

REPORT NUMBER: SPNCAP-MGA-19-061

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test**

**AUDI AG
2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
NHTSA No.: O20195807**

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



Test Date: January 30, 2020

Final Report Date: April 29, 2020

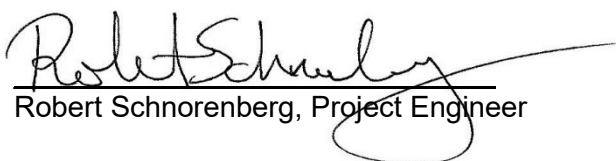
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

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Approval Date: April 29, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

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

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

TECHNICAL REPORT DOCUMENTATION PAGE

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4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan NHTSA No.: O20195807		5. Report Date April 29, 2020																											
		6. Performing Organization Code MGA																											
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		14. Sponsoring Agency Code NRM-110																											
15. Supplementary Notes																													
16. Abstract A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on January 30, 2020. The impact velocity was 32.46 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.4°C. The test vehicle post-test maximum crush was 319 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Measurement Description</th> <th rowspan="2" style="text-align: center;">Units</th> <th colspan="2" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td style="text-align: center;">1000</td> <td style="text-align: center;">395</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">g</td> <td style="text-align: center;">82</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">2285</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38*</td> <td style="text-align: center;">24</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45*</td> <td style="text-align: center;">24</td> </tr> </tbody> </table> *Proposed IARV The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.				Measurement Description	Units	Driver ATD (SID-IIs)		Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	395	Resultant Lower Spine Acceleration	g	82	39	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2285	Maximum Thoracic Rib Deflection	mm	38*	24	Maximum Abdomen Rib Deflection	mm	45*	24
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590																											
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This side pole impact test is part of the MY 2019 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 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated April 2018.

SUMMARY

A rigid pole side impact test was conducted on a 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.46 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on January 30, 2020. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated April 2018. 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	395
Resultant Lower Spine Acceleration	g	82	39
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2285
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdomen Rib Deflection	mm	45*	24

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Struck Side Driver		Struck Side Left Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Side Airbag (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 B-Post @ Sill Y recorded questionable data.

Driver Seat Track Y recorded no valid data.

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: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20195807	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Audi	Automatic Door Locks (ADL)	Yes
Model	A6 45 TFSI S tronic quattro	Power Window Auto-Reverse	Yes
Body Style	4-Door Sedan	Other Optional Feature	No
VIN	WAUD8AF2XKN129455	Driver Front Airbag	Yes
Body Color	Florett Silver Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	121 km / 75 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0 L	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	7	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	Yes
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	AUDI AG	GVWR (kg)	5335
Date of Manufacture	06/19	GAWR Front (kg)	2657
Vehicle Type	Passenger Car	GAWR Rear (kg)	2800

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				500	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				160	(A-B)

VEHICLE SEAT TYPE

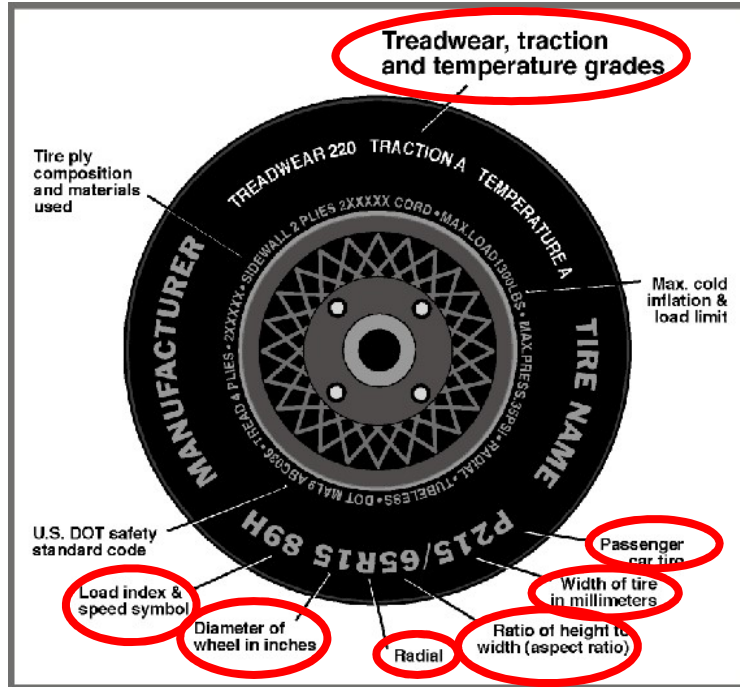
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row				X	X		
Third Row Seat							

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	240
Recommended Tire Size	245/45R19	245/45R19
Tire Size on Vehicle	245/45R19	245/45R19
Tire Manufacturer	Continental	Continental
Tire Model	ProContact	ProContact
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Rayon	1 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	102H	102H
Tire Material	Rubber	Rubber
DOT Safety Code Left	AFA2 WD4C 0819	AFA2 WD4C 0719
DOT Safety Code Right	AFA2 WD4C 0819	AFA2 WD4C 0719

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
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NHTSA No.: O20195807
 Test Date: 1/30/2020

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	195	195	220	215
Tire Placard	kPa	220	220	240	240
Owner's Manual	kPa	220	220	240	240
As Tested	kPa	220	220	240	240

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	489.5	402.5		500.0	508.5		495.0	515.5	
Right	kg	501.0	431.0		494.0	526.5		491.5	534.0	
Ratio	%	54.3%	45.7%		49.0%	51.0%		48.5%	51.5%	
Totals	kg	990.5	833.5	1824.0	994.0	1035.0	2029.0	986.5	1049.5	2036.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1824.0	(A)
Actual Weight of 1 P572 ATD (SID-IIs) Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	160	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2036.0	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement
Driver Door Sill Angle (front-to-back)*	deg	-0.2	1.0	1.1	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	0.0	0.4	0.8	Yes
Front Bumper Angle (left-to-right)**	deg	0.4	0.1	0.0	Yes
Rear Bumper Angle (left-to-right)**	deg	0.0	0.5	0.5	Yes
Vehicle CG (Aft of Front Axle)	mm	1339	1495	1510	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	-18	-5	-6	

* 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	137
Components Removed: none	kg	

Test height adjustable suspension setting, if applicable:	Not Applicable
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DATA SHEET NO. 2
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020

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	29.5	18.5	24.0
Front Passenger Seat	27.6	17.3	22.5
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 SCRIP Height (mm)	SCRIP Height Position	SCRIP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	24.0	34	Max	68	68	68
			Mid	34	34	34
			Min	0	0	0
Front Passenger Seat	22.5	35	Max	70	70	70
			Mid	35	35	35
			Min	0	0	0
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

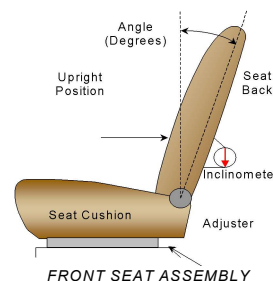
NHTSA No.: O20195807
 Test Date: 1/30/2020

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	246		0	
Front Passenger Seat	246		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. All rear passenger seat backs are positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	67.2		14.4	
Front Passenger Seat	66.1		14.4	
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 seatback center.

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

	Total # of Positions	Placed in Position #
Driver Seat	4	1 (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	5	0 (Lowest as 0) / Forward

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

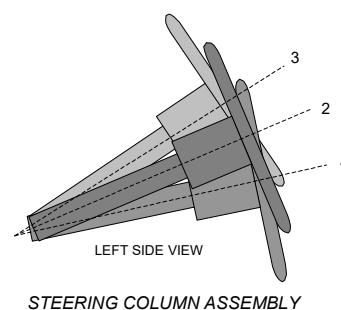
Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
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NHTSA No.: O20195807
 Test Date: 1/30/2020

STEERING COLUMN ADJUSTMENT

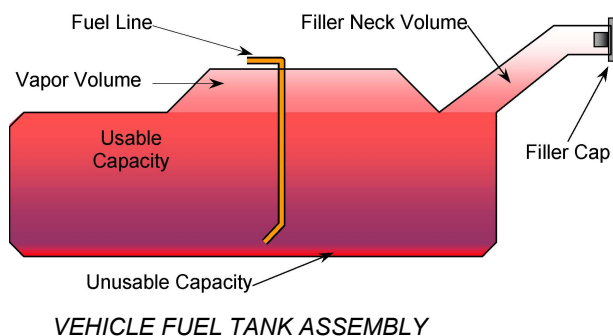
Steering wheel and column adjustments are made so that the steering wheel geometric locus is described when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	71.2	
Geometric Center, Position 2	68.8	
Uppermost, Position 3	66.3	
Telescoping Steering Wheel Travel		57
Test Position	68.8	29



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump will run when the engine is running. The pump will also briefly run when the ignition key is turned to the "on" position. The filler neck is located on the passenger's side



FUEL TANK CAPACITY DATA

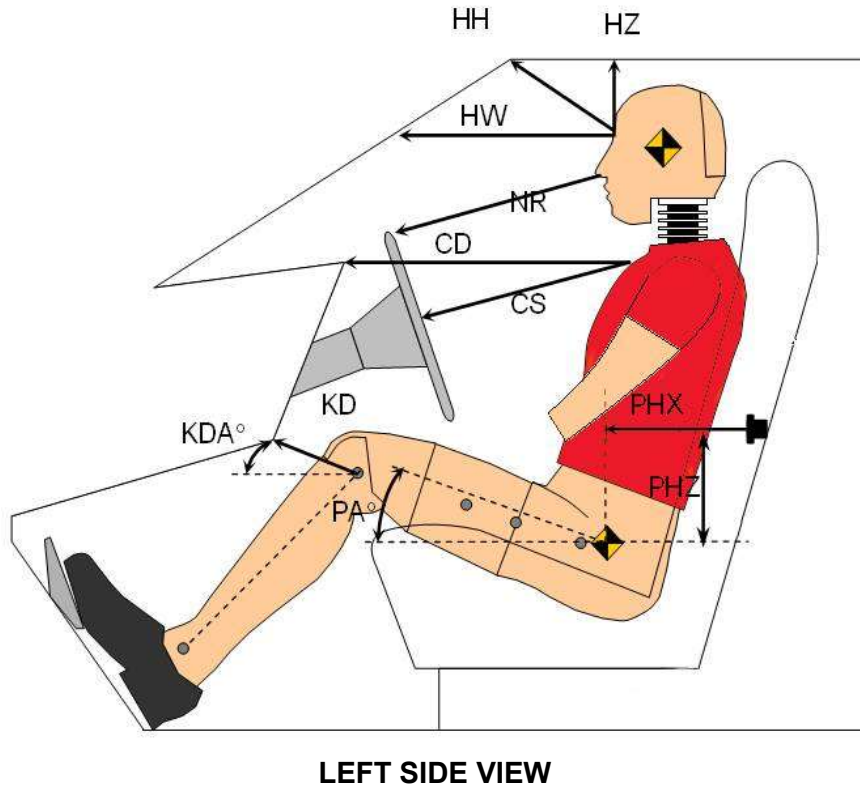
	Liters
Usable Capacity of Standard Tank (see Form No. 1)	73.1
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	73.1
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	67.9
Actual Amount of Solvent Used	68.1
1/3 of Usable Capacity	24.4

Is the actual amount of solvent used in the test equal to 93% $\pm$ 1%
 of the Usable Capacity stated in Form No. 1? **YES**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
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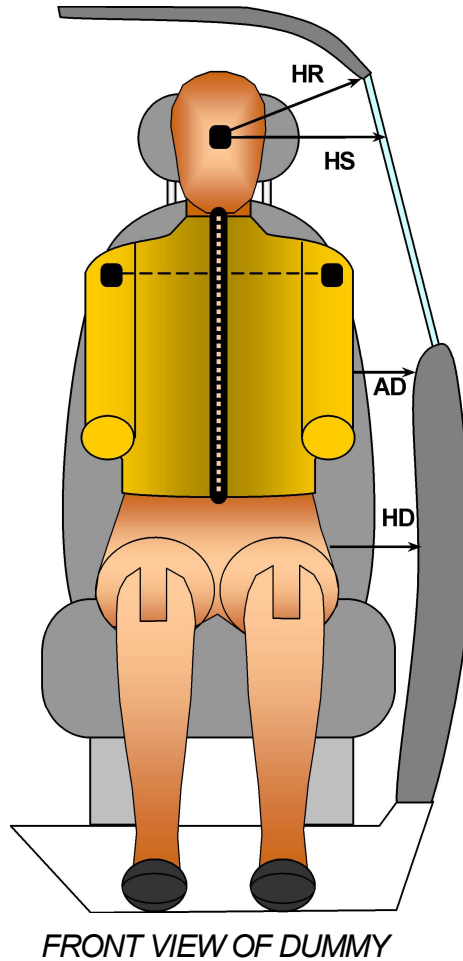


Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	275	
HW	Head to Windshield	596	
HZ	Head to Roof Liner	187	
NR	Nose to Rim/Seat Back	251	
CD	Chest to Dashboard/Seat Back	420	
CS	Chest to Steering Wheel	202	
KDL / KDAL	Left Knee to Dash/Seat Back	175	26.1
KDR / KDAL	Right Knee to Dash/Seat Back	165	30.0
PAX	Pelvic Tilt Angle X		22.0
PAY	Pelvic Tilt Angle Y		-0.2
PHX	Hip Point to Striker (X-Axis)	299	
PHZ	Hip Point to Striker (Z-Axis)	186	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020

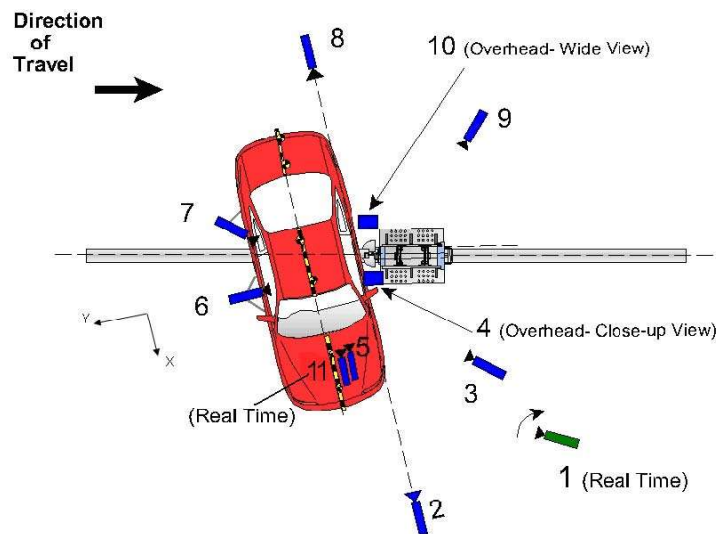


Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	234
HS	Head to Side Window	373
AD	Arm to Door	183
HD	Hip Point to Door	171

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020



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	6350	20	-1775	25	1000
3	Impact Side 45° Forward	4155	-1500	-1880	20	1000
4	Overhead Closeup	0	0	-6670	70	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8.5	1000
7	Onboard – Driver Rear				8.5	1000
8	Rear Ground Level	-6790	-120	-1790	25	1000
9	Impact Side 45° Rearward	-2805	-3075	-1870	20	1000
10	Overhead Wide View	-100	800	-6650	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

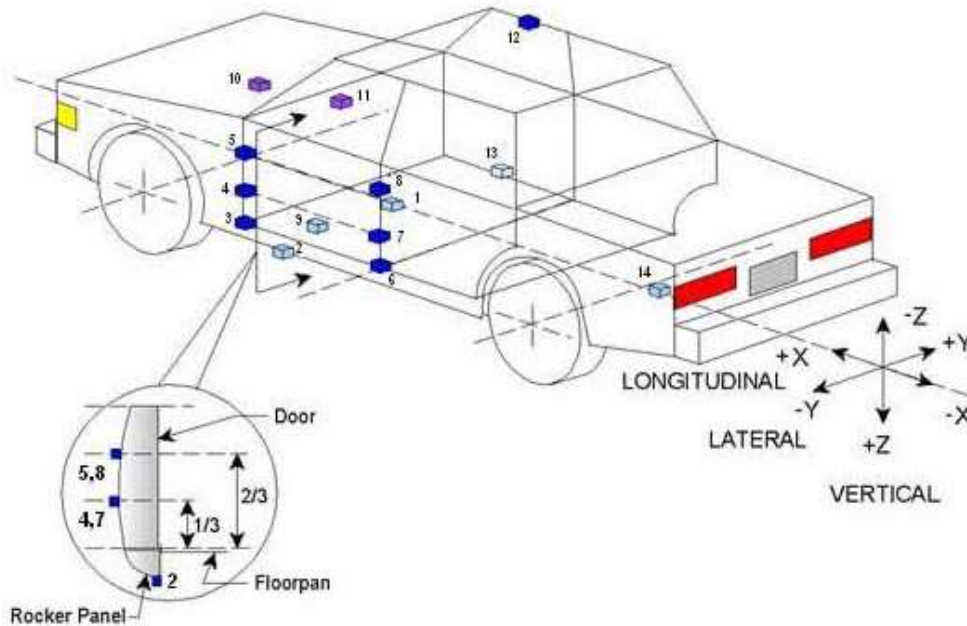
INSTRUMENTATION

	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: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020



TEST VEHICLE ACCELEROMETER LOCATIONS

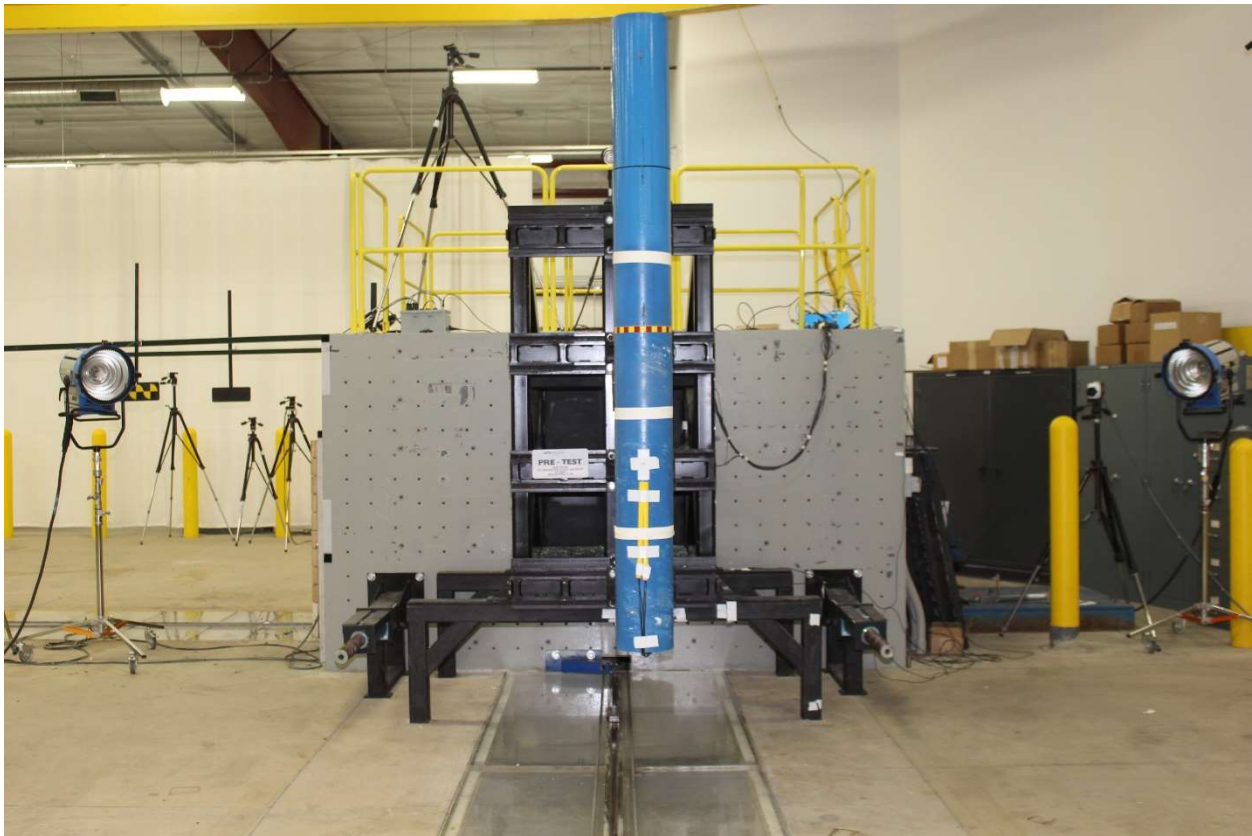
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2484	370	-170
2	Left Floor Sill	3118	-793	-195
3	A Pillar Sill	3536	-793	-204
4	A Pillar Low	3380	-850	-530
5	A Pillar Mid	3385	-850	-755
6	B Pillar Sill	2309	-793	-186
7	B Pillar Low	2405	-750	-430
8	B Pillar Mid	2400	-780	-700
9	Driver Seat Track	2518	-415	-200
10	Engine Top	4285	35	-822
11	Firewall	3878	24	-889
12	Right Roof	2319	557	-1427
13	Right Floor Sill	3118	793	-195
14	Rear Floorpan	865	0	-520

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: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020



254 mm Diameter Rigid Pole

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

**DATA SHEET NO. 8
POST-TEST OBSERVATIONS**

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

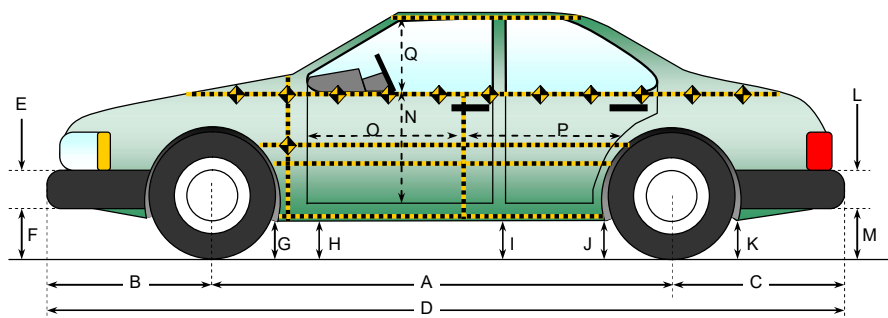
SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1263
Actual Impact Point (Aft of Front Axle)	mm		1264
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-1
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	75.0
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.46
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.48

DATA SHEET NO. 9 TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020



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

LEFT SIDE VIEW

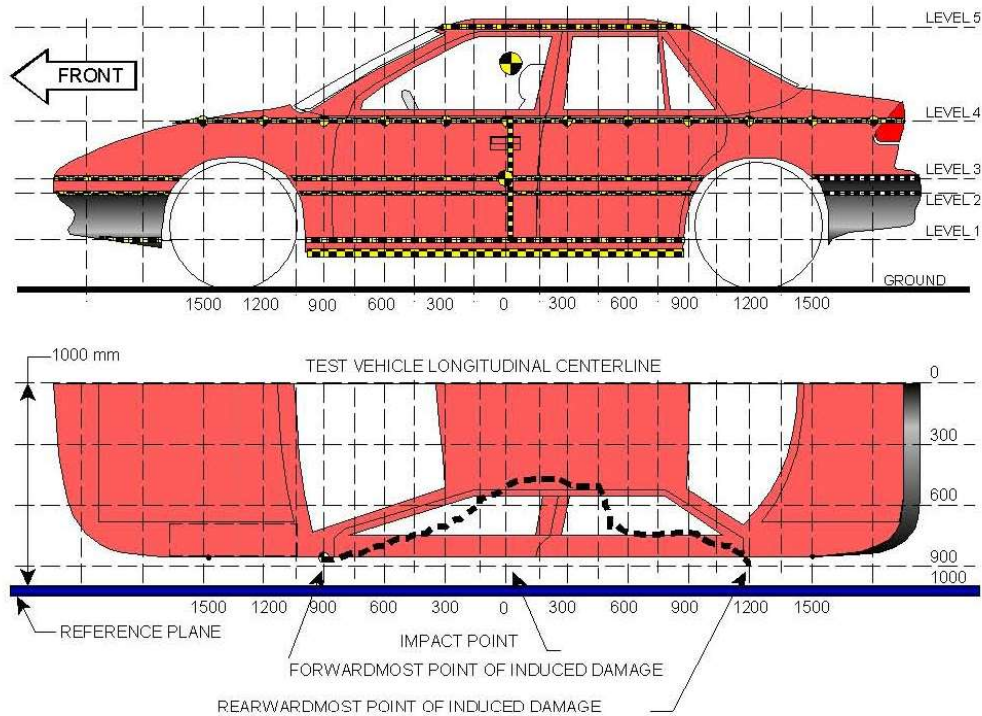
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2930	2861	69
B	Front Axle to FSOV	915	908	7
C	Rear Axle to RSOV	1065	1120	-55
D	Total Vehicle Length at Centerline	4910	4889	21
E	Front Bumper Thickness	110	110	0
F	Front Bumper Bottom to Ground	96	200	-104
G	Sill Height at Front Wheel Well	180	187	-7
H	Sill Height at Front Door Leading Edge	184	183	1
I	Sill Height at B-Pillar	166	176	-10
J1	Sill Height at Rear Wheel Well	159	168	-9
J2	Pinch Weld Height at Rear Wheel Well	168	182	-14
K	Sill Height Aft of Rear Wheel Well	206	212	-6
L	Rear Bumper Thickness	150	150	0
M	Rear Bumper Bottom to Ground	264	265	-1
N	Sill Height to Bottom of Front Window Sill	740	749	-9
O	Front Door Leading Edge to Impact CL	705	623	82
P	Rear Door Trailing Edge to Impact CL	1311	1232	79
Q	Front Window Opening	380	342	38
R	Right Side Length	3955	3961	-6
S	Left Side Length	3955	3905	50
T	Vehicle Width at B-Pillars	1875	1754	121
U	Front Wheel Track Width	2930	2861	69
V	Rear Wheel Track Width	915	908	7

DATA SHEET NO. 10 TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
Test Date: 1/30/2020



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 MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	345	281	0
2	Occupant H-Point	546	306	75
3	Mid Door	631	319	75
4	Window Sill	954	247	75
5	Window Top	1395	59	75

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020

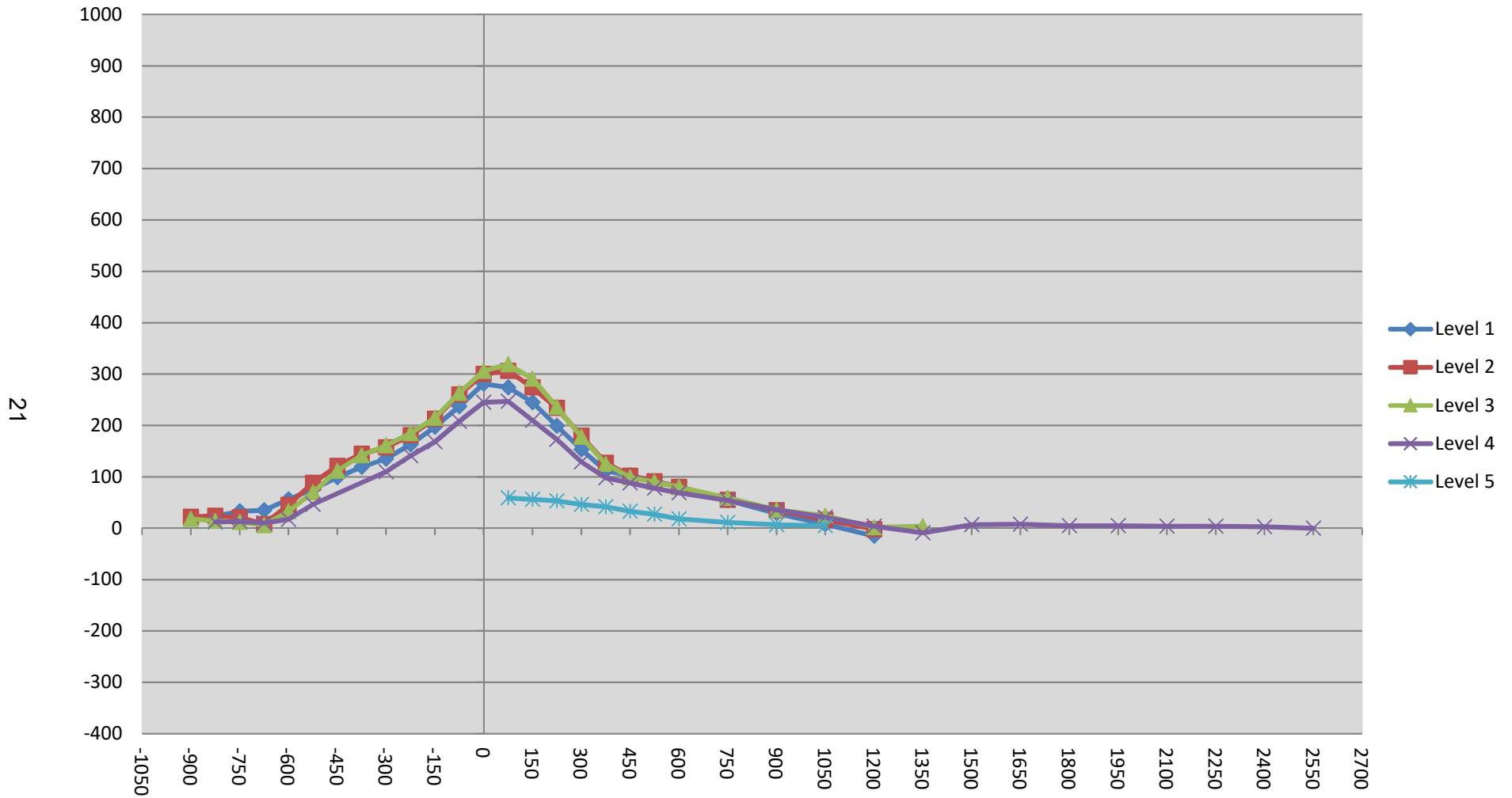
Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

	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															
-1050															
-900		160	161				182	179				22	18		
-825	174	163	163	286		197	187	177	298		23	24	14	12	
-750	178	164	163	277		211	185	175	290		33	21	12	13	
-675	183	166	165	275		218	174	171	285		35	8	6	10	
-600	188	168	167	266		244	213	200	283		56	45	33	17	
-525	192	170	168	264		268	258	238	310		76	88	70	46	
-450	192	172	170			291	293	282			99	121	112		
-375	193	173	172			312	318	314			119	145	142		
-300	192	175	172	262		327	332	333	372		135	157	161	110	
-225	190	175	172	257		353	356	357	398		163	181	185	141	
-150	189	174	171	256		386	387	386	424		197	213	215	168	
-75	188	173	171	255		425	433	434	463		237	260	263	208	
0	187	173	170	253		468	473	476	498		281	300	306	245	
75	187	173	170	250	518	461	479	489	497	577	274	306	319	247	59
150	187	172	169	249	507	432	446	460	459	563	245	274	291	210	56
225	187	172	169	247	503	386	406	405	420	556	199	234	236	173	53
300	186	173	170	246	500	339	353	348	375	546	153	180	178	129	46
375	185	173	170	245	499	297	300	295	343	541	112	127	125	98	42
450	185	175	171	243	499	288	277	270	331	532	103	102	99	88	33
525	187	176	172	244	500	278	267	262	322	527	91	91	90	78	27
600	187	177	173	245	502	268	257	253	314	520	81	80	80	69	18
675															
750	188	180	176	247	505	242	235	235	301	516	54	55	59	54	11
825															
900	189	179	177	249	513	218	214	213	285	520	29	35	36	36	7
1050	188	173	172	247	527	196	189	196	268	532	8	16	24	21	5
1200	182	167	167	242		167	165	169	246		-15	-2	2	4	
1350			163	236				167	227				4	-9	
1500				236					243					7	
1650				238					246					8	
1800				248					253					5	
1950				265					270					5	
2100				290					294					4	
2250				324					328					4	
2400				365					368					3	
2550				443					443					0	
2700															

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
Test Program: NCAP Side Pole Impact Test

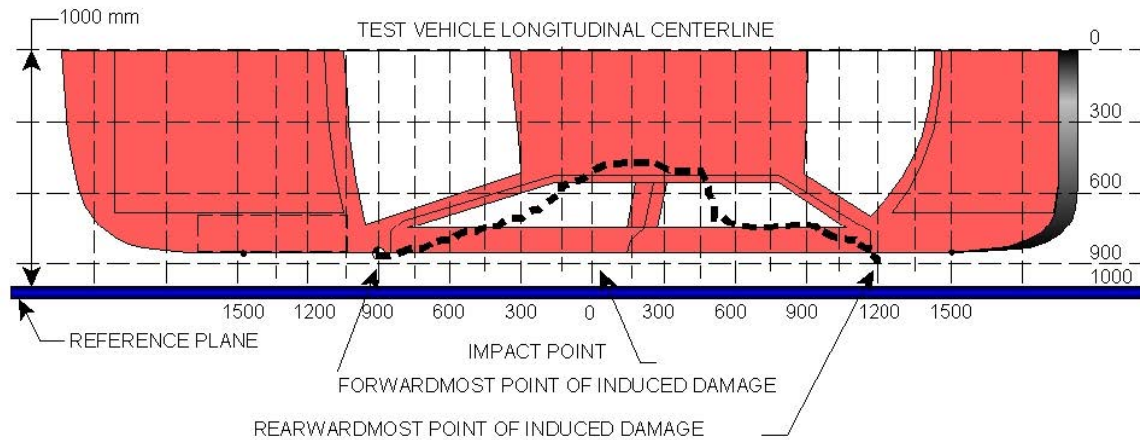
NHTSA No.: O20195807
Test Date: 1/30/2020



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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	400	3	170	277	107
2	180	3	169	436	267
3	-40	3	171	457	286
4	-260	3	172	345	173
5	-480	3	169	265	96
6	-700	3	164	159	-5

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

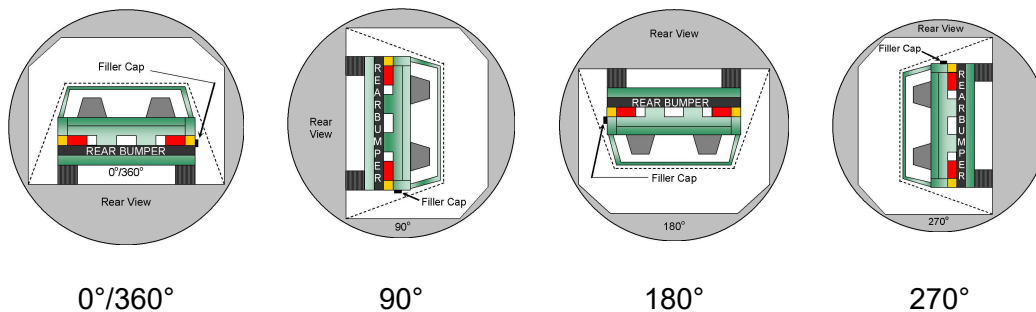
NHTSA No.: O20195807
 Test Date: 1/30/2020

Test Time: 11:01 am

Temperature: 21.4°C

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None
 D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	111	300	411
180° to 270°	107	300	407
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

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

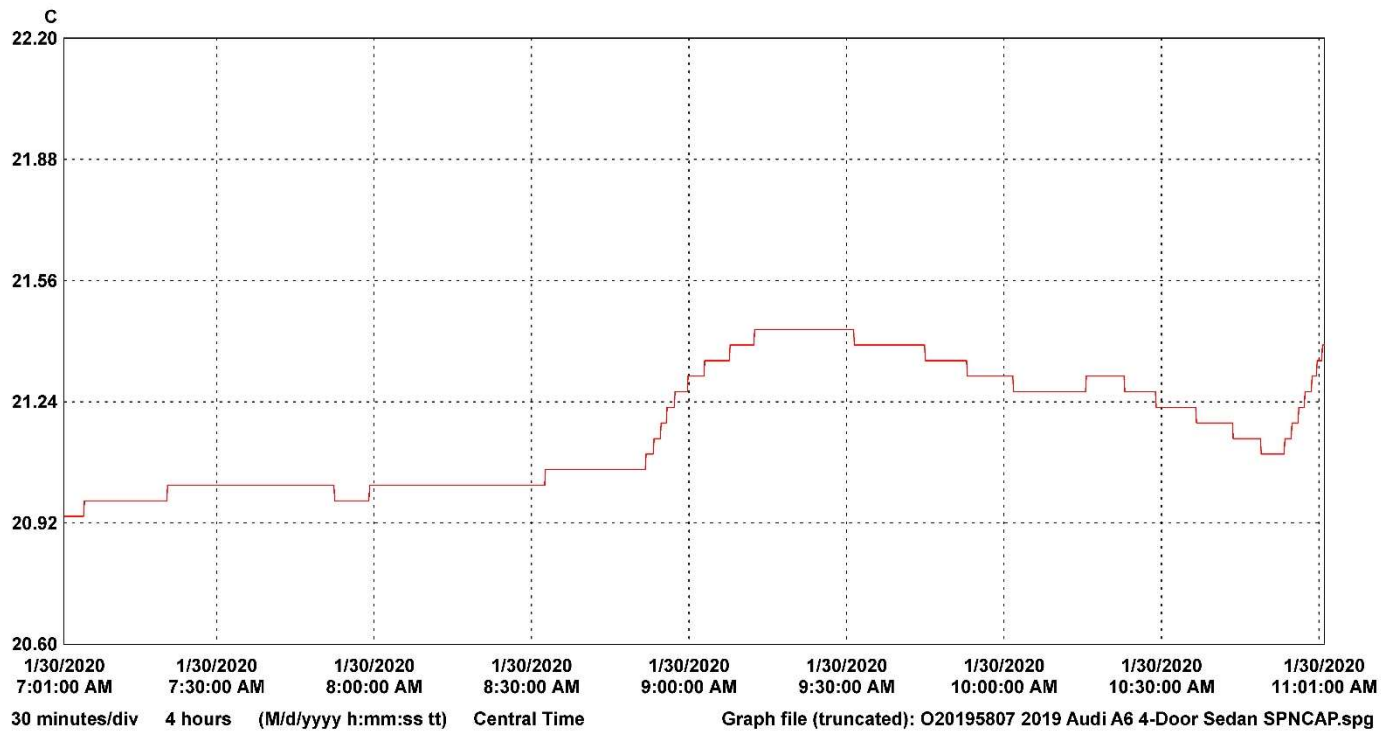
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2019 Audi A6 45 TFSI S tronic quattro 4-Door Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: O20195807
 Test Date: 1/30/2020



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	18352041	VSC_South_Hall	1		21.43	21.17	20.94	C	Temperature	18352041_VSC_South_Hall.spl

