

REPORT NUMBER: SideNCAPMDB-MGA-21-004

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

**KIA MOTORS MANUFACTURING GEORGIA, INC.
2021 Kia K5 LXS 4-Door Sedan
NHTSA No.: O20214205**

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



Test Date: September 30, 2020

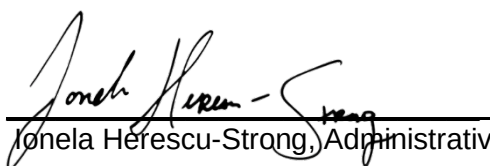
Final Report Date: December 7, 2020

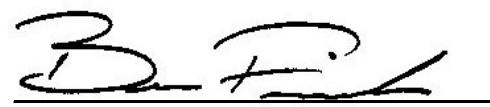
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-100
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

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

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

Prepared by: 
Jonela Herescu-Strong, Administrative Assistant

Approved by: 
Ben Fischer, Project Manager

Approval Date: December 7, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SideNCAPMDB-MGA-21-004	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of 2021 Kia K5 LXS 4-Door Sedan, NHTSA No.: O20214205		5. Report Date December 7, 2020
7. Author(s) Ionela Herescu-Strong, Administrative Assistant Ben Fischer, Project Manager		6. Performing Organization Code MGA
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		8. Performing Organization Report No. SideNCAPMDB-MGA-21-004
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-100) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		10. Work Unit No.
		11. Contract or Grant No. DTNH22-14-D-00353
		13. Type of Report and Period Covered: Final Test Report September 30, 2020 to December 7, 2020
		14. Sponsoring Agency Code NRM-100

15. Supplementary Notes

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Kia K5 LXS 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on September 30, 2020.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.07 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.0°C. The target vehicle post-test maximum crush was 223 mm at level 2. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	110
Maximum Thorax Rib Deflection	mm	44	26
Total Abdominal Force	N	2500	847
Pubic Symphysis Force	N	6000	1174
Resultant Lower Spine Acceleration	g	82*	29

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	202
Resultant Lower Spine Acceleration	g	82	74
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3055
Maximum Thoracic Rib Deflection	mm	38*	25
Maximum Abdomen Rib Deflection	mm	45*	27

*Proposed IARV

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door(s) did not open during the side impact event.

17. Key Words 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 1200 New Jersey Ave, SE Washington, DC 20590	
19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 225	22. Price

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	8
3	Dummy Longitudinal Clearance Dimensions	12
4	Dummy Lateral Clearance Dimensions	13
5	Camera and Instrumentation Data	14
6	Test Vehicle Accelerometer Locations	15
7	MDB Accelerometer Locations	16
8	Post-Test Observations	17
9	MDB Summary of Results	19
10	Test Vehicle Profile Measurements	20
11	Test Vehicle Exterior Crush Measurements	21
12	MDB Exterior Static Crush Measurements	24
13	Vehicle and MDB Damage Profile Distances	25
14	FMVSS No. 301 Static Rollover Results	26
15	Dummy/Vehicle Temperature and Humidity Stabilization Data	27
<u>Appendix</u>		
A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D
E	Seating Procedure Worksheets and Plots	E

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2021 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 2021 Kia K5 LXS 4-Door Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated March 2020.

SUMMARY

A 2021 Kia K5 LXS 4-Door Sedan 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 62.07 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 September 30, 2020. 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 March 2020. 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
- Head Triaxial 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	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	110
Maximum Thorax Rib Deflection	mm	44	26
Total Abdominal Force	N	2500	847
Pubic Symphysis Force	N	6000	1174
Resultant Lower Spine Acceleration	g	82*	29

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	202
Resultant Lower Spine Acceleration	g	82	74
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3055
Maximum Thoracic Rib Deflection	mm	38*	25
Maximum Abdomen Rib Deflection	mm	45*	27

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Side Torso Airbag	No		Yes	Yes
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 after 25 ms.
 Left Lower A-Post Y recorded no valid data after 19 ms.
 Left Lower B-Post Y recorded questionable data.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20214205	Traction Control System (TCS)	Yes
Model Year	2021	Auto-Leveling System	No
Make	Kia	Automatic Door Locks (ADL)	Yes
Model	K5 LXS	Power Window Auto-Reverse	Yes
Body Style	4-Door Sedan	Other Optional Feature	No
VIN	5XXG14J2XMG001440	Driver Front Airbag	Yes
Body Color	Everlasting Silver	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	18 mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	1.6 L	Driver Torso Airbag	No
Type/No. Cylinders	Inline 4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	Yes
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA MOTORS MANUFACTURING GEORGIA, INC.	GVWR (kg)	1975
Date of Manufacture	JUN/05/20	GAWR Front (kg)	1140
Vehicle Type	Passenger Car	GAWR Rear (kg)	1050

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				410	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				70	(A-B)

VEHICLE SEAT TYPE

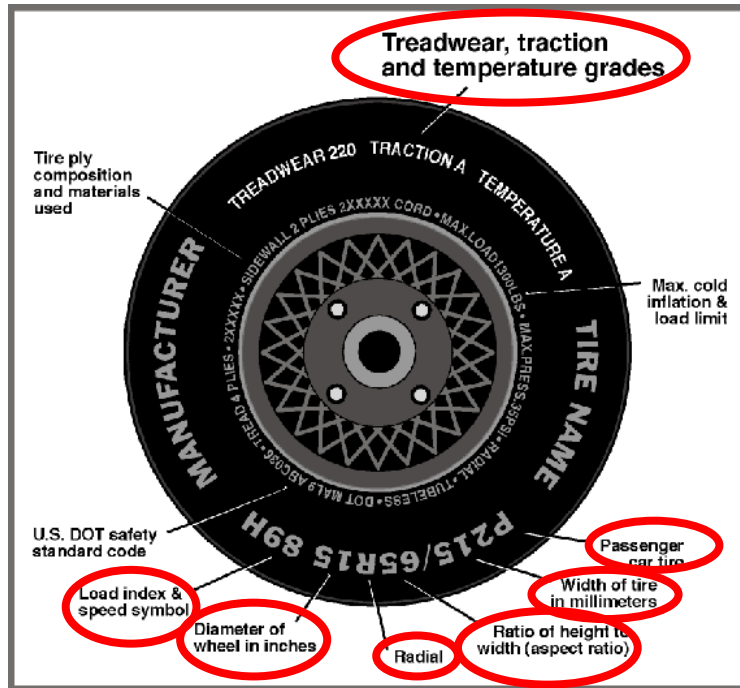
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second Row				X	X		
Third Row Seat							

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	205/65R16	205/65R16
Tire Size on Vehicle	205/65R16	205/65R16
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus	Solus
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index/Speed Symbol	95 H	95 H
Tire Material	Rubber	Rubber
DOT Safety Code Left	000 ERYAY1	000 ERYAY1
DOT Safety Code Right	000 ERYAY1	000 ERYAY1

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

TEST VEHICLE TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	215	205	220	215
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	427.5	290.5		462.5	378.0		462.5	386.0	
Right	kg	442.5	271.5		445.5	338.0		442.0	340.5	
Ratio	%	60.8%	39.2%		55.9%	44.1%		55.5%	44.5%	
Totals	kg	870.0	562.0	1432.0	908.0	716.0	1624.0	904.5	726.5	1631.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1432.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	70	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1631.0	(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	699	701	Yes
Right Front	mm	702	701	Yes
Right Rear	mm	695	700	Yes
Left Rear	mm	693	692	Yes
Vehicle CG (Aft of Front Axle)	mm	1270	1257	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	33	29	

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)

*** 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: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Units	Weight
Weight of Ballast Added	kg	30
Components Removed: none	kg	

TEST SURFACE MARKINGS

	Units	Distance from 63° Impact Angle Line
Fore 25 mm Target	mm	930
Aft 25 mm Target	mm	940
Pre-Impact Angle Line	mm	100

Parallel Track Target	Units	X Location	Y Location
A	mm	0	0
B	mm		
C	mm		
D	mm		

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

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	15.4	12.0	13.7
Front Passenger Seat	15.4	12.2	13.8
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 SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear-Most	Mid	Forward- Most
Driver Seat	13.7	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Passenger Seat	13.8	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: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

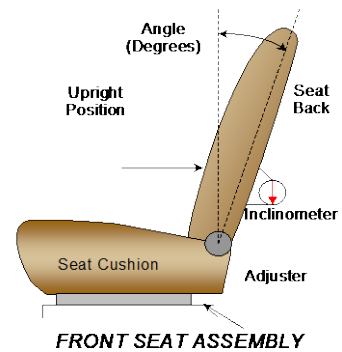
NHTSA No.: O20214205
 Test Date: 9/30/2020

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	260	41	130	20
Front Passenger Seat	234	37	117	18
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 center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck side rear seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as 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	64.2	33	1.8	9
Front Passenger Seat	62.4	33	2.2	9
Front Center Seat				
Struck Side Rear Seat	Fixed		12.1	
Non-Struck Side Rear Seat	Fixed		12.1	
Rear Center Seat	Fixed		12.1	

Seat back angles measured on outboard headrest post.

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on S1 - Vehicle Setup Information.

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

HEAD RESTRAINT ADJUSTMENT

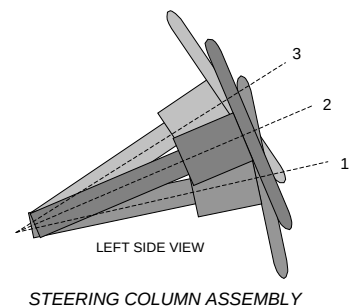
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	5	4 (Lowest as 0) / Fixed Fore-Aft
Rear Seat	3	0 (Lowest as 0) / Fixed Fore-Aft

STEERING COLUMN ADJUSTMENT

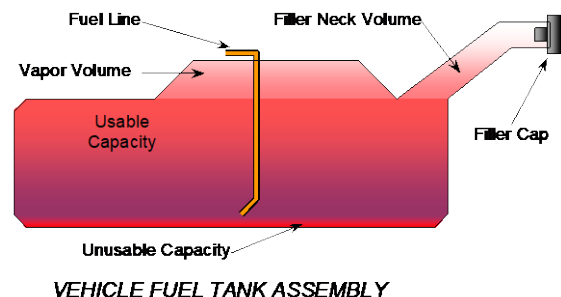
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Wheel Angle (°)	Fore/Aft Position (mm)
Lowermost, Position 1	70.9	
Geometric Center, Position 2	68.4	
Uppermost, Position 3	65.9	
Telescoping Steering Wheel Travel		50
Test Position	68.4	25



FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump will operate when the engine system is operating normally. 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: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020

FUEL TANK CAPACITY DATA

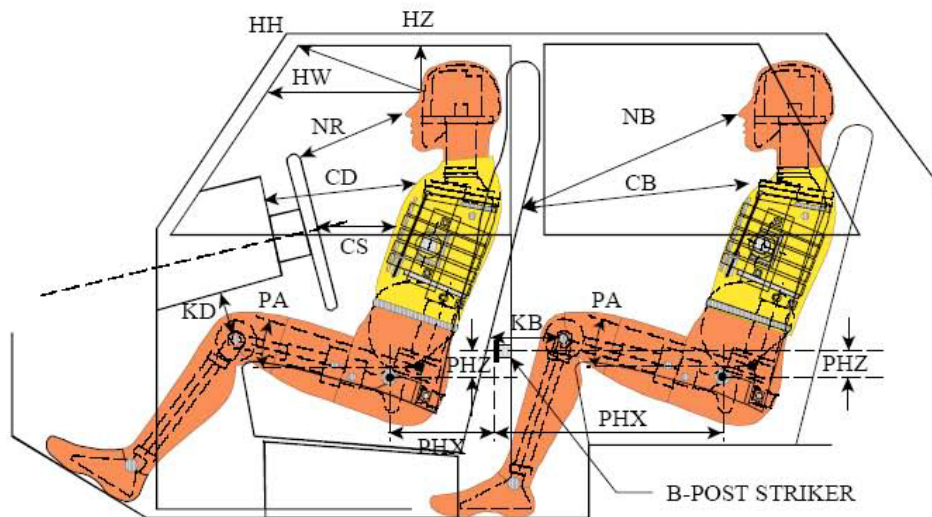
	Liters
Usable Capacity of Standard Tank (see S1 - Vehicle Setup Information)	60.0
Usable Capacity of Optional Tank (see S1 - Vehicle Setup Information)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	60.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	55.8
Actual Amount of Solvent Used	55.6
1/3 of Usable Capacity	20.0

Is the actual amount of solvent used in the test equal to 93% $\pm$ 1%
of the Usable Capacity stated in S1 - Vehicle Setup Information? **YES**

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020



LEFT SIDE VIEW

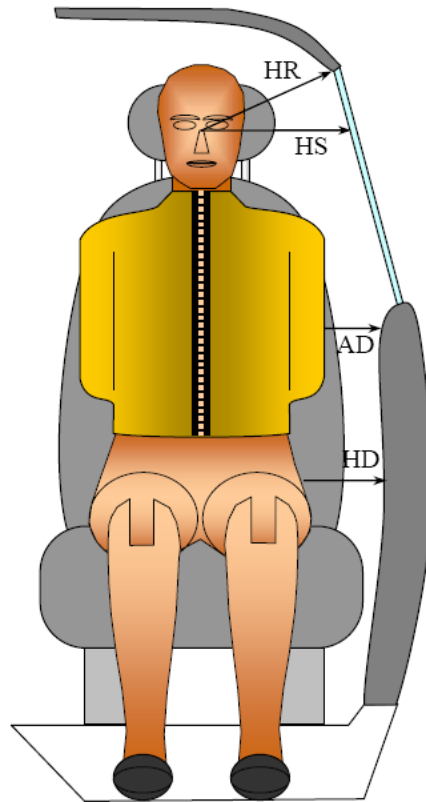
NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	299	15.7		
HW		Head to Windshield	566	0		
HZ	HZ	Head to Roof Liner	130	90	278	90
NR	NB	Nose to Rim/Seat Back	432	18.0	600	4.0
CD	CB	Chest to Dashboard/Seat Back	566	9.7	608	8.5
CS		Chest to Steering Wheel	371	11.1		
KDL	KBL	Left Knee to Dash/Seat Back	242	31.3	320	11.8
KDR	KBR	Right Knee to Dash/Seat Back	229	33.5	321	12.7
PAX	PAX	Pelvic Tilt Angle X		19.5		27.1
PAY	PAY	Pelvic Tilt Angle Y		-0.4		-0.8
PHX	PHX	Hip Point to Striker (X-Axis)	184		223	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	269		267	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

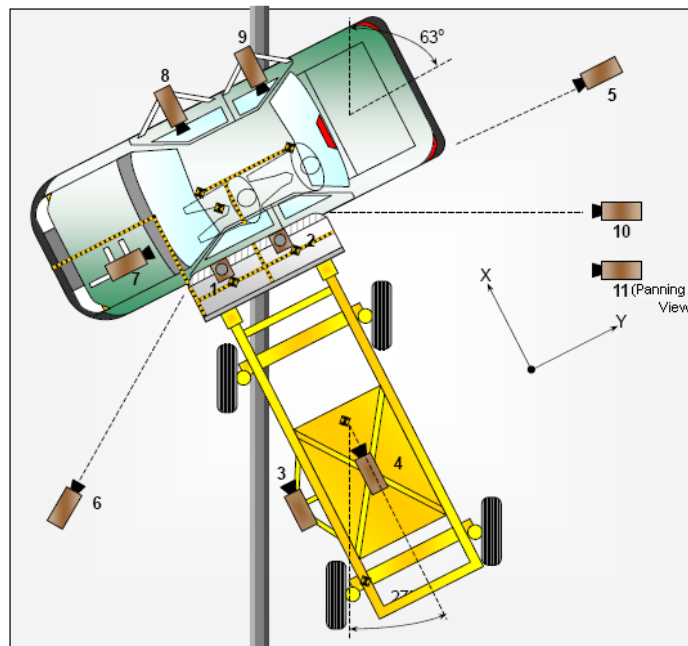


Code	Measurement Description	Driver	Passenger
		Length (mm)	
HR	Head to Side Header	192	242
HS	Head to Side Window	330	350
AD	Arm to Door	124	170
HD	Hip Point to Door	183	210

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates* (mm)			Lens (mm)	Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	500	-700	-4995	8.5	1000
2	Overhead Close-Up	0	105	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-250	6805	-1315	24	1000
6	Left Front	2600	-6705	-1525	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

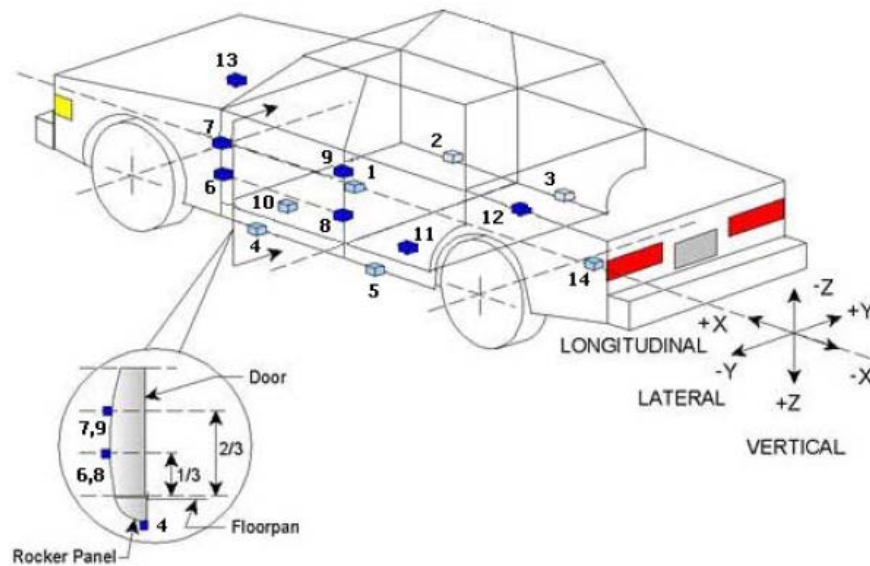
INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Passenger Dummy	19
Vehicle Structure	23
MDB Accelerometers	5
Total	63

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020



TEST VEHICLE ACCELEROMETER LOCATIONS

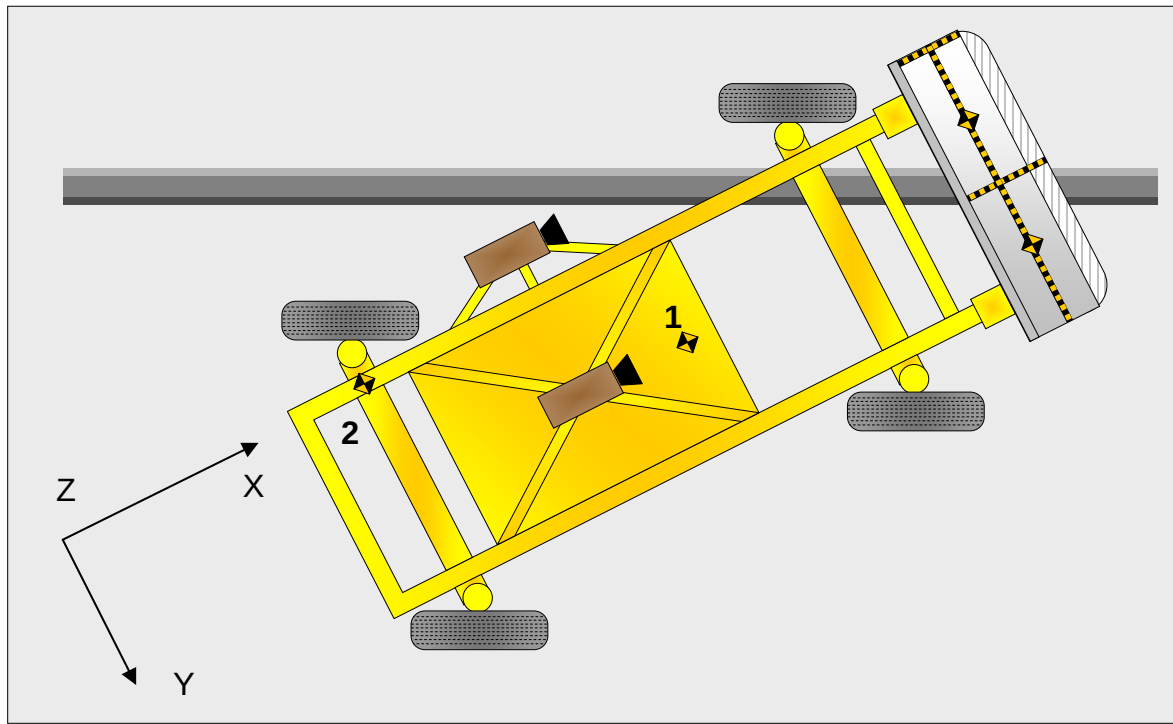
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2695	155	-190
2	Right Sill at Front Seat	2885	755	-180
3	Right Sill at Rear Seat	1550	755	-180
4	Left Sill at Front Door	2830	-755	-180
5	Left Sill at Rear Door	1770	-755	-180
6	Left Lower A-Post	3395	-815	-520
7	Left Middle A-Post	3395	-815	-760
8	Left Lower B-Post	2235	-750	-450
9	Left Middle B-Post	2240	-750	-725
10	Front Seat Track	2445	-390	-230
11	Rear Seat Structure	1990	-365	-150
12	Rt. Rear Occ. Compartment	1990	365	-215
13	Engine Block	4075	205	-875
14	Rear Above Axle	1075	0	-510

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: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020



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)

Width between left and right MDB contact switches	mm	1392
---	----	------

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Seatback
Top of Head	Curtain Airbag, Headliner	Curtain Airbag, Seatback, Center Headrest
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headliner, Headrest	Curtain Airbag, Headrest, Seatback
Left Shoulder	Side Torso/Pelvis Airbag	Seatback
Upper Torso	Side Torso/Pelvis Airbag, Seatback	Seatback
Lower Torso	Side Torso/Pelvis Airbag, Seatback	Seatback, Door Panel
Left Hip	Side Torso/Pelvis Airbag, Seat Cushion	Seat Cushion, Door Panel
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Left Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Side Torso Airbag	No		Yes	Yes
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		2852
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		486
Actual Impact Point (Aft of Front Axle)	mm		498
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-12
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	4

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2591
CG Location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	368.2	320.6	
Right	kg	400.7	271.4	
Ratio	%	56.5	43.5	
Totals	kg	768.9	592.0	1360.9

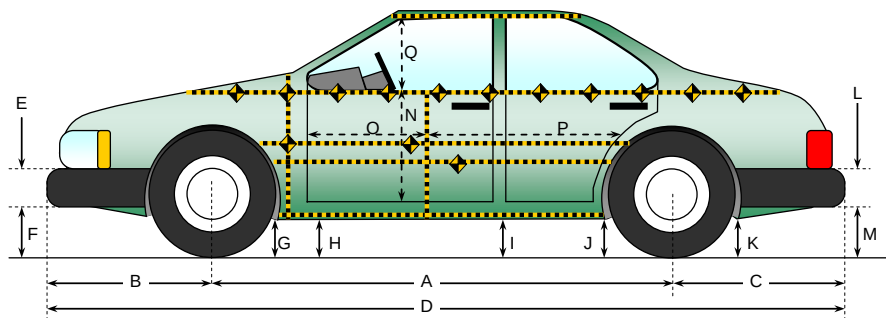
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.07
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.15
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	91.1
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	27.0

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
Test Date: 9/30/2020



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

LEFT SIDE VIEW

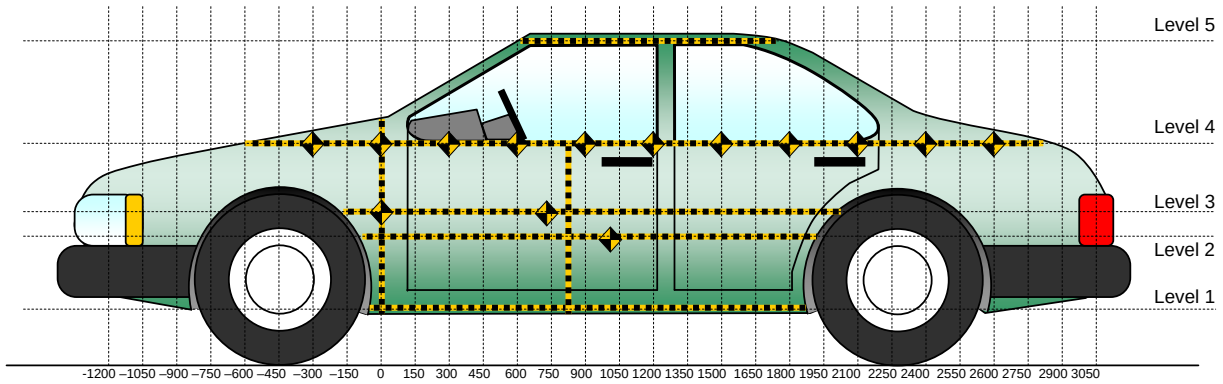
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2852	2845	7
B	Front Axle to FSOV	936	952	-16
C	Rear Axle to RSOV	1117	1085	32
D	Total Length at Centerline	4905	4882	23
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	197	200	-3
G	Sill Height at Front Wheel Well	163	171	-8
H	Sill Height at Front Door Leading Edge	163	176	-13
I	Sill Height at B Pillar	160	173	-13
J1	Sill Height at Rear Wheel Well	157	171	-14
J2	Pinch Weld Height at Rear Wheel Well	157	171	-14
K	Sill Height Aft of Rear Wheel Well	210	216	-6
L	Rear Bumper Thickness	200	200	0
M	Rear Bumper Bottom to Ground	269	281	-12
N	Sill Height to Window Bottom Sill	735	682	53
O	Front Door Leading Edge to Impact CL	822	763	59
P	Rear Door Trailing Edge to Impact CL	1196	1147	49
Q	Front Window Opening	396	387	9
R	Right Side Length	4040	4053	-13
S	Left Side Length	4040	4029	11
T	Vehicle Width at B Post	1895	1879	16
U	Front Wheel Track Width	1635		
V	Rear Wheel Track Width	1645		

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	306	150	300
2	Occupant H-Point	500	223	450
3	Mid Door	614	209	750
4	Window Sill	909	175	1800
5	Window Top	1370	13	1350

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: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020

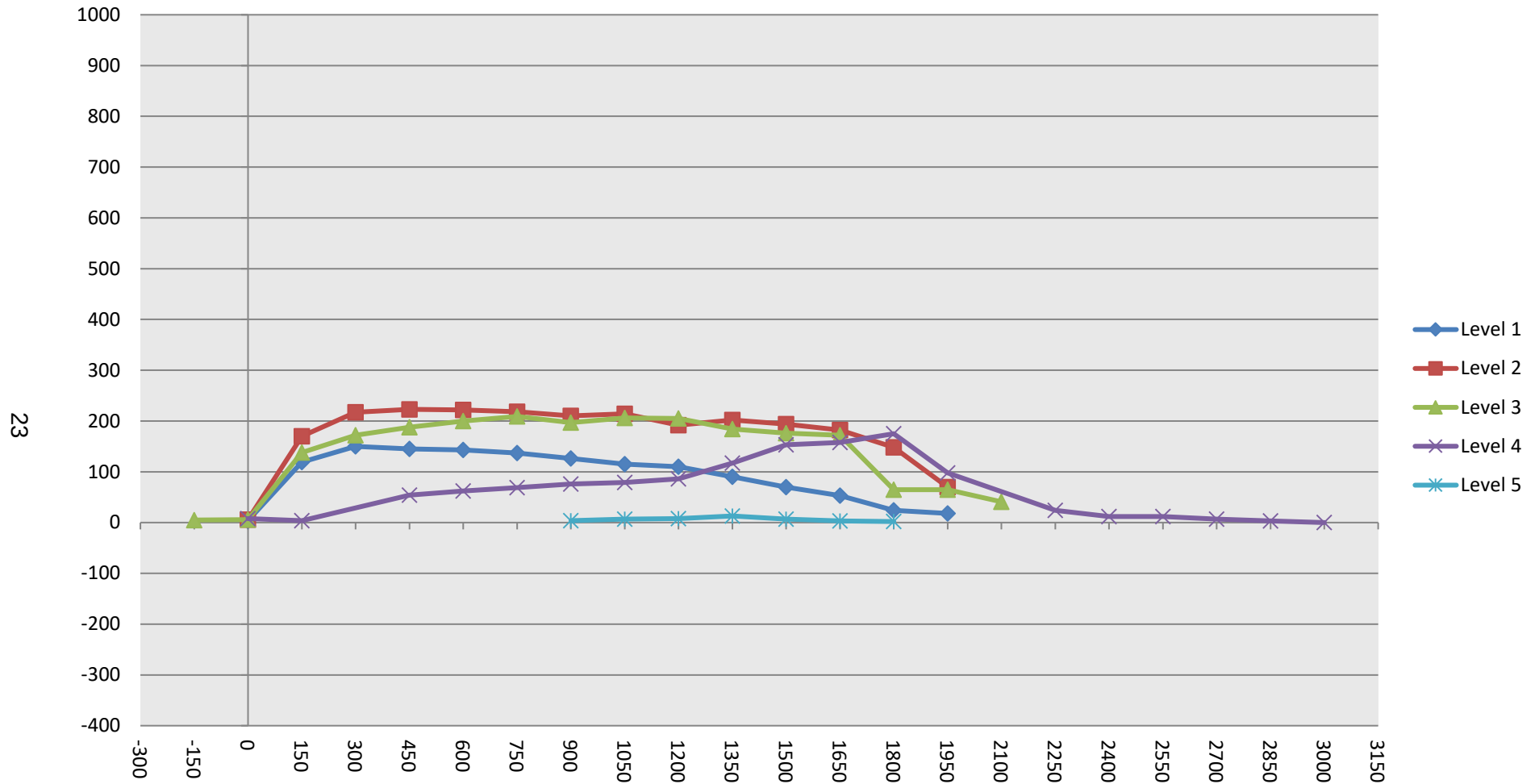
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600															
-450															
-300															
-150			173					178					5		
0	194	182	176	286		198	188	182	294		4	6	6	8	
150	197	190	177	275		316	360	315	279		119	170	138	4	
300	194	190	177			344	407	349			150	217	172		
450	196	190	177	256		341	413	365	310		145	223	188	54	
600	198	191	178	250		341	413	378	312		143	222	200	62	
750	201	192	178	244		338	410	387	313		137	218	209	69	
900	204	194	180	240	506	330	404	377	316	510	126	210	197	76	4
1050	207	195	181	236	487	322	409	387	315	494	115	214	206	79	7
1200	211	199	185	234	486	321	391	390	320	494	110	192	205	86	8
1350	215	202	189	234	489	305	404	373	351	502	90	202	184	117	13
1500	218	203	192	231	495	288	397	368	384	502	70	194	176	153	7
1650	222	201	190	229	508	275	383	362	387	511	53	182	172	158	3
1800	215	195	188	225	532	239	343	253	400	534	24	148	65	175	2
1950	198	186	184	222		216	256	249	320		18	70	65	98	
2100			178					219					41		
2250				211					235					24	
2400				213					225					12	
2550				221					233					12	
2700				237					244					7	
2850				262					265					3	
3000				290					290					0	
3150															
3300															
3450															
3600															
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: 2021 Kia K5 LXS 4-Door Sedan
Test Program: NCAP Side MDB Impact Test

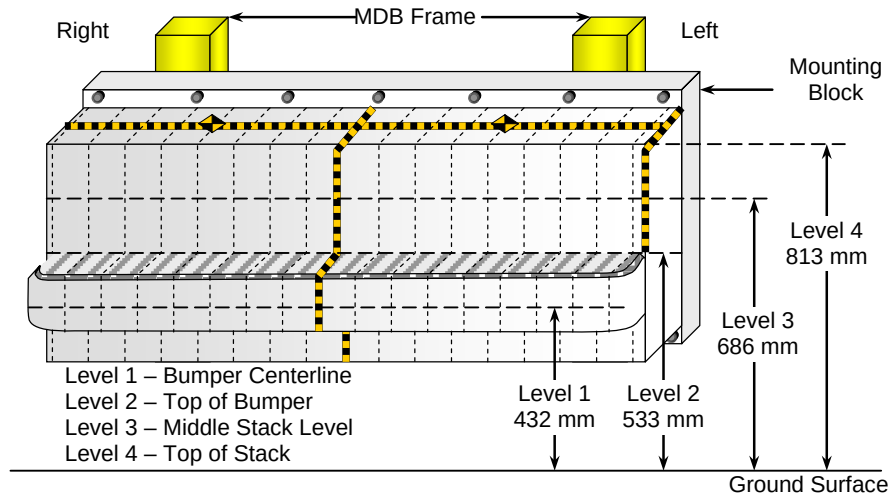
NHTSA No.: O20214205
Test Date: 9/30/2020



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	158
B	Top of Bumper	533	800	Left	99
C	Mid-Level	686	800	Left	108
D	Top of Stack	813	800	Left	155

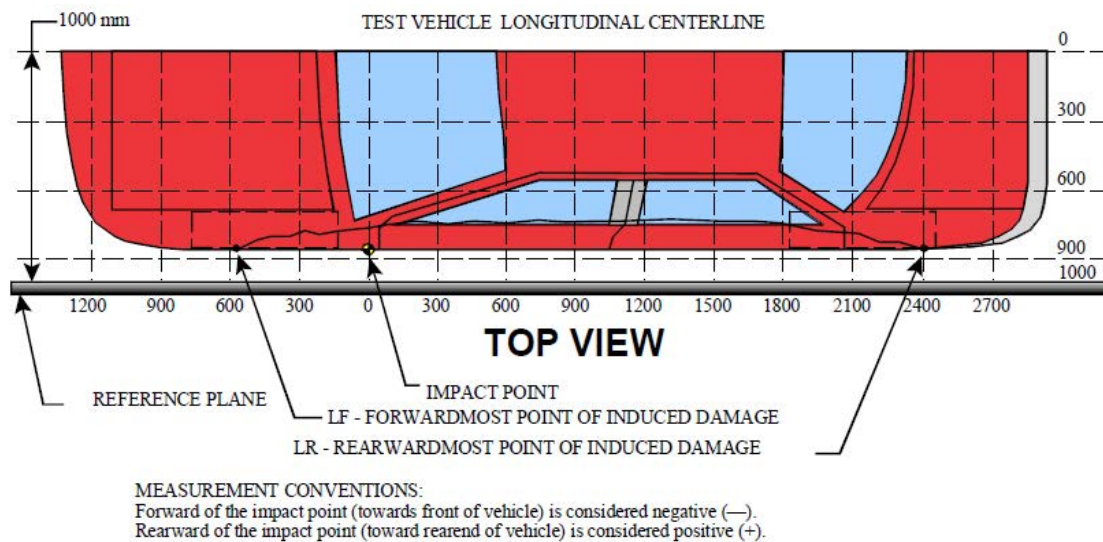
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C _L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
4	16	5	13	29	55	88	120	115	99	101	96	81	85	105	121	136	155
3	22	13	15	22	34	46	66	65	44	34	29	29	32	40	51	74	108
2	89	87	87	89	90	92	93	85	90	87	84	85	85	85	88	92	99
1	142	142	144	146	148	157	153	153	146	140	136	137	137	137	137	144	158

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2245	3	197	189	8
2	1810	3	398	188	210
3	1375	3	362	190	172
4	940	3	319	180	139
5	505	3	311	177	134
6	70	3	232	176	56

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	618	476	142
2	480 mm right of center	1	612	463	149
3	160 mm right of center	1	616	463	153
4	160 mm left of center	1	597	463	134
5	480 mm left of center	1	606	463	143
6	800 mm left of center	1	634	476	158

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

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

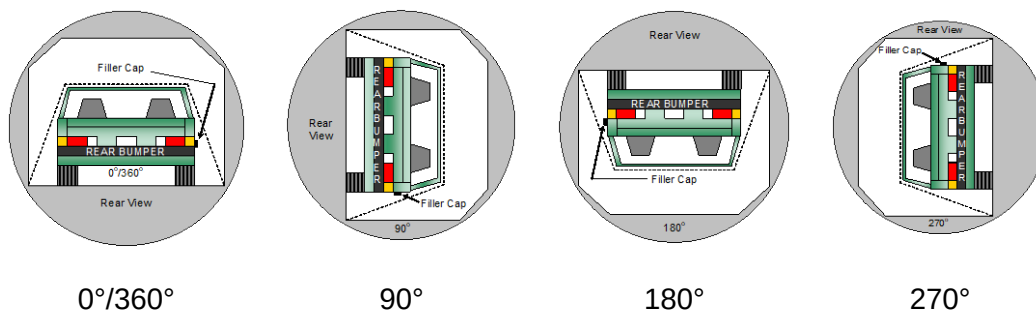
NHTSA No.: O20214205
 Test Date: 9/30/2020

Test Time: 12:18 pm

Temperature: 22.0°C

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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	110	300	410
90° to 180°	110	300	410
180° to 270°	108	300	408
270° to 360°	111	300	411

FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)

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

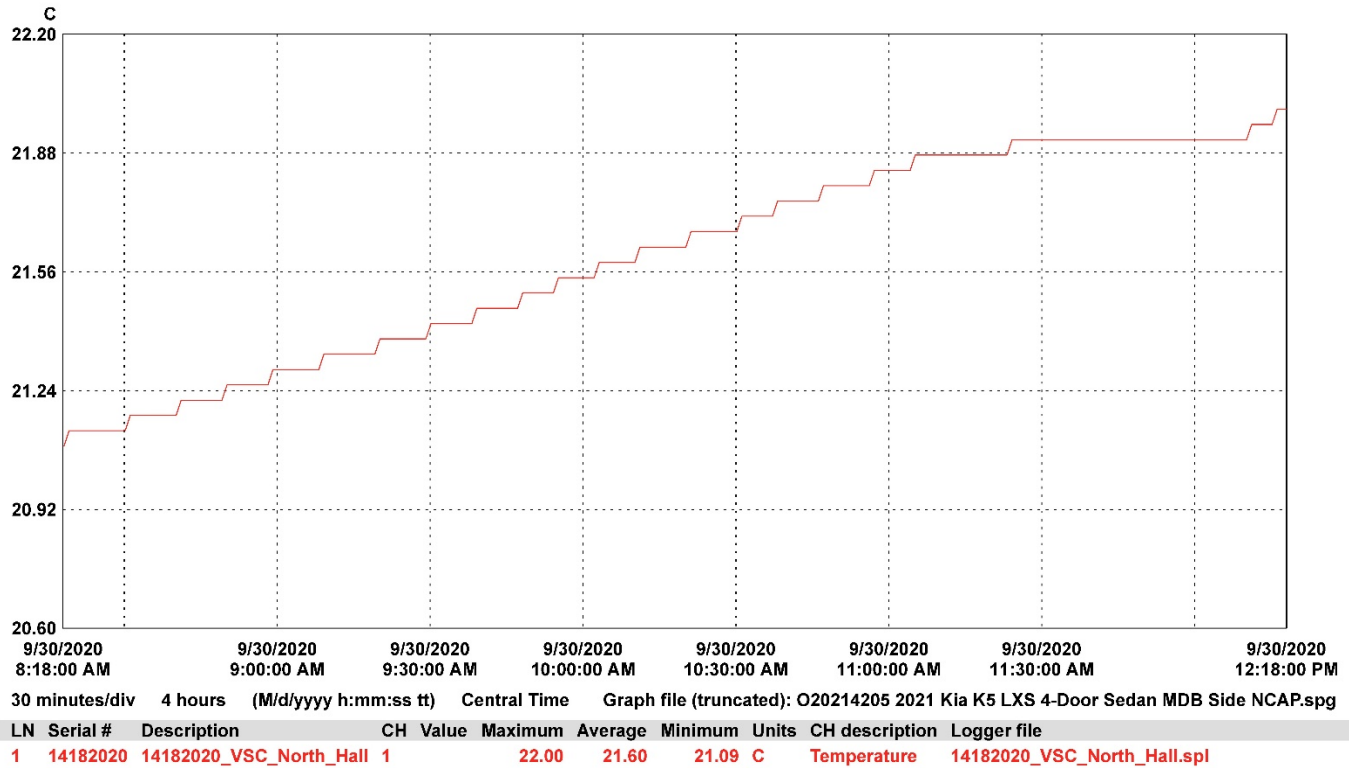
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2021 Kia K5 LXS 4-Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: O20214205
 Test Date: 9/30/2020



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	As Delivered Right Front Three-Quarter View of Test Vehicle	A-1
Photo No. 002	As Delivered Left Rear Three-Quarter View of Test Vehicle	A-1
Photo No. 003	Pre-Test Frontal View of Test Vehicle	A-2
Photo No. 004	Post-Test Frontal View of Test Vehicle	A-2
Photo No. 005	Pre-Test Left Front Three-Quarter View of Test Vehicle	A-3
Photo No. 006	Post-Test Left Front Three-Quarter View of Test Vehicle	A-3
Photo No. 007	Pre-Test Left Side View of Test Vehicle	A-4
Photo No. 008	Post-Test Left Side View of Test Vehicle	A-4
Photo No. 009	Pre-Test Left Three-Quarter Rear View of Test Vehicle	A-5
Photo No. 010	Post-Test Left Three-Quarter Rear View of Test Vehicle	A-5
Photo No. 011	Pre-Test Rear View of Test Vehicle	A-6
Photo No. 012	Post-Test Rear View of Test Vehicle	A-6
Photo No. 013	Pre-Test Right Side View of Test Vehicle	A-7
Photo No. 014	Post-Test Right Side View of Test Vehicle	A-7
Photo No. 015	Pre-Test Overhead View of Test Area	A-8
Photo No. 016	Post-Test Overhead View of Test Area	A-8
Photo No. 017	Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle	A-9
Photo No. 018	Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle	A-9
Photo No. 019	Pre-Test Close-Up View of Impact Point Target	A-10
Photo No. 020	Post-Test Close-Up View of Impact Point Target	A-10
Photo No. 021	Pre-Test Left Front Door Latch Close-Up	A-11
Photo No. 022	Post-Test Left Front Door Latch Close-Up	A-11
Photo No. 023	Pre-Test Left Rear Door Latch Close-Up	A-12
Photo No. 024	Post-Test Left Rear Door Latch Close-Up	A-12
Photo No. 025	Pre-Test Front Close-Up View of Driver Dummy	A-13
Photo No. 026	Post-Test Front Close-Up View of Driver Dummy	A-13
Photo No. 027	Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking	A-14
Photo No. 028	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-14
Photo No. 029	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-15
Photo No. 030	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-15

		<u>Page No.</u>
Photo No. 031	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-16
Photo No. 032	Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning	A-16
Photo No. 033	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-17
Photo No. 034	Pre-Test Placement of Driver Dummy's Feet	A-17
Photo No. 035	Pre-Test View of Belt Anchorage for Driver Dummy	A-18
Photo No. 036	Pre-Test Left Side View of Steering Wheel	A-18
Photo No. 037	Pre-Test View of Disengaged Parking Brake	A-19
Photo No. 038	Pre-Test View of Parking Brake	A-19
Photo No. 039	Pre-Test Close-Up Left Side View of Driver Seat Track	A-20
Photo No. 040	Pre-Test Close-Up Left Side View of Driver Seat Back	A-20
Photo No. 041	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-21
Photo No. 042	Pre-Test Driver Dummy and Door Clearance View	A-21
Photo No. 043	Post-Test Driver Dummy and Door Clearance View	A-22
Photo No. 044	Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-22
Photo No. 045	Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-23
Photo No. 046	Pre-Test Driver Inner Door Panel View	A-23
Photo No. 047	Post-Test Driver Inner Door Panel View	A-24
Photo No. 048	Post-Test Driver Dummy Close-up Head Contact with Vehicle Interior View	A-24
Photo No. 049	Post-Test Driver Dummy Close-up Head Contact with Side Airbag View	A-25
Photo No. 050	Post-Test Driver Dummy Close-up Torso Contact with Vehicle Interior View	A-25
Photo No. 051	Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View	A-26
Photo No. 052	Post-Test Driver Dummy Close-up Pelvis Contact with Vehicle Interior View	A-26
Photo No. 053	Post-Test Driver Dummy Close-up Pelvis Contact with Side Airbag View	A-27
Photo No. 054	Post-Test Driver Dummy Close-up Knee Contact View	A-27
Photo No. 055	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-28
Photo No. 056	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-28
Photo No. 057	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-29

		<u>Page No.</u>
Photo No. 058	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-29
Photo No. 059	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-30
Photo No. 060	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-30
Photo No. 061	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-31
Photo No. 062	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-31
Photo No. 063	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-32
Photo No. 064	Pre-Test Placement of Rear Passenger Dummy's Feet	A-32
Photo No. 065	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-33
Photo No. 066	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-33
Photo No. 067	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-34
Photo No. 068	Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint	A-34
Photo No. 069	Pre-Test Rear Passenger Dummy and Door Clearance View	A-35
Photo No. 070	Post-Test Rear Passenger Dummy and Door Clearance View	A-35
Photo No. 071	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
Photo No. 072	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
Photo No. 073	Pre-Test Rear Passenger Inner Door Panel View	A-37
Photo No. 074	Post-Test Rear Passenger Inner Door Panel View	A-37
Photo No. 075	Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View	A-38
Photo No. 076	Post-Test Rear Passenger Dummy Close-up Head Contact with Side Airbag View	A-38
Photo No. 077	Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View	A-39
Photo No. 078	Post-Test Rear Passenger Dummy Close-up Torso Contact with Side Airbag View	A-39
Photo No. 079	Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Vehicle Interior View	A-40
Photo No. 080	Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Side Airbag View	A-40
Photo No. 081	Post-Test Rear Passenger Dummy Close-up Knee Contact View	A-41
Photo No. 082	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-41
Photo No. 083	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-42

		<u>Page No.</u>
Photo No. 084	Pre-Test Front View of MDB Impactor Face	A-42
Photo No. 085	Post-Test Front View of MDB Impactor Face	A-43
Photo No. 086	Pre-Test Top View of MDB Impactor Face	A-43
Photo No. 087	Post-Test Top View of MDB Impactor Face	A-44
Photo No. 088	Pre-Test Left Side View of MDB Impactor Face	A-44
Photo No. 089	Post-Test Left Side View of MDB Impactor Face	A-45
Photo No. 090	Pre-Test Right Side View of MDB Impactor Face	A-45
Photo No. 091	Post-Test Right Side View of MDB Impactor Face	A-46
Photo No. 092	Close-Up View of Vehicle's Certification Label	A-46
Photo No. 093	Close-Up View of Vehicle's Tire Information Placard or Label	A-47
Photo No. 094	Pre-Test Ballast View	A-47
Photo No. 095	Post-Test Primary and Redundant Speed Trap Read-Out	A-48
Photo No. 096	FMVSS No. 301 Static Rollover 0 Degrees	A-48
Photo No. 097	FMVSS No. 301 Static Rollover 90 Degrees	A-49
Photo No. 098	FMVSS No. 301 Static Rollover 180 Degrees	A-49
Photo No. 099	FMVSS No. 301 Static Rollover 270 Degrees	A-50
Photo No. 100	FMVSS No. 301 Static Rollover 360 Degrees	A-50
Photo No. 101	Impact Event	A-51
Photo No. 102	Monroney Label	A-51
Photo No. 103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52
Photo No. 104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52



