

REPORT NUMBER: SINCAP-MGA-2019-033

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

**GENERAL MOTORS LLC
2019 Chevrolet Silverado 1500 LT Crew Cab Truck
NHTSA No.: M20190108**

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



Test Date: February 28, 2019

Final Report Date: July 10, 2019

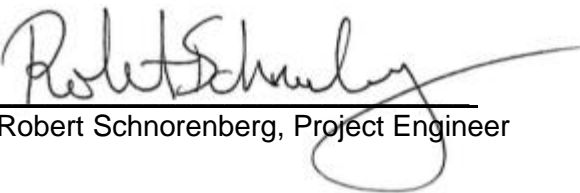
FINAL REPORT

**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: July 10, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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16. Abstract <p>A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2019 Chevrolet Silverado 1500 LT Crew Cab Truck in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on February 28, 2019.</p> <p>The impact velocity of the Moving Deformable Barrier (MDB) was 62.20 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 target vehicle post-test maximum crush was 283 mm at level 1. The test vehicle's performance was as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th colspan="4" style="text-align: center;">Driver ATD (ES-2re)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">74</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">44</td> <td style="text-align: center;">18</td> </tr> <tr> <td>Total Abdominal Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">2500</td> <td style="text-align: center;">486</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">6000</td> <td style="text-align: center;">840</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82*</td> <td style="text-align: center;">21</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th colspan="4" style="text-align: center;">Passenger ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">72</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82</td> <td style="text-align: center;">30</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">1198</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38*</td> <td style="text-align: center;">25</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45*</td> <td style="text-align: center;">27</td> </tr> </tbody> </table> <p style="text-align: center; margin: 0;">*Proposed IARV</p>				Driver ATD (ES-2re)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	74	Maximum Thorax Rib Deflection	mm	44	18	Total Abdominal Force	N	2500	486	Pubic Symphysis Force	N	6000	840	Resultant Lower Spine Acceleration	Gs	82*	21	Passenger ATD (SID-IIs)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	72	Resultant Lower Spine Acceleration	Gs	82	30	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1198	Maximum Thoracic Rib Deflection	mm	38*	25	Maximum Abdomen Rib Deflection	mm	45*	27
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SECTION 1
TEST PURPOSE AND PROCEDURE

This moving deformable barrier 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 Chevrolet Silverado 1500 LT Crew Cab Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated October 2015.

SECTION 2 SUMMARY OF TEST RESULTS

A 2019 Chevrolet Silverado 1500 LT Crew Cab Truck was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.20 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin on February 28, 2019. Pre-test and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS NCAP Side Laboratory Test Procedure dated October 2015. The side impact event was documented by eleven (11) cameras. Camera locations are included in this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and Redundant Head CG Triaxial Accelerometers
 Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
 Abdomen Forward, Middle, and Rear Y-Axis Load Cells
 Lower Spine (T12) Triaxial Accelerometers
 Pubic Symphysis Y-Axis Load Cell

PASSENGER ATD (SID-IIs)

Primary and Redundant Head CG Triaxial Accelerometers
 Primary Head CG Angular Rate Sensors
 Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
 Abdomen Upper Rib and Lower Rib Y-Axis Displacement Potentiometers
 Lower Spine (T12) Triaxial Accelerometers
 Acetabulum and Iliac Wing Y-Axis Load Cells

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

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

	Driver ATD (ES-2re)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	74
Maximum Thorax Rib Deflection	mm	44	18
Total Abdominal Force	N	2500	486
Pubic Symphysis Force	N	6000	840
Resultant Lower Spine Acceleration	Gs	82*	21

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	72
Resultant Lower Spine Acceleration	Gs	82	30
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1198
Maximum Thoracic Rib Deflection	mm	38*	25
Maximum Abdomen Rib Deflection	mm	45*	27

*Proposed IARV

Supplemental restraint information is given below:

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side 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

Left Lower B-Post Y was not installed.

Left Mid B-Post Y was not installed.

Left Rear Sill Y recorded no valid data after 20 ms.

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

**SECTION 3
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS**

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20190108	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Chevrolet	Automatic Door Locks (ADL)	Yes
Model	Silverado 1500 LT Crew Cab	Power Window Auto-Reverse	Yes
Body Style	Truck	Other Optional Feature	N/A
VIN	1GCPWCEDXKZ110563	Driver Front Airbag	Yes
Body Color	Cajun Red	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	16km / 10mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	5.3L	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	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	RWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	Yes	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?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	GENERAL MOTORS LLC	GVWR (kg)	3130
Date of Manufacture	08/18	GAWR Front (kg)	1678
Vehicle Type	Truck	GAWR Rear (kg)	1724

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	3	3		6	
Capacity Weight (VCW) (kg)				922	(A)
DSC x 68.04 kg				408	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				514	(A-B)

VEHICLE SEAT TYPE

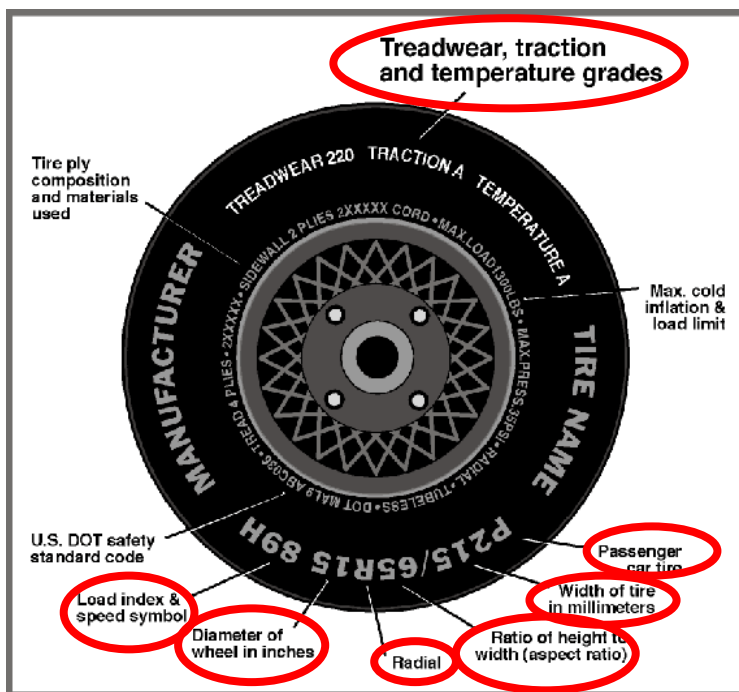
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X					w/ Lever	Driver Only
Rear or Second Row Seat			X		X		
Third Row Seat							

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	265/65R18	265/65R18
Tire Size on Vehicle	265/65R18	265/65R18
Tire Manufacturer	Michilen	Michilen
Tire Model	Primacy LTX	Primacy LTX
Treadwear	480	480
Traction	A	A
Temperature Grade	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	114T	114T
Tire Material	Rubber	Rubber
DOT Safety Code Left	M3KA 00FX 2018	M3KA 00FX 2018
DOT Safety Code Right	M3KA 00FX 2018	M3KA 00FX 2018

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	215	215	200
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	642.0	464.5		706.0	570.0		689.0	585.5	
Right	kg	636.5	458.0		636.0	547.0		627.5	564.0	
Ratio	%	58.1%	41.9%		54.6%	45.4%		53.4%	46.6%	
Totals	kg	1278.5	922.5	2201.0	1342.0	1117.0	2459.0	1316.5	1149.5	2466.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2201.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	136	(C)
Calculated Test Vehicle Target Weight (TV/TW)	kg	2466.0	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	926	923	Yes
Right Front	mm	929	923	Yes
Right Rear	mm	960	966	Yes
Left Rear	mm	945	945	Yes
Vehicle CG (Aft of Front Axle)	mm	1750	1705	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	29	33	

*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

Test height adjustable suspension setting, if applicable:	Not Applicable
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DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	108
None	

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	16.1	6.2	11.2
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 SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	11.2	0	Max	65	65	65
			Mid	33	33	33
			Min	0	0	0
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 Chevrolet Silverado 1500 LT Crew Cab Truck
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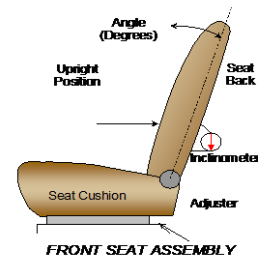
NHTSA No. M20190108
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SEAT FORE/AFT POSITIONS

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	260		130	
Front Passenger Seat	260	27	130	13
Front Center Seat	Fixed		Fixed	
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is adjusted following Appendix C, "Positioning Dummies in the Test Vehicle" in the NCAP Laboratory Test Procedure dated October 2015. The rear center and non-struck side rear outboard seat backs are positioned to match the struck side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	66.4		-11.2	
Front Passenger Seat	66.0	33	-12.1	10
Front Center Seat	Fixed		Fixed	
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

Driver and left rear passenger seat back angle measured on headrest post.

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
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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	Fixed	
Rear Seat	Fixed	

HEAD RESTRAINT ADJUSTMENT

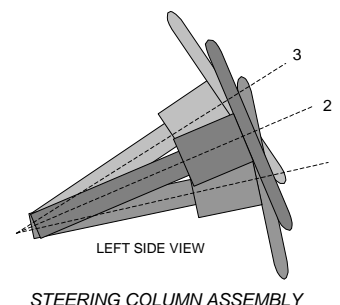
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	9	8 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	Fixed	

STEERING COLUMN ADJUSTMENT

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

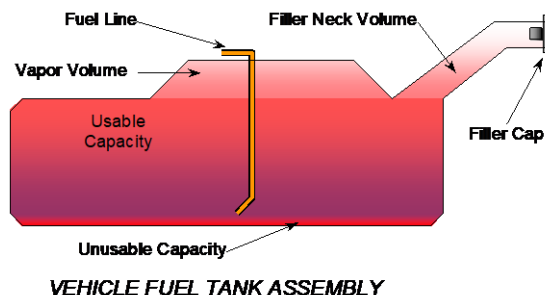
	Wheel Angle (deg)	Fore/Aft Position (mm)
Lowermost, Position 1	69.1	257
Geometric Center, Position 2	67.1	232
Uppermost, Position 3	65.1	206
Telescoping Steering Wheel Travel		51
Test Position	67.1	232



FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler pipe.

The vehicle is equipped with an electronic fuel pump. The fuel pump will run for approximately 3 seconds when the key is turned to "ON" position, then it will stop and will not resume operation unless the engine is cranking or running. The filler neck is located on the driver's side.



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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
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FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	90.8
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	90.8
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	84.5
Actual Amount of Solvent Used	84.4
1/3 of Usable Capacity	30.3

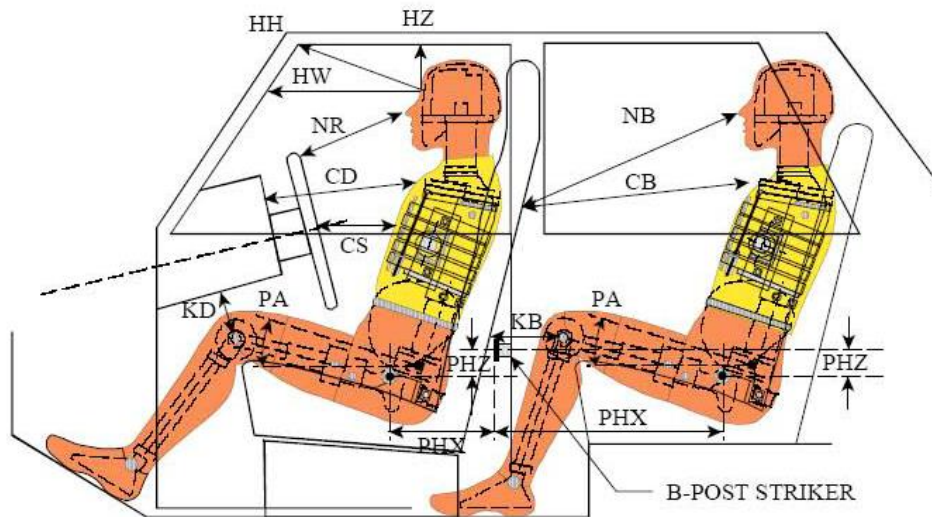
Is the actual amount of solvent used in the test equal to 93% + 1%
 of the Usable Capacity stated in Form No. 1?

YES

**DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019



LEFT SIDE VIEW

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

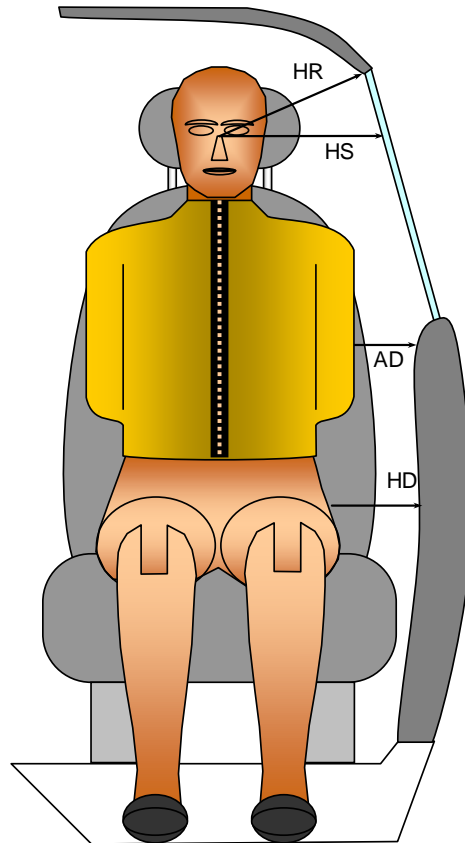
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	459	17.7		
HW		Head to Windshield	750	0		
HZ	HZ	Head to Roof Liner	215	90	325	90
NR	NB	Nose to Rim/Seat Back	471	17.1	627	10.5
CD	CB	Chest to Dashboard/Seat Back	635	7.0	631	2.0
CS		Chest to Steering Wheel	408	9.2		
KDL	KBL	Left Knee to Dash/Seat Back	210	29.7	345	6.5
KDR	KBR	Right Knee to Dash/Seat Back	221	31.1	359	6.8
PAX	PAX	Pelvic Tilt Angle X		19.4		20.4
PAY	PAY	Pelvic Tilt Angle Y		-0.6		-1.0
PHX	PHX	Hip Point to Striker (X-Axis)	185		229	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	84		62	

**DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019



FRONT VIEW OF DUMMY

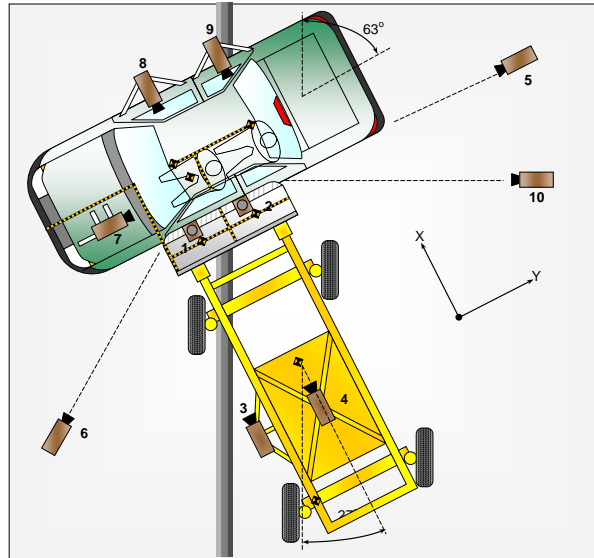
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	228	282
HS	Head to Side Window	mm	343	379
AD	Arm to Door	mm	128	183
HD	Hip Point to Door	mm	152	165

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	580	-800	-4995	8.5	1000
2	Overhead Close-Up	-160	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	60	6720	-1560	24	1000
6	Left Front	-2270	-6320	-1580	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down

* All measurements accurate to ± 6 mm

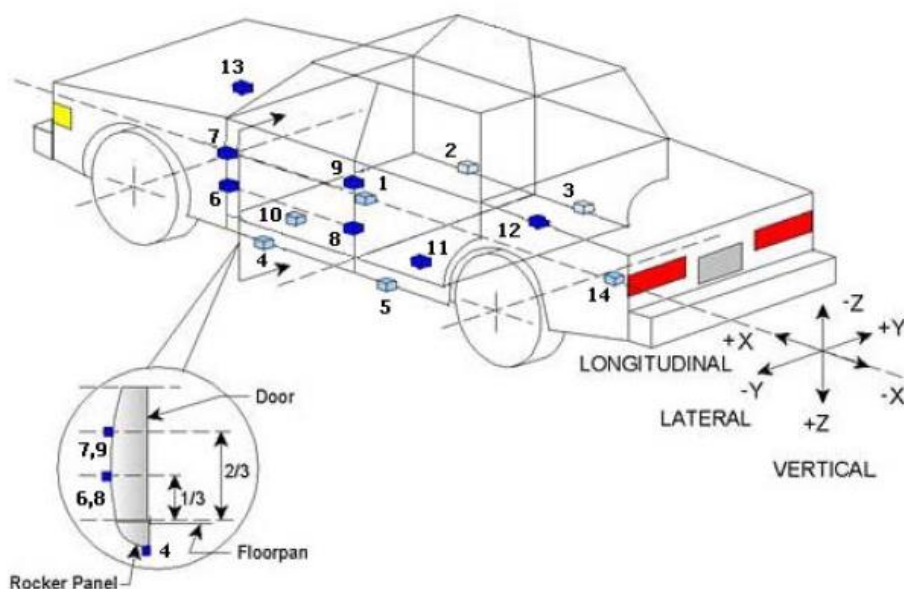
INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Passenger Dummy	19
Vehicle Structure	23
MDB Accelerometers	5
MDB Contacts	2
Total	65

DATA SHEET NO. 6 TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

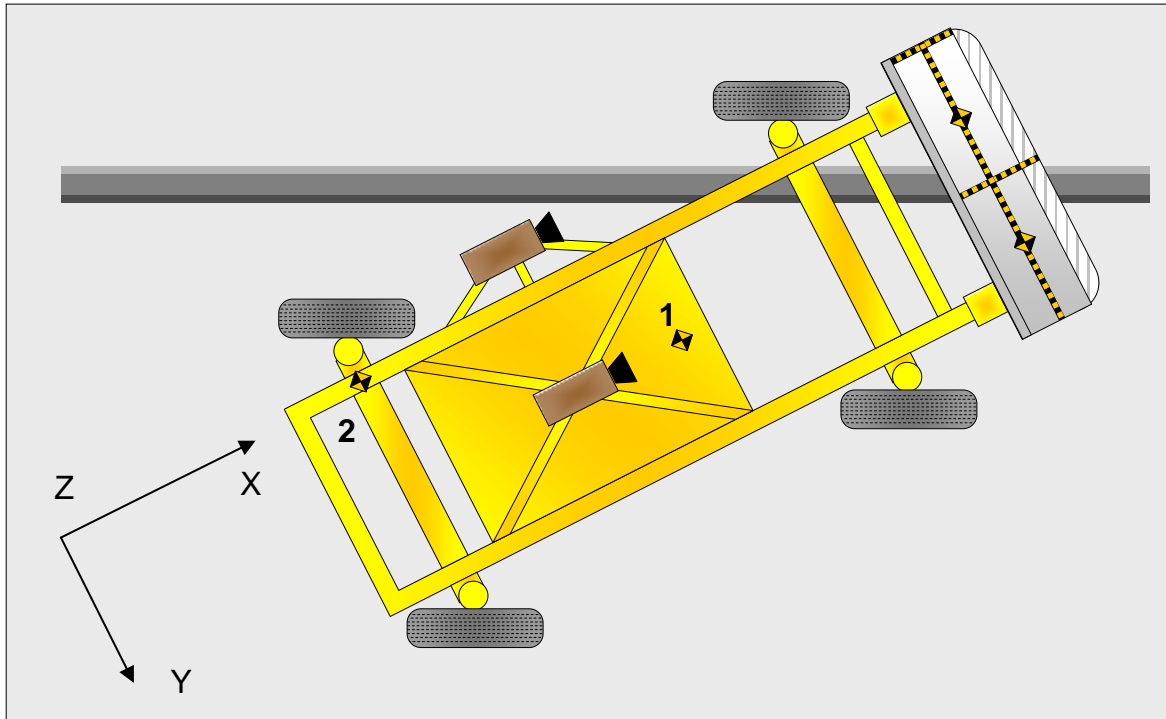
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3224	256	-545
2	Right Sill at Front Seat	3370	766	-389
3	Right Sill at Rear Seat	2335	766	-413
4	Left Sill at Front Door	3732	-766	-390
5	Left Sill at Rear Door	2736	-766	-400
6	Left Lower A-Post	4311	-894	-800
7	Left Middle A-Post	4311	-878	-1080
8	Left Lower B-Post			
9	Left Middle B-Post			
10	Front Seat Track	3391	-443	-585
11	Rear Seat Structure	2438	-349	-610
12	Rt. Rear Occ. Compartment	2793	470	-585
13	Engine Block	4850	42	-1130
14	Rear Above Axle	1265	0	-815

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

**DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019



MDB ACCELEROMETER LOCATIONS

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

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

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-lis)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag, Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, C-Pillar Trim
Left Shoulder	Curtain Airbag	Curtain Airbag
Upper Torso	Side Torso/Pelvis Airbag	None
Lower Torso	Side Torso/Pelvis Airbag	Door Panel
Left Hip	Side Torso/Pelvis Airbag	Door Panel
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch / Other Door
	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	None
Side Window Damage	None
Other Notable Effects	LF wheel hub separated from MDB during impact

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side 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	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3754
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		508
Actual Impact Point (Aft of Front Axle)	mm		506
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	2
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	1

**DATA SHEET NO. 9
MDB SUMMARY OF RESULTS**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2584
CG Location aft of Front Axle	1128

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	427.9	264.0	
Right	kg	340.6	331.2	
Ratio	%	56.4	43.6	
Totals	kg	768.5	595.2	

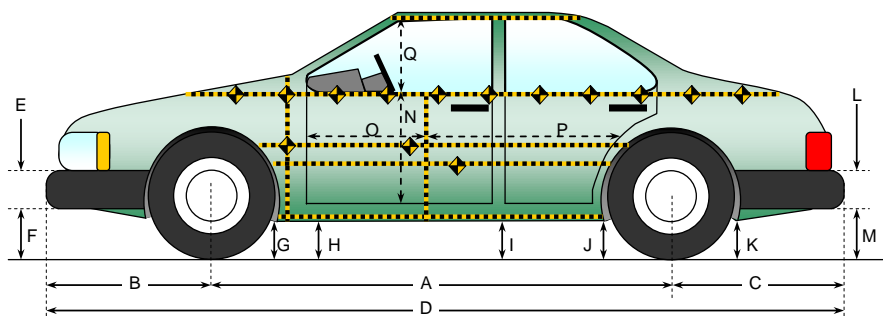
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.20
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.87
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.2
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.1
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.7

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019



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

LEFT SIDE VIEW

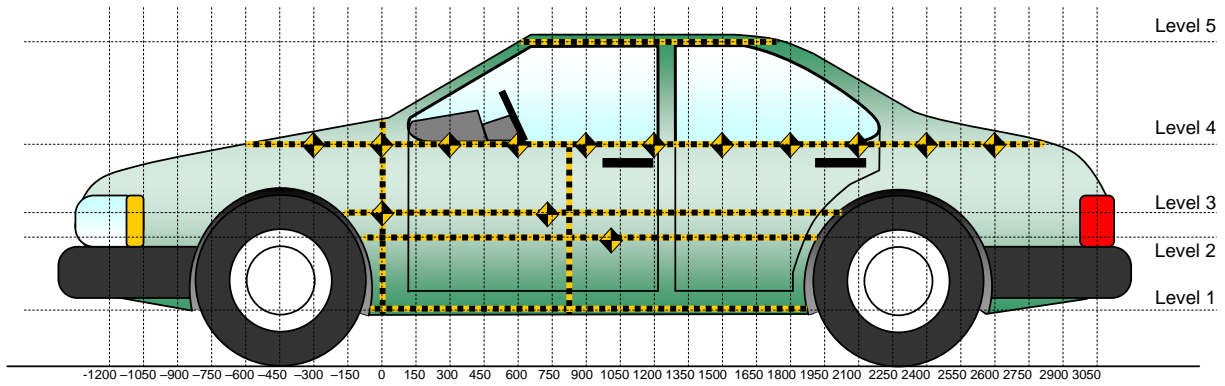
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3754	3664	90
B	Front Axle to FSOV	979	1086	-107
C	Rear Axle to RSOV	1211	1188	23
D	Total Length at Centerline	5944	5938	6
E	Front Bumper Thickness	186	186	0
F	Front Bumper Bottom to Ground	214	227	-13
G	Sill Height at Front Wheel Well	320	314	6
H	Sill Height at Front Door Leading Edge	322	313	9
I	Sill Height at B Pillar	330	331	-1
J1	Sill Height at Rear Wheel Well	347	344	3
J2	Pinch Weld Height at Rear Wheel Well	344	326	18
K	Sill Height Aft of Rear Wheel Well	377	388	-11
L	Rear Bumper Thickness	250	250	0
M	Rear Bumper Bottom to Ground	394	391	3
N	Sill Height to Window Bottom Sill	887	877	10
O	Front Door Leading Edge to Impact CL	800	802	-2
P	Rear Door Trailing Edge to Impact CL	1444	1404	40
Q	Front Window Opening	570	562	8
R	Right Side Length	5238	5280	-42
S	Left Side Length	5238	5188	50
T	Vehicle Width at B Post	2030	1974	56

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	484	283	1650
2	Occupant H-Point	851	222	1650
3	Mid Door	920	203	1800
4	Window Sill	1234	115	1350
5	Window Top	1805	102	2250

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

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

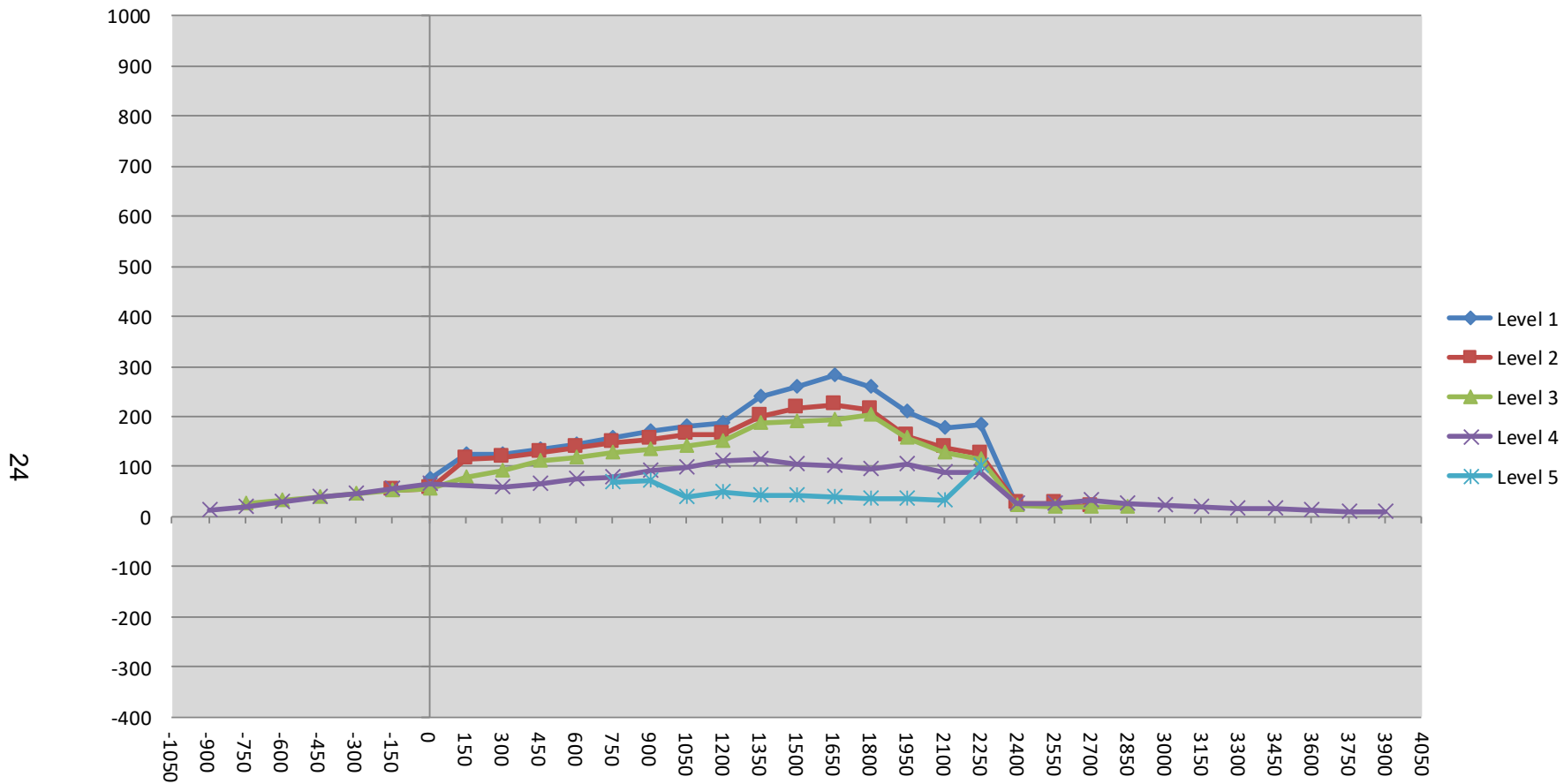
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900				220					234					14	
-750			84	200				111	219				27	19	
-600			83	185				115	215				32	30	
-450			81	170				121	208				40	38	
-300			81	163				127	209				46	46	
-150		80	81	156			133	132	213			53	51	57	
0	104	86	90	151		179	141	146	215		75	55	56	64	
150	128	95	98			252	210	178			124	115	80		
300	144	99	99	152		269	216	191	211		125	117	92	59	
450	146	99	97	148		282	228	210	215		136	129	113	67	
600	147	98	96	144		292	237	213	218		145	139	117	74	
750	148	97	94	142	402	304	245	221	222	471	156	148	127	80	69
900	148	96	94	136	389	319	251	230	228	461	171	155	136	92	72
1050	148	96	93	133	385	328	259	235	232	425	180	163	142	99	40
1200	149	97	93	129	380	337	260	243	242	428	188	163	150	113	48
1350	151	98	94	126	379	390	299	280	241	423	239	201	186	115	44
1500	155	99	95	125	377	415	317	285	229	418	260	218	190	104	41
1650	156	100	96	123	377	439	322	291	223	417	283	222	195	100	40
1800	159	101	97	122	376	417	313	300	218	413	258	212	203	96	37
1950	162	103	100	121	376	371	263	257	225	411	209	160	157	104	35
2100	167	105	102	123	377	345	244	231	213	409	178	139	129	90	32
2250	170	108	105	124	379	353	233	221	211	481	183	125	116	87	102
2400	175	114	110	129		198	139	134	155		23	25	24	26	
2550	153	107	105	131		176	132	123	158		23	25	18	27	
2700		89	90	132			108	110	163			19	20	31	
2850			80	134				99	161				19	27	
3000				137					160					23	
3150				140					160					20	
3300				143					160					17	
3450				146					161					15	
3600				150					163					13	
3750				154					164					10	
3900				158					166					8	

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

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019

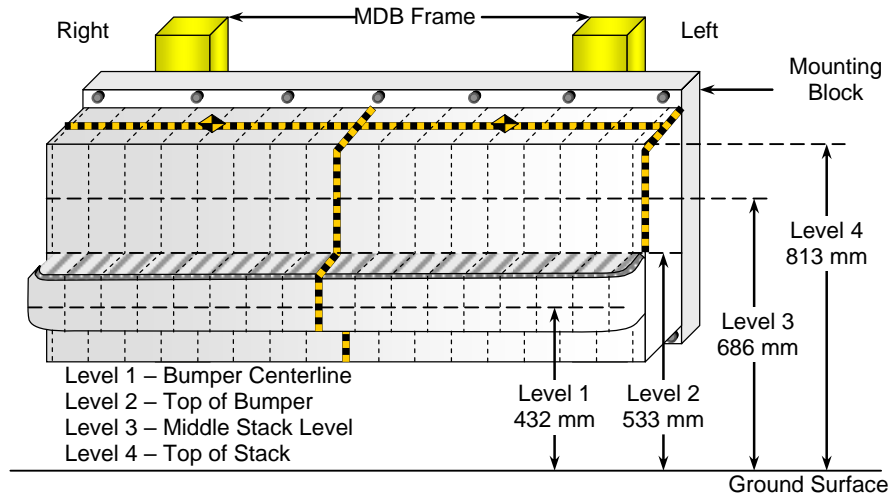


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DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Row	Vertical Location		From Centerline		Maximum Crush
	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	202
B	Top of Bumper	533	800	Left	197
C	Mid-Level	686	800	Left	150
D	Top of Stack	813	800	Right	170

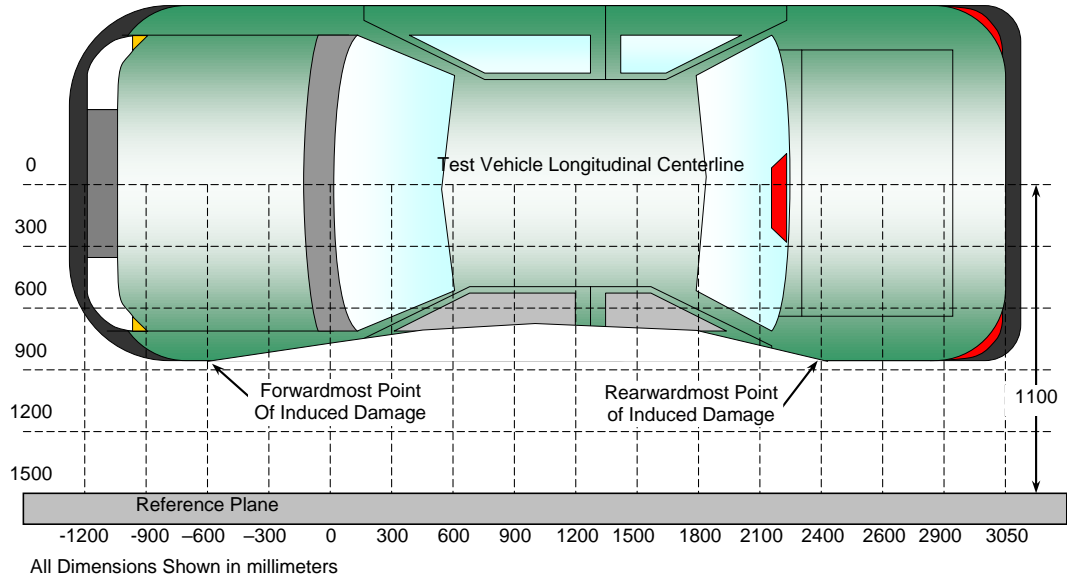
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C _L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100		0	100	200	300	400	500	600	700
4	170	125	83	48	73	116	162	162	139	103	102	102	109	118	125	135	165
3	108	55	16	29	63	104	109	115	115	113	105	101	99	102	107	122	150
2	59	45	56	76	91	72	80	91	130	140	146	155	163	173	182	190	197
1	41	49	58	68	80	92	105	114	125	135	143	150	161	171	182	195	202

**DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES**

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
Test Date: 2/28/2019



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2295	3	238	107	131
2	1843	3	293	98	195
3	1391	3	282	94	188
4	939	3	232	94	138
5	487	3	211	97	114
6	35	3	179	92	87

MDB DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	800 mm right of center	1	517	476	41
2	480 mm right of center	1	538	463	75
3	160 mm right of center	1	569	463	106
4	160 mm left of center	1	600	463	137
5	480 mm left of center	1	635	463	172
6	800 mm left of center	1	678	476	202

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

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

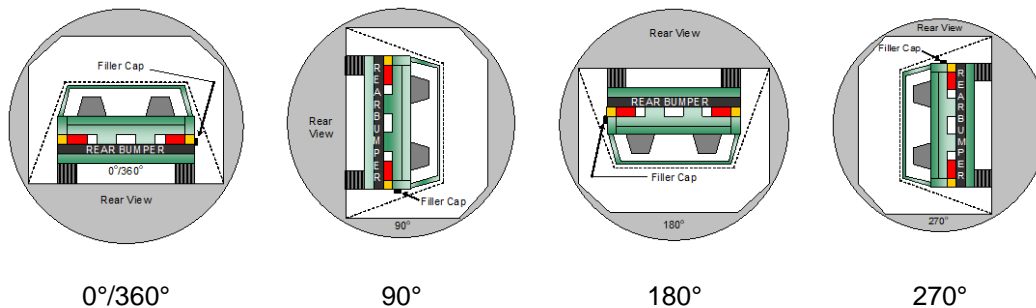
NHTSA No. M20190108
 Test Date: 2/28/2019

Test Time: 12:54 pm

Temperature: 22.0 °C

- A. From impact until vehicle motion ceases: 0.0 oz.
 (Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0.0 oz.
- C. For the following 25 minutes: None
 (Maximum Allowable = 1 ounce / minute)
- 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°	91	300	391
90° to 180°	90	300	390
180° to 270°	85	300	385
270° to 360°	90	300	390

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	

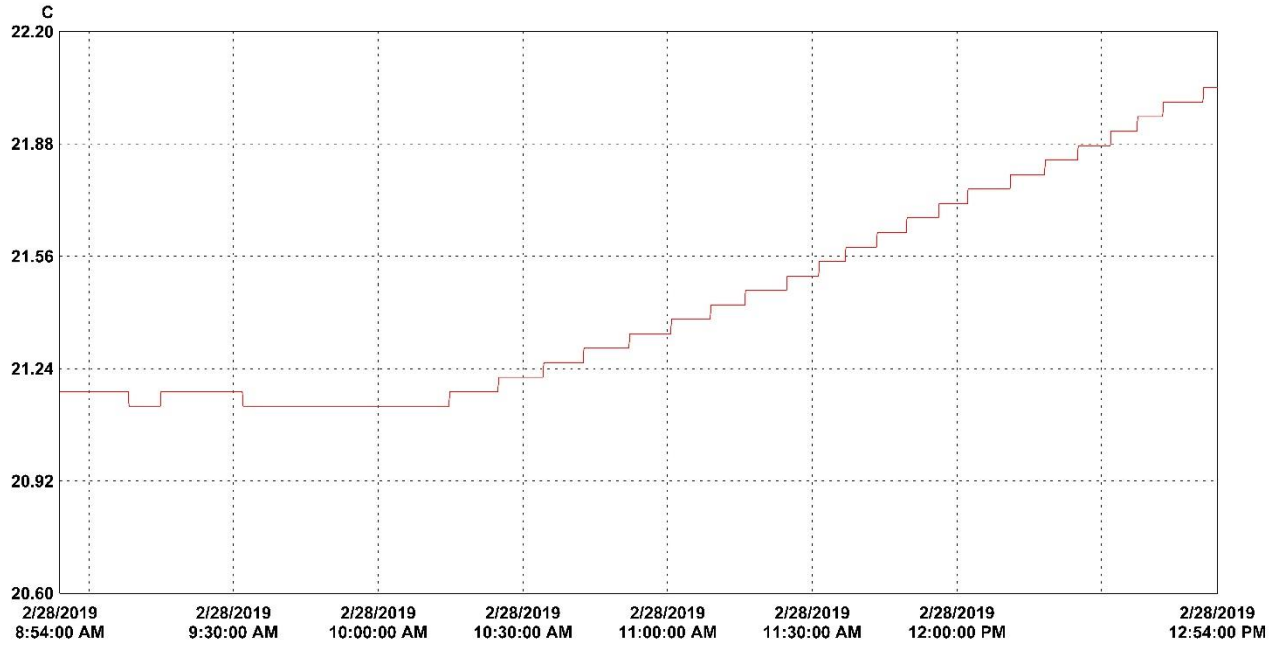
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2019 Chevrolet Silverado 1500 LT Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20190108
 Test Date: 2/28/2019



30 minutes/div 4 hours (M/d/yyyy h:mm:ss tt) Central Time Graph file (truncated): M20190108 2019 Chevrolet Silverado LT Crew Cab SINCAP.spg

LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	17012040	VSC_North_Hall	1	22.04	21.43	21.13	C	Temperature	17012040_VSC_North_Hall.spl	

**APPENDIX A
PHOTOGRAPHS**

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



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

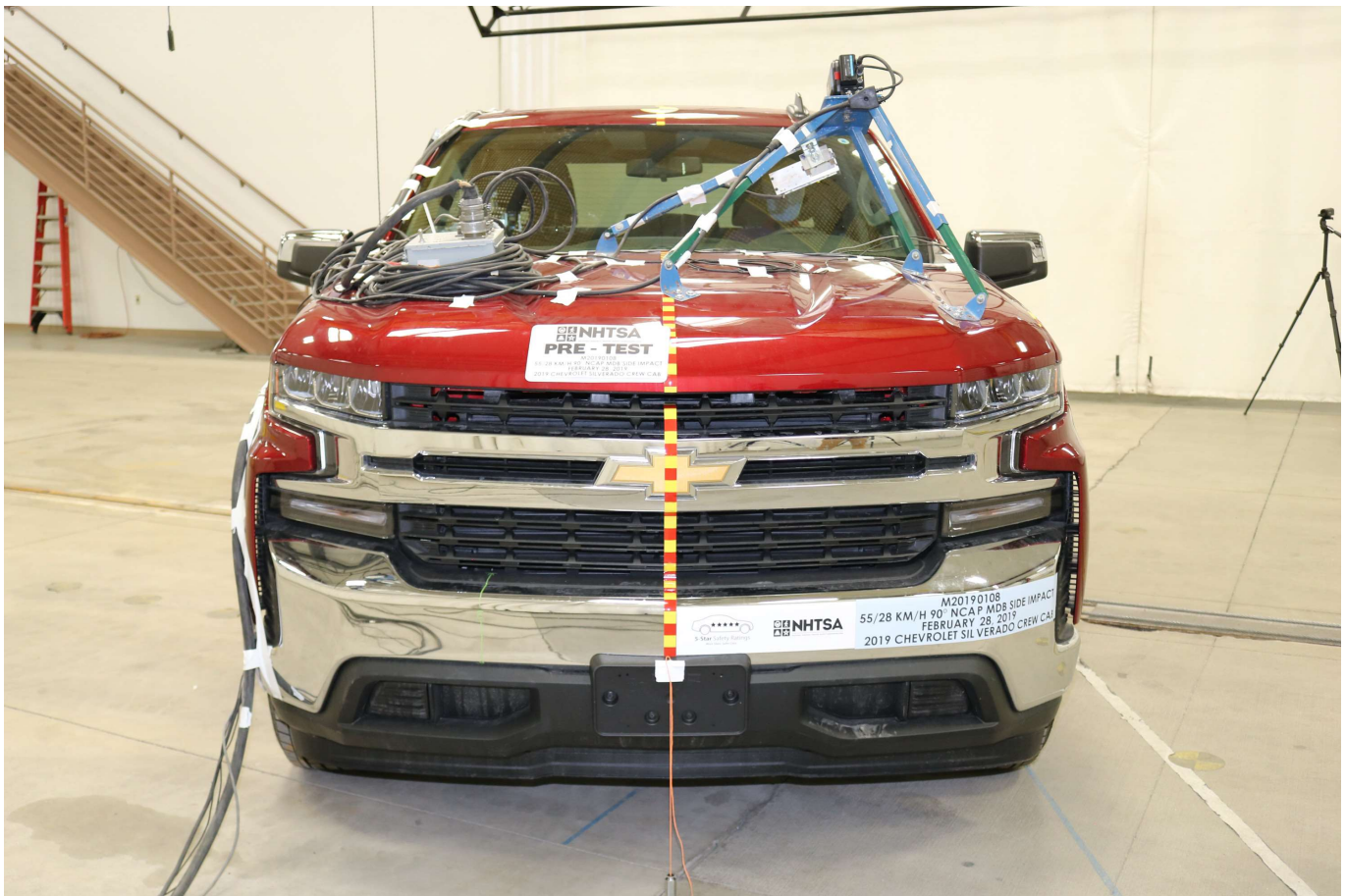


Photo No. 003 - Pre-Test Frontal View of Test Vehicle



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



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



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



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



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



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



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



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



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



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



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

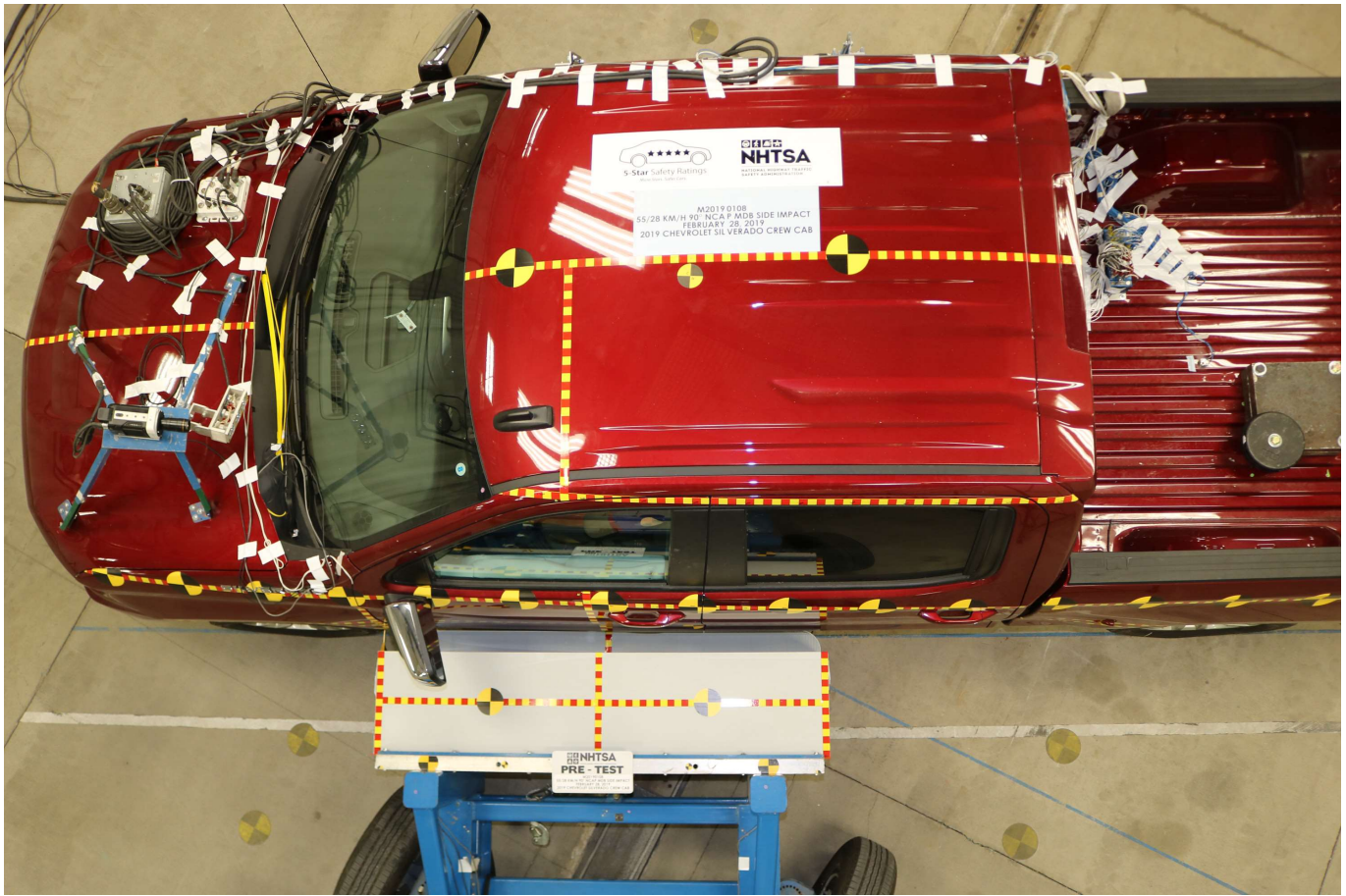


Photo No. 015 - Pre-Test Overhead View of Test Area



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



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



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



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



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



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



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



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



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



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

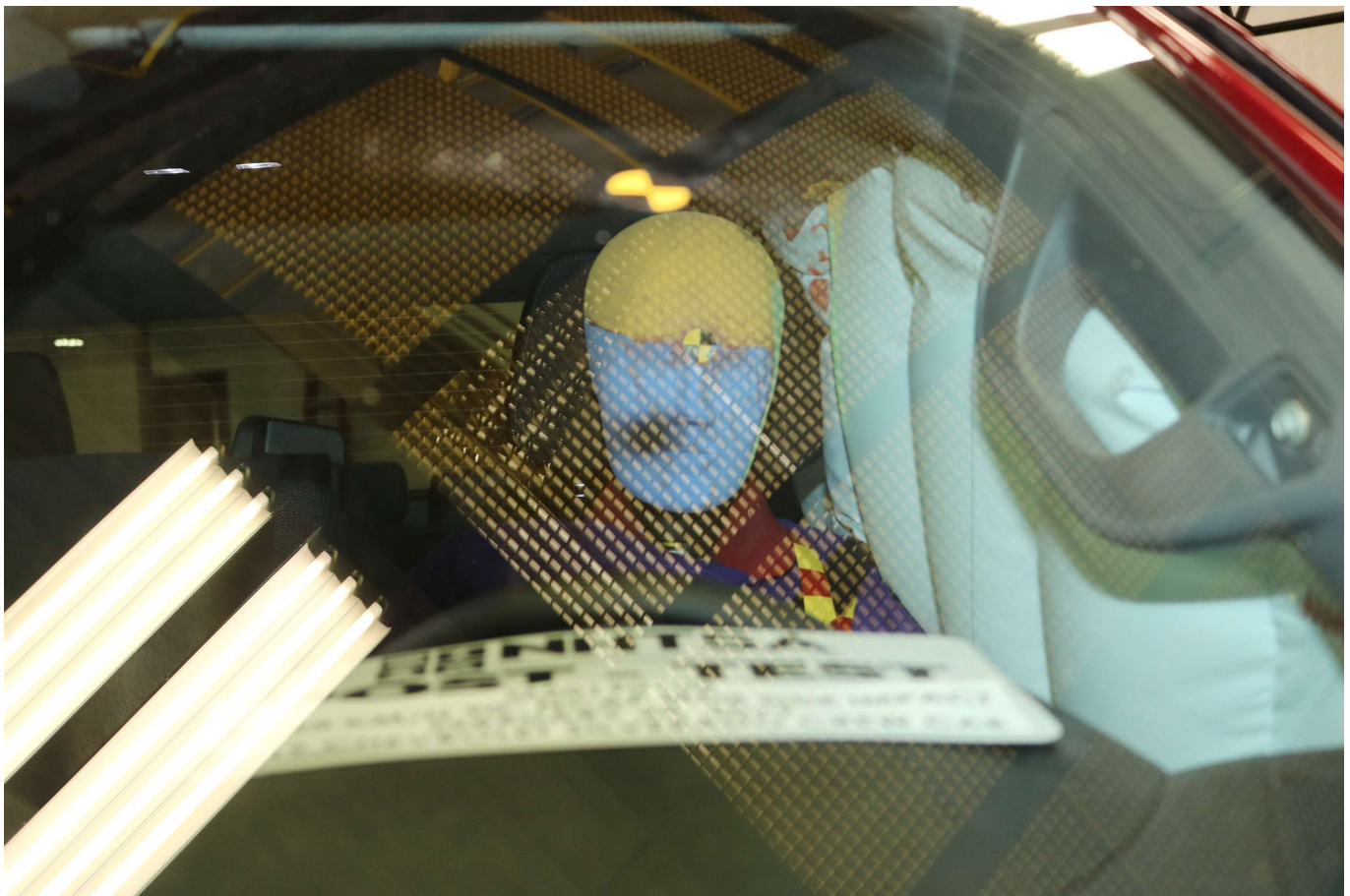


Photo No. 026 - Post-Test Front Close-Up View of Driver Dummy



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



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



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



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

PHOTOGRAPH NOT AVAILABLE

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



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

PHOTOGRAPH NOT AVAILABLE

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



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



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



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



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



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



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



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



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



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



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



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



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



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

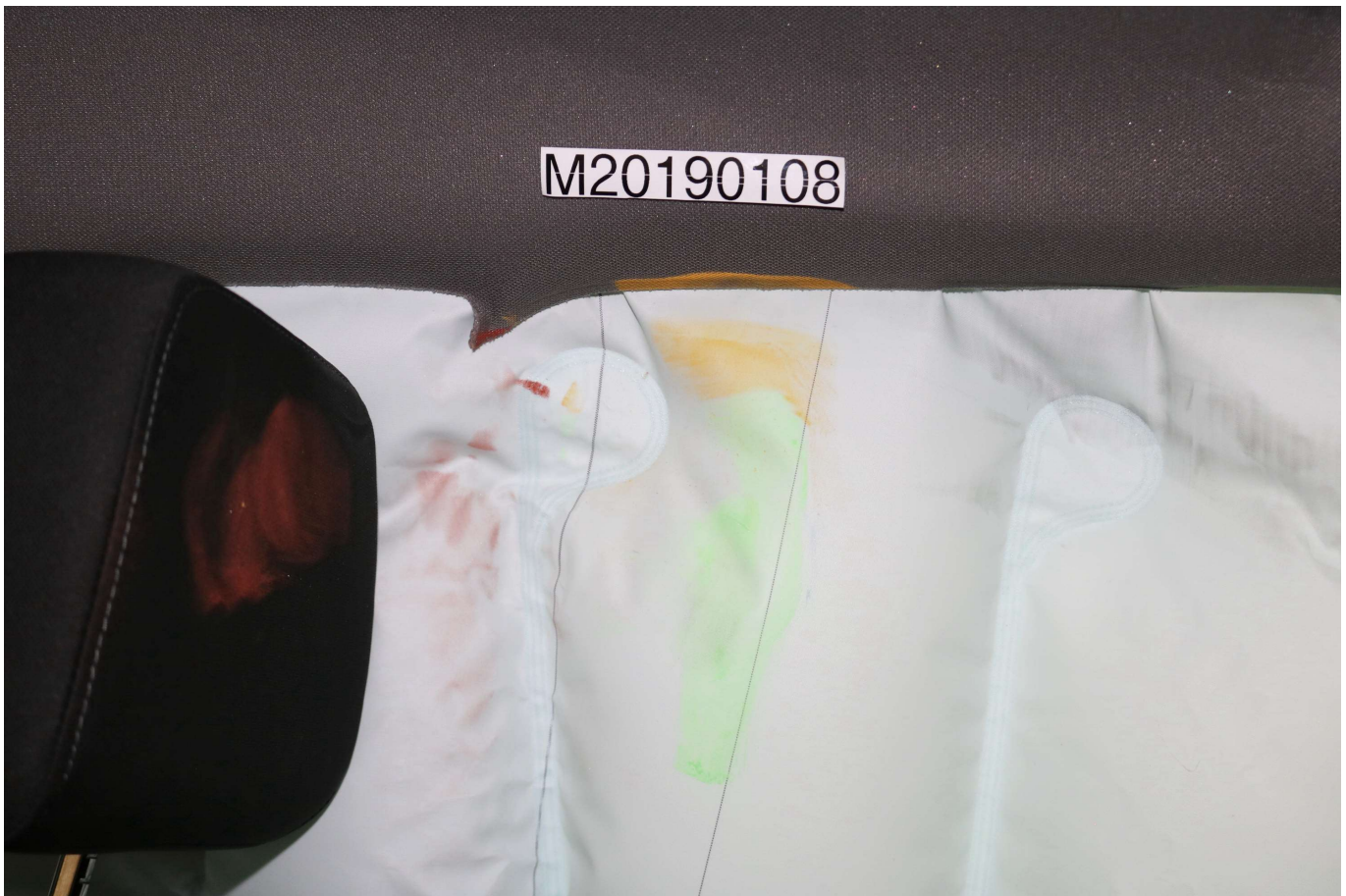


Photo No. 049 - Post-Test Driver Dummy Close-up Head Contact with Side Airbag View



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



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

PHOTOGRAPH NOT APPLICABLE

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



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

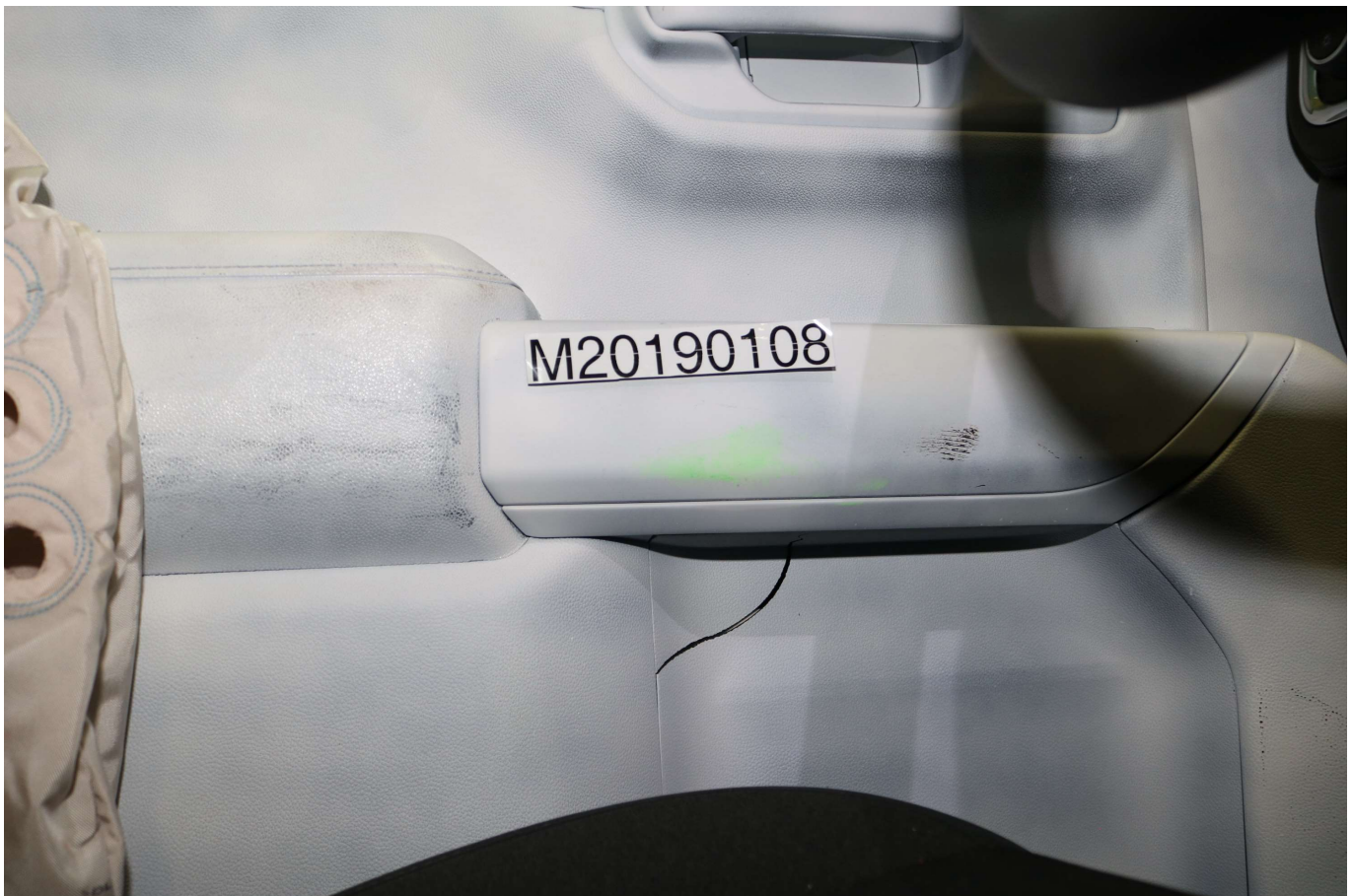


Photo No. 054 - Post-Test Driver Dummy Close-up Knee Contact View



Photo No. 055 - Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking



Photo No. 056 - Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



Photo No. 057 - Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



Photo No. 058 - Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



Photo No. 059 - Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 060 - Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Photo No. 061 - Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



Photo No. 062 - Pre-Test View of Rear Passenger Dummy Neck Showing Position of Adjustable Neck Bracket



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



Photo No. 064 - Pre-Test Placement of Rear Passenger Dummy Feet



Photo No. 065 - Pre-Test View of Belt Anchorage for Rear Passenger Dummy



Photo No. 066 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



Photo No. 067 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

PHOTOGRAPH NOT APPLICABLE

Photo No. 068 - Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint



Photo No. 069 - Pre-Test Rear Passenger Dummy and Door Clearance View



Photo No. 070 - Post-Test Rear Passenger Dummy and Door Clearance View



Photo No. 071 - Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Photo No. 072 - Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Photo No. 073 - Pre-Test Rear Passenger Inner Door Panel View



Photo No. 074 - Post-Test Rear Passenger Inner Door Panel View



Photo No. 075 - Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View



Photo No. 076 - Post-Test Rear Passenger Dummy Close-up Head Contact with Side Airbag View



Photo No. 077 - Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View

PHOTOGRAPH NOT APPLICABLE

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

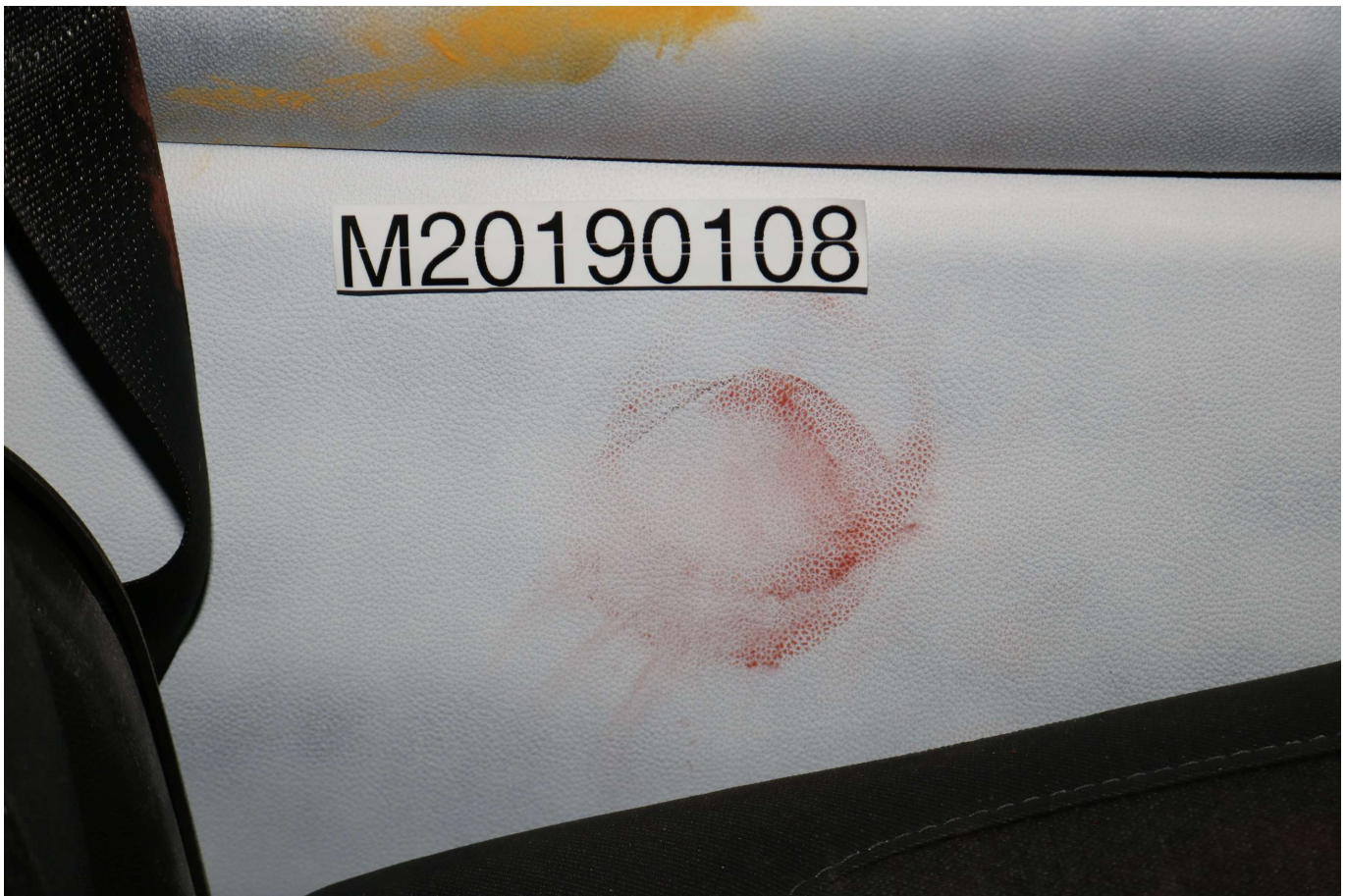


Photo No. 079 - Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Vehicle Interior View

PHOTOGRAPH NOT APPLICABLE

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

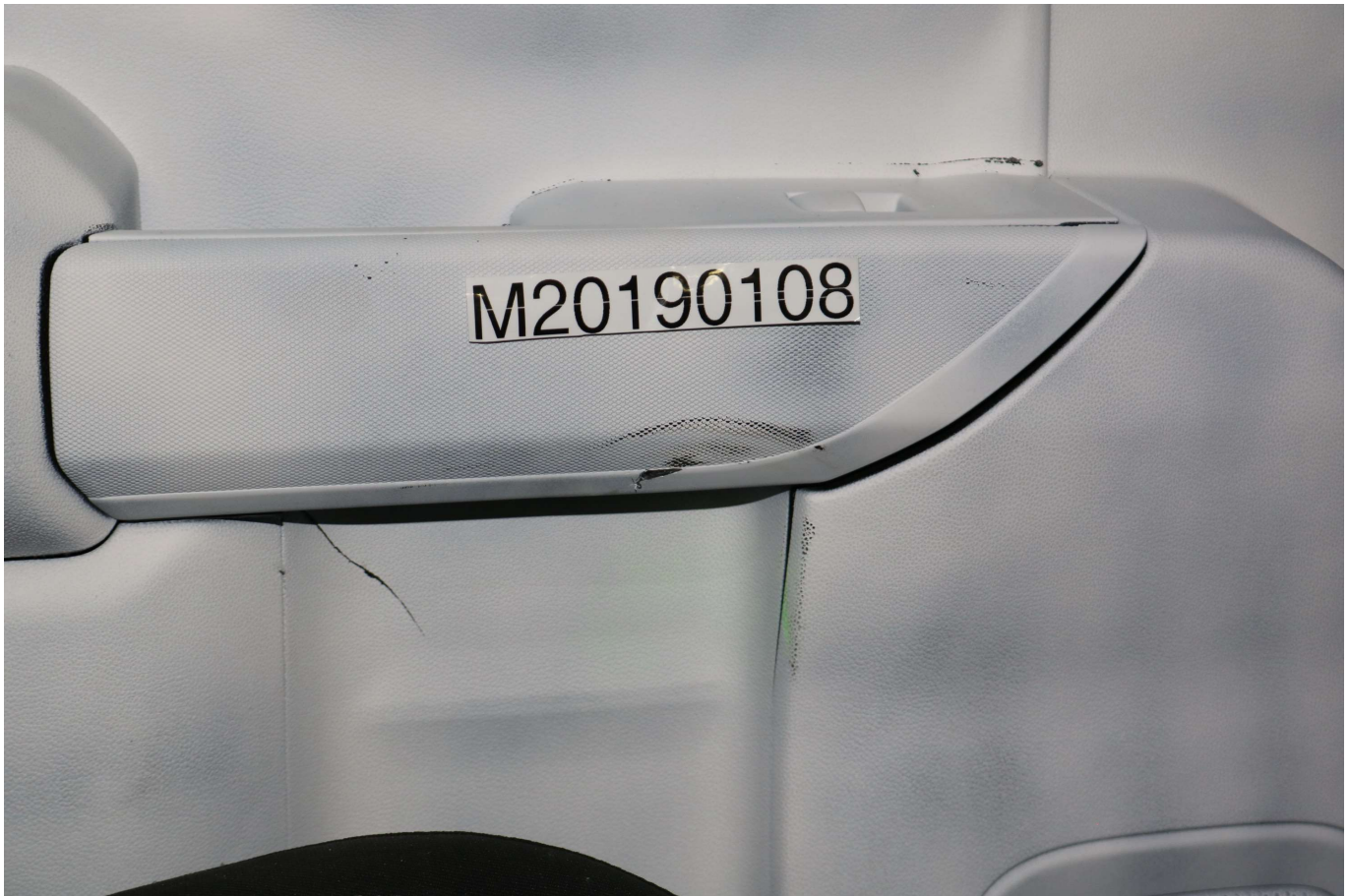


Photo No. 081 - Post-Test Rear Passenger Dummy Close-up Knee Contact View



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



Photo No. 083 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 084 - Pre-Test Front View of MDB Impactor Face



Photo No. 085 - Post-Test Front View of MDB Impactor Face



Photo No. 086 - Pre-Test Top View of MDB Impactor Face

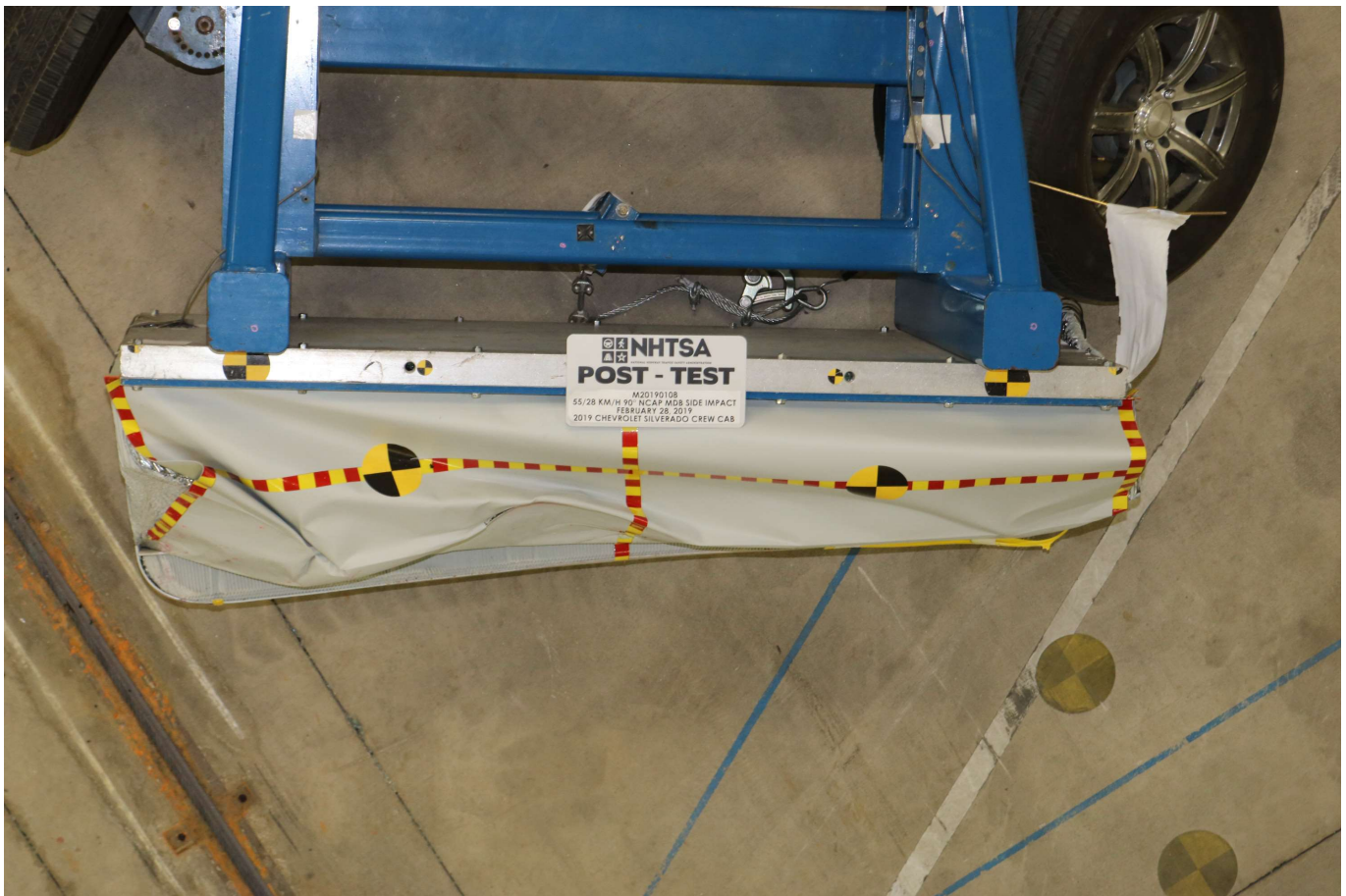


Photo No. 087 - Post-Test Top View of MDB Impactor Face



Photo No. 088 - Pre-Test Left Side View of MDB Impactor Face



Photo No. 089 - Post-Test Left Side View of MDB Impactor Face



Photo No. 090 - Pre-Test Right Side View of MDB Impactor Face



Photo No. 091 - Post-Test Right Side View of MDB Impactor Face



Photo No. 092 - Close-Up View of Vehicle Certification Label

M20190108

TIRE AND LOADING INFORMATION

SEATING CAPACITY | TOTAL 6 | FRONT 3 | REAR 3

The combined weight of occupants and cargo should never exceed 922 kg or 2033 lbs.

