REPORT NUMBER: SideNCAPPole-MGA-21-018

NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test

TOYOTA MOTOR CORPORATION
2021 Lexus IS 300 4-Door Sedan
NHTSA No.: O20215100

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: February 4, 2021

Final Report Date: June 1, 2021

FINAL REPORT

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

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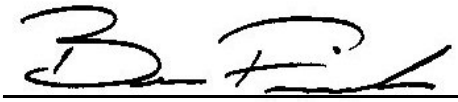
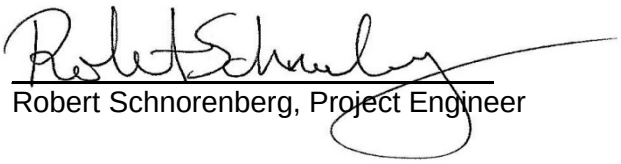
Prepared by: 
Ben Fischer, Project Manager

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: June 1, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

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

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

TECHNICAL REPORT DOCUMENTATION PAGE

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7. Author(s) Ben Fischer, Project Manager		**8. Performing Organization Report No.** SideNCAPPole-MGA-21-018
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 United States 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		**13. Type of Report and Period Covered:** Final Test Report February 4, 2021 to June 1, 2021 **14. Sponsoring Agency Code** NRM-100
15. Supplementary Notes		

16. Abstract

A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2021 Lexus IS 300 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on February 4, 2021.

The impact velocity was 32.27 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 20.6°C. The test vehicle post-test maximum crush was 386 mm at level 3. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC_{36})		1000	293
Resultant Lower Spine Acceleration	g	82	34
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2890
Maximum Thoracic Rib Deflection	mm	38*	17
Maximum Abdomen Rib Deflection	mm	45*	16

*Proposed IARV

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

17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	**18. Distribution Statement** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590

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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This side pole impact test is part of the MY 2021 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2021 Lexus IS 300 4-Door Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SUMMARY

A rigid pole side impact test was conducted on a 2021 Lexus IS 300 4-Door Sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.27 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on February 4, 2021. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated March 2020. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Triaxial Accelerometers
Head Triaxial Angular Rate Sensors
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper Rib and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

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

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Units	Driver ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC36)		1000	293
Resultant Lower Spine Acceleration	g	82	34
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2890
Maximum Thoracic Rib Deflection	mm	38*	17
Maximum Abdomen Rib Deflection	mm	45*	16

*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

Left Floor Sill Y recorded no valid data after 44 ms.
Load Cell Pole #8 Fy recorded no valid data.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20215100	Traction Control System (TCS)	Yes
Model Year	2021	Auto-Leveling System	No
Make	Lexus	Automatic Door Locks (ADL)	Yes
Model	IS 300	Power Window Auto-Reverse	Yes
Body Style	4-Door Sedan	Other Optional Feature	No
VIN	JTHCA1D28M5110555	Driver Front Airbag	Yes
Body Color	Atomic Silver	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	19 km / 12 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0 L	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	RWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR CORPORATION
Date of Manufacture	11/20
Vehicle Type	Passenger Car

GVWR (kg)	2127
GAWR Front (kg)	1120
GAWR Rear (kg)	1154

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				375	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				30	(A-B)

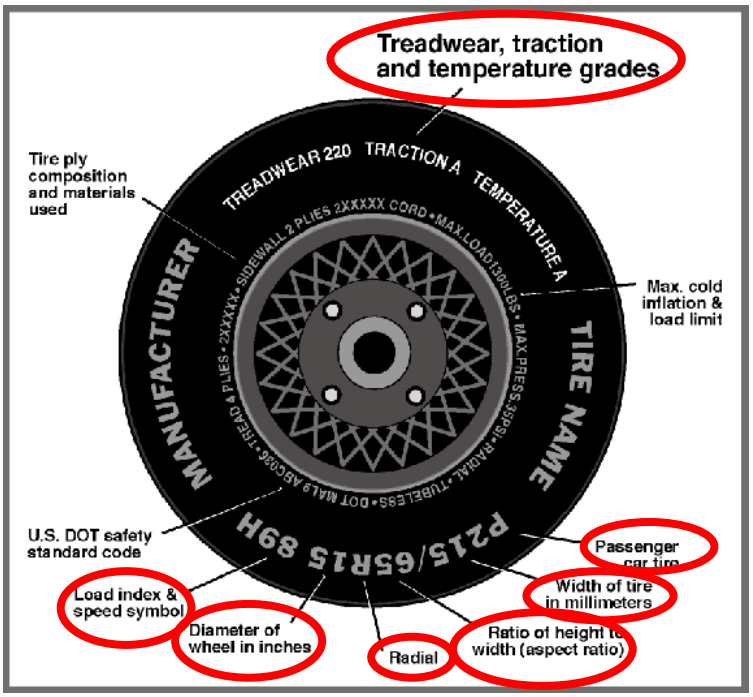
VEHICLE SEAT TYPE

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: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/45R18	235/45R18
Tire Size on Vehicle	235/45R18	235/45R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy Tour A/S	Primacy Tour A/S
Treadwear	540	540
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	94V	94V
Tire Material	Rubber	Rubber
DOT Safety Code Left	B9EL 08CX 2920	B9EL 08CX 2920
DOT Safety Code Right	B9EL 08CX 2920	B9EL 08CX 2920

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

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

TEST PRESSURES

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

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	451.5	416.0		478.5	434.0		472.5	447.5	
Right	kg	465.0	388.0		471.5	411.5		467.5	415.0	
Ratio	%	53.3%	46.7%		52.9%	47.1%		52.1%	47.9%	
Totals	kg	916.5	804.0	1720.5	950.0	845.5	1795.5	940.0	862.5	1802.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1720.5	(A)
Actual Weight of 1 P572 ATD (SID-IIs) Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	30	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1802.5	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement
Driver Door Sill Angle (front-to-back)*	deg	0.0	0.1	0.1	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	0.2	0.3	0.4	Yes
Front Bumper Angle (left-to-right)**	deg	0.5	0.4	0.4	Yes
Rear Bumper Angle (left-to-right)**	deg	0.6	0.6	0.6	Yes
Vehicle CG (Aft of Front Axle)	mm	1310	1320	1341	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	7	13	16	

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	0
Components Removed: none	kg	

Test height adjustable suspension setting, if applicable:	Not Applicable

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

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm Target	920
Aft 25 mm Target	930

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

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, 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	27.6	15.6	21.6
Front Passenger Seat	27.6	15.8	21.7
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	21.6	22	Max	44	44	44
			Mid	22	22	22
			Min	0	0	0
Front Passenger Seat	21.7	22	Max	44	44	44
			Mid	22	22	22
			Min	0	0	0
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

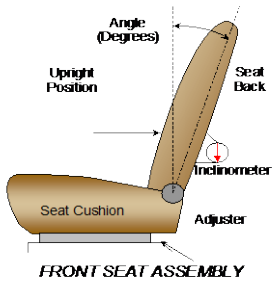
Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

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	260		0	
Front Passenger Seat	260		0	
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 such that the dummy's head is level. 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 passenger seat back is positioned in accordance with the information provided by the manufacturer on S1 – Vehicle Setup Information for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1st as 1)	Degrees	Detent (1st as 0)
Driver Seat	52.0		-4.0	
Front Passenger Seat	51.9		-3.8	
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

All seat back angles measured on outboard headrest post.

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)

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

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

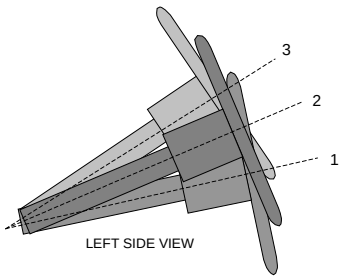
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

STEERING COLUMN ADJUSTMENT

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

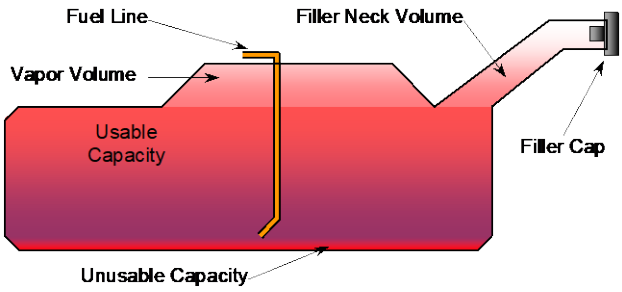
	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	70.5	
Geometric Center, Position 2	68.9	
Uppermost, Position 3	67.3	
Telescoping Steering Wheel Travel		40
Test Position	68.9	20



STEERING COLUMN ASSEMBLY

FUEL PUMP

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



VEHICLE FUEL TANK ASSEMBLY

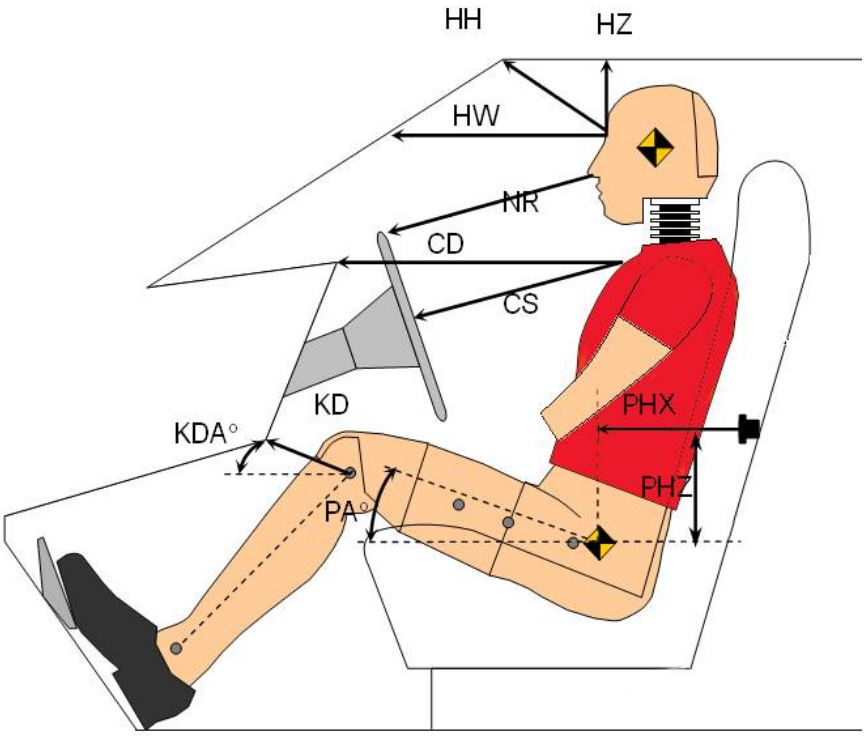
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see S1 – Vehicle Setup Information)	66.2
Usable Capacity of Optional Tank (see S1 – Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	66.2
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	61.6
Actual Amount of Solvent Used	61.7
1/3 of Usable Capacity	22.1

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: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021

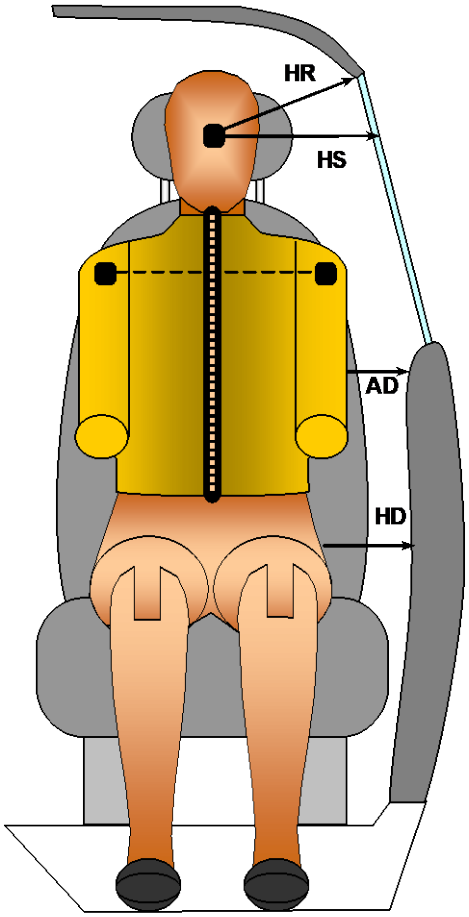


LEFT SIDE VIEW

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	237	
HW	Head to Windshield	515	
HZ	Head to Roof Liner	155	
NR	Nose to Rim/Seat Back	214	
CD	Chest to Dashboard/Seat Back	403	
CS	Chest to Steering Wheel	167	
KDL / KDAL	Left Knee to Dash/Seat Back	127	39.7
KDR / KDAL	Right Knee to Dash/Seat Back	116	39.4
PAX	Pelvic Tilt Angle X		22.2
PAY	Pelvic Tilt Angle Y		0.3
PHX	Hip Point to Striker (X-Axis)	297	
PHZ	Hip Point to Striker (Z-Axis)	206	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021

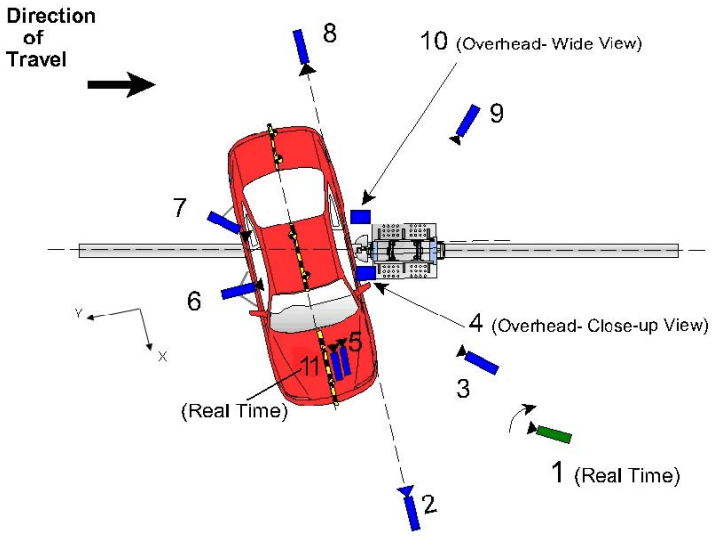


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	200
HS	Head to Side Window	341
AD	Arm to Door	170
HD	Hip Point to Door	167

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021



Reference: (from Point of Impact for X and Y; from Ground for Z):
+X = Forward of Impact, + Y = Right of Impact, +Z = Down

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Real-Time Pan View					30
2	Front Ground Level	5795	-480	-1875	24	1000
3	Impact Side 45° Forward	4195	-1500	-1930	12	1000
4	Overhead Closeup	0	0	-6700	85	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	-6485	-30	-1855	24	1000
9	Impact Side 45° Rearward	-3510	-3630	-1880	12	1000
10	Overhead Wide View	210	785	-6540	12	1000
11	Real-Time Dummy Front View					30

*All measurements accurate to ±6 mm
Note: Vehicle was positioned at a 75° angle to the rigid pole.

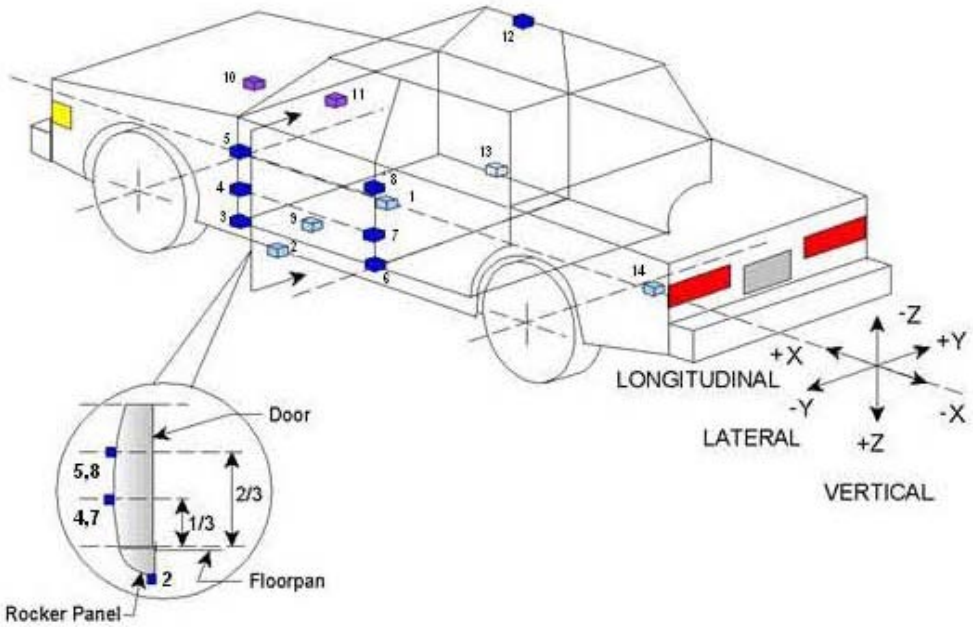
Explain why camera(s) did not operate as intended: None

INSTRUMENTATION

	Number of Channels
Driver Dummy	19
Vehicle Structure	18
Pole Load Cells	8
Total	45

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021



TEST VEHICLE ACCELEROMETER LOCATIONS

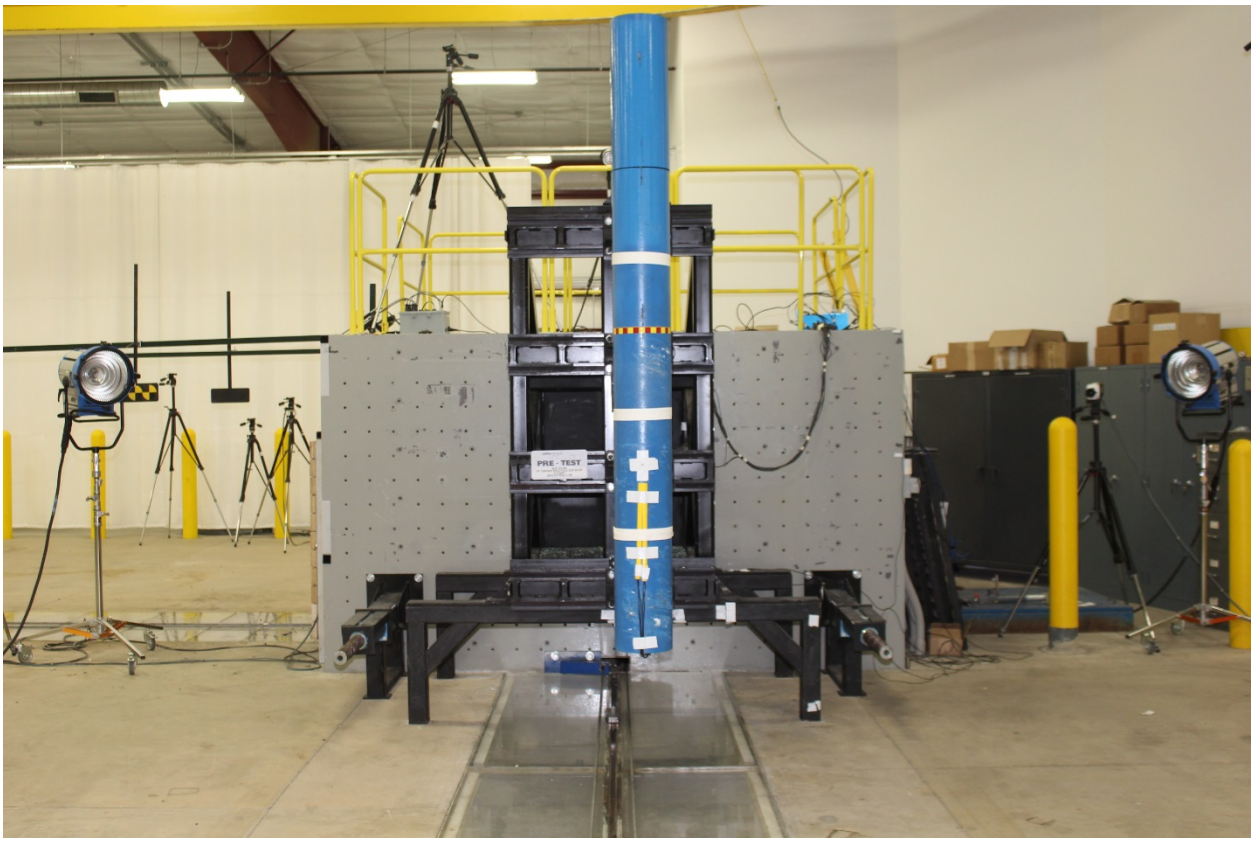
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2455	177	-216
2	Left Floor Sill	2859	-731	-199
3	A Pillar Sill	3327	-731	-195
4	A Pillar Low	3210	-815	-537
5	A Pillar Mid	3224	-810	-722
6	B Pillar Sill	2097	-731	-205
7	B Pillar Low	2106	-710	-540
8	B Pillar Mid	2070	-718	-730
9	Driver Seat Track	2199	-373	-220
10	Engine Top	3667	-10	-844
11	Firewall	3440	0	-909
12	Right Roof	2075	460	-1396
13	Right Floor Sill	2837	731	-202
14	Rear Floorpan	993	-20	-498

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

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20215100
Test Date: 2/4/2021



254 mm Diameter Rigid Pole

Load Cell Locations	
ID	**Height from Impact Surface (mm)**
1	182
2	470
3	698
4	986
5	1212
6	1641
7	1854
8	2053

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest, Seatback
Left Shoulder	Seatback
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion
Left Knee	None

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	
Disengaged from Latched Position	No	No	No	No	
Latch Separated from Striker	No	No	No	No	
Jammed Shut	Yes	Yes	No	No	
If Door Opened at Striker, Record Width of Opening at Striker (mm)					

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

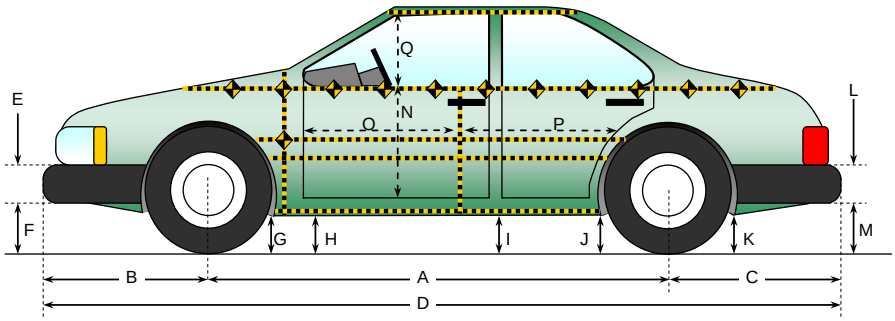
Restraint Type	Struck Side Driver		Struck Side Left Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Side Airbag (Other)				
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load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

SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1245
Actual Impact Point (Aft of Front Axle)	mm		1247
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-2
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	74.6
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.27
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.25

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021



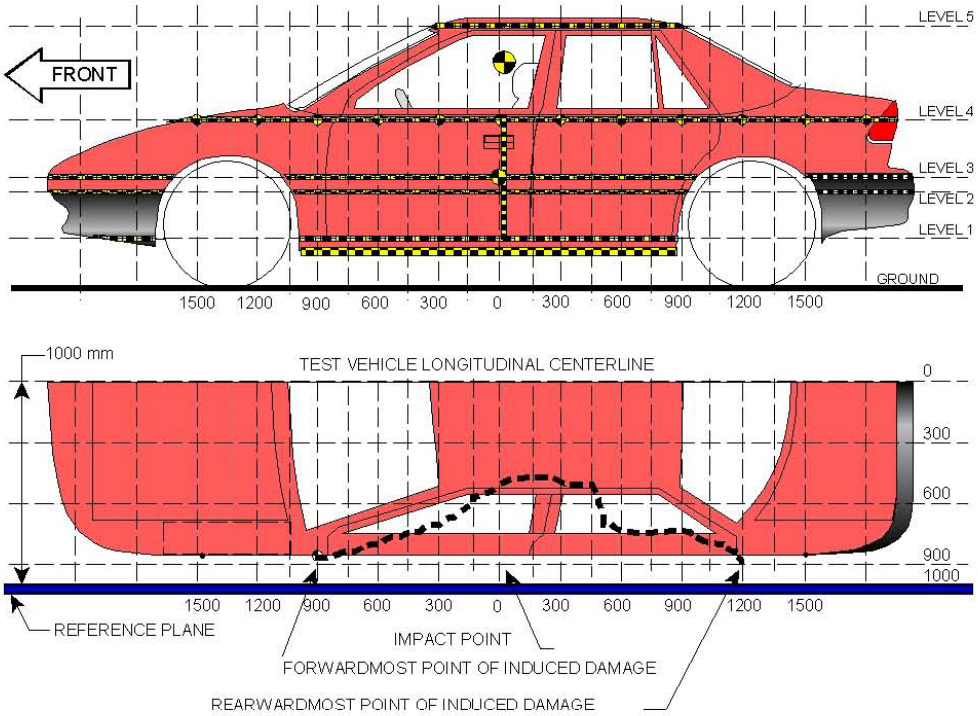
All measurements in (mm) with tolerance of ± 3 mm
LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2803	2669	134
B	Front Axle to FSOV	865	950	-85
C	Rear Axle to RSOV	1037	1024	13
D	Total Vehicle Length at Centerline	4705	4643	62
E	Front Bumper Thickness	114	114	0
F	Front Bumper Bottom to Ground	168	199	-31
G	Sill Height at Front Wheel Well	183	179	4
H	Sill Height at Front Door Leading Edge	185	181	4
I	Sill Height at B-Pillar	190	205	-15
J1	Sill Height at Rear Wheel Well	185	206	-21
J2	Pinch Weld Height at Rear Wheel Well	189	206	-17
K	Sill Height Aft of Rear Wheel Well	201	209	-8
L	Rear Bumper Thickness	109	109	0
M	Rear Bumper Bottom to Ground	262	261	1
N	Sill Height to Bottom of Front Window Sill	731	729	2
O	Front Door Leading Edge to Impact CL	741	625	116
P	Rear Door Trailing Edge to Impact CL	1210	1076	134
Q	Front Window Opening	398	335	63
R	Right Side Length	3850	3865	-15
S	Left Side Length	3850	3716	134
T	Vehicle Width at B-Pillars	1780	1658	122
U	Front Wheel Track Width	1575		
V	Rear Wheel Track Width	1587		

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021



NOTE: The measurements are taken along the vertical impact reference line.
Vehicle measurements forward of the vertical impact reference line are negative.

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	317	335	0
2	Occupant H-Point	491	374	0
3	Mid Door	613	386	0
4	Window Sill	904	313	0
5	Window Top	1360	85	0

DATA SHEET NO. 10 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021

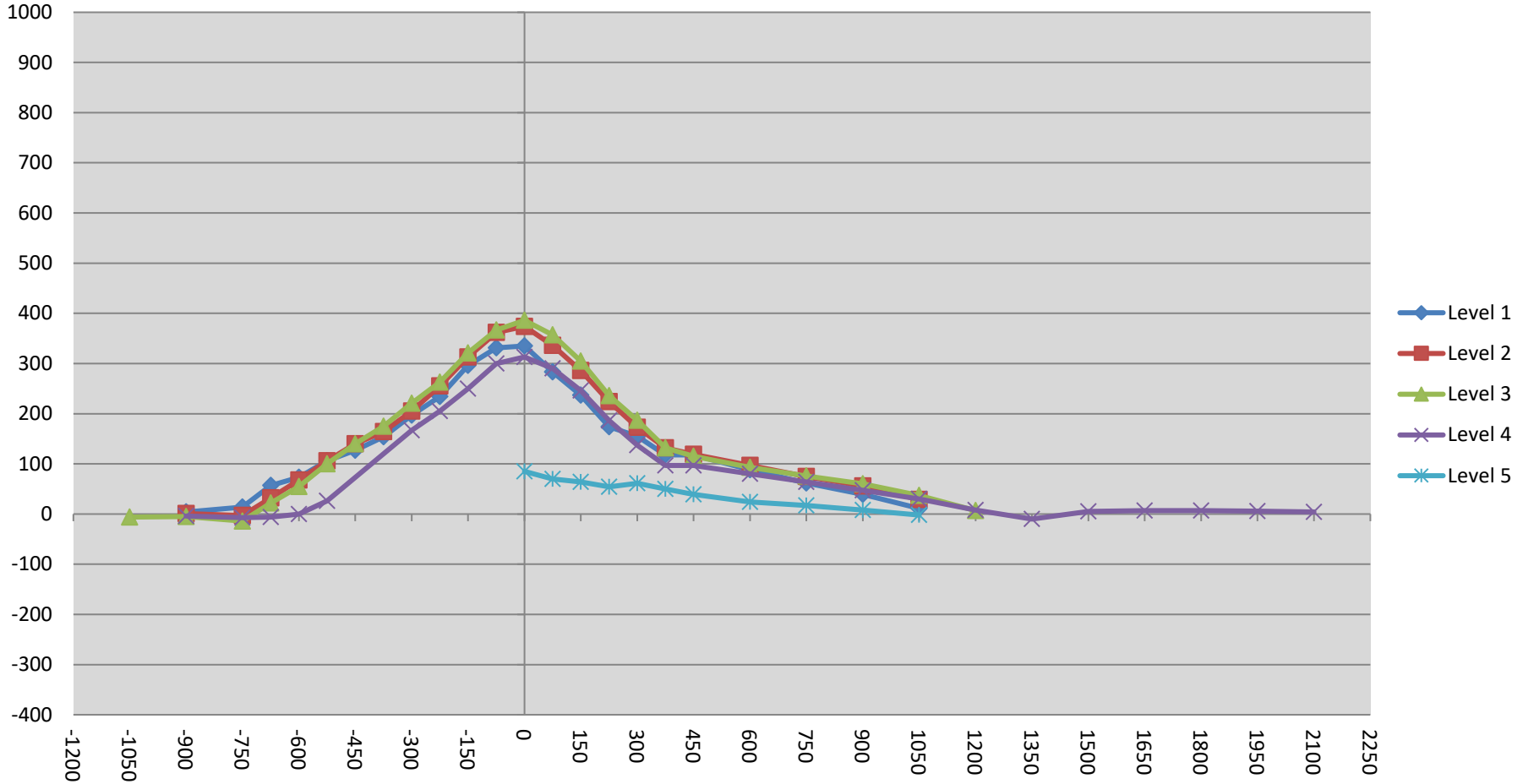
Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050			184					178					-6		
-900	206	188	190	362		210	189	185	358		4	1	-5	-4	
-825															
-750	214	199	200	342		228	196	186	335		14	-3	-14	-7	
-675	220	205	202	332		277	237	224	326		57	32	22	-6	
-600	224	207	204	325		297	275	259	325		73	68	55	0	
-525	227	209	205	313		333	315	305	339		106	106	100	26	
-450	230	210	206			357	350	346			127	140	140		
-375	232	210	206			386	374	381			154	164	175		
-300	234	211	206	293		431	416	427	460		197	205	221	167	
-225	236	212	206	290		470	467	469	495		234	255	263	205	
-150	239	212	206	285		535	525	527	535		296	313	321	250	
-75	242	212	206	280		573	574	573	580		331	362	367	300	
0	246	213	206	273	571	581	587	592	586	656	335	374	386	313	85
75	247	214	207	268	552	530	550	564	558	622	283	336	357	290	70
150	249	217	207	264	535	486	503	512	510	599	237	286	305	246	64
225	250	217	208	260	529	424	441	444	446	583	174	224	236	186	54
300	250	218	209	258	526	405	391	396	395	587	155	173	187	137	61
375	250	220	210	254	522	368	352	342	351	572	118	132	132	97	50
450	250	222	211	253	520	368	341	326	350	559	118	119	115	97	39
525															
600	240	227	217	251	521	328	324	310	331	545	88	97	93	80	24
675															
750	208	231	222	250	524	270	306	298	314	541	62	75	76	64	17
825															
900	206	220	223	253	537	245	276	283	300	545	39	56	60	47	8
1050	196	192	210	253	568	207	221	247	283	566	11	29	37	30	-2
1200			181	268				188	276				7	8	
1350				245					235					-10	
1500				238					243					5	
1650				244					251					7	
1800				259					266					7	
1950				276					282					6	
2100				309					313					4	
2250															
2400															
2550															
2700															

DATA SHEET NO. 10 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

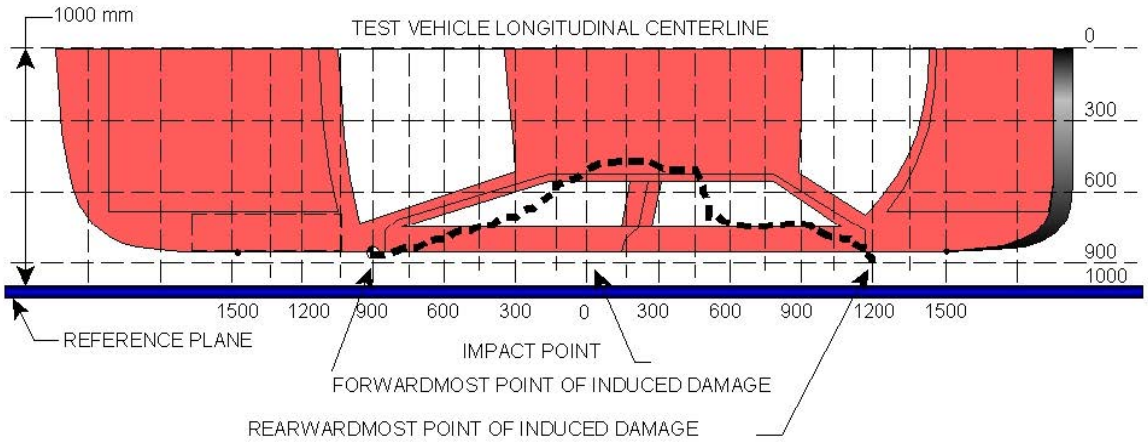
Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20215100
Test Date: 2/4/2021



DATA SHEET NO. 10 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	395	3	208	329	121
2	173	3	207	492	285
3	-49	3	206	591	385
4	-271	3	206	437	231
5	-493	3	205	319	114
6	-715	3	201	204	3

DATA SHEET NO. 11
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan
Test Program: NCAP Side Pole Impact Test
NHTSA No.: O20215100
Test Date: 2/4/2021

Test Time: 2:03 pm
Temperature: 20.6°C

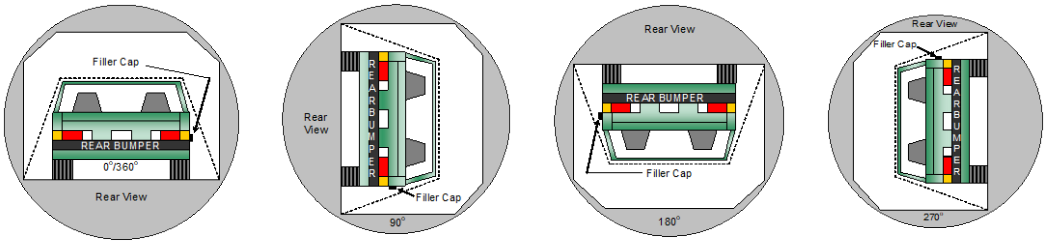
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.

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

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

D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



0°/360° 90° 180° 270°

ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	111	300	411
90° to 180°	110	300	410
180° to 270°	107	300	407
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

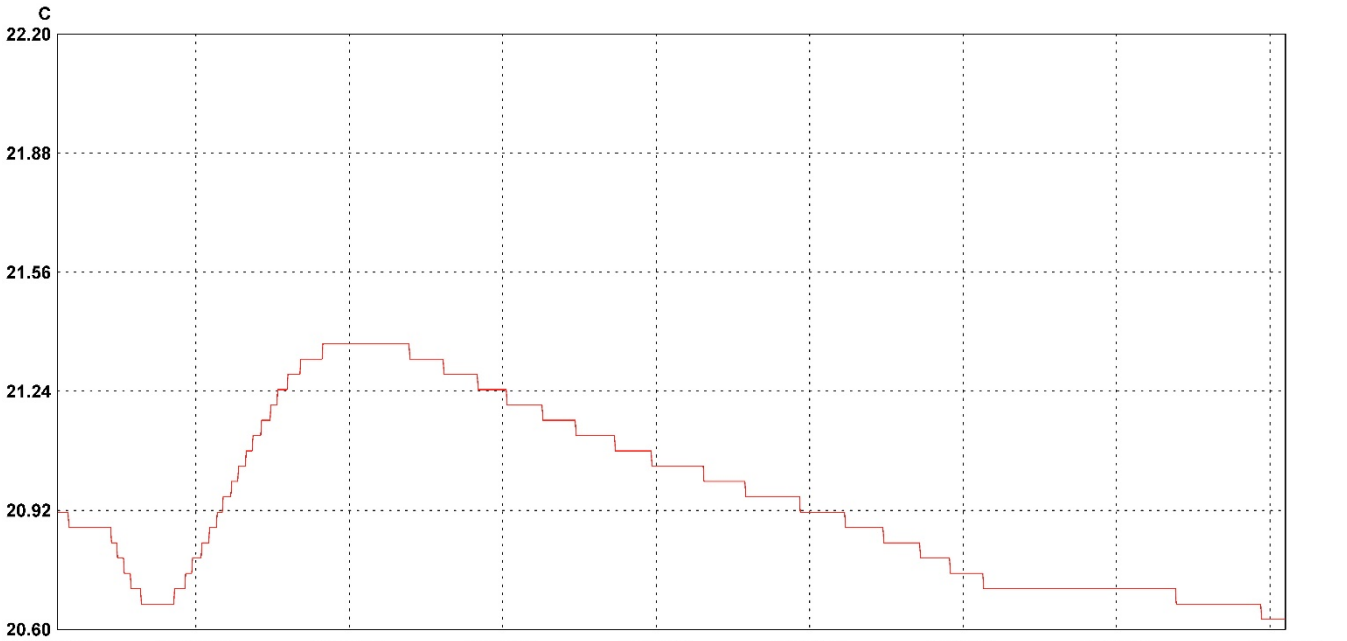
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0.0	0.0	0.0	
90° to 180°	0.0	0.0	0.0	
180° to 270°	0.0	0.0	0.0	
270° to 360°	0.0	0.0	0.0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 12
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2021 Lexus IS 300 4-Door Sedan NHTSA No.: O20215100
Test Program: NCAP Side Pole Impact Test Test Date: 2/4/2021



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	12032257	VSC_South_Hall	1		21.37	20.95	20.63	C	Temperature	12032257_VSC_South_Hall.spl

