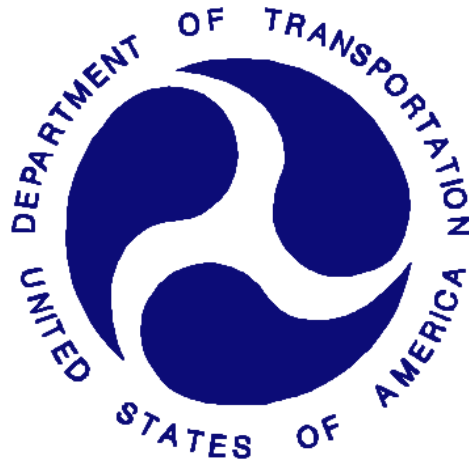


REPORT NUMBER: SINCAP-MGA-2019-043

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

**NISSAN MOTOR CO., LTD.
2019 Nissan Frontier SL Crew Cab Truck
NHTSA No.: O20195203**

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



Test Date: May 10, 2019

Final Report Date: August 2, 2019

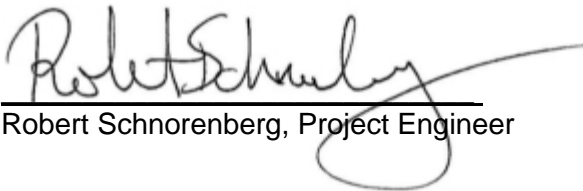
FINAL REPORT

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

Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: August 2, 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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7. Author(s) Ben Fischer, Project Engineer		8. Performing Organization Report No. SINCAP-MGA-2019-043																													
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																													
		11. Contract or Grant No. DTNH22-14-D-00353																													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report May 10, 2019 to August 2, 2019																													
		14. Sponsoring Agency Code NRM-110																													
15. Supplementary Notes																															
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2019 Nissan Frontier SL 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 May 10, 2019. The impact velocity of the Moving Deformable Barrier (MDB) was 62.28 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.1°C. The target vehicle post-test maximum crush was 289 mm at level 1. The test vehicle's performance was as follows:																															
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The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.																															
17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590																													
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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 Nissan Frontier SL 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 Nissan Frontier SL 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 62.28 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 May 10, 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

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	41
Maximum Thorax Rib Deflection	mm	44	14
Total Abdominal Force	N	2500	626
Pubic Symphysis Force	N	6000	1490
Resultant Lower Spine Acceleration	Gs	82*	20

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	41
Resultant Lower Spine Acceleration	Gs	82	32
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1807
Maximum Thoracic Rib Deflection	mm	38*	26
Maximum Abdomen Rib Deflection	mm	45*	21

*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	Yes		
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 Front Sill Y recorded no valid data.
Left Lower A-Post Y recorded no valid data.
Left Mid A-Post Y recorded no valid data.
Left Lower B-Post Y recorded questionable data.

Driver side curtain airbag deployment was restricted by b-pillar trim.

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 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
Test Date: 5/10/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20195203	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Nissan	Automatic Door Locks (ADL)	Yes
Model	Frontier SL Crew Cab	Power Window Auto-Reverse	Yes
Body Style	Truck	Other Optional Feature	N/A
VIN	1N6AD0ER9KN757515	Driver Front Airbag	Yes
Body Color	Arctic Blue Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	14km / 9mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	4.0L	Driver Torso Airbag	No
Type/No. Cylinders	V6	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	5	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	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	Yes	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	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
---	----

DATA FROM CERTIFICATION LABEL

Manufactured By	NISSAN MOTOR CO., LTD.	GVWR (kg)	2599
Date of Manufacture	03/19	GAWR Front (kg)	1495
Vehicle Type	Truck	GAWR Rear (kg)	1511

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				575	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				235	(A-B)

VEHICLE SEAT TYPE

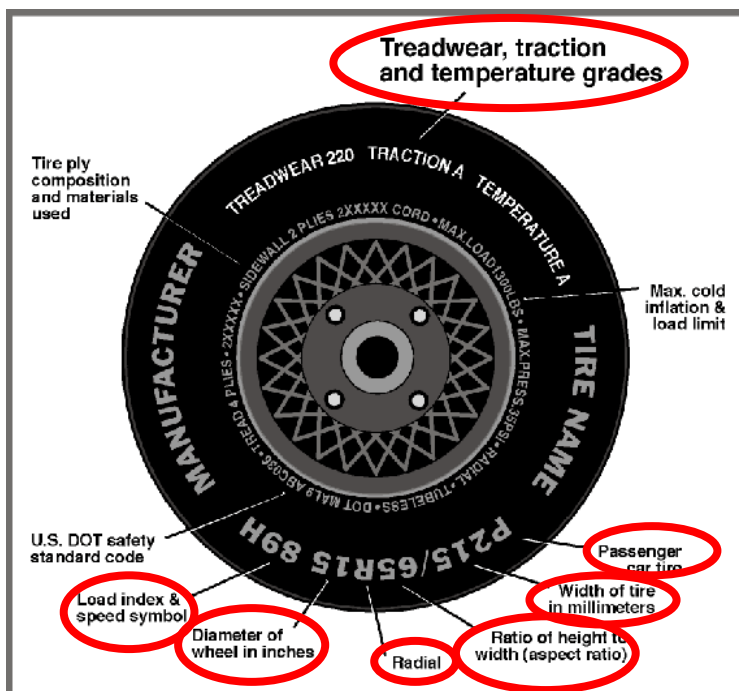
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X						X
Rear or Second Row Seat			X		X		
Third Row Seat							

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/60R18	P265/60R18
Tire Size on Vehicle	265/60R18	265/60R18
Tire Manufacturer	Hankook	Hankook
Tire Model	Dynapro HT	Dynapro HT
Treadwear	700	700
Traction	A	A
Temperature Grade	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester	2 Steel, 2 Polyester
Load Index/Speed Symbol	109T	109T
Tire Material	Rubber	Rubber
DOT Safety Code Left	5M6U HUH 4918	5M6U HUH 5018
DOT Safety Code Right	5M6U HUH 4918	5M6U HUH 4918

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
 Test Date: 5/10/2019

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	275	275	275	275
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	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	548.0	449.0		597.0	554.0		580.0	559.0	
Right	kg	536.0	451.0		545.5	546.0		555.0	555.0	
Ratio	%	54.6%	45.4%		50.9%	49.1%		50.5%	49.5%	
Totals	kg	1084.0	900.0	1984.0	1142.5	1100.0	2242.5	1135.0	1114.0	2249.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1984.0	(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 (TVT _W)	kg	2249.0	(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	855	856	Yes
Right Front	mm	850	851	Yes
Right Rear	mm	868	870	Yes
Left Rear	mm	852	855	Yes
Vehicle CG (Aft of Front Axle)	mm	1590	1575	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	10	21	

*** 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
---	----------------

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
Test Date: 5/10/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	95
None	

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019

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	11.8	2.5	7.2
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid)	As-Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	7.2	0	Max	24	24	24
			Mid	12	12	12
			Min	0	0	0
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

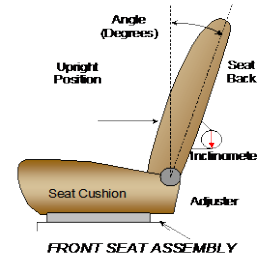
NHTSA No. O20195203
 Test Date: 5/10/2019

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	213		107	
Front Passenger Seat	235		118	
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned 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	98.8		7.1	
Front Passenger Seat	102.7		8.0	
Front Center Seat				
Struck Side Rear Seat	Fixed		N/A	
Non-Struck Side Rear Seat	Fixed		N/A	
Rear Center Seat	Fixed		N/A	

Driver and Front Passenger seat back angles measured on headrest post.

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019

SEAT BELT ANCHORAGE ADJUSTMENT

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

	Total # of Positions	Placed in Position #
Driver Seat	4	0 (Uppermost as 0)
Rear Seat	Fixed	

HEAD RESTRAINT ADJUSTMENT

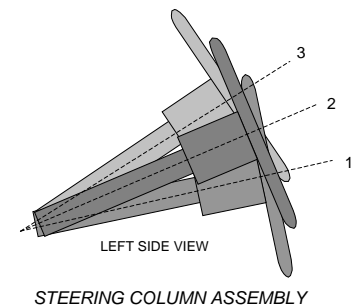
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	6	5 (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.

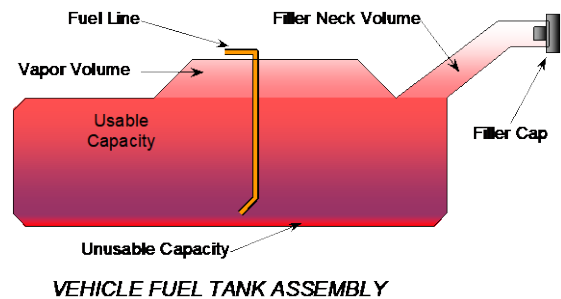
	Wheel Angle (deg)	Fore/Aft Position (mm)
Lowermost, Position 1	75.6	
Geometric Center, Position 2	68.2	
Uppermost, Position 3	60.7	
Telescoping Steering Wheel Travel		
Test Position	69.7	



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 is activated approximately 1 second after the ignition is switched "ON"; while the engine is running; and approximately 1.5 seconds after the engine stops 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 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
Test Date: 5/10/2019

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	79.9
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	79.9
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	74.3
Actual Amount of Solvent Used	74.2
1/3 of Usable Capacity	26.6

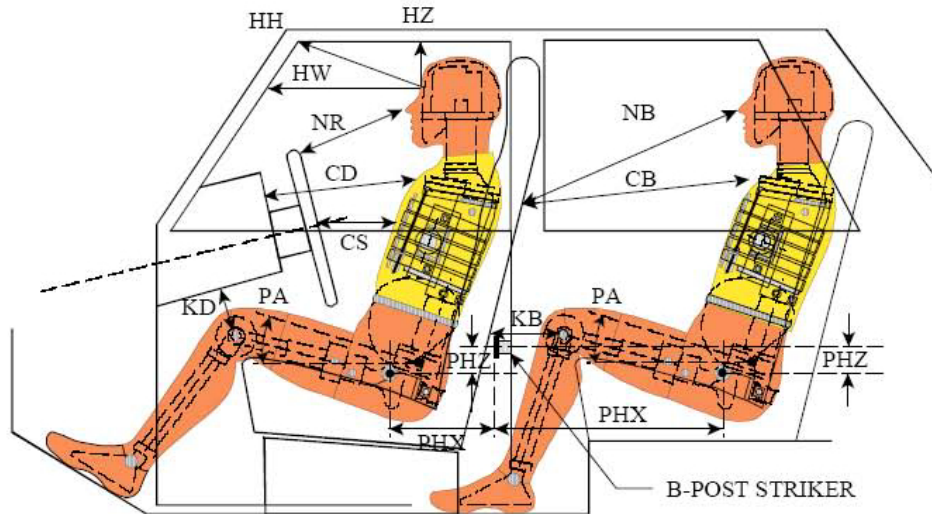
Is the actual amount of solvent used in the test equal to 93% + 1%
of the Usable Capacity stated in Form No. 1?

YES

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



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

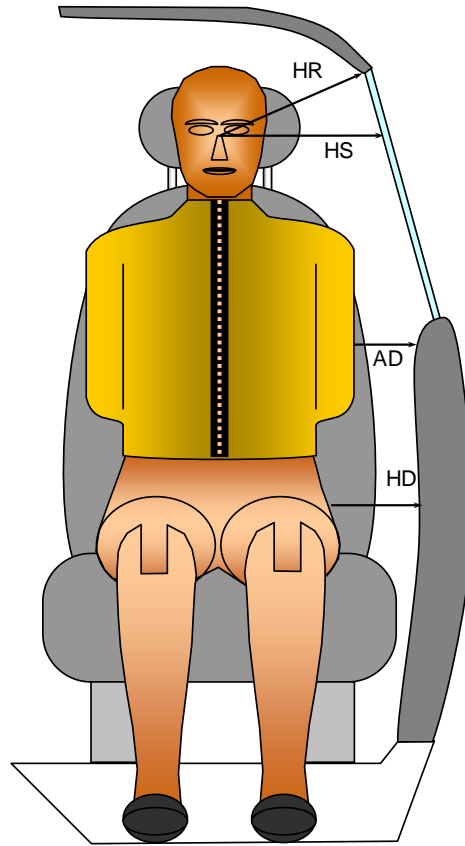
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	319	12.9		
HW		Head to Windshield	502	0		
HZ	HZ	Head to Roof Liner	117	90	243	90
NR	NB	Nose to Rim/Seat Back	391	30.9	474	9.2
CD	CB	Chest to Dashboard/Seat Back	557	1.7	497	3.5
CS		Chest to Steering Wheel	329	21.5		
KDL	KBL	Left Knee to Dash/Seat Back	131	12.8	262	24.2
KDR	KBR	Right Knee to Dash/Seat Back	119	13.2	264	25.6
PAX	PAX	Pelvic Tilt Angle X		21.5		19.8
PAY	PAY	Pelvic Tilt Angle Y		-1.3		-0.4
PHX	PHX	Hip Point to Striker (X-Axis)	244		202	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	41		60	

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



FRONT VIEW OF DUMMY

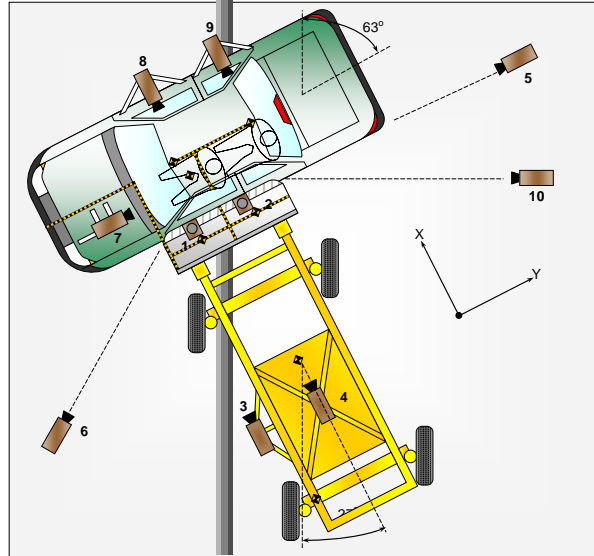
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	166	253
HS	Head to Side Window	mm	298	357
AD	Arm to Door	mm	78	137
HD	Hip Point to Door	mm	112	189

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
Test Date: 5/10/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	600	-950	-4895	8.5	1000
2	Overhead Close-Up	-100	0	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-90	6490	-1610	24	1000
6	Left Front	-2450	-5900	-1530	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

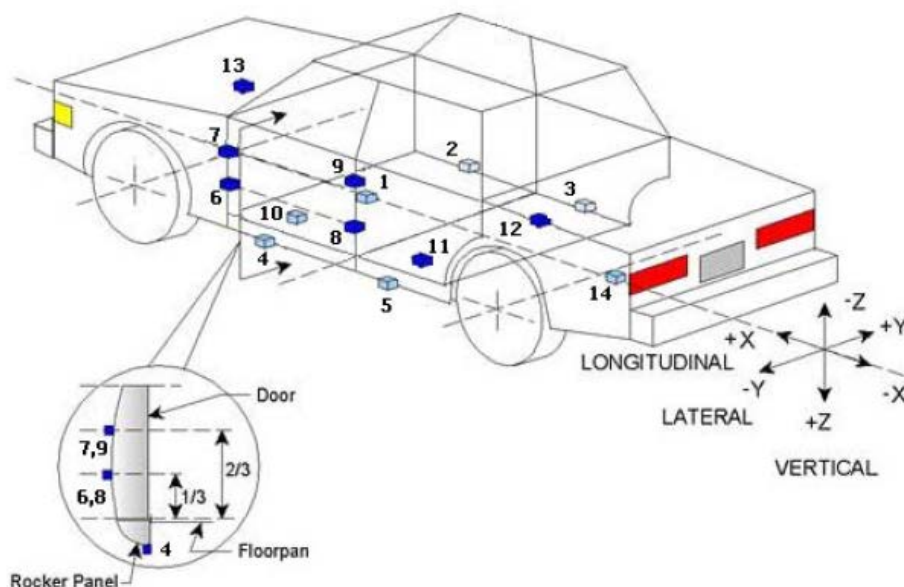
INSTRUMENTATION

	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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

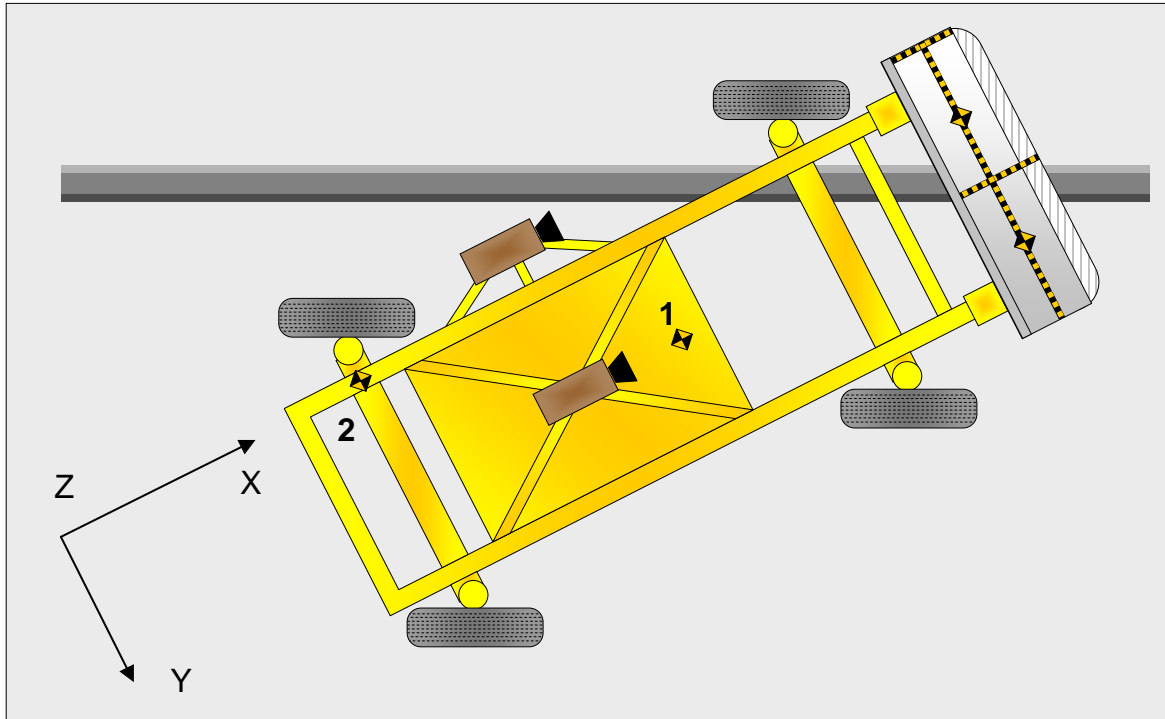
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2844	322	-524
2	Right Sill at Front Seat	3203	747	-357
3	Right Sill at Rear Seat	2126	747	-373
4	Left Sill at Front Door	3267	-747	-349
5	Left Sill at Rear Door	2286	-747	-358
6	Left Lower A-Post	3808	-818	-750
7	Left Middle A-Post	3805	-820	-935
8	Left Lower B-Post	2702	-732	-694
9	Left Middle B-Post	2680	-730	-930
10	Front Seat Track	2858	-385	-510
11	Rear Seat Structure	2056	-398	-657
12	Rt. Rear Occ. Compartment	2386	407	-539
13	Engine Block	4284	62	-1047
14	Rear Above Axle	1304	0	-730

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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
 Test Date: 5/10/2019

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	Headliner	Curtain Airbag
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headrest, Headliner	Curtain Airbag, Headrest
Left Shoulder	Side Torso/Pelvis Airbag	Door Panel
Upper Torso	Side Torso/Pelvis Airbag	Door Panel, C-Pillar Trim
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	RR tire deflated after impact and tailgate unlatched at driver's side

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
Test Date: 5/10/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes		
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		3210
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		508
Actual Impact Point (Aft of Front Axle)	mm		510
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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
 Test Date: 5/10/2019

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	1363.7

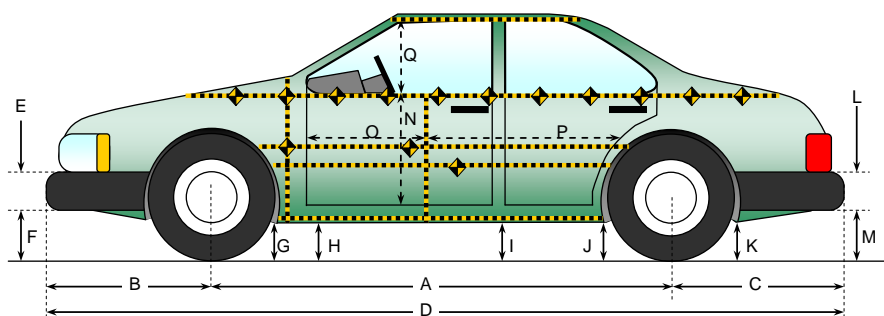
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.28
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.05
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.6
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.9
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.9

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
Test Date: 5/10/2019



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

LEFT SIDE VIEW

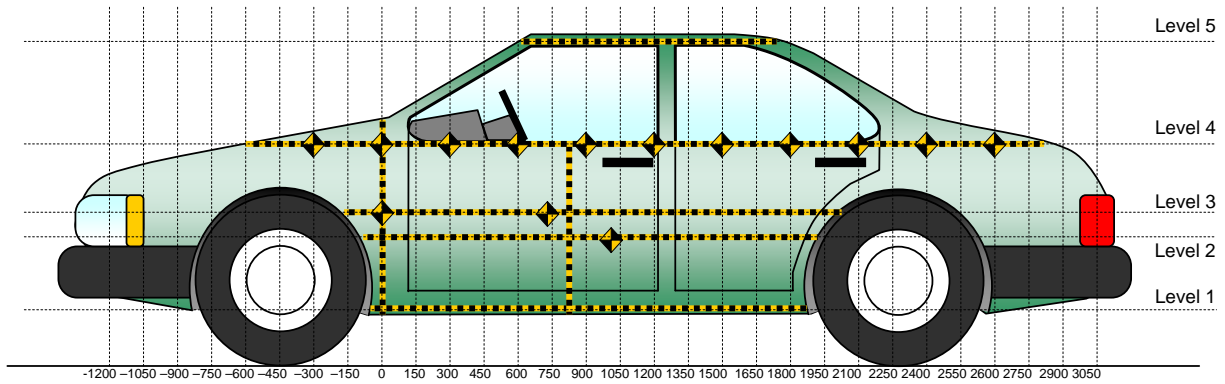
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3210	3193	17
B	Front Axle to FSOV	796	809	-13
C	Rear Axle to RSOV	1235	1198	37
D	Total Length at Centerline	5241	5200	41
E	Front Bumper Thickness	265	265	0
F	Front Bumper Bottom to Ground	348	354	-6
G	Sill Height at Front Wheel Well	309	298	11
H	Sill Height at Front Door Leading Edge	320	300	20
I	Sill Height at B Pillar	327	332	-5
J1	Sill Height at Rear Wheel Well	336	292	44
J2	Pinch Weld Height at Rear Wheel Well	331	303	28
K	Sill Height Aft of Rear Wheel Well	380	373	7
L	Rear Bumper Thickness	166	166	0
M	Rear Bumper Bottom to Ground	418	356	62
N	Sill Height to Window Bottom Sill	750	694	56
O	Front Door Leading Edge to Impact CL	750	726	24
P	Rear Door Trailing Edge to Impact CL	1235	1204	31
Q	Front Window Opening	502	512	-10
R	Right Side Length	4702	4770	-68
S	Left Side Length	4702	4586	116
T	Vehicle Width at B Post	1797	1699	98

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



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	442	289	1650
2	Mid Door	786	258	1350
3	Occupant H-Point	810	250	1350
4	Window Sill	1111	158	1350
5	Window Top	1644	150	2100

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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019

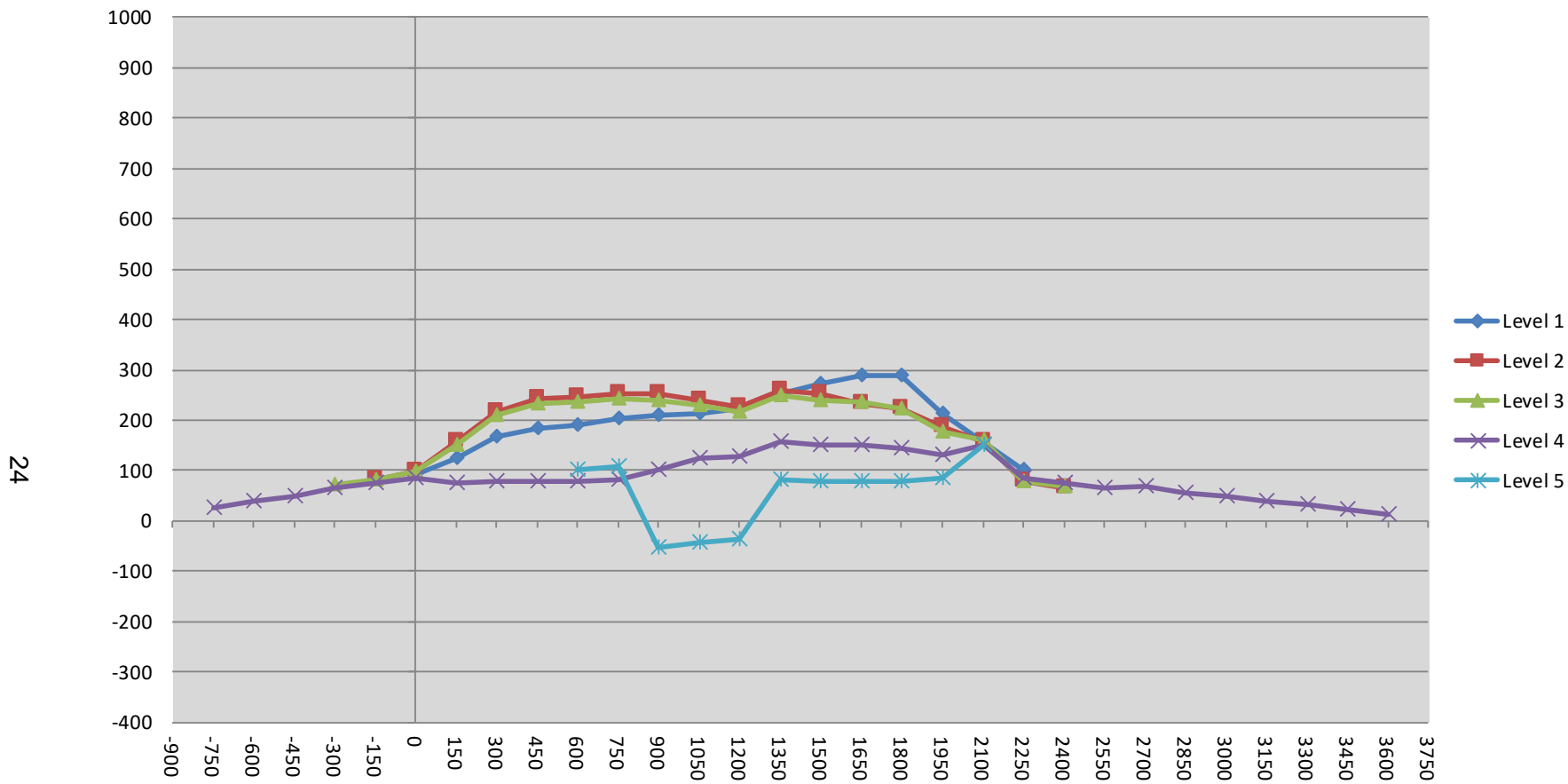
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750				335					360					25	
-600				300					338					38	
-450				283					332					49	
-300			176	271				249	335				73	64	
-150		185	191	264			267	273	340			82	82	76	
0	215	224	225	259		306	322	322	343		91	98	97	84	
150	265	222	223	254		390	378	375	329		125	156	152	75	
300	267	219	219	263		435	434	429	341		168	215	210	78	
450	265	217	217	259		447	460	451	337		182	243	234	78	
600	264	216	216	253	470	455	462	453	333	572	191	246	237	80	102
750	263	214	214	249	451	465	467	457	332	559	202	253	243	83	108
900	262	213	213	245	443	473	464	454	348	391	211	251	241	103	-52
1050	262	212	212	240	439	474	452	443	366	396	212	240	231	126	-43
1200	260	211	211	238	437	482	438	427	367	400	222	227	216	129	-37
1350	261	212	212	238	435	515	470	462	396	518	254	258	250	158	83
1500	260	212	212	239	435	533	463	453	391	515	273	251	241	152	80
1650	261	213	213	239	434	550	447	450	389	514	289	234	237	150	80
1800	263	214	214	239	436	552	437	437	382	515	289	223	223	143	79
1950	266	215	214	240	436	479	402	392	372	520	213	187	178	132	84
2100		215	215	241	442		372	376	393	592		157	161	152	150
2250	217	205	209	255		317	284	289	339		100	79	80	84	
2400		176	177	254			241	246	329			65	69	75	
2550				253					319					66	
2700				252					321					69	
2850				253					310					57	
3000				253					303					50	
3150				254					294					40	
3300				256					287					31	
3450				258					280					22	
3600				261					274					13	
3750															
3900															

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 Nissan Frontier SL Crew Cab Truck
Test Program: NCAP Side MDB Impact Test

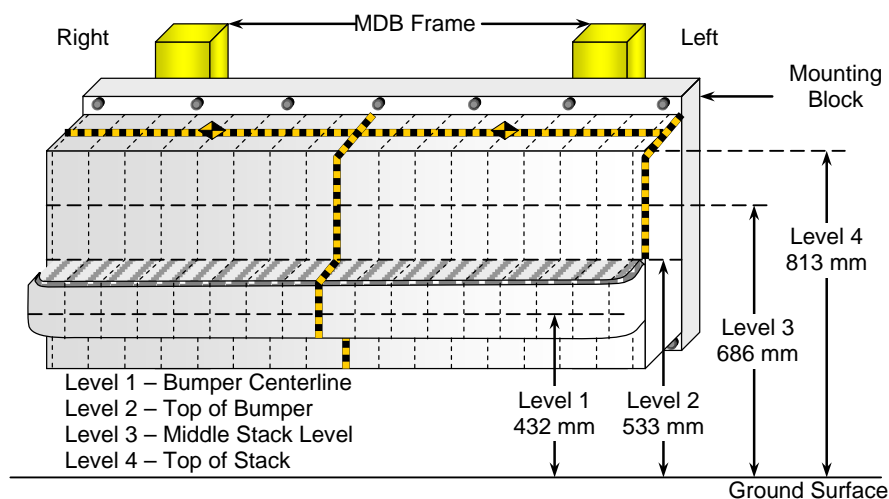
NHTSA No. O20195203
Test Date: 5/10/2019



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



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	188
B	Top of Bumper	533	800	Left	183
C	Mid-Level	686	800	Left	125
D	Top of Stack	813	800	Right	167

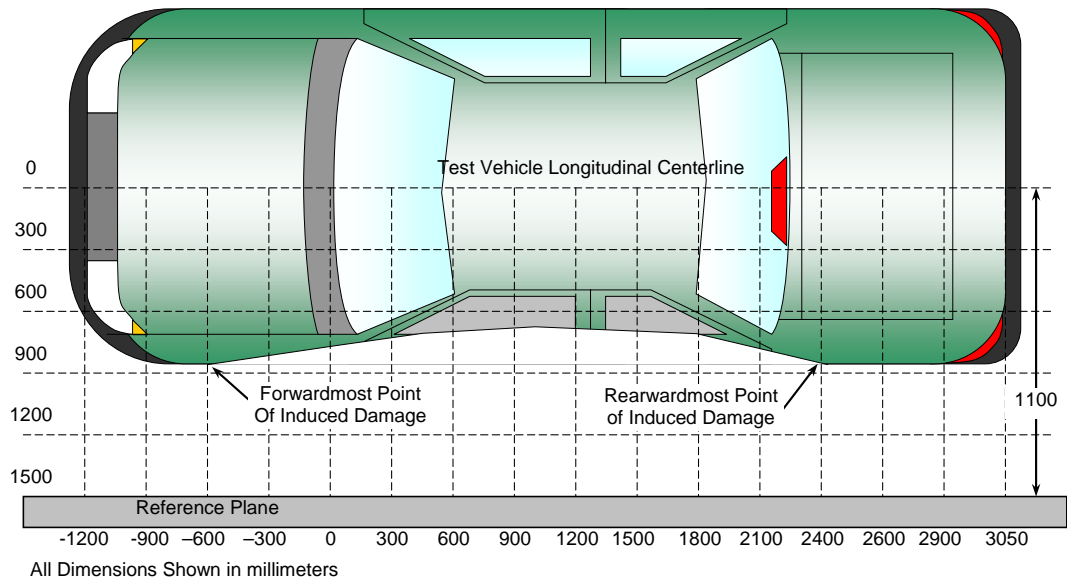
DEFORMABLE BARRIER STATIC CRUSH

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	167	119	109	85	90	121	127	110	85	73	66	68	71	74	80	104	140
3	103	65	58	64	75	110	107	87	75	68	63	61	61	66	84	85	125
2	101	109	116	124	128	133	105	103	99	99	112	140	142	153	160	164	183
1	99	108	113	118	126	131	135	141	143	143	148	153	158	163	170	180	188

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. Q20195203
 Test Date: 5/10/2019



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2070	3	373	215	158
2	1674	3	446	213	233
3	1278	3	437	212	225
4	882	3	461	213	248
5	486	3	458	217	241
6	90	3	345	224	121

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	575	476	99
2	480 mm right of center	1	585	463	122
3	160 mm right of center	1	600	463	137
4	160 mm left of center	1	606	463	143
5	480 mm left of center	1	630	463	167
6	800 mm left of center	1	664	476	188

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

Test Vehicle: 2019 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

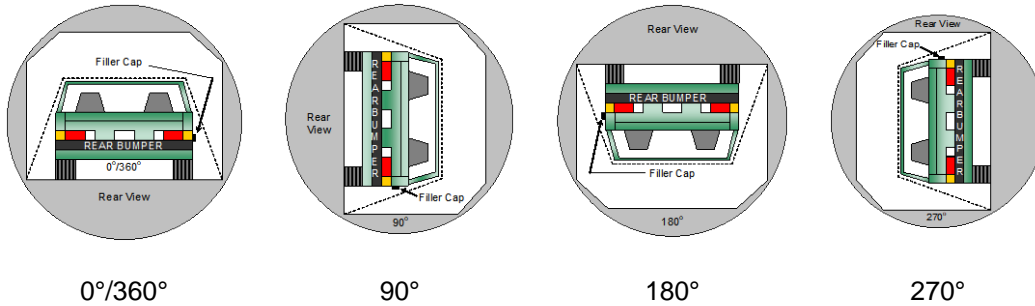
NHTSA No. O20195203
 Test Date: 5/10/2019

Test Time: 11:46 am

Temperature: 22.1 °C

- A. From impact until vehicle motion ceases: 0.0
 (Maximum Allowable = 1 ounce) oz.
- 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°	111	300	411
90° to 180°	110	300	410
180° to 270°	108	300	408
270° to 360°	110	300	410

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	

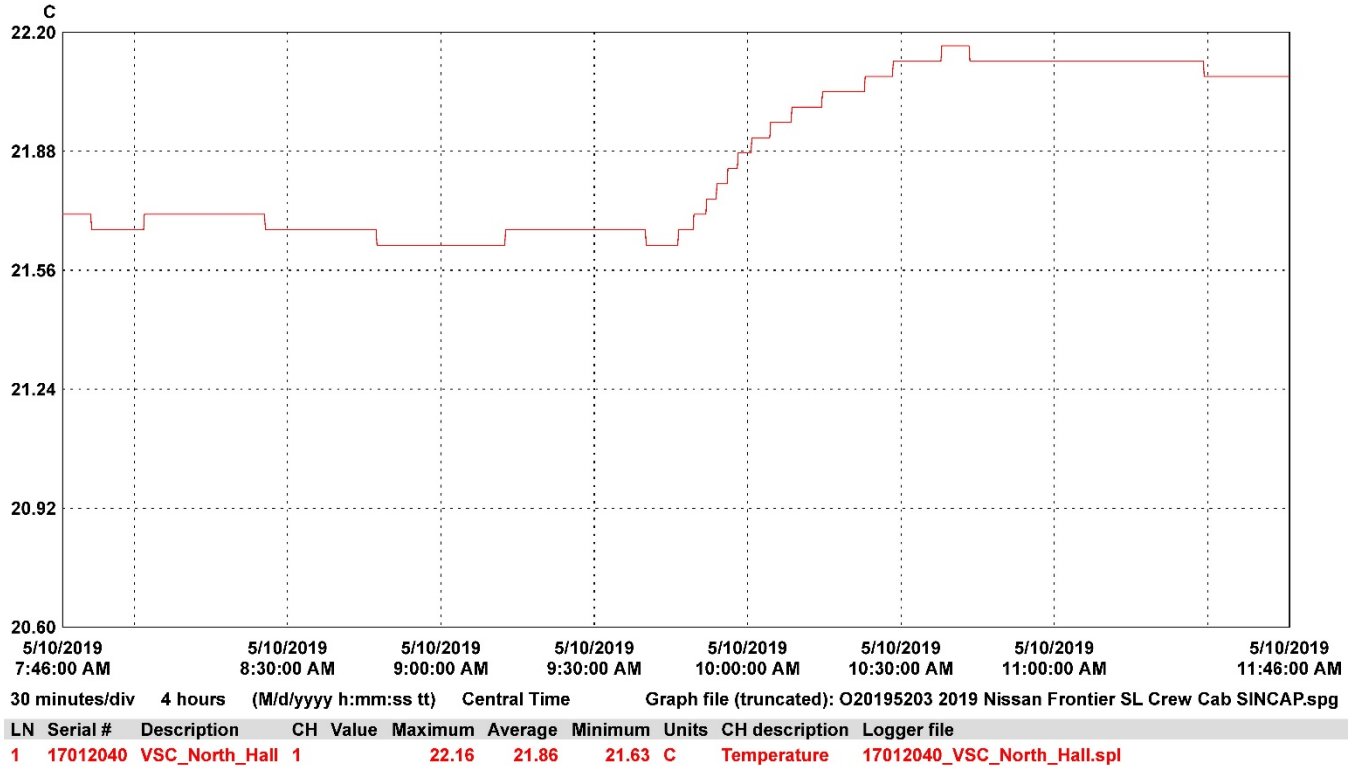
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Nissan Frontier SL Crew Cab Truck
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195203
 Test Date: 5/10/2019



**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

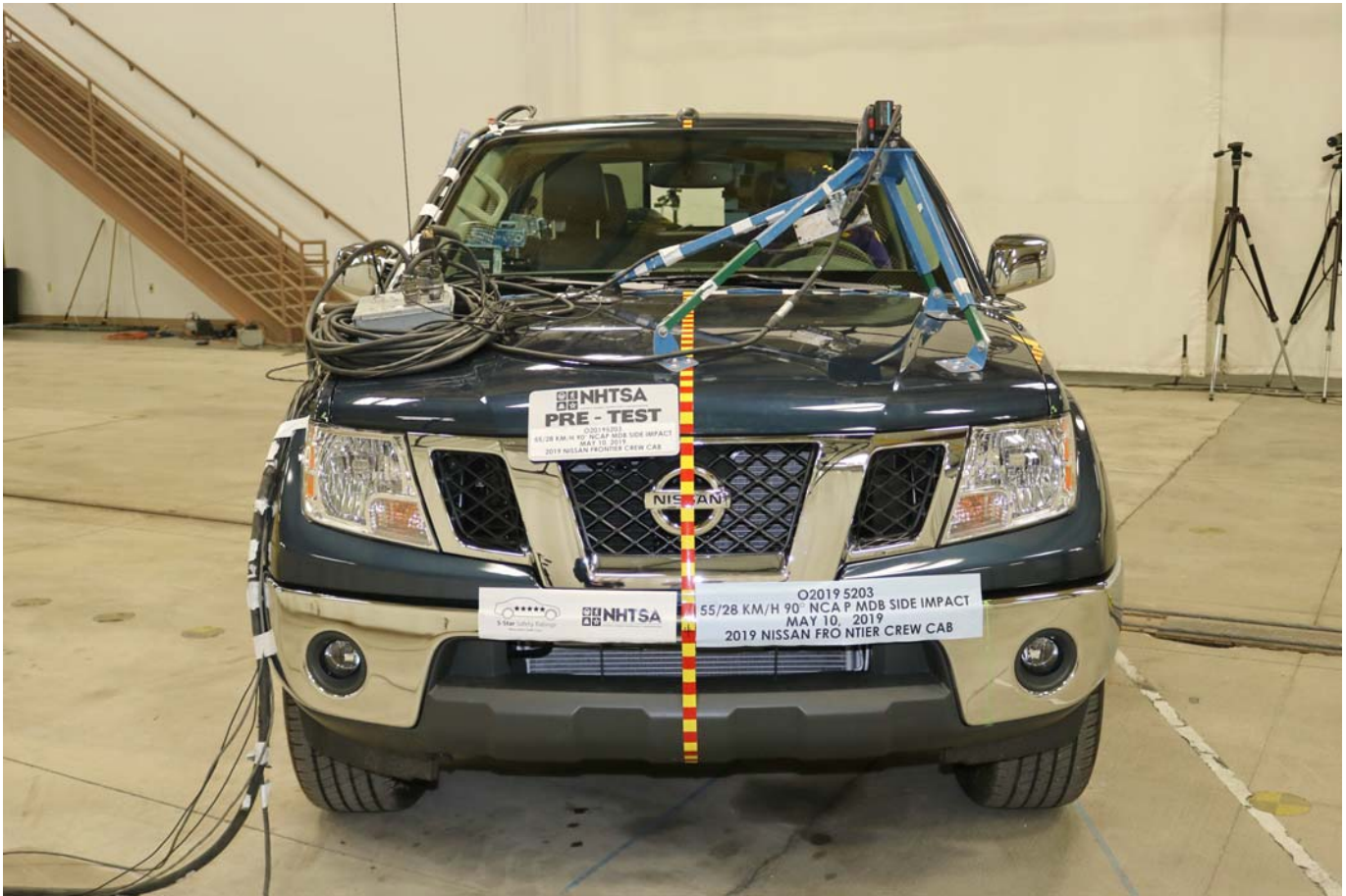


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

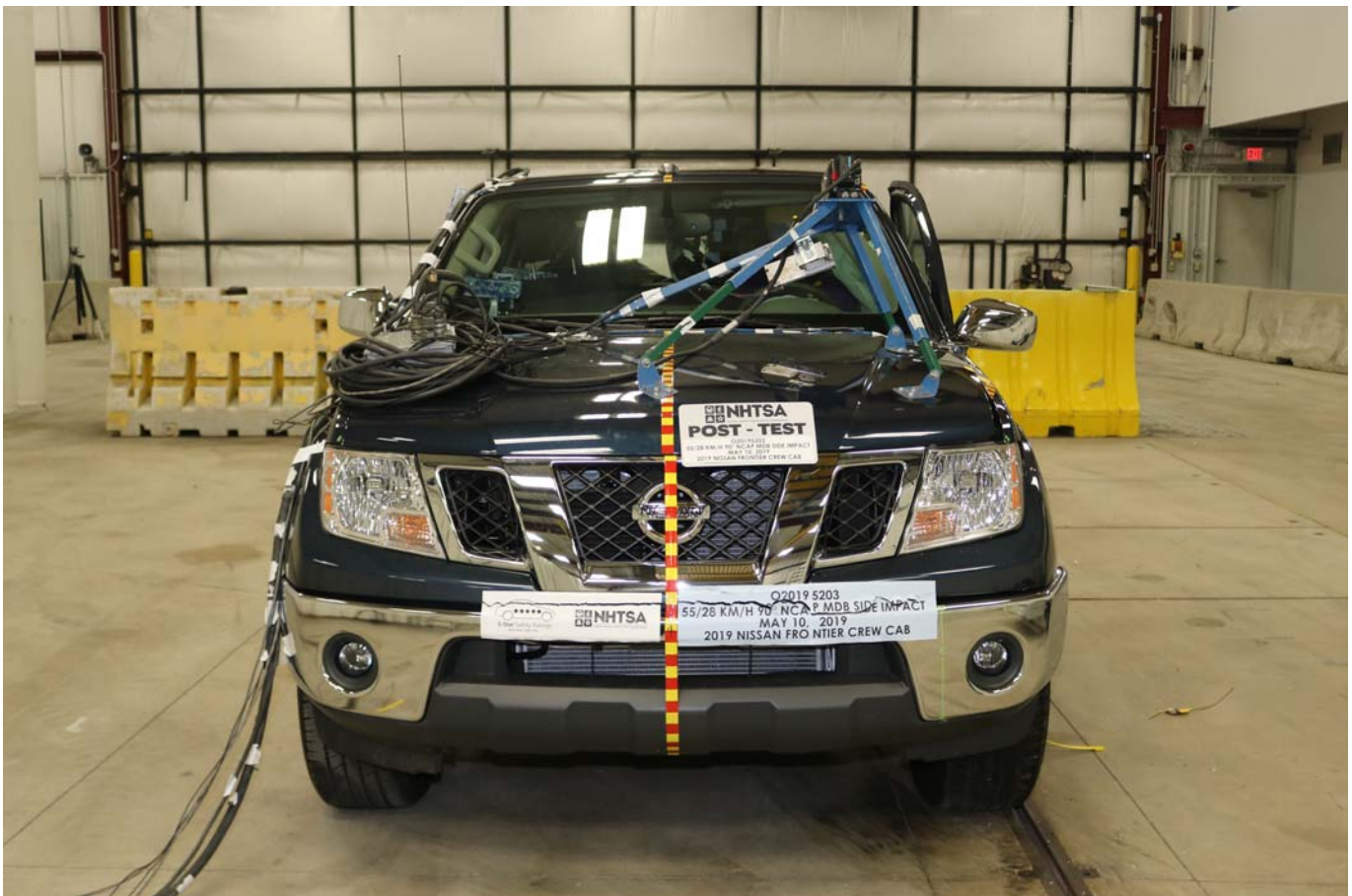


Photo No. 004 - Post-Test Frontal View of Test Vehicle



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

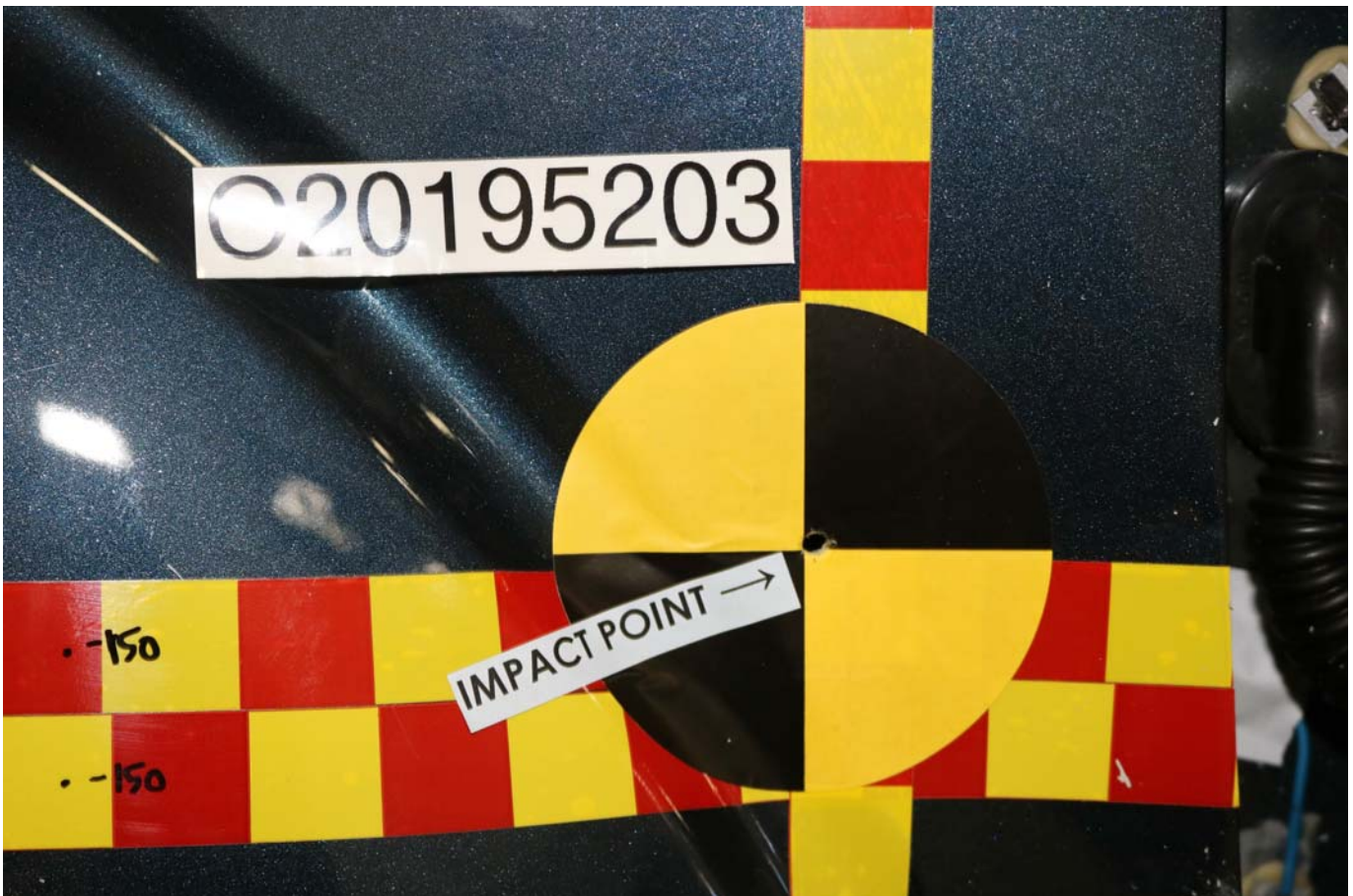


Photo No. 020 - Post-Test Close-Up View of Impact Point Target



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

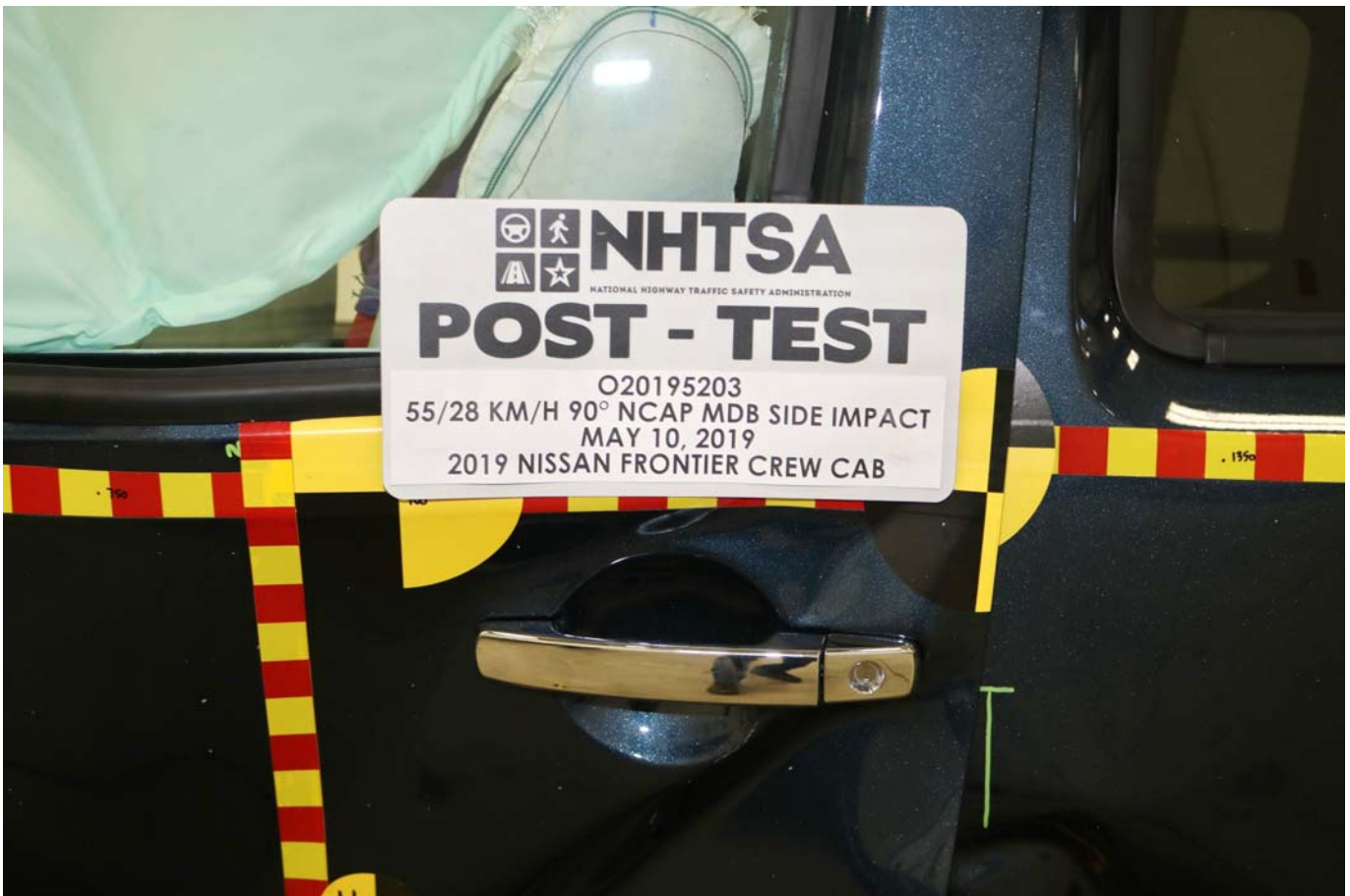


Photo No. 022 - Post-Test Left Front Door Latch Close-Up



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



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



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



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

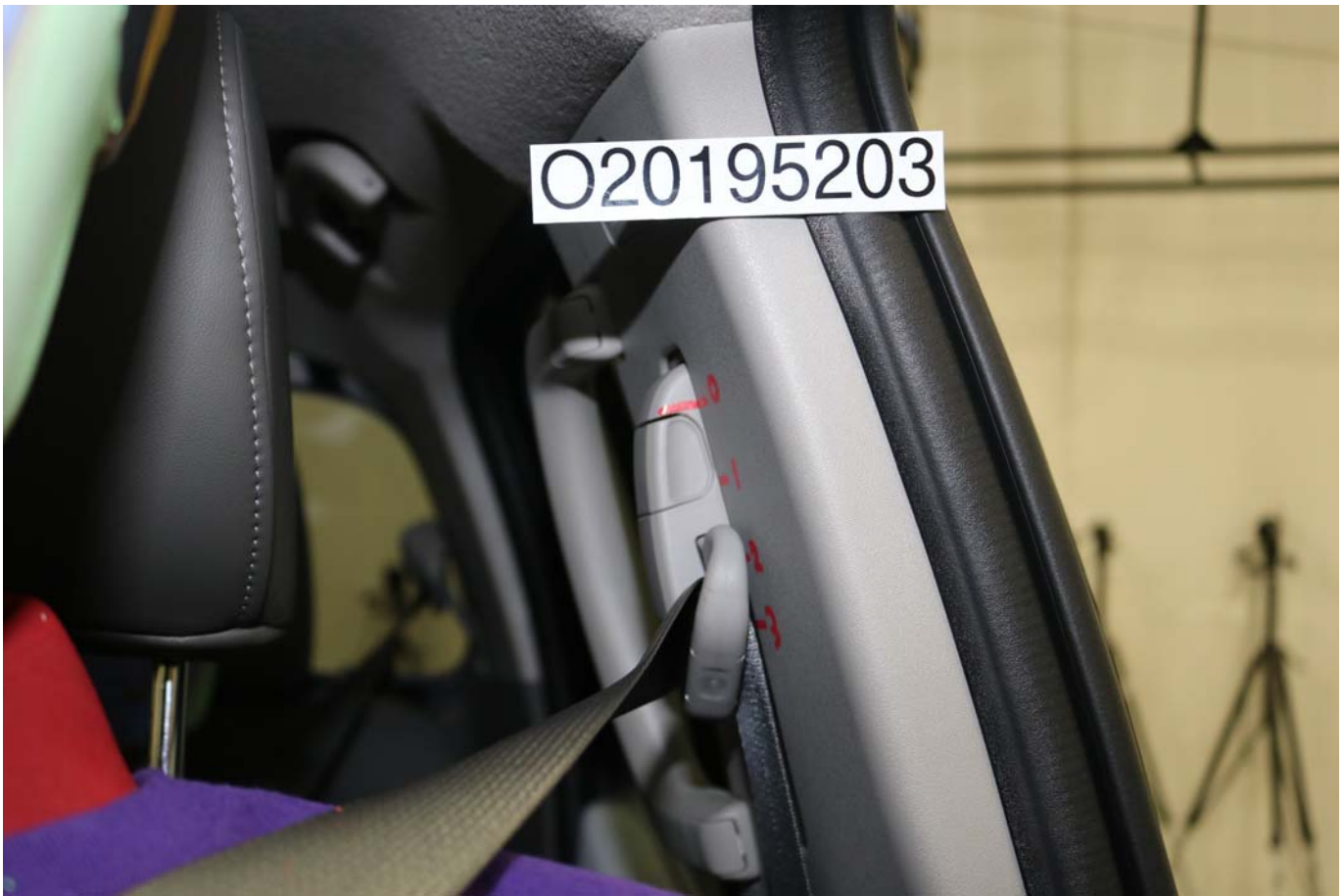


Photo No. 035 - Pre-Test View of Belt Anchorage for Driver Dummy



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. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track



Photo No. 040 - Pre-Test Close-Up Left Side View of Driver Seat Back



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

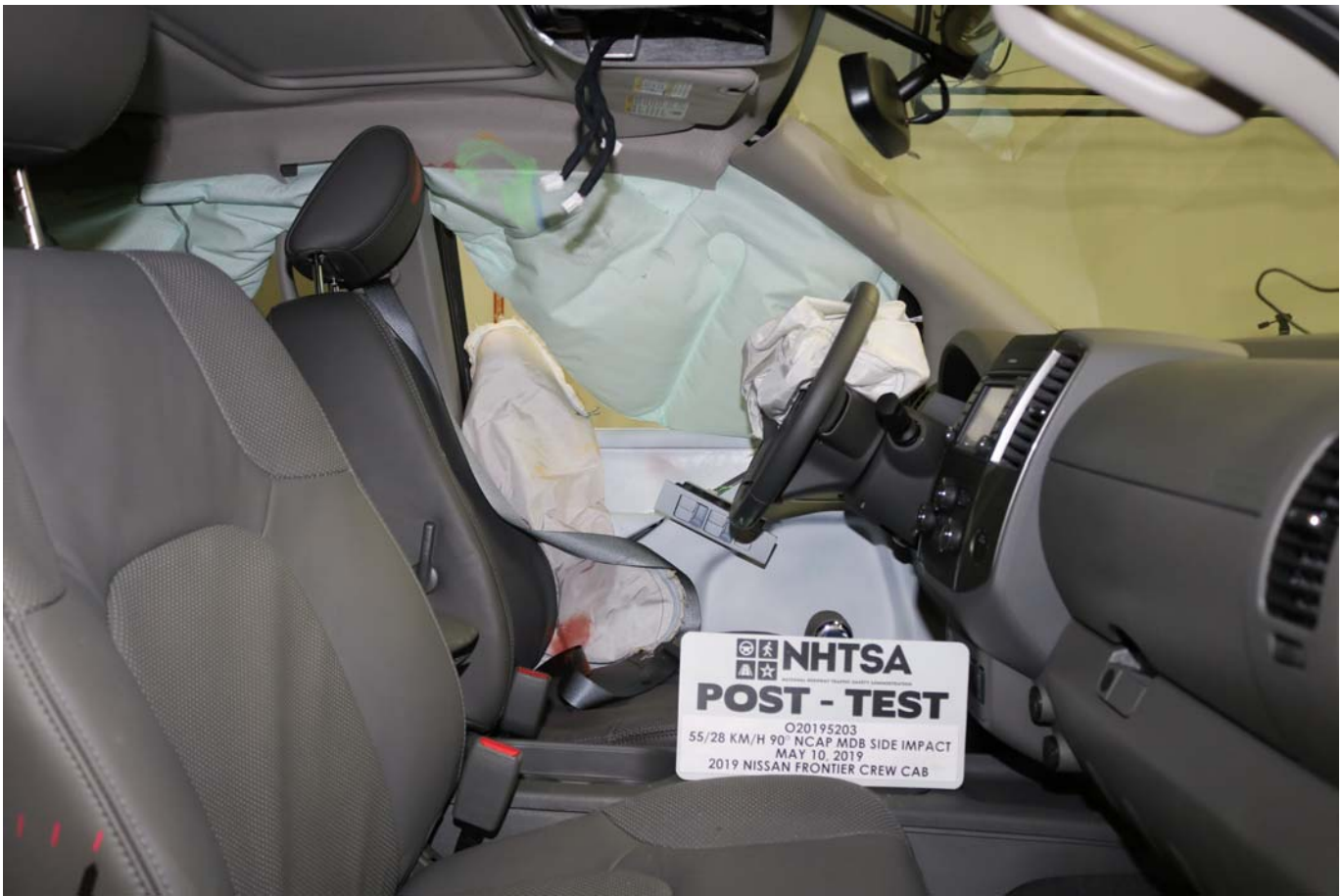


Photo No. 047 - Post-Test Driver Inner Door Panel View



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

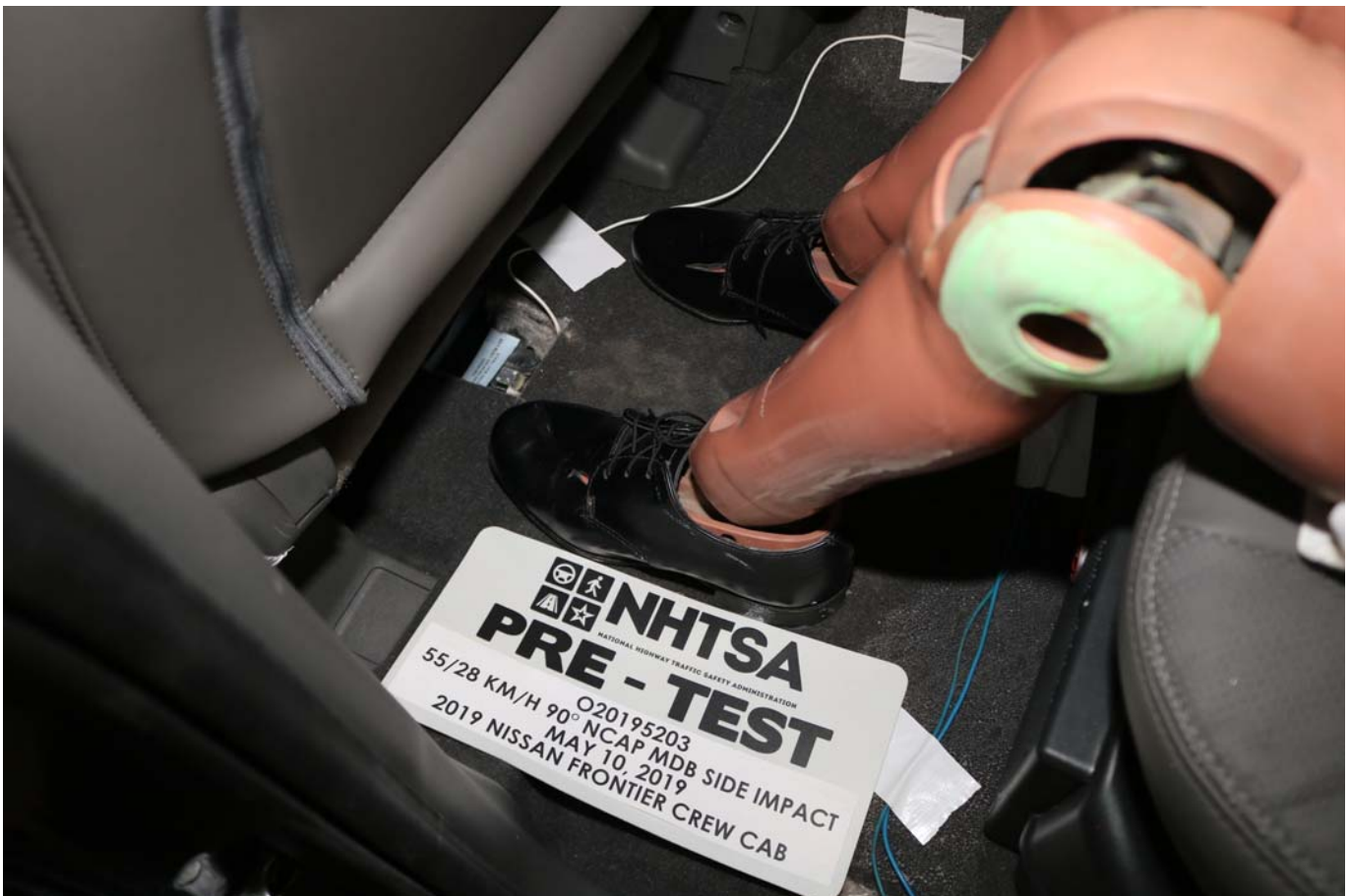


Photo No. 064 - Pre-Test Placement of Rear Passenger Dummy Feet



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

PHOTOGRAPH NOT APPLICABLE

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

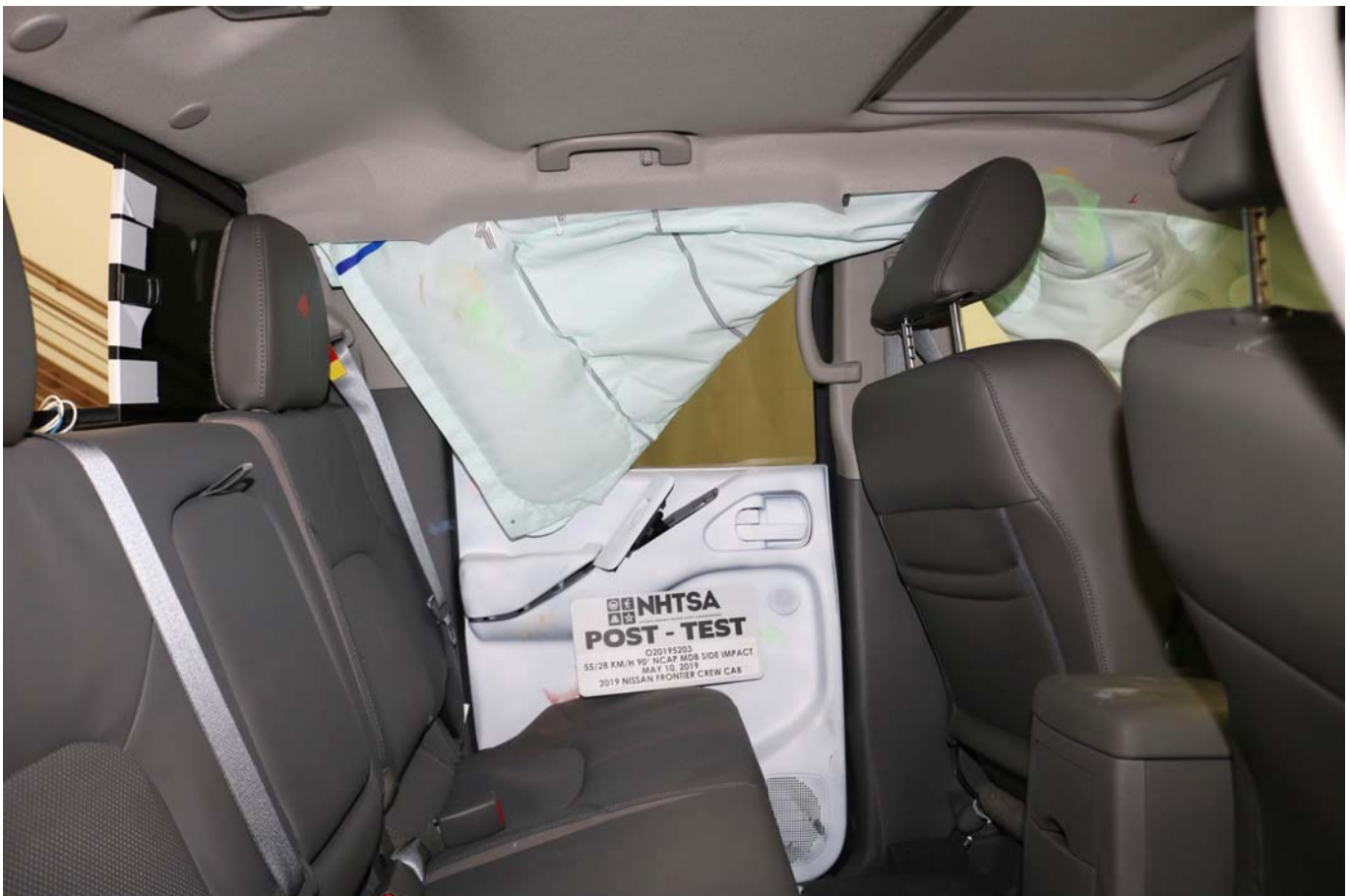


Photo No. 074 - Post-Test Rear Passenger Inner Door Panel View



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

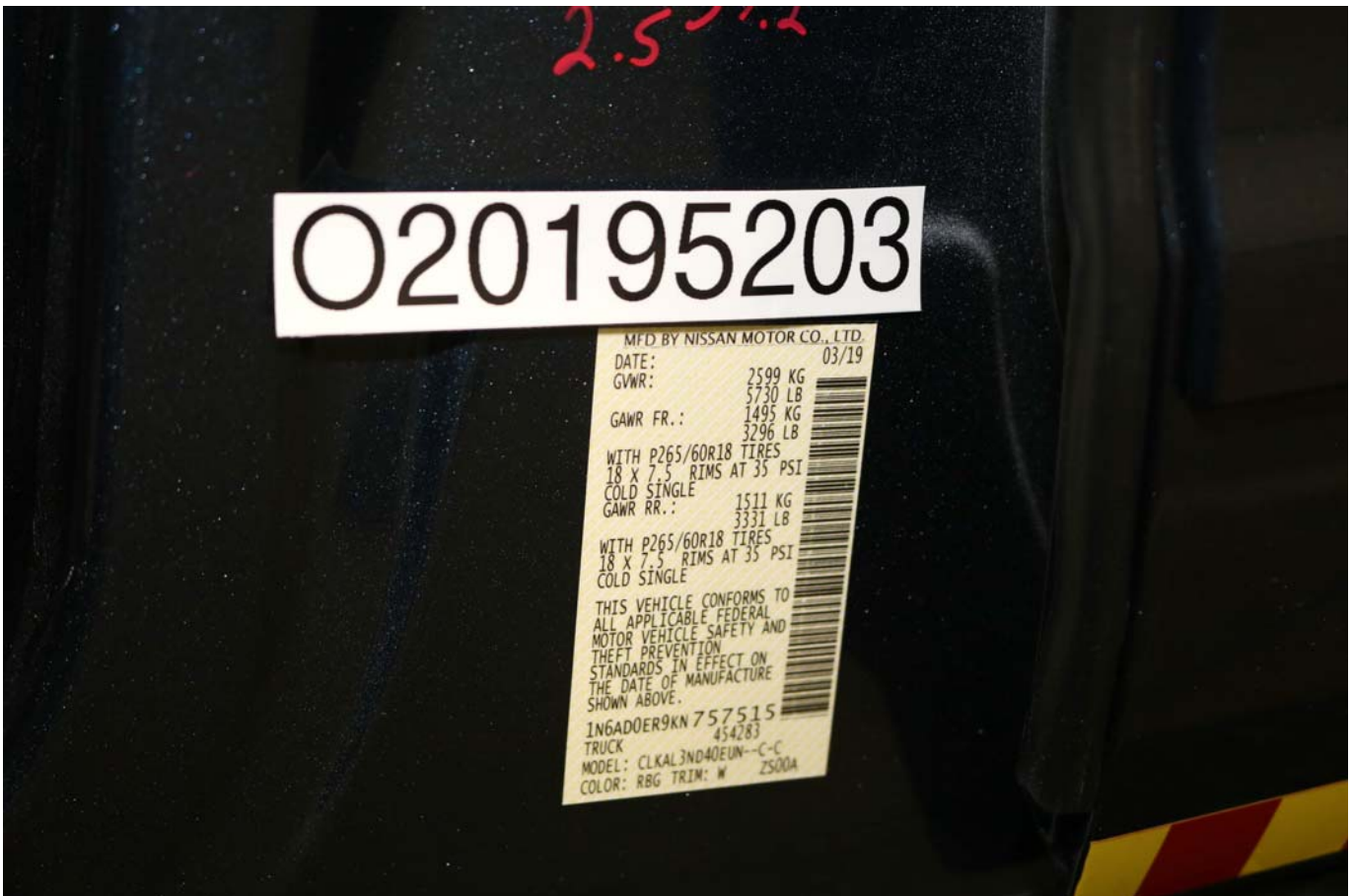


Photo No. 092 - Close-Up View of Vehicle Certification Label



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

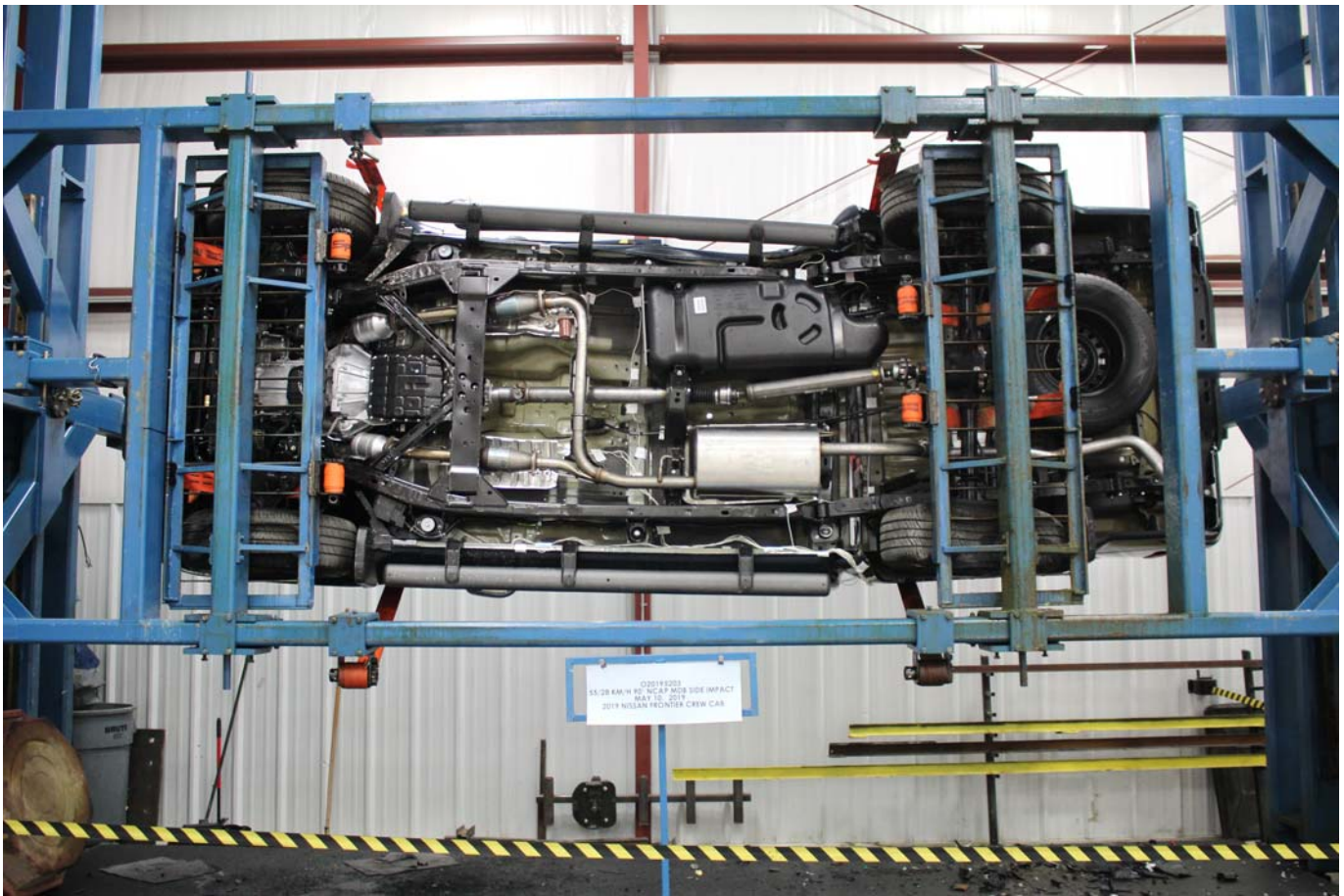


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees



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

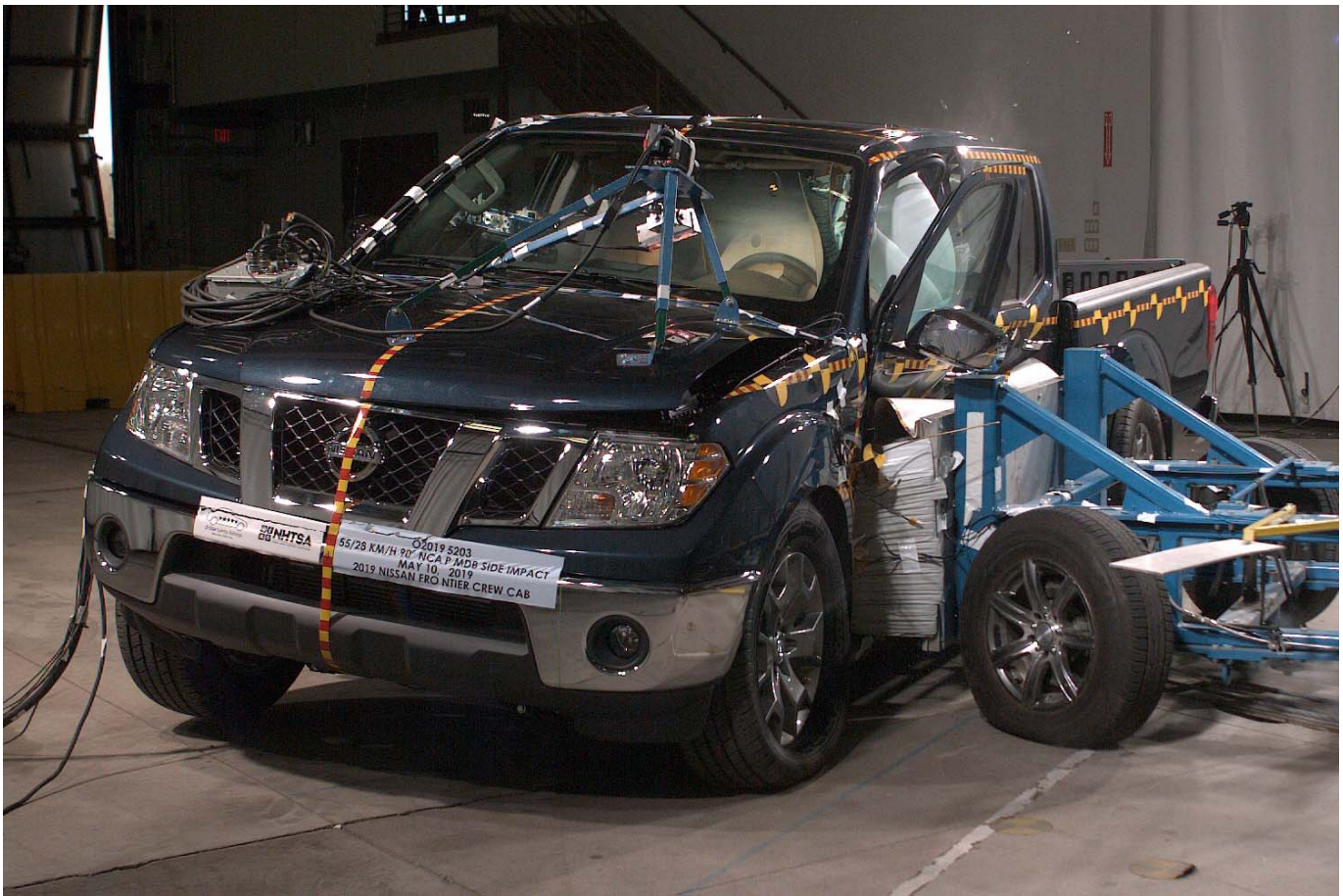




Photo No. 101 - Impact Event



2019 NISSAN FRONTIER

SL CREW CAB SWB

4X2 AUTOMATIC V6



MECHANICAL & PERFORMANCE

- 4.0-Liter DOHC V6 Engine
- 261 Horsepower and 281 lb-ft of Torque
- 5-Speed Automatic Transmission
- 4-Wheel Ventilated Disc Brakes
- 2-Wheel Active Brake Limited Slip (ABLS)
- 18" Alloy Wheels
- P265/60R18 All-Season Tires

SAFETY & SECURITY

- Driver & Front Passenger, Side-Impact, & Curtain Air Bags
- Front-Seat Active Head Restraints
- Lower Anchors & Tethers for Children (LATCH)
- Pipe-Style Steel Side-Door Guard Beams
- 4-Wheel Anti-Lock Braking System (ABS)
- Electronic Brake Force Distribution (EBD)
- Vehicle Dynamic Control (VDC)
- Tire Pressure Monitoring System (TPMS)
- Vehicle Security System (VSS)
- Nissan Vehicle Immobilizer System

COMFORT & CONVENIENCE

- 8-Way Power Driver Seat
- 4-Way Power Front Passenger Seat
- Leather-Appointed Seats
- Heated Front Seats
- 60/40 Split Fold-Down Rear Seat
- Rear-Seat Fold-Down Center Armrest
- Leather-wrapped Steering Wheel
- Leather-wrapped Shift Knob
- Cruise Control
- Rockford Fosgate® Premium Audio System with AM/FM/1CD Aux Input and 10 Speakers including Subwoofers
- NissanConnect™ with Navigation and Mobile Apps**
- 5.8" Color Touch-Screen Display
- Nissan Voice Recognition for NavI and Audio
- SiriusXM NavTraffic
- SiriusXM Travel Link
- SiriusXM Satellite Radio**
- USB Connection Port w/ iPod® Connectivity
- Bluetooth® Hands-free Phone System**
- Siri® Eyes Free**
- Rear Sonar
- Rear-View Monitor
- Power Door Locks
- Power Windows w/driver auto down
- Dual Zone Automatic Temperature Control
- Sun Visors with Illuminated Vanity Mirrors
- Rear Under-Seat Storage Bin

Manufacturer's Suggested Retail Base Price: \$34,010.00

Options Included by Manufacturer

- SPLASH GUARDS 210.00
- FLOOR MATS 155.00

DESTINATION CHARGES: 1,045.00

Total* \$35,420.00

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy

19 MPG combined city/hwy

16 city 23 highway

5.3 gallons per 100 miles

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

Annual fuel cost \$2,000

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

3 (Best) 10 (Worst)

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. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

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

Frontal Crash	Driver Passenger	★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover		★★★
Based on the risk of rollover in a single-vehicle crash.		