TIRE	ORIGINAL SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	265/65R18 T	240 kPa, 35 PSI	
REAR	265/65R18 T	240 kPa, 35 PSI	
SPARE	265/70R17 S	240 kPa, 35 PSI	

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Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label



Photo No. 094 - Pre-Test Ballast View

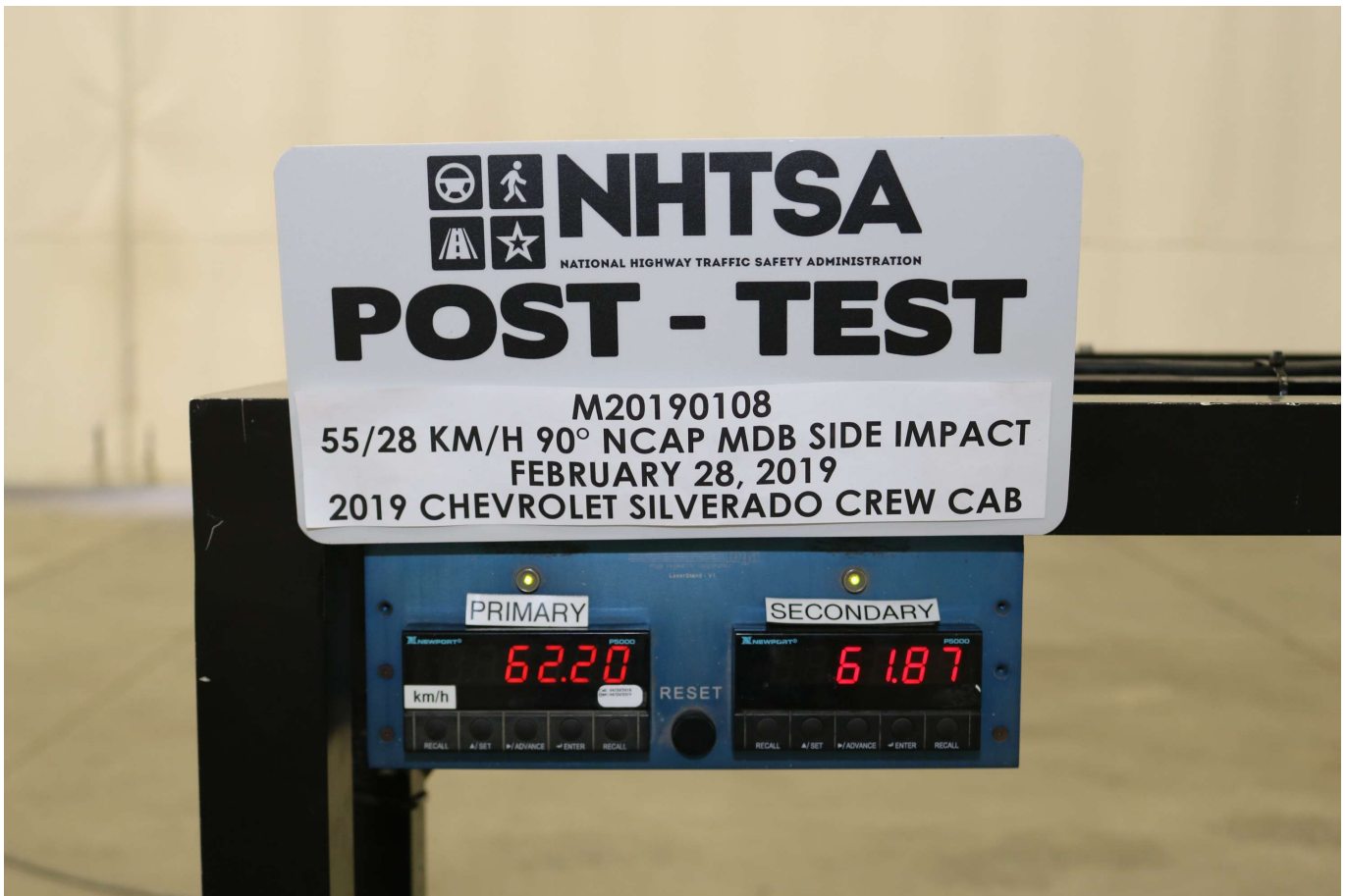


Photo No. 095 - Post-Test Primary and Redundant Speed Trap Read-Out



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



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



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

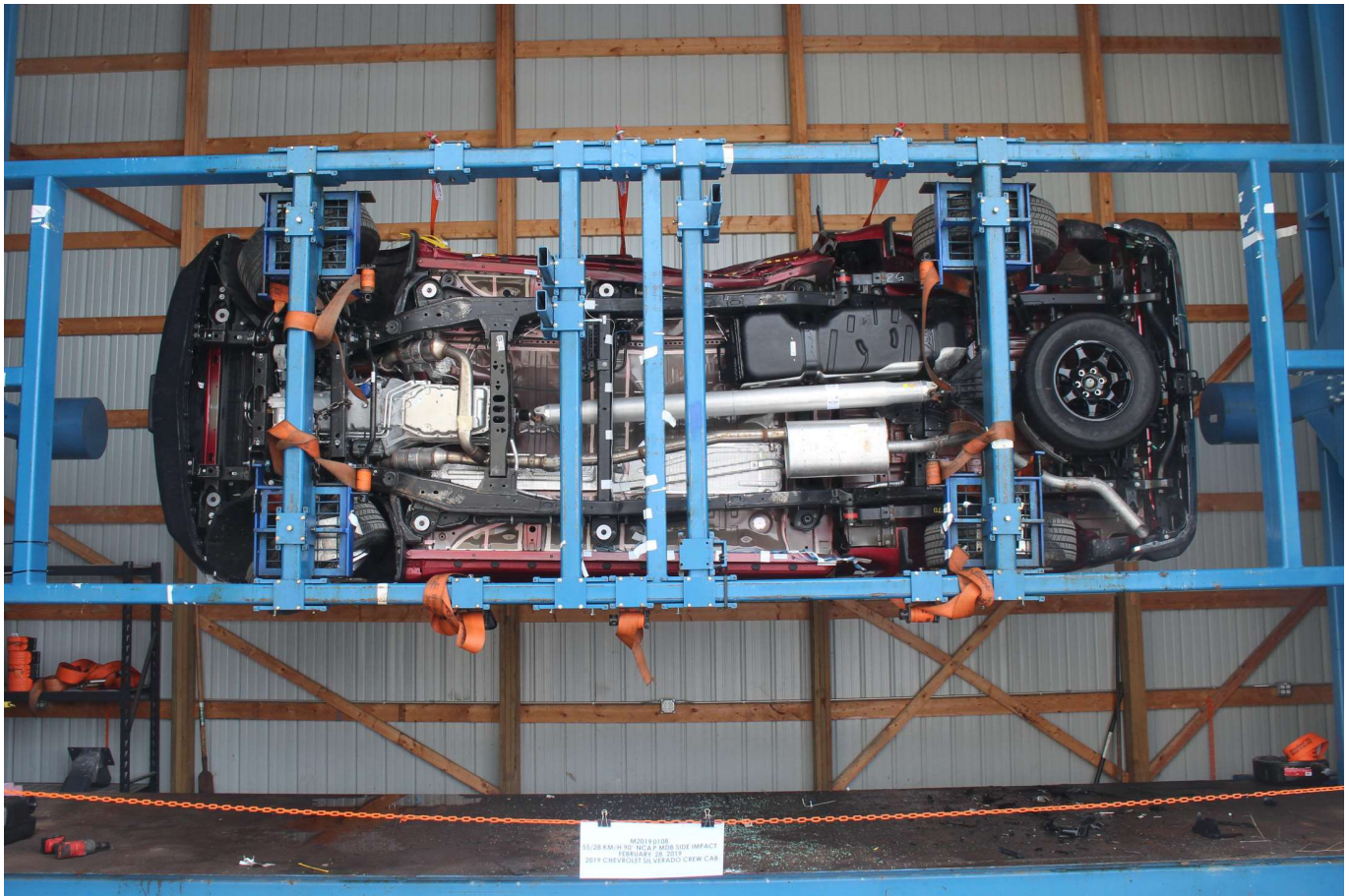


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees



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



Photo No. 101 - Impact Event



CHEVROLET

2019 SILVERADO 2WD LT CREW

EXTERIOR: CAJUN RED TINTCOAT
INTERIOR: JET BLACK

ENGINE: 5.3L ECOTEC3 V8 WITH
TRANSMISSION, 8-SPEED AUTOMATIC

STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

- 3 YR/36,000 MILES BUMPER-TO-BUMPER WARRANTY
- 5 YR/60,000 MILES POWERTRAIN LIMITED WARRANTY
- ROADSIDE ASSISTANCE
- COURTESY TRANSPORTATION
- FIRST MAINTENANCE VISIT
- OIL CHANGE AND TIRE ROTATION
- MULTI POINT VEHICLE INSPECTION
- SEE CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS

MECHANICAL

- CAPLESS FUEL FILL

SAFETY & SECURITY

- REAR VISION CAMERA
- TEEN DRIVER MODE
- STABILITRAK-W/ TRAILER SWAY CONTROL & HILL START ASSIST
- ONSTAR (R) SERVICES CAPABLE

(SUBJECT TO TERMS SEE ONSTAR.COM)

EXTERIOR

- TAILGATE WITH LIFT ASSIST
- 12 FIXED DURABLE TIE DOWNS W/ EACH CORNER RATED AT 500LBS
- CARGO AREA LAMP
- CORNERSTEP REAR BUMPER
- POWER ADJUSTABLE HEATED OUTSIDE MIRRORS
- LED REFLECTOR HEAD LAMPS
- INCANDESCENT TAIL LAMPS
- LED DAYTIME RUNNING LAMPS
- ALL SEASON TIRES

INTERIOR

- 40/20/40 SPLIT BENCH FRONT SEATS W/ ARMREST STORAGE
- FRONT DRIVER AND PASSENGER 4-WAY SEAT ADJUSTER
- 60/40 FOLDING REAR BENCH SEAT
- REAR SEAT REMINDER
- REMOTE KEYLESS ENTRY

- POWER WINDOWS: EXPRESS UP & DOWN DRIVER, EXPRESS DOWN FRONT PASSENGER & REAR
- REAR HVAC VENTS
- SINGLE ZONE CLIMATE CONTROL
- FRONT 12V AUX POWER OUTLET
- STEERING WHEEL AUDIO CONTROLS
- CHEVROLET INFOTAINMENT 3 8" DIAG COLOR TOUCHSCREEN
- ADDITIONAL FEATURES FOR COMPATIBLE PHONES INCLUDE:
 - BLUETOOTH AUDIO STREAMING
 - VOICE COMMAND PASSTHROUGH TO PHONE, ANDROID AUTO & APPLE CARPLAY CAPABLE
 - 4G LTE WI-FI (R) HOTSPOT CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM)

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$39,300.00

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

- ALL STAR EDITION 2,815.00
- DUAL-ZONE CLIMATE CONTROL
- SEAT ADJUSTER, DRIVER 10-WAY POWER INCLUDING LUMBAR
- SEATING, HEATED DRIVER AND FRONT PASSENGER
- STEERING WHEEL, HEATED
- STEERING WHEEL, LEATHER-WRAPPED
- STEERING COLUMN, LOCK CONTROL, ELECTRICAL
- STEERING COLUMN, MANUAL TILT AND TELESCOPING
- 2ND ROW USB PORTS, (2) CHARGE-ONLY
- REAR-WINDOW DEFOGGER
- POWER OUTLET, REAR AUX 12V
- KEYLESS OPEN AND START
- REMOTE VEHICLE STARTER SYSTEM
- THEFT-DETERRENT SYSTEM
- SEATS, FRONT 40/20/40 SPLIT-

Visit us at www.chevy.com

- SPLIT-BENCH WITH COVERED ARMREST STORAGE, ADJUSTABLE LUMBAR AND UNDER-SEAT STORAGE
- TAILGATE, WITH LIFT ASSIST, POWER LOCK, AND RELEASE
- LED DURABLE LIGHTING
- DIFFERENTIAL, AUTO LOCKING REAR
- TRAILERING PACKAGE
 - TRAILER HITCH
 - 7 PIN AND 4 PIN CONNECTORS
 - HITCH GUIDANCE
- ENGINE, 5.3L ECOTEC3 V8 WITH DYNAMIC FUEL MANAGEMENT 1,395.00
- CAJUN RED TINTCOAT 495.00
- 18" BRIGHT SILVER PAINTED ALUMINUM WHEELS 300.00
- TRAILER BRAKE CONTROLLER 275.00
- GVWR, 6,900 LBS. (3,130 KG) INC.
- REAR AXLE 3.23 RATIO INC.

TOTAL OPTIONS \$5,280.00
TOTAL VEHICLE & OPTIONS \$44,580.00

DESTINATION CHARGE 1,495.00
TOTAL BEFORE SAVINGS \$46,075.00
ALL-STAR EDITION DISCOUNT -500.00

TOTAL VEHICLE PRICE* \$45,575.00

EPA DOT Fuel Economy and Environment

Fuel Economy

19 MPG combined city/hwy
17 MPG city
23 MPG highway

Standard pickup trucks range from 14 to 22 MPG. The best vehicle rates 136 MPG.

You spend \$3,000 more in fuel costs over 5 years compared to the average new vehicle.

5.3 gallons per 100 miles

Gasoline Vehicle

Annual fuel cost \$2,000

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

This vehicle emits 467 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuelconomy.gov.

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 42%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 46%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ROANOKE, IN U.S.A.
COUNTRY OF ORIGIN: U.S.A.
ENGINE: UNITED STATES
TRANSMISSION: UNITED STATES

This label has been applied pursuant to Federal law - Do not remove prior to delivery to the ultimate purchaser. *Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

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GM/BL_PROD_0038 - 07/22/2018

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.55 per gallon. MPGs is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

Equipped with the safety and connectivity of OnStar!

Visit onstar.com for details.
onstar.com/privacy

ORDER NO W0TH00 SALES CODE E
SALES MODEL CODE CC10643
DEALER NO 14185
FINAL ASSEMBLY: ROANOKE, IN U.S.A.
VIN 1GCPWEDXKZ110563

DEALER TO WHOM DELIVERED
J. B. A. CHEVROLET
7327 RITCHIE HWY
GLEN BURNIE, MD 21061-3195

4J
1FA3612652

Photo No. 102 - Monroney Label

Head Restraints

Warning

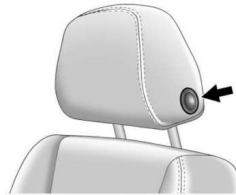
With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.



Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

Front Seats

The vehicle's front seats have adjustable head restraints in the outboard seating positions.



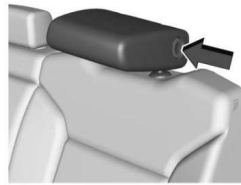
To raise or lower the head restraint, press the button on the side of the head restraint and pull up or push the head restraint down and release the button.

Pull and push on the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Head Restraints

The vehicle's rear seat has head restraints in the outboard seating positions that cannot be adjusted.



The head restraint can be folded forward to allow for better visibility when the rear seat is unoccupied. To fold the head restraint, press the button on the side of the head restraint.

When an occupant is in the seat, always return the head restraint to the upright position until it locks into place. Push and pull on the head restraint to make sure that it is locked.

If you are installing a child restraint in the rear seat, see *Lower Anchors and Tethers for Children (LATCH System)* > 105.

Center Headrest

The vehicle's rear seat may be equipped with a headrest in the center seating position that cannot be adjusted.

If you are installing a child restraint in the rear seat, see *Lower Anchors and Tethers for Children (LATCH System)* > 105.

Front Seats

Seat Adjustment

Warning

You can lose control of the vehicle if you try to adjust a driver seat while the vehicle is moving. Adjust the driver seat only when the vehicle is not moving.



To adjust a manual seat:

1. Pull the handle at the front of the seat.

Photo No. 103 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
Figure No. 1.	Driver Head Acceleration (X) Primary vs. Time	B-1
Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
Figure No. 3.	Driver Head Acceleration (Z) Primary vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
Figure No. 5.	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 6.	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
Figure No. 10.	Driver Middle Abdomen Force (Y) vs. Time	B-3
Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
Figure No. 12.	Driver Total Abdominal Force (Y) vs. Time	B-3
Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
Figure No. 14.	Passenger Head Acceleration (X) Primary vs. Time	B-5
Figure No. 15.	Passenger Head Acceleration (Y) Primary vs. Time	B-5
Figure No. 16.	Passenger Head Acceleration (Z) Primary vs. Time	B-5
Figure No. 17.	Passenger Head Resultant Acceleration Primary vs. Time	B-5
Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

Additional Driver & Passenger Dummy Instrumentation Data

Passenger Head Angular Velocity (X)
Passenger Head Angular Velocity (Y)
Passenger Head Angular Velocity (Z)
Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Track Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

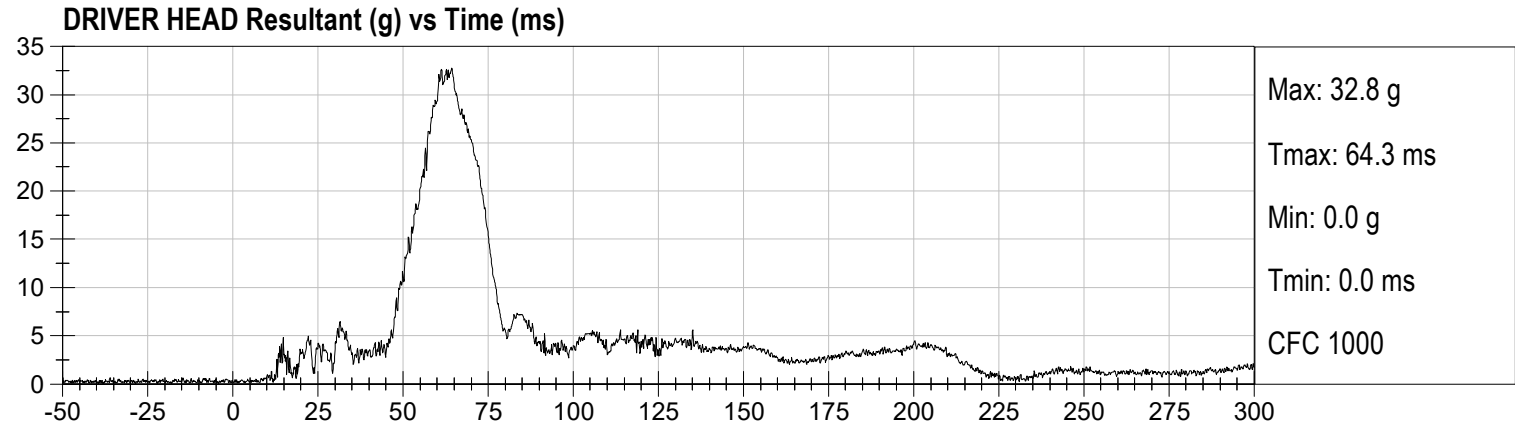
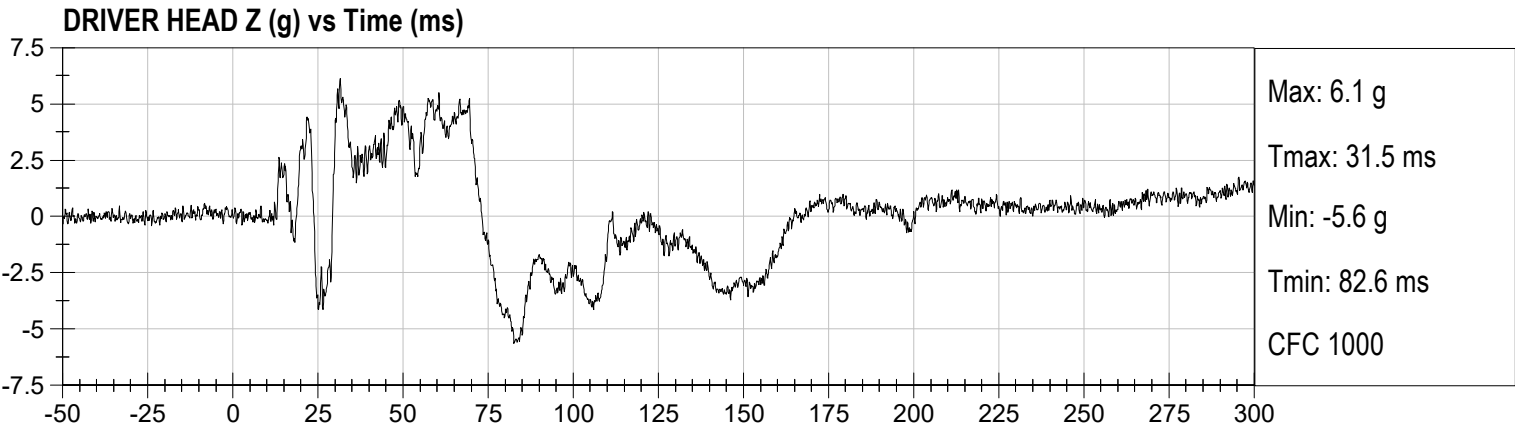
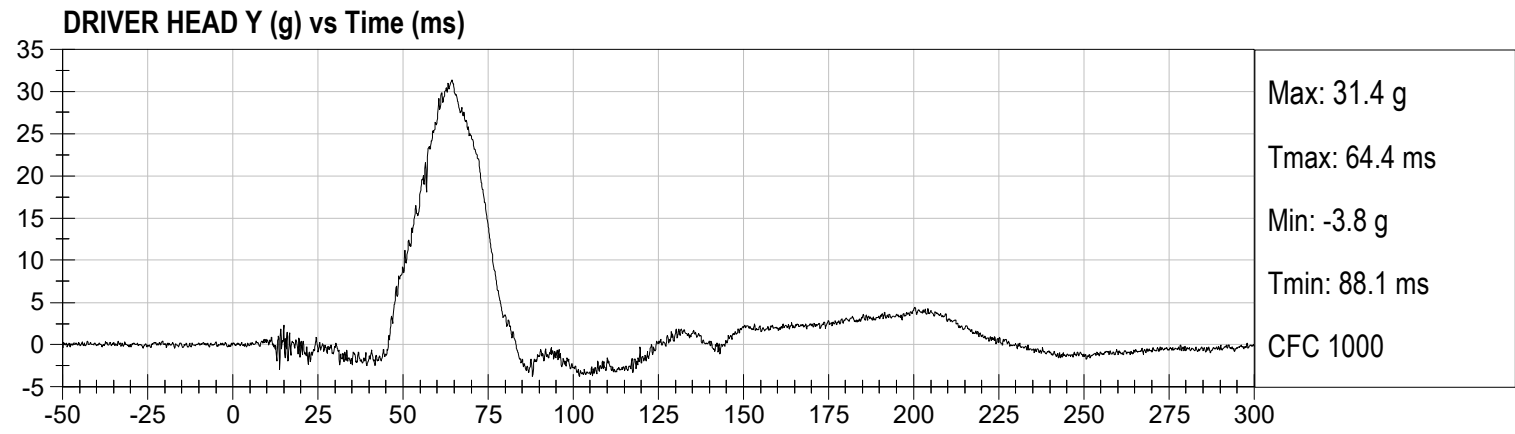
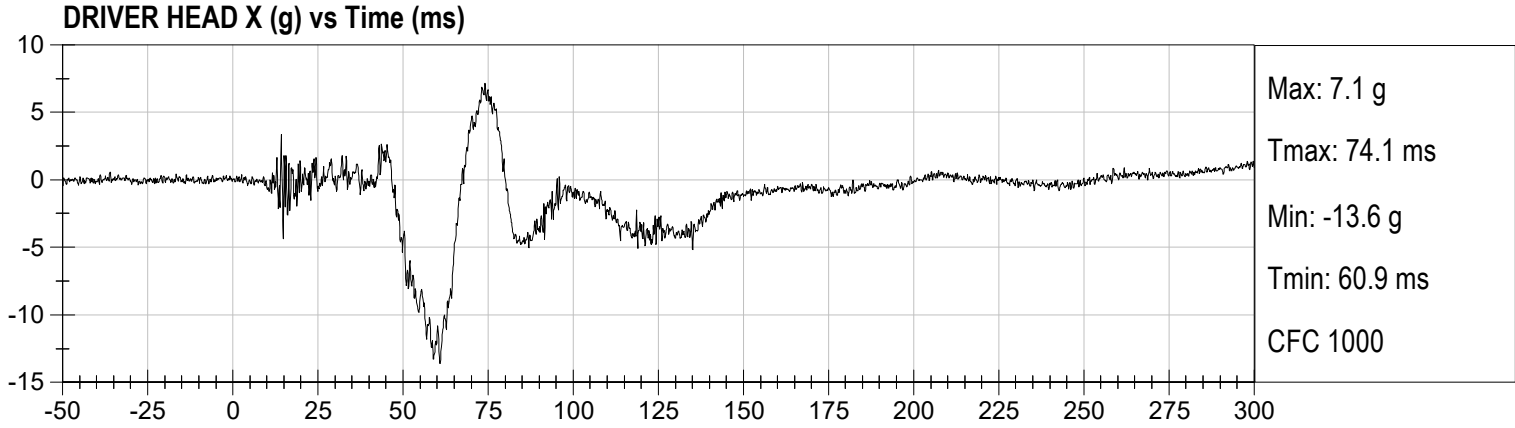
MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

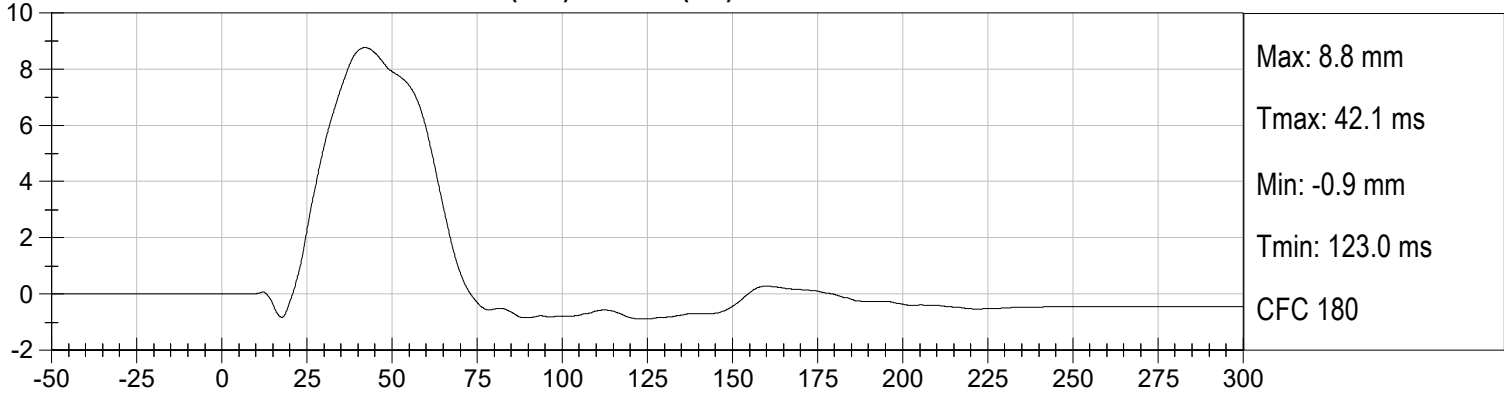
MDB Rear Acceleration (Y)

Left MDB Contact Switch

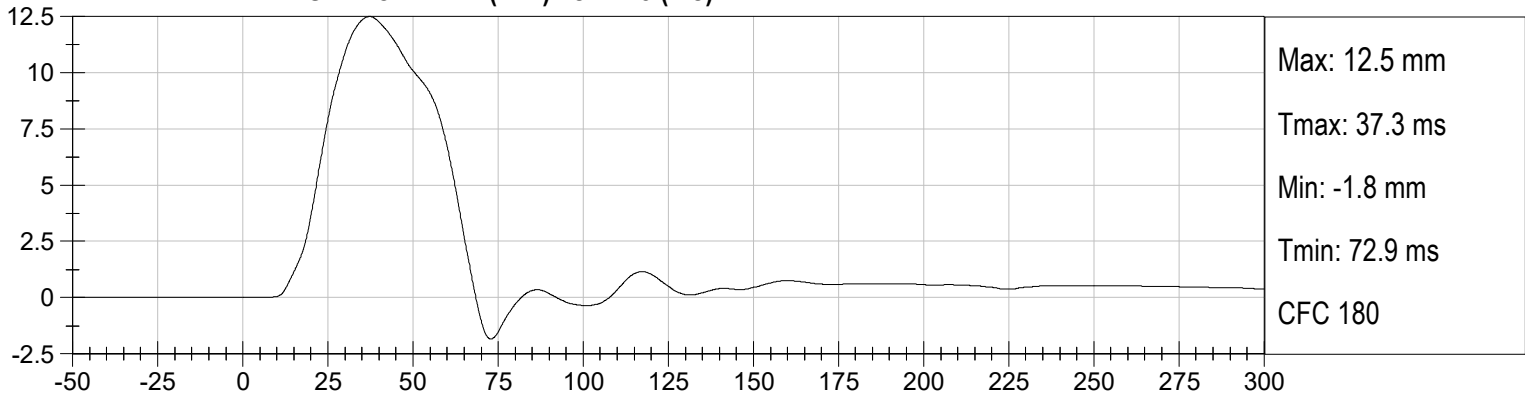
Right MDB Contact Switch



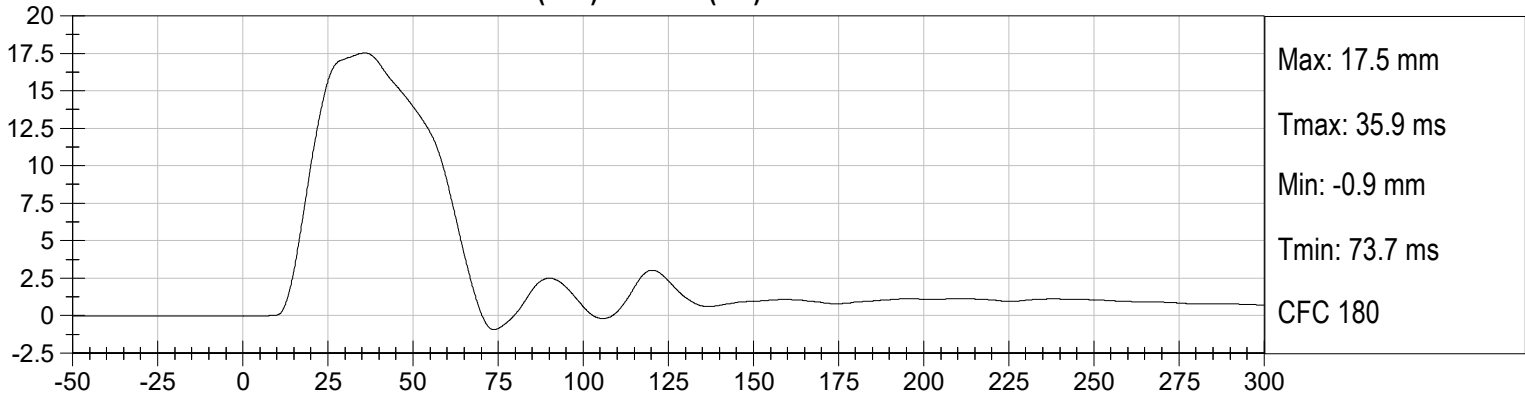
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



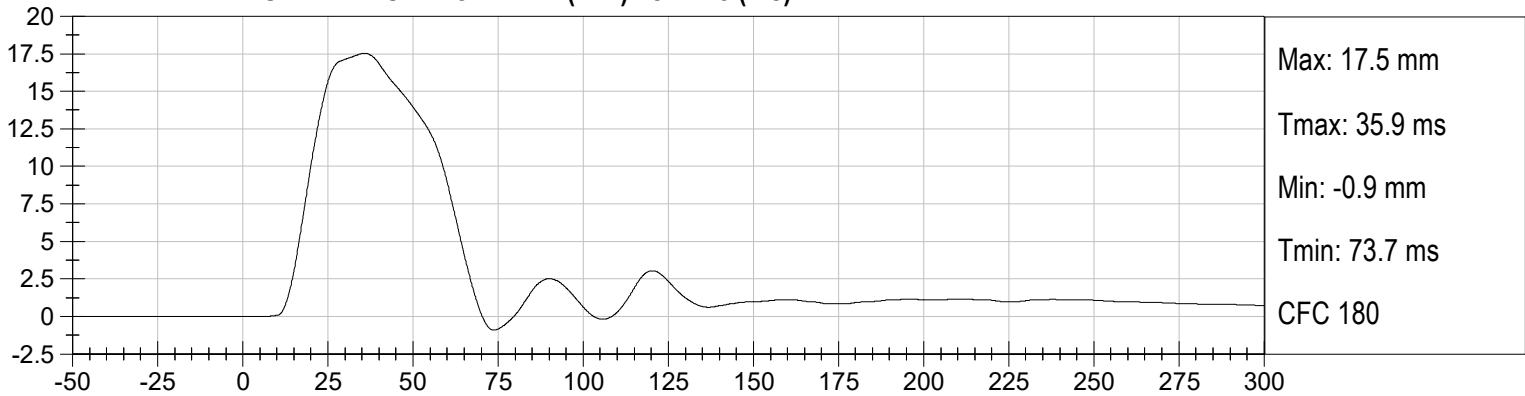
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



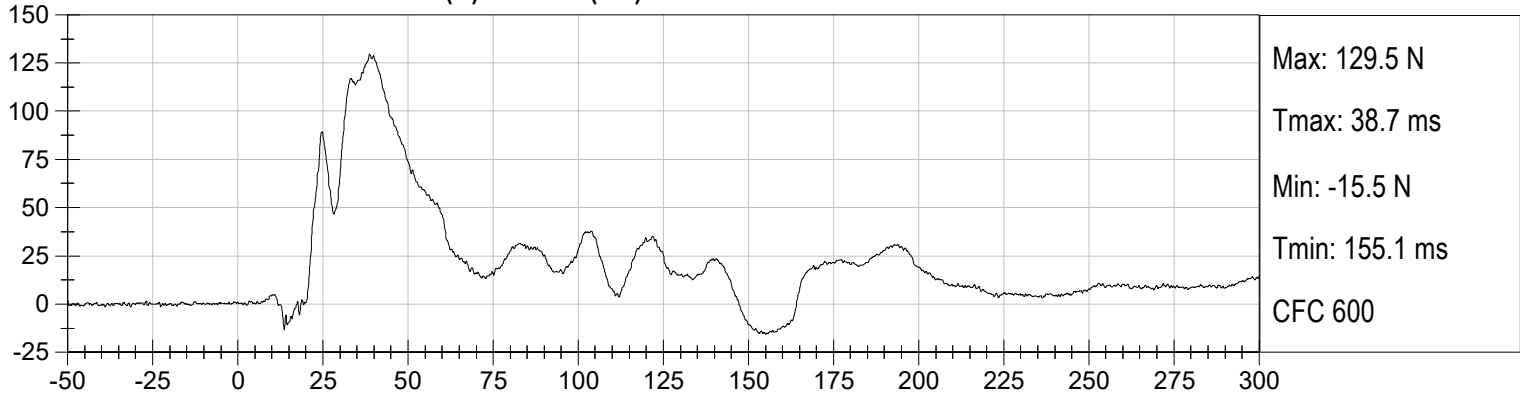
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



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



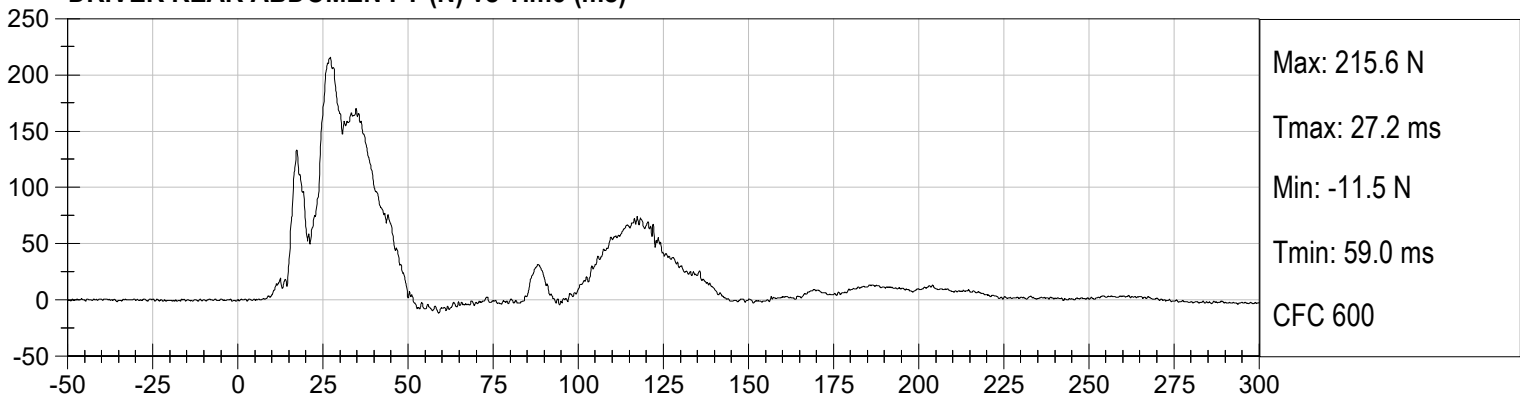
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



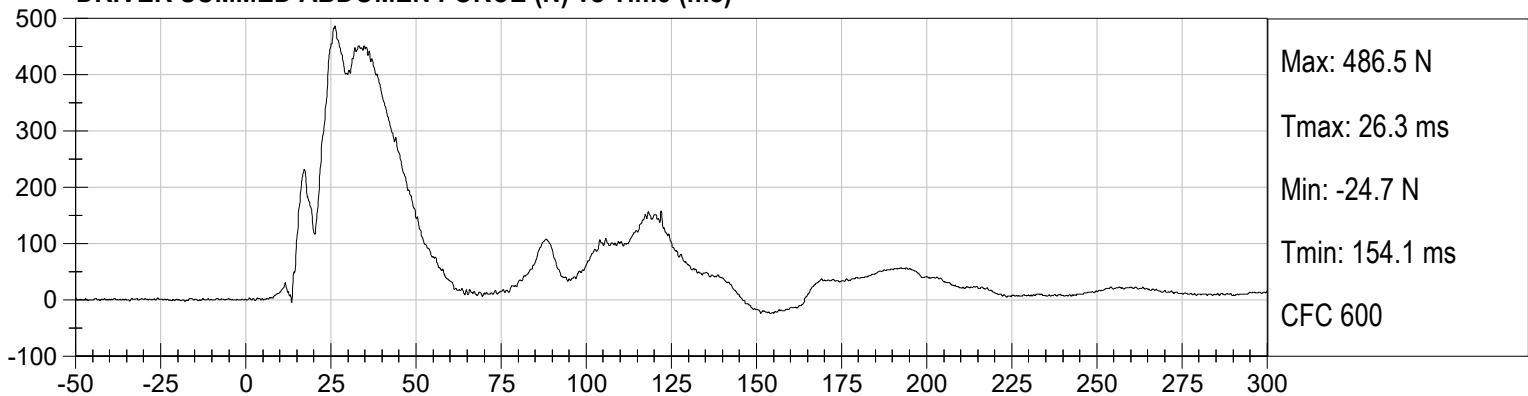
DRIVER MID ABDOMEN FY (N) vs Time (ms)

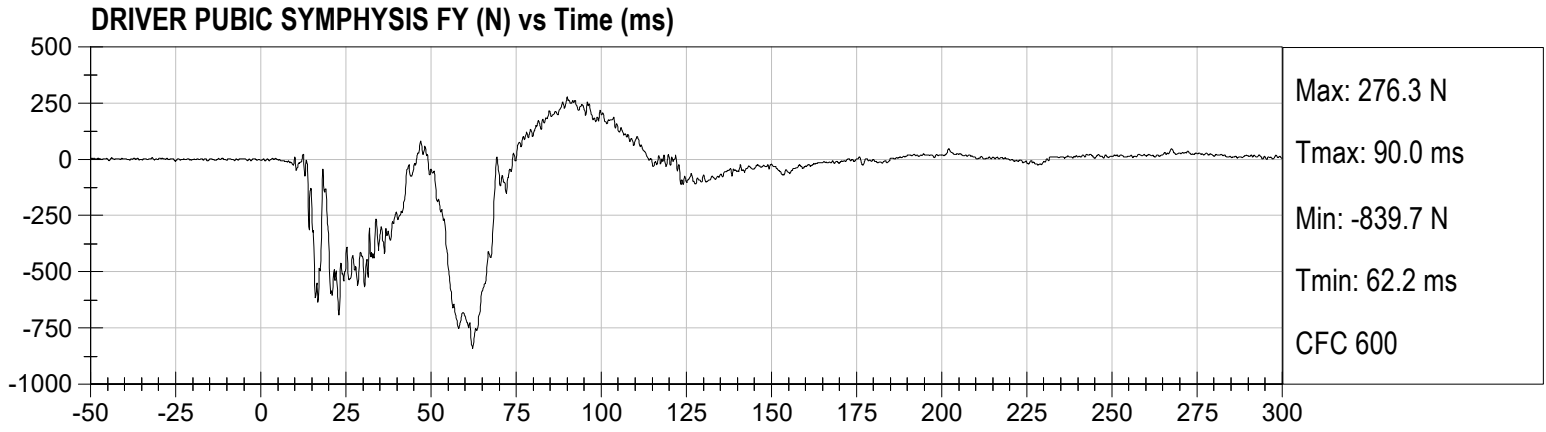


DRIVER REAR ABDOMEN FY (N) vs Time (ms)

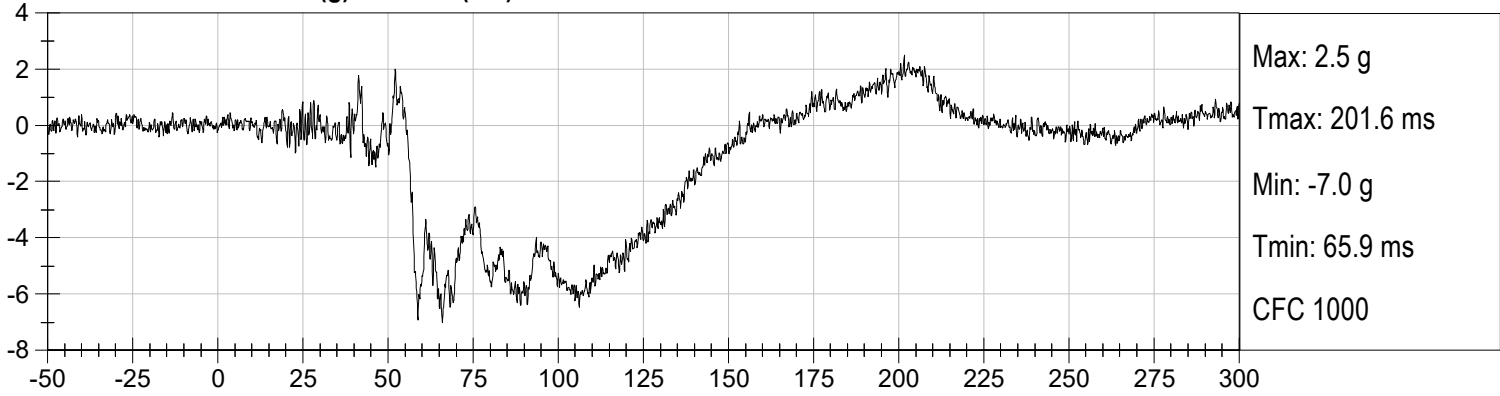


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

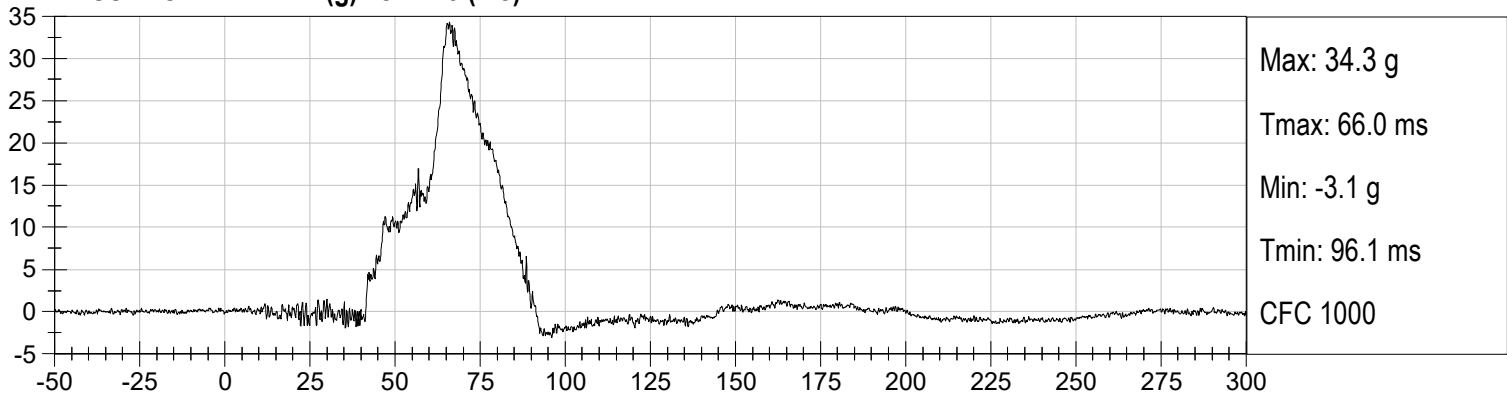




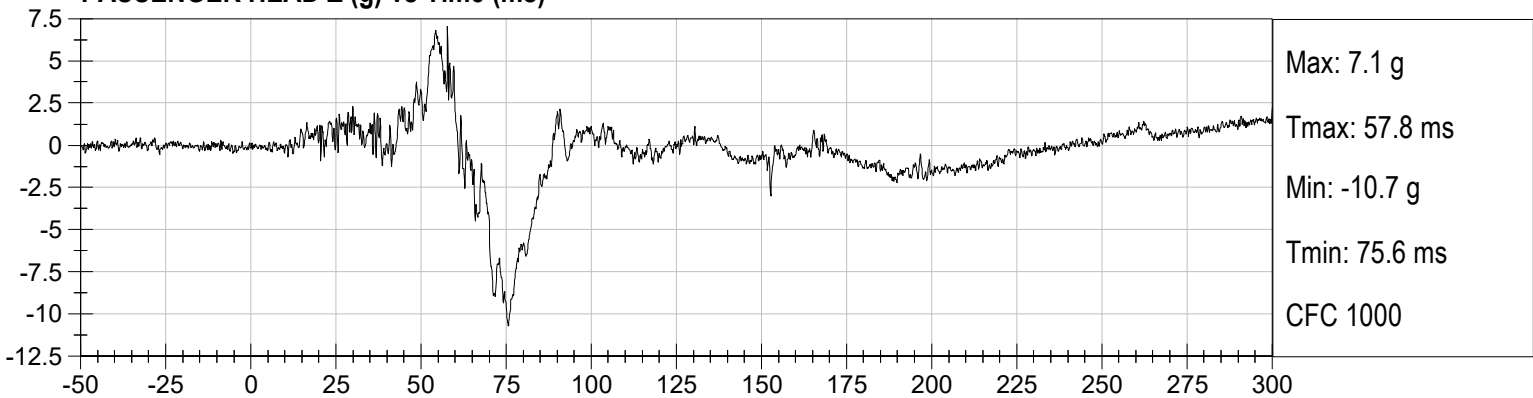
PASSENGER HEAD X (g) vs Time (ms)



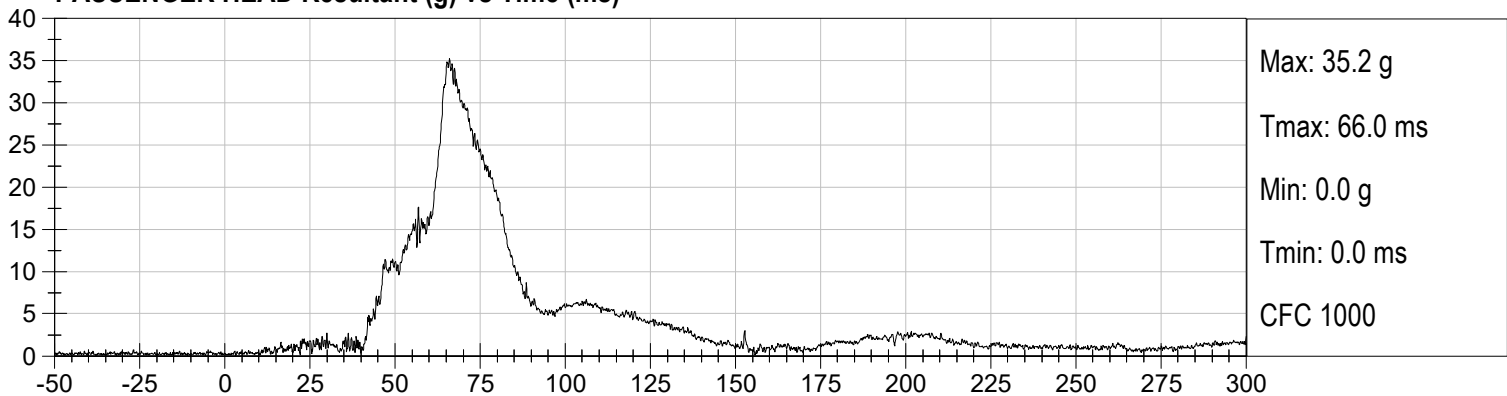
PASSENGER HEAD Y (g) vs Time (ms)



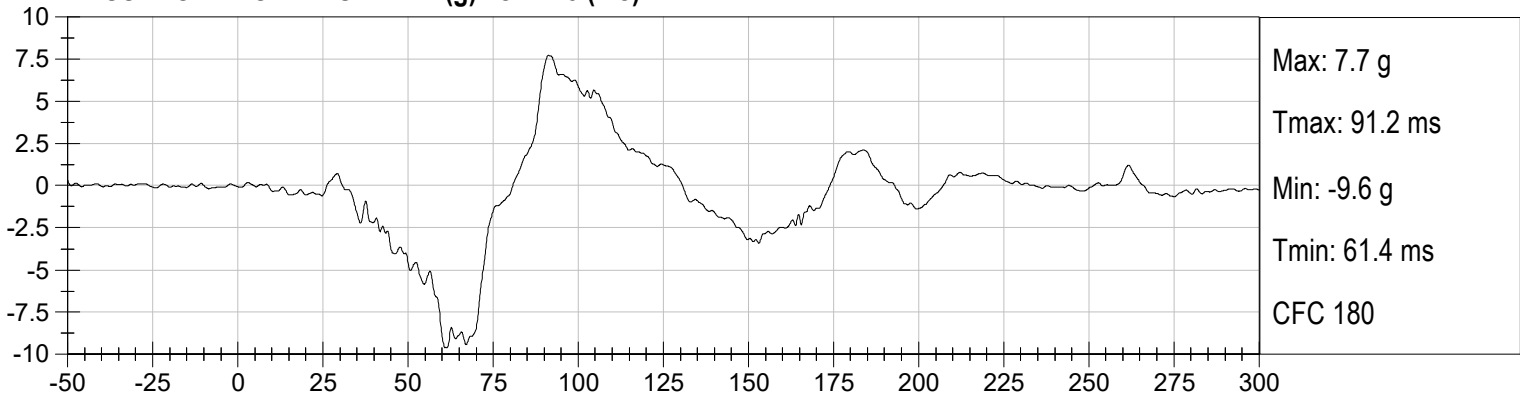
PASSENGER HEAD Z (g) vs Time (ms)



PASSENGER HEAD Resultant (g) vs Time (ms)



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



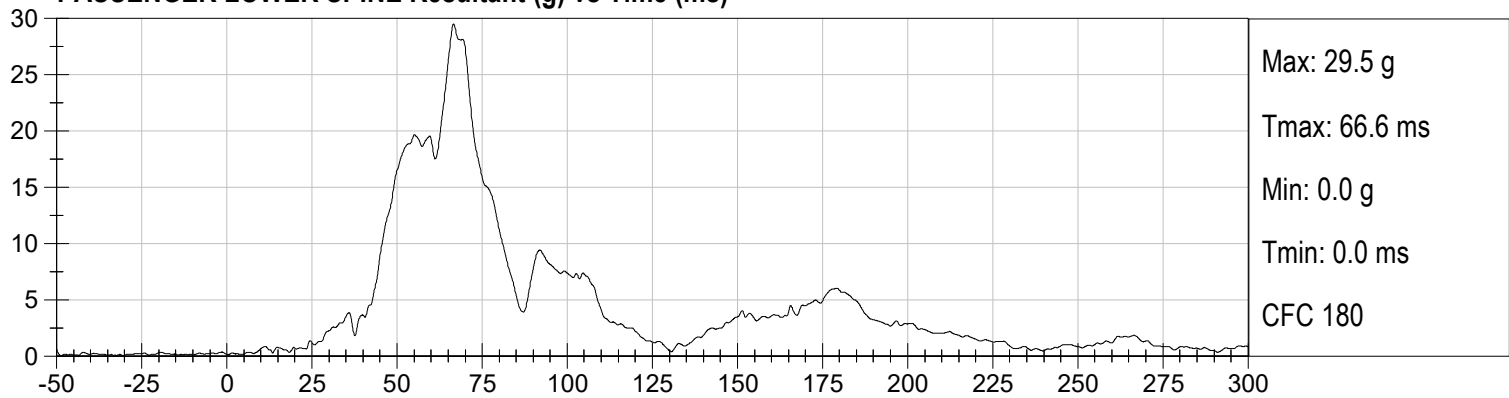
PASSENGER LOWER SPINE Y (g) vs Time (ms)



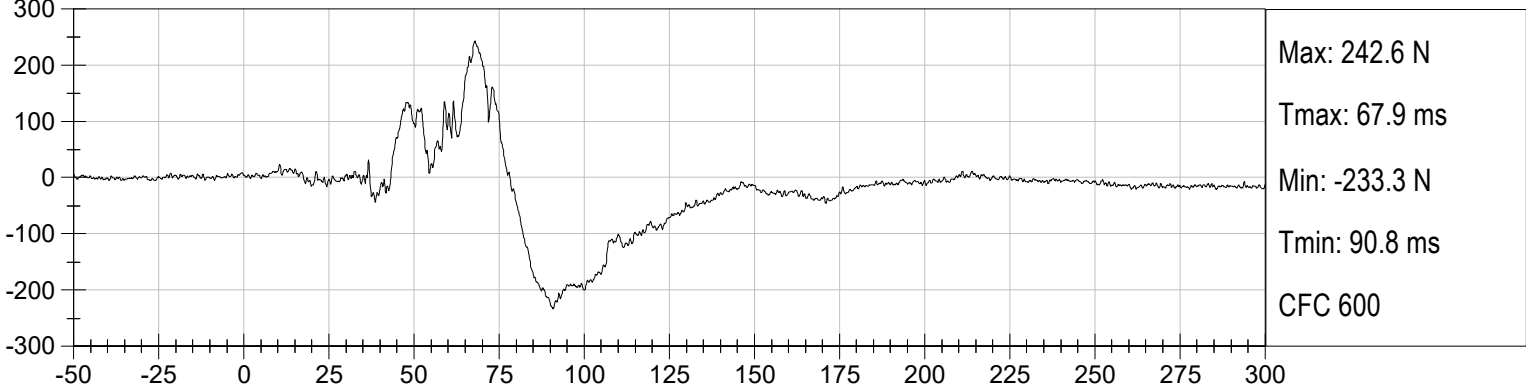
PASSENGER LOWER SPINE Z (g) vs Time (ms)



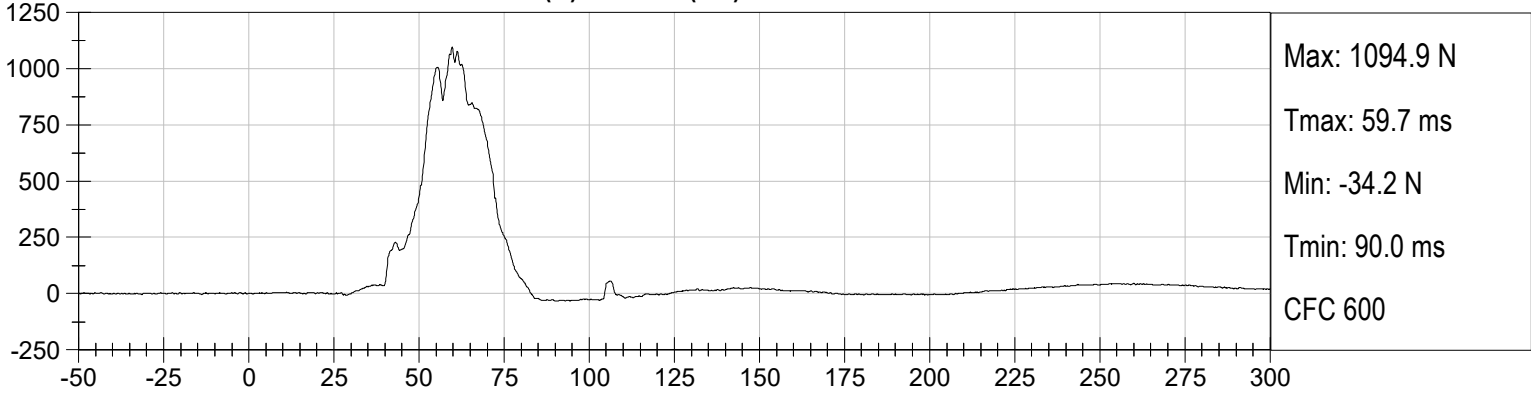
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



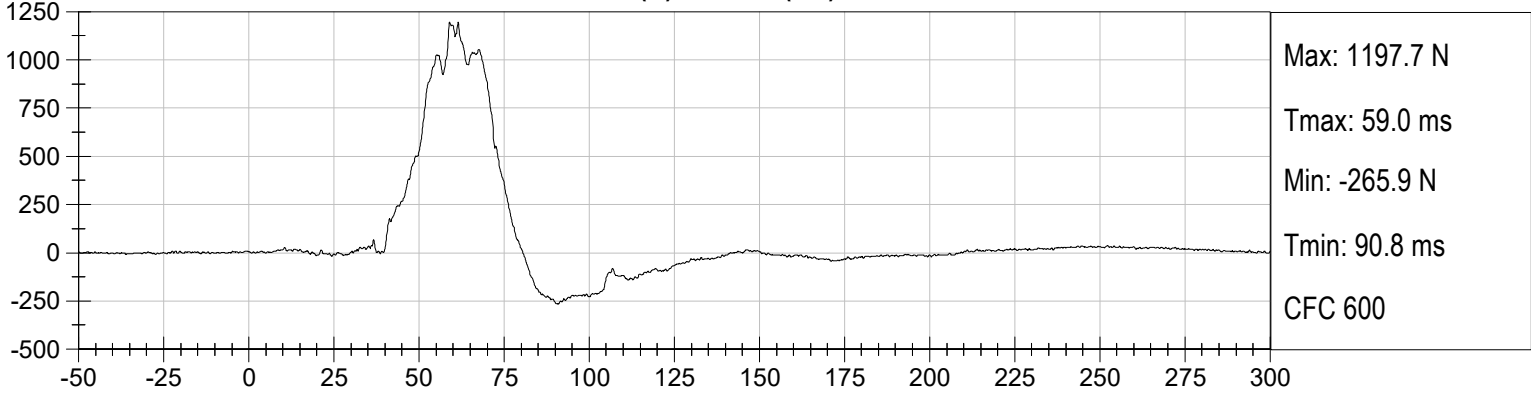
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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



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



APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

**ES-2re External Measurements
SN: 032**

No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION
HEAD DROP TEST
ES-2re DUMMY

ATD Serial No: 032

Test ID: D190521

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	125 to 155	138	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

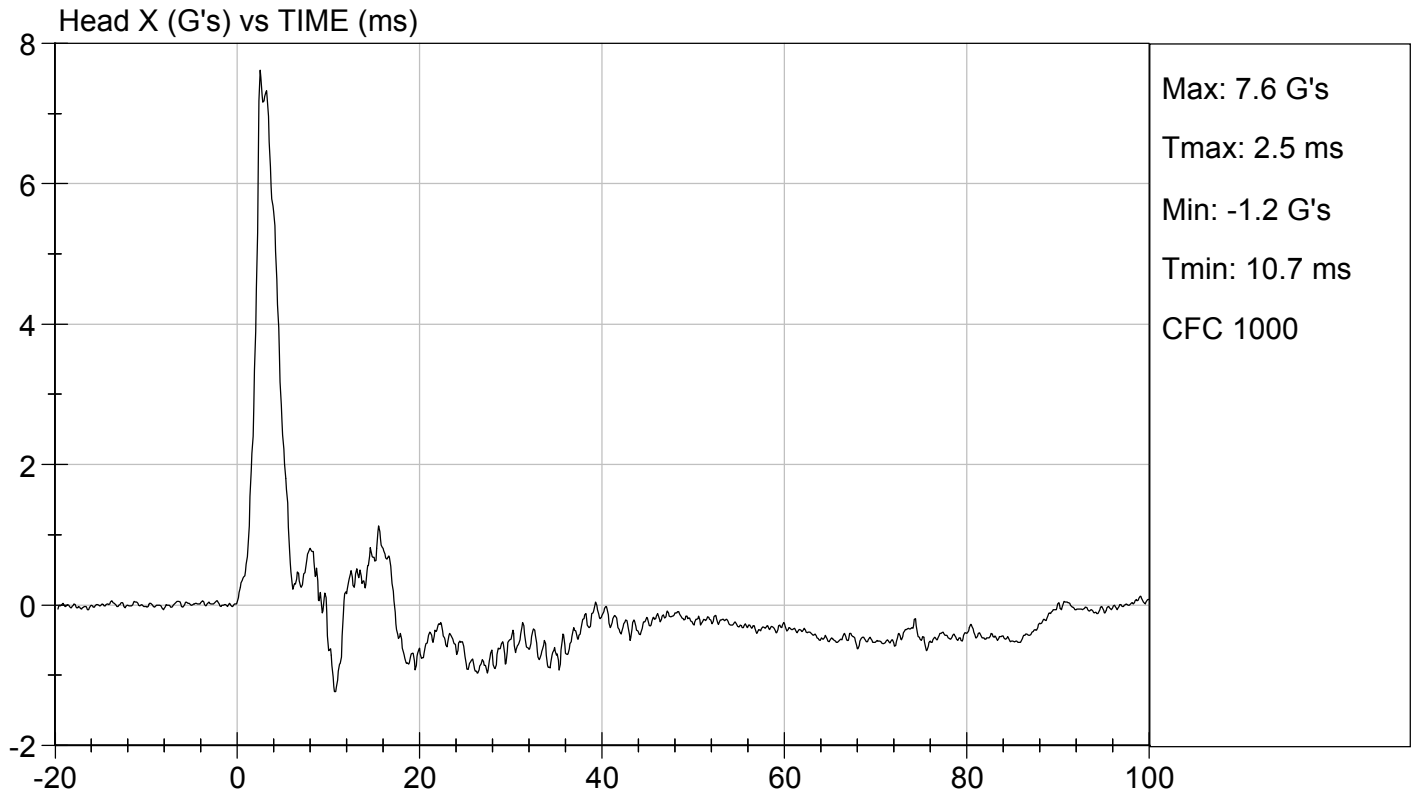
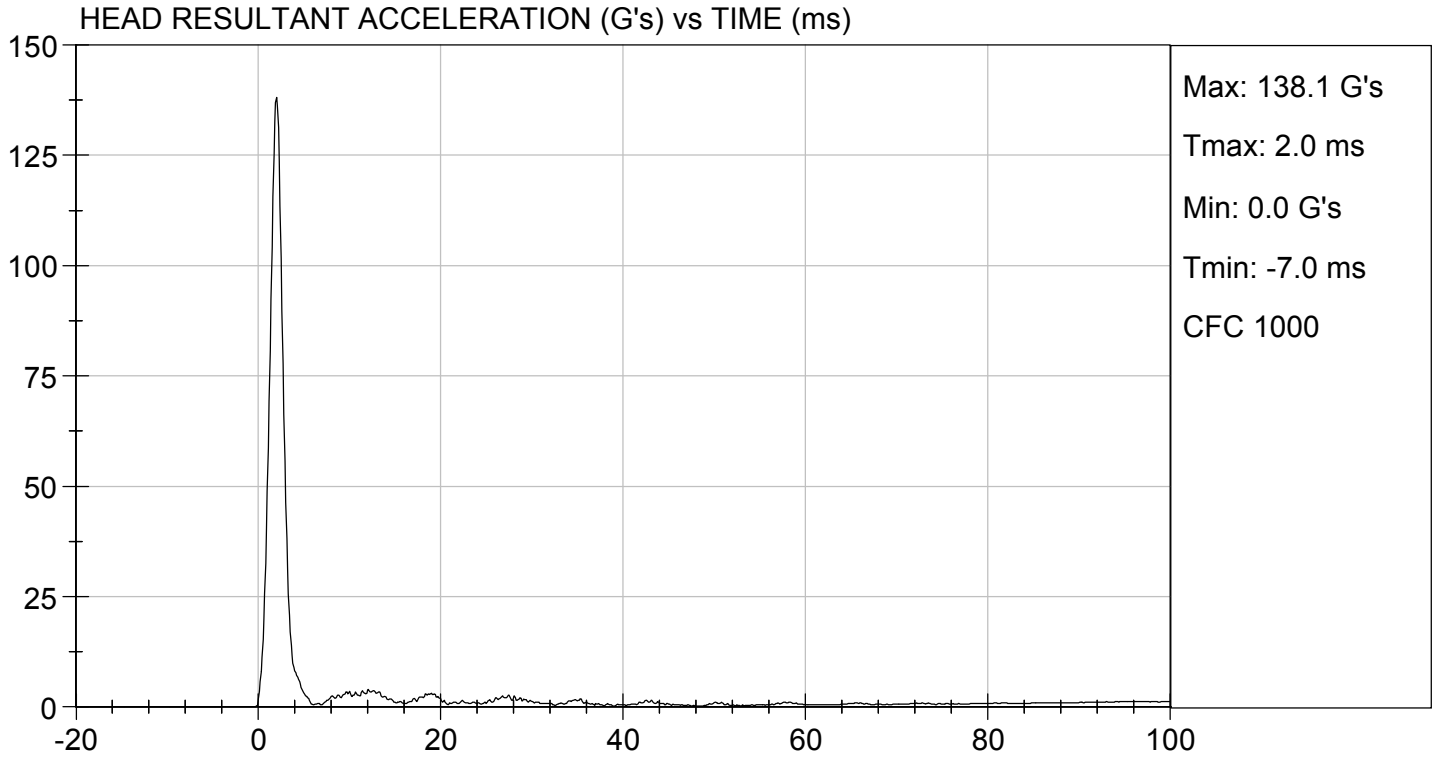


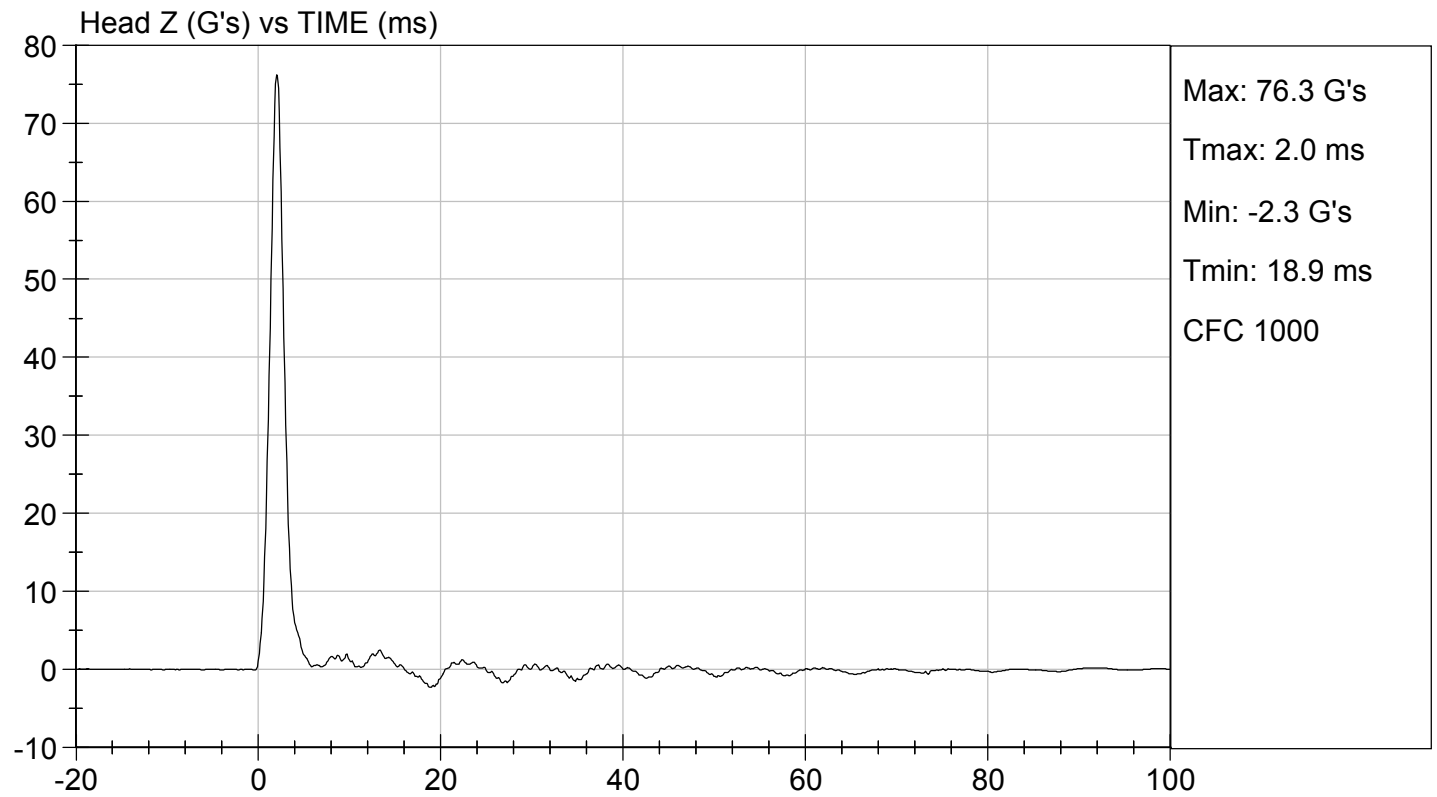
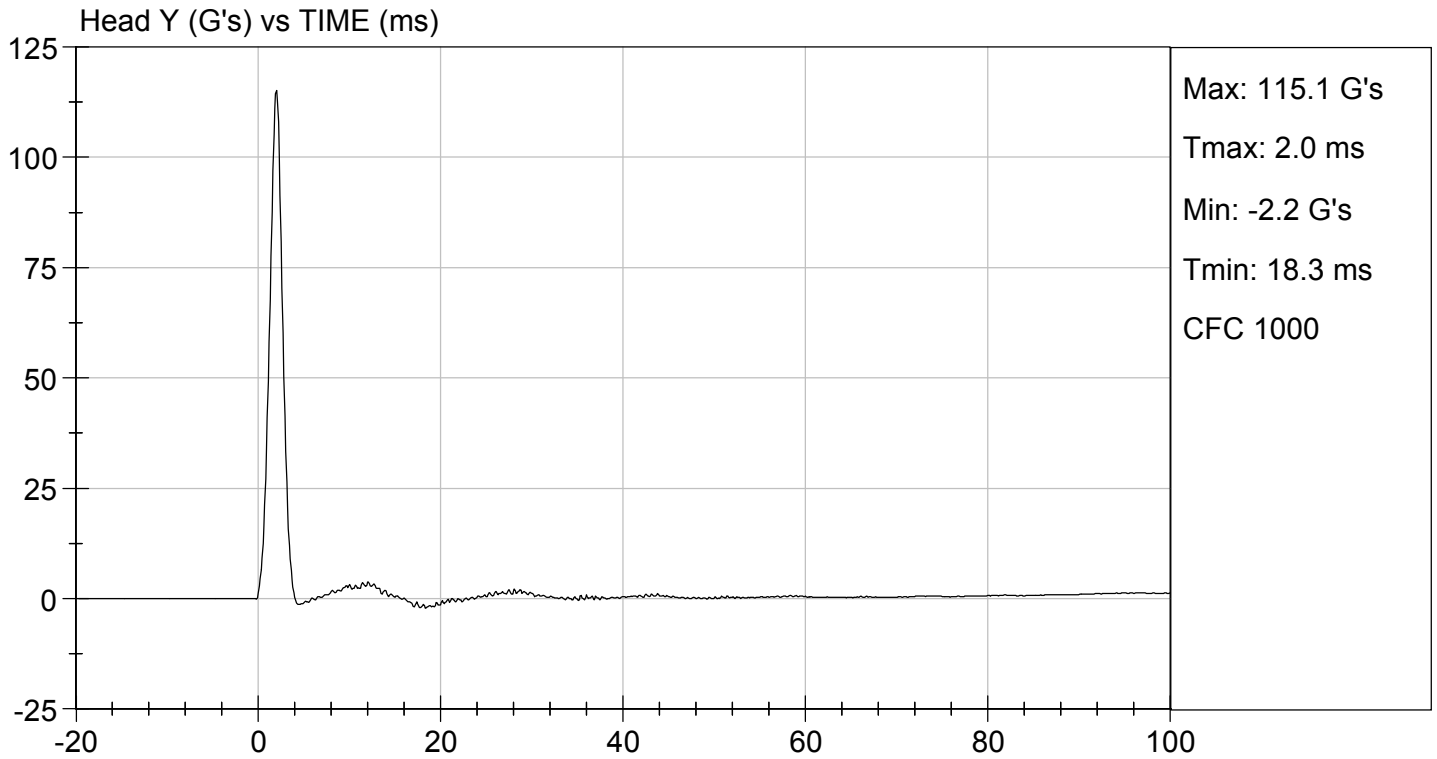
 Laboratory Technician

02/07/2019

 Test Date

Approved By _____





**MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY**

ATD Serial No: 032

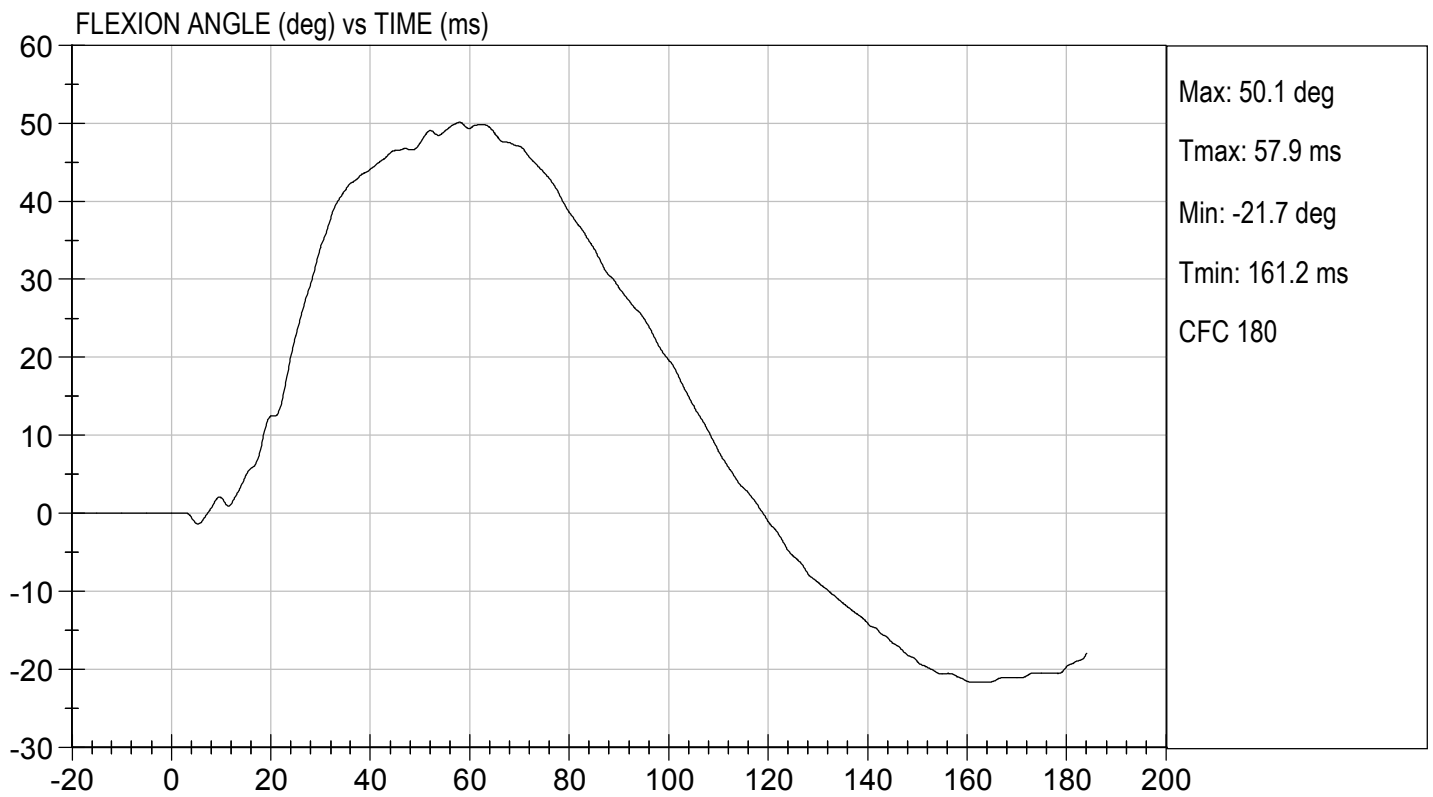
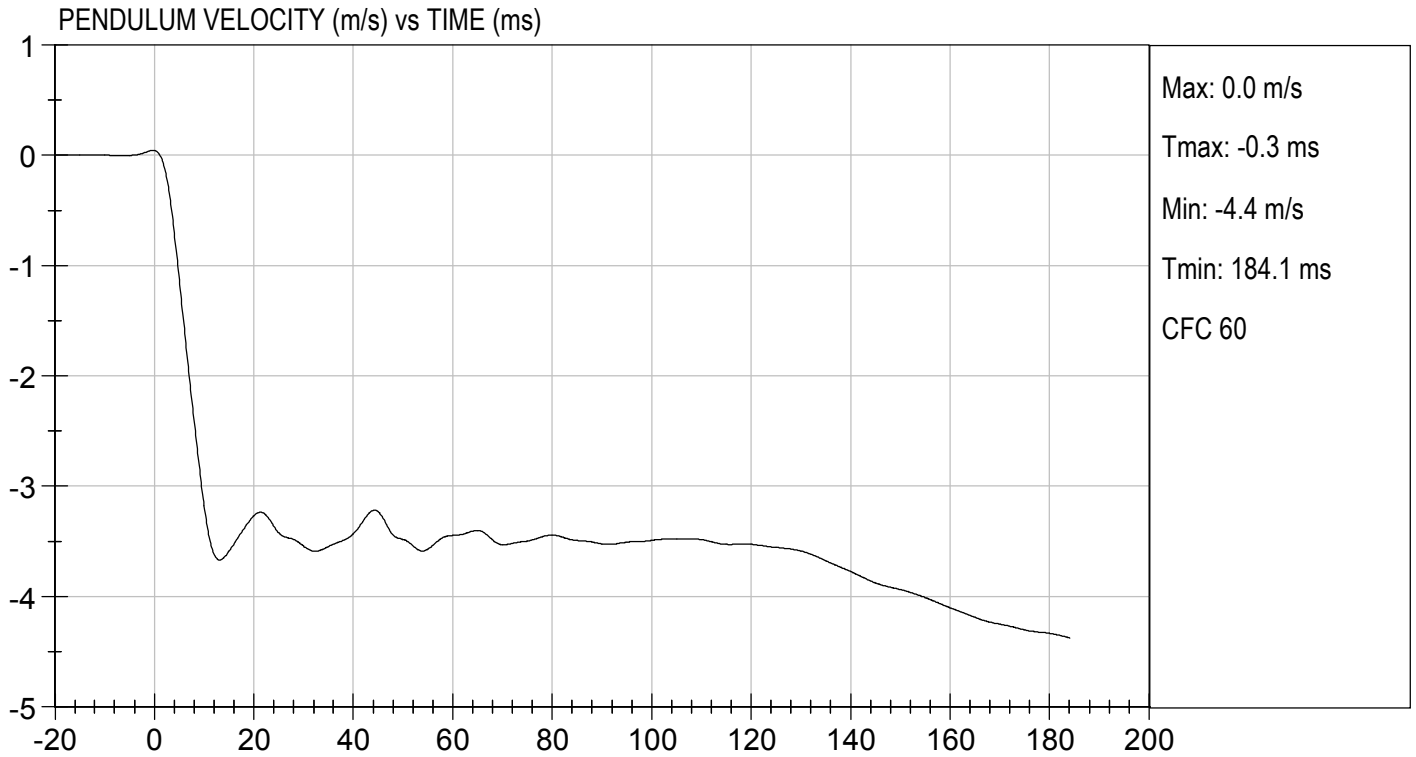
Test I.D: D190522

