

REPORT NUMBER: SPNCAP-MGA-19-050

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

**FORD MOTOR CO.
2019 Ford F-250 SuperCab XL Truck
NHTSA No.: M20190209**

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



Test Date: July 18, 2019

Final Report Date: September 19, 2019

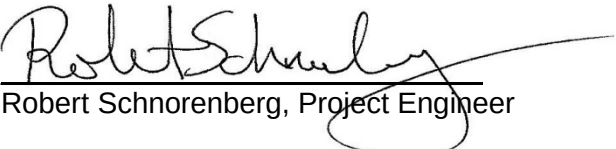
FINAL REPORT

**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: September 19, 2019

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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7. Author(s) Ben Fischer, Project Engineer		8. Performing Organization Report No. SPNCAP-MGA-19-050																											
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15. Supplementary Notes																													
16. Abstract A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2019 Ford F-250 SuperCab XL Truck 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 July 18, 2019. The impact velocity was 32.35 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.0°C. The test vehicle post-test maximum crush was 383 mm at level 2. The test vehicle's performance was as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>482</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>35</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>1886</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>20</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>17</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	482	Resultant Lower Spine Acceleration	g	82	35	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1886	Maximum Thoracic Rib Deflection	mm	38*	20	Maximum Abdomen Rib Deflection	mm	45*	17
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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, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590																											
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Occupant and Vehicle Information	4

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	5
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	8
3	Dummy Longitudinal Clearance Dimensions	11
4	Dummy Lateral Clearance Dimensions	12
5	Camera and Instrumentation Data	13
6	Vehicle Accelerometer Data	14
7	Rigid Pole Load Cell Data	15
8	Post-Test Observations	16
9	Vehicle Profile Measurements	18
10	Vehicle Exterior Crush Measurements	19
11	Vehicle Damage Profile Distances	22
12	FMVSS No. 301 Static Rollover Results	23
13	Dummy/Vehicle Temperature Stabilization Data	24

Appendix

A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D

SECTION 1

TEST PURPOSE AND PROCEDURE

This side 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 Ford F-250 SuperCab XL Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2 SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2019 Ford F-250 SuperCab XL Truck. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.35 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on July 18, 2019. 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 October 2015. 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
- 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	482
Resultant Lower Spine Acceleration	g	82	35
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1886
Maximum Thoracic Rib Deflection	mm	38*	20
Maximum Abdomen Rib Deflection	mm	45*	17

*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	No			
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

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

GENERAL COMMENTS

Driver Head Angular Velocity X, Y, and Z were not installed.

Left Lower B-Post Y was not installed.

Left Mid B-Post Y was not installed.

Top of Engine X recorded no valid data after 90 ms.

Bottom of Engine X recorded no valid data after 90 ms.

Right Roof Y recorded no valid data after 59 ms.

Load Cell Pole #8 Fy recorded no valid data.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20190209	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Ford	Automatic Door Locks (ADL)	Yes
Model	F-250 SuperCab XL	Power Window Auto-Reverse	Yes
Body Style	Truck	Other Optional Feature	No
VIN	1FT7X2A69KEE12920	Driver Front Airbag	Yes
Body Color	Race Red	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	28 km / 18 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	6.2 L	Driver Torso Airbag	No
Type/No. Cylinders	V8	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	6	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	RWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	Yes	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	FORD MOTOR CO.	GVWR (kg)	4536
Date of Manufacture	02/19	GAWR Front (kg)	1792
		GAWR Rear (kg)	2876

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	3	3		6	
Capacity Weight (VCW) (kg)				1752	(A)
DSC x 68.04 kg				408	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				136*	(A-B)

* Rated Cargo and Luggage Weight (RCLW) limited to maximum of 300 lbs (136 kg).

VEHICLE SEAT TYPE

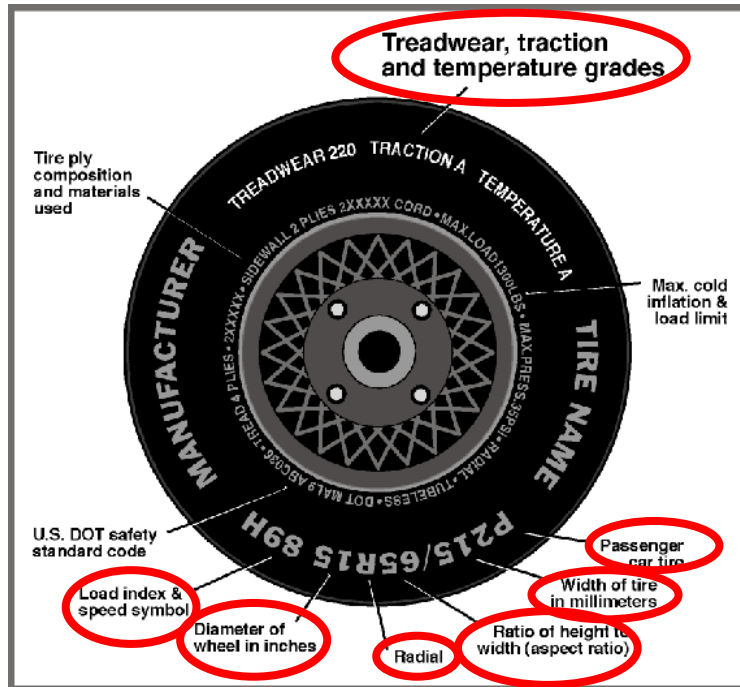
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X					X	
Rear or Second Row			X		X		
Third Row Seat							

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	550	550
Cold Pressure (kPa)	420	520
Recommended Tire Size	LT275/65R18	LT275/65R18
Tire Size on Vehicle	LT275/65R18	LT275/65R18
Tire Manufacturer	Continental	Continental
Tire Model	ContiTrac	ContiTrac
Treadwear	None	None
Traction	None	None
Temperature Grade	None	None
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, Polyamide	2 Polyester, 2 Steel, Polyamide
Load Index/Speed Symbol	123 / 120 S	123 / 120 S
Tire Material	Rubber	Rubber
DOT Safety Code Left	A3B9 H00R 0219	A3B9 H00R 0219
DOT Safety Code Right	A3B9 H00R 0219	A3B9 H00R 0219

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	440	425	470	490
Tire Placard	kPa	420	420	520	520
Owner's Manual	kPa	420	420	520	520
As Tested	kPa	420	420	520	520

TEST AXLE VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	790.5	582.0		791.5	677.0		804.5	688.0	
Right	kg	758.0	594.0		753.0	684.5		741.0	679.0	
Ratio	%	56.8%	43.2%		53.1%	46.9%		53.1%	46.9%	
Totals	kg	1548.5	1176.0	2724.5	1544.5	1361.5	2906.0	1545.5	1367.0	2912.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2724.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	136	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2912.5	(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	-1.1	-1.1	-0.5	Yes
Front Pass. Door Sill Angle (front-to-back)*	deg	-3.0	-2.9	-2.5	Yes
Front Bumper Angle (left-to-right)**	deg	0.8	1.0	1.0	Yes
Rear Bumper Angle (left-to-right)**	deg	0.1	0.0	0.0	Yes
Vehicle CG (Aft of Front Axle)	mm	1623	1761	1764	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	6	9	21	

* 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	100
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 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

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	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat	Fixed	Fixed	Fixed
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid) (°)	As-Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	Fixed	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	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
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 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

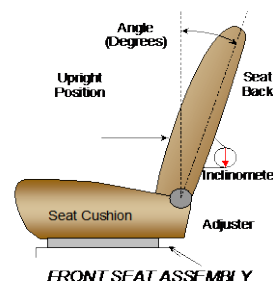
NHTSA No.: M20190209
 Test Date: 7/18/2019

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	255	38	0	0
Front Passenger Seat	255	38	0	0
Front Center Seat	Fixed	Fixed	Fixed	Fixed
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	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	50.6	28	-8.3	3
Front Passenger Seat	50.7	28	-7.9	3
Front Center Seat	Fixed	Fixed	Fixed	Fixed
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	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 Form No. 1.

	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	3	0 (Lowest as 0) / Fixed Fore-Aft

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

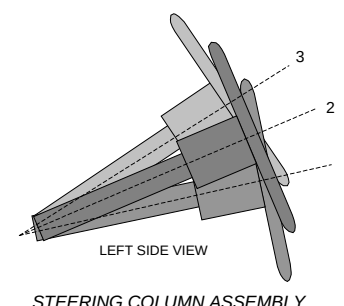
Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

STEERING COLUMN ADJUSTMENT

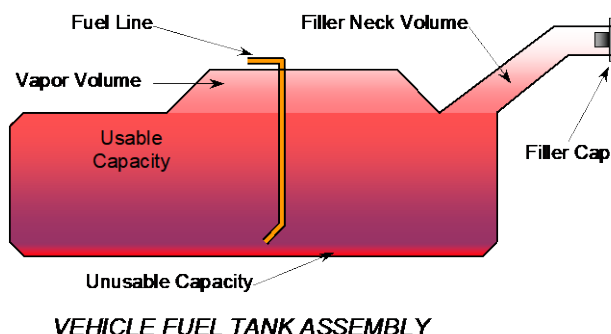
Steering wheel and column adjustments are made so that the steering wheel geometric locus is described when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	64.2	
Geometric Center, Position 2	66.3	
Uppermost, Position 3	68.3	
Telescoping Steering Wheel Travel		41
Test Position	66.3	21



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The electric fuel pump operates for 3 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 3 seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. Also, the fuel pump is shut-off by the restraint control module to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude. The filler neck is located on the driver's side.



FUEL TANK CAPACITY DATA

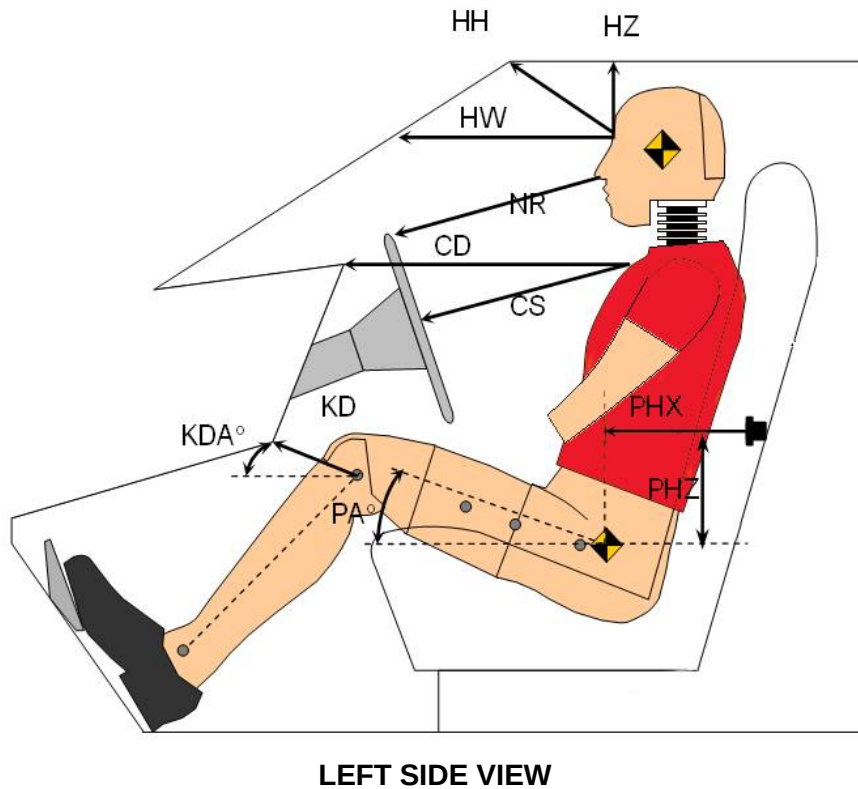
	Liters
Usable Capacity of Standard Tank (see Form No. 1)	128.7
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	128.7
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	119.7
Actual Amount of Solvent Used	119.6
1/3 of Usable Capacity	42.9

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 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

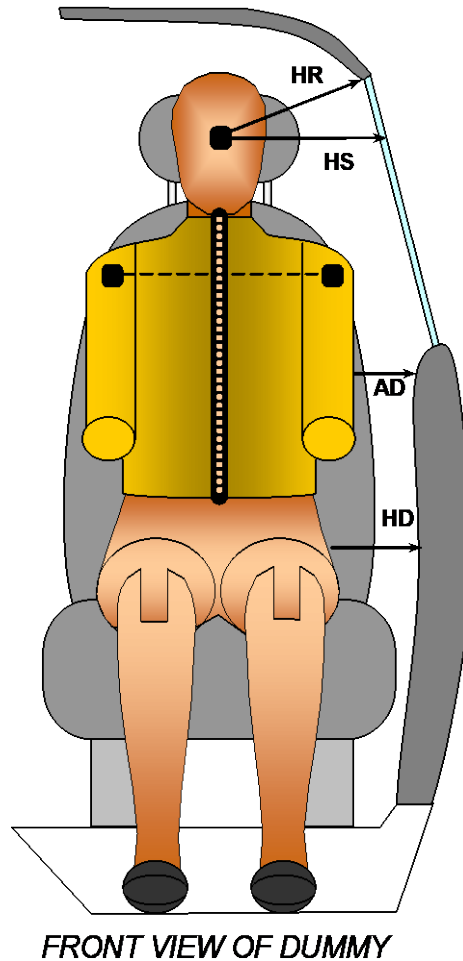


Driver Code	Pass. Code	Measurement Description	Driver	
			Length (mm)	Angle (°)
HH		Head to Header	347	
HW		Head to Windshield	642	
HZ	HZ	Head to Roof Liner	249	
NR	NB	Nose to Rim/Seat Back	222	
CD	CB	Chest to Dashboard/Seat Back	452	
CS		Chest to Steering Wheel	185	
KDL	KBL	Left Knee to Dash/Seat Back	103	25.0
KDR	KBR	Right Knee to Dash/Seat Back	96	26.1
PAX	PAX	Pelvic Tilt Angle X		20.2
PAY	PAY	Pelvic Tilt Angle Y		-0.4
PHX	PHX	Hip Point to Striker (X-Axis)	457	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	64	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

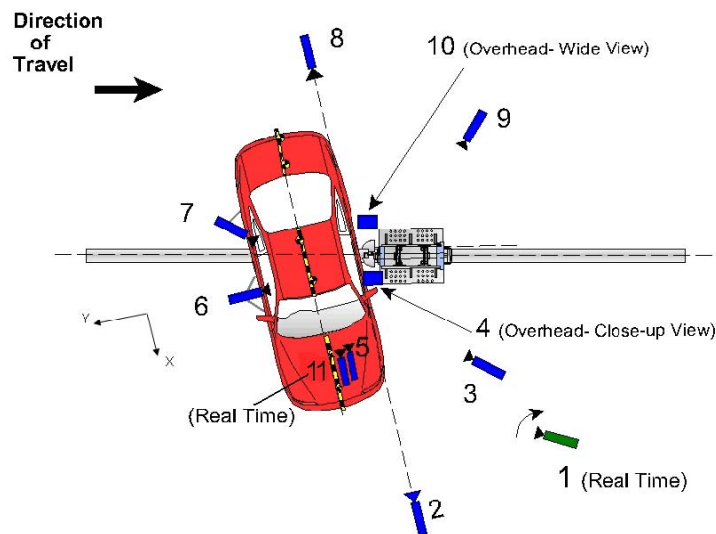


Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	270
HS	Head to Side Window	384
AD	Arm to Door	192
HD	Hip Point to Door	160

**DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019



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	6800	50	-2050	25	1000
3	Impact Side 45° Forward	4500	-2170	-2070	11	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	-7990	-60	-2000	24	1000
9	Impact Side 45° Rearward	-3750	-3900	-1980	11	1000
10	Overhead Wide View	0	610	-6650	11	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

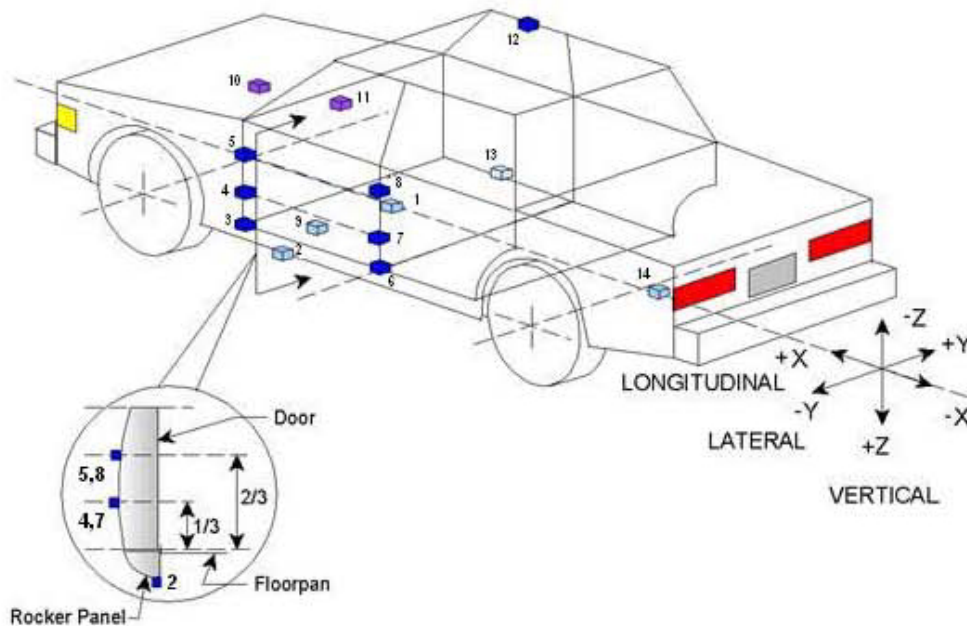
INSTRUMENTATION

	Number of Channels
Driver Dummy	13
Vehicle Structure	16
Pole Load Cells	8
Total	40

DATA SHEET NO. 6 **VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

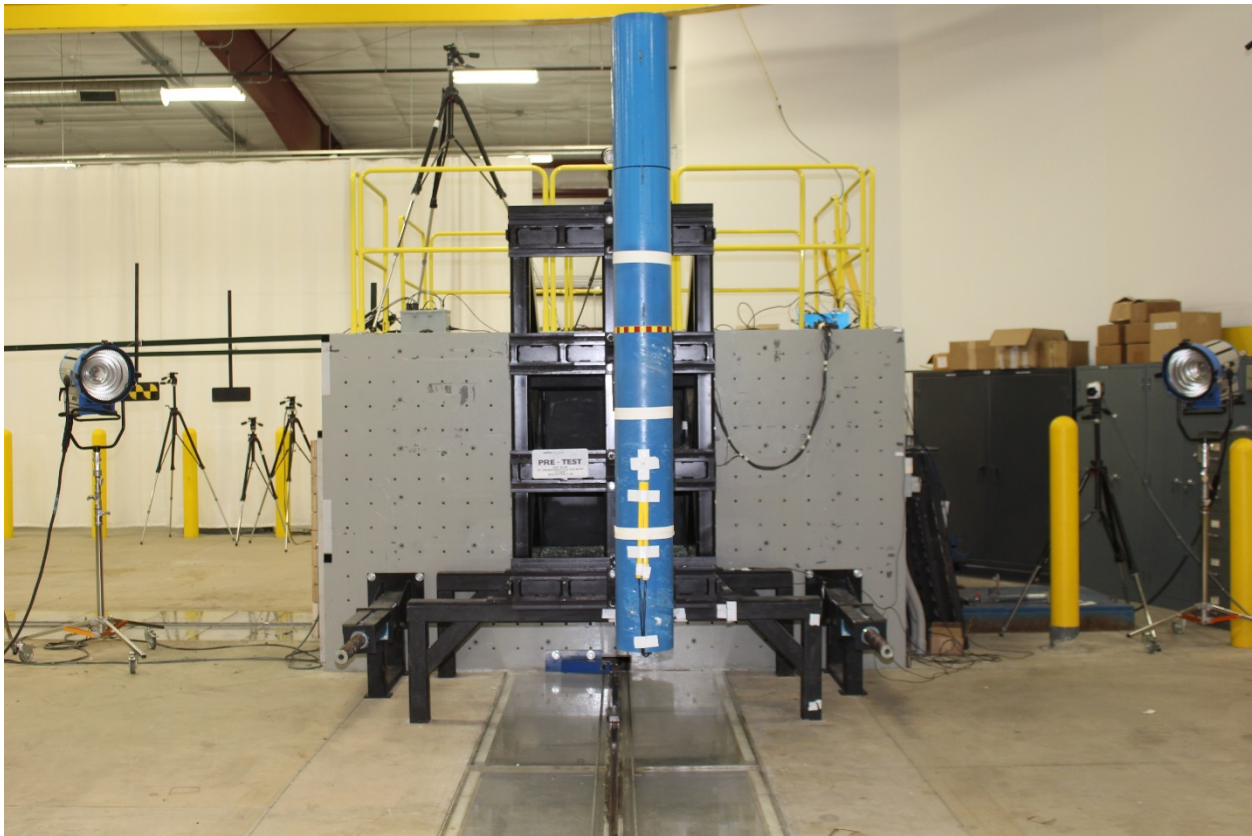
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3404	0	-648
2	Left Floor Sill	4122	-840	-465
3	A Pillar Sill	4493	-840	-465
4	A Pillar Low	4366	-930	-788
5	A Pillar Mid	4360	-910	-1129
6	B Pillar Sill	3153	-840	-485
7	B Pillar Low			
8	B Pillar Mid			
9	Driver Seat Track	3405	-446	-705
10	Engine Top	4885	0	-1301
11	Firewall	4916	0	-1348
12	Right Roof	3381	610	-1981
13	Right Floor Sill	4118	840	-462
14	Rear Floorpan	1364	0	-849

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 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019



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 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019

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	Headrest
Left Shoulder	Side Torso/Pelvis Airbag, Seat Back
Upper Torso	Side Torso/Pelvis Airbag, Seat Back
Lower Torso	Side Torso/Pelvis Airbag, Seat Back
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion
Left Knee	None

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

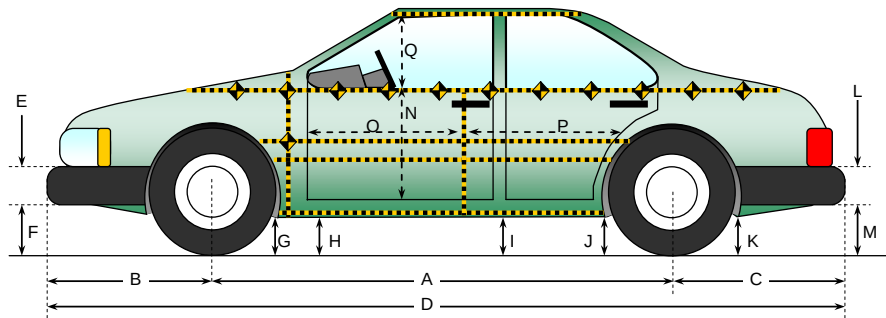
SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1275
Actual Impact Point (Aft of Front Axle)	mm		1283
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-8
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	degrees	75 +/- 3	75.1
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.35
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.44

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019



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

LEFT SIDE VIEW

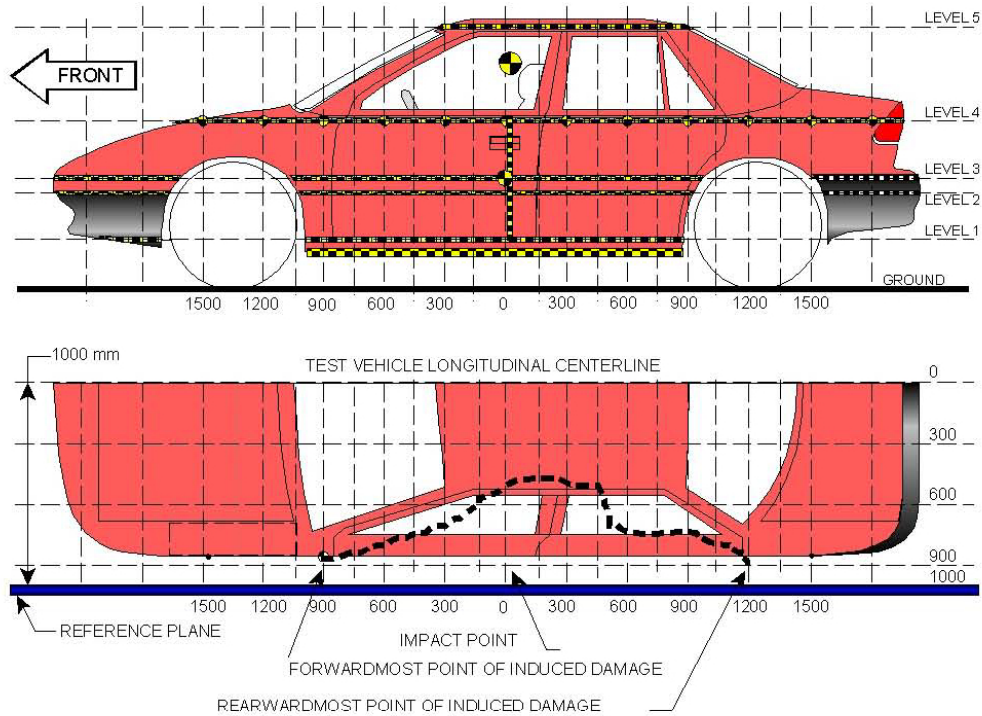
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3759	3686	73
B	Front Axle to FSOV	977	1112	-135
C	Rear Axle to RSOV	1323	1210	113
D	Total Vehicle Length at Centerline	6059	6008	51
E	Front Bumper Thickness	334	334	0
F	Front Bumper Bottom to Ground	350	346	4
G	Sill Height at Front Wheel Well	439	415	24
H	Sill Height at Front Door Leading Edge	443	406	37
I	Sill Height at B-Pillar	466	422	44
J1	Sill Height at Rear Wheel Well	482	477	5
J2	Pinch Weld Height at Rear Wheel Well	474	470	4
K	Sill Height Aft of Rear Wheel Well	519	539	-20
L	Rear Bumper Thickness	230	230	0
M	Rear Bumper Bottom to Ground	420	410	10
N	Sill Height to Bottom of Front Window Sill	925	837	88
O	Front Door Leading Edge to Impact CL	674	517	157
P	Rear Door Trailing Edge to Impact CL	1252	1153	99
Q	Front Window Opening	551	577	-26
R	Right Side Length	5365	5374	-9
S	Left Side Length	5365	5202	163
T	Vehicle Width at B-Pillars	2028	1977	51

DATA SHEET NO. 10 **VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019



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	551	367	0
2	Occupant H-Point	845	383	0
3	Mid Door	1004	382	0
4	Window Sill	1220	359	0
5	Window Top	1875	94	0

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019

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.

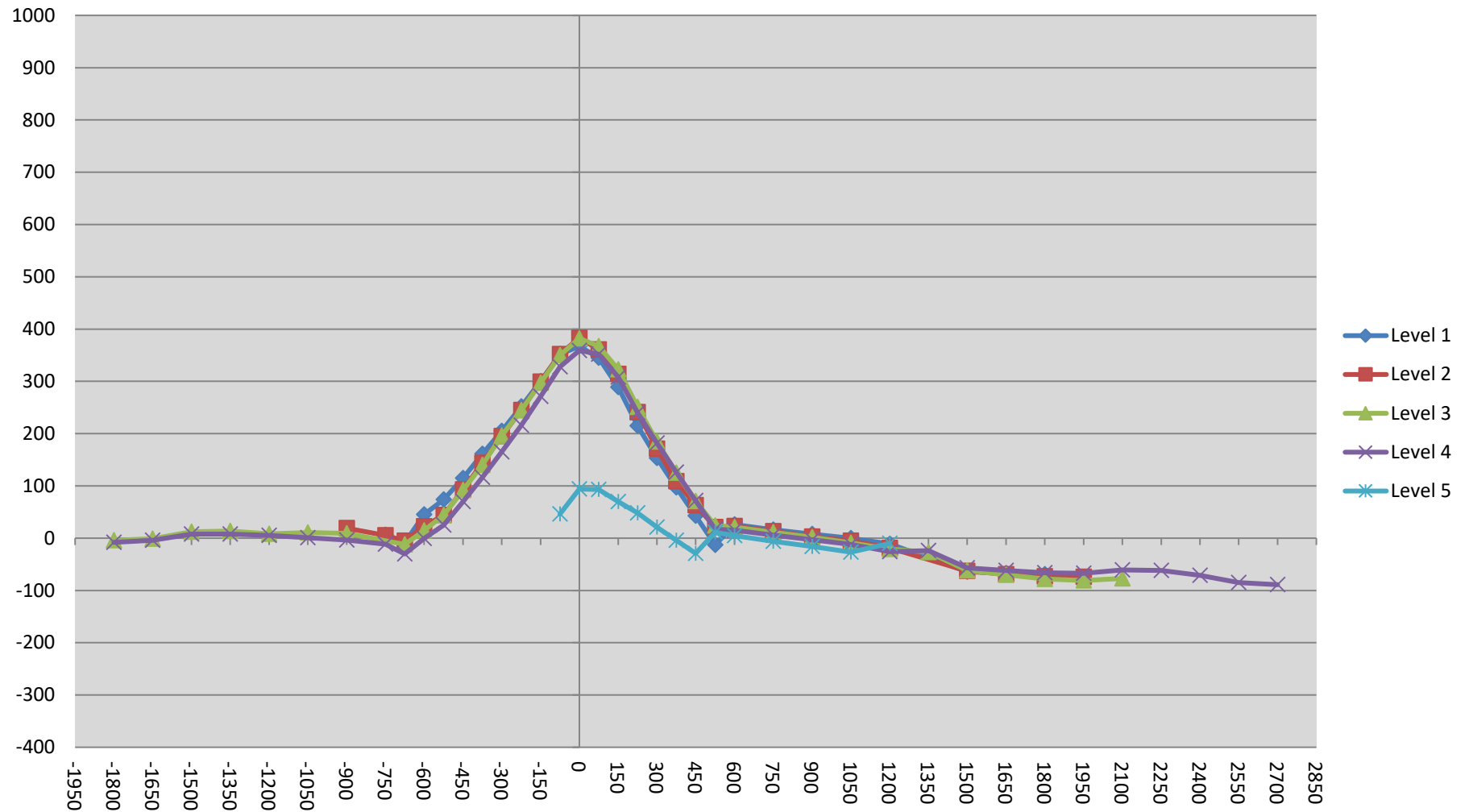
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800			167	217				163	209				-4	-8	
-1650			128	193				127	189				-1	-4	
-1500			100	174				112	182				12	8	
-1350			93	159				107	167				14	8	
-1200			88	148				96	153				8	5	
-1050			91	140				102	141				11	1	
-900		89	105	133			108	114	129			19	9	-4	
-825															
-750	109	107		127		115	112		115		6	5		-12	
-675	125	109	105	125		116	104	93	95		-9	-5	-12	-30	
-600	131	109	104	124		176	131	118	123		45	22	14	-1	
-525	130	109	103	120		204	153	147	145		74	44	44	25	
-450	128	108	101	119		243	201	193	189		115	93	92	70	
-375	126	107	100	117		287	251	240	233		161	144	140	116	
-300	125	106	98	115		330	301	294	280		205	195	196	165	
-225	122	105	97	113		374	350	342	329		252	245	245	216	
-150	121	104	97	112		421	403	394	383		300	299	297	271	
-75	119	102	96	110	376	471	454	446	438	422	352	352	350	328	46
0	118	101	95	108	368	485	484	477	467	462	367	383	382	359	94
75	117	100	94	107	365	462	461	461	459	458	345	361	367	352	93
150	115	99	93	106	364	404	413	416	414	434	289	314	323	308	70
225	115	99	92	104	364	330	340	343	344	412	215	241	251	240	48
300	114	99	91	103	360	267	270	276	285	381	153	171	185	182	21
375	113	98	90	102	357	210	207	215	228	353	97	109	125	126	-4
450	113	97	90	101	357	156	160	161	173	328	43	63	71	72	-29
525	112	97	89	100	355	99	118	113	117	366	-13	21	24	17	11
600	114	99	92	100	353	140	122	113	115	358	26	23	21	15	5
675															
750	114	100	92	100	351	130	113	103	106	345	16	13	11	6	-6
825															
900	114	100	93	101	349	122	103	95	98	333	8	3	2	-3	-16
1050	115	101	94	101	347	115	96	85	89	320	0	-5	-9	-12	-27
1200	116	102	95	102	351	105	83	74	76	341	-11	-19	-21	-26	-10
1350			128	137				101	113				-27	-24	
1500	127	112	104	107		63	49	42	50		-64	-63	-62	-57	
1650	129	112	104	107		62	43	34	45		-67	-69	-70	-62	
1800	109	104	102	107		40	31	24	41		-69	-73	-78	-66	
1950		87	93	109			13	12	42			-74	-81	-67	
2100			86	112				9	51				-77	-61	
2250				112					50					-62	
2400				111					40					-71	
2550				117					32					-85	
2700				124					35					-89	

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
Test Date: 7/18/2019

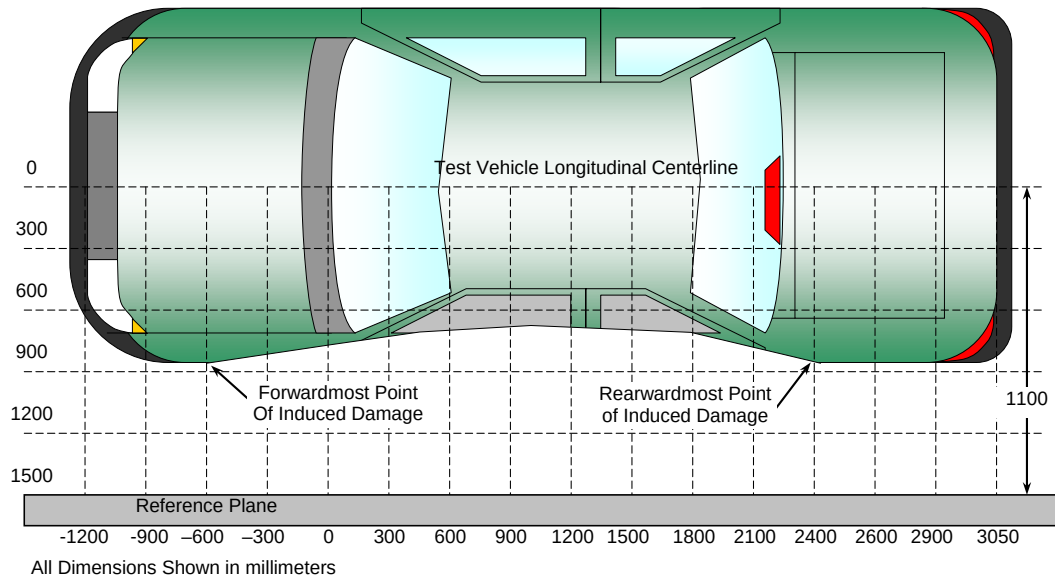
21



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	555	3	98	95	-3
2	309	3	91	268	177
3	63	3	94	464	370
4	-183	3	97	370	273
5	-429	3	101	203	102
6	-675	3	105	91	-14

DATA SHEET NO. 12
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

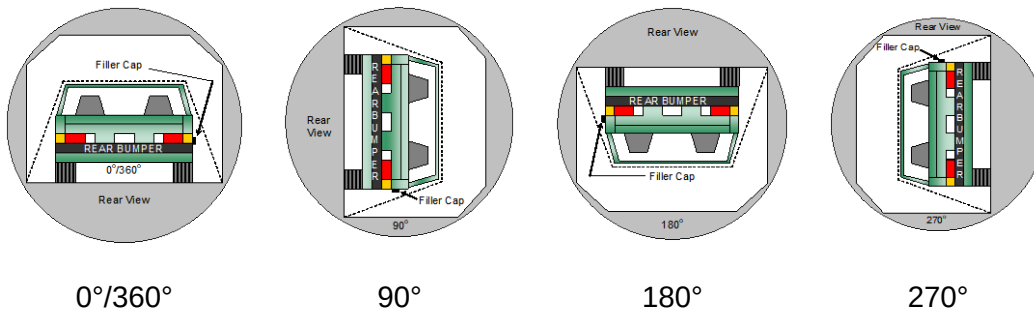
NHTSA No.: M20190209
 Test Date: 7/18/2019

Test Time: 10:43 am

Temperature: 22.0°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°	93	300	393
90° to 180°	90	300	390
180° to 270°	84	300	384
270° to 360°	86	300	386

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	

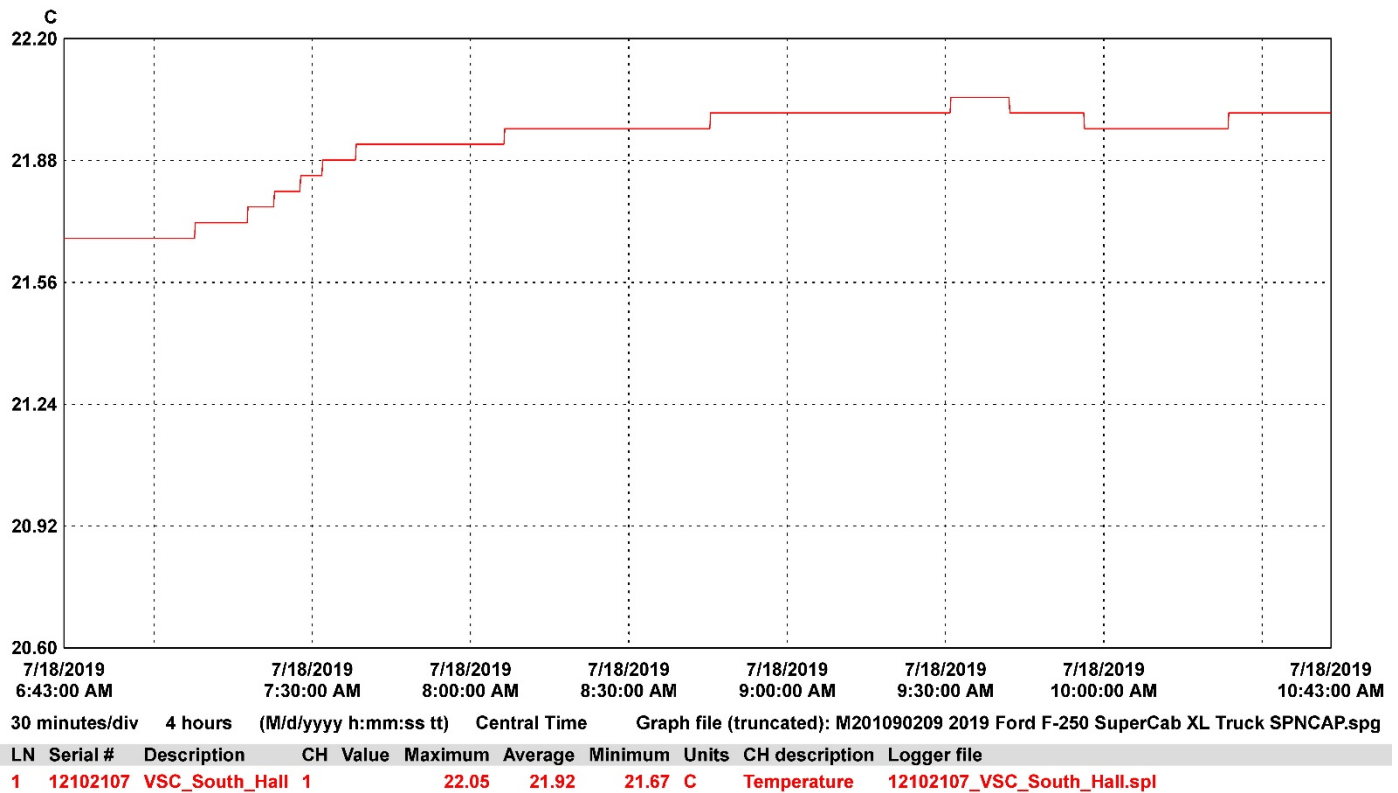
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20190209
 Test Date: 7/18/2019



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-1
Photo No. 002	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-1
Photo No. 003	Pre-Test Frontal View of Test Vehicle	A-2
Photo No. 004	Post-Test Frontal View of Test Vehicle	A-2
Photo No. 005	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
Photo No. 006	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
Photo No. 007	Pre-Test Left Side View of Test Vehicle	A-4
Photo No. 008	Post-Test Left Side View of Test Vehicle	A-4
Photo No. 009	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
Photo No. 010	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
Photo No. 011	Pre-Test Rear View of Test Vehicle	A-6
Photo No. 012	Post-Test Rear View of Test Vehicle	A-6
Photo No. 013	Pre-Test Right Side View of Test Vehicle	A-7
Photo No. 014	Post-Test Right Side View of Test Vehicle	A-7
Photo No. 015	Pre-Test Overhead View of Test Area	A-8
Photo No. 016	Post-Test Overhead View of Test Area	A-8
Photo No. 017	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-9
Photo No. 018	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-9
Photo No. 019	Pre-Test Close-Up View of Impact Point Target	A-10
Photo No. 020	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-10
Photo No. 021	Pre-Test Front Close-Up View of Dummy Head and Chest	A-11
Photo No. 022	Post-Test Front Close-Up View of Dummy	A-11
Photo No. 023	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-12
Photo No. 024	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-12
Photo No. 025	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-13

		<u>Page No.</u>
Photo No. 026	Pre-Test Front View of Seat Back Prior to Dummy Positioning	A-13
Photo No. 027	Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint	A-14
Photo No. 028	Pre-Test Front View of Seat Pan Prior to Dummy Positioning	A-14
Photo No. 029	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-15
Photo No. 030	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-15
Photo No. 031	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-16
Photo No. 032	Pre-Test Placement of Dummy's Feet	A-16
Photo No. 033	Pre-Test View of Belt Anchorage for Dummy	A-17
Photo No. 034	Pre-Test Left Side View of Steering Wheel	A-17
Photo No. 035	Pre-Test View of Disengaged Parking Brake	A-18
Photo No. 036	Pre-Test View of Parking Brake	A-18
Photo No. 037	Pre-Test Close-Up Left Side View of Driver Seat Track	A-19
Photo No. 038	Pre-Test Close-Up Left Side View of Driver Seat Back	A-19
Photo No. 039	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-20
Photo No. 040	Pre-Test Dummy and Door Clearance View	A-20
Photo No. 041	Post-Test Dummy and Door Clearance View	A-21
Photo No. 042	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-21
Photo No. 043	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-22
Photo No. 044	Pre-Test Inner Door Panel View	A-22
Photo No. 045	Post-Test Inner Door Panel View Showing Dummy Contact Location	A-23
Photo No. 046	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-23
Photo No. 047	Post-Test Dummy Close-Up Head Contact with Side Air Bag View	A-24
Photo No. 048	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-24
Photo No. 049	Post-Test Dummy Close-Up Torso Contact with Side Air Bag View	A-25

		<u>Page No.</u>
Photo No. 050	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-25
Photo No. 051	Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View	A-26
Photo No. 052	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-26
Photo No. 053	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
Photo No. 054	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
Photo No. 055	Close-Up View of Vehicle's Certification Label	A-28
Photo No. 056	Close-Up View of Vehicle's Tire Information Placard or Label	A-28
Photo No. 057	Pre-Test Pole Barrier Front View	A-29
Photo No. 058	Post-Test Pole Barrier Front View	A-29
Photo No. 059	Pre-Test Pole Barrier Side View	A-30
Photo No. 060	Post-Test Pole Barrier Side View	A-30
Photo No. 061	Pre-Test Ballast View	A-31
Photo No. 062	Post-Test Primary and Redundant Speed Trap Read-Out	A-31
Photo No. 063	FMVSS No. 301 Static Rollover 0 Degrees	A-32
Photo No. 064	FMVSS No. 301 Static Rollover 90 Degrees	A-32
Photo No. 065	FMVSS No. 301 Static Rollover 180 Degrees	A-33
Photo No. 066	FMVSS No. 301 Static Rollover 270 Degrees	A-33
Photo No. 067	FMVSS No. 301 Static Rollover 360 Degrees	A-34
Photo No. 068	Impact Event	A-34
Photo No. 069	Monroney Label	A-35
Photo No. 070	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-35
Photo No. 071	Post-Test View of Shattered Vehicle Inner Door Panel	A-36