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

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

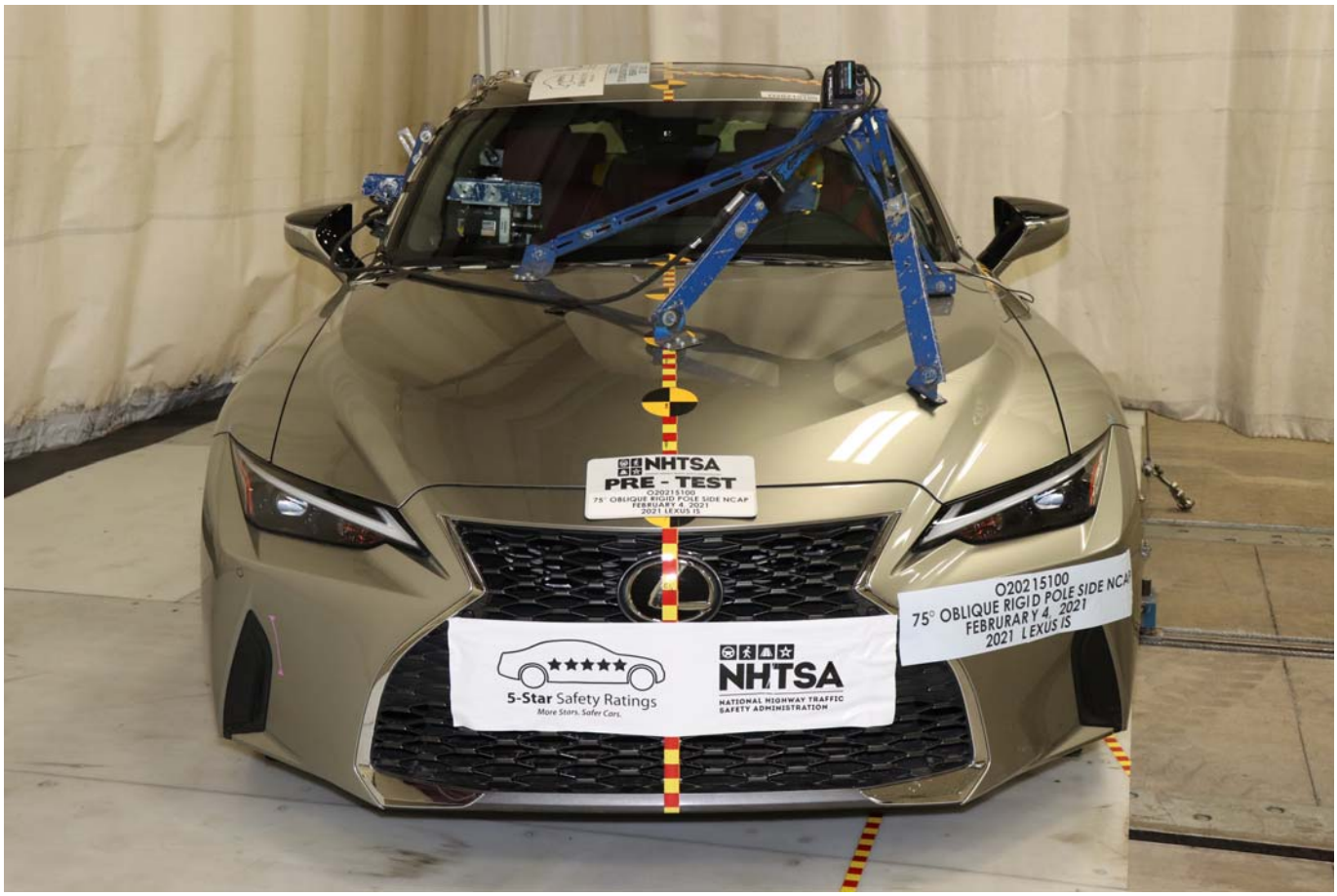


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

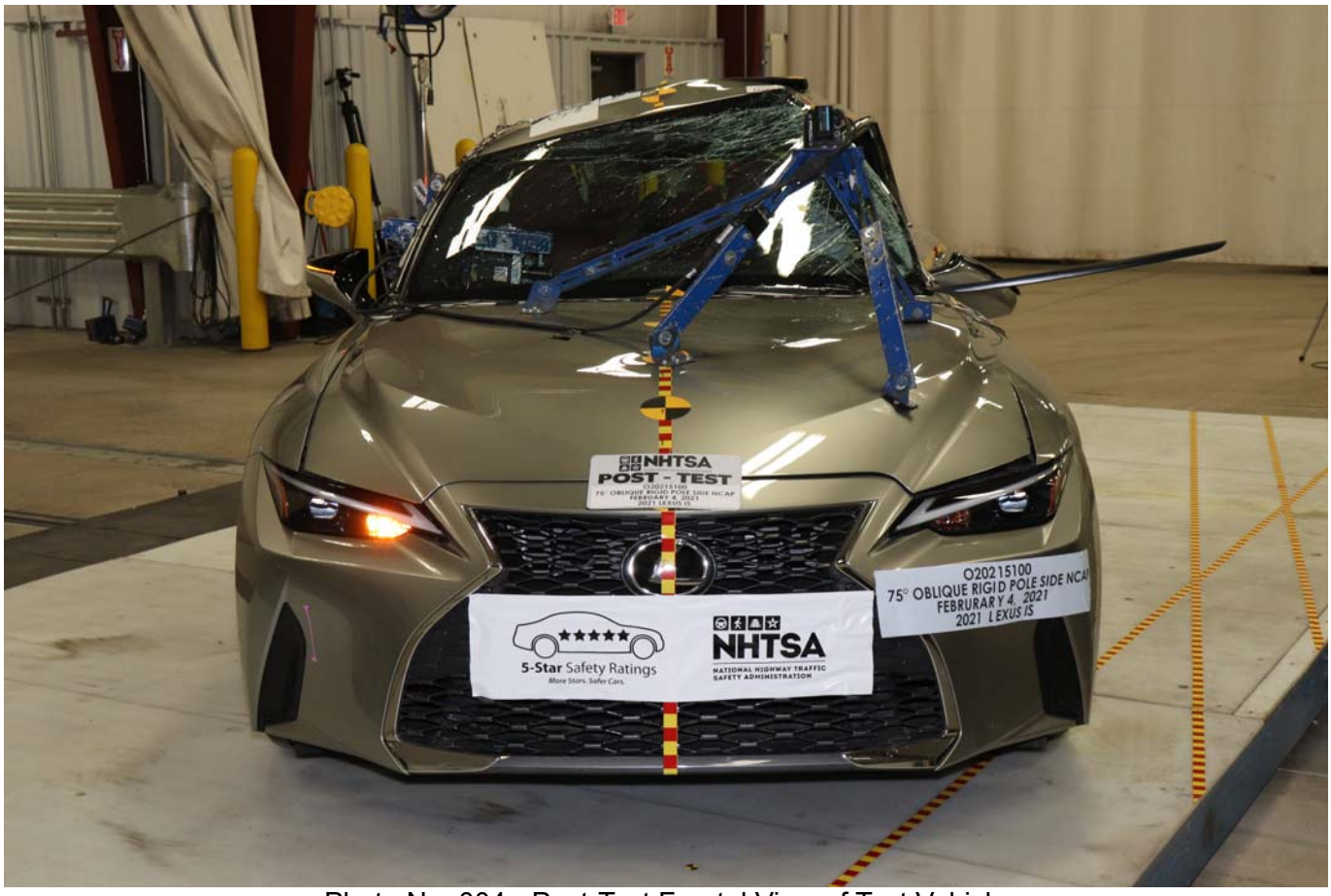


Photo No. 004 - Post-Test Frontal View of Test Vehicle

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

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

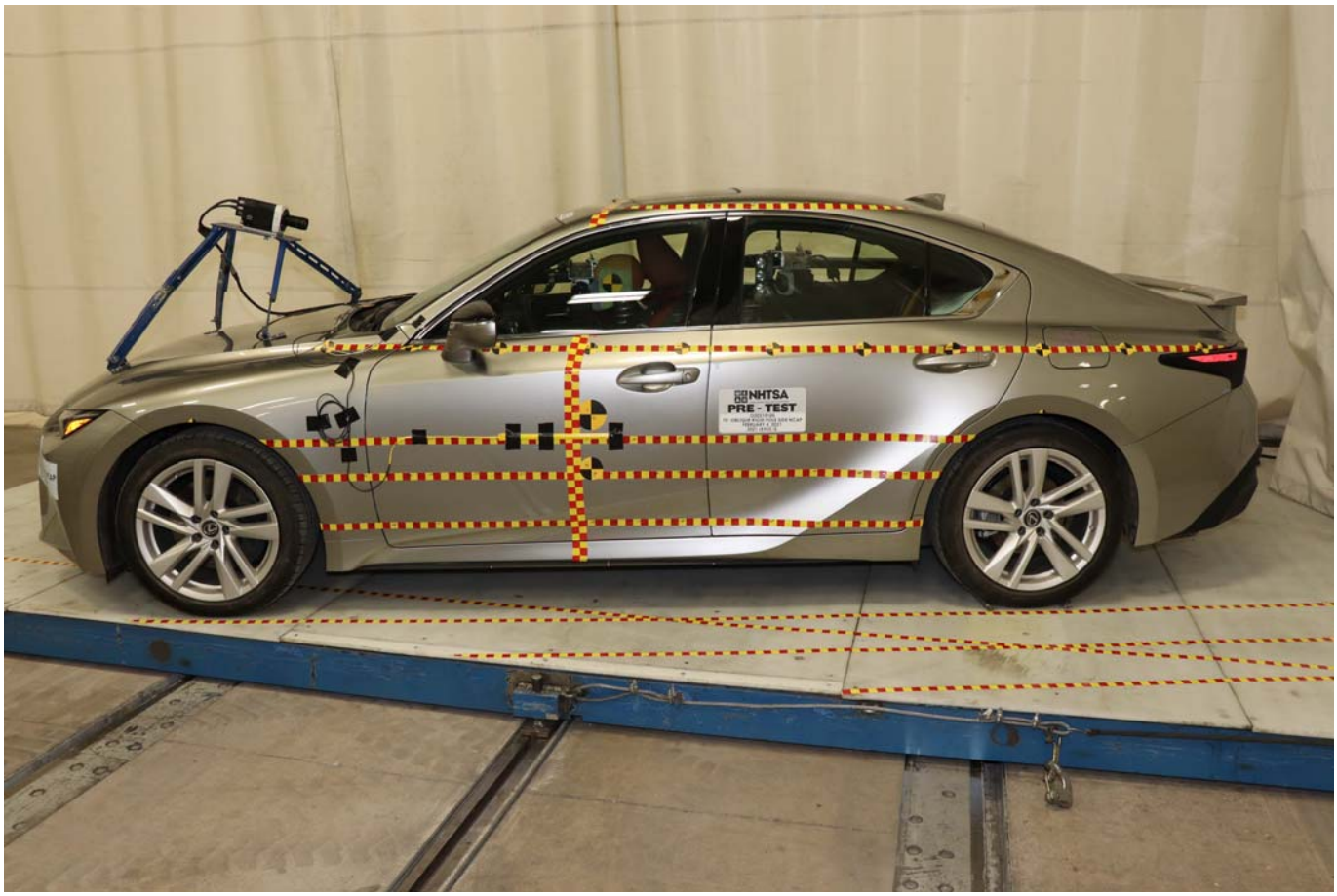


Photo No. 007 - Pre-Test Left Side View of Test Vehicle

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

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

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

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

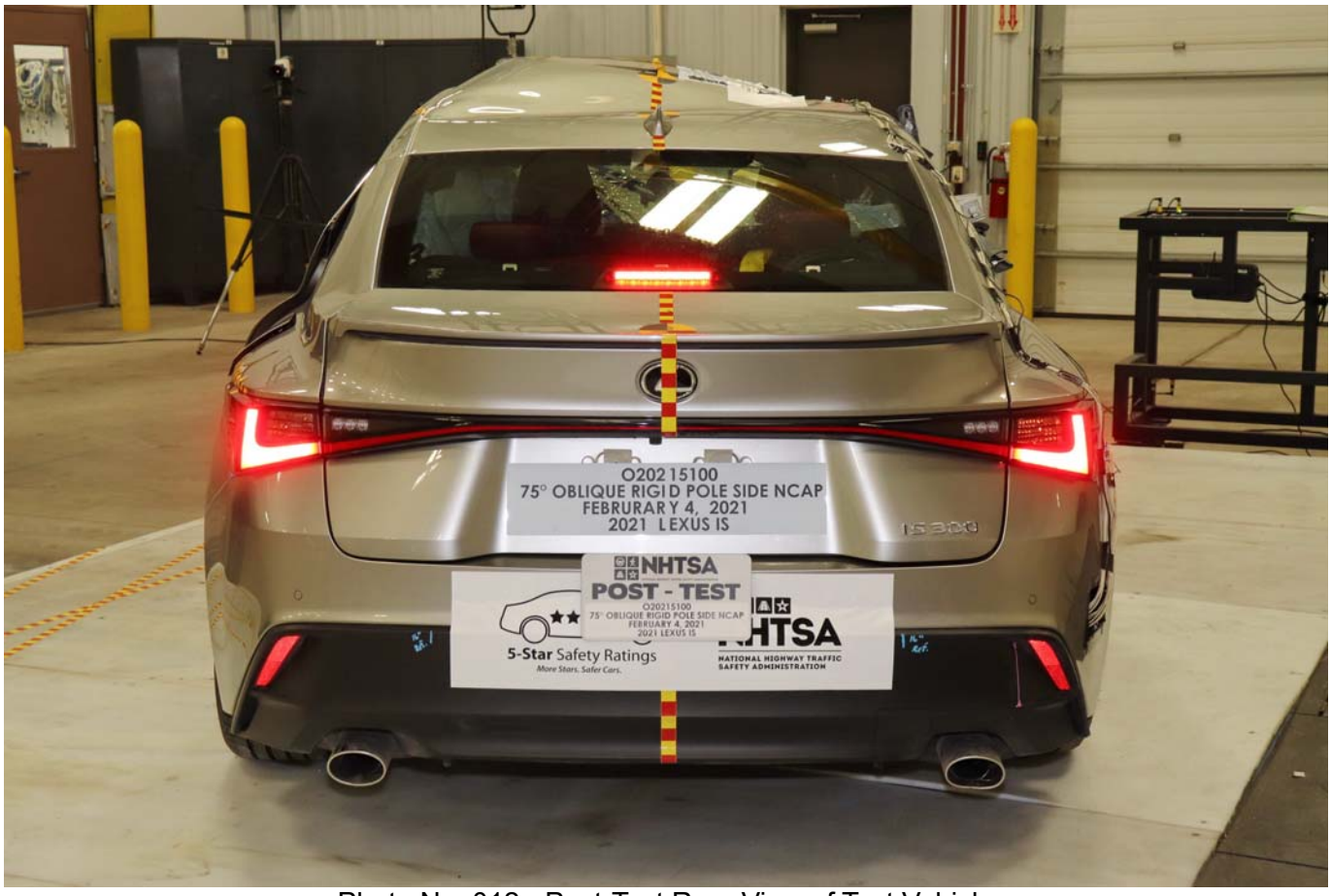


Photo No. 012 - Post-Test Rear View of Test Vehicle

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

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

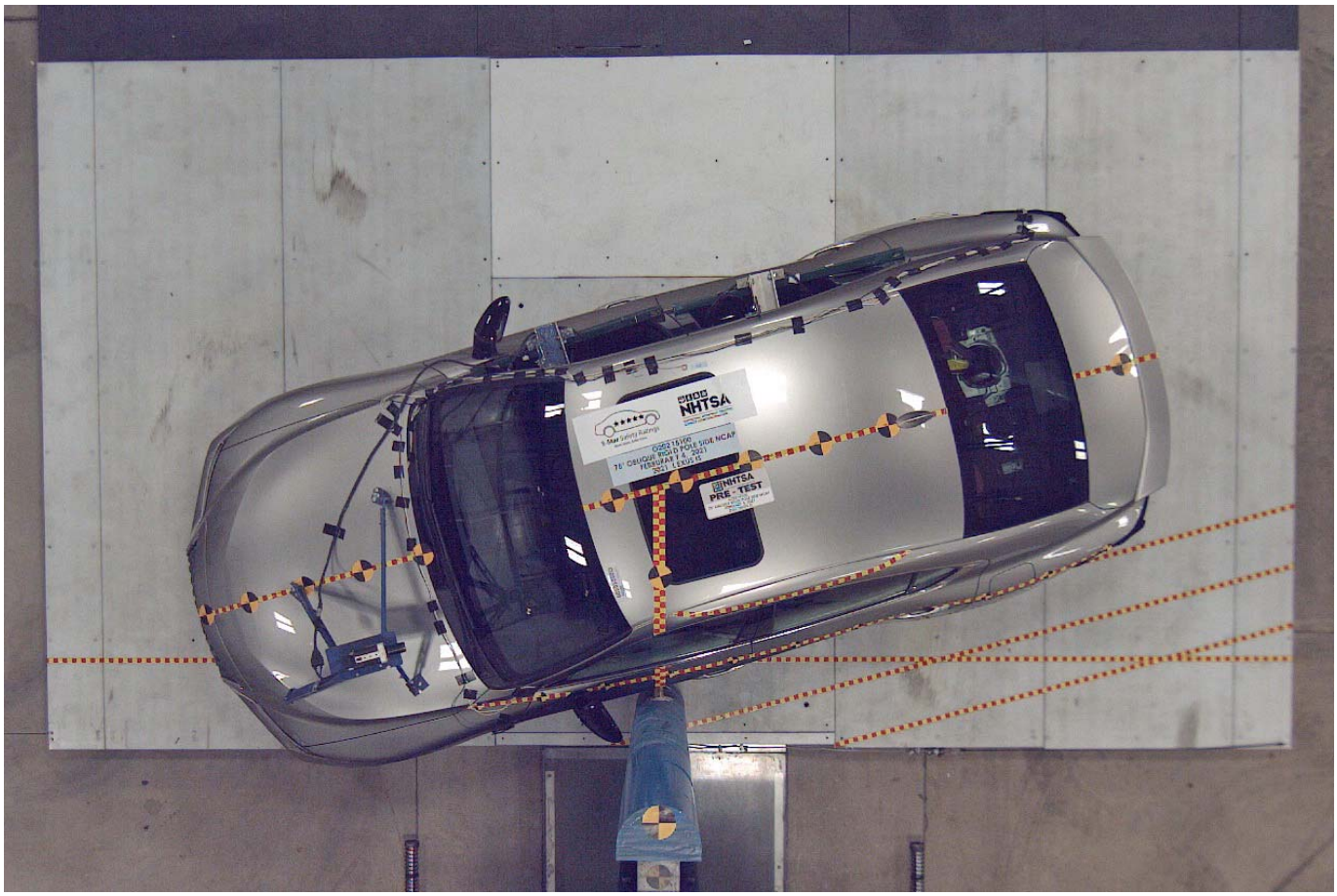


Photo No. 015 - Pre-Test Overhead View of Test Area

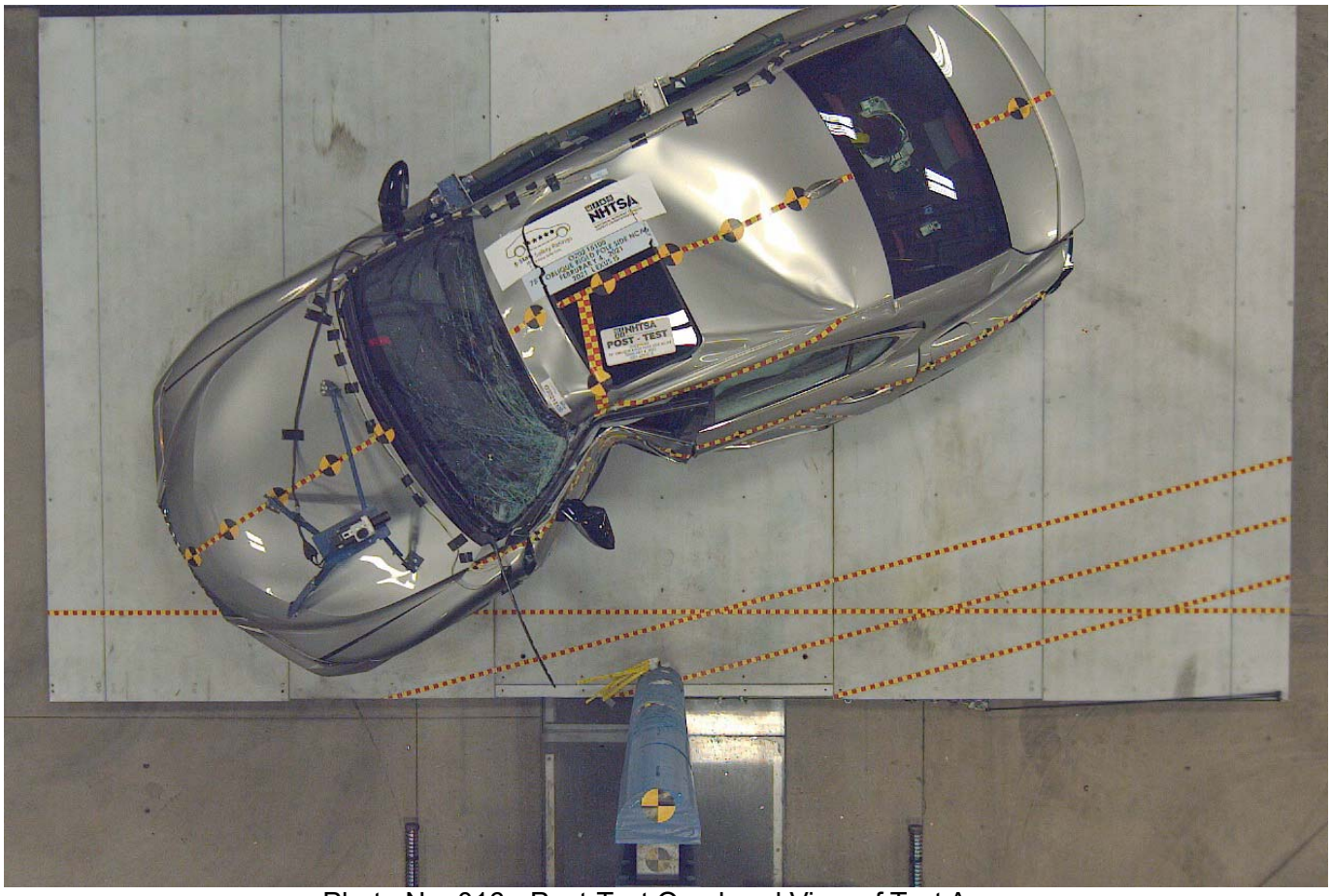


Photo No. 016 - Post-Test Overhead View of Test Area

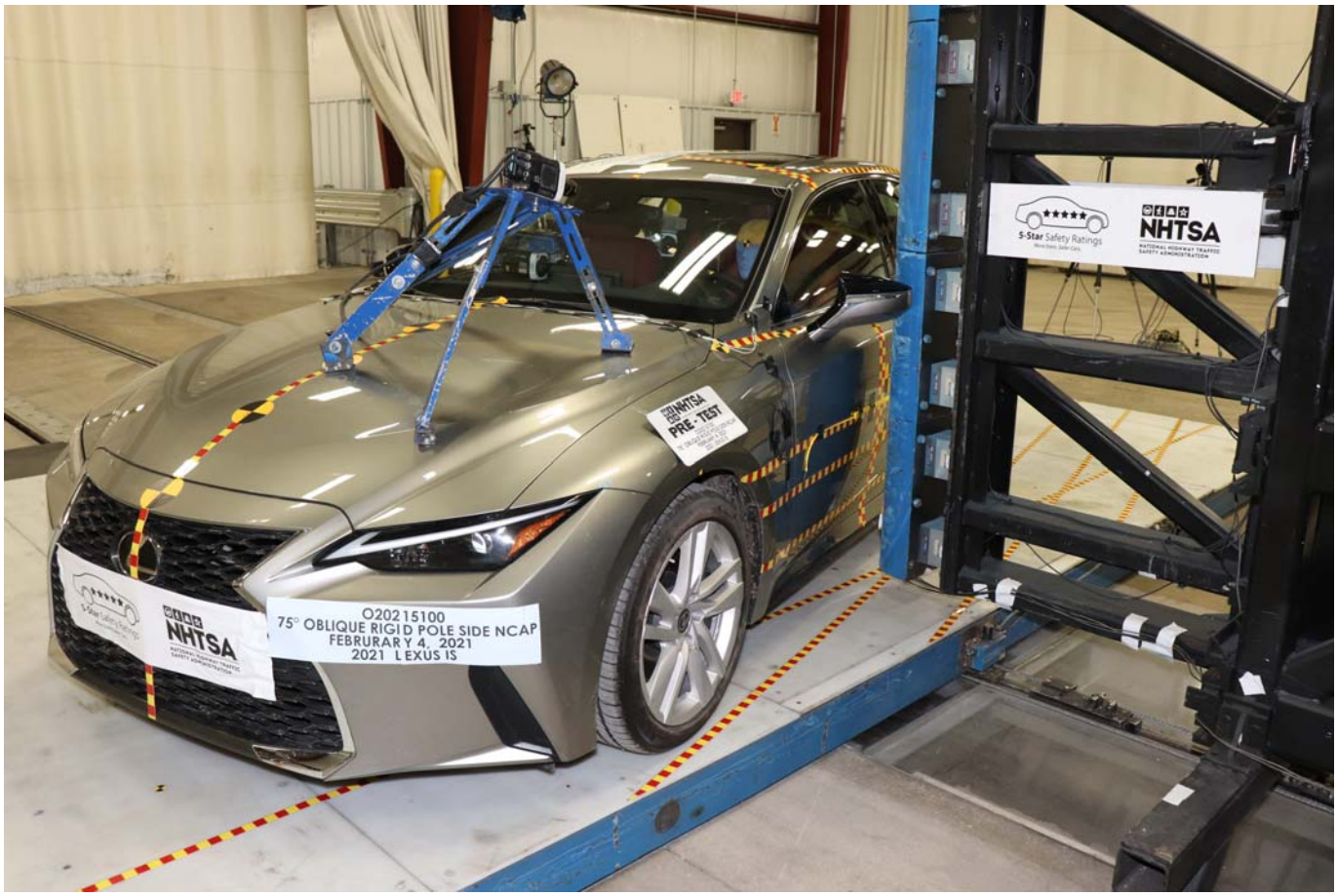


Photo No. 017 - Pre-Test Left Side View of Pole Positioned Against Side of Vehicle

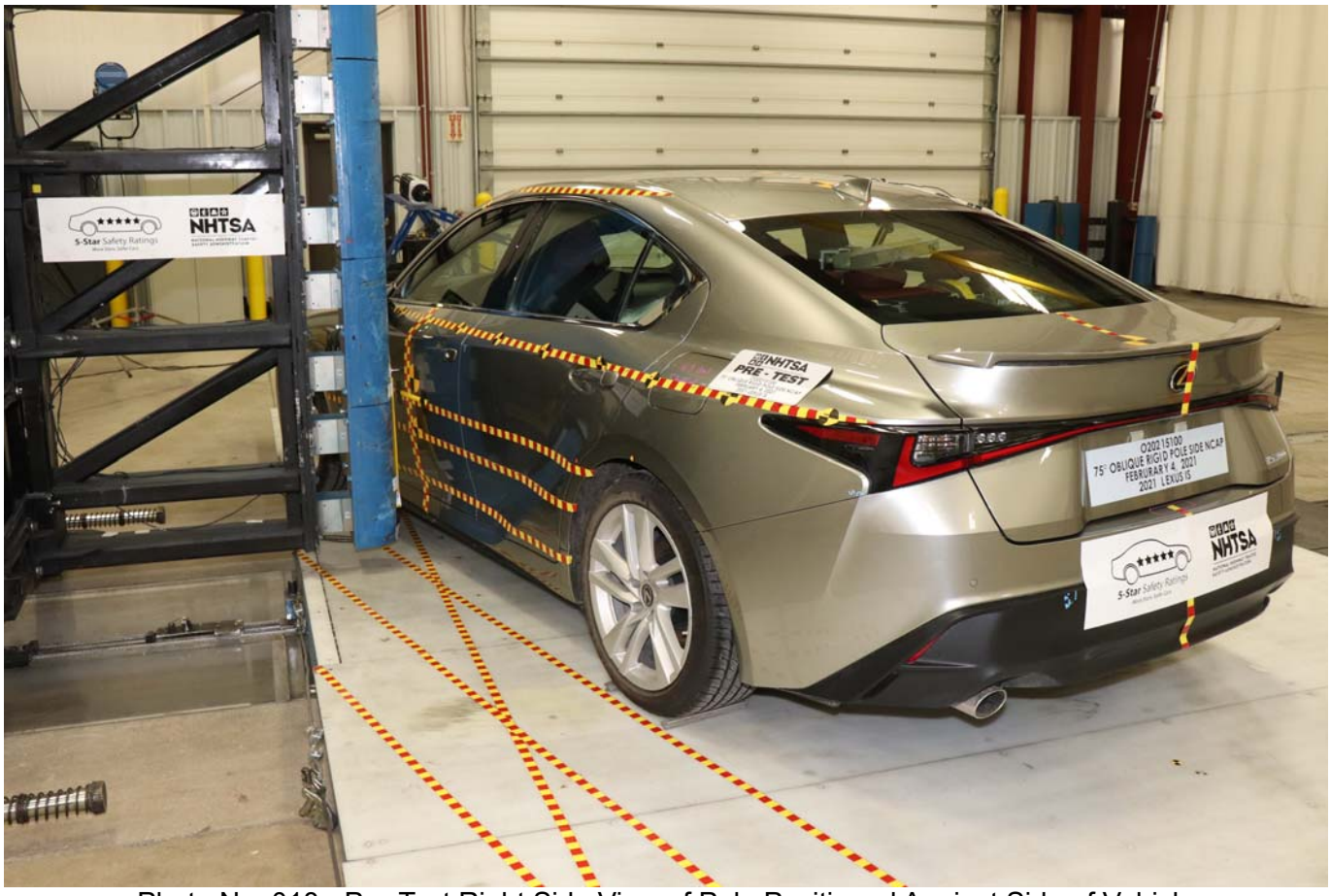


Photo No. 018 - Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

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

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

Photo No. 021 - Pre-Test Front Close-Up View of Dummy Head and Chest

Photo No. 022 - Post-Test Front Close-Up View of Dummy

Photo No. 023 - Pre-Test Left Side View of Dummy Showing Belt and Chalking

Photo No. 024 - Pre-Test Left Side View of Dummy Shoulder and Door Top View

Photo No. 025 - Post-Test Left Side View of Dummy Shoulder and Door Top View

Photo No. 026 - Pre-Test Front View of Seat Back Prior to Dummy Positioning

Photo No. 027 - Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint

Photo No. 028 - Pre-Test Front View of Seat Pan Prior to Dummy Positioning

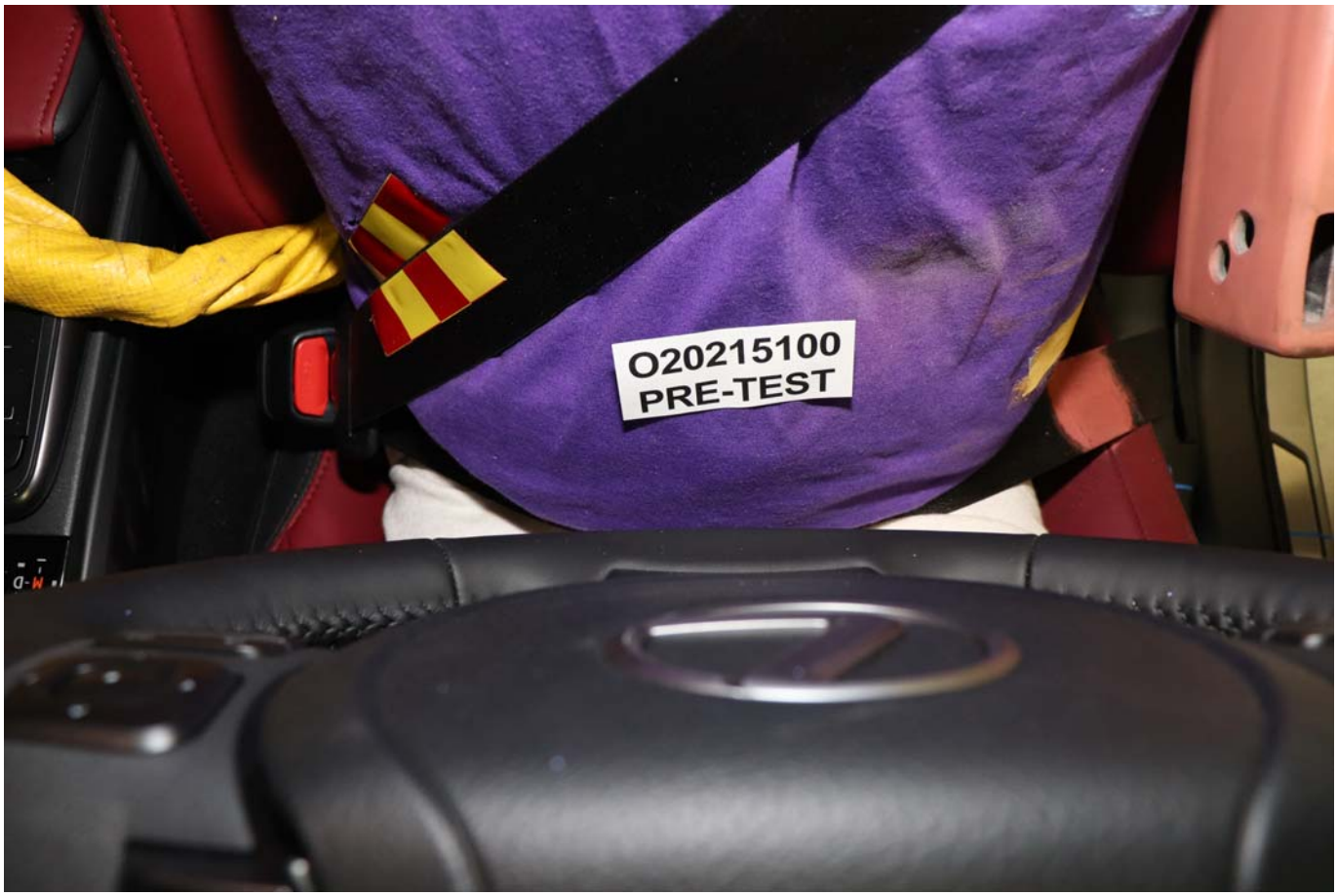


Photo No. 029 - Pre-Test Overhead View of Dummy Thighs on Seat Pan

Photo No. 030 - Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket

Photo No. 031 - Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level

Photo No. 032 - Pre-Test Placement of Dummy Feet

Photo No. 033 - Pre-Test View of Belt Anchorage for Dummy

Photo No. 034 - Pre-Test Left Side View of Steering Wheel

Photo No. 035 - Pre-Test View of Disengaged Parking Brake

Photo No. 036 - Pre-Test View of Parking Brake

Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track

Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back

Photo No. 039 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint

Photo No. 040 - Pre-Test Dummy and Door Clearance View

Photo No. 041 - Post-Test Dummy and Door Clearance View

Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment

Photo No. 043 - Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

Photo No. 044 - Pre-Test Inner Door Panel View

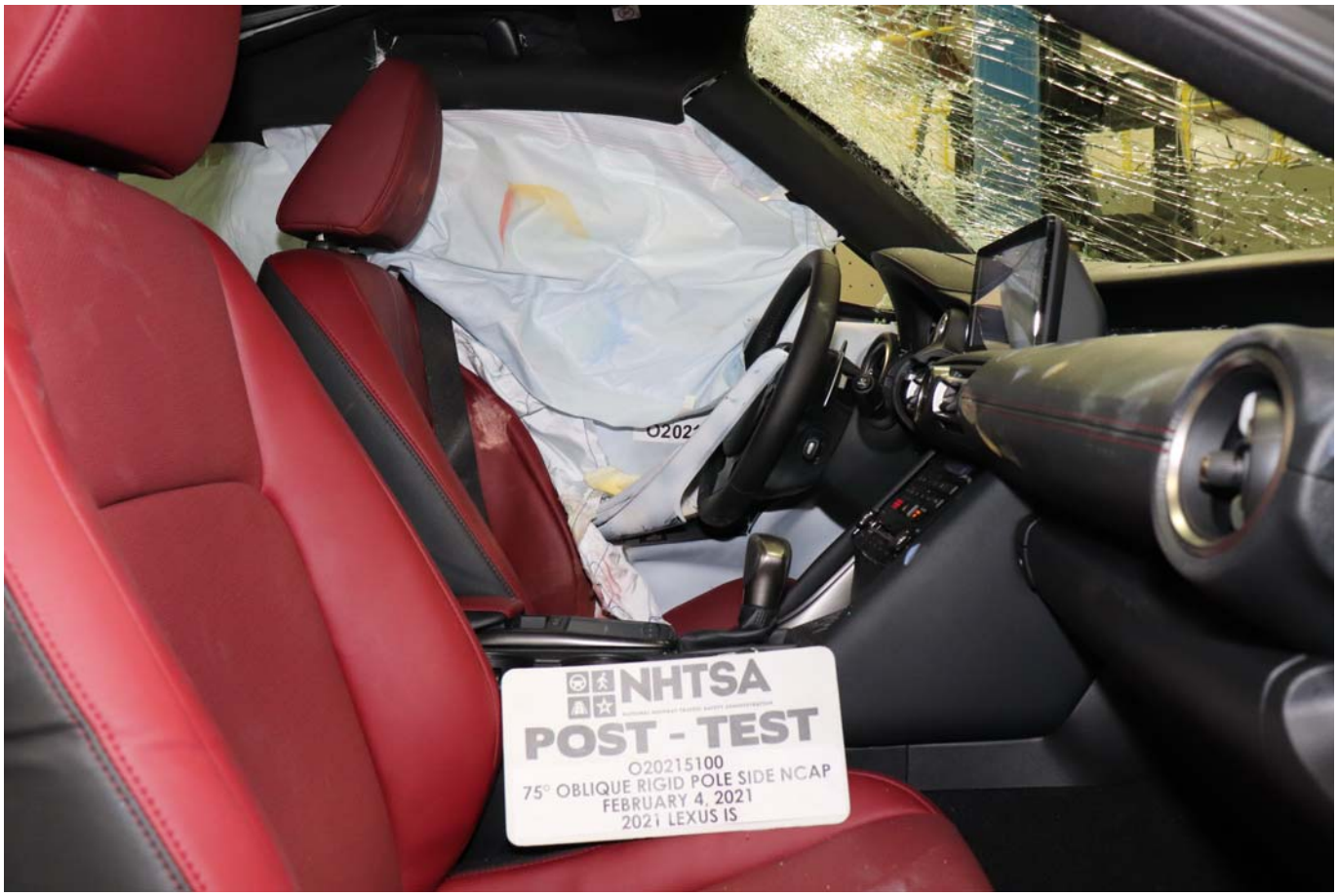


Photo No. 045 - Post-Test Inner Door Panel View Showing Dummy Contact Location

Photo No. 046 - Post-Test Dummy Close-Up Head Contact with Vehicle Interior View

Photo No. 047 - Post-Test Dummy Close-Up Head Contact with Side Air Bag View

Photo No. 048 - Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View

Photo No. 049 - Post-Test Dummy Close-Up Torso Contact with Side Air Bag View

Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View

Photo No. 051 - Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 052 - Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

Photo No. 053 - Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment

Photo No. 054 - Post-Test Inner Rear Passenger Torso Air Bag Deployment View

Photo No. 055 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 056 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 057 - Close-Up View of Vehicle Certification Label

Photo No. 058 - Close-Up View of Vehicle Tire Information Placard or Label

Photo No. 058a - Close-Up View of Vehicle Load Carrying Capacity Reduction Label

Photo No. 059 - Pre-Test Pole Barrier Front View

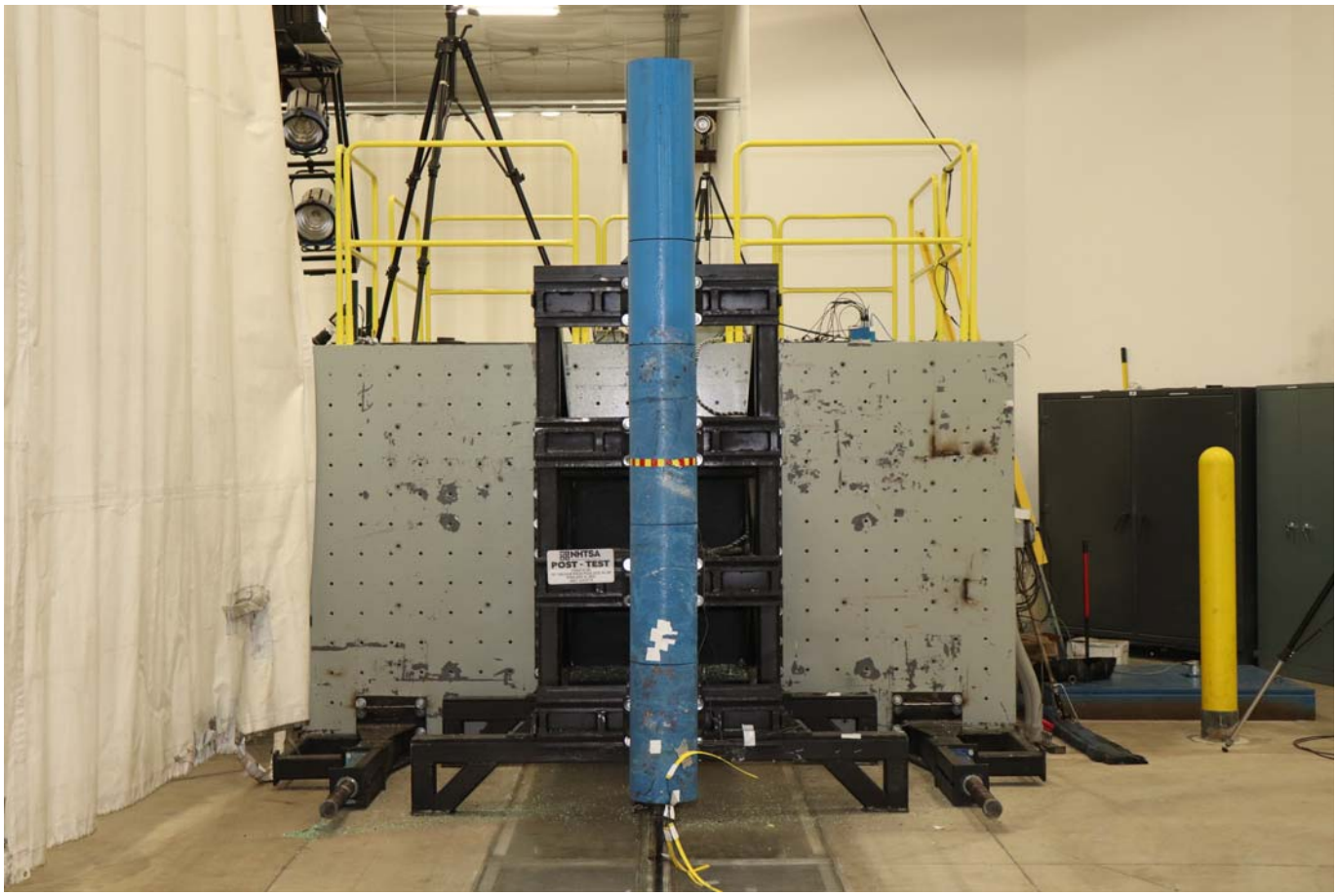


Photo No. 060 - Post-Test Pole Barrier Front View

Photo No. 061 - Pre-Test Pole Barrier Side View

Photo No. 062 - Post-Test Pole Barrier Side View

PHOTOGRAPH NOT APPLICABLE

Photo No. 063 - Pre-Test Ballast View

Photo No. 064 - Post-Test Primary and Redundant Speed Trap Read-Out

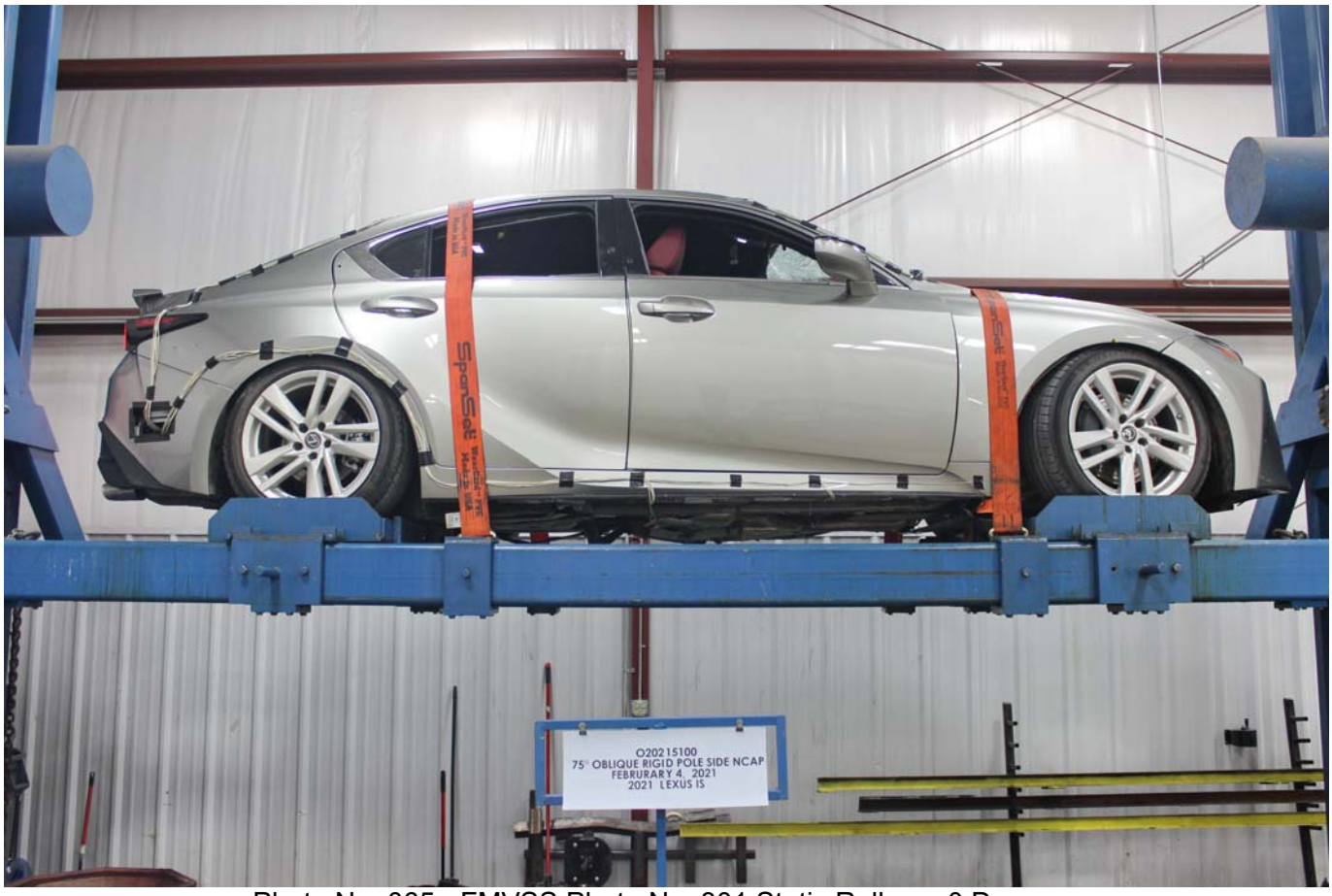


Photo No. 065 - FMVSS Photo No. 301 Static Rollover 0 Degrees

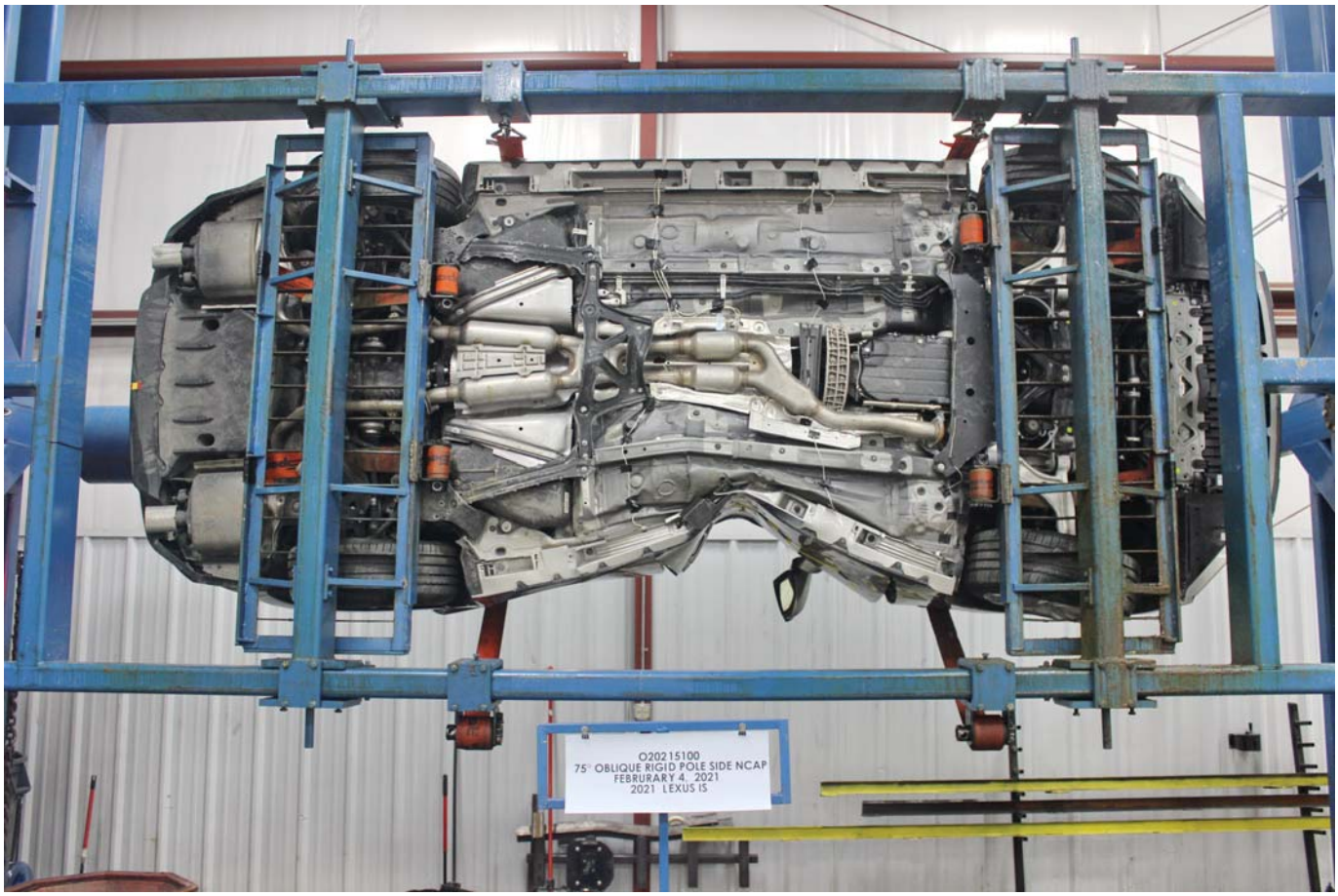


Photo No. 066 - FMVSS Photo No. 301 Static Rollover 90 Degrees

Photo No. 067 - FMVSS Photo No. 301 Static Rollover 180 Degrees

Photo No. 068 - FMVSS Photo No. 301 Static Rollover 270 Degrees

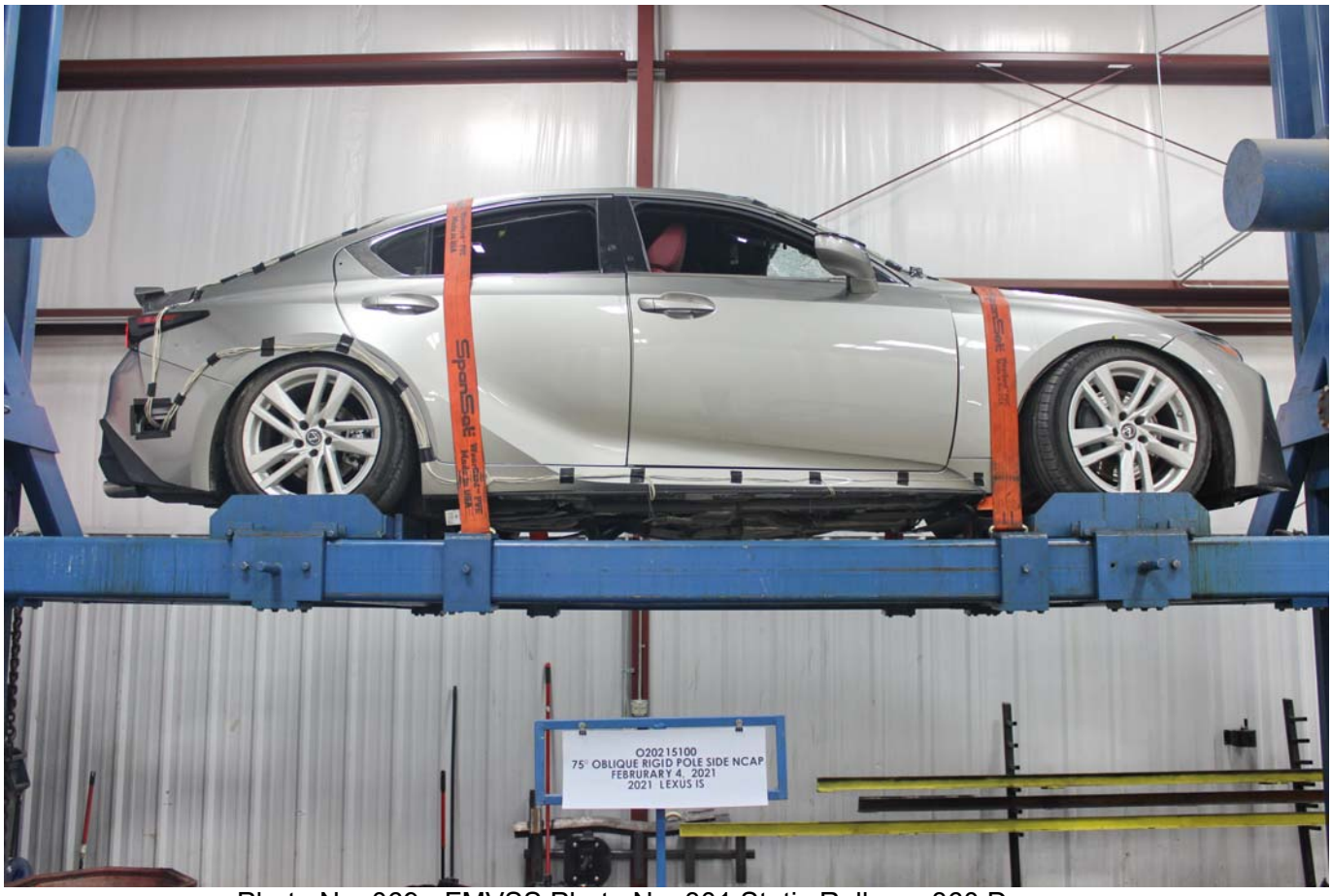


Photo No. 069 - FMVSS Photo No. 301 Static Rollover 360 Degrees

Photo No. 070 - Impact Event

Photo No. 071 - Monroney Label

Head restraints

Head restraints are provided for all seats.