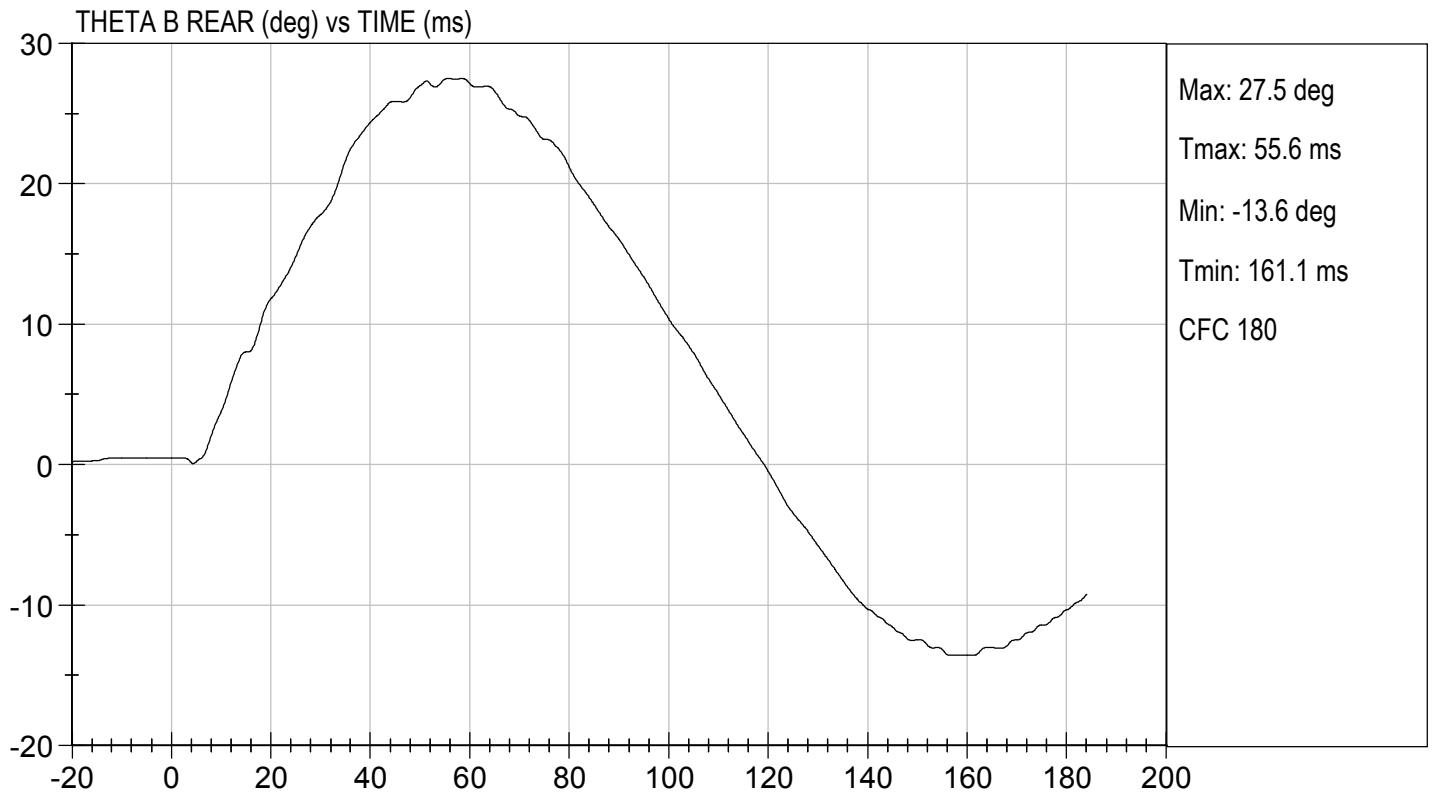
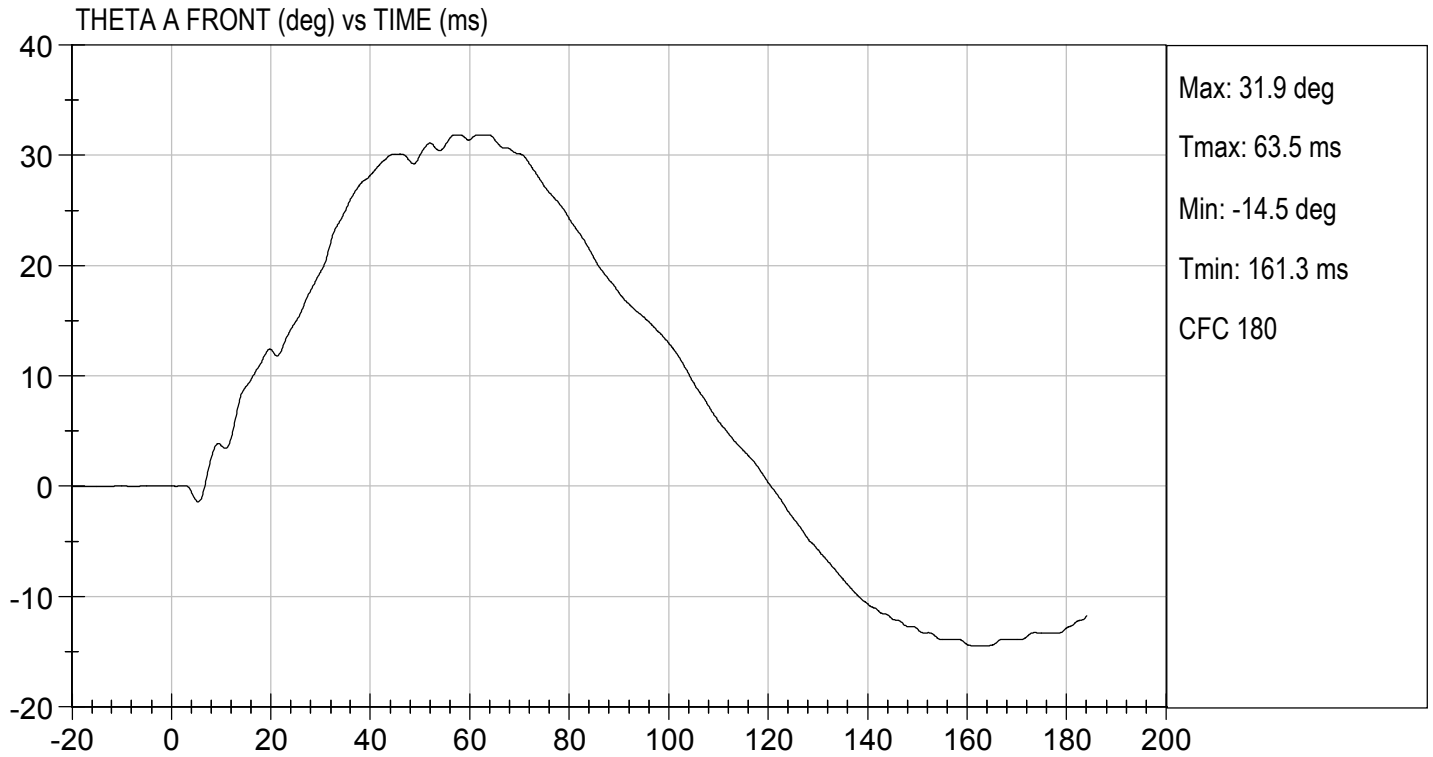
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass	
Laboratory Relative Humidity	%	10 to 70	32	Pass	
Pendulum Speed	m/s	3.30 to 3.50	3.50	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.35	Pass
	14 ms	m/s	-3.20 to -3.70	-3.65	Pass
	17 ms	m/s	>= -3.70	-3.45	Pass
Maximum Flexion Angle	deg	49.0 to 59.0	50.1	Pass	
Time of Maximum Flexion Angle	ms	54.0 to 66.0	57.9	Pass	
Head Rotation Decay Time to 0 Degree	ms	53.0 to 88.0	61.1	Pass	
Overall Results				Pass	

Danielle Redinlaugh
Laboratory Technician

02/06/2019
Test Date

Approved By _____

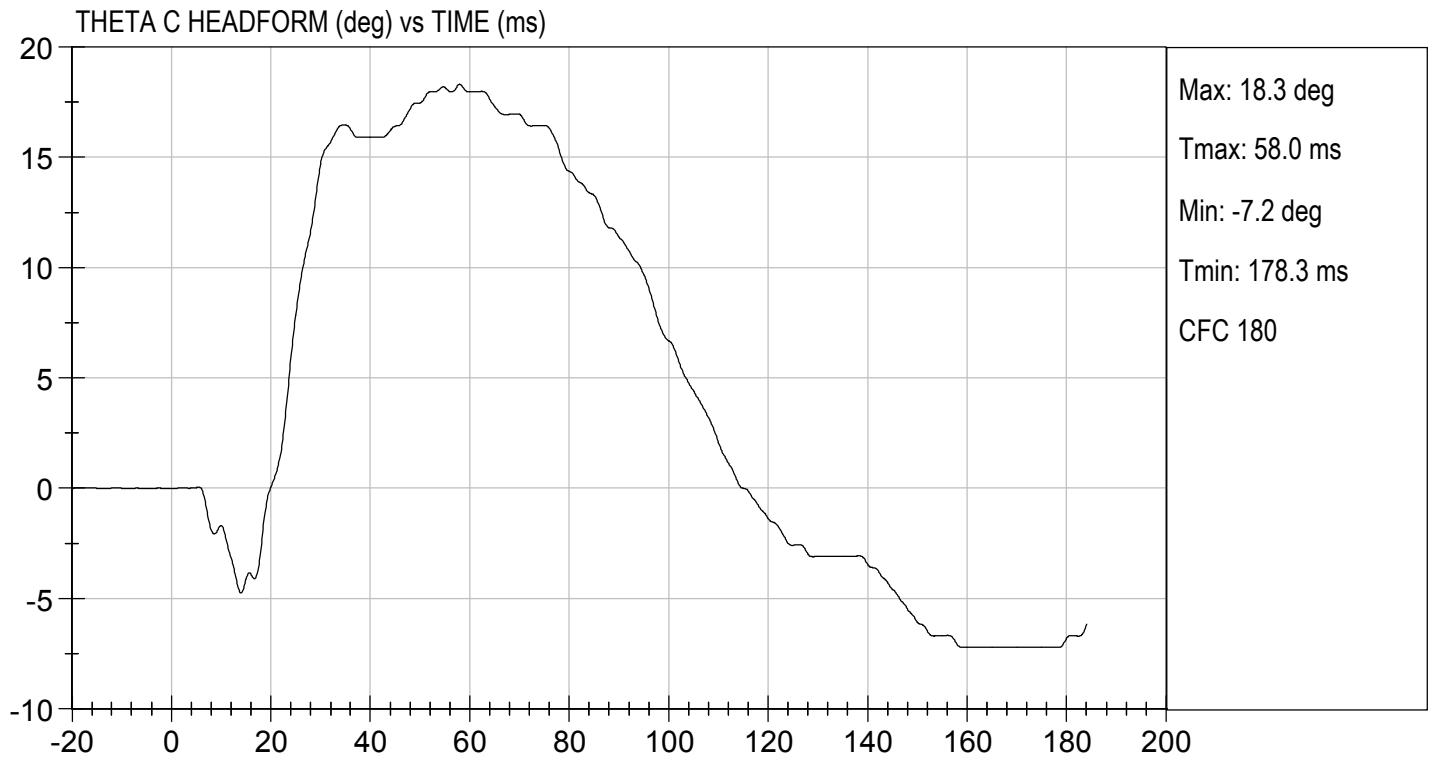






TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 02/06/2019
TEST #: D190522



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190523

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	32	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.21	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.3	Pass
Overall Test Results				Pass

Danielle Redinlaugh
 Laboratory Technician

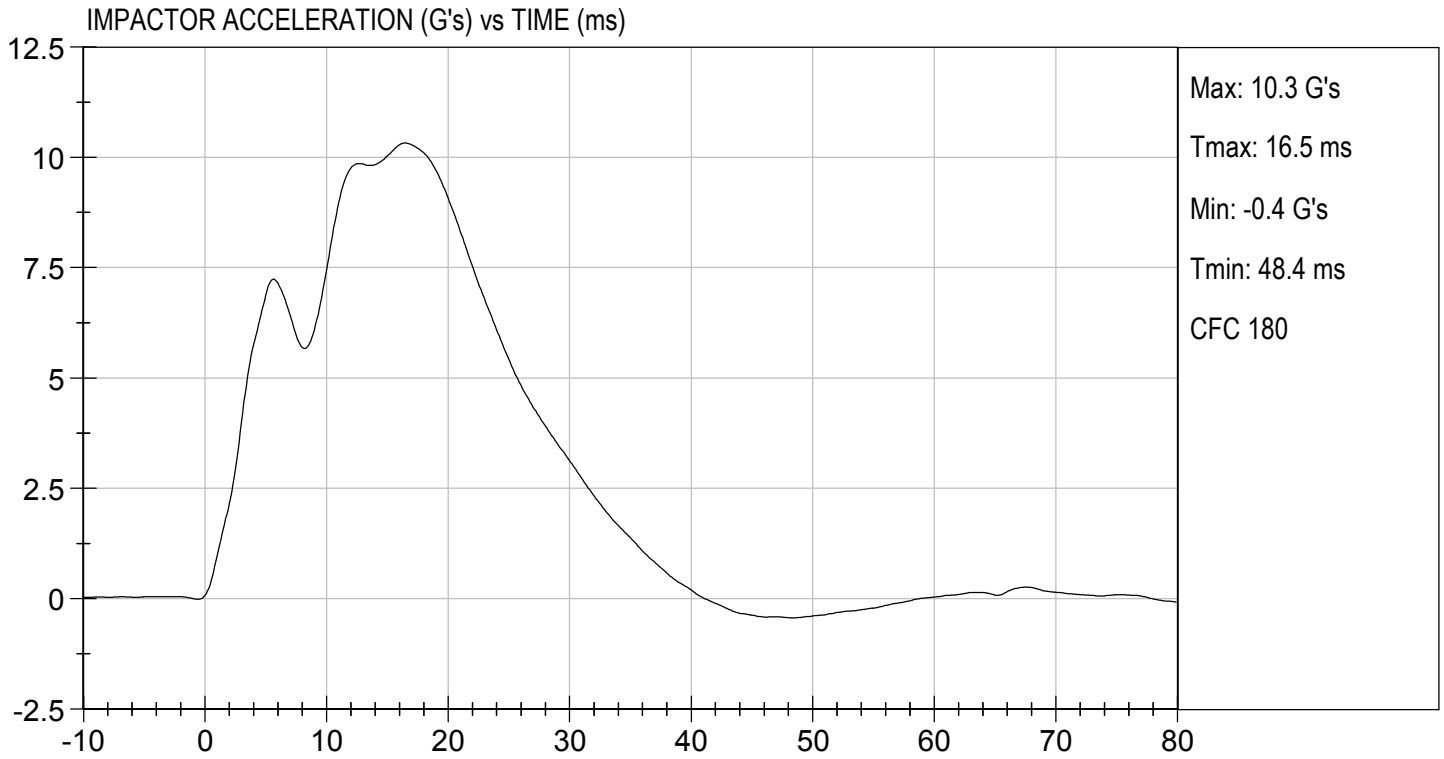
02/07/2019
 Test Date

Approved By _____



TEST DESC: SHOULDER IMPACT
VELOCITY: 13.80 ft/s, 4.21 m/s

TEST DATE: 02/07/2019
TEST #: D190523



MGA RESEARCH CORPORATION

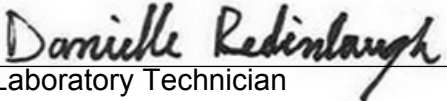
UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

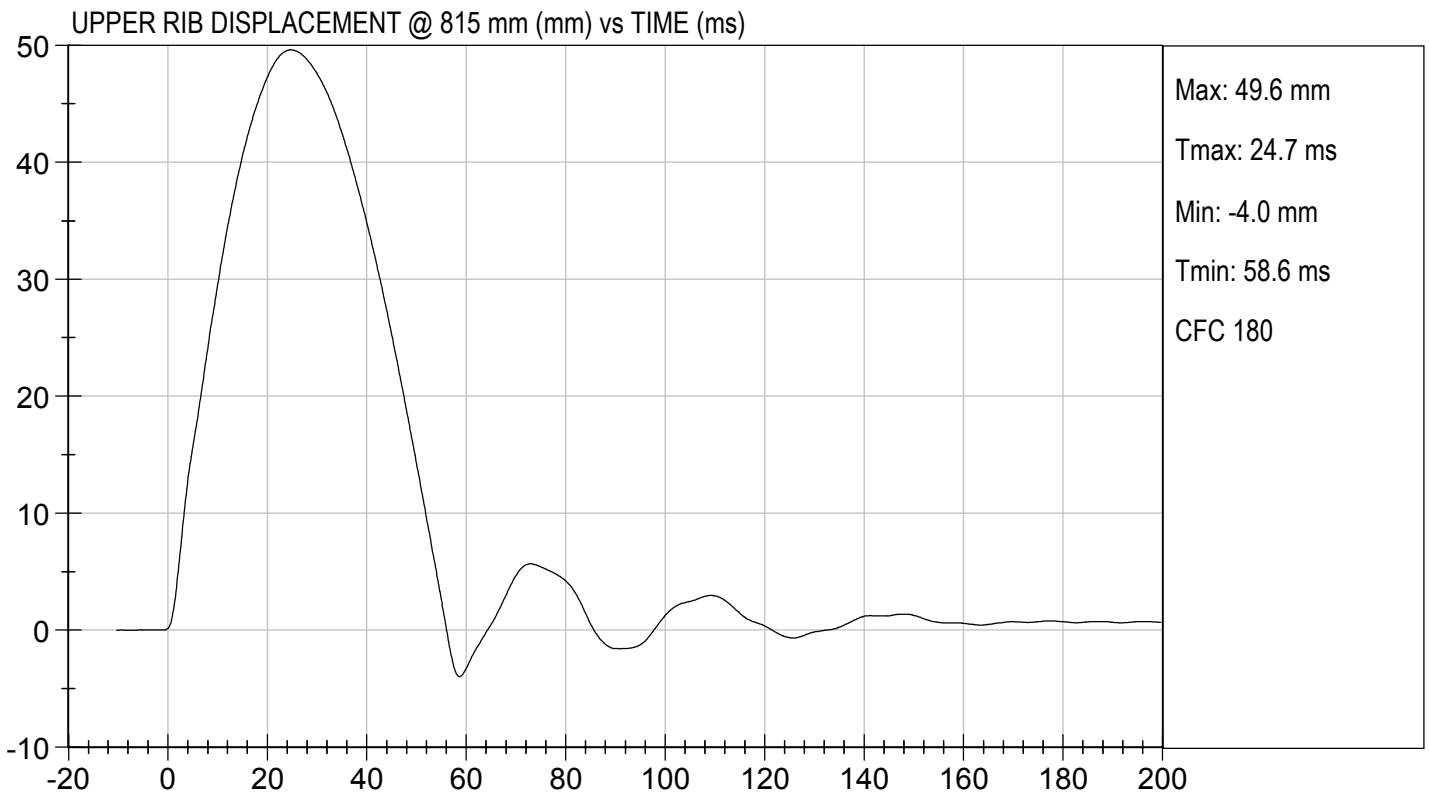
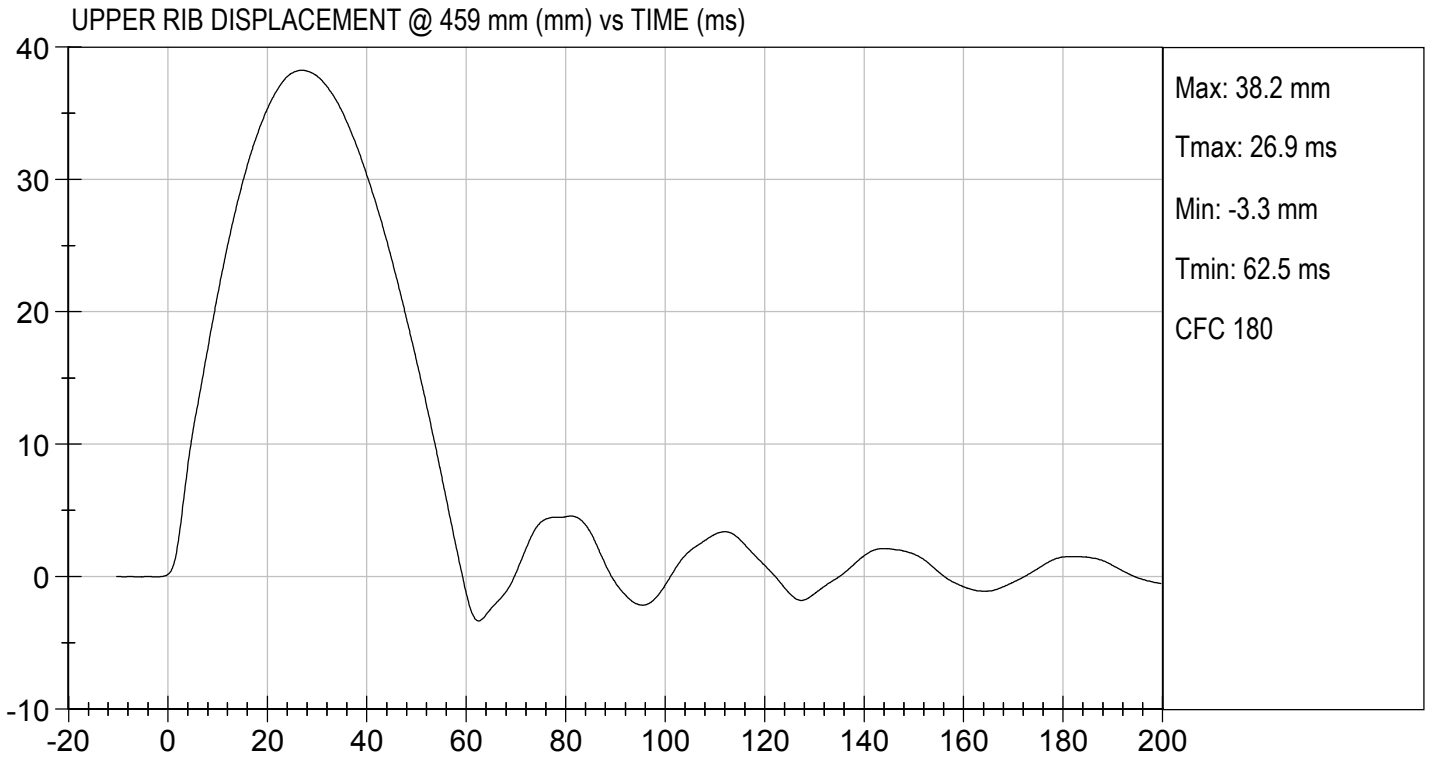
Test I.D: D190524

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.6	Pass
Overall Test Results				Pass


Laboratory Technician

02/07/2019
Test Date

Approved By _____



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MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

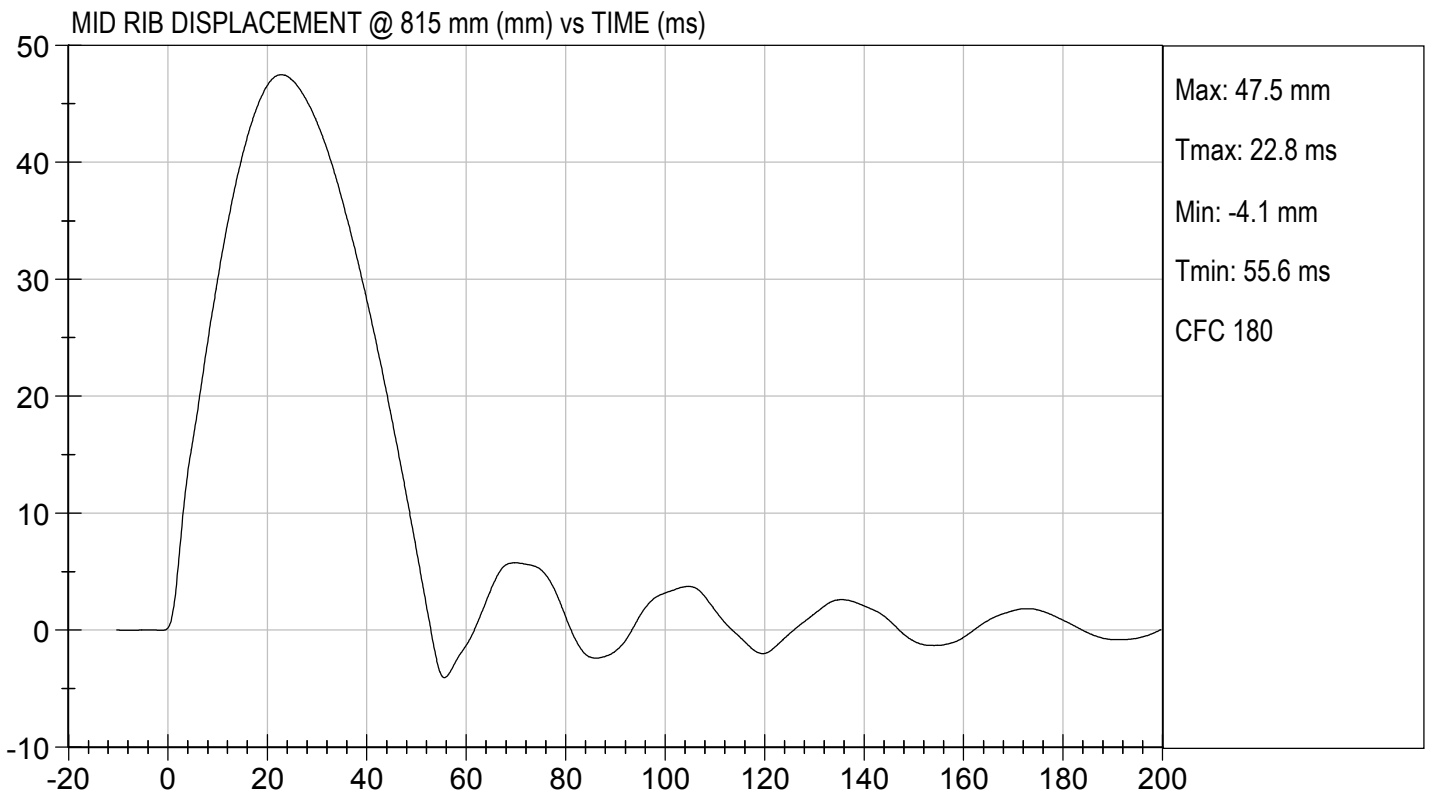
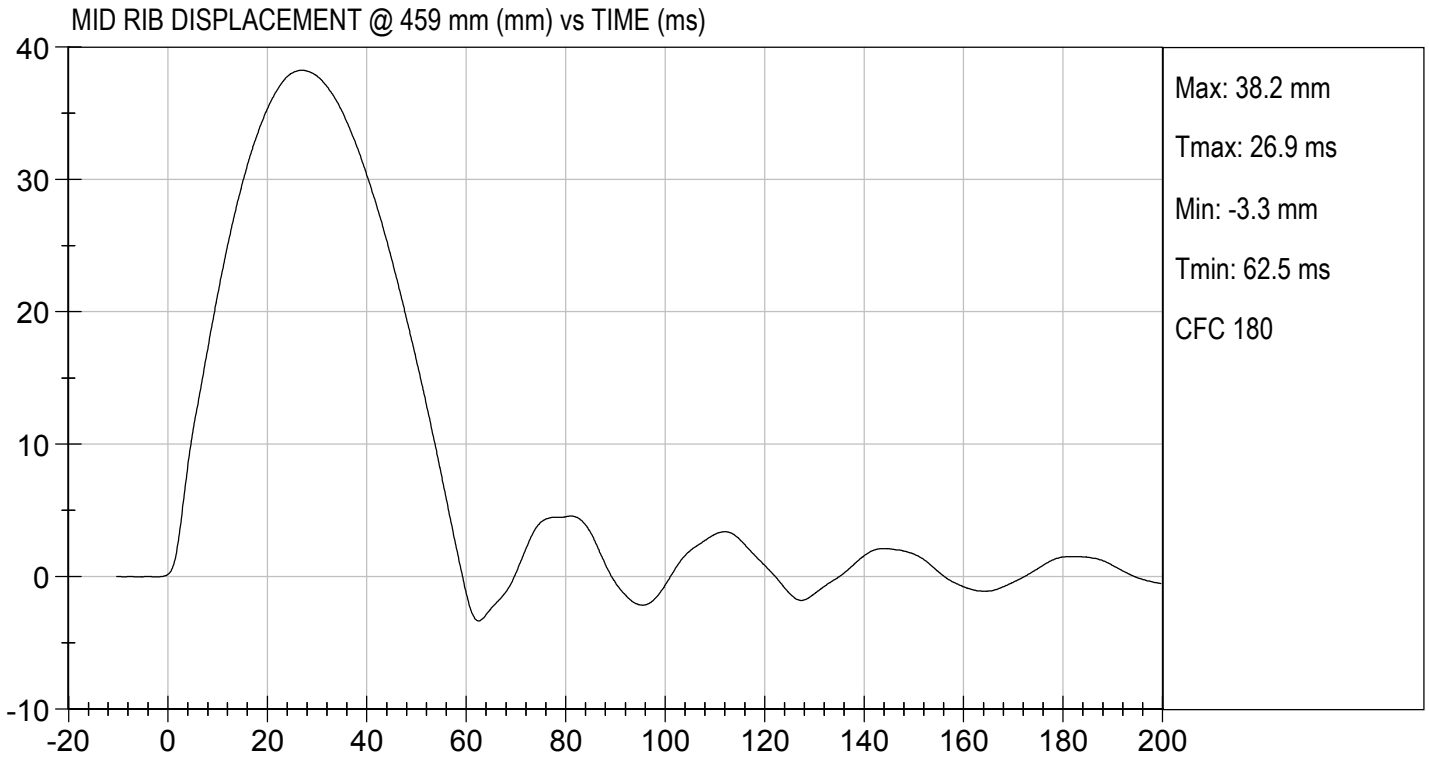
Test I.D.: D190525

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.5	Pass
Overall Test Results				Pass


Laboratory Technician

02/07/2019
Test Date

Approved By _____



MGA RESEARCH CORPORATION


LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

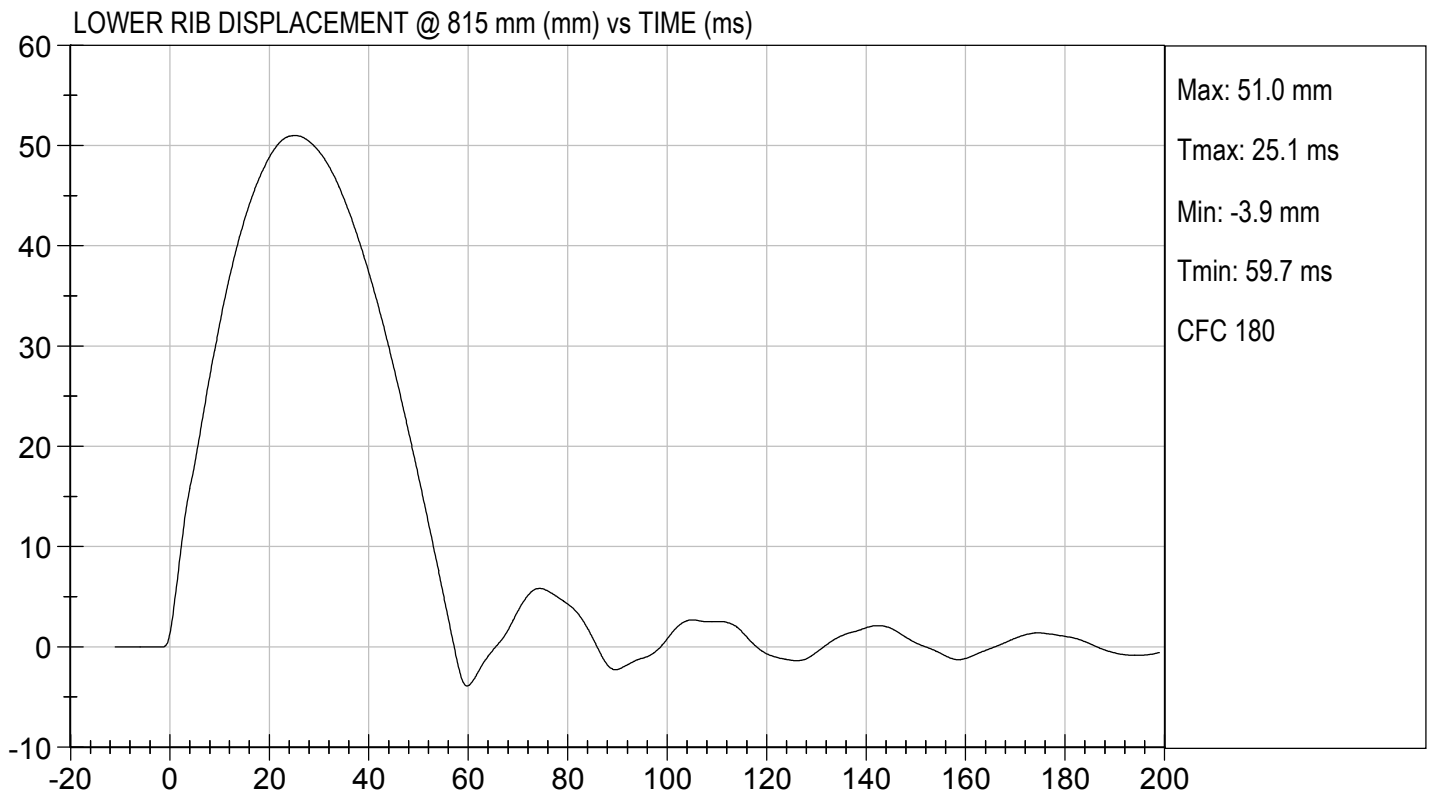
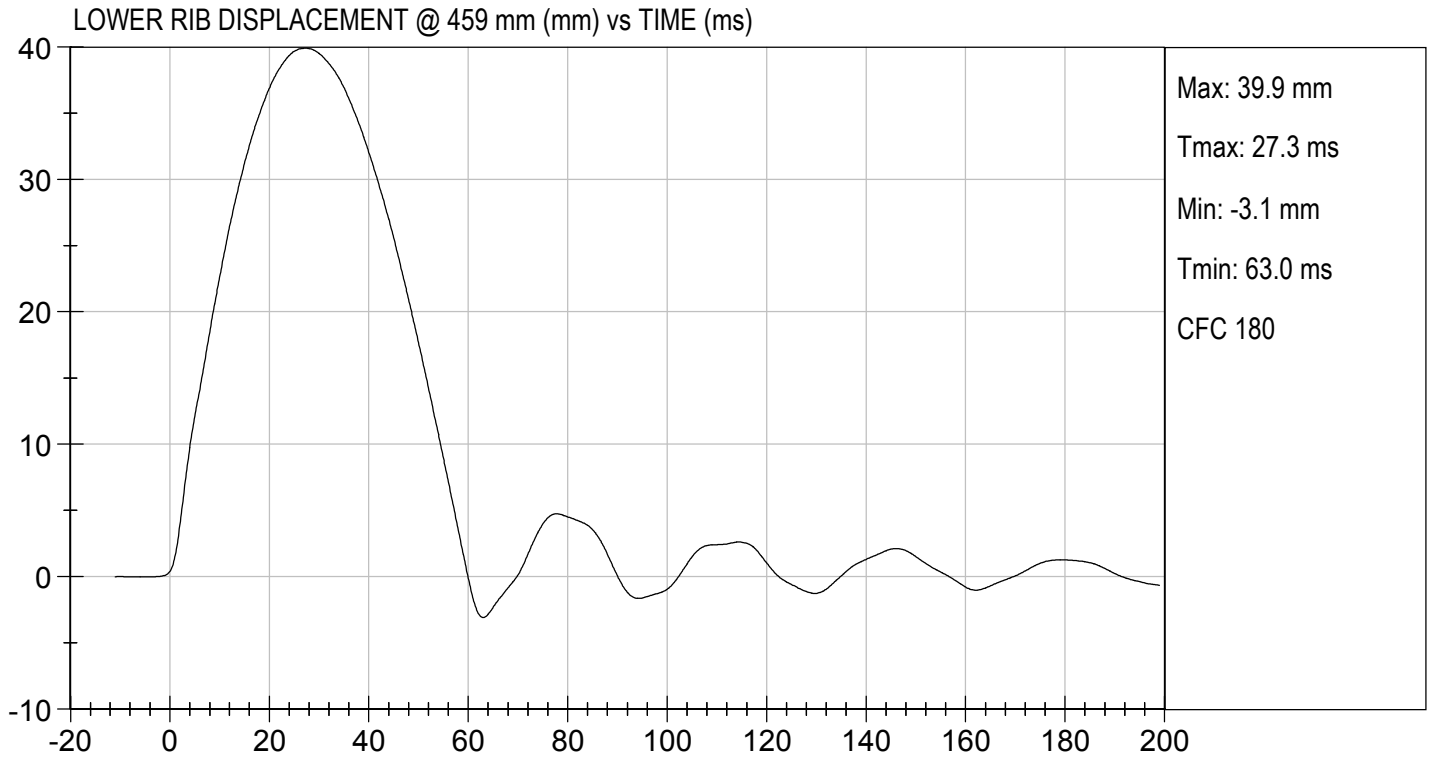
Test I.D.: D190526

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	51.0	Pass
Overall Test Results				Pass


Laboratory Technician

02/07/2019
Test Date

Approved By _____



MGA RESEARCH CORPORATION


ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190527

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	32	Pass
Probe Speed	m/s	3.90 to 4.10	4.08	Pass
Maximum Impactor Force	N	4000 to 4800	4258	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2417	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass


Laboratory Technician

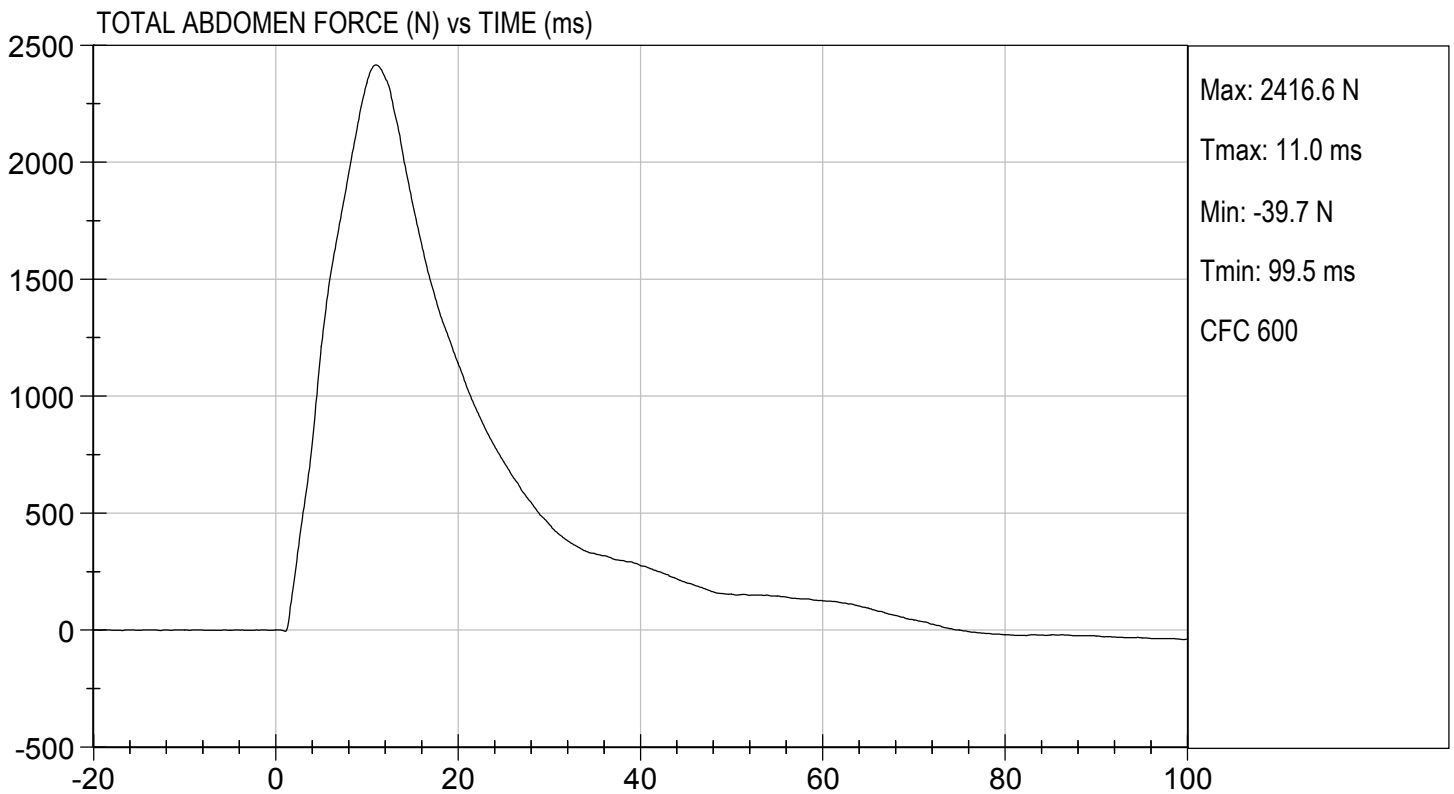
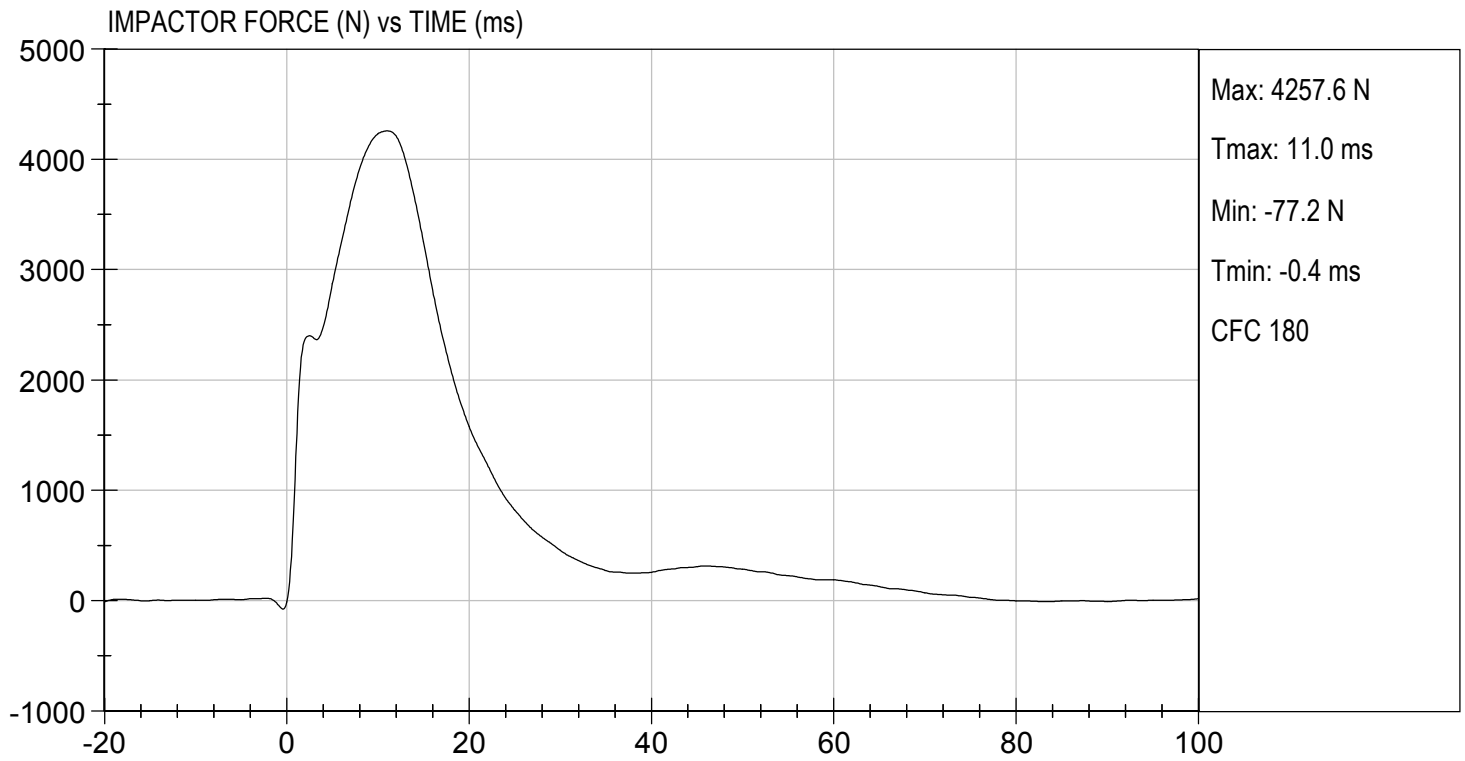
02/07/2019
Test Date

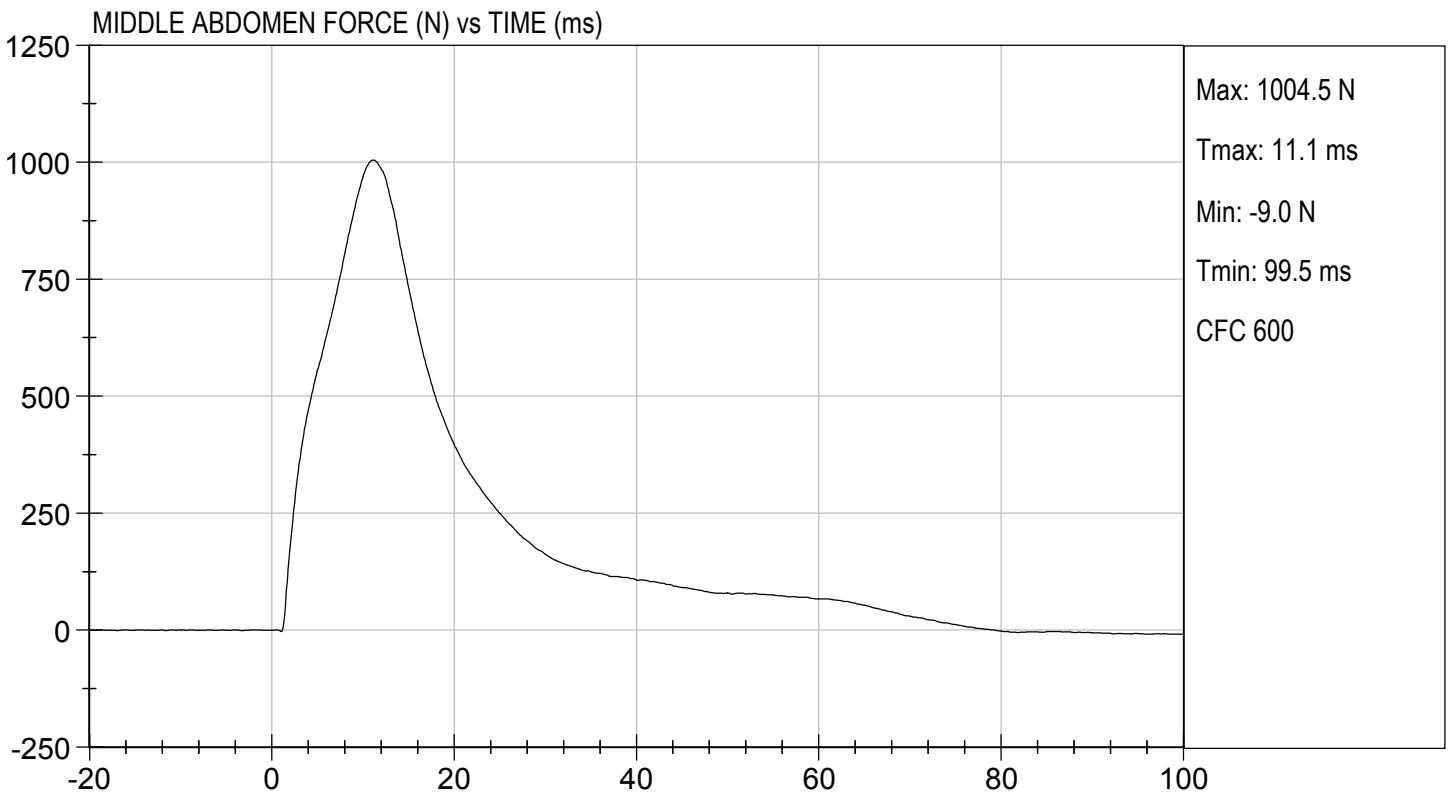
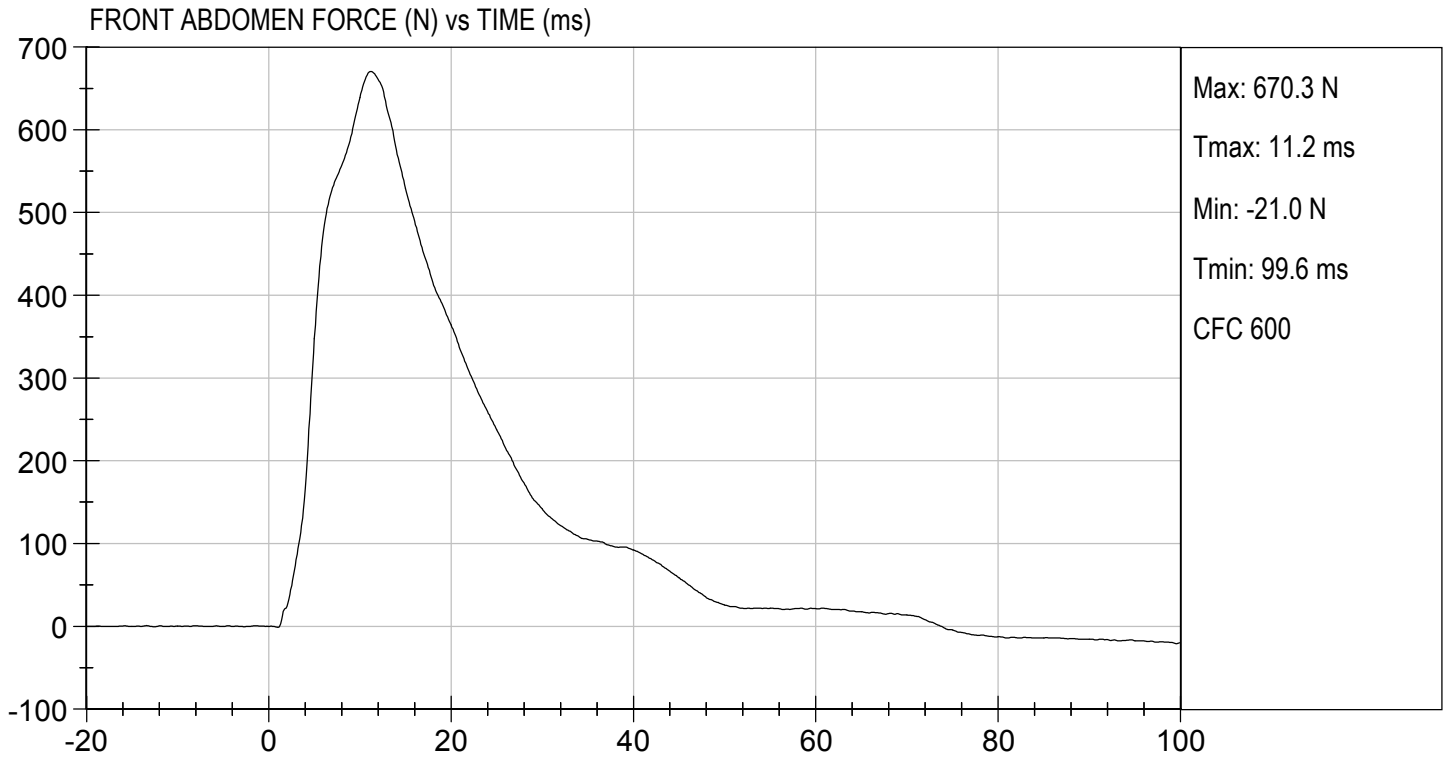
Approved By _____



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 02/07/2019
TEST #: D190527

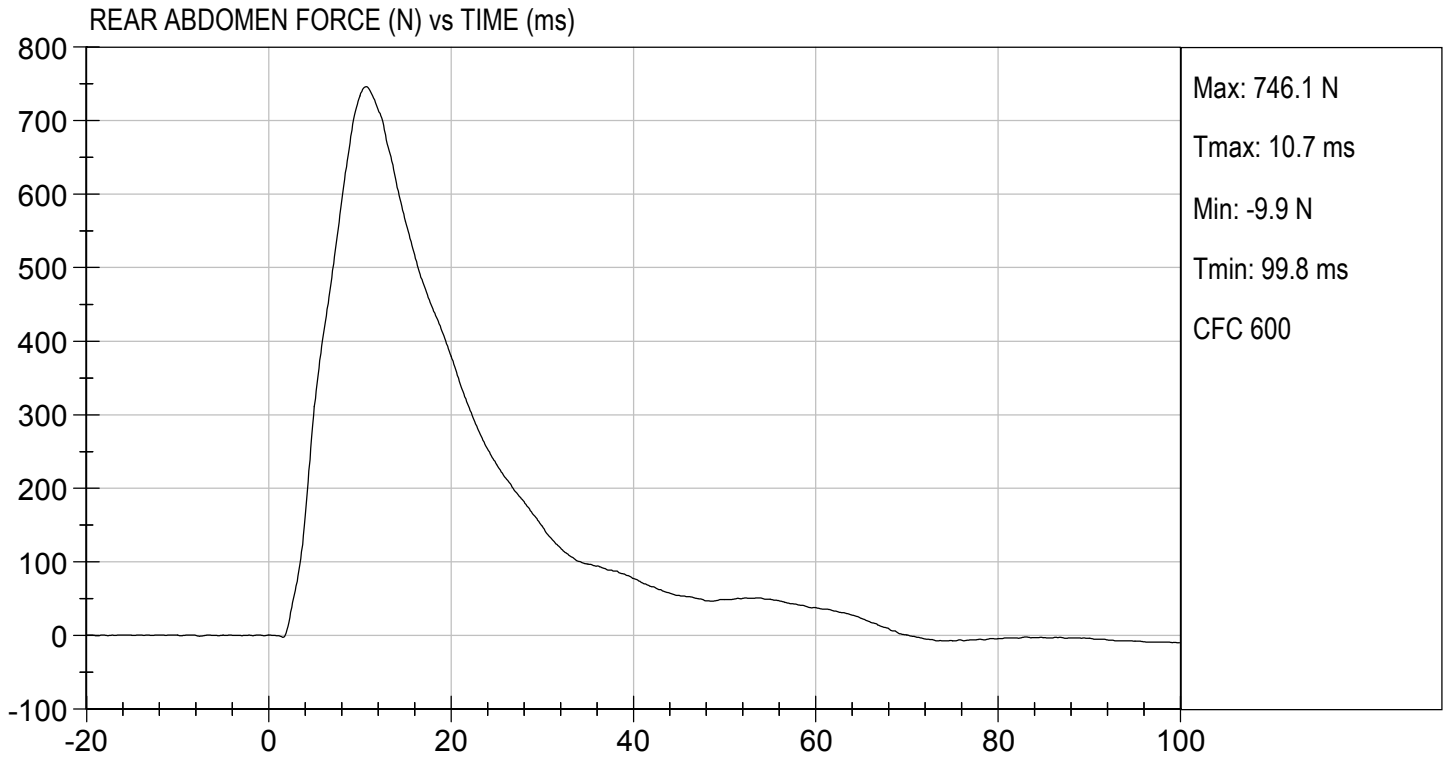






TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.40 ft/s, 4.08 m/s

TEST DATE: 02/07/2019
TEST #: D190527



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

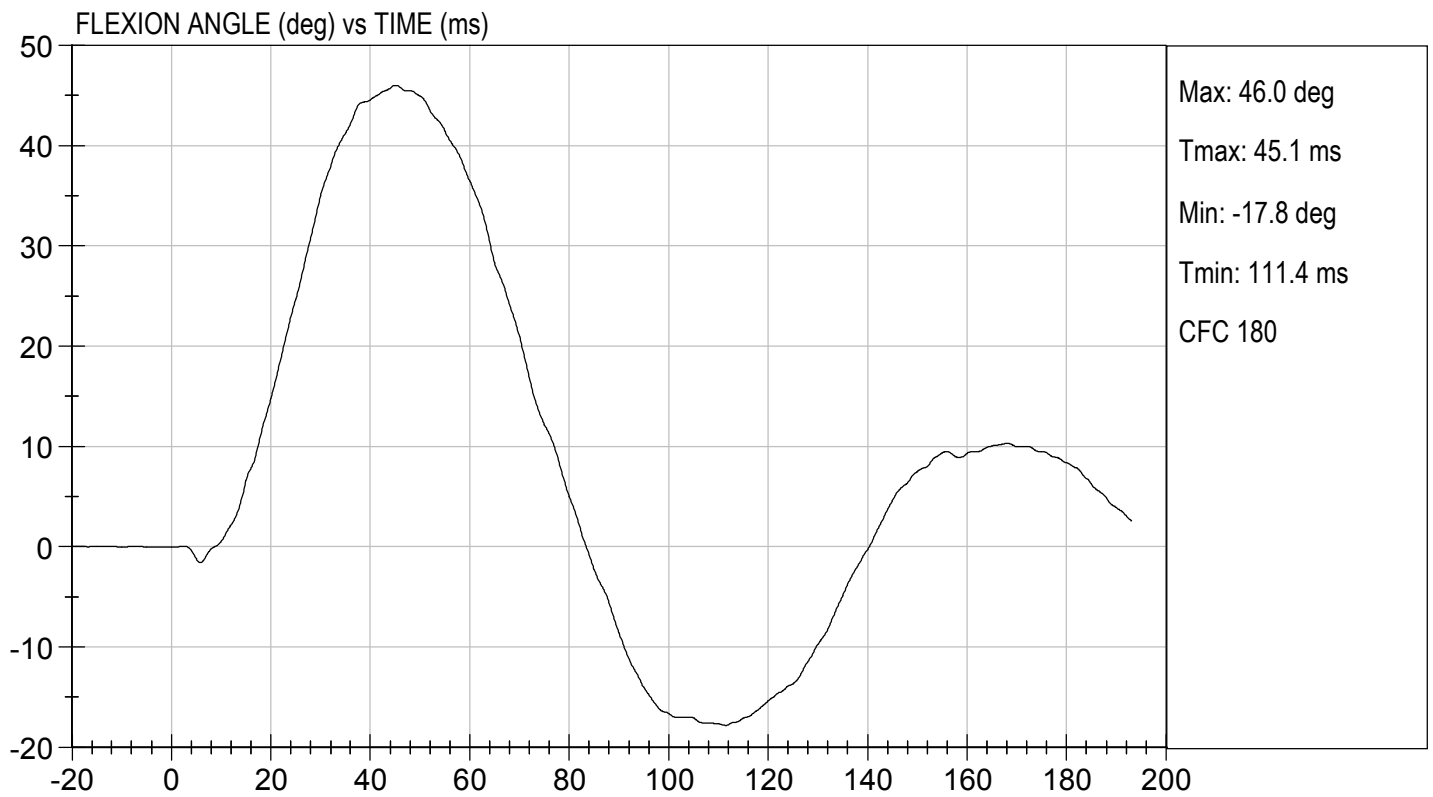
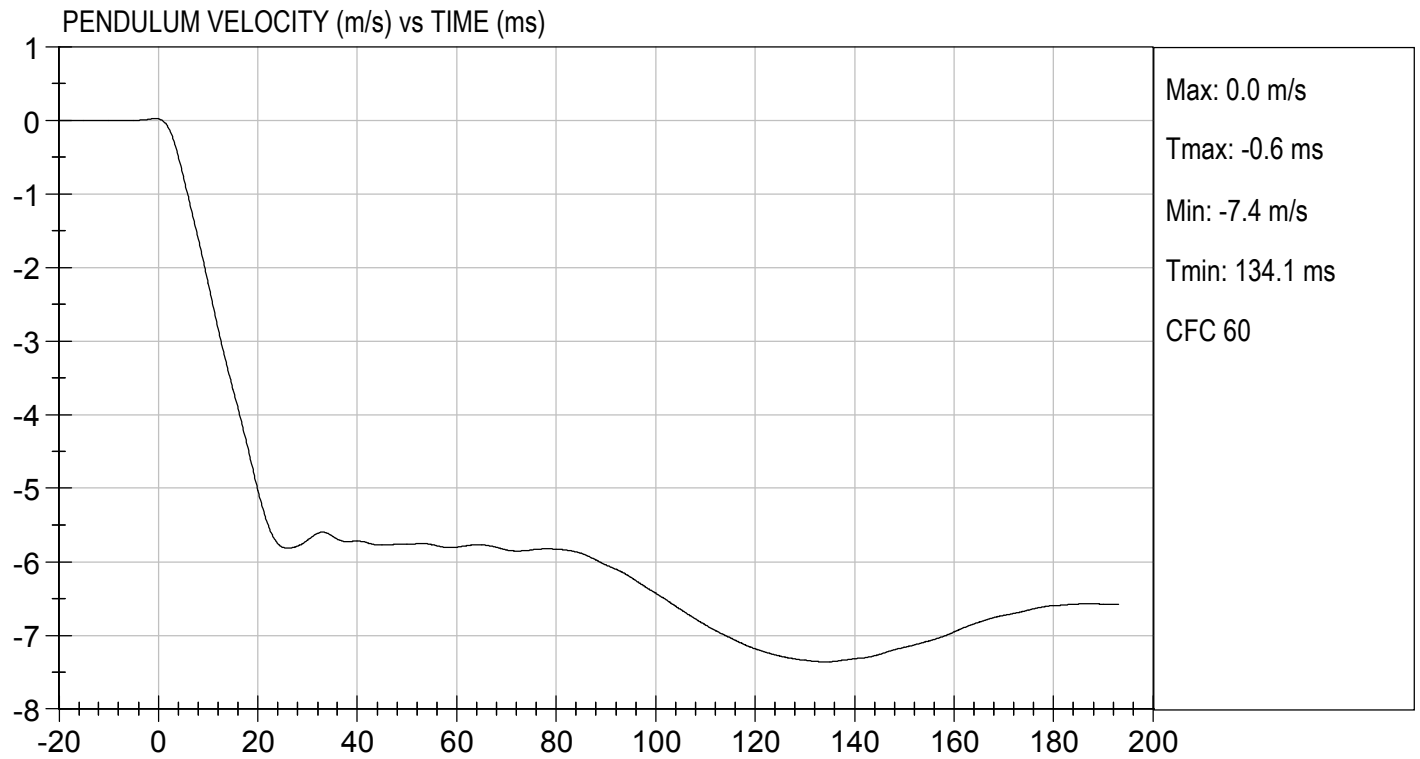
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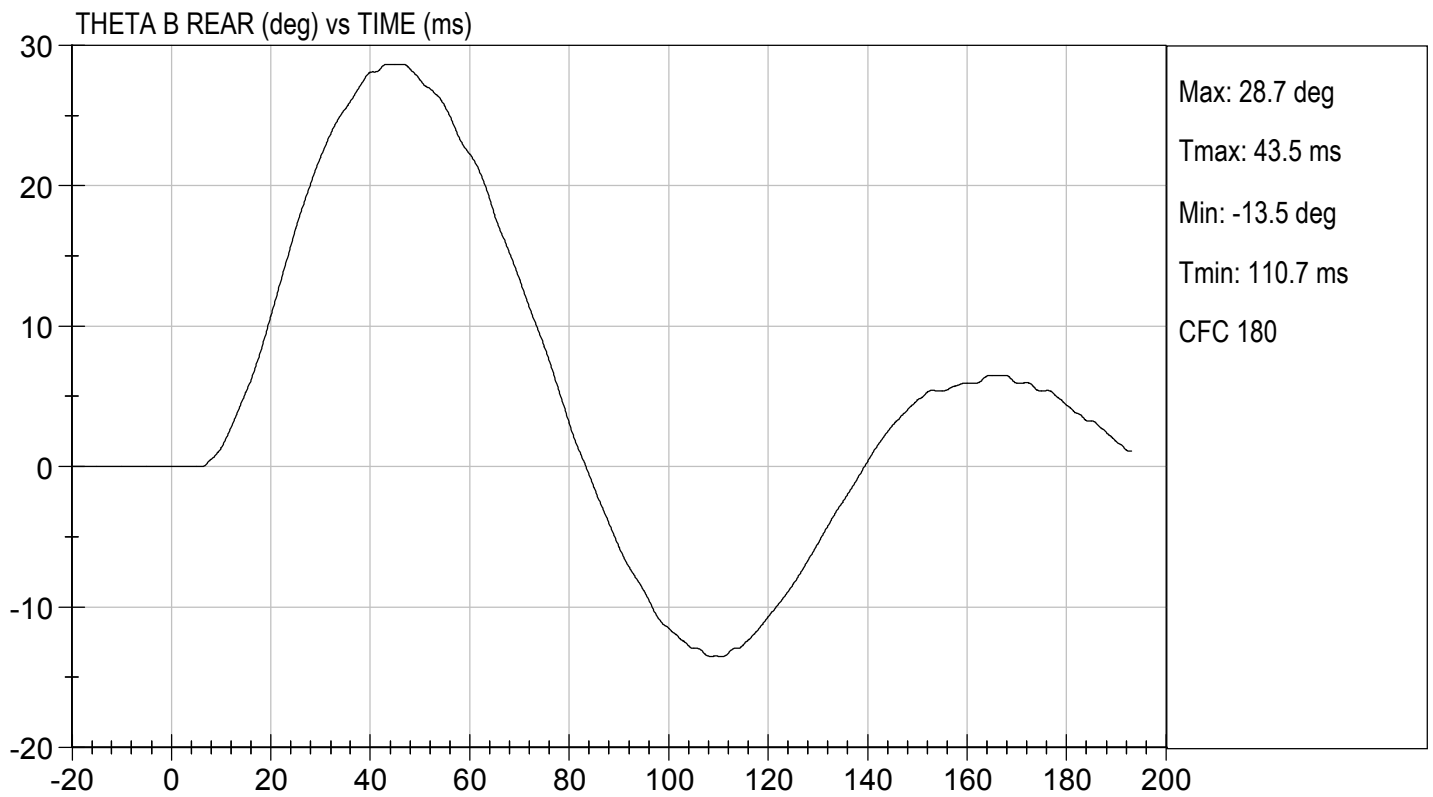
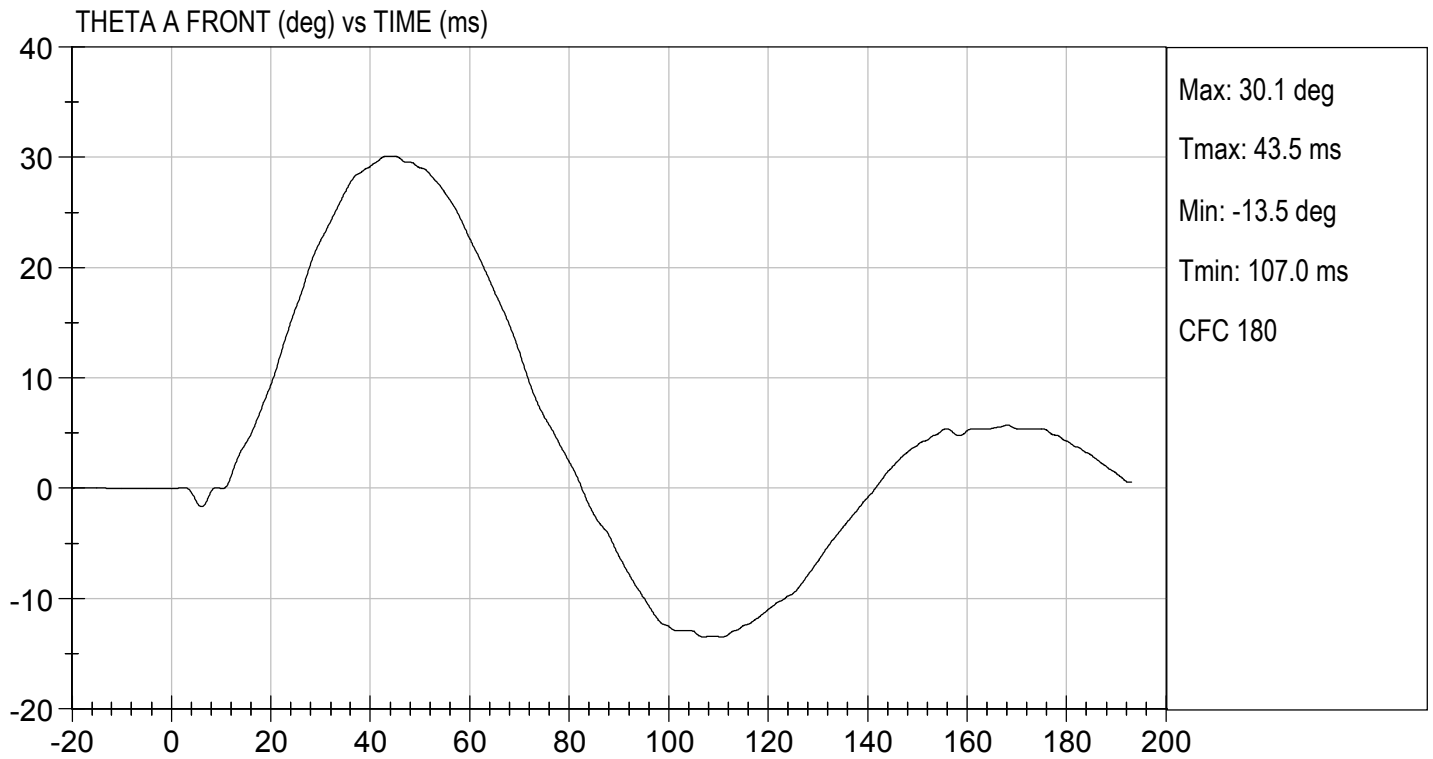
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass	
Laboratory Relative Humidity	%	10 to 70	32	Pass	
Pendulum Speed	m/s	5.95 to 6.15	6.12	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.415	Pass
	27 ms	m/s	-6.50 to -5.80	-5.81	Pass
	30 ms	m/s	>= -6.50	-5.71	Pass
Maximum Flexion Angle	deg	45.0 to 55.0	46.0	Pass	
Time of Maximum Flexion Angle	ms	39.0 to 53.0	45.1	Pass	
Headform Rotation Decay to Initial Position	ms	37 to 57	38	Pass	
Overall Results				Pass	

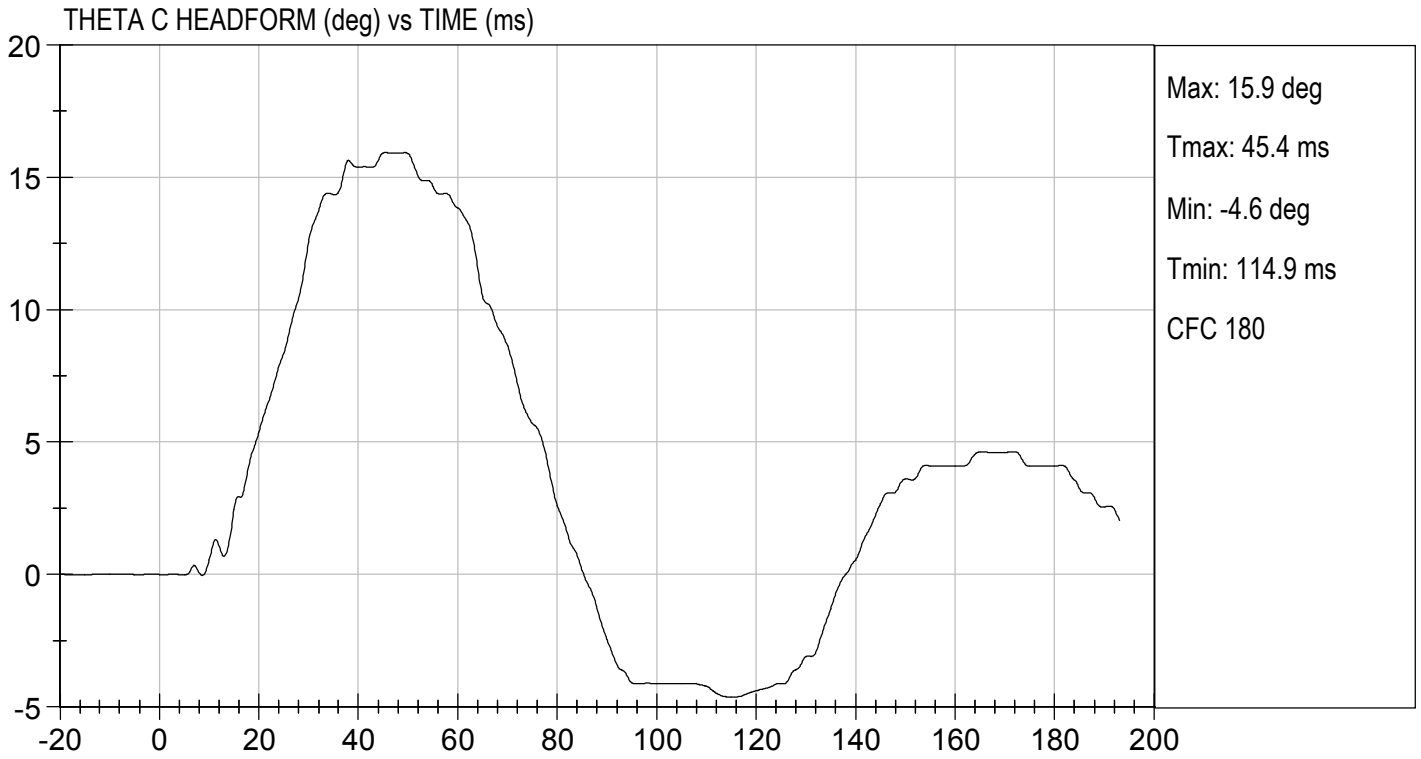
Danielle Redinlaugh
 Laboratory Technician