APPENDIX A
PHOTOGRAPHS

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



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

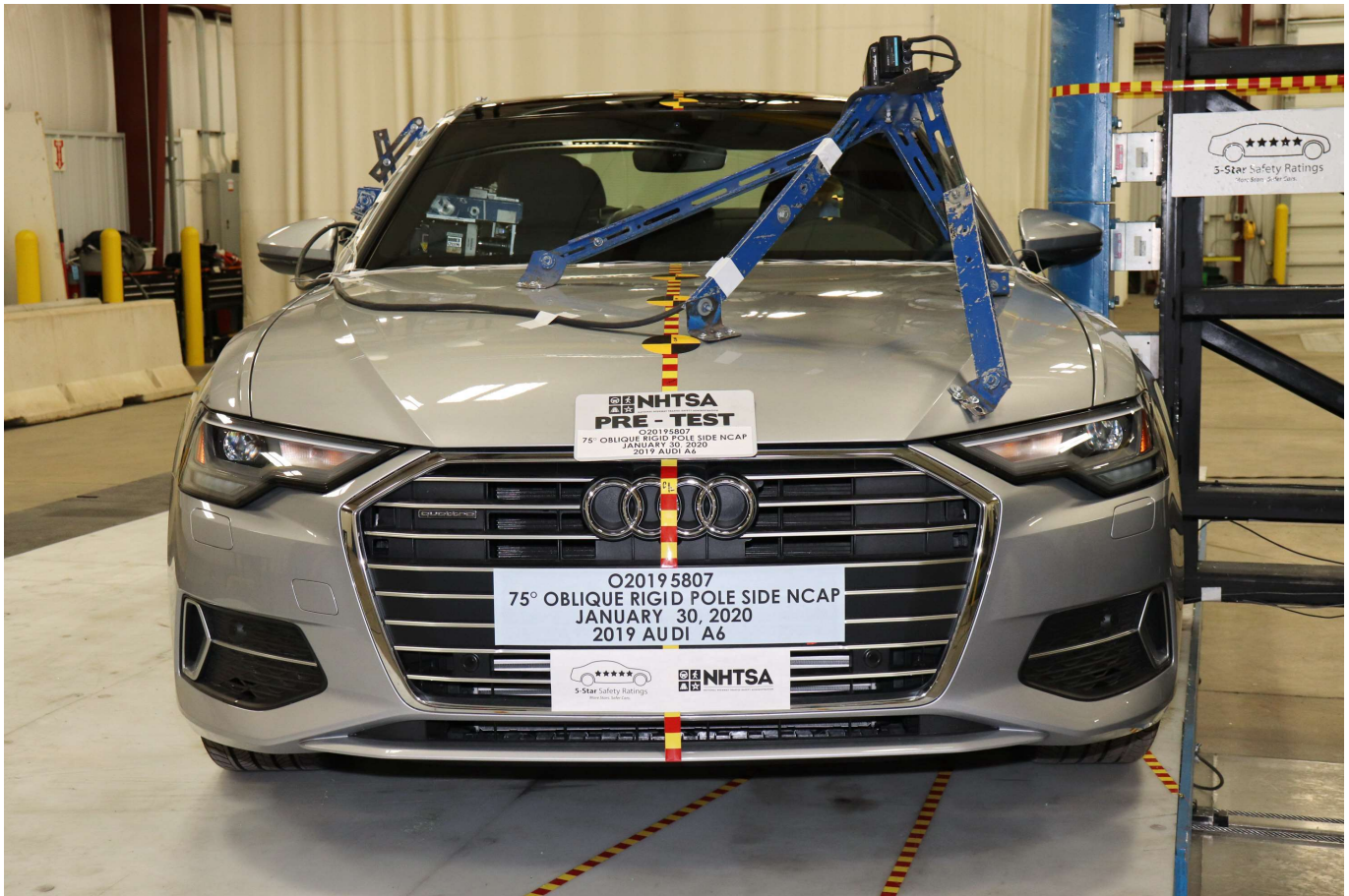


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

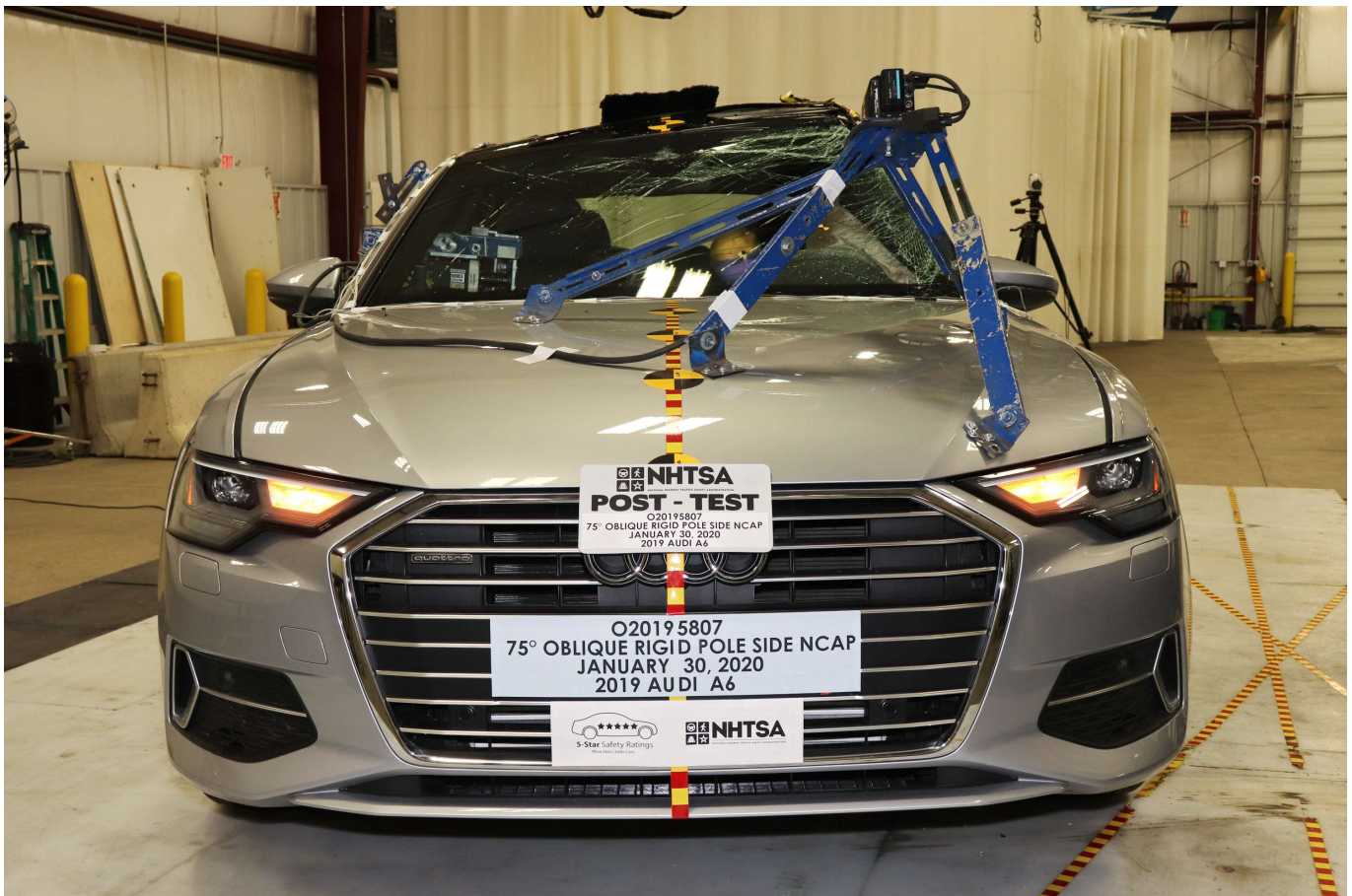


Photo No. 004 - Post-Test Frontal View of Test Vehicle



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



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

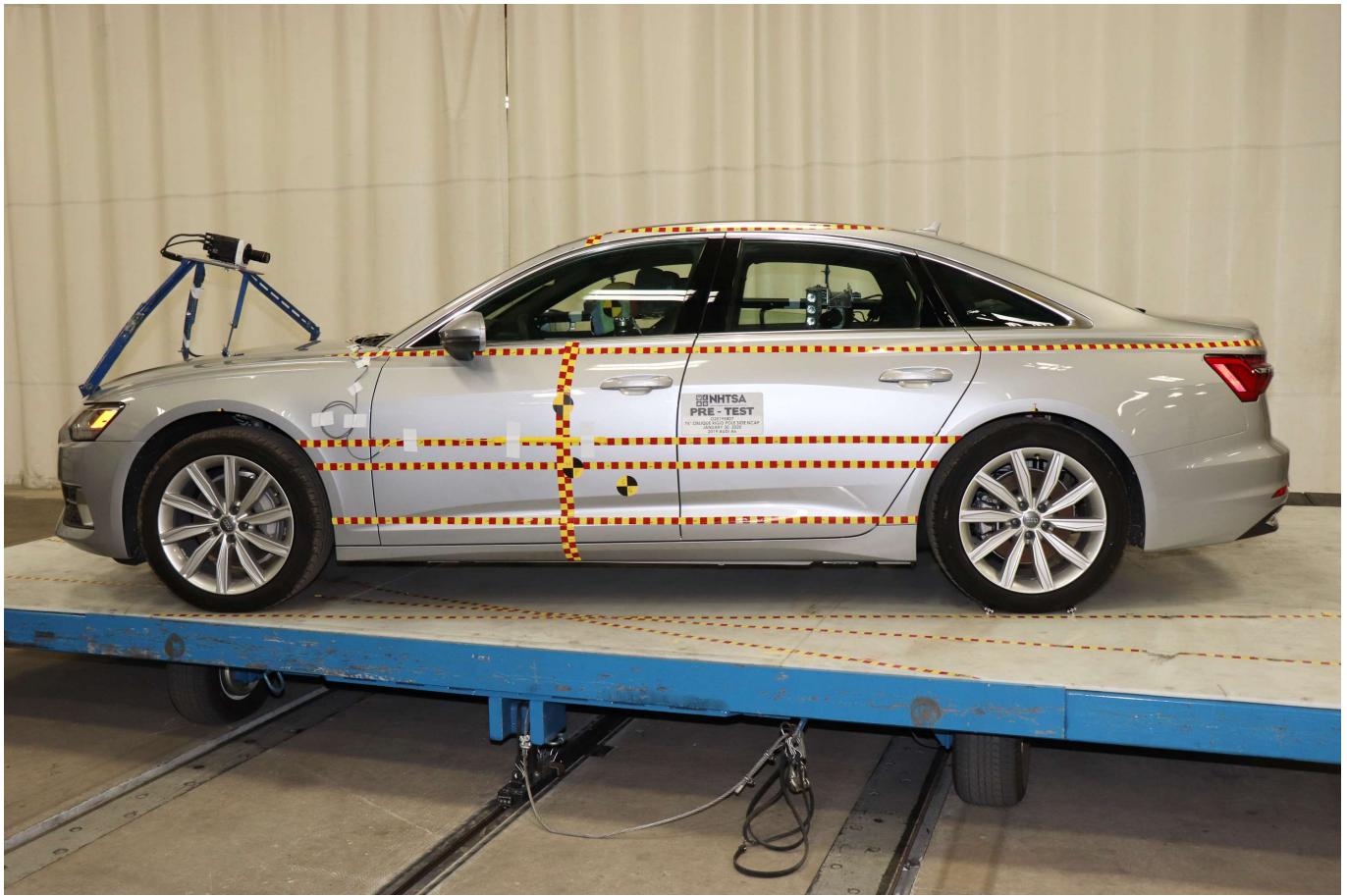


Photo No. 007 - Pre-Test Left Side View of Test Vehicle

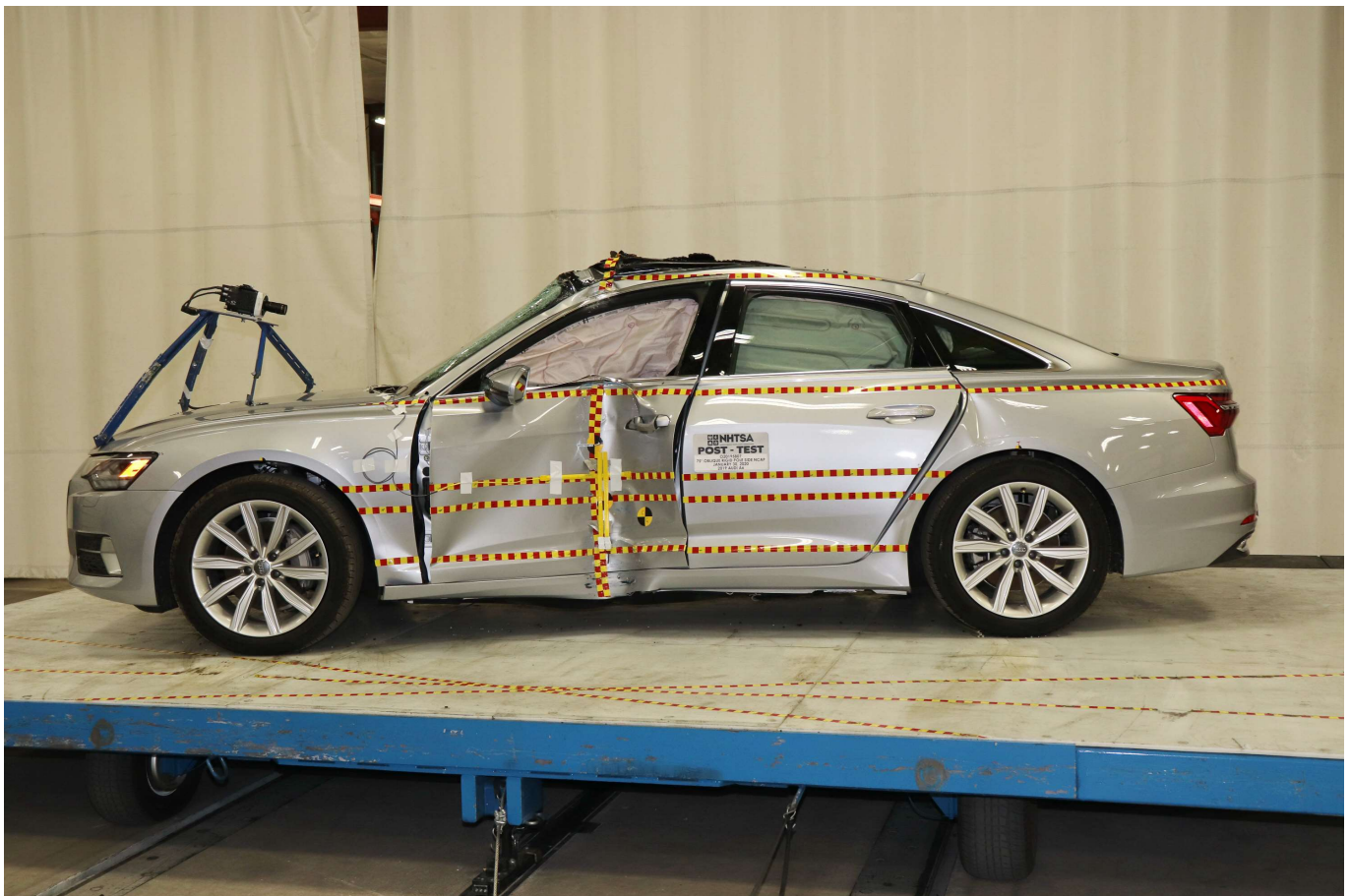


Photo No. 008 - Post-Test Left Side View of Test Vehicle



Photo No. 009 - Pre-Test Left 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

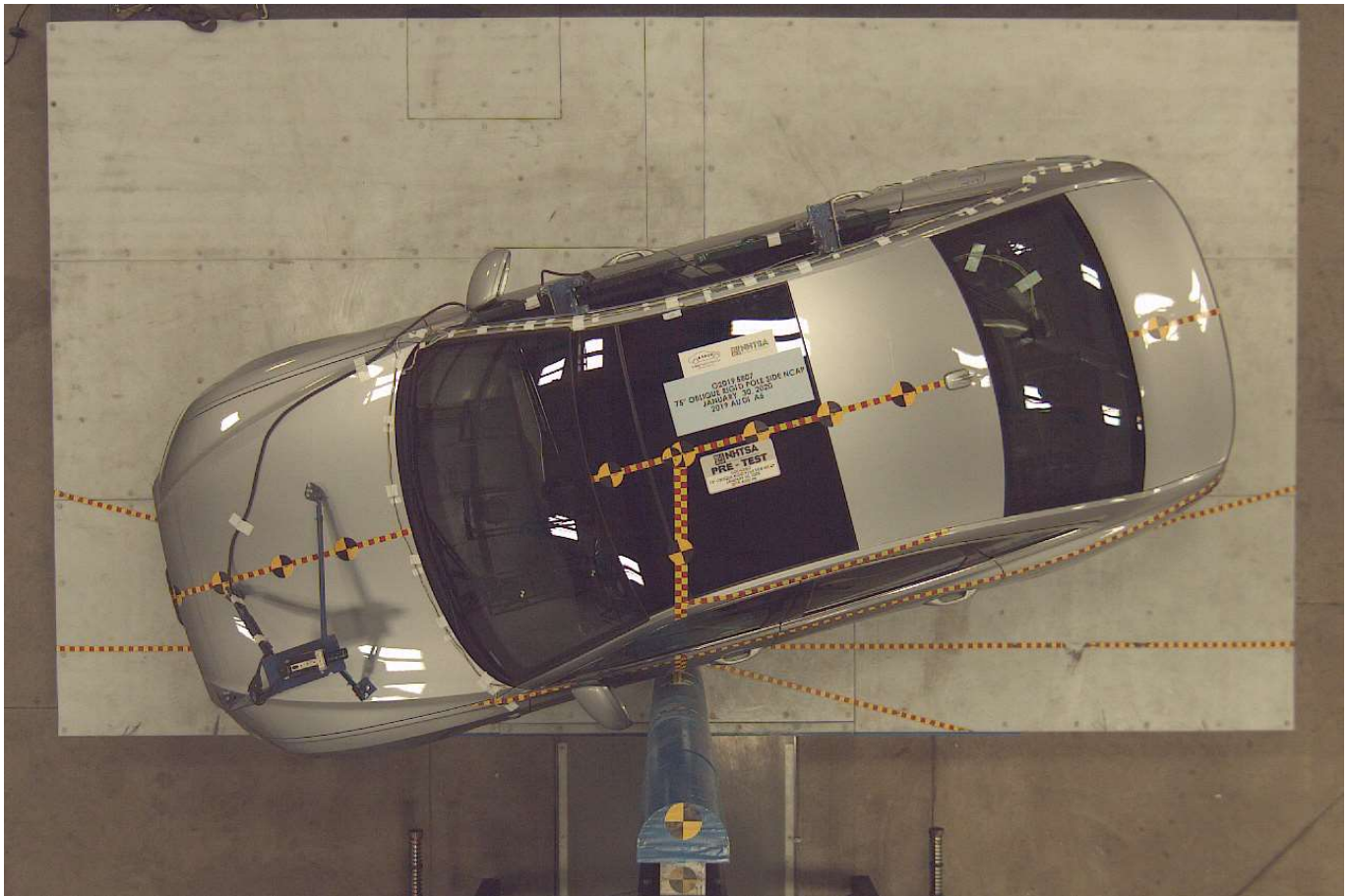


Photo No. 015 - Pre-Test Overhead View of Test Area

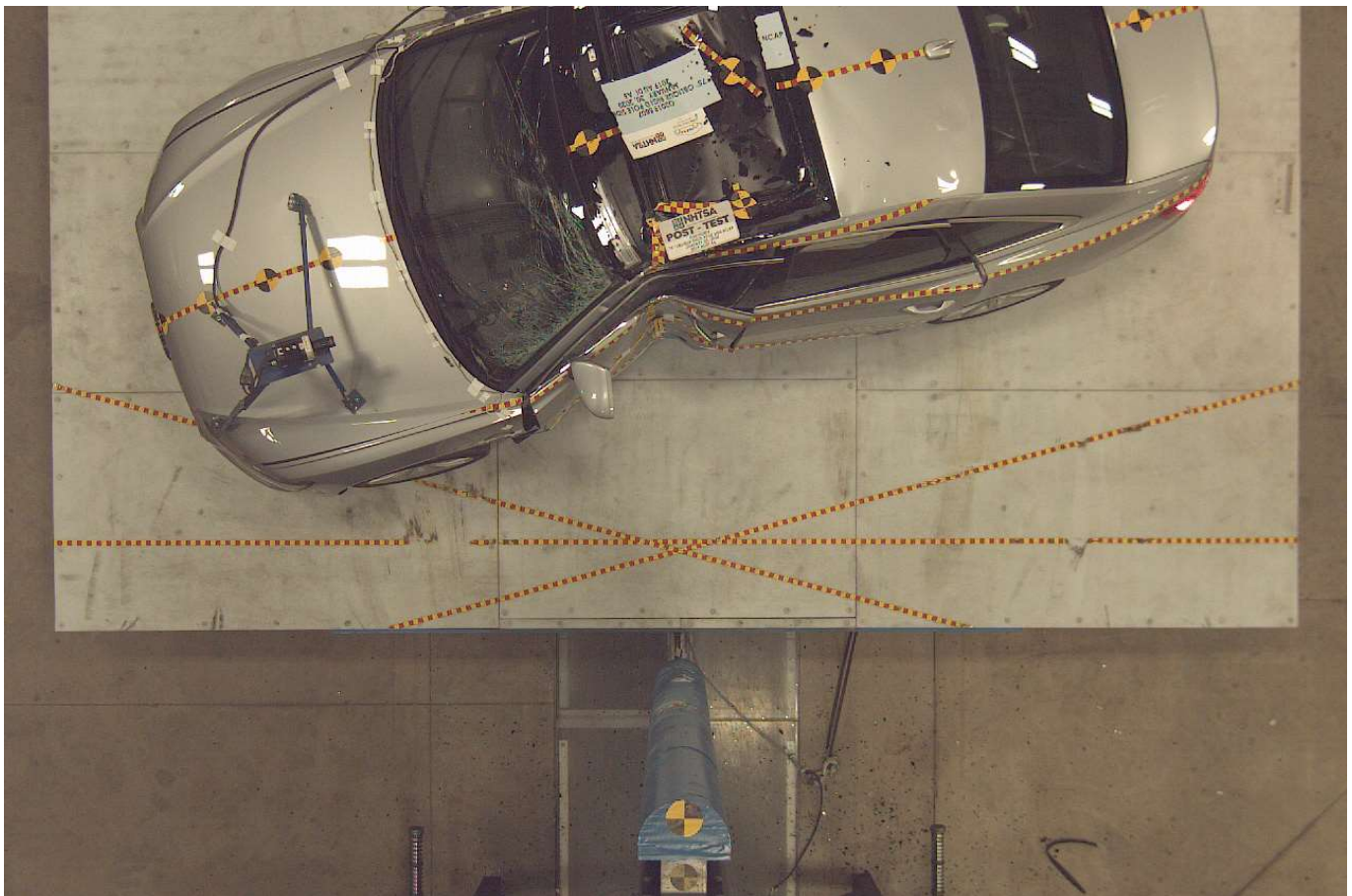


Photo No. 016 - Post-Test Overhead View of Test Area

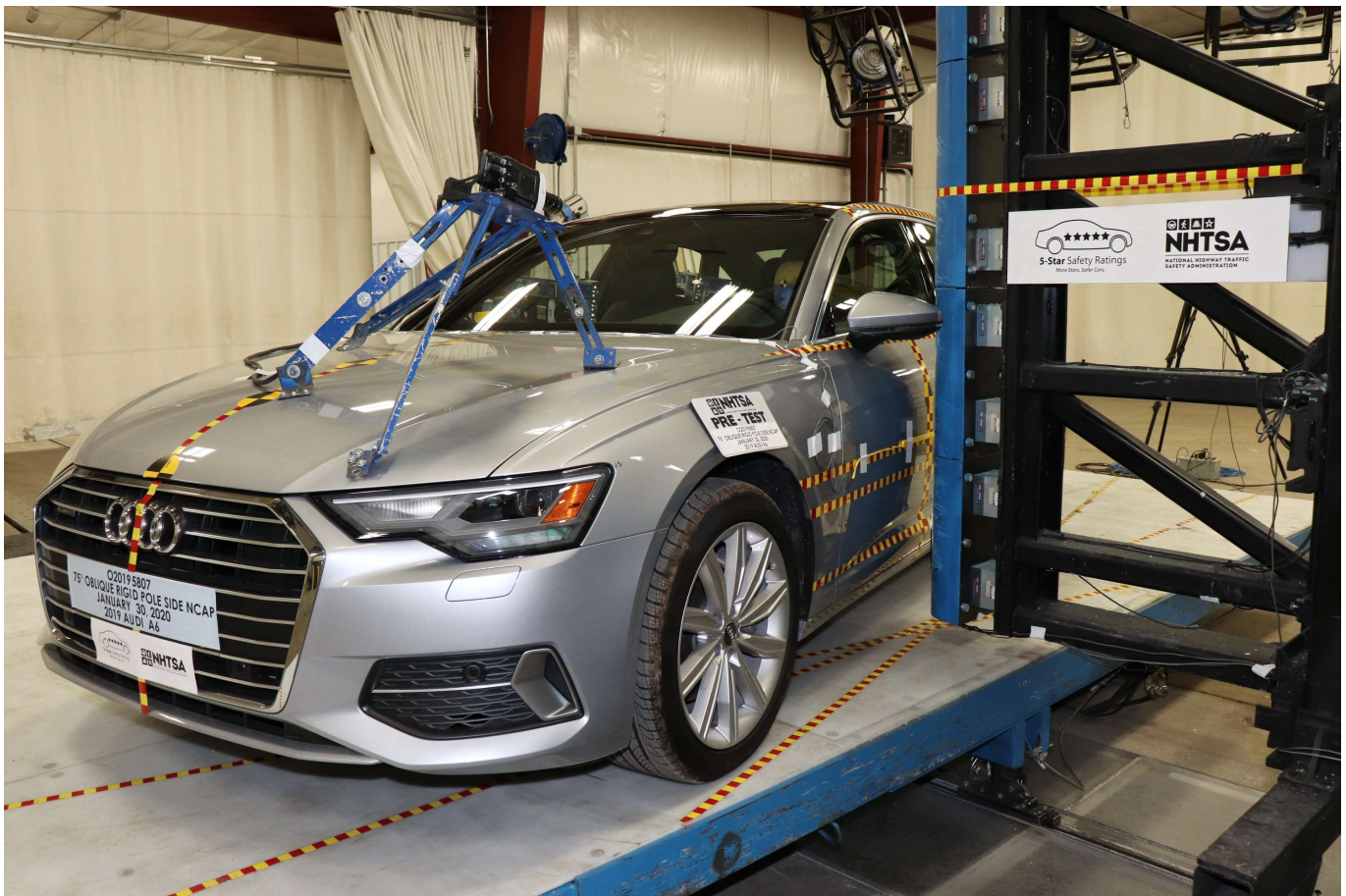


Photo No. 017 - Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



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

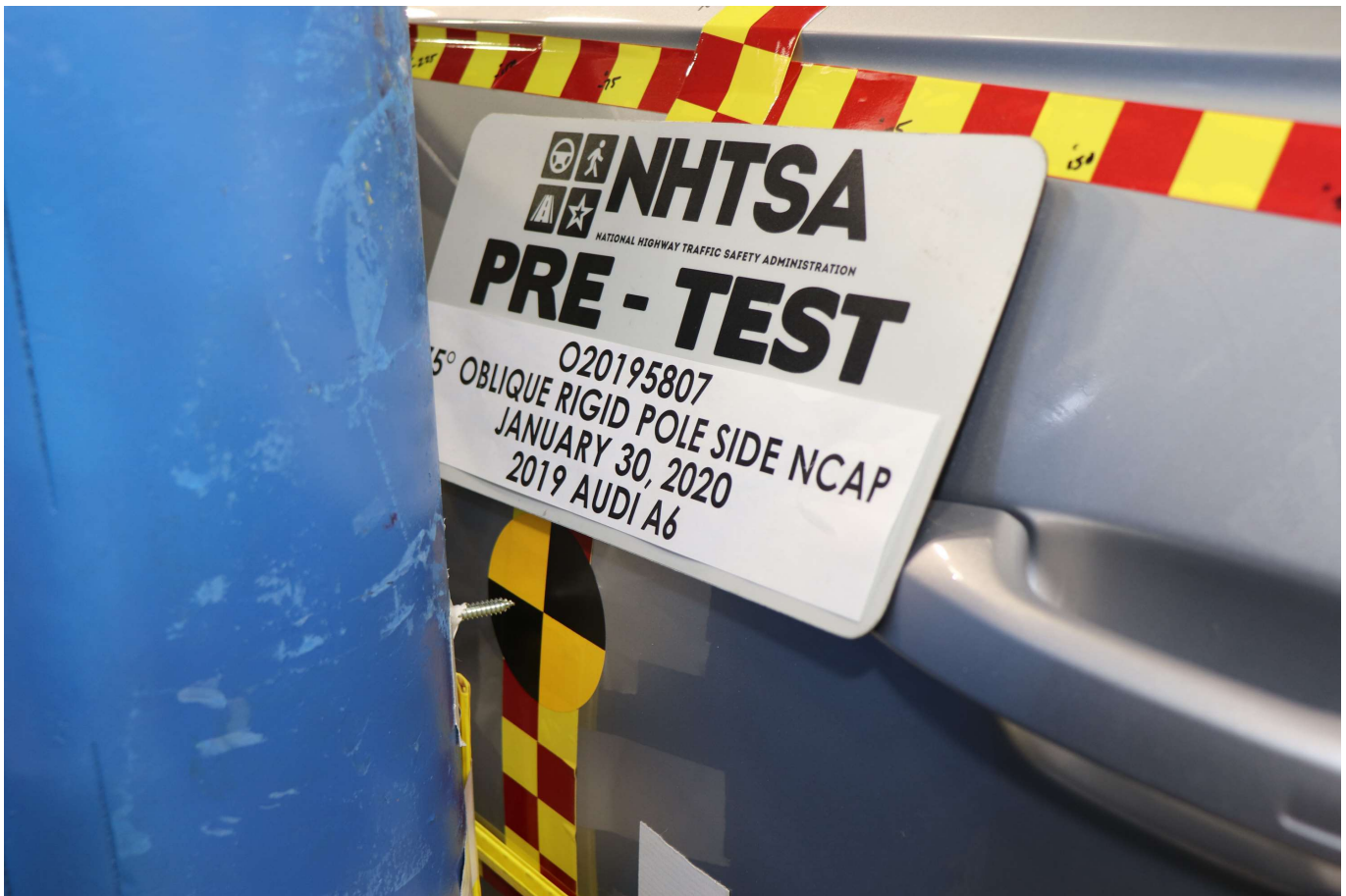


Photo No. 019 - Pre-Test Close-Up View of Impact Point Target



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 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 054 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 055 - Close-Up View of Vehicle Certification Label



Photo No. 056 - Close-Up View of Vehicle Tire Information Placard or Label

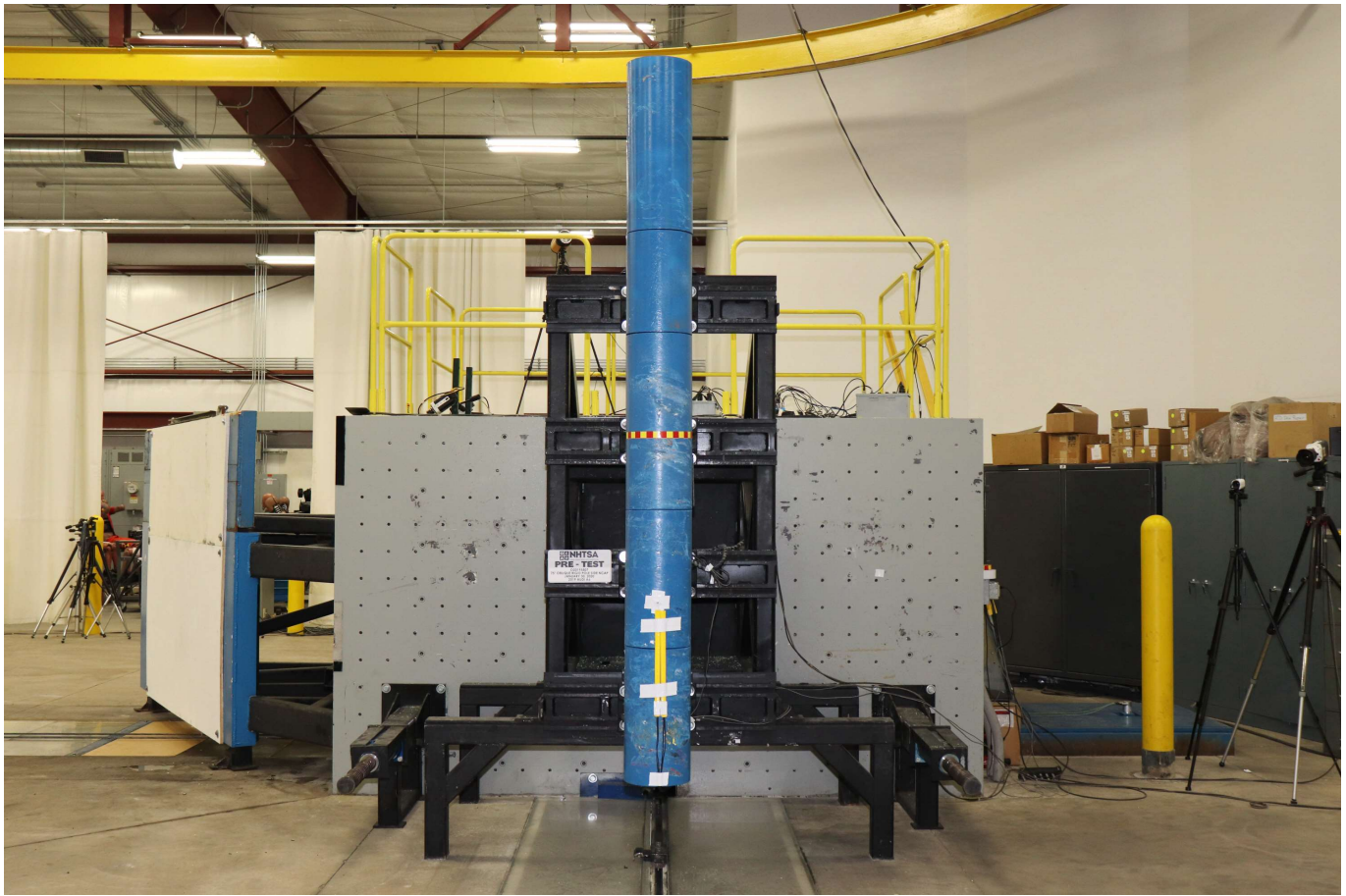


Photo No. 057 - Pre-Test Pole Barrier Front View

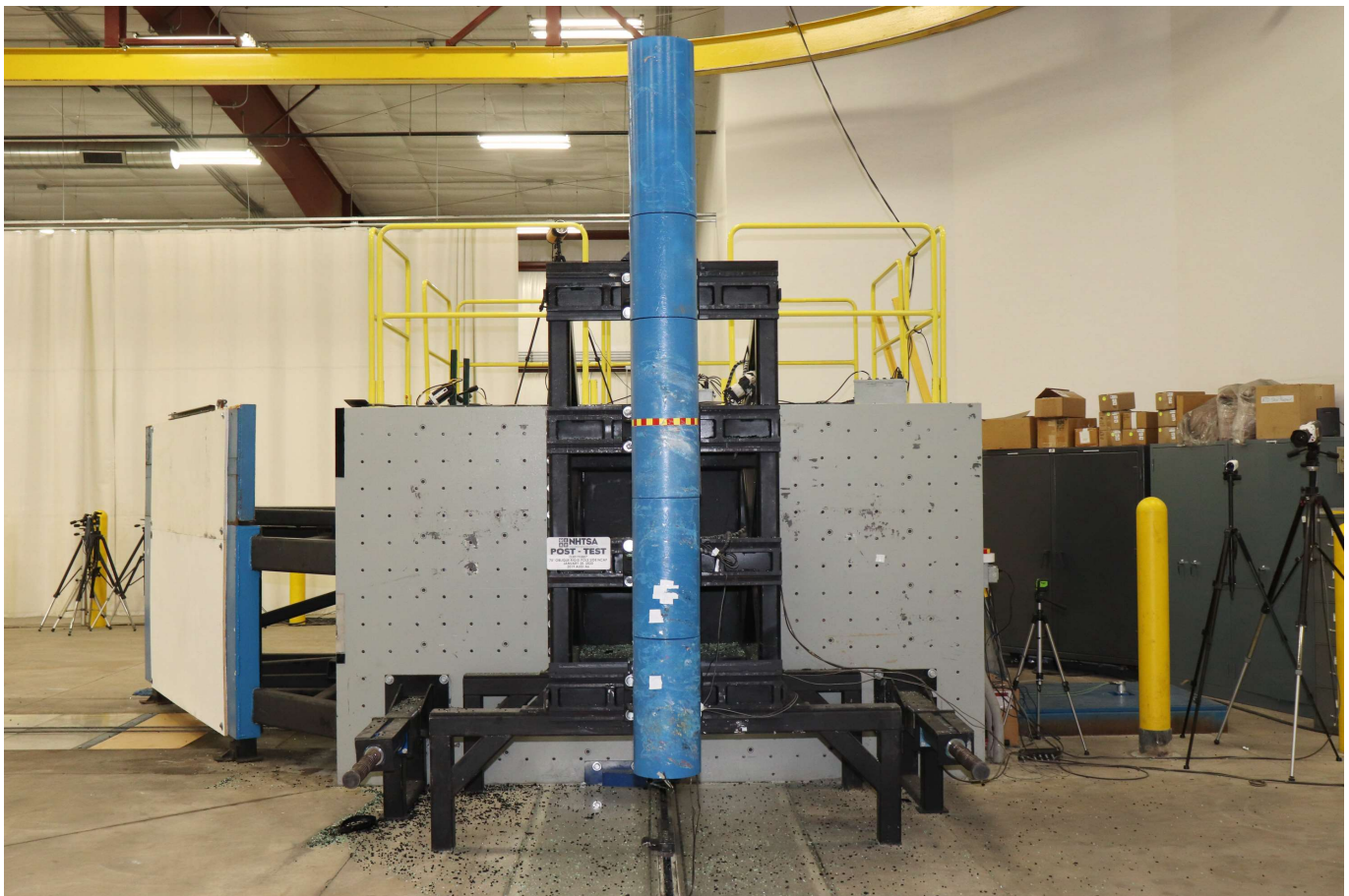


Photo No. 058 - Post-Test Pole Barrier Front View



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



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



Photo No. 061 - Pre-Test Ballast View

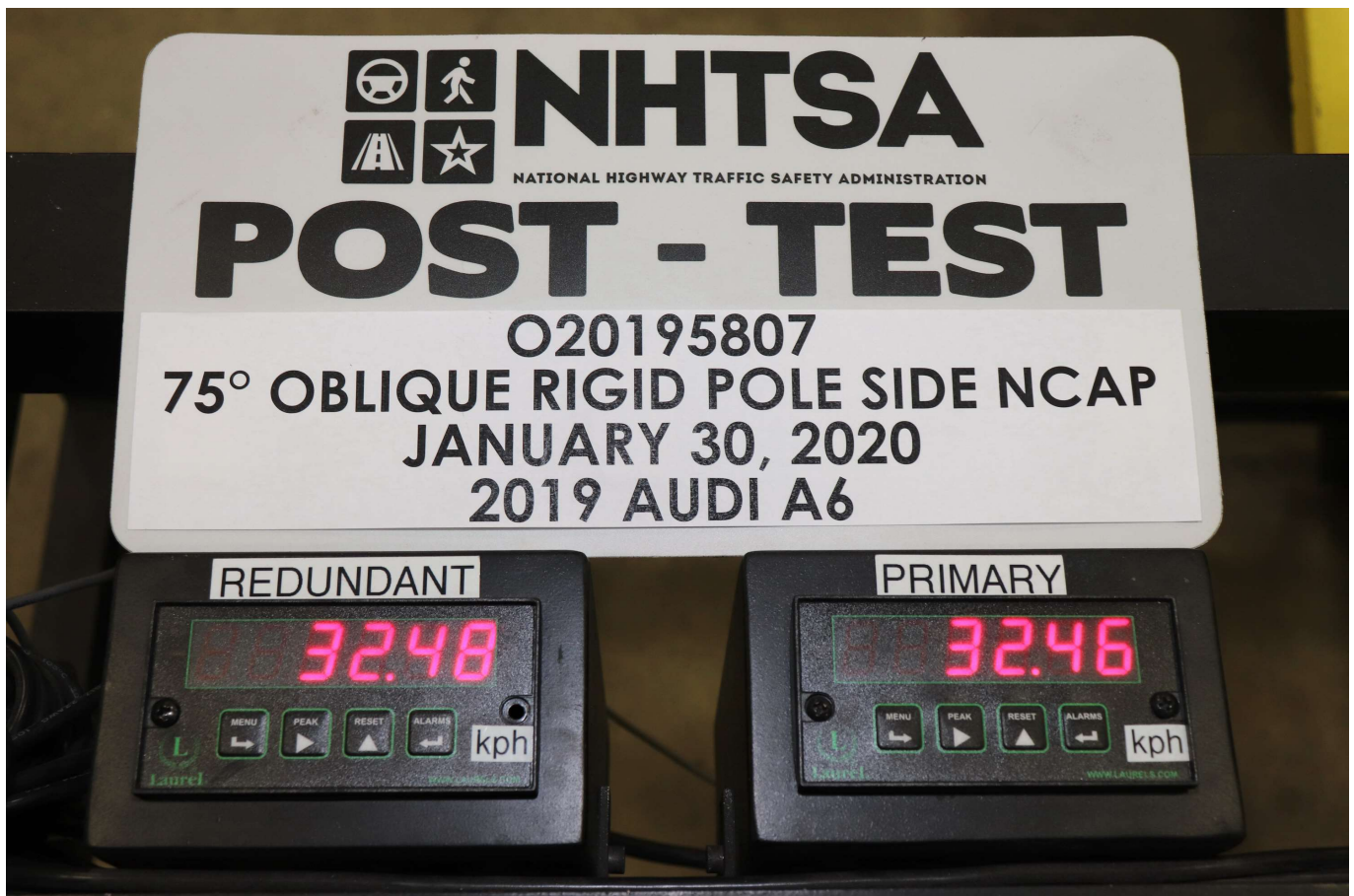


Photo No. 062 - Post-Test Primary and Redundant Speed Trap Read-Out



Photo No. 063 - FMVSS Photo No. 301 Static Rollover 0 Degrees



Photo No. 064 - FMVSS Photo No. 301 Static Rollover 90 Degrees



Photo No. 065 - FMVSS Photo No. 301 Static Rollover 180 Degrees

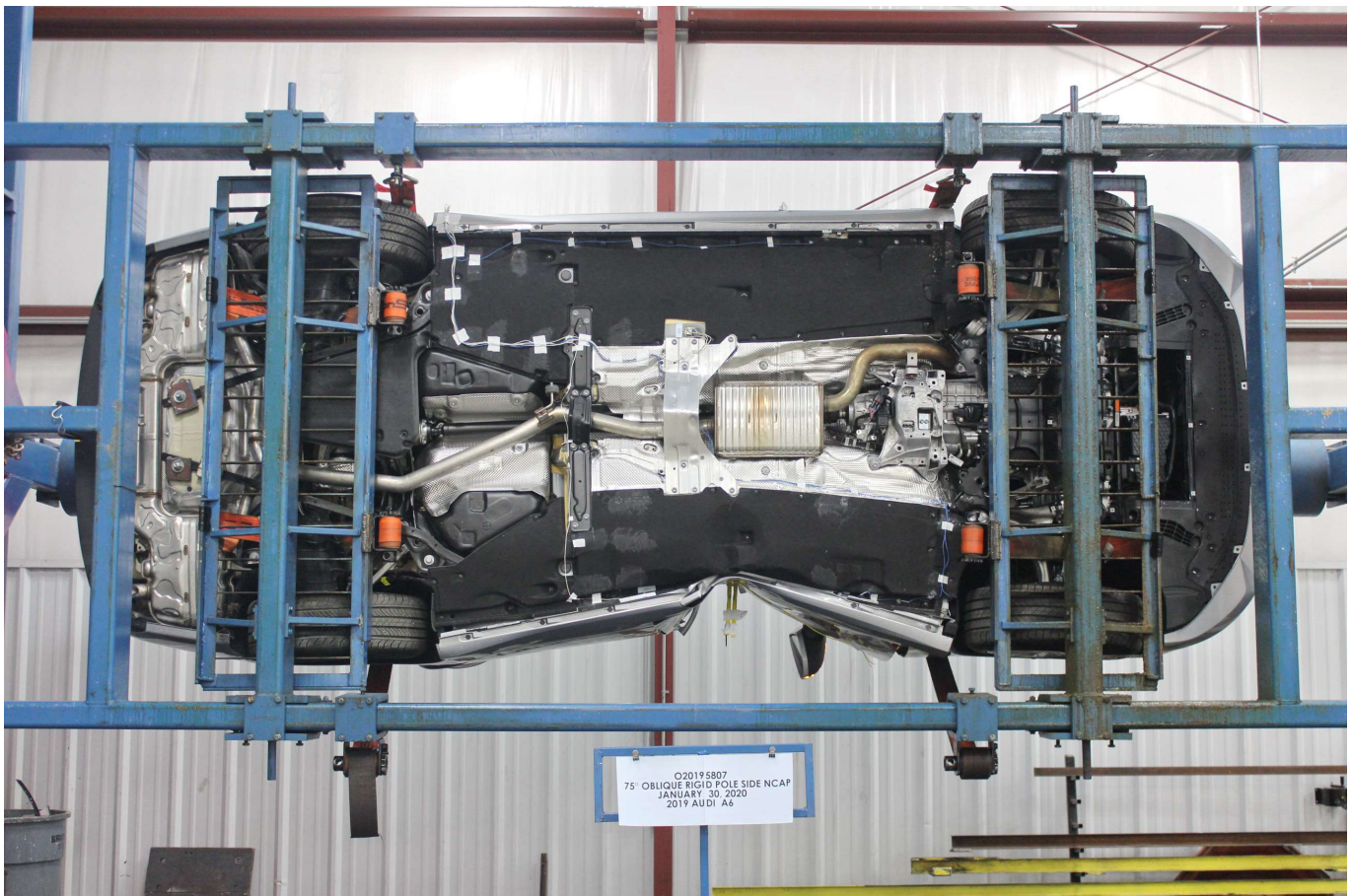


Photo No. 066 - FMVSS Photo No. 301 Static Rollover 270 Degrees



Photo No. 067 - FMVSS Photo No. 301 Static Rollover 360 Degrees



Photo No. 068 - Impact Event

2019 Audi A6 45 TFSI (2.0T) S tronic quattro



STANDARD EQUIPMENT (unless replaced by options)

TECHNICAL

- 2.0L TFSI® I4 engine
- quattro® all-wheel drive system
- 7-speed S tronic® transmission
- 19" 10-spoke-dynamic design wheels, all-season tires
- Energy recuperation with start-stop system
- Space-saving spare tire

COMFORT/TECHNOLOGY

- Audi connect® CARE (limited time subscription)
- Audi connect® PRIME & PLUS (6 month trial)
- Audi MMI Navigation w/ MMI touch response
- Audi smartphone interface
- Audi sound system
- Auto dimming, power-folding, heated exterior mirrors w/ memory
- Dark Brown Walnut wood inlays
- Garage door opener (HomeLink®)
- Heated, 8-way power front seats w/ driver memory and 4-way lumbar adjustment
- Leather seating surfaces
- LED headlights with High beam assist
- Parking system plus
- Preparation for mobile phone (Bluetooth®)
- Power adjustable steering column with memory
- Power sunroof
- Split-folding rear seat back with pass-through (40/20/40)
- Three-zone automatic climate control
- 3-spoke multi-function steering wheel w/ shift paddles

SAFETY/CONVENIENCE

- Advanced Airbag Protection System with 8 airbags
- Anti-lock Braking System (ABS) w/ Brake Assist
- Audi pre sense basic (preventative occupant protection)
- Audi pre sense front
- Child safety locks in rear doors, power
- Electronic Stabilization Control (ESC) w/ Sport mode
- Electronic vehicle immobilization w/ anti-theft alarm
- LED Daytime Running Lights (DRLs)
- LED taillights w/ dynamic turn signals
- Lower Anchors and Tethers for Children (LATCH)
- Rearview camera
- Tire Pressure Monitoring System (TPMS)

WARRANTY/MAINTENANCE

- 4 Year/50,000 mile (whichever occurs first) New Vehicle Limited Warranty*
 - 12 Year Limited Warranty Against Corrosion Perforation
 - 1 Year/10,000 mile (whichever occurs first) First Scheduled Maintenance Service FREE OF CHARGE
 - 4 Years Roadside Assistance coverage provided by a third party supplier
- *Please refer to the 2019 Audi Warranty and Maintenance Booklet for complete coverage information.

MANUFACTURER'S SUGGESTED RETAIL PRICE

2019 Audi A6 45 TFSI (2.0T) S tronic quattro \$54,100.00

PACKAGES / OPTIONS

Flarett Silver metallic	\$595.00
Black interior	Included
Convenience package	\$1,300.00
Audi phone box with wireless charging and antenna booster	
Audi advanced key	
Audi side assist, rear cross traffic, vehicle exit warning	
Audi pre sense rear	
Heated steering wheel	
Black cloth headliner	Included
Gray/Brown Fine Grain Ash natural wood inlays	Included
Destination Charge	\$995.00

Total Price: \$56,990.00

Fuel, license, title fees, taxes and dealer-installed accessories are not included.

MODEL: 4A2B8Y

VIN: WAUD8AF2XKN129455

DEALER: 406A40
AUDI ALLENTOWN
4725 HAMILTON BLVD
ALLENTOWN, PA 18103
Port of Entry: DAVISVILLE

SHIP TO: 406A40
AUDI ALLENTOWN
4725 HAMILTON BLVD
ALLENTOWN, PA 18103
COMM NUM: WC4445
Transportation Method: TRUCK

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger Not Rated Not Rated

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

Side Crash Front Seat Rear Seat Not Rated Not Rated

Based on the risk of injury in a side impact.

Rollover 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

EPA DOT Fuel Economy and Environment



Gasoline Vehicle

Fuel Economy
27 MPG
combined city/hwy
3.7 gallons per 100 miles

Mid-Size Cars range from 12 to 136 MPG. The best vehicle rates 136 MPG.

You spend \$1,250

more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,650

Fuel Economy & Greenhouse Gas Rating (tailpipe only)



This vehicle emits 329 grams of CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. MPG 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



PARTS CONTENT INFORMATION

For Vehicles In This Carline
U.S./Canadian Parts Content:
Major Sources Of Foreign
Parts Content: **GERMANY:**

1%
For This Vehicle:
Final Assembly Point: **NECKARSULM, GERMANY**
Country Of Origin:
ENGINE: HUNGARY
TRANSMISSION: GERMANY

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

Photo No. 069 - Monroney Label

Sitting correctly and safely

- Always hold the steering wheel with your hands in the 9 o'clock and 3 o'clock positions to reduce the risk of injury if the airbag deploys.
- Never hold the steering wheel in the 12 o'clock position or with both hands on the rim or the center of the steering wheel. Holding the steering wheel incorrectly significantly increases the risk of injury to the hands, arms and head if the driver airbag deploys.

Power steering wheel position adjustment

Applies to: vehicles with power steering wheel adjustment

The steering wheel position can be adjusted electrically up/down and forward/back.



Fig. 56 Steering column: switch for adjusting the steering wheel position

- ▶ To move the steering wheel up or down, press the switch upward or downward.
- ▶ To move the steering wheel forward or back, press the switch forward or back.

The steering wheel can also be adjusted when the ignition is switched off.

In vehicles with memory function*, the steering column settings are stored together with the seat position.

Tips

The entry assistance makes entering and exiting the vehicle easier, because the steering column moves upward into the park position when the ignition is switched off. After entering the vehicle, the steering column returns to the stored position once the ignition is switched on. To use entry assistance, select

on the home screen: **VEHICLE > Seats > Additional seat settings > Driver seat entry assistance.**

Head restraints

General information

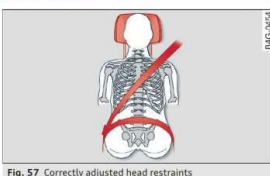


Fig. 57 Correctly adjusted head restraints

Make sure that:

- The upper edge of the head restraint is as even as possible with the top of your head
- The head restraint is as close as possible to the back of your head
- The head restraints on the occupied rear seats are positioned all the way up

WARNING

- There is one head restraint for each seat. All vehicle occupants must adjust the head restraint correctly before every trip. Having head restraints that are not adjusted correctly or not installed in the vehicle increases the risk of a neck injury during sudden or unexpected driving or braking maneuvers or in a collision.
- Only remove the rear seat head restraints if it is necessary to install a child safety seat → page 73. Stow the removed head restraints securely, for example in the luggage compartment. Reinstall the head restraints immediately once the child safety seat has been removed. Driving without head restraints increases the risk of serious neck injuries.