WARNING

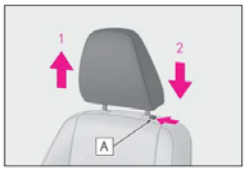
■ Head restraint precautions

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

Adjusting a head restraint vertically

▶ Front seats



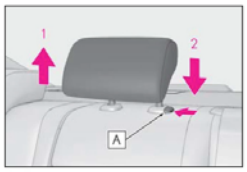
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pressing the lock release button A.

▶ Rear seats



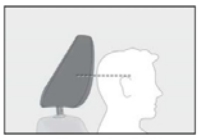
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pressing the lock release button A.

■ Adjusting the height of the head restraints



Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

■ Adjusting the rear seat head restraint

Always raise the head restraint one level from the stowed position when using.

Horizontal adjustment (if equipped)

The position of the head restraint can be adjusted forward in 4 stages.

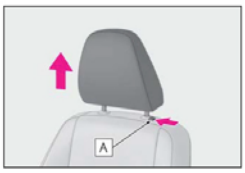
If the head restraint is pulled forward from the foremost position, it will return to the rearmost position.

3 Before driving

Removing the head restraints

Pull the head restraint up while pressing the lock release button A.

If the head restraint touches the ceiling, making the removal difficult, change the seat height or angle.

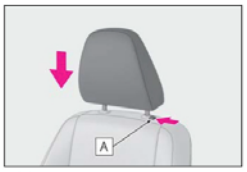


Installing the head restraints

▶ Front seats

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button A when lowering the head restraint.



▶ Rear seats

Align the head restraint with the installation holes and push it down to the lowest lock position while pressing the lock release button A.

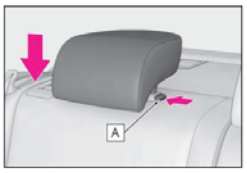


Photo No. 072 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

Photo No. 073 - Post-Test View of Shattered Vehicle Inner Door Panel

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 Dummy Instrumentation Data

Driver Head CG Redundant Acceleration (X) vs. Time

Driver Head CG Redundant Acceleration (Y) vs. Time

Driver Head CG Redundant Acceleration (Z) vs. Time

Driver Head Angular Velocity X (Deg/Sec) vs. Time

Driver Head Angular Velocity Y (Deg/Sec) vs. Time

Driver Head Angular Velocity Z (Deg/Sec) vs. Time

Driver Upper Thorax Rib Deflection (Y)

Driver Middle Thorax Rib Deflection (Y)

Driver Lower Thorax Rib Deflection (Y)

Driver Upper Abdomen Rib Deflection (Y)

Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

Load Cell Pole Barrier #4 Force (Y)

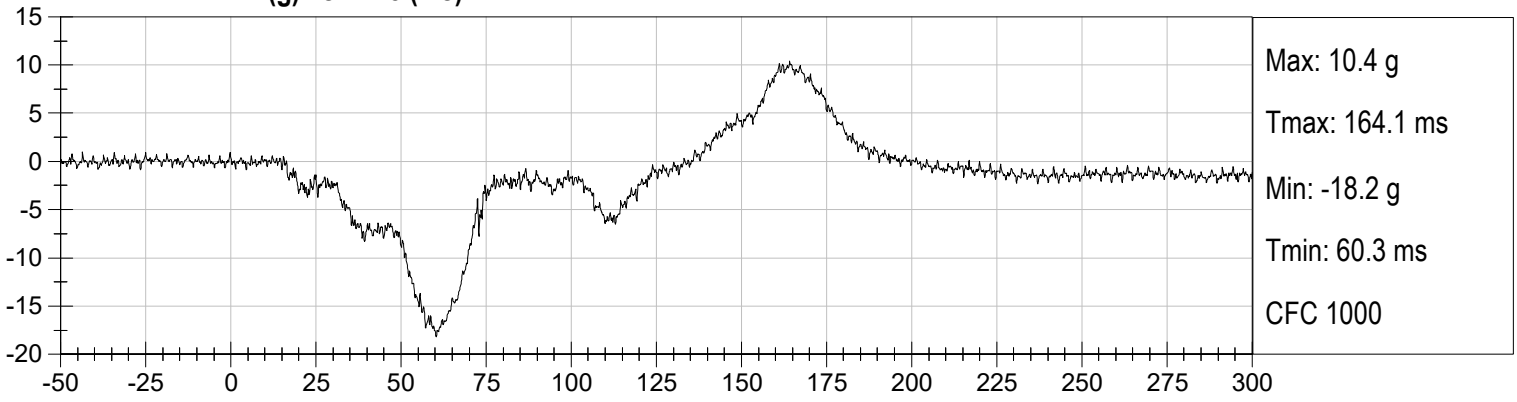
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

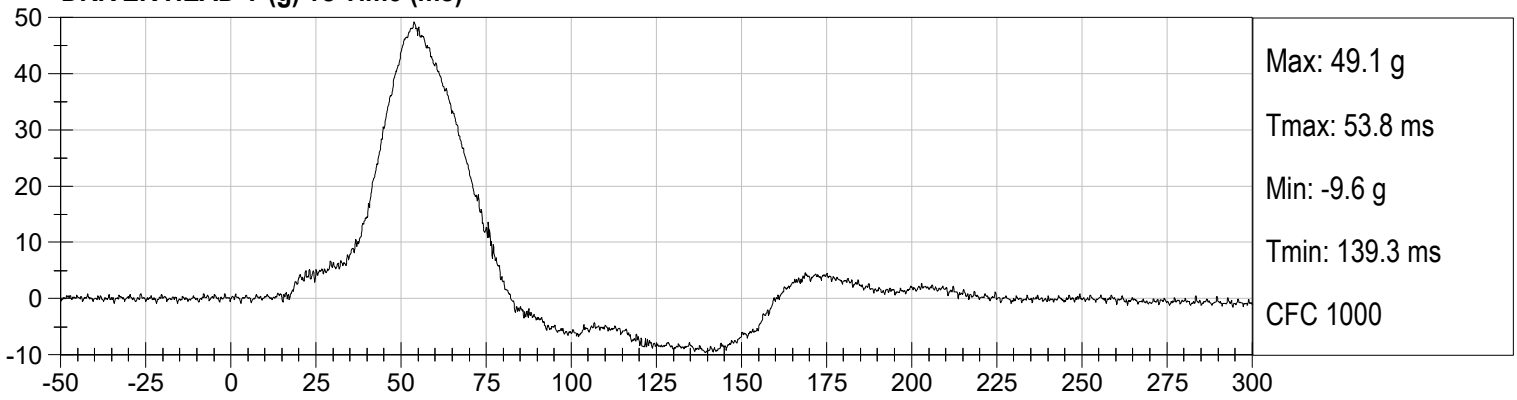
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

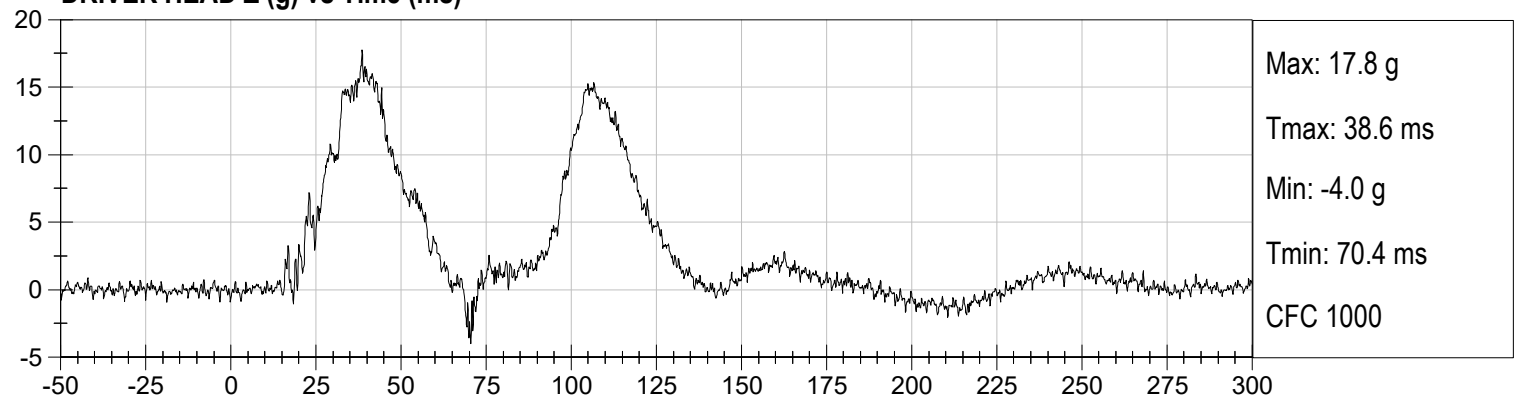
DRIVER HEAD X (g) vs Time (ms)



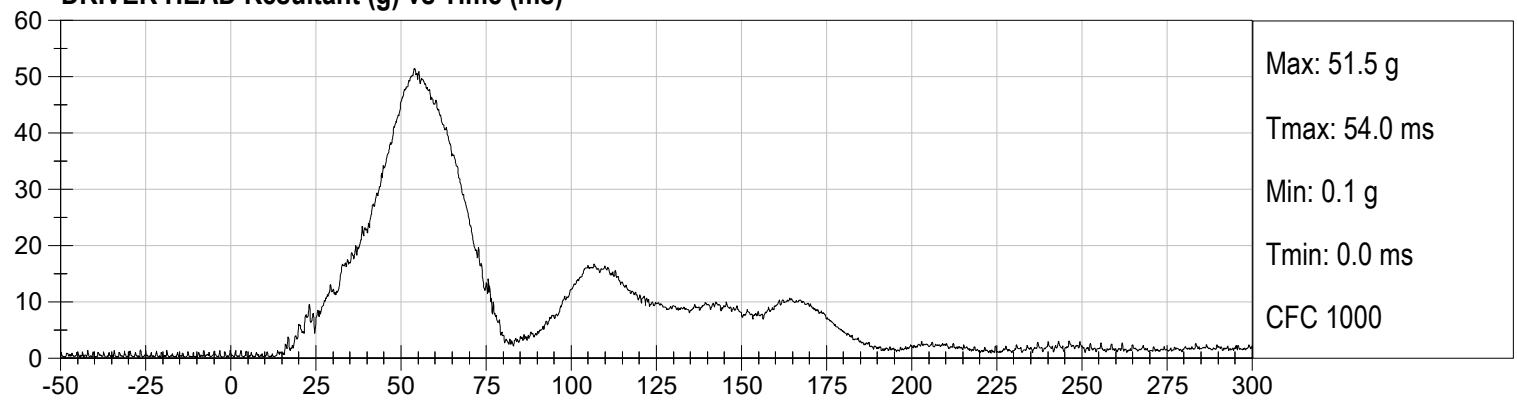
DRIVER HEAD Y (g) vs Time (ms)



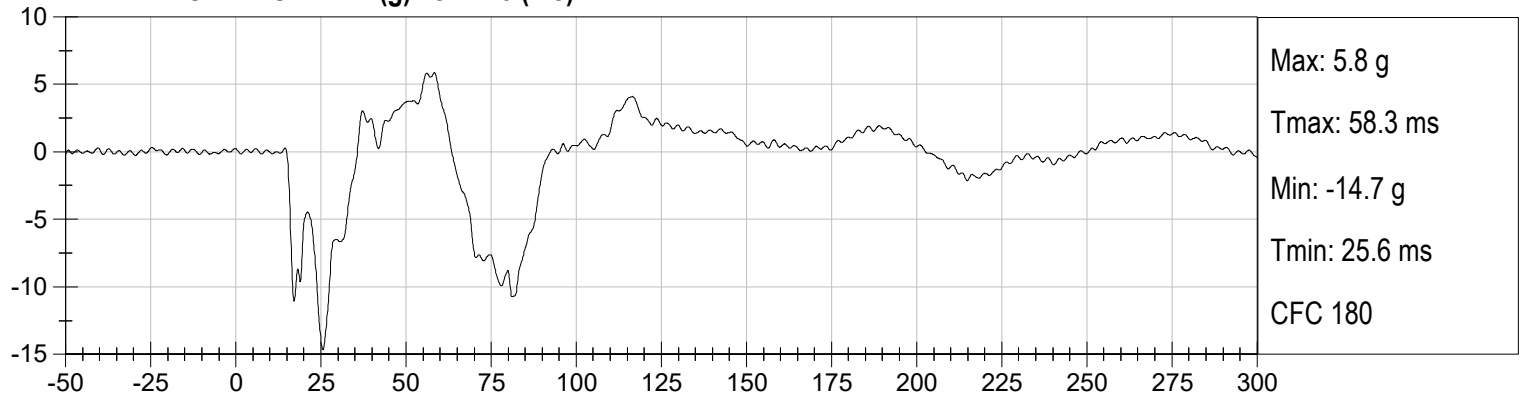
DRIVER HEAD Z (g) vs Time (ms)



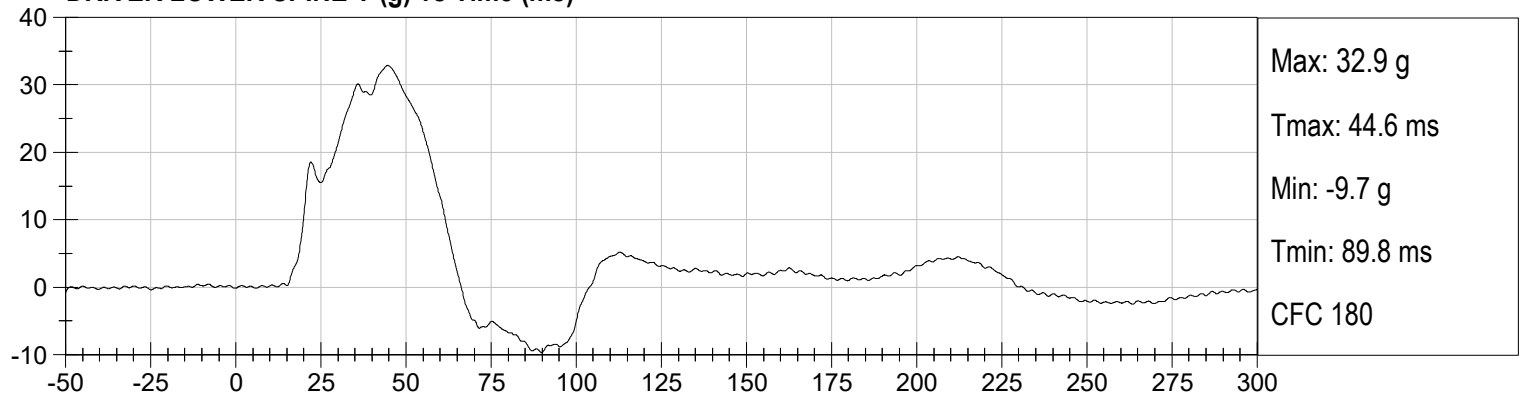
DRIVER HEAD Resultant (g) vs Time (ms)



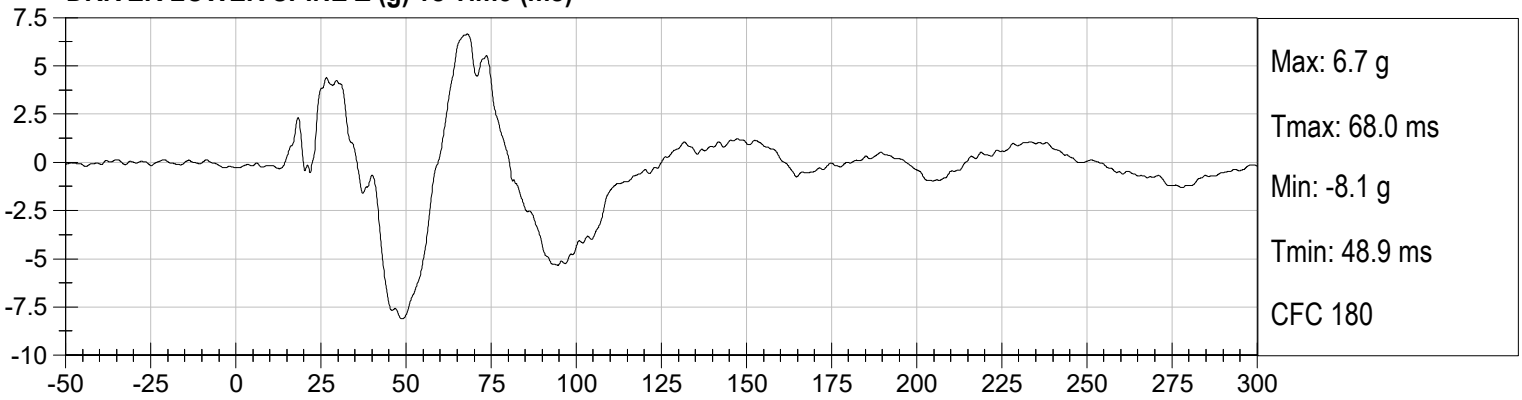
DRIVER LOWER SPINE X (g) vs Time (ms)



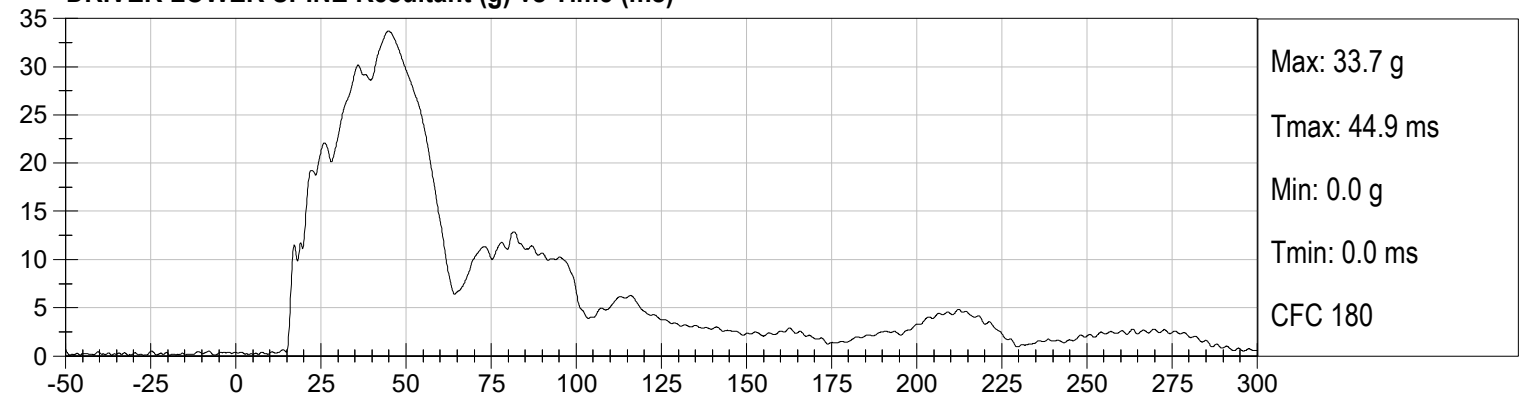
DRIVER LOWER SPINE Y (g) vs Time (ms)



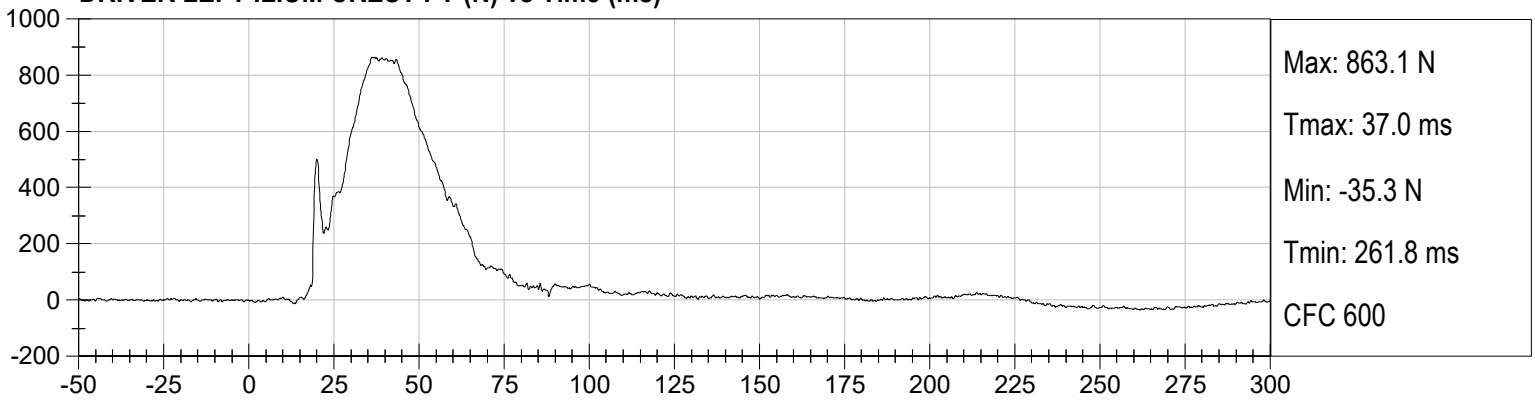
DRIVER LOWER SPINE Z (g) vs Time (ms)



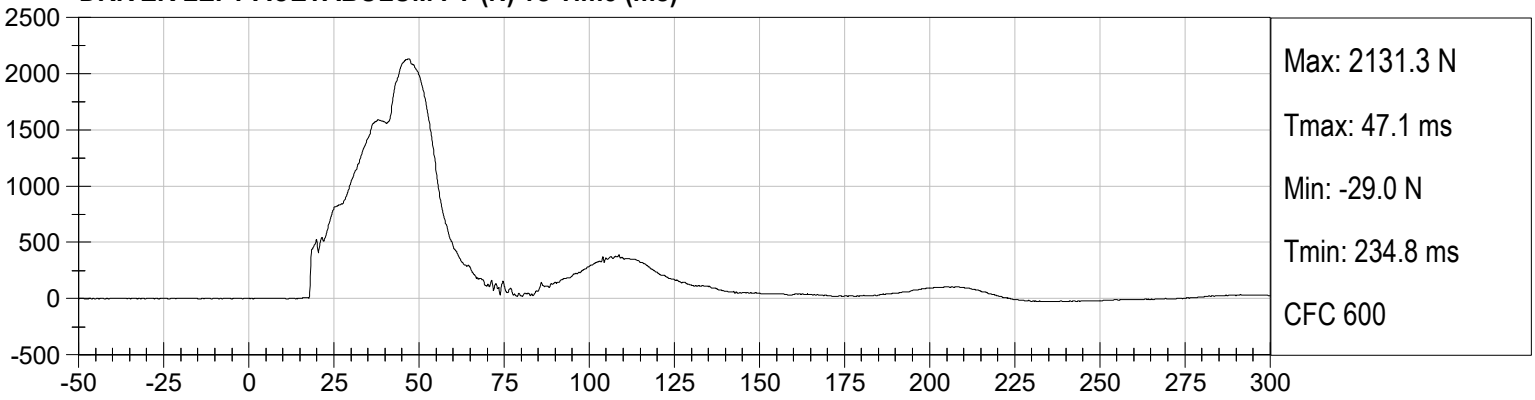
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



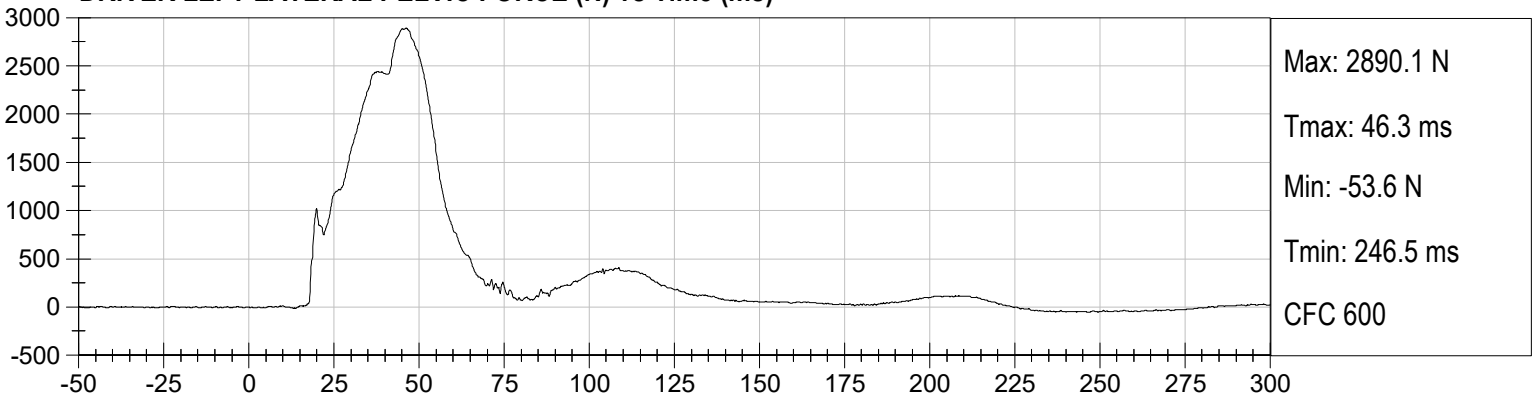
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



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



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



APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER 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:** D210041

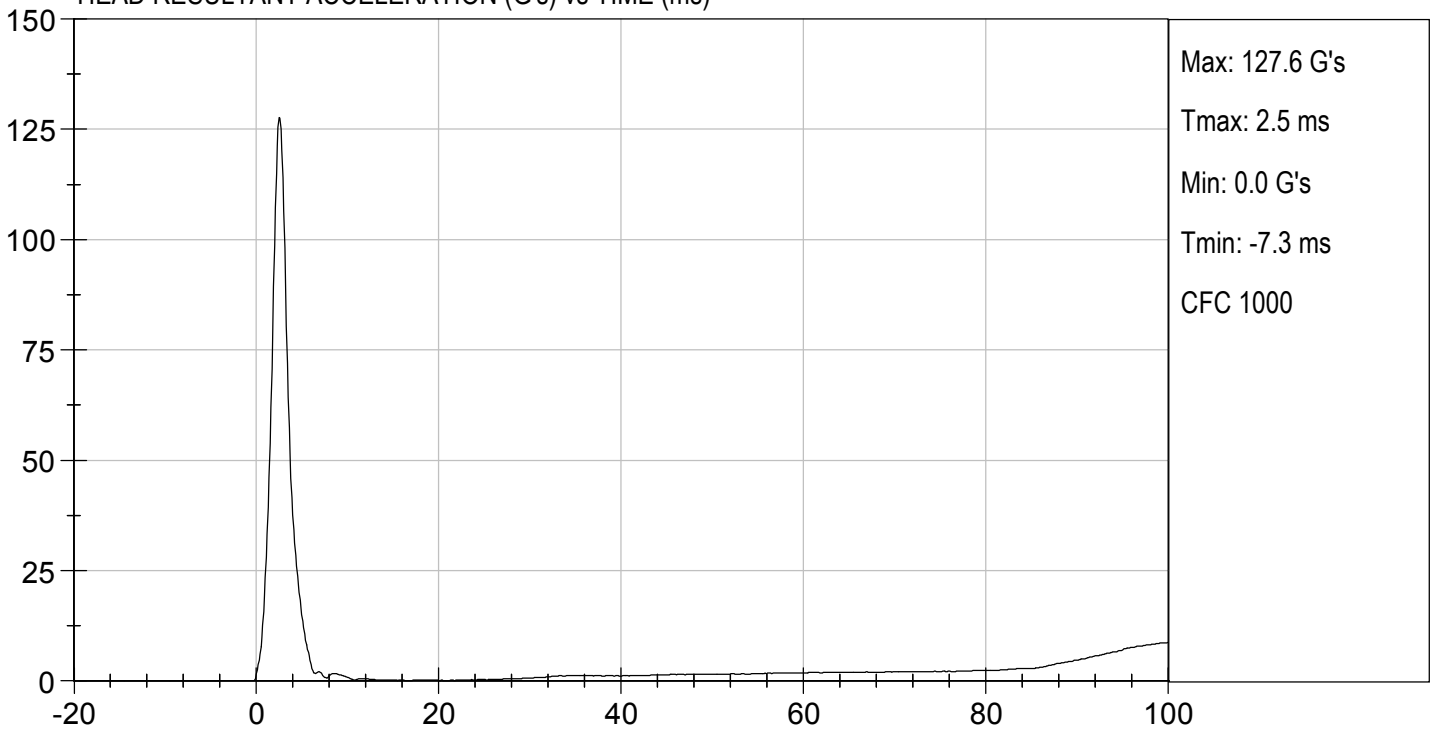
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	115 to 137	128	Pass
Peak Longitudinal Acceleration	G's	+/- 15	4.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

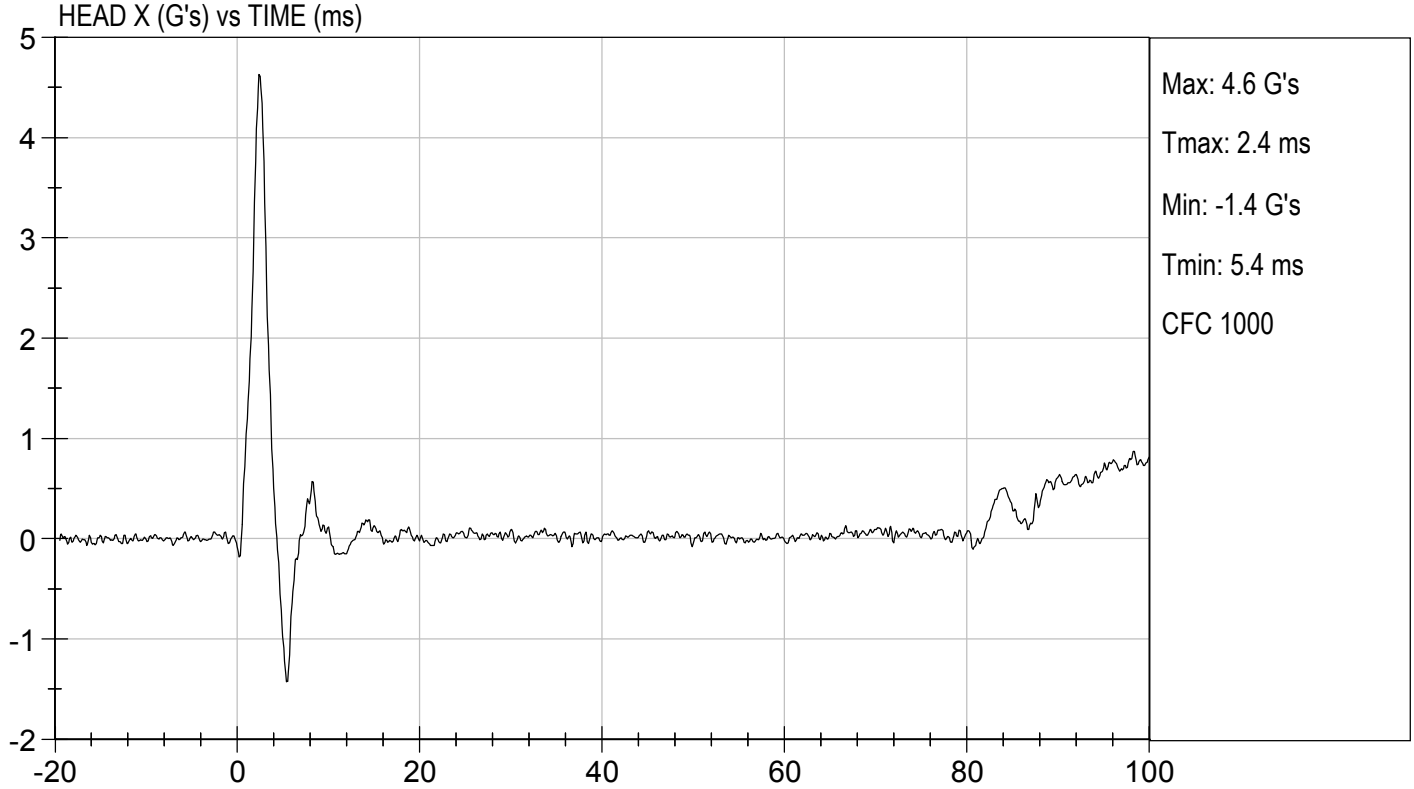
01/07/2021
Test Date

Approved By

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

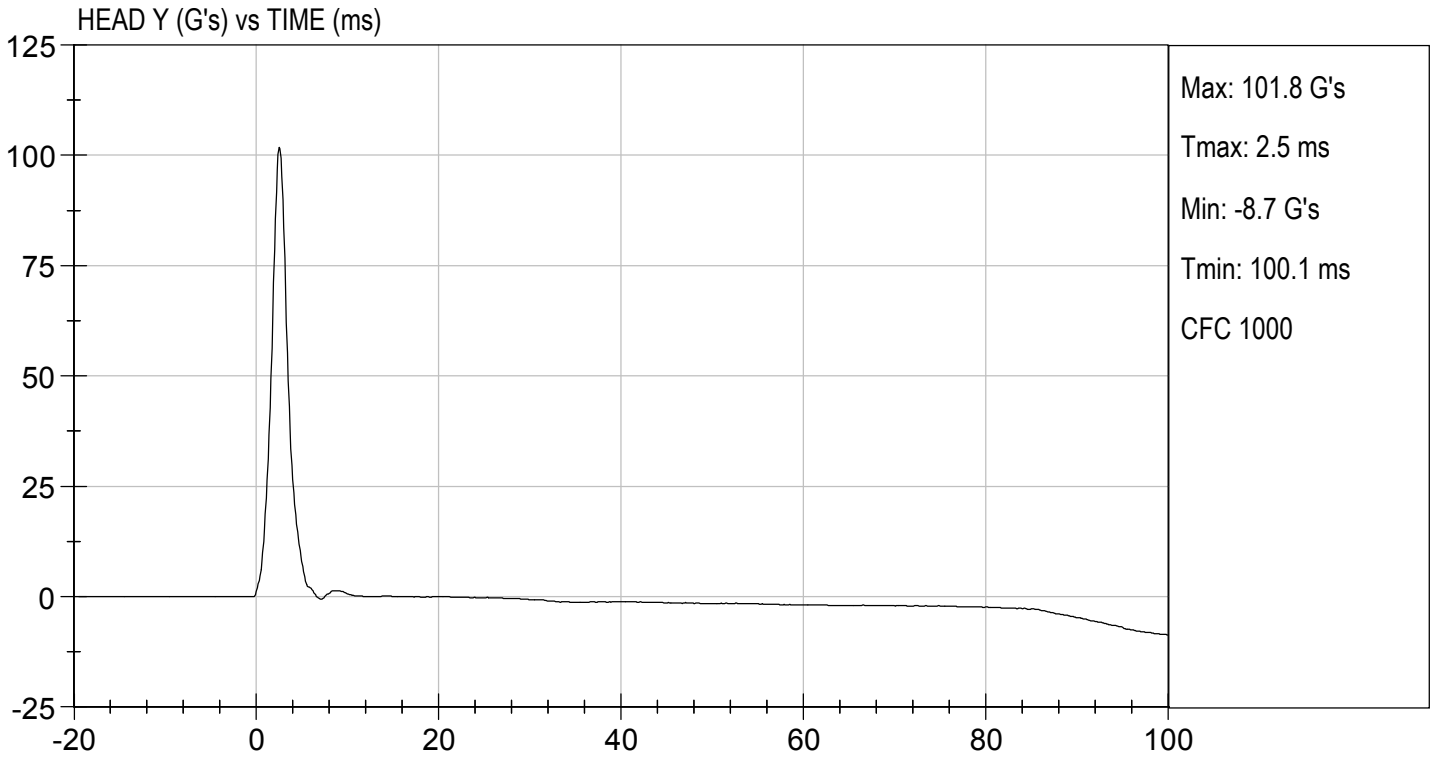


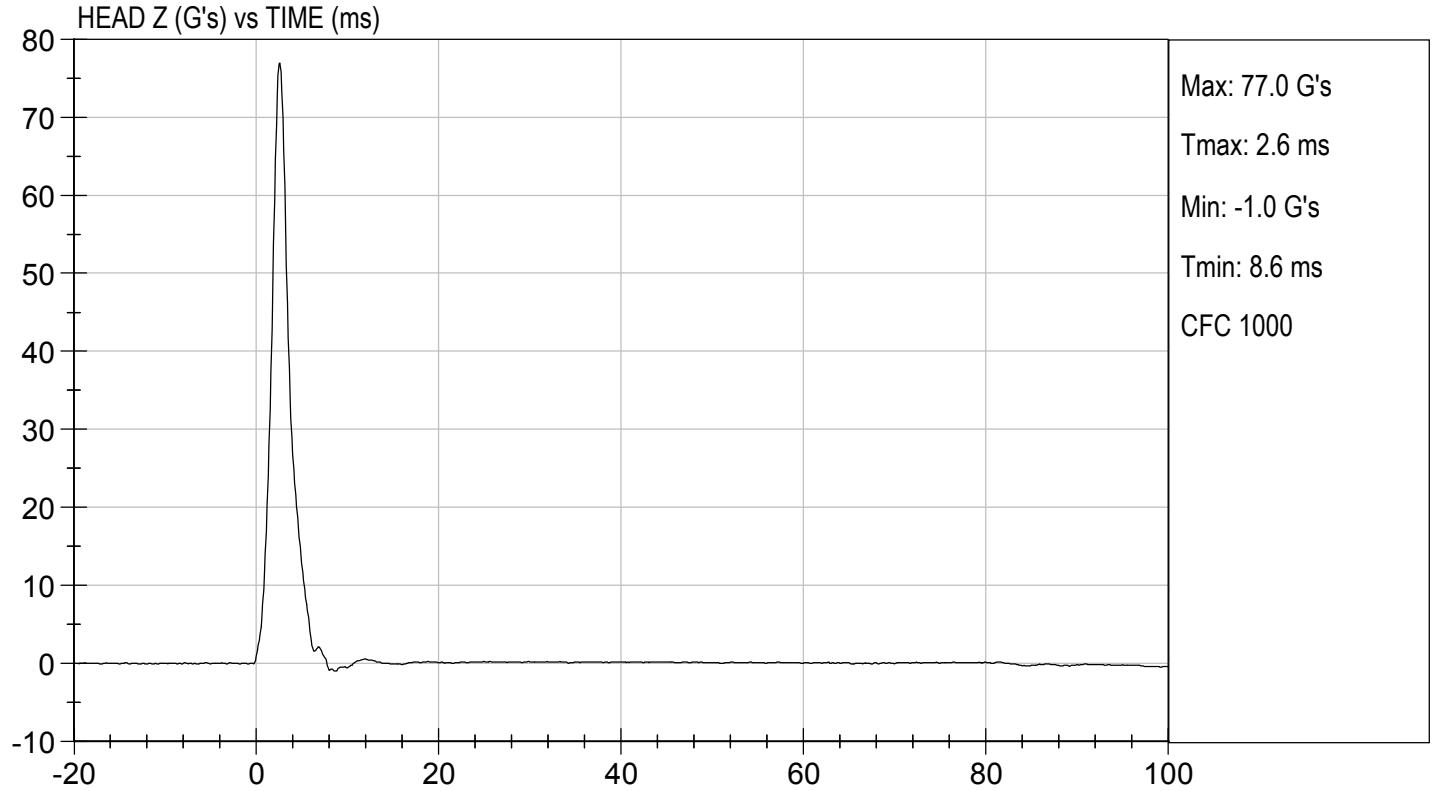
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 01/07/2021
TEST #: D210041





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210042

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	23	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.65	Pass
	15 ms	m/s	3.30 to 4.10	3.87	Pass
	20 ms	m/s	4.40 to 5.40	5.19	Pass
	25 ms	m/s	5.40 to 6.10	5.63	Pass
	25-100 ms	m/s	5.50 to 6.20	5.66	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	64	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	121	Pass
			Overall Test Results		Pass