02/06/2019
 Test Date

Approved By _____







MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

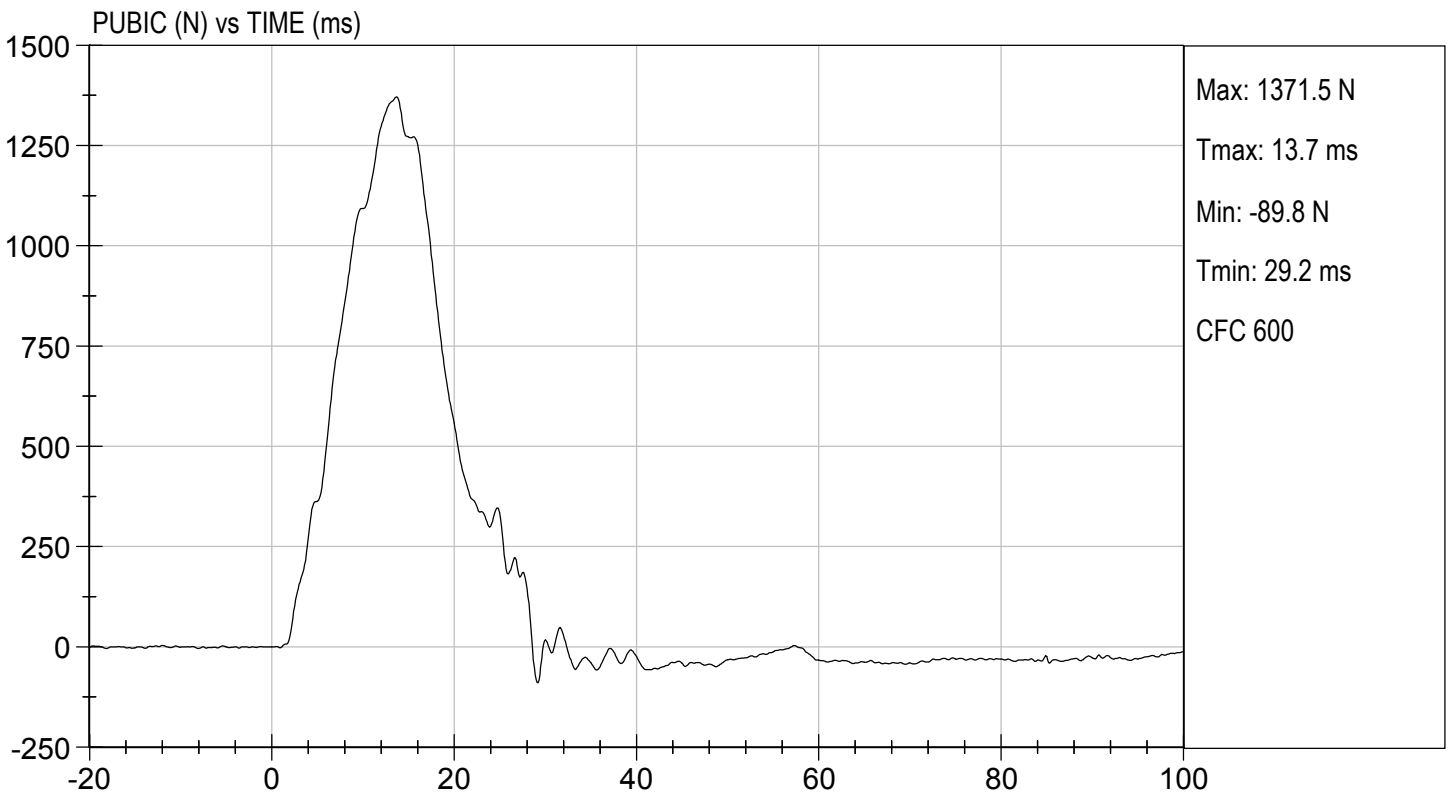
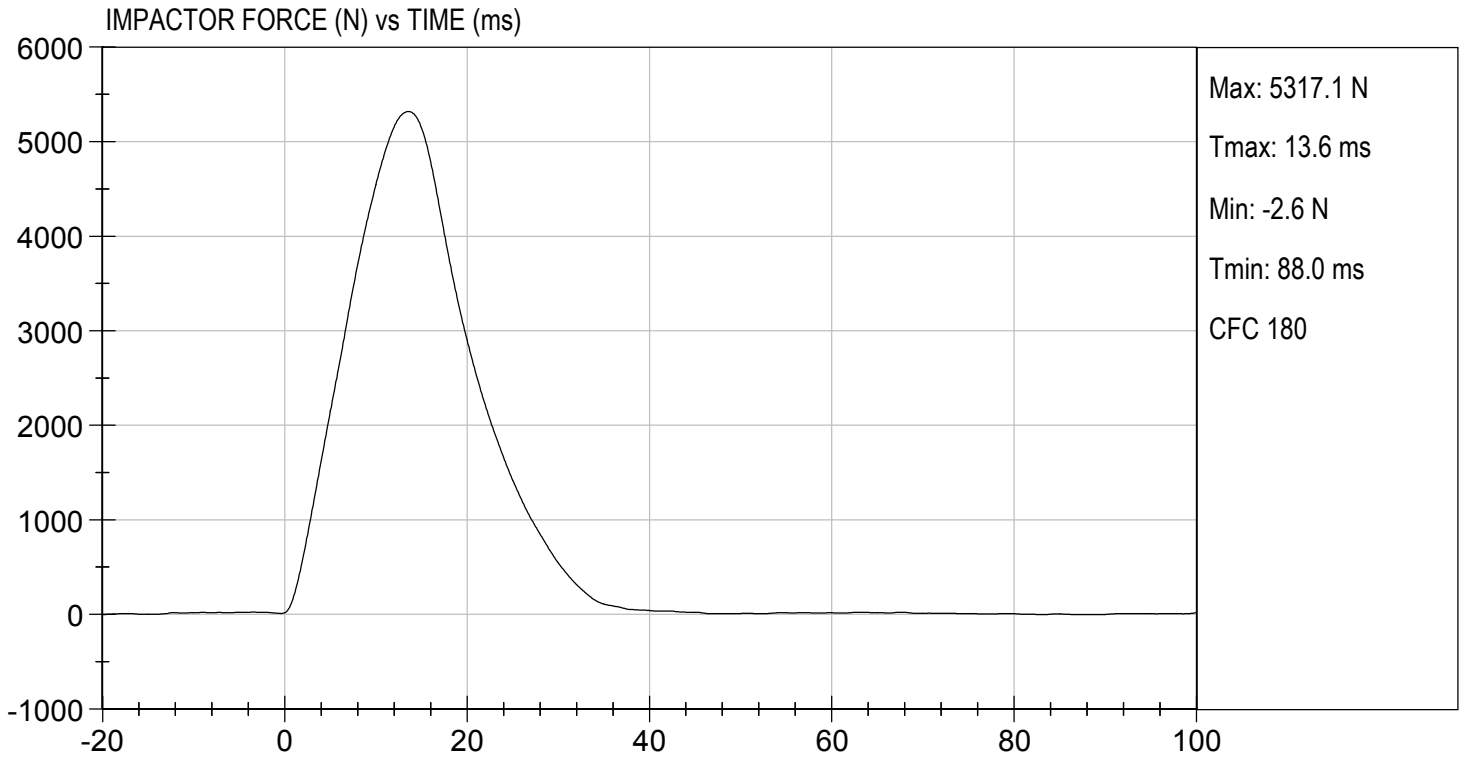
Test I.D: D190529

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	32	Pass
Probe Speed	m/s	4.20 to 4.40	4.39	Pass
Maximum Impactor Force	N	4700 to 5400	5317	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.6	Pass
Maximum Pubic Force	N	1230 to 1590	1372	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.7	Pass
Overall Test Results				Pass


Laboratory Technician

02/07/2019
Test Date

Approved By _____



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

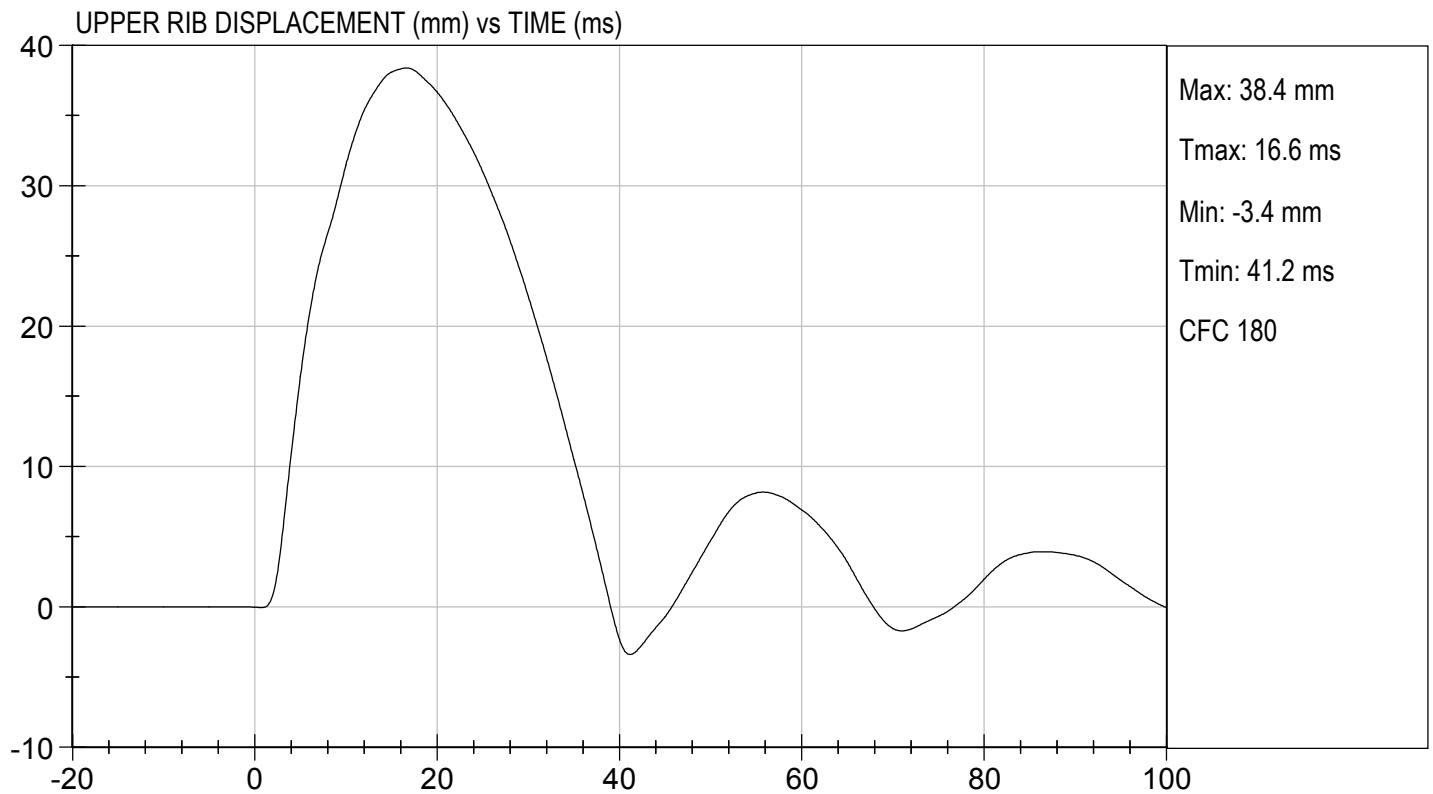
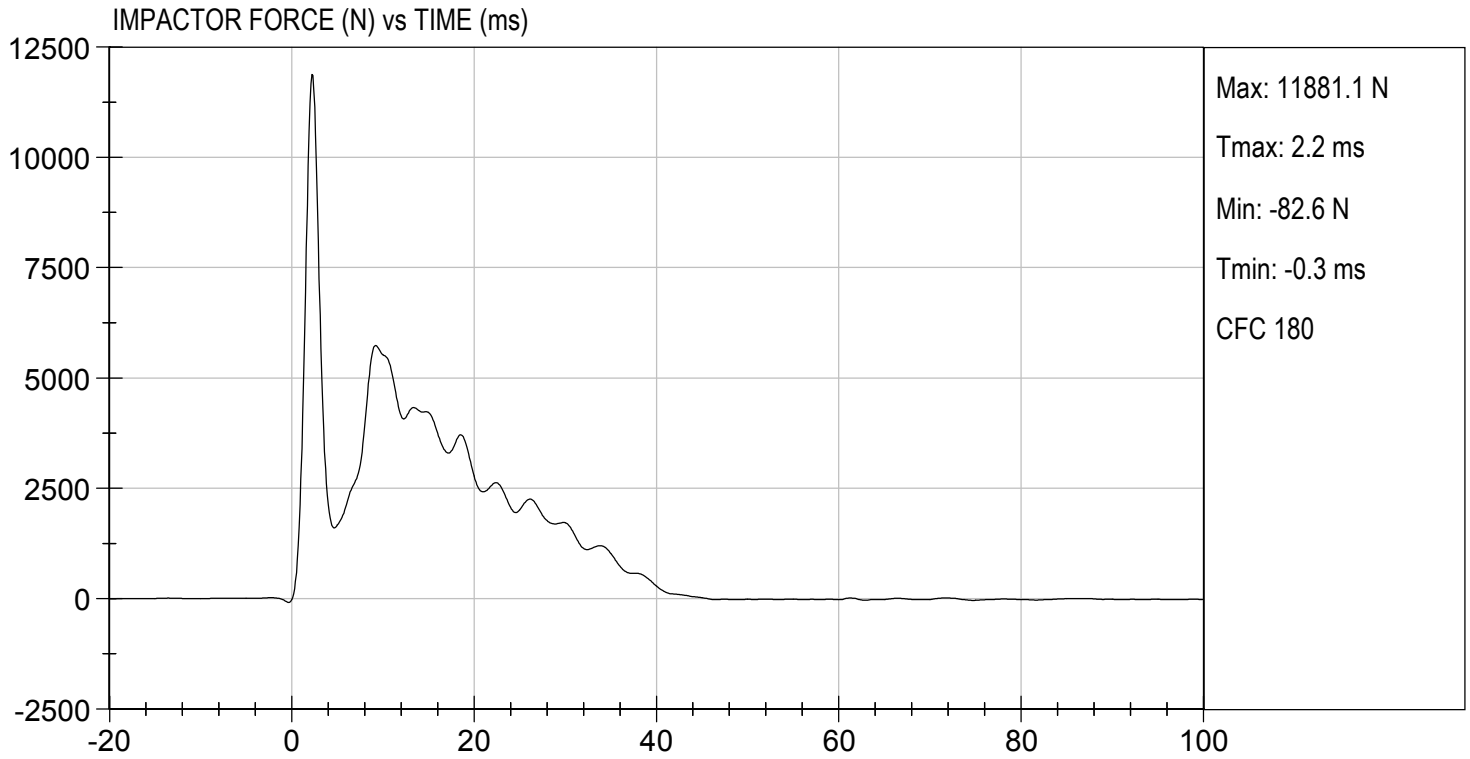
Test I.D: D190520

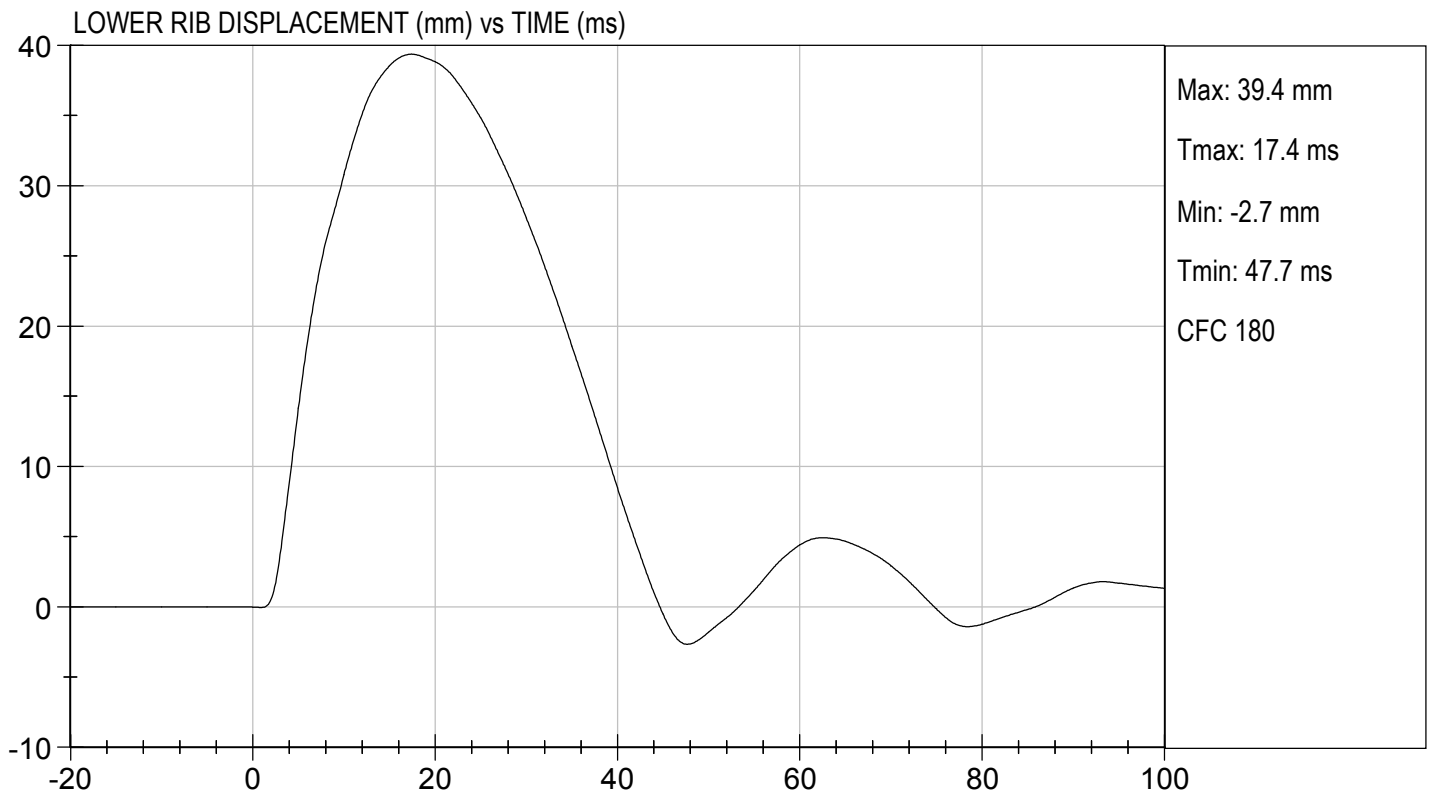
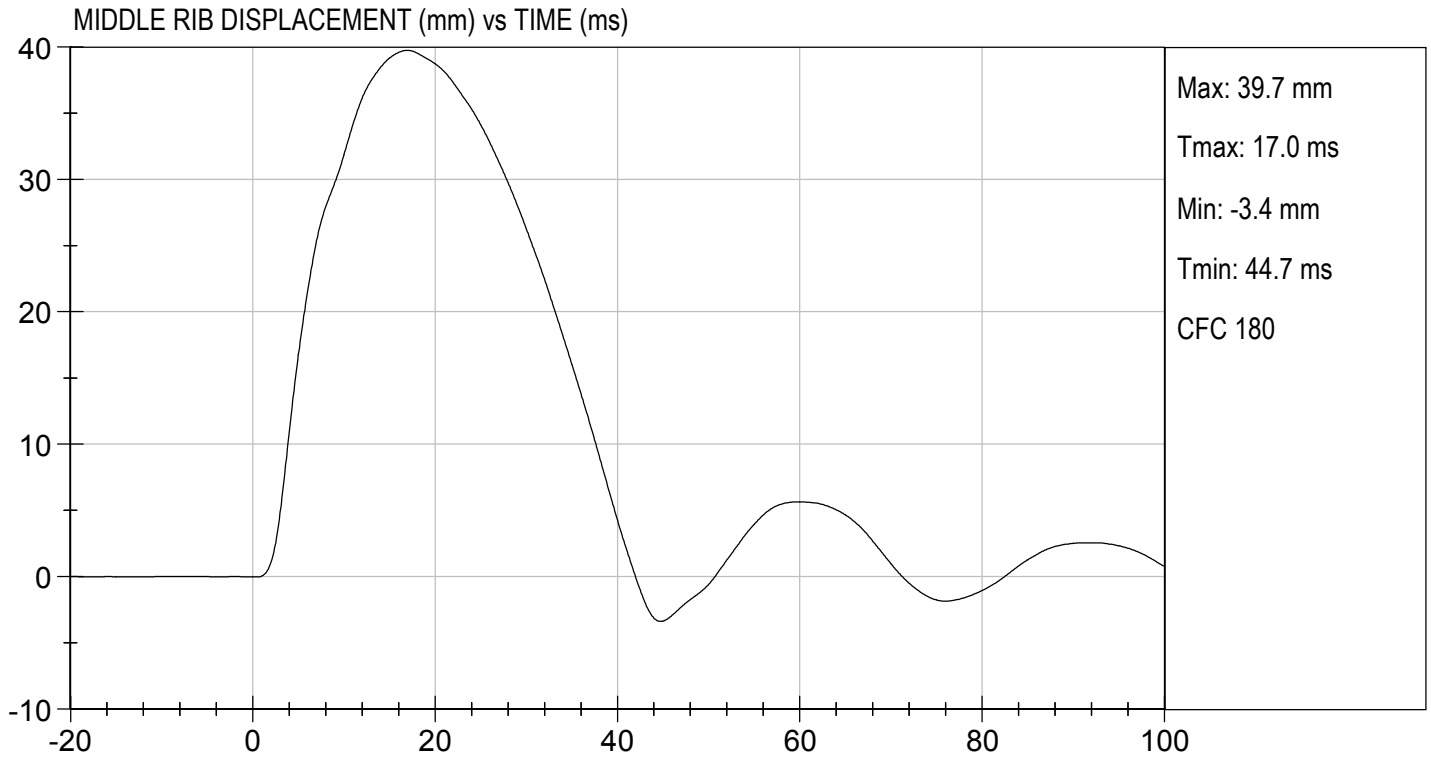
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	5.40 to 5.60	5.41	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5736	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.7	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.4	Pass
Overall Test Results				Pass


 Laboratory Technician

02/07/2019
 Test Date

Approved By _____





CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 032


No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION
HEAD DROP TEST
ES-2re DUMMY

ATD Serial No: 032

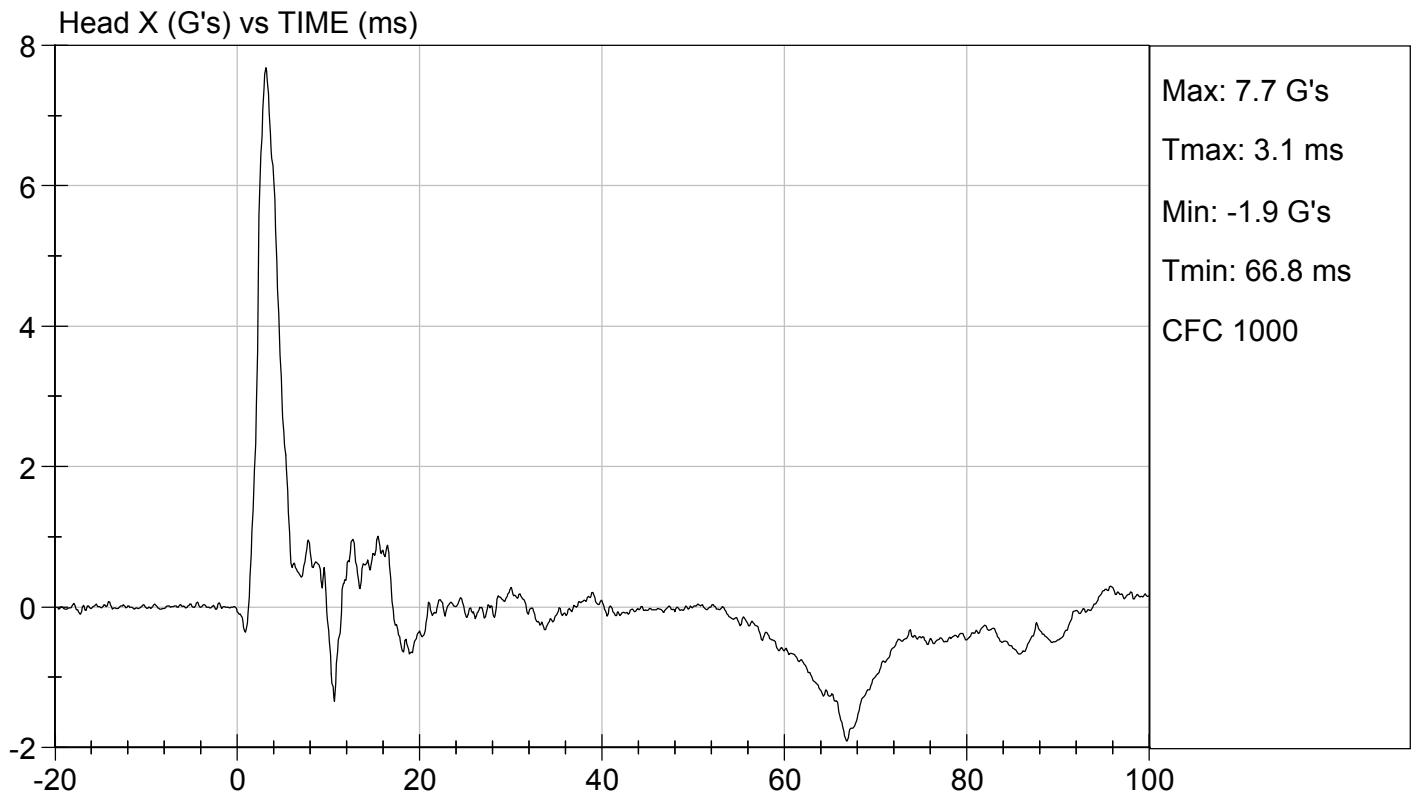
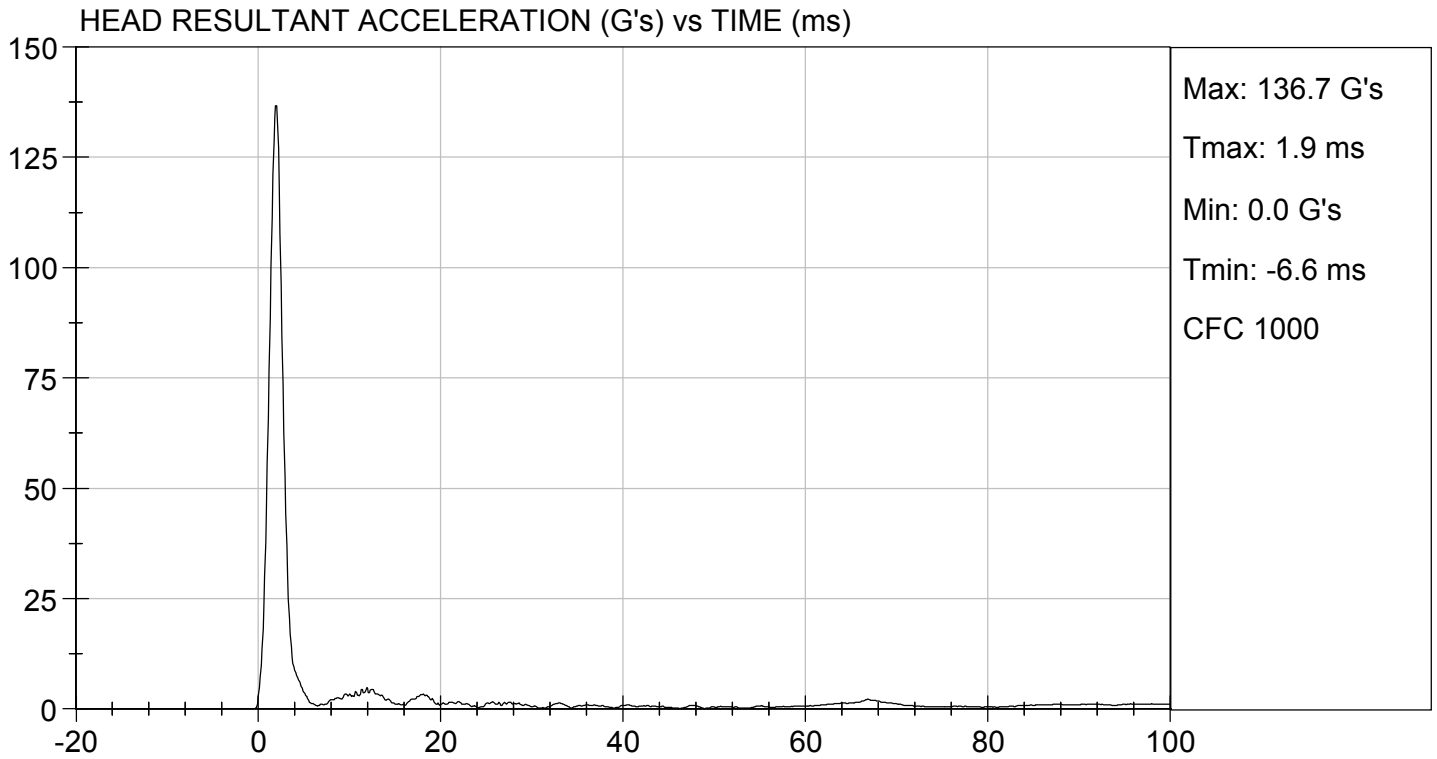
Test ID: D190801

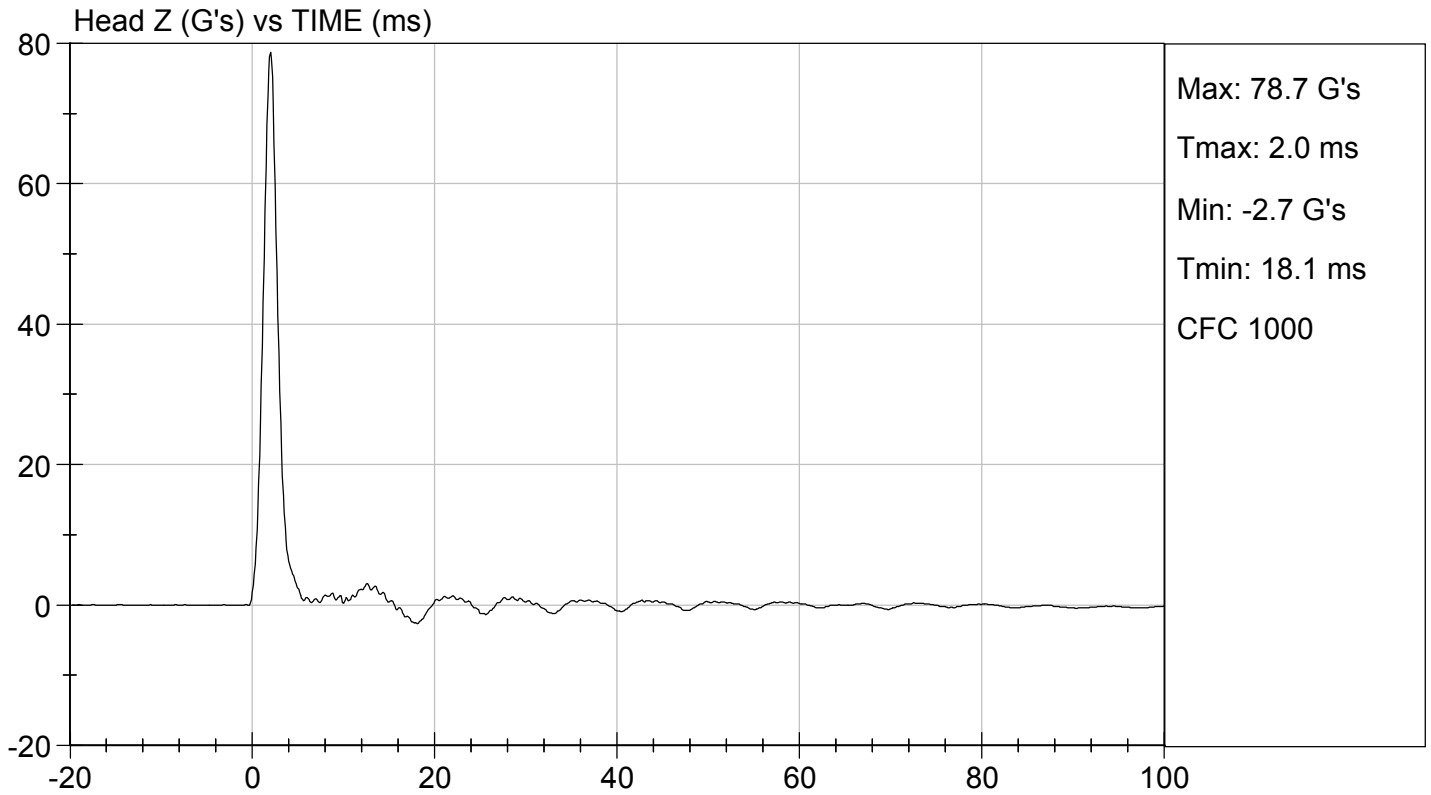
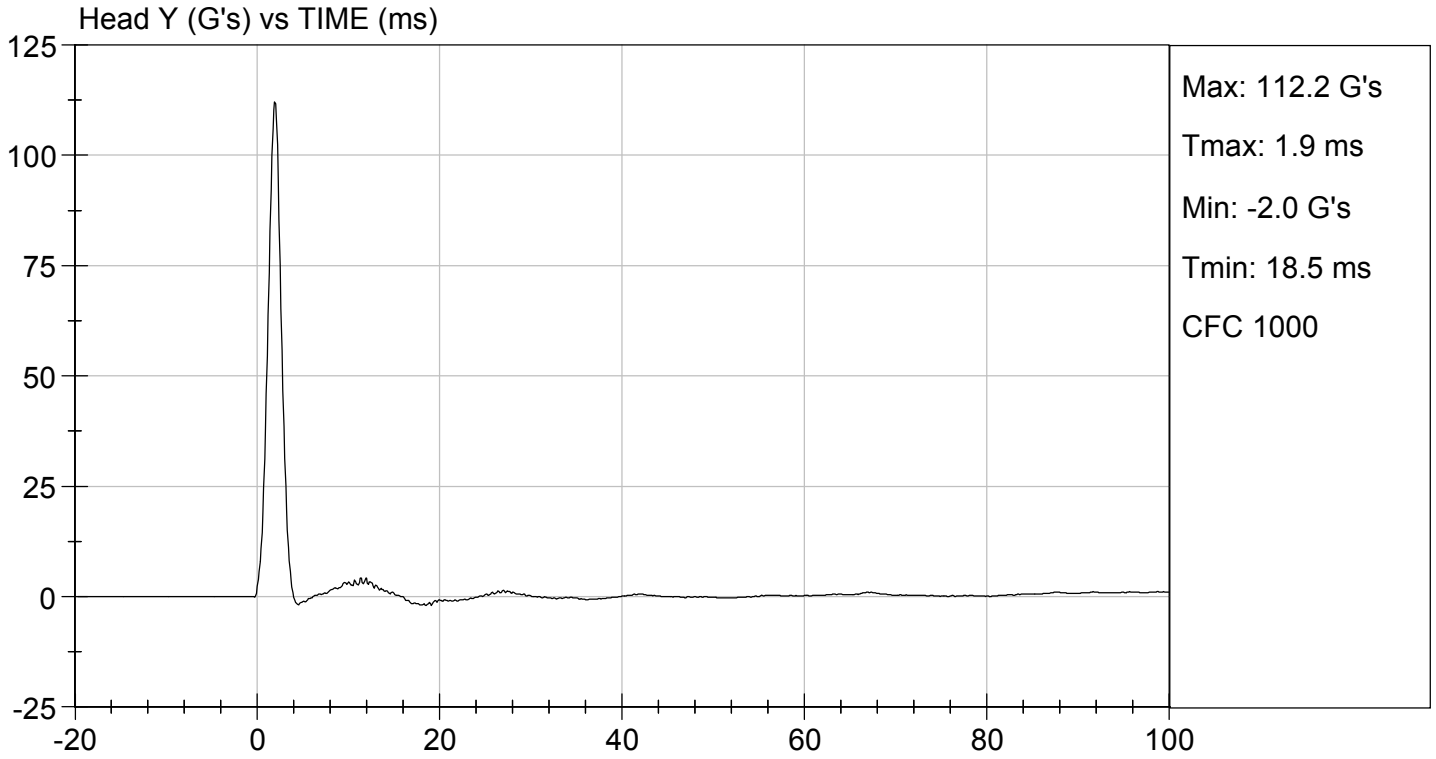
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	125 to 155	137	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

03/01/2019
 Test Date

Approved By _____





**MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY**

ATD Serial No: 032

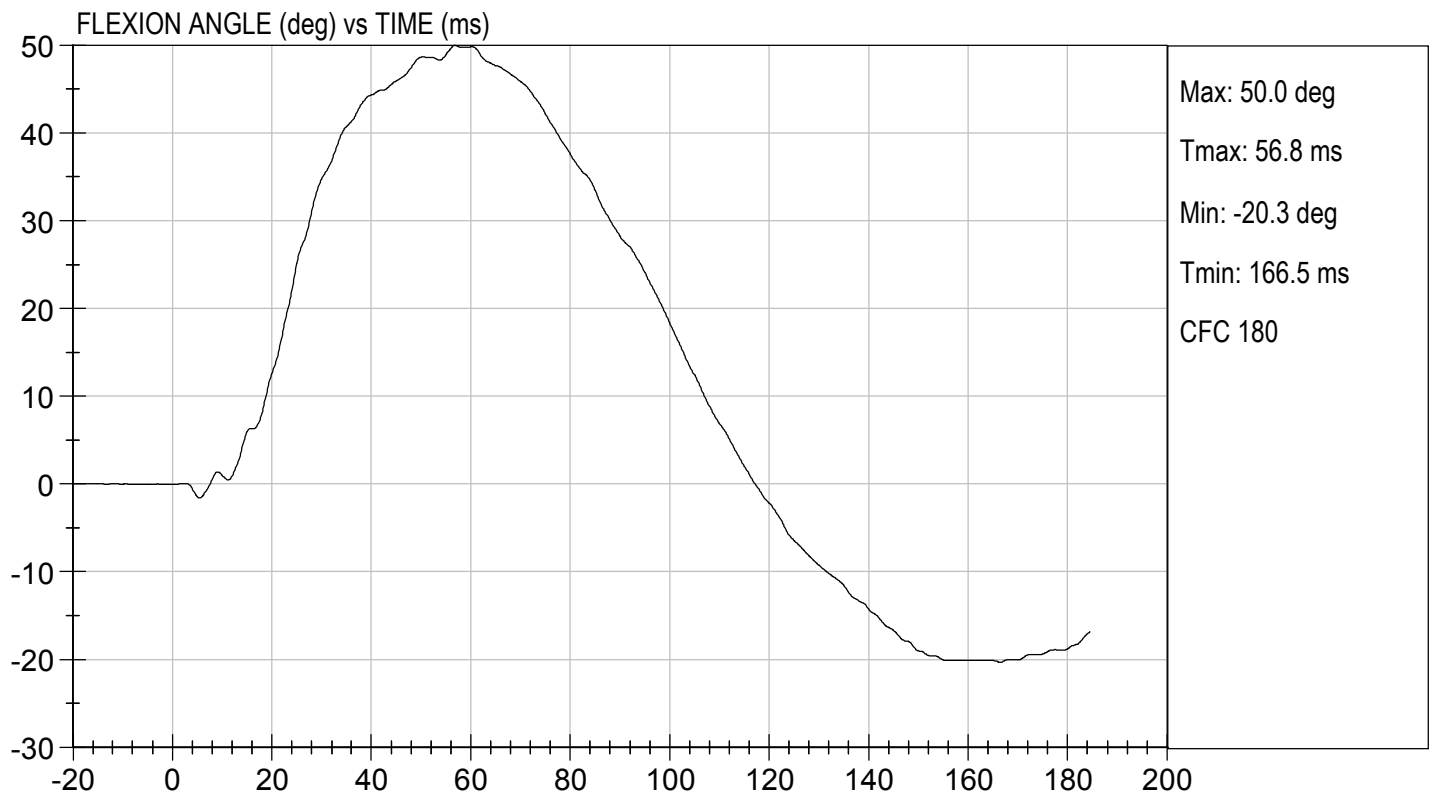
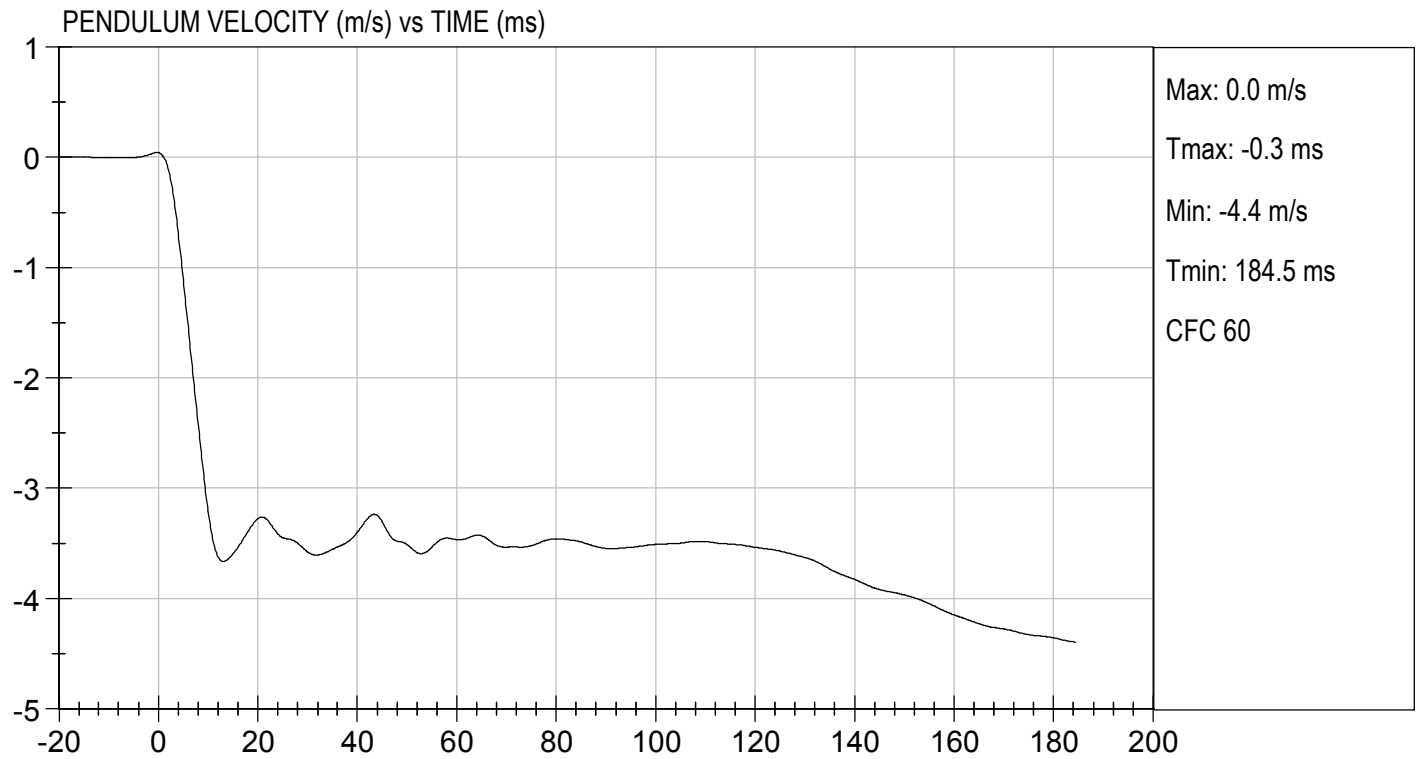
Test I.D.: D190802

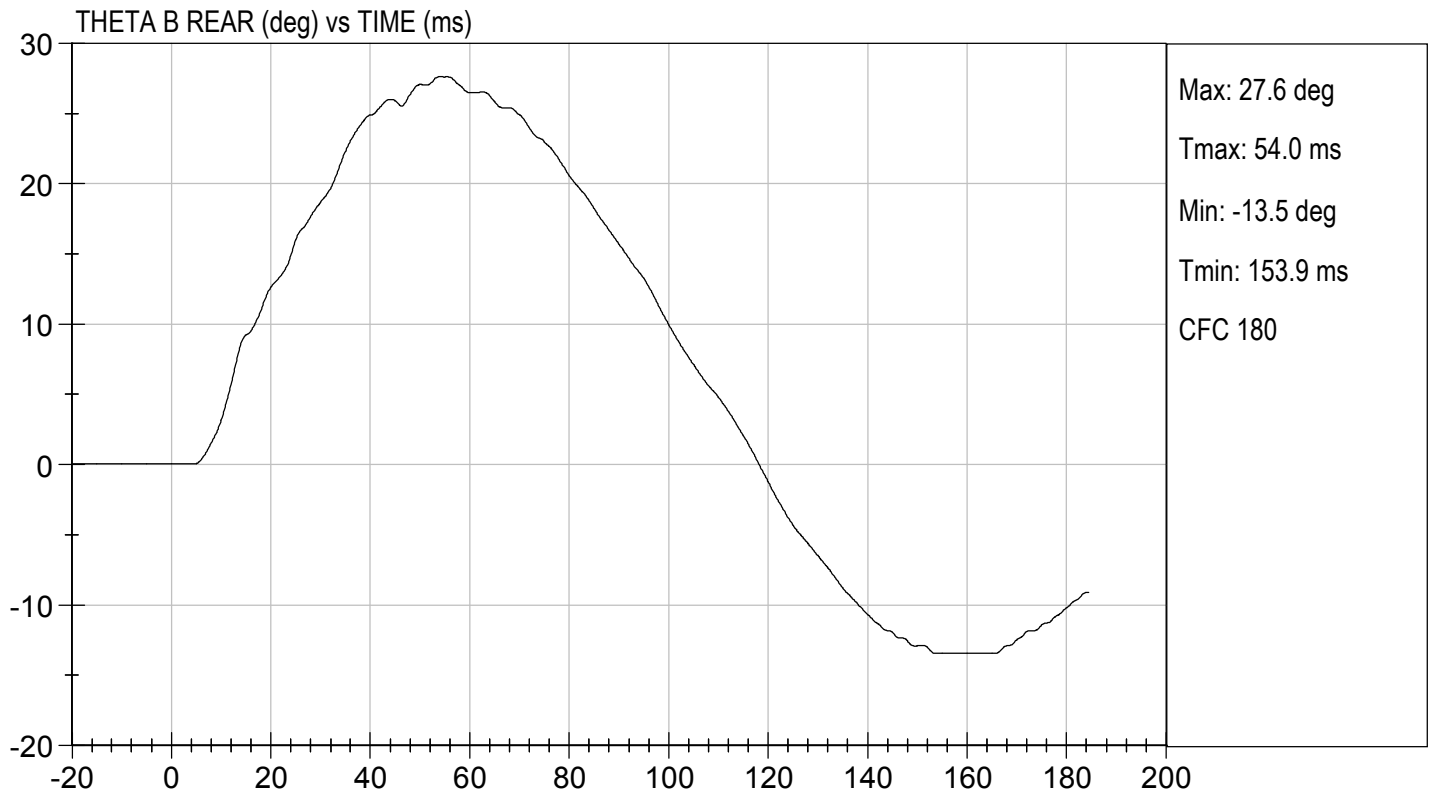
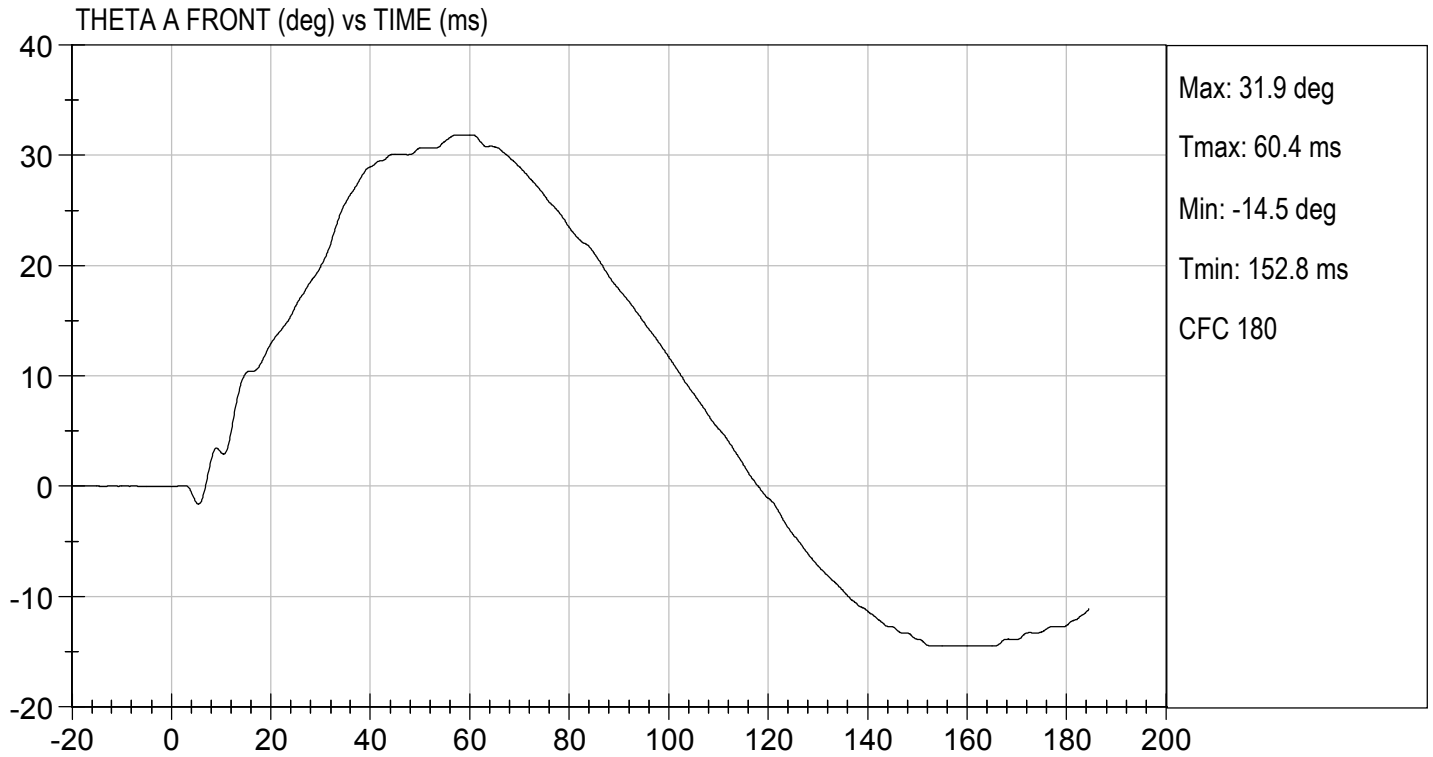
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass	
Laboratory Relative Humidity	%	10 to 70	23	Pass	
Pendulum Speed	m/s	3.30 to 3.50	3.50	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.64	Pass
	17 ms	m/s	>= -3.70	-3.46	Pass
Maximum Flexion Angle	deg	49.0 to 59.0	50.0	Pass	
Time of Maximum Flexion Angle	ms	54.0 to 66.0	56.8	Pass	
Head Rotation Decay Time to 0 Degree	ms	53.0 to 88.0	60.4	Pass	
Overall Results				Pass	

Danielle Redinlaugh
Laboratory Technician

03/01/2019
Test Date

Approved By _____

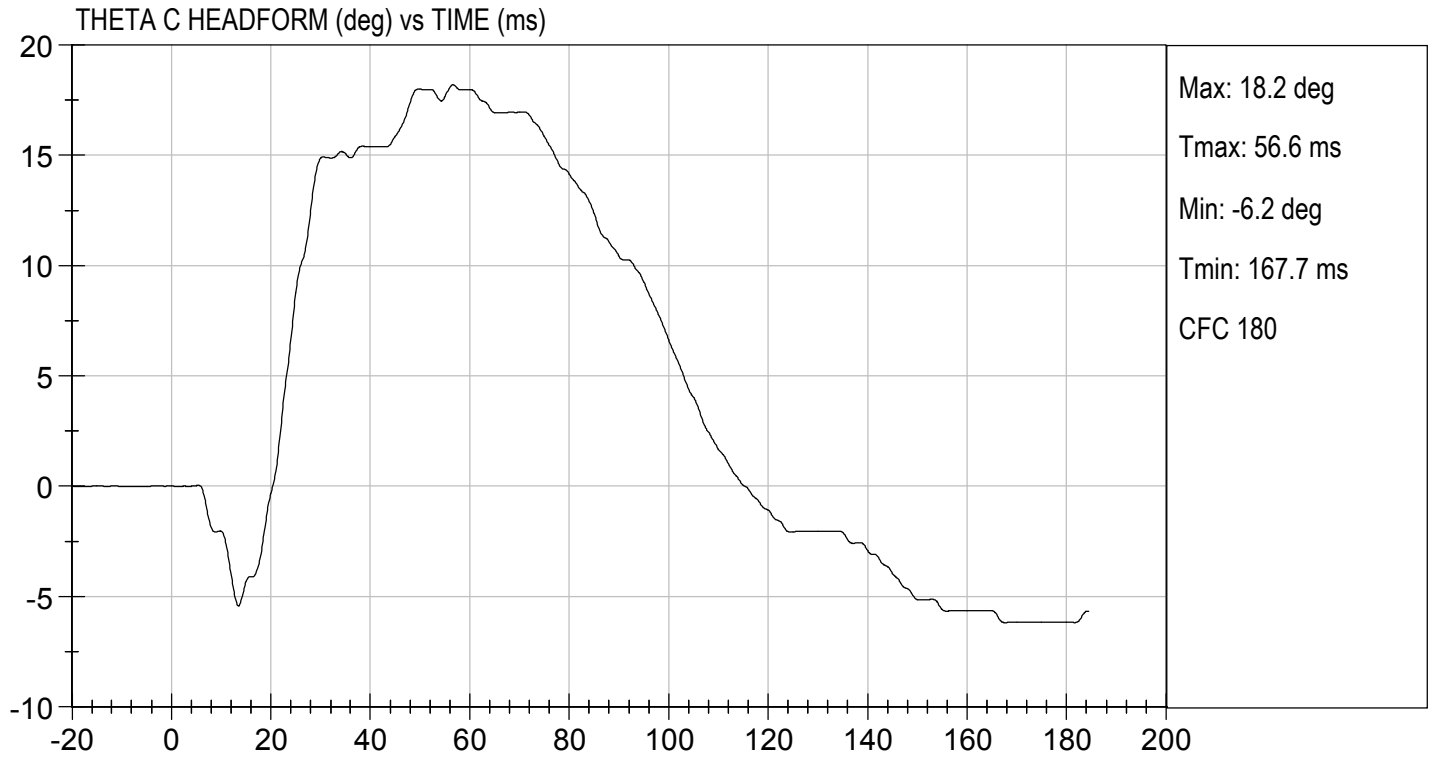






TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 03/01/2019
TEST #: D190802



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190803

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.2	Pass
Overall Test Results				Pass

Danielle Redinlaugh
 Laboratory Technician

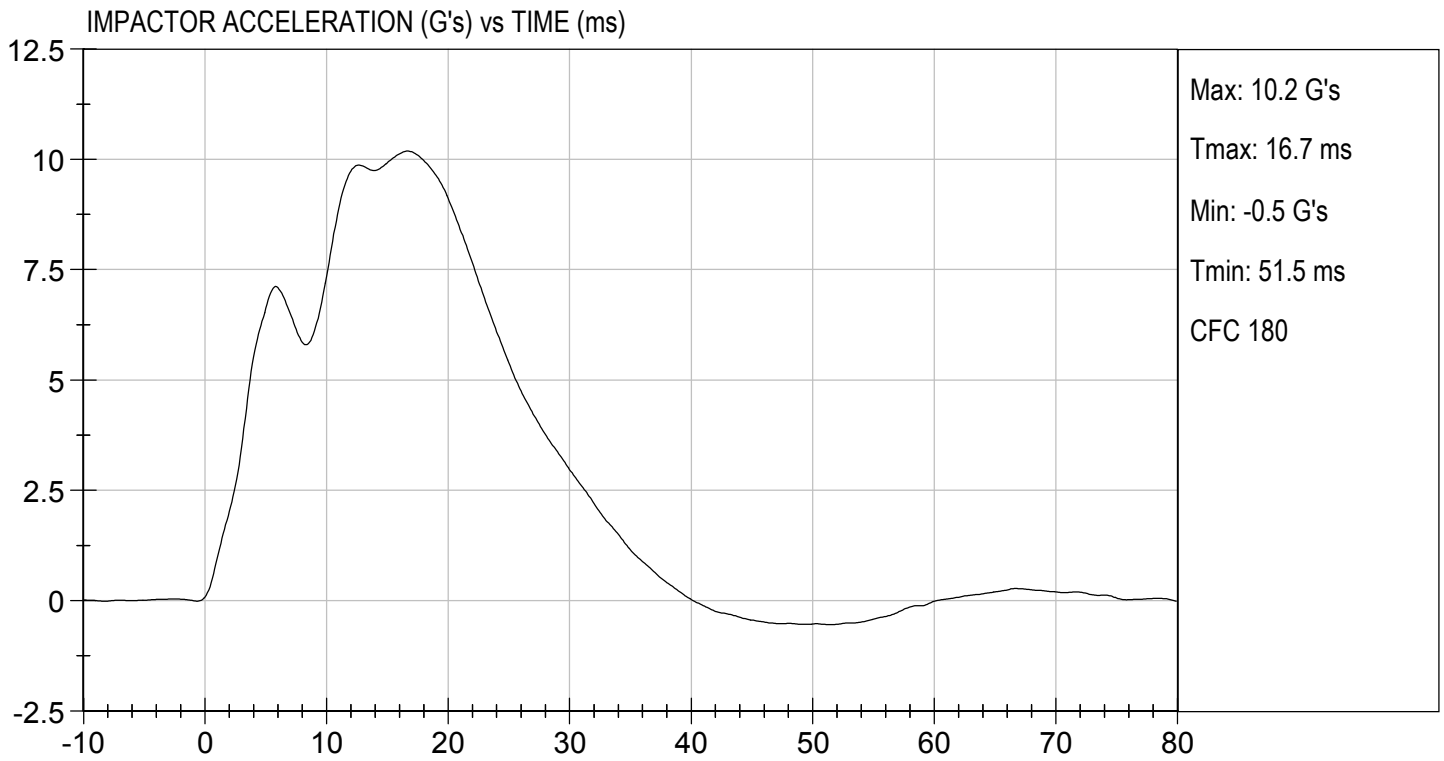
03/01/2019
 Test Date

Approved By _____



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

TEST DATE: 03/01/2019
TEST #: D190803



MGA RESEARCH CORPORATION


UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190804

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.9	Pass
Overall Test Results				Pass

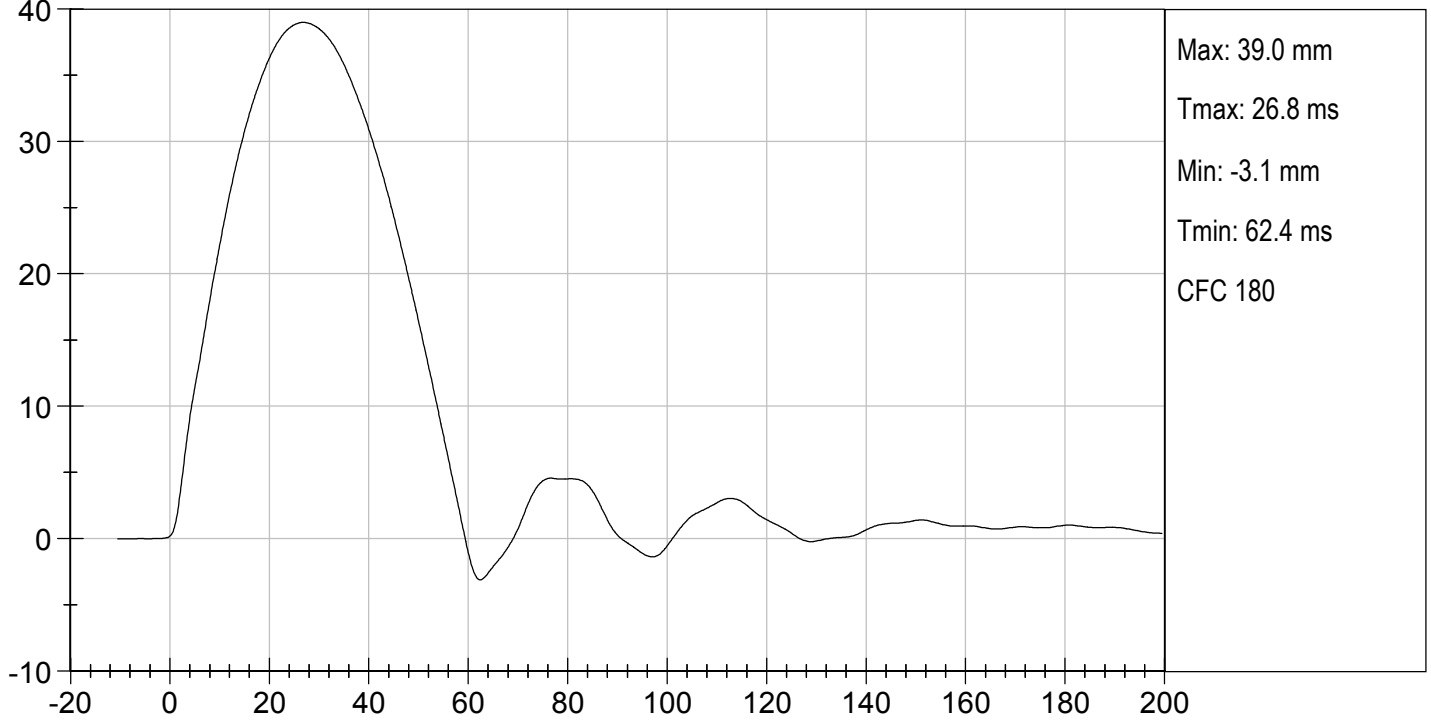

Laboratory Technician

03/01/2019
Test Date

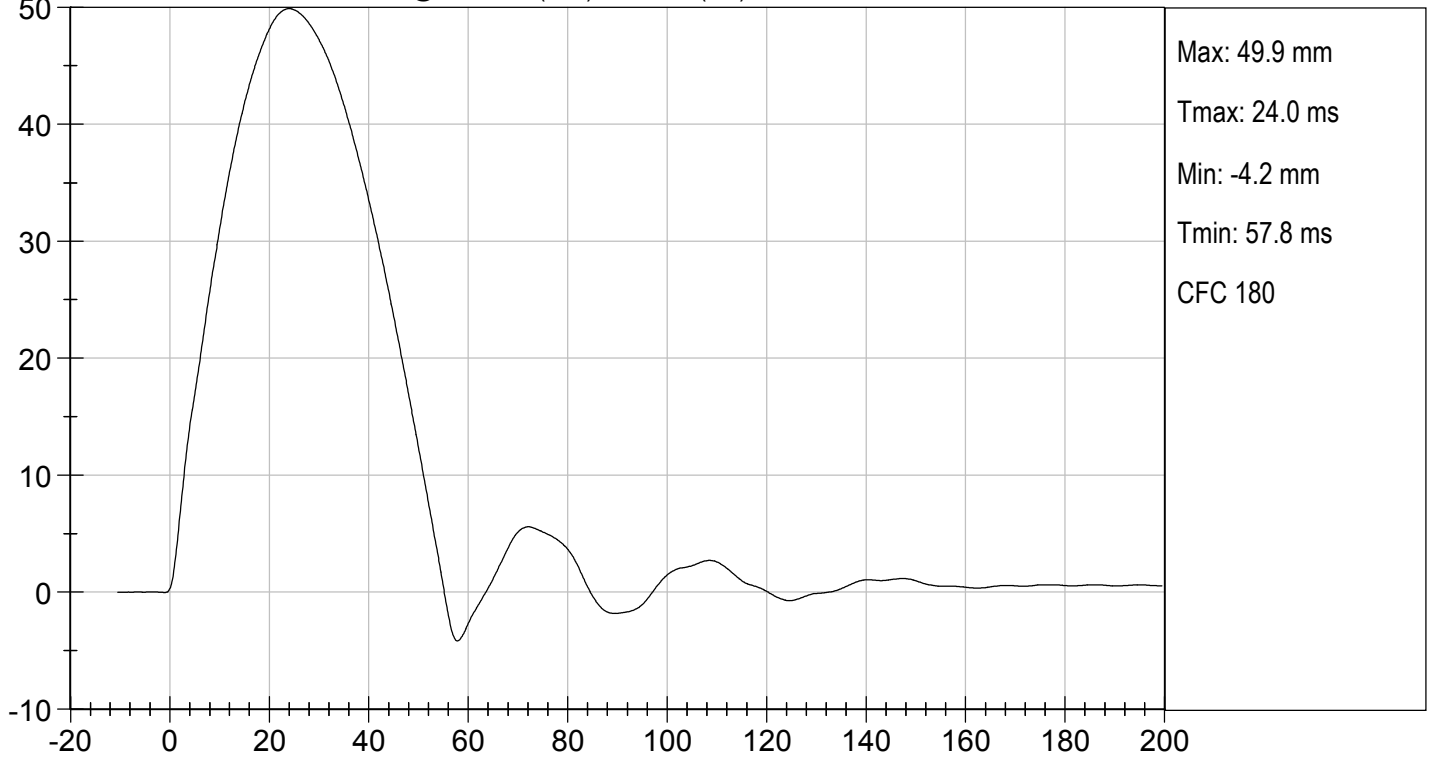
Approved By _____



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



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



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

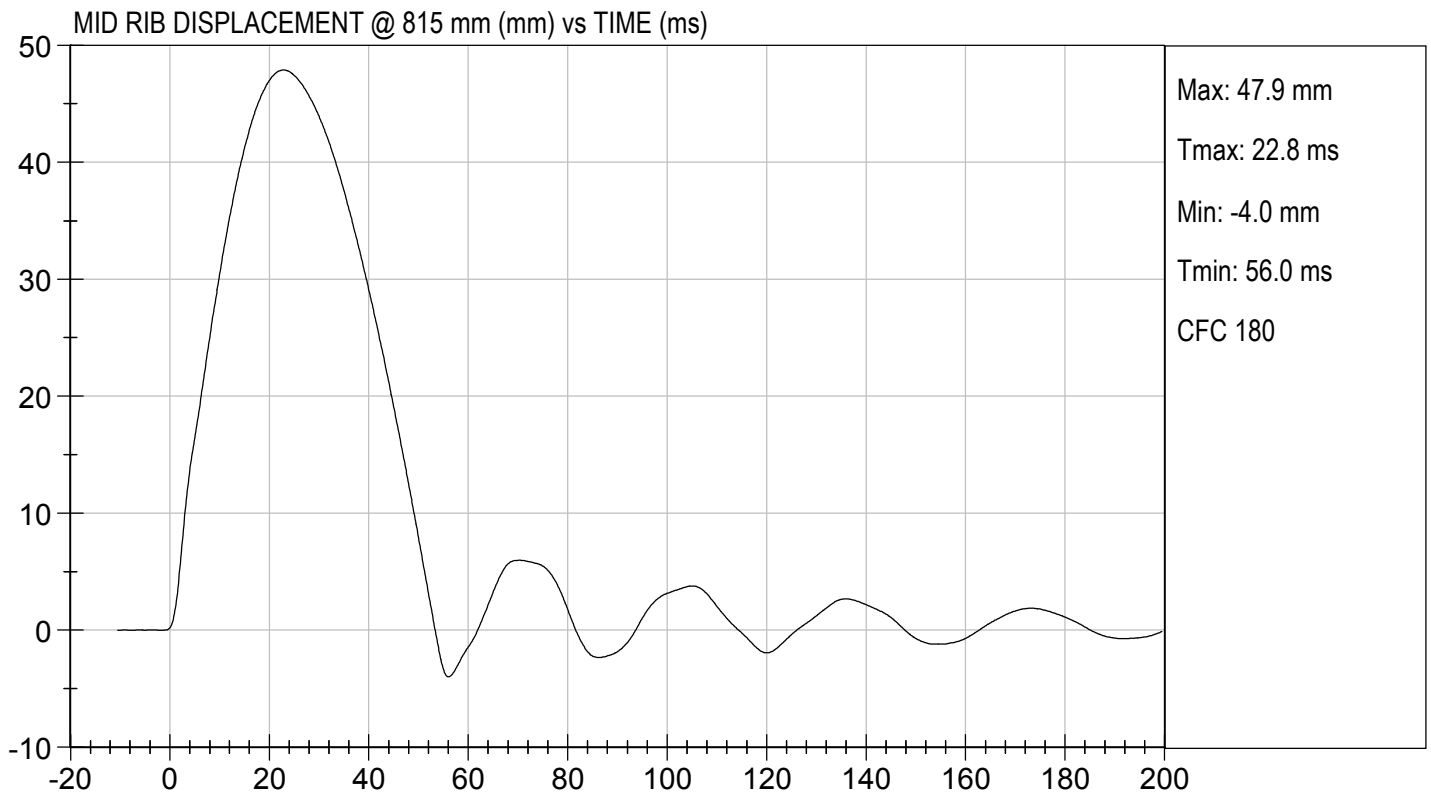
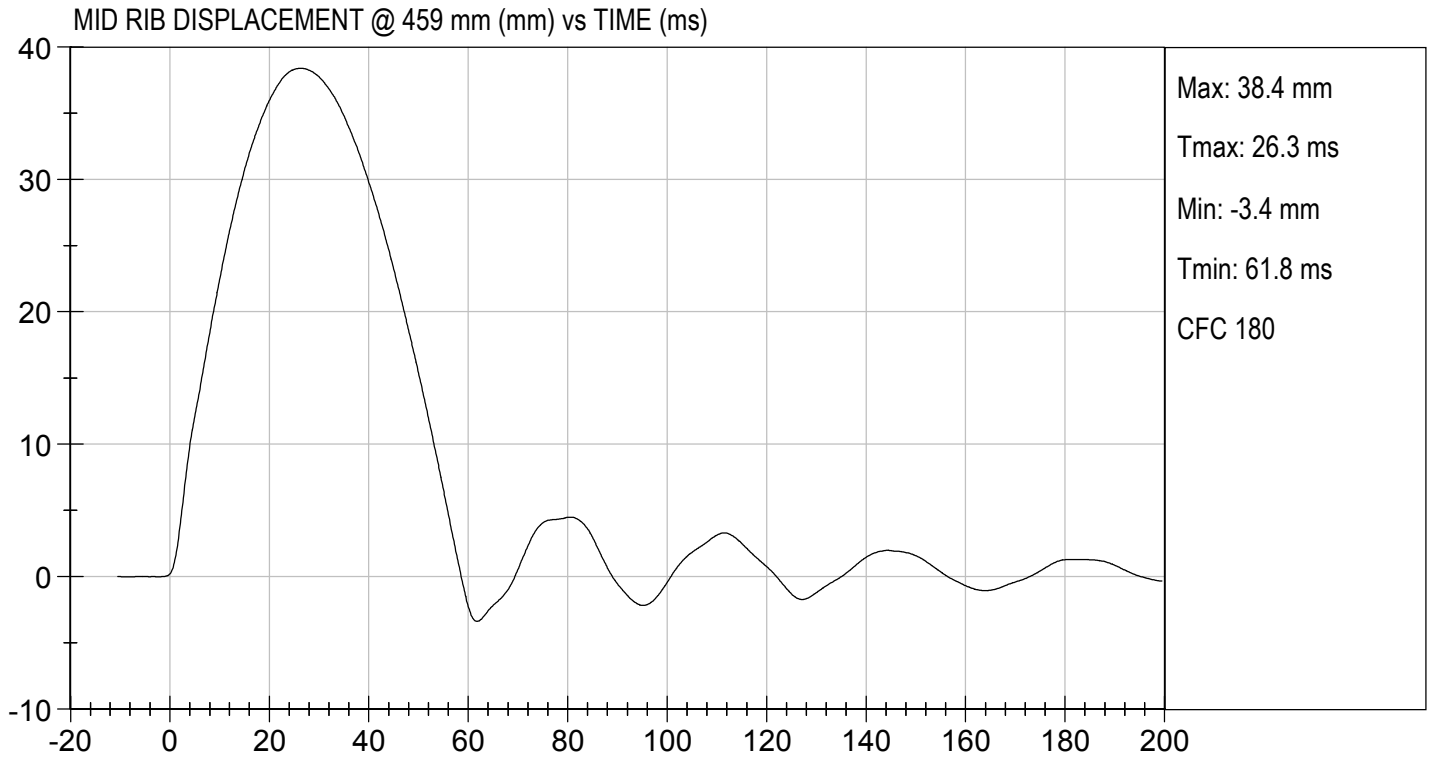
Test I.D: D190805

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.9	Pass
Overall Test Results				Pass


Laboratory Technician

03/01/2019
Test Date

Approved By _____



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190806

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.2	Pass
Overall Test Results				Pass

