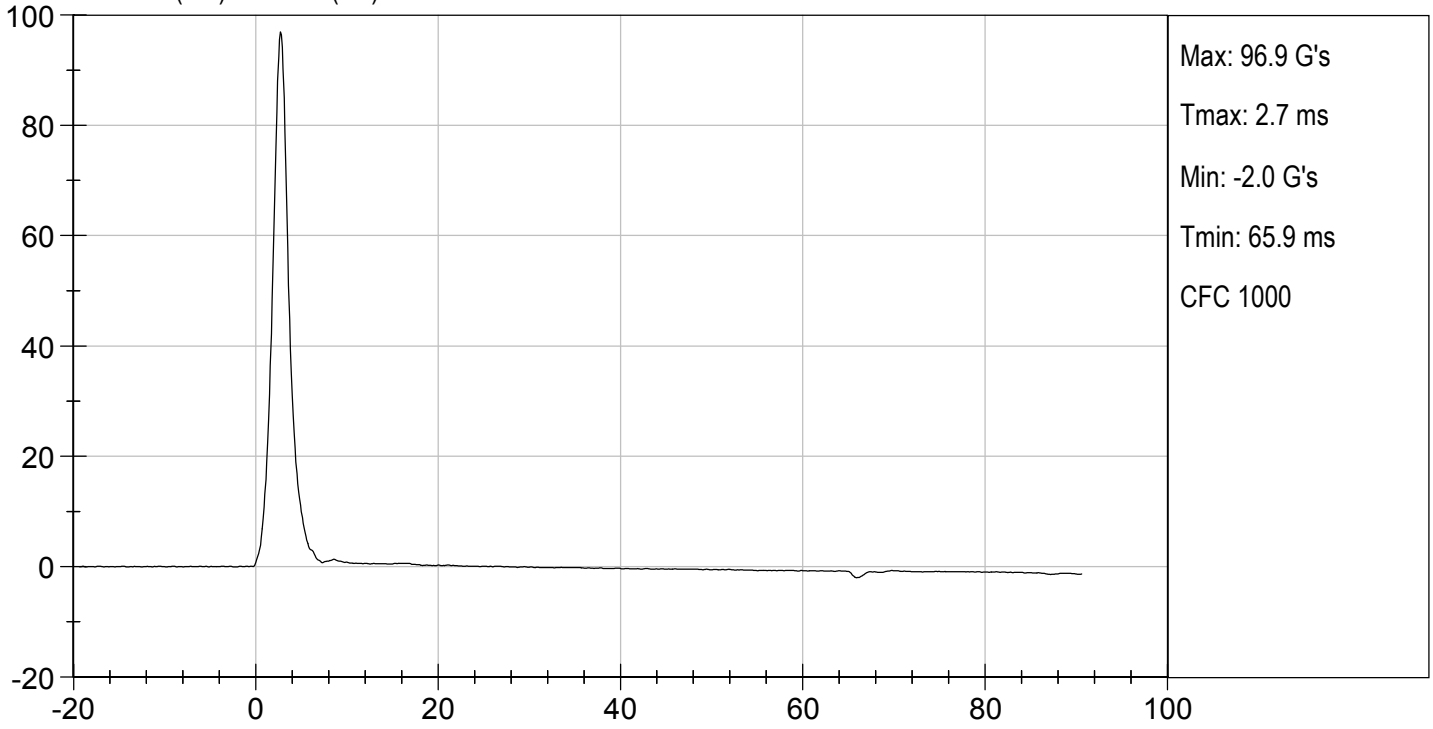
HEAD X (G's) vs TIME (ms)



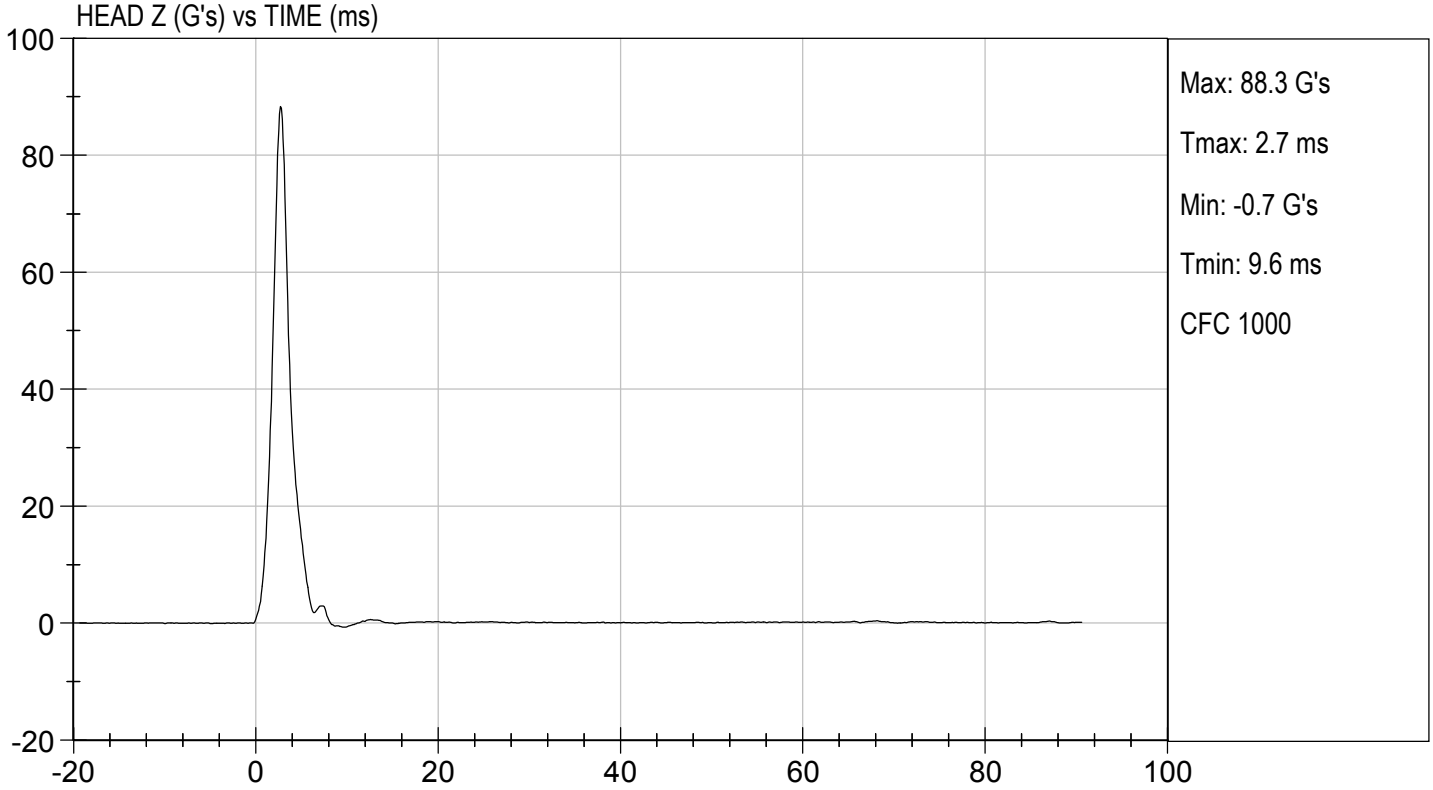
TEST DESC: HEAD DROP

TEST DATE: 07/15/2020
TEST #: D201731

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



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



MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201732

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	45	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.52	Pass
	15 ms	m/s	3.30 to 4.10	3.74	Pass
	20 ms	m/s	4.40 to 5.40	5.24	Pass
	25 ms	m/s	5.40 to 6.10	5.60	Pass
	25-100 ms	m/s	5.50 to 6.20	5.62	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-36	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	121	Pass
			Overall Test Results		Pass

Laboratory Technician

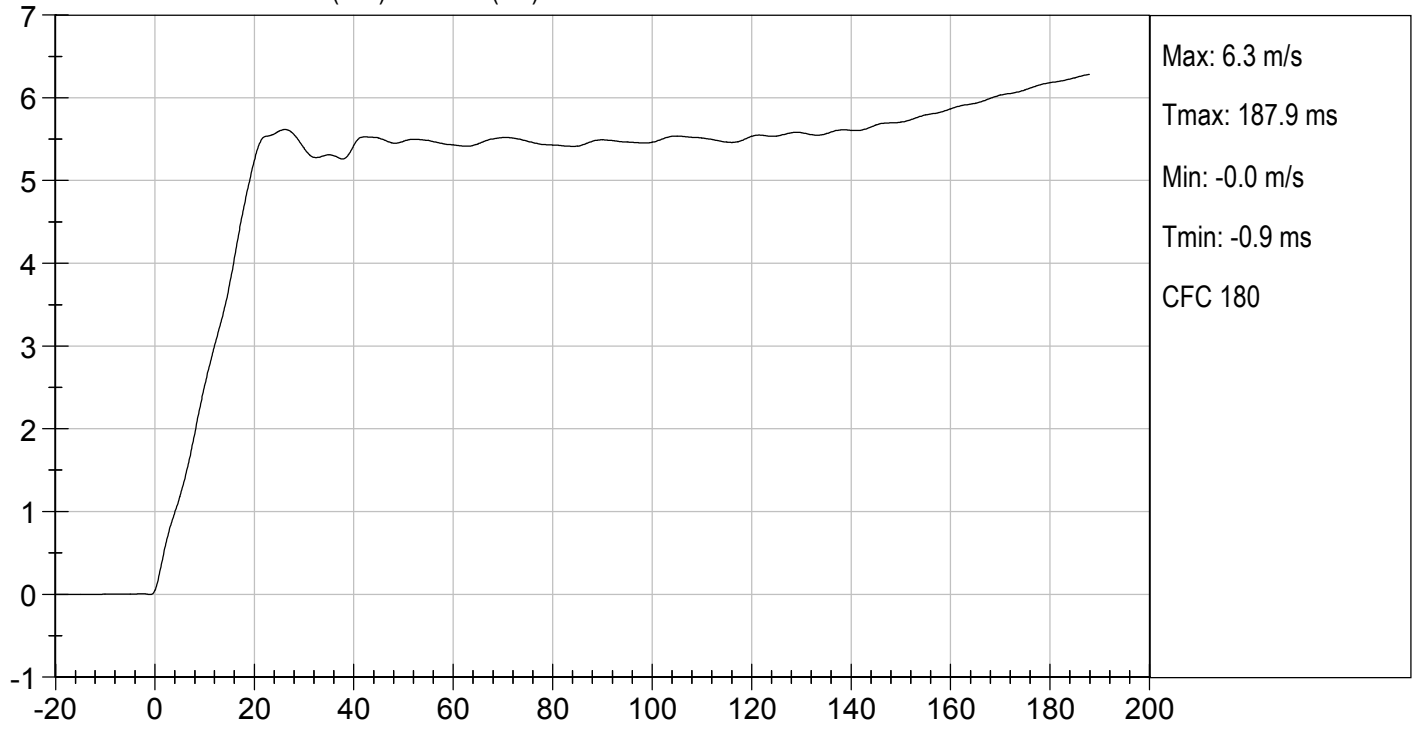
07/15/2020
Test Date

Approved By

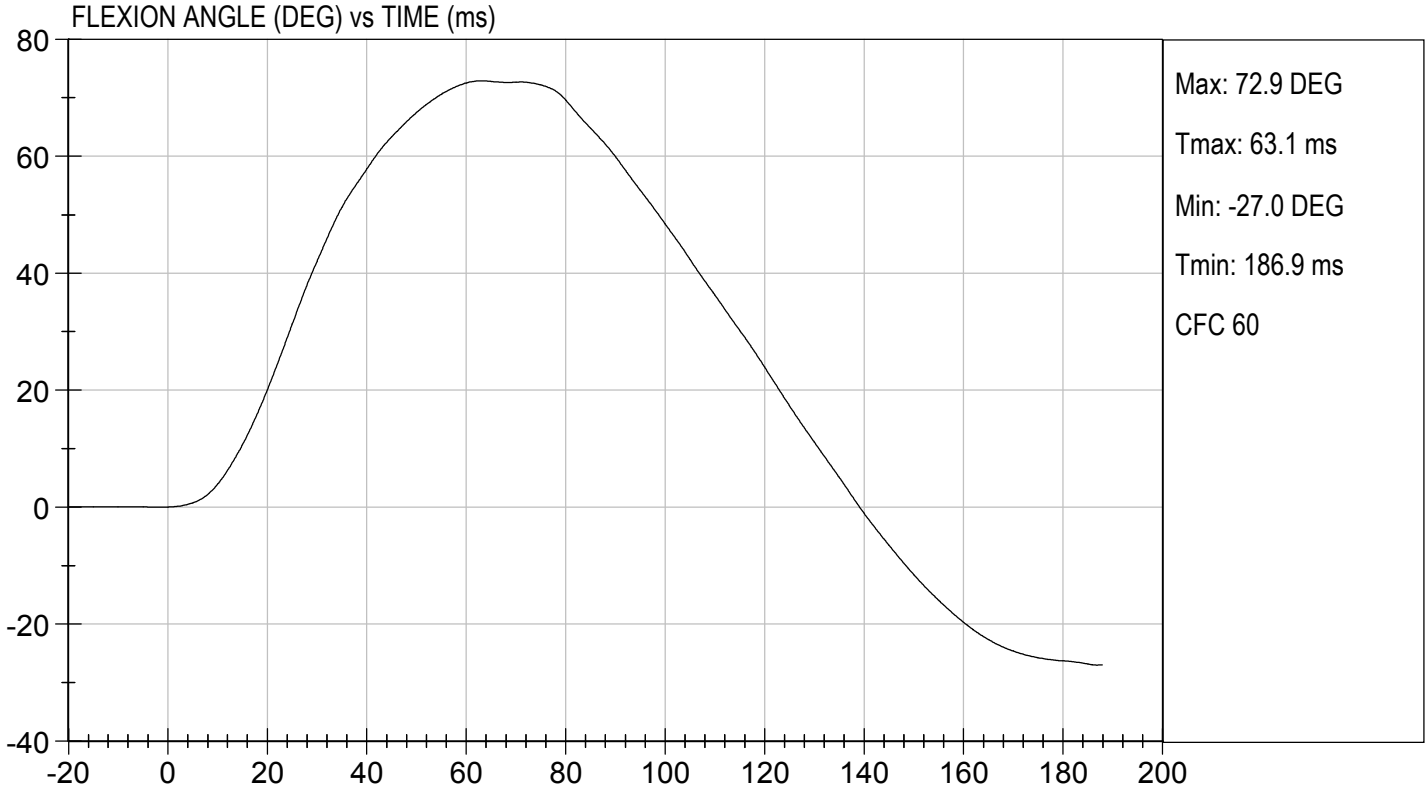
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 07/15/2020
TEST #: D201732

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

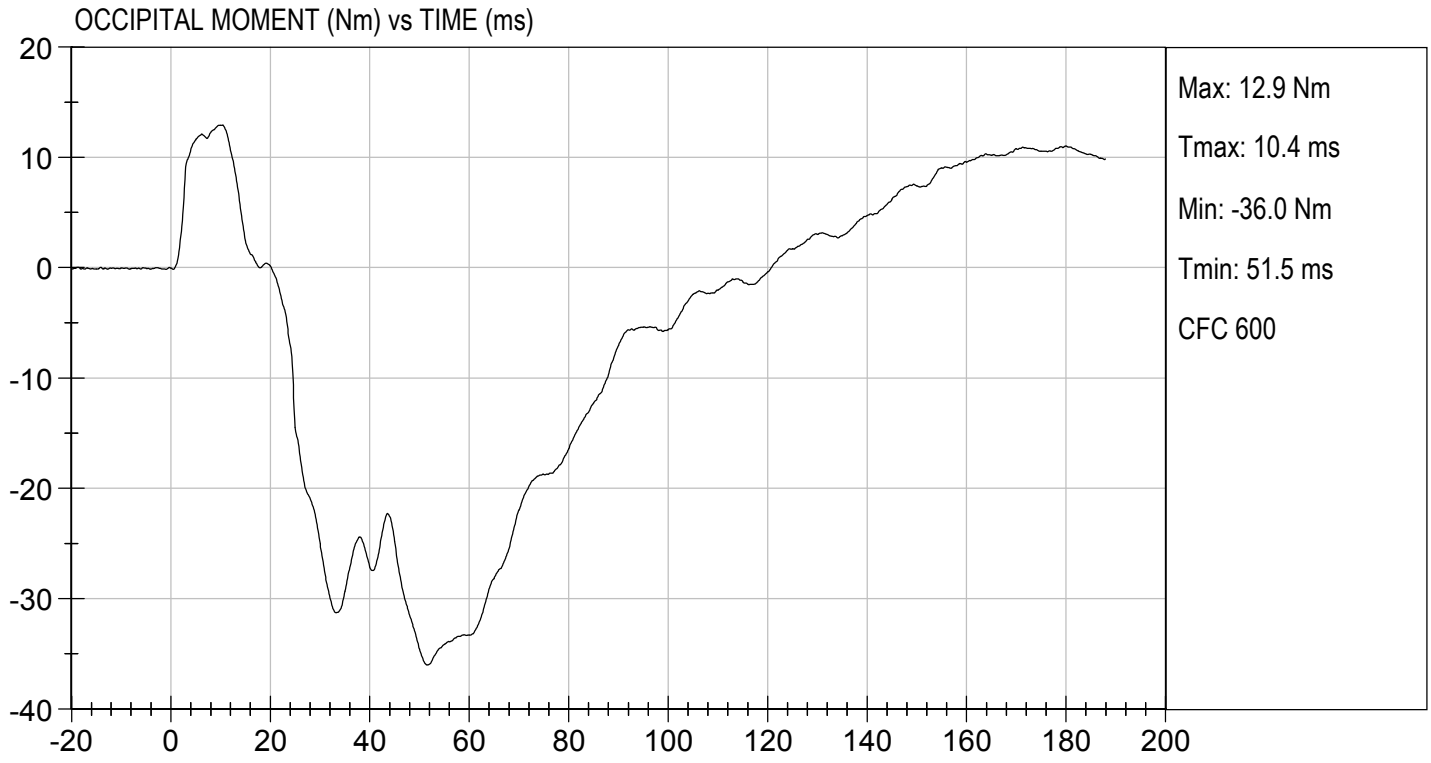


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 07/15/2020
TEST #: D201732



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D201733

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
		Overall Test Results		Pass

Laboratory Technician

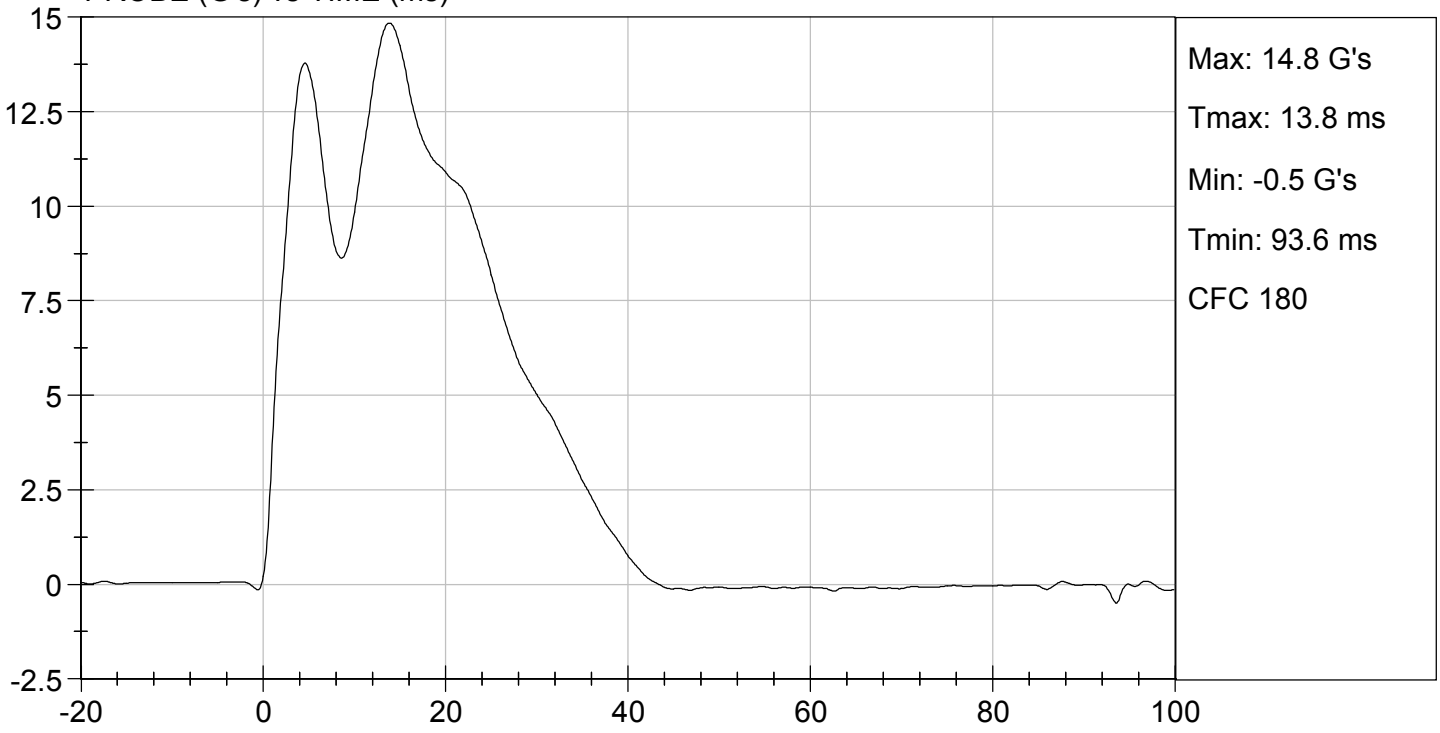
07/14/2020
Test Date

Approved By

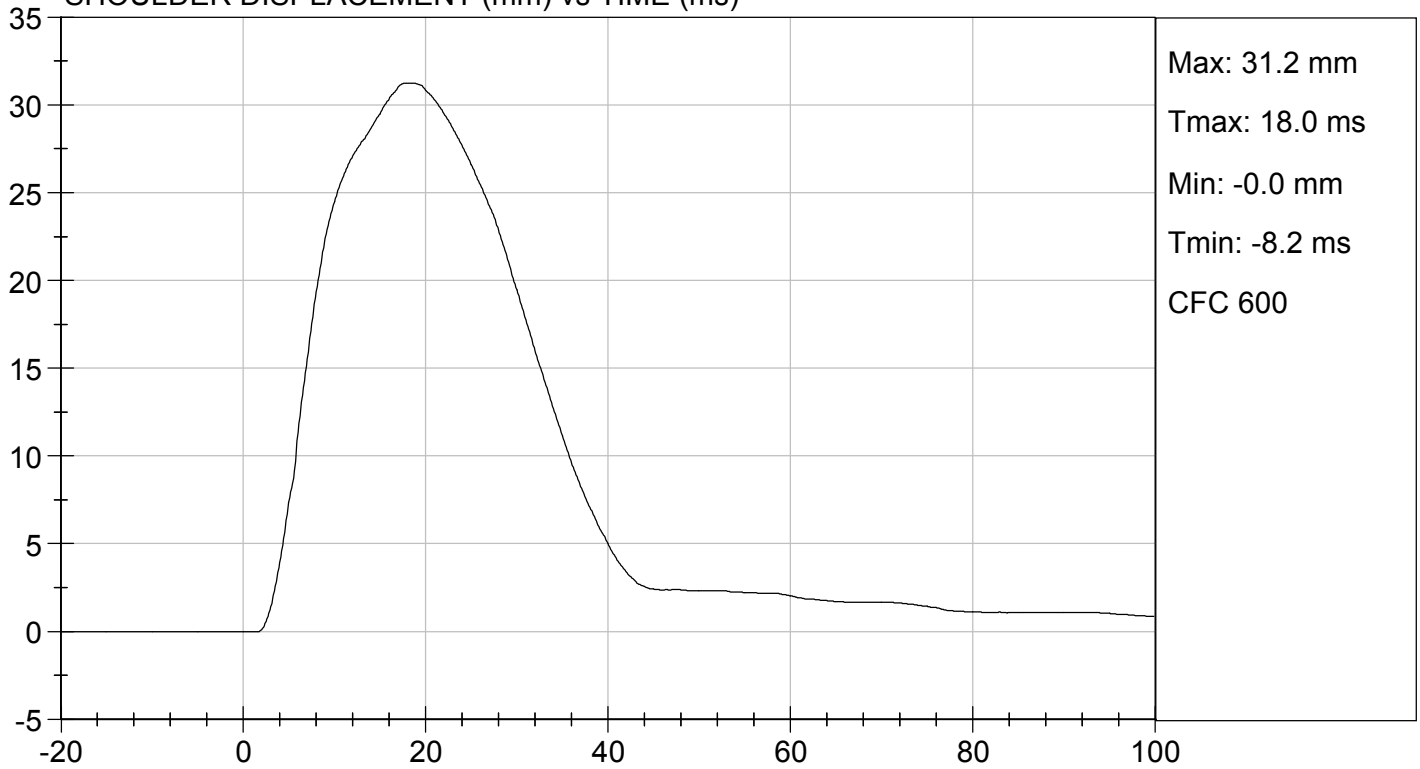
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 07/14/2020
TEST #: D201733

PROBE (G's) vs TIME (ms)

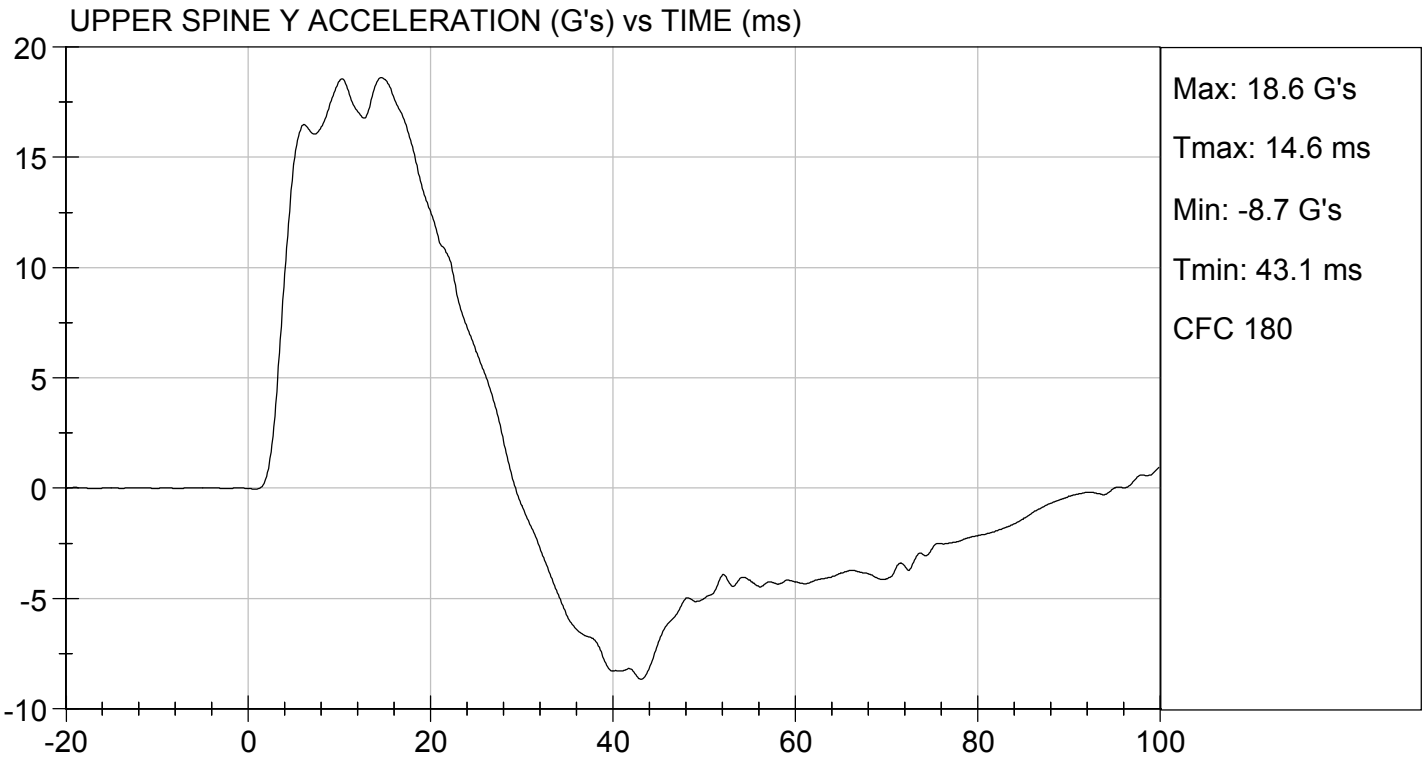


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201733



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201734

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	43	Pass
Impact Velocity	m/s	6.60 to 6.80	6.80	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	30	Pass
Middle Rib Displacement	mm	30 to 36	33	Pass
Lower Rib Displacement	mm	32 to 38	34	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