Sitting correctly and safely

Front head restraints

Applies to: vehicles with adjustable head restraints

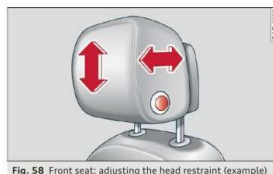


Fig. 58 Front seat: adjusting the head restraint (example)

Adjusting the head restraints

- ▶ To move the head restraint upward or forward*, slide it until it locks into place.
- ▶ To move the head restraint down or back*, press the side button and slide the head restraint in the desired direction until it locks into place.

Rear head restraints

Applies to: vehicles with adjustable head restraints

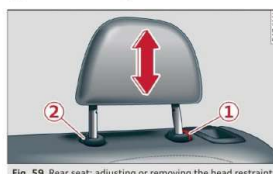


Fig. 59 Rear seat: adjusting or removing the head restraint (example)

Adjusting the head restraints

- ▶ Upward: slide the head restraint upward until it latches into place.
- ▶ Downward: press the button on the head restraint base → fig. 59 and slide the head restraint downward. Release the button and slide the head restraint farther until it locks into place.

Removing the head restraints

Applies to: vehicles with removable head restraints

- ▶ Move the head restraint upward all the way.

- ▶ Press the release point on the head restraint base → fig. 59 using the mechanical key → page 34. Key set and press the button ①. Pull the head restraint out of the backrest at the same time → Δ in General information on page 63.

Installing the head restraints

Applies to: vehicles with removable head restraints

- ▶ Slide the posts on the head restraint down into the guides until the posts click into place.
- ▶ Press the button ① and slide the head restraint all the way down. You should not be able to remove the head restraint from the backrest without pressing the button.

Safety belts

General information

Each seat is equipped with a three-point safety belt. Safety belts that are worn correctly are the most effective way to reduce the risk of serious or fatal injuries in a collision. Therefore, wear your safety belt correctly and make sure that all vehicle occupants also wear their safety belts correctly when the vehicle is moving.

Even though your vehicle is equipped with an air-bag system, all vehicle occupants must still always wear their safety belts. In addition to their normal protective function, safety belts also hold vehicle occupants in the correct seating position in the event of a collision so that the airbags can deploy correctly and provide additional protection. Safety belts provide protection during collisions when the airbags do not deploy or if they have already deployed.

WARNING

The risk of serious or fatal injury increases if the safety belt is not fastened, if it is worn incorrectly, or if it is damaged.

- All vehicle occupants, including the driver, must fasten their safety belts correctly before every trip and must always keep their safety belts fastened during the trip, regardless of whether the seat is equipped with an airbag or not. This also applies to children

Photo No. 070 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual



Photo No. 071 - Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B

DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

		<u>Page No.</u>
Figure No. 1.	Driver Head CG Acceleration (X) vs. Time	B-1
Figure No. 2.	Driver Head CG Acceleration (Y) vs. Time	B-1
Figure No. 3.	Driver Head CG Acceleration (Z) vs. Time	B-1
Figure No. 4.	Driver Head CG Resultant Acceleration (X) vs. Time	B-1
Figure No. 5.	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
Figure No. 6.	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
Figure No. 8.	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
Figure No. 9.	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
Figure No. 10.	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
Figure No. 11.	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

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)

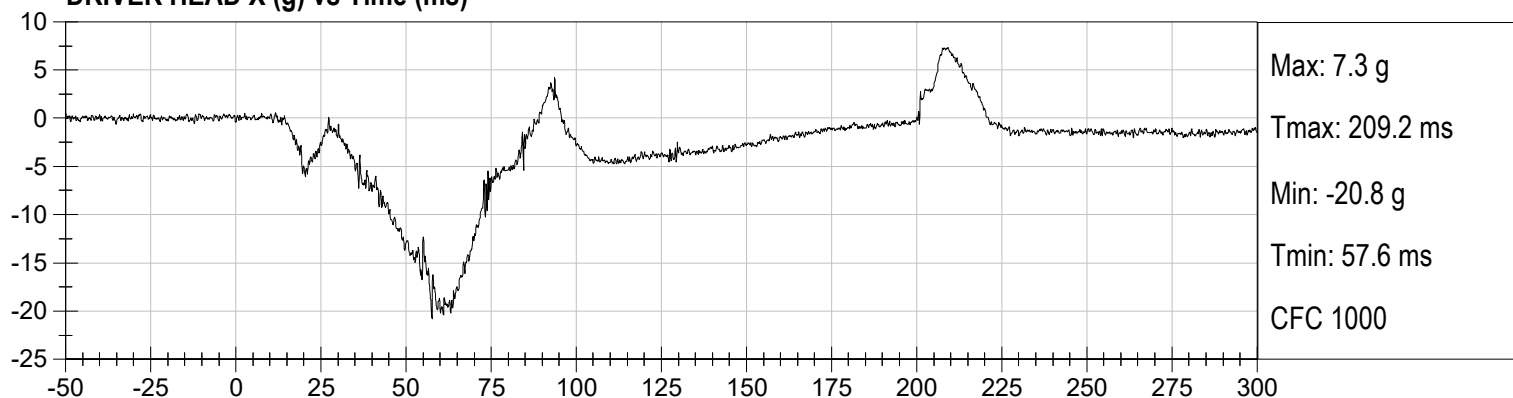
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

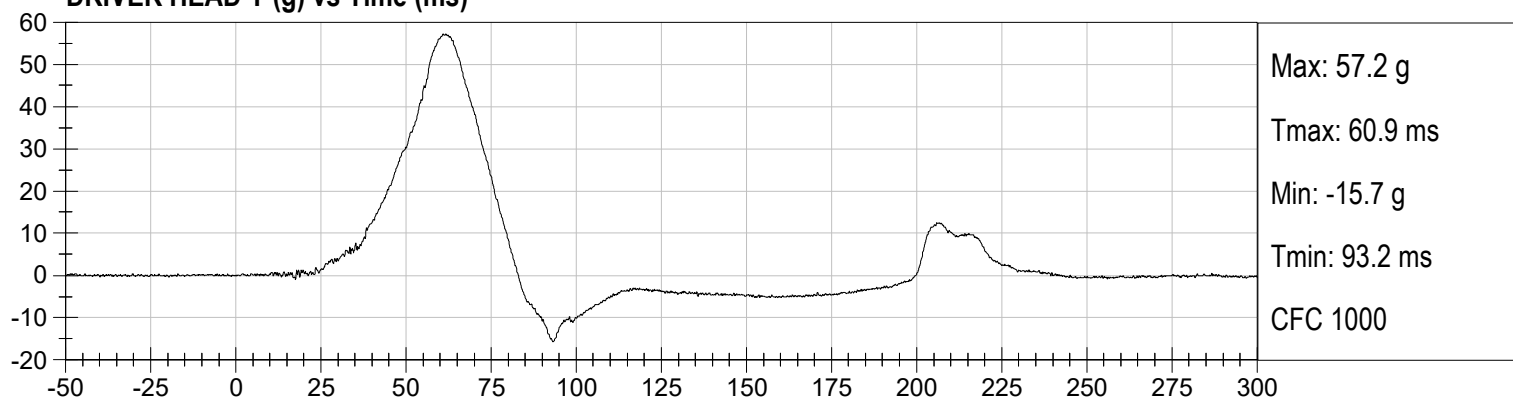
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

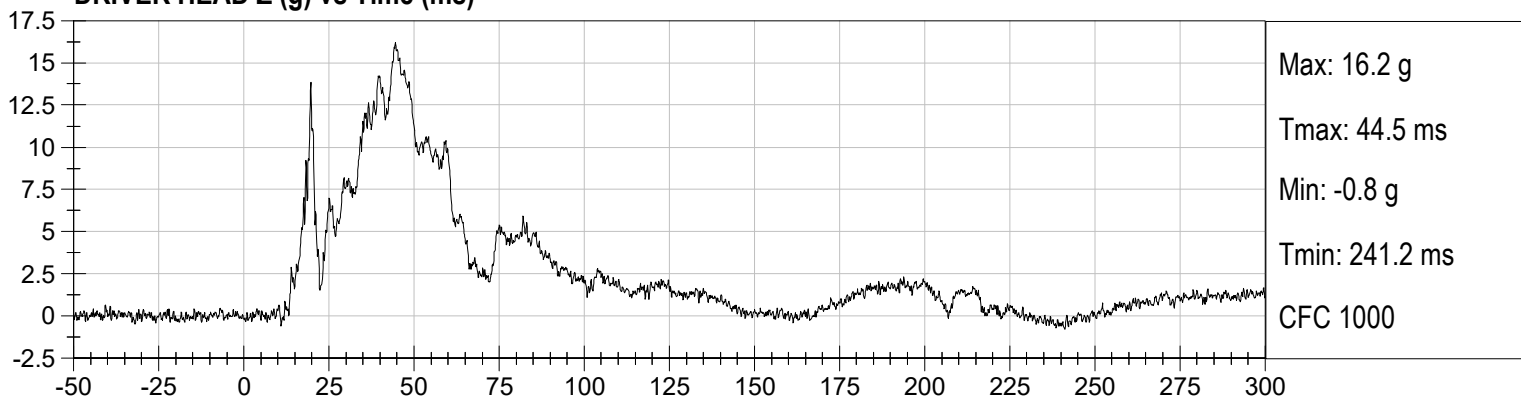
DRIVER HEAD X (g) vs Time (ms)



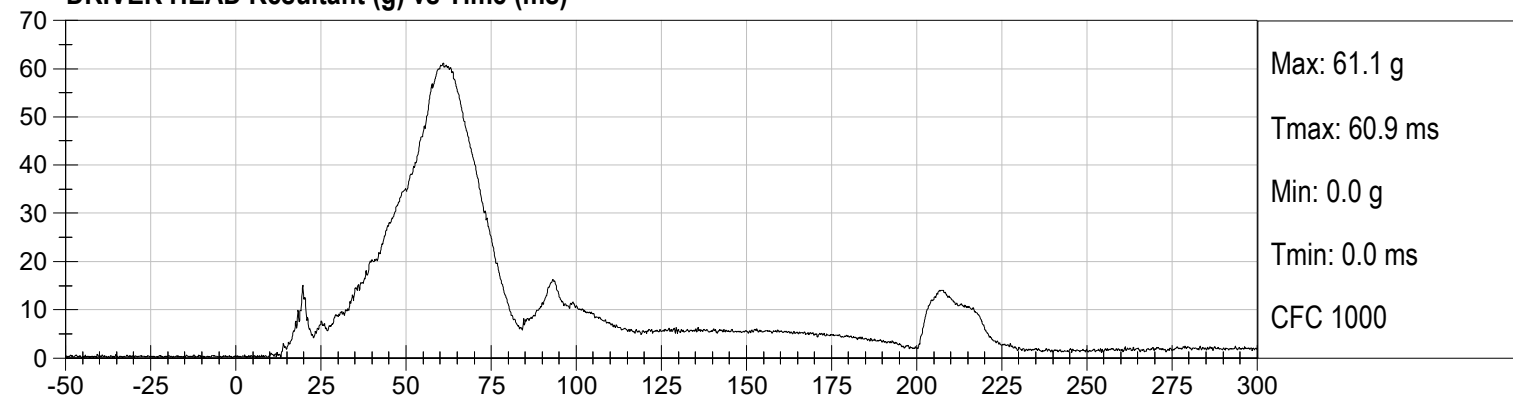
DRIVER HEAD Y (g) vs Time (ms)



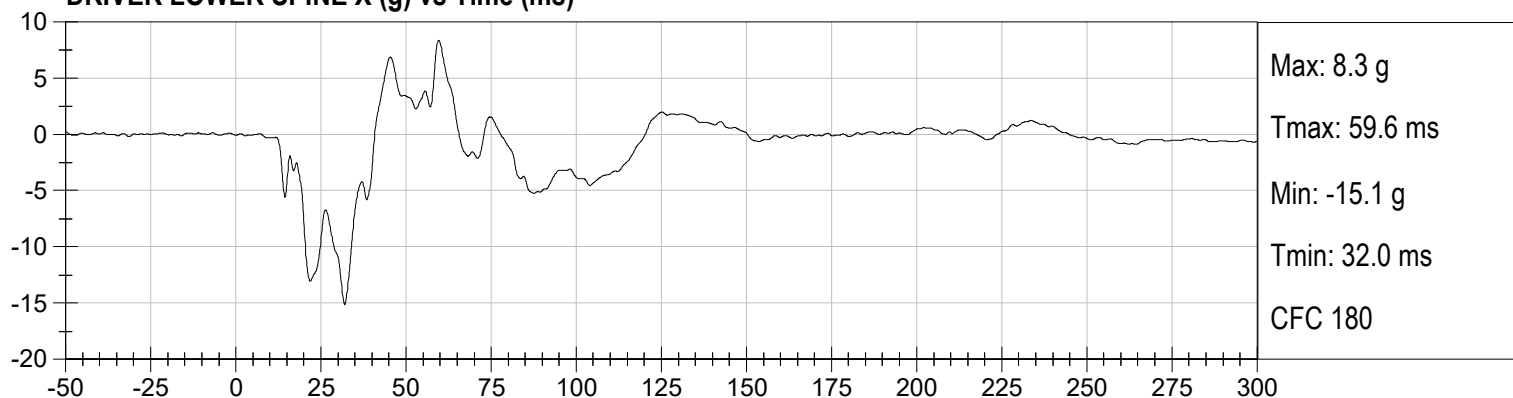
DRIVER HEAD Z (g) vs Time (ms)



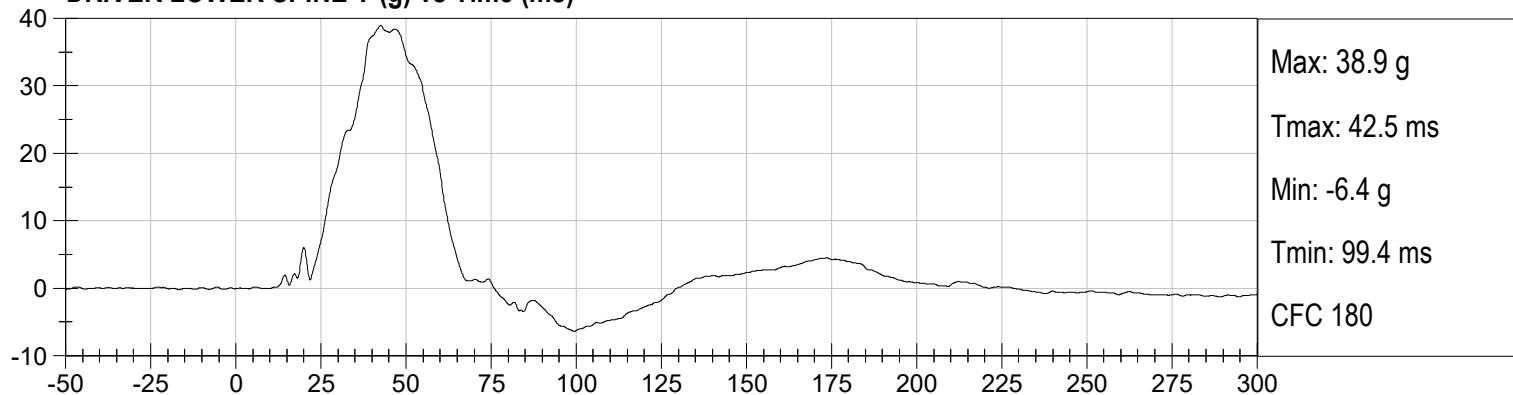
DRIVER HEAD Resultant (g) vs Time (ms)



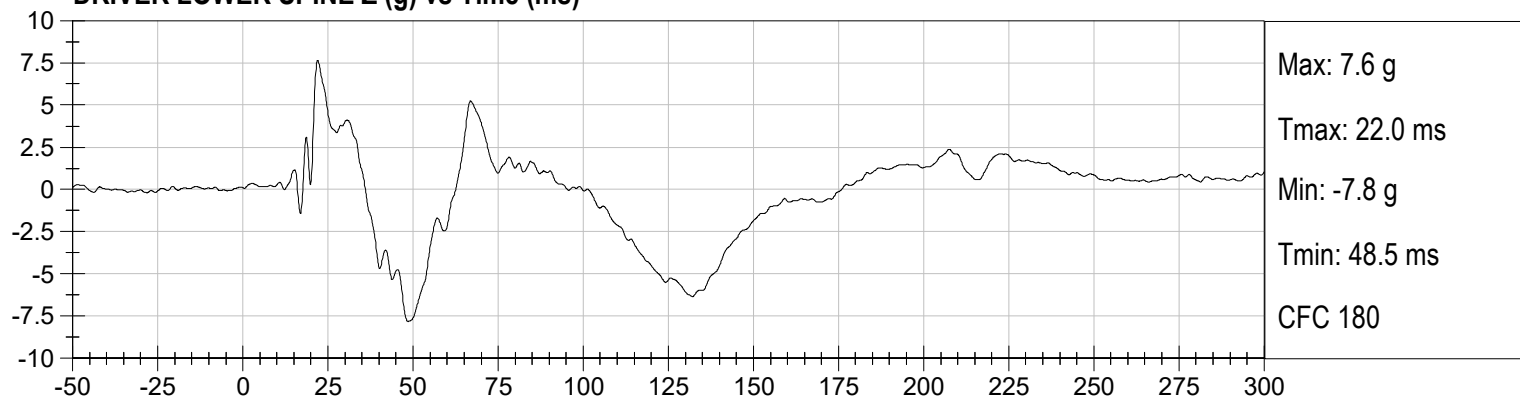
DRIVER LOWER SPINE X (g) vs Time (ms)



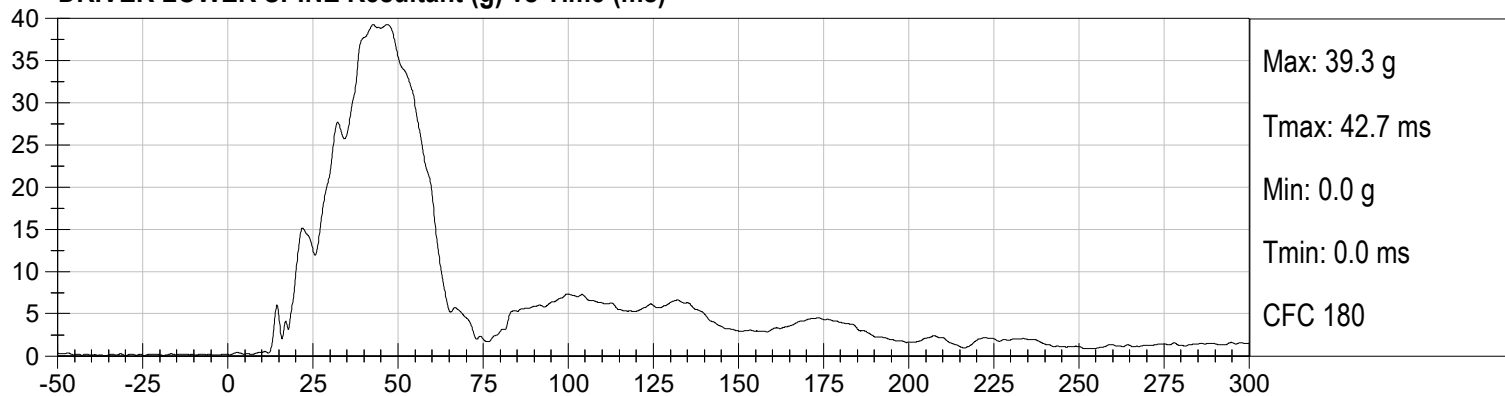
DRIVER LOWER SPINE Y (g) vs Time (ms)



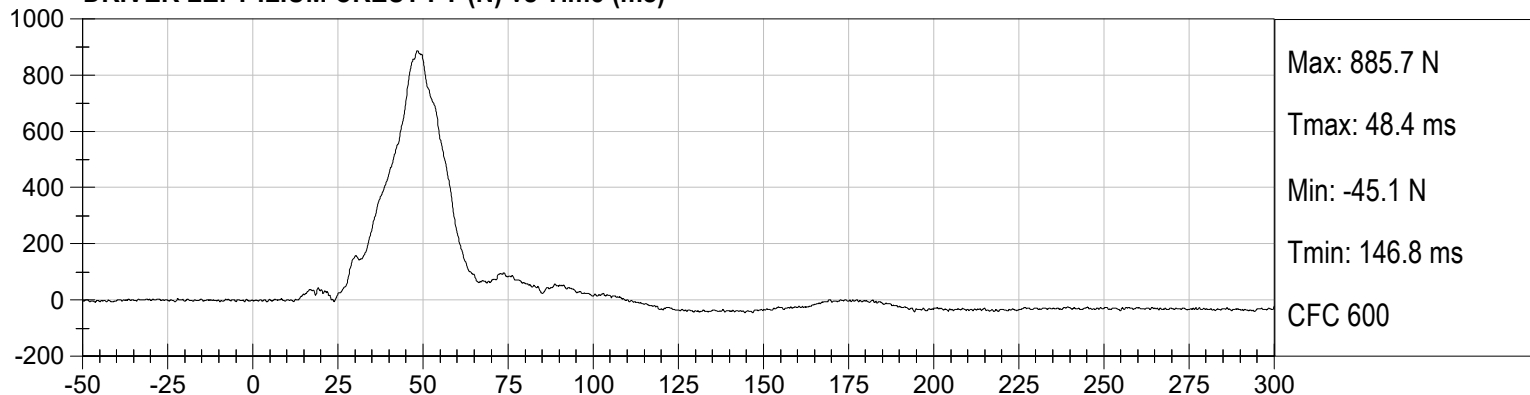
DRIVER LOWER SPINE Z (g) vs Time (ms)



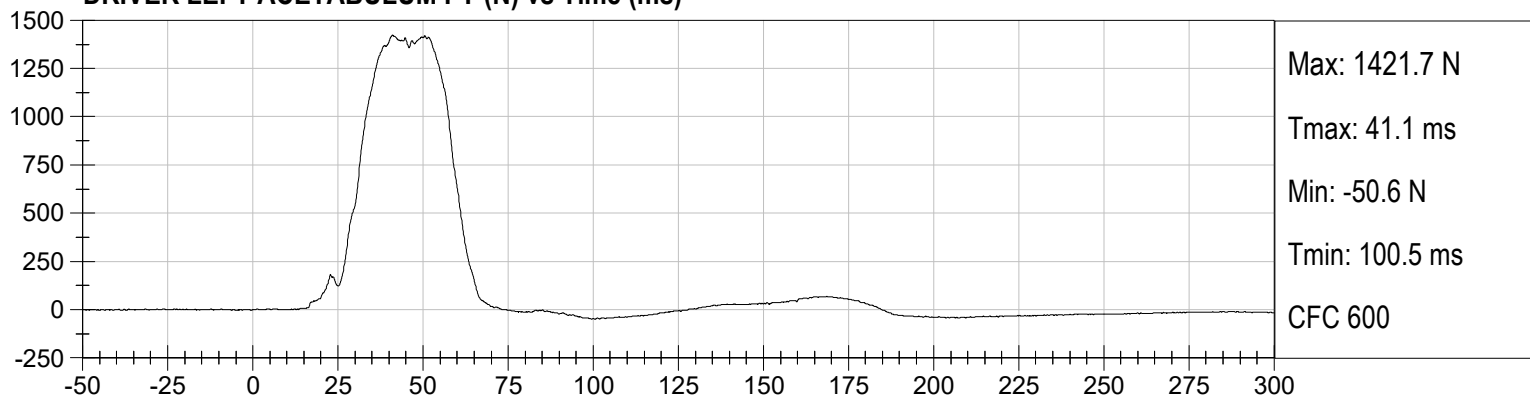
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



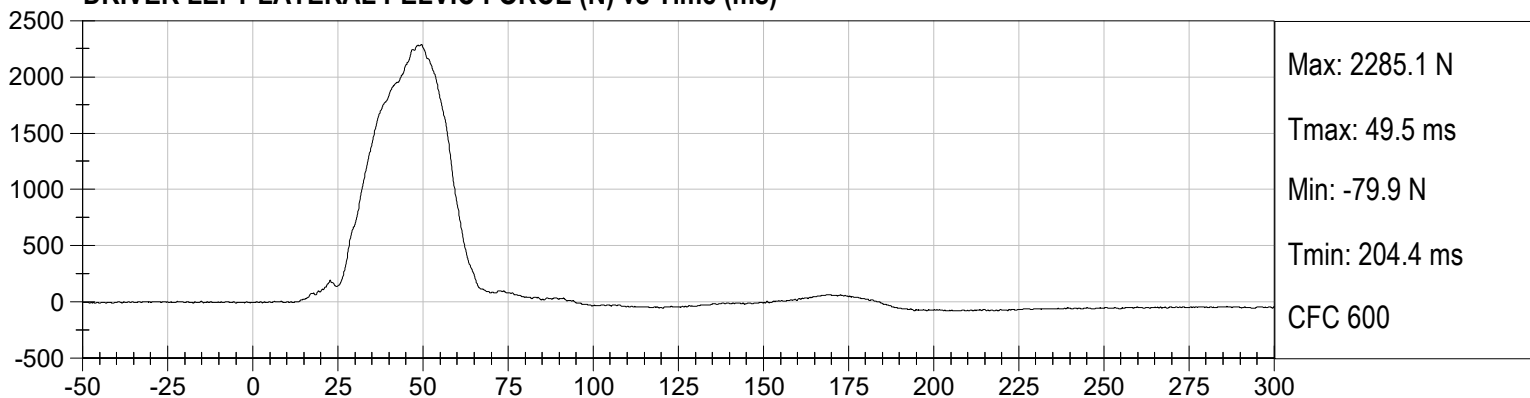
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



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

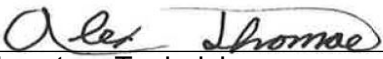
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148	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

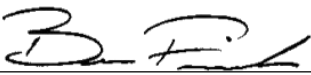
Test ID: D200111

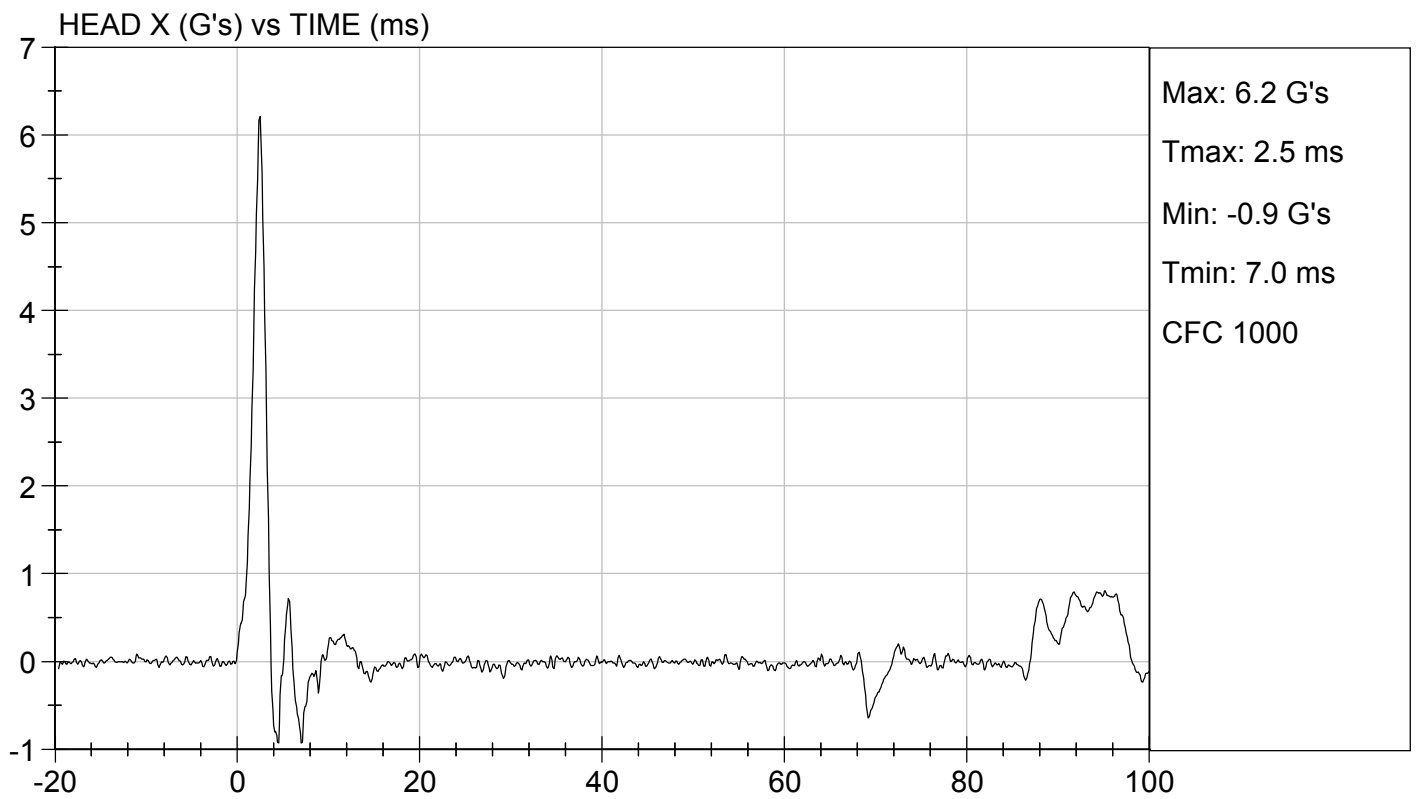
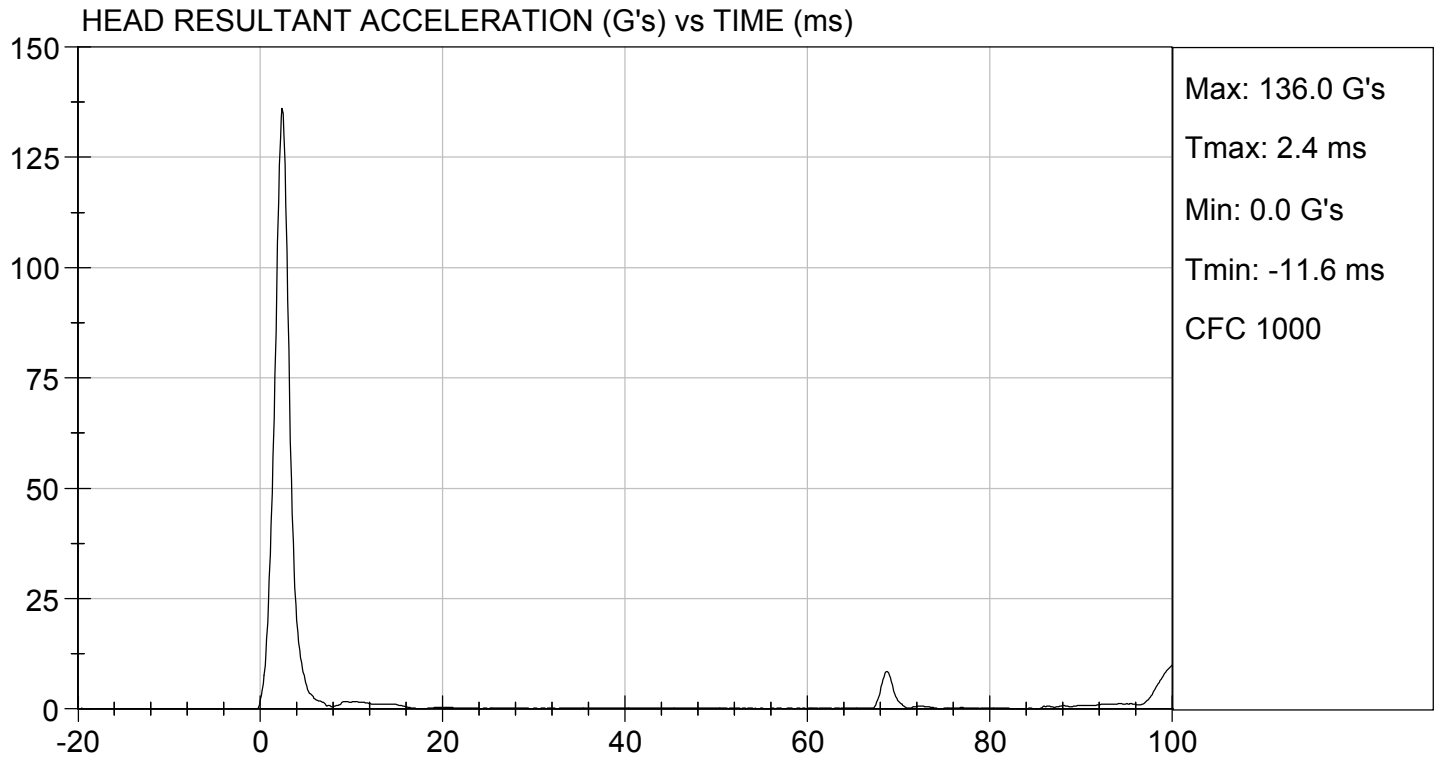
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	115 to 137	136	Pass
Peak Longitudinal Acceleration	G's	+/- 15	6.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass

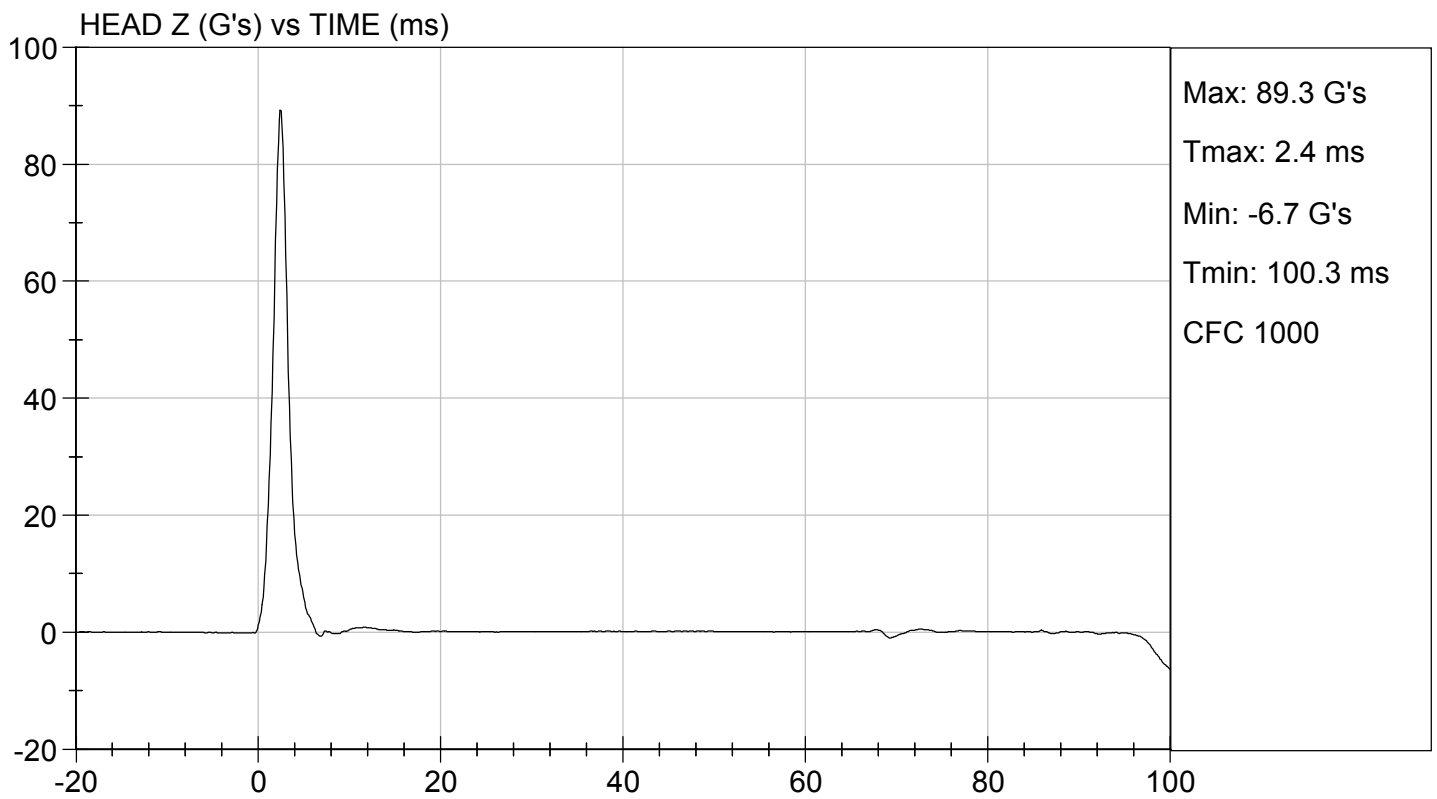
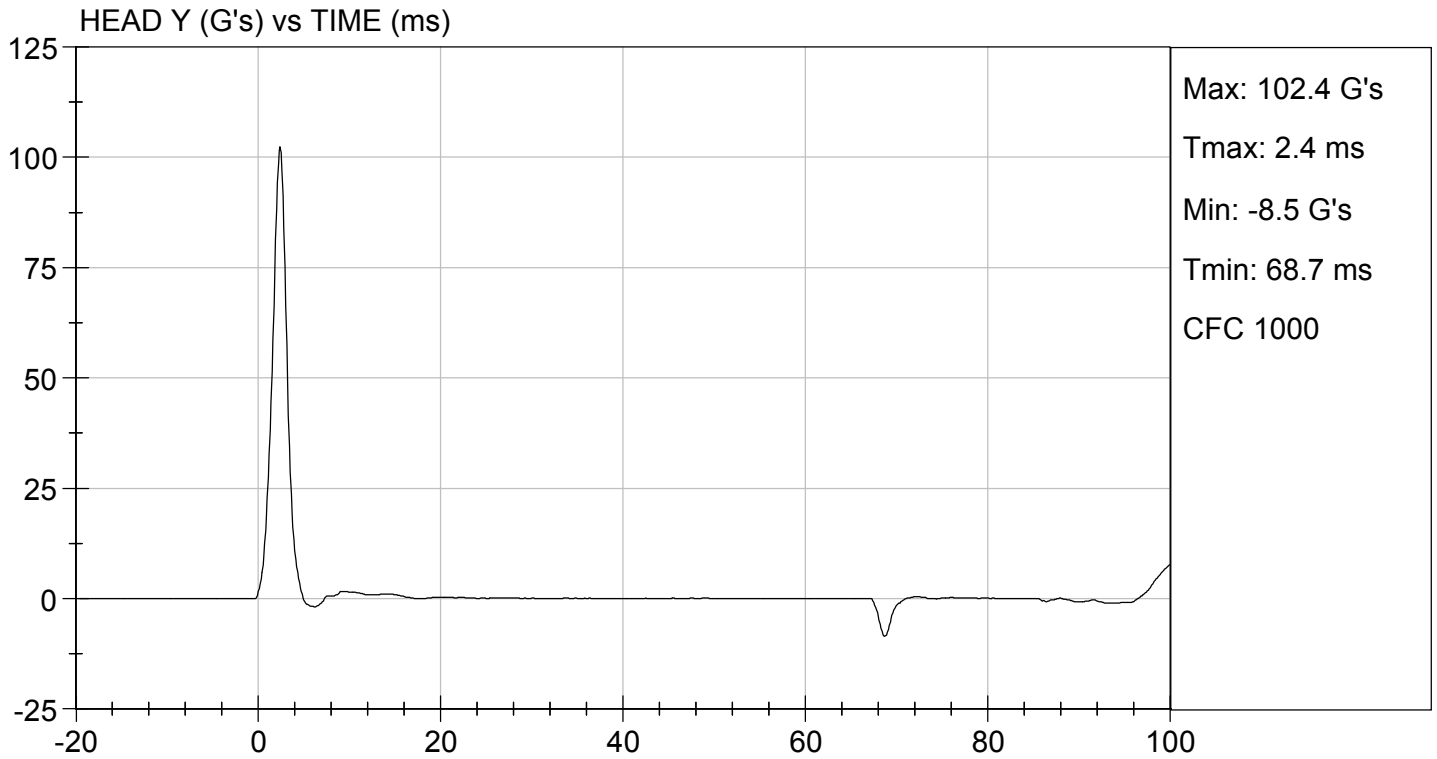

Laboratory Technician

01/09/2020

Test Date


Approved By





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

ATD Serial No: 306

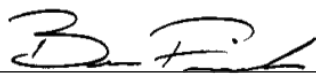
Test I.D: D200112

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21	Pass
Humidity		%	10 to 70	30	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.37	Pass
	15 ms	m/s	3.30 to 4.10	3.44	Pass
	20 ms	m/s	4.40 to 5.40	4.93	Pass
	25 ms	m/s	5.40 to 6.10	5.67	Pass
	25-100 ms	m/s	5.50 to 6.20	5.68	Pass
Maximum D-Plane Rotation		deg	71 to 81	76	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	65	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	121	Pass
Overall Test Results					Pass


 Laboratory Technician

01/10/2020

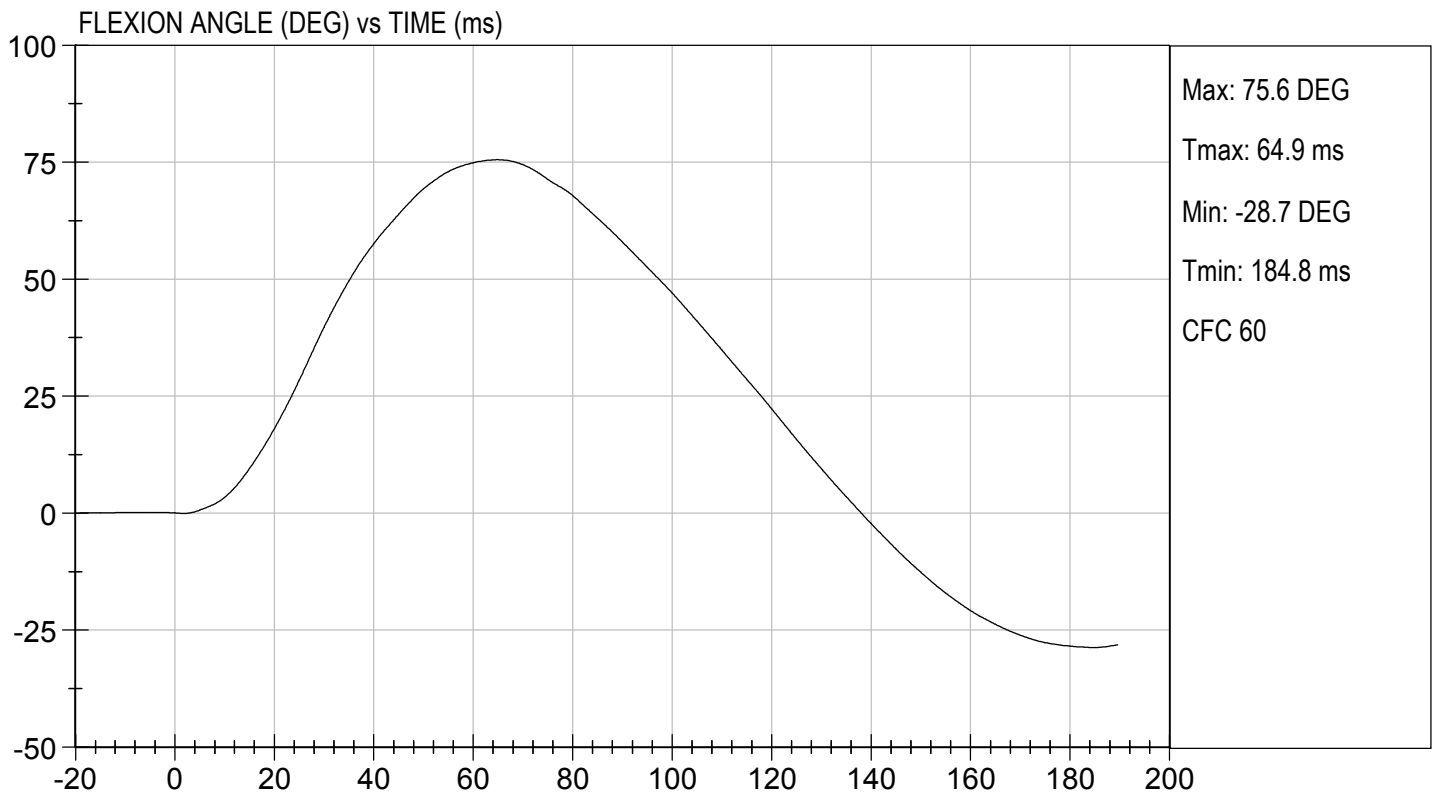
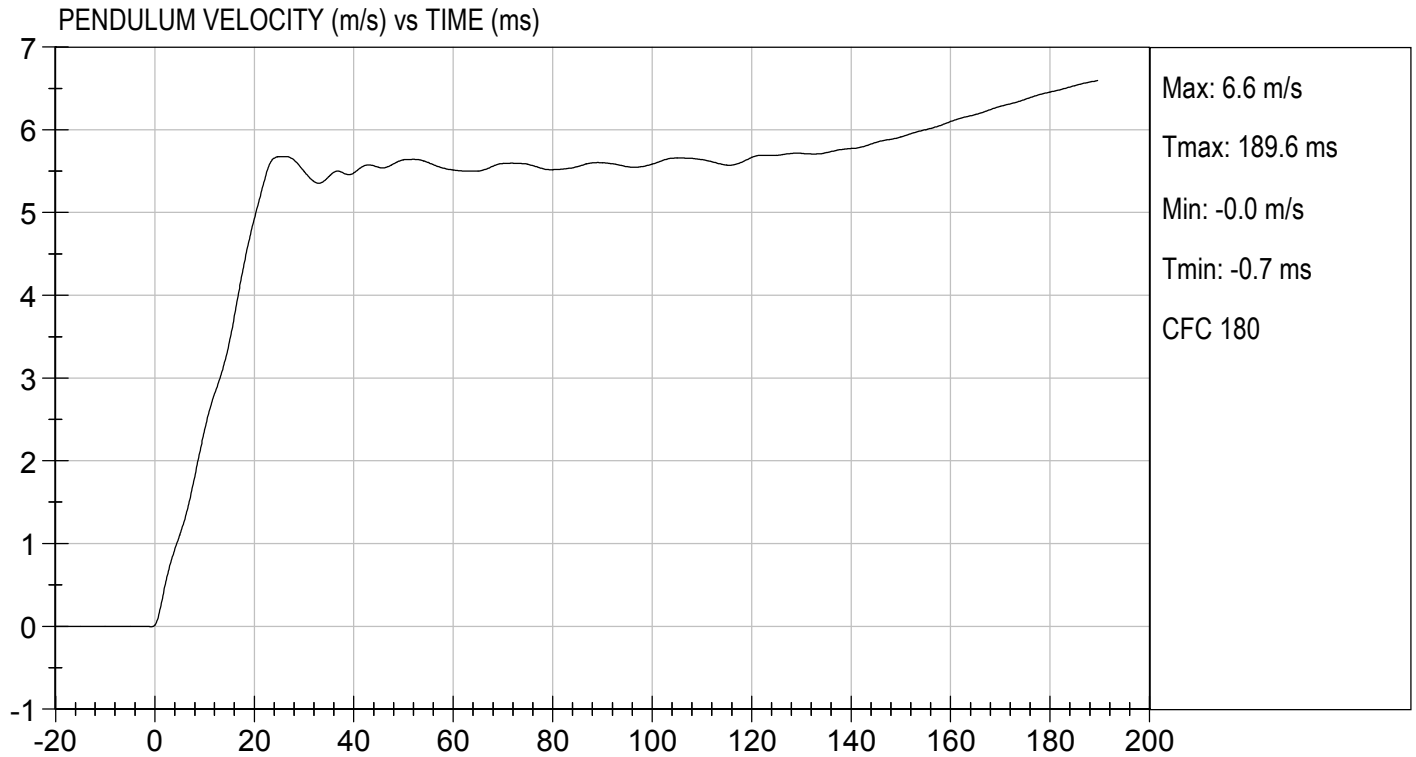
Test Date


