REPORT NUMBER: SideNCAPPole-MGA-20-030

NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test

NISSAN MOTOR CO., LTD.
2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback
NHTSA No.: M20205204

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: August 7, 2020

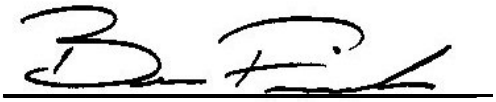
Final Report Date: October 20, 2020

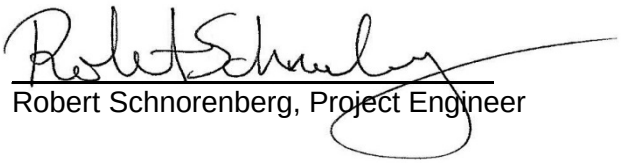
FINAL REPORT

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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement.

Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: October 20, 2020

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

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SideNCAPPole-MGA-20-030		

4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing and FMVSS No. 305 indicant testing of a 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback, NHTSA No.: M20205204	**5. Report Date** October 20, 2020 **6. Performing Organization Code** MGA
7. Author(s) Ben Fischer, Project Engineer	**8. Performing Organization Report No.** SideNCAPPole-MGA-20-030
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 August 7, 2020 to October 20, 2020 **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 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback 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 August 7, 2020.

The impact velocity was 32.36 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.8°C. The test vehicle post-test maximum crush was 333 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	158
Resultant Lower Spine Acceleration	g	82	38
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2960
Maximum Thoracic Rib Deflection	mm	38*	18
Maximum Abdomen Rib Deflection	mm	45*	17

*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 Pole Part 572V 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	169	

TABLE OF CONTENTS

SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This side pole 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 (40 kWh Battery) 5-Door Hatchback. 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 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.36 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on August 7, 2020. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in 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 (HIC_{36})		1000	158
Resultant Lower Spine Acceleration	g	82	38
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2960
Maximum Thoracic Rib Deflection	mm	38*	18
Maximum Abdomen Rib Deflection	mm	45*	17

*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	Yes		
Knee Airbag	Yes	Yes		
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 A-Post at Sill Y recorded no valid data after 23 ms.
Left Lower A-Post Y recorded no valid after 35 ms.
Left Mid B-Post Y recorded no valid data after 11 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: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20205204	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	1N4AZ1BP8LC300632	Driver Front Airbag	Yes
Body Color	Brilliant Silver	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	61 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	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	NISSAN MOTOR CO., LTD.	GVWR (kg)	2035
Date of Manufacture	12/19	GAWR Front (kg)	1070
Vehicle Type	Passenger Car	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)

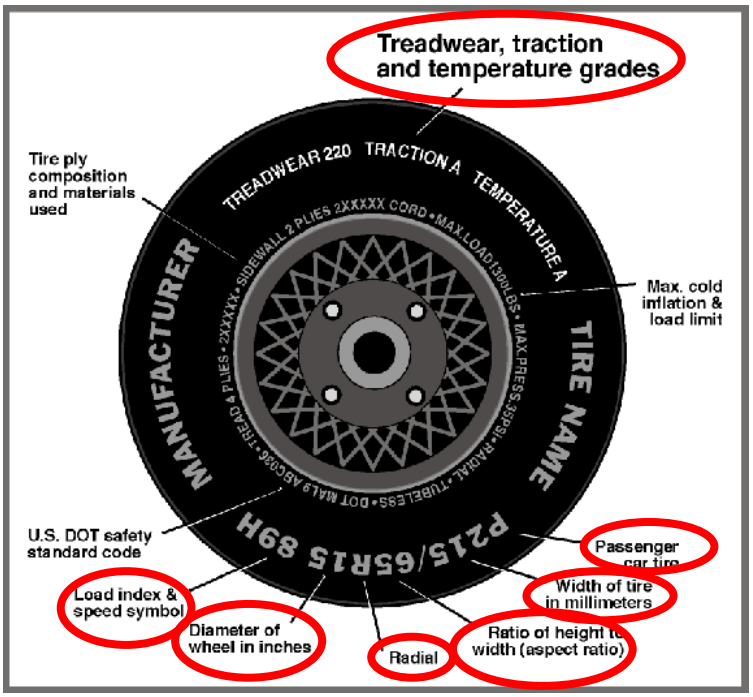
VEHICLE SEAT TYPE

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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	89H	89H
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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	215	220	220
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	456.5	349.0		486.5	378.5		476.5	391.0	
Right	kg	463.5	326.5		479.5	347.5		471.0	359.0	
Ratio	%	57.7%	42.3%		57.1%	42.9%		55.8%	44.2%	
Totals	kg	920.0	675.5	1595.5	966.0	726.0	1692.0	947.5	750.0	1697.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1595.5	(A)
Actual Weight of 1 P572 ATD (SID-IIs) Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	50	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1697.5	(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	-0.7	-0.5	-0.4	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	-1.0	-0.9	-0.6	Yes
Front Bumper Angle (left-to-right)**	deg	0.0	-0.1	-0.1	Yes
Rear Bumper Angle (left-to-right)**	deg	-0.1	-0.2	-0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1143	1159	1193	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	7	17	17	

* 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: Cargo area carpet/divider/organizer, RF/RR door trim panel, RF/LR/RR floor mat, LR/RR headrest, RR speaker, RR taillight, underbody plastic	kg	22

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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

TEST SURFACE MARKINGS

	Distance from 75° Impact Location Line (mm)
Fore 25 mm Target	886
Aft 25 mm Target	894

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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	15.5	13.0	14.3
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	14.3	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

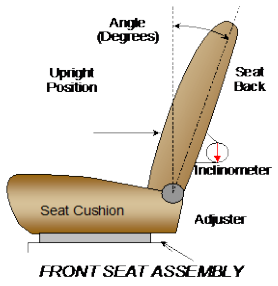
Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	0	0
Front Passenger Seat	210	22	0	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	56.1	29	1.1	2
Front Passenger Seat	56.0	29	1.1	2
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	6	0 (Lowest as 0) / Fixed Fore-Aft

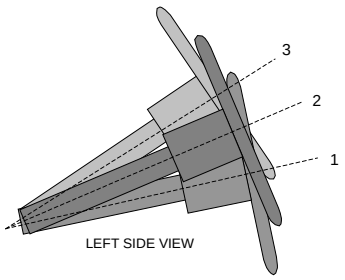
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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.

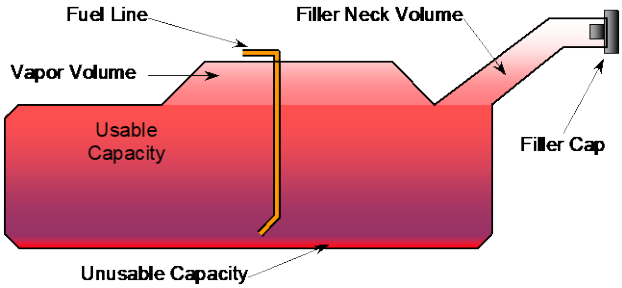
	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	67.3	
Geometric Center, Position 2	64.5	
Uppermost, Position 3	61.7	
Telescoping Steering Wheel Travel		30
Test Position	64.5	15



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

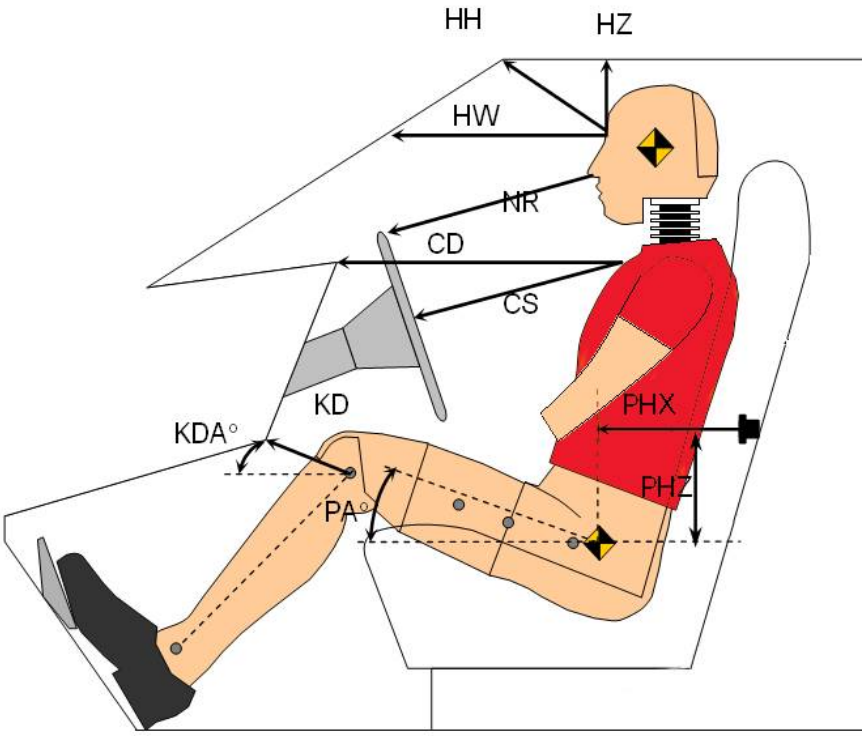
FUEL TANK CAPACITY DATA

	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? **N/A**

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

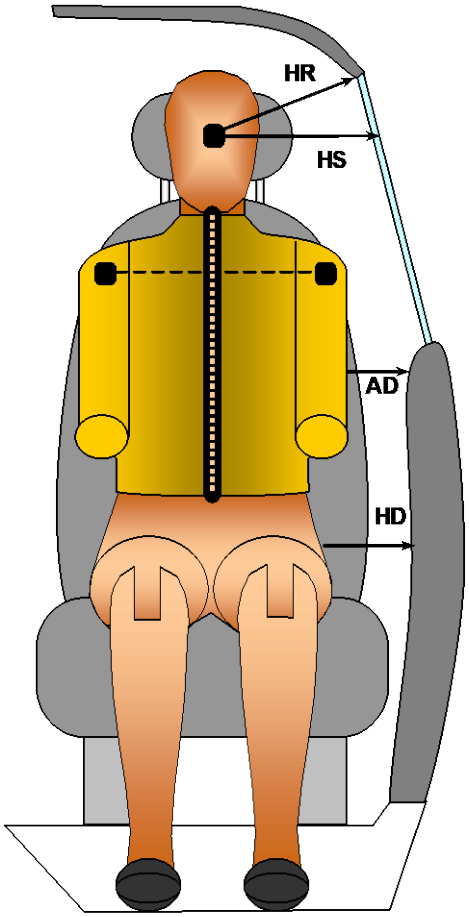


LEFT SIDE VIEW

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	299	
HW	Head to Windshield	636	
HZ	Head to Roof Liner	202	
NR	Nose to Rim/Seat Back	202	
CD	Chest to Dashboard/Seat Back	388	
CS	Chest to Steering Wheel	134	
KDL / KDAL	Left Knee to Dash/Seat Back	84	44.1
KDR / KDAL	Right Knee to Dash/Seat Back	86	42.0
PAX	Pelvic Tilt Angle X		18.5
PAY	Pelvic Tilt Angle Y		-0.6
PHX	Hip Point to Striker (X-Axis)	408	
PHZ	Hip Point to Striker (Z-Axis)	148	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

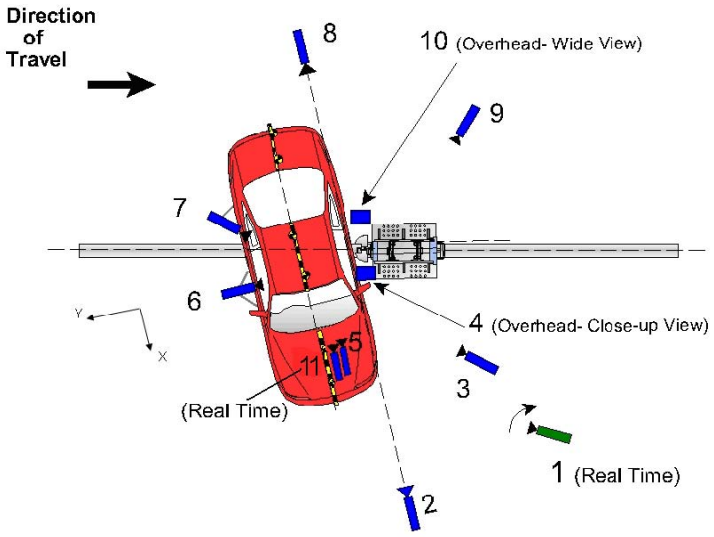


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	249
HS	Head to Side Window	373
AD	Arm to Door	162
HD	Hip Point to Door	167

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



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	5970	-90	-1740	24	1000
3	Impact Side 45° Forward	3830	-1590	-1720	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	-6600	-60	-1730	24	1000
9	Impact Side 45° Rearward	-2880	-3640	-1740	12	1000
10	Overhead Wide View	0	525	-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.

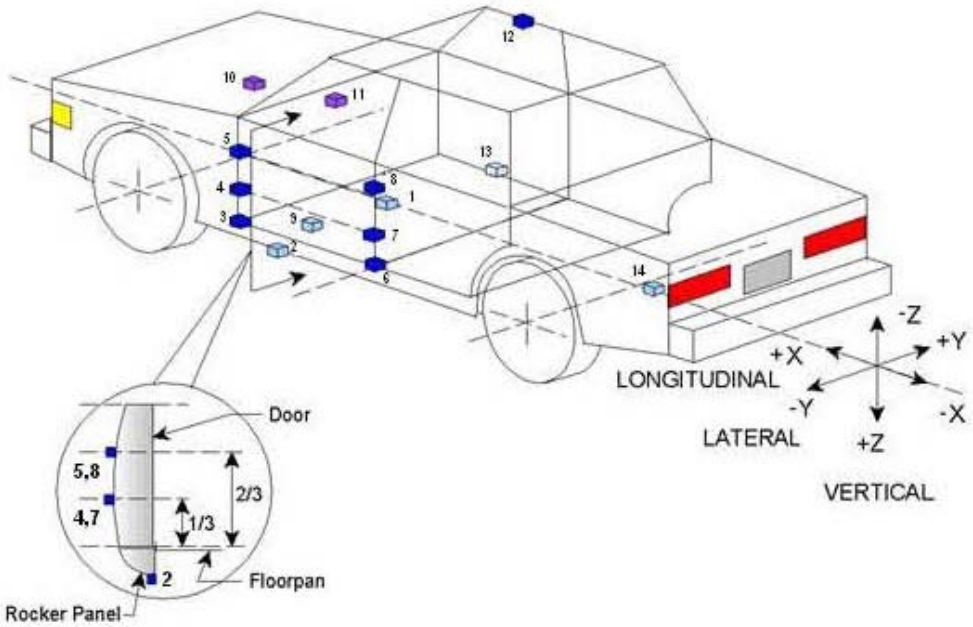
Explain why camera(s) did not operate as intended: None

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: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



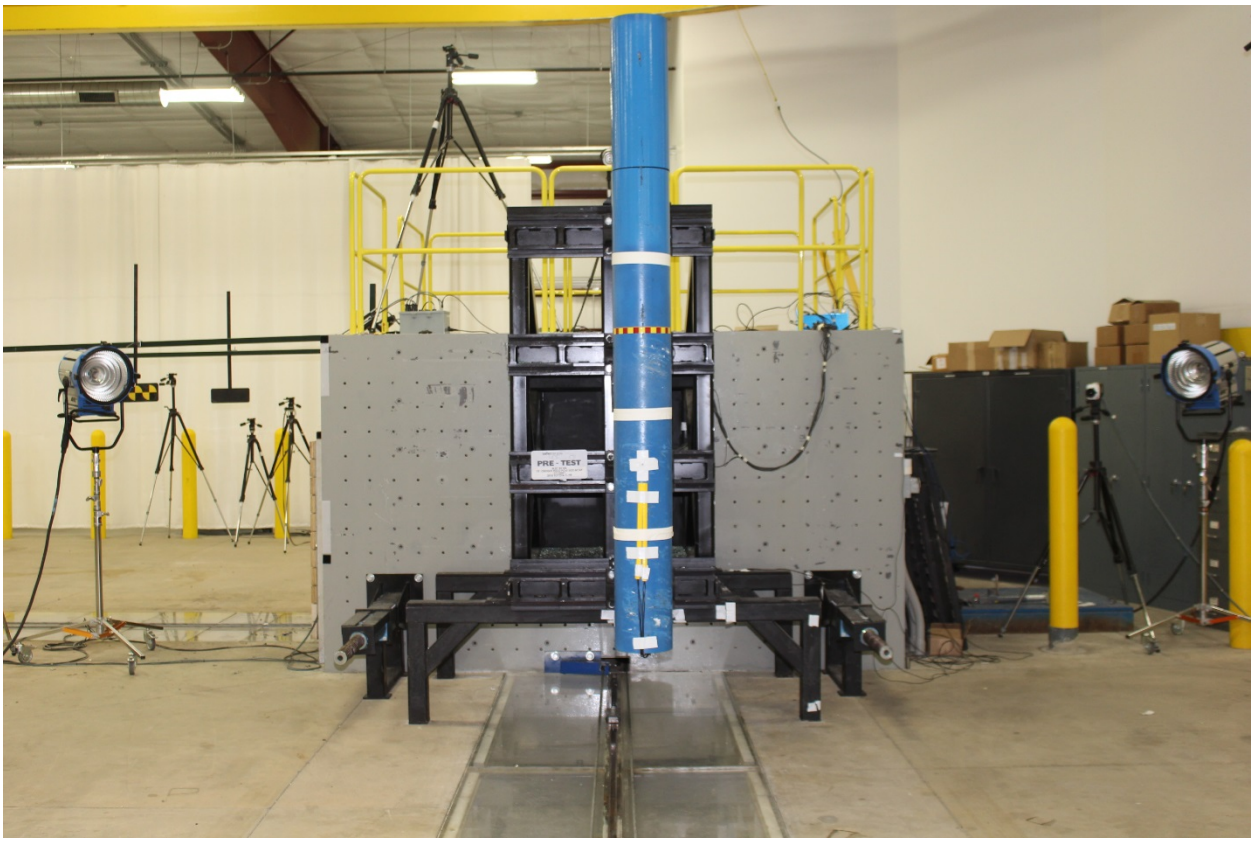
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2336	0	-163
2	Left Floor Sill	2574	-716	-165
3	A Pillar Sill	3003	-716	-161
4	A Pillar Low	2979	-810	-536
5	A Pillar Mid	2954	-815	-772
6	B Pillar Sill	1837	-716	-176
7	B Pillar Low	1922	-709	-616
8	B Pillar Mid	1916	-712	-834
9	Driver Seat Track	2065	-359	-371
10	Engine Top	3621	80	-815
11	Firewall	3458	0	-891
12	Right Roof	2011	520	-1507
13	Right Floor Sill	2574	716	-172
14	Rear Floorpan	777	0	-451

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: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



254 mm Diameter Rigid Pole

Load Cell Locations	
ID	**Height from Test 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: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver Dummy (SID-IIs)
Face	Curtain Airbag, Driver Airbag
Top of Head	Curtain Airbag, Driver Airbag
Left Side of Head	Curtain Airbag, Headrest
Back of Head	Curtain Airbag, Headrest
Left Shoulder	Side Torso/Pelvis Airbag, Seatback
Upper Torso	Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion
Left Knee	Door Panel, Knee Airbag

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	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: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

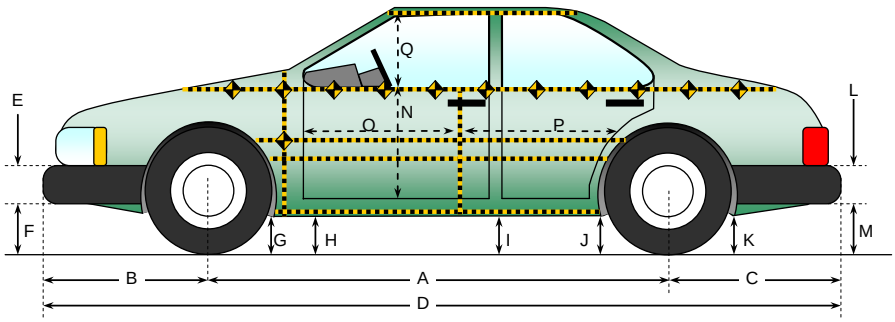
Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes		
Knee Airbag	Yes	Yes		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Side Airbag (Other)				
Seat Belt Pretensioner	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		1002
Actual Impact Point (Aft of Front Axle)	mm		1009
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-7
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	74.9
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.36
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.32

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



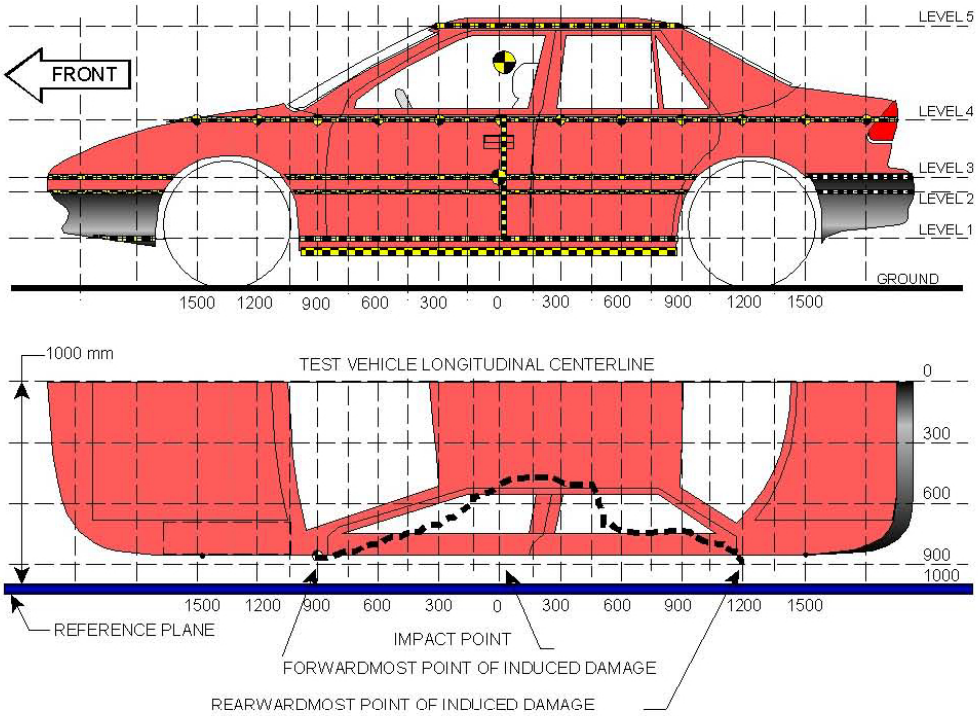
All measurements in (mm) with tolerance of ± 3 mm
LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2700	2667	33
B	Front Axle to FSOV	1003	1007	-4
C	Rear Axle to RSOV	788	785	3
D	Total Vehicle Length at Centerline	4491	4459	32
E	Front Bumper Thickness	135	135	0
F	Front Bumper Bottom to Ground	209	238	-29
G	Sill Height at Front Wheel Well	146	142	4
H	Sill Height at Front Door Leading Edge	146	139	7
I	Sill Height at B-Pillar	160	148	12
J1	Sill Height at Rear Wheel Well	167	171	-4
J2	Pinch Weld Height at Rear Wheel Well	163	166	-3
K	Sill Height Aft of Rear Wheel Well	198	202	-4
L	Rear Bumper Thickness	141	141	0
M	Rear Bumper Bottom to Ground	287	285	2
N	Sill Height to Bottom of Front Window Sill	738	725	13
O	Front Door Leading Edge to Impact CL	561	473	88
P	Rear Door Trailing Edge to Impact CL	1409	1337	72
Q	Front Window Opening	431	394	37
R	Right Side Length	3671	3682	-11
S	Left Side Length	3671	3605	66
T	Vehicle Width at B-Pillars	1773	1708	65
U	Front Wheel Track Width	1535		
V	Rear Wheel Track Width	1548		

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



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	306	266	75
2	Occupant H-Point	592	327	75
3	Mid Door	624	333	75
4	Window Sill	620	300	75
5	Window Top	1455	122	75

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

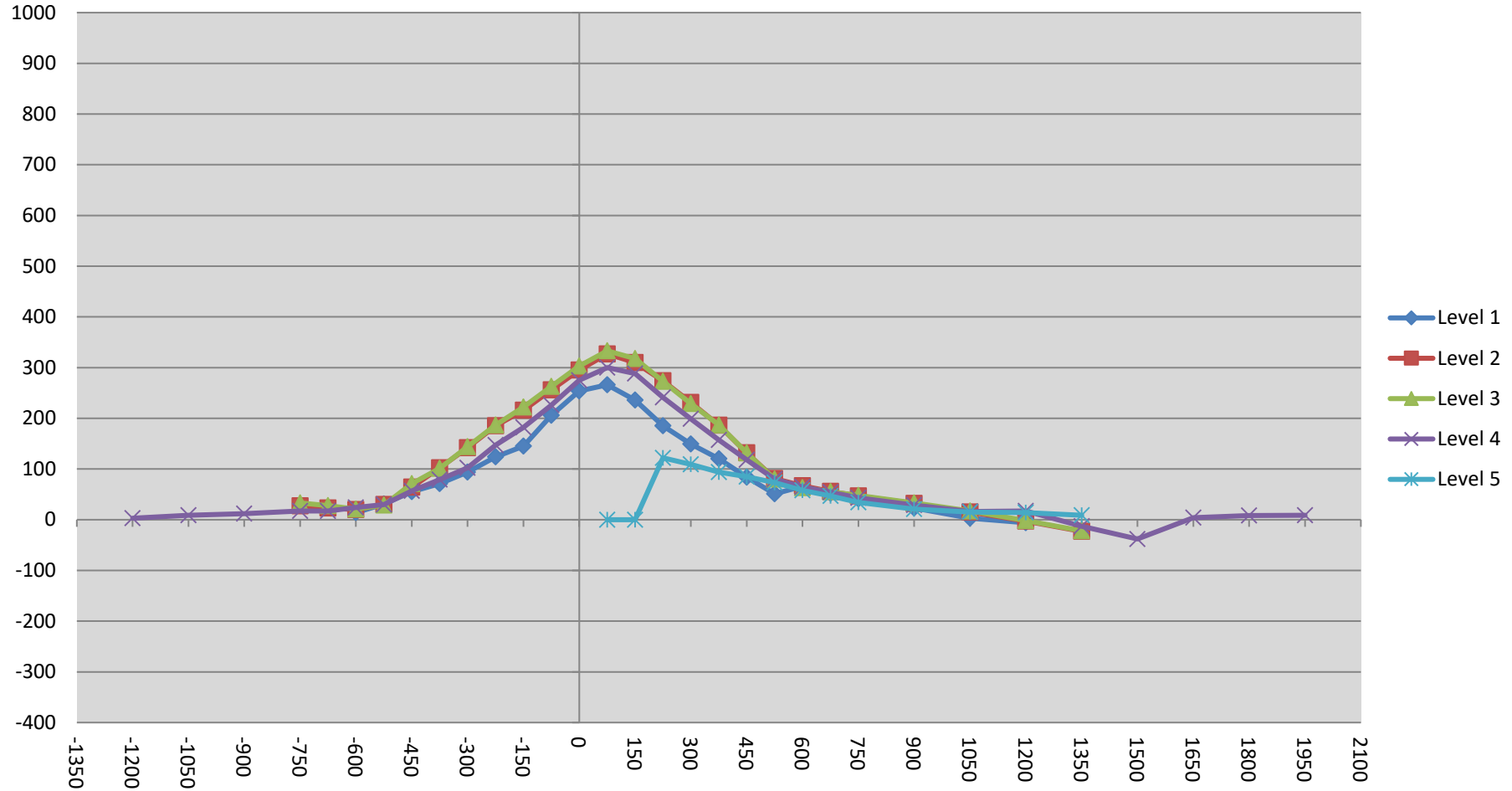
Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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				347					350					3	
-1050				317					326					9	
-900				299					311					12	
-825															
-750		216	215	313			243	248	330			27	33	17	
-675		216	215	310			239	243	327			23	28	17	
-600	237	217	220	305		251	237	241	329		14	20	21	24	
-525	242	223	225	299		273	253	254	329		31	30	29	30	
-450	249	224	225	293		304	288	296	350		55	64	71	57	
-375	254	223	224	288		325	325	325	367		71	102	101	79	
-300	256	222	222	283		350	364	366	385		94	142	144	102	
-225	257	220	221	276		381	405	408	423		124	185	187	147	
-150	257	219	219	271		402	435	441	453		145	216	222	182	
-75	257	218	218	267		463	474	481	493		206	256	263	226	
0	257	218	217	263		511	513	520	538		254	295	303	275	
75	259	217	216	258	504	525	544	549	558	626	266	327	333	300	122
150	260	216	215	255	496	496	526	533	543	605	236	310	318	288	109
225	260	216	215	254	494	445	490	488	495	588	185	274	273	241	94
300	260	216	215	252	492	409	447	444	451	577	149	231	229	199	85
375	260	215	214	254	490	380	401	401	411	563	120	186	187	157	73
450	262	215	214	249	490	346	347	346	367	548	84	132	132	118	58
525	263	215	215	247	489	314	296	295	327	536	51	81	80	80	47
600	265	217	217	246	489	331	284	280	311	523	66	67	63	65	34
675	267	218	217	246	491	319	274	272	300	515	52	56	55	54	24
750	270	219	218	247	491	311	266	266	290	512	41	47	48	43	21
825															
900	271	219	218	246	498	294	251	251	275	513	23	32	33	29	15
1050	265	216	215	246	506	268	231	232	262	520	3	15	17	16	14
1200	248	210	210	248	521	242	207	208	265	530	-6	-3	-2	17	9
1350		205	205	269	544		182	183	256	549		-23	-22	-13	5
1500				256	587				218	588				-38	1
1650				256					260					4	
1800				256					264					8	
1950				261					270					9	
2100															
2250															
2400															
2550															
2700															

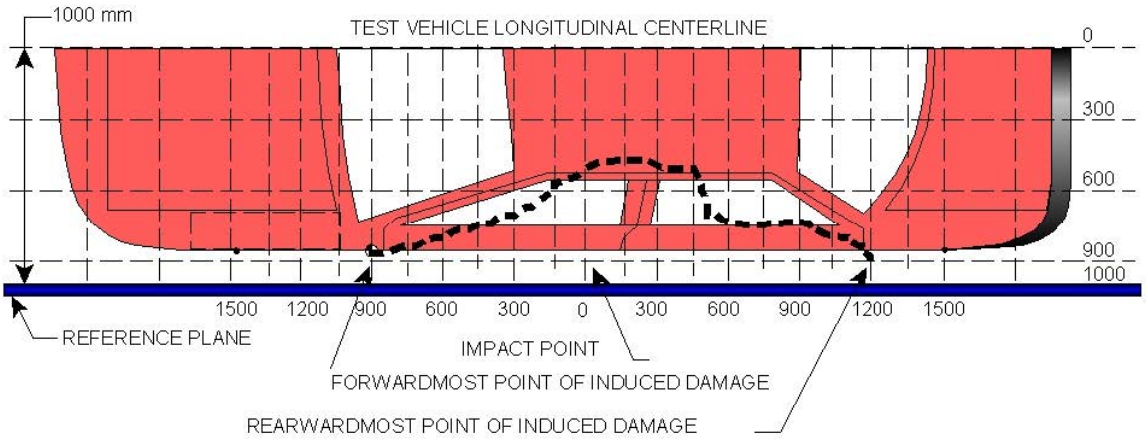
DATA SHEET NO. 10 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	550	3	216	278	62
2	328	3	215	429	214
3	106	3	216	547	331
4	-116	3	219	460	241
5	-338	3	223	346	123
6	-560	3	223	239	16

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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

Test Time: 1:28 pm Temperature: 21.8°C

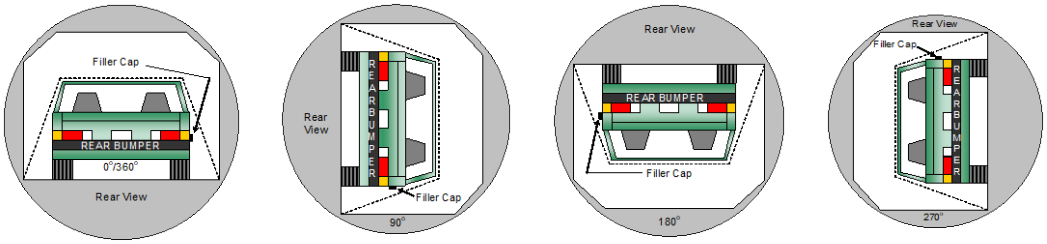
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) N/A oz.

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)

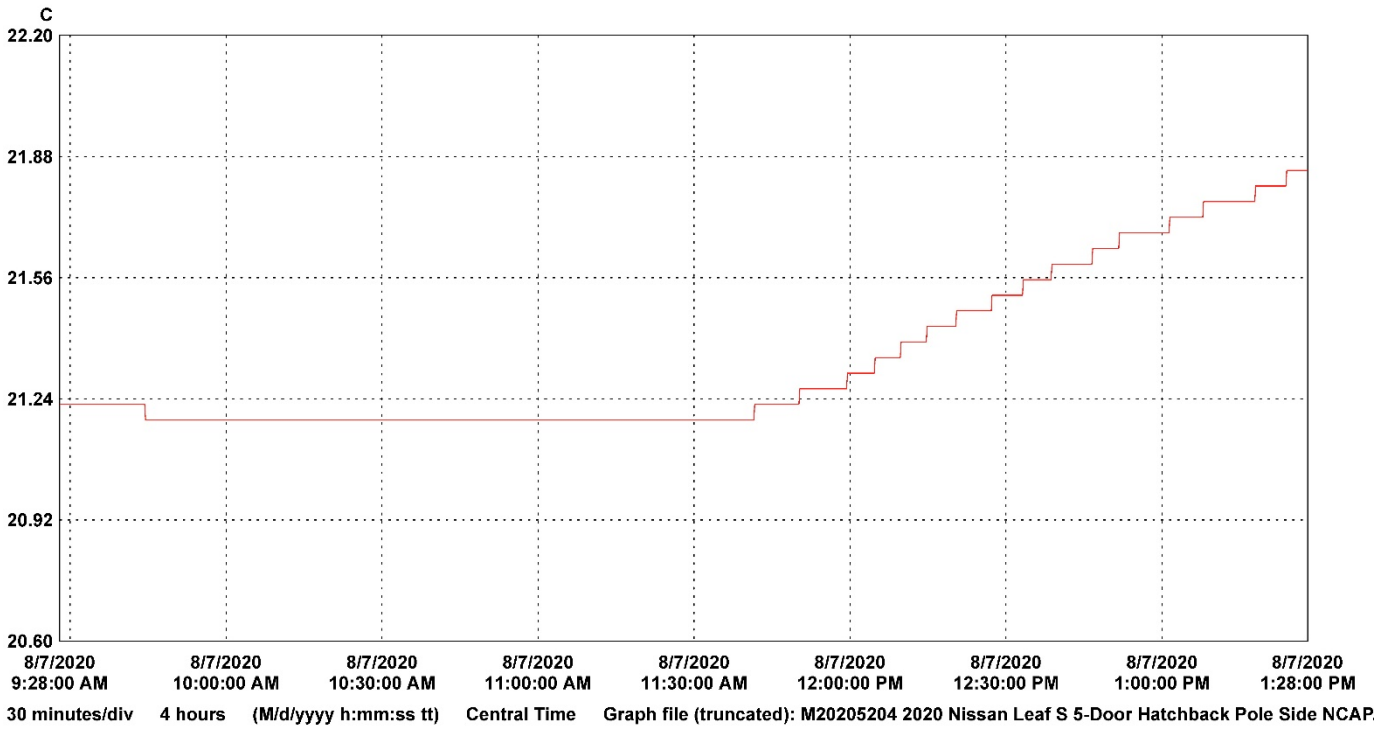
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352041	VSC_South_Hall	1		21.84	21.34	21.18	C	Temperature	18352041_VSC_South_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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	399.2 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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	399.2

ELECTRIC ISOLATION MEASUREMENTS
PROPULSION BATTERY TO VEHICLE CHASSIS

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

V1	V	232.2
V2	V	172.0

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	25.0
V2' Pre-Impact	V	25.3

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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	2,787,346
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']		
Ri2 Pre-Impact	Ω	2,632,598
Ri = The lesser of Ri1 and Ri2		
Ri Pre-Impact	Ω	2,632,598
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage		
Ri / Vb Pre-Impact	Ω	6,595

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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	4.6

V1 Post-Impact	V	14.4	Impact Time	1	Minutes	13	Seconds
V2 Post-Impact	V	0.8		1	Minutes	18	Seconds
V1' Post-Impact	V	0.0		1	Minutes	28	Seconds
V2' Post-Impact	V	0.0		1	Minutes	25	Seconds

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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	28	Seconds
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2 Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	25	Seconds
Ri = The lesser of Ri1 and Ri2							
Ri Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	28	Seconds
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb Post-Impact	Ω	Zero Volts	Impact Time	1	Minutes	28	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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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

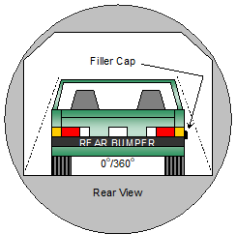
	Yes (Fail)	No
Has an outside Propulsion Battery Component intruded into the passenger compartment?		X

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

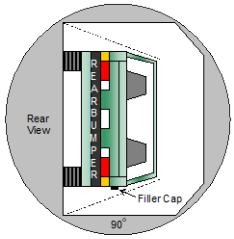
DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA
FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback
Test Program: NCAP Side Pole Impact Test
NHTSA No.: M20205204
Test Date: 8/7/2020

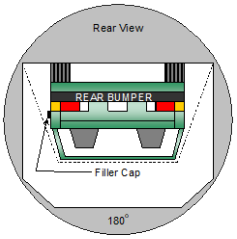
PROPULSION BATTERY SYSTEM COMPONENTS



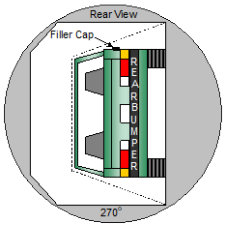
0°/360°



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	51	sec	5	min	6	min	51	sec	7	min
90° - 180°	1	min	50	sec	5	min	6	min	50	sec	7	min
180° - 270°	1	min	48	sec	5	min	6	min	48	sec	7	min
270° - 360°	1	min	51	sec	5	min	6	min	51	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 (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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	4.6

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	0.5	V	0°		min		sec
	0.3		90°	2		37	
	0.0		180°	3		02	
	0.0		270°	2		40	
	0.0		360°	2		58	
V2	0.0	V	0°		min		sec
	0.0		90°	2		41	
	0.0		180°	3		09	
	0.0		270°	2		42	
	0.0		360°	3		01	
V1'	0.0	V	0°		min		sec
	0.3		90°	2		47	
	0.0		180°	3		14	
	0.0		270°	2		47	
	0.0		360°	3		05	
V2'	0.0	V	0°		min		sec
	0.0		90°	2		51	
	0.0		180°	3		18	
	0.0		270°	2		50	
	0.0		360°	3		08	

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

Test Vehicle: 2020 Nissan Leaf S (40 kWh Battery) 5-Door Hatchback NHTSA No.: M20205204
Test Program: NCAP Side Pole Impact Test Test Date: 8/7/2020

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		47	
	Zero Volts		180°	3		14	
	Zero Volts		270°	2		47	
	Zero Volts		360°	3		05	
Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']							
Ri2	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		51	
	Zero Volts		180°	3		18	
	Zero Volts		270°	2		50	
	Zero Volts		360°	3		08	
Ri = The lesser of Ri1 and Ri2							
Ri	Zero Volts	Ω	0°		min		sec
	Zero Volts		90°	2		51	
	Zero Volts		180°	3		18	
	Zero Volts		270°	2		50	
	Zero Volts		360°	3		08	
Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage							
Ri / Vb	Zero Volts	Ω/V	0°		min		sec
	Zero Volts		90°	2		51	
	Zero Volts		180°	3		18	
	Zero Volts		270°	2		50	
	Zero Volts		360°	3		08	

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

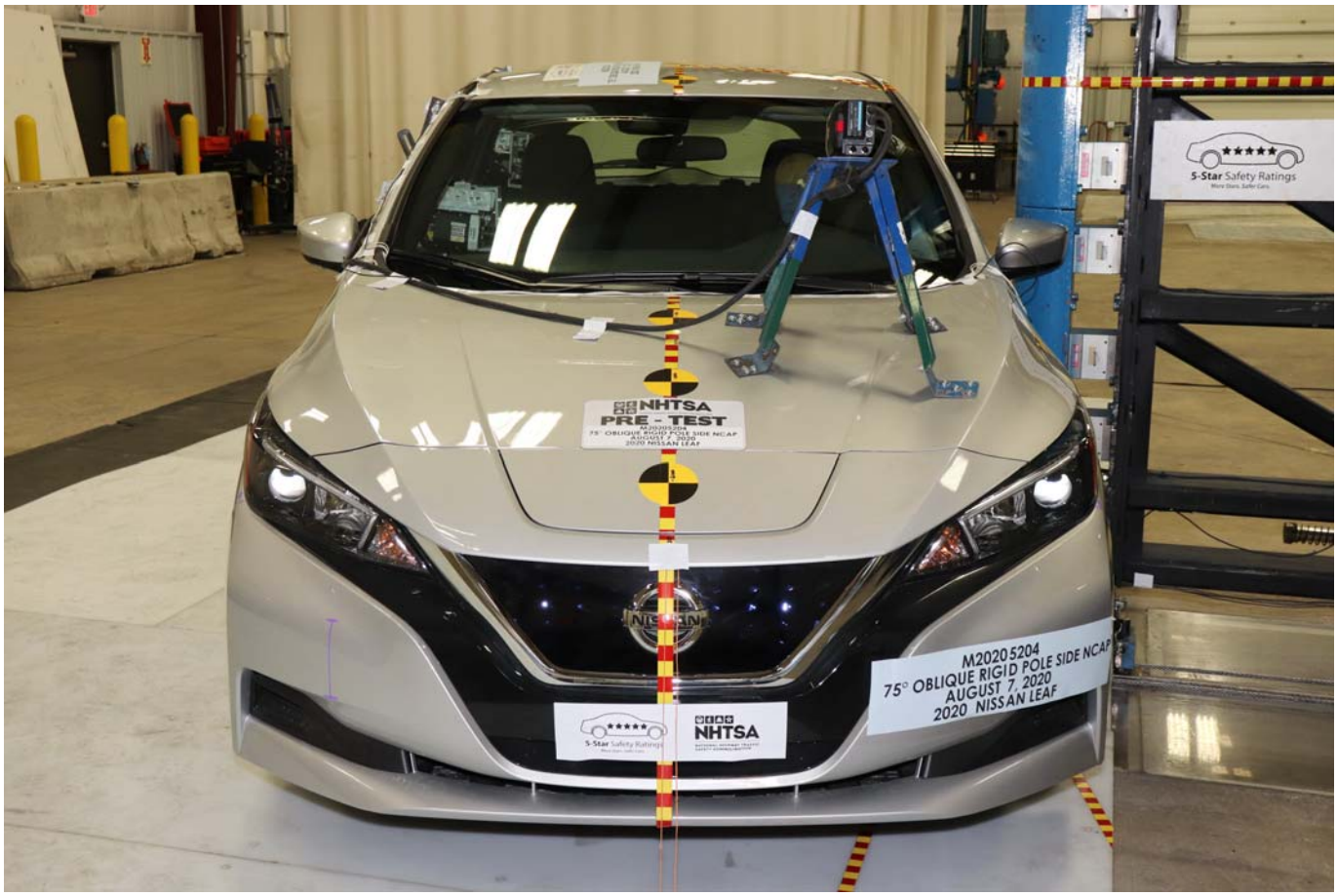


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

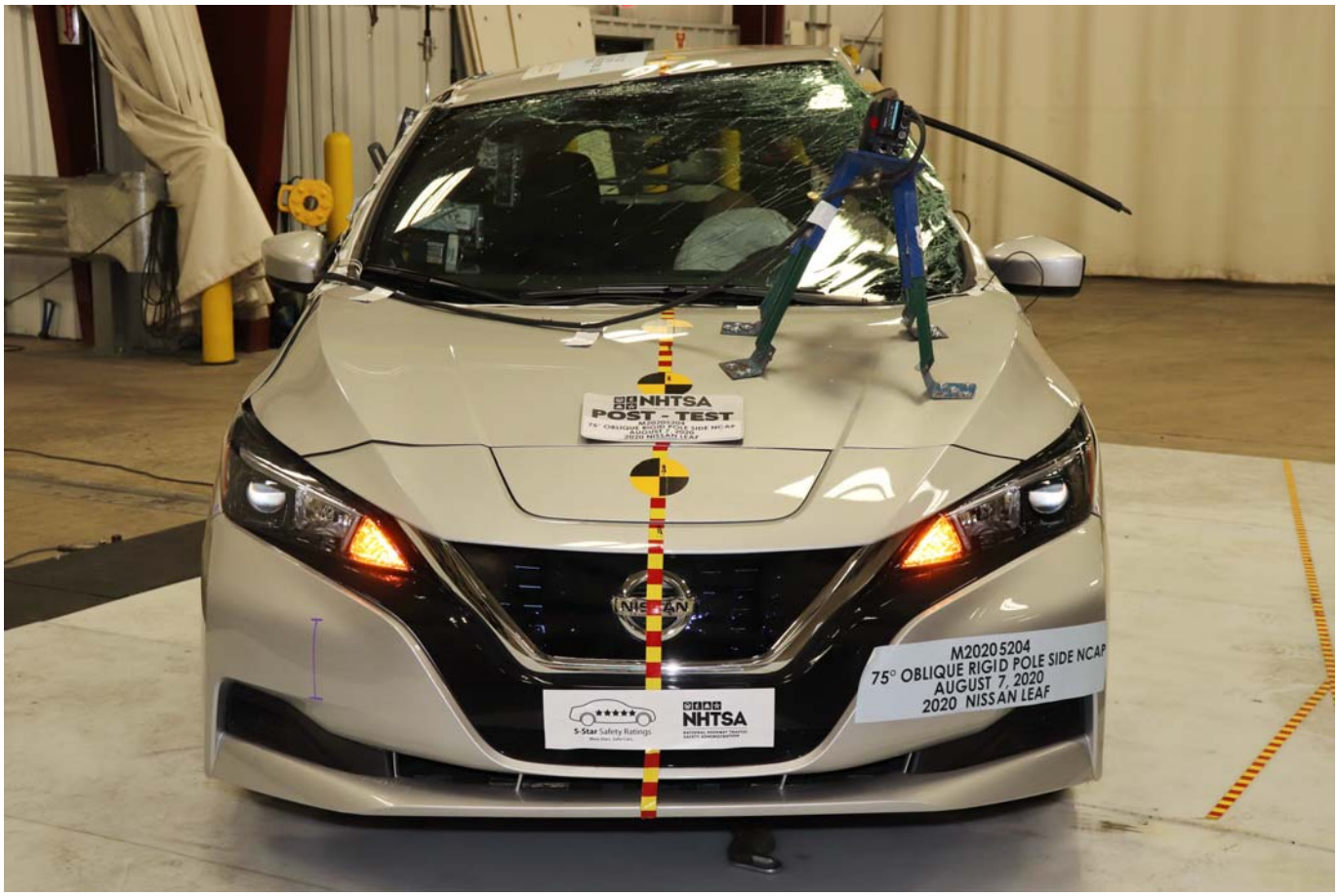


Photo No. 004 - Post-Test Frontal View of Test Vehicle

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

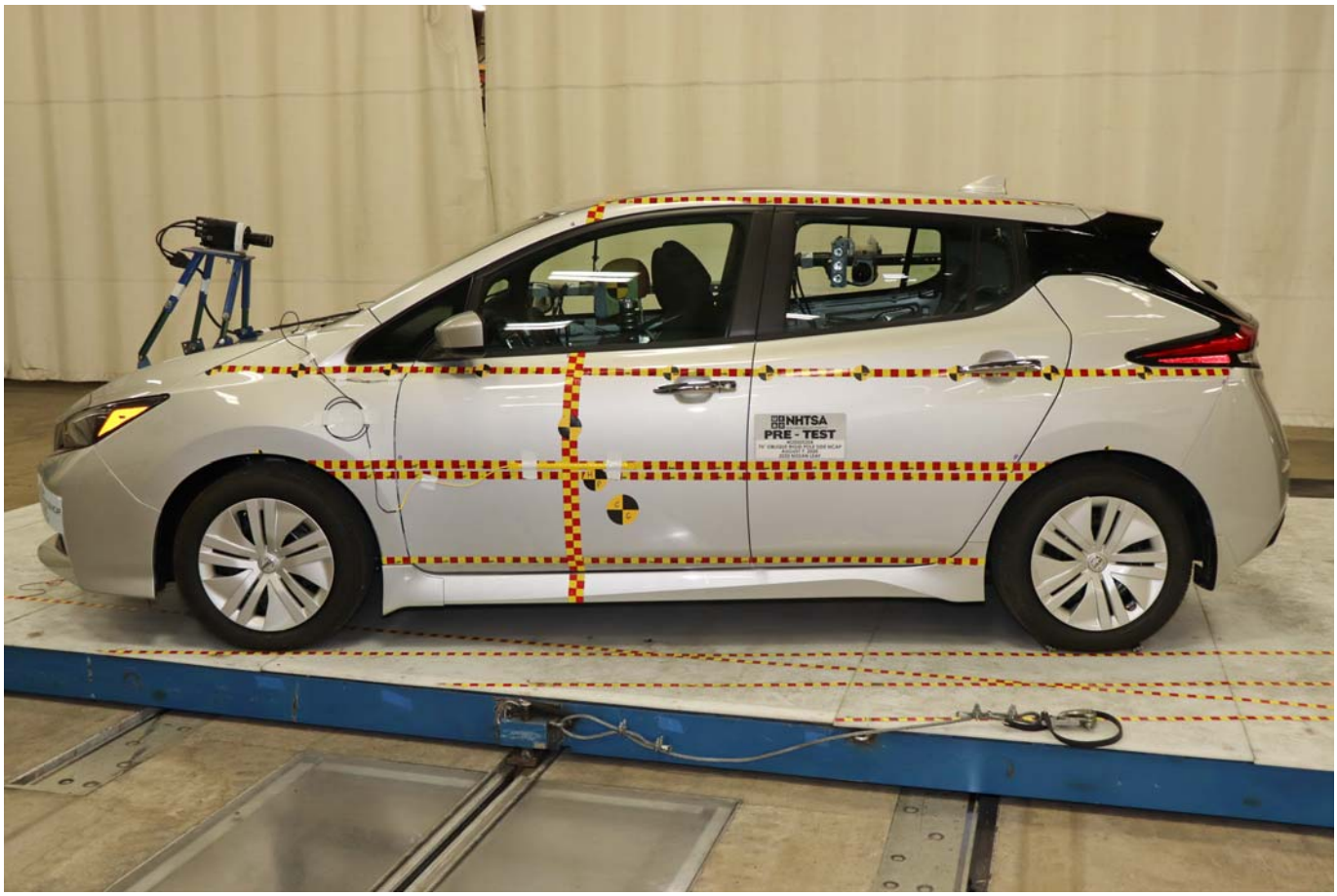


Photo No. 007 - Pre-Test Left Side View of Test Vehicle

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

Photo No. 009 - Pre-Test Left 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