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

This Vehicle qualifies for Nissan's **Security+Plus Extended Protection Plan**

The only service agreement backed by Nissan Extended Services North America! Ask your dealer for details, or call 1-800-NISSAN-1 for more information

DELIVERY

VEHICLE COLORS: EXT:ARCTIC BLUE MET INT: STEEL

FINAL ASSEMBLY POINT: CANTON

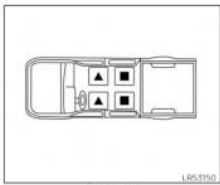
TRANSPORT METHOD: TRUCK

DEALER: NEWTON NISSAN OF GALLATIN 14611 NASHVILLE PIKE GALLATIN TN 37066

VIN: 1N6AD0ER9KN757515
 EMS:50 STATE EMISSIONS
 MDL:32719-757515 RBG-W
 OPT: (L-R)01 02C9568A

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

Photo No. 102 - Monroney Label



King Cab®

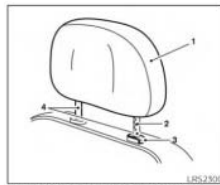
The illustration shows the seating positions equipped with head restraints/headrests.

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

■ Indicates the seating position is equipped with a headrest.

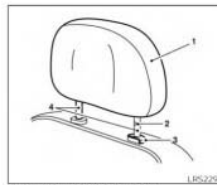
• Indicates the seating position is not equipped with a head restraint or headrest (if applicable).

- Your vehicle is equipped with a head restraint/headrest that may be integrated, adjustable or non-adjustable.
- Adjustable head restraints/headrests have multiple notches along the stalk(s) to lock them in a desired adjustment position.
- The non-adjustable head restraints/headrests have a single locking notch to secure them to the seat frame.
- Proper Adjustment:
 - For the adjustable type, align the head restraint/headrest so the center of your ear is approximately level with the center of the head restraint/headrest.
 - If your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.
- If the head restraint/headrest has been removed, ensure that it is reinstalled and locked in place before riding in that designated seating position.



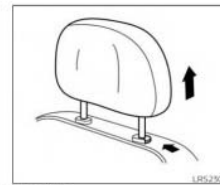
ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

1. Removable head restraint/headrest.
2. Multiple notches.
3. Lock knob.
4. Stalks.



NON-ADJUSTABLE HEAD RESTRAINT/HEADREST COMPONENTS

1. Removable head restraint/headrest.
2. Single notch.
3. Lock knob.
4. Stalks.



REMOVE

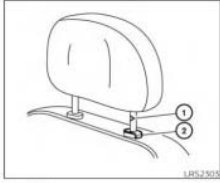
Use the following procedure to remove the head restraint/headrest:

1. Pull the head restraint/headrest up to the highest position.
2. Push and hold the lock knob.
3. Remove the head restraint/headrest from the seat.
4. Store the head restraint/headrest properly in a secure place so it is not loose in the vehicle.

5. Reinstall and properly adjust the head restraint/headrest before an occupant uses the seating position.

Safety—Seats, seat belts and supplemental restraint system 1-11

1-12 Safety—Seats, seat belts and supplemental restraint system



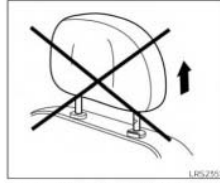
INSTALL

1. Align the head restraint/headrest stalks with the holes in the seat. Make sure that the head restraint/headrest is facing the correct direction. The stalk with the notch (notches) ① must be installed in the hole with the lock knob ②.
2. Push and hold the lock knob and push the head restraint/headrest down.
3. Properly adjust the head restraint/headrest before an occupant uses the seating position.



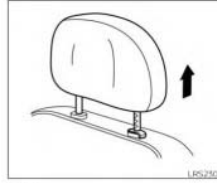
ADJUST

For adjustable head restraint/headrest
Adjust the head restraint/headrest so the center is level with the center of your ears if your ear position is still higher than the recommended alignment, place the head restraint/headrest at the highest position.



For non-adjustable head restraint/headrest

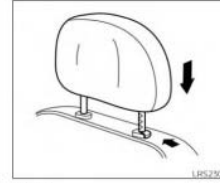
Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.



Raise

To raise the head restraint/headrest, pull it up.

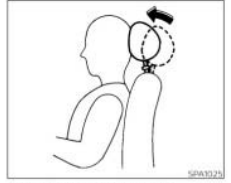
Make sure the head restraint/headrest is positioned so the lock knob is engaged in the notch before riding in that designated seating position.



Lower

To lower, push and hold the lock knob and push the head restraint/headrest down.

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



FRONT-SEAT ACTIVE HEAD RESTRAINTS

WARNING

- Always adjust the head restraints properly as specified in this section. Failure to do so can reduce the effectiveness of the active head restraint.
- Active head restraints are designed to supplement other safety systems. Always wear seat belts. No system can prevent all injuries in any accident.

Safety—Seats, seat belts and supplemental restraint system 1-13

1-14 Safety—Seats, seat belts and supplemental restraint system

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

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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
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Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
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Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
Figure No. 14.	Passenger Head Acceleration (X) Primary vs. Time	B-5
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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)

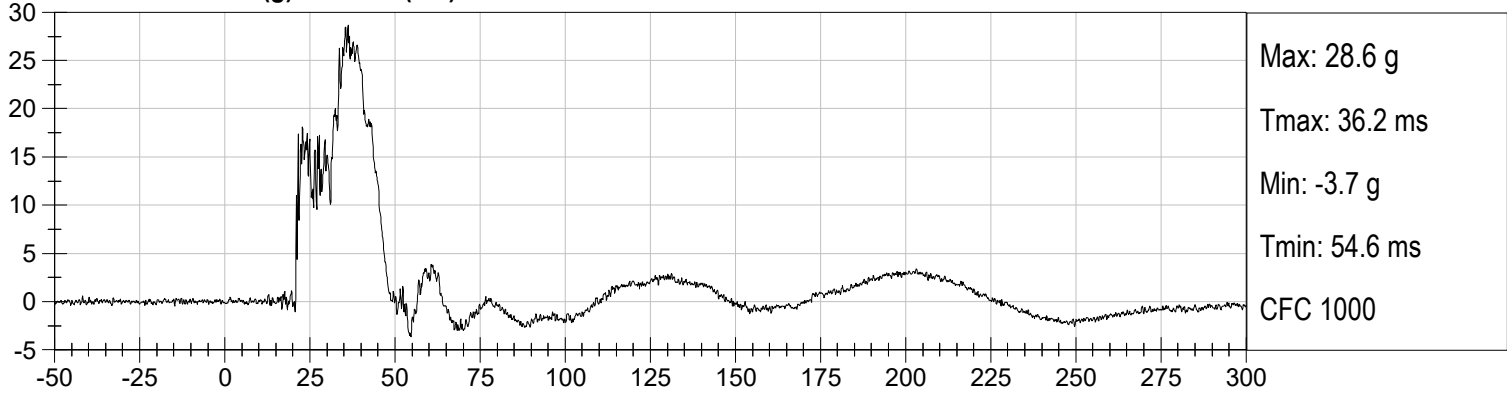
Left MDB Contact Switch

Right MDB Contact Switch

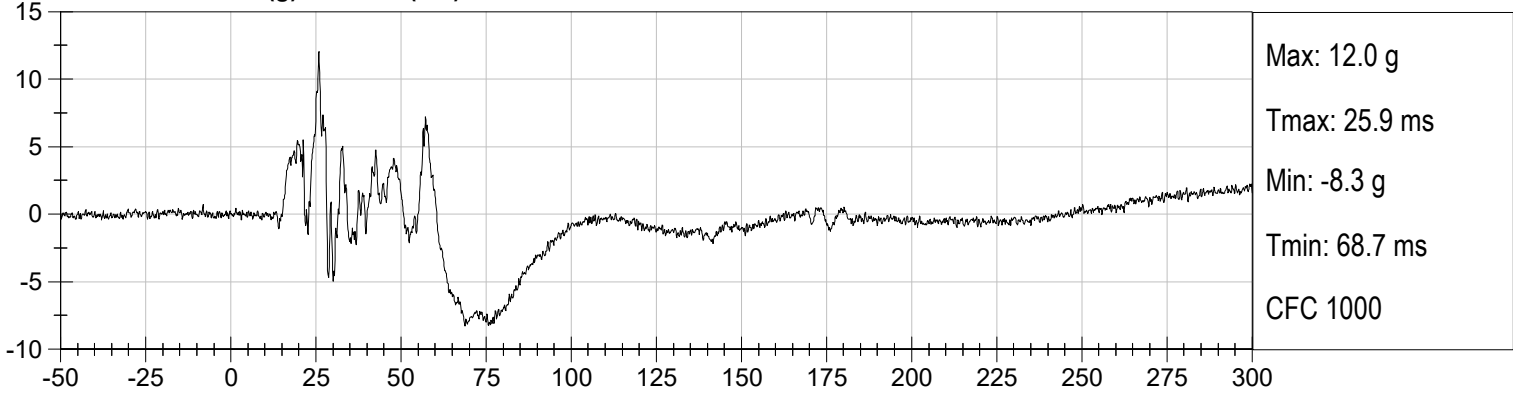
DRIVER HEAD X (g) vs Time (ms)



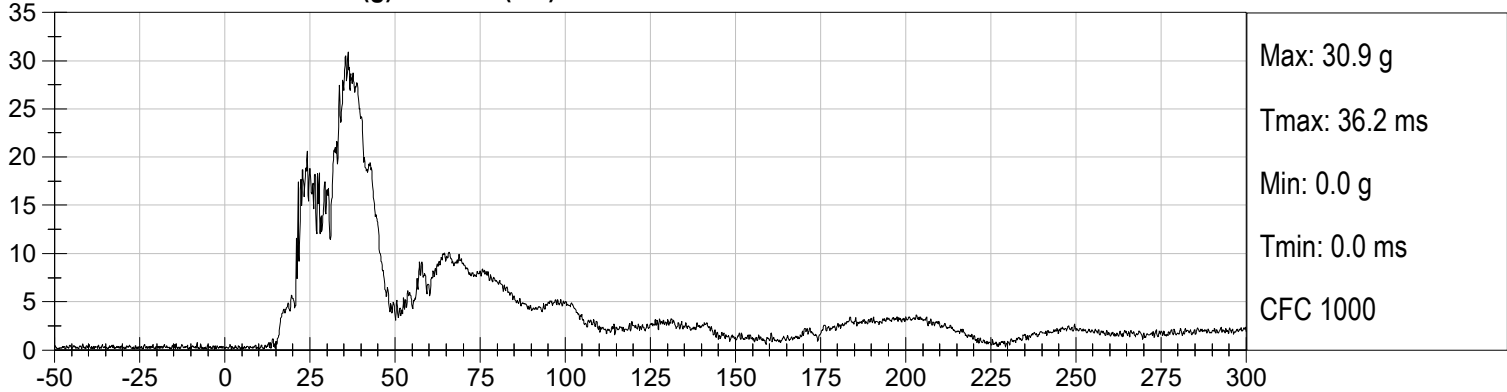
DRIVER HEAD Y (g) vs Time (ms)



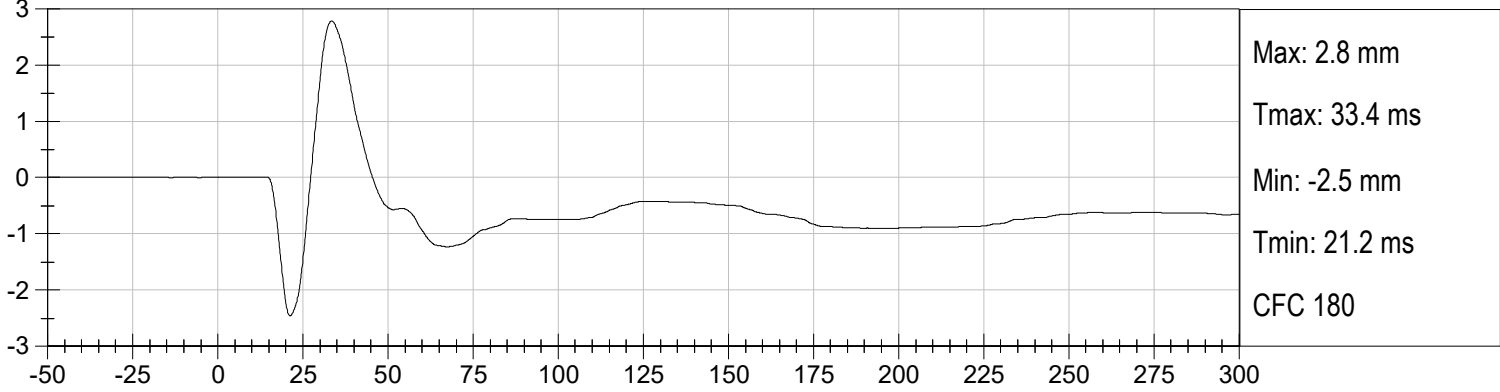
DRIVER HEAD Z (g) vs Time (ms)



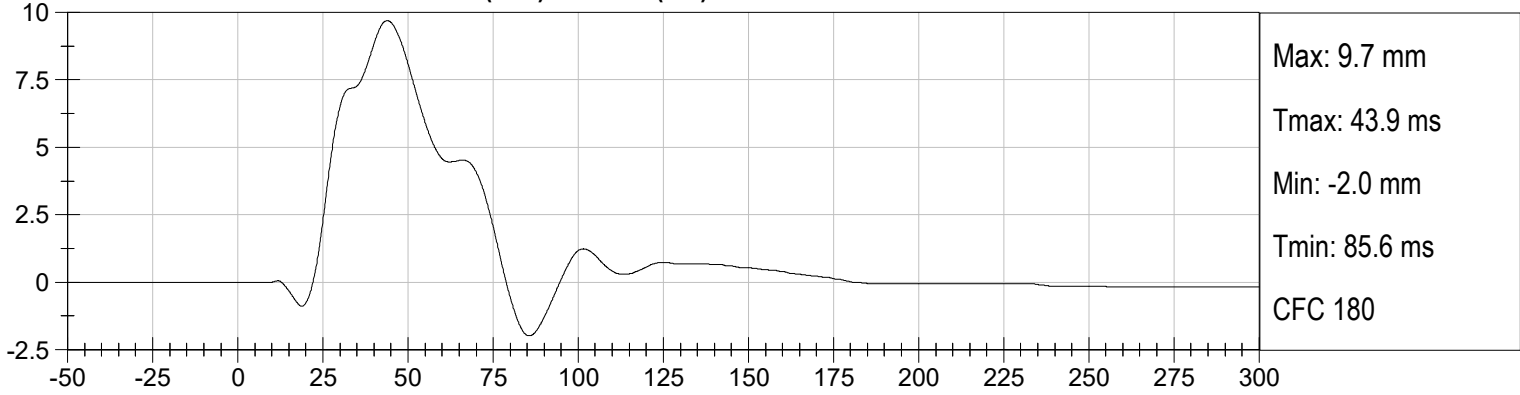
DRIVER HEAD Resultant (g) vs Time (ms)



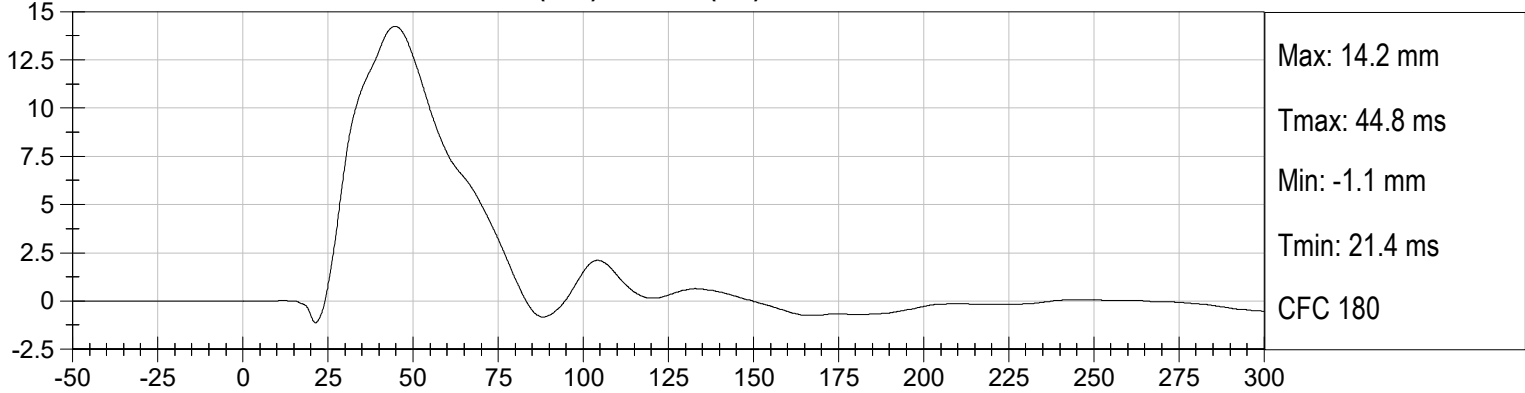
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



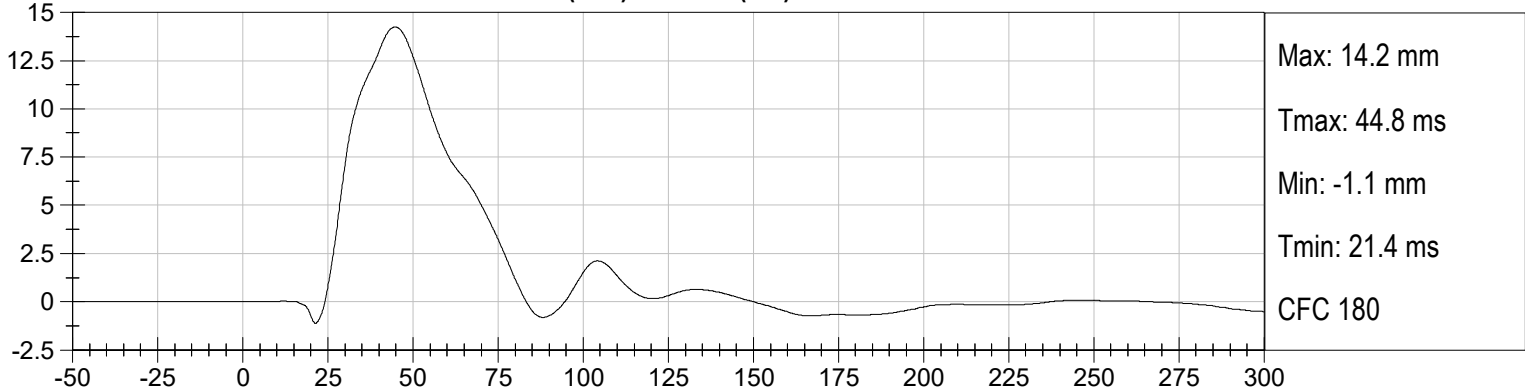
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



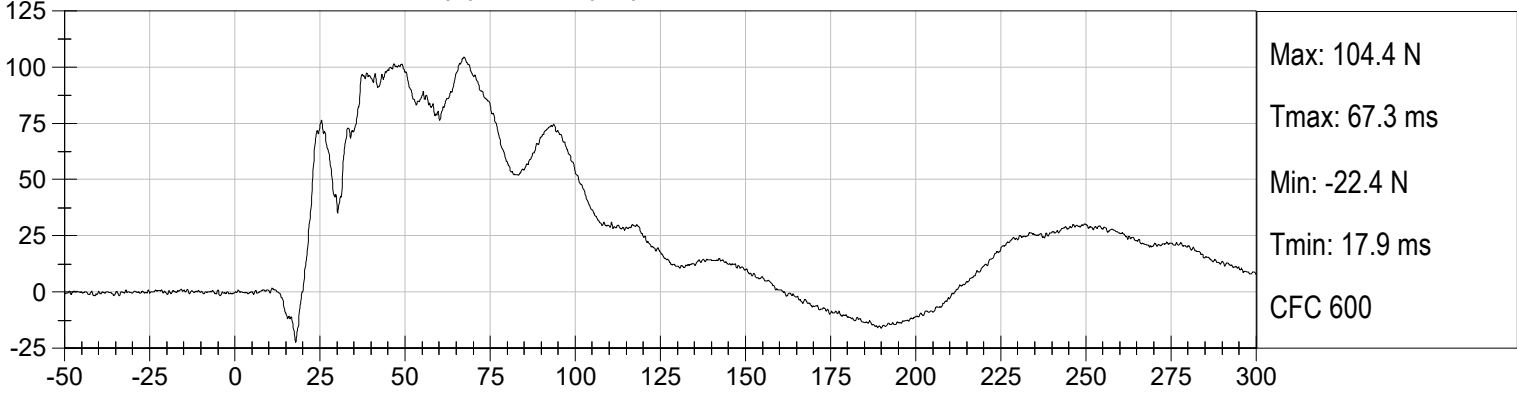
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



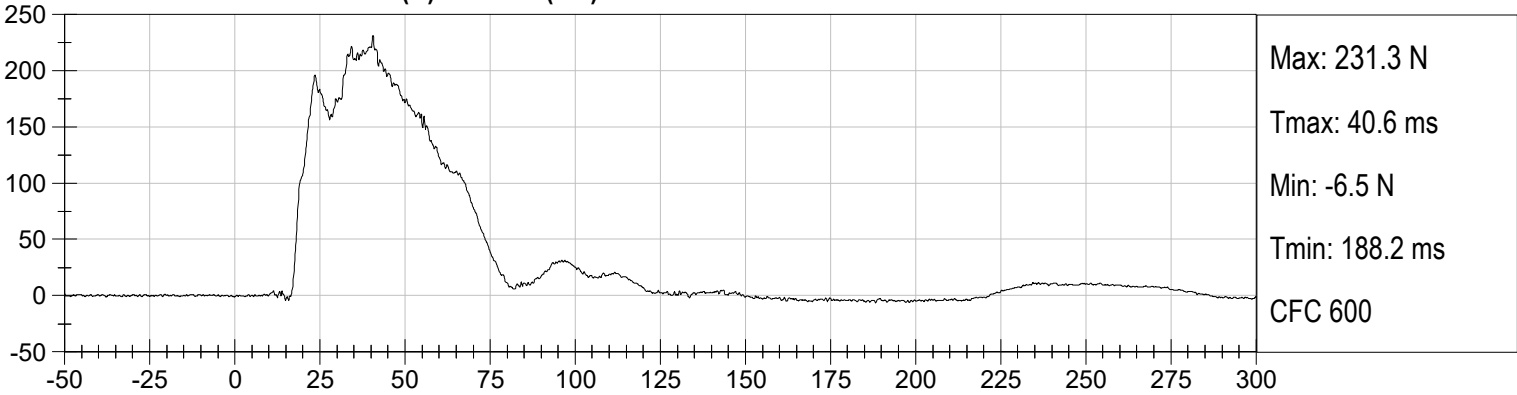
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



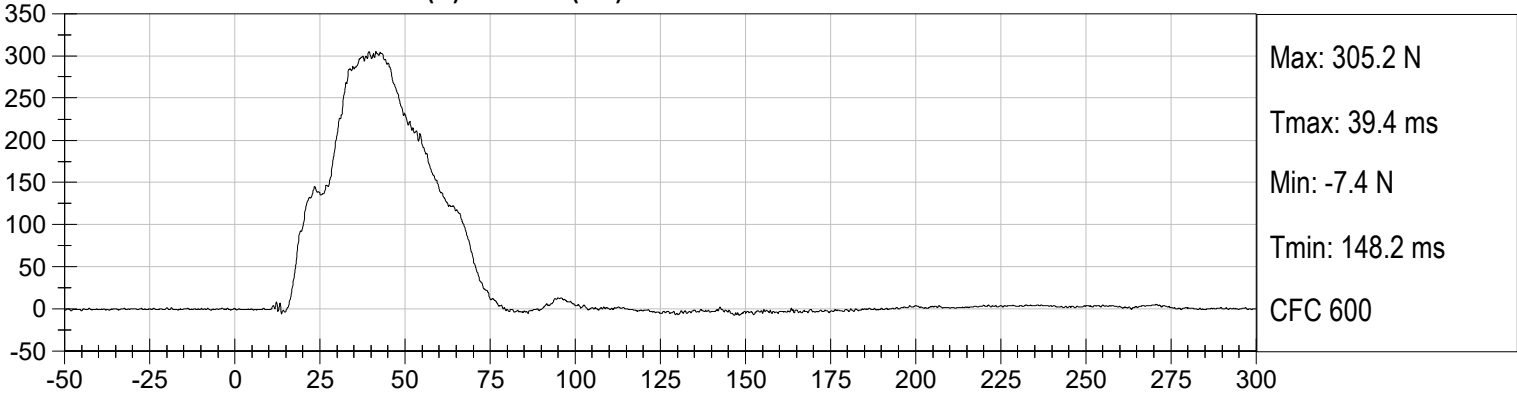
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



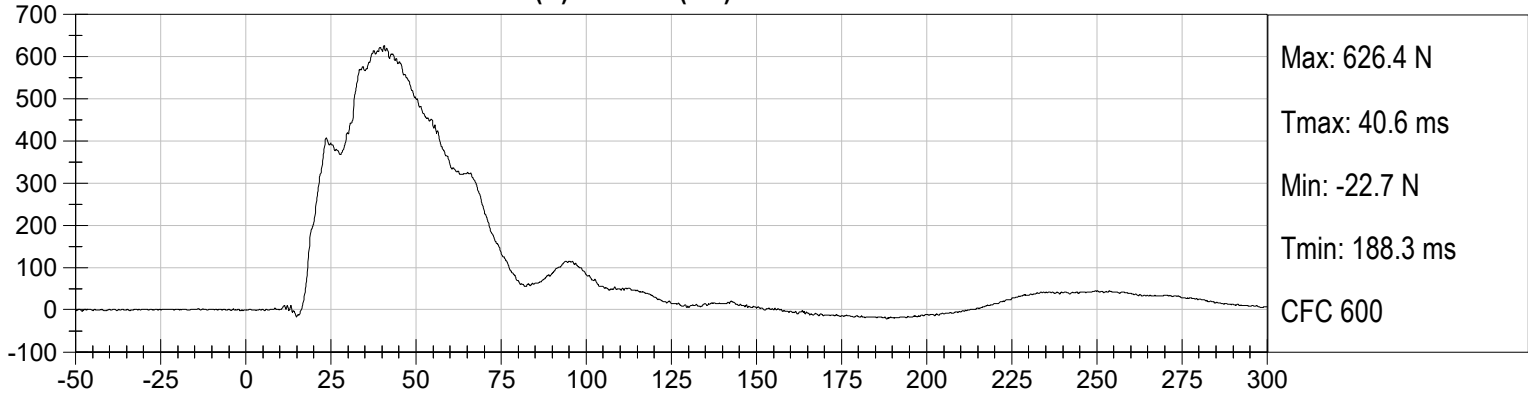
DRIVER MID ABDOMEN FY (N) vs Time (ms)

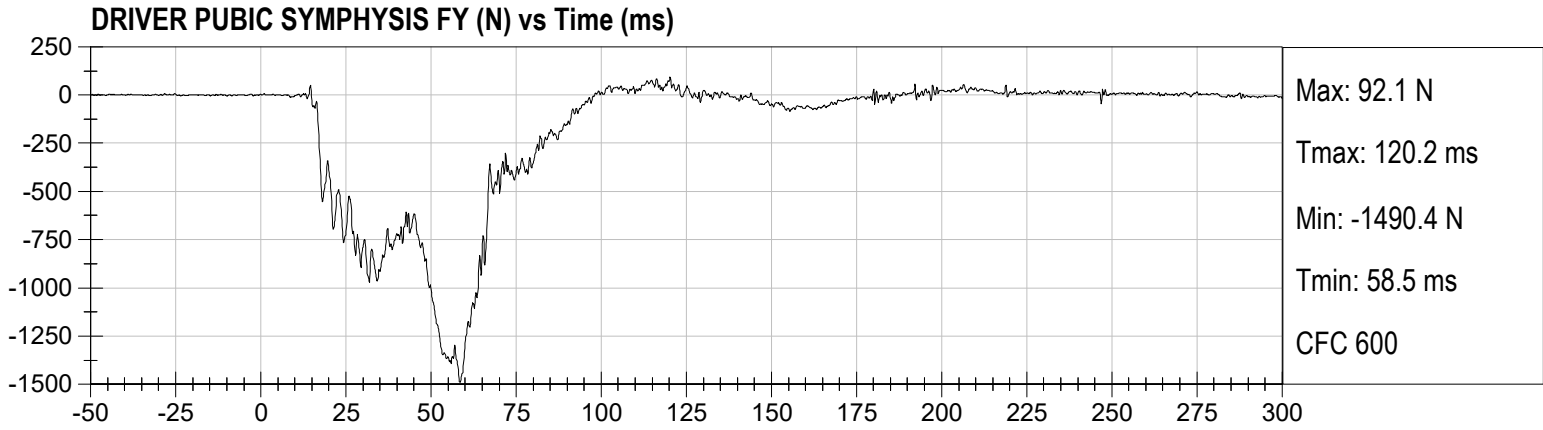


DRIVER REAR ABDOMEN FY (N) vs Time (ms)

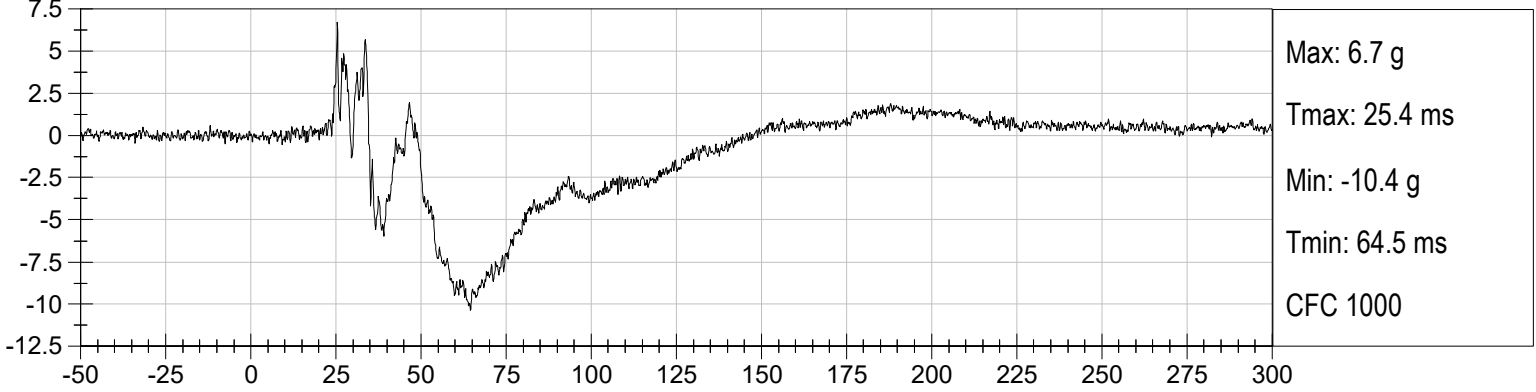


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

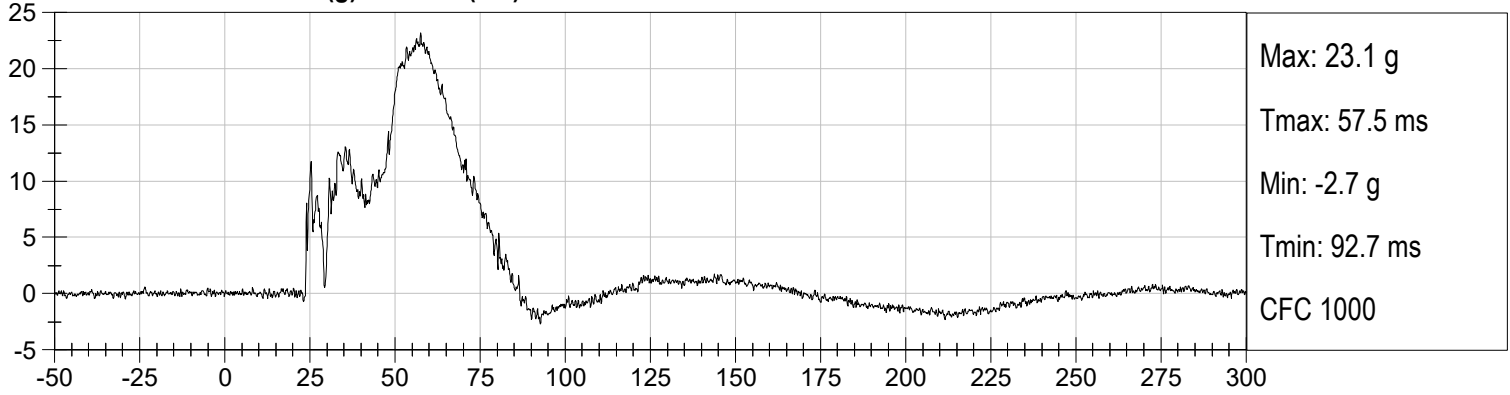




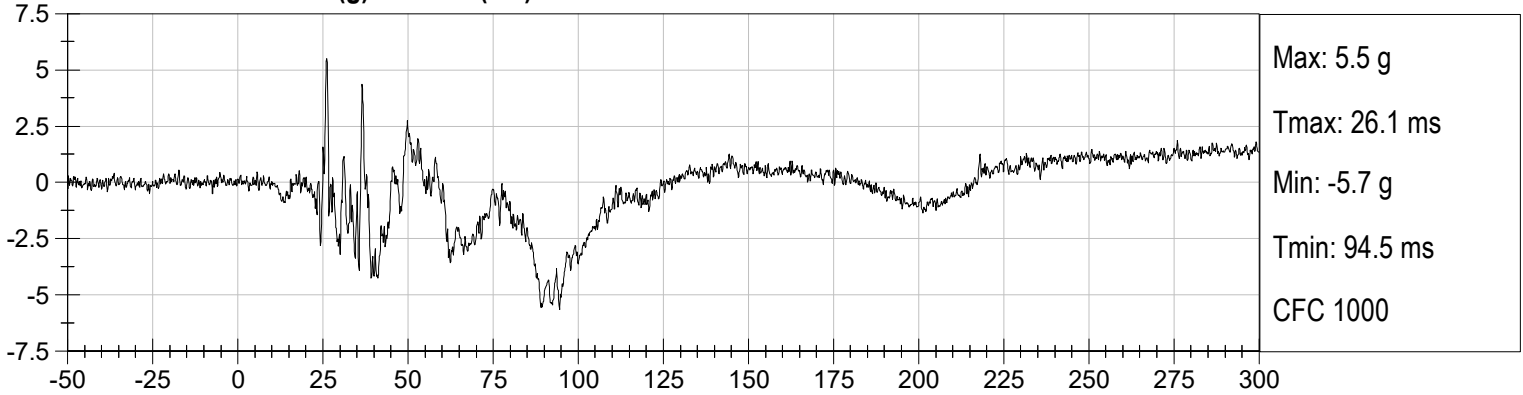
PASSENGER HEAD X (g) vs Time (ms)



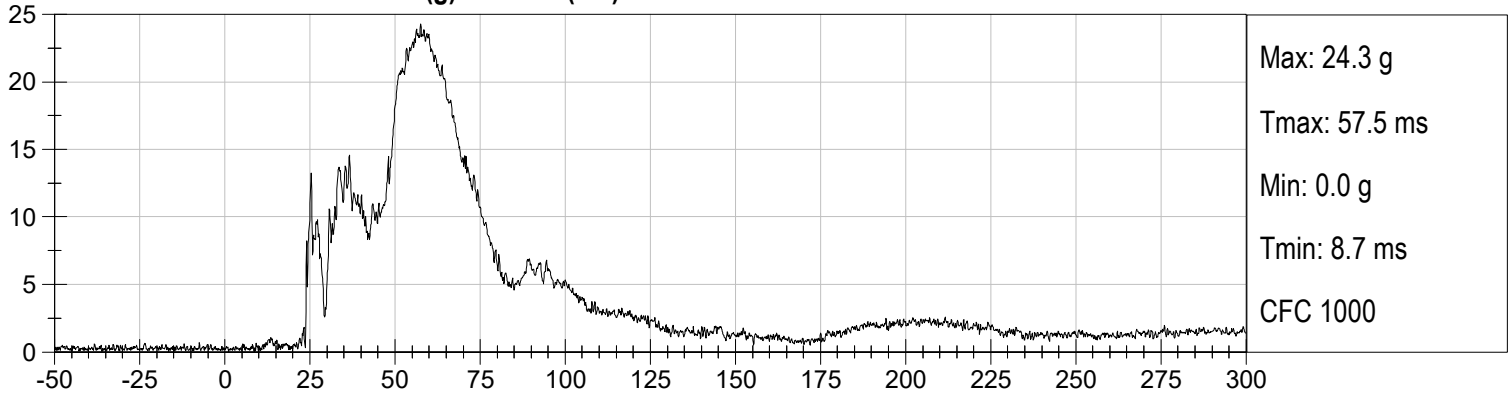
PASSENGER HEAD Y (g) vs Time (ms)



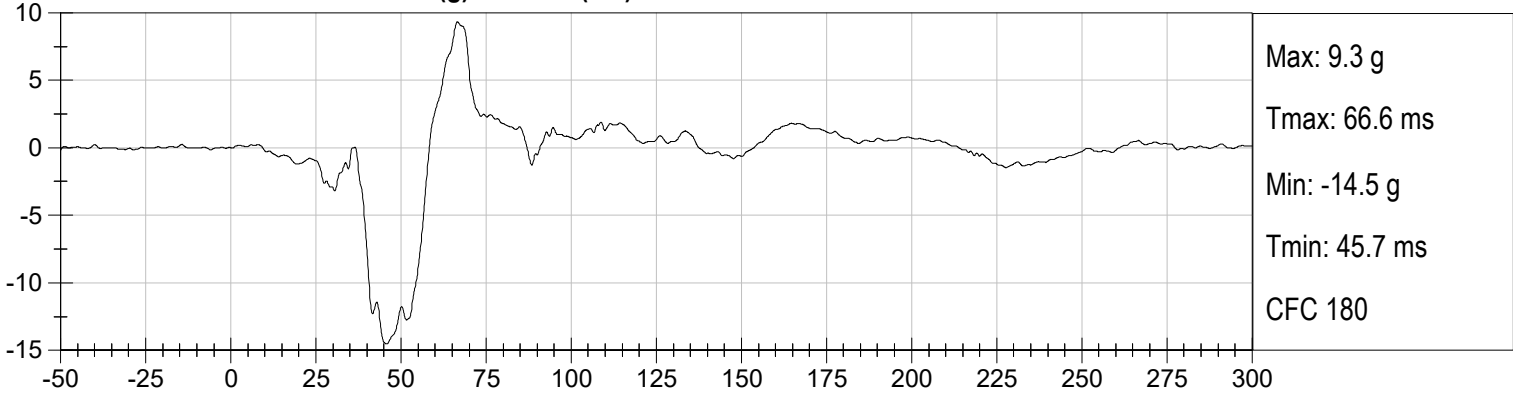
PASSENGER HEAD Z (g) vs Time (ms)



PASSENGER HEAD Resultant (g) vs Time (ms)



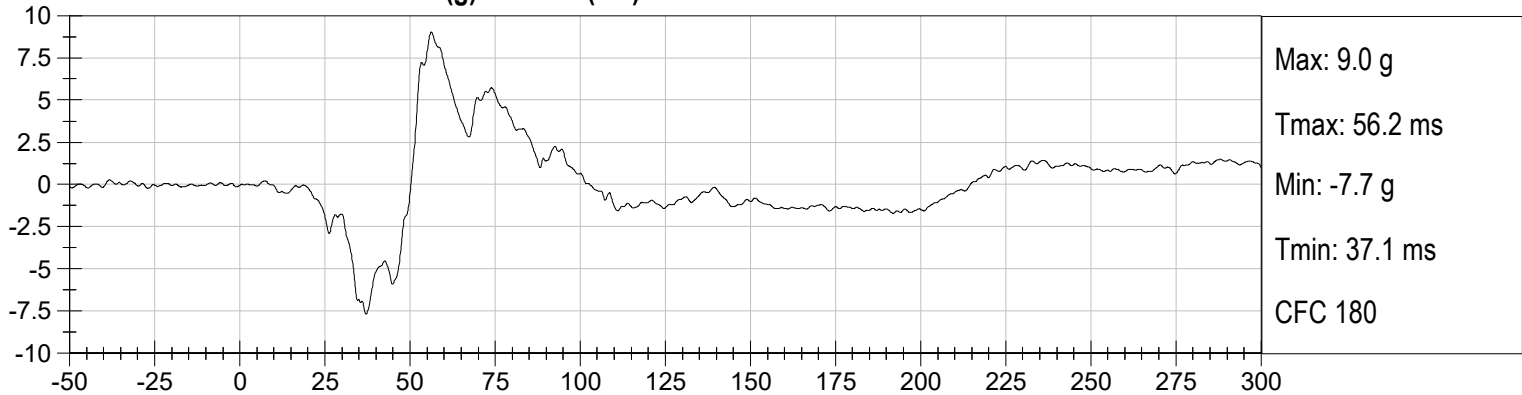
PASSENGER LOWER SPINE X (g) vs Time (ms)



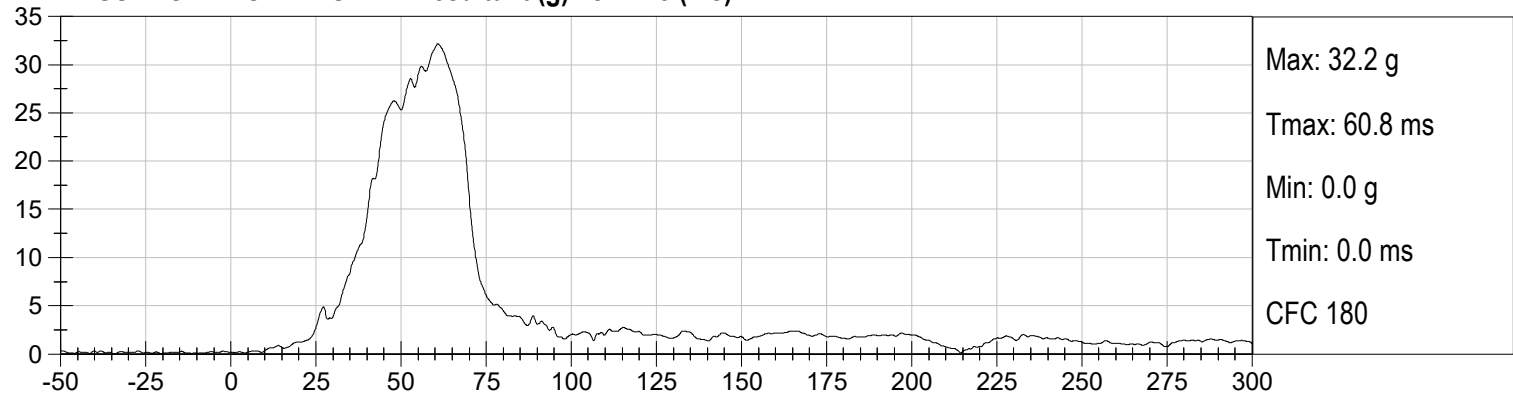
PASSENGER LOWER SPINE Y (g) vs Time (ms)



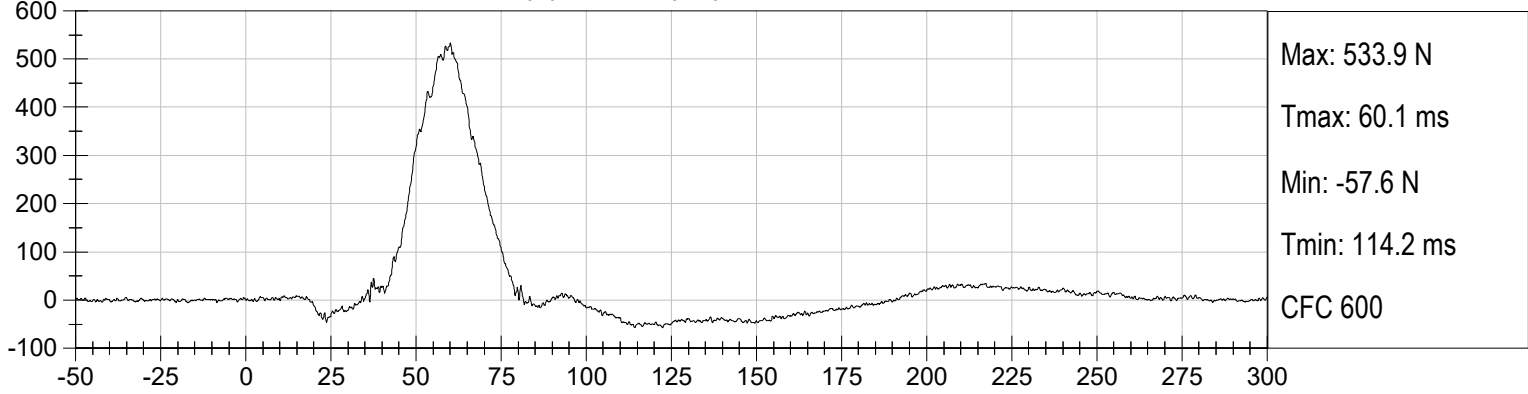
PASSENGER LOWER SPINE Z (g) vs Time (ms)



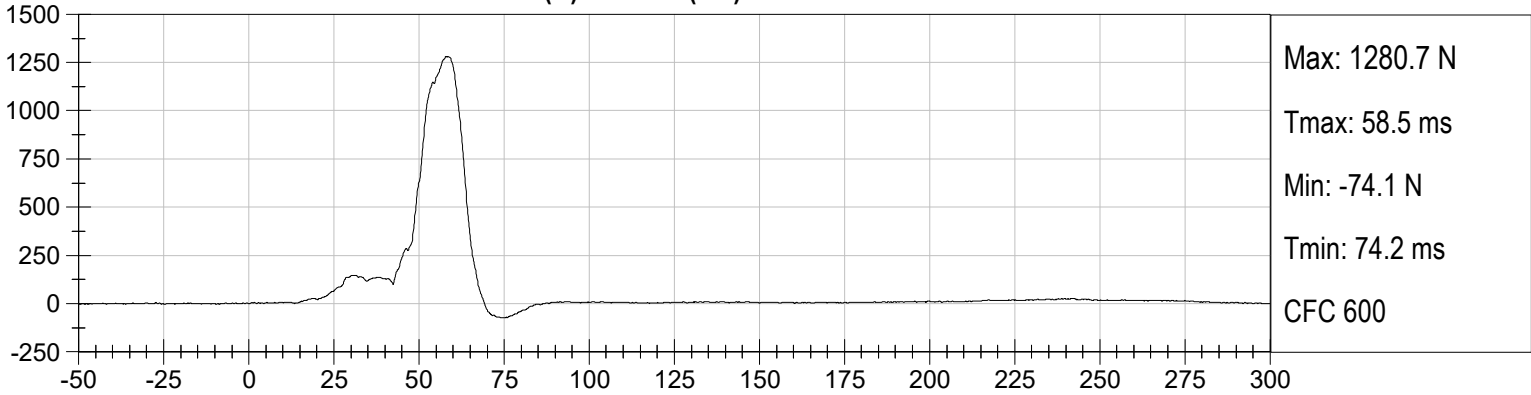
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



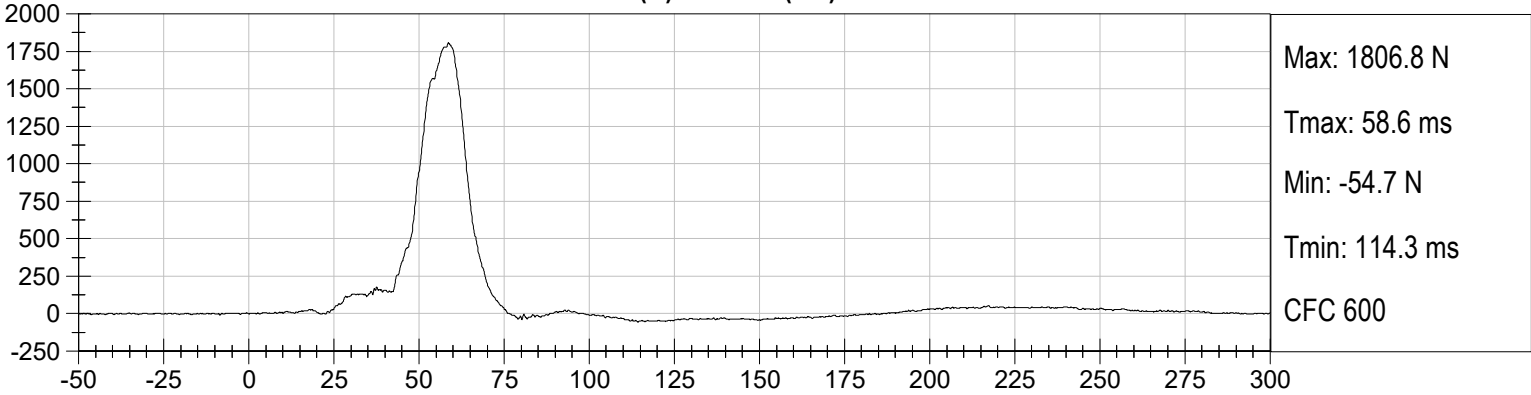
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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

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HEAD DROP TEST
ES-2re DUMMY

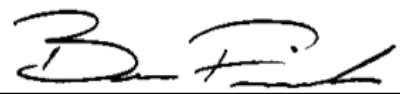
ATD Serial No: 032

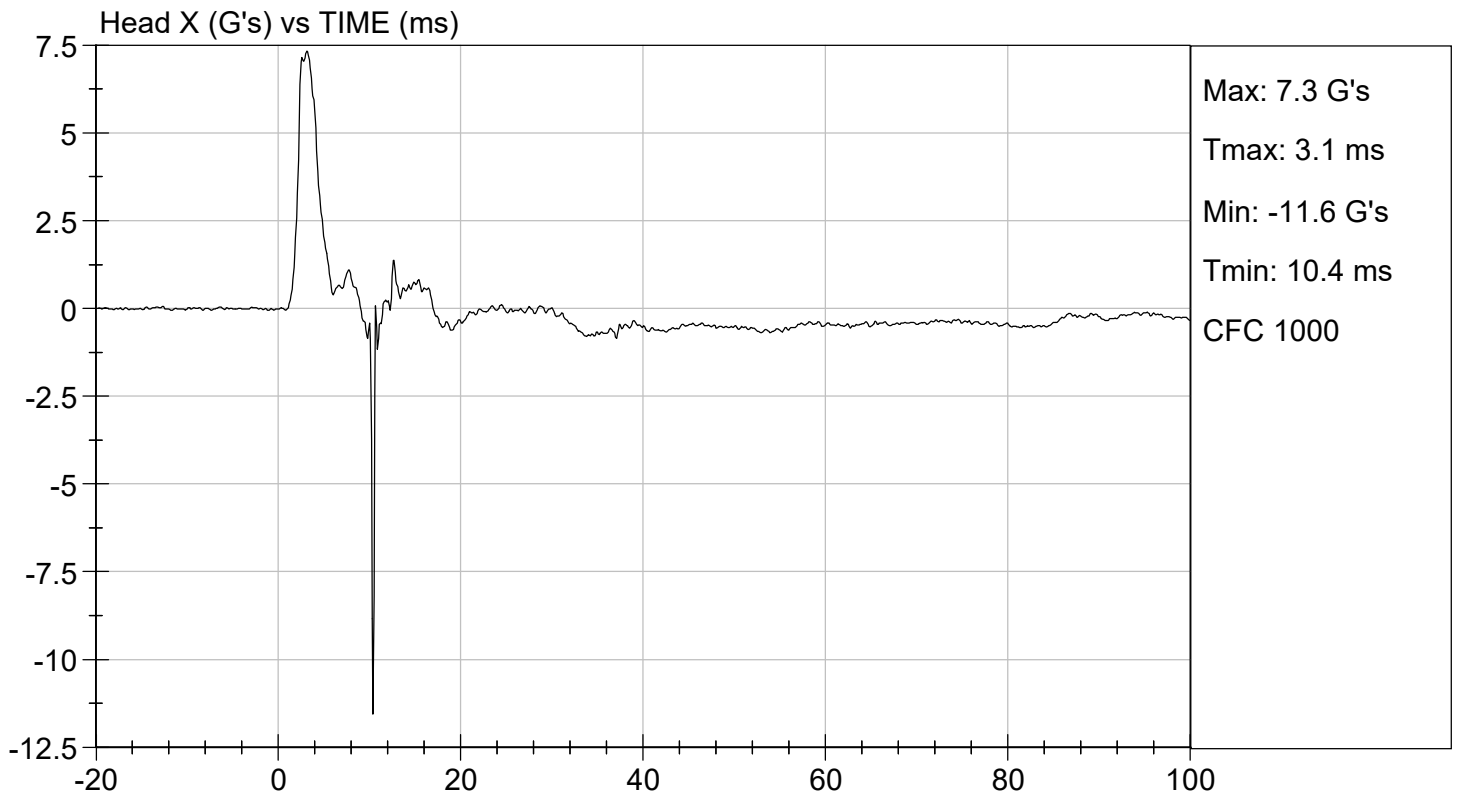
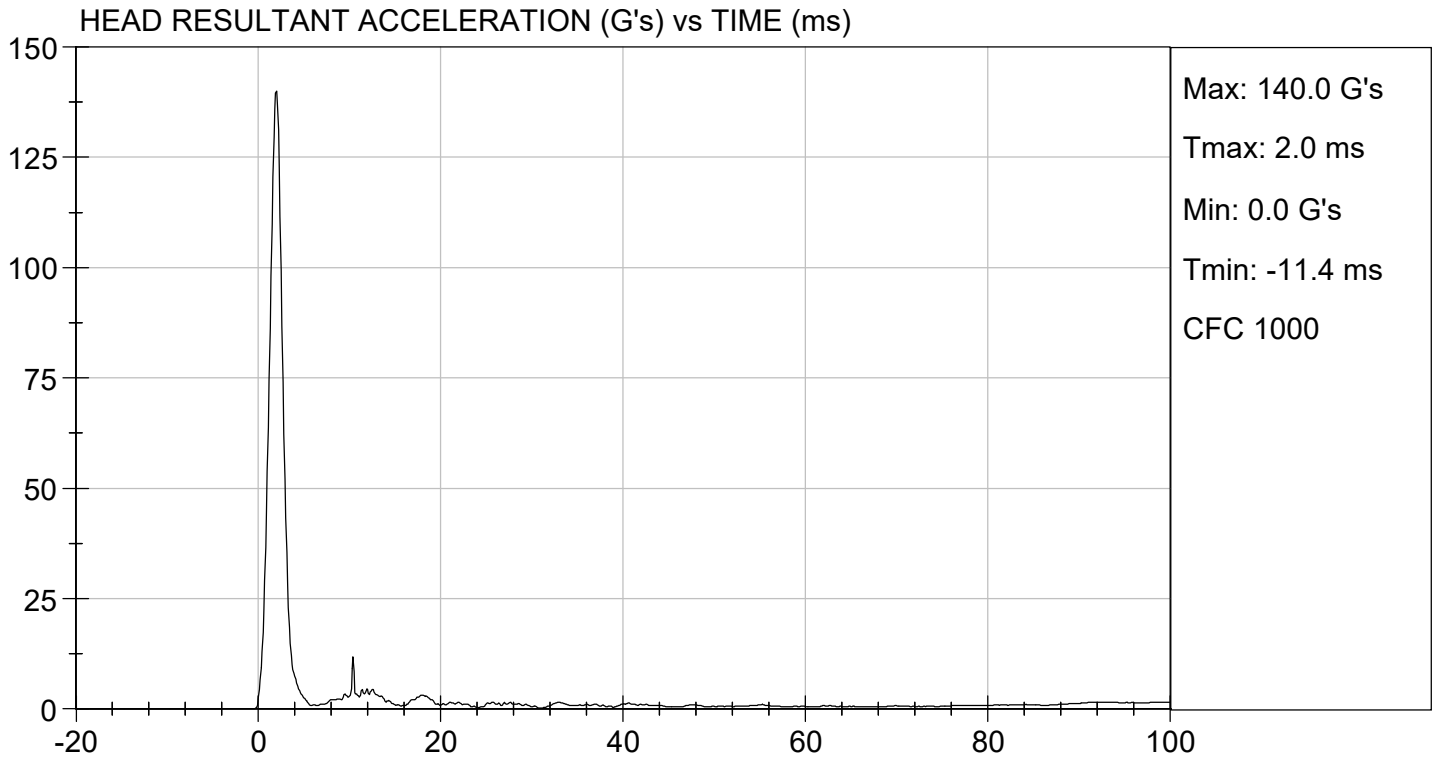
Test ID: D191211

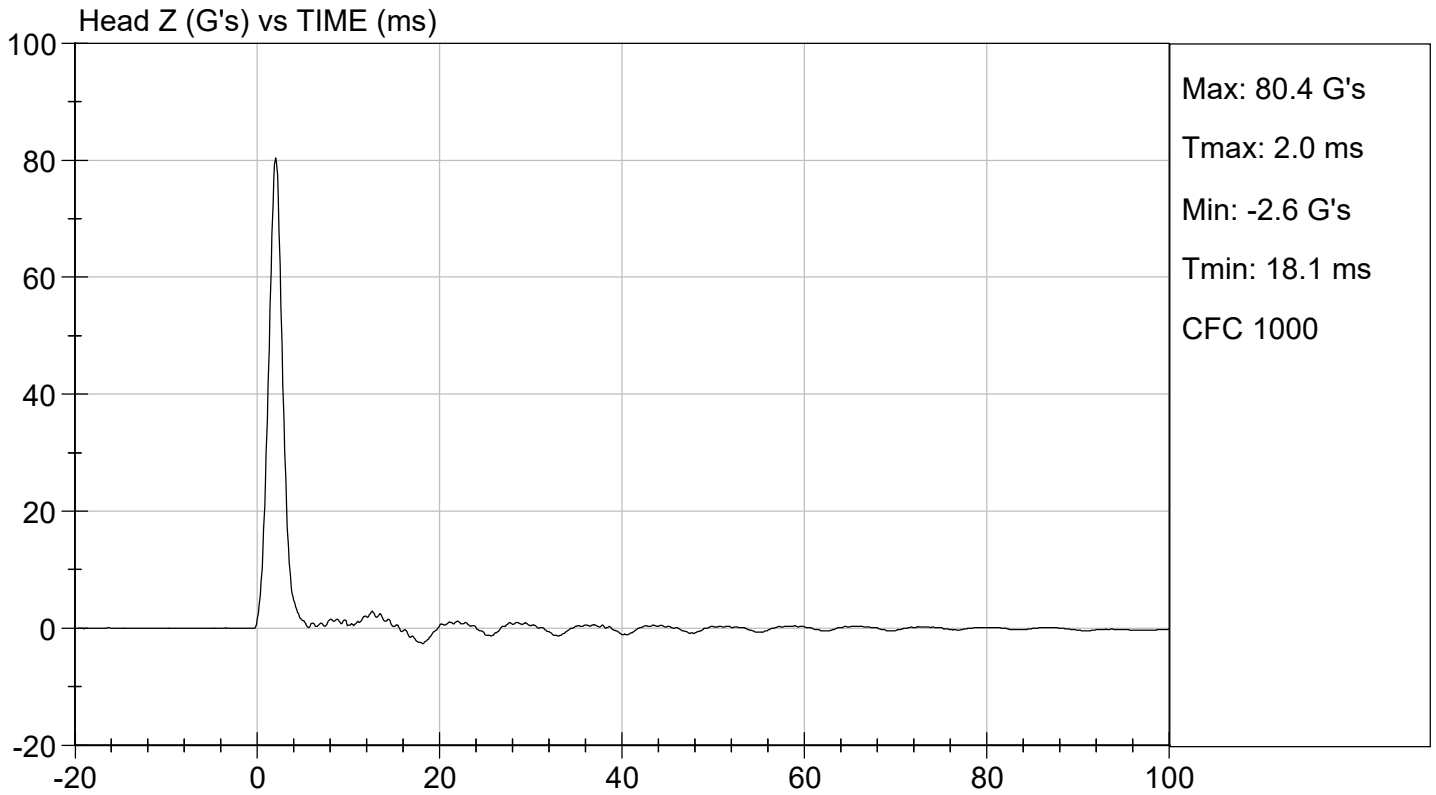
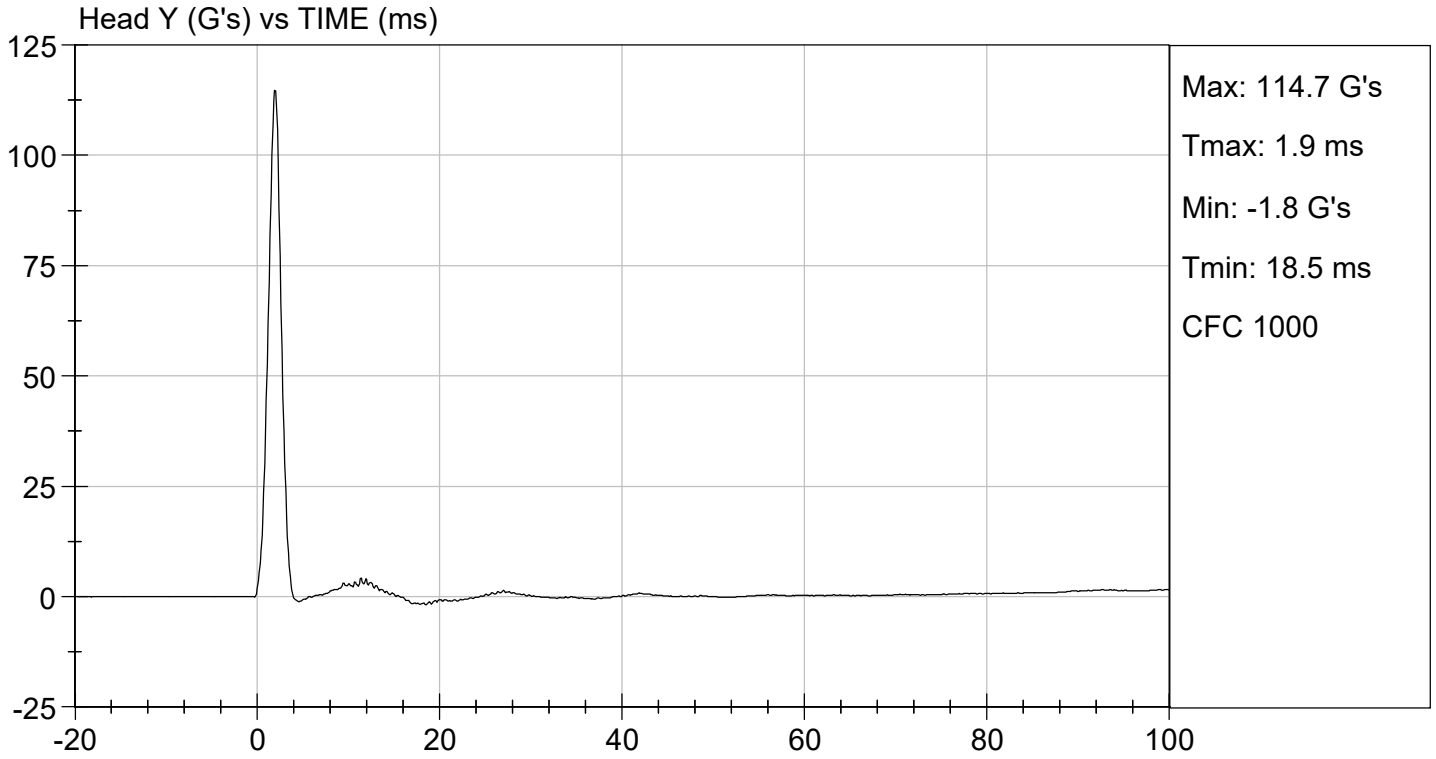
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	125 to 155	140	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	-11.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

04/04/2019
 Test Date


 Approved By





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NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

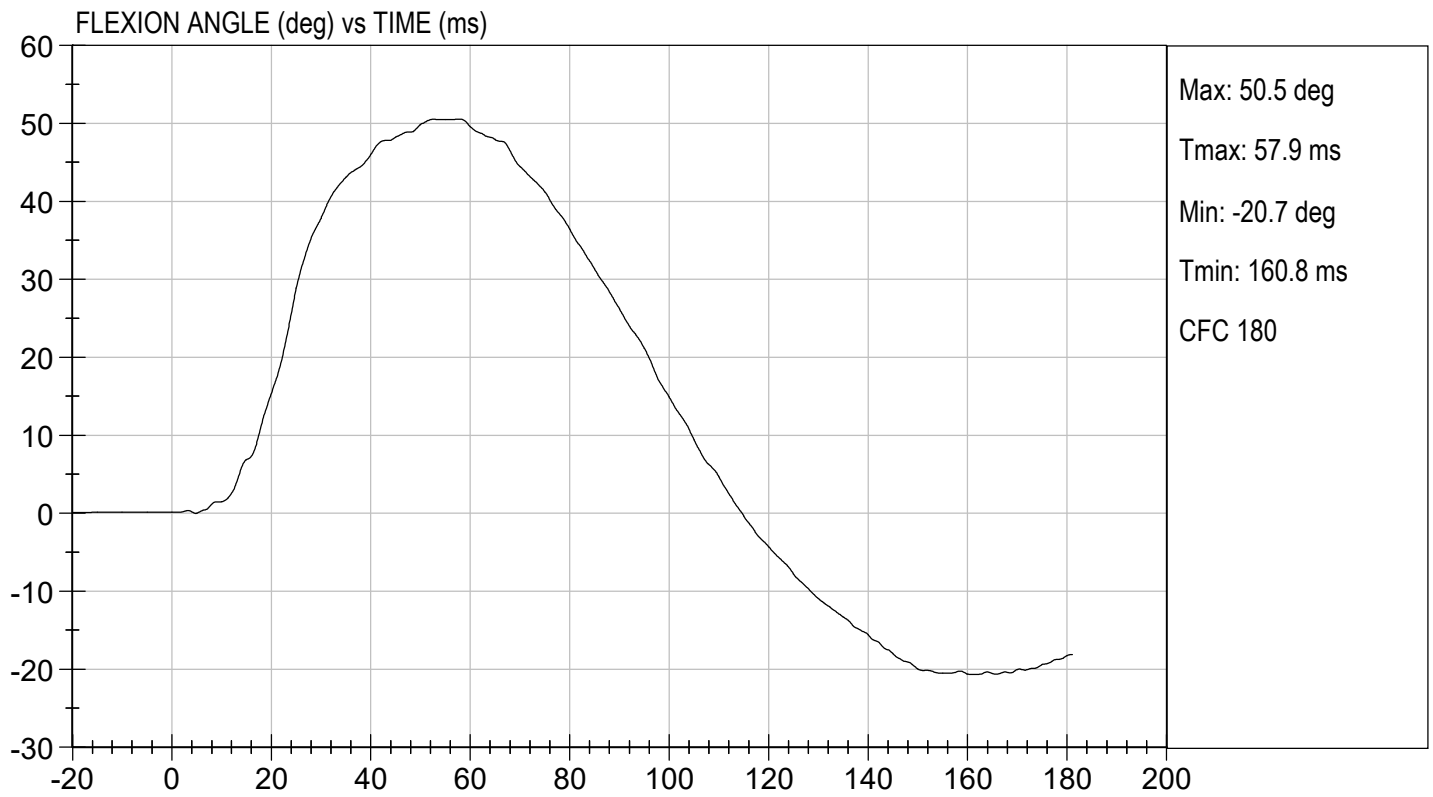
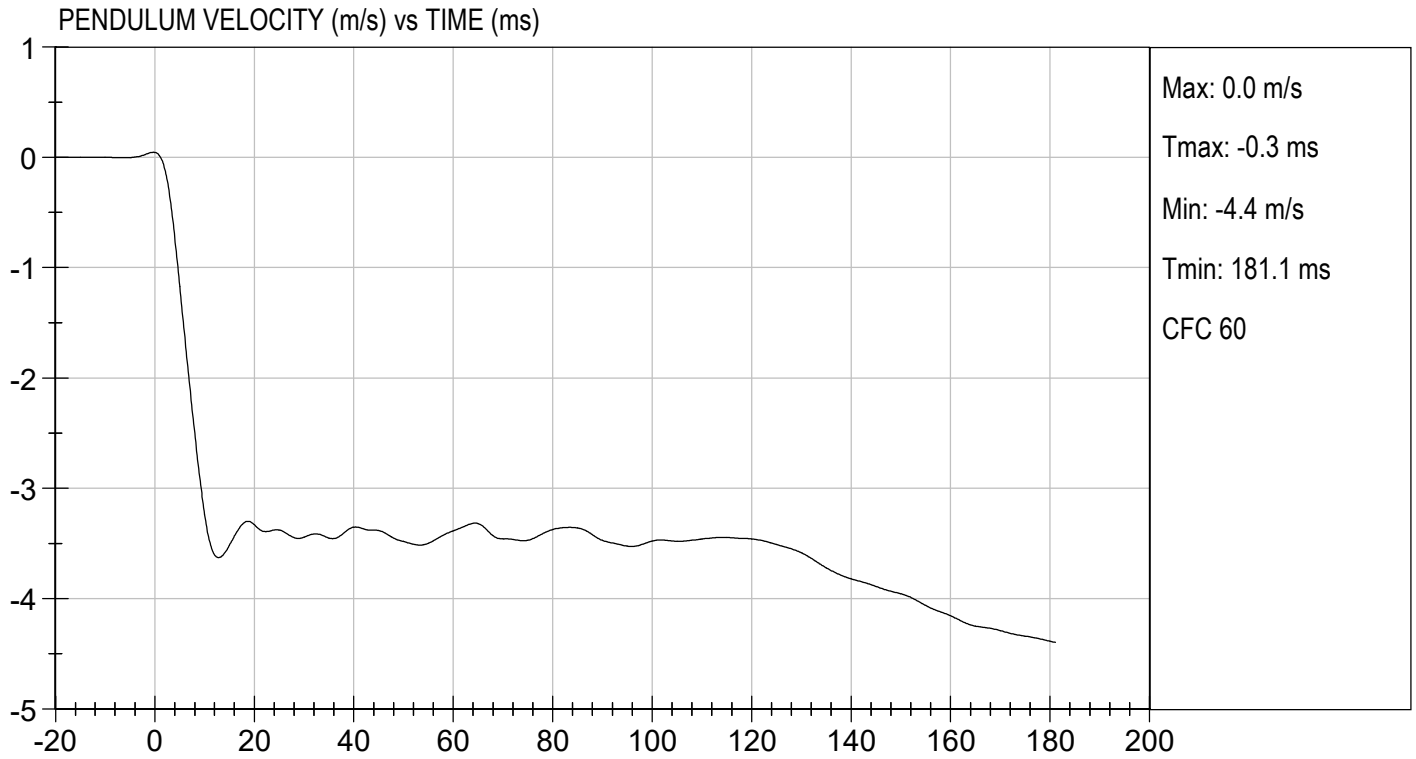
Test I.D: D191212