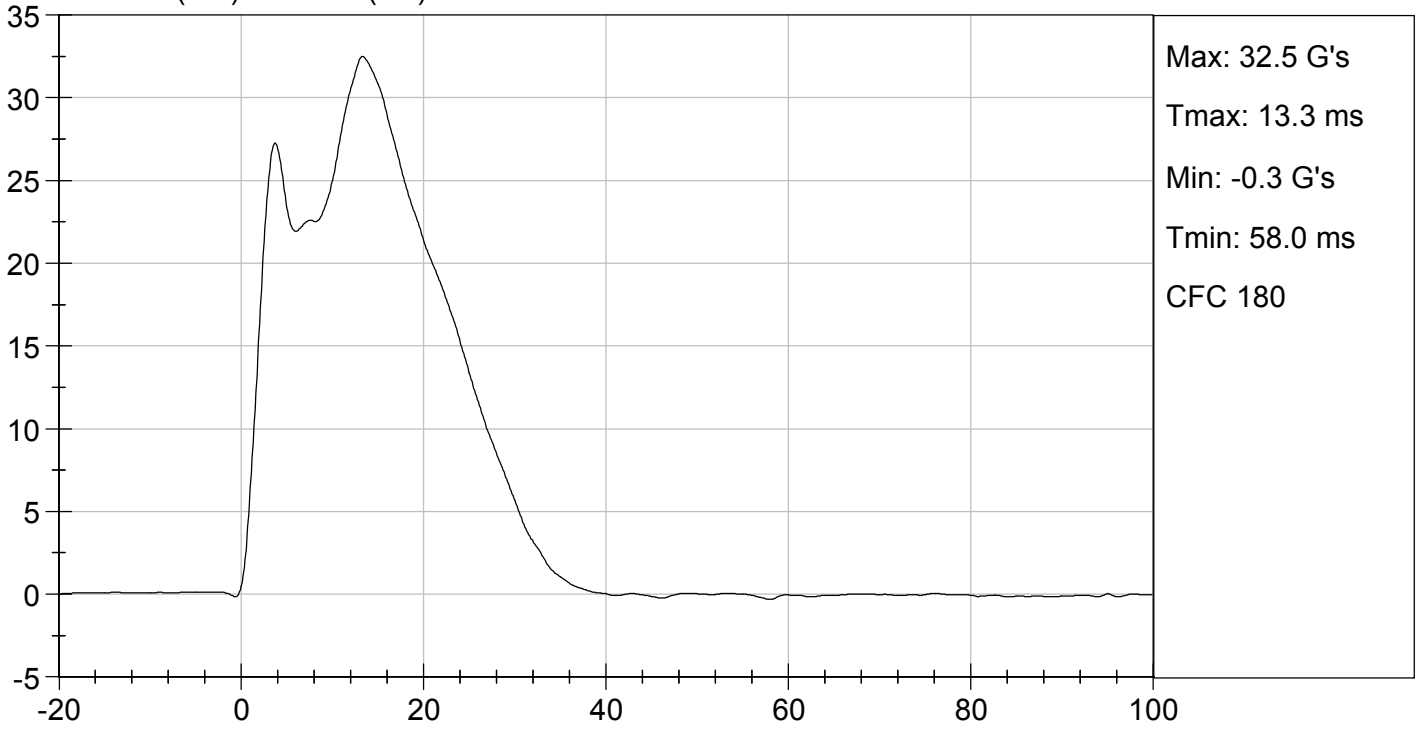
07/14/2020
Test Date

Approved By

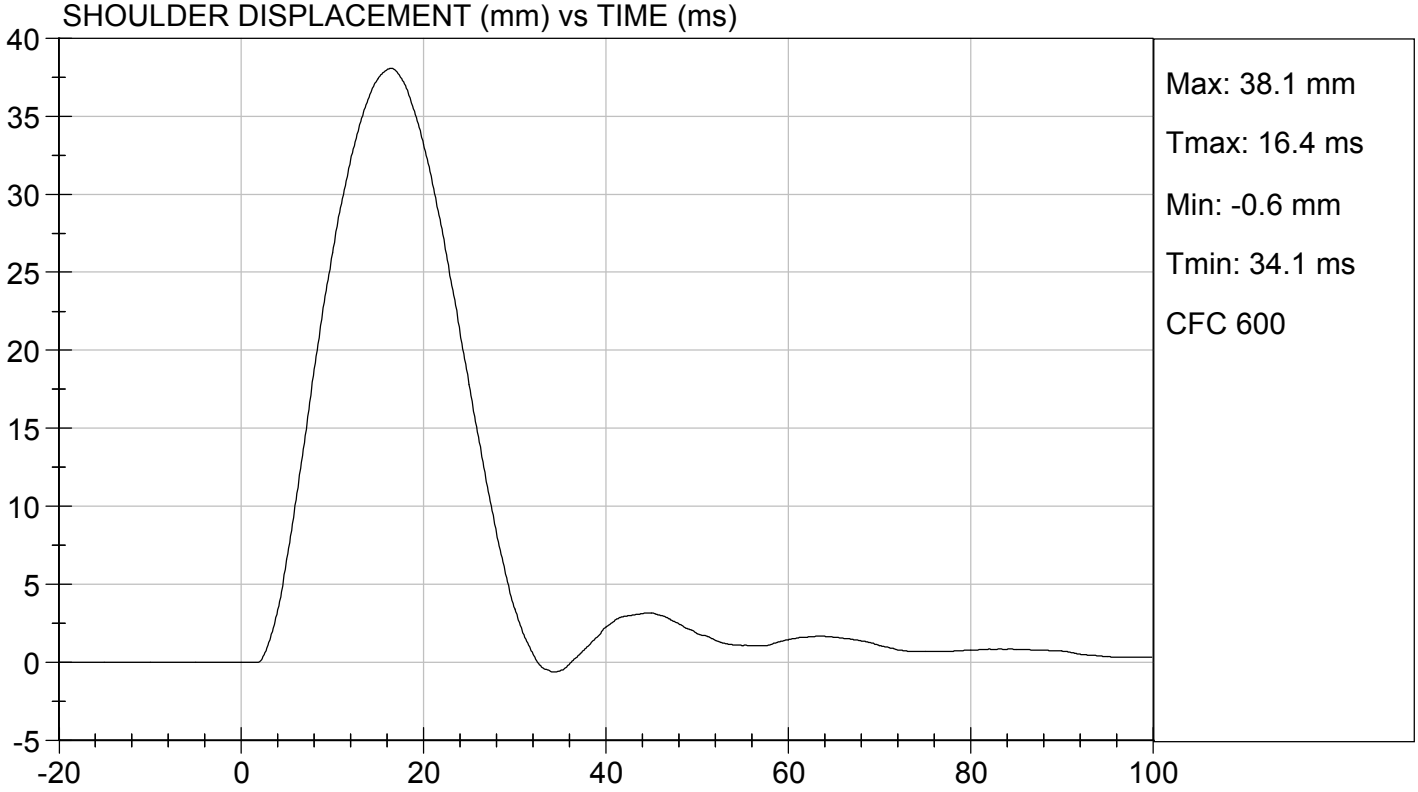
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.32 ft/s, 6.80 m/s

TEST DATE: 07/14/2020
TEST #: D201734

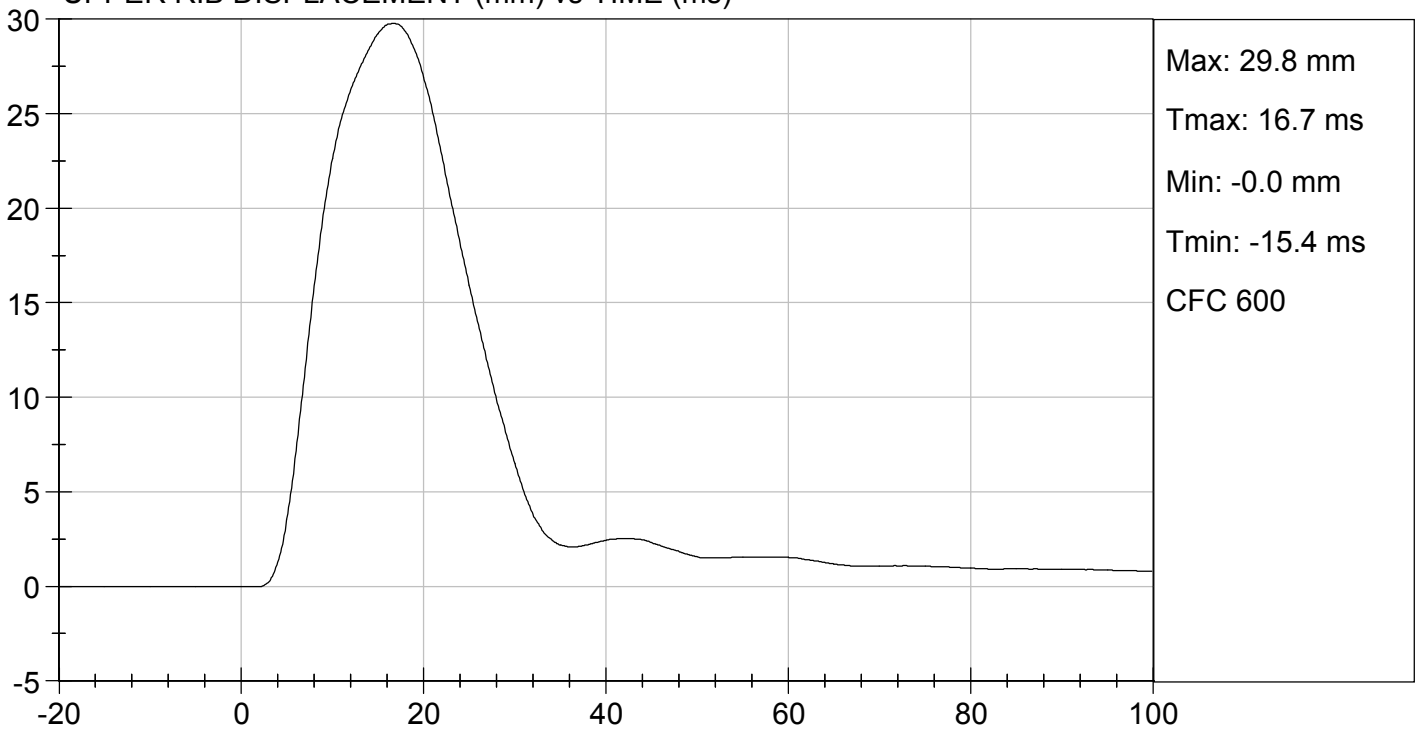
PROBE (G's) vs TIME (ms)



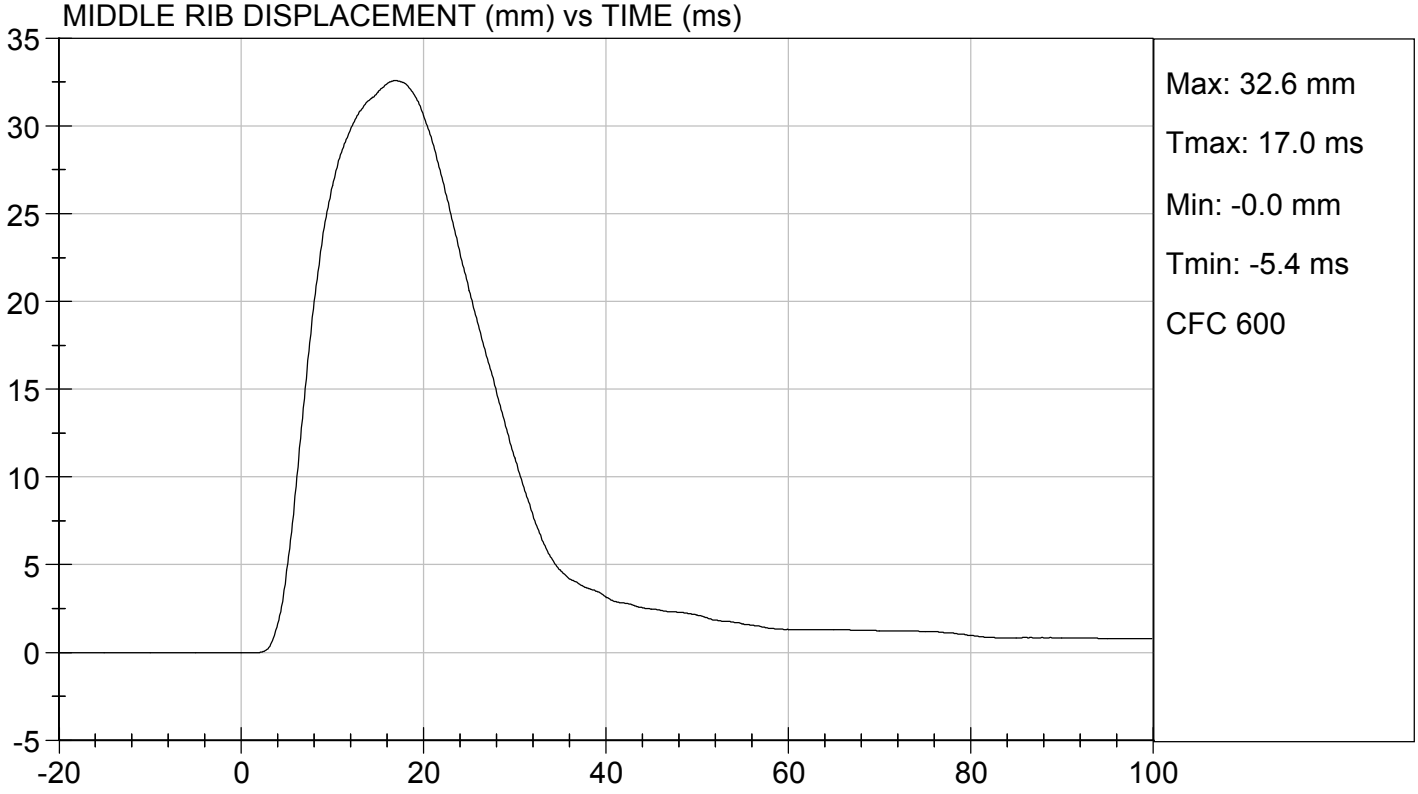
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



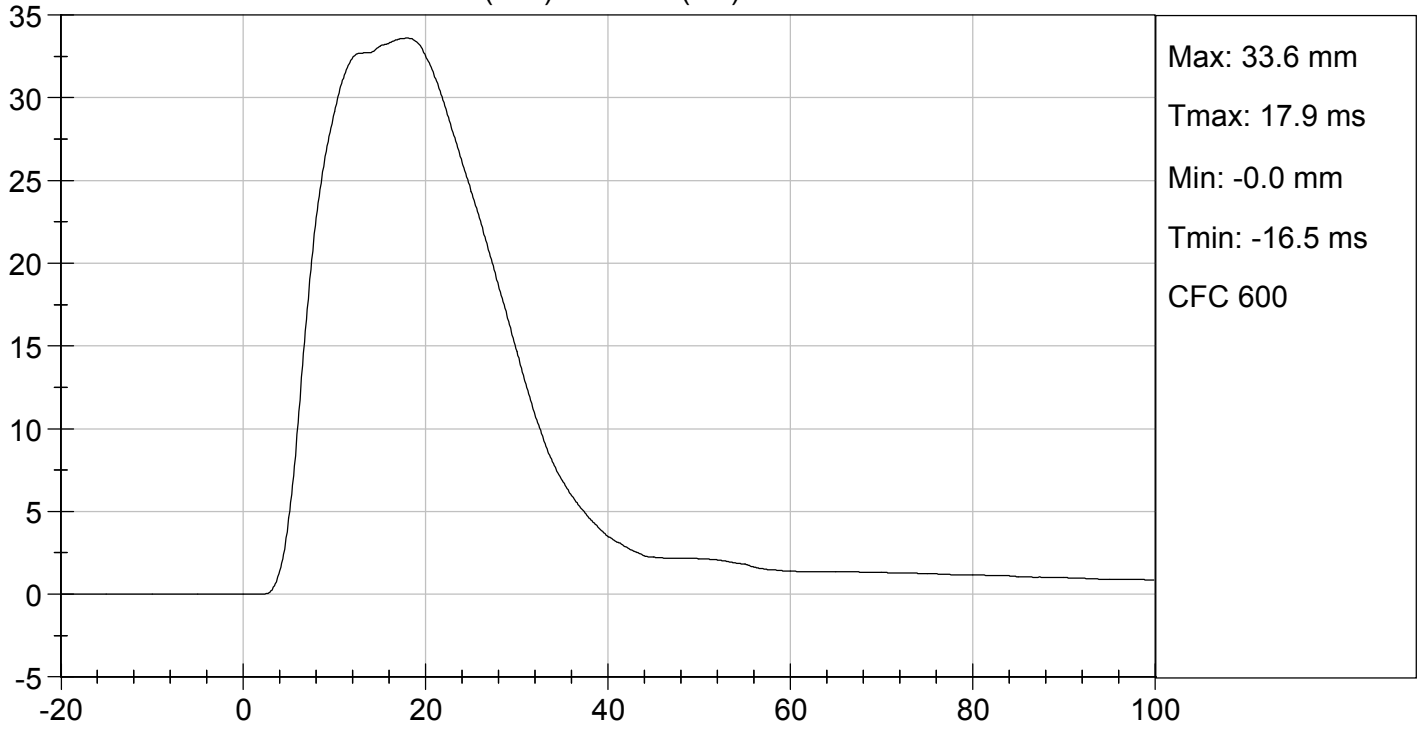
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



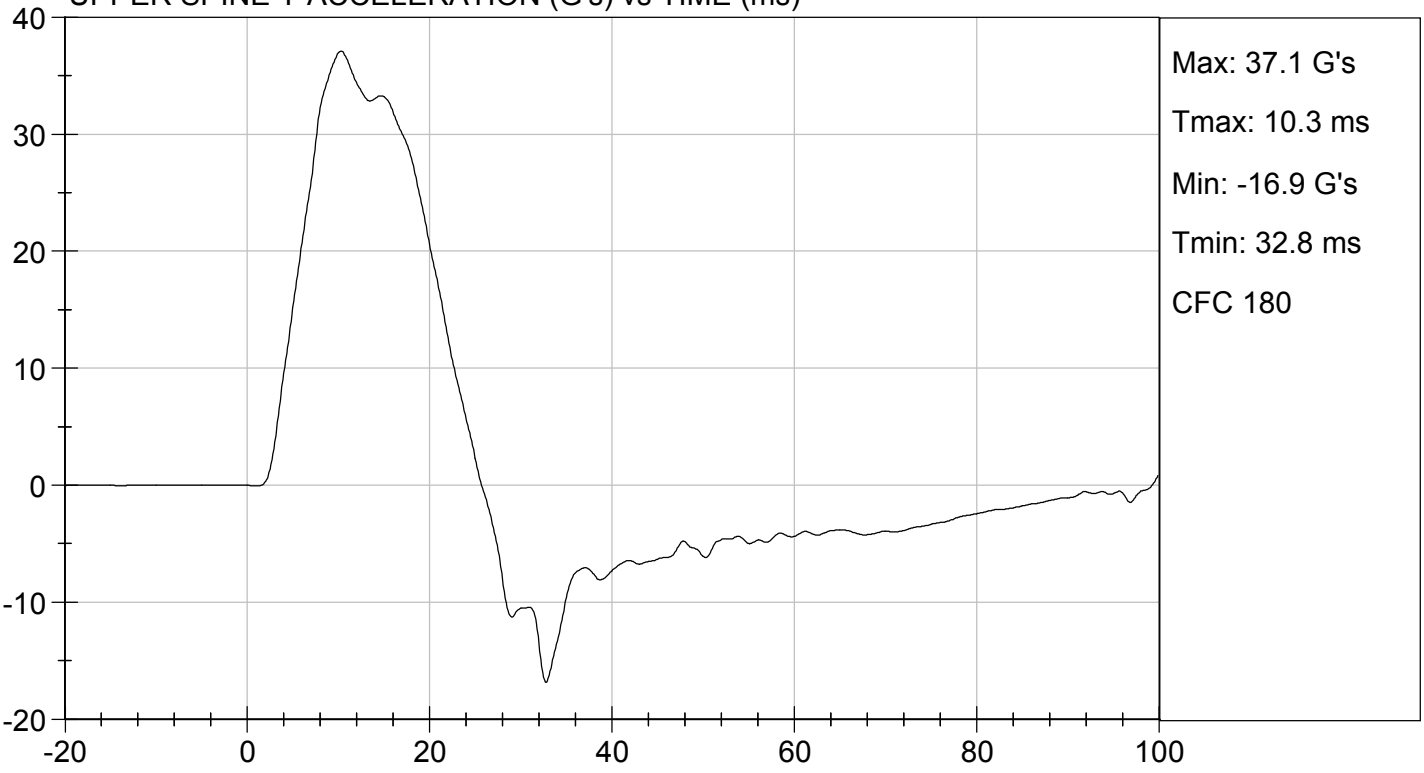
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.32 ft/s, 6.80 m/s

TEST DATE: 07/14/2020
TEST #: D201734

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

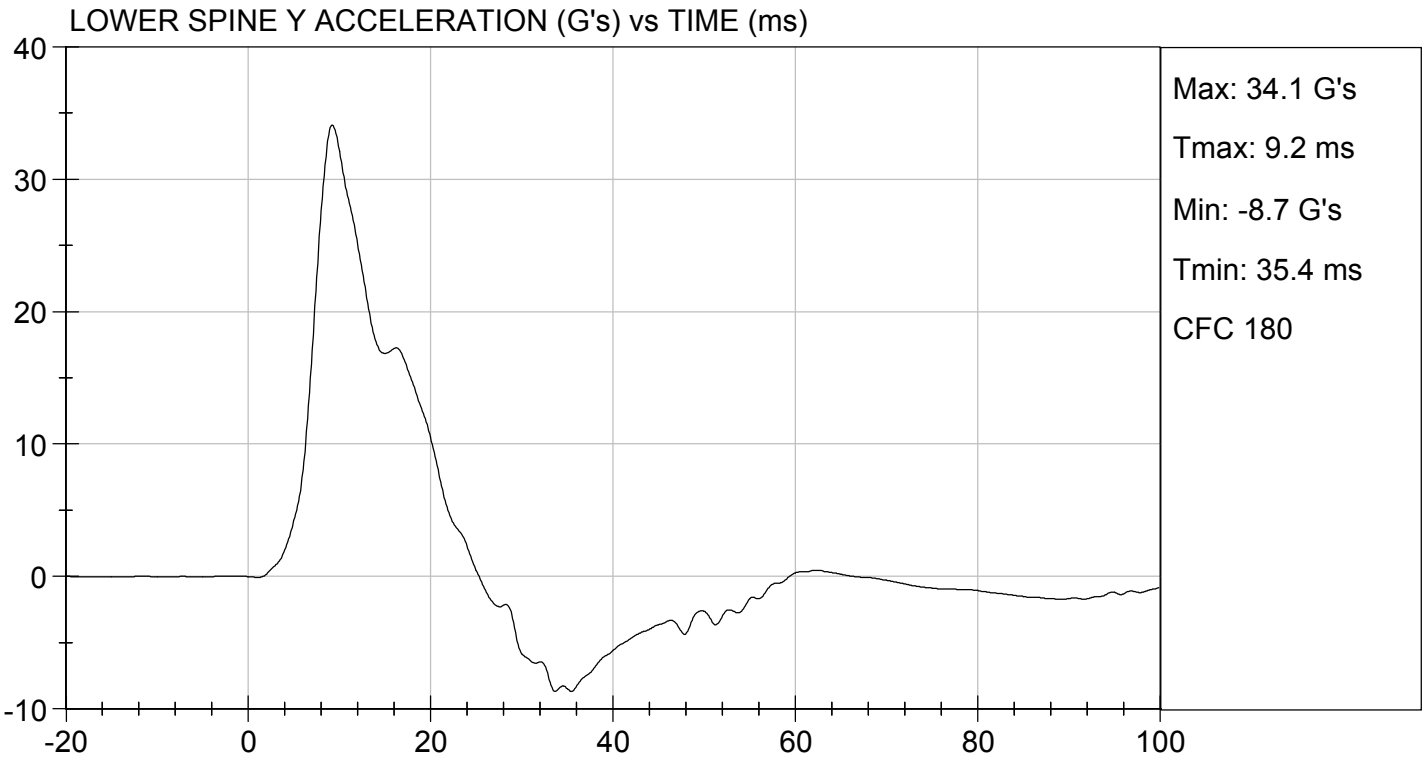


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.32 ft/s, 6.80 m/s

TEST DATE: 07/14/2020
TEST #: D201734



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

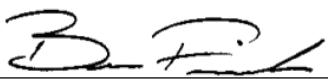
ATD Serial No: 296 **Test I.D:** D201735

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	45	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	44	Pass
Lower Rib Displacement	mm	35 to 43	41	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

Laboratory Technician

07/15/2020

Test Date

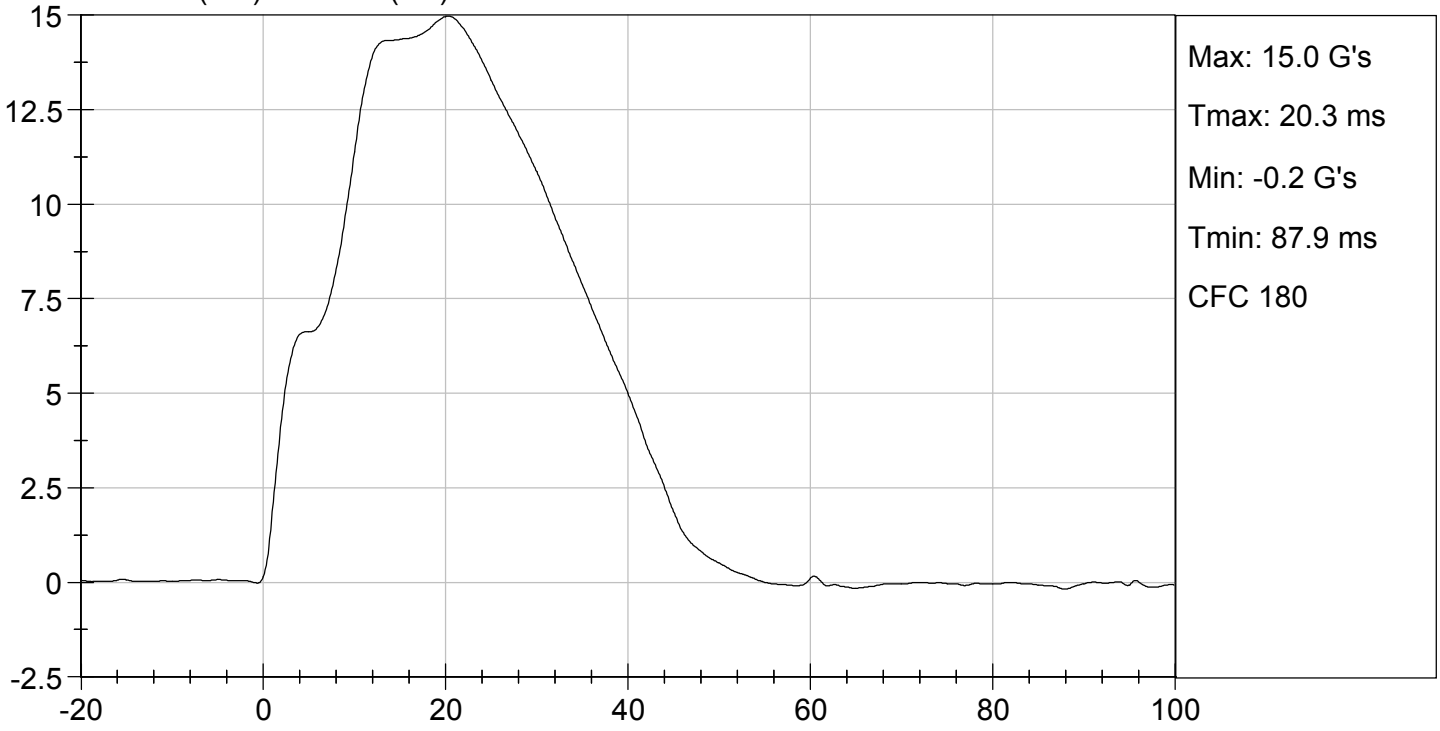


Approved By

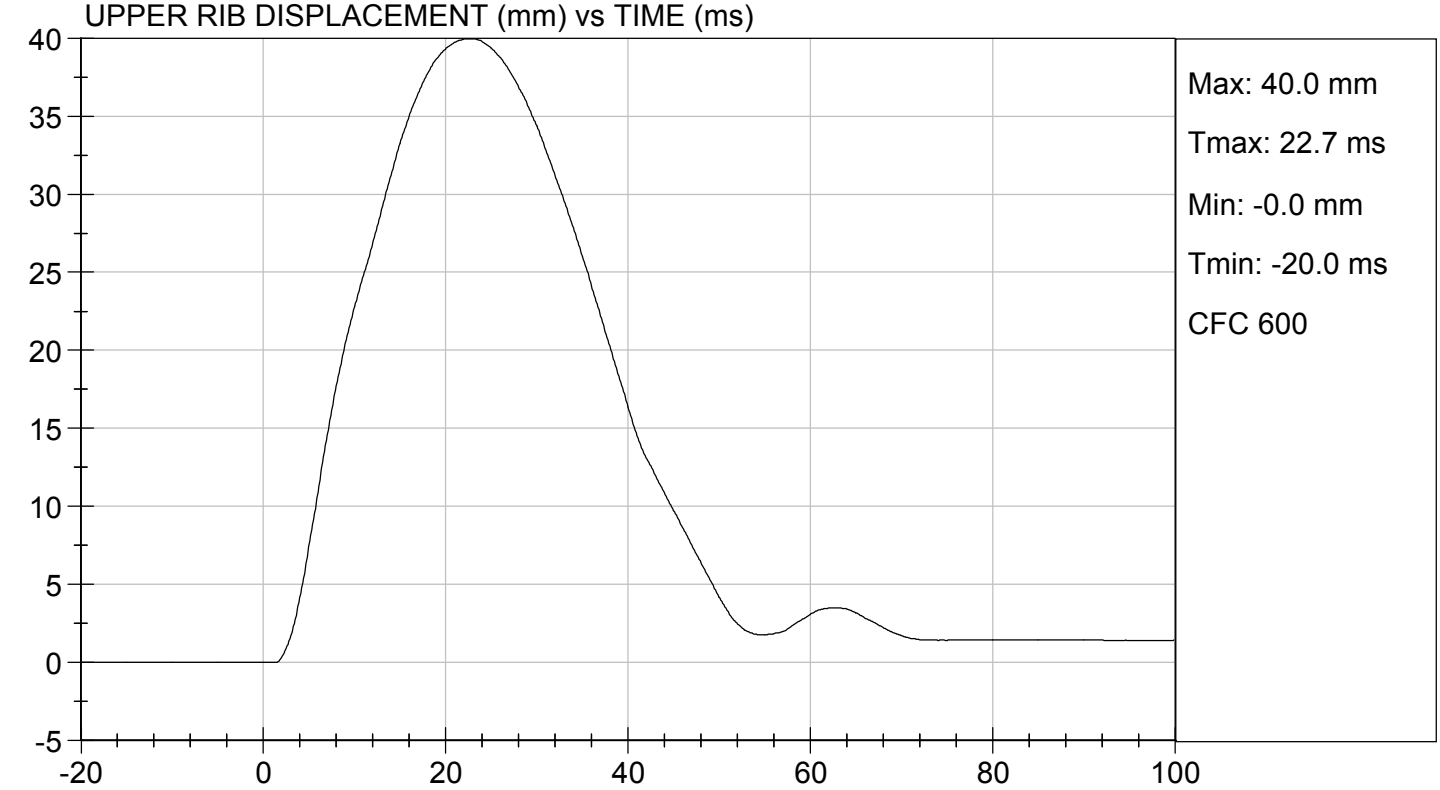
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/15/2020
TEST #: D201735