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



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

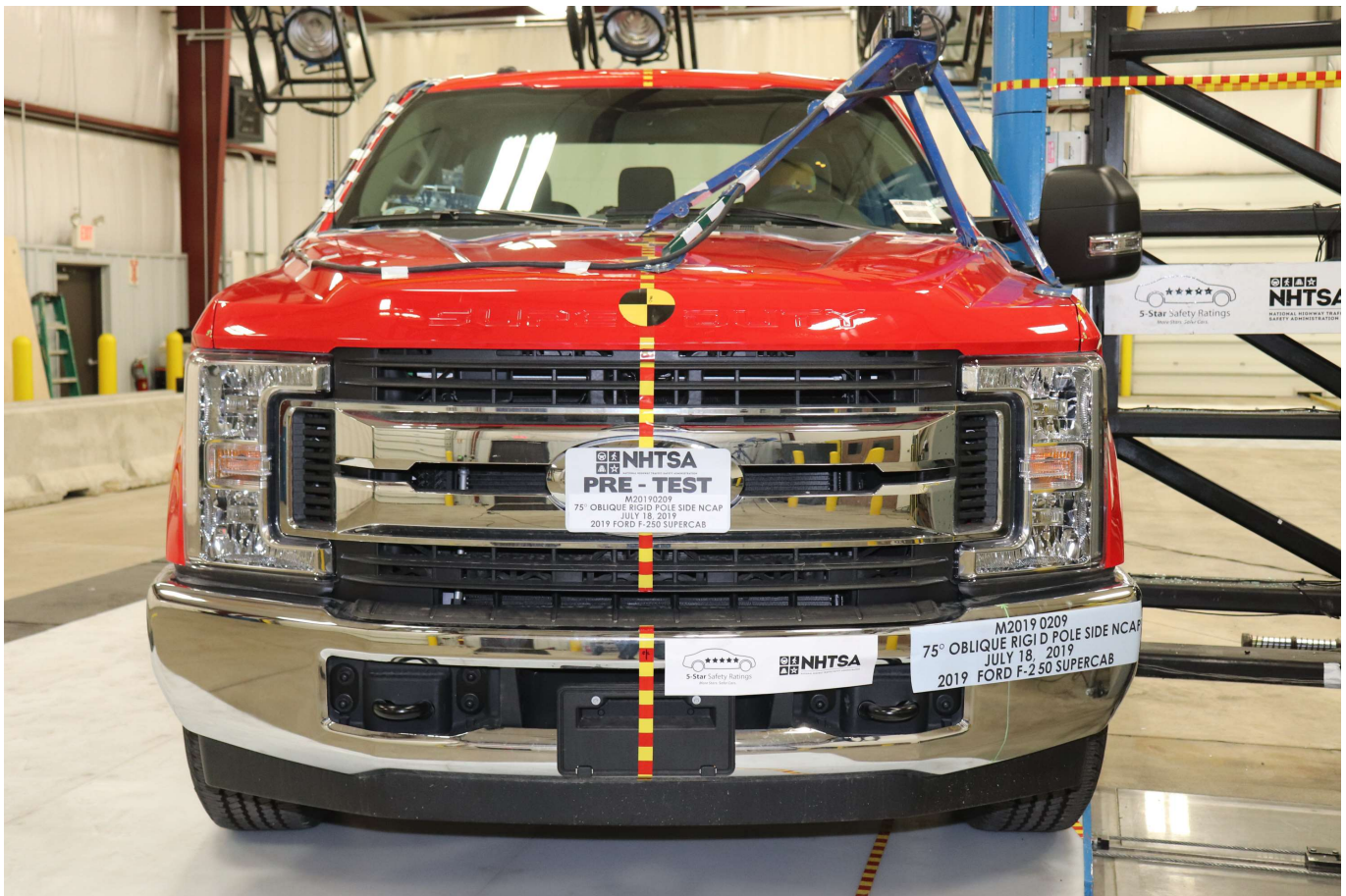


Photo No. 003 - Pre-Test Frontal View of Test Vehicle



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



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



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

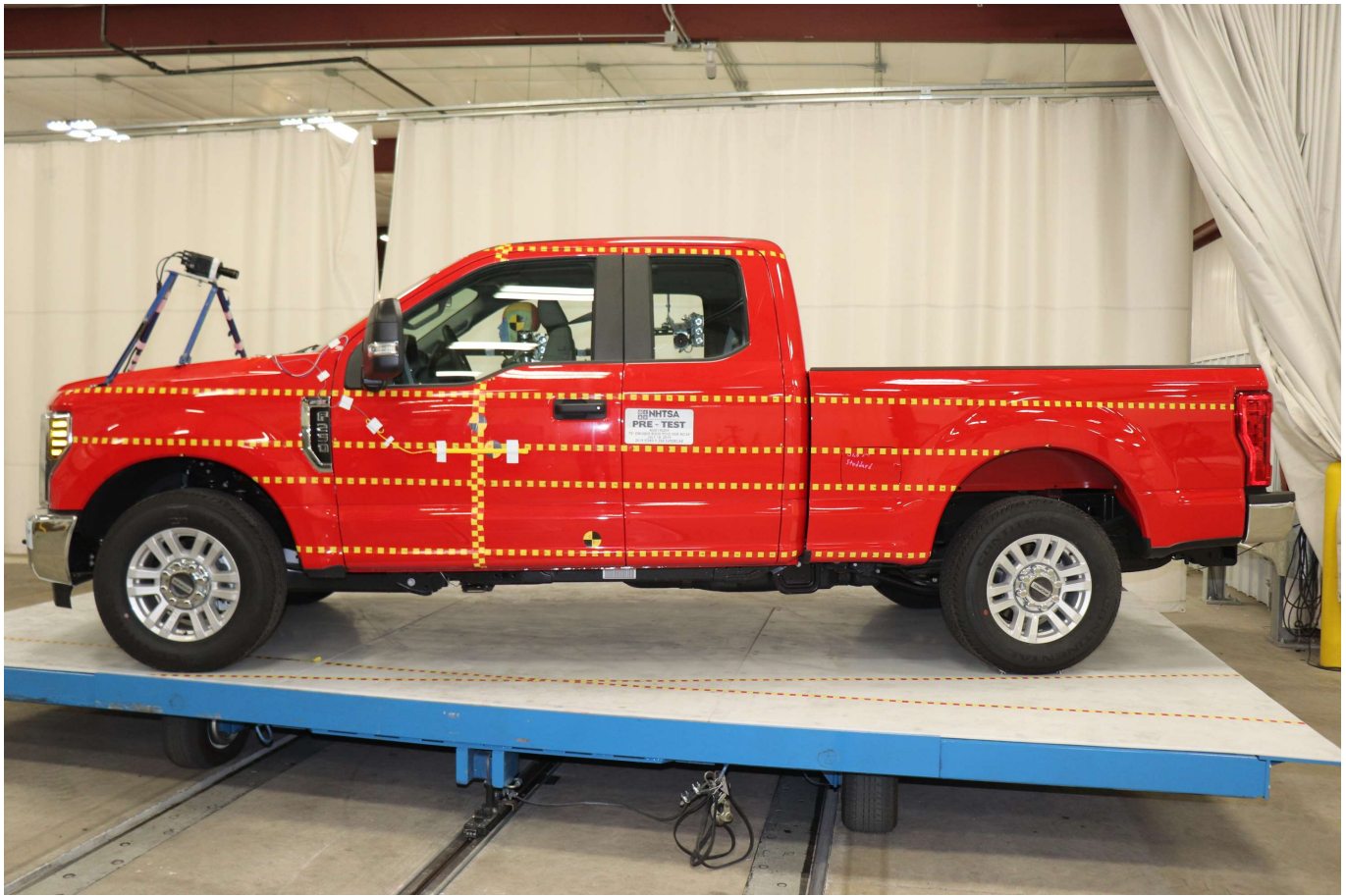


Photo No. 007 - Pre-Test Left Side View of Test Vehicle



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



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



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



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



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



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



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

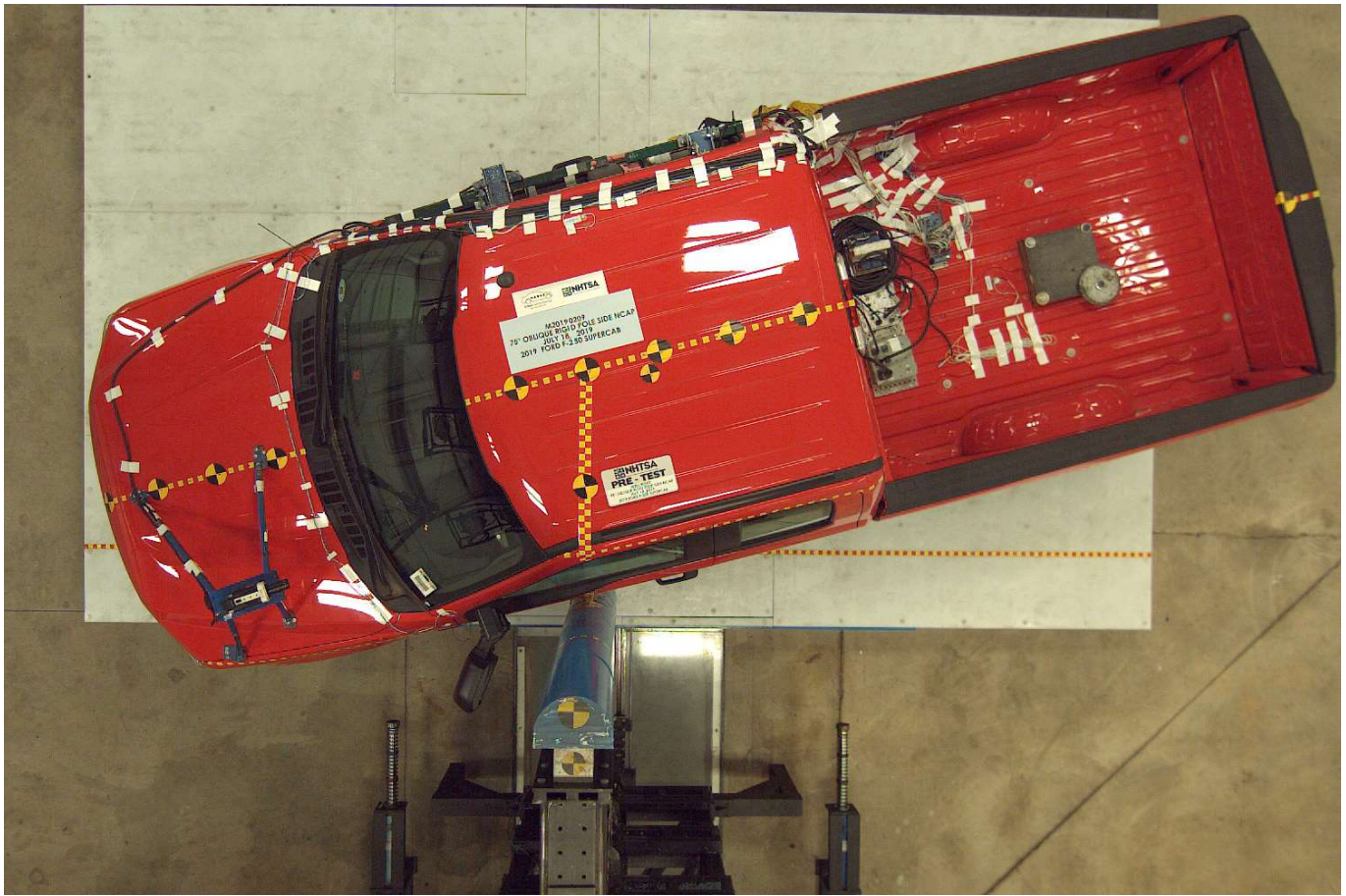


Photo No. 015 - Pre-Test Overhead View of Test Area

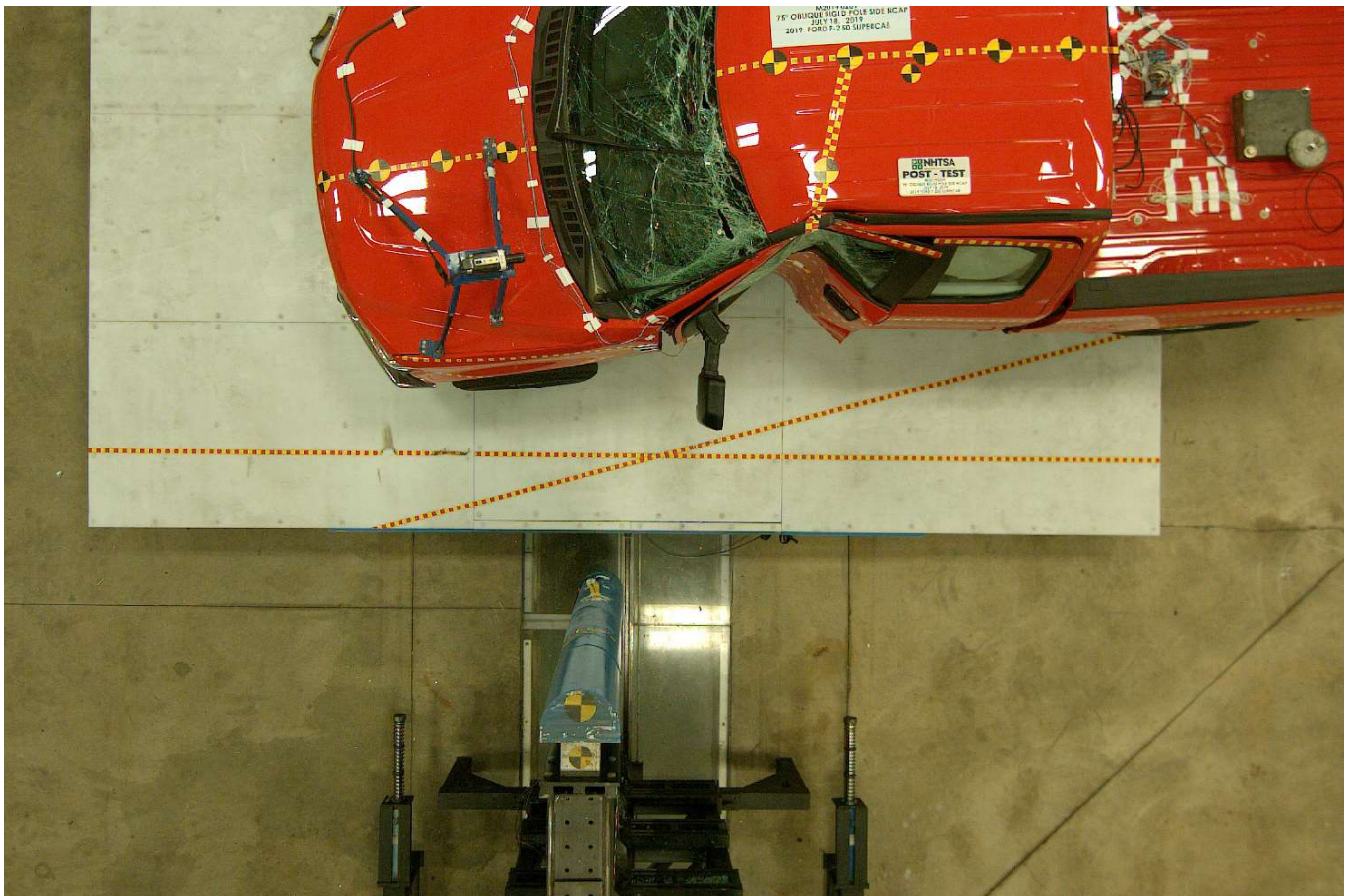


Photo No. 016 - Post-Test Overhead View of Test Area



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

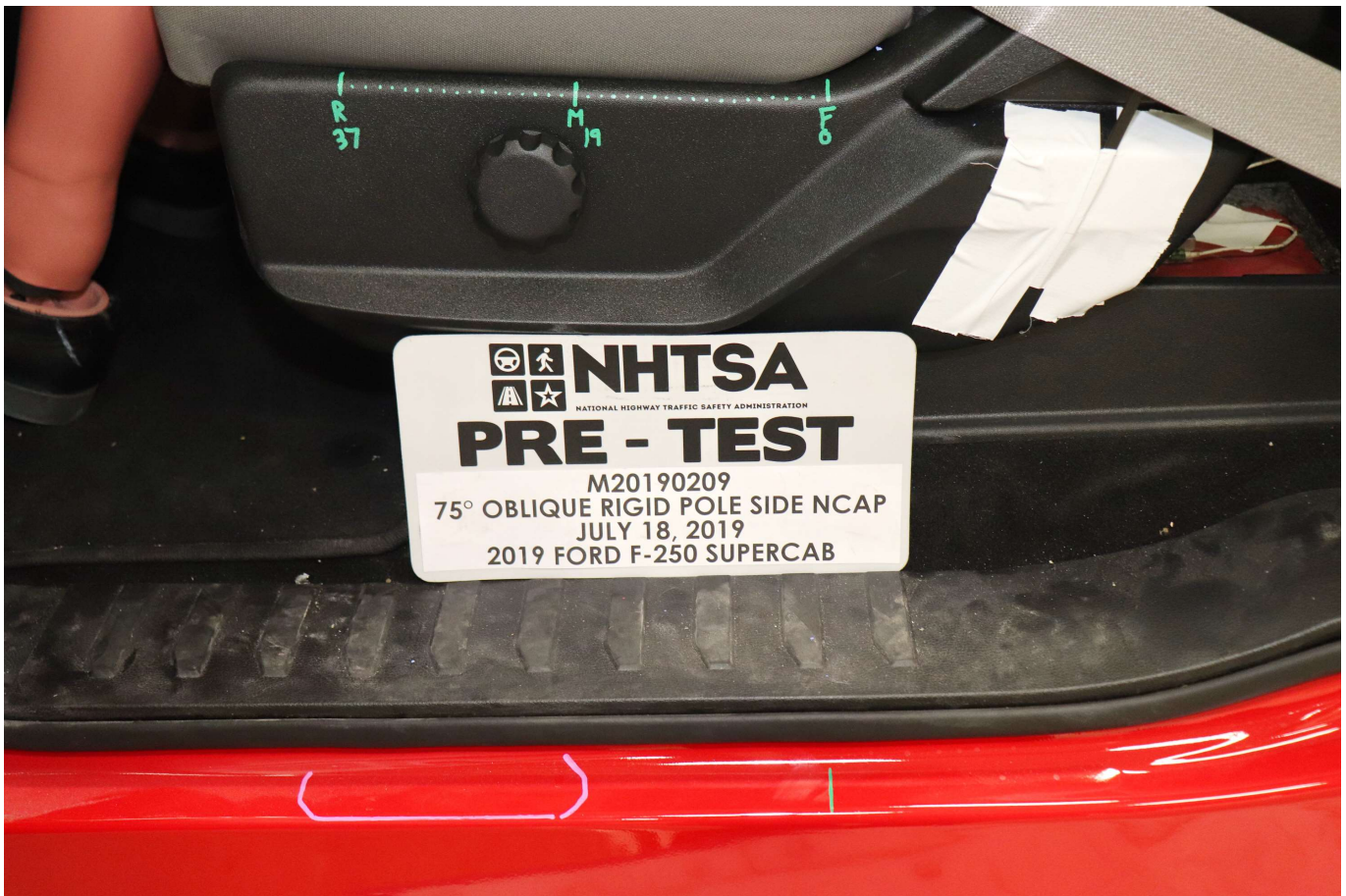


Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track

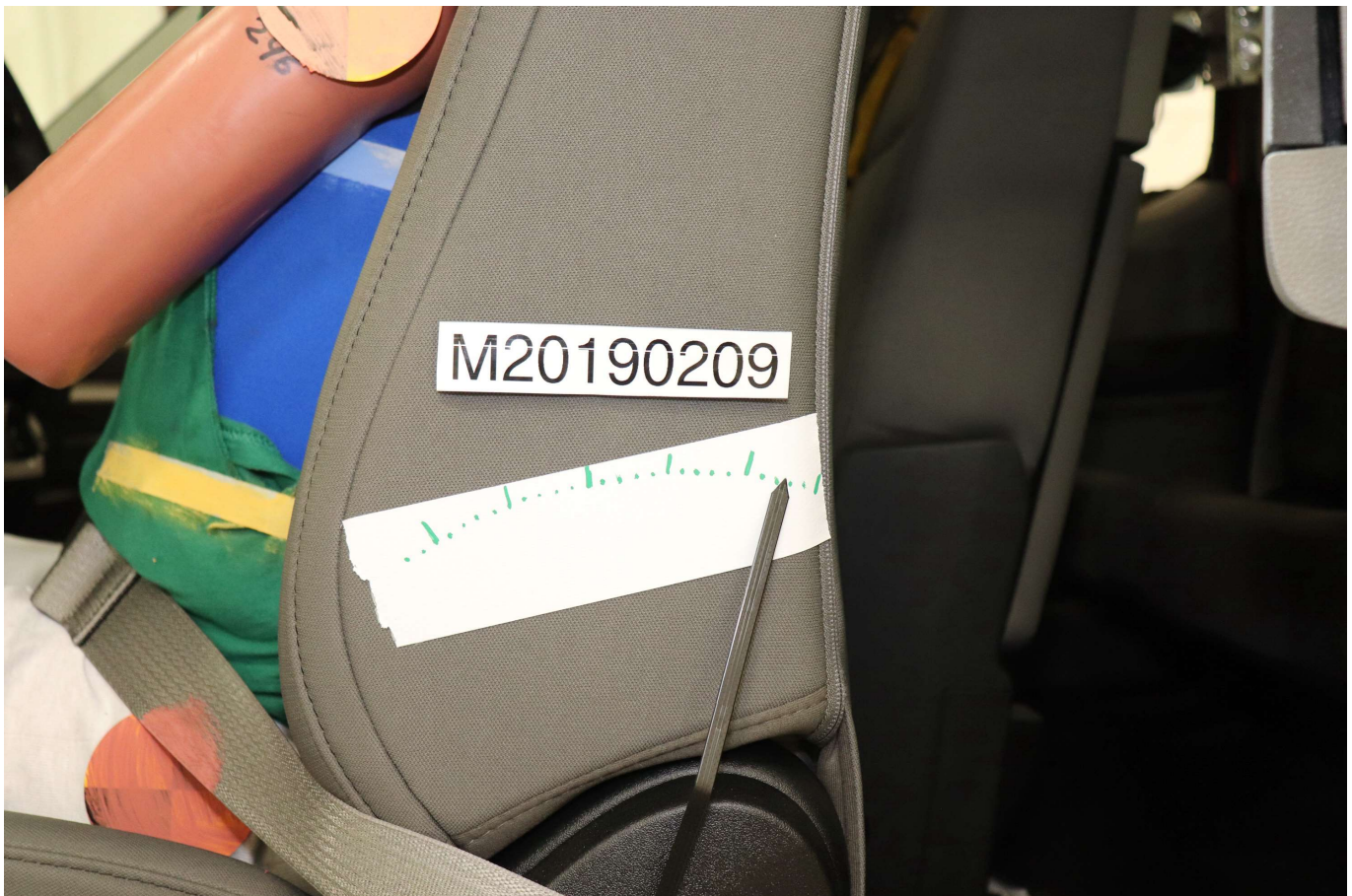


Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back



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



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



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



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



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



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



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



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



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



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



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

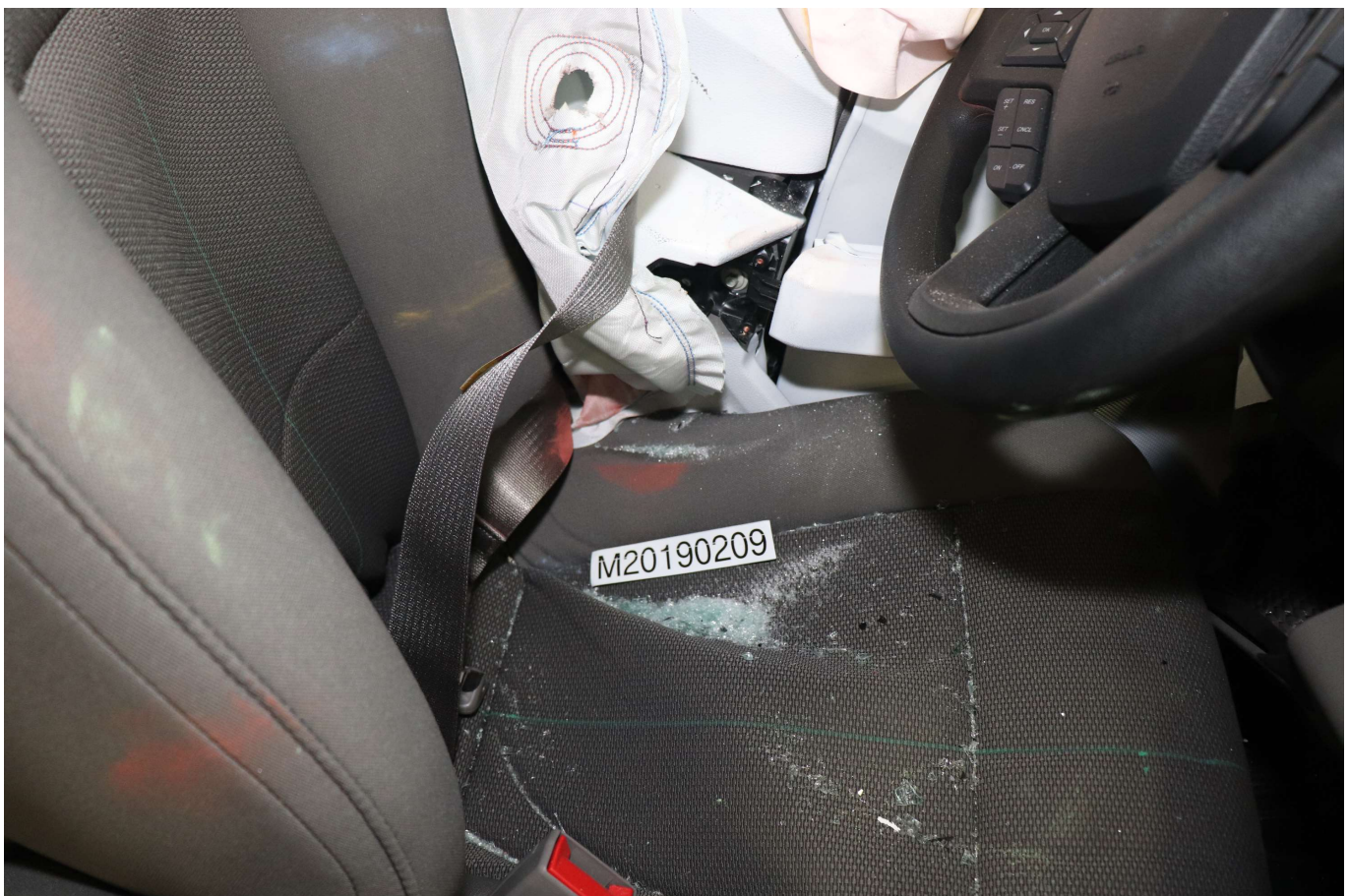


Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



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

PHOTOGRAPH NOT APPLICABLE

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



Photo No. 053 - 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

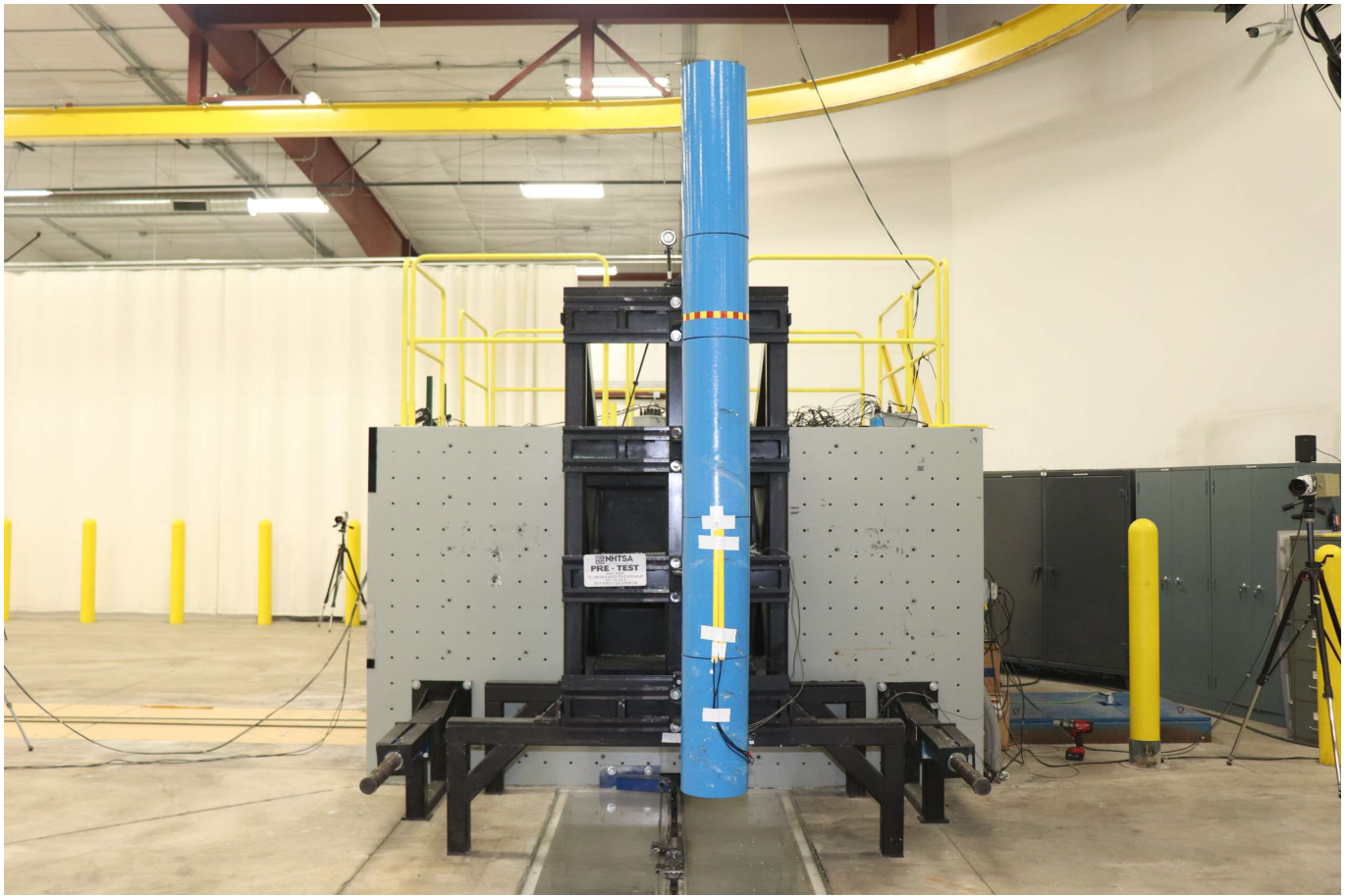


Photo No. 057 - Pre-Test Pole Barrier Front View



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

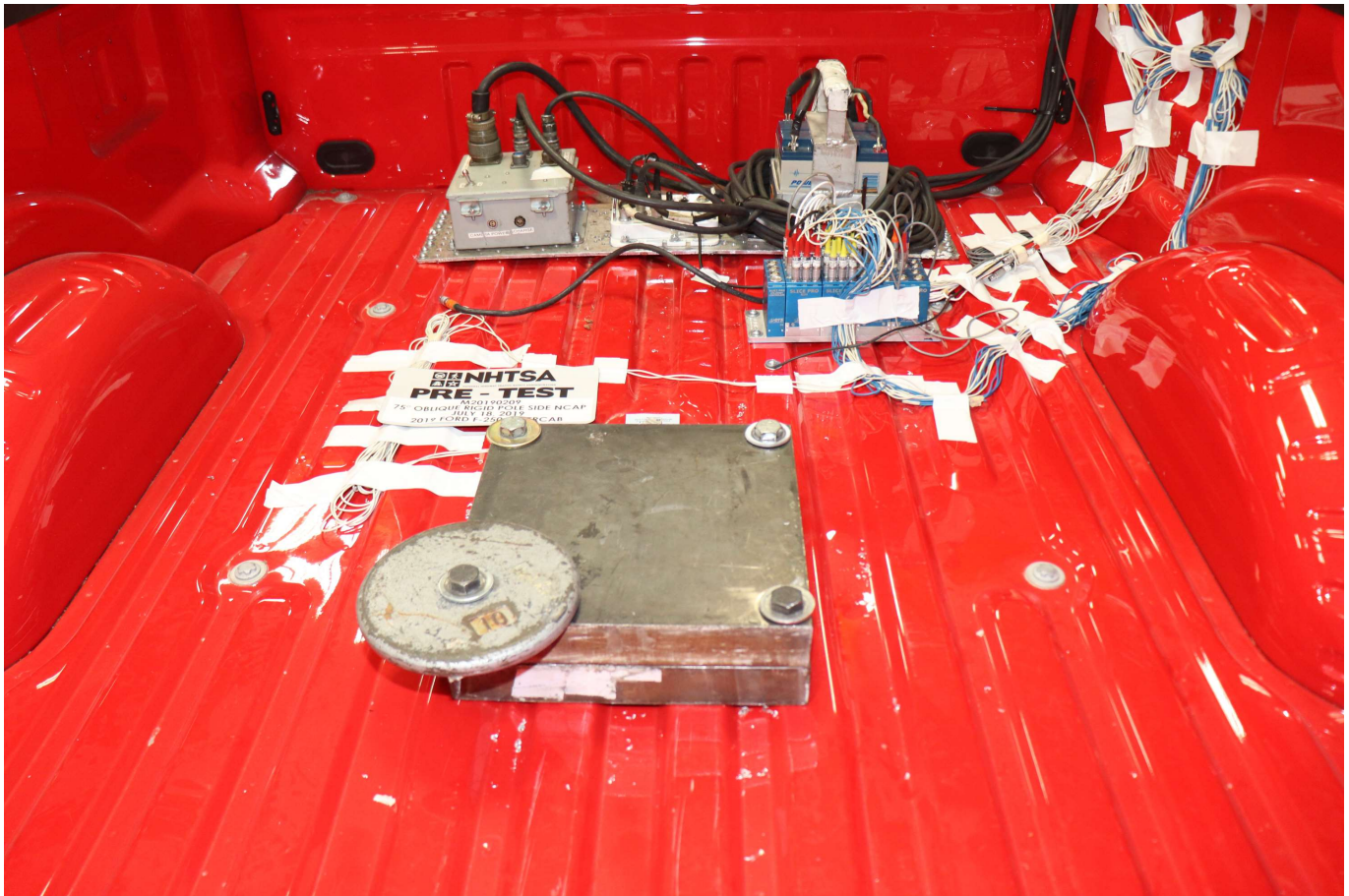


Photo No. 061 - Pre-Test Ballast View



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



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

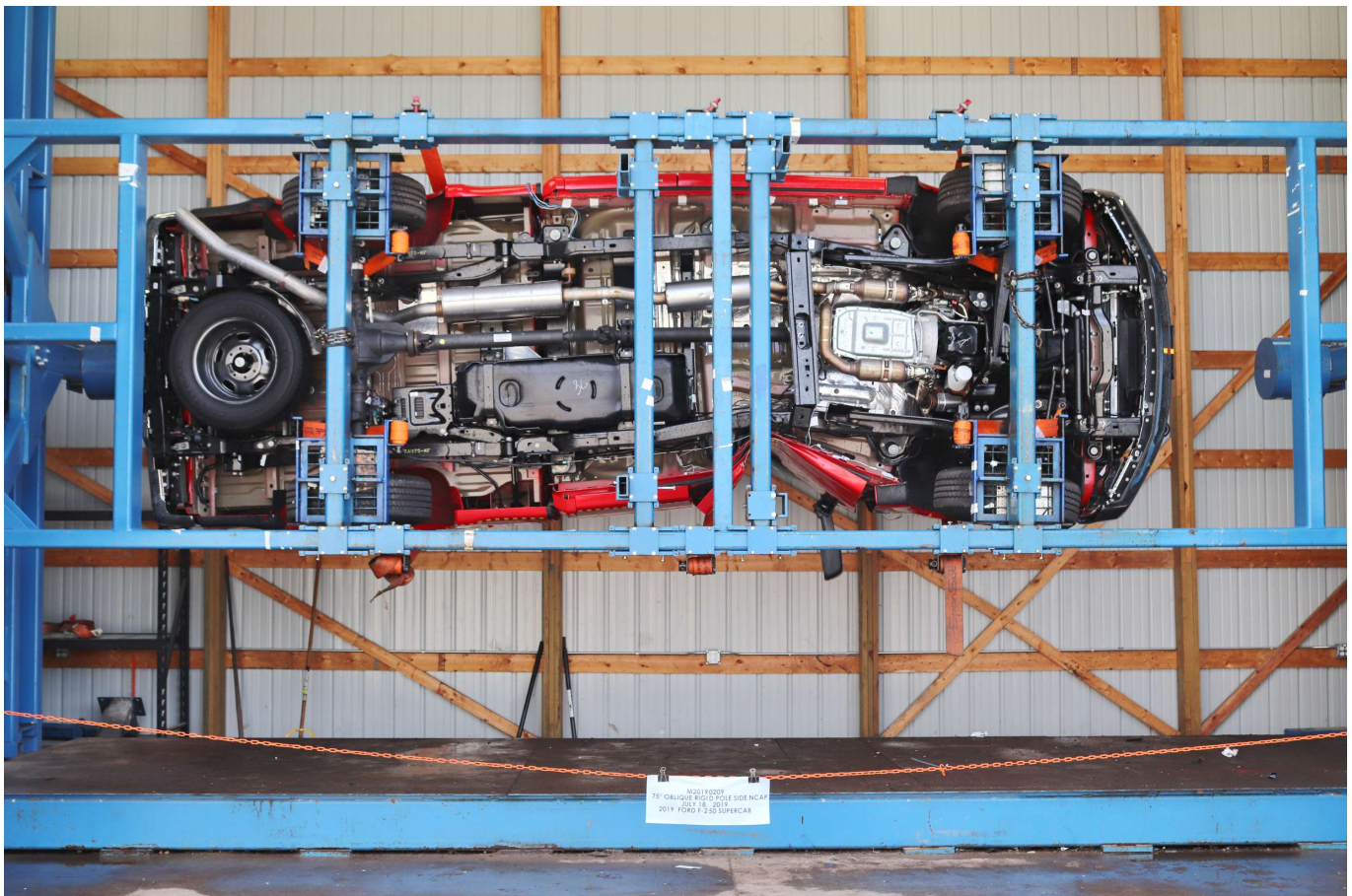


Photo No. 064 - FMVSS Photo No. 301 Static Rollover 90 Degrees



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

Ford Go Further ford.com

VEHICLE DESCRIPTION

SUPER DUTY

2019 F250 SRW 4X2 SUPERCAB XL 148" WB STYLESIDE 6.2L EFI V-8 ENGINE 8-SPEED AUTOMATIC TRANS G

EXTERIOR RACE RED INTERIOR MEDIUM EARTH GRAY CLOTH

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTERIOR

- BOX RAIL/TAILOATE MOLDINGS
- DOOR HANDLES - BLACK
- HEADLAMPS - WIPER ACTIVATED
- LOCKING REMOVABLE TAILGATE
- PICKUP BOX, TIE DOWN HOOKS
- NA W/BOX DLT
- SPARE TIRE AND WHEEL LOCK
- NA W/BOX DLT
- TOW HOOKS
- TRAILER SWAY CONTROL

INTERIOR

- 60/40 FOLD-DOWN REAR BENCH SEAT
- AIR COND. MANUAL FRONT
- DRIVER SEAT-MANUAL LUMBAR
- OUTSIDE TEMP DISPLAY
- PARTICULATE AIR FILTER
- TILT/TELESCOPE STR COLUMN
- VINYL SUN VISORS

FUNCTIONAL

- 4-WHEEL ANTI-LOCK DISC BRAKING SYSTEM
- HILL START ASSIST
- JEWEL EFFECT HEADLAMPS
- MYKEY®
- REAR VIEW CAMERA
- NA W/BOX DLT
- TWIN I-BEAM INDEPENDENT FRNT SUSPENSION W/STAB BAR

SAFETY/SECURITY

- ADVANCETRAC WITH RSC
- AIRBAGS - SAFETY CANOPY
- BELT-MINDER CHIME
- DRIVER/PASSENGER AIR BAGS
- SECURILOCK® ANTI-THEFT SYS
- SOS POST CRASH ALERT SYS

WARRANTY

- 3YR/36,000 BUMPER / BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST
- 5YR/100,000 DIESEL ENGINE

INCLUDED ON THIS VEHICLE (MSRP)

OPTIONAL EQUIPMENT/OTHER

PREFERRED EQUIPMENT PKG.600A 8-SPEED AUTOMATIC TRANS G NO CHARGE

3.73 ELECTRONIC-LOCKING AXLE 390.00

POWER EQUIPMENT GROUP 915.00

CARPET FLOORING AND MATS XL 60.00

STX APPEARANCE PACKAGE 1,690.00

L1725/SERVICE BSW ALL SEASON CRUISE CONTROL

JAM/FM STEREO MP3/CLK 185.00

SILVER CAST ALUM WHEELS-18" 445.00

PLATFORM RUNNING BOARDS 10000# GVWR PACKAGE

SIRIUS SAT RADIO NO CHARGE

50 STATE EMISSIONS NO CHARGE

110V/400W OUTLET NO CHARGE

SPARE TIRE AND WHEEL NO CHARGE

TRAILER BRAKE CONTROLLER TELESCOPING TT MIRR-POWER/HTD JACK

UPFITTER SWITCHES 165.00

EXTRA HEAVY DUTY ALTERNATOR NO CHARGE

REMOTE START SYSTEM 250.00

ULTIMATE TRAILER TOW CAMERA CLOTH 40/20/40 SEAT 710.00

SYNCH 3 VOICE ACTIVATED SYSTEMS 100.00

450.00

PRICE INFORMATION

BASE PRICE \$35,485.00

TOTAL OPTIONS/OTHER 5,360.00

TOTAL VEHICLE & OPTIONS/OTHER 40,845.00

DESTINATION & DELIVERY 1,595.00

SOLD TO

Fritta Ford 71D 155

8000 Auto Drive CA 92504

RAMP ONE

RE27

FINAL ASSEMBLY PLANT

KENTUCKY

METHOD OF TRANSF

RAIL

ITEM #:

71-Z203 Q/T 2

TOTAL MSRP \$42,440.00

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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 Not Rated Rear seat Not Rated

Based on the risk of injury in a side impact.

Rollover ★★ ★★

Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236

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SCAN OR TEXT 1FKEE12920 TO 48888

Msg & Data rates may apply. Text HELP for help.

www.ford.com/help/privacy-term/

Photo No. 069 - Monroney Label

Seats

SITTING IN THE CORRECT POSITION

WARNING: Sitting improperly, out of position or with the seatback reclined too far can take weight off the seat cushion and affect the decision of the passenger sensing system, resulting in serious injury or death in the event of a crash. Always sit upright against your seat back, with your feet on the floor.

WARNING: Do not recline the seatback too far as this can cause the occupant to slide under the seatbelt, resulting in serious injury in the event of a collision.

WARNING: Do not place objects higher than the top of the seat backrest. Failure to follow this instruction could result in personal injury or death in the event of a sudden stop or crash.

We recommend that you follow these guidelines:

- Sit in an upright position with the base of your spine as far back as possible.
- Do not recline the seat backrest so that your torso is more than 30° from the upright position.
- Adjust the head restraint so that the top of it is level with the top of your head and as far forward as possible. Make sure that you remain comfortable.
- Keep sufficient distance between yourself and the steering wheel. We recommend a minimum of 10 in (25 cm) between your breastbone and the airbag cover.
- Hold the steering wheel with your arms slightly bent.
- Bend your legs slightly so that you can press the pedals fully.
- Position the shoulder strap of the seatbelt over the center of your shoulder and position the lap strap tightly across your hips.

Make sure that your driving position is comfortable and that you can maintain full control of your vehicle.

HEAD RESTRAINTS

WARNING: Fully adjust the head restraint before you sit in or operate your vehicle. This will help minimize the risk of neck injury in the event of a crash. Do not adjust the head restraint when your vehicle is moving.



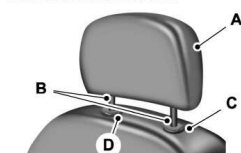
When you use them properly, the seat, head restraint, seatbelt and airbags will provide optimum protection in the event of a crash.

Seats

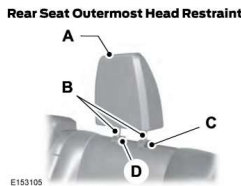
WARNING: The head restraint is a safety device. Whenever possible it should be installed and properly adjusted when the seat is occupied. Failure to adjust the head restraint properly could reduce its effectiveness during certain impacts.

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

Front Seat Head Restraint



Rear Seat Outermost Head Restraints



The head restraints may consist of:

- A An energy absorbing head restraint.
- B Two steel stems.
- C Guide sleeve adjust and release button.
- D Guide sleeve unlock and remove button.

Adjusting the Head Restraint

Raising the Head Restraint

Pull the head restraint up.

Lowering the Head Restraint

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

Removing the Head Restraint

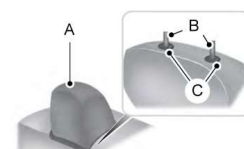
1. Press and hold buttons C and D.
2. Pull the head restraint up.

Installing the Head Restraint

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

Front Row Center and Rear Seat Center (Crew Cab) Head Restraints

Your vehicle may have head restraints that are non-adjustable. The non-adjustable head restraints consist of:



- A An energy absorbing head restraint.
- B Two steel stems.
- C Guide sleeve unlock and remove button.

Removing the Head Restraint

1. Press and hold buttons C.
2. Pull up the head restraint.

Installing the Head Restraint

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

Front Seat Center Head Restraint

Your vehicle may have a front row center head restraint that you cannot adjust or remove.

Tilting Head Restraints (If Equipped)

The front head restraints tilt for extra comfort.



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

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

Note: Do not attempt to force the head restraint backward after you tilt it. Instead, continue tilting it forward until the head restraint releases to the upright position.

MANUAL SEATS (IF EQUIPPED)

WARNING: Do not adjust the driver's seat or seatback when your vehicle is moving.