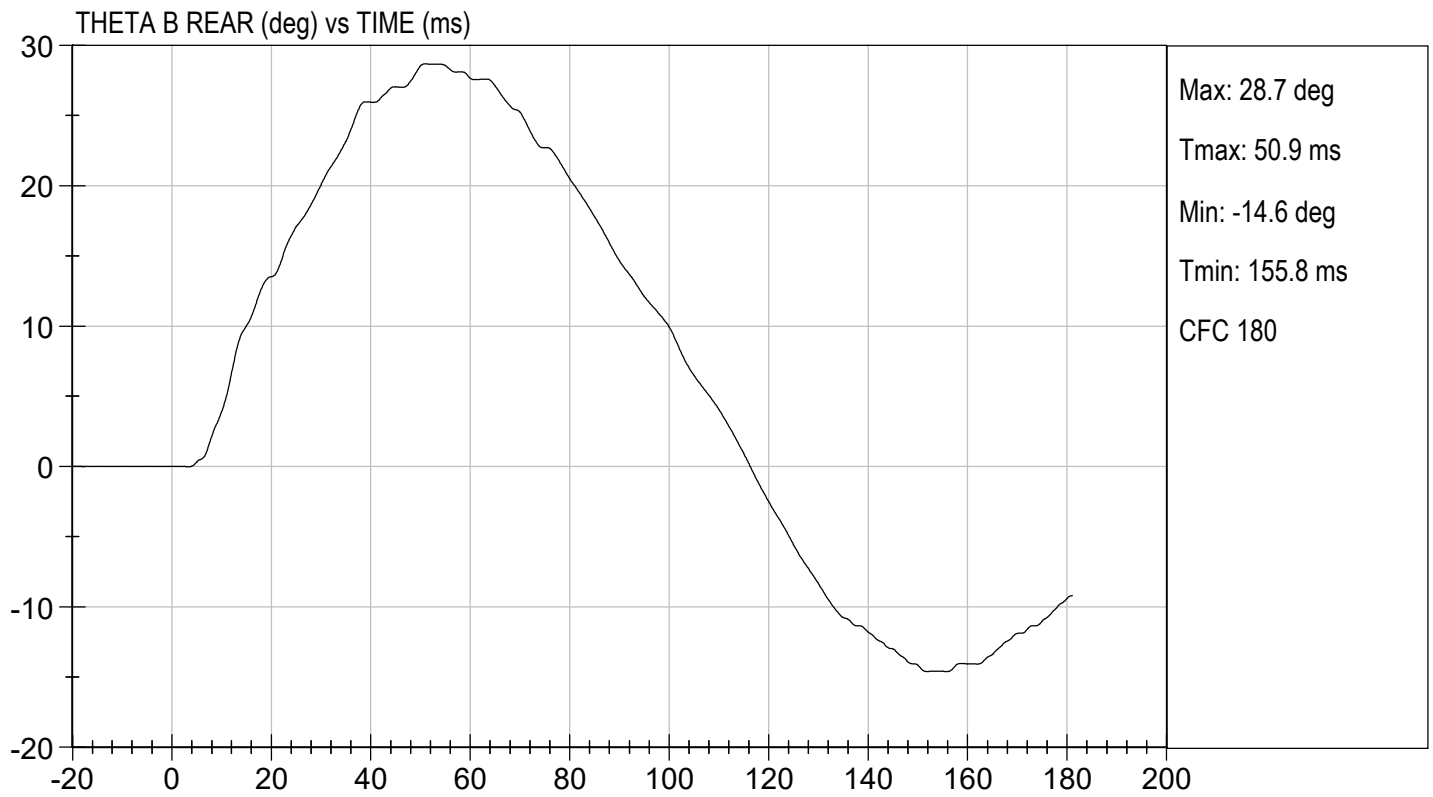
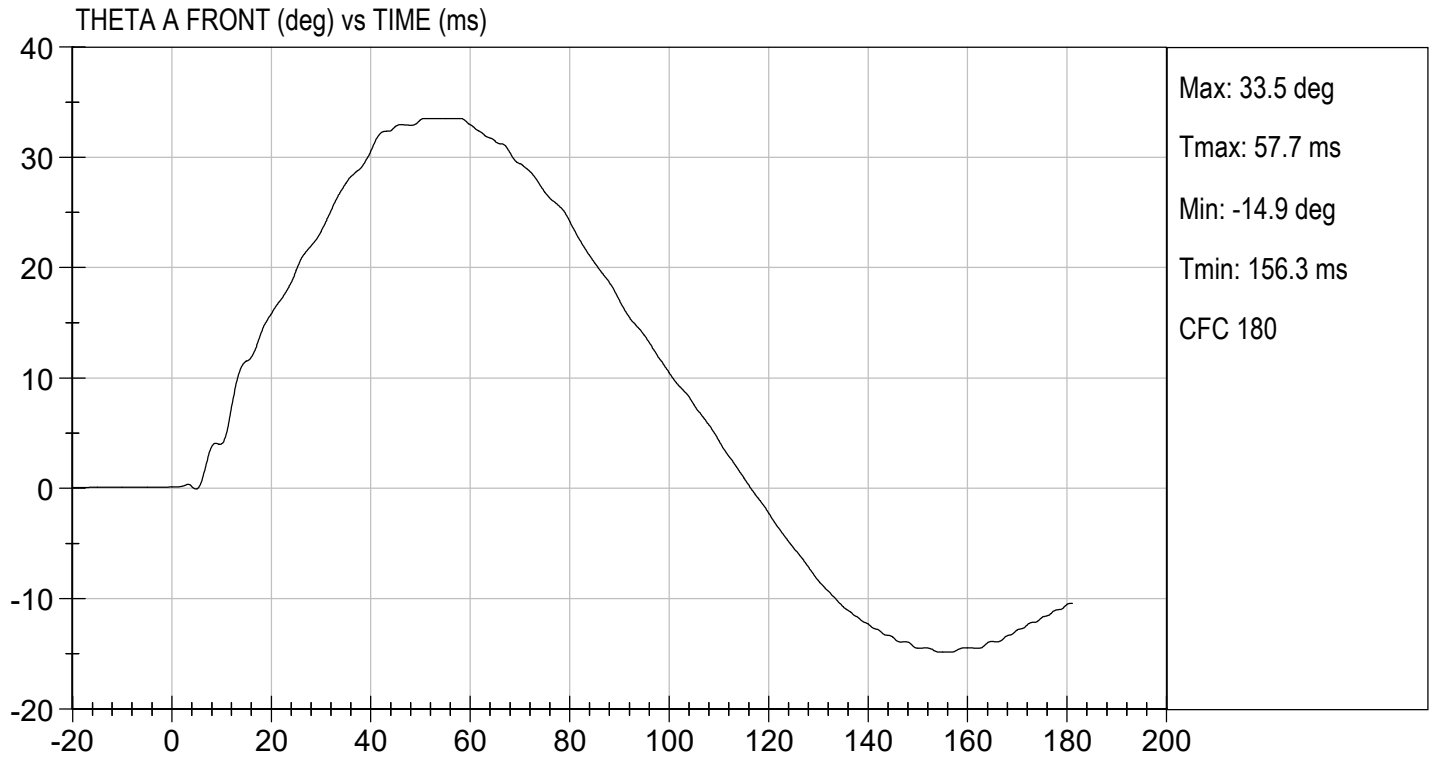
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	21.9	Pass	
Laboratory Relative Humidity	%	10 to 70	28	Pass	
Pendulum Speed	m/s	3.30 to 3.50	3.50	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.36	Pass
	14 ms	m/s	-3.20 to -3.70	-3.59	Pass
	17 ms	m/s	>= -3.70	-3.36	Pass
Maximum Flexion Angle	deg	49.0 to 59.0	50.5	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	56.8	Pass	
Overall Results				Pass	

Danielle Redinlaugh
 Laboratory Technician

04/05/2019
 Test Date

B. F. K.
 Approved By

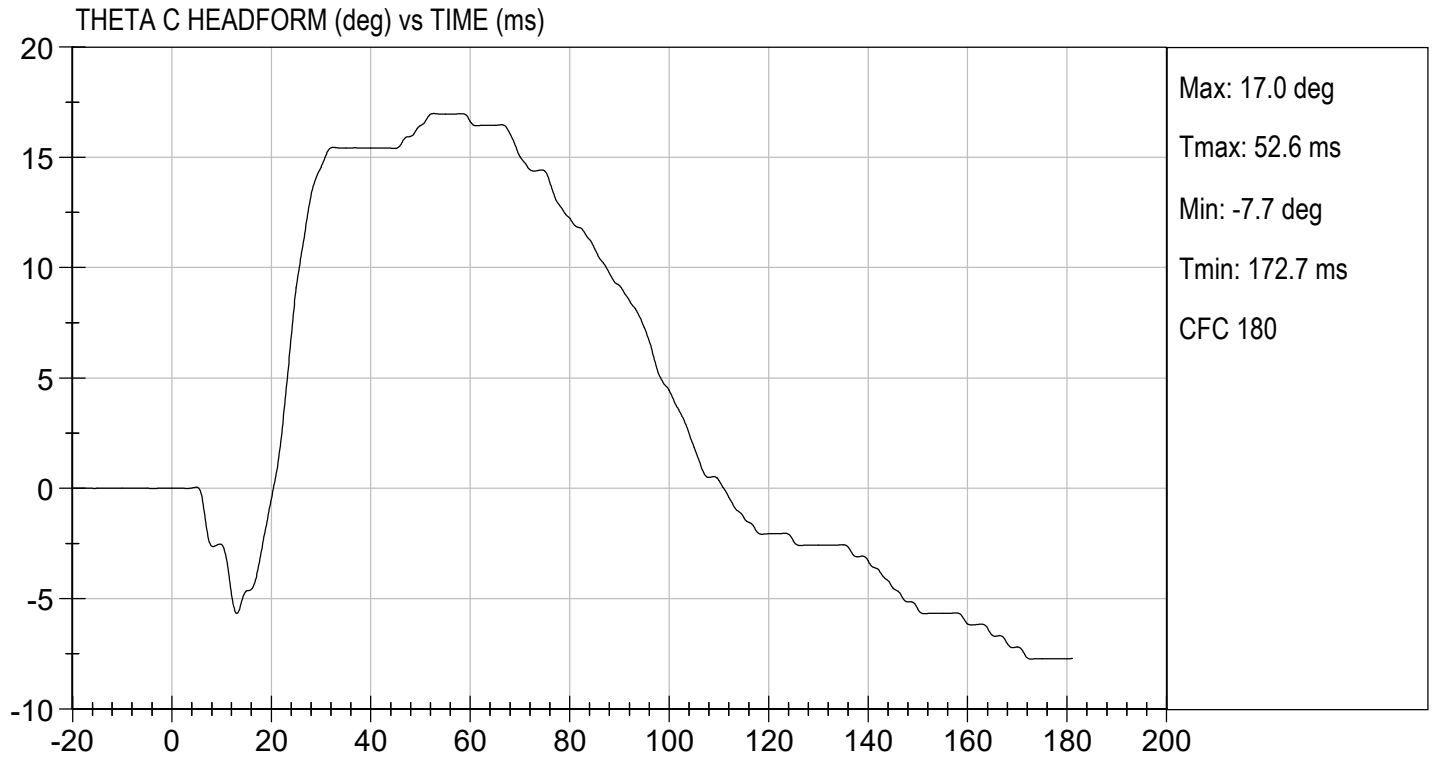






TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 04/05/2019
TEST #: D191212



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SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

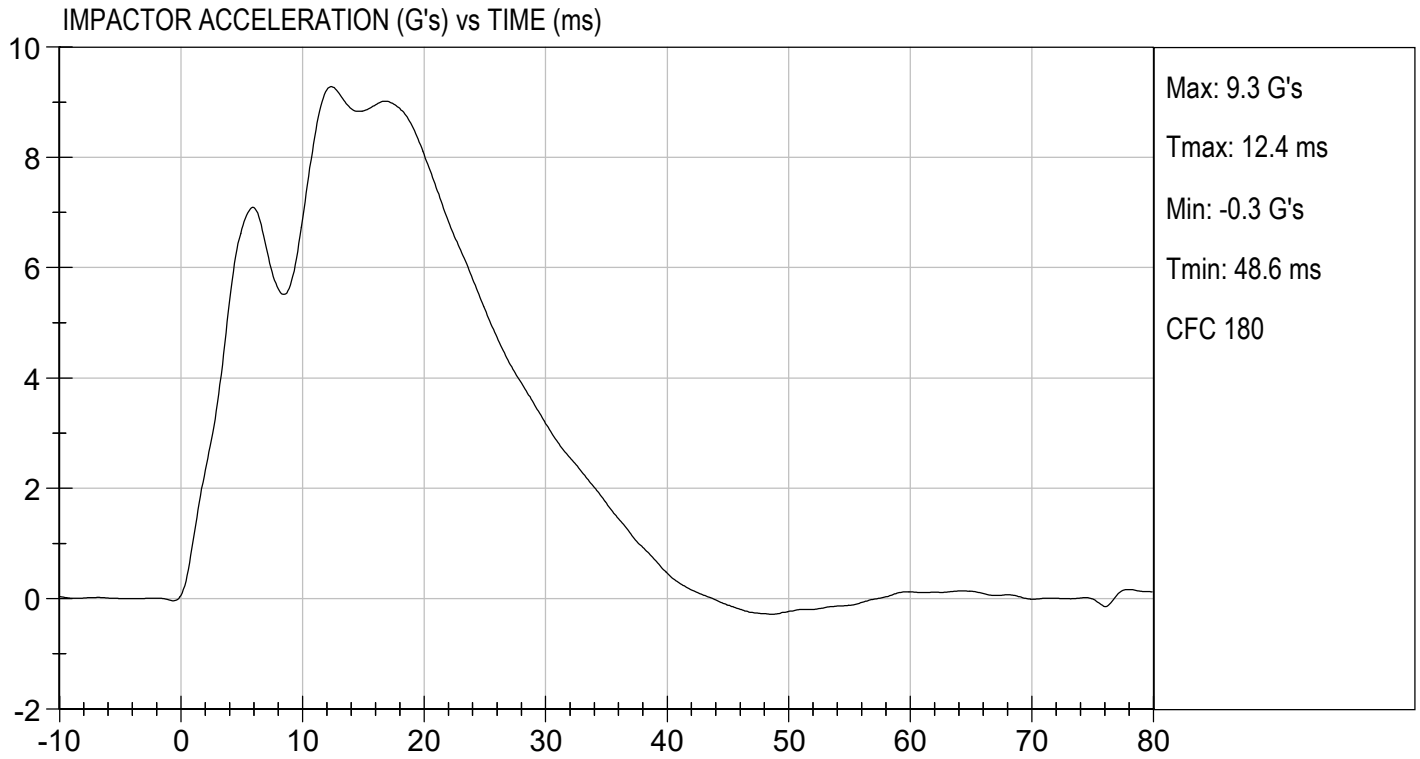
Test I.D: D191213

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.21	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.3	Pass
Overall Test Results				Pass

Danielle Redinlaugh
 Laboratory Technician

04/04/2019
 Test Date

B. F. K.
 Approved By



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UPPER RIB TEST

ES-2re DUMMY

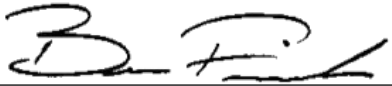
ATD Serial No: 032

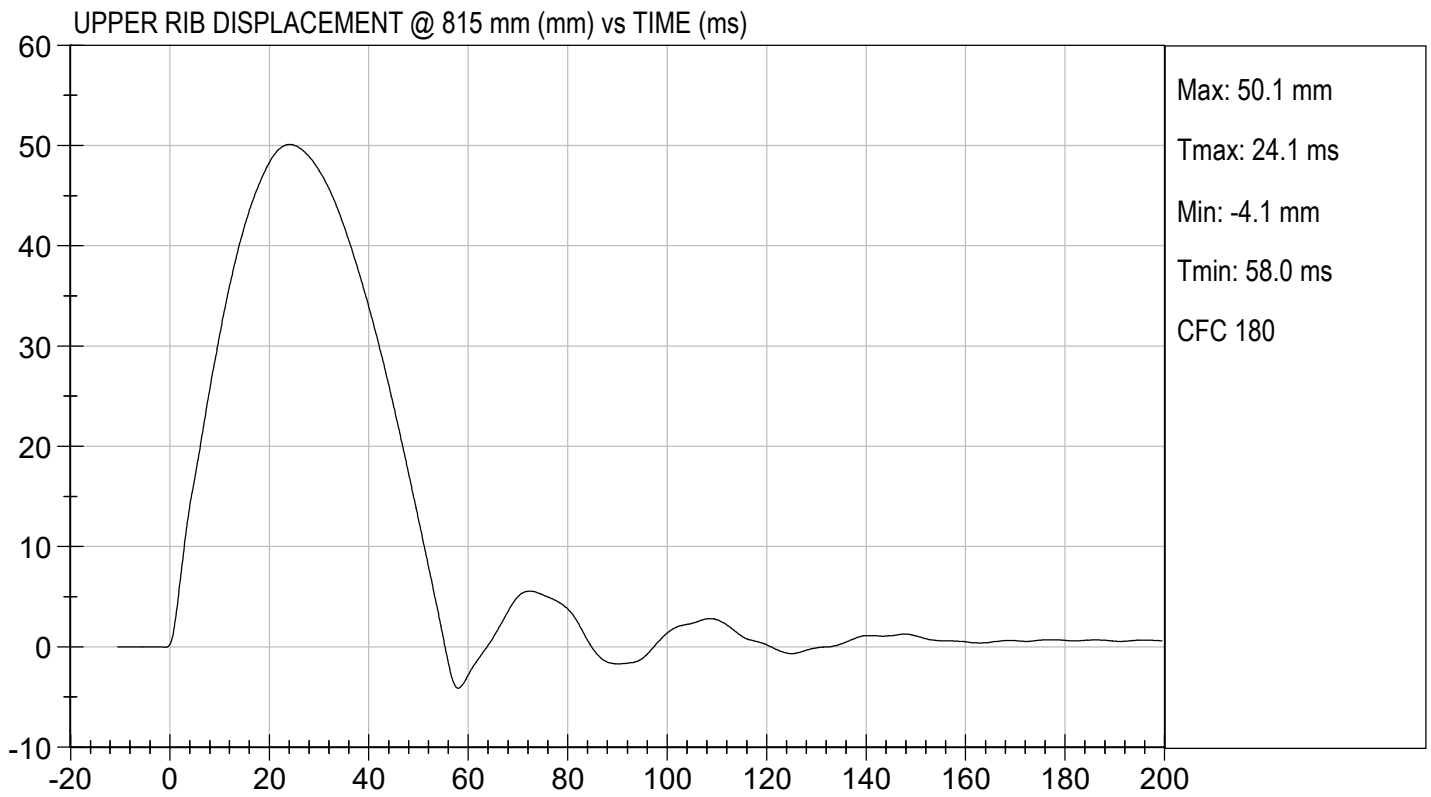
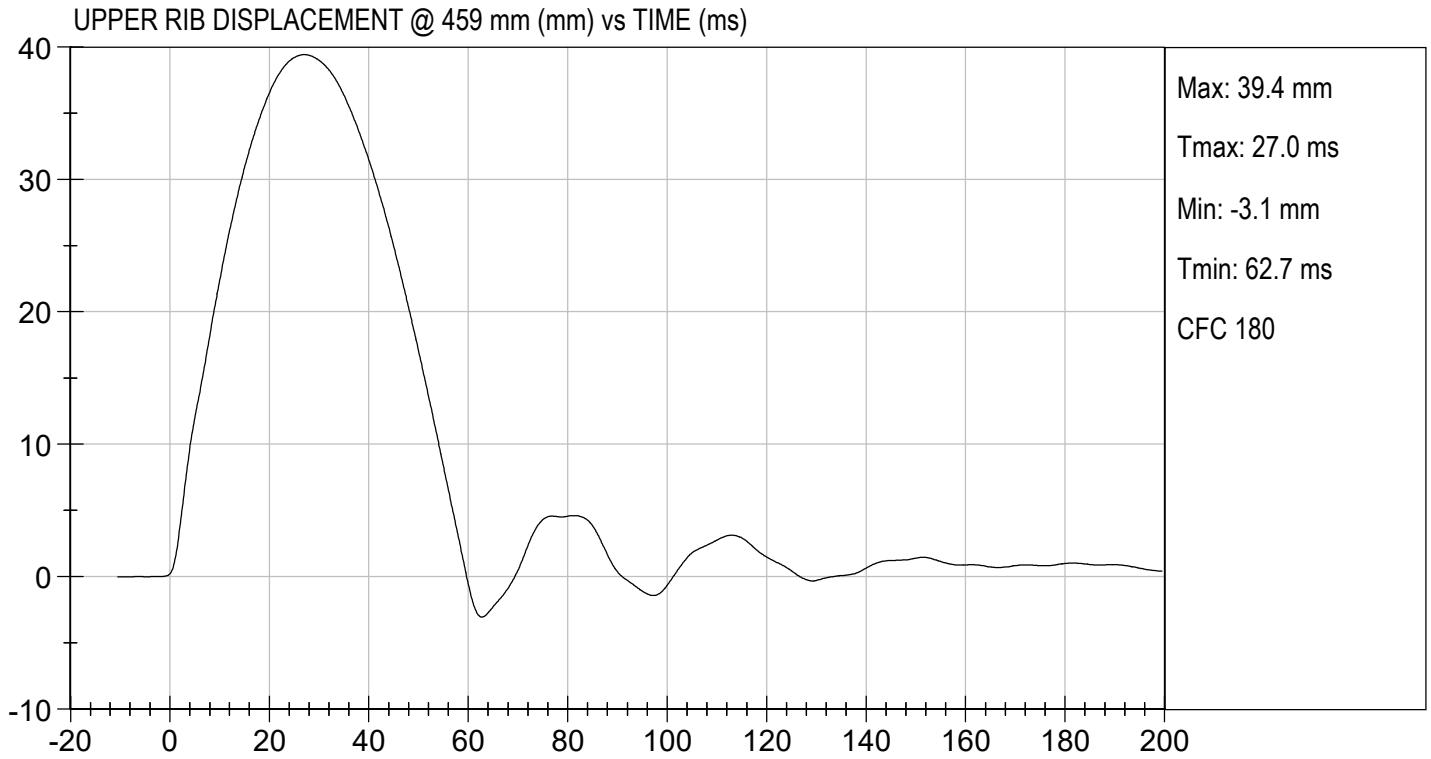
Test I.D: D191214

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.1	Pass
Overall Test Results				Pass


Laboratory Technician

04/04/2019
Test Date


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MID RIB TEST

ES-2re DUMMY

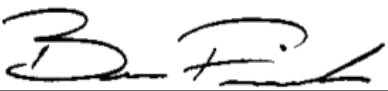
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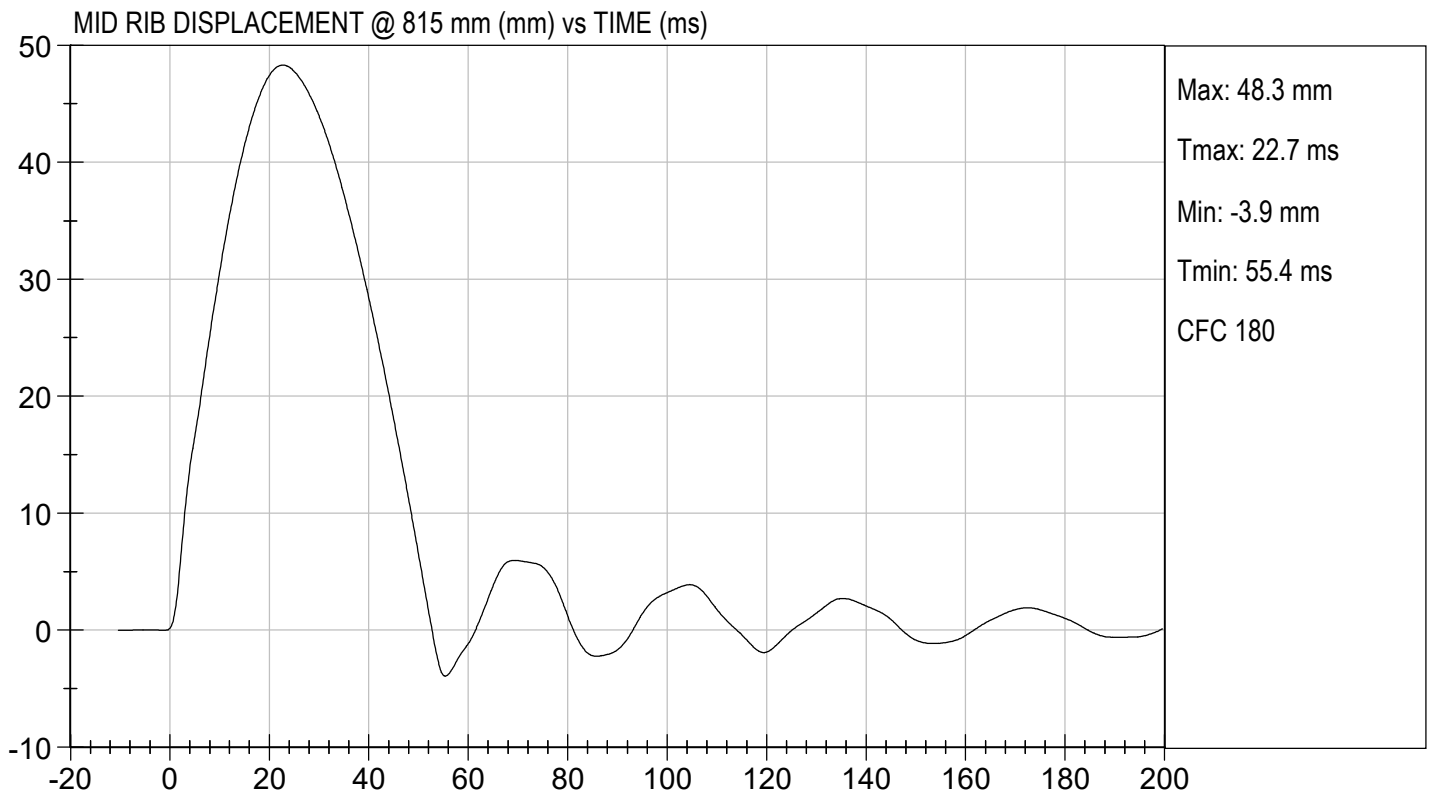
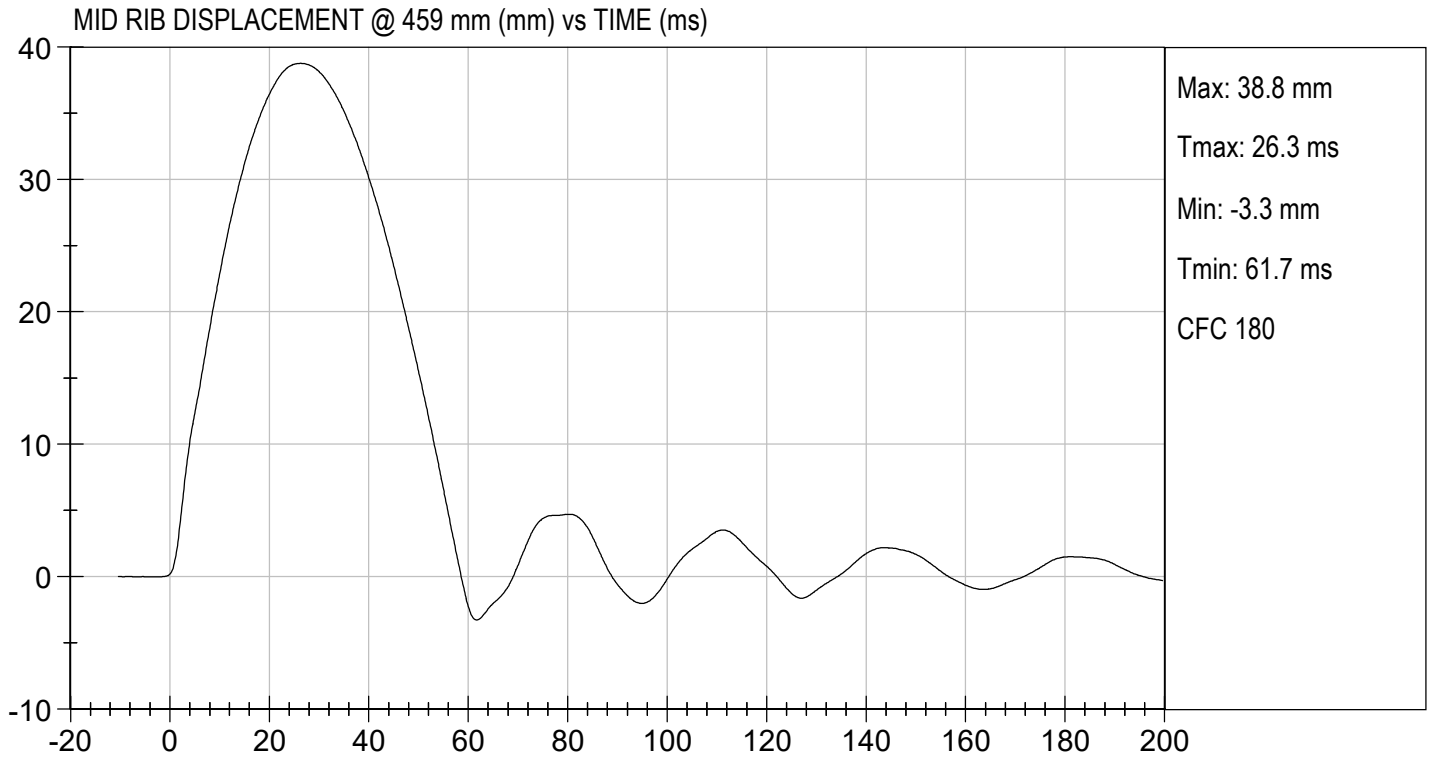
Test I.D: D191215

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.3	Pass
Overall Test Results				Pass


Laboratory Technician

04/04/2019
Test Date


Approved By



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LOWER RIB TEST

ES-2re DUMMY

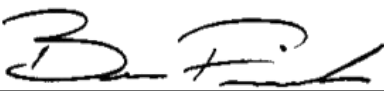
ATD Serial No: 032

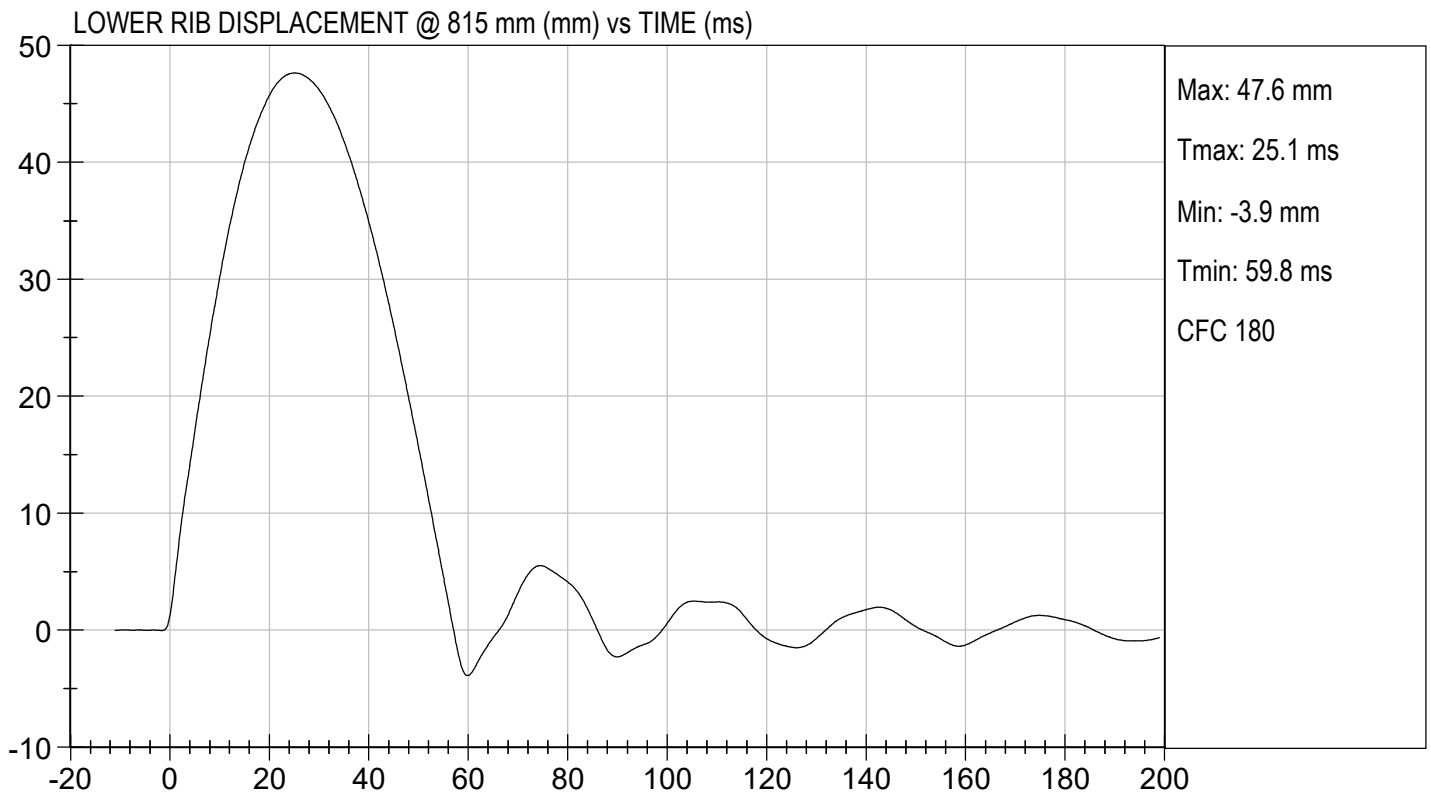
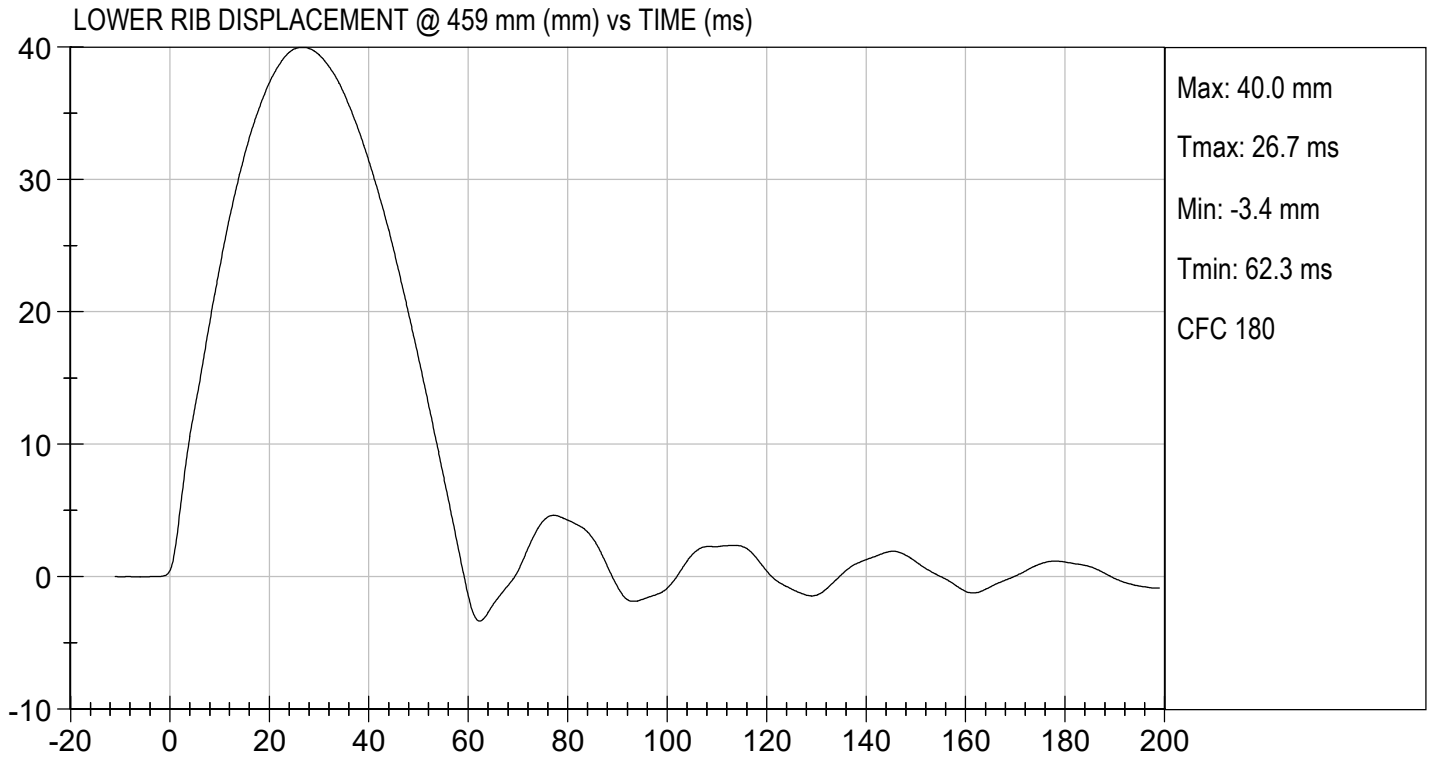
Test I.D: D191216

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Displacement at 459 mm	mm	36.0 to 40.0	40.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.6	Pass
Overall Test Results				Pass


Laboratory Technician

04/04/2019
Test Date


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ABDOMEN TEST

ES-2re DUMMY

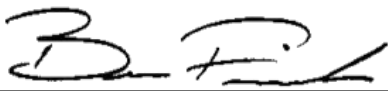
ATD Serial No: 032

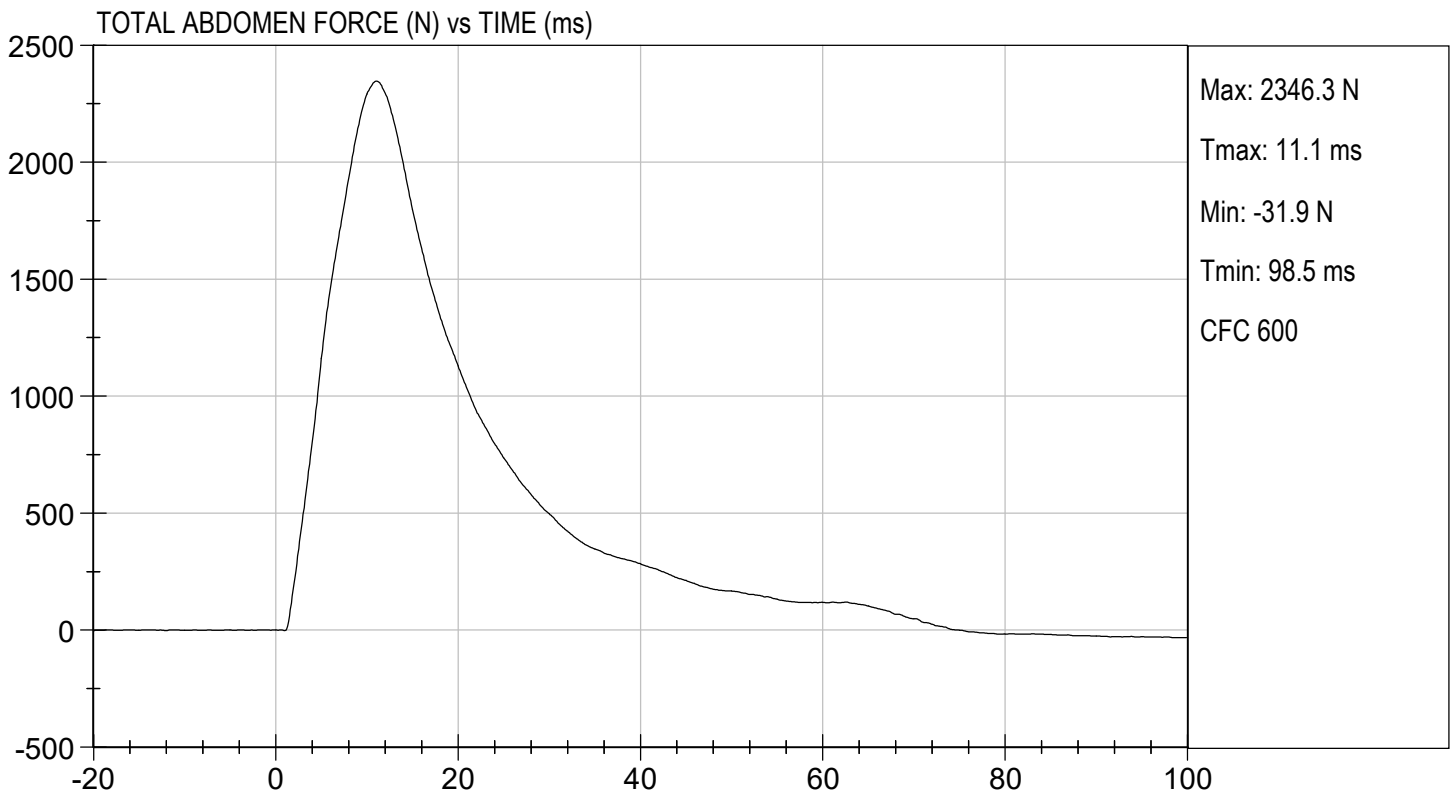
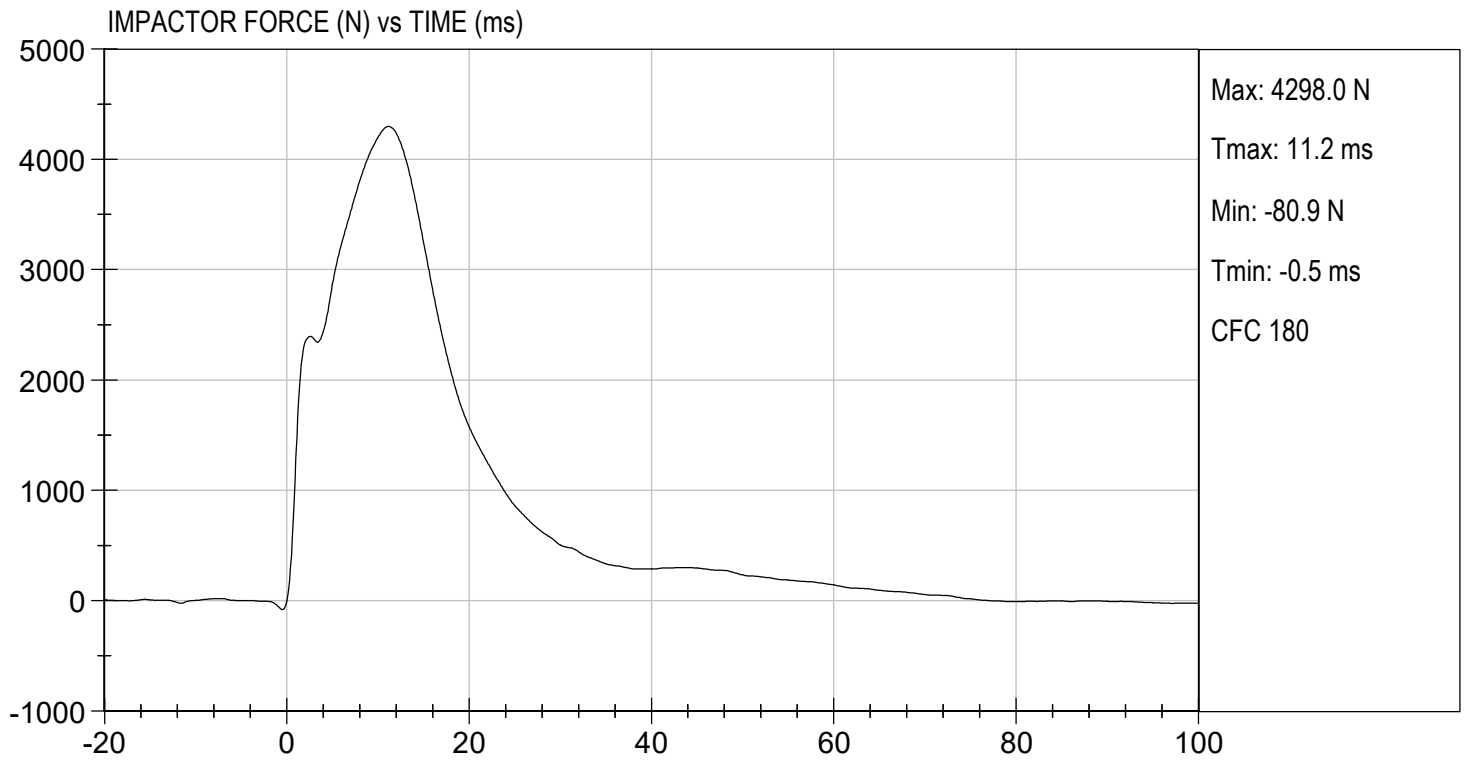
Test I.D: D191217

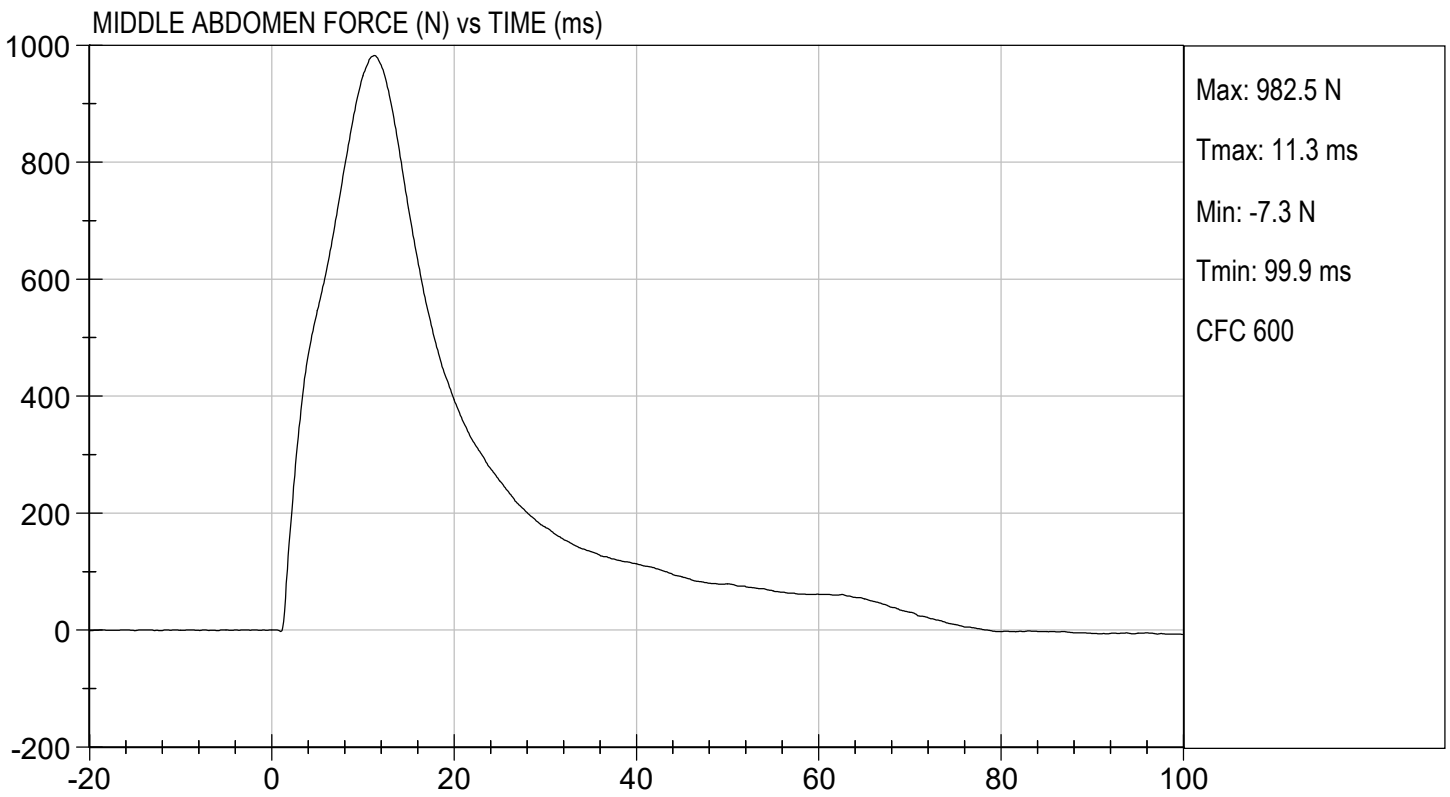
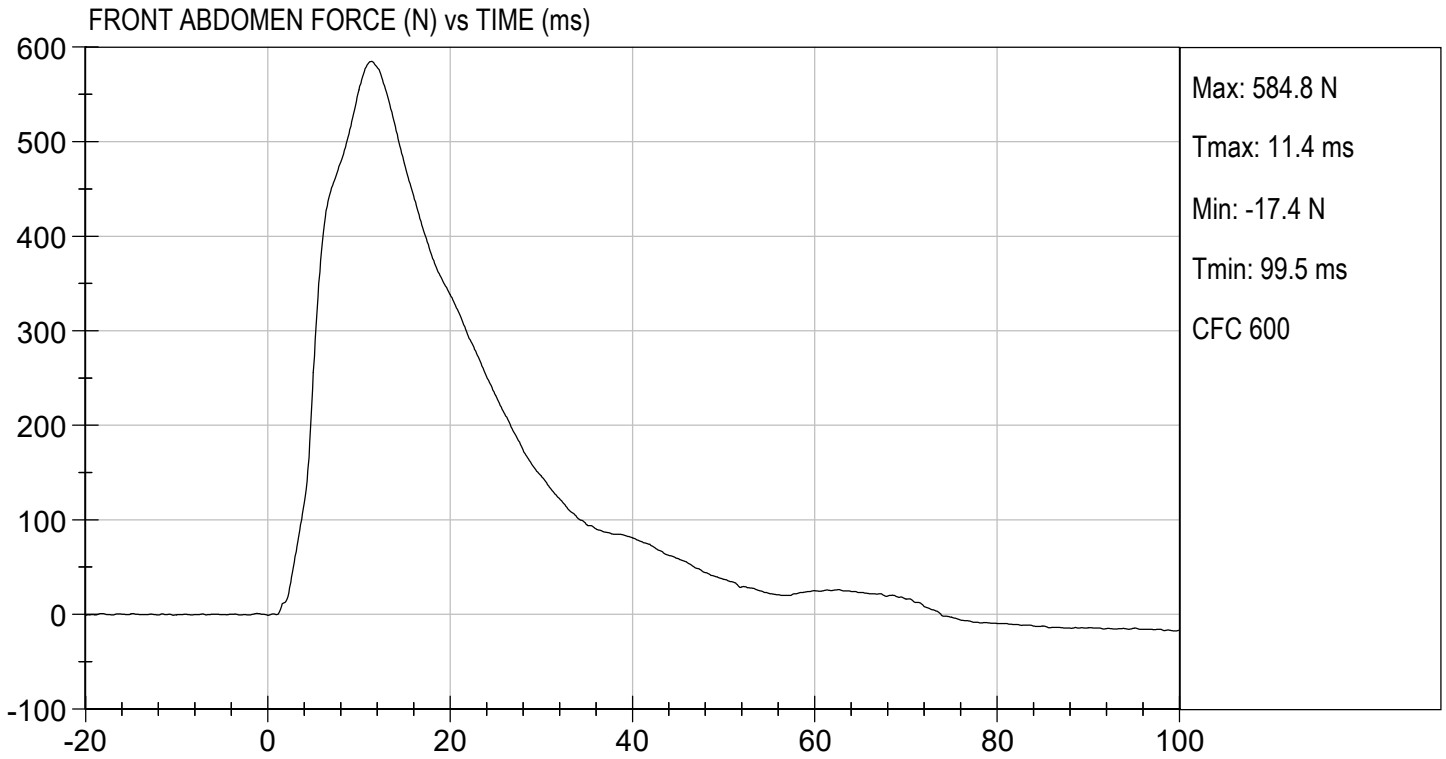
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4298	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.2	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2346	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.1	Pass
Overall Test Results				Pass


Laboratory Technician

04/04/2019
Test Date


Approved By

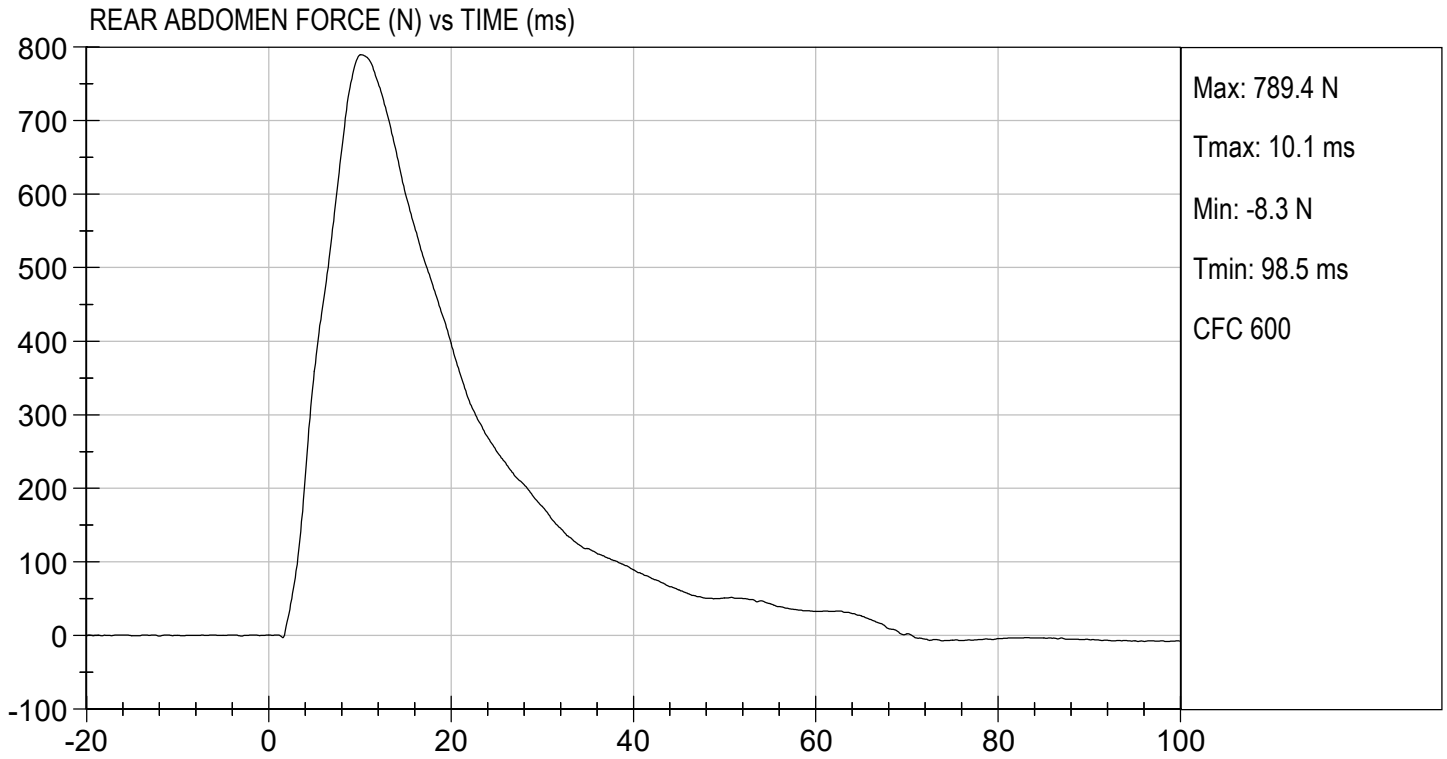






TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 04/04/2019
TEST #: D191217

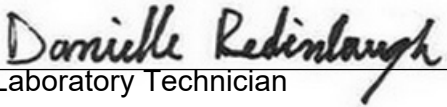


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

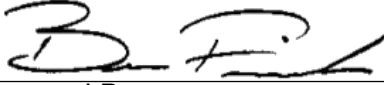
ATD Serial No: 032

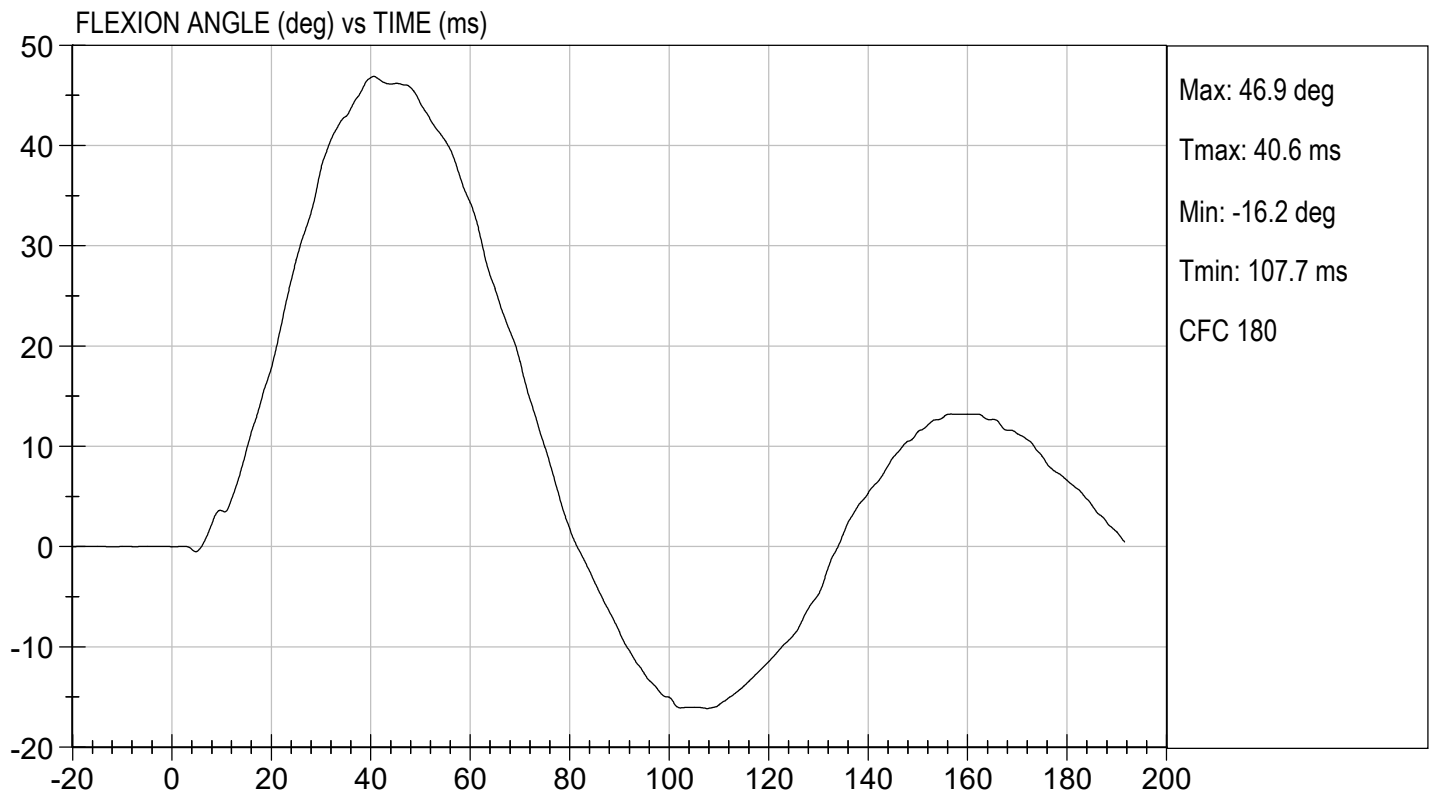
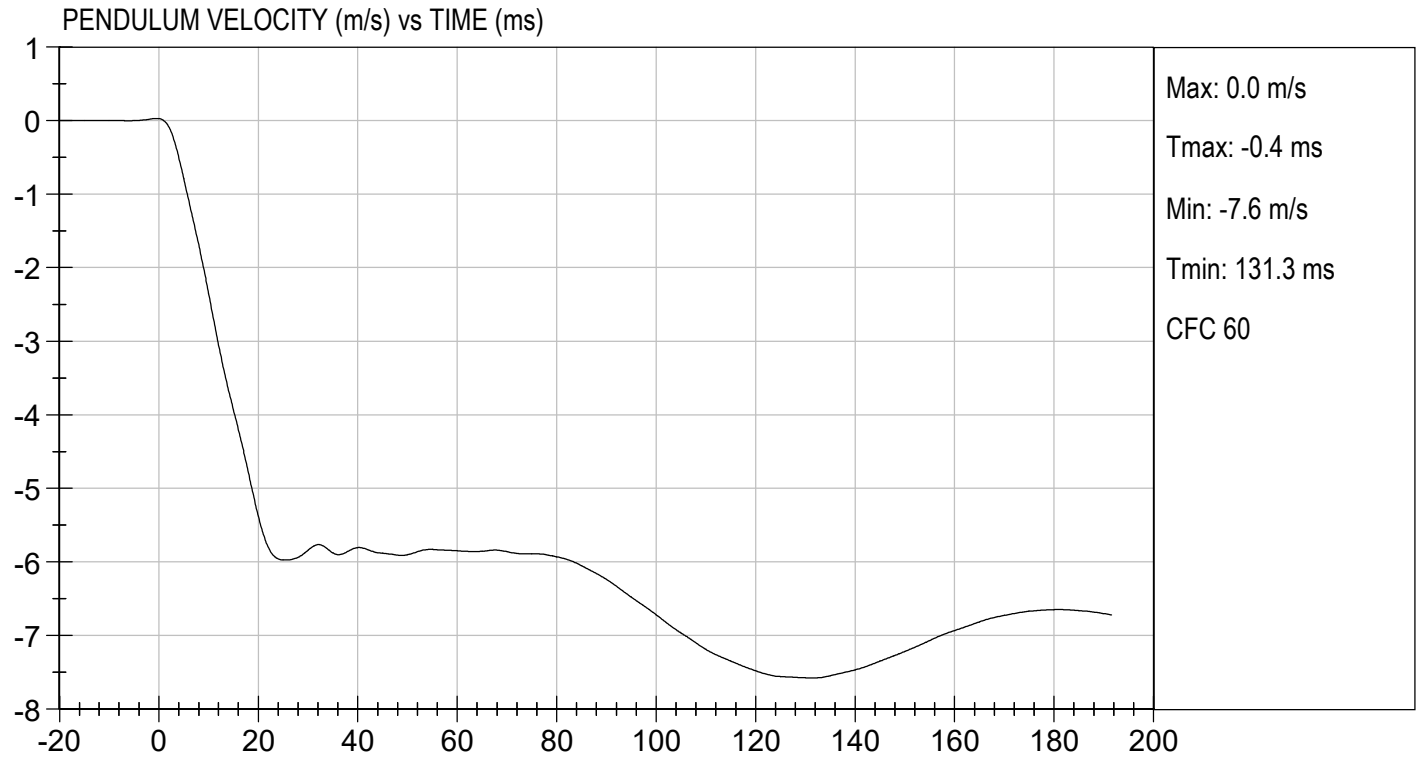
Test I.D.: D191218

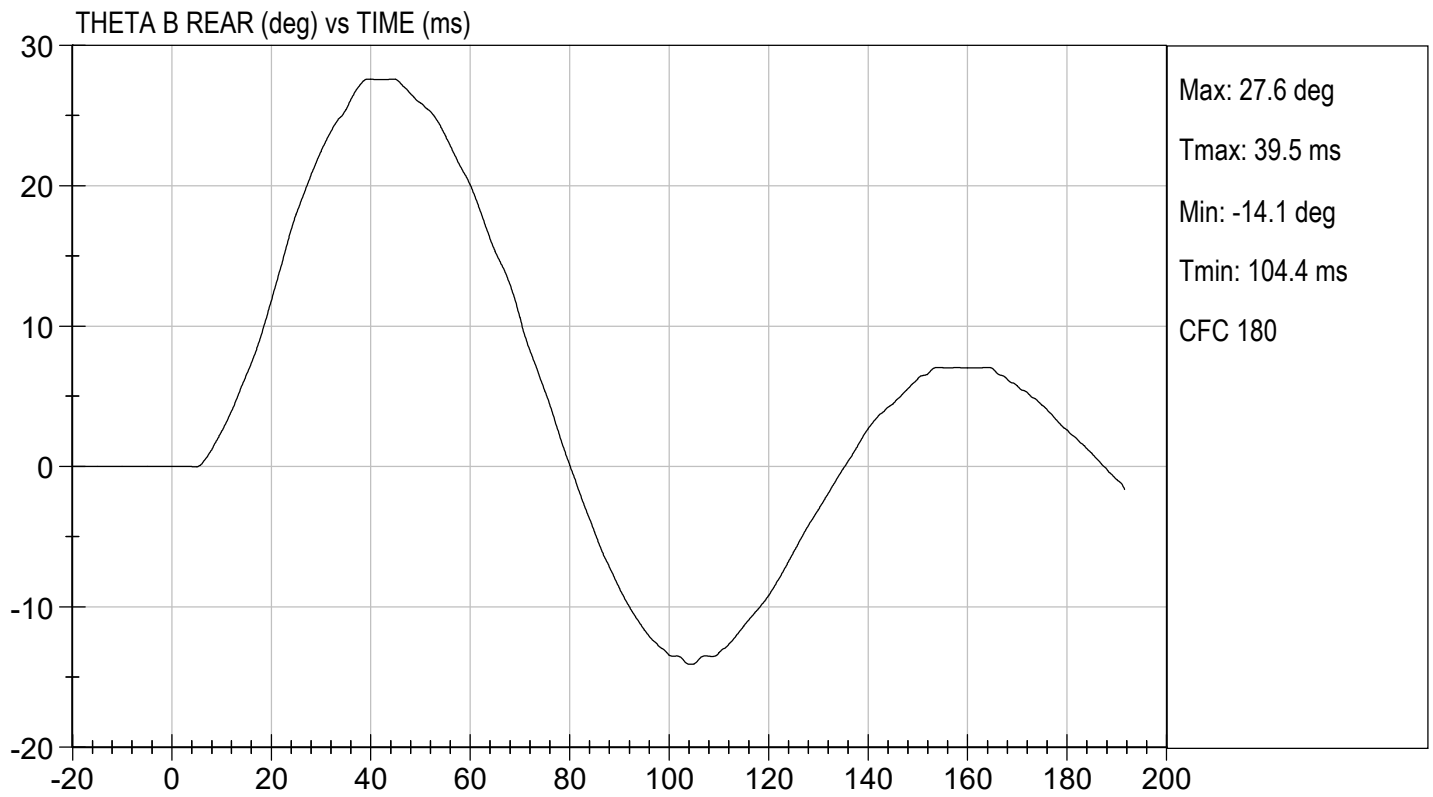
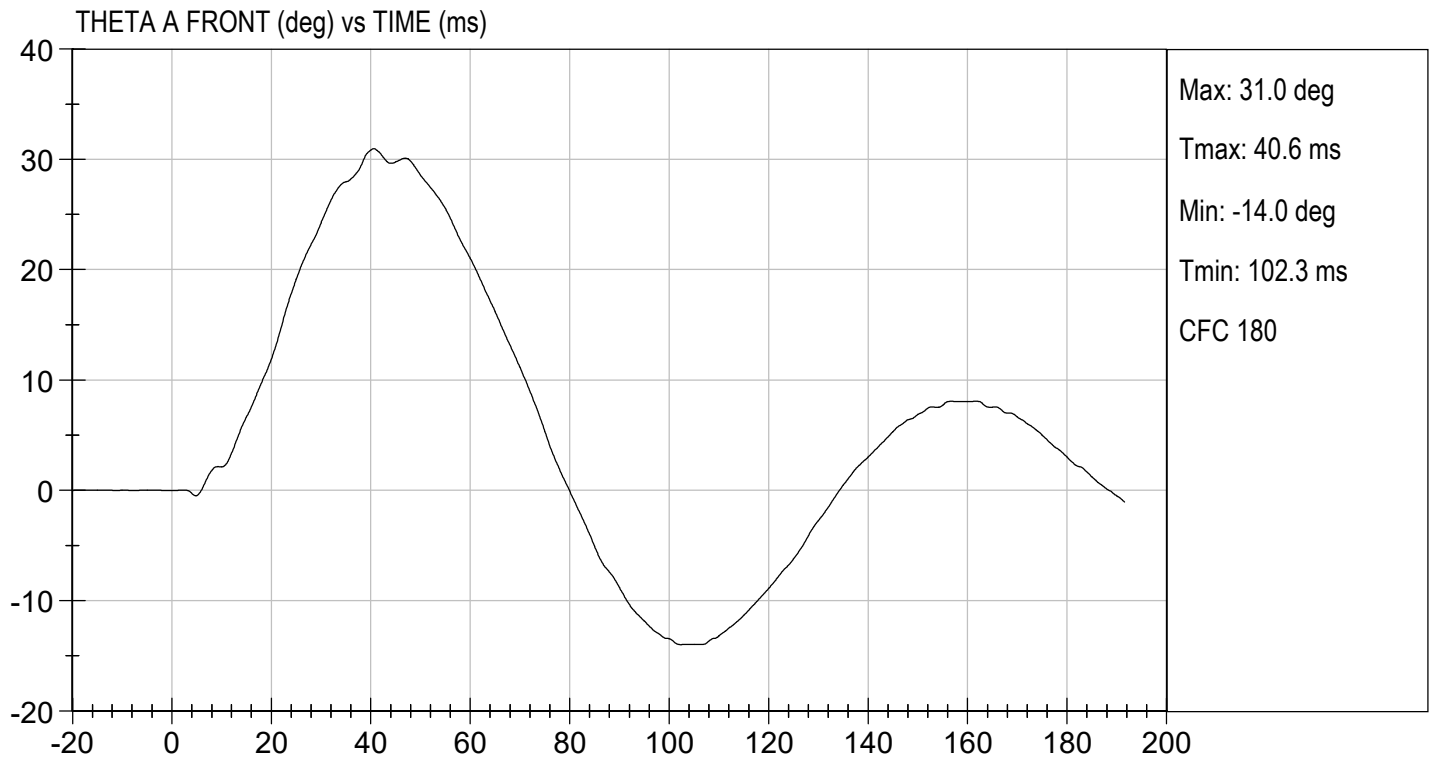
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.421	Pass
	27 ms	m/s	-6.50 to -5.80	-5.96	Pass
	30 ms	m/s	>= -6.50	-5.84	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.9	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	40.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	41	Pass
Overall Results					Pass

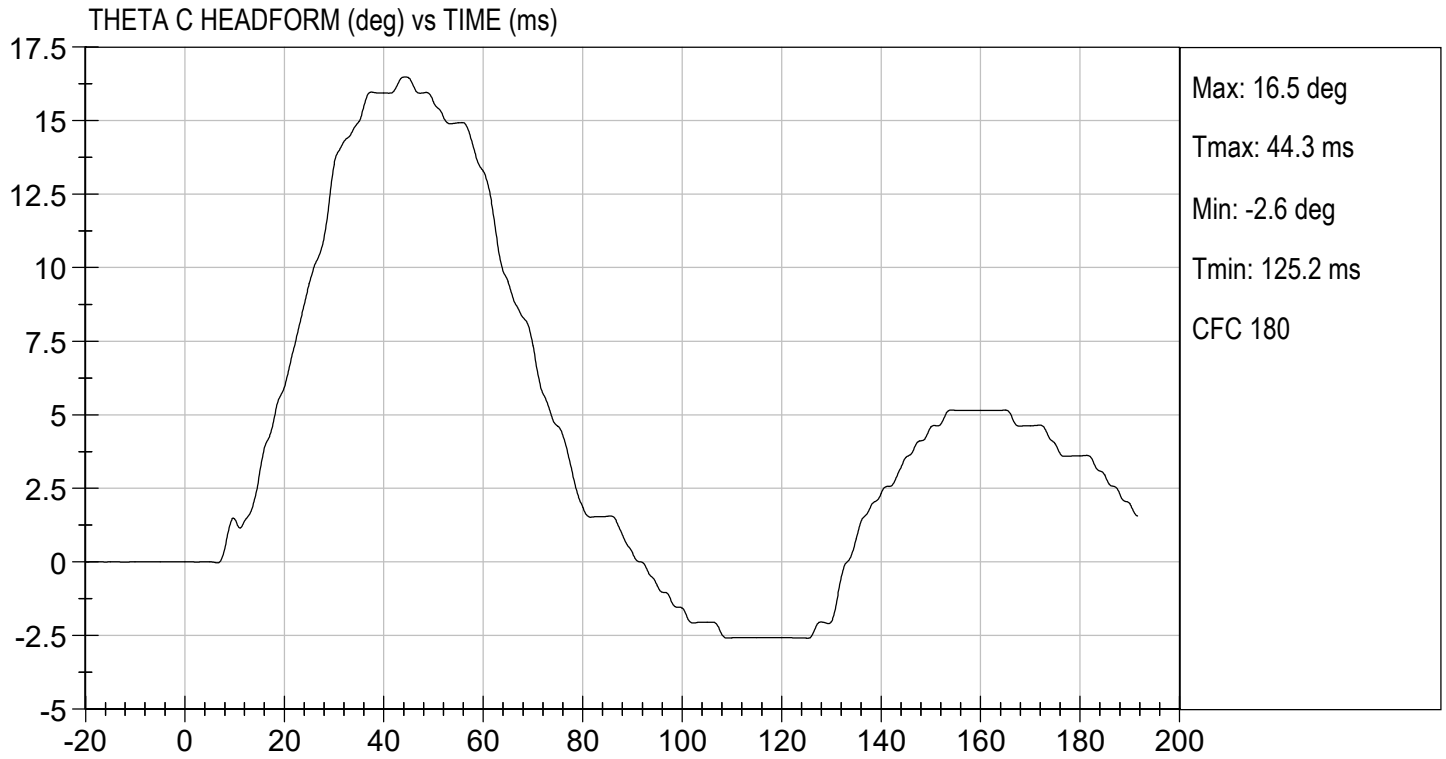

 Laboratory Technician

04/05/2019
 Test Date


 Approved By








MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

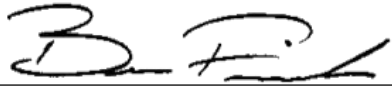
ATD Serial No: 032

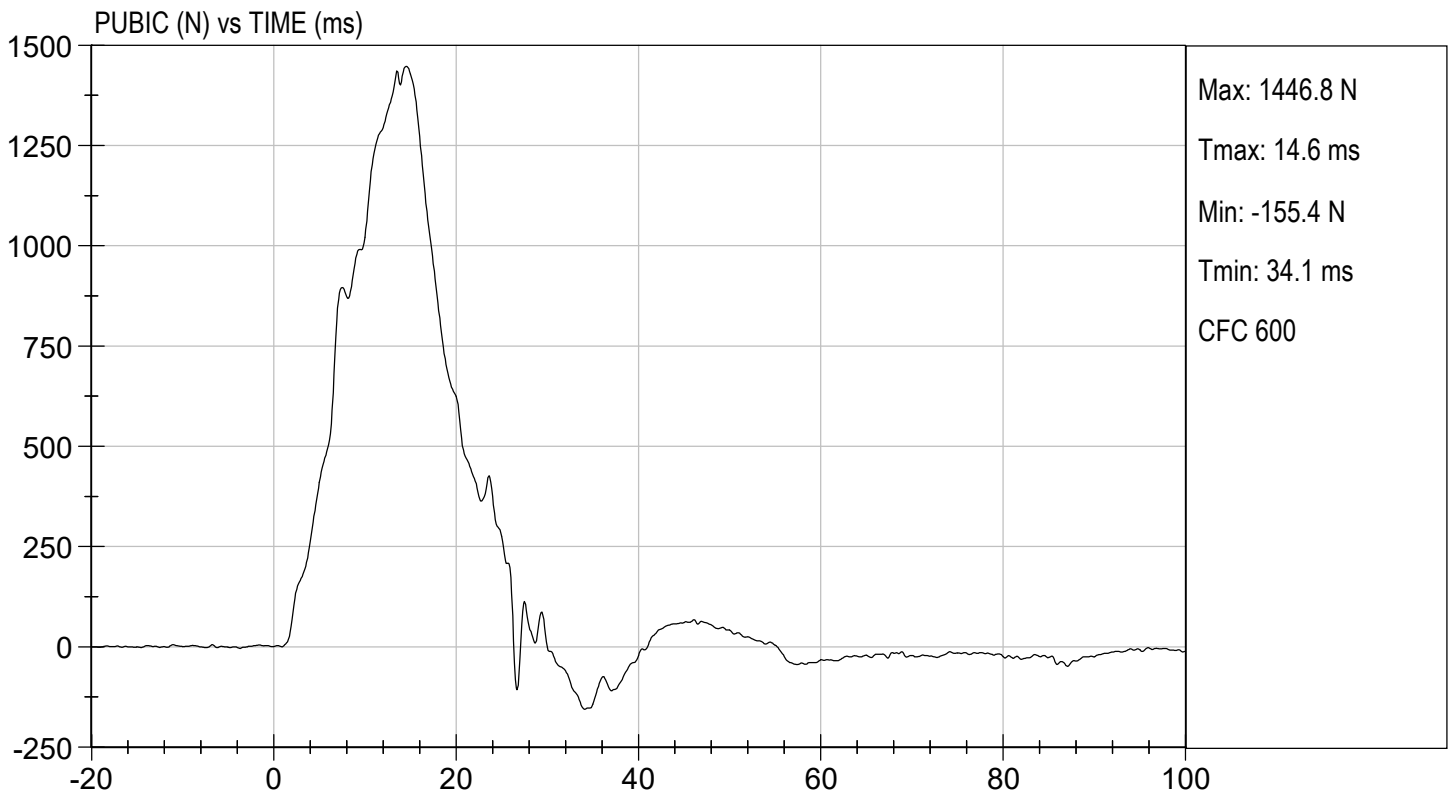
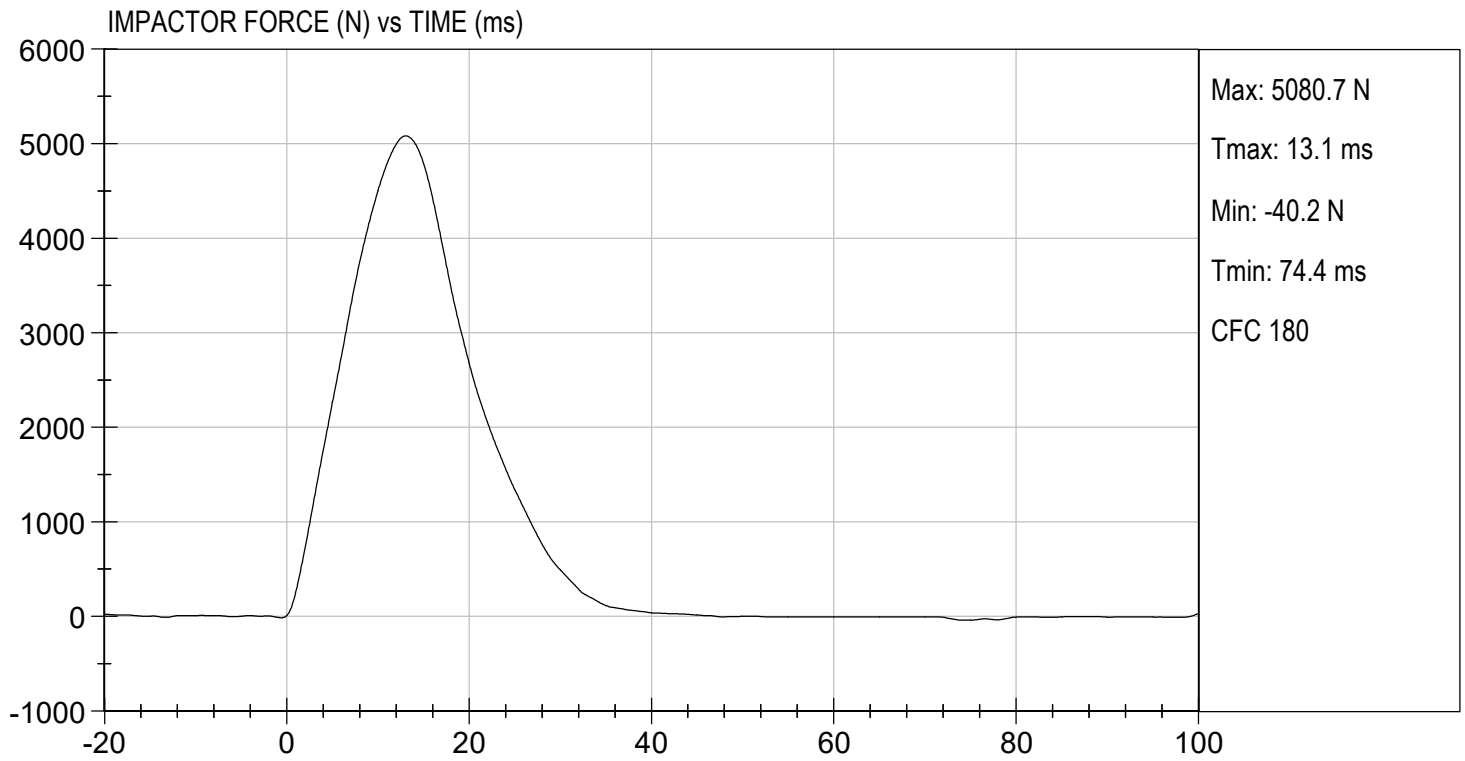
Test I.D: D191219