PROBE (G's) vs TIME (ms)



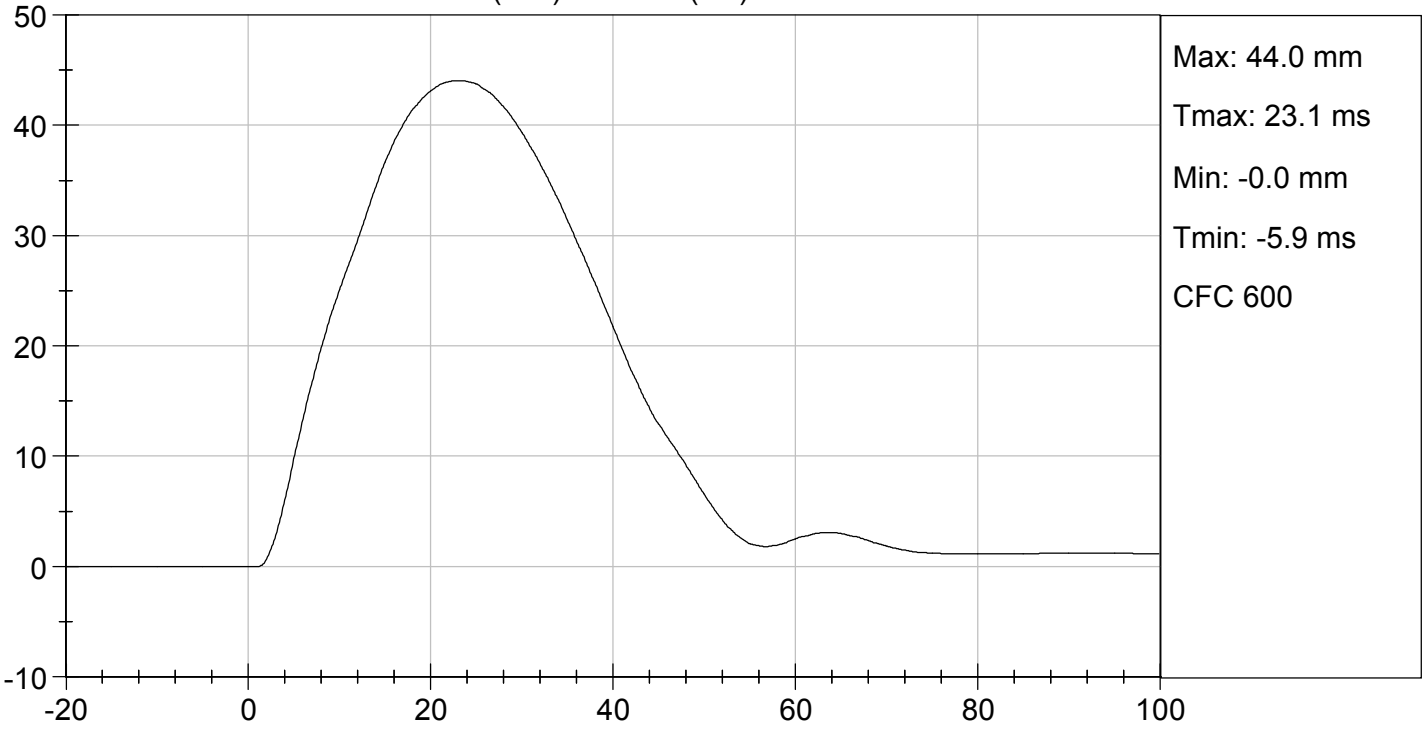
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



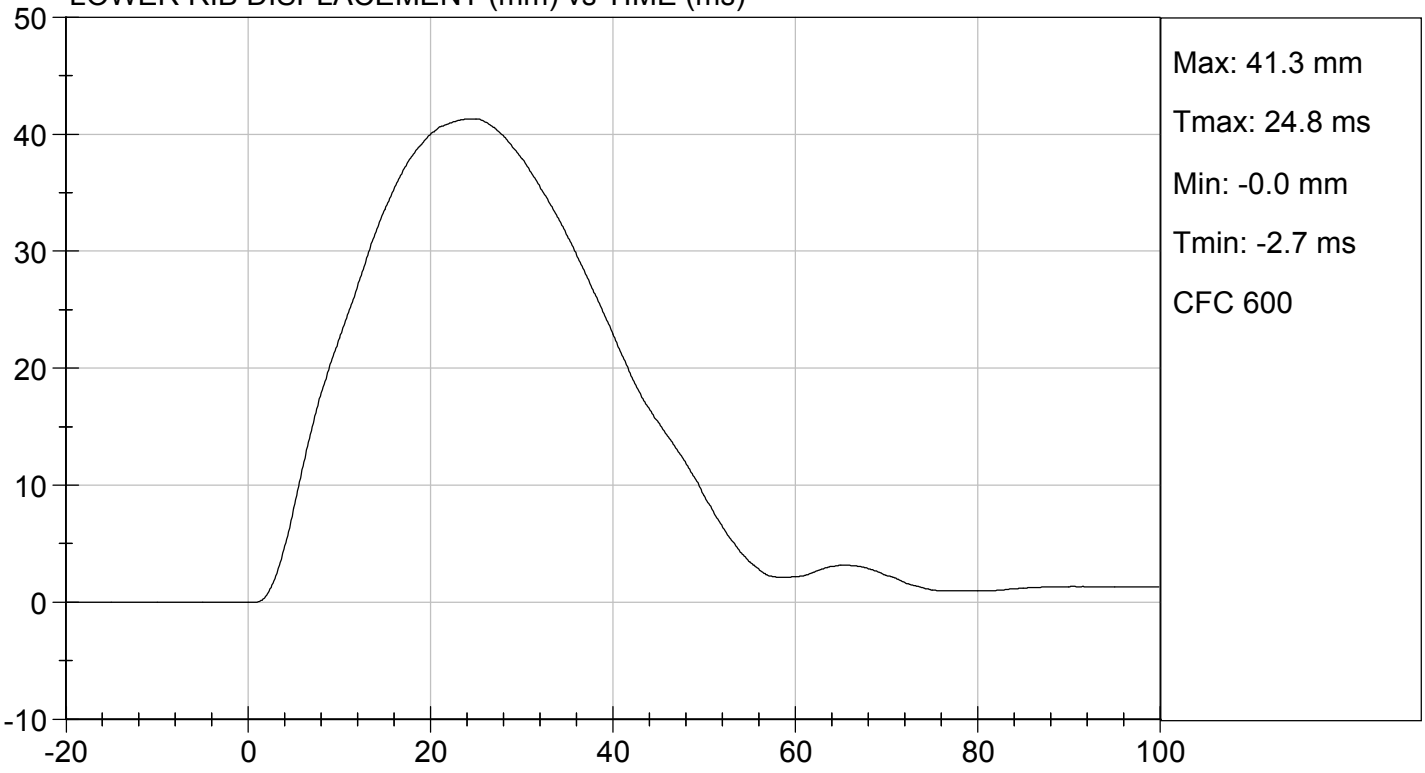
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/15/2020
TEST #: D201735

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



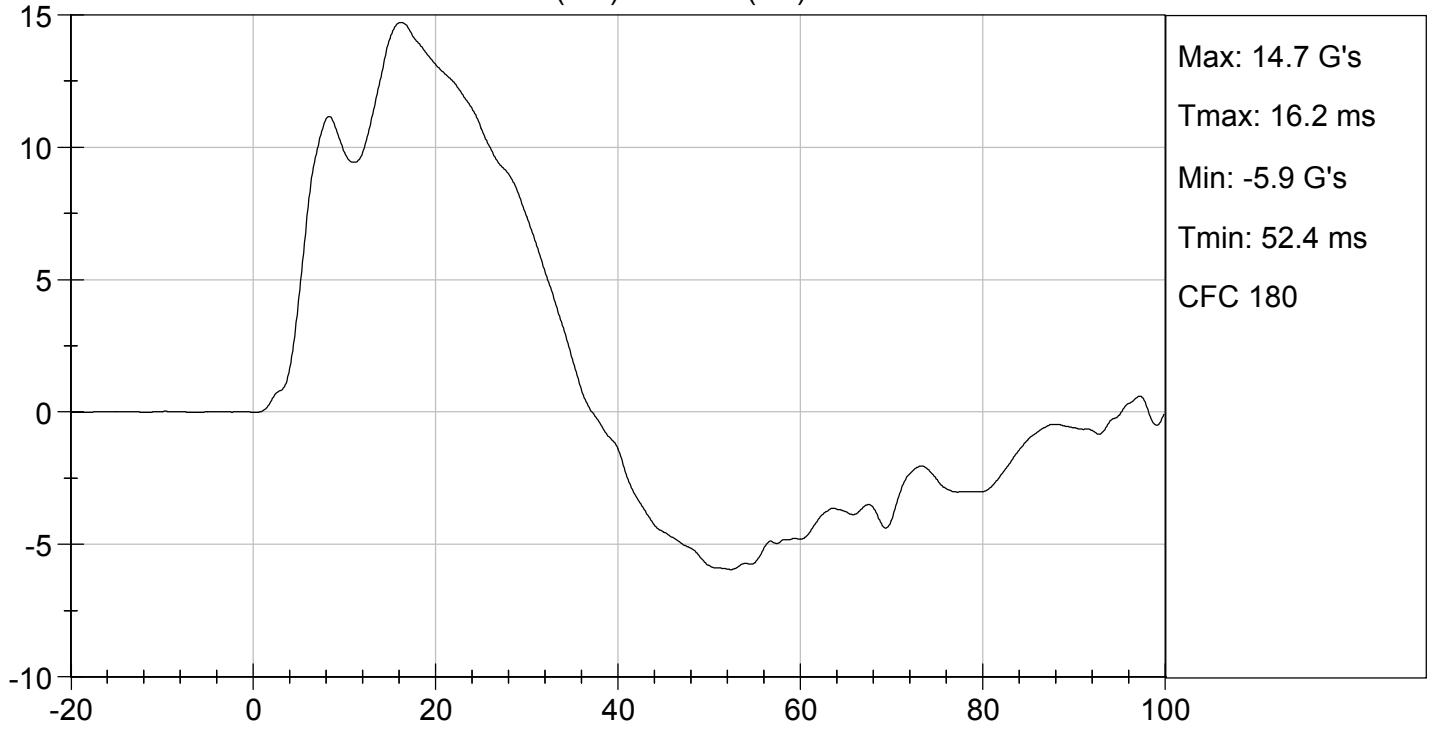
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



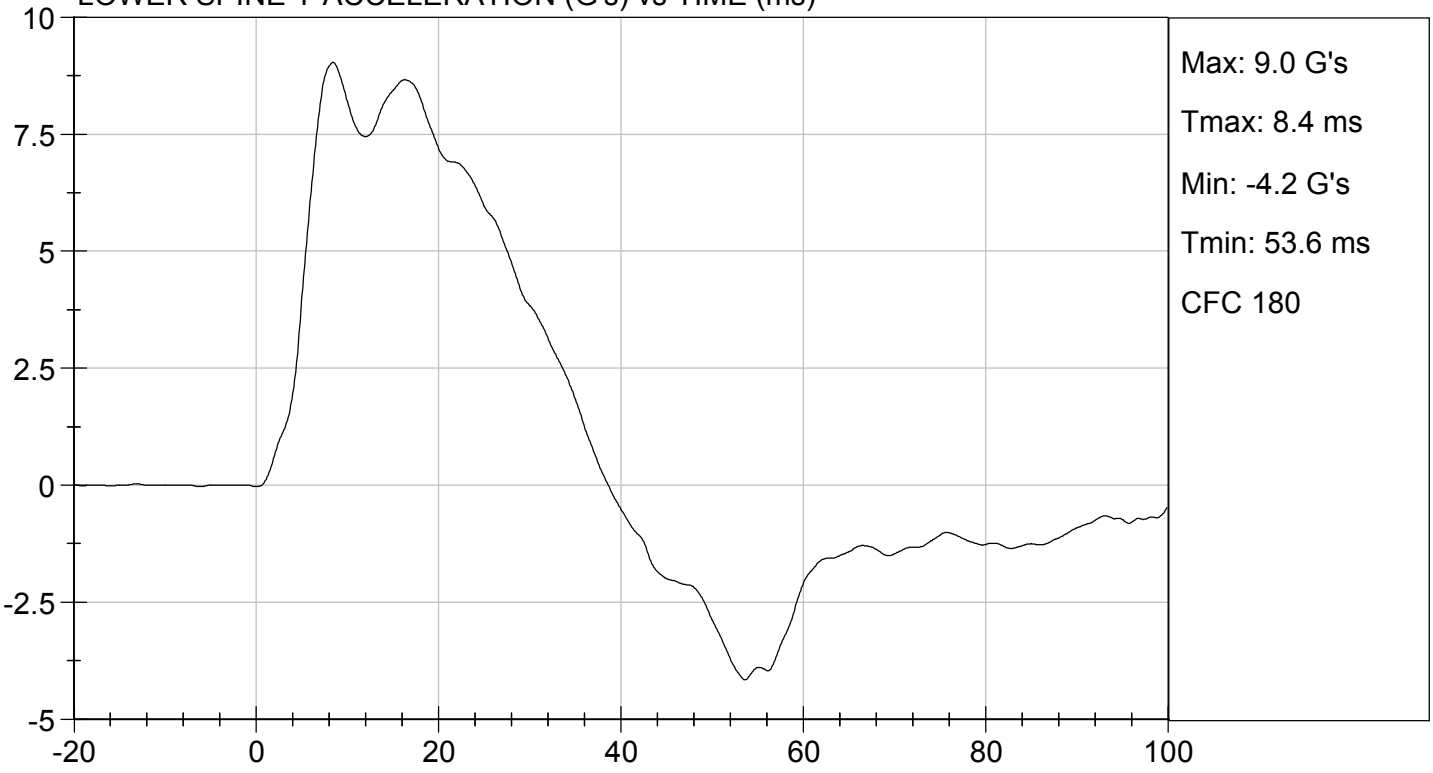
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/15/2020
TEST #: D201735

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



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201736

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	43	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Laboratory Technician

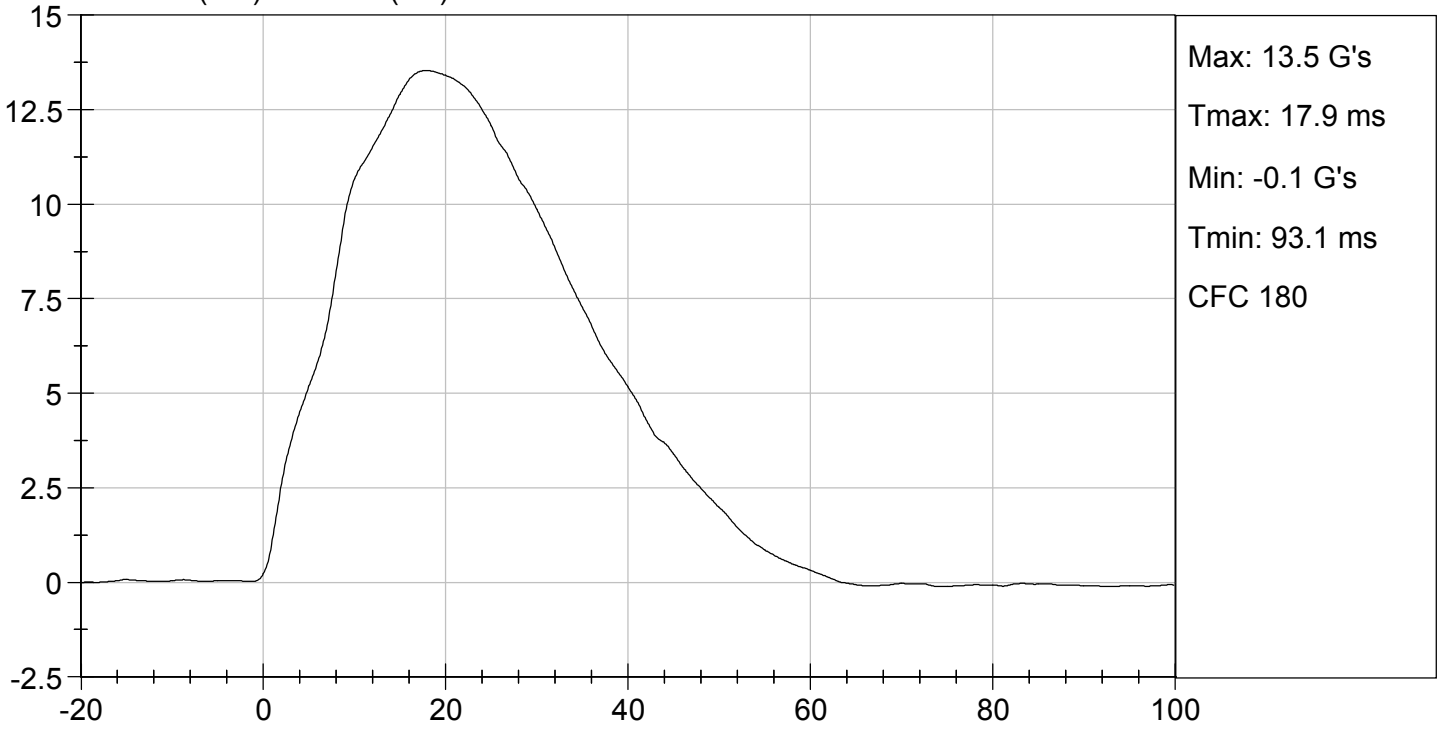
07/15/2020
Test Date

Approved By

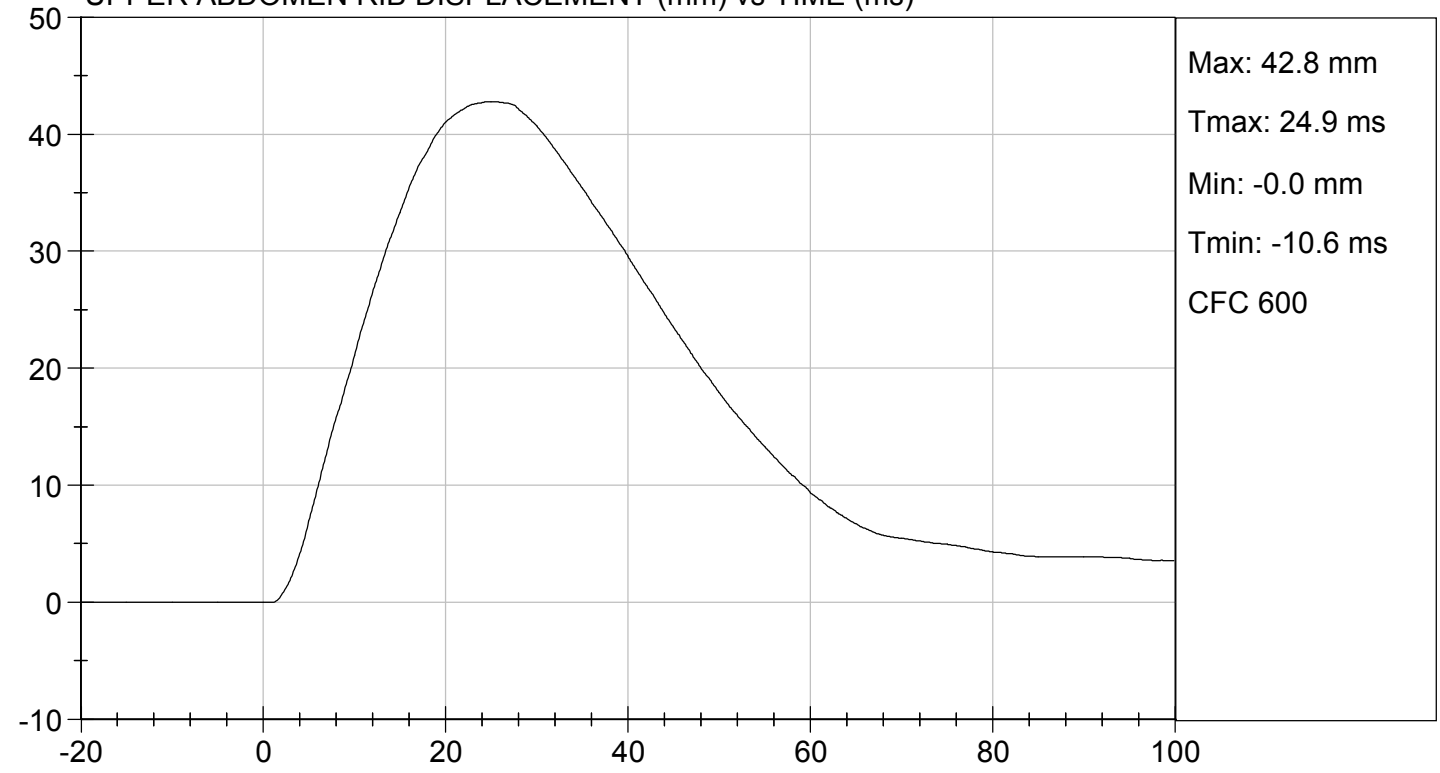
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 07/15/2020
TEST #: D201736

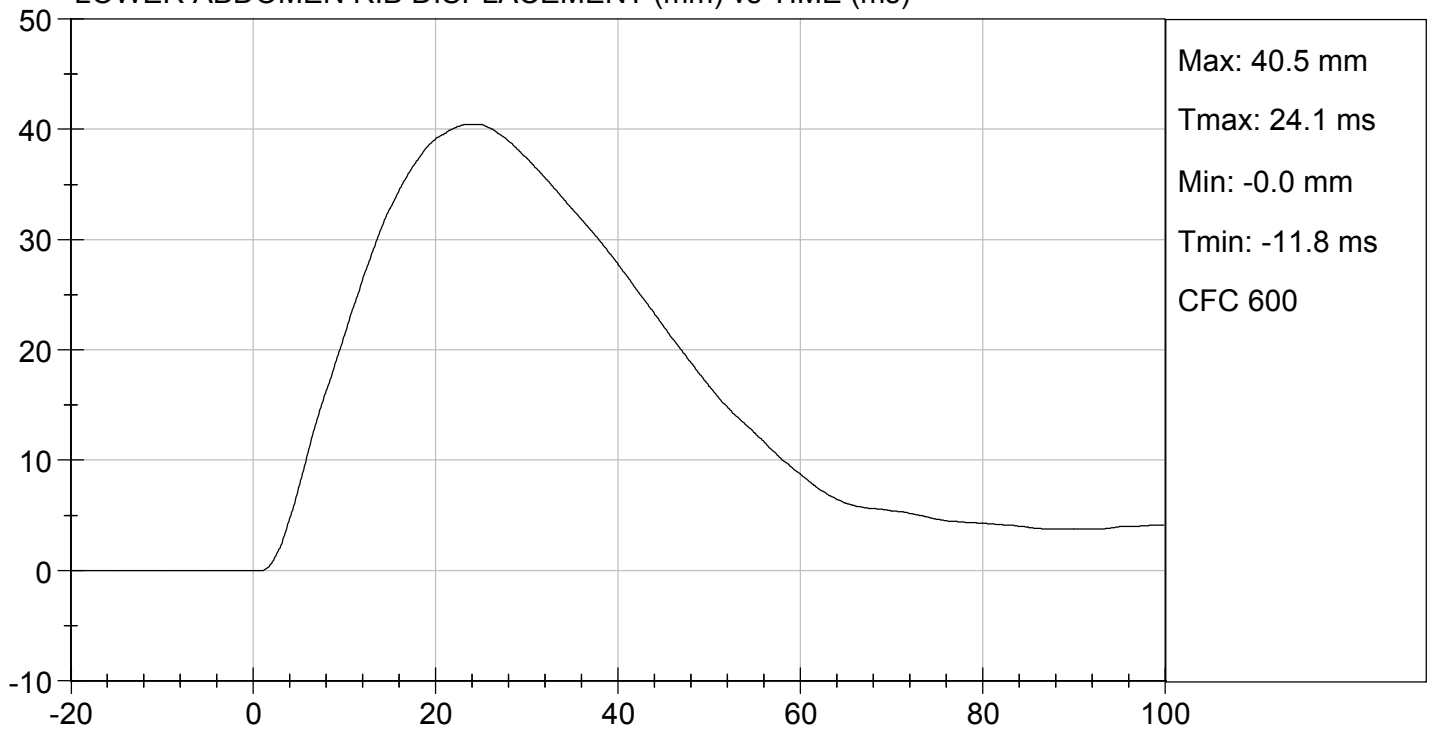
PROBE (G's) vs TIME (ms)



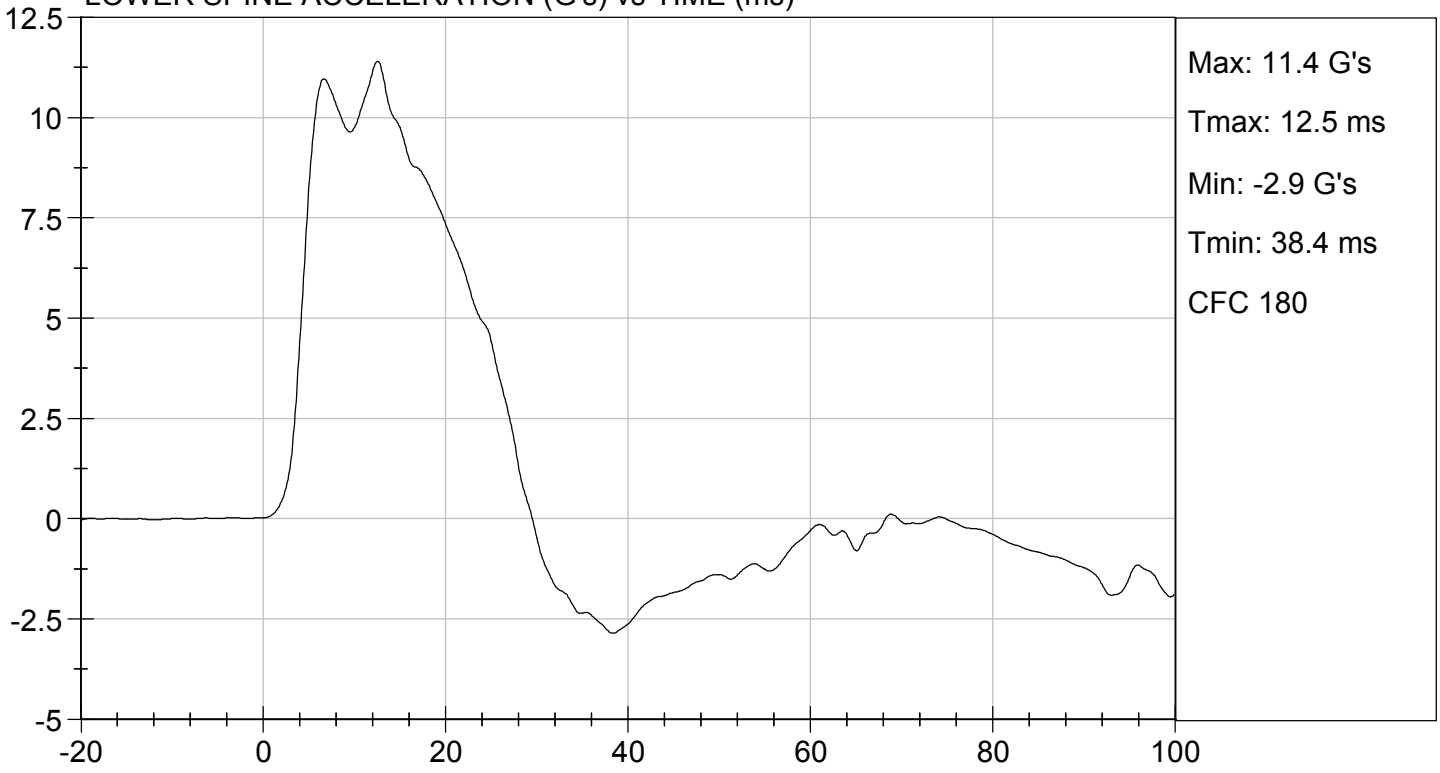
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201737