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)

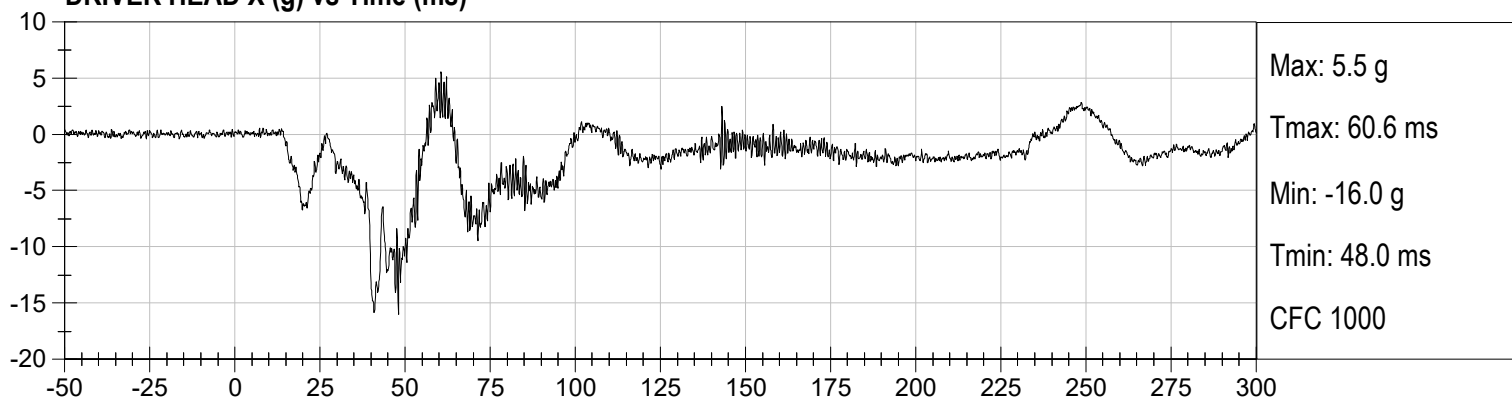
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

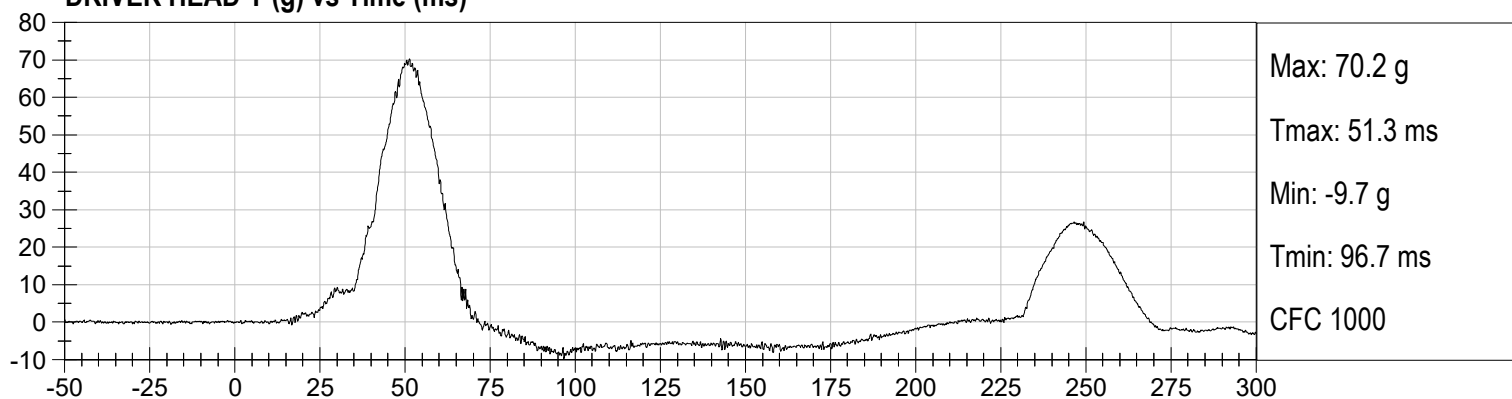
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

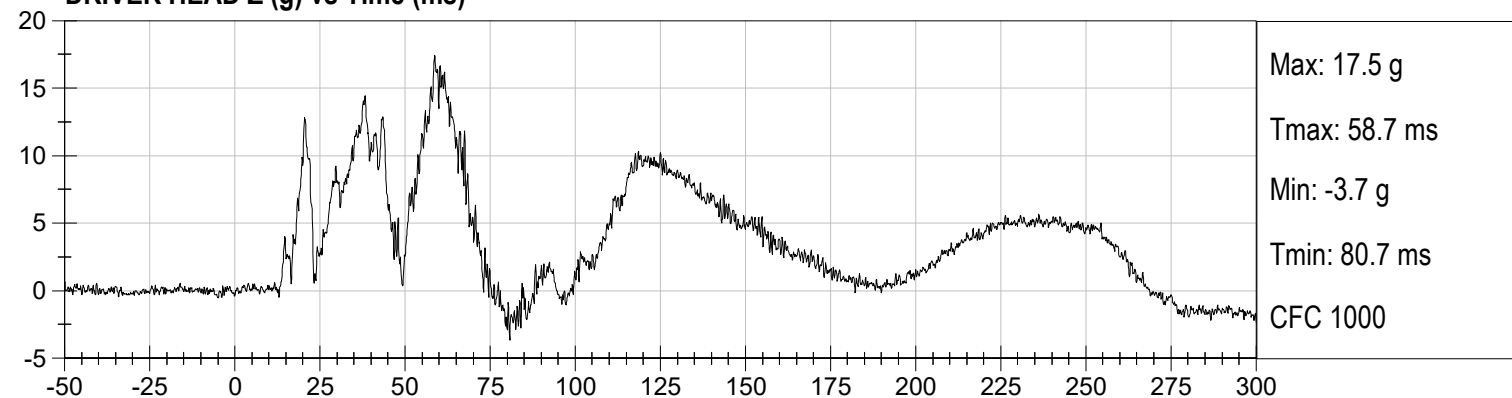
DRIVER HEAD X (g) vs Time (ms)



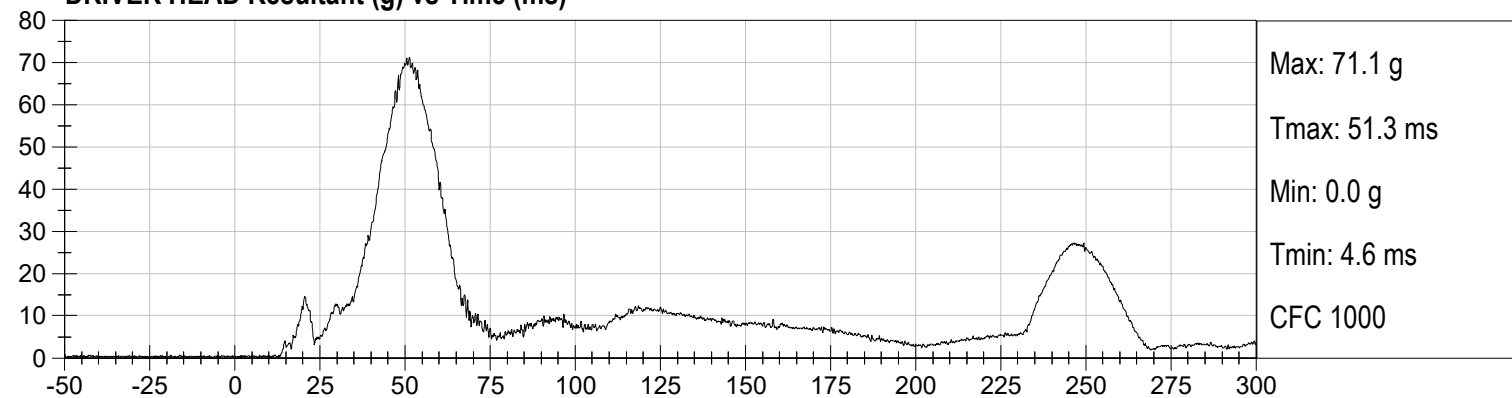
DRIVER HEAD Y (g) vs Time (ms)



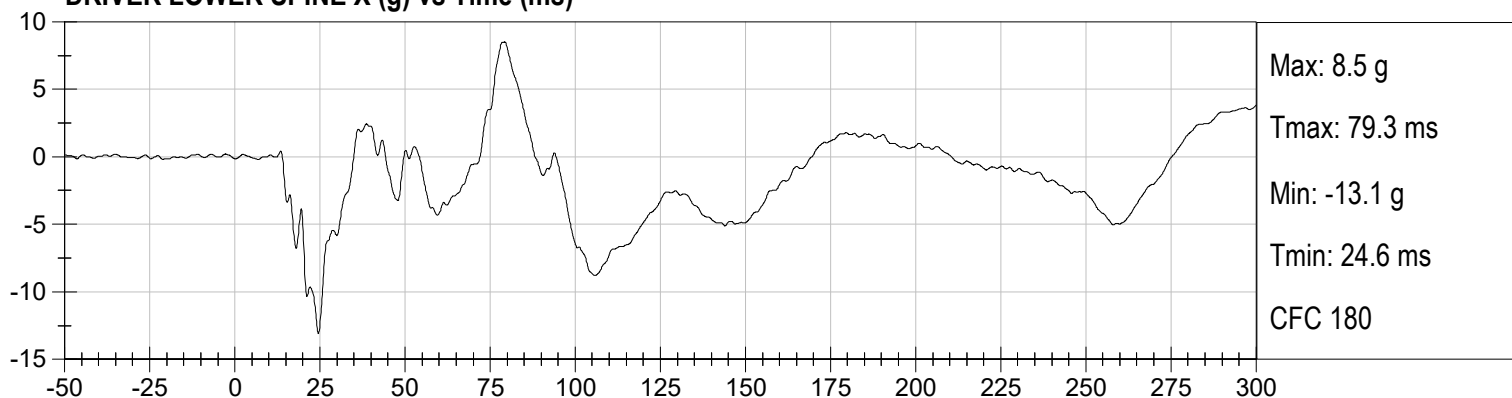
DRIVER HEAD Z (g) vs Time (ms)



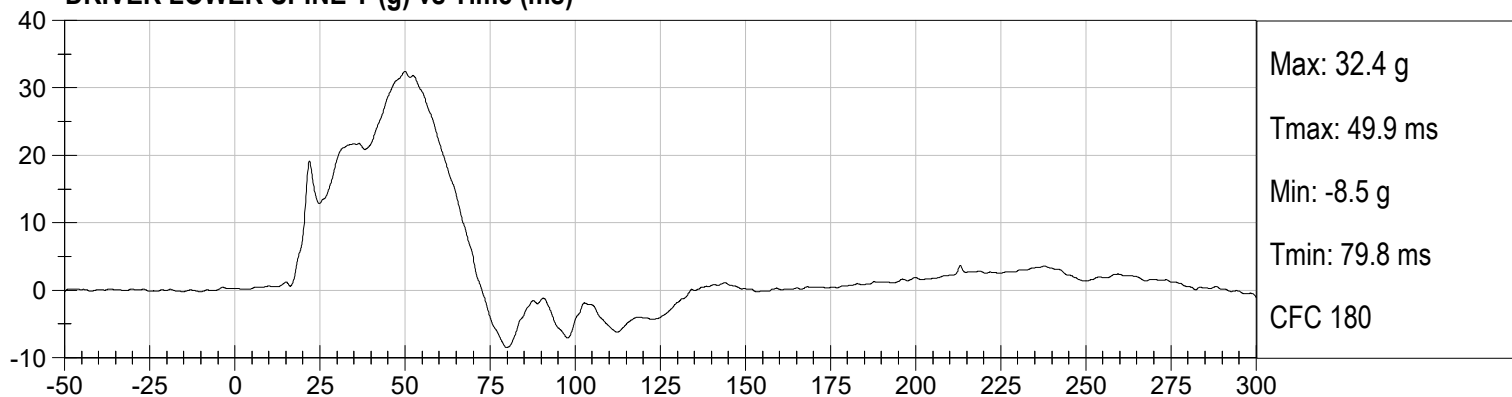
DRIVER HEAD Resultant (g) vs Time (ms)



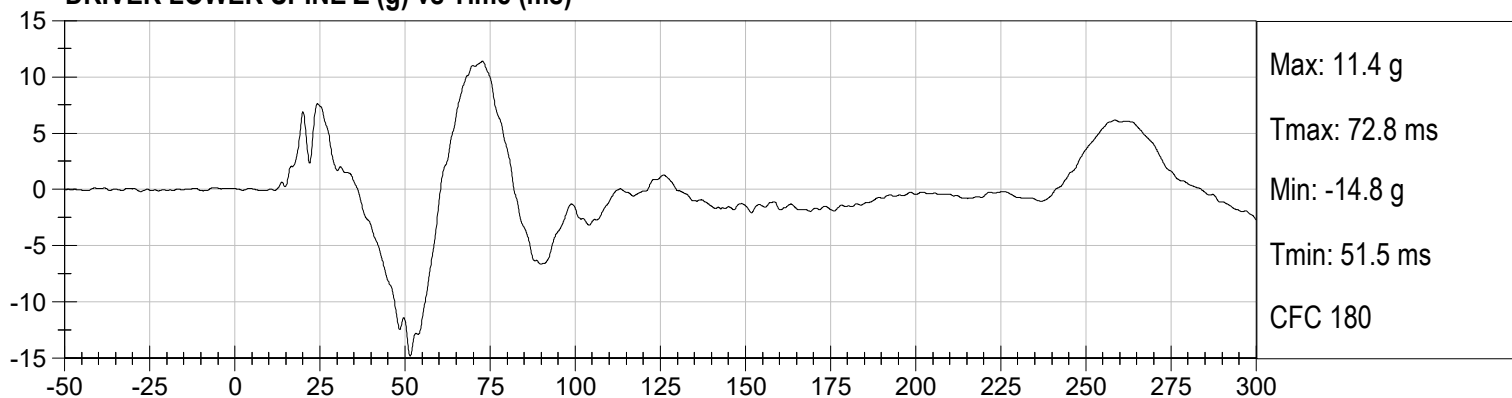
DRIVER LOWER SPINE X (g) vs Time (ms)



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



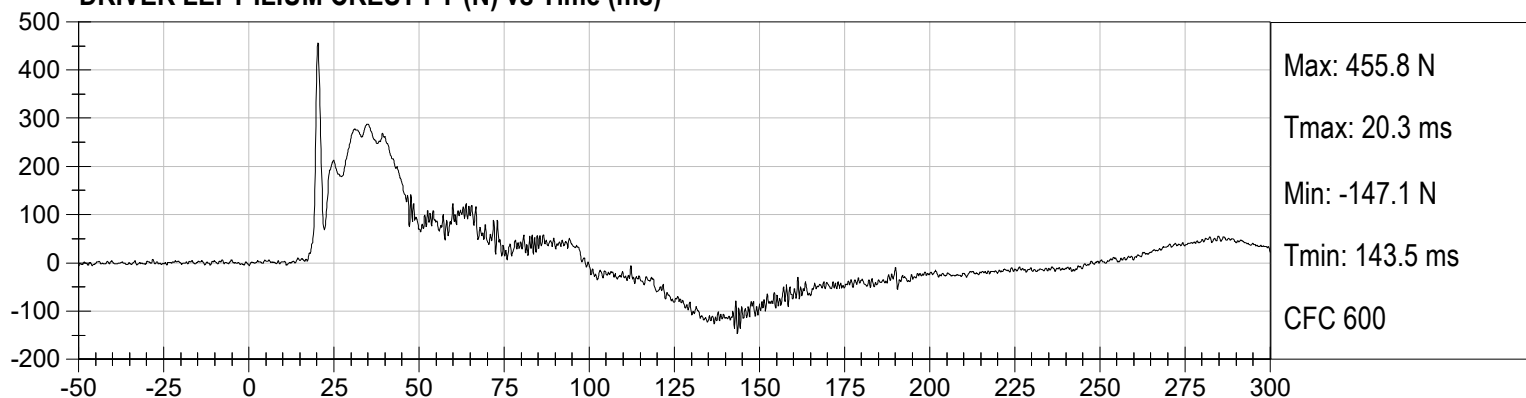
DRIVER LOWER SPINE Z (g) vs Time (ms)



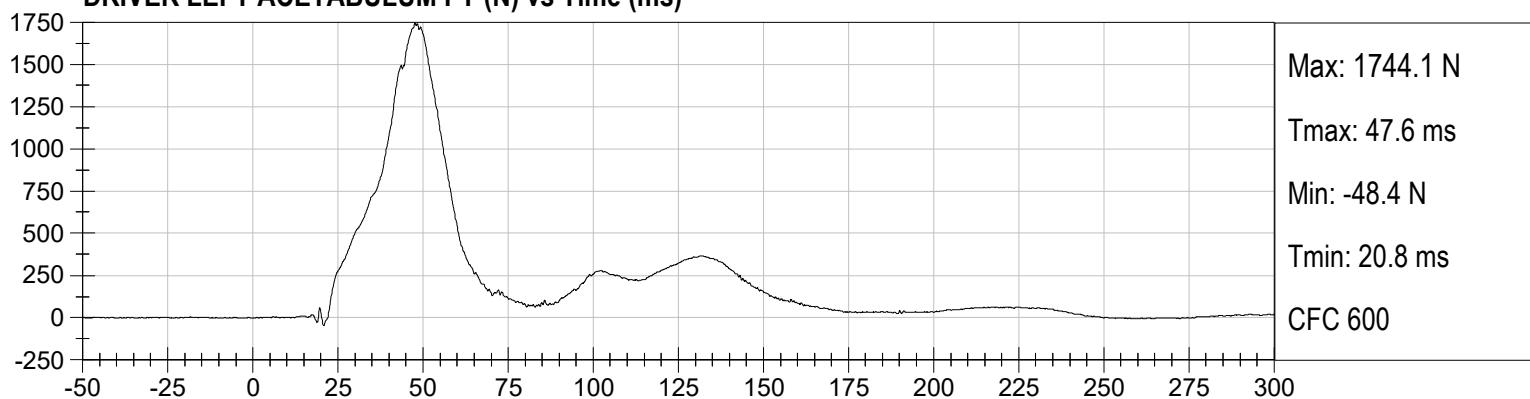
DRIVER LOWER SPINE Resultant (g) vs Time (ms)



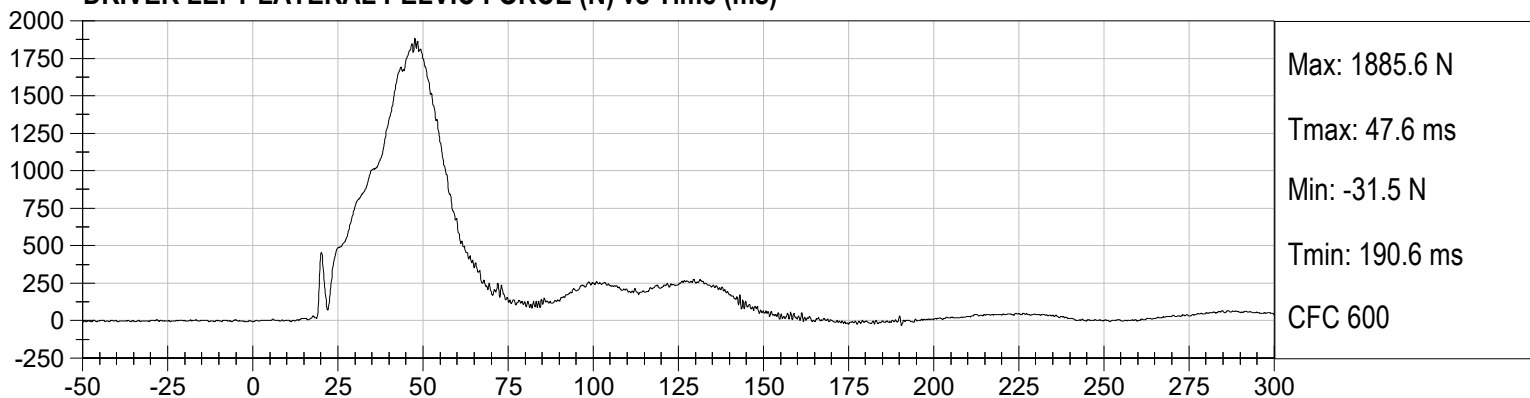
DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)



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: 296

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

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-IIs BUILD LEVEL D DUMMY

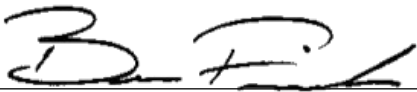
ATD Serial No: 296

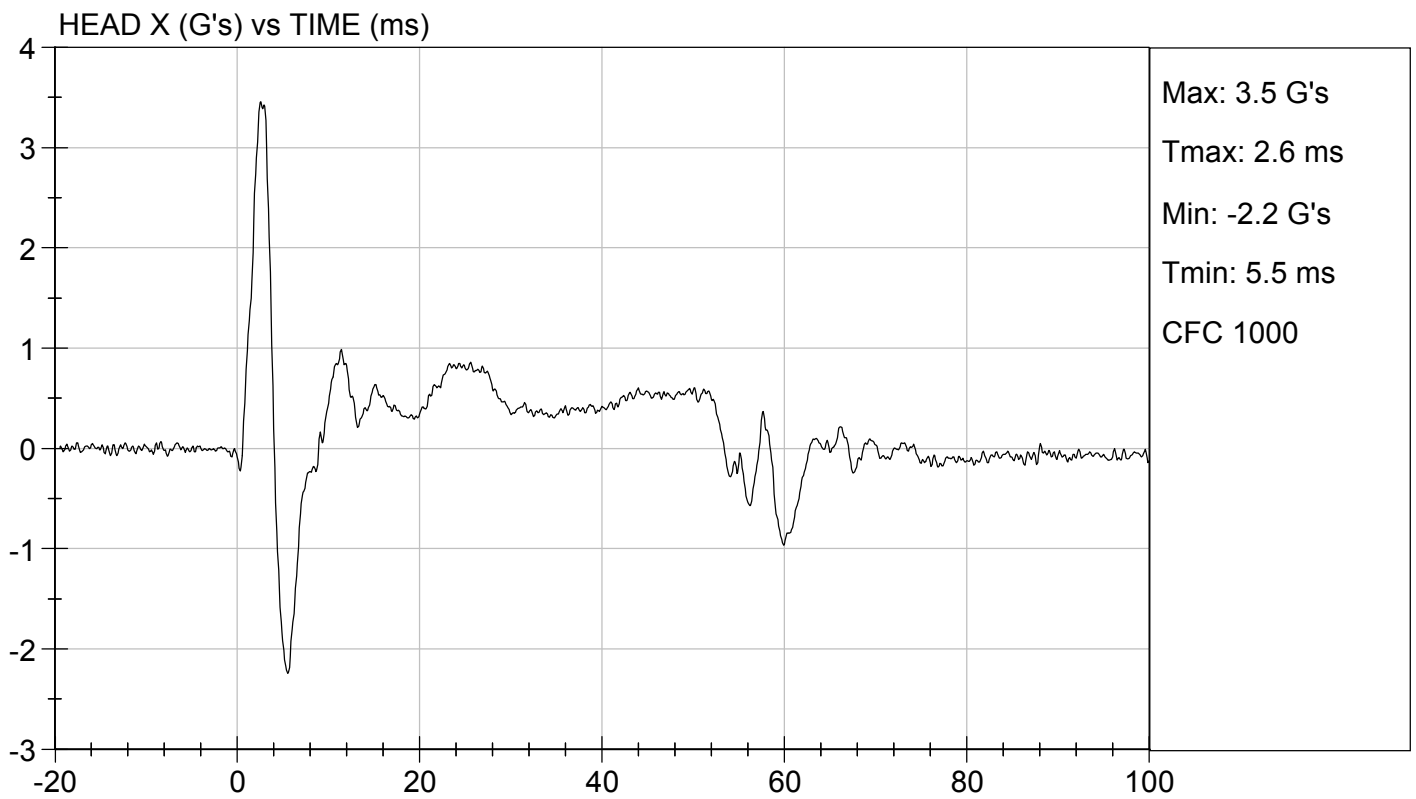
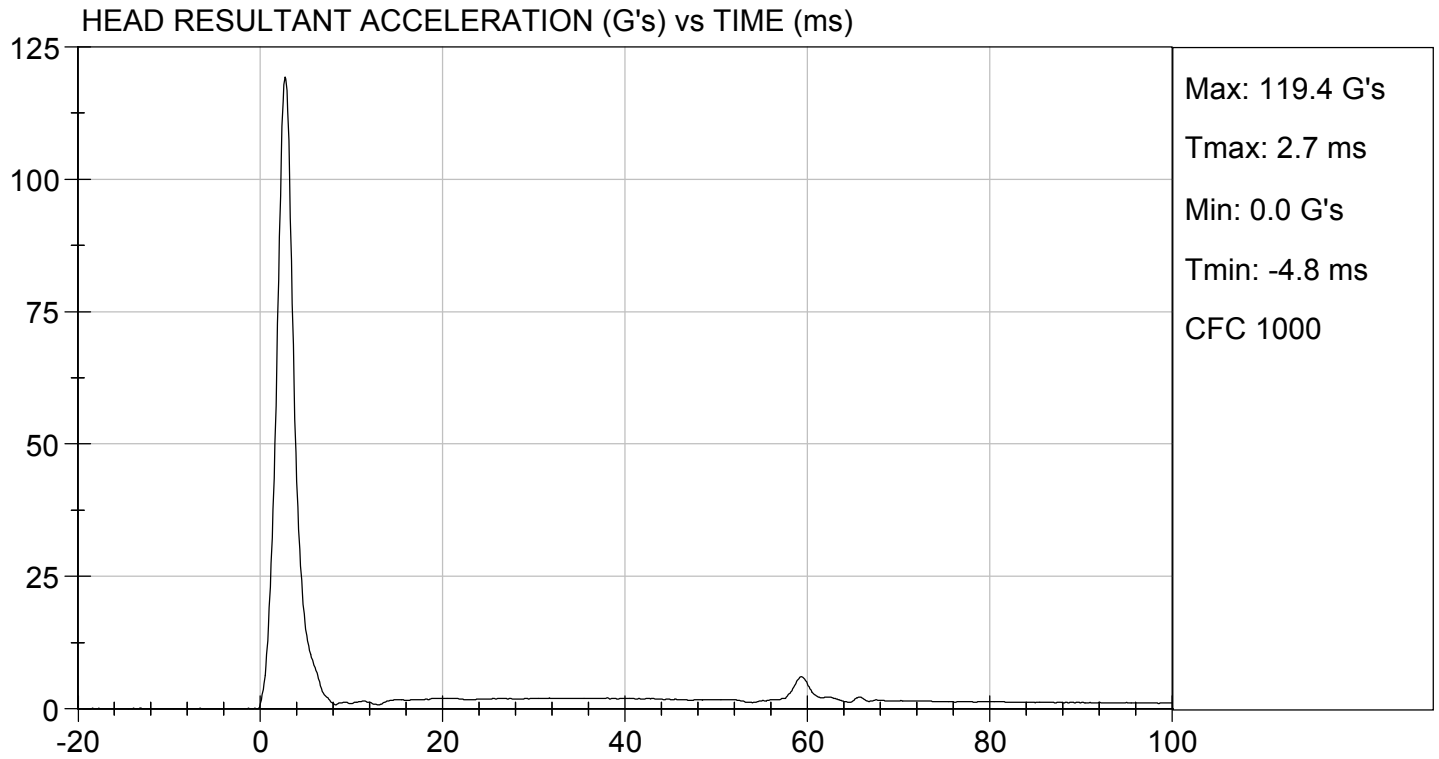
Test ID: D191701

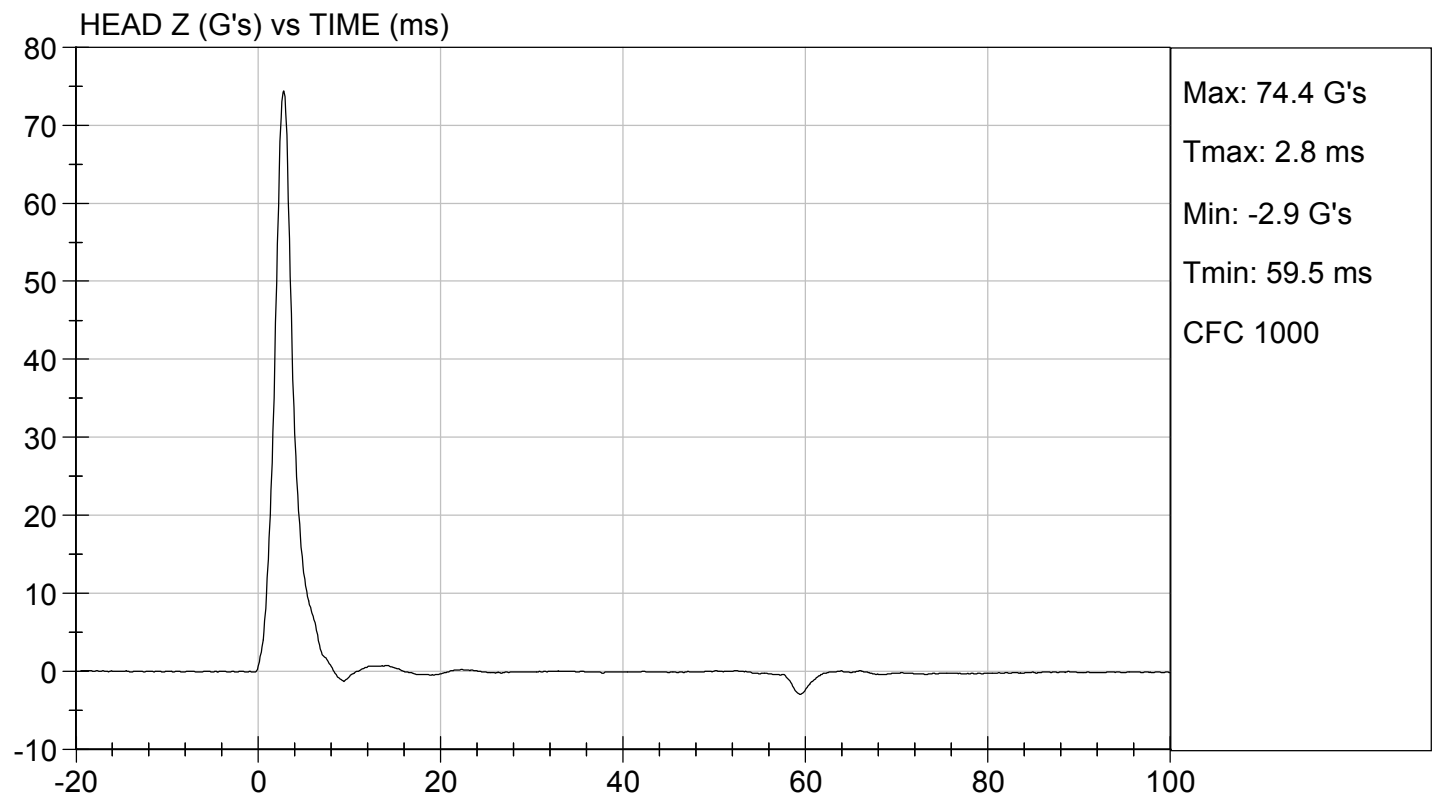
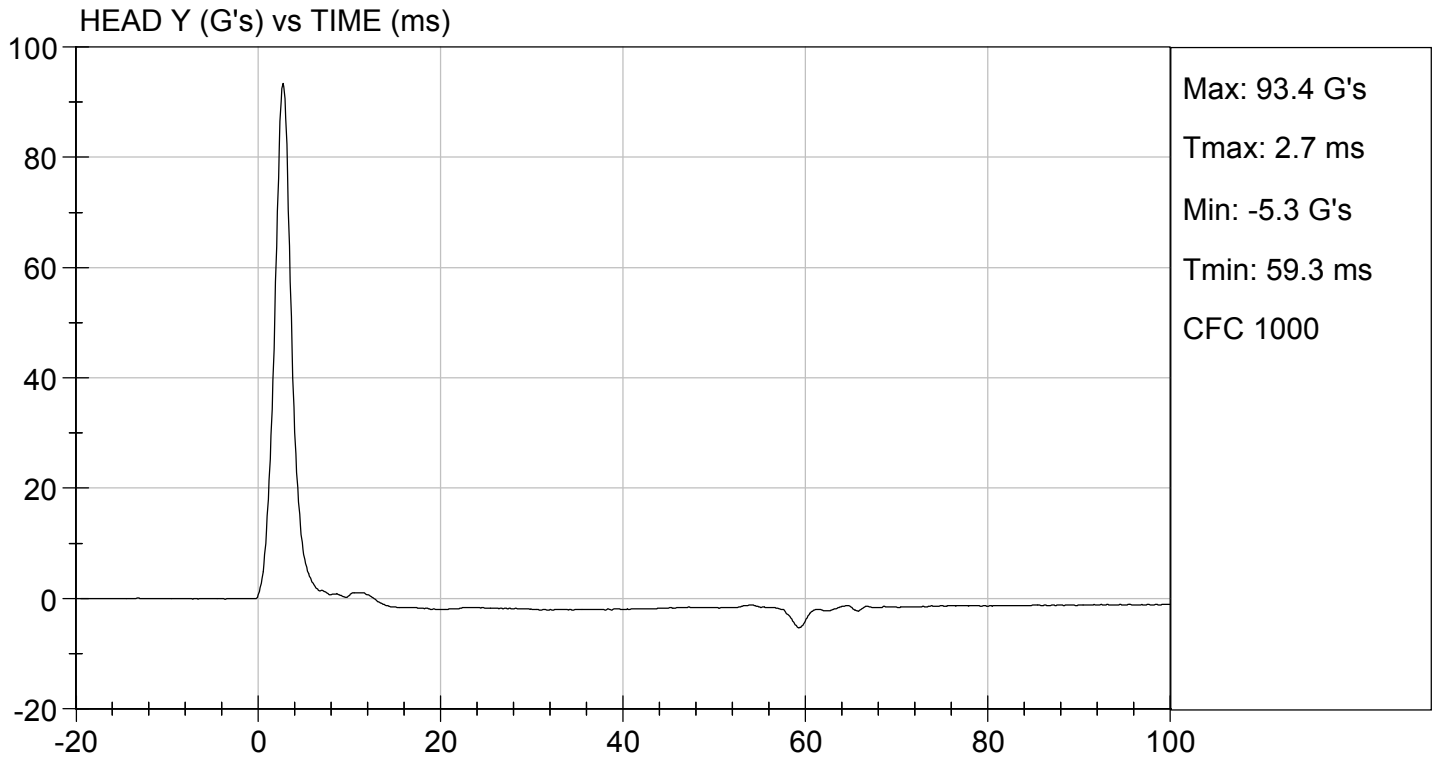
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Peak Resultant Acceleration	G's	115 to 137	119	Pass
Peak Longitudinal Acceleration	G's	+/- 15	3.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

05/31/2019
Test Date


Approved By



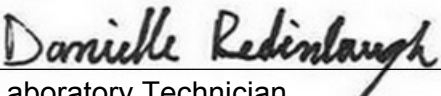


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

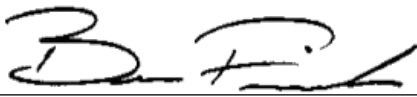
Test I.D: D191702

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.7	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	2.29	Pass
	15 ms	m/s	3.30 to 4.10	3.44	Pass
	20 ms	m/s	4.40 to 5.40	4.83	Pass
	25 ms	m/s	5.40 to 6.10	5.71	Pass
	25-100 ms	m/s	5.50 to 6.20	5.72	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	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
Overall Test Results					Pass


 Laboratory Technician

05/31/2019

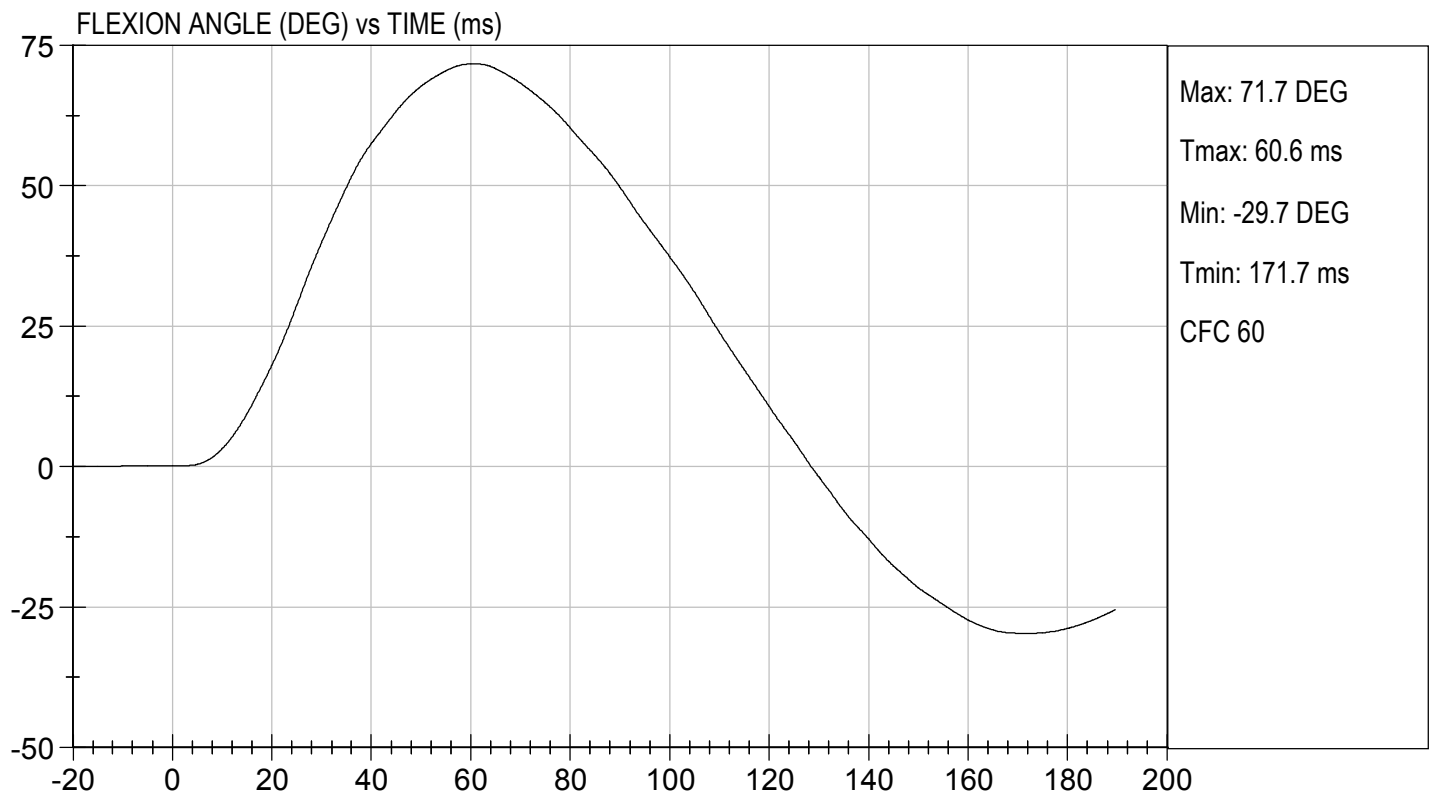
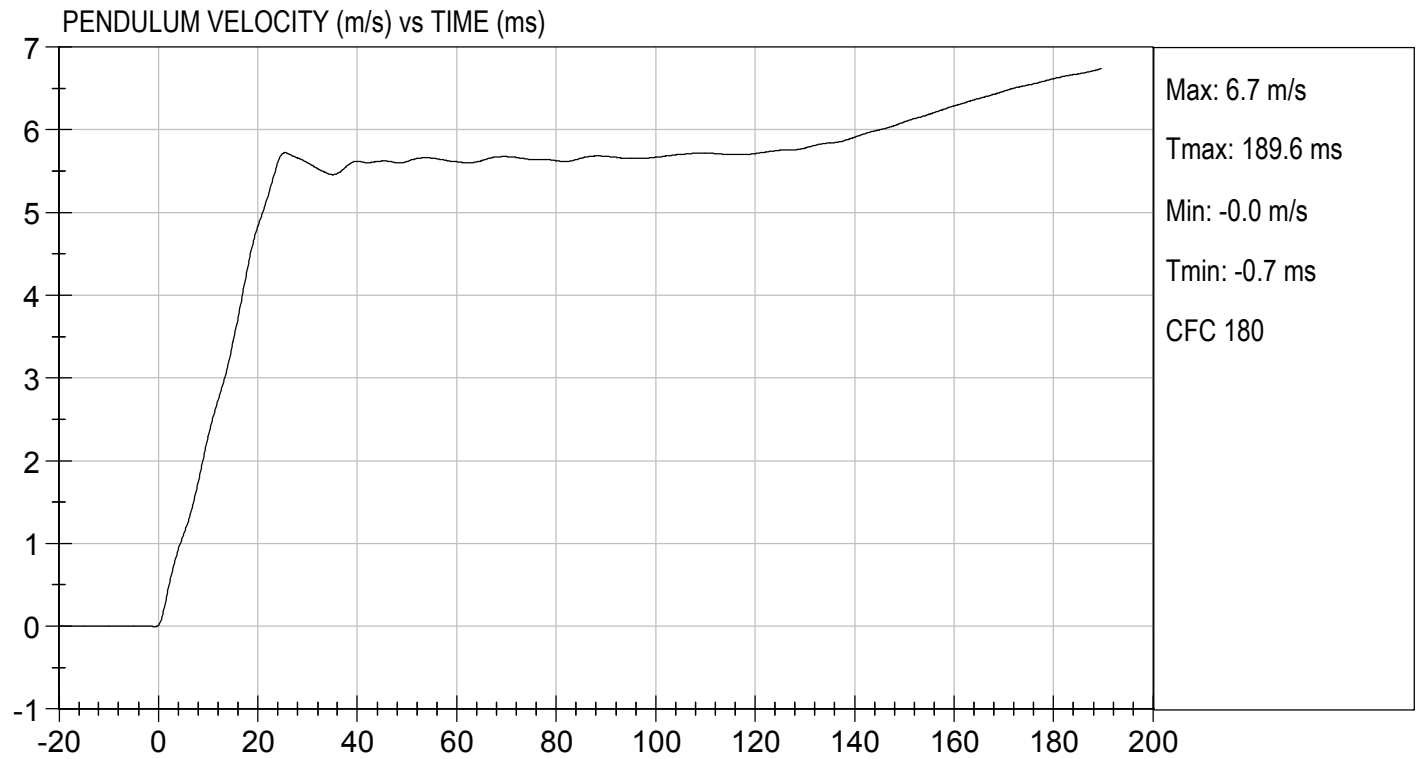
Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

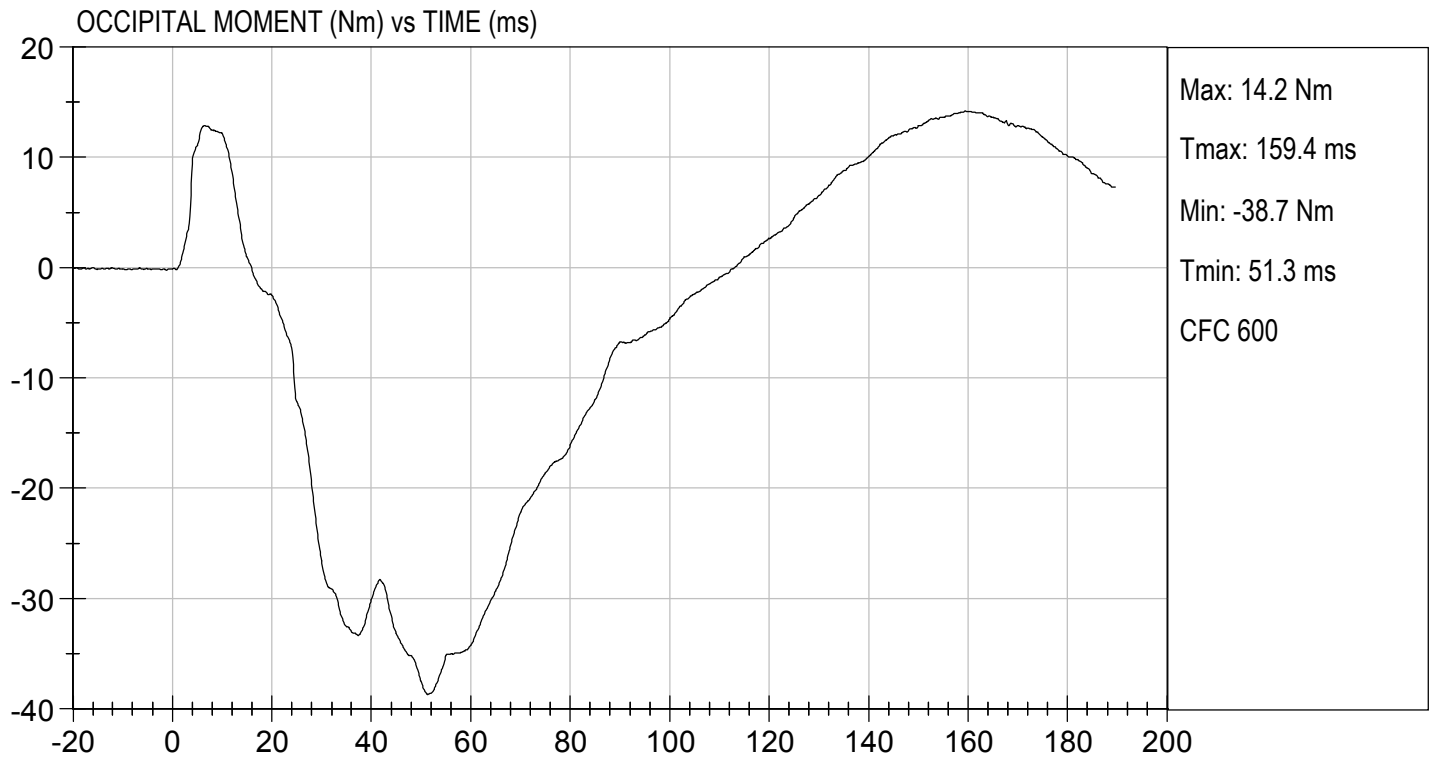
TEST DATE: 05/31/2019
TEST #: D191702





TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

TEST DATE: 05/31/2019
TEST #: D191702

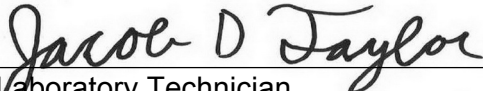


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

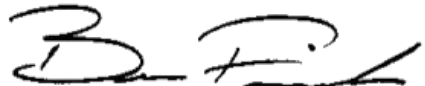
Test ID: D191703

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
Overall Test Results			Pass	