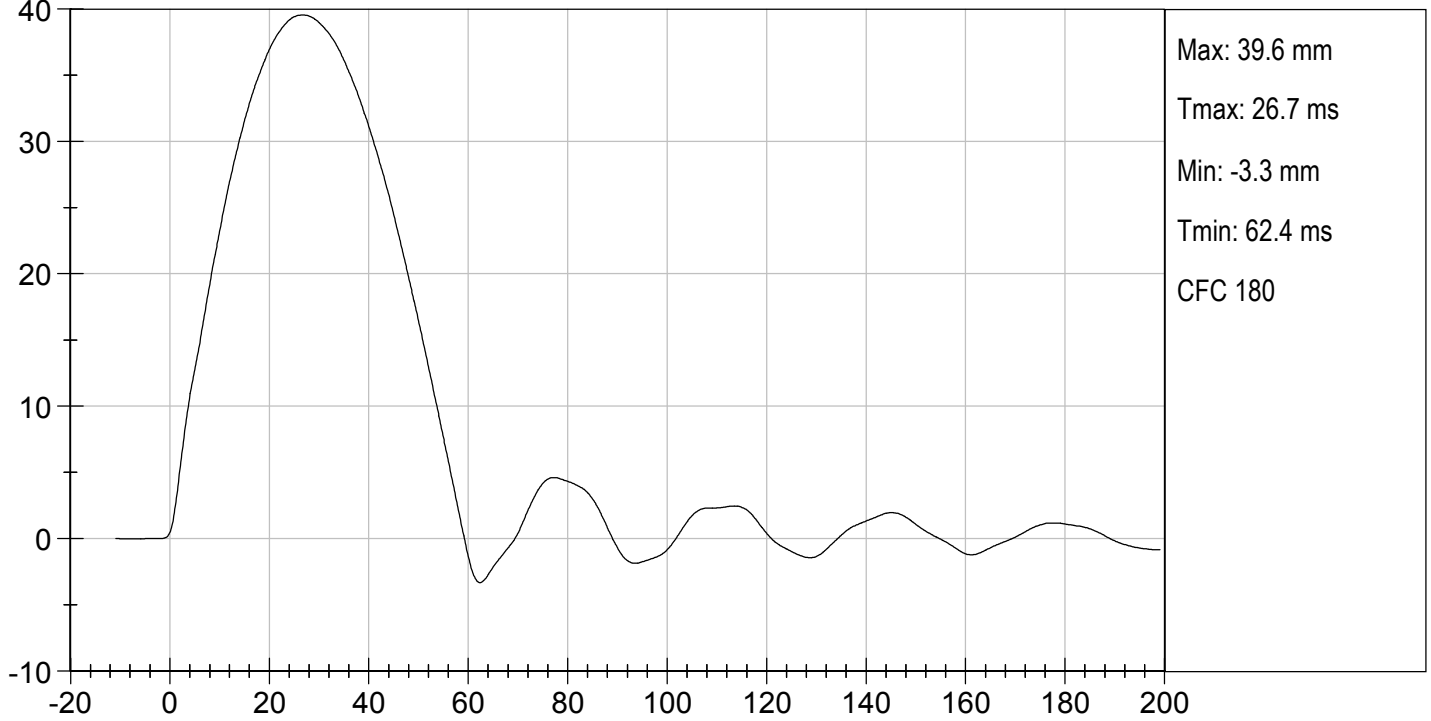

Laboratory Technician

03/01/2019
Test Date

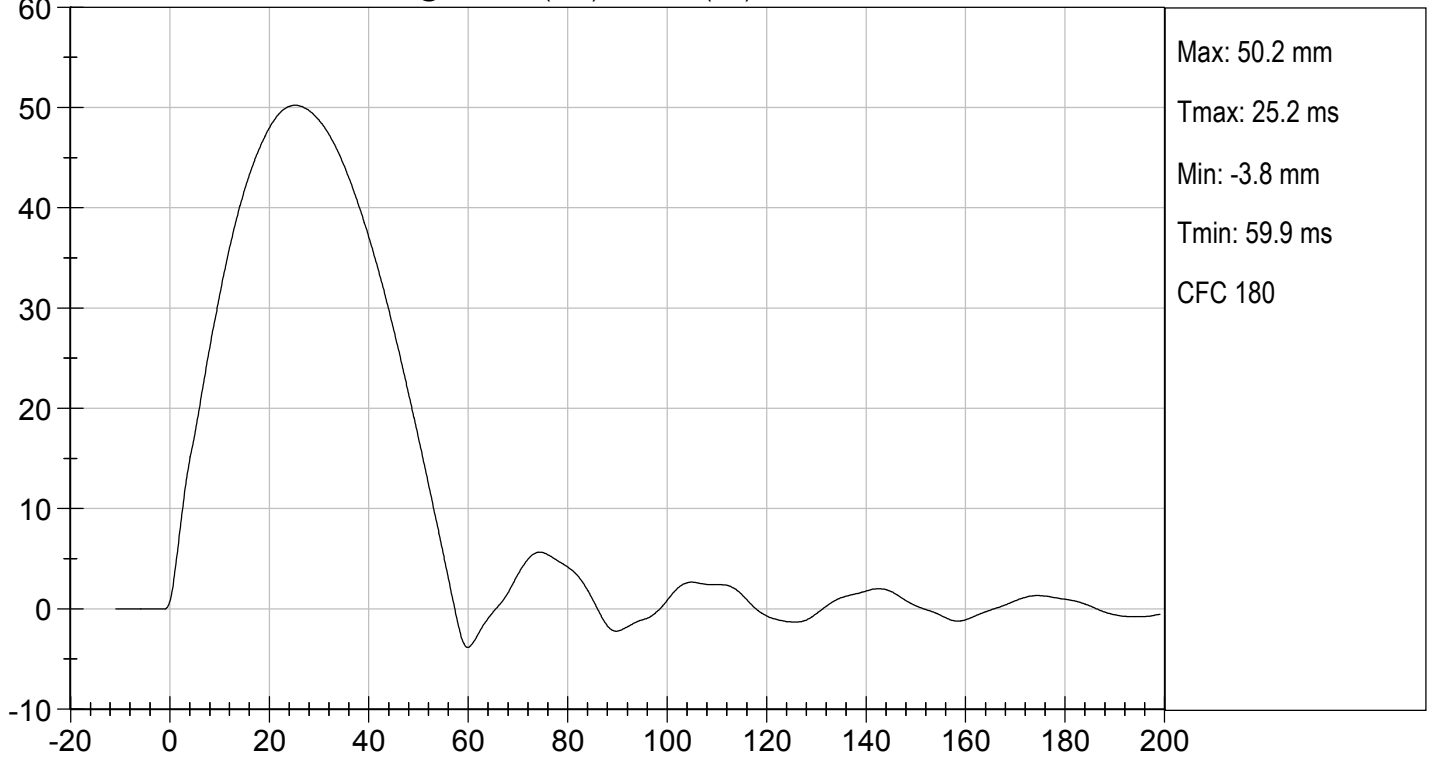
Approved By _____



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



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



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

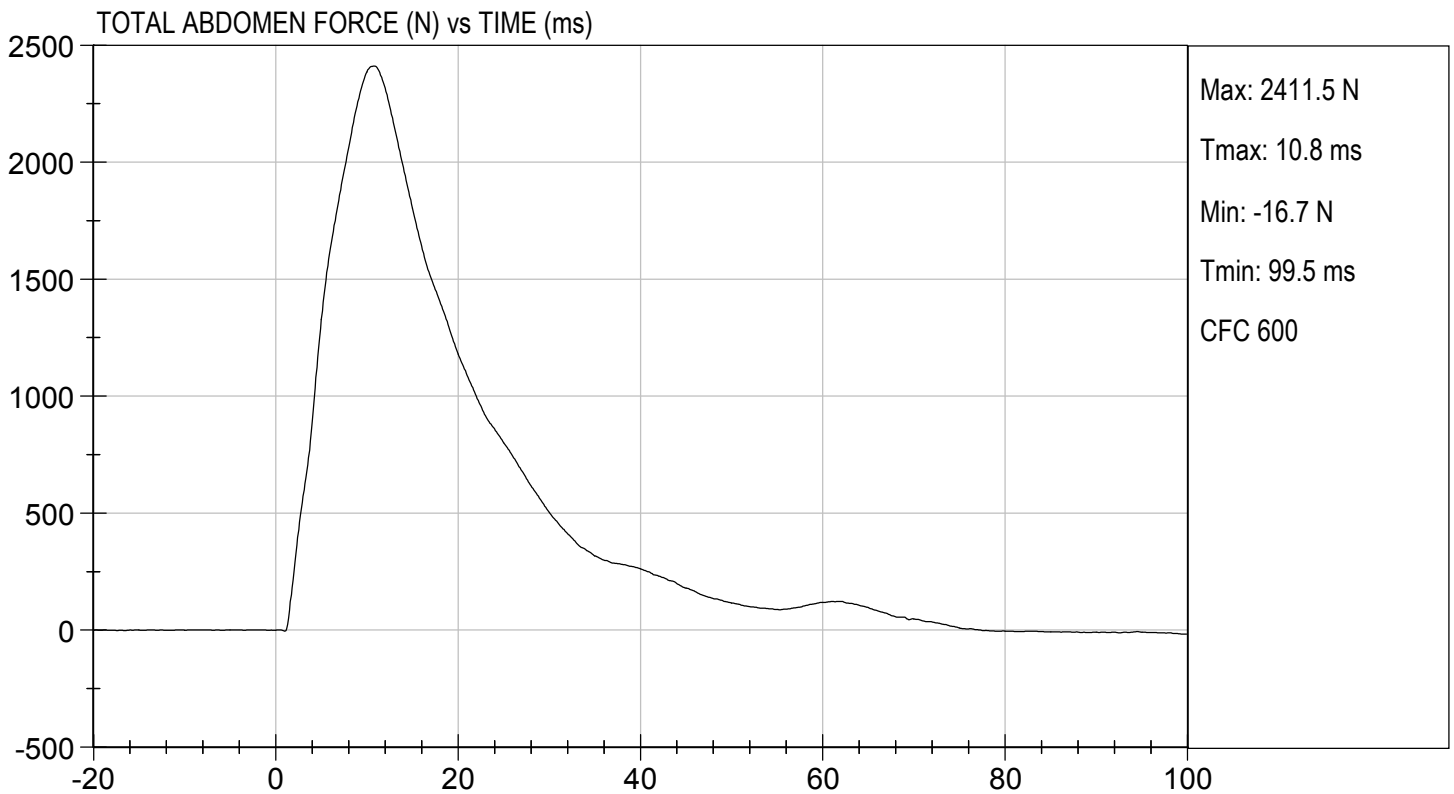
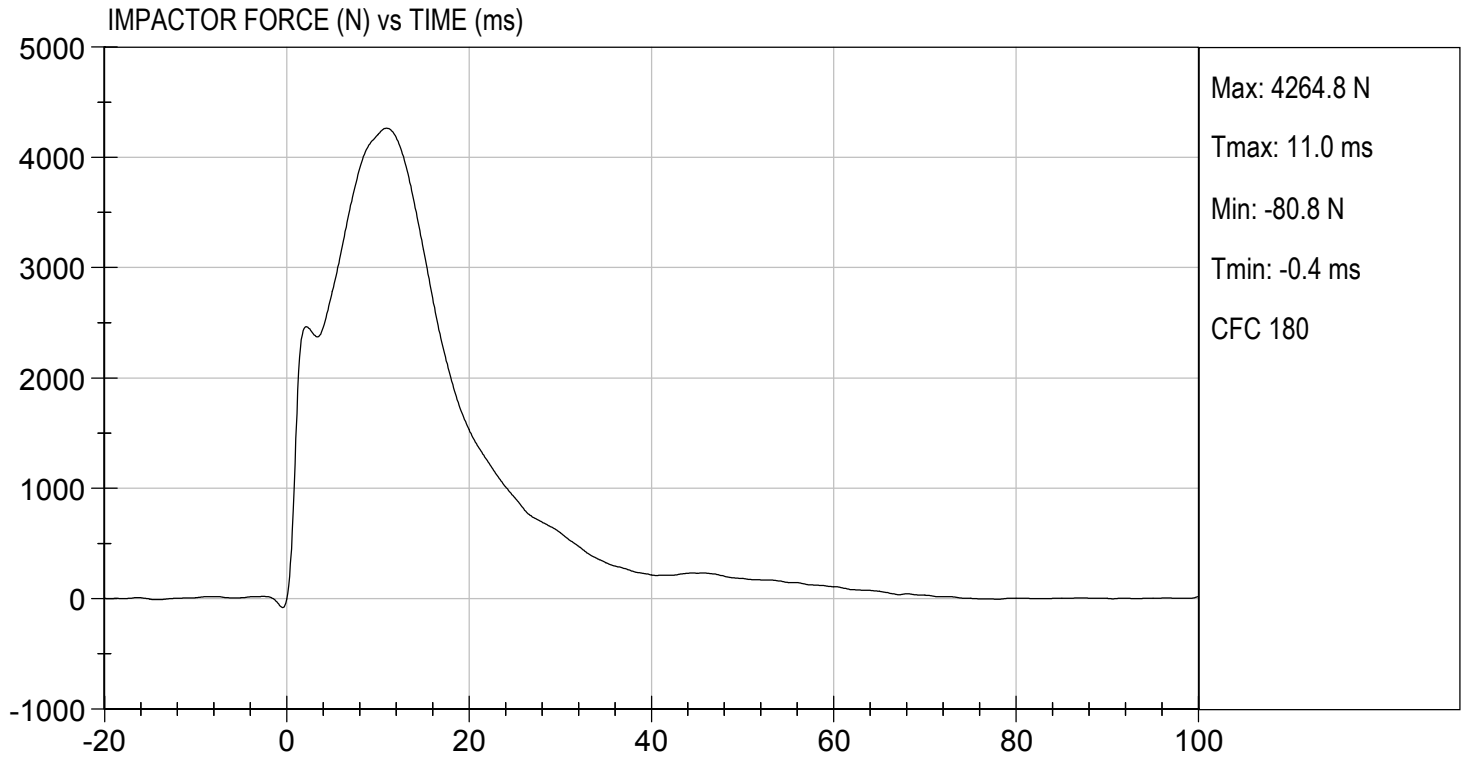
Test I.D: D190807

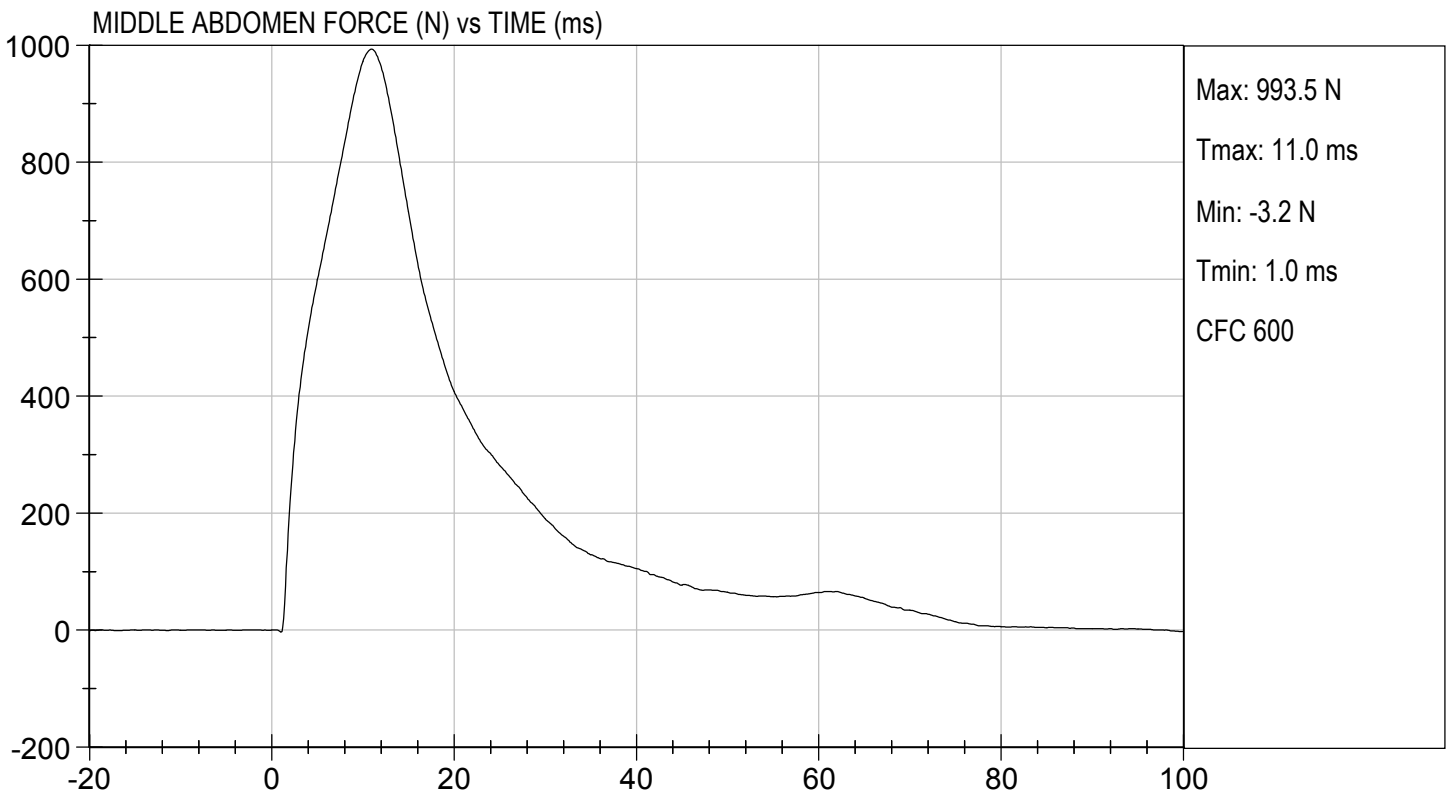
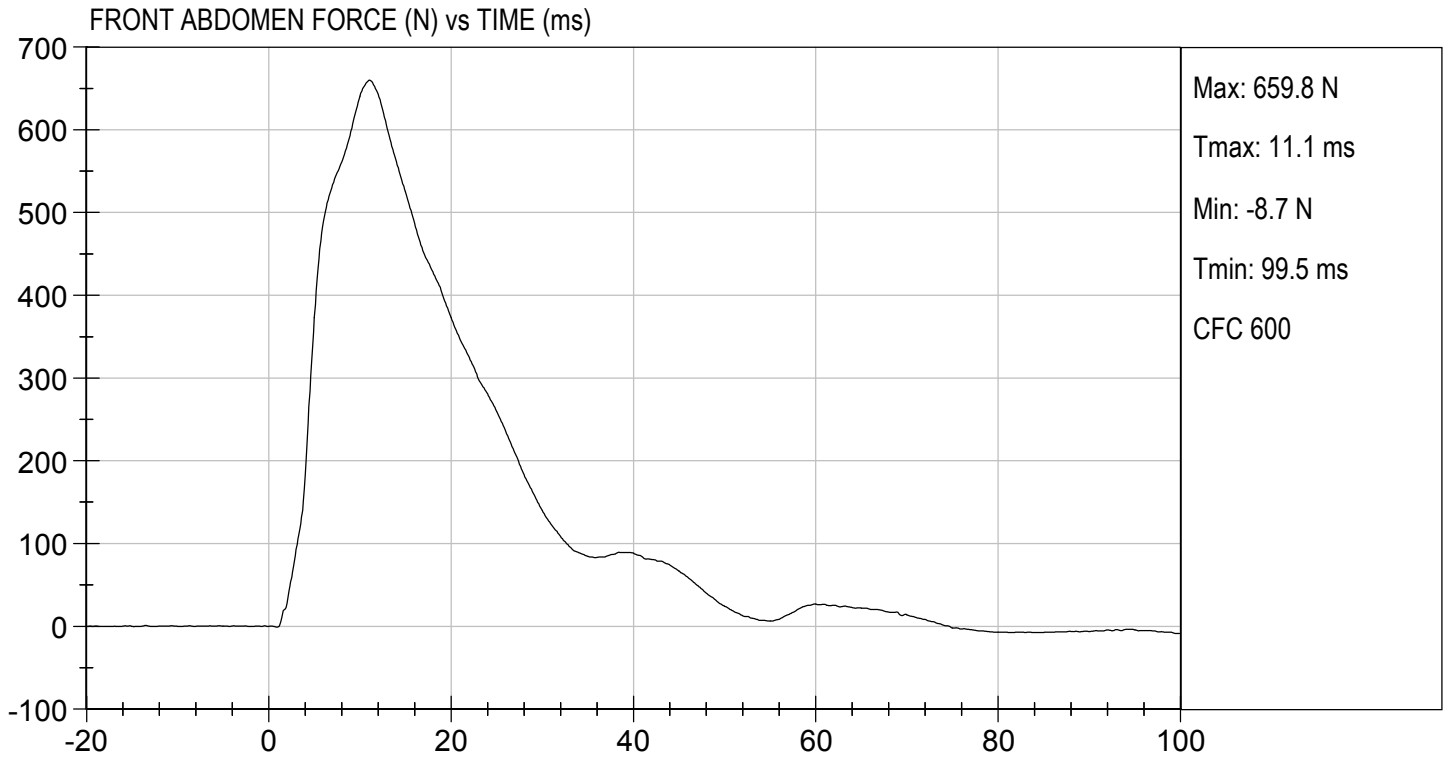
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	3.90 to 4.10	3.91	Pass
Maximum Impactor Force	N	4000 to 4800	4265	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2412	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.8	Pass
Overall Test Results				Pass


Laboratory Technician

03/01/2019
Test Date

Approved By _____

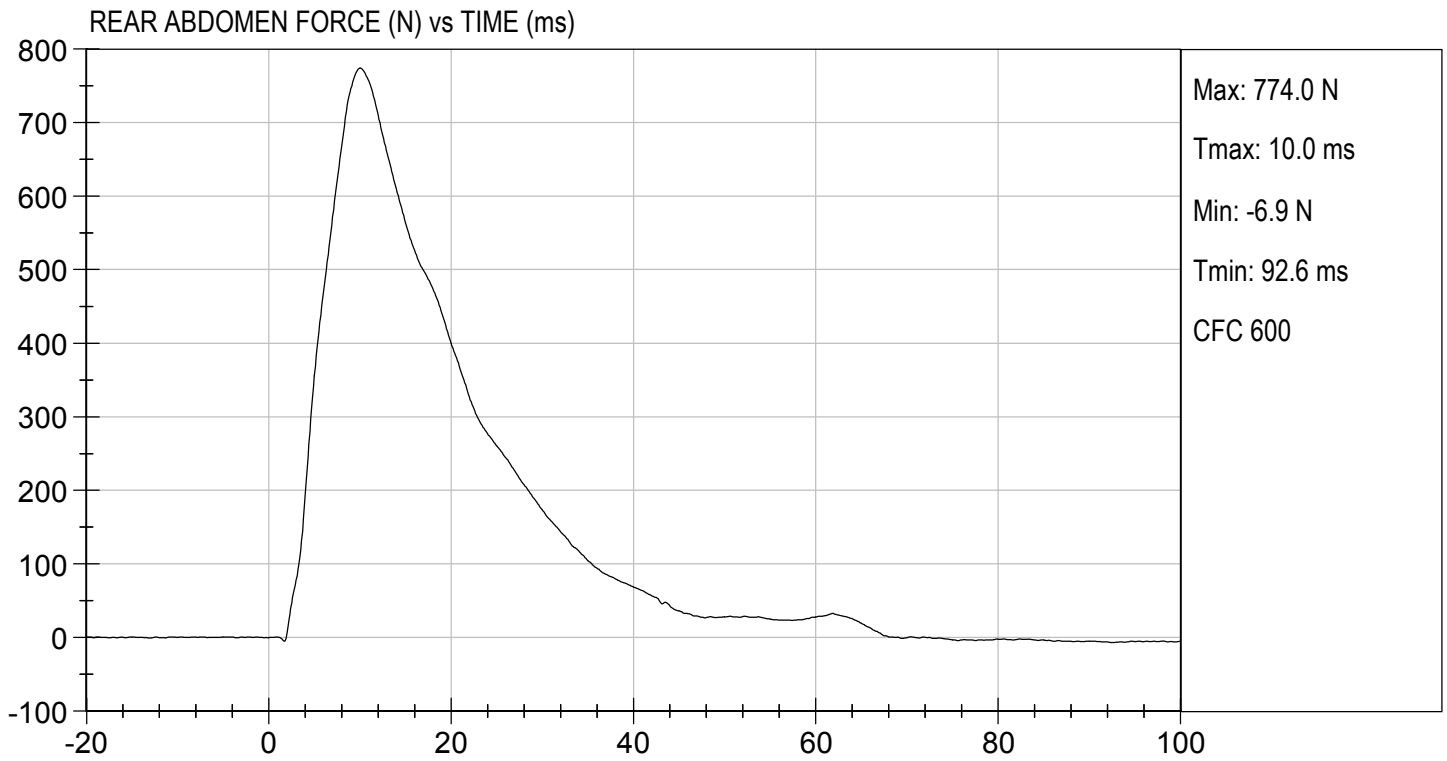






TEST DESC: ABDOMEN IMPACT
VELOCITY: 12.82 ft/s, 3.91 m/s

TEST DATE: 03/01/2019
TEST #: D190807



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

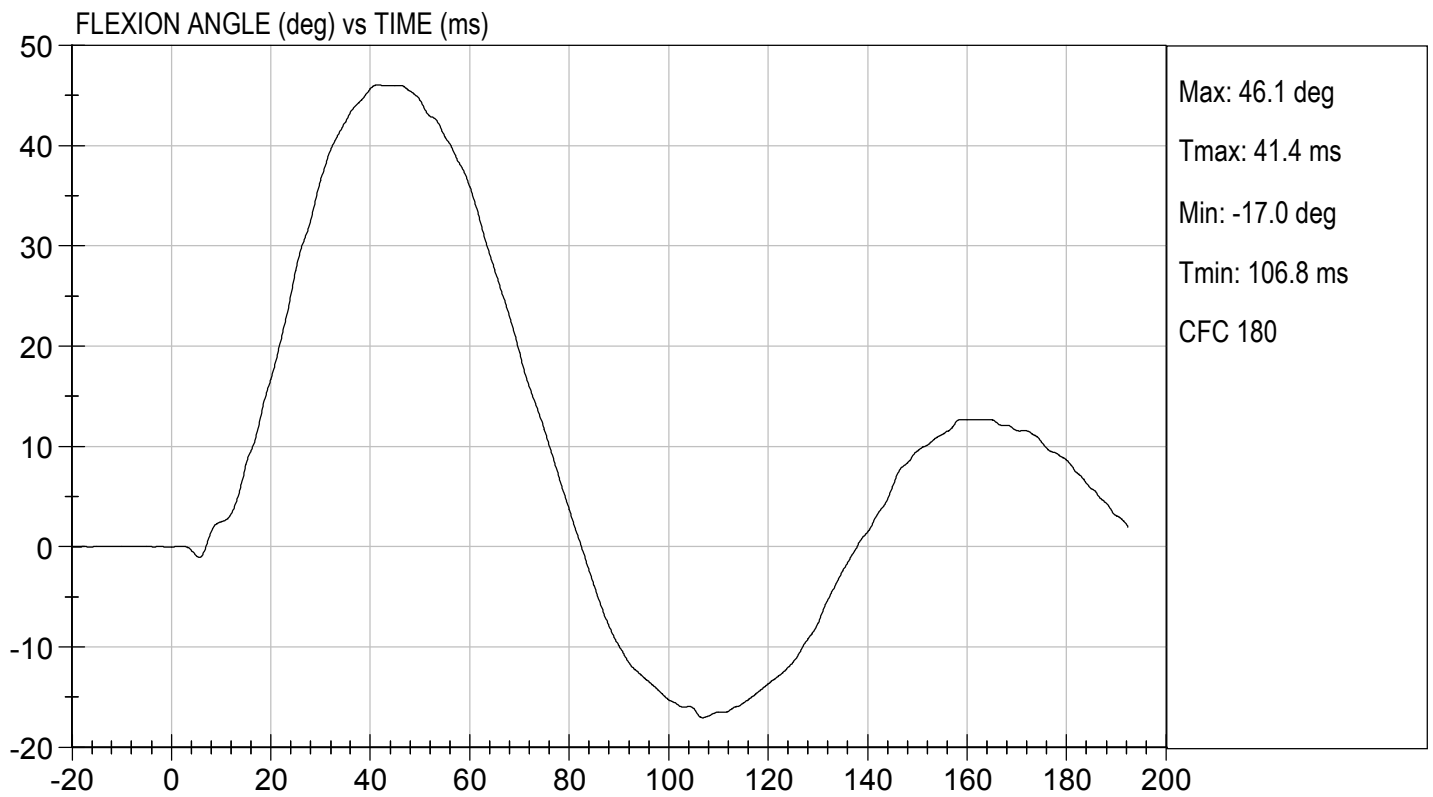
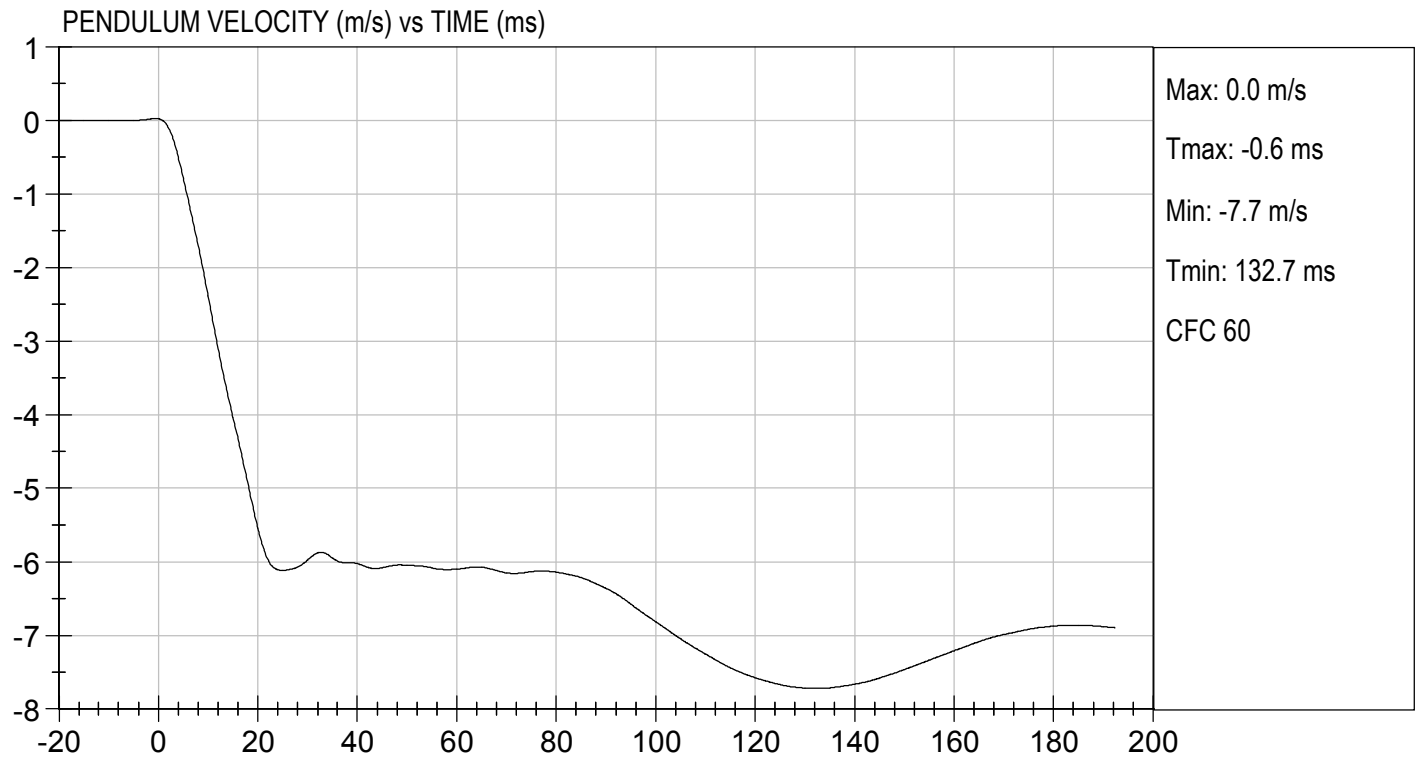
Test I.D: D190808

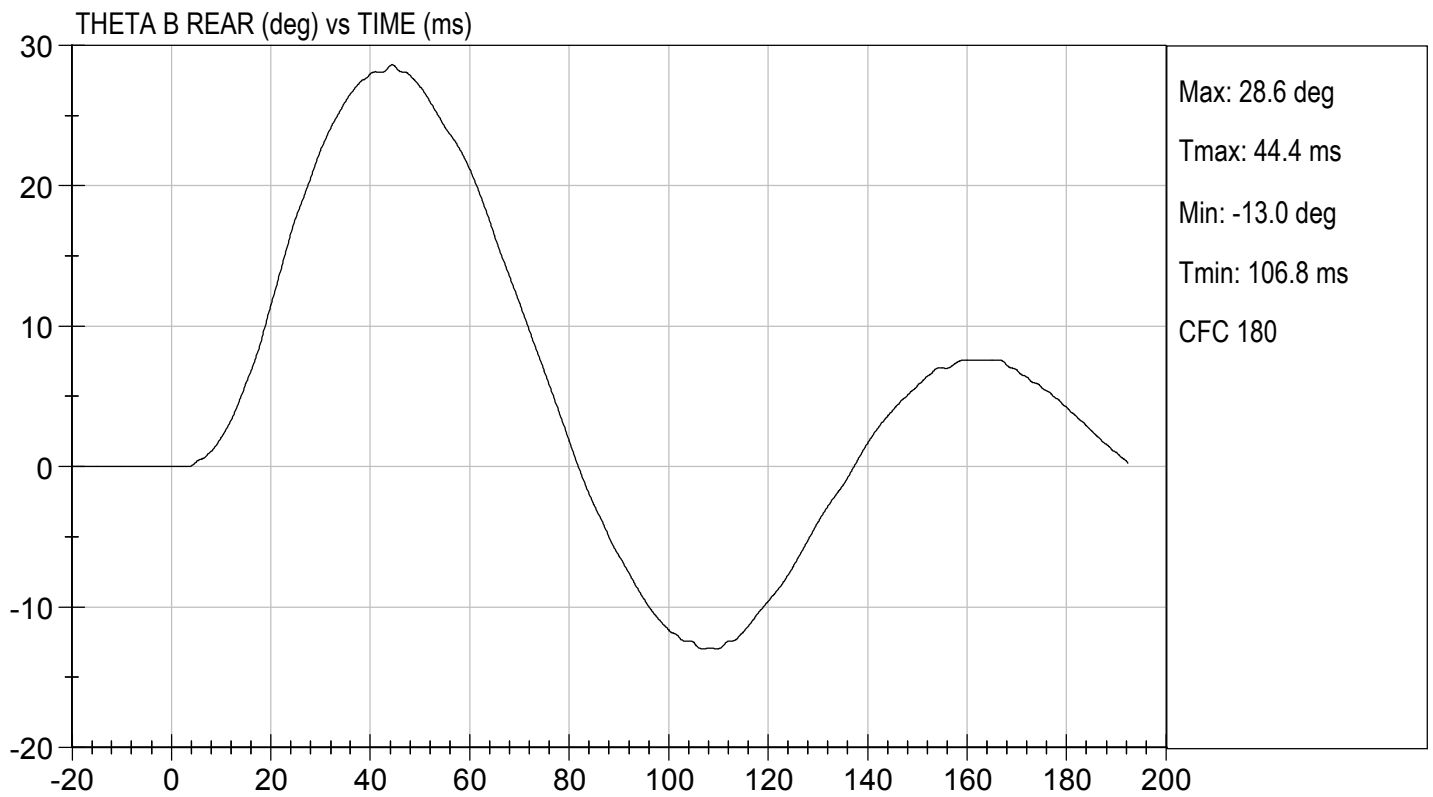
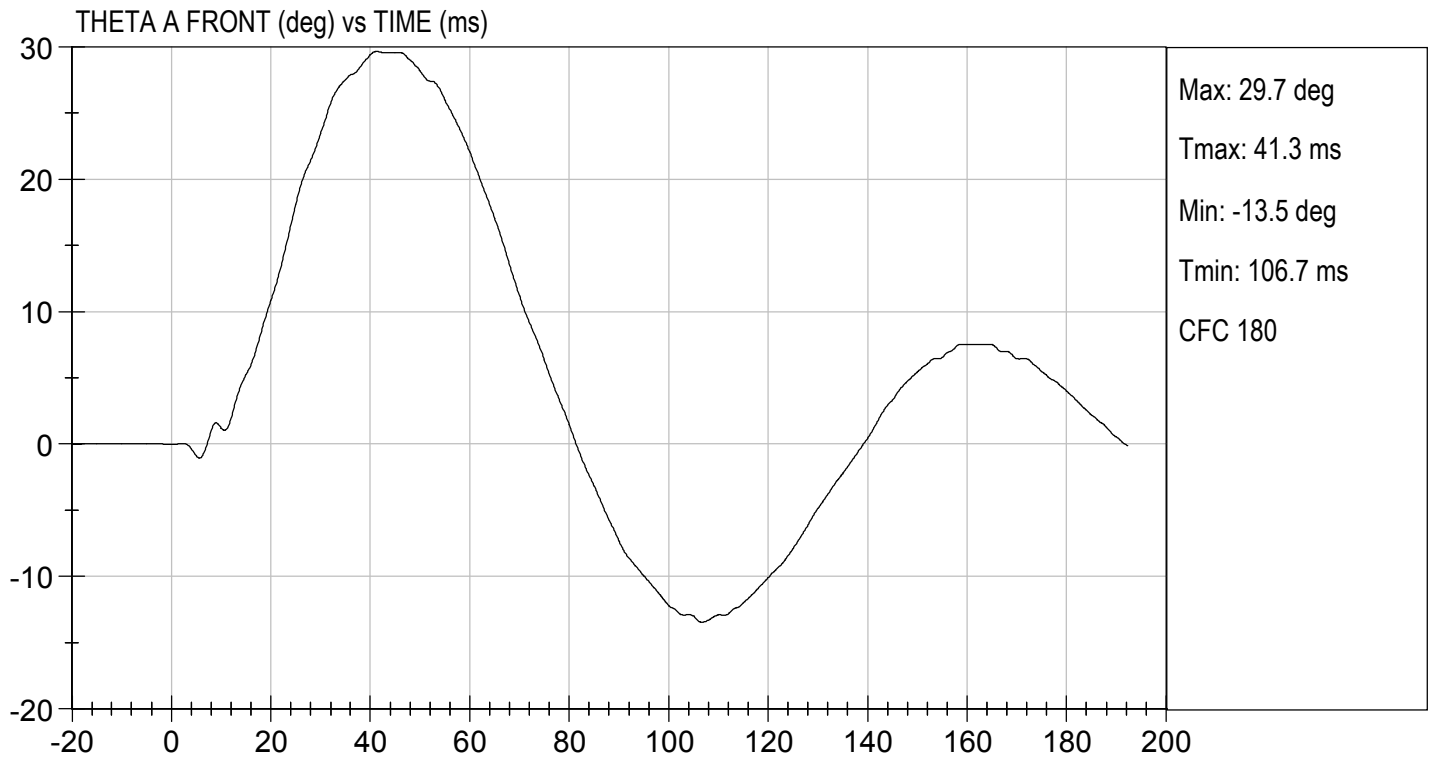
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass	
Laboratory Relative Humidity	%	10 to 70	13	Pass	
Pendulum Speed	m/s	5.95 to 6.15	6.12	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.421	Pass
	27 ms	m/s	-6.50 to -5.80	-6.09	Pass
	30 ms	m/s	>= -6.50	-5.98	Pass
Maximum Flexion Angle	deg	45.0 to 55.0	46.1	Pass	
Time of Maximum Flexion Angle	ms	39.0 to 53.0	41.4	Pass	
Headform Rotation Decay to Initial Position	ms	37 to 57	41	Pass	
Overall Results				Pass	

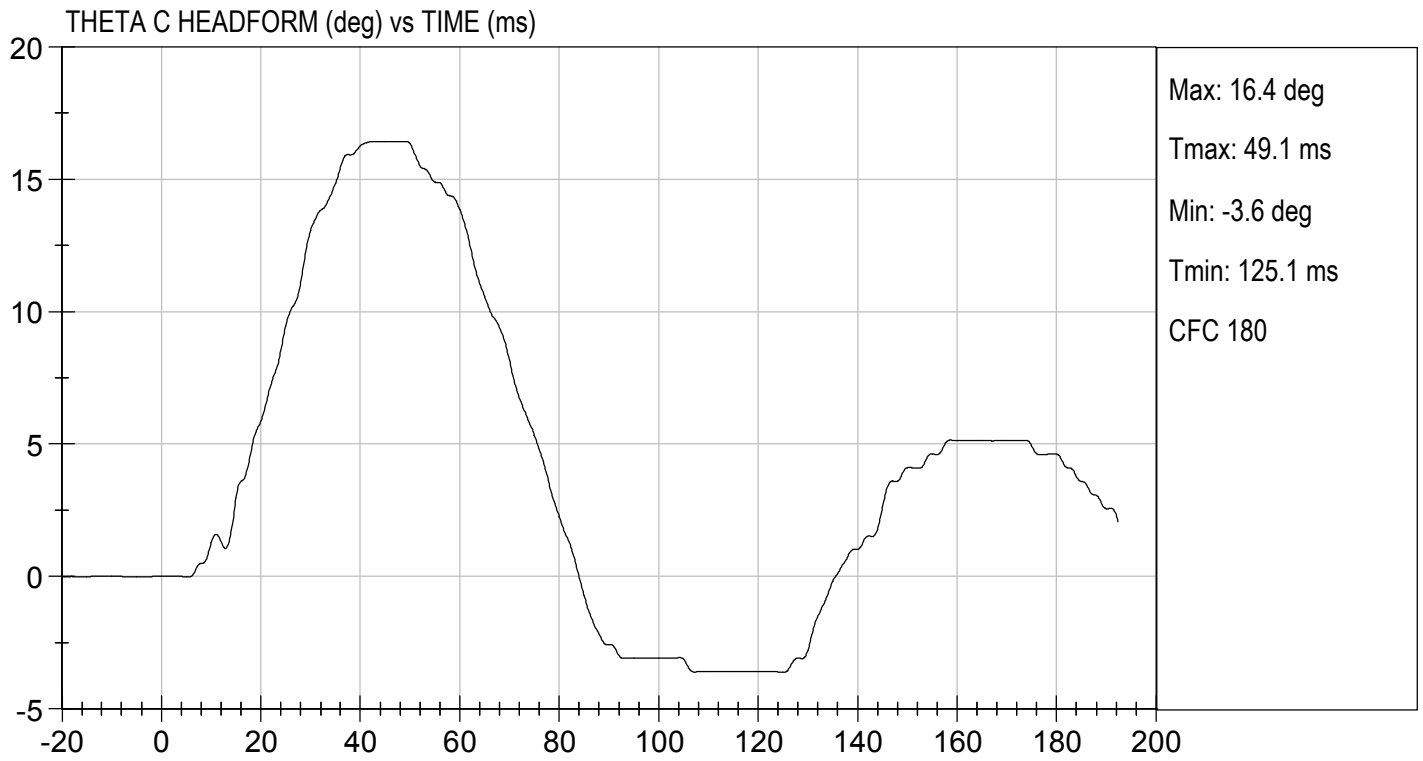
Danielle Redinlaugh
 Laboratory Technician

03/01/2019
 Test Date

Approved By _____








MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

ATD Serial No: 032

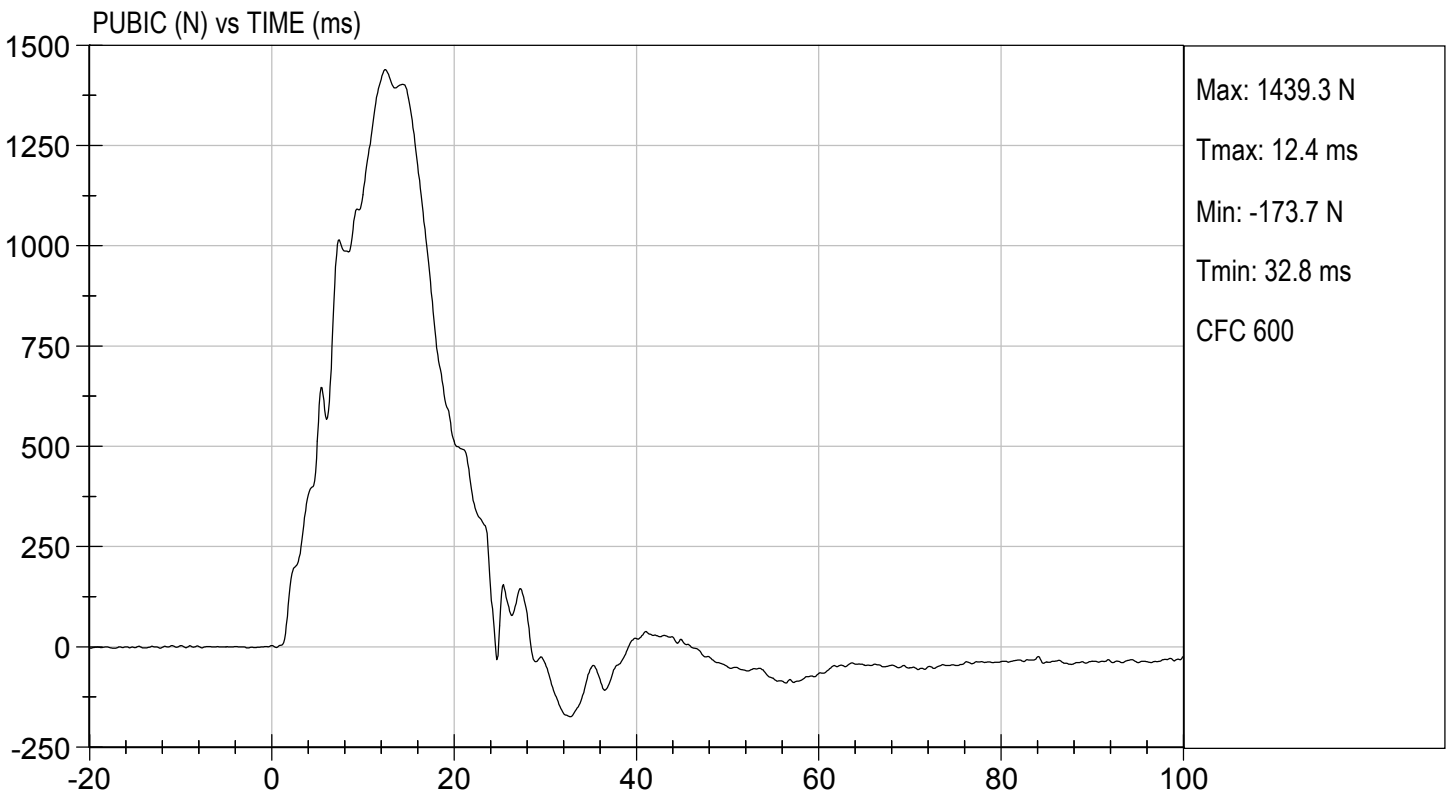
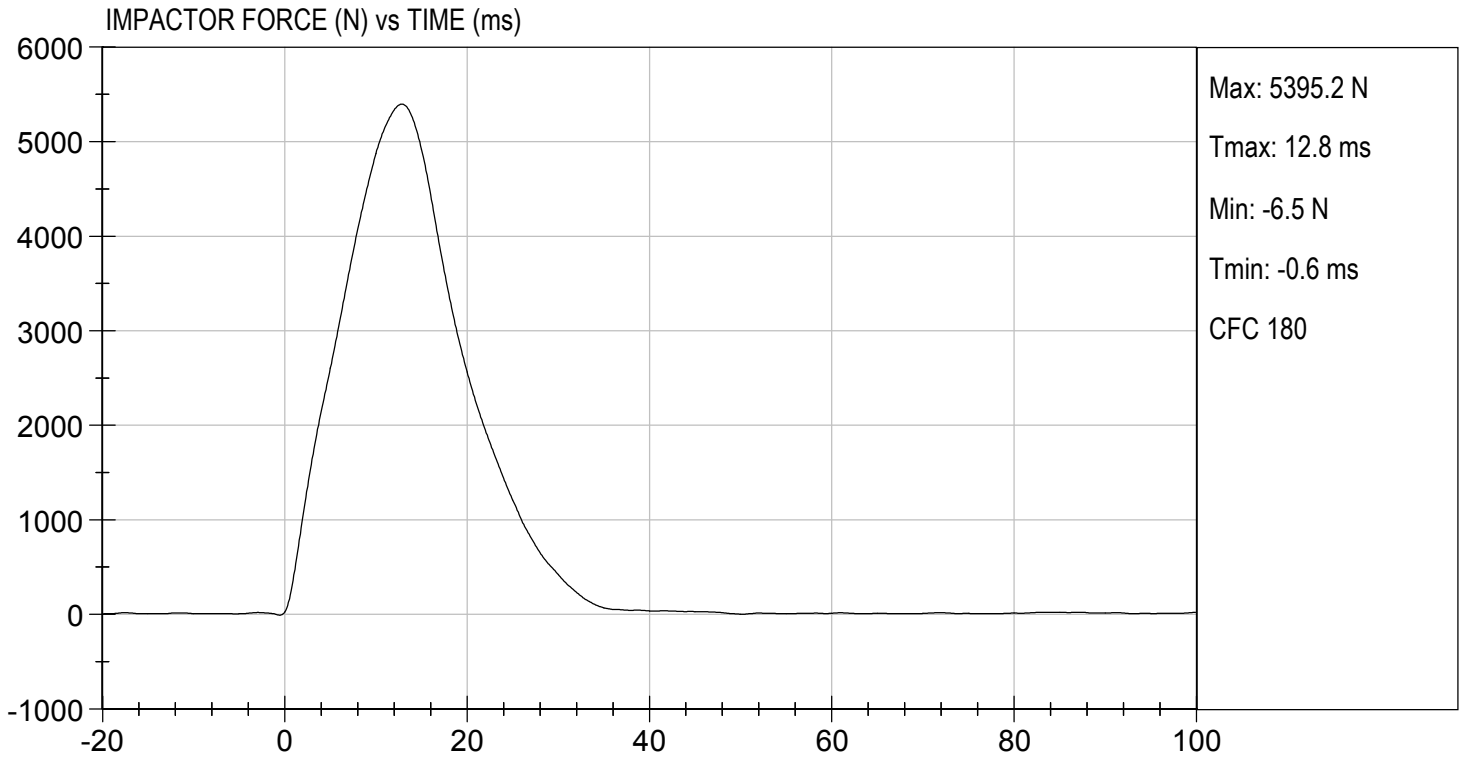
Test I.D: D190809

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	4.20 to 4.40	4.38	Pass
Maximum Impactor Force	N	4700 to 5400	5395	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.8	Pass
Maximum Pubic Force	N	1230 to 1590	1439	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	12.4	Pass
Overall Test Results				Pass


Laboratory Technician

03/01/2019
Test Date

Approved By _____



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

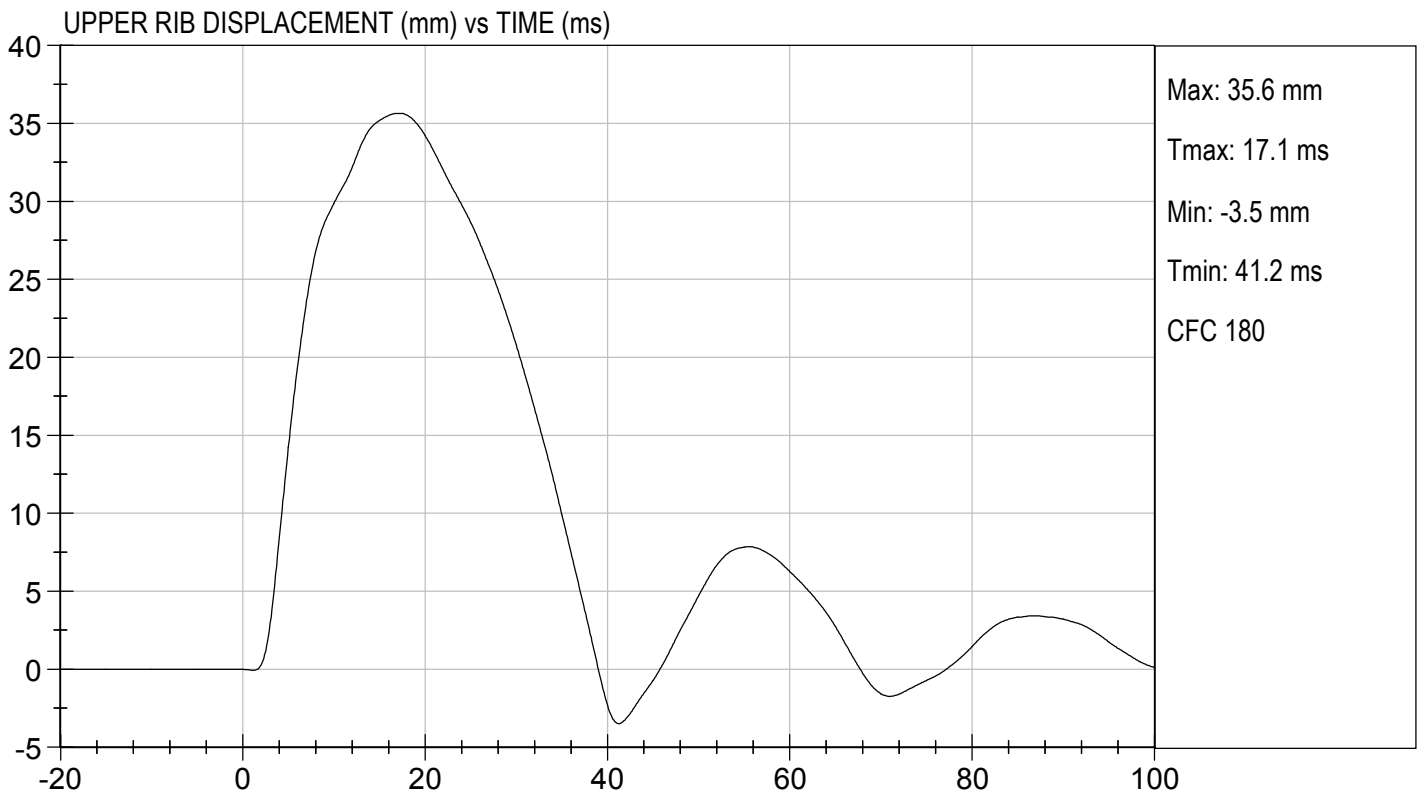
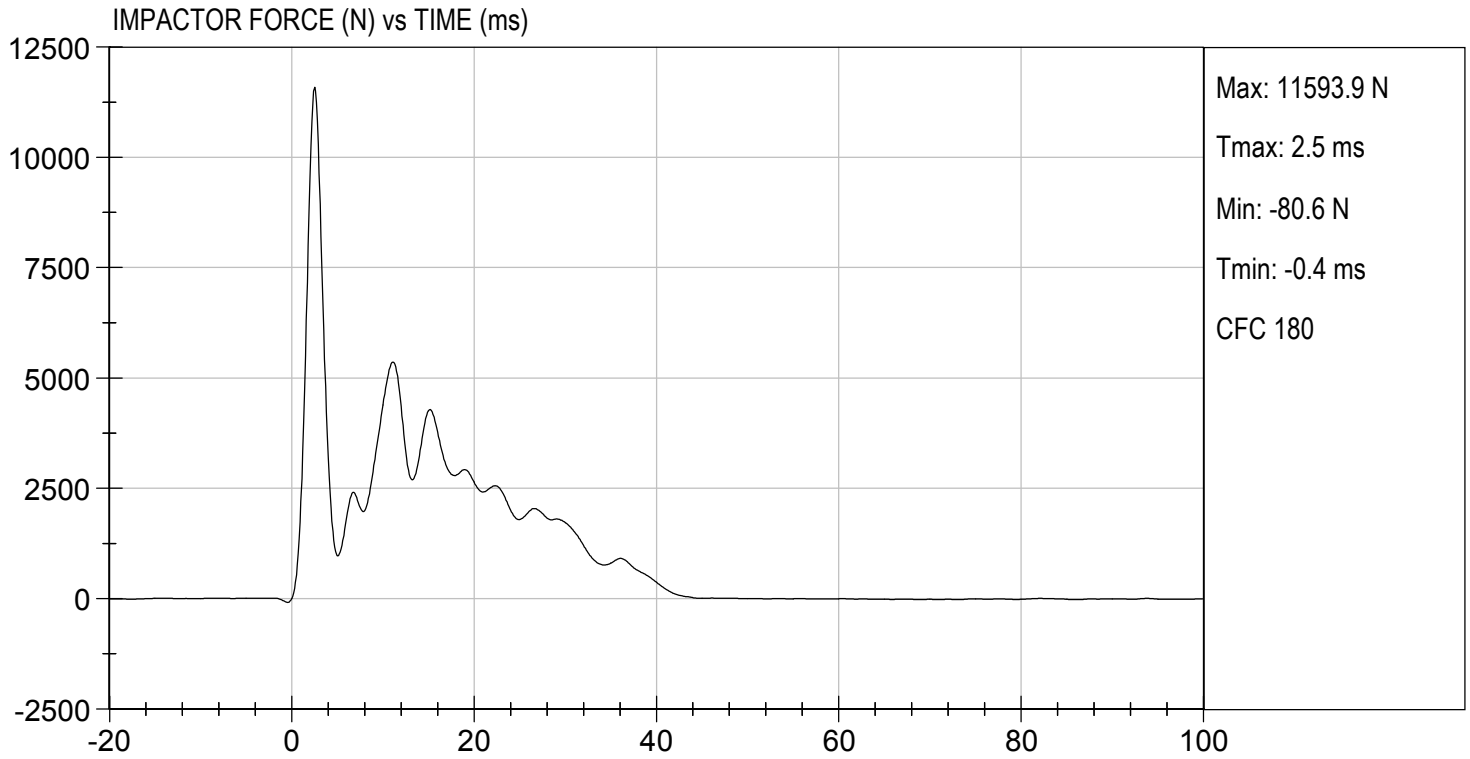
Test I.D: D190800

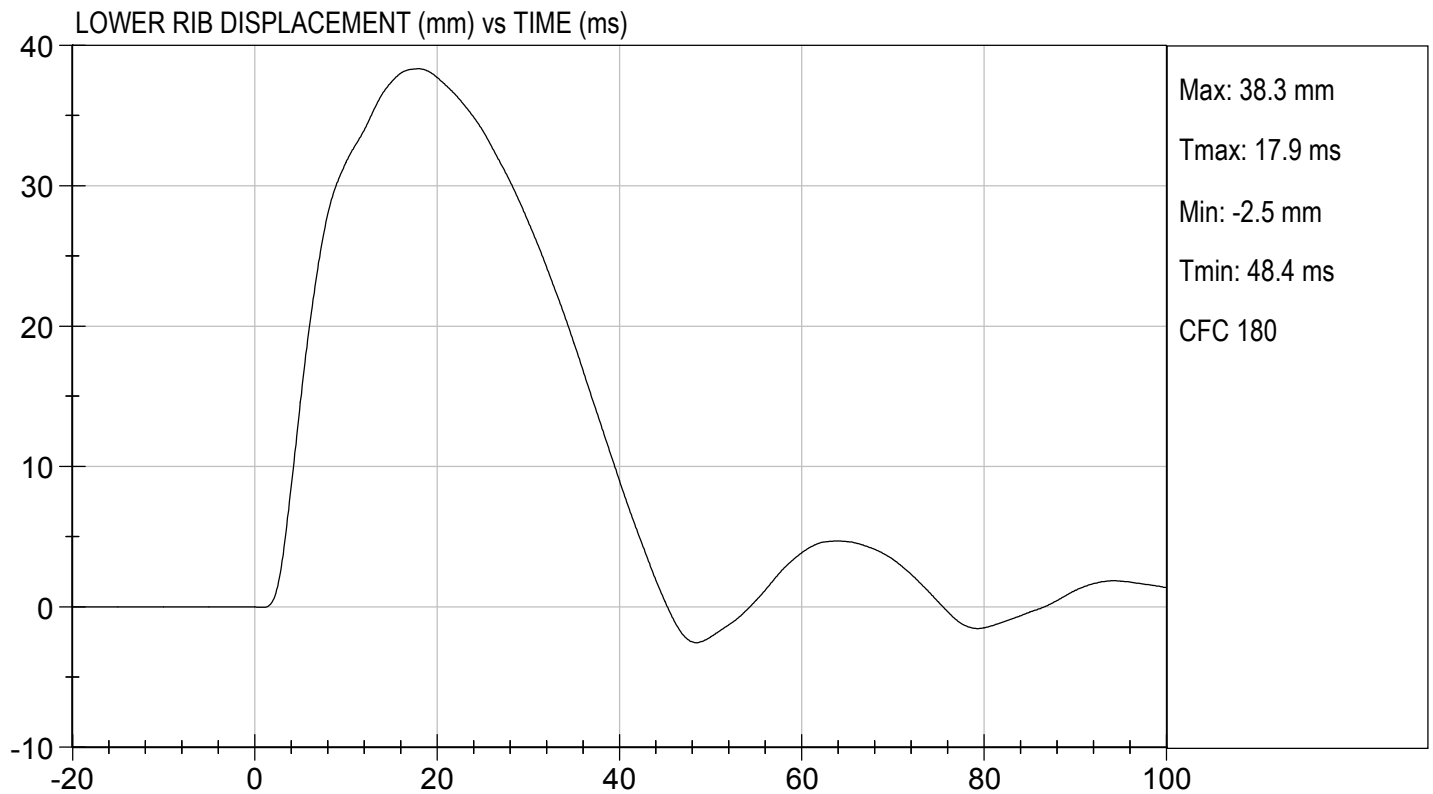
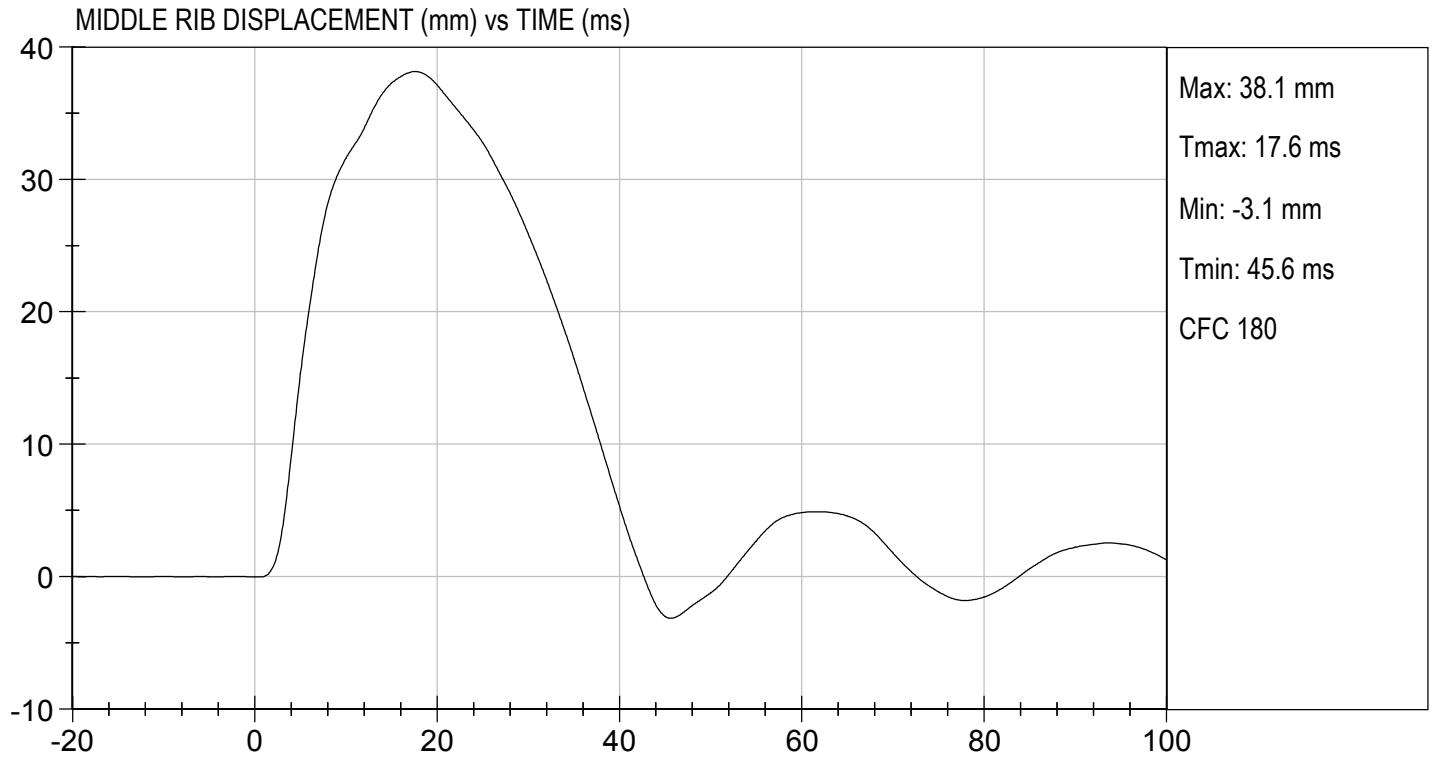
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5364	Pass
Upper Rib Displacement	mm	34.0 to 41.0	35.6	Pass
Middle Rib Displacement	mm	37.0 to 45.0	38.1	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.3	Pass
Overall Test Results				Pass

Danielle Redinlaugh
 Laboratory Technician

03/01/2019
 Test Date

Approved By _____





CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

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

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

ATD Serial No: 306

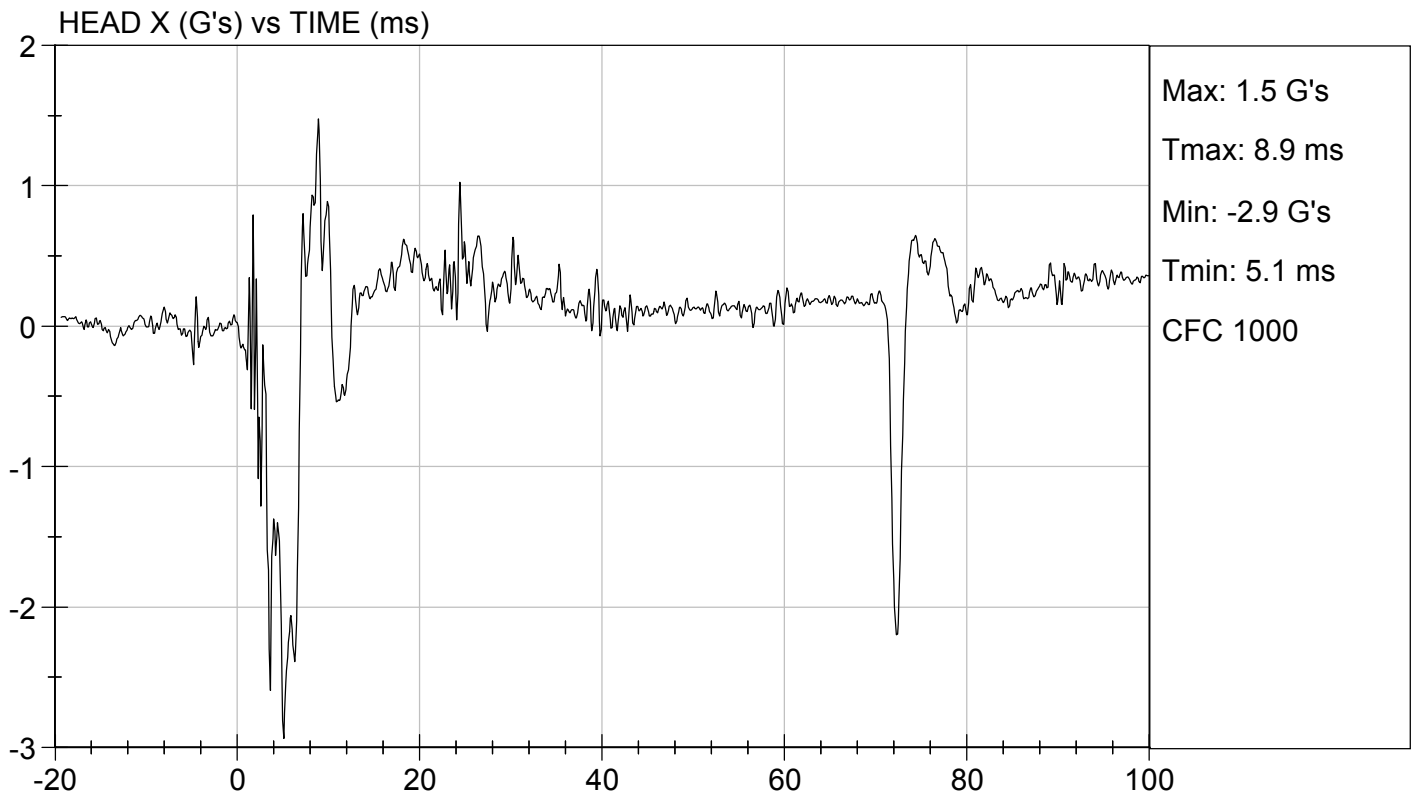
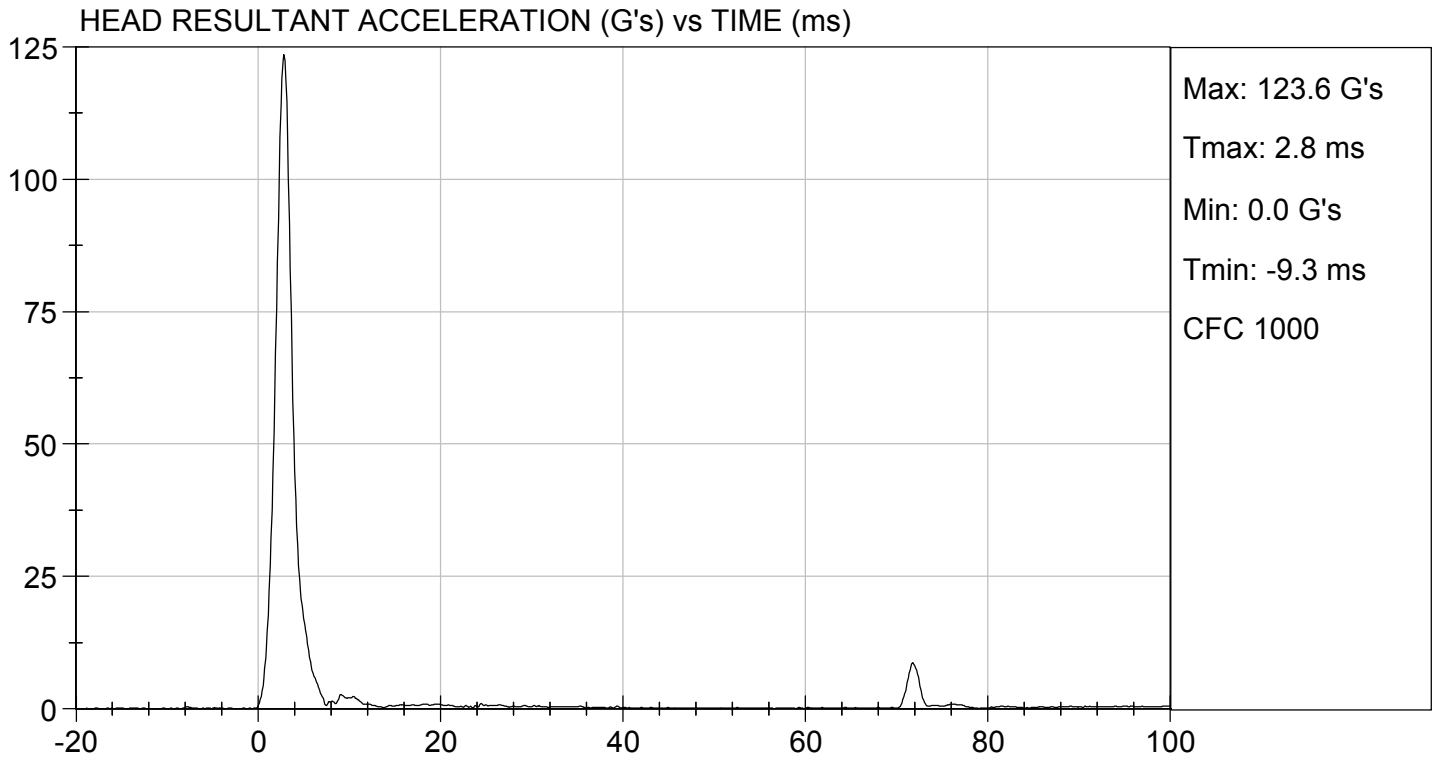
Test ID: D190531

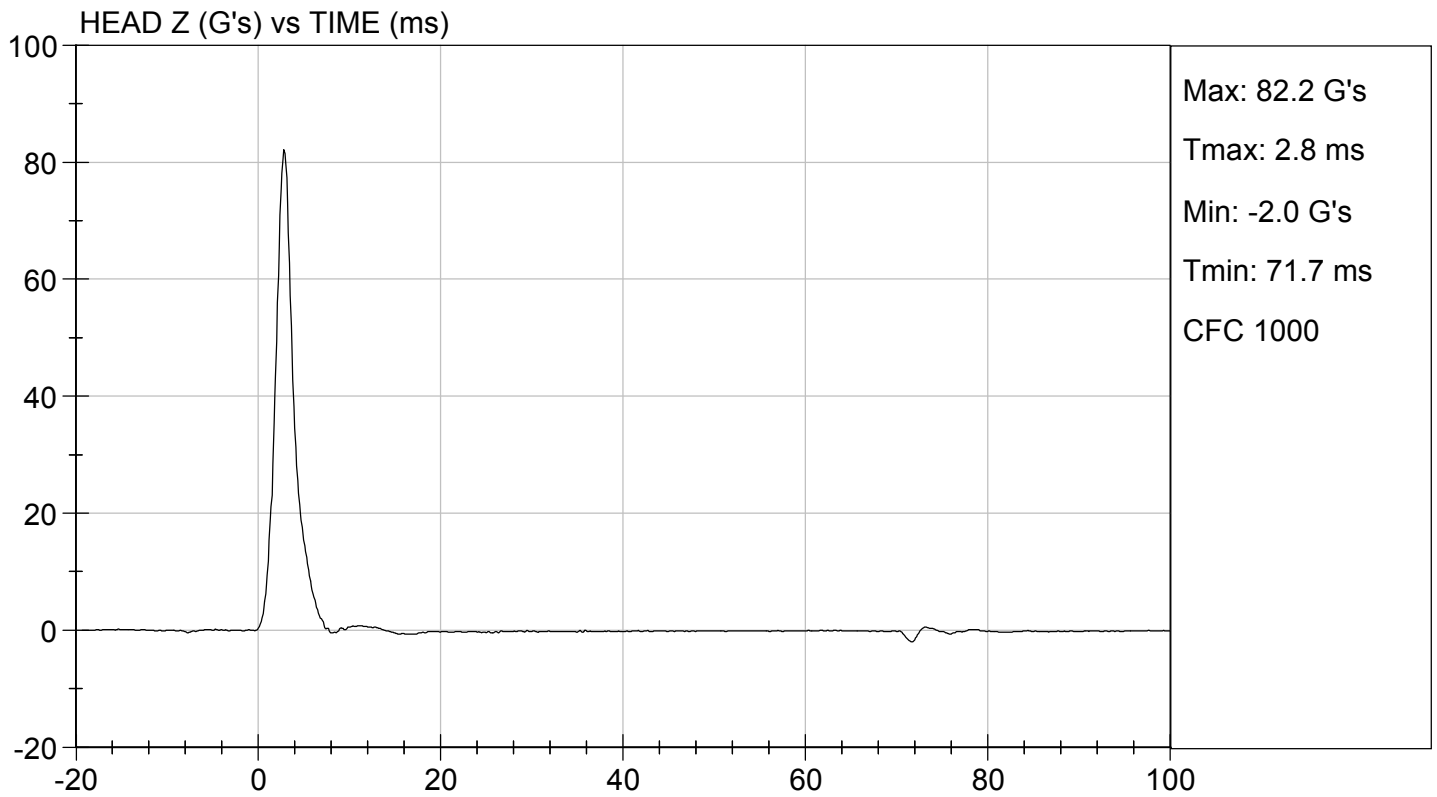
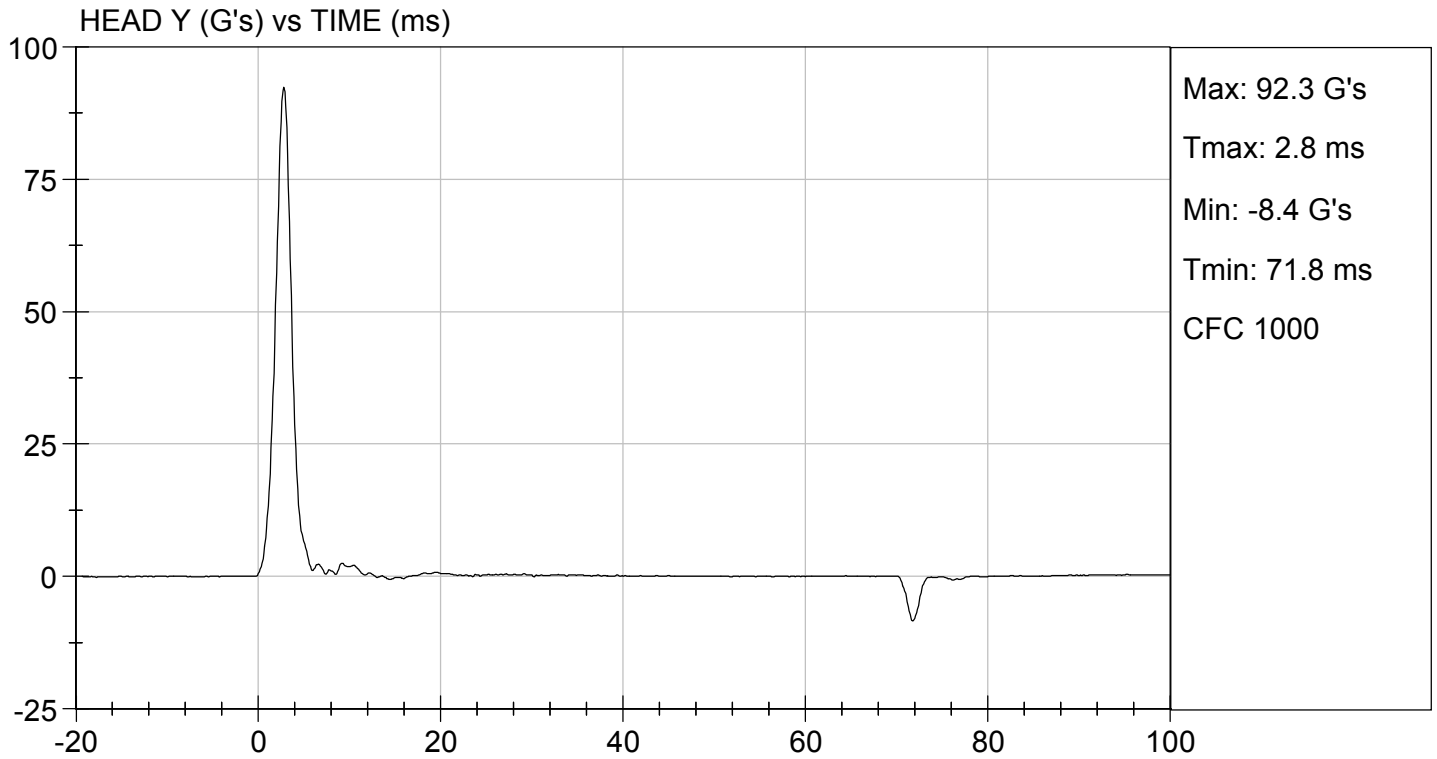
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Danielle Redinlaugh
Laboratory Technician