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	43	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	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	3,873	Pass
		Overall Test Results		Pass

Laboratory Technician

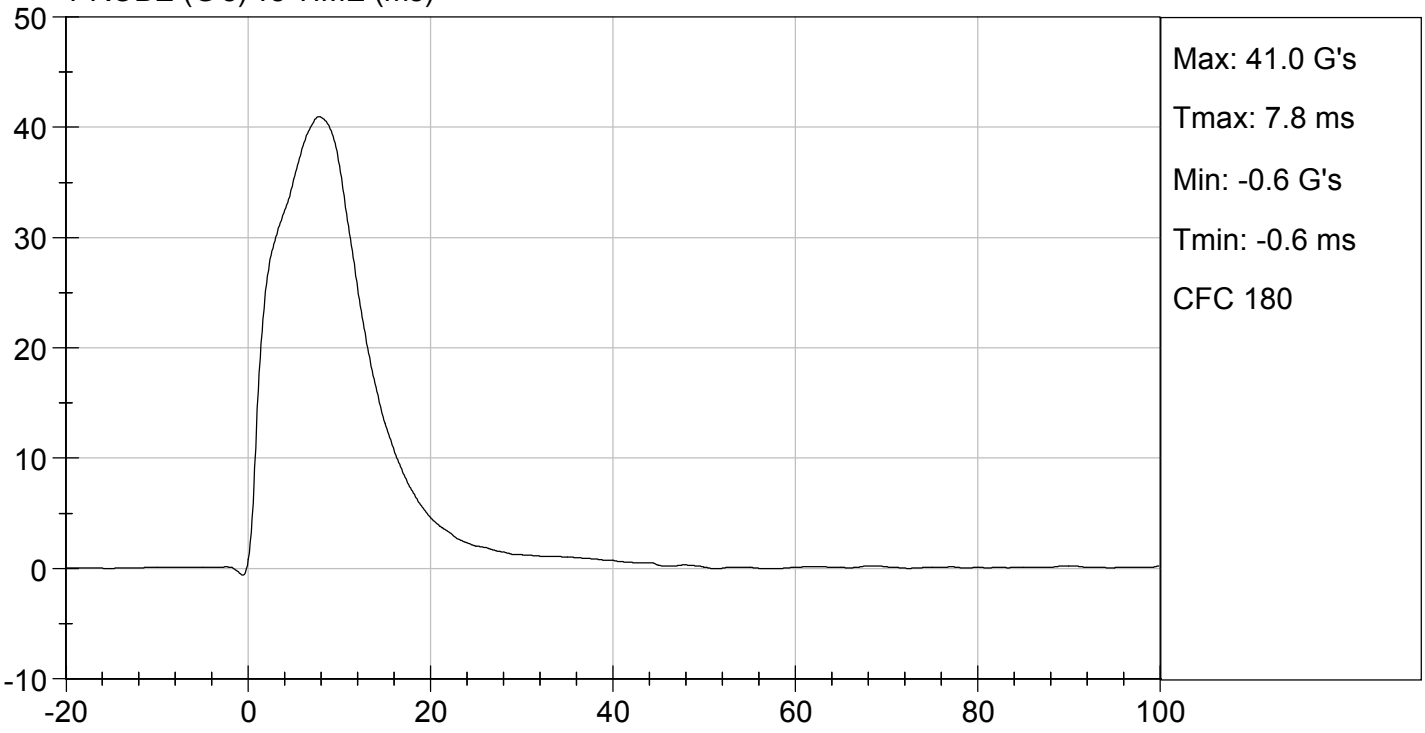
07/15/2020
Test Date

Approved By

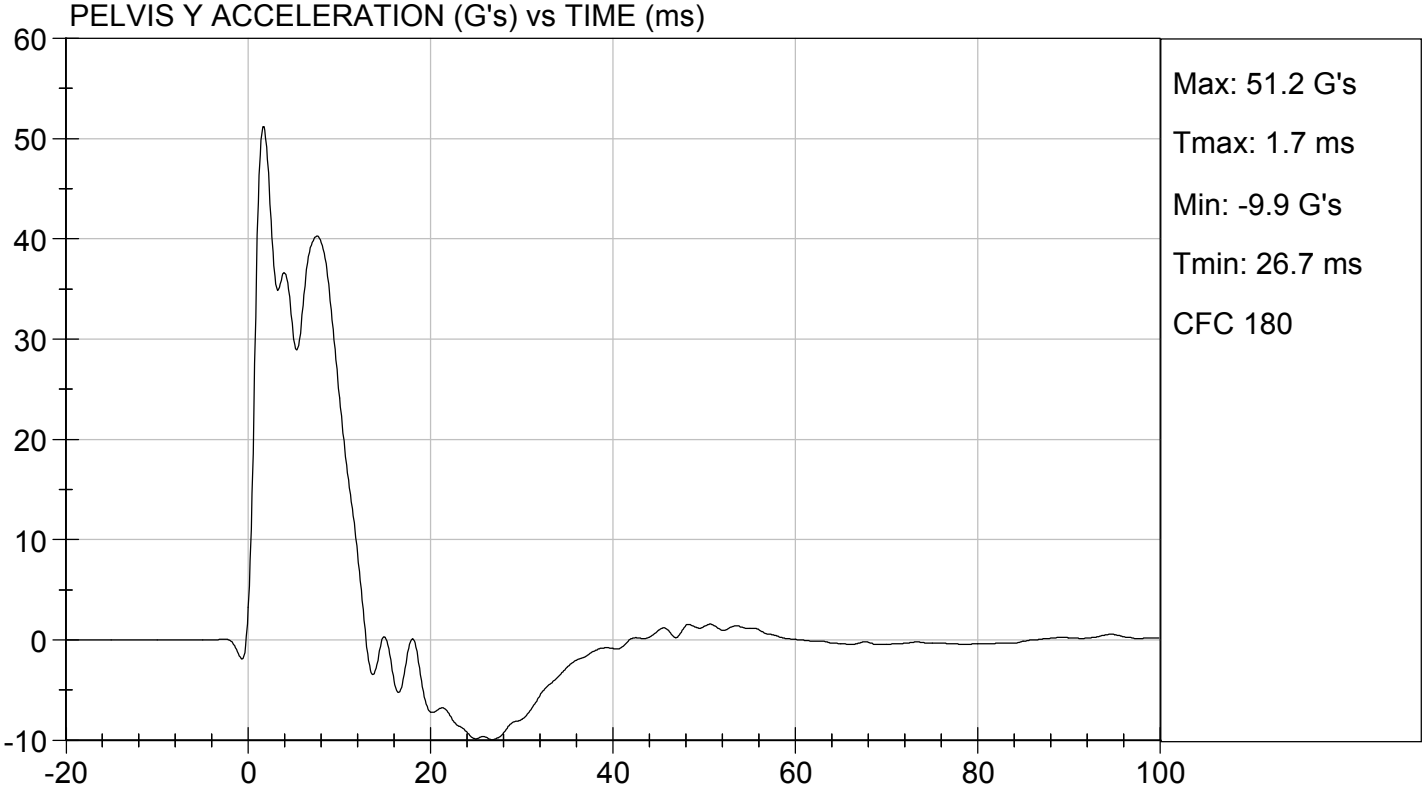
TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

TEST DATE: 07/15/2020
TEST #: D201737

PROBE (G's) vs TIME (ms)

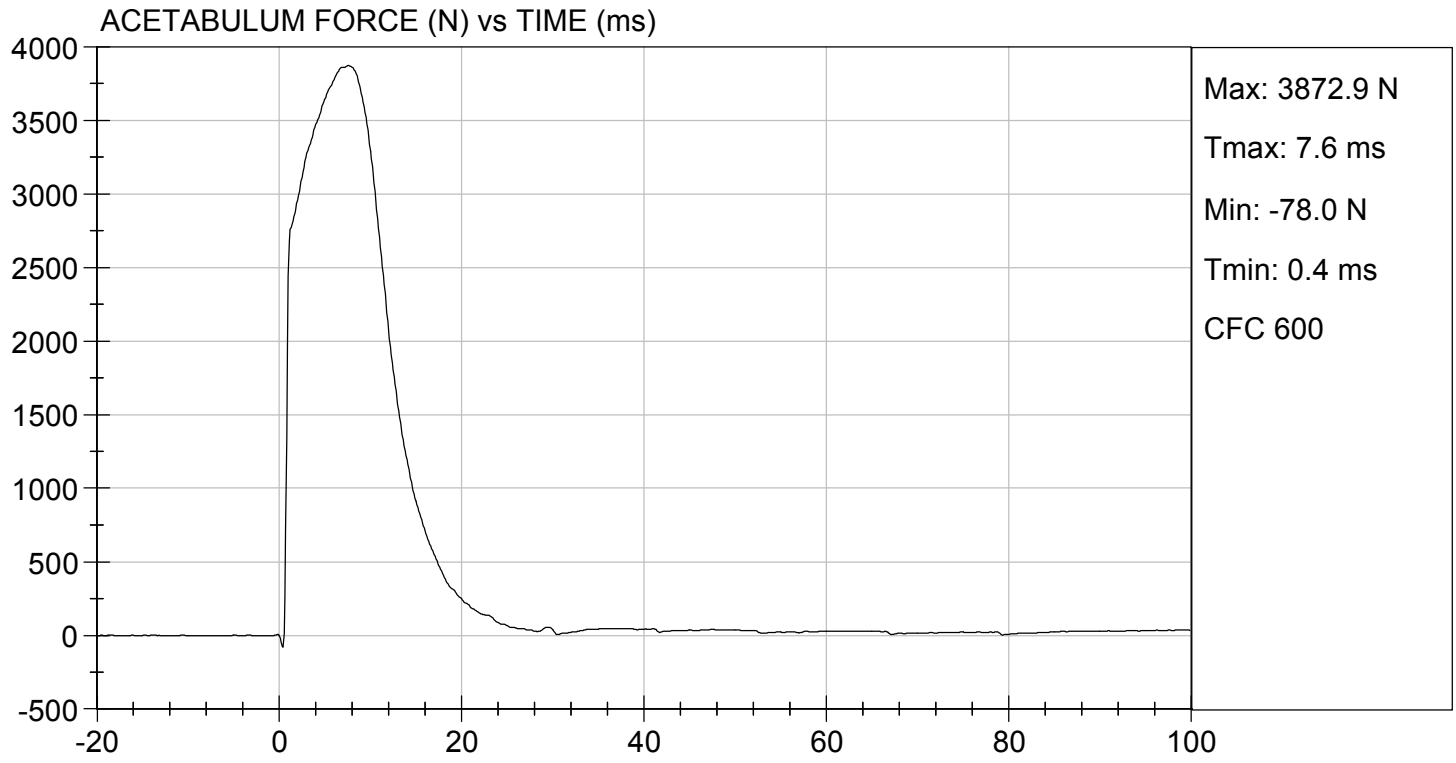


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/15/2020
TEST #: D201737



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: F032 **Test I.D:** D201738

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	43	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	43	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	5,081	Pass
		Overall Test Results		Pass

Laboratory Technician

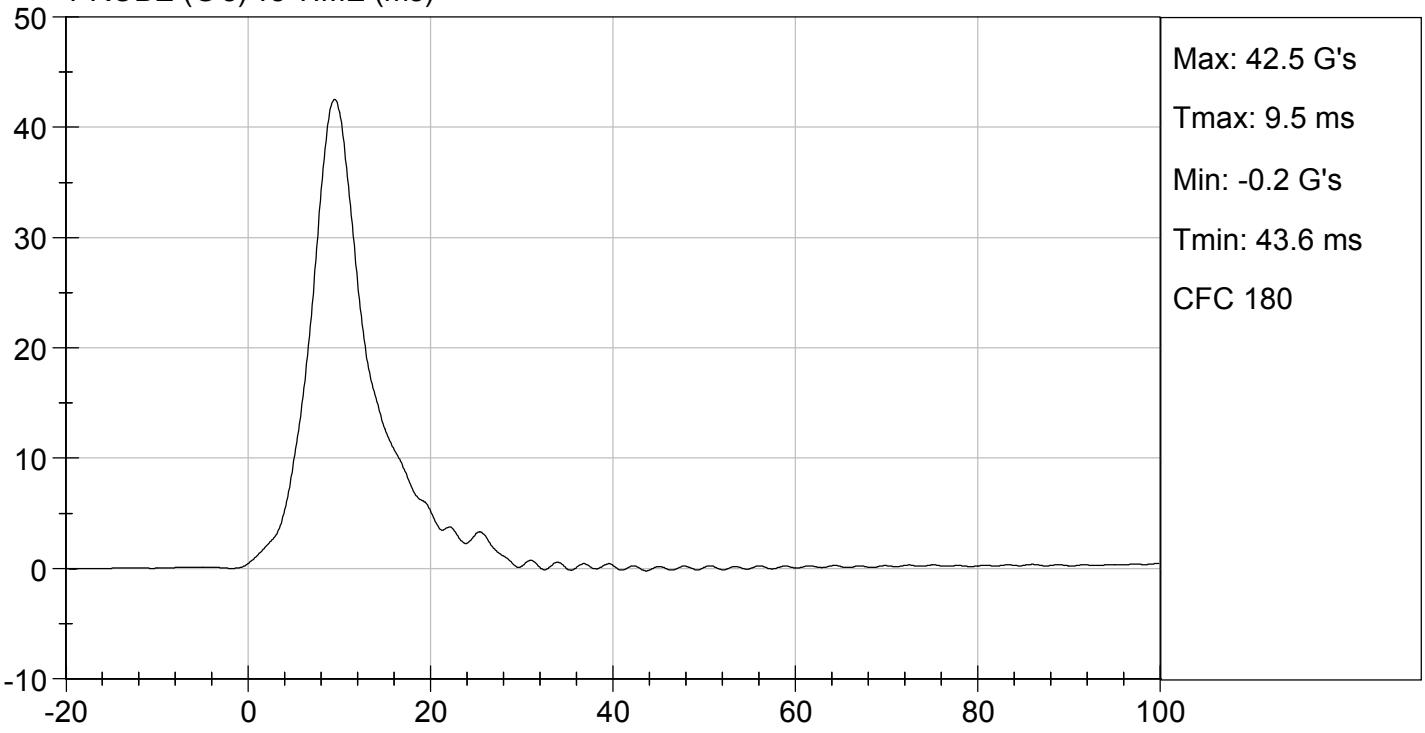
07/15/2020
Test Date

Approved By

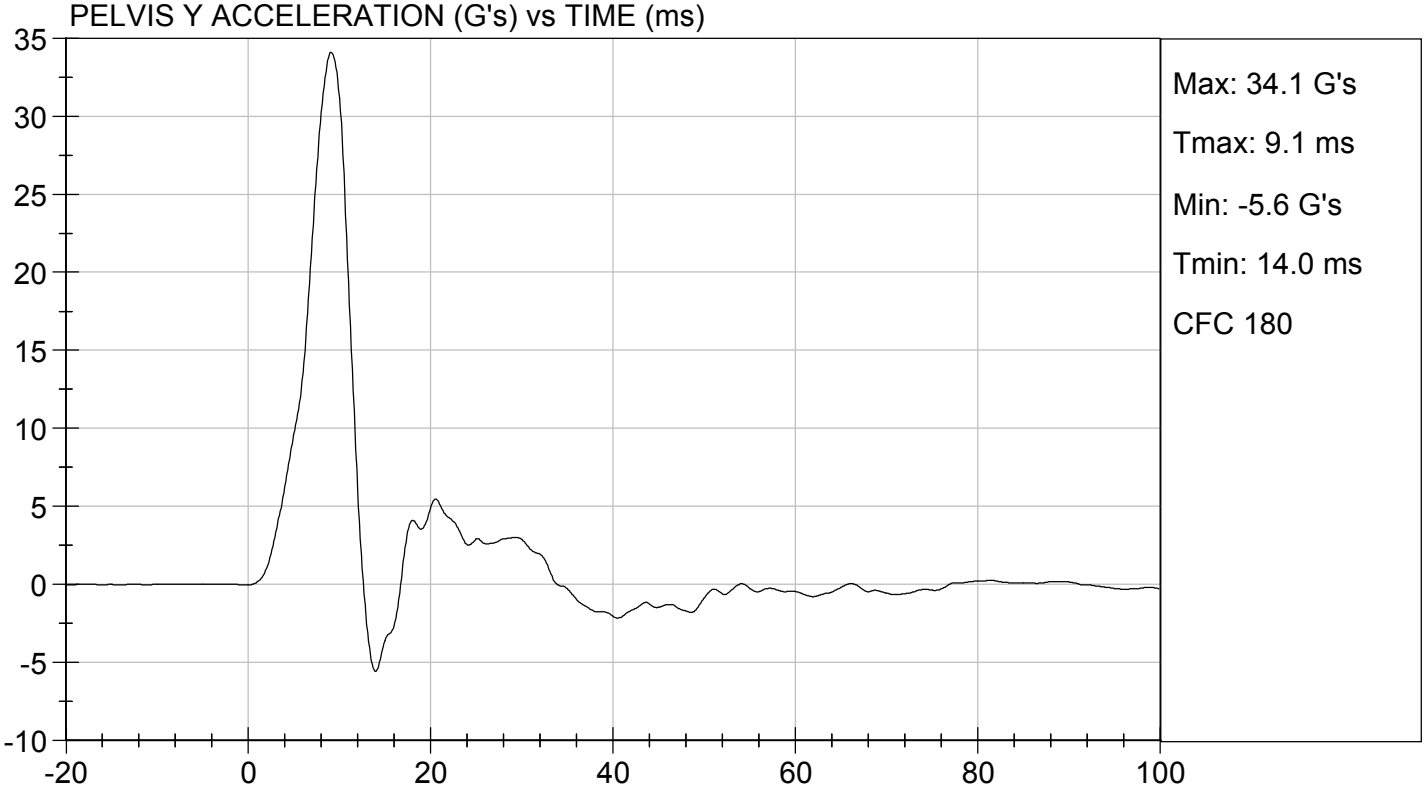
TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/15/2020
TEST #: D201738

PROBE (G's) vs TIME (ms)

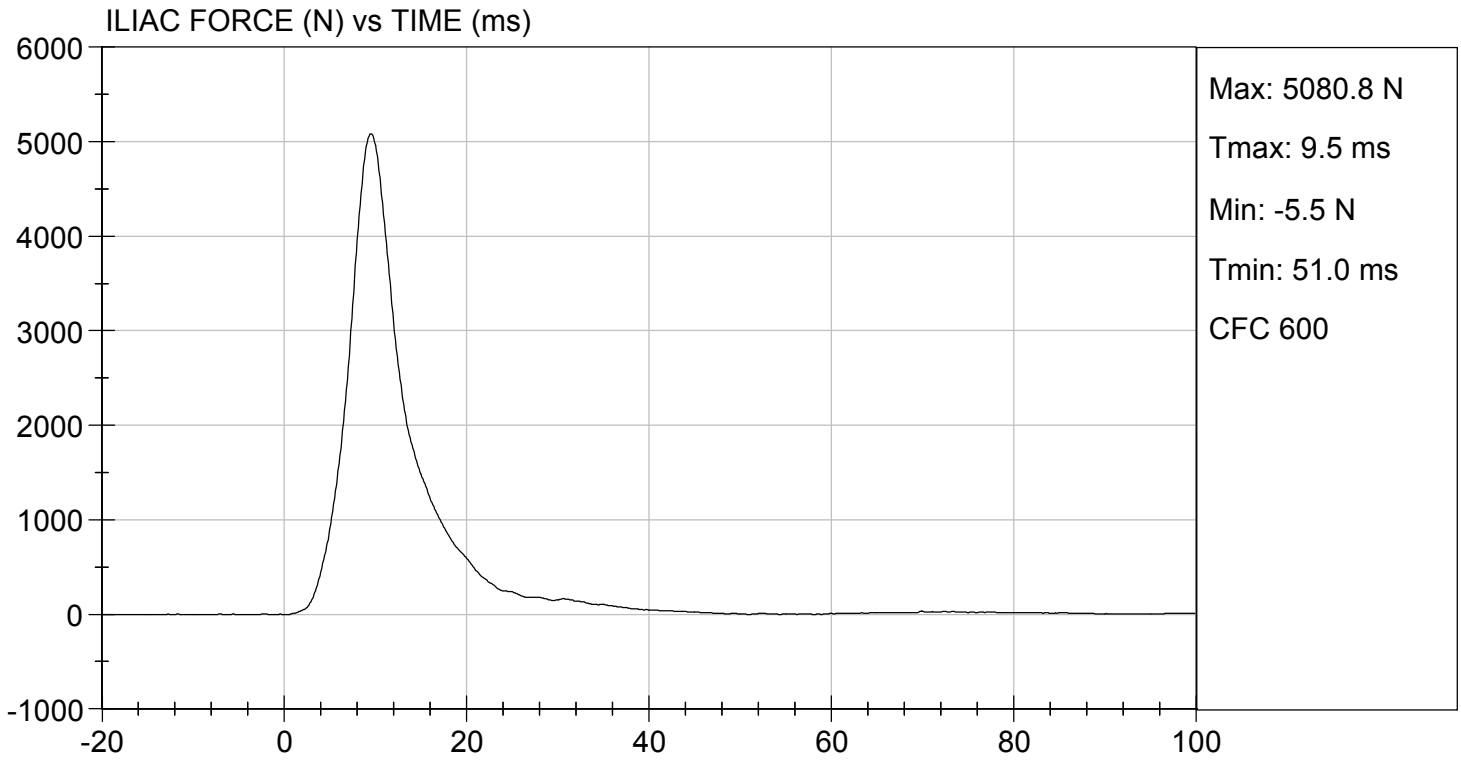


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/15/2020
TEST #: D201738



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:** D201951

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	115 to 137	130	Pass
Peak Longitudinal Acceleration	G's	+/- 15	5.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