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

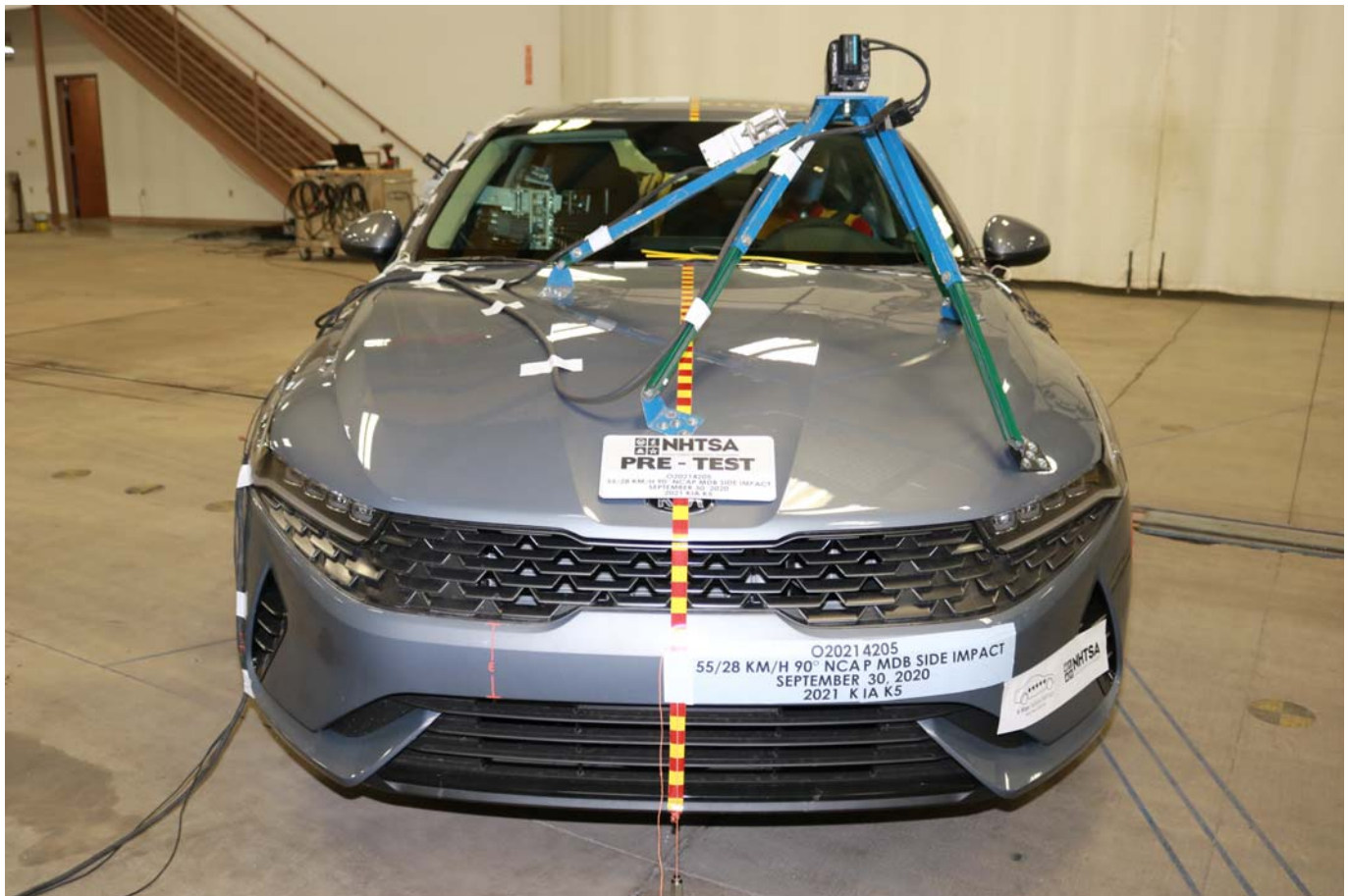


Photo No. 003 - Pre-Test Frontal View of Test Vehicle

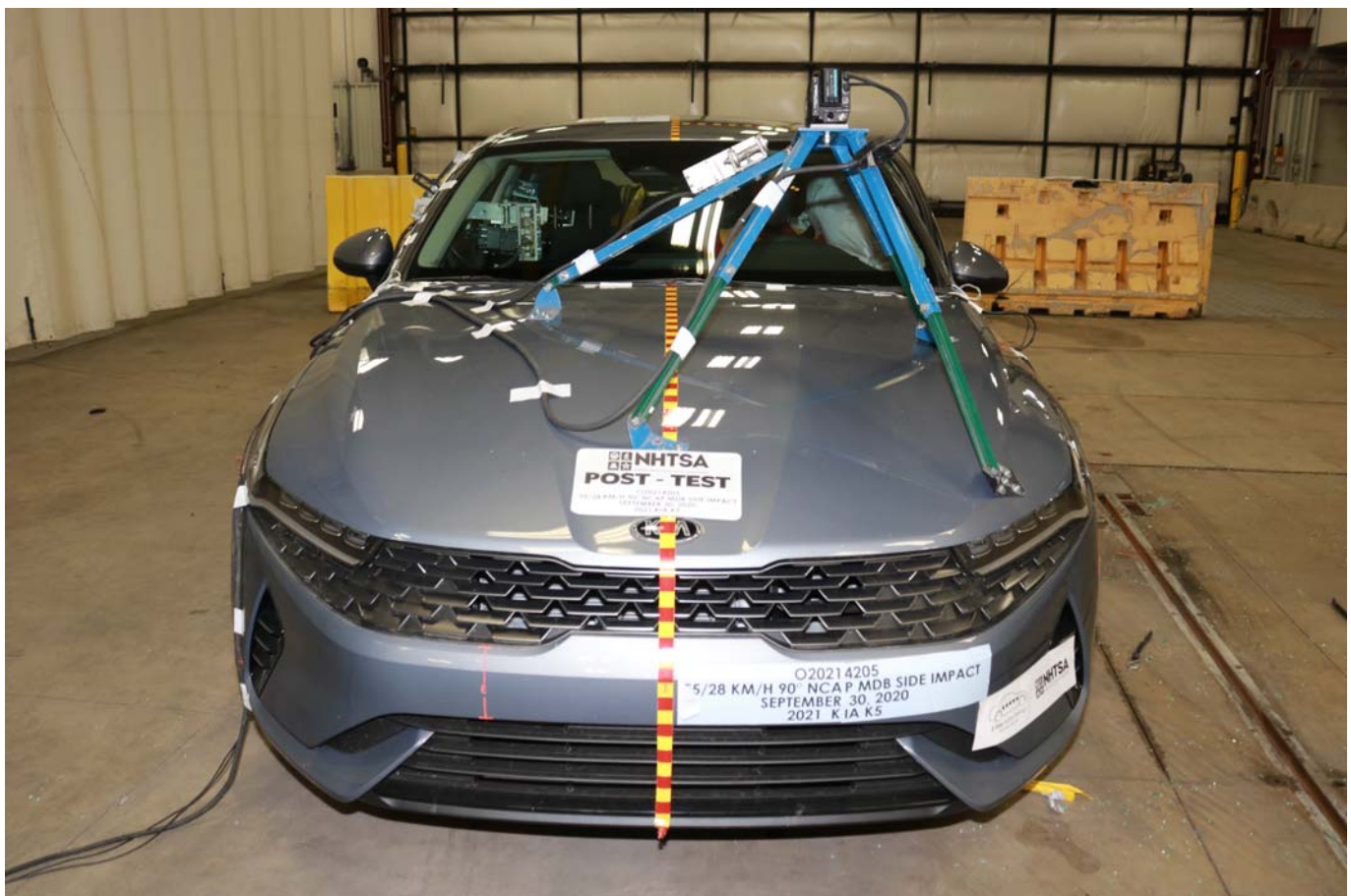


Photo No. 004 - Post-Test Frontal View of Test Vehicle



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

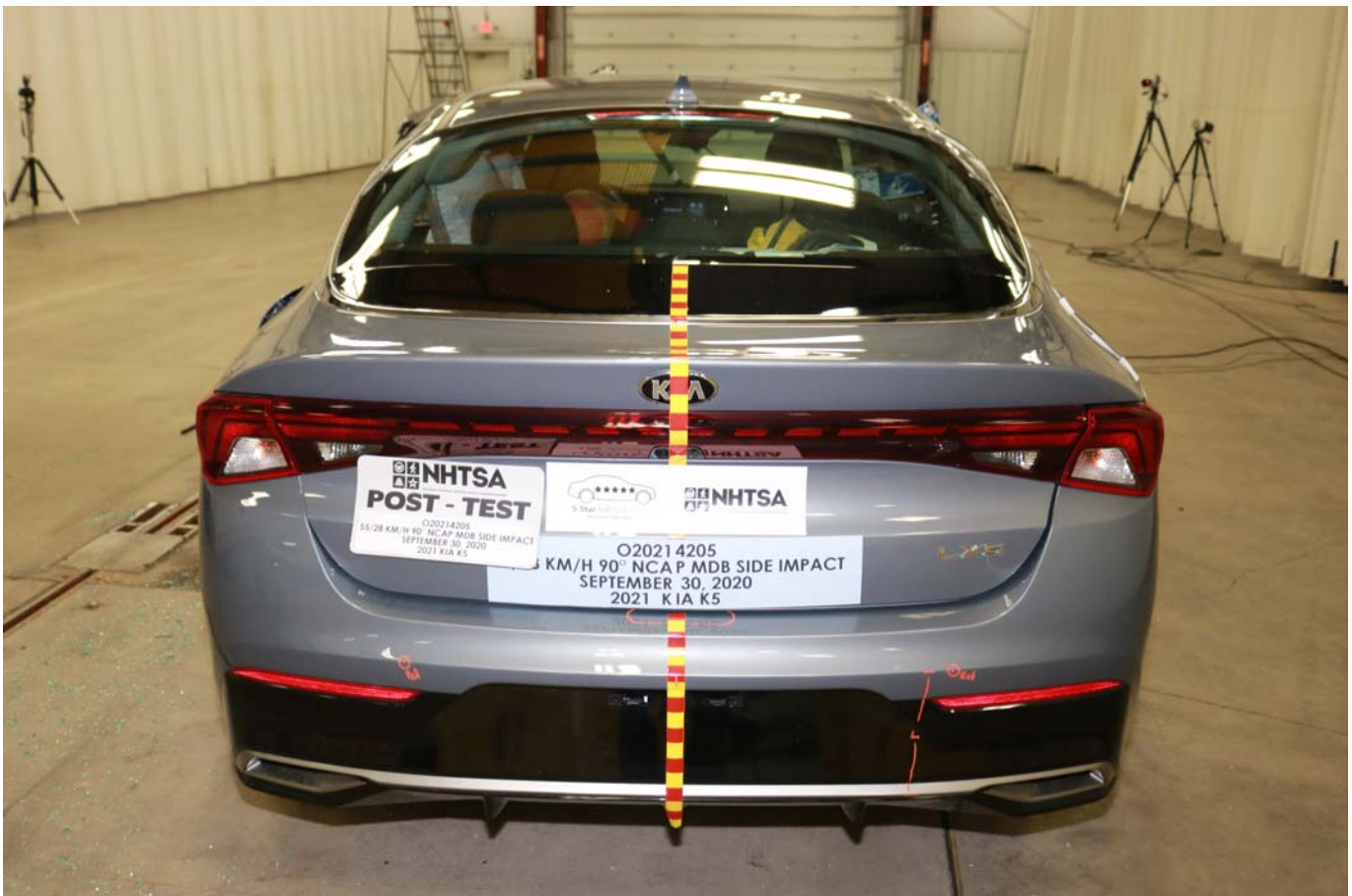


Photo No. 012 - Post-Test Rear View of Test Vehicle



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



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

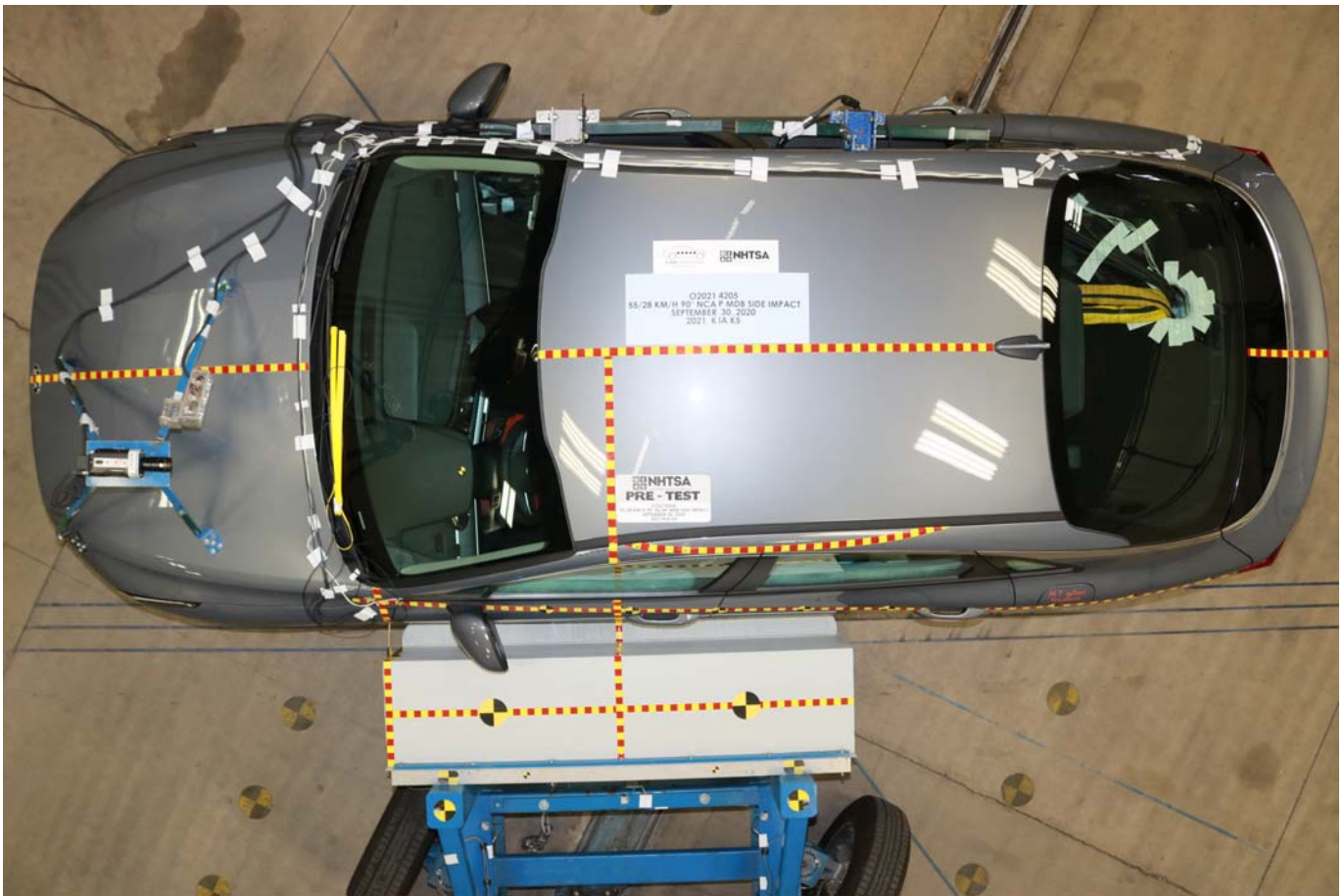


Photo No. 015 - Pre-Test Overhead View of Test Area



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

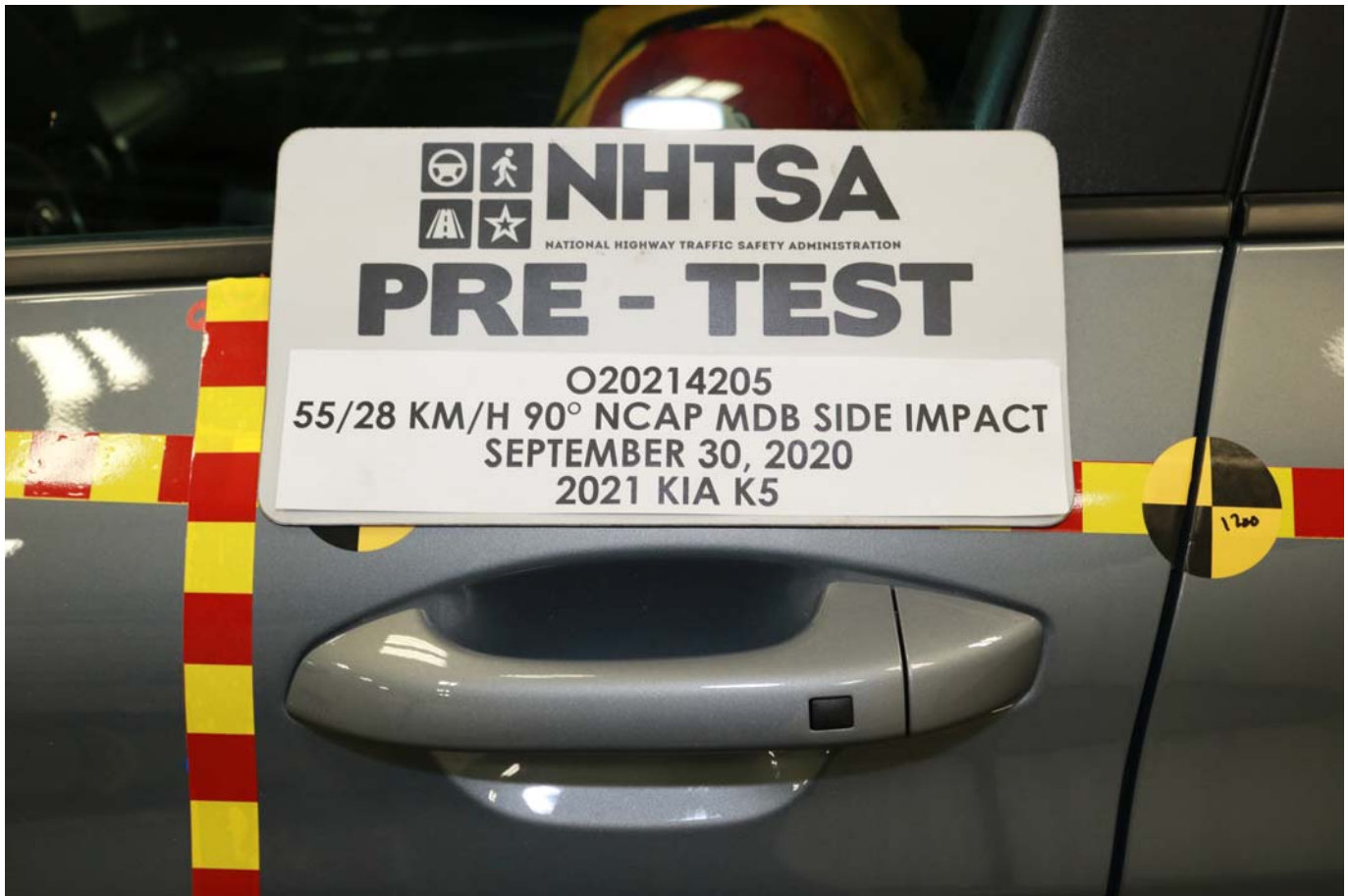


Photo No. 021 - Pre-Test Left Front Door Latch Close-Up



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

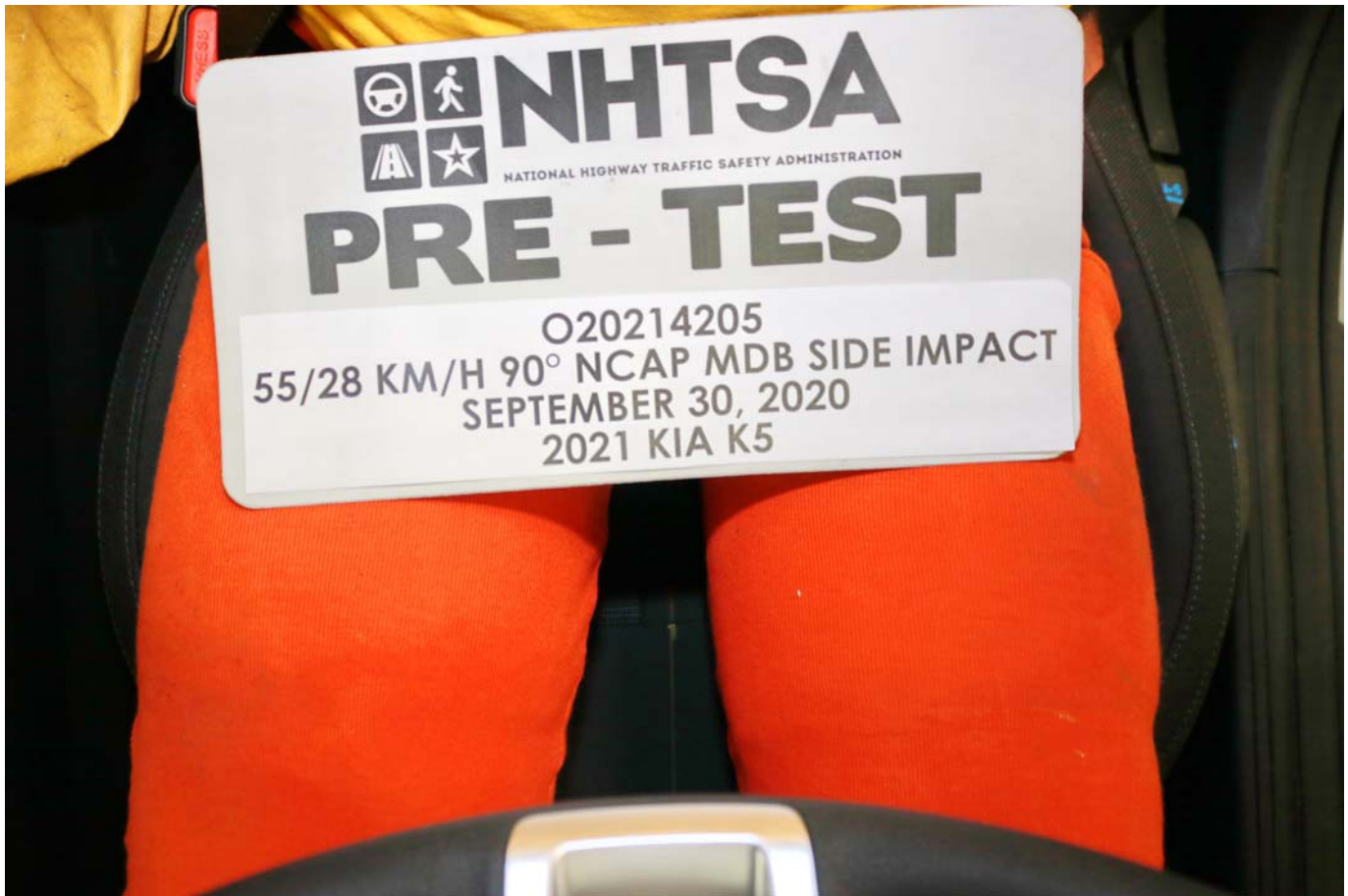


Photo No. 033 - Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



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

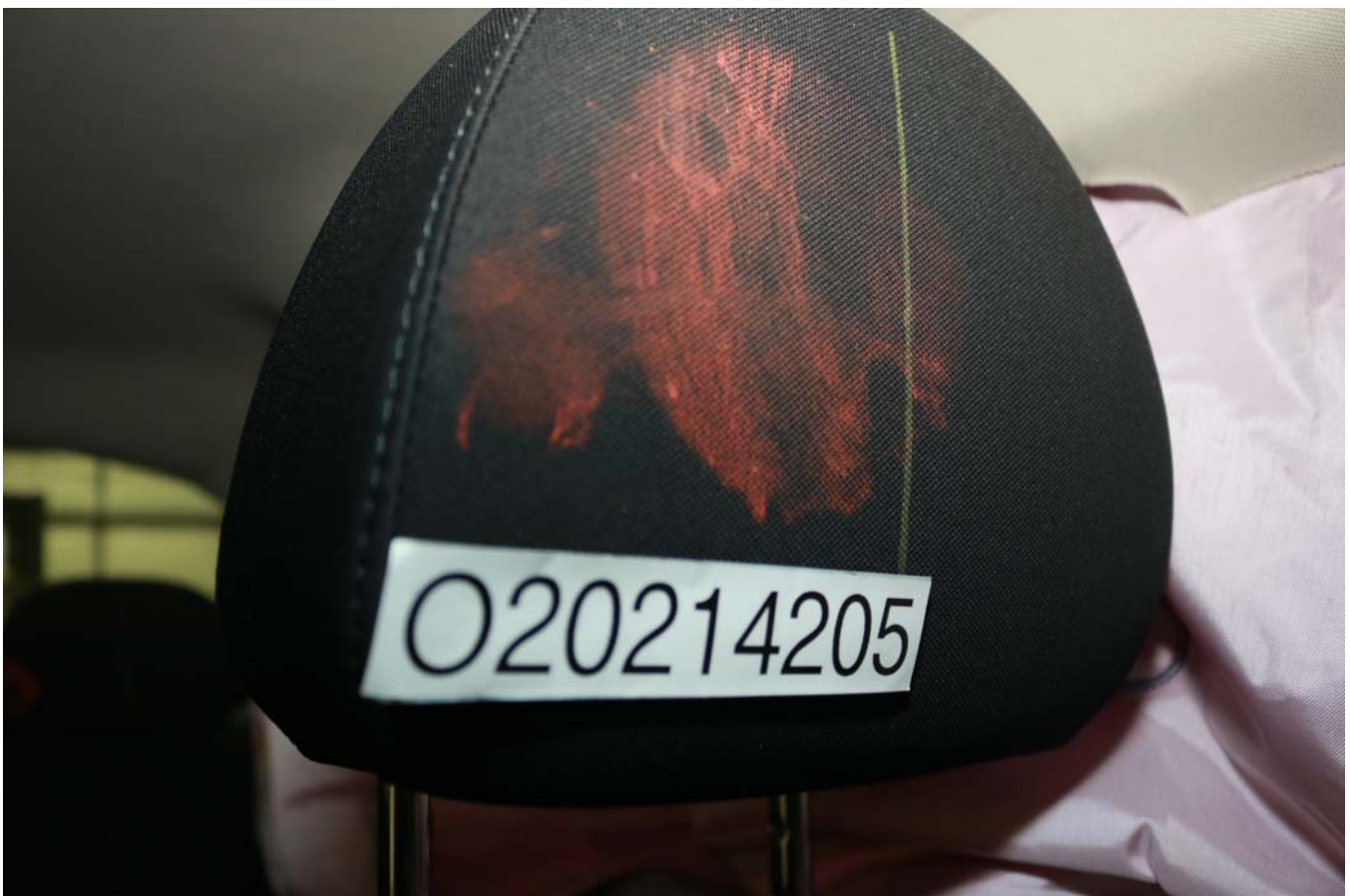


Photo No. 048 - Post-Test Driver Dummy Close-up Head Contact with Vehicle Interior View



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



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



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



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



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



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



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



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



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



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



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

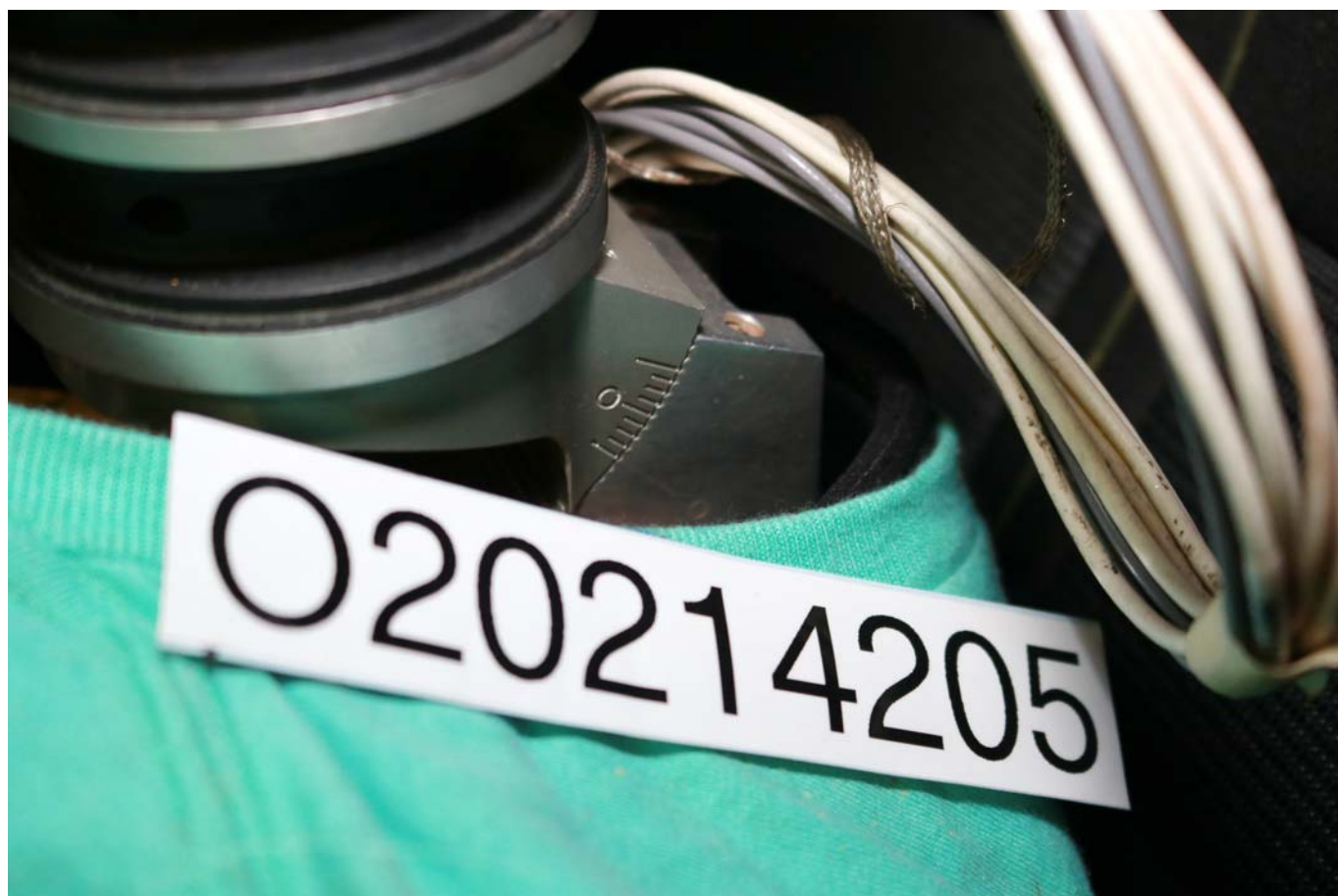


Photo No. 062 - Pre-Test View of Rear Passenger Dummy Neck Showing Position of Adjustable Neck Bracket



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



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



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



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



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



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

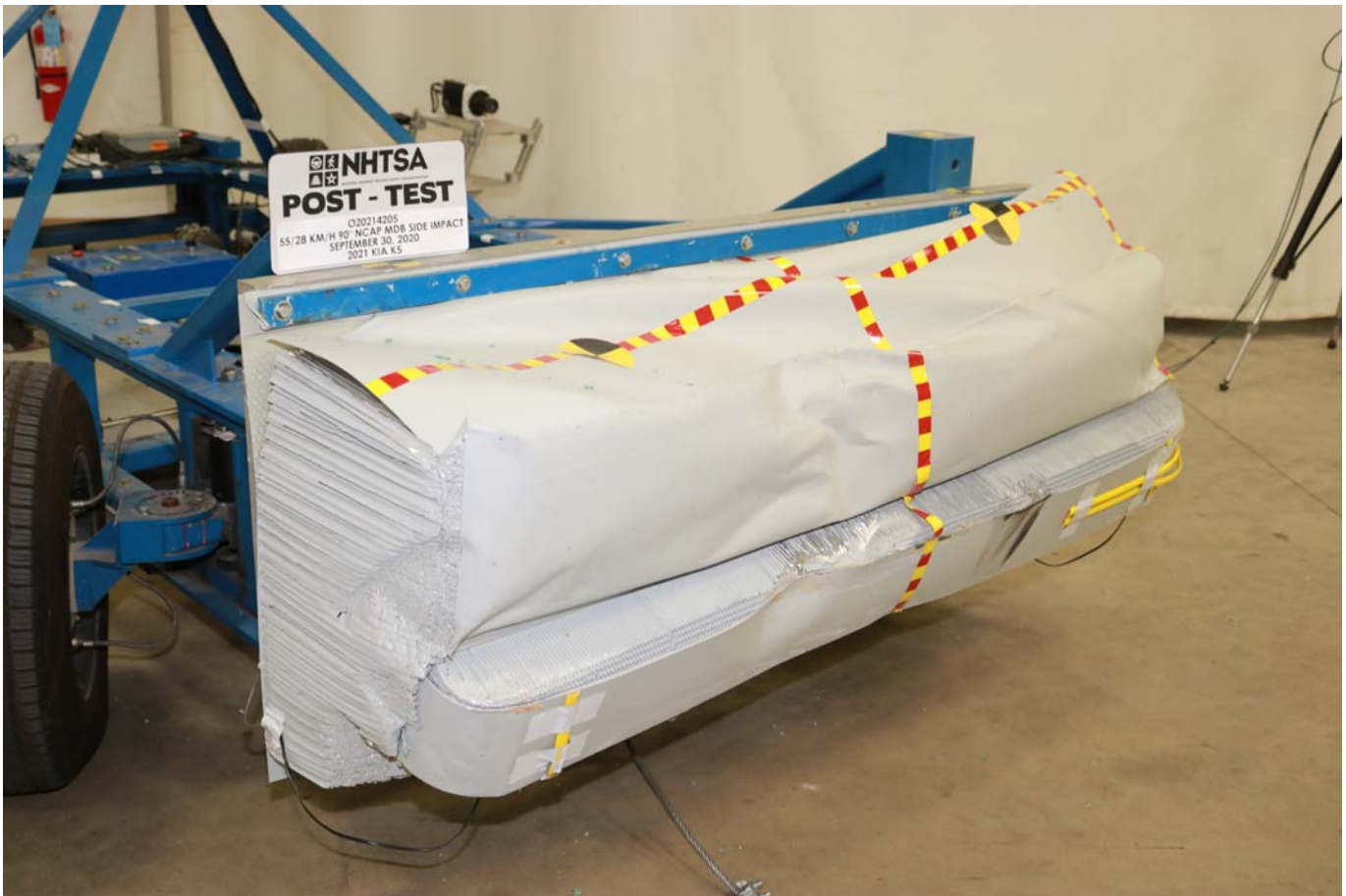


Photo No. 091 - Post-Test Right Side View of MDB Impactor Face



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

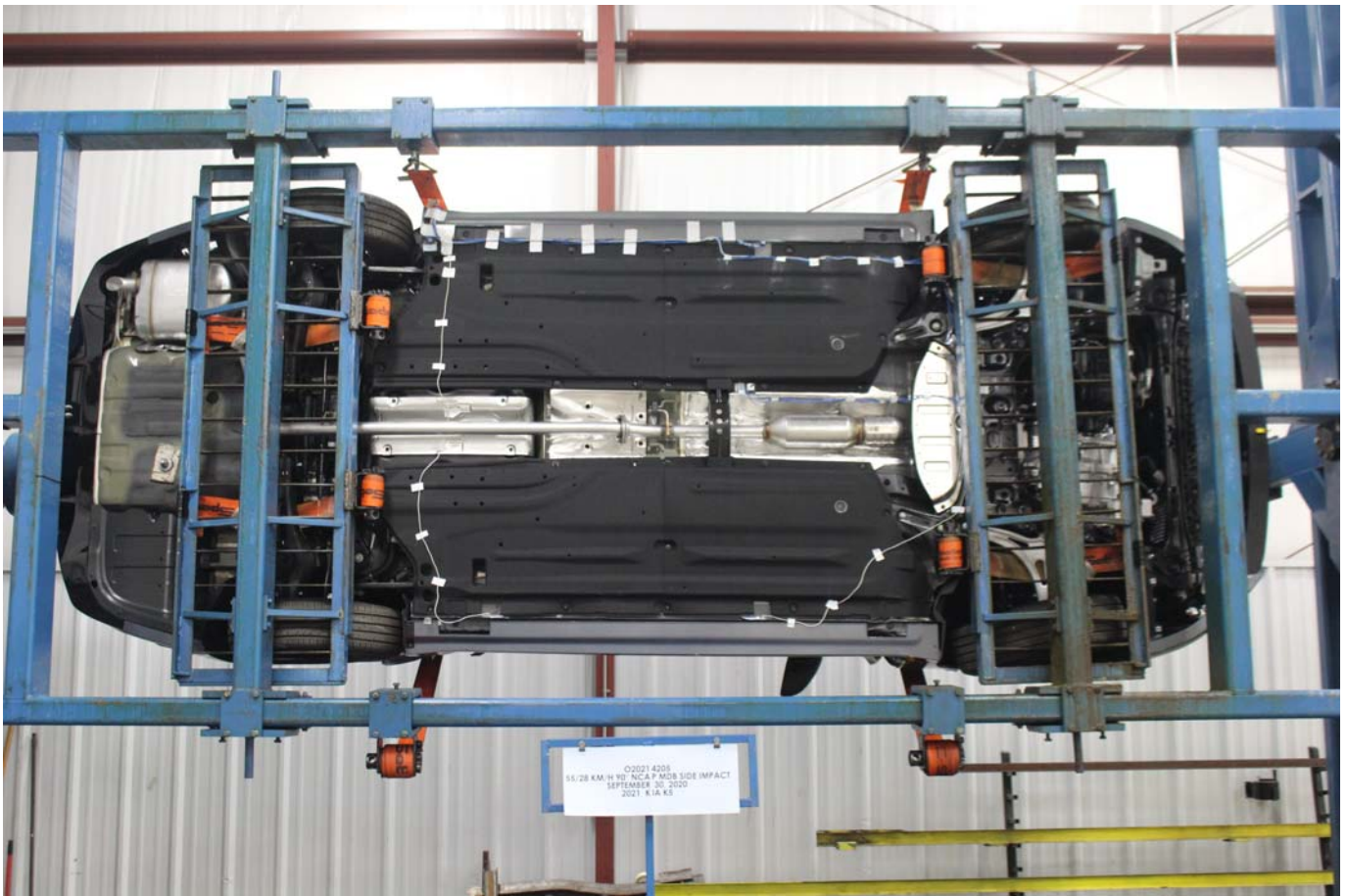


Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees



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

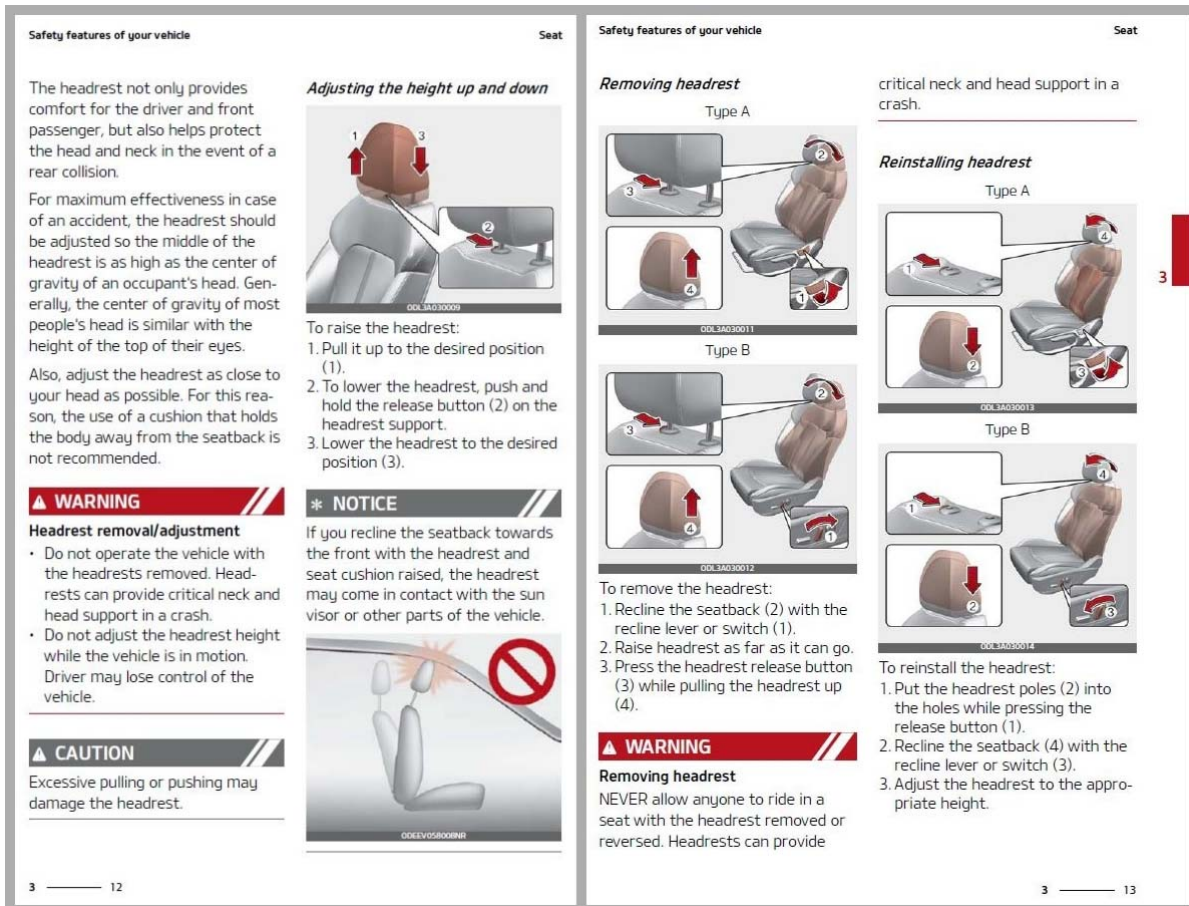


Photo No. 103 - Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

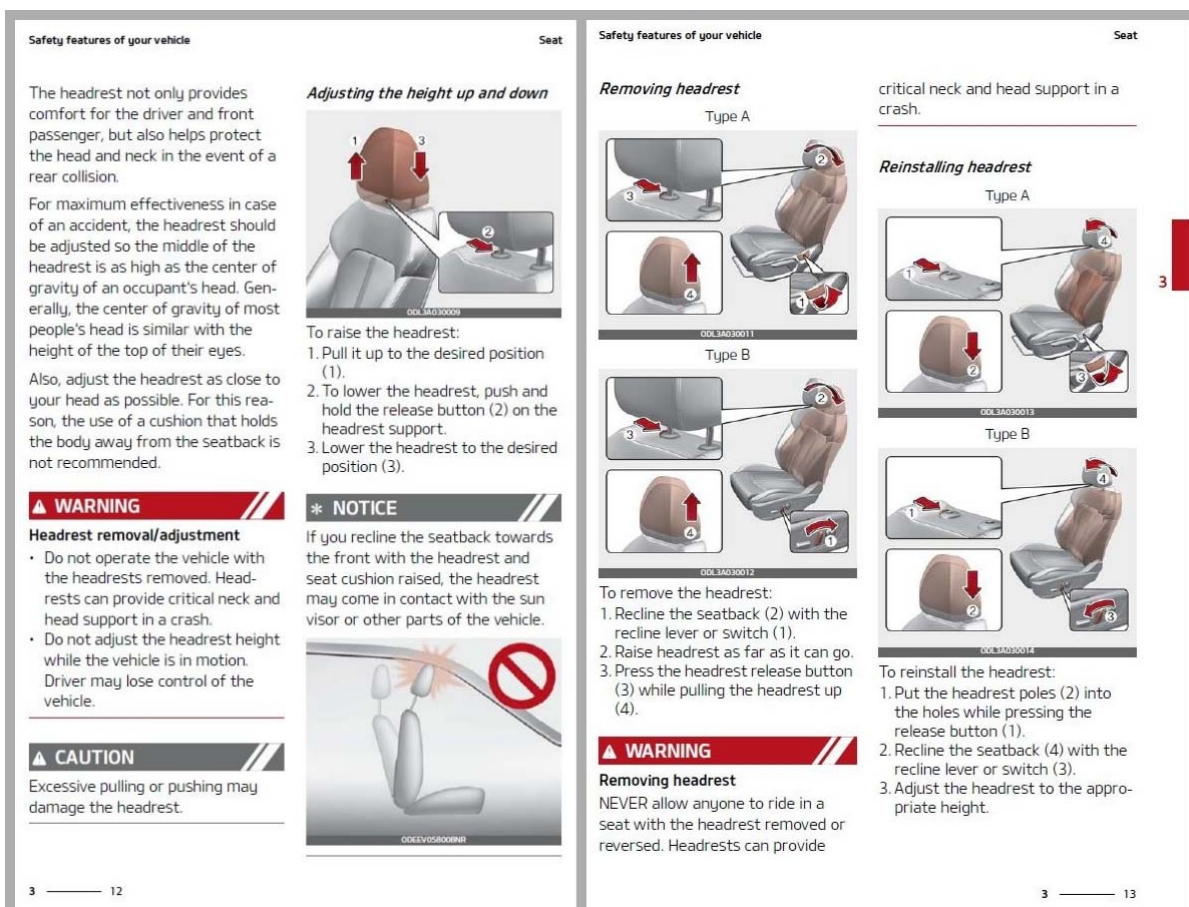


Photo No. 104 - Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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

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

Additional Driver & Passenger Dummy Instrumentation Data

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

Vehicle Instrumentation Data

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

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

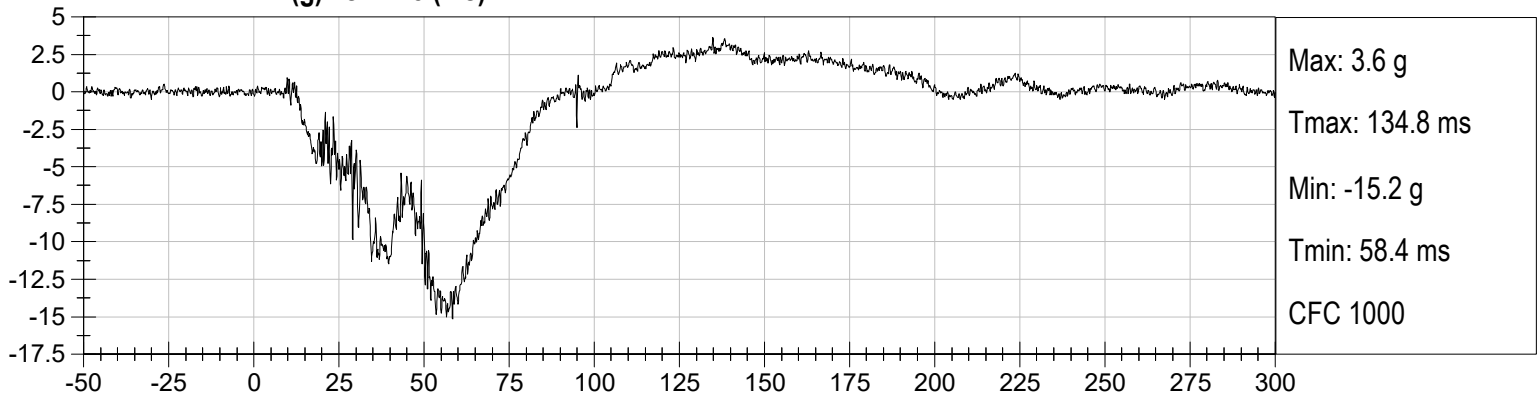
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

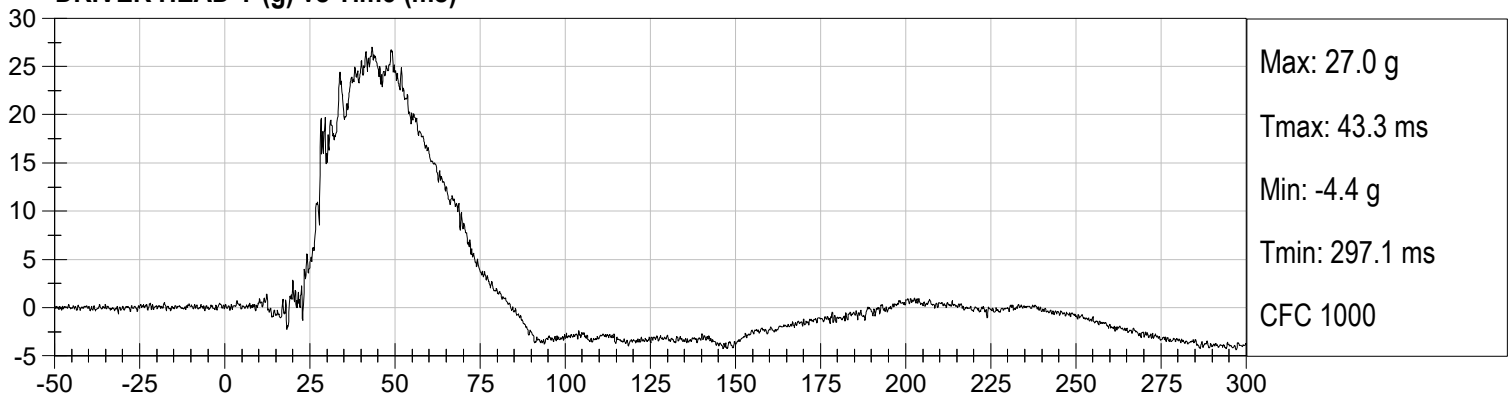
Left MDB Contact Switch

Right MDB Contact Switch

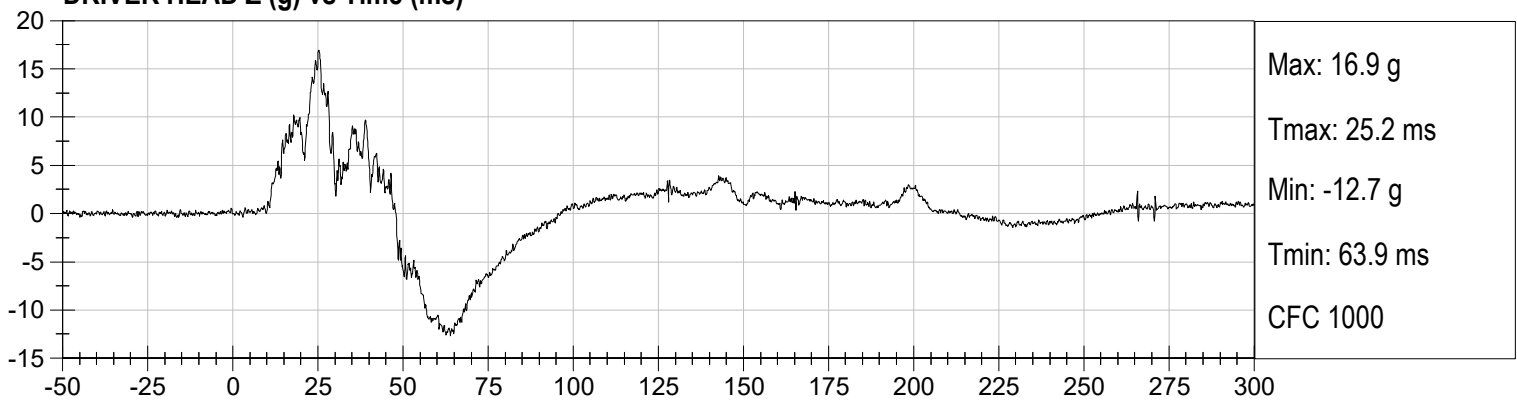
DRIVER HEAD X (g) vs Time (ms)



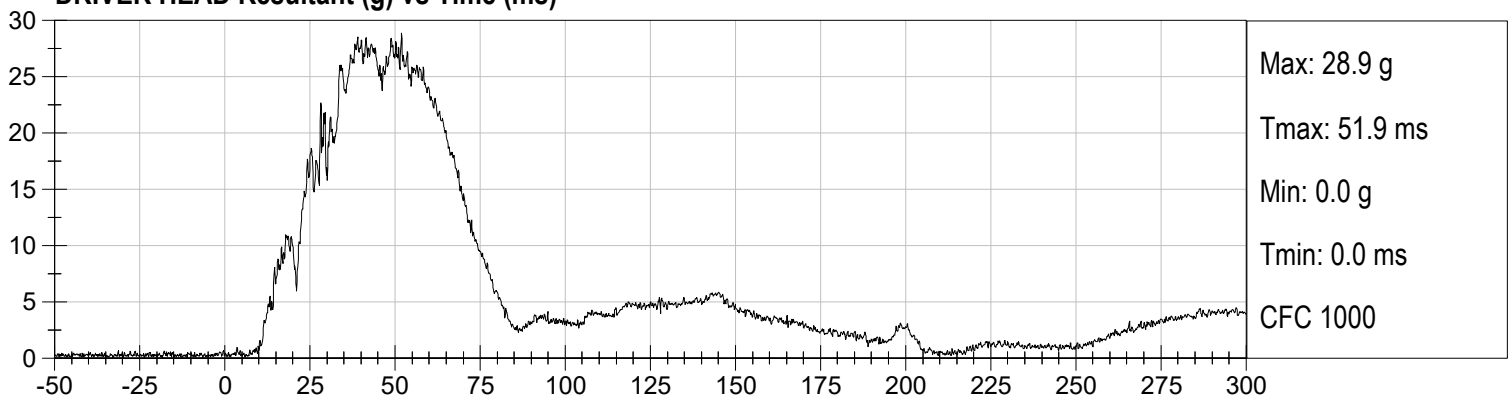
DRIVER HEAD Y (g) vs Time (ms)



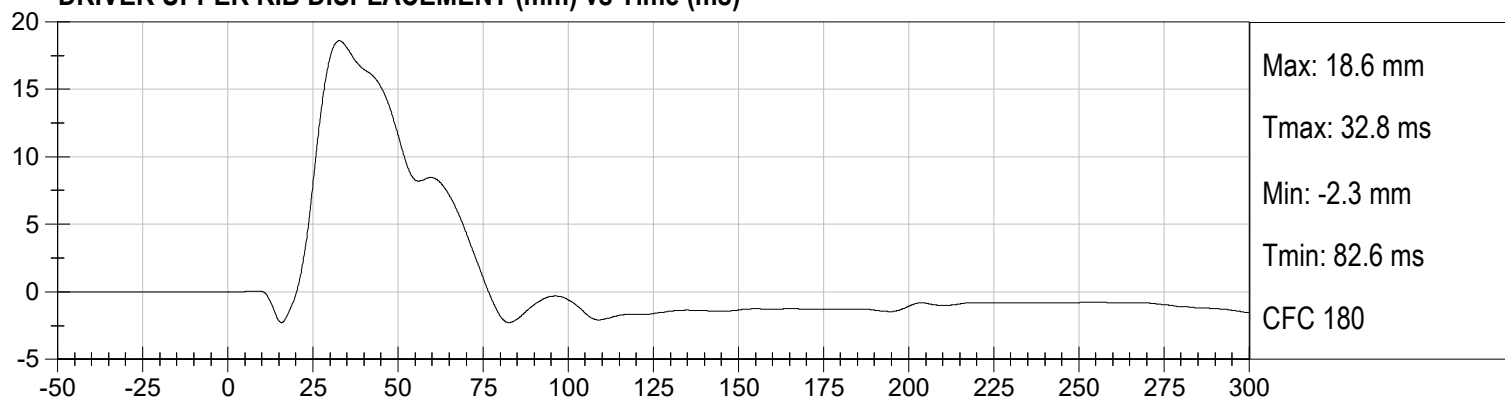
DRIVER HEAD Z (g) vs Time (ms)



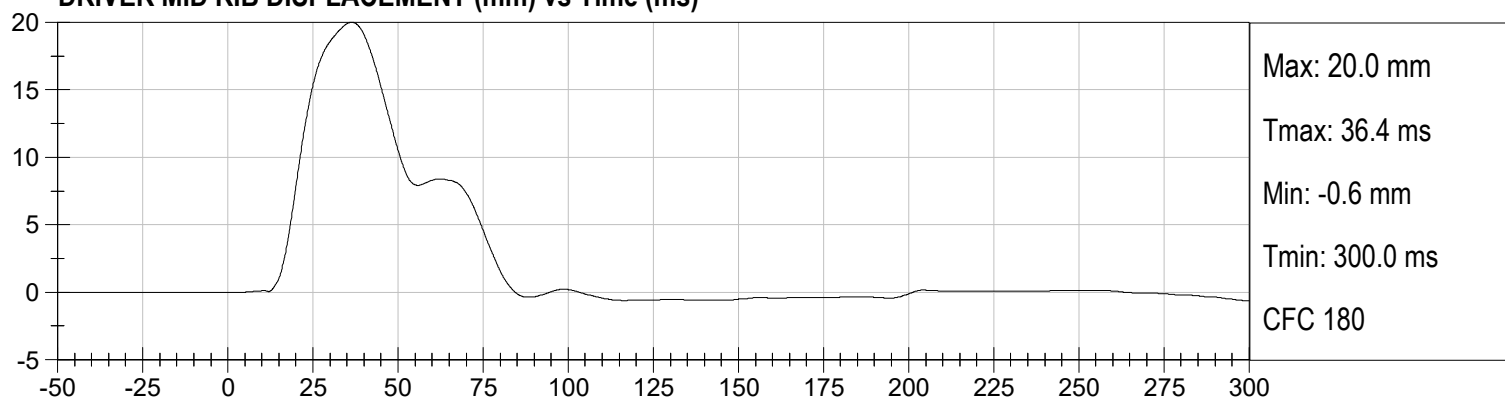
DRIVER HEAD Resultant (g) vs Time (ms)



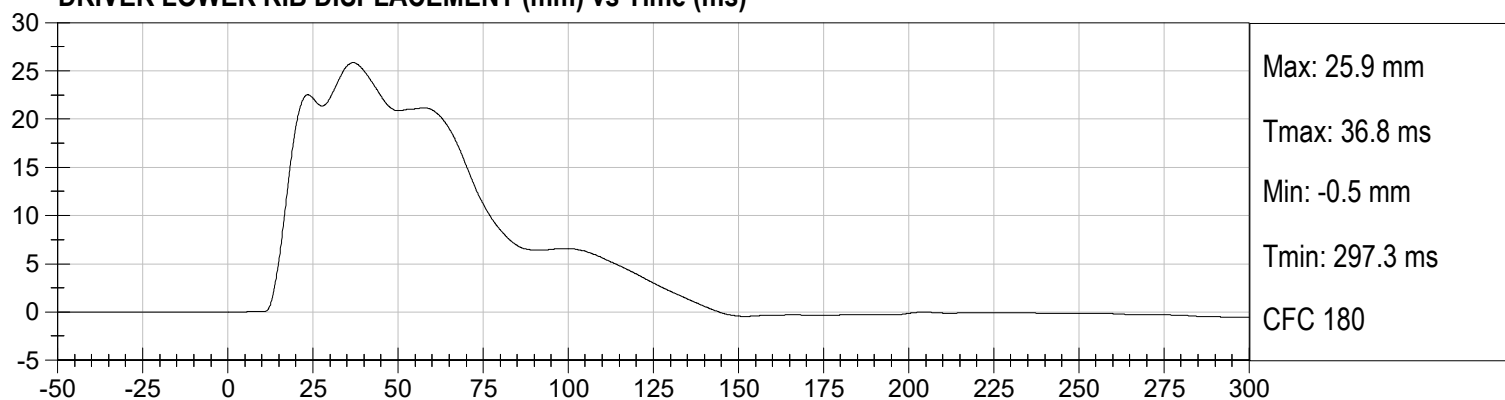
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



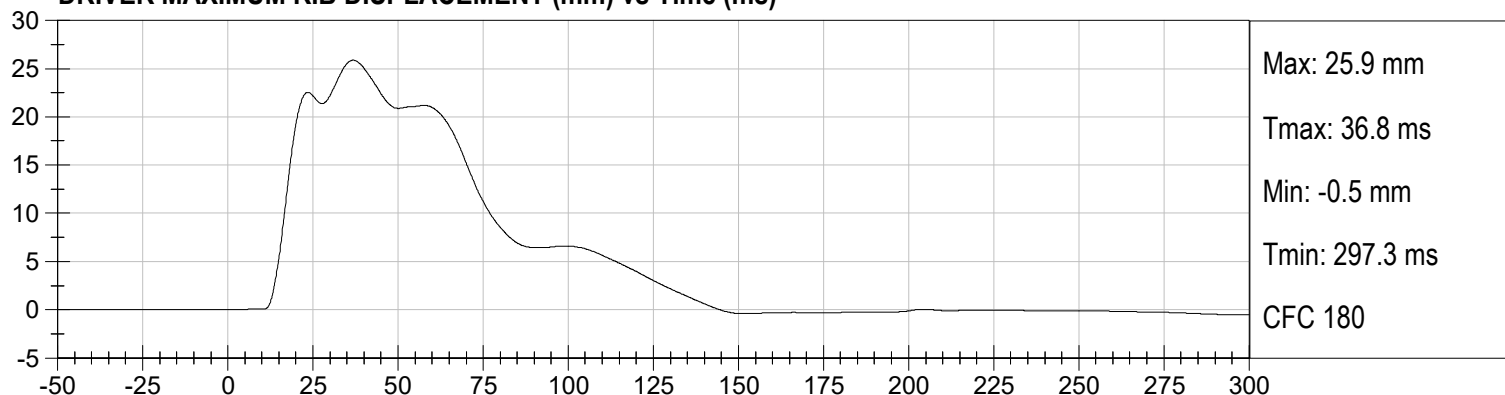
DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



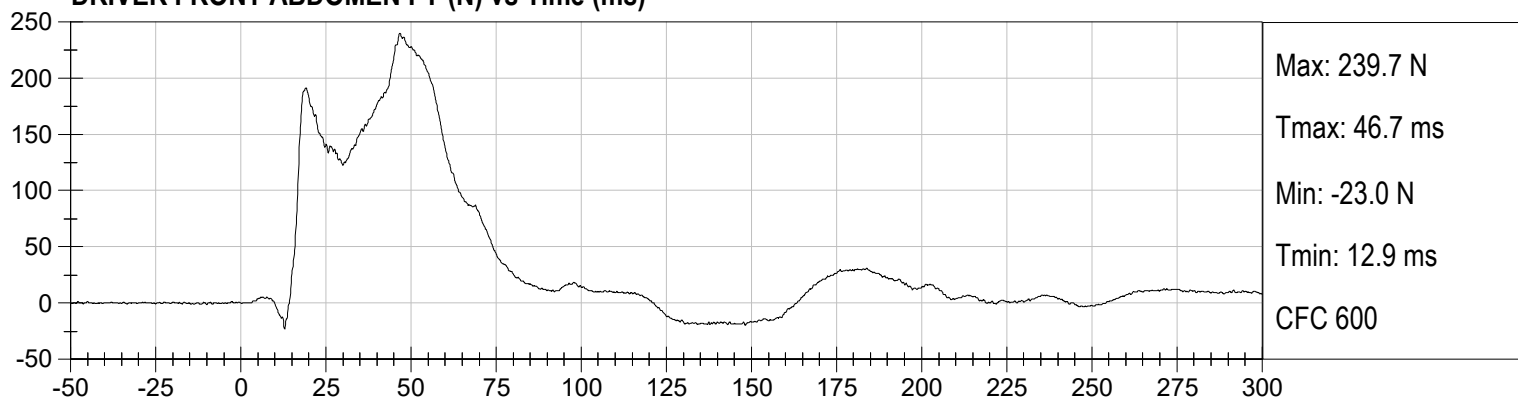
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



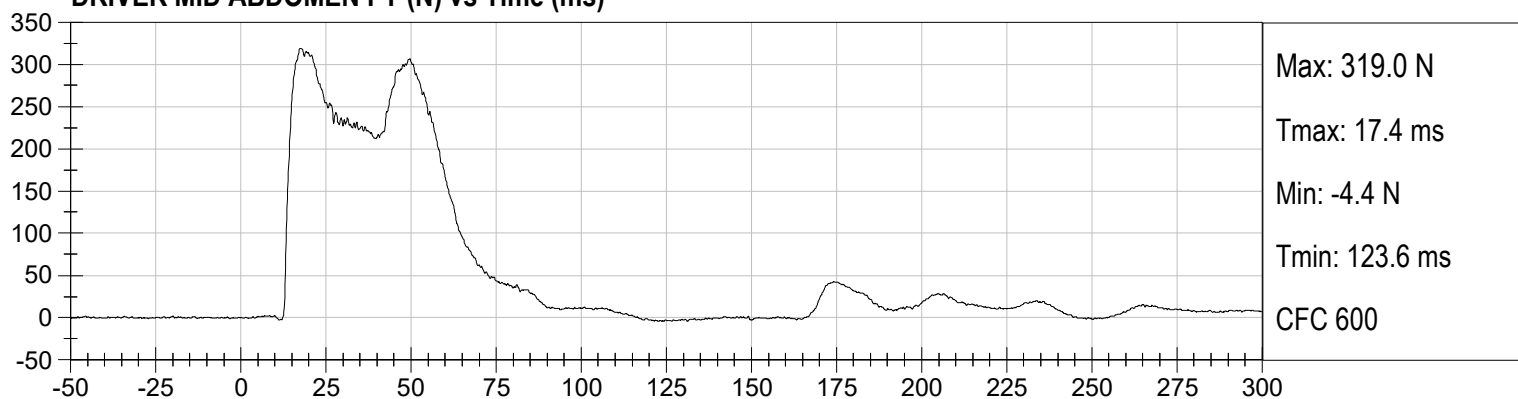
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



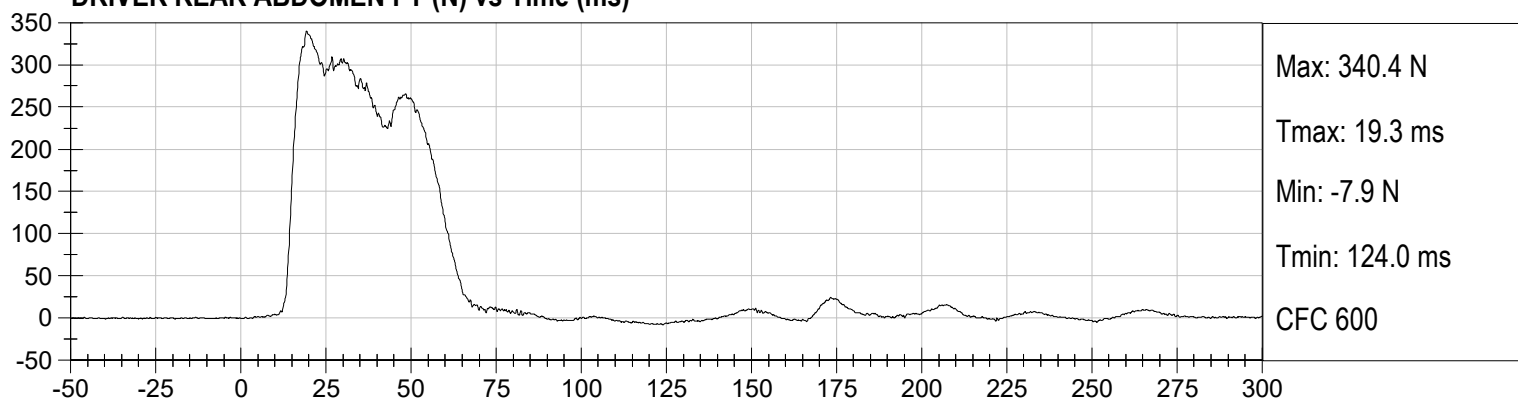
DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



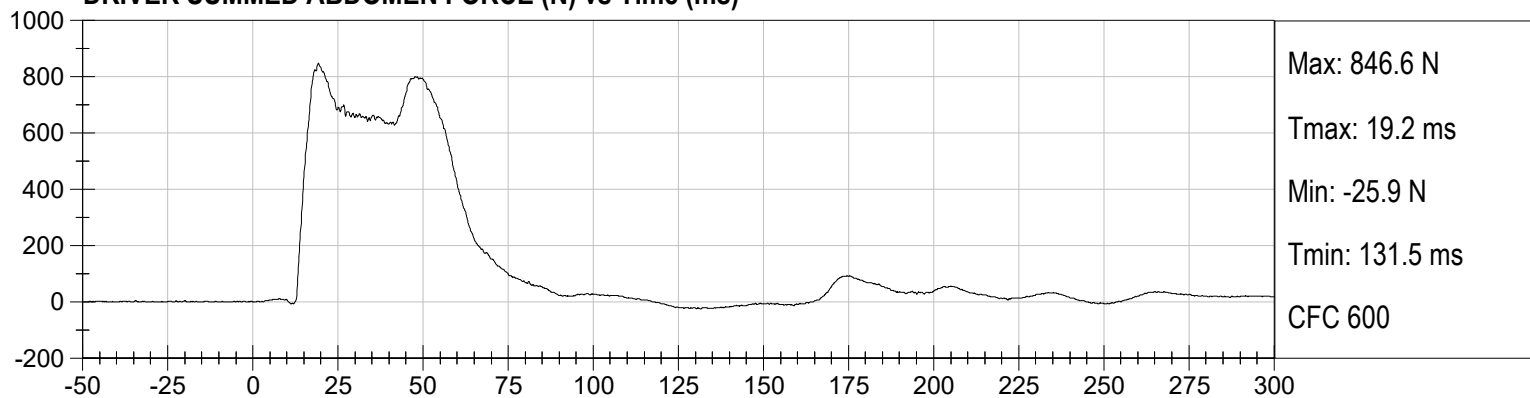
DRIVER MID ABDOMEN FY (N) vs Time (ms)

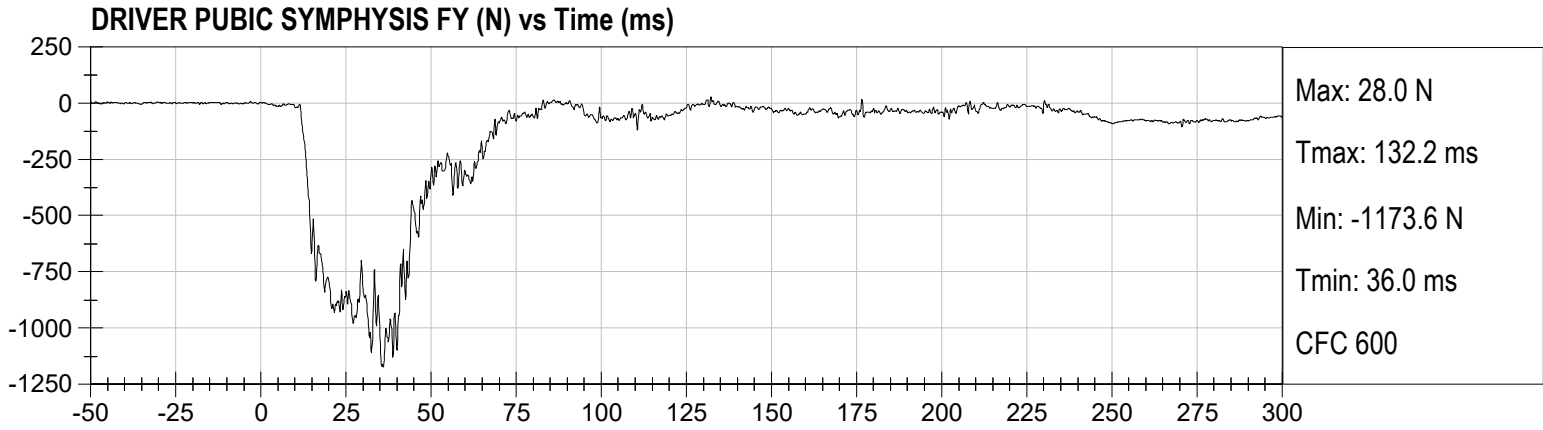


DRIVER REAR ABDOMEN FY (N) vs Time (ms)