Laboratory Technician

05/31/2019

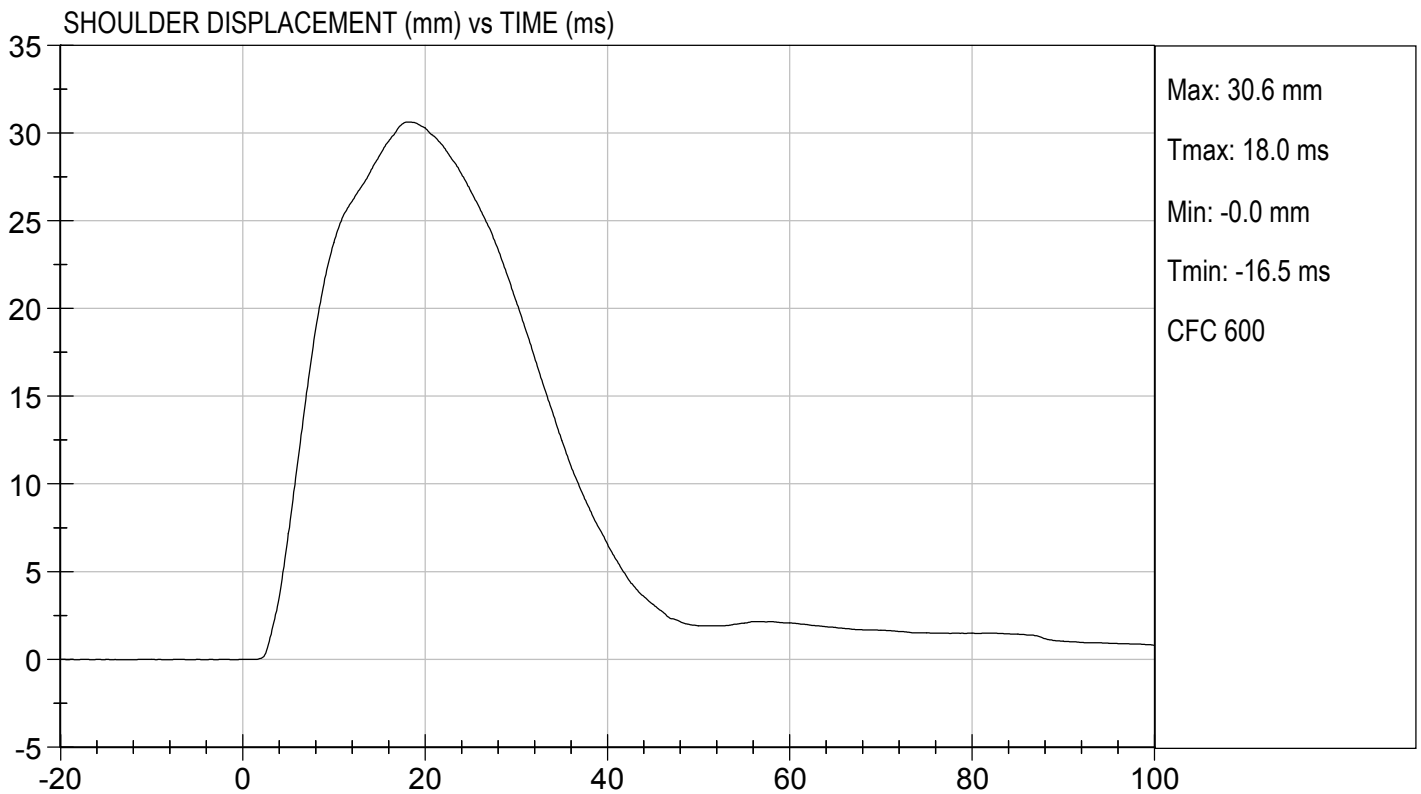
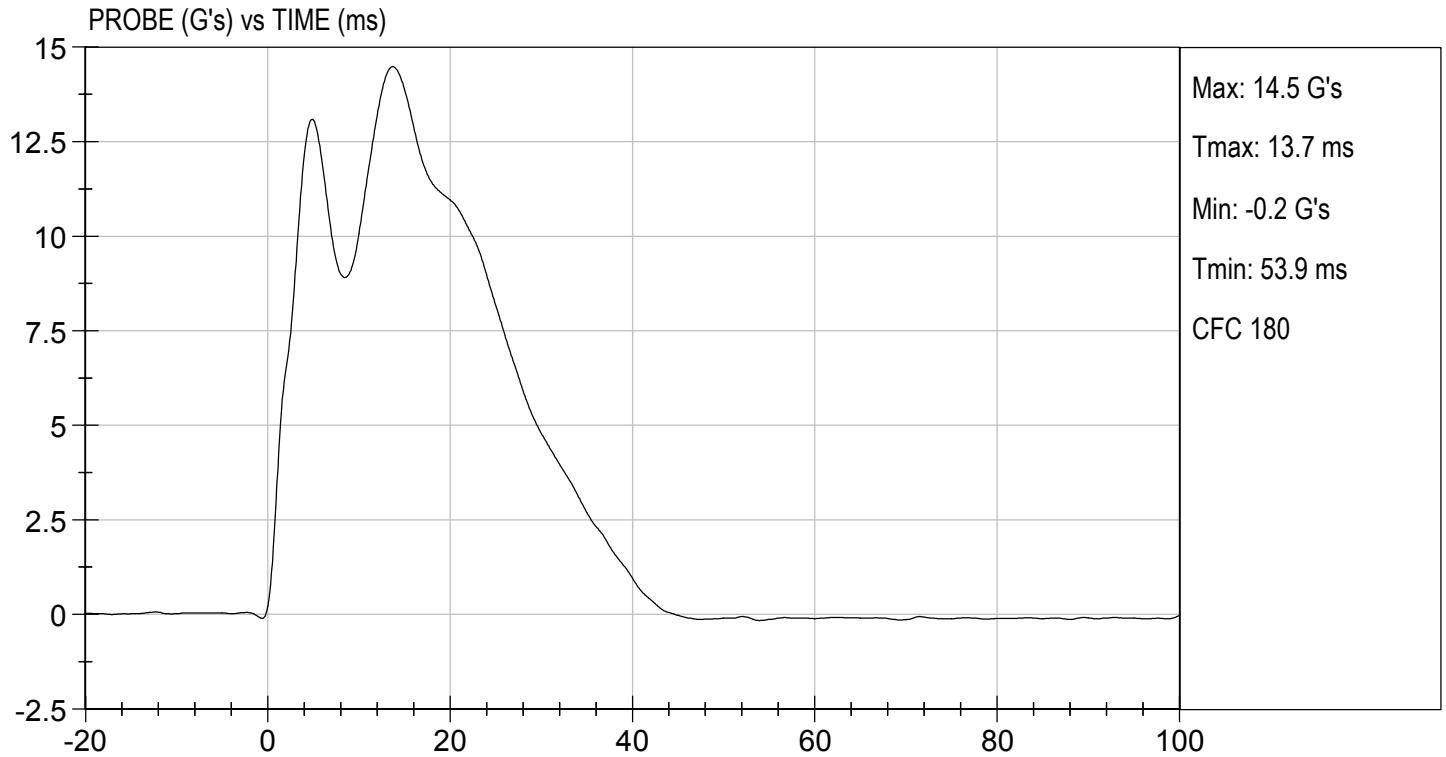
Test Date


Approved By



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

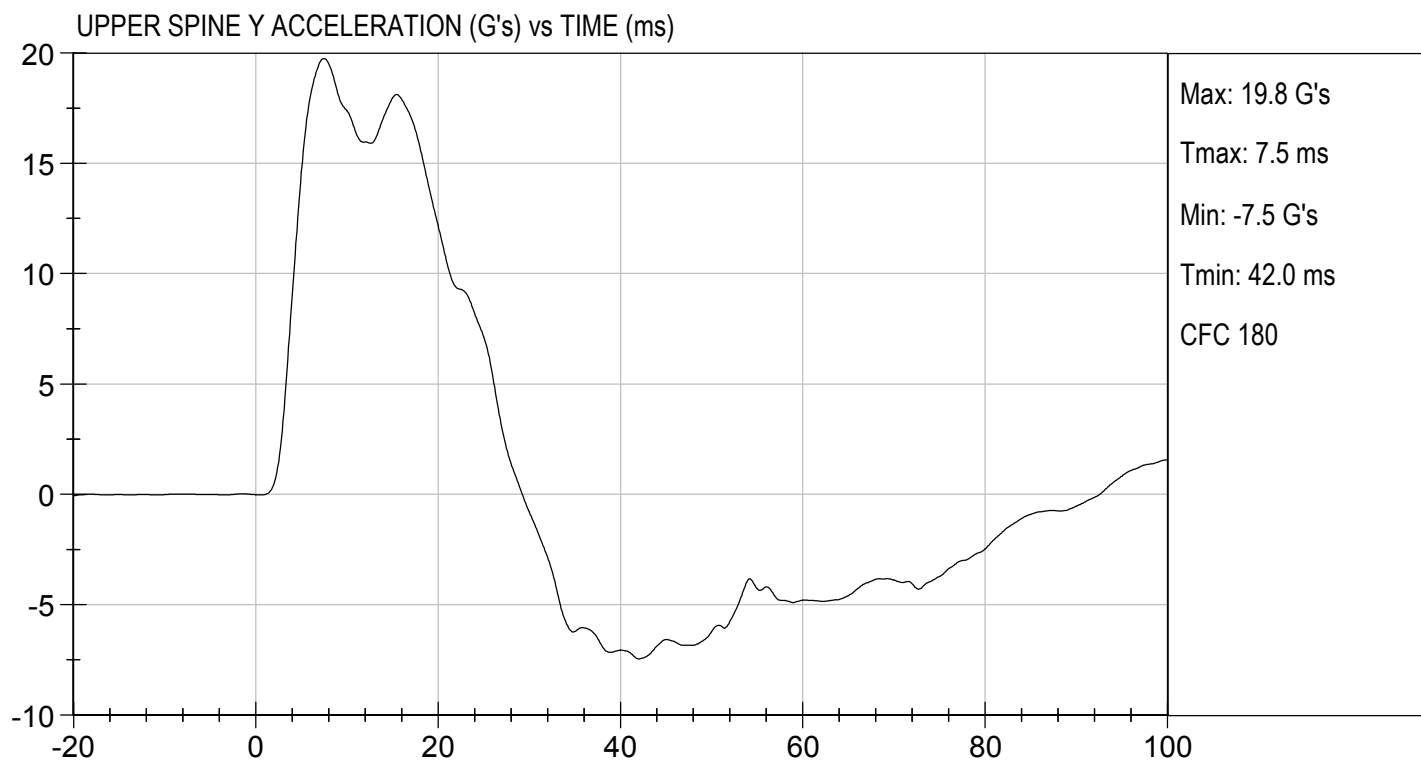
TEST DATE: 05/31/2019
TEST #: D191703





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

TEST DATE: 05/31/2019
TEST #: D191703

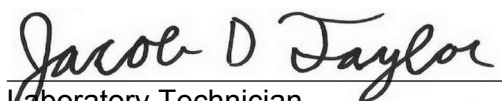


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

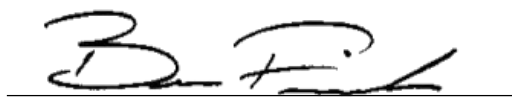
Test I.D: D191704

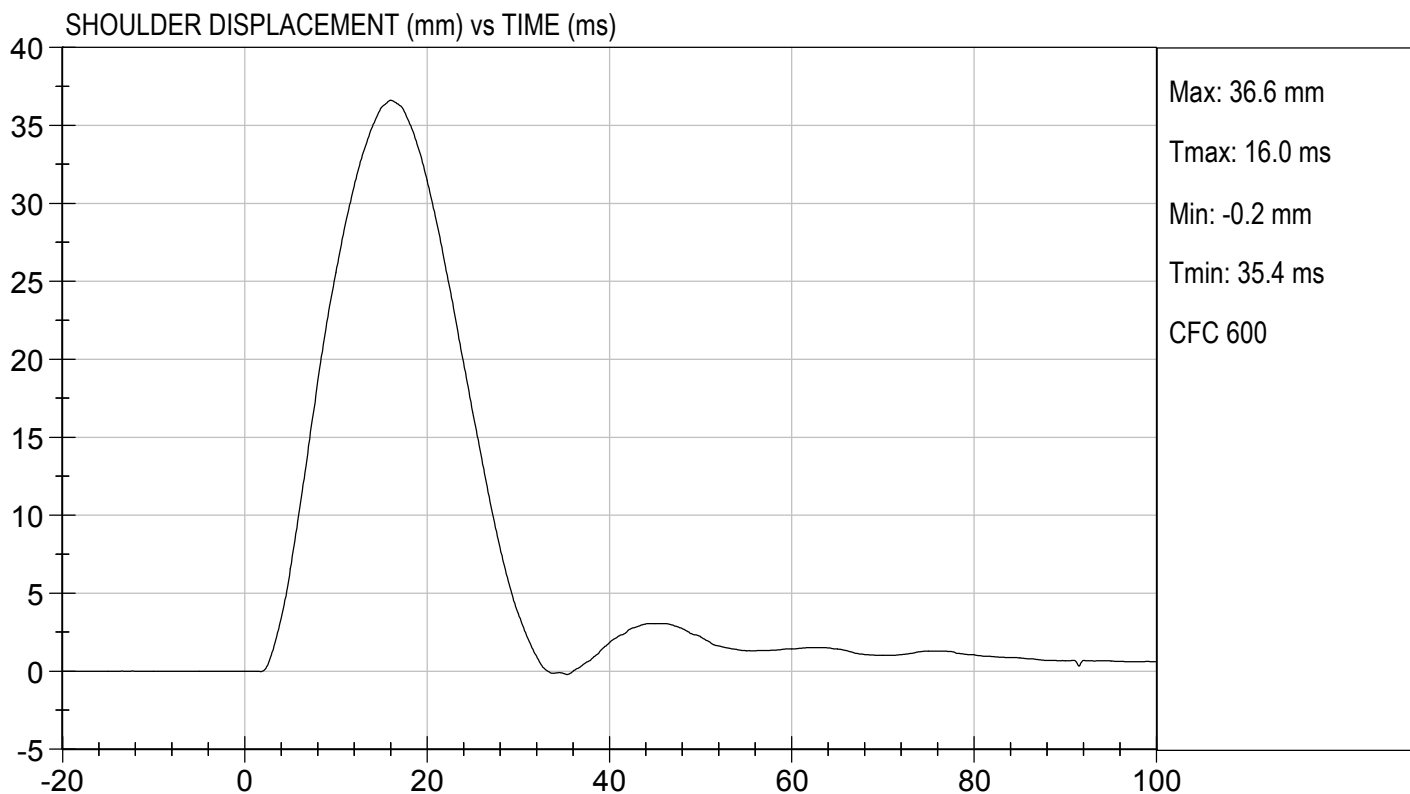
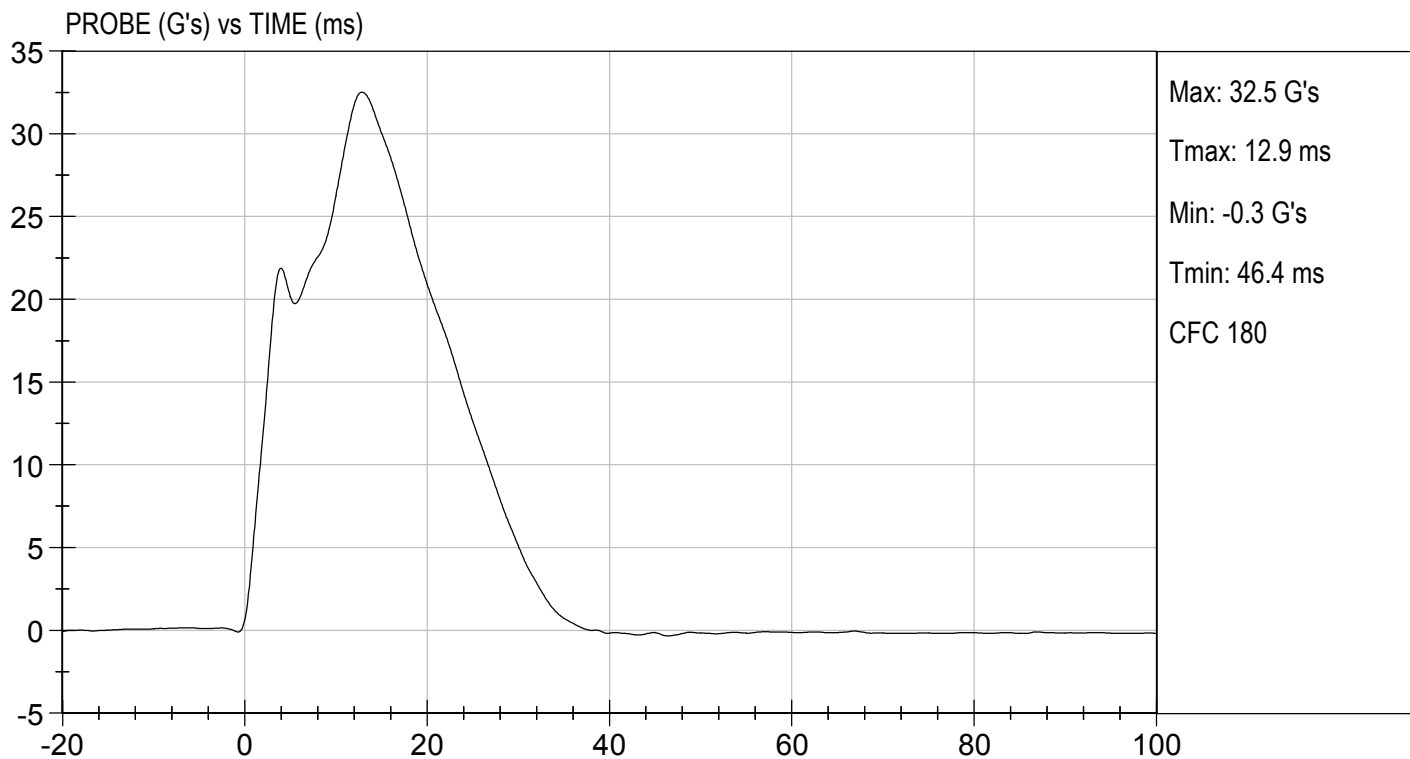
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	37	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	30	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
Overall Test Results				Pass

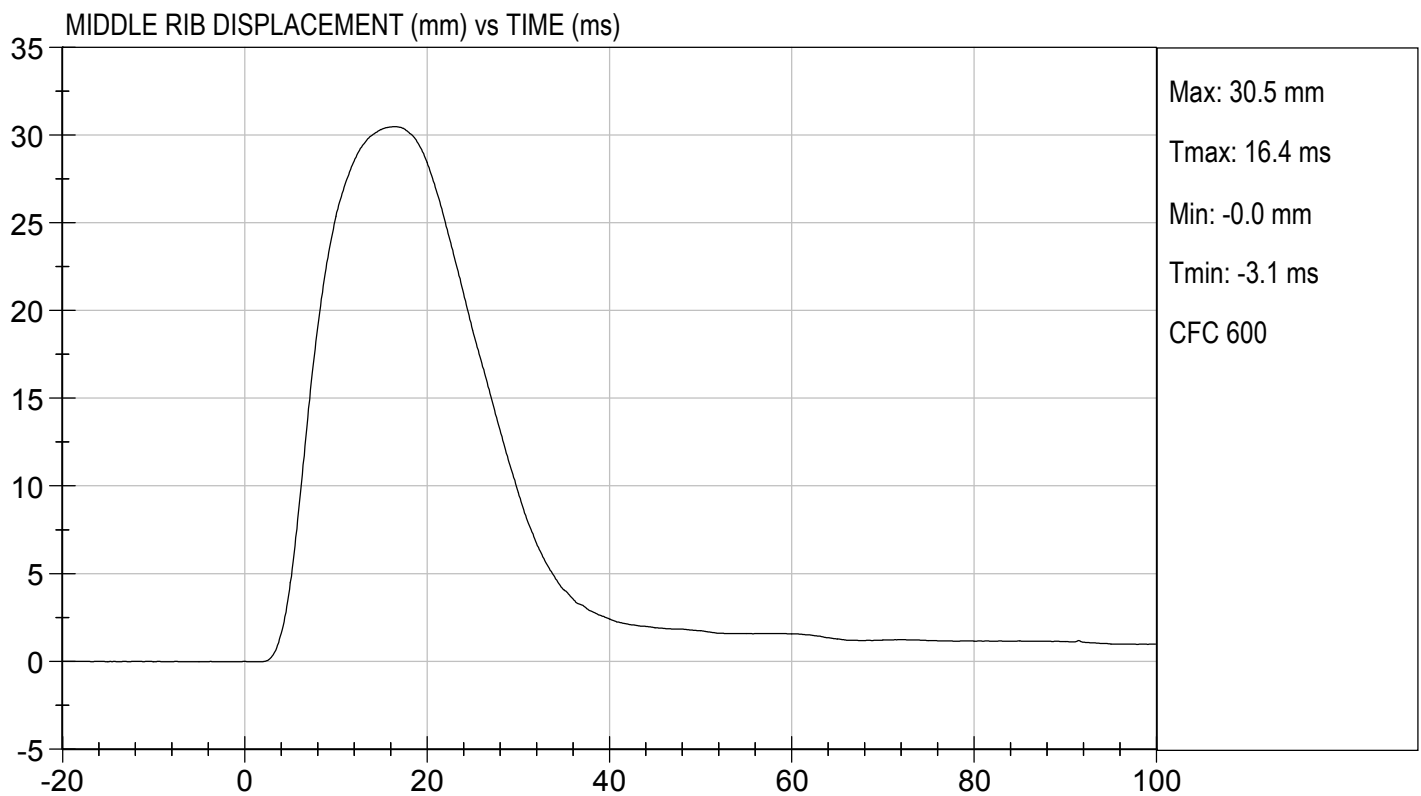
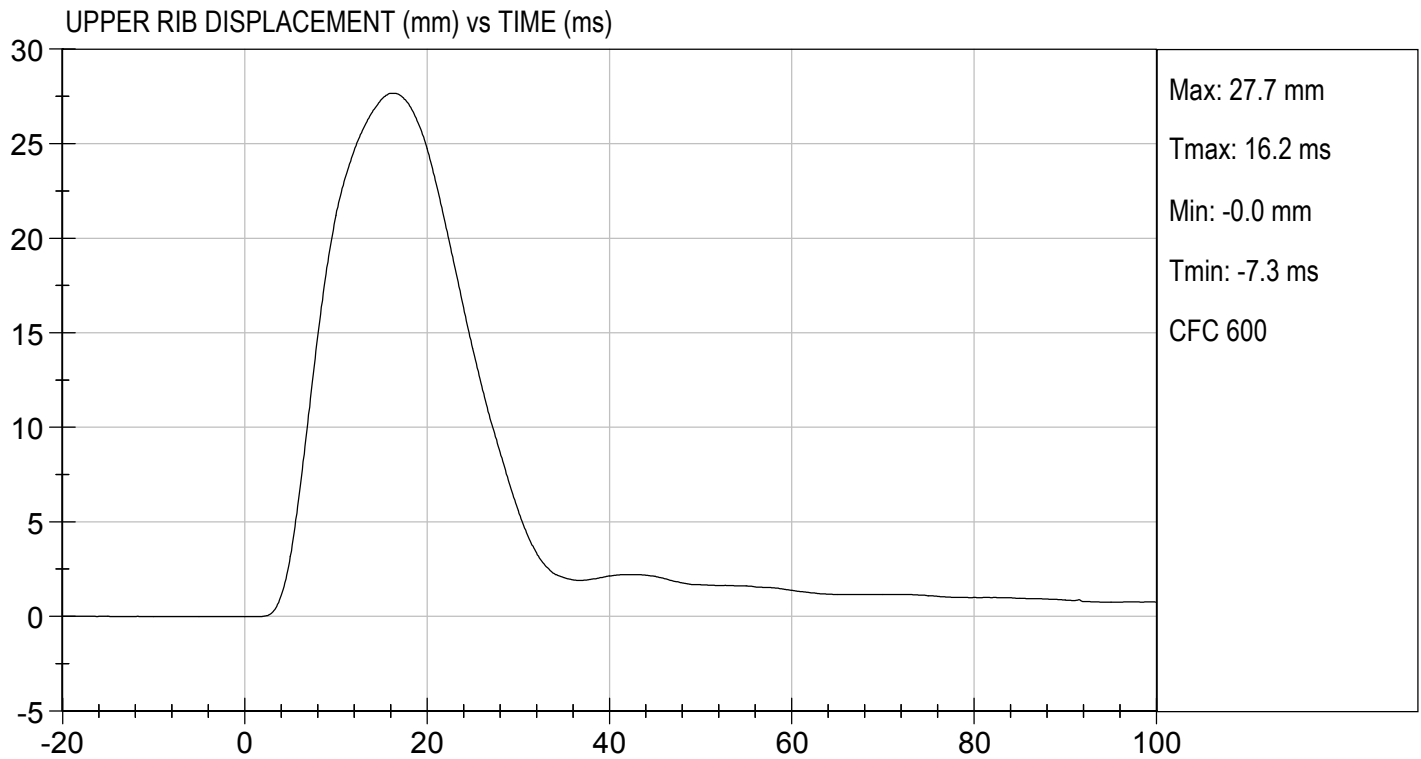

 Laboratory Technician

05/31/2019

Test Date


 Approved By

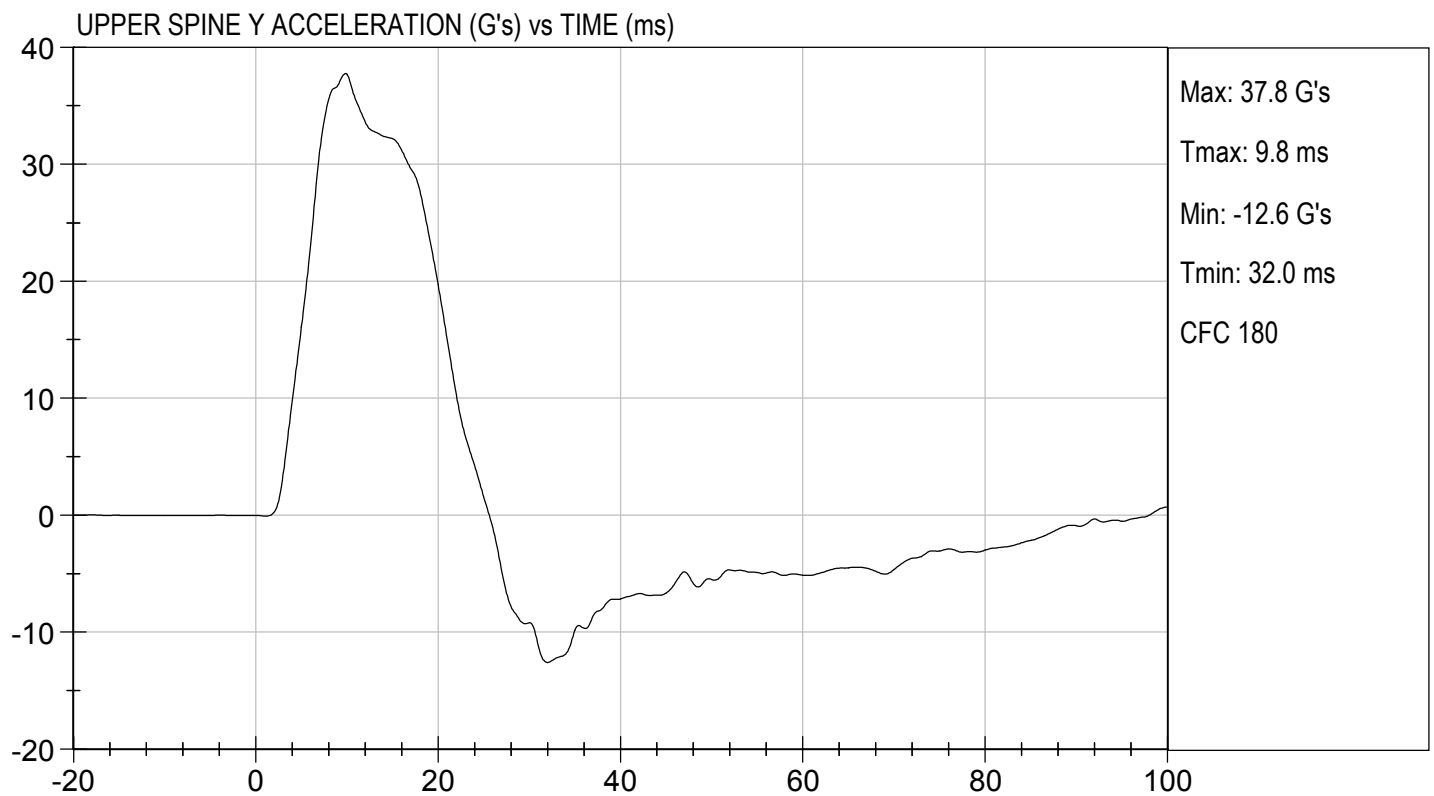
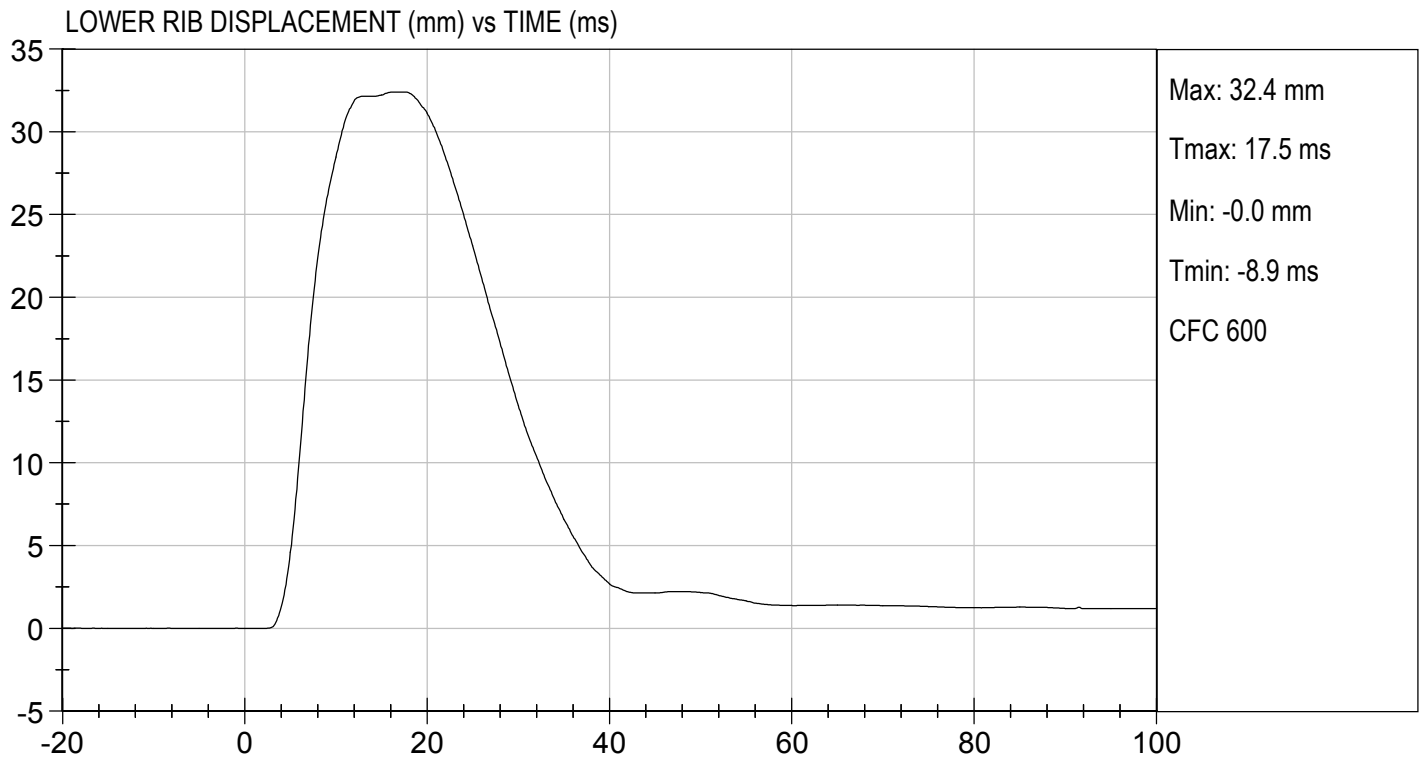






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

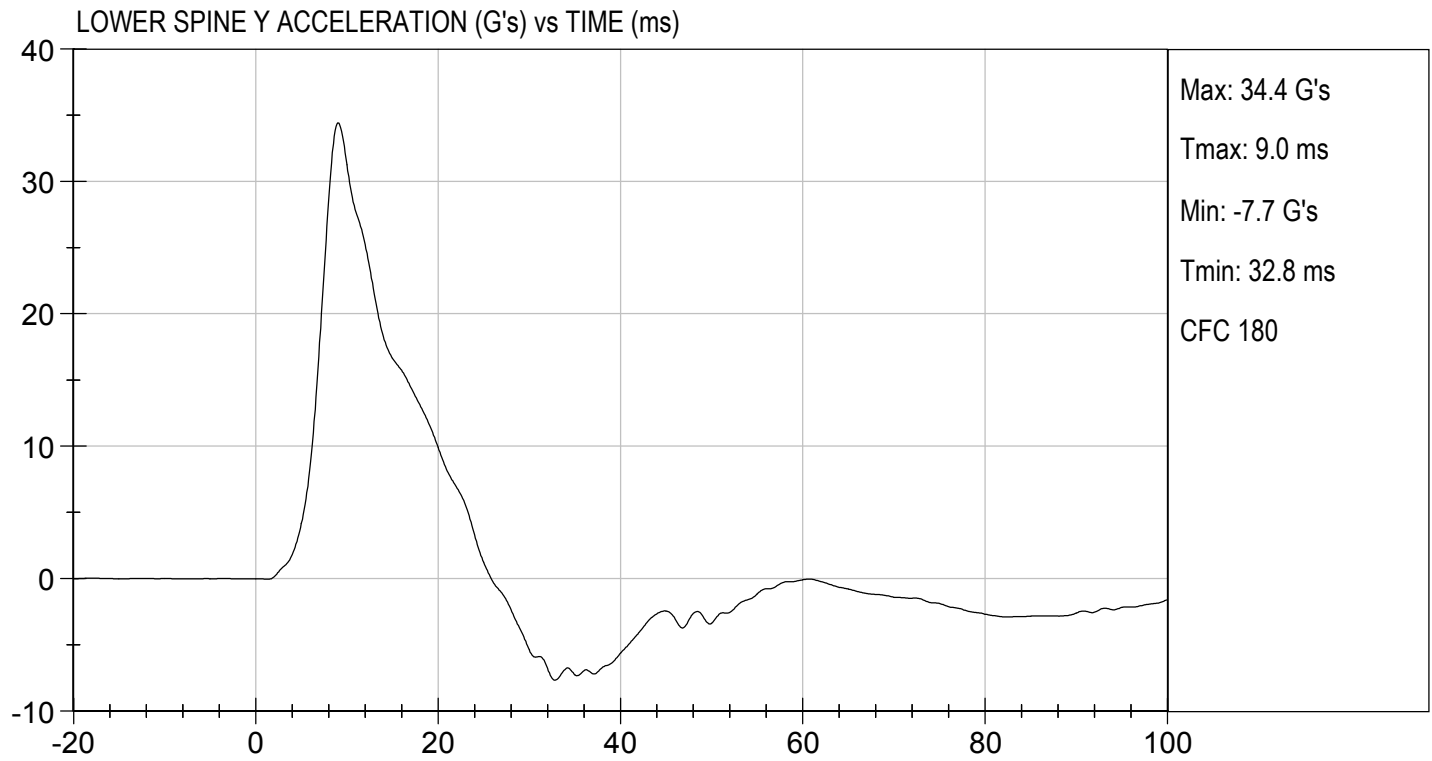
TEST DATE: 05/31/2019
TEST #: D191704





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

TEST DATE: 05/31/2019
TEST #: D191704

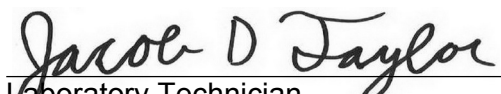


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

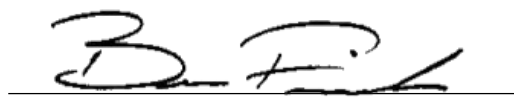
Test I.D: D191705

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	51	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	38	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
			Overall Test Results	Pass


Laboratory Technician

05/31/2019

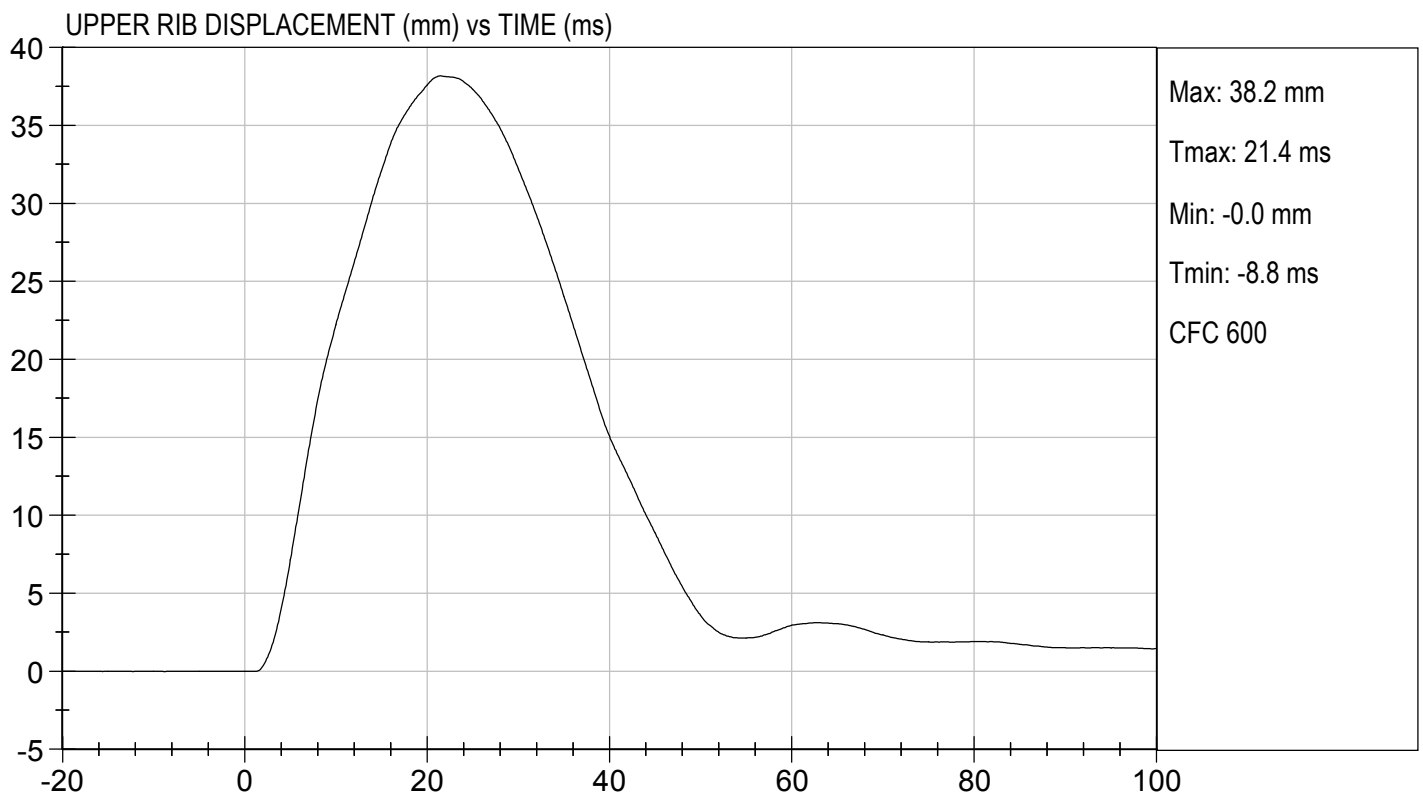
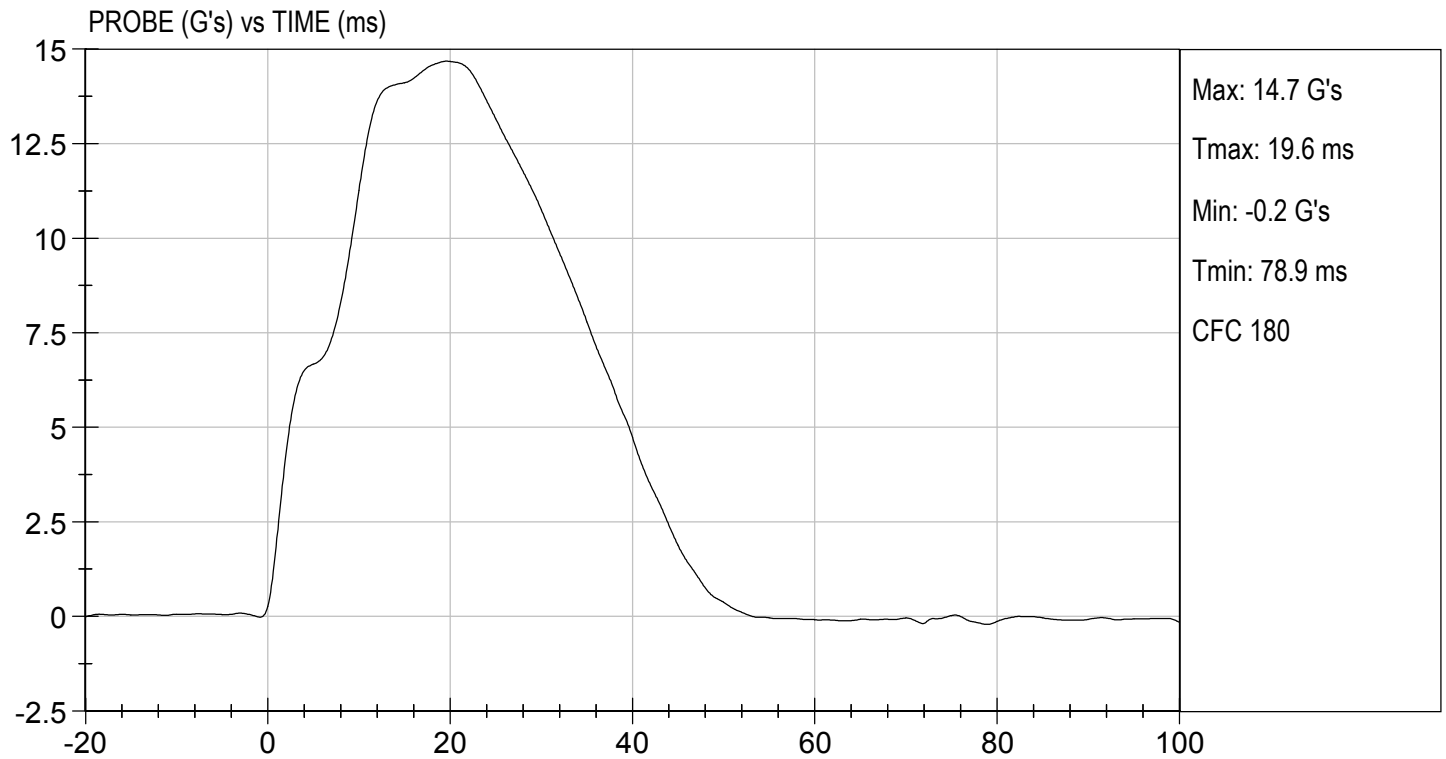
Test Date