 Approved By



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

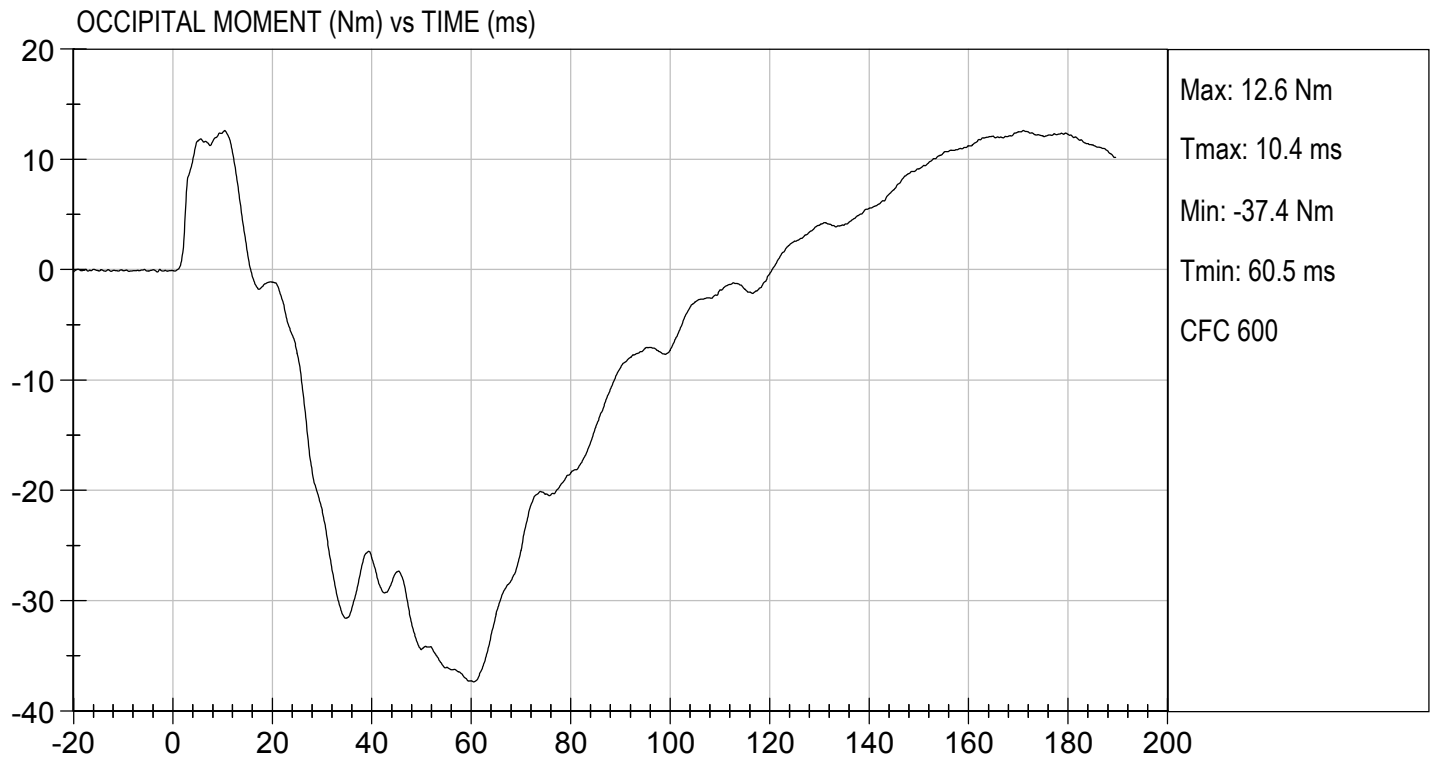
TEST DATE: 01/10/2020
TEST #: D200112





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

TEST DATE: 01/10/2020
TEST #: D200112



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

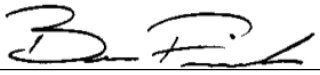
ATD Serial No: 306

Test ID: D200113

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
Overall Test Results				Pass


Laboratory Technician

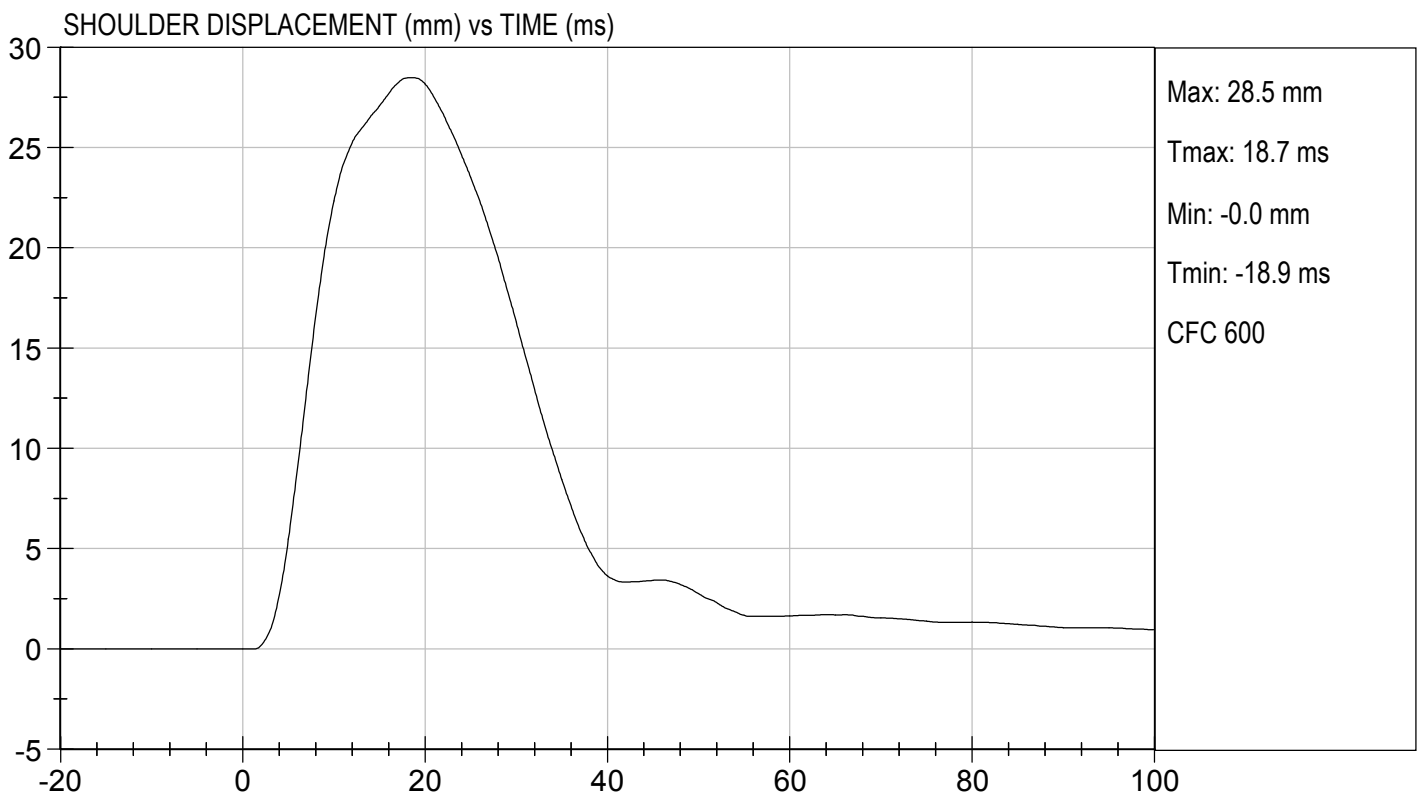
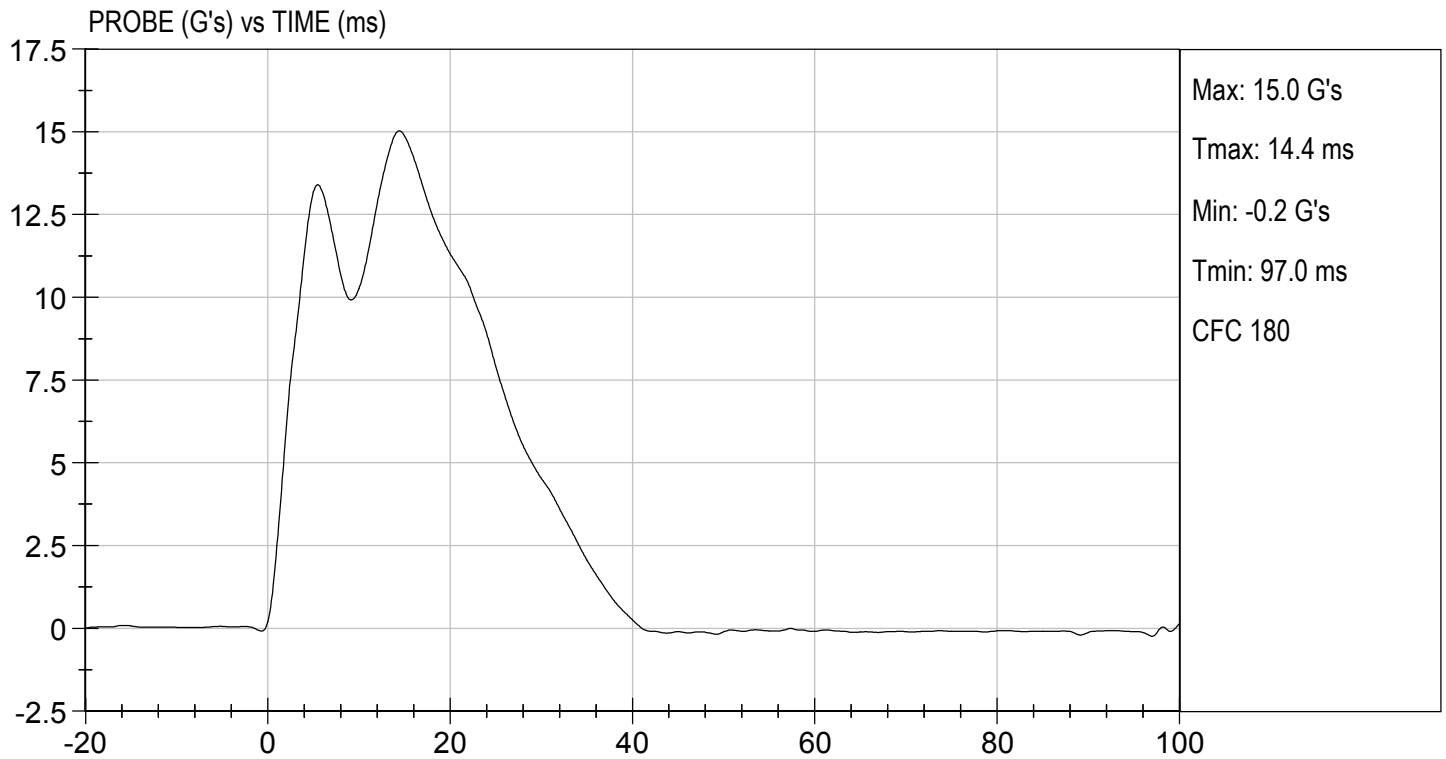
01/09/2020
Test Date


Approved By



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

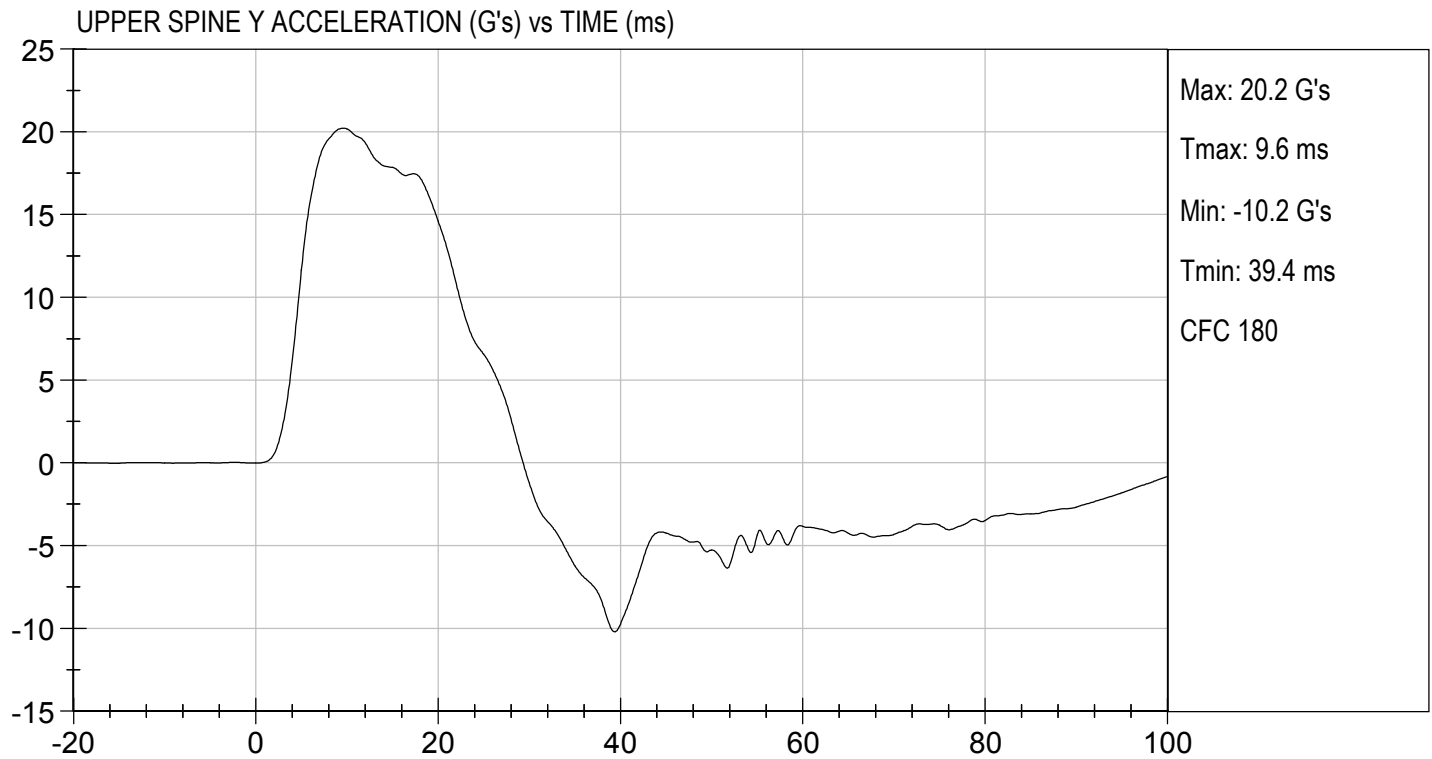
TEST DATE: 01/09/2020
TEST #: D200113





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

TEST DATE: 01/09/2020
TEST #: D200113



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

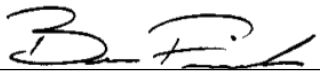
ATD Serial No: 306

Test I.D: D200114

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	31	Pass
Upper Rib Displacement	mm	25 to 32	26	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	41	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	30	Pass
Overall Test Results				Pass


 Laboratory Technician

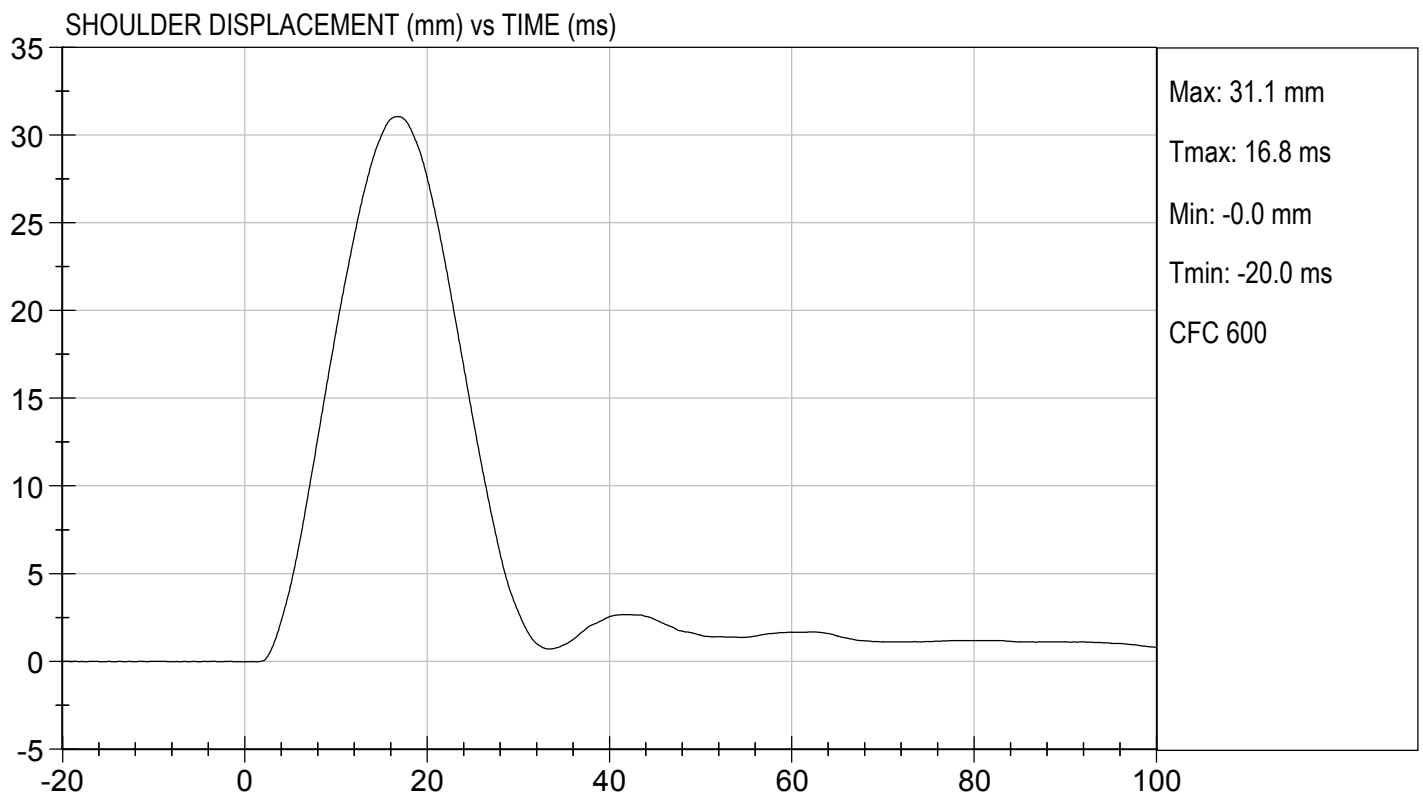
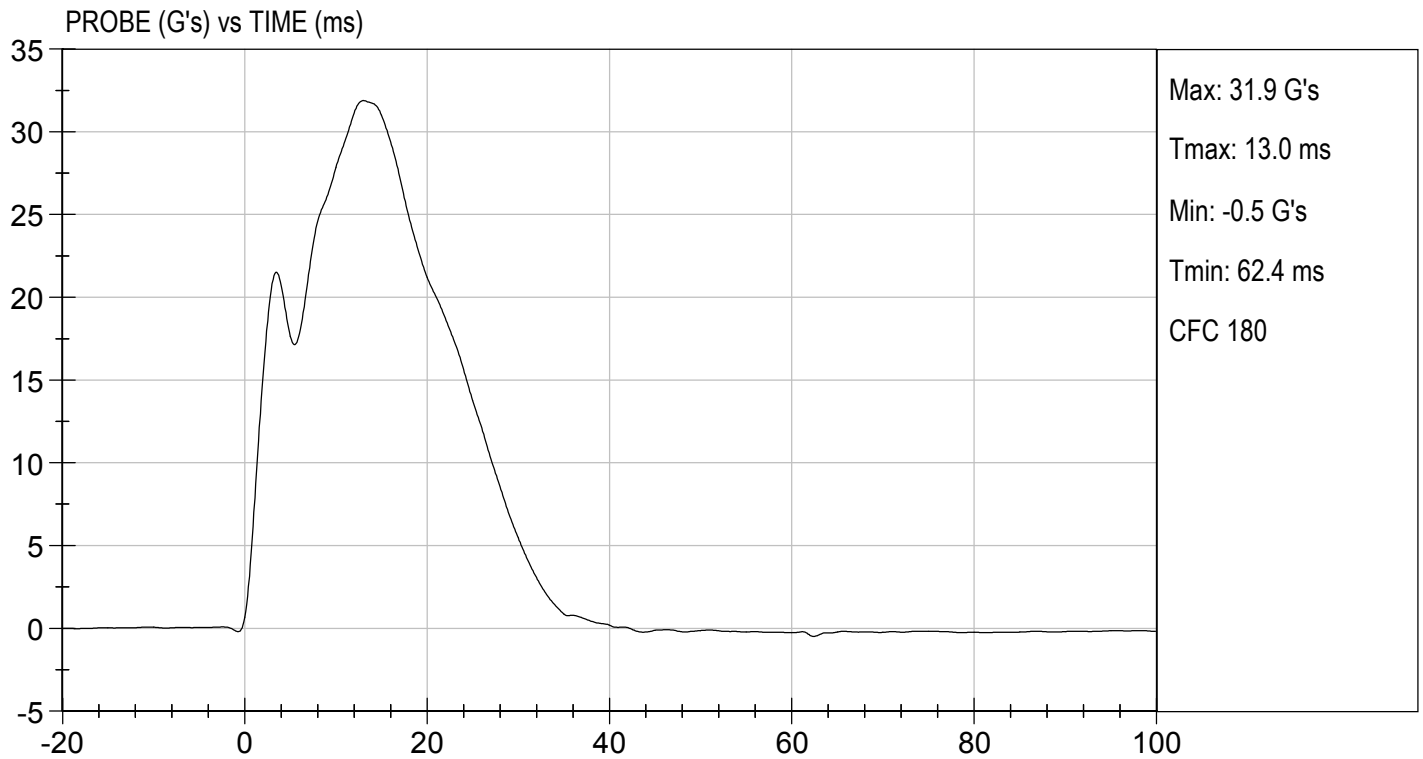
01/09/2020
 Test Date


 Approved By



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

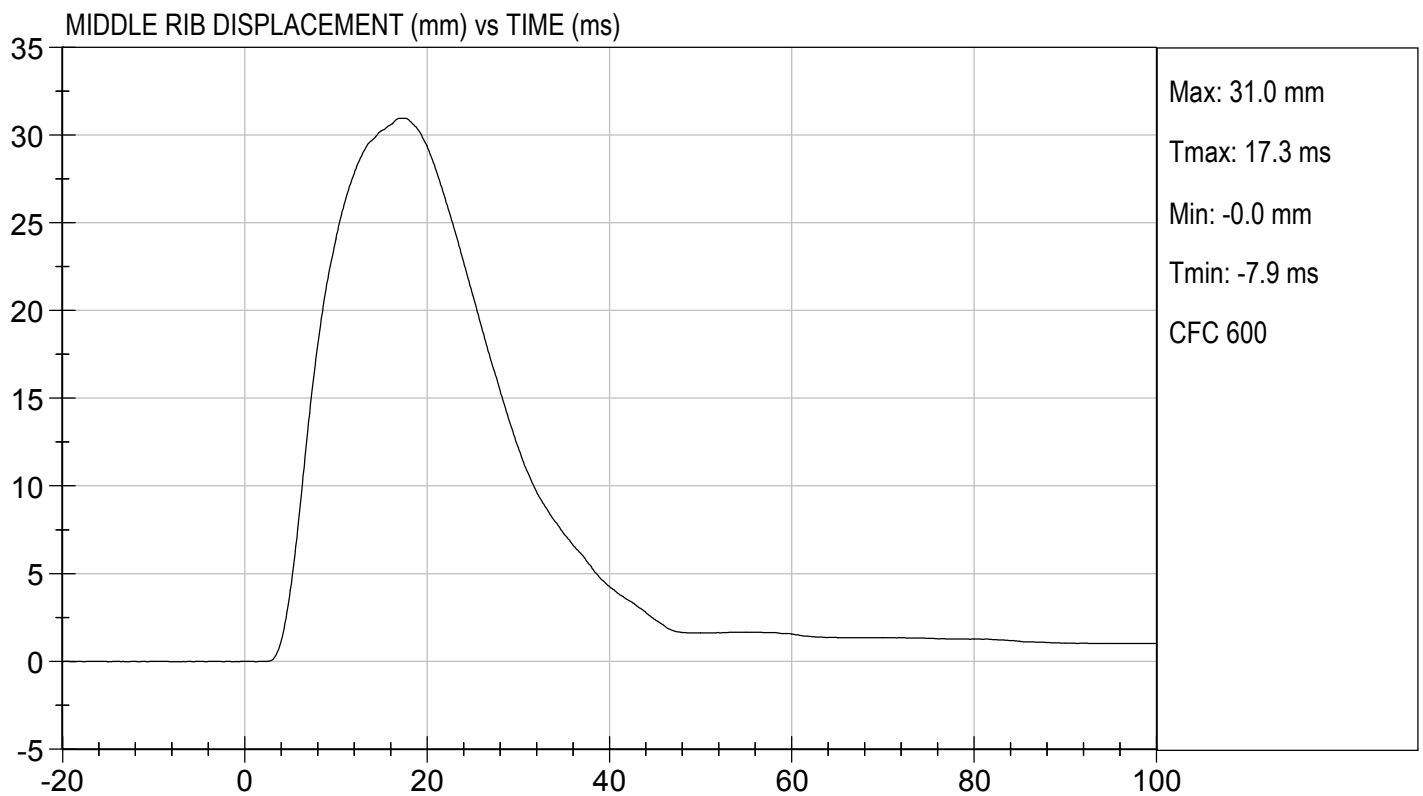
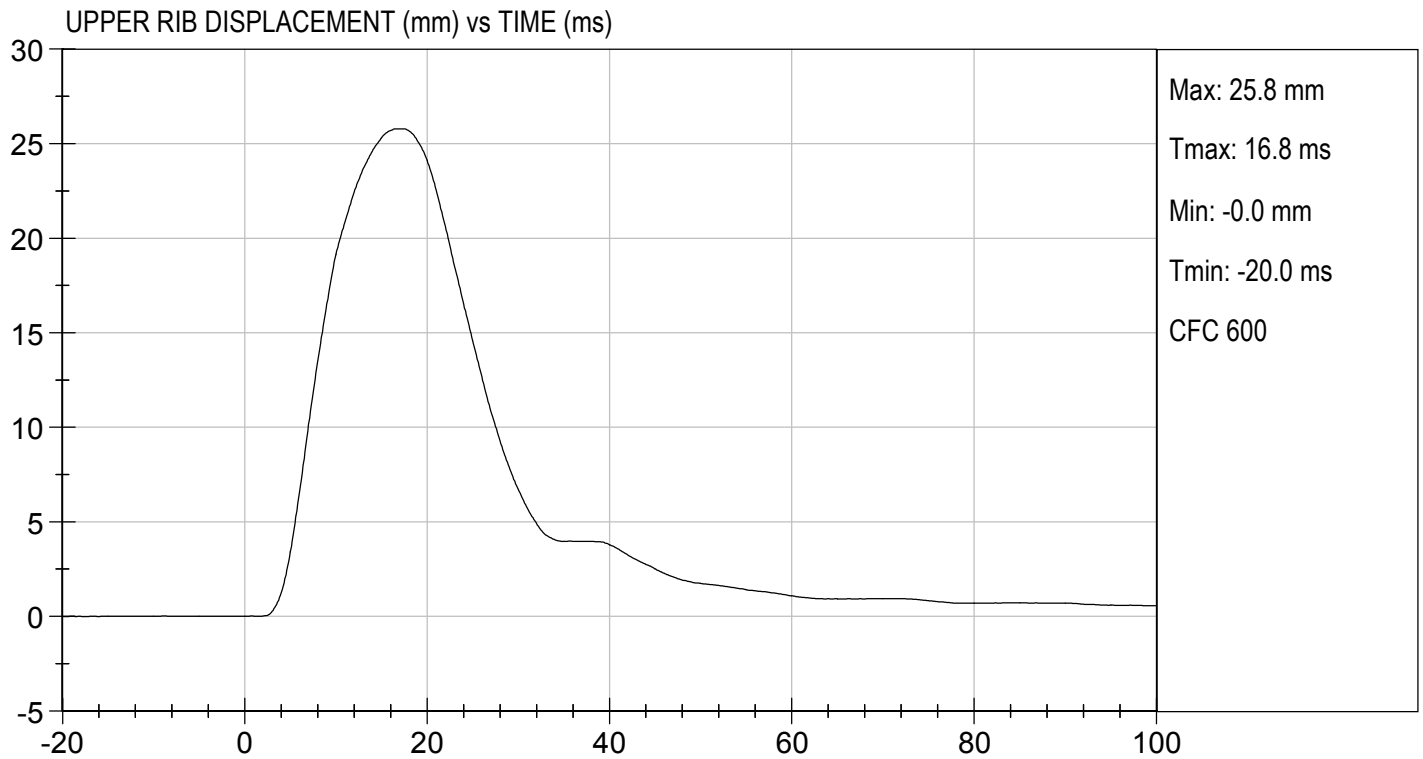
TEST DATE: 01/09/2020
TEST #: D200114





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

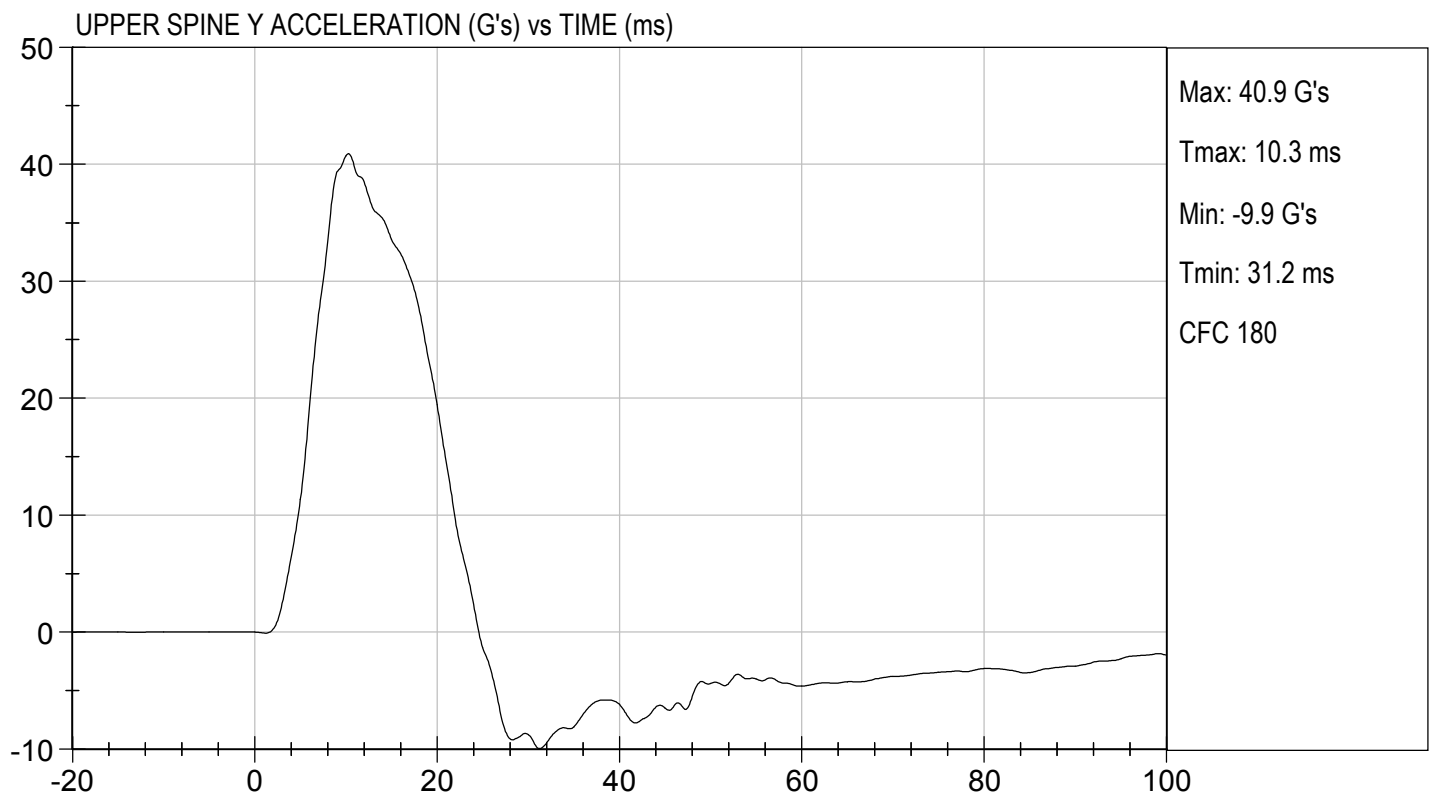
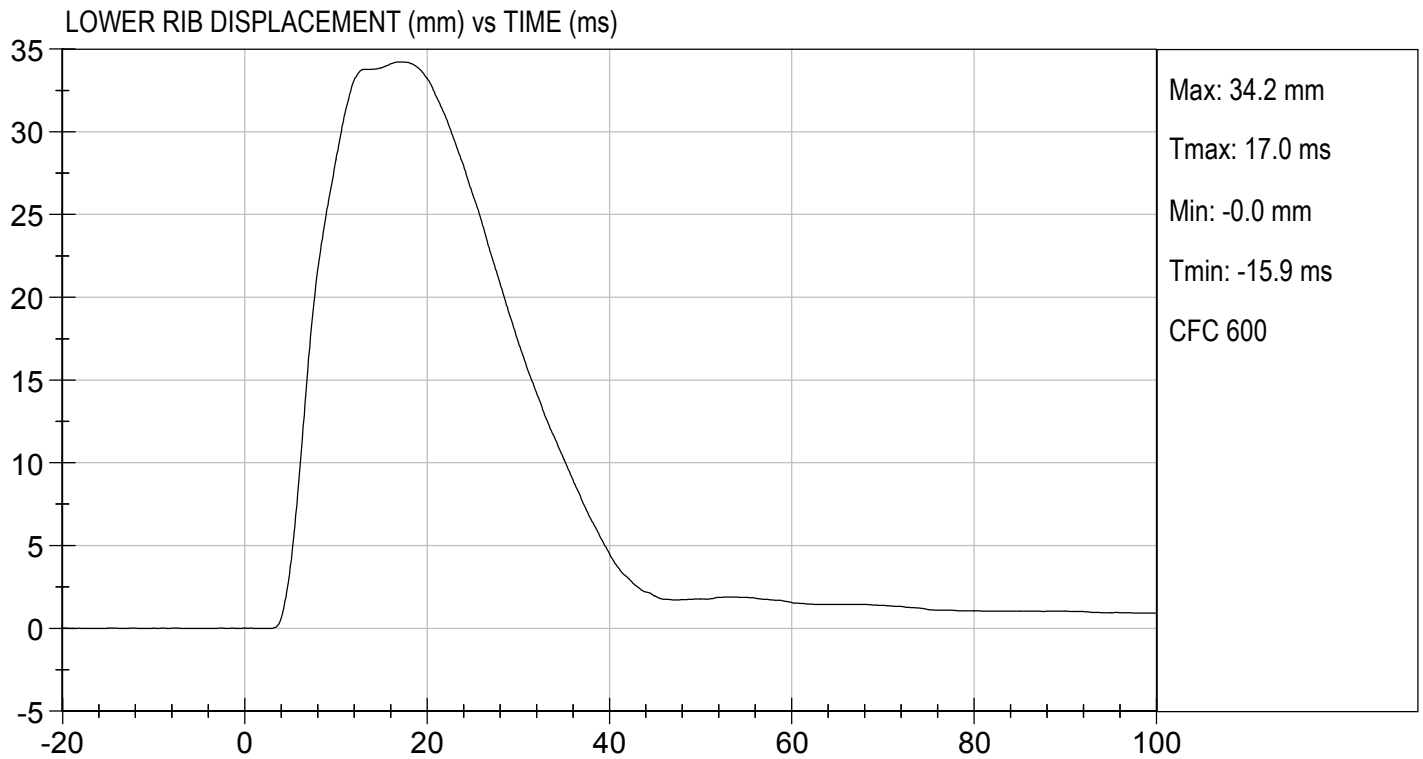
TEST DATE: 01/09/2020
TEST #: D200114





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

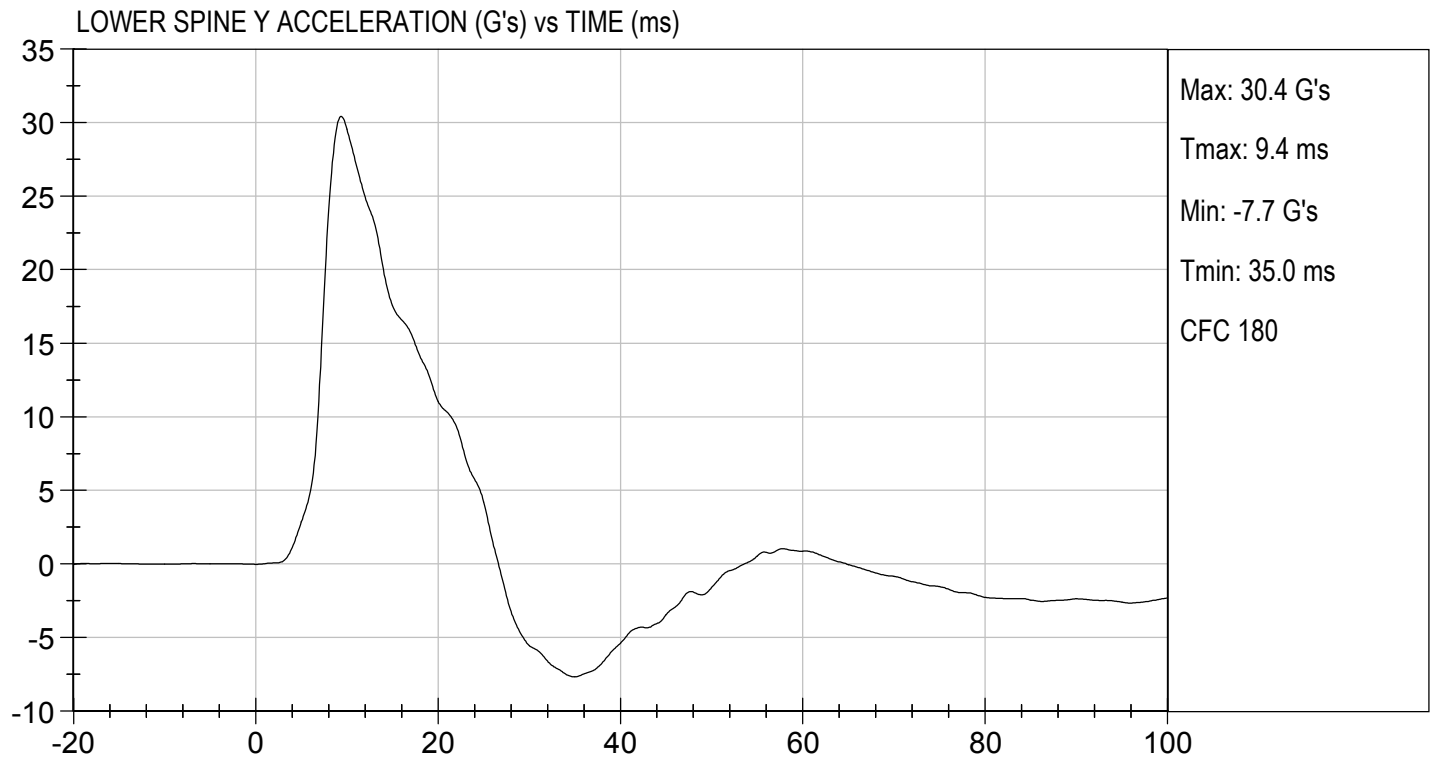
TEST DATE: 01/09/2020
TEST #: D200114





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 01/09/2020
TEST #: D200114



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

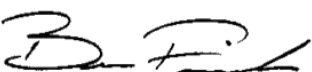
ATD Serial No: 306

Test I.D: D200115

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	36	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results				Pass