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Speed	m/s	4.20 to 4.40	4.23	Pass
Maximum Impactor Force	N	4700 to 5400	5081	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.1	Pass
Maximum Pubic Force	N	1230 to 1590	1447	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.6	Pass
Overall Test Results				Pass


Laboratory Technician

04/04/2019
Test Date


Approved By



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

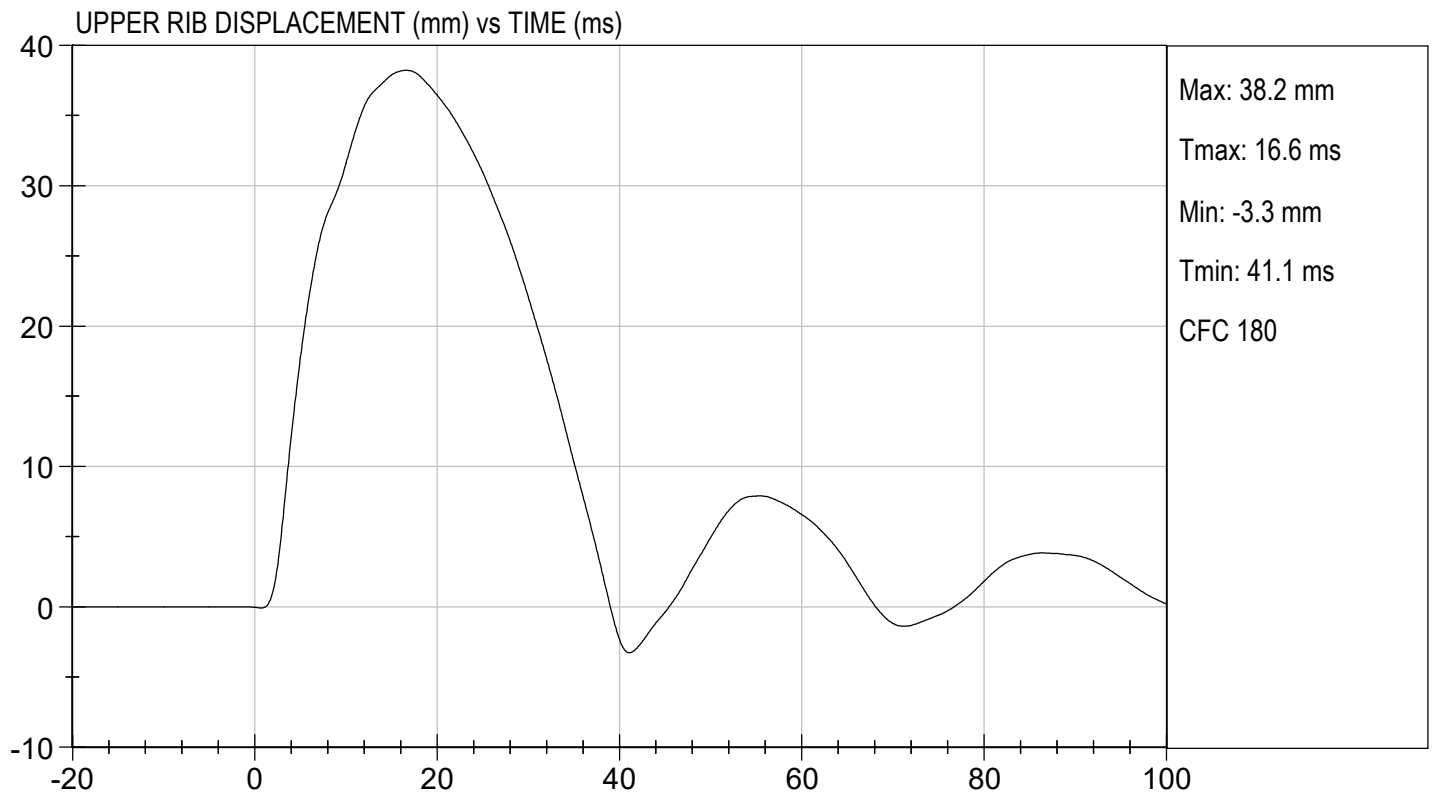
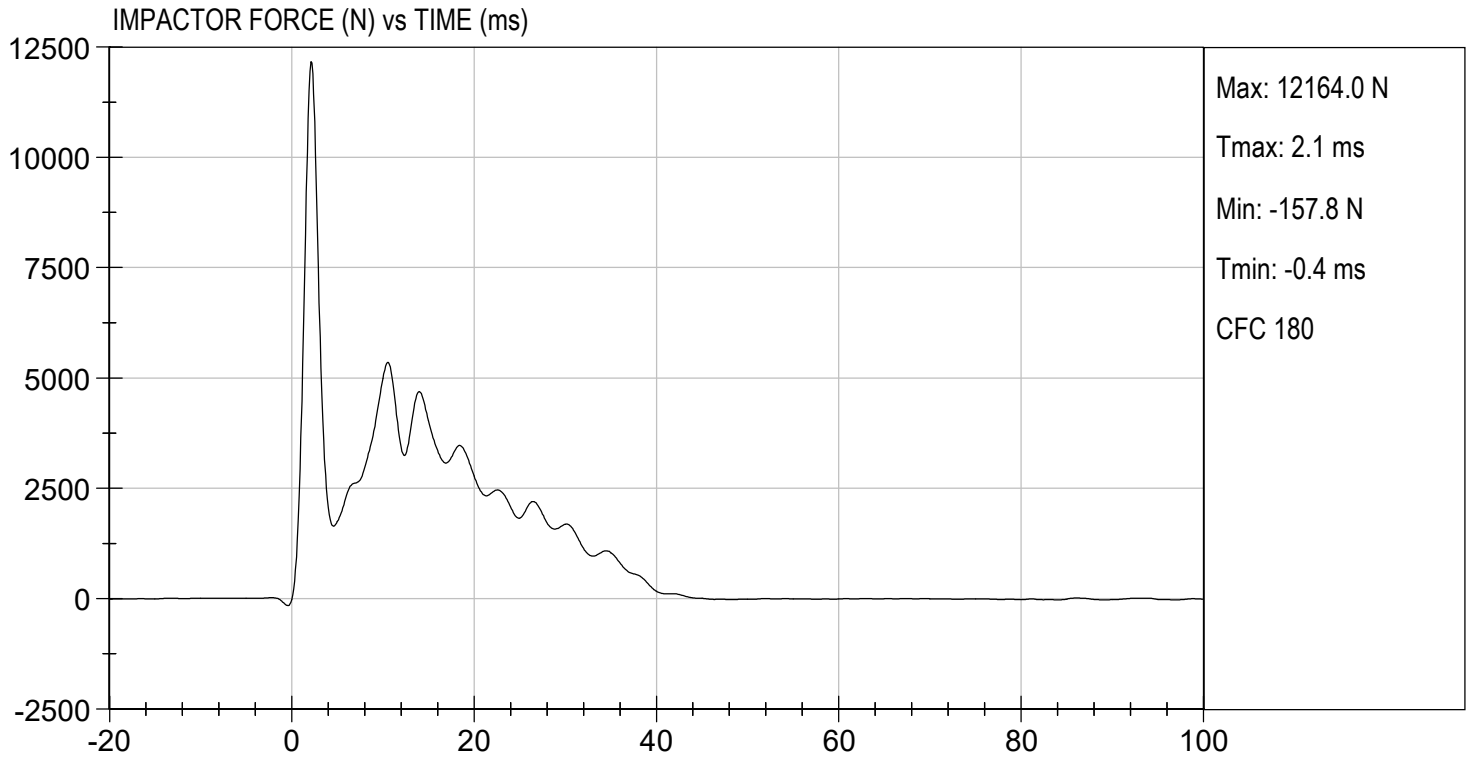
Test I.D: D191210

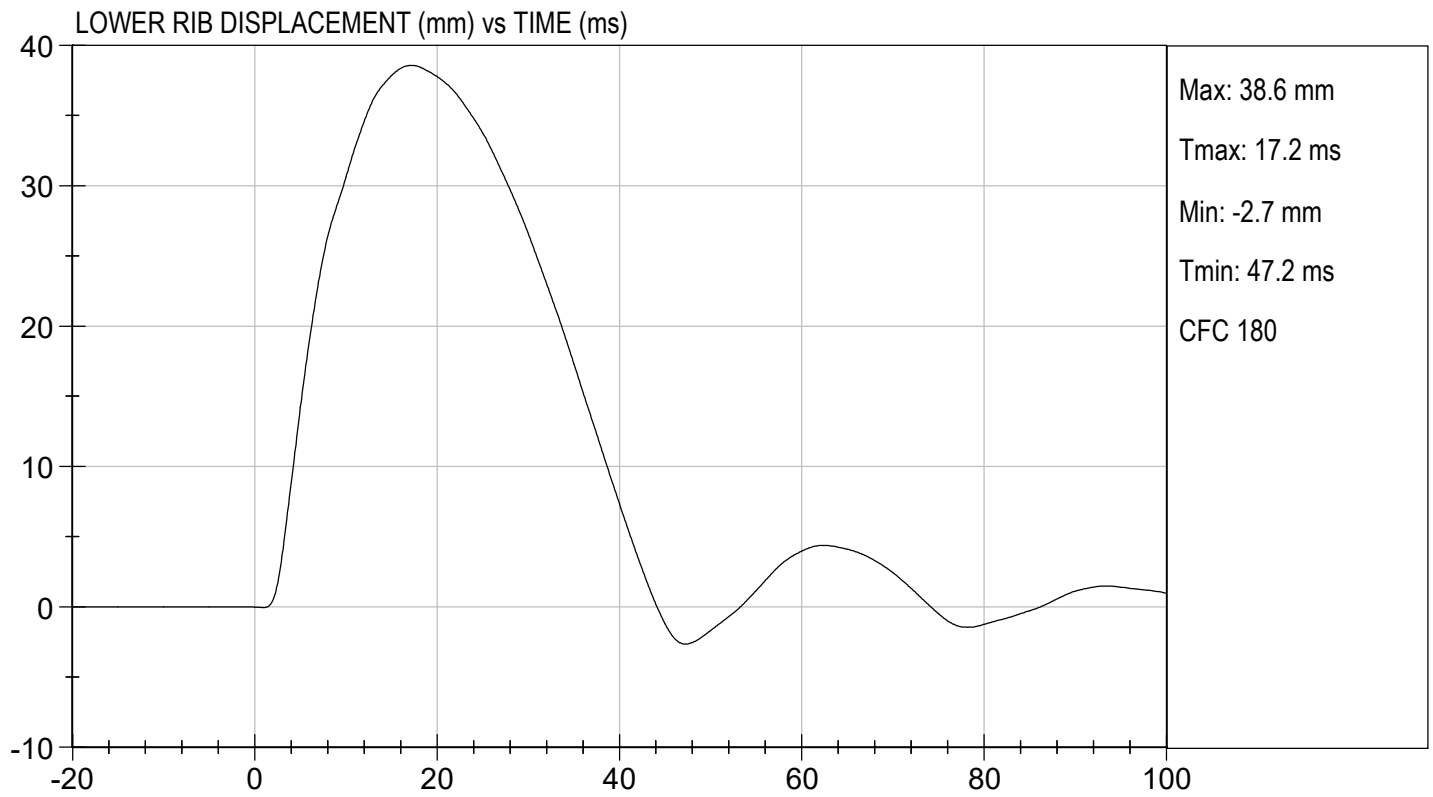
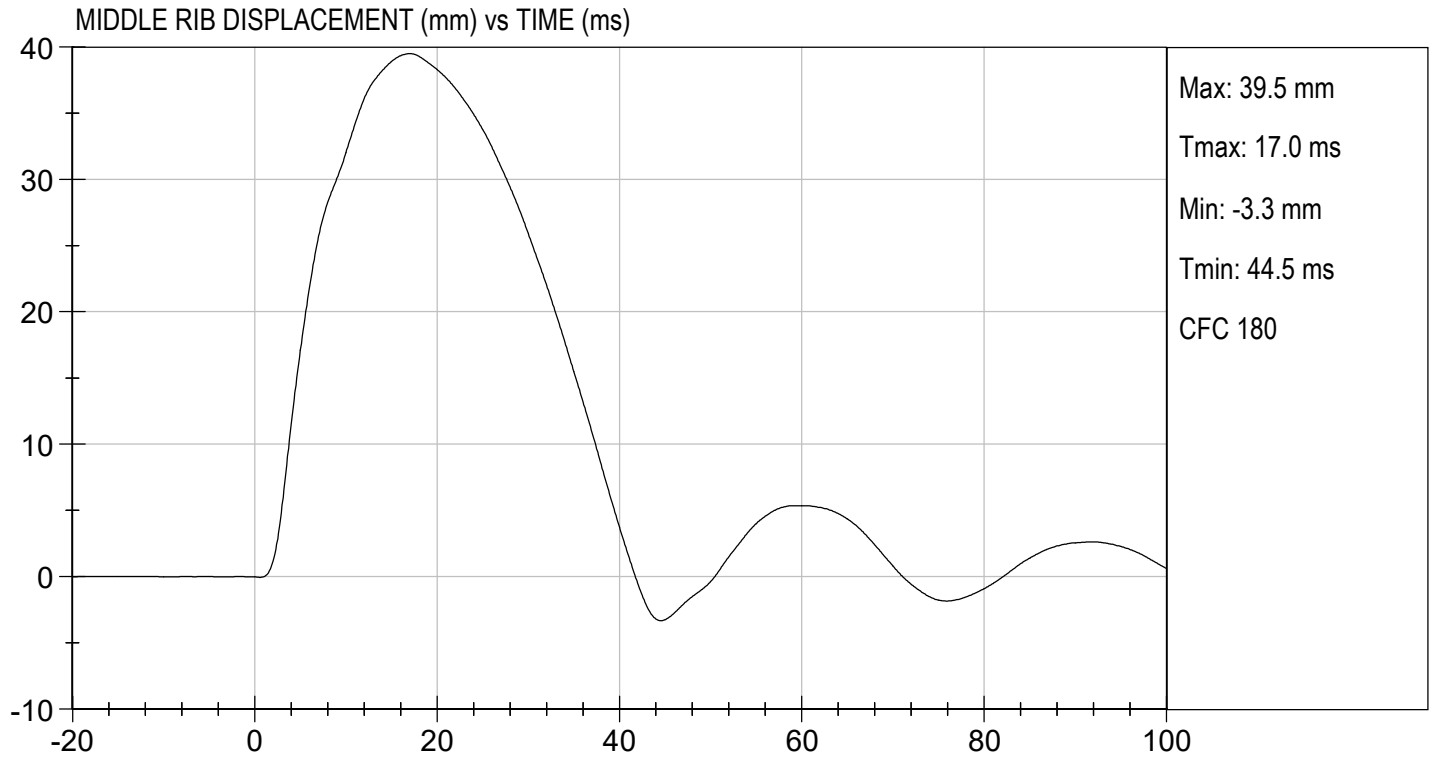
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	26	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5357	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.2	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.5	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.6	Pass
Overall Test Results				Pass

Danielle Redinlaugh
 Laboratory Technician

04/04/2019
 Test Date

B. F. K.
 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

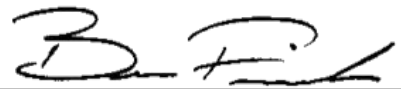
ATD Serial No: 032

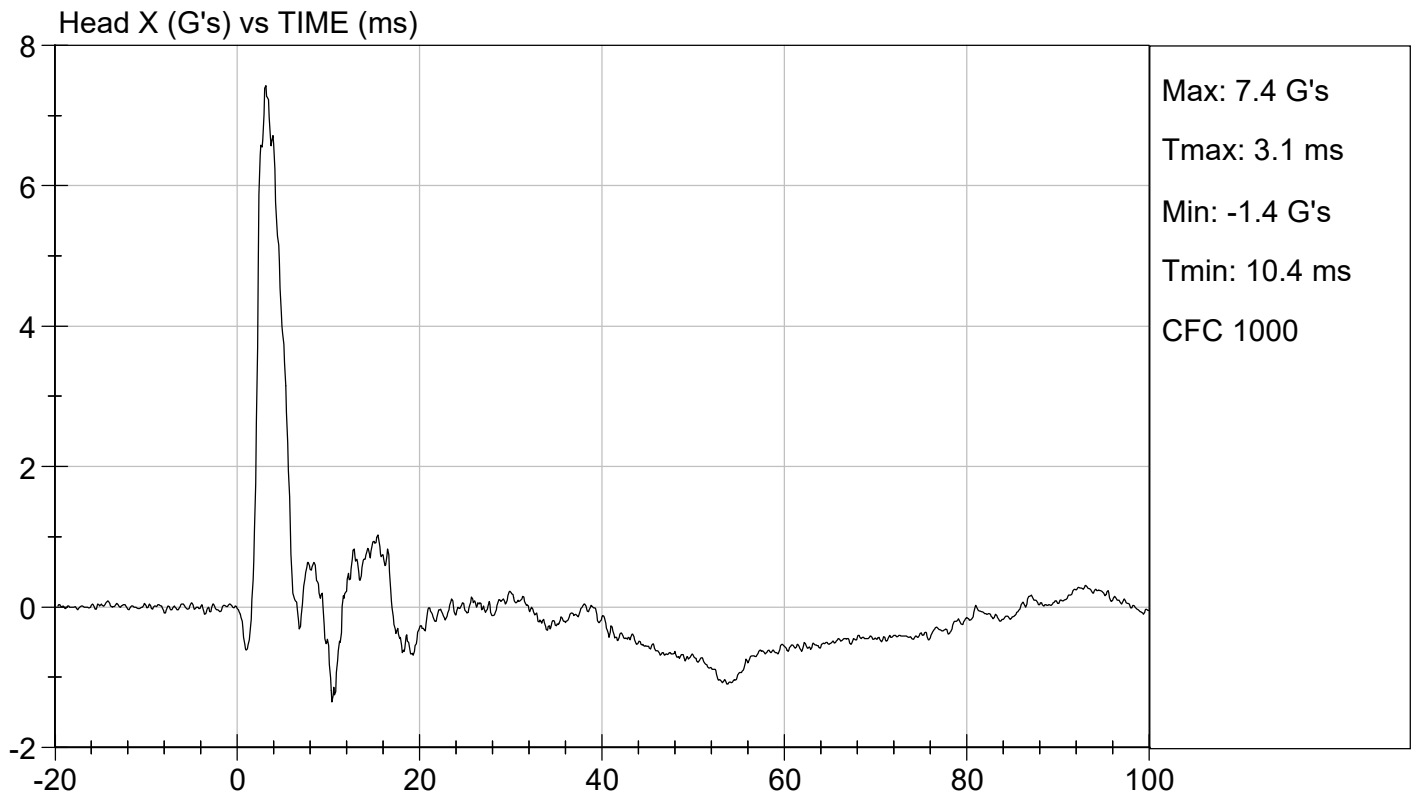
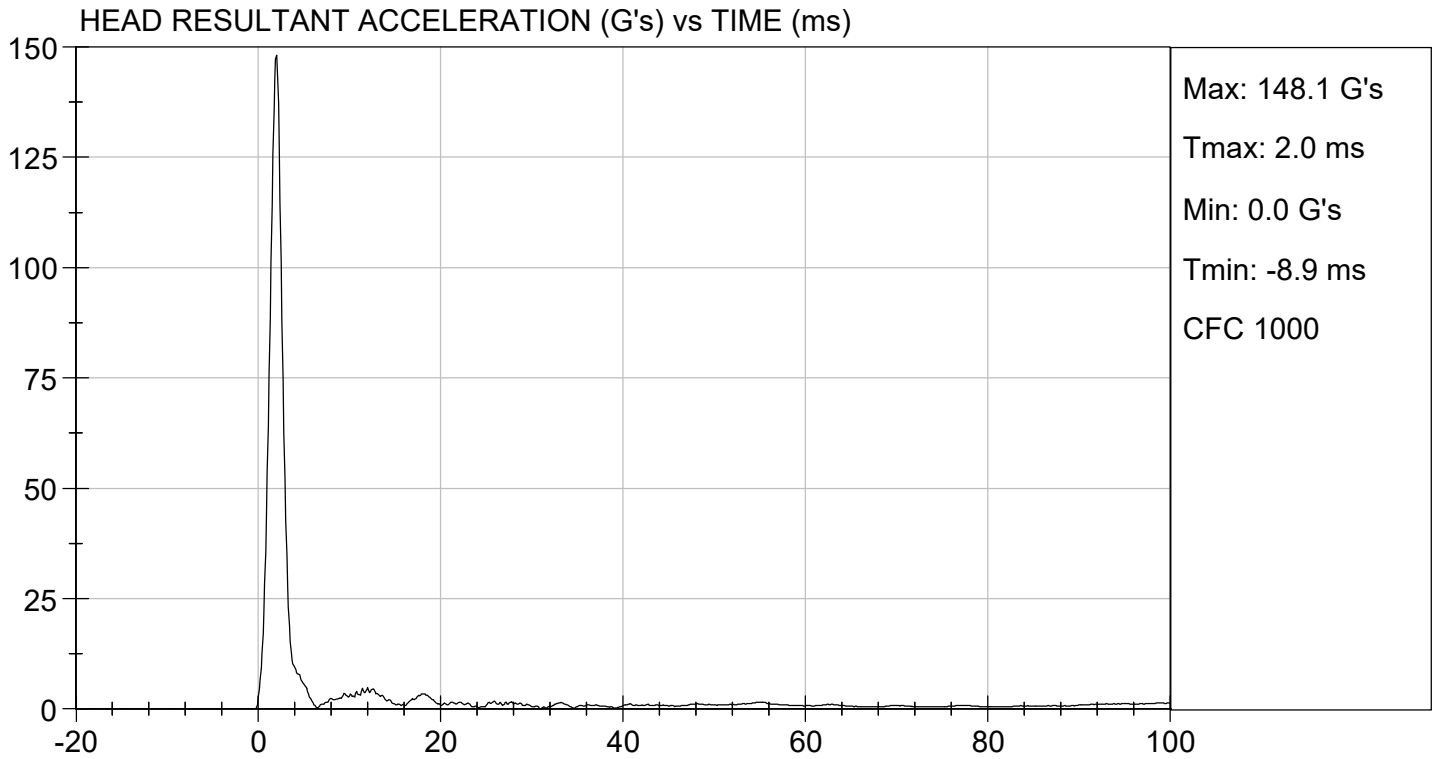
Test ID: D191591

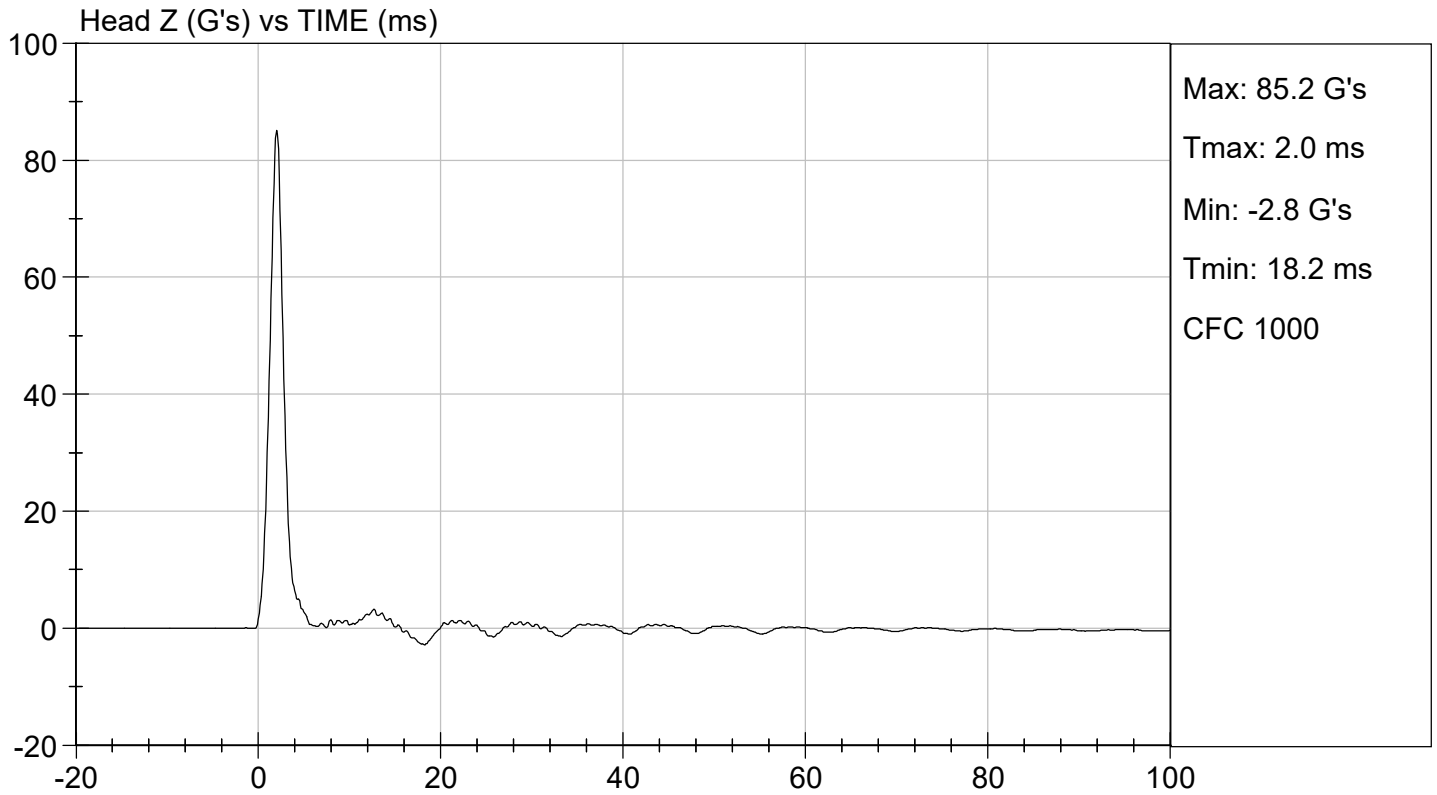
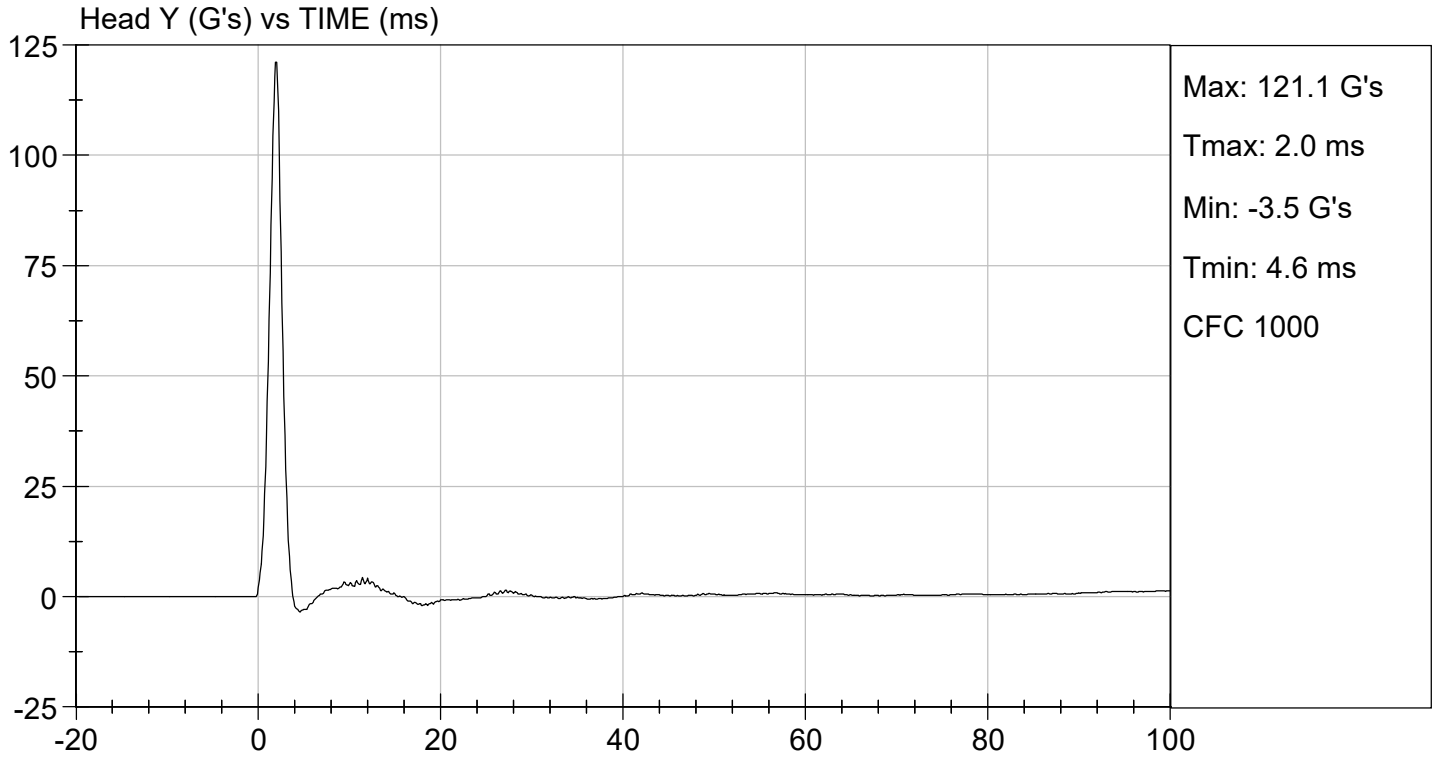
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	125 to 155	148	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

05/14/2019
 Test Date


 Approved By





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

ATD Serial No: 032

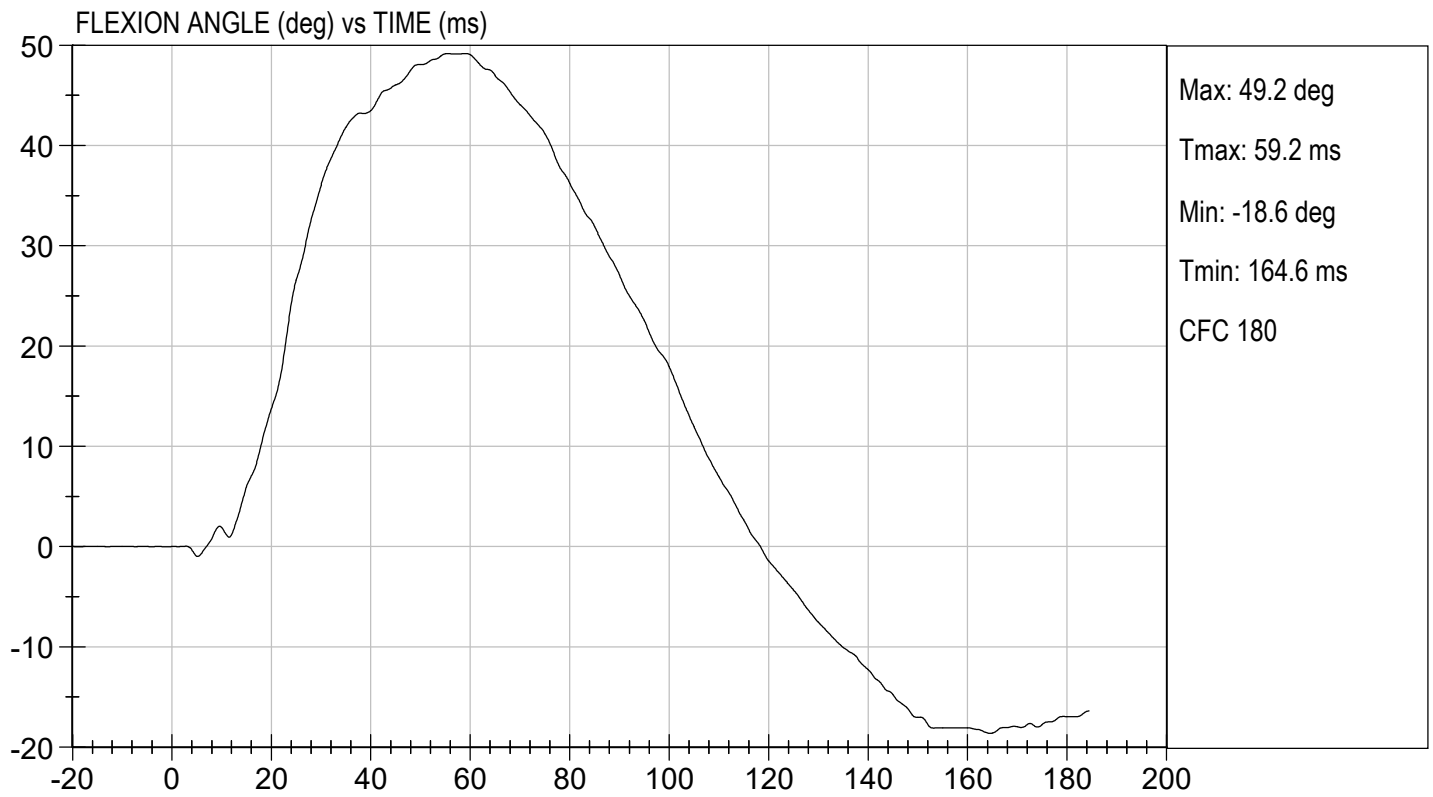
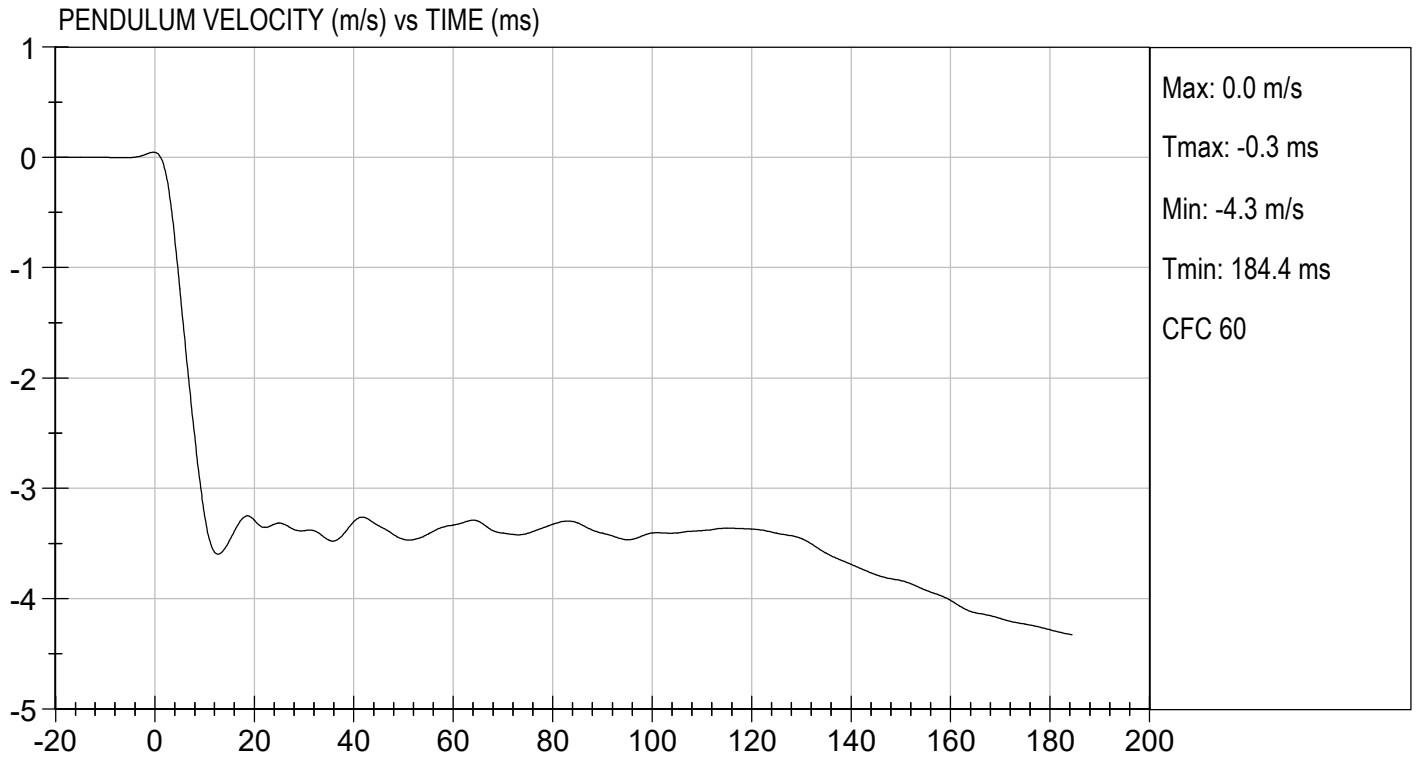
Test I.D.: D191592

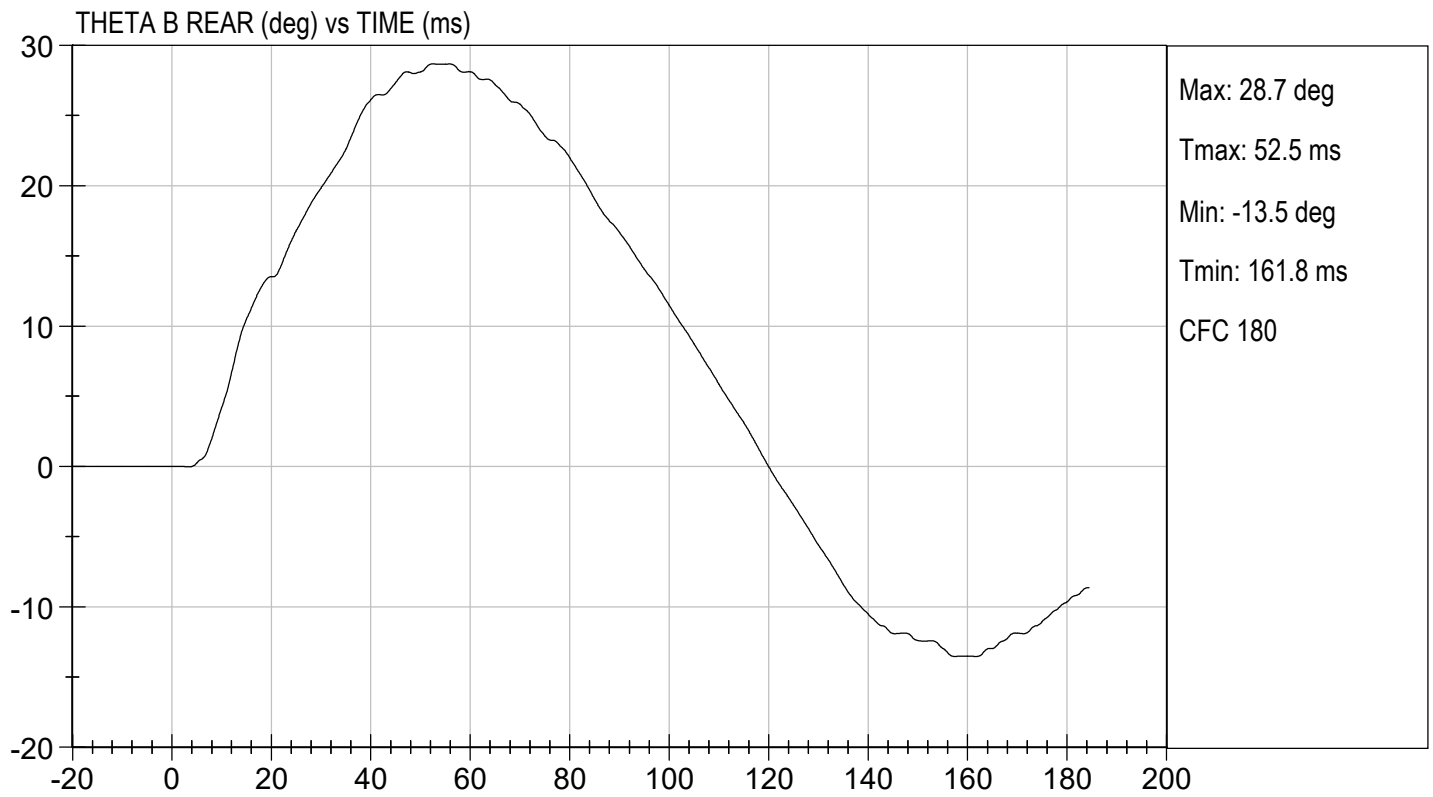
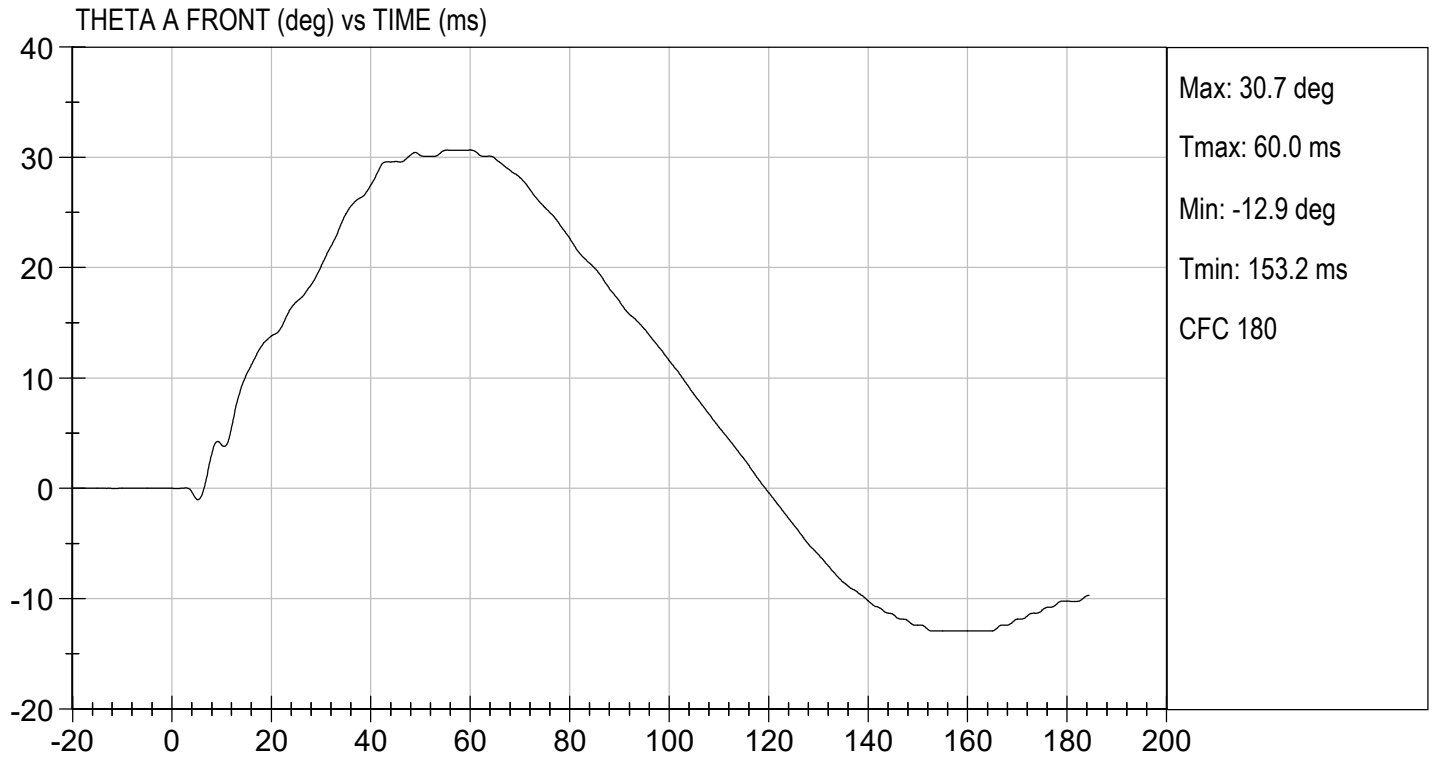
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass	
Laboratory Relative Humidity	%	10 to 70	33	Pass	
Pendulum Speed	m/s	3.30 to 3.50	3.32	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.36	Pass
	14 ms	m/s	-3.20 to -3.70	-3.55	Pass
	17 ms	m/s	>= -3.70	-3.31	Pass
Maximum Flexion Angle	deg	49.0 to 59.0	49.2	Pass	
Time of Maximum Flexion Angle	ms	54.0 to 66.0	59.2	Pass	
Head Rotation Decay Time to 0 Degree	ms	53.0 to 88.0	59.2	Pass	
Overall Results				Pass	

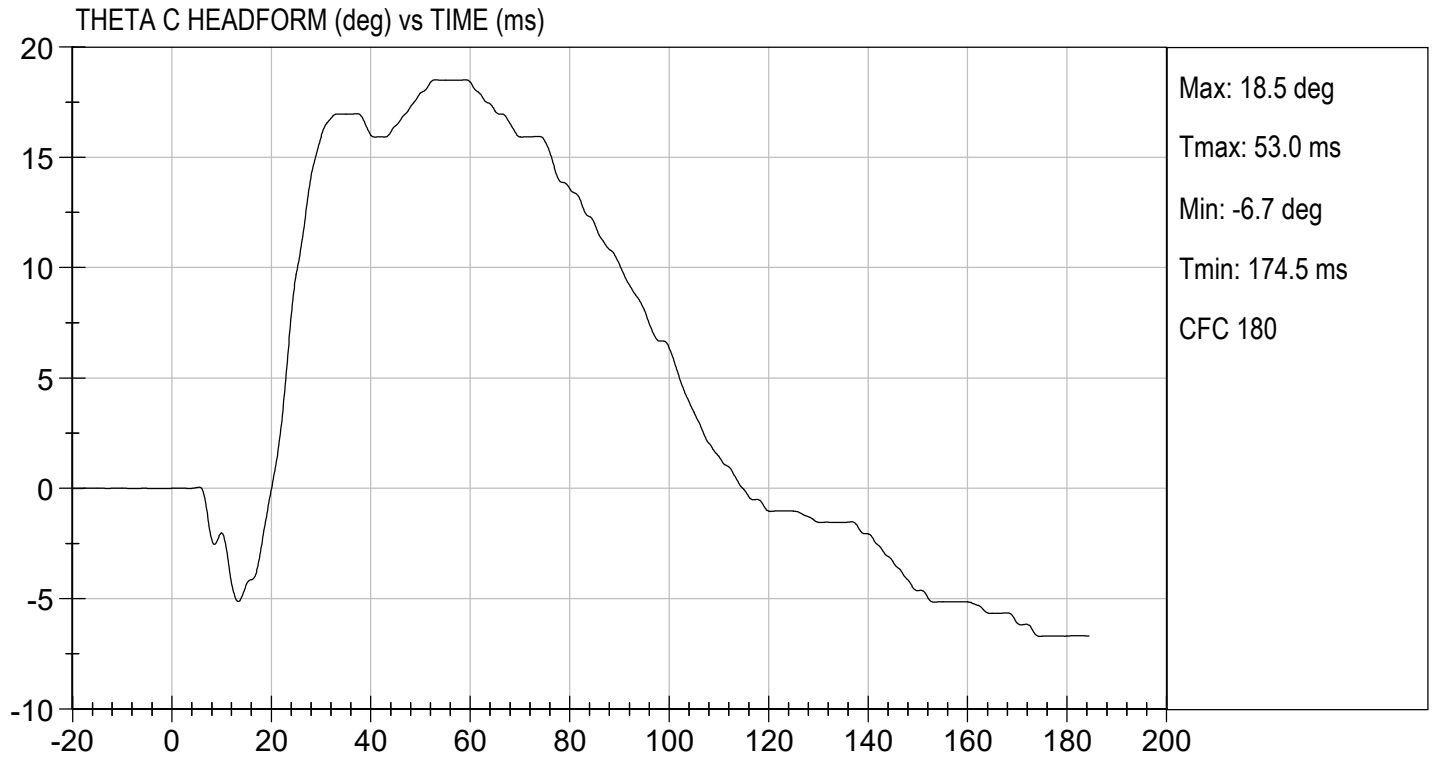
Danielle Redinlaugh
Laboratory Technician

05/14/2019
Test Date

B. F.
Approved By








MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

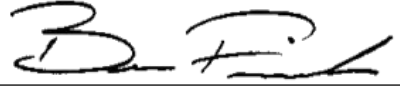
ATD Serial No: 032

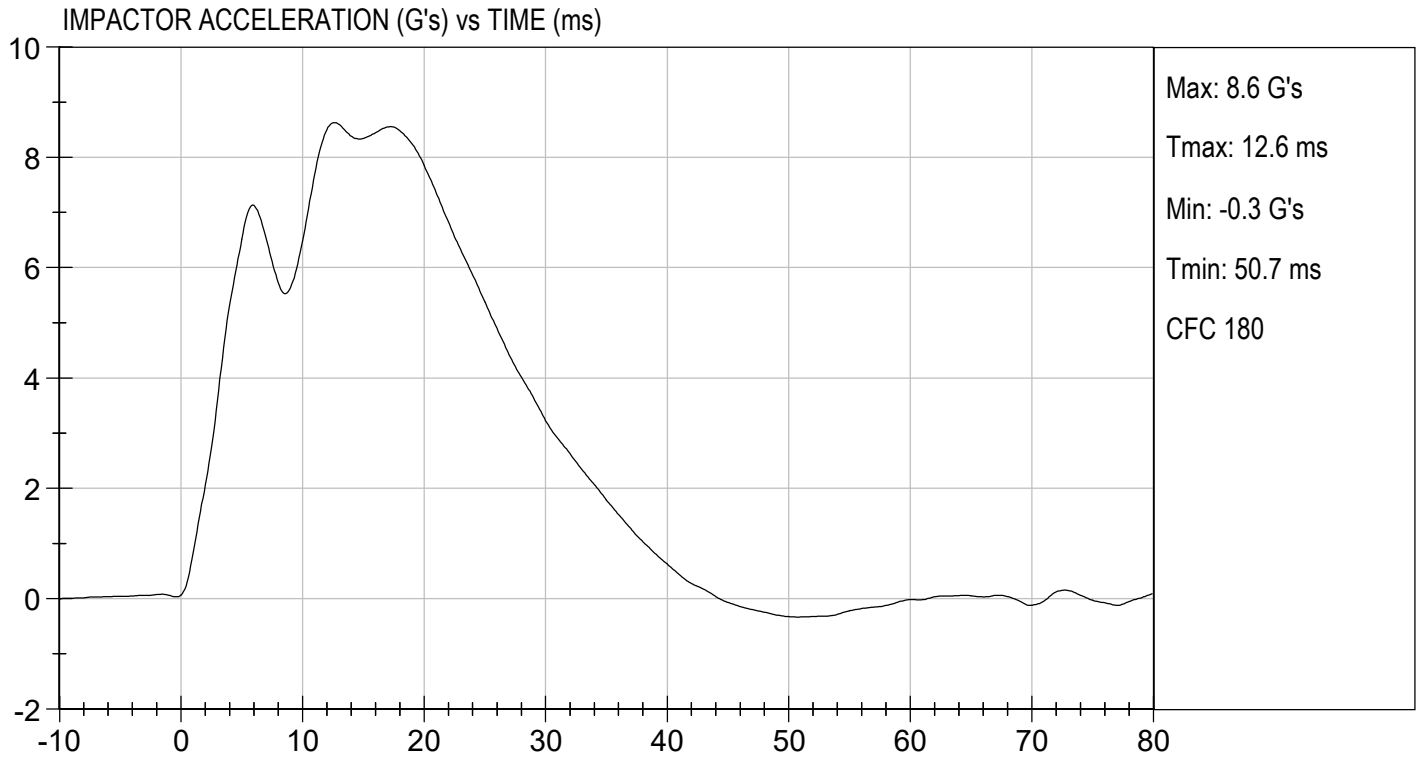
Test I.D: D191593

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	4.23	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.6	Pass
Overall Test Results				Pass


Laboratory Technician

05/13/2019
Test Date


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UPPER RIB TEST

ES-2re DUMMY

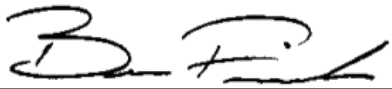
ATD Serial No: 032

Test I.D: D191594

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.3	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.2	Pass
Overall Test Results				Pass

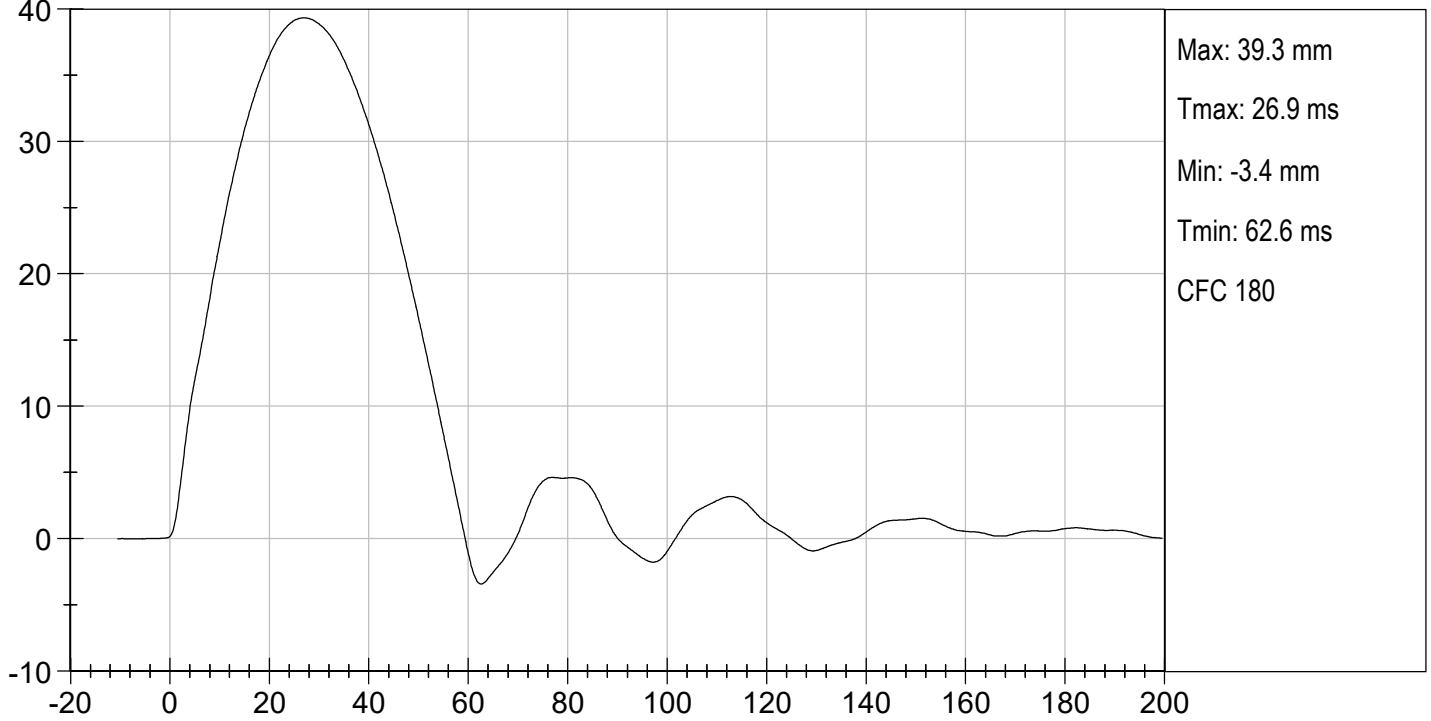

Laboratory Technician

05/14/2019
Test Date

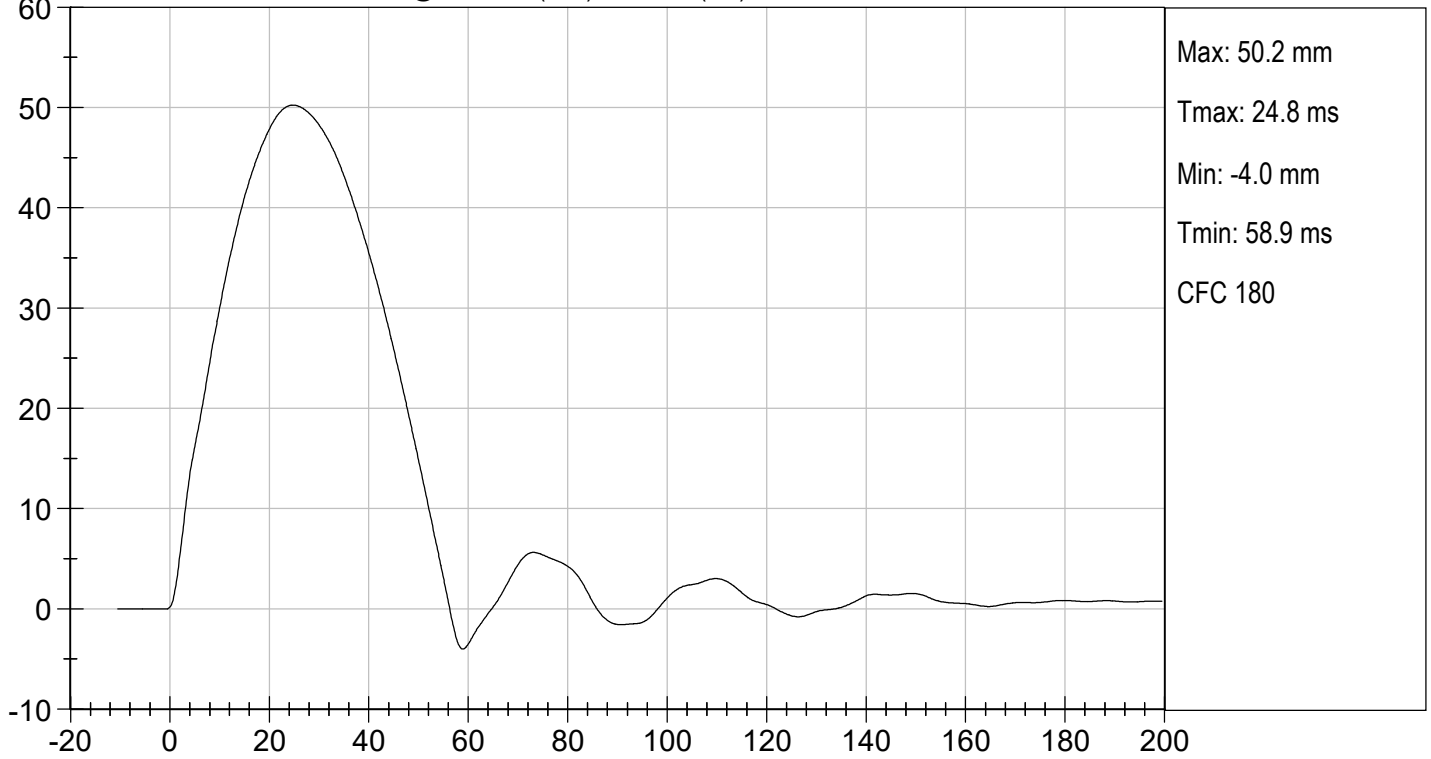

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UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



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



MGA RESEARCH CORPORATION

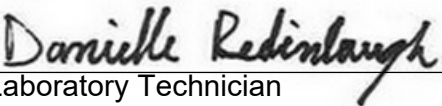
MID RIB TEST

ES-2re DUMMY

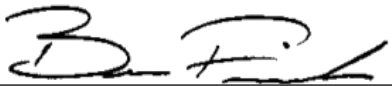
ATD Serial No: 032

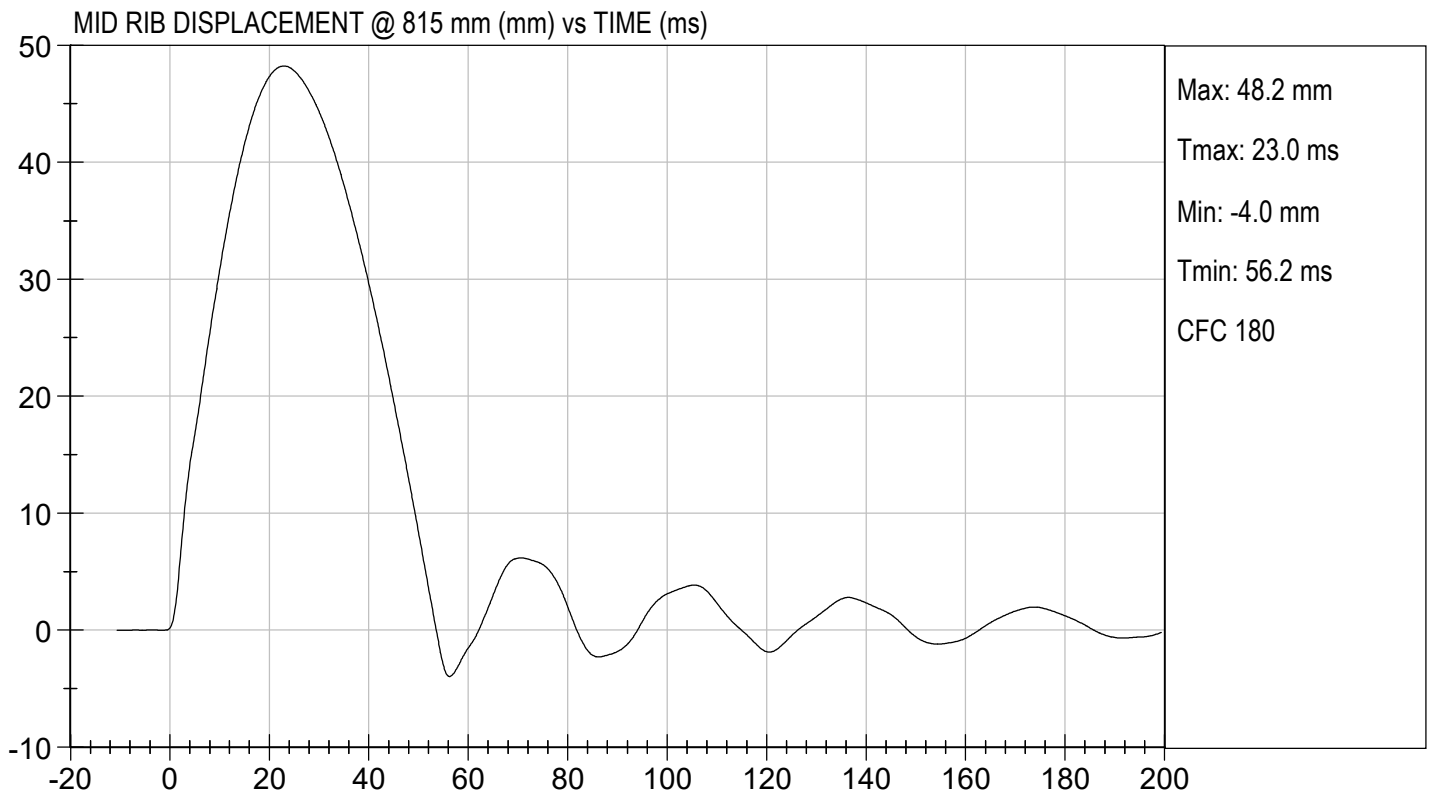
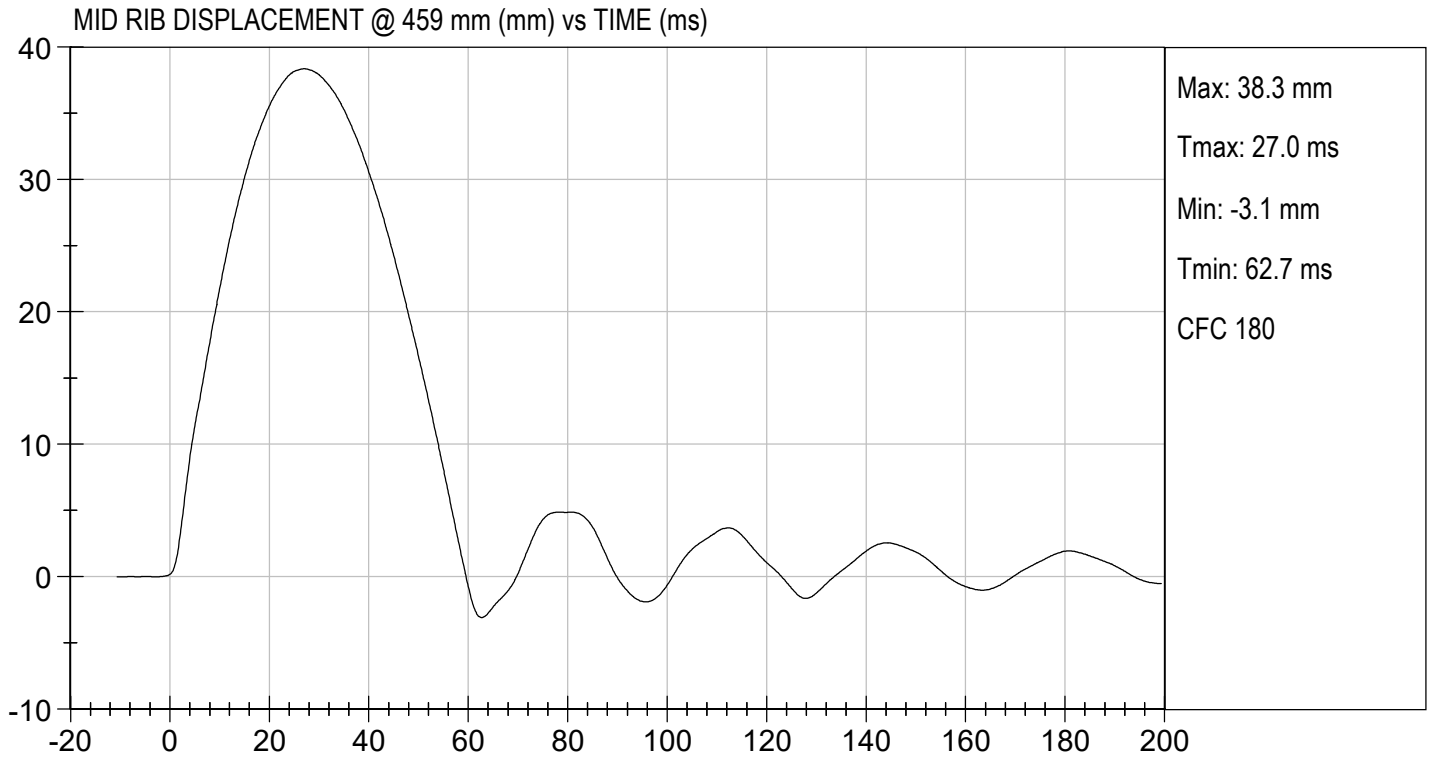
Test I.D: D191595

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.2	Pass
Overall Test Results				Pass


Laboratory Technician

05/14/2019
Test Date


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MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D191596

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.9	Pass
Overall Test Results				Pass

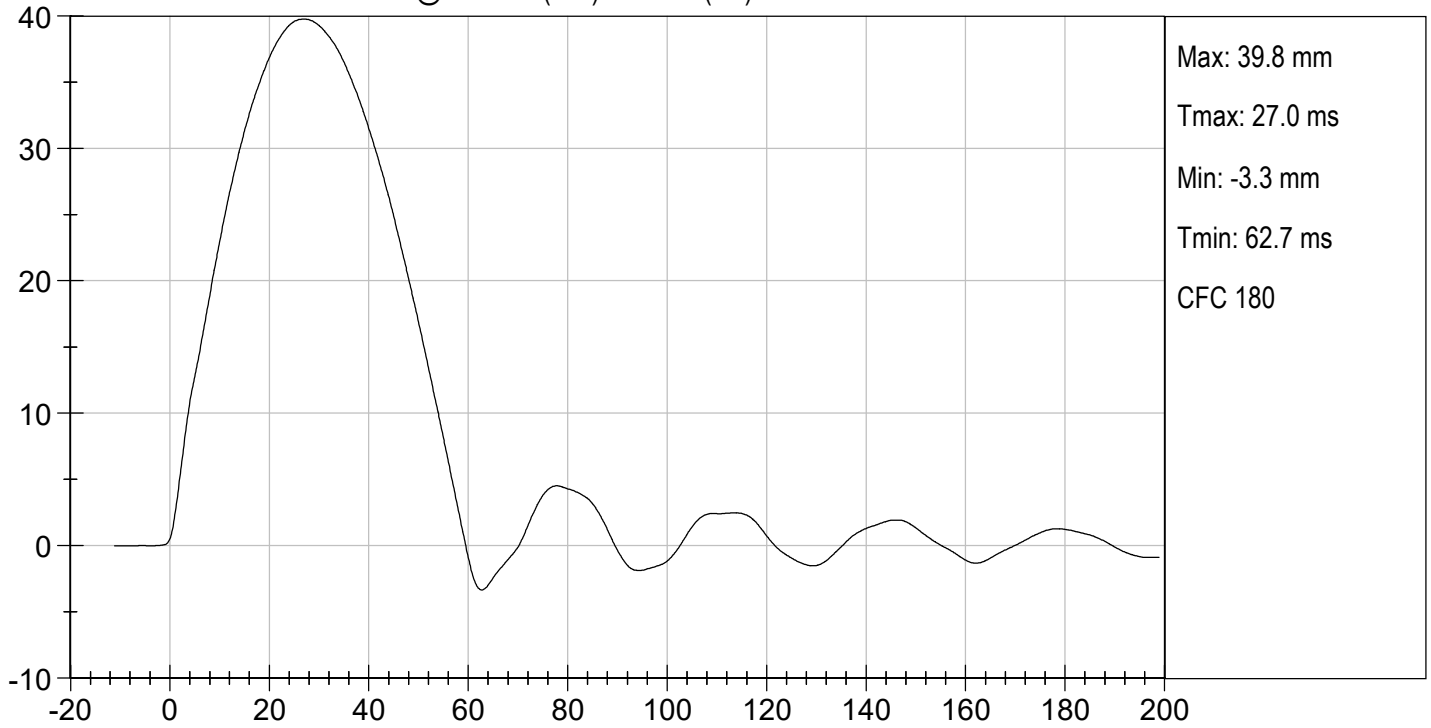
Danielle Redinlaugh
Laboratory Technician

05/14/2019
Test Date

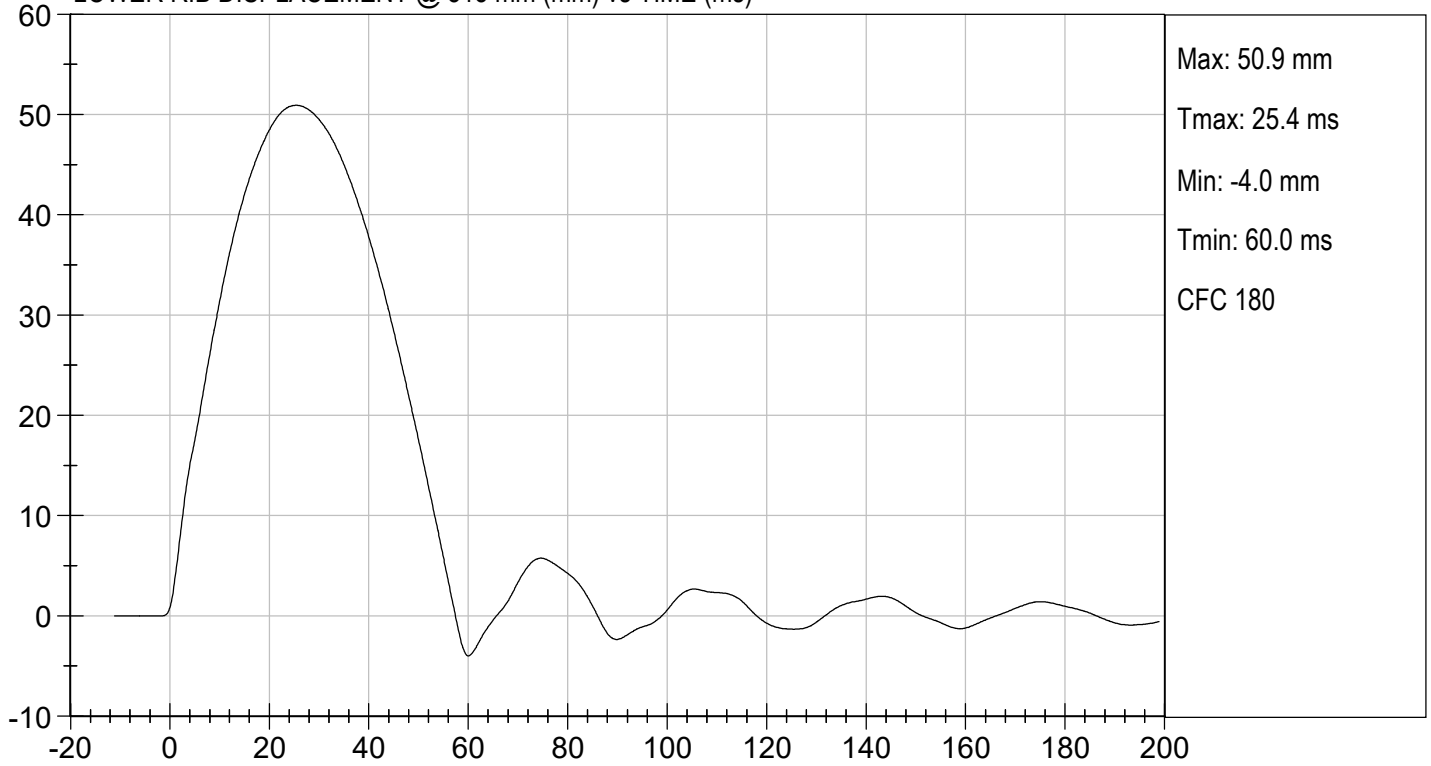
B. F. K.
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LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