Approved By



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

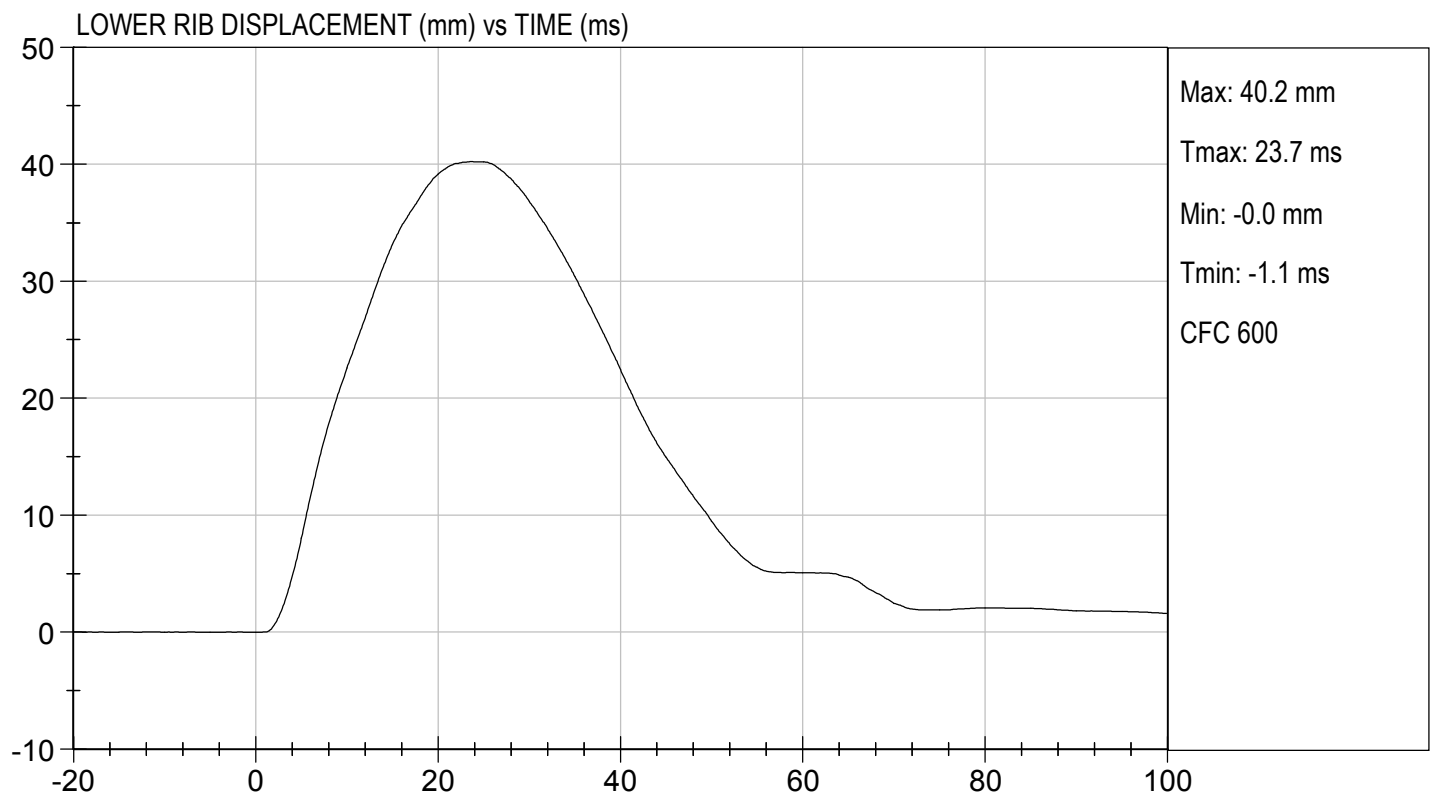
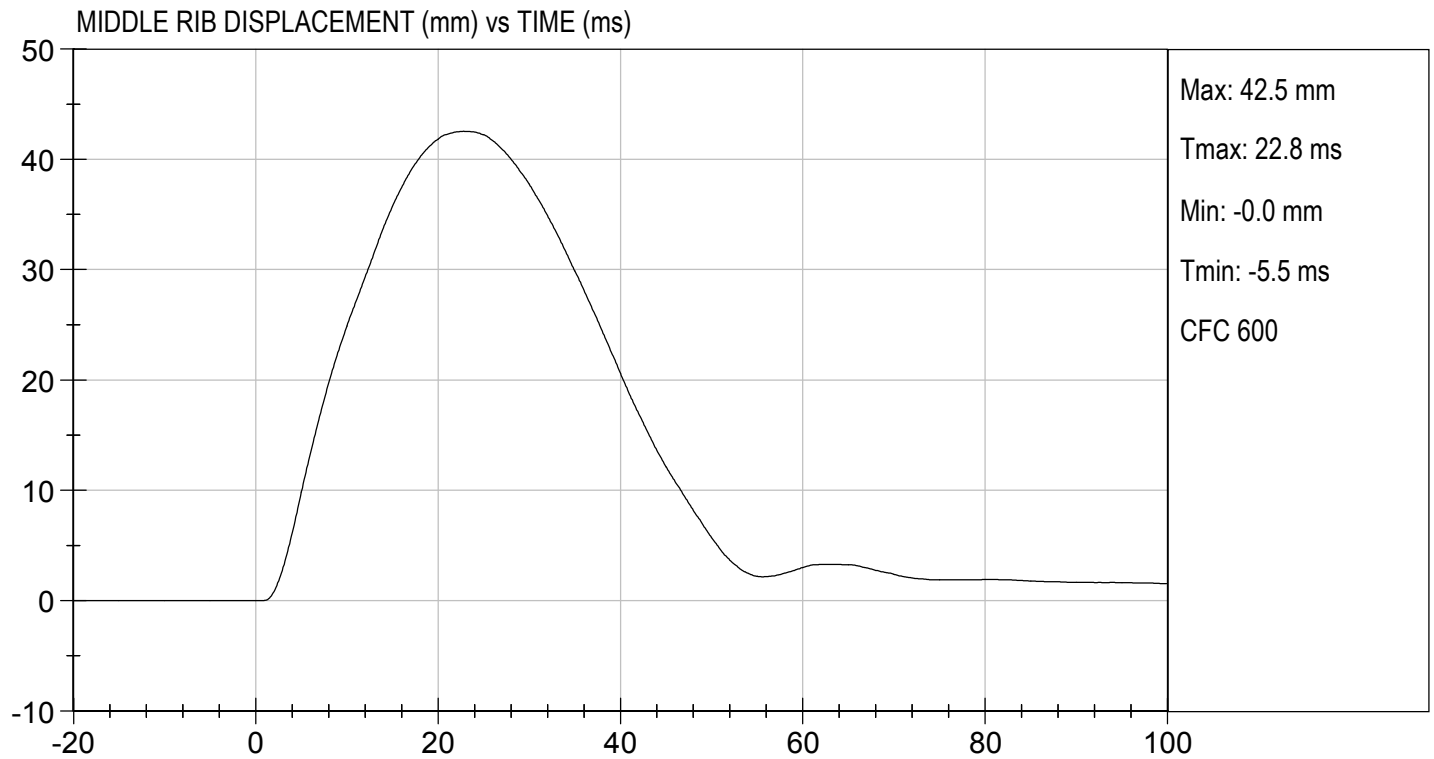
TEST DATE: 05/31/2019
TEST #: D191705





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

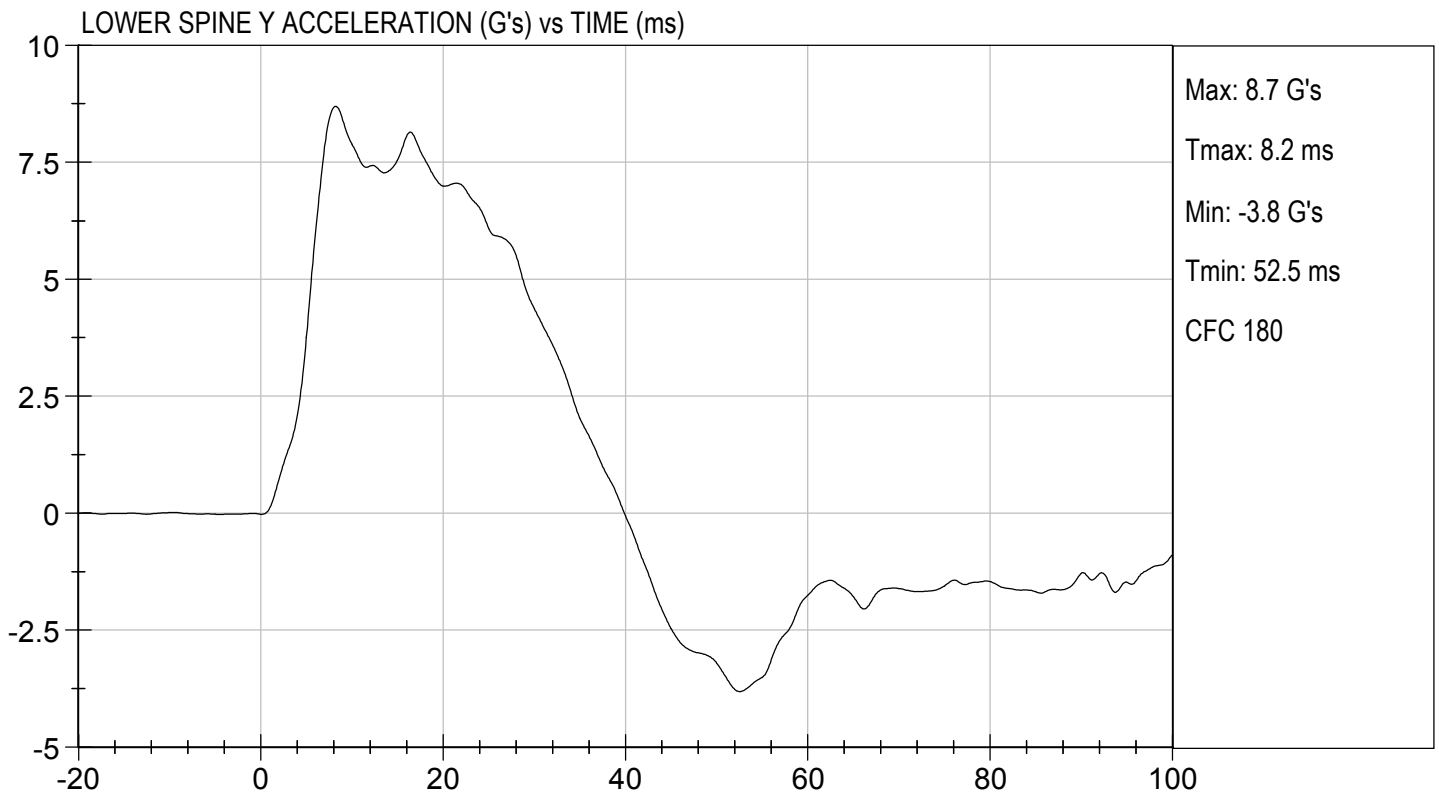
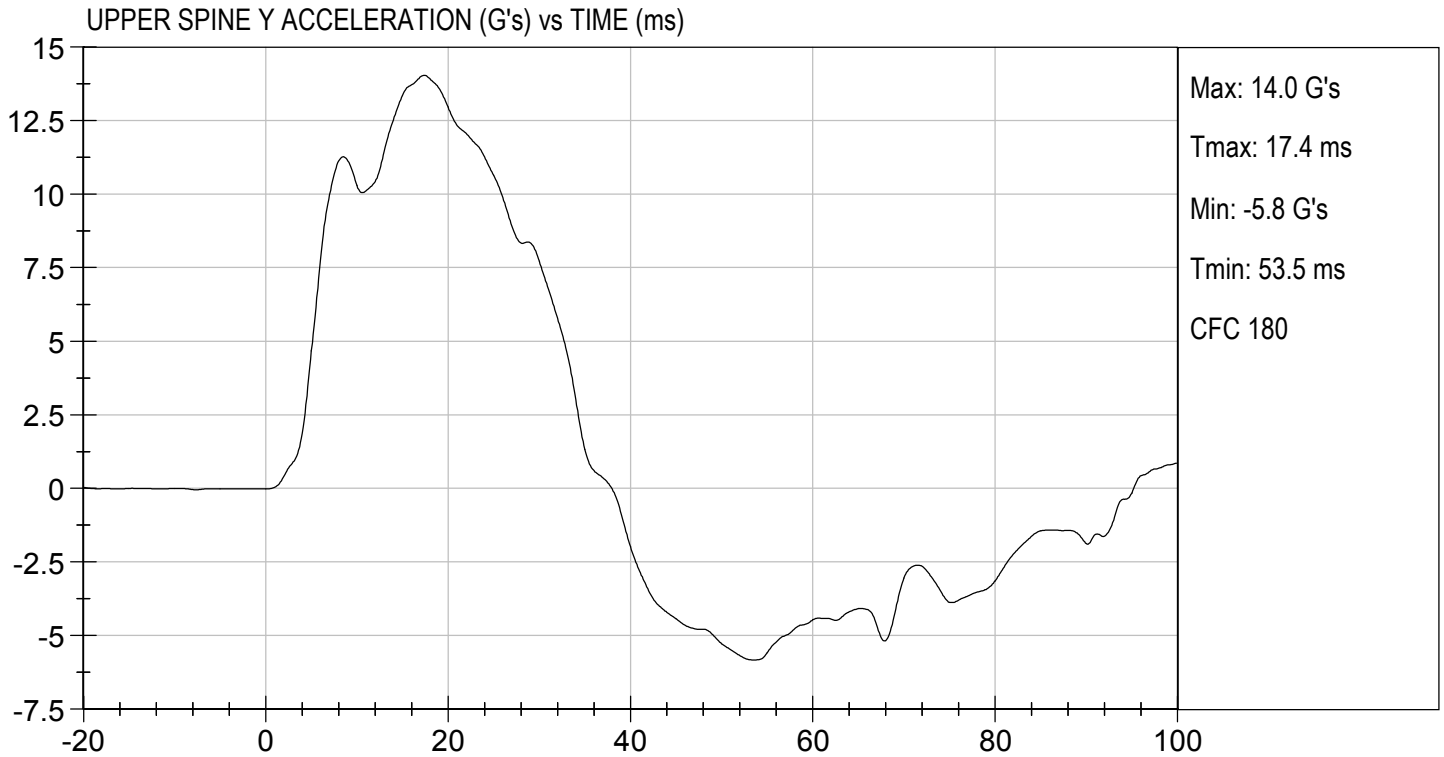
TEST DATE: 05/31/2019
TEST #: D191705





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

TEST DATE: 05/31/2019
TEST #: D191705



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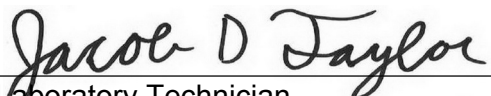
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

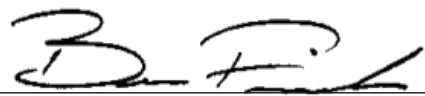
Test I.D: D191706

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	15	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	12	Pass
Overall Test Results				Pass


Laboratory Technician

05/31/2019

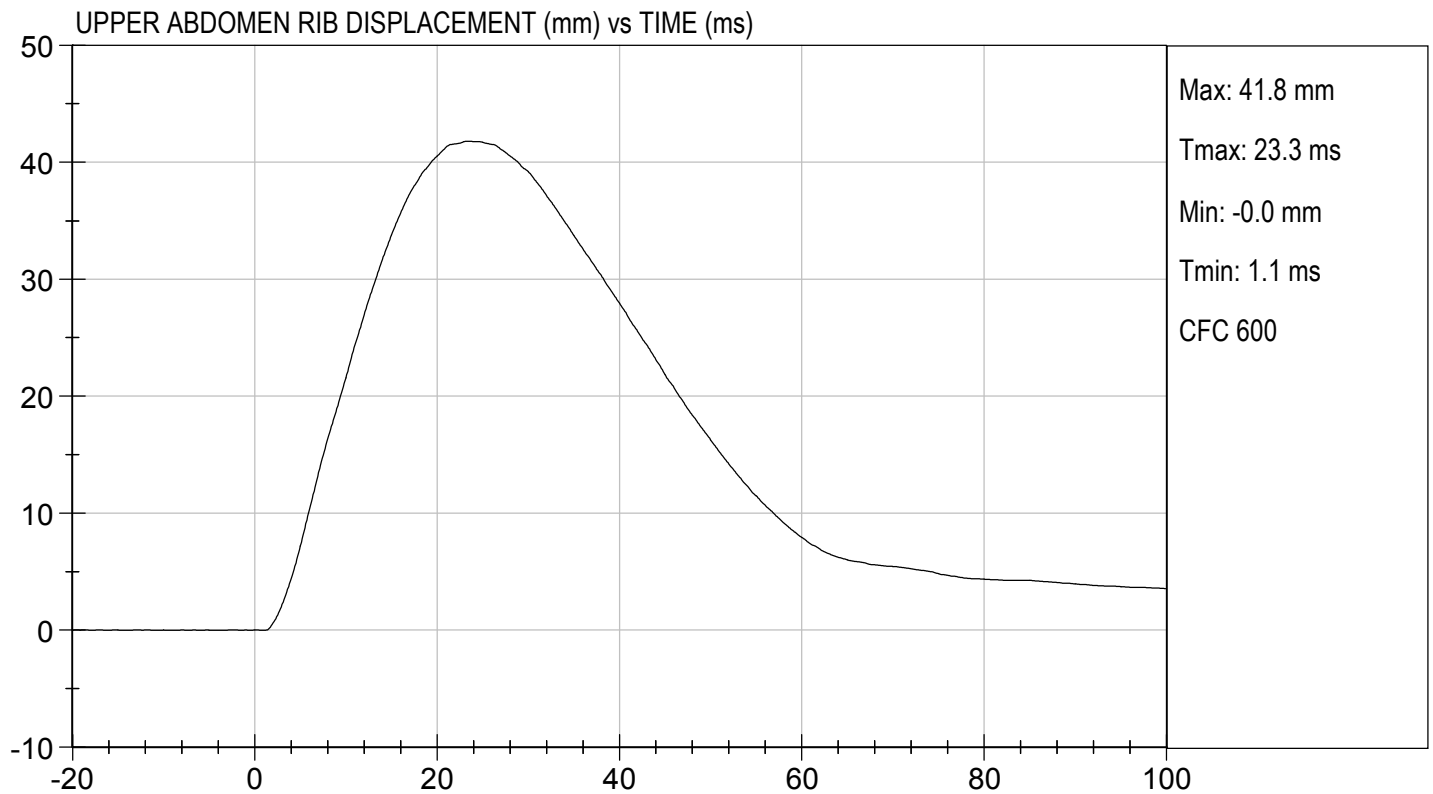
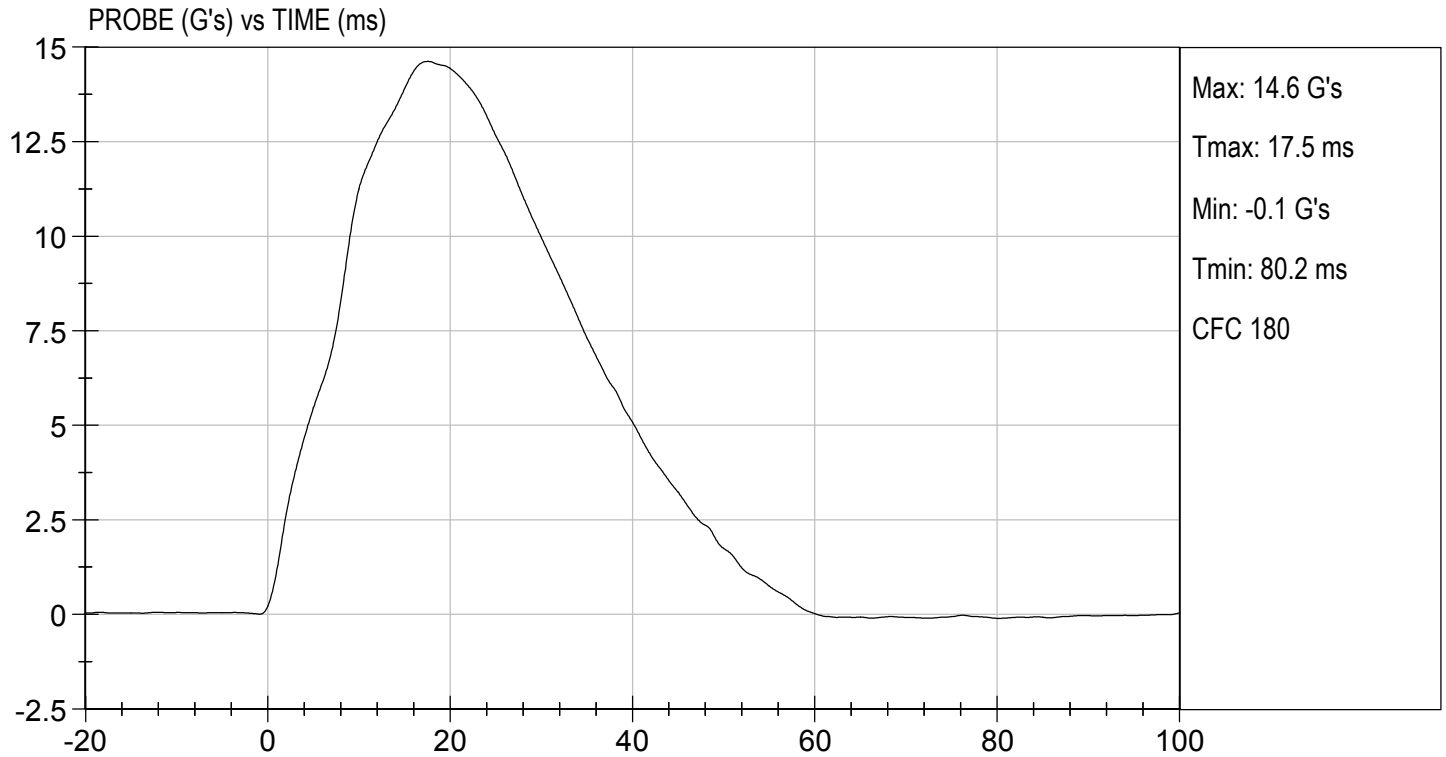
Test Date


Approved By



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

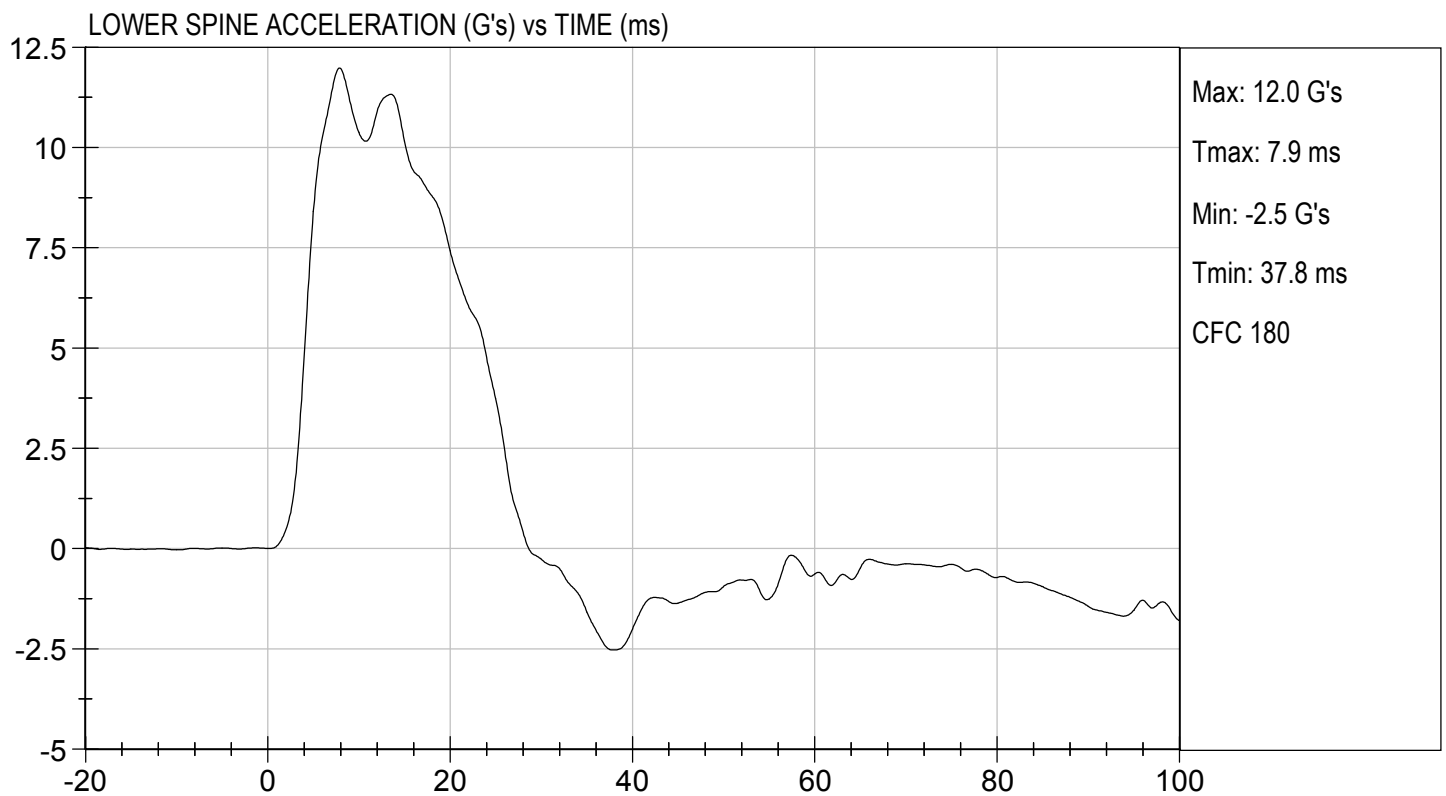
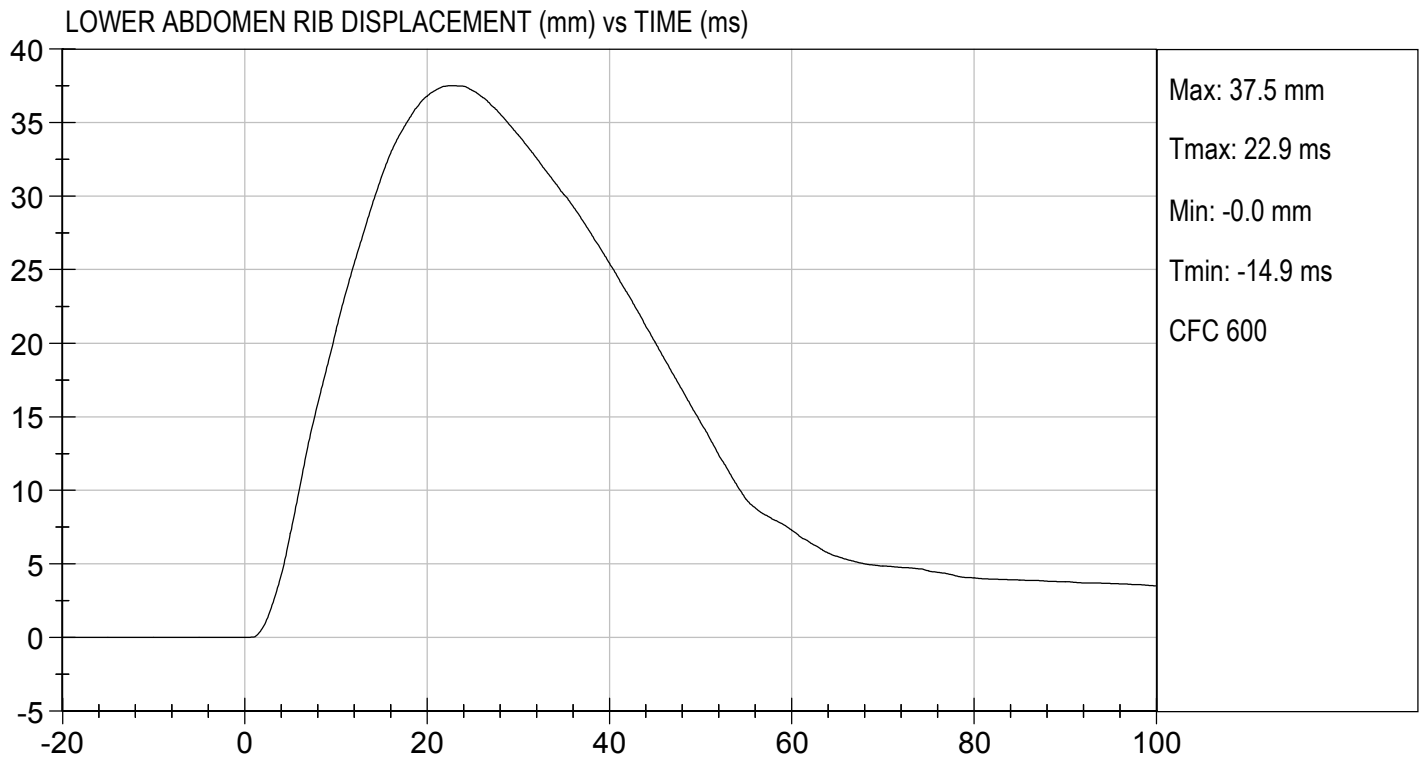
TEST DATE: 05/31/2019
TEST #: D191706





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

TEST DATE: 05/31/2019
TEST #: D191706



MGA RESEARCH CORPORATION

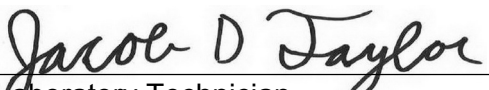
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

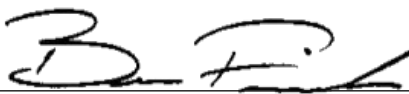
Test I.D: D191707

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	4,139	Pass
Overall Test Results				Pass


Laboratory Technician

05/31/2019

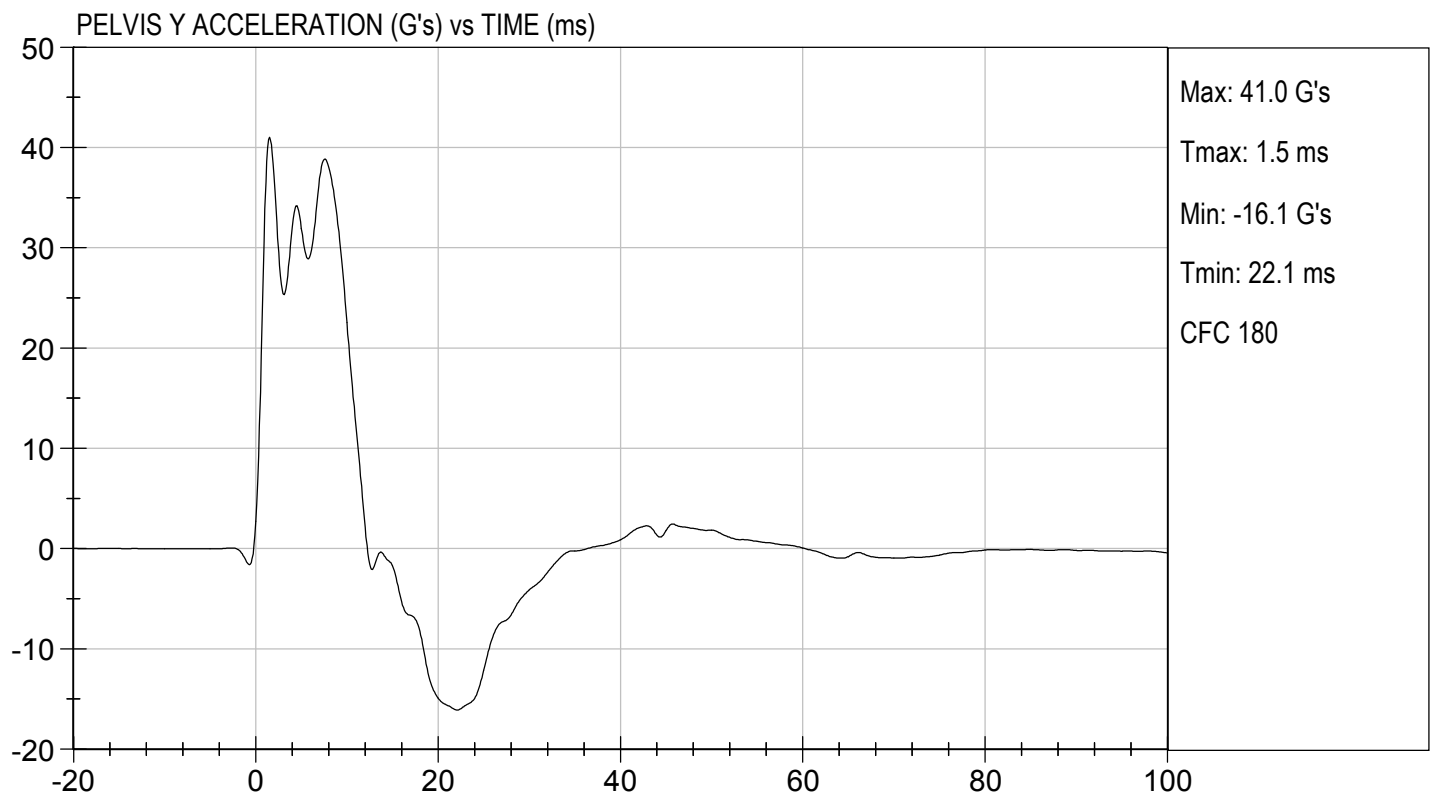
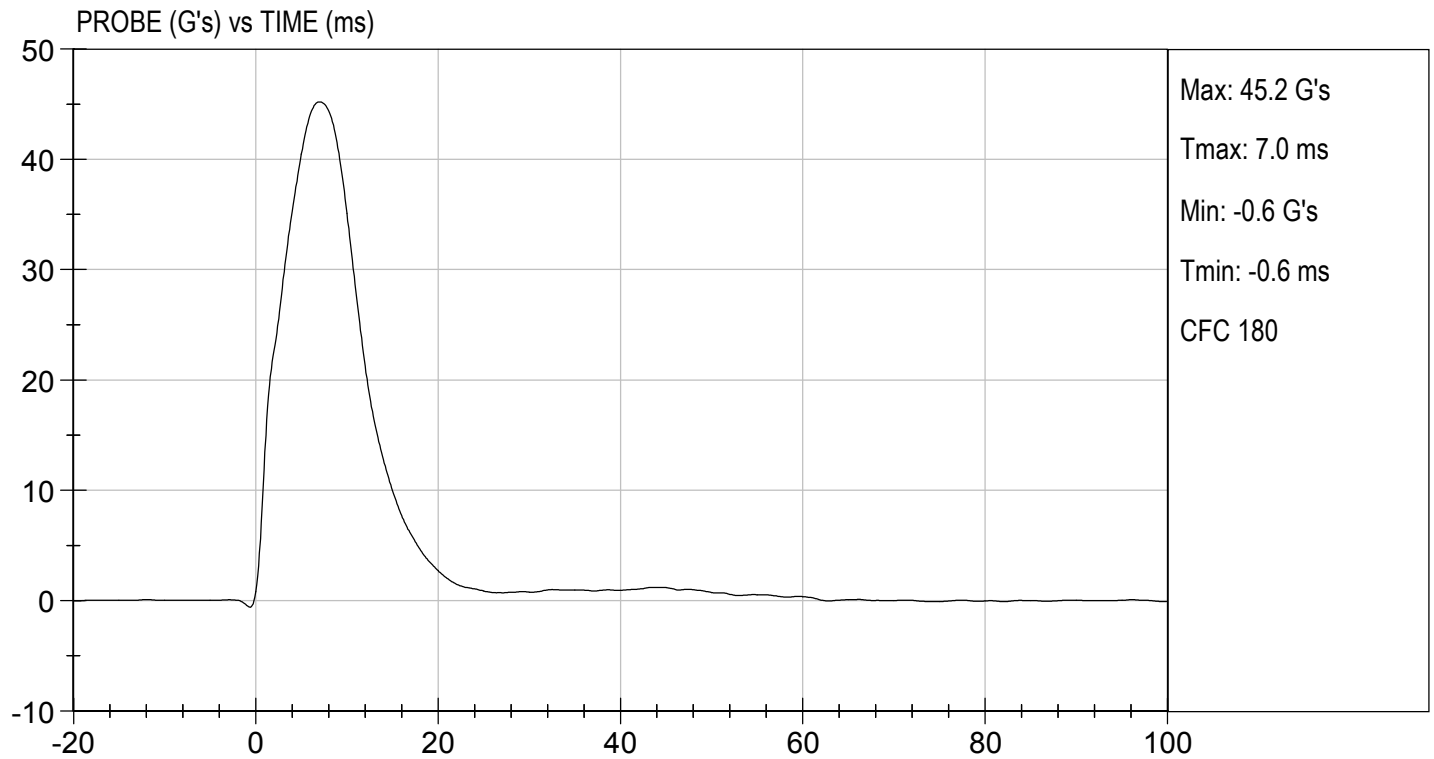
Test Date


Approved By



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

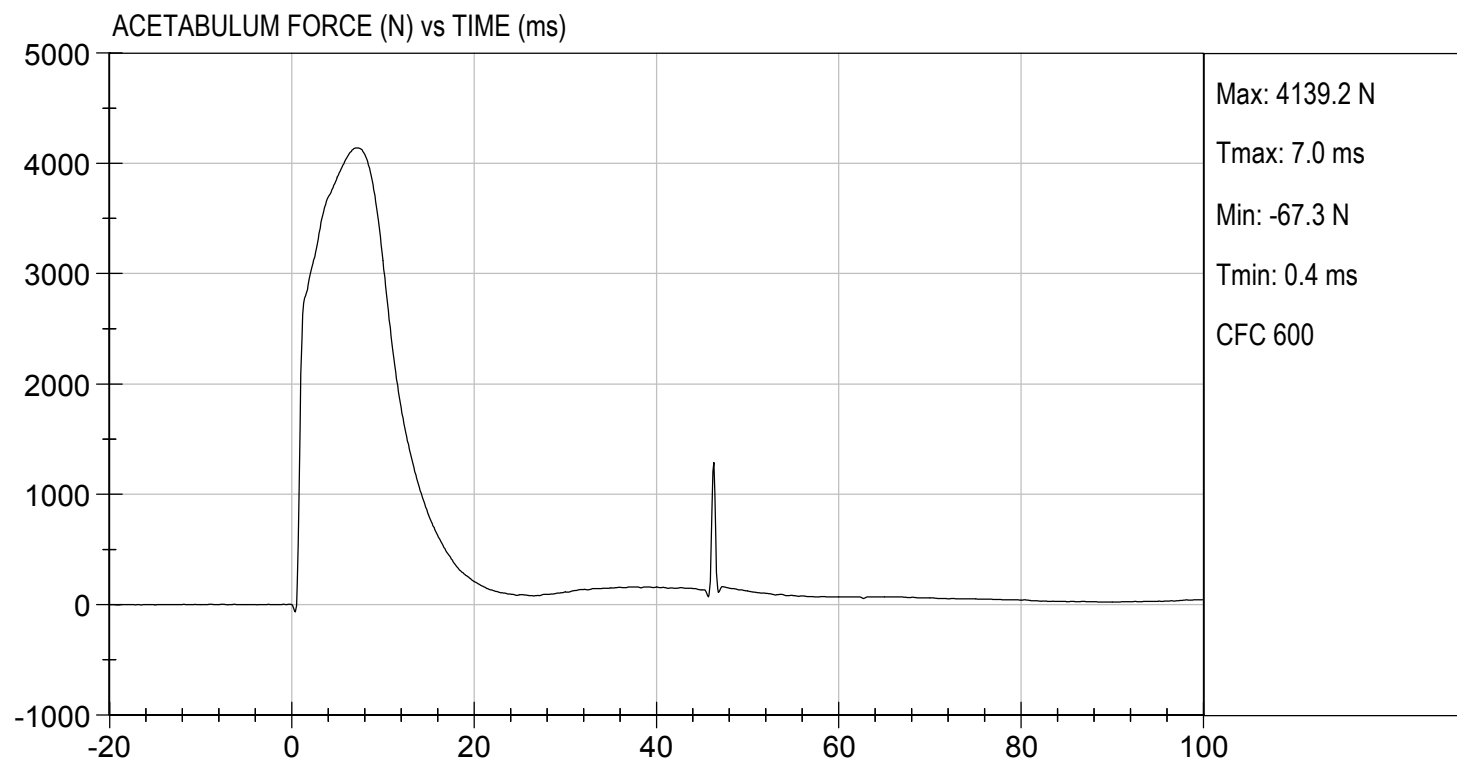
TEST DATE: 05/31/2019
TEST #: D191707





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

TEST DATE: 05/31/2019
TEST #: D191707



MGA RESEARCH CORPORATION

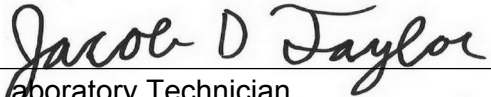
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

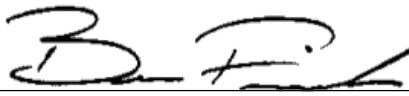
Test I.D: D191708

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,308	Pass
Overall Test Results				Pass


Laboratory Technician

05/31/2019

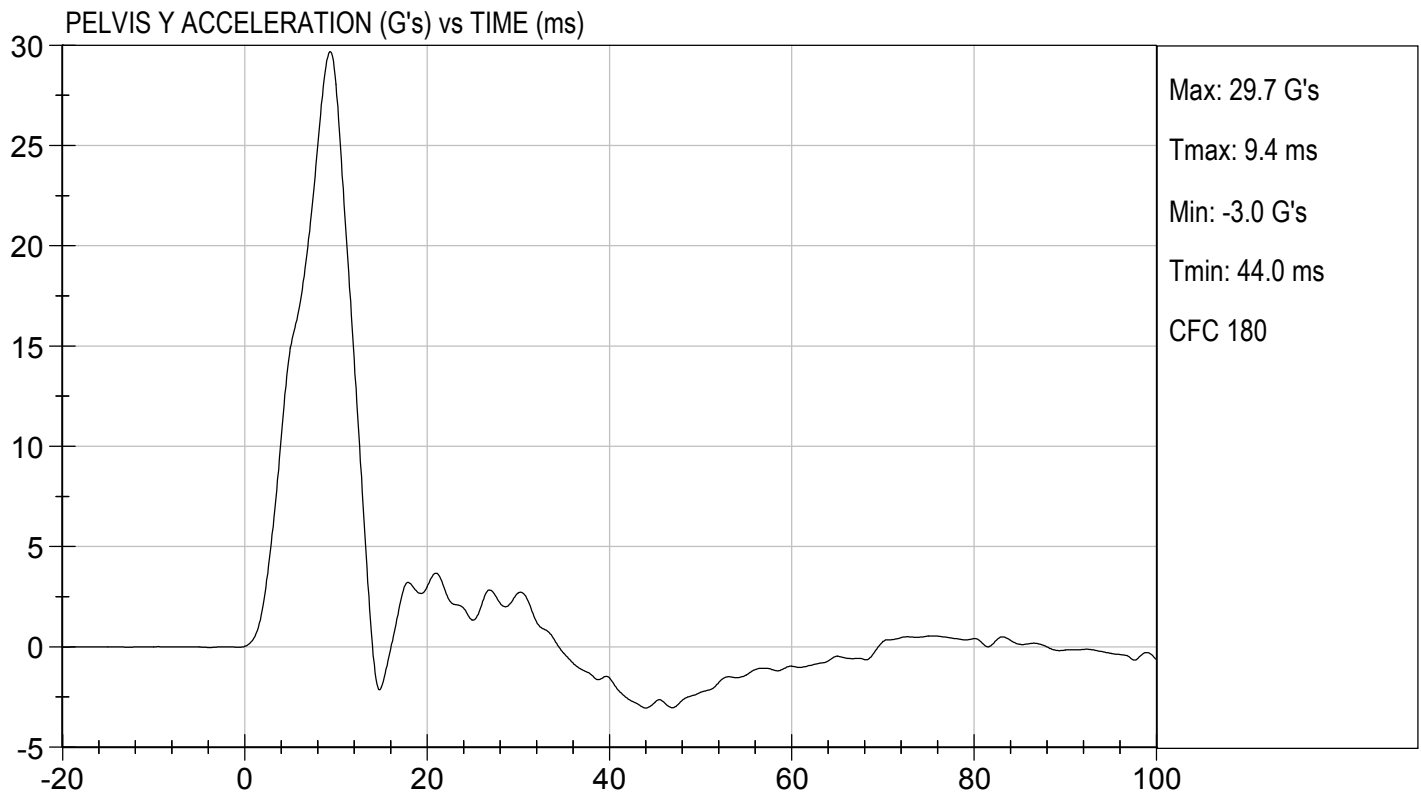
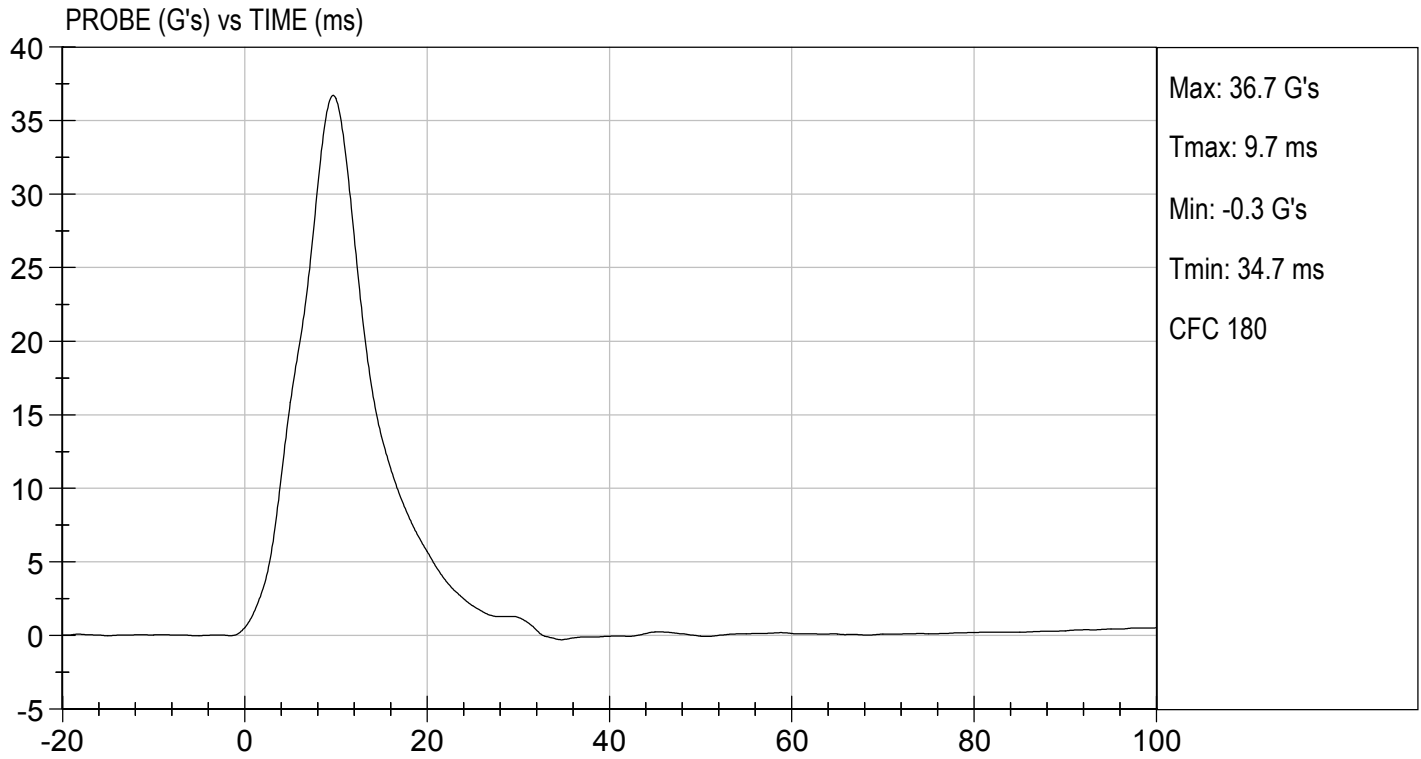
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.40 ft/s, 4.39 m/s