 Laboratory Technician

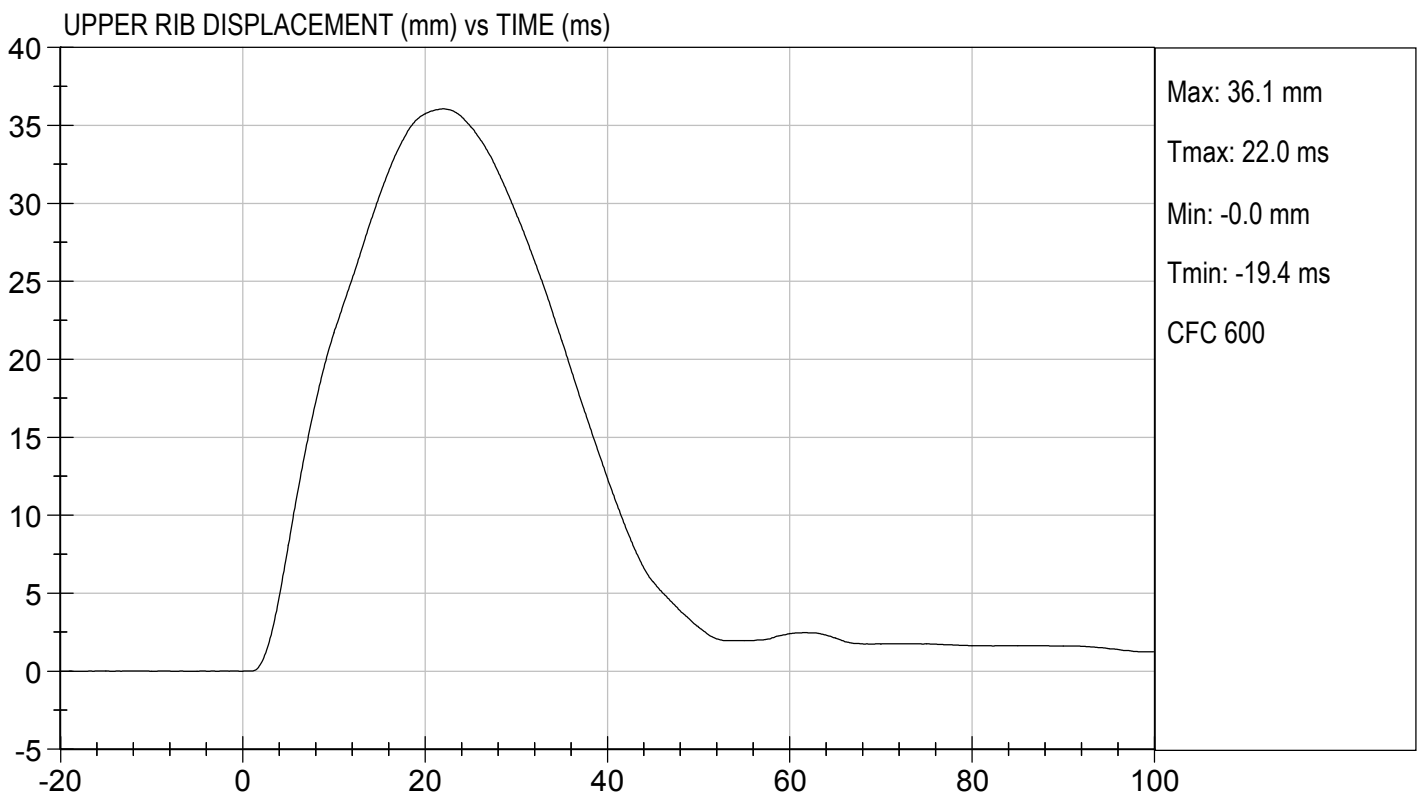
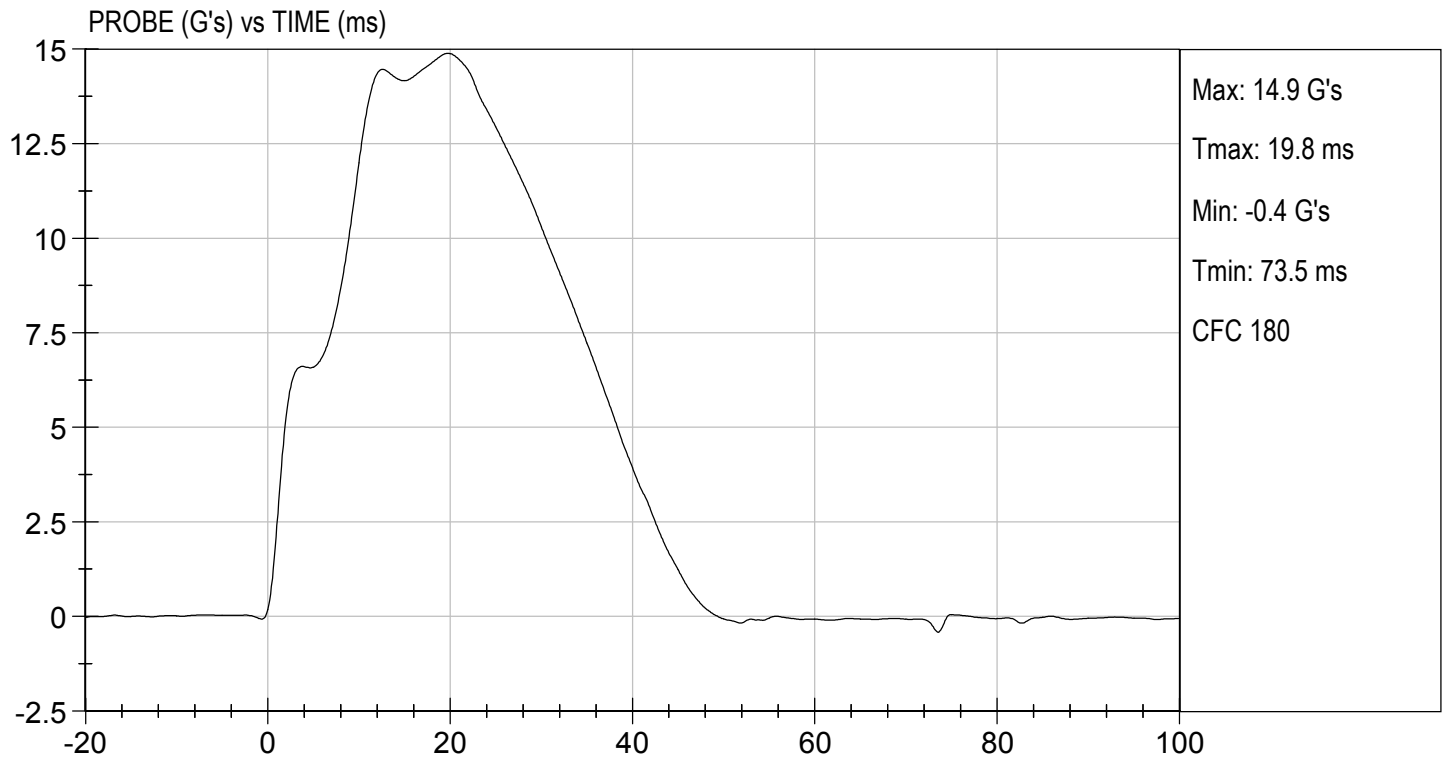
01/09/2020
 Test Date


 Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

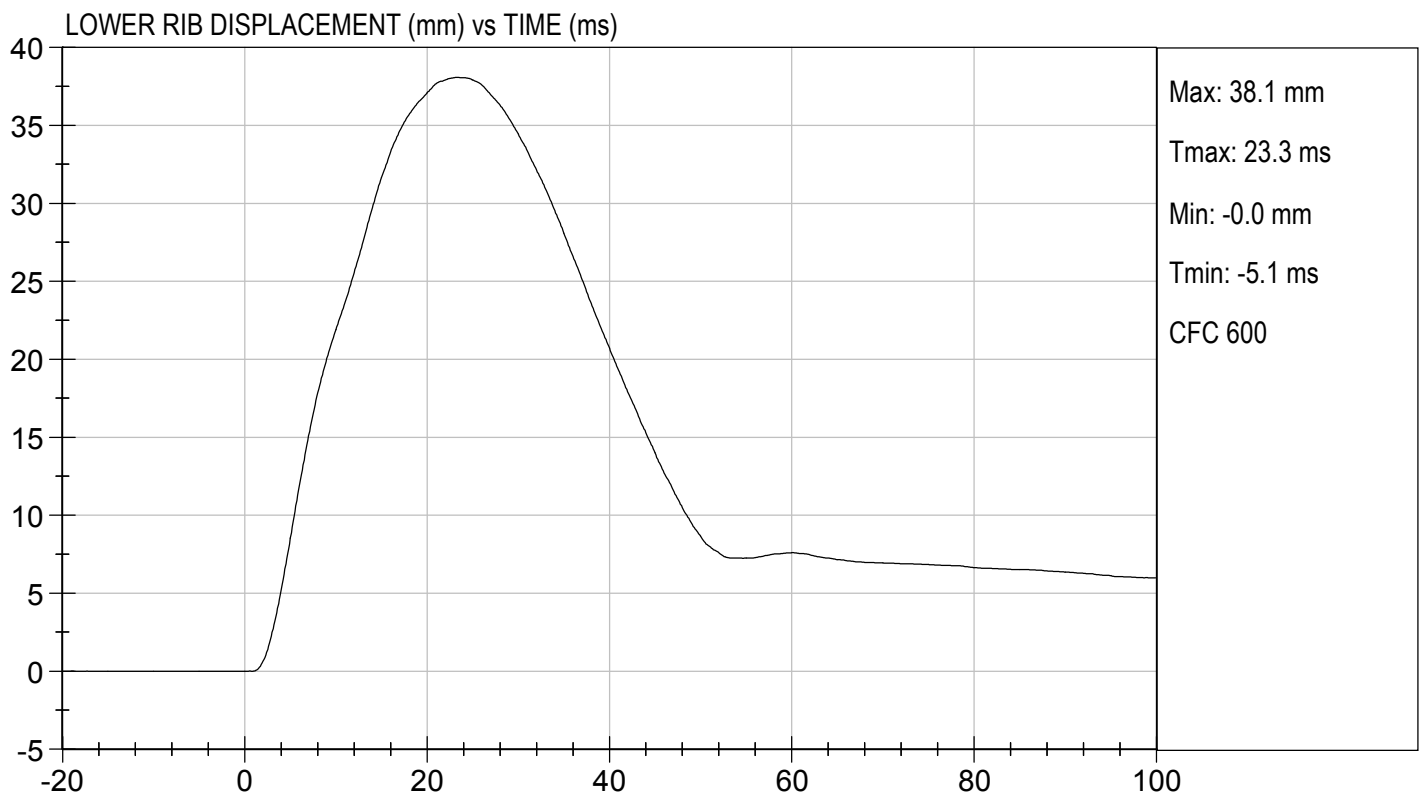
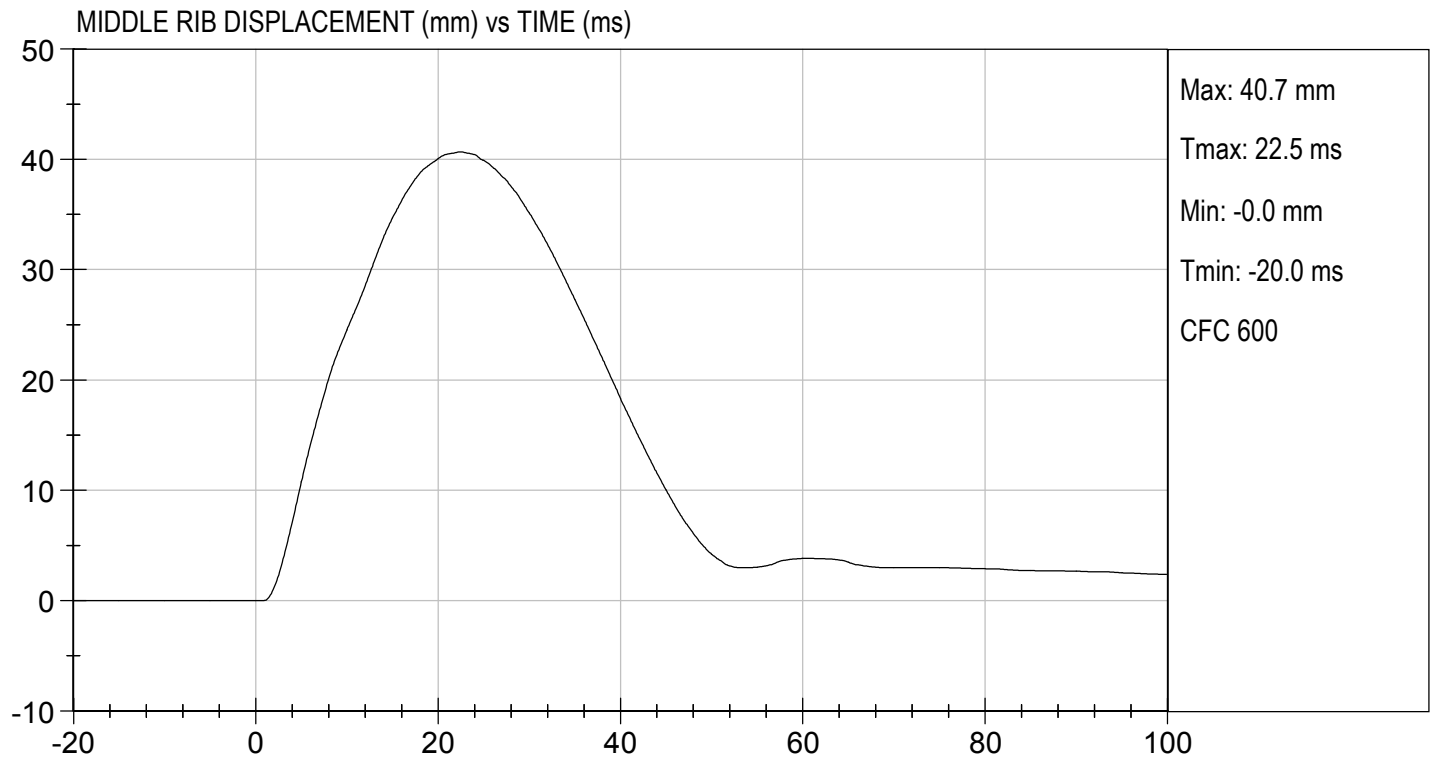
TEST DATE: 01/09/2020
TEST #: D200115





TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

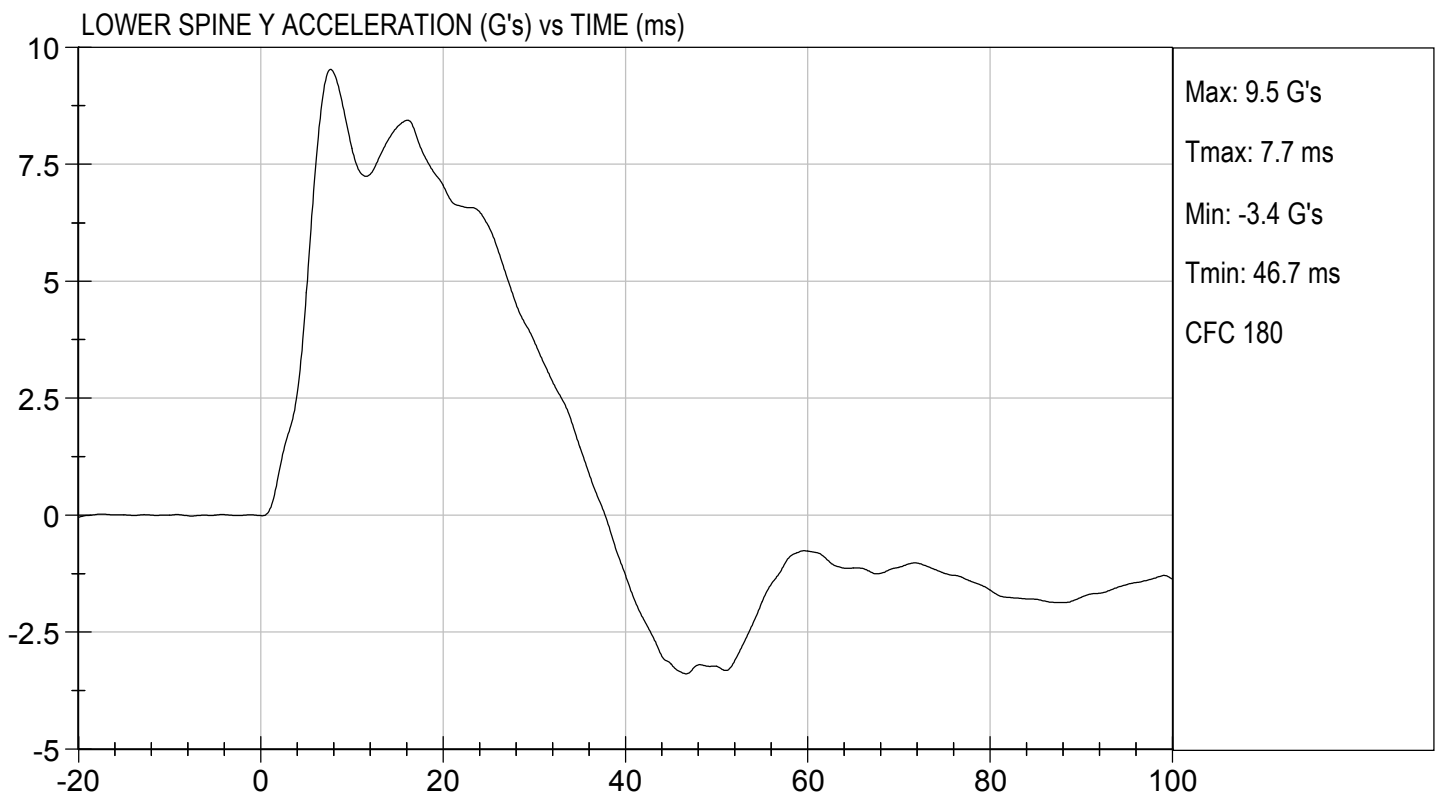
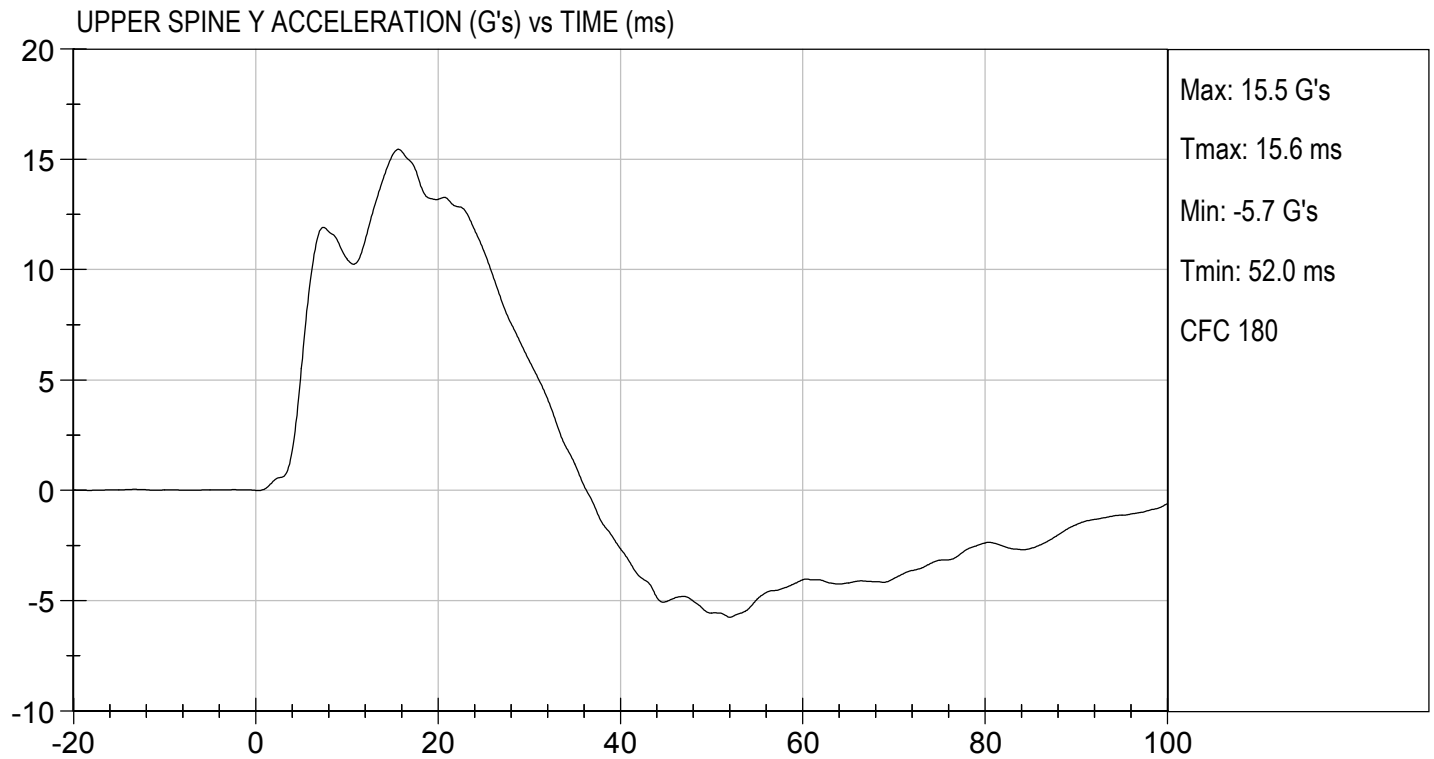
TEST DATE: 01/09/2020
TEST #: D200115





TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 01/09/2020
TEST #: D200115



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

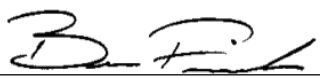
Test I.D: D200116

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	40	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

01/09/2020

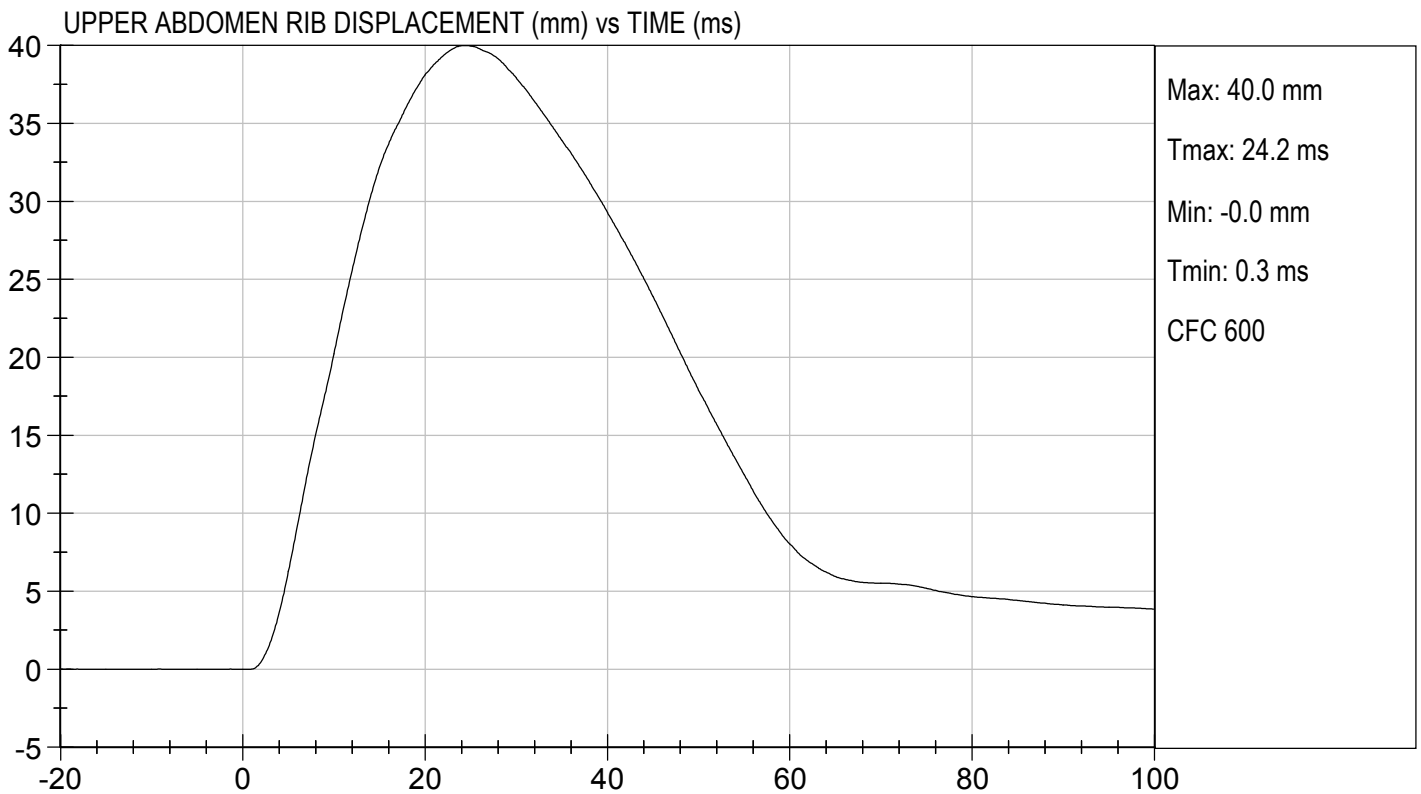
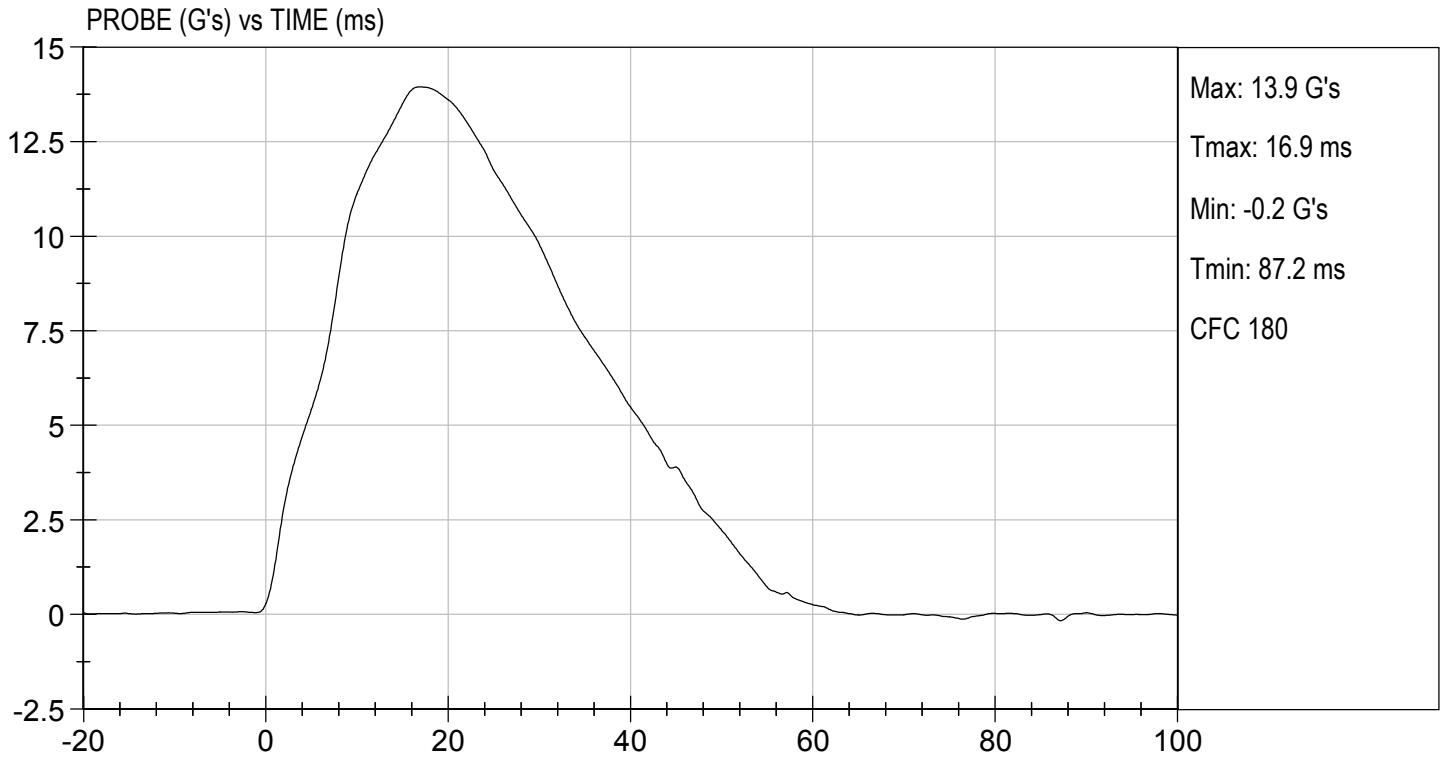
Test Date


Approved By



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

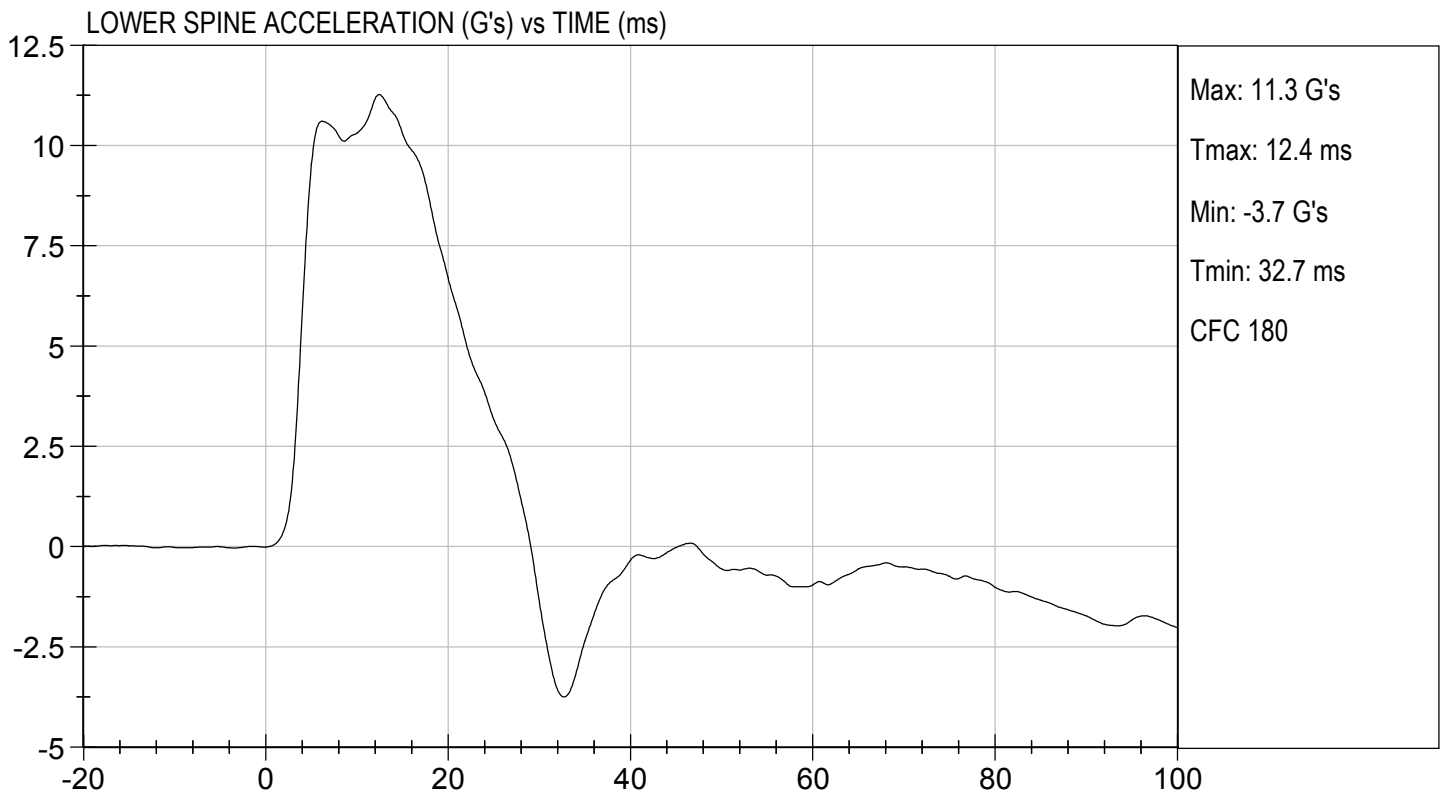
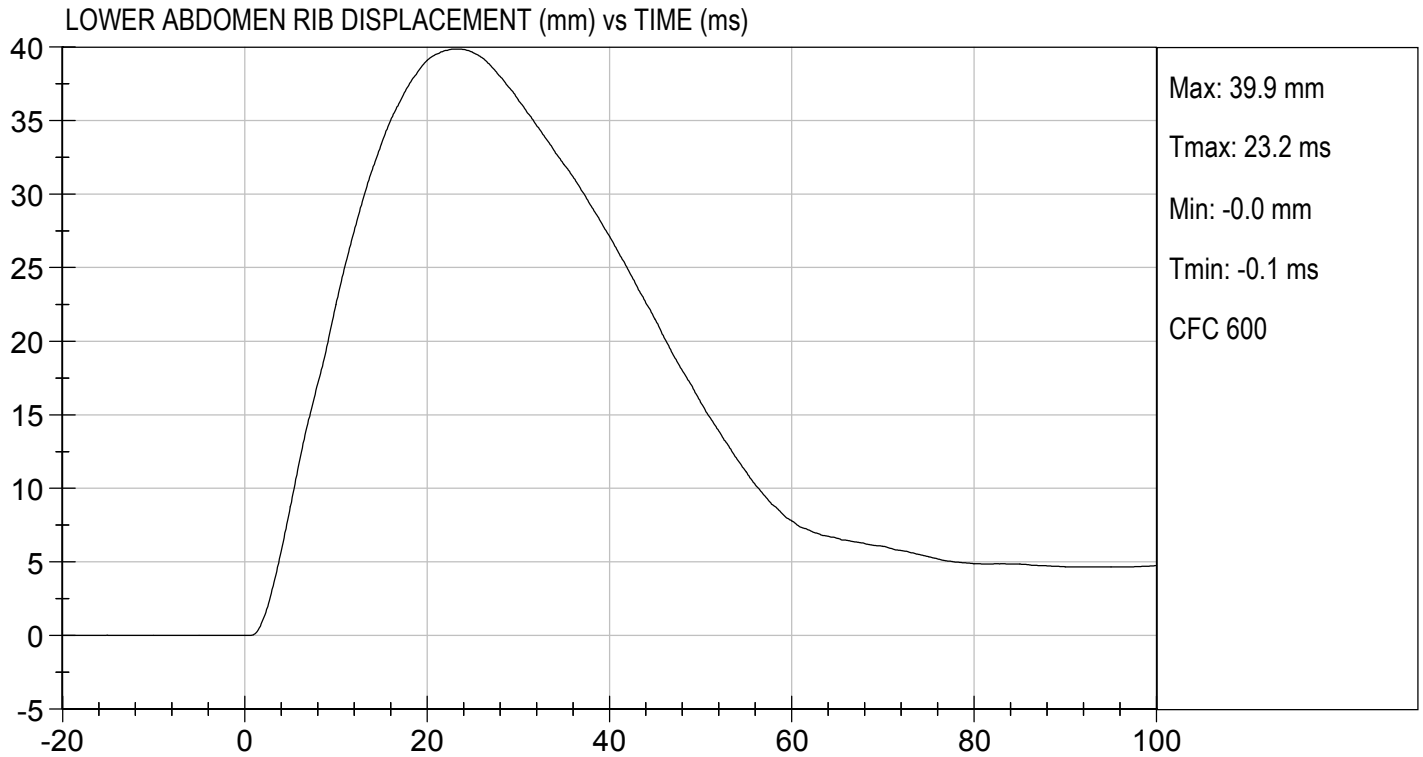
TEST DATE: 01/09/2020
TEST #: D200116





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

TEST DATE: 01/09/2020
TEST #: D200116



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

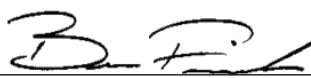
ATD Serial No: 306

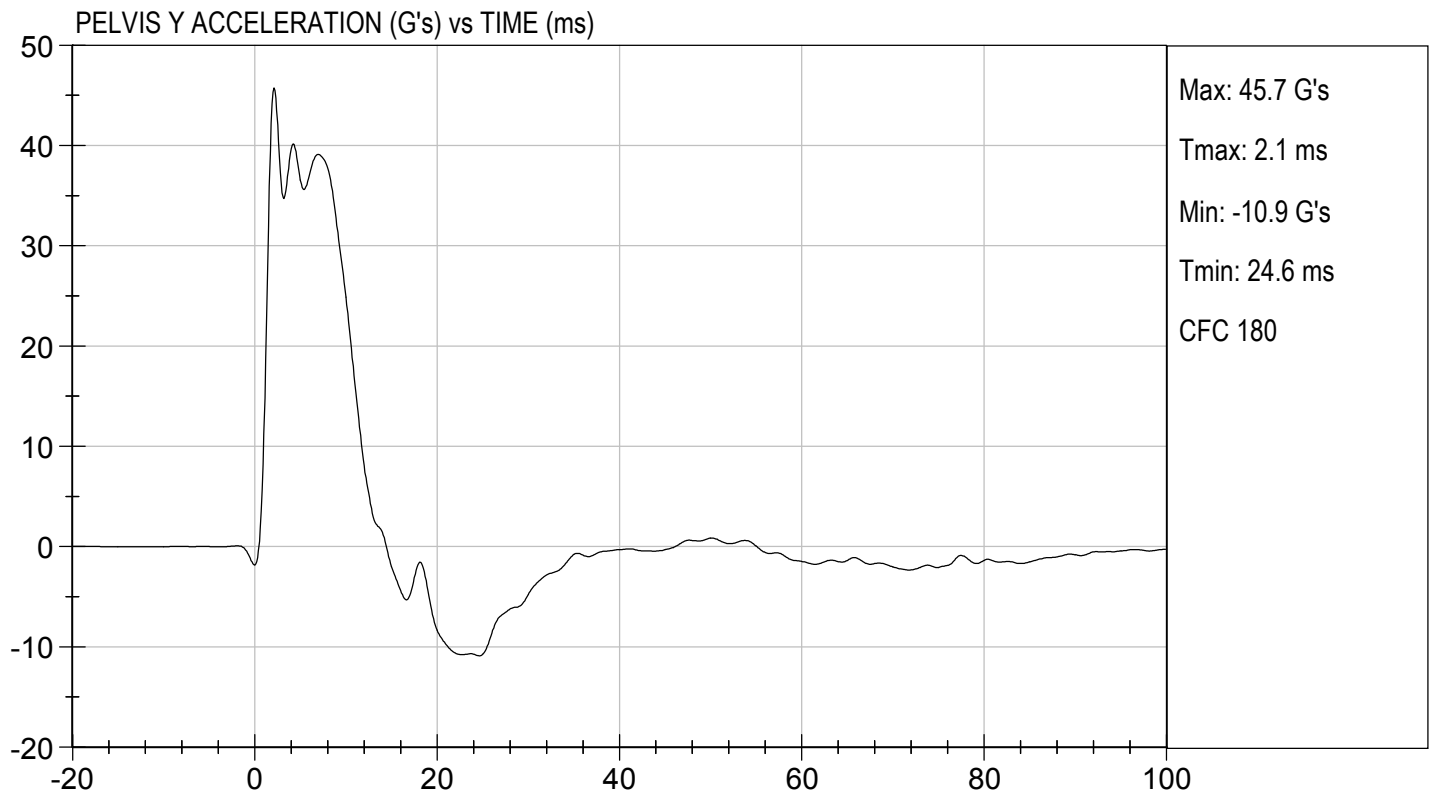
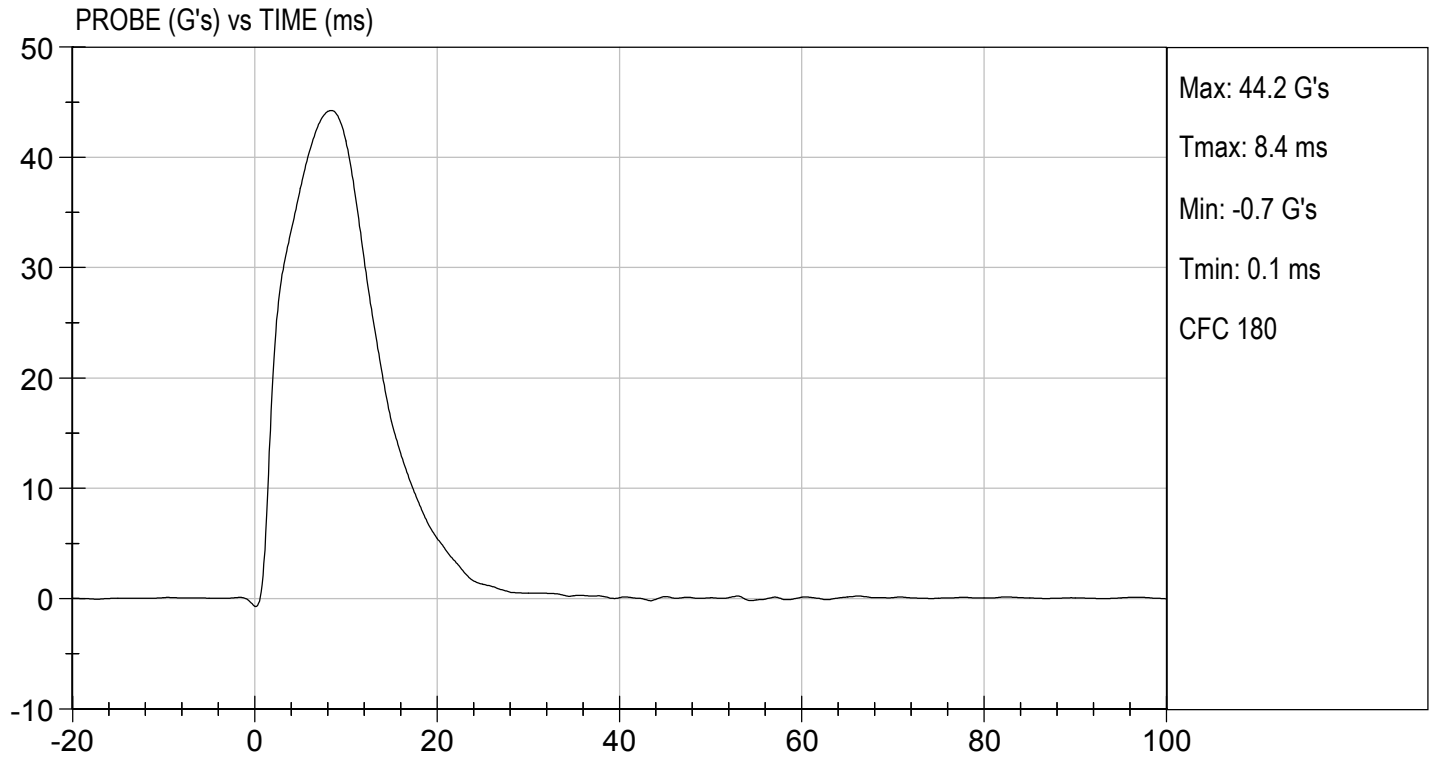
Test I.D: D200117

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,985	Pass
Overall Test Results				Pass


Laboratory Technician

01/09/2020
Test Date

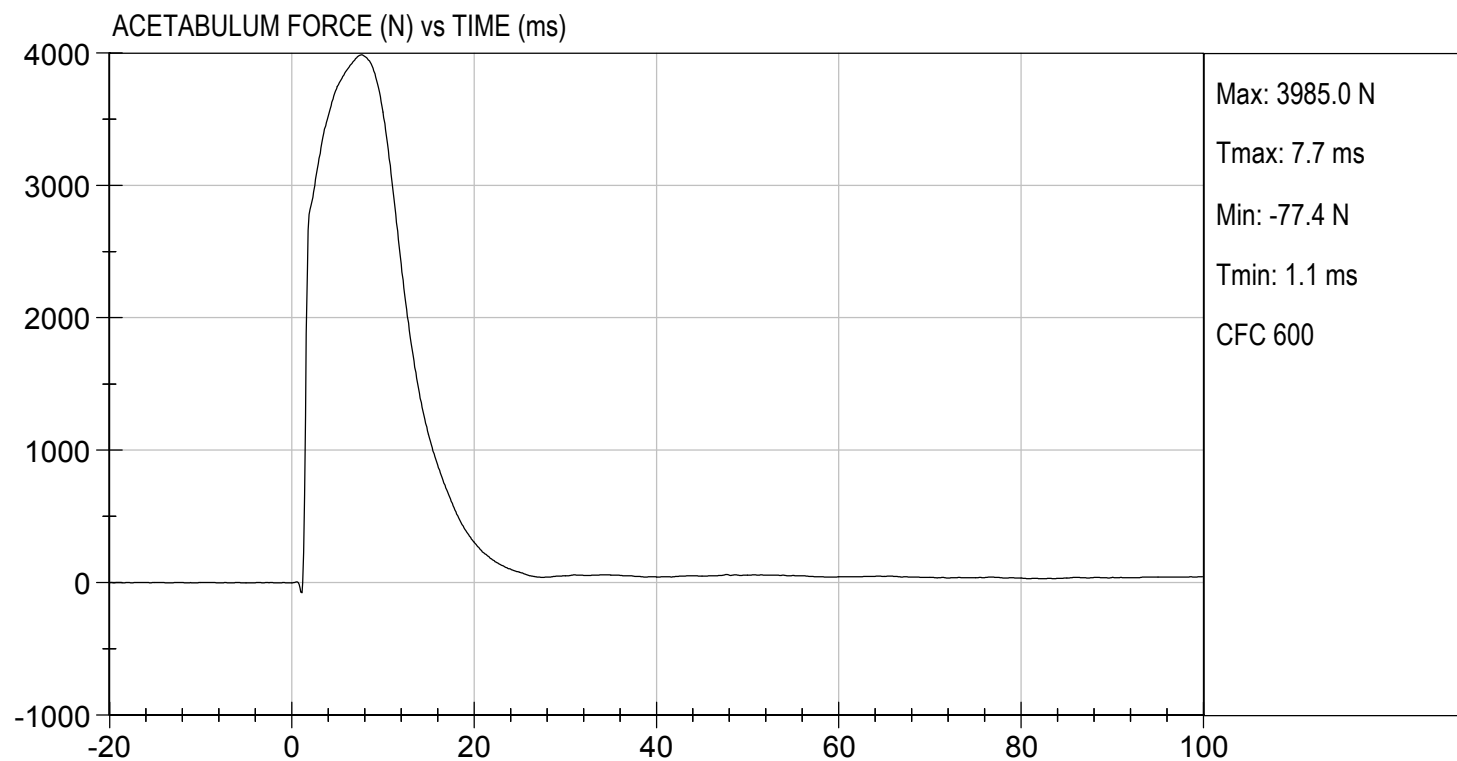

Approved By





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

TEST DATE: 01/09/2020
TEST #: D200117



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

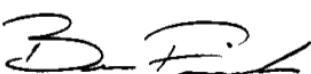
Test I.D: D200118

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.7	Pass
Humidity	%	10 to 70	21	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	36 to 45	41	Pass
Pelvis Y Acceleration	G's	28 to 39	35	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,619	Pass
Overall Test Results				Pass