02/06/2019
Test Date

Approved By _____





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

ATD Serial No: 306

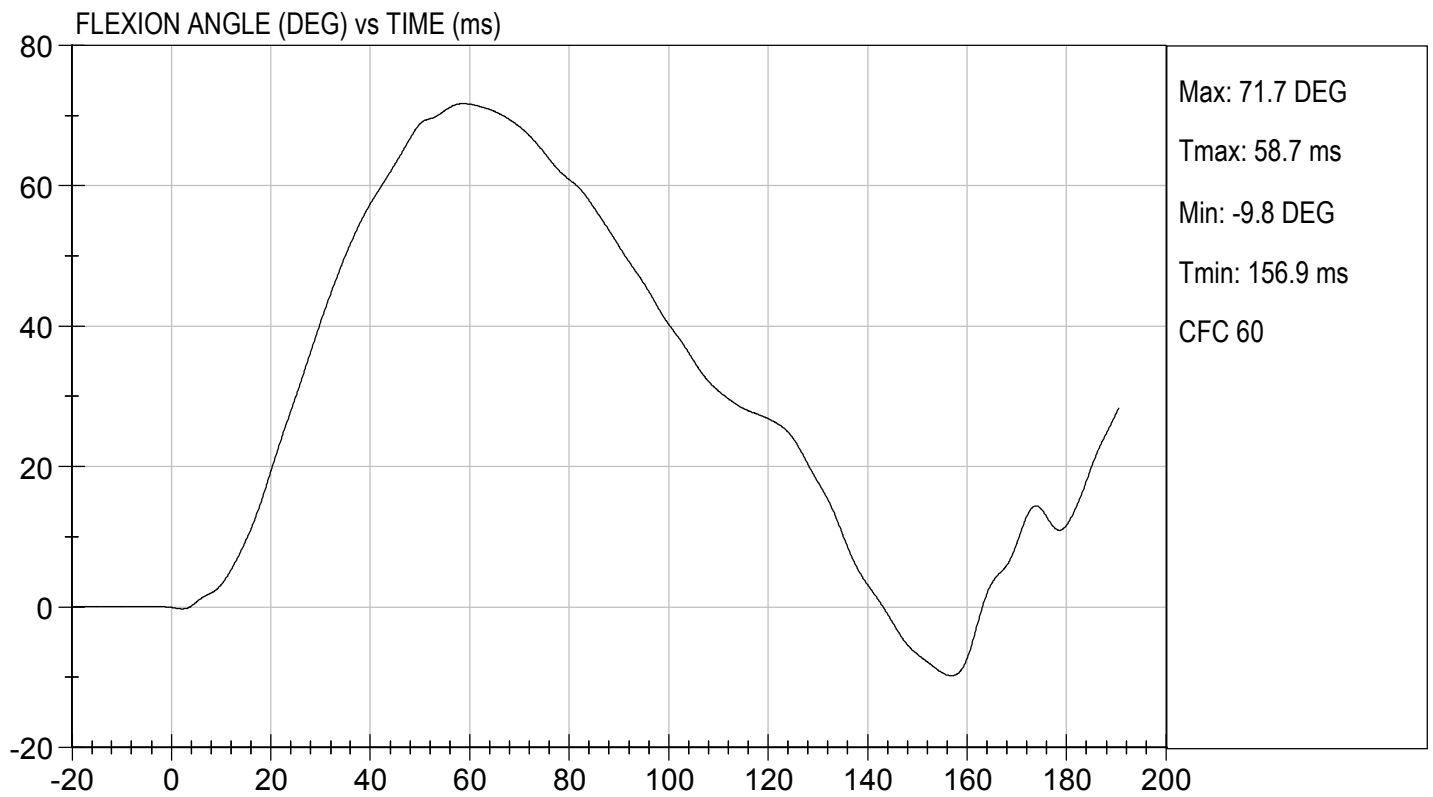
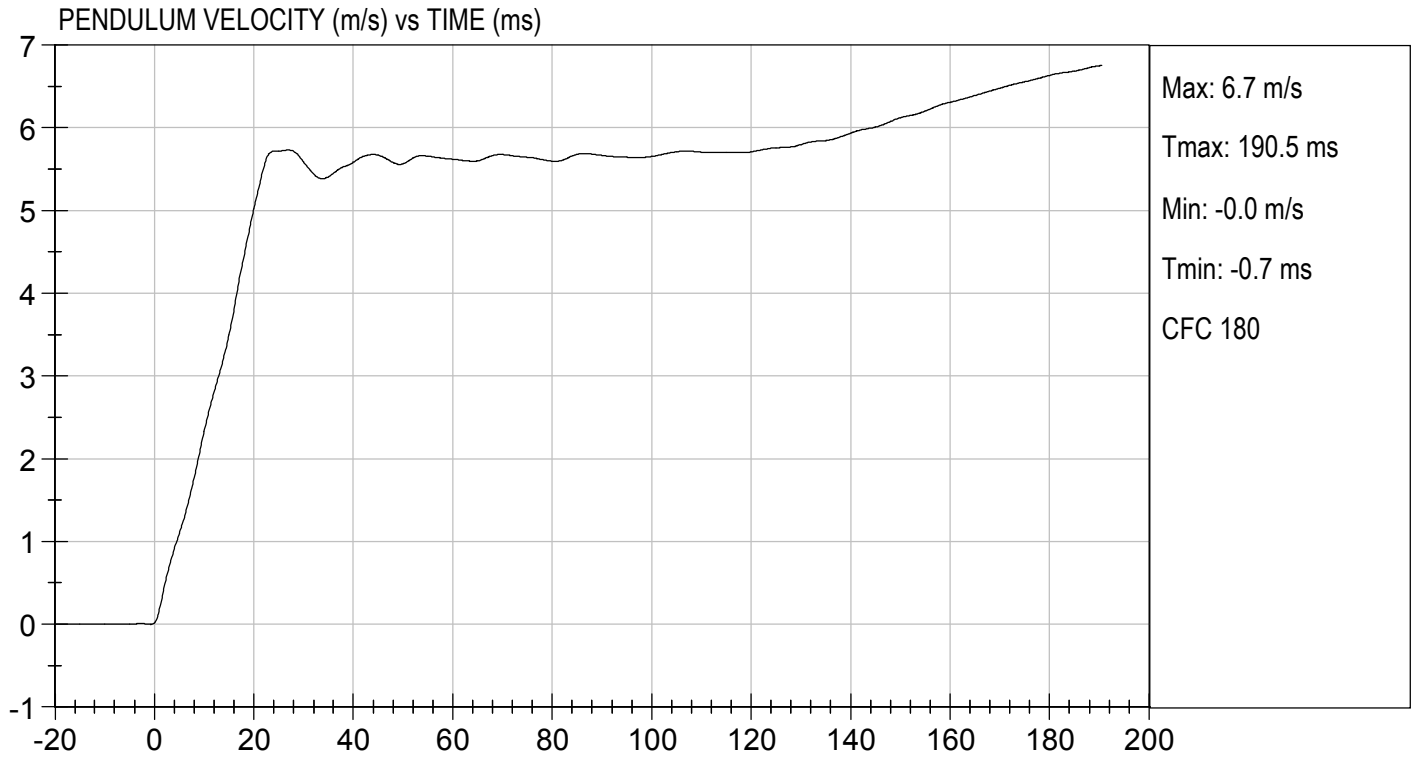
Test I.D: D190532

Tested Parameter	Units	Specification	Result	Pass/Fail	
Temperature	deg C	20.6 to 22.2	21	Pass	
Humidity	%	10 to 70	32	Pass	
Impact Velocity	m/s	5.51 to 5.63	5.61	Pass	
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.33	Pass
	15 ms	m/s	3.30 to 4.10	3.50	Pass
	20 ms	m/s	4.40 to 5.40	5.02	Pass
	25 ms	m/s	5.40 to 6.10	5.71	Pass
	25-100 ms	m/s	5.50 to 6.20	5.73	Pass
Maximum D-Plane Rotation	deg	71 to 81	72	Pass	
Time of Maximum D-Plane Rotation	ms	50 to 70	59	Pass	
Maximum Occipital Condyle Moment	Nm	-44 to -36	-42	Pass	
Time of Moment Decay to 0 Nm	ms	102 to 126	110	Pass	
Overall Test Results				Pass	

Danielle Redinlaugh
Laboratory Technician

02/06/2019
Test Date

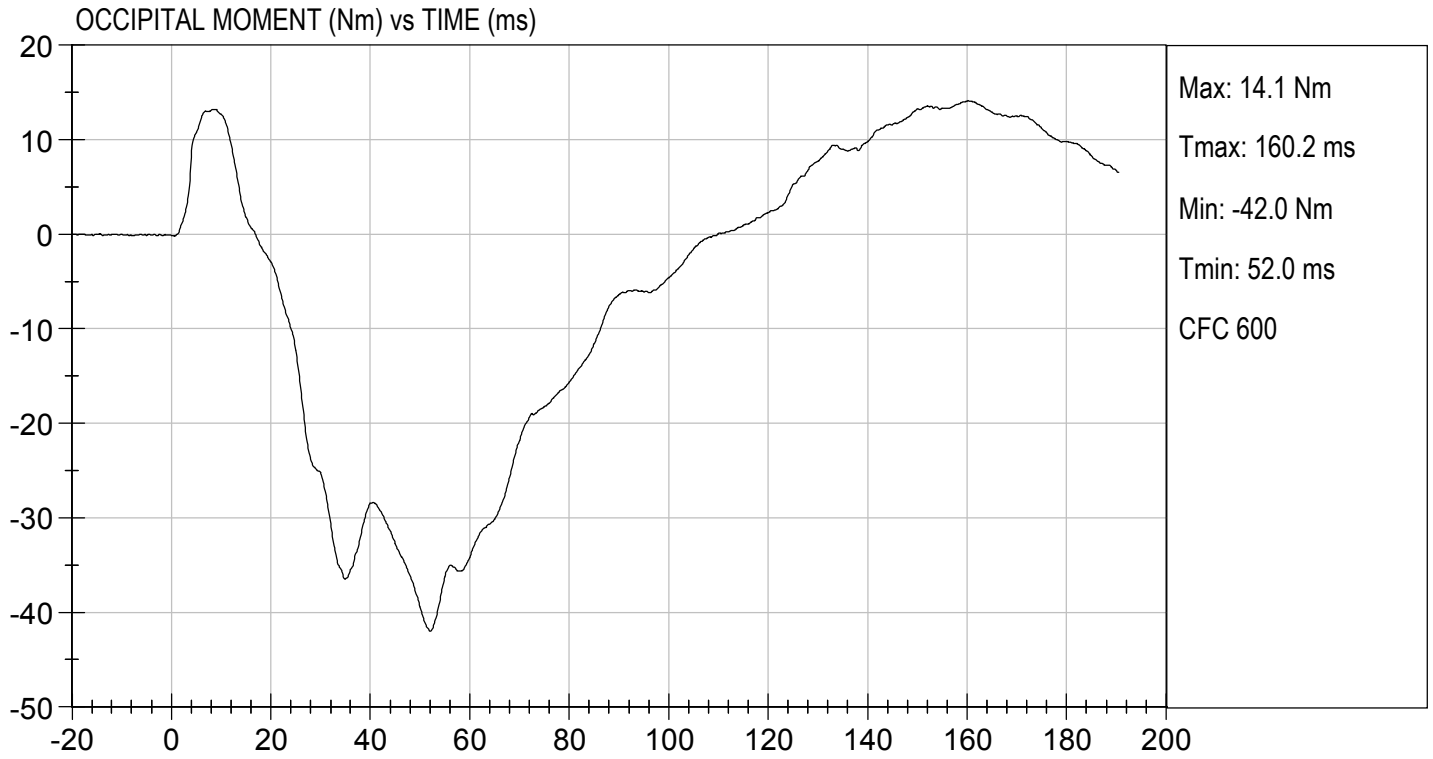
Approved By _____





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

TEST DATE: 02/06/2019
TEST #: D190532



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

ATD Serial No: 306

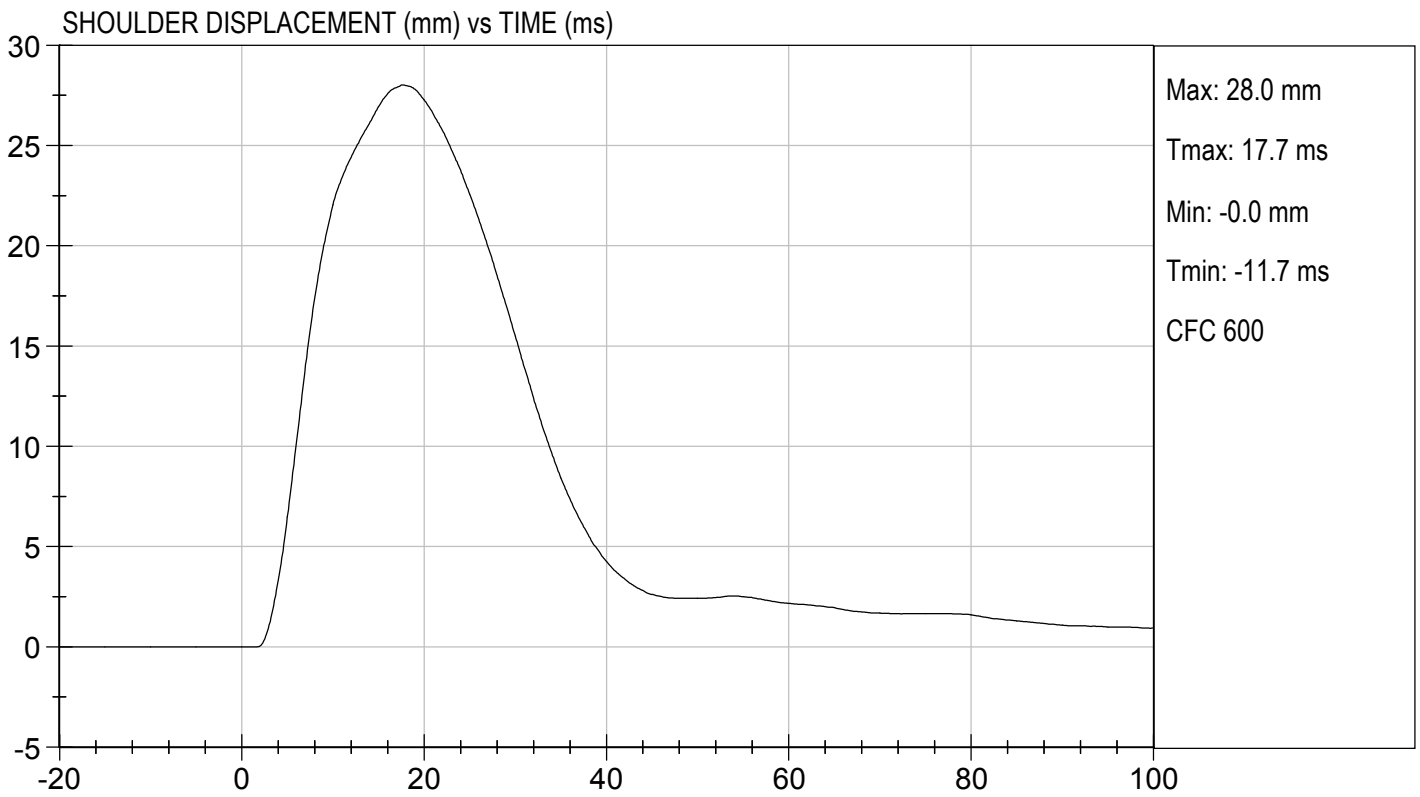
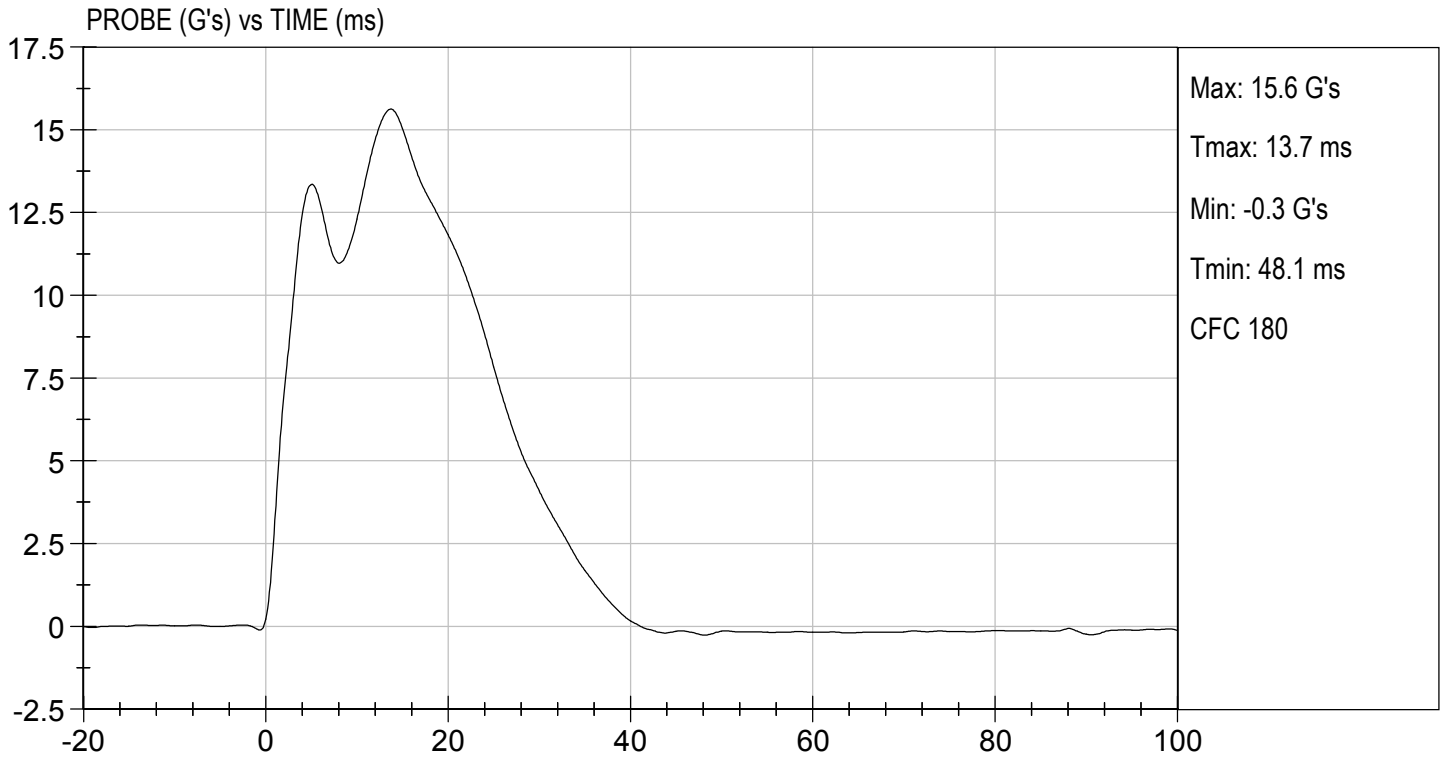
Test ID: D190533

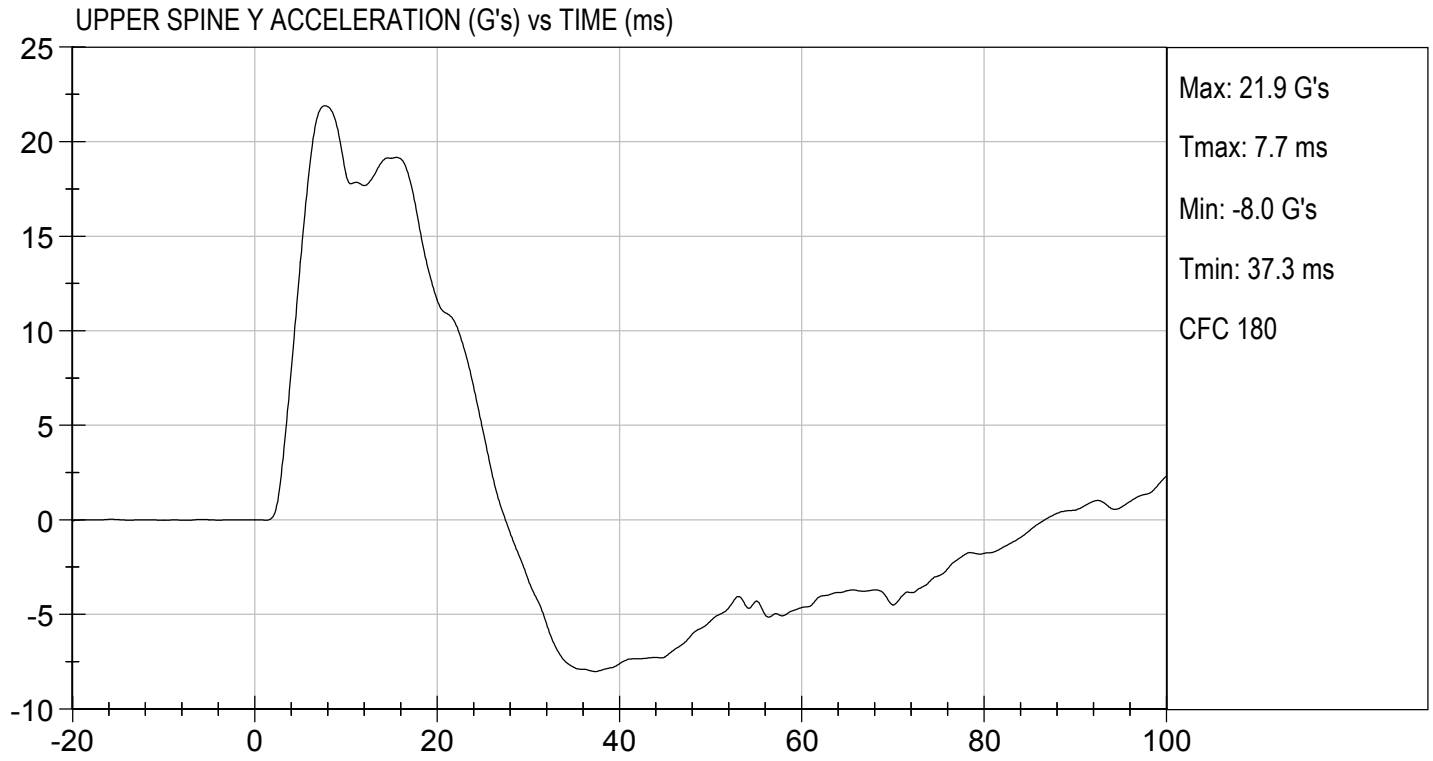
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	22	Pass
Overall Test Results				Pass

Jacob D Taylor
 Laboratory Technician

02/08/2019
 Test Date

Approved By _____





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

ATD Serial No: 306

Test I.D: D190534

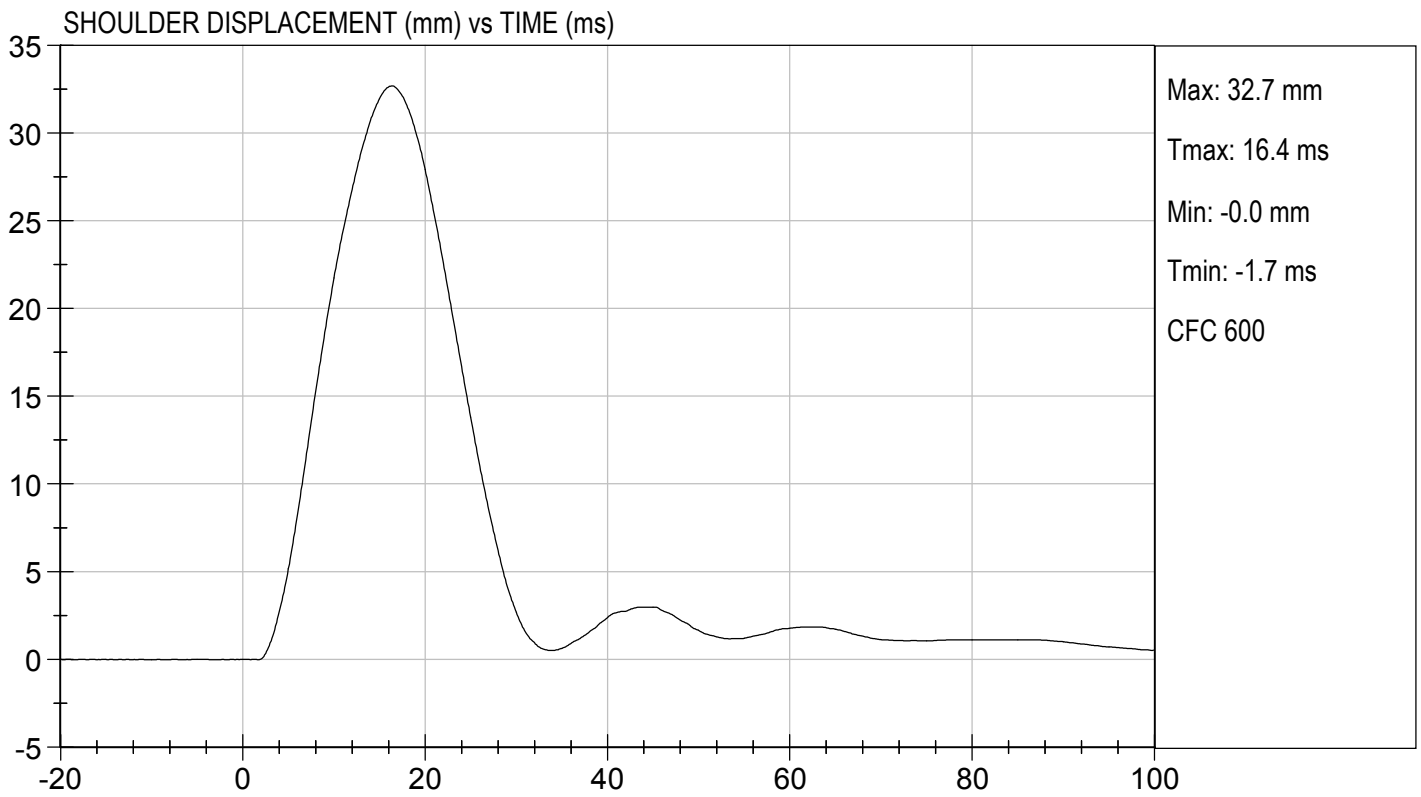
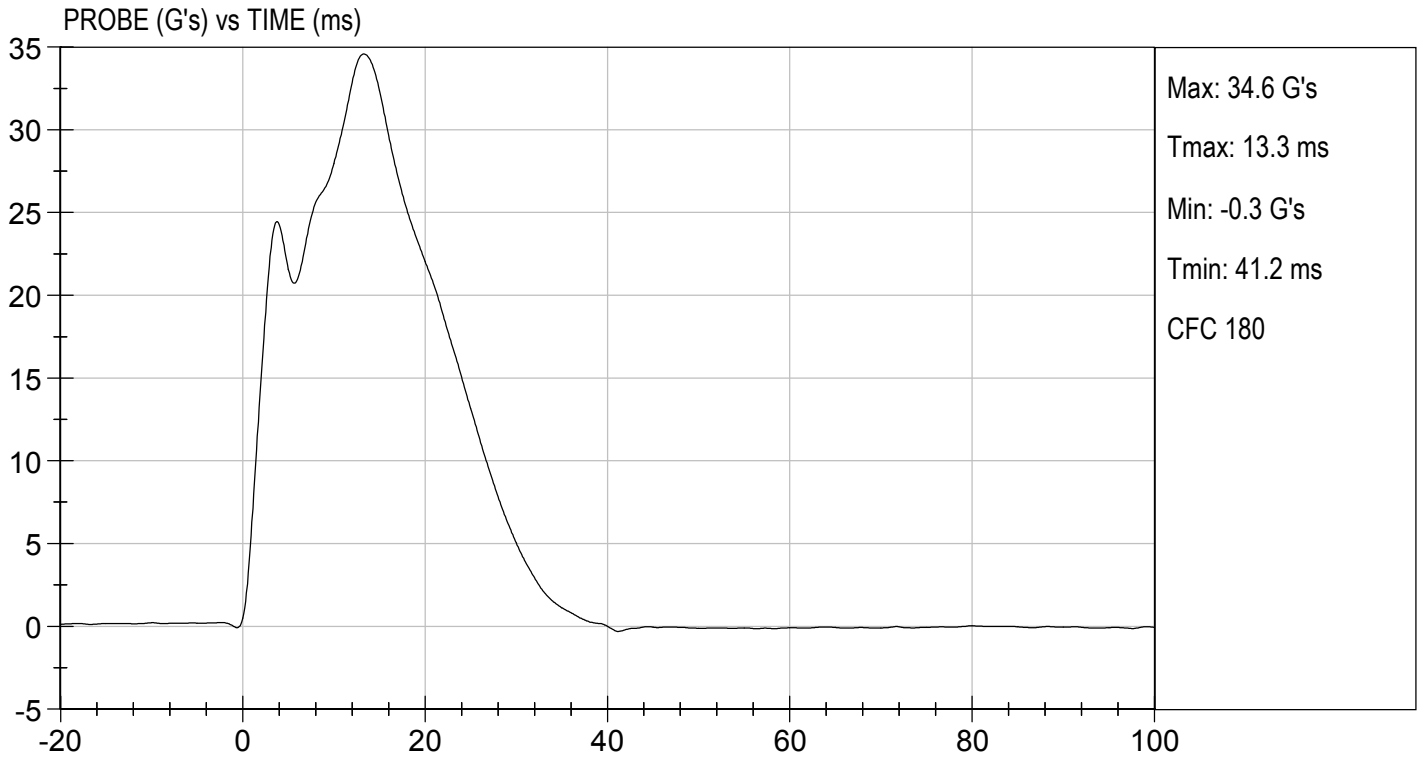
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	35	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	43	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass

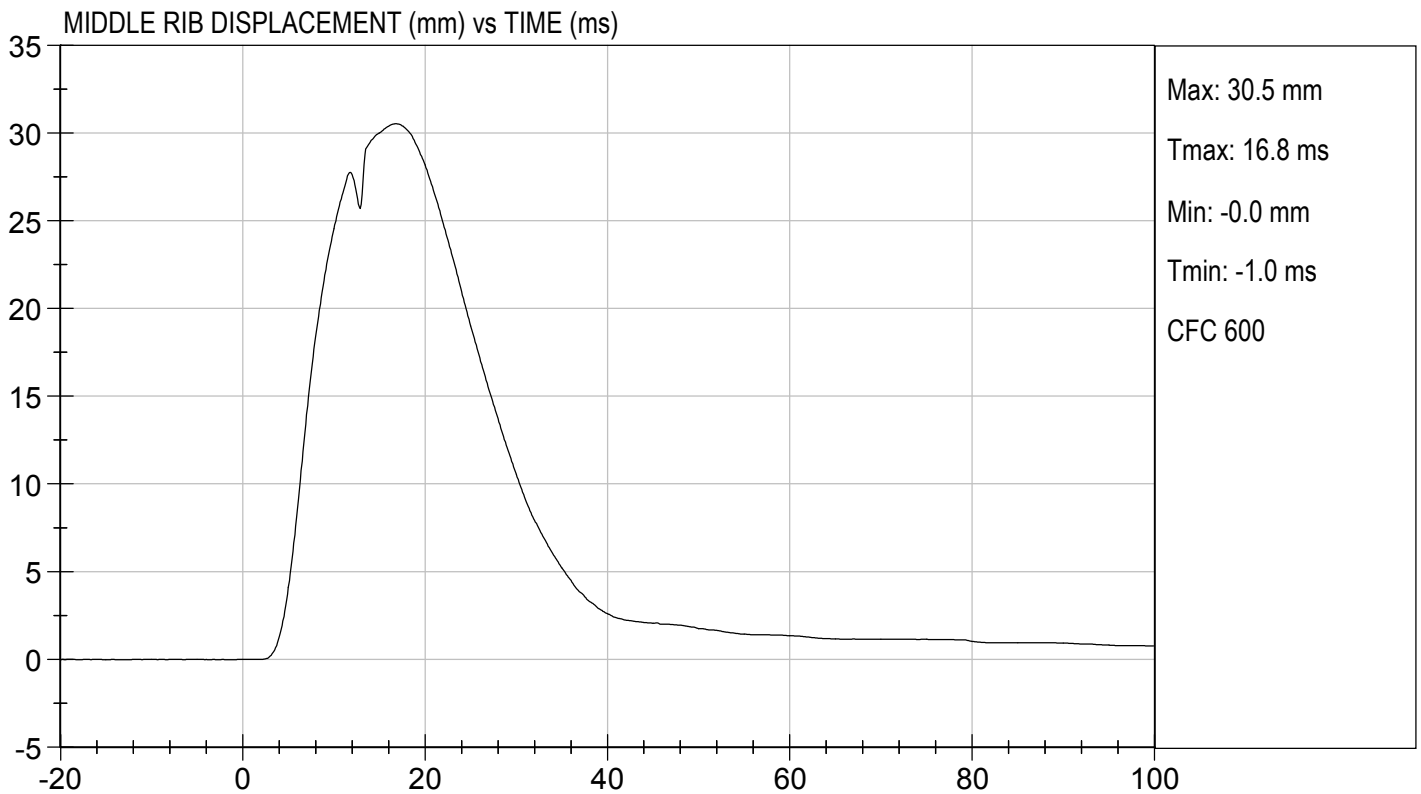
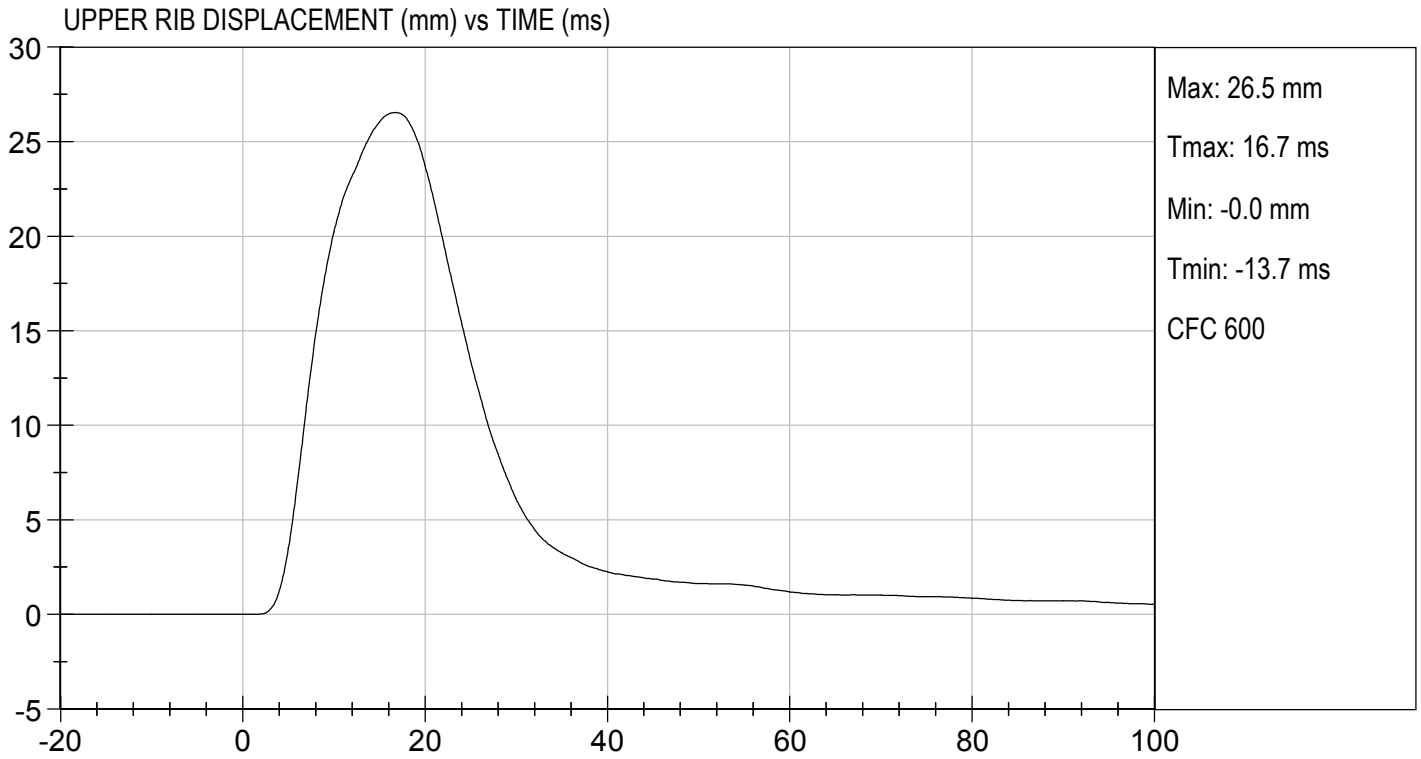
Jacob D Taylor
Laboratory Technician

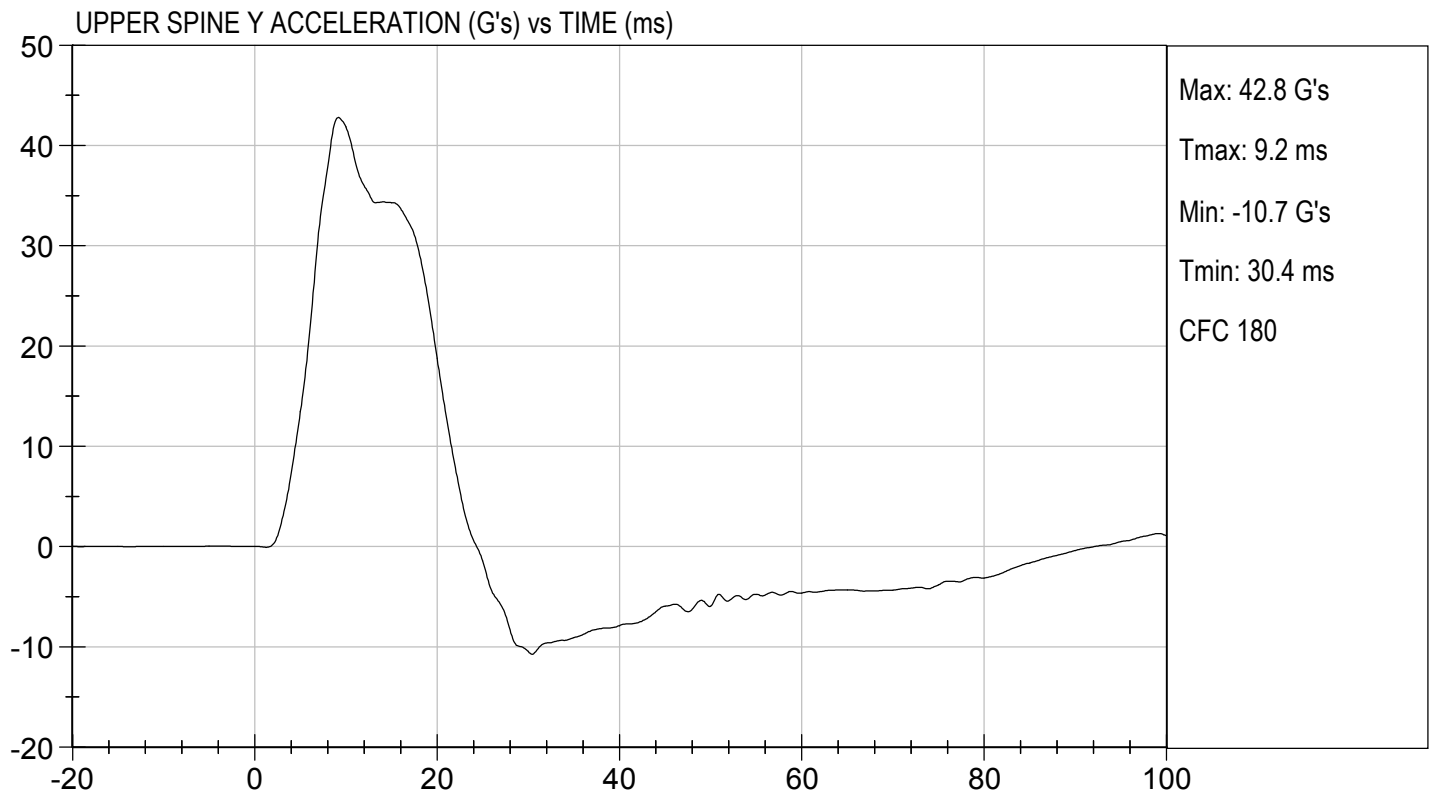
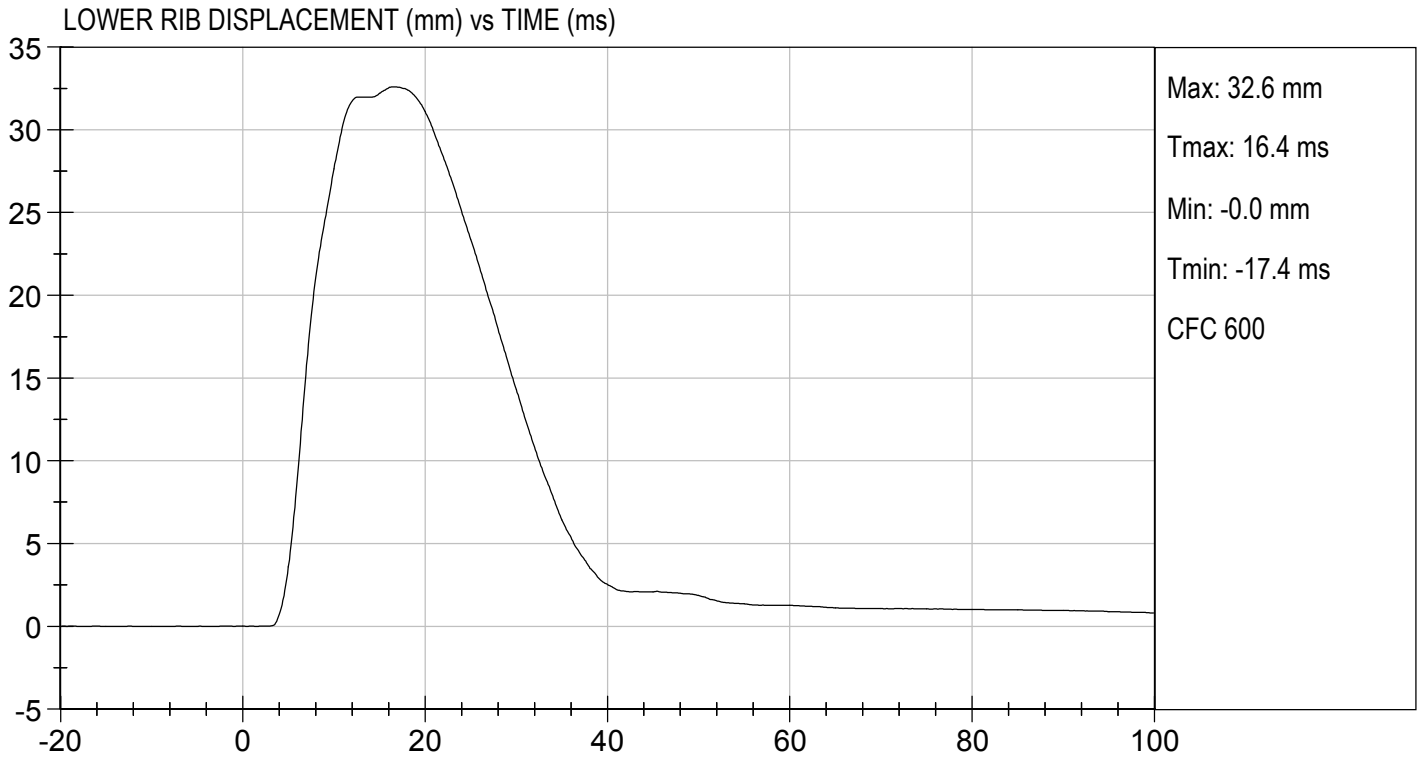
02/08/2019

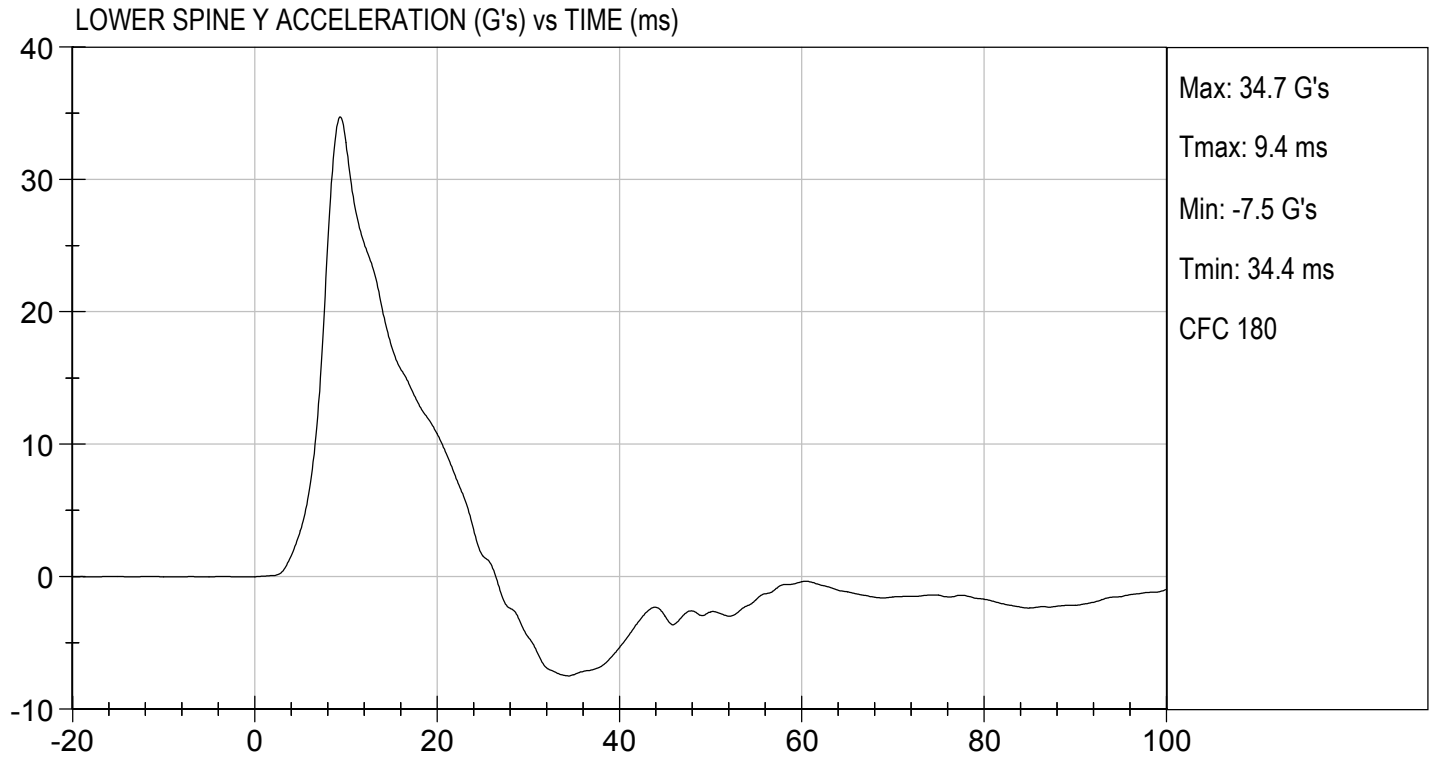
Test Date

Approved By









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

ATD Serial No: 306

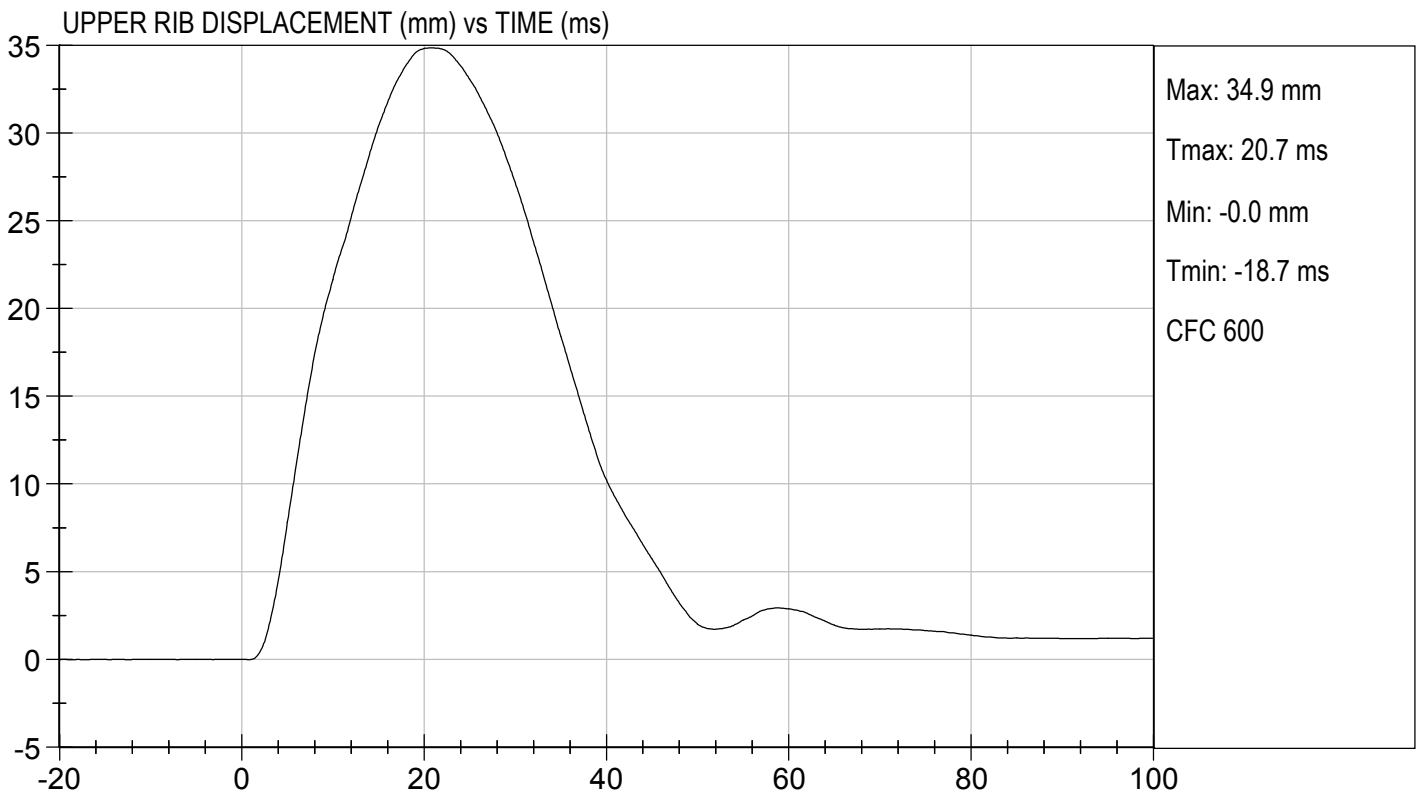
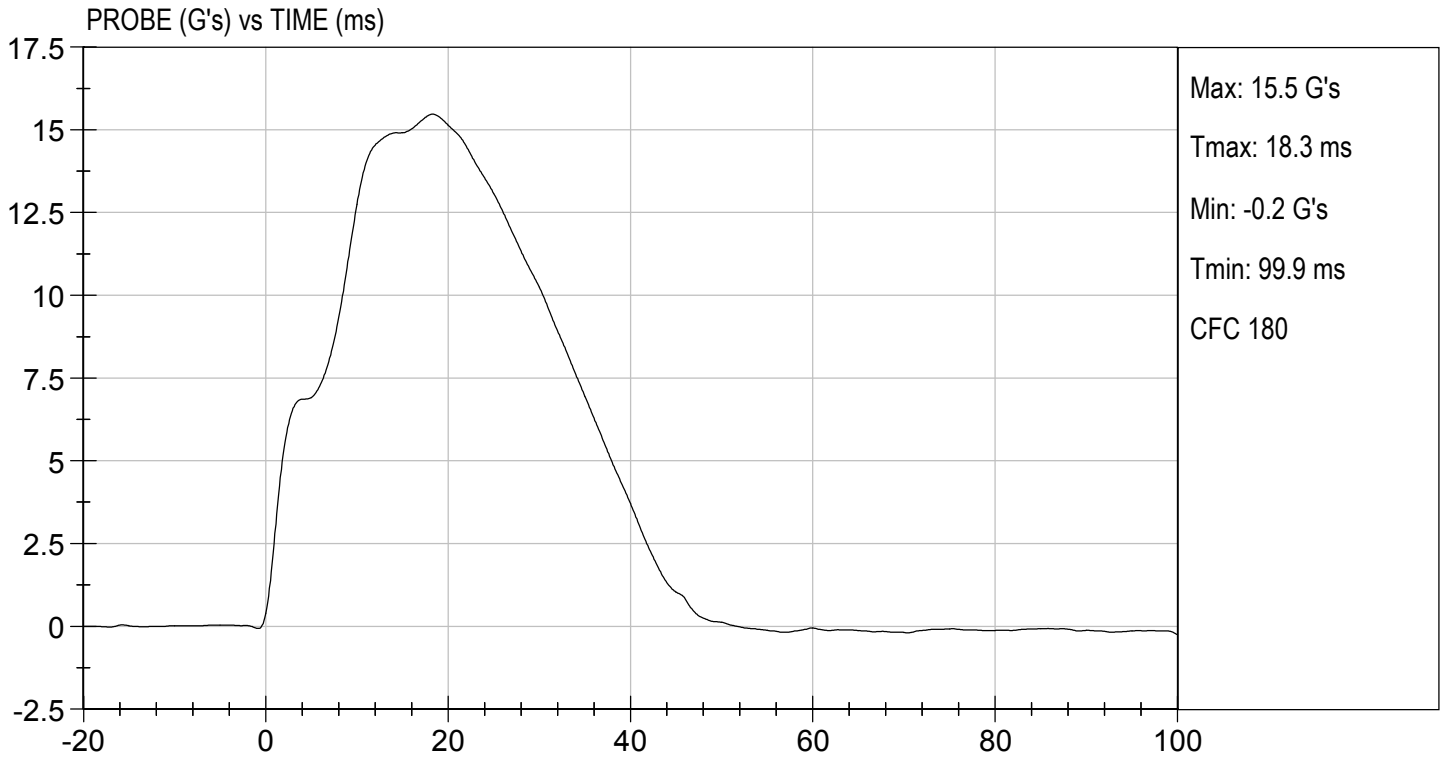
Test I.D: D190535

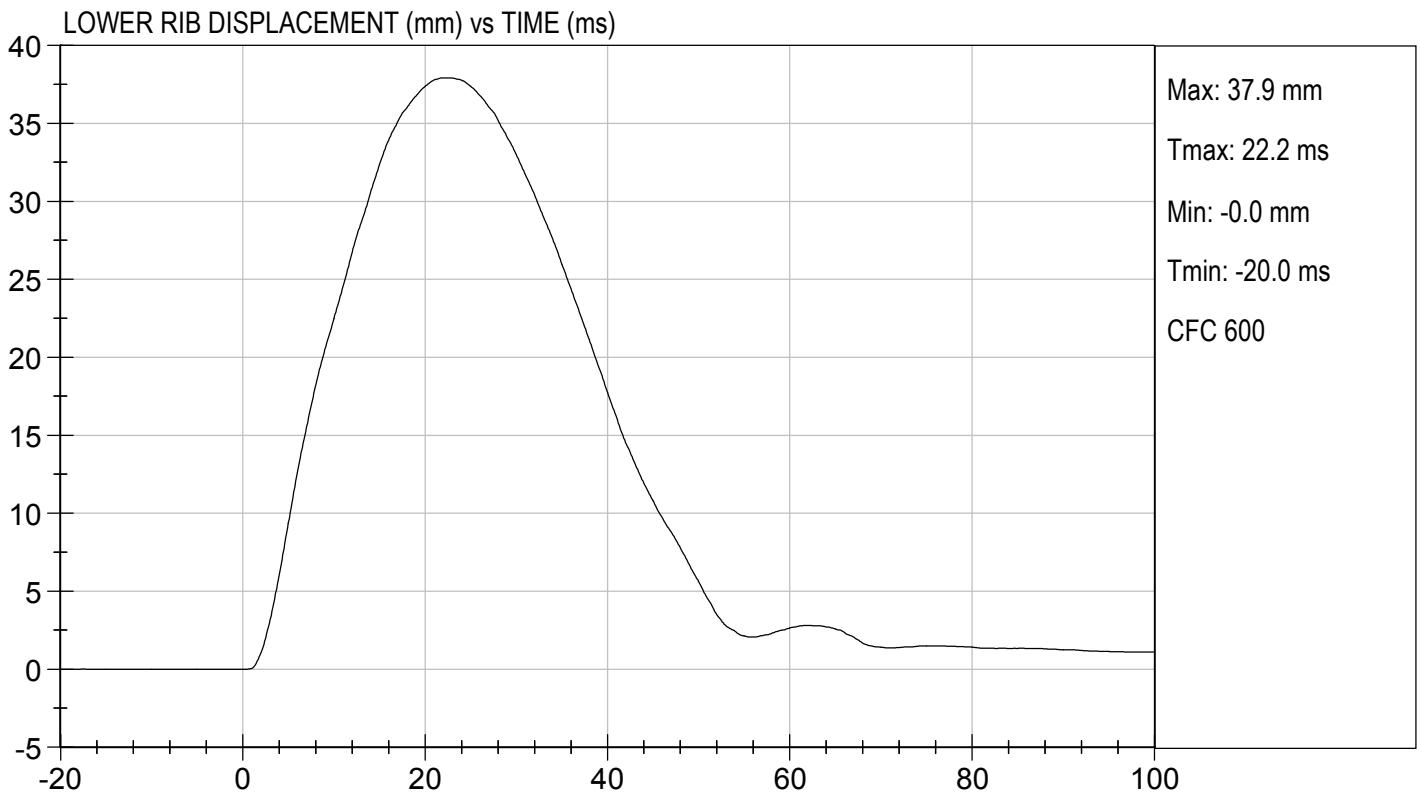
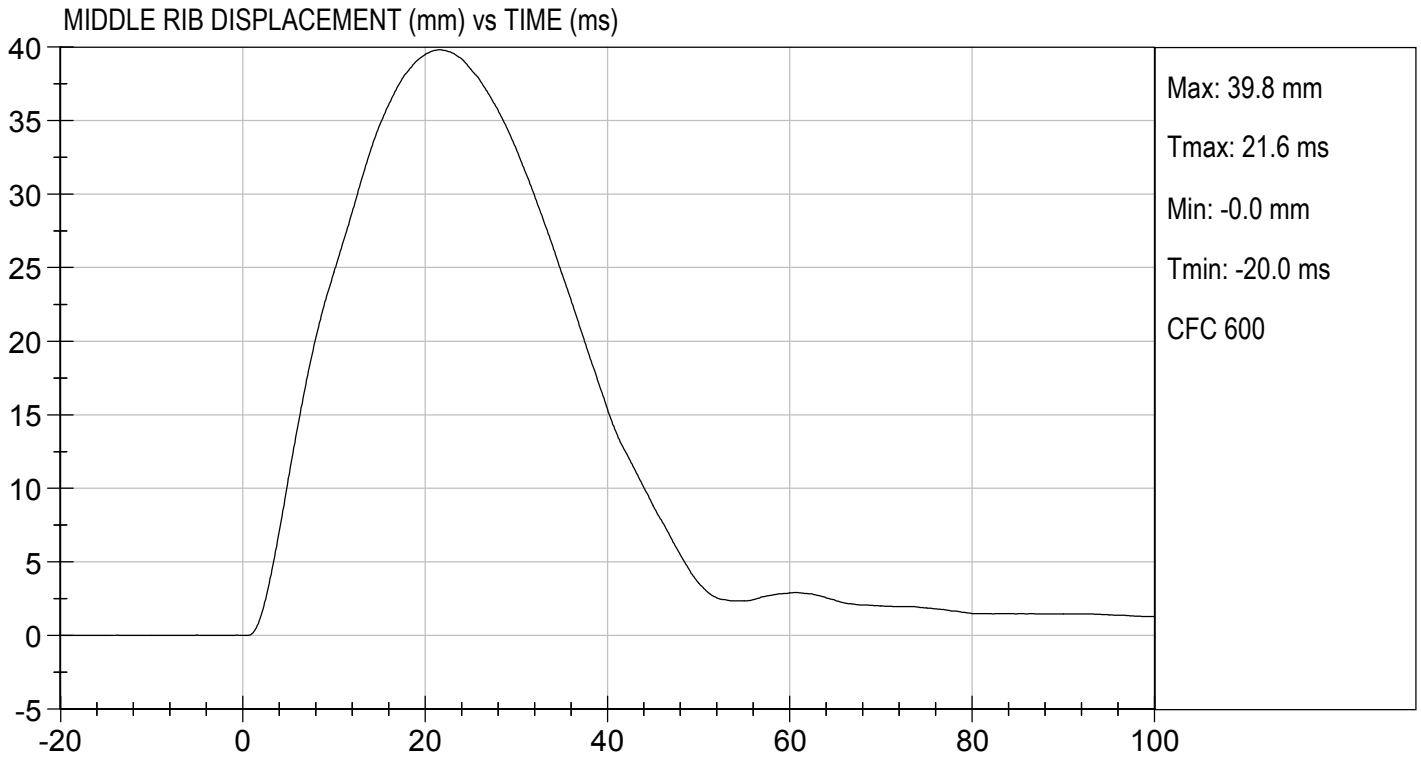
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
			Overall Test Results	Pass

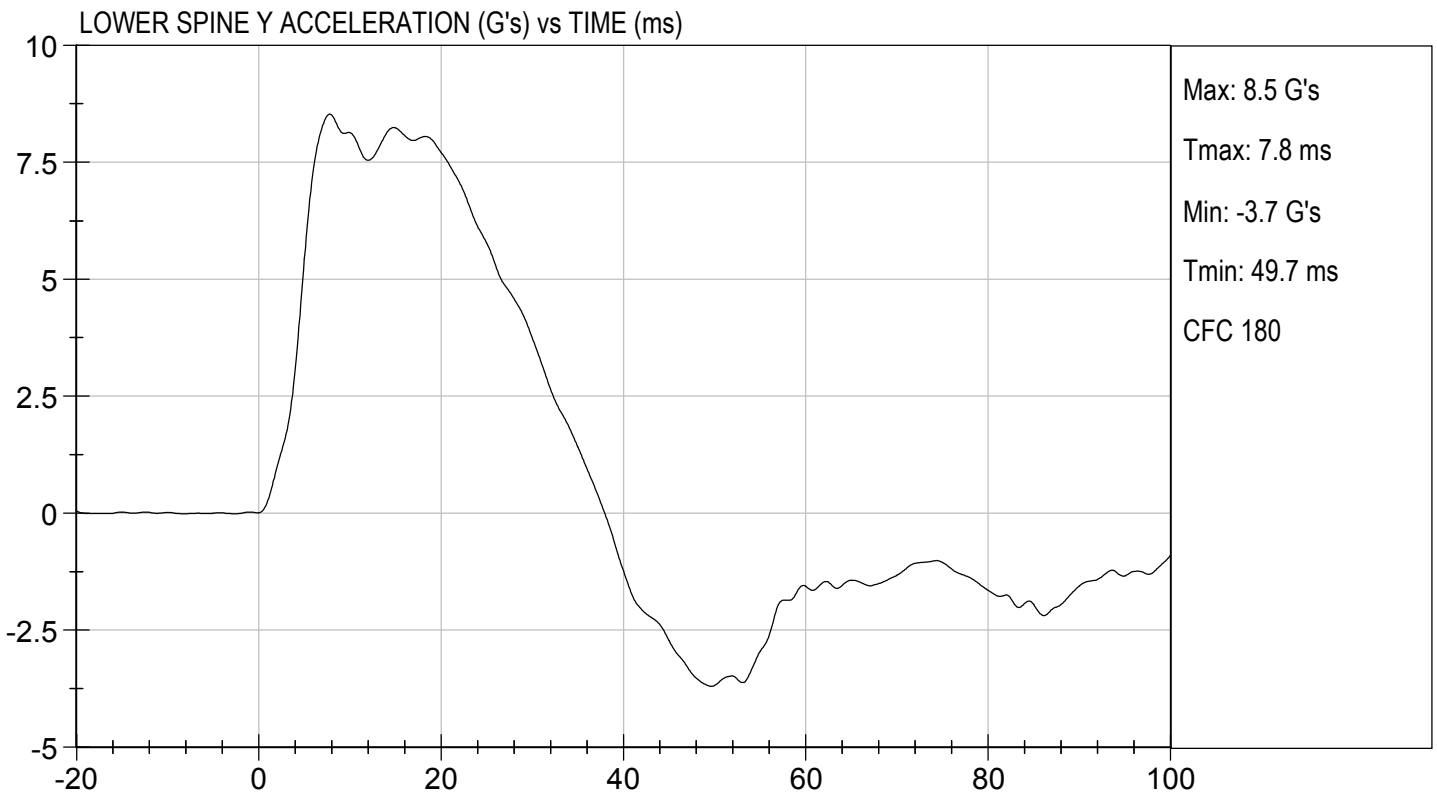
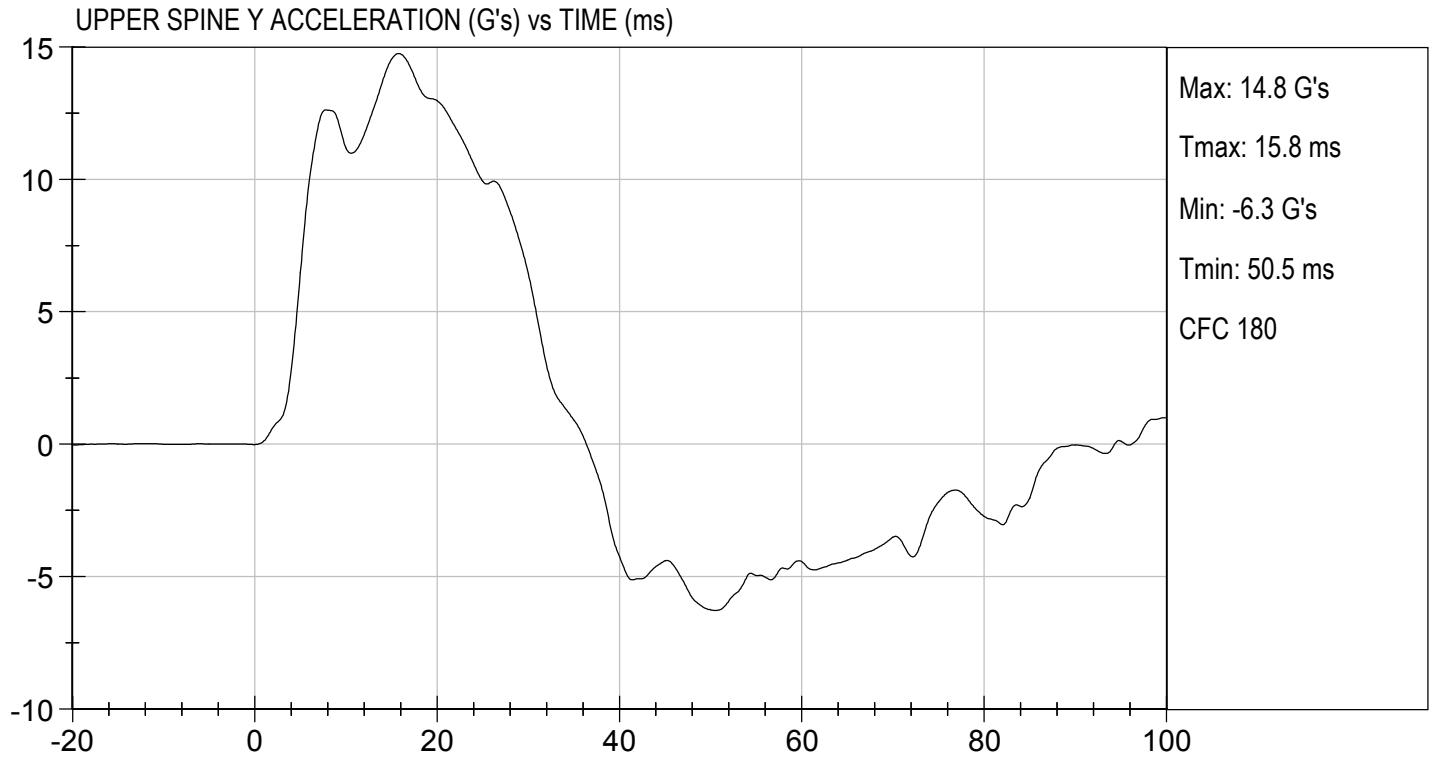
Jacob D Taylor
 Laboratory Technician

02/08/2019
 Test Date

Approved By _____







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

ATD Serial No: 306

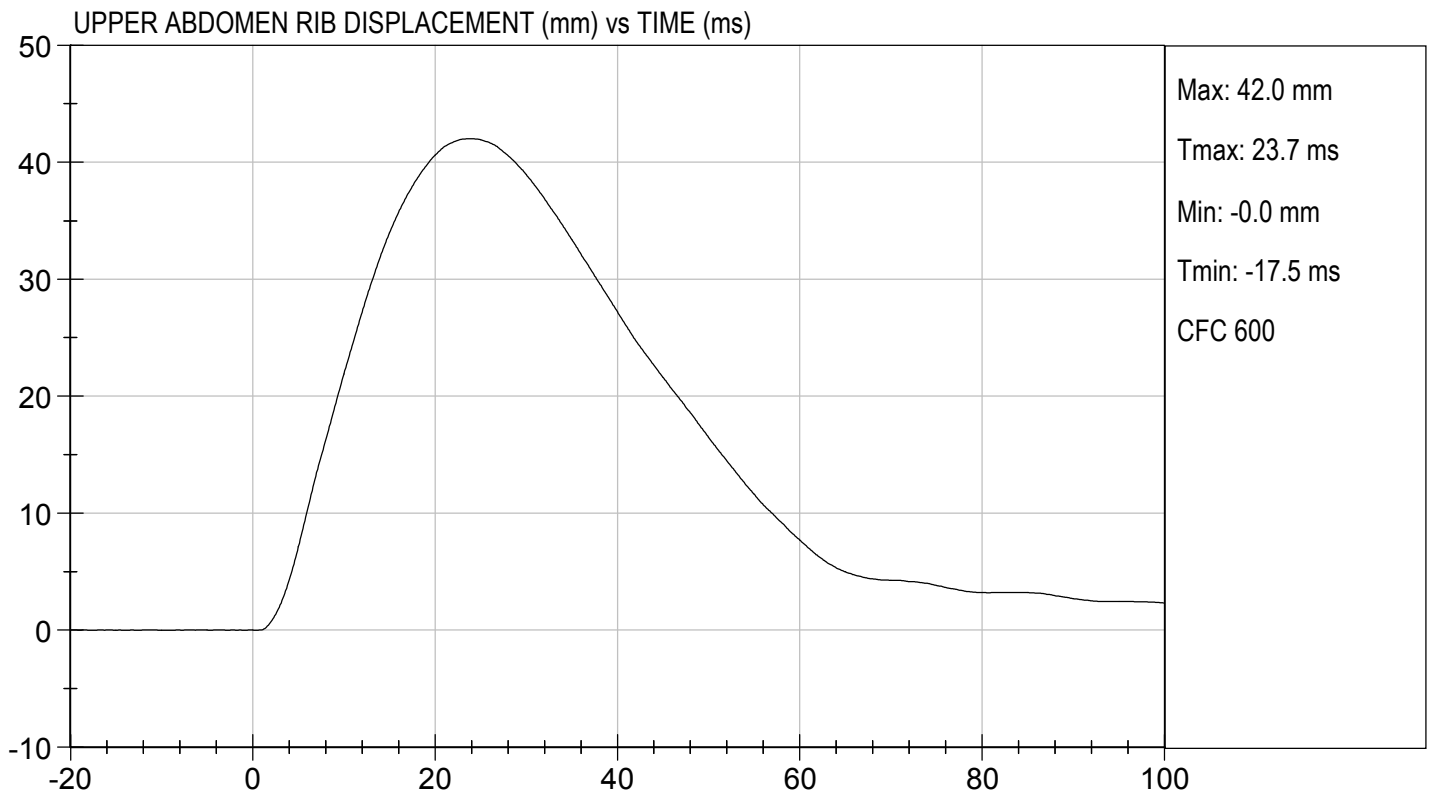
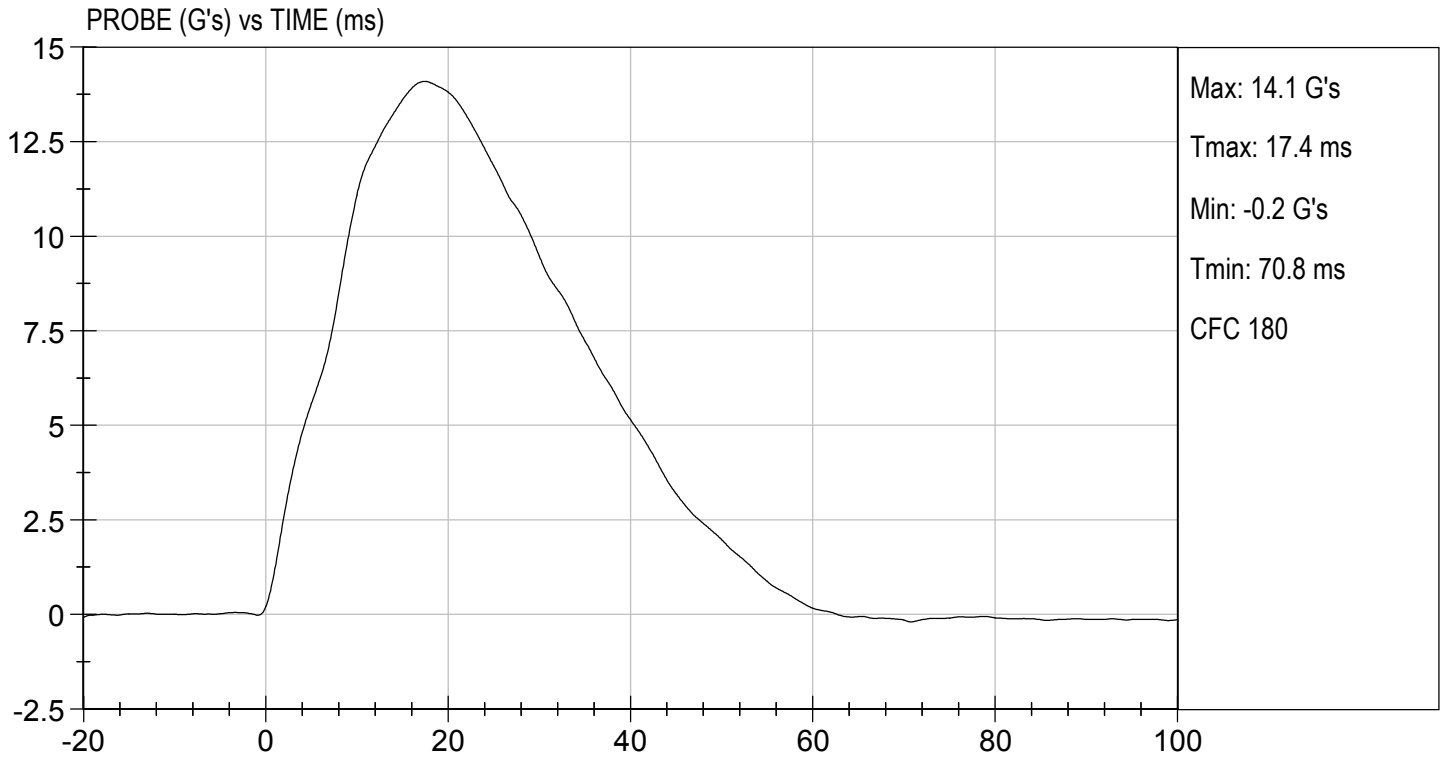
Test I.D: D190536

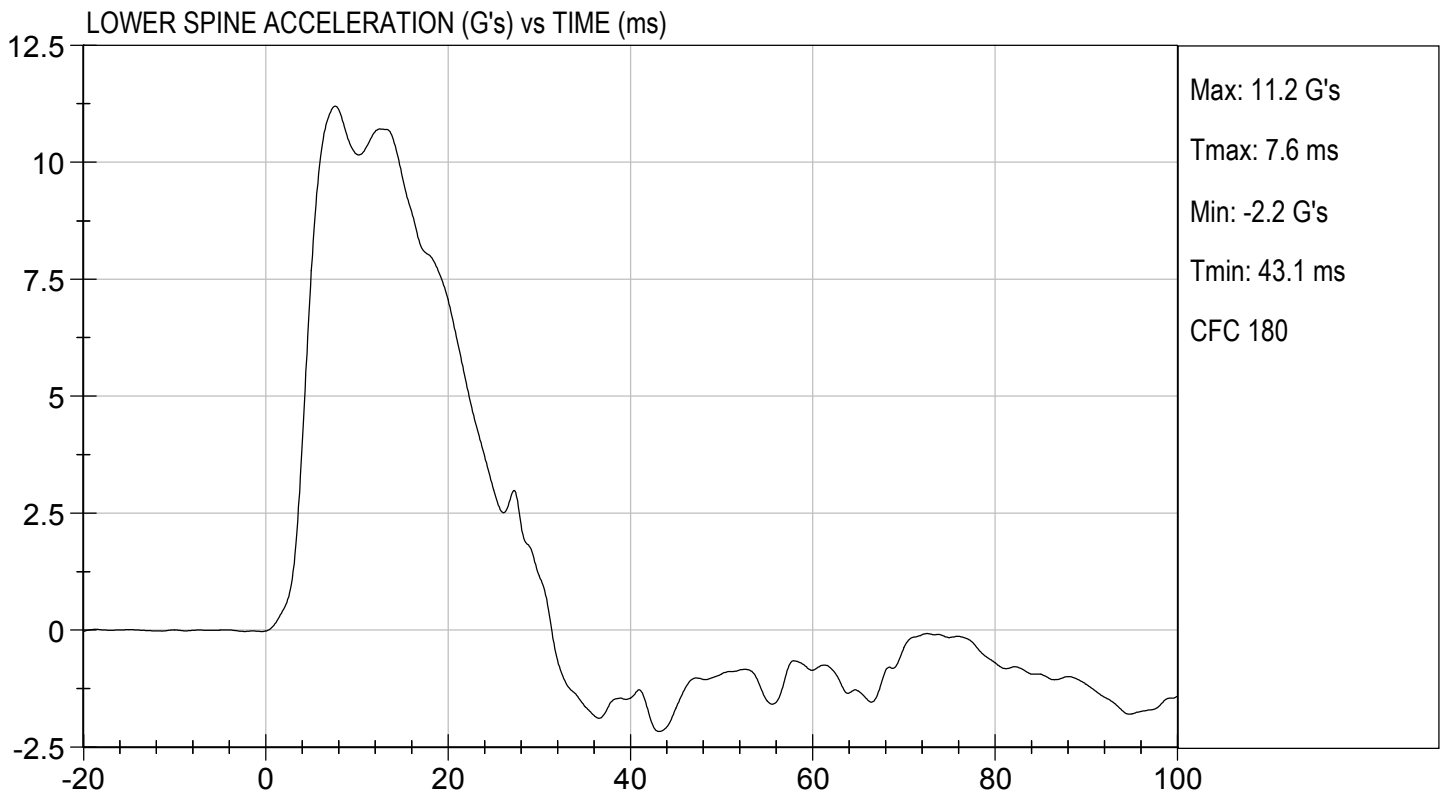
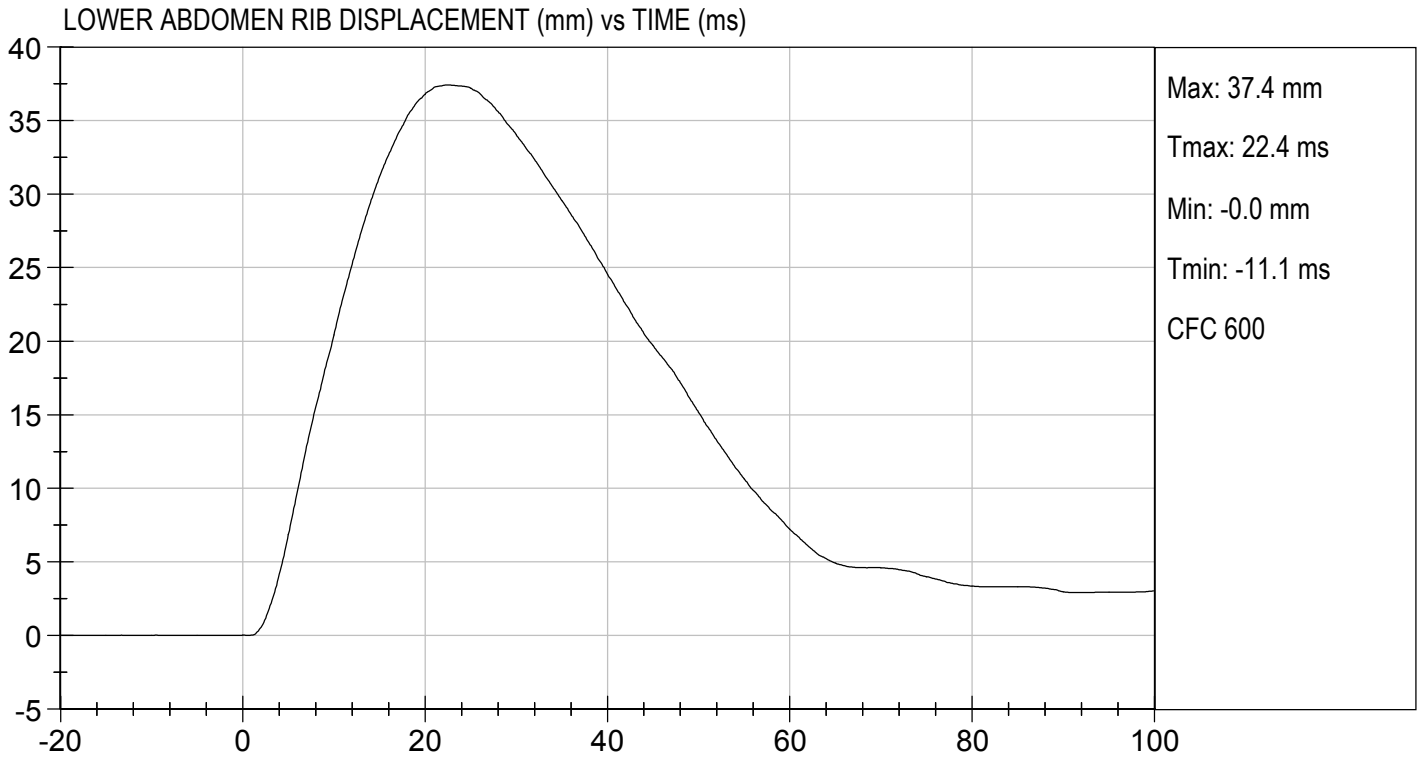
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass

Jacob D Taylor
 Laboratory Technician

02/08/2019
 Test Date

Approved By _____





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

ATD Serial No: 306

Test I.D: D19AF7

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	26	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4,204	Pass
Overall Test Results				Pass

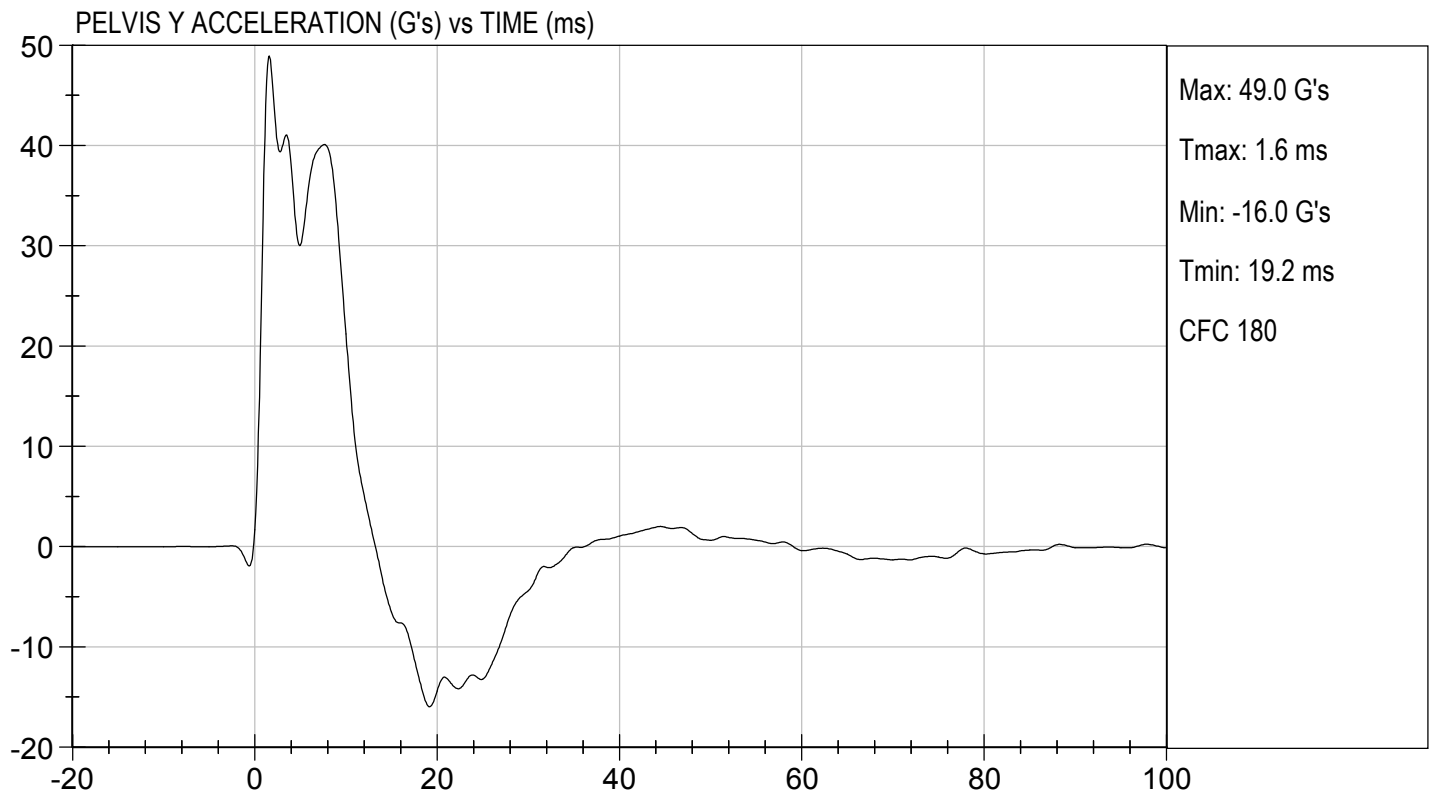
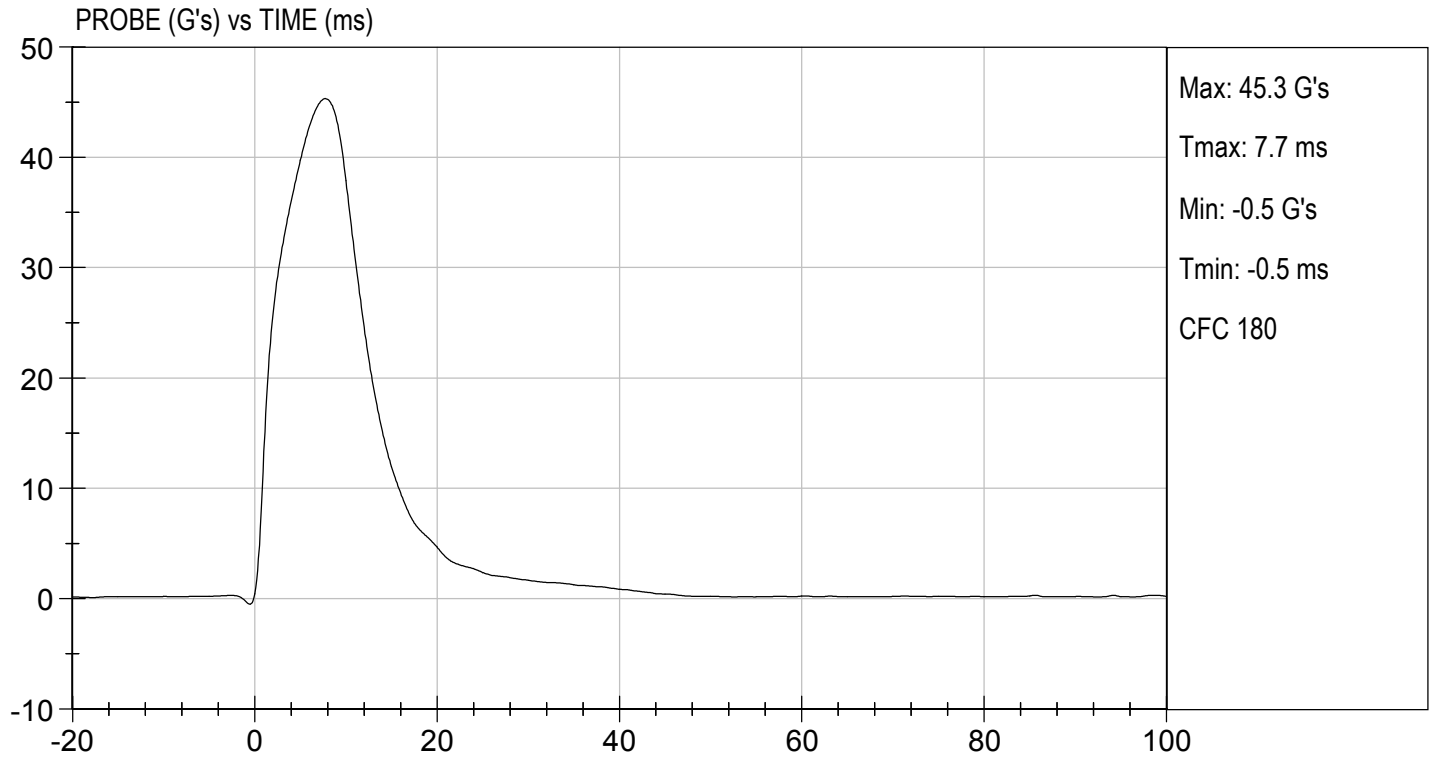


 Laboratory Technician

02/27/2019

 Test Date

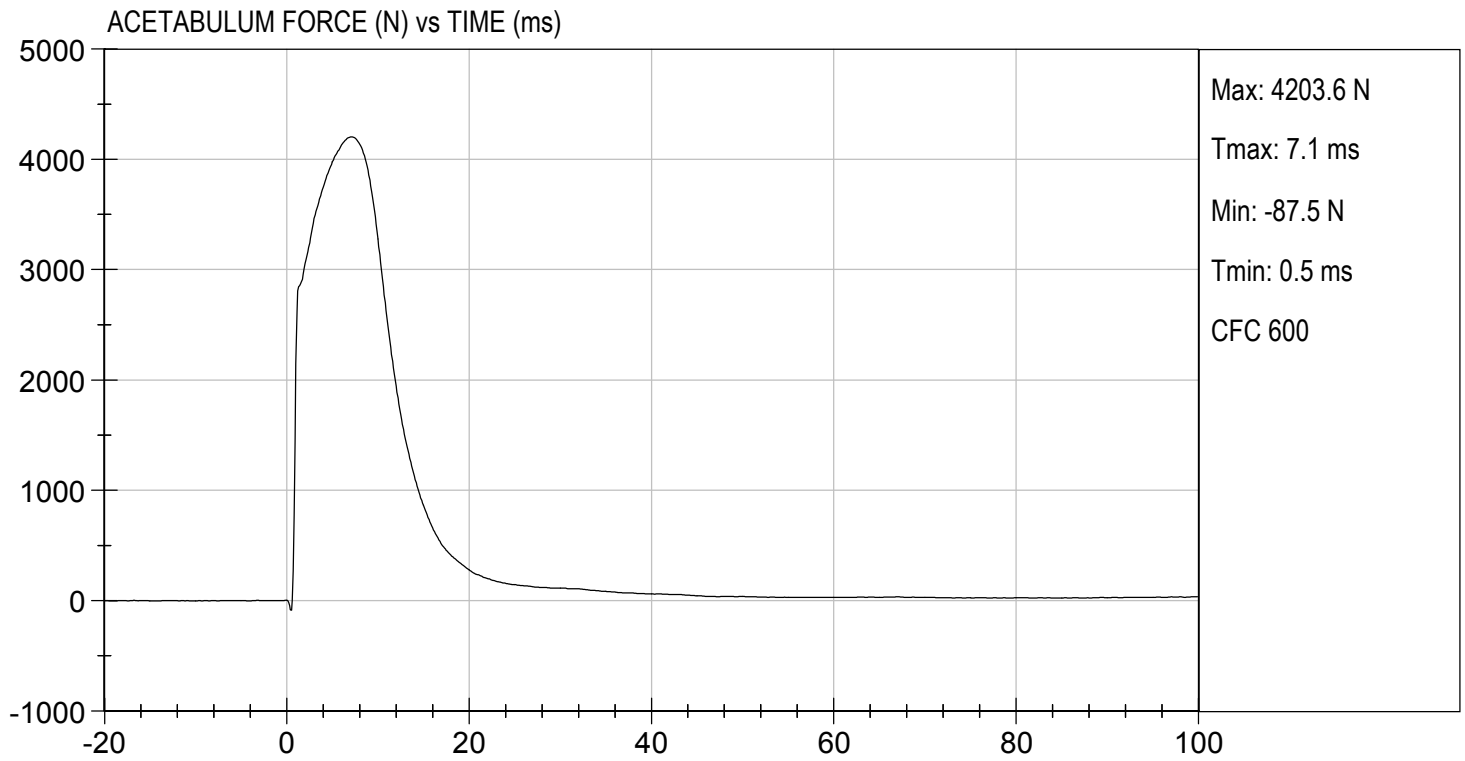
 Approved By





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

TEST DATE: 02/27/2019
TEST #: D19AF7



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

ATD Serial No: 306

Test I.D: D19AF8

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	36 to 45	41	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,626	Pass
Overall Test Results				Pass

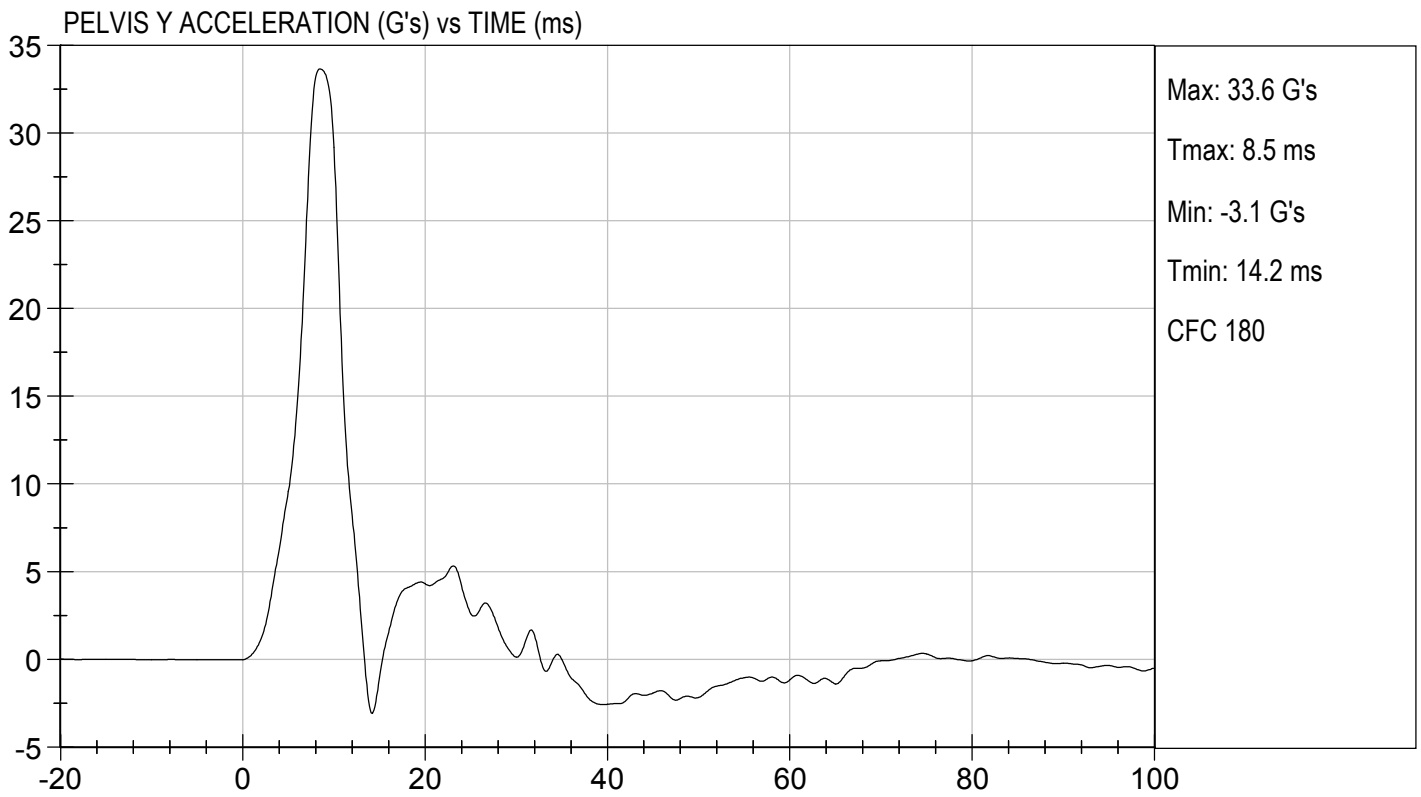
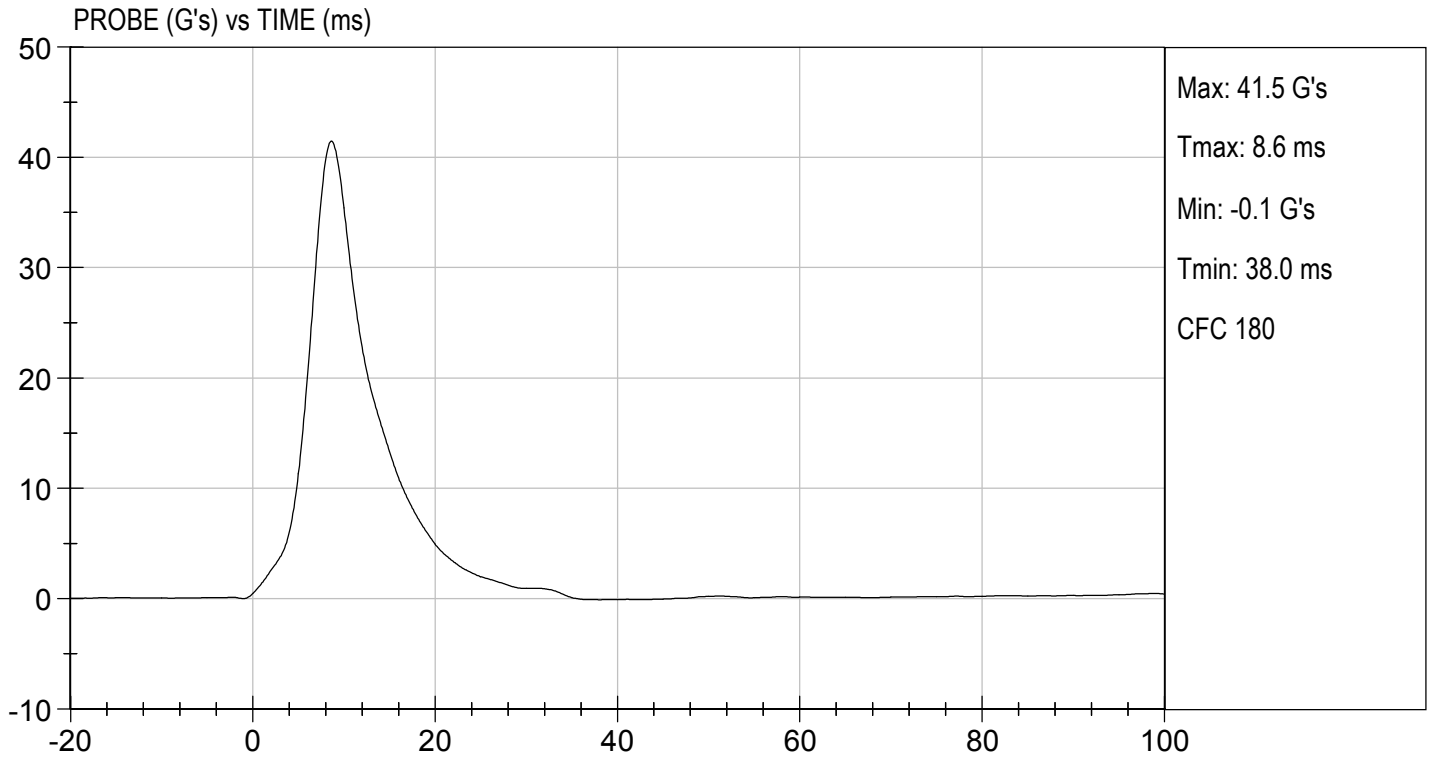


 Laboratory Technician

02/27/2019

 Test Date

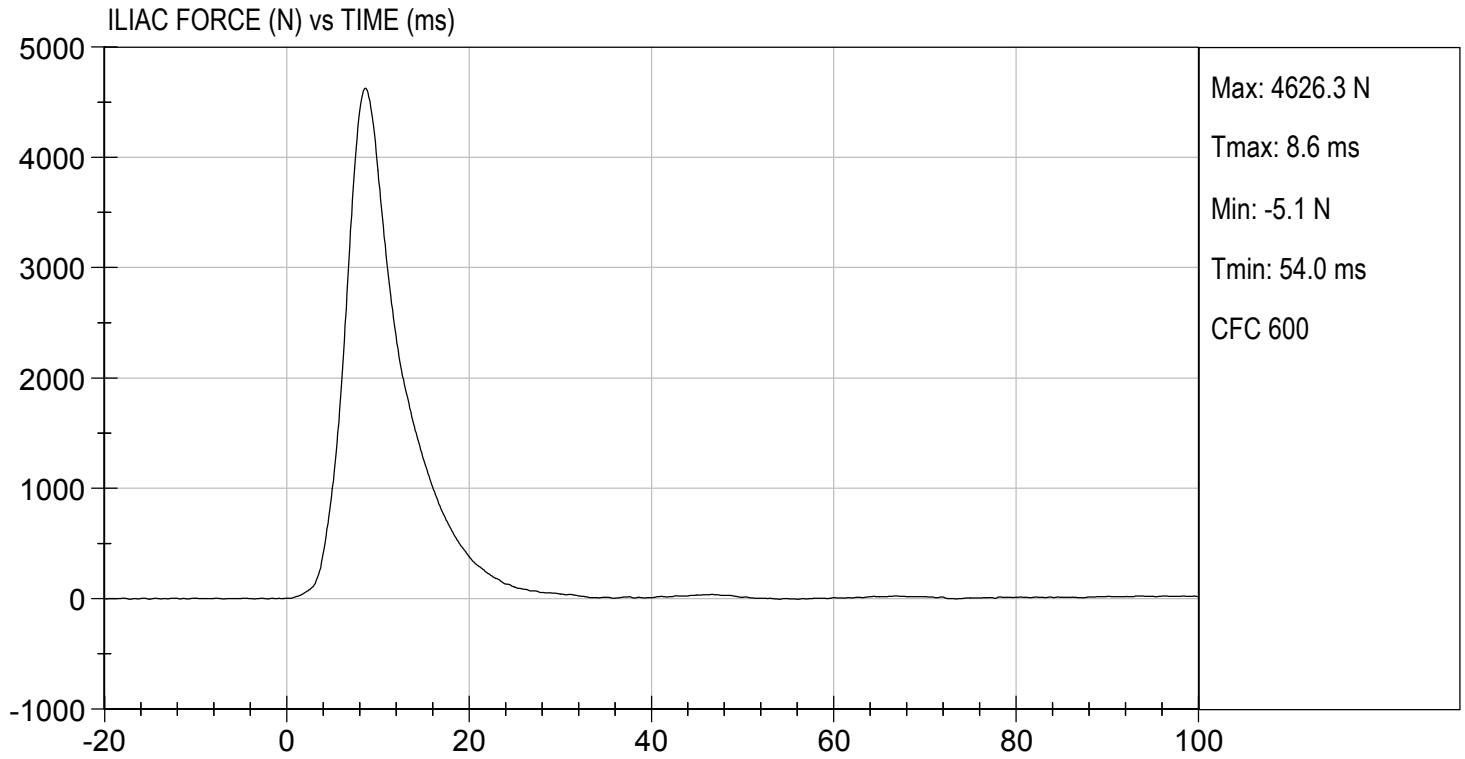
 Approved By





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

TEST DATE: 02/27/2019
TEST #: D19AF8



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

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

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

ATD Serial No: 306

Test ID: D190811

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	115 to 137	129	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-1.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results				Pass

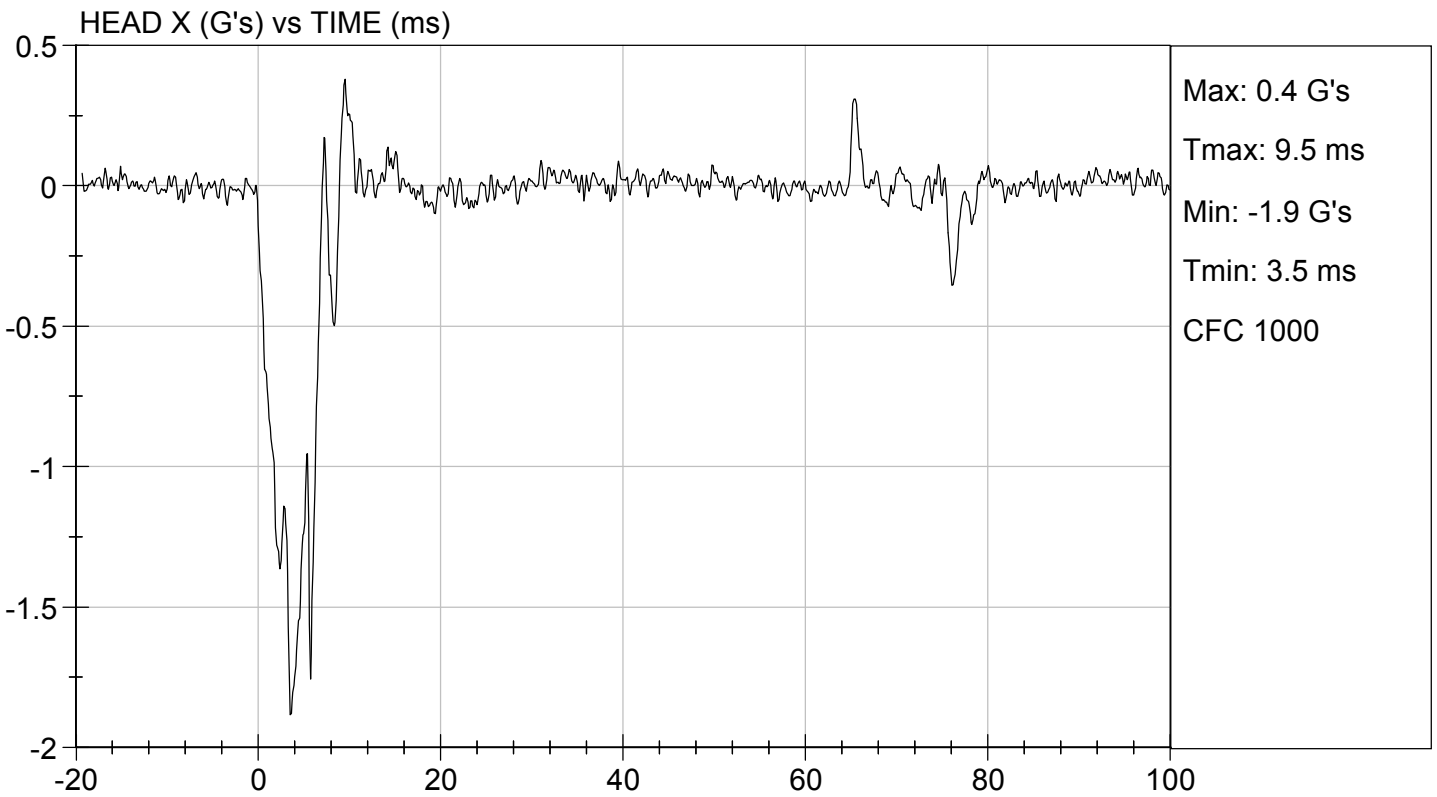
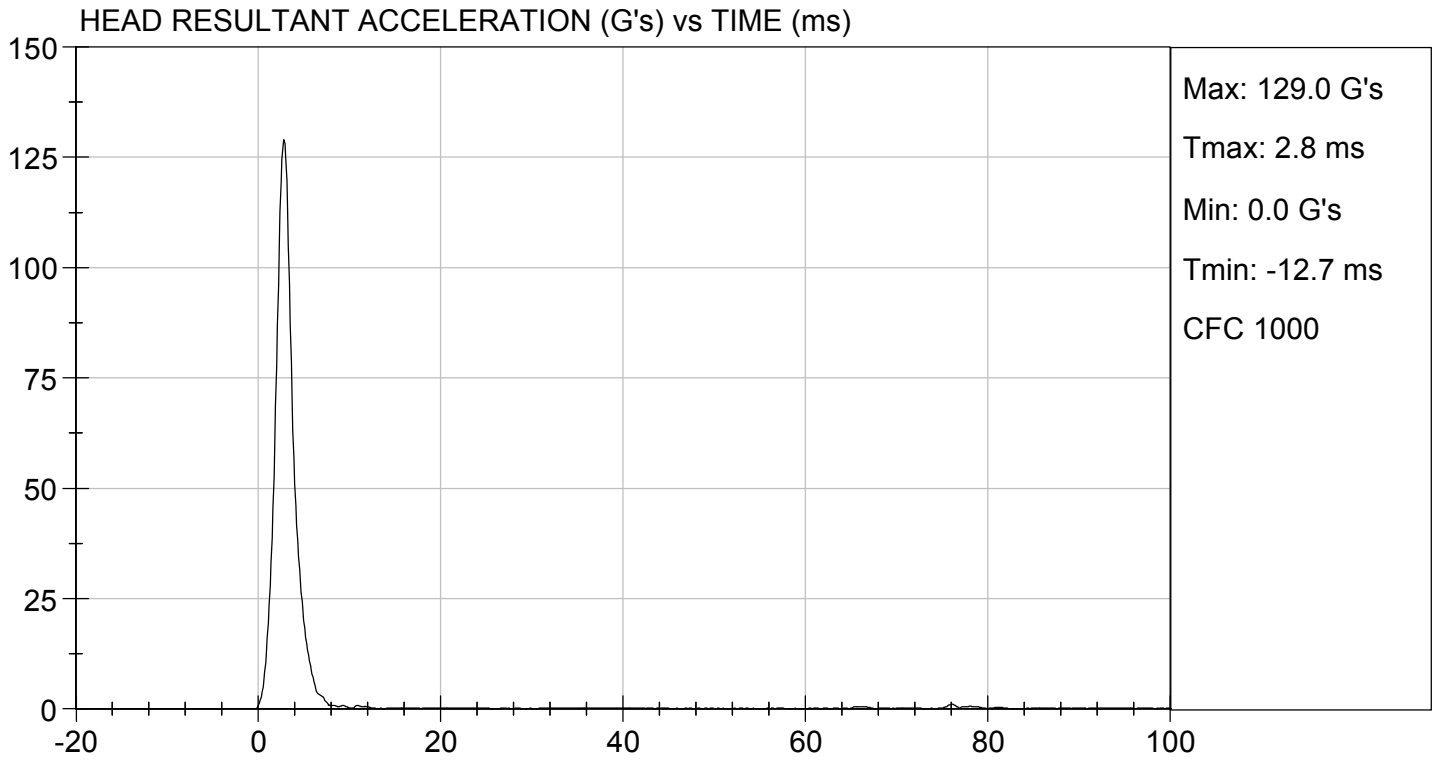


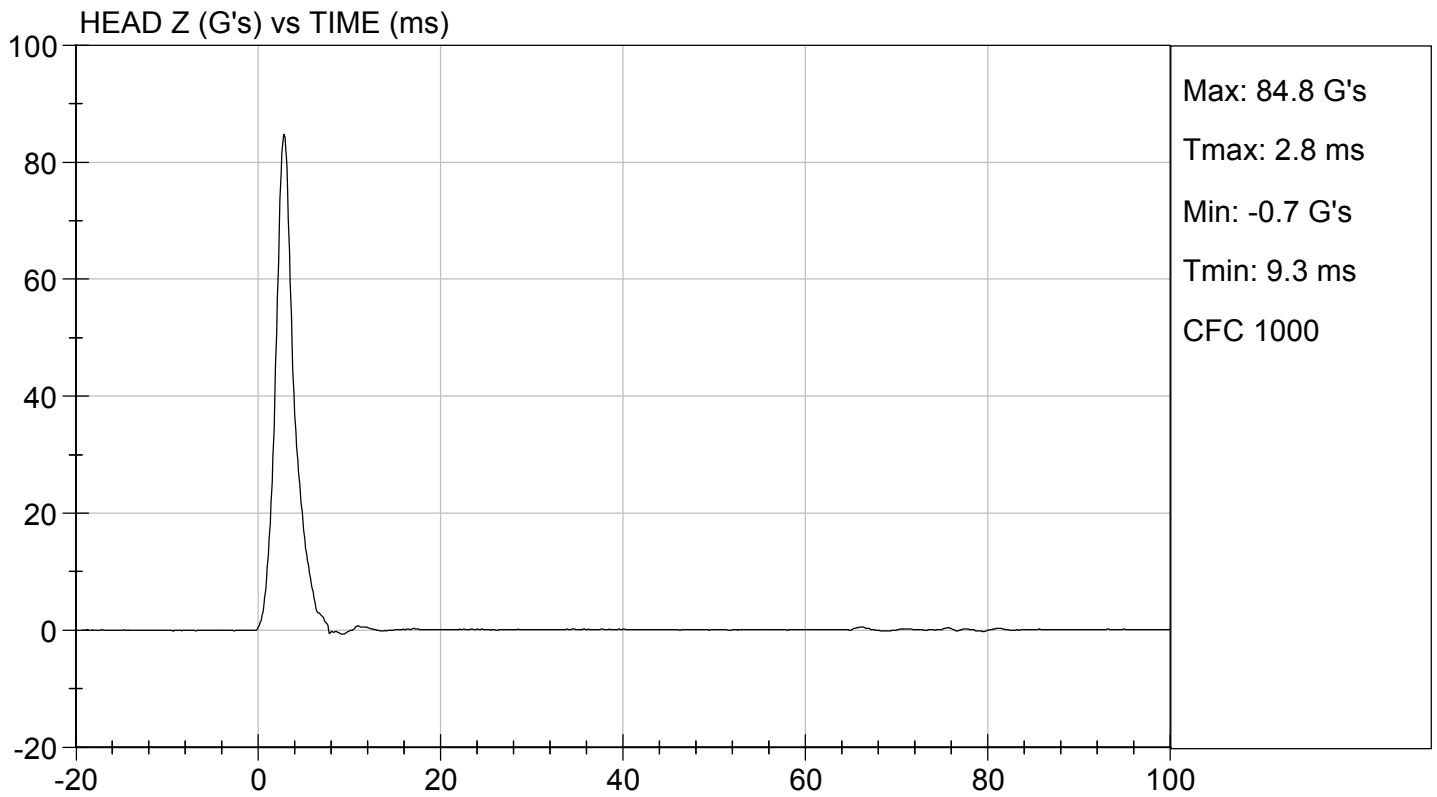
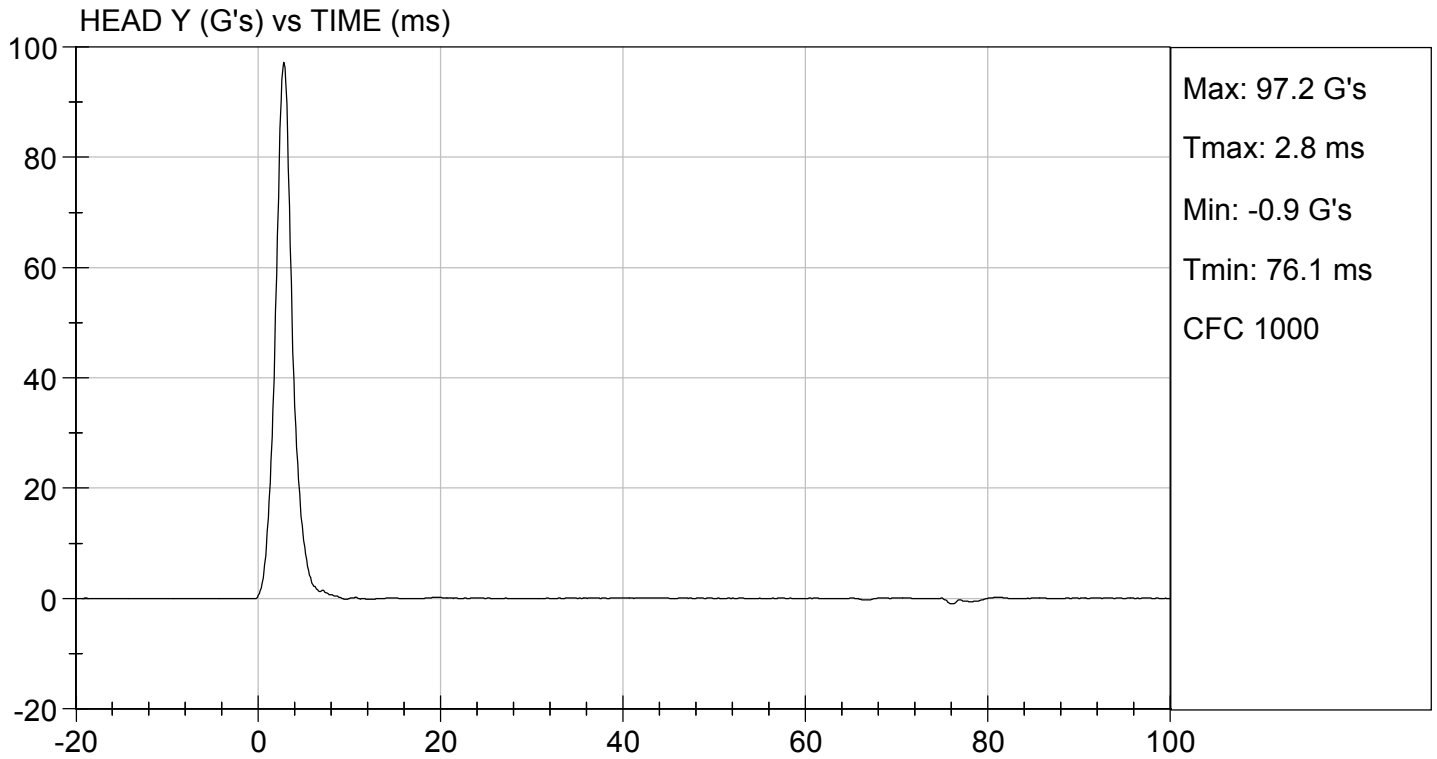
 Laboratory Technician

03/01/2019

 Test Date

 Approved By





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

ATD Serial No: 306

Test I.D.: D190812

Tested Parameter	Units	Specification	Result	Pass/Fail	
Temperature	deg C	20.6 to 22.2	22.1	Pass	
Humidity	%	10 to 70	23	Pass	
Impact Velocity	m/s	5.51 to 5.63	5.58	Pass	
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.48	Pass
	15 ms	m/s	3.30 to 4.10	3.59	Pass
	20 ms	m/s	4.40 to 5.40	5.05	Pass
	25 ms	m/s	5.40 to 6.10	5.55	Pass
	25-100 ms	m/s	5.50 to 6.20	5.59	Pass
Maximum D-Plane Rotation	deg	71 to 81	76	Pass	
Time of Maximum D-Plane Rotation	ms	50 to 70	62	Pass	
Maximum Occipital Condyle Moment	Nm	-44 to -36	-38	Pass	
Time of Moment Decay to 0 Nm	ms	102 to 126	118	Pass	
Overall Test Results				Pass	

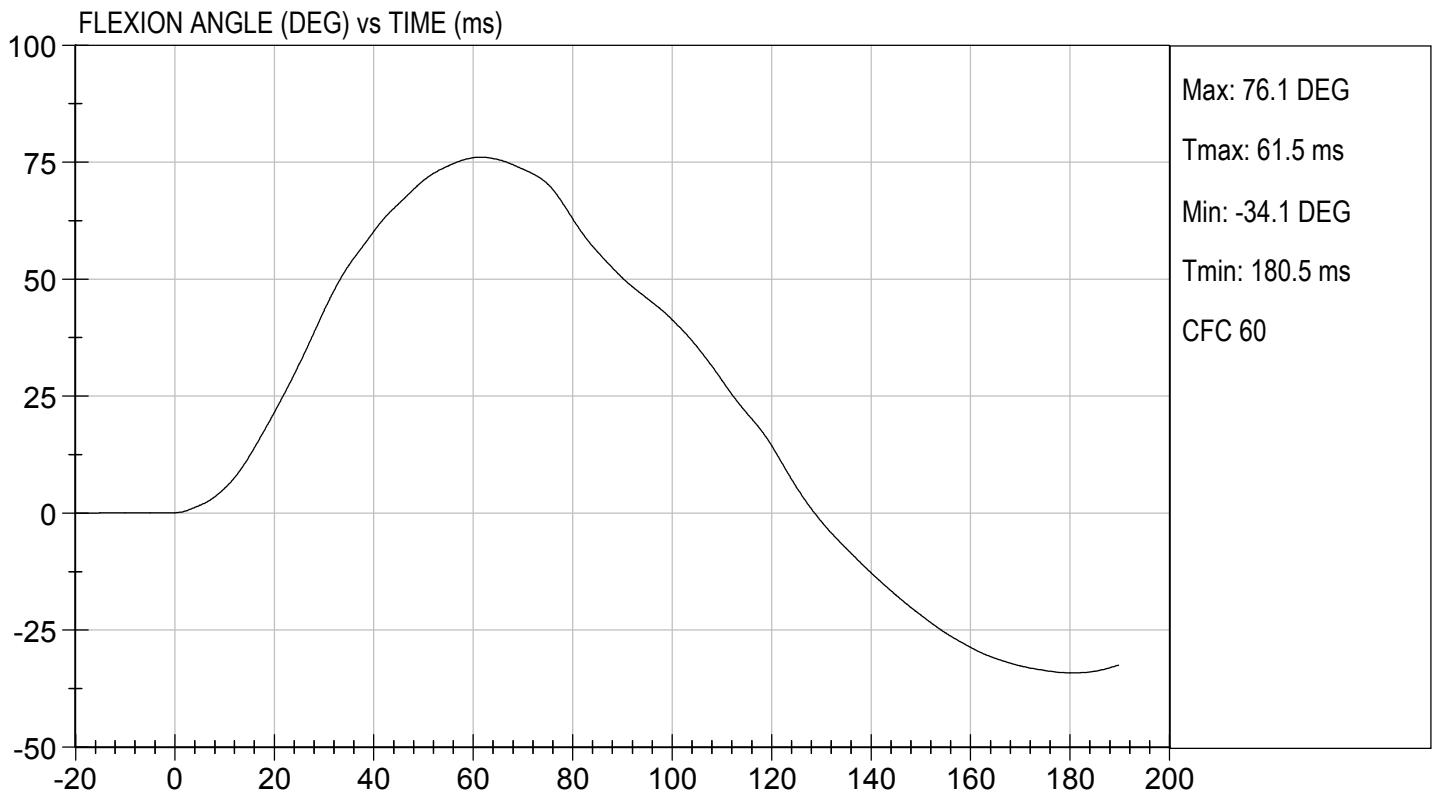
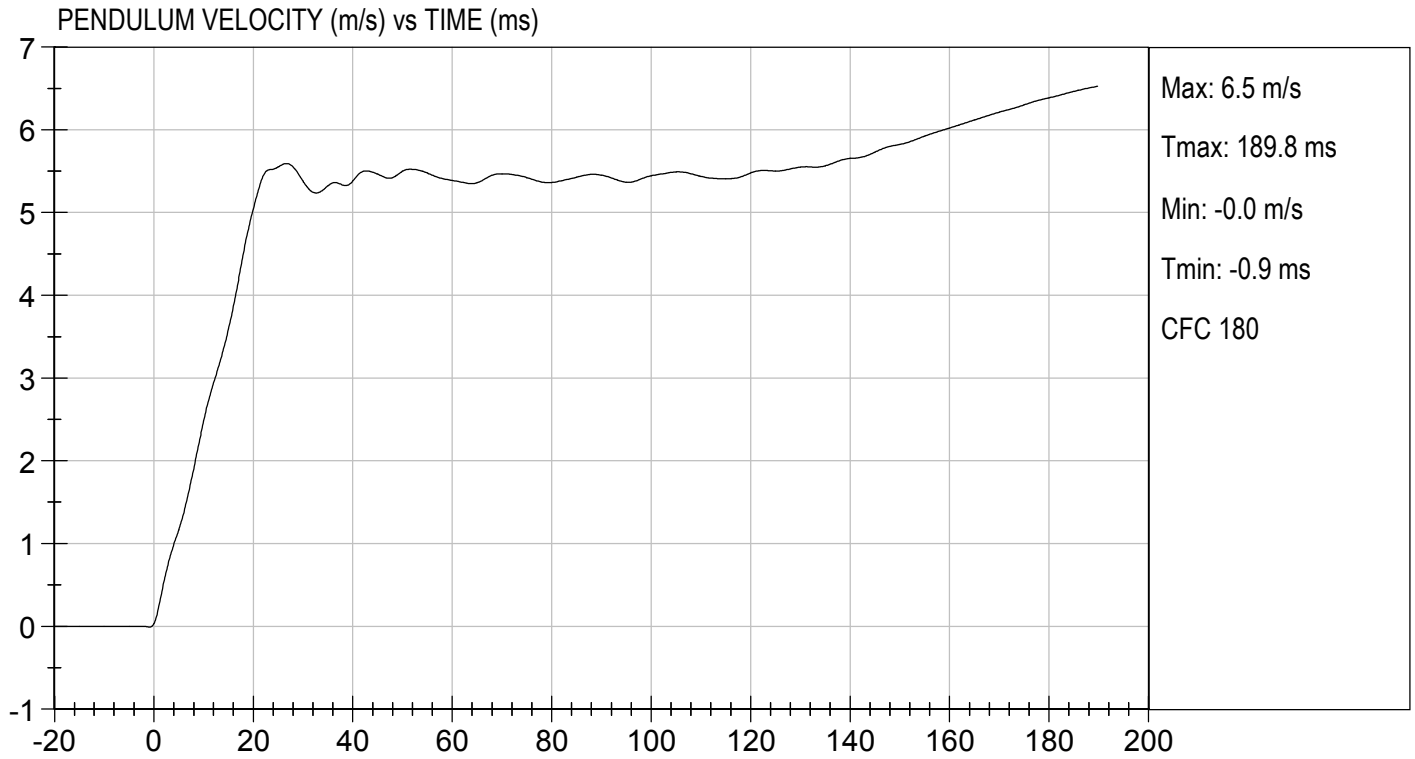


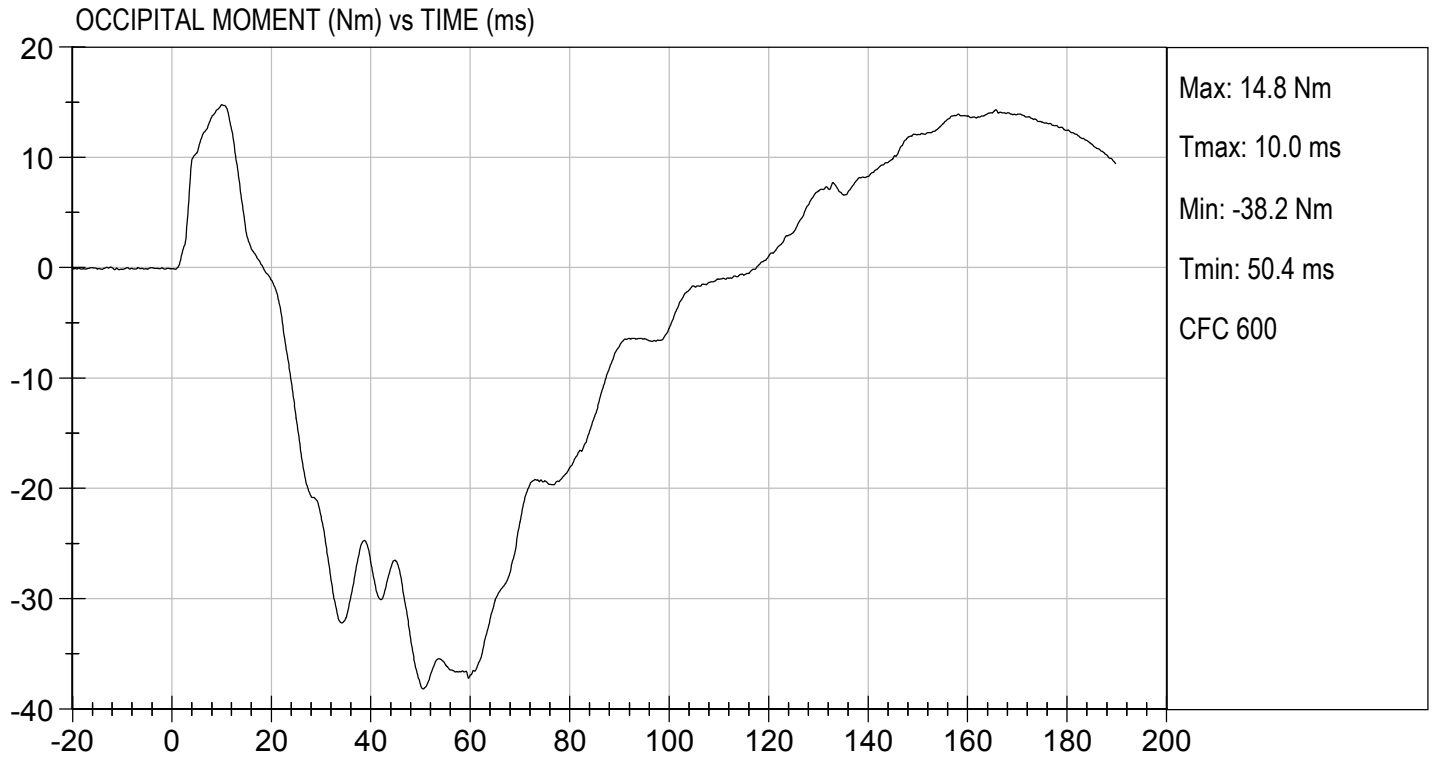
Laboratory Technician

03/01/2019

Test Date

Approved By





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

ATD Serial No: 306

Test ID: D190813

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	21	Pass
Overall Test Results				Pass

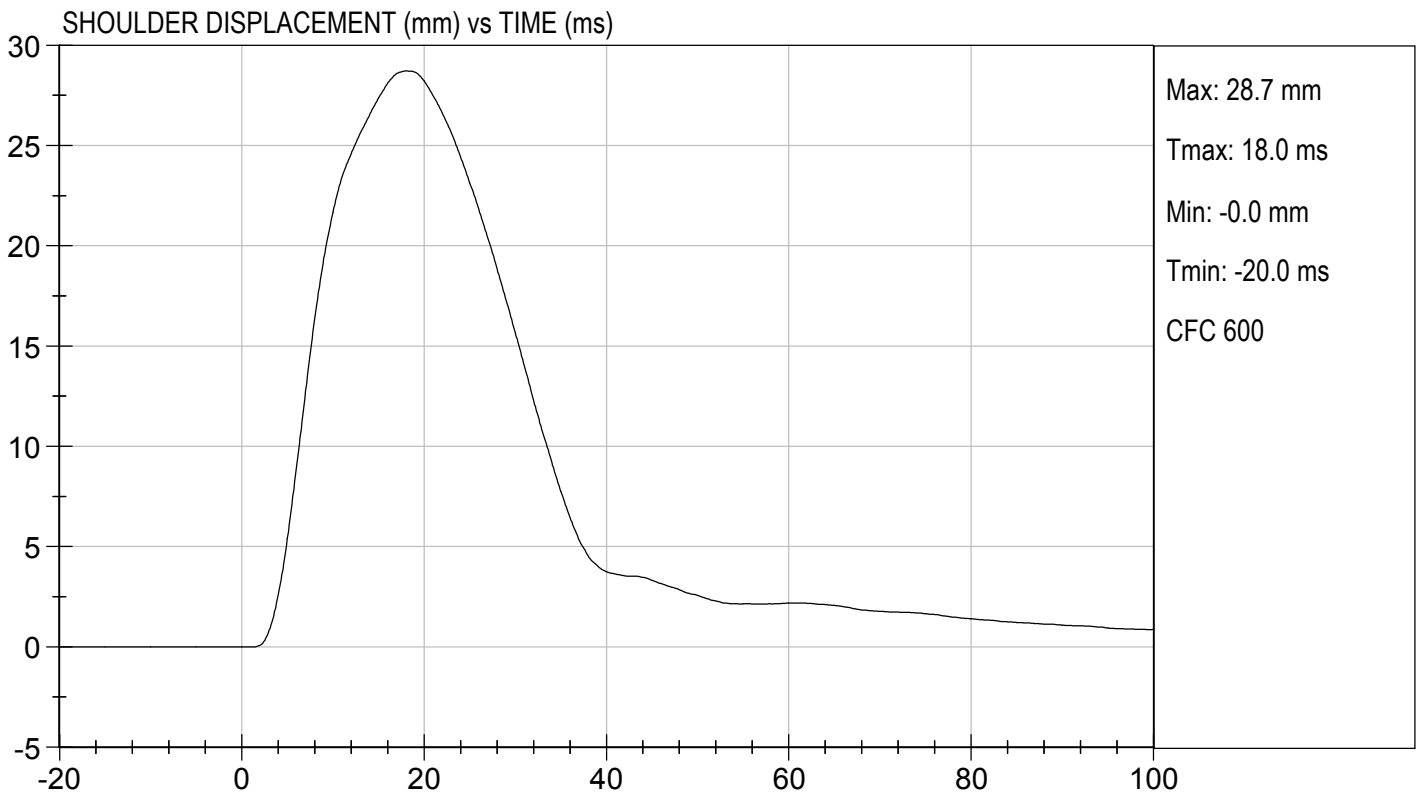
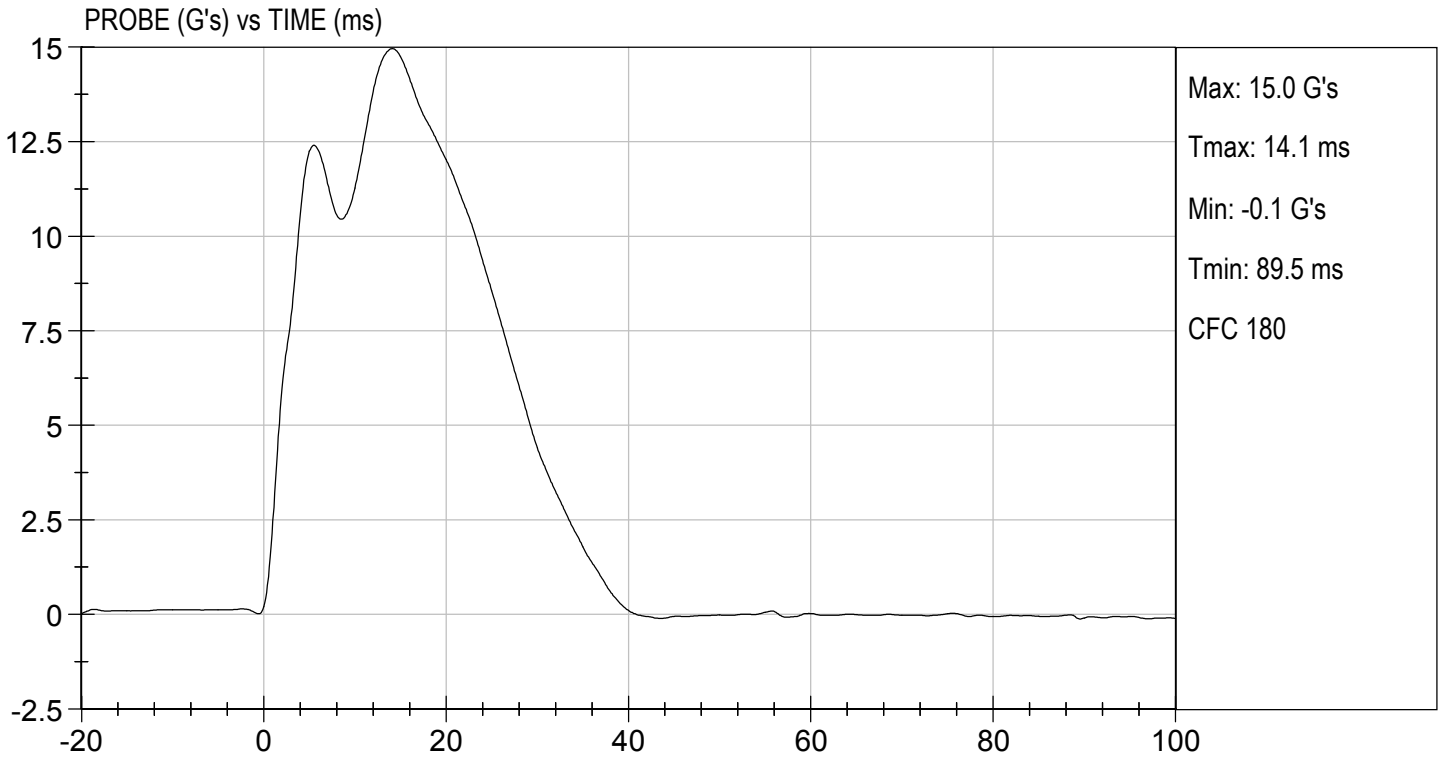


 Laboratory Technician

03/01/2019

 Test Date

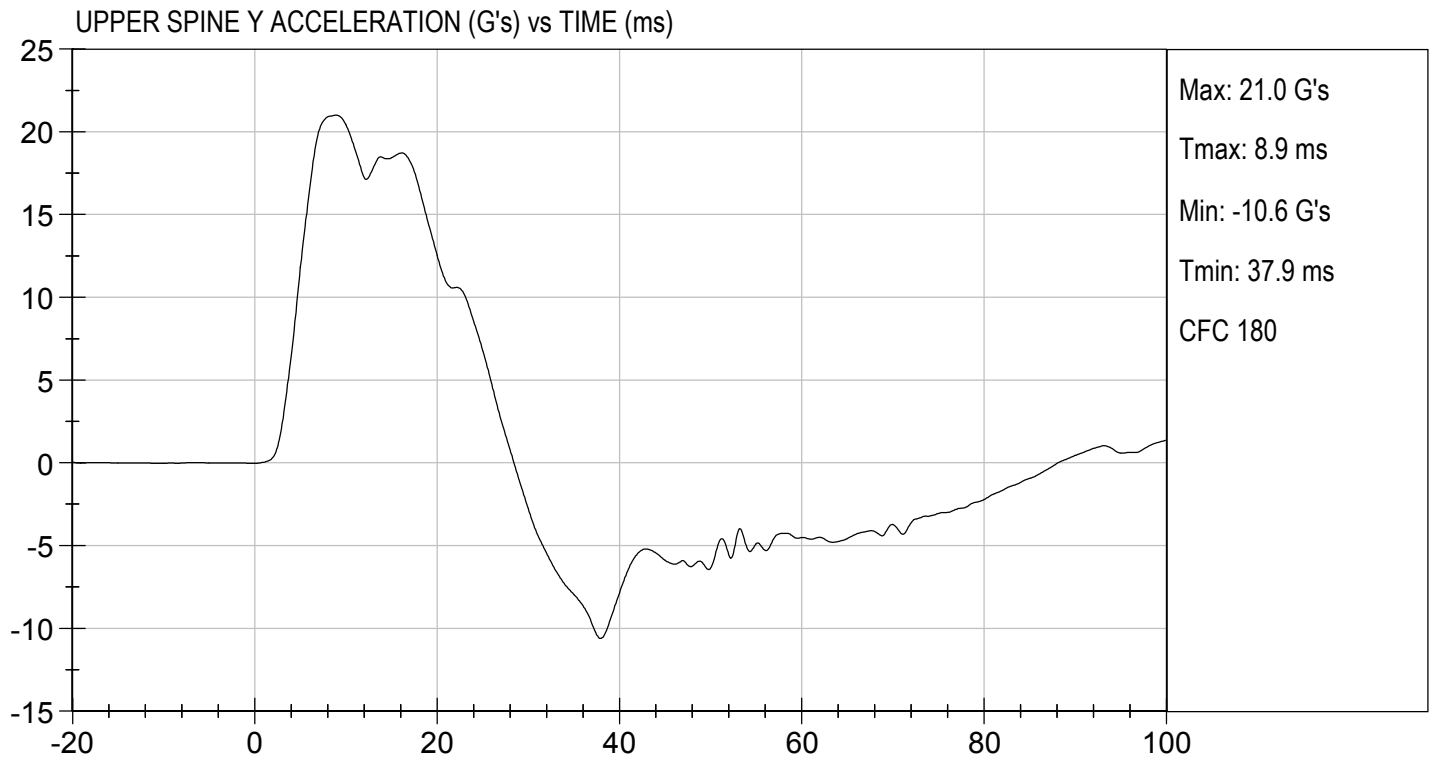
 Approved By





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

TEST DATE: 03/01/2019
TEST #: D190813



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

ATD Serial No: 306

Test I.D: D190814

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	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	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	41	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	36	Pass
Overall Test Results				Pass

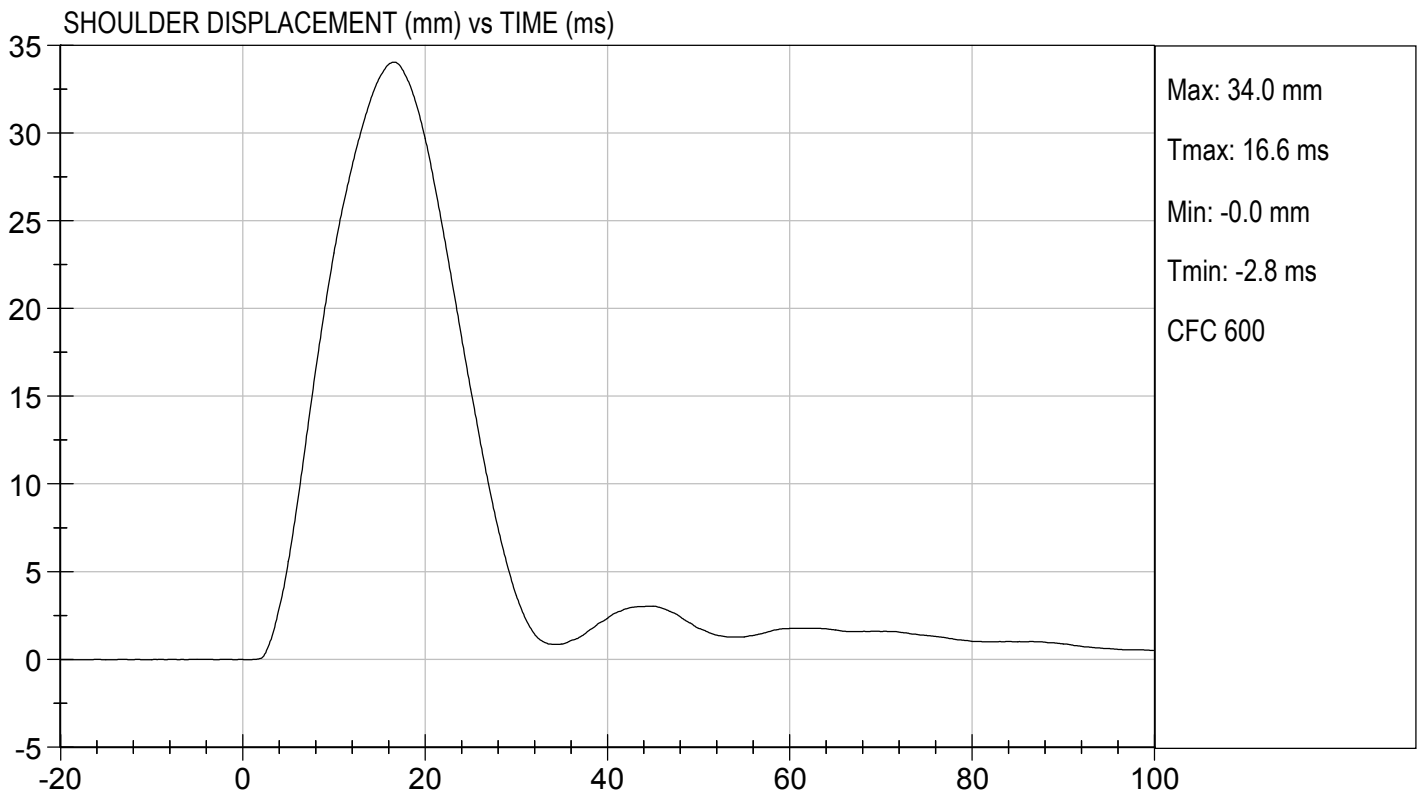
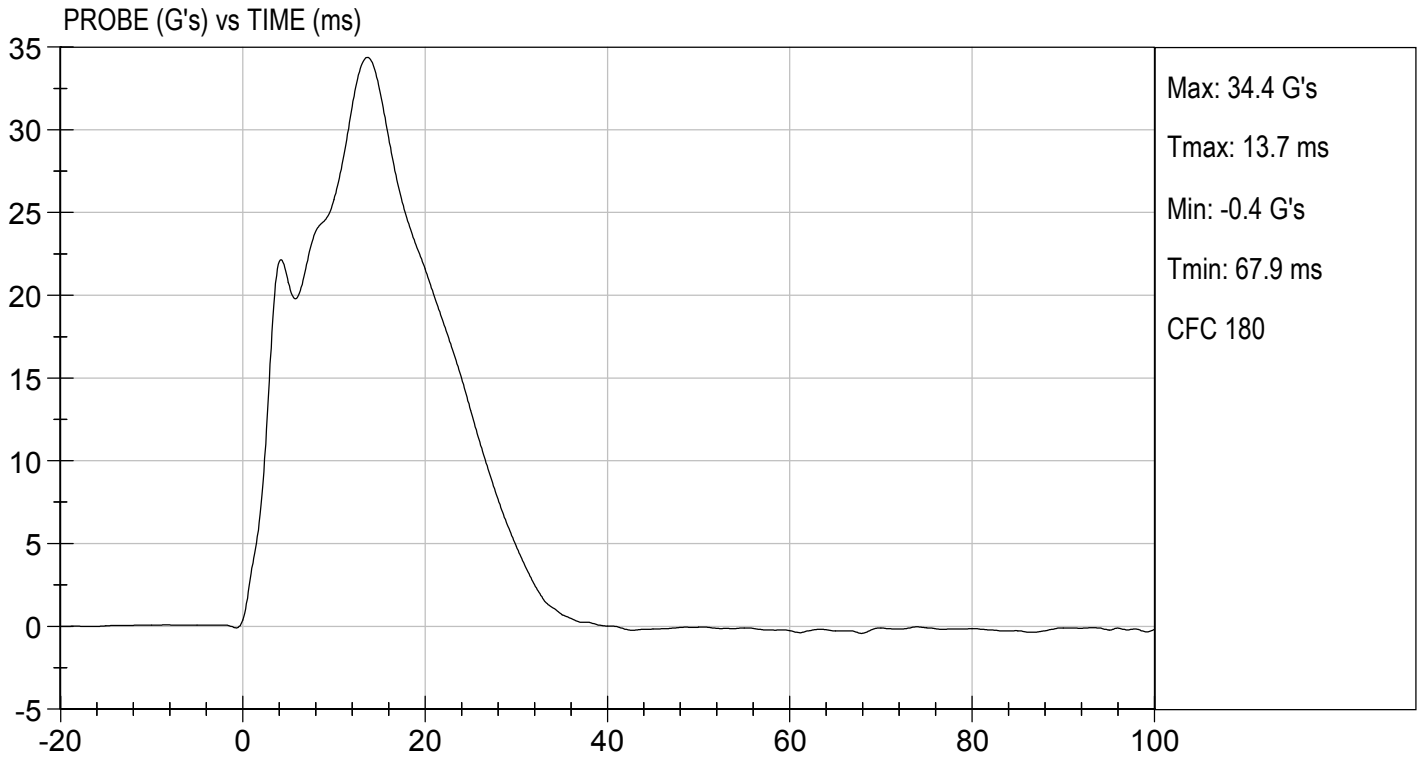


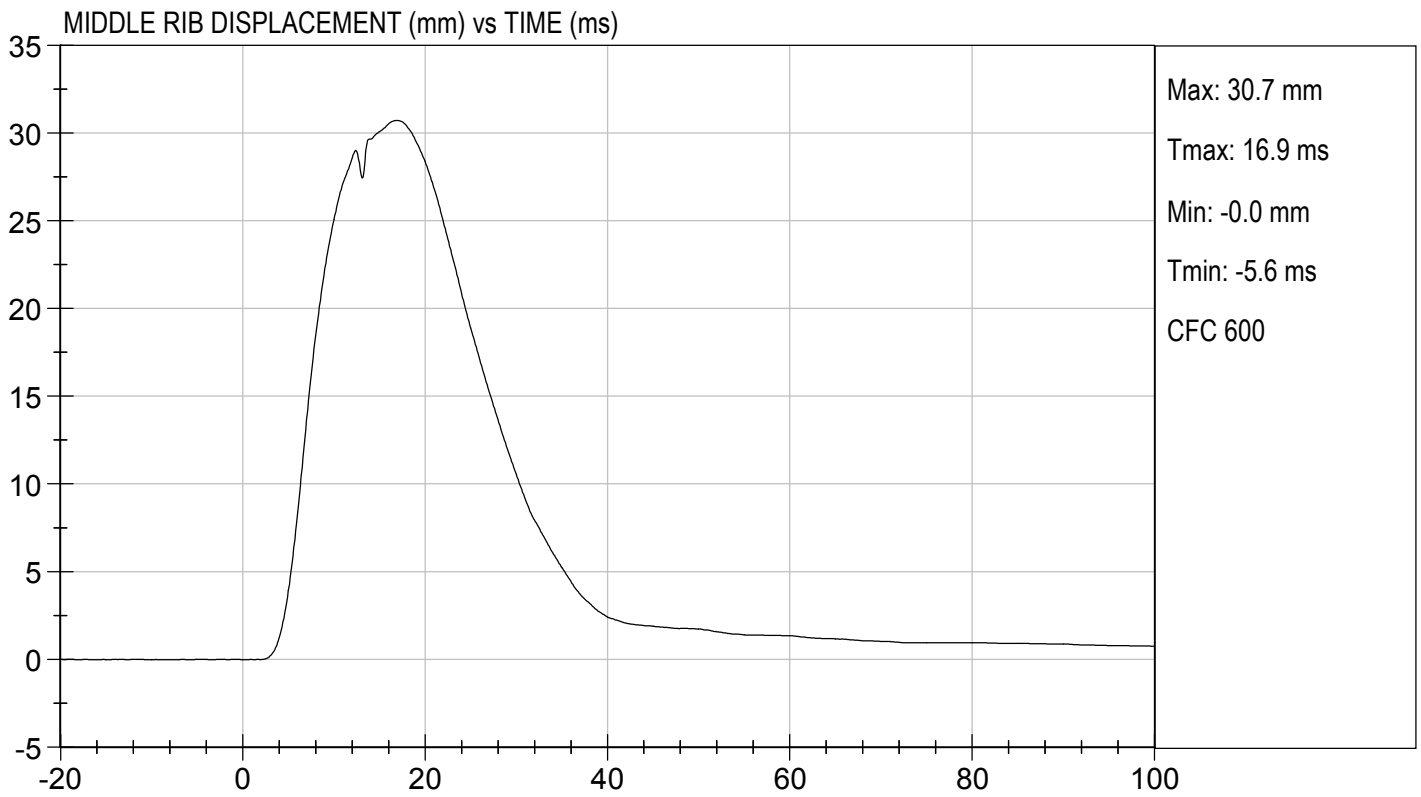
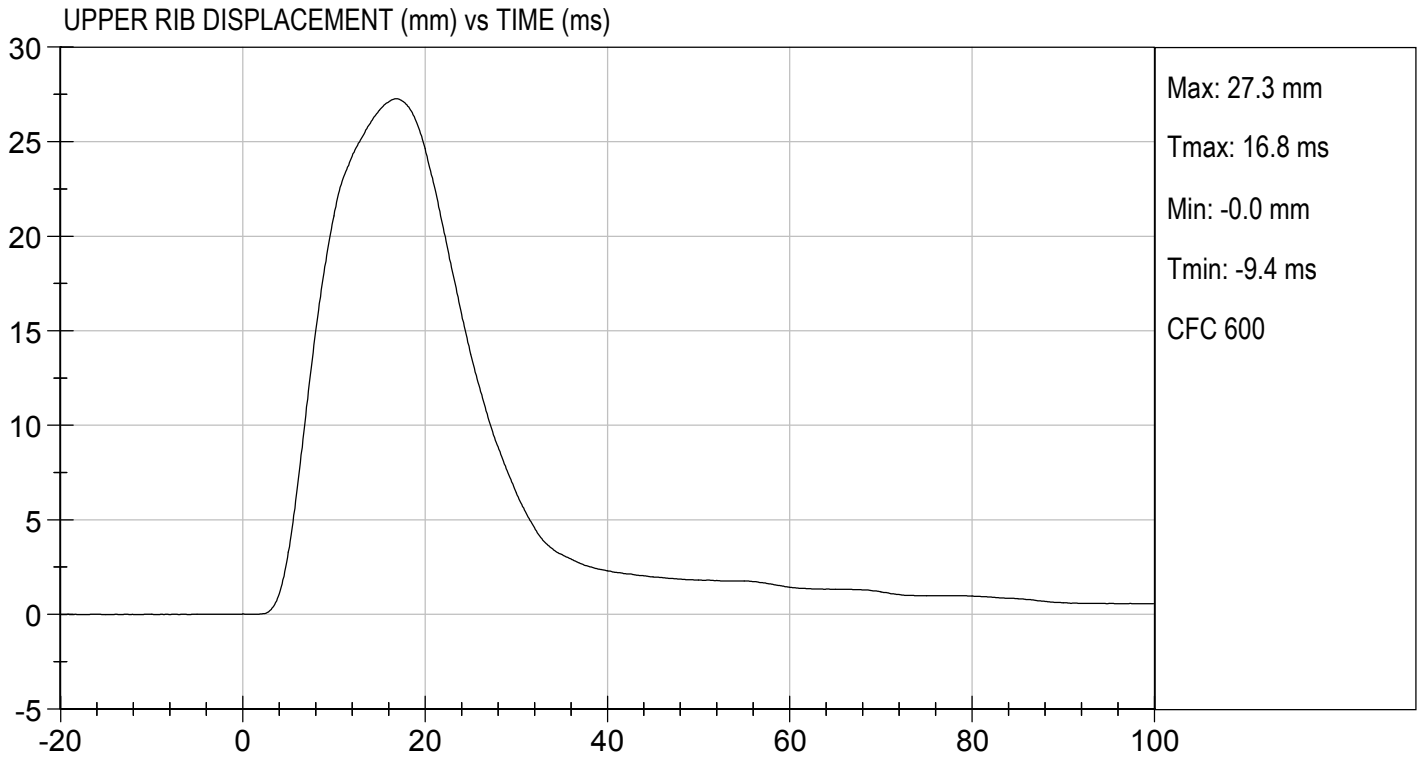
Laboratory Technician