Gerald Guerrero

Laboratory Technician

01/07/2021

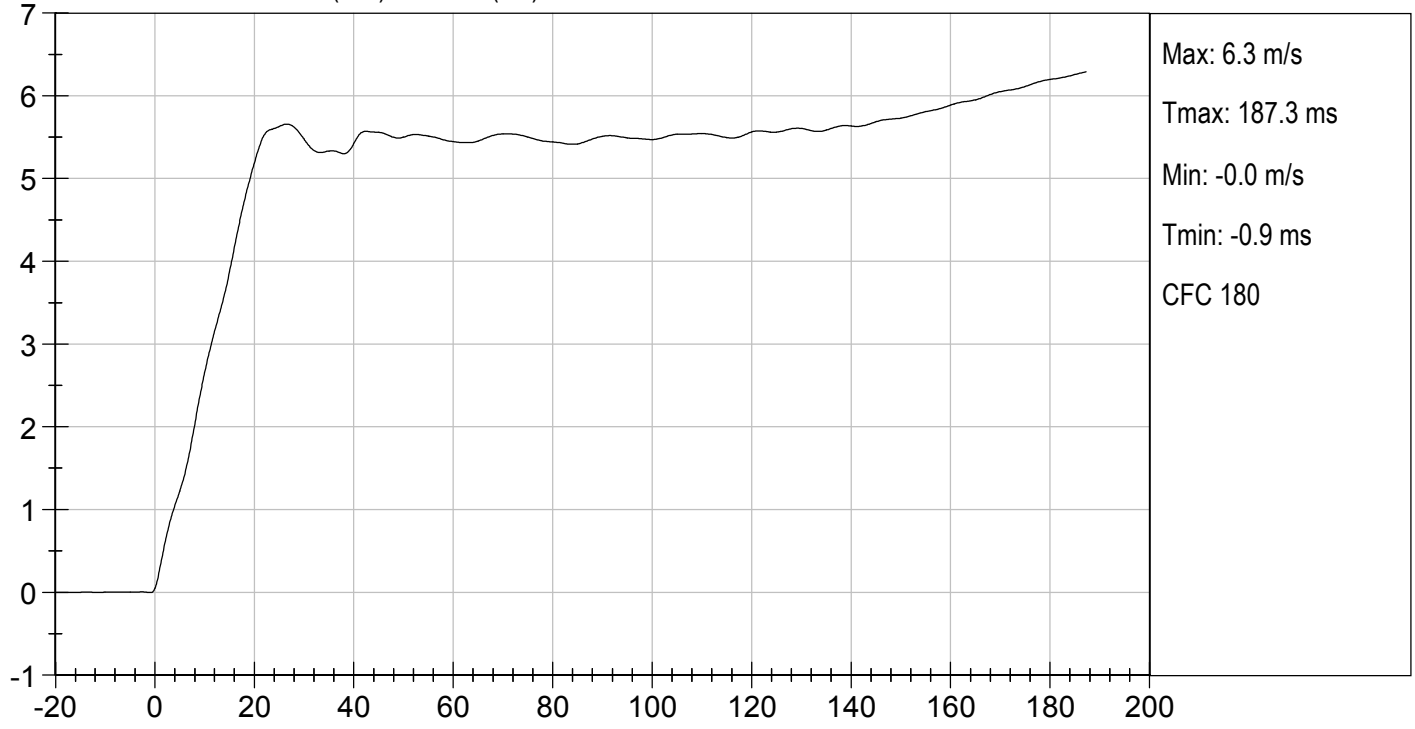
Test Date

Approved By

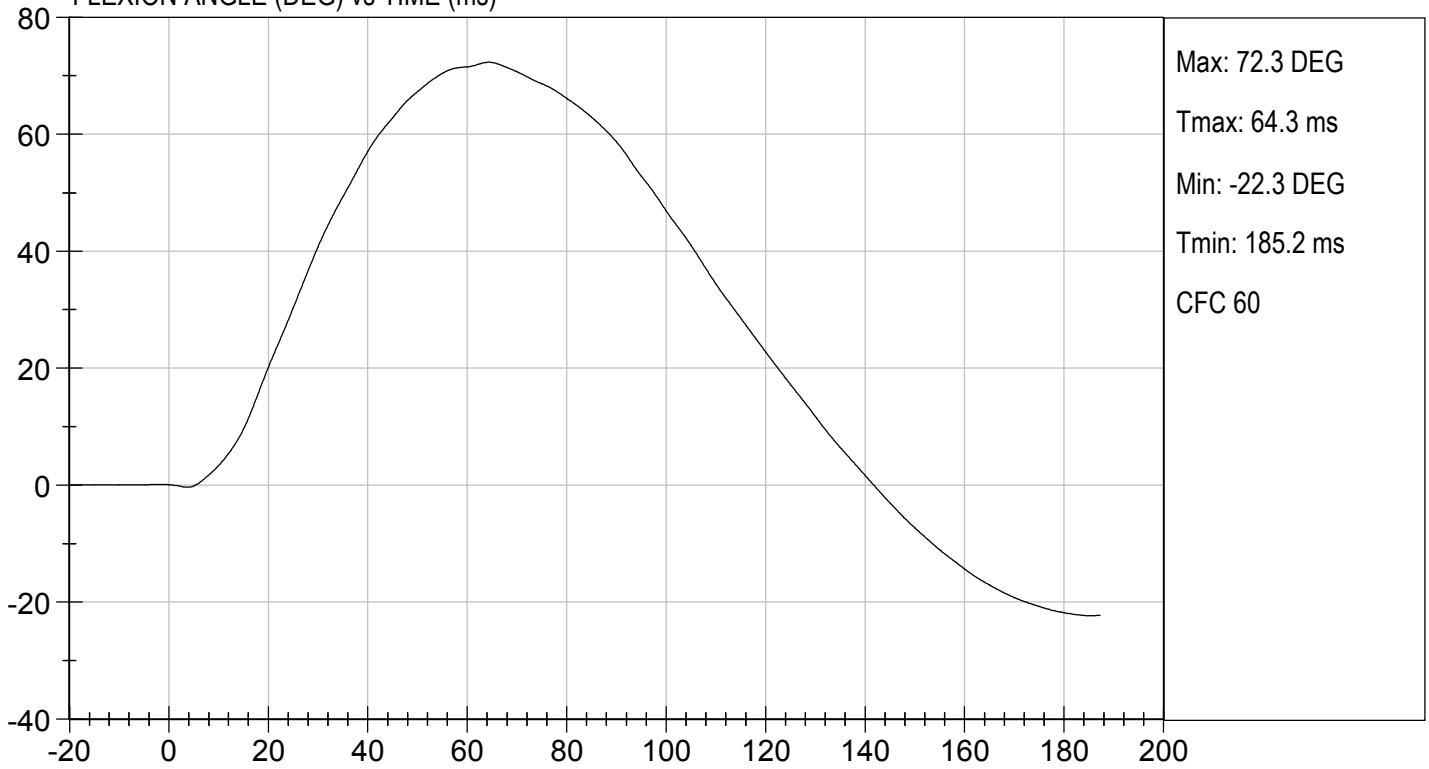
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 01/07/2021
TEST #: D210042

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

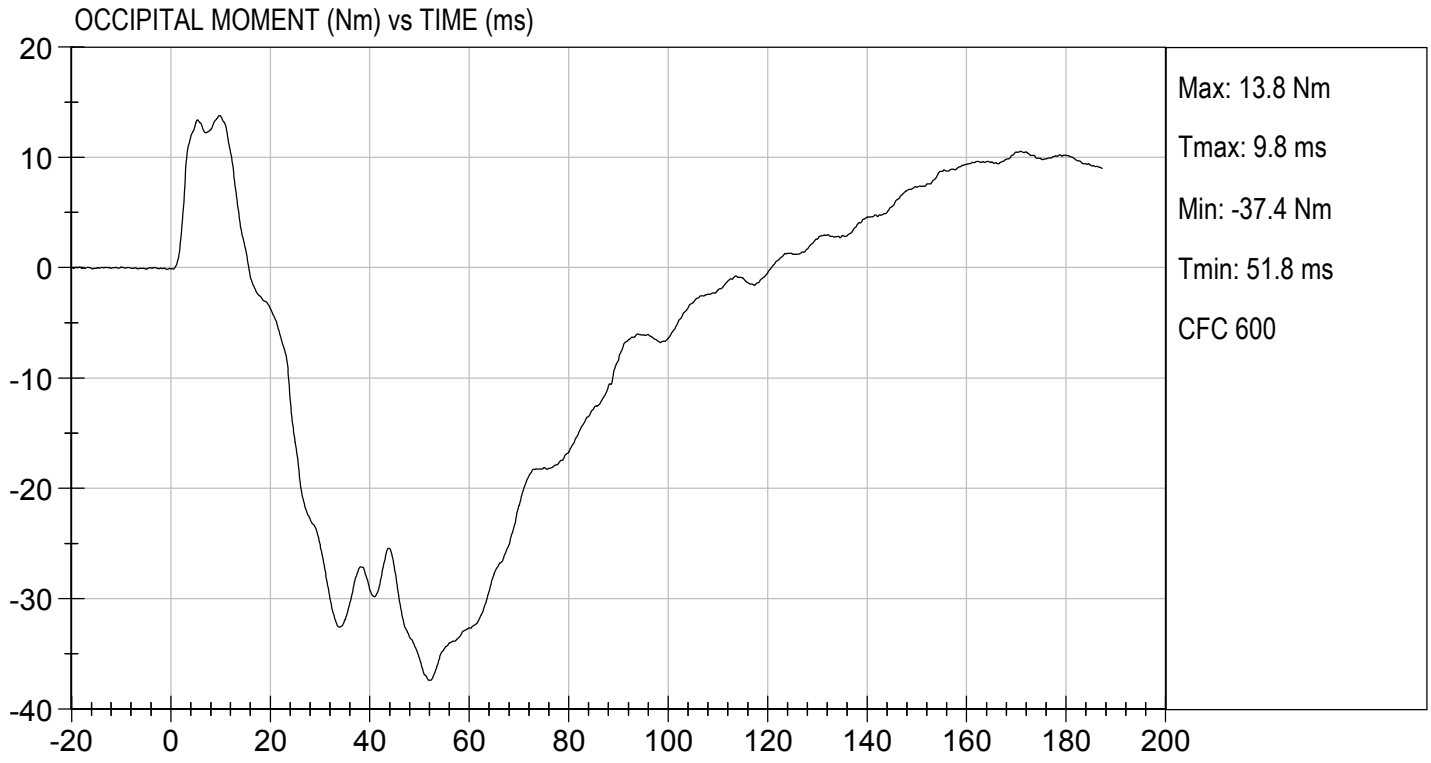


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 01/07/2021
TEST #: D210042



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D210043

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	23	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	33	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

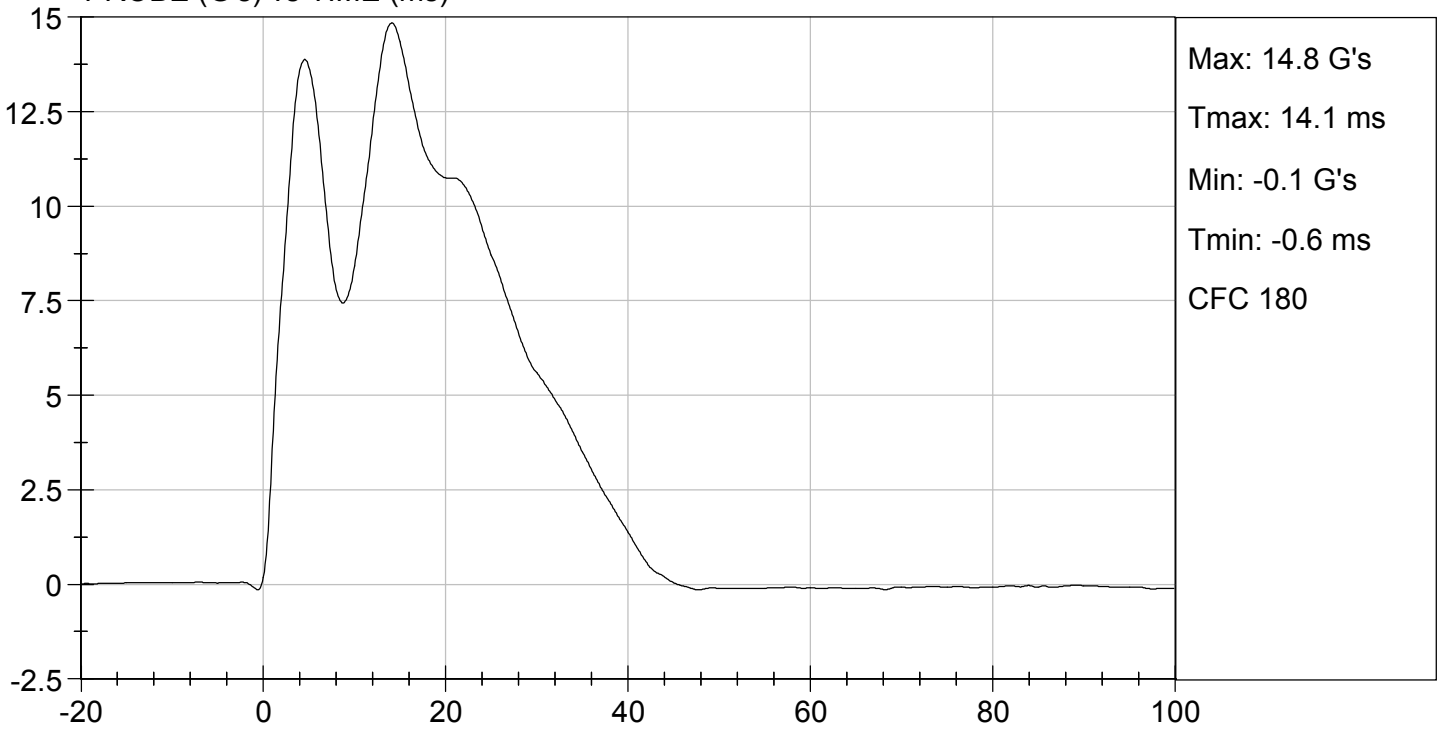
01/06/2021
Test Date

Approved By

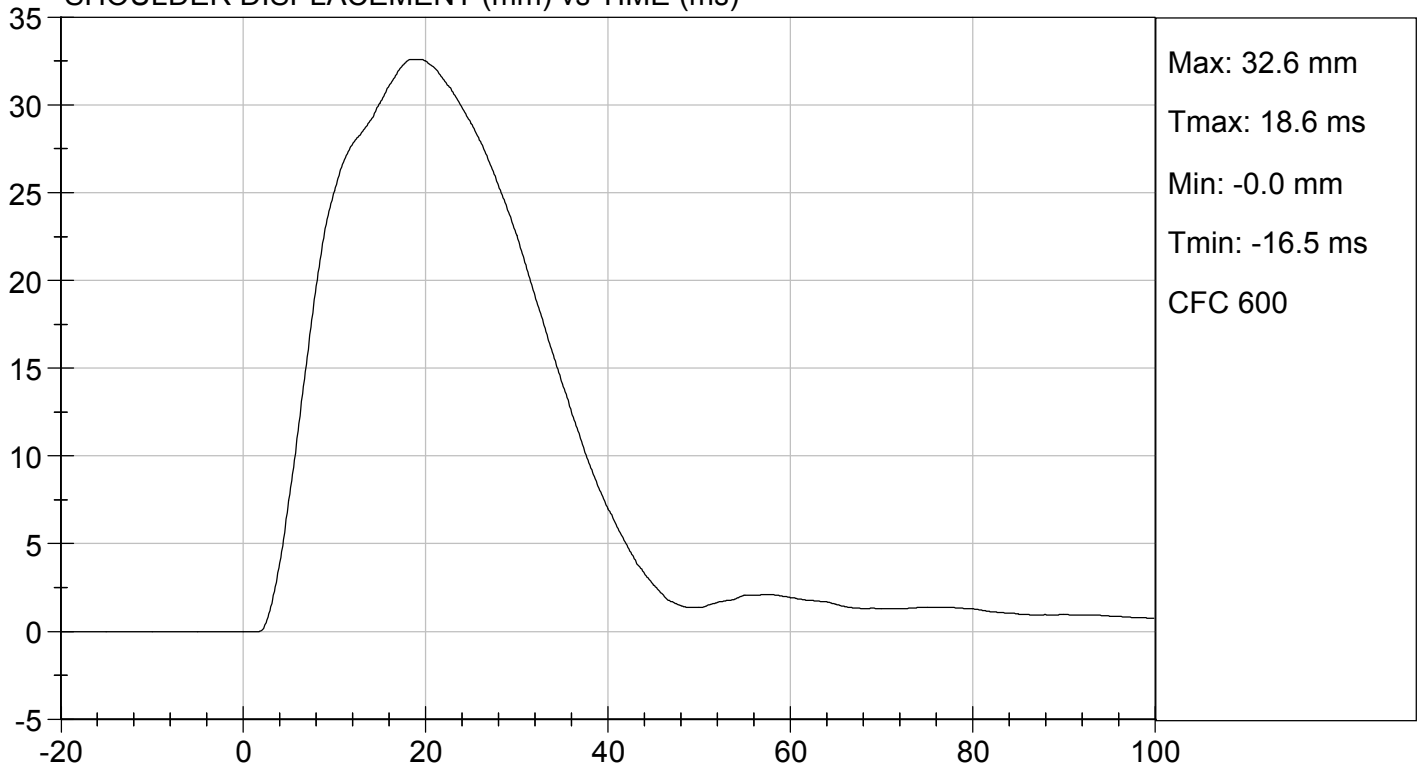
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/06/2021
TEST #: D210043

PROBE (G's) vs TIME (ms)

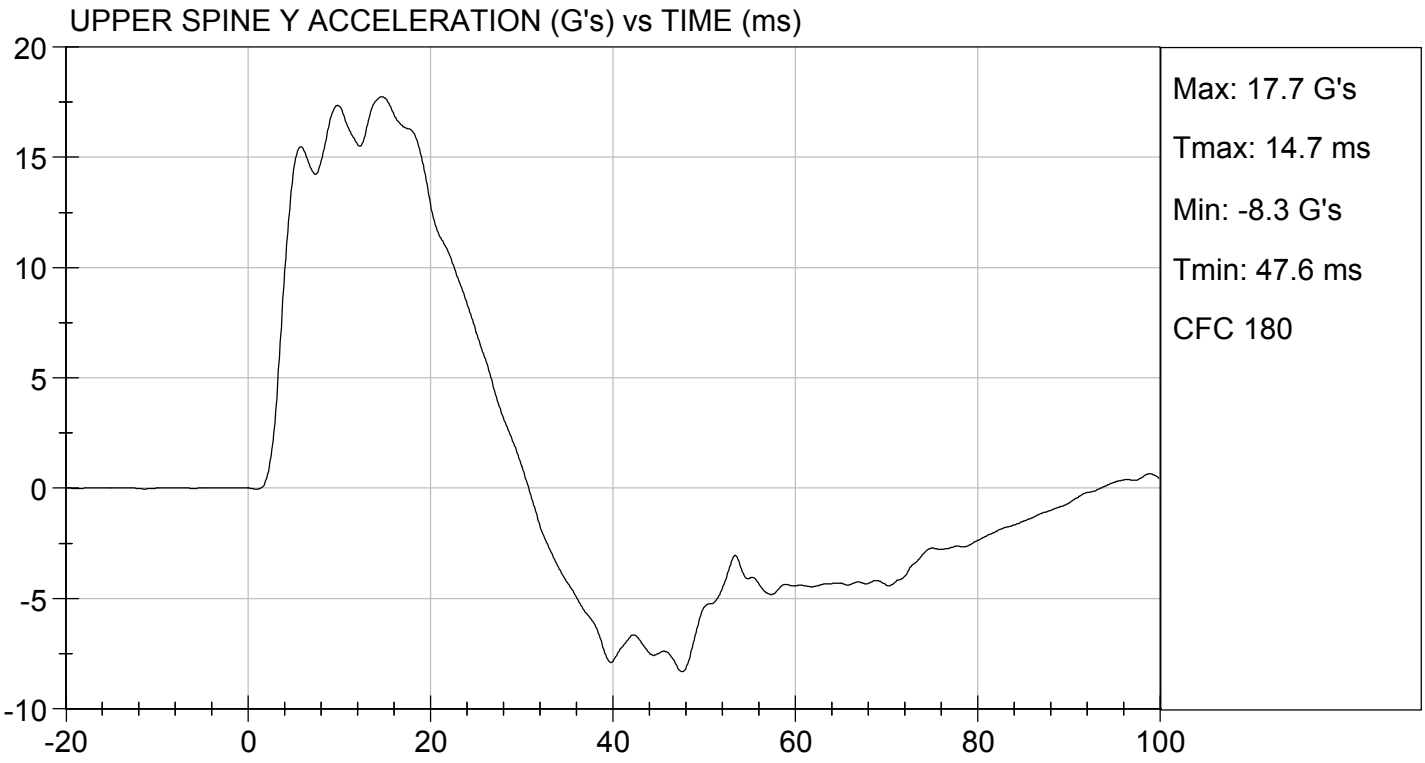


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 01/06/2021
TEST #: D210043



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210044

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	23	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	29	Pass
Middle Rib Displacement	mm	30 to 36	32	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	33	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

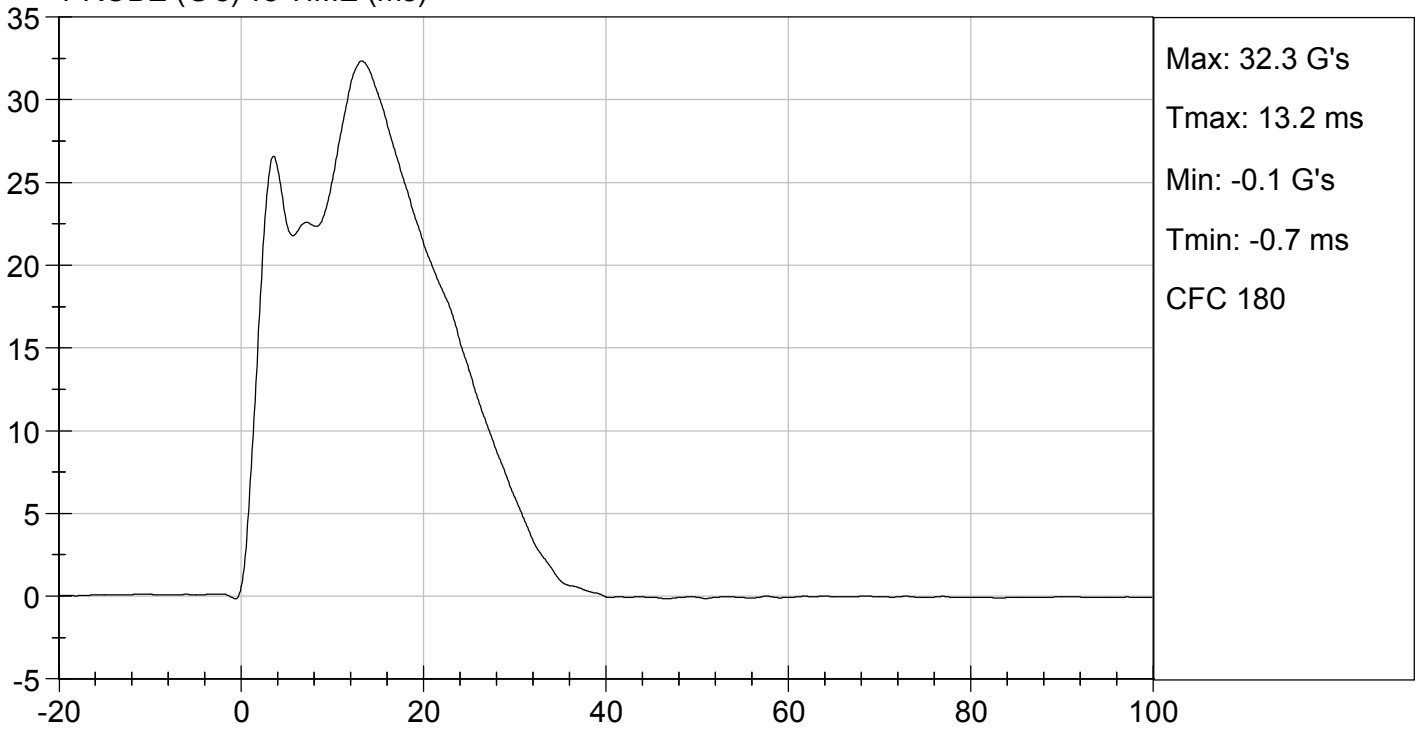
01/06/2021
Test Date

Approved By

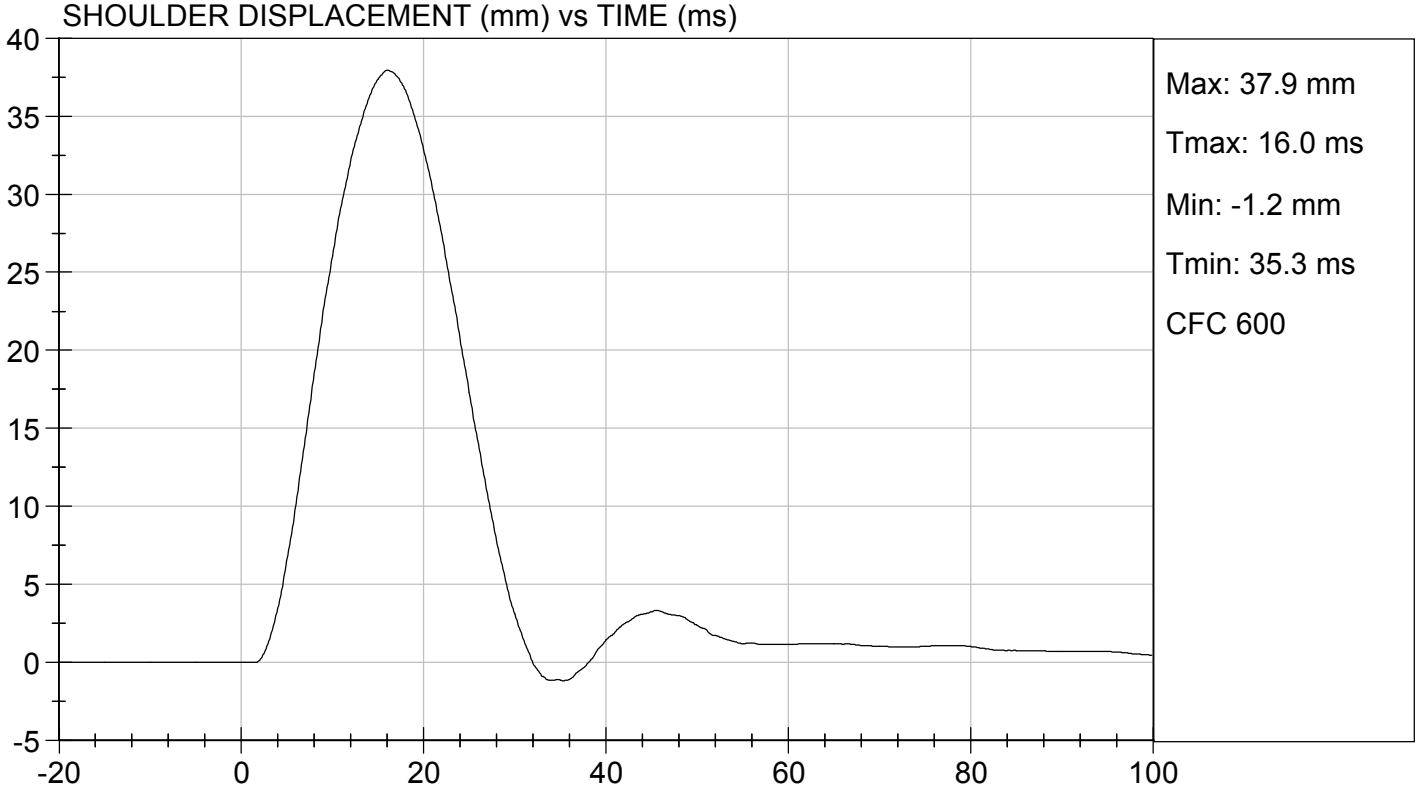
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/06/2021
TEST #: D210044

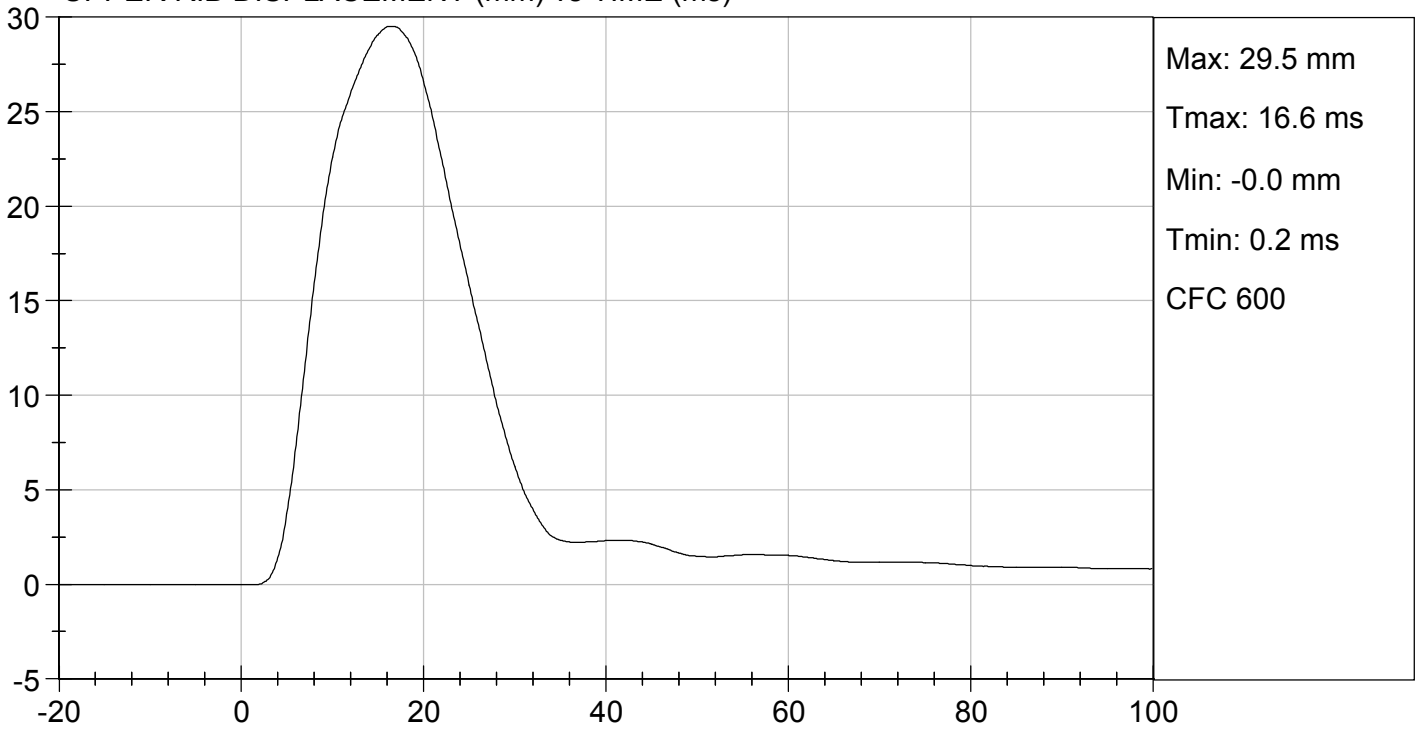
PROBE (G's) vs TIME (ms)



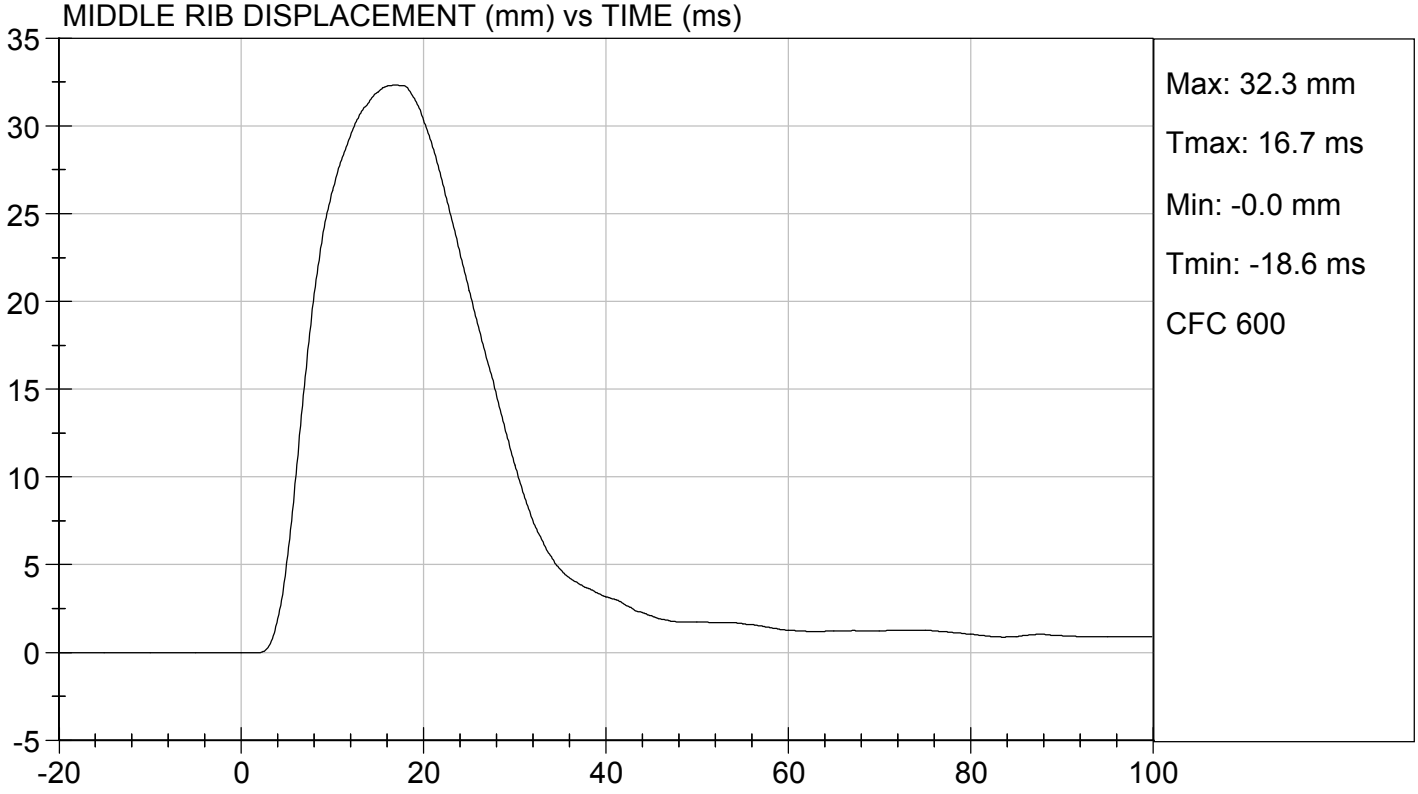
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



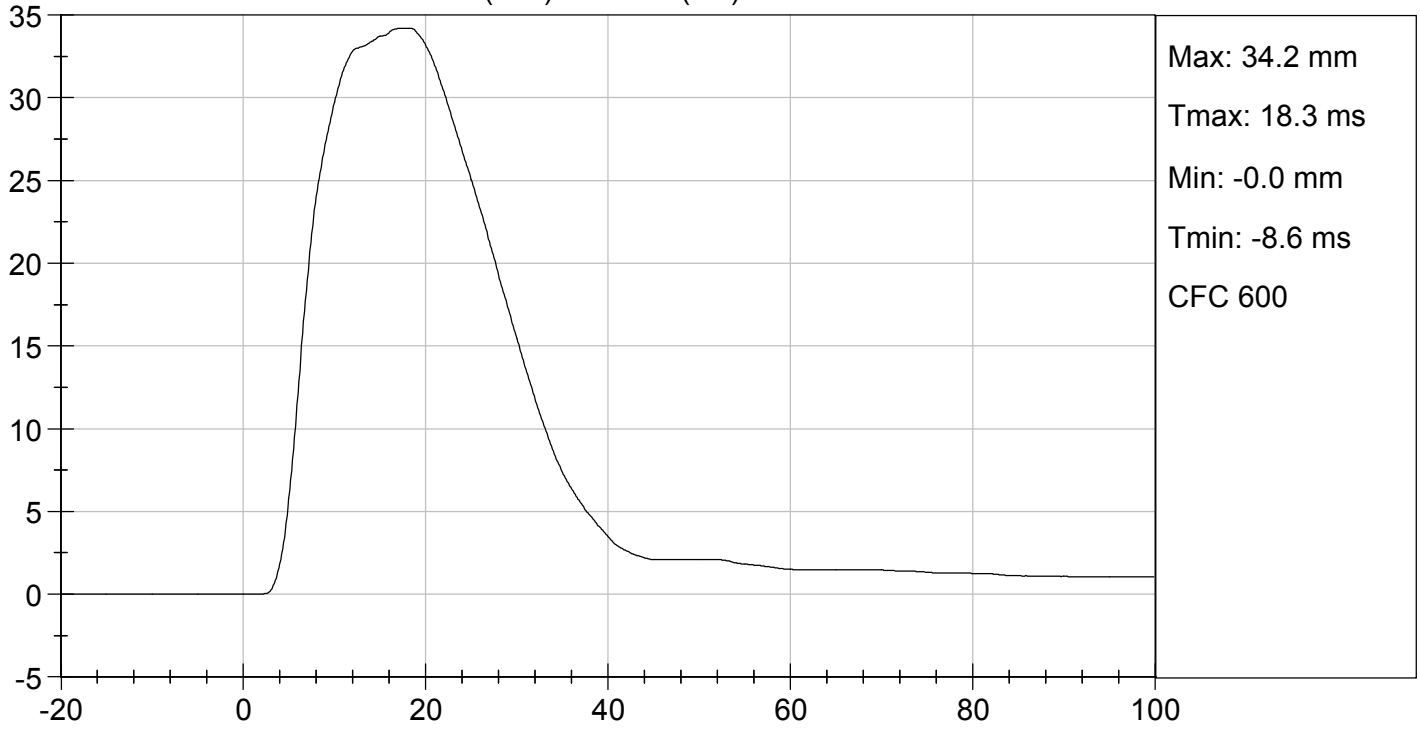
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



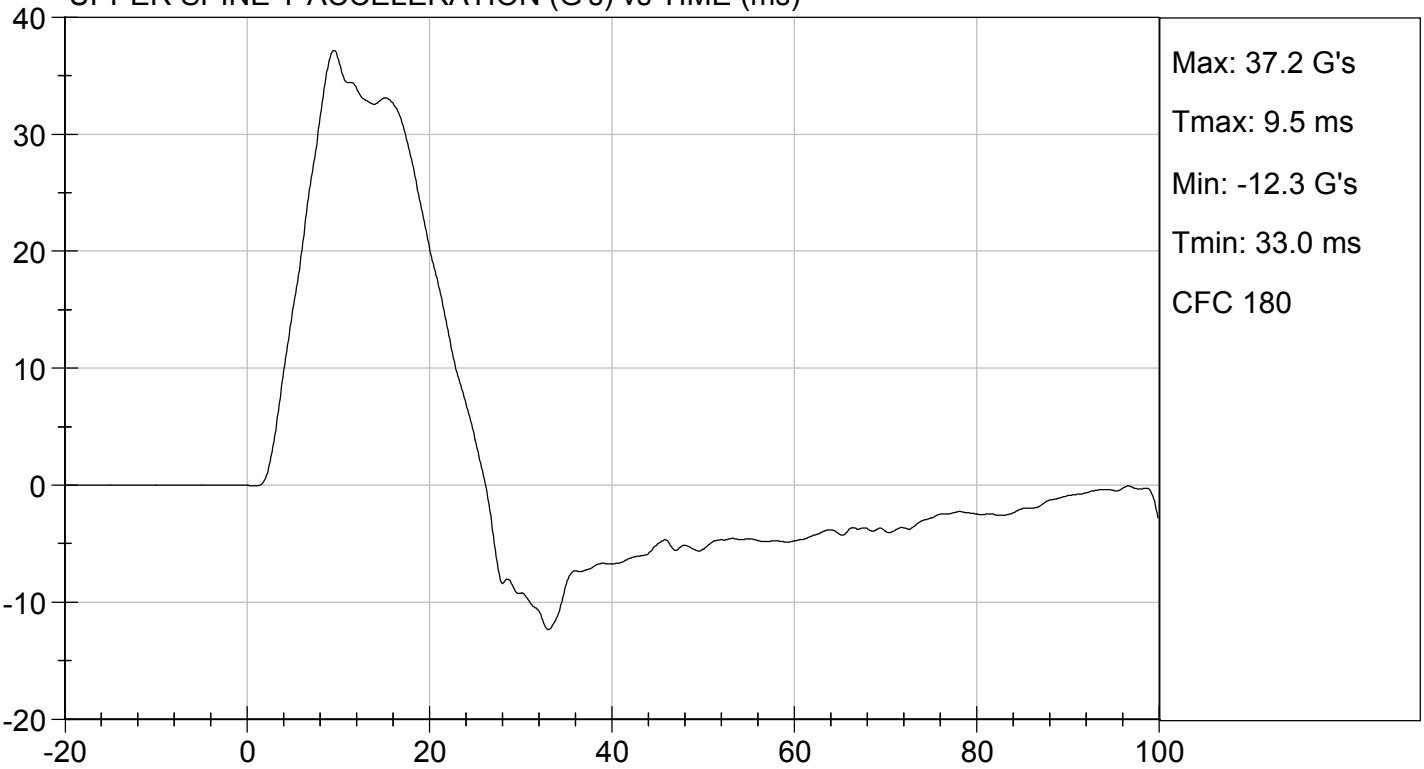
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/06/2021
TEST #: D210044

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

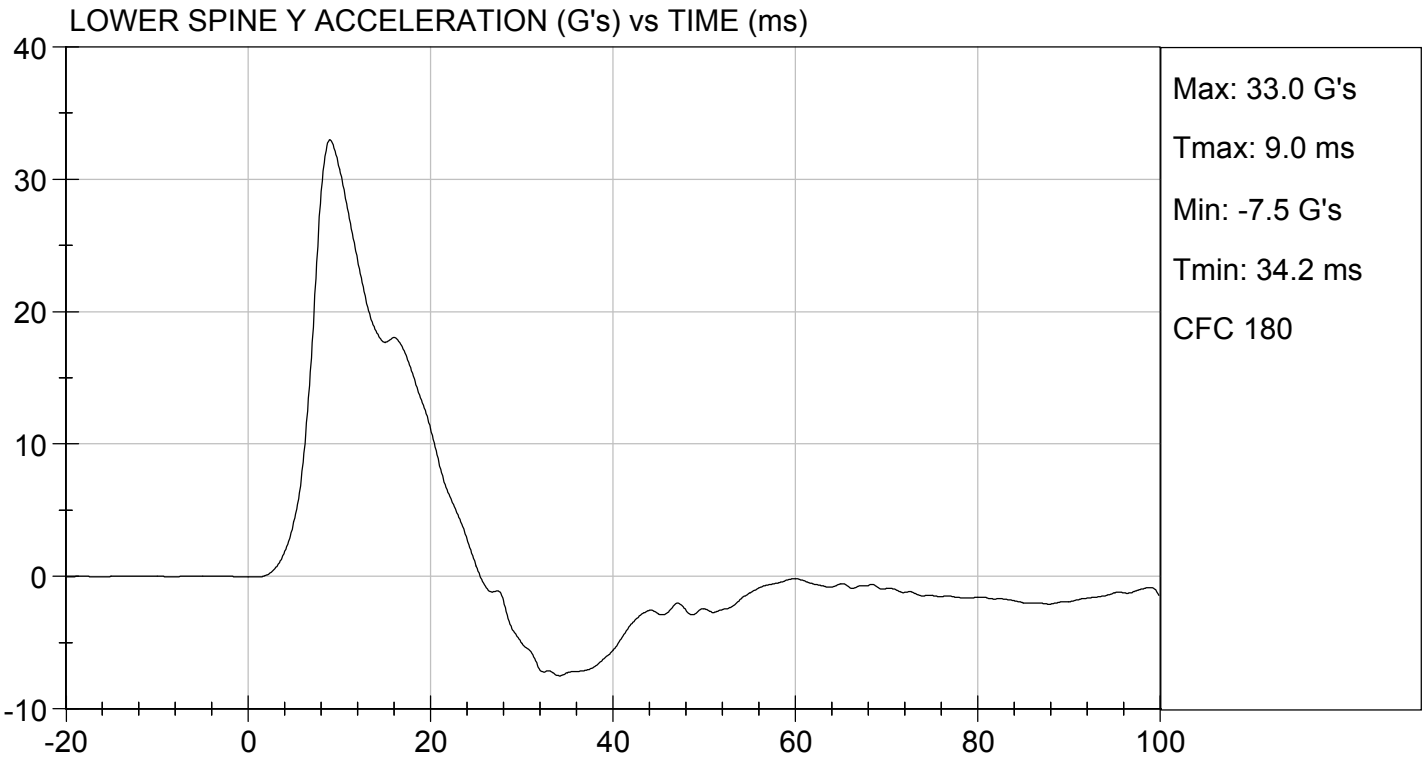


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 01/06/2021
TEST #: D210044



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210045

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	14	Pass
Upper Rib Displacement	mm	32 to 40	39	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	39	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