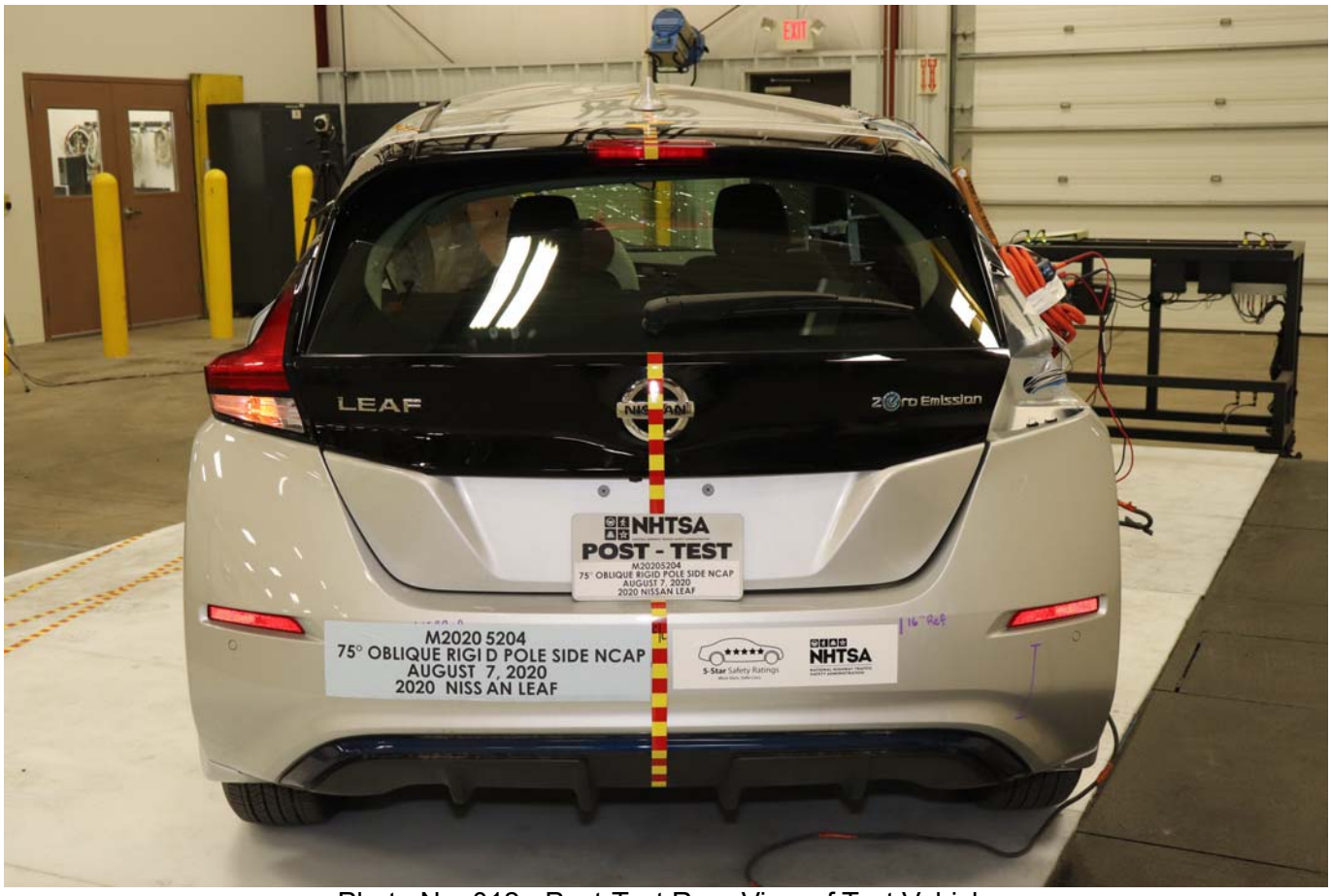


Photo No. 012 - Post-Test Rear View of Test Vehicle

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

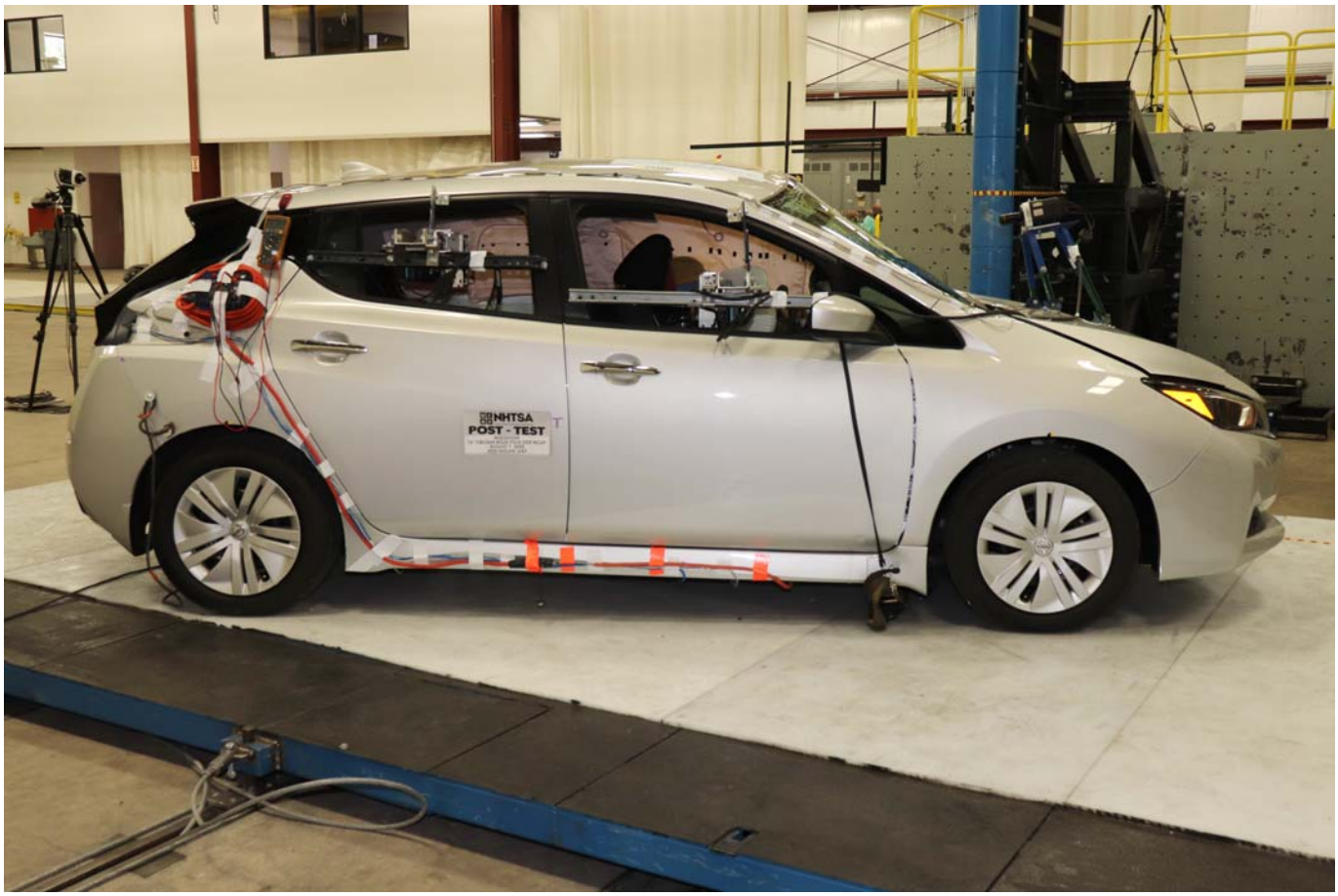


Photo No. 014 - Post-Test Right Side View of Test Vehicle

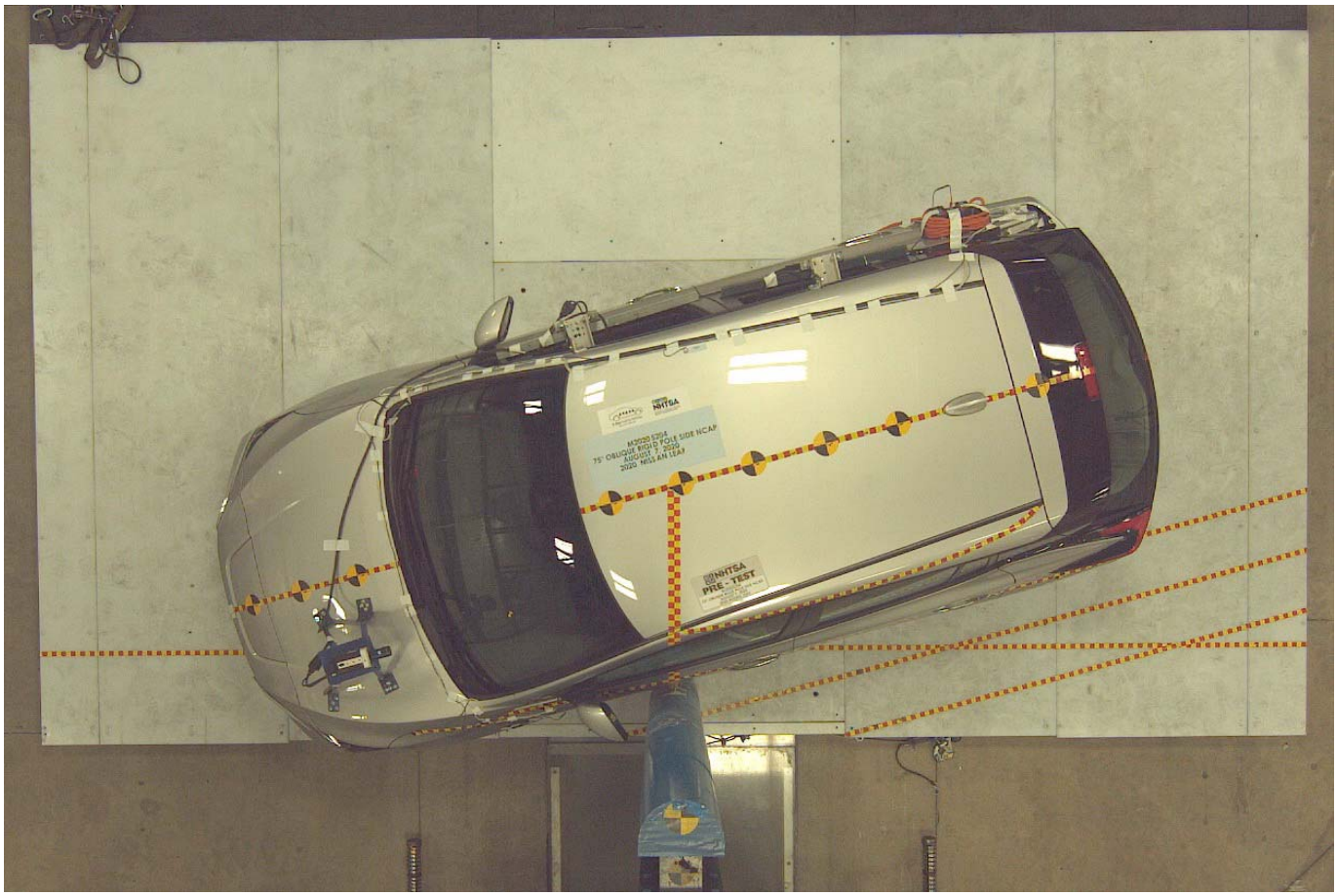


Photo No. 015 - Pre-Test Overhead View of Test Area

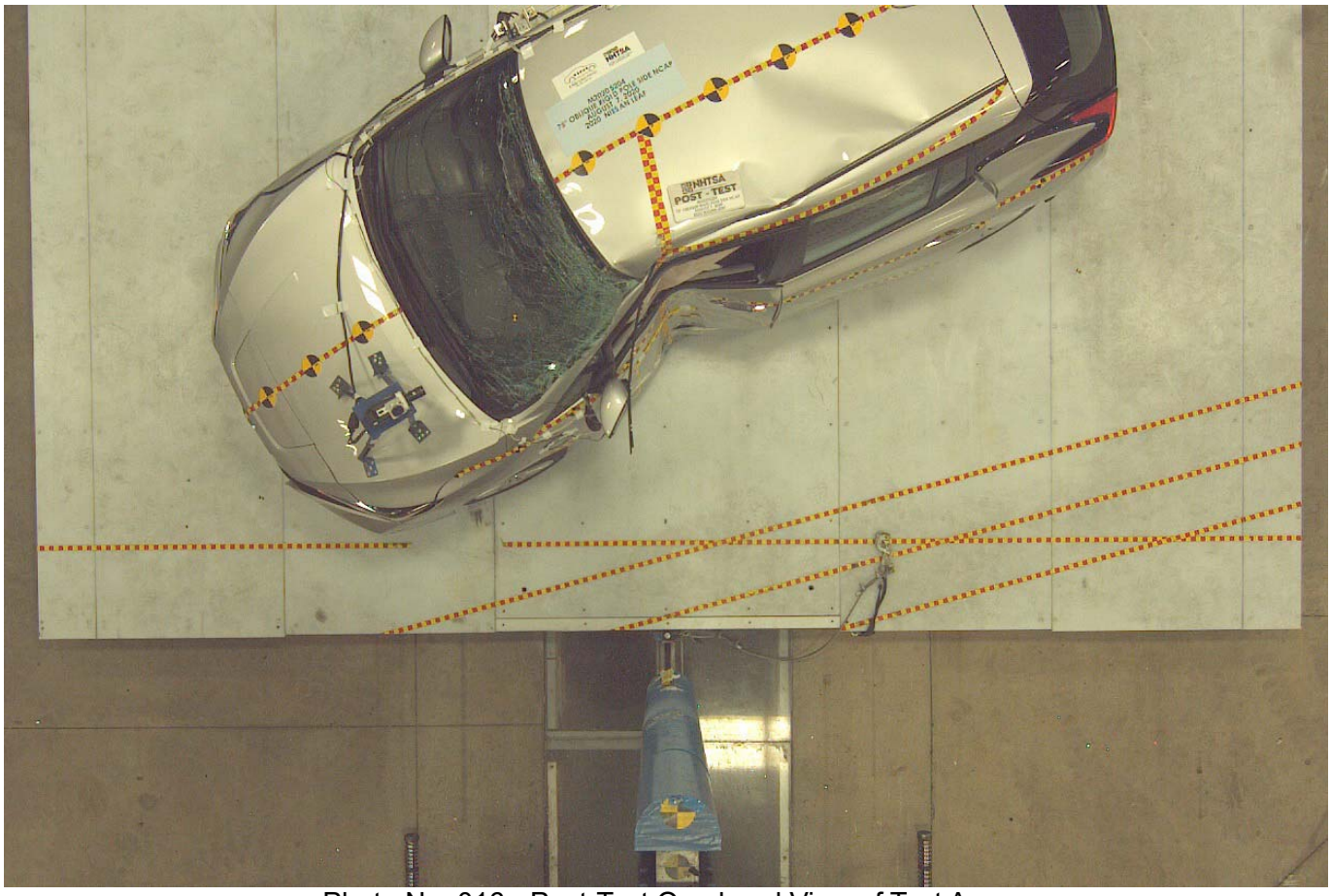


Photo No. 016 - Post-Test Overhead View of Test Area

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

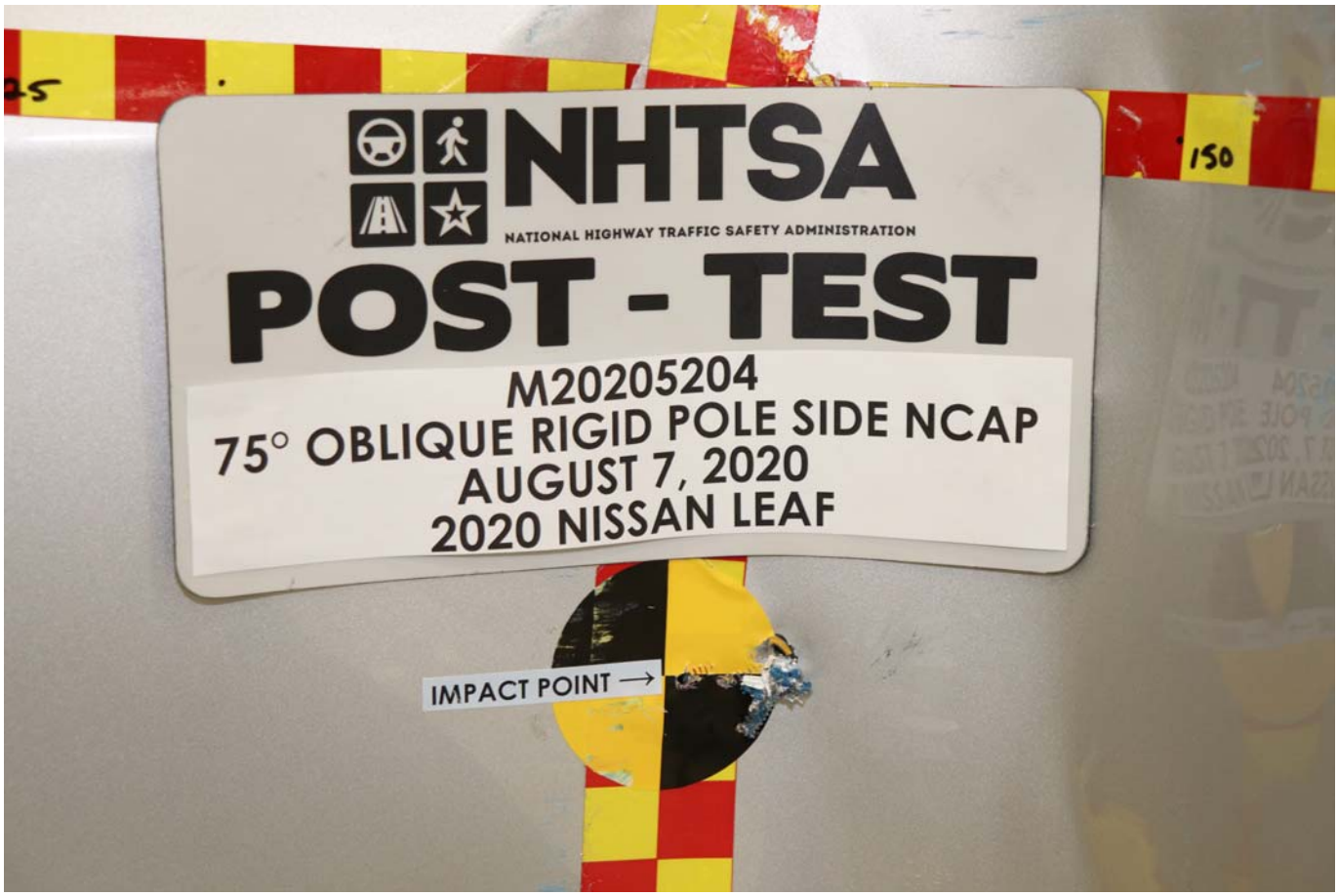


Photo No. 020 - Post-Test Close-Up View of Impact Point Target Showing Impact Location

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

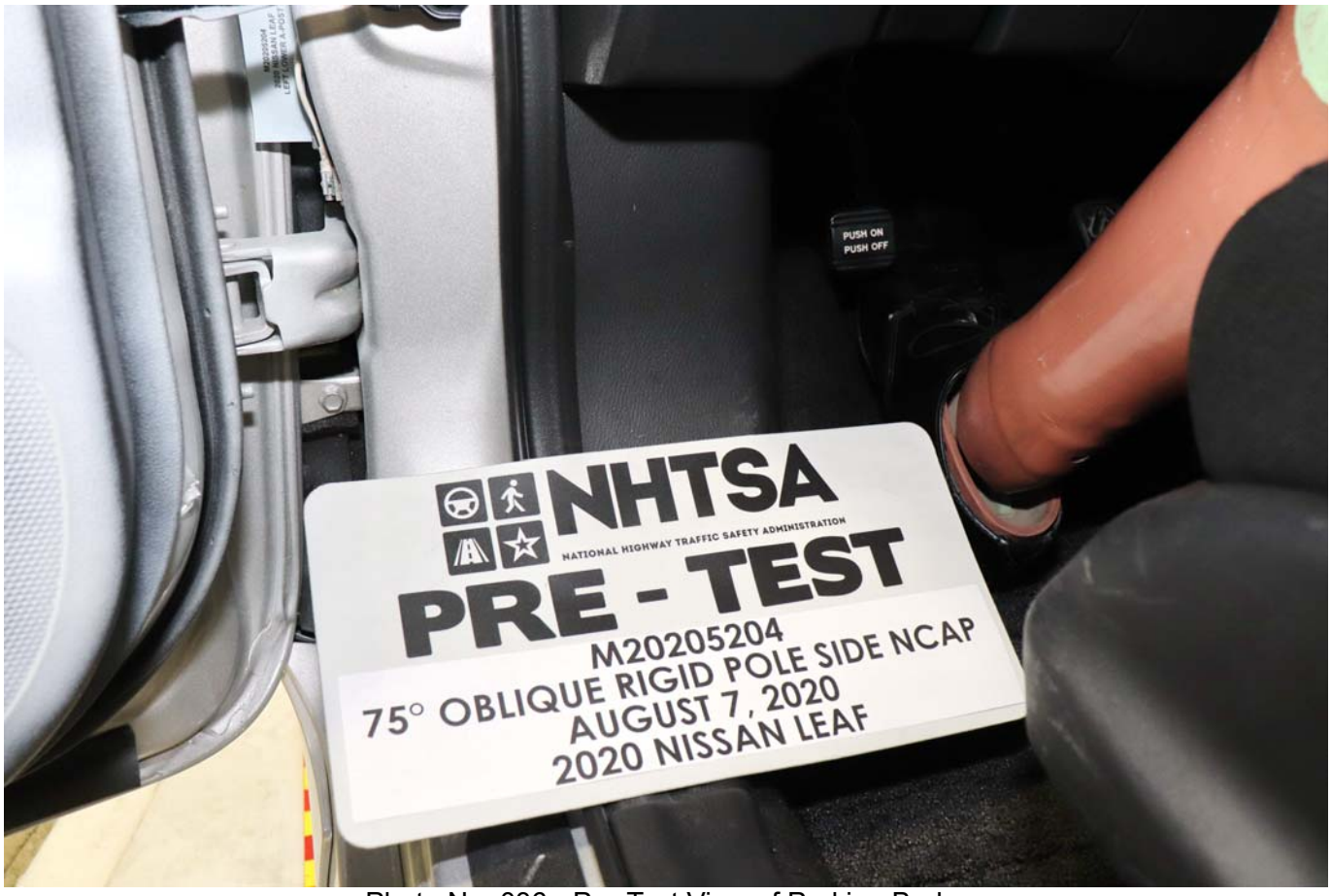


Photo No. 036 - Pre-Test View of Parking Brake

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

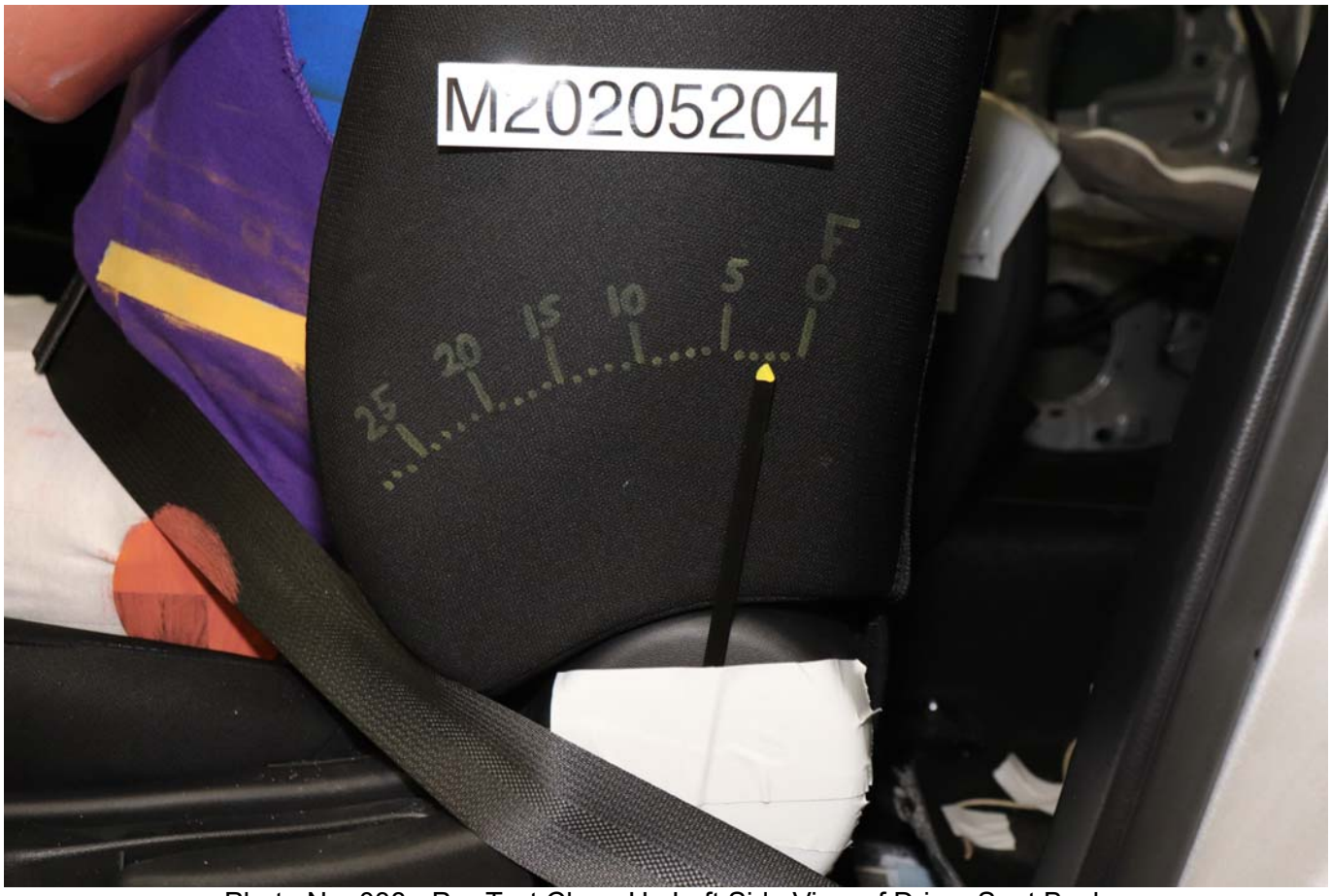


Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back

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

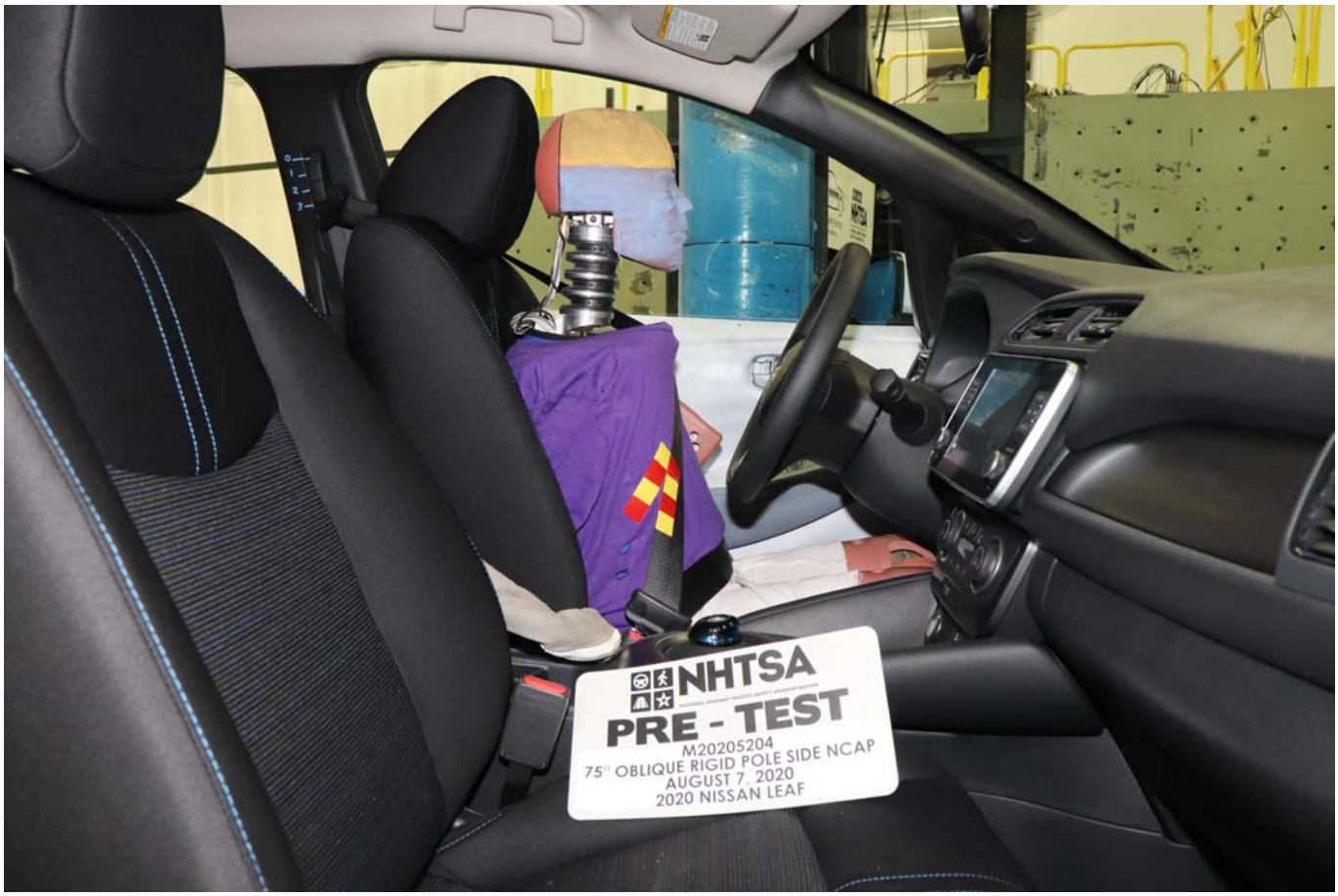


Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment

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

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

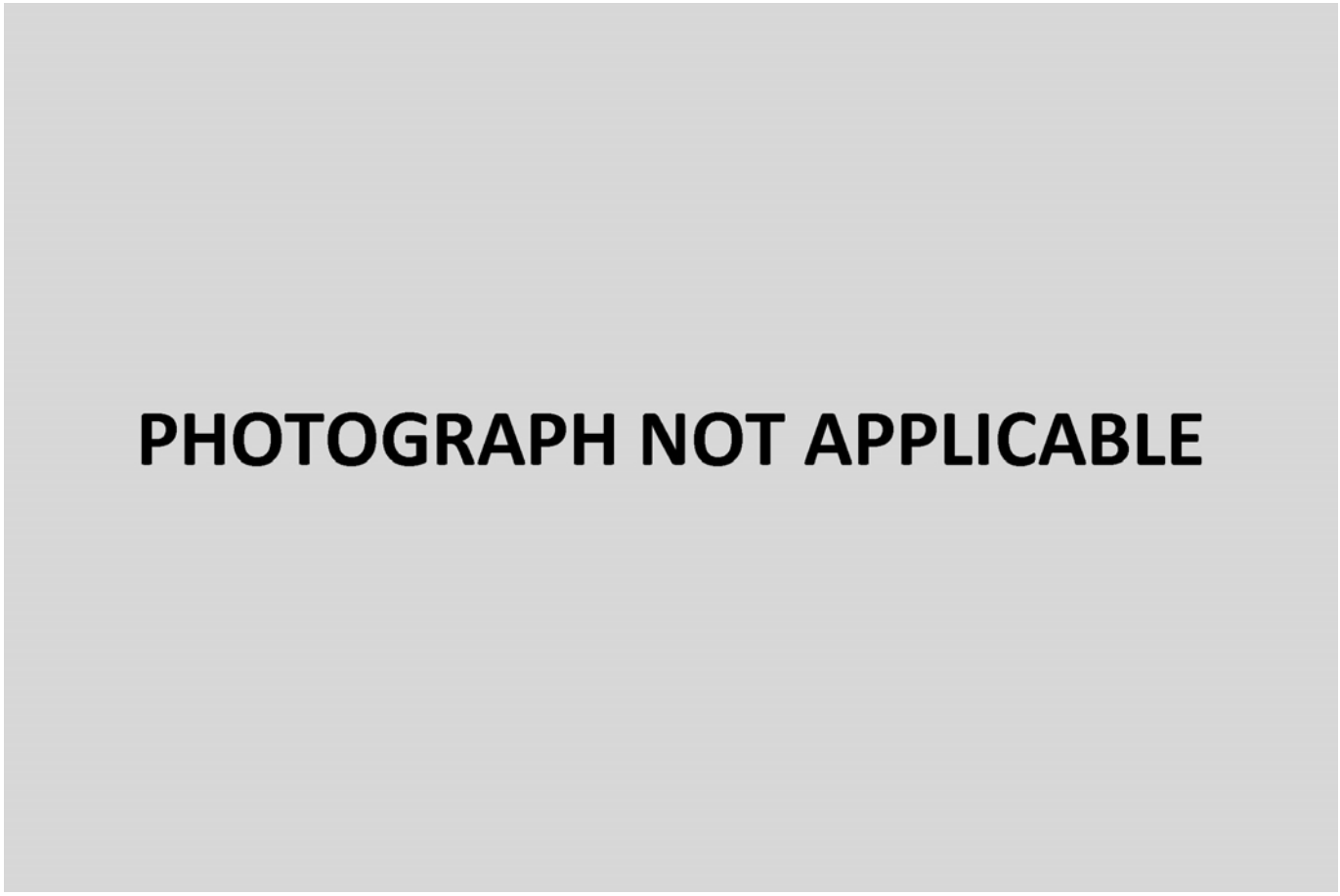


Photo No. 055 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

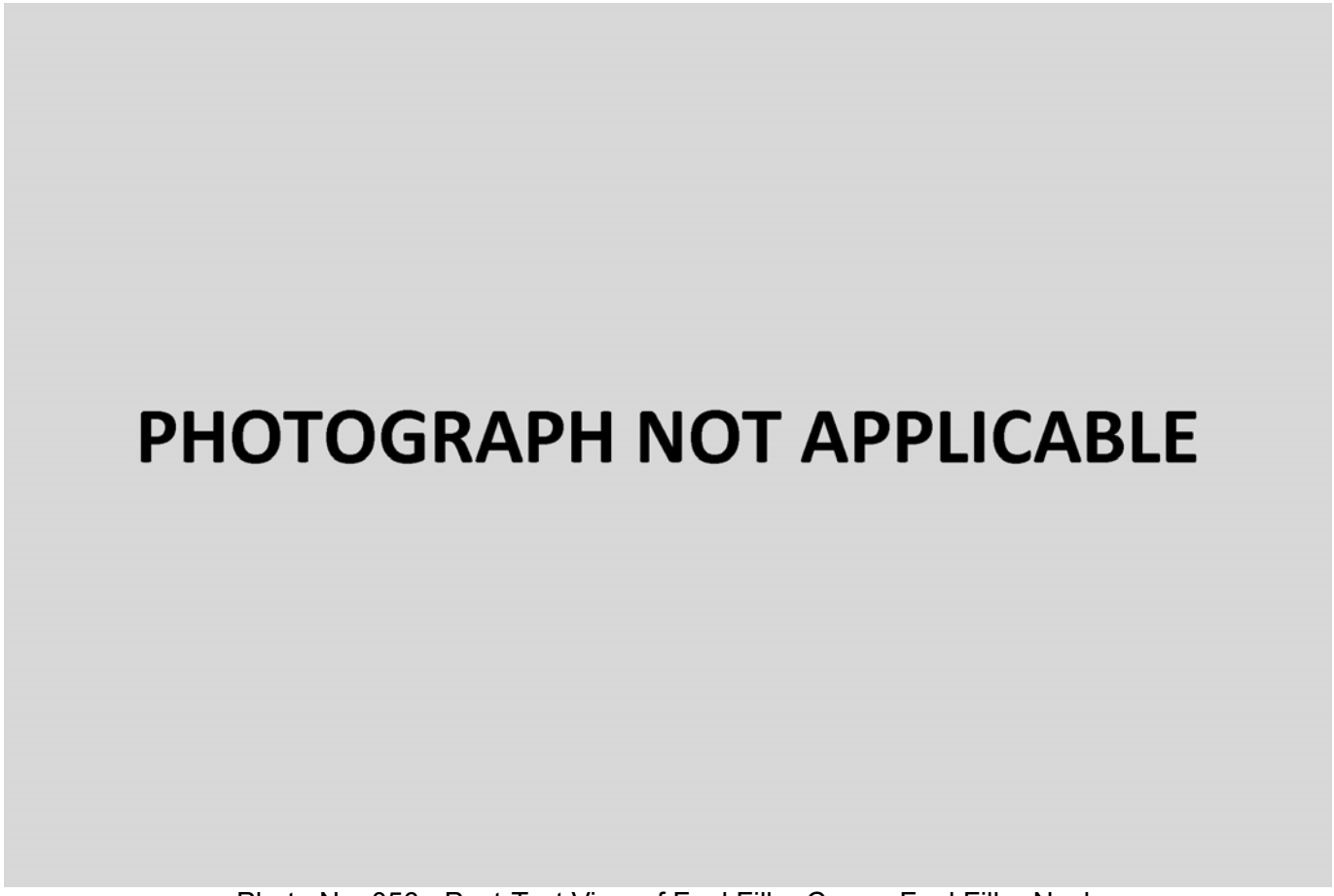


Photo No. 056 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck

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. 059 - Pre-Test Pole Barrier Front View

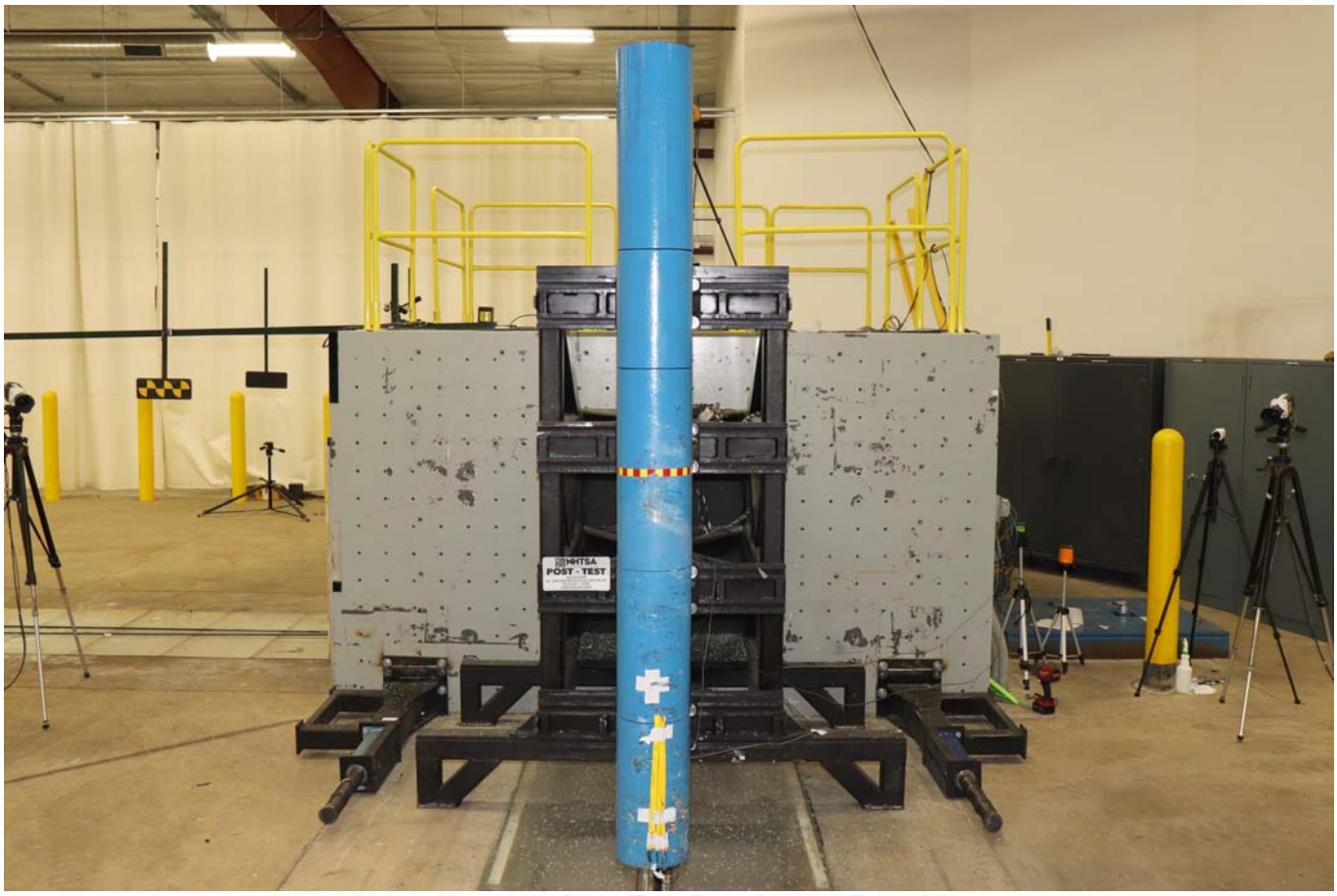


Photo No. 060 - Post-Test Pole Barrier Front View

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

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

Photo No. 063 - Pre-Test Ballast View

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

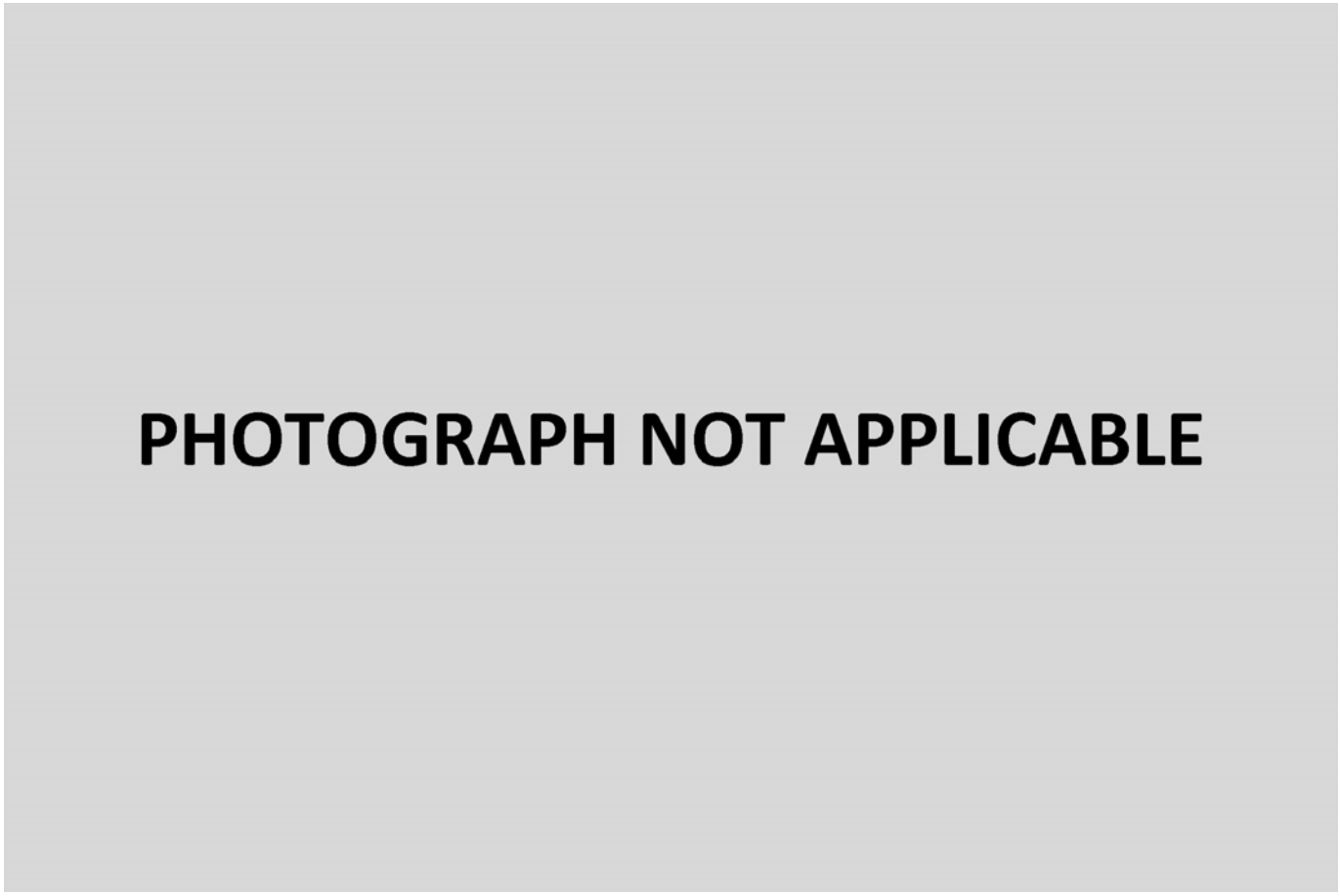


Photo No. 065 - FMVSS Photo No. 301 Static Rollover 0 Degrees

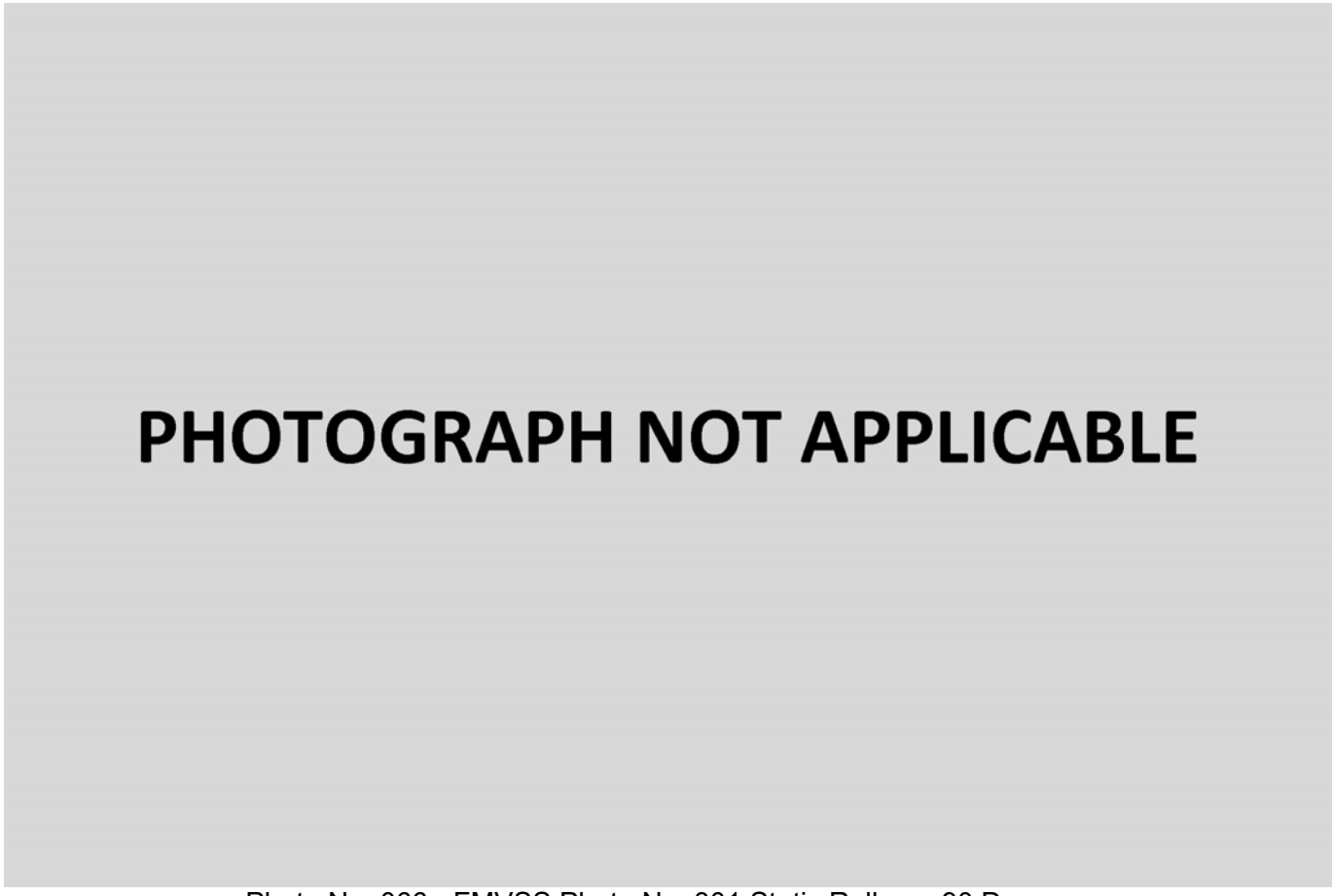


Photo No. 066 - FMVSS Photo No. 301 Static Rollover 90 Degrees

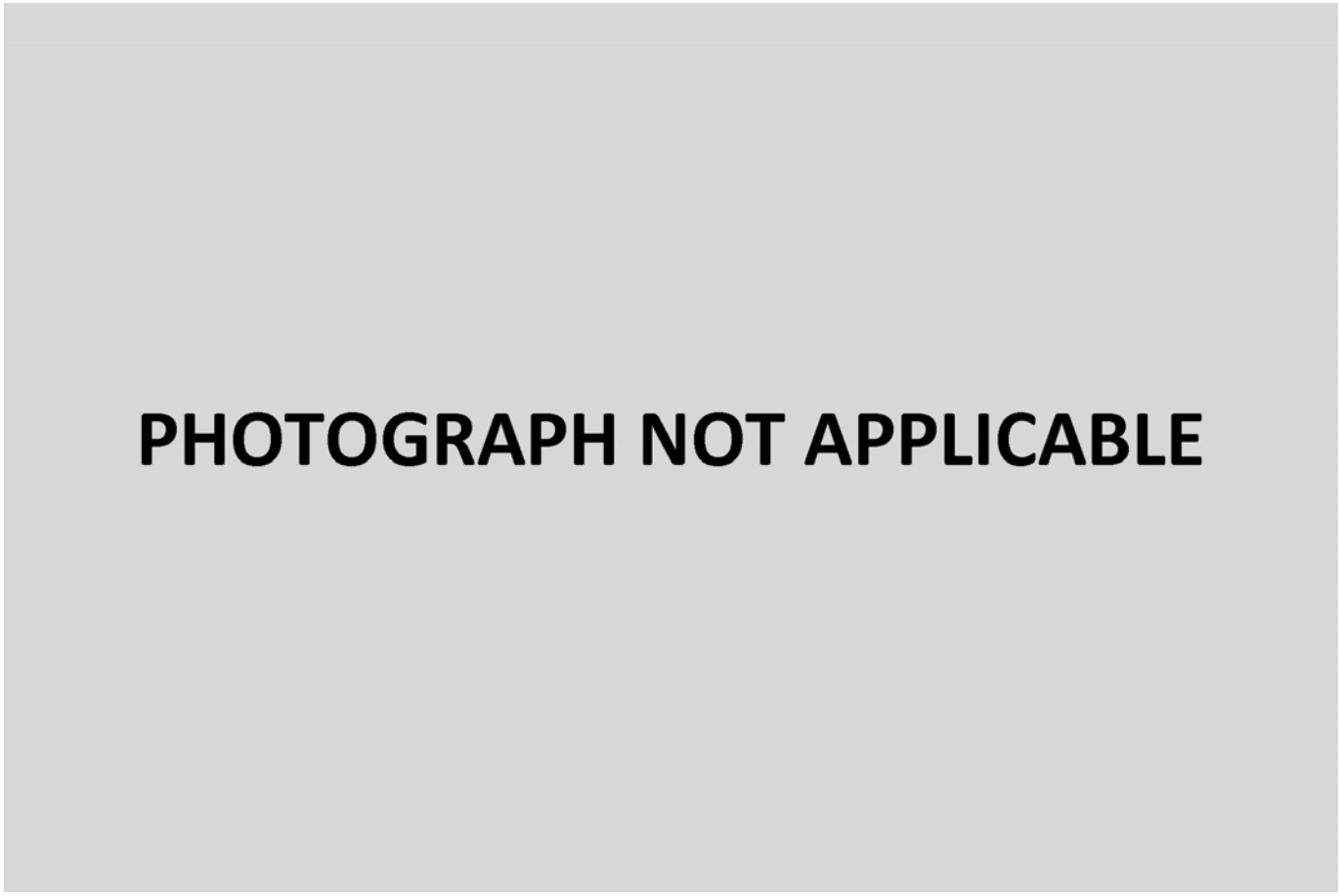


Photo No. 067 - FMVSS Photo No. 301 Static Rollover 180 Degrees

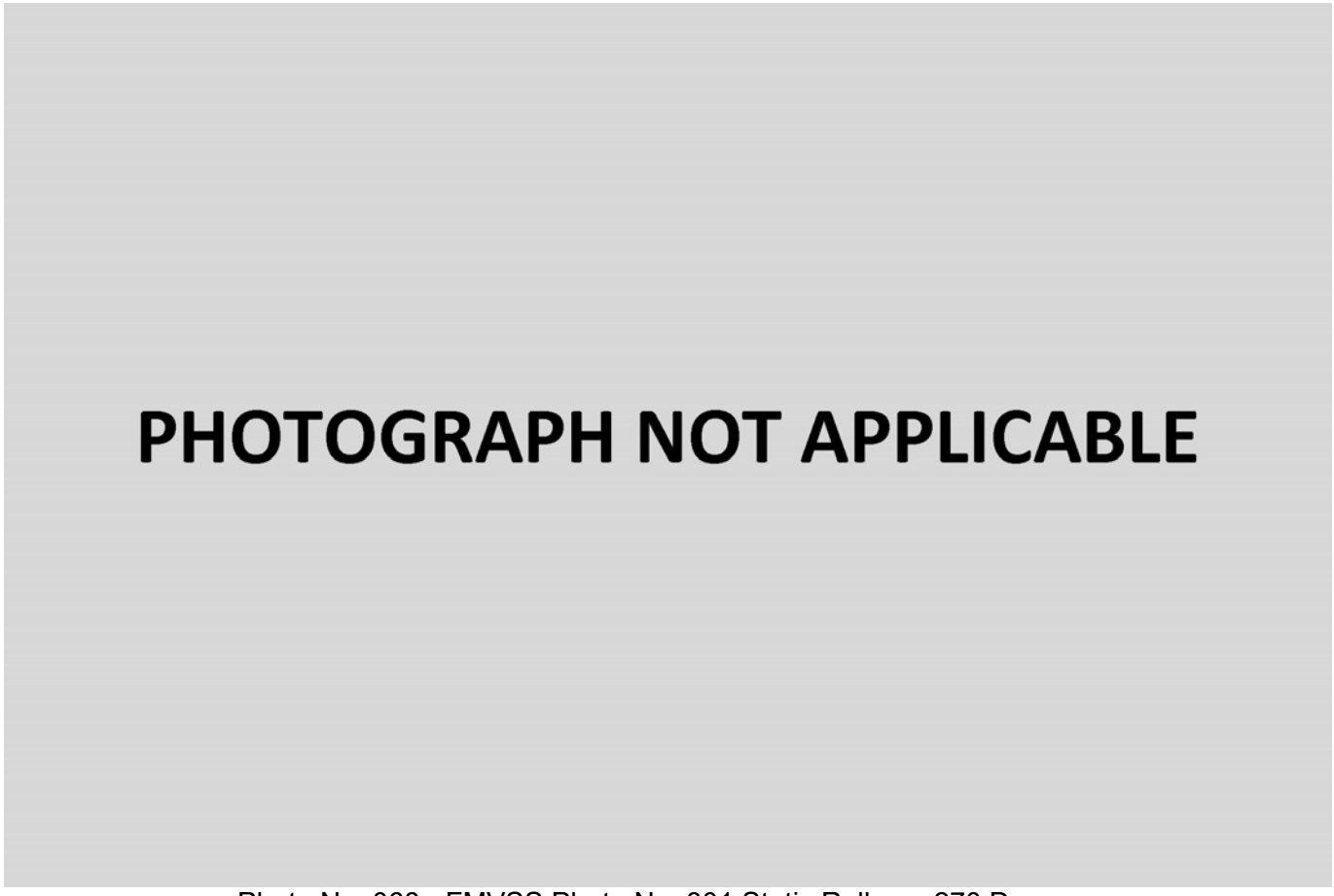


Photo No. 068 - FMVSS Photo No. 301 Static Rollover 270 Degrees

PHOTOGRAPH NOT APPLICABLE

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

Photo No. 070 - Impact Event

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 USBS (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

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

***Replaces Standard Equipment

*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.

Manufacturer's Suggested Retail Base Price:	$31,600.00
Options Included by Manufacturer	
SPLASH GUARDS	200.00
CHARGE PACKAGE Quick Charge Port Portable Charge Cable (120V/240V EVSE)***	1,690.00
CARPETED FLOOR MATS AND CARGO AREA MAT	195.00
SAFETY KIT First-Aid Kit Emergency Kit	80.00
DESTINATION CHARGES	925.00
Total*	$34,690.00

EPA DOT Fuel Economy and Environment — Electric Vehicle

Fuel Economy: **111** MPGe combined city/hwy (Midsize Cars range from 12 to 136 MPGe. The best vehicle rates 136 MPGe.)
123 city / 99 highway
30 kW-hrs per 100 miles
Driving Range: When fully charged, vehicle can travel about... 149 miles
Charge Time: 8 hours (240V)

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

Annual fuel cost **$600**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 10 (Best) — Smog Rating (tailpipe only): 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 $0.12 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: BRILLIANT SILVE
INT: BLACK

FINAL ASSEMBLY POINT: SMYRNA
TRANSPORT METHOD: TRUCK
DEALER: MICHAEL JORDAN NISSAN, 3930 CHAPEL HILL BLVD, DURHAM NC, 27707

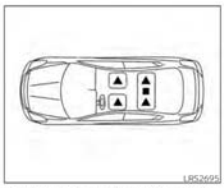
VIN: 1N4AZ1BP8LC300632
EMS: 50 STATE EMISSIONS
MDL: 17010-300632 K23-G
OPT: D-B93F01L92S92C03

20191218224953AS2923

Photo No. 071 - 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

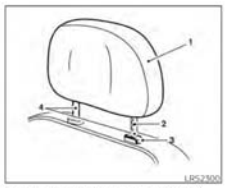
The illustration shows the seating positions equipped with head restraints/ headrests.