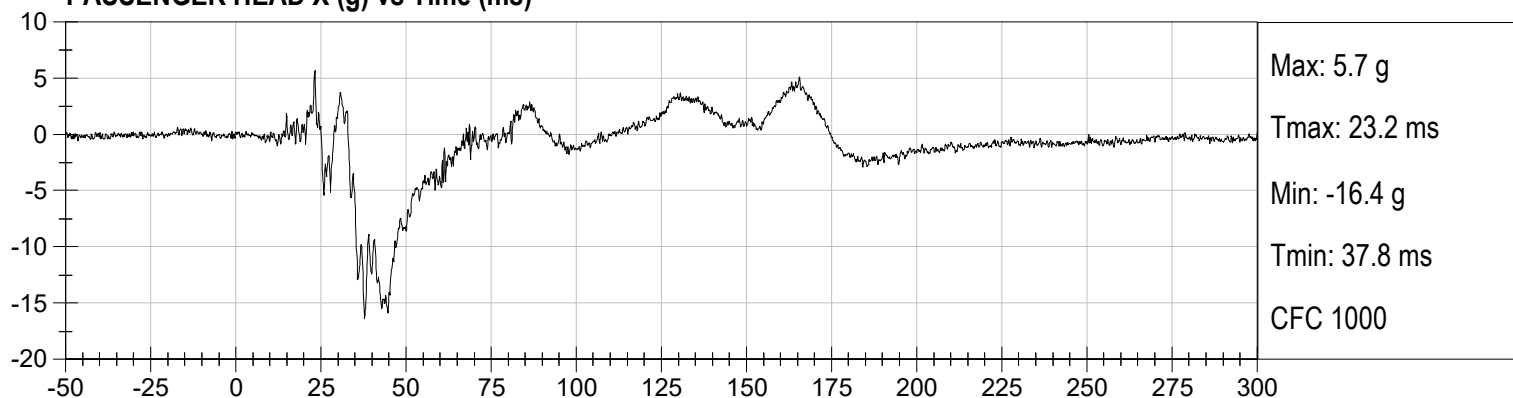


DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)

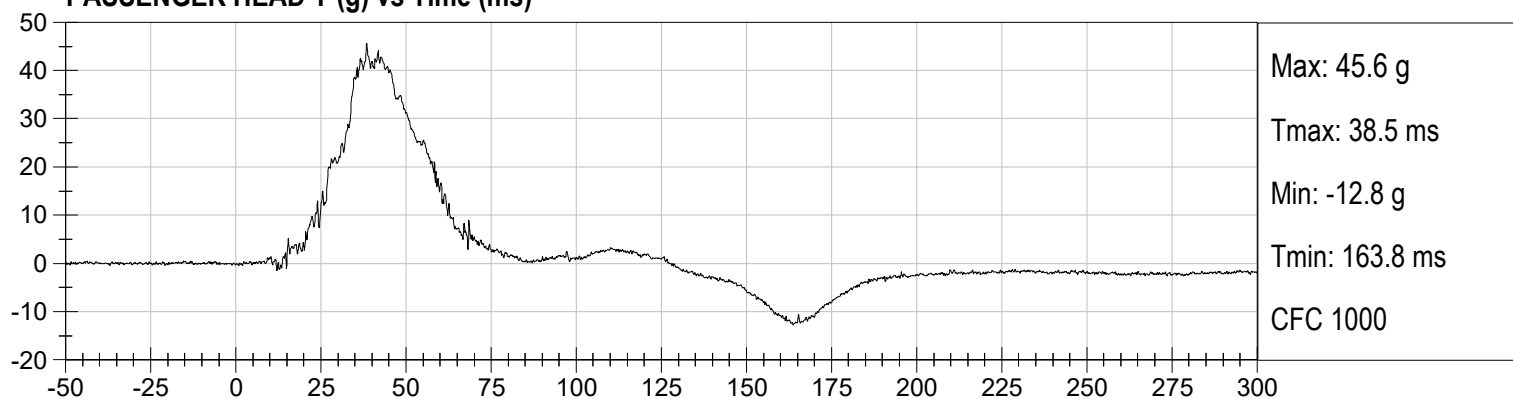




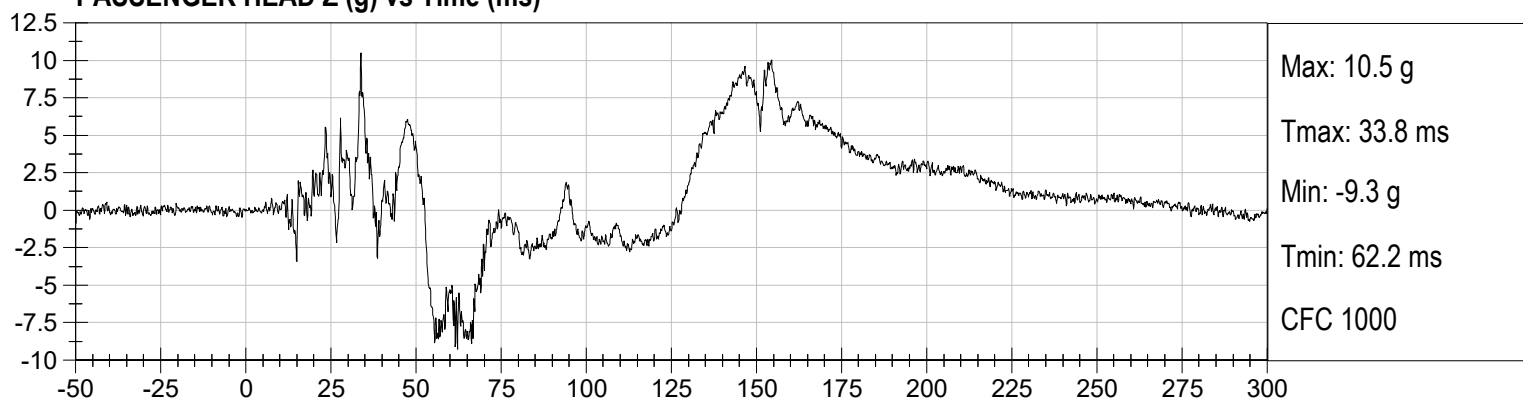
PASSENGER HEAD X (g) vs Time (ms)



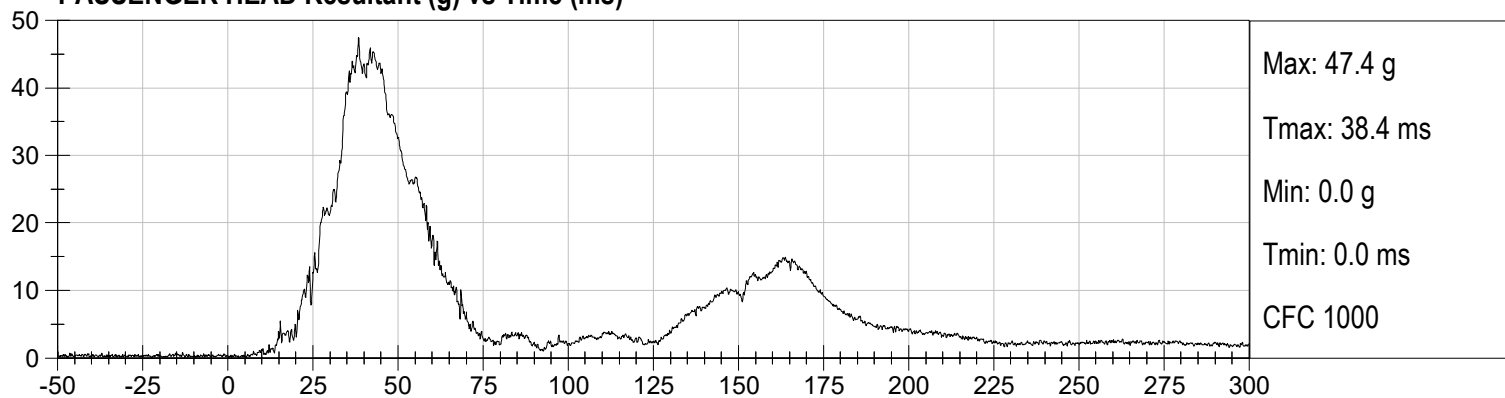
PASSENGER HEAD Y (g) vs Time (ms)



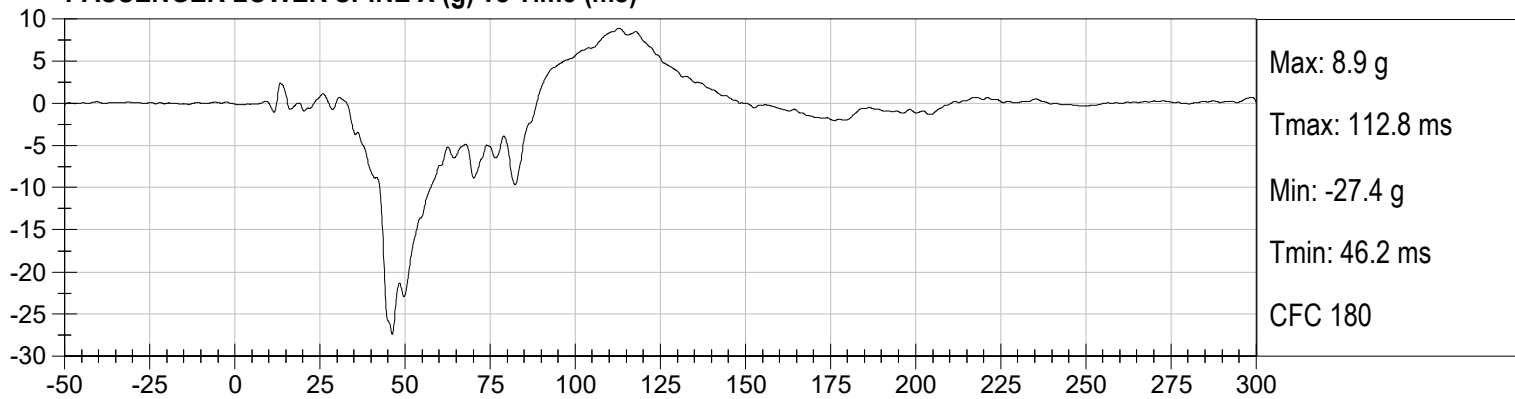
PASSENGER HEAD Z (g) vs Time (ms)



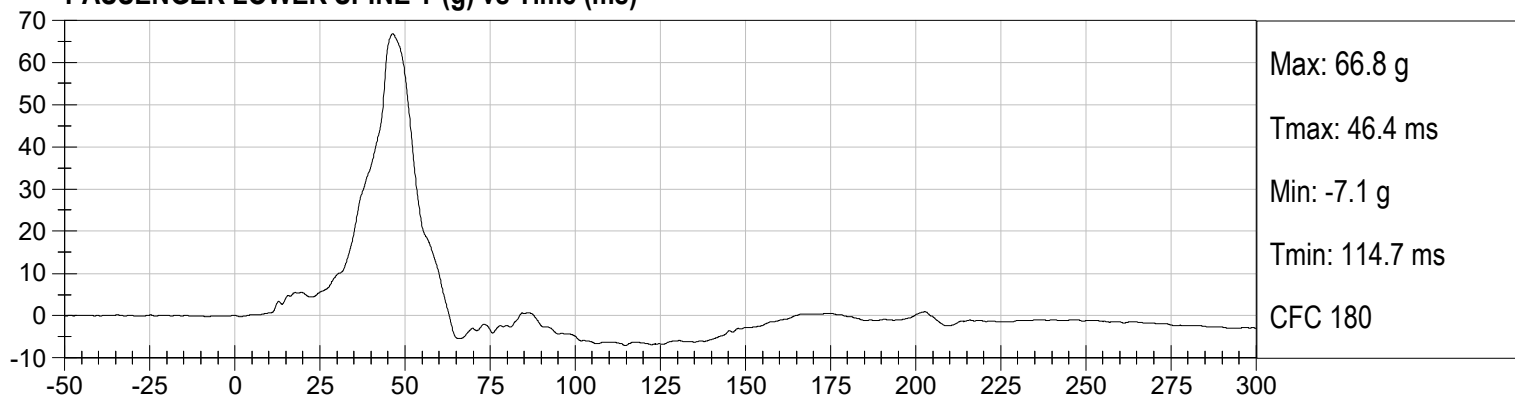
PASSENGER HEAD Resultant (g) vs Time (ms)



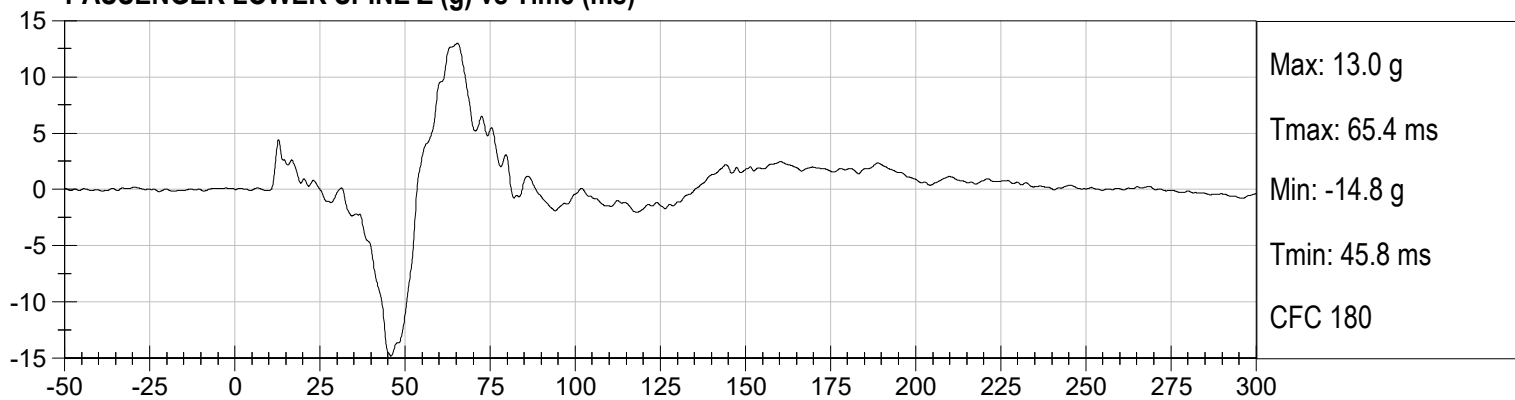
PASSENGER LOWER SPINE X (g) vs Time (ms)



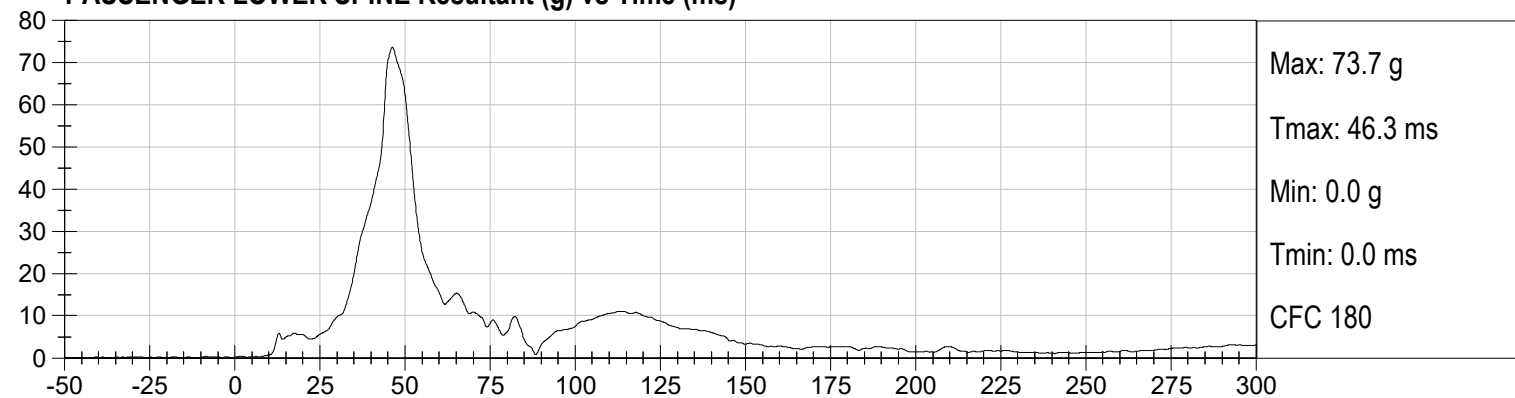
PASSENGER LOWER SPINE Y (g) vs Time (ms)



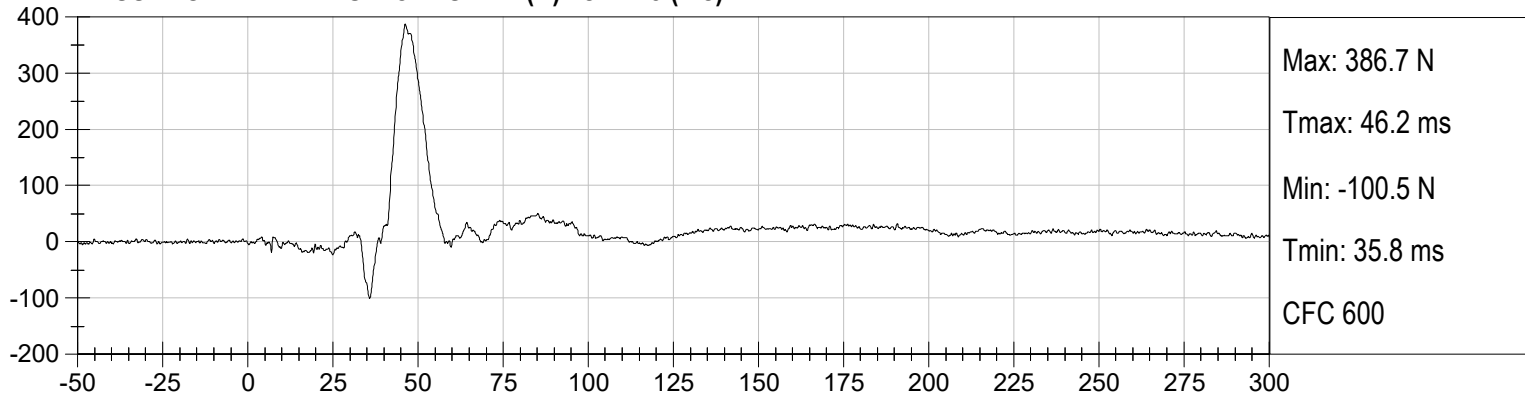
PASSENGER LOWER SPINE Z (g) vs Time (ms)



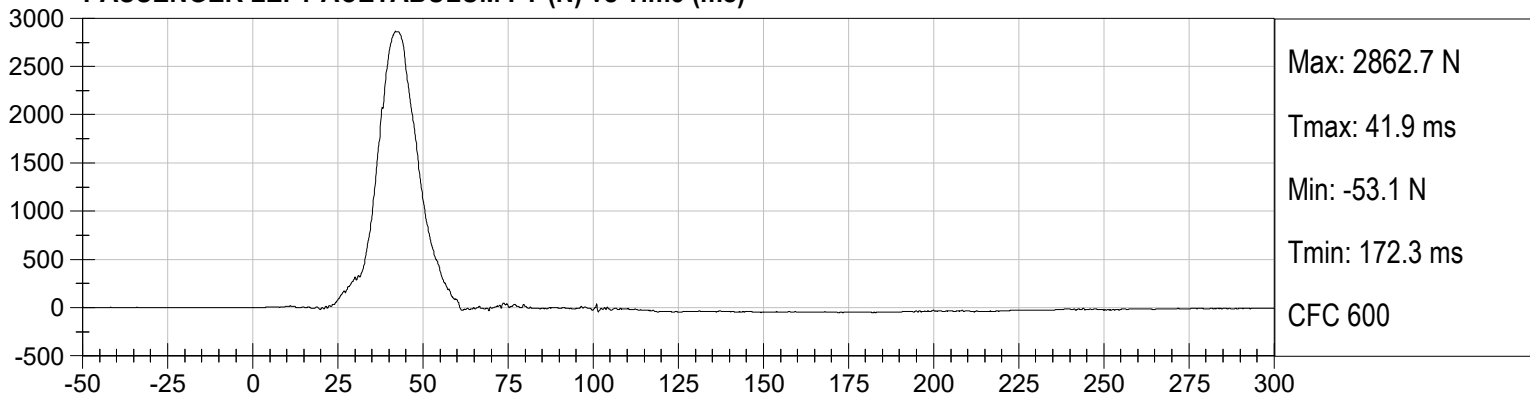
PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



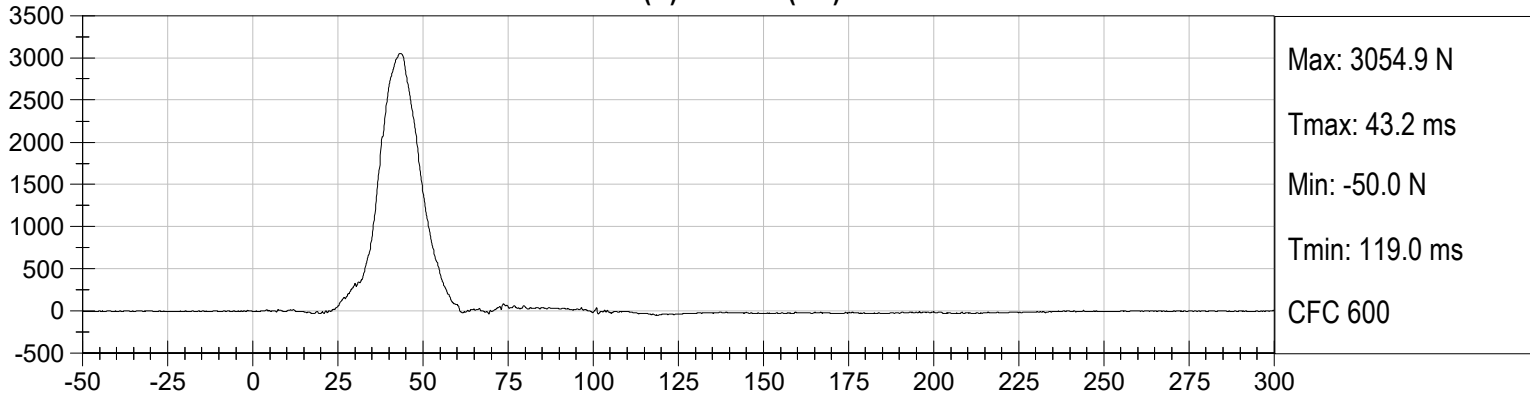
PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)



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: F032

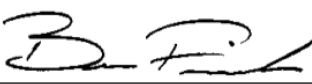
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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

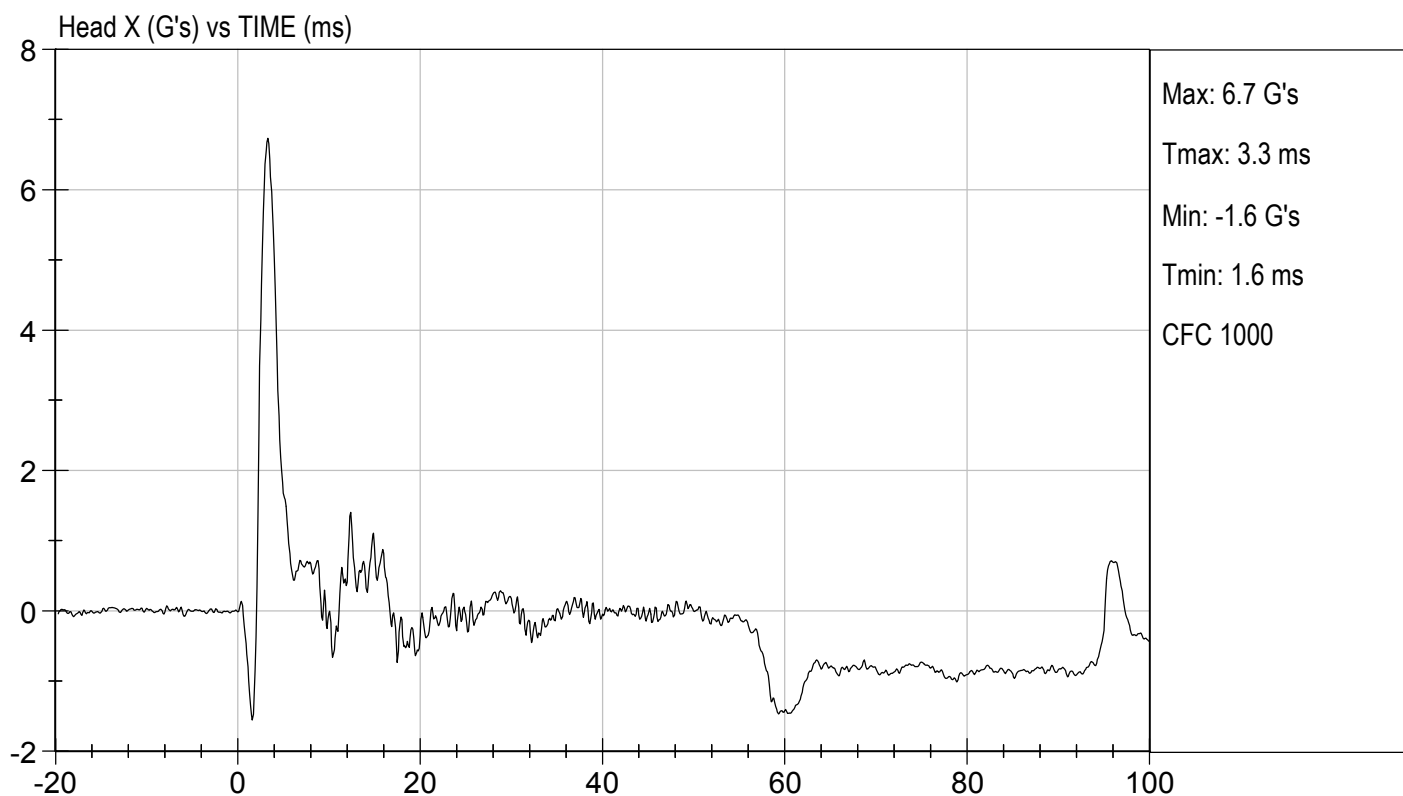
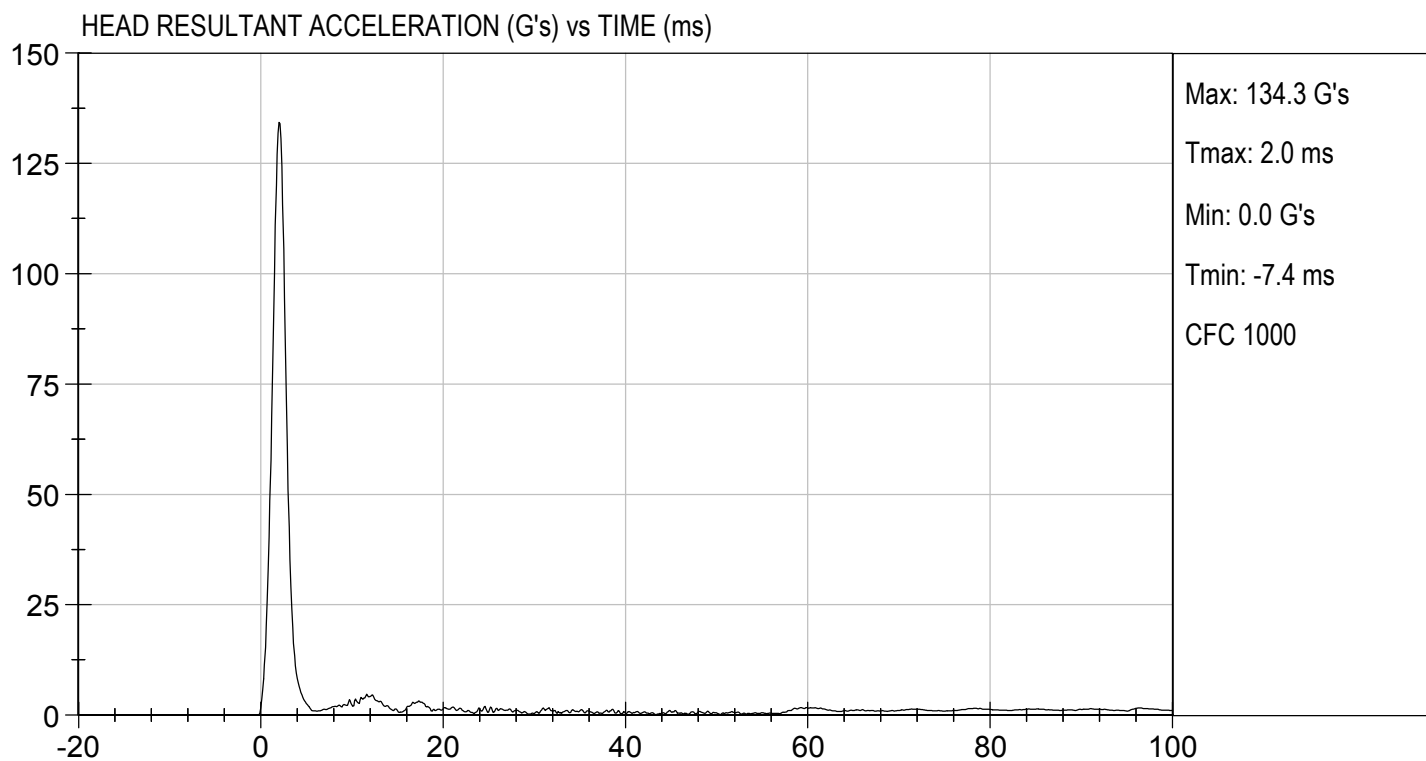
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: F032Test ID: D201961

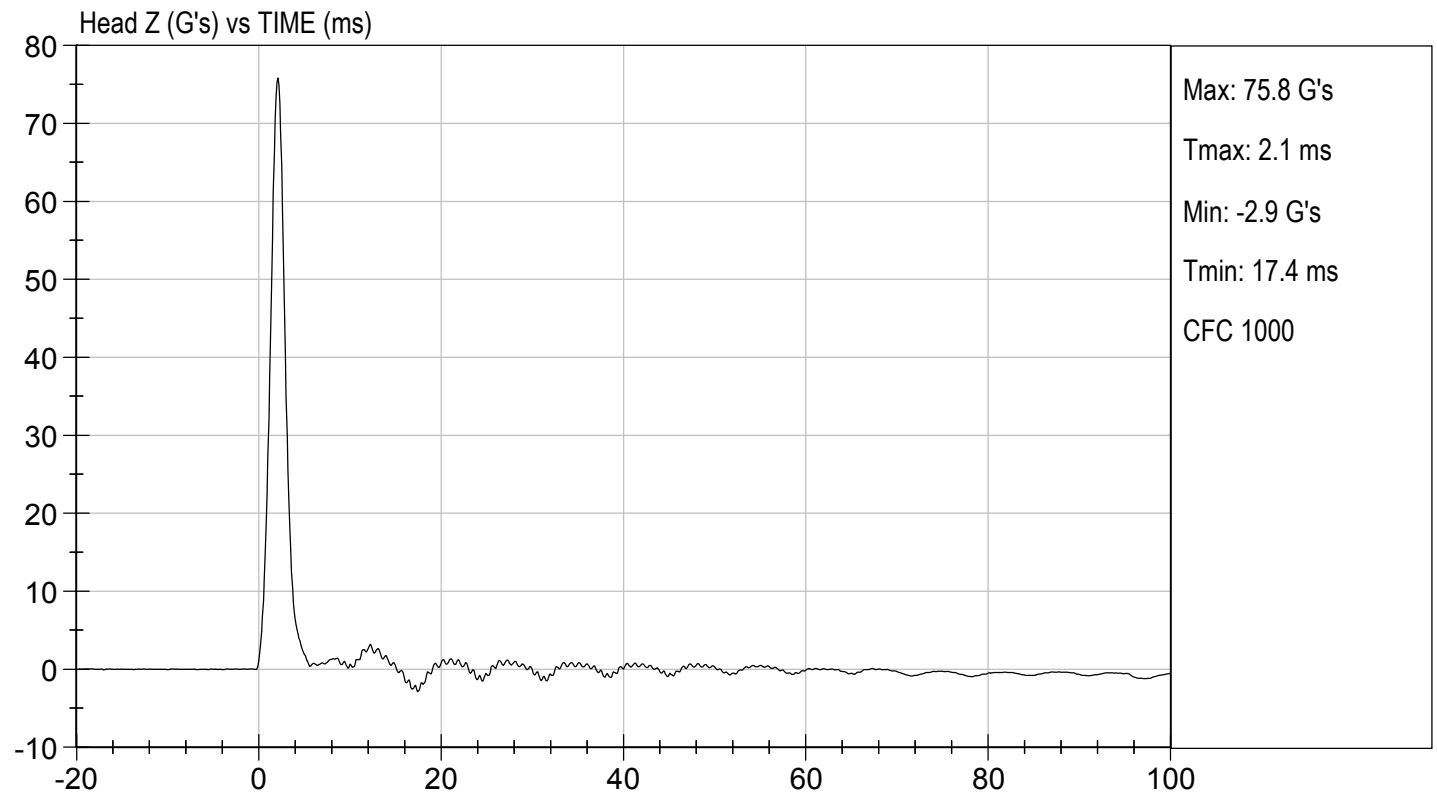
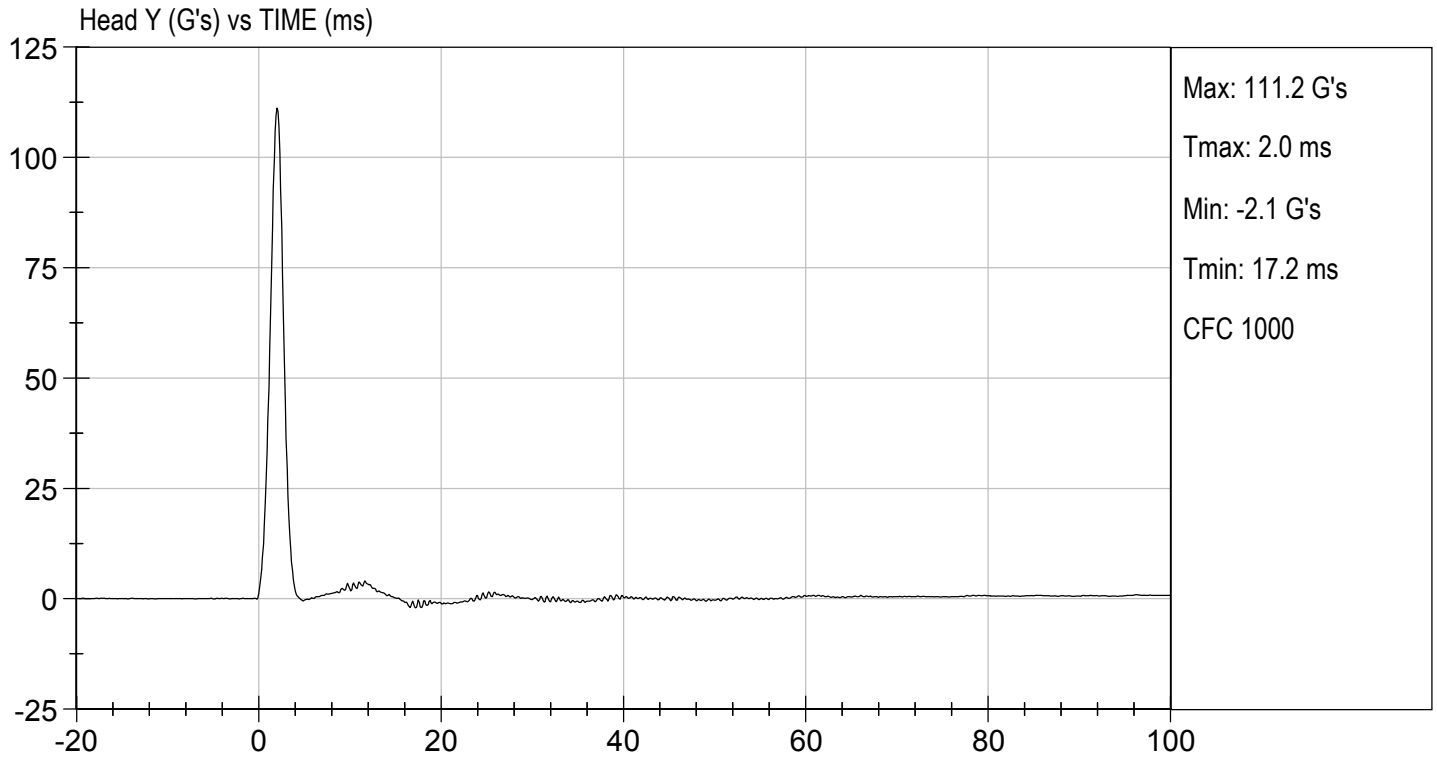
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	125 to 155	134	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	6.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

08/07/2020
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

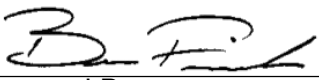
ATD Serial No: F032

Test I.D: D201962

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	49	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	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.50	Pass
	17 ms	m/s	>= -3.70	-3.40	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.0	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	55.8	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	60.5	Pass
Overall Results					Pass


 Laboratory Technician

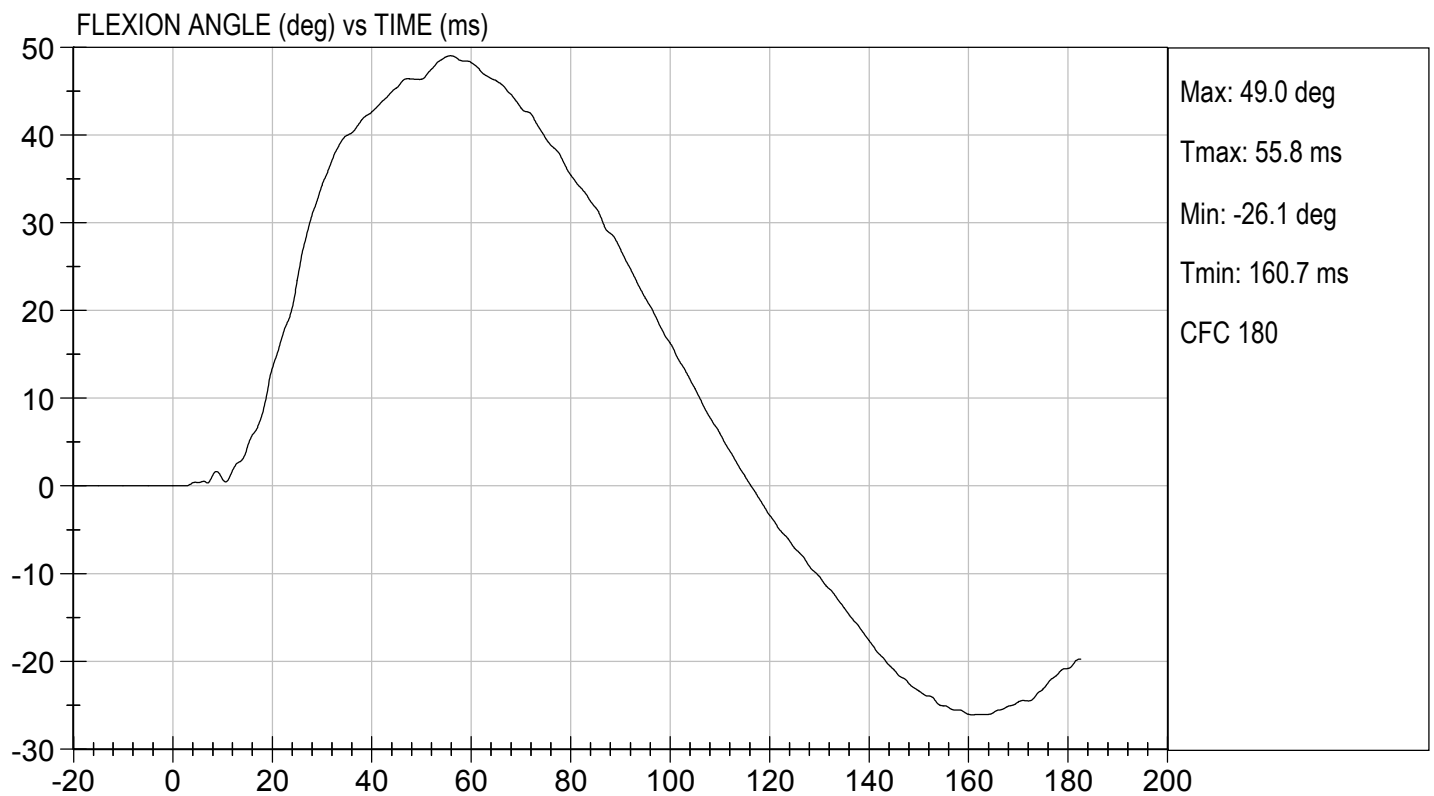
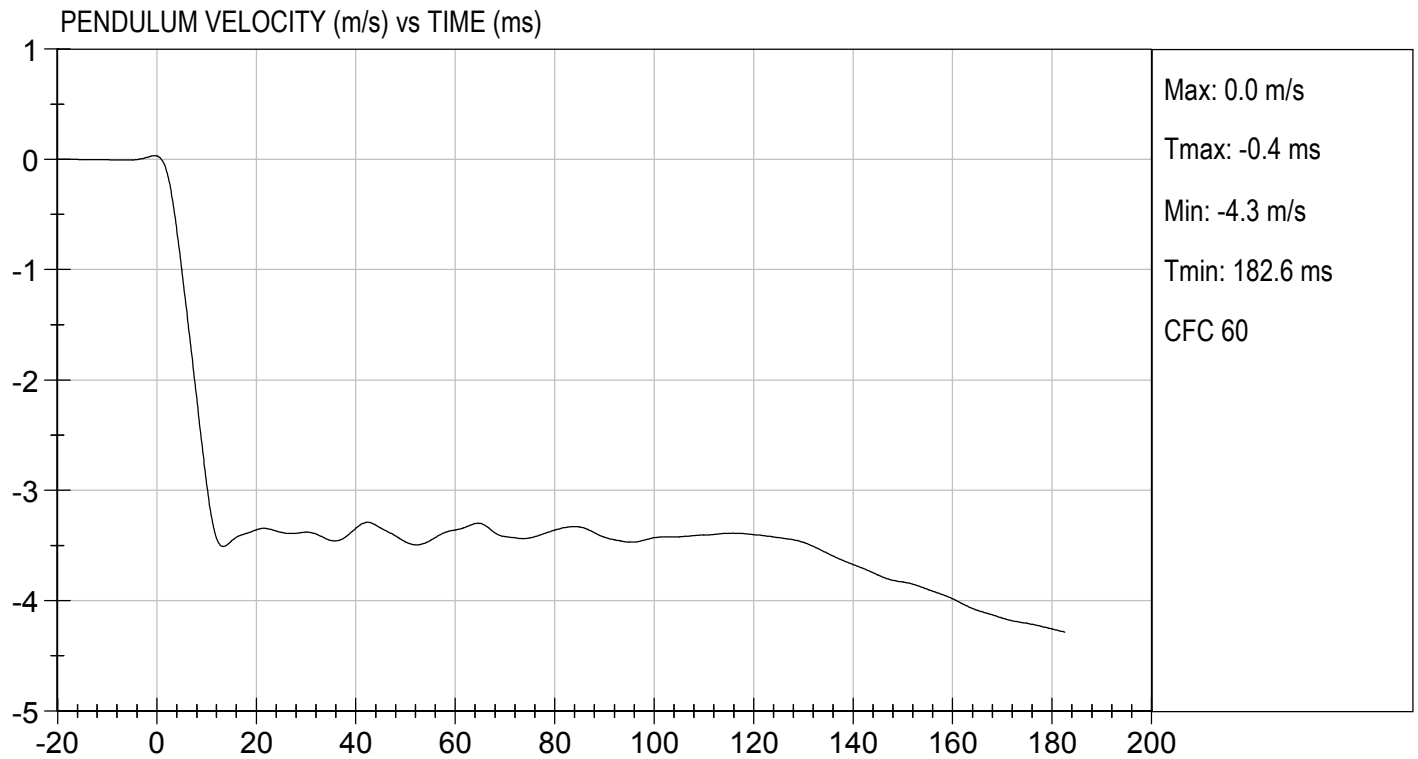
08/10/2020
 Test Date


 Approved By



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

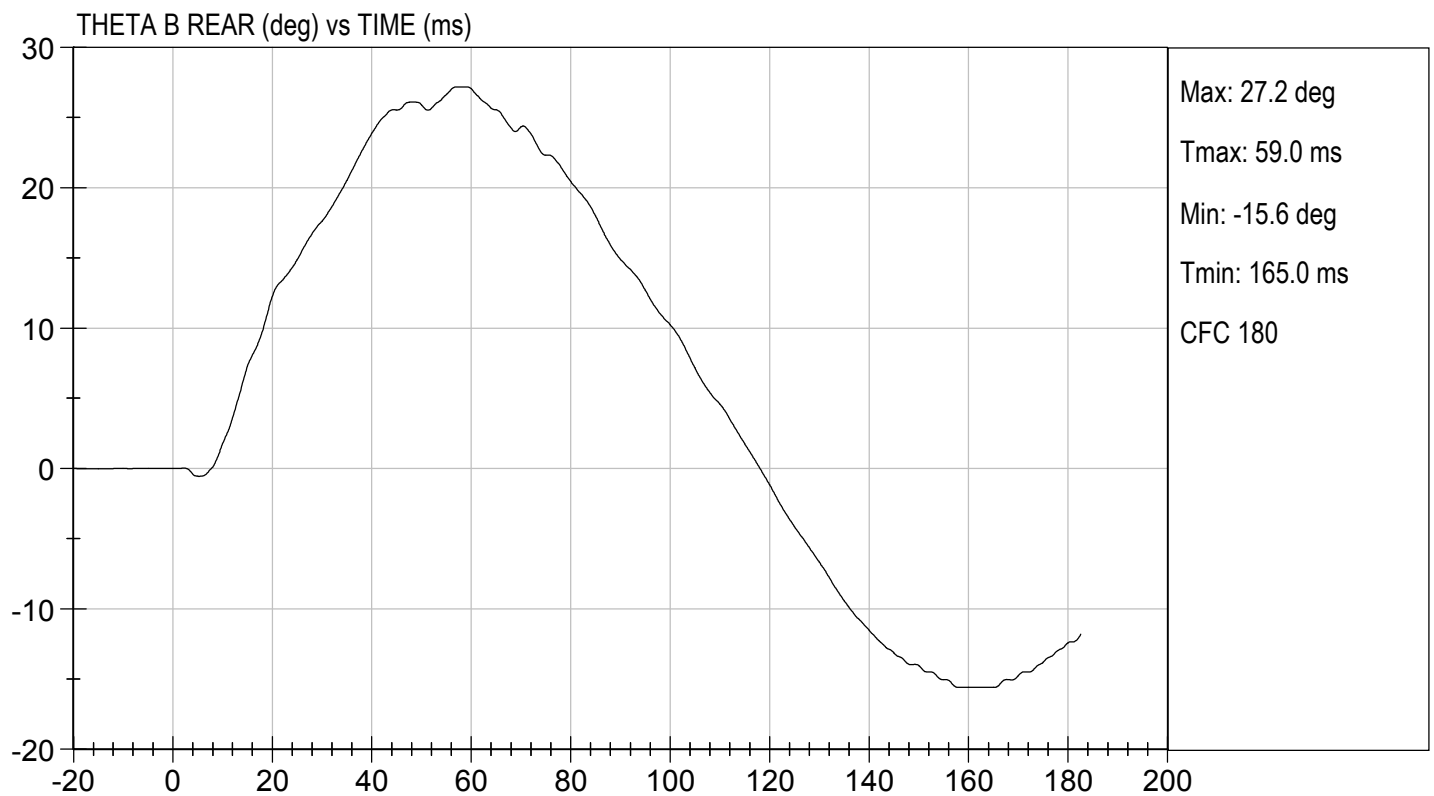
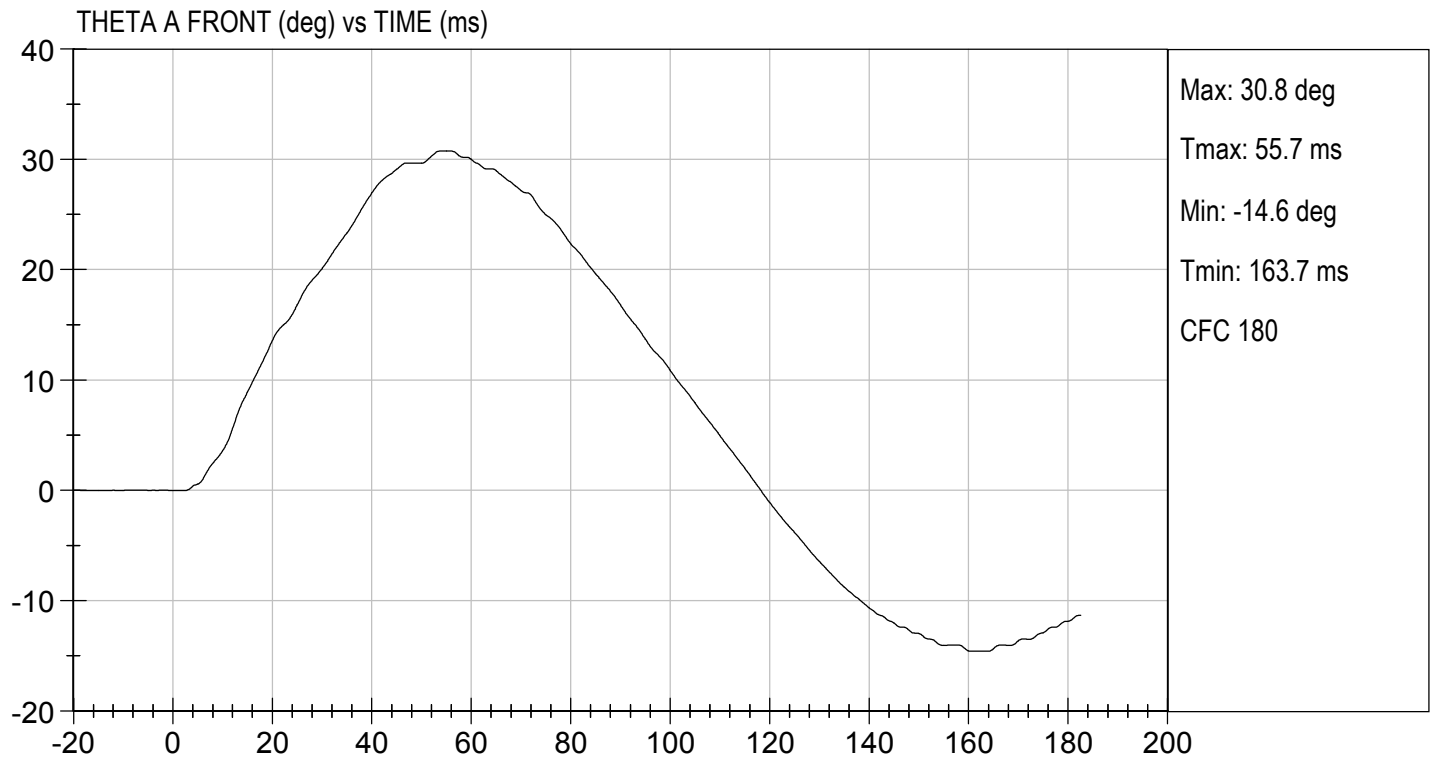
TEST DATE: 08/10/2020
TEST #: D201962





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

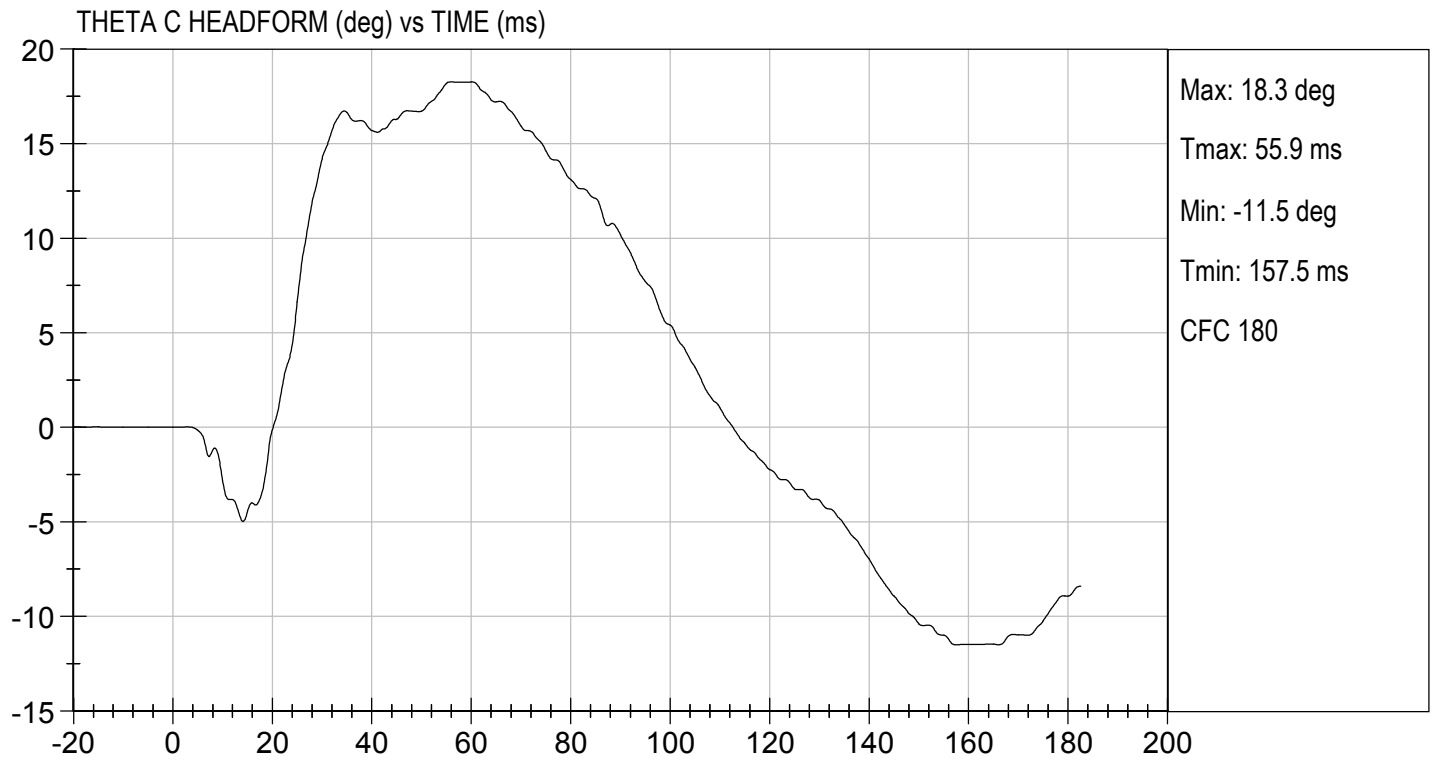
TEST DATE: 08/10/2020
TEST #: D201962





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

TEST DATE: 08/10/2020
TEST #: D201962



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

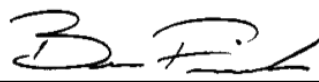
ATD Serial No: F032

Test I.D: D201963

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.9	Pass
Overall Test Results				Pass