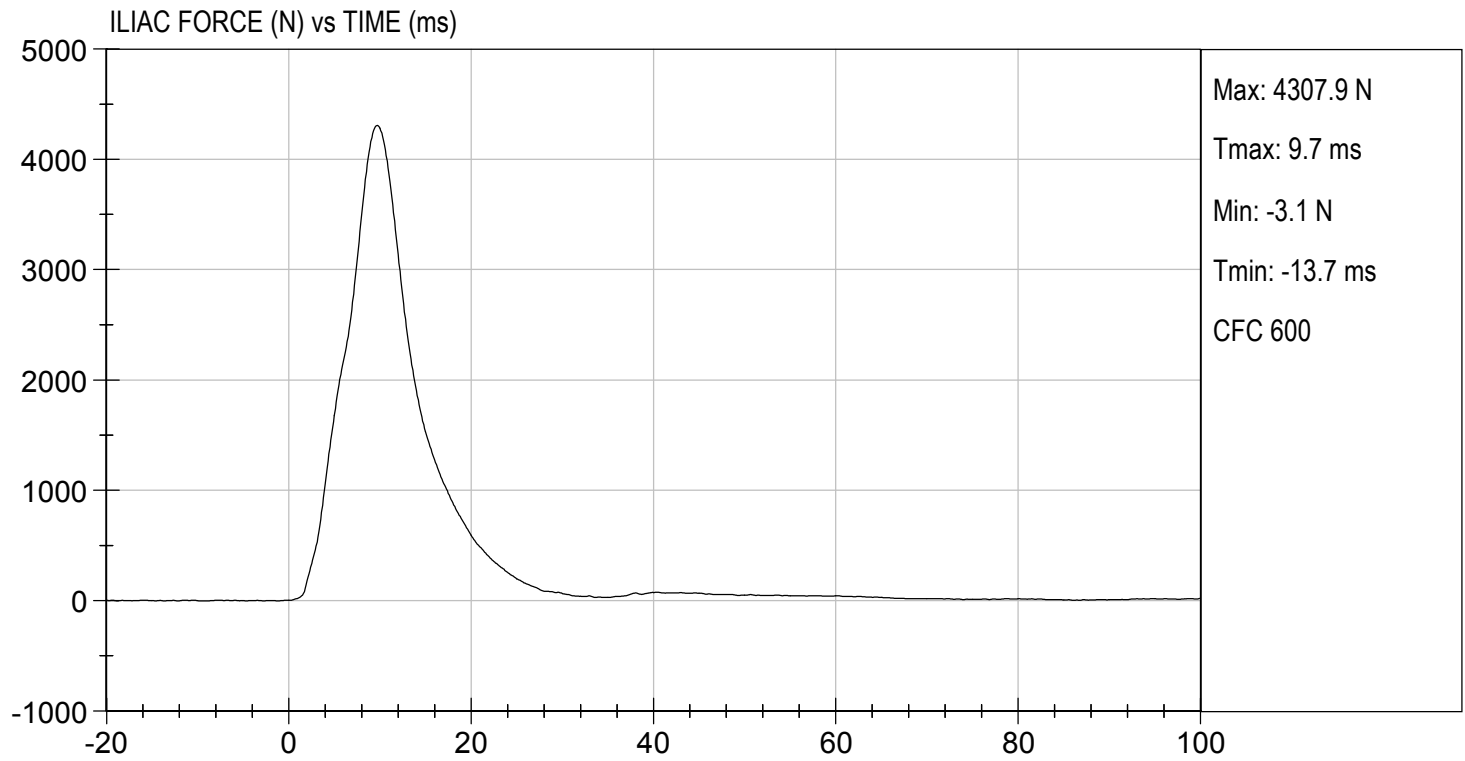
TEST DATE: 05/31/2019
TEST #: D191708





TEST DESC: ILLIAC
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 05/31/2019
TEST #: D191708



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SID-IIsD External Measurements
SN: 296

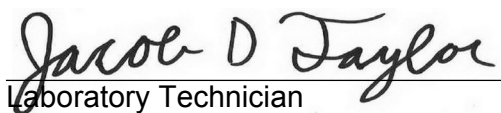
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148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

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

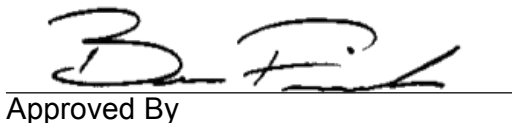
Test ID: D192221

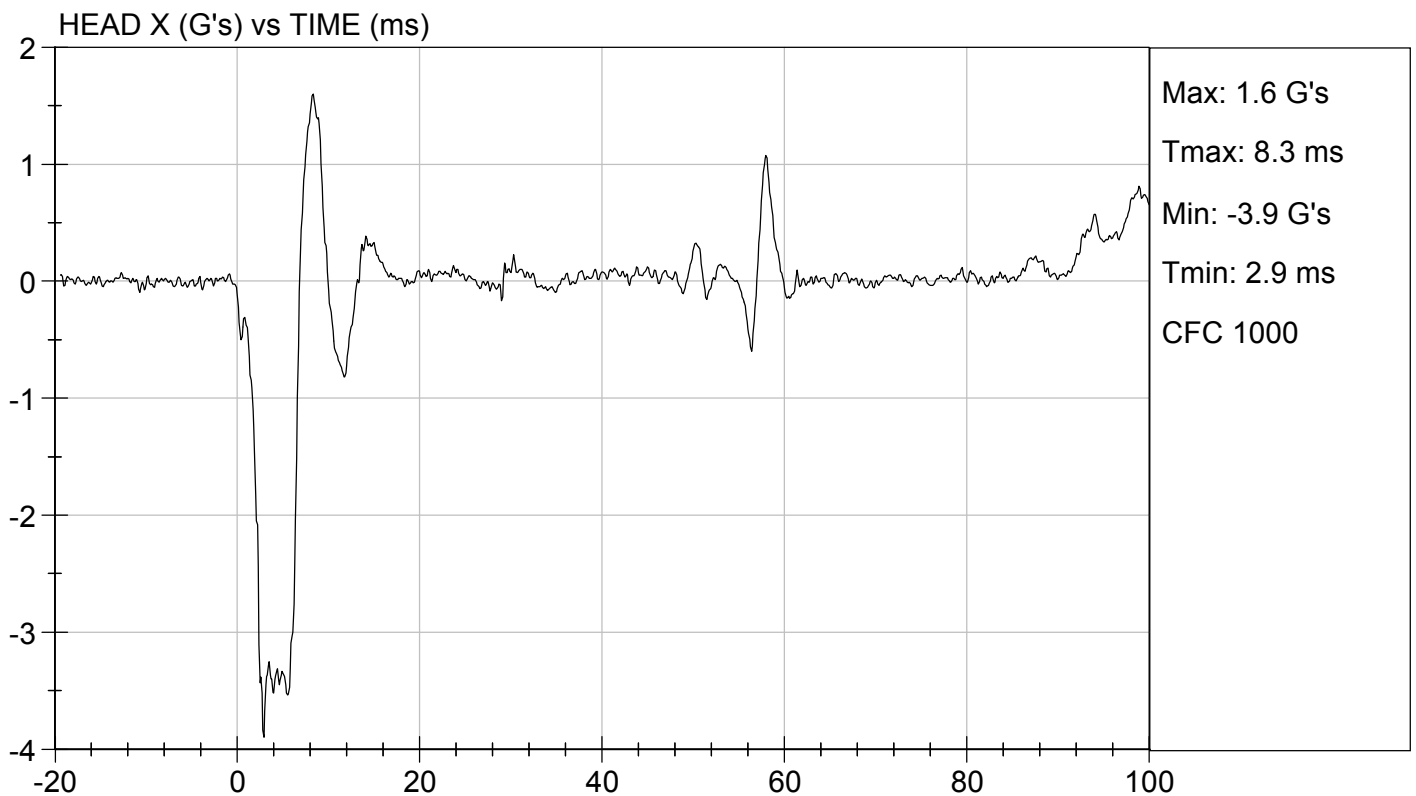
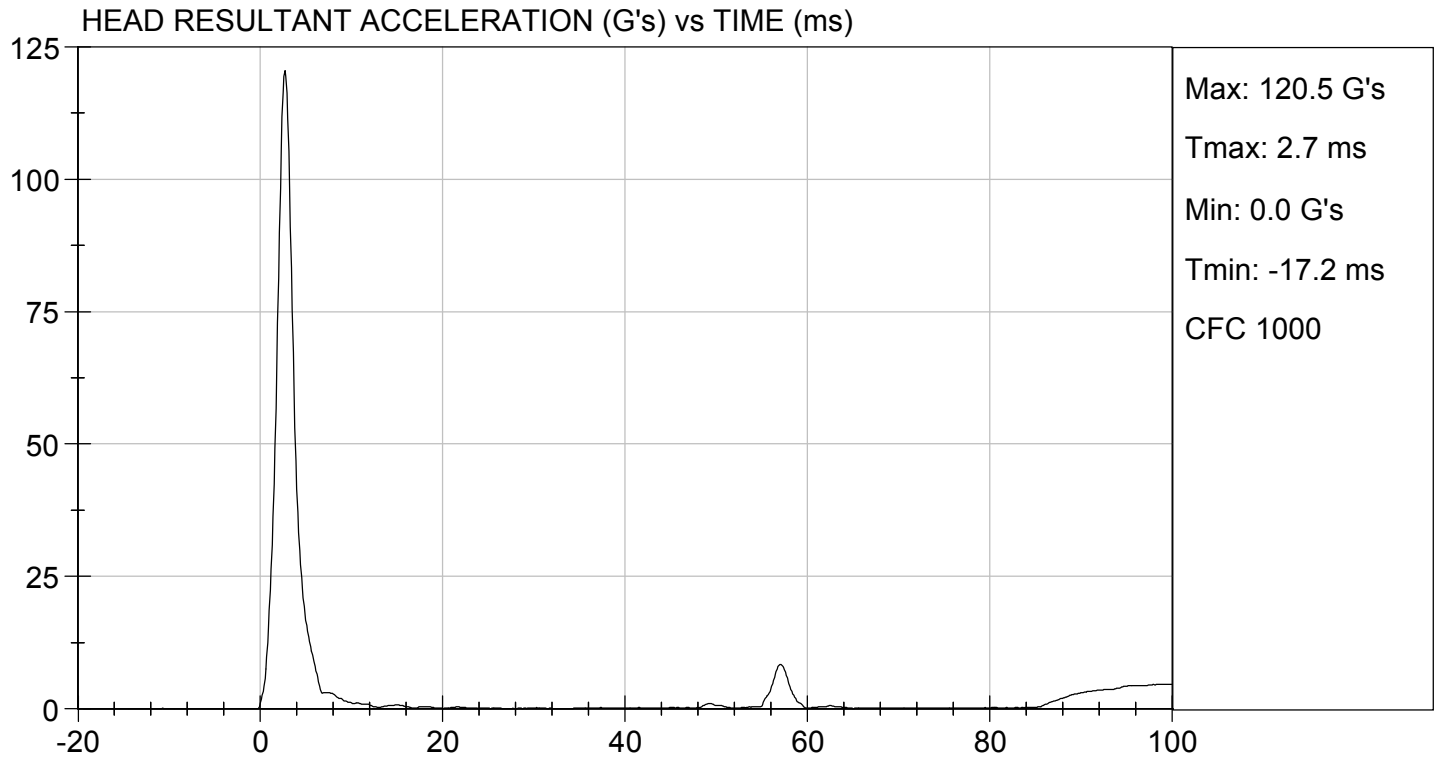
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Peak Resultant Acceleration	G's	115 to 137	121	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-3.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass

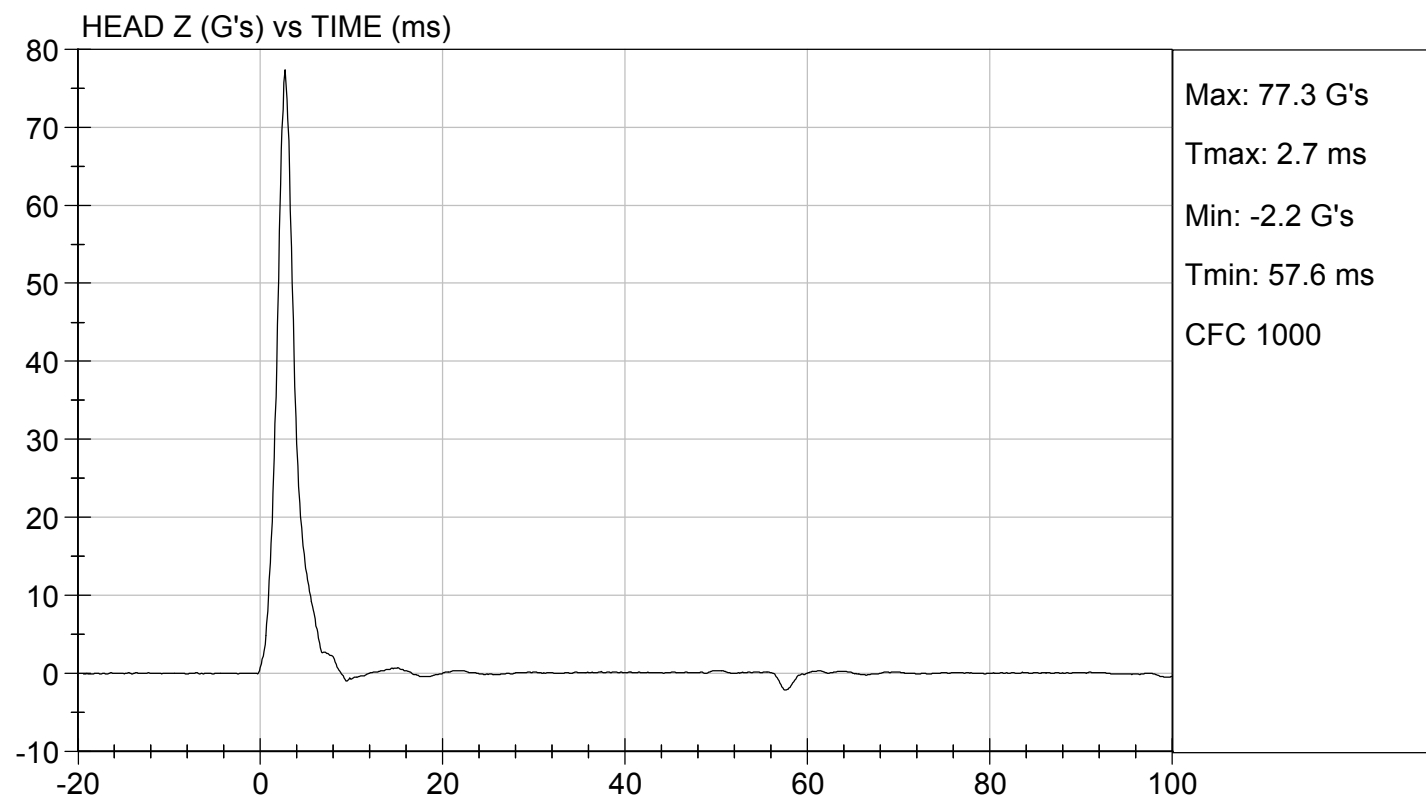
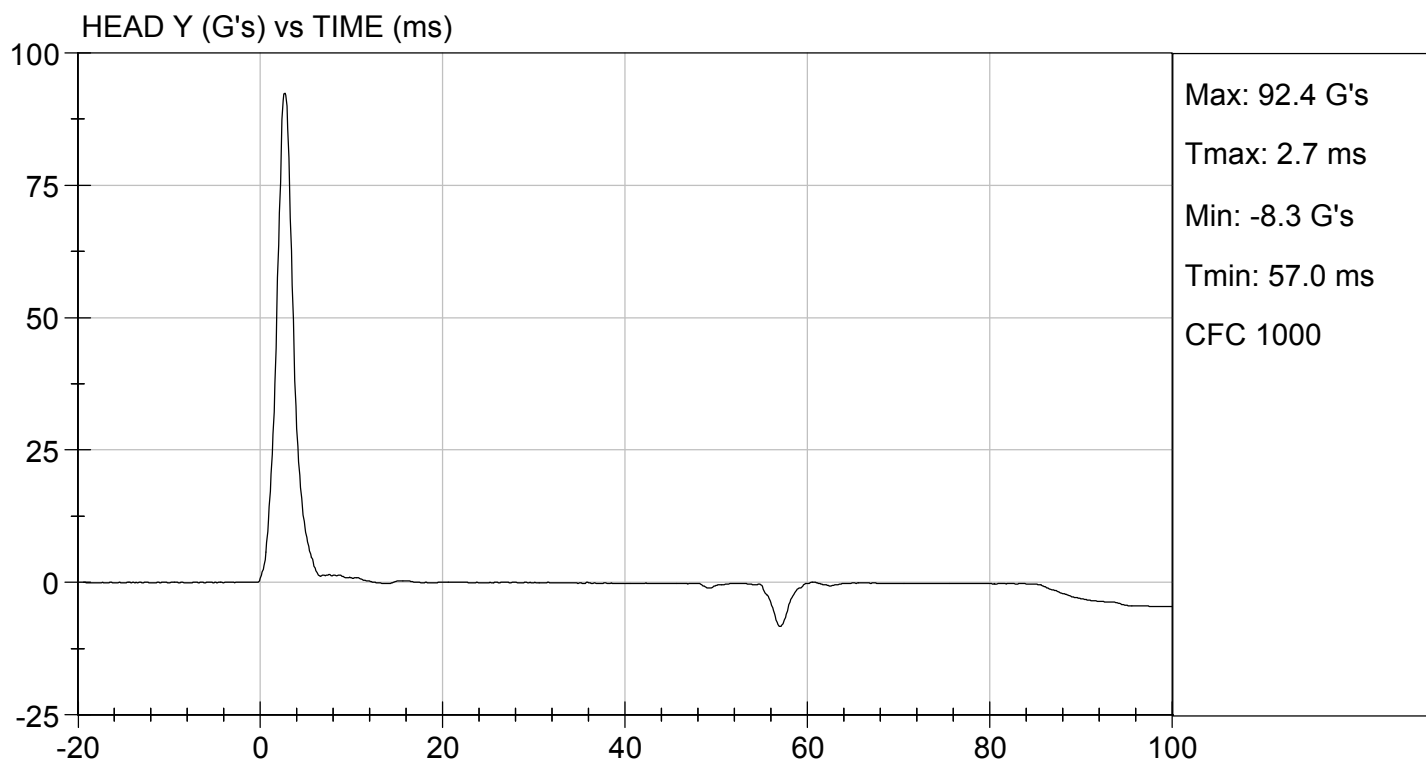

Laboratory Technician

07/23/2019

Test Date


Approved By



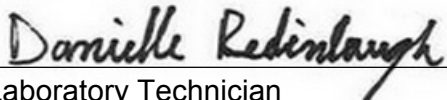


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

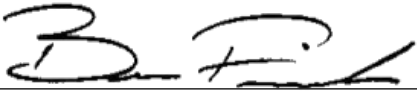
Test I.D: D192222

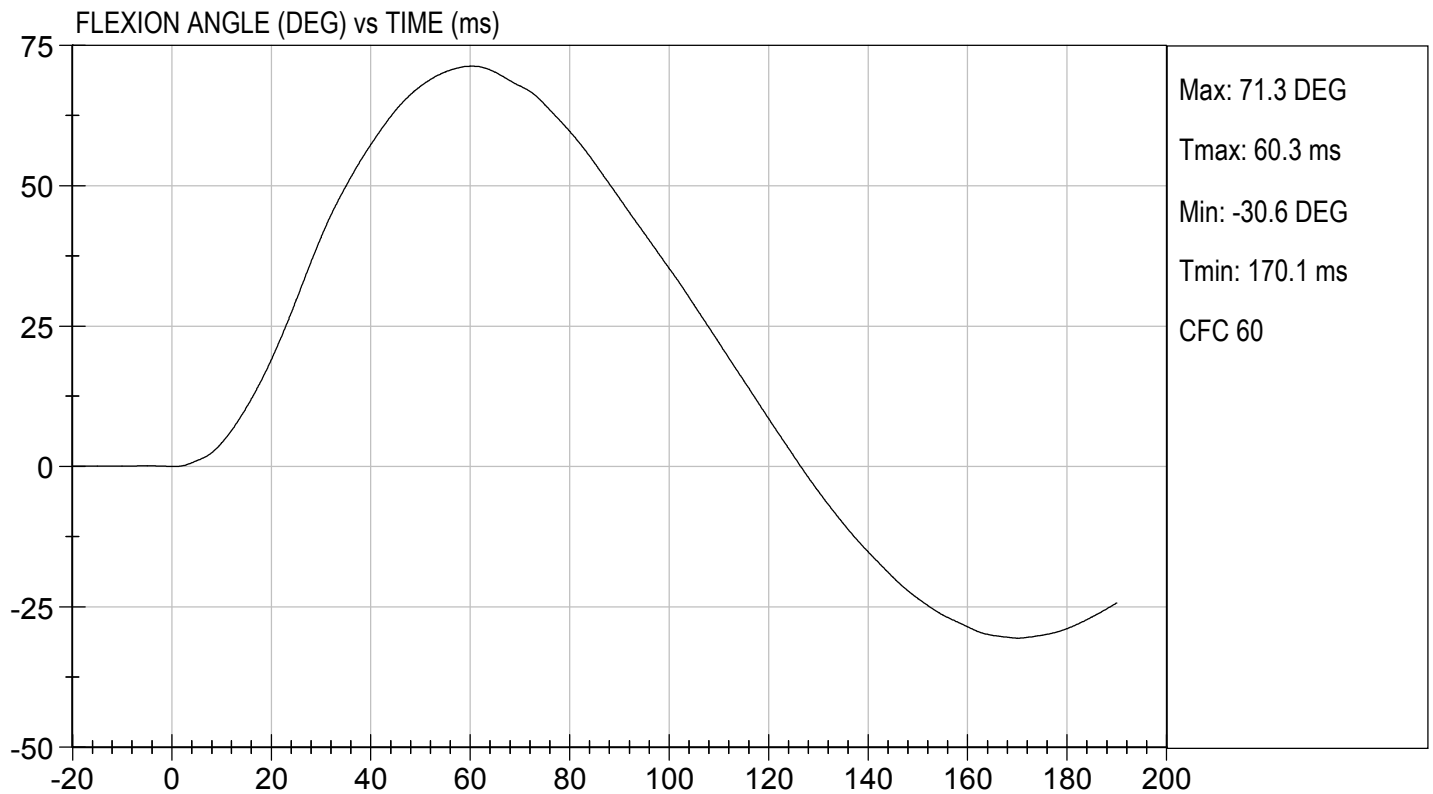
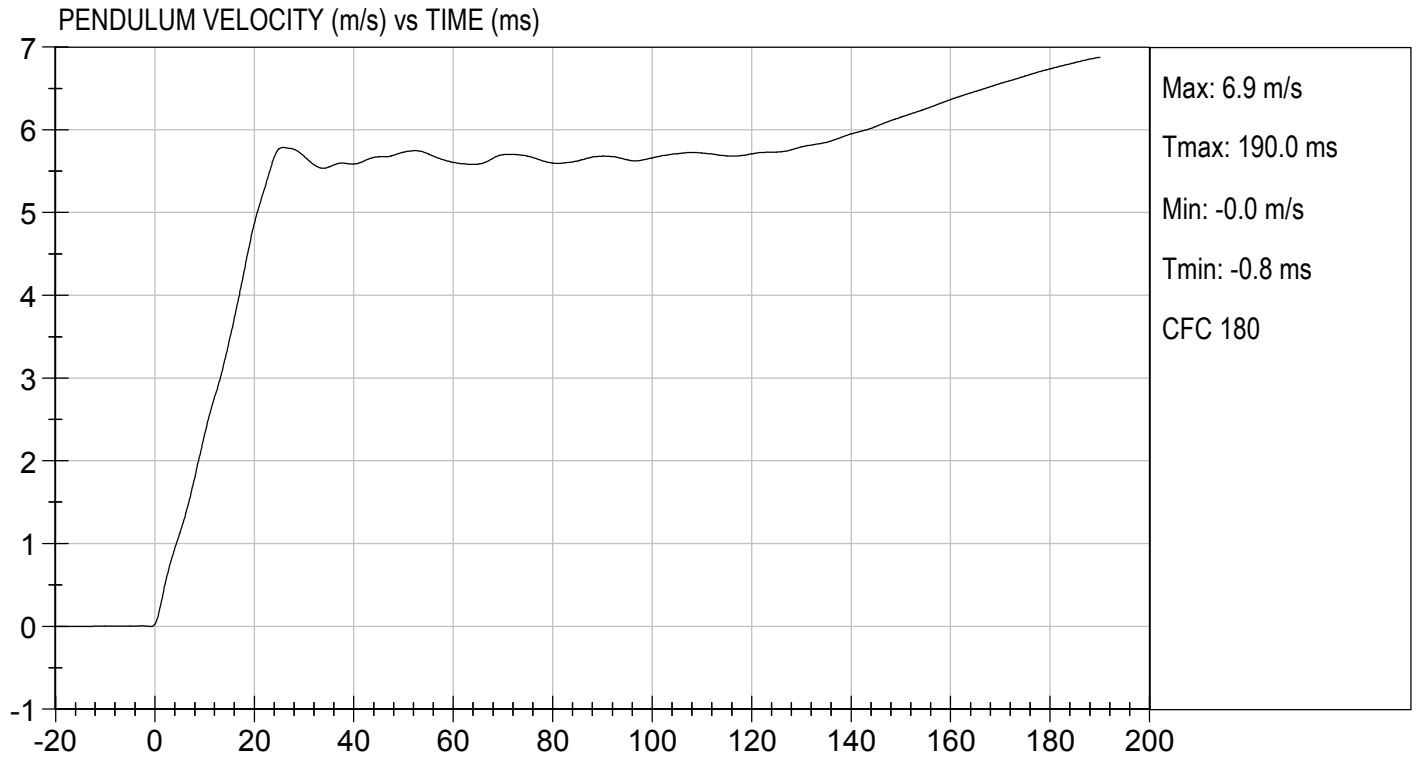
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	41	Pass
Impact Velocity		m/s	5.51 to 5.63	5.61	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.32	Pass
	15 ms	m/s	3.30 to 4.10	3.46	Pass
	20 ms	m/s	4.40 to 5.40	4.87	Pass
	25 ms	m/s	5.40 to 6.10	5.77	Pass
	25-100 ms	m/s	5.50 to 6.20	5.79	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	111	Pass
Overall Test Results					Pass


Laboratory Technician

07/23/2019

Test Date

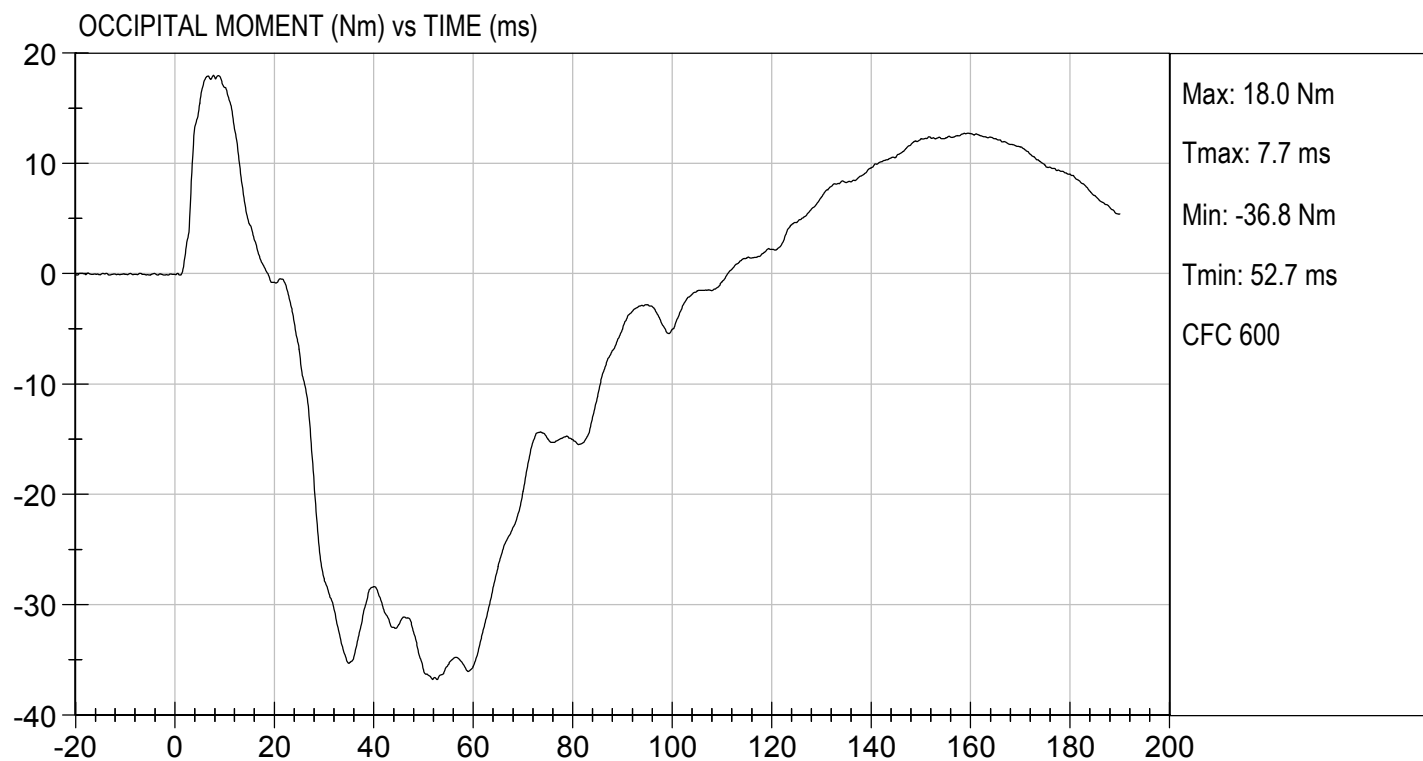

Approved By





TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 07/23/2019
TEST #: D192222

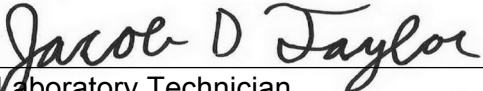


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

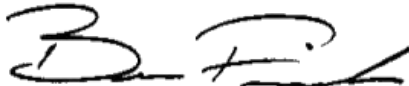
Test ID: D192223

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	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	20	Pass
Overall Test Results			Pass	


Laboratory Technician

07/19/2019

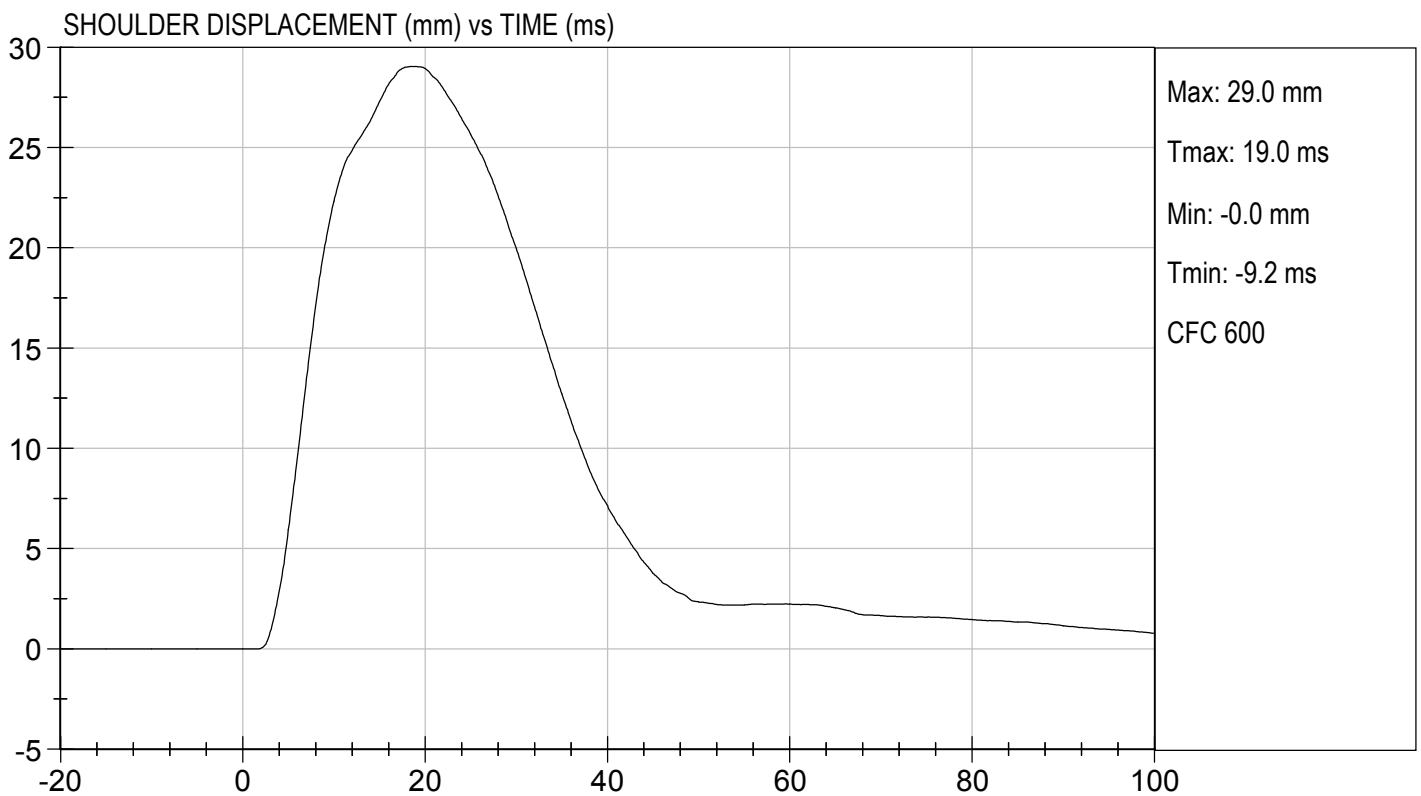
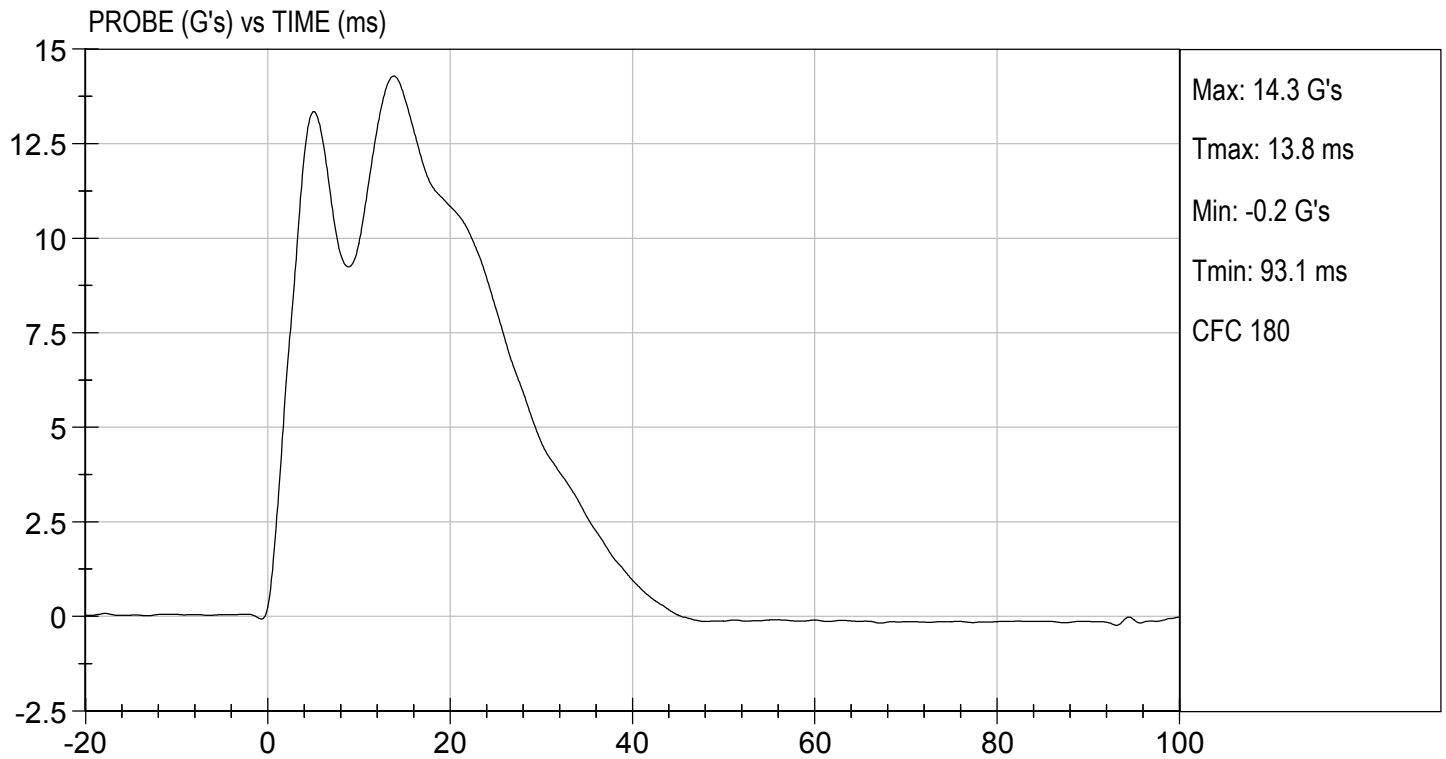
Test Date


Approved By



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

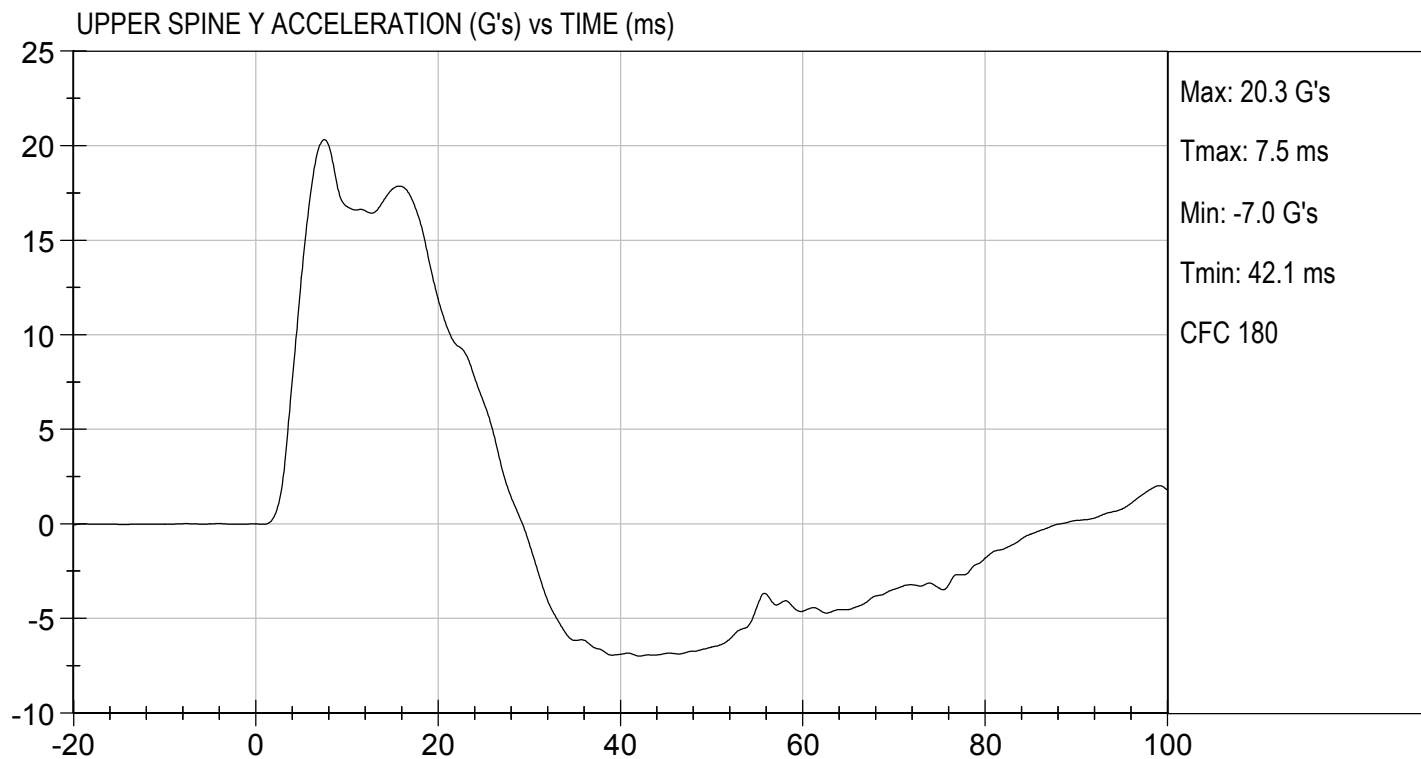
TEST DATE: 07/19/2019
TEST #: D192223





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

TEST DATE: 07/19/2019
TEST #: D192223

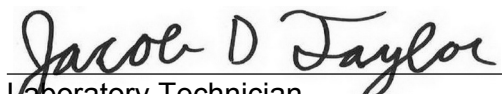


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

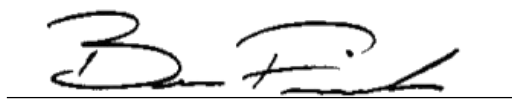
Test I.D: D192224

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	34	Pass
Upper Rib Displacement	mm	25 to 32	27	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass