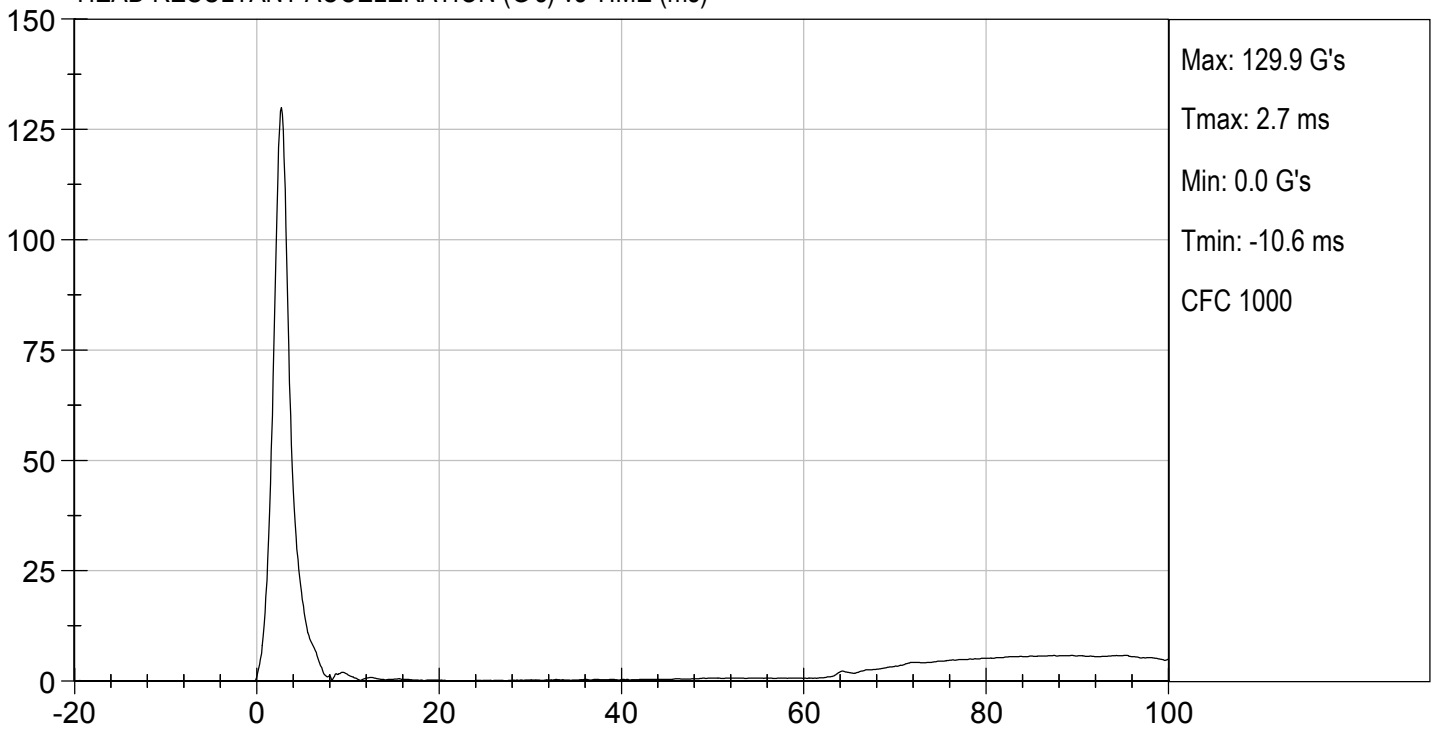
08/07/2020
Test Date

Approved By

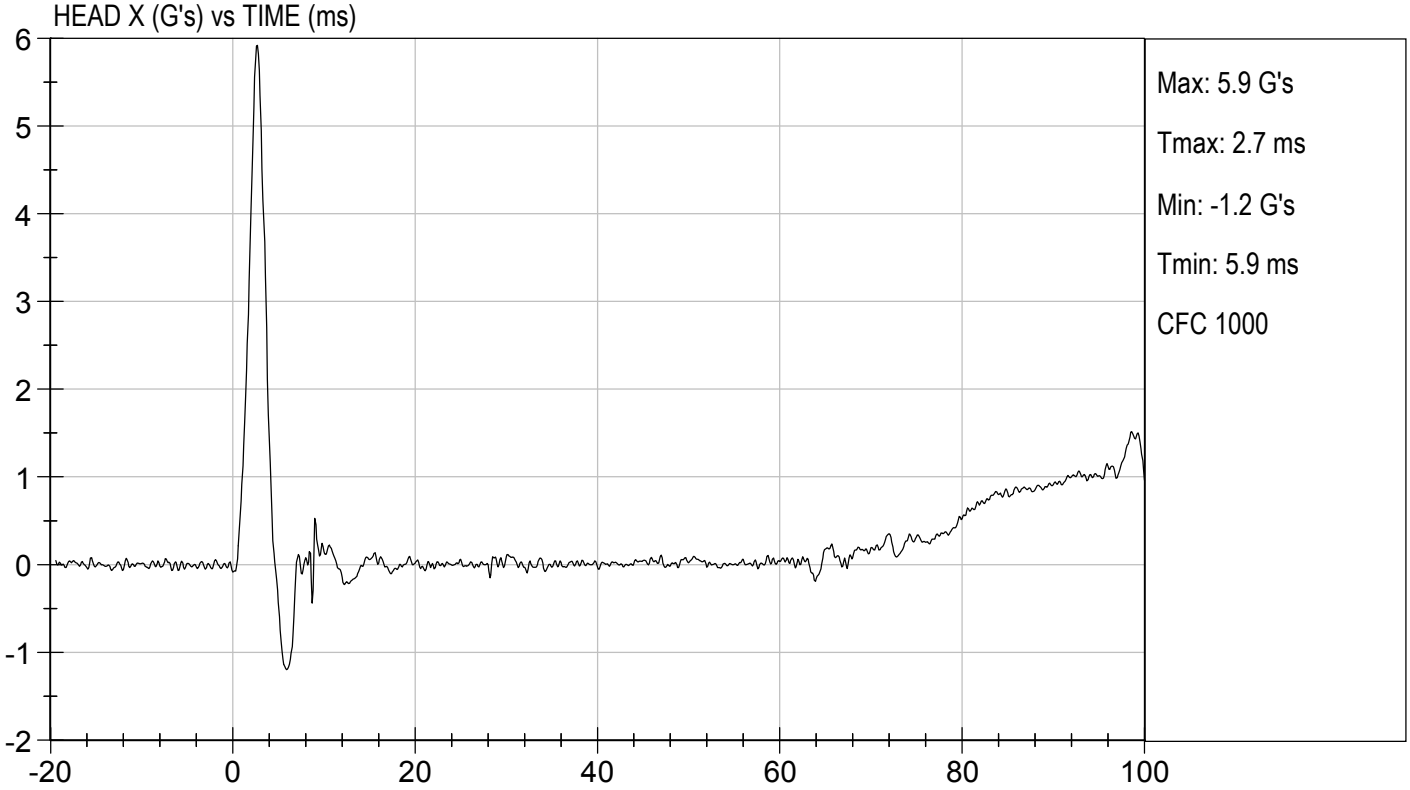
TEST DESC: HEAD DROP

TEST DATE: 08/07/2020
TEST #: D201951

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

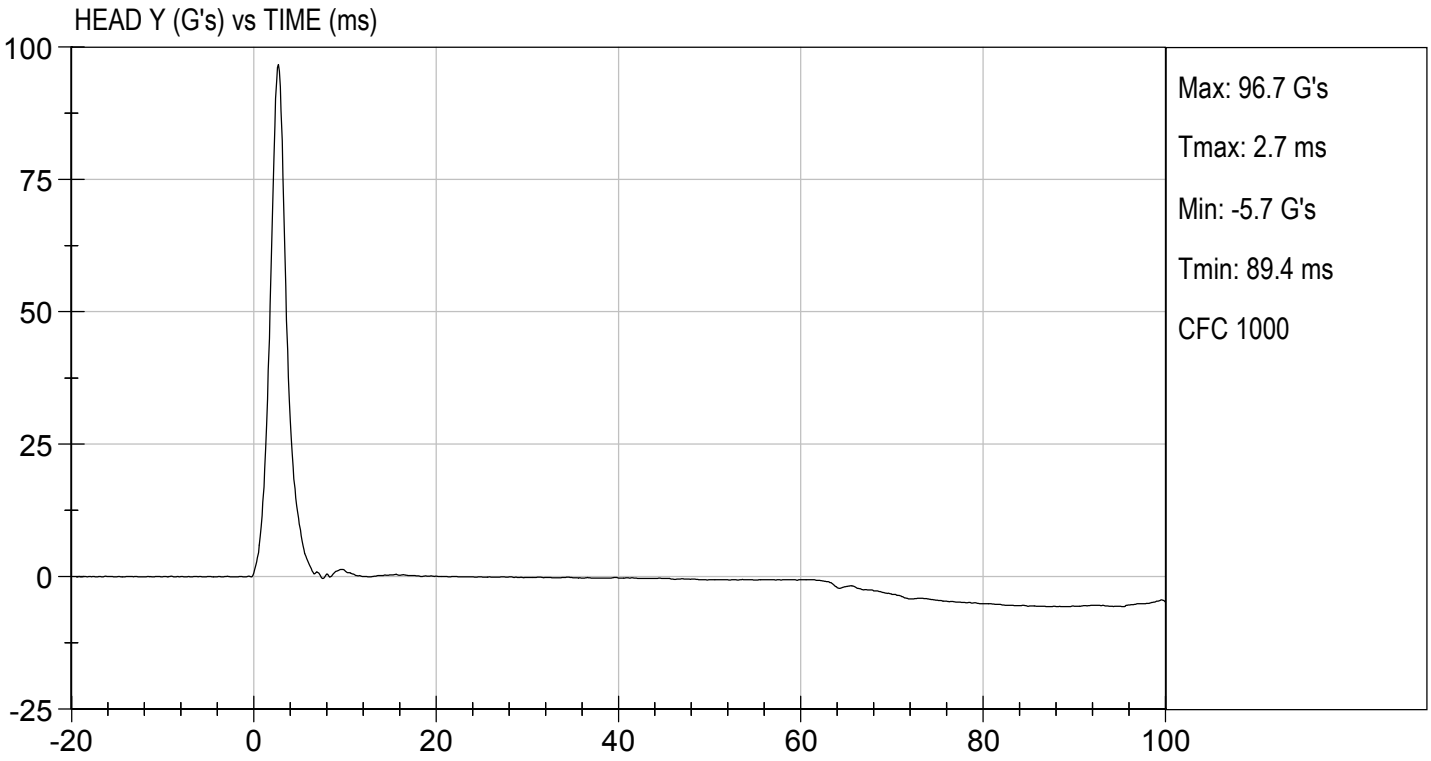


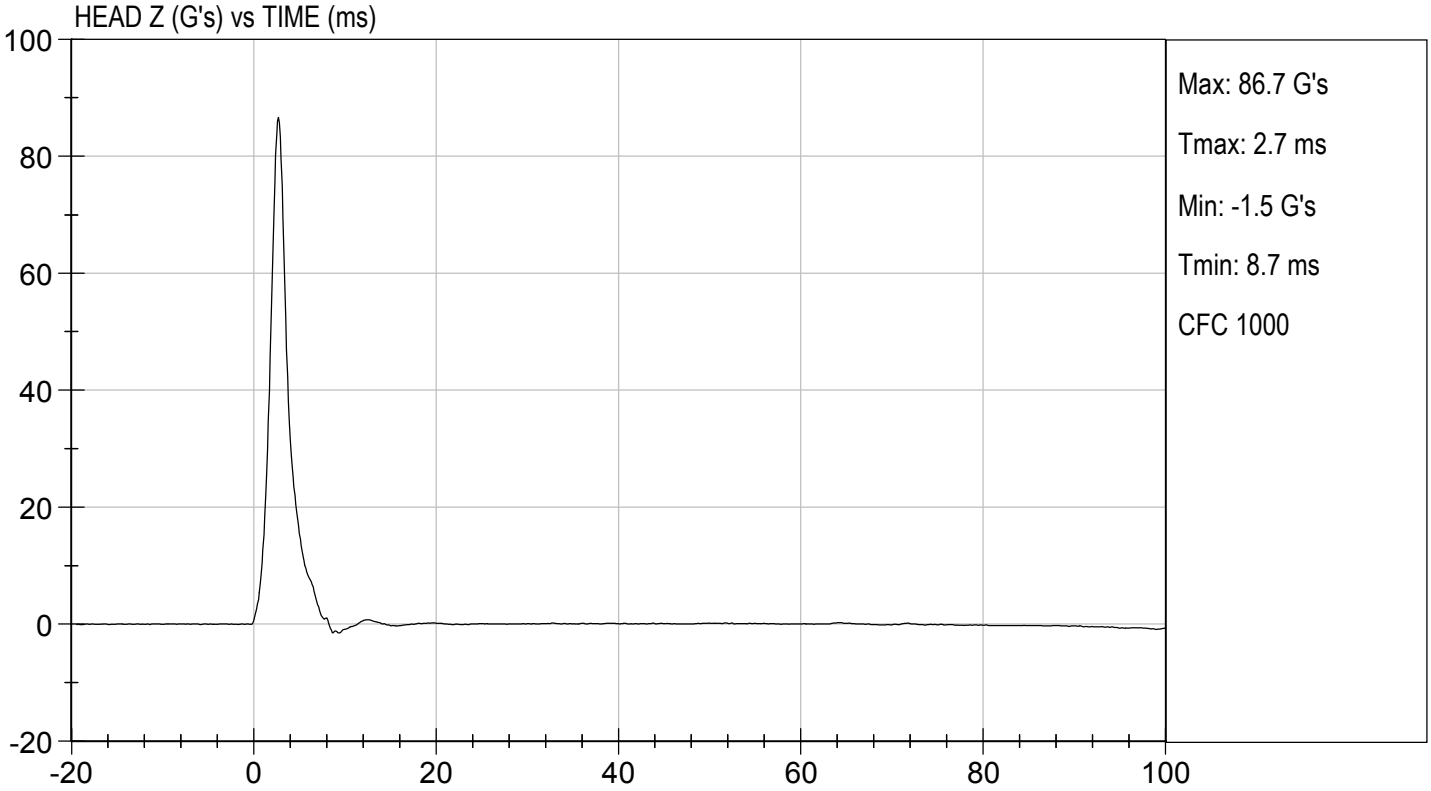
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 08/07/2020
TEST #: D201951





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 278 **Test I.D:** D201952

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	41	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.60	Pass
	15 ms	m/s	3.30 to 4.10	3.85	Pass
	20 ms	m/s	4.40 to 5.40	5.27	Pass
	25 ms	m/s	5.40 to 6.10	5.63	Pass
	25-100 ms	m/s	5.50 to 6.20	5.64	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
			Overall Test Results		Pass

Laboratory Technician

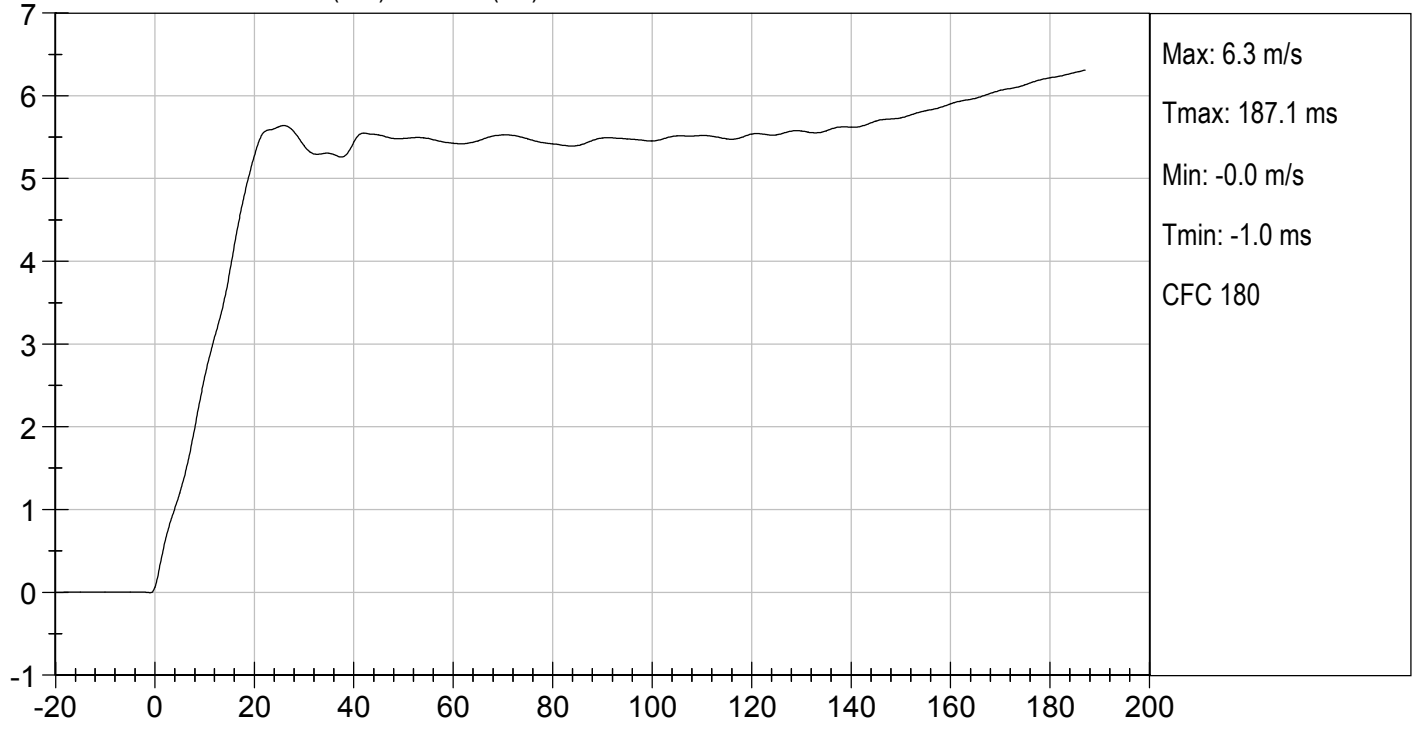
08/07/2020
Test Date

Approved By

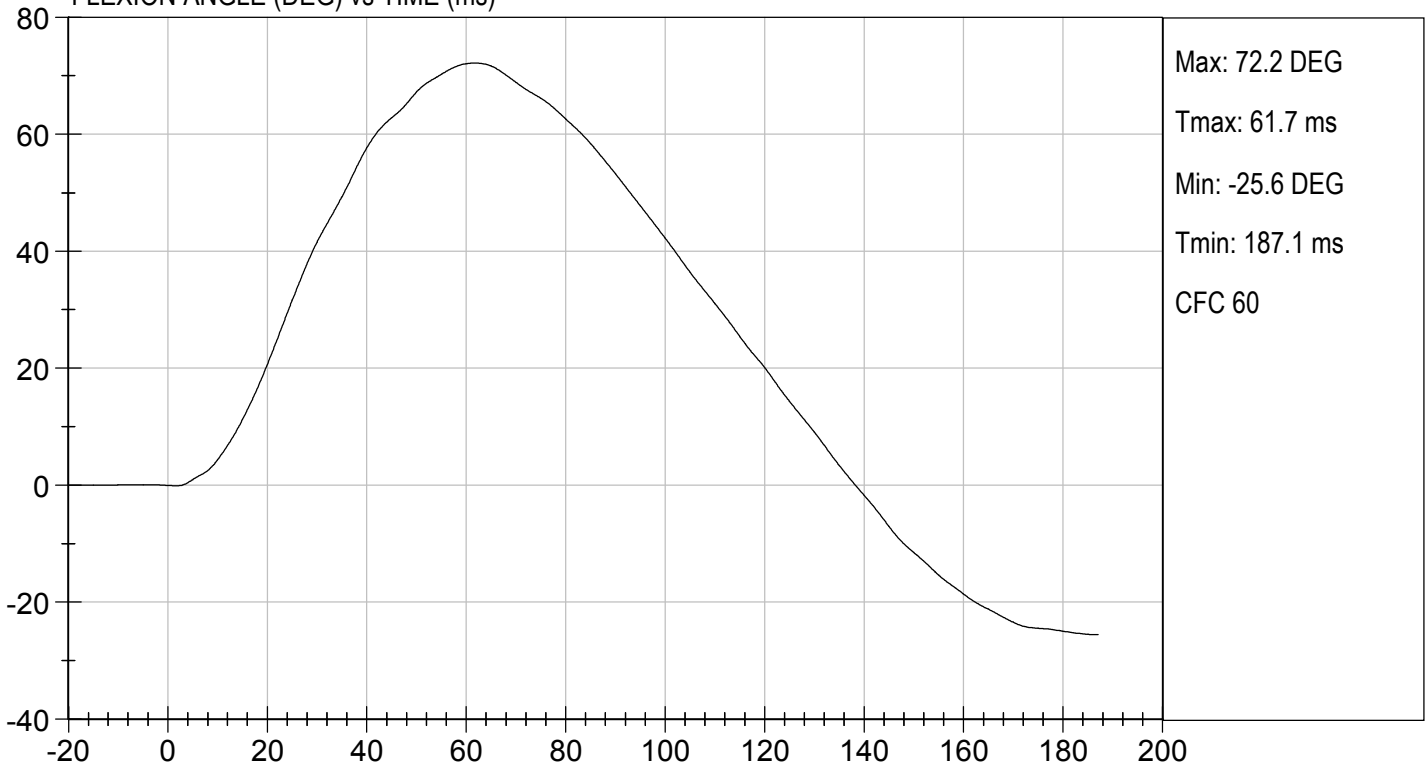
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 08/07/2020
TEST #: D201952

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

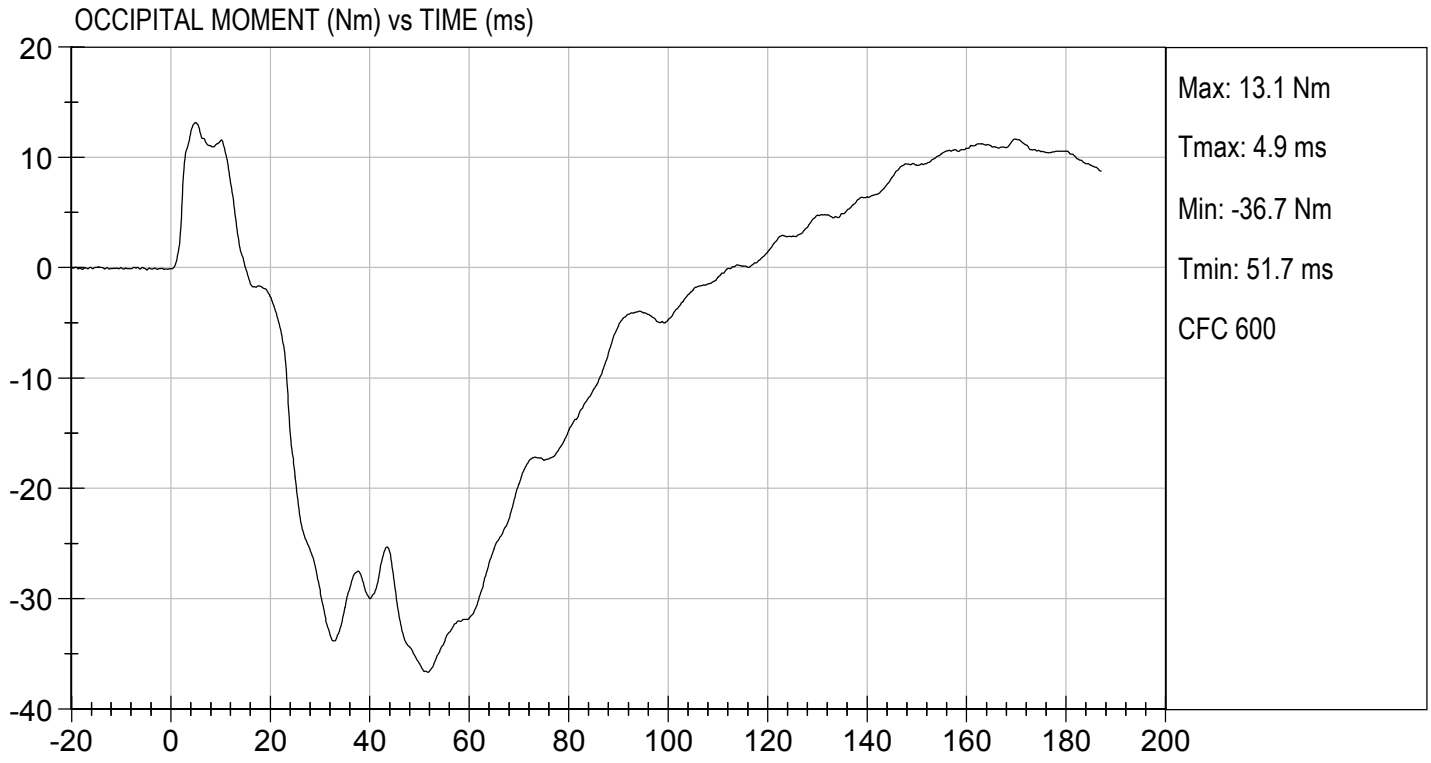


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 08/07/2020
TEST #: D201952



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D201953

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	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	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	18	Pass
		Overall Test Results		Pass

Laboratory Technician

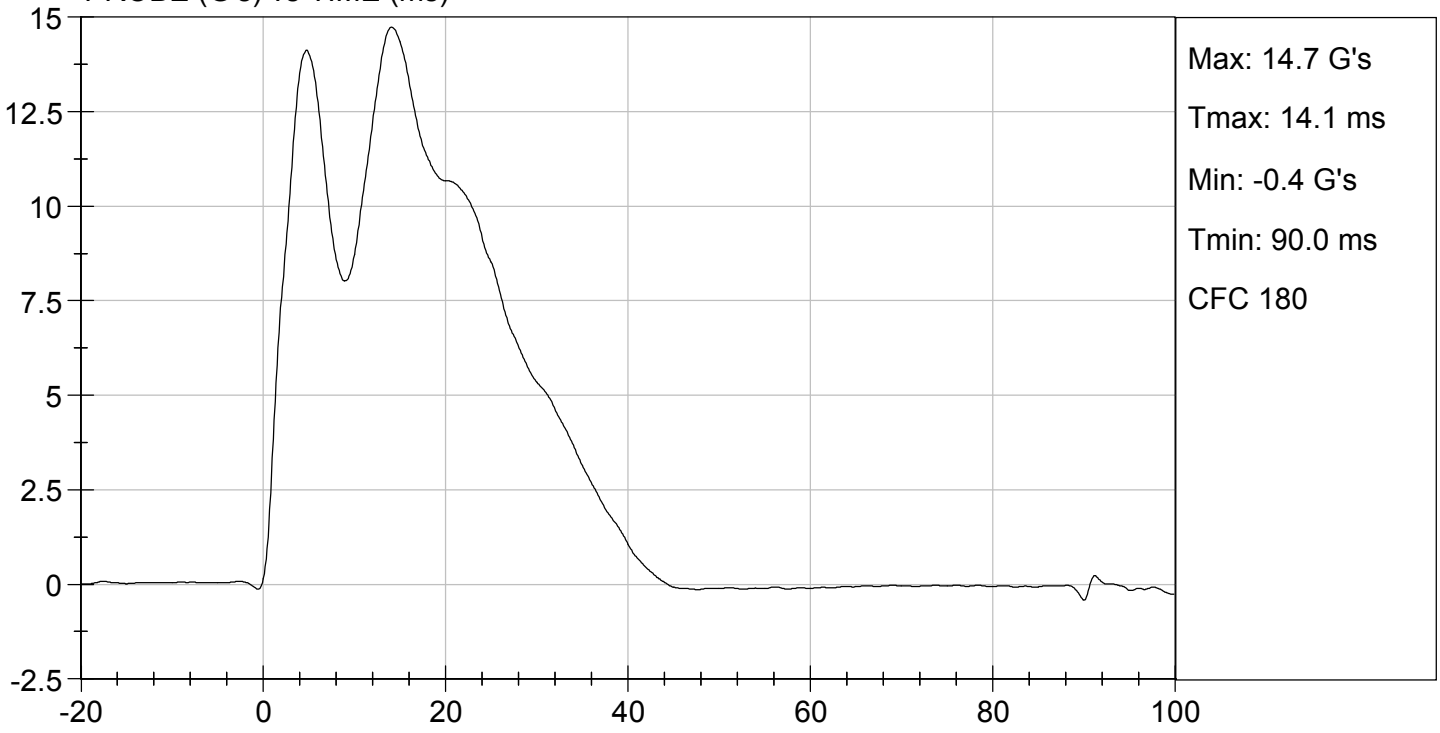
08/07/2020
Test Date

Approved By

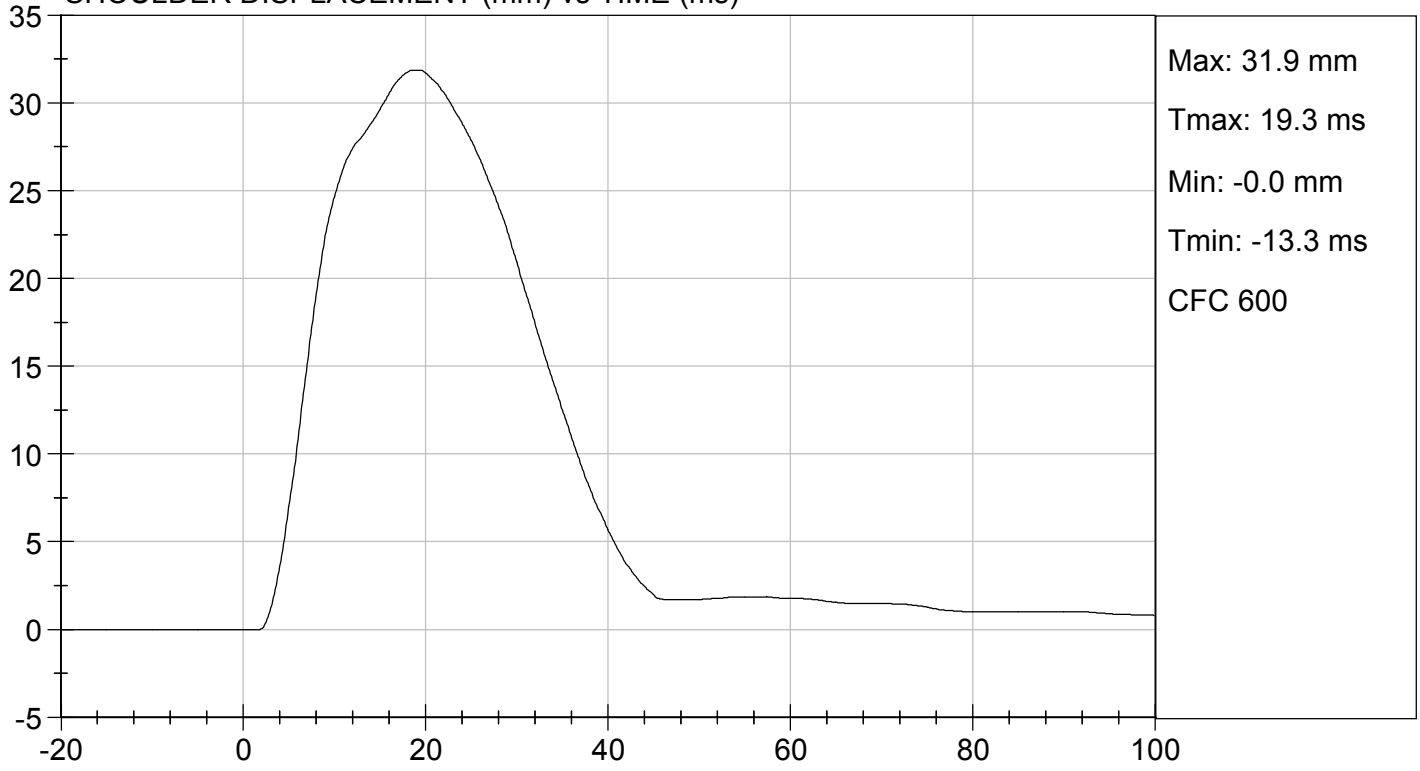
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/07/2020
TEST #: D201953

PROBE (G's) vs TIME (ms)

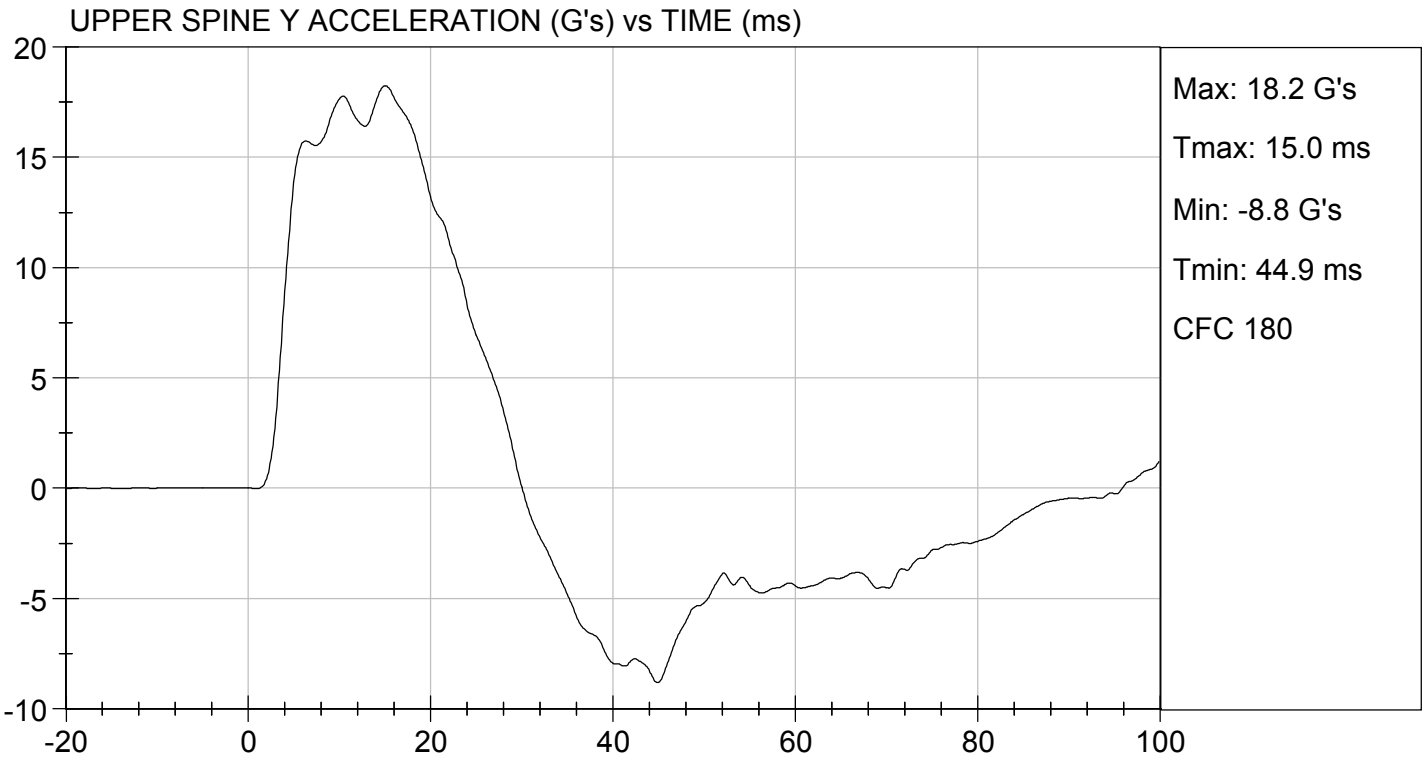


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/07/2020
TEST #: D201953



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201954

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	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	38	Pass
Upper Rib Displacement	mm	25 to 32	30	Pass
Middle Rib Displacement	mm	30 to 36	33	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
		Overall Test Results		Pass