Laboratory Technician

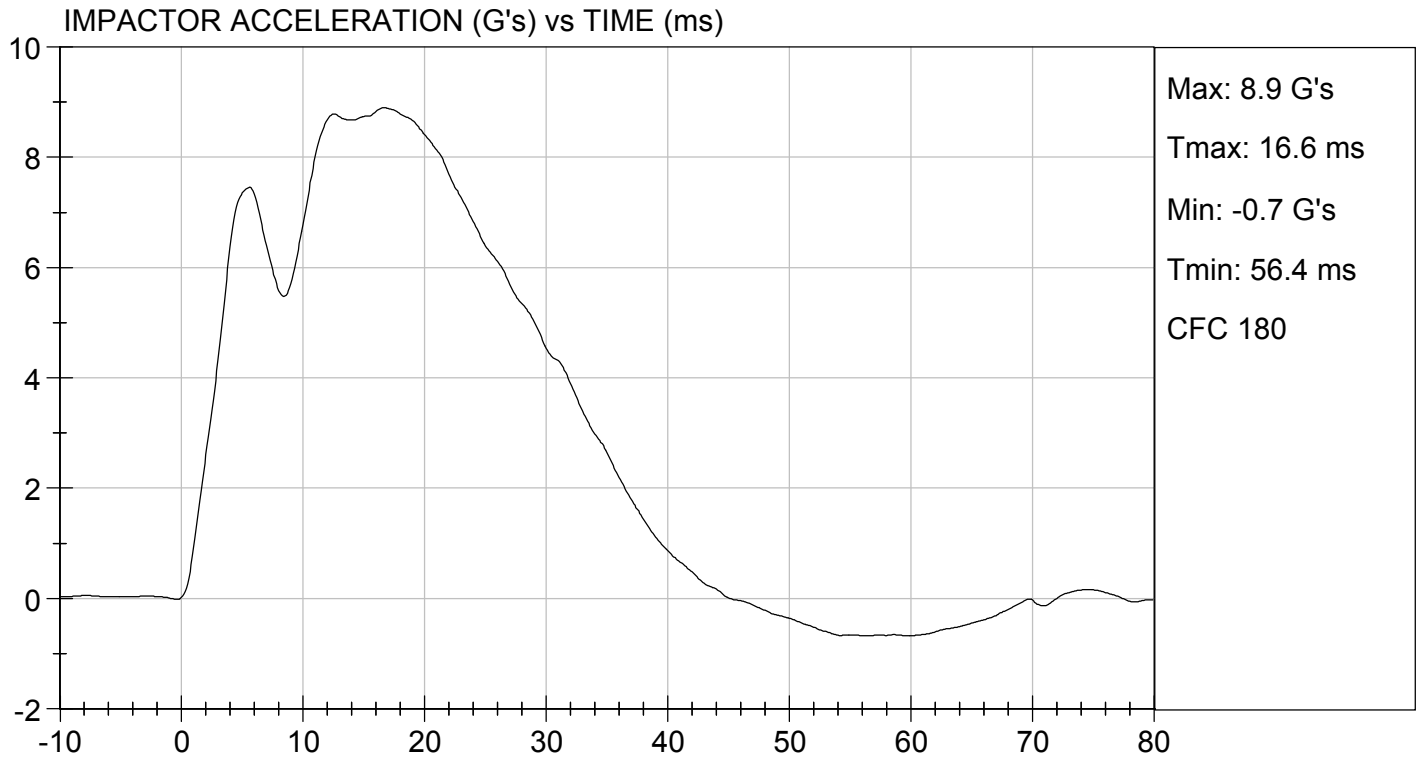
08/11/2020
Test Date


Approved By



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

TEST DATE: 08/11/2020
TEST #: D201963



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

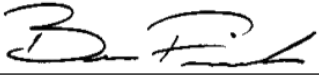
ATD Serial No: F032

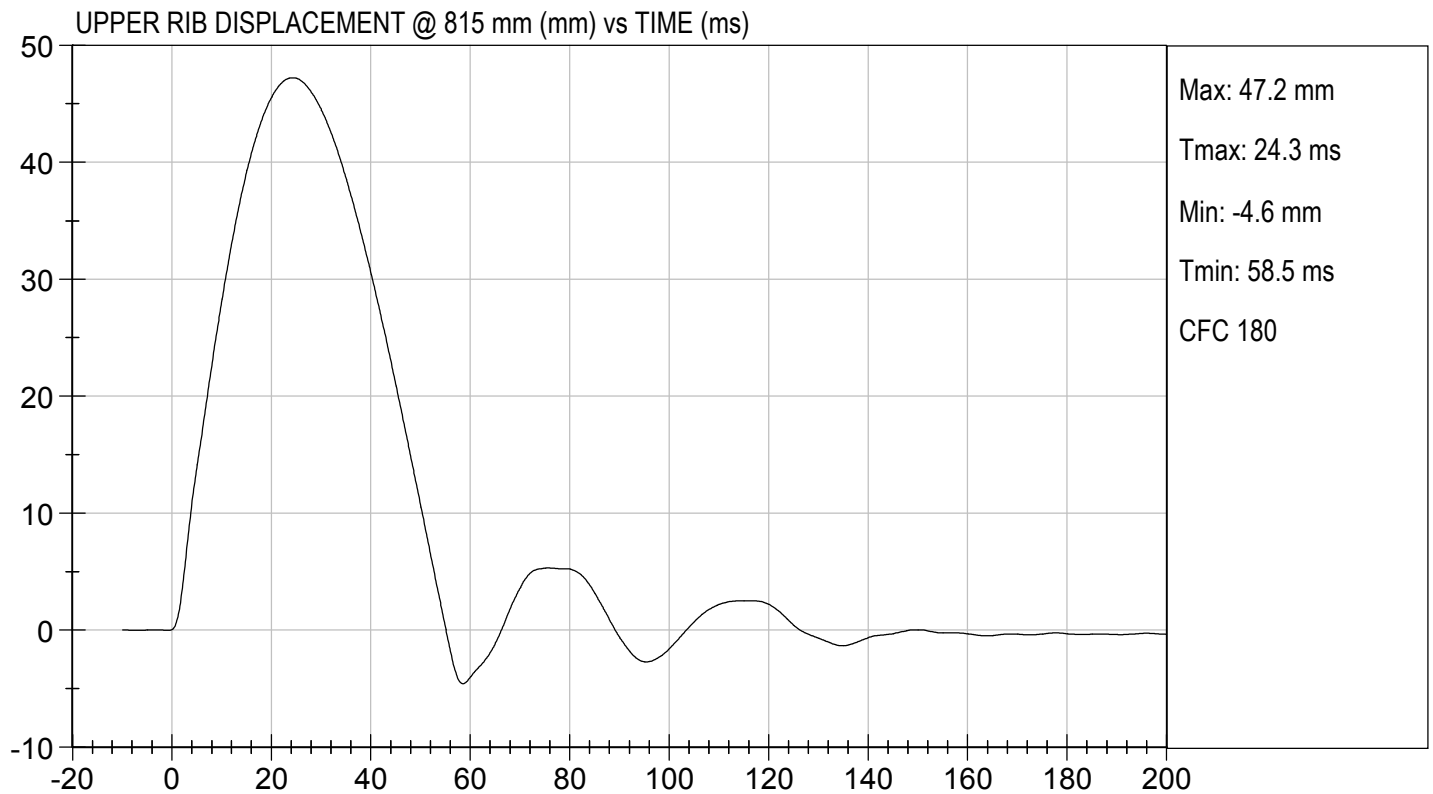
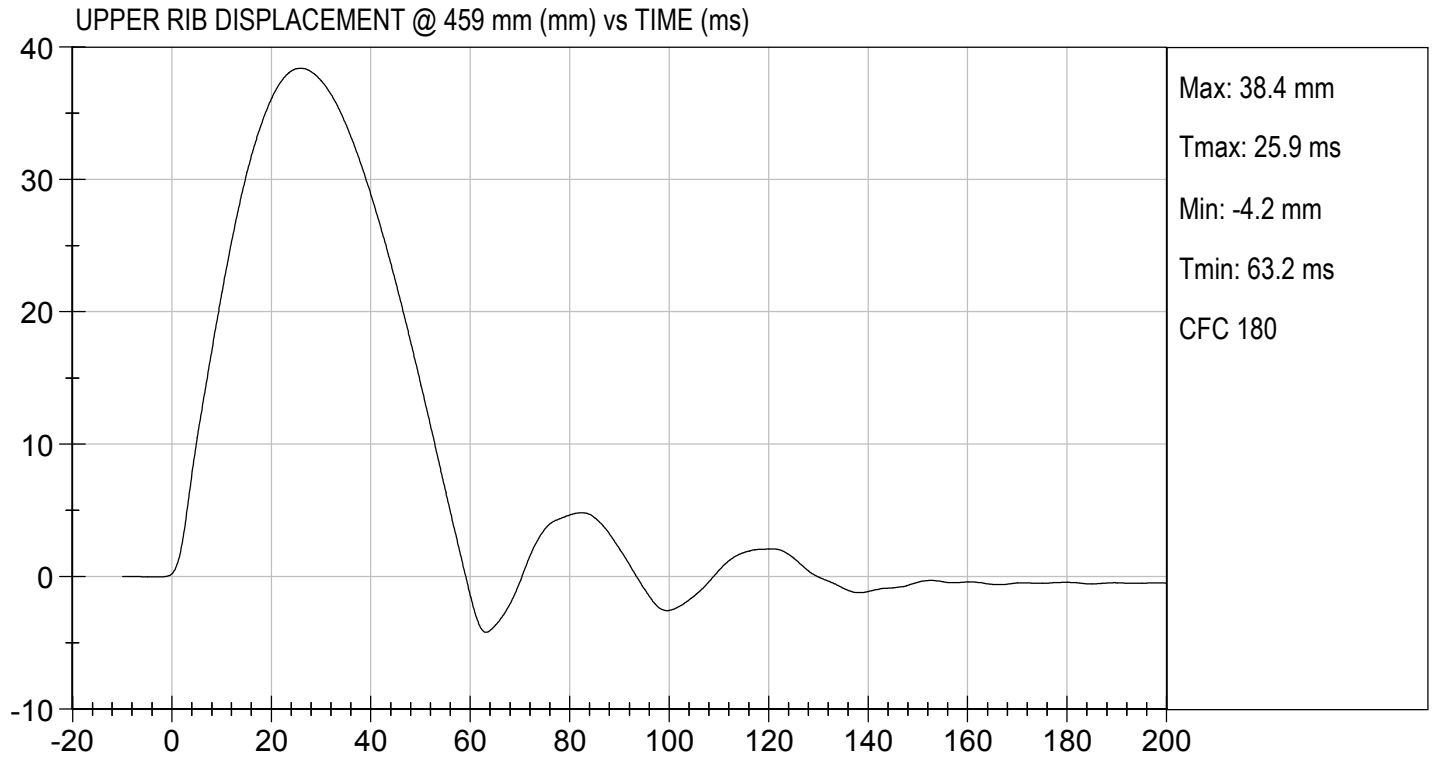
Test I.D: D201964

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	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.2	Pass
Overall Test Results				Pass


Laboratory Technician

08/07/2020
Test Date


Approved By



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

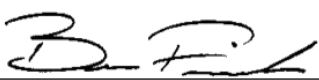
ATD Serial No: F032

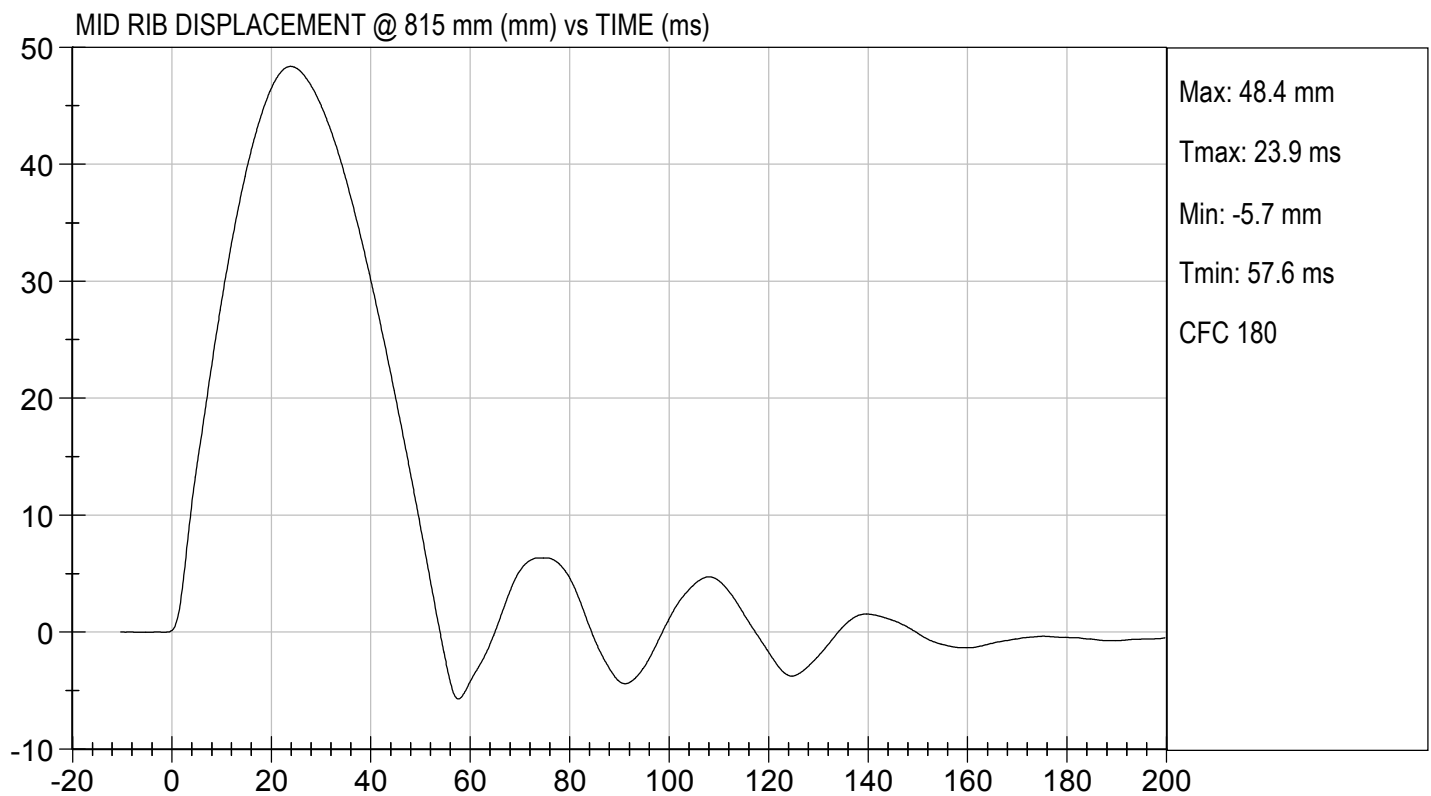
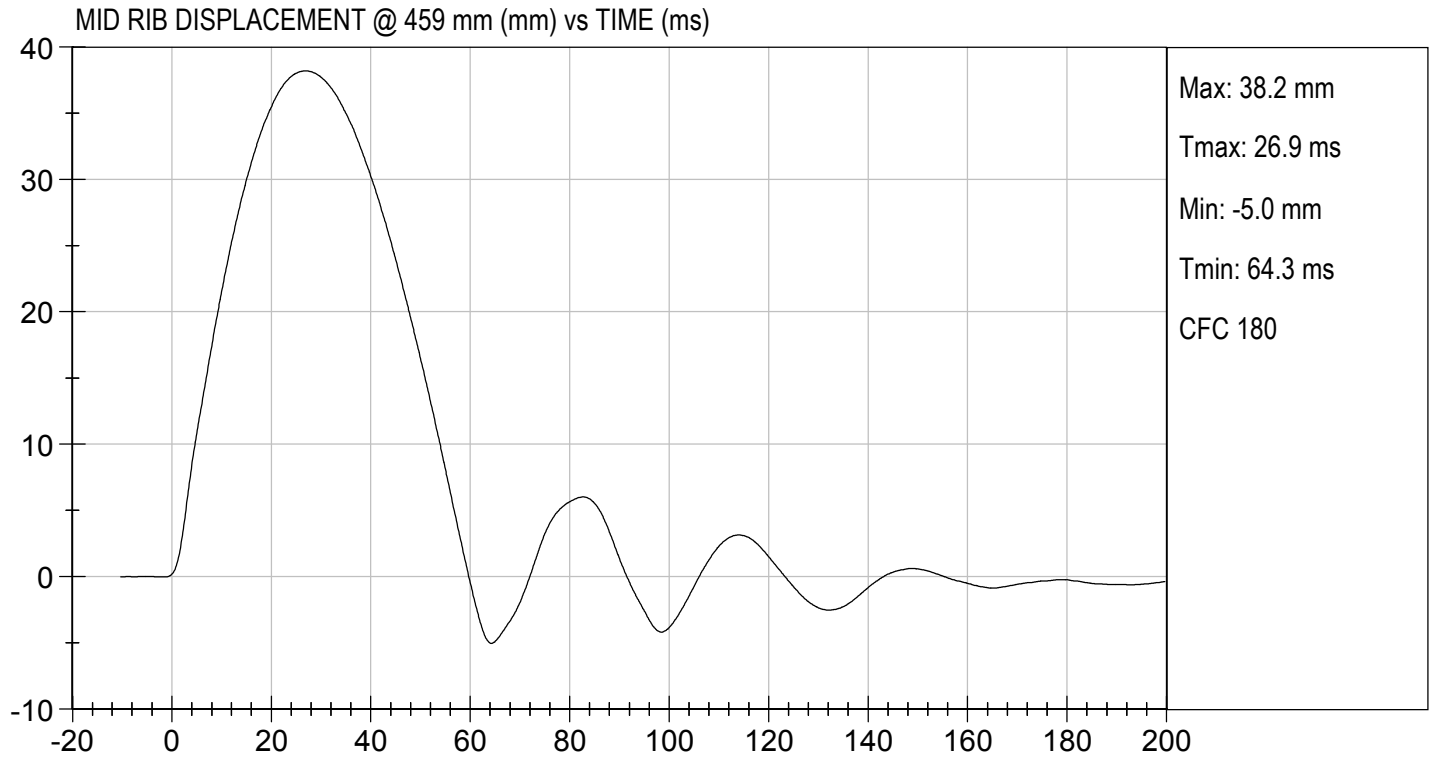
Test I.D: D201965

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	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.4	Pass
Overall Test Results				Pass


Laboratory Technician

08/07/2020
Test Date


Approved By



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

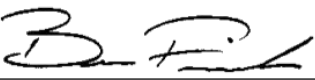
ATD Serial No: F032

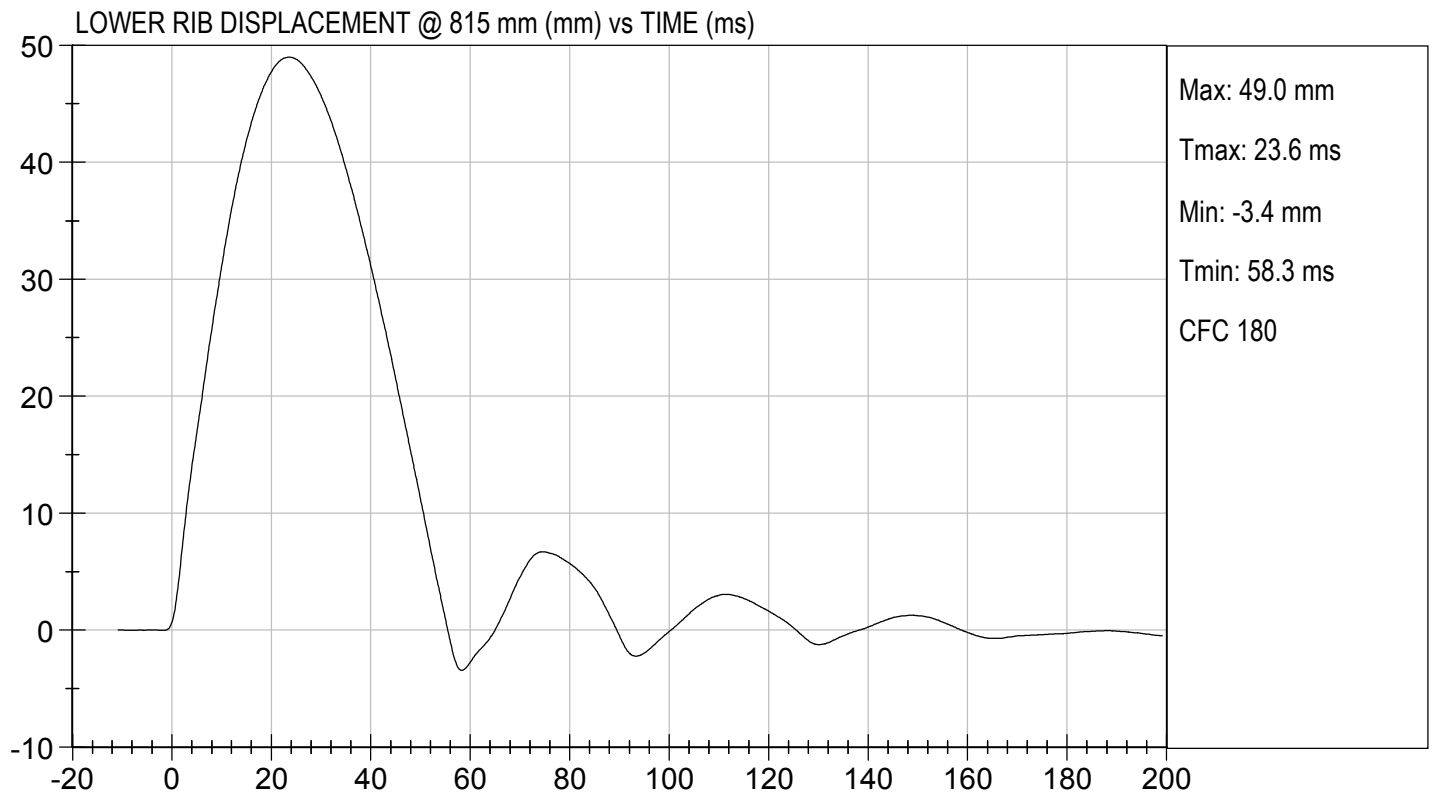
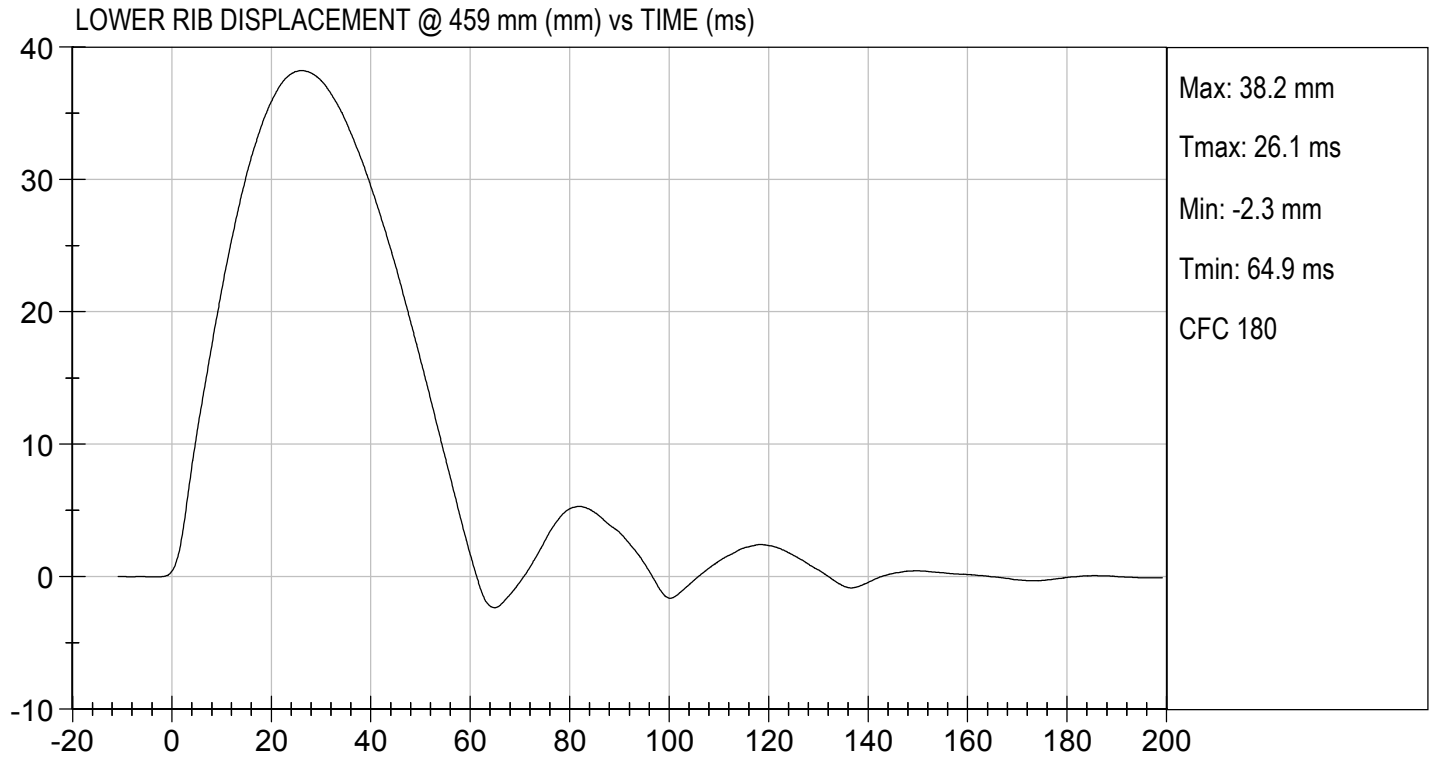
Test I.D: D201966

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	41	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.2	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.0	Pass
Overall Test Results				Pass


Laboratory Technician

08/07/2020
Test Date


Approved By

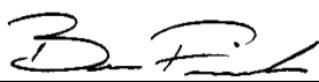


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D201967

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4385	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.2	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2435	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.5	Pass
Overall Test Results				Pass


Laboratory Technician

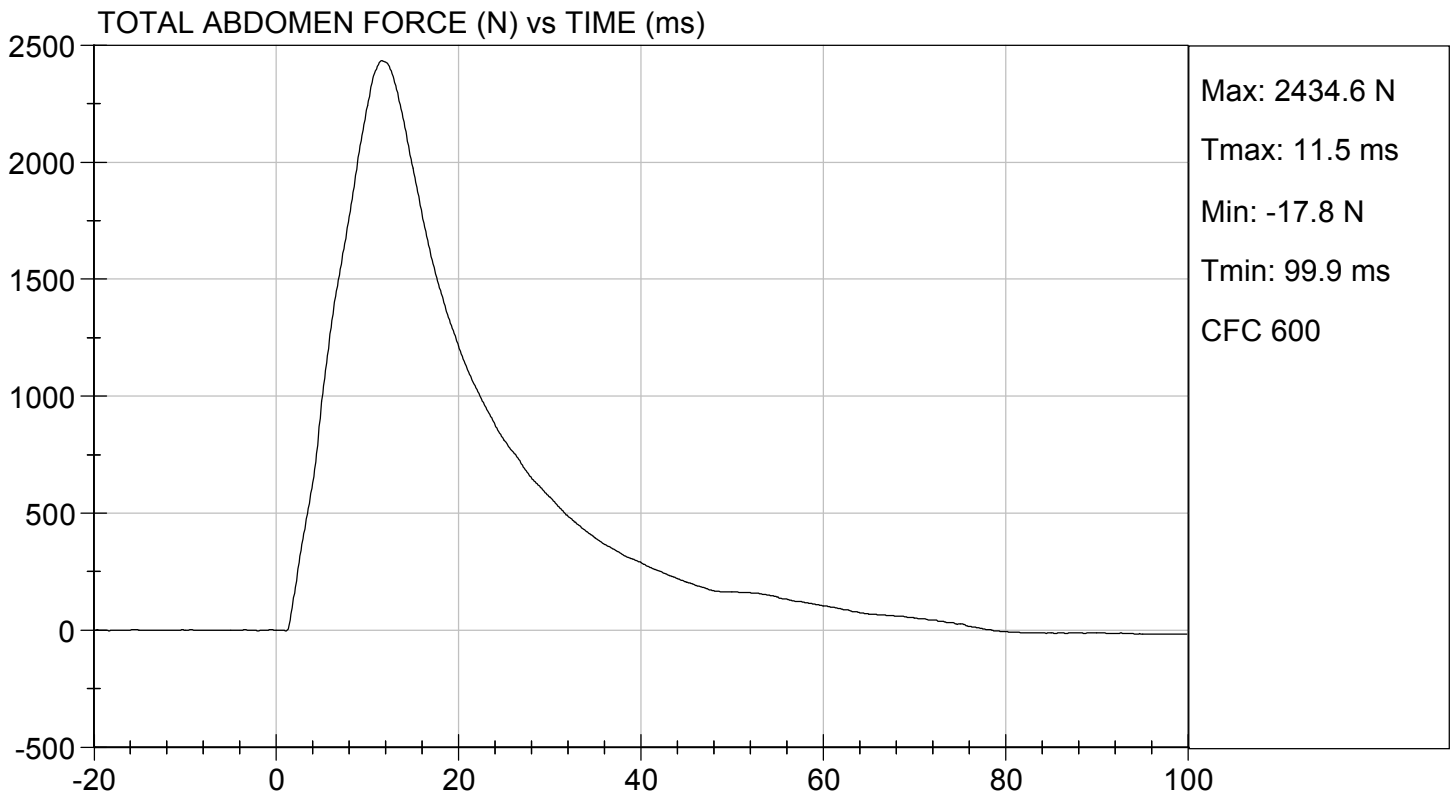
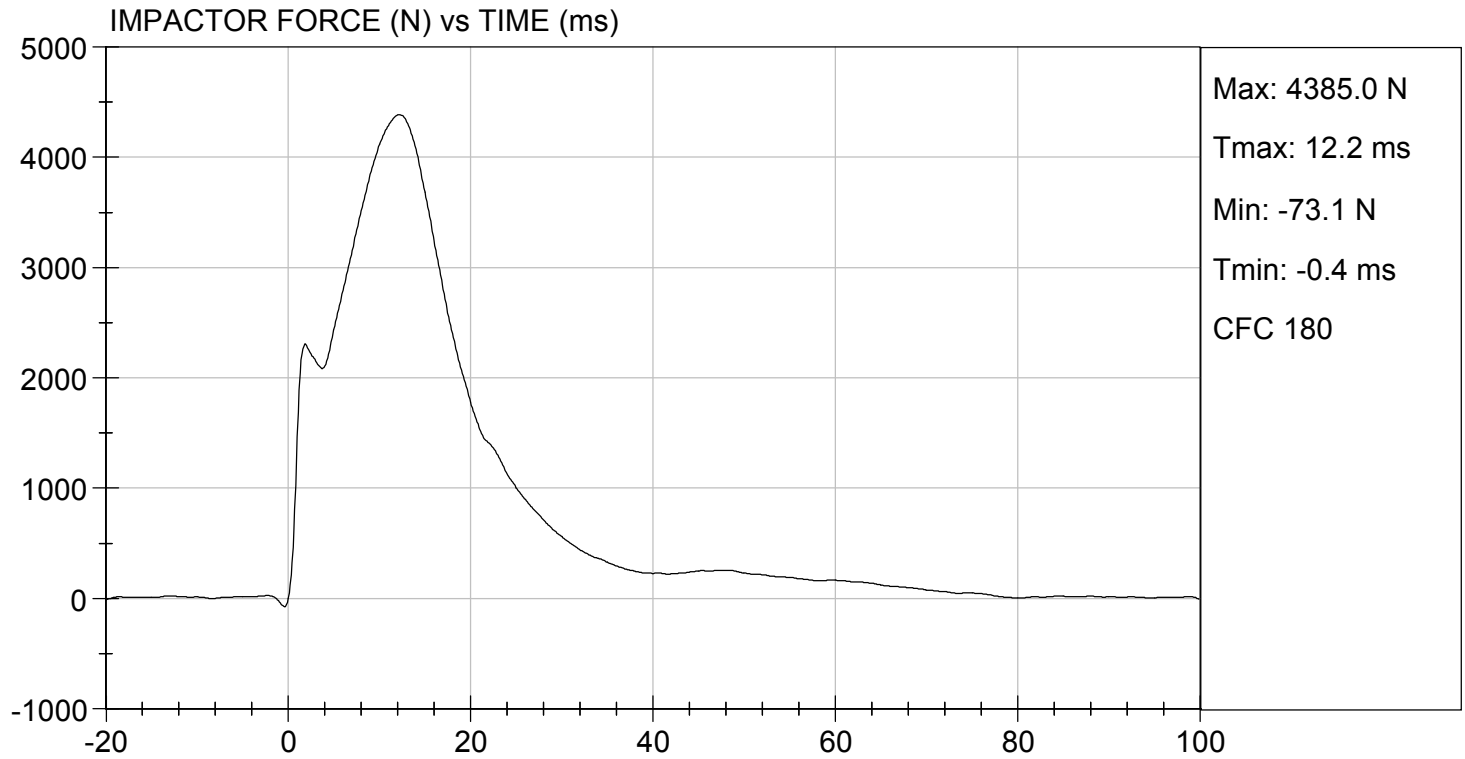
08/11/2020
Test Date


Approved By



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

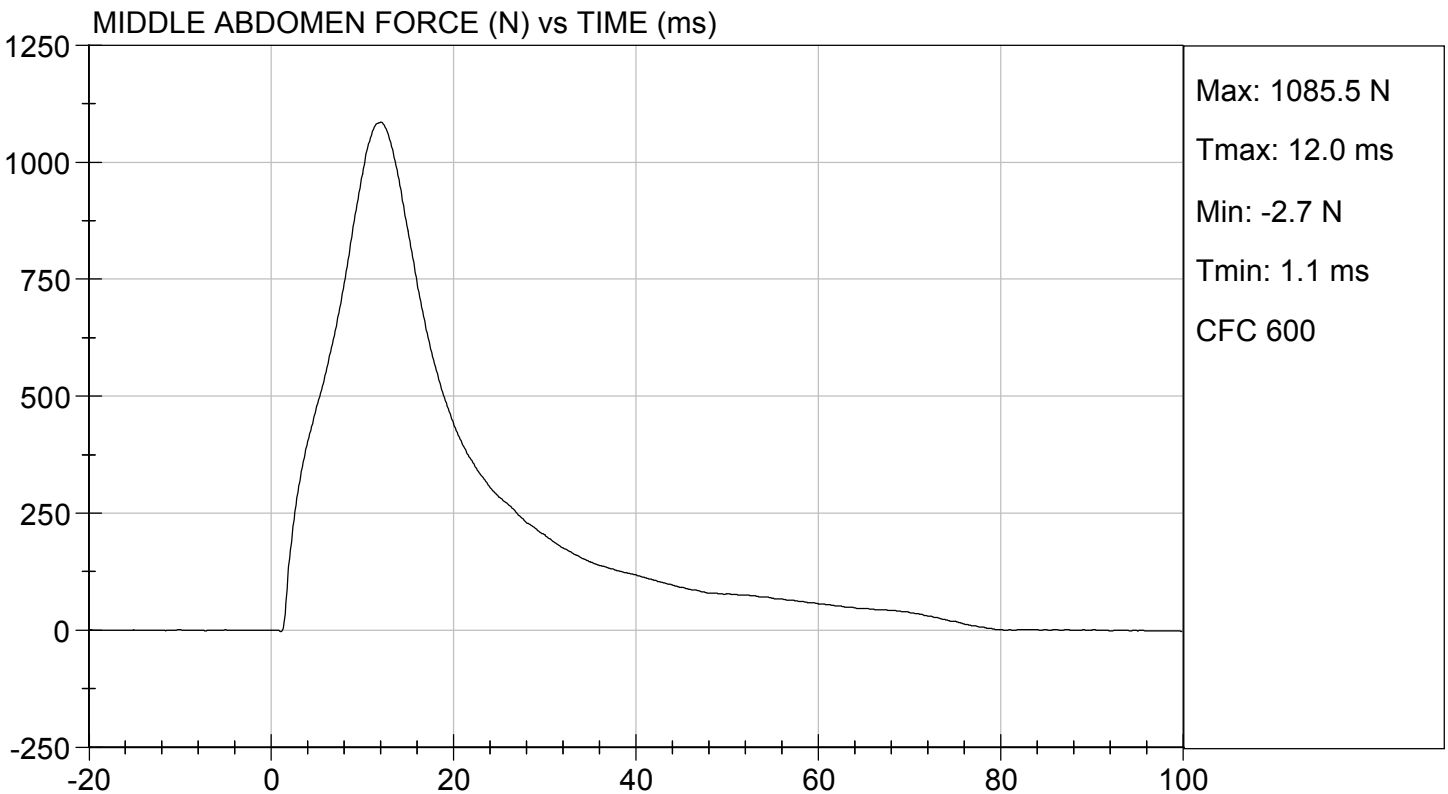
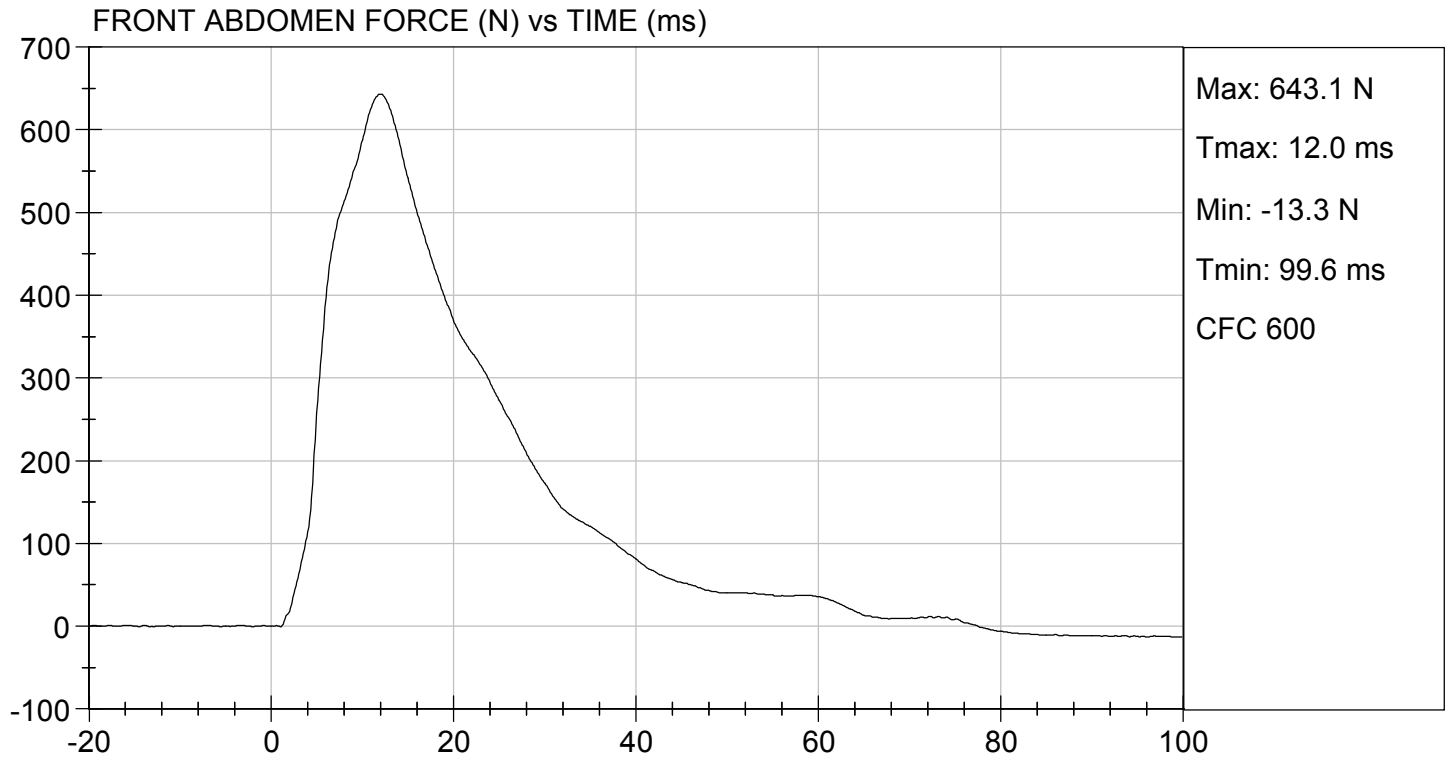
TEST DATE: 08/11/2020
TEST #: D201967





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

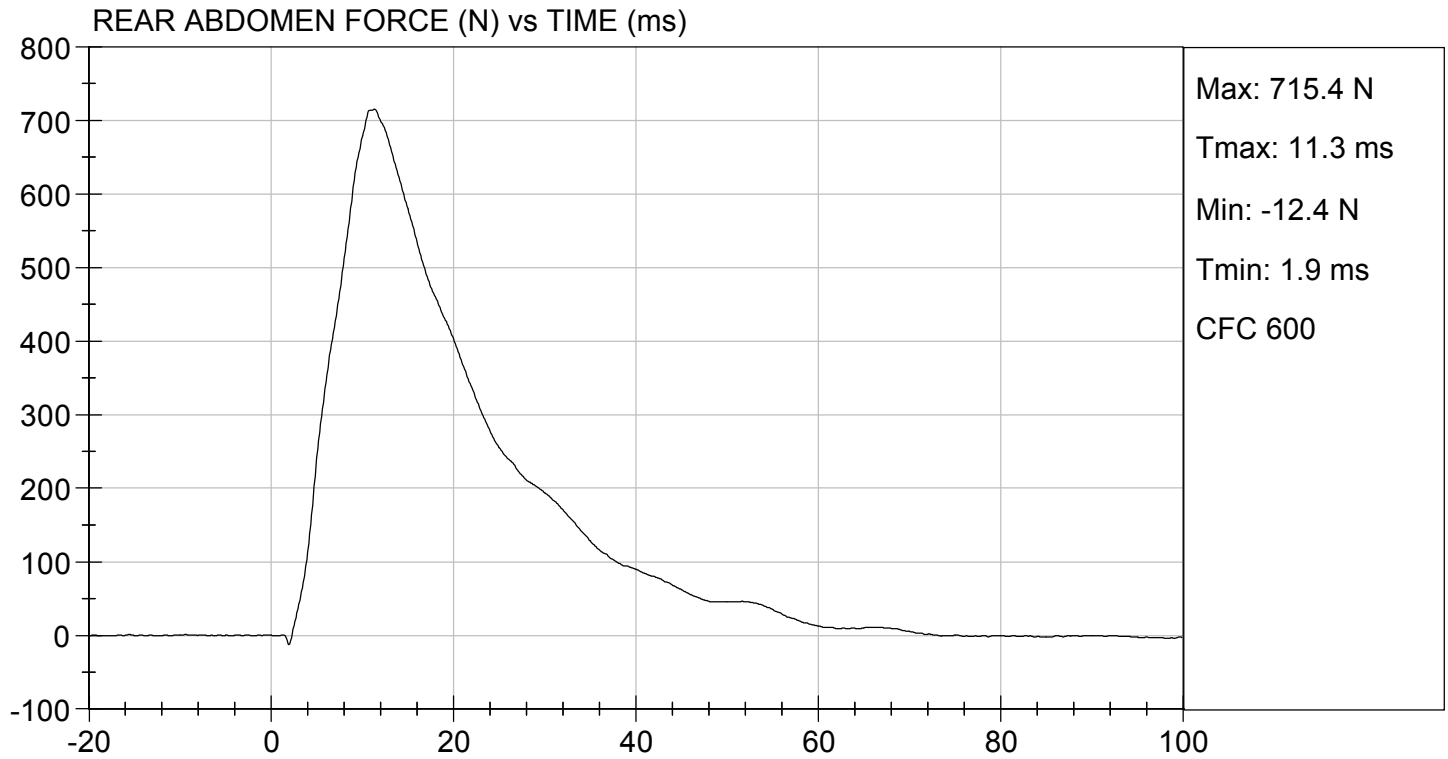
TEST DATE: 08/11/2020
TEST #: D201967





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

TEST DATE: 08/11/2020
TEST #: D201967



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

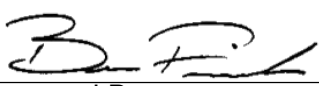
ATD Serial No: F032

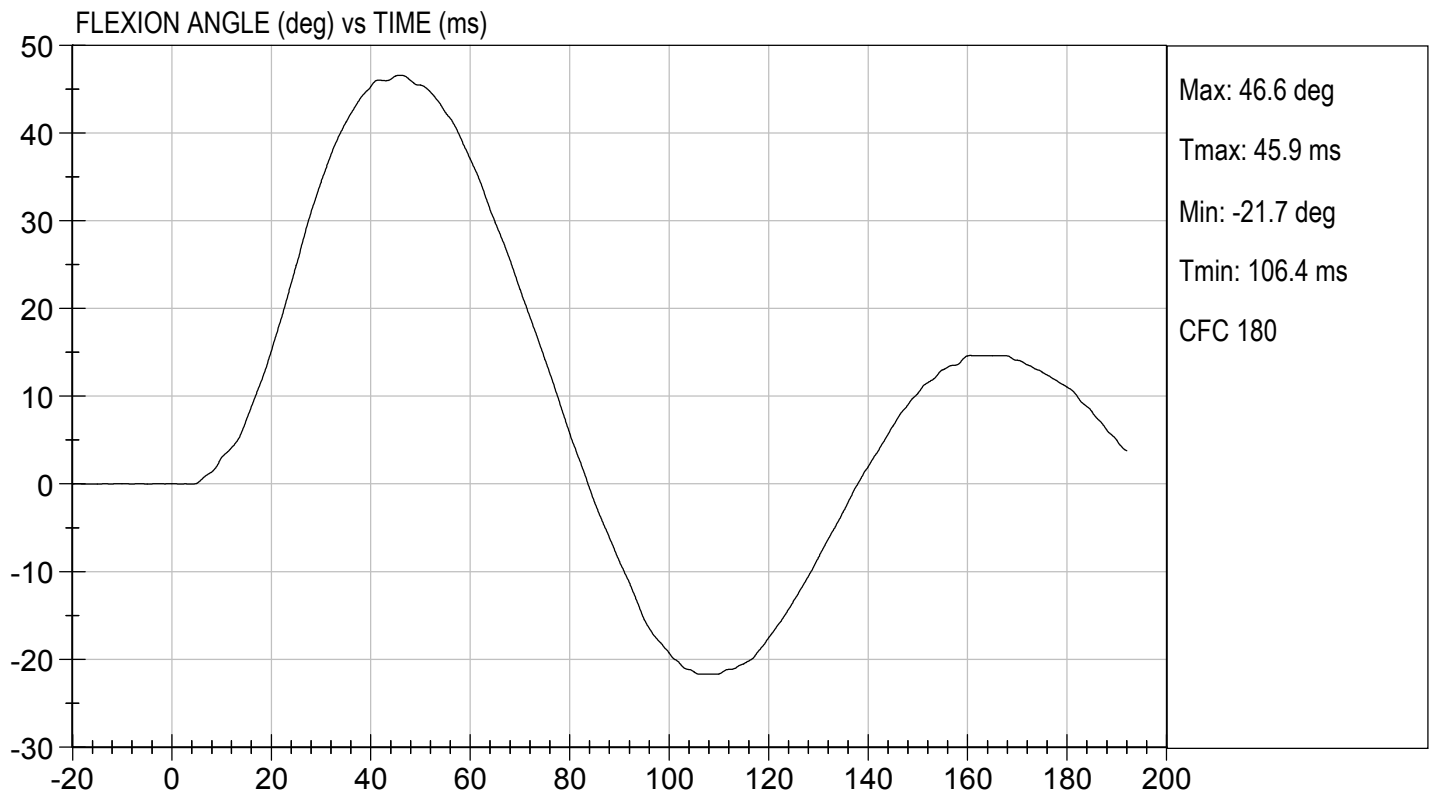
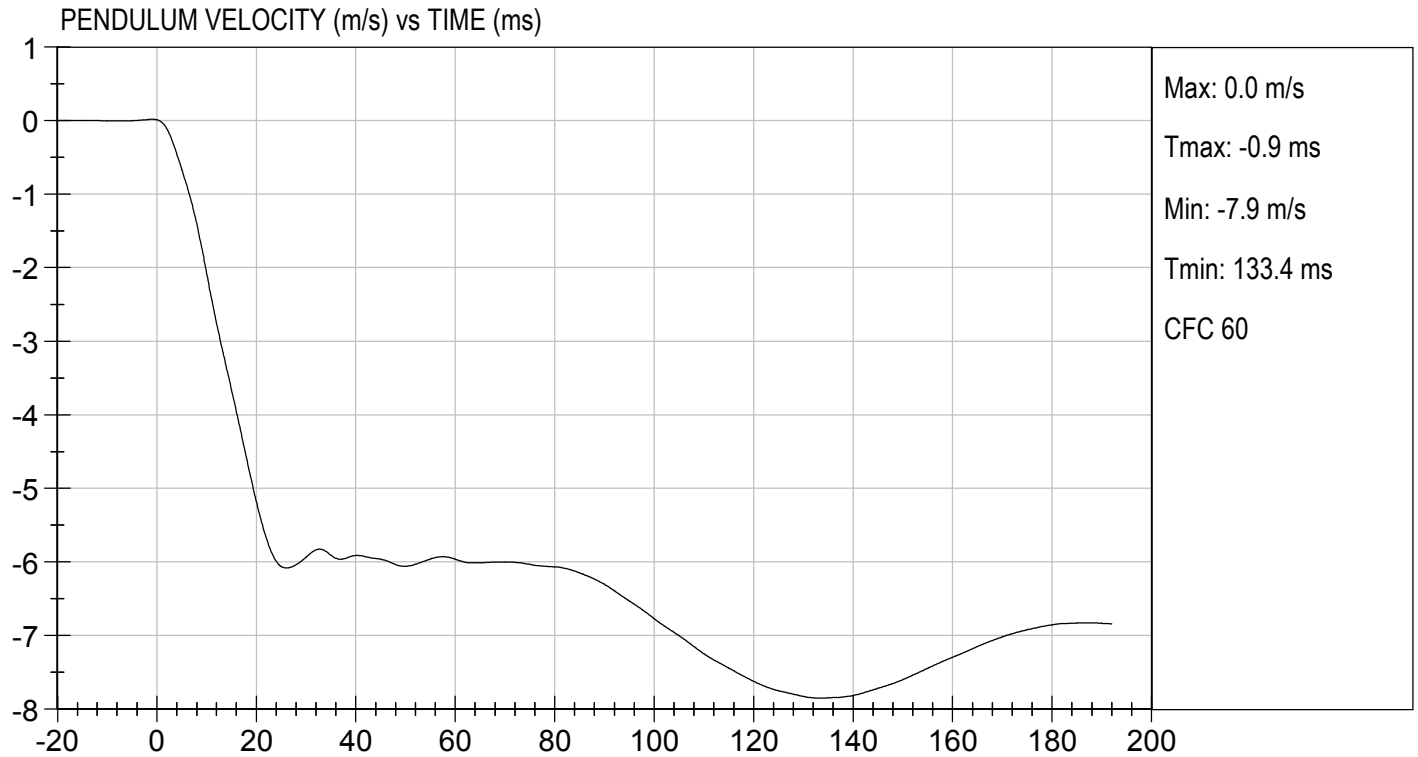
Test I.D: D201968

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.393	Pass
	27 ms	m/s	-6.50 to -5.80	-6.07	Pass
	30 ms	m/s	>= -6.50	-5.94	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.6	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.9	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
Overall Results					Pass


 Laboratory Technician

08/10/2020
 Test Date

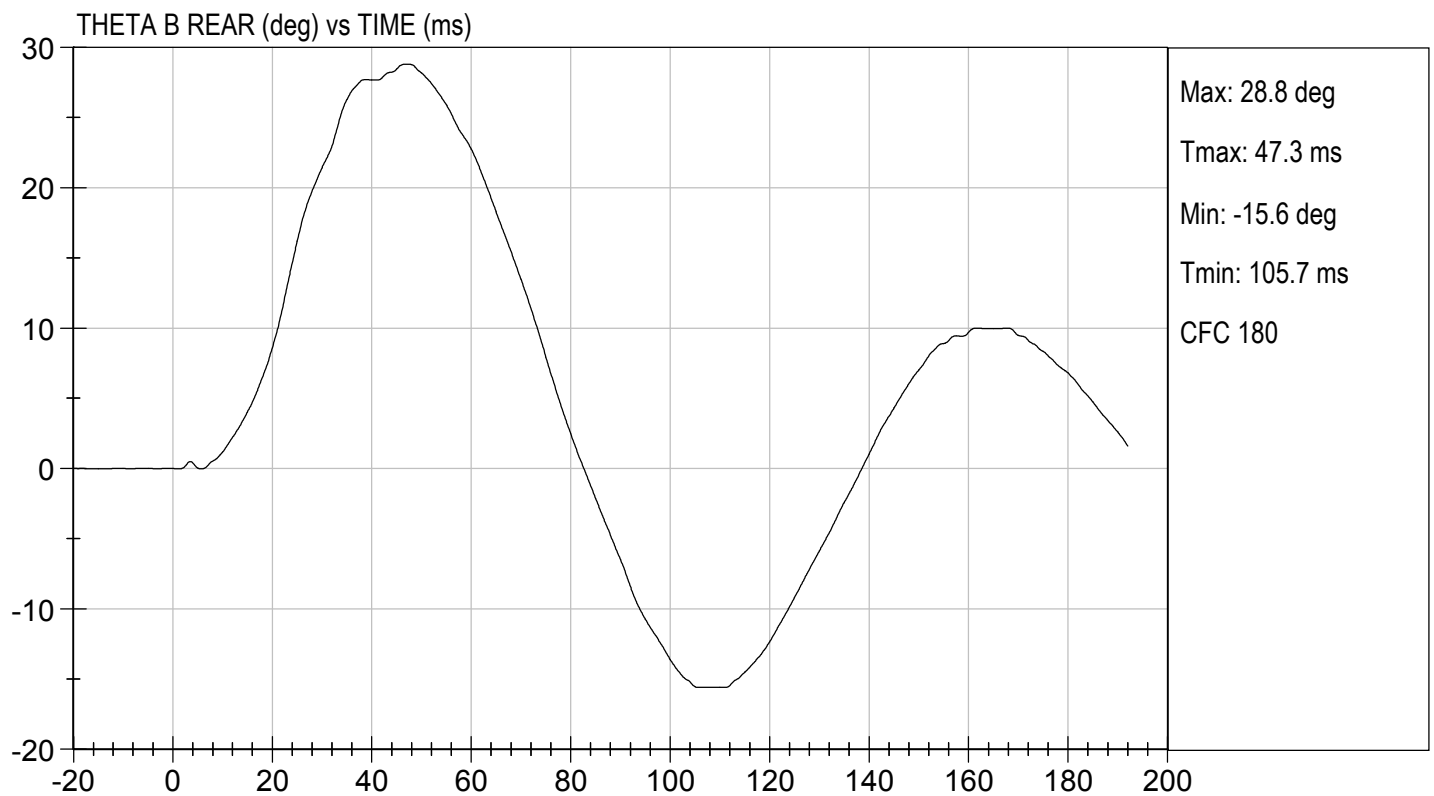
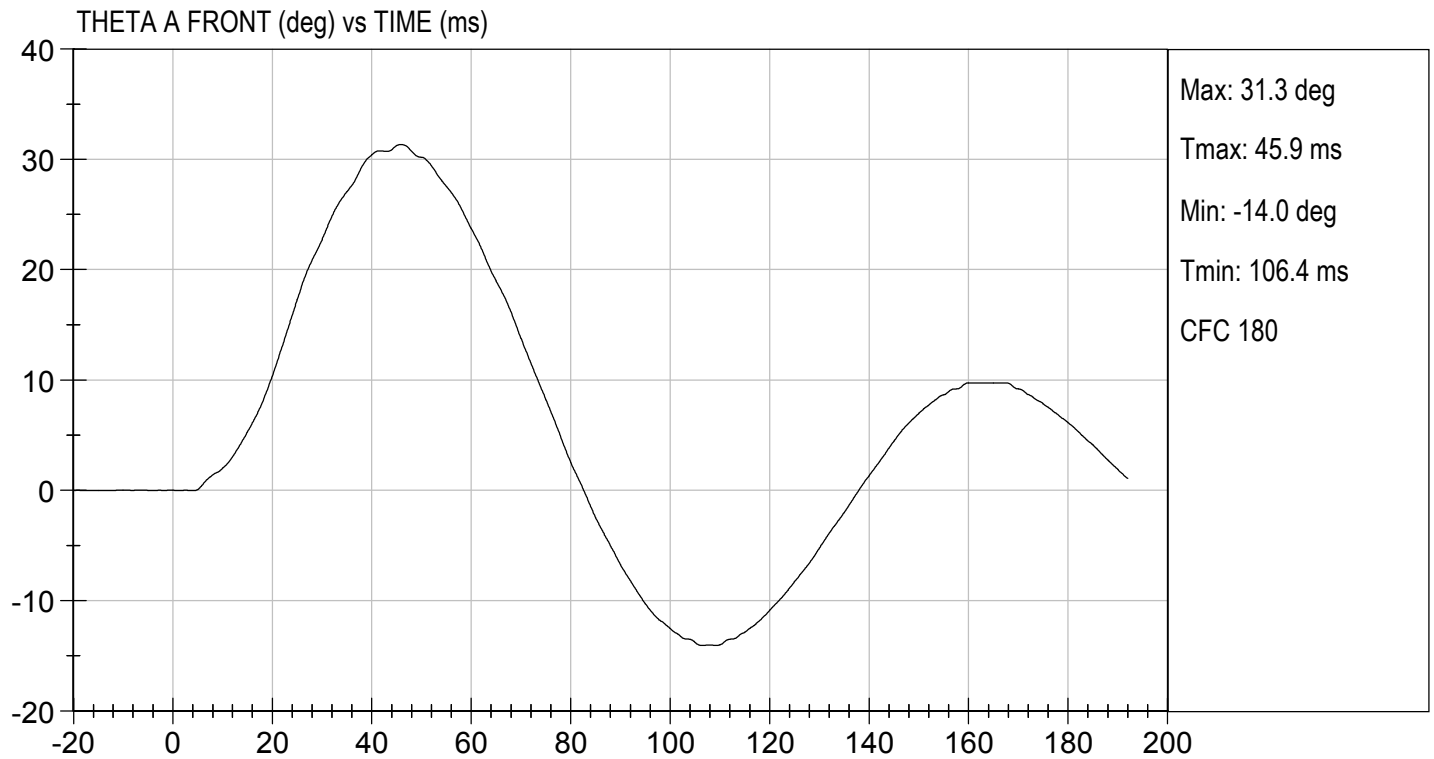

 Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

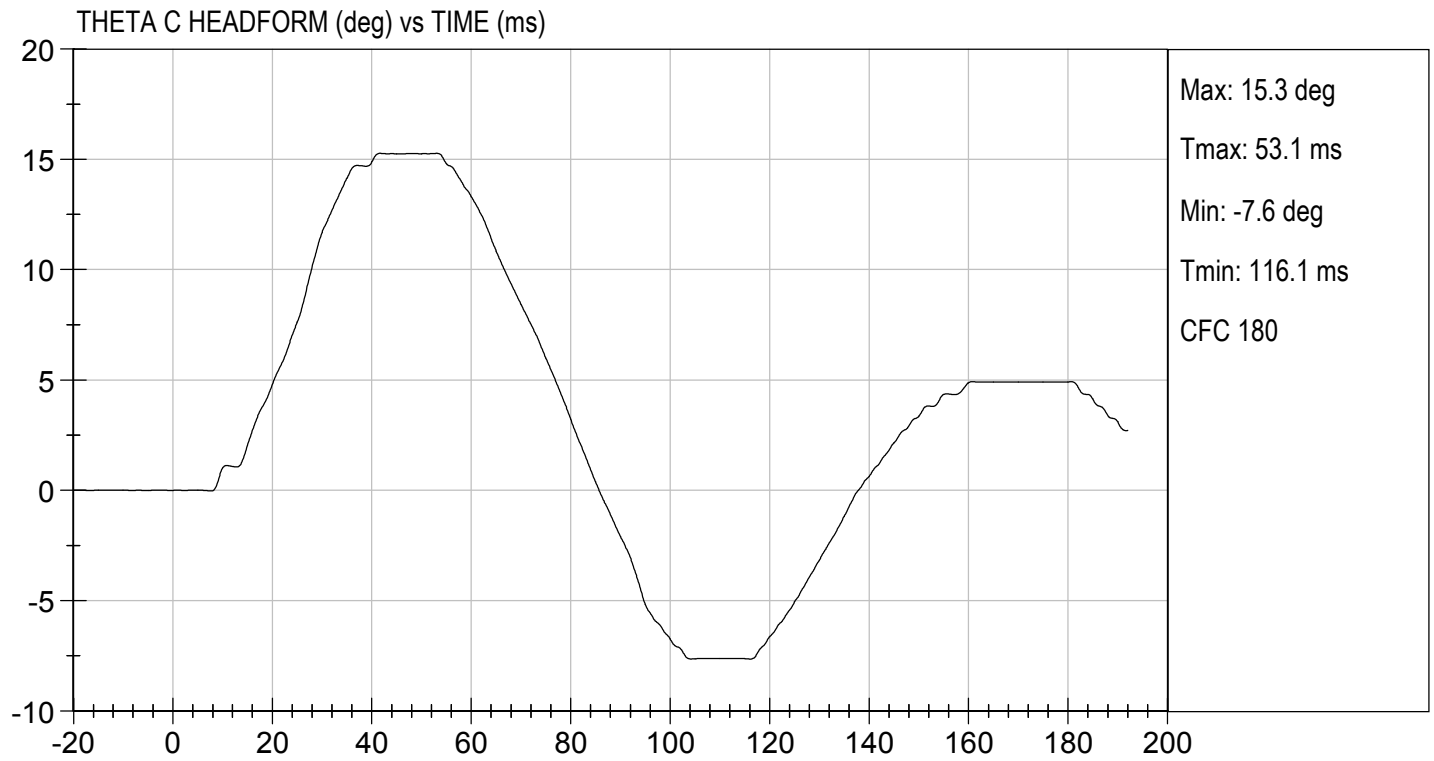
TEST DATE: 08/10/2020
TEST #: D201968





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 08/10/2020
TEST #: D201968



MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D201969

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	5091	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.7	Pass
Maximum Pubic Force	N	1230 to 1590	1461	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.0	Pass
Overall Test Results				Pass