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

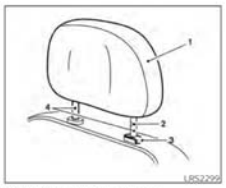
■ Indicates the seating position is equipped with a headrest.

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

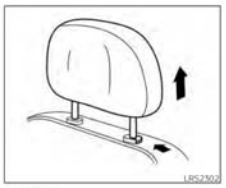
- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalks to lock them in a desired adjustment position.
- The non-adjustable head restraints/ headrests have a single locking 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

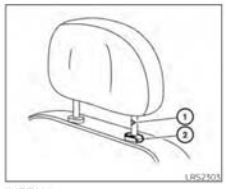

LRS2299

NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS
1. Removable head restraint/headrest
2. Single notch
3. Lock knob
4. Stalks

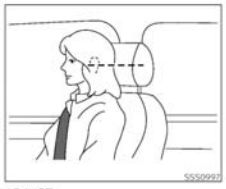

LRS2302

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.

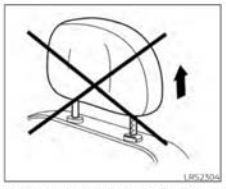

SSS0997

ADJUST

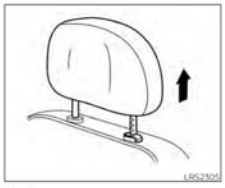
For adjustable head restraint/headrest

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

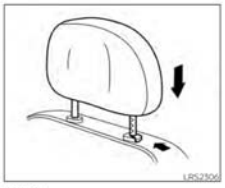
Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.


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.

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.

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

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

Photo No. 305-02 - Power Inverter Warning Label

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-03 - First Responder Warning Label

PHOTOGRAPH NOT APPLICABLE

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

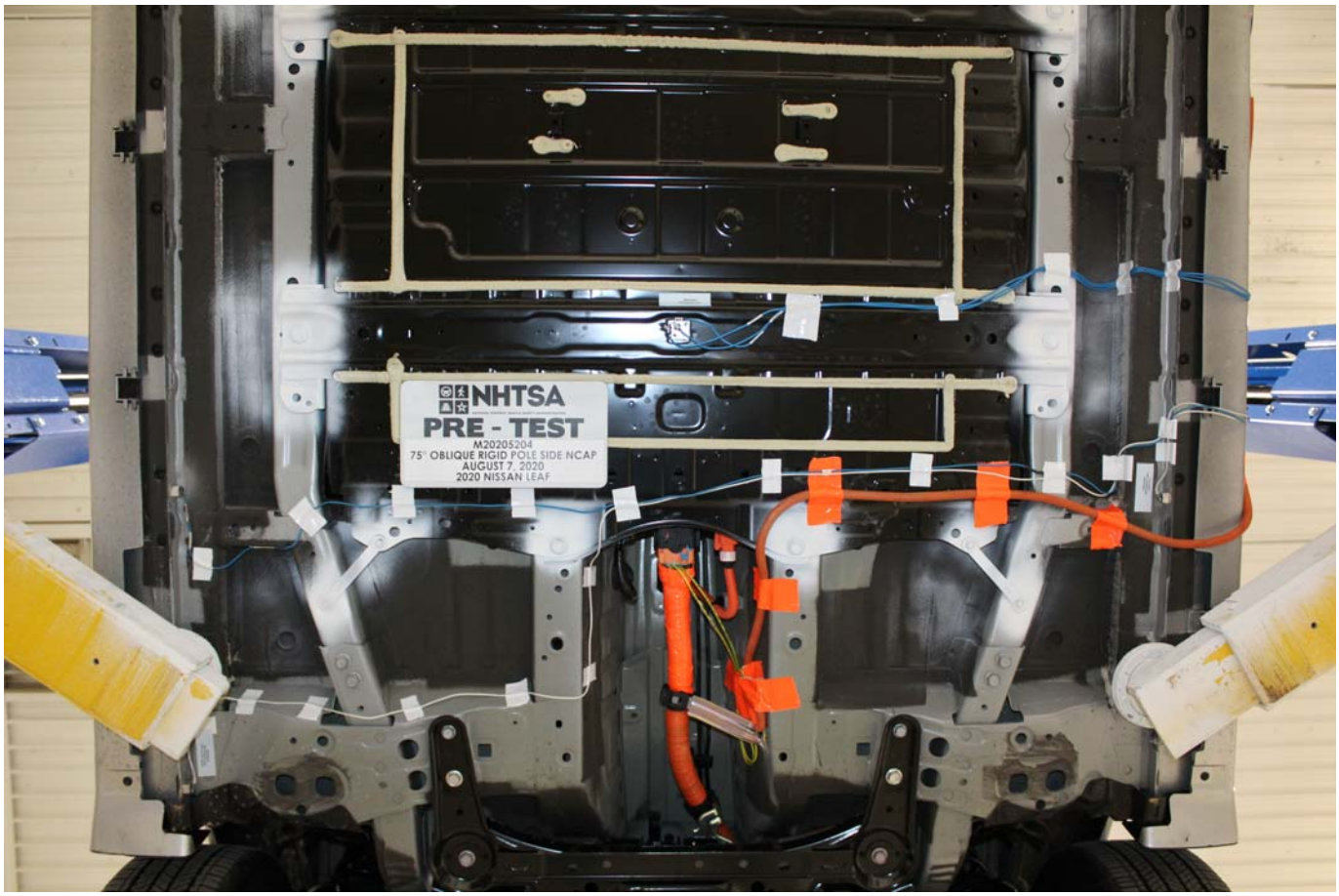


Photo No. 305-09 - Pre-Impact View of Propulsion Battery

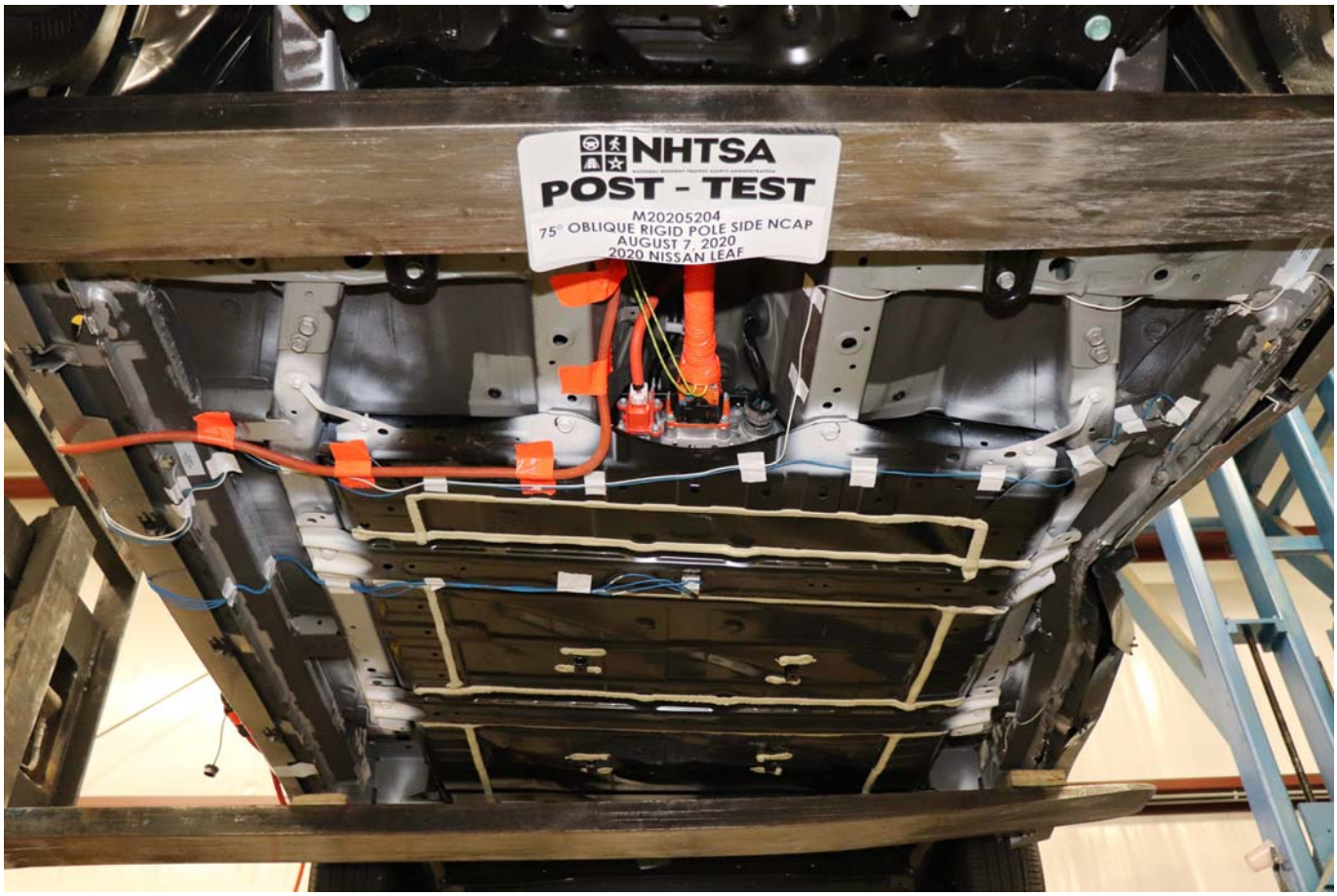


Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

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

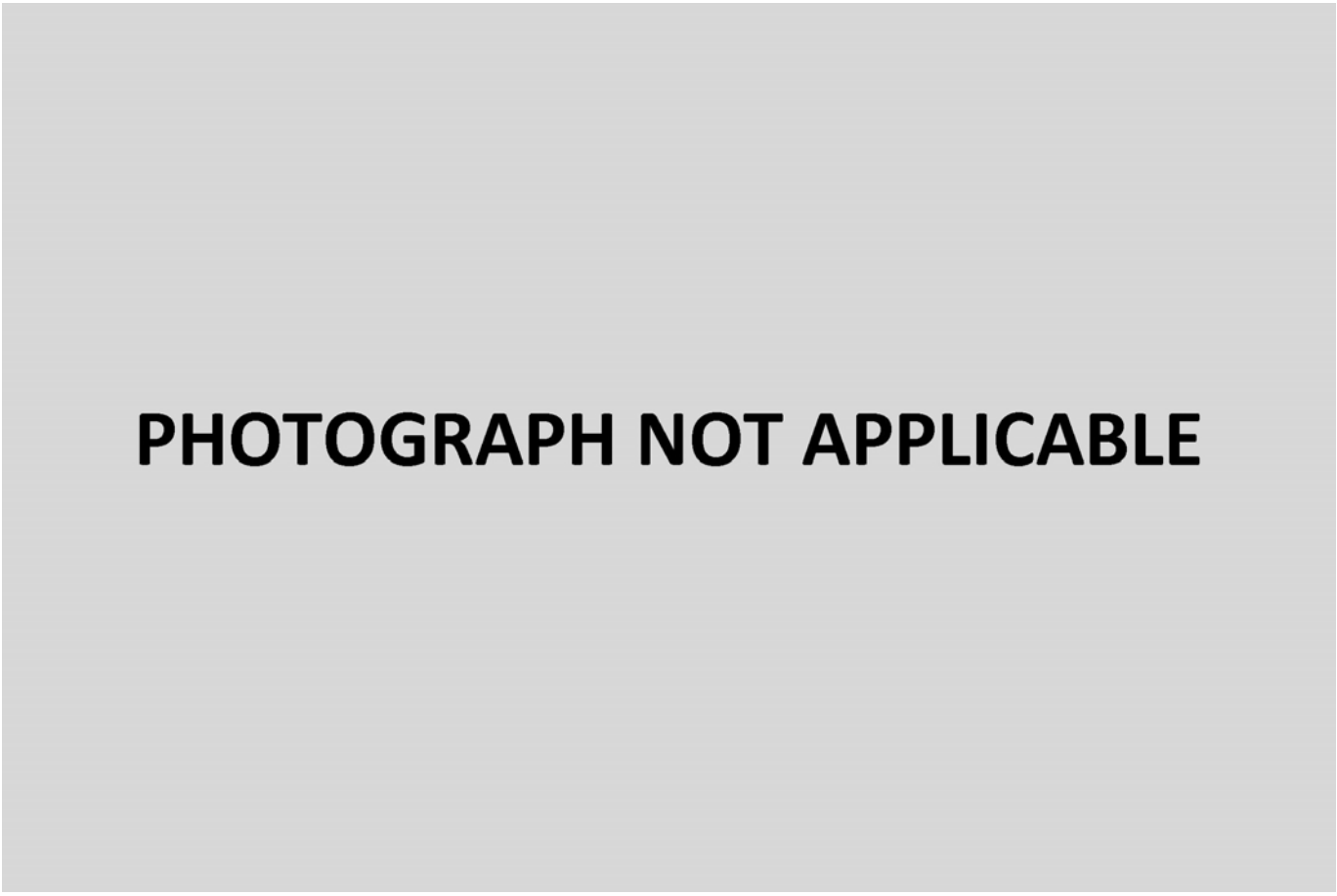


Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

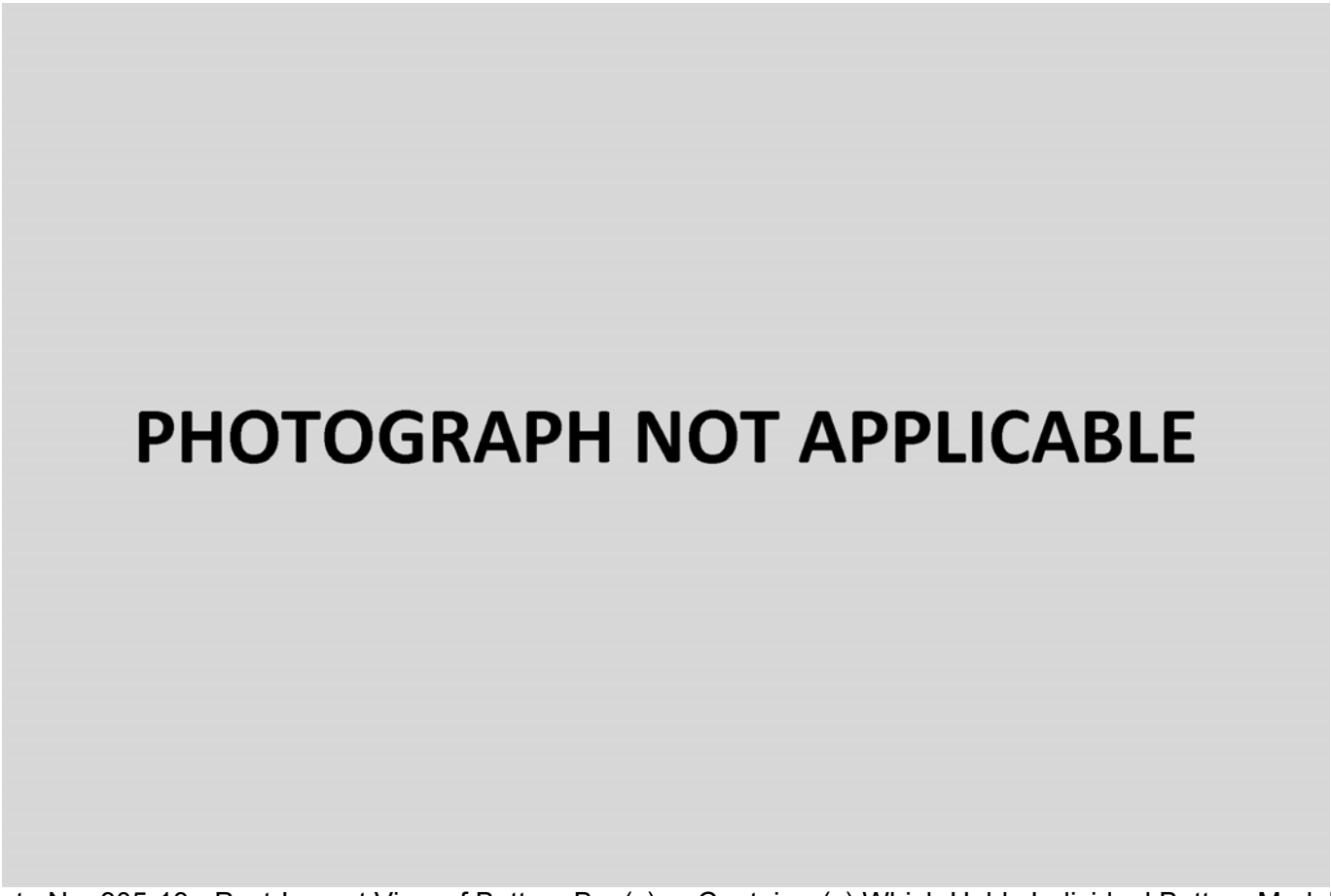


Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

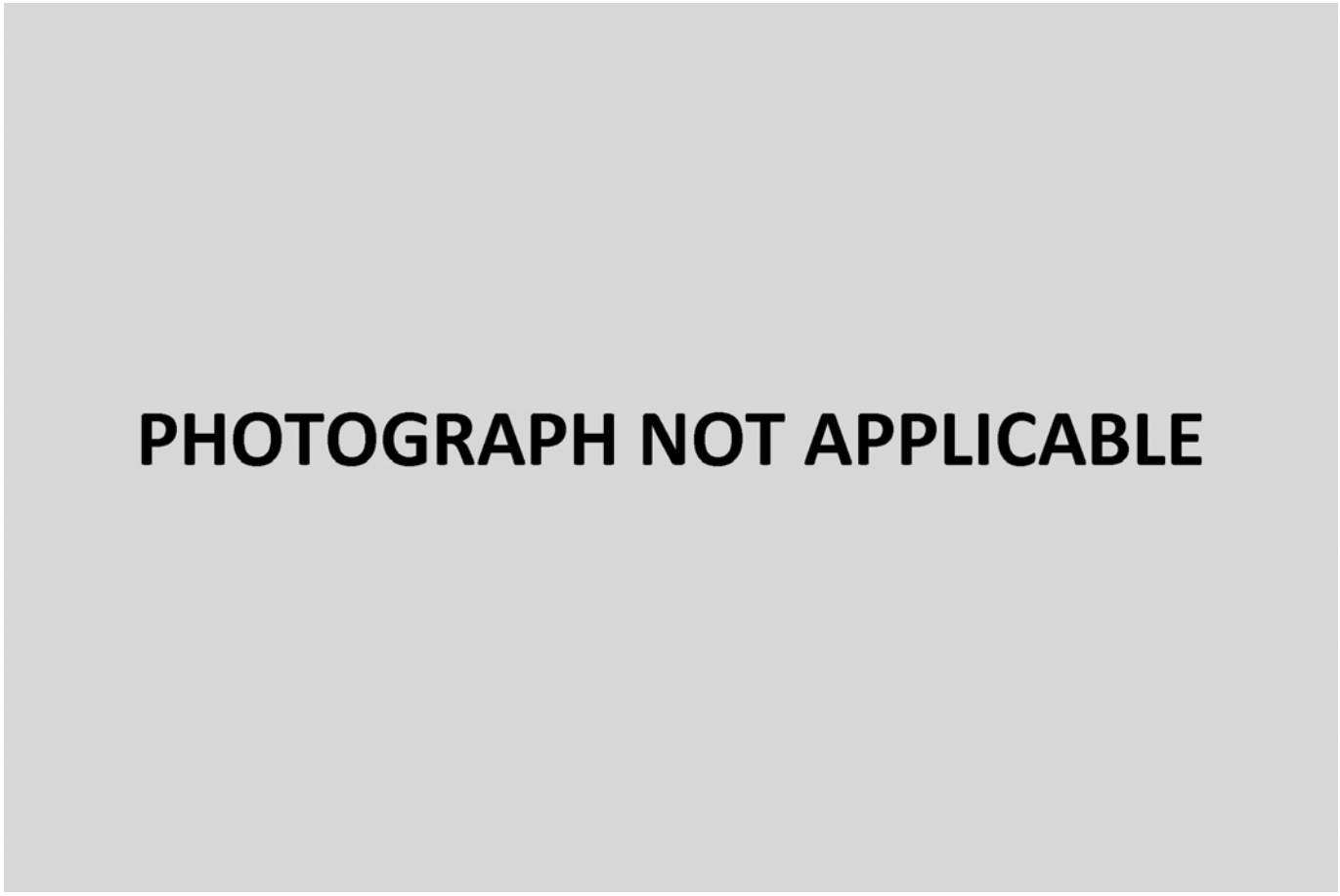


Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

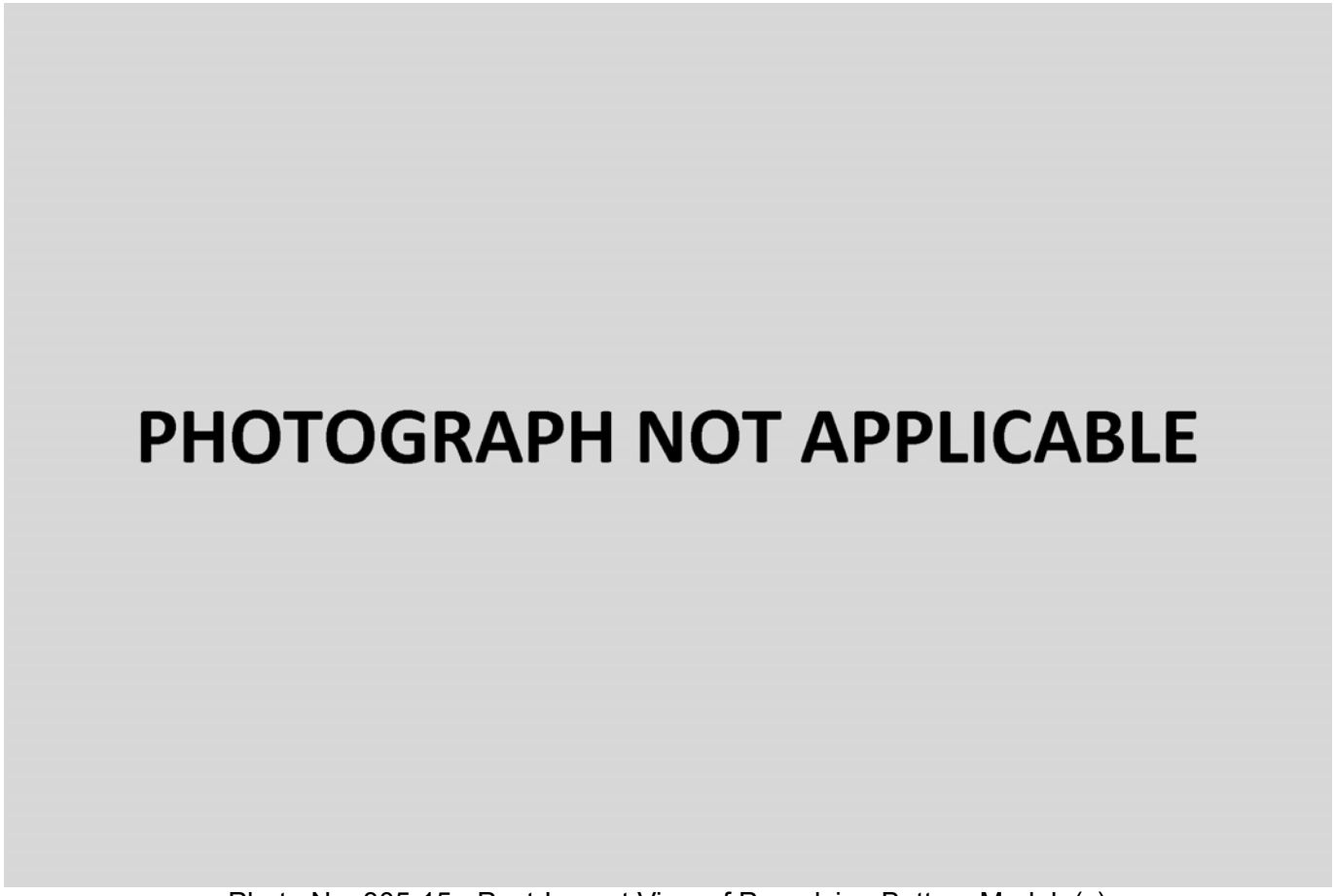


Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

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

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

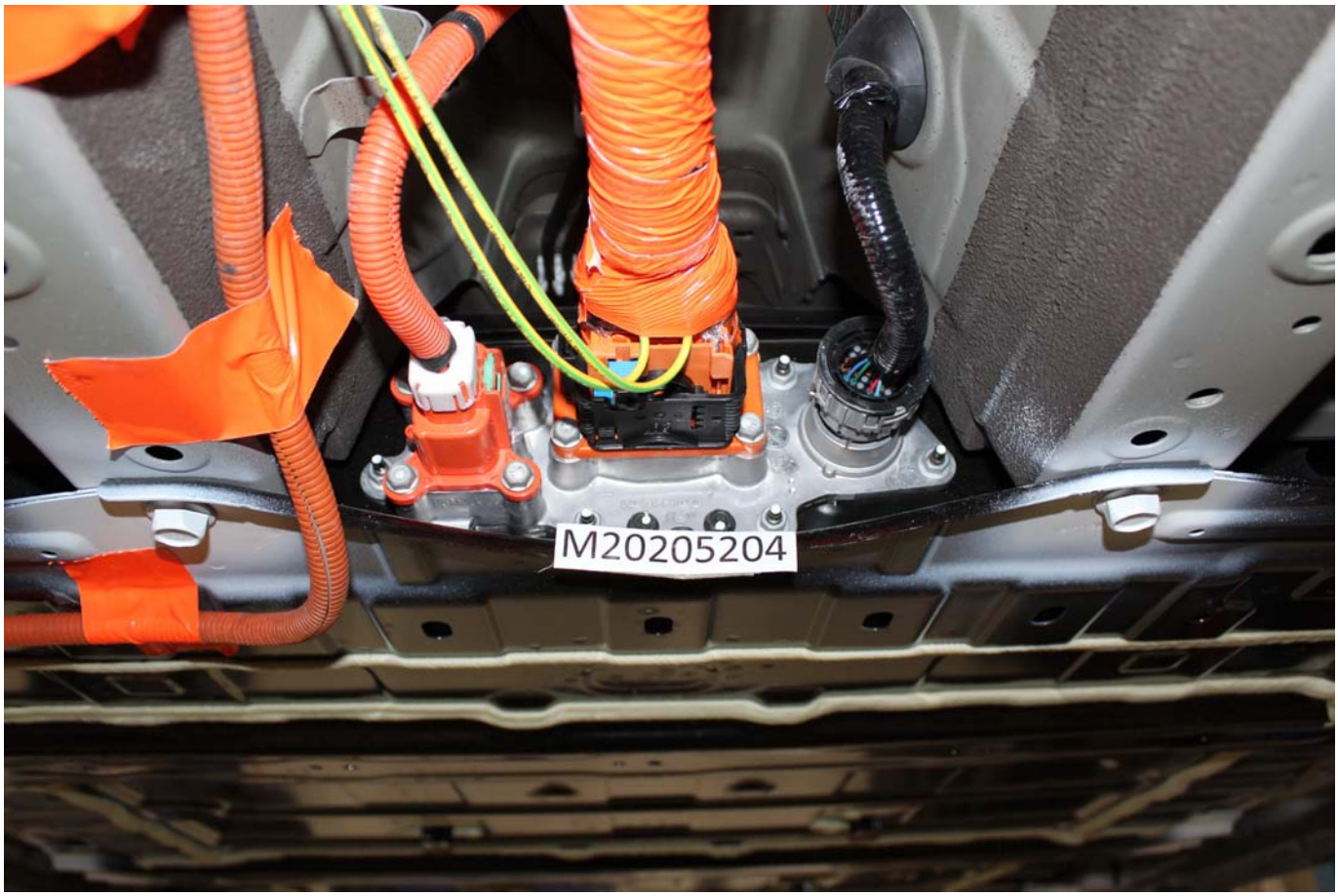


Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)