Laboratory Technician

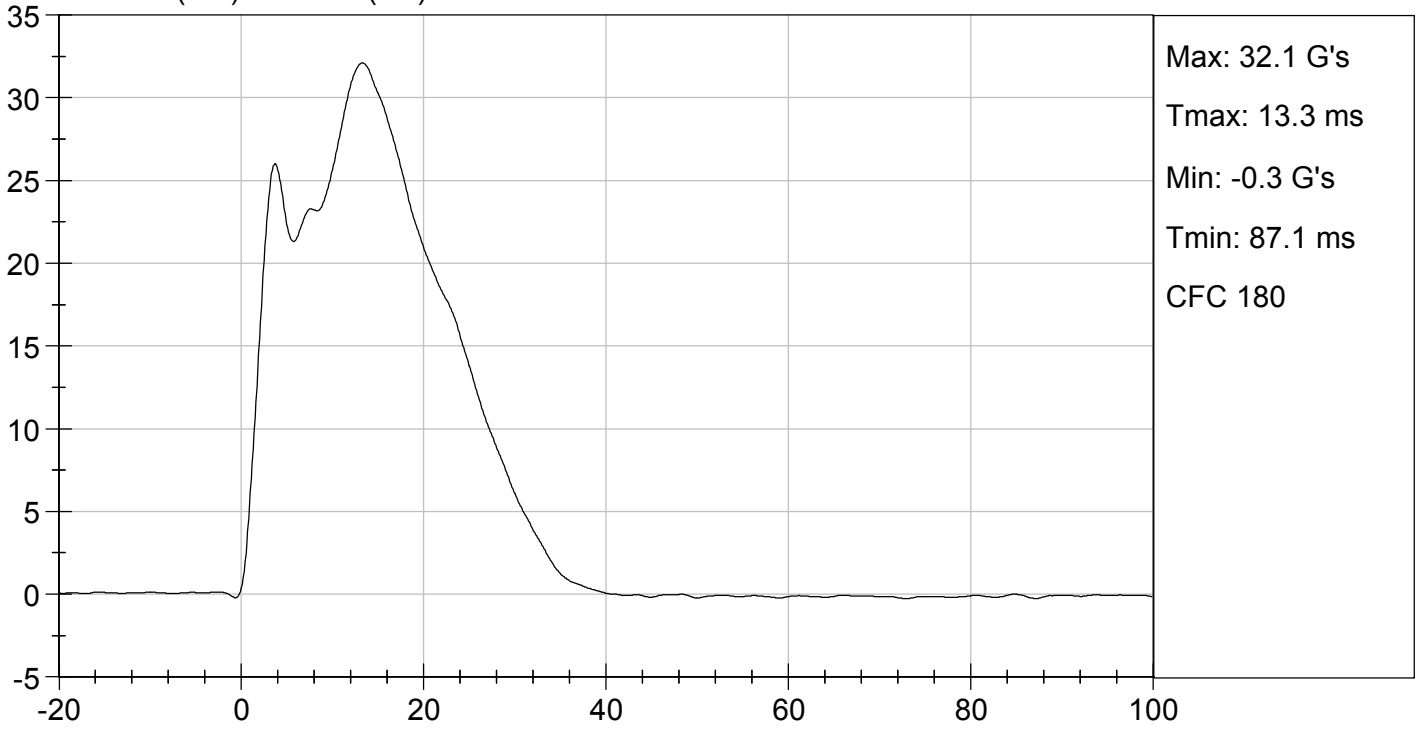
08/07/2020
Test Date

Approved By

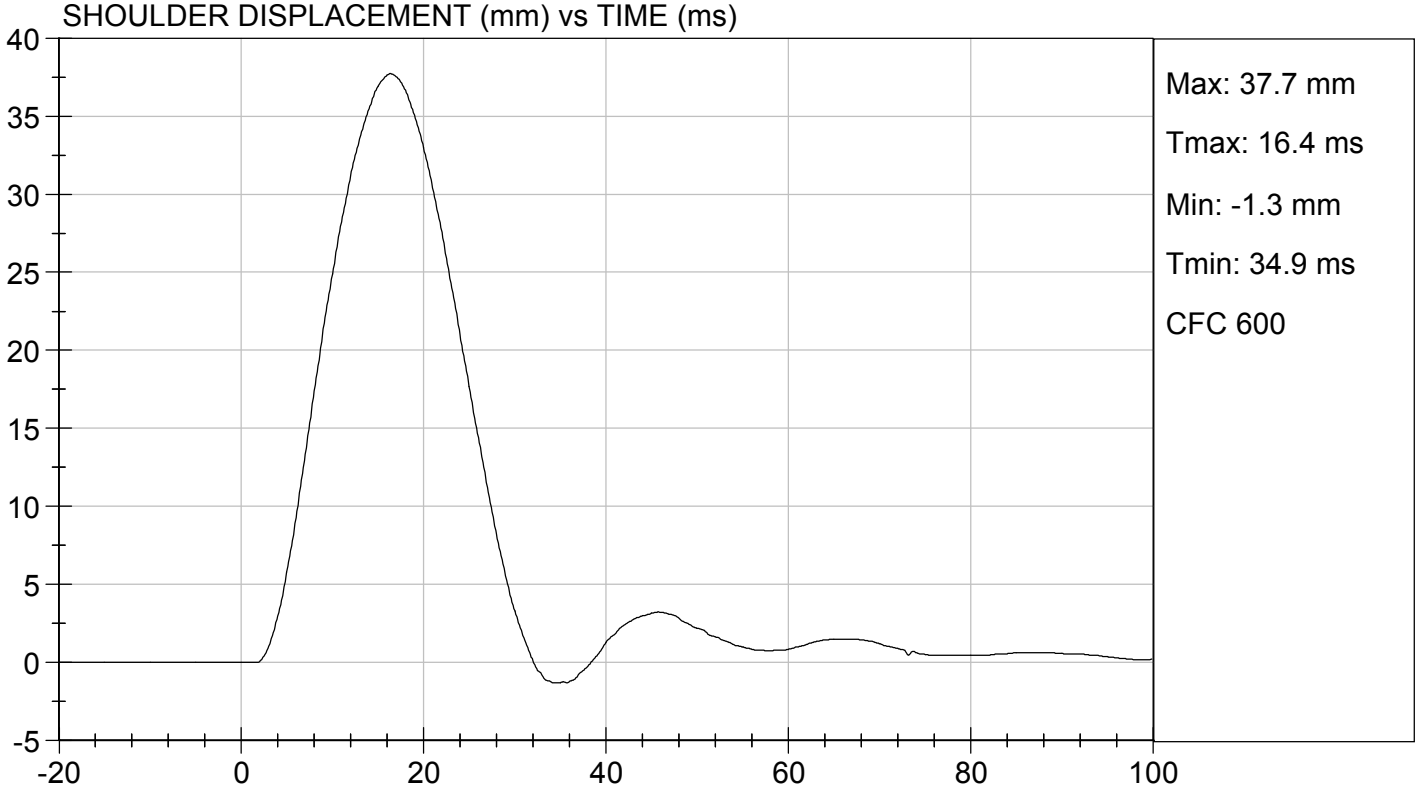
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/07/2020
TEST #: D201954

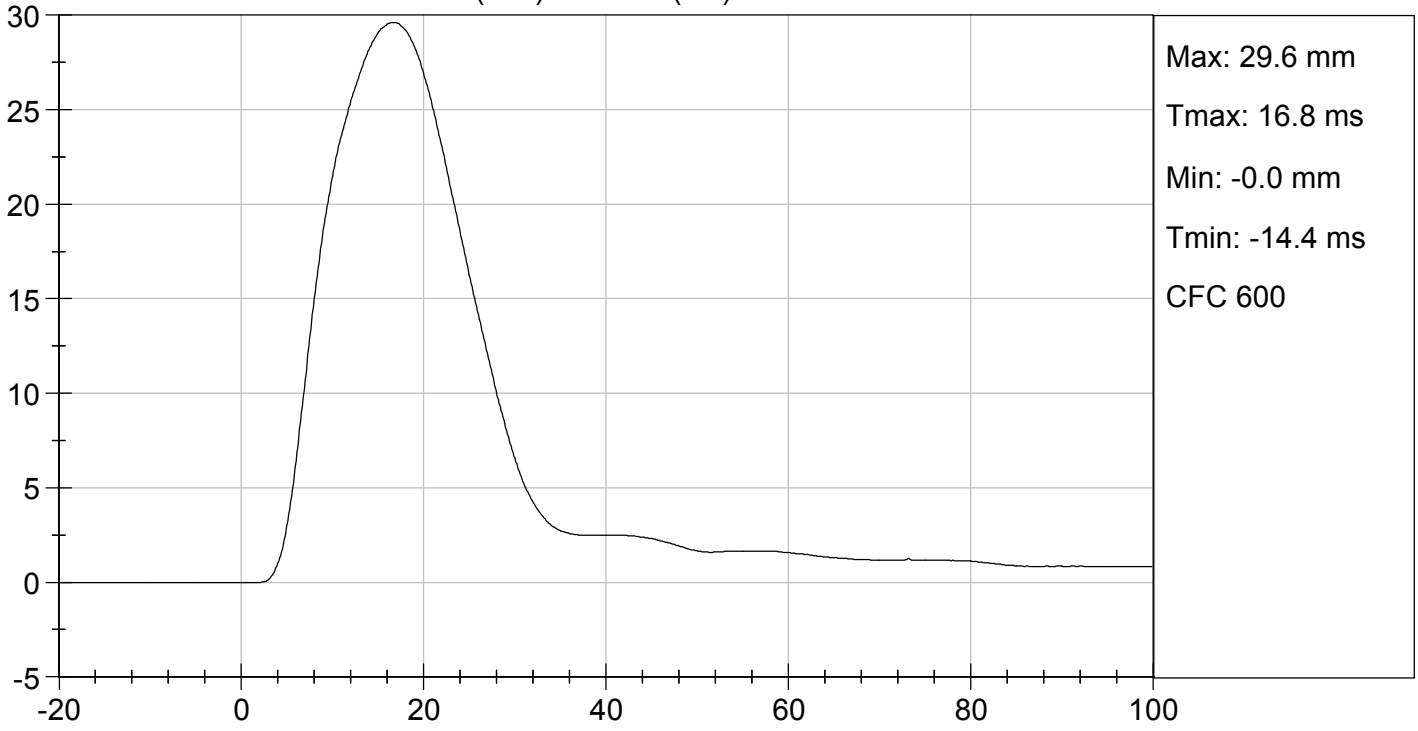
PROBE (G's) vs TIME (ms)



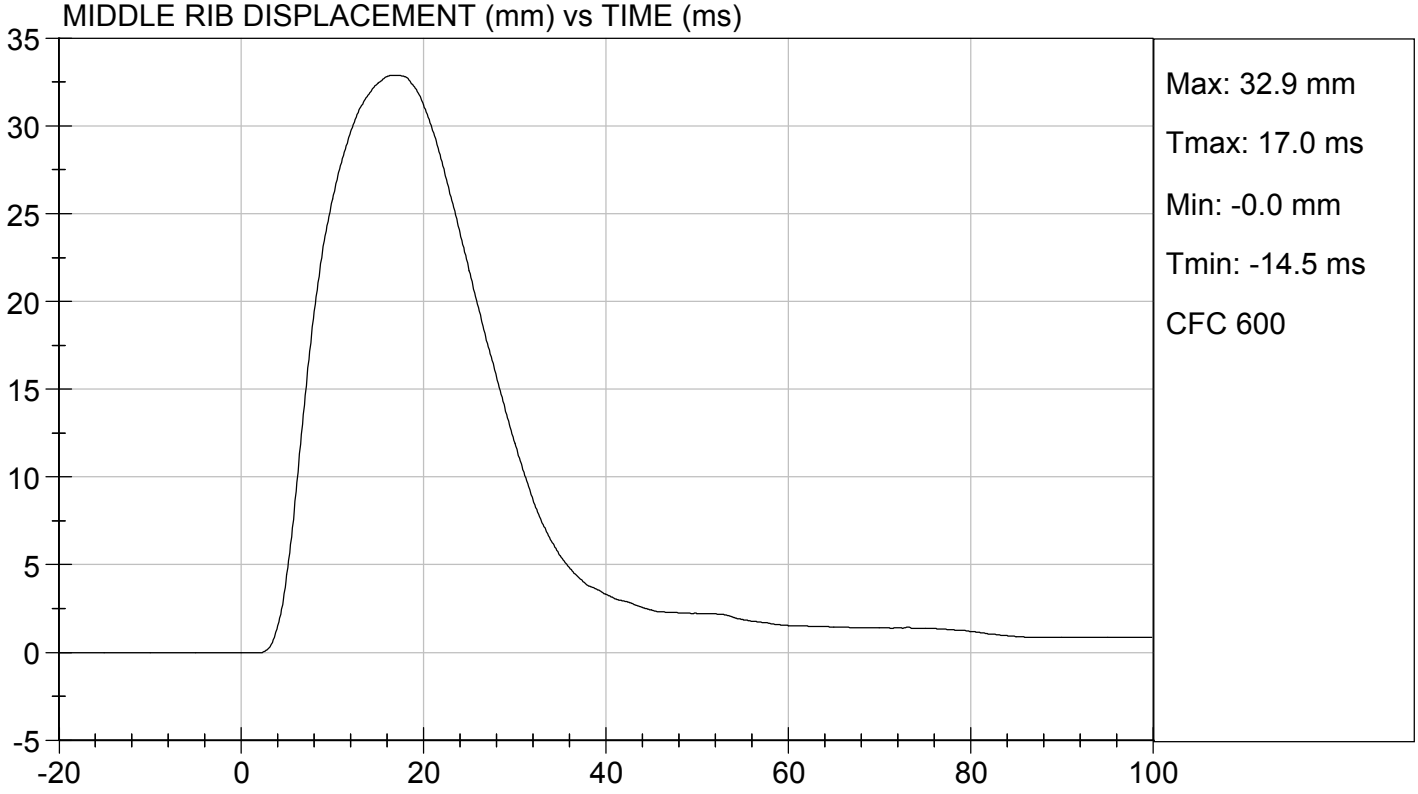
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



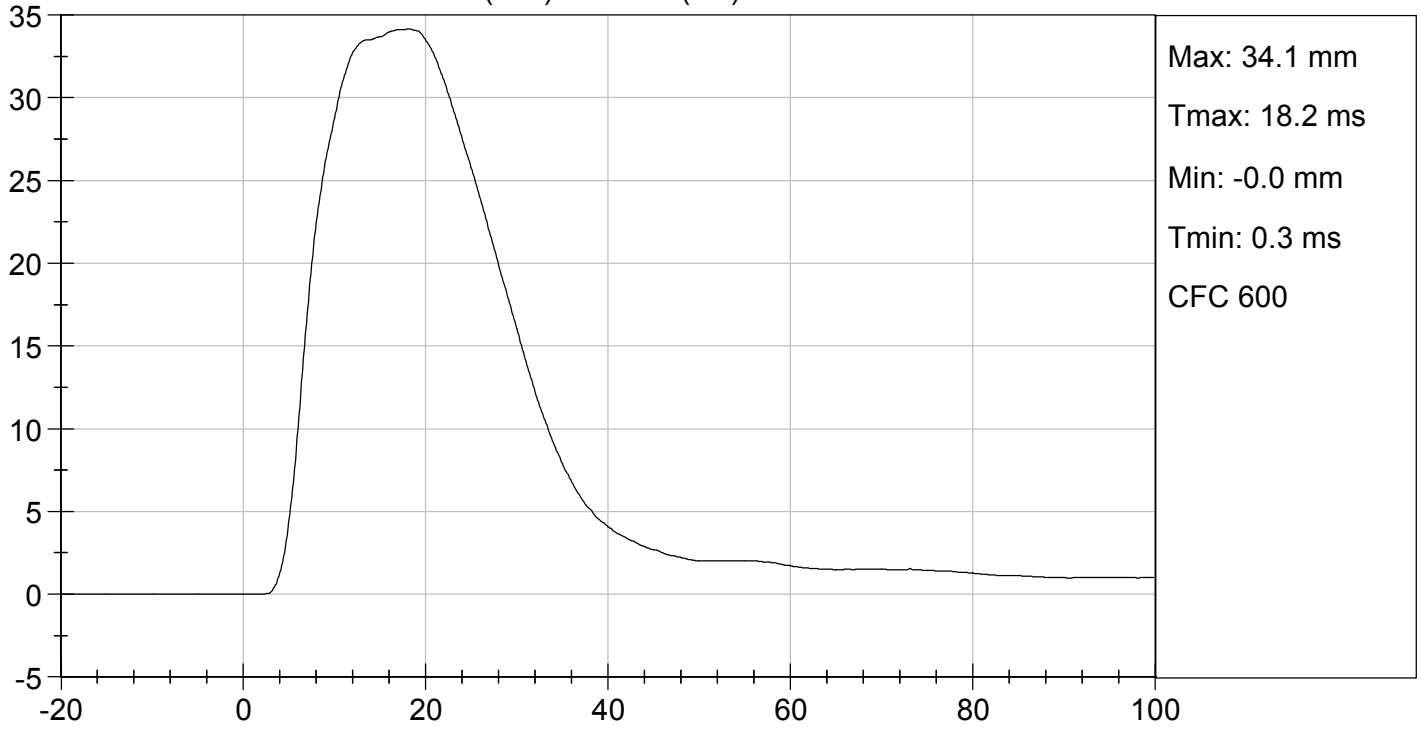
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



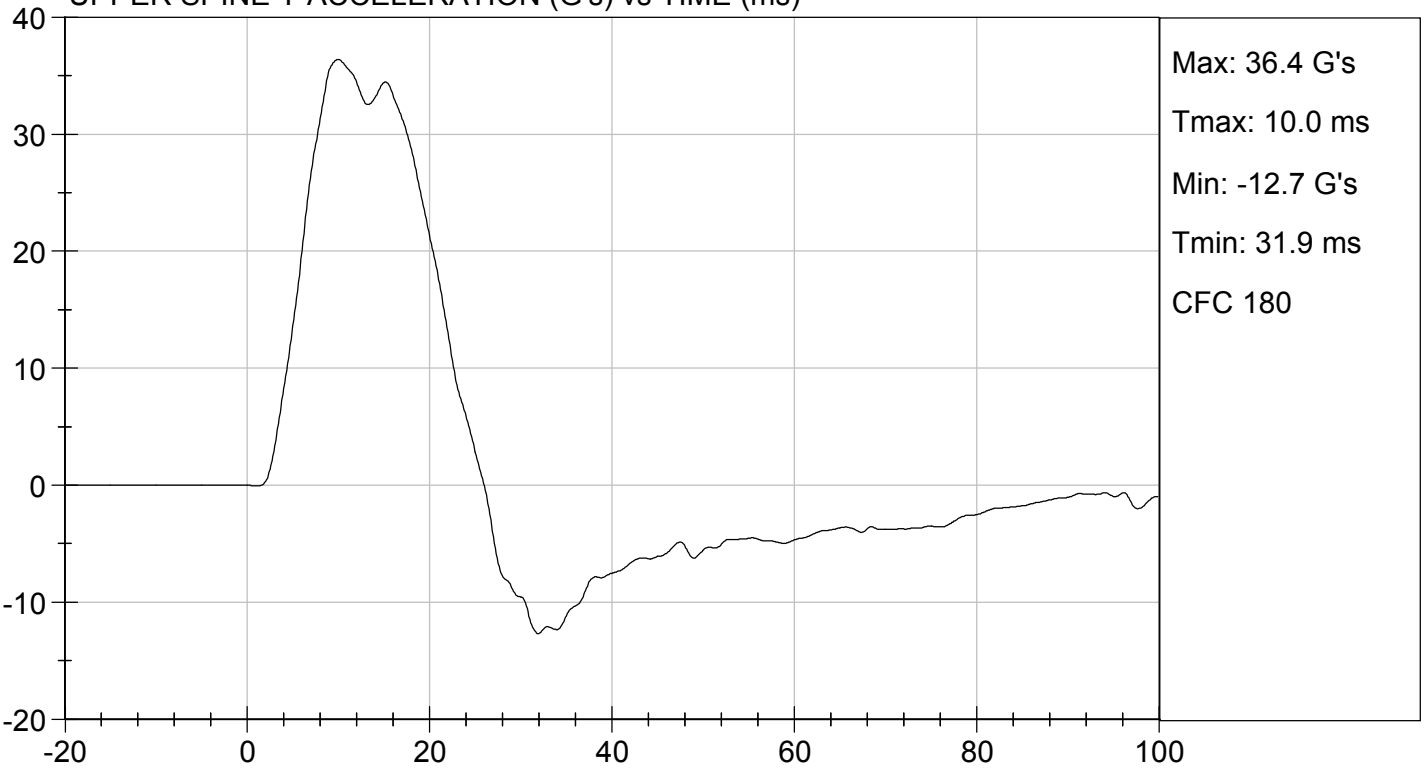
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/07/2020
TEST #: D201954

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

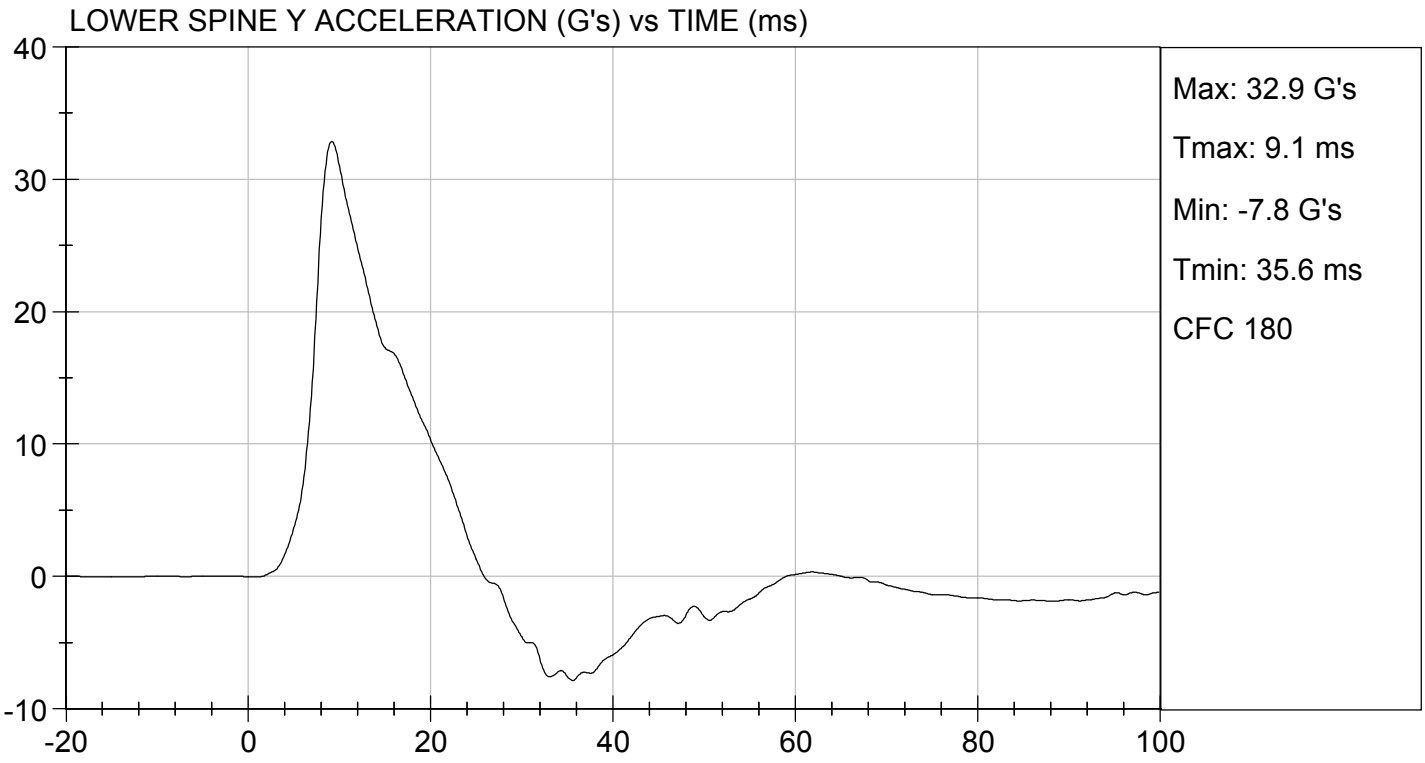


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 08/07/2020
TEST #: D201954



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201955

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	44	Pass
Lower Rib Displacement	mm	35 to 43	41	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