Laboratory Technician

01/13/2020

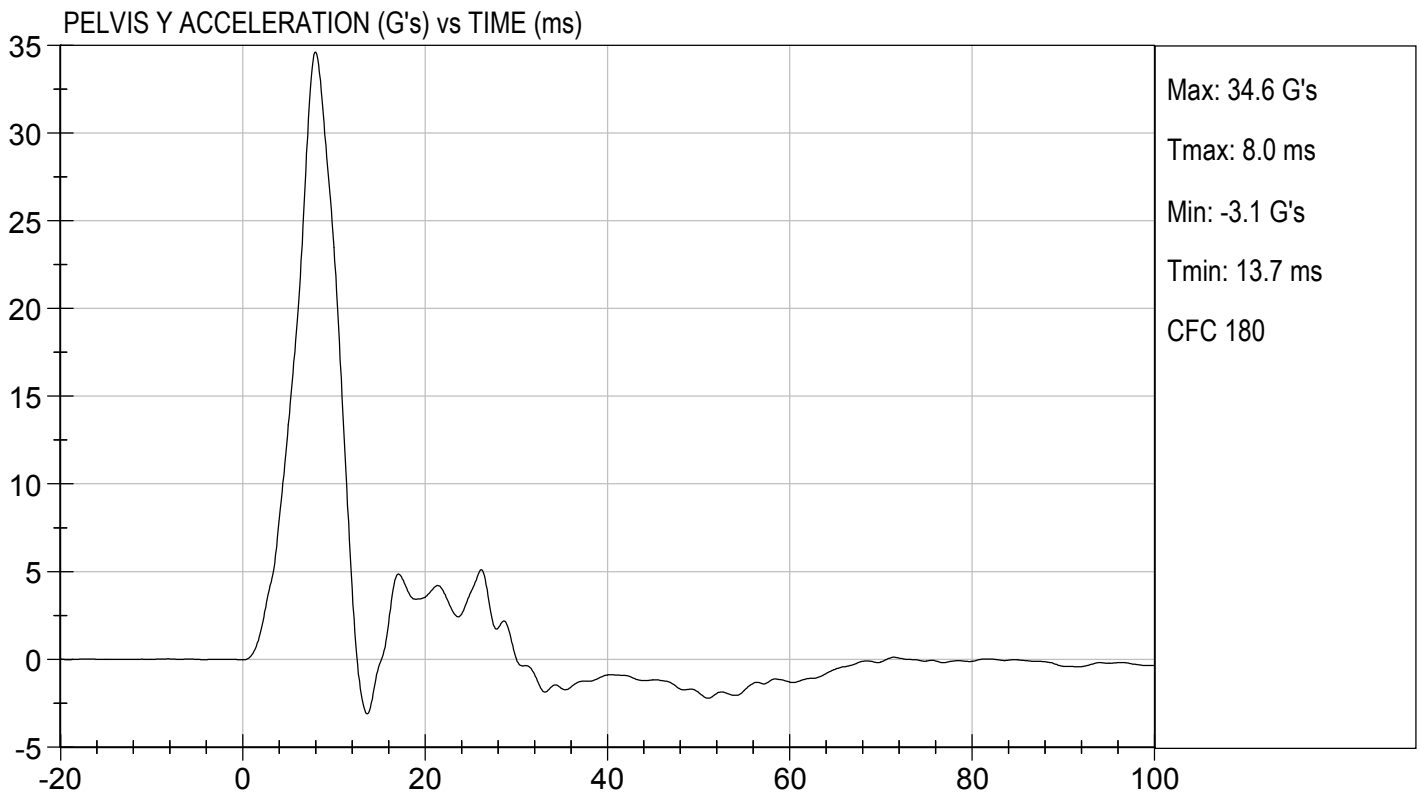
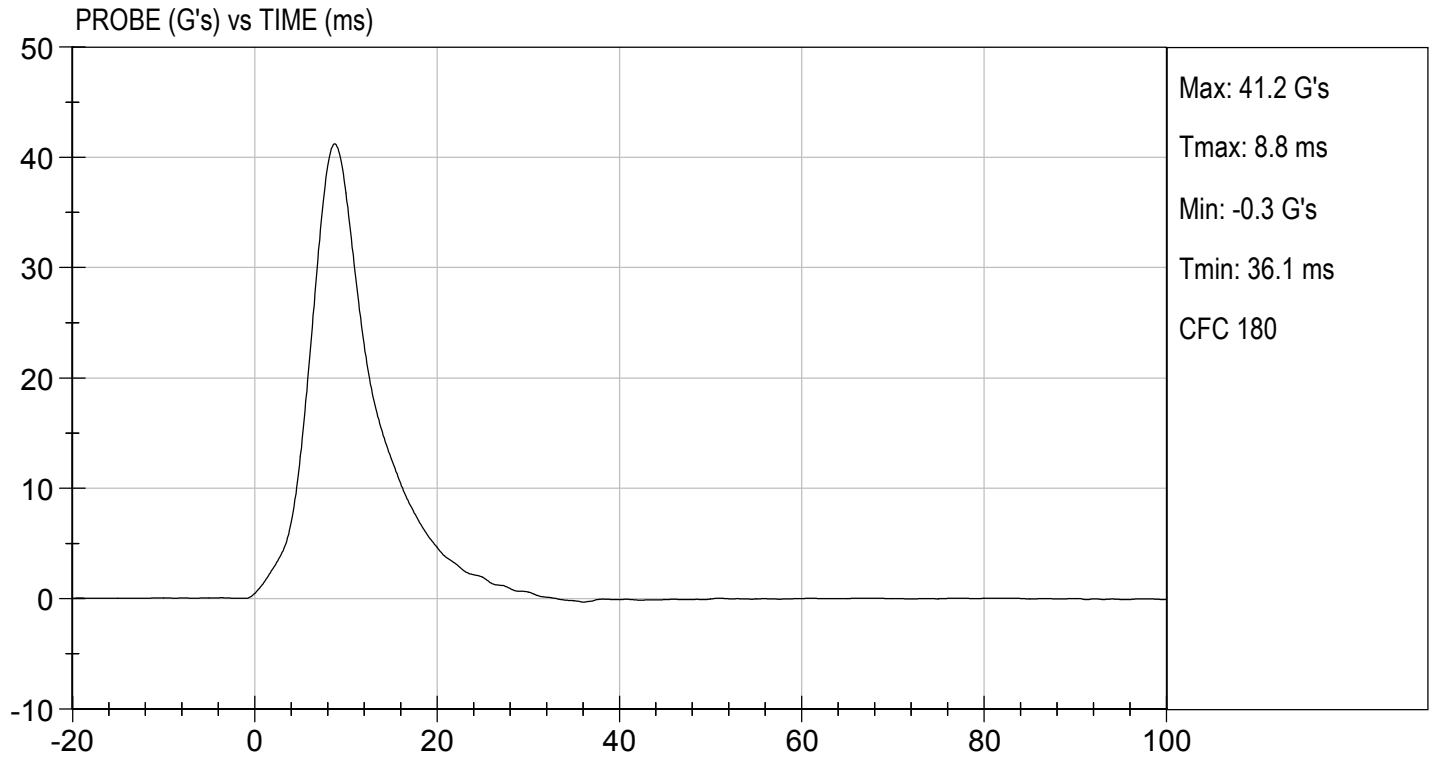
Test Date


Approved By



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

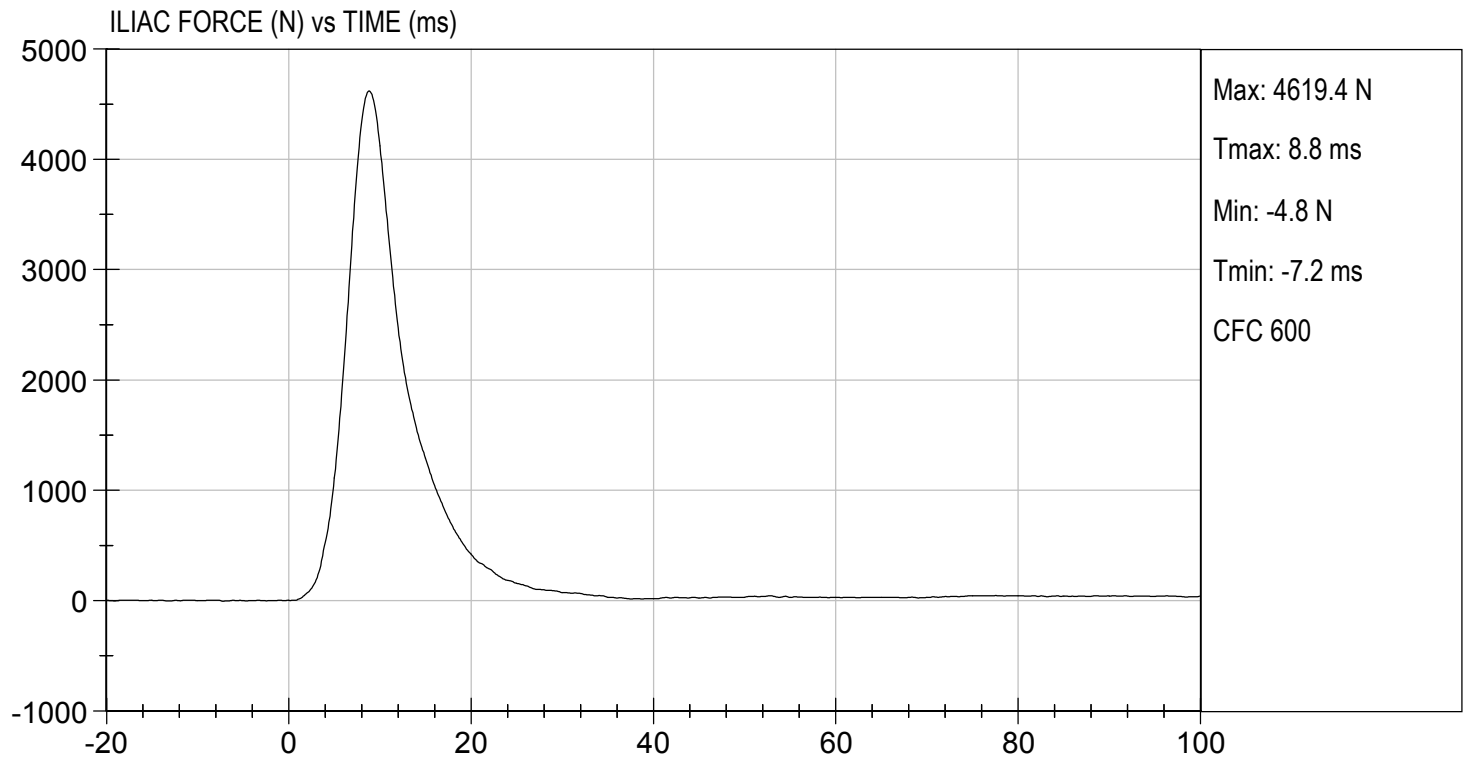
TEST DATE: 01/13/2020
TEST #: D200118





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

TEST DATE: 01/13/2020
TEST #: D200118



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

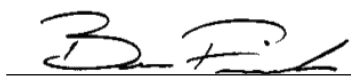
ATD Serial No: 306

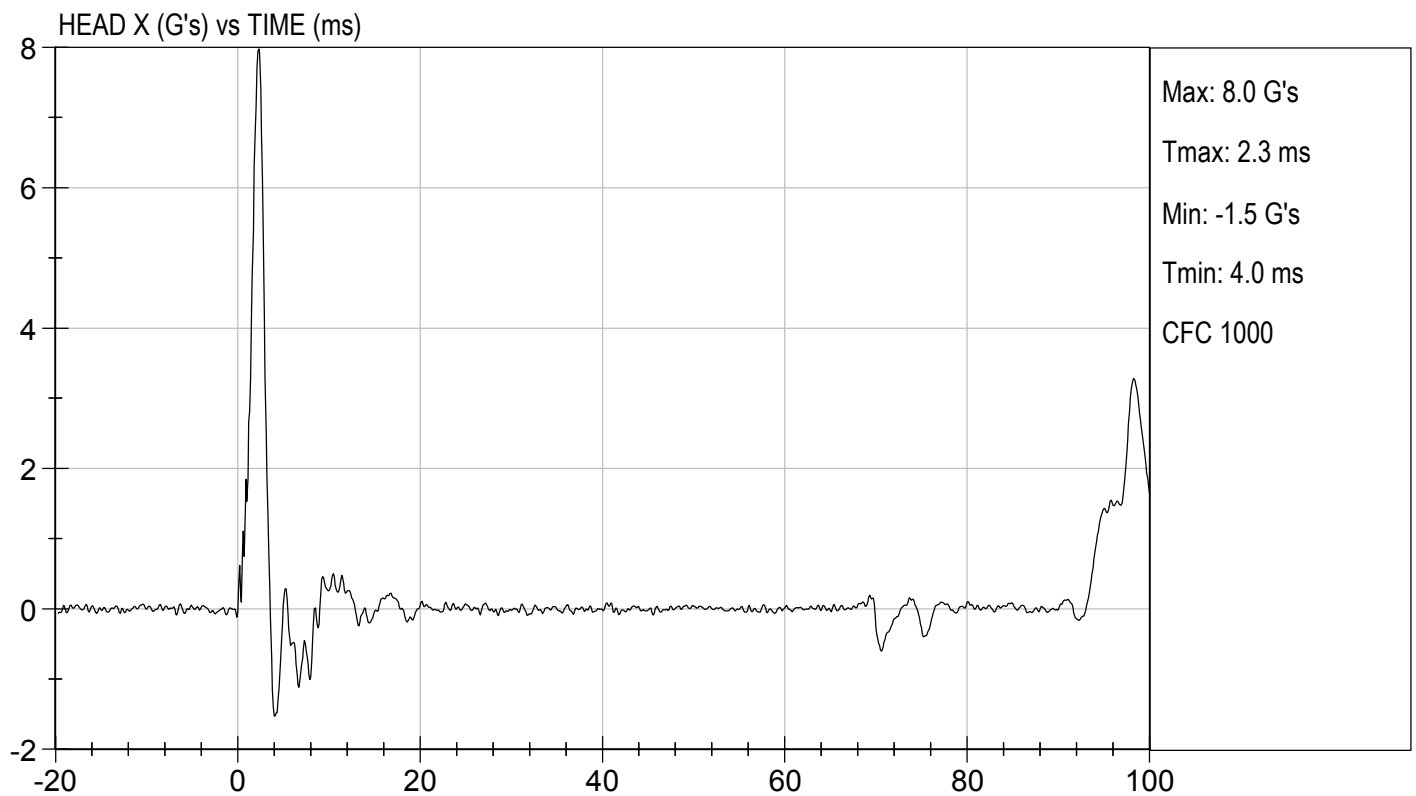
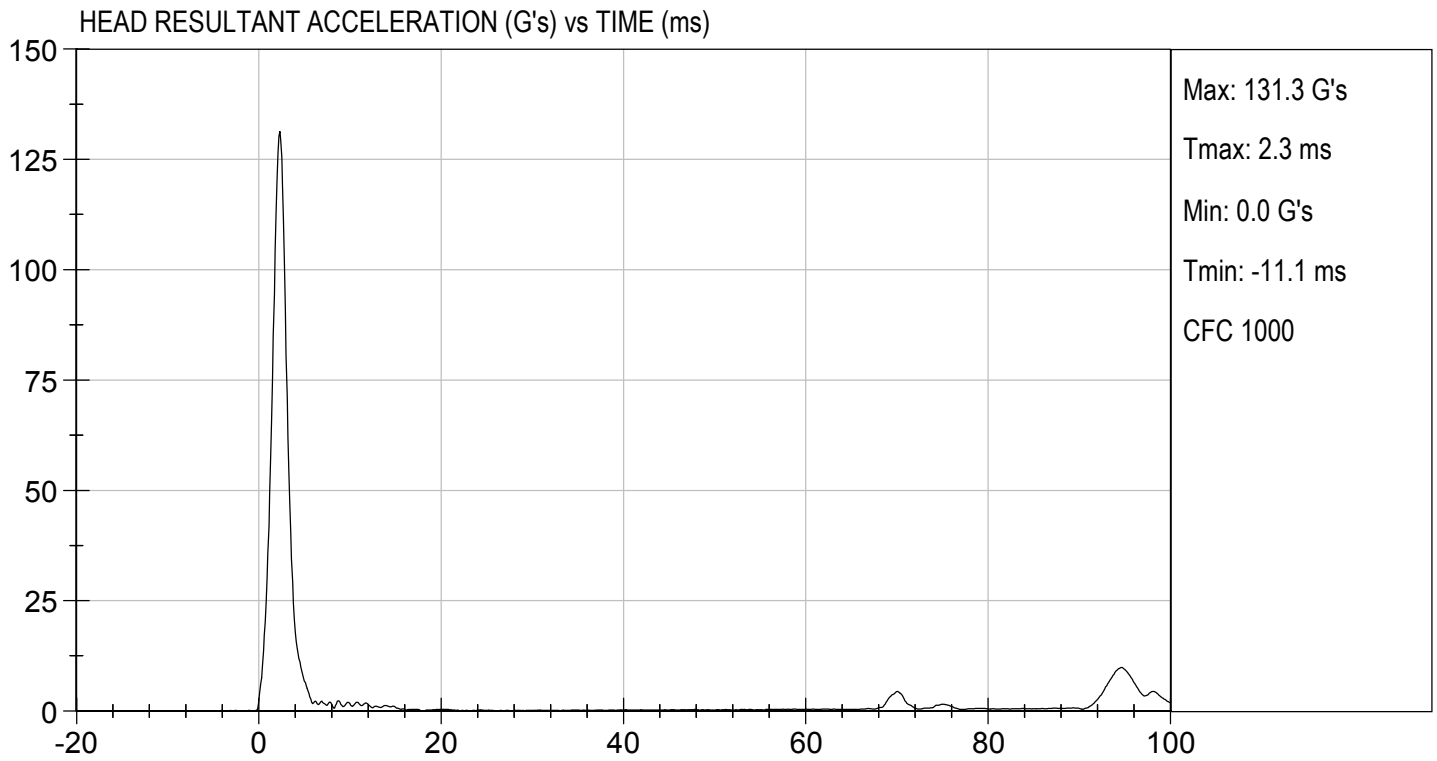
Test ID: D200361

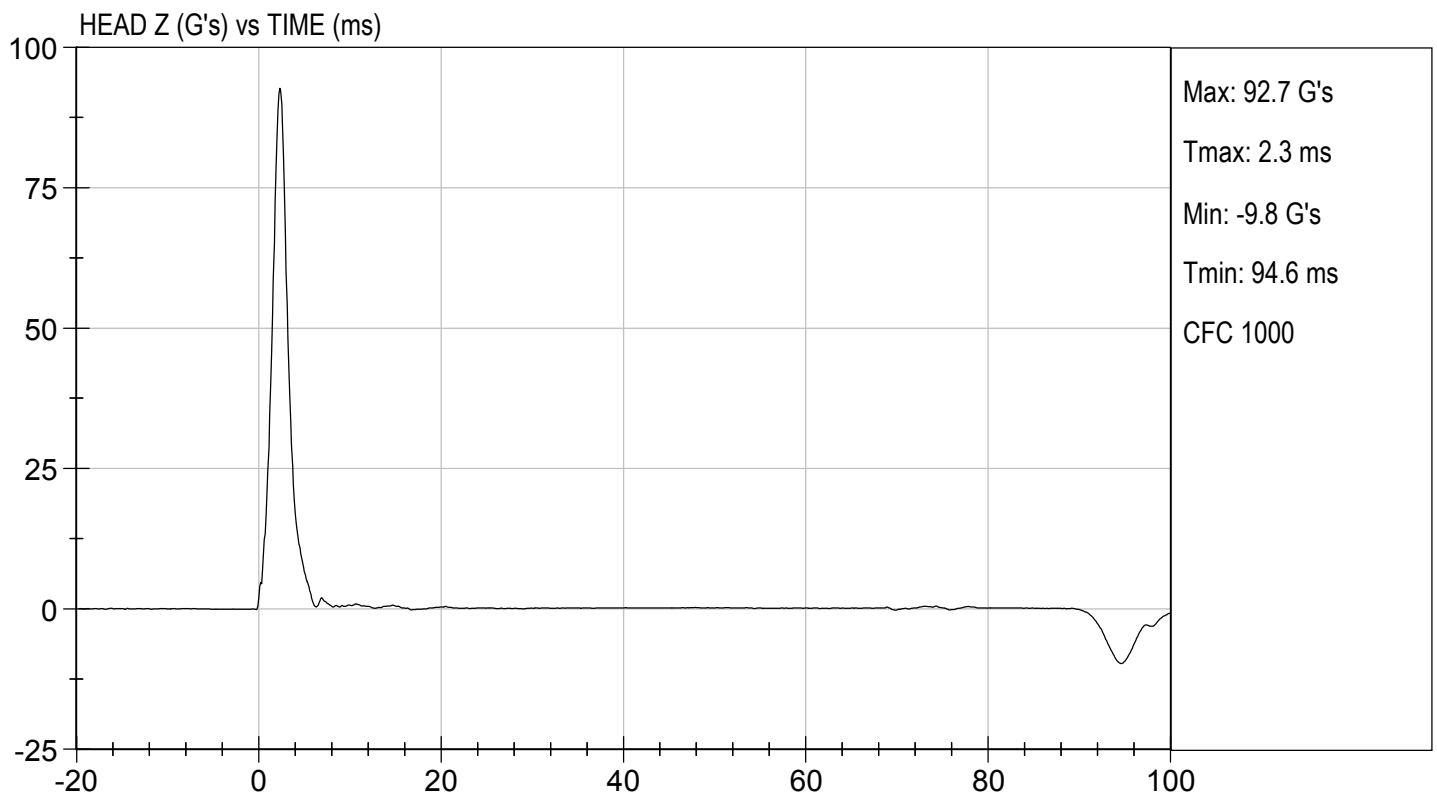
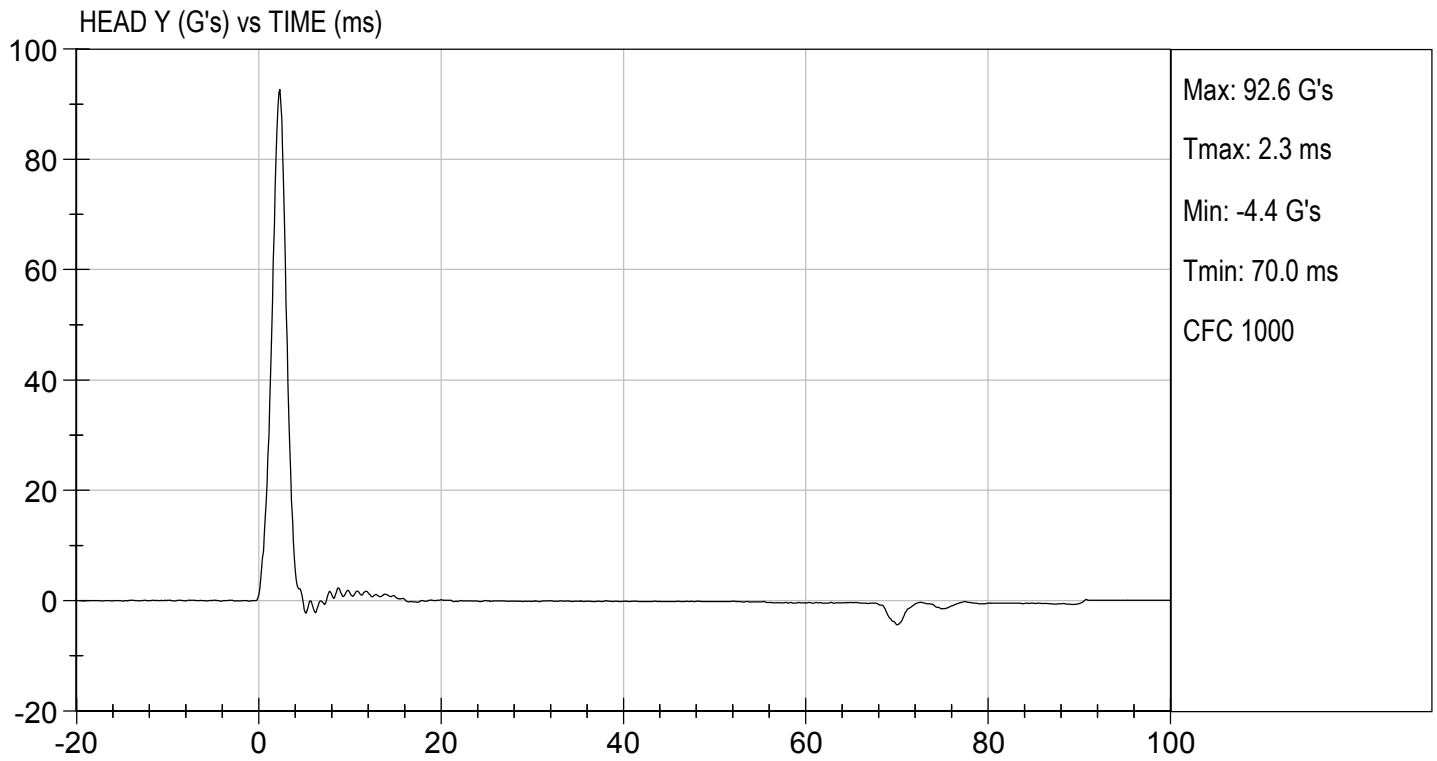
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	115 to 137	131	Pass
Peak Longitudinal Acceleration	G's	+/- 15	8.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

01/31/2020
Test Date


Approved By





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

ATD Serial No: 306

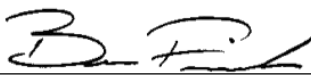
Test I.D: D200362

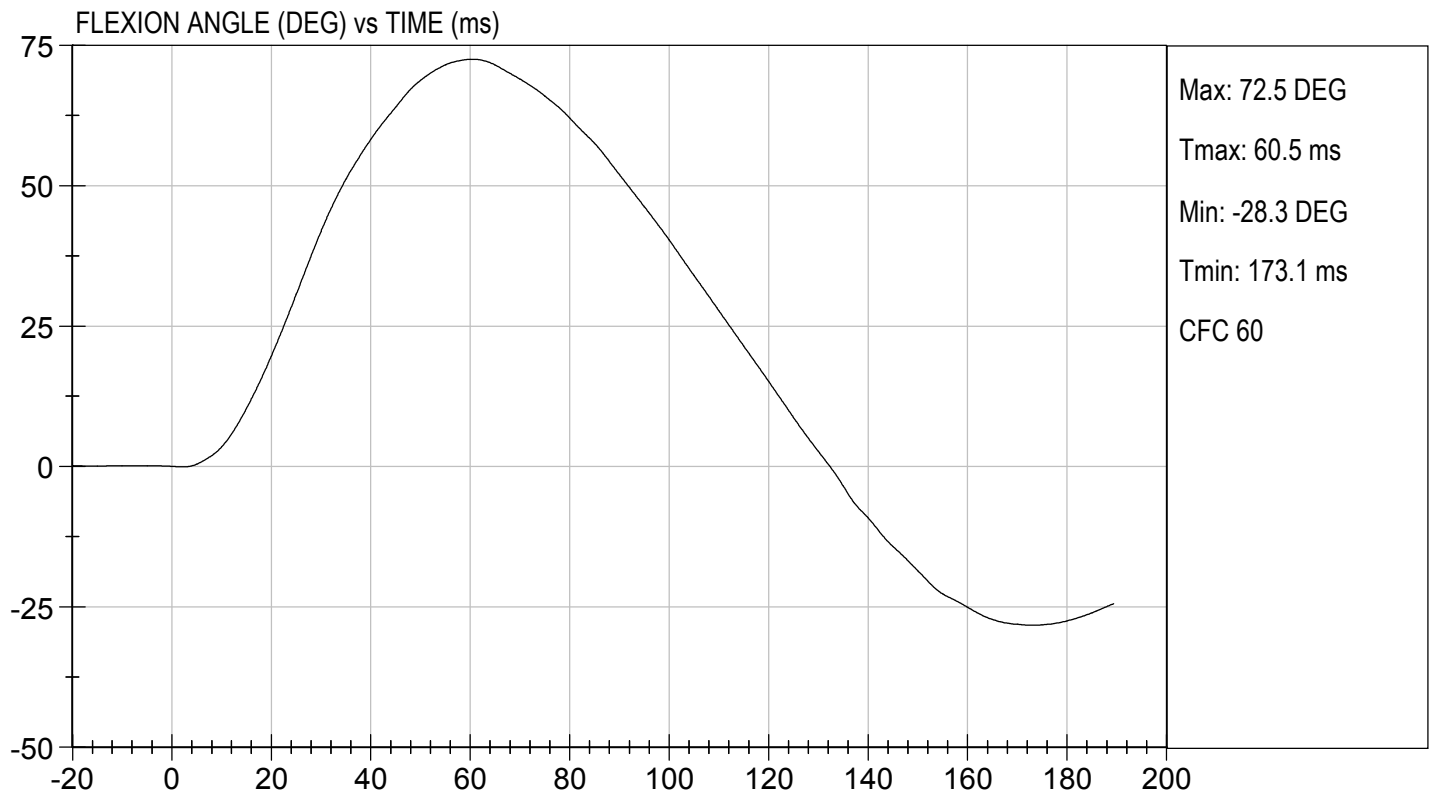
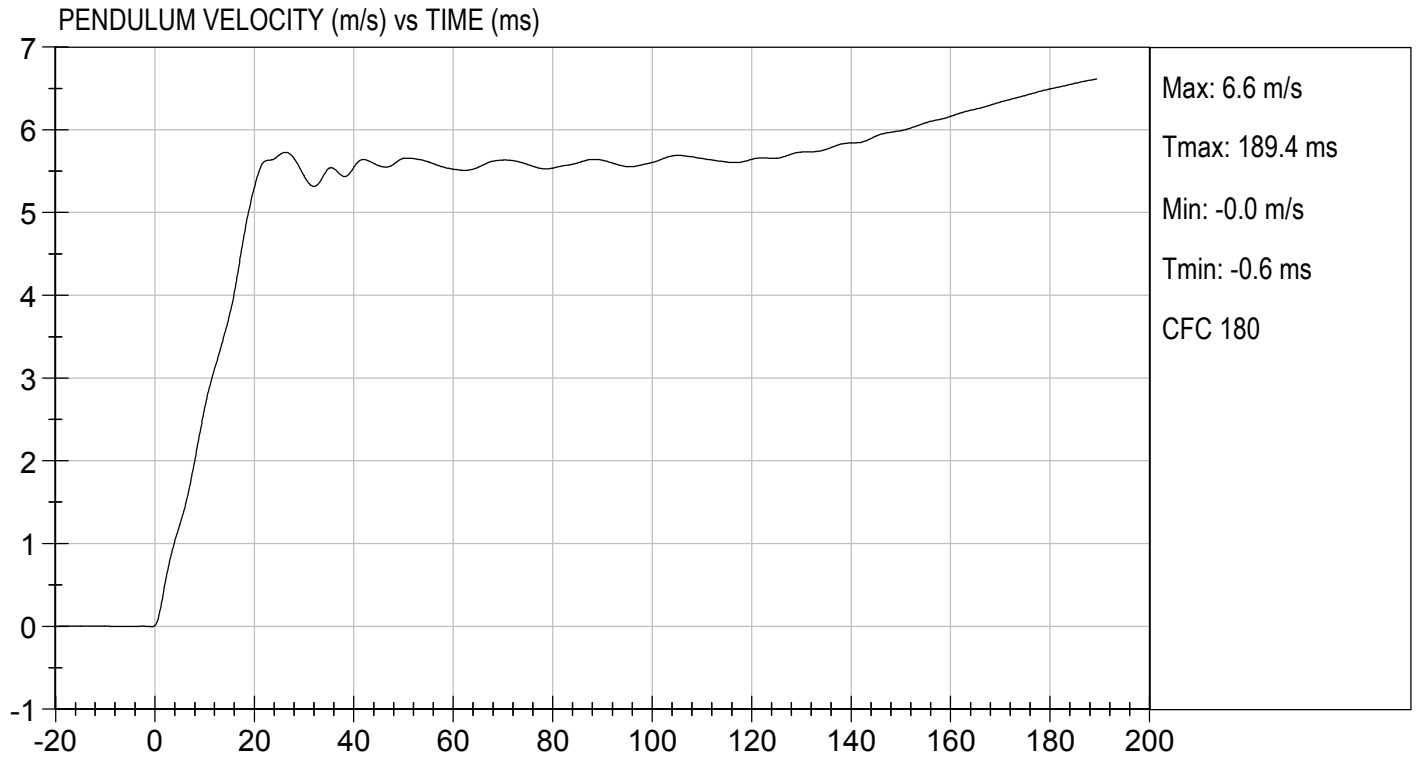
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.6	Pass
Humidity		%	10 to 70	23	Pass
Impact Velocity		m/s	5.51 to 5.63	5.63	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.63	Pass
	15 ms	m/s	3.30 to 4.10	3.76	Pass
	20 ms	m/s	4.40 to 5.40	5.30	Pass
	25 ms	m/s	5.40 to 6.10	5.69	Pass
	25-100 ms	m/s	5.50 to 6.20	5.73	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results					Pass


 Laboratory Technician

01/31/2020

Test Date

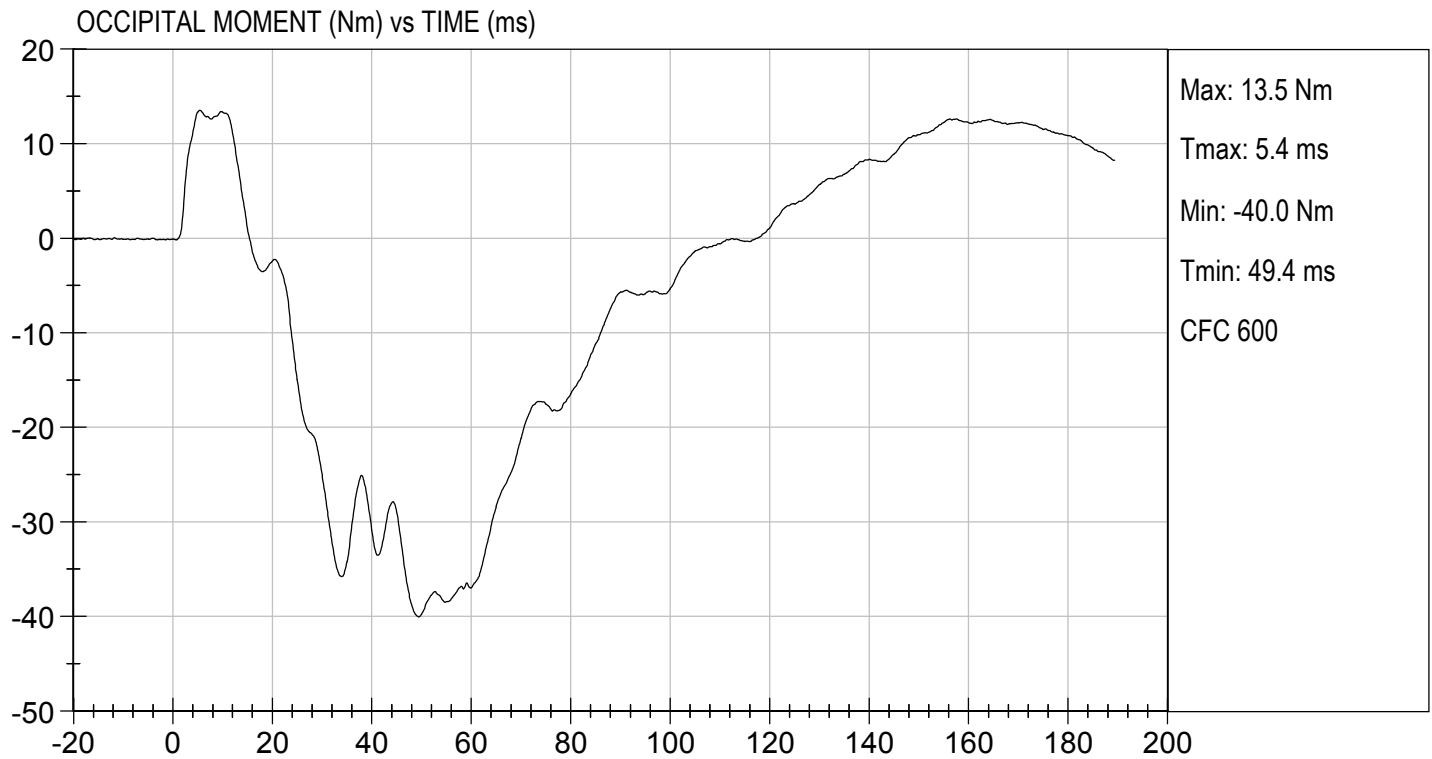

 Approved By





TEST DESC: NECK BENDING
VELOCITY: 18.48 ft/s, 5.63 m/s

TEST DATE: 01/31/2020
TEST #: D200362



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

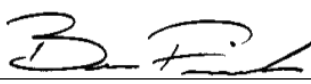
ATD Serial No: 306

Test ID: D200363

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	25	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

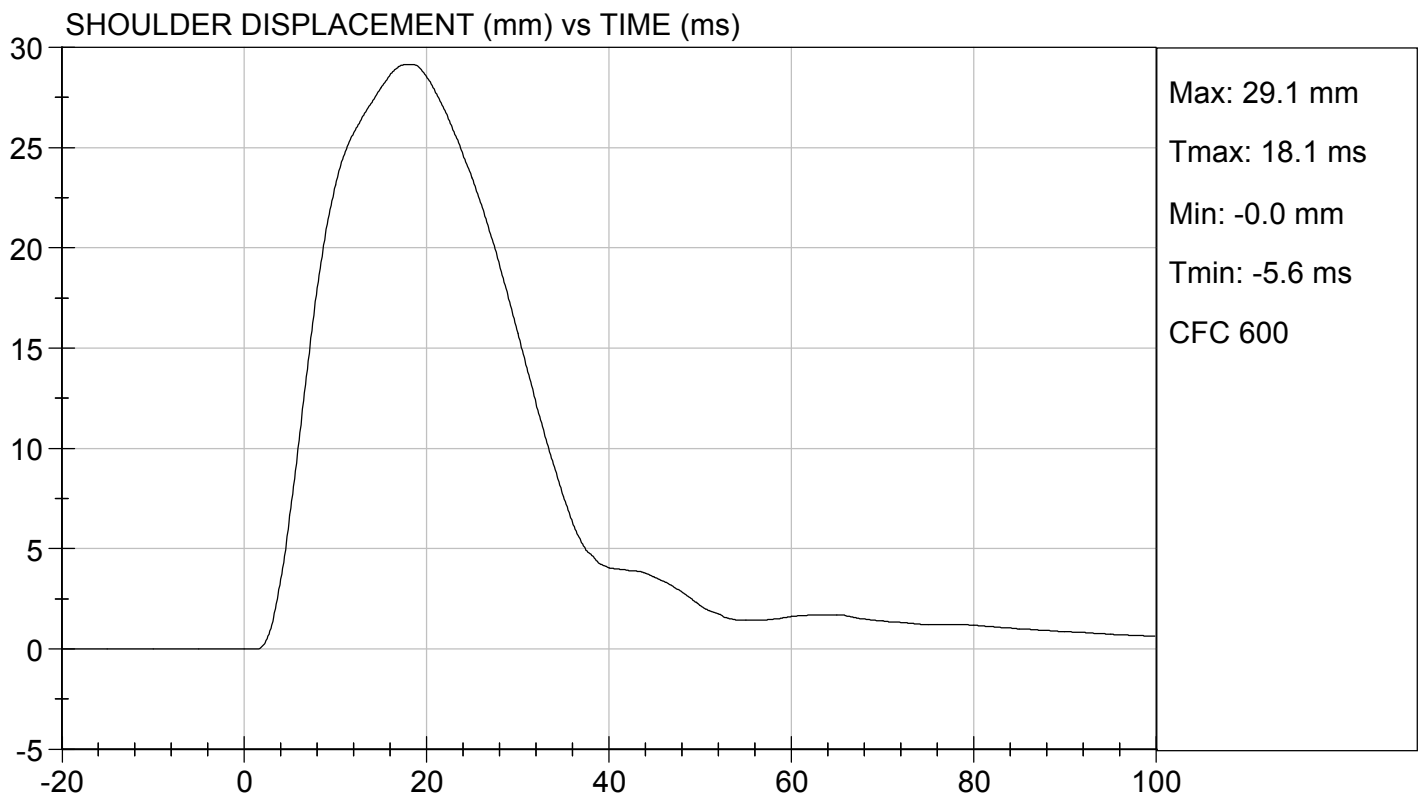
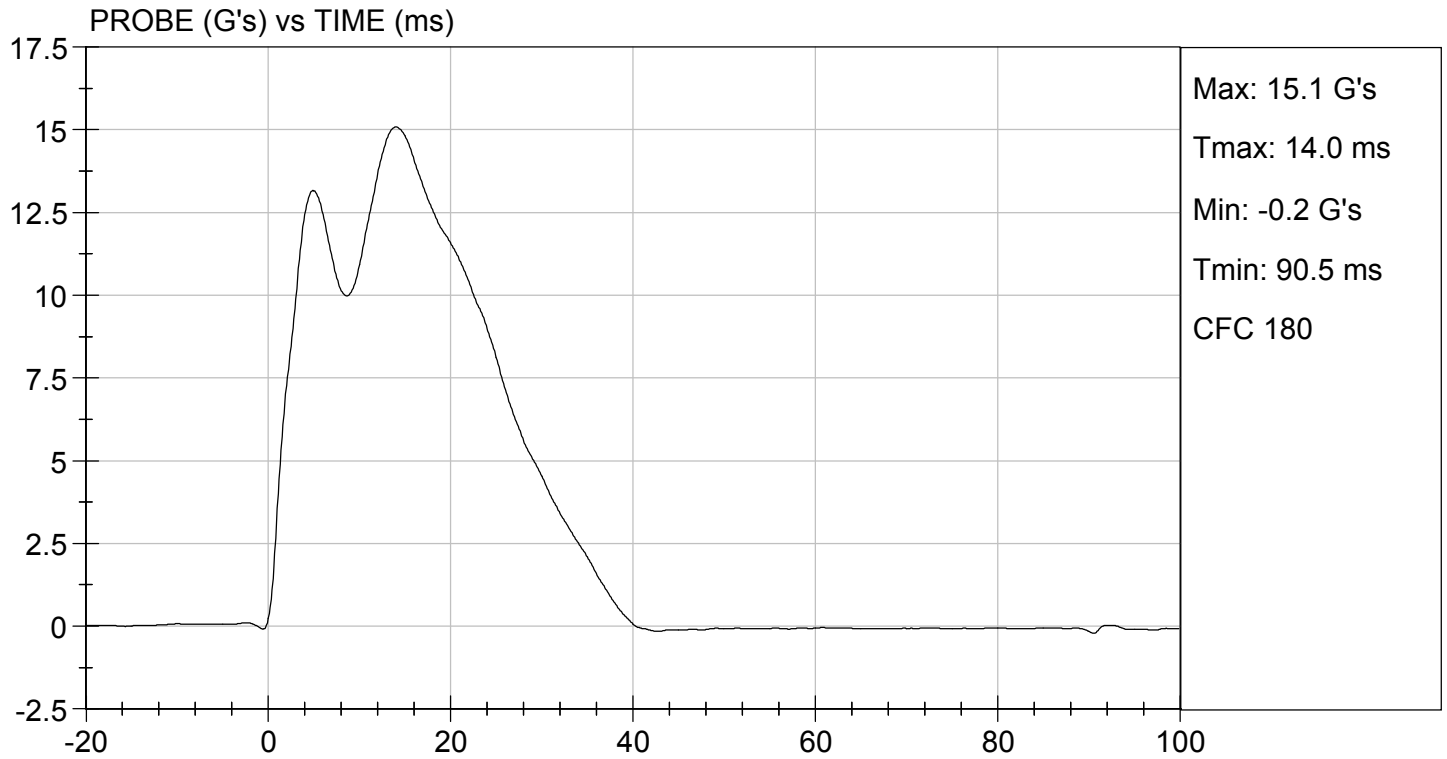
01/30/2020
Test Date


Approved By



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

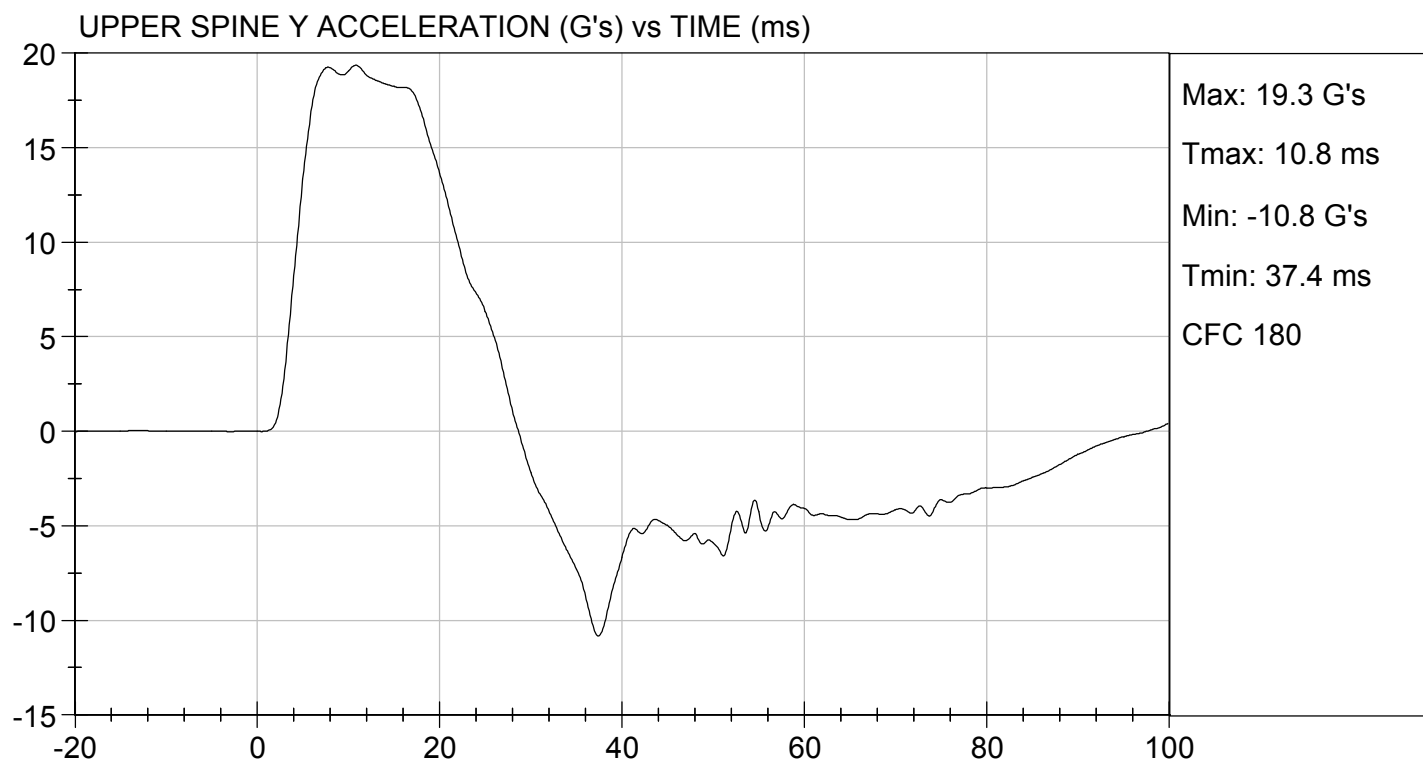
TEST DATE: 01/30/2020
TEST #: D200363





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

TEST DATE: 01/30/2020
TEST #: D200363



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

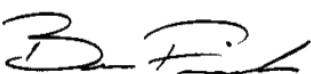
ATD Serial No: 306

Test I.D: D200364

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	25	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	26	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	41	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results				Pass