Laboratory Technician

07/19/2019

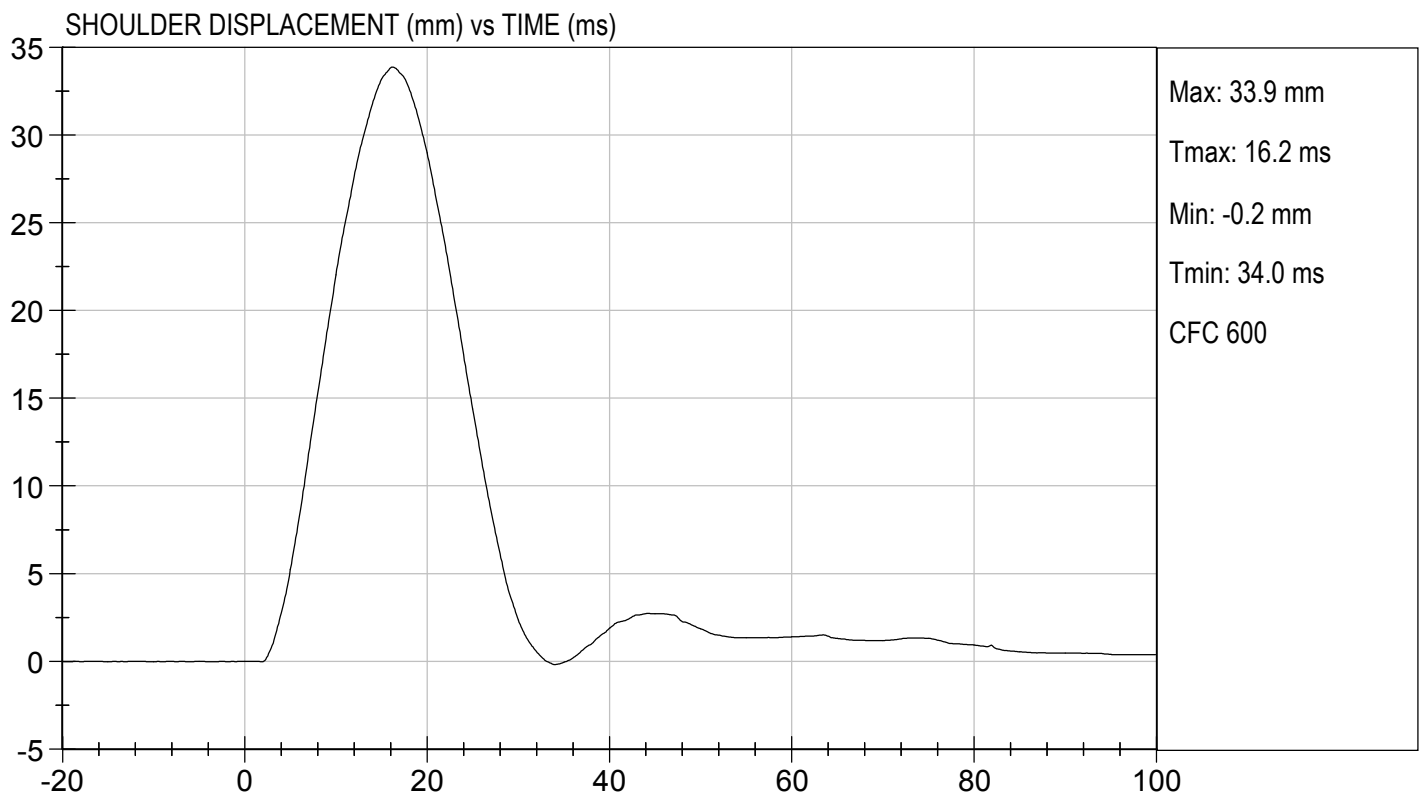
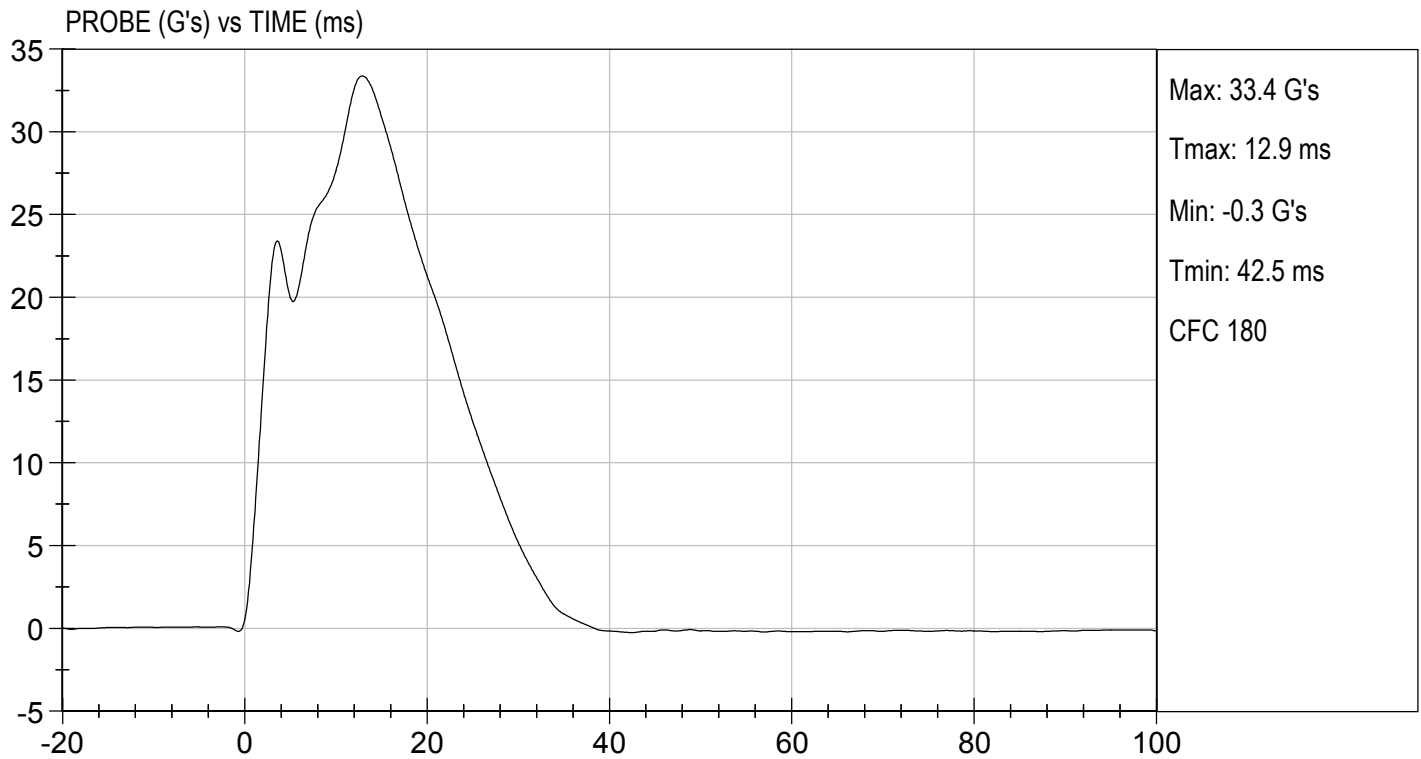
Test Date


Approved By



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

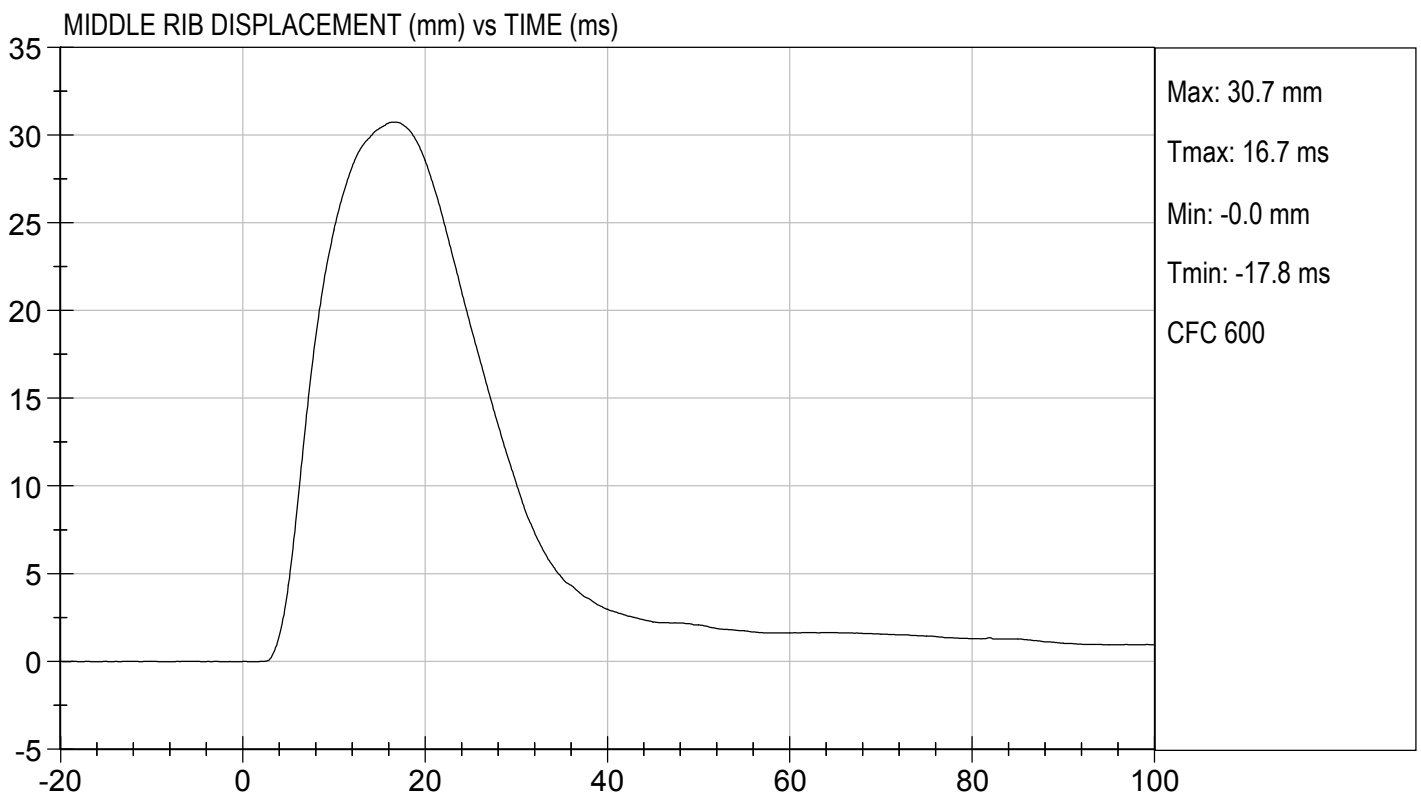
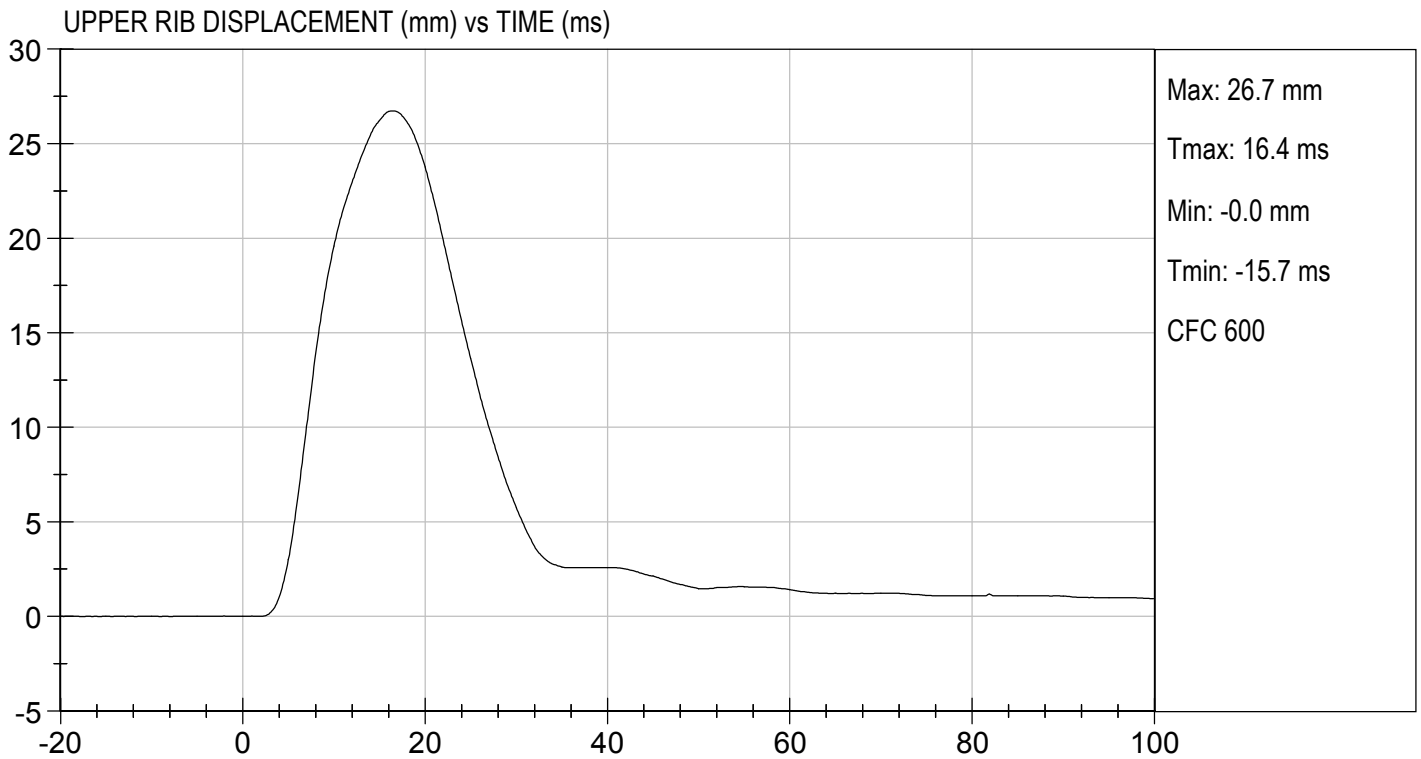
TEST DATE: 07/19/2019
TEST #: D192224





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

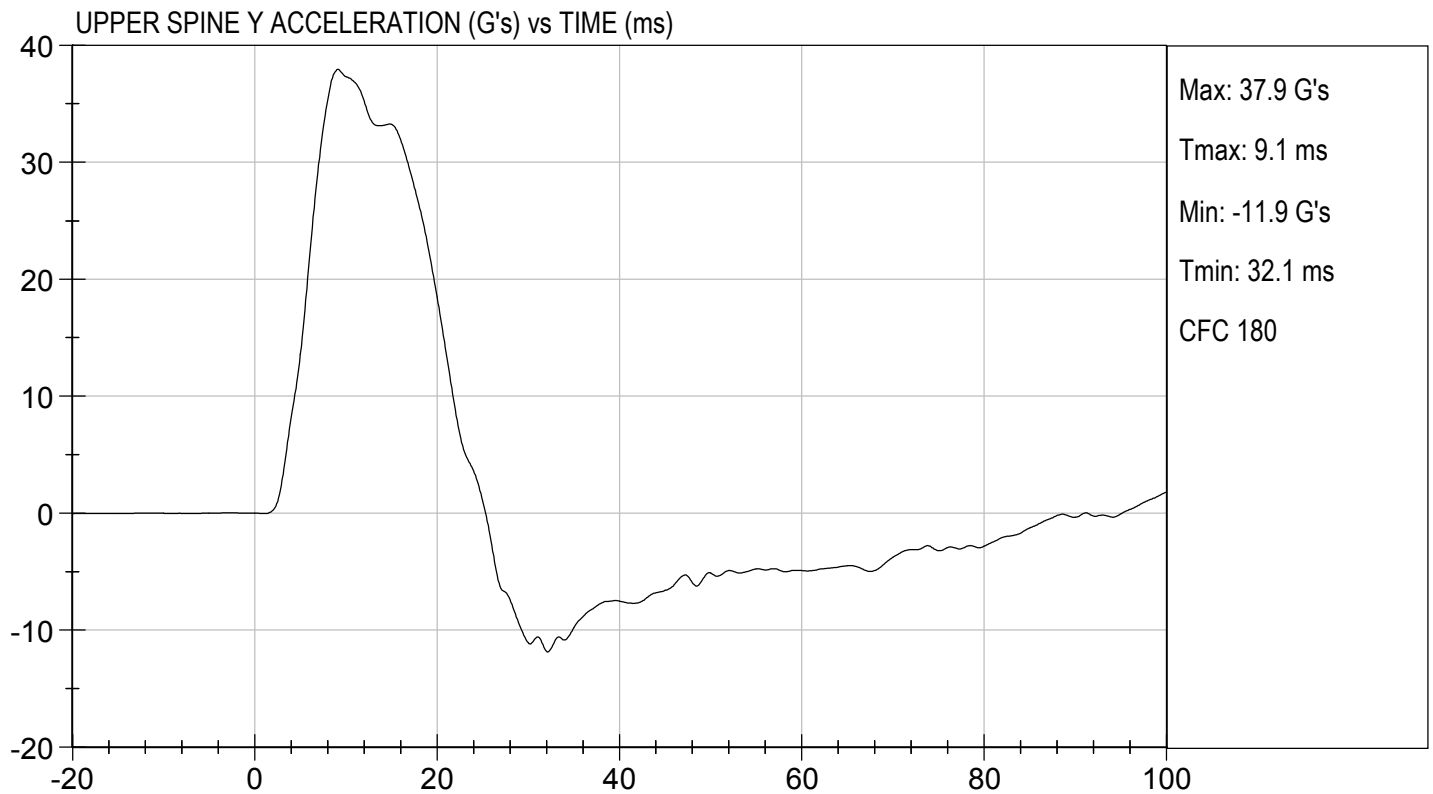
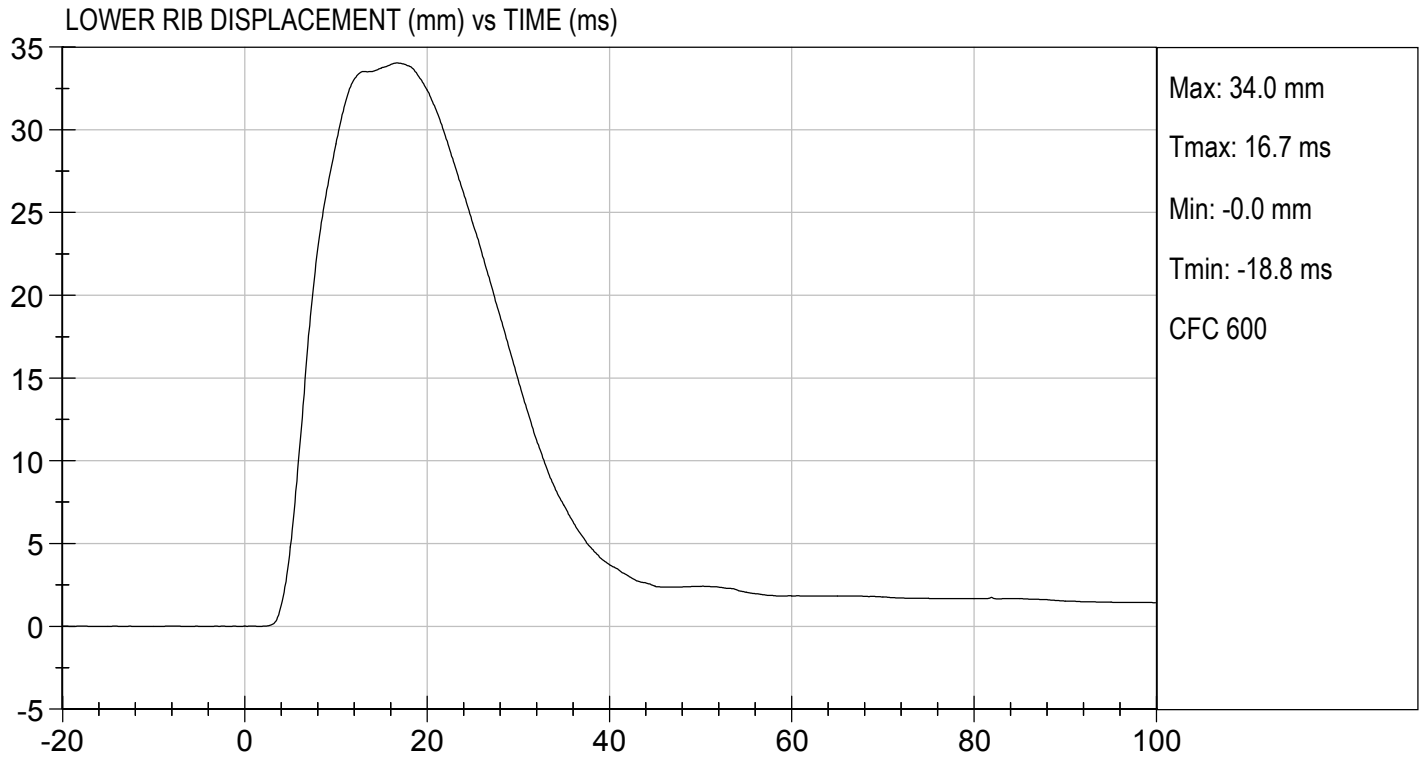
TEST DATE: 07/19/2019
TEST #: D192224





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

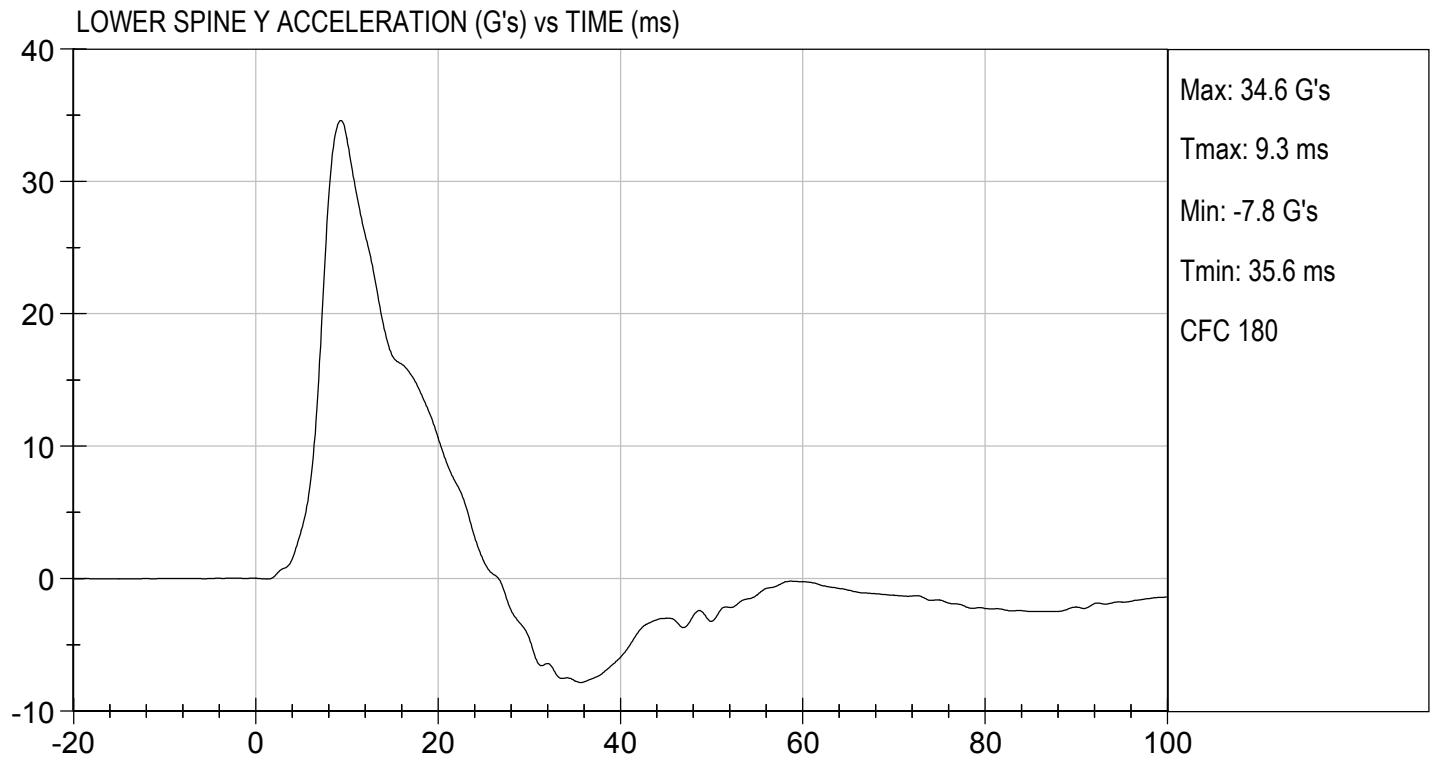
TEST DATE: 07/19/2019
TEST #: D192224





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

TEST DATE: 07/19/2019
TEST #: D192224

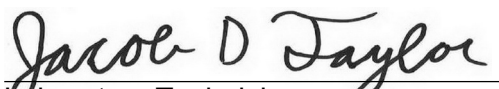


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

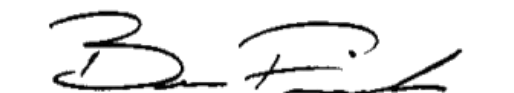
Test I.D: D192225

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	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	42	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


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07/19/2019

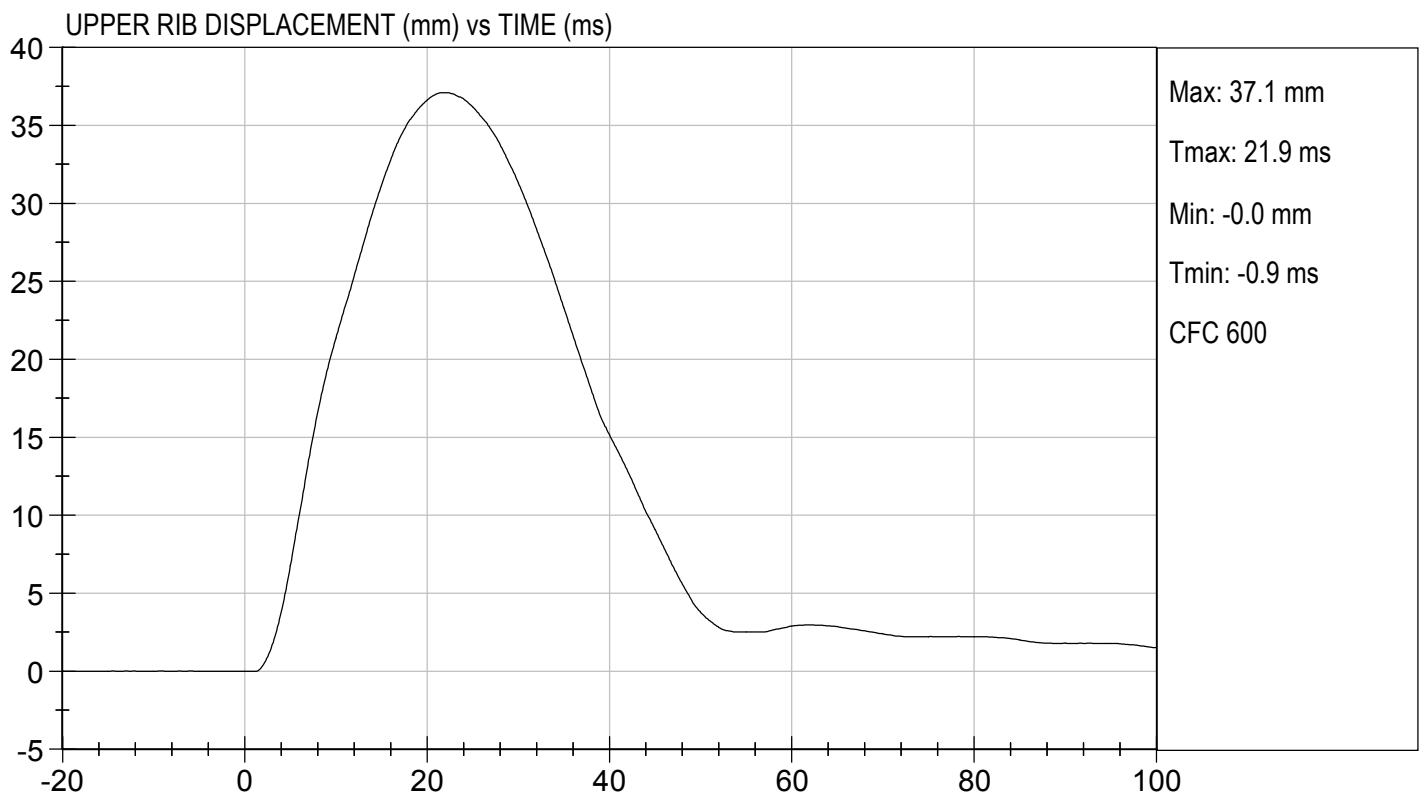
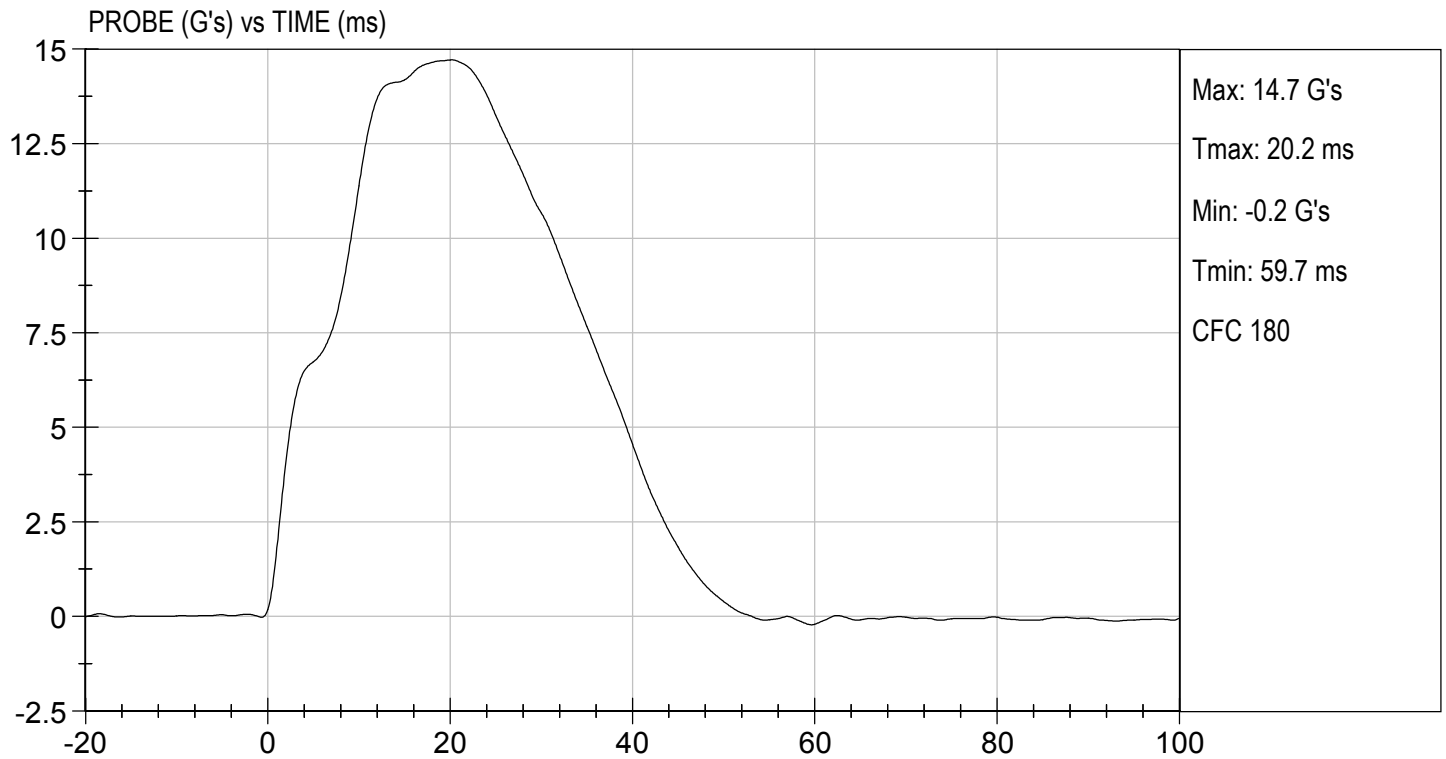
Test Date


Approved By



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

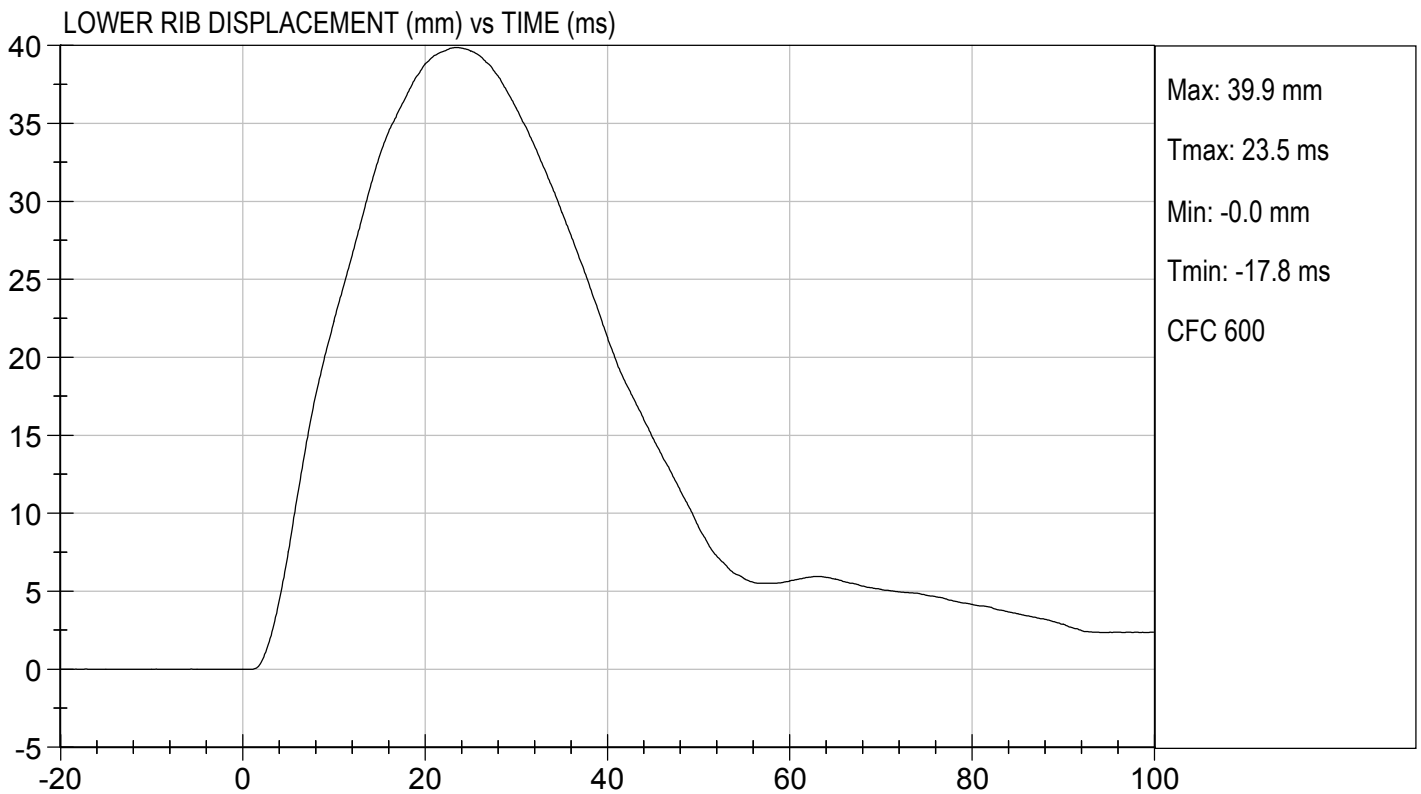
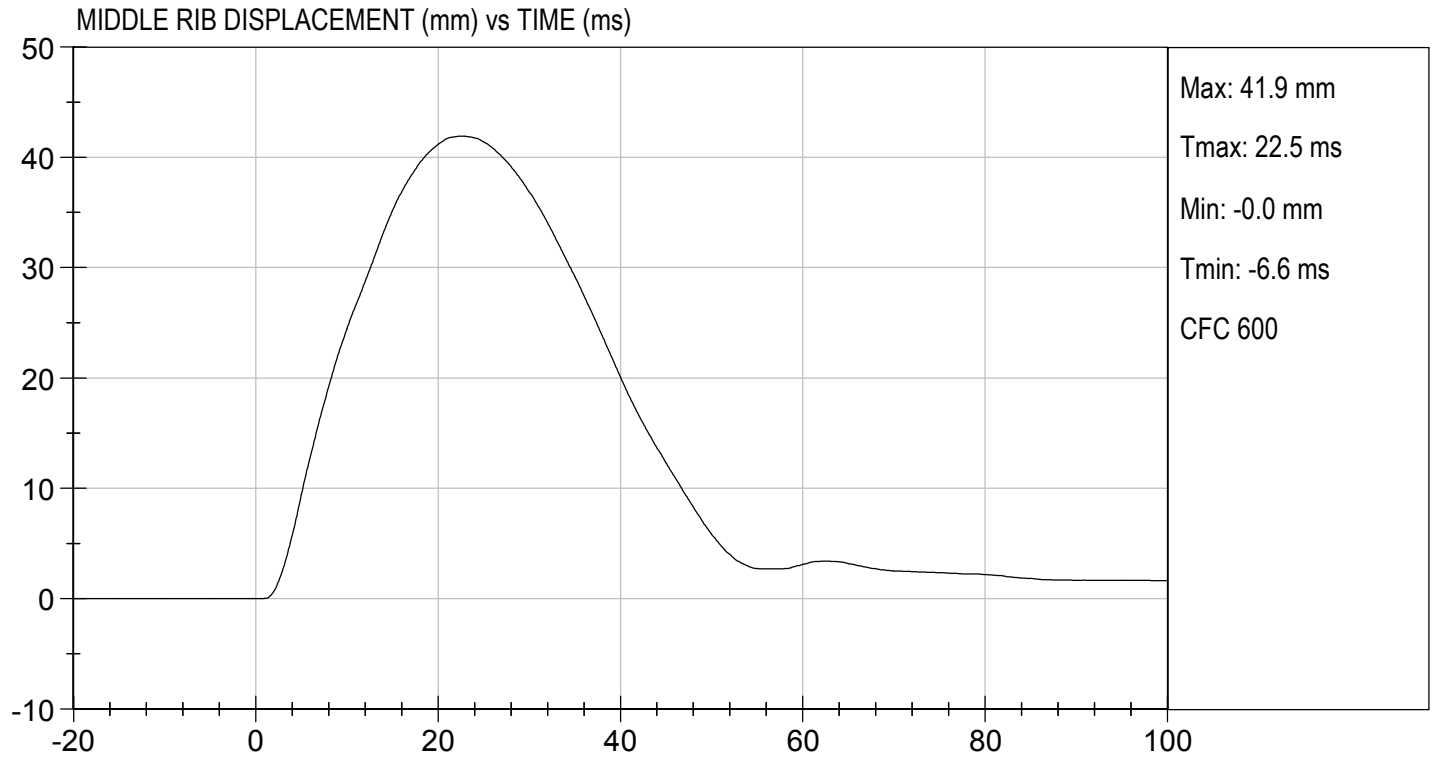
TEST DATE: 07/19/2019
TEST #: D192225





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

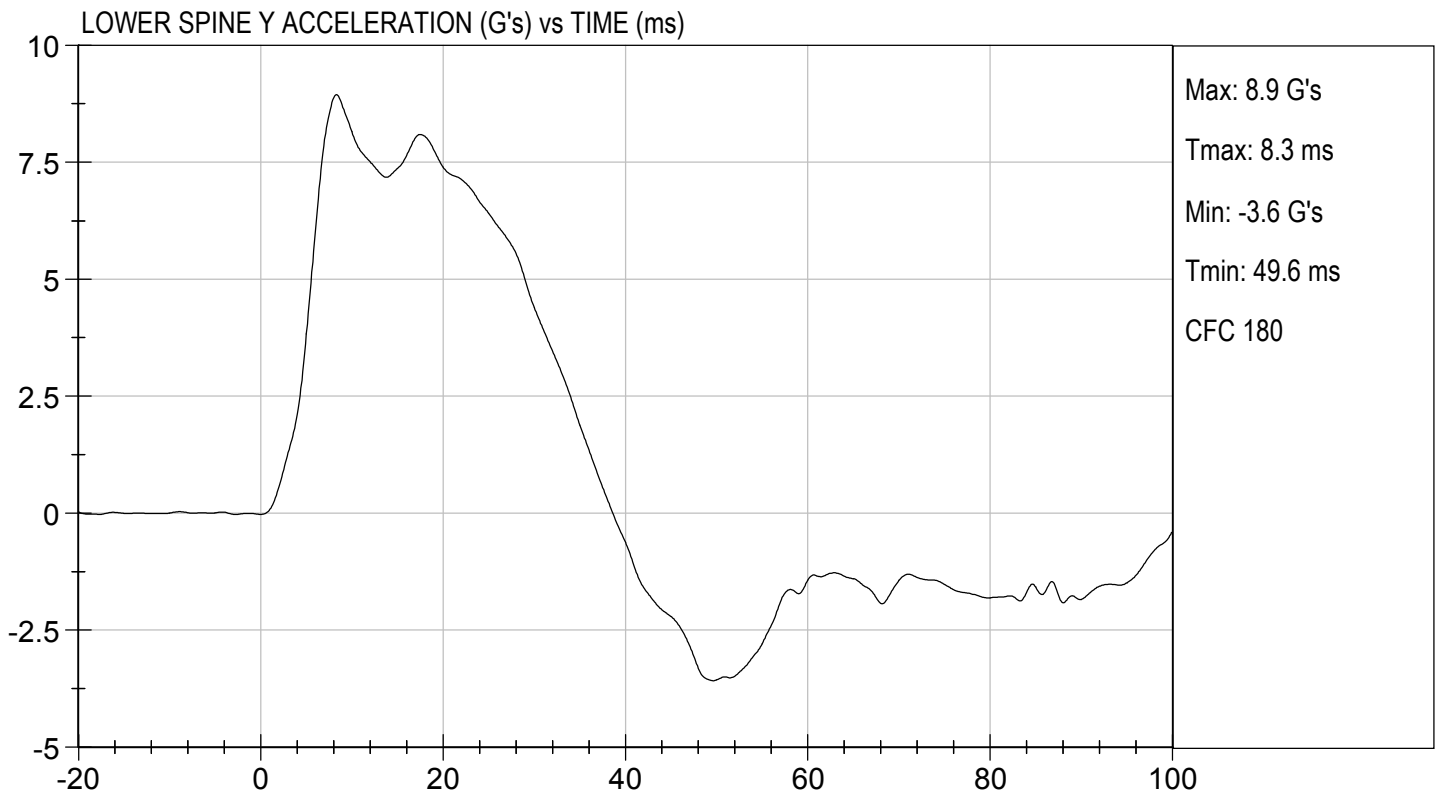
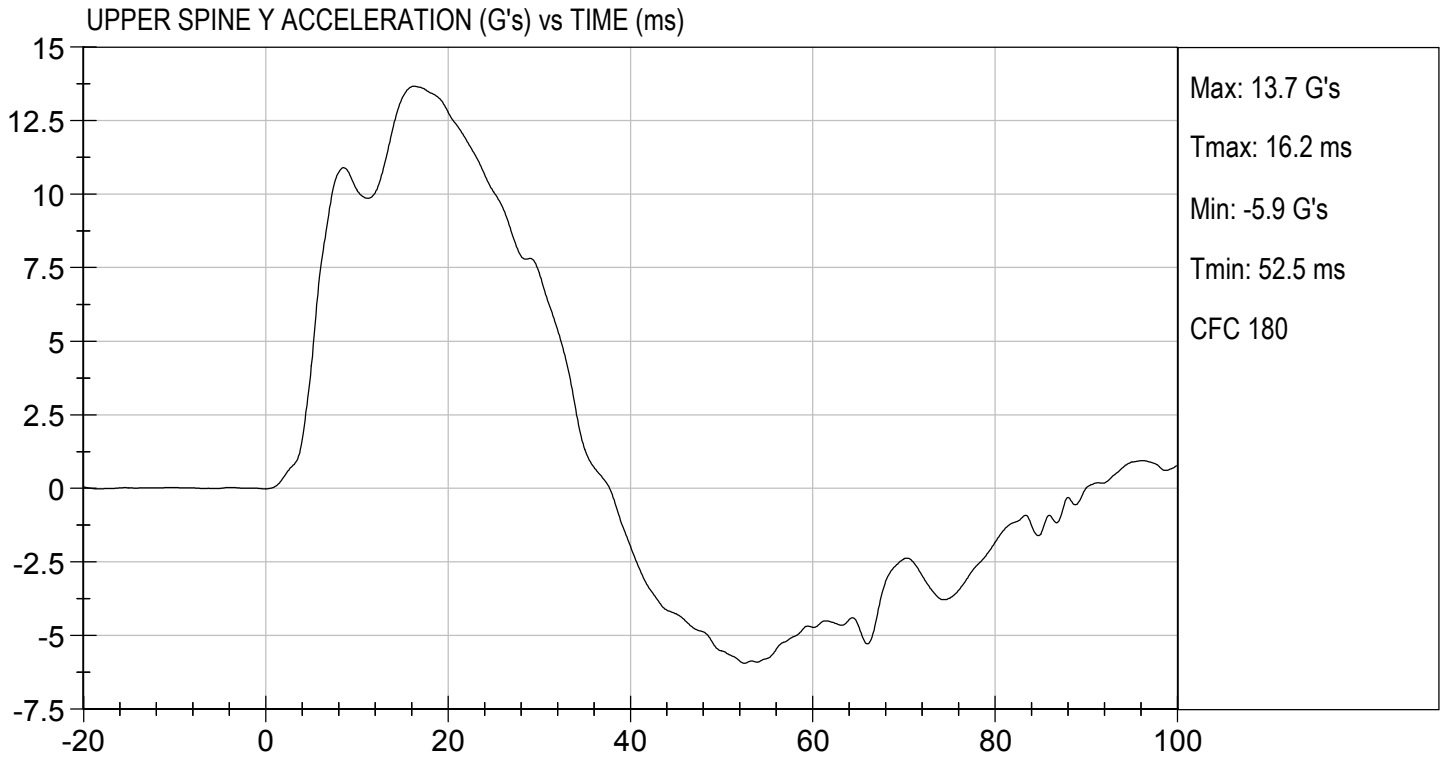
TEST DATE: 07/19/2019
TEST #: D192225