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



MGA RESEARCH CORPORATION


ABDOMEN TEST

ES-2re DUMMY

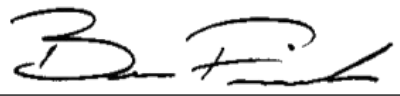
ATD Serial No: 032

Test I.D: D191597

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	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4295	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.5	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2292	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.5	Pass
Overall Test Results				Pass


Laboratory Technician

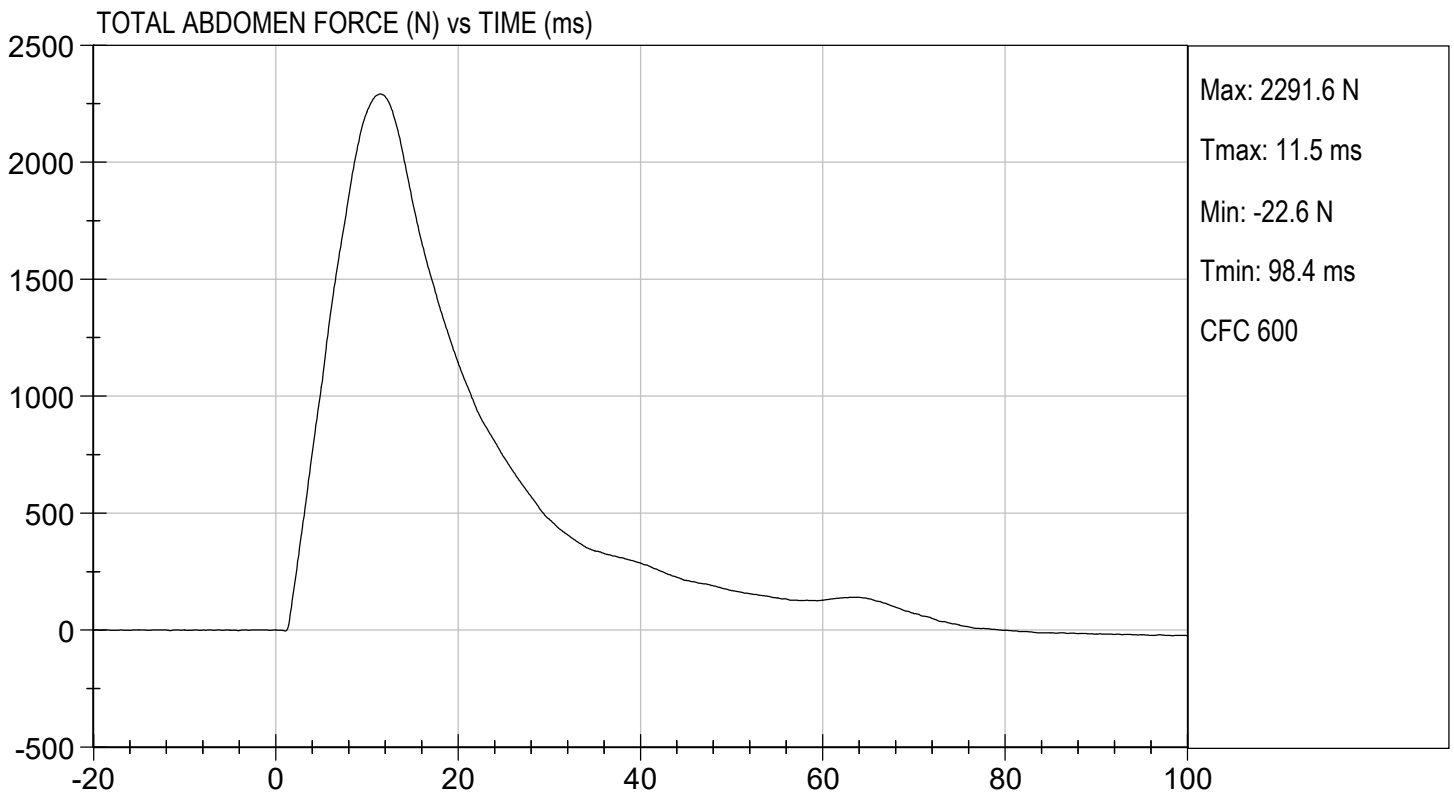
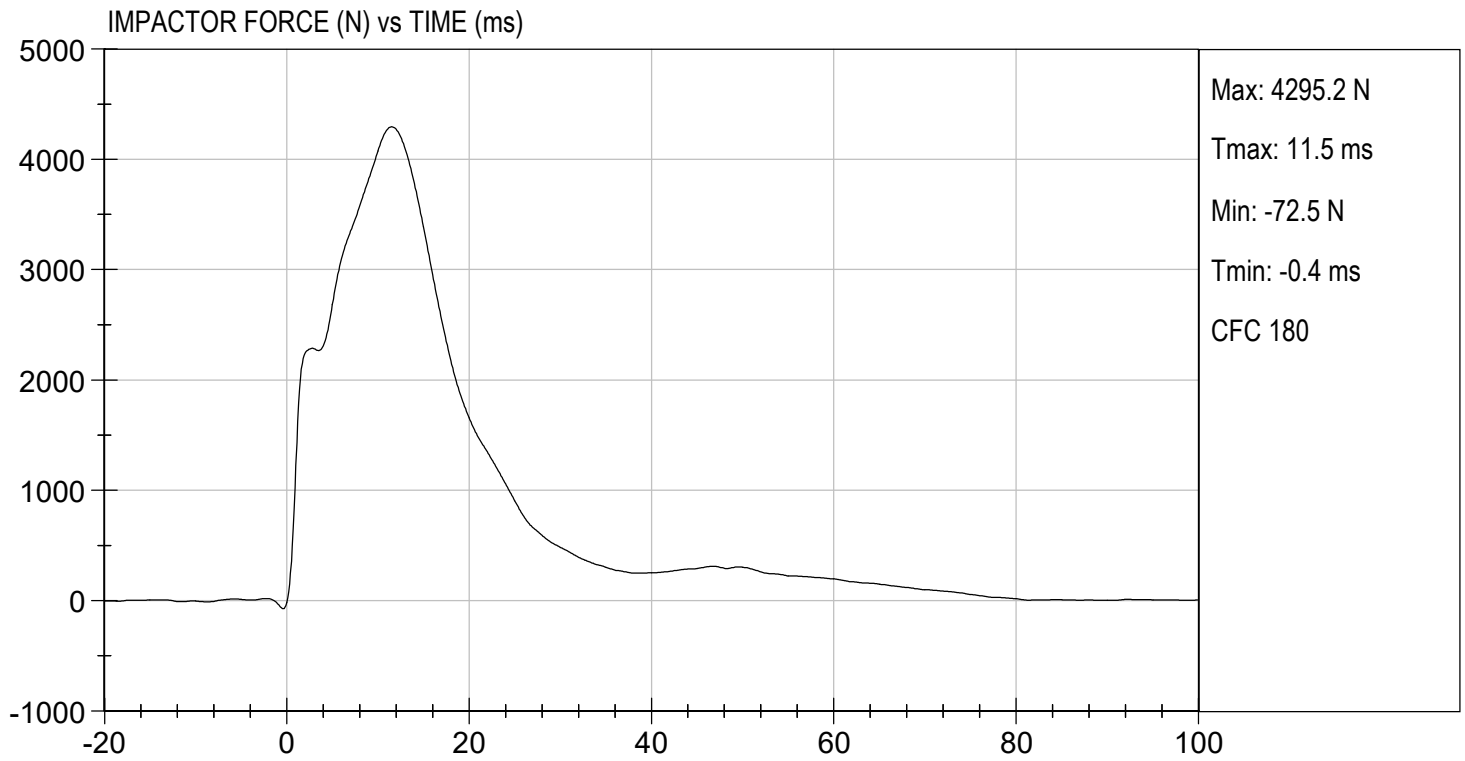
05/13/2019
Test Date

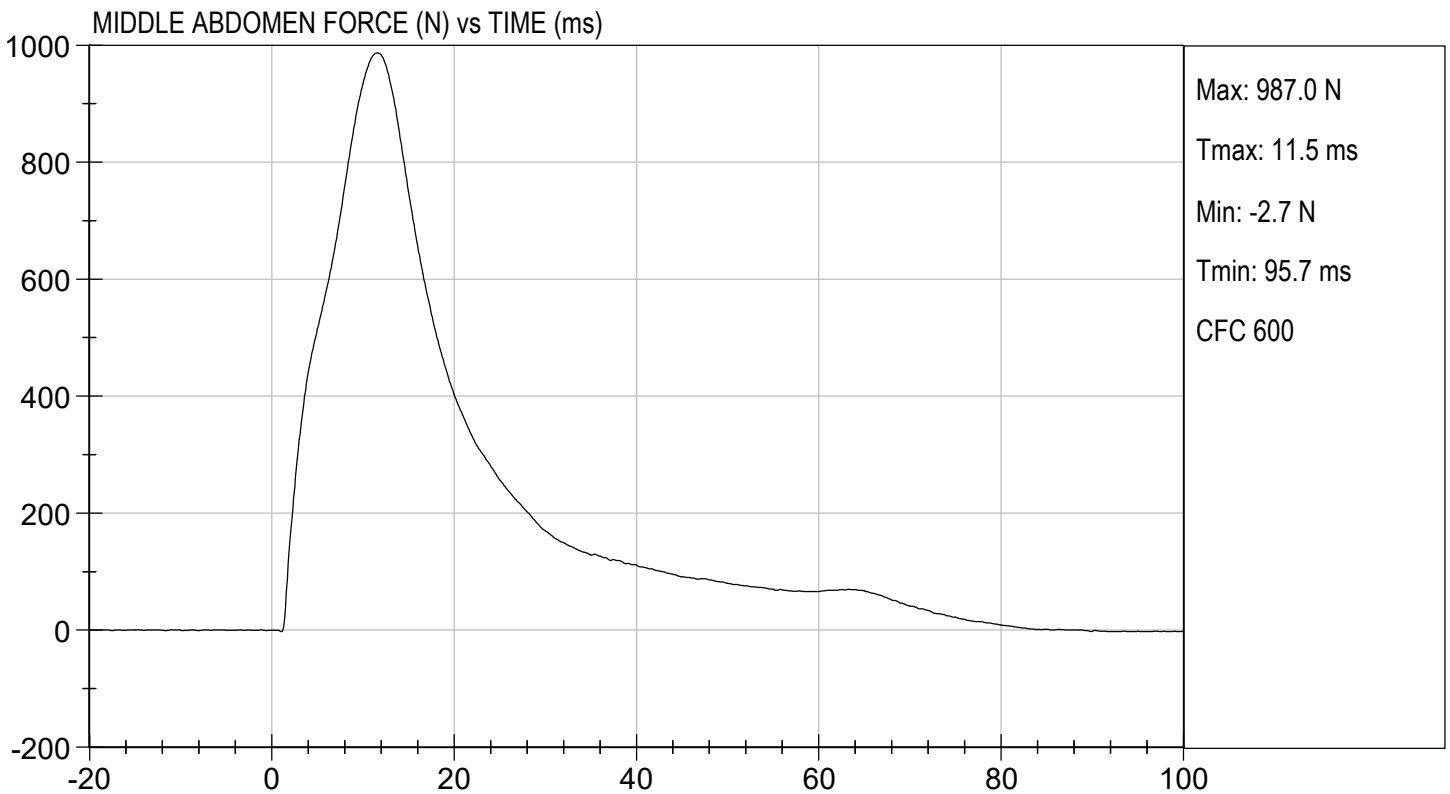
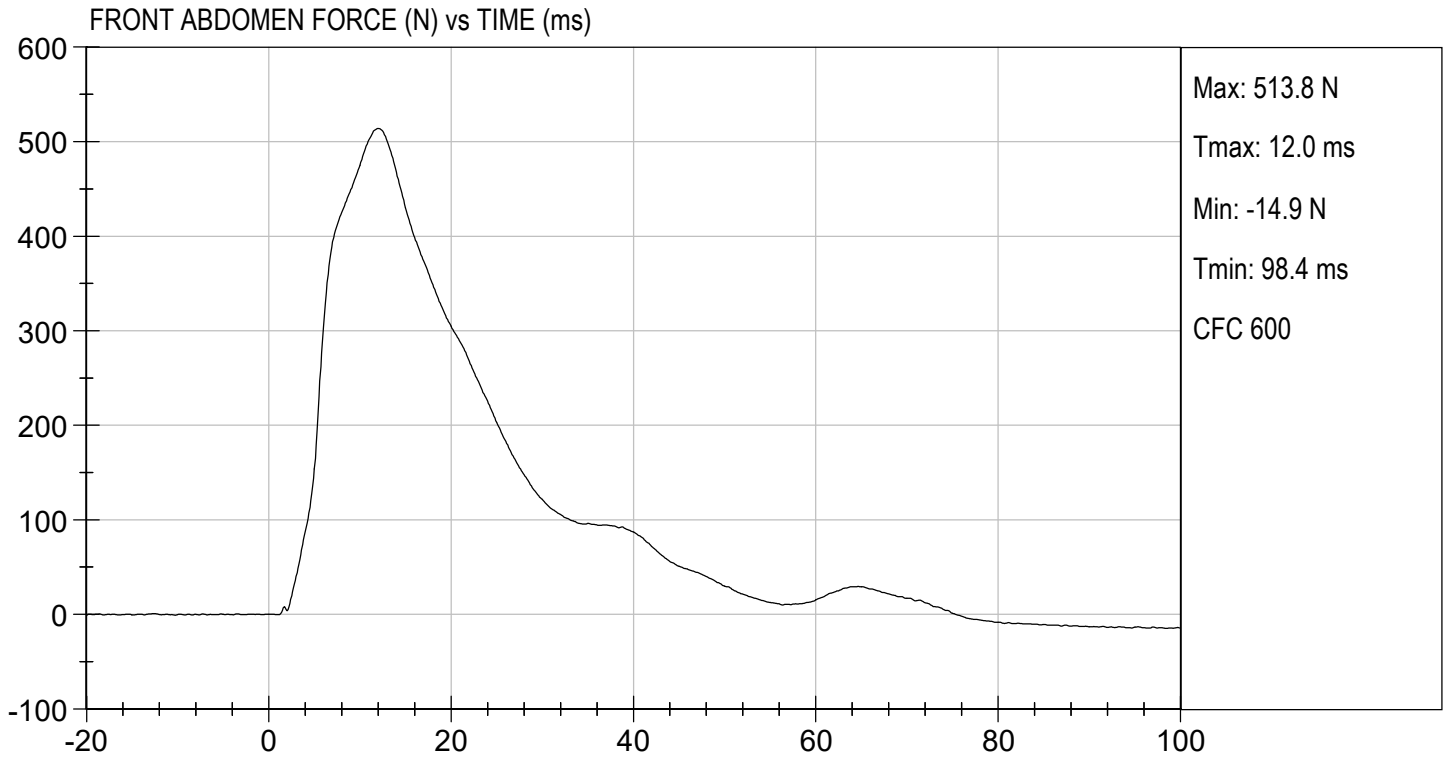

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TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 05/13/2019
TEST #: D191597

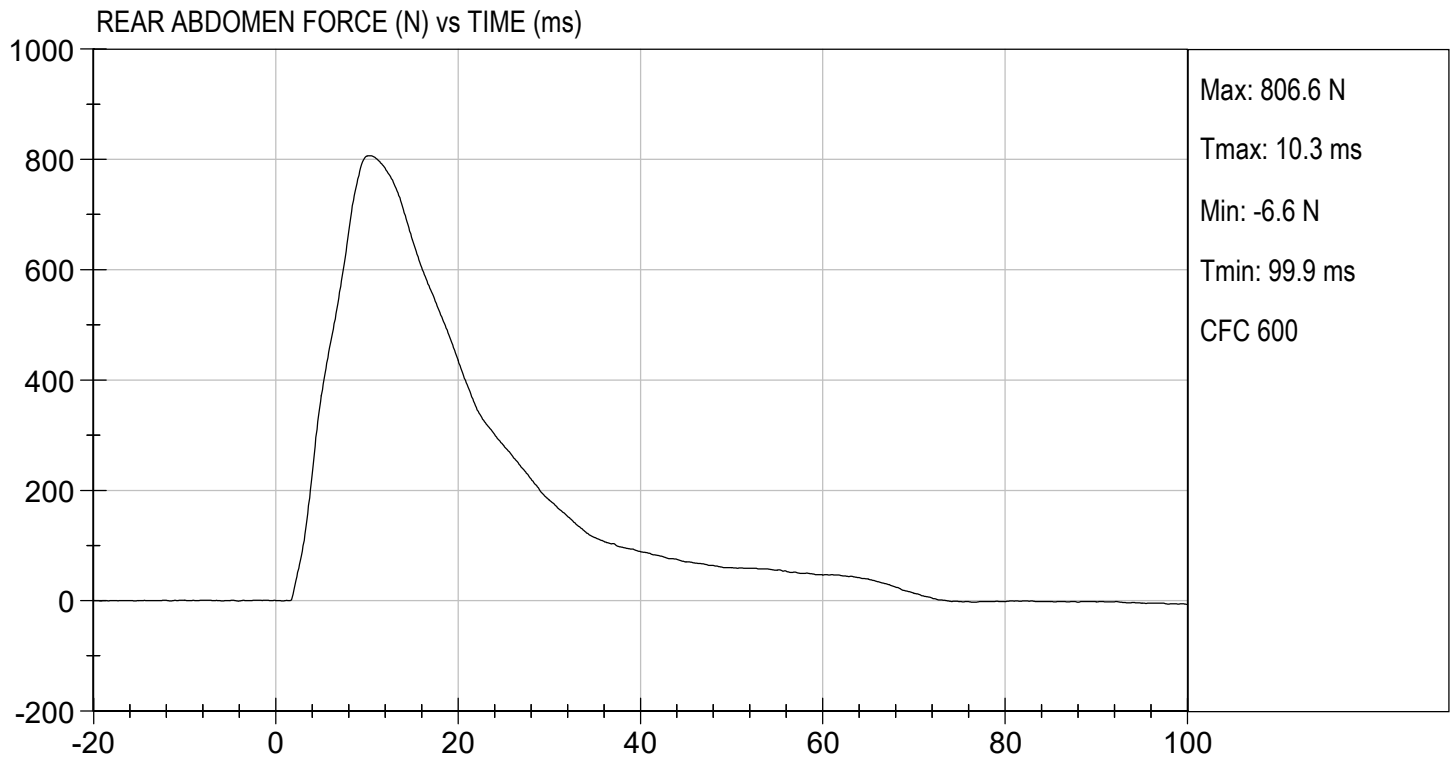






TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 05/13/2019
TEST #: D191597



**MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY**

ATD Serial No: 032

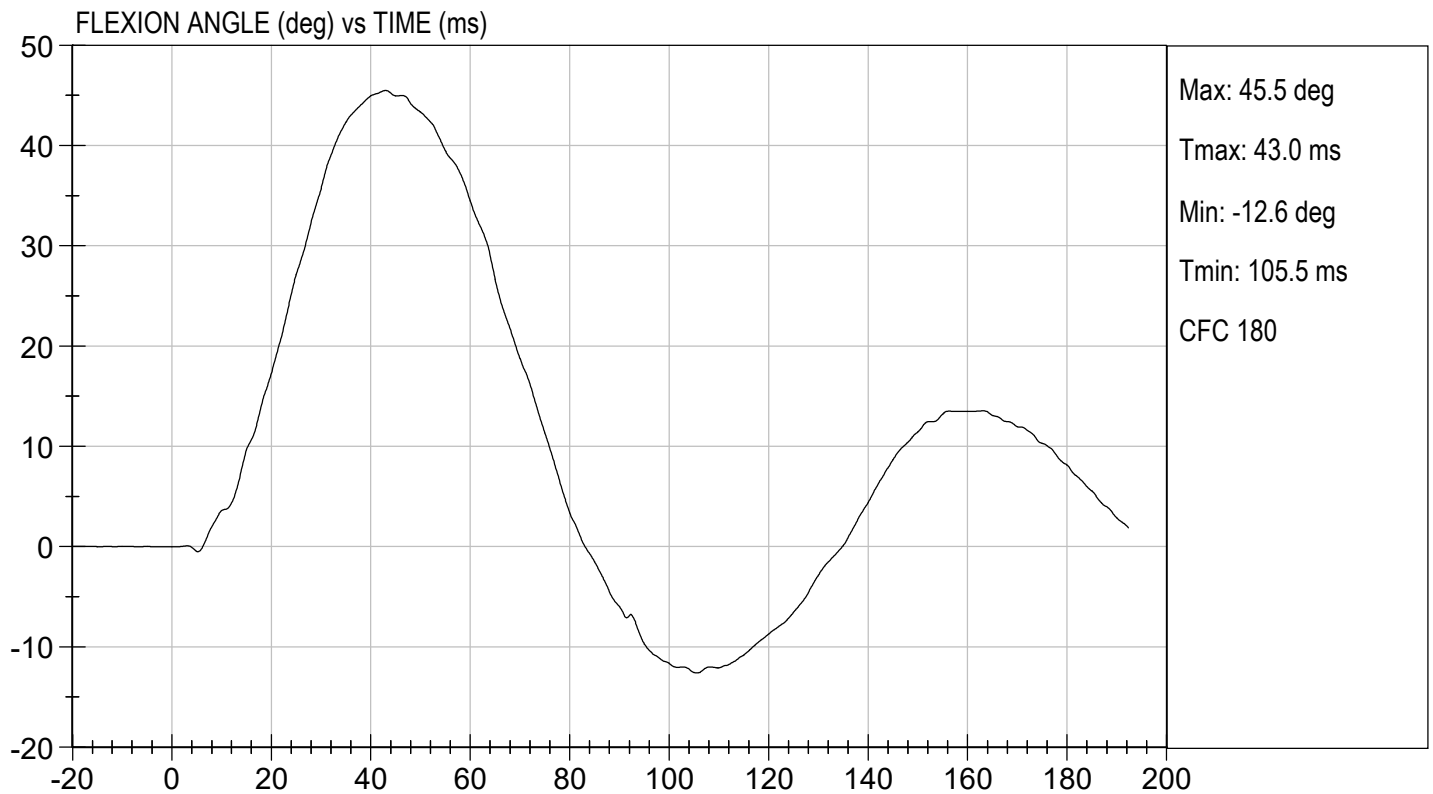
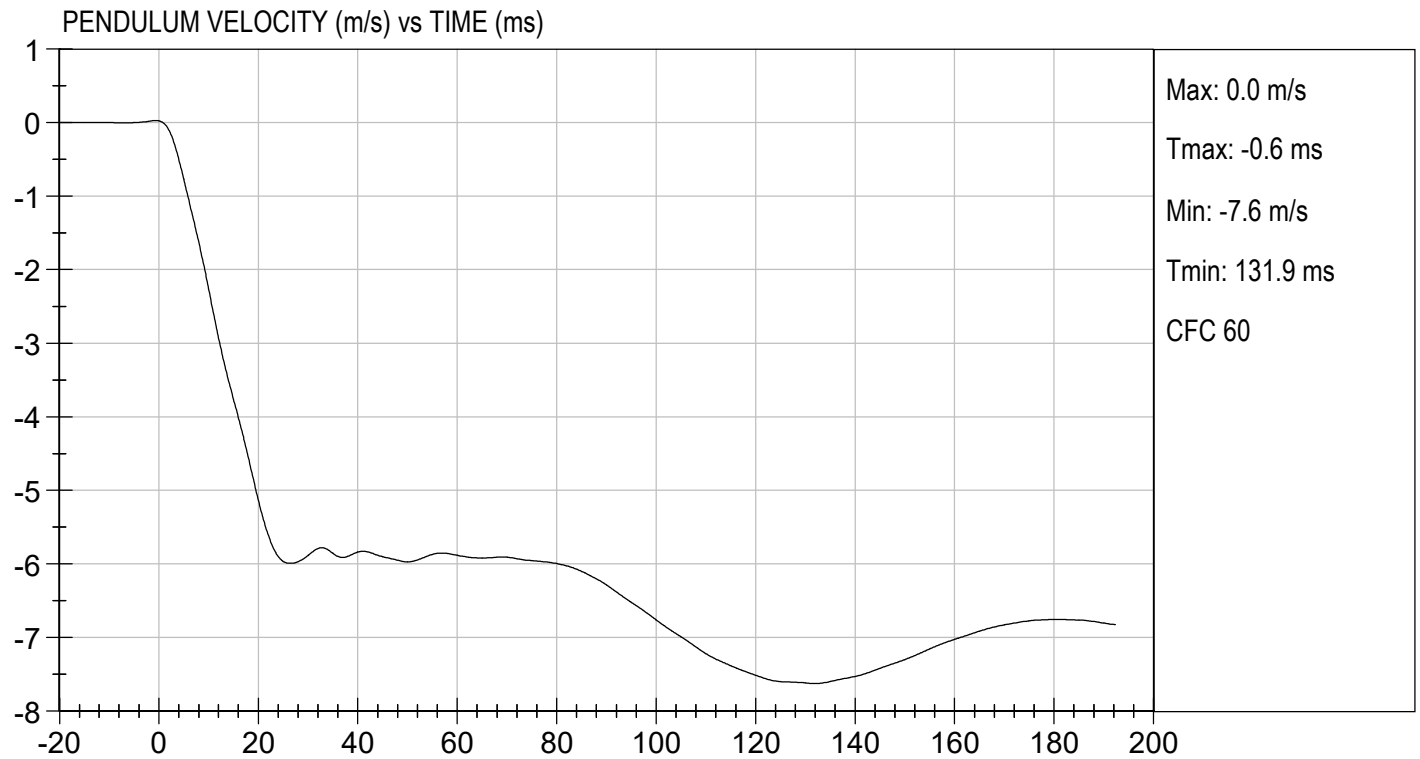
Test I.D.: D191598

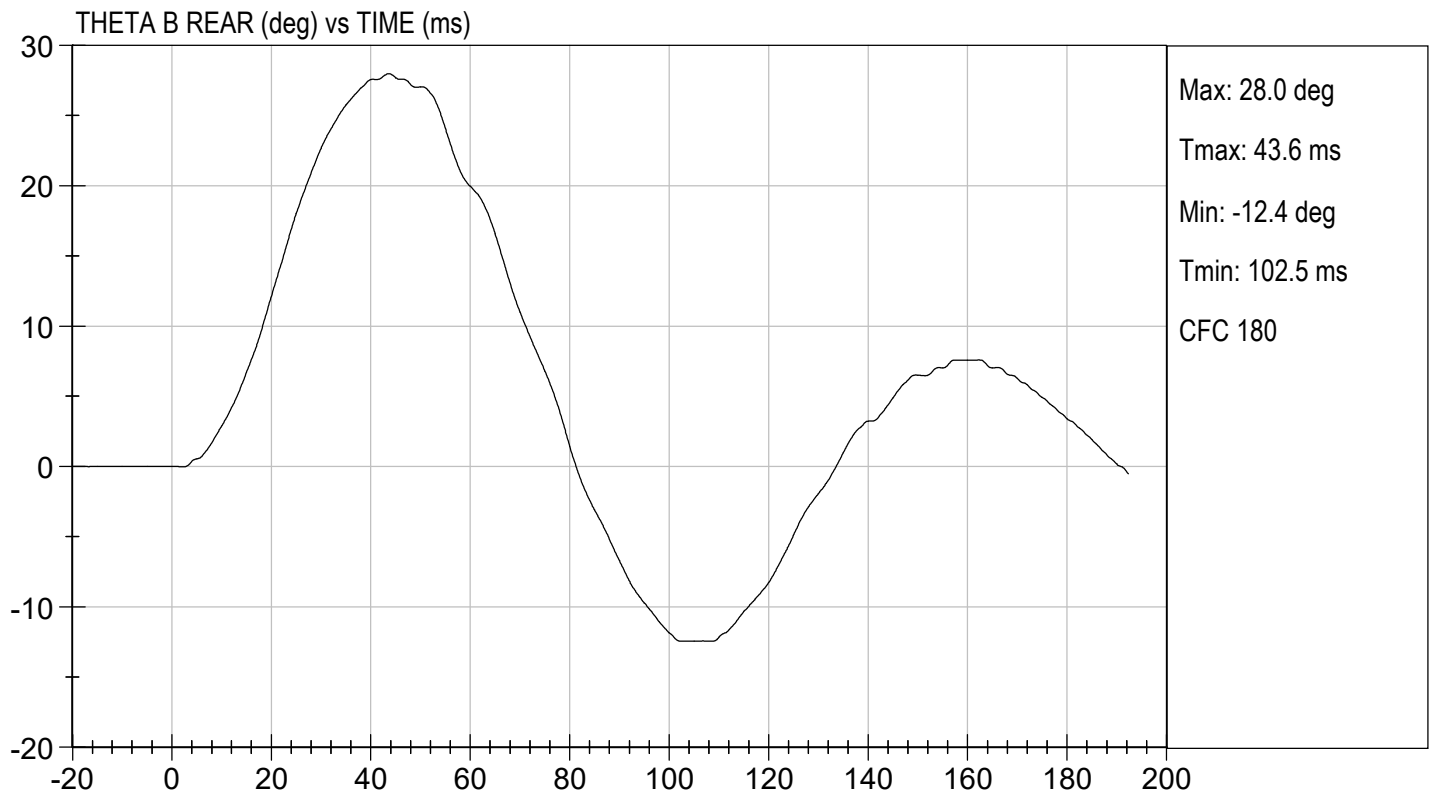
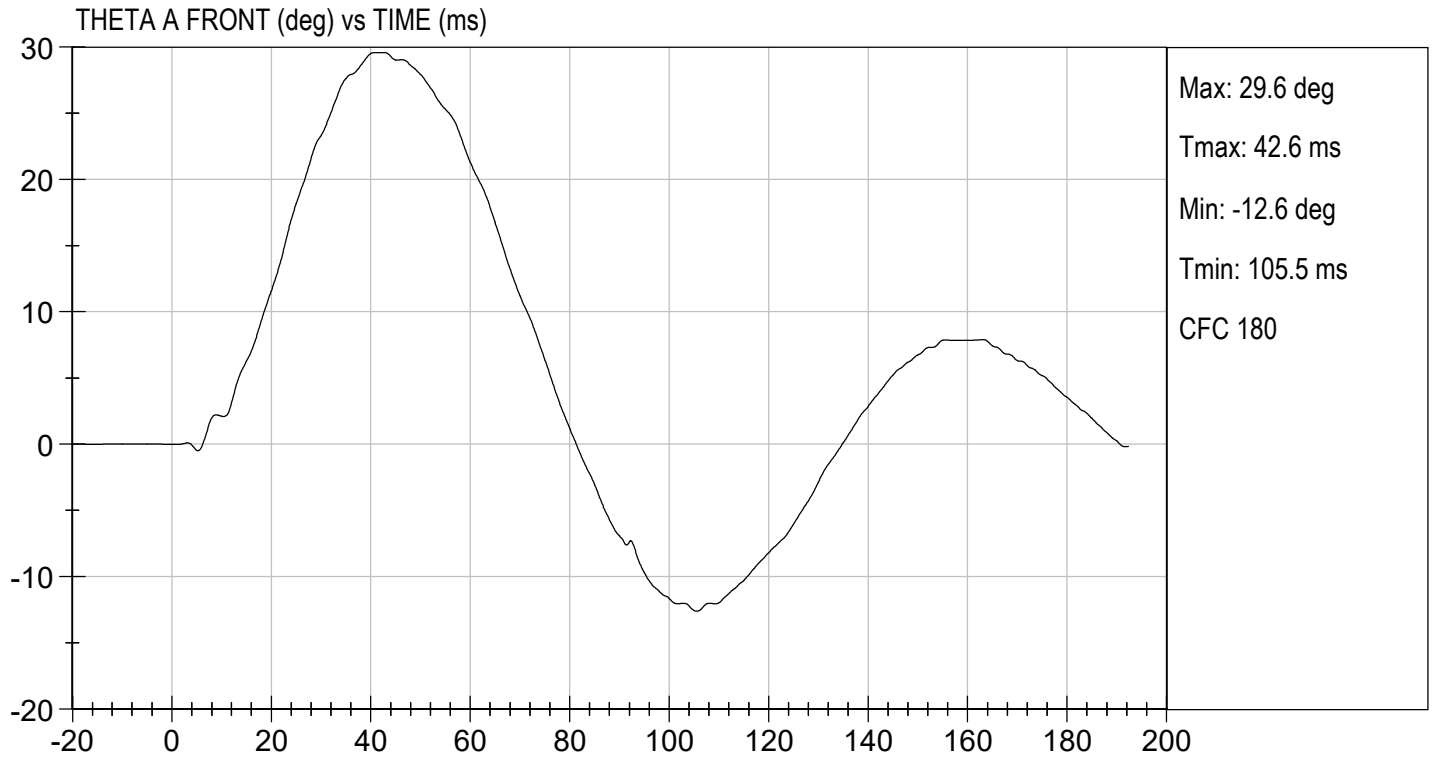
Tested Parameter	Units	Specification	Result	Pass/Fail	
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass	
Laboratory Relative Humidity	%	10 to 70	33	Pass	
Pendulum Speed	m/s	5.95 to 6.15	6.13	Pass	
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.424	Pass
	27 ms	m/s	-6.50 to -5.80	-5.99	Pass
	30 ms	m/s	>= -6.50	-5.88	Pass
Maximum Flexion Angle	deg	45.0 to 55.0	45.5	Pass	
Time of Maximum Flexion Angle	ms	39.0 to 53.0	43.0	Pass	
Headform Rotation Decay to Initial Position	ms	37 to 57	40	Pass	
Overall Results				Pass	

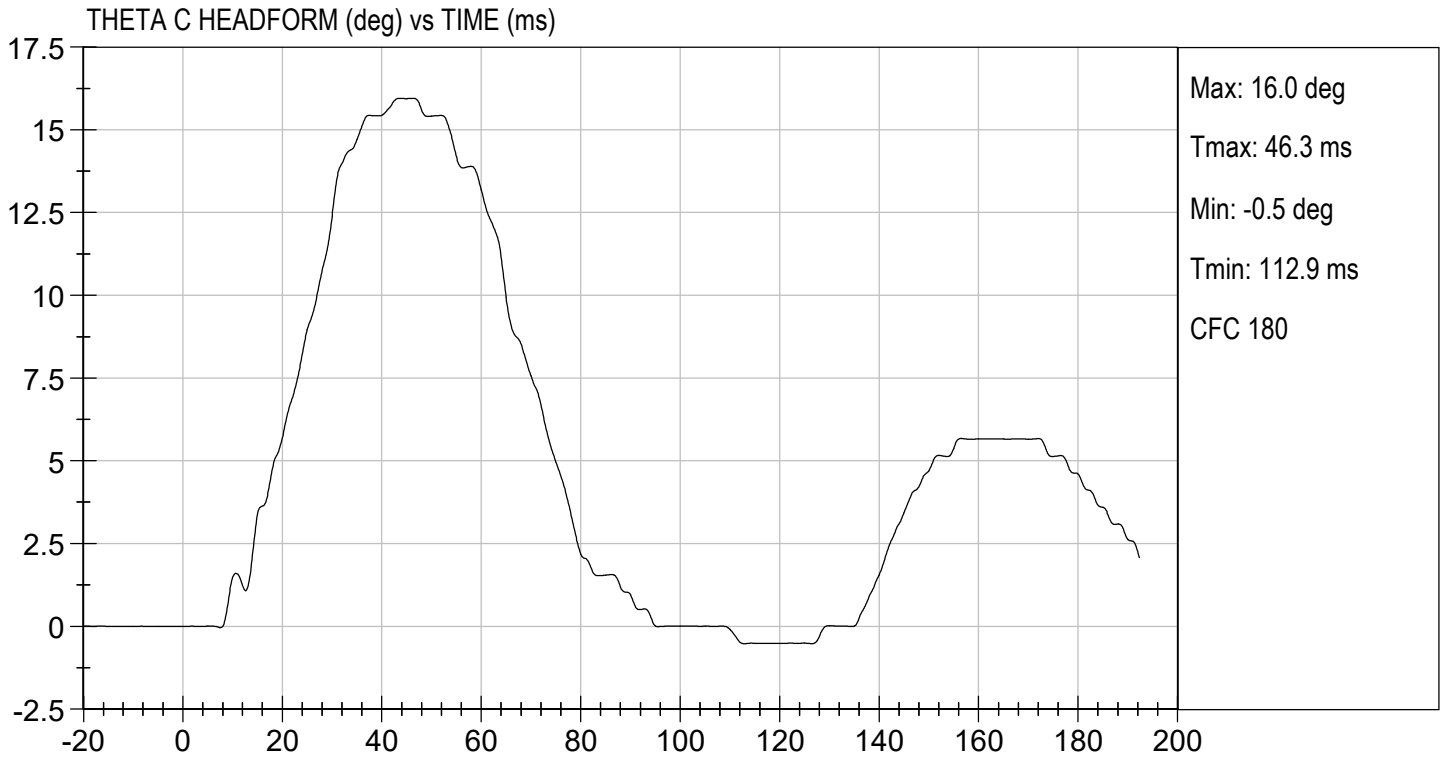
Danielle Redinlaugh
Laboratory Technician

05/14/2019
Test Date

B. F.
Approved By







MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

ATD Serial No: 032

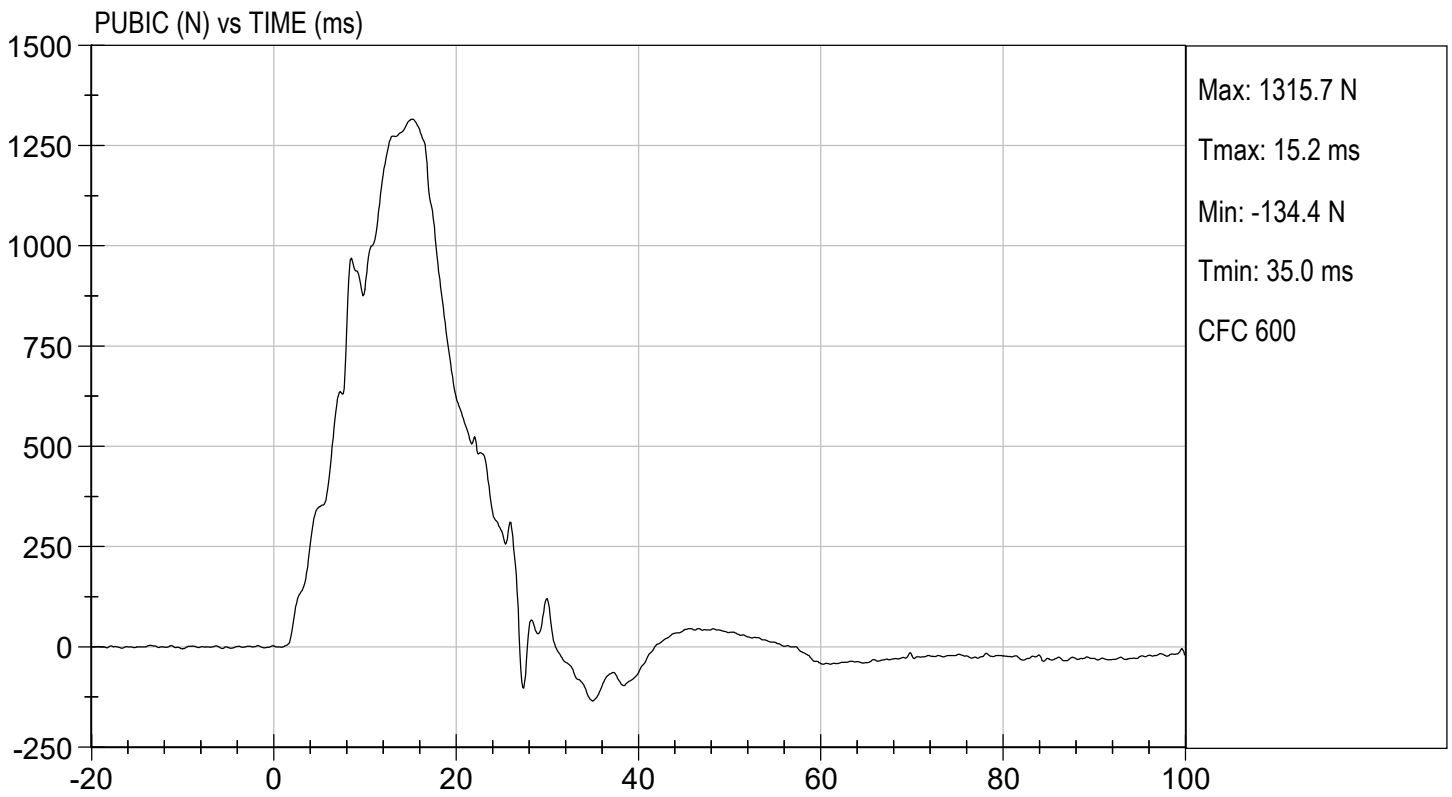
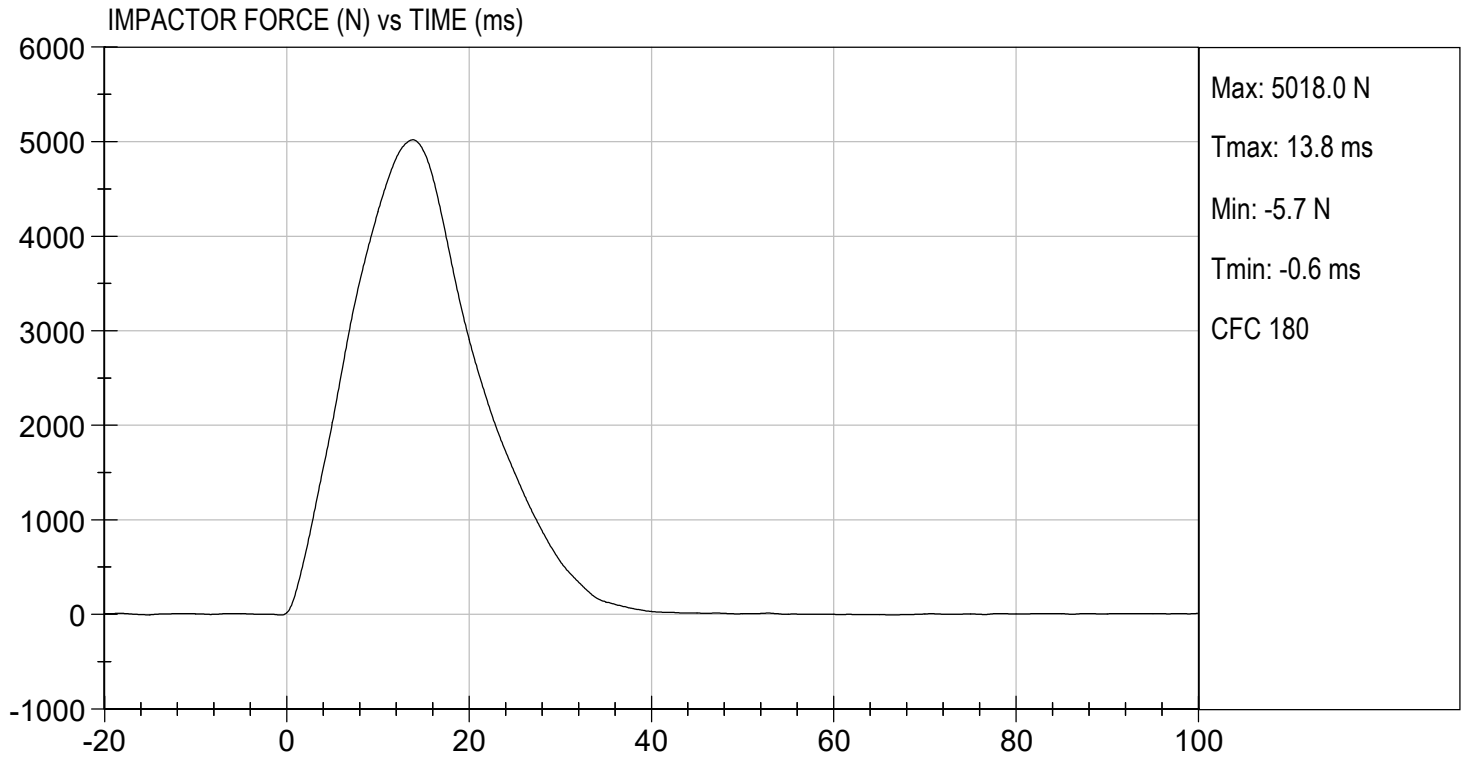
Test I.D: D191599

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	4.21	Pass
Maximum Impactor Force	N	4700 to 5400	5018	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.8	Pass
Maximum Pubic Force	N	1230 to 1590	1316	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	15.2	Pass
Overall Test Results				Pass

Danielle Redinlaugh
Laboratory Technician

05/13/2019
Test Date

B. Fink
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MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

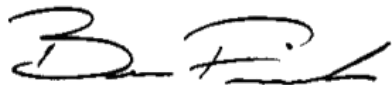
ATD Serial No: 032

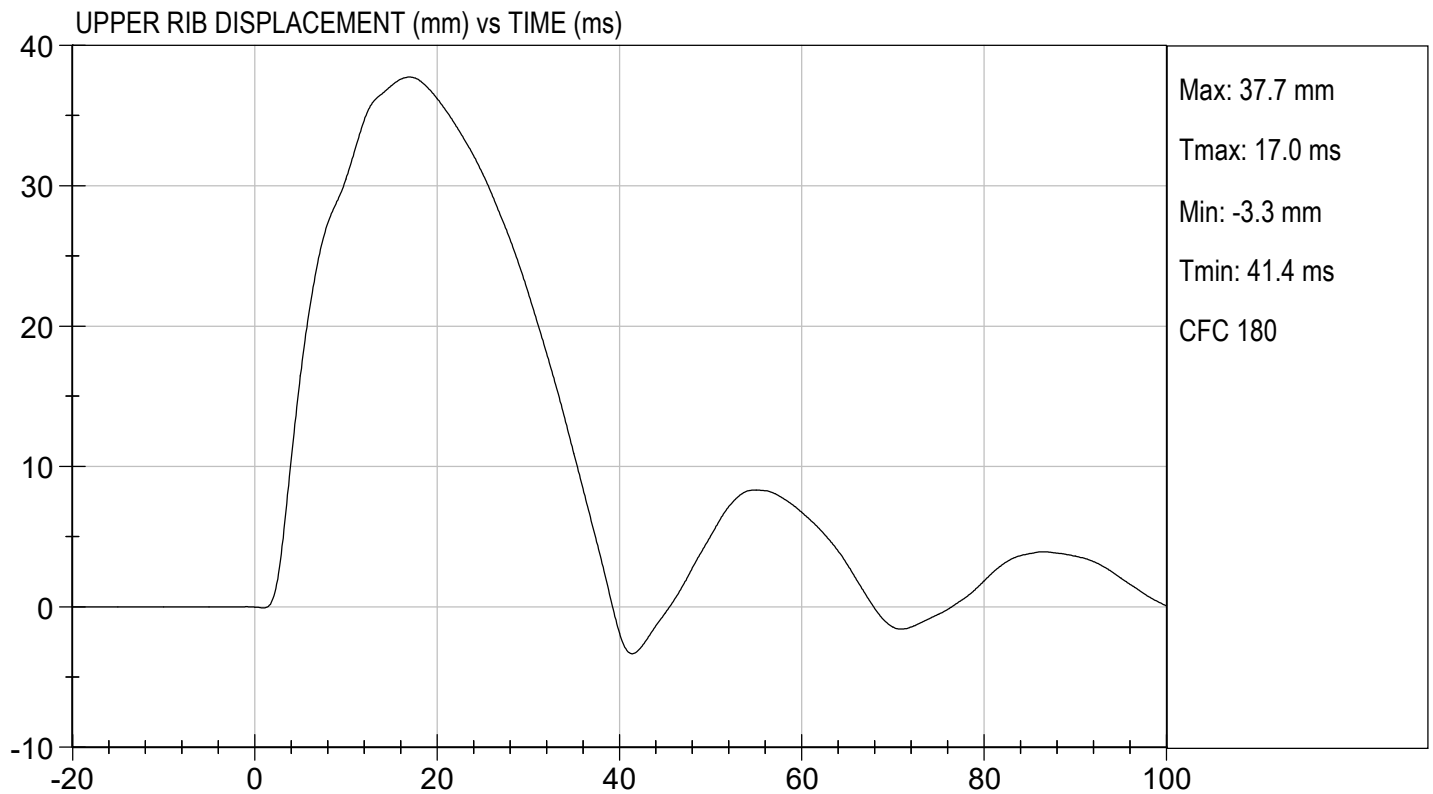
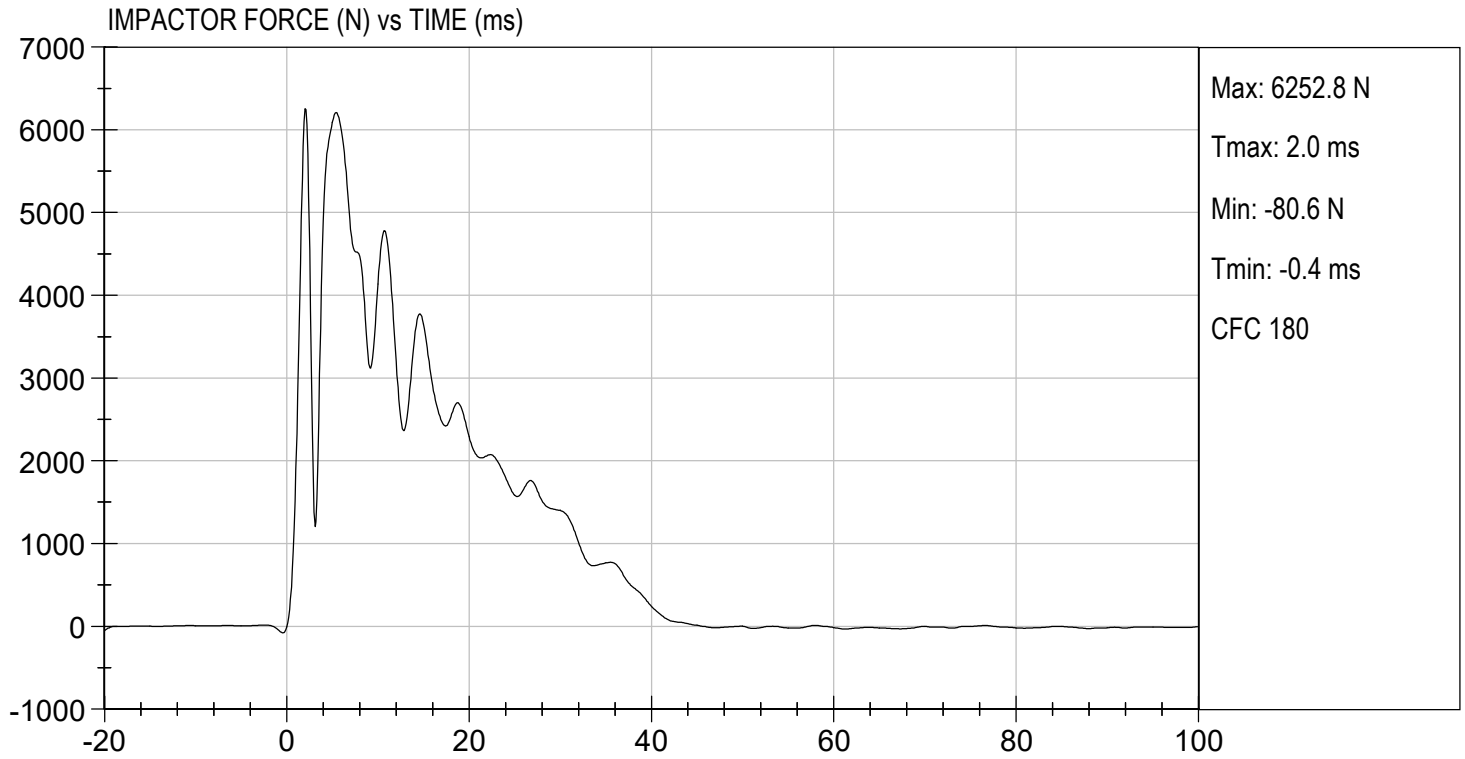
Test I.D: D191590

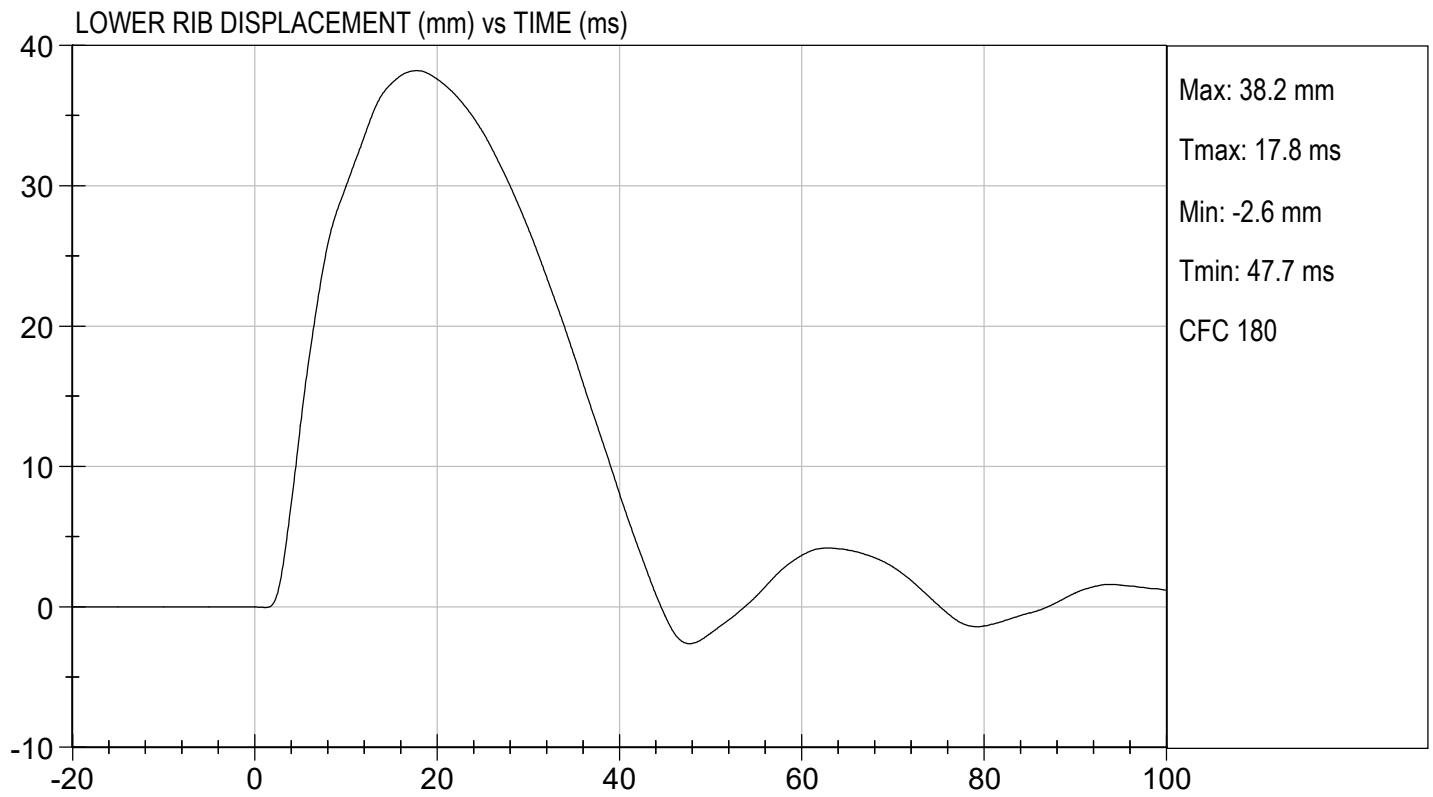
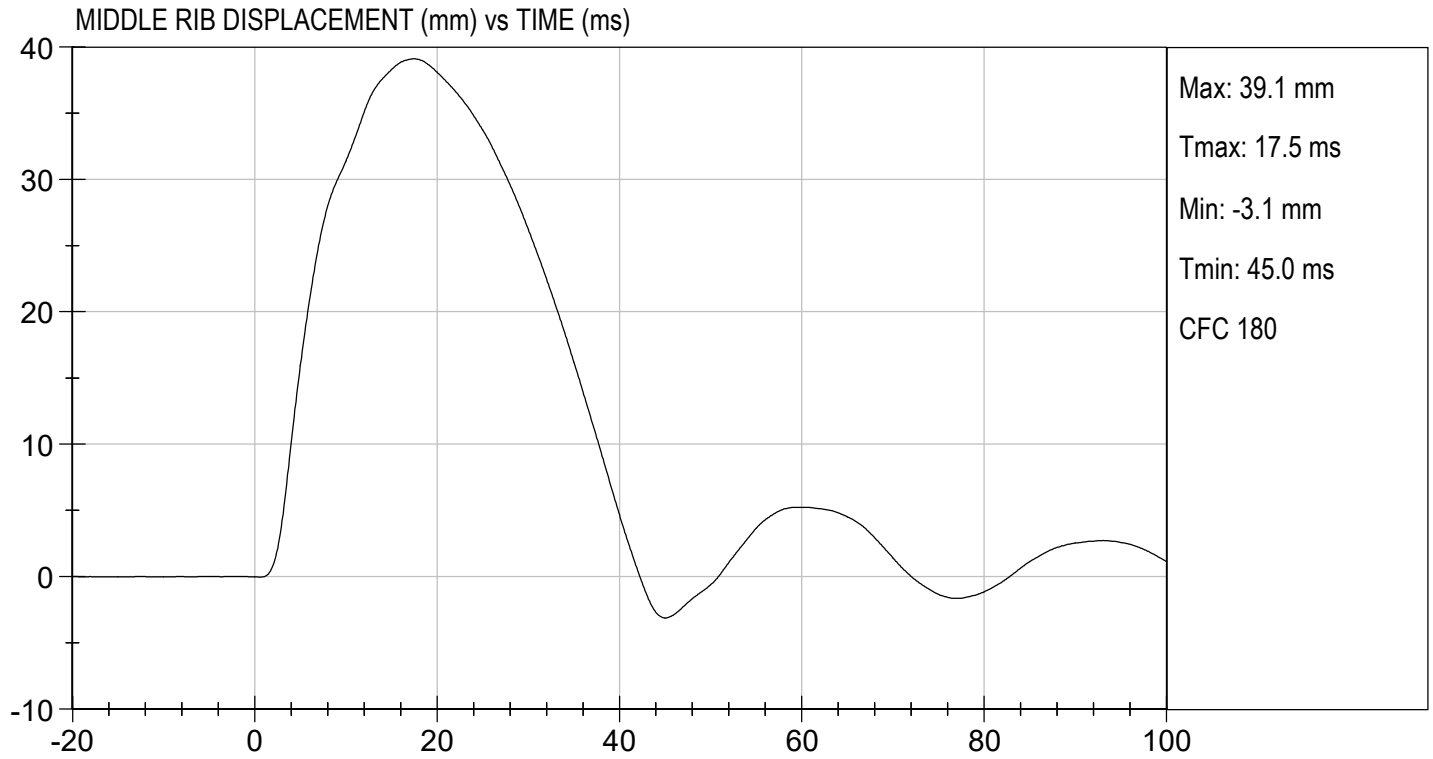
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	5.40 to 5.60	5.46	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5904	Pass
Upper Rib Displacement	mm	34.0 to 41.0	37.7	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.1	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.2	Pass
Overall Test Results				Pass


 Laboratory Technician

05/13/2019
 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

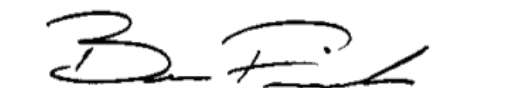
Test ID: D191221

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	42	Pass
Peak Resultant Acceleration	G's	115 to 137	126	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-1.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results				Pass

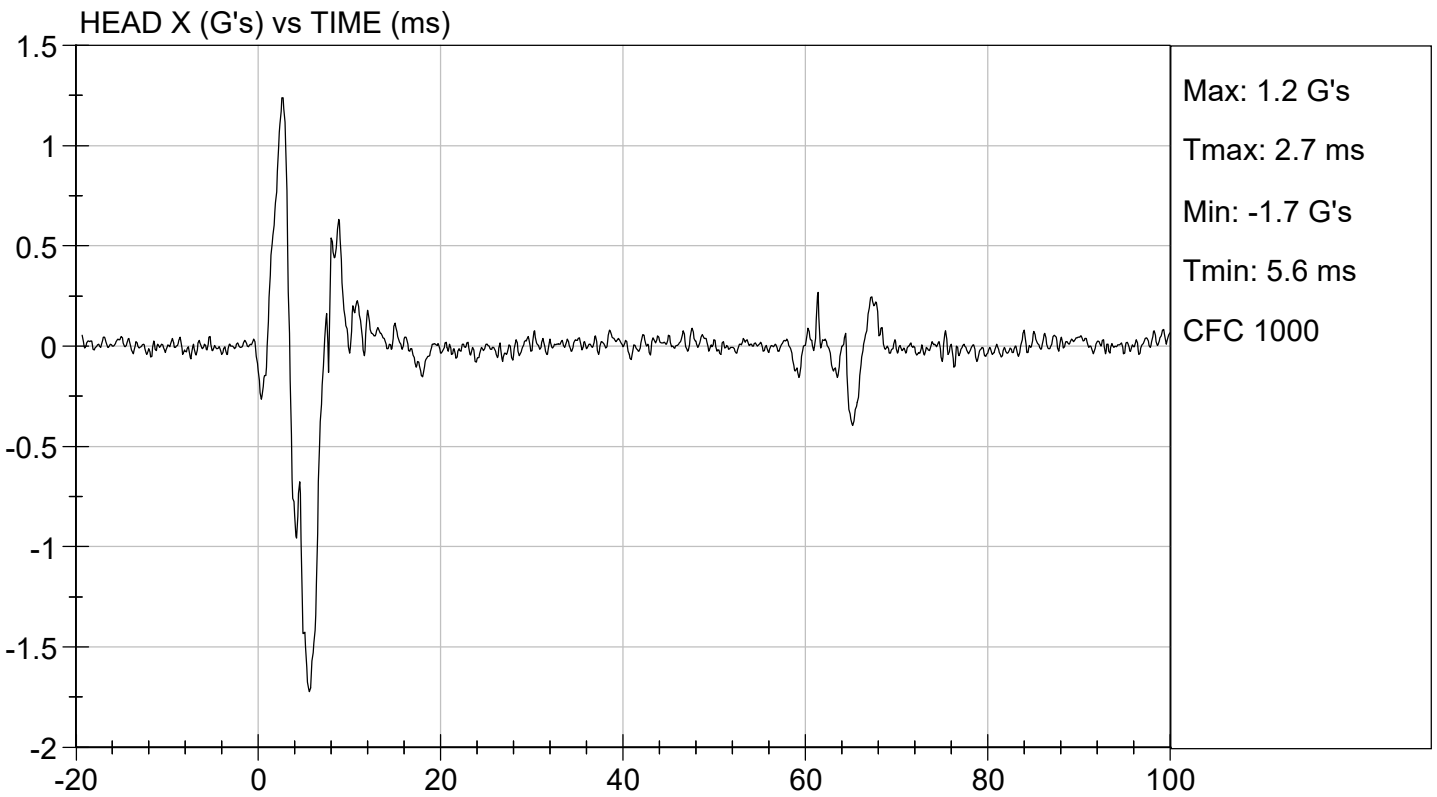
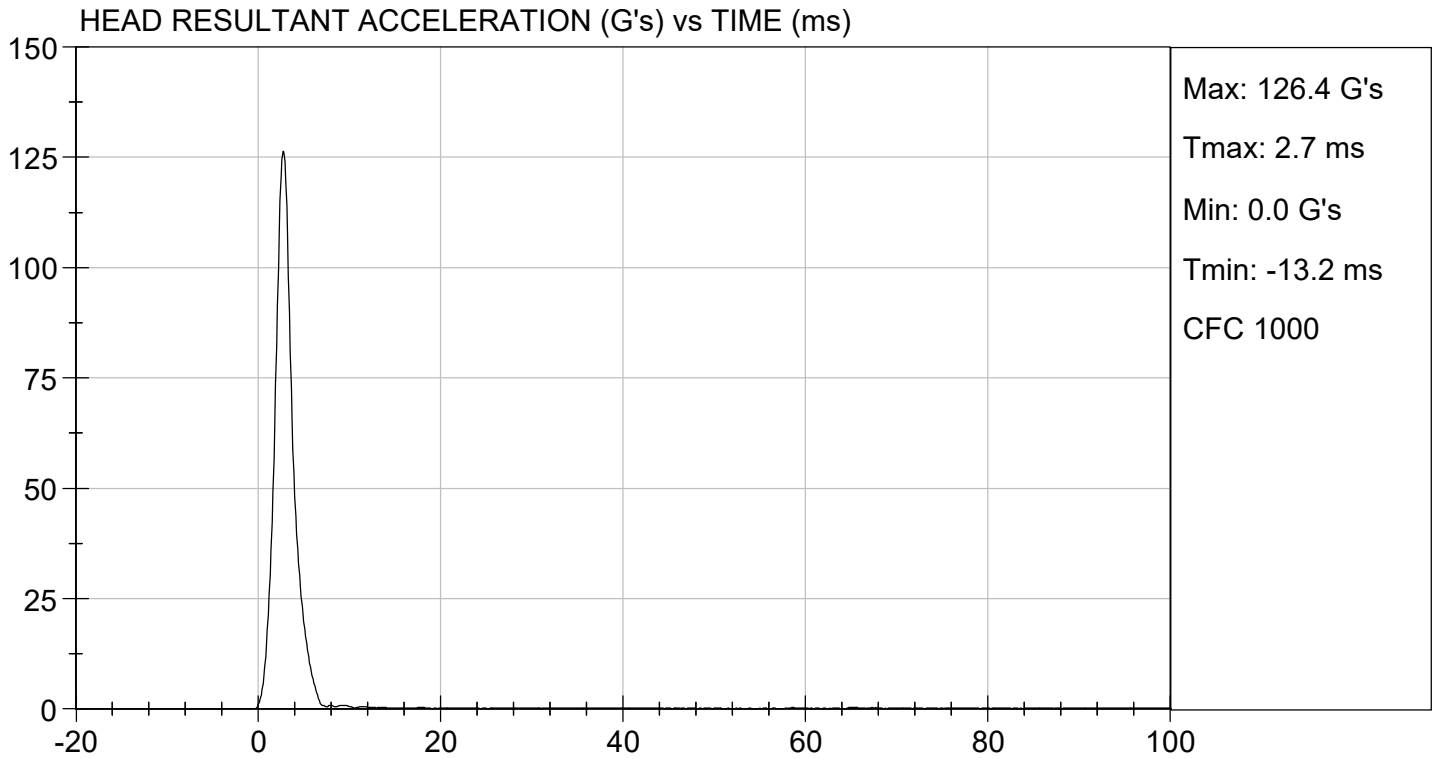


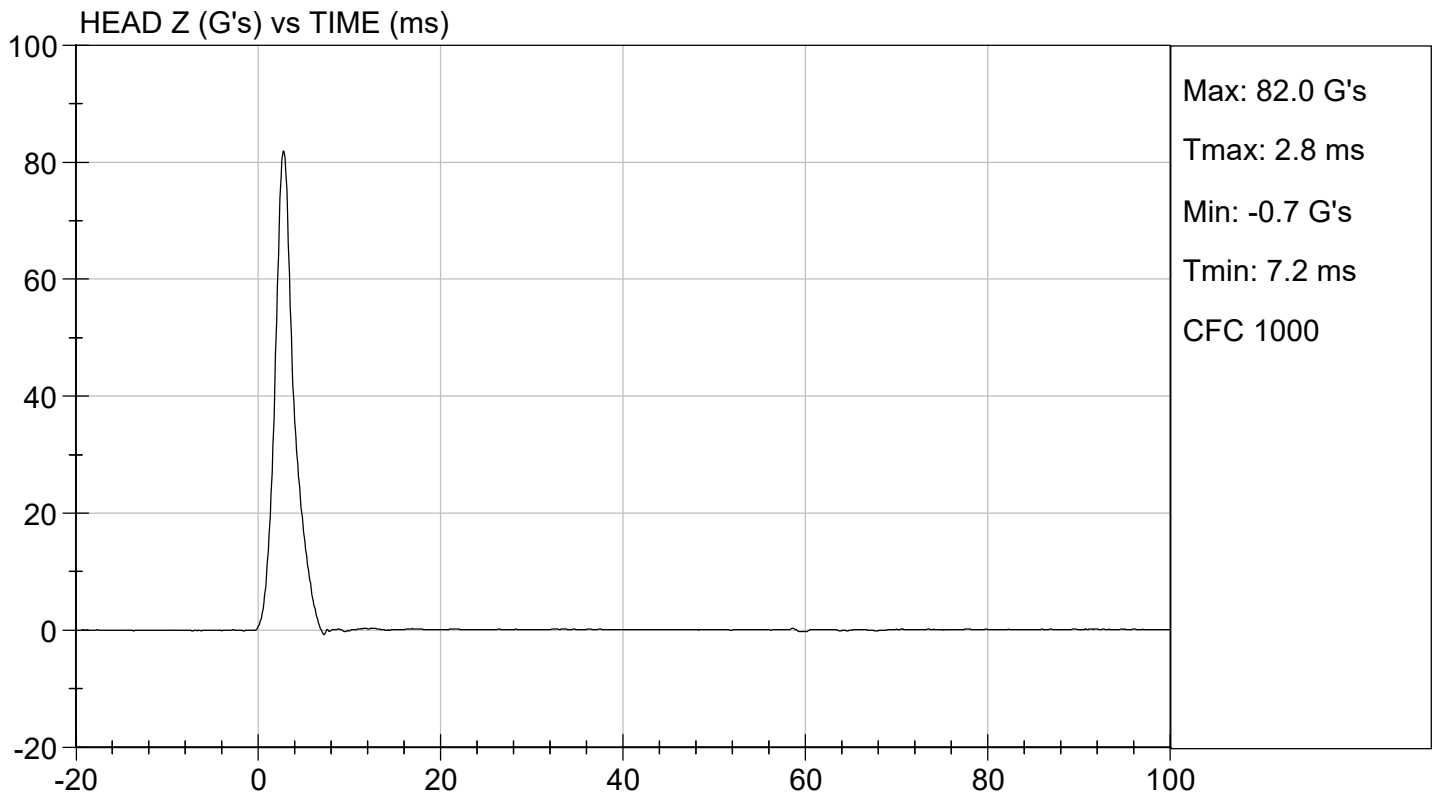
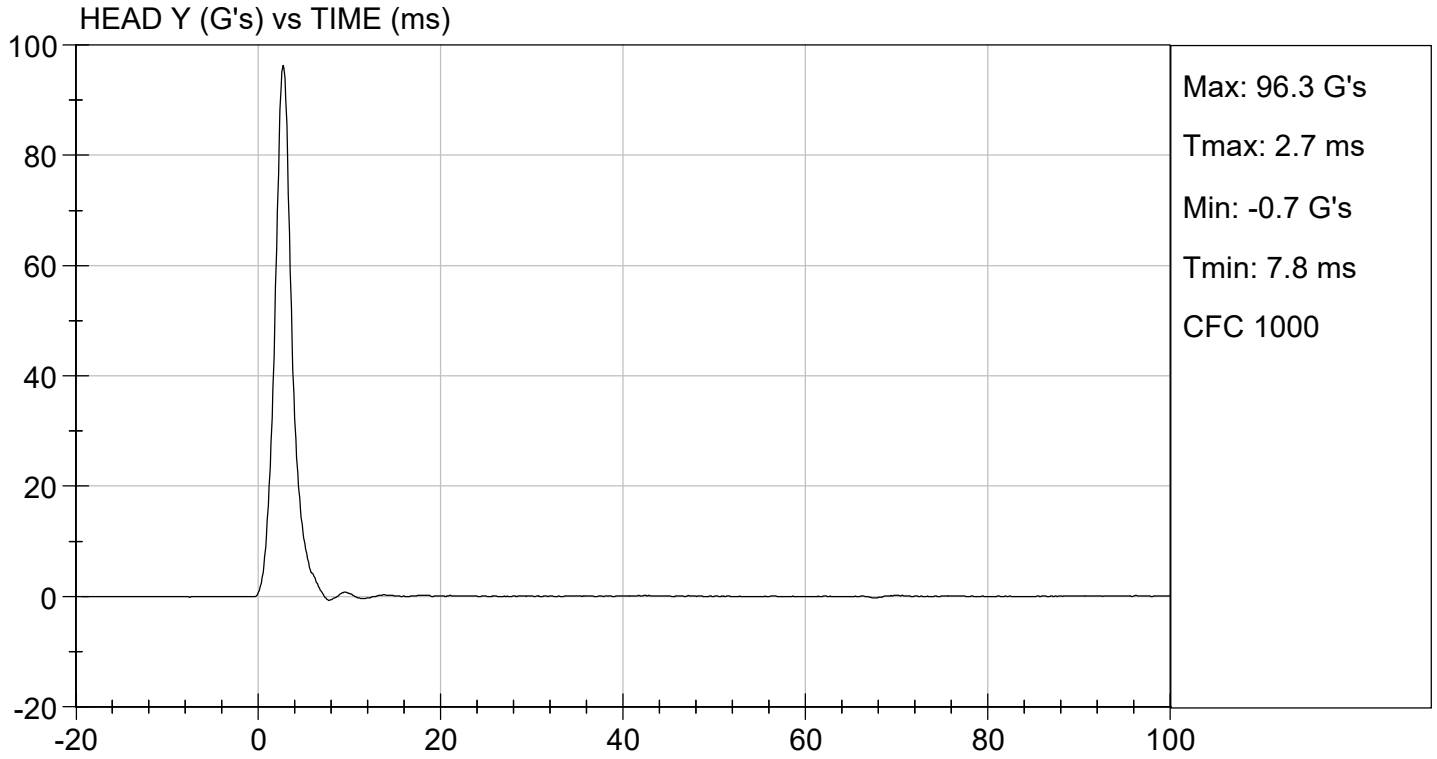
Laboratory Technician