Gerald Guerrero
Laboratory Technician

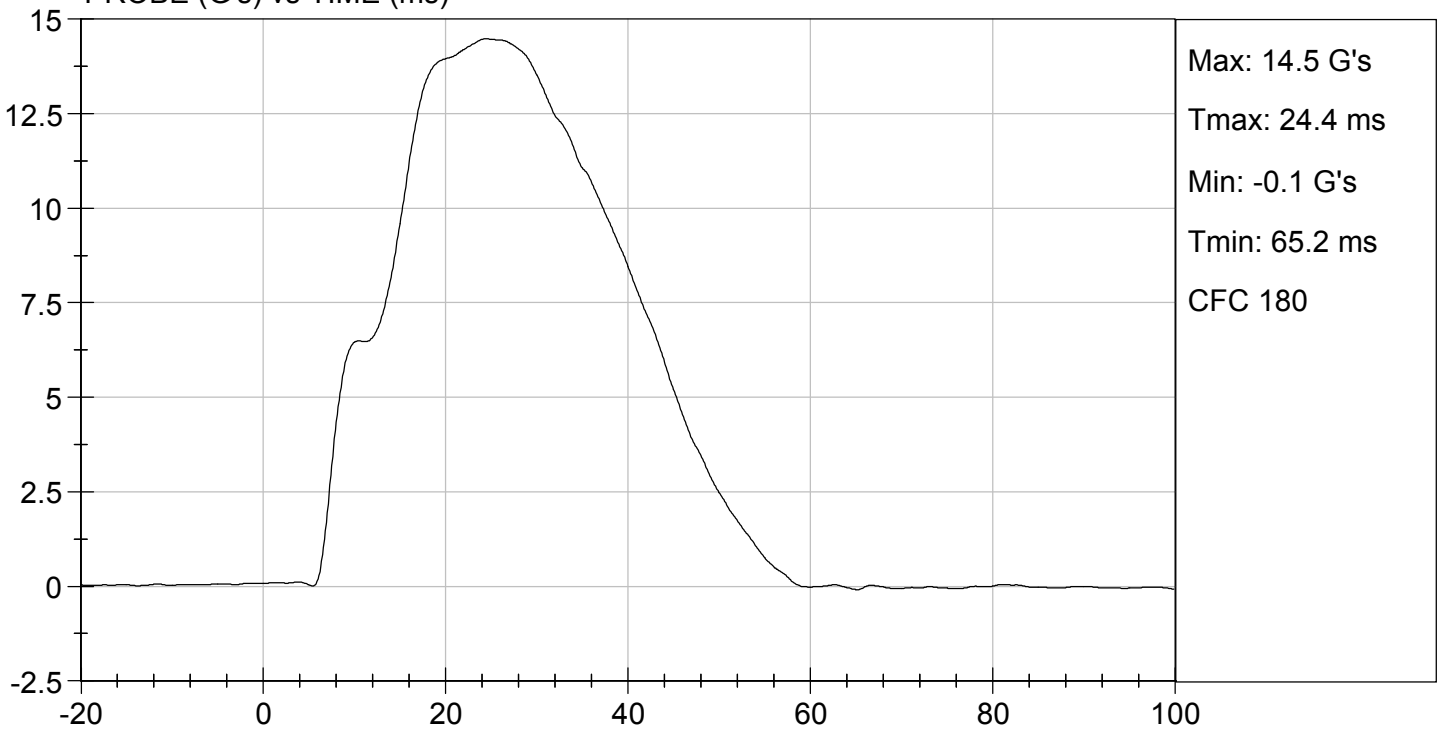
01/06/2021
Test Date

Approved By

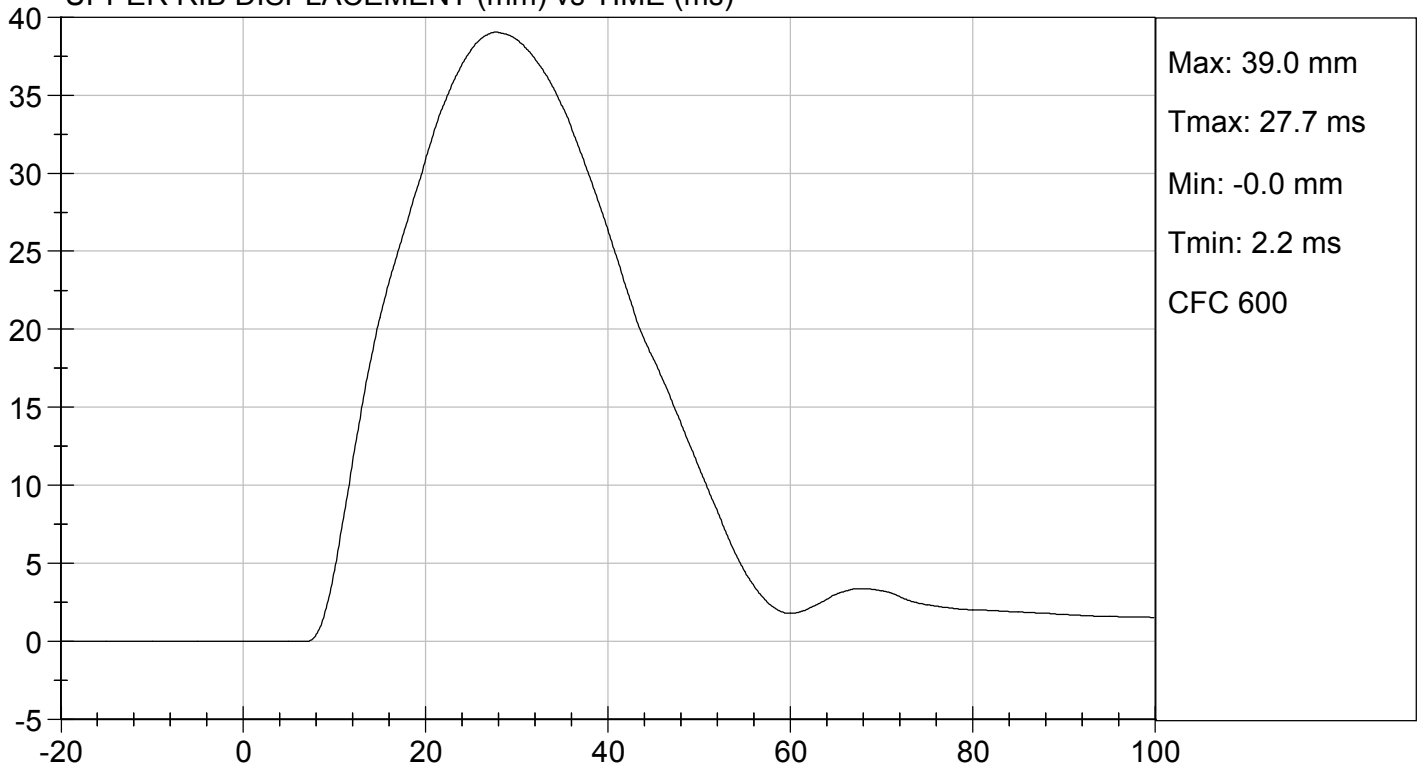
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/06/2021
TEST #: D210045

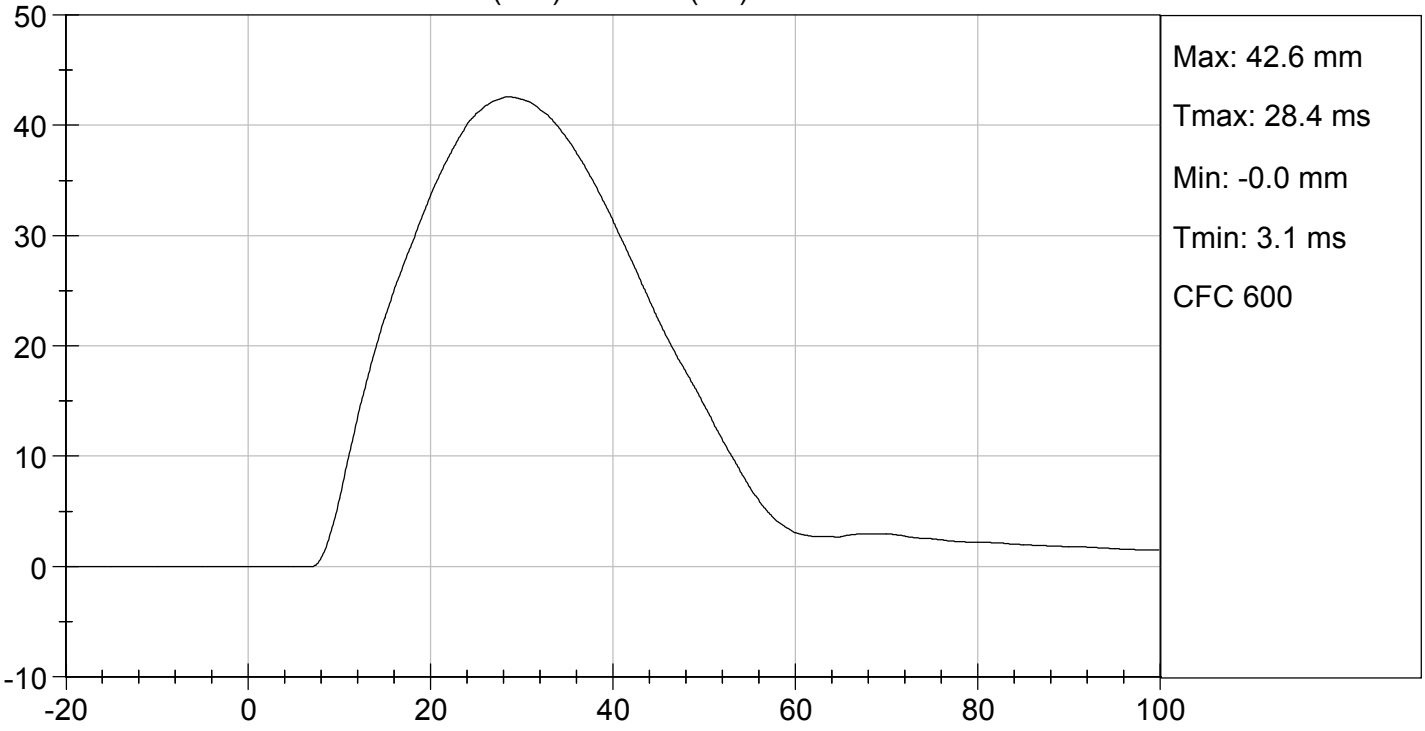
PROBE (G's) vs TIME (ms)



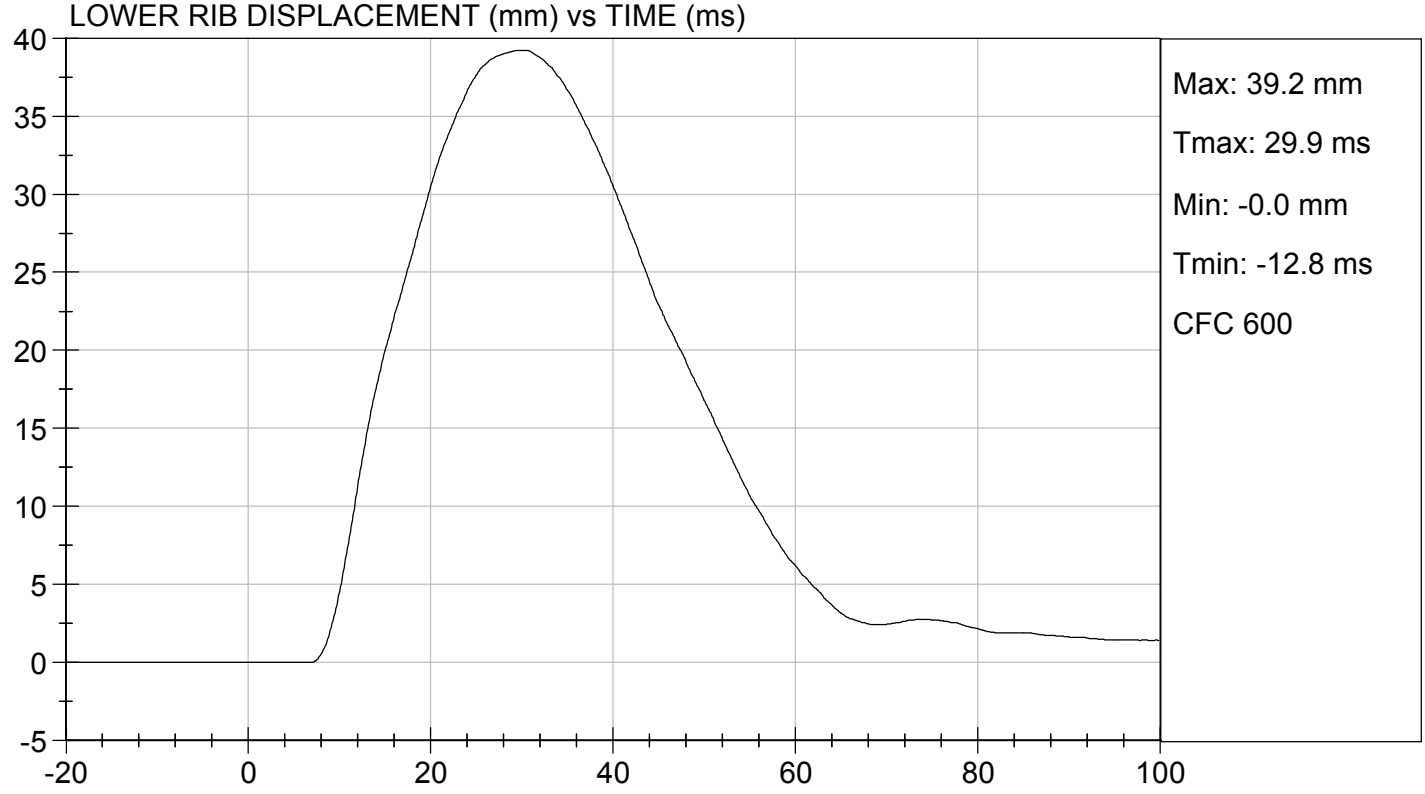
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



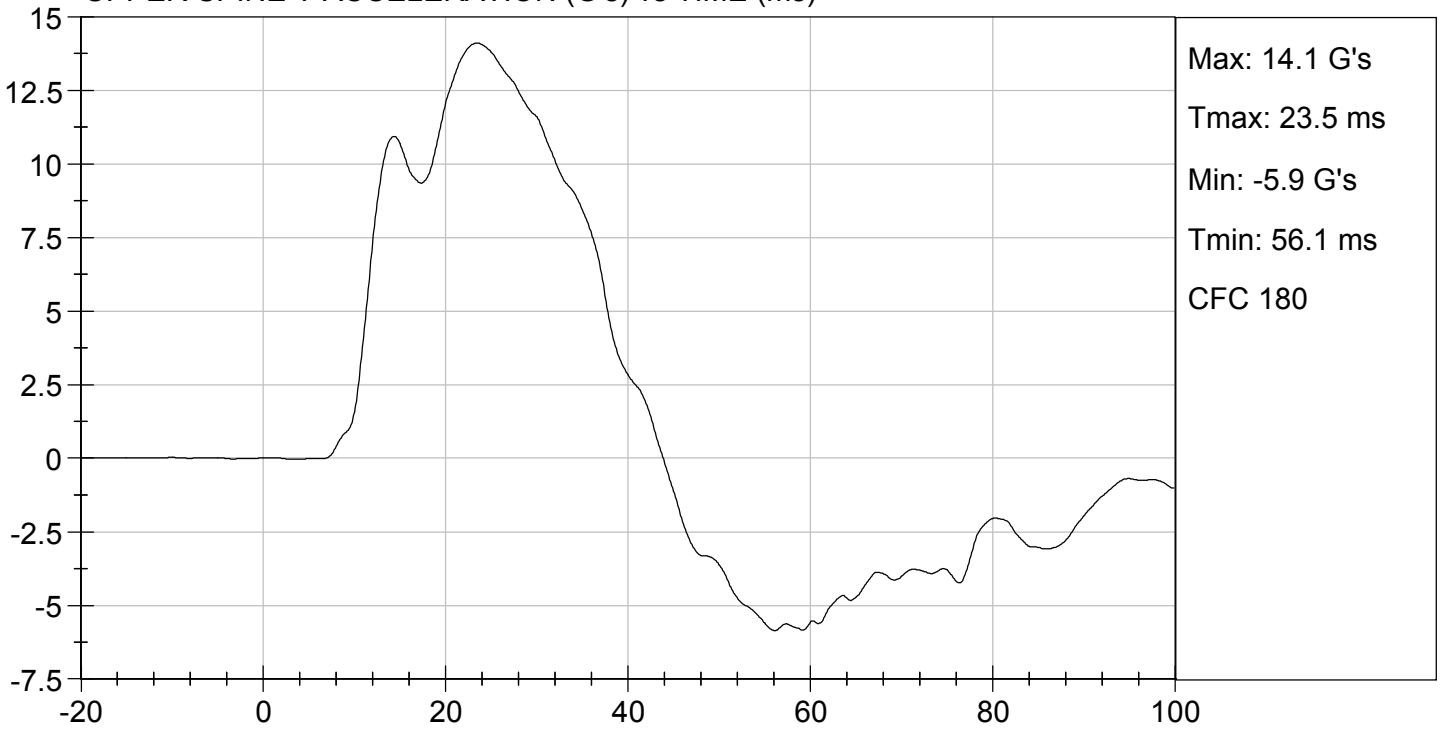
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



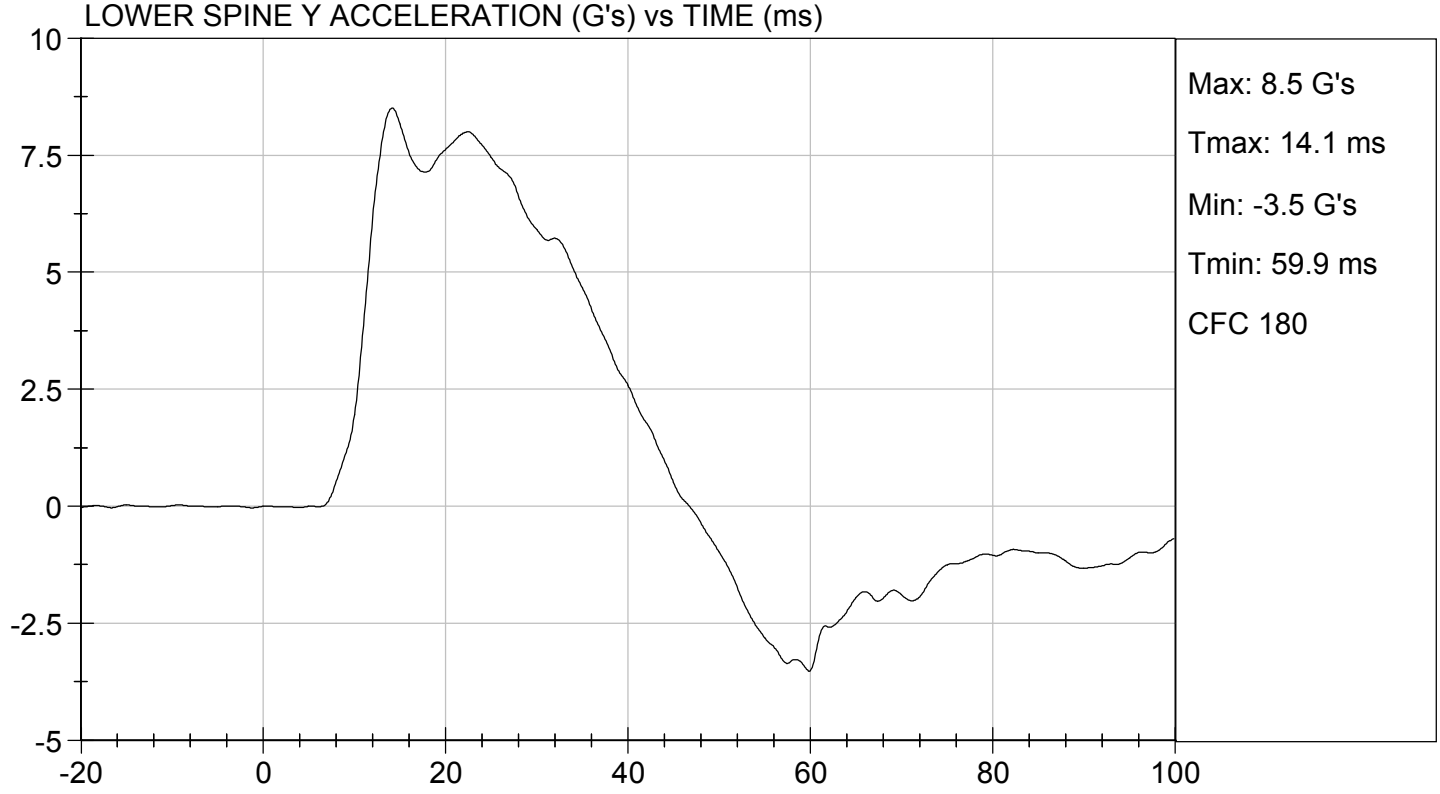
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/06/2021
TEST #: D210045

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:** D210046

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Gerald Guerrero

Laboratory Technician

01/06/2021

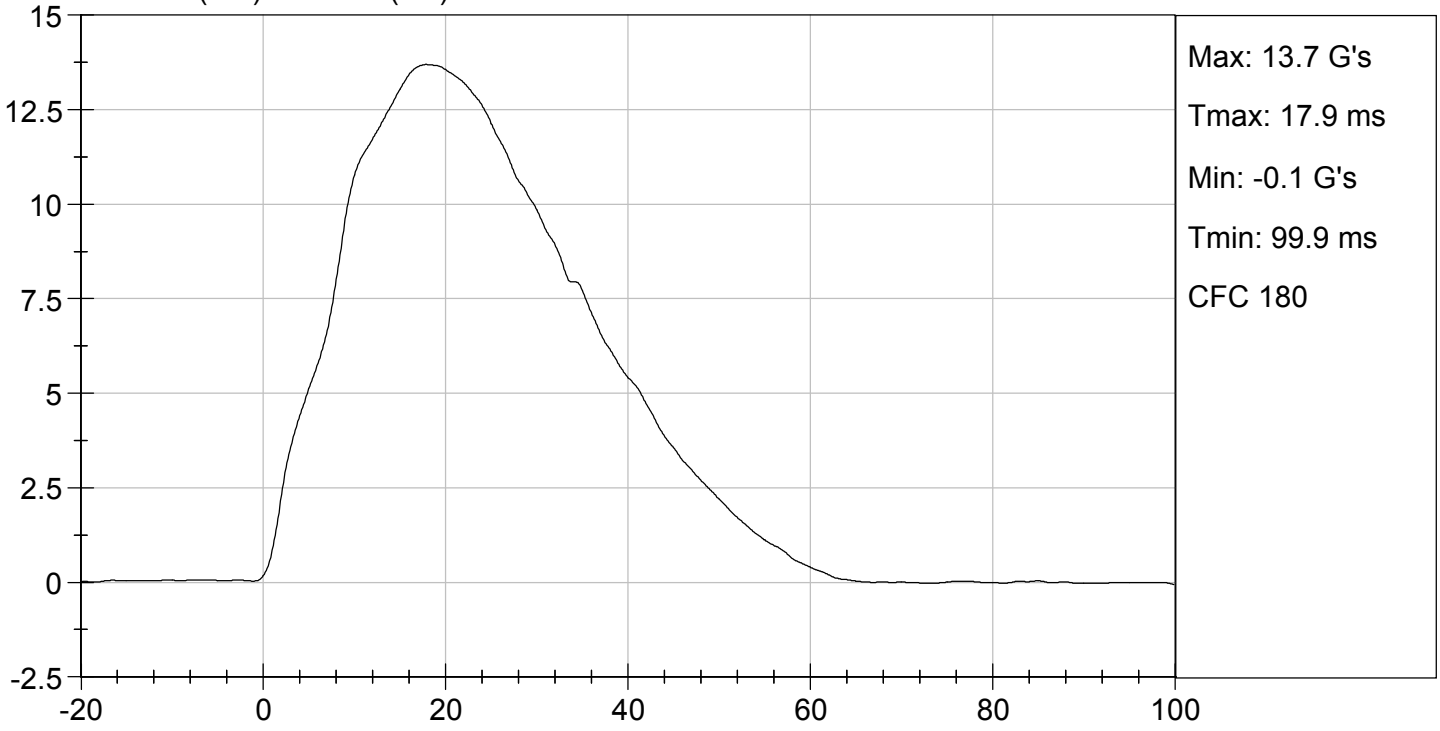
Test Date

Approved By

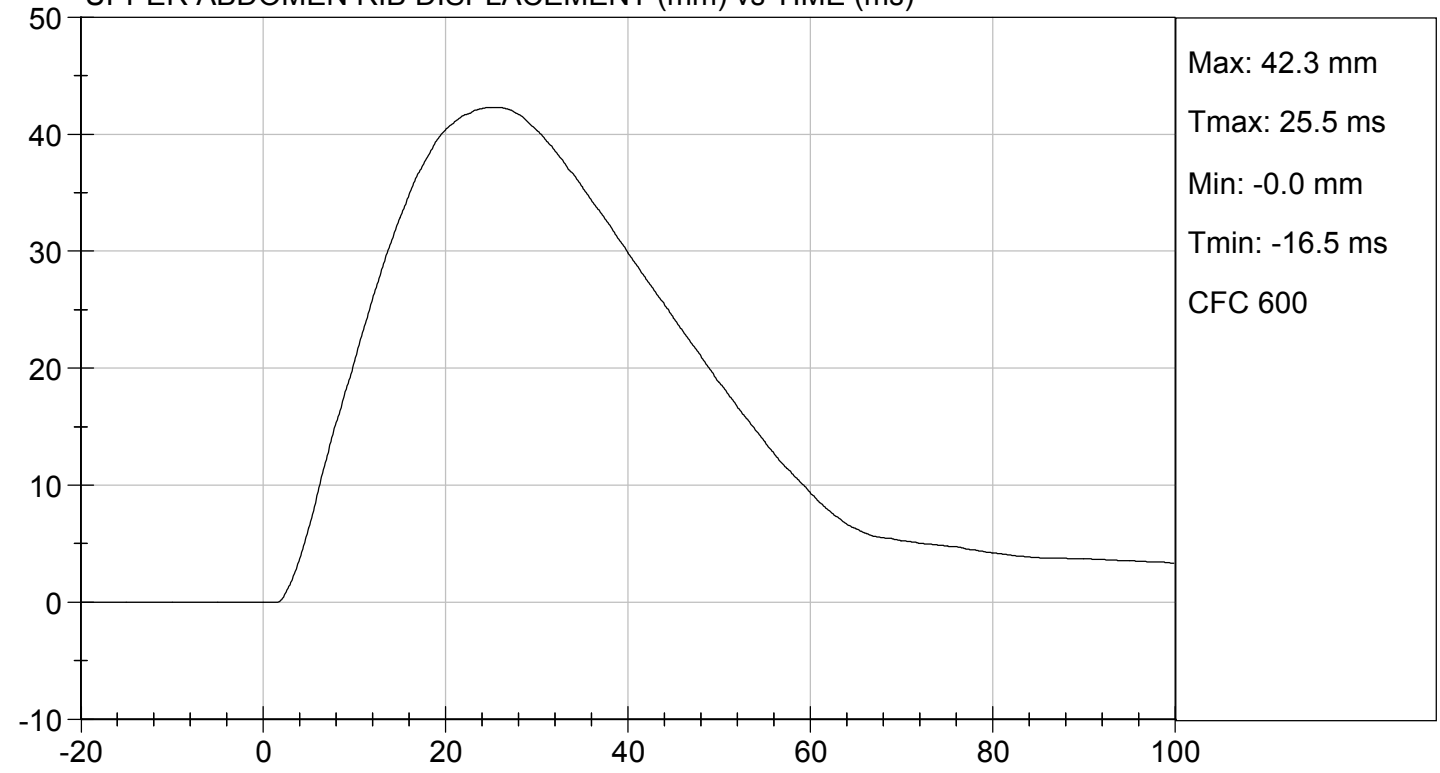
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/06/2021
TEST #: D210046

PROBE (G's) vs TIME (ms)



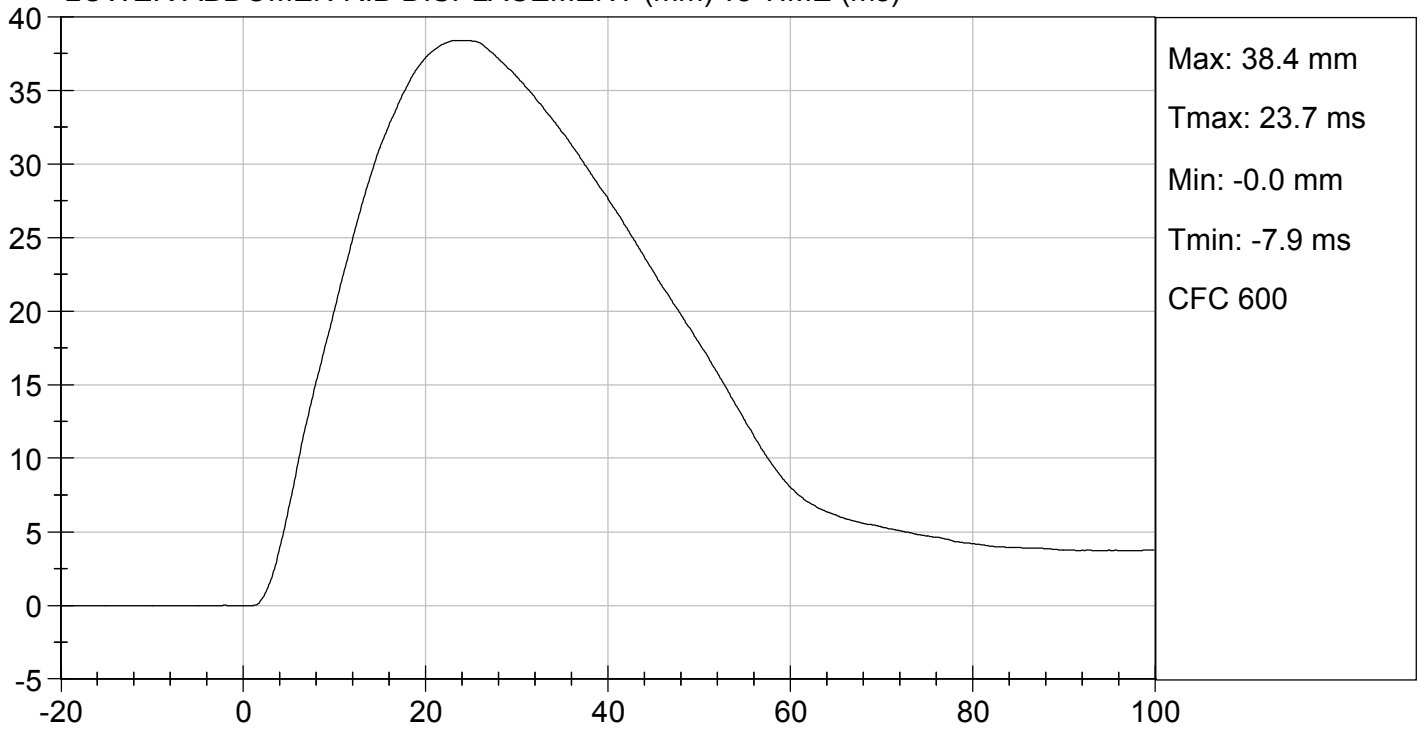
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



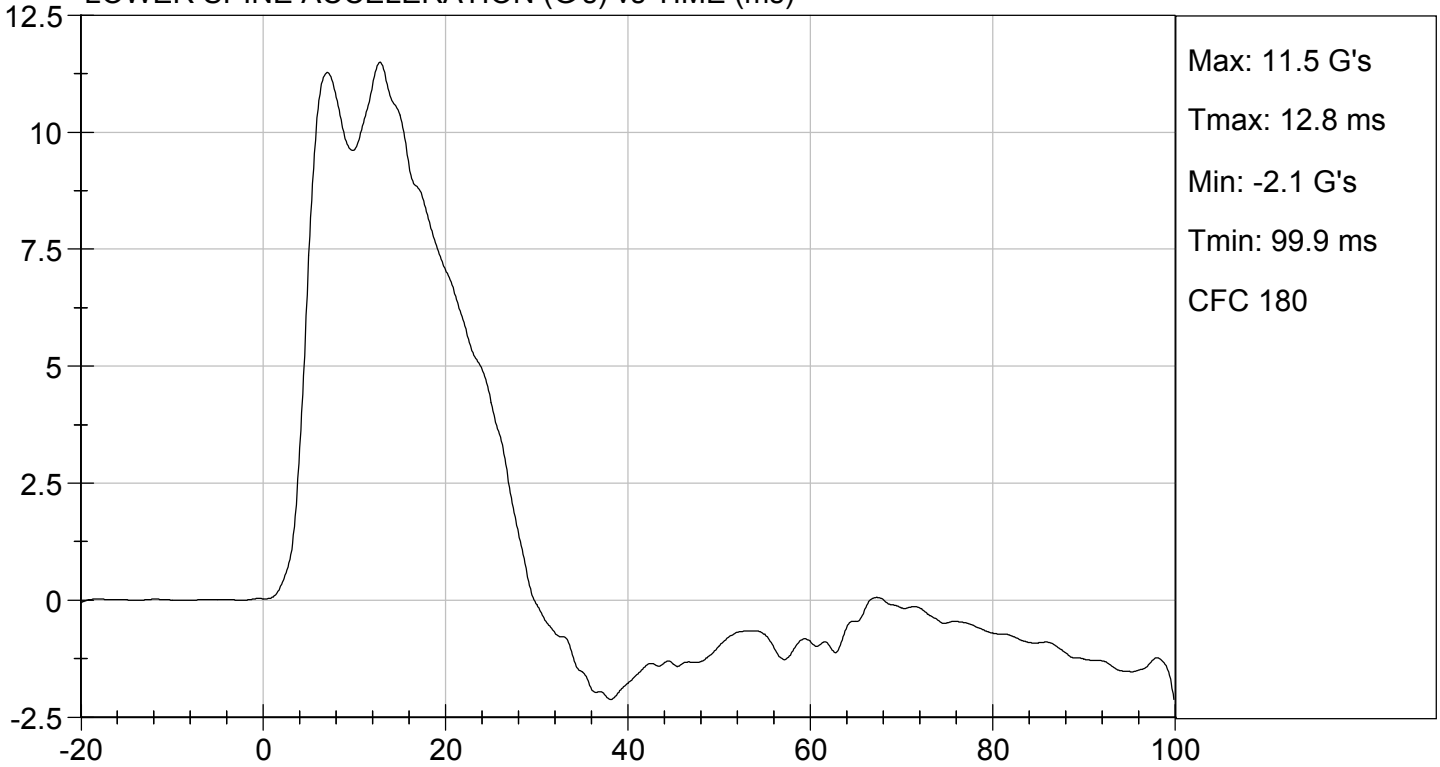
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/06/2021
TEST #: D210046

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:** D210047

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	40	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	38	Pass
Peak Acetabulum Force	N	3600 to 4300	3,810	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

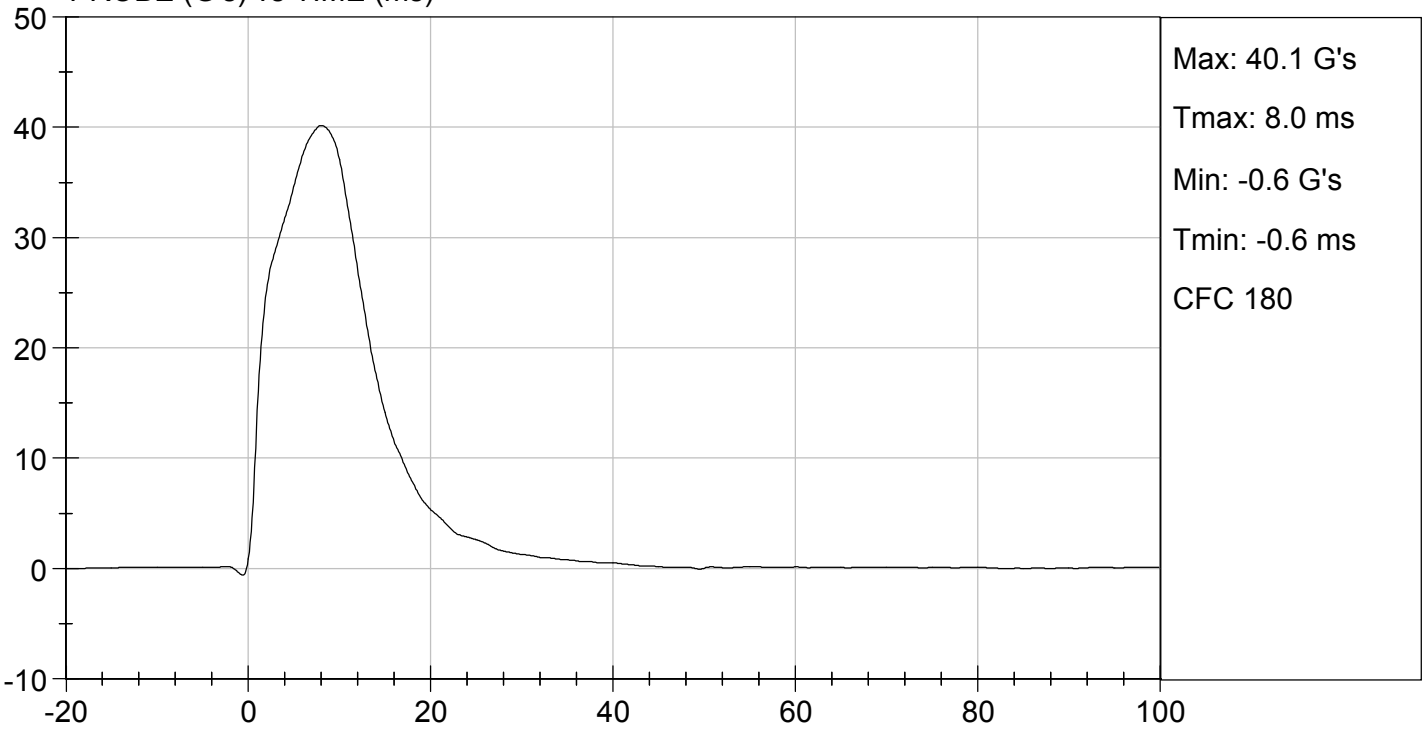
01/06/2021
Test Date

Approved By

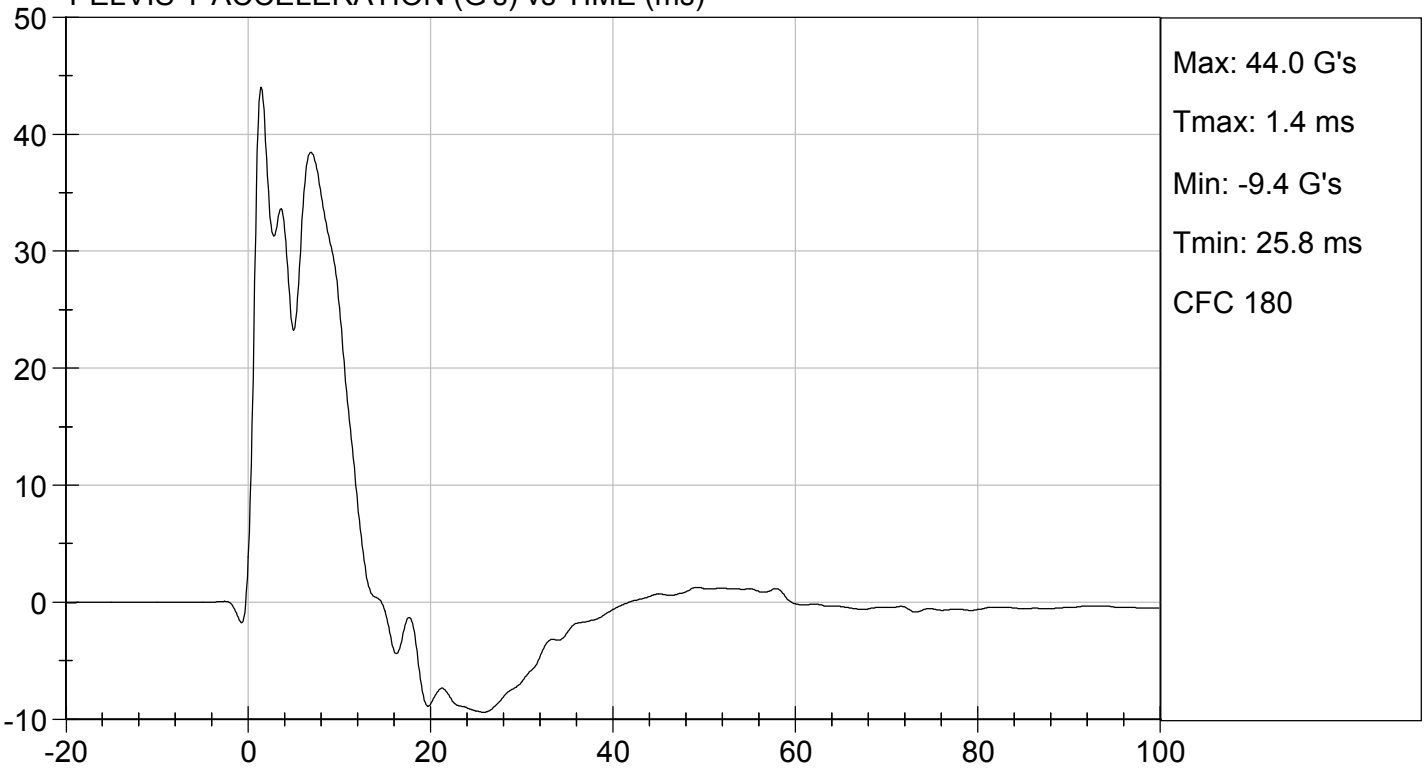
TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 01/06/2021
TEST #: D210047

PROBE (G's) vs TIME (ms)

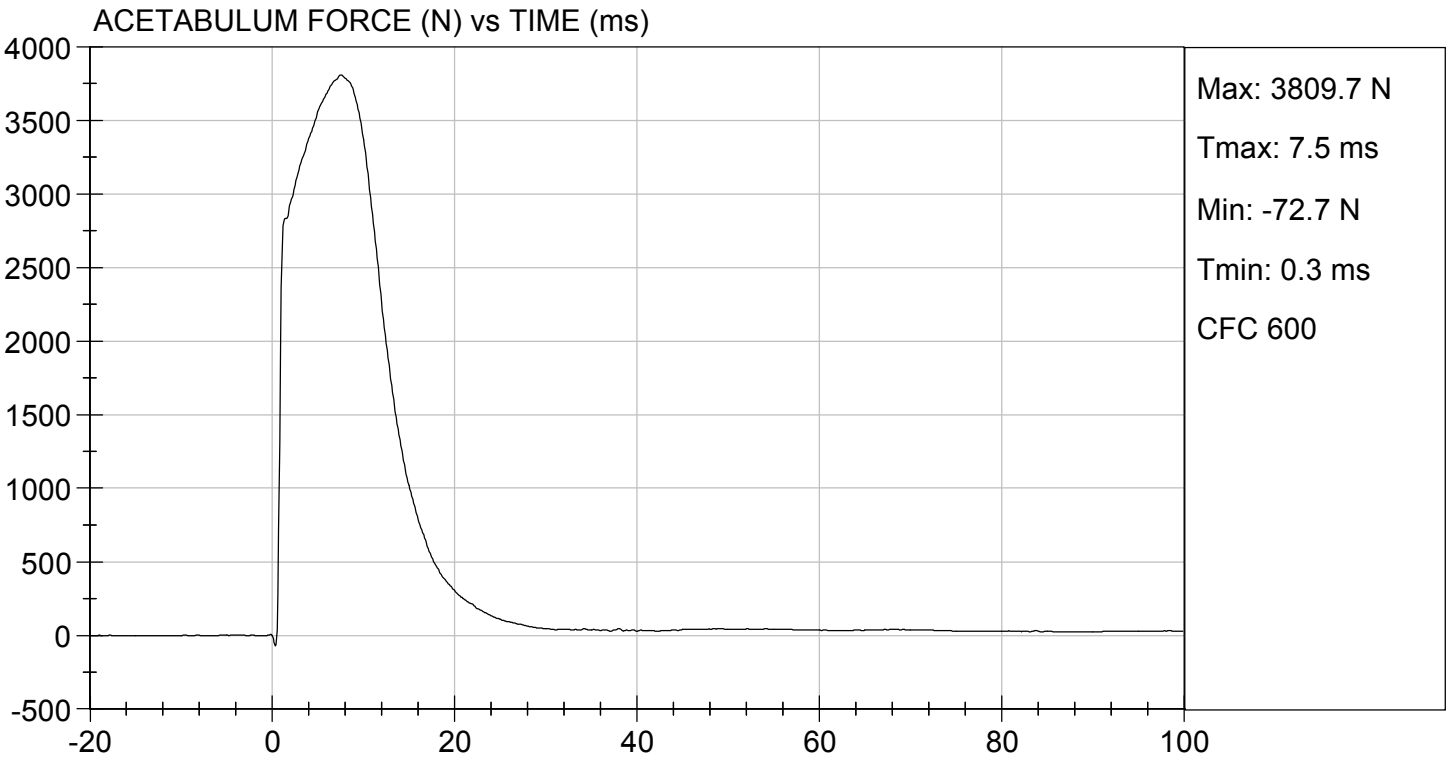


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 01/06/2021
TEST #: D210047



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210048

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	36	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,892	Pass
		Overall Test Results		Pass