Laboratory Technician

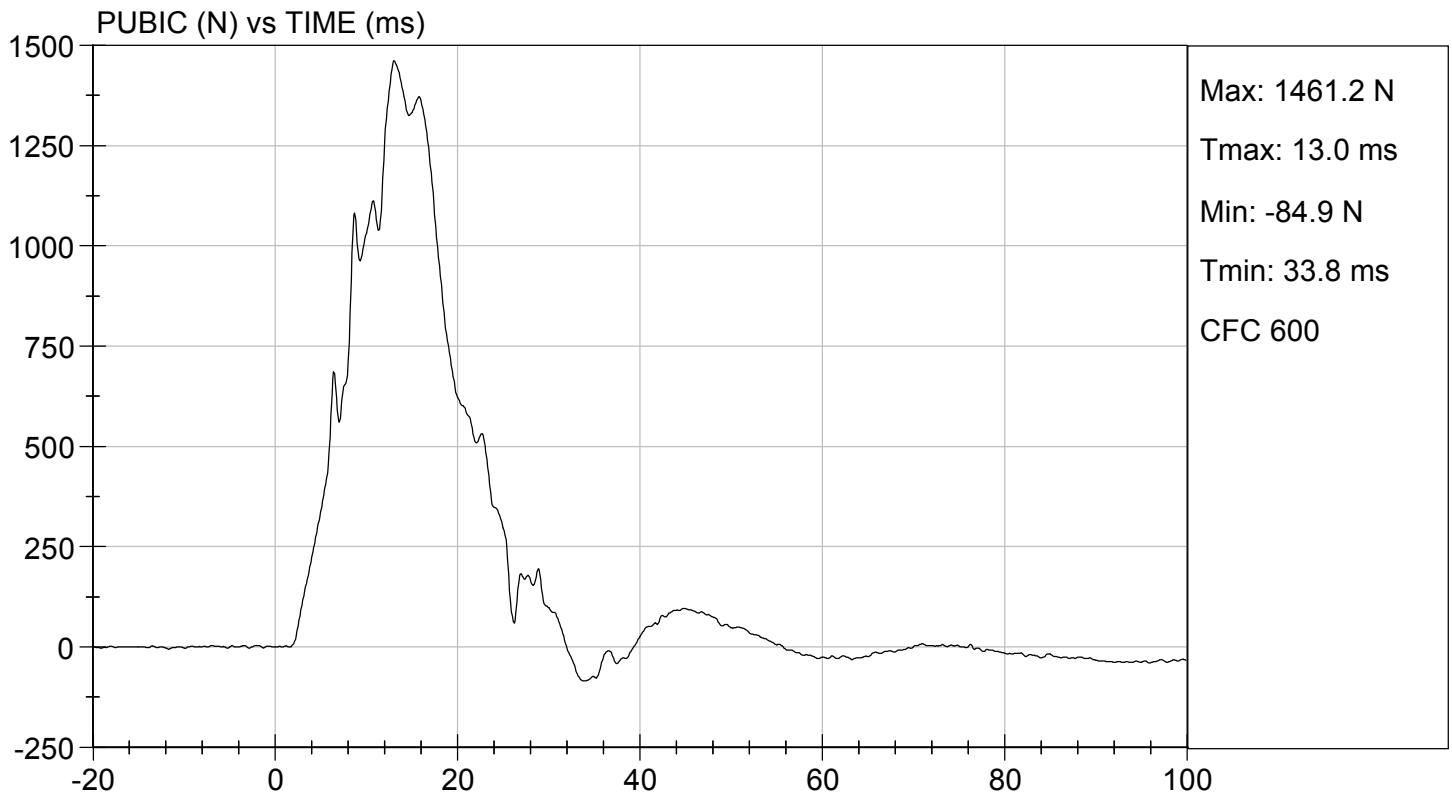
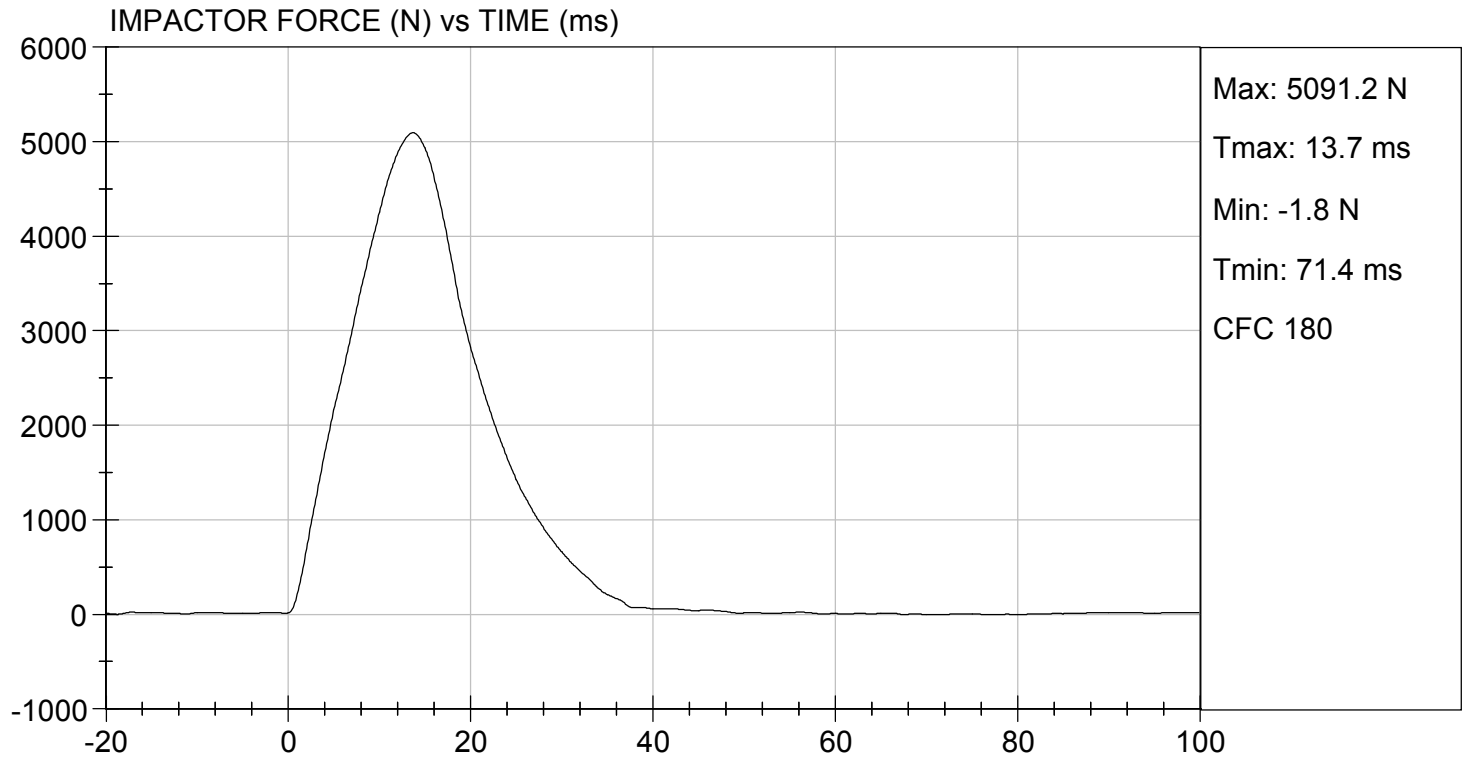
08/11/2020
Test Date


Approved By



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

TEST DATE: 08/11/2020
TEST #: D201969



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

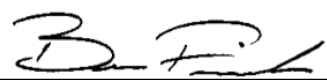
ATD Serial No: F032

Test I.D: D201960

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5627	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.2	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.0	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.9	Pass
Overall Test Results			Pass	


Laboratory Technician

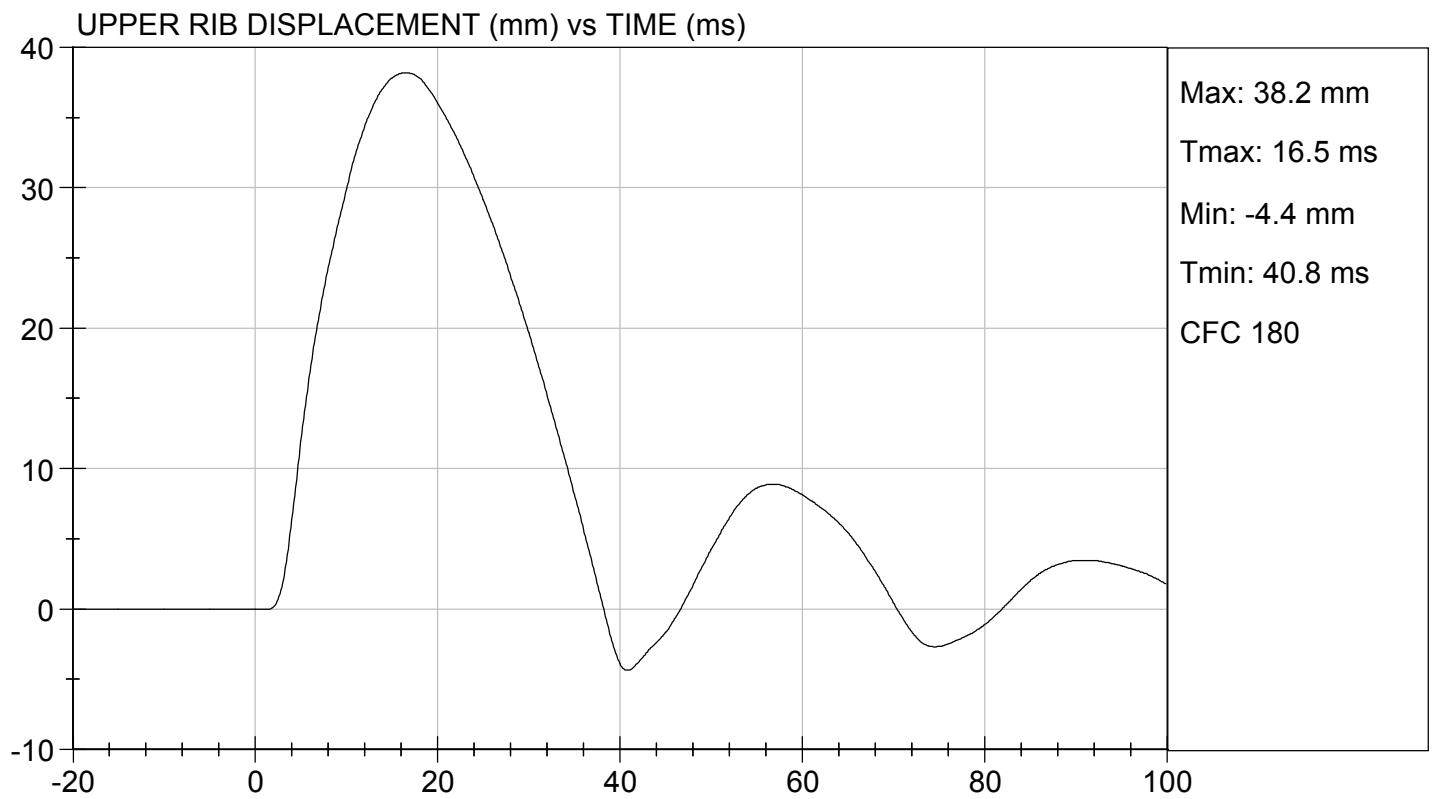
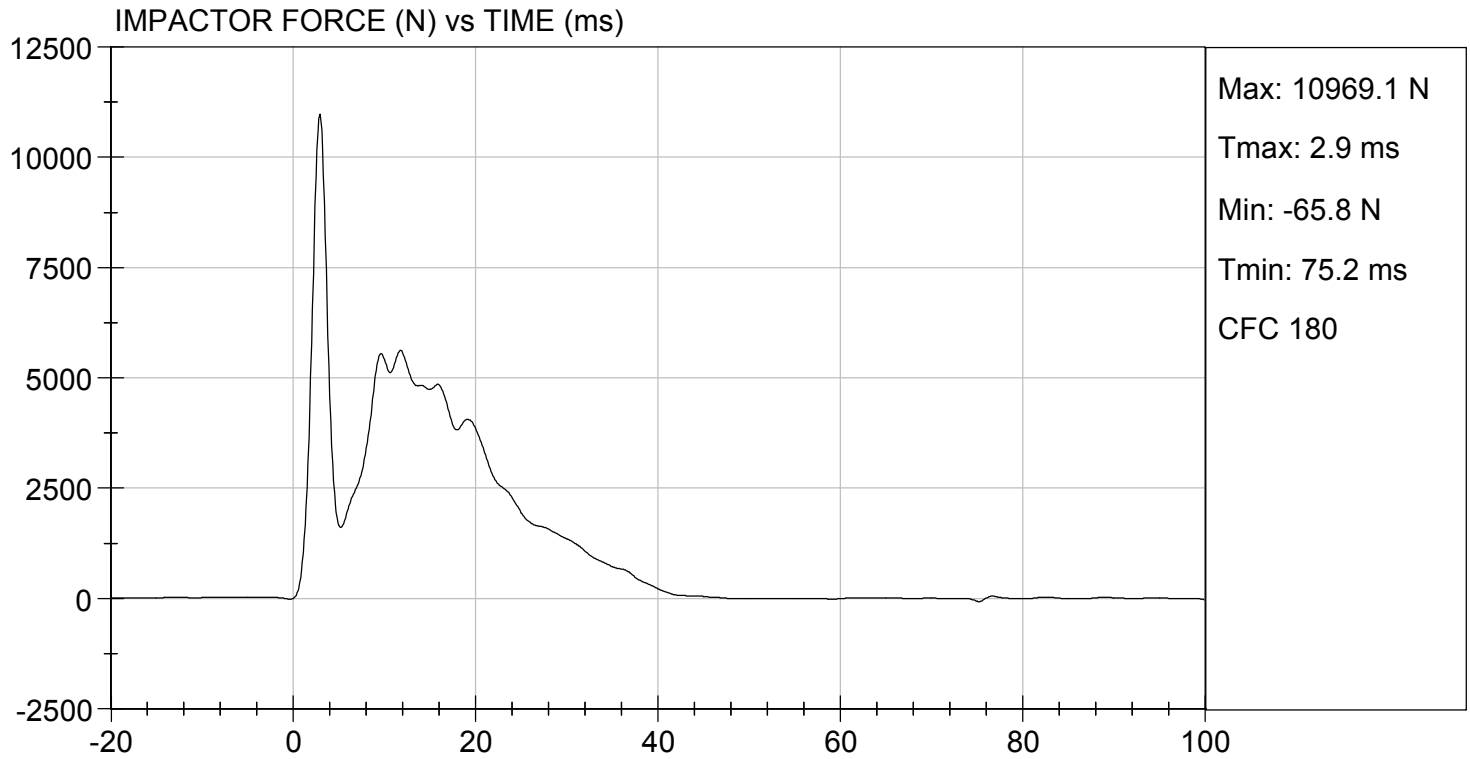
08/11/2020
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

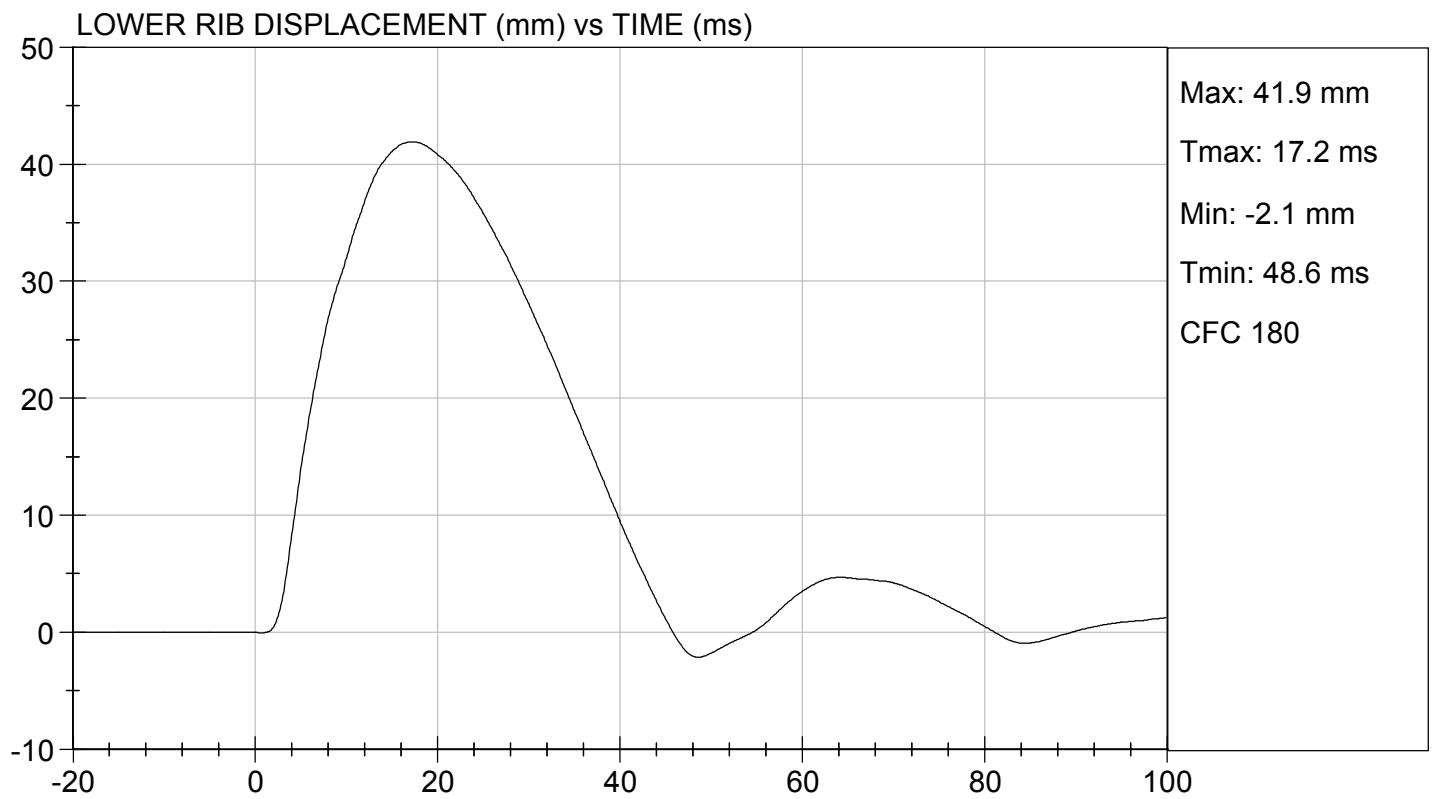
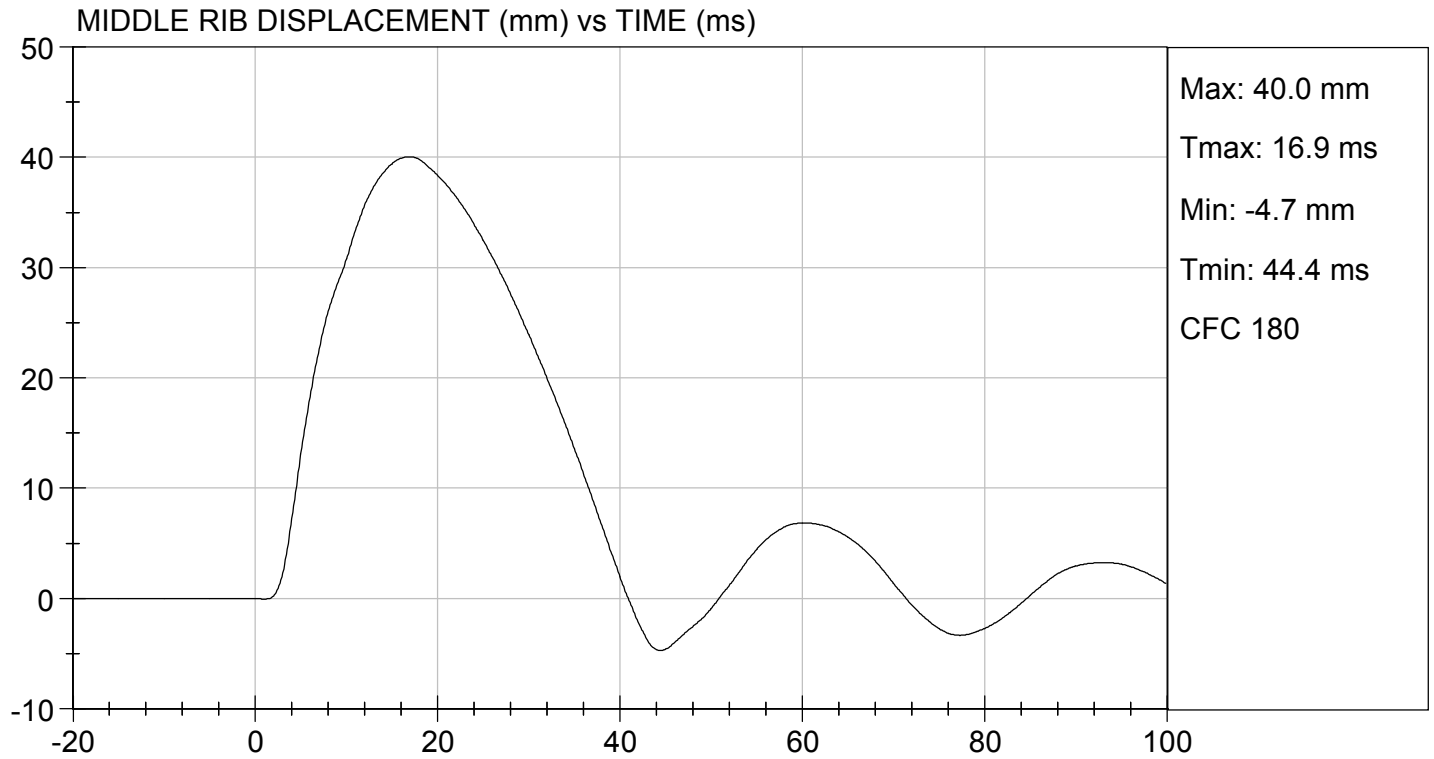
TEST DATE: 08/11/2020
TEST #: D201960





TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 08/11/2020
TEST #: D201960



CALIBRATION TEST RESULTS

POST-TEST

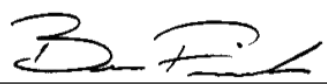
EUROSID 2 (ES-2RE) MALE – DRIVER ATD

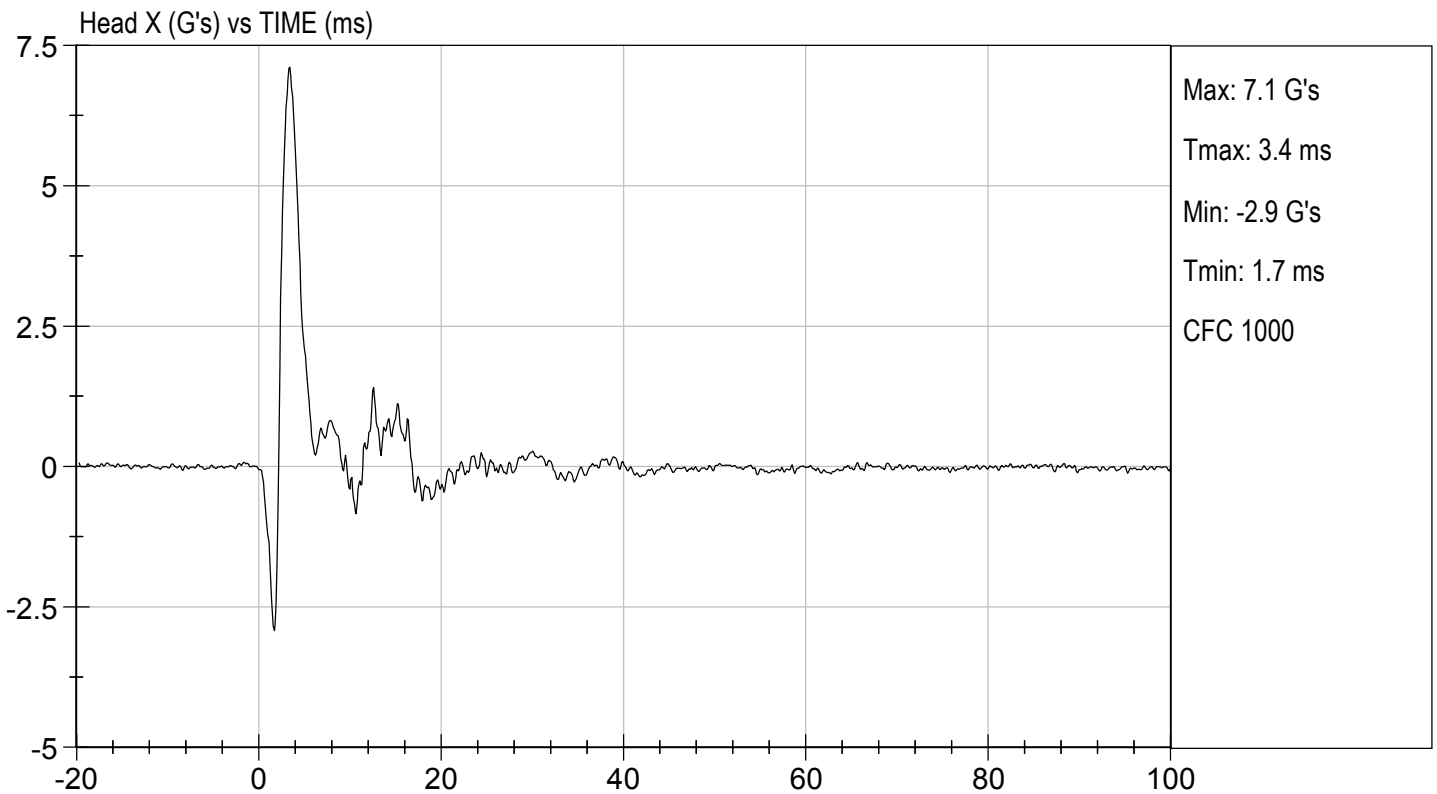
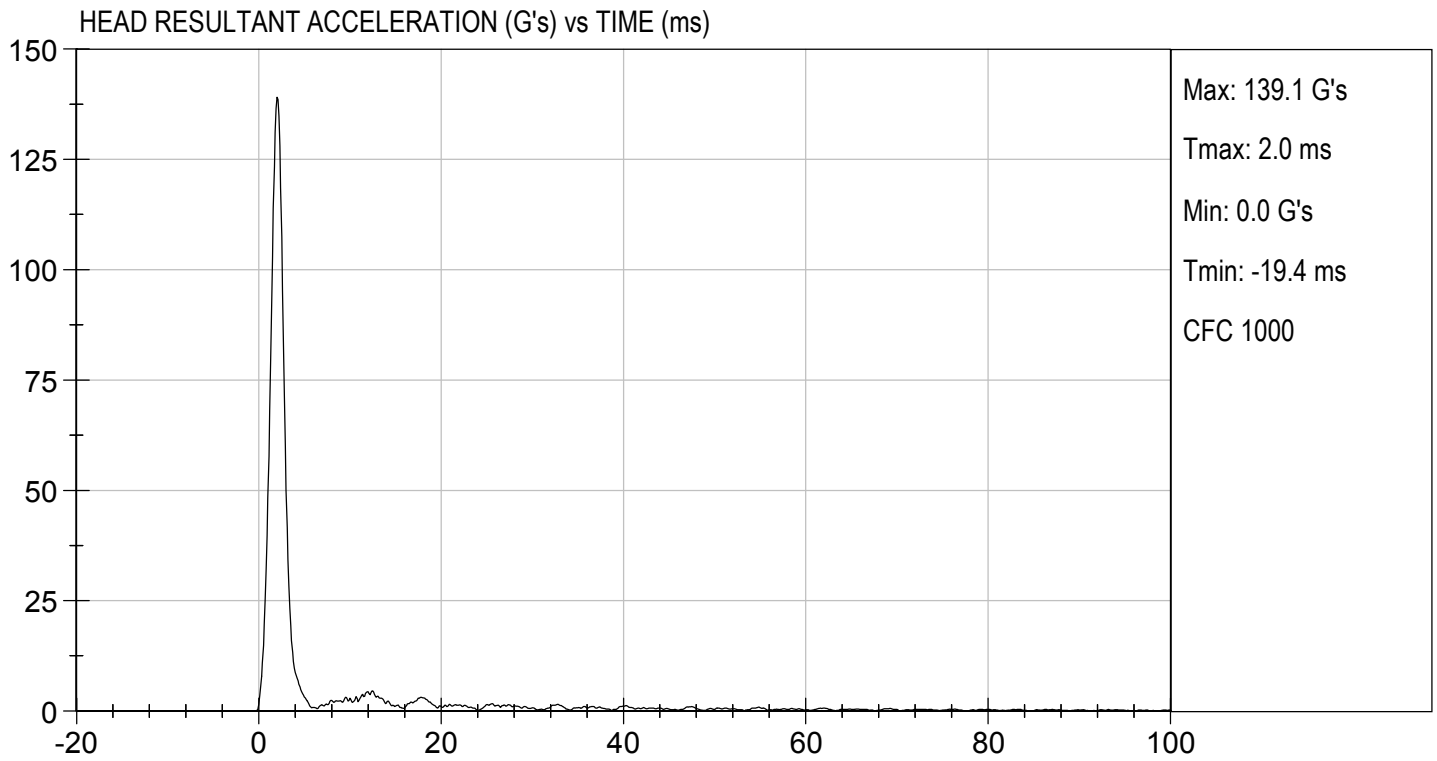
ES-2re External Measurements
SN: F032

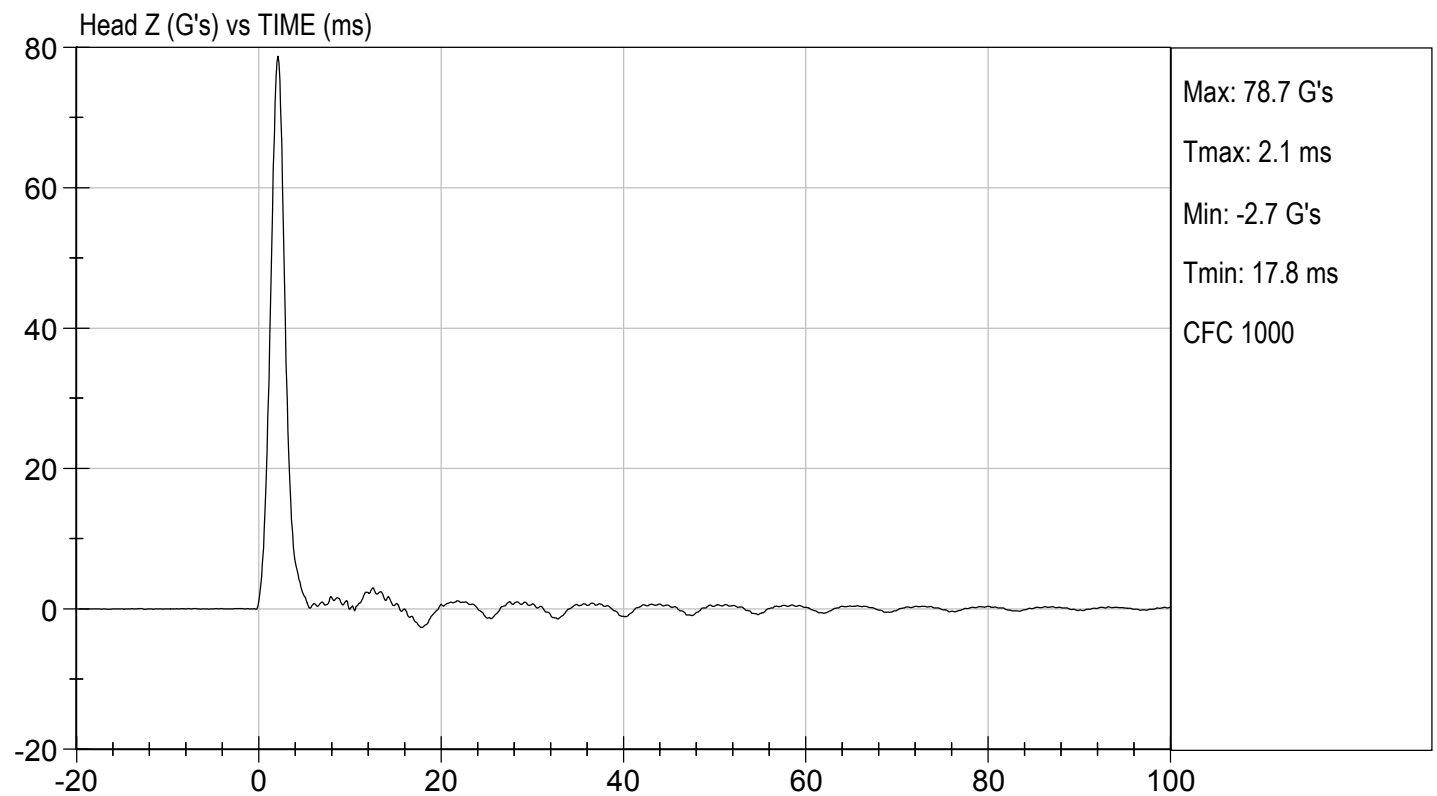
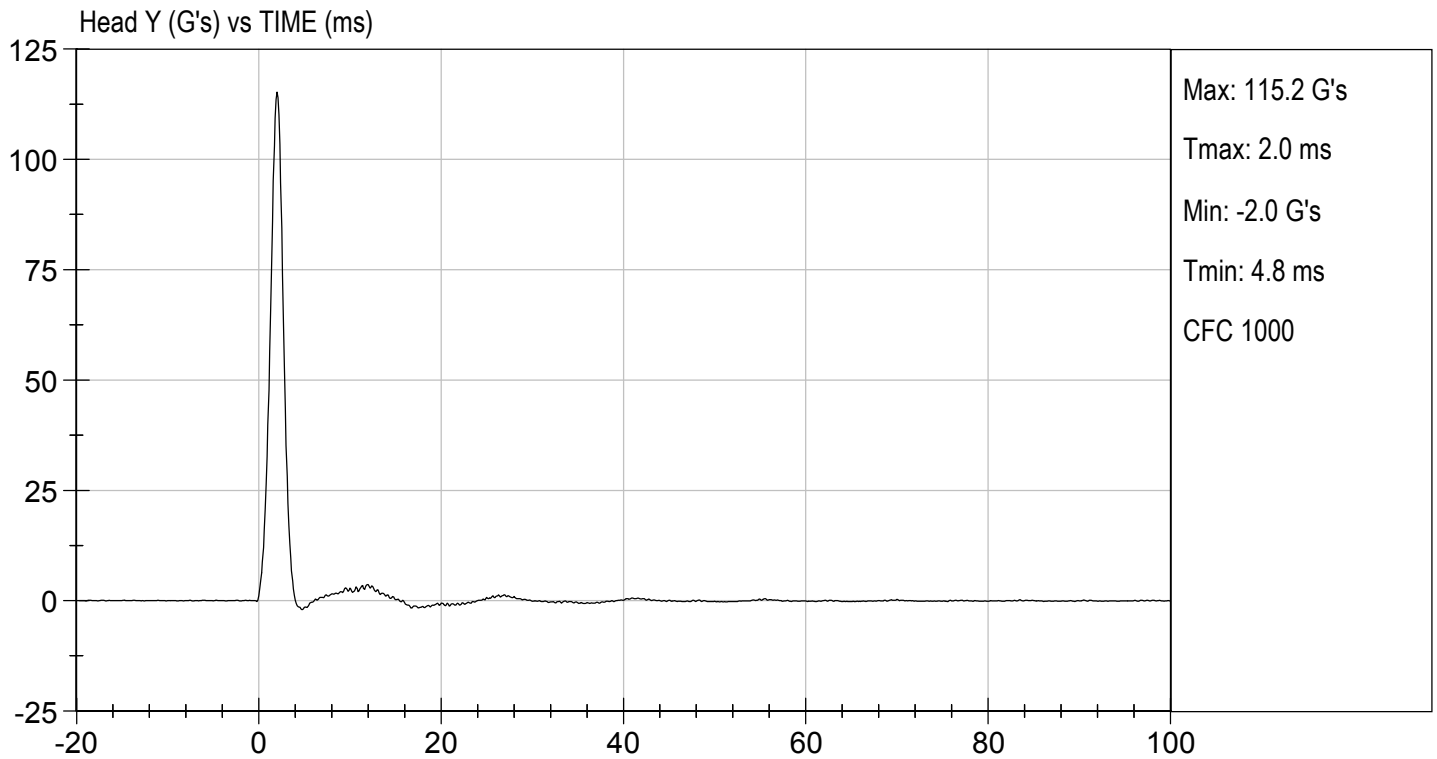
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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: F032Test ID: D202461

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Peak Resultant Acceleration	G's	125 to 155	139	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician10/02/2020
Test Date
Approved By





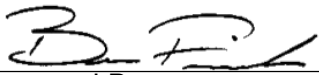
MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D202462

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	34	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.50	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.59	Pass
	17 ms	m/s	>= -3.70	-3.43	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	53.8	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	66.0	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	63.7	Pass
Overall Results					Pass


 Laboratory Technician

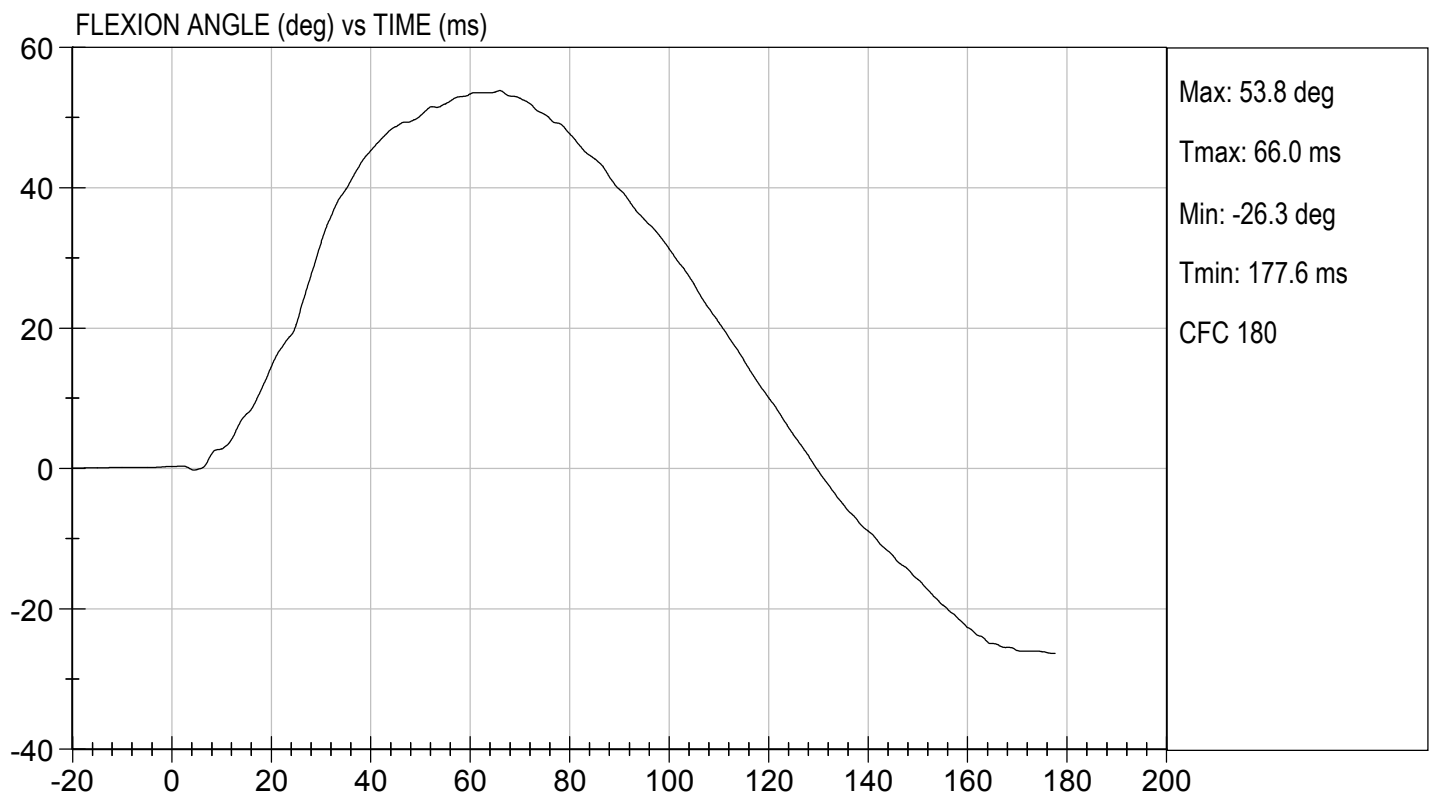
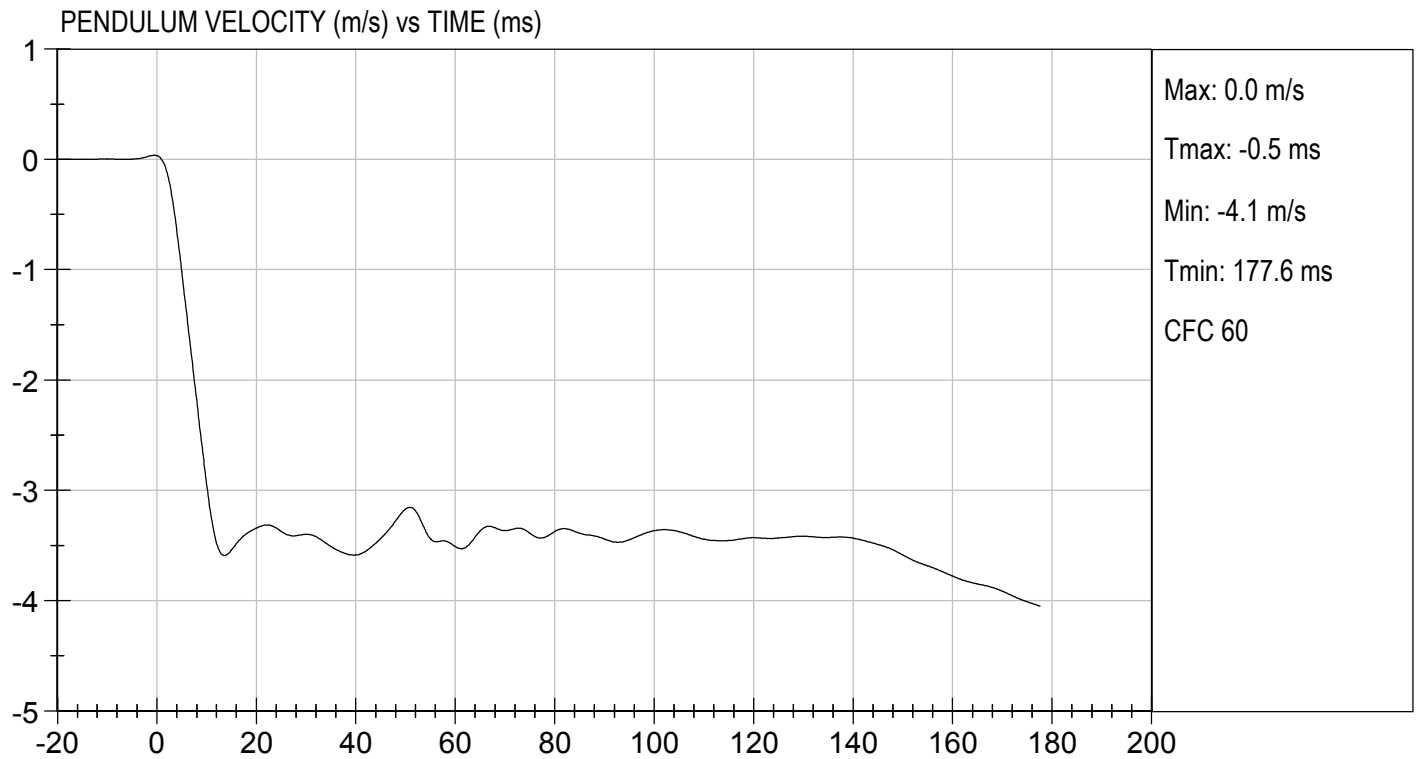

 Approved By

10/03/2020
 Test Date



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

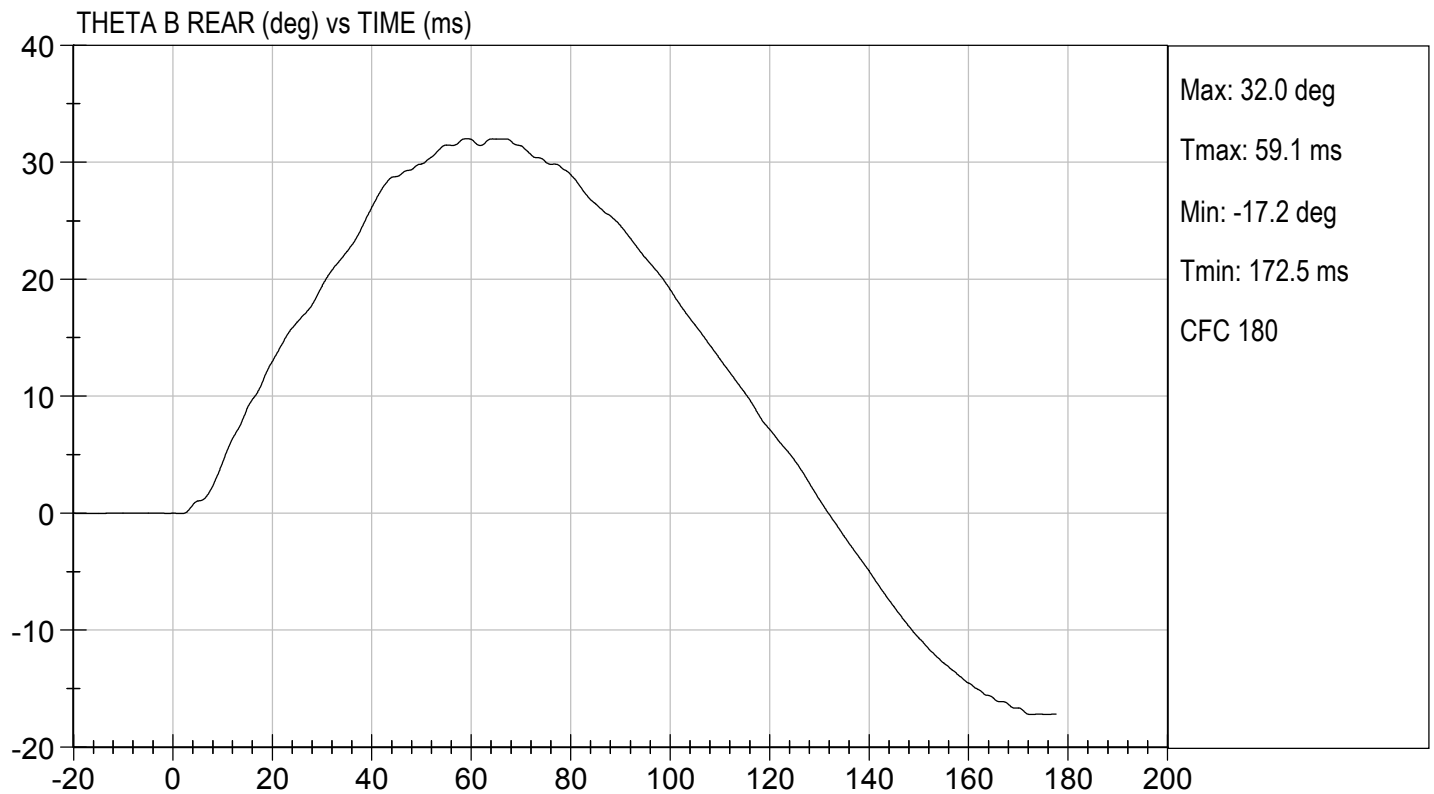
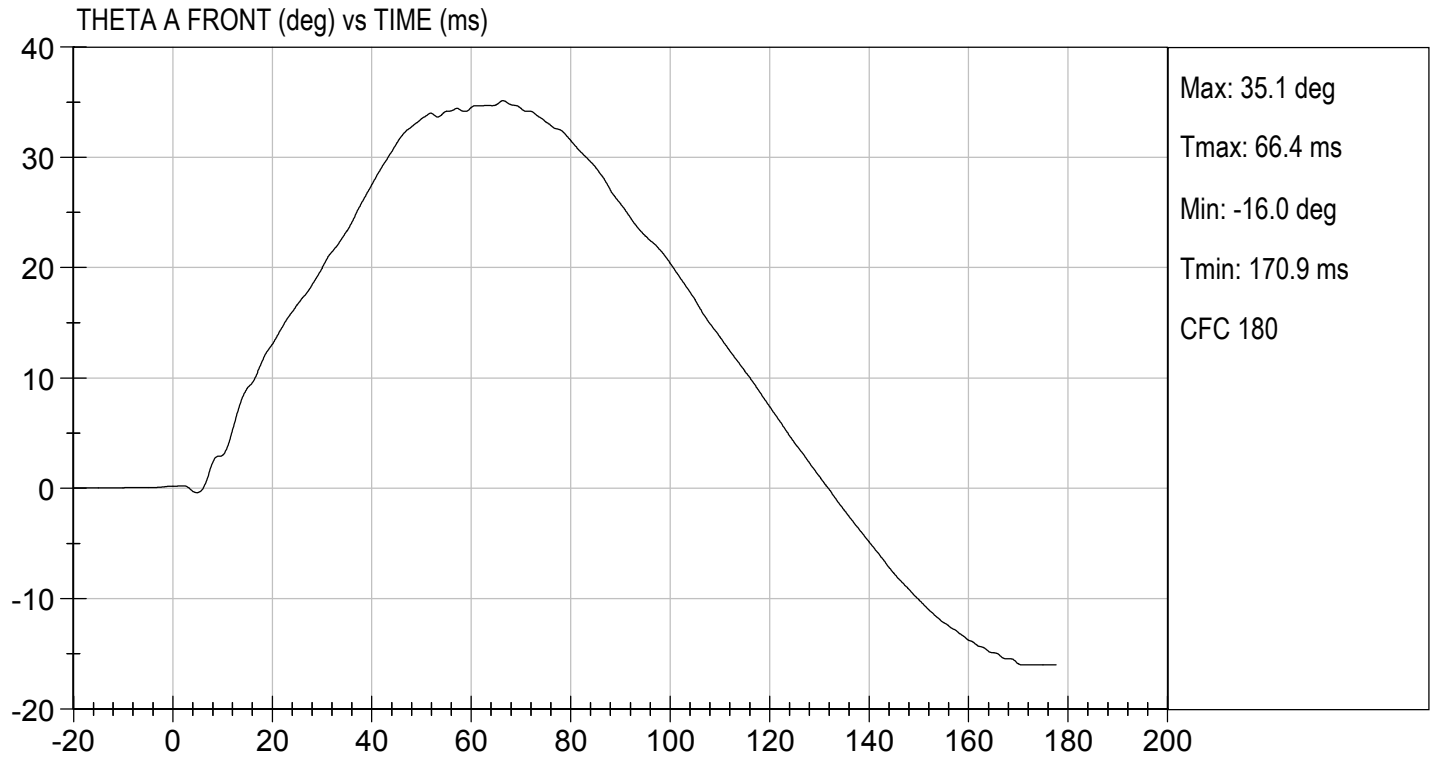
TEST DATE: 10/03/2020
TEST #: D202462





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

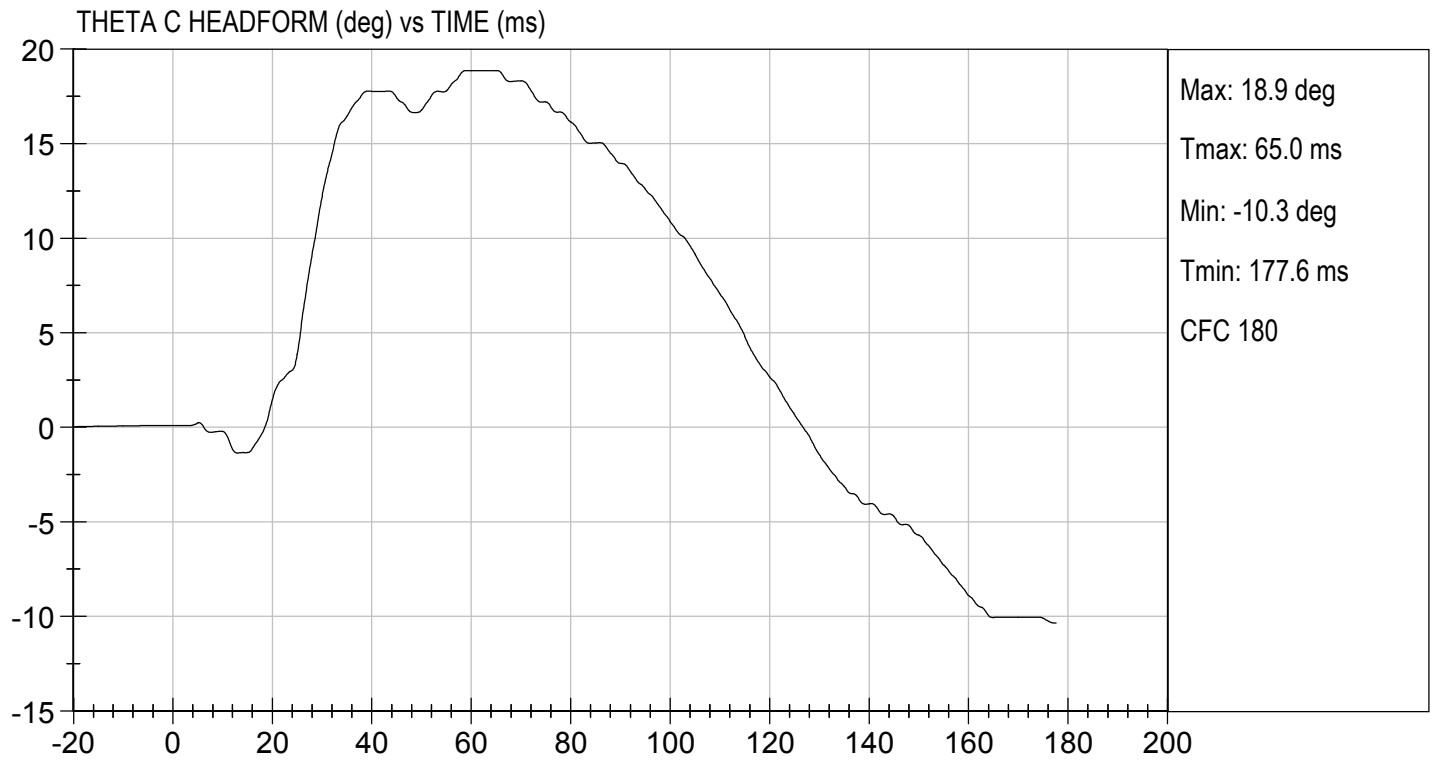
TEST DATE: 10/03/2020
TEST #: D202462





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

TEST DATE: 10/03/2020
TEST #: D202462



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

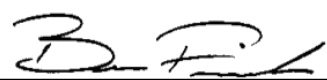
ATD Serial No: F032

Test I.D: D202463

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.1	Pass
Overall Test Results				Pass


Laboratory Technician

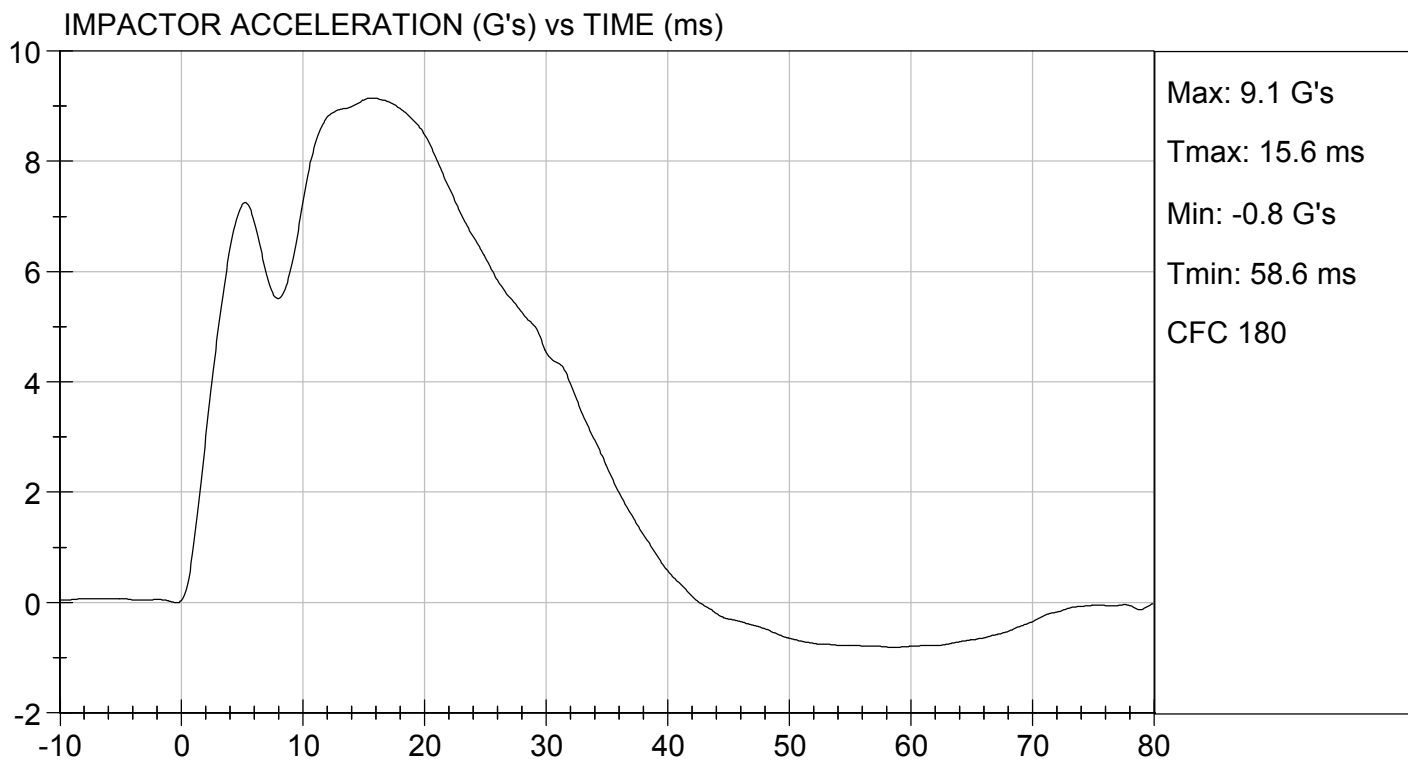
10/05/2020
Test Date


Approved By



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

TEST DATE: 10/05/2020
TEST #: D202463



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

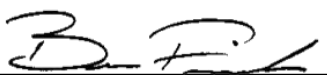
ATD Serial No: F032

Test I.D: D202464

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	35	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	47.8	Pass
Overall Test Results			Pass	