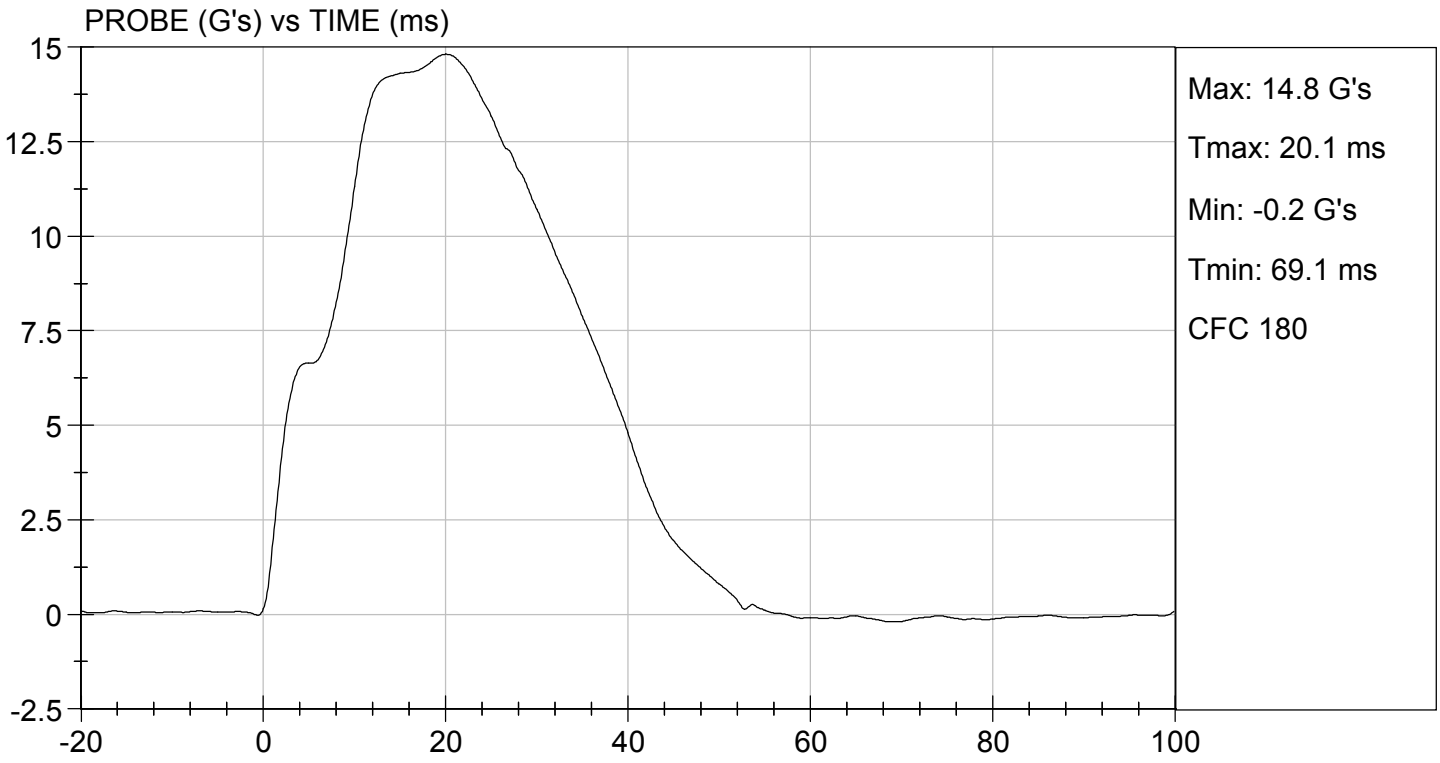
Laboratory Technician

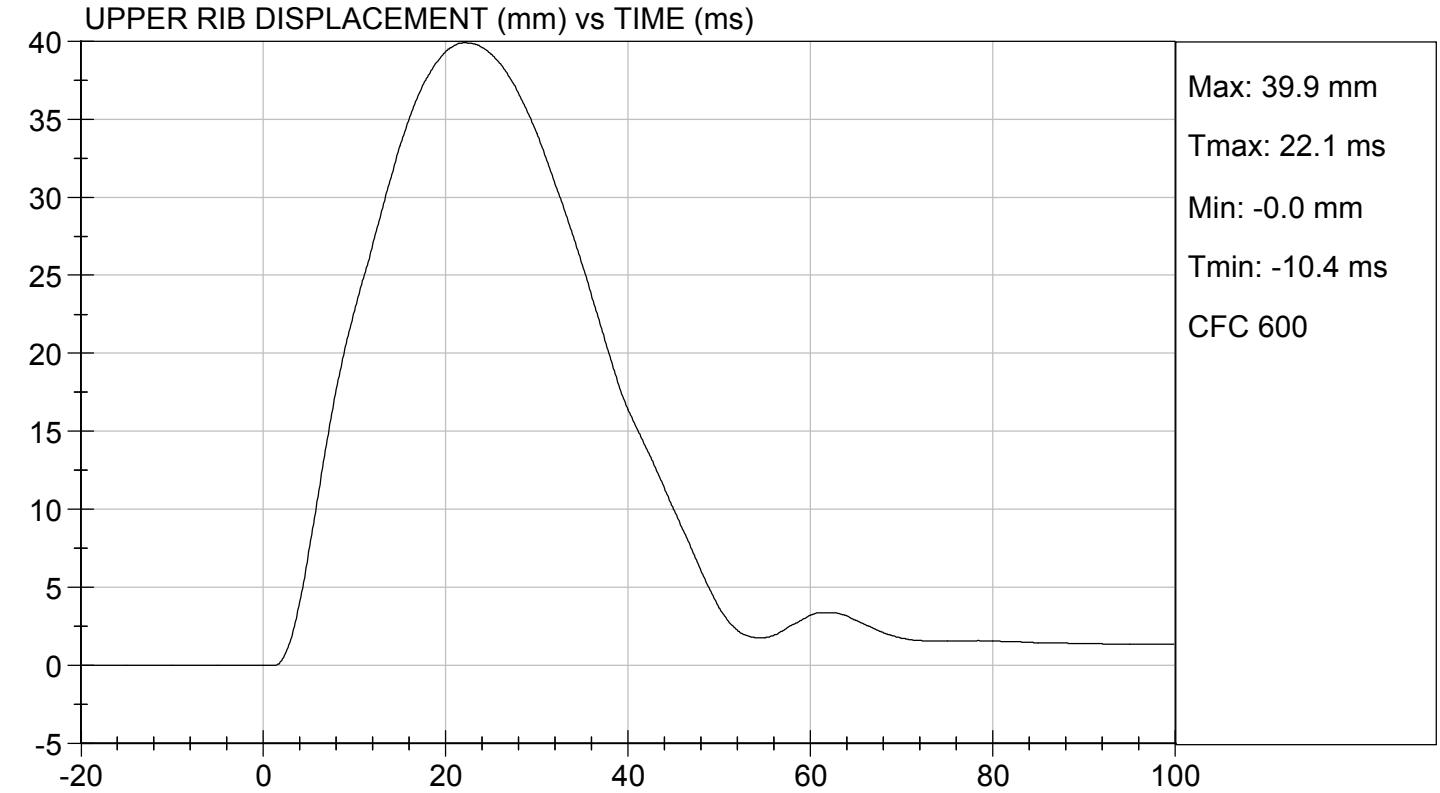
08/07/2020
Test Date

Approved By

TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201955

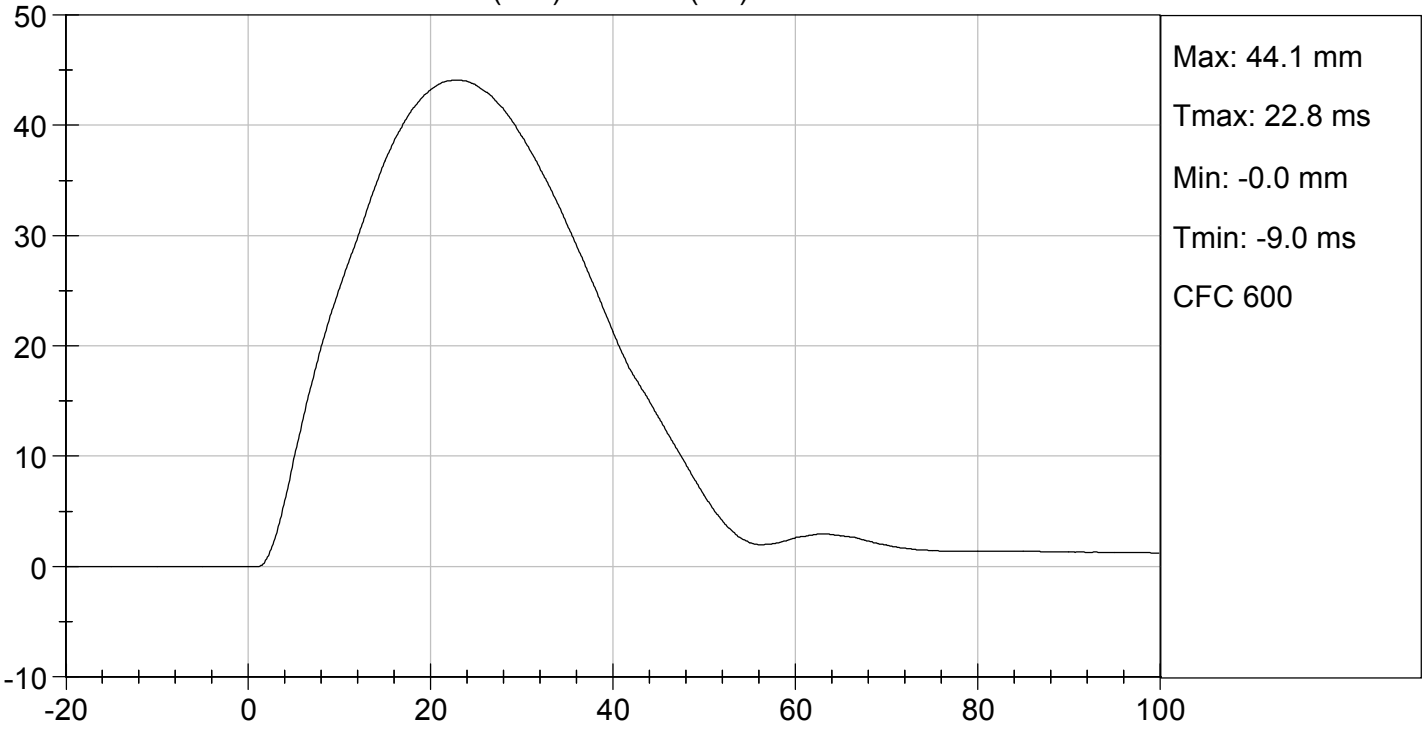




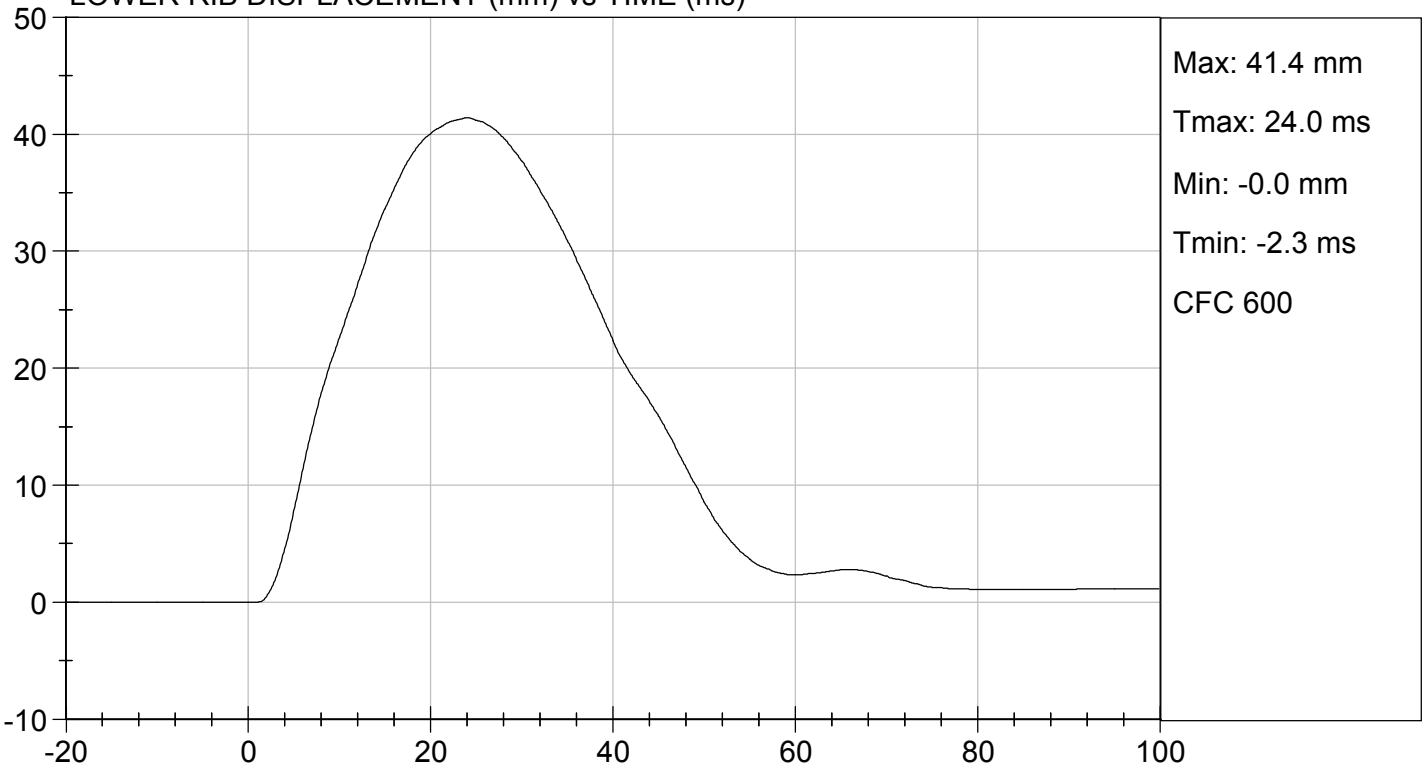
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201955

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



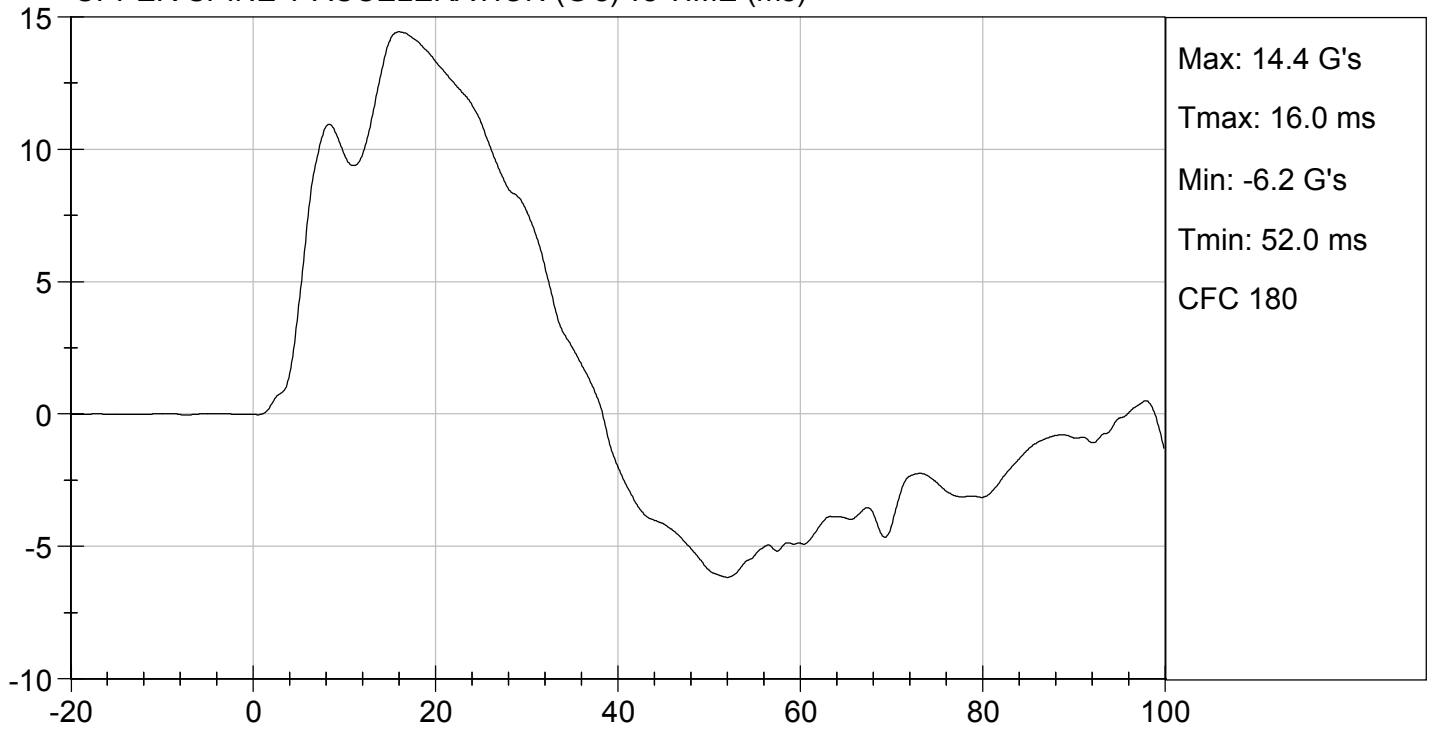
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



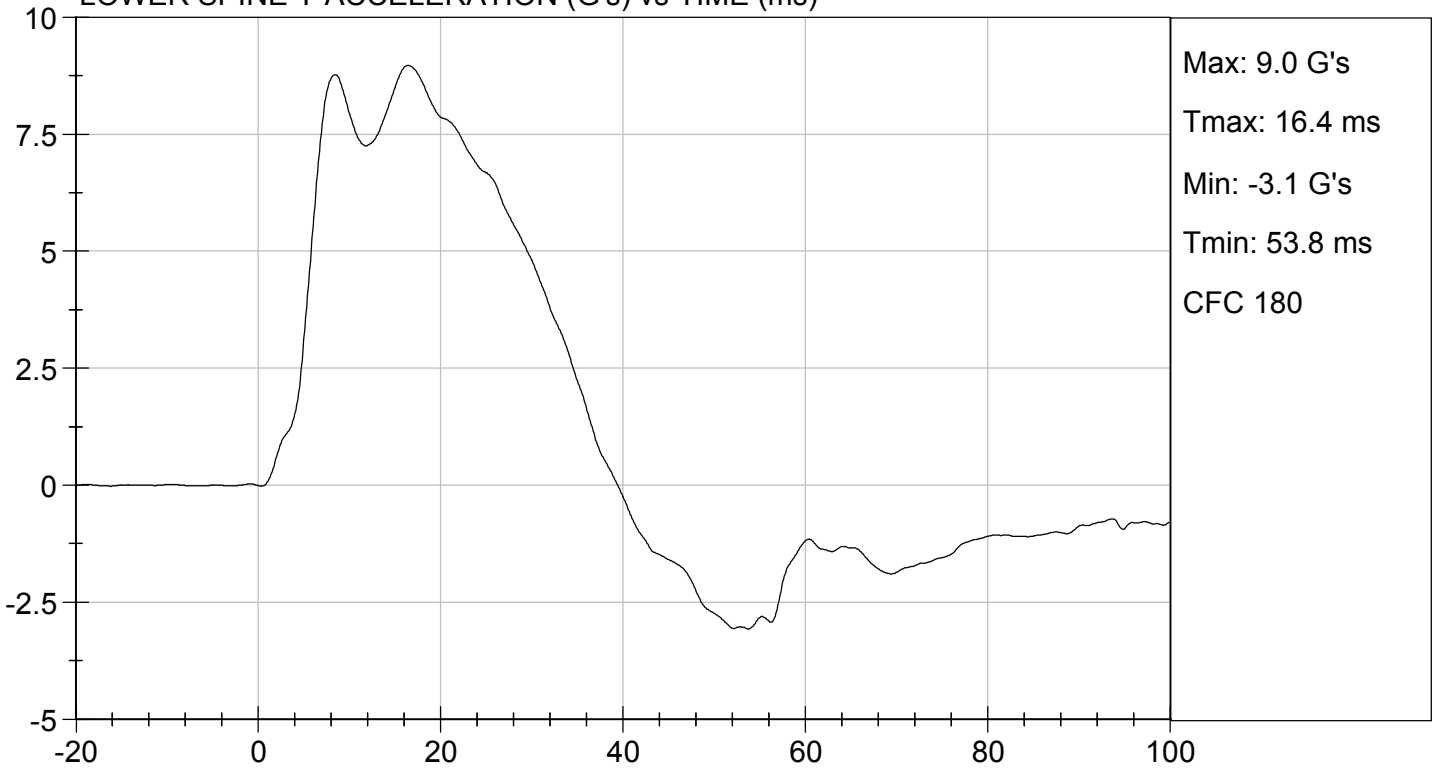
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201955

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



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201956

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	44	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Laboratory Technician

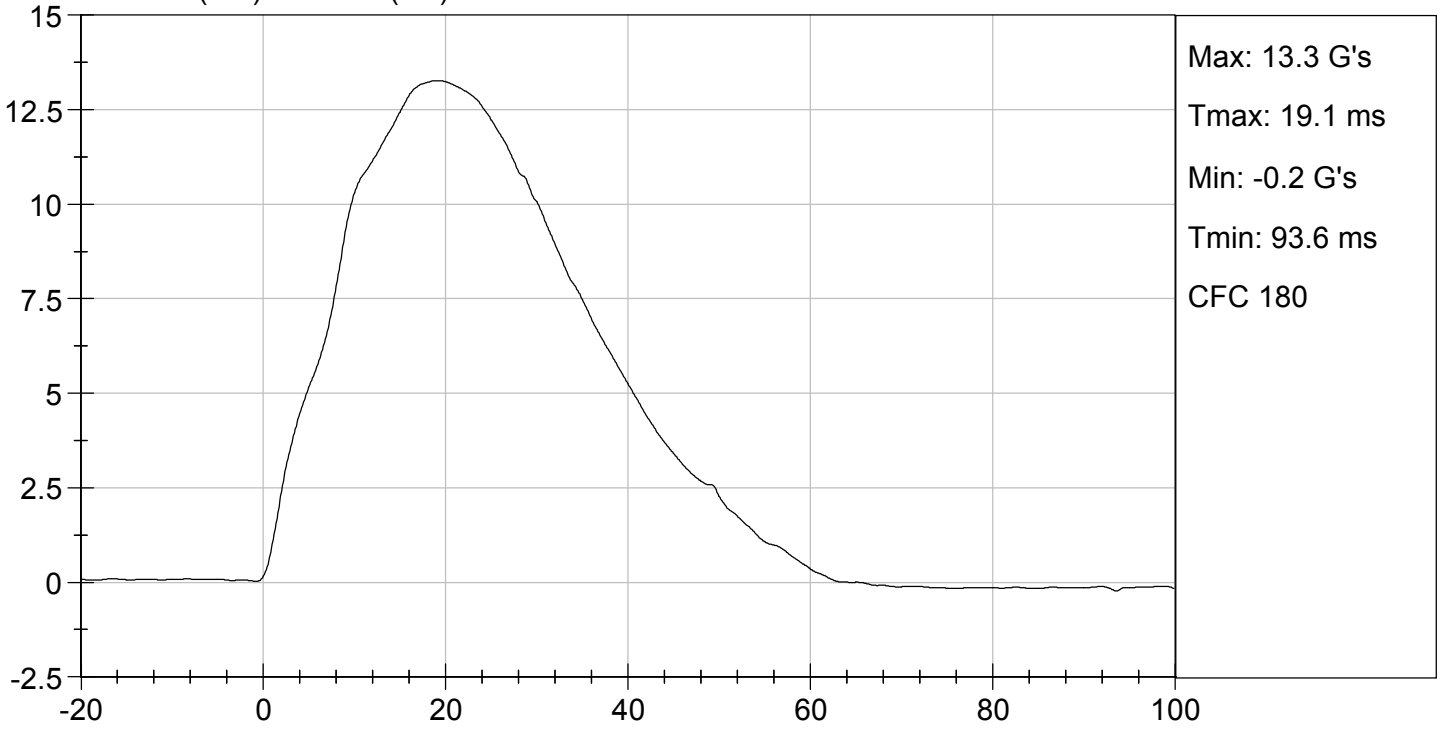
08/07/2020
Test Date

Approved By

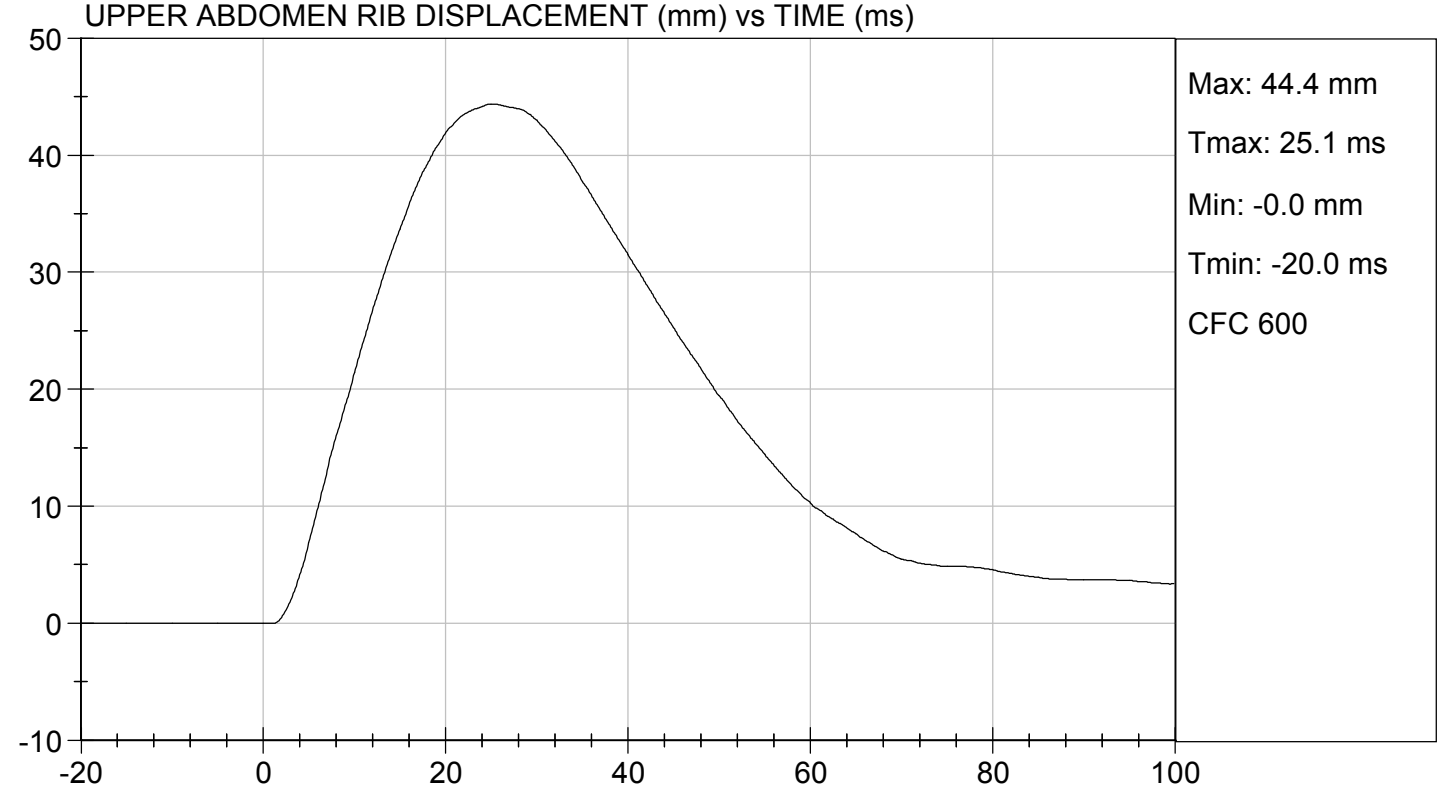
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201956

PROBE (G's) vs TIME (ms)



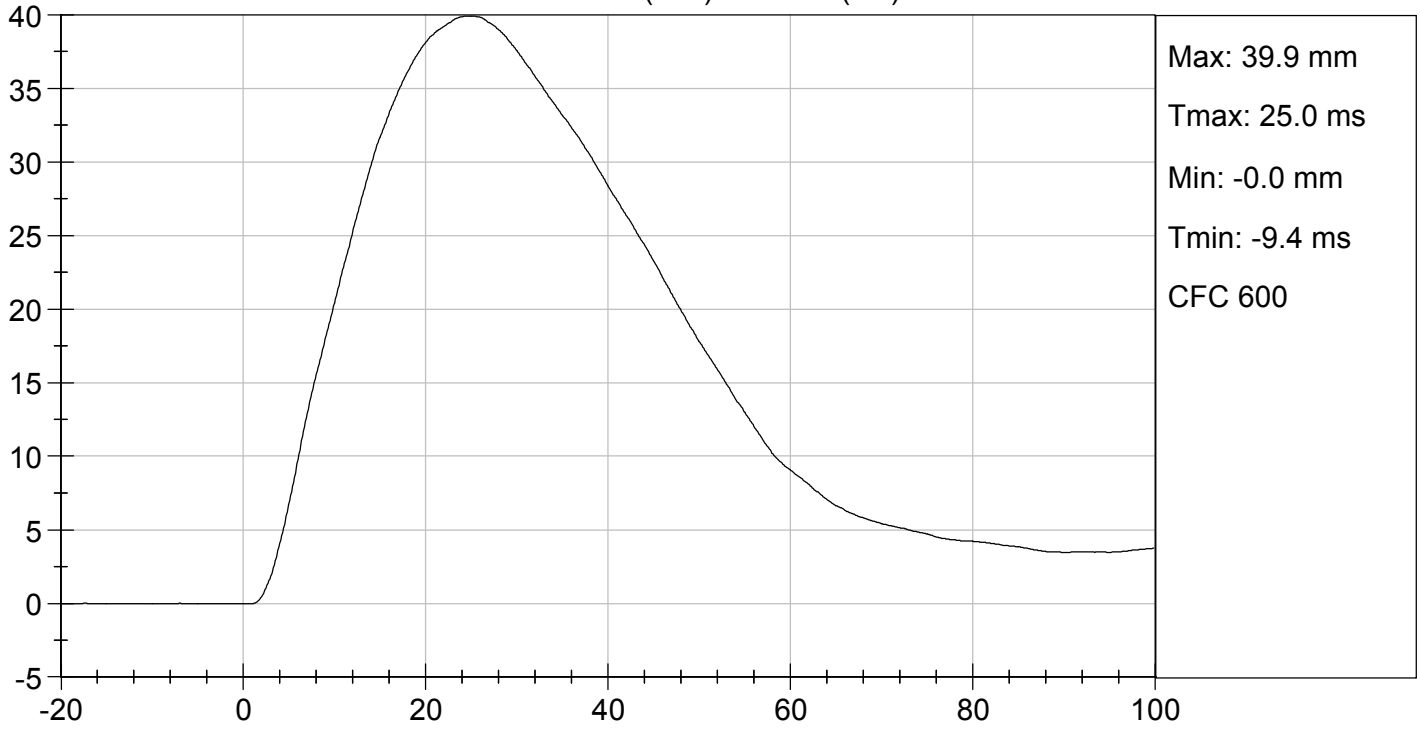
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



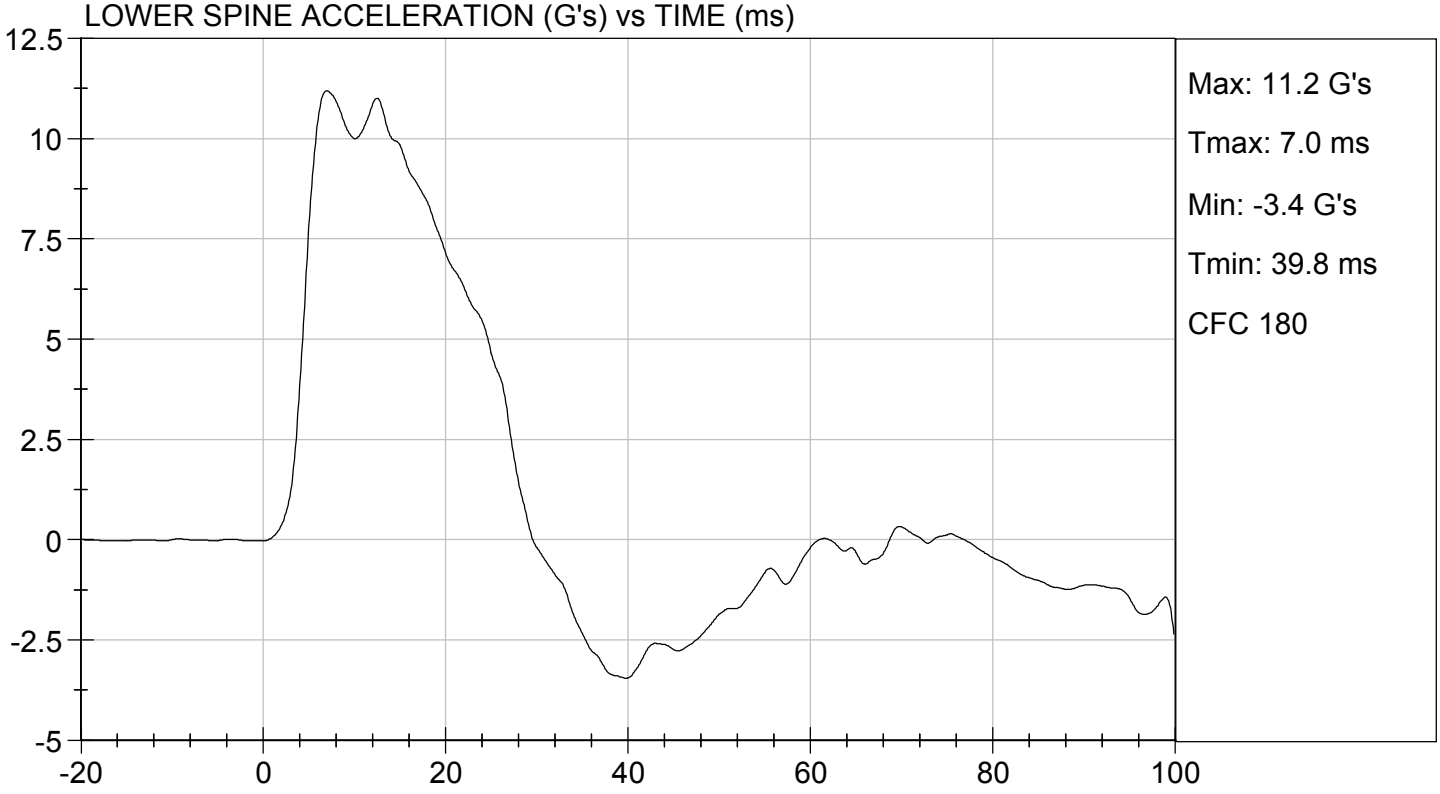
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201956