04/08/2019
Test Date



Approved By





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

ATD Serial No: 306

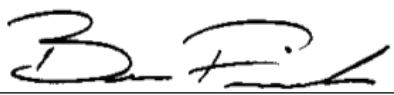
Test I.D.: D19AM2

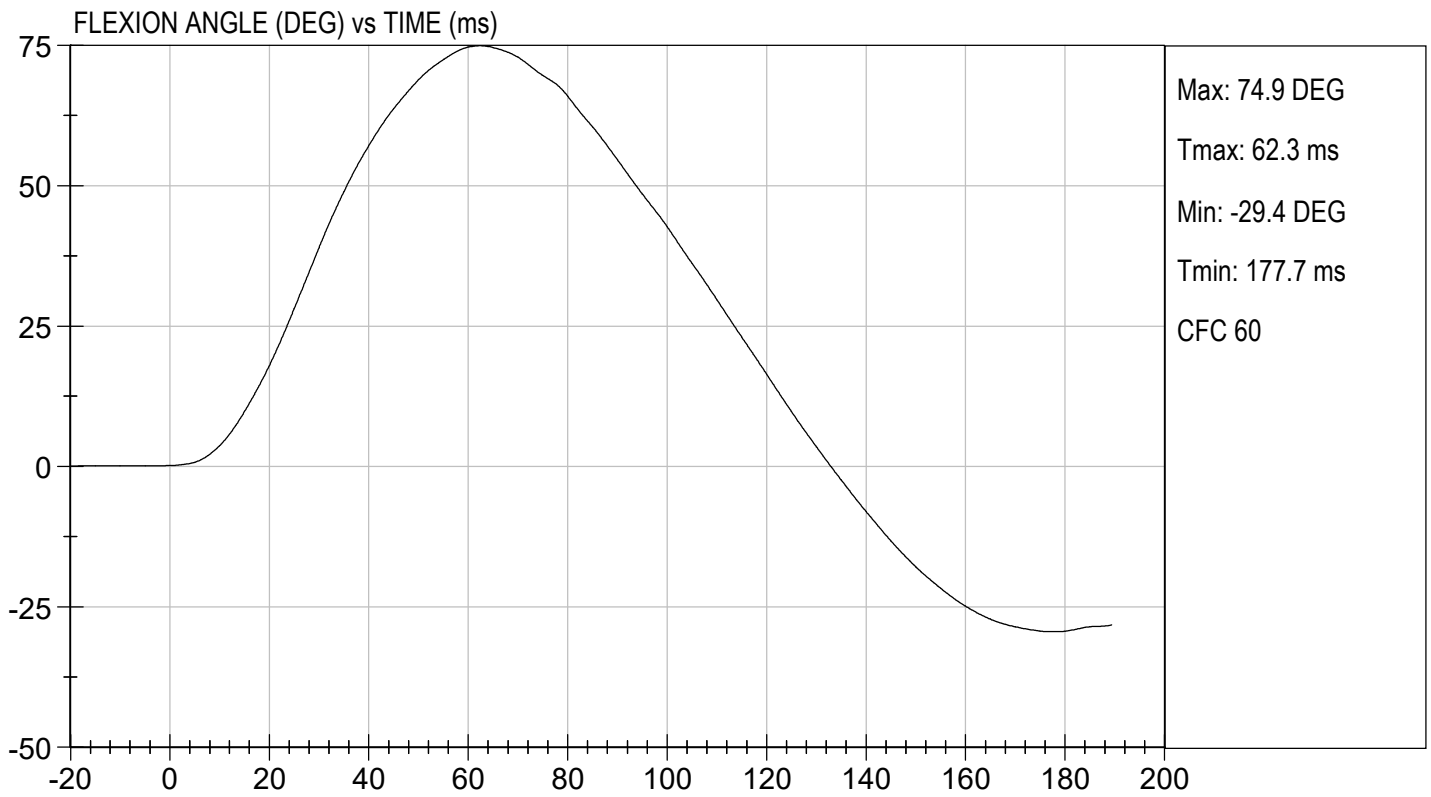
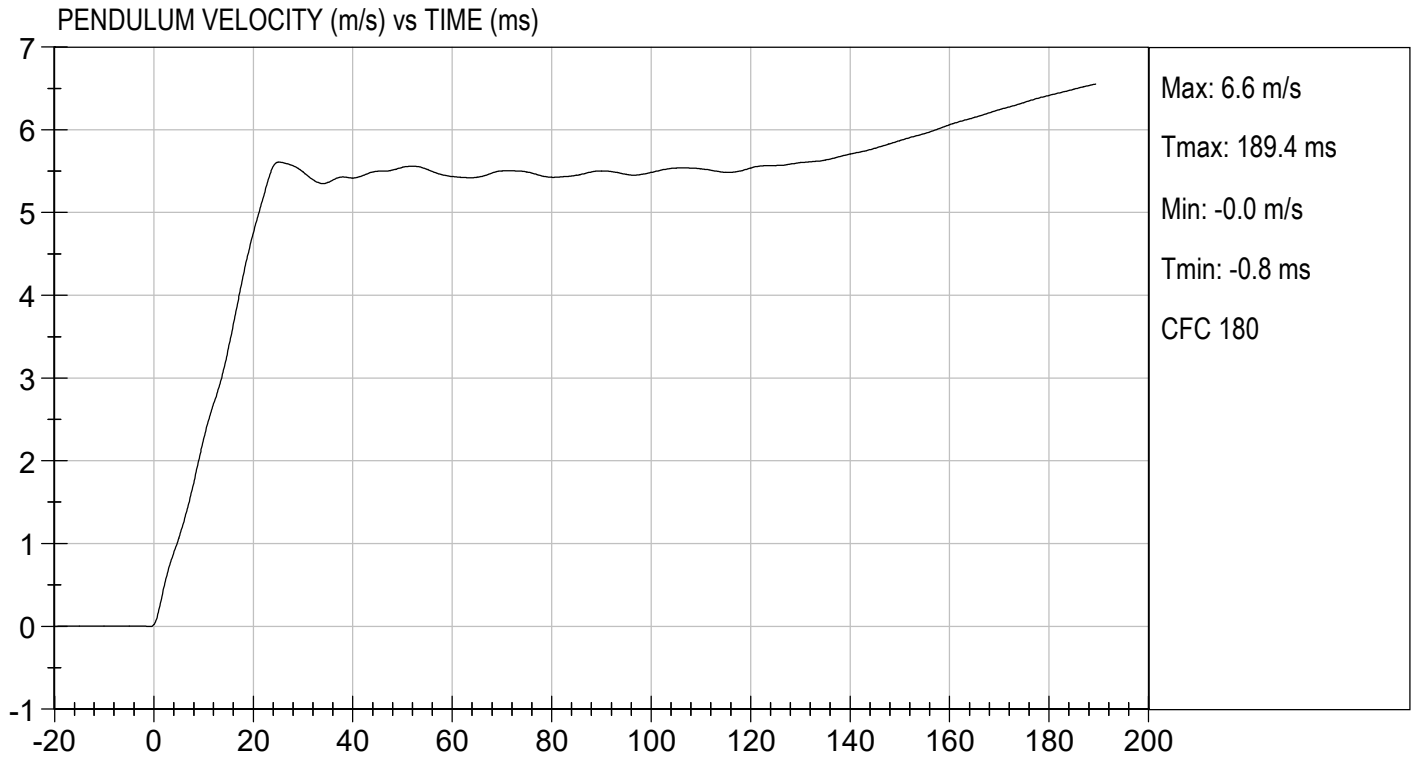
Tested Parameter	Units	Specification	Result	Pass/Fail	
Temperature	deg C	20.6 to 22.2	21.6	Pass	
Humidity	%	10 to 70	32	Pass	
Impact Velocity	m/s	5.51 to 5.63	5.62	Pass	
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.26	Pass
	15 ms	m/s	3.30 to 4.10	3.36	Pass
	20 ms	m/s	4.40 to 5.40	4.76	Pass
	25 ms	m/s	5.40 to 6.10	5.61	Pass
	25-100 ms	m/s	5.50 to 6.20	5.61	Pass
Maximum D-Plane Rotation	deg	71 to 81	75	Pass	
Time of Maximum D-Plane Rotation	ms	50 to 70	62	Pass	
Maximum Occipital Condyle Moment	Nm	-44 to -36	-39	Pass	
Time of Moment Decay to 0 Nm	ms	102 to 126	118	Pass	
Overall Test Results				Pass	


Laboratory Technician

04/30/2019

Test Date

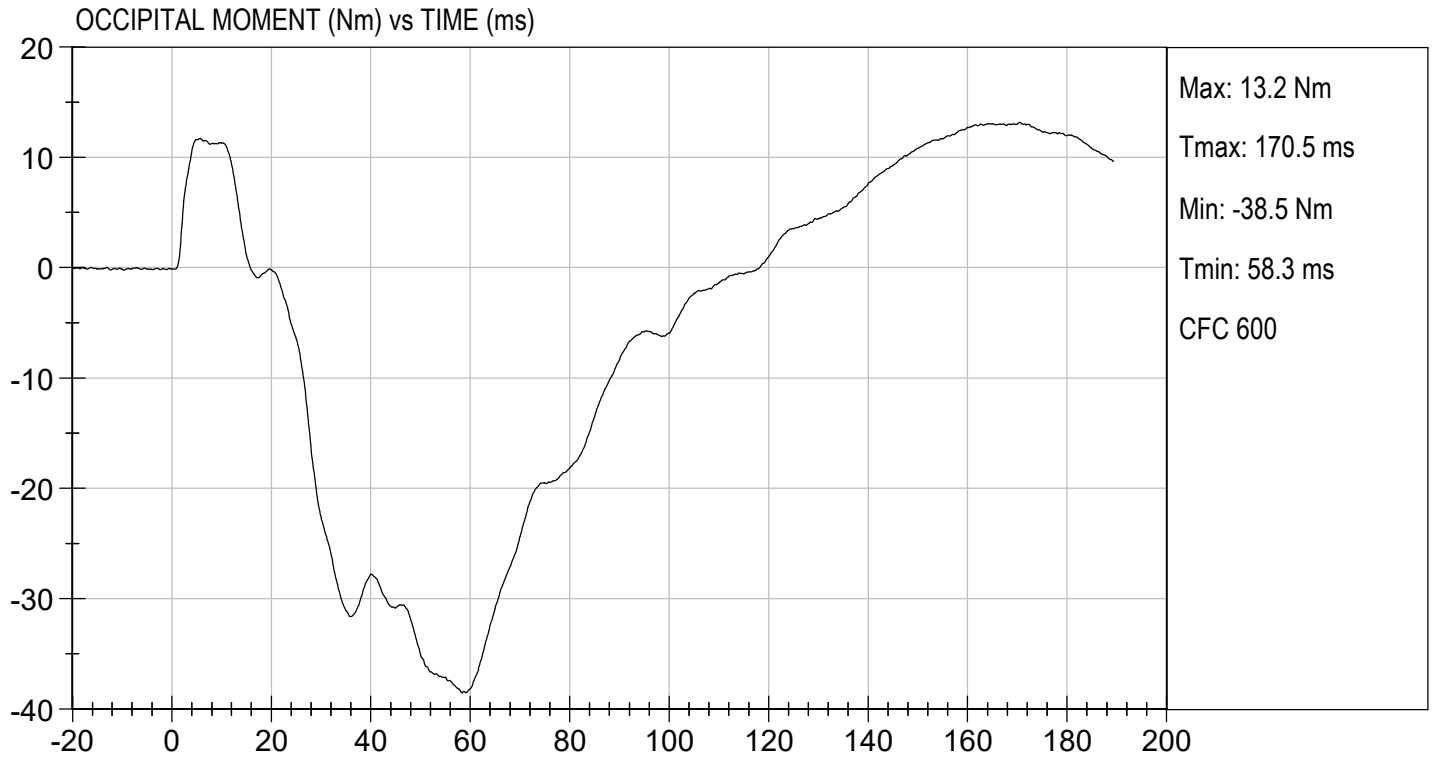

Approved By





TEST DESC: NECK BENDING
VELOCITY: 18.45 ft/s, 5.62 m/s

TEST DATE: 04/30/2019
TEST #: D19AM2



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

ATD Serial No: 306

Test ID: D191223

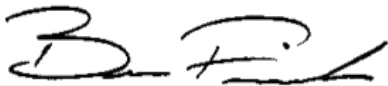
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	21	Pass
Overall Test Results				Pass



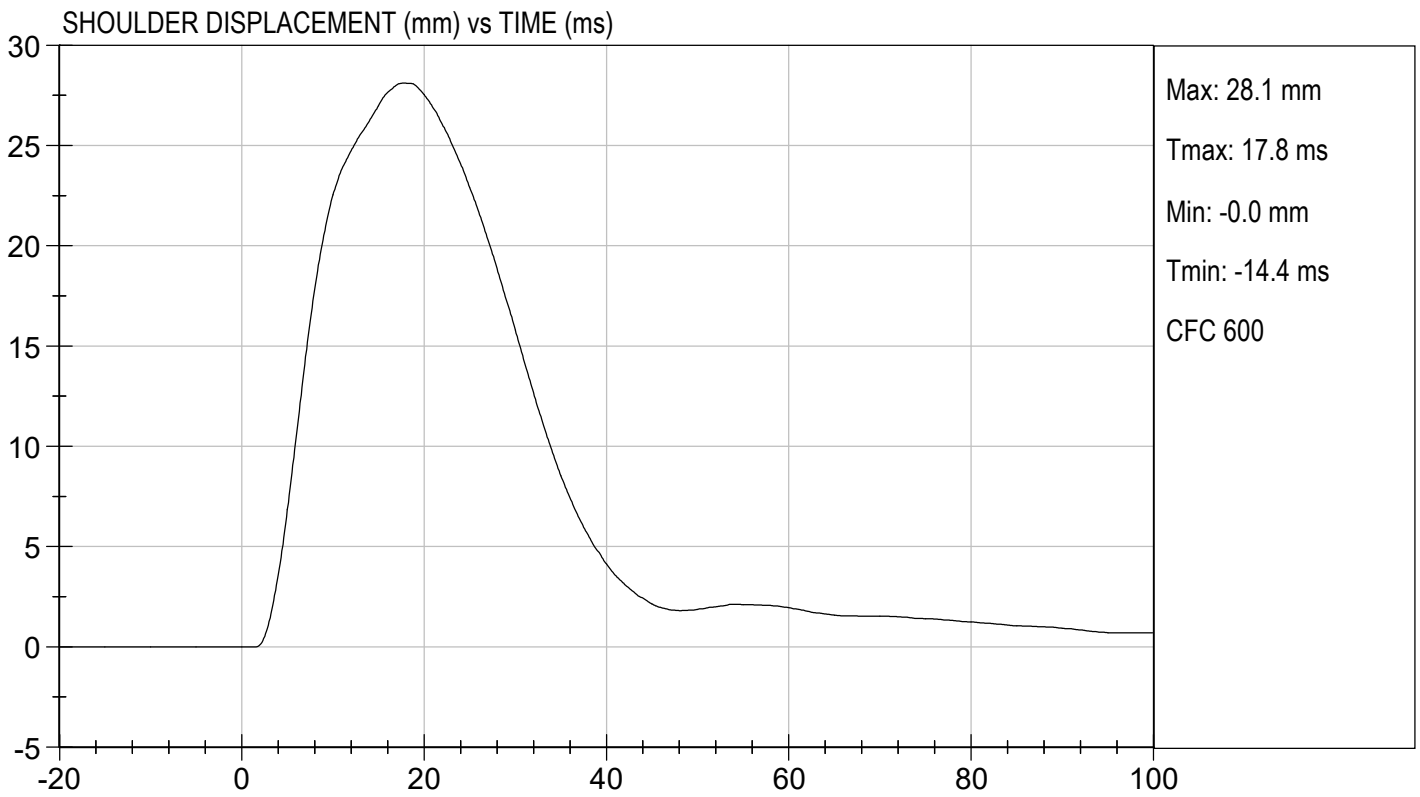
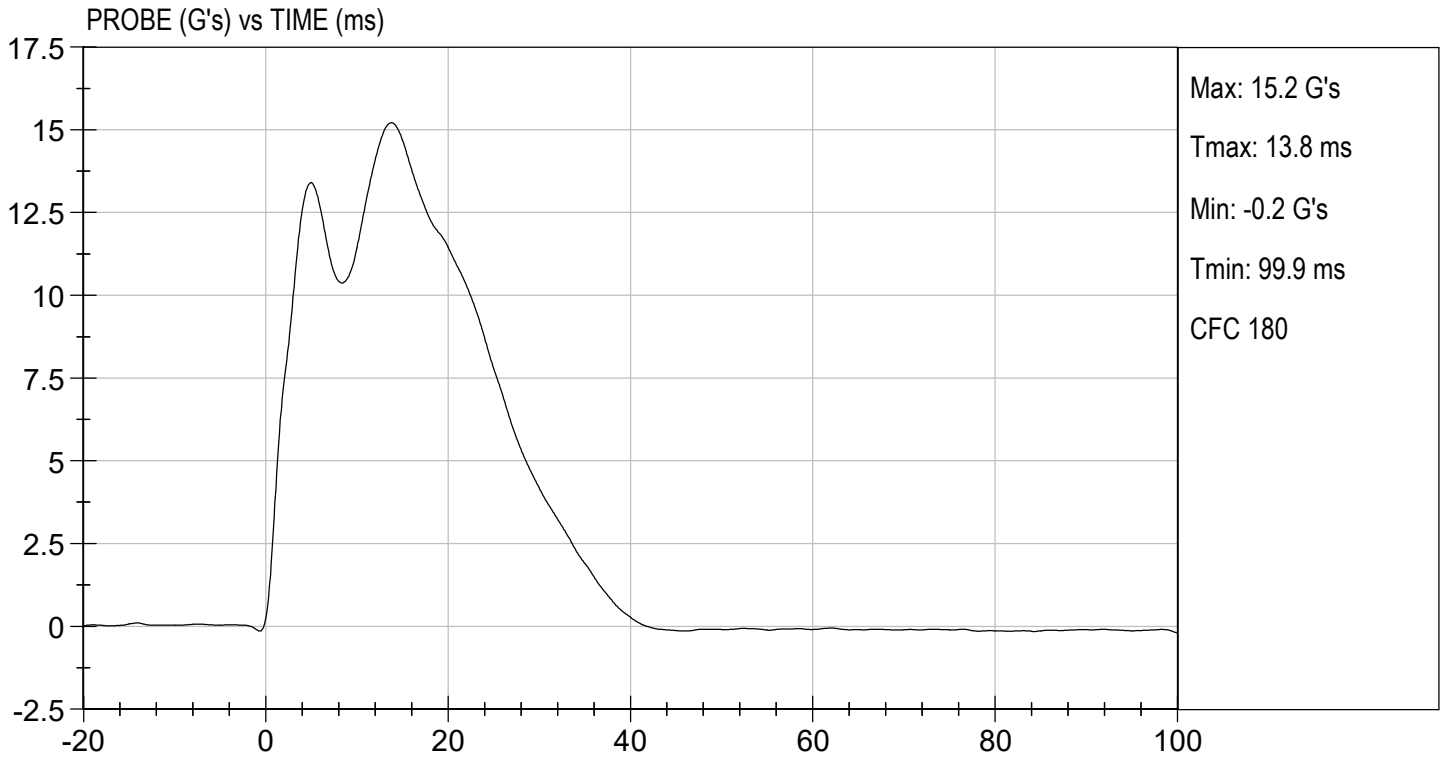
Laboratory Technician

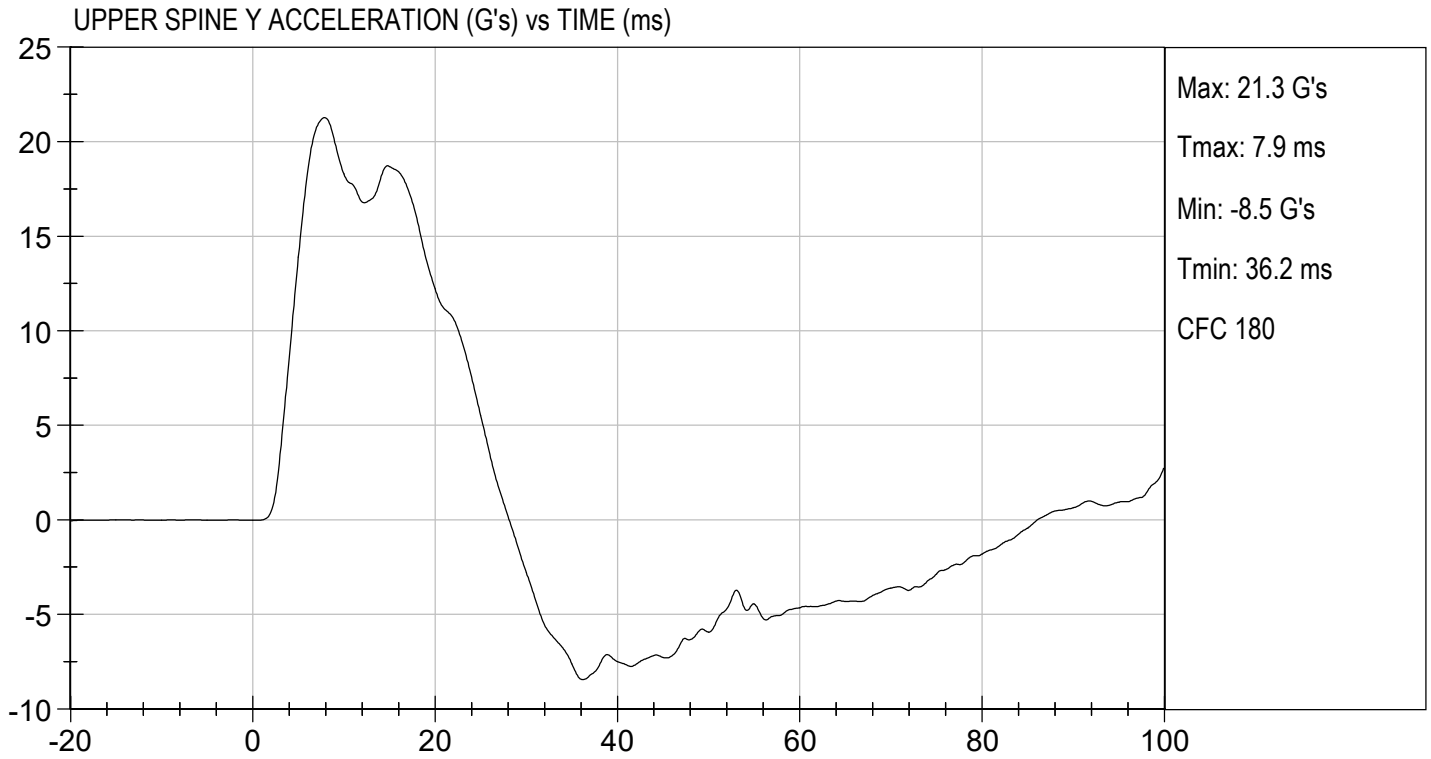
04/09/2019

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: D191224

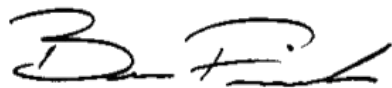
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	34	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle 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	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass



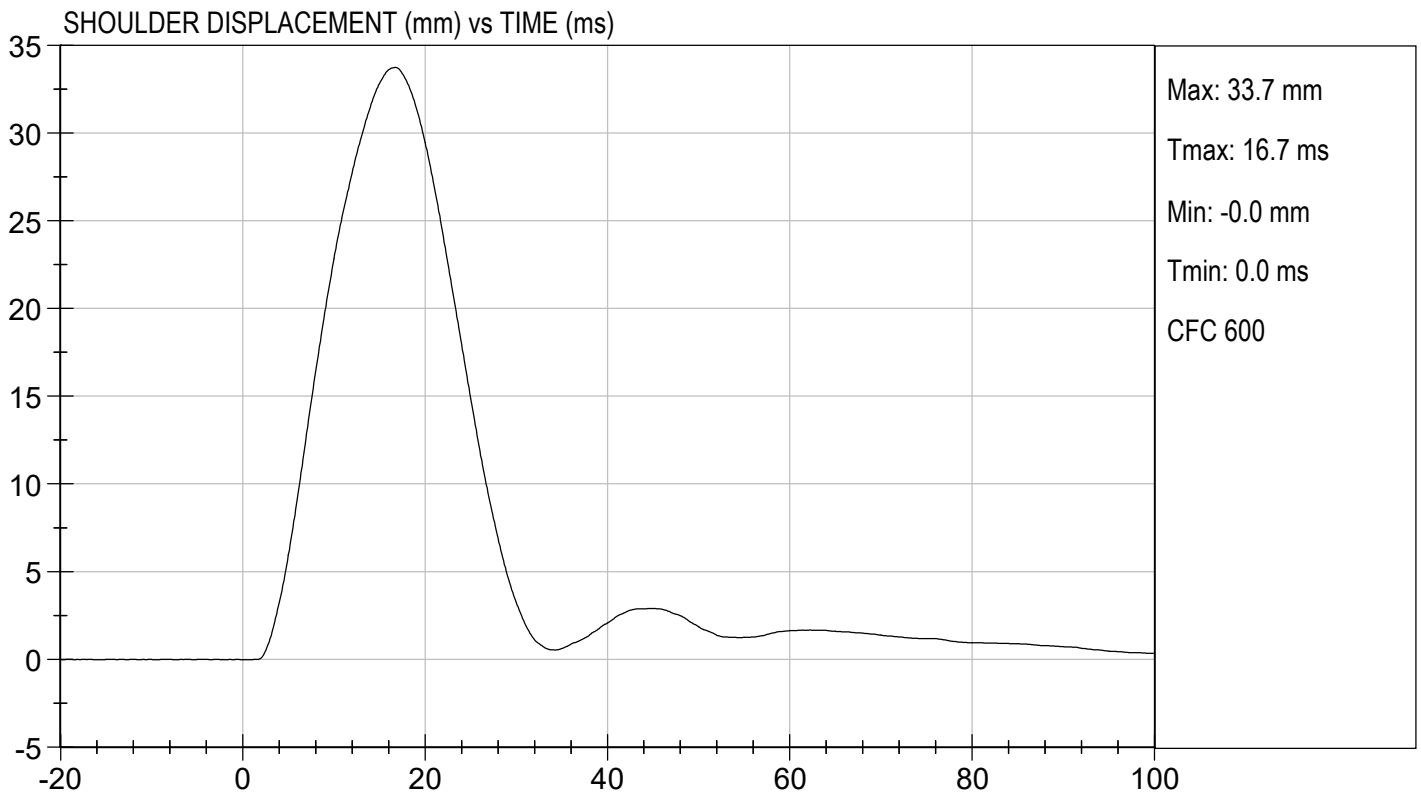
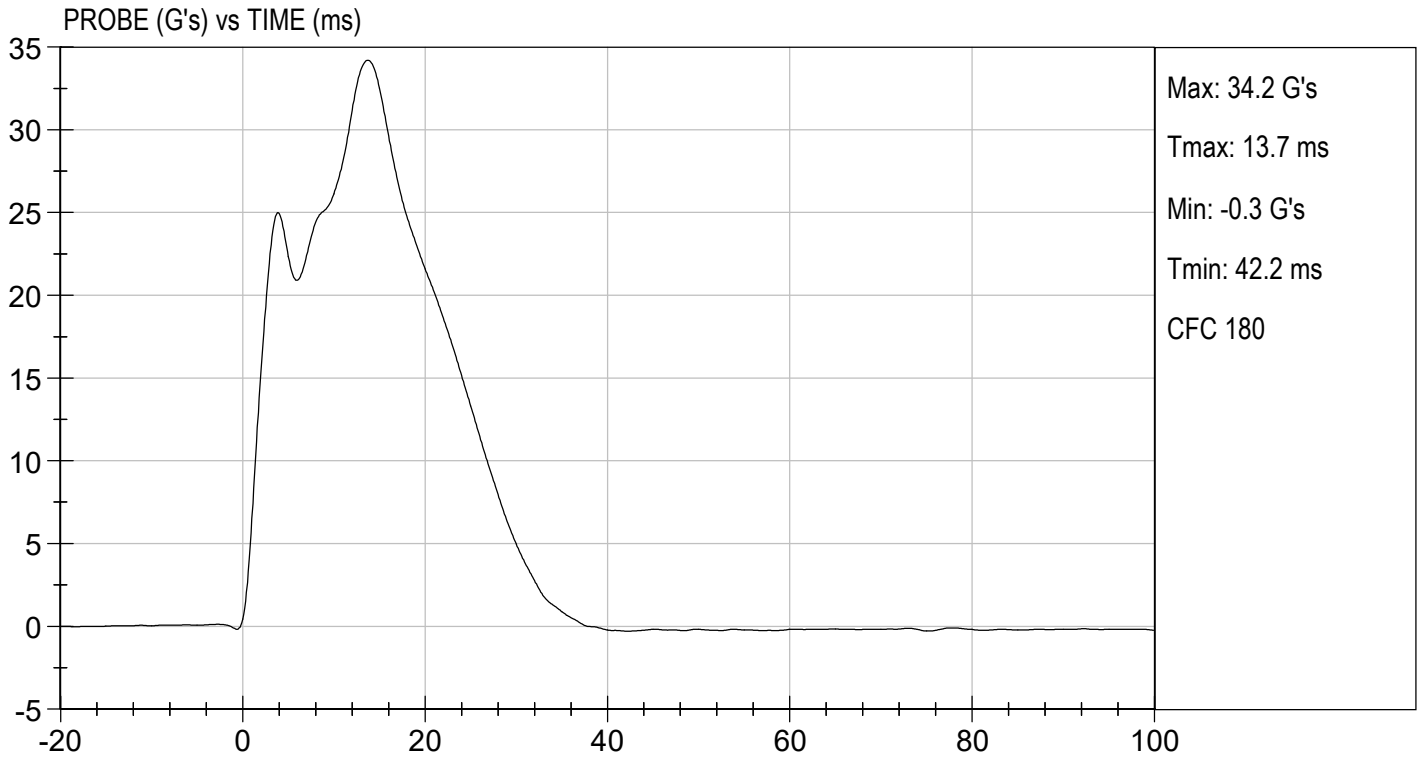
Laboratory Technician

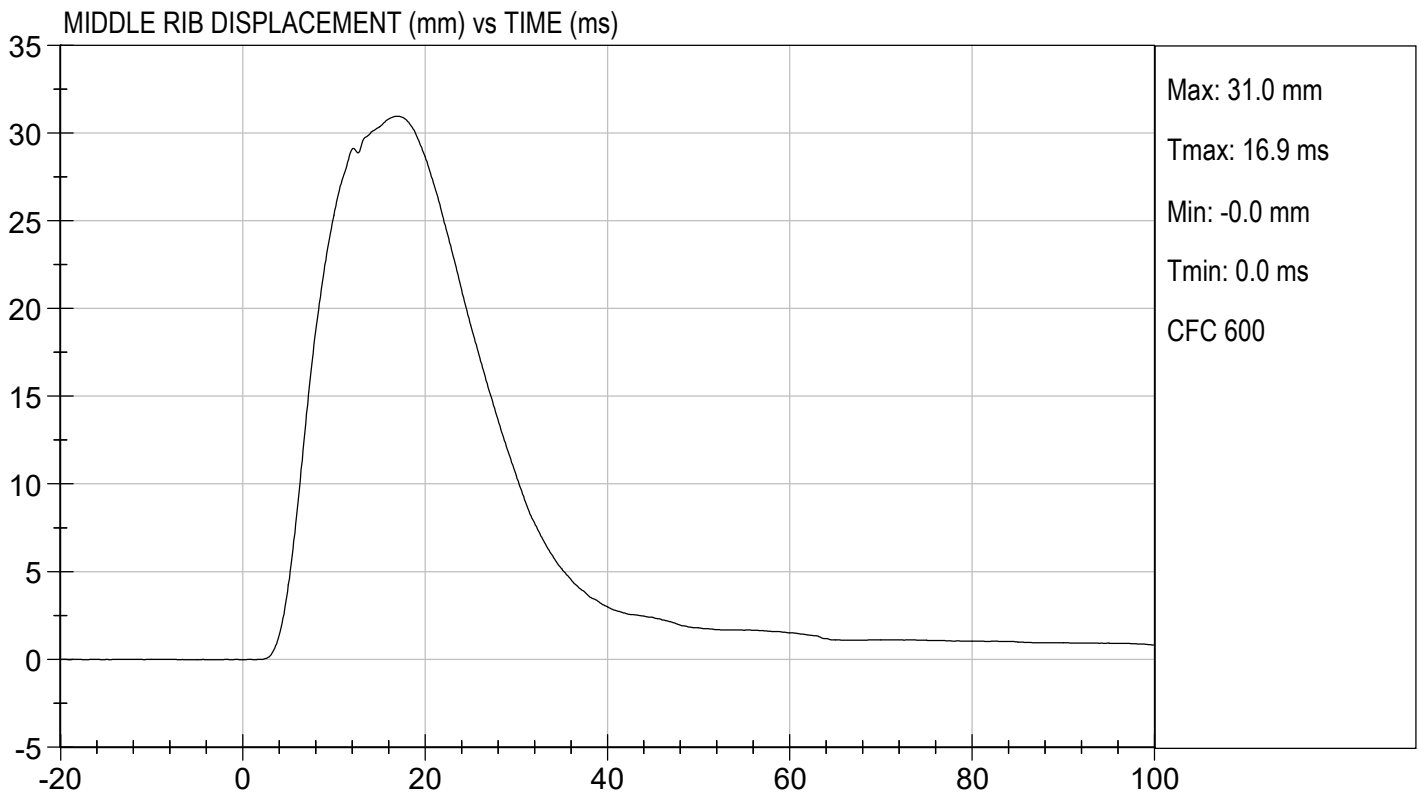
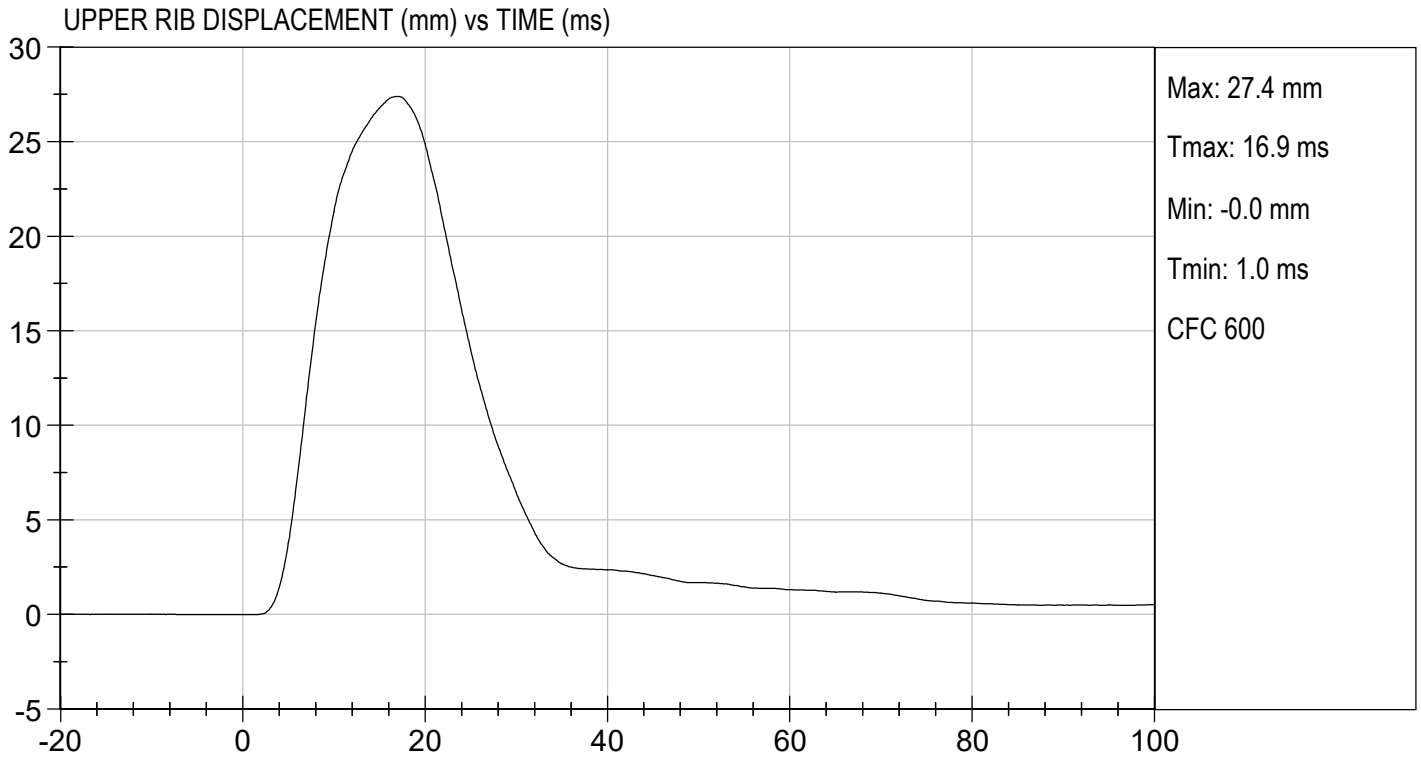
04/09/2019

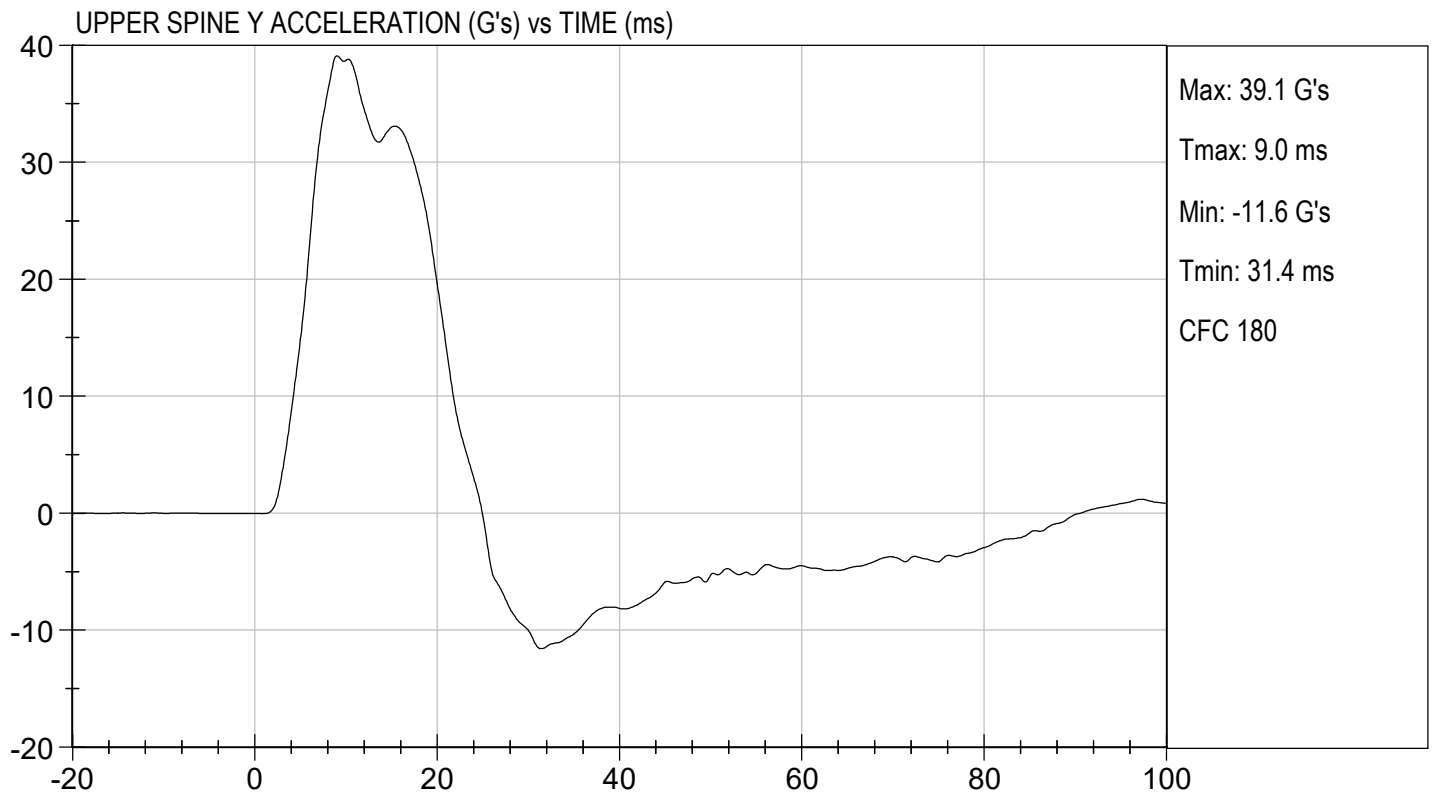
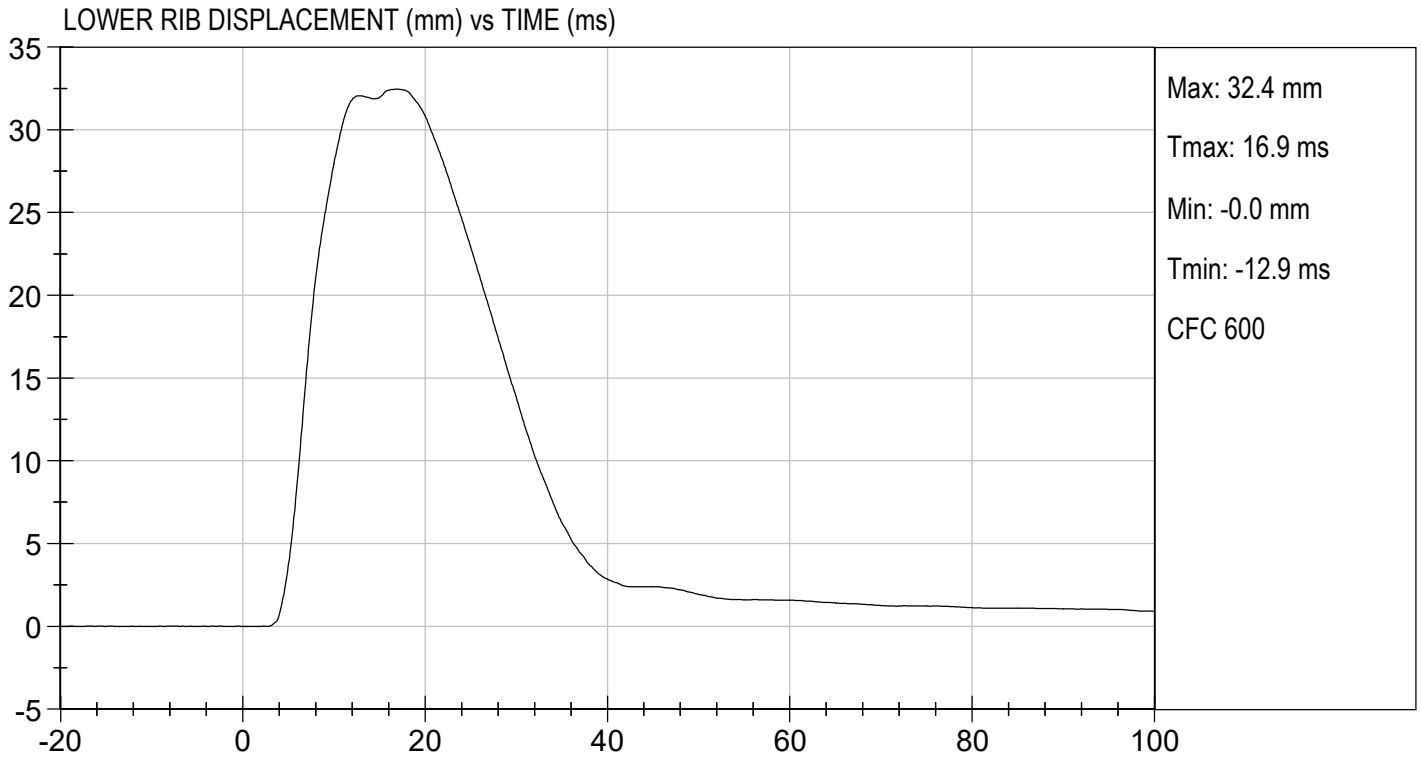
Test Date

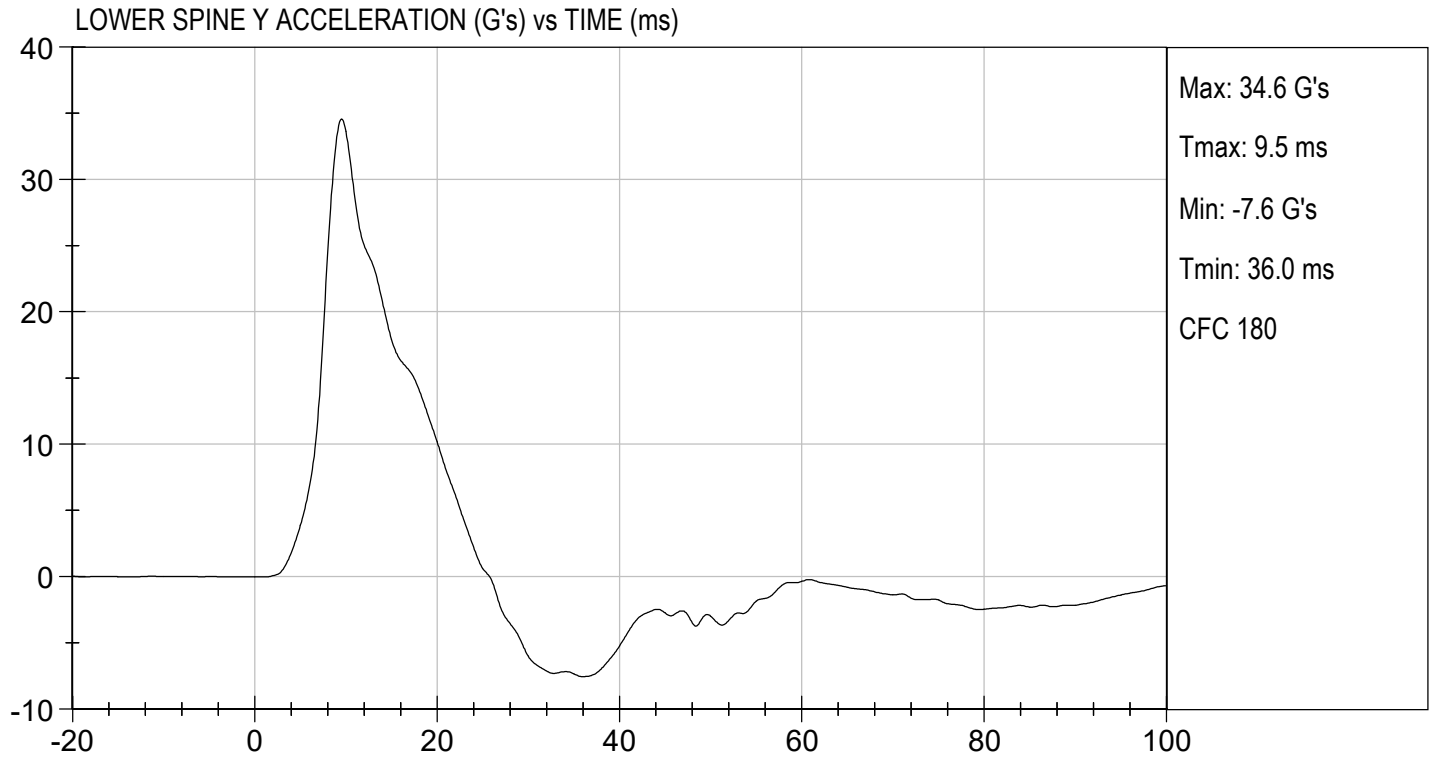


Approved By









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

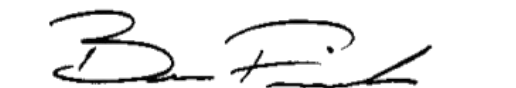
ATD Serial No: 306

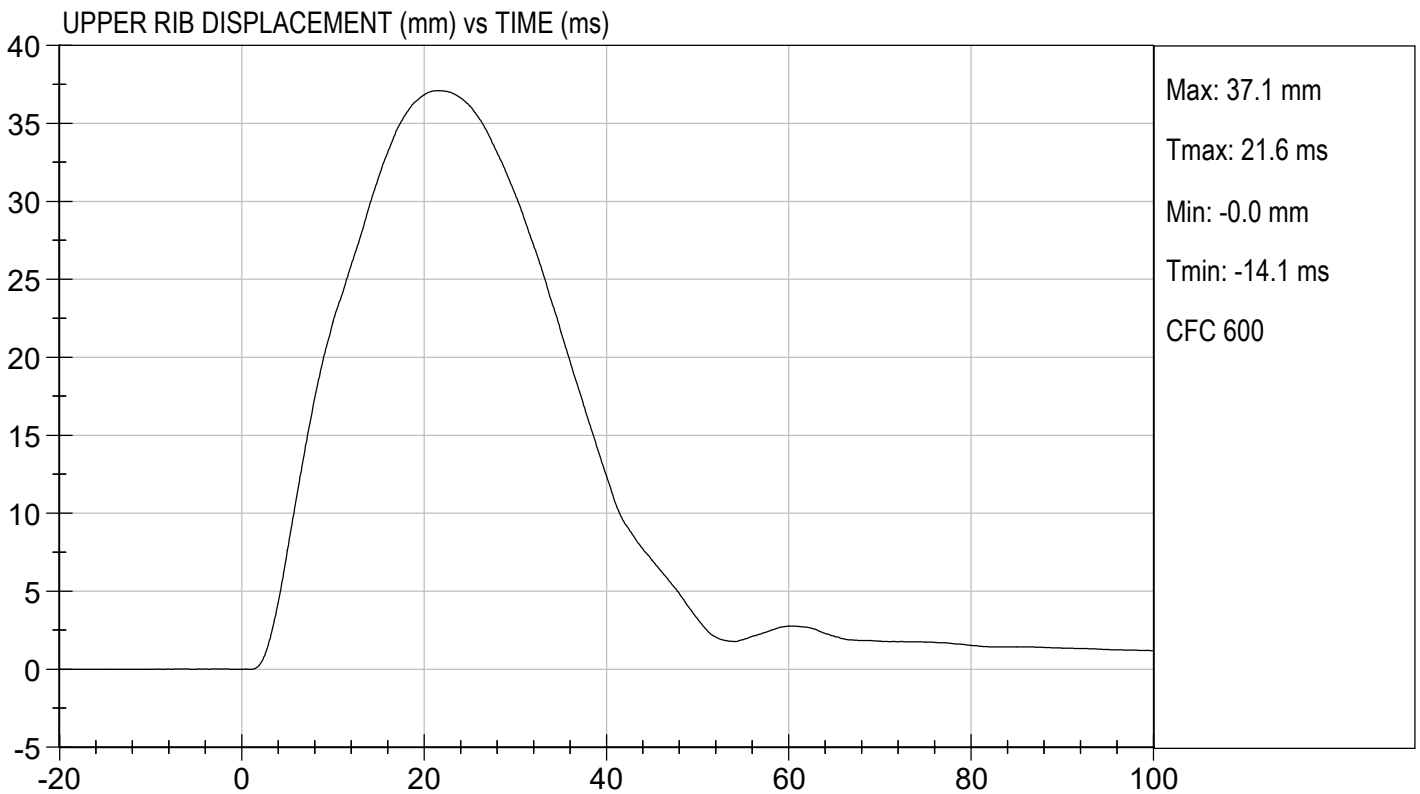
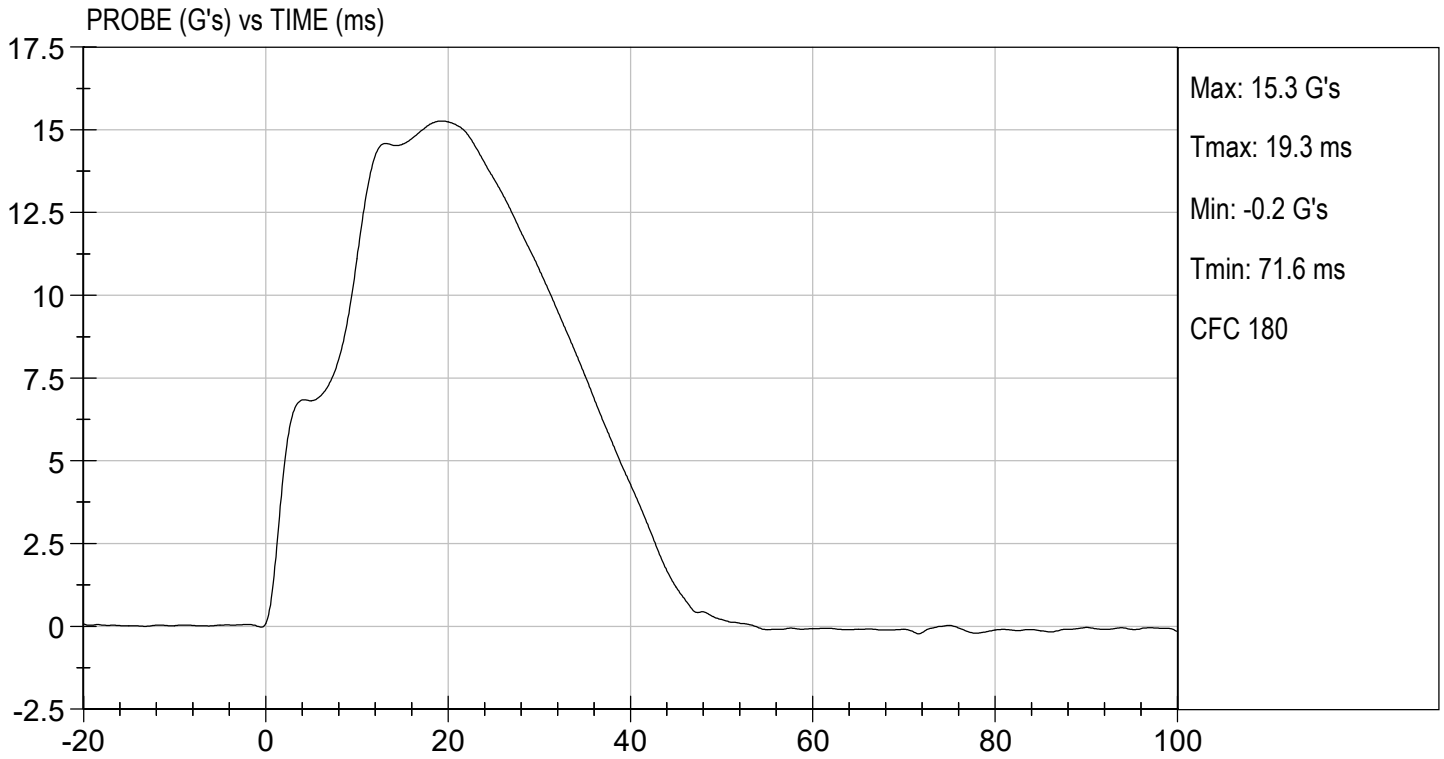
Test I.D: D191225

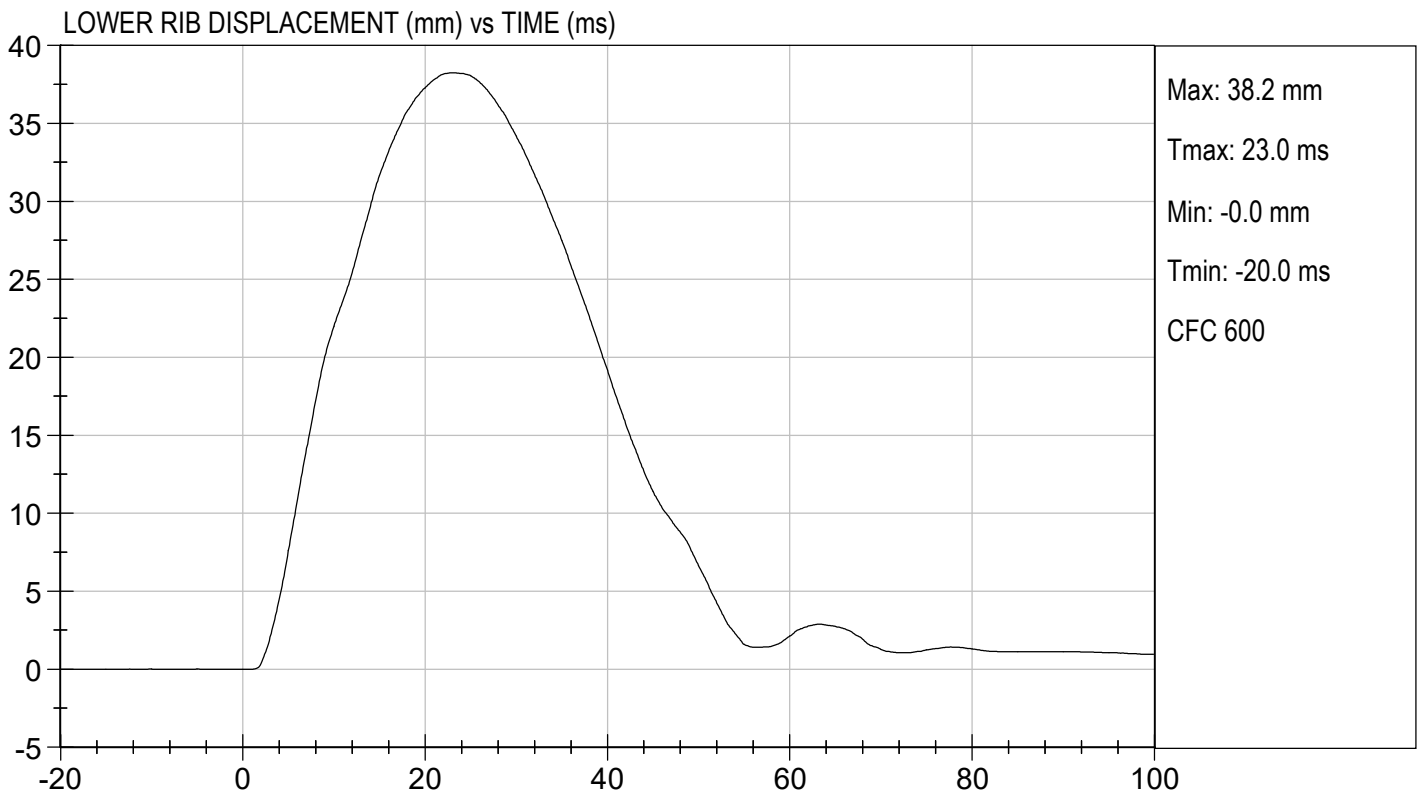
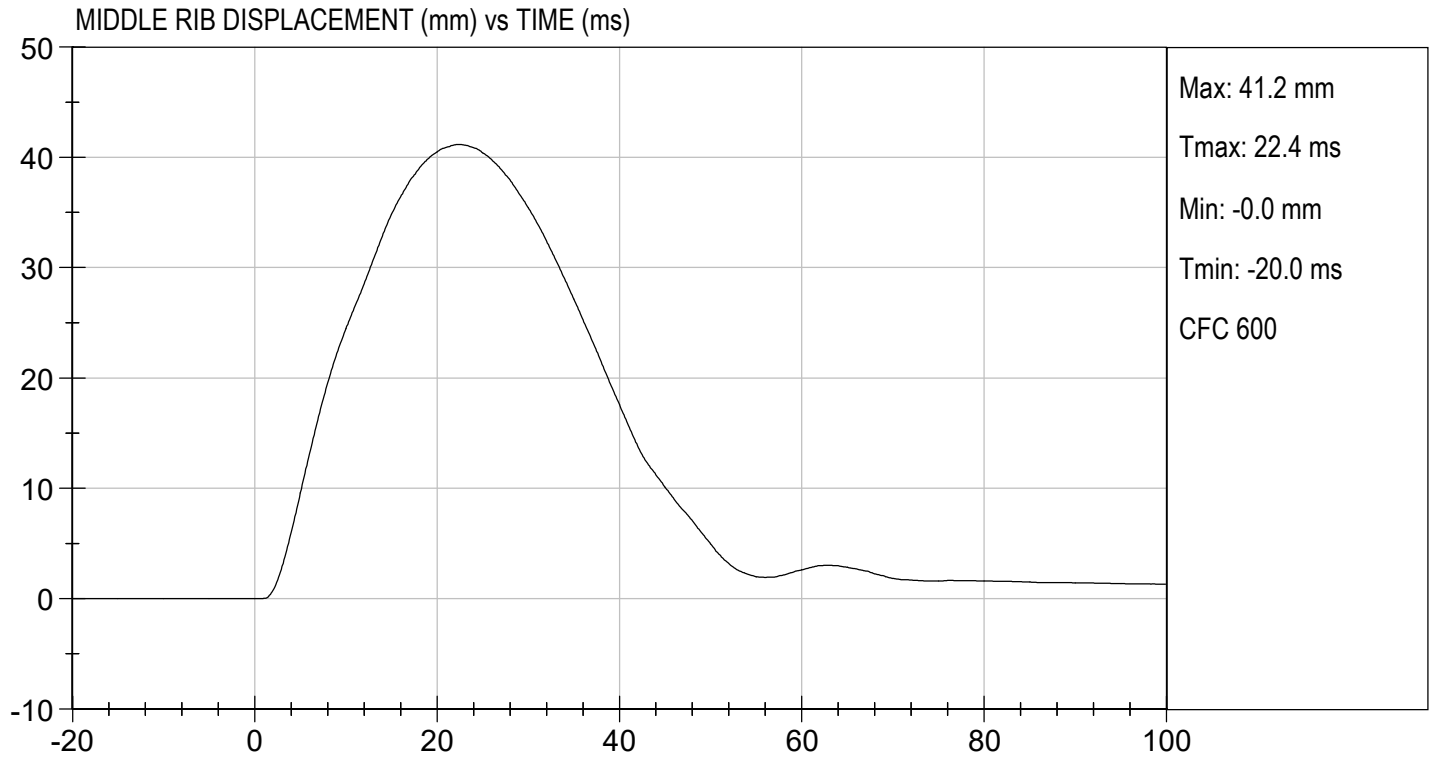
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass

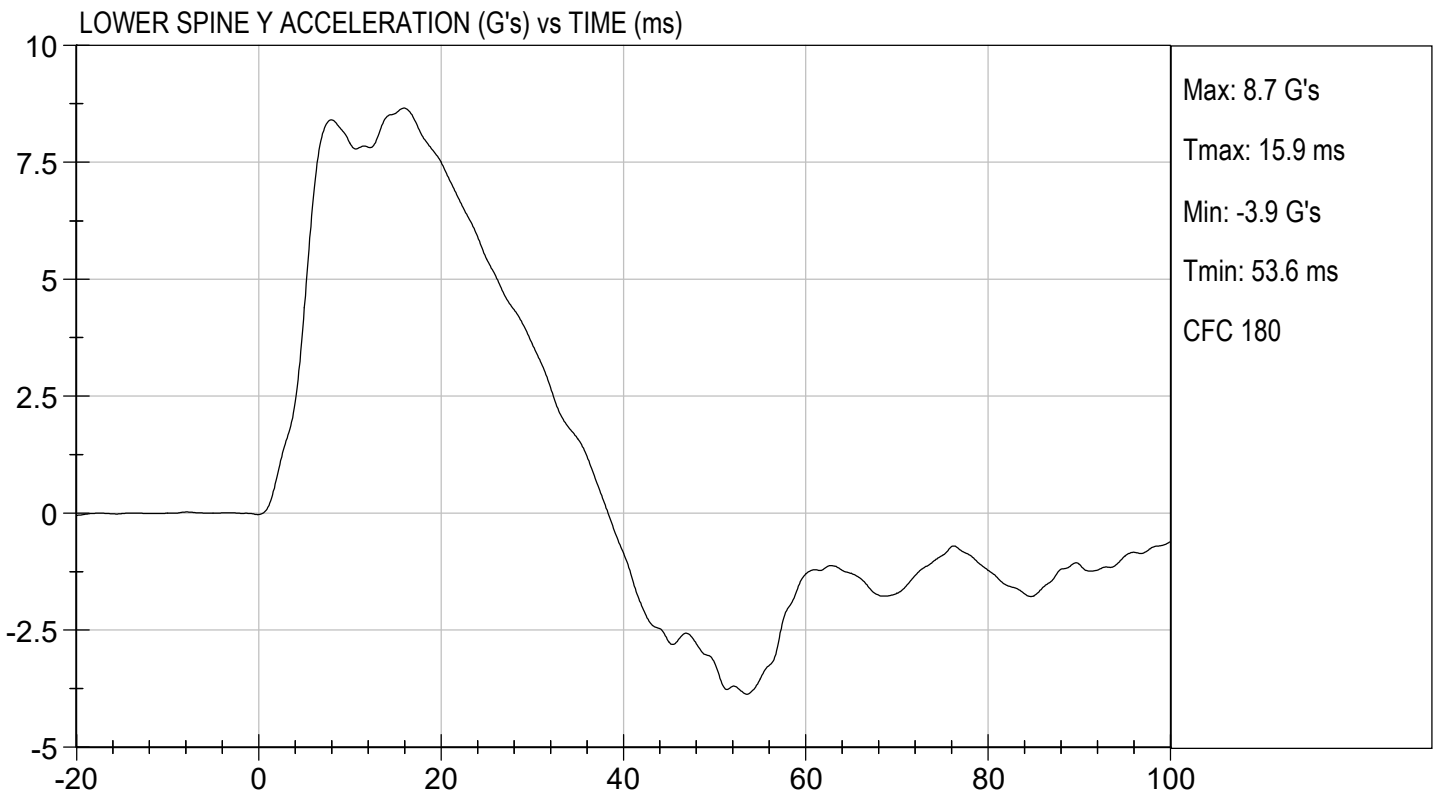
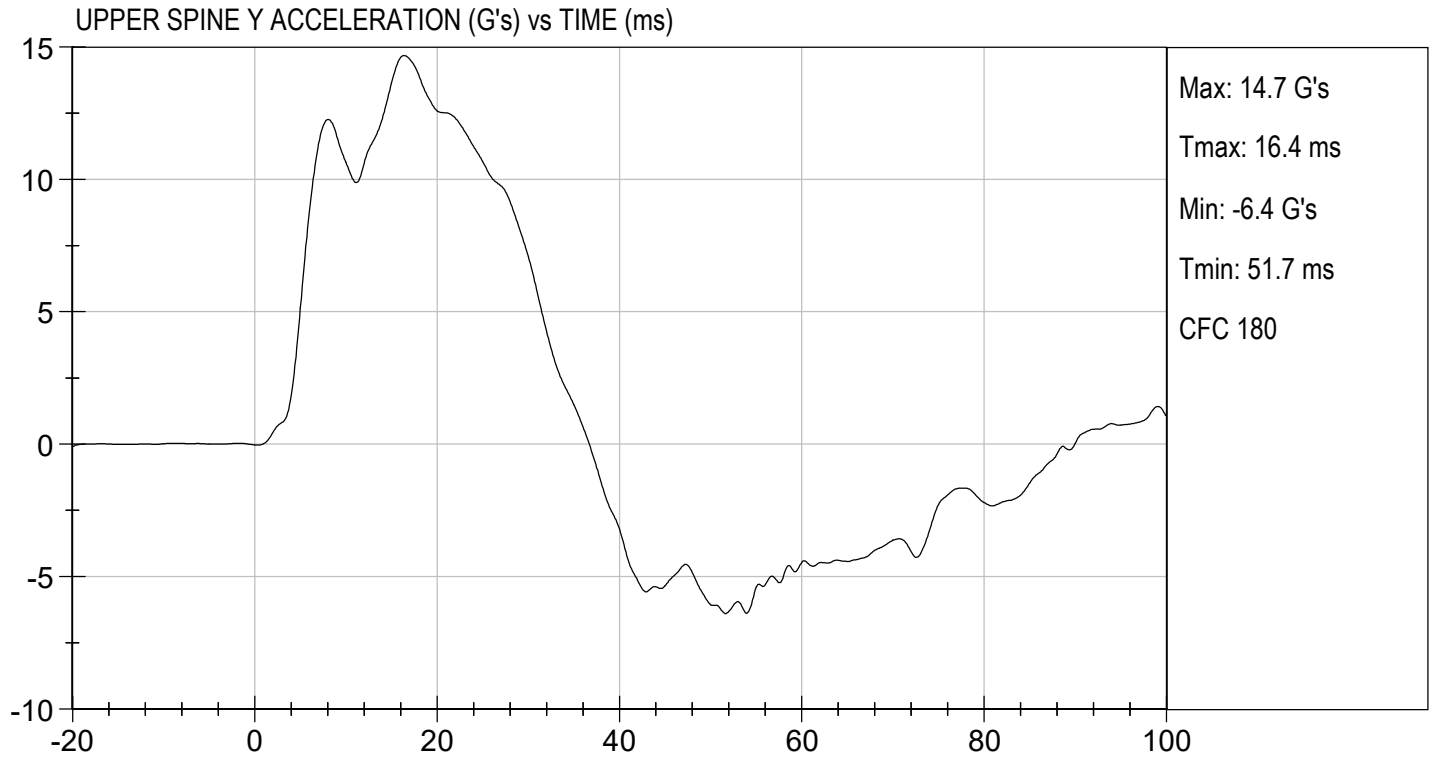

 Laboratory Technician

04/09/2019
 Test Date


 Approved By







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

ATD Serial No: 306

Test I.D: D191226

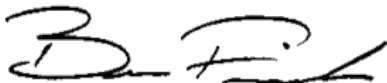
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass



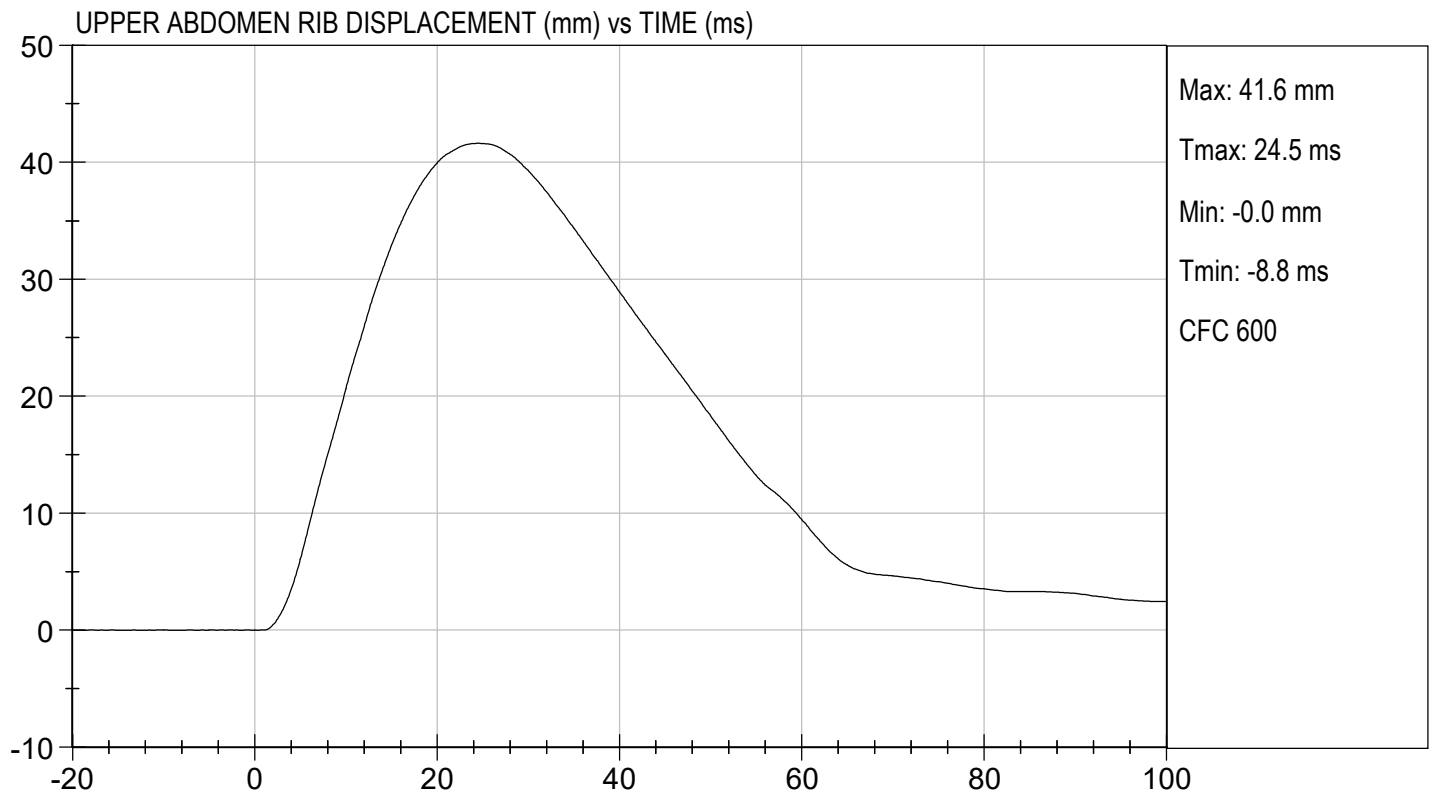
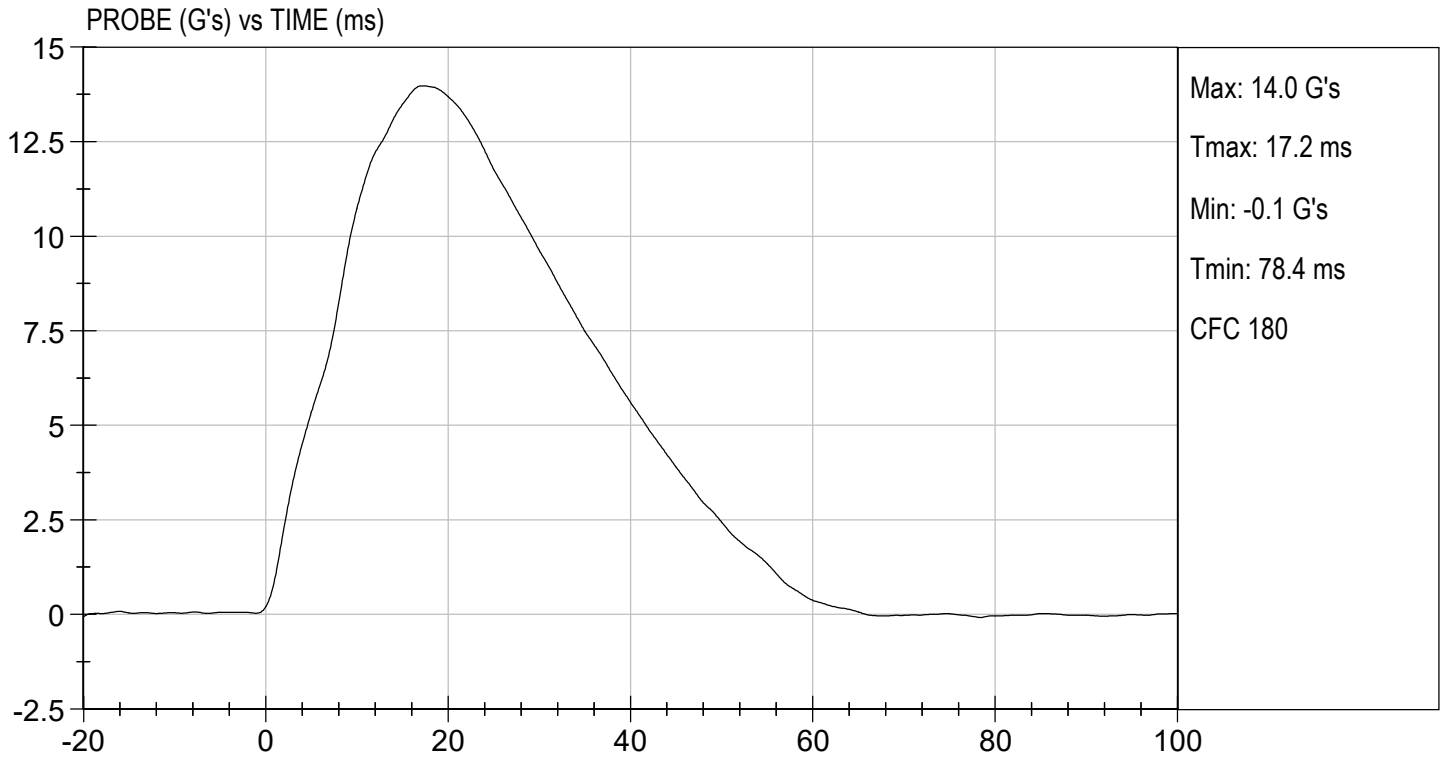
Laboratory Technician

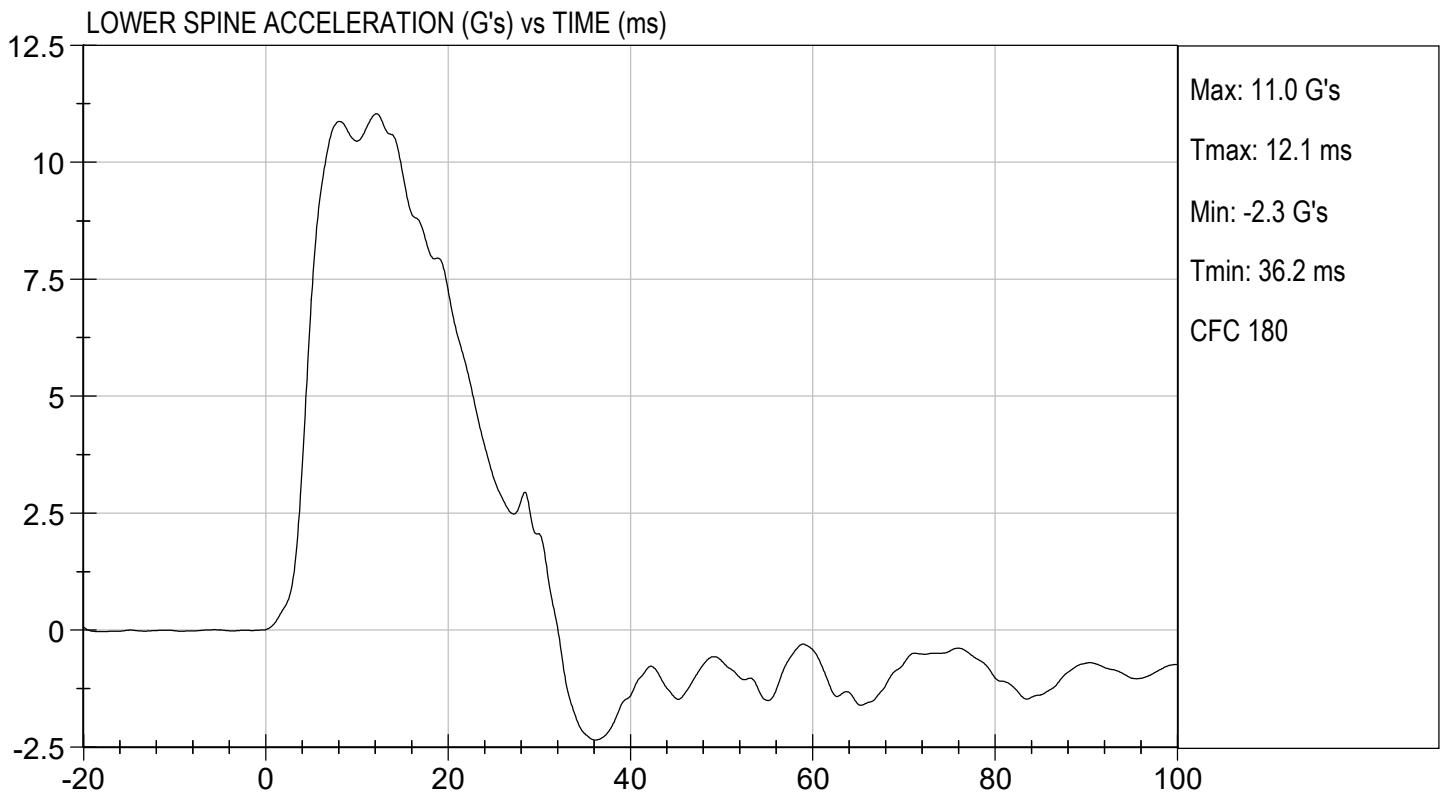
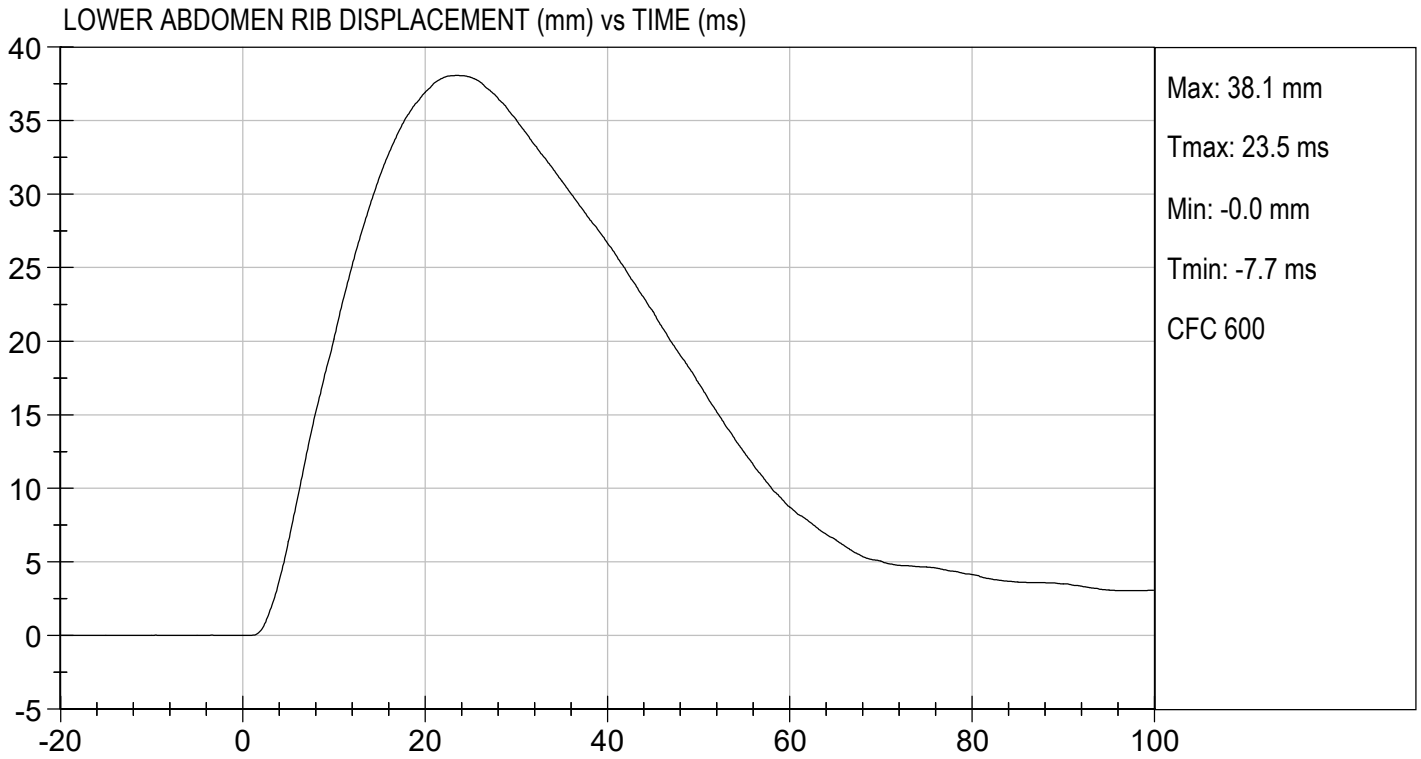
04/09/2019