PHOTOGRAPH NOT APPLICABLE

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

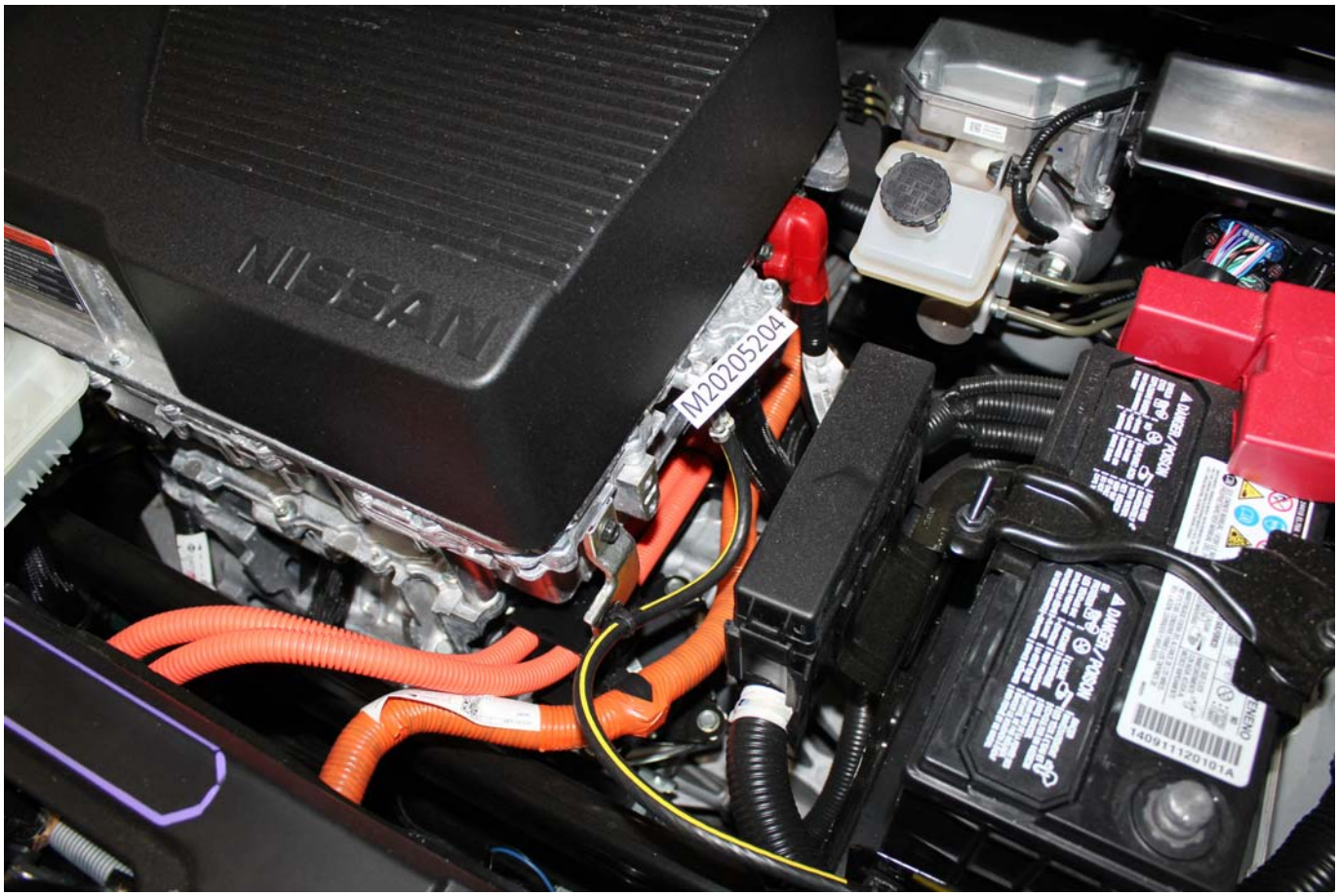


Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components

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

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

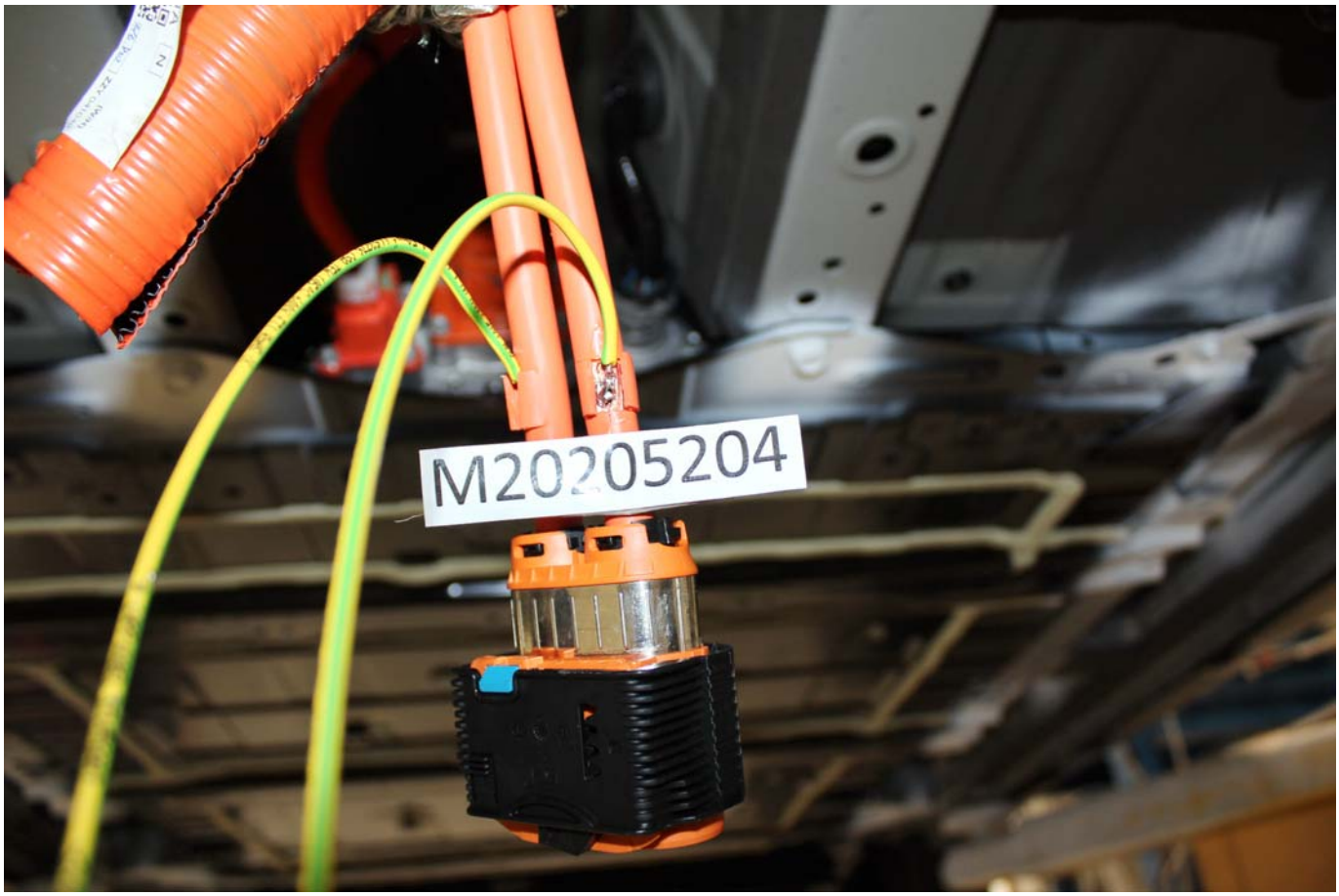


Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached

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

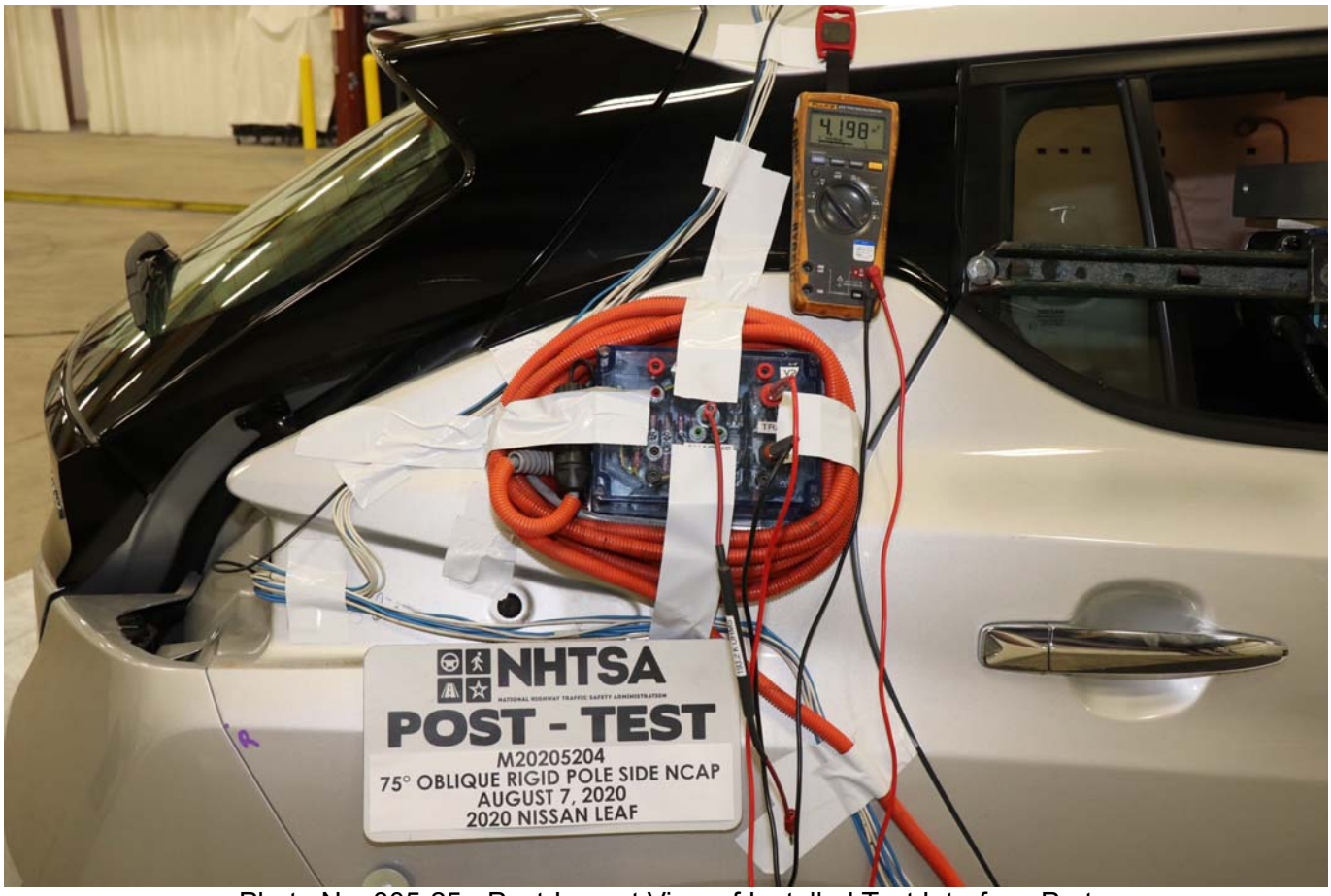


Photo No. 305-25 - Post-Impact View of Installed Test Interface Port

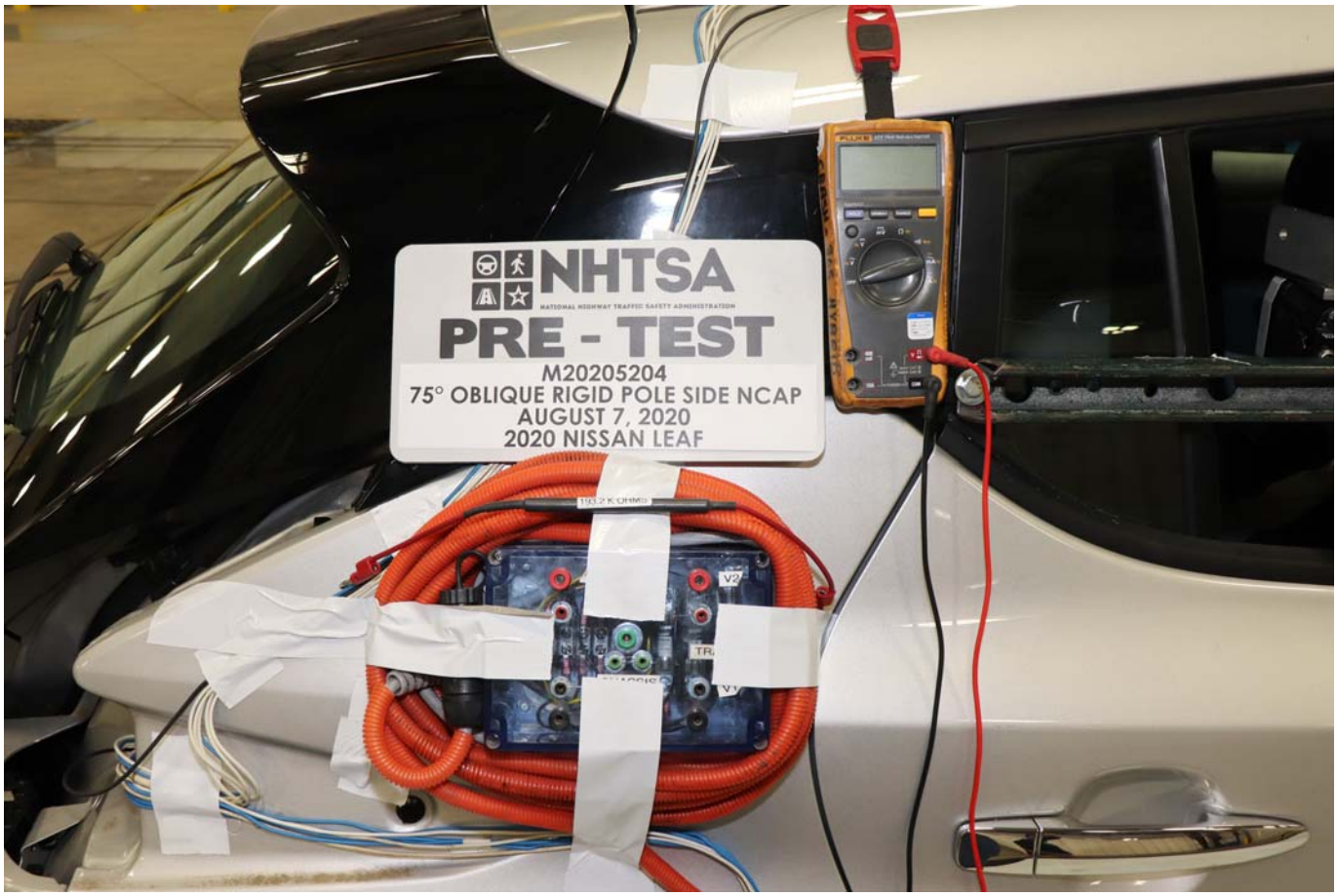


Photo No. 305-26 - Pre-Impact View of Other Test Devices

PHOTOGRAPH NOT APPLICABLE

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

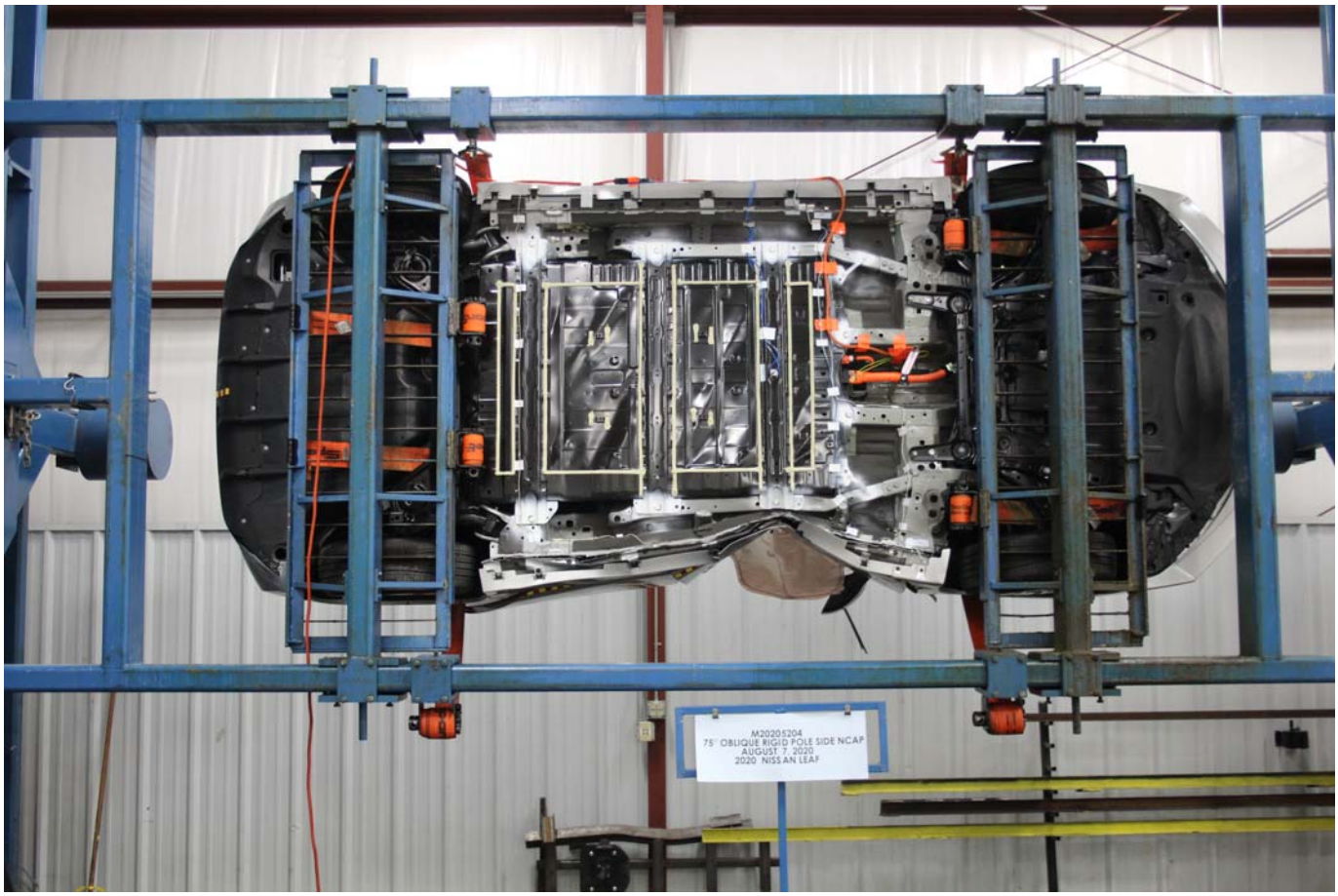


Photo No. 305-28 - FMVSS No. 305 Static Rollover at 90 Degrees

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

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

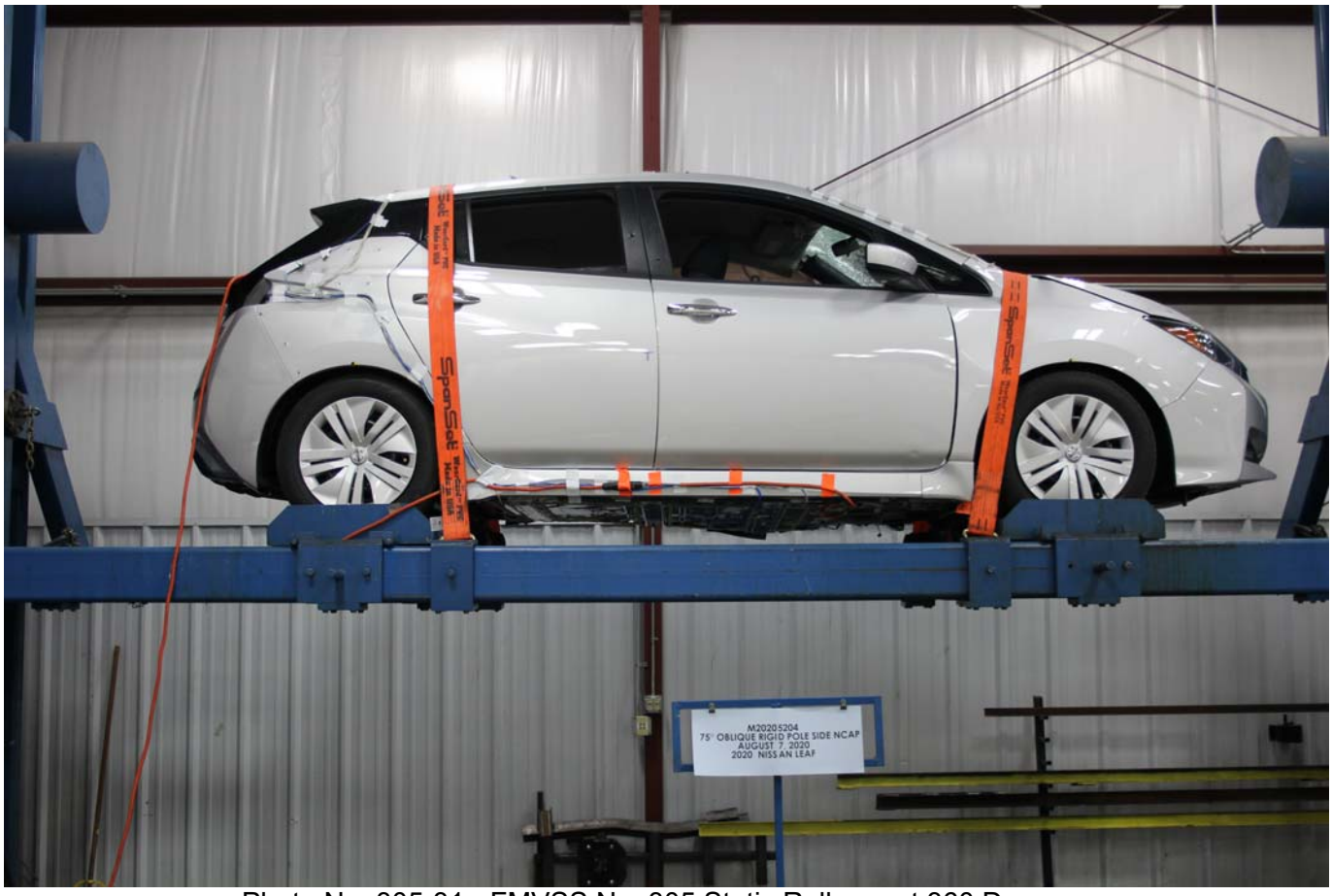


Photo No. 305-31 - FMVSS No. 305 Static Rollover at 360 Degrees

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

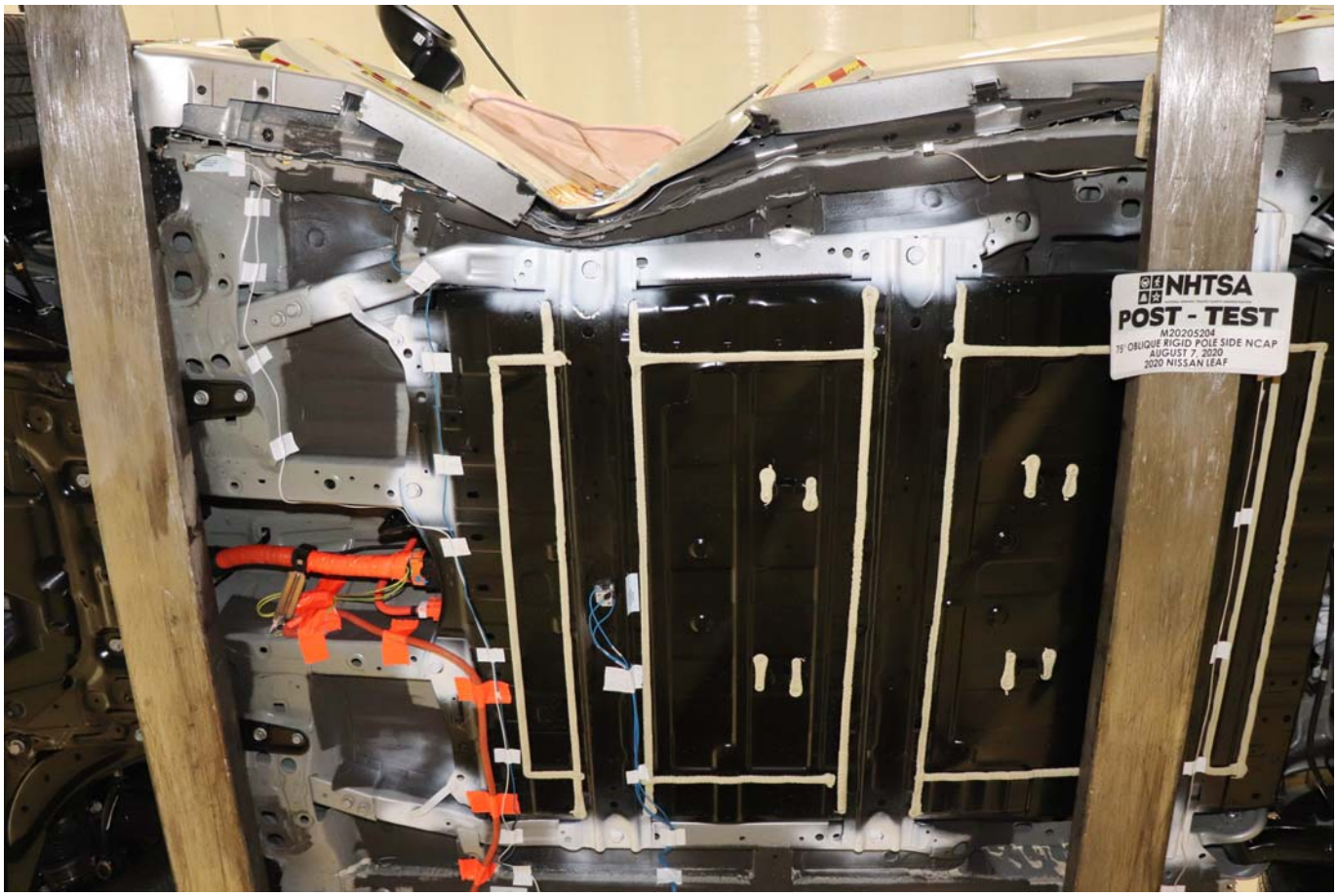


Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

PHOTOGRAPH NOT APPLICABLE

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

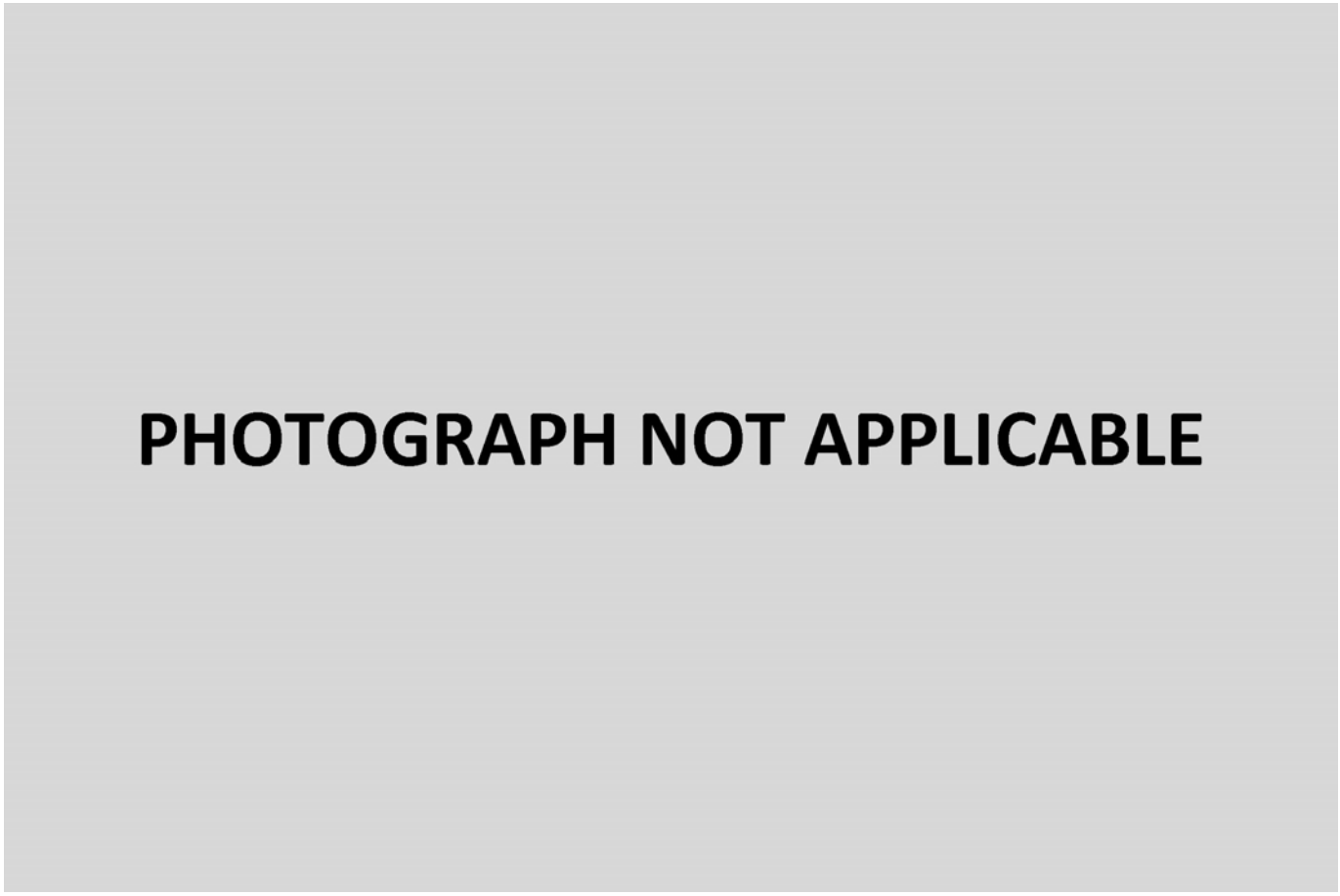


Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

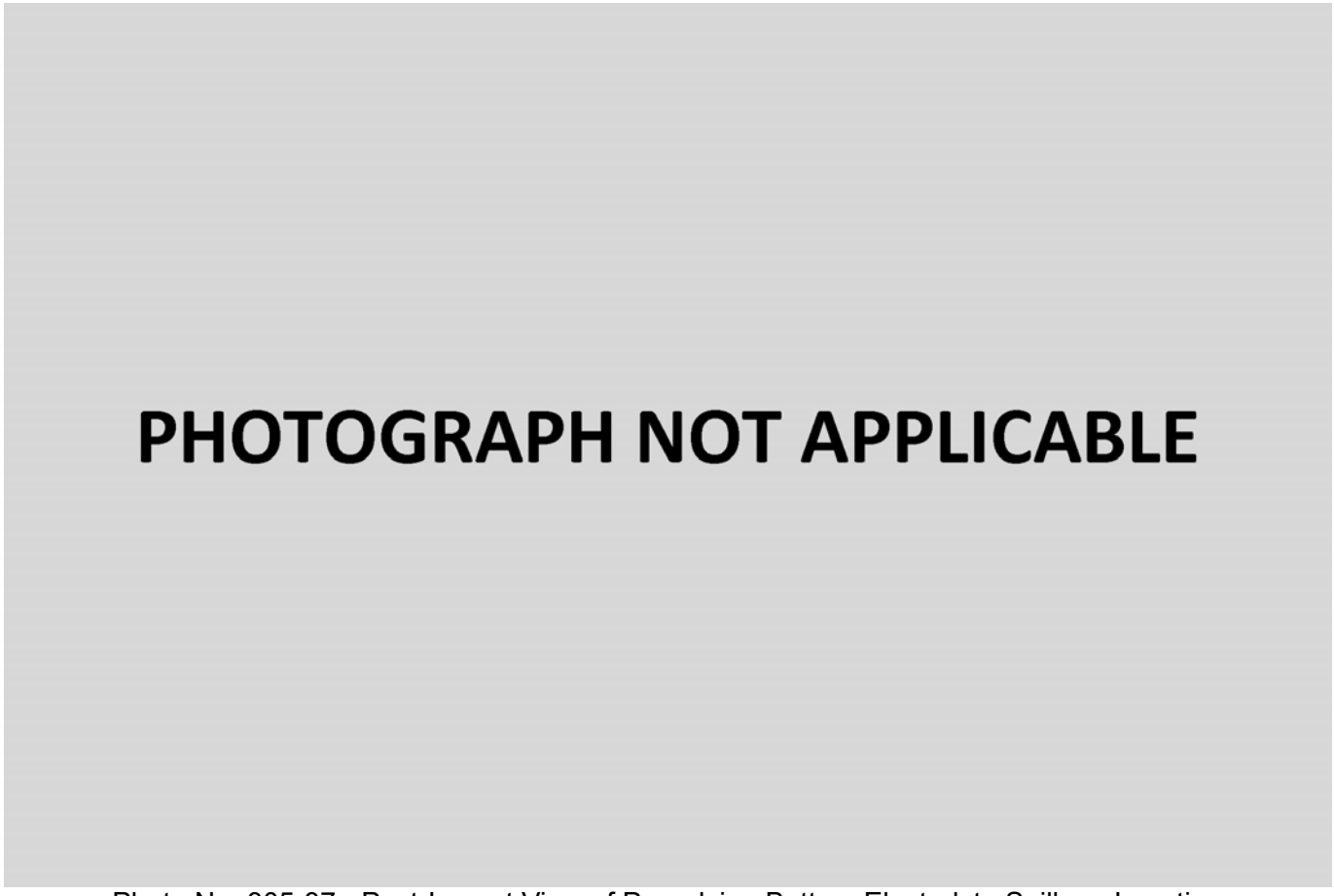


Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

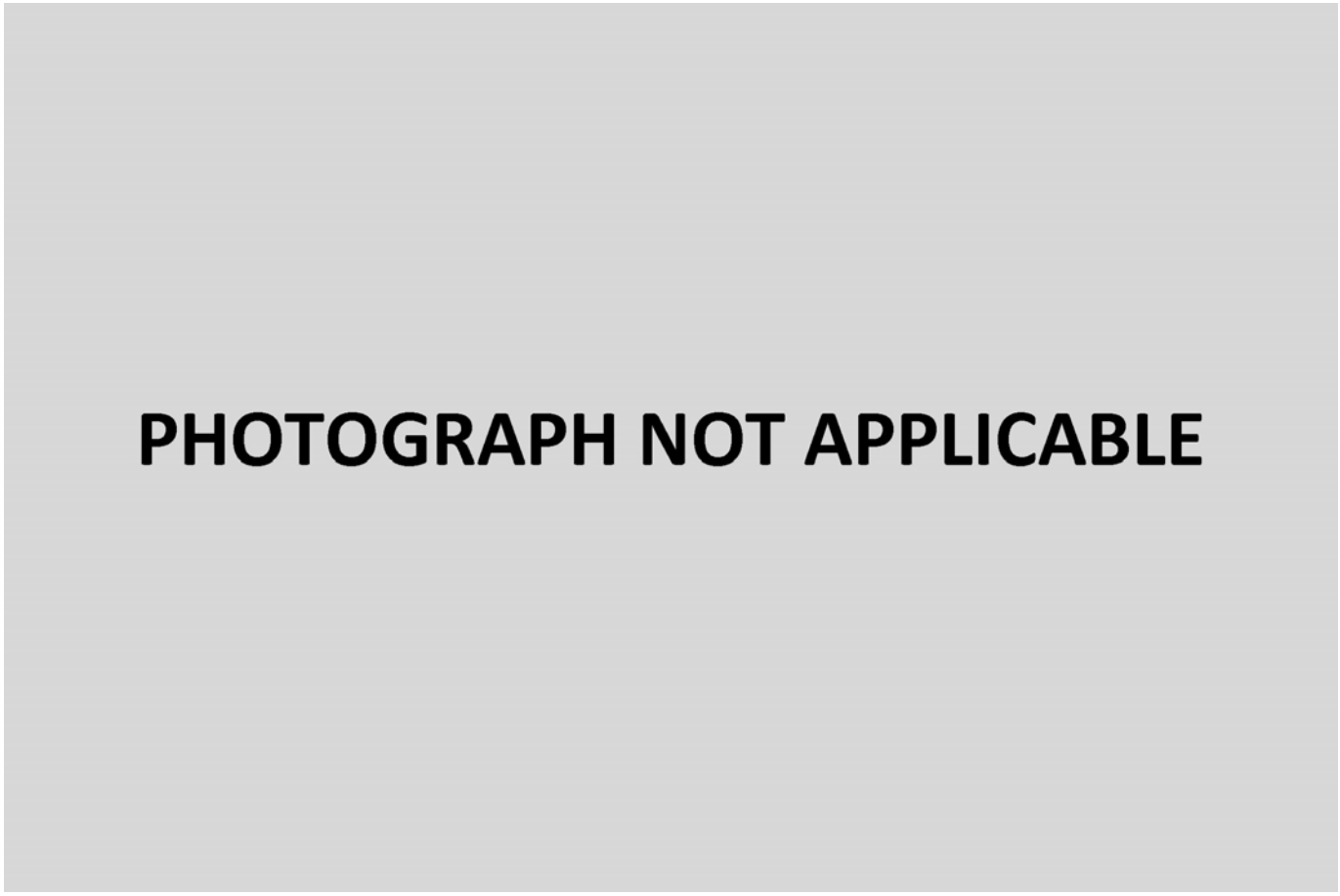


Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

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 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)

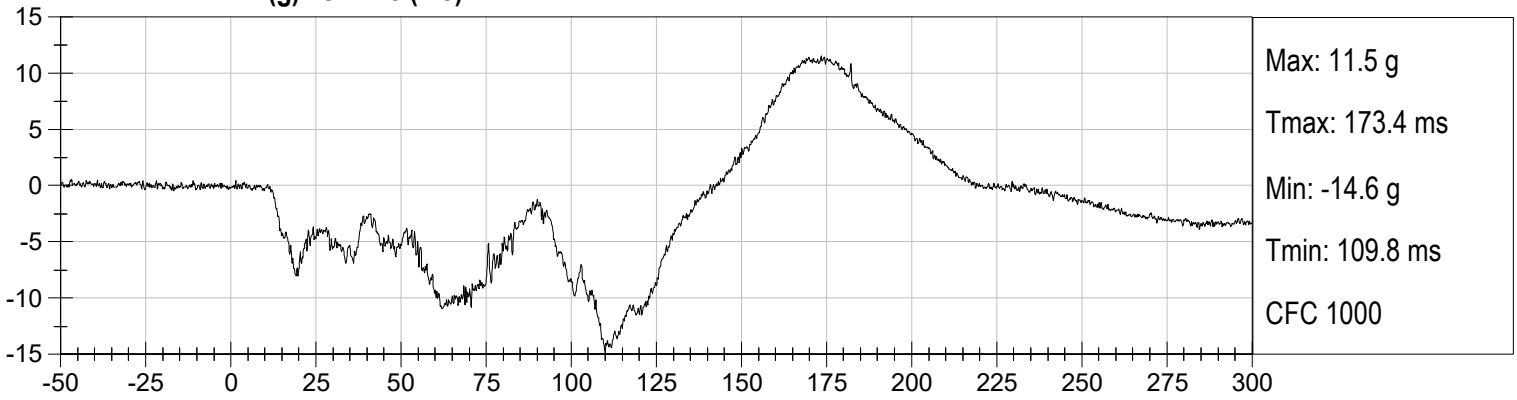
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

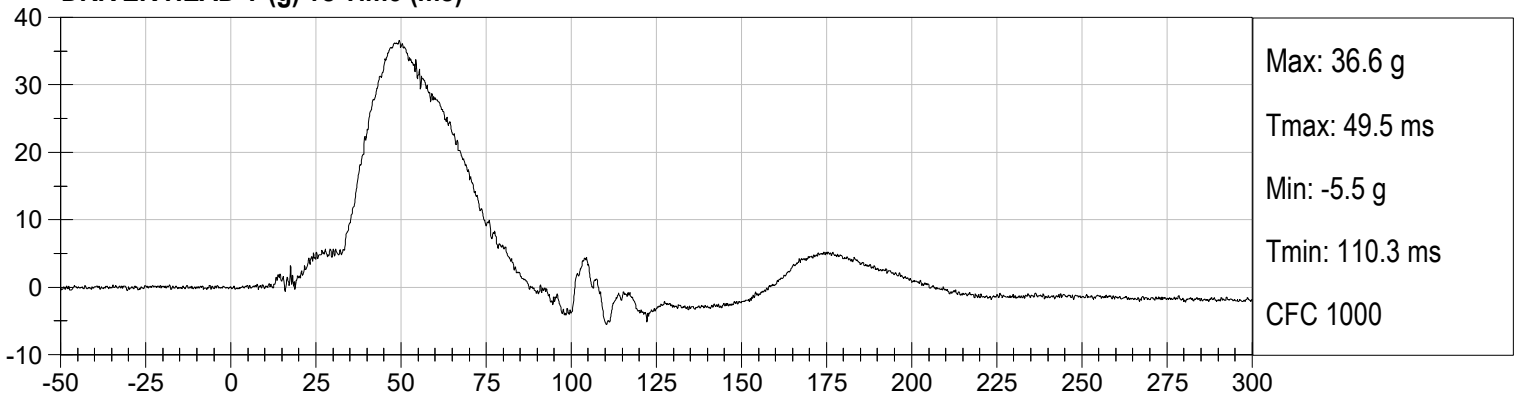
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

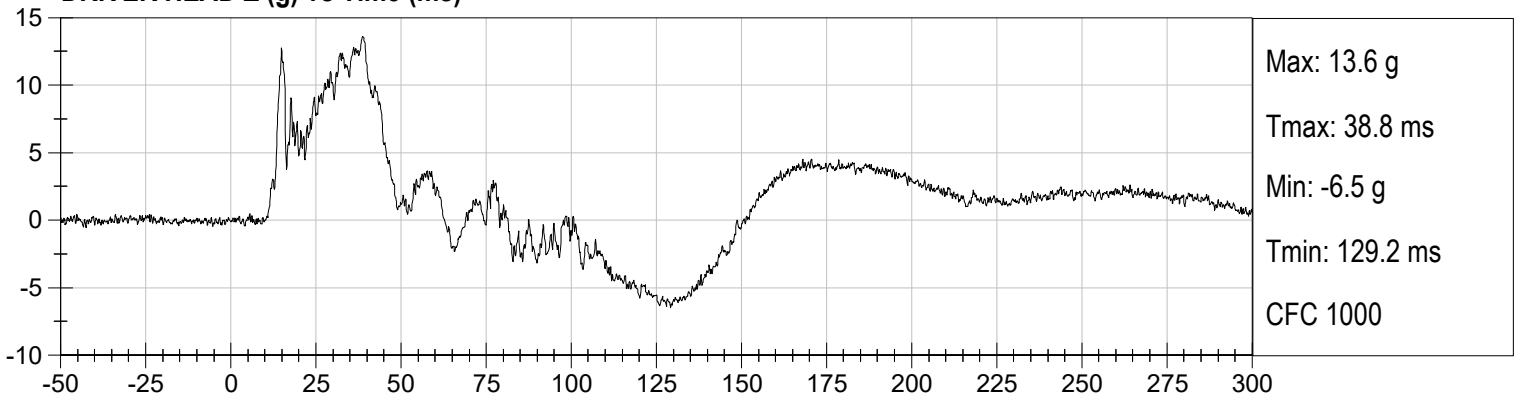
DRIVER HEAD X (g) vs Time (ms)



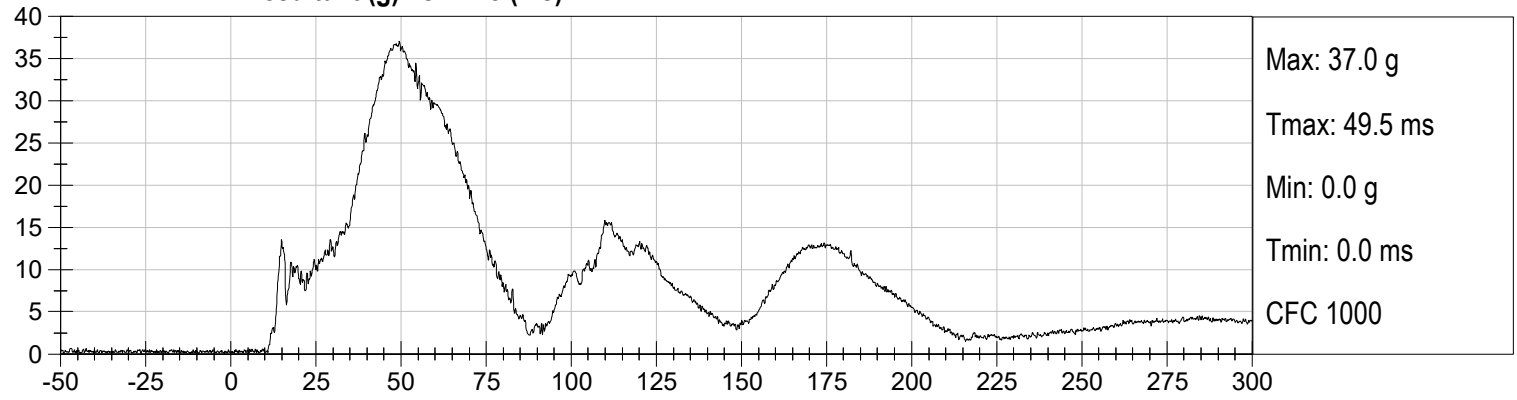
DRIVER HEAD Y (g) vs Time (ms)



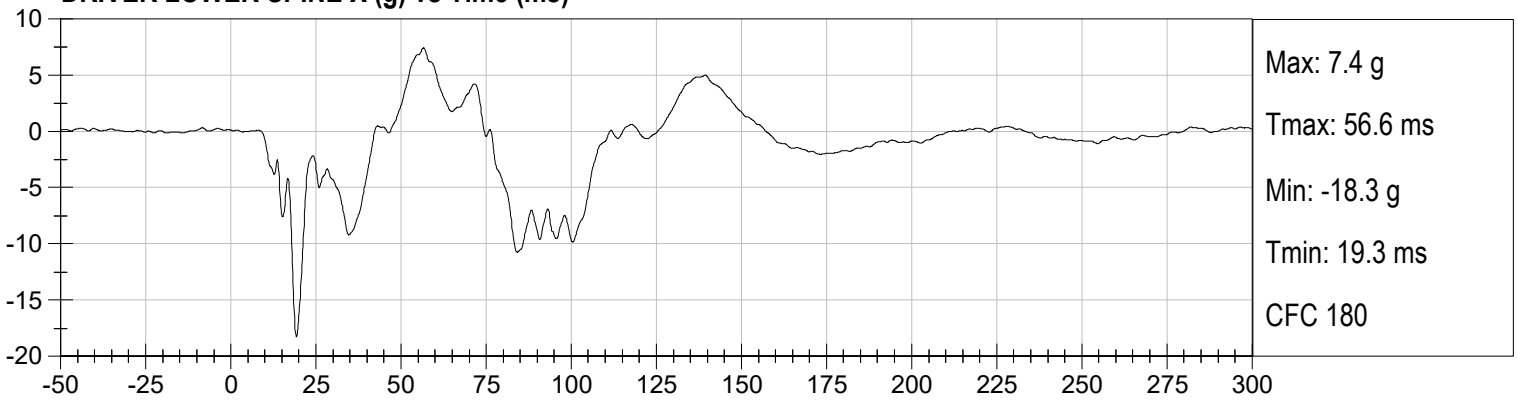
DRIVER HEAD Z (g) vs Time (ms)



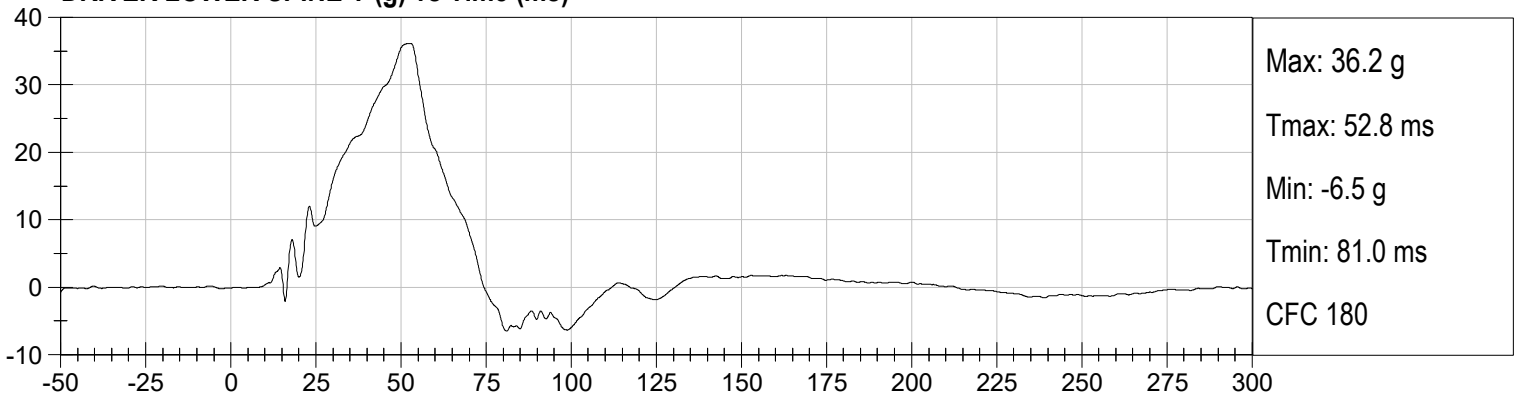
DRIVER HEAD Resultant (g) vs Time (ms)



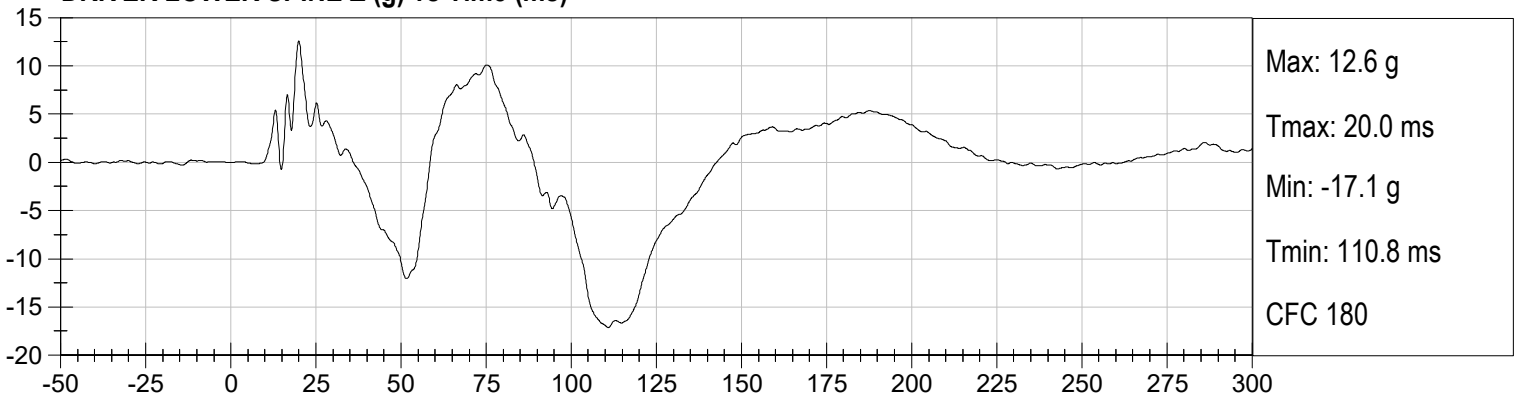
DRIVER LOWER SPINE X (g) vs Time (ms)



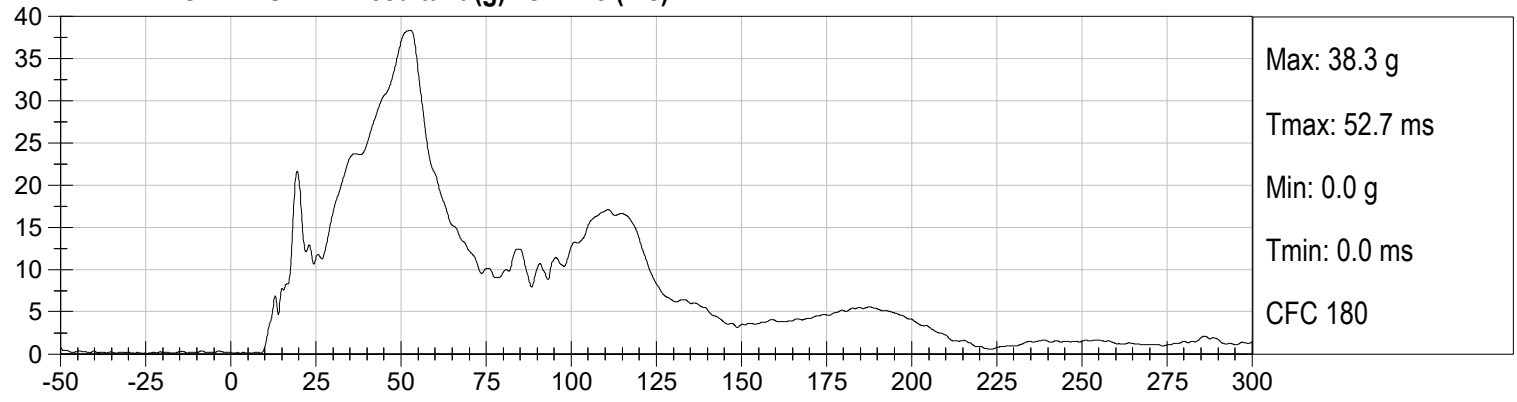
DRIVER LOWER SPINE Y (g) vs Time (ms)



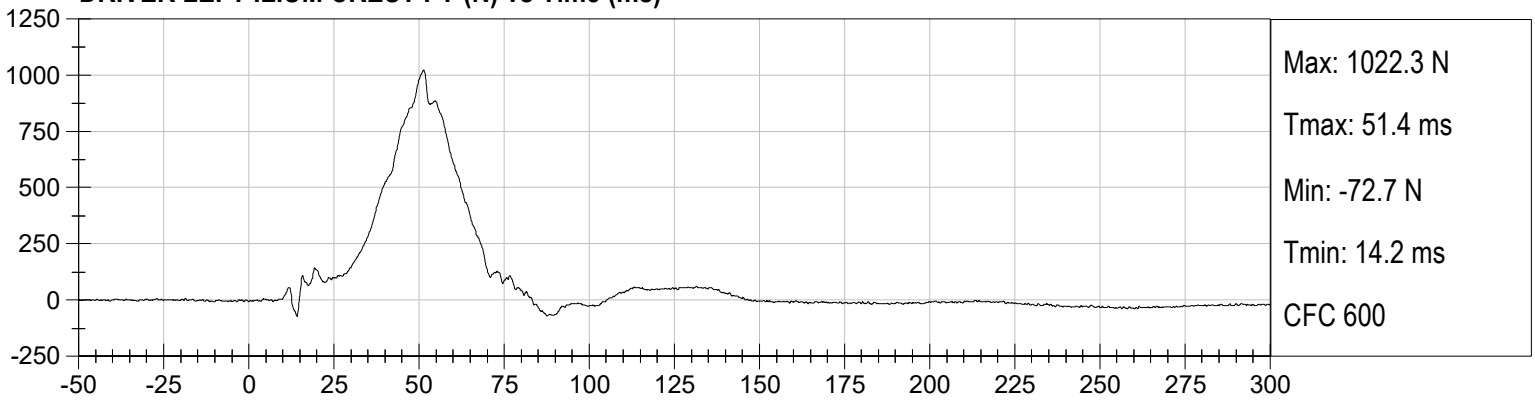
DRIVER LOWER SPINE Z (g) vs Time (ms)



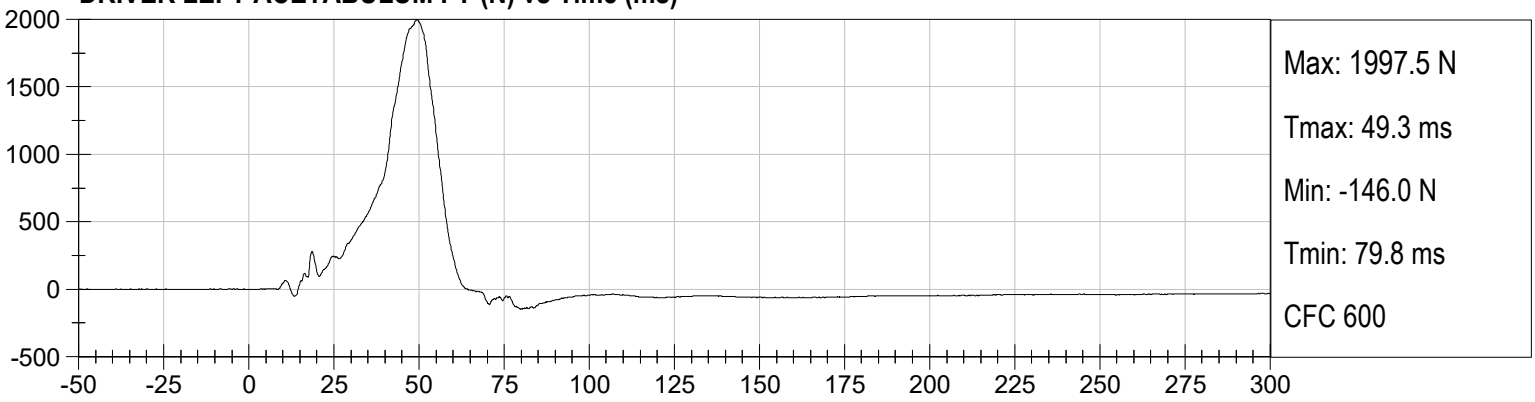
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



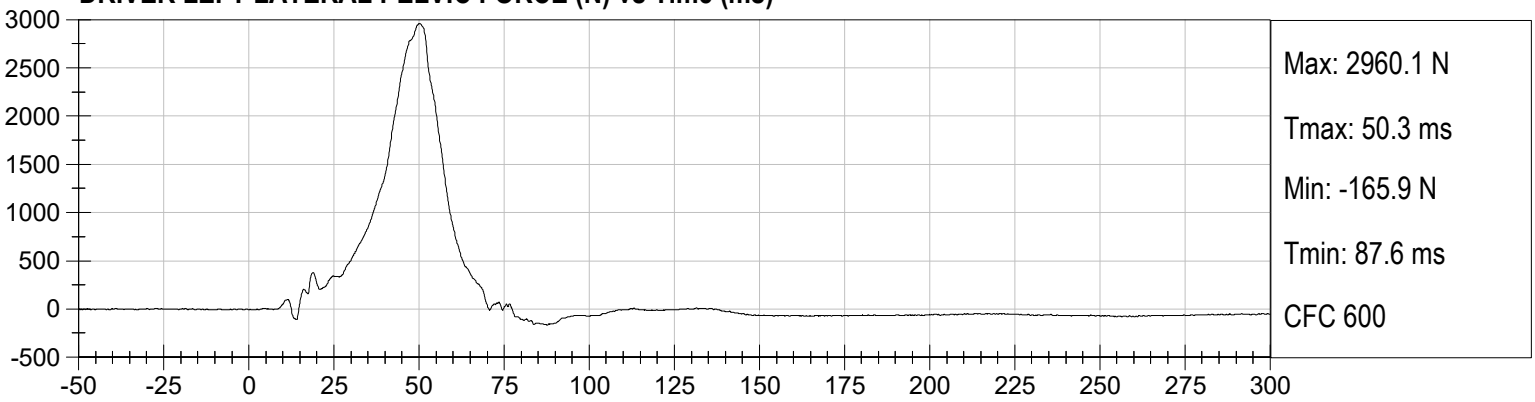
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



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: 306

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

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D201711

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	44	Pass
Peak Resultant Acceleration	G's	115 to 137	130	Pass
Peak Longitudinal Acceleration	G's	+/- 15	3.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

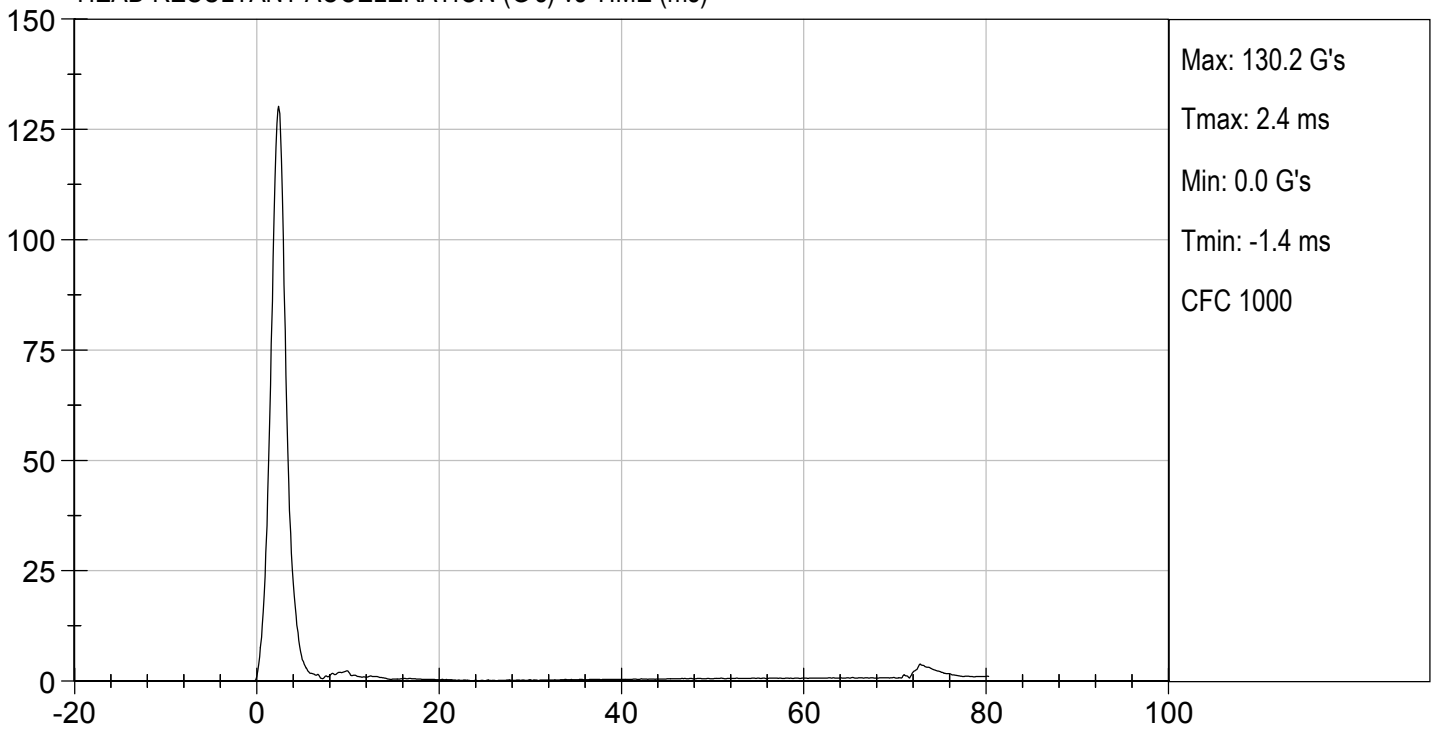
07/14/2020
Test Date

Approved By

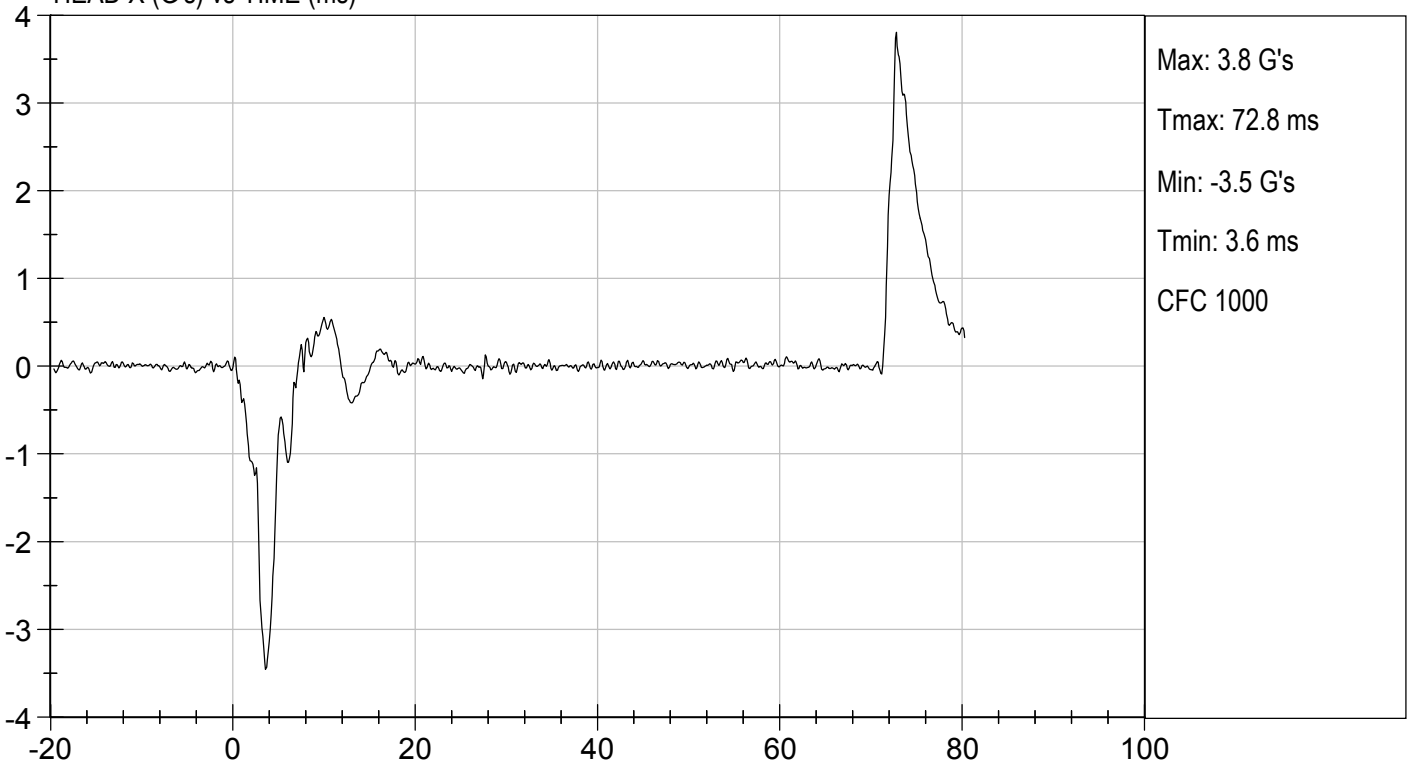
TEST DESC: HEAD DROP

TEST DATE: 07/14/2020
TEST #: D201711

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

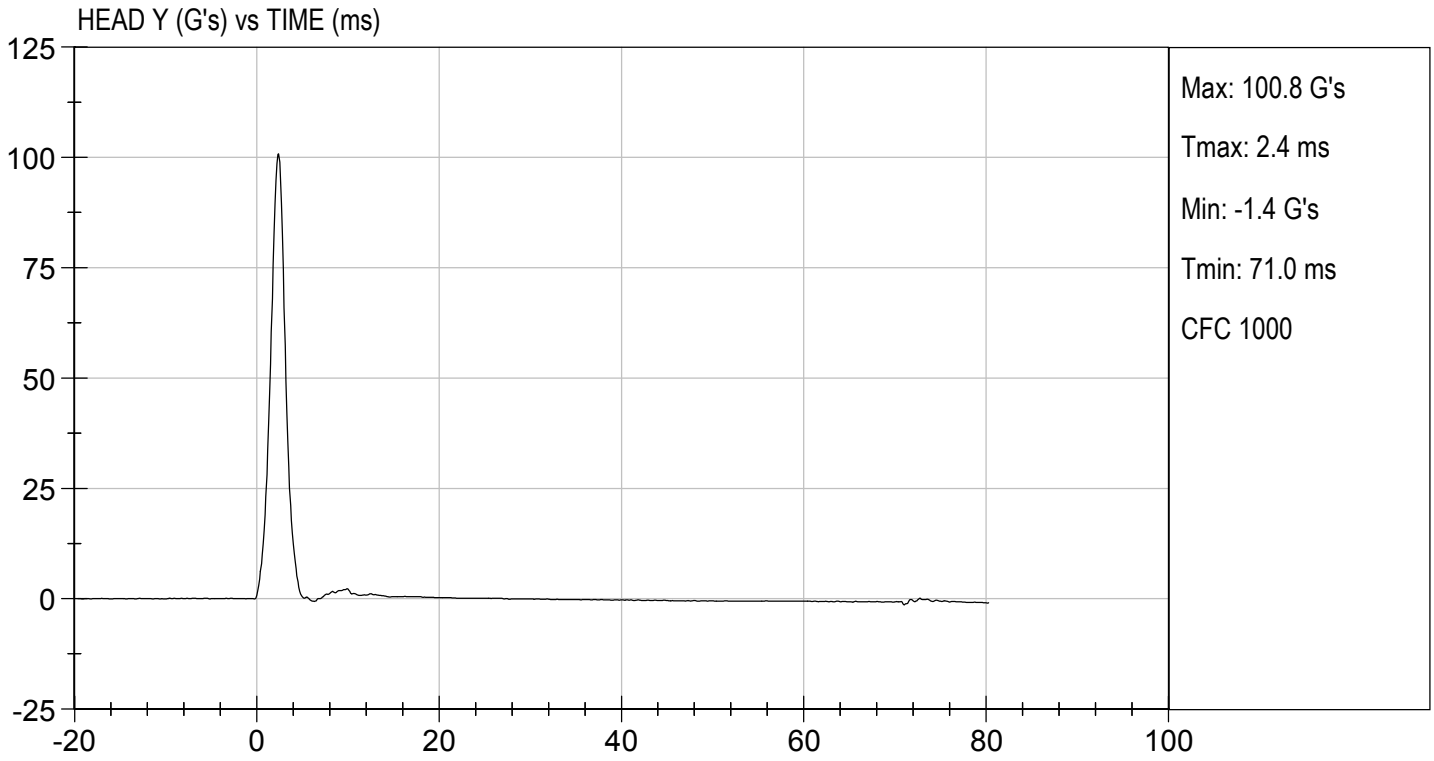


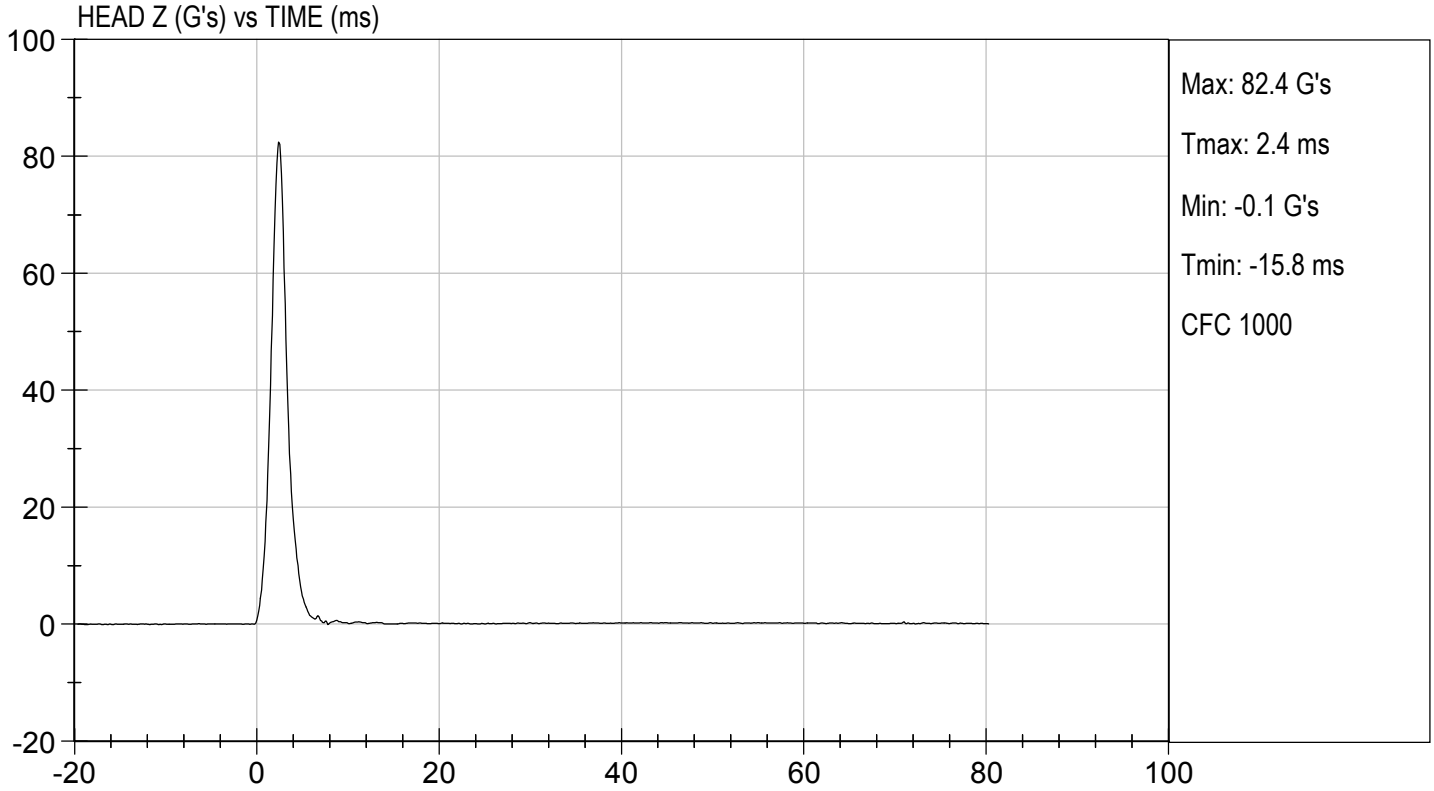
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 07/14/2020
TEST #: D201711





MGA RESEARCH CORPORATION

LATERAL NECK PENDULUM TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 075 **Test I.D:** D201712

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	42	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.59	Pass
	15 ms	m/s	3.30 to 4.10	3.72	Pass
	20 ms	m/s	4.40 to 5.40	5.18	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	119	Pass
			Overall Test Results		Pass

Laboratory Technician

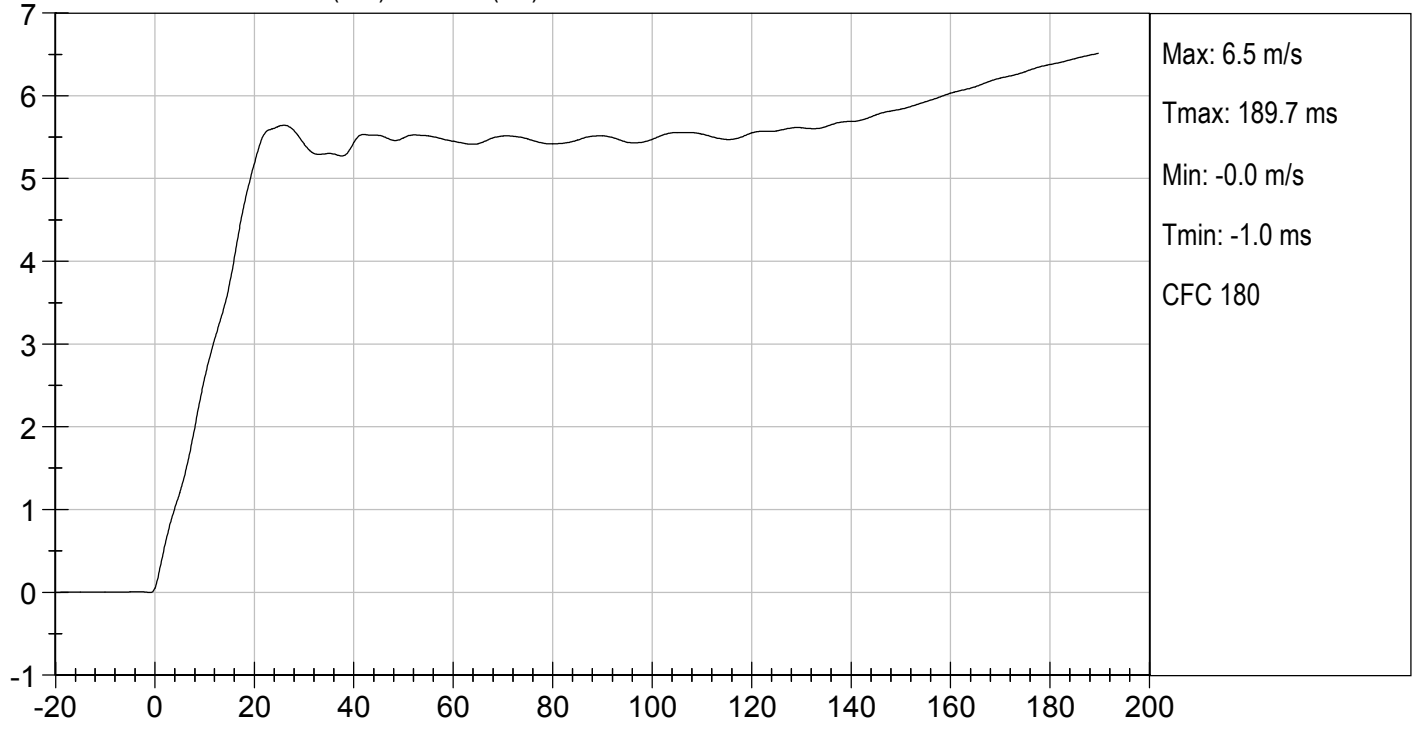
07/14/2020
Test Date

Approved By

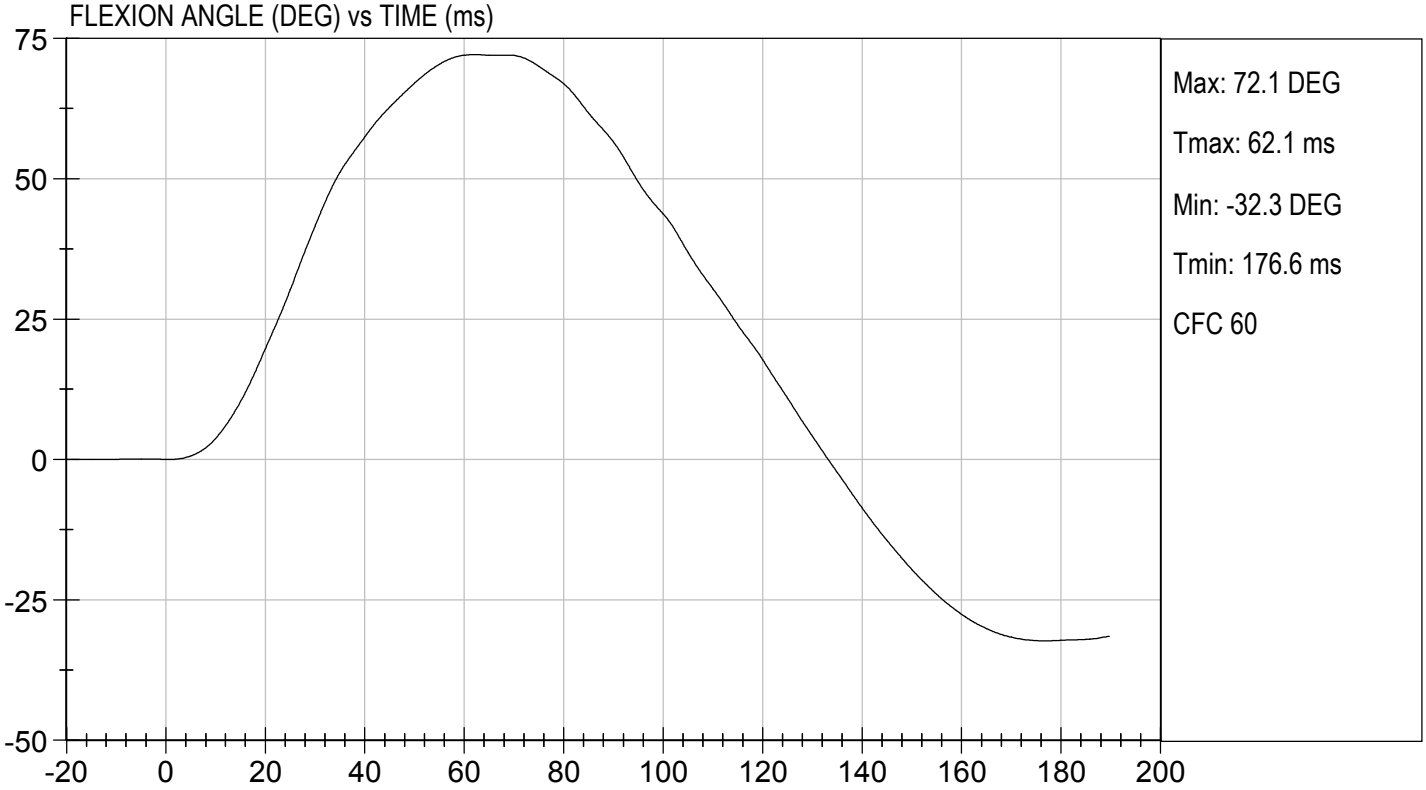
TEST DESC: NECK BENDING
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 07/14/2020
TEST #: D201712