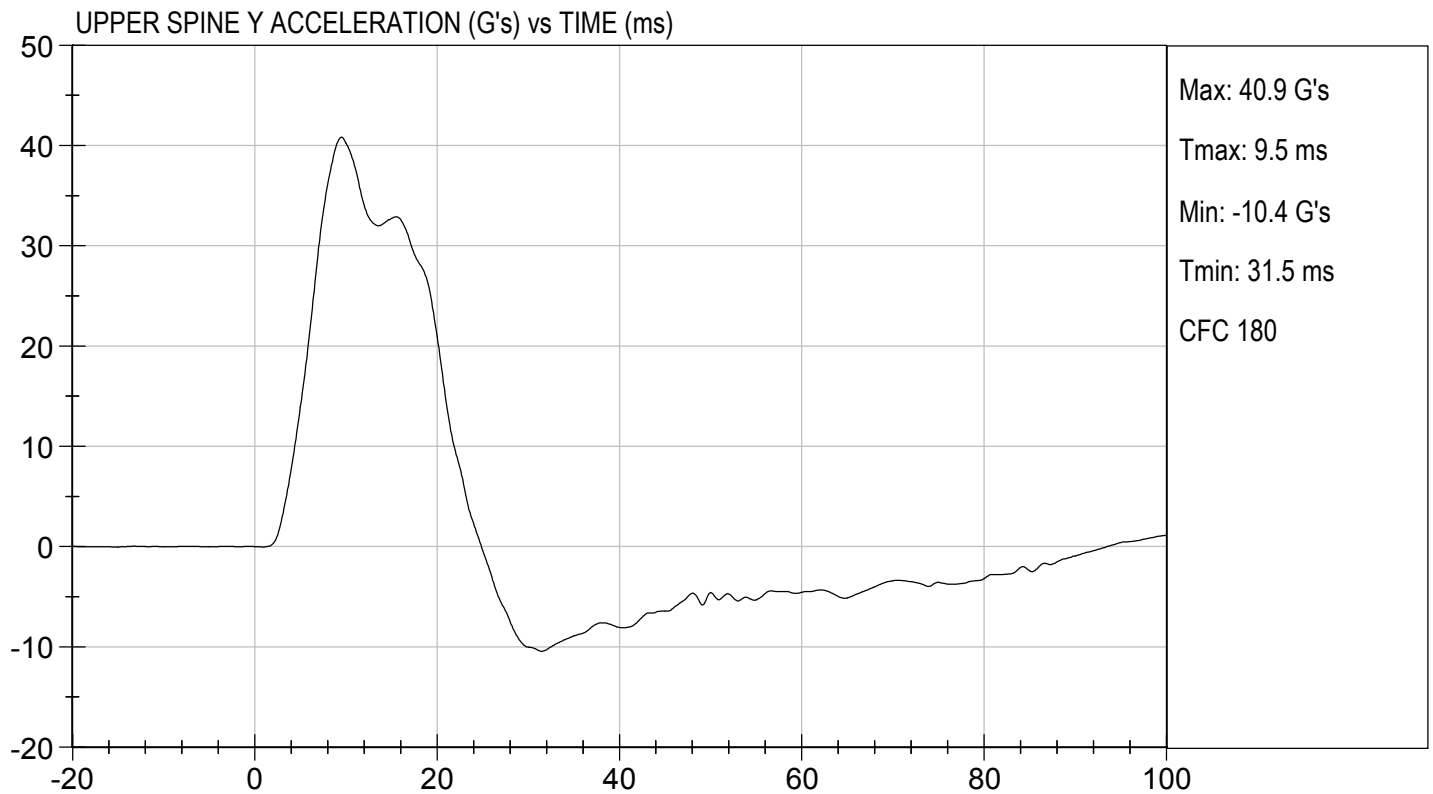
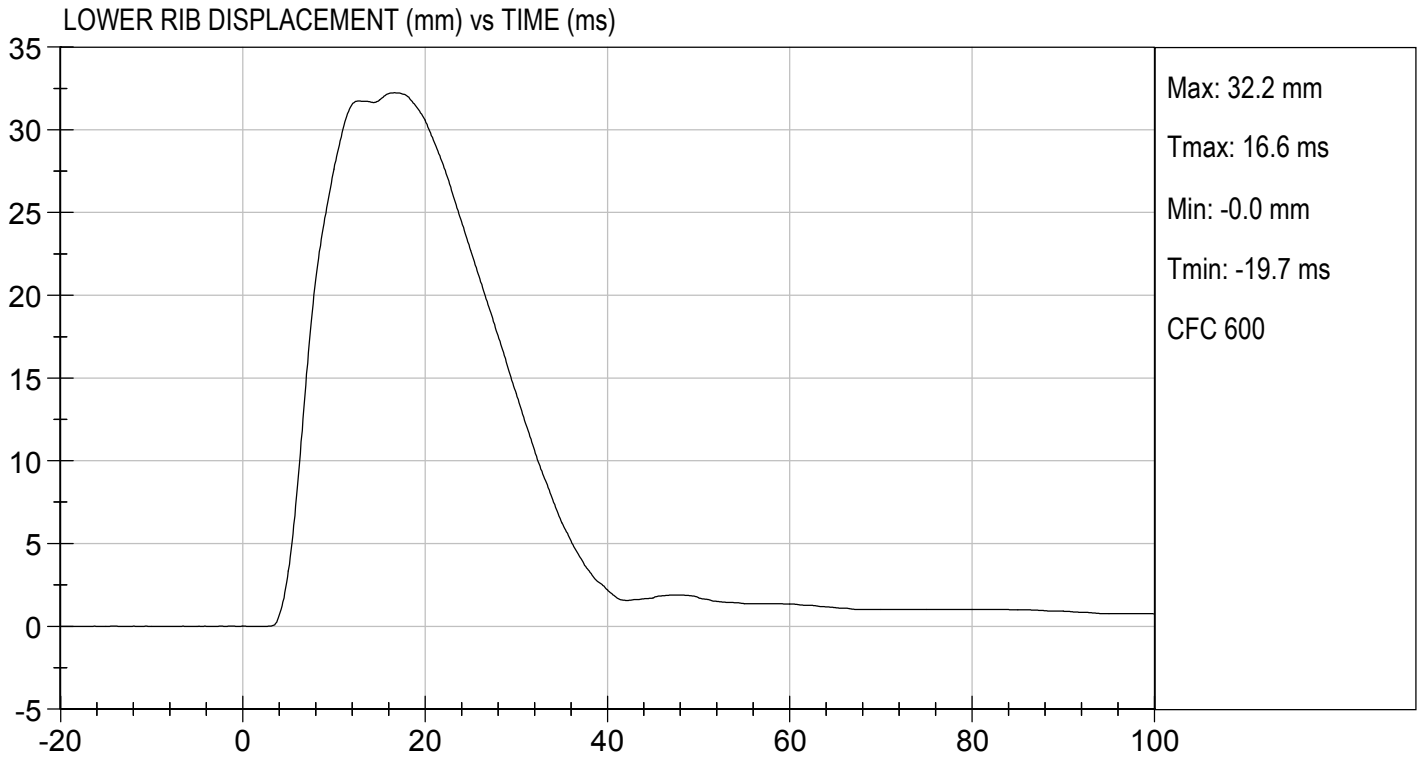
03/01/2019

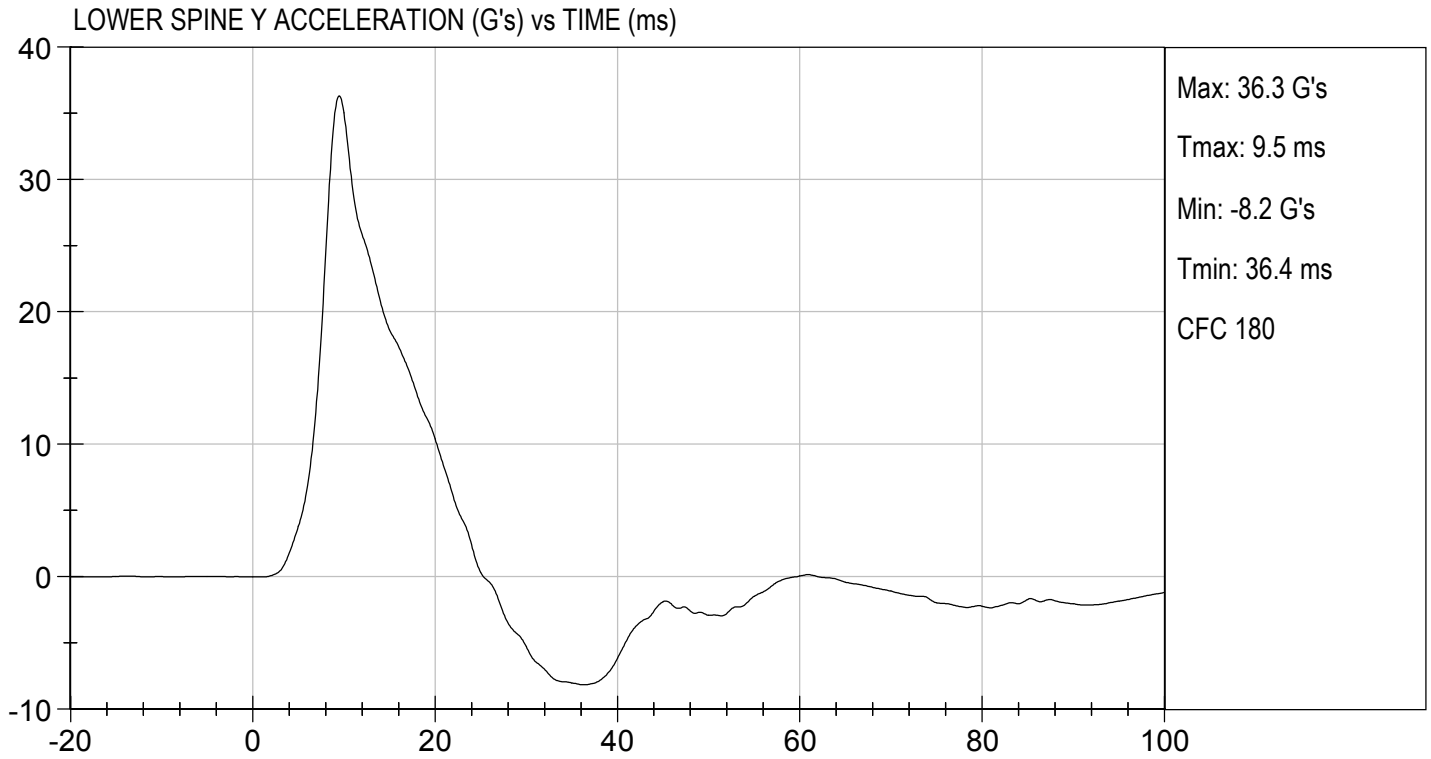
Test Date

Approved By









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

ATD Serial No: 306

Test I.D: D190815

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass

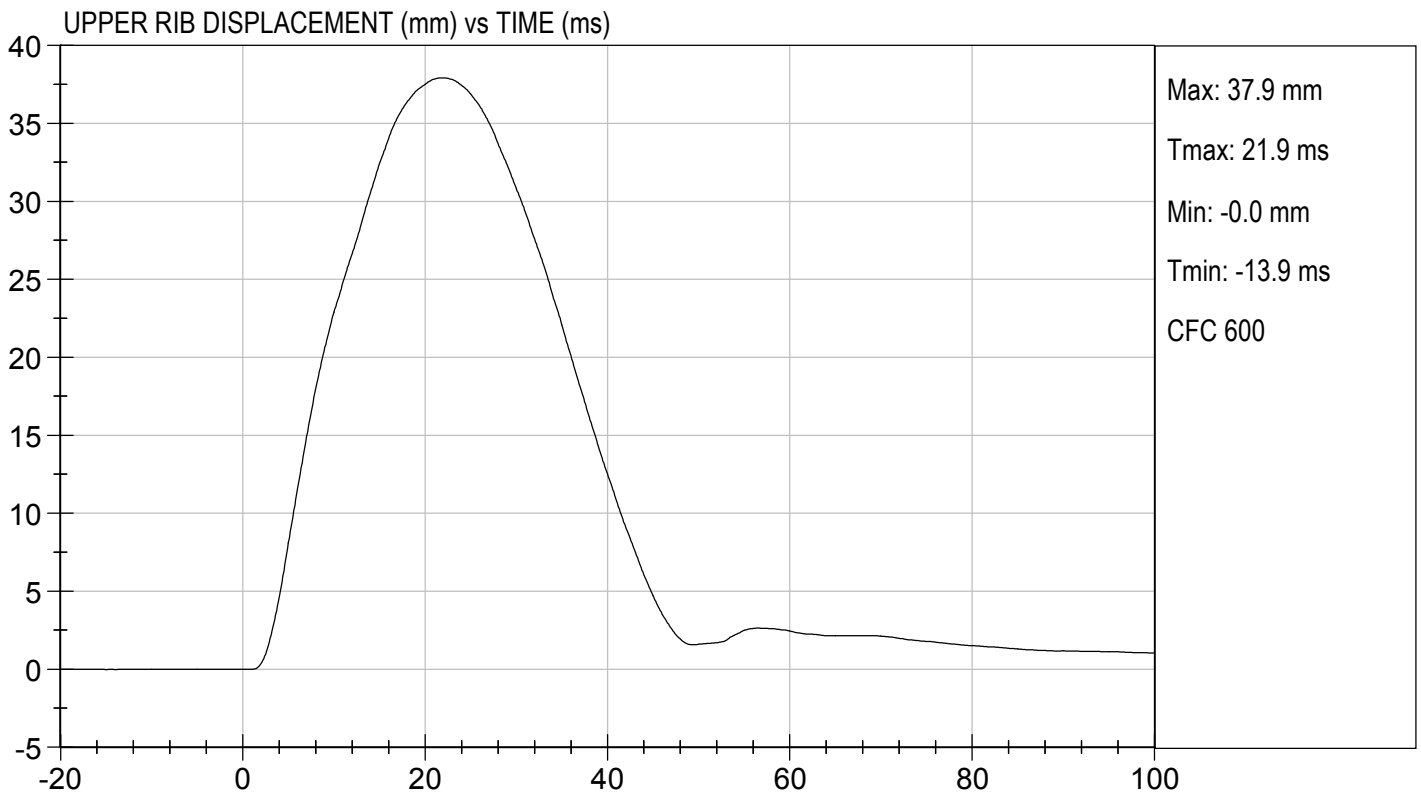
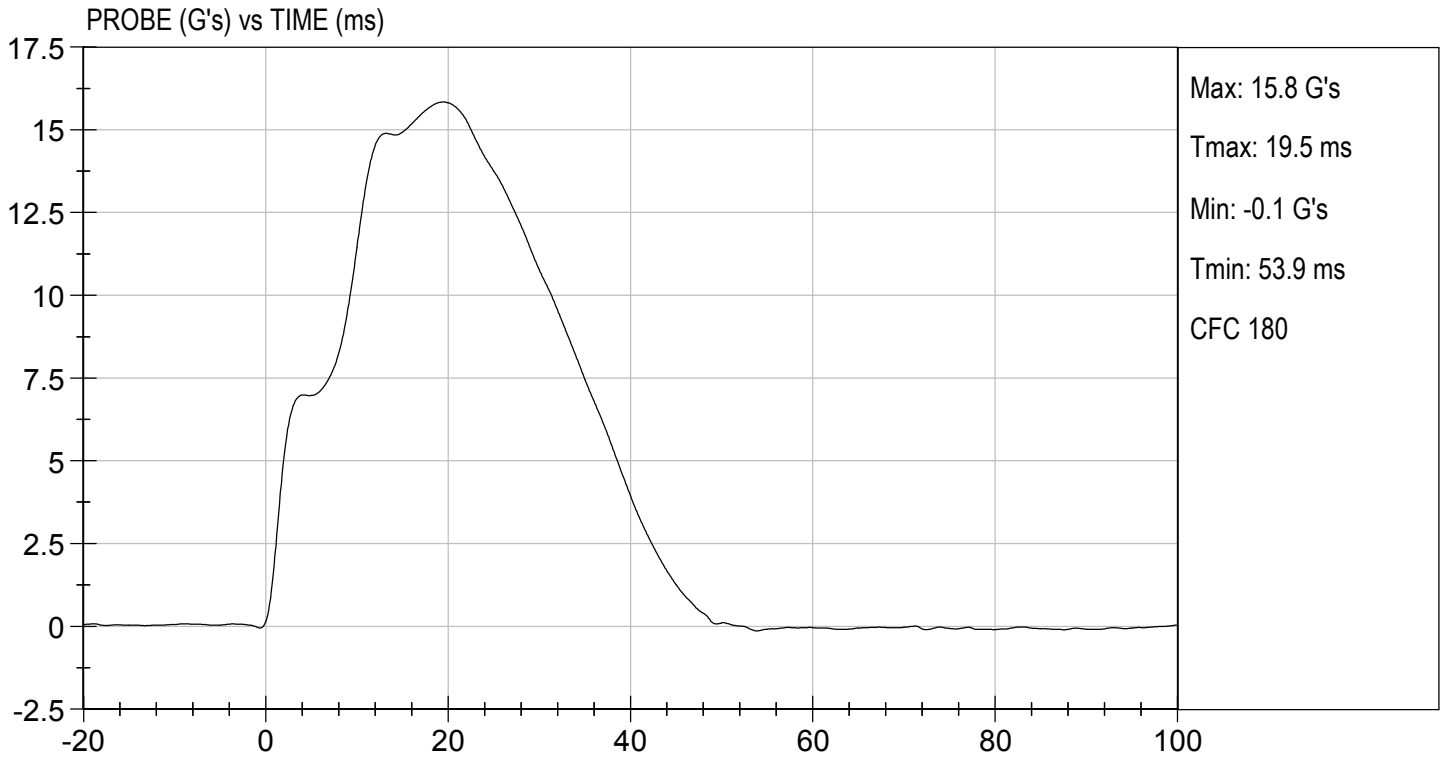


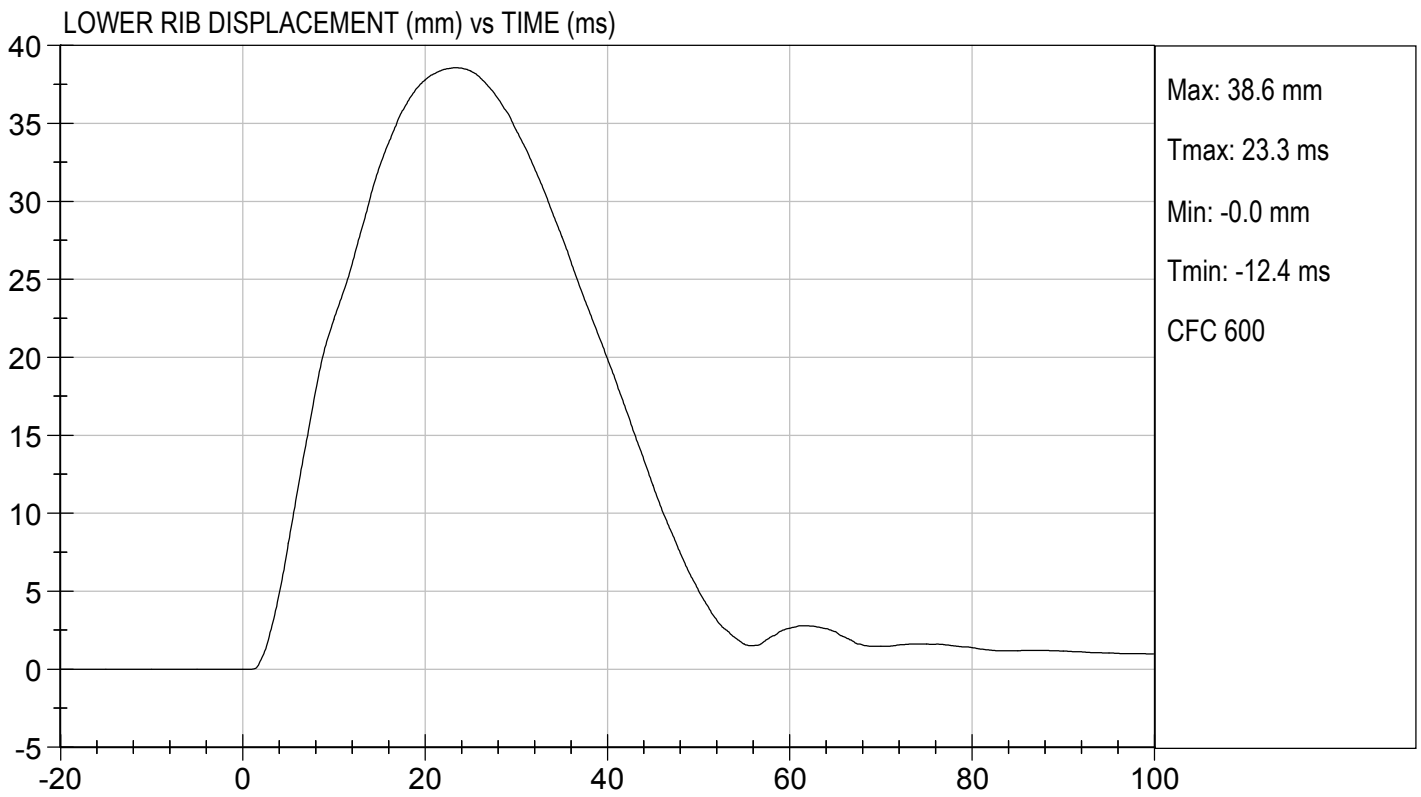
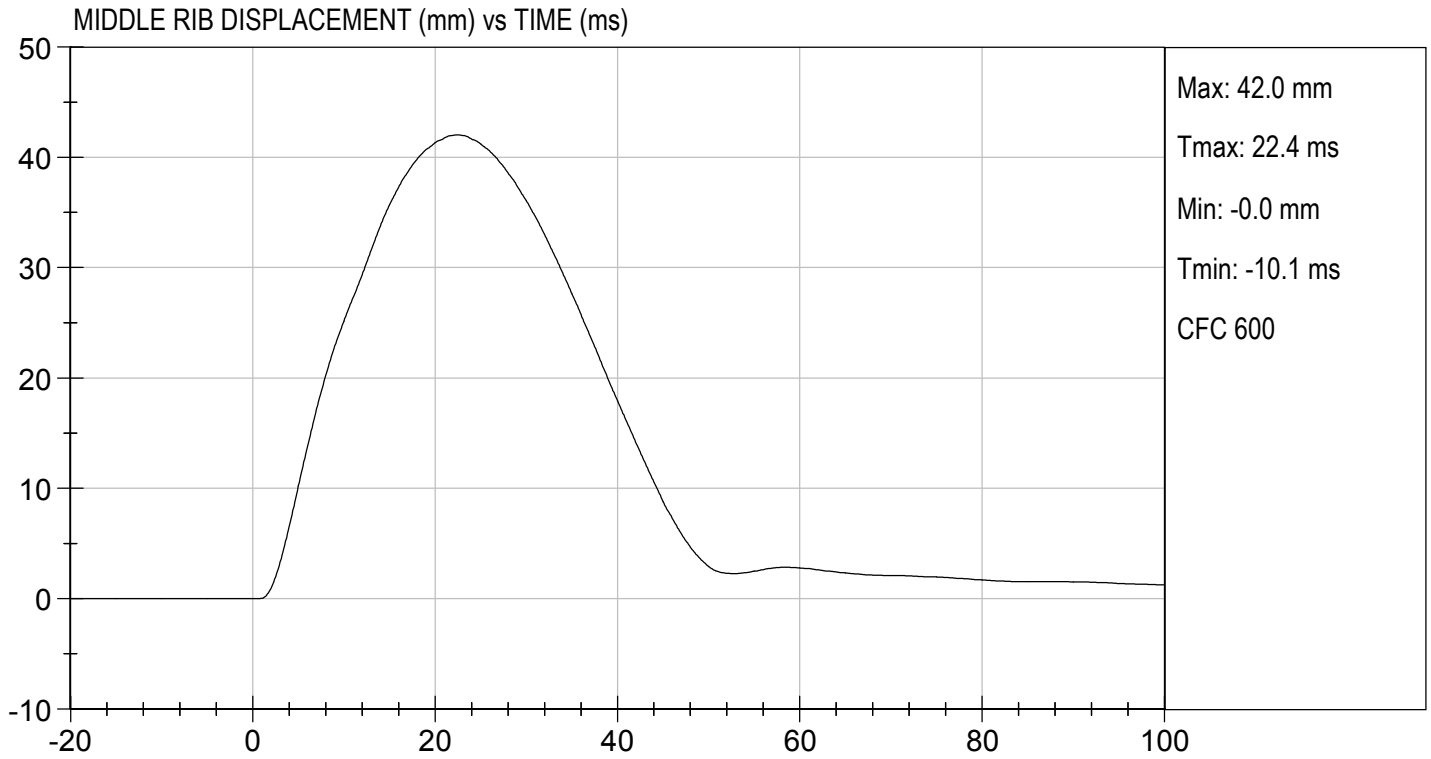
 Laboratory Technician

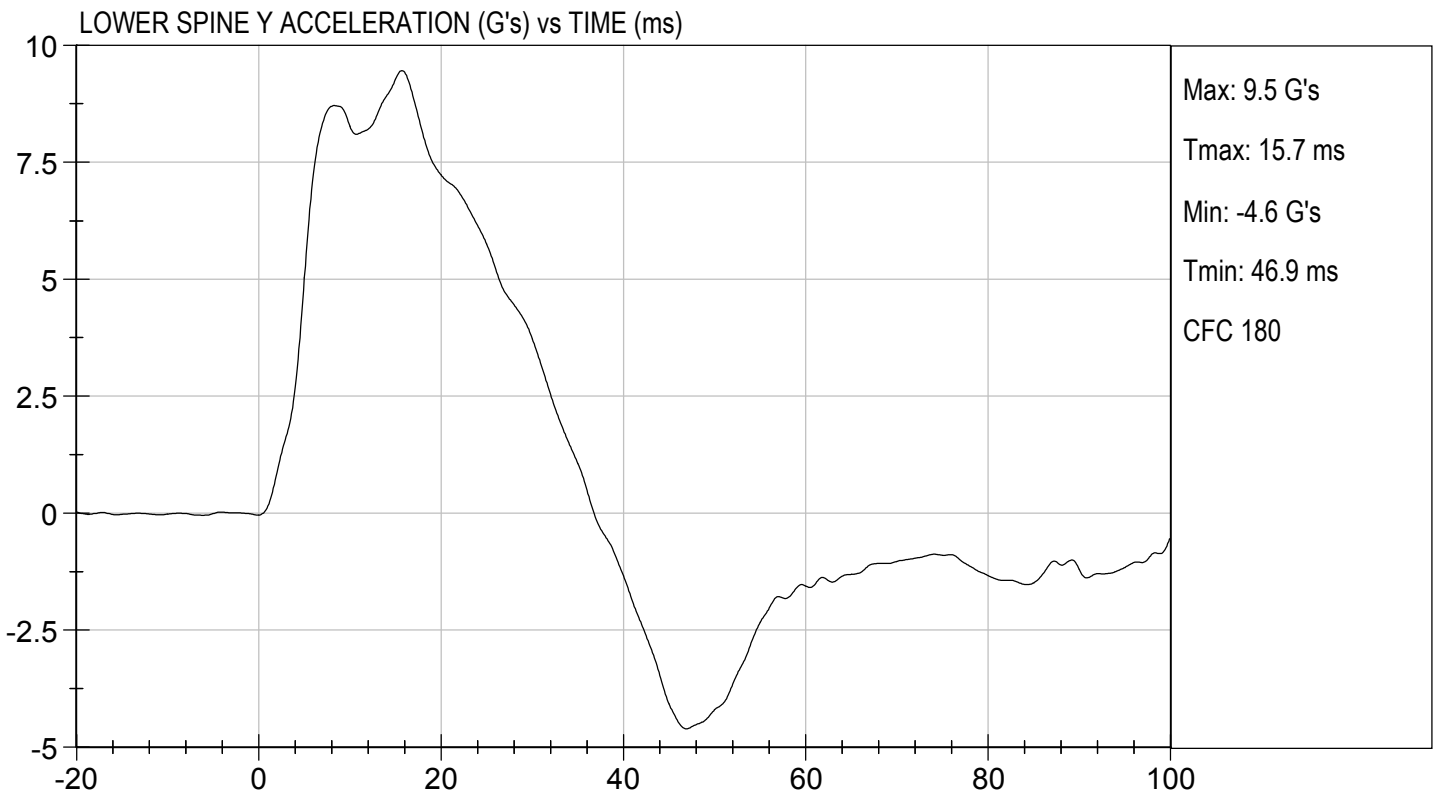
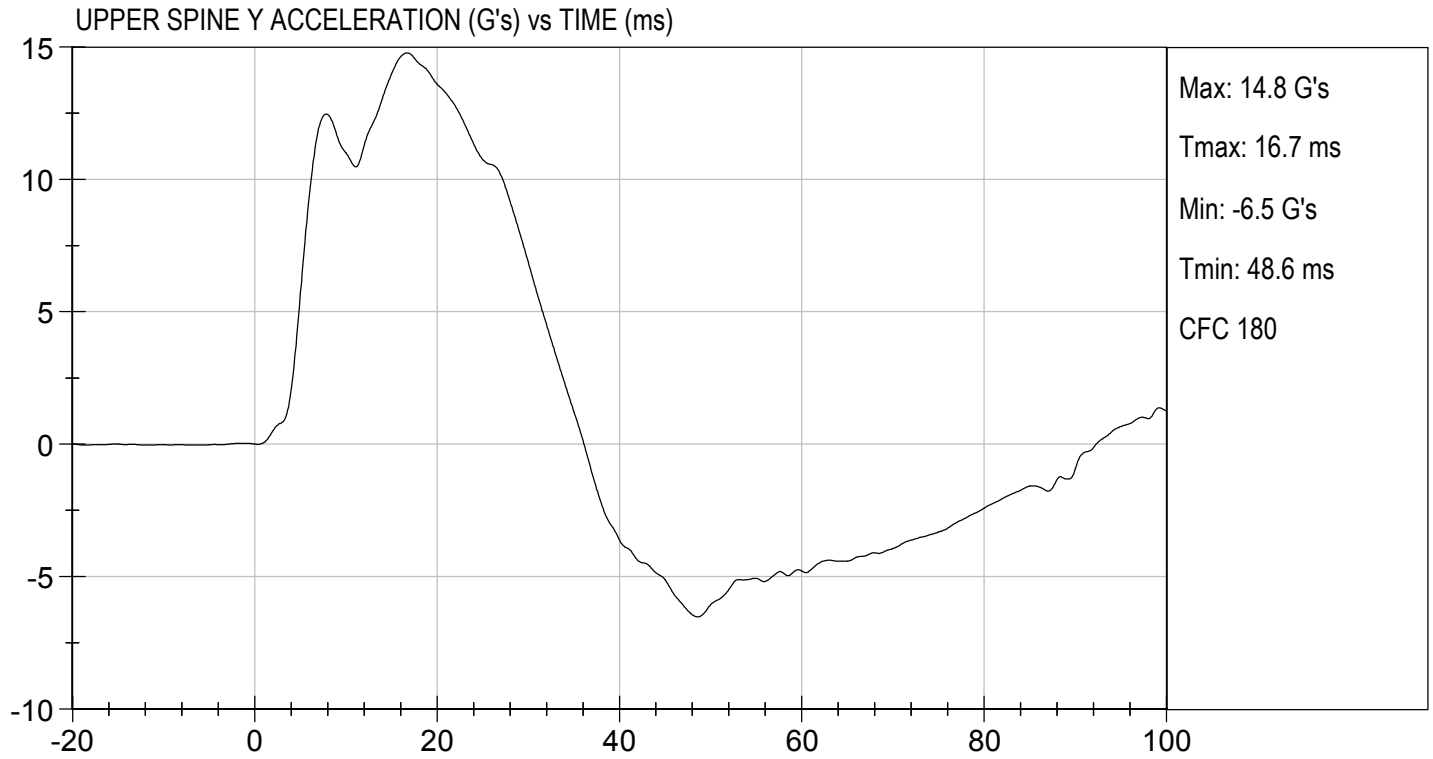
03/01/2019

 Test Date

 Approved By







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

ATD Serial No: 306

Test I.D: D190816

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass

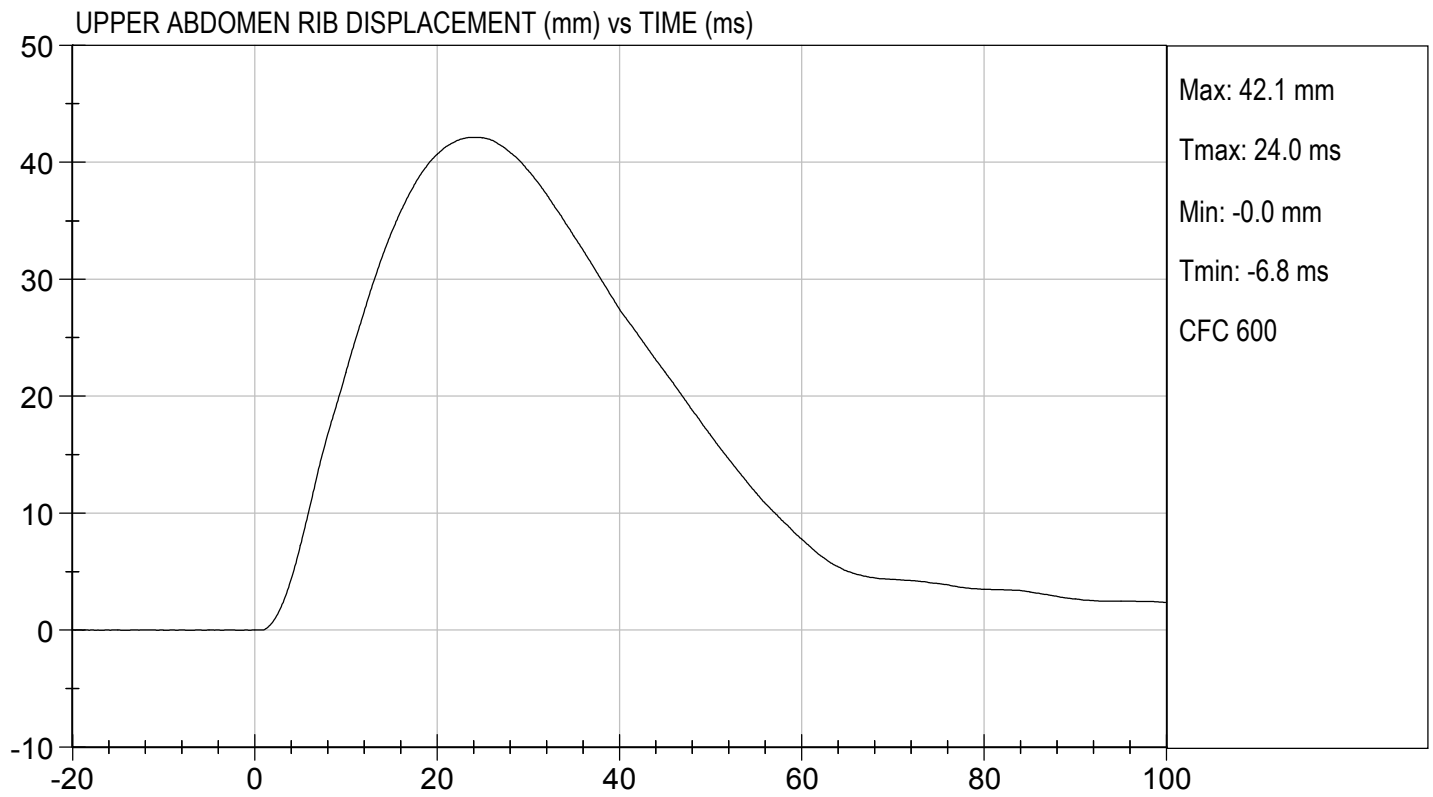
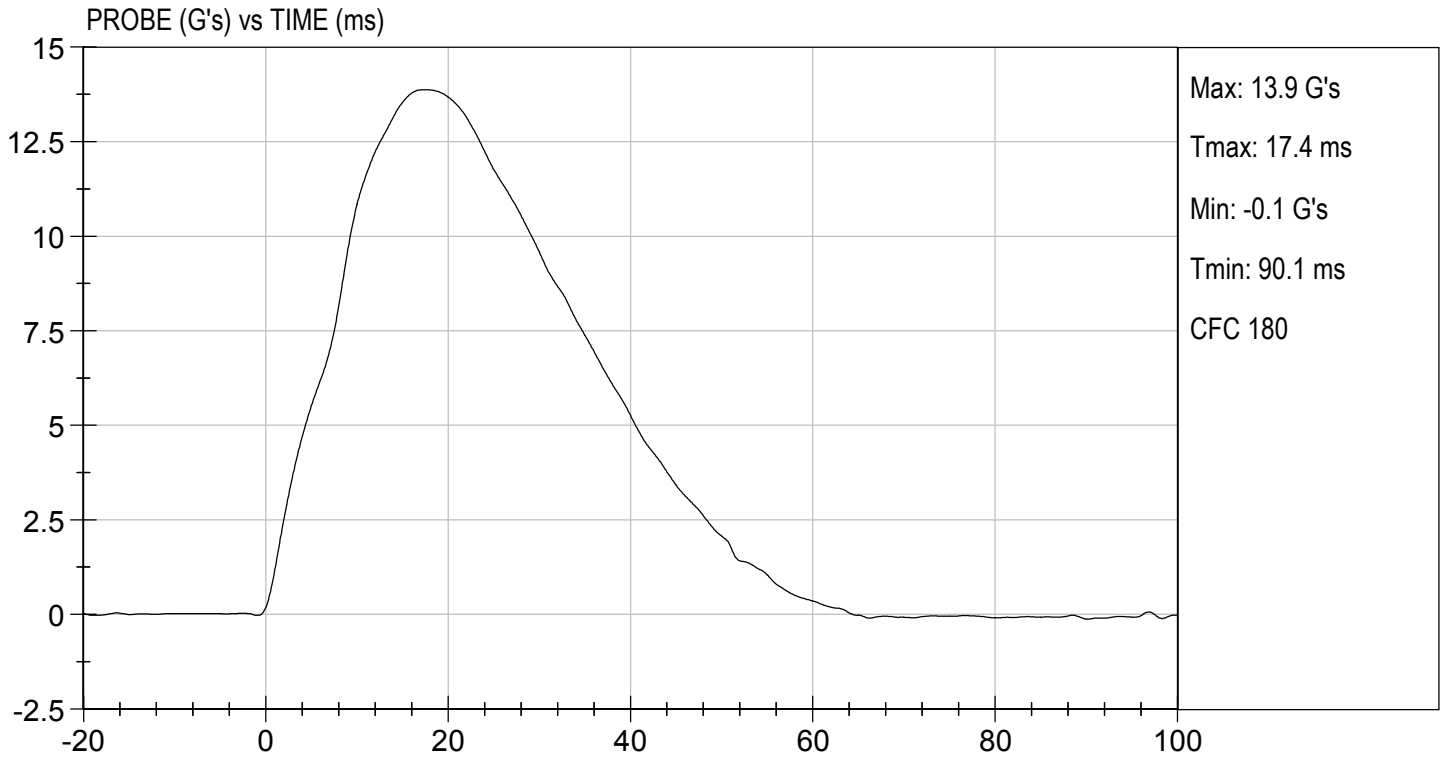


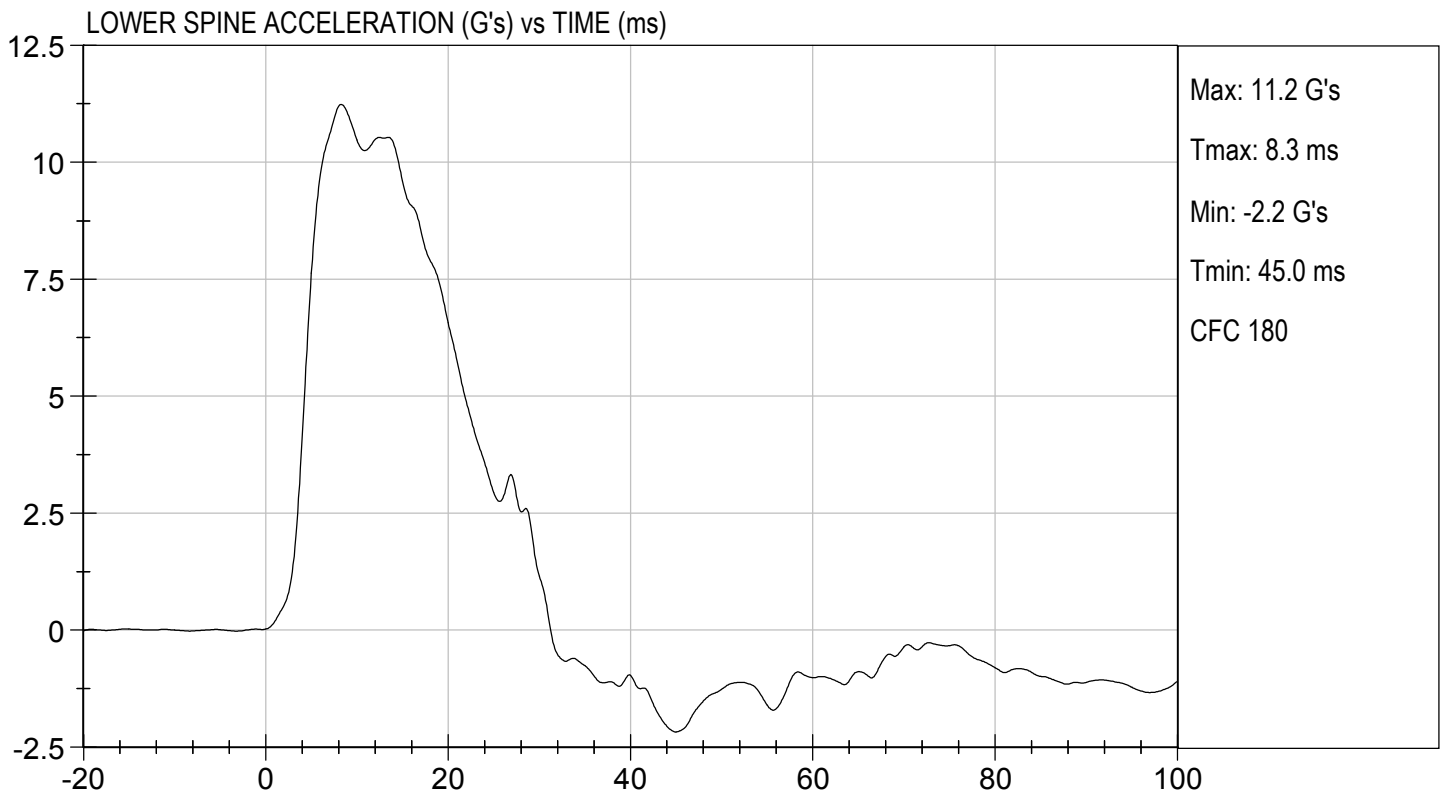
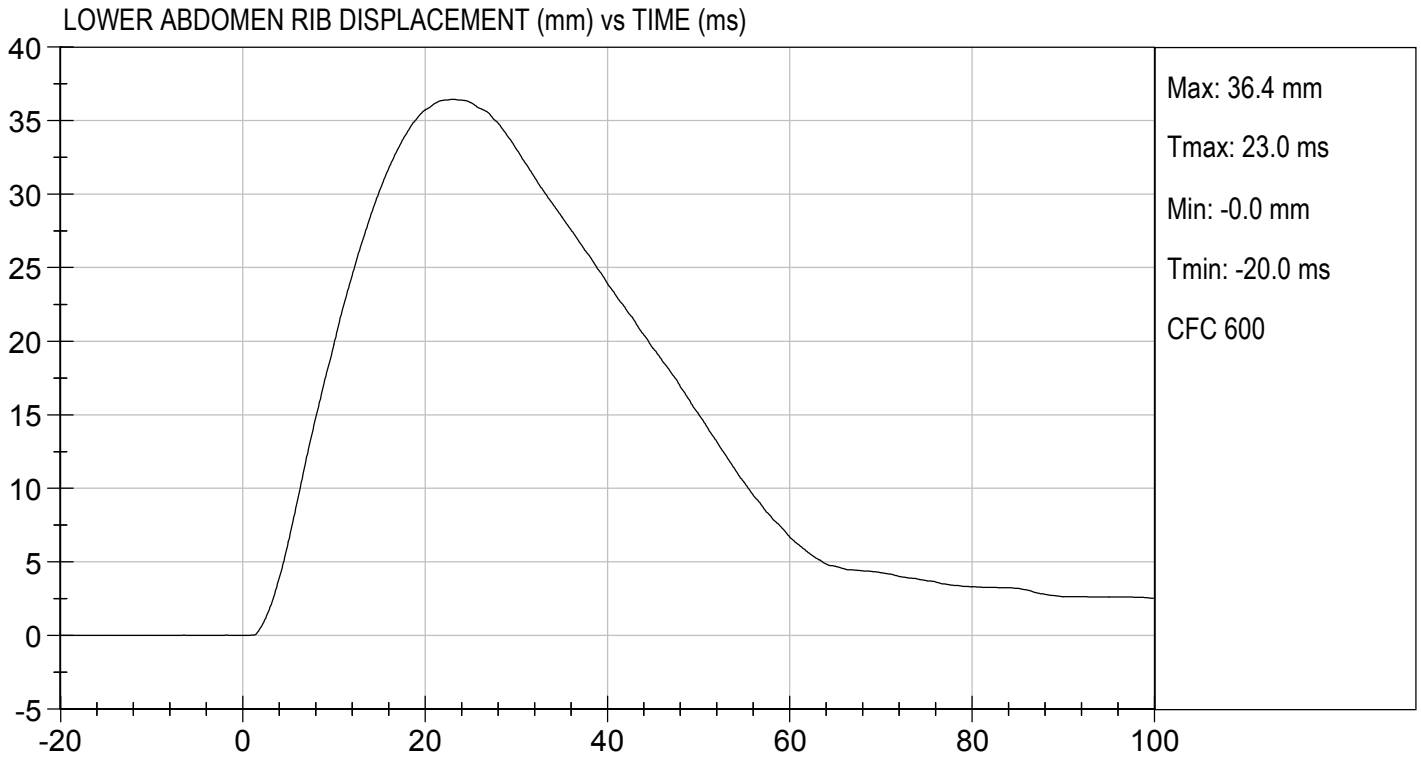
 Laboratory Technician

03/01/2019

 Test Date

 Approved By





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

ATD Serial No: 306

Test I.D: D190817

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	12	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	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3,905	Pass
Overall Test Results				Pass

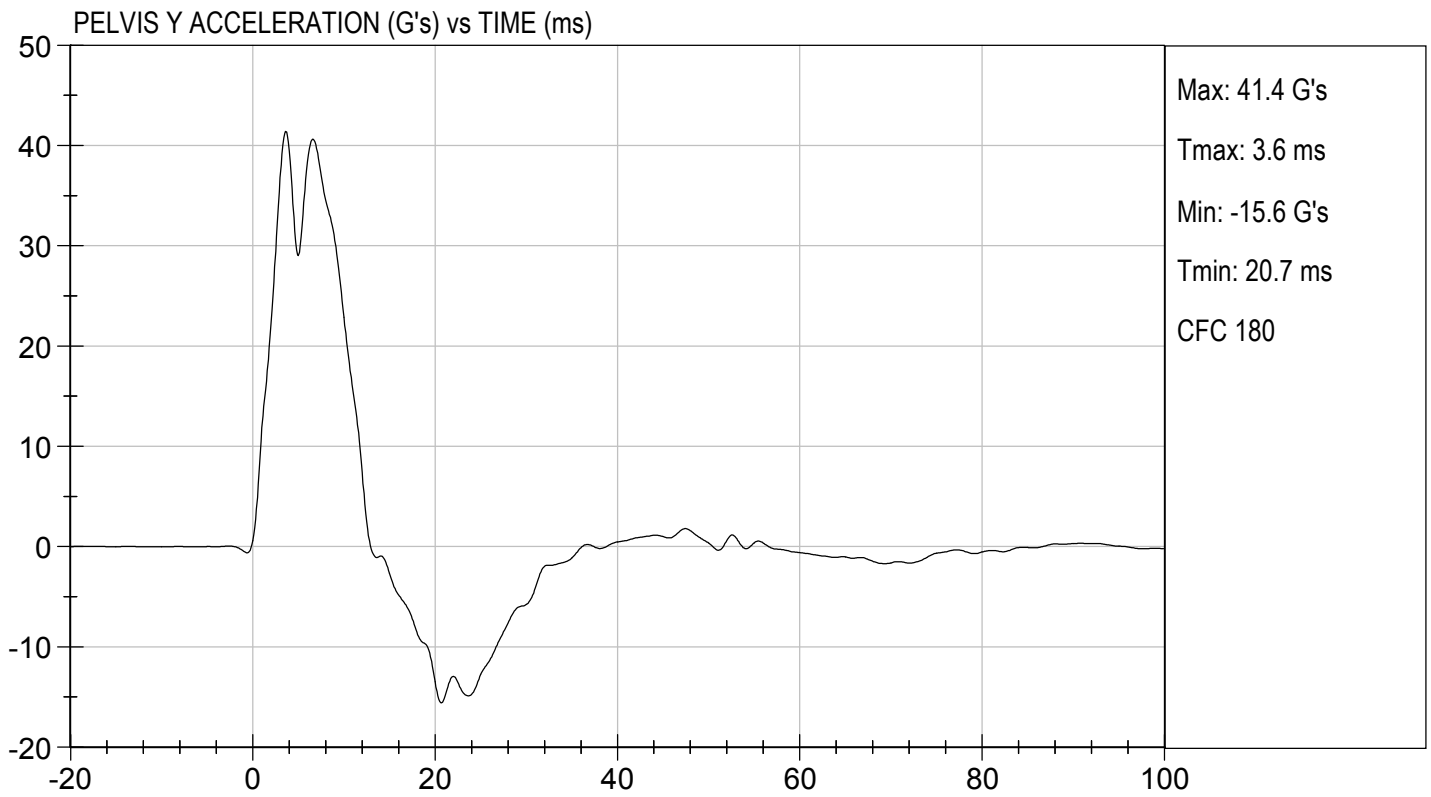
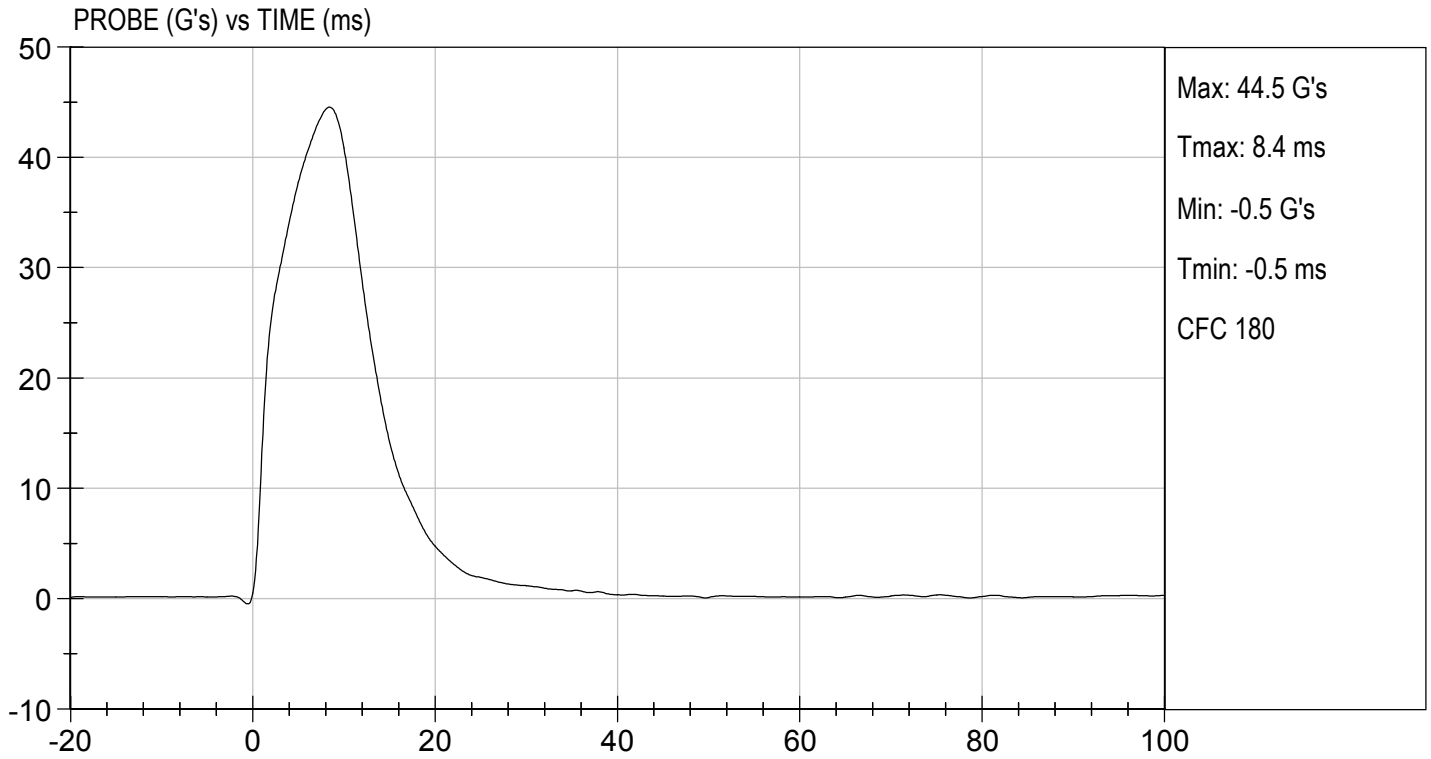


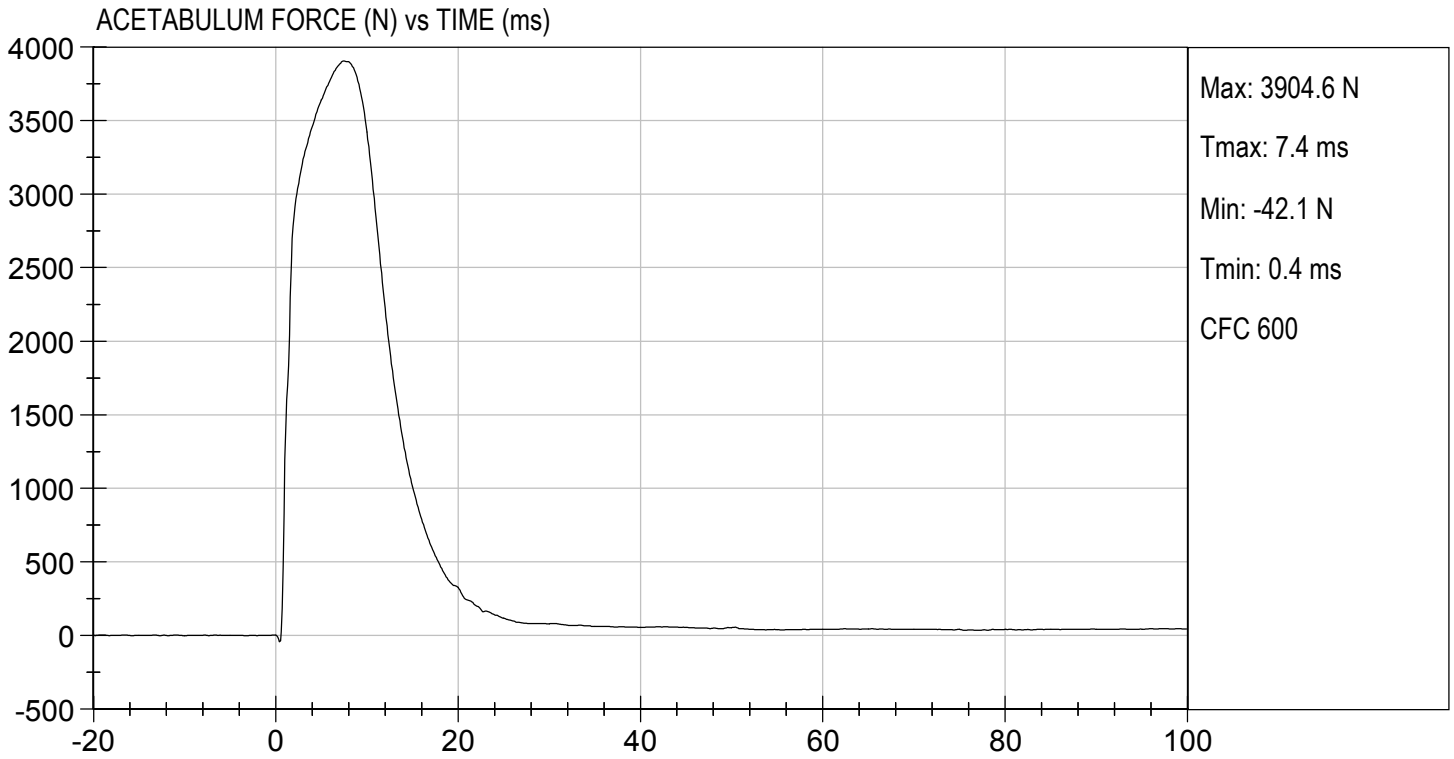
 Laboratory Technician

03/04/2019

 Test Date

 Approved By





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

ATD Serial No: 306

Test I.D: D190818

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	36 to 45	43	Pass
Pelvis Y Acceleration	G's	28 to 39	35	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,868	Pass
Overall Test Results				Pass

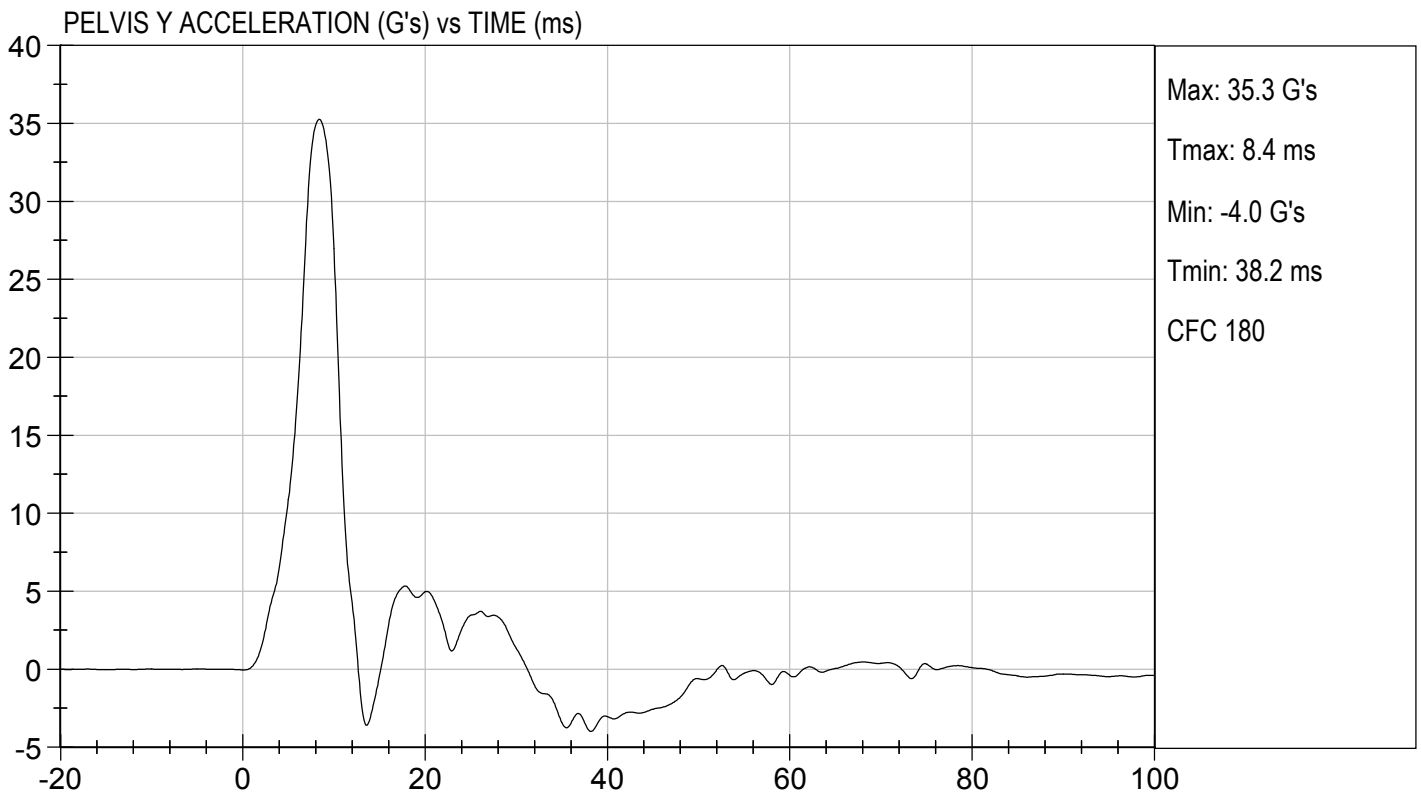
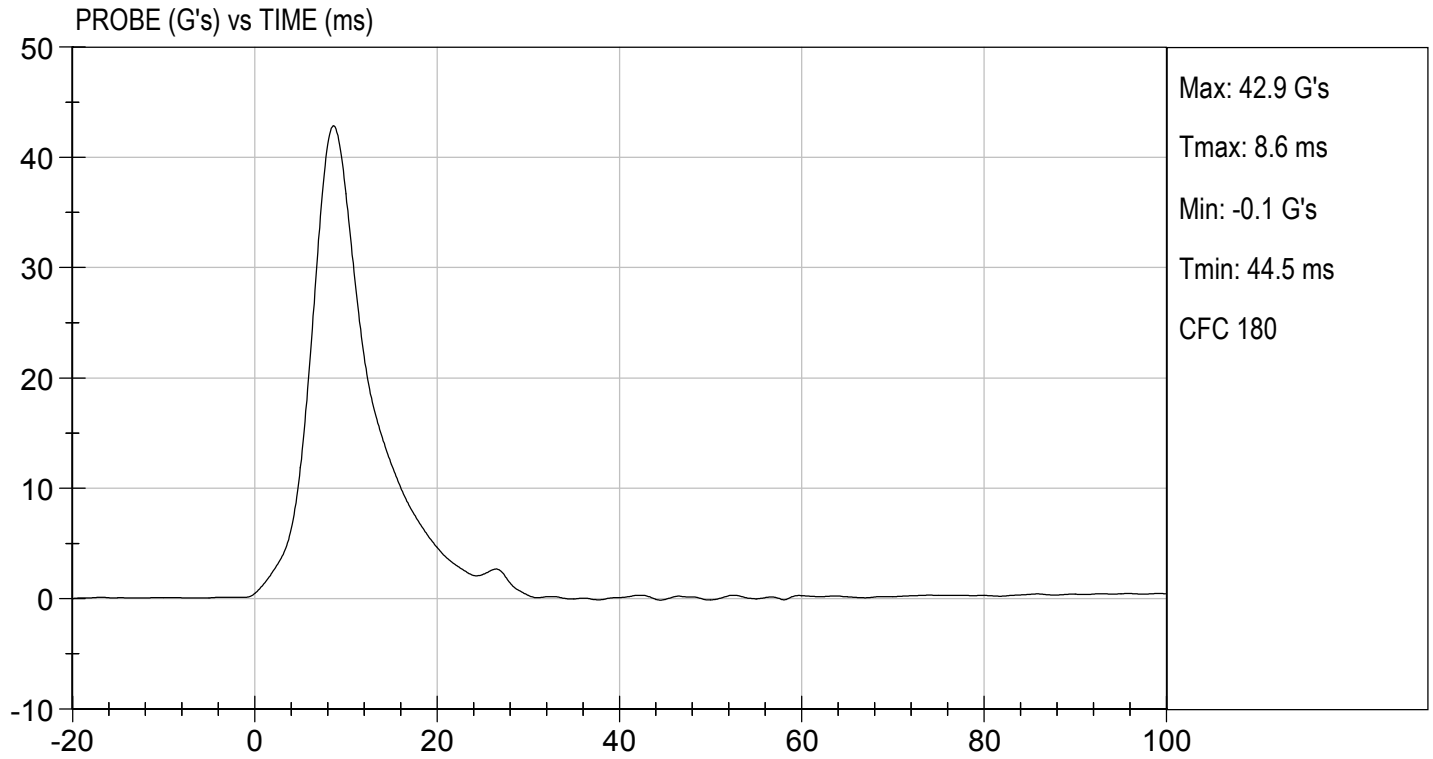


 Laboratory Technician

03/01/2019

 Test Date

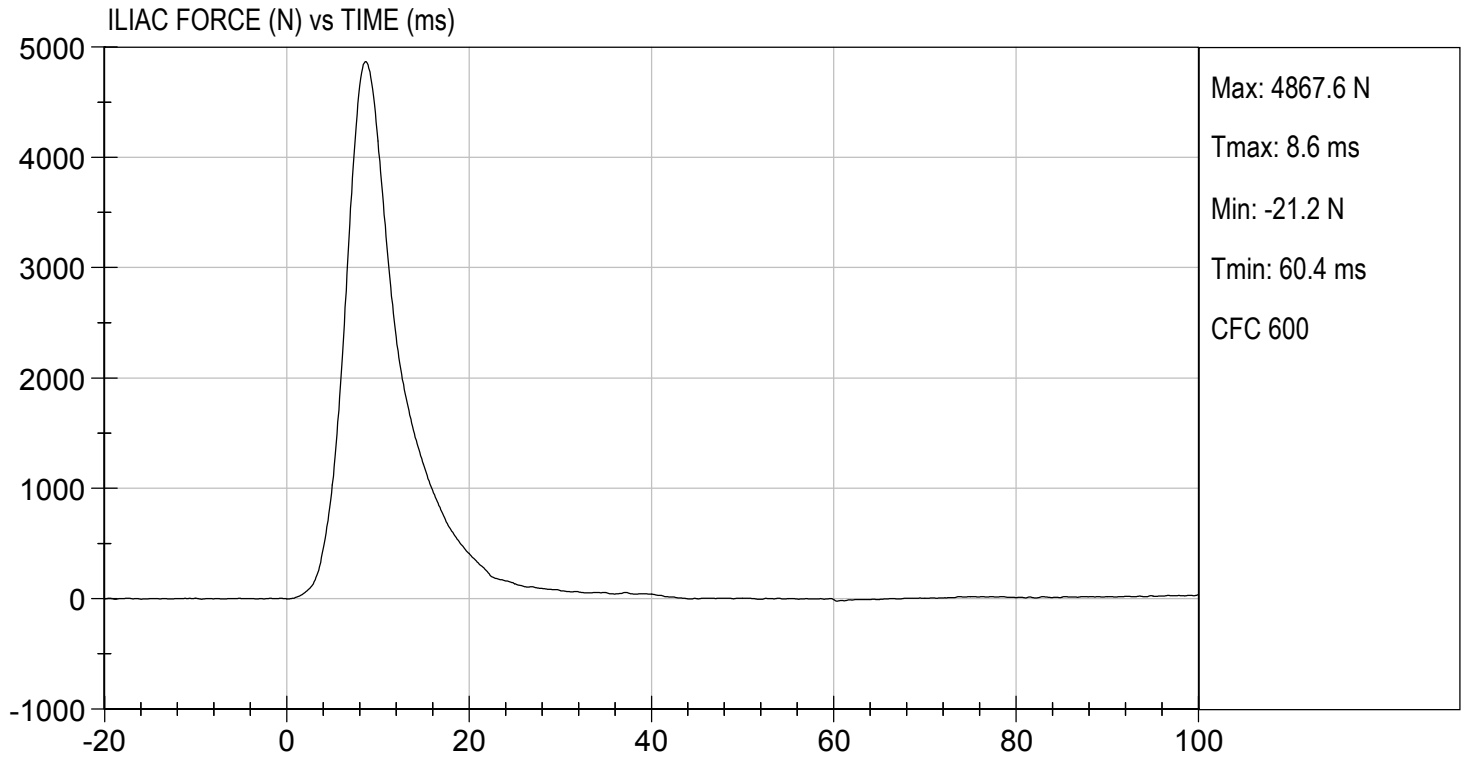
 Approved By





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

TEST DATE: 03/01/2019
TEST #: D190818





SID-IIs Pelvis Plug Certification Test

Plug S/N 12372

Test Number 6760

Report Number 6775

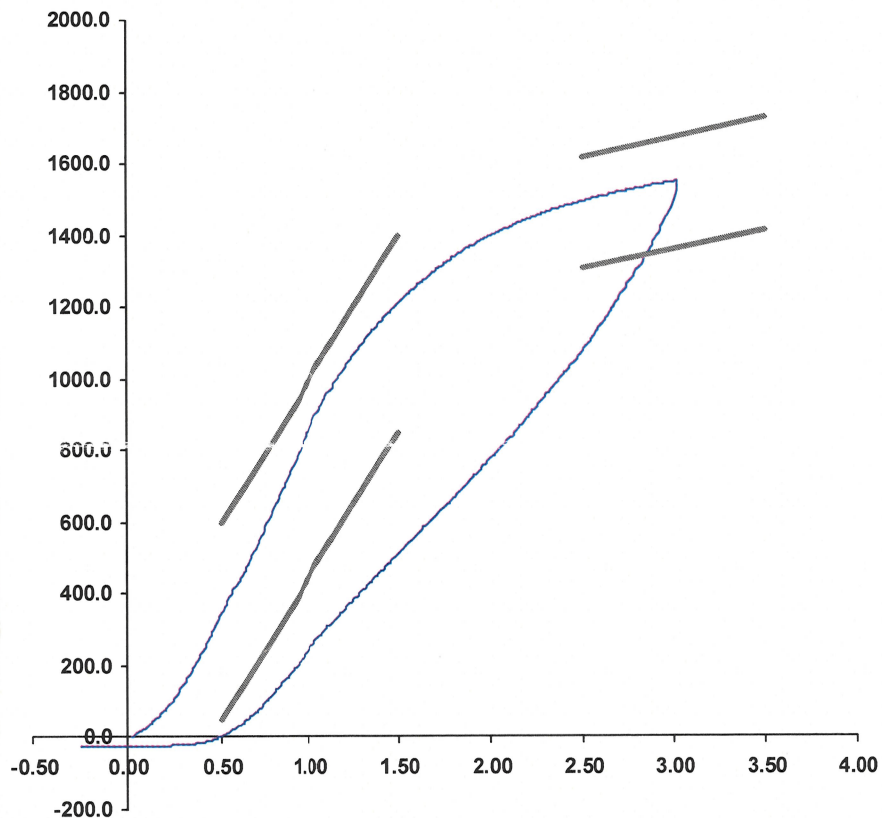
Test Date 3/23/2018 9:39:24 AM

	<u>Test Results</u>	<u>Spec Min</u>	<u>Spec Max</u>
Force @ 0.5 mm (N)	348.43	50.00	600.00
Force @ 1.5 mm (N)	1,213.11	850.00	1,400.00
Force @ 2.5 mm (N)	1,494.96	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,550.69	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 23-Mar-18
 SACO Research

By : DC Date : 3/23/18



SID-IIs Pelvis Plug Certification Test

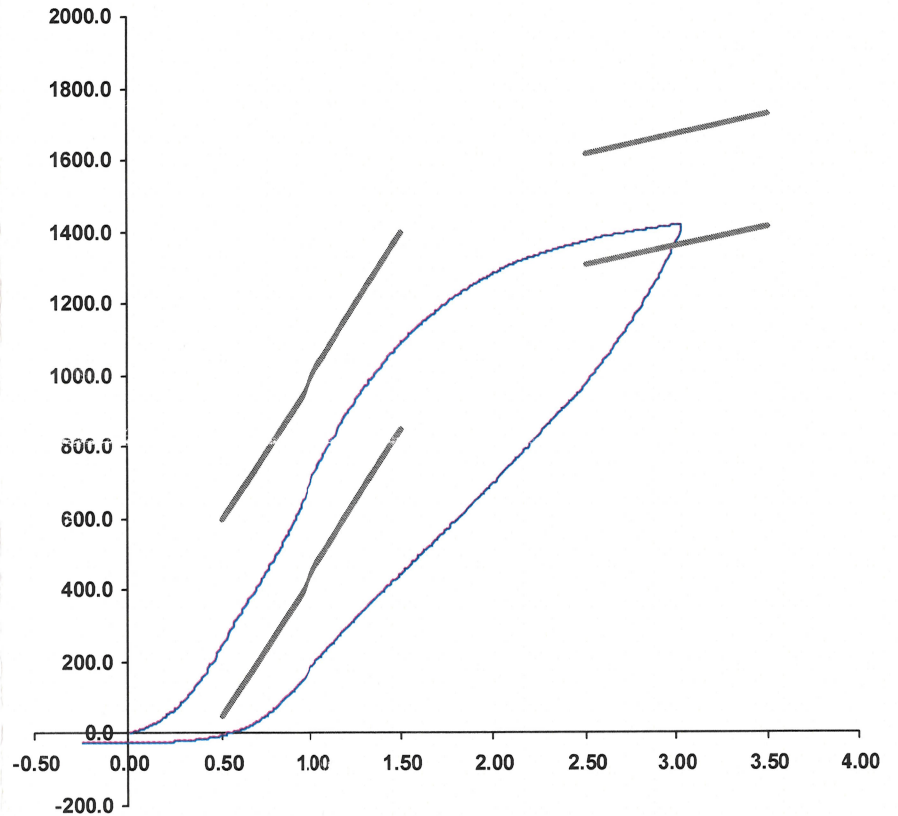
Plug S/N 12300
 Test Number 6685
 Report Number 6700
 Test Date 3/15/2018 12:07:17 PM

	<u>Test Results</u>	<u>Spec Min</u>	<u>Spec Max</u>
Force @ 0.5 mm (N)	258.12	50.00	600.00
Force @ 1.5 mm (N)	1,091.88	850.00	1,400.00
Force @ 2.5 mm (N)	1,373.79	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,420.44	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 15-Mar-18
 SACO Research

By: DC Date: 3/15/18

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

		ES-2re S/N 032			
		Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers		X	P79711	Endevco	01/18/19
		Y	P79712	Endevco	01/18/19
		Z	P88170	Endevco	01/18/19
		Xr	P79750	Endevco	01/18/19
		Yr	P79751	Endevco	01/18/19
		Zr	P79753	Endevco	01/18/19
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	01/18/19
	Middle	Y	G169	Honeywell	01/18/19
	Lower	Y	G164	Honeywell	01/18/19
Abdomen Load Cells	Forward	Y	ABG1513FY	Denton	09/12/18
	Middle	Y	ABG1531FY	Denton	09/12/18
	Rear	Y	ABG1536FY	Denton	09/12/18
Lower Spine Accelerometers (T12)		X	P79574	Endevco	01/18/19
		Y	P82097	Endevco	01/18/19
		Z	P82603	Endevco	01/18/19
Public Symphysis Load Cell		Y	PG462FY	Denton	09/12/18

Table 2 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N 306			
			Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers			X	P79445	Endevco	01/11/19
			Y	P79721	Endevco	01/11/19
			Z	P79724	Endevco	01/11/19
			Xr	P84999	Endevco	01/11/19
			Yr	P85000	Endevco	01/11/19
			Zr	P85001	Endevco	01/11/19
Head Angular Rate Sensors			X	ARS7416	DTS	07/15/14
			Y	ARS7442	DTS	07/15/14
			Z	ARS7475	DTS	07/08/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	01/11/19
		Middle	Y	G1261	FTSS	01/11/19
		Lower	Y	G1270	FTSS	01/11/19
	Abdominal Rib	Upper	Y	G032	FTSS	01/11/19
		Lower	Y	G1304	FTSS	01/11/19
Lower Spine Accelerometers (T12)			X	P96332	Endevco	01/11/19
			Y	P96335	Endevco	01/11/19
			Z	P96341	Endevco	01/11/19
Acetabulum Load Cell			Y	ACG268FY	Denton	12/04/18
Iliac Wing Load Cell			Y	IWG273FY	Denton	12/04/18
Pelvis Plug (struck side)				12372	SACO	03/23/18
Pelvis Plug (non-struck side)				12300	SACO	03/15/18

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	PCB1194	PCB	1/9/19
	Vehicle Center of Gravity	Y	PCB732	PCB	1/9/19
	Vehicle Center of Gravity	Z	PCB1150	PCB	1/9/19
2	Right Sill at Front Seat	X	PCB1278	PCB	1/16/19
	Right Sill at Front Seat	Y	PCB1247	PCB	1/16/19
	Right Sill at Front Seat	Z	PCB1294	PCB	1/16/19
3	Right Sill at Rear Seat	X	PCB1147	PCB	10/23/18
	Right Sill at Rear Seat	Y	T12259	Endevco	10/23/18
	Right Sill at Rear Seat	Z	PCB1318	PCB	10/24/18
4	Left Sill at Front Door	Y	T18390	Endevco	1/14/19
5	Left Sill at Rear Door	Y	PCB1191	PCB	12/5/18
6	Left A-Post Lower	Y	T19005	Endevco	1/24/19
7	Left A-Post Middle	Y	T19000	Endevco	1/24/19
8	Left B-Post Lower	Y			
9	Left B-Post Middle	Y			
10	Front Seat Track	Y	T17840	Endevco	12/5/18
11	Rear Seat Track or Structure	Y	PCB1037	PCB	9/24/18
12	Right Rear Occ. Compartment	Y	PCB1254	PCB	12/21/18
13	Engine Block	X	T18986	Endevco	1/24/19
	Engine Block	Y	T19018	Endevco	1/24/19
14	Rear Floorpan Above Axle	X	PCB1126	PCB	1/16/19
	Rear Floorpan Above Axle	Y	PCB1263	PCB	1/16/19
	Rear Floorpan Above Axle	Z	PCB883	PCB	1/16/19

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB511D	PCB	9/24/18
MDB Center of Gravity	Y	PCB753D	PCB	9/24/18
MDB Center of Gravity	Z	PCB557D	PCB	9/24/18
Left Frame at Rear Axle Centerline	X	PCB660D	PCB	9/26/18
Left Frame at Rear Axle Centerline	Y	PCB659D	PCB	9/26/18