Gerald Guerrero
Laboratory Technician

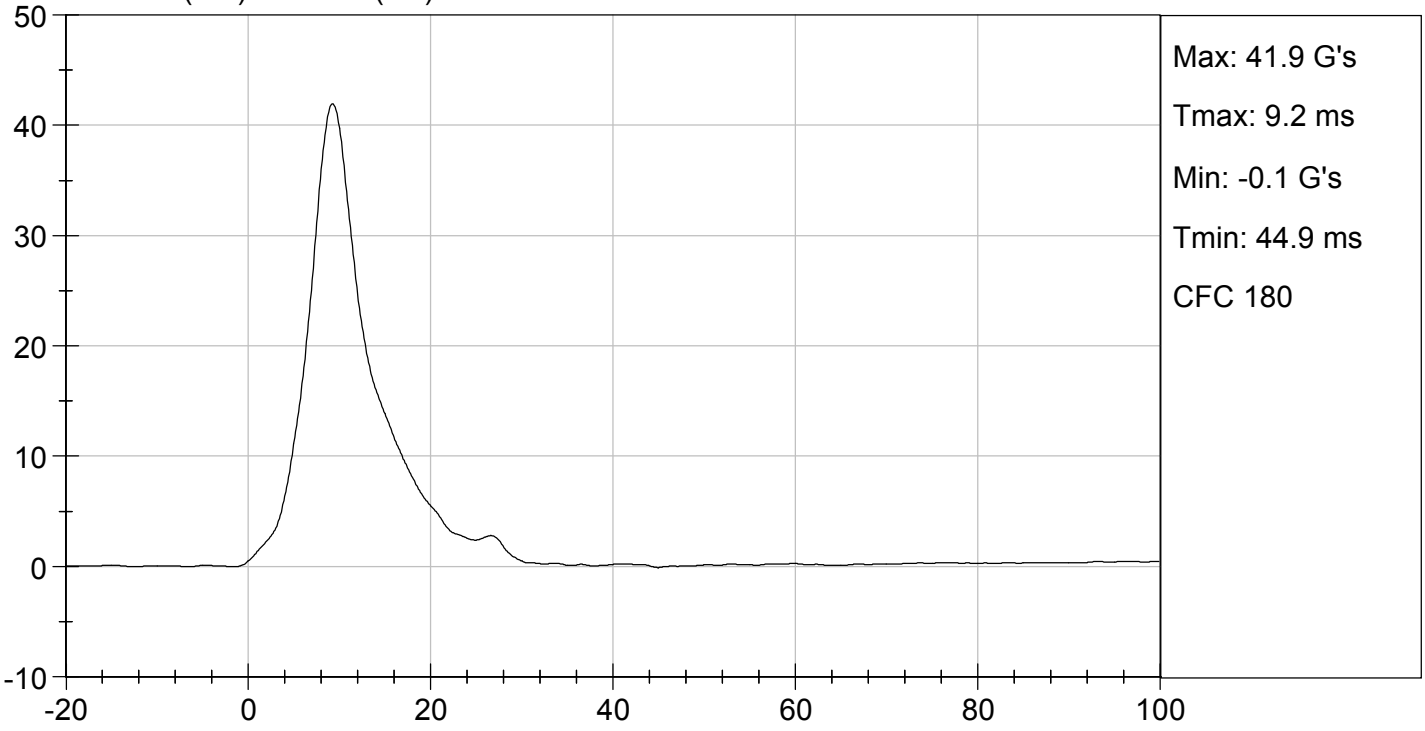
01/07/2021
Test Date

Approved By

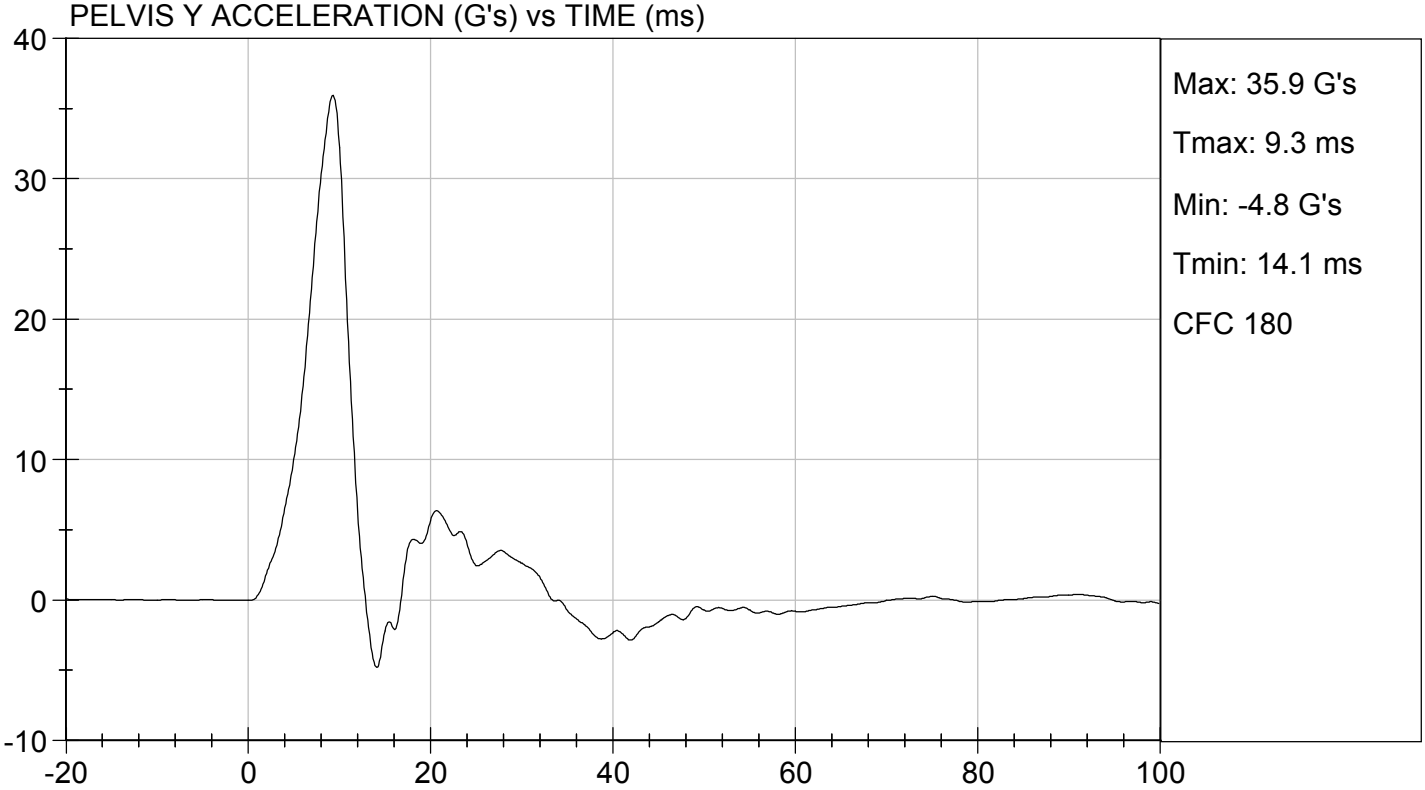
TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/07/2021
TEST #: D210048

PROBE (G's) vs TIME (ms)

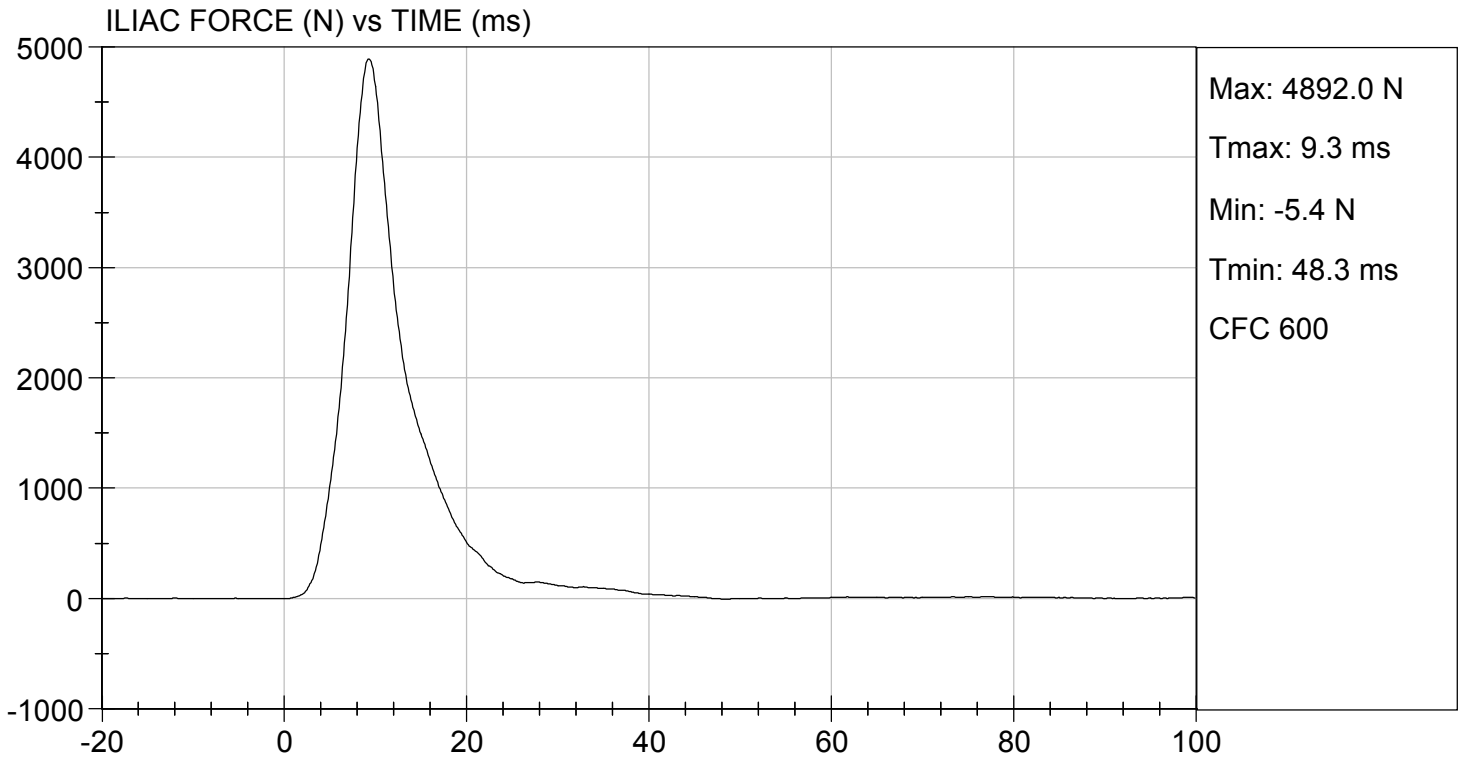


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 01/07/2021
TEST #: D210048



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER 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:** D210311

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	14	Pass
Peak Resultant Acceleration	G's	115 to 137	132	Pass
Peak Longitudinal Acceleration	G's	+/- 15	3.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

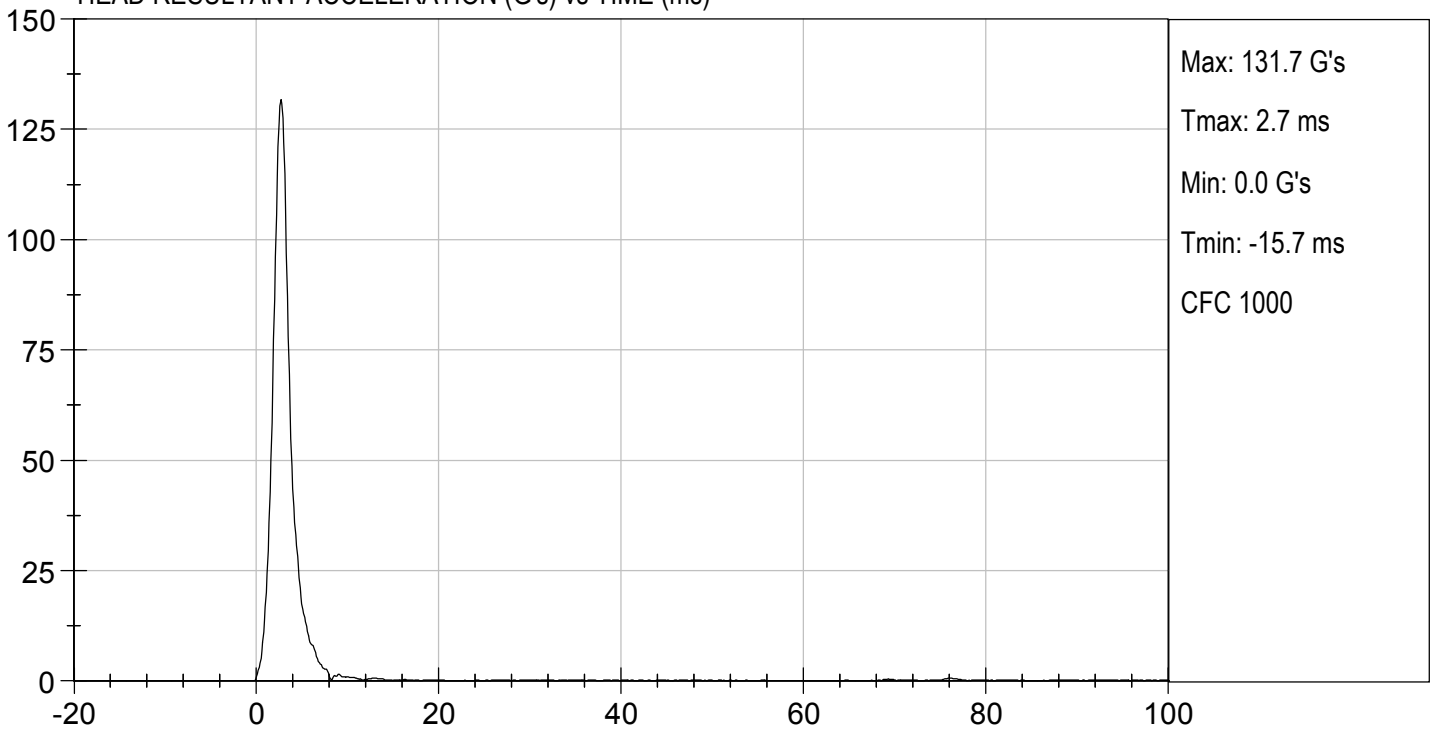
02/08/2021
Test Date

Approved By

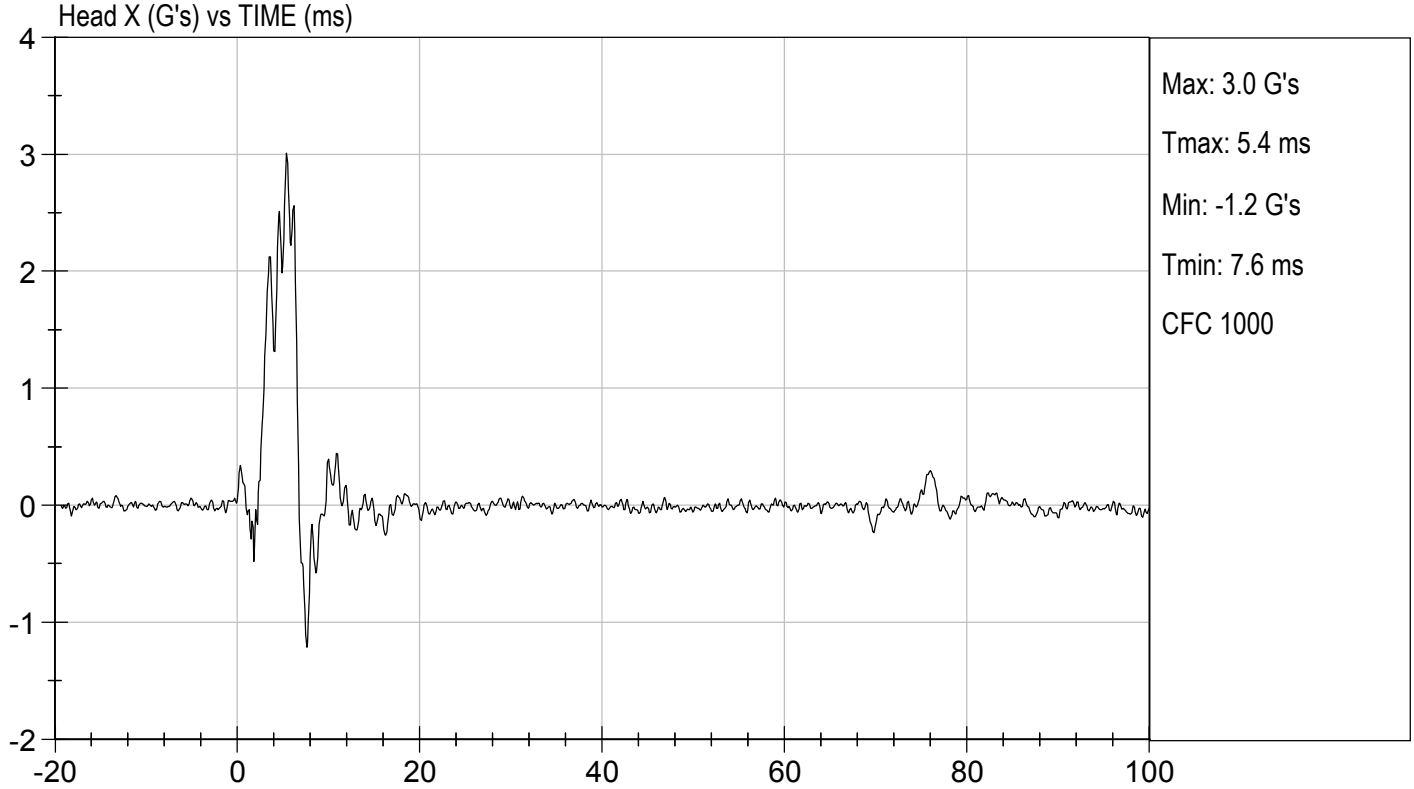
TEST DESC: HEAD DROP

TEST DATE: 02/08/2021
TEST #: D210311

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

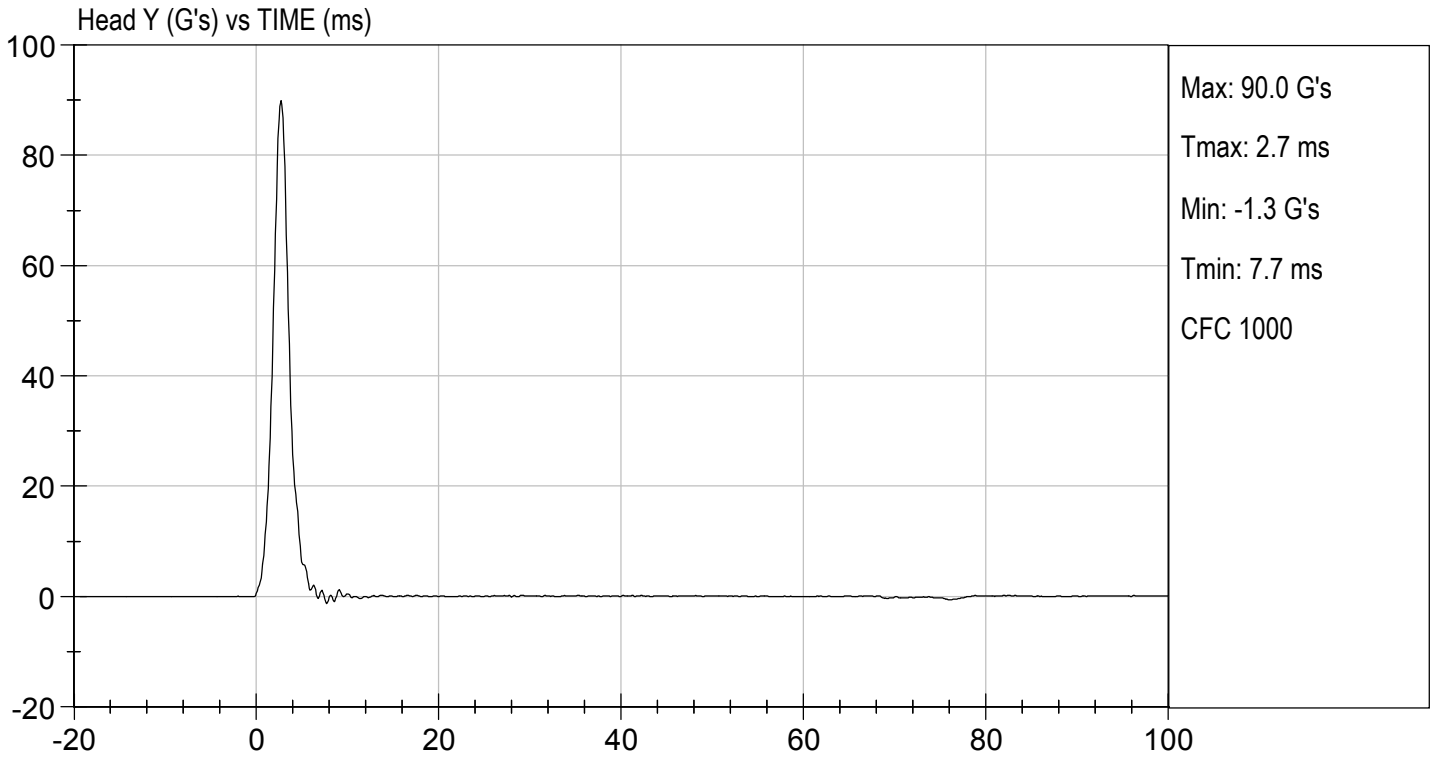


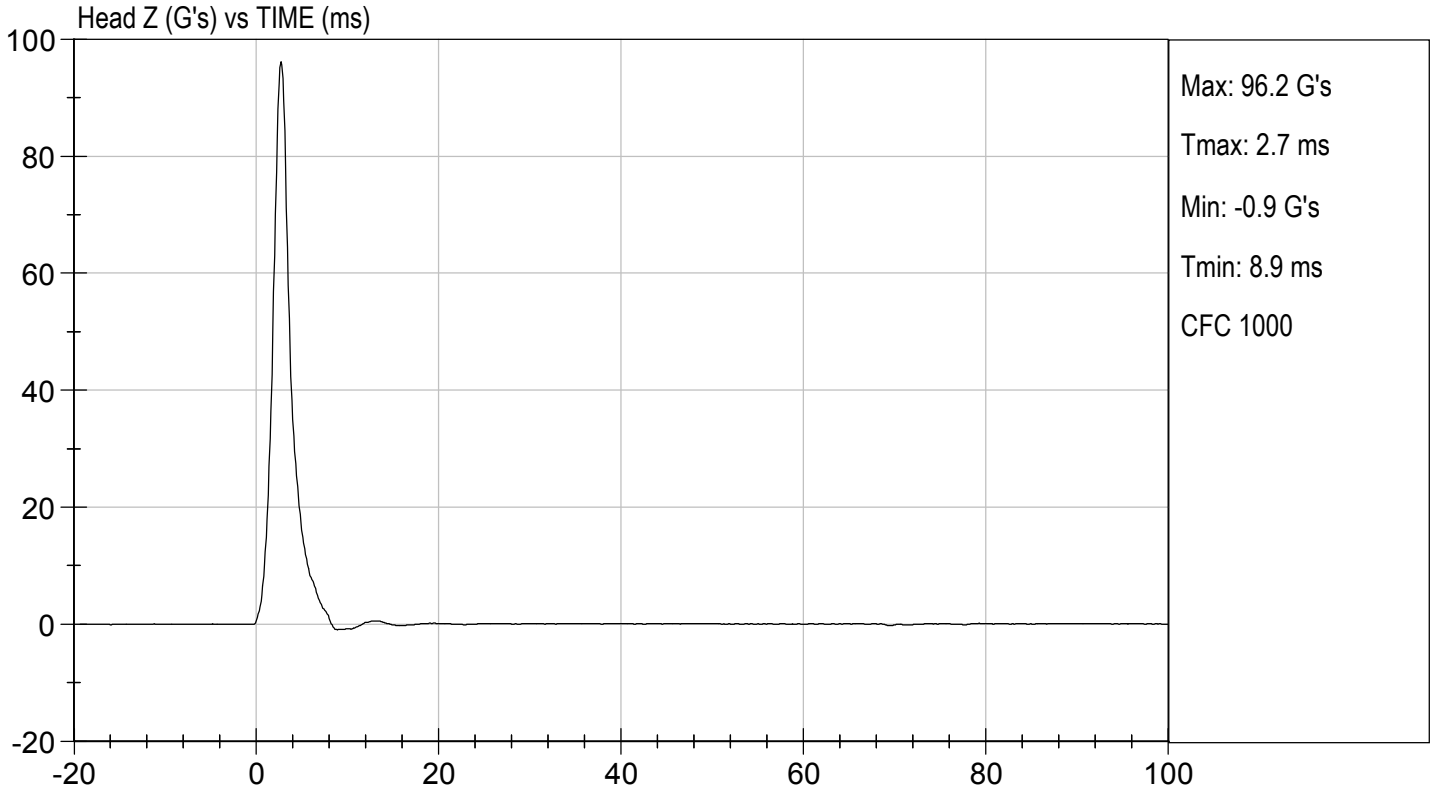
Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 02/08/2021
TEST #: D210311





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210312

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.0	Pass
Humidity		%	10 to 70	14	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.58	Pass
	15 ms	m/s	3.30 to 4.10	3.70	Pass
	20 ms	m/s	4.40 to 5.40	5.06	Pass
	25 ms	m/s	5.40 to 6.10	5.74	Pass
	25-100 ms	m/s	5.50 to 6.20	5.75	Pass
Maximum D-Plane Rotation		deg	71 to 81	74	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-38	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
			Overall Test Results		Pass

Laboratory Technician

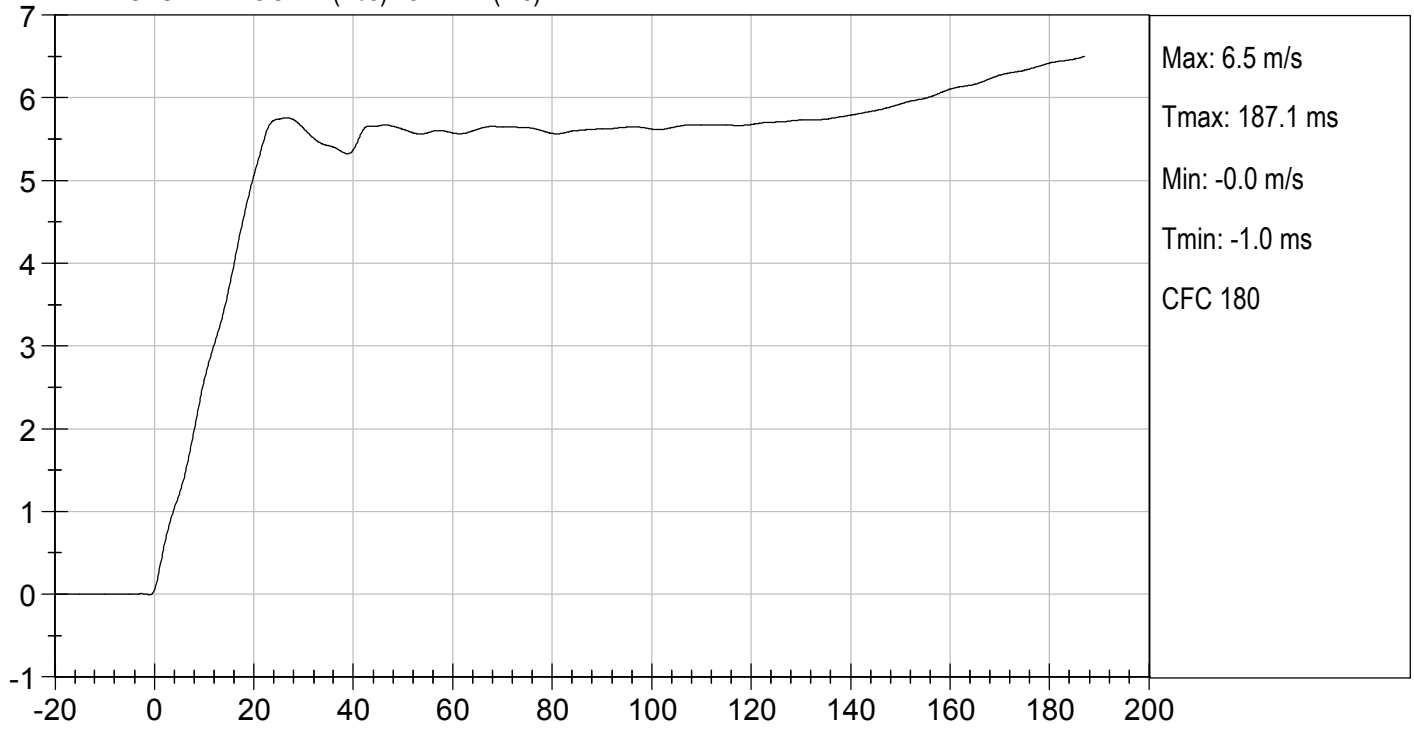
02/08/2021
Test Date

Approved By

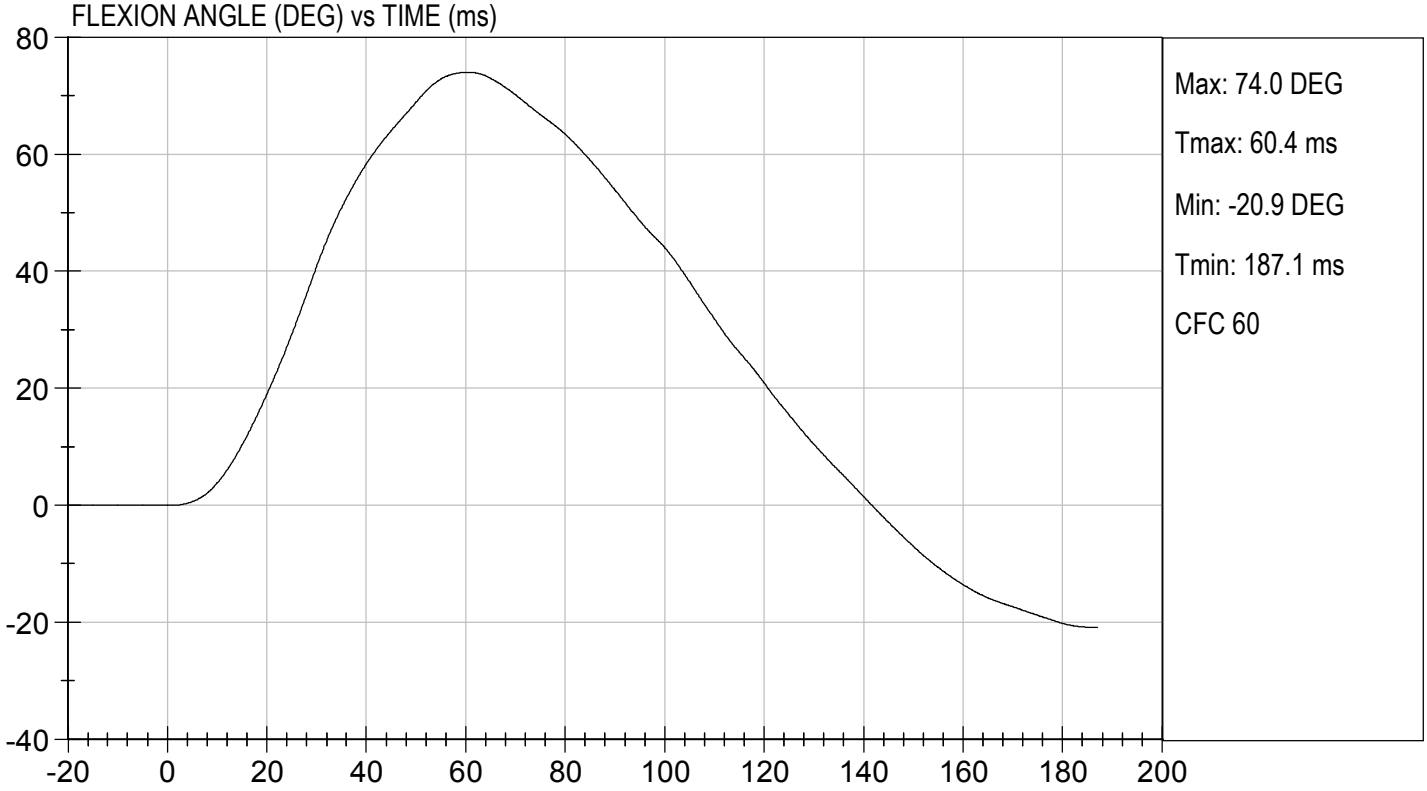
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 02/08/2021
TEST #: D210312

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

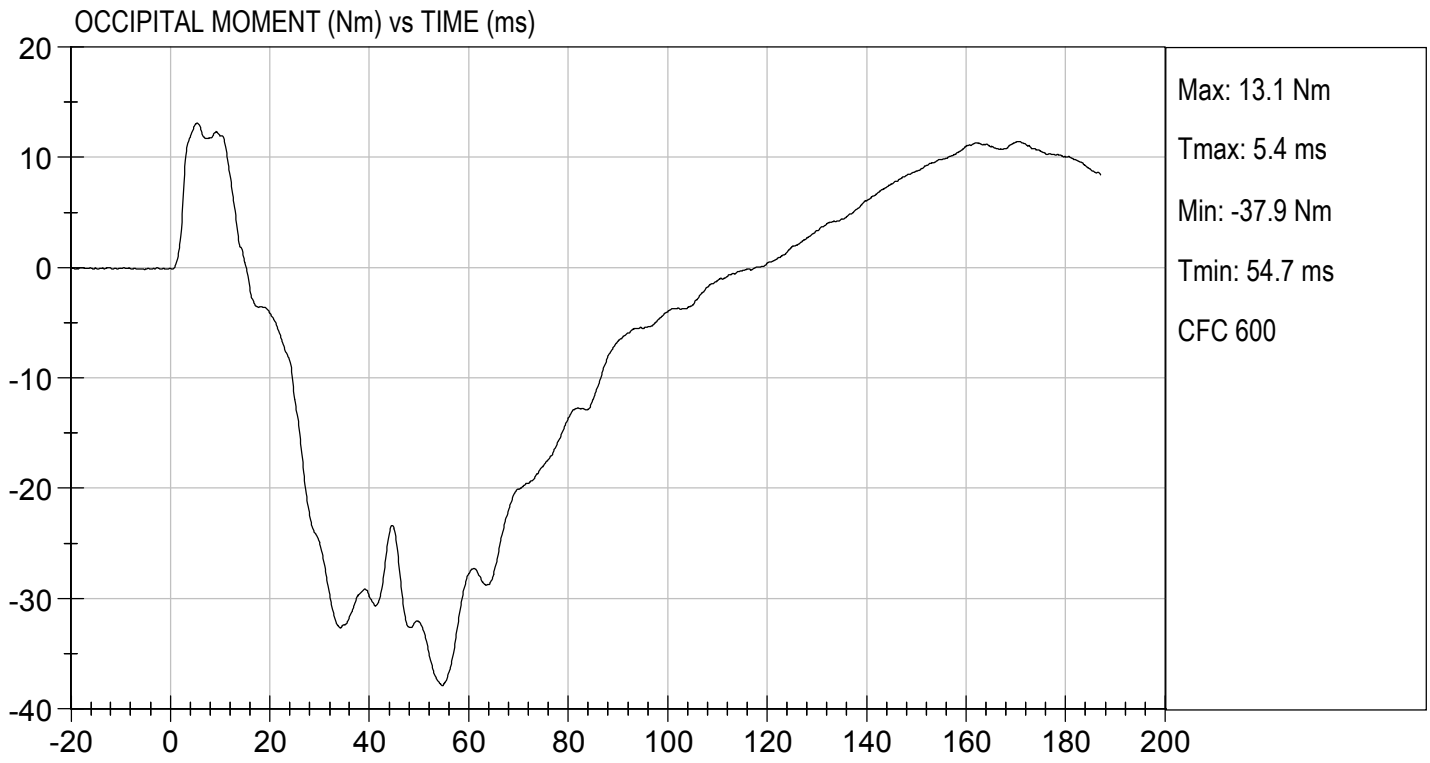


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 02/08/2021
TEST #: D210312



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test ID:** D210313

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
		Overall Test Results		Pass

Laboratory Technician

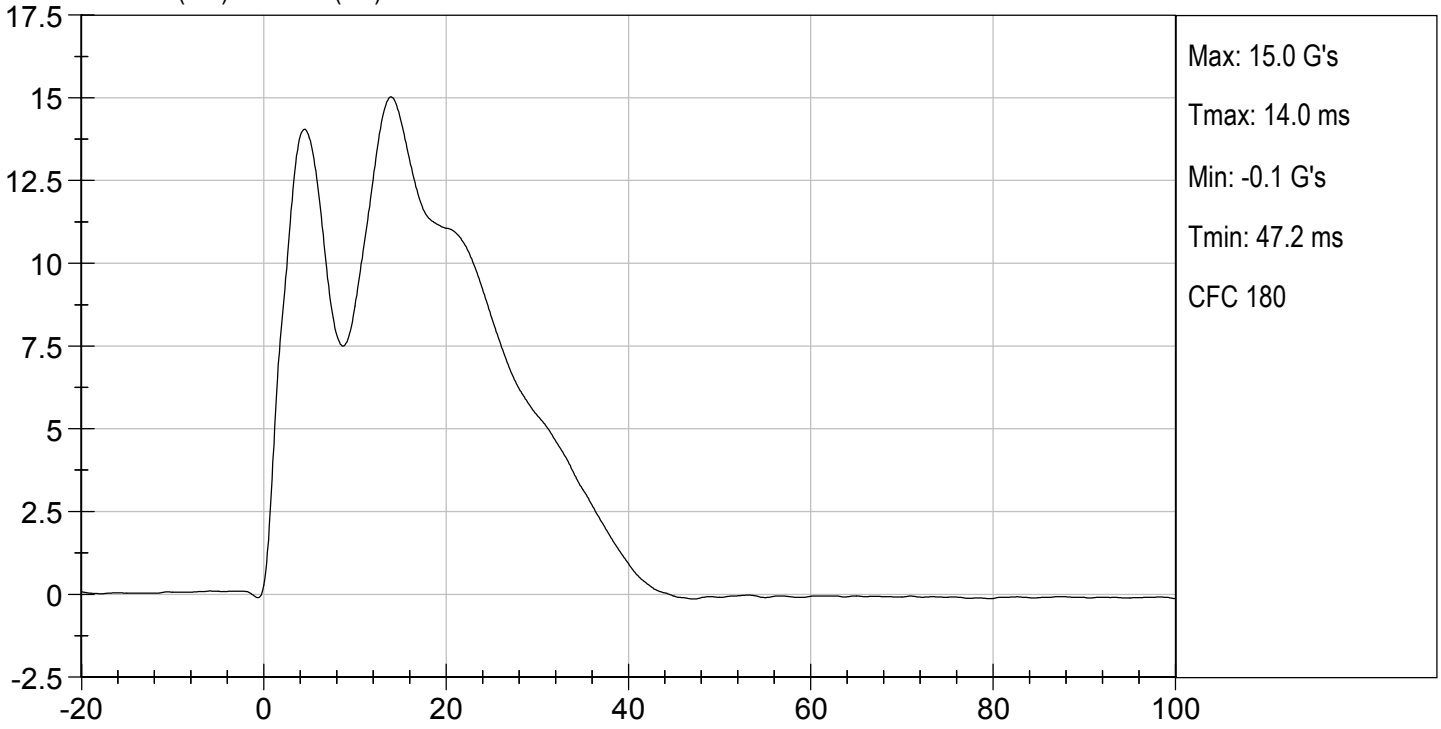
02/08/2021
Test Date

Approved By

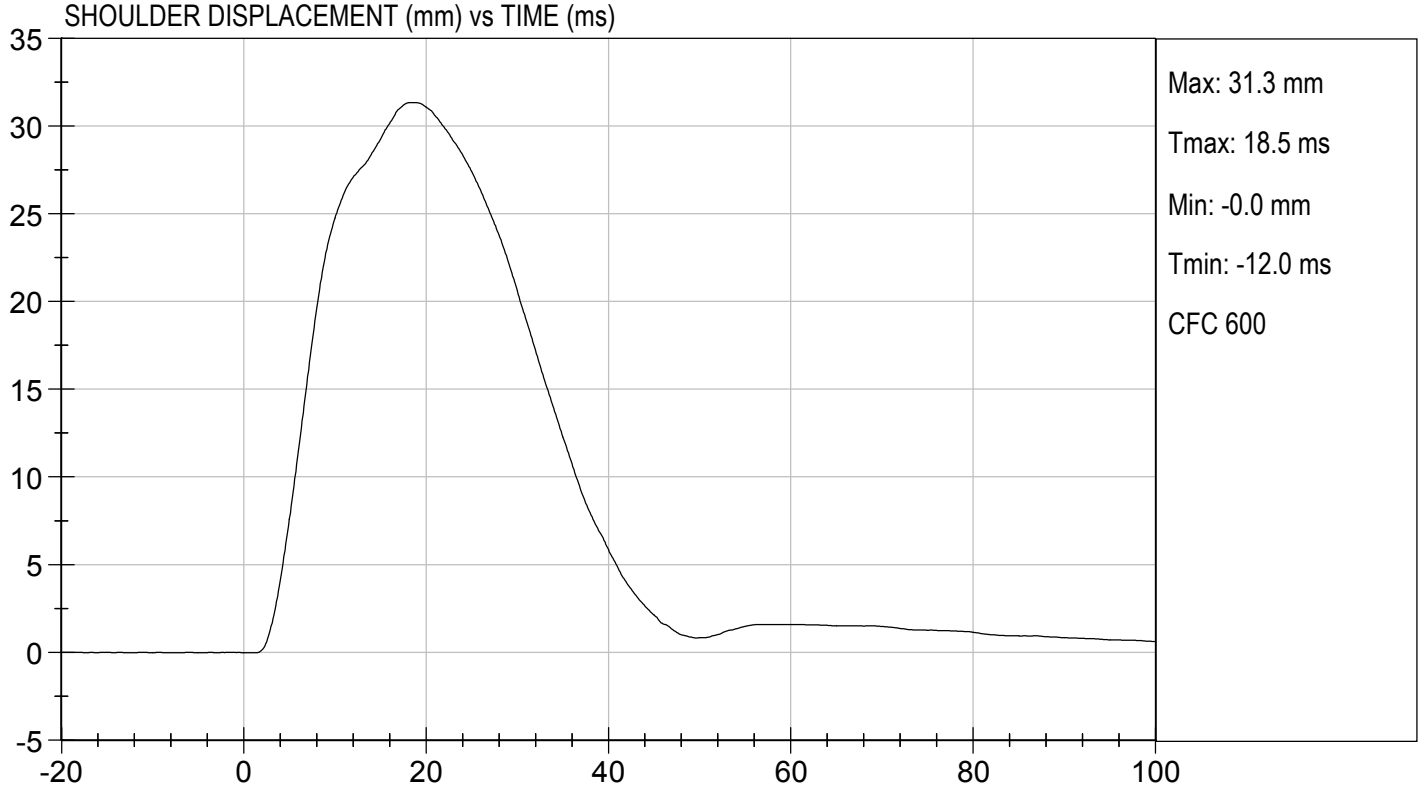
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/08/2021
TEST #: D210313

PROBE (G's) vs TIME (ms)



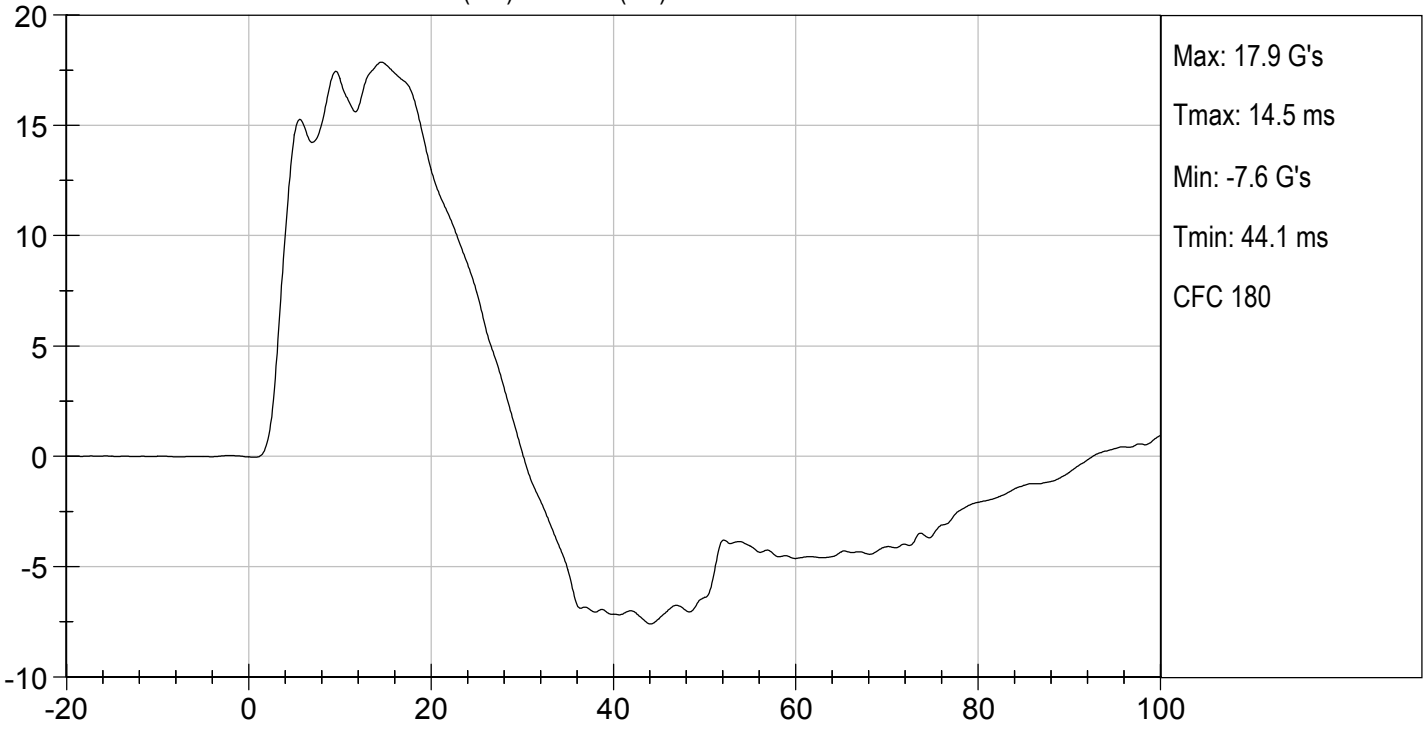
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 02/08/2021
TEST #: D210313