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

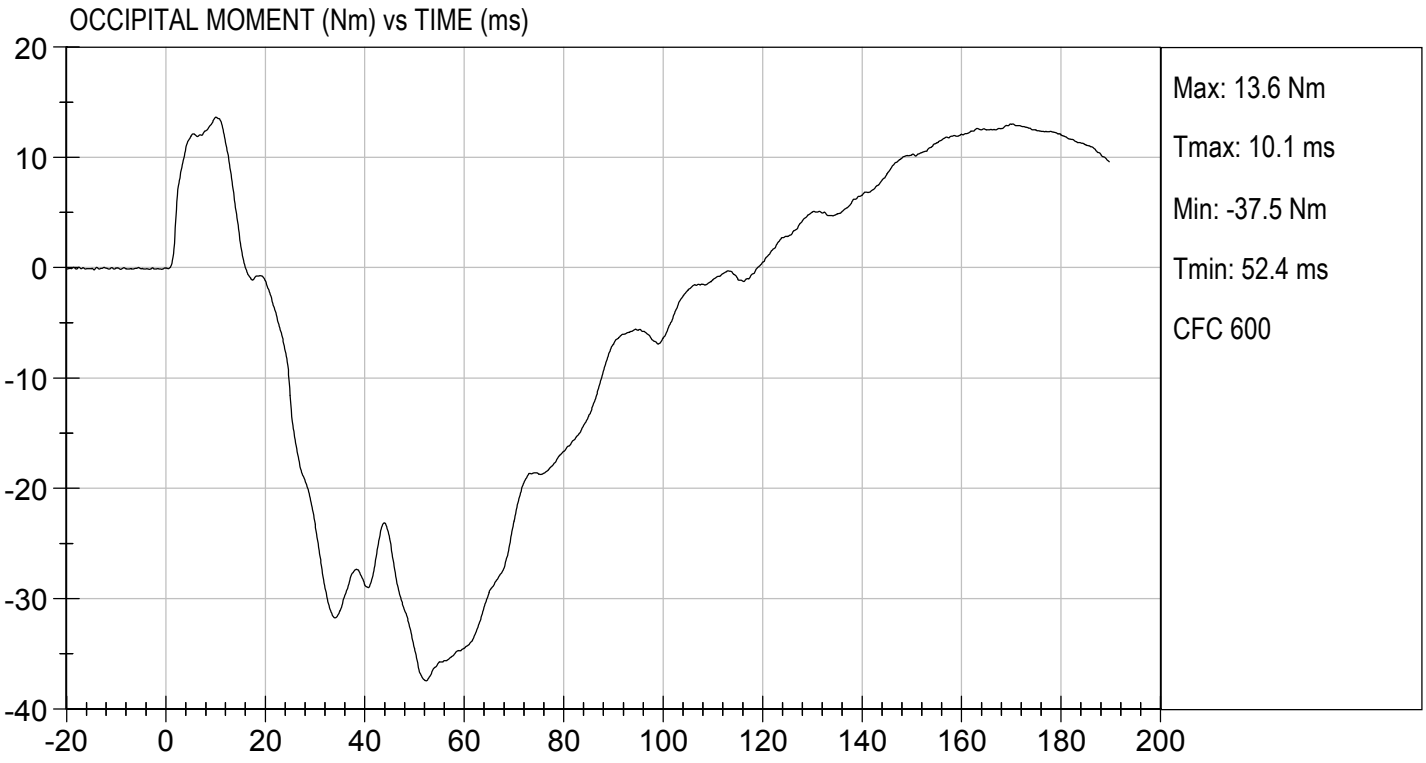


FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201712



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D201713

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	4.30	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
		Overall Test Results		Pass

Laboratory Technician

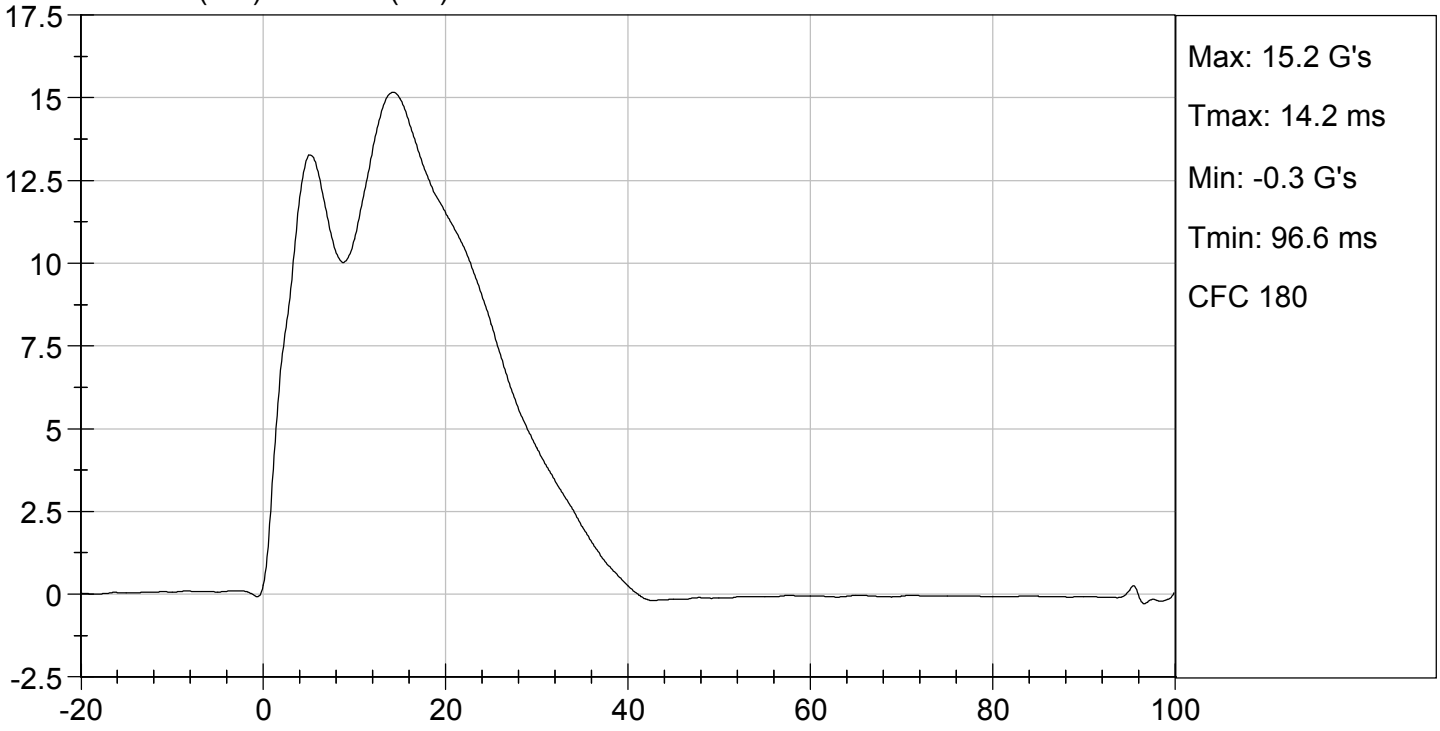
07/14/2020
Test Date

Approved By

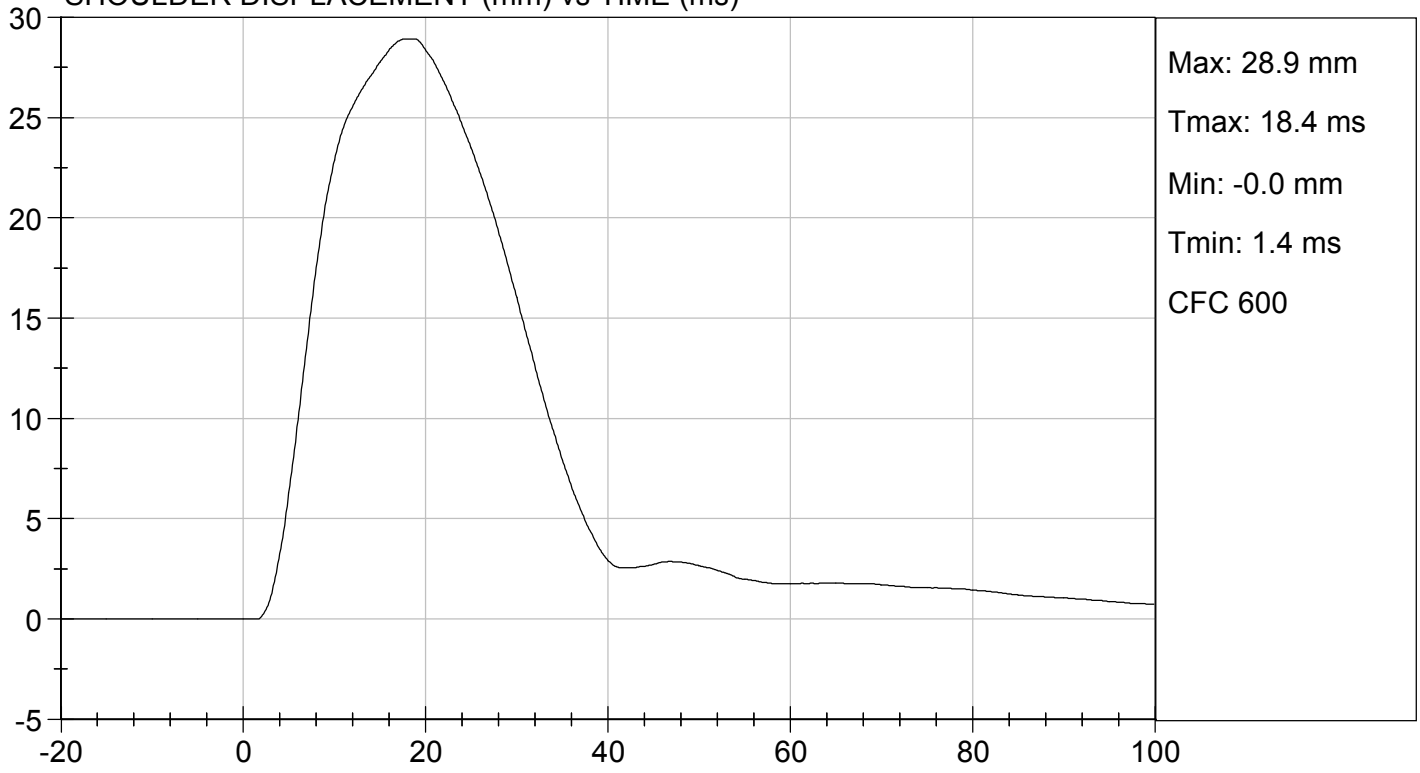
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/14/2020
TEST #: D201713

PROBE (G's) vs TIME (ms)

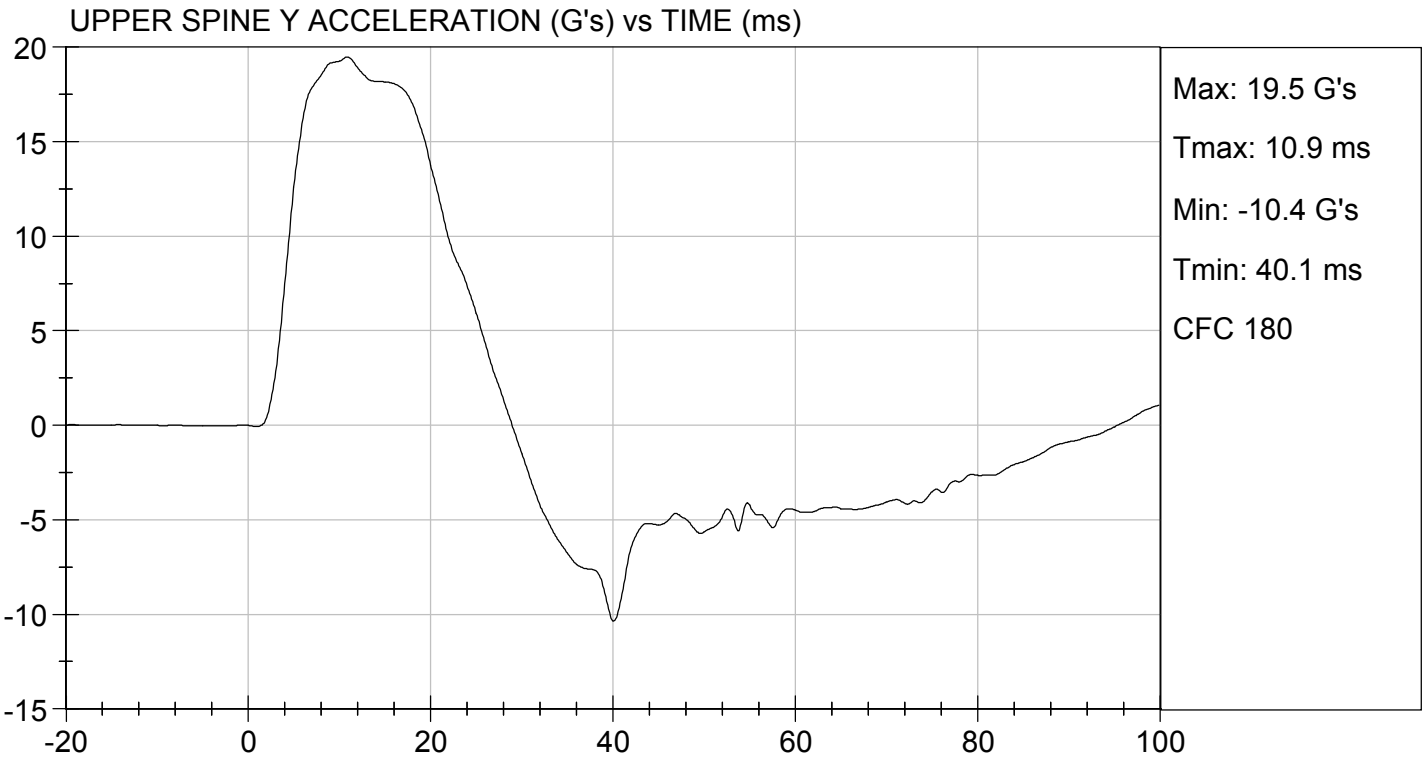


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201713



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201714

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	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	40	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
		Overall Test Results		Pass

Laboratory Technician

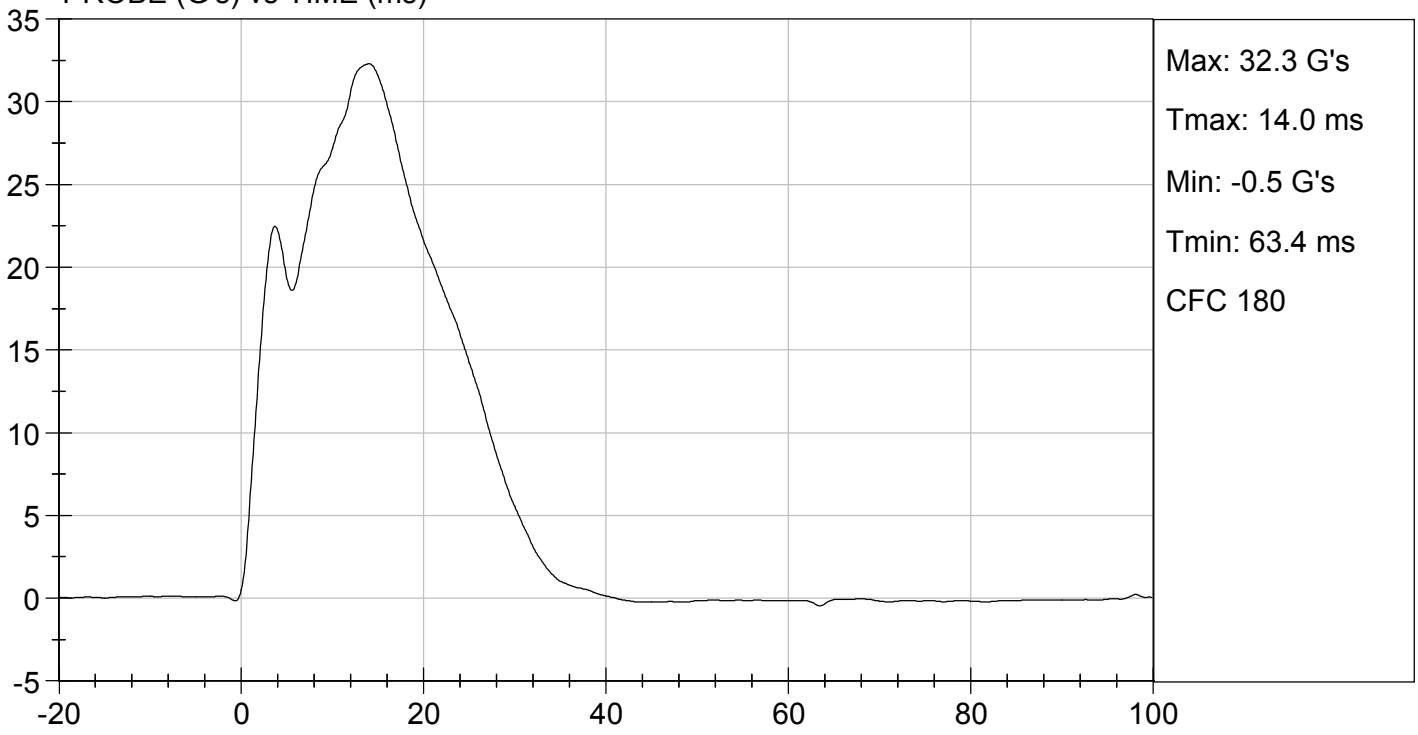
07/14/2020
Test Date

Approved By

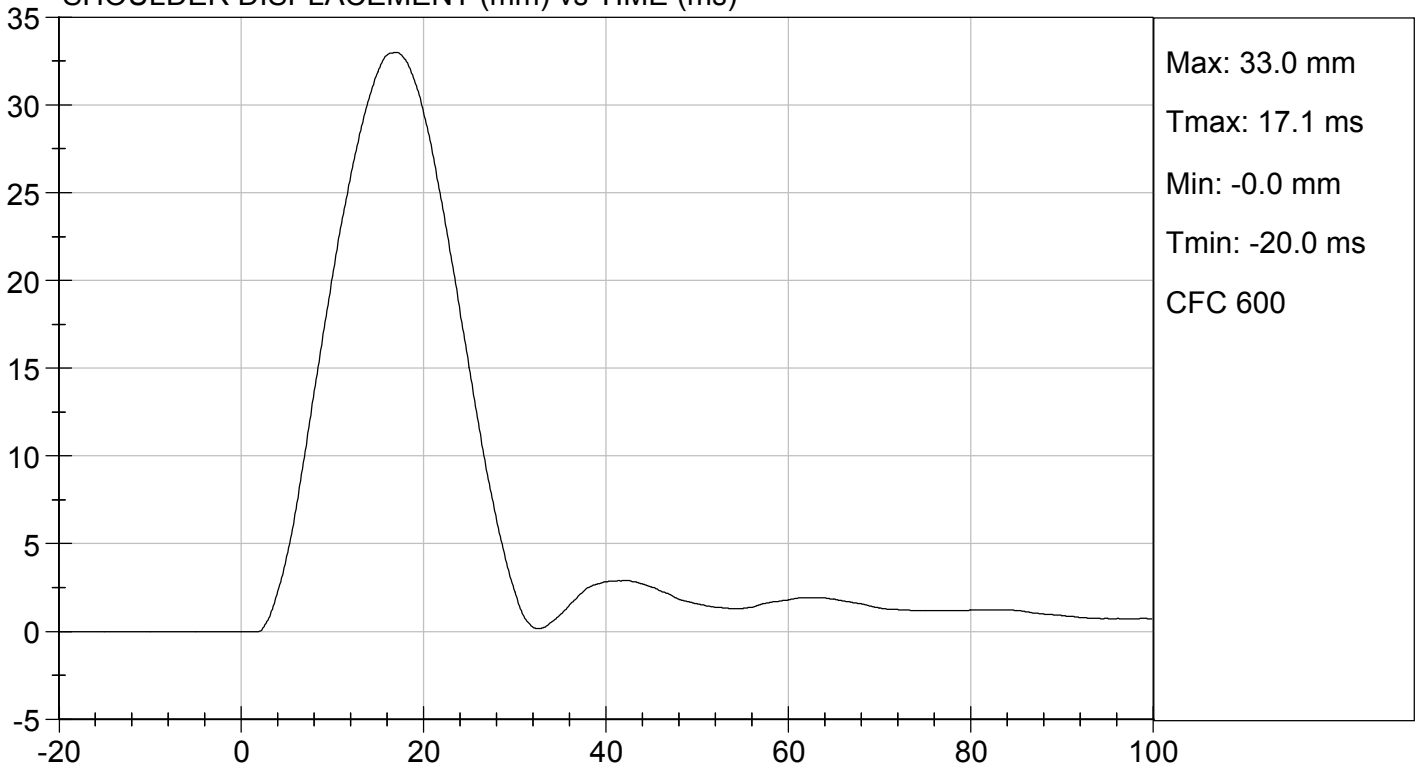
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 07/14/2020
TEST #: D201714

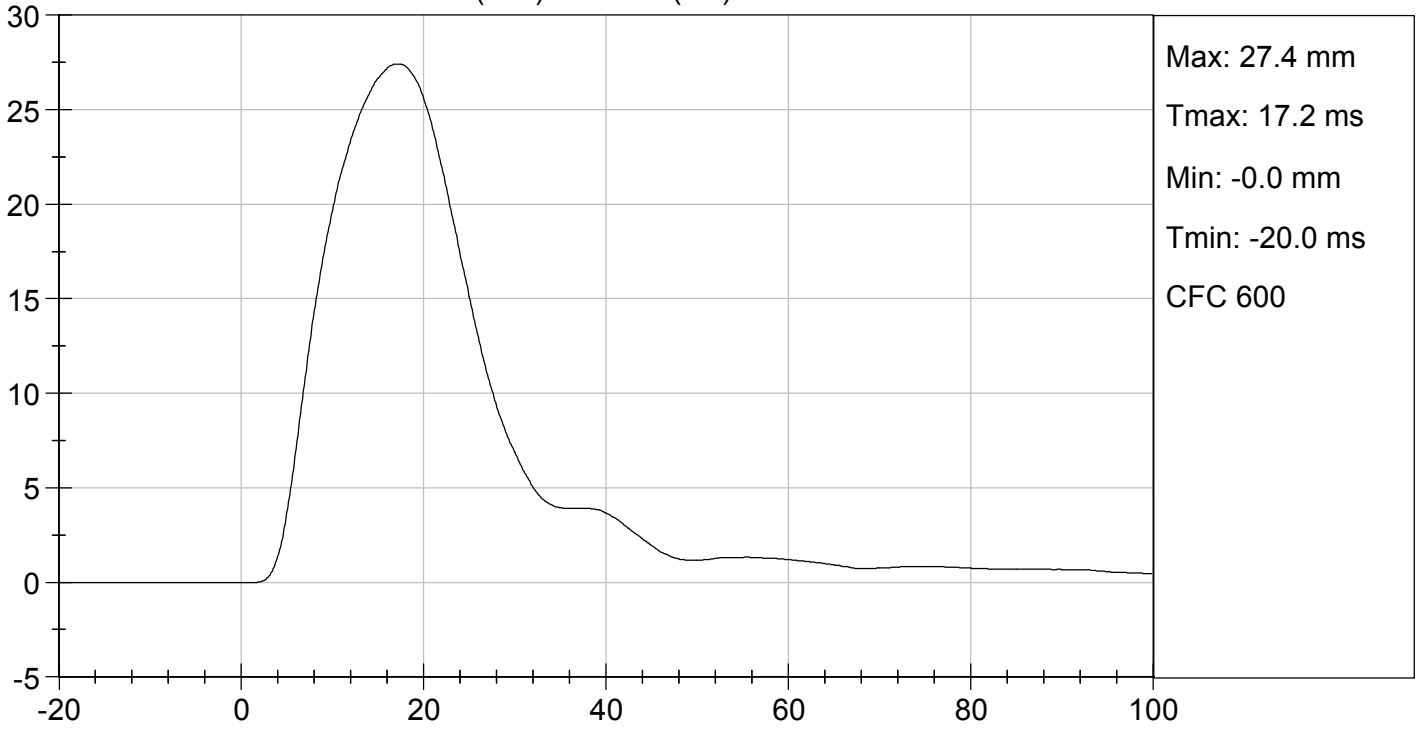
PROBE (G's) vs TIME (ms)



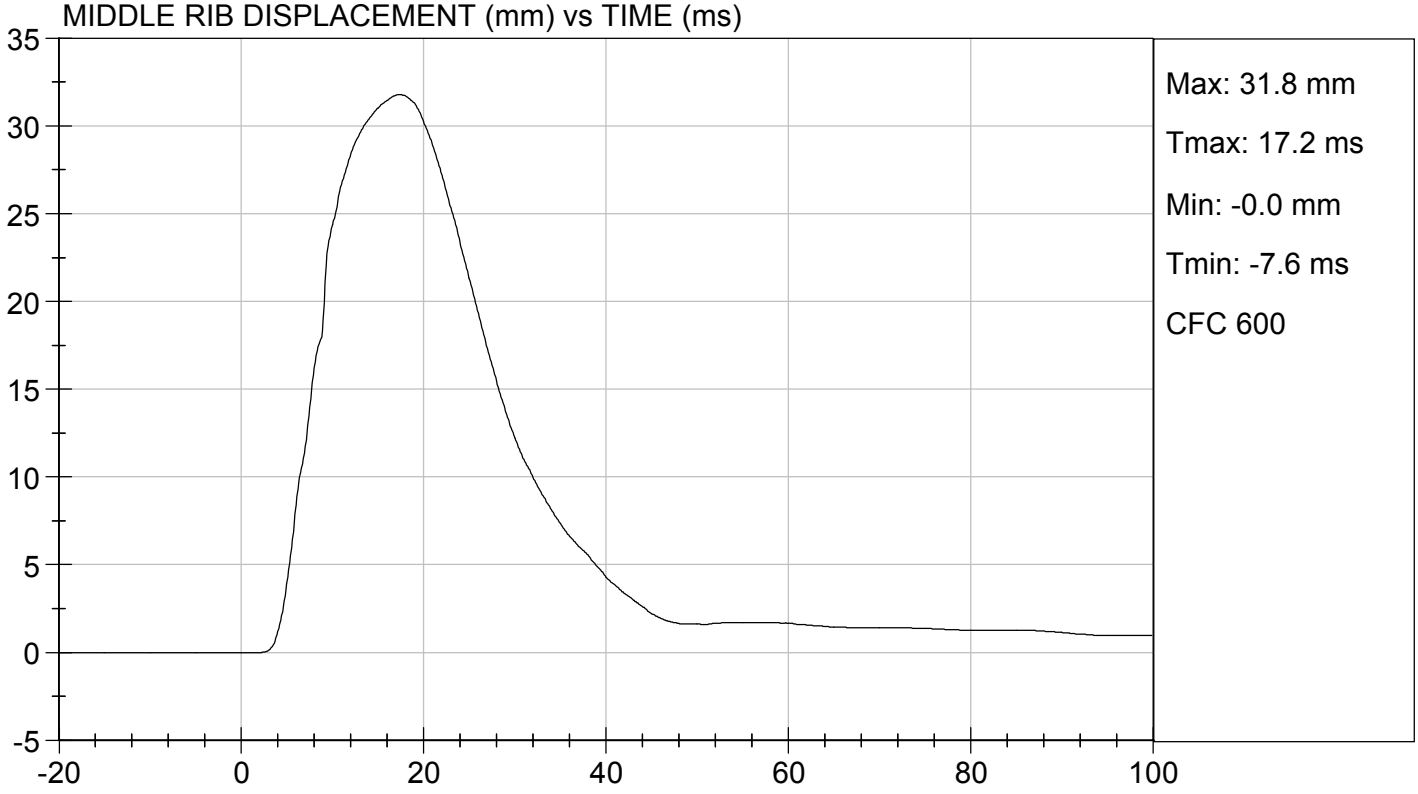
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



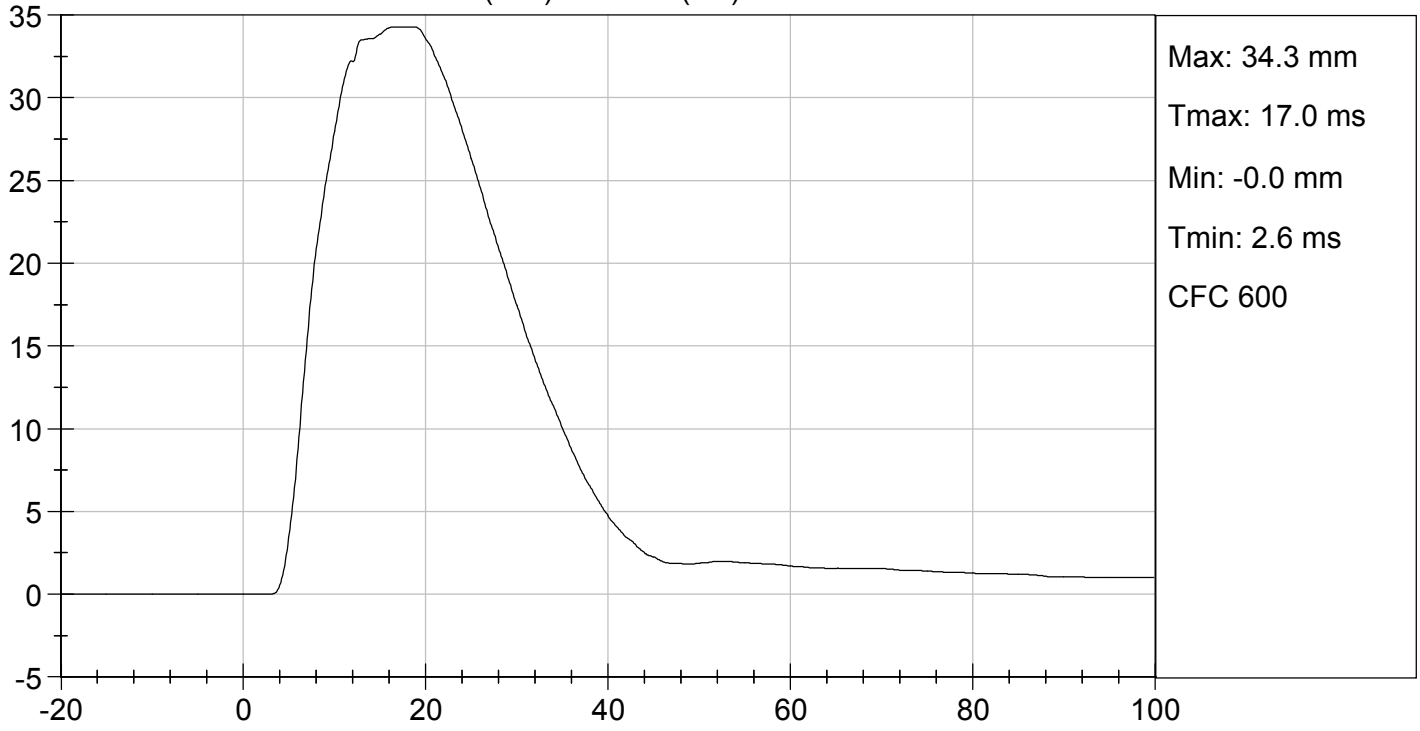
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



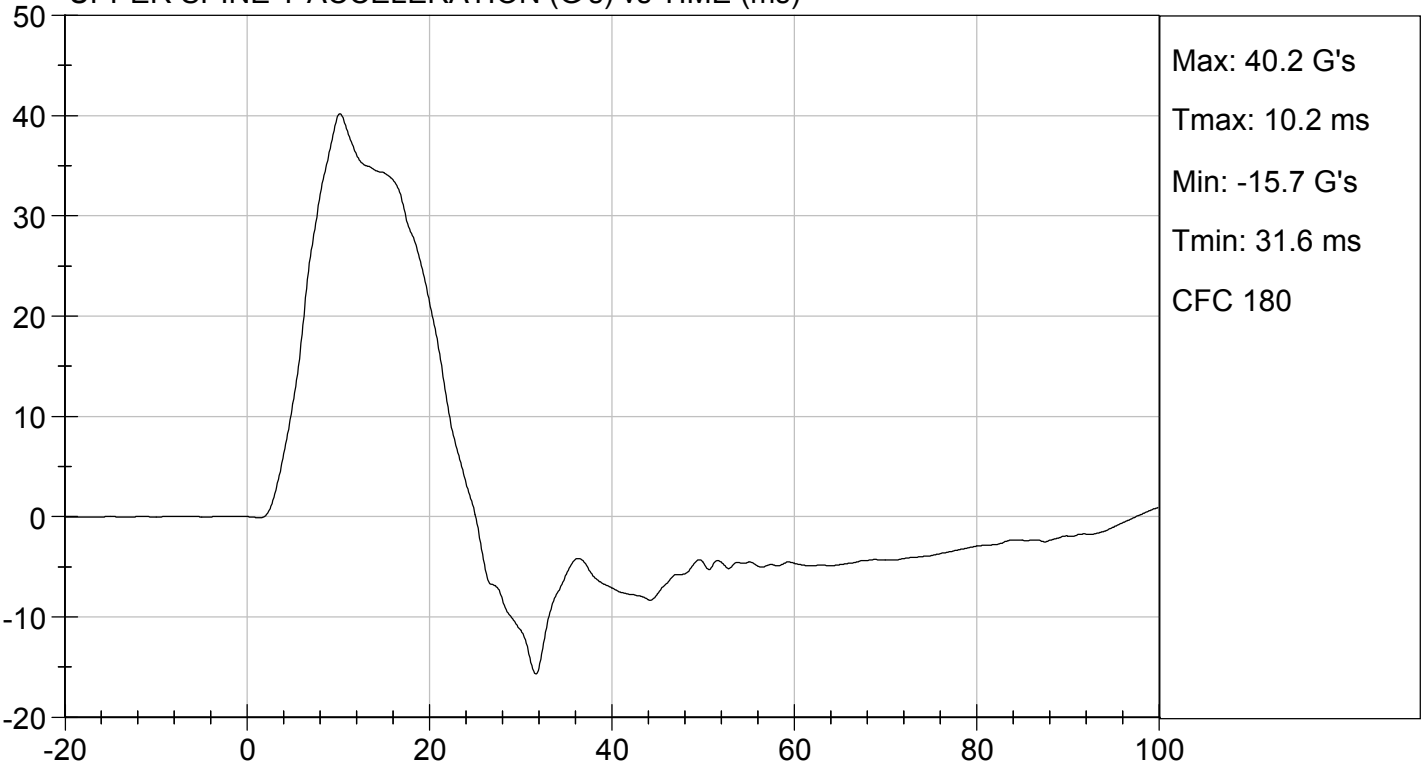
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



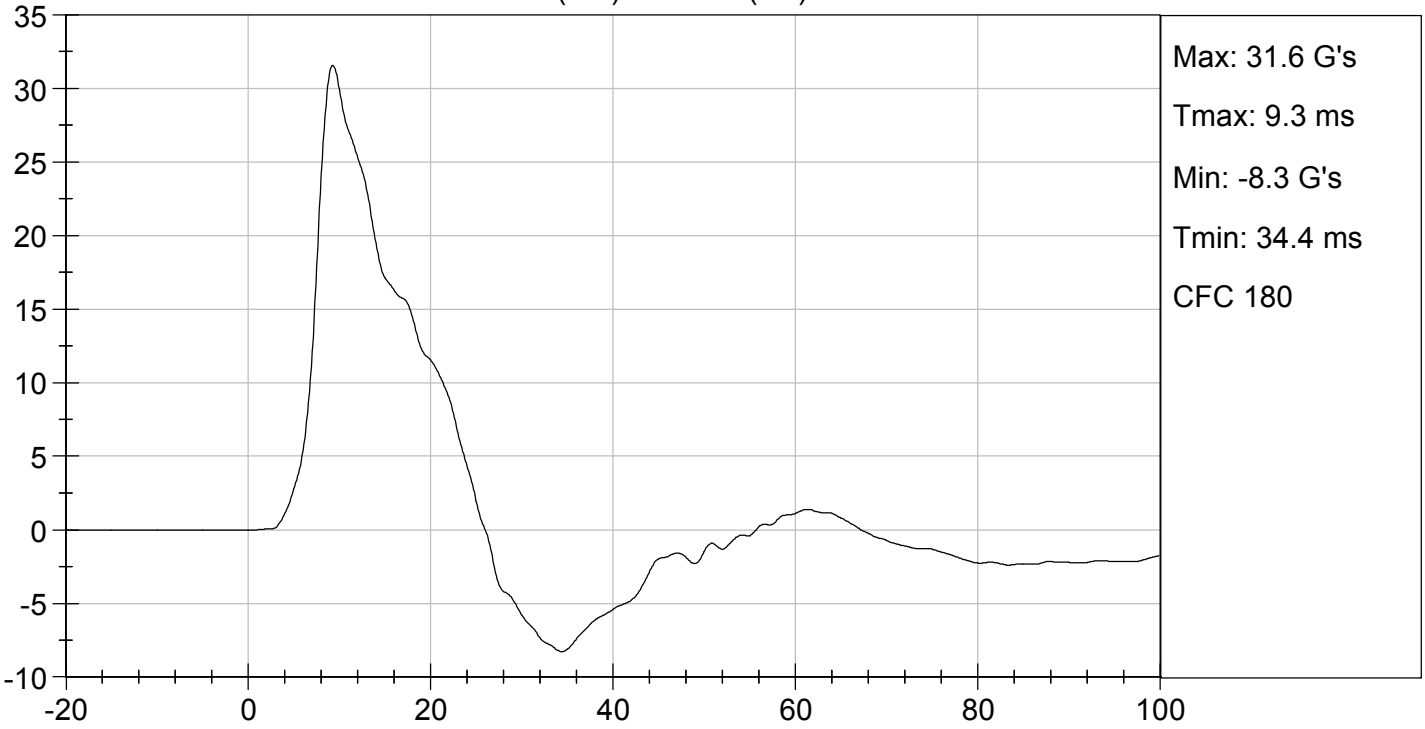
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201714

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



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201715

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	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	16	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

Laboratory Technician

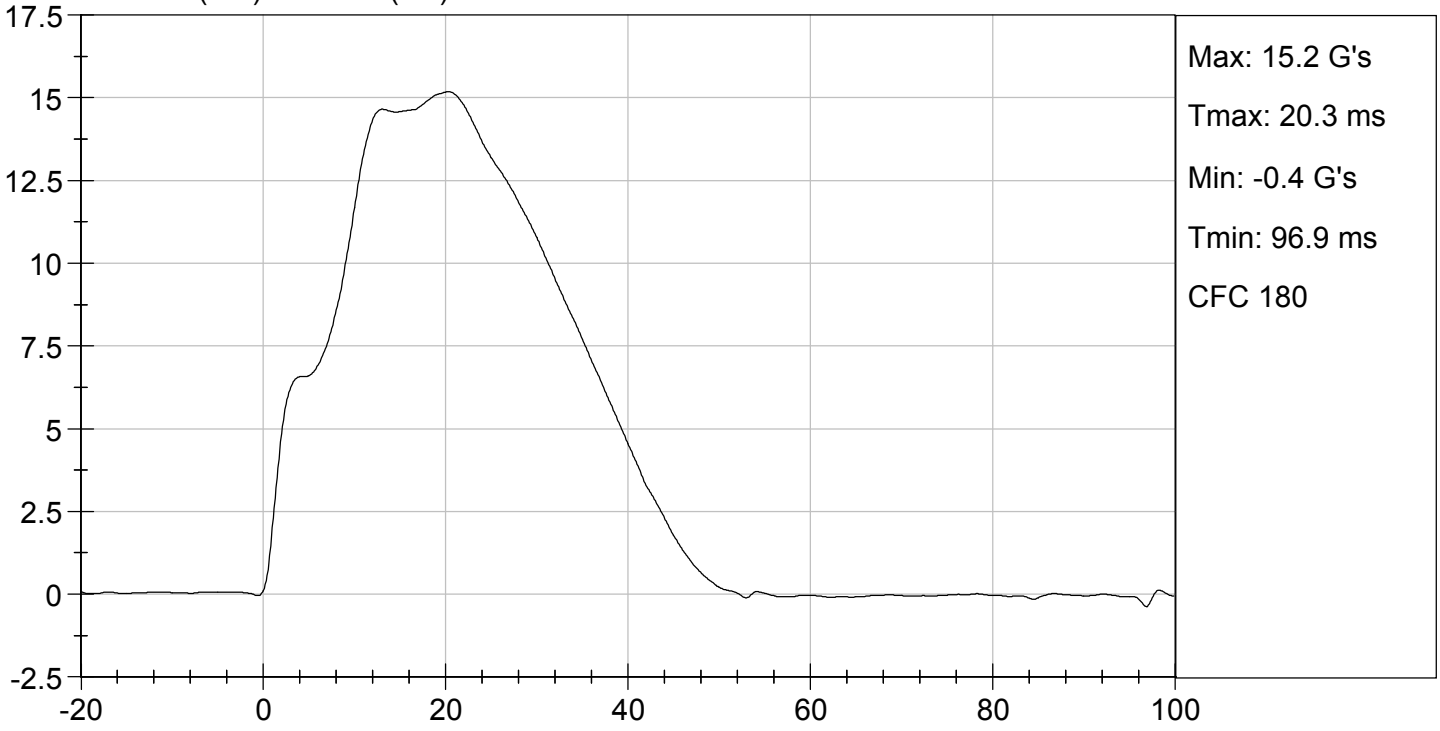
07/14/2020
Test Date

Approved By

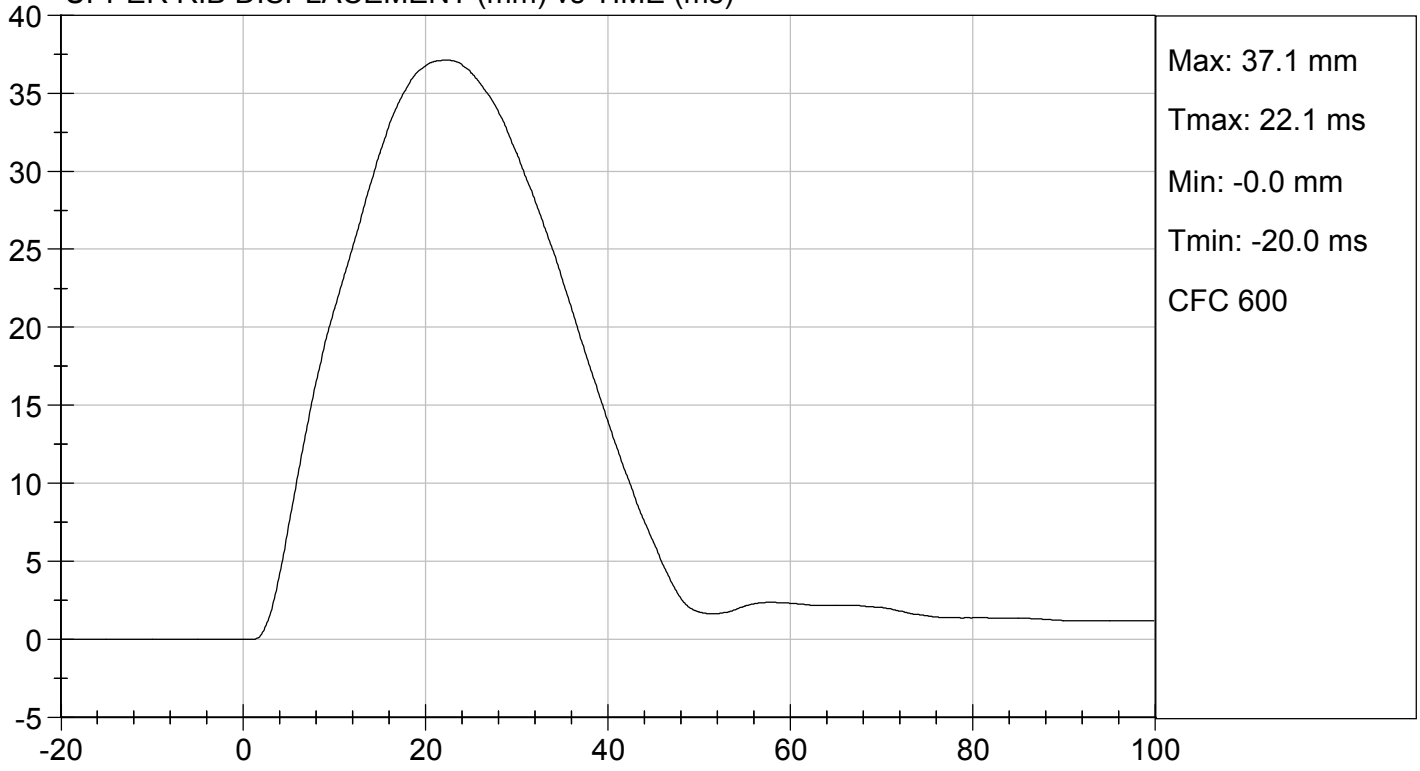
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 07/14/2020
TEST #: D201715

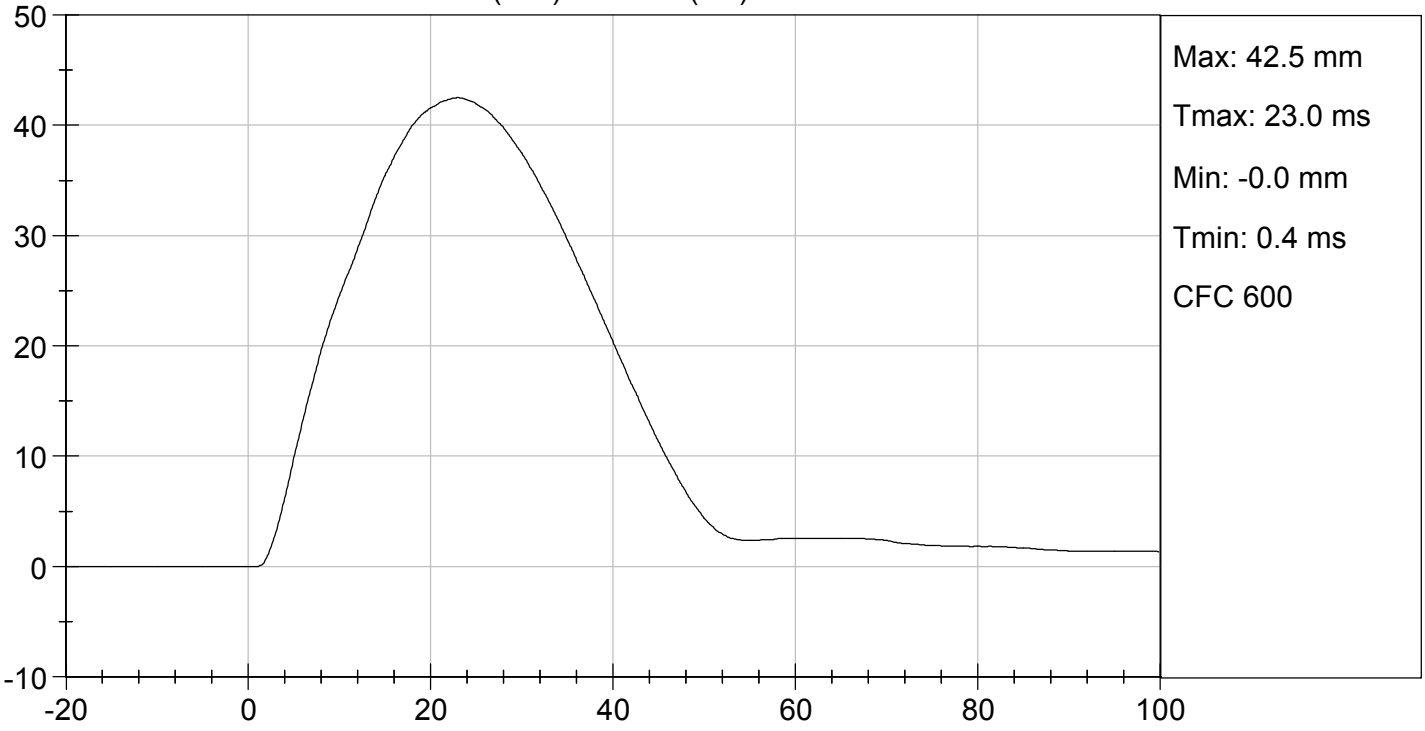
PROBE (G's) vs TIME (ms)



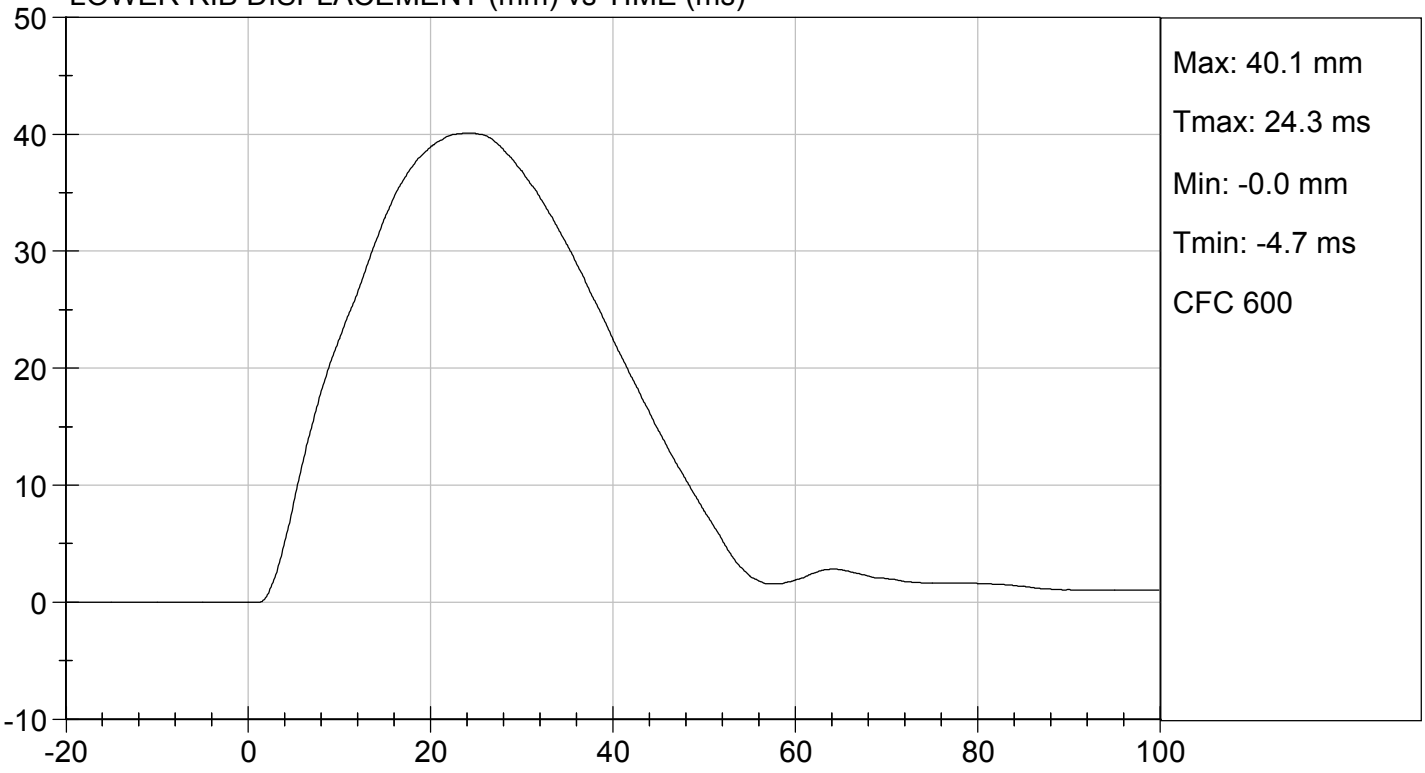
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



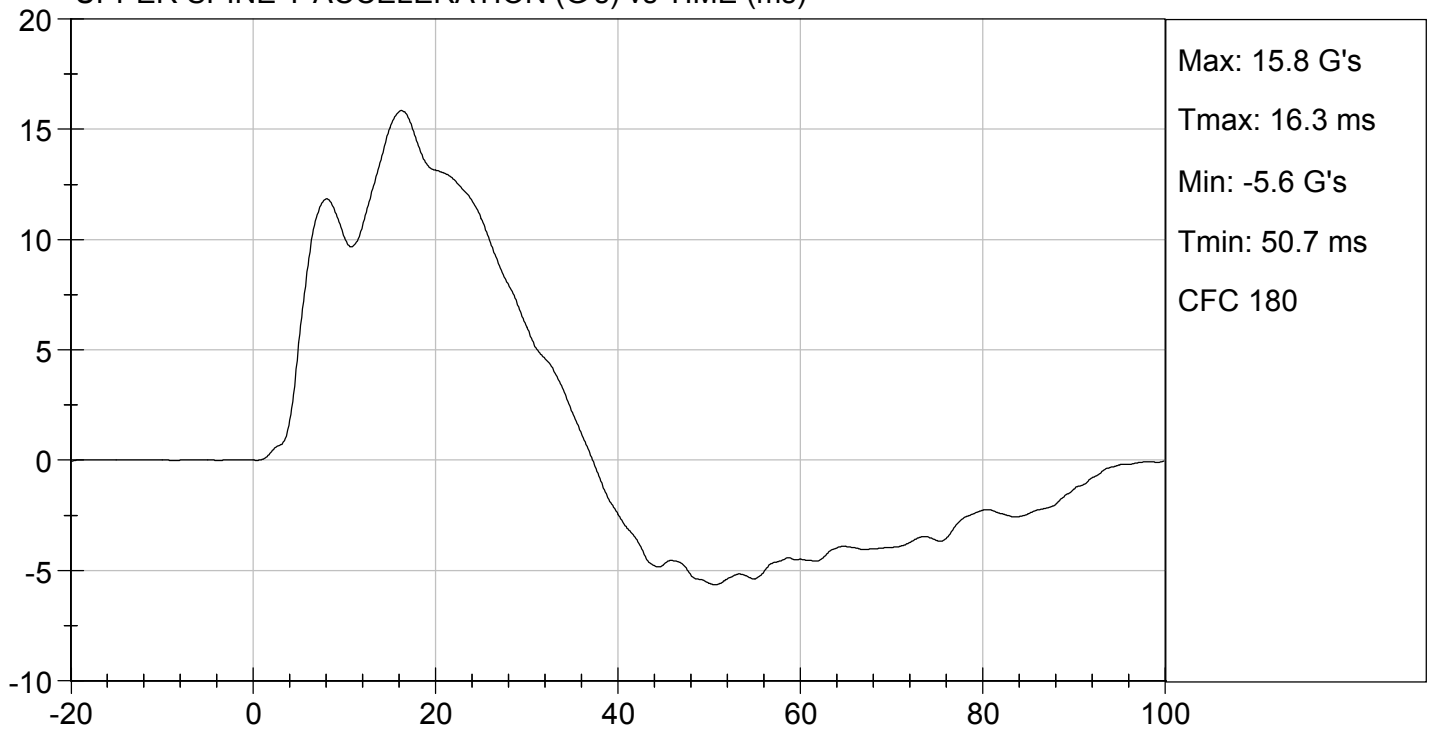
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