Laboratory Technician



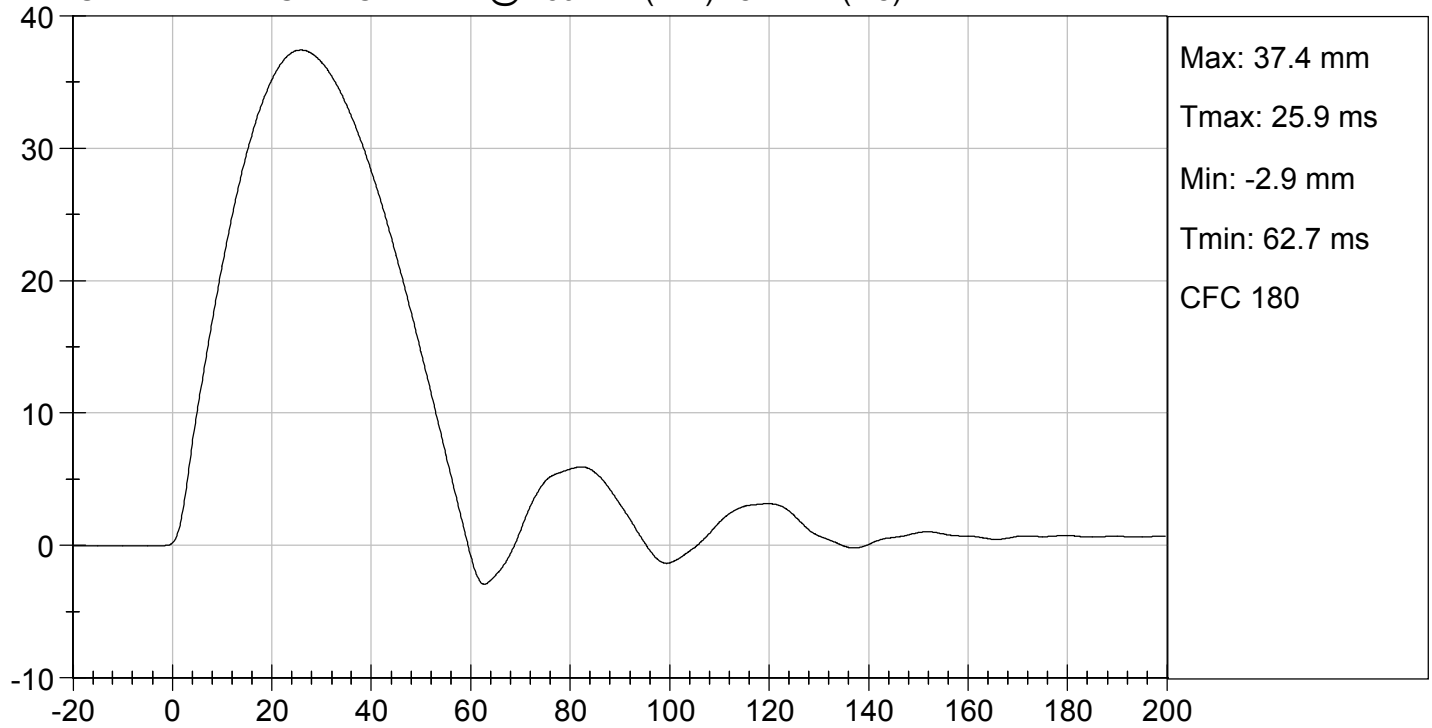
Approved By

10/03/2020

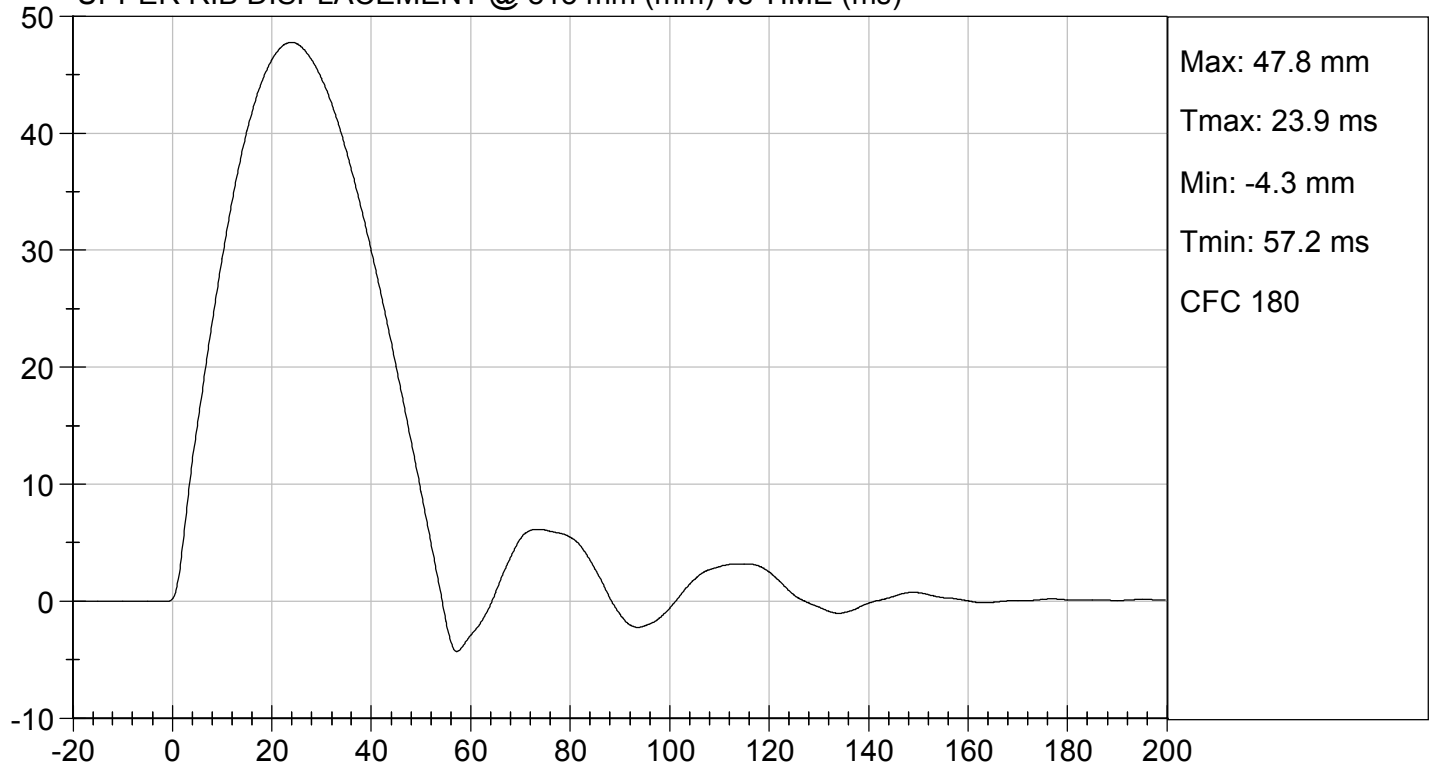
Test Date



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

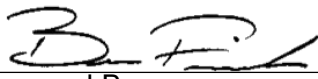
ATD Serial No: F032

Test I.D: D202465

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	35	Pass
Displacement at 459 mm	mm	36.0 to 40.0	40.0	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.1	Pass
			Overall Test Results	Pass

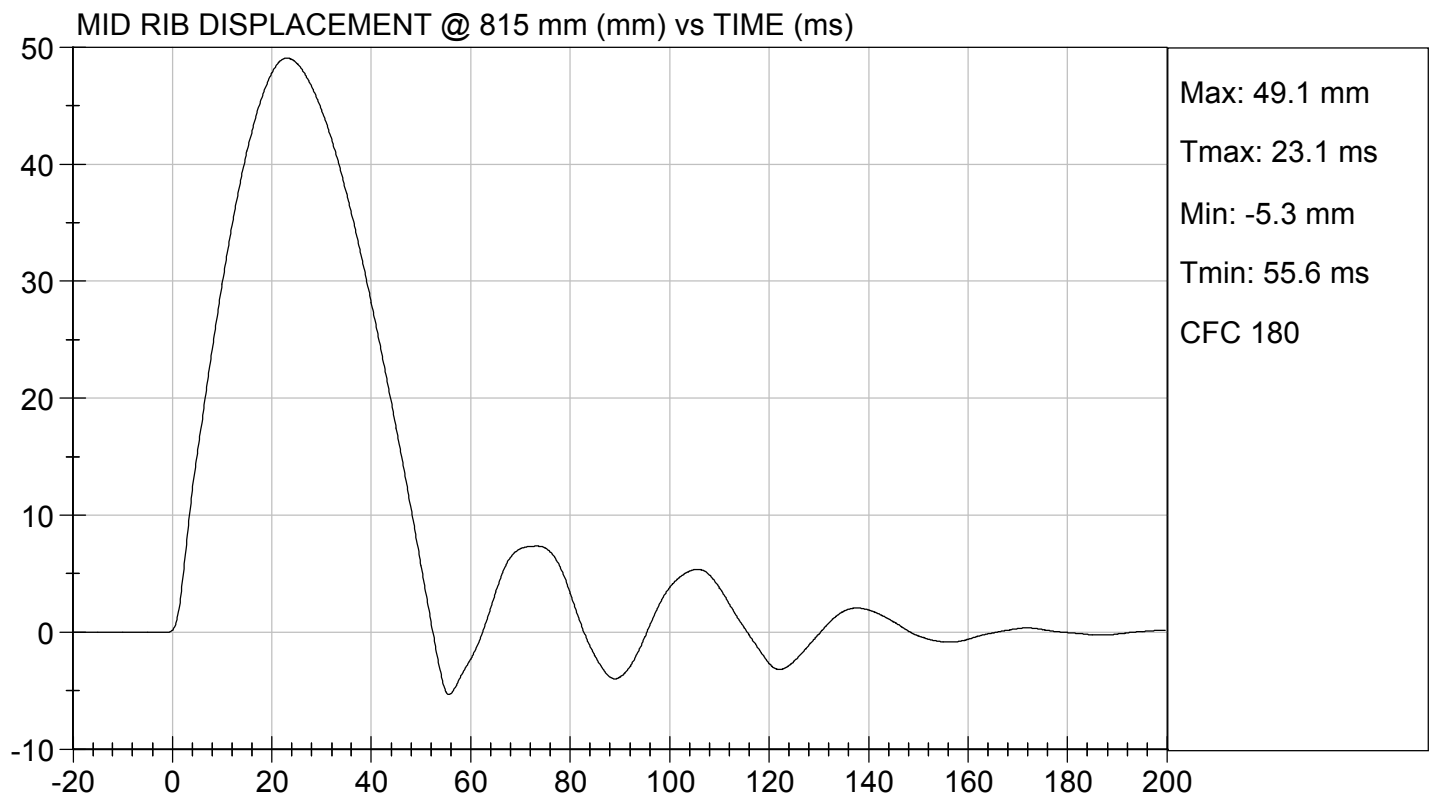
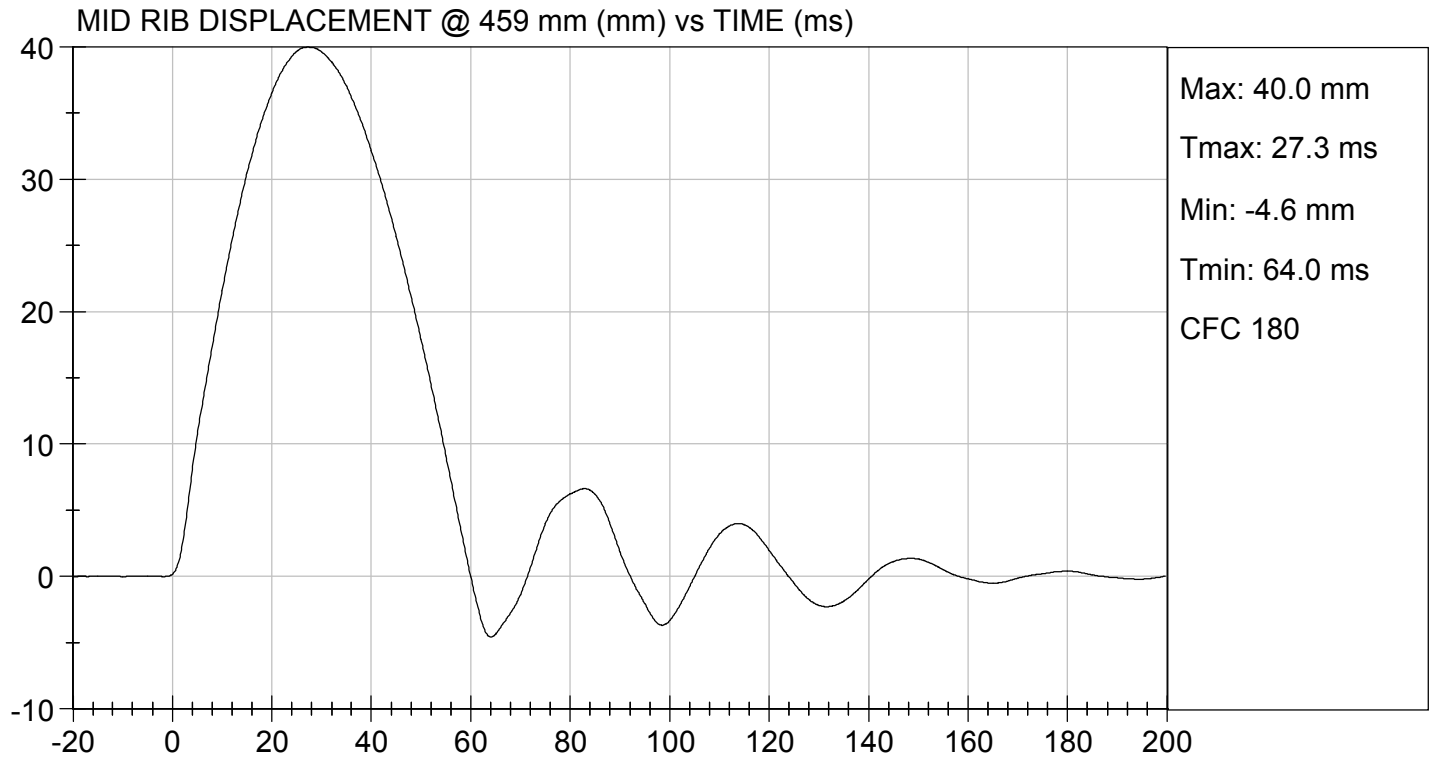


Laboratory Technician



Approved By

10/03/2020
Test Date



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

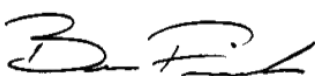
ATD Serial No: F032

Test I.D: D202466

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	35	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.4	Pass
Overall Test Results				Pass



Laboratory Technician



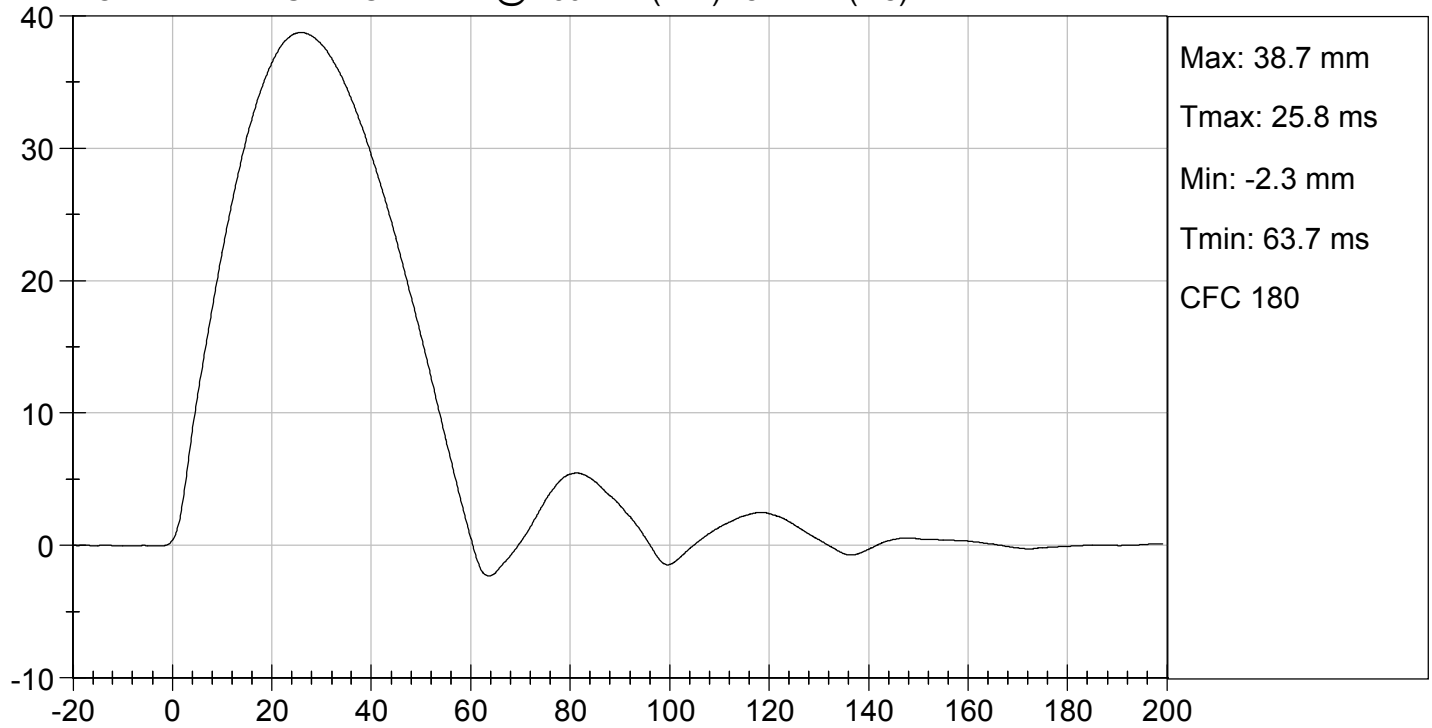
Approved By

10/03/2020

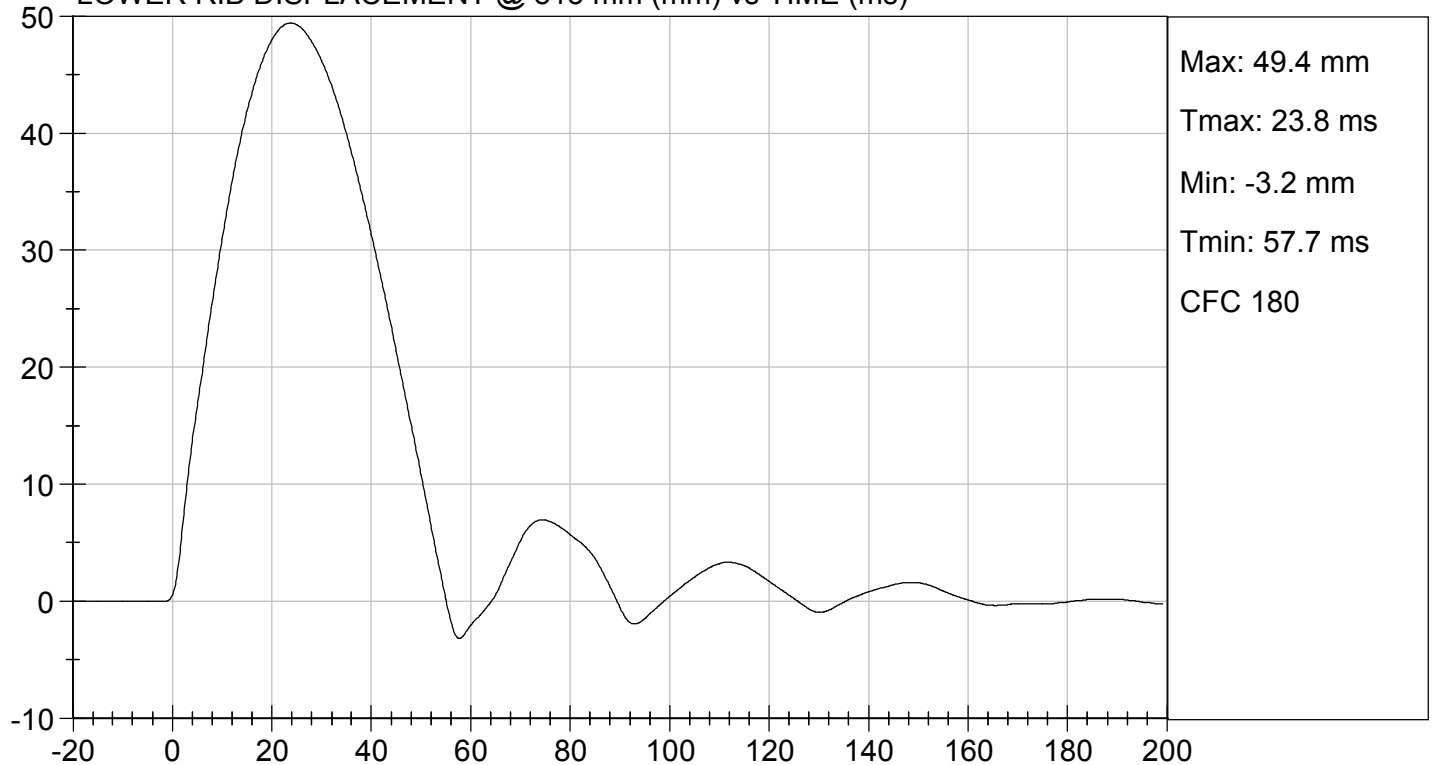
Test Date



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



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

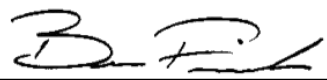


MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D202467

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	3.90 to 4.10	4.00	Pass
Maximum Impactor Force	N	4000 to 4800	4290	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.8	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2298	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.5	Pass
Overall Test Results				Pass


Laboratory Technician

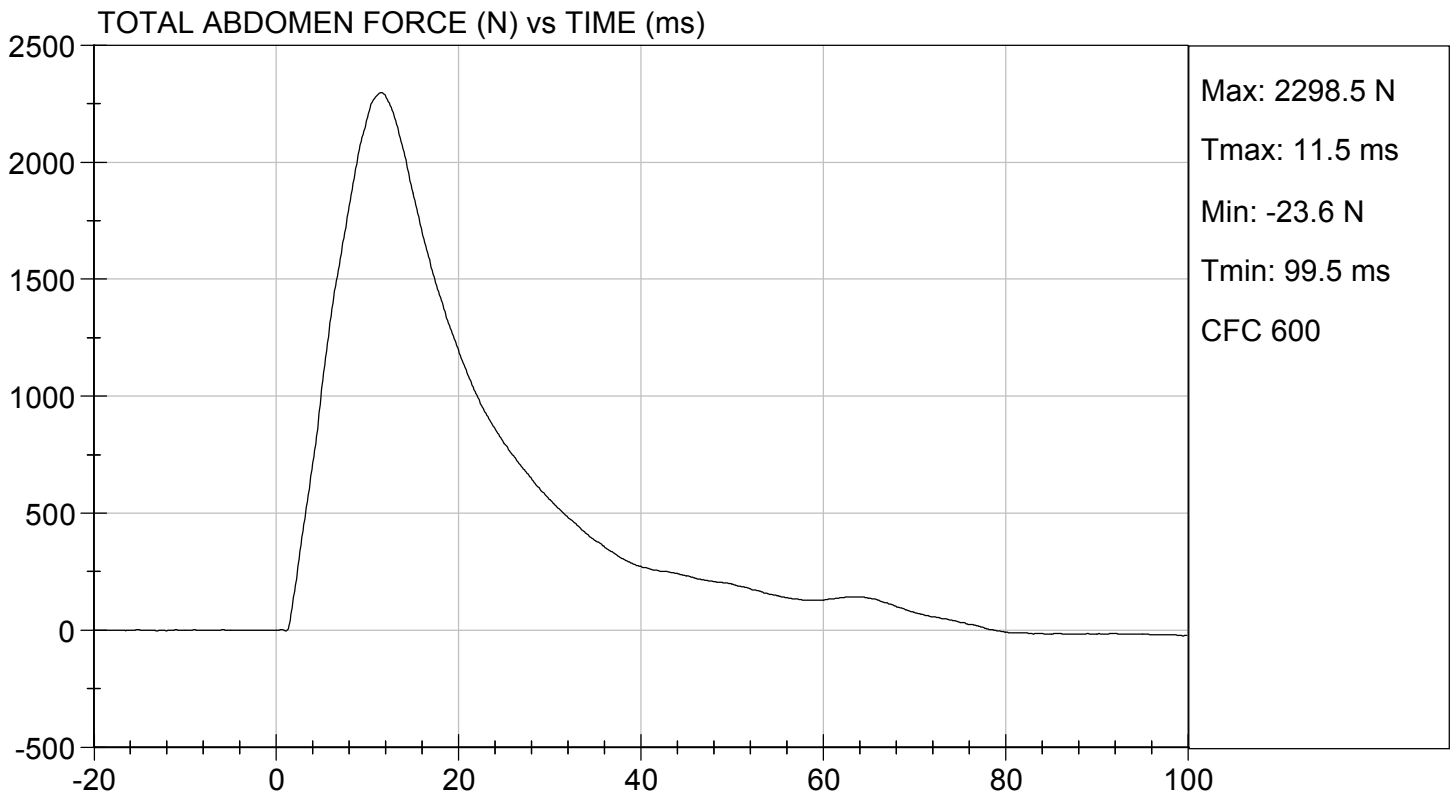
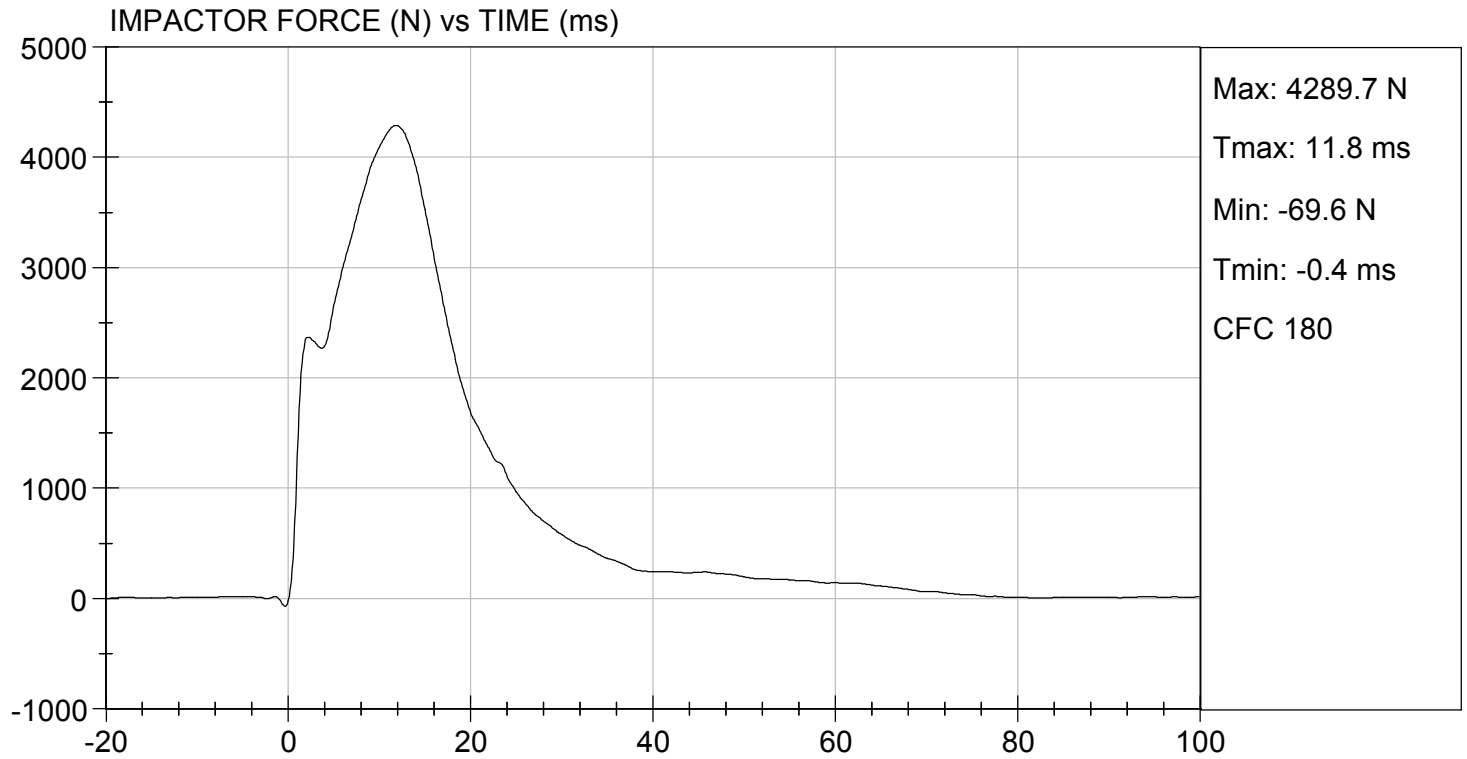
10/05/2020
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

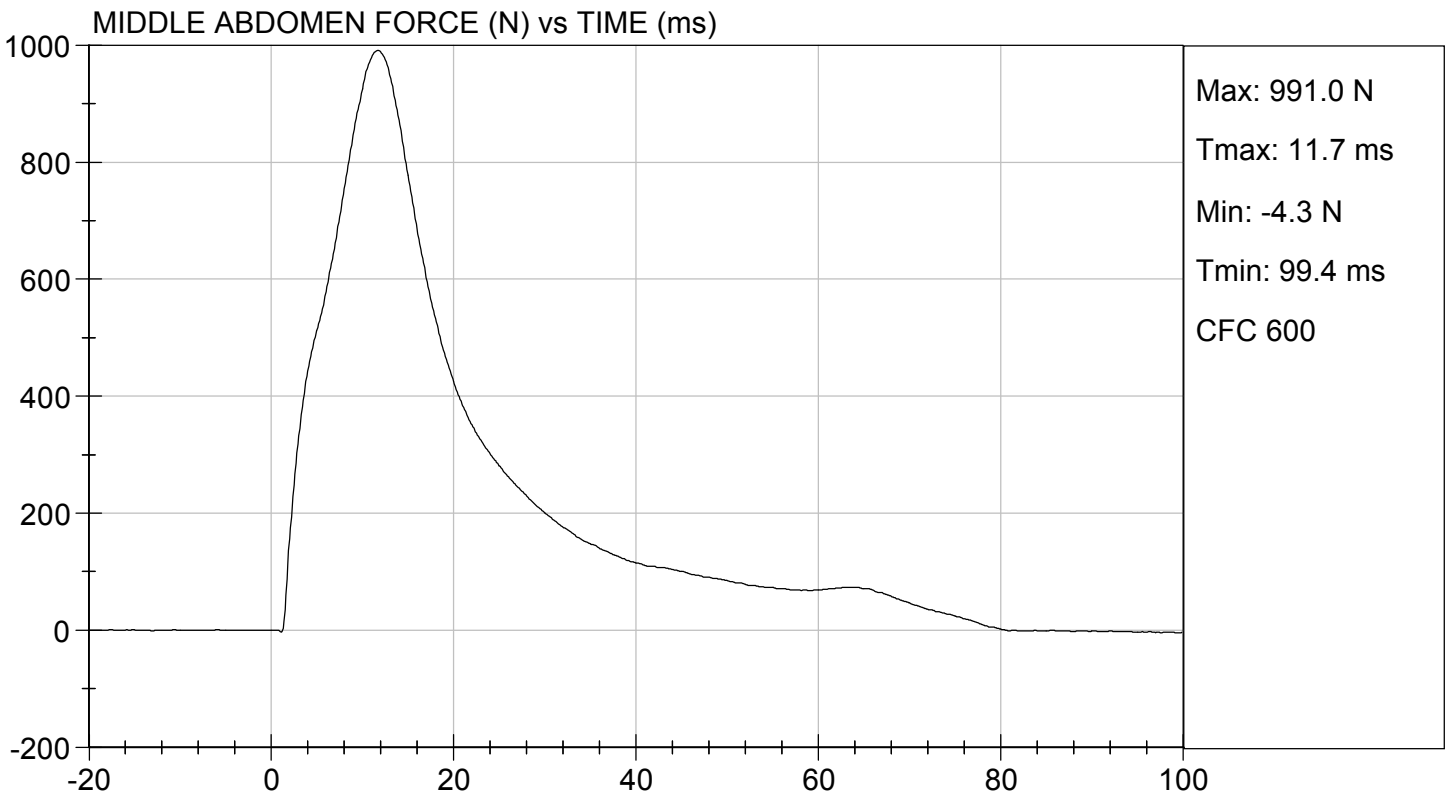
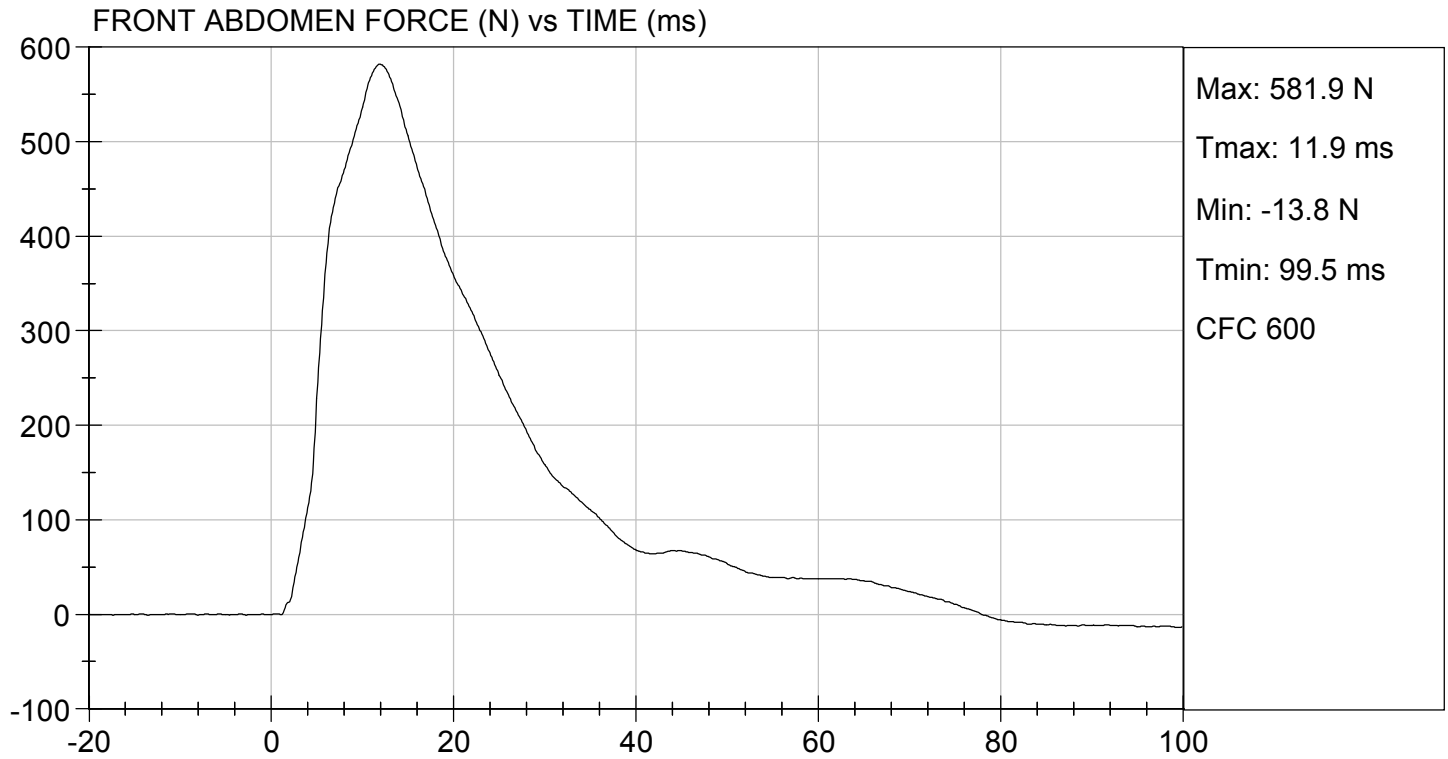
TEST DATE: 10/05/2020
TEST #: D202467





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

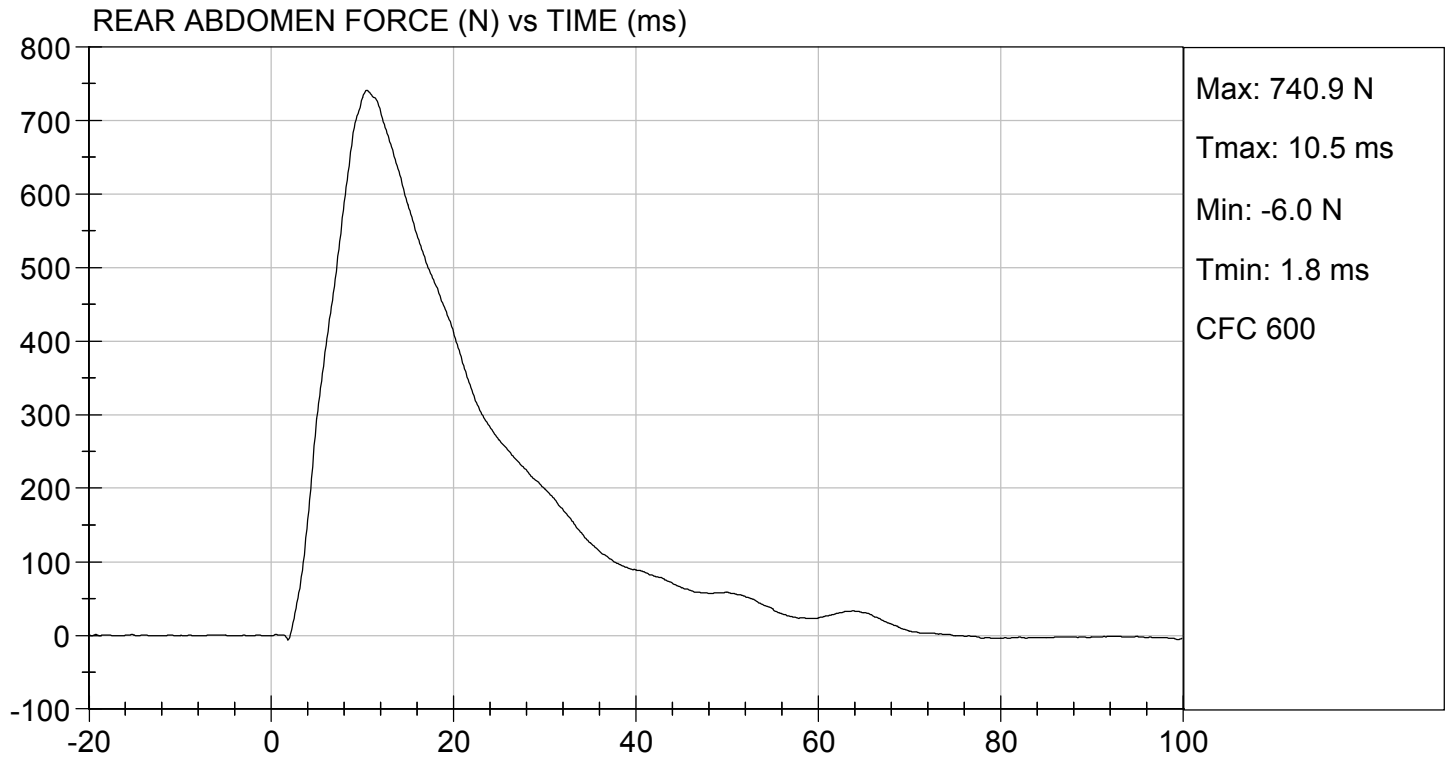
TEST DATE: 10/05/2020
TEST #: D202467





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.12 ft/s, 4.00 m/s

TEST DATE: 10/05/2020
TEST #: D202467



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

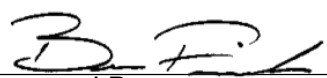
ATD Serial No: F032

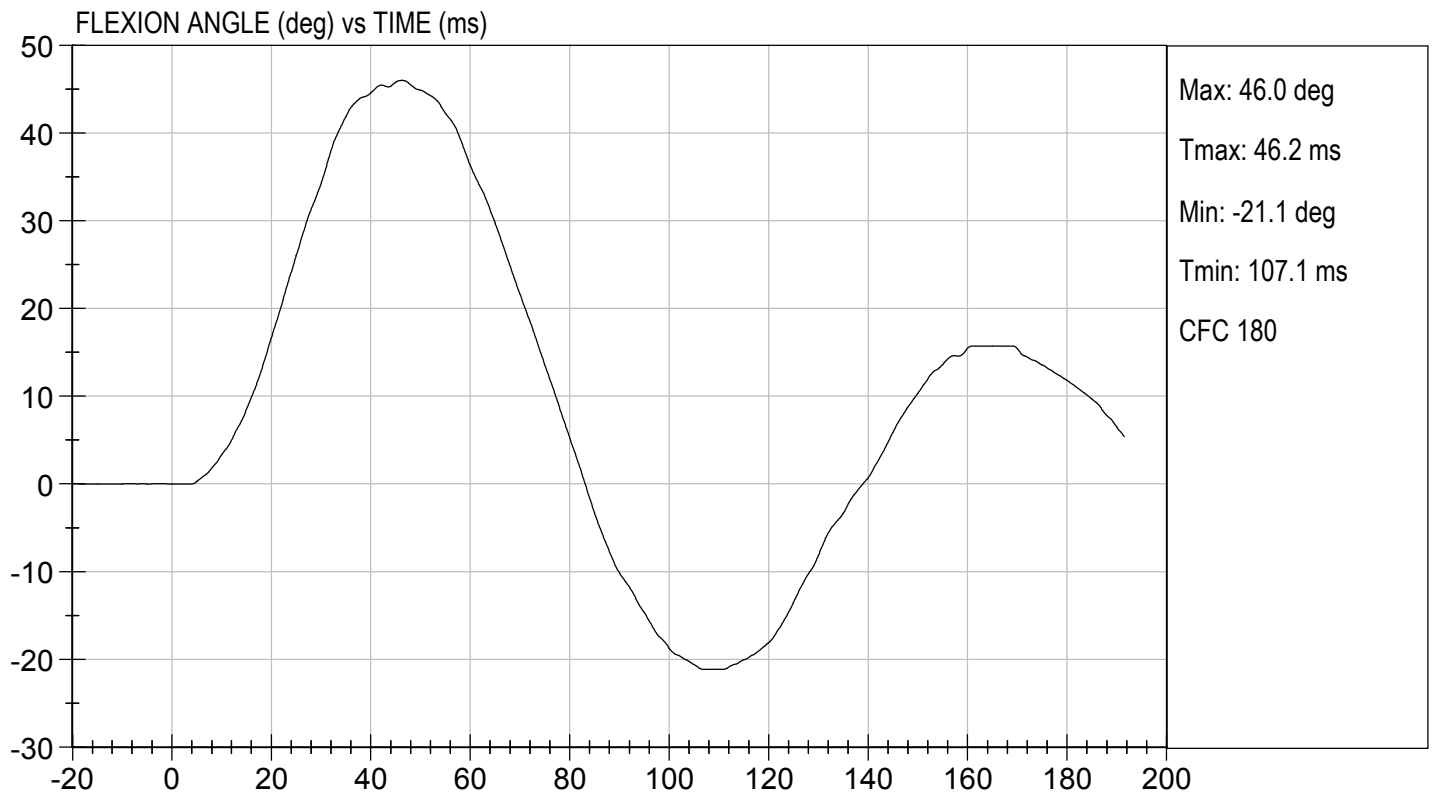
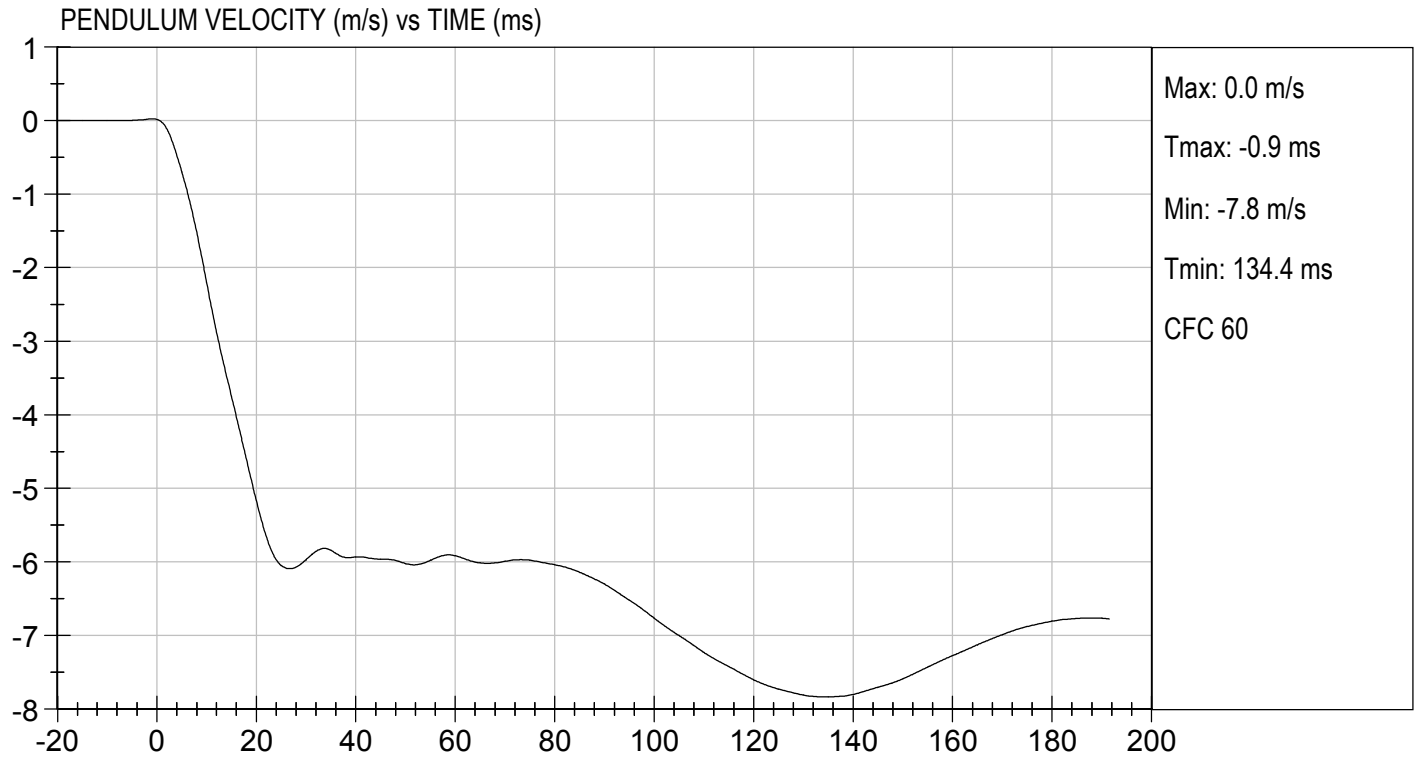
Test I.D: D202468

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	34	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.406	Pass
	27 ms	m/s	-6.50 to -5.80	-6.09	Pass
	30 ms	m/s	>= -6.50	-5.97	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	46.2	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	37	Pass
Overall Results					Pass


 Laboratory Technician

10/03/2020
 Test Date

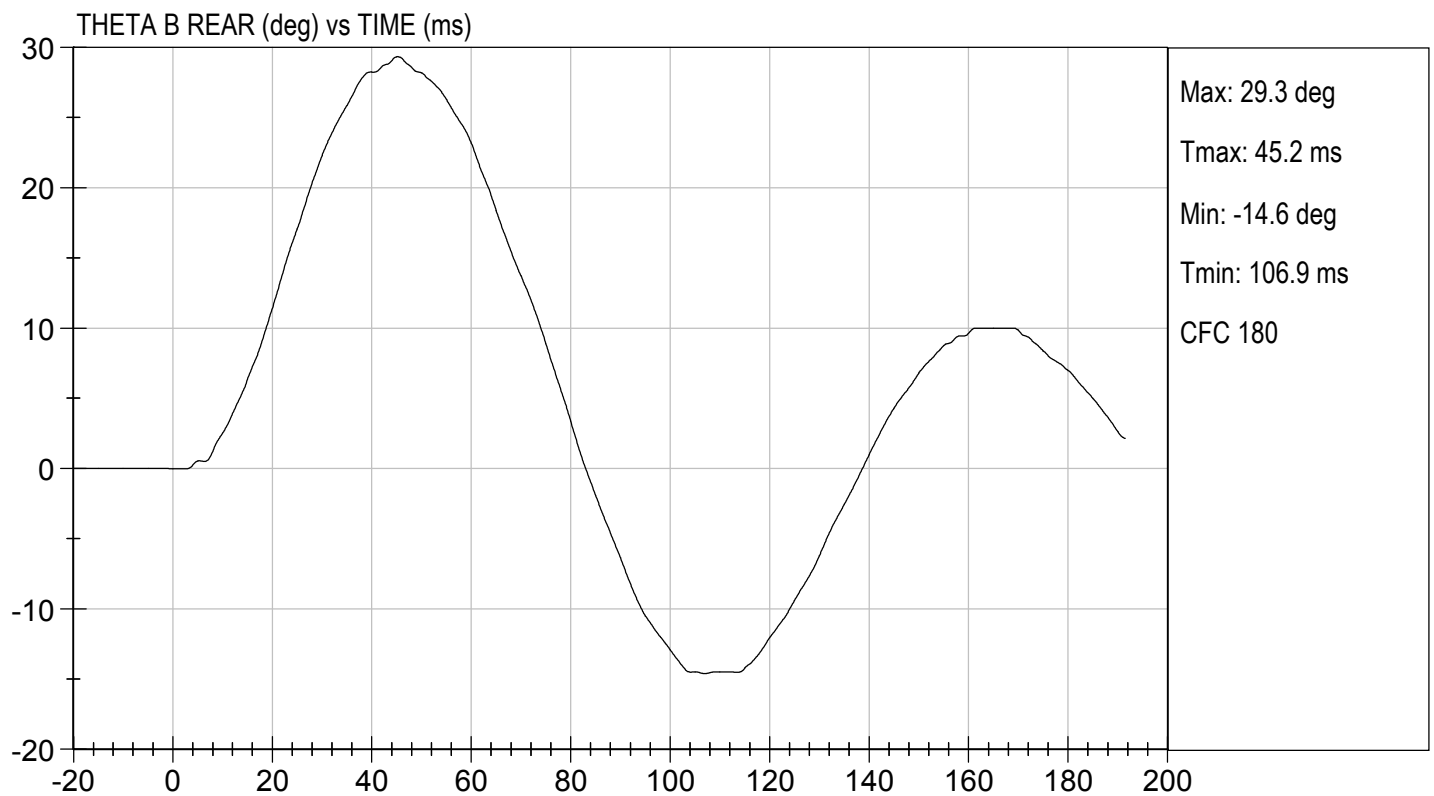
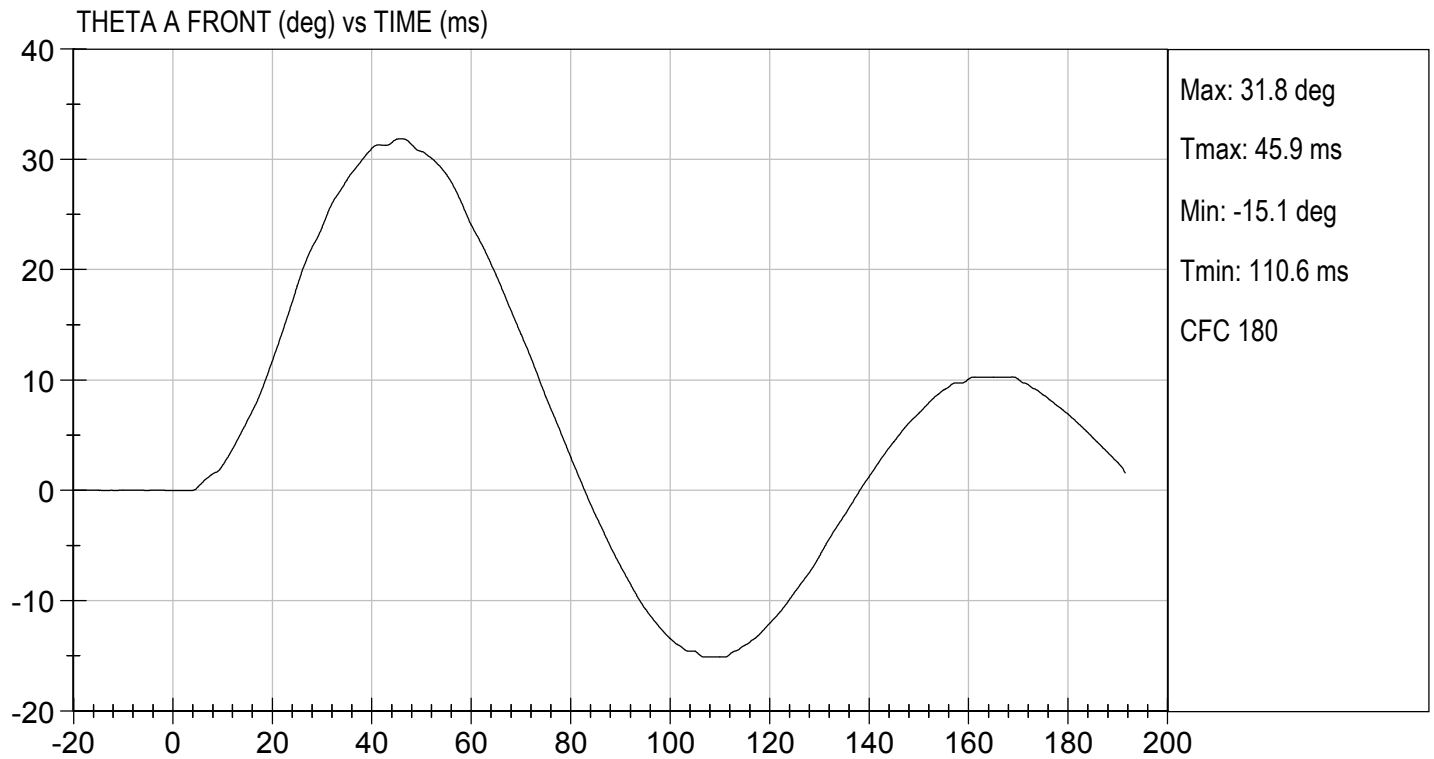

 Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

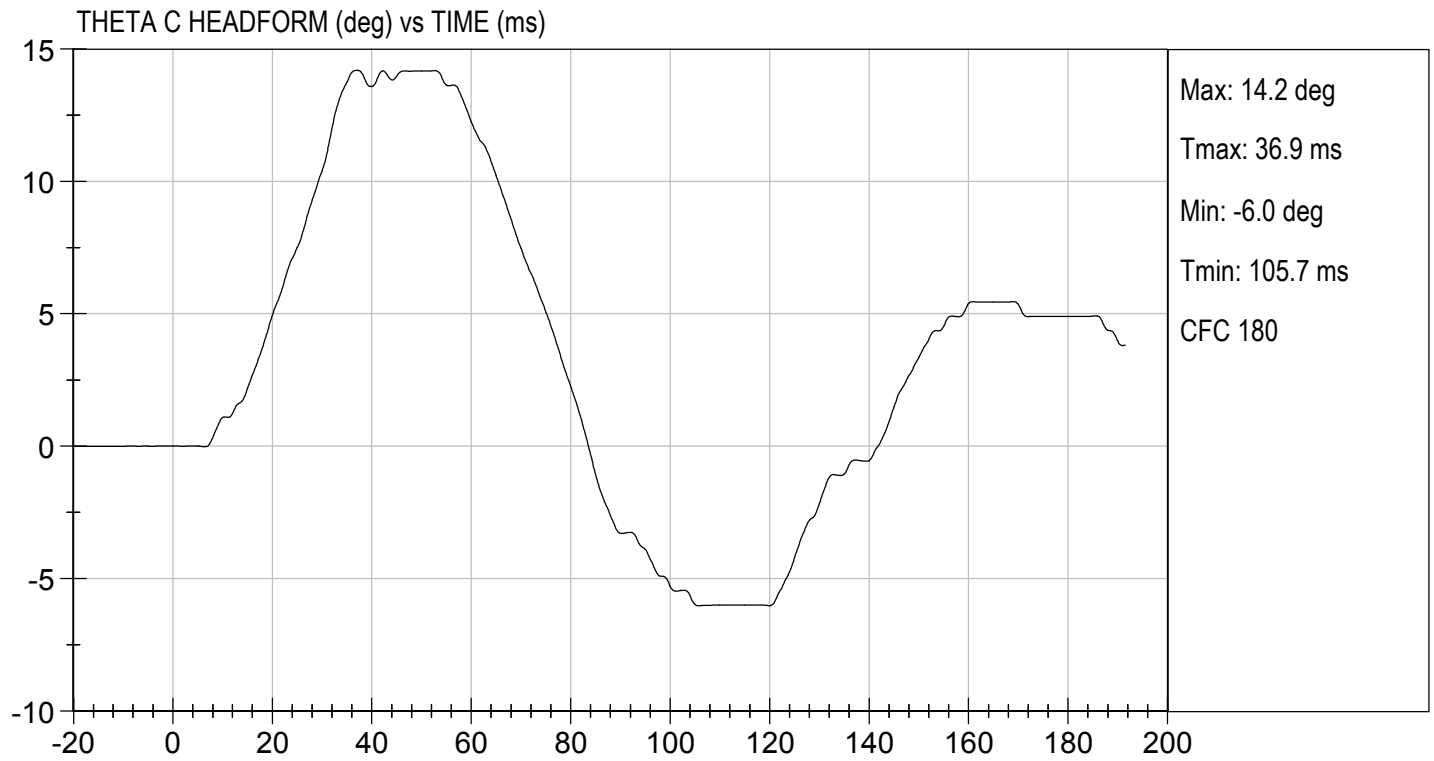
TEST DATE: 10/03/2020
TEST #: D202468





TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 10/03/2020
TEST #: D202468

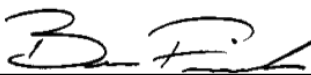


MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** F032**Test I.D:** D202469

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	4973	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.6	Pass
Maximum Pubic Force	N	1230 to 1590	1378	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.0	Pass
Overall Test Results				Pass