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

TEST DATE: 07/19/2019
TEST #: D192225



MGA RESEARCH CORPORATION

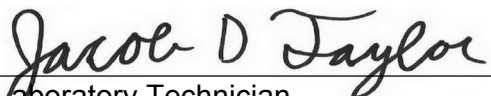
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

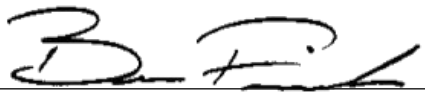
Test I.D: D192226

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


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07/19/2019

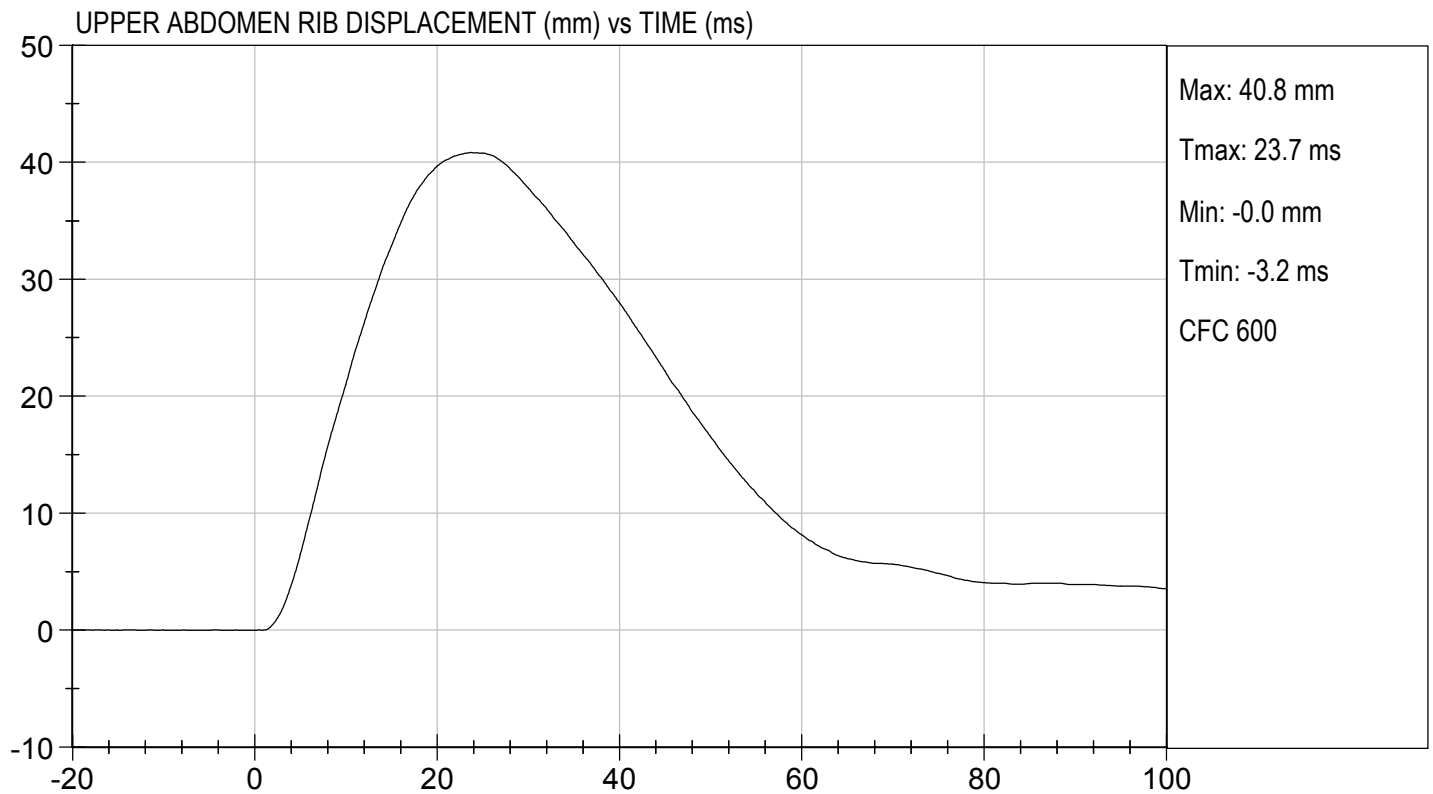
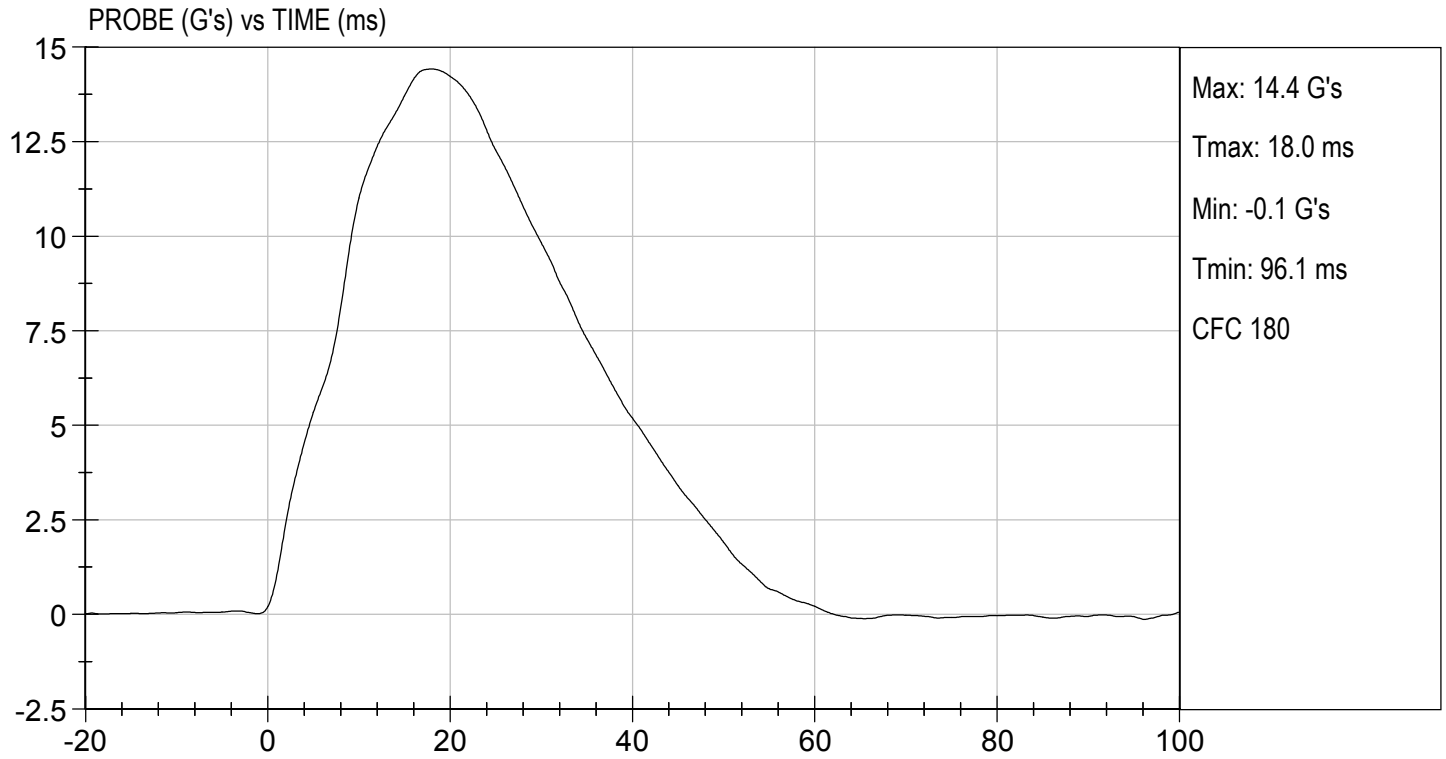
Test Date


Approved By



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

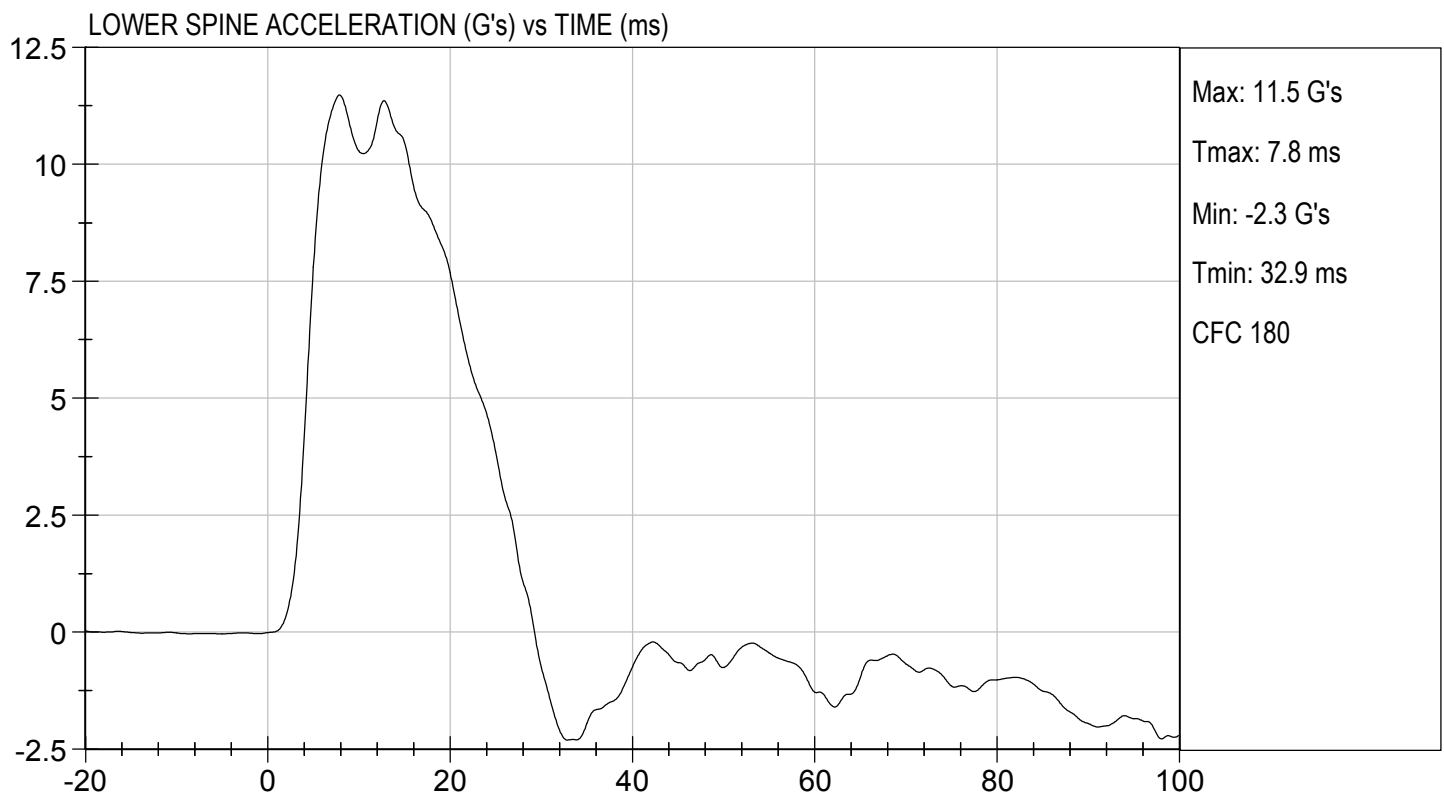
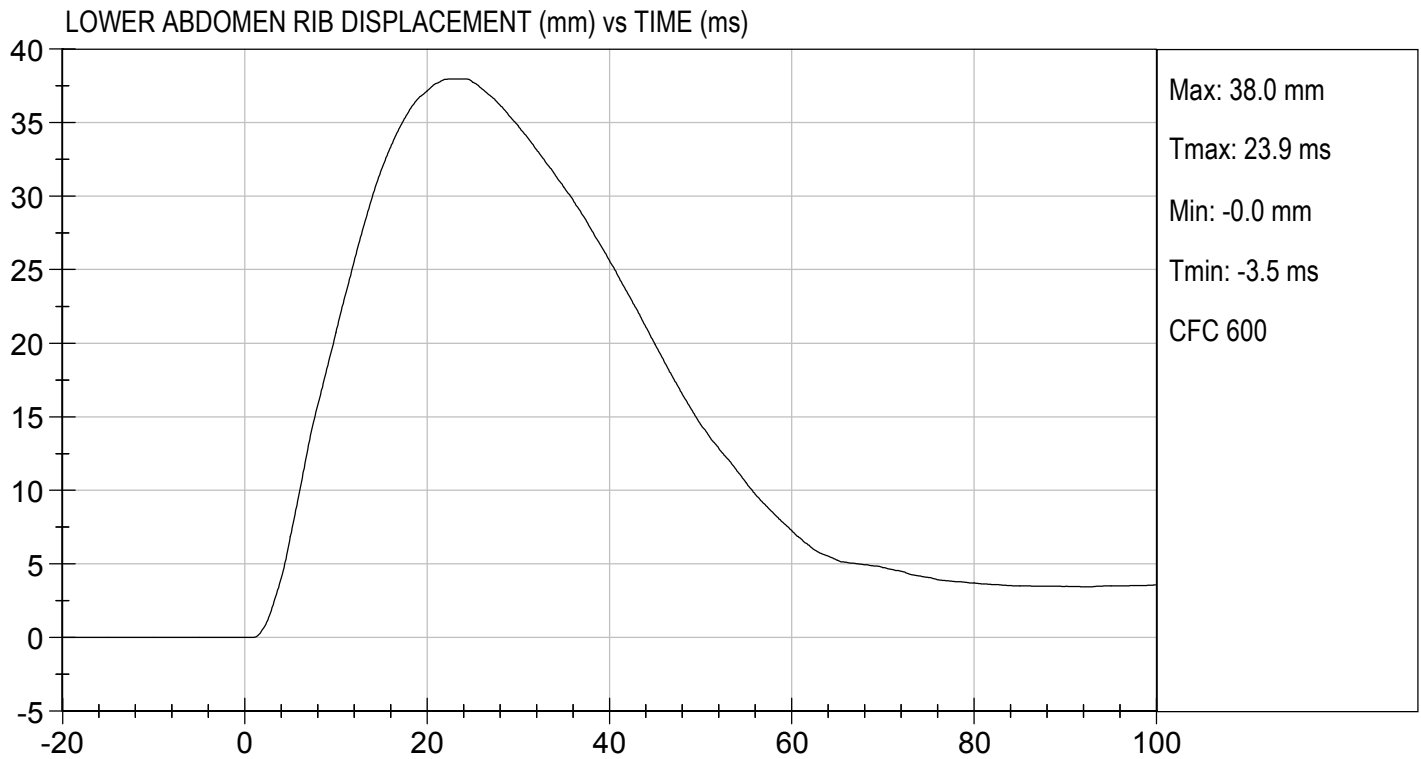
TEST DATE: 07/19/2019
TEST #: D192226





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

TEST DATE: 07/19/2019
TEST #: D192226



MGA RESEARCH CORPORATION

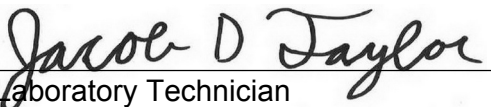
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

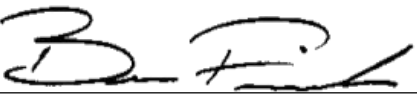
Test I.D: D192227

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	46	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	37	Pass
Peak Acetabulum Force	N	3600 to 4300	4,189	Pass
Overall Test Results				Pass


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07/19/2019

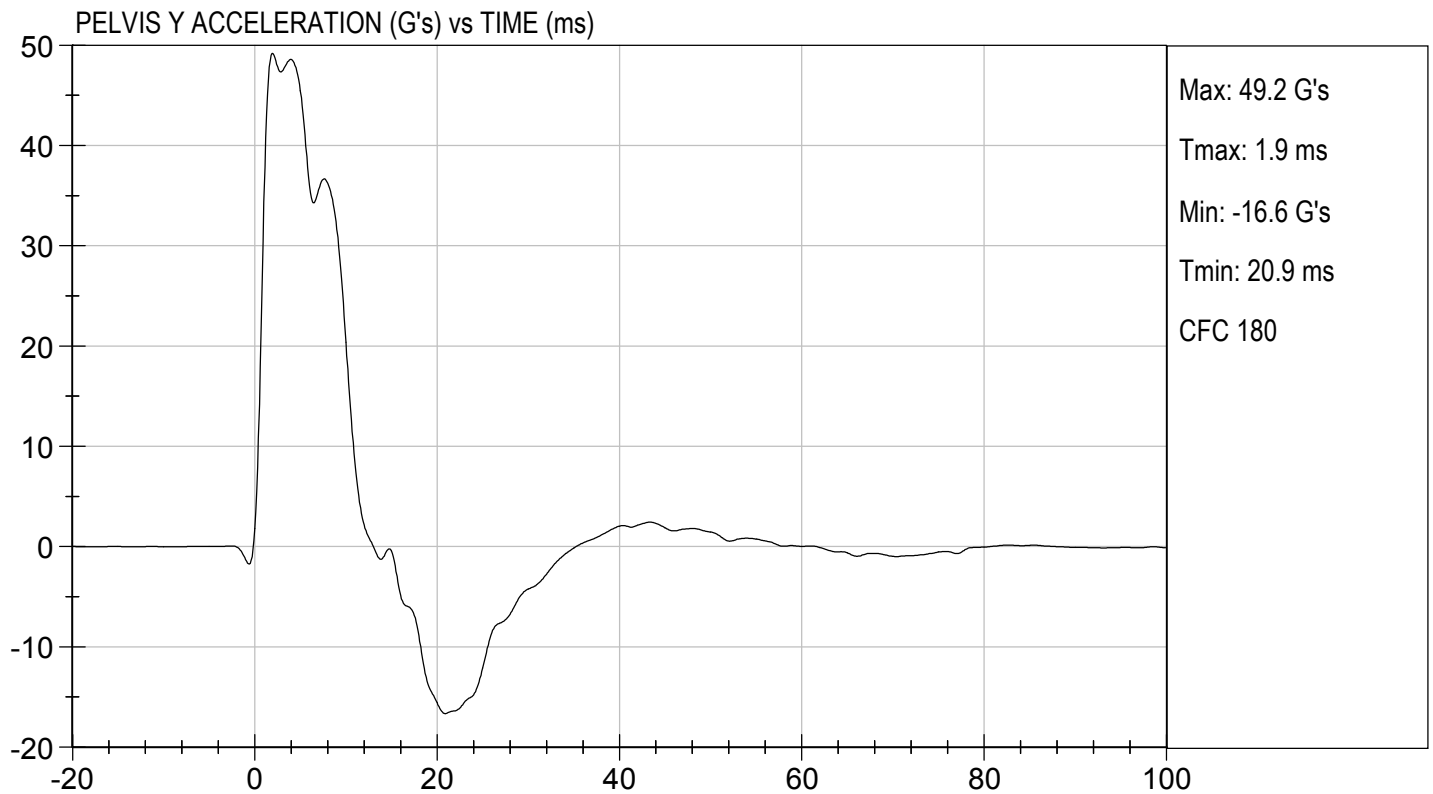
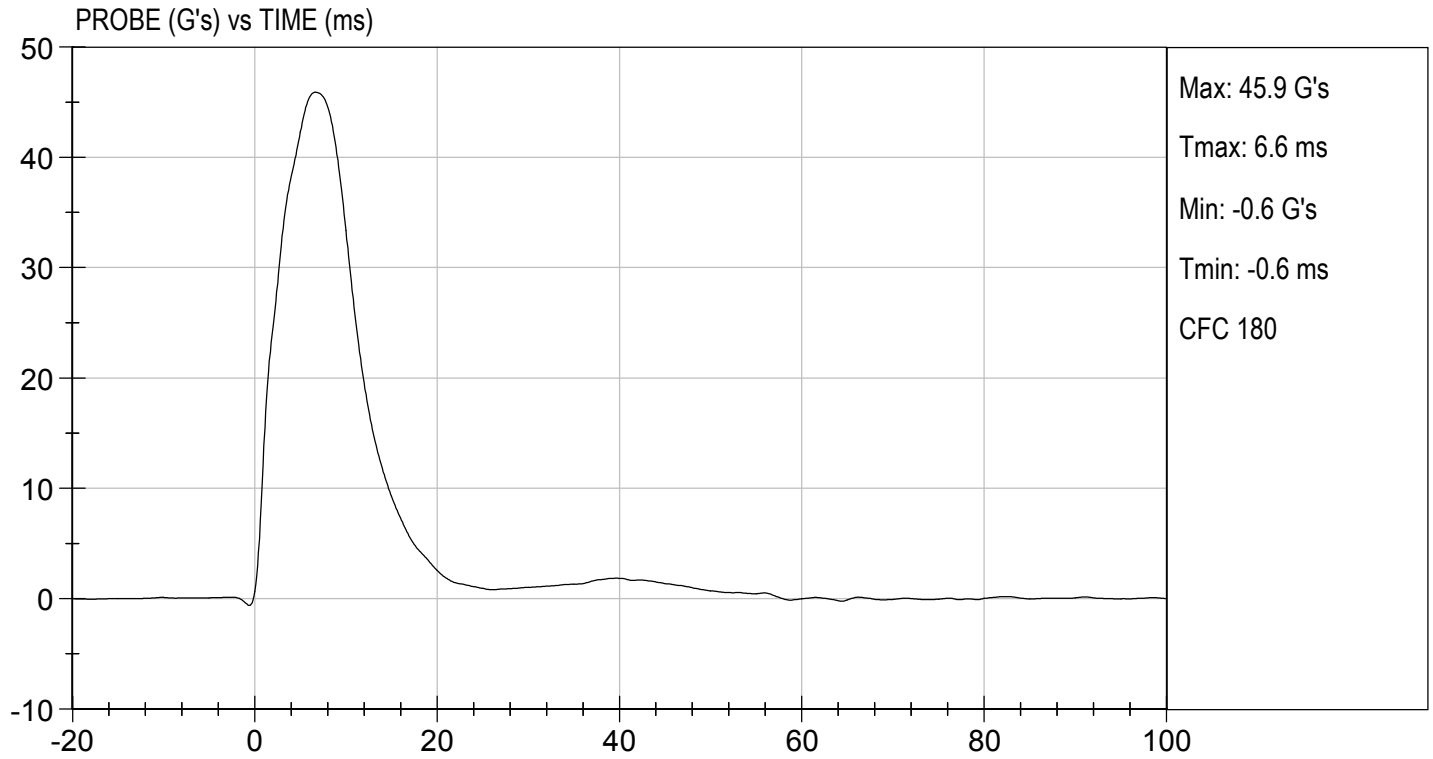
Test Date


Approved By



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

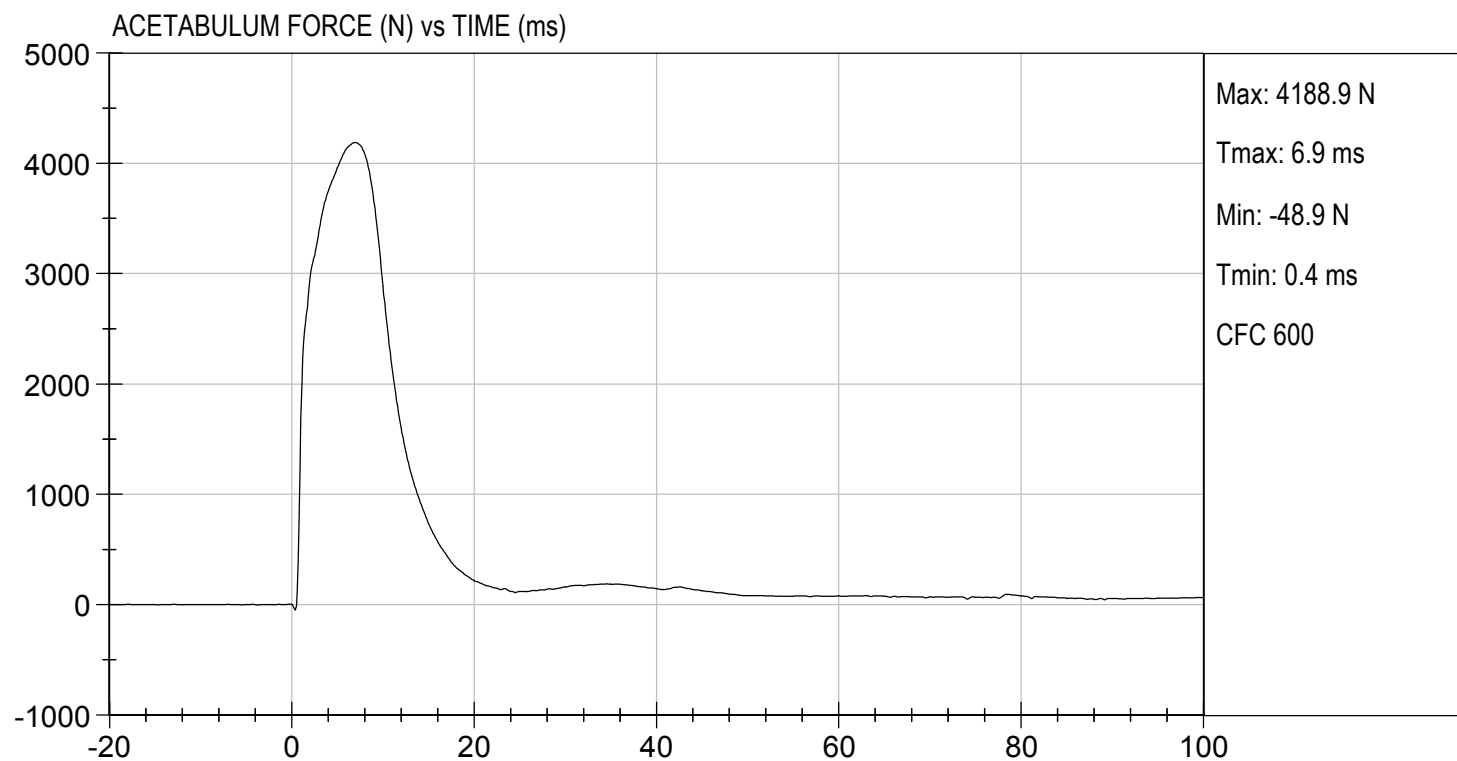
TEST DATE: 07/19/2019
TEST #: D192227





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

TEST DATE: 07/19/2019
TEST #: D192227



MGA RESEARCH CORPORATION

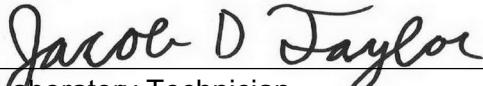
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

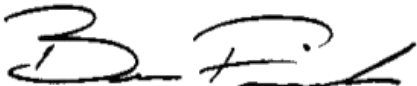
Test I.D: D192228

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	36 to 45	36	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,127	Pass
Overall Test Results				Pass


Laboratory Technician

07/19/2019

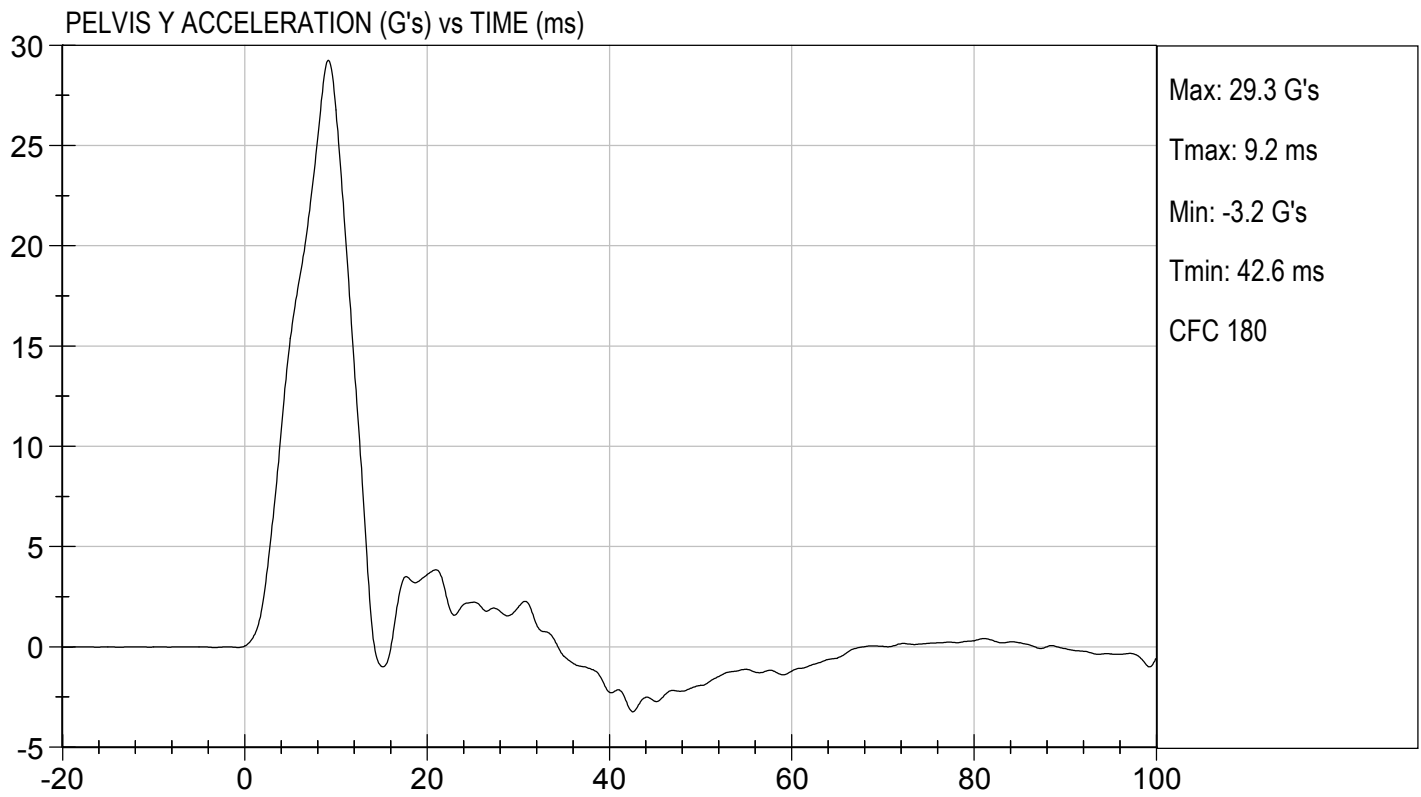
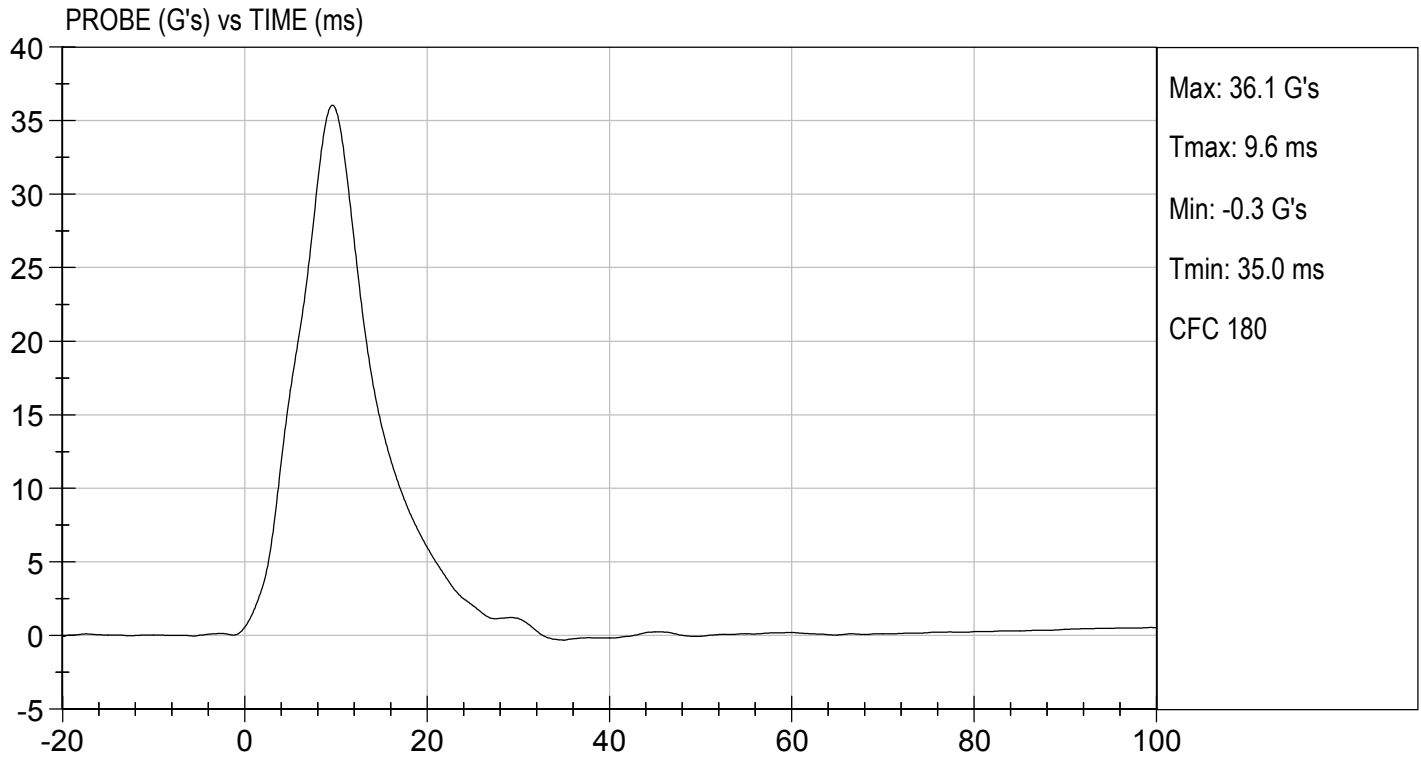
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.40 ft/s, 4.39 m/s

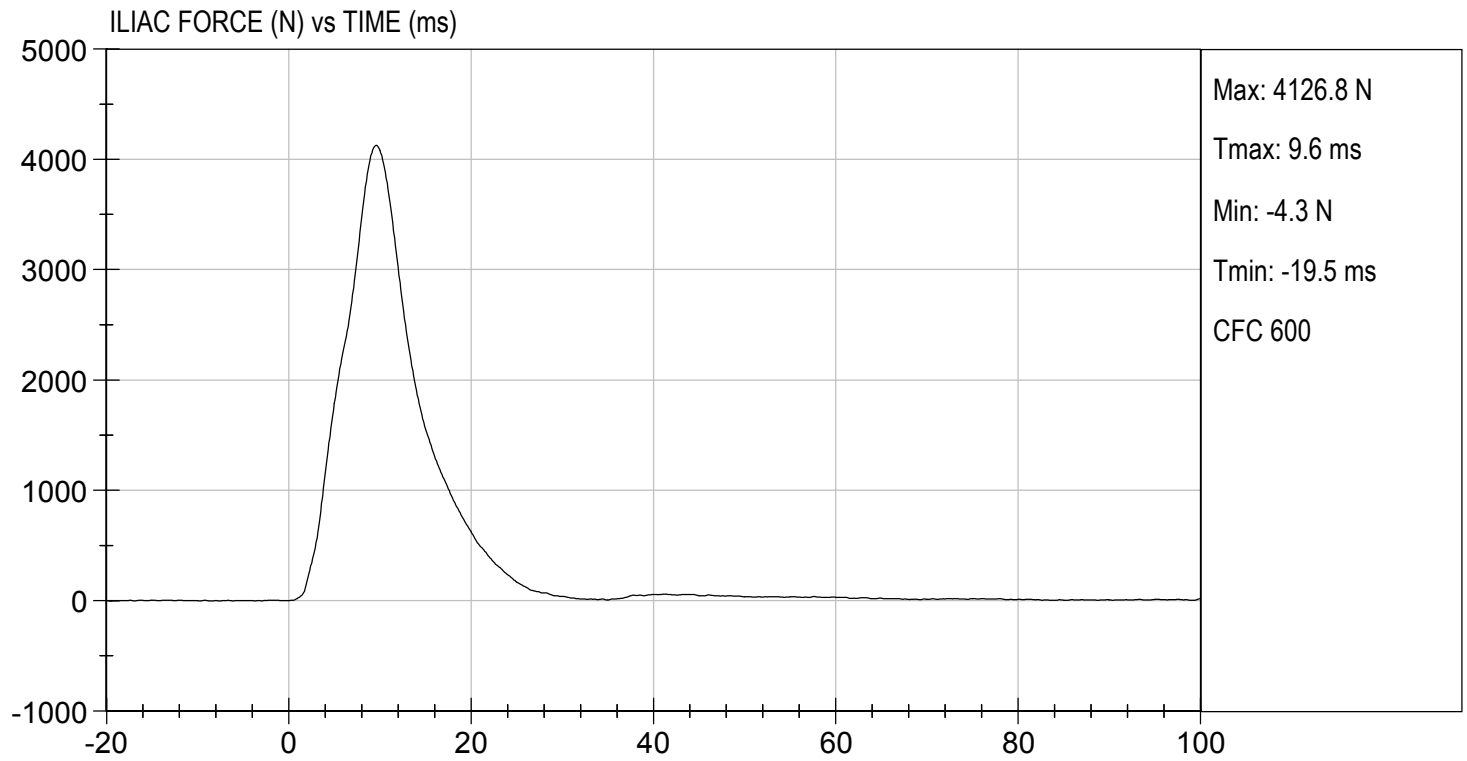
TEST DATE: 07/19/2019
TEST #: D192228





TEST DESC: ILLIAC
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 07/19/2019
TEST #: D192228





SID-IIs Pelvis Plug Certification Test

Plug S/N 12309

Test Number 6694

Report Number 6709

Test Date 3/21/2018 12:13:38 PM

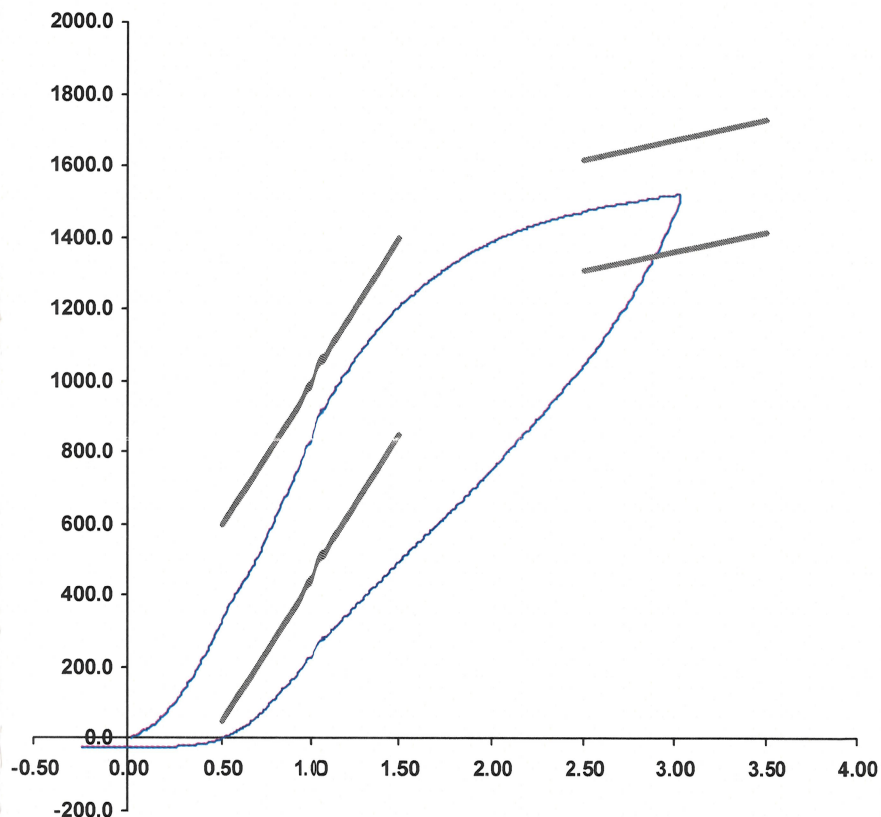
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	324.24	50.00	600.00
Force @ 1.5 mm (N)	1,210.28	850.00	1,400.00
Force @ 2.5 mm (N)	1,473.53	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,519.03	1,361.00	1,673.00

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

22-Mar-18

SACO Research

By :

DC

Date :

3/21/18

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 11863

Test Number 5973

Report Number 5989

Test Date 1/23/2018 12:46:58 PM

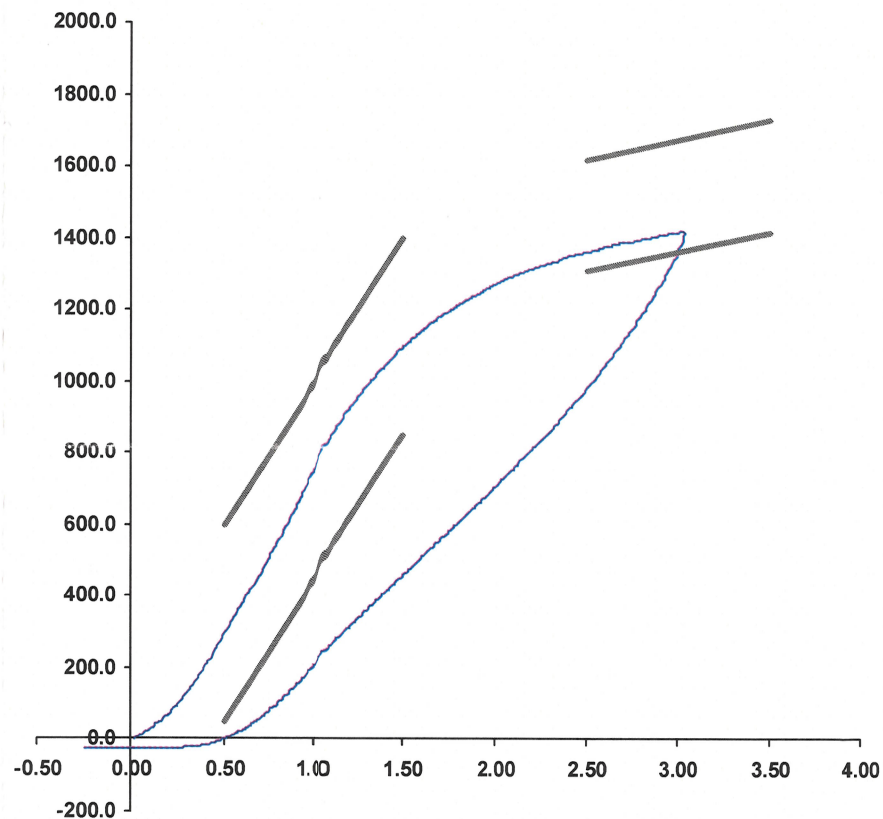
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	298.68	50.00	600.00
Force @ 1.5 mm (N)	1,097.17	850.00	1,400.00
Force @ 2.5 mm (N)	1,361.24	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,416.90	1,361.00	1,673.00

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 DC

Part Number 180-4450

Template No 107
SACO Research

23-Jan-18

By : DC

Date : 1/23/18

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 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P85003	Endevco	07/12/19
				Y	P94783	Endevco	07/12/19
				Z	P94786	Endevco	07/12/19
				Xr	P94938	Endevco	07/12/19
				Yr	P96854	Endevco	07/12/19
				Zr	P97386	Endevco	07/12/19
Head Angular Rate Sensors				X			
				Y			
				Z			
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	07/12/19	
		Middle	Y	G1163	FTSS	07/12/19	
		Lower	Y	G1158	FTSS	07/12/19	
	Abdominal Rib	Upper	Y	G1146	FTSS	07/12/19	
		Lower	Y	G1126	FTSS	07/12/19	
Lower Spine Accelerometers (T12)				X	P79418	Endevco	07/12/19
				Y	P79439	Endevco	07/12/19
				Z	P79614	Endevco	07/12/19
Acetabulum Load Cell				Y	ACG269	Denton	03/15/19
Iliac Wing Load Cell				Y	IWG282	Denton	03/15/19
Pelvis Plug (struck side)					12309	SACO	03/21/18
Pelvis Plug (non-struck side)					11863	SACO	01/23/18

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	PCB695	PCB	03/13/19
Vehicle Center of Gravity	Y	PCB688	PCB	03/13/19
Vehicle Center of Gravity	Z	PCB694	PCB	03/13/19
Left Floor Sill	Y	PCB1068	PCB	04/08/19
A-Pillar Sill	Y	T19352	Endevco	05/02/19
A-Pillar Low	Y	PCB1355	PCB	03/13/19
A-Pillar Mid	Y	T16900	Endevco	06/12/19
B-Pillar Sill	Y	T11726	Endevco	01/23/19
B-Pillar Low	Y			
B-Pillar Mid	Y			
Driver Seat	Y	T19543	Endevco	05/02/19
Engine Top	X	PCB1040	PCB	04/08/19
Engine Top	Y	PCB1119	PCB	04/08/19
Firewall	Y	T19367	Endevco	04/12/19
Right Roof	Y	T19546	Endevco	04/12/19
Right Floor Sill	Y	PCB1174	PCB	06/12/19
Rear Floorpan	X	T19488	Endevco	04/30/19
Rear Floorpan	Y	T18974	Endevco	01/24/19

Table 3 – Pole Instrumentation

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