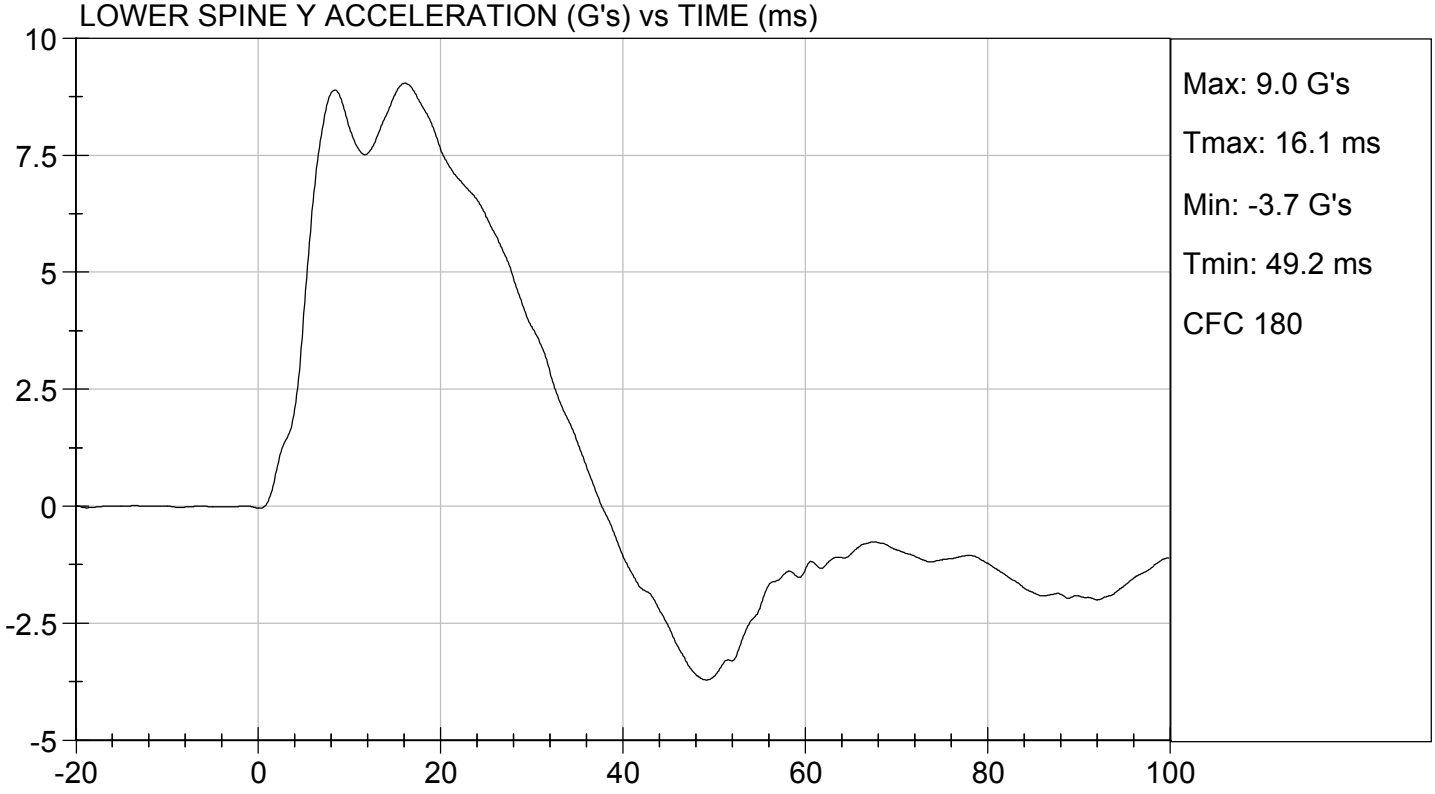
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 07/14/2020
TEST #: D201715

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



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201716

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	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	42	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Laboratory Technician

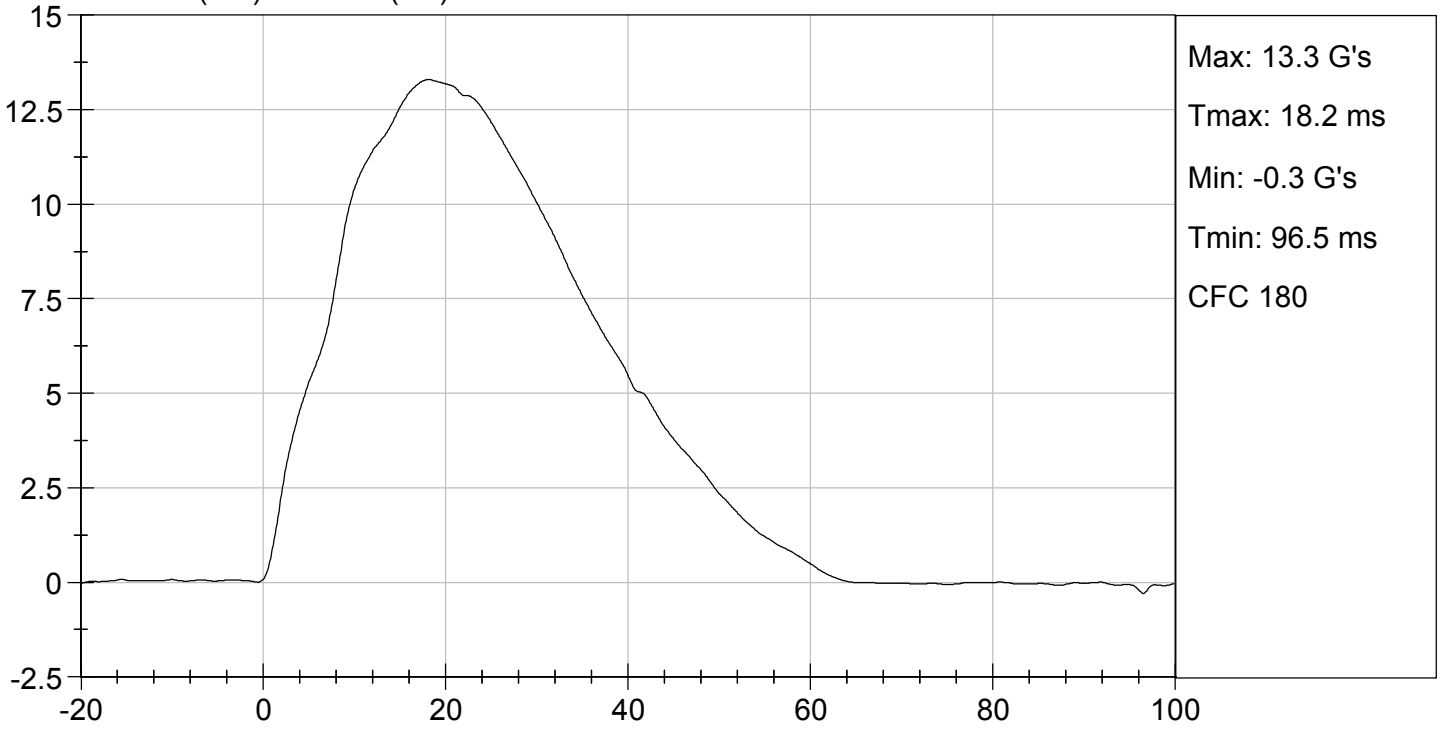
07/14/2020
Test Date

Approved By

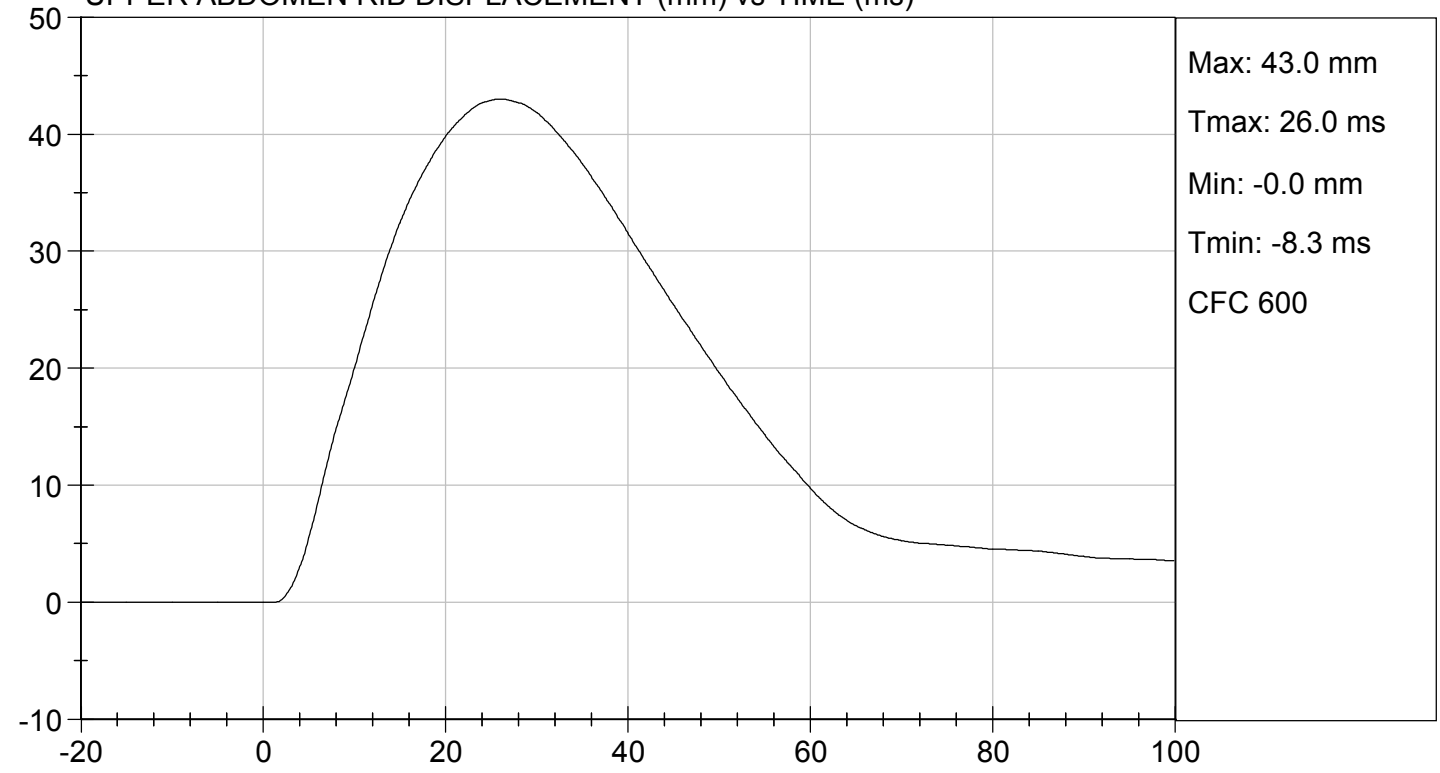
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 07/14/2020
TEST #: D201716

PROBE (G's) vs TIME (ms)



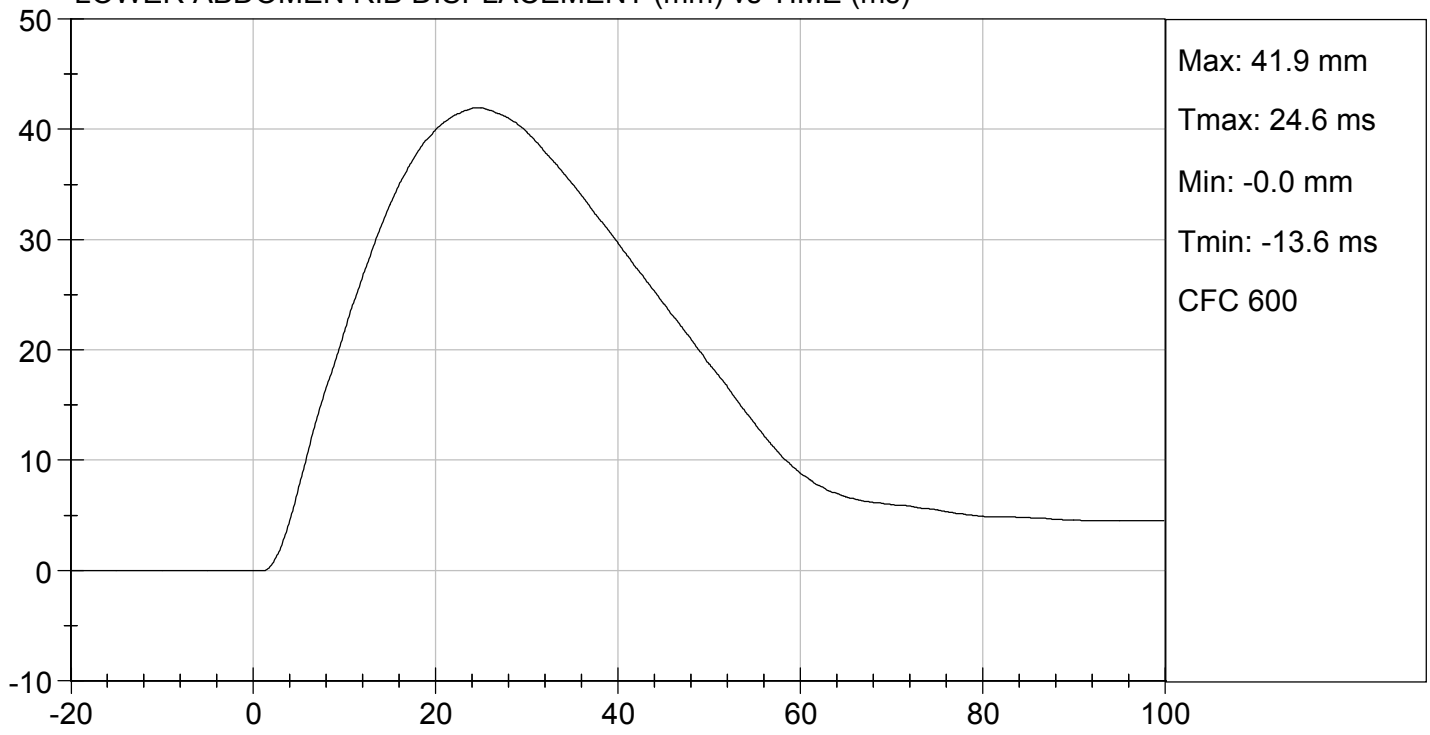
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



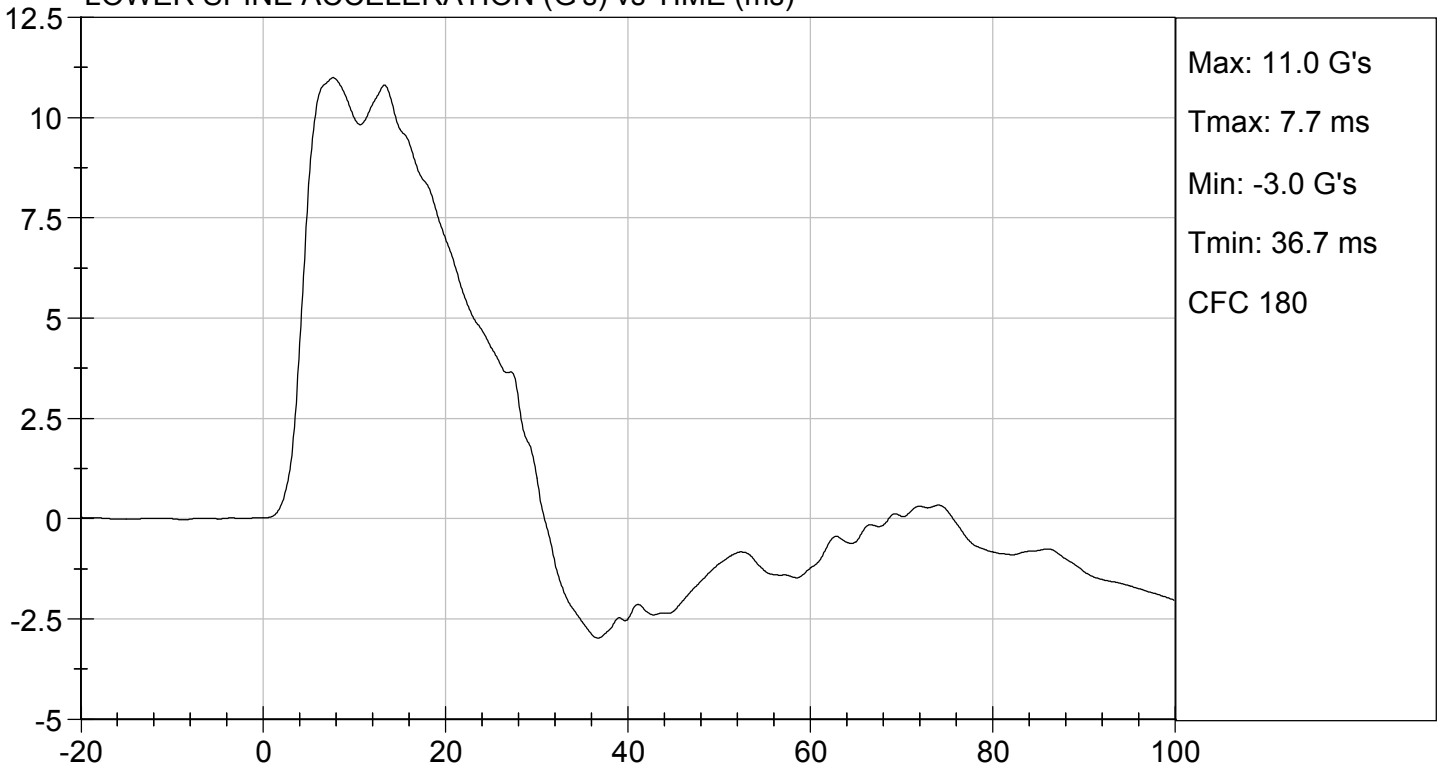
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 07/14/2020
TEST #: D201716

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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201717

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	3,747	Pass
		Overall Test Results		Pass

Laboratory Technician

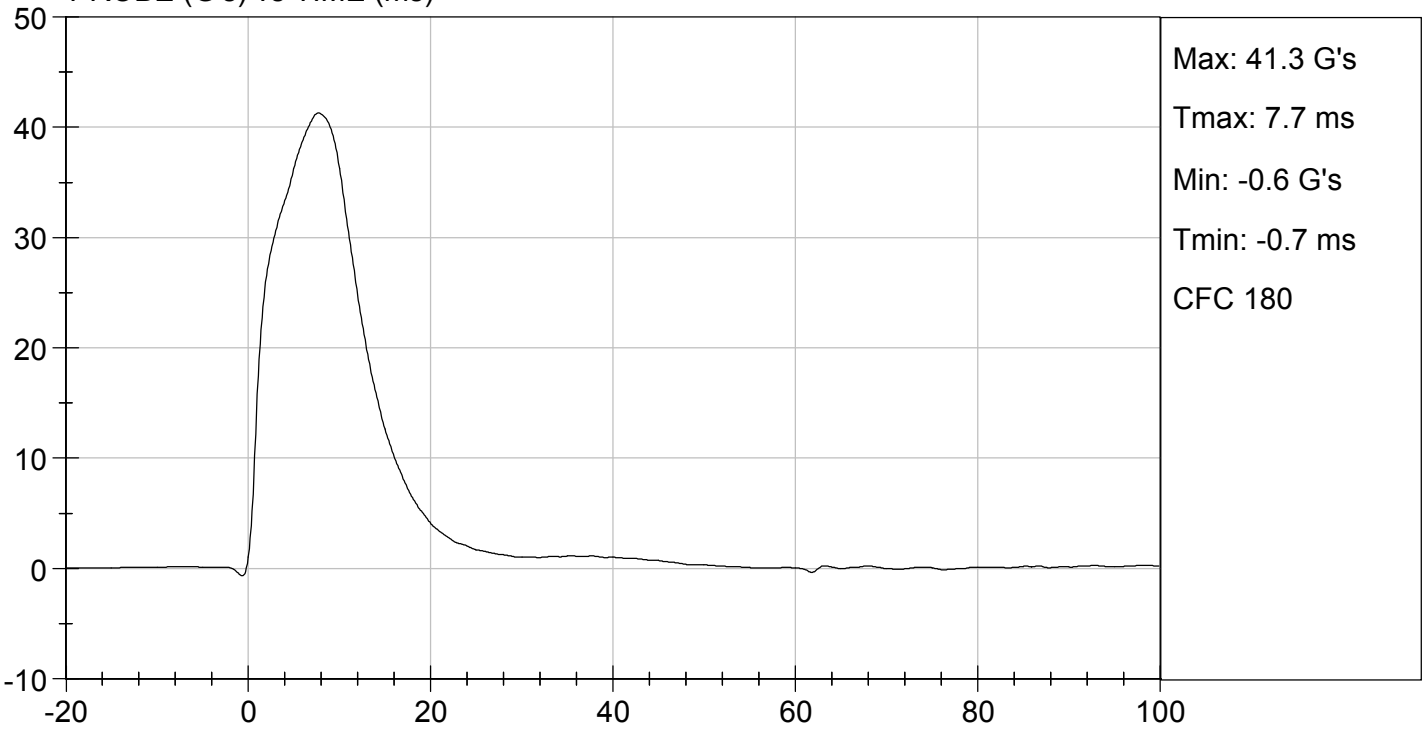
07/14/2020
Test Date

Approved By

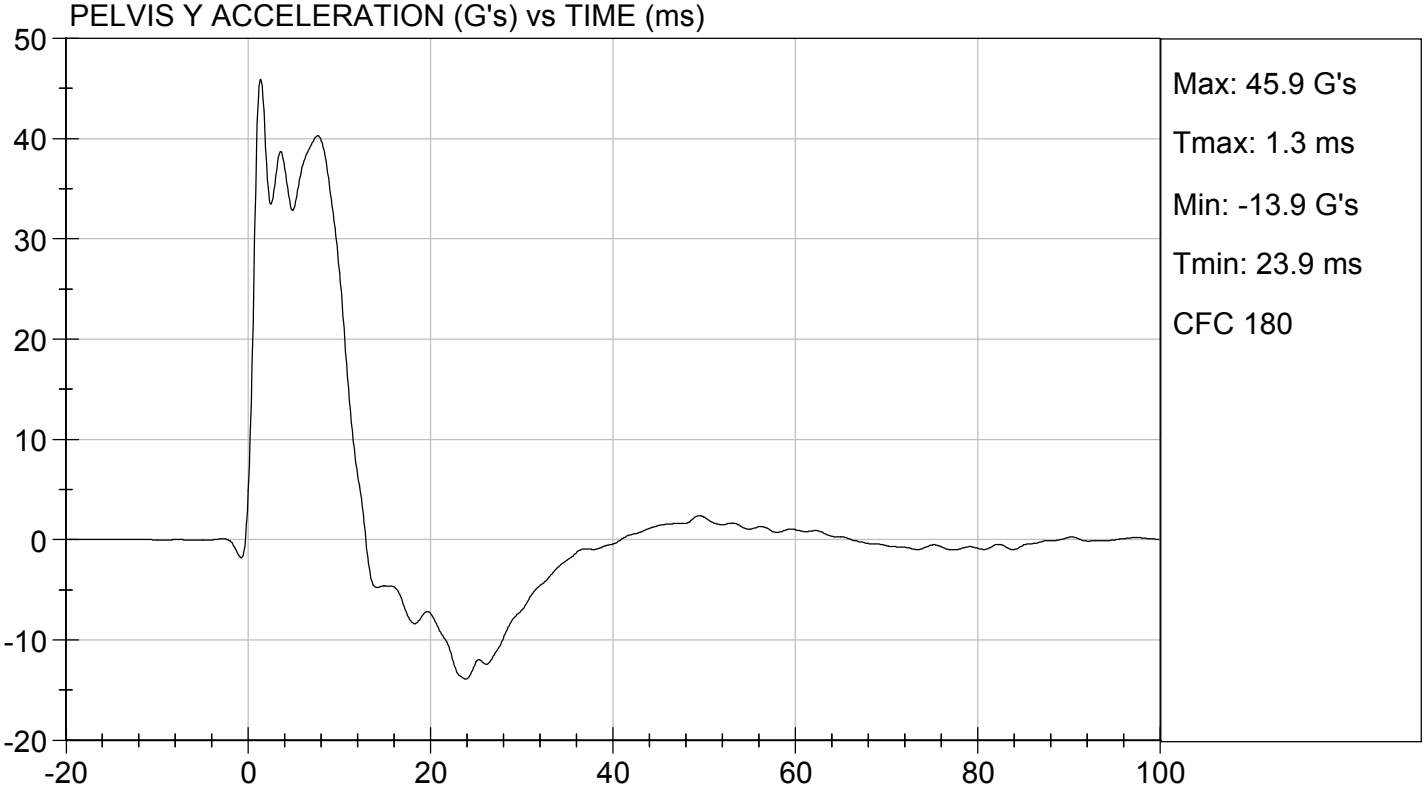
TEST DESC: PELVIS IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 07/14/2020
TEST #: D201717

PROBE (G's) vs TIME (ms)

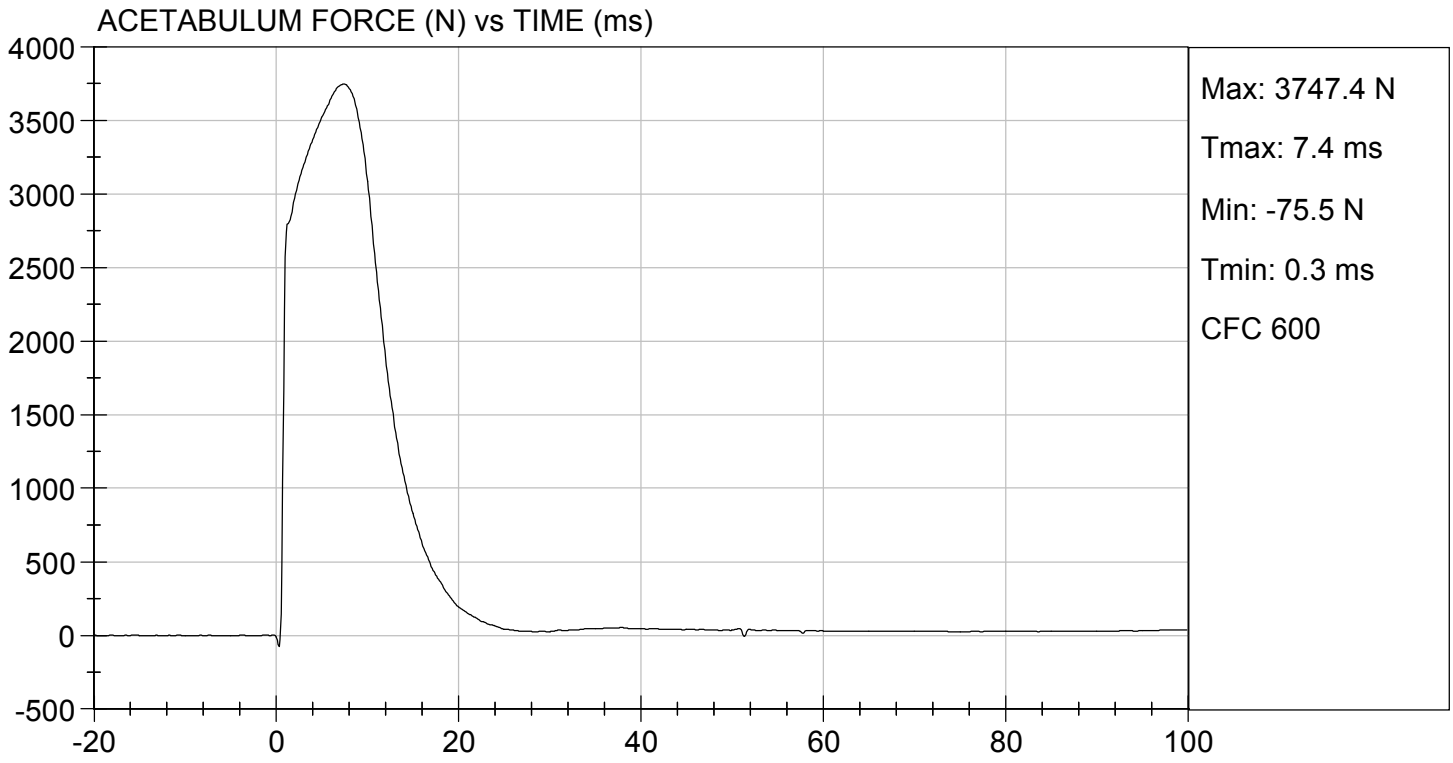


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201717



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201718

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	37	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,957	Pass
		Overall Test Results		Pass

Laboratory Technician

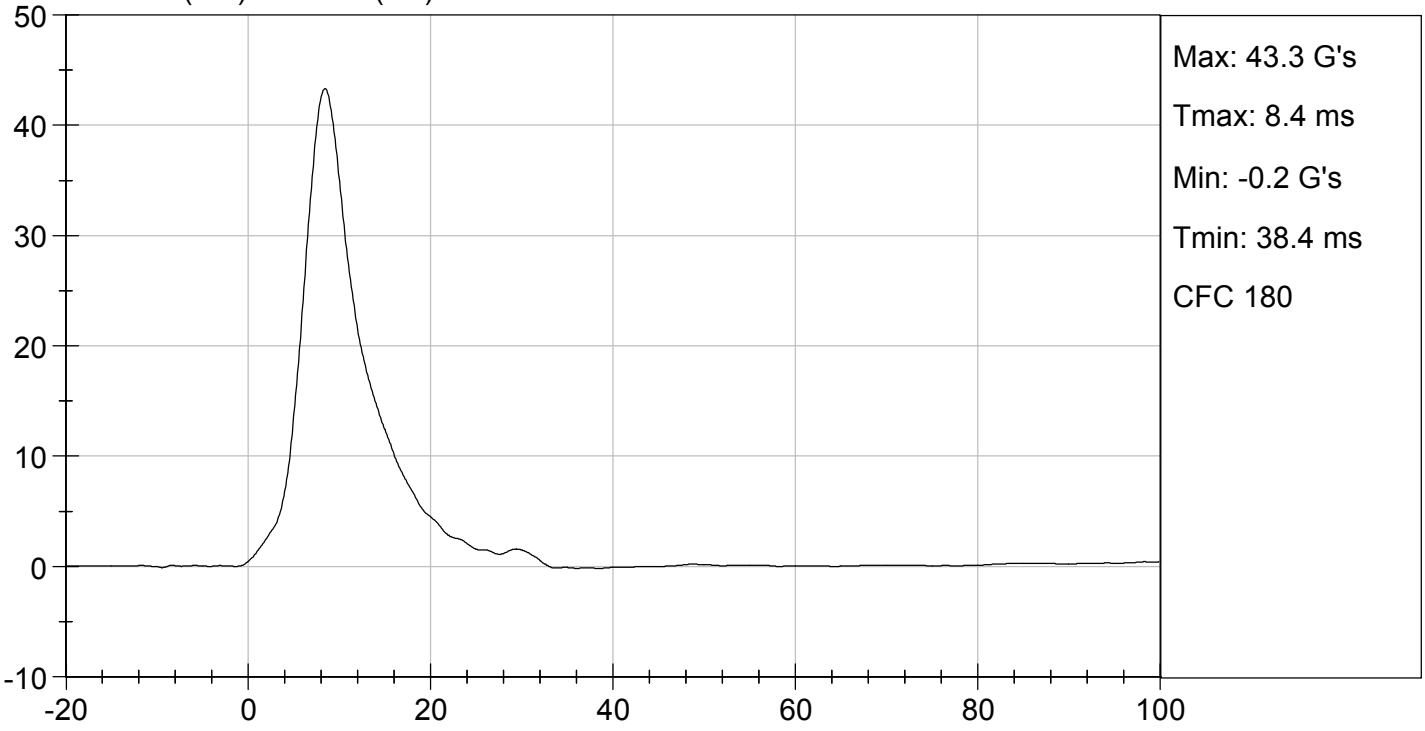
07/14/2020
Test Date

Approved By

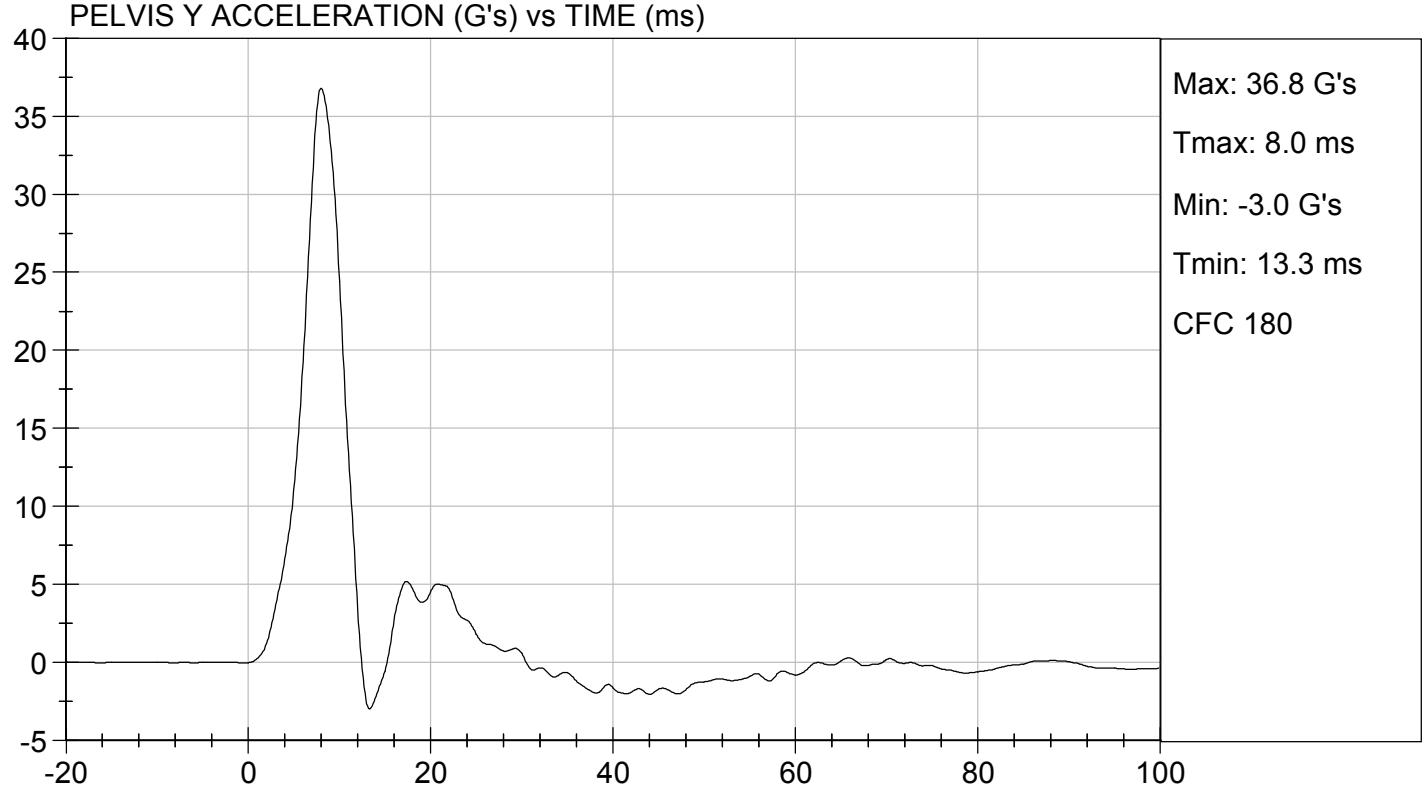
TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/14/2020
TEST #: D201718

PROBE (G's) vs TIME (ms)

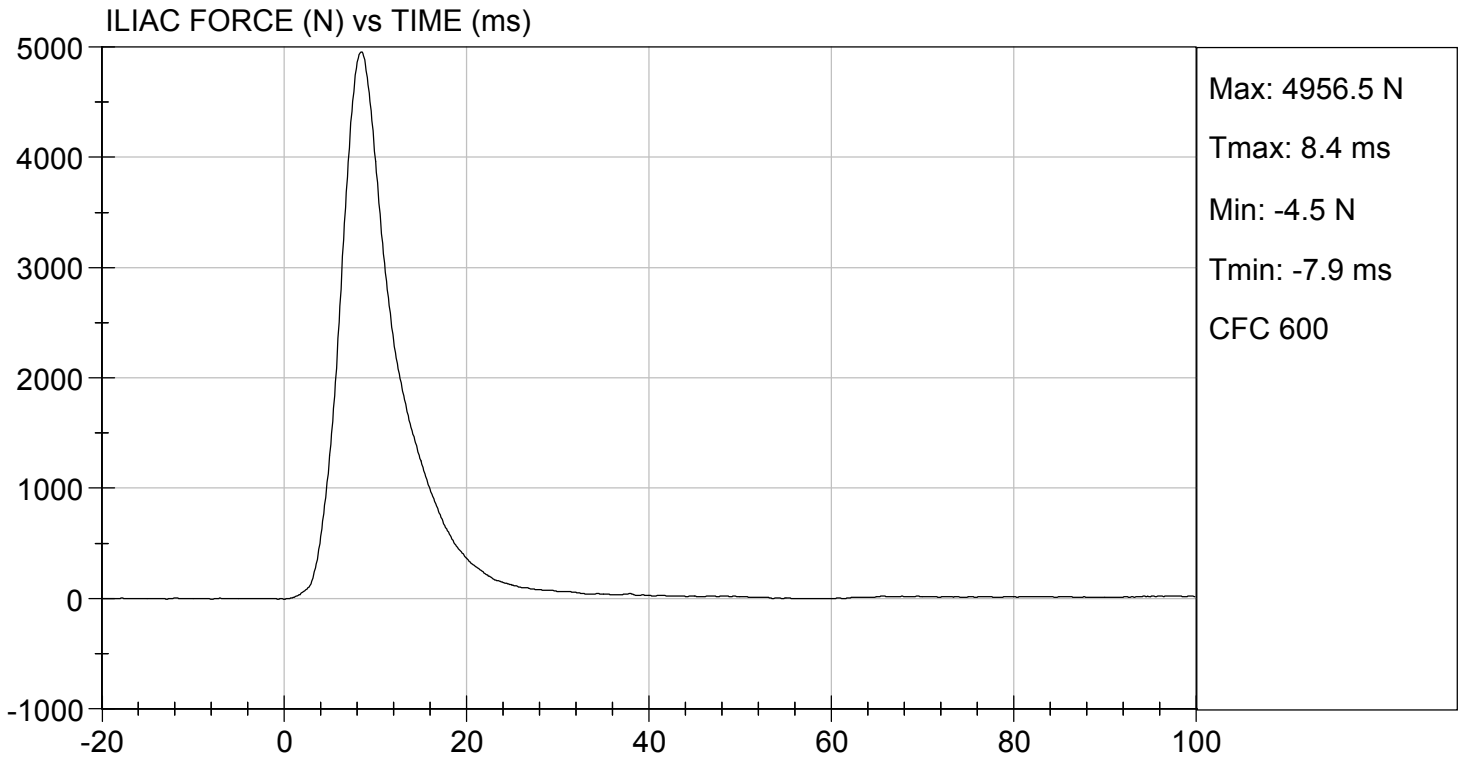


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/14/2020
TEST #: D201718



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SID-IIsD External Measurements
SN: 306

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

MGA RESEARCH CORPORATION

HEAD DROP TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D201971

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Peak Resultant Acceleration	G's	115 to 137	131	Pass
Peak Longitudinal Acceleration	G's	+/- 15	10.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

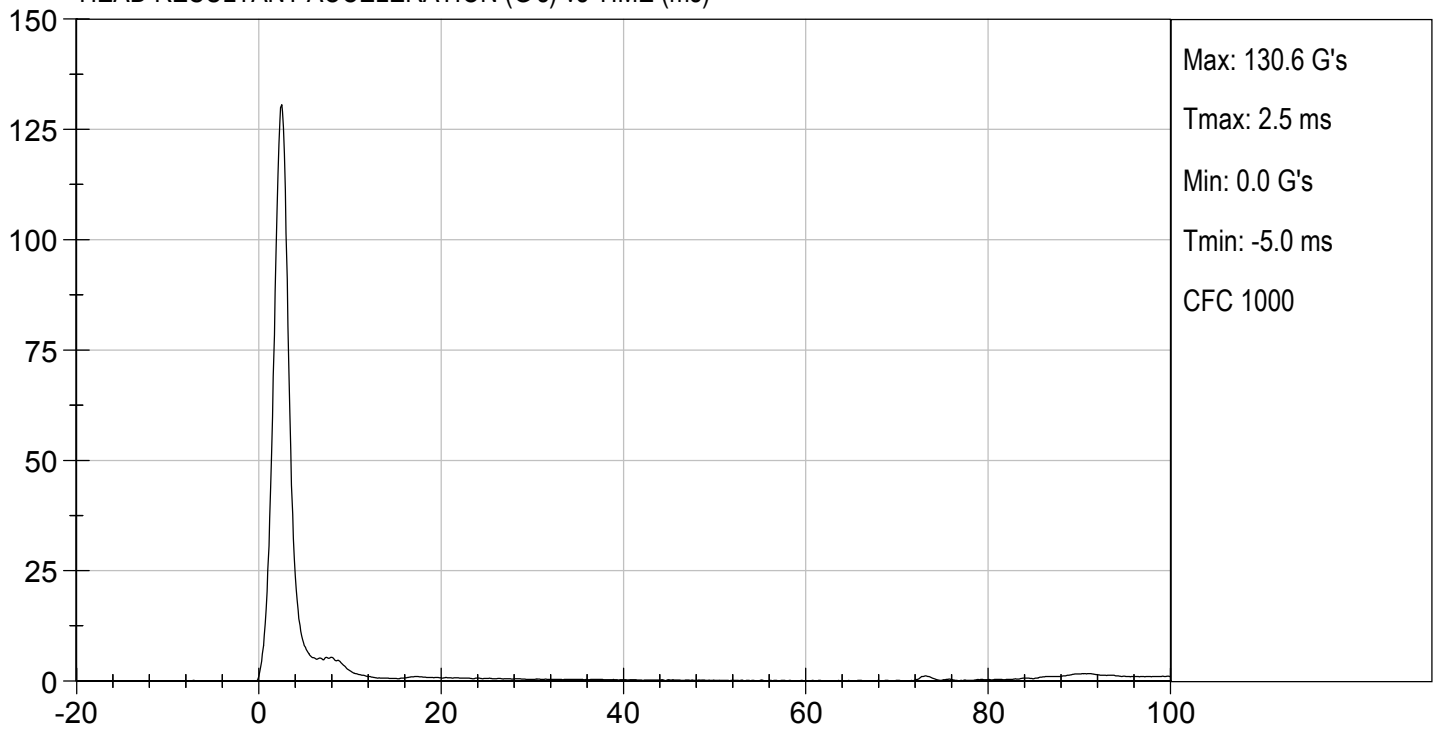
08/10/2020
Test Date

Approved By

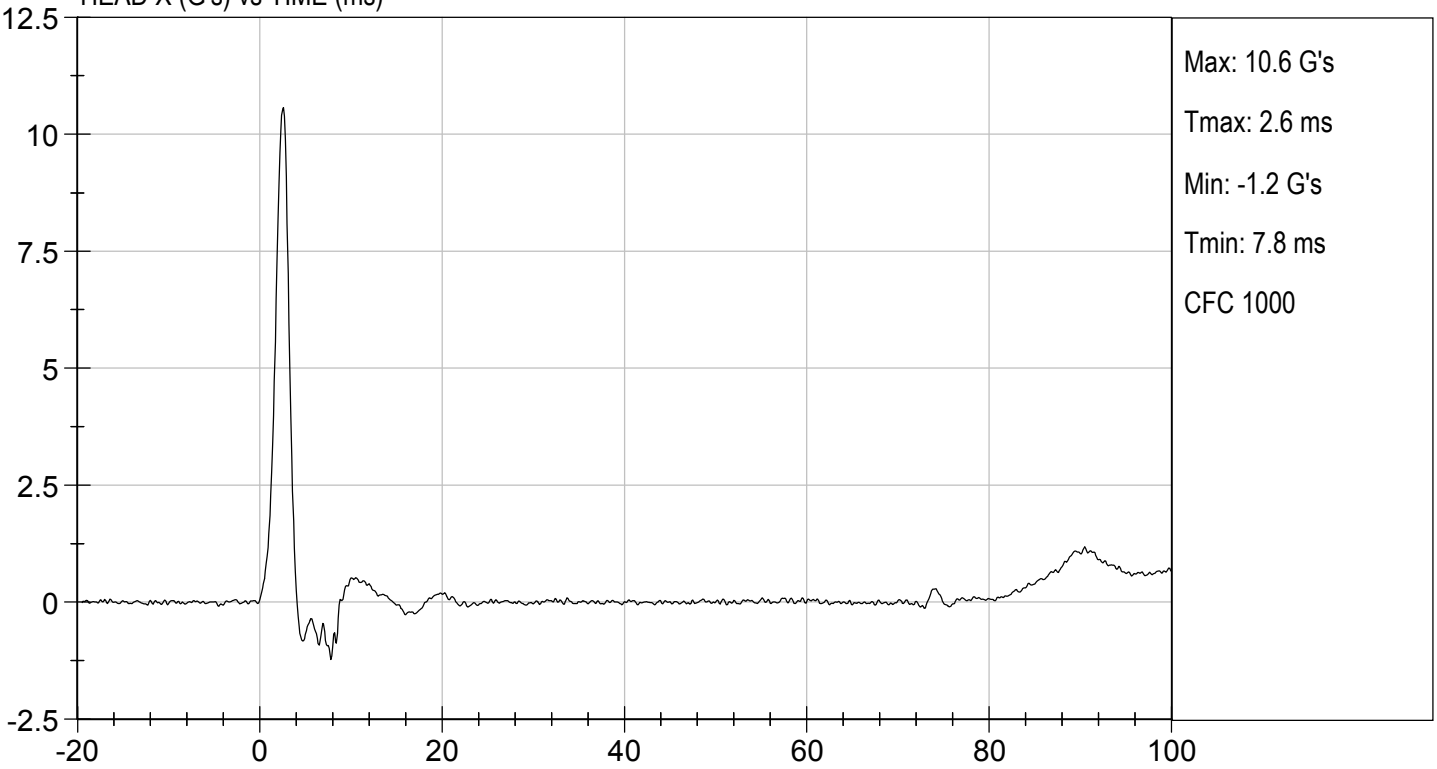
TEST DESC: HEAD DROP

TEST DATE: 08/10/2020
TEST #: D201971

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



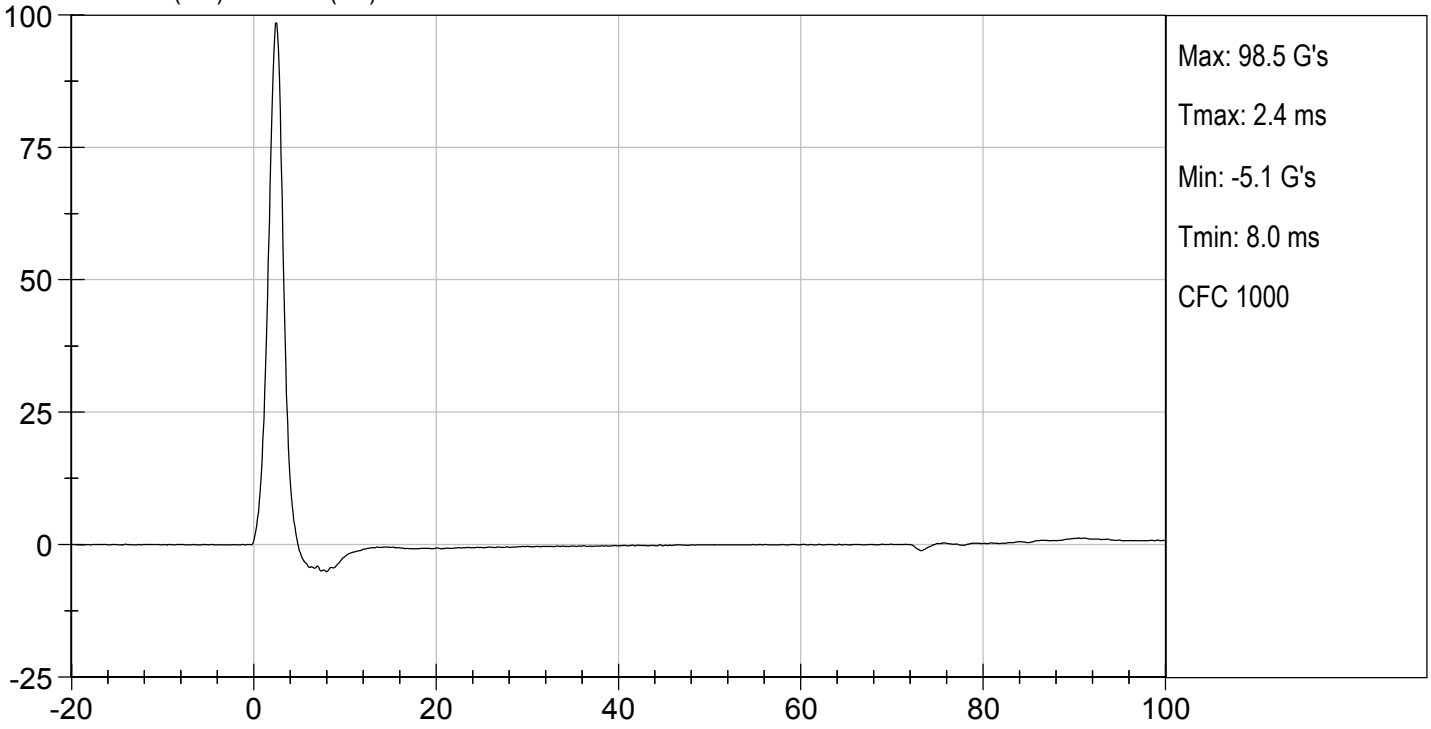
HEAD X (G's) vs TIME (ms)



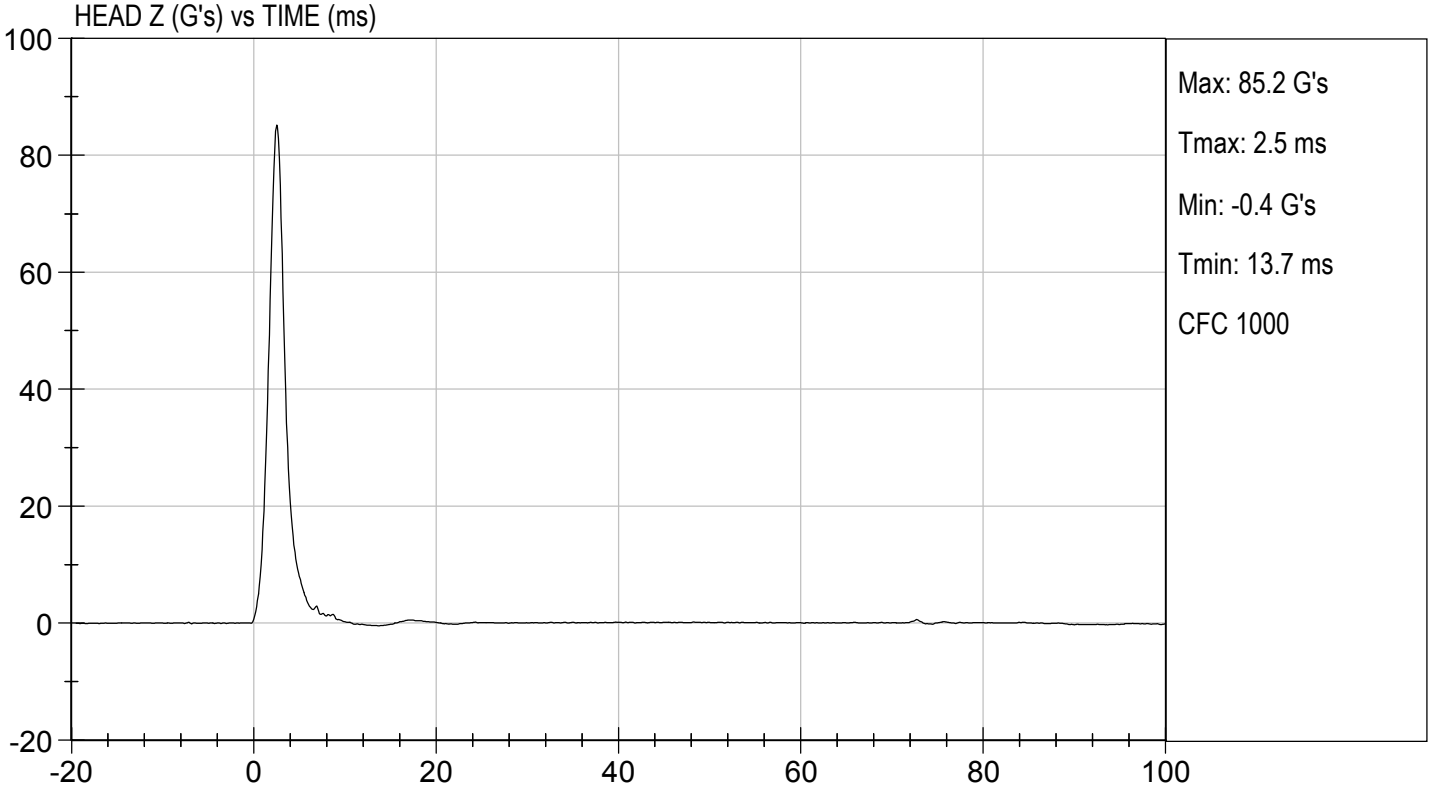
TEST DESC: HEAD DROP

TEST DATE: 08/10/2020
TEST #: D201971

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: 306 **Test I.D:** D201972

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.8	Pass
Humidity		%	10 to 70	52	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	3.73	Pass
	20 ms	m/s	4.40 to 5.40	5.18	Pass
	25 ms	m/s	5.40 to 6.10	5.70	Pass
	25-100 ms	m/s	5.50 to 6.20	5.72	Pass
Maximum D-Plane Rotation		deg	71 to 81	75	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	114	Pass
			Overall Test Results		Pass