Laboratory Technician

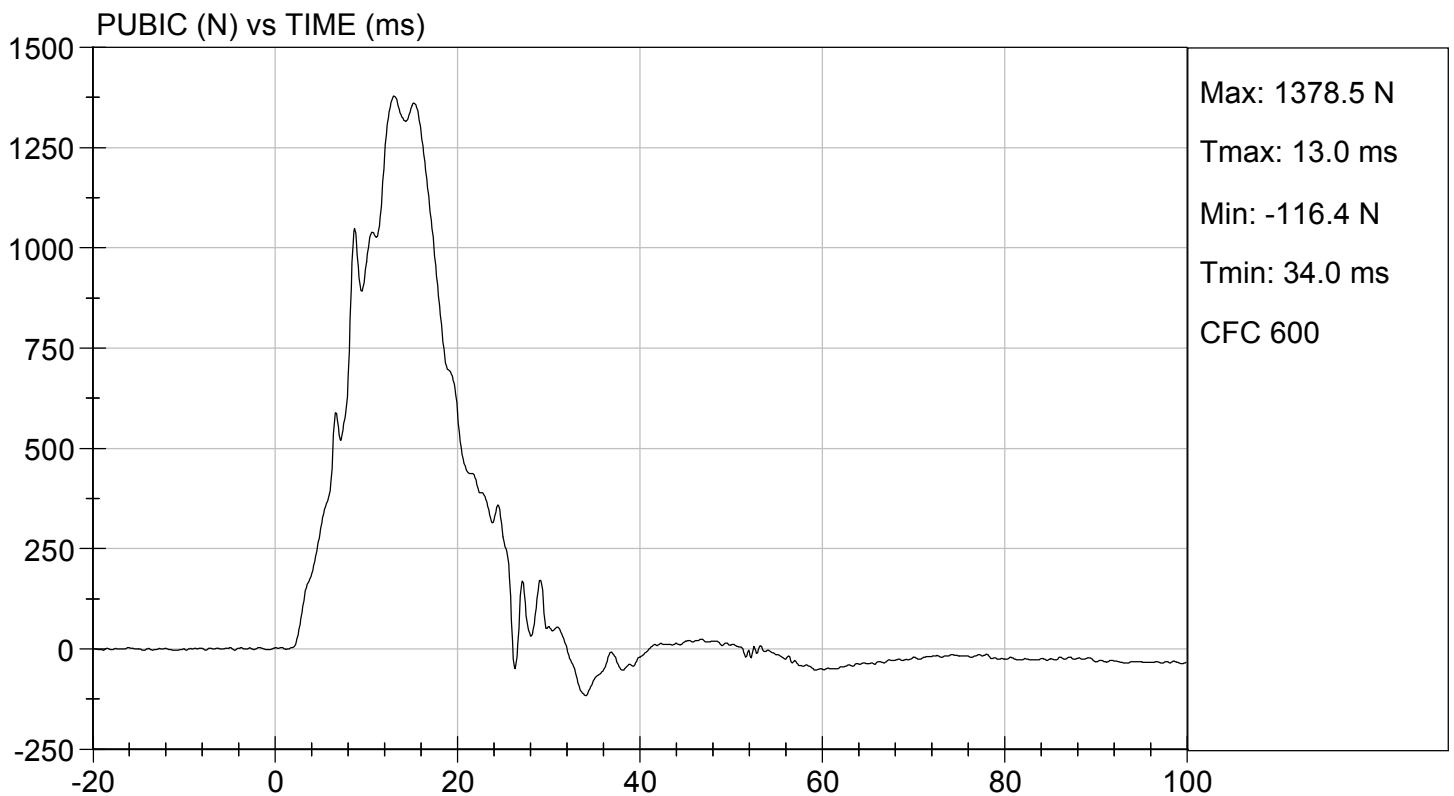
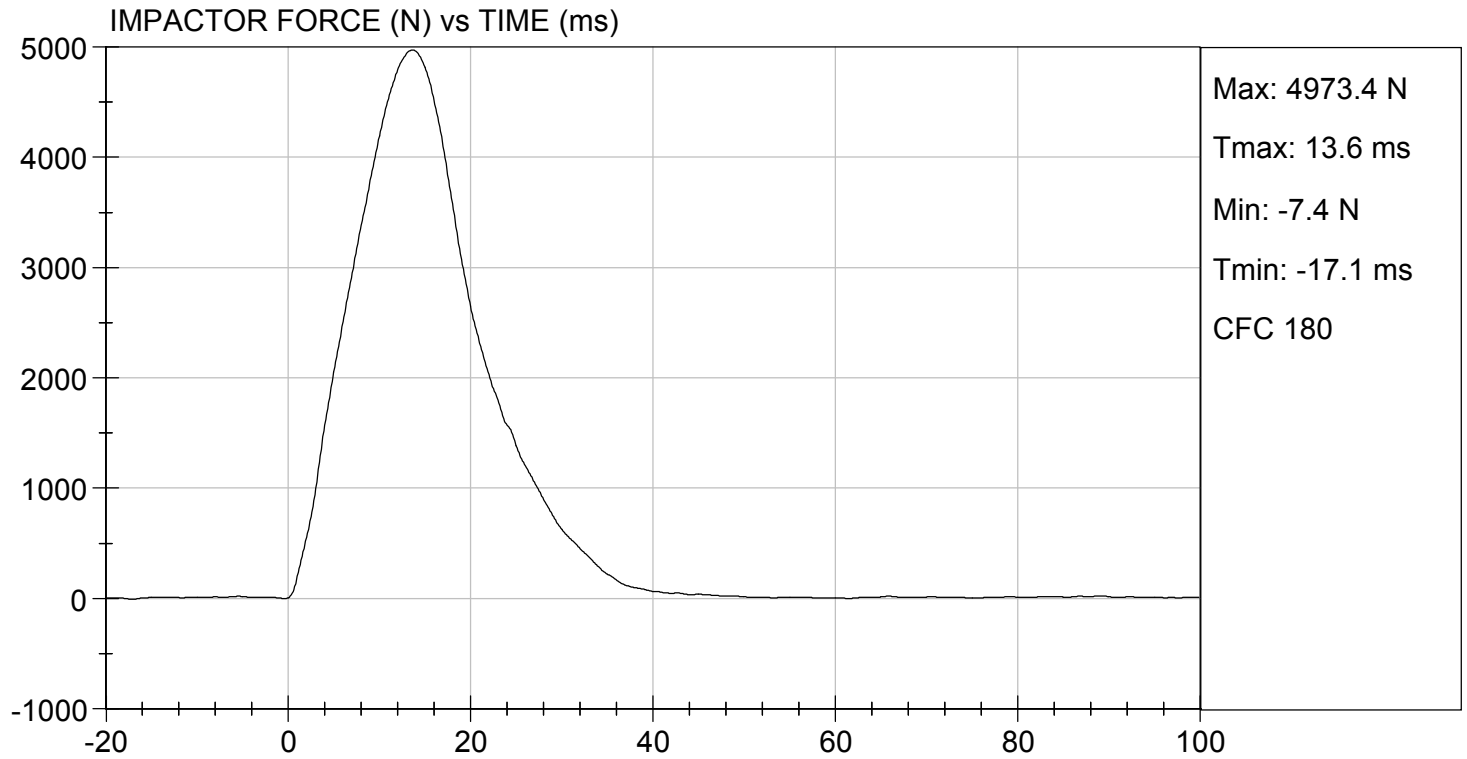
10/05/2020
Test Date


Approved By



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

TEST DATE: 10/05/2020
TEST #: D202469



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: F032

Test I.D: D202460

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5596	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.6	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.4	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.7	Pass
Overall Test Results			Pass	


Laboratory Technician

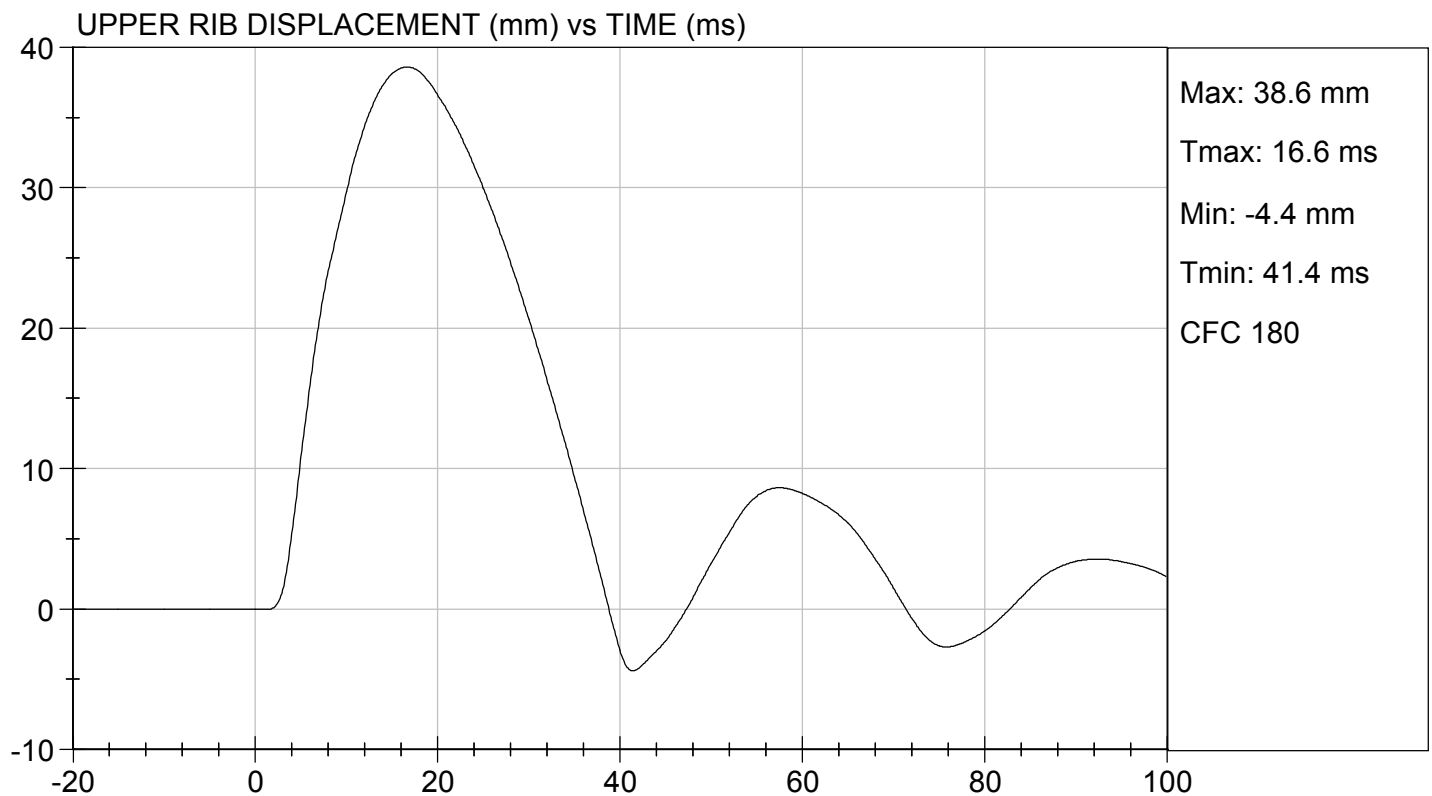
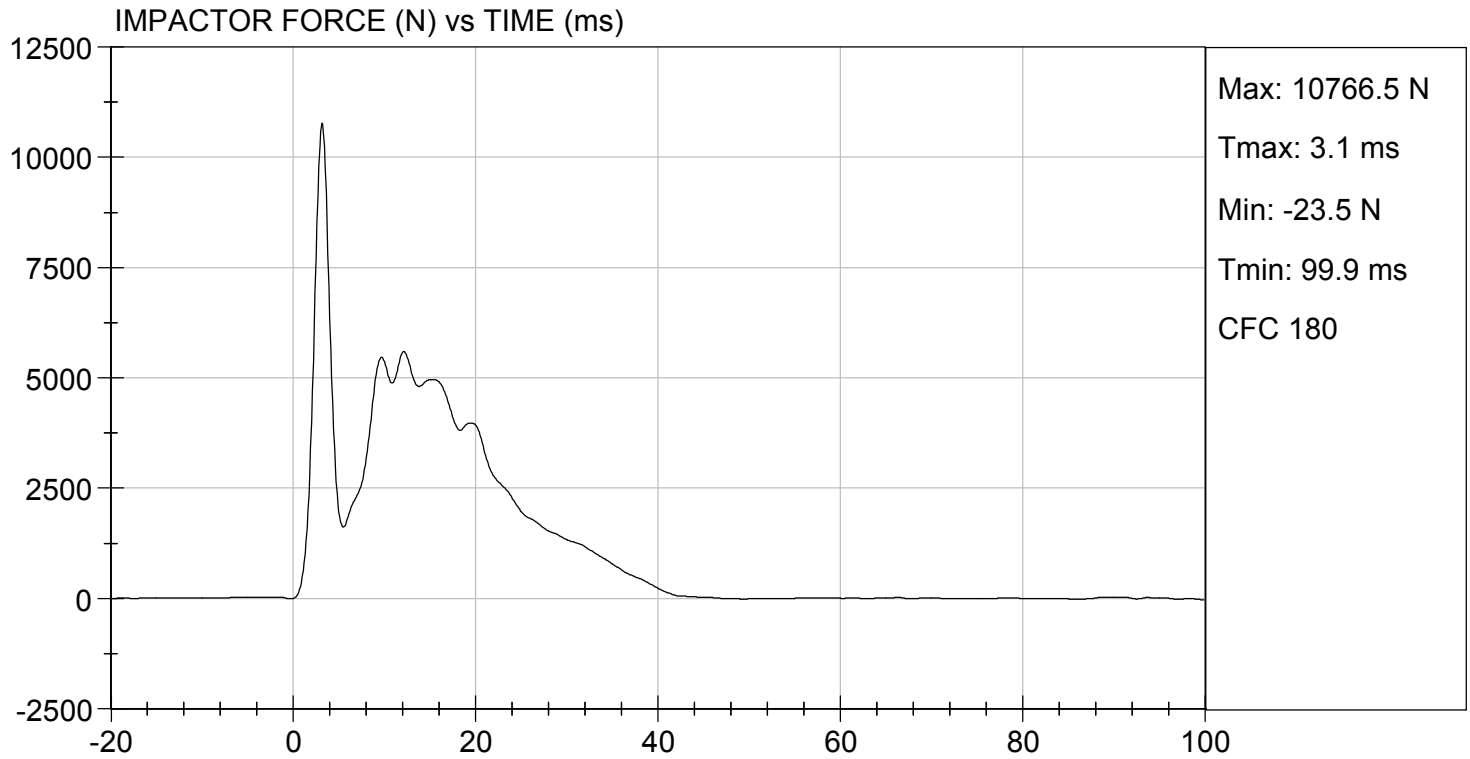
10/05/2020
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.31 ft/s, 5.58 m/s

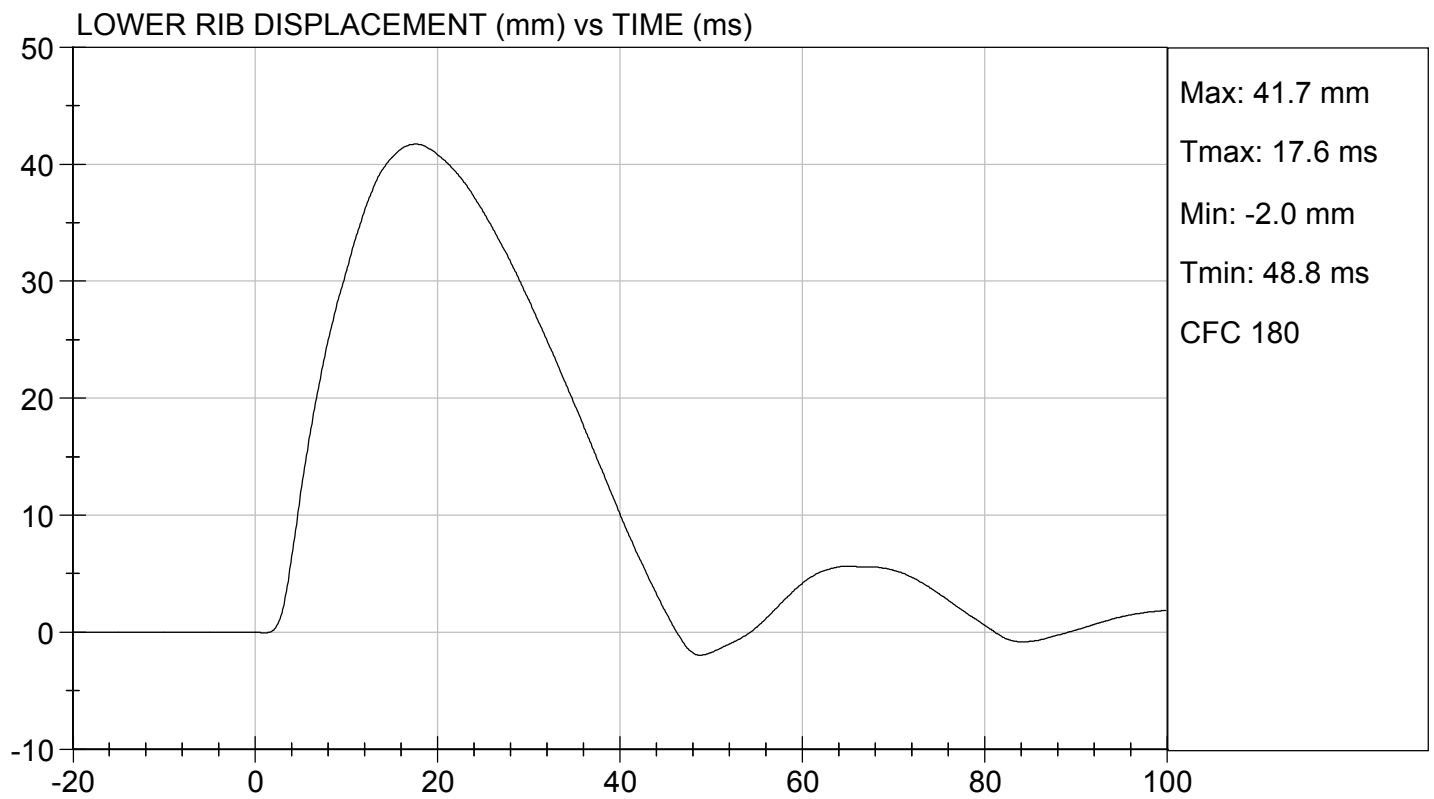
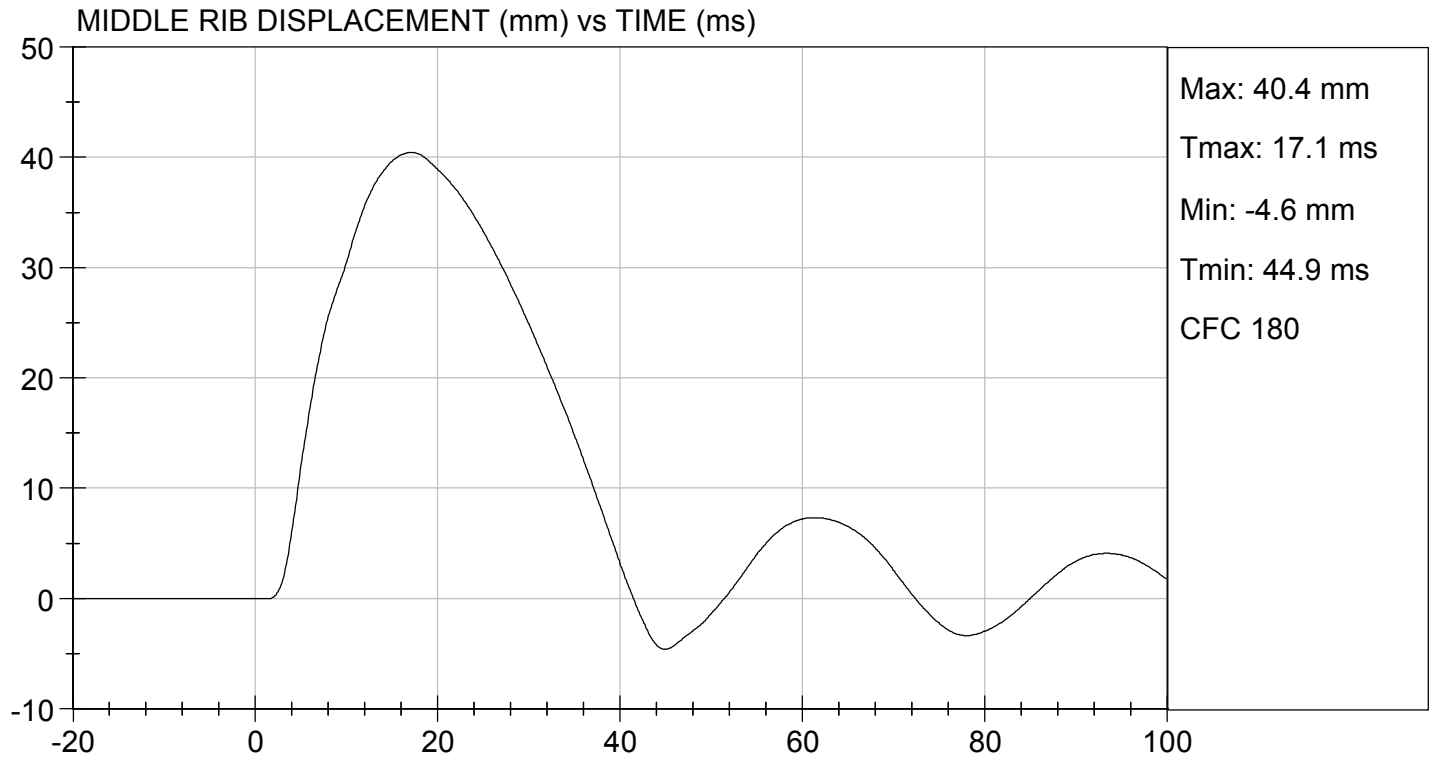
TEST DATE: 10/05/2020
TEST #: D202460





TEST DESC: THORAX IMPACT
VELOCITY: 18.31 ft/s, 5.58 m/s

TEST DATE: 10/05/2020
TEST #: D202460



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

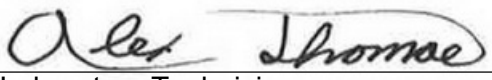
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148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

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

ATD Serial No: 296

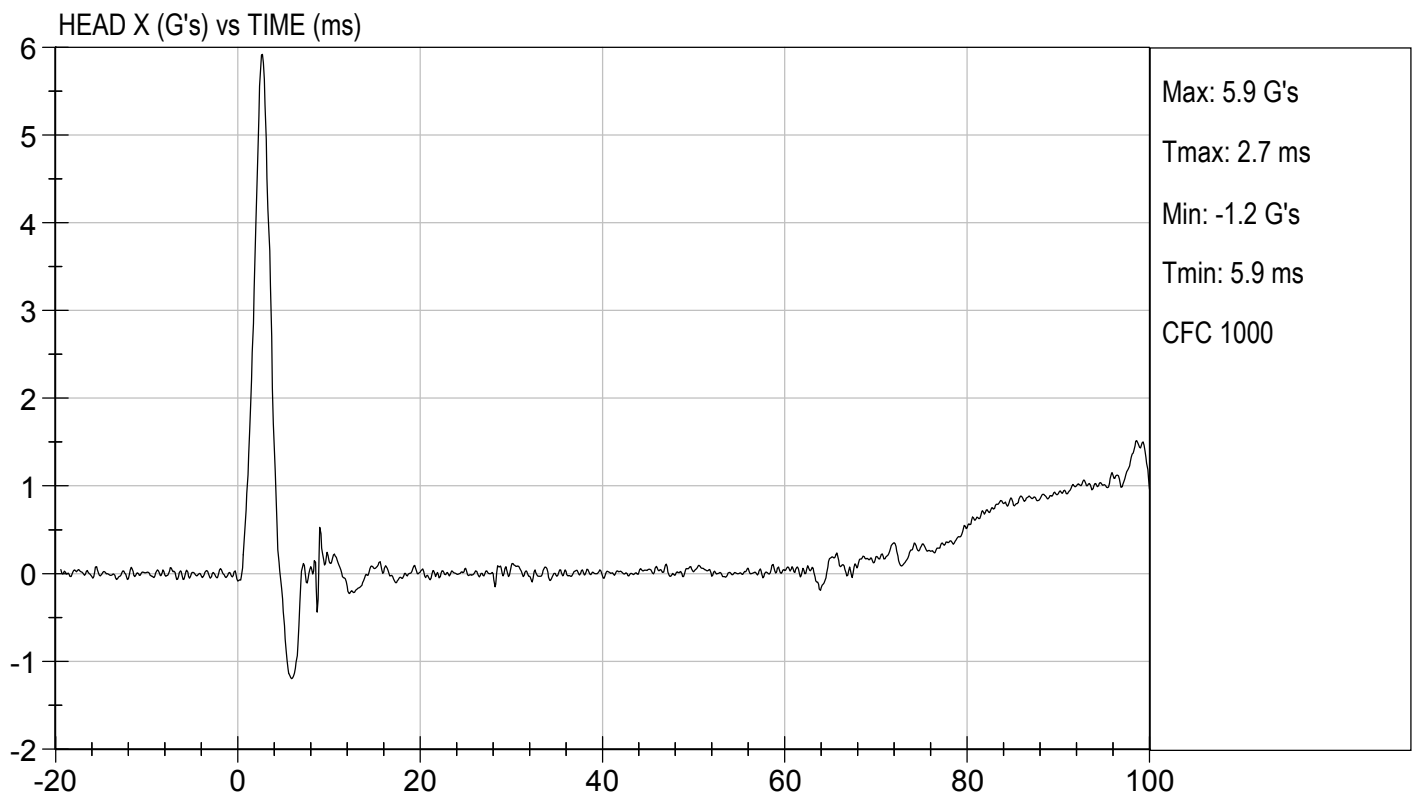
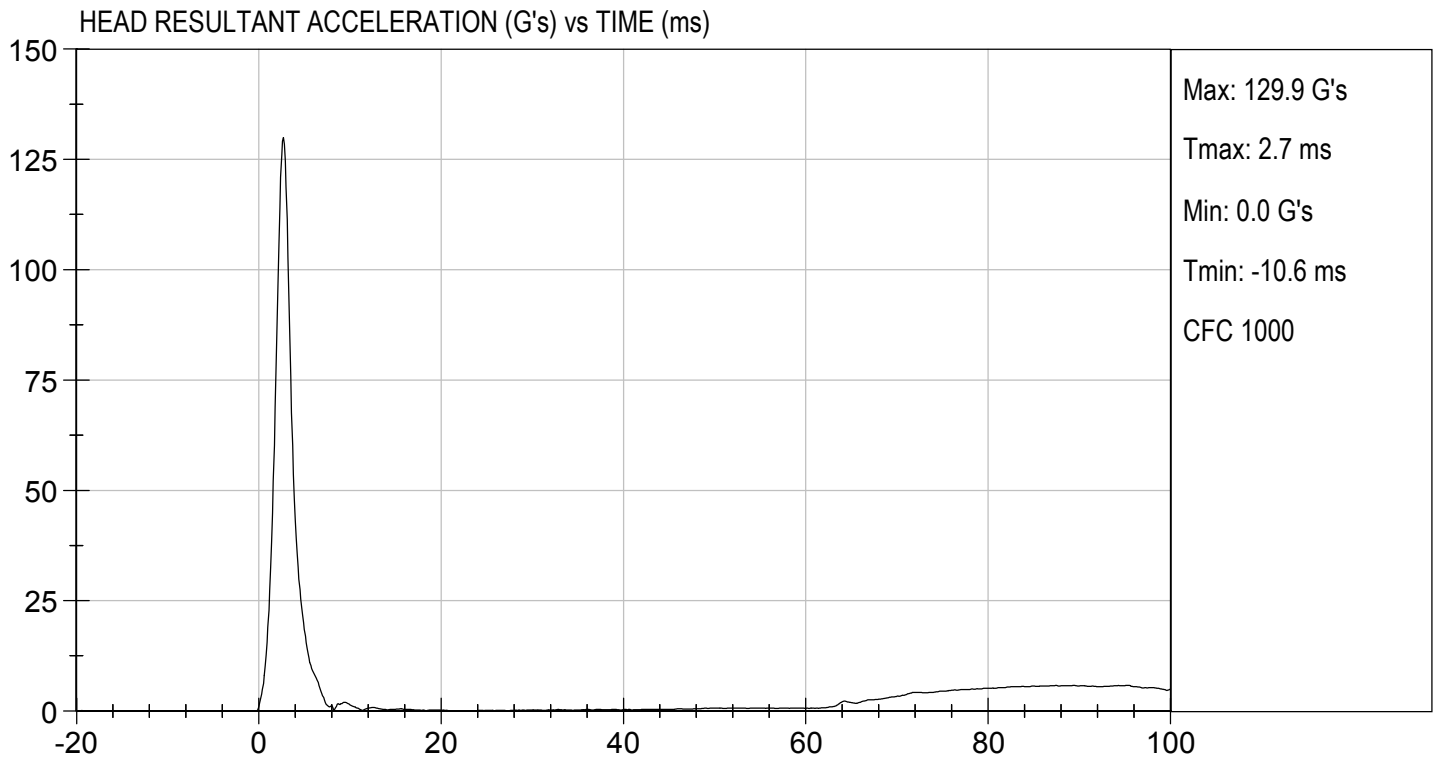
Test ID: D201951

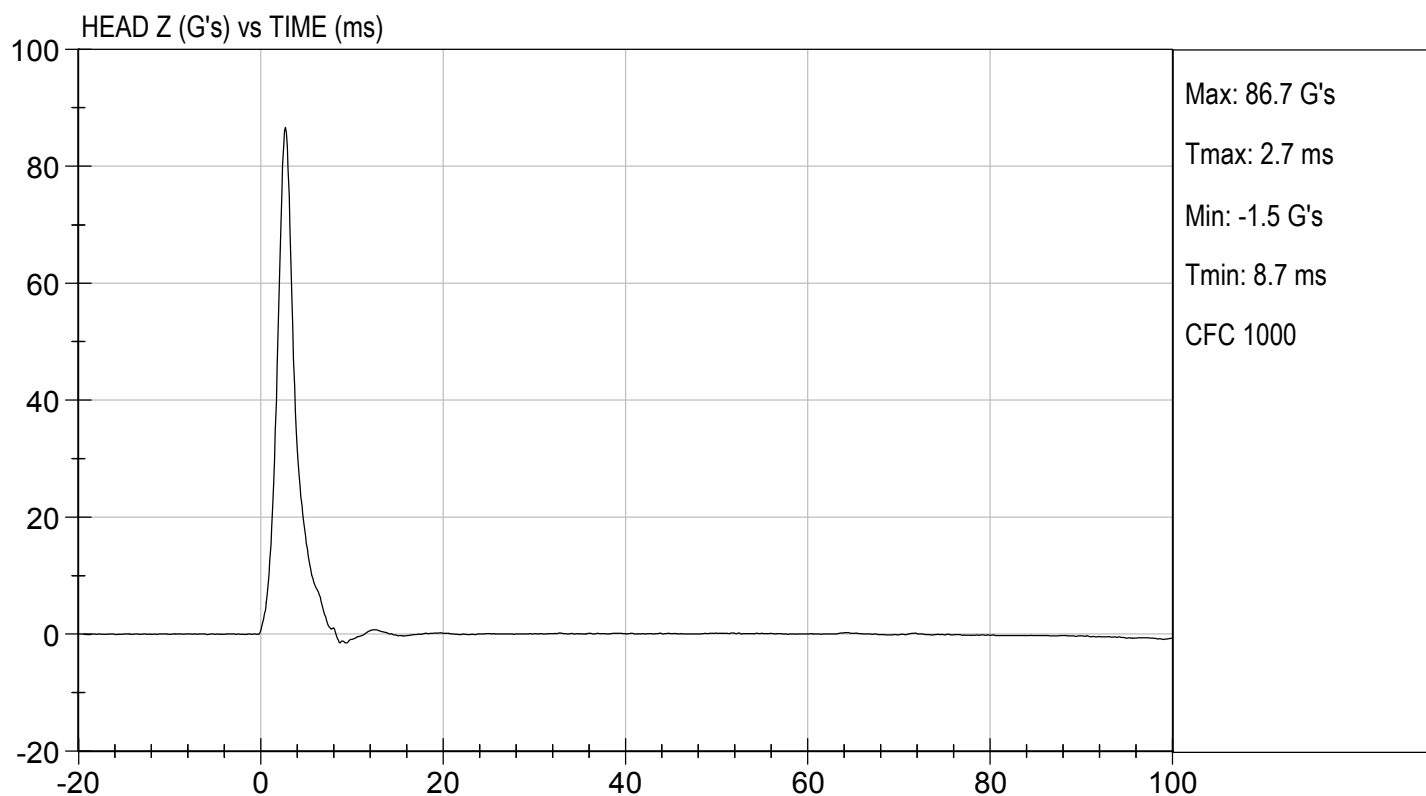
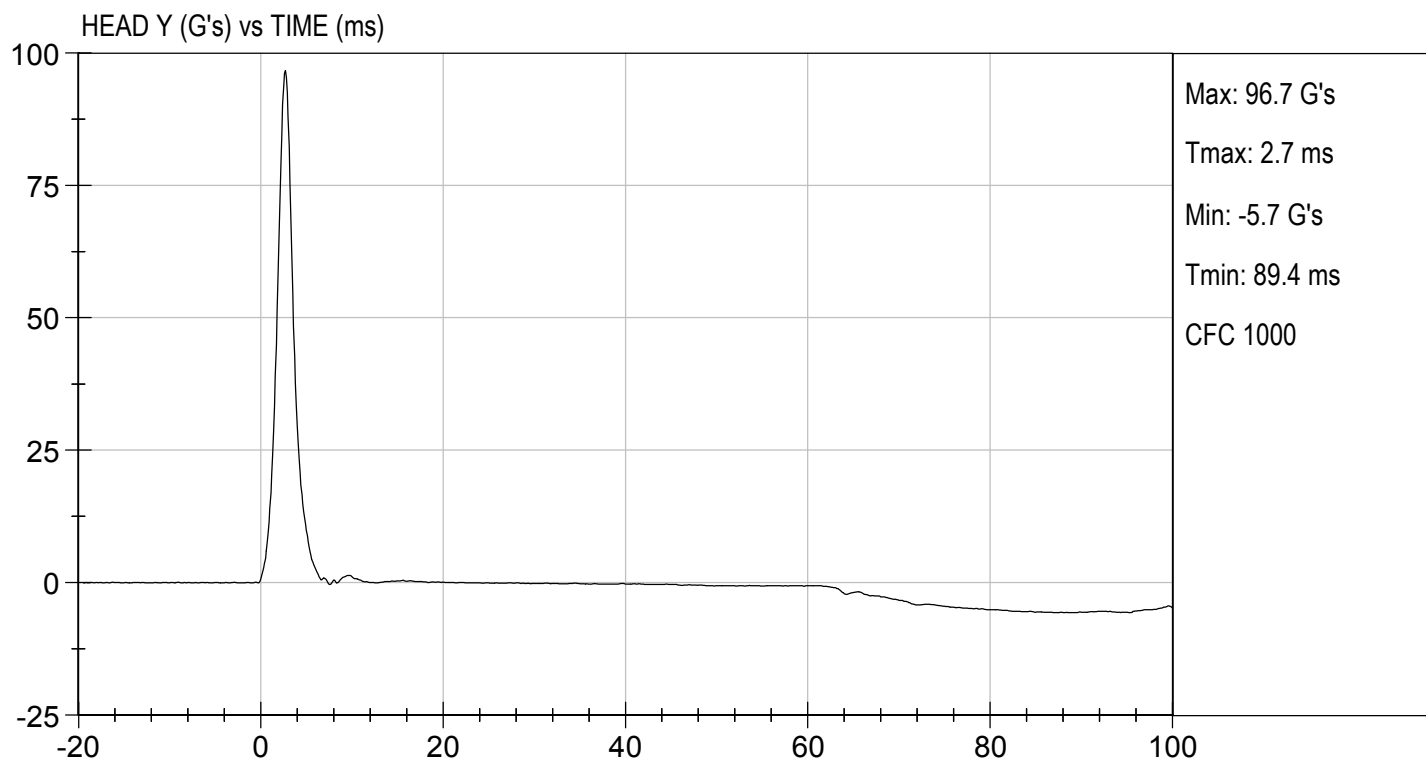
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	115 to 137	130	Pass
Peak Longitudinal Acceleration	G's	+/- 15	5.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

08/07/2020
Test Date


Approved By



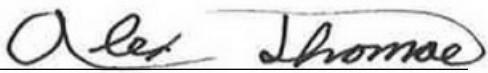


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 278

Test I.D: D201952

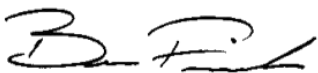
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	41	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.60	Pass
	15 ms	m/s	3.30 to 4.10	3.85	Pass
	20 ms	m/s	4.40 to 5.40	5.27	Pass
	25 ms	m/s	5.40 to 6.10	5.63	Pass
	25-100 ms	m/s	5.50 to 6.20	5.64	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-37	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
Overall Test Results					Pass



Laboratory Technician

08/07/2020

Test Date

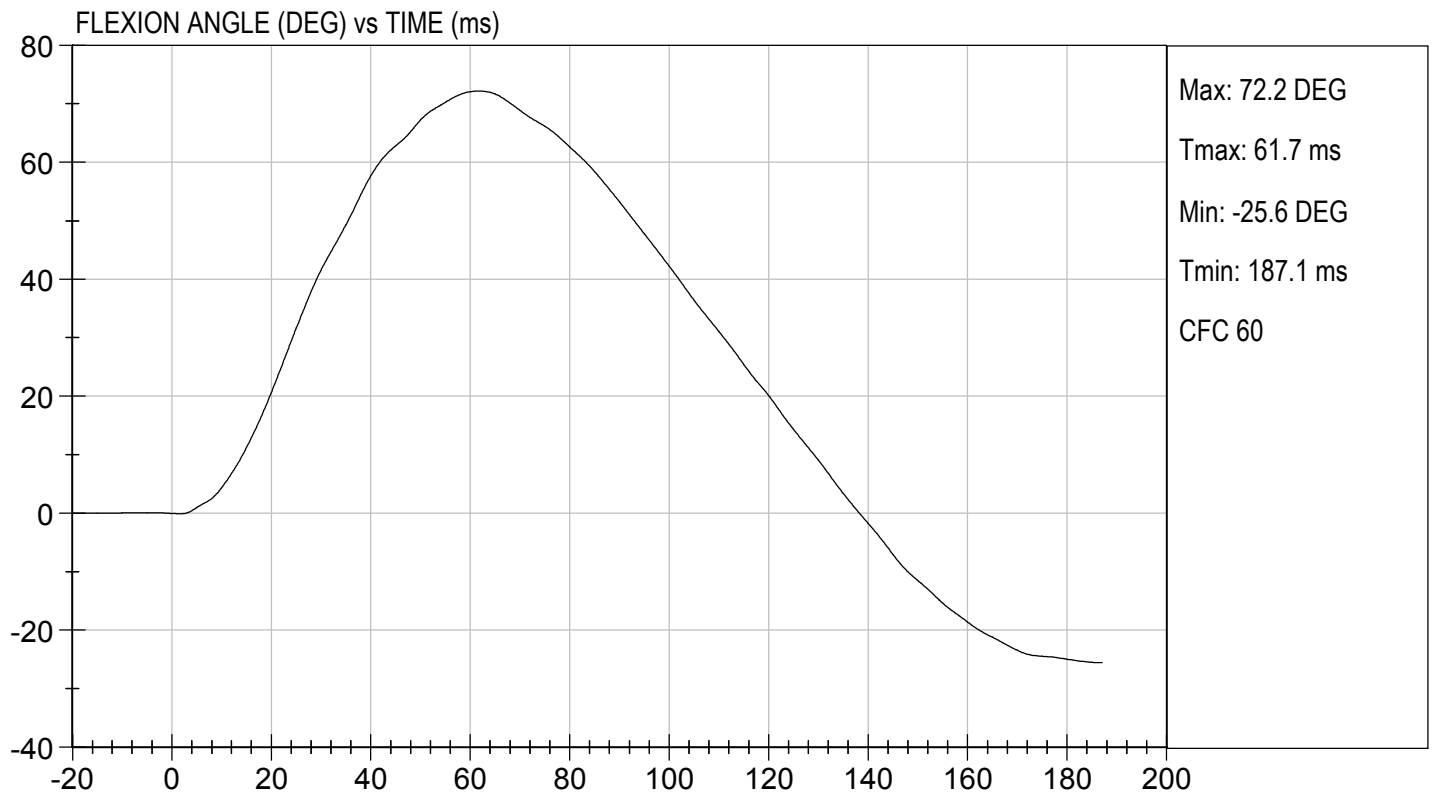
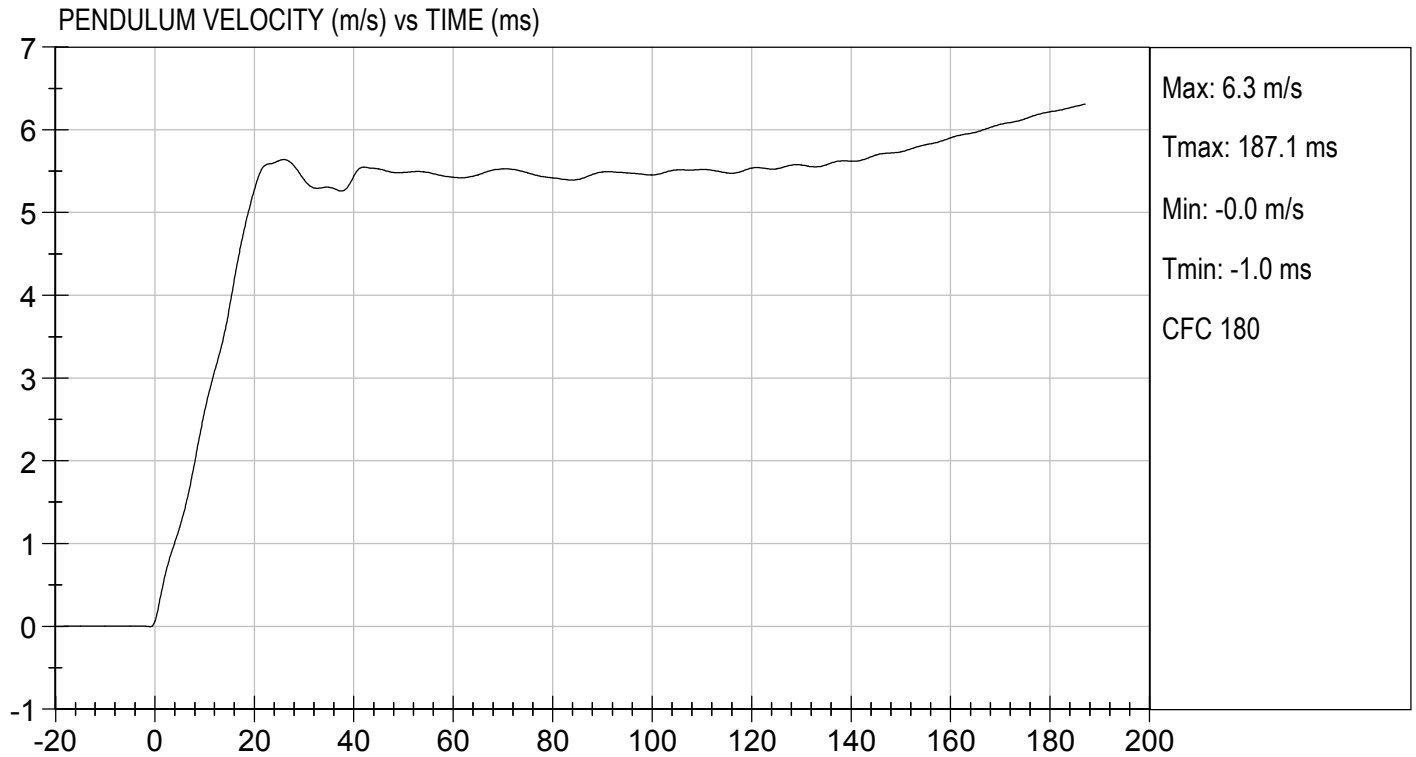


Approved By



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

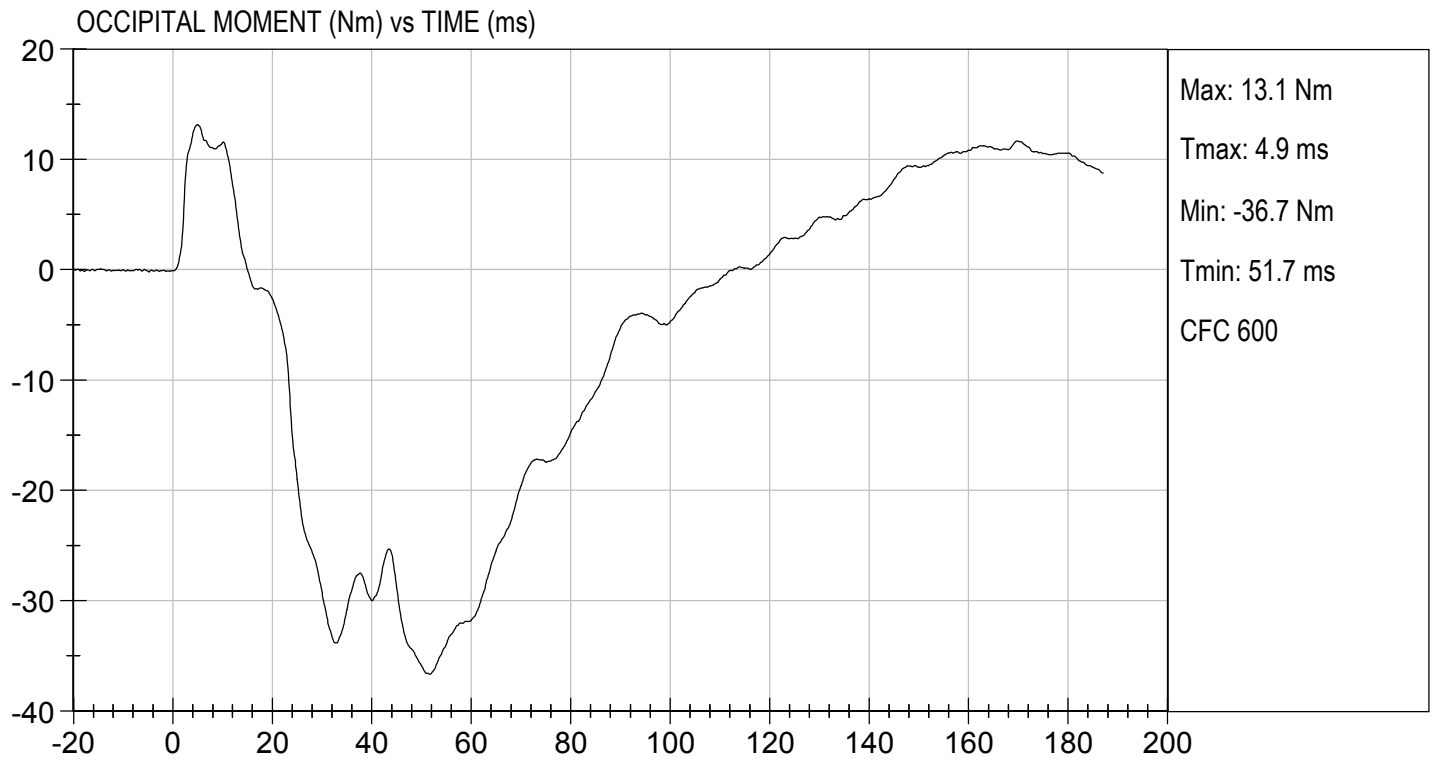
TEST DATE: 08/07/2020
TEST #: D201952





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

TEST DATE: 08/07/2020
TEST #: D201952



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

ATD Serial No: 296

Test ID: D201953

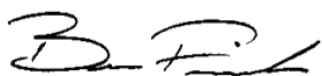
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	32	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass



Laboratory Technician

08/07/2020

Test Date

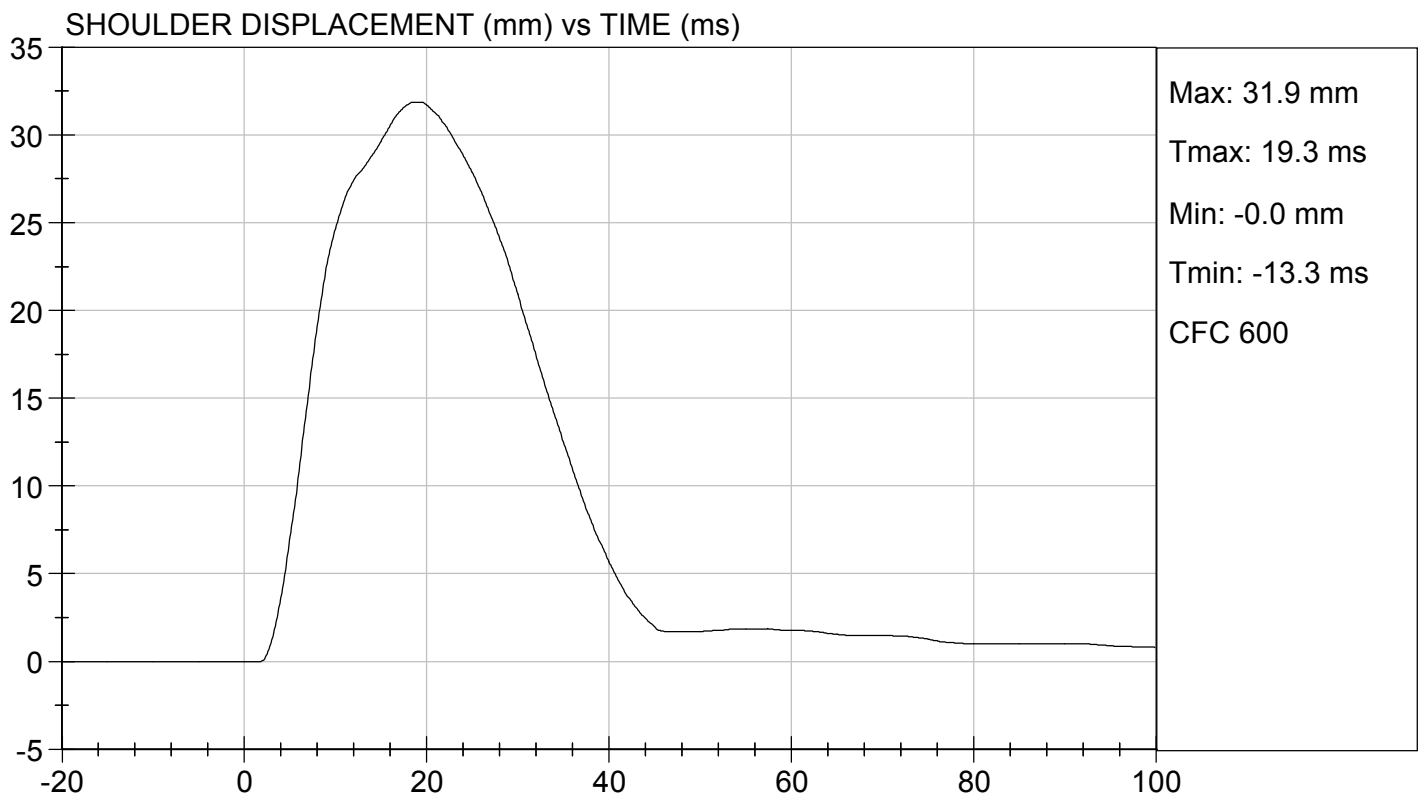
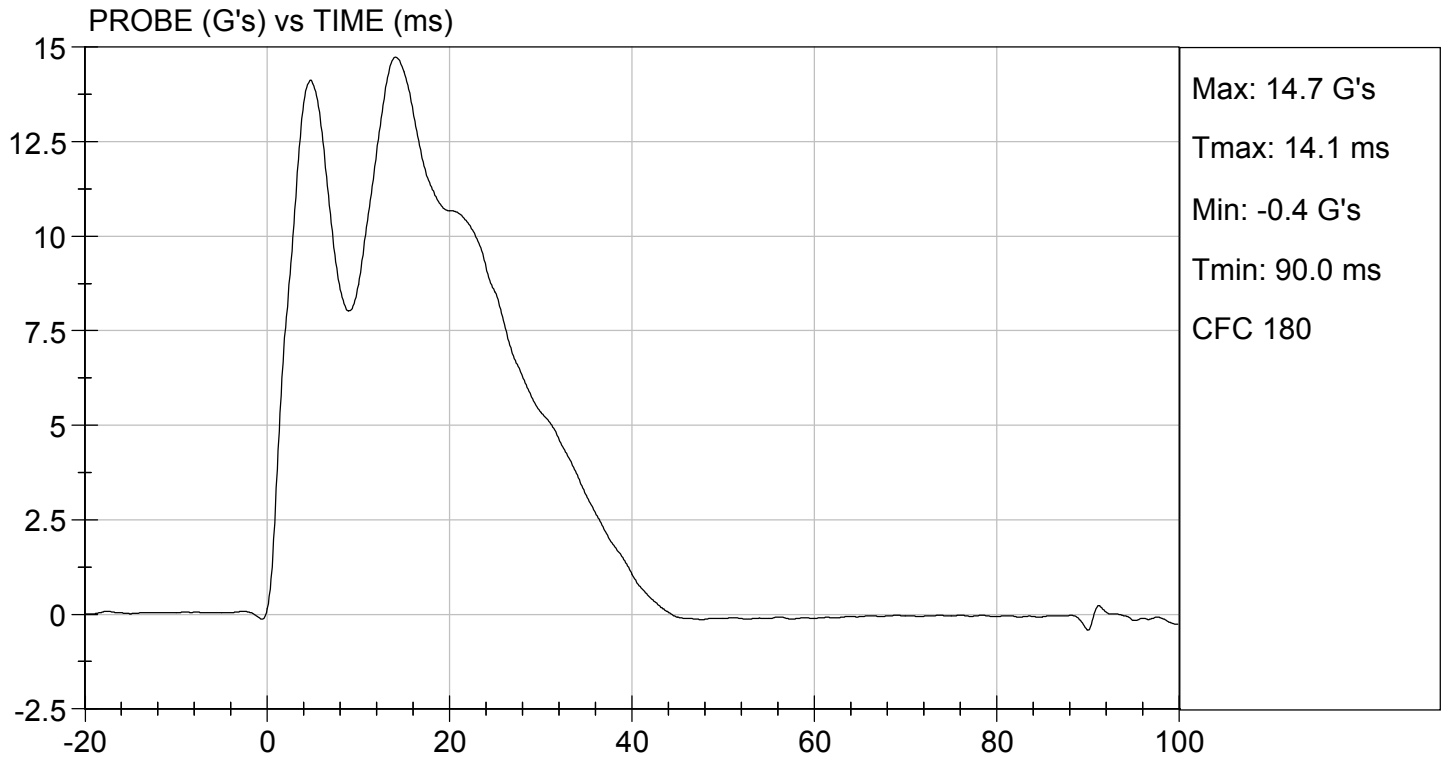


Approved By



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

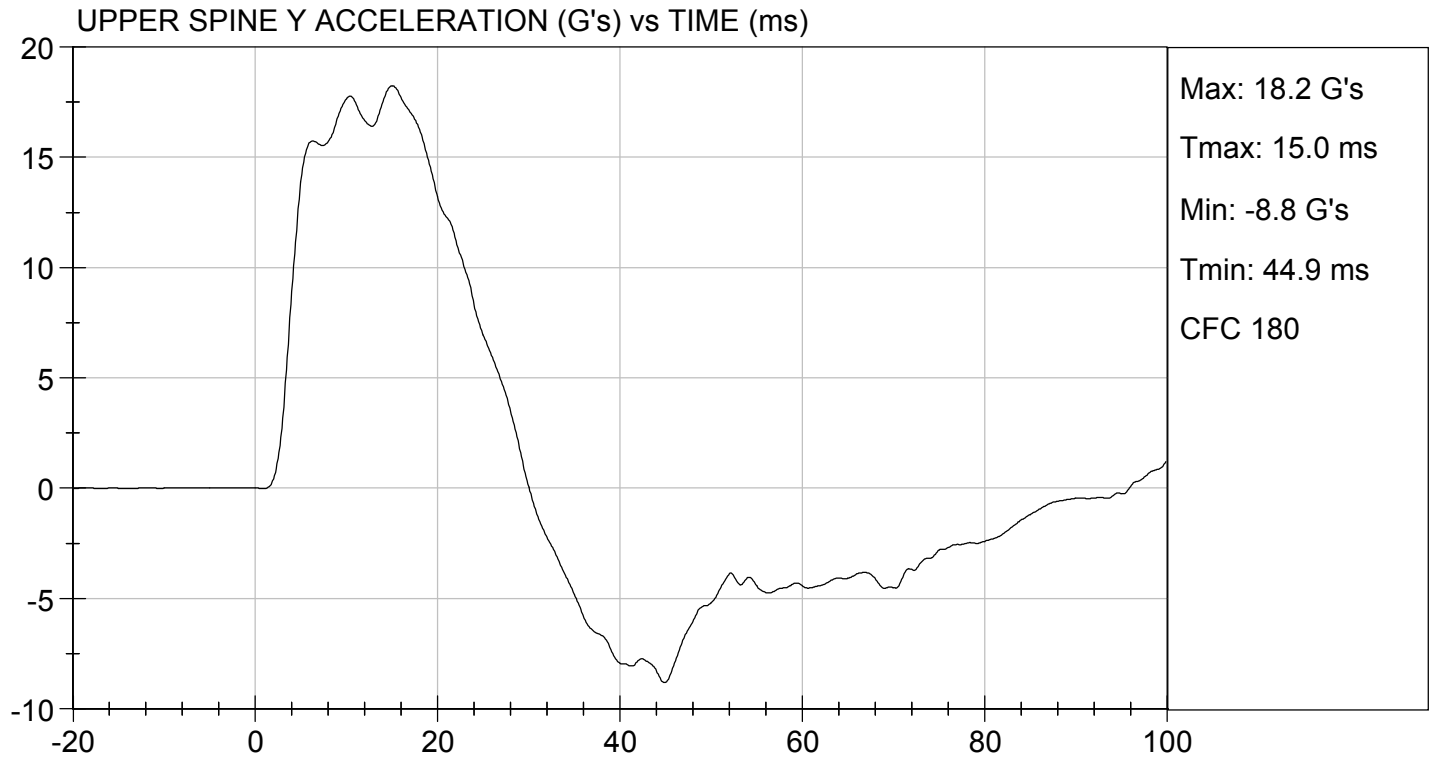
TEST DATE: 08/07/2020
TEST #: D201953





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

TEST DATE: 08/07/2020
TEST #: D201953



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

ATD Serial No: 296

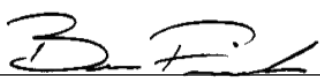
Test I.D: D201954

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	30	Pass
Middle Rib Displacement	mm	30 to 36	33	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
			Overall Test Results	Pass