Laboratory Technician

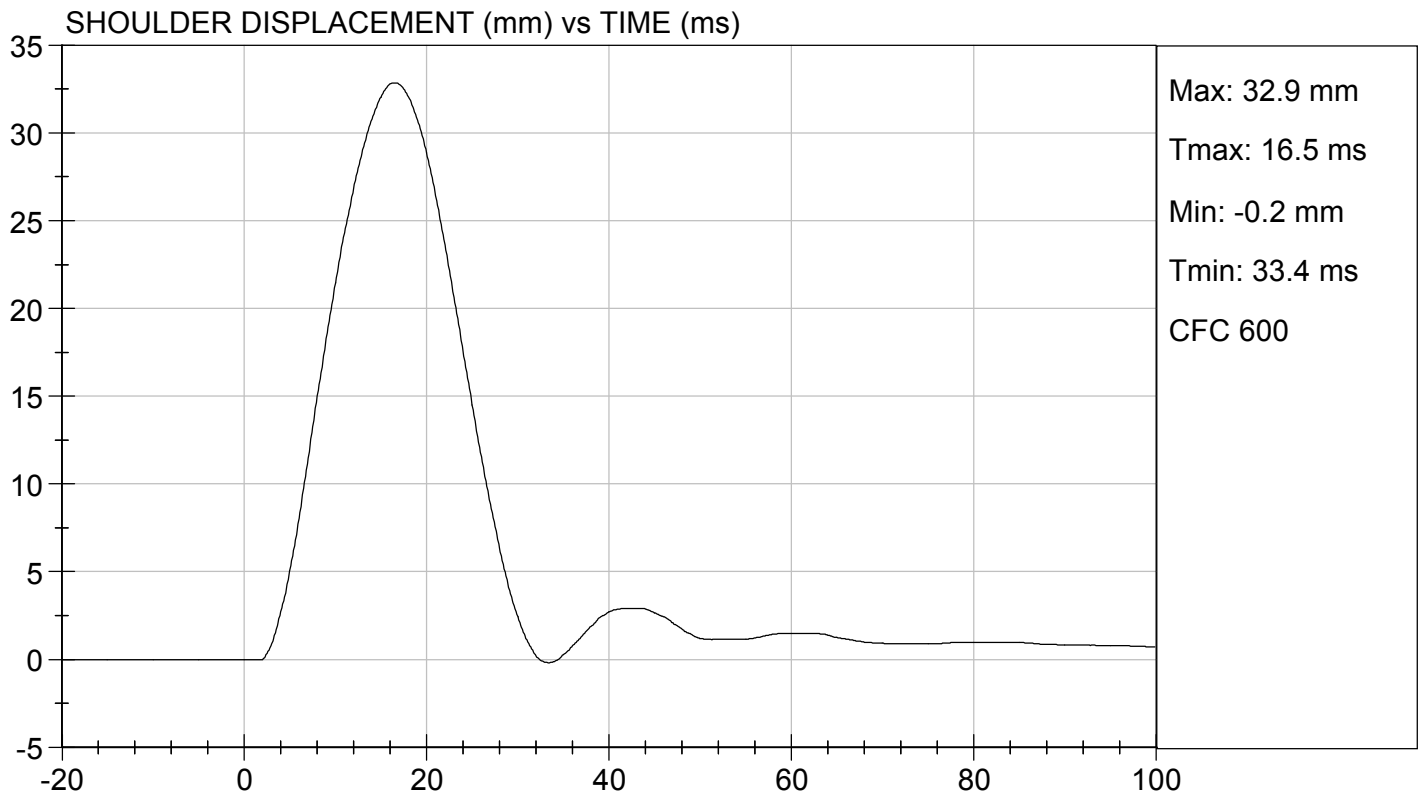
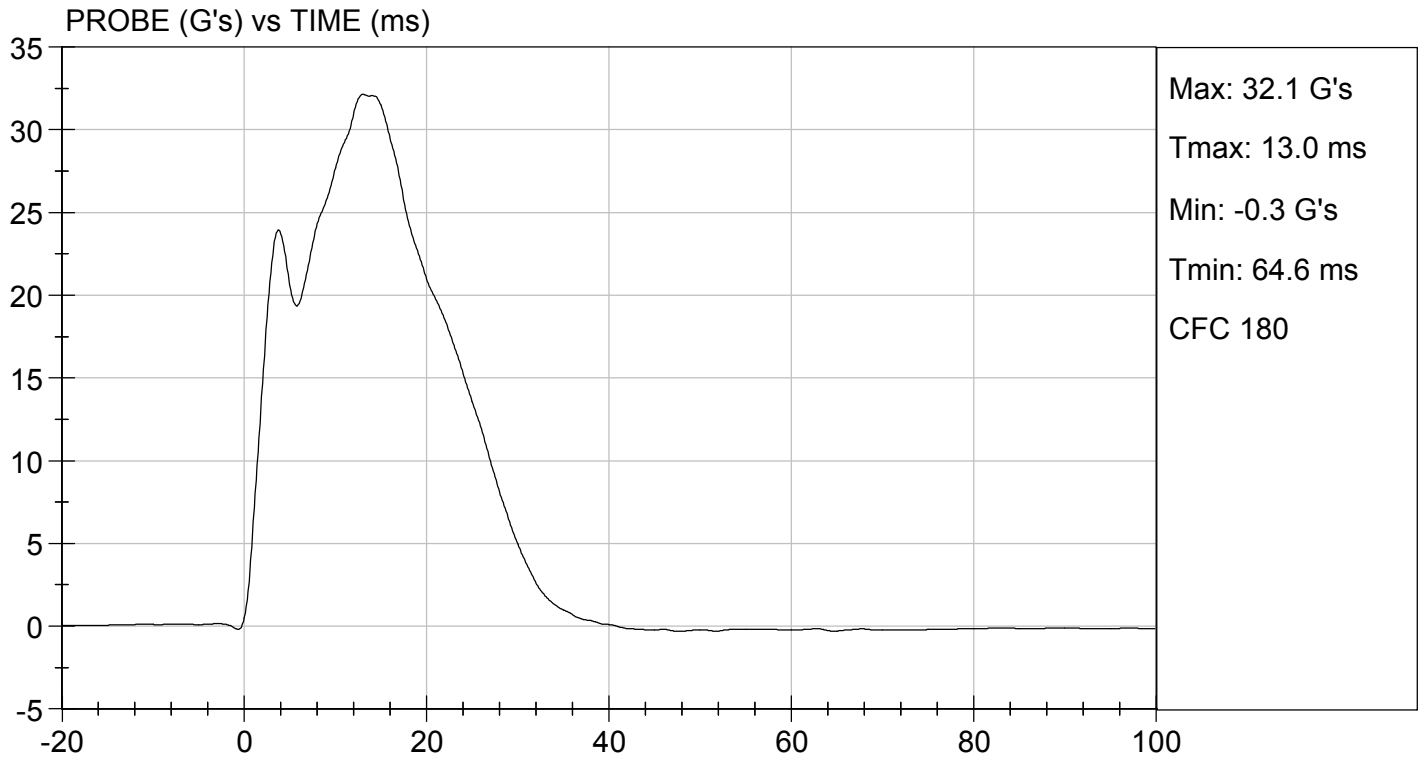
01/30/2020
Test Date


Approved By



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

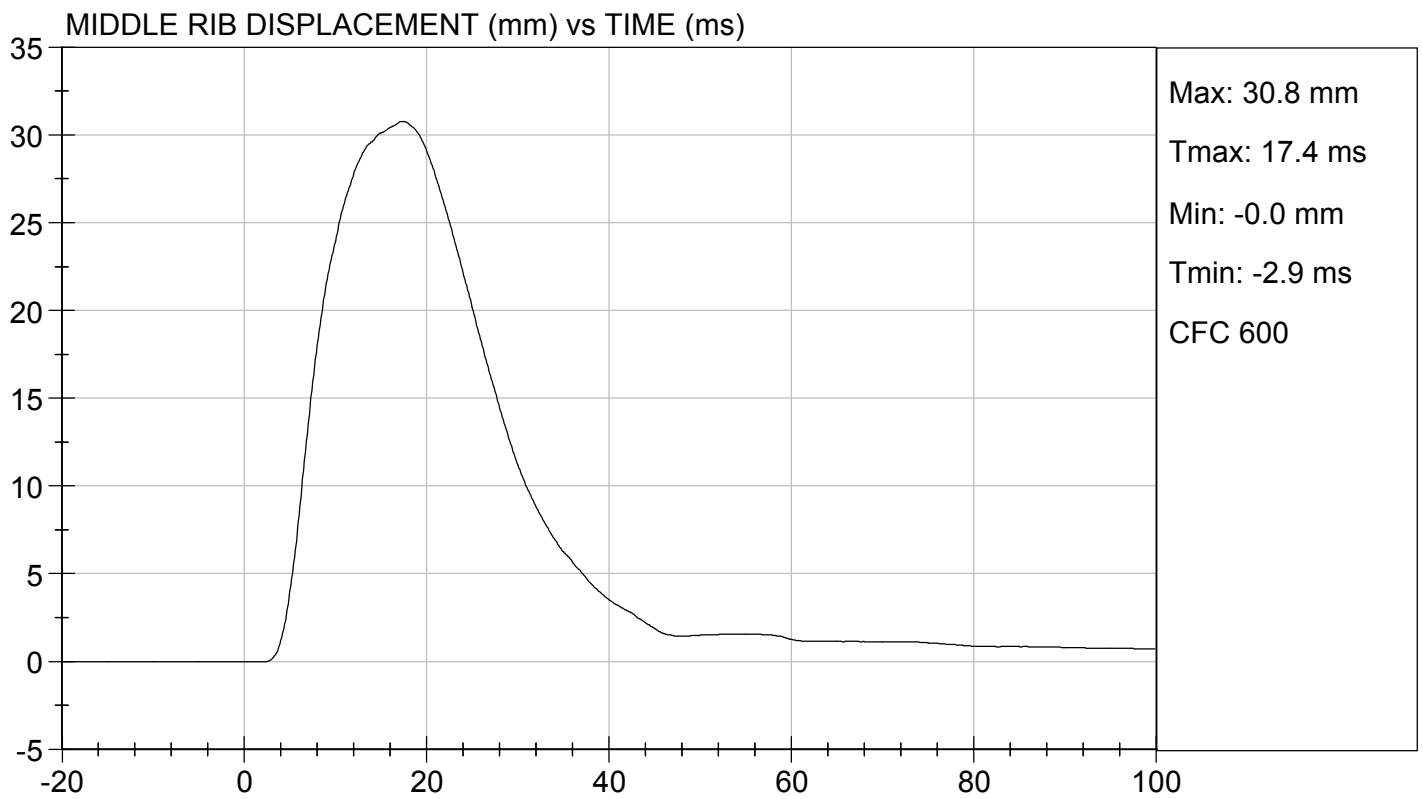
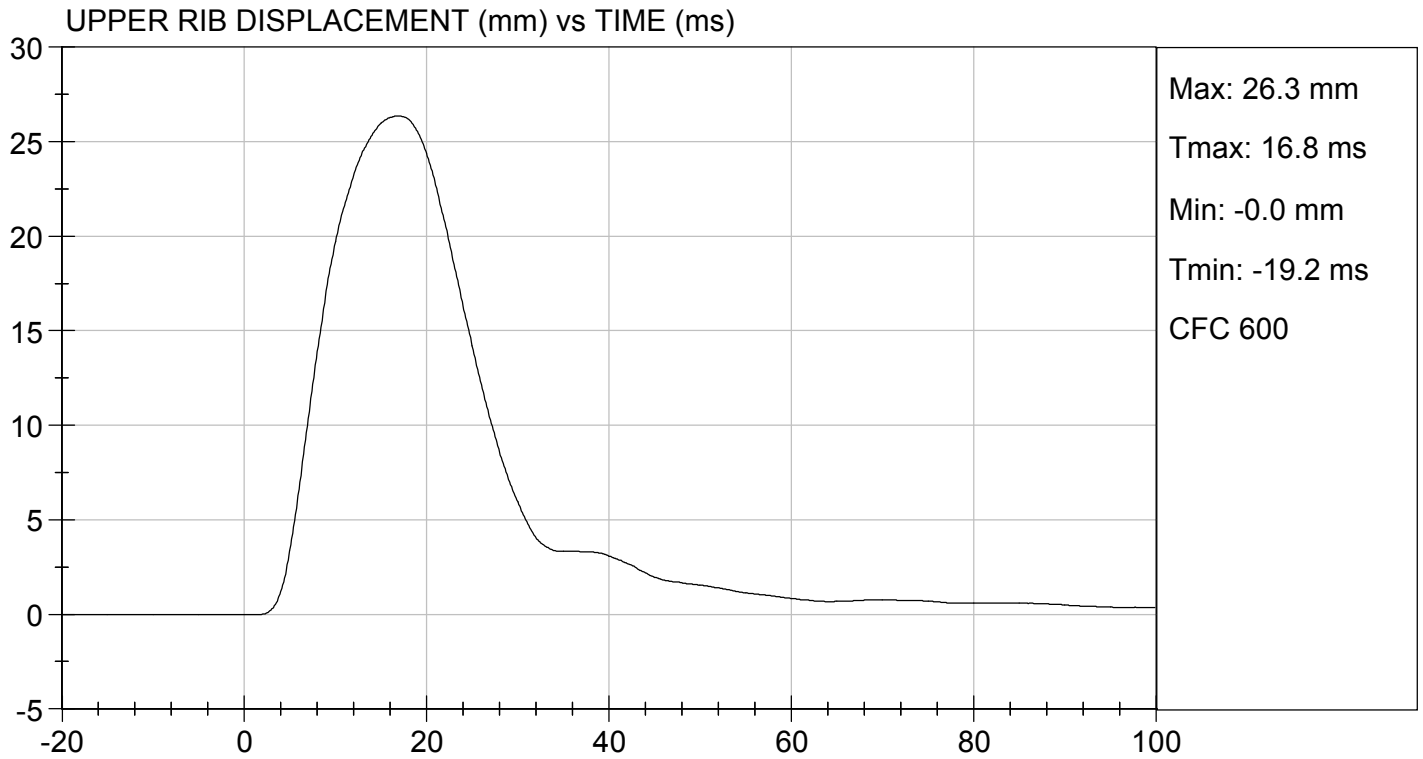
TEST DATE: 01/30/2020
TEST #: D200364





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

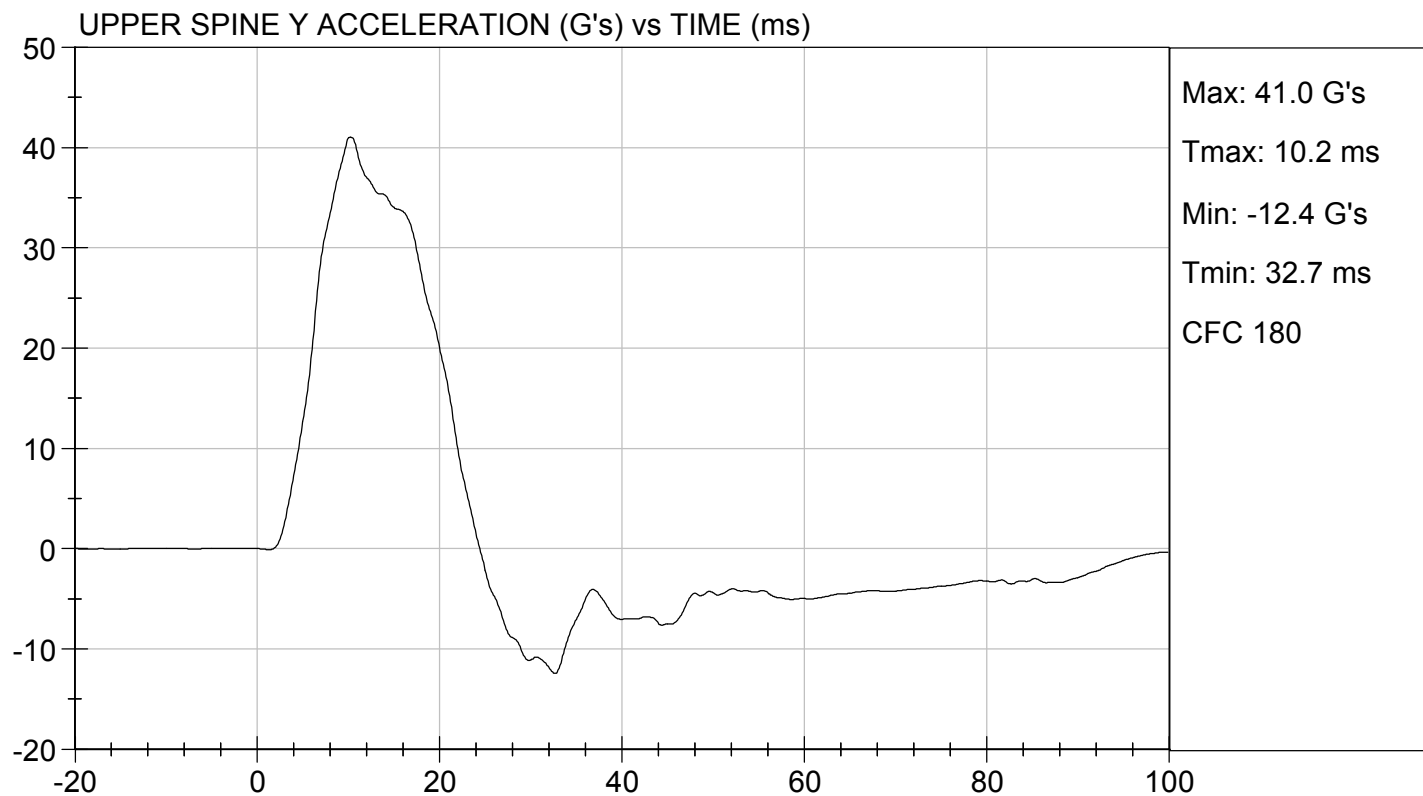
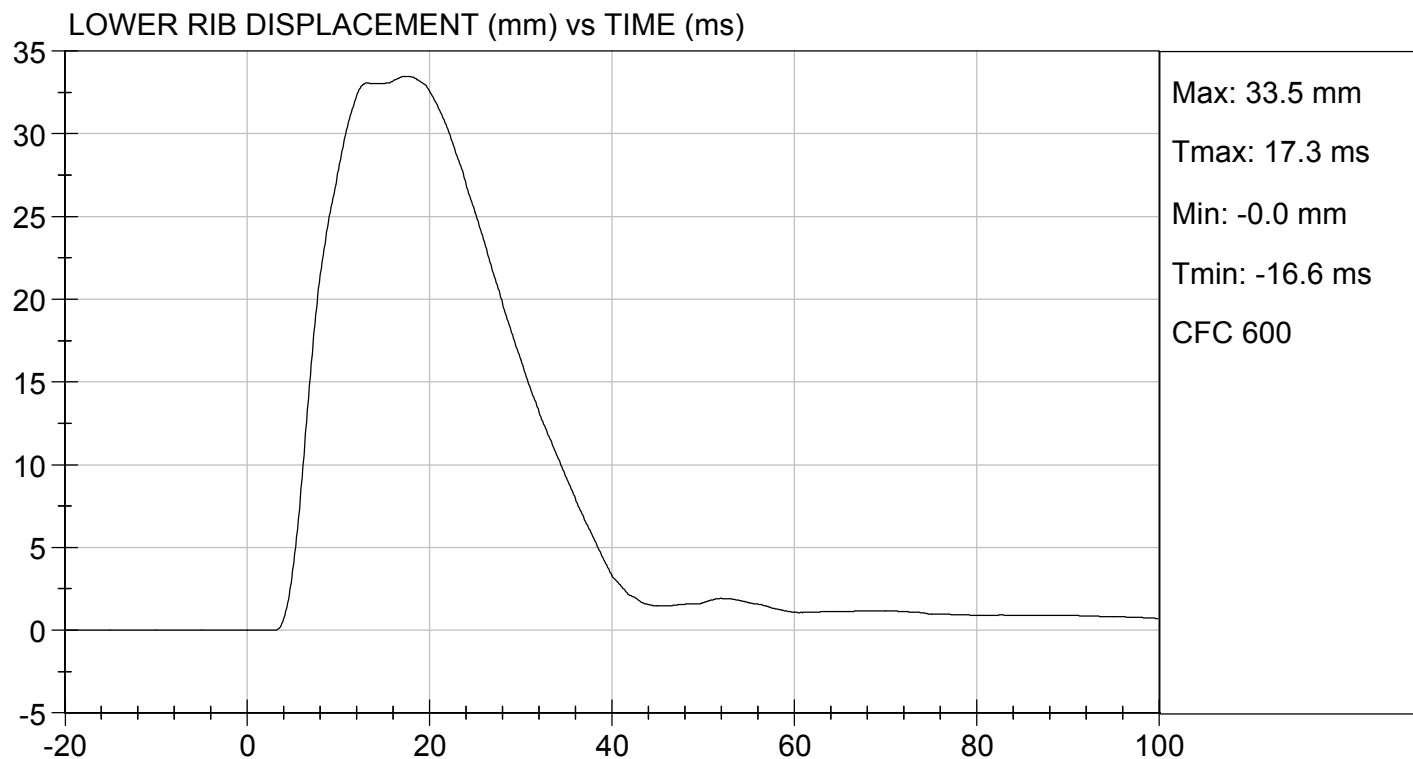
TEST DATE: 01/30/2020
TEST #: D200364





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

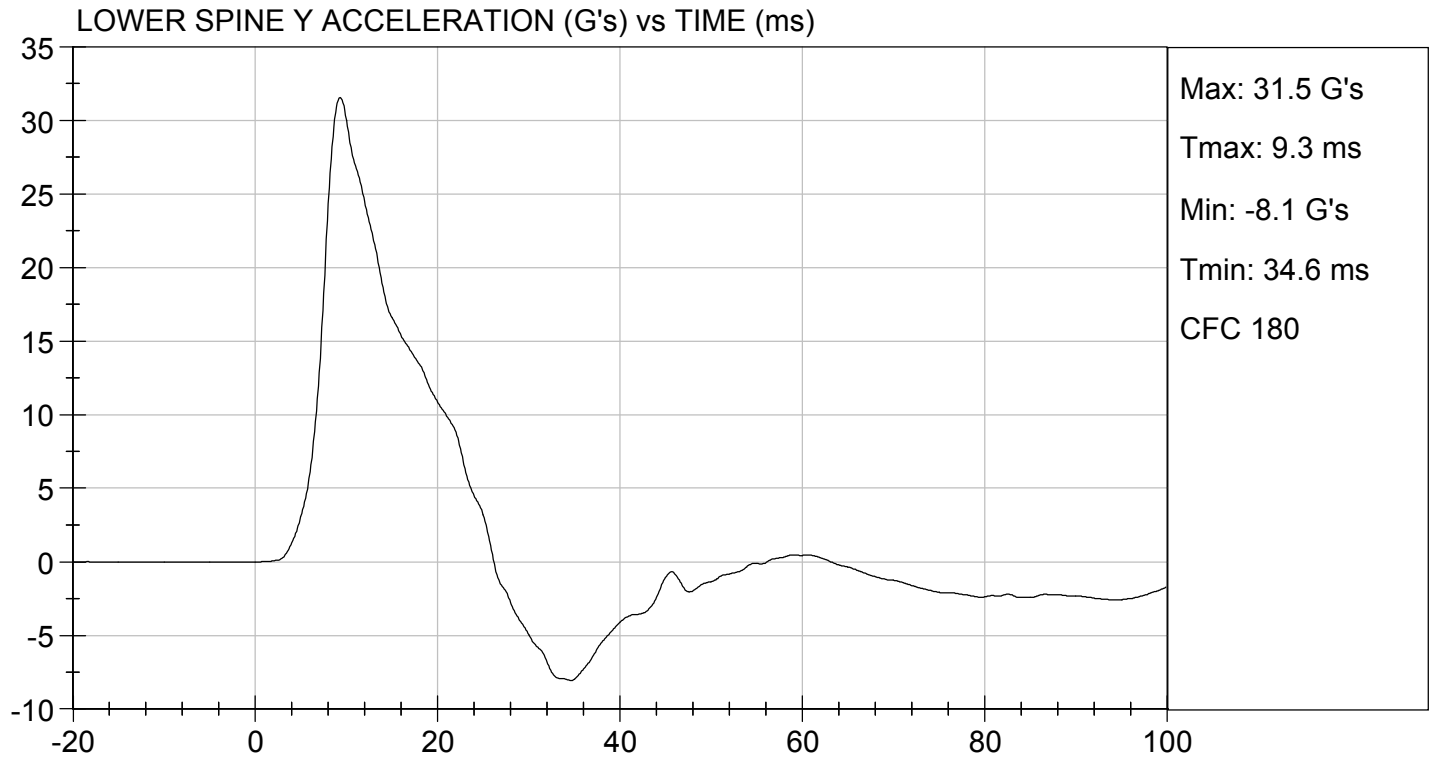
TEST DATE: 01/30/2020
TEST #: D200364





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

TEST DATE: 01/30/2020
TEST #: D200364



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

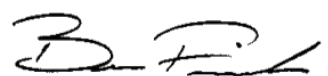
ATD Serial No: 306

Test I.D: D200365

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	34	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


 Laboratory Technician

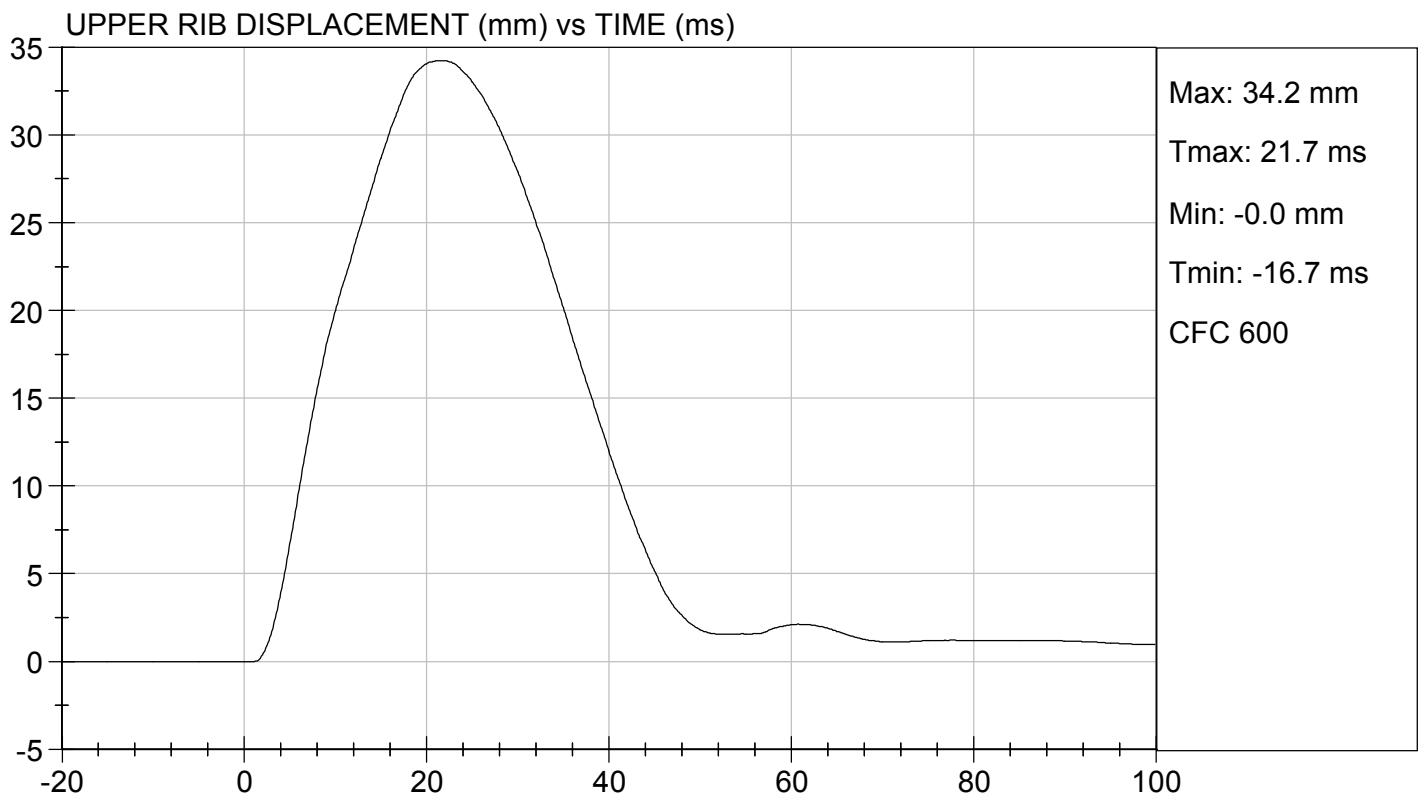
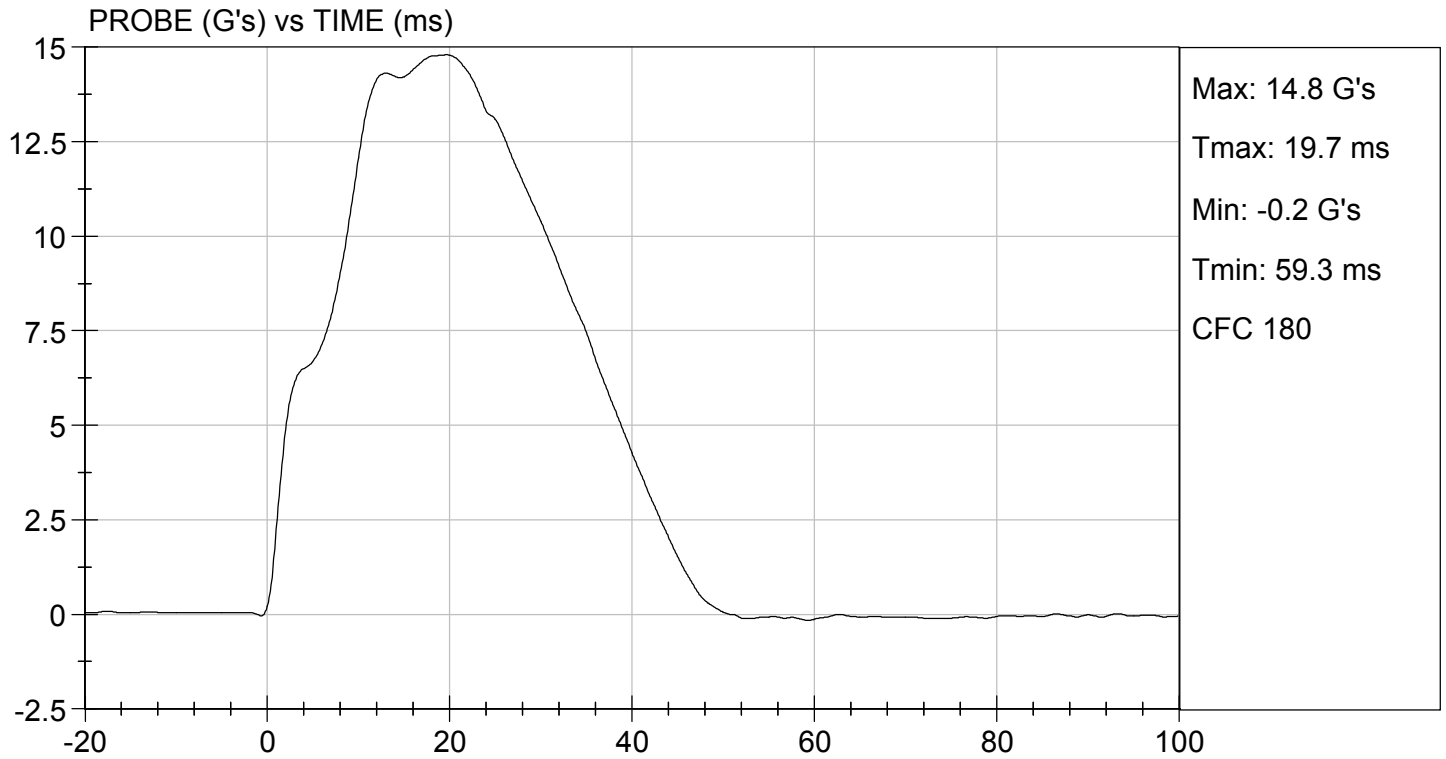
01/30/2020
 Test Date


 Approved By



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

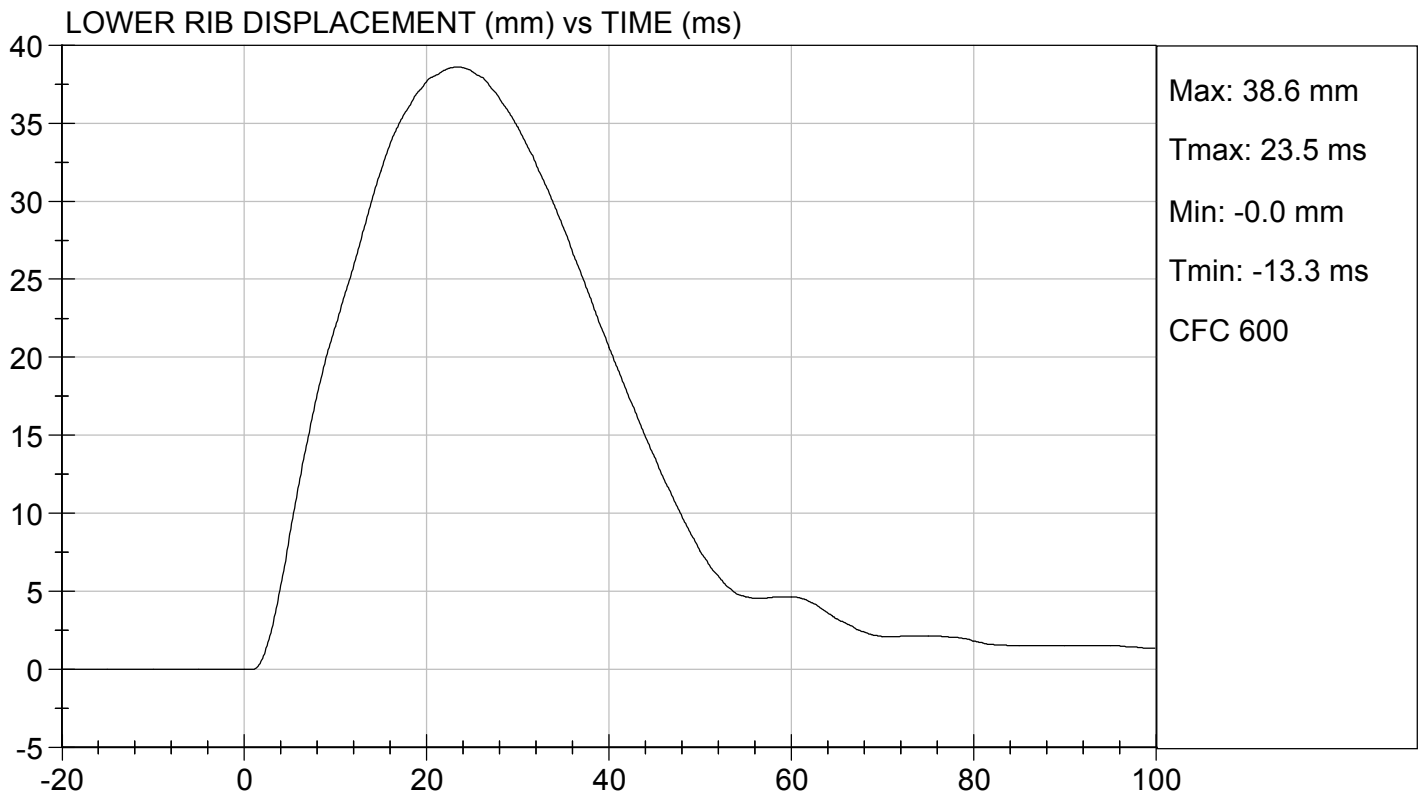
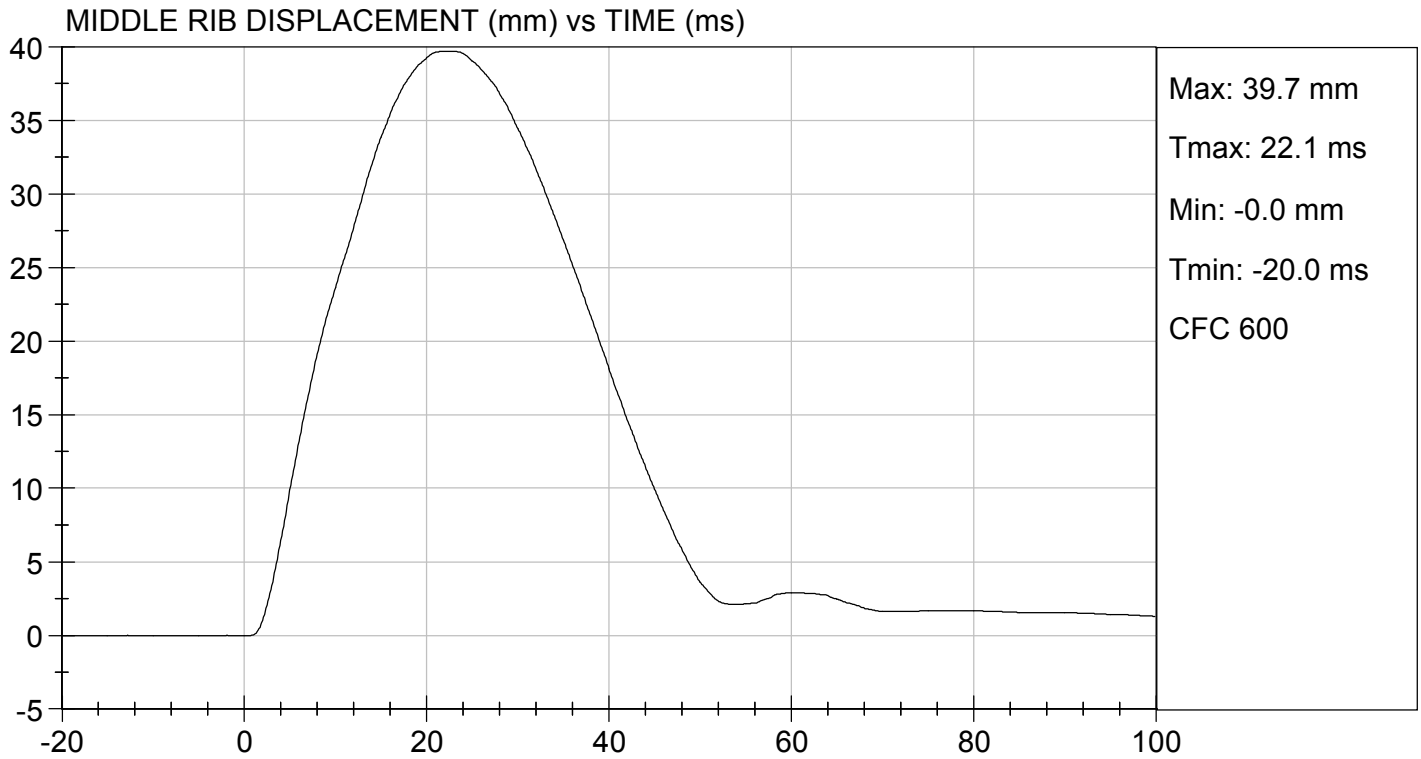
TEST DATE: 01/30/2020
TEST #: D200365





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

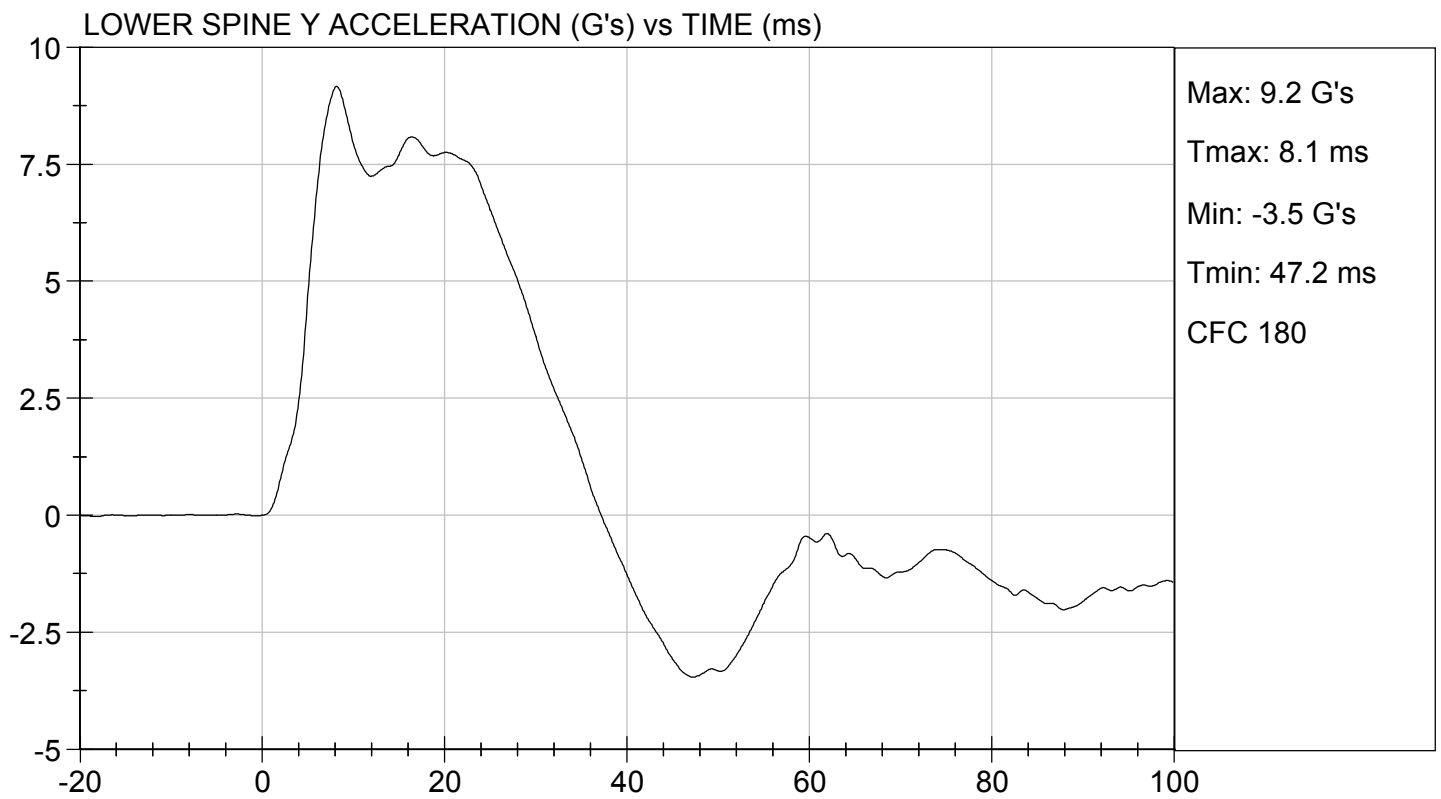
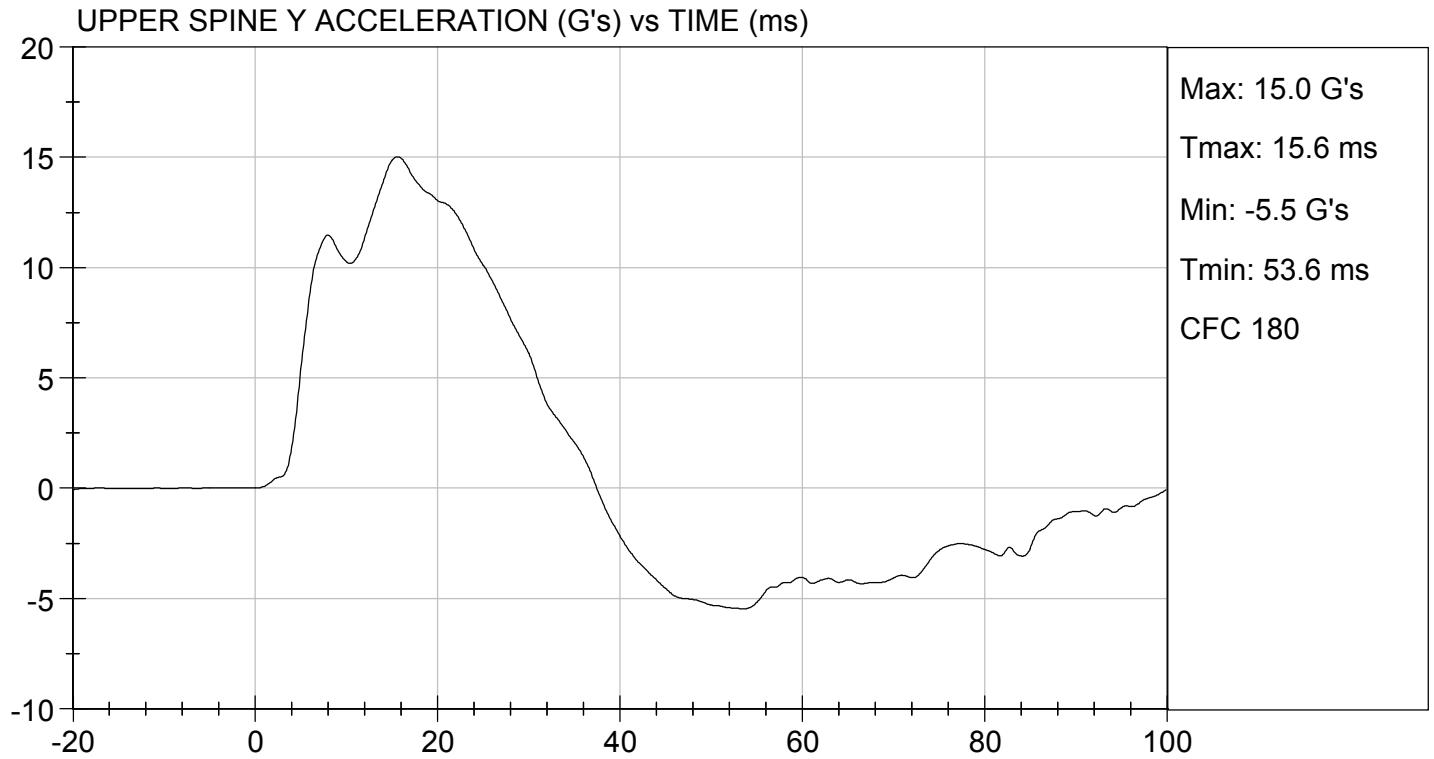
TEST DATE: 01/30/2020
TEST #: D200365