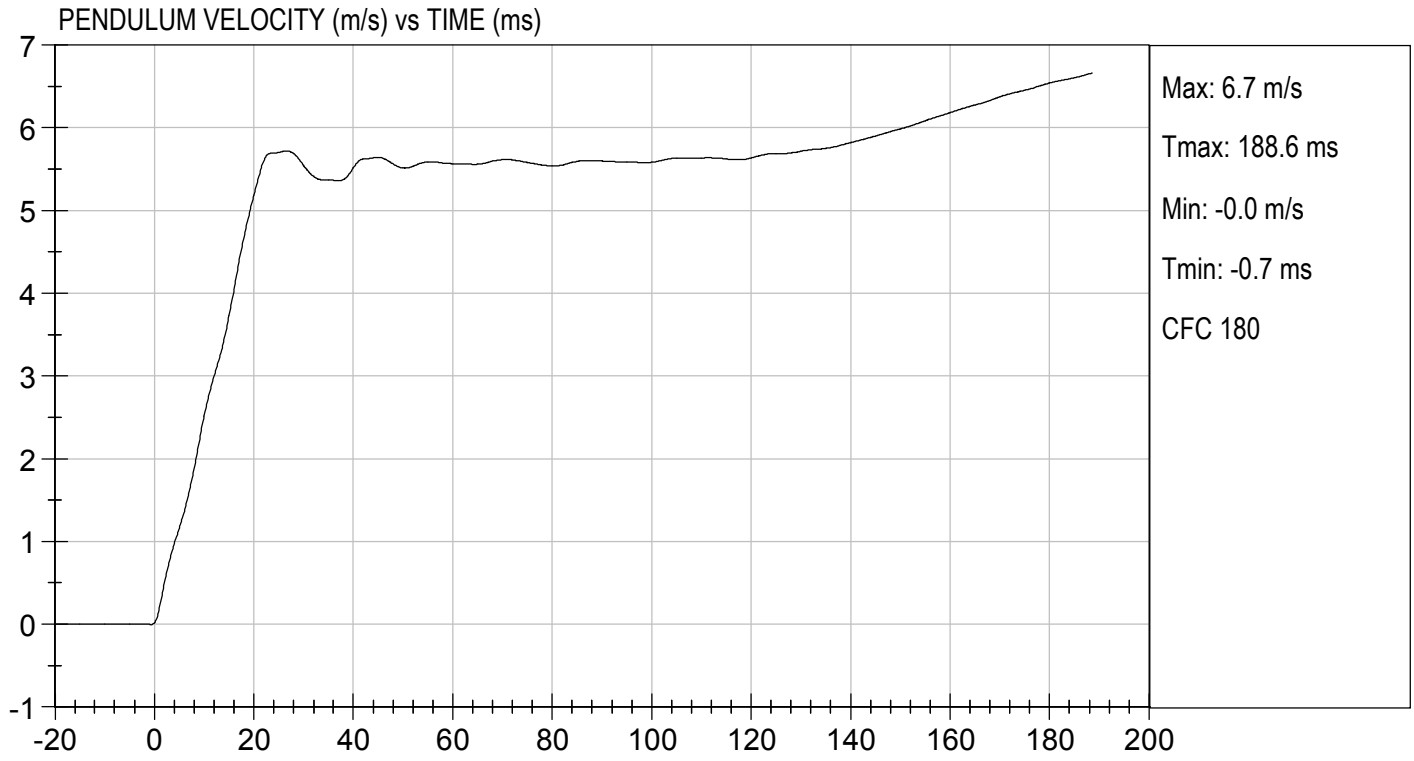
Laboratory Technician

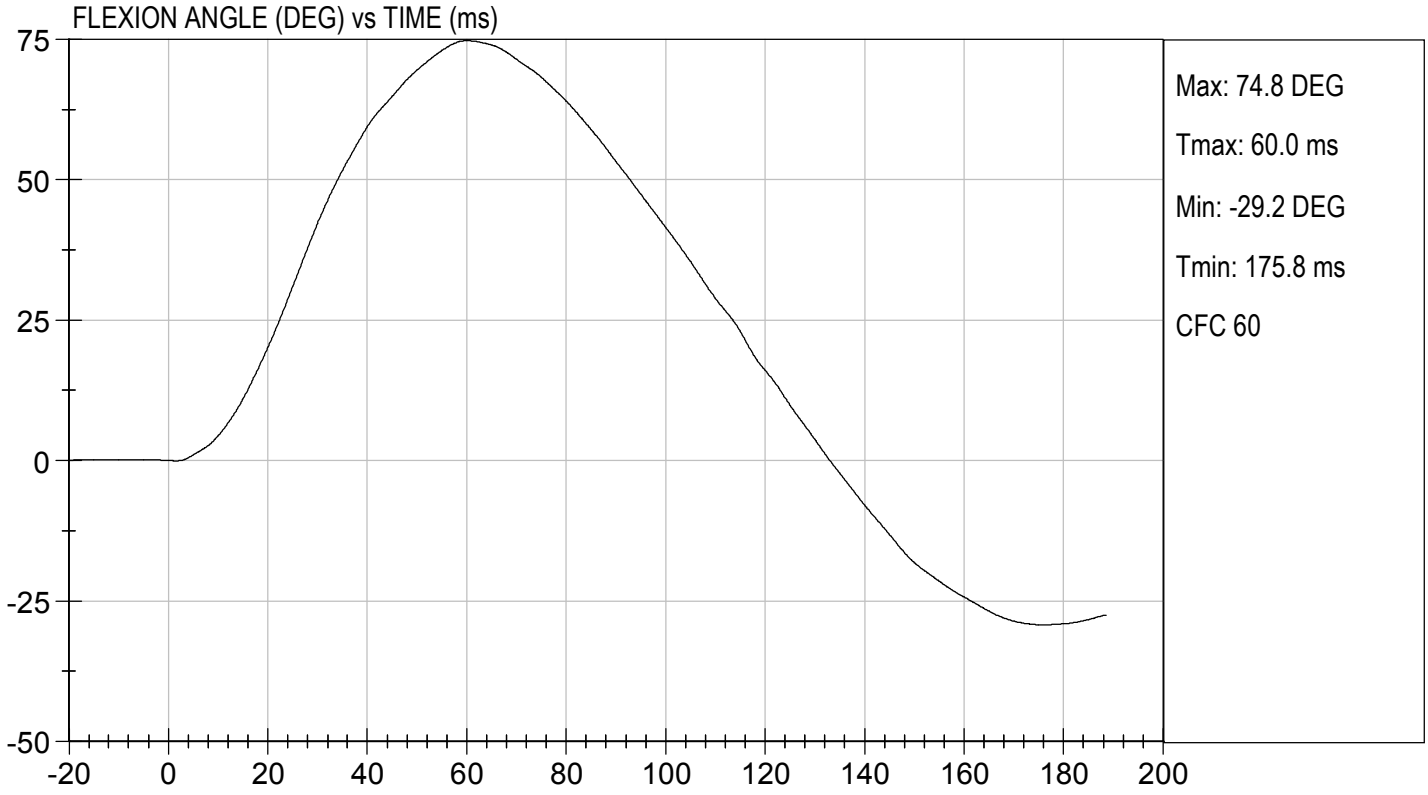
08/10/2020
Test Date

Approved By

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

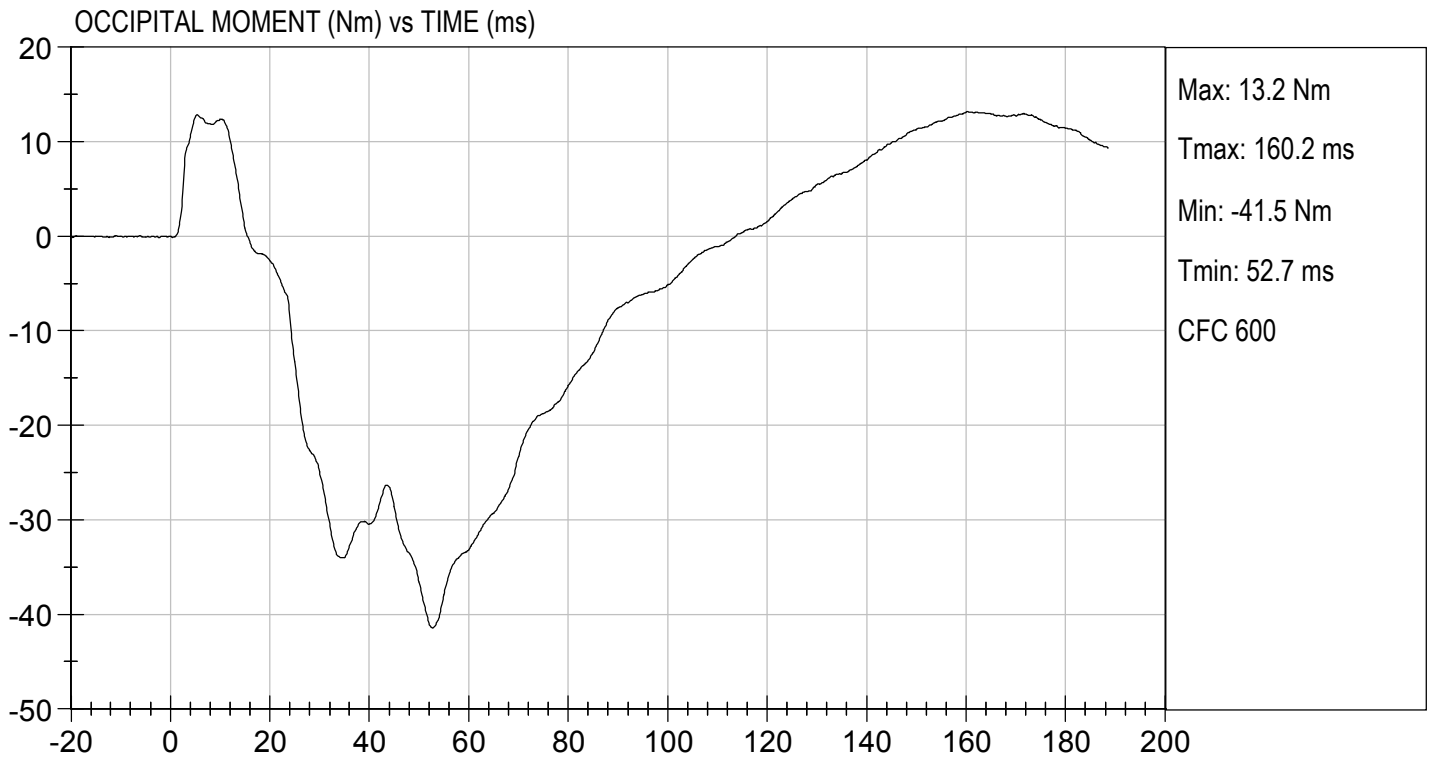
TEST DATE: 08/10/2020
TEST #: D201972





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

TEST DATE: 08/10/2020
TEST #: D201972



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test ID:** D201973

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
		Overall Test Results		Pass

Laboratory Technician

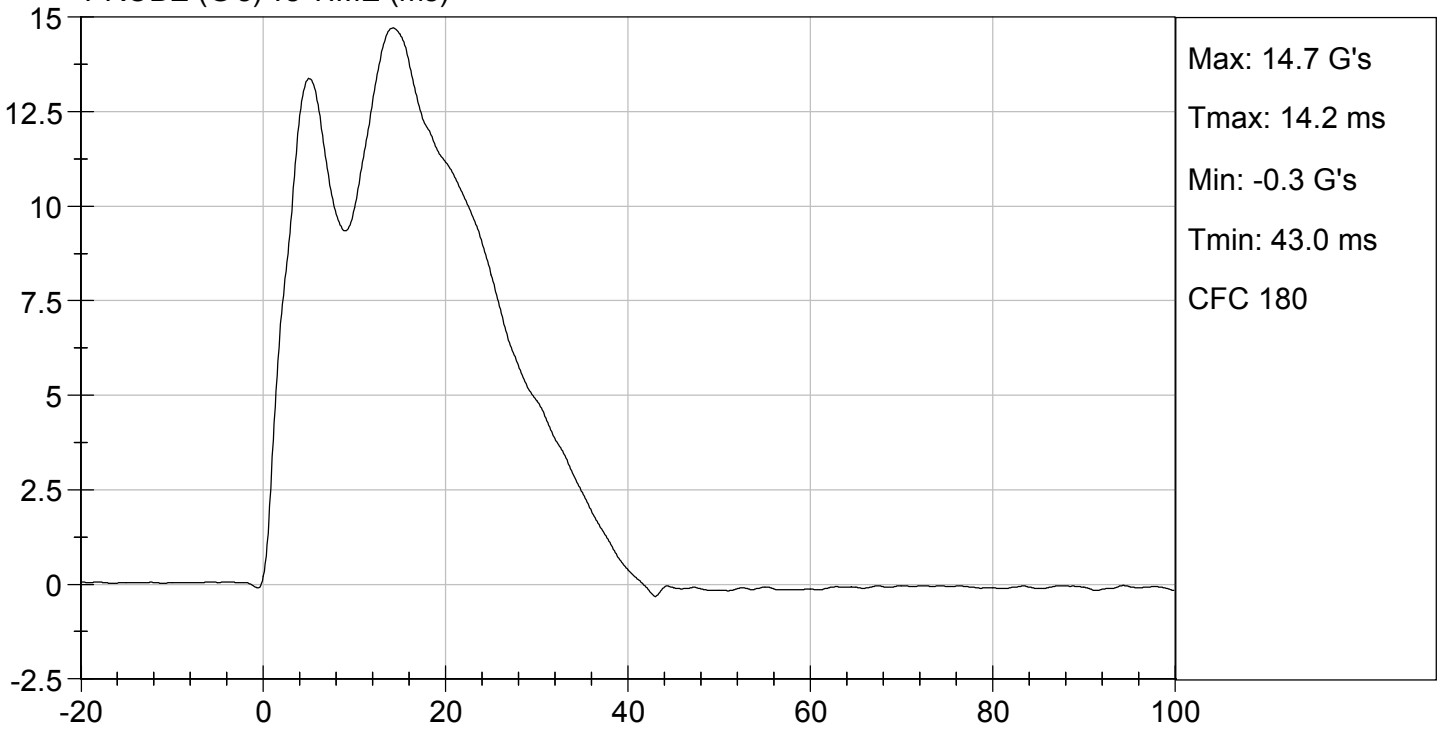
08/10/2020
Test Date

Approved By

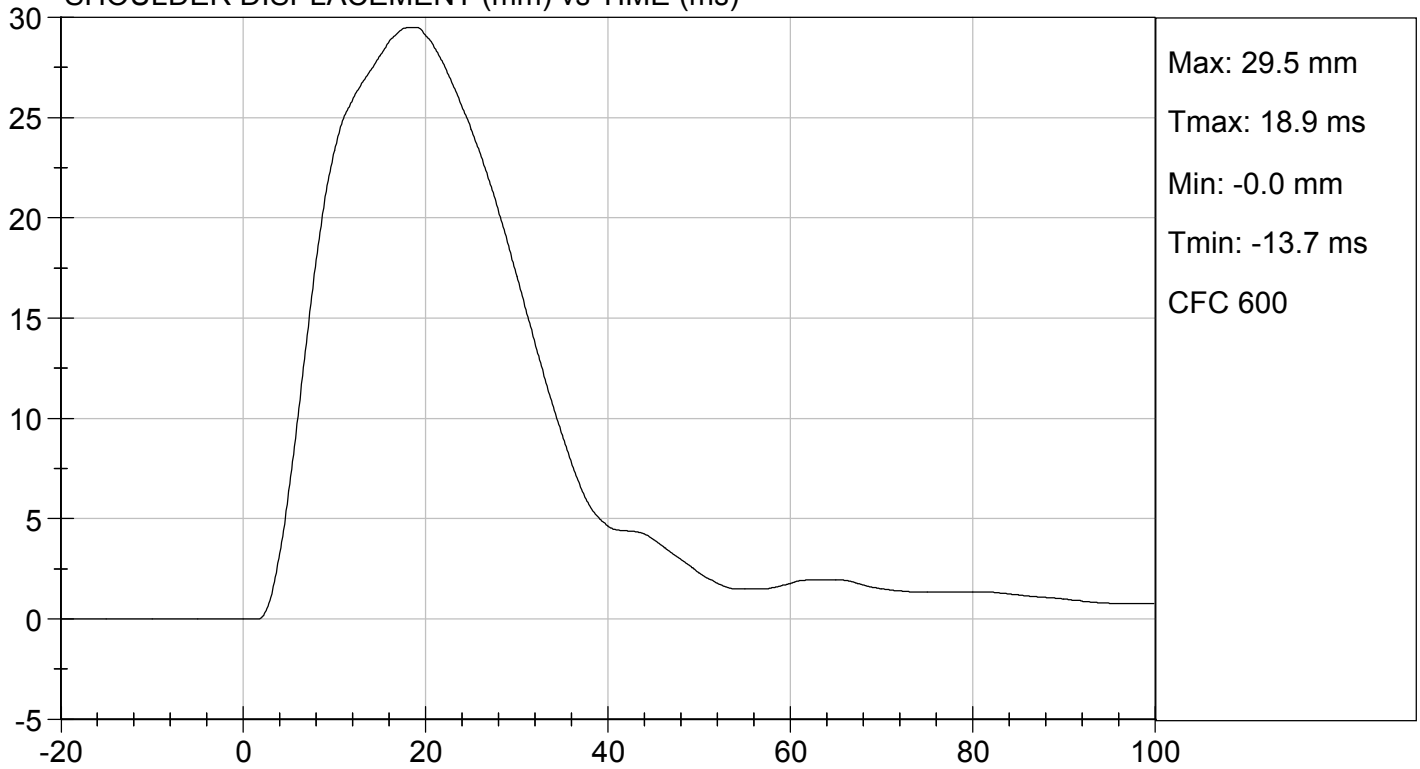
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/10/2020
TEST #: D201973

PROBE (G's) vs TIME (ms)

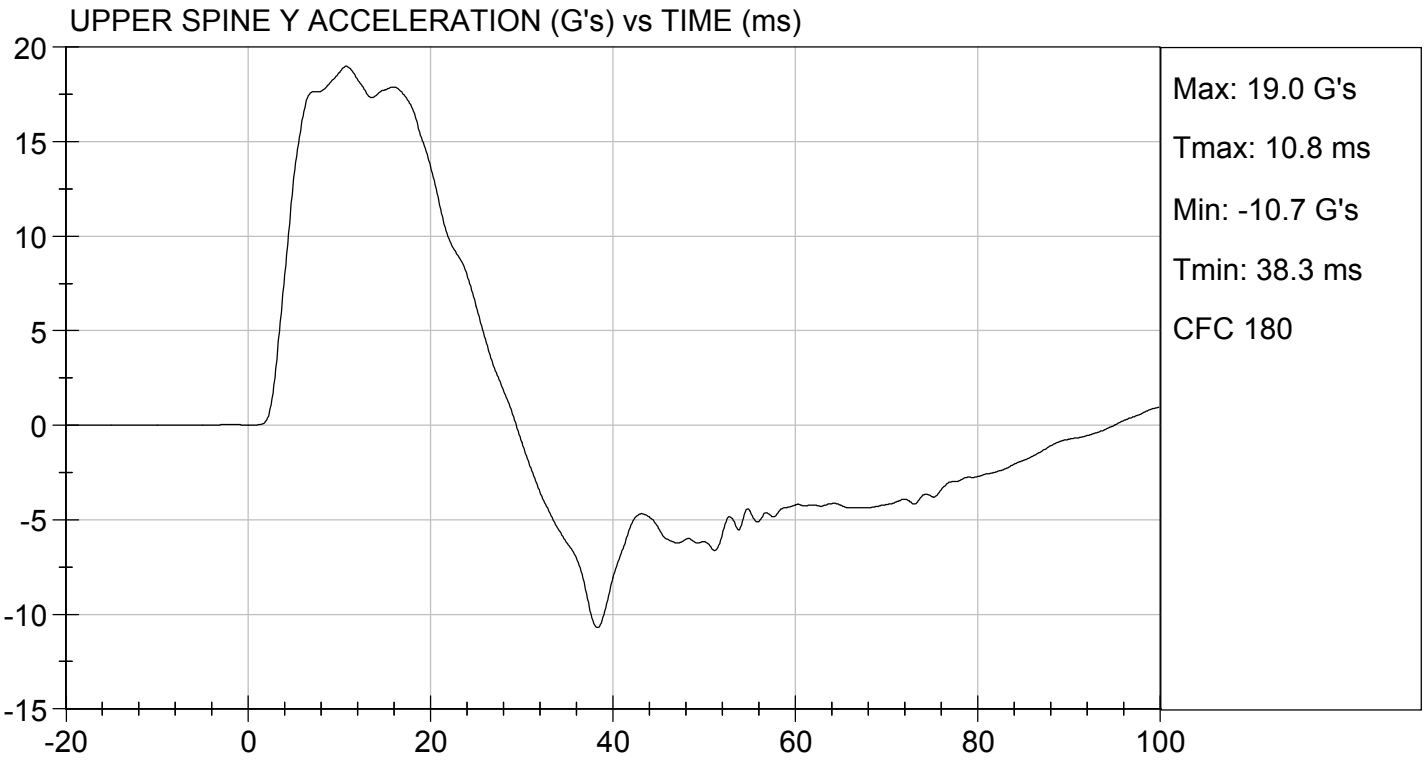


SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 08/10/2020
TEST #: D201973



MGA RESEARCH CORPORATION

THORAX (WITH ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201974

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	52	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	34	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
		Overall Test Results		Pass

Laboratory Technician

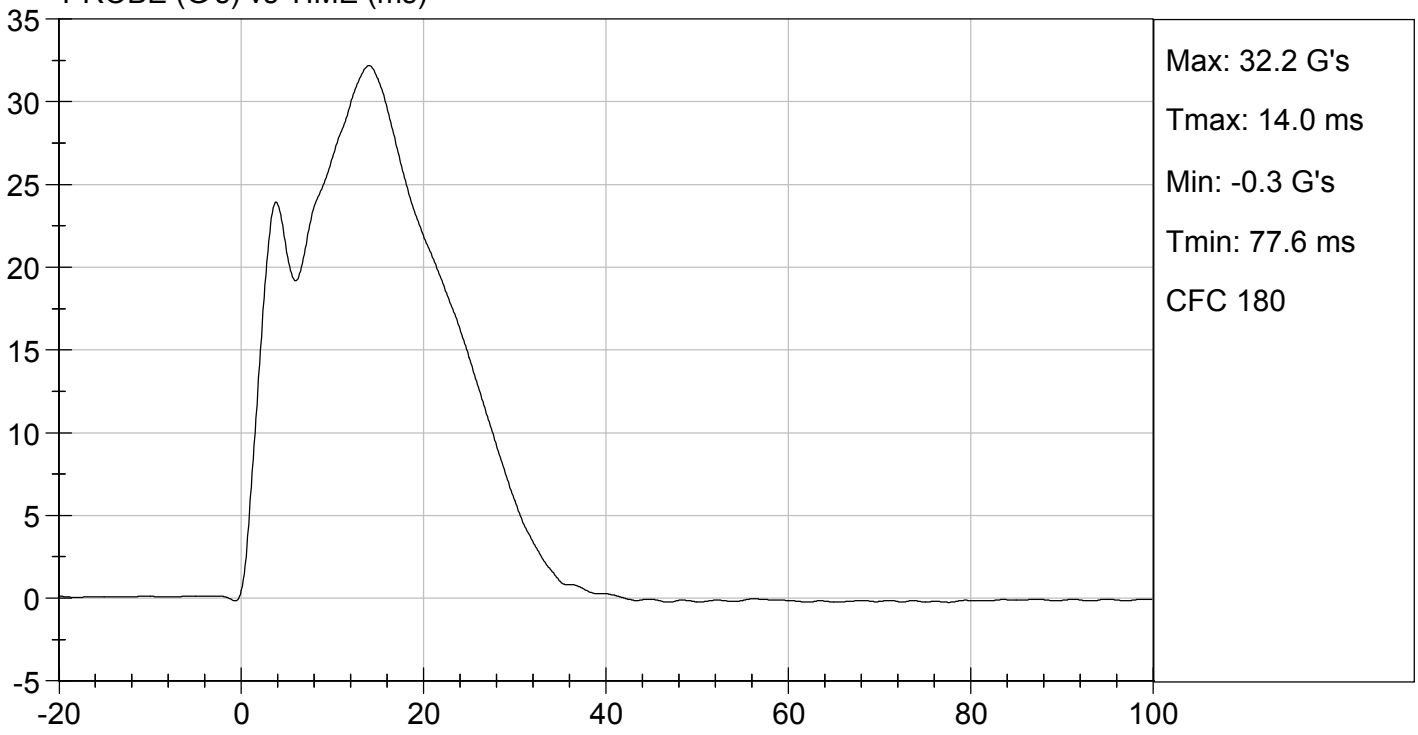
08/10/2020
Test Date

Approved By

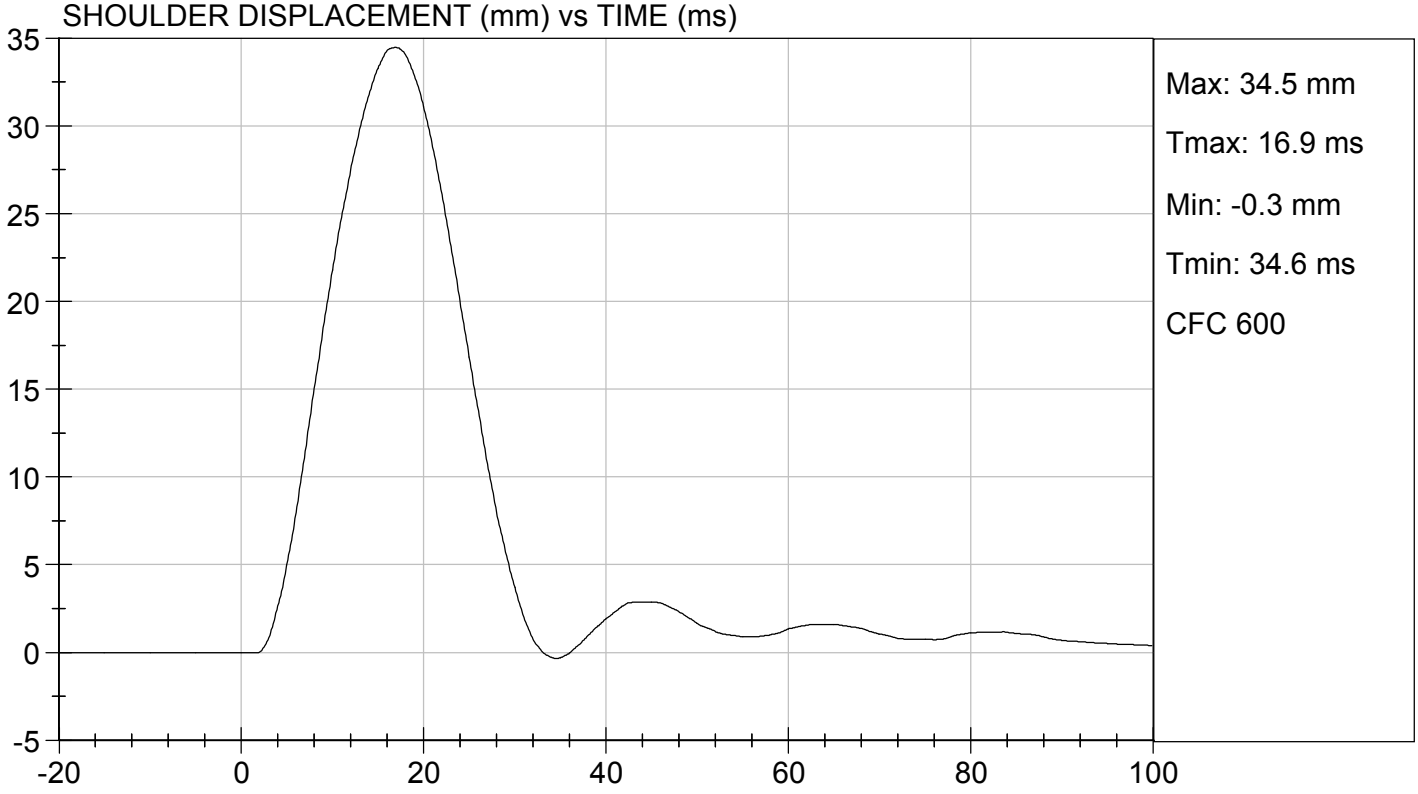
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/10/2020
TEST #: D201974

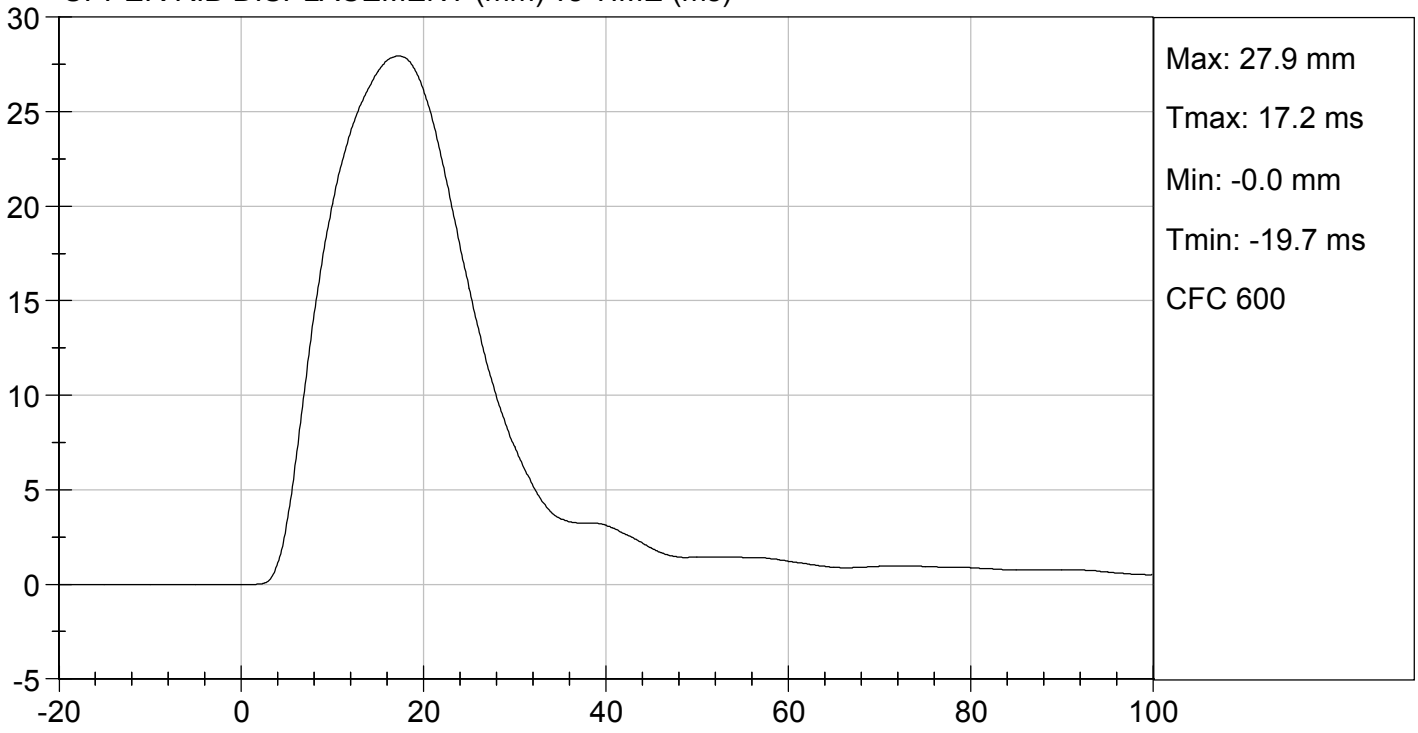
PROBE (G's) vs TIME (ms)



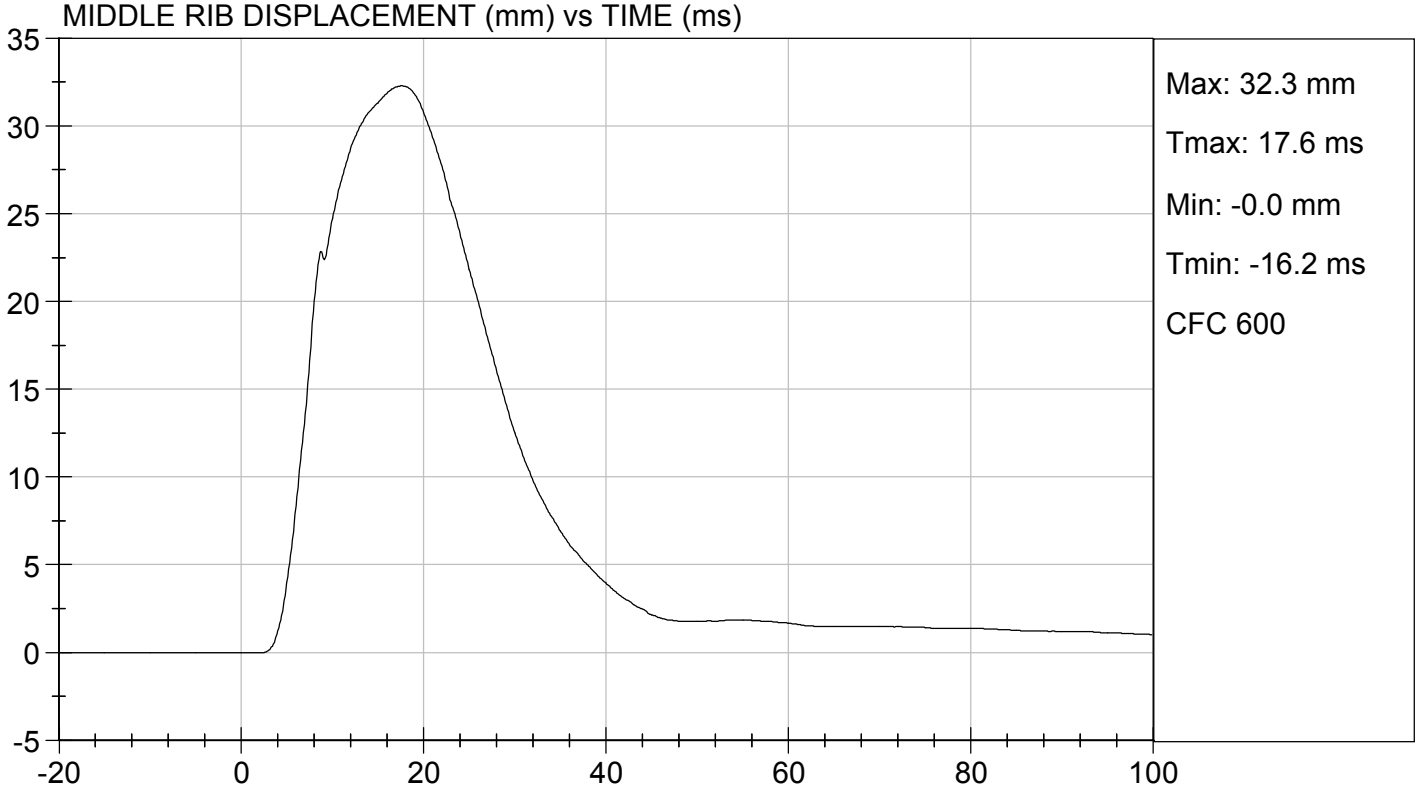
SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



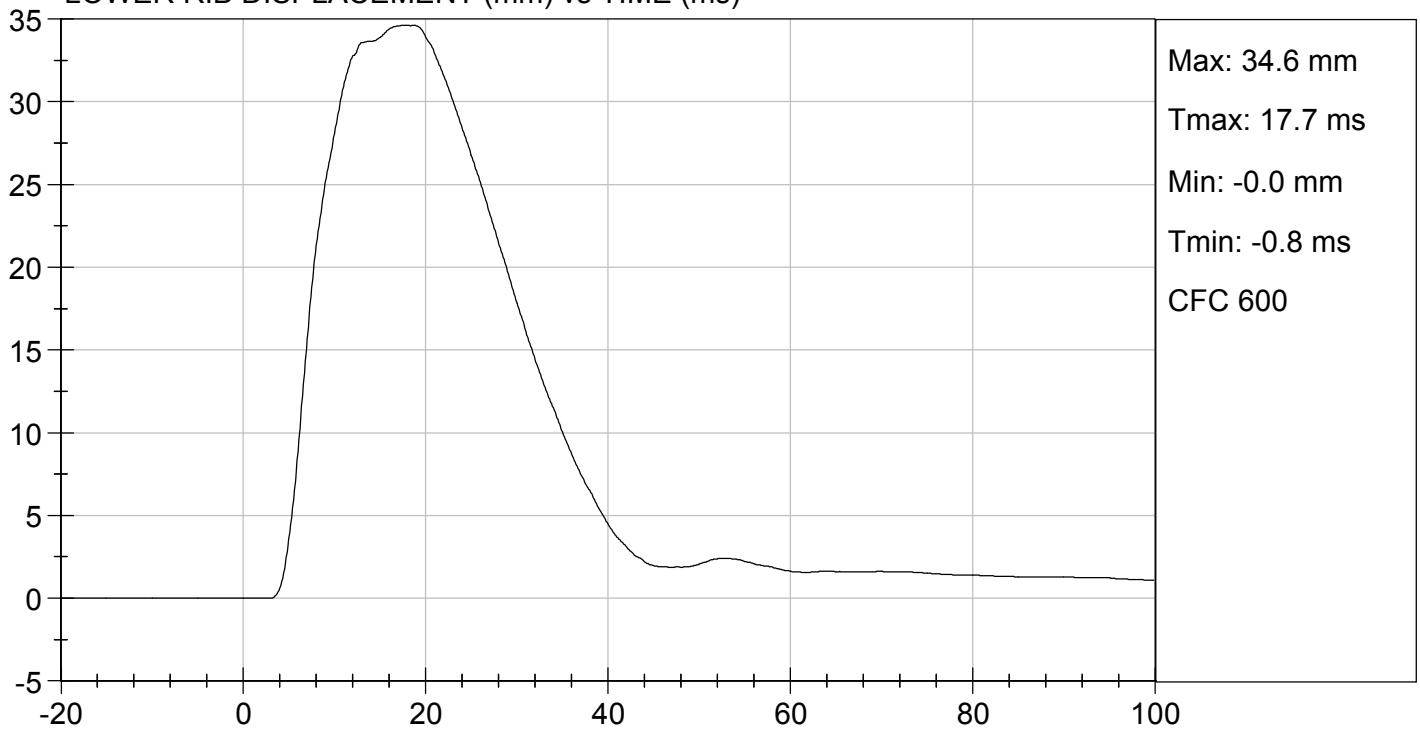
MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



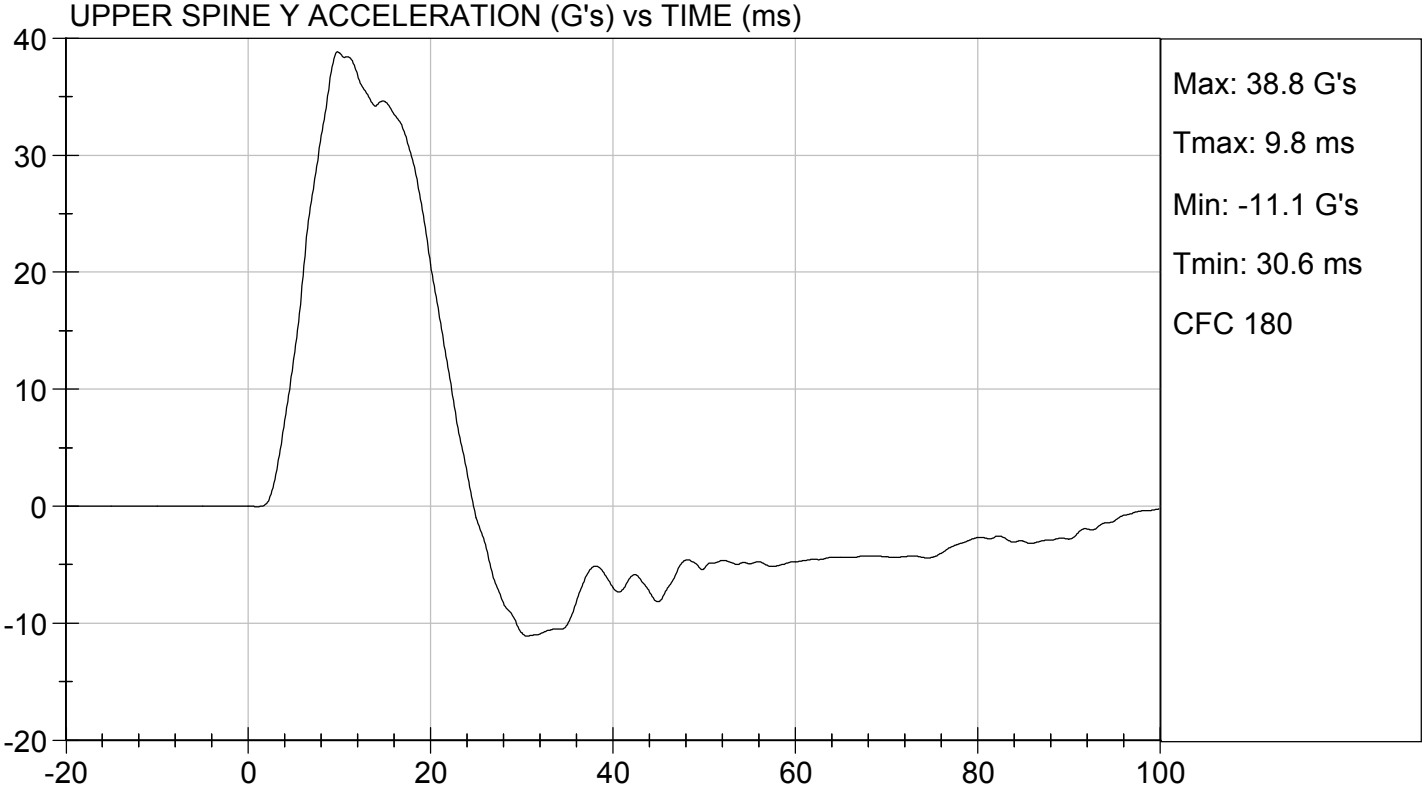
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/10/2020
TEST #: D201974

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



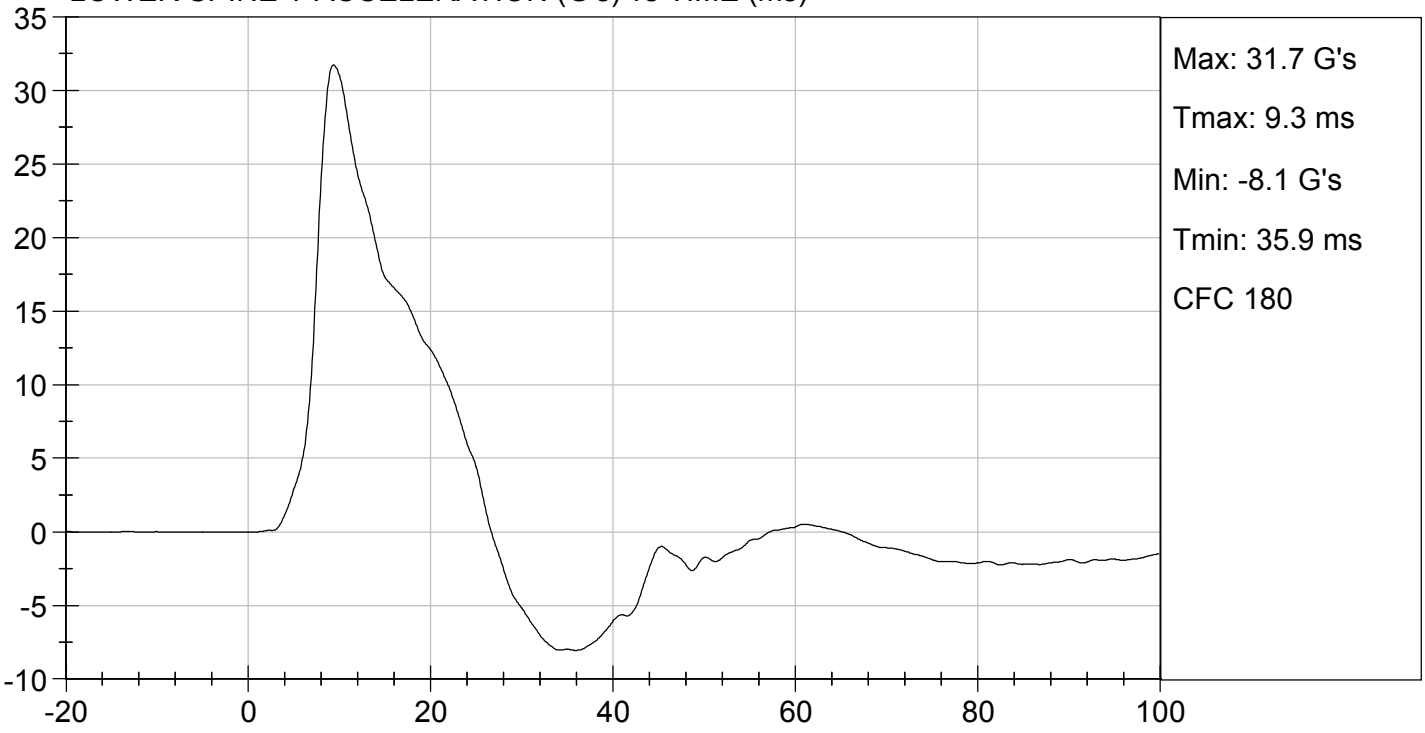
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 08/10/2020
TEST #: D201974

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



MGA RESEARCH CORPORATION

THORAX (WITHOUT ARM) IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201975

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	52	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	16	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
		Overall Test Results		Pass

Laboratory Technician

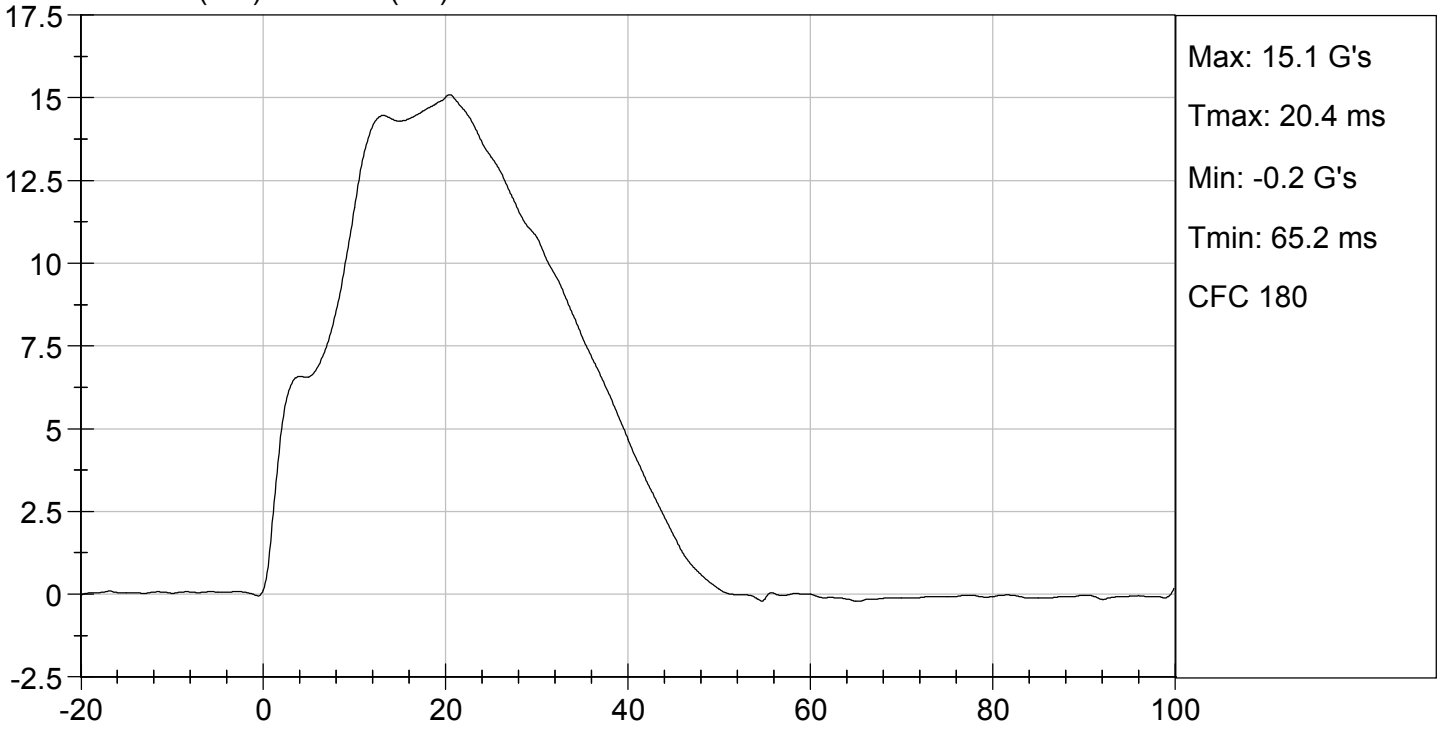
08/10/2020
Test Date

Approved By

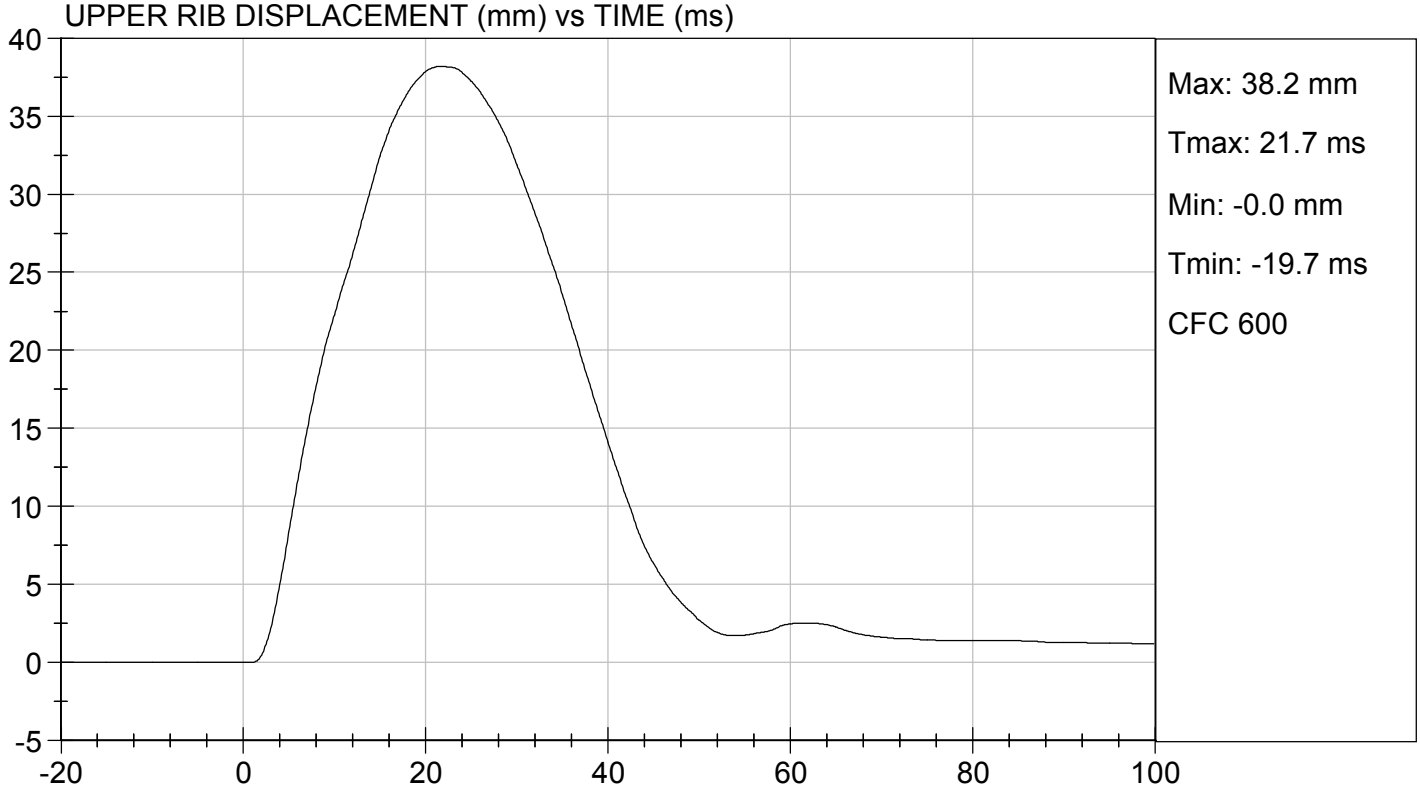
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/10/2020
TEST #: D201975

PROBE (G's) vs TIME (ms)



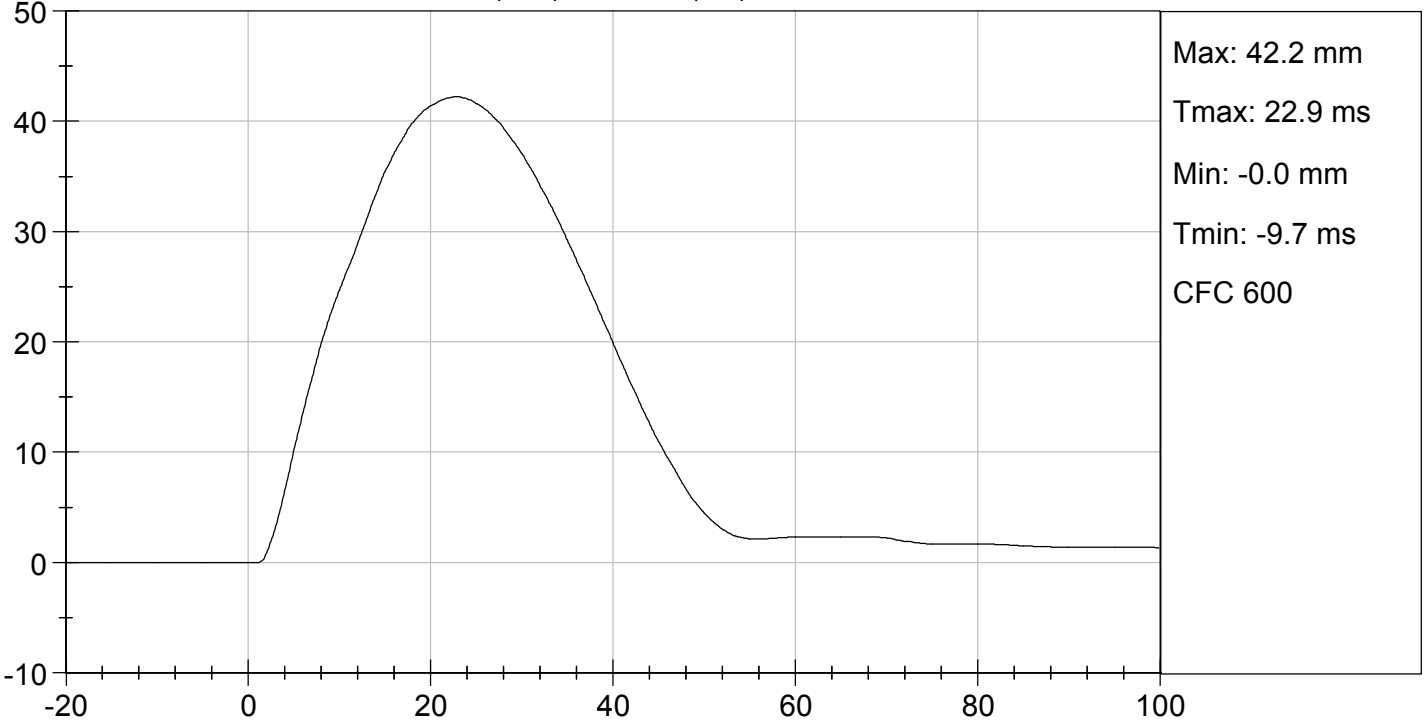
UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