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



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210314

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
		Overall Test Results		Pass

Alex Thomas
Laboratory Technician

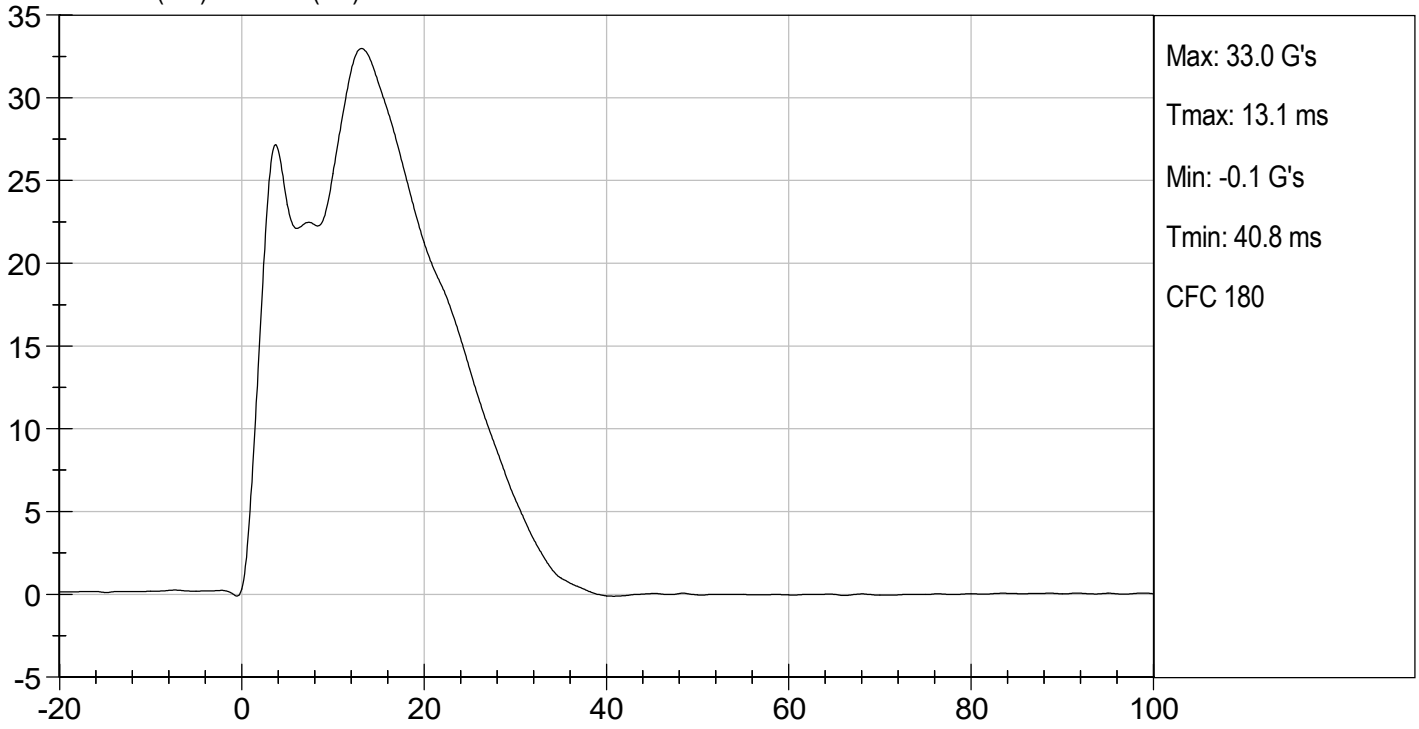
02/08/2021
Test Date

Approved By

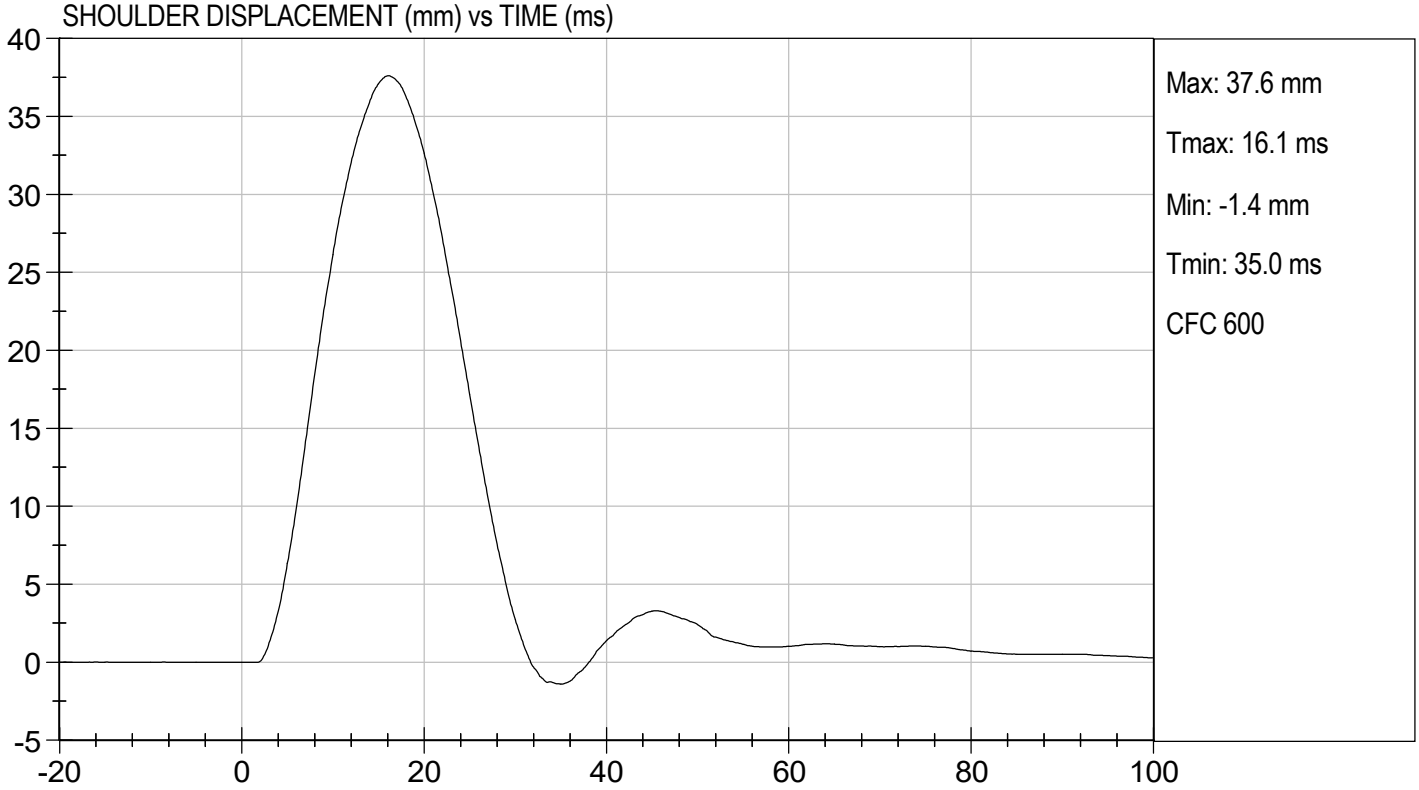
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 02/08/2021
TEST #: D210314

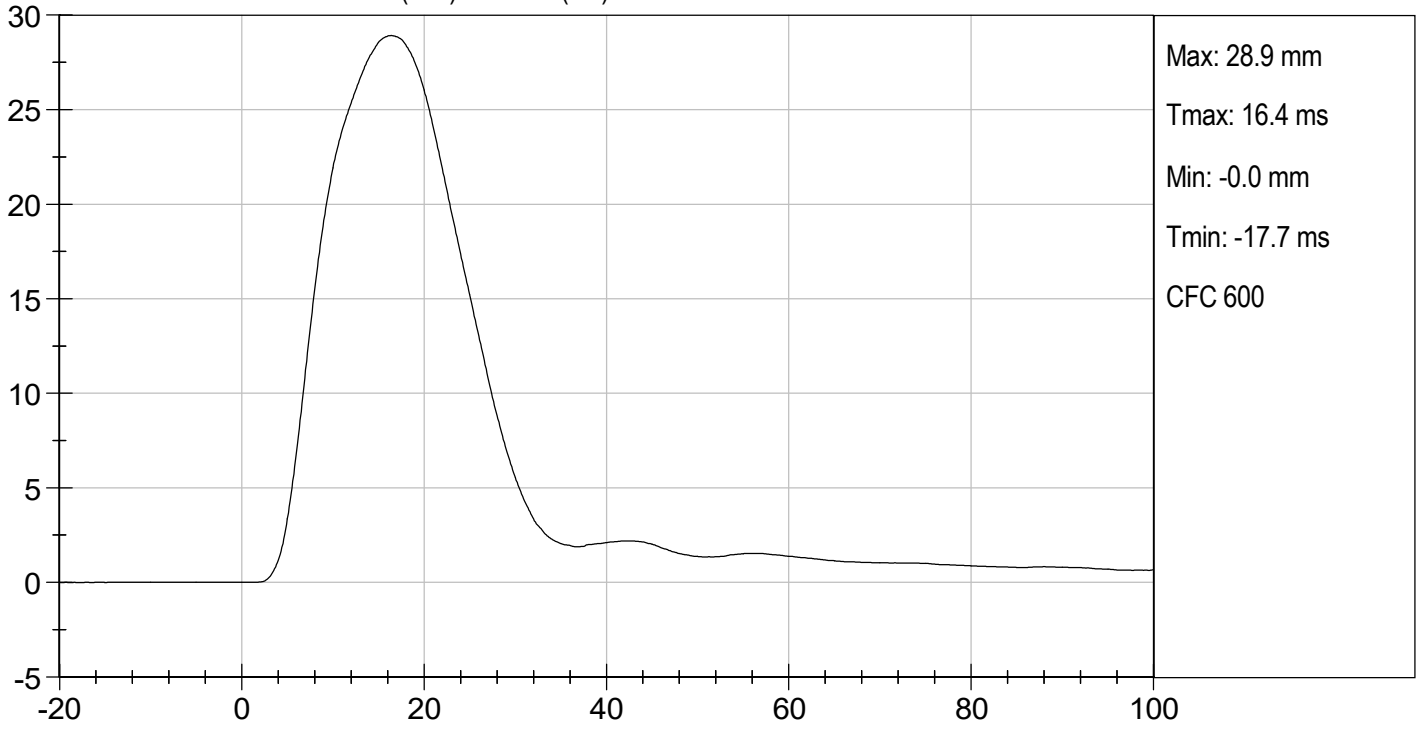
PROBE (G's) vs TIME (ms)



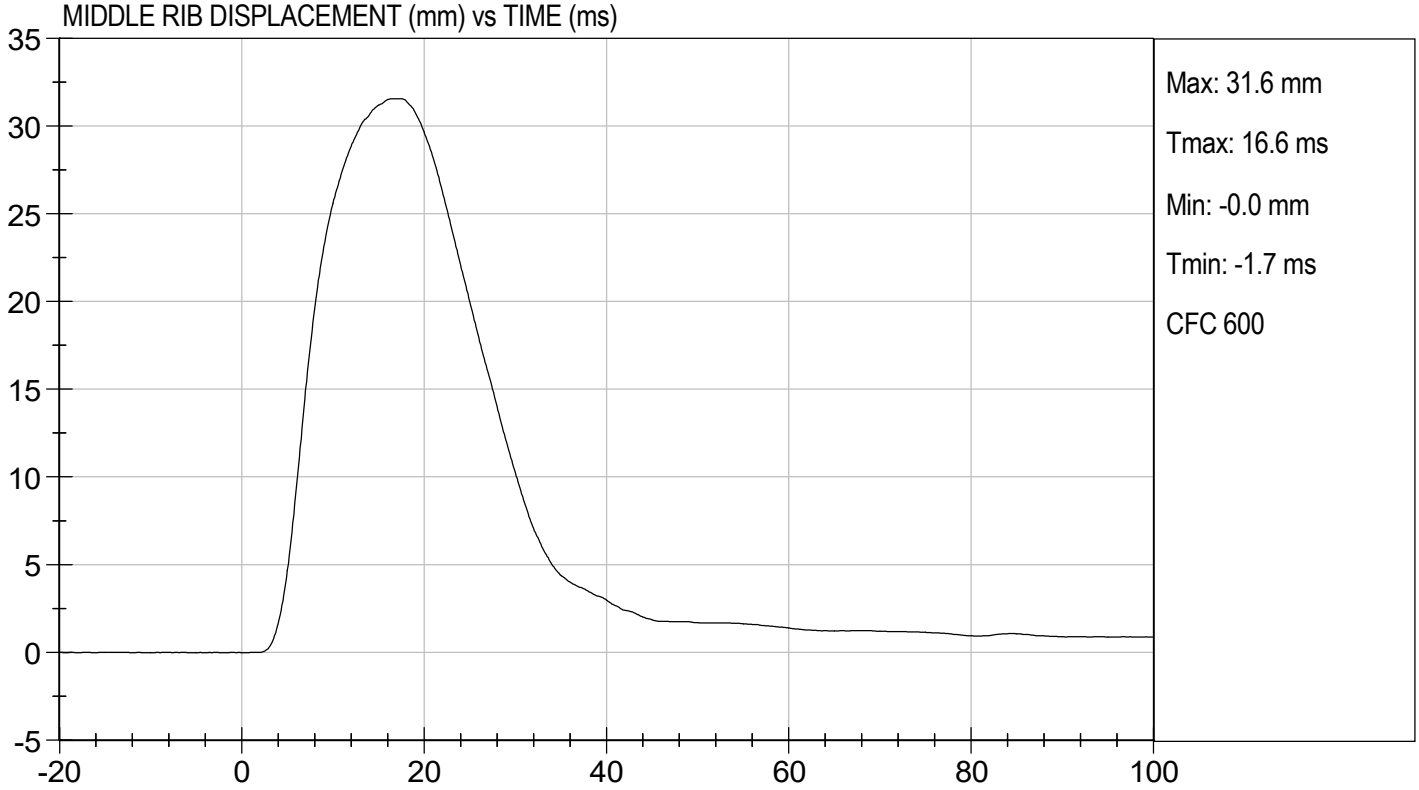
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



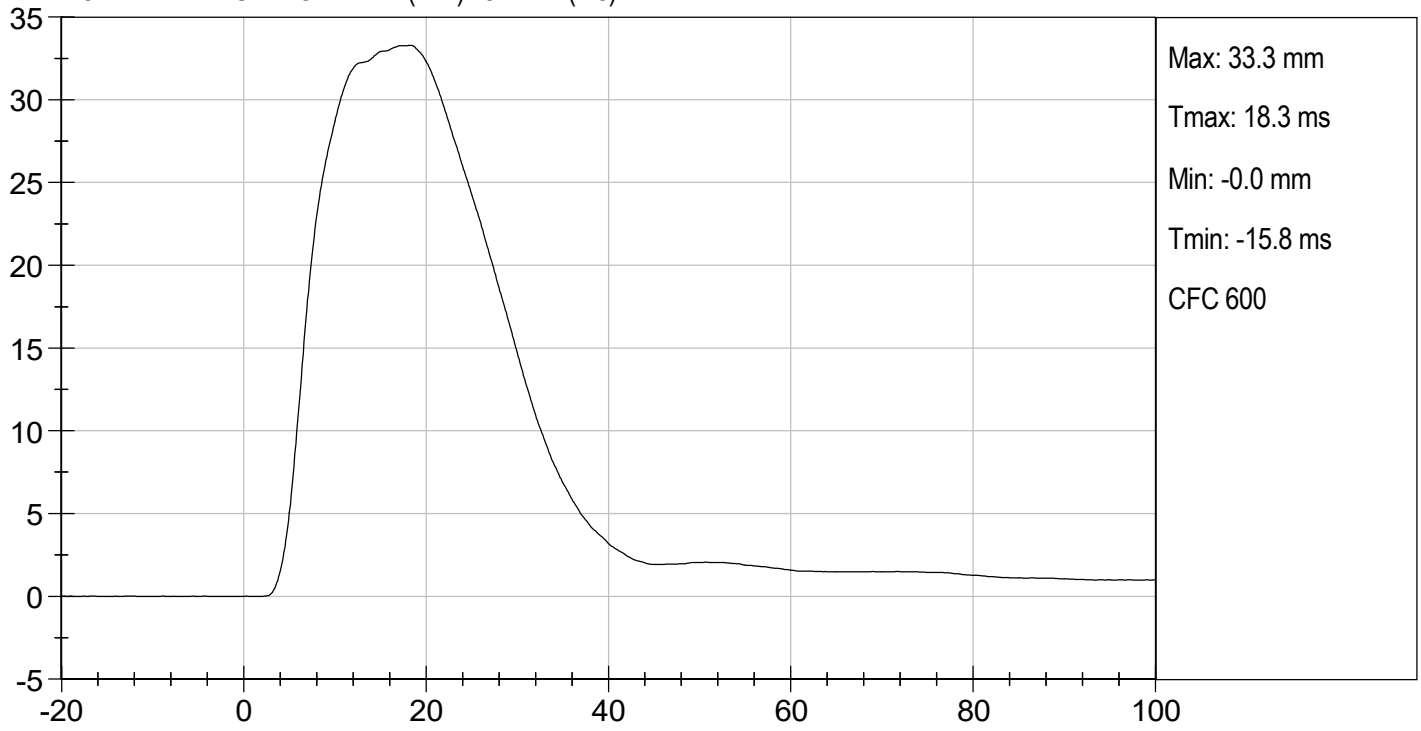
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



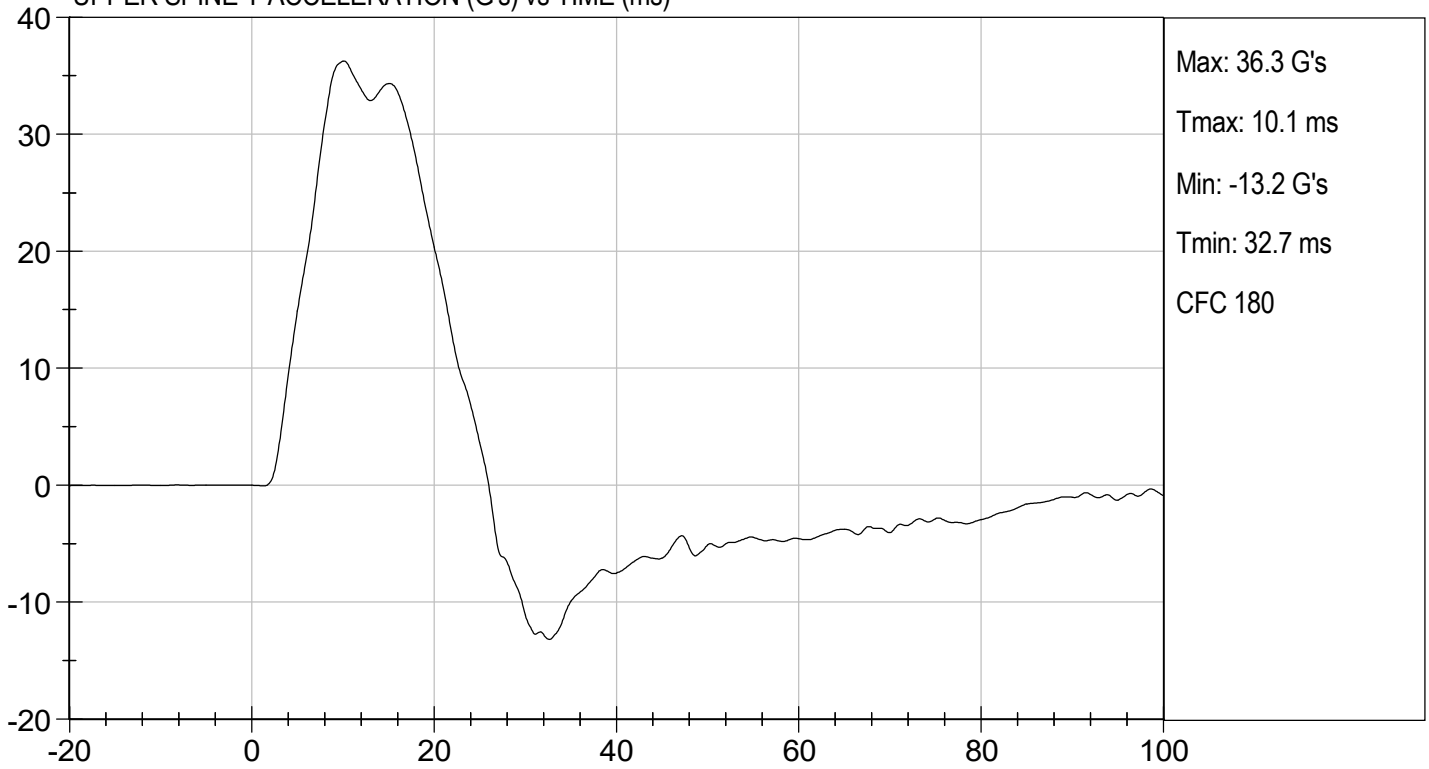
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 02/08/2021
TEST #: D210314

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

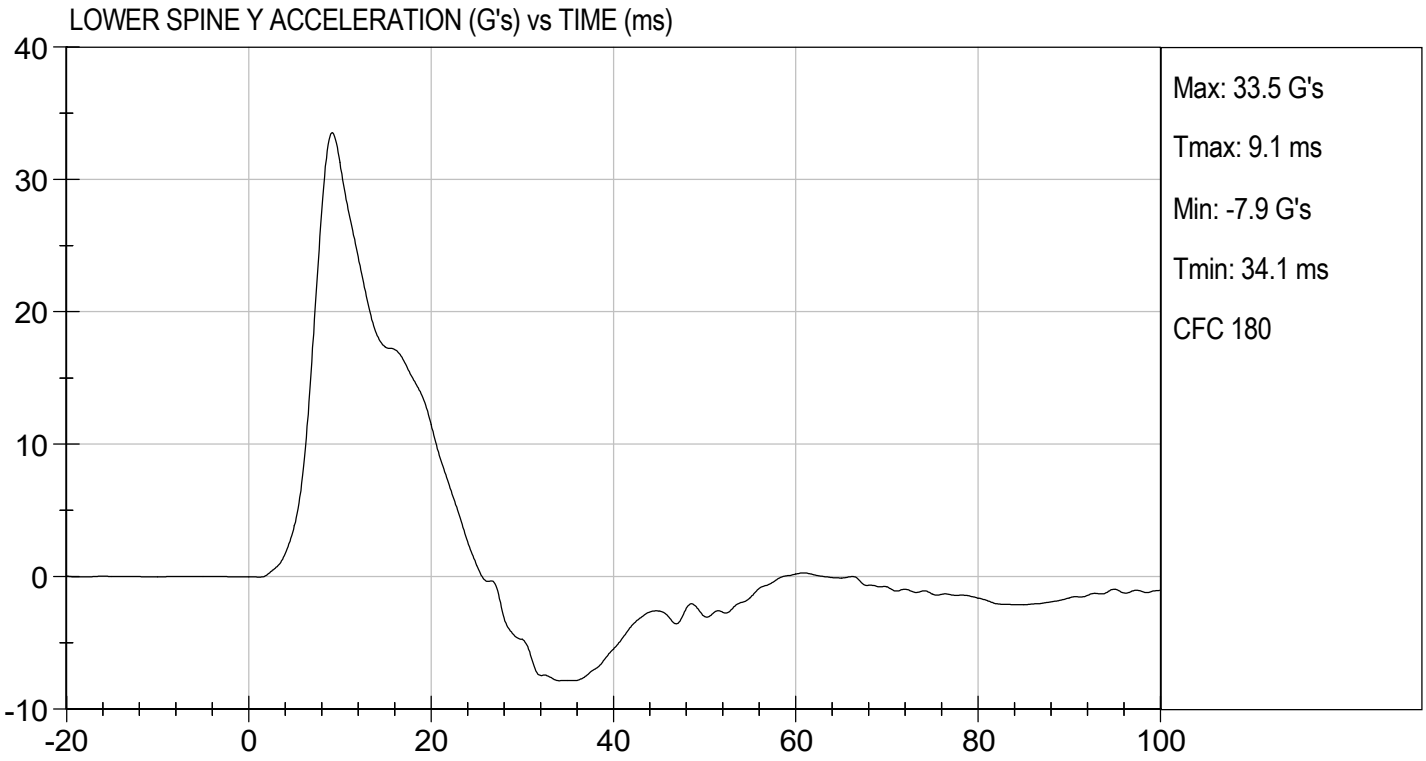


UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 02/08/2021
TEST #: D210314



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210315

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	39	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

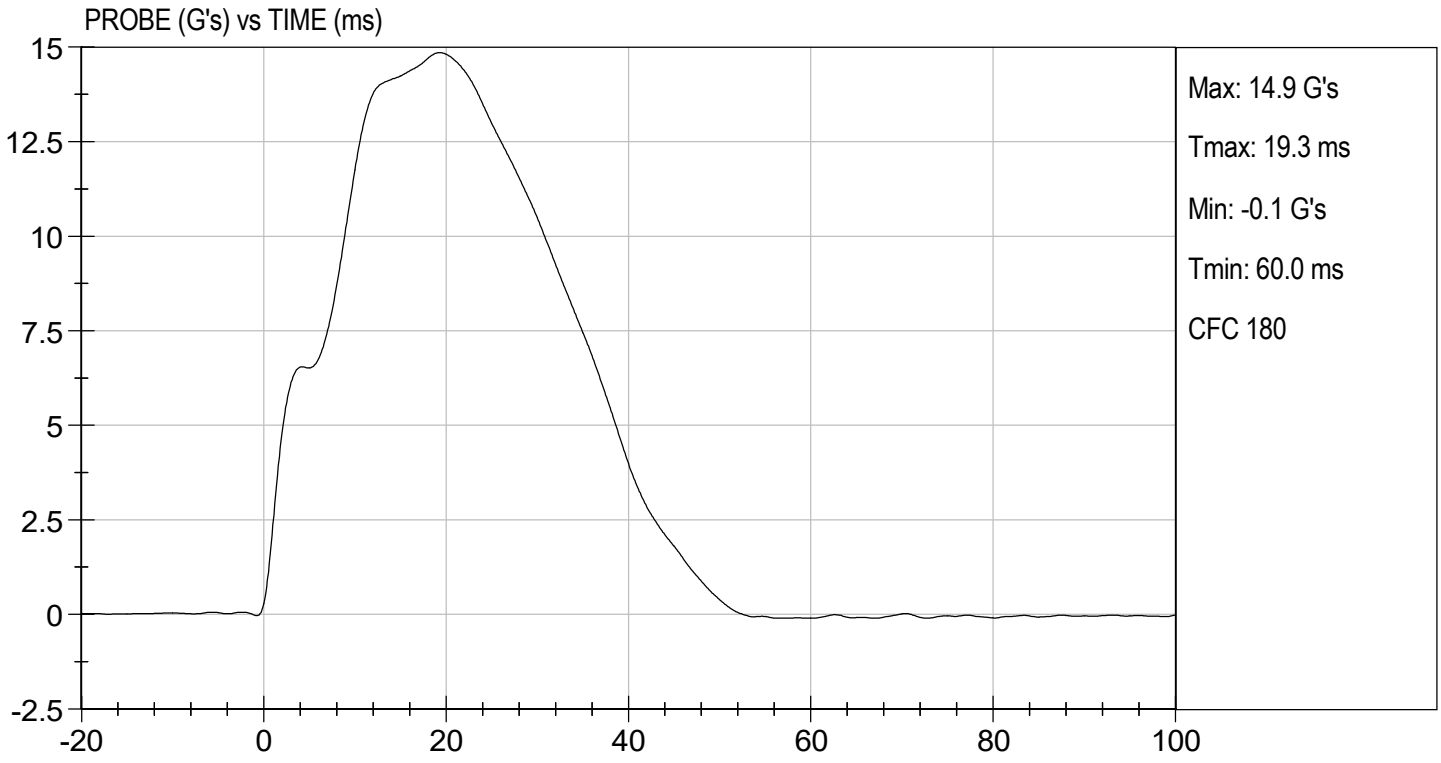
Laboratory Technician

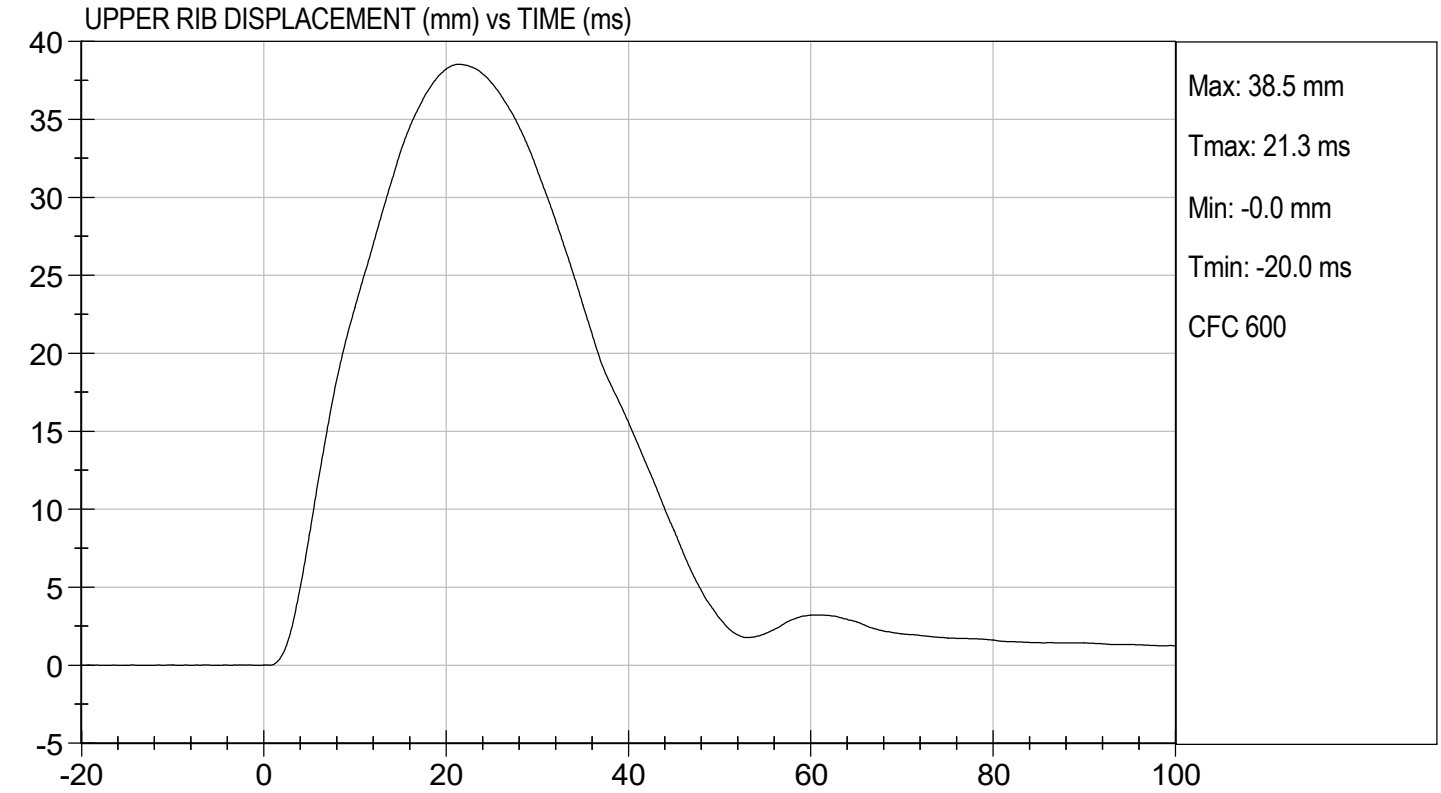
02/08/2021
Test Date

Approved By

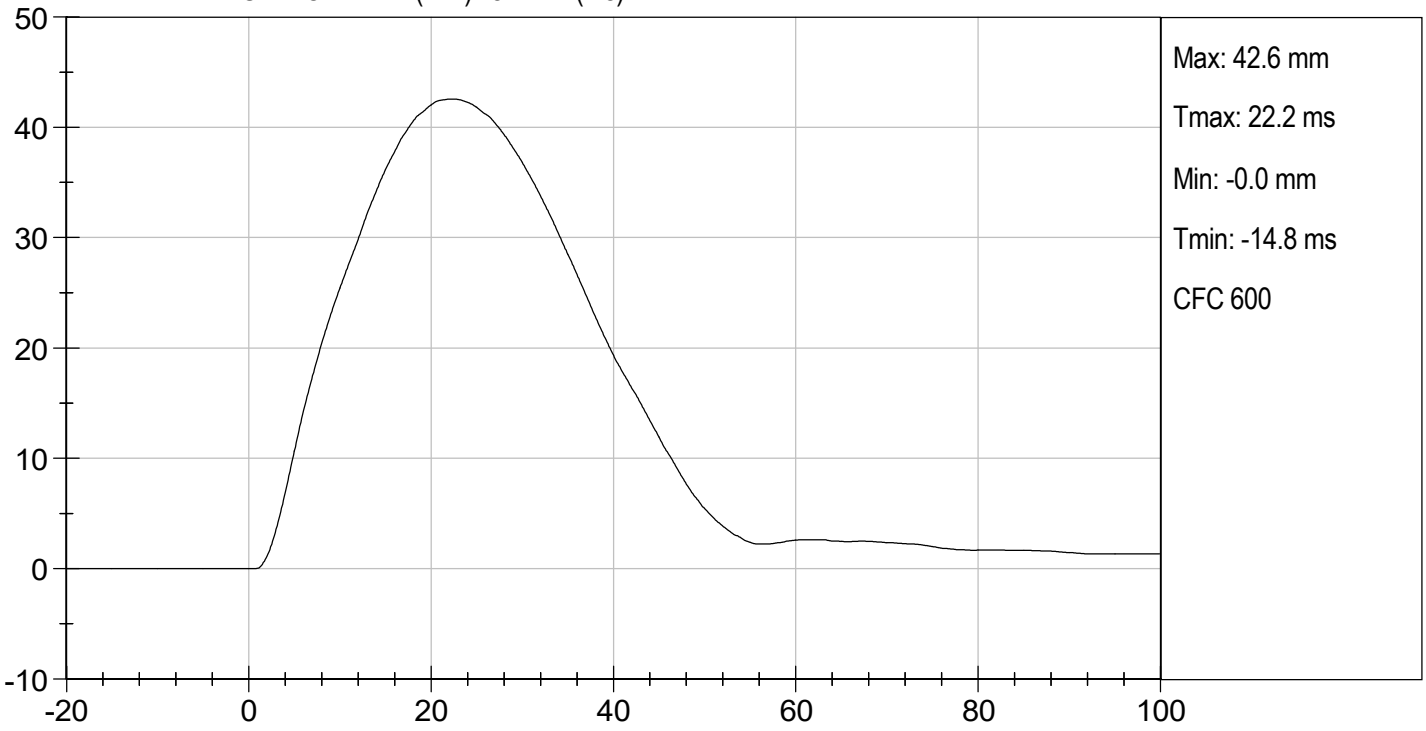
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/08/2021
TEST #: D210315

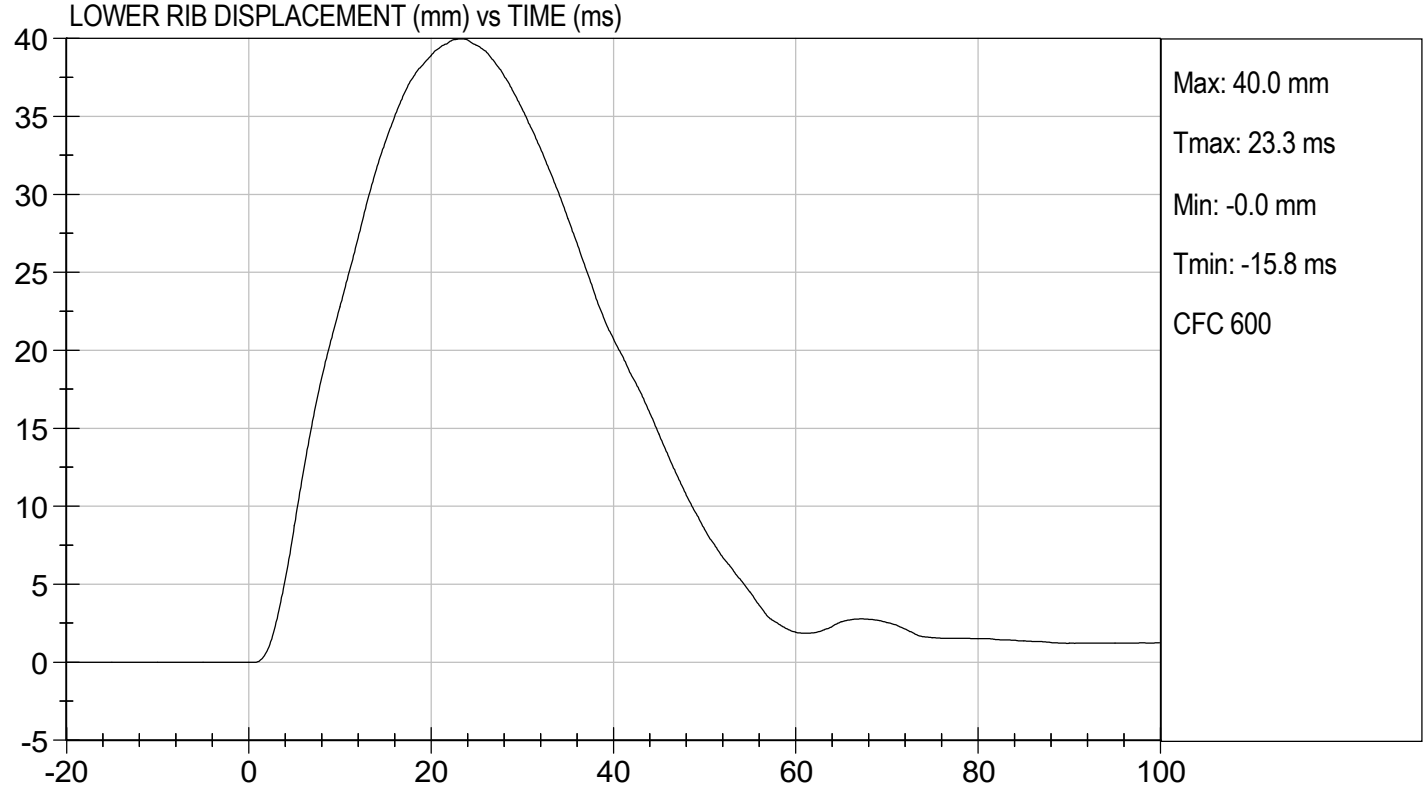




MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



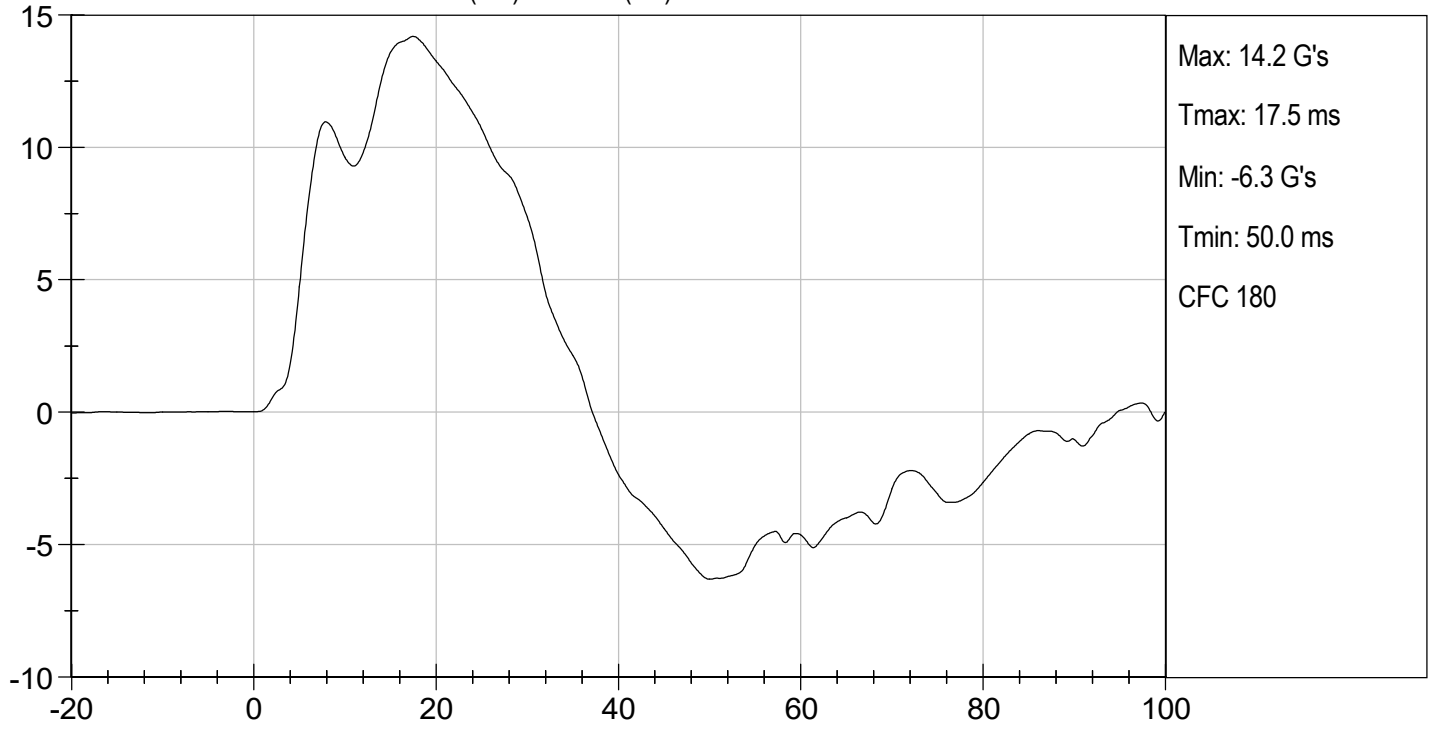
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



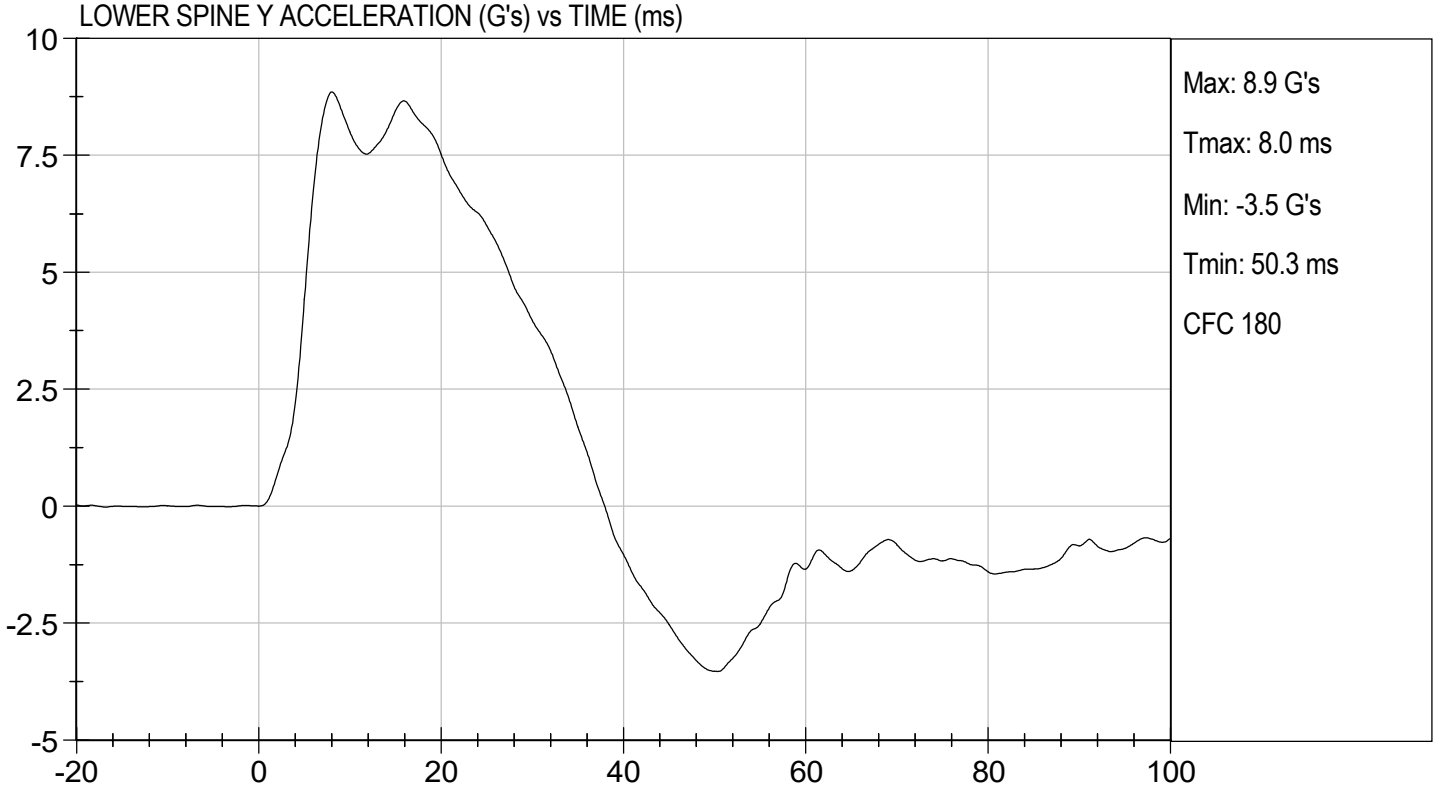
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 02/08/2021
TEST #: D210315