Test Date



Approved By





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

ATD Serial No: 306

Test I.D: D191227

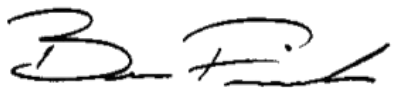
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	3,637	Pass
Overall Test Results				Pass



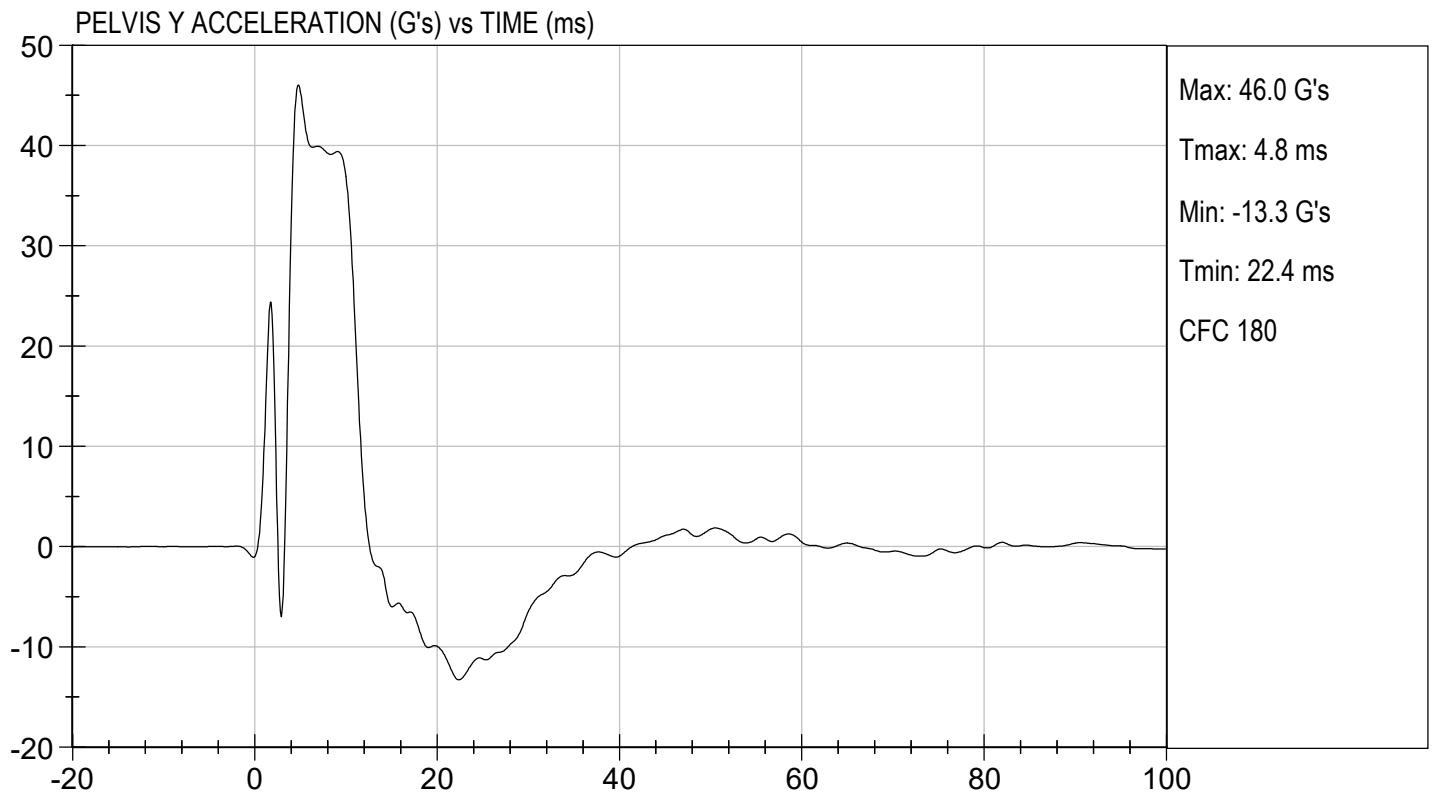
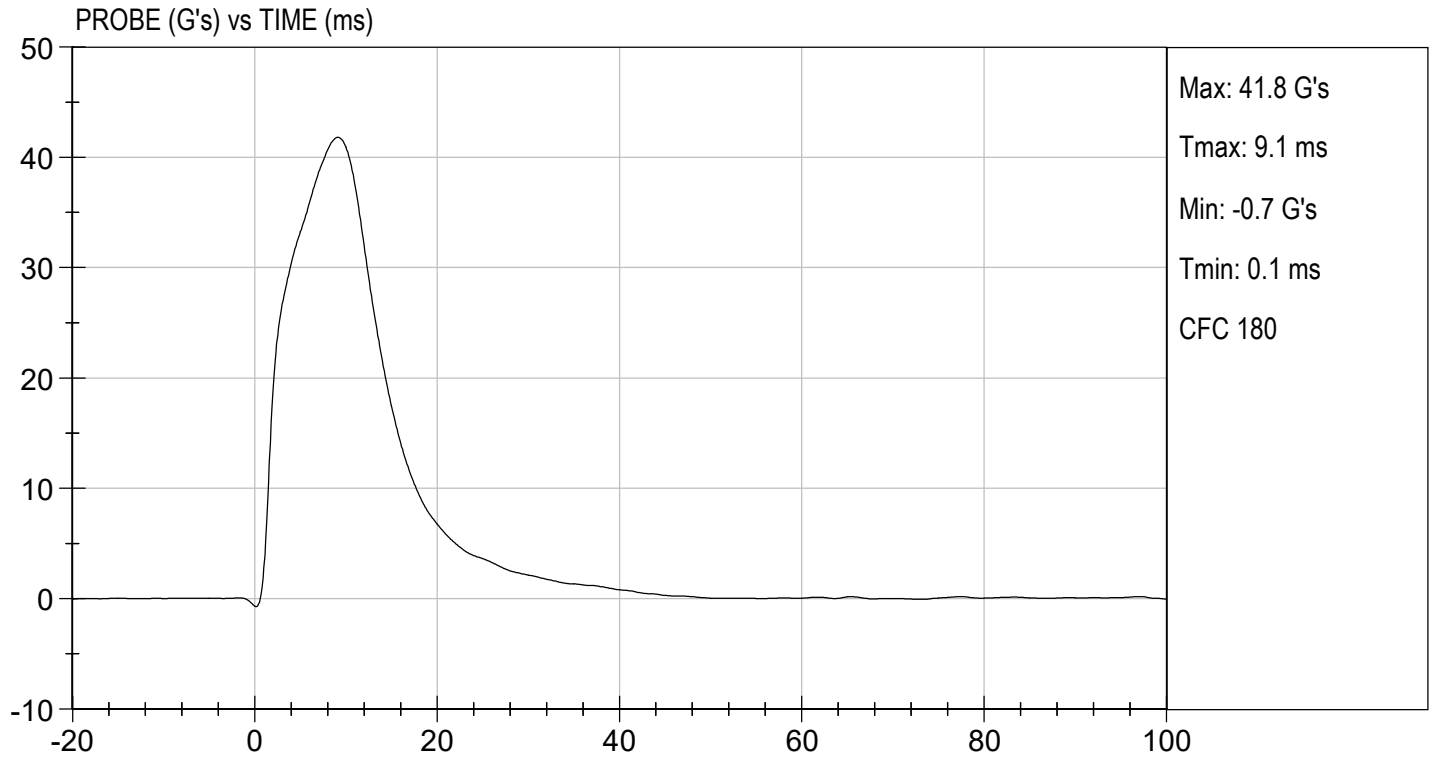
Laboratory Technician

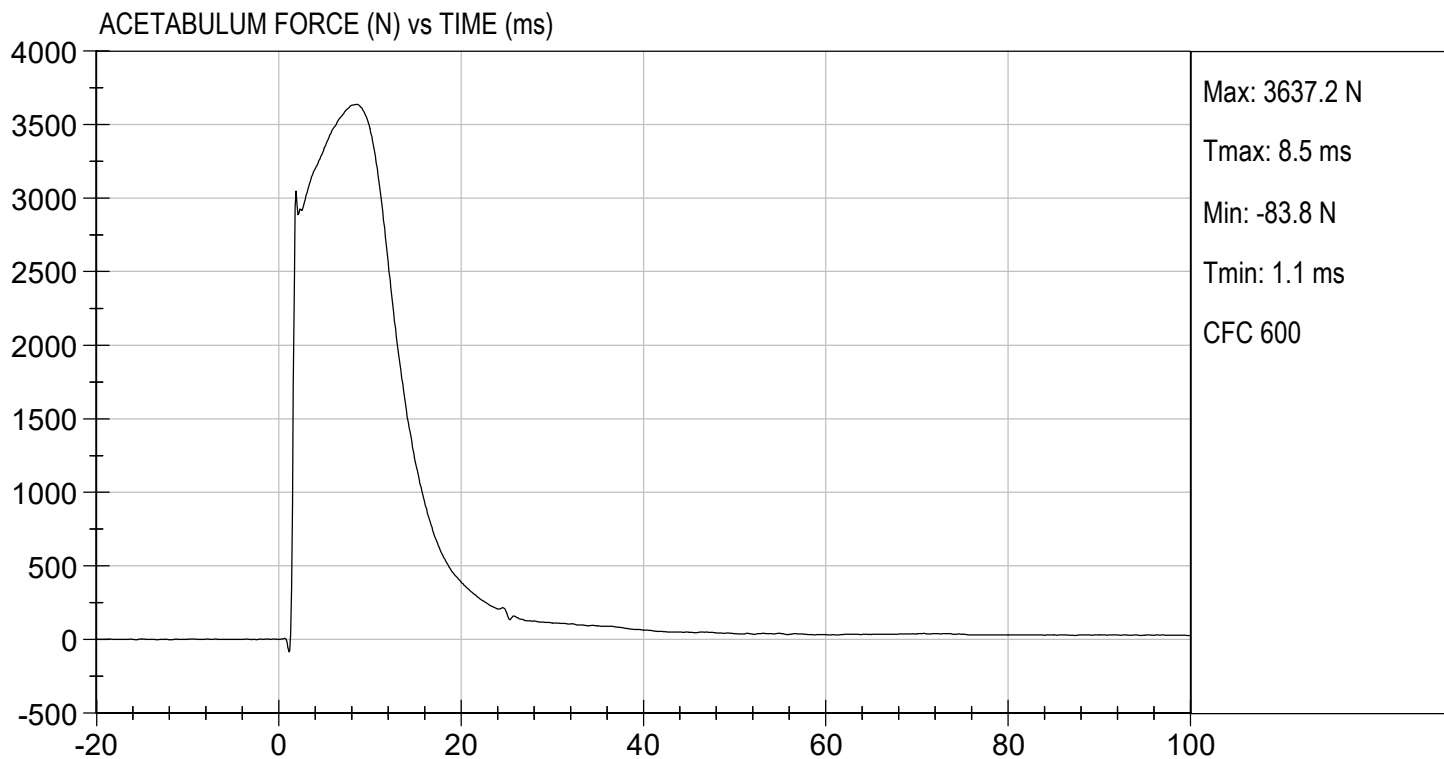
04/08/2019

Test Date



Approved By





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

ATD Serial No: 296

Test I.D: D191228

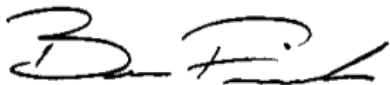
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	32	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,537	Pass
Overall Test Results				Pass



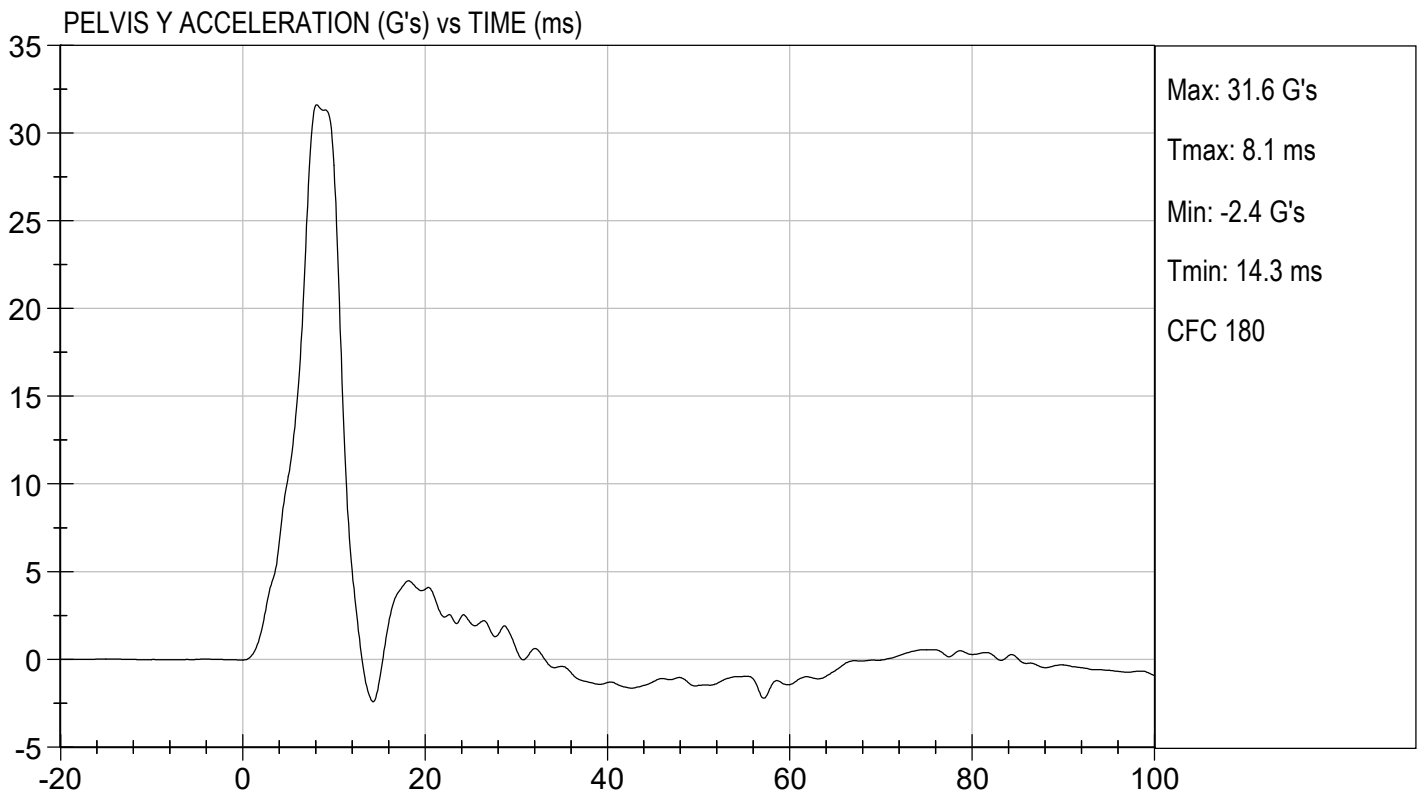
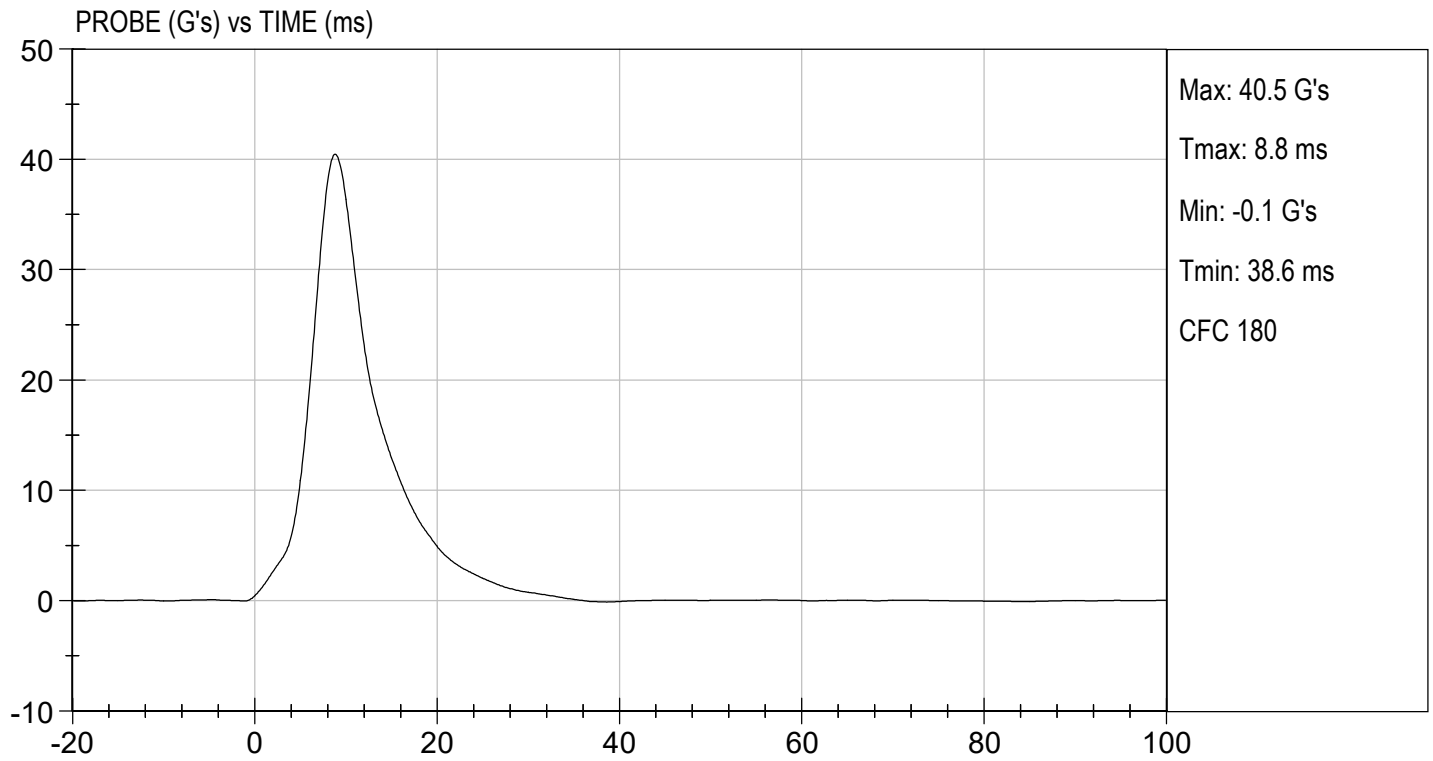
Laboratory Technician

04/09/2019

Test Date



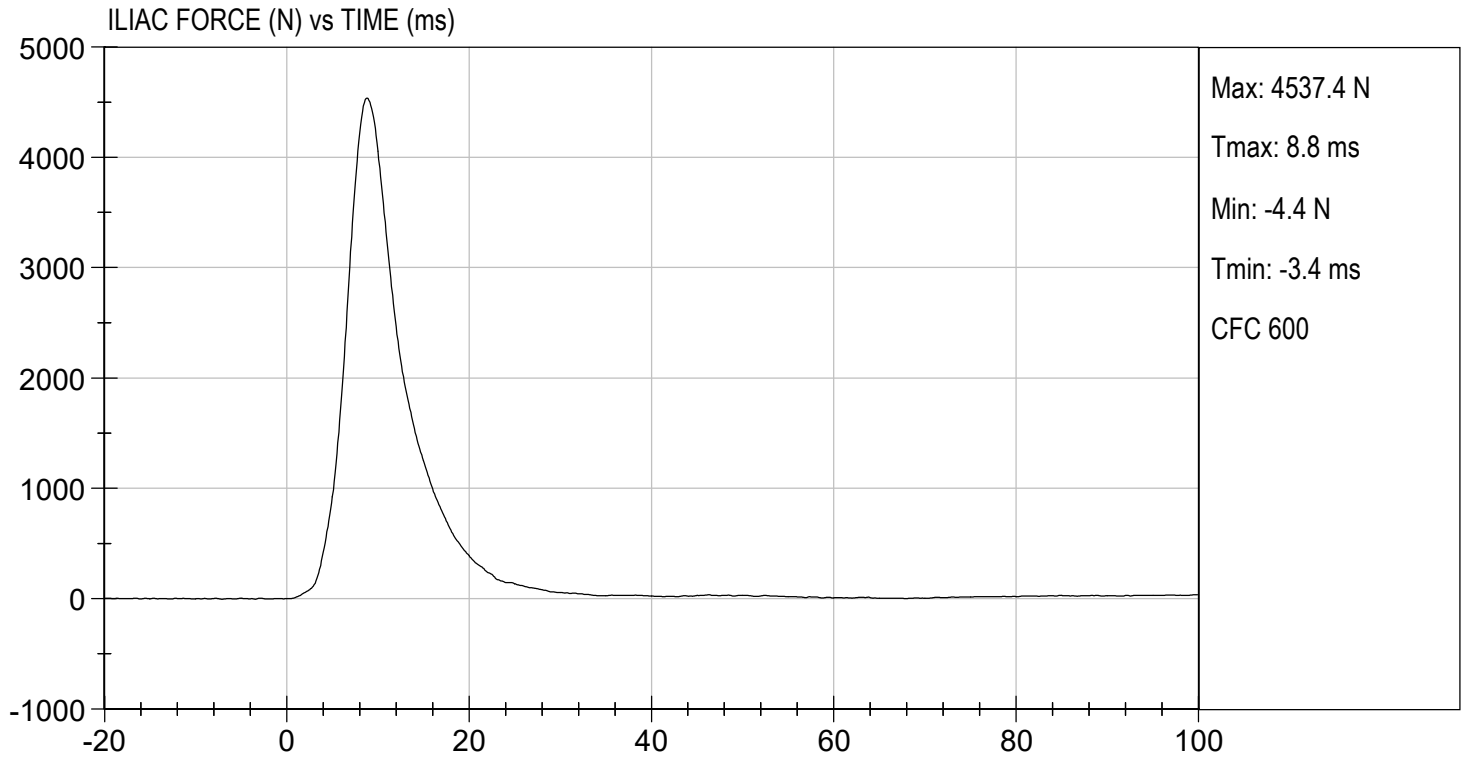
Approved By





TEST DESC: ILLIAC
VELOCITY: 13.78 ft/s, 4.20 m/s

TEST DATE: 04/09/2019
TEST #: D191228



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

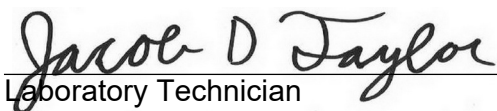
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

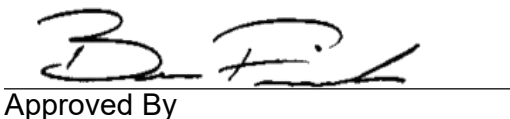
Test ID: D191601

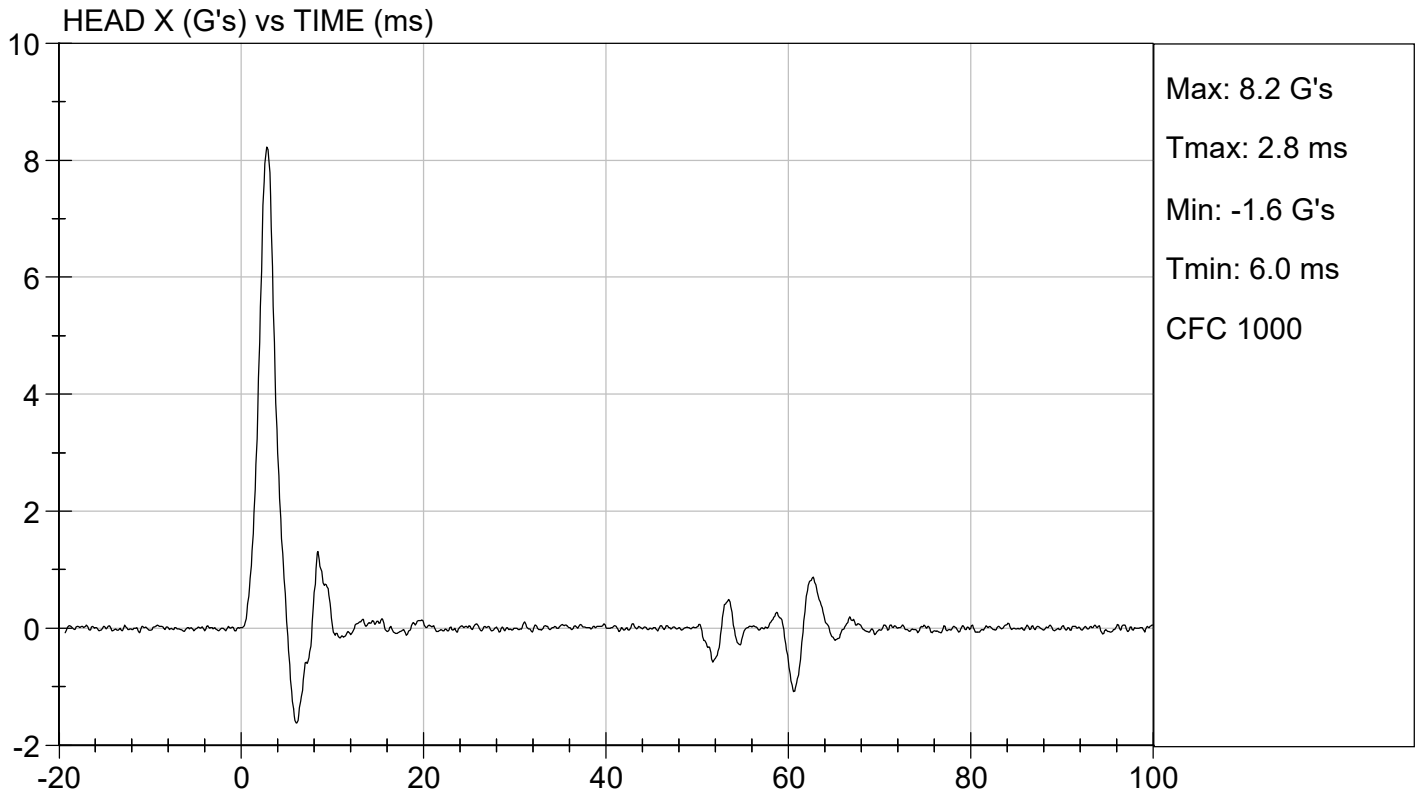
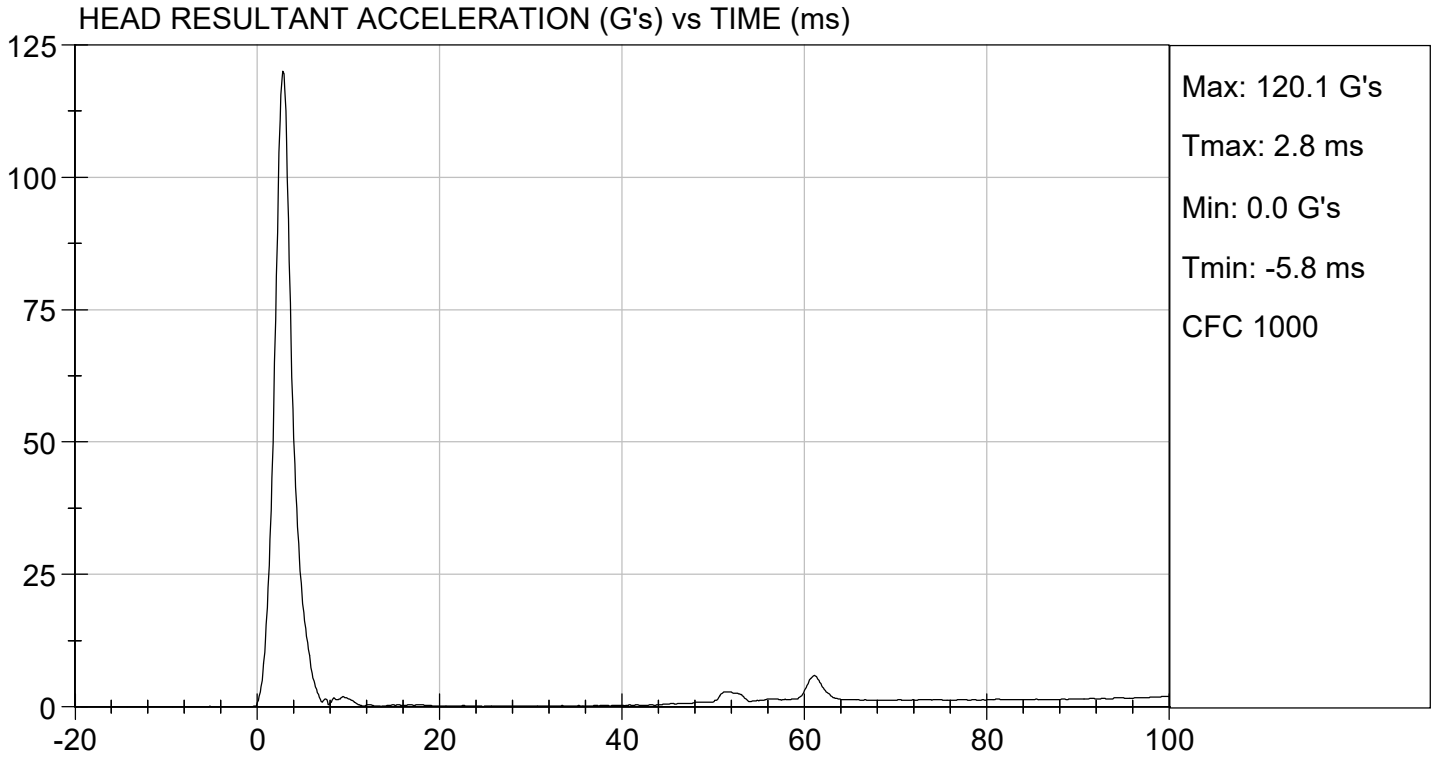
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	115 to 137	120	Pass
Peak Longitudinal Acceleration	G's	+/- 15	8.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results				Pass

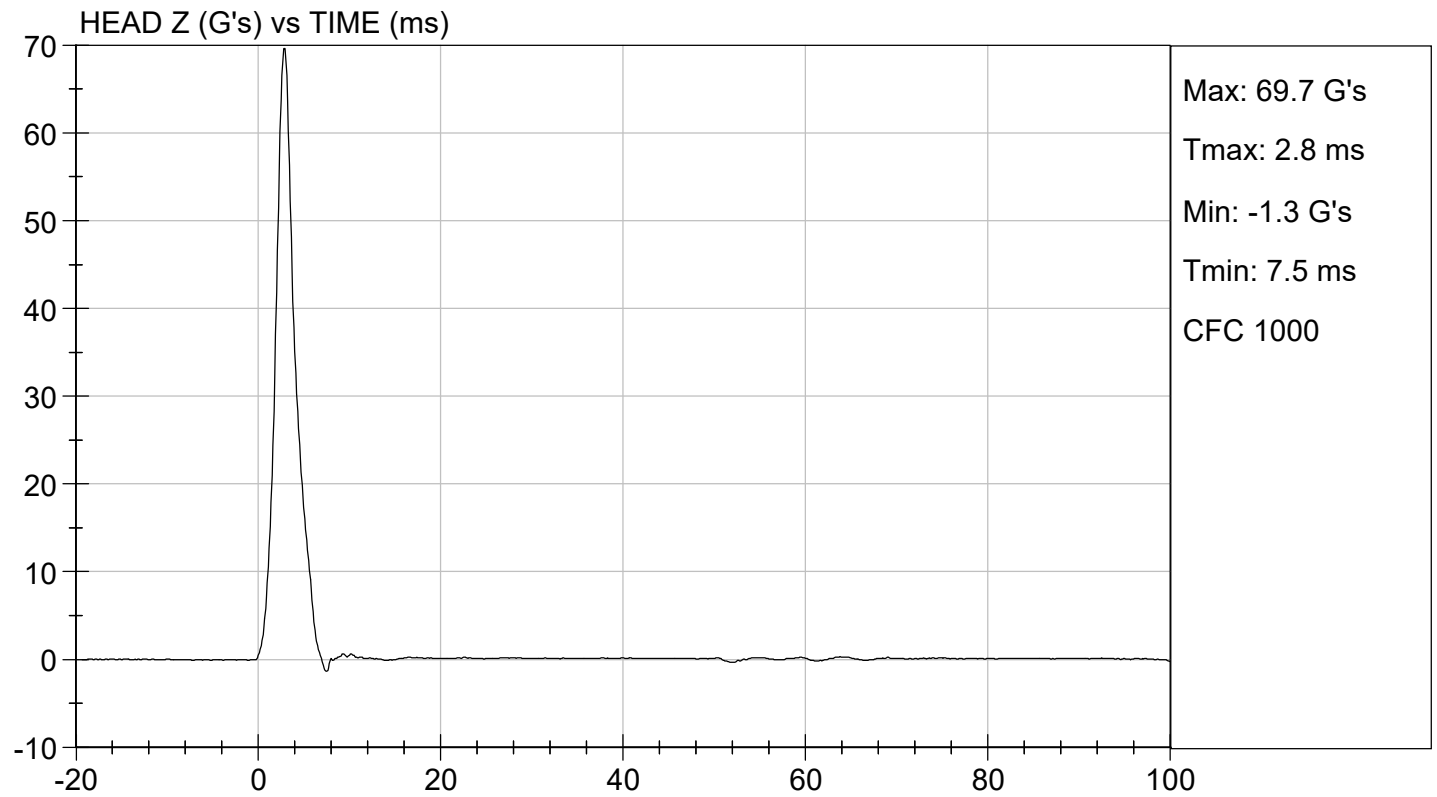
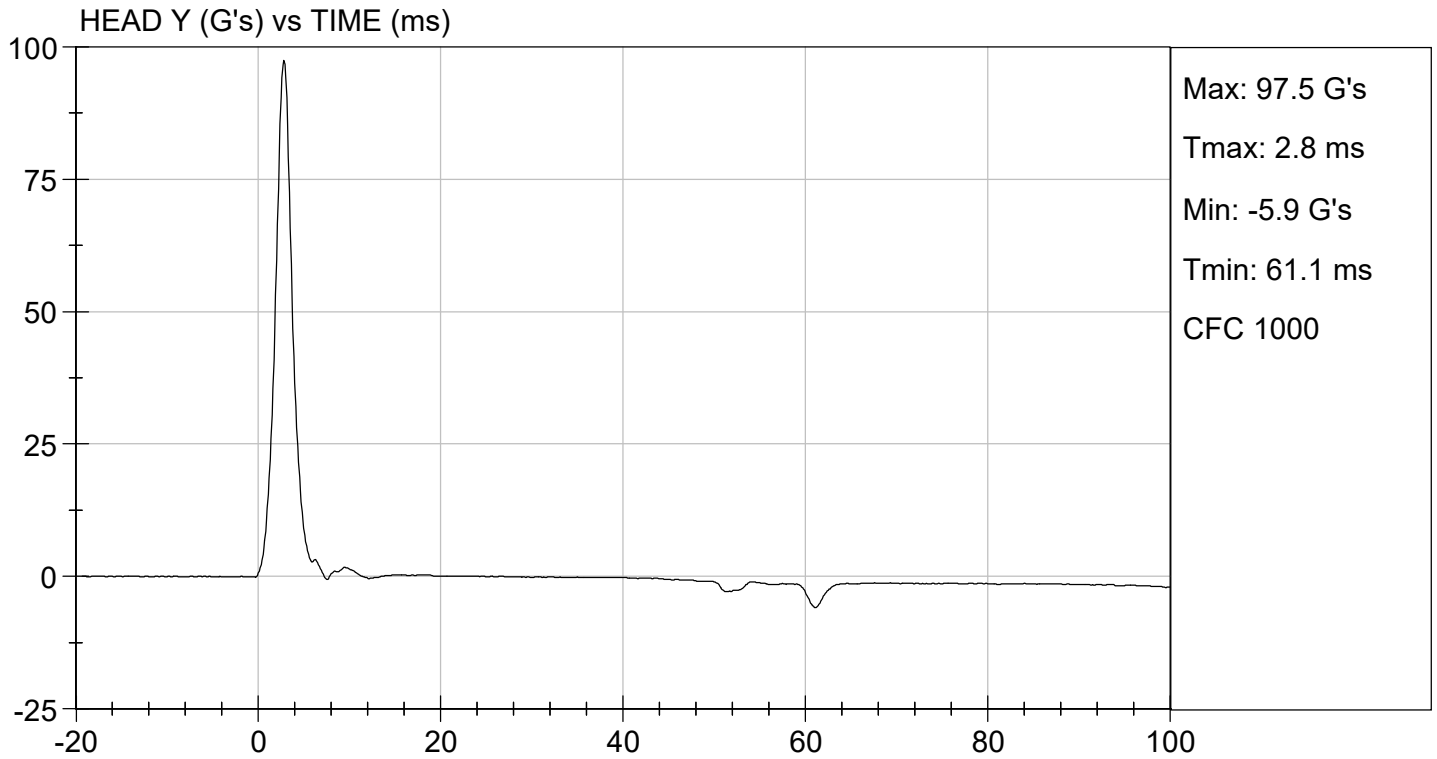

 Laboratory Technician

05/13/2019

Test Date


 Approved By



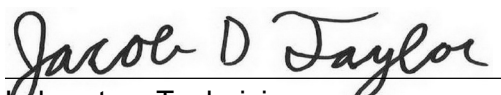


**MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY**

ATD Serial No: 306

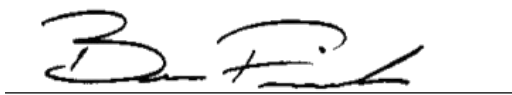
Test I.D.: D191602

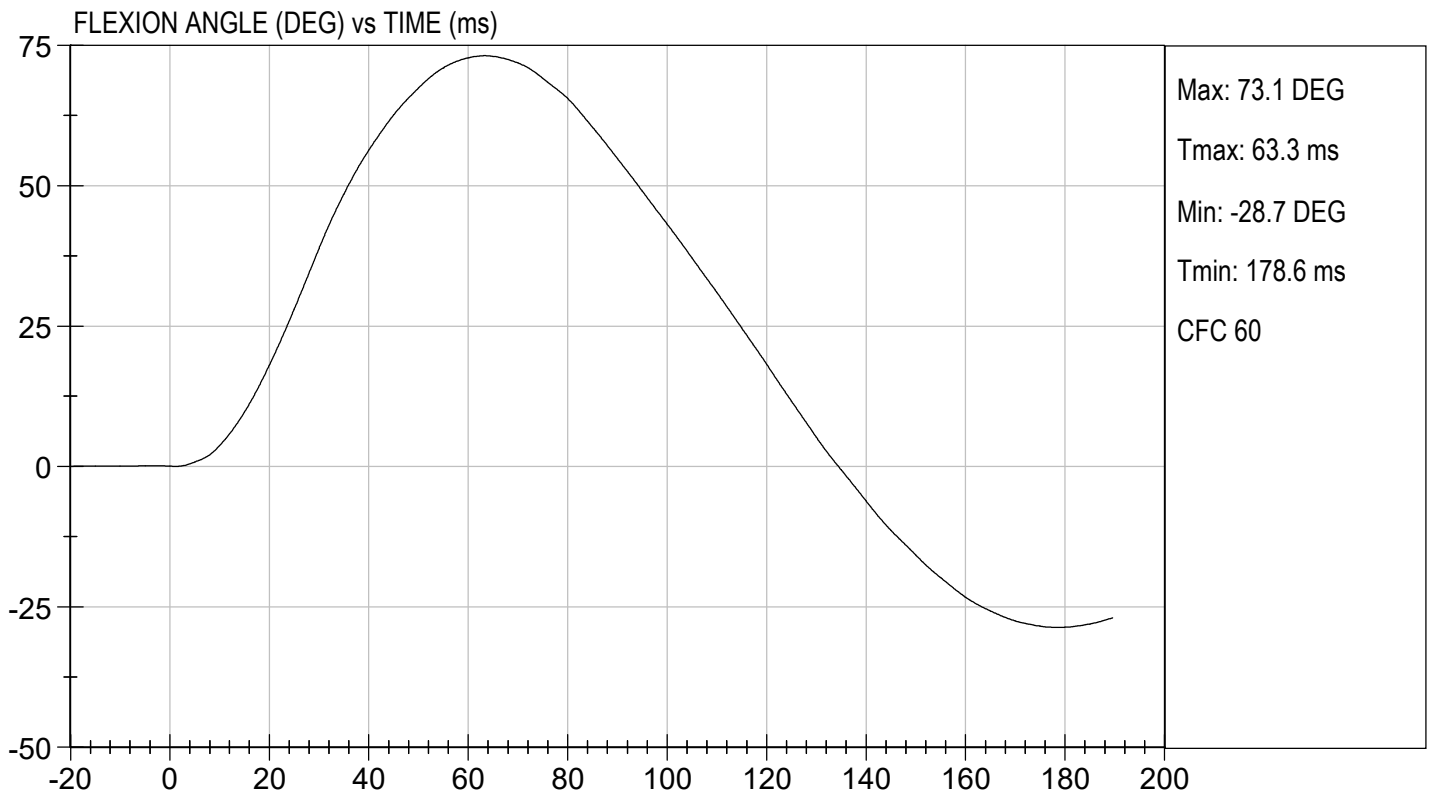
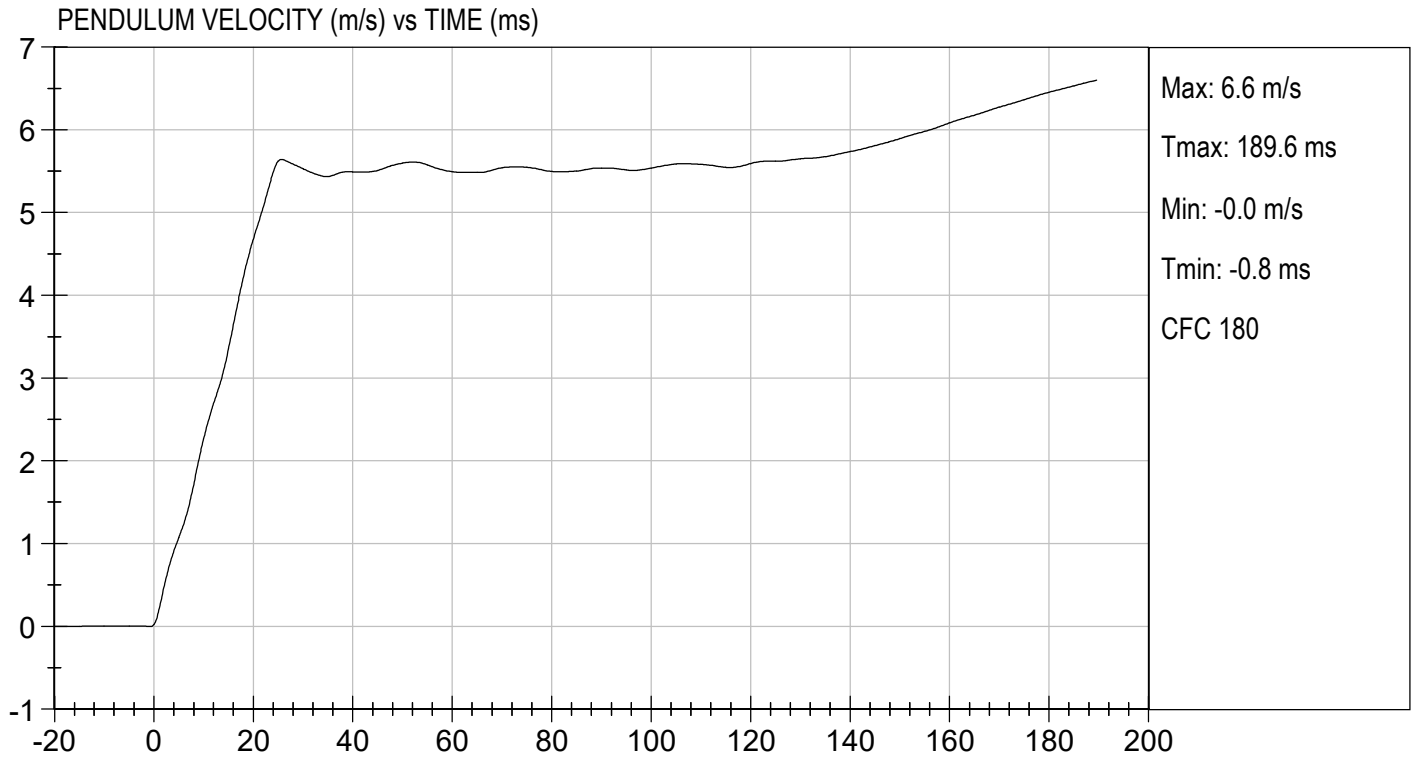
Tested Parameter	Units	Specification	Result	Pass/Fail	
Temperature	deg C	20.6 to 22.2	21.7	Pass	
Humidity	%	10 to 70	32	Pass	
Impact Velocity	m/s	5.51 to 5.63	5.62	Pass	
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.27	Pass
	15 ms	m/s	3.30 to 4.10	3.35	Pass
	20 ms	m/s	4.40 to 5.40	4.68	Pass
	25 ms	m/s	5.40 to 6.10	5.62	Pass
	25-100 ms	m/s	5.50 to 6.20	5.64	Pass
Maximum D-Plane Rotation	deg	71 to 81	73	Pass	
Time of Maximum D-Plane Rotation	ms	50 to 70	63	Pass	
Maximum Occipital Condyle Moment	Nm	-44 to -36	-37	Pass	
Time of Moment Decay to 0 Nm	ms	102 to 126	119	Pass	
Overall Test Results				Pass	

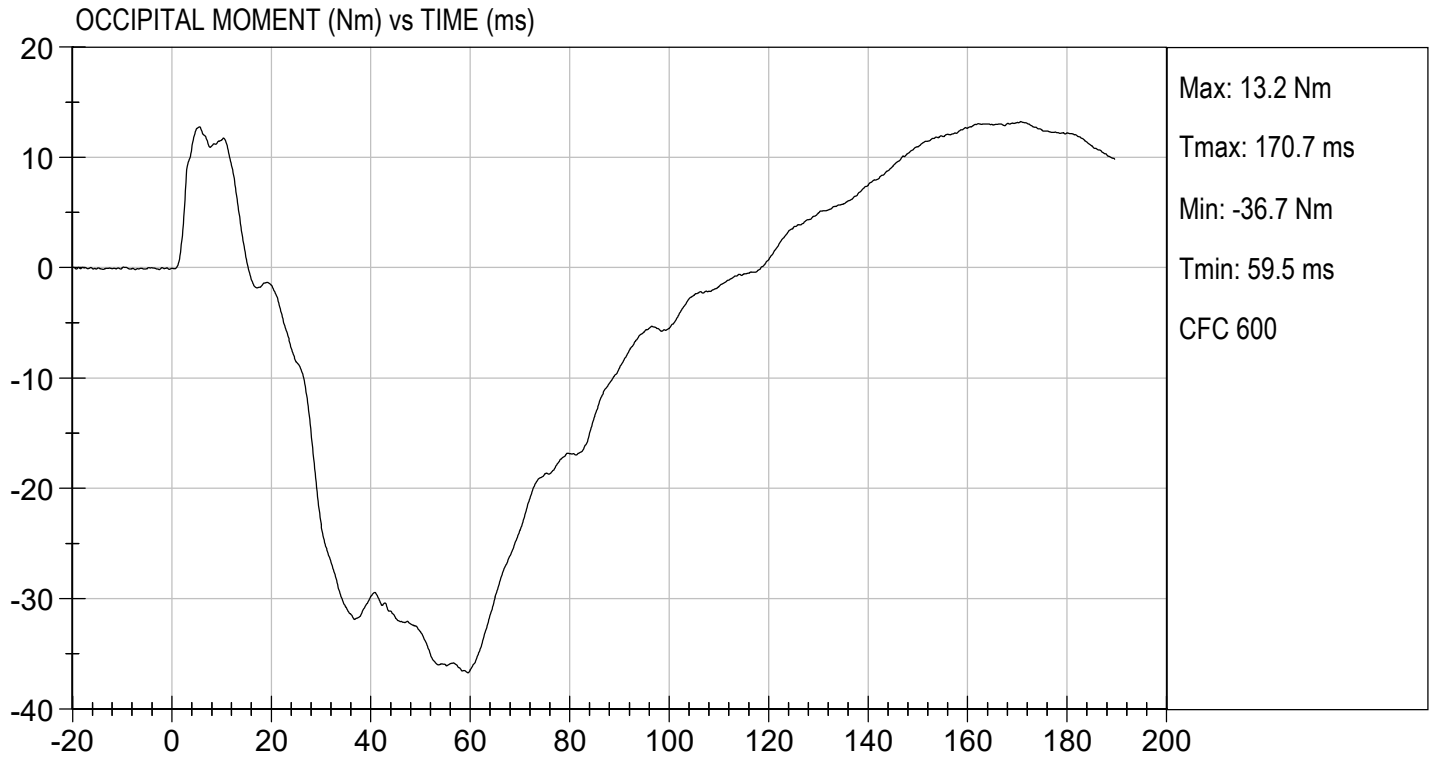

Laboratory Technician

05/13/2019

Test Date


Approved By





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

ATD Serial No: 306

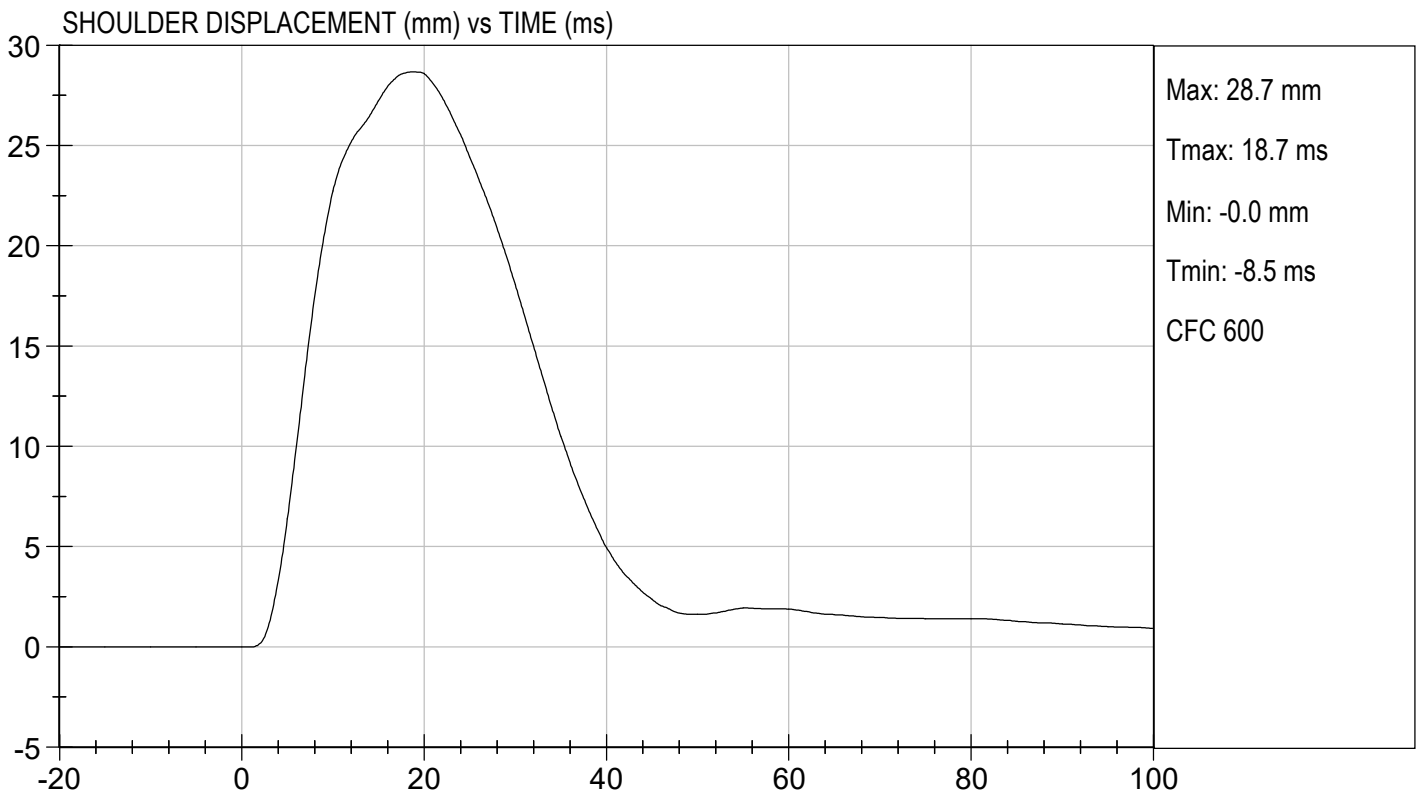
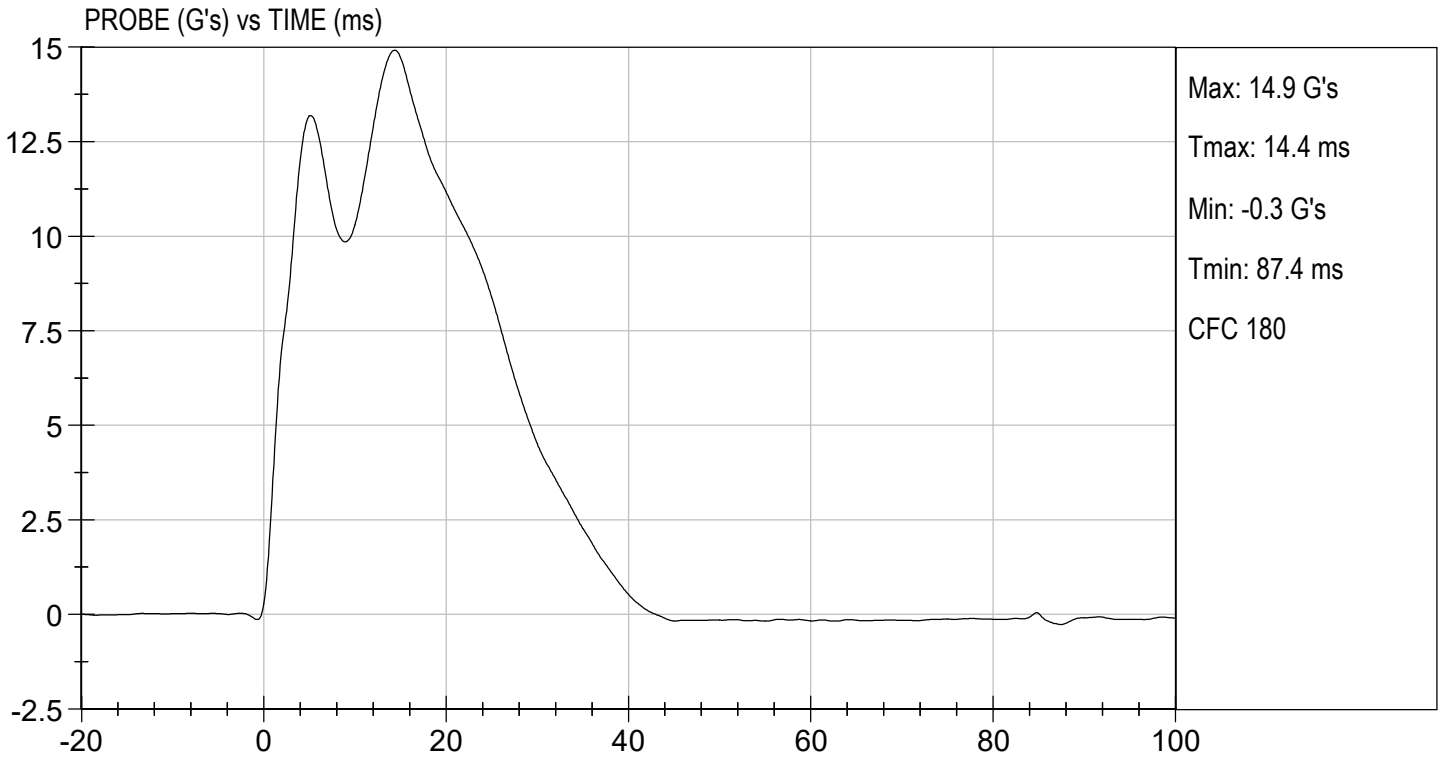
Test ID: D191603

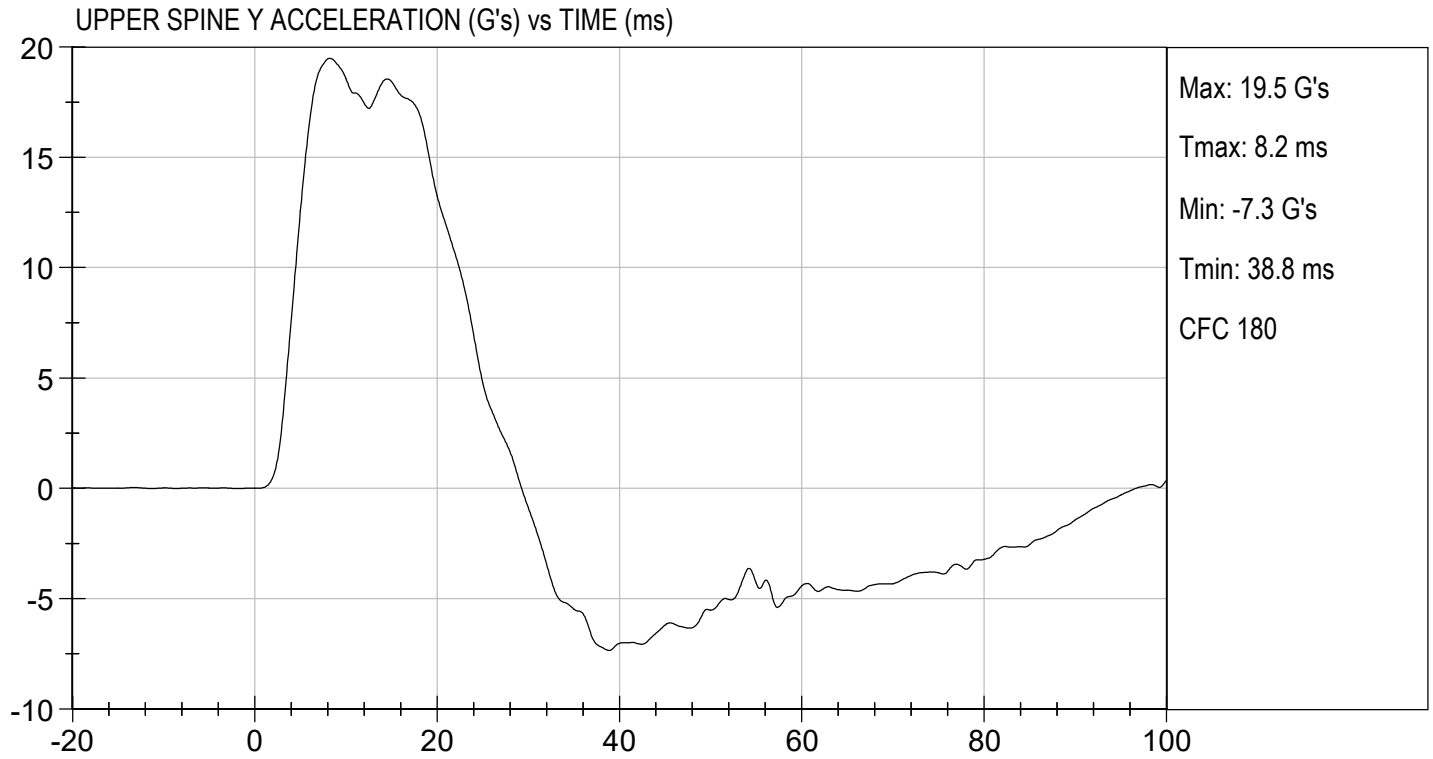
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results				Pass

Jacob D Taylor
Laboratory Technician

05/14/2019
Test Date

B. F. K.
Approved By






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

ATD Serial No: 306

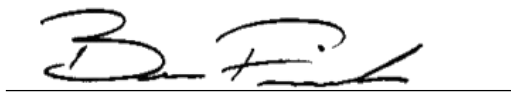
Test I.D: D191604

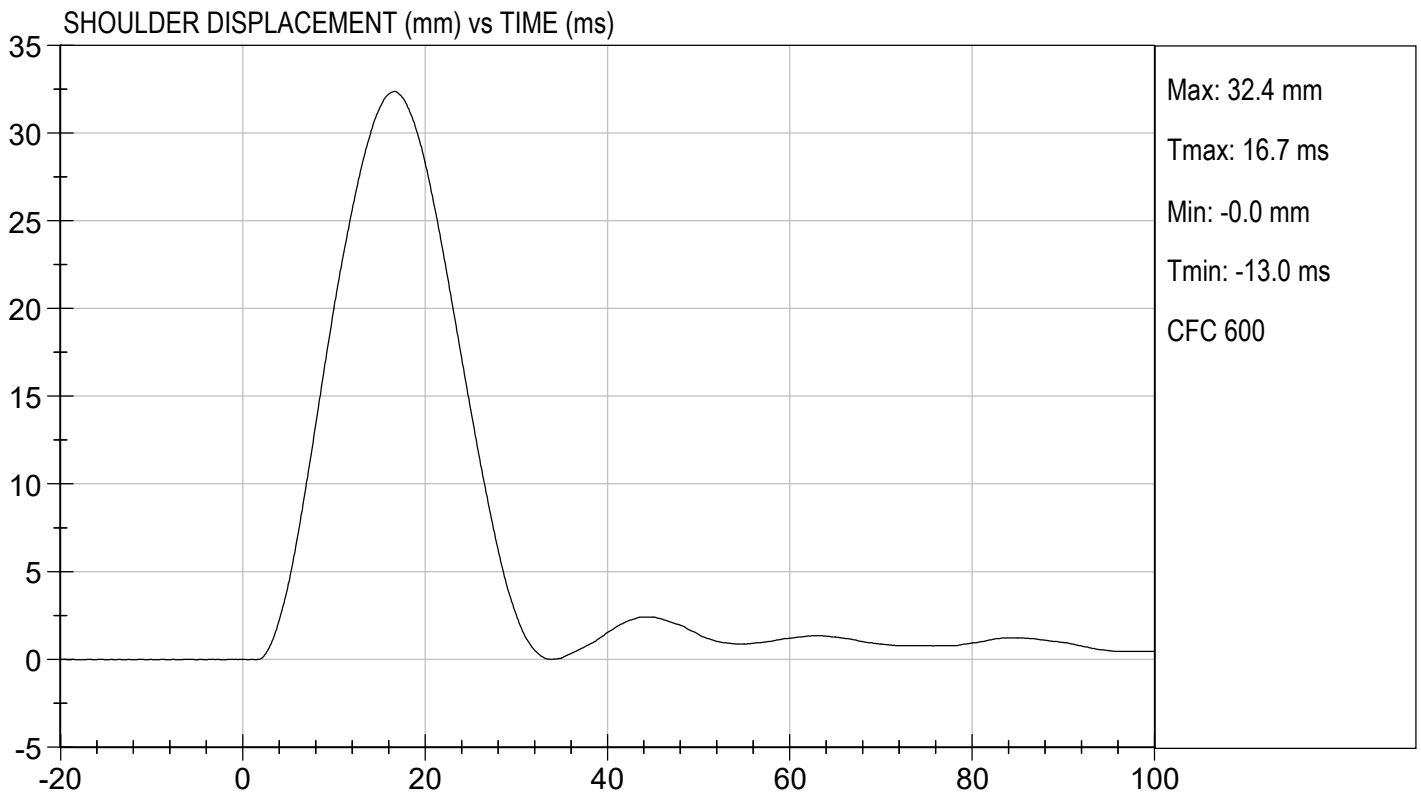
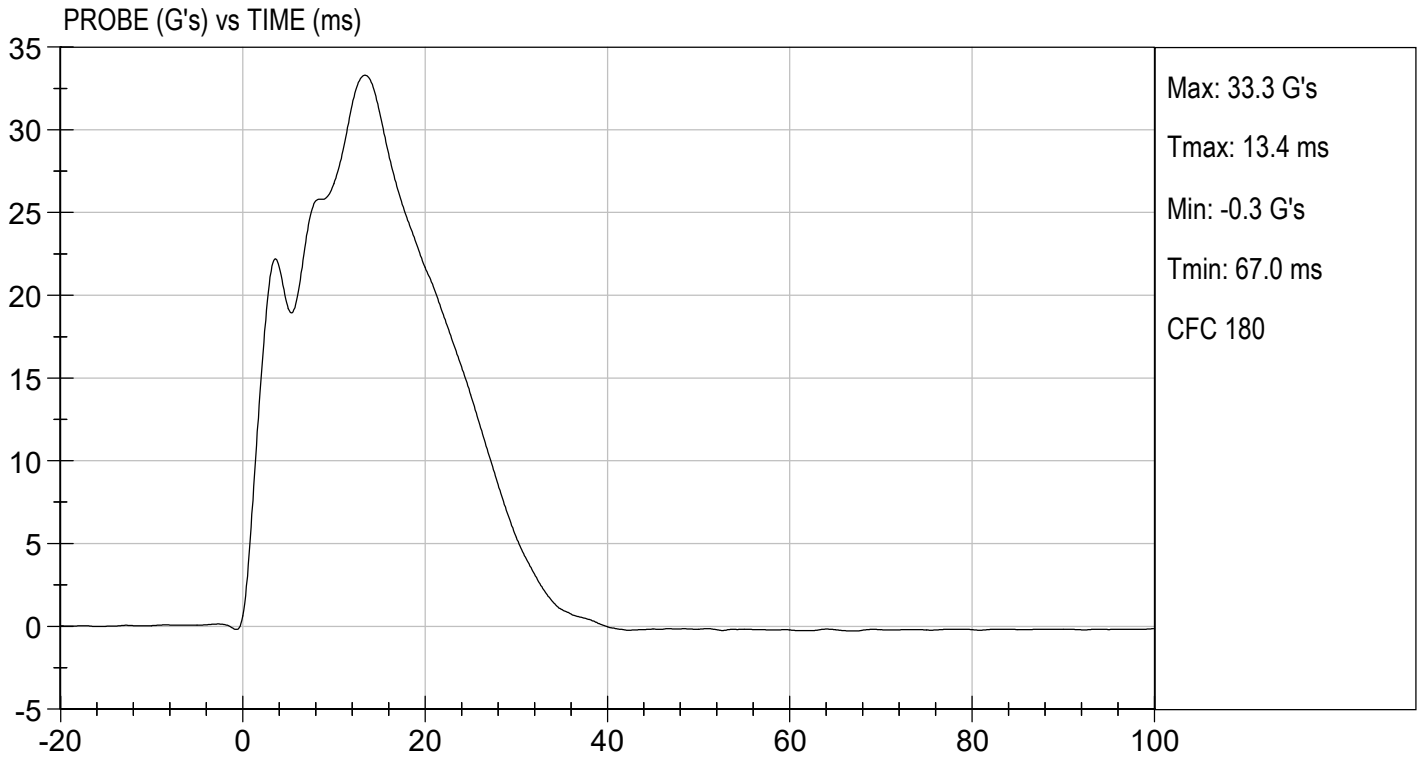
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	32	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	40	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
Overall Test Results				Pass

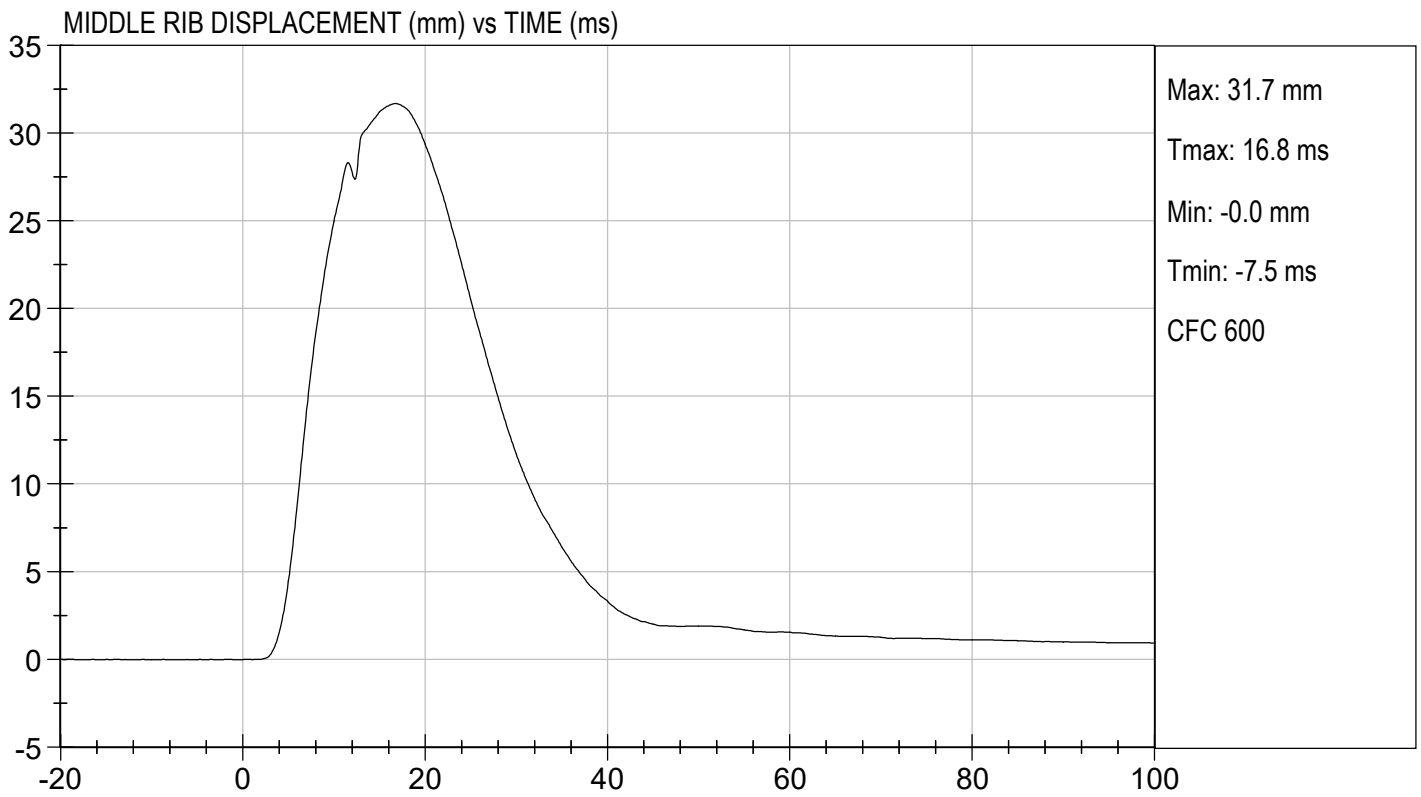
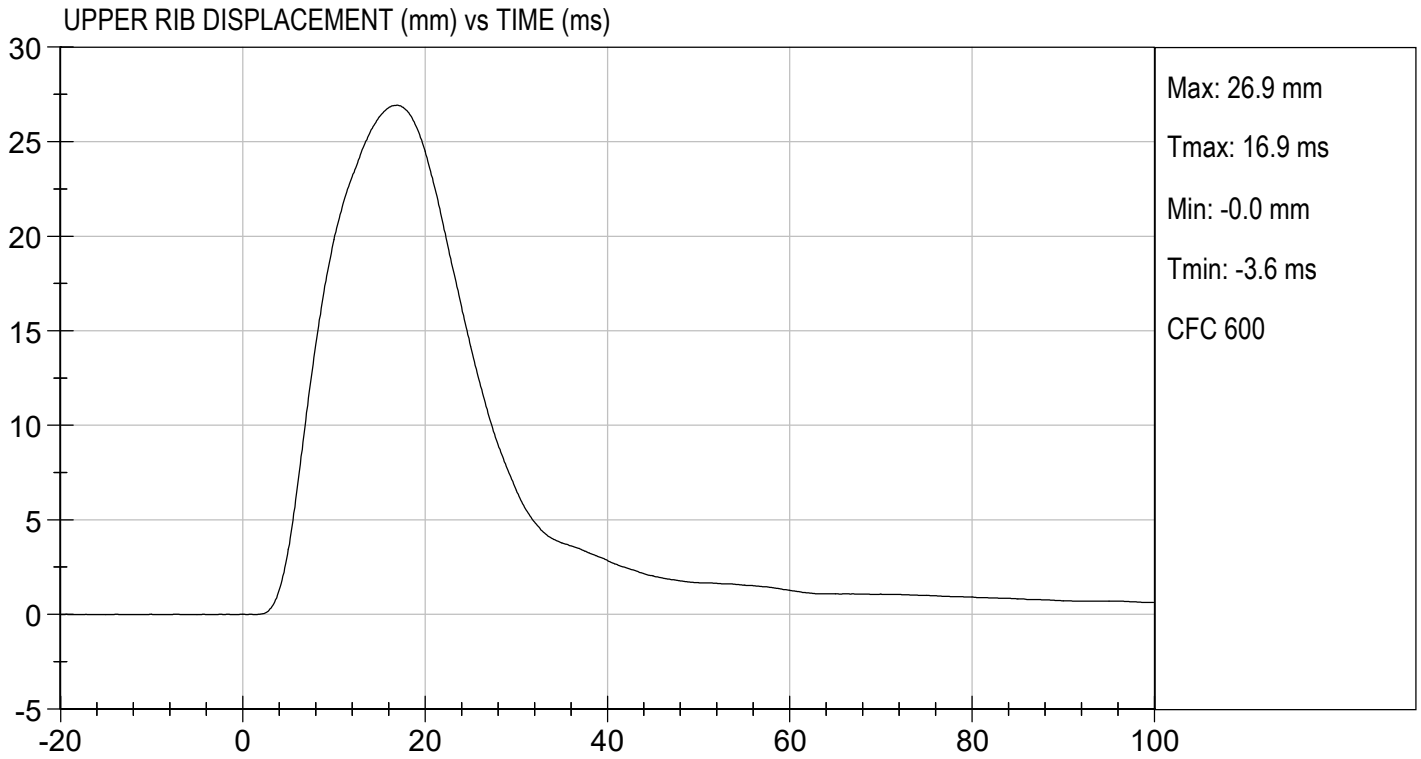