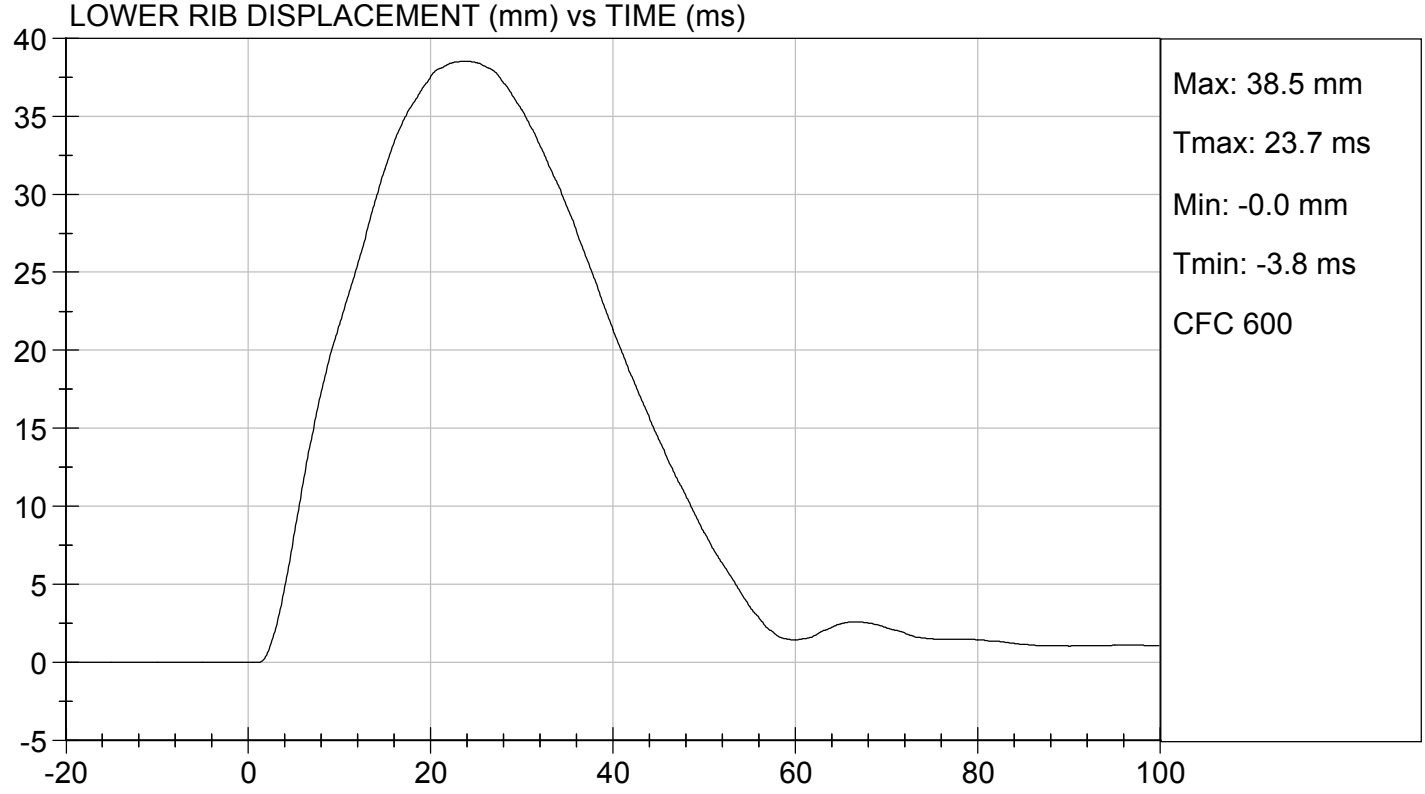
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/10/2020
TEST #: D201975

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



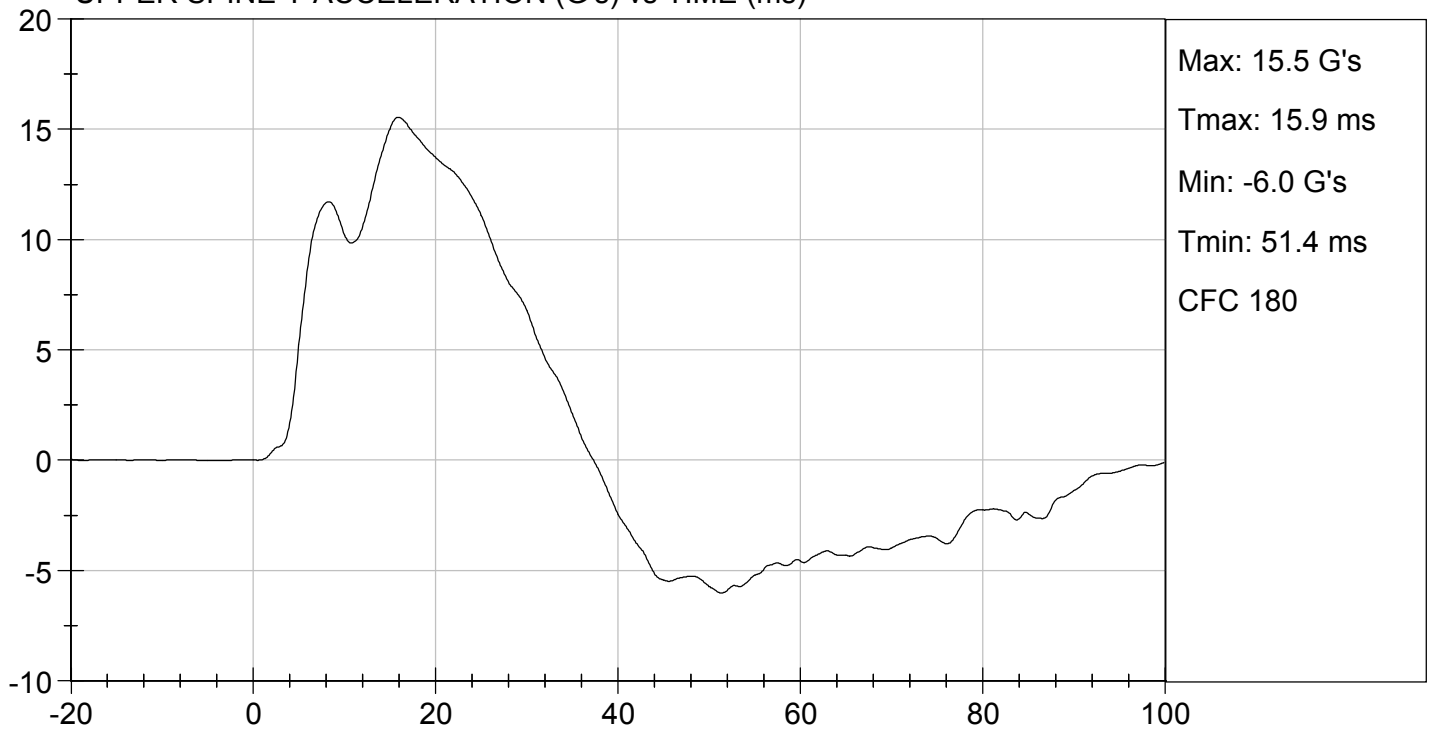
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



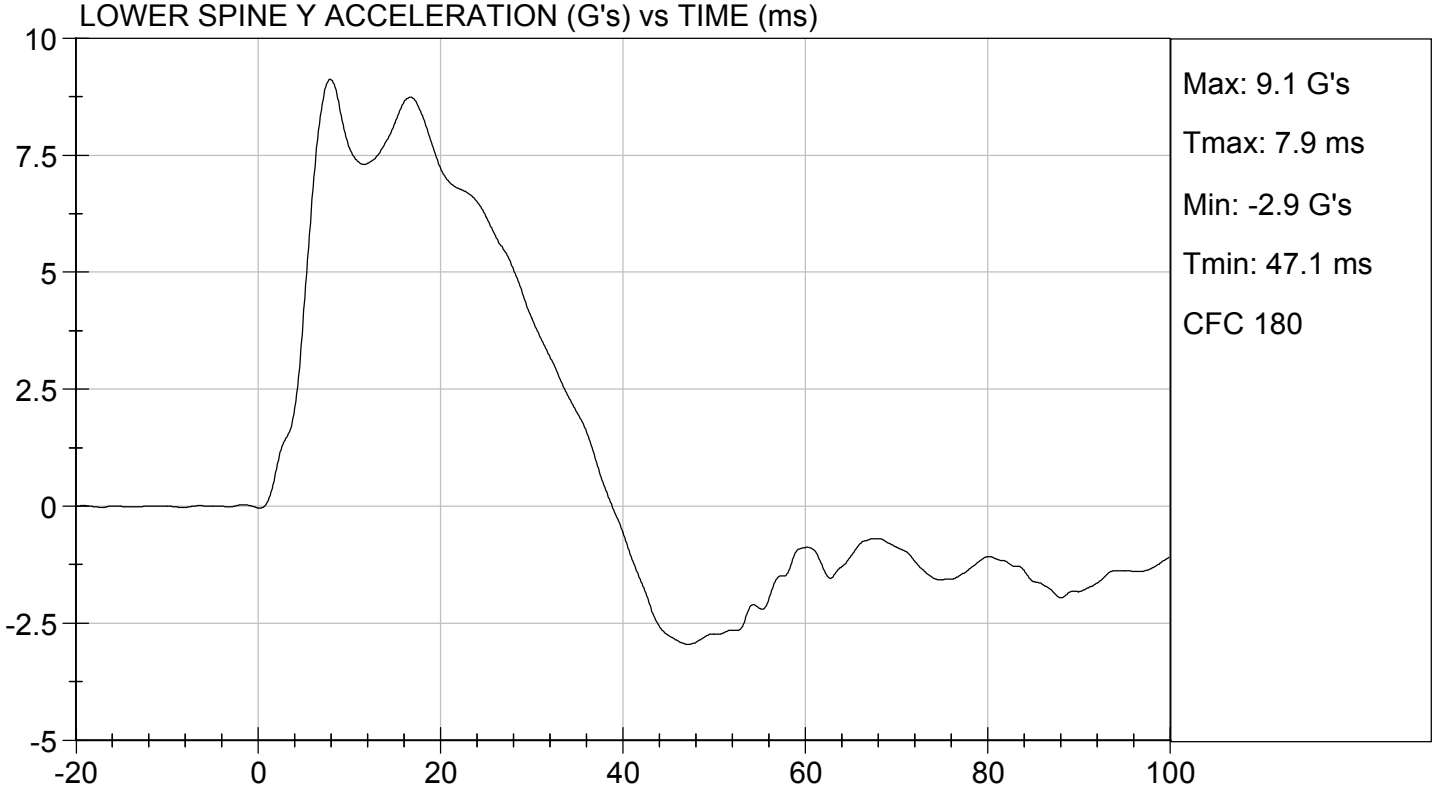
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/10/2020
TEST #: D201975

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



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201976

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	52	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	41	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
		Overall Test Results		Pass

Laboratory Technician

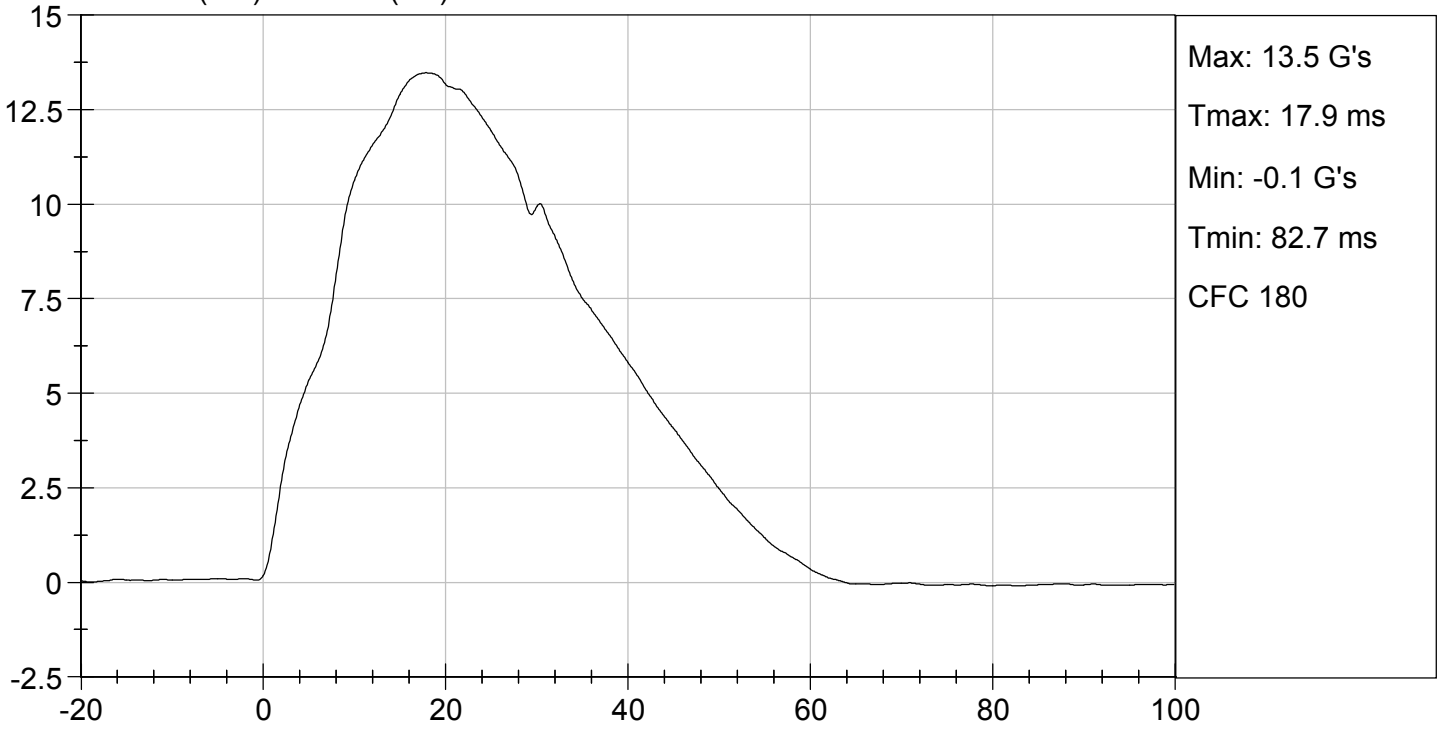
08/10/2020
Test Date

Approved By

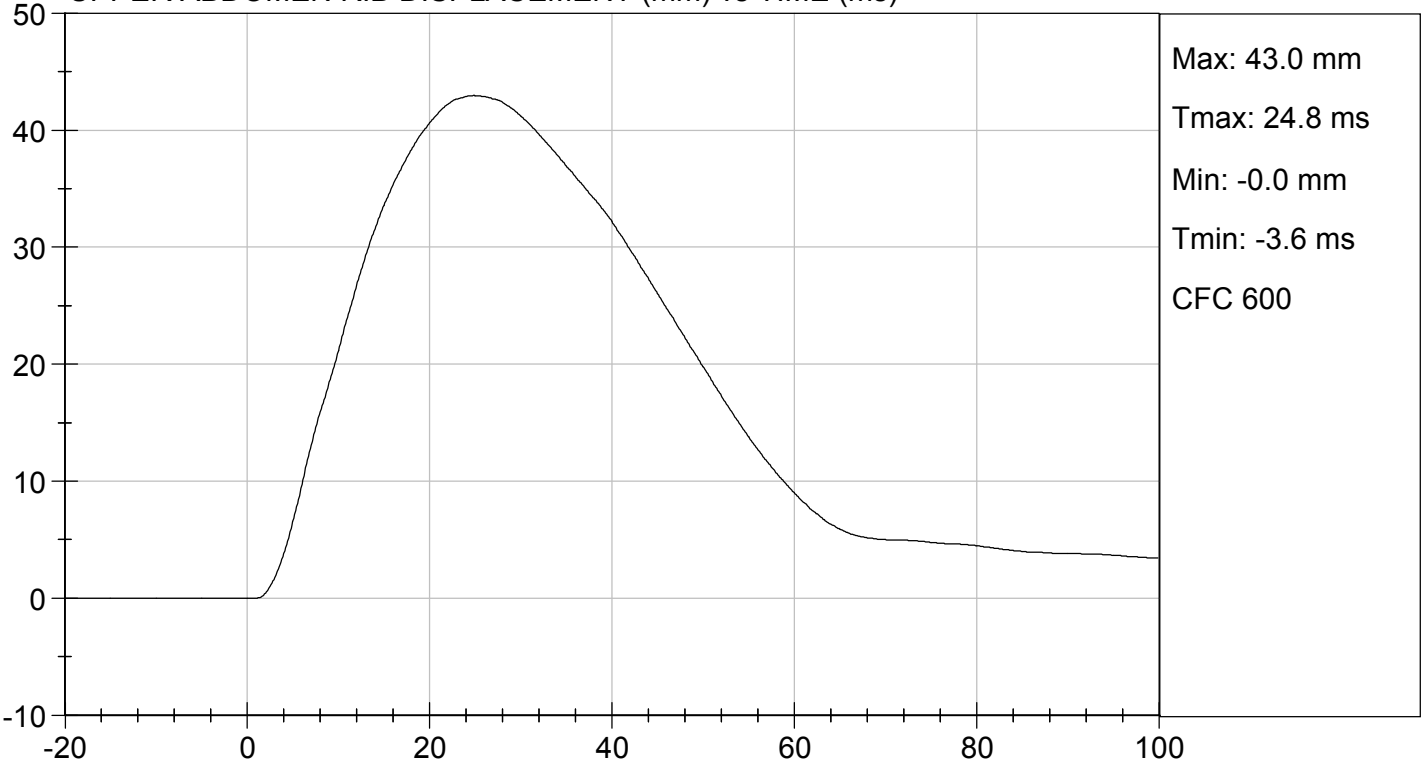
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/10/2020
TEST #: D201976

PROBE (G's) vs TIME (ms)



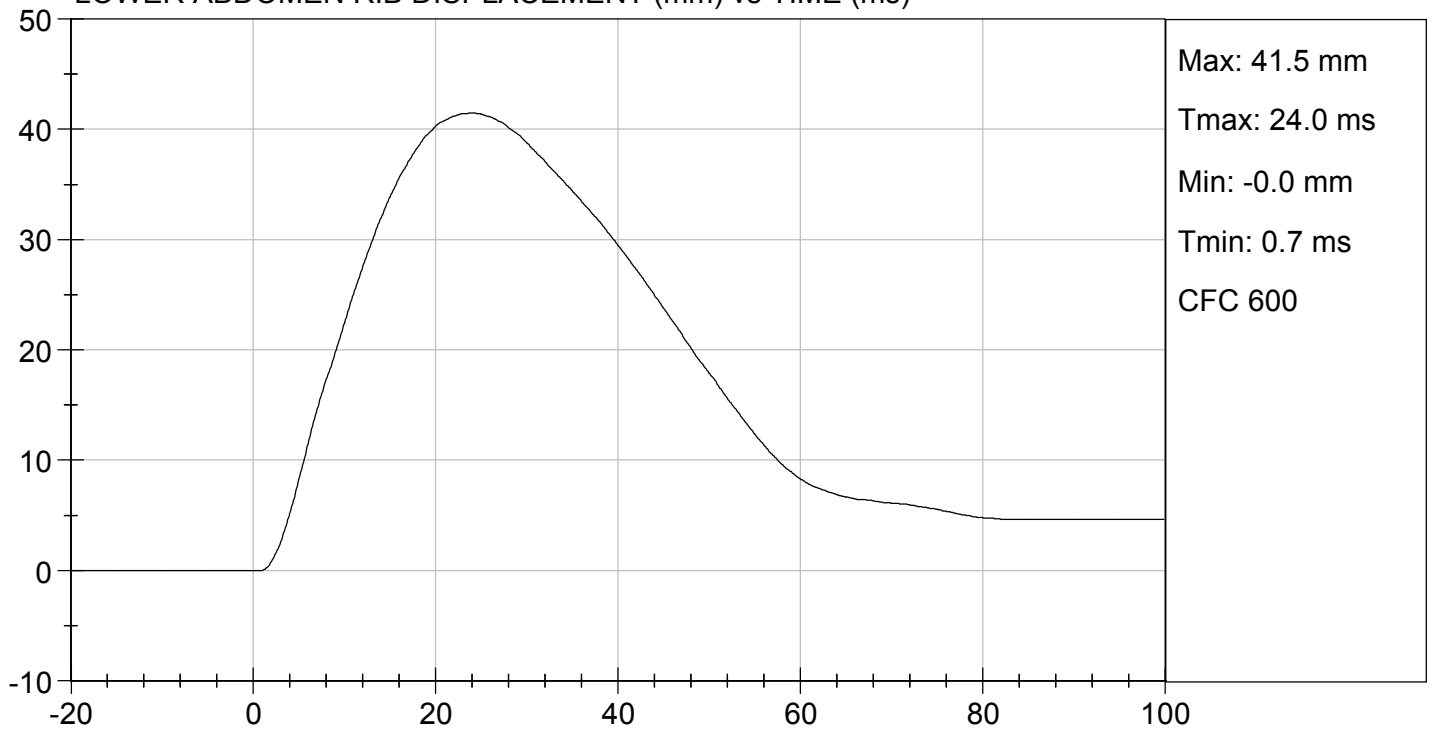
UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



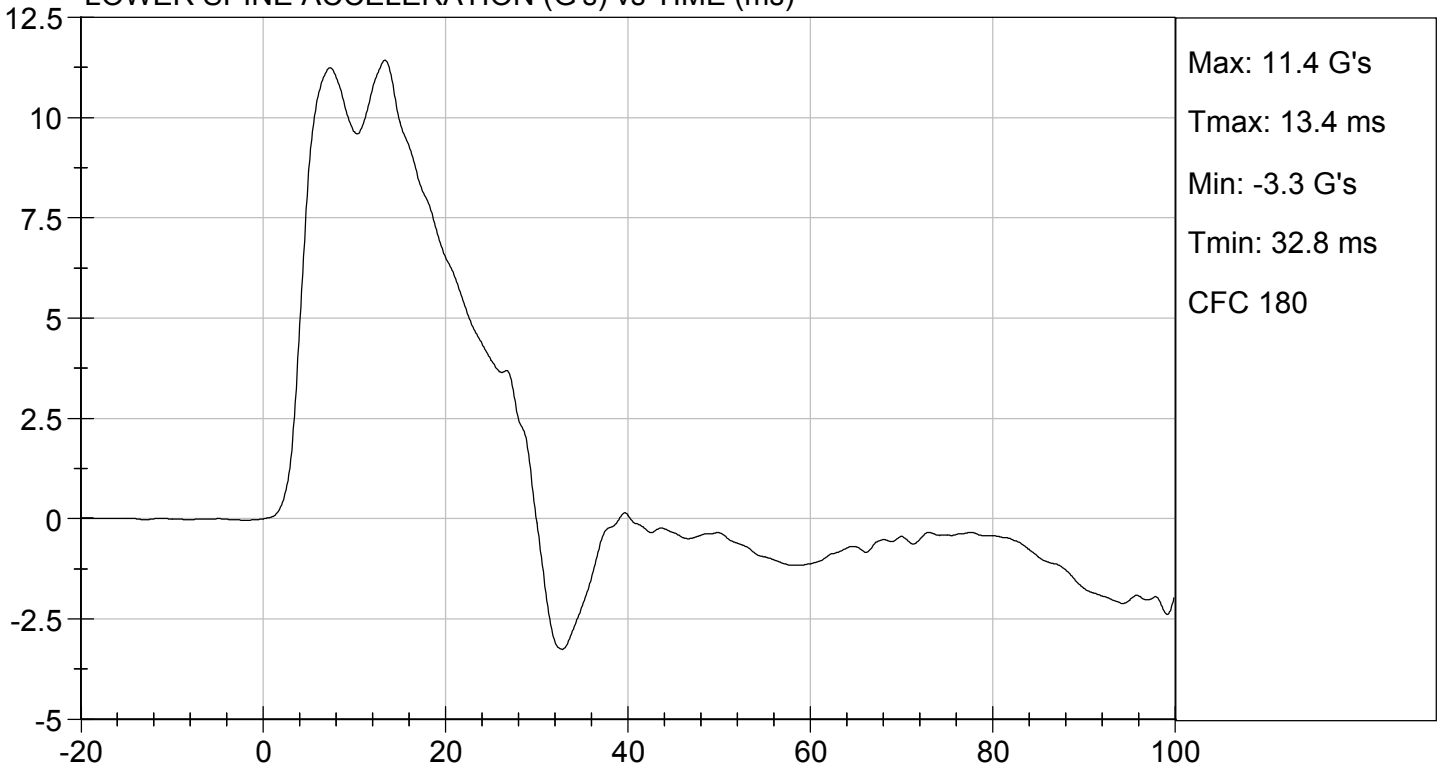
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/10/2020
TEST #: D201976

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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201977

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	52	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	3,852	Pass
		Overall Test Results		Pass

Laboratory Technician

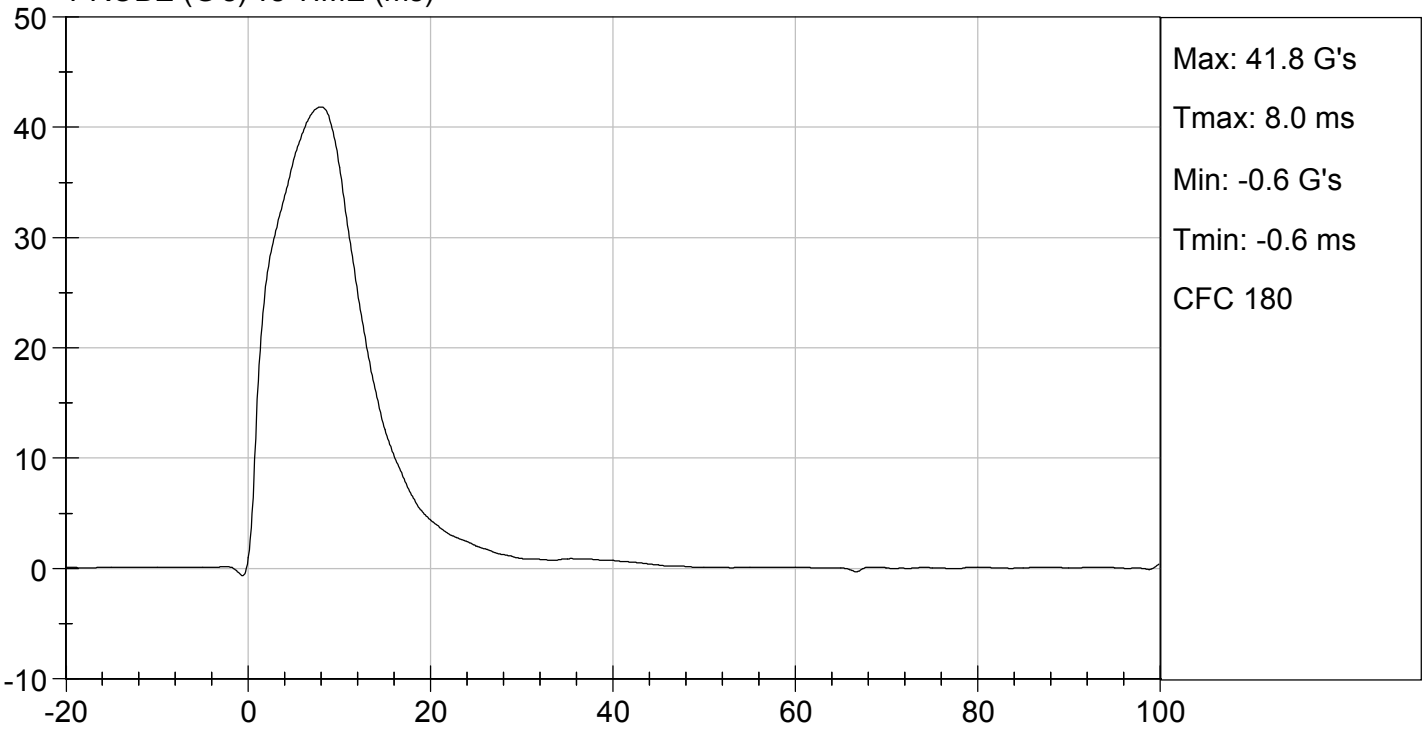
08/10/2020
Test Date

Approved By

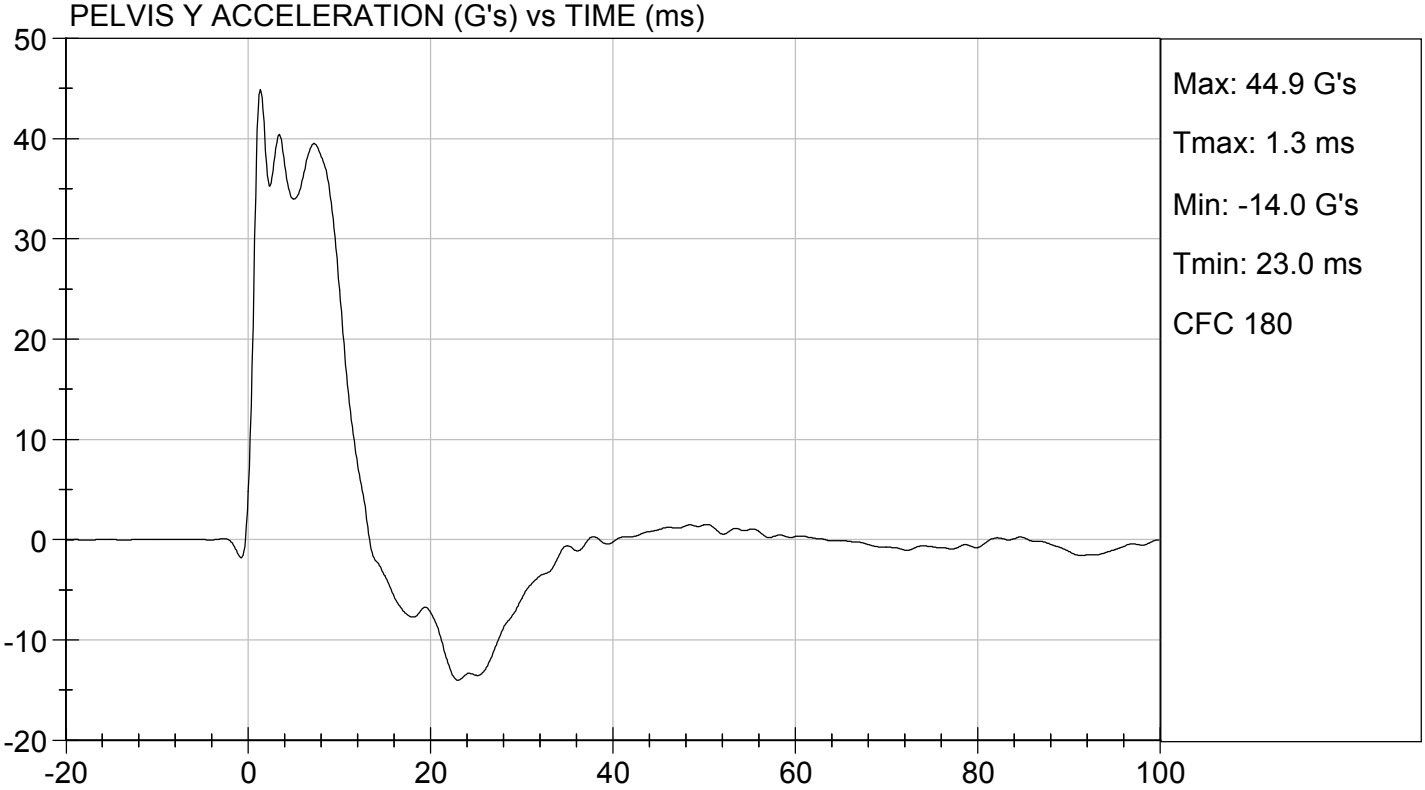
TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 08/10/2020
TEST #: D201977

PROBE (G's) vs TIME (ms)

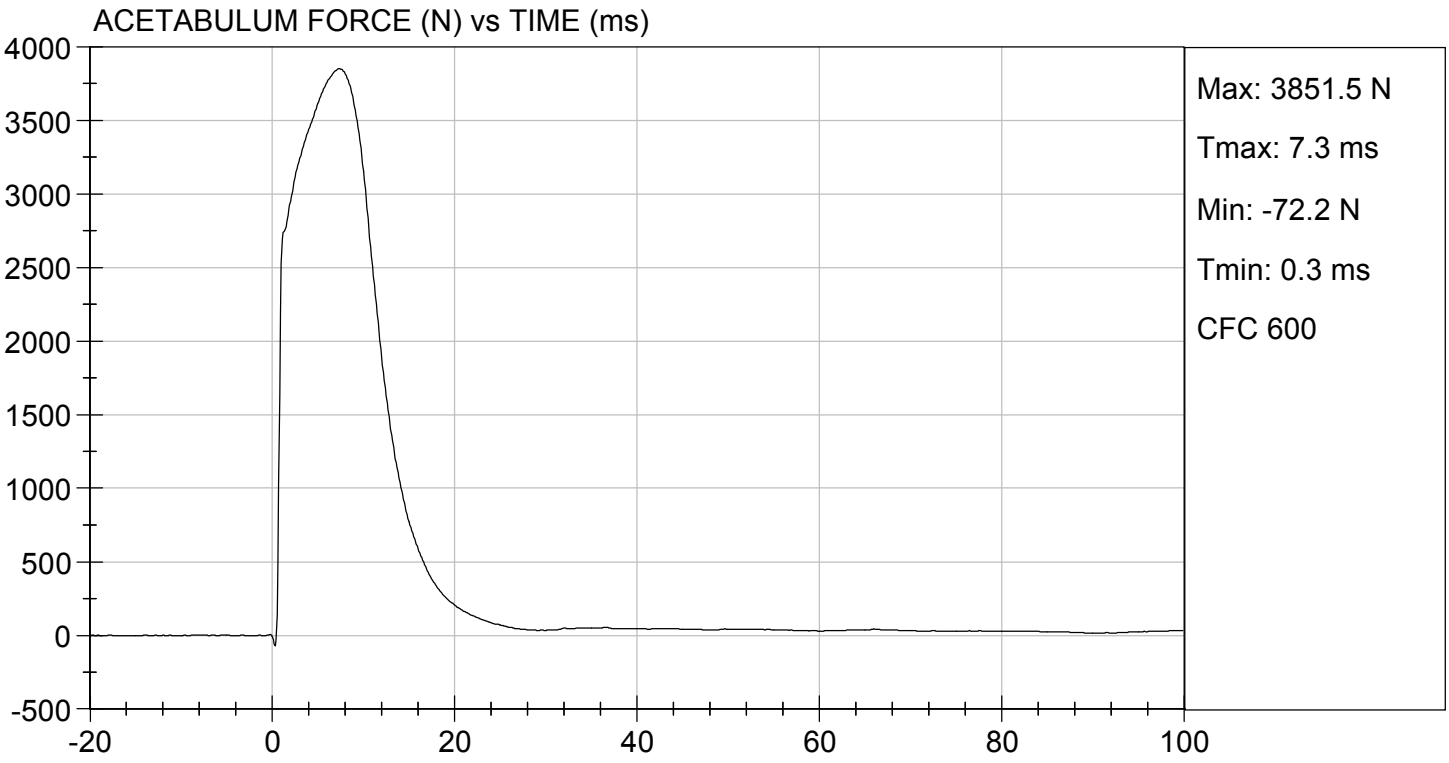


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 08/10/2020
TEST #: D201977



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306 **Test I.D:** D201978

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	50	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	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	4,598	Pass
		Overall Test Results		Pass

Laboratory Technician

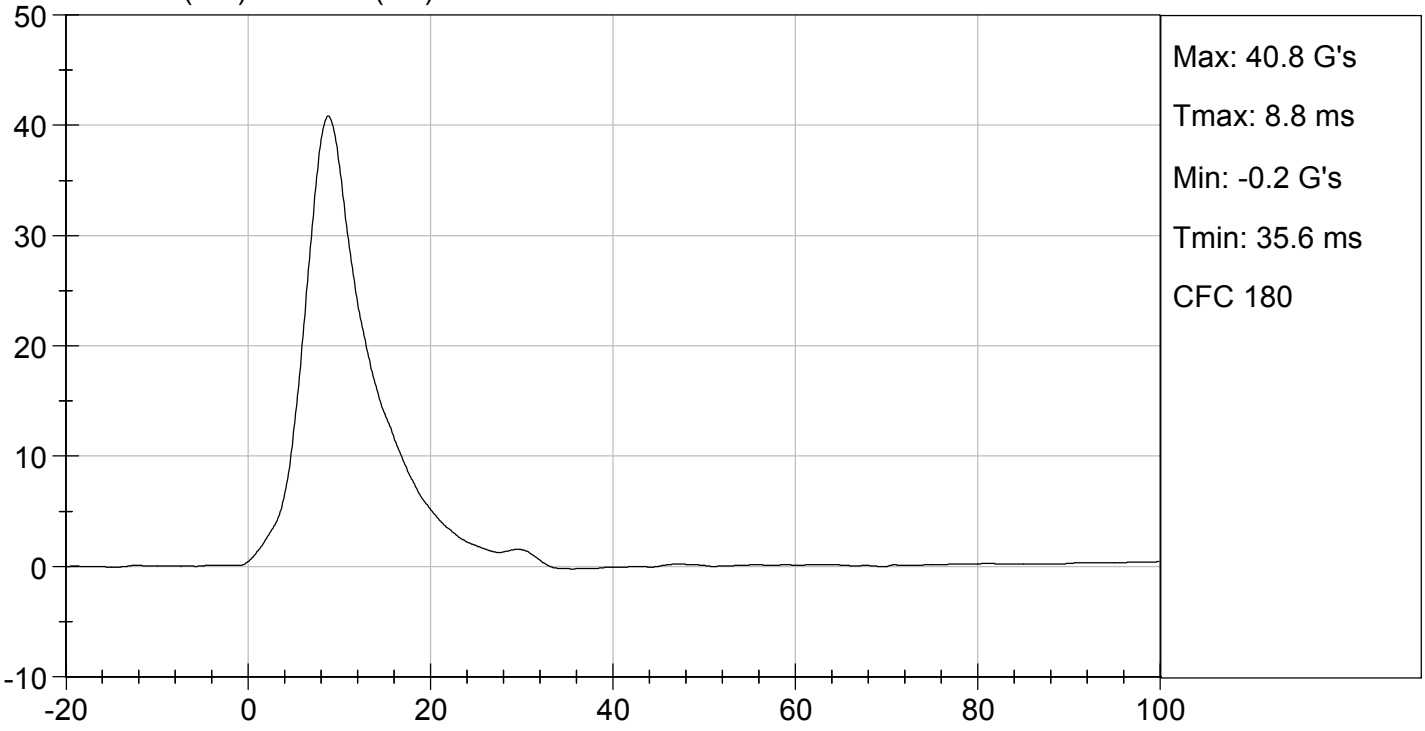
08/10/2020
Test Date

Approved By

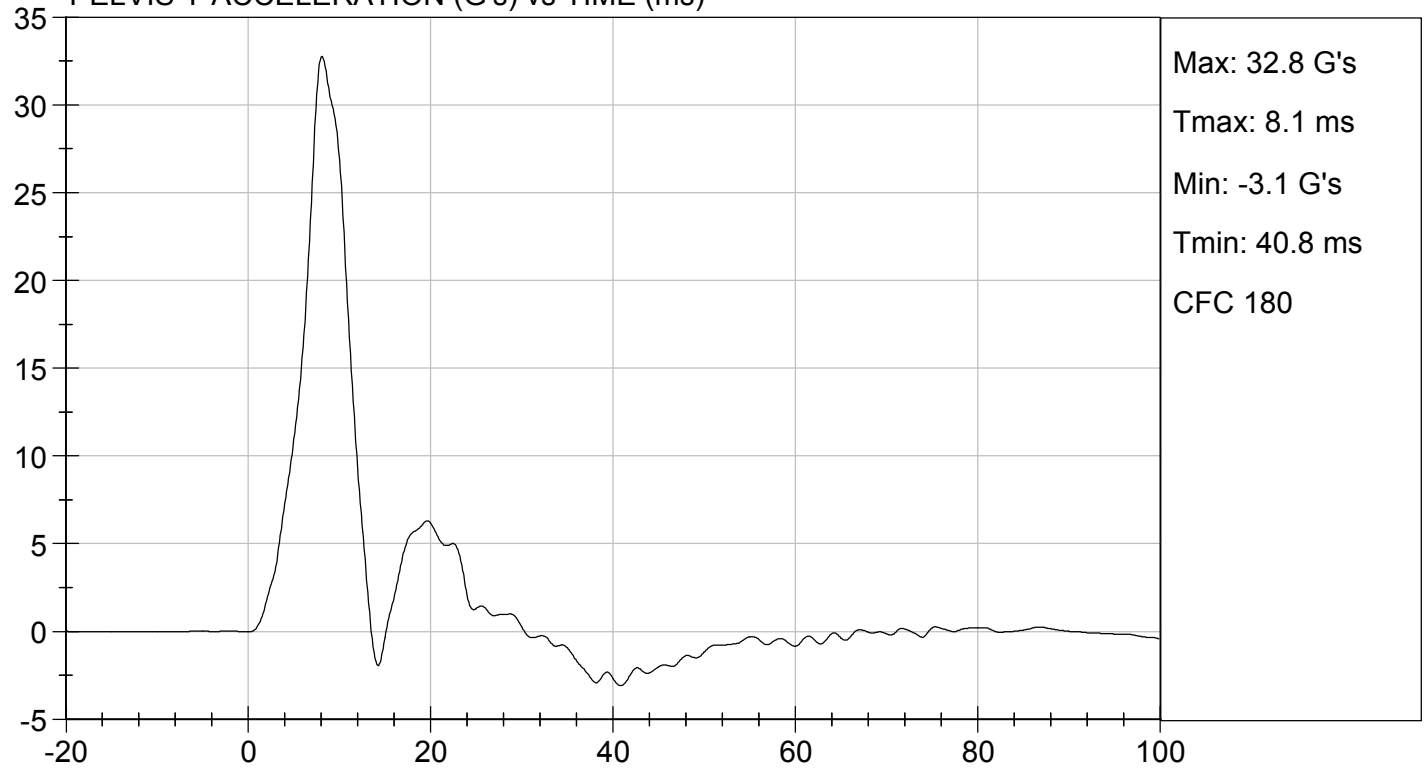
TEST DESC: ILLIAC
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 08/10/2020
TEST #: D201978

PROBE (G's) vs TIME (ms)

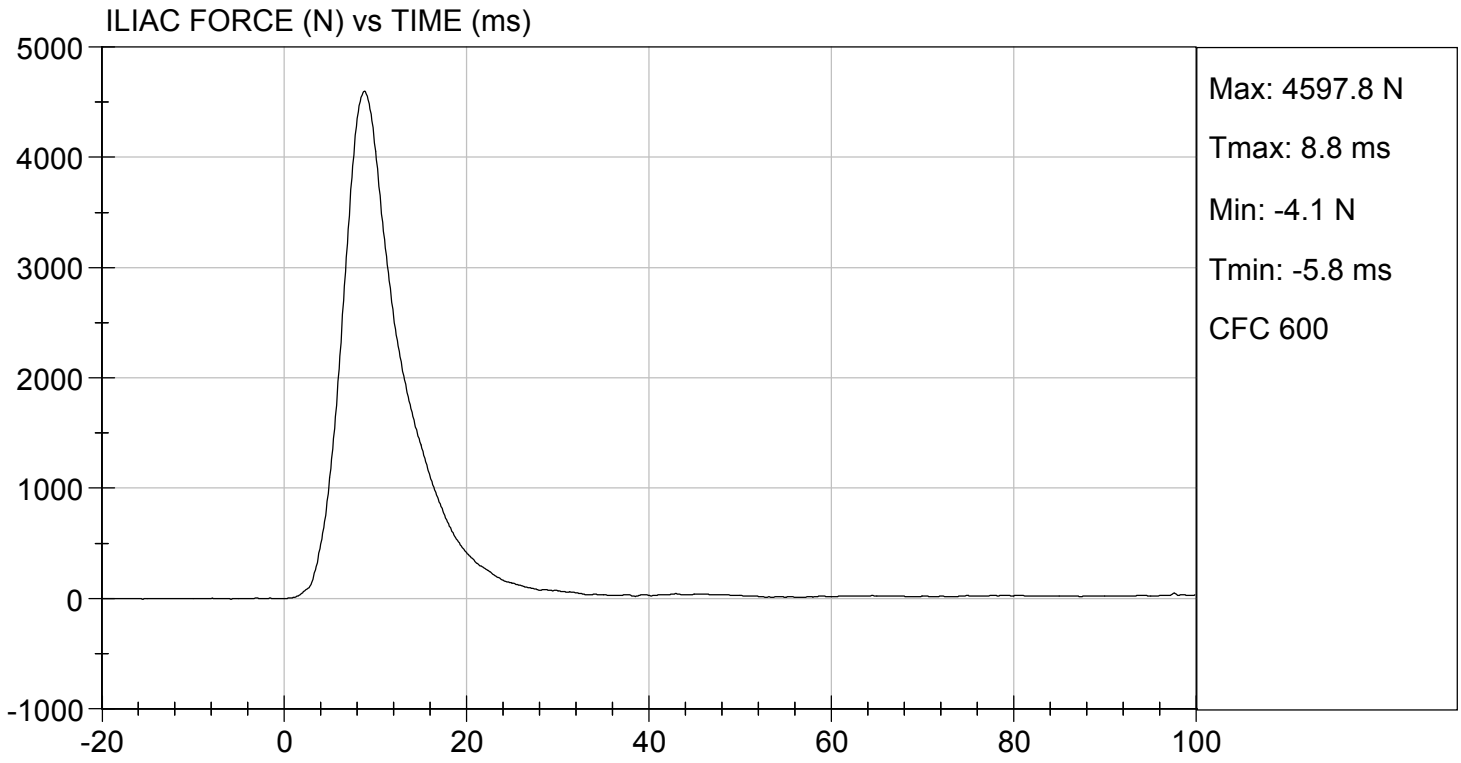


PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 08/10/2020
TEST #: D201978



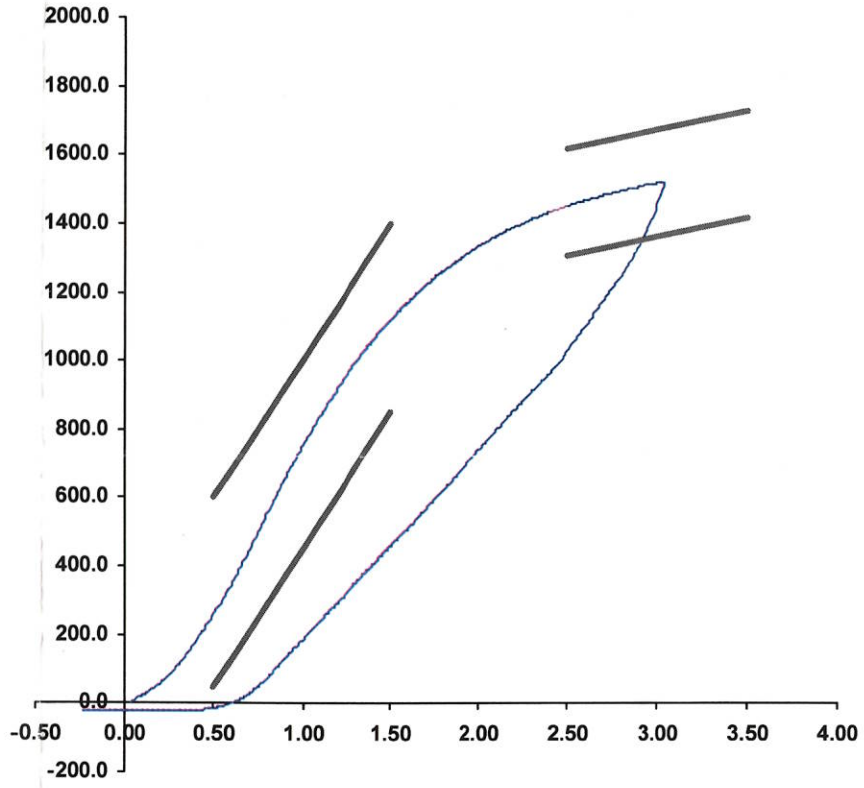
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13528
Test Number 11172
Report Number 11210
Test Date 9/23/2019 10:44:44 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	266.29	50.00	600.00
Force @ 1.5 mm (N)	1,124.20	850.00	1,400.00
Force @ 2.5 mm (N)	1,455.30	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,520.04	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 23-Sep-19
SACO Research

By : DC Date : 9/23/2019

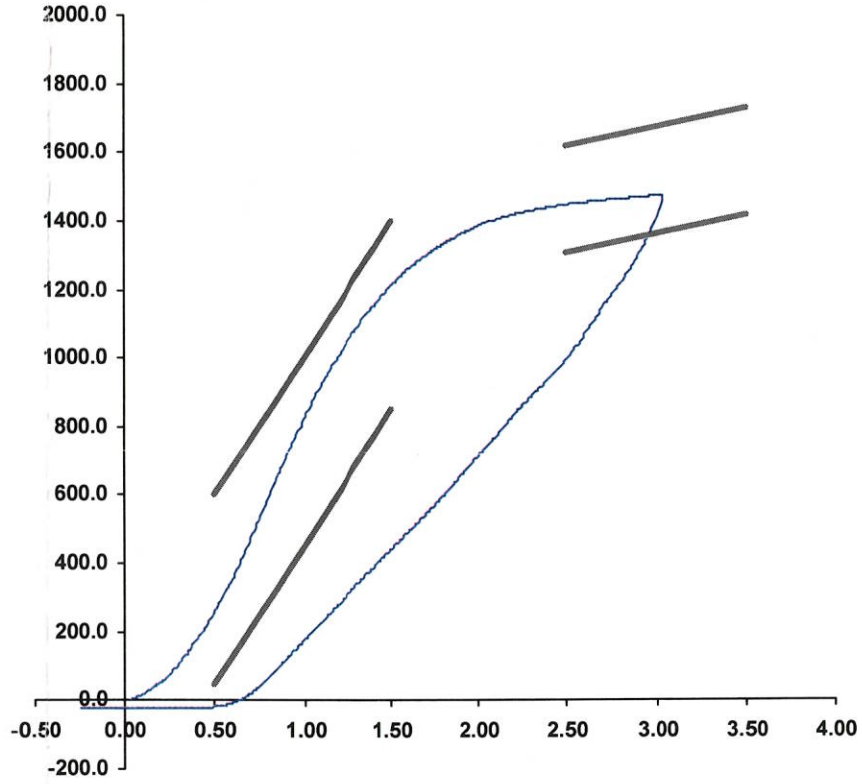
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

SID-IIs Pelvis Plug Certification Test

Plug S/N 13369
Test Number 11011
Report Number 11049
Test Date 9/19/2019 10:55:06 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	269.81	50.00	600.00
Force @ 1.5 mm (N)	1,214.13	850.00	1,400.00
Force @ 2.5 mm (N)	1,448.88	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,473.18	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

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation

				SID-IIs S/N 306		
				Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers			X	P79721	Endevco	06/29/2020
			Y	P79724	Endevco	06/29/2020
			Z	P79445	Endevco	06/29/2020
			Xr	P84999	Endevco	06/29/2020
			Yr	P85000	Endevco	06/29/2020
			Zr	P85001	Endevco	06/29/2020
Head Angular Rate Sensors			X	ARS15231	DTS	11/08/2019
			Y	ARS15213	DTS	11/08/2019
			Z	ARS15229	DTS	11/08/2019
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	06/30/2020
		Middle	Y	G1261	FTSS	06/30/2020
		Lower	Y	G1270	FTSS	06/30/2020
	Abdominal Rib	Upper	Y	G032	FTSS	06/30/2020
		Lower	Y	G1304	FTSS	06/30/2020
Lower Spine Accelerometers (T12)			X	P96332	Endevco	06/29/2020
			Y	P96335	Endevco	06/29/2020
			Z	P96341	Endevco	06/29/2020
Acetabulum Load Cell			Y	ACG4285	FTSS	11/27/2019
Iliac Wing Load Cell			Y	IWG3023	FTSS	11/27/2019
Pelvis Plug (struck side)				13528	SACO	09/23/2019
Pelvis Plug (non-struck side)				13369	SACO	09/19/2019

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	PCB1403	PCB	07/17/2020
Vehicle Center of Gravity	Y	PCB1423	PCB	07/20/2020
Vehicle Center of Gravity	Z	PCB1394	PCB	07/17/2020
Left Floor Sill	Y	PCB1125	PCB	02/28/2020
A-Pillar Sill	Y	T22584	Endevco	02/20/2020
A-Pillar Low	Y	T20041	Endevco	06/18/2020
A-Pillar Mid	Y	T20361	Endevco	06/18/2020
B-Pillar Sill	Y	A305694	MSI	06/02/2020
B-Pillar Low	Y	T22876	Endevco	03/19/2020
B-Pillar Mid	Y	T22779	Endevco	03/20/2020
Driver Seat	Y	A305719	MSI	06/02/2020
Engine Top	X	T19031	Endevco	02/27/2020
Engine Top	Y	T19012	Endevco	02/27/2020
Firewall	Y	T21472	Endevco	06/18/2020
Right Roof	Y	PCB1282	PCB	07/01/2020
Right Floor Sill	Y	T20733	Endevco	06/18/2020
Rear Floorpan	X	PCB1137	PCB	06/17/2020
Rear Floorpan	Y	PCB1146	PCB	06/17/2020

Table 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DG6277	FTSS	07/30/2018
Load Cell 2	DG6278	FTSS	07/30/2018
Load Cell 3	DG6279	FTSS	07/30/2018
Load Cell 4	DG6280	FTSS	07/30/2018
Load Cell 5	DG6281	FTSS	07/30/2018
Load Cell 6	DG6283	FTSS	07/30/2018
Load Cell 7	DG6284	FTSS	07/30/2018
Load Cell 8	DG6582	FTSS	07/30/2018