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:** D210316

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
		Overall Test Results		Pass

Laboratory Technician

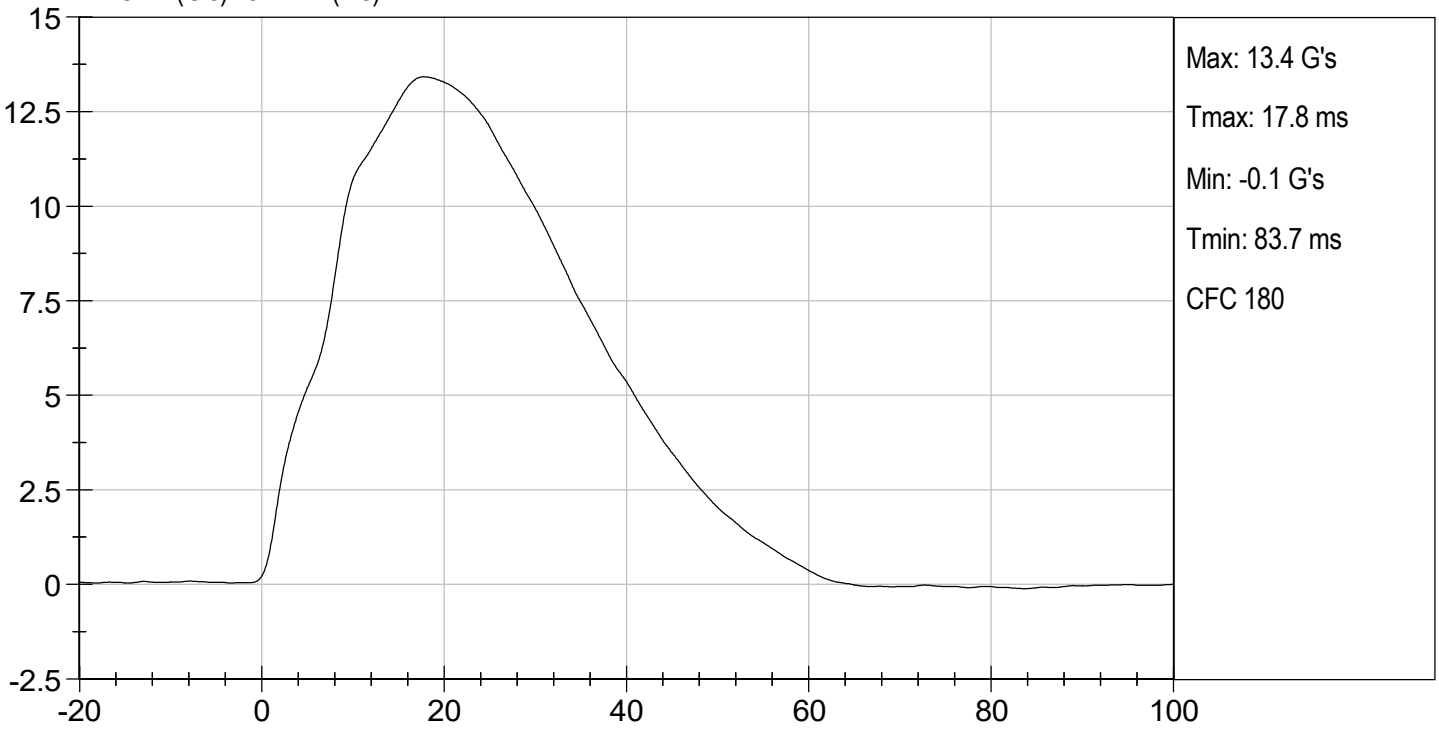
02/08/2021
Test Date

Approved By

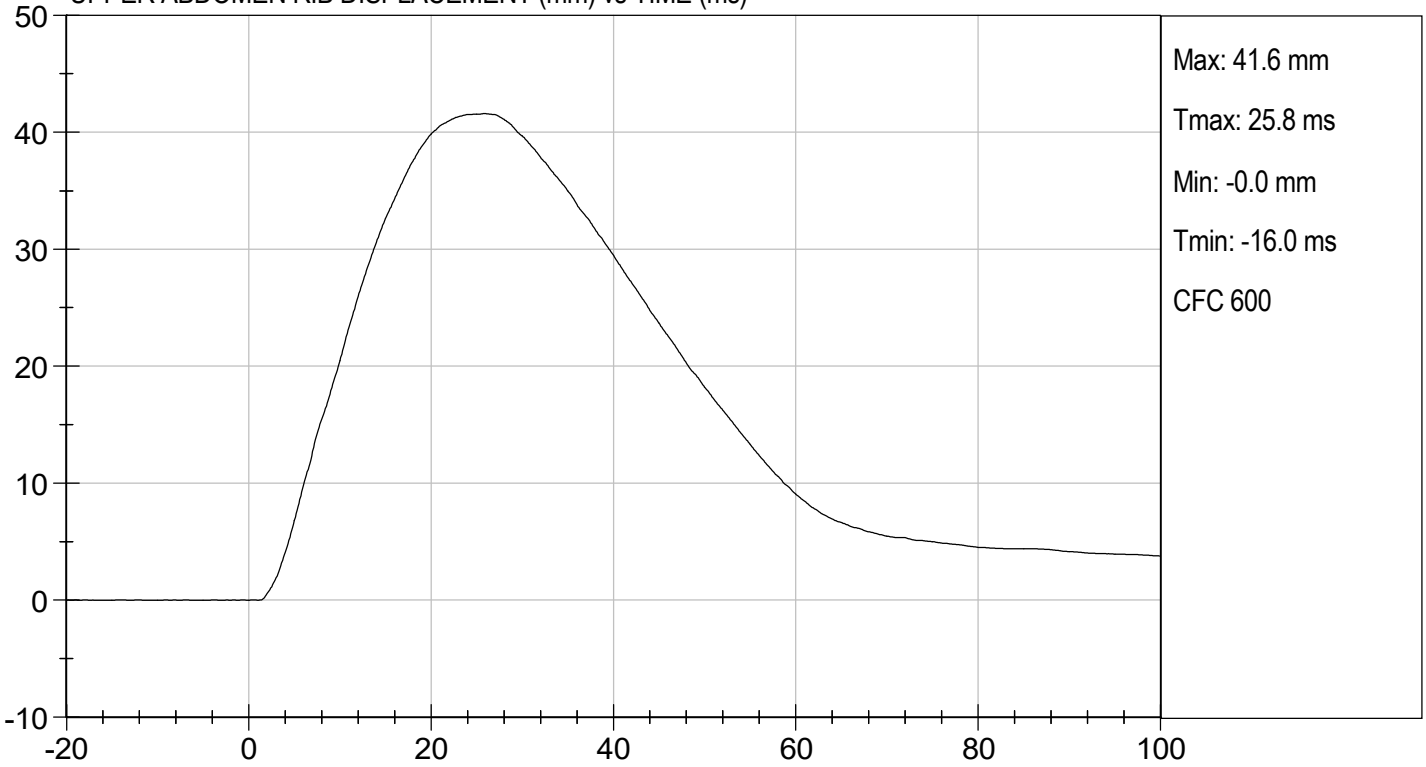
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 02/08/2021
TEST #: D210316

PROBE (G's) vs TIME (ms)



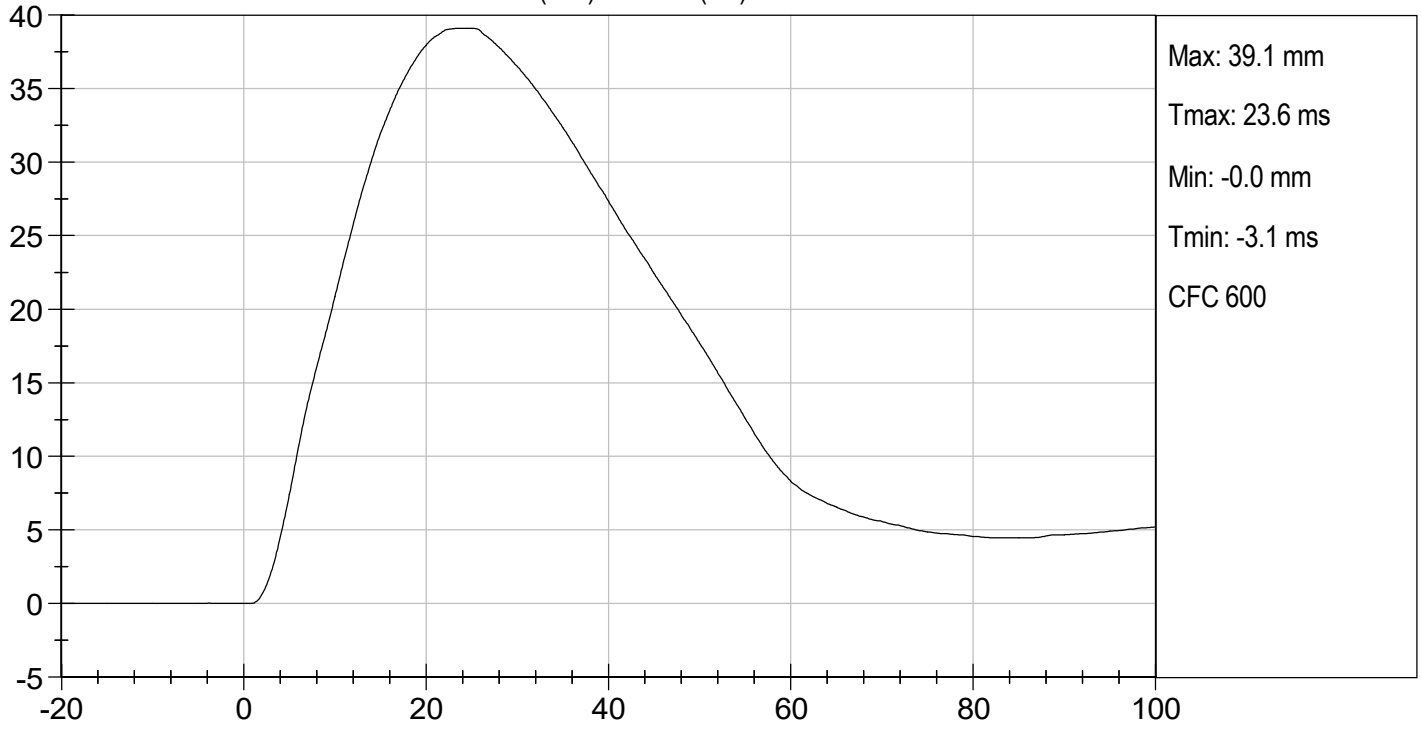
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



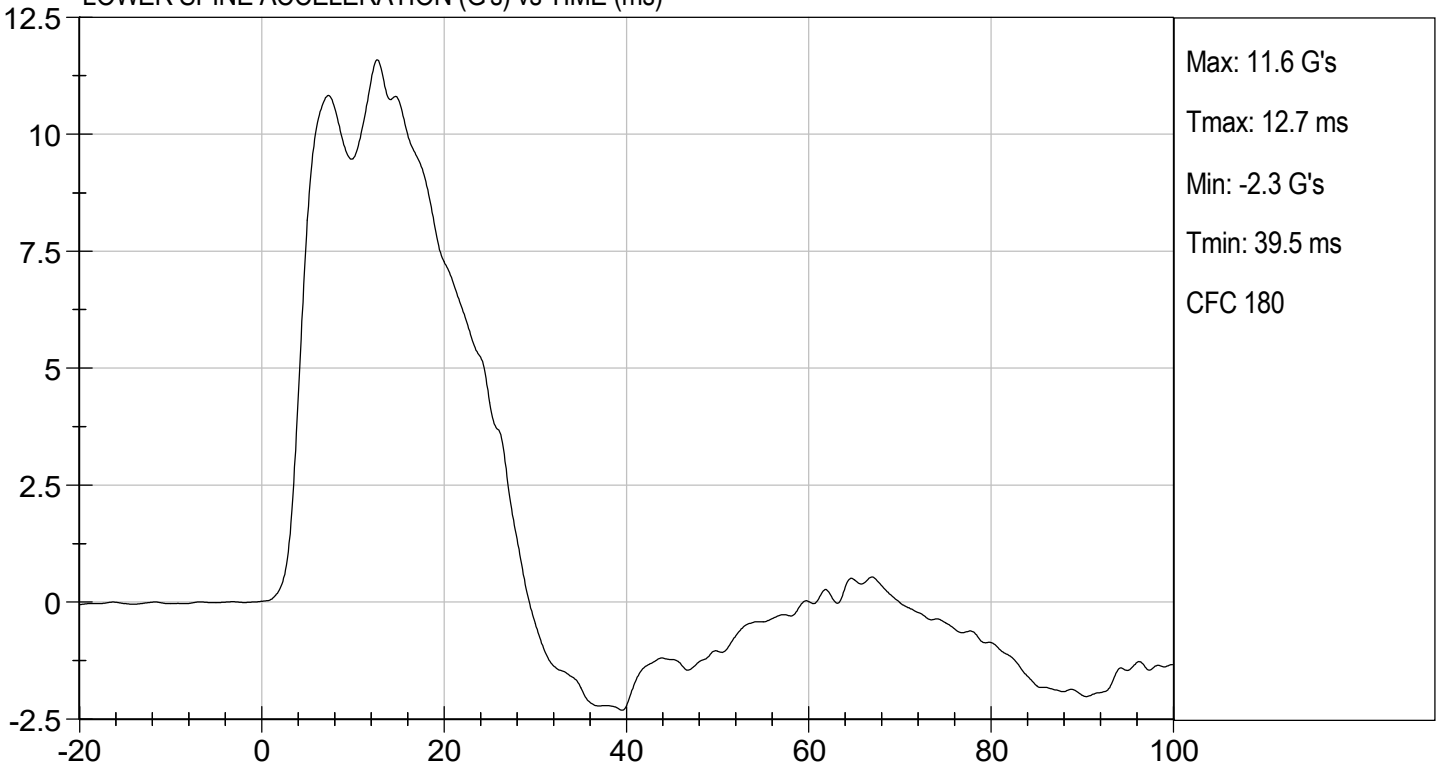
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 02/08/2021
TEST #: D210316

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:** D210317

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,887	Pass
		Overall Test Results		Pass

Laboratory Technician

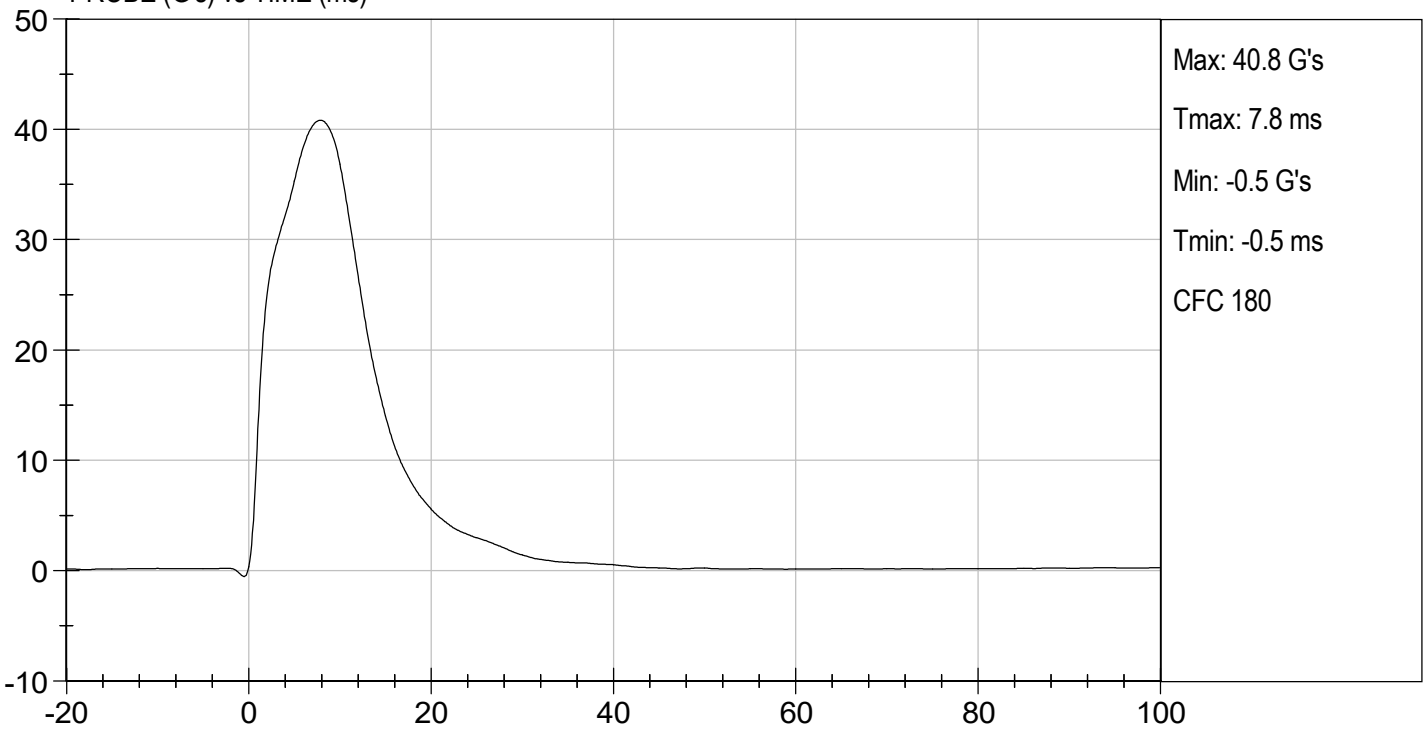
02/08/2021
Test Date

Approved By

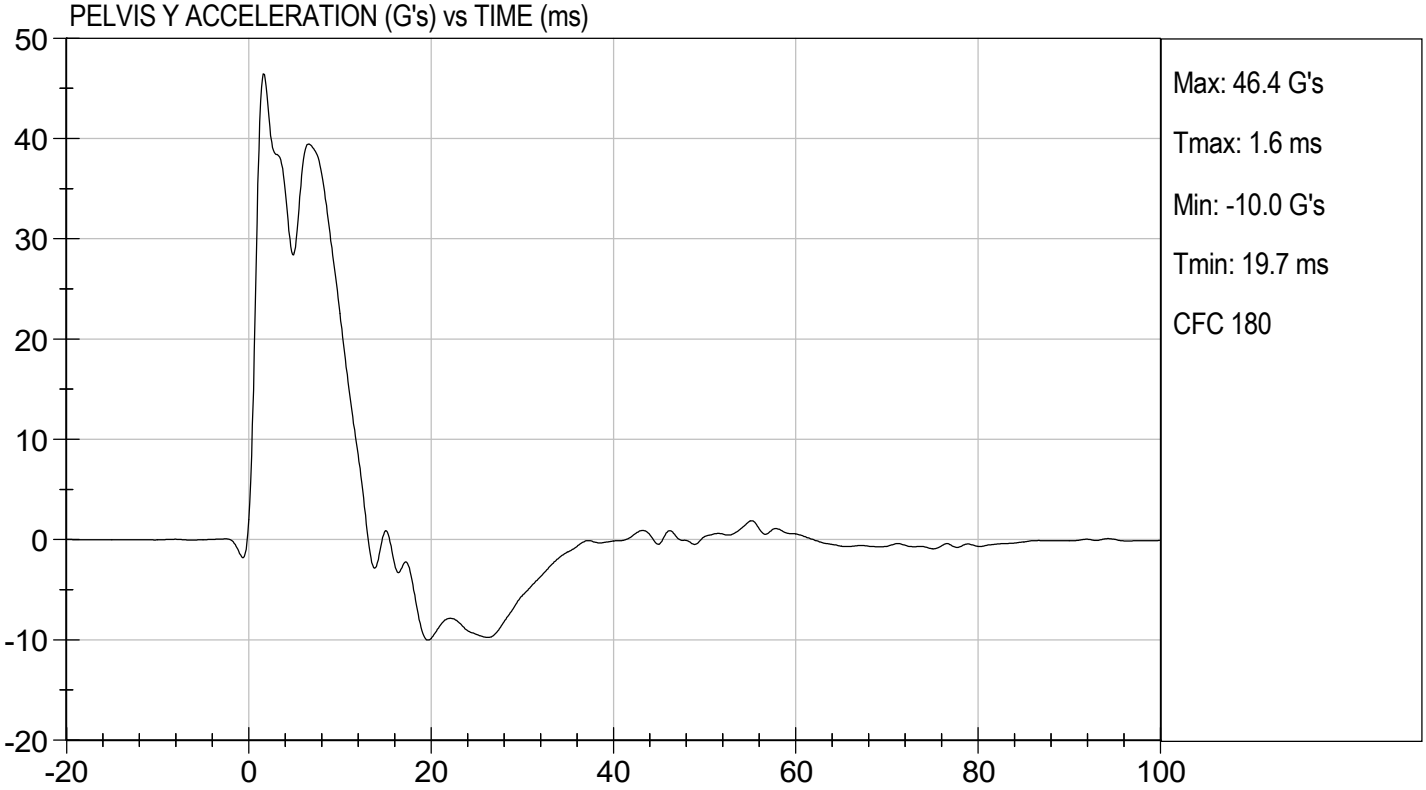
TEST DESC: PELVIS IMPACT
VELOCITY: 21.66 ft/s, 6.60 m/s

TEST DATE: 02/08/2021
TEST #: D210317

PROBE (G's) vs TIME (ms)

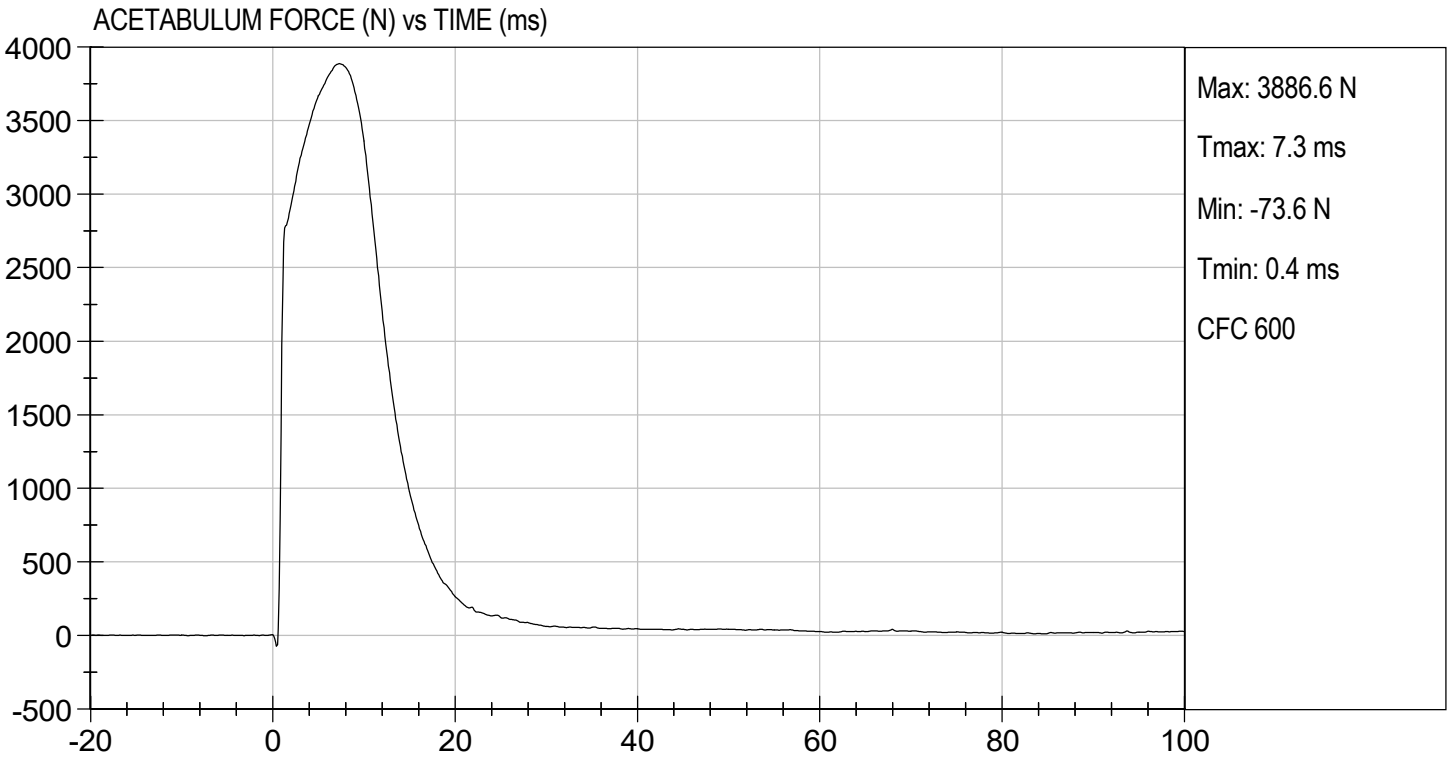


PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: PELVIS IMPACT
VELOCITY: 21.66 ft/s, 6.60 m/s

TEST DATE: 02/08/2021
TEST #: D210317



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296 **Test I.D:** D210318

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	36 to 45	41	Pass
Pelvis Y Acceleration	G's	28 to 39	33	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,717	Pass
		Overall Test Results		Pass

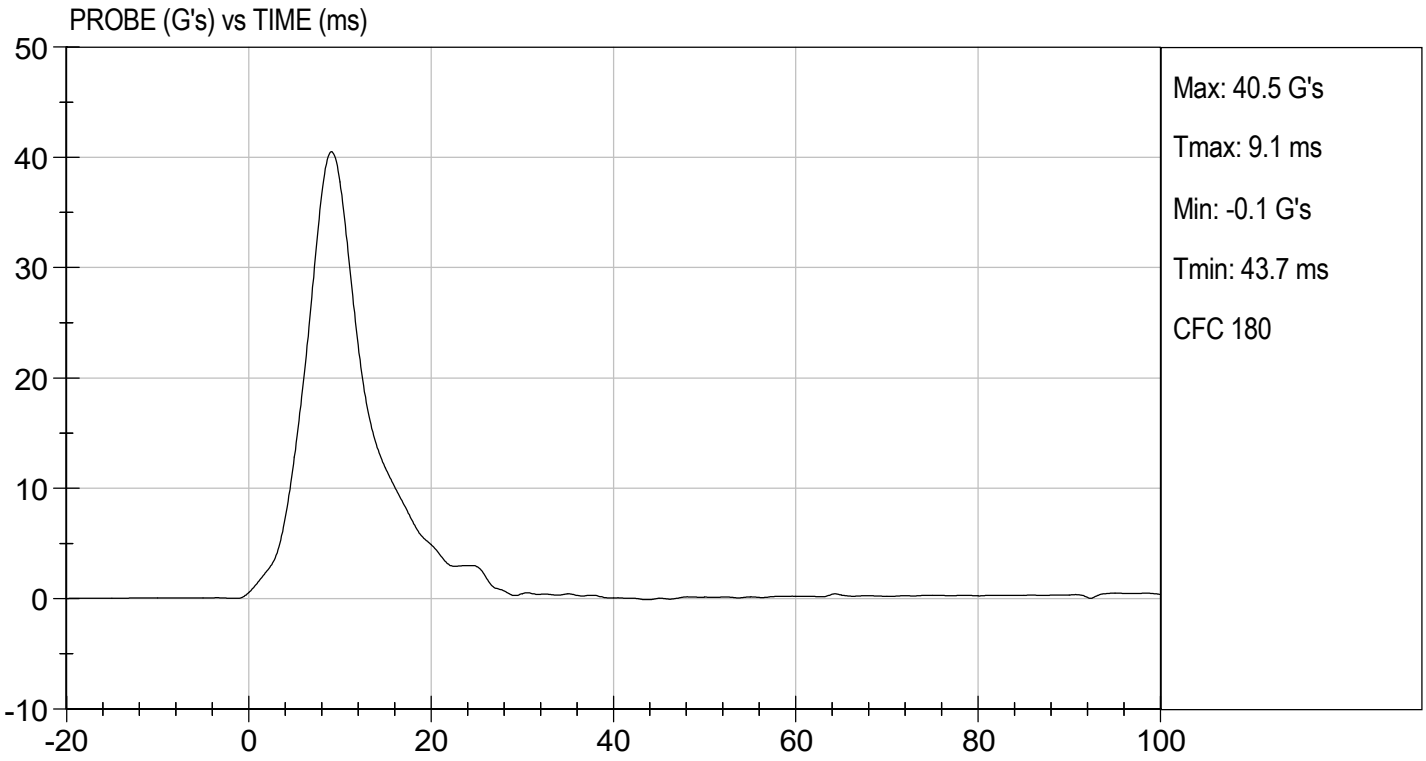
Laboratory Technician

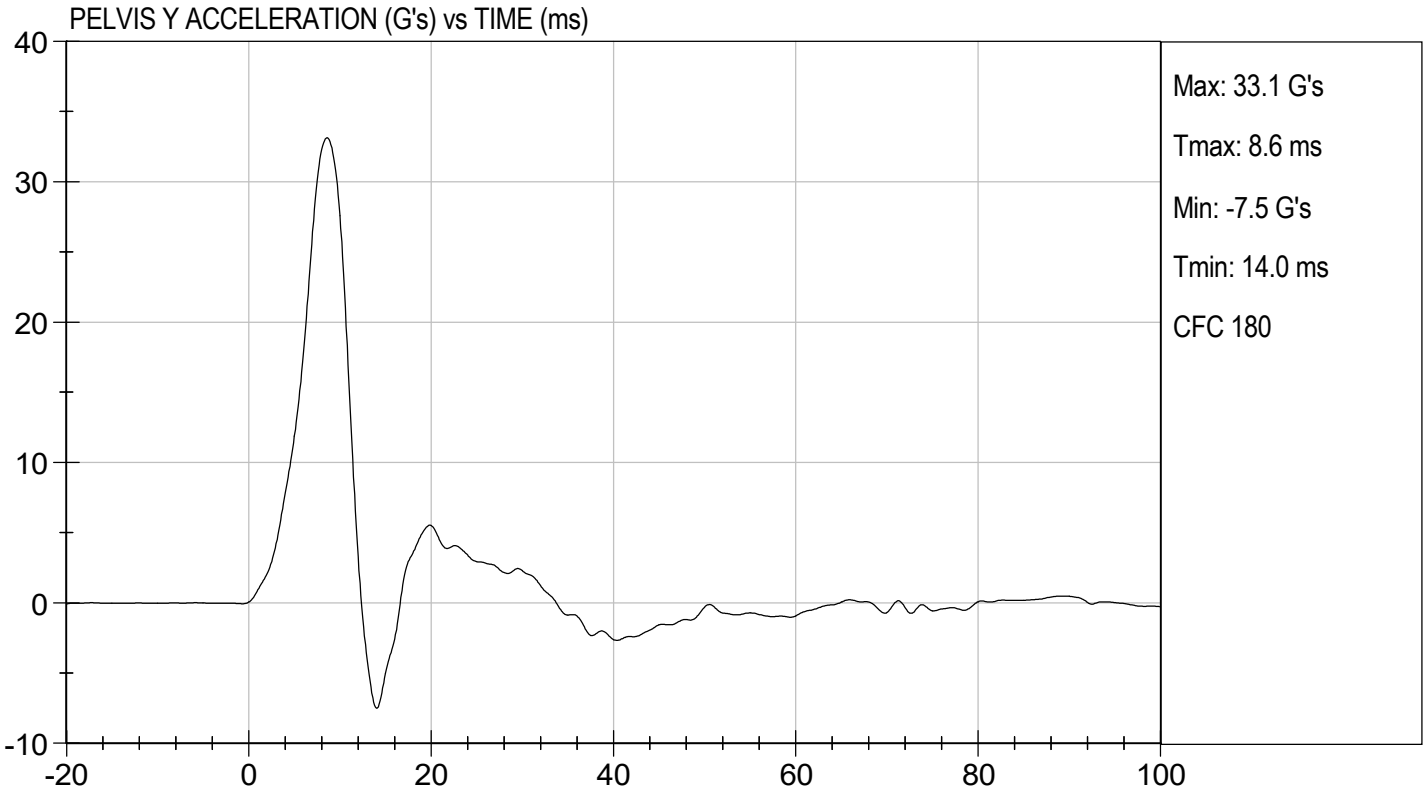
02/08/2021
Test Date

Approved By

TEST DESC: ILLIAC
VELOCITY: 13.77 ft/s, 4.20 m/s

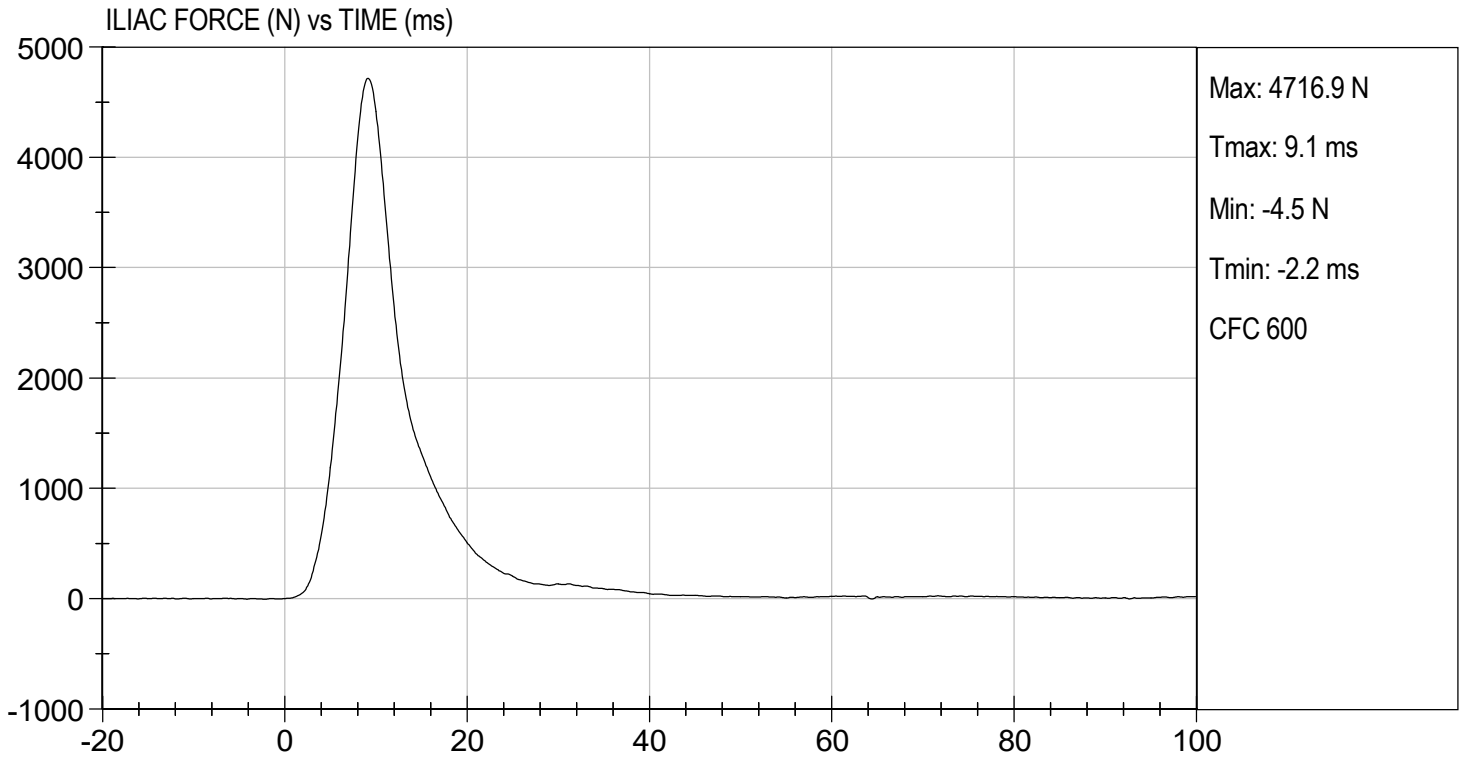
TEST DATE: 02/08/2021
TEST #: D210318





TEST DESC: ILLIAC
VELOCITY: 13.77 ft/s, 4.20 m/s

TEST DATE: 02/08/2021
TEST #: D210318

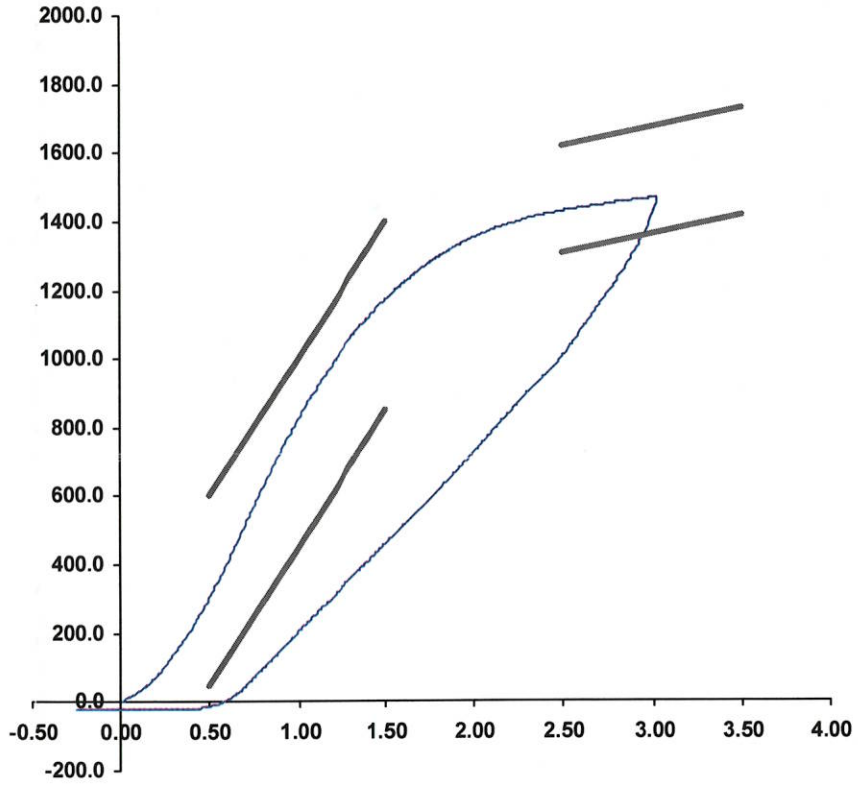


SID-IIs Pelvis Plug Certification Test

Plug S/N 13548
Test Number 11192
Report Number 11230
Test Date 9/23/2019 12:03:51 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	318.19	50.00	600.00
Force @ 1.5 mm (N)	1,176.27	850.00	1,400.00
Force @ 2.5 mm (N)	1,430.86	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,467.53	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 23-Sep-19
SACO Research

By : DC Date : 9/23/2019

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

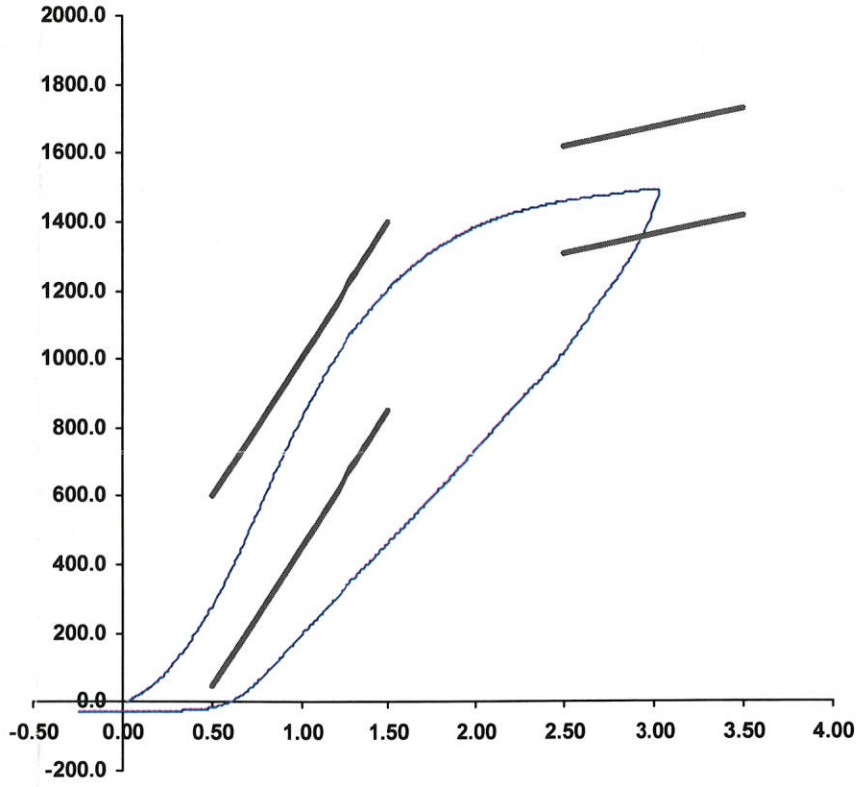
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13538
Test Number 11182
Report Number 11220
Test Date 9/23/2019 11:49:53 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	288.70	50.00	600.00
Force @ 1.5 mm (N)	1,207.61	850.00	1,400.00
Force @ 2.5 mm (N)	1,459.34	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,493.12	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 23-Sep-19
SACO Research

By : DC Date : 9/23/2019

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

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation

				SID-IIs S/N 296		
				Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers			X	P85003	Endevco	01/18/2021
			Y	P94783	Endevco	01/18/2021
			Z	P94786	Endevco	01/18/2021
			Xr	P94938	Endevco	01/18/2021
			Yr	P96854	Endevco	01/18/2021
			Zr	P97386	Endevco	01/18/2021
Head Angular Rate Sensors			X	ARS7325	DTS	09/14/2020
			Y	ARS7354	DTS	08/04/2020
			Z	ARS7371	DTS	09/14/2020
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	FTSS	12/23/2020
		Middle	Y	G1163	FTSS	12/23/2020
		Lower	Y	G1158	FTSS	12/23/2020
	Abdominal Rib	Upper	Y	G1146	FTSS	12/23/2020
		Lower	Y	G1126	FTSS	12/23/2020
Lower Spine Accelerometers (T12)			X	P79418	Endevco	01/18/2021
			Y	P79439	Endevco	01/18/2021
			Z	P79614	Endevco	01/18/2021
Acetabulum Load Cell			Y	ACG111	FTSS	02/24/2020
Iliac Wing Load Cell			Y	IWG226	FTSS	02/24/2020
Pelvis Plug (struck side)				13548	SACO	09/23/2019
Pelvis Plug (non-struck side)				13538	SACO	09/23/2019

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	T22853	Endevco	09/17/2020
Vehicle Center of Gravity	Y	A356218	MSI	12/18/2020
Vehicle Center of Gravity	Z	A337220	MSI	09/22/2020
Left Floor Sill	Y	A356221	MSI	12/05/2020
A-Pillar Sill	Y	T22745	Endevco	11/02/2020
A-Pillar Low	Y	A340806	MSI	10/09/2020
A-Pillar Mid	Y	T22573	Endevco	08/04/2020
B-Pillar Sill	Y	A356212	MSI	12/09/2020
B-Pillar Low	Y	A340201	MSI	12/18/2020
B-Pillar Mid	Y	A305676	MSI	12/31/2020
Driver Seat	Y	A337218	MSI	11/03/2020
Engine Top	X	A360949	MSI	12/08/2020
Engine Top	Y	A360983	MSI	12/10/2020
Firewall	Y	T22622	Endevco	08/04/2020
Right Roof	Y	A340699	MSI	10/07/2020
Right Floor Sill	Y	T22577	Endevco	09/28/2020
Rear Floorpan	X	A340808	MSI	10/09/2020
Rear Floorpan	Y	A337167	MSI	11/12/2020

Table 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DG6277	FTSS	07/30/18
Load Cell 2	DG6278	FTSS	07/30/18
Load Cell 3	DG6279	FTSS	07/30/18
Load Cell 4	DG6280	FTSS	07/30/18
Load Cell 5	DG6281	FTSS	07/30/18
Load Cell 6	DG6283	FTSS	07/30/18
Load Cell 7	DG6284	FTSS	07/30/18
Load Cell 8	DG6582	FTSS	07/30/18