 Laboratory Technician

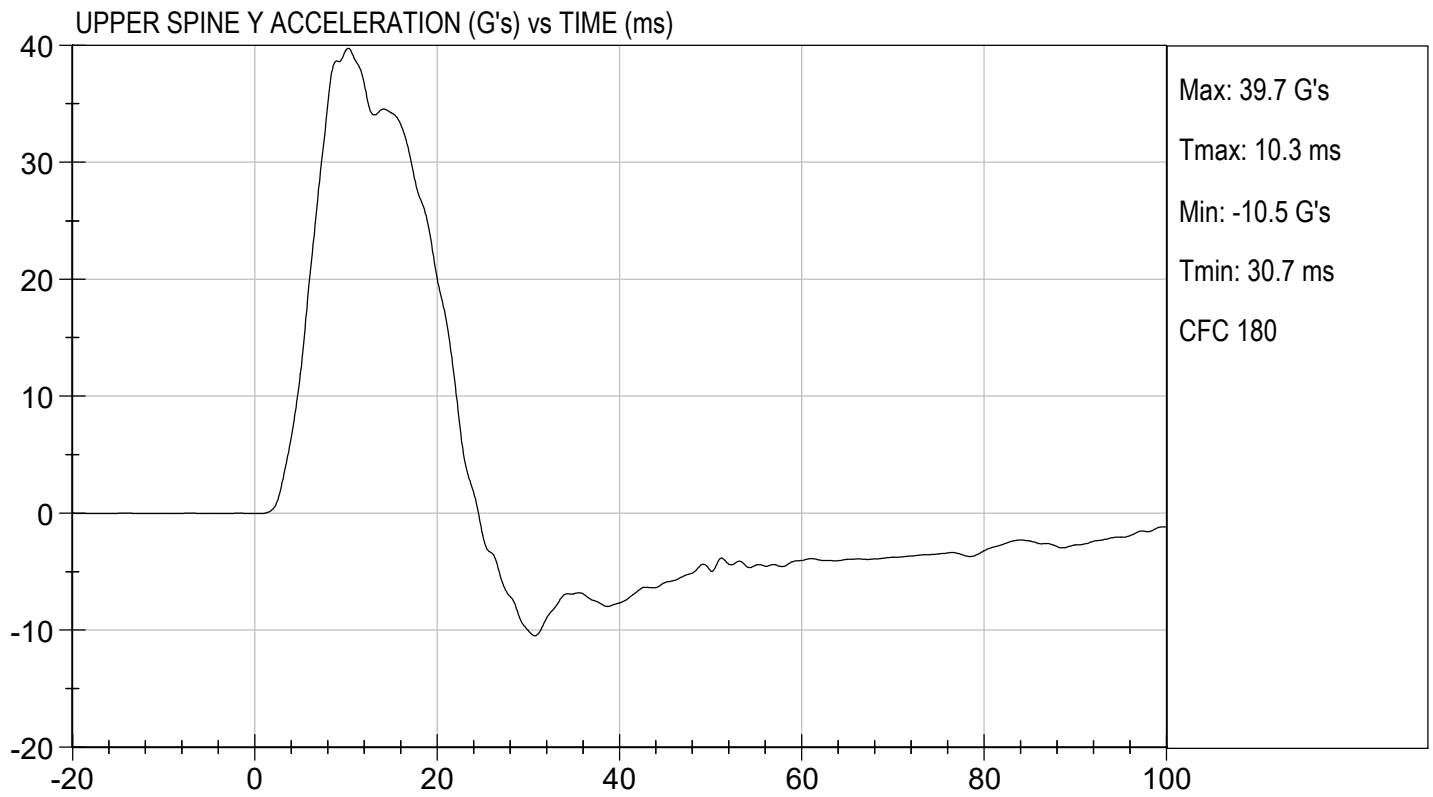
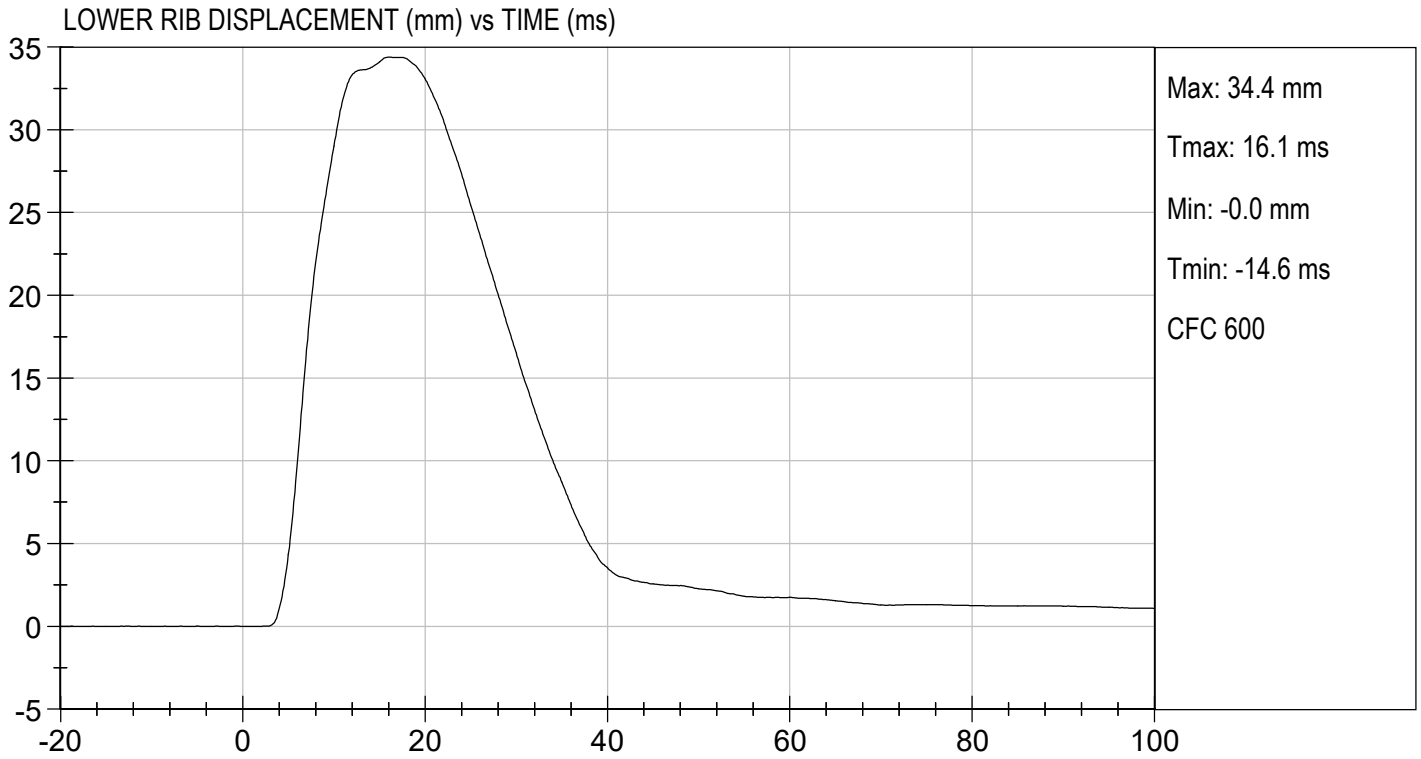
05/14/2019

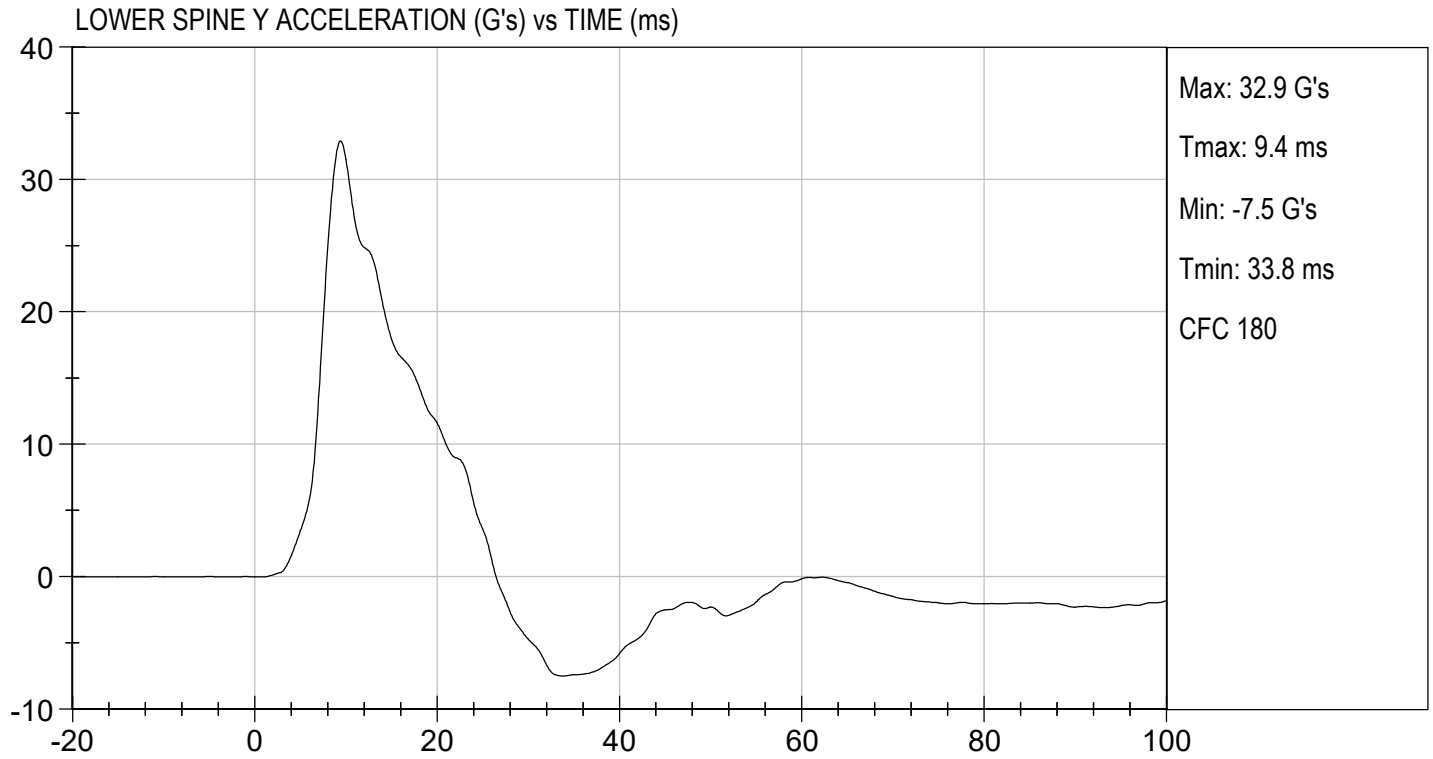
Test Date


 Approved By









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

ATD Serial No: 306

Test I.D: D191605

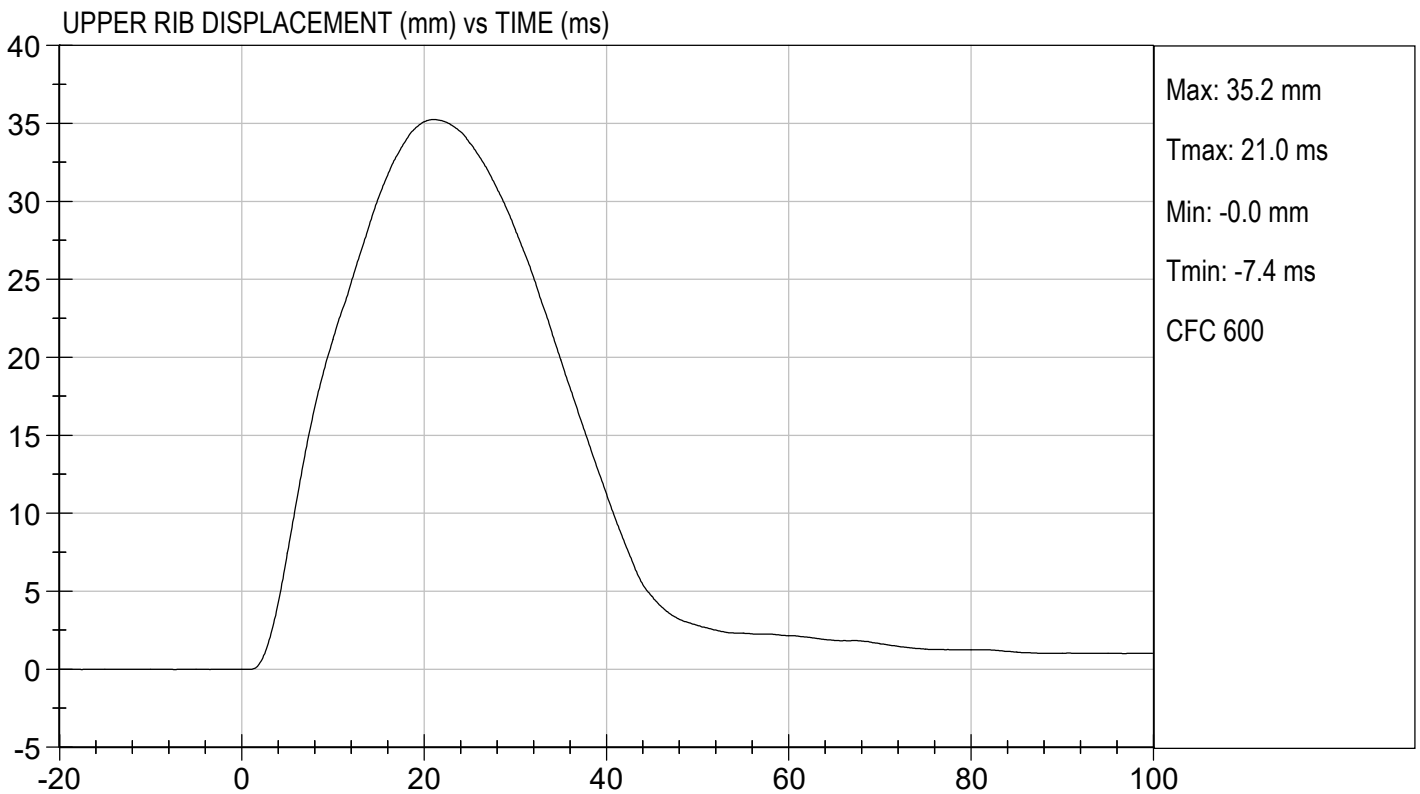
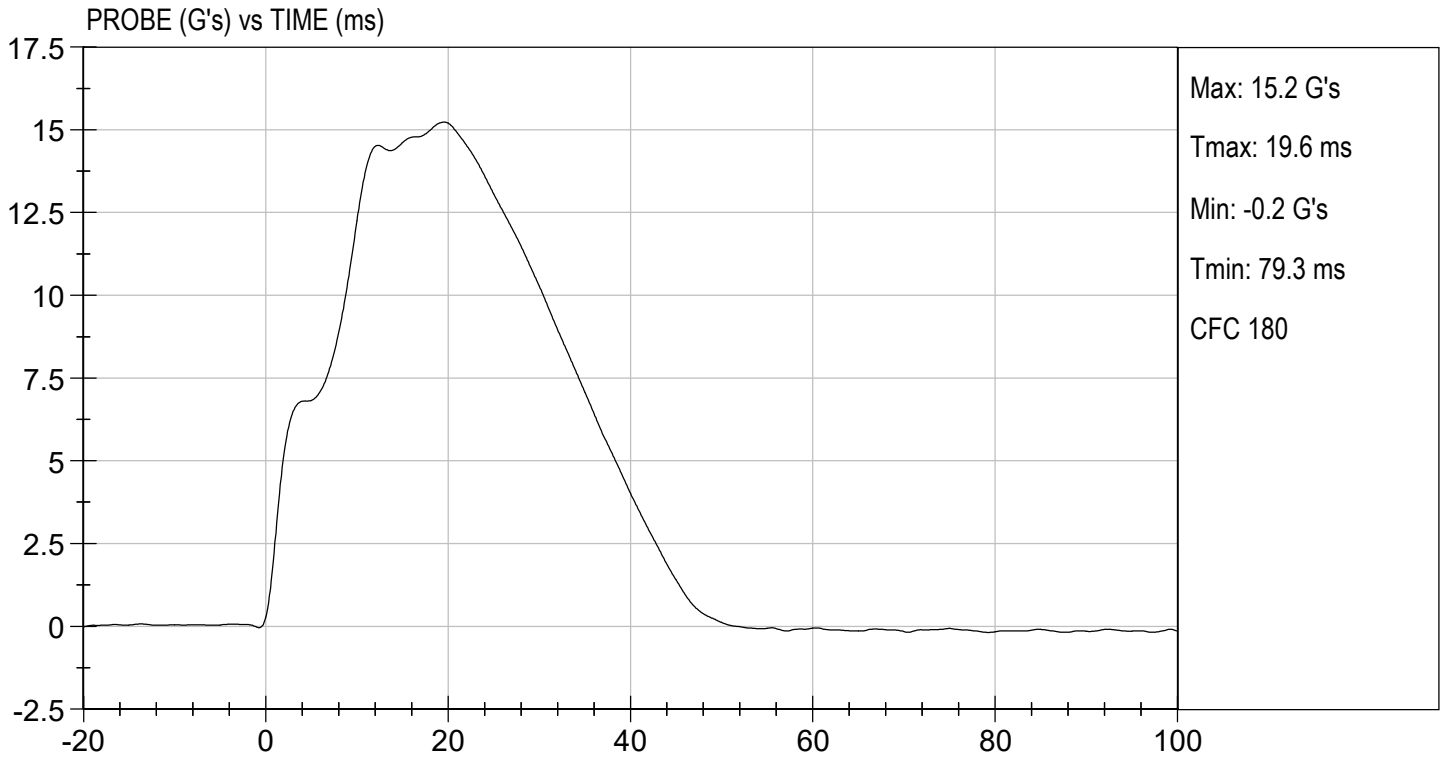
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	16	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass

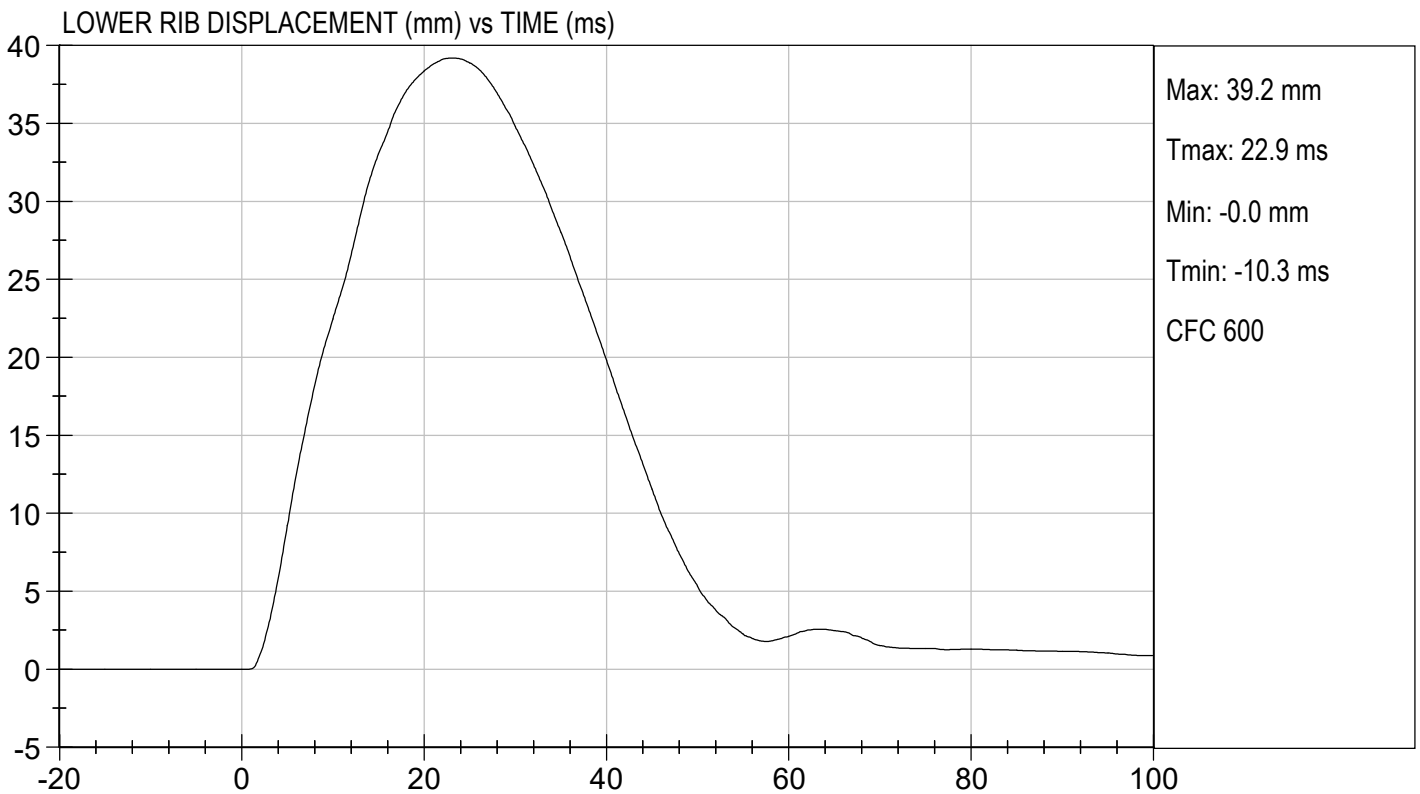
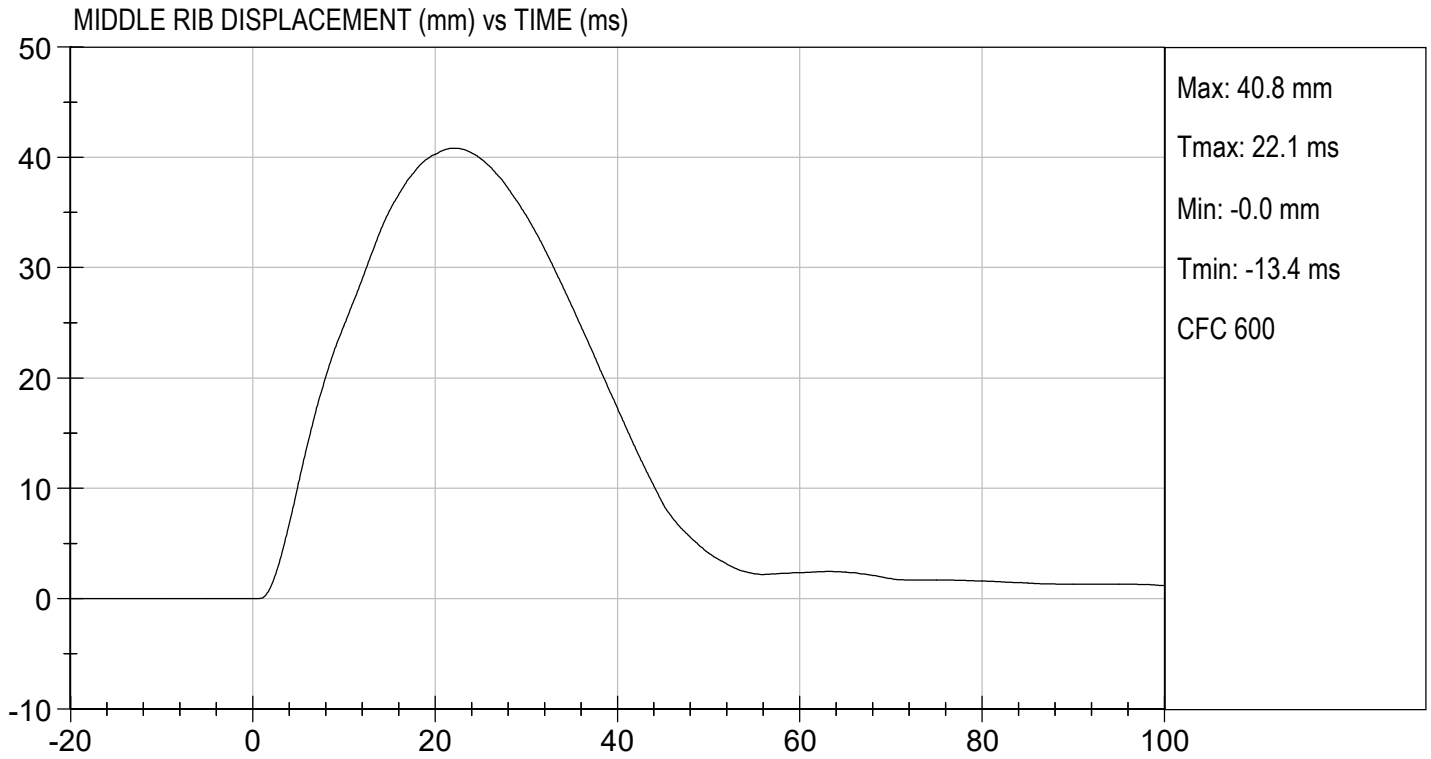
Jacob D Taylor
 Laboratory Technician

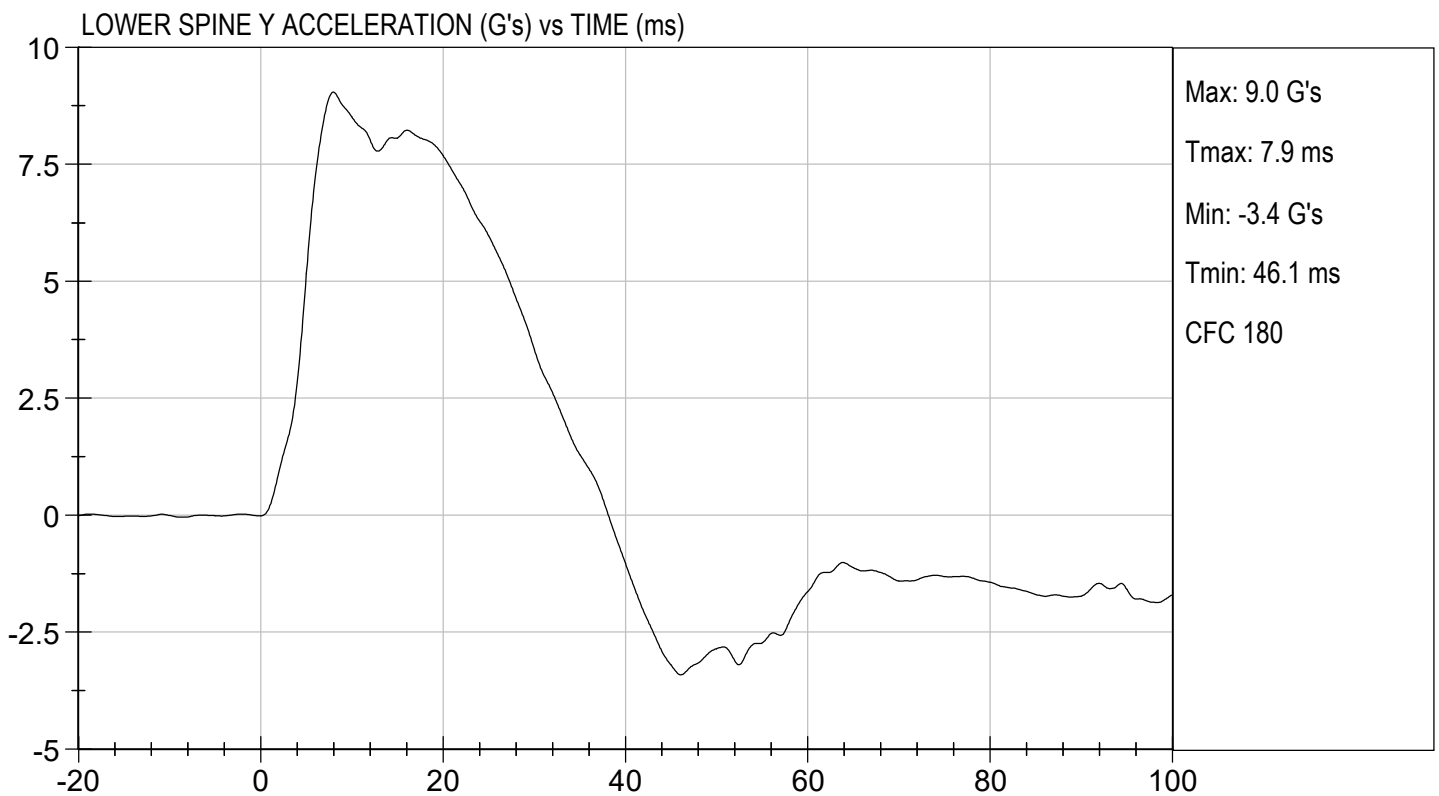
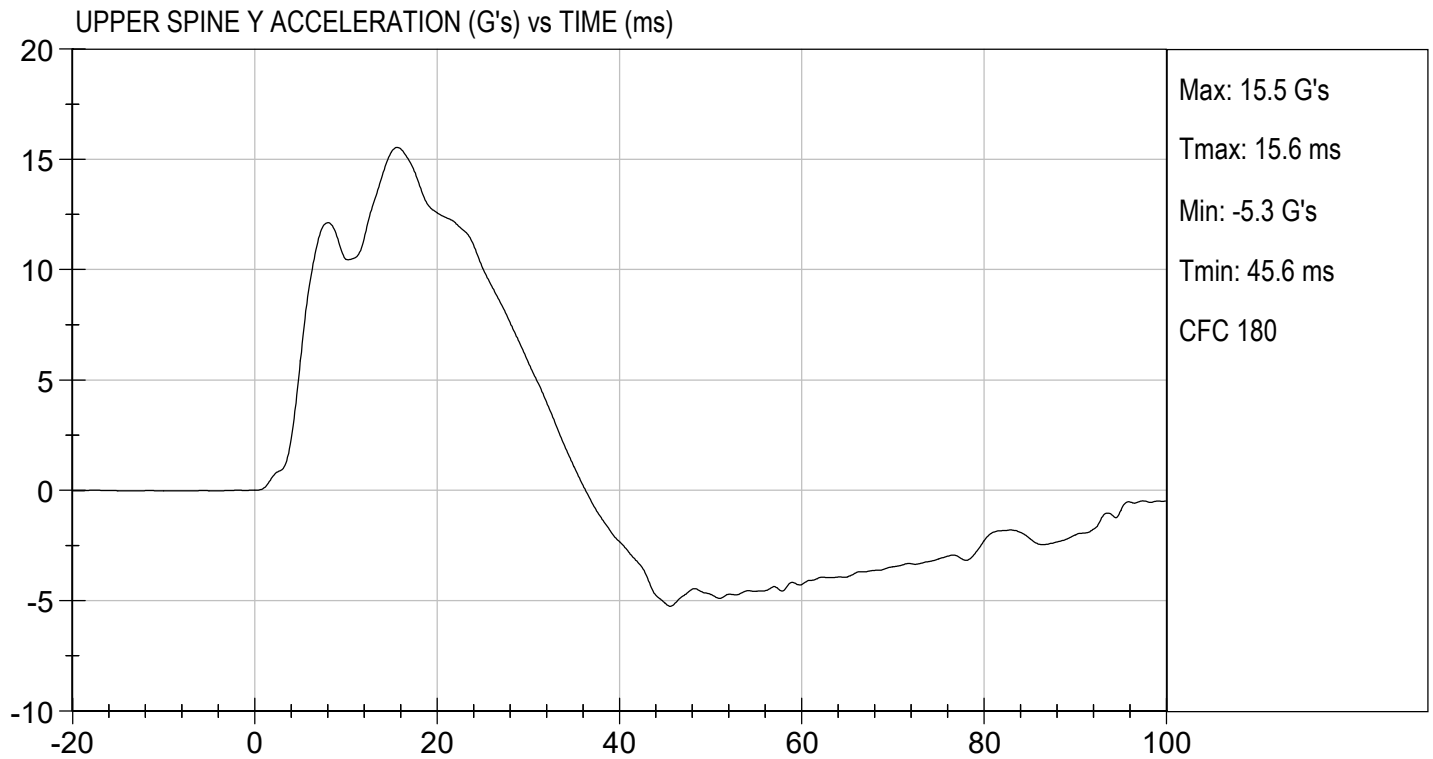
05/14/2019

Test Date

B. F. K.
 Approved By







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

ATD Serial No: 306

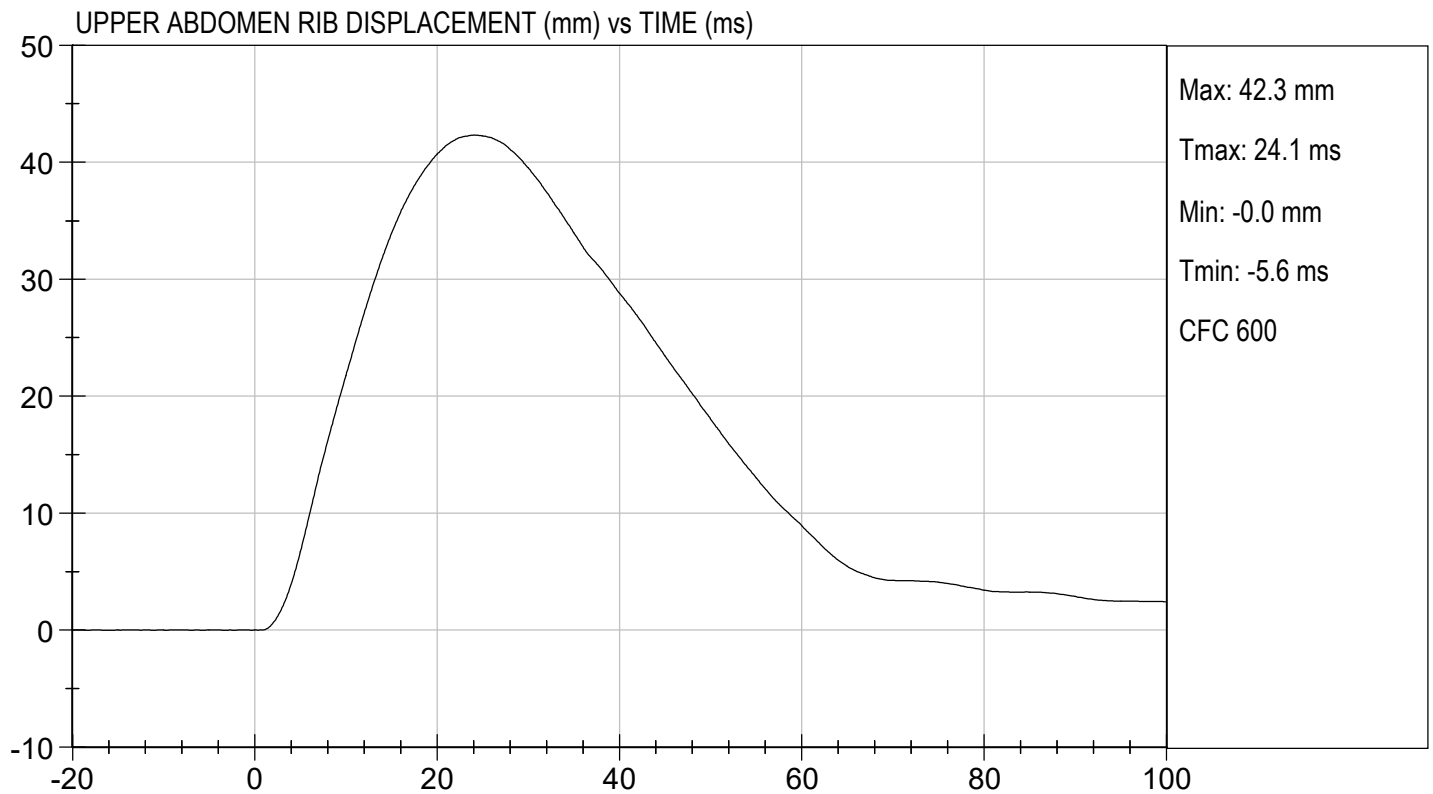
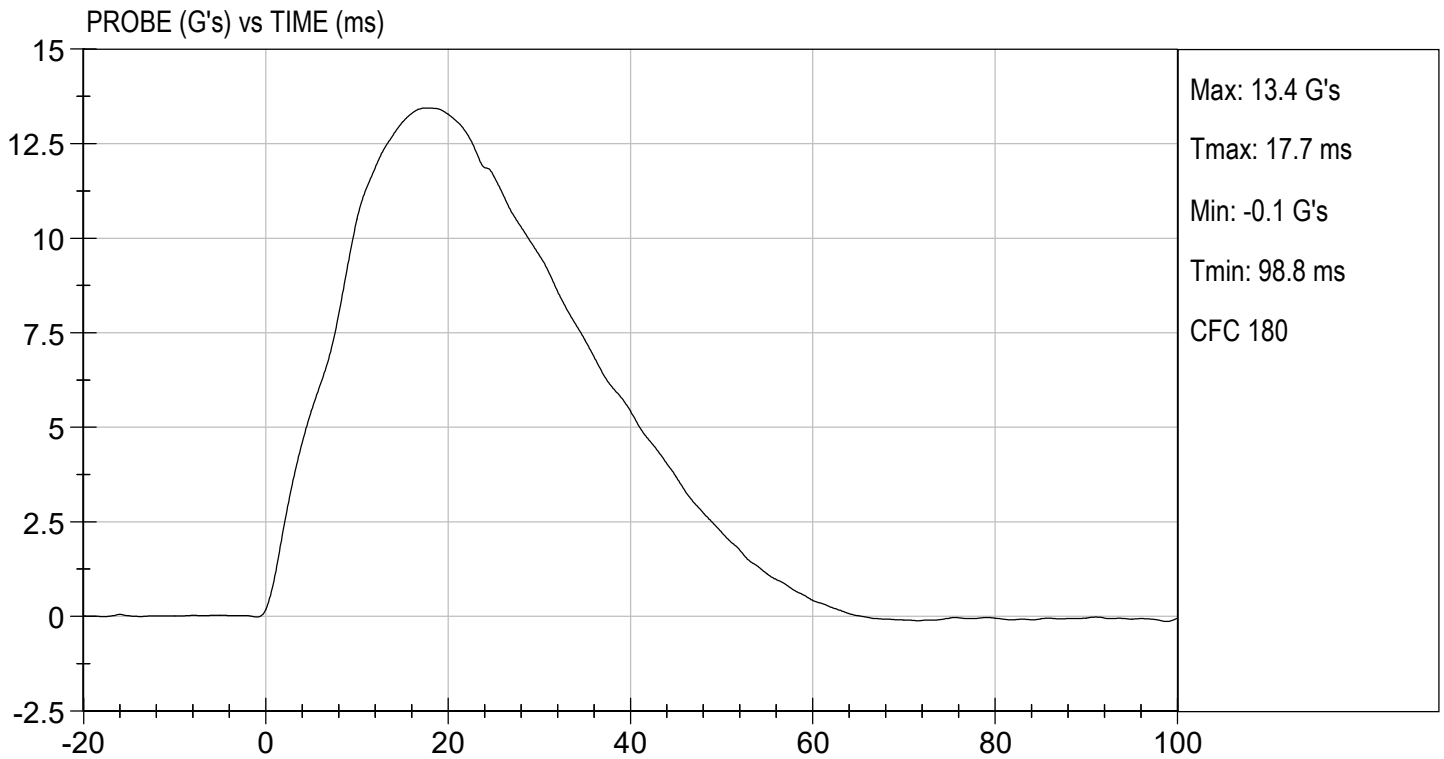
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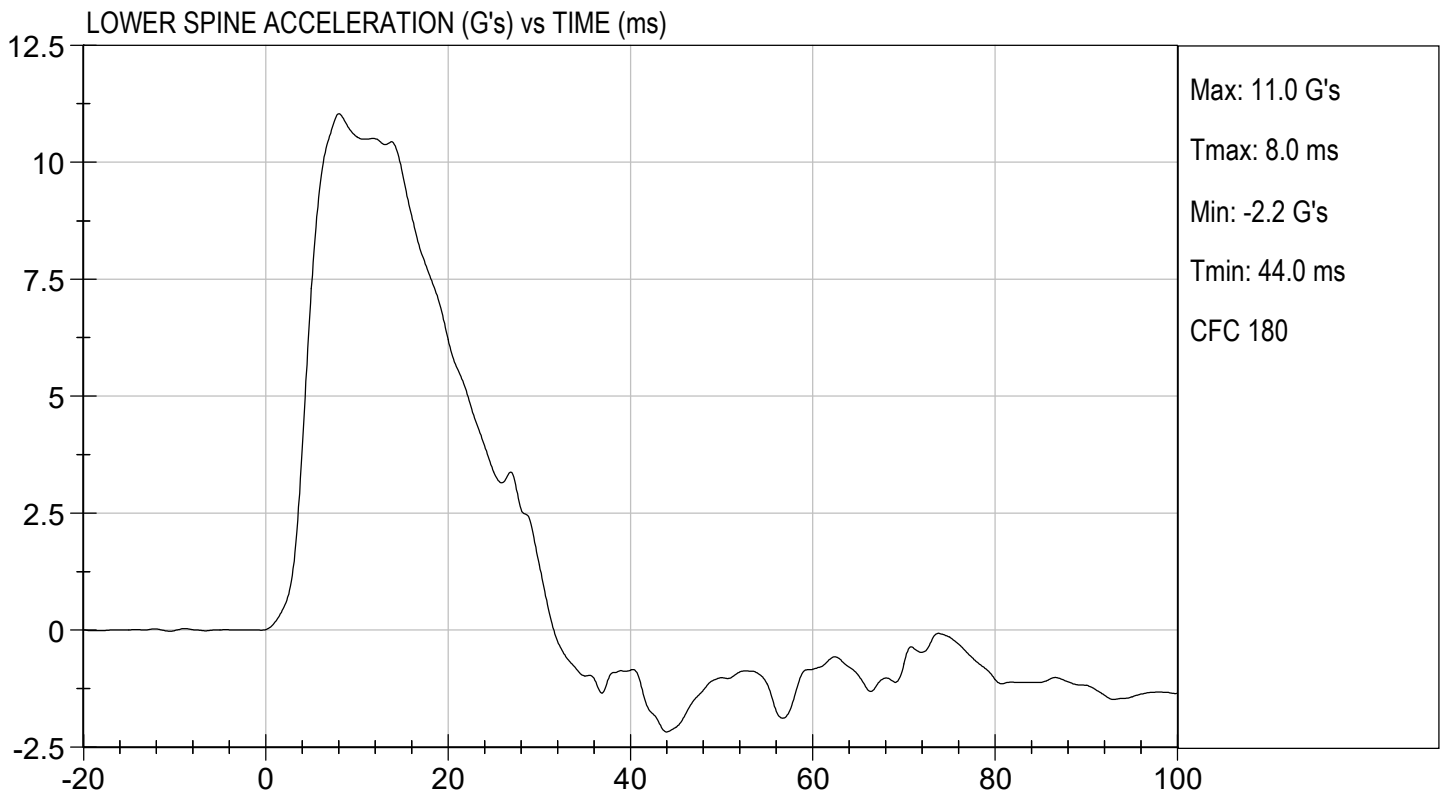
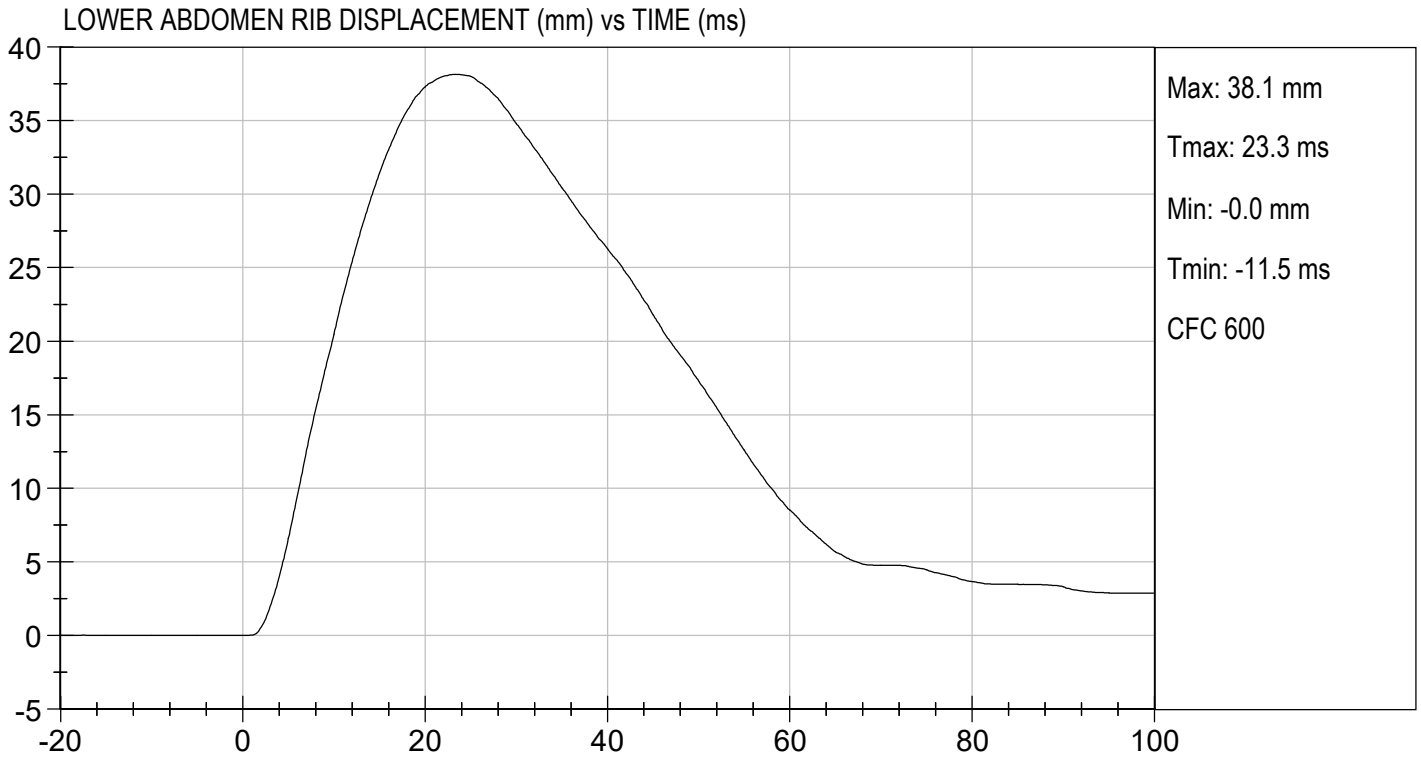
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	38	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass

Jacob D Taylor
 Laboratory Technician

05/14/2019
 Test Date

B. F. H.
 Approved By





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

ATD Serial No: 306

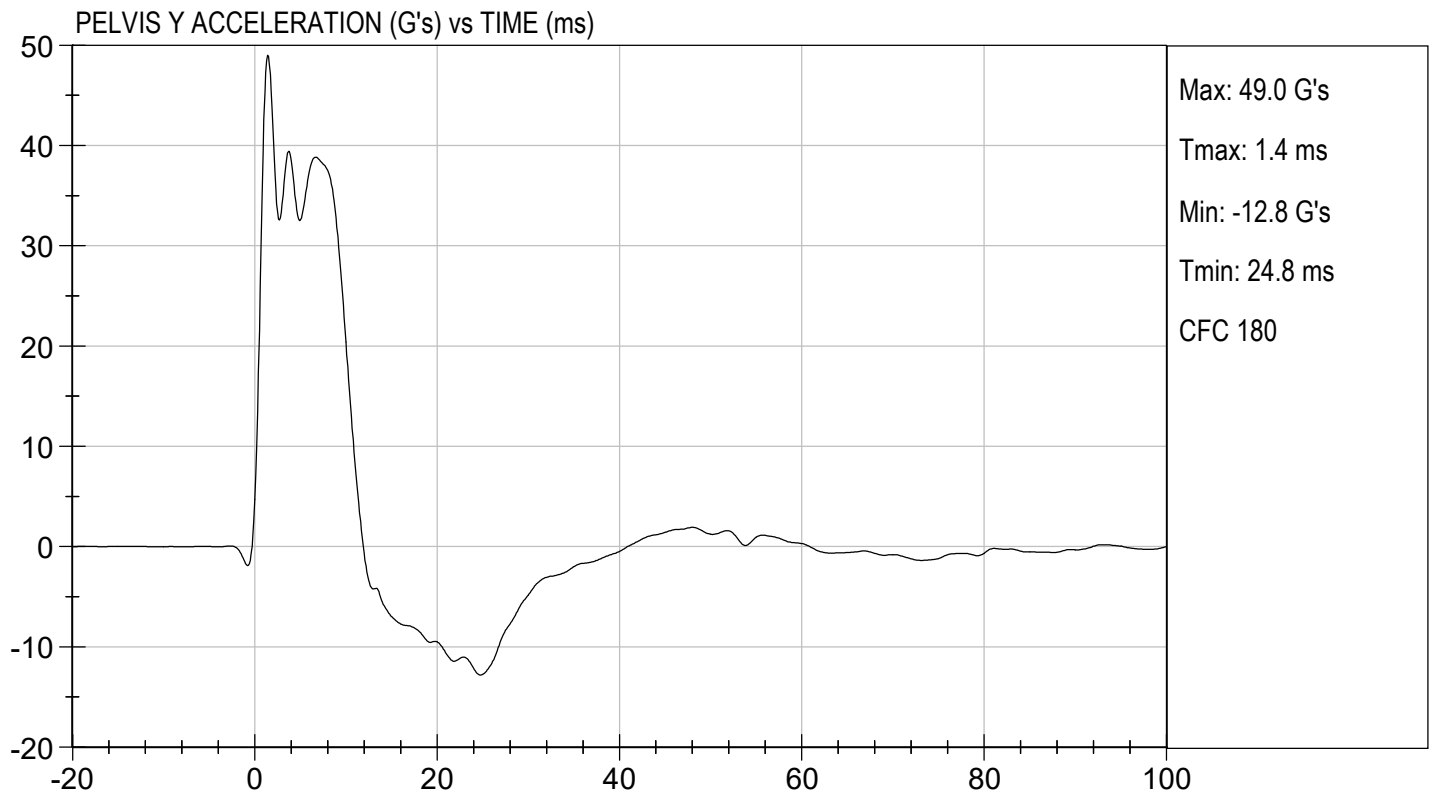
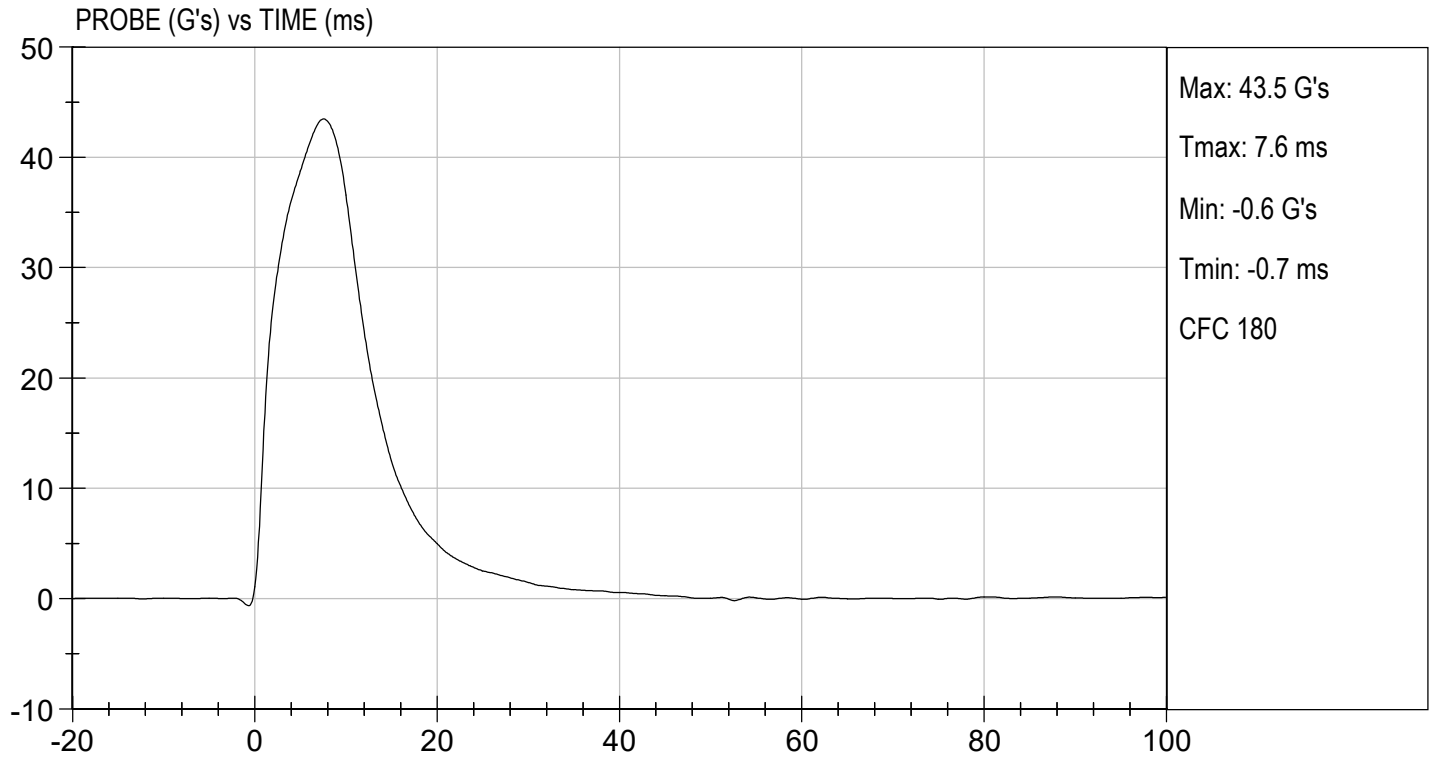
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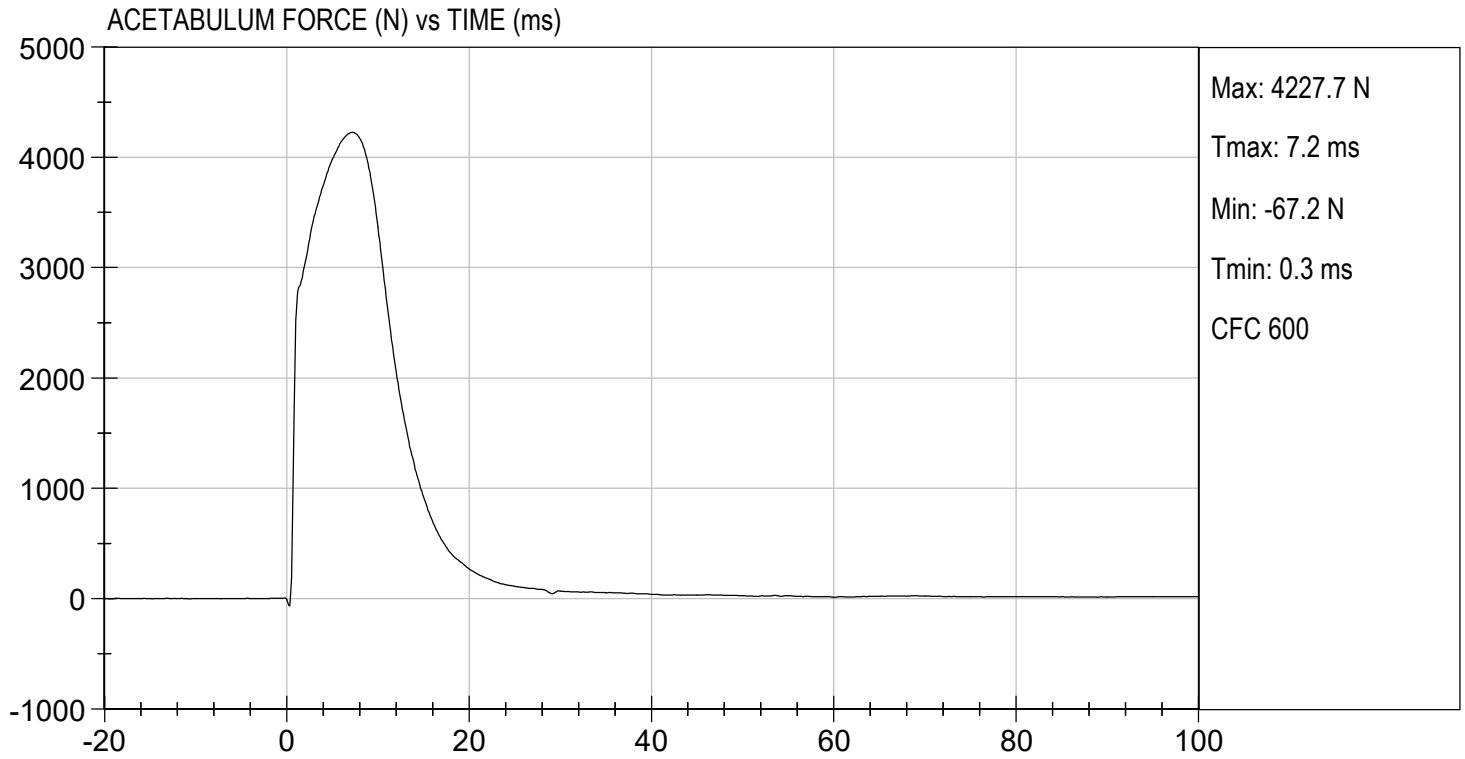
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	4,228	Pass
Overall Test Results				Pass

Jacob D Taylor
 Laboratory Technician

05/14/2019
 Test Date

B. F. H.
 Approved By





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

ATD Serial No: 306

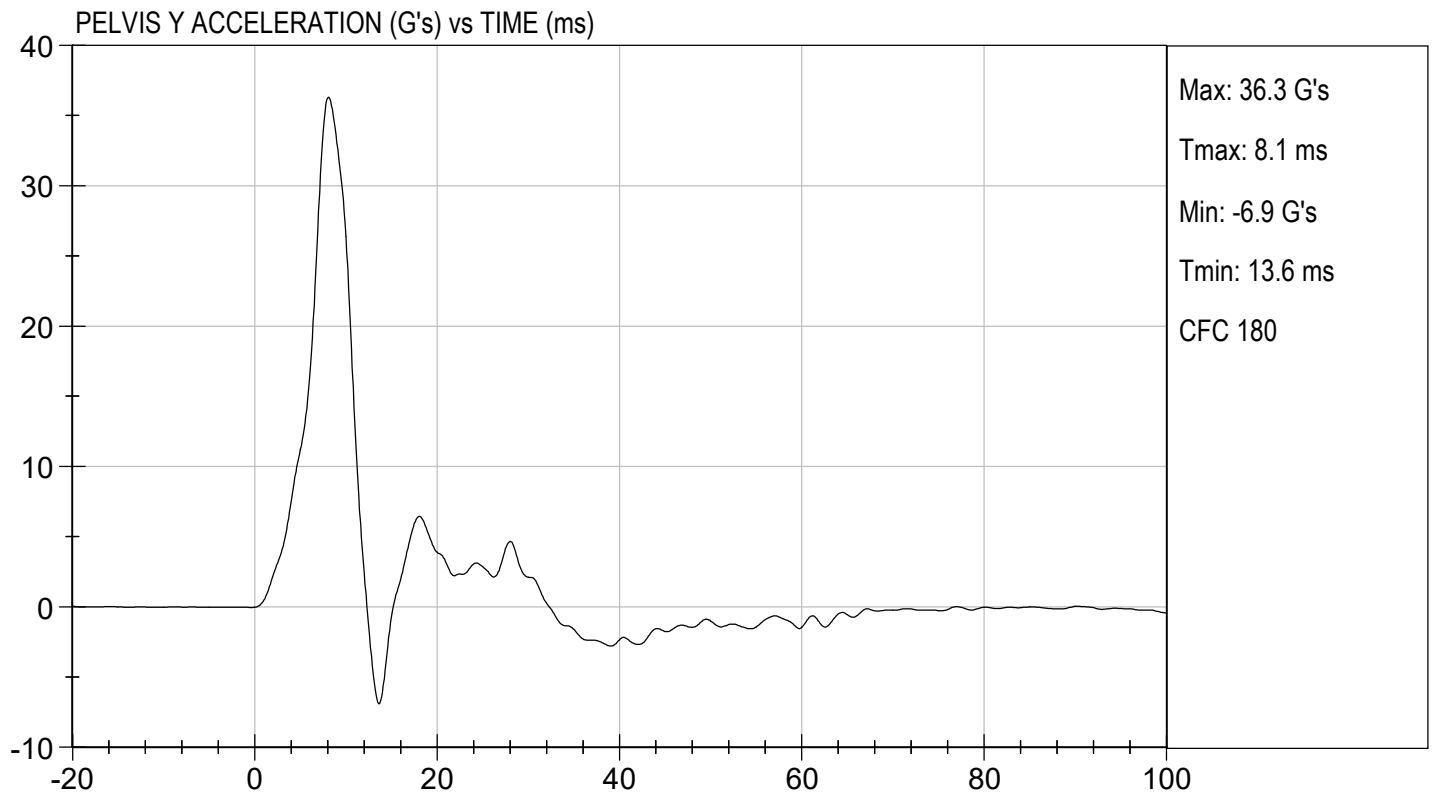
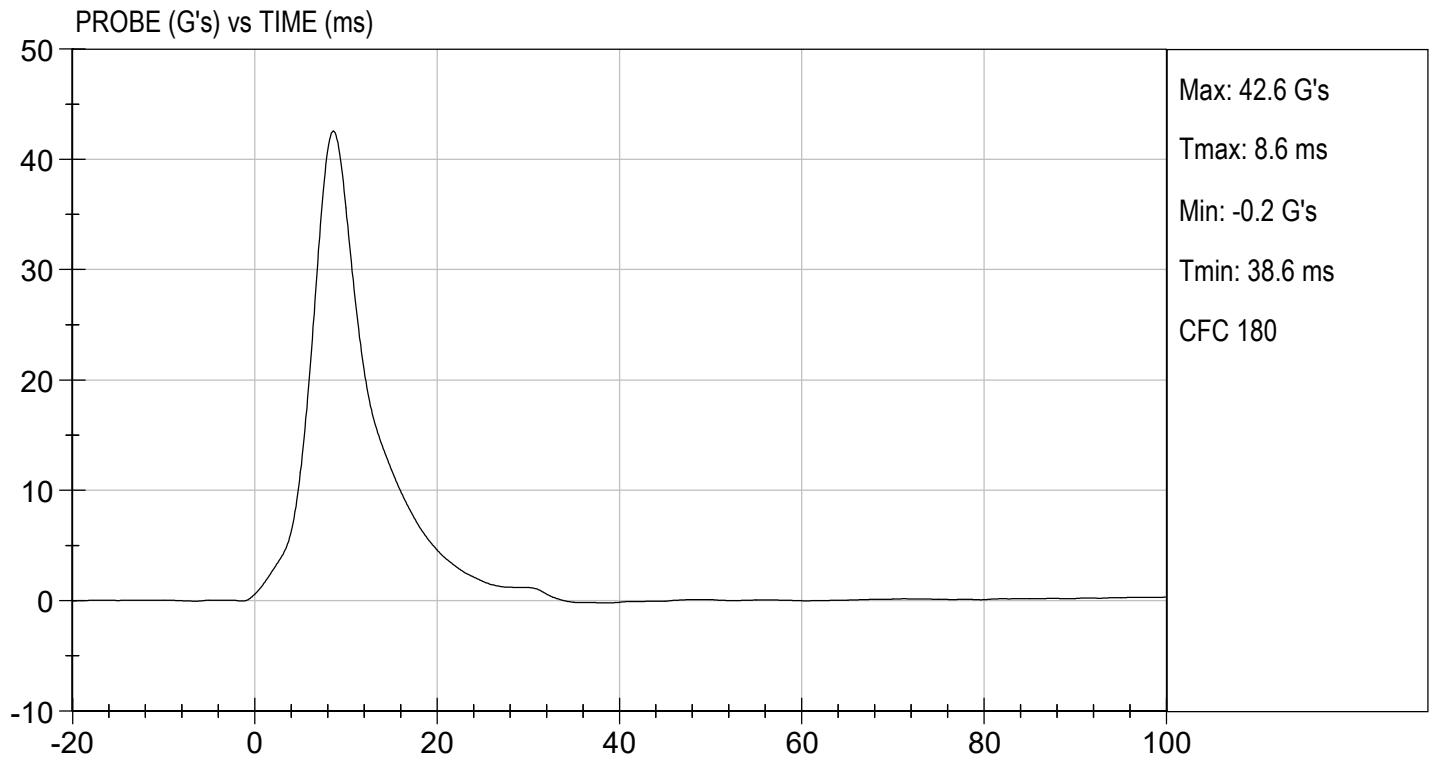
Test I.D: D191608

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.21	Pass
Maximum Probe Acceleration	G's	36 to 45	43	Pass
Pelvis Y Acceleration	G's	28 to 39	36	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,819	Pass
Overall Test Results				Pass

Jacob D Taylor
 Laboratory Technician

05/14/2019
 Test Date

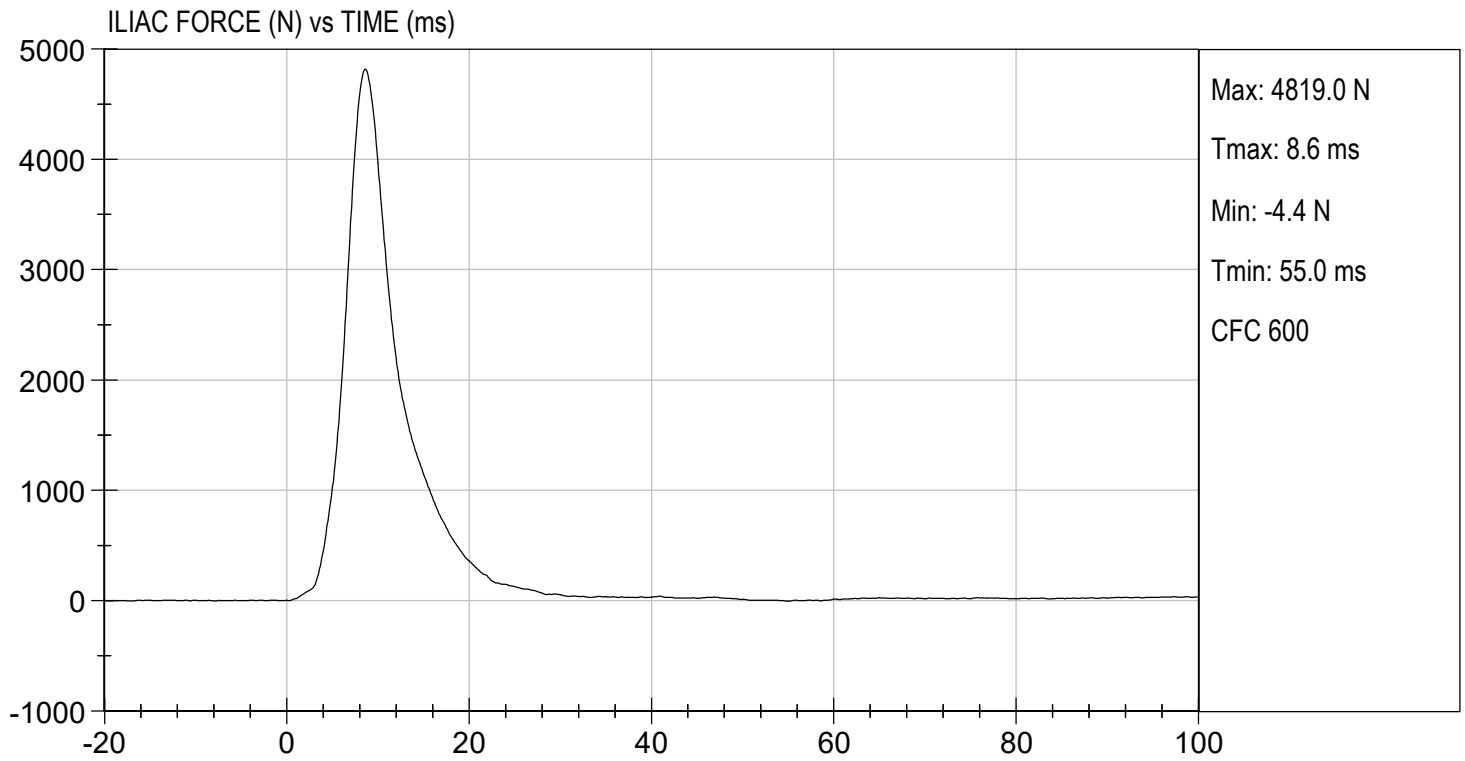
B. F. H.
 Approved By





TEST DESC: ILLIAC
VELOCITY: 13.80 ft/s, 4.21 m/s

TEST DATE: 05/14/2019
TEST #: D191608





SID-IIs Pelvis Plug Certification Test

Plug S/N 12310

Test Number 6695

Report Number 6710

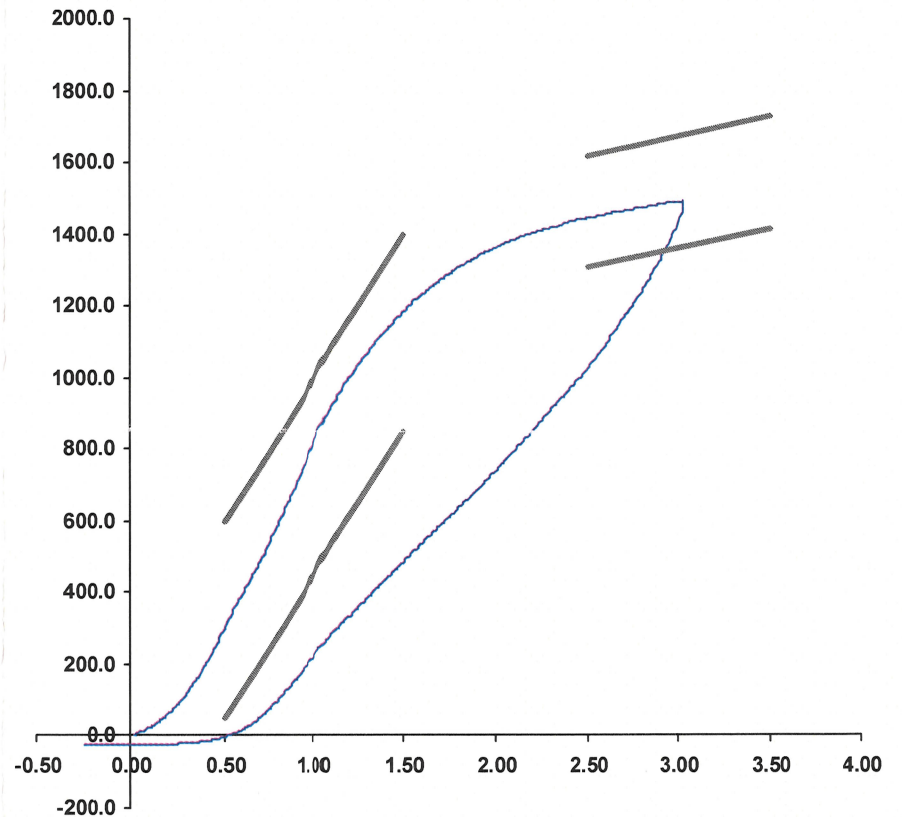
Test Date 3/21/2018 12:14:55 PM

	<u>Test Results</u>	<u>Spec Min</u>	<u>Spec Max</u>
Force @ 0.5 mm (N)	300.18	50.00	600.00
Force @ 1.5 mm (N)	1,187.38	850.00	1,400.00
Force @ 2.5 mm (N)	1,444.27	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,489.58	1,361.00	1,673.00

Testing Machine STM-20 5965542
 Load Cell S/N (FI360947), Units (LBS) 1000
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator _____
 Part Number 180-4450

Template No 107 22-Mar-18
 SACO Research

By : DC Date : 3/21/18



SID-IIs Pelvis Plug Certification Test

Plug S/N 11453

Test Number 2942

Report Number 2939

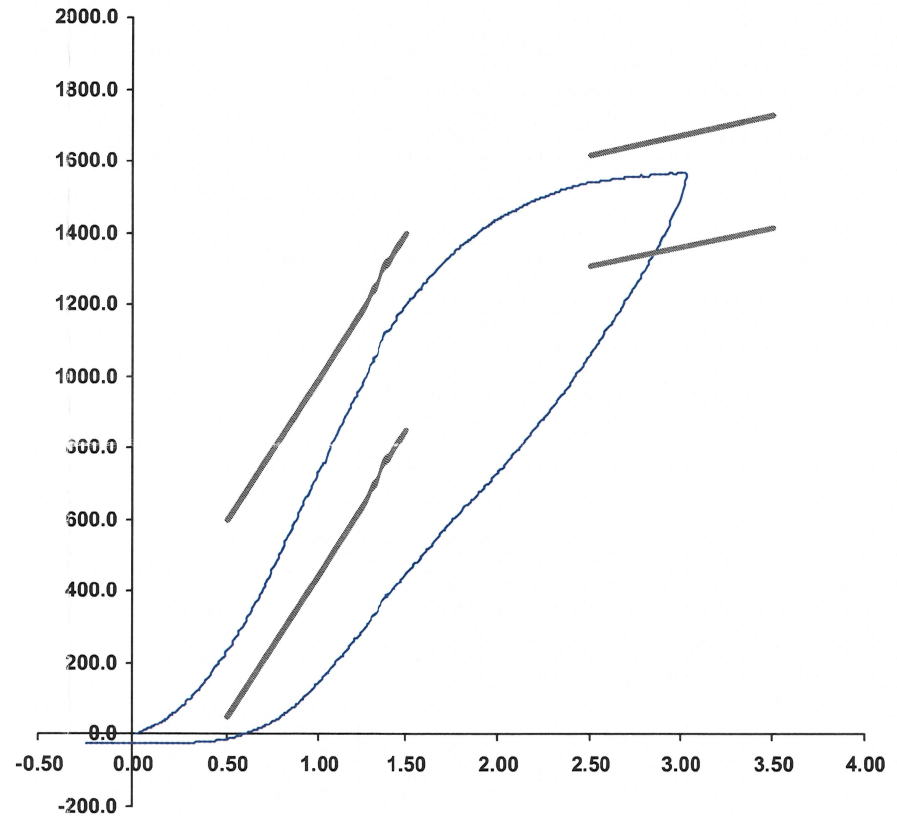
Test Date 8/30/2016 11:12:19 AM

	<u>Test Results</u>	<u>Spec Min</u>	<u>Spec Max</u>
Force @ 0.5 mm (N)	235.60	50.00	600.00
Force @ 1.5 mm (N)	1,204.83	850.00	1,400.00
Force @ 2.5 mm (N)	1,540.51	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,567.36	1,361.00	1,673.00

Testing Machine STM-20 5965542
 Load Cell S/N (TI240813), Units (LBS) 1000
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator DC
 Part Number 180-4450

Template No 107 30-Aug-16
 SACO Research

By: DC Date: 8/30/16

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	ABG1513	Denton	09/12/18
	Middle	Y	ABG1531	Denton	09/12/18
	Rear	Y	ABG1536	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	PG462	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	ACG268	Denton	12/04/18
Iliac Wing Load Cell			Y	IWG273	Denton	12/04/18
Pelvis Plug (struck side)				12310	SACO	3/21/18
Pelvis Plug (non-struck side)				11453	SACO	8/30/16

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T19501	Endevco	02/18/19
	Vehicle Center of Gravity	Y	T19551	Endevco	05/02/19
	Vehicle Center of Gravity	Z	T19345	Endevco	05/02/19
2	Right Sill at Front Seat	X	T19511	Endevco	05/02/19
	Right Sill at Front Seat	Y	T19529	Endevco	05/02/19
	Right Sill at Front Seat	Z	T19541	Endevco	05/02/19
3	Right Sill at Rear Seat	X	T19381	Endevco	05/02/19
	Right Sill at Rear Seat	Y	T19373	Endevco	04/30/19
	Right Sill at Rear Seat	Z	T19517	Endevco	05/02/19
4	Left Sill at Front Door	Y	T19378	Endevco	05/02/19
5	Left Sill at Rear Door	Y	T19524	Endevco	05/02/19
6	Left A-Post Lower	Y	PCB1385	PCB	03/04/19
7	Left A-Post Middle	Y	PCB1371	PCB	03/04/19
8	Left B-Post Lower	Y	PCB1109	PCB	04/08/19
9	Left B-Post Middle	Y	PCB1347	PCB	12/28/18
10	Front Seat Track	Y	T19358	Endevco	05/02/19
11	Rear Seat Track or Structure	Y	T19549	Endevco	05/02/19
12	Right Rear Occ. Compartment	Y	T19044	Endevco	05/02/19
13	Engine Block	X	T19001	Endevco	01/23/19
	Engine Block	Y	T18982	Endevco	01/23/19
14	Rear Floorpan Above Axle	X	T19510	Endevco	05/03/19
	Rear Floorpan Above Axle	Y	T19338	Endevco	05/02/19
	Rear Floorpan Above Axle	Z	T19390	Endevco	05/03/19

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB753D	PCB	03/21/19
MDB Center of Gravity	Y	PCB557D	PCB	03/20/19
MDB Center of Gravity	Z	PCB511D	PCB	03/20/19
Left Frame at Rear Axle Centerline	X	PCB660D	PCB	03/21/19
Left Frame at Rear Axle Centerline	Y	PCB661D	PCB	03/21/19