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:** D201957

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	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	3,929	Pass
		Overall Test Results		Pass

Laboratory Technician

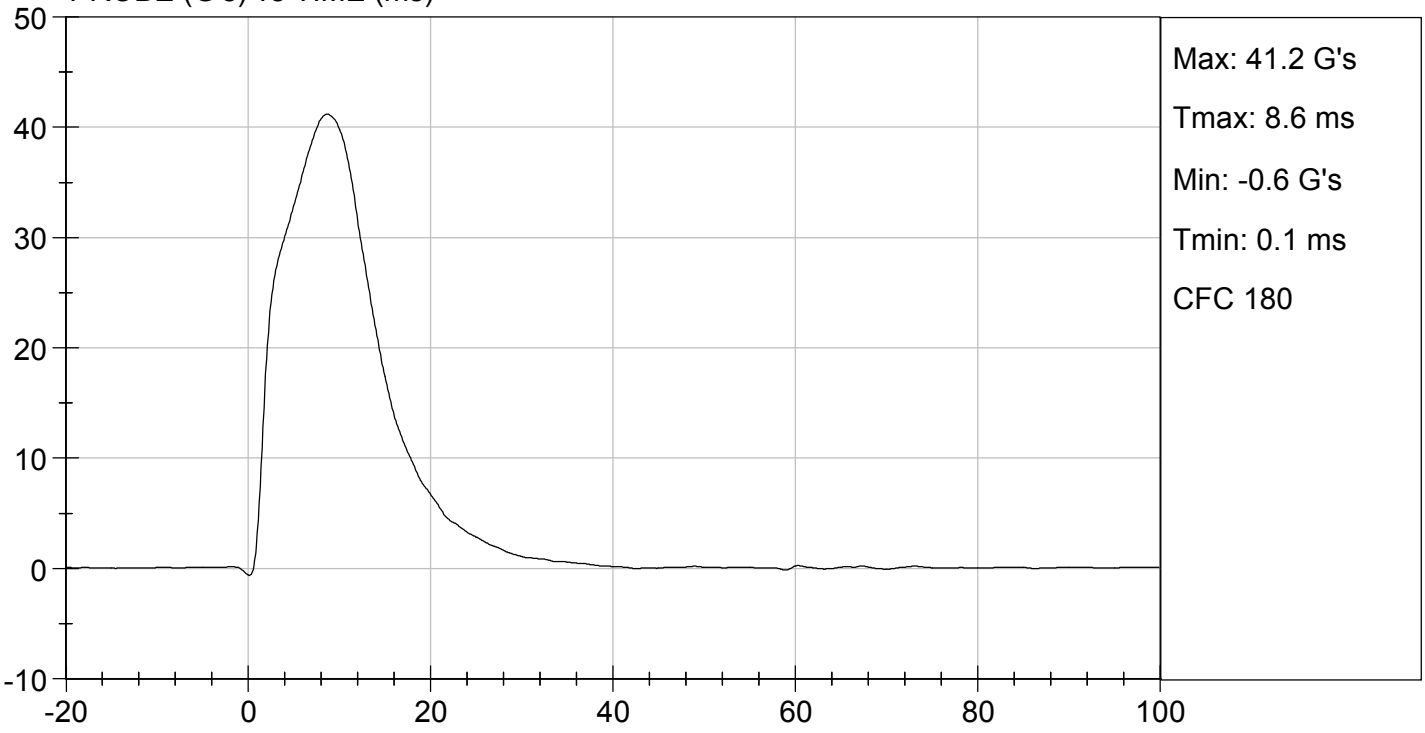
08/07/2020
Test Date

Approved By

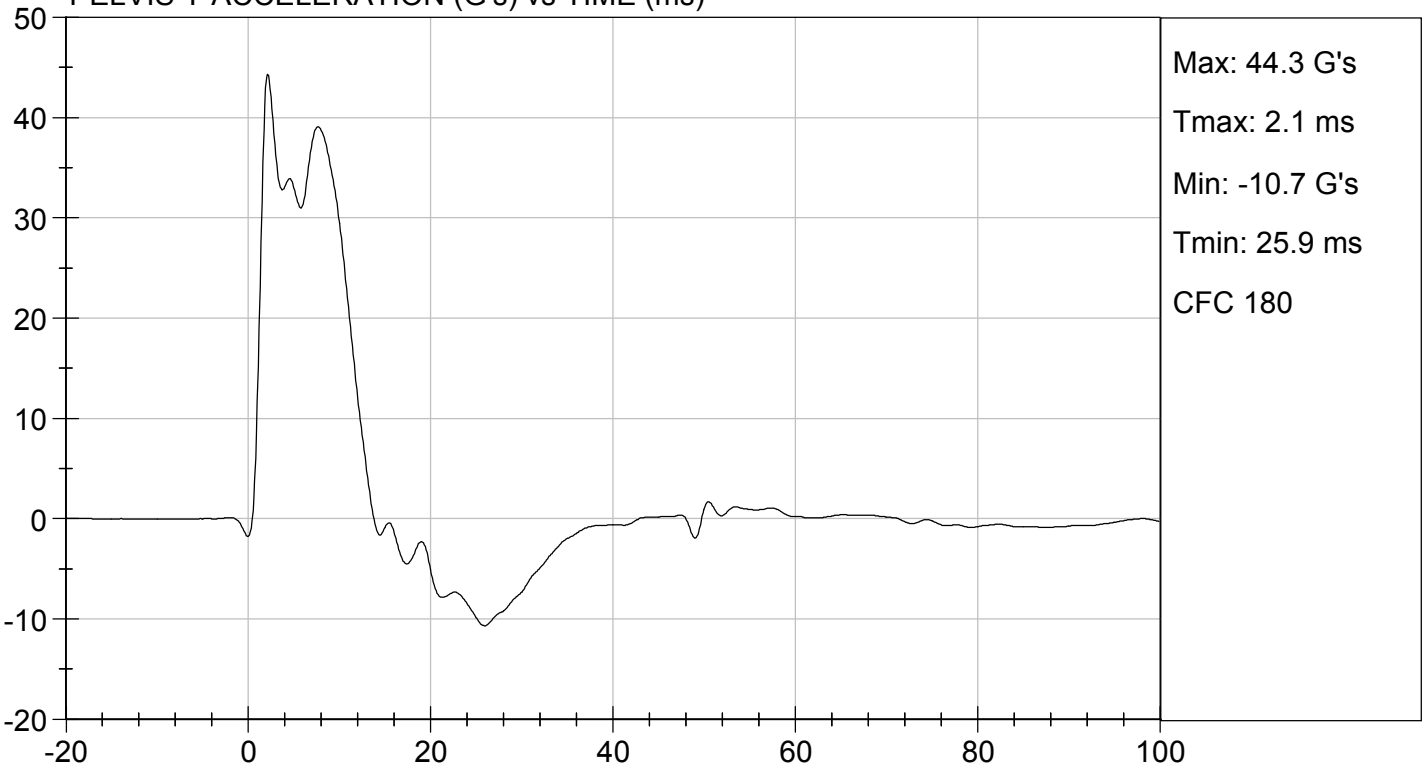
TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 08/07/2020
TEST #: D201957

PROBE (G's) vs TIME (ms)

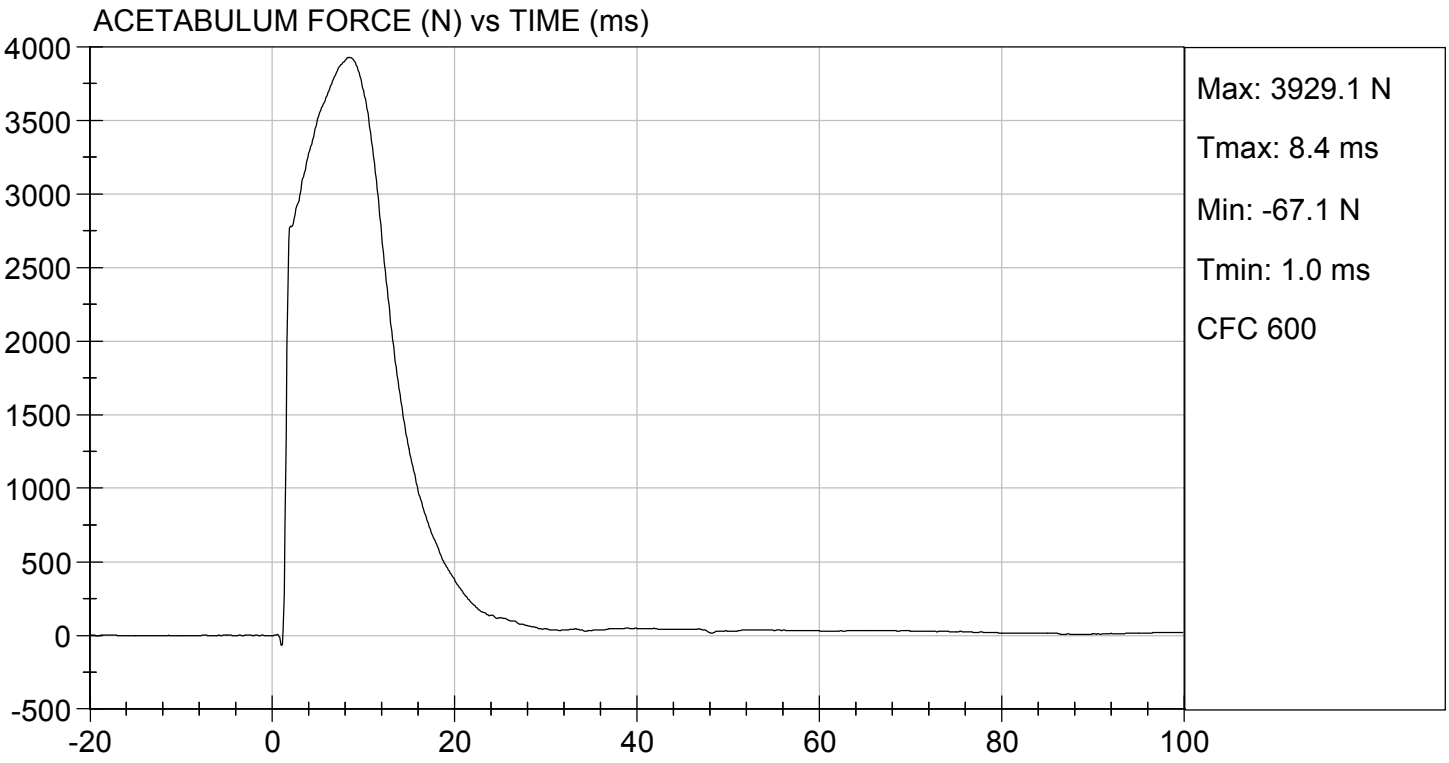


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 08/07/2020
TEST #: D201957



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D201958

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Humidity	%	10 to 70	38	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,605	Pass
		Overall Test Results		Pass

Laboratory Technician

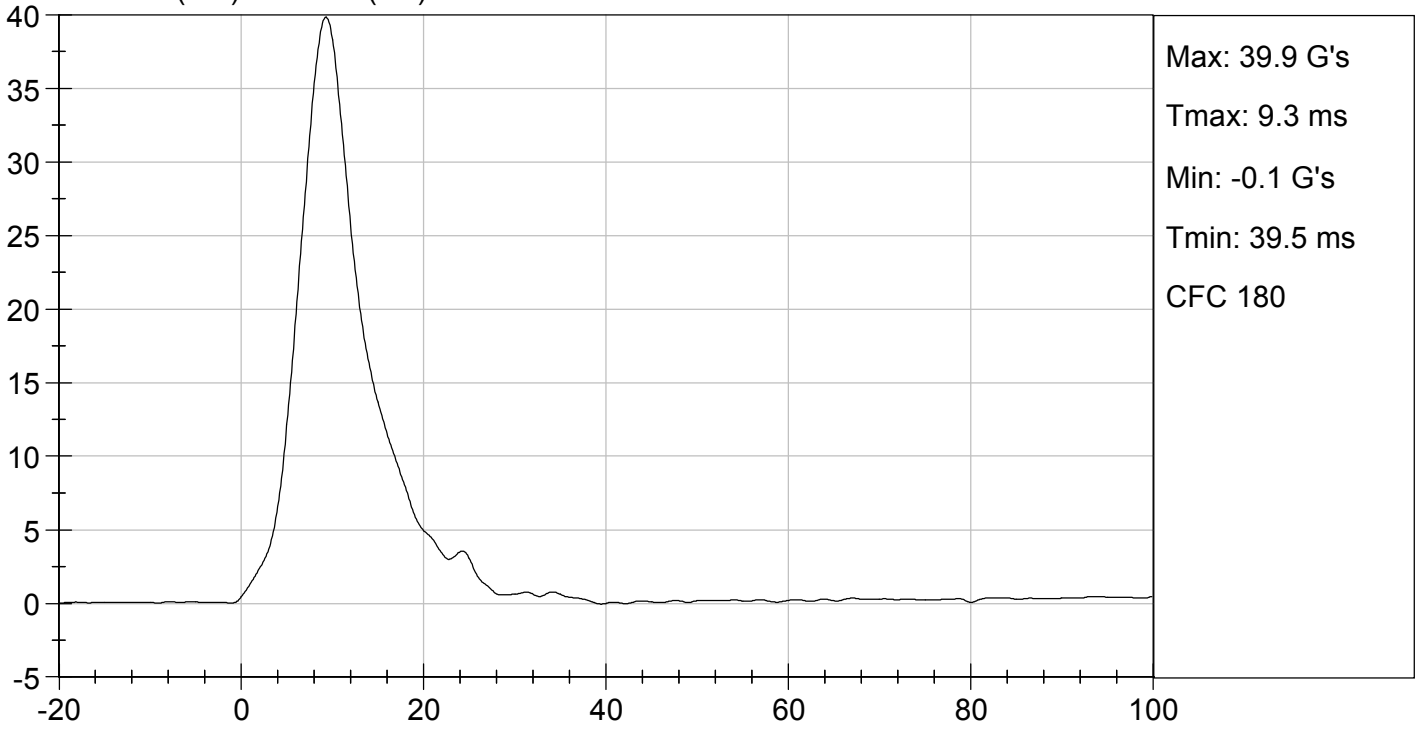
08/13/2020
Test Date

Approved By

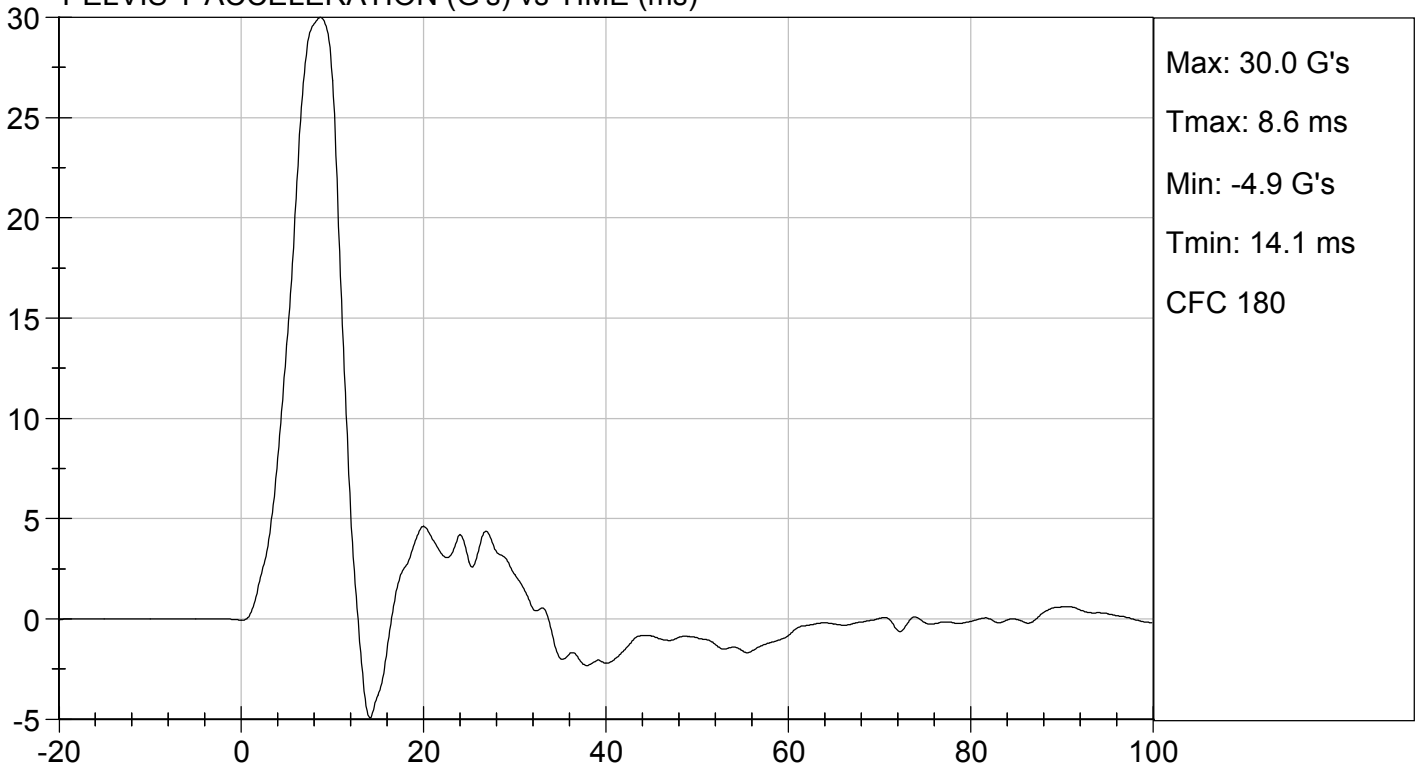
TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/13/2020
TEST #: D201958

PROBE (G's) vs TIME (ms)

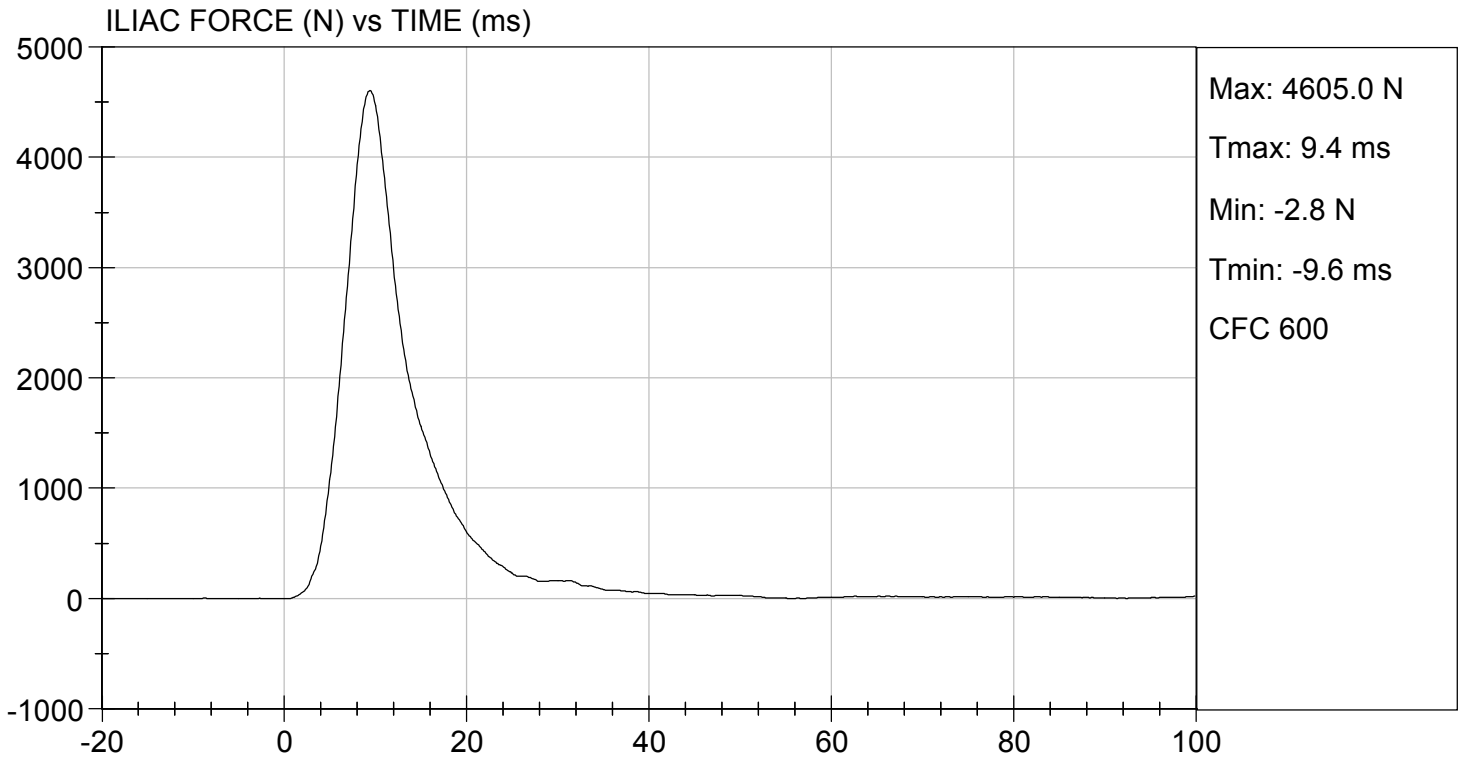


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/13/2020
TEST #: D201958

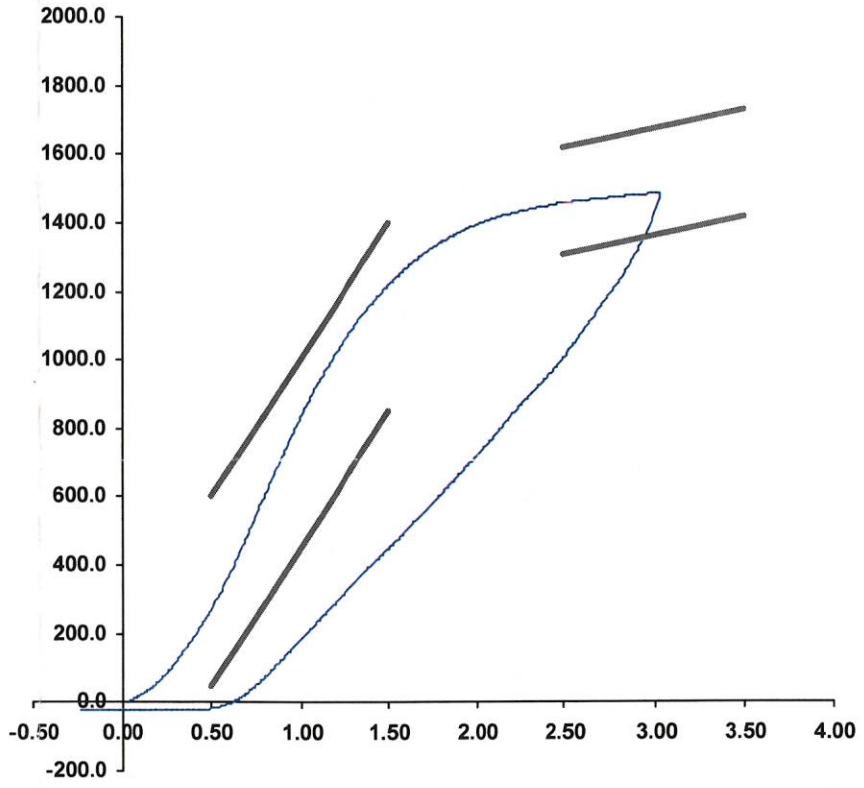


SID-IIs Pelvis Plug Certification Test

Plug S/N 13371
Test Number 11013
Report Number 11051
Test Date 9/19/2019 10:58:12 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	280.50	50.00	600.00
Force @ 1.5 mm (N)	1,220.32	850.00	1,400.00
Force @ 2.5 mm (N)	1,456.95	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,487.04	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 19-Sep-19
SACO Research

By : DC Date : 9/19/2019

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

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13518
Test Number 11162
Report Number 11200
Test Date 9/23/2019 10:30:14 AM

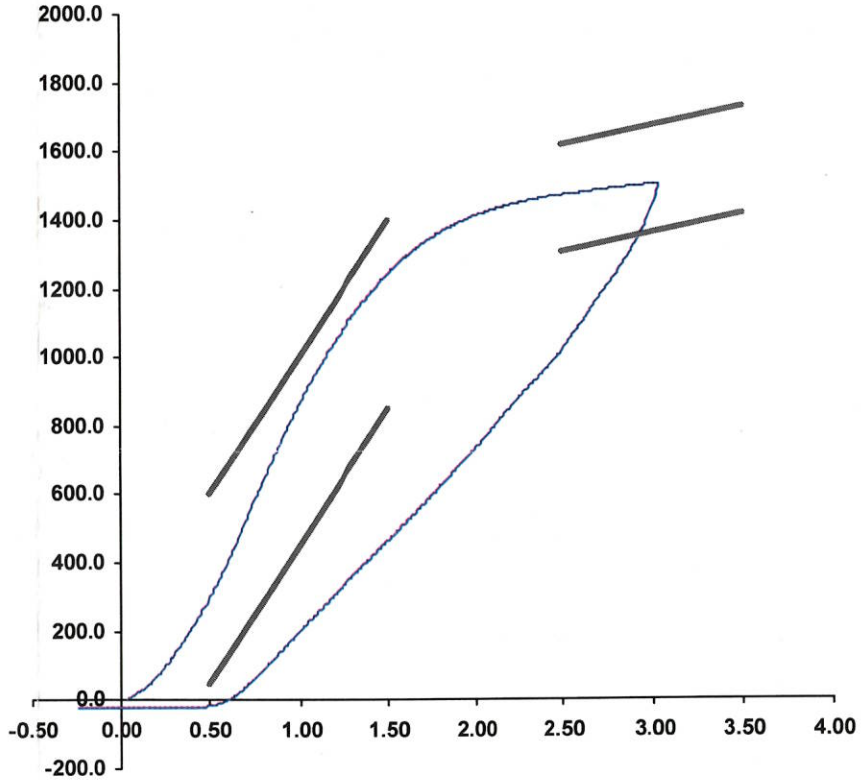
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	310.02	50.00	600.00
Force @ 1.5 mm (N)	1,245.50	850.00	1,400.00
Force @ 2.5 mm (N)	1,472.79	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,502.86	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 23-Sep-19
SACO Research

By : DC Date : 9/23/2019

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	ABG1532	Denton	08/13/2019
	Middle	Y	ABG1534	Denton	08/13/2019
	Rear	Y	ABG1535	Denton	08/13/2019
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	PG461	Denton	08/13/2019

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	ARS7502	DTS	11/04/2019
			Y	ARS7566	DTS	11/04/2019
			Z	ARS7602	DTS	11/04/2019
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	06/30/2020
		Middle	Y	G1163	FTSS	06/30/2020
		Lower	Y	G1158	FTSS	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	ACG111	FTSS	02/24/2020
Iliac Wing Load Cell			Y	IWG226	FTSS	02/24/2020
Pelvis Plug (struck side)				13371	SACO	09/19/2019
Pelvis Plug (non-struck side)				13518	SACO	09/23/2019

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	PCB1463	PCB	07/20/2020
	Vehicle Center of Gravity	Y	PCB1424	PCB	07/20/2020
	Vehicle Center of Gravity	Z	PCB1441	PCB	07/20/2020
2	Right Sill at Front Seat	X	PCB1390	PCB	07/20/2020
	Right Sill at Front Seat	Y	PCB1411	PCB	07/21/2020
	Right Sill at Front Seat	Z	PCB1396	PCB	07/20/2020
3	Right Sill at Rear Seat	X	PCB1429	PCB	07/17/2020
	Right Sill at Rear Seat	Y	PCB1393	PCB	07/17/2020
	Right Sill at Rear Seat	Z	PCB1395	PCB	07/17/2020
4	Left Sill at Front Door	Y	T20772	Endevco	06/29/2020
5	Left Sill at Rear Door	Y	T22654	Endevco	02/20/2020
6	Left A-Post Lower	Y	T22617	Endevco	02/19/2020
7	Left A-Post Middle	Y	T21444	Endevco	03/05/2020
8	Left B-Post Lower	Y	T20028	Endevco	07/30/2020
9	Left B-Post Middle	Y	T22659	Endevco	07/30/2020
10	Front Seat Track	Y	T22778	Endevco	02/21/2020
11	Rear Seat Track or Structure	Y	T22706	Endevco	03/06/2020
12	Right Rear Occ. Compartment	Y	T22813	Endevco	03/06/2020
13	Engine Block	X	T22612	Endevco	03/09/2020
	Engine Block	Y	T22805	Endevco	03/09/2020
14	Rear Floorpan Above Axle	X	T20764	Endevco	07/13/2020
	Rear Floorpan Above Axle	Y	T19513	Endevco	06/18/2020
	Rear Floorpan Above Axle	Z	T19958	Endevco	06/29/2020

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