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

TEST DATE: 01/30/2020
TEST #: D200365



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

ATD Serial No: 306

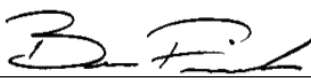
Test I.D: D200366

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	39	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	41	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

01/30/2020

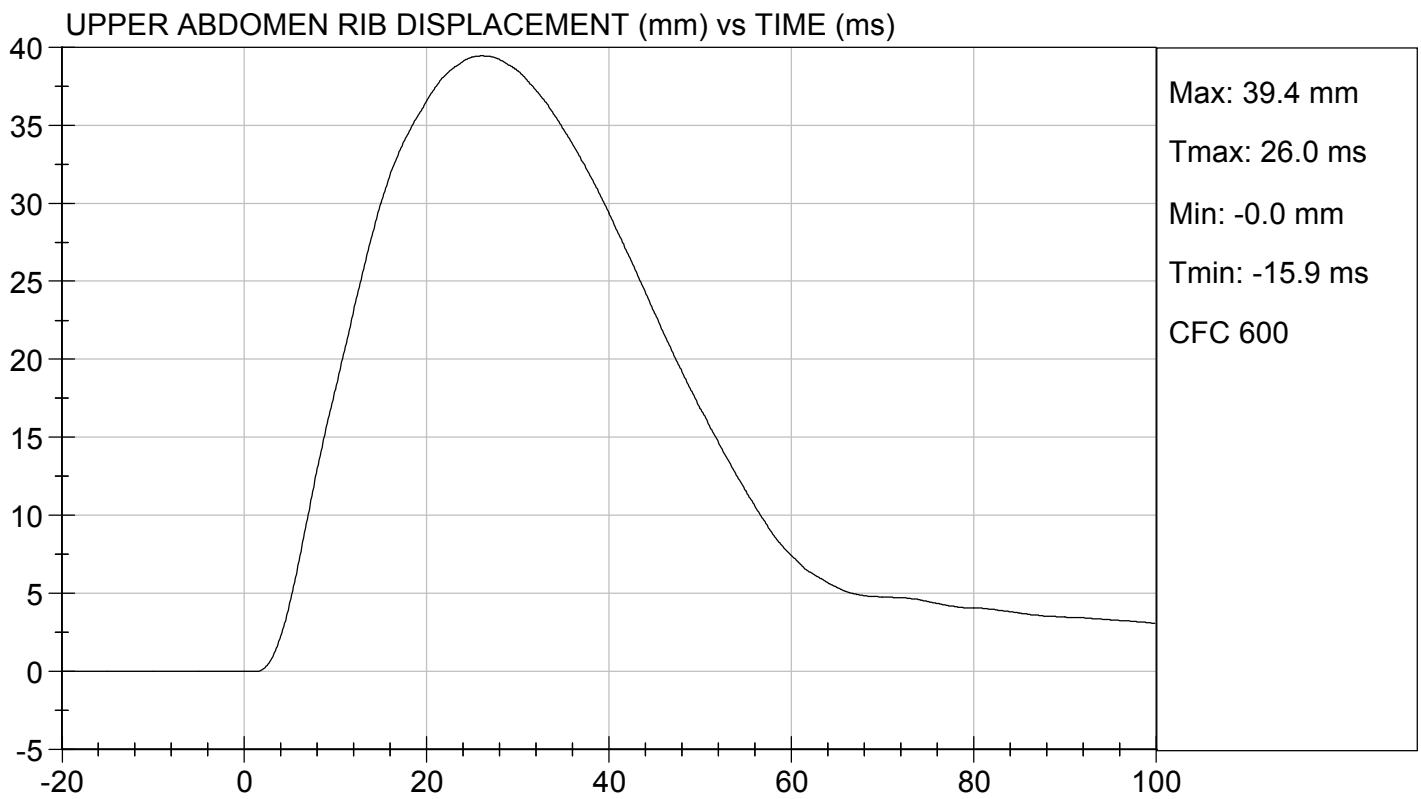
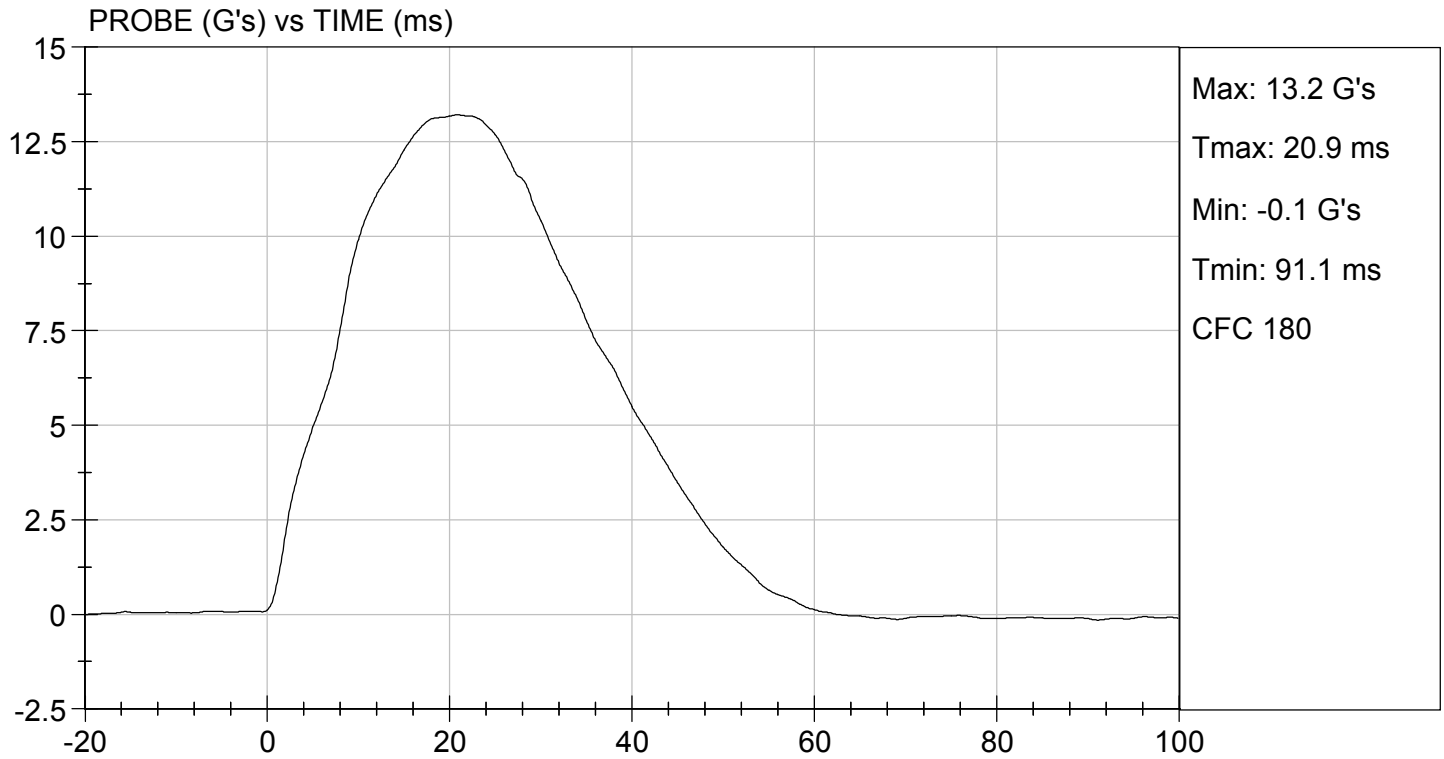
Test Date


Approved By



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

TEST DATE: 01/30/2020
TEST #: D200366

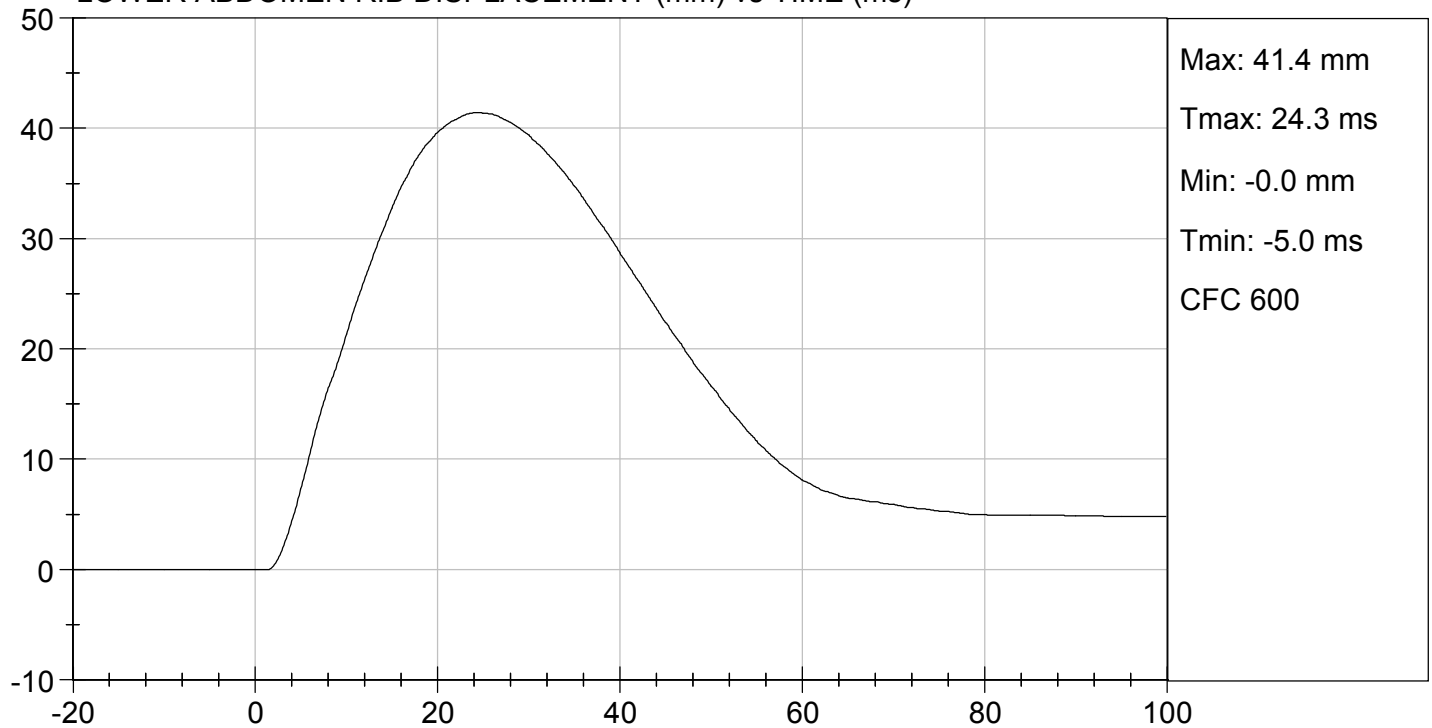




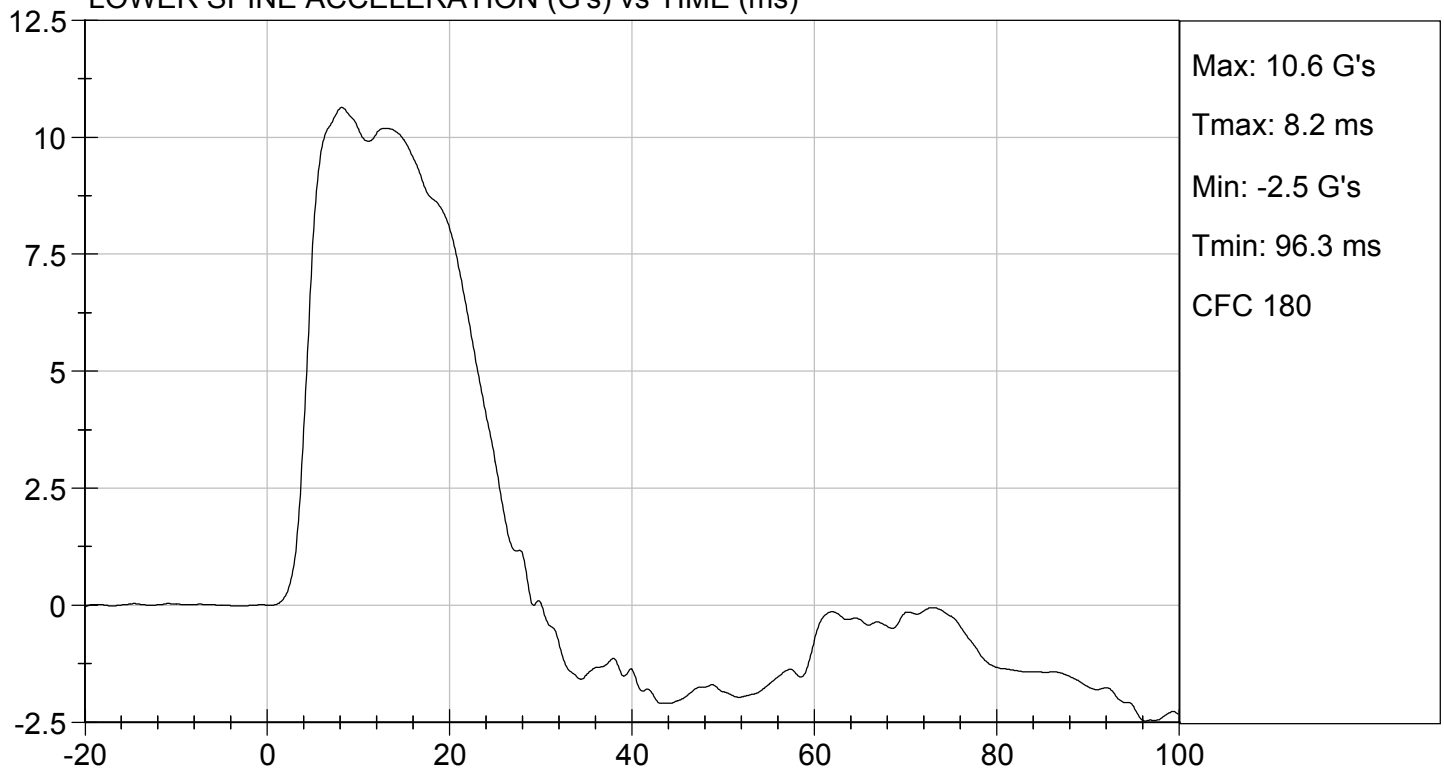
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 01/30/2020
TEST #: D200366

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

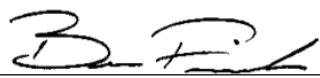
ATD Serial No: 306

Test I.D: D200367

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,853	Pass
Overall Test Results				Pass


Laboratory Technician

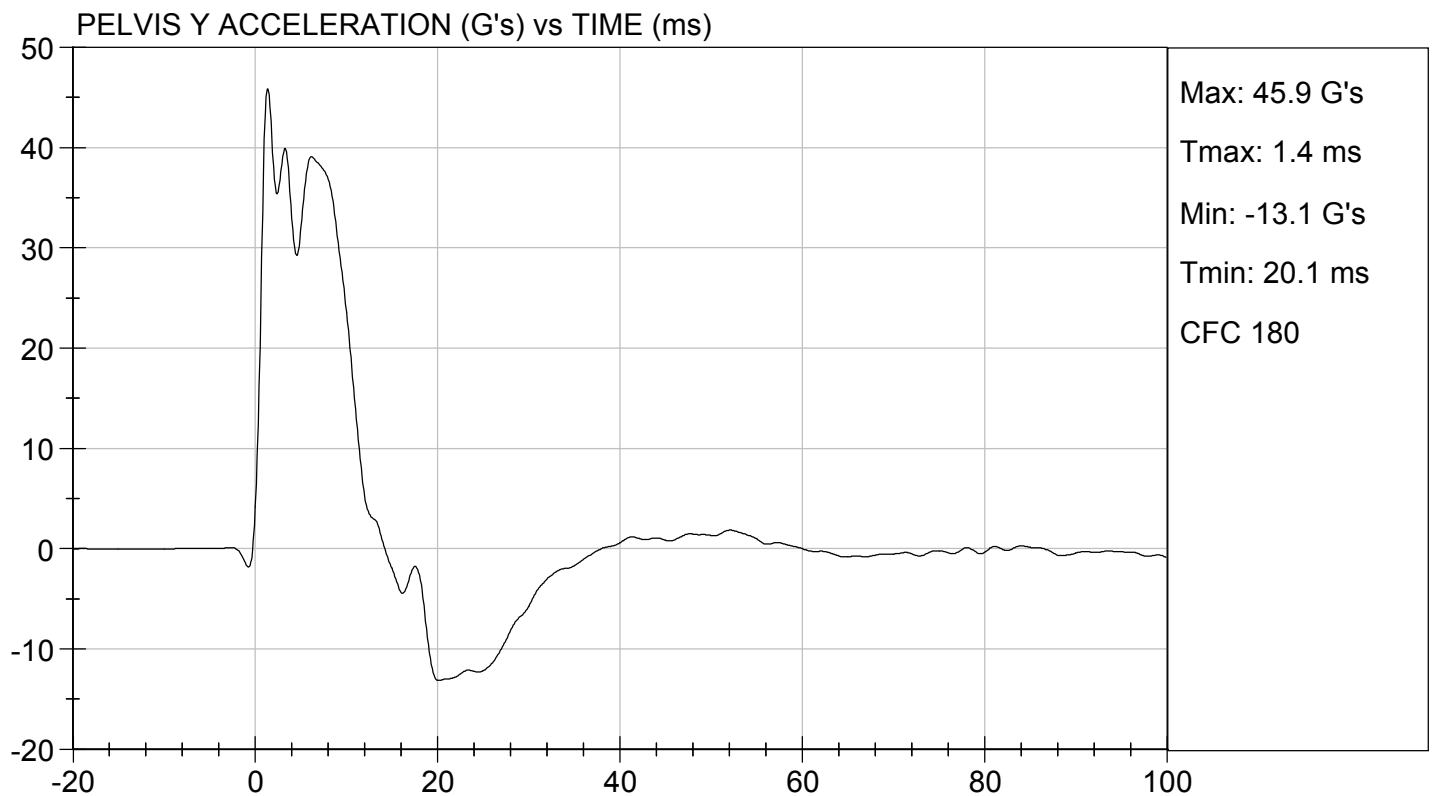
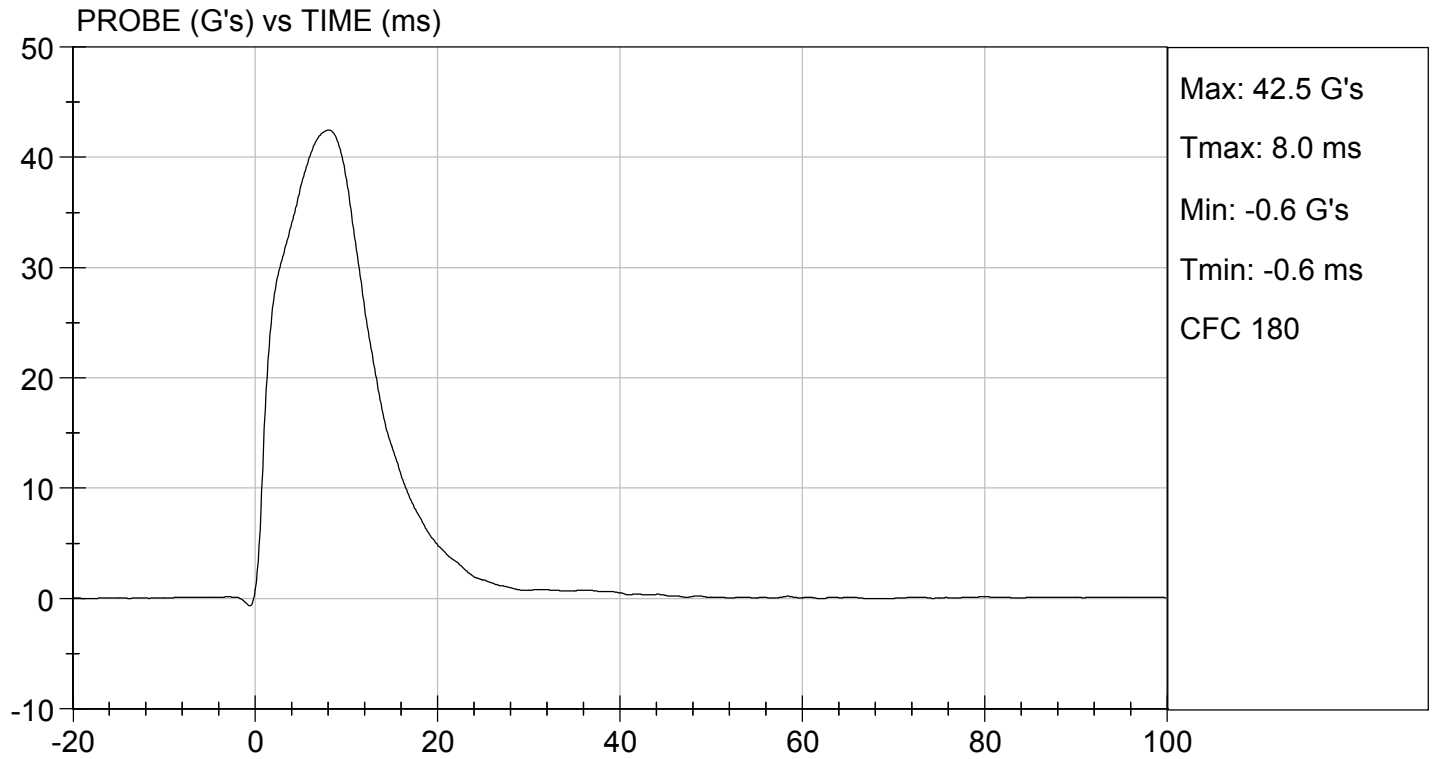
01/30/2020
Test Date


Approved By



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

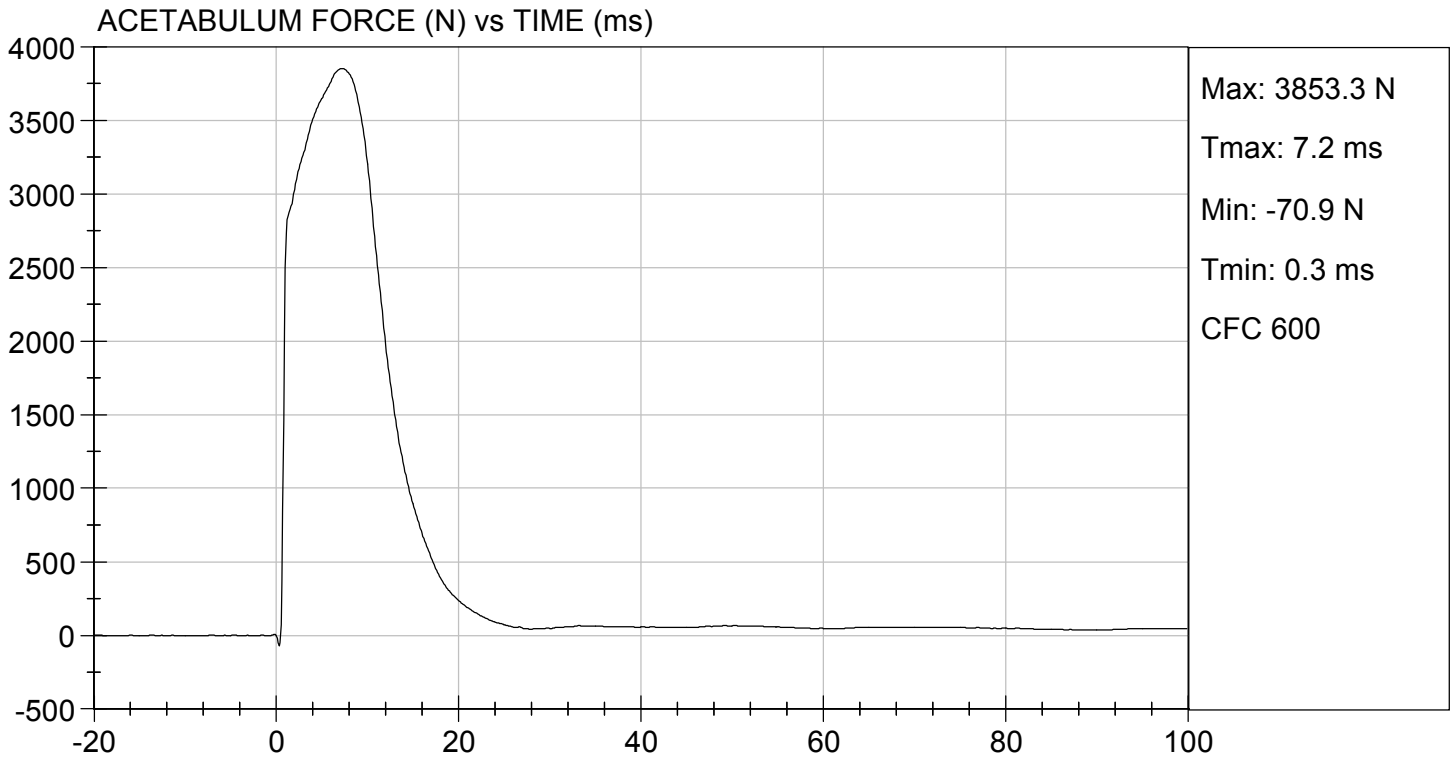
TEST DATE: 01/30/2020
TEST #: D200367





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

TEST DATE: 01/30/2020
TEST #: D200367



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

ATD Serial No: 306

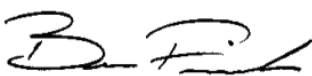
Test I.D: D200368

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	36 to 45	43	Pass
Pelvis Y Acceleration	G's	28 to 39	38	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,981	Pass
Overall Test Results				Pass


Laboratory Technician

01/31/2020

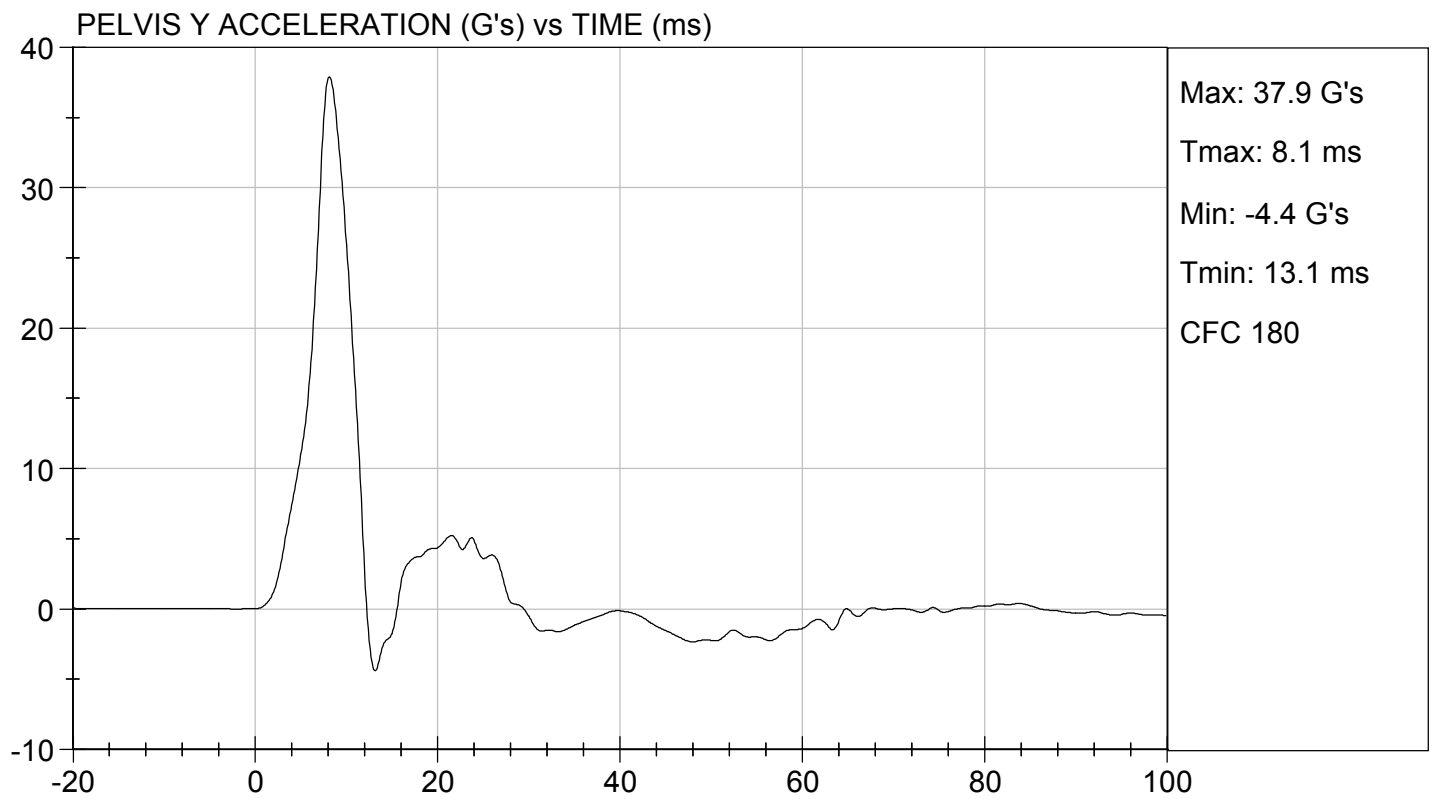
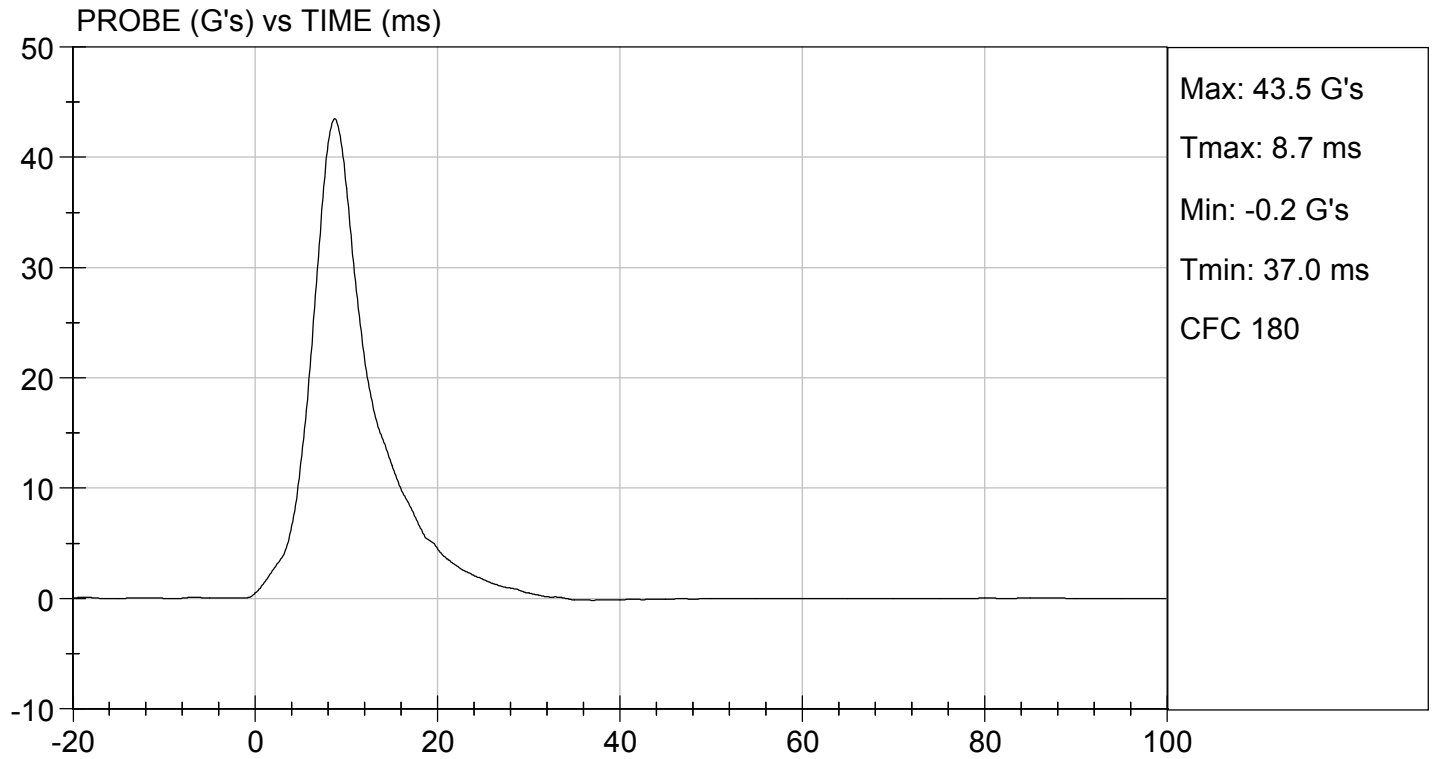
Test Date


Approved By



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

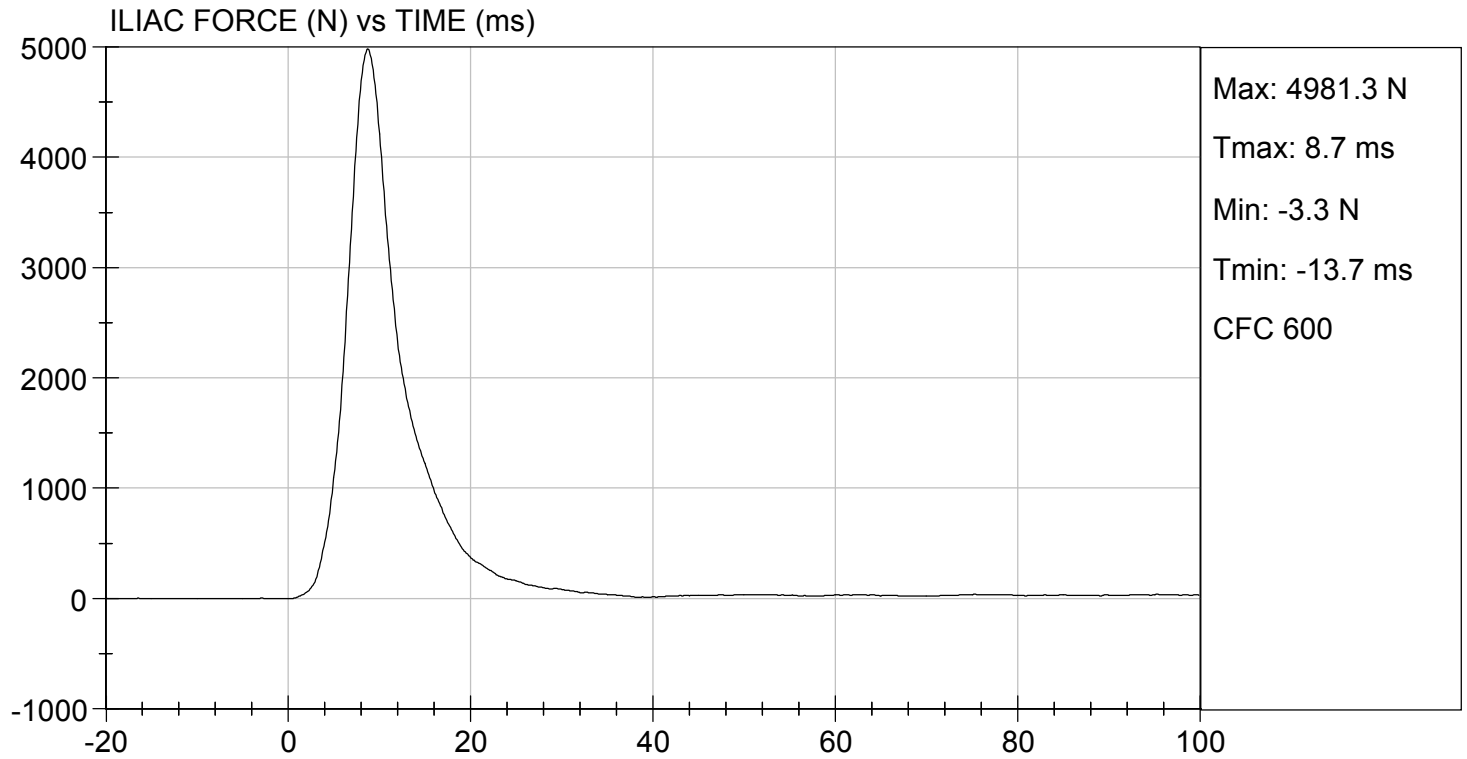
TEST DATE: 01/31/2020
TEST #: D200368





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

TEST DATE: 01/31/2020
TEST #: D200368





SID-IIs Pelvis Plug Certification Test

Plug S/N 13189

Test Number 10584

Report Number 10619

Test Date 8/8/2019 11:37:15 AM

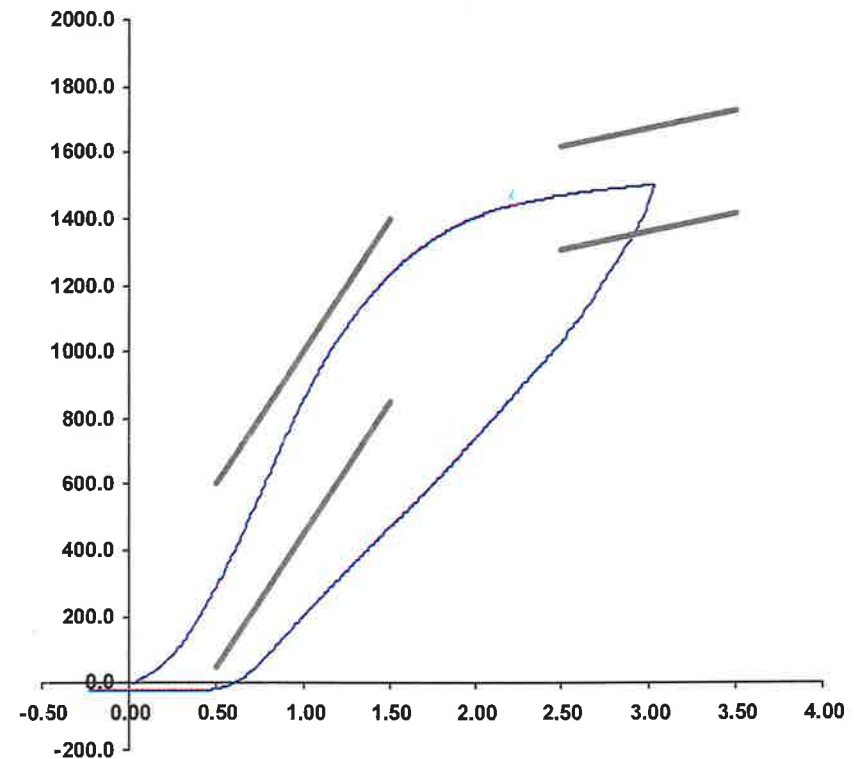
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	292.59	50.00	600.00
Force @ 1.5 mm (N)	1,231.07	850.00	1,400.00
Force @ 2.5 mm (N)	1,470.44	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,504.34	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator 131

Part Number 180-4450

Template No 107
SACO Research

08-Aug-19

By : DC Date : 8/8/2019

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 12584

Test Number 7514

Report Number 7529

Test Date 10/3/2018 10:20:07 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	318.09	50.00	600.00
Force @ 1.5 mm (N)	1,179.68	850.00	1,400.00
Force @ 2.5 mm (N)	1,447.93	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,497.86	1,361.00	1,673.00

Testing Machine STM-20 5965542

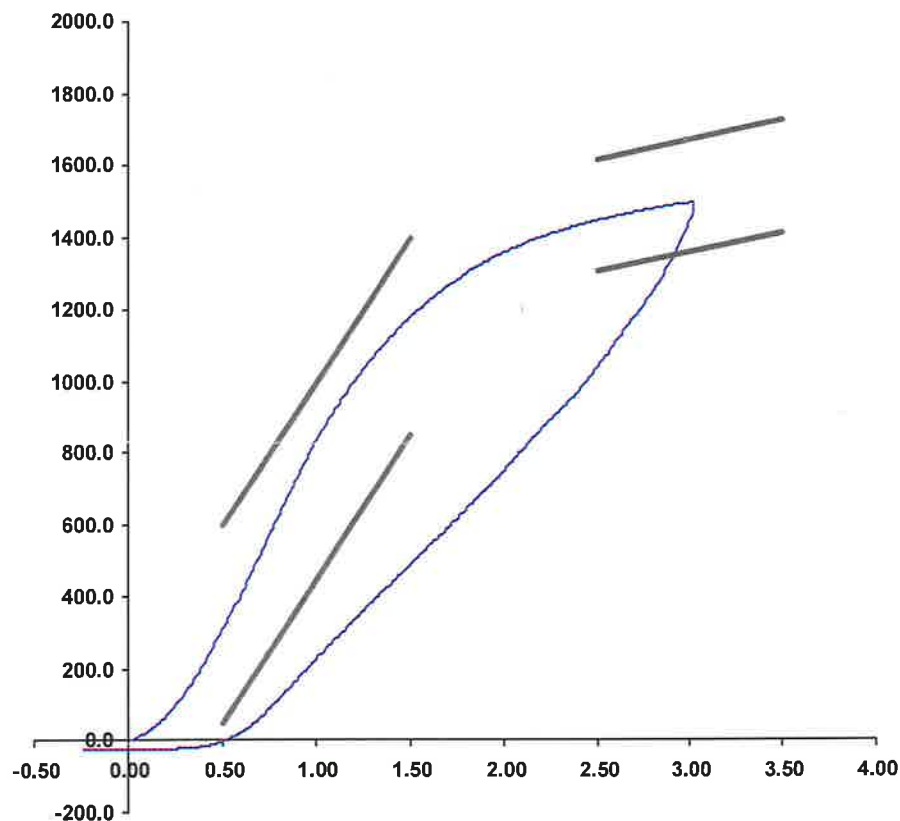
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

03-Oct-18

SACO Research

By : DC

Date : 10/3/18

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

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation

				SID-IIs S/N 306			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P79721	Endevco	1/2/2020
				Y	P79724	Endevco	1/2/2020
				Z	P79445	Endevco	1/2/2020
				Xr	P84999	Endevco	1/2/2020
				Yr	P85000	Endevco	1/2/2020
				Zr	P85001	Endevco	1/2/2020
Head Angular Rate Sensors				X	ARS7416	DTS	7/8/2019
				Y	ARS7442	DTS	07/08/19
				Z	ARS7475	DTS	07/08/19
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	1/2/2020	
		Middle	Y	G1261	FTSS	1/2/2020	
		Lower	Y	G1270	FTSS	1/2/2020	
	Abdominal Rib	Upper	Y	G032	FTSS	1/2/2020	
		Lower	Y	G1304	FTSS	1/2/2020	
Lower Spine Accelerometers (T12)				X	P96332	Endevco	1/2/2020
				Y	P96335	Endevco	1/2/2020
				Z	P96341	Endevco	1/2/2020
Acetabulum Load Cell				Y	ACG4285	Endevco	11/27/2019
Iliac Wing Load Cell				Y	IWG3023	FTSS	11/27/2019
Pelvis Plug (struck side)					13189	SACO	8/8/2019
Pelvis Plug (non-struck side)					12584	SACO	10/3/2018

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	P92951	Endevco	1/23/2020
Vehicle Center of Gravity	Y	P88698	Endevco	1/23/2020
Vehicle Center of Gravity	Z	P97405	Endevco	1/23/2020
Left Floor Sill	Y	PCB1247	PCB	1/22/2020
A-Pillar Sill	Y	PCB1143	PCB	1/22/2020
A-Pillar Low	Y	P79881	Endevco	1/23/2020
A-Pillar Mid	Y	T19548	Endevco	1/23/2020
B-Pillar Sill	Y	T16900	Endevco	1/22/2020
B-Pillar Low	Y	T19997	Endevco	12/3/2019
B-Pillar Mid	Y	T19991	Endevco	12/17/2019
Driver Seat	Y	T17553	Endevco	1/22/2020
Engine Top	X	T20752	Endevco	12/2/2019
Engine Top	Y	T20713	Endevco	12/31/2019
Firewall	Y	T19977	Endevco	1/23/2020
Right Roof	Y	PCB1279	PCB	1/22/2020
Right Floor Sill	Y	PCB1244	PCB	1/22/2020
Rear Floorpan	X	T20729	Endevco	1/2/2020
Rear Floorpan	Y	T20722	Endevco	1/2/2020

Table 3 – Pole Instrumentation

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