Laboratory Technician

08/07/2020

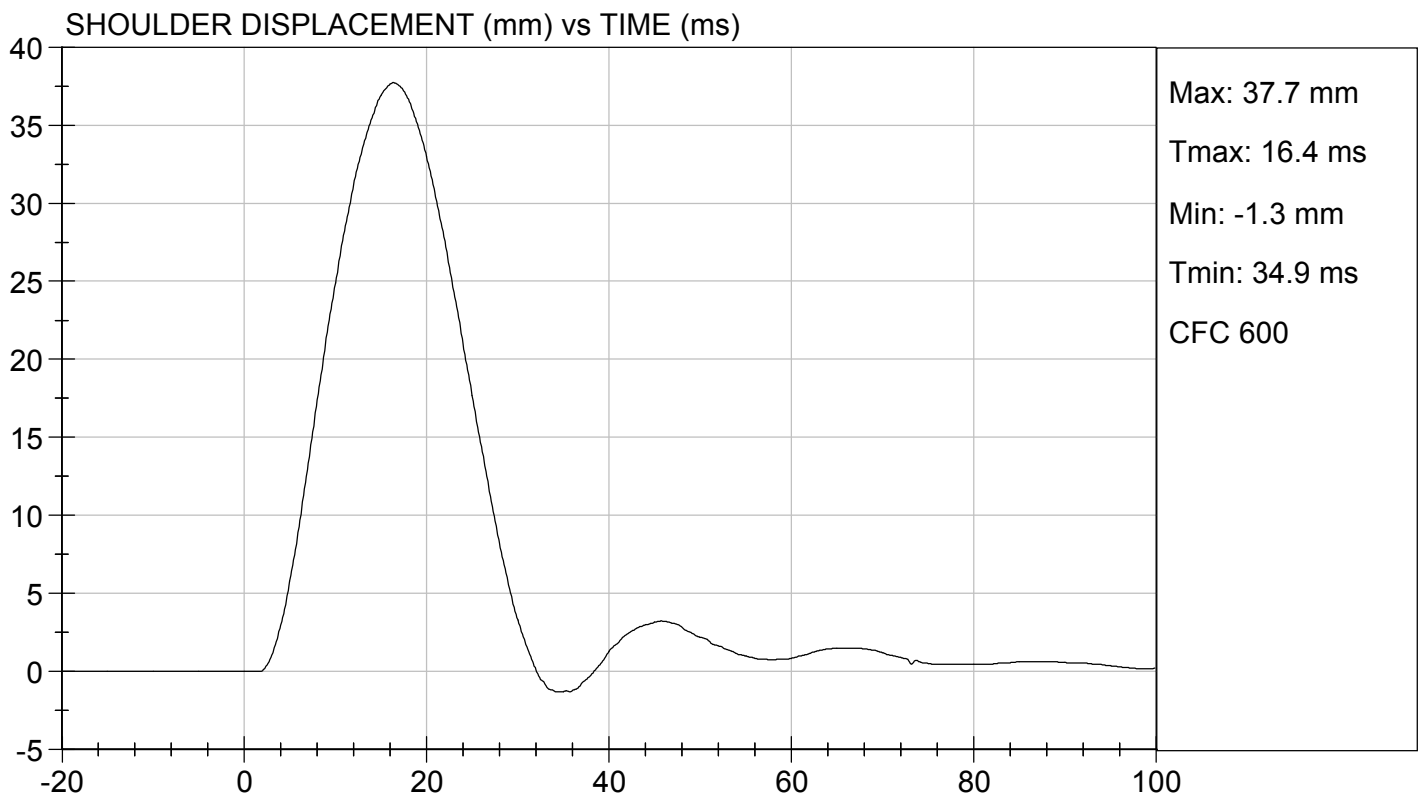
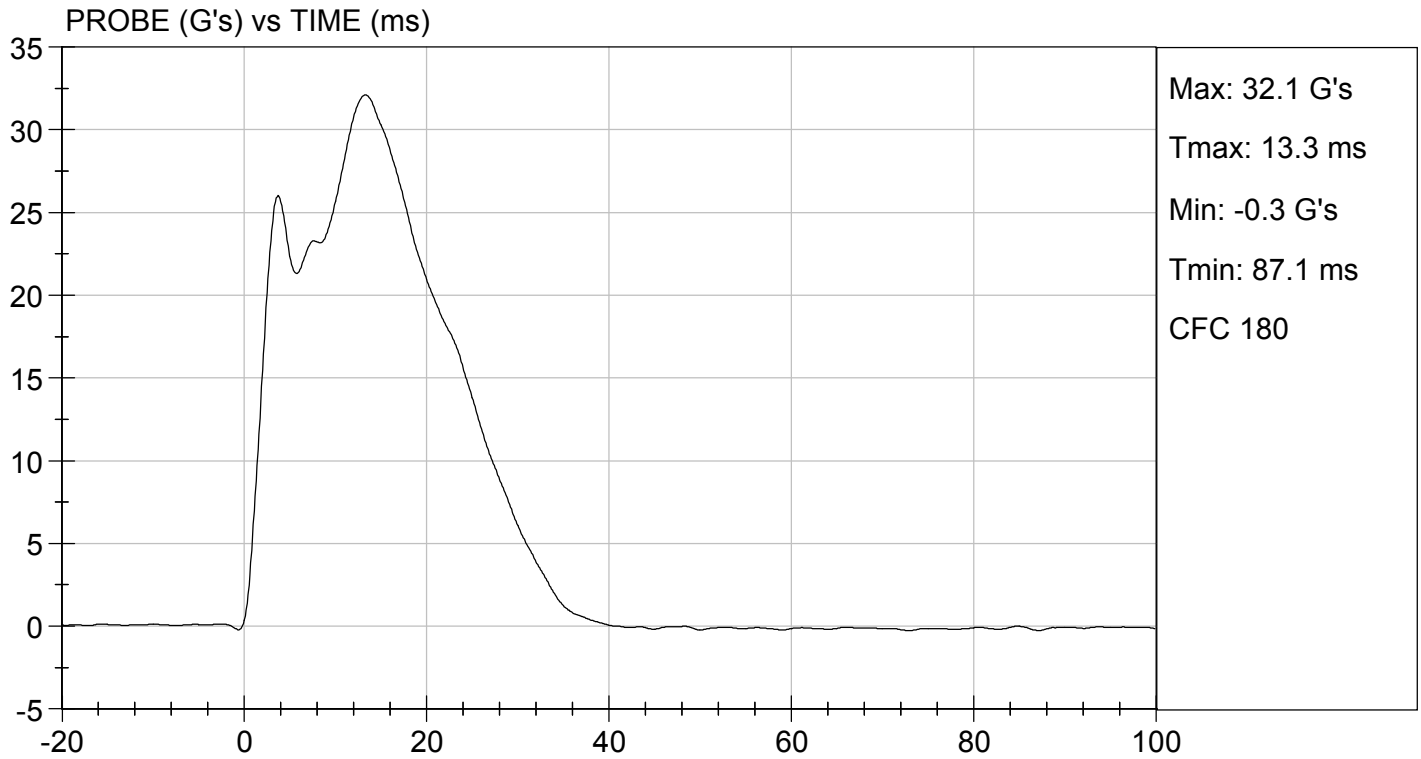
Test Date

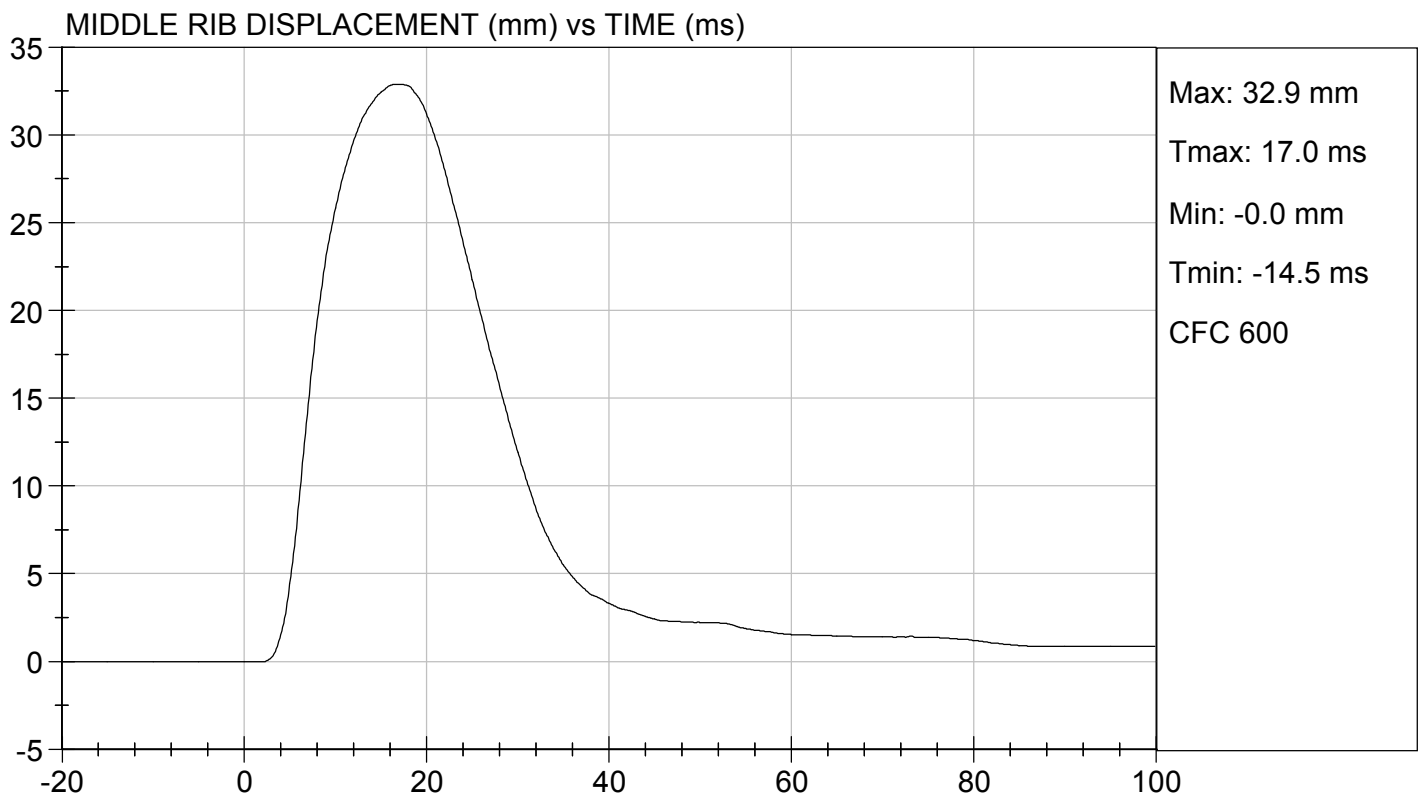
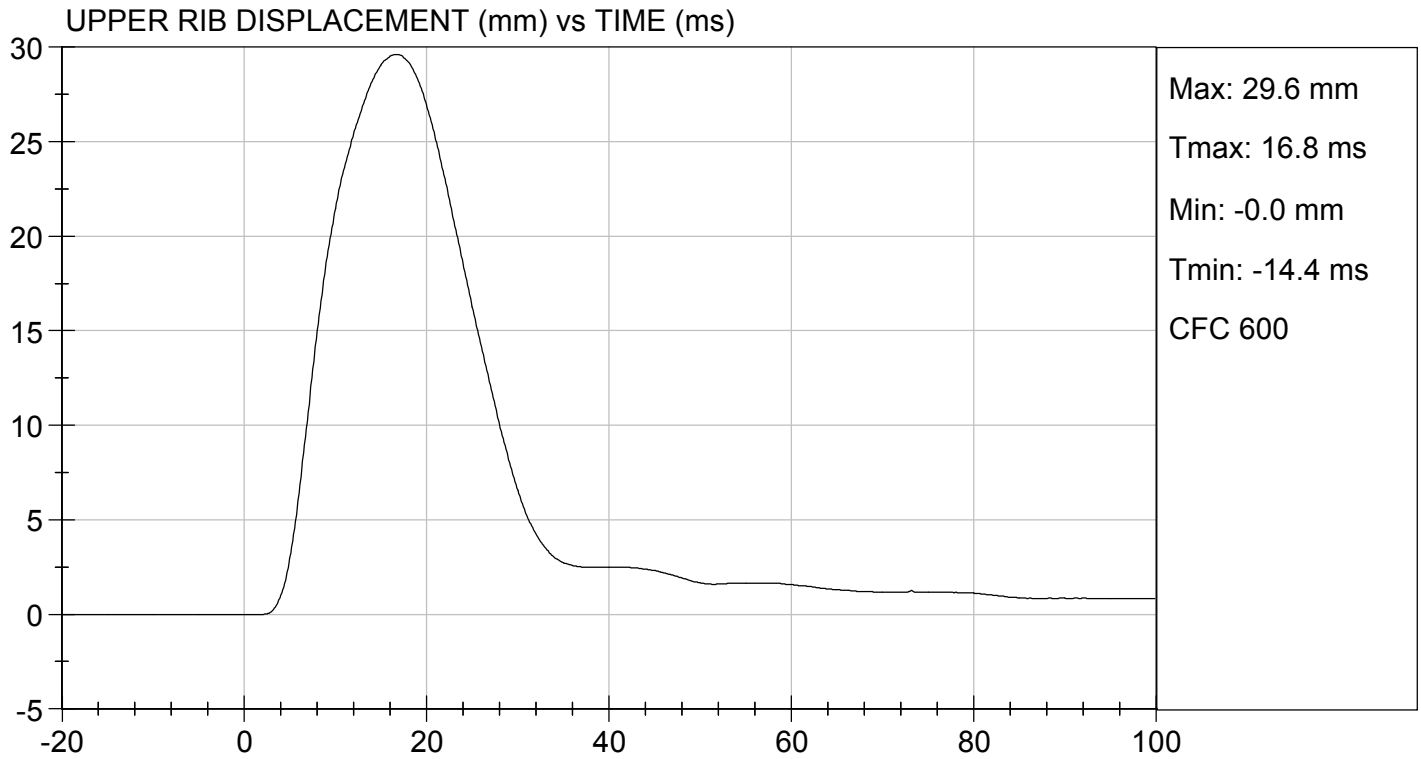

Approved By



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

TEST DATE: 08/07/2020
TEST #: D201954

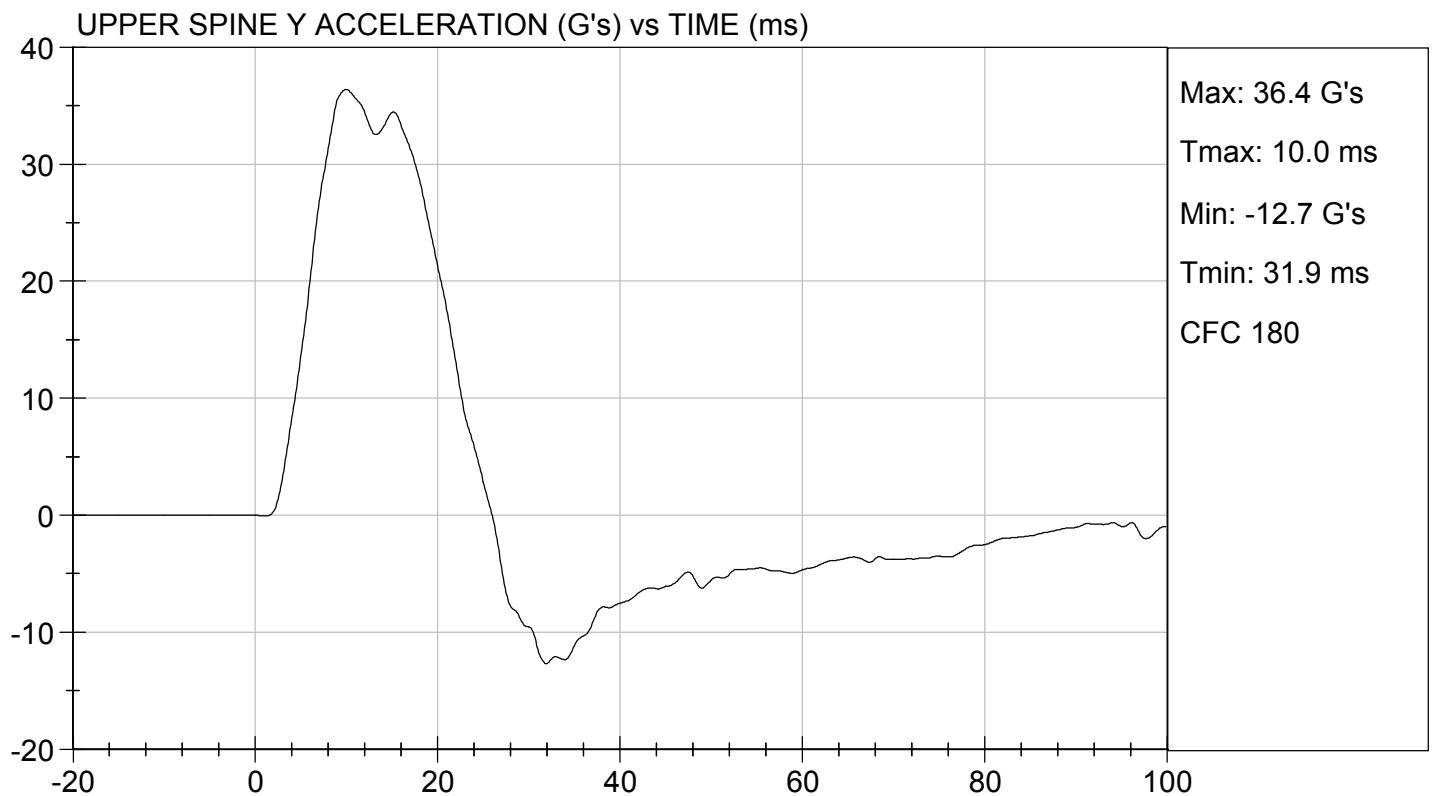
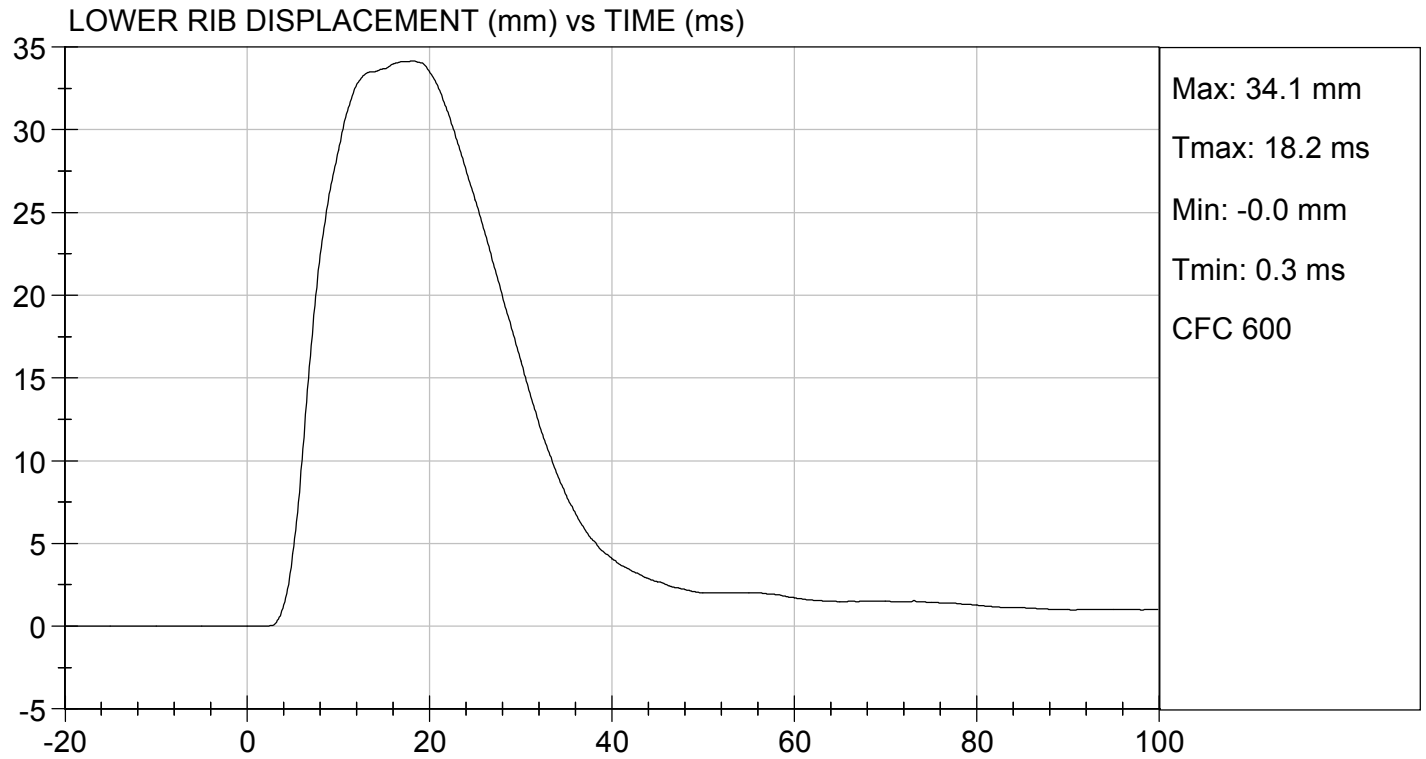






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

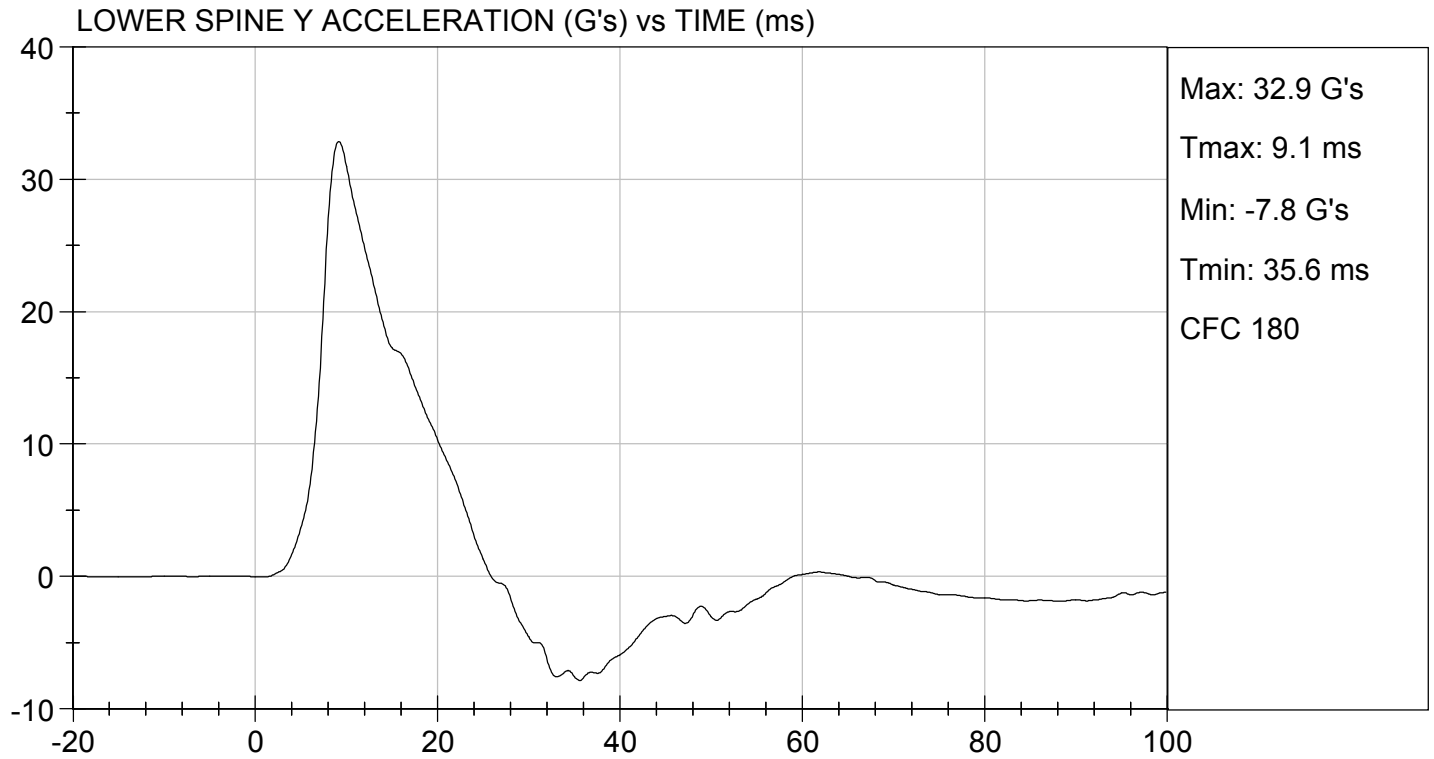
TEST DATE: 08/07/2020
TEST #: D201954





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

TEST DATE: 08/07/2020
TEST #: D201954



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

ATD Serial No: 296

Test I.D: D201955

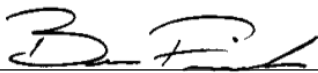
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	44	Pass
Lower Rib Displacement	mm	35 to 43	41	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
			Overall Test Results	Pass



Laboratory Technician

08/07/2020

Test Date

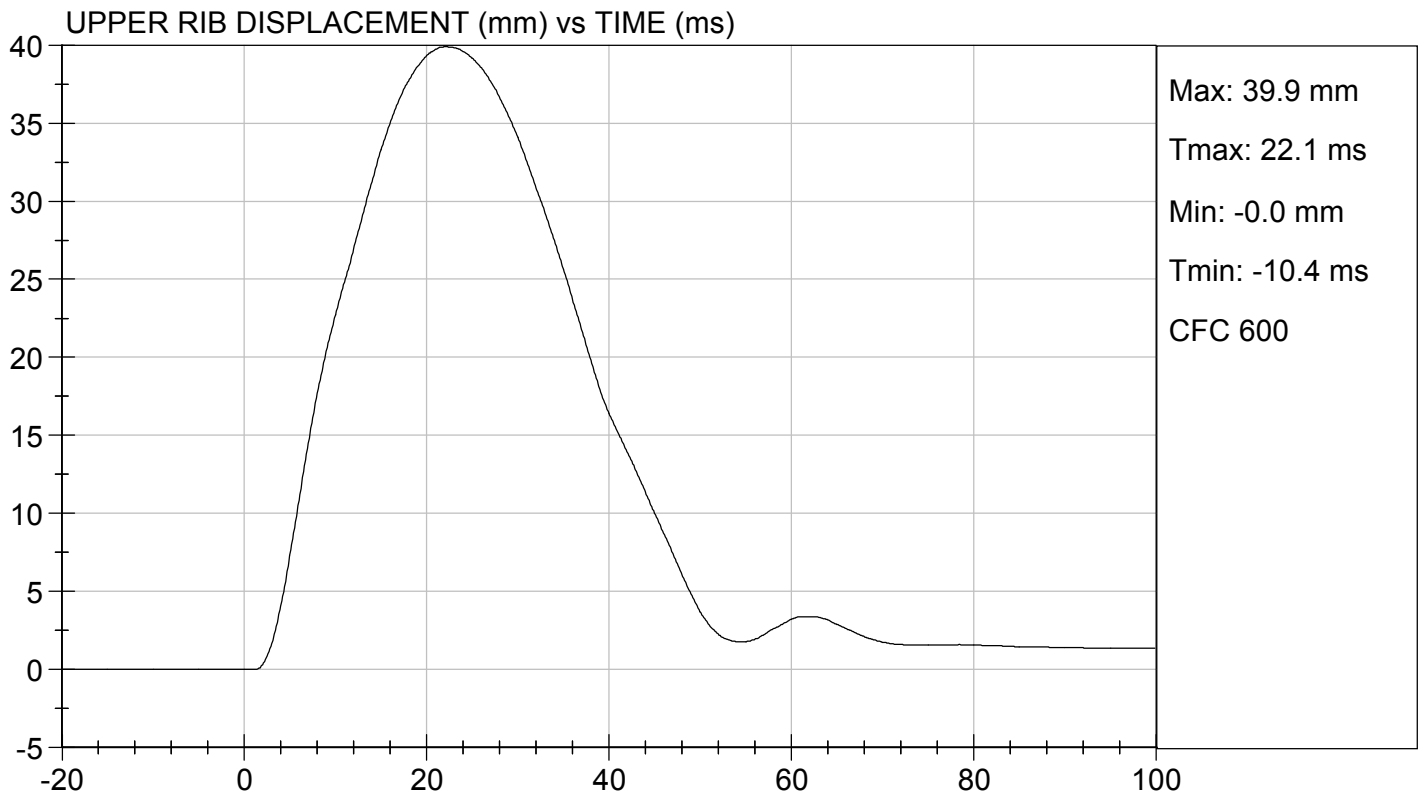
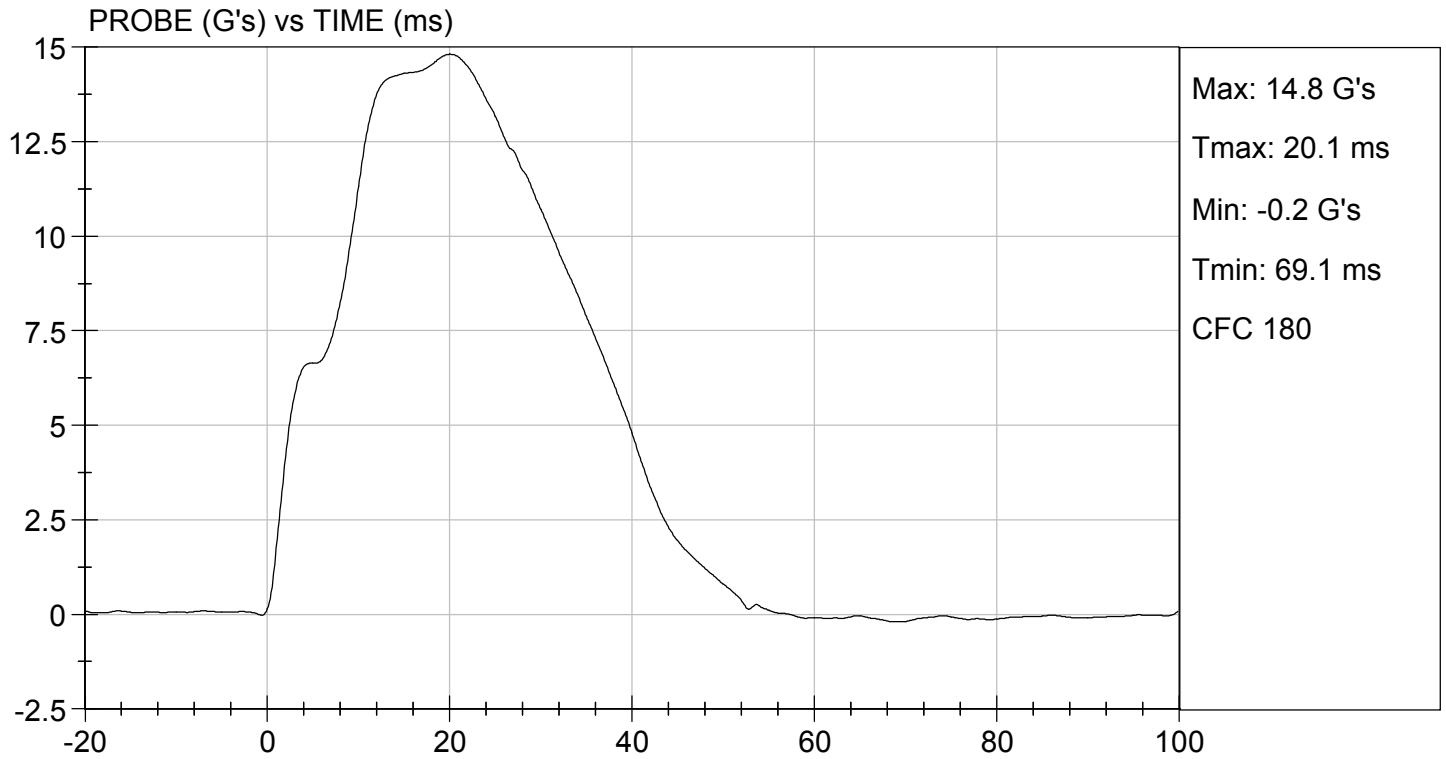


Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

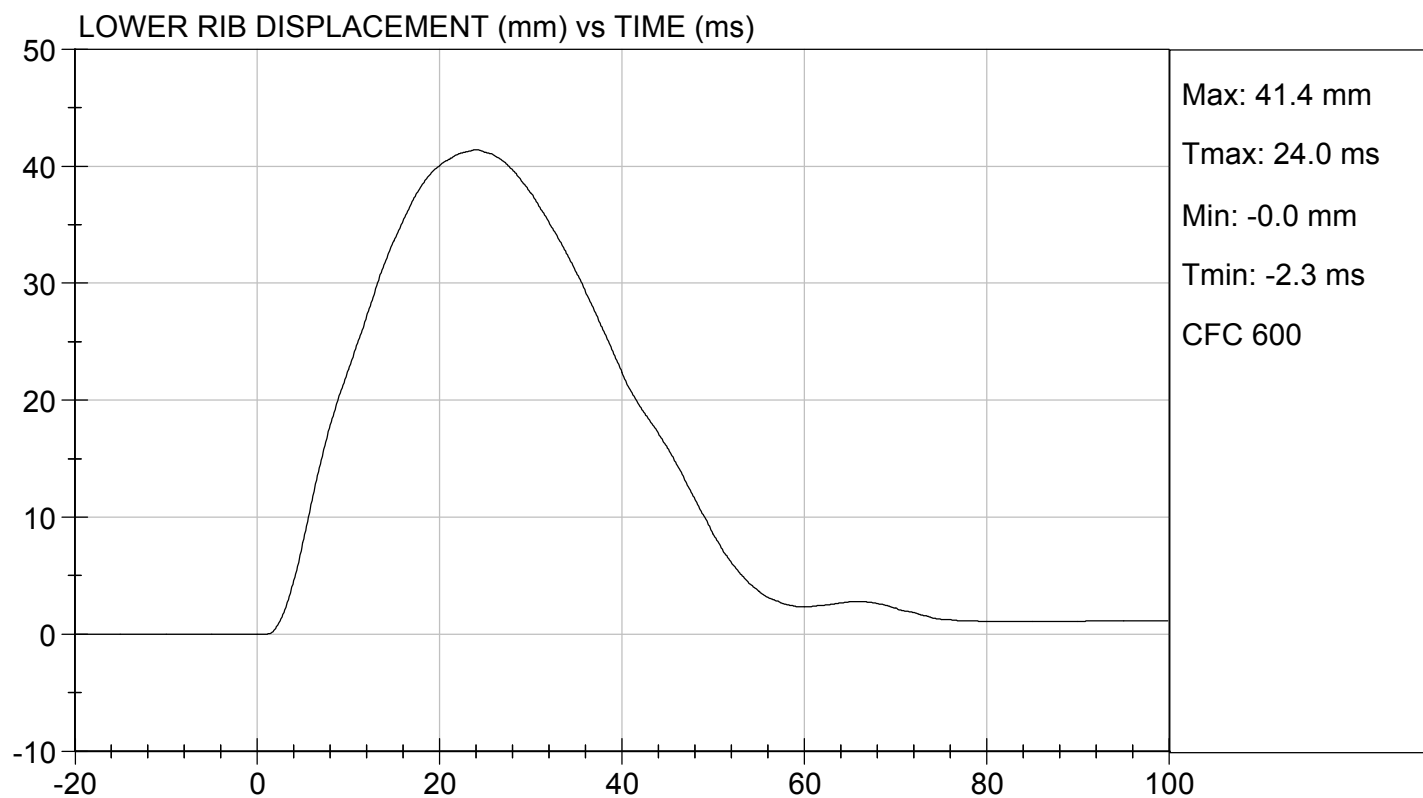
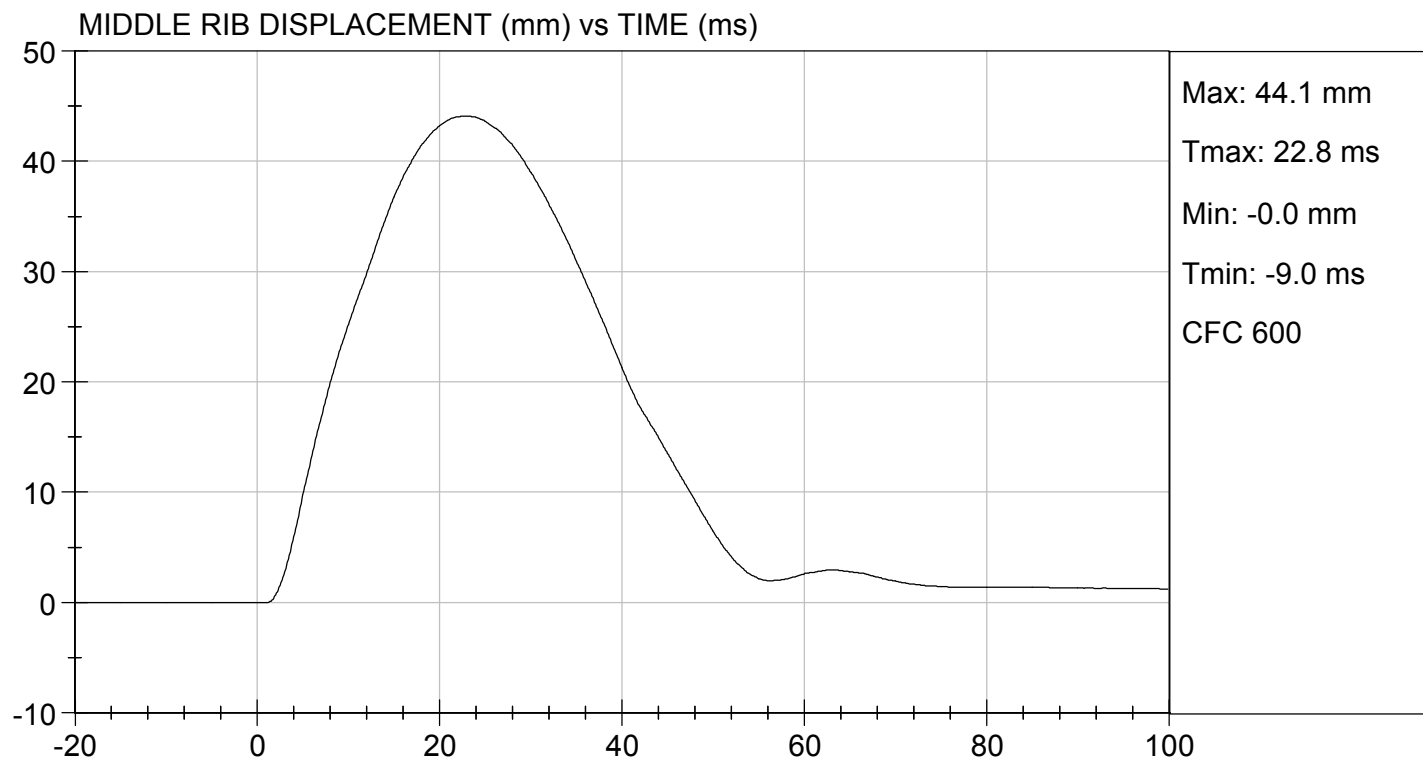
TEST DATE: 08/07/2020
TEST #: D201955

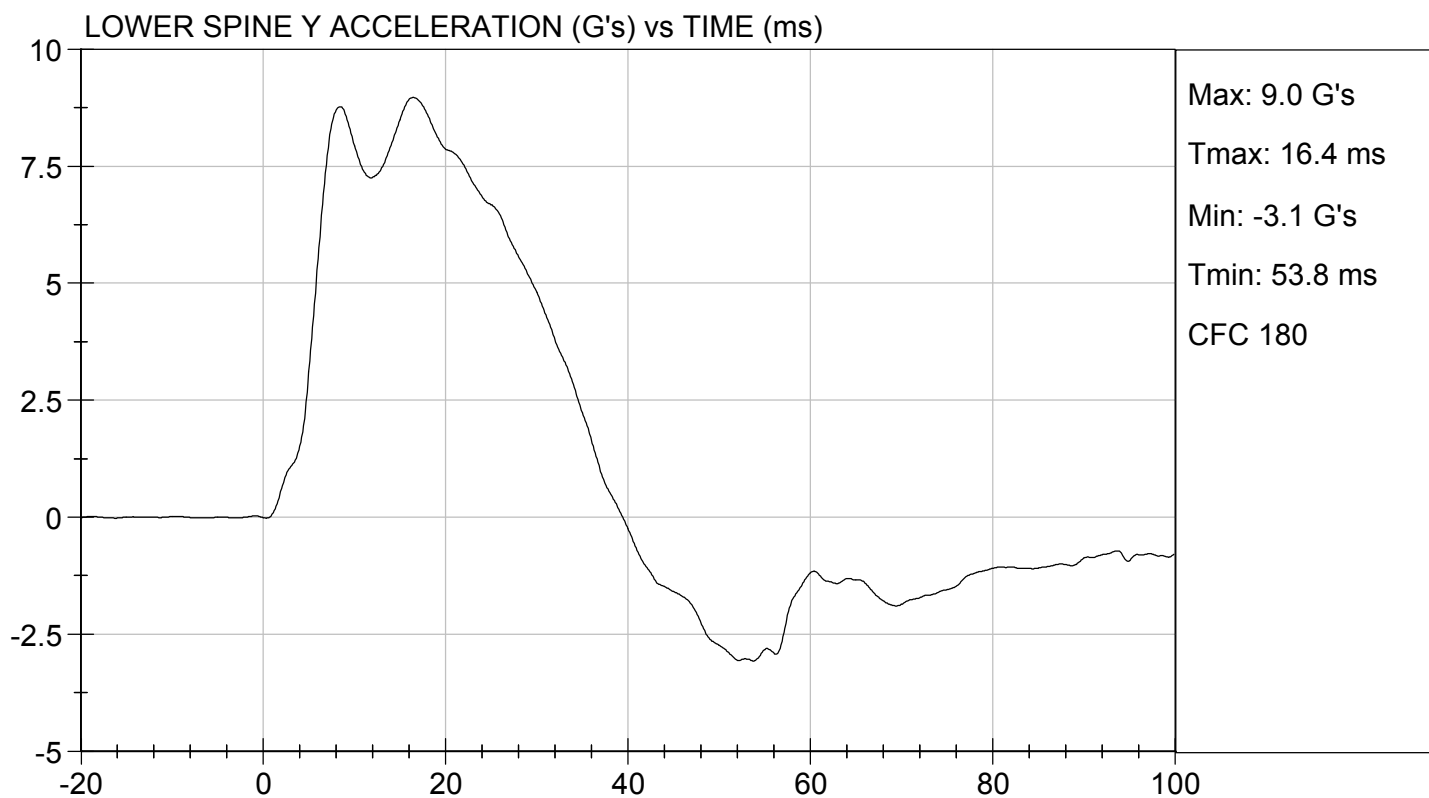
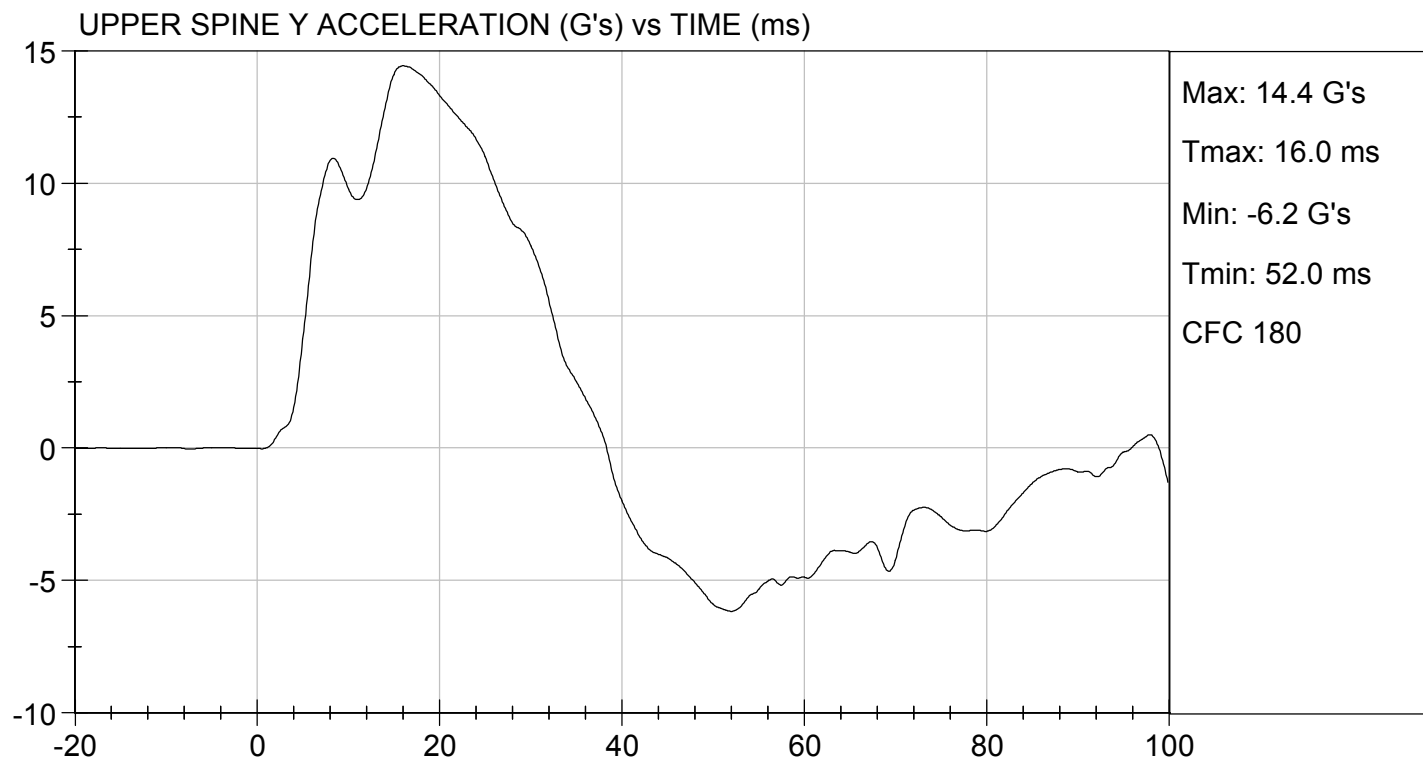




TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201955





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

ATD Serial No: 296

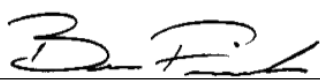
Test I.D: D201956

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	44	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

08/07/2020

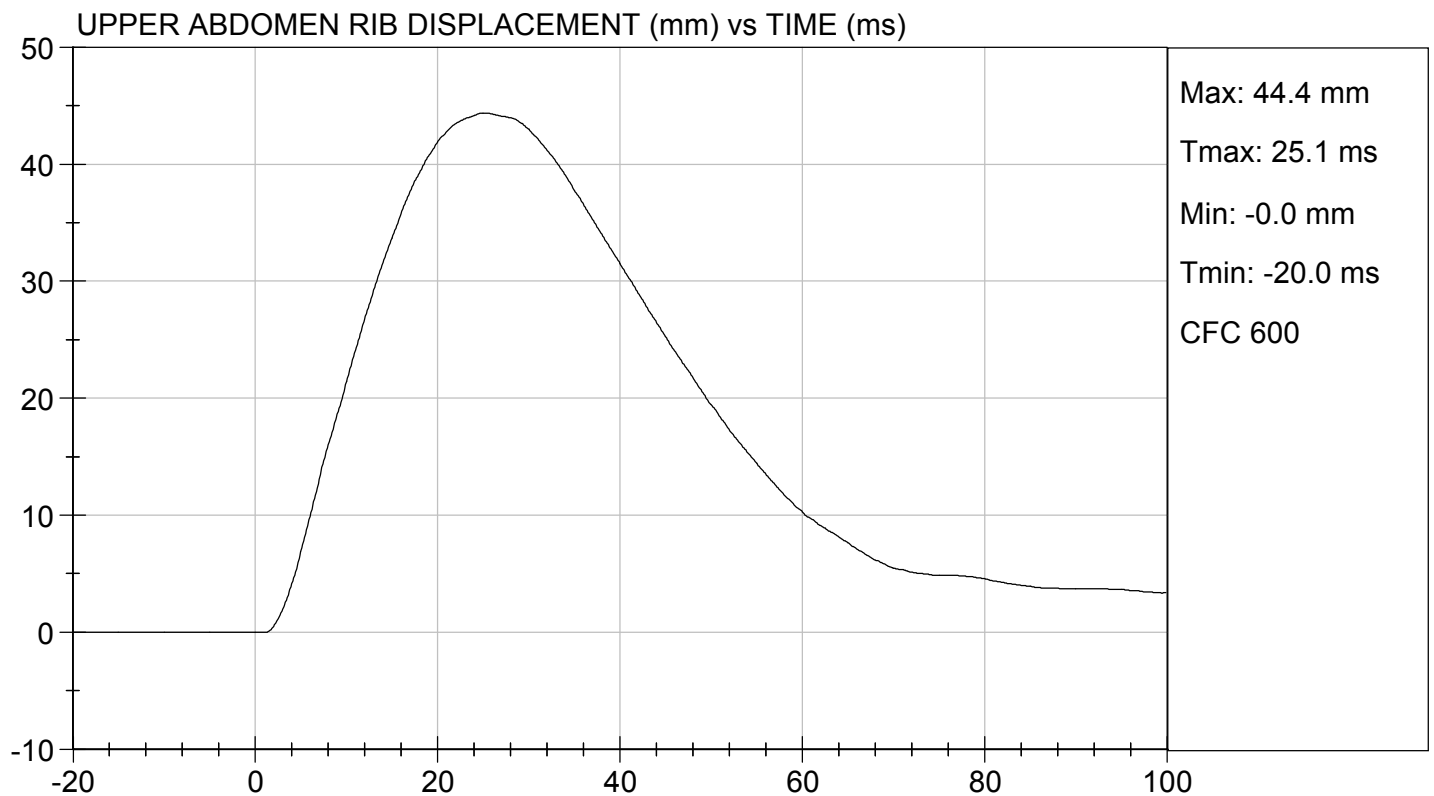
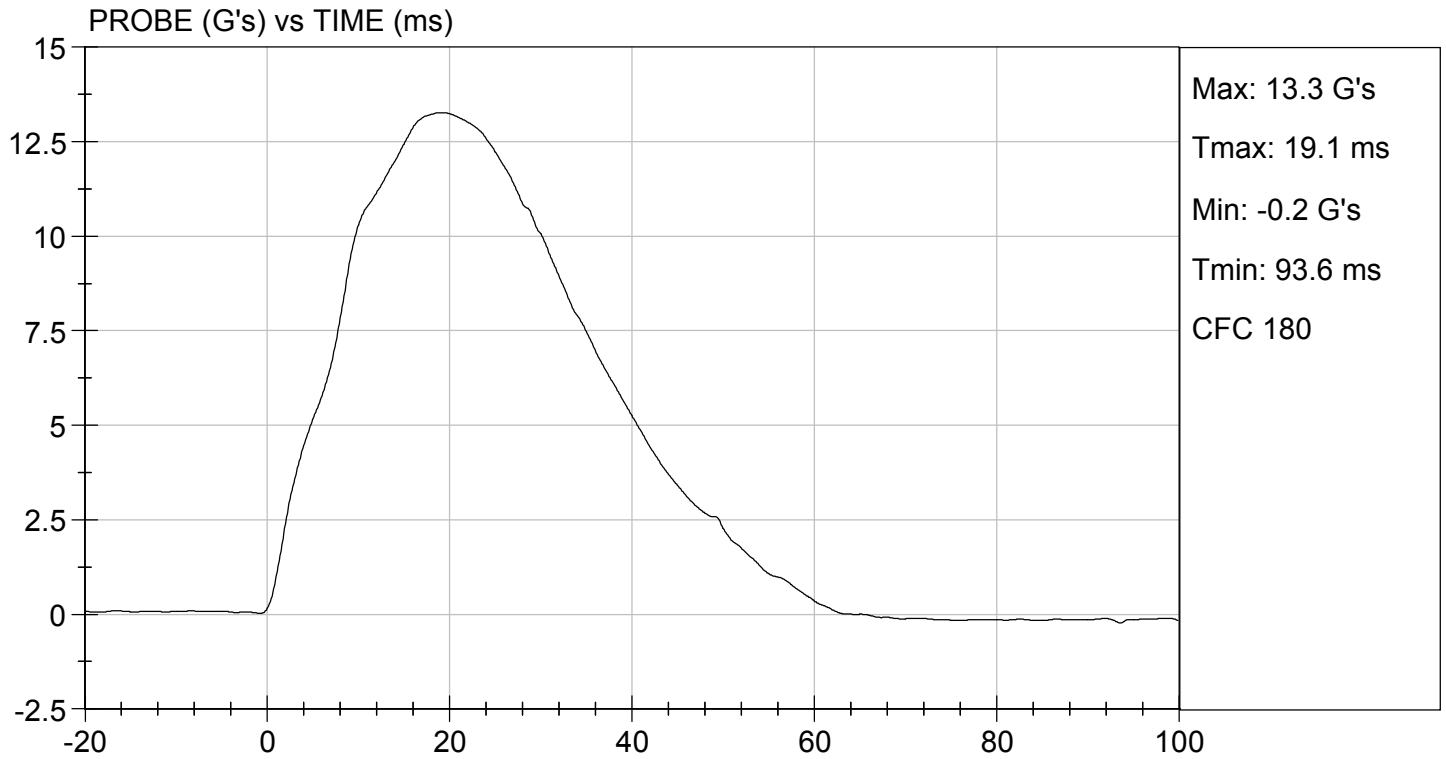
Test Date


Approved By



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

TEST DATE: 08/07/2020
TEST #: D201956

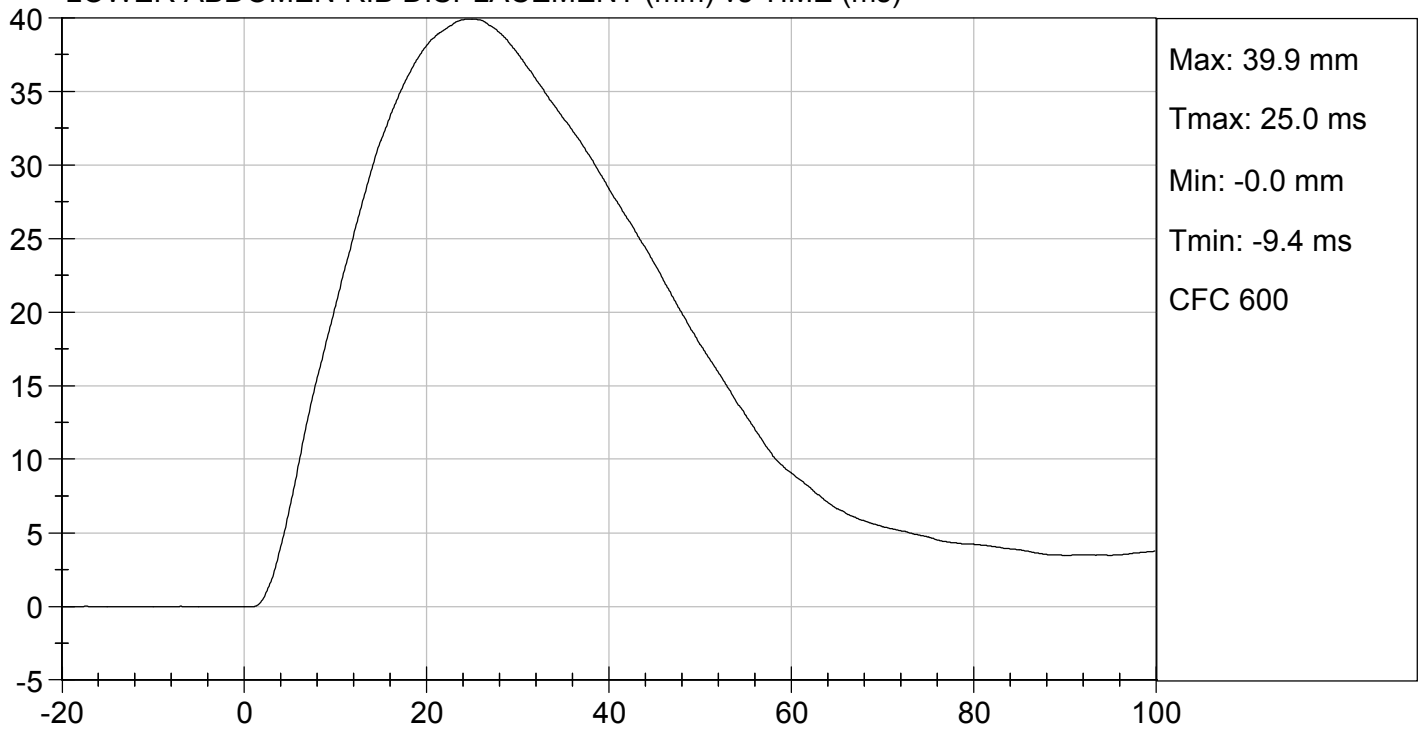




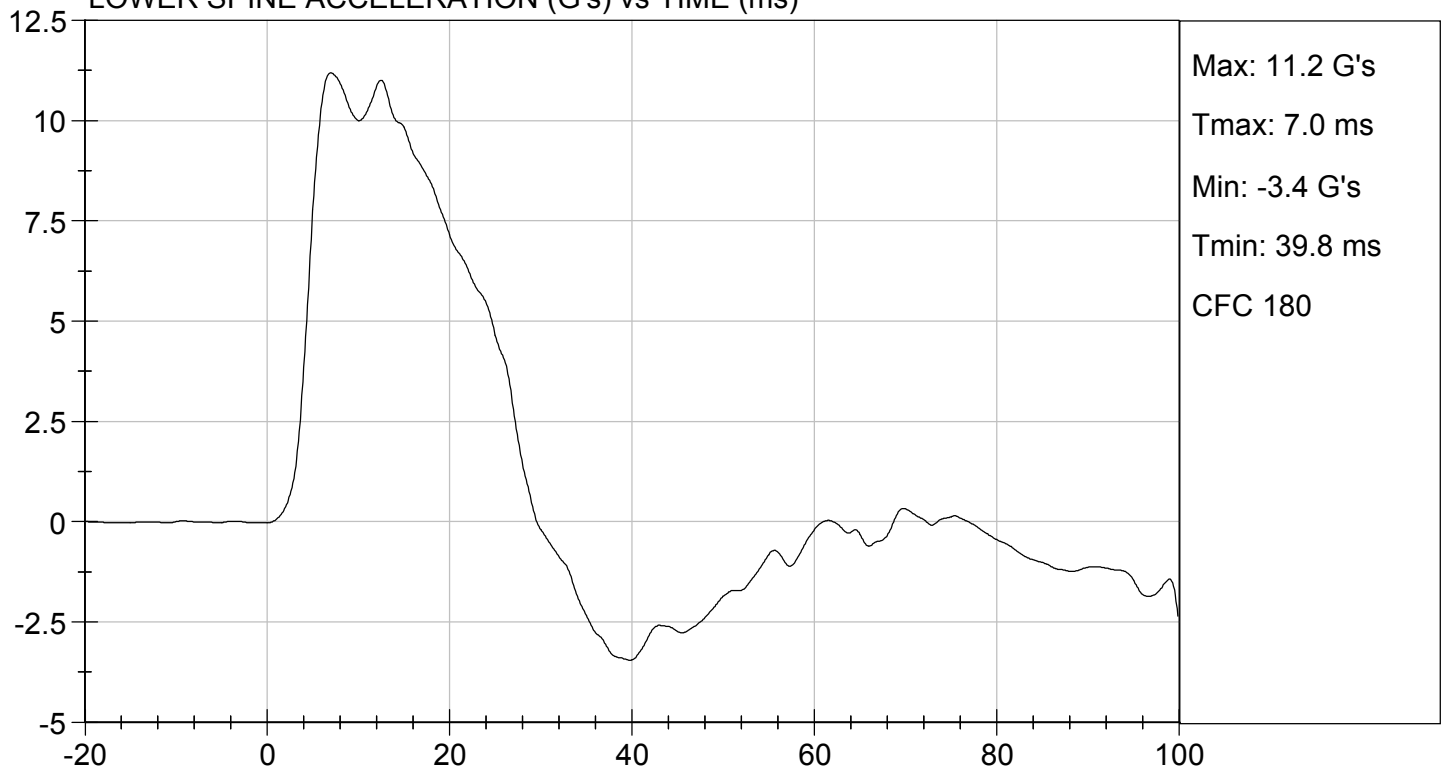
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/07/2020
TEST #: D201956

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



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



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

ATD Serial No: 296

Test I.D: D201957

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	39	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,929	Pass
Overall Test Results				Pass



Laboratory Technician

08/07/2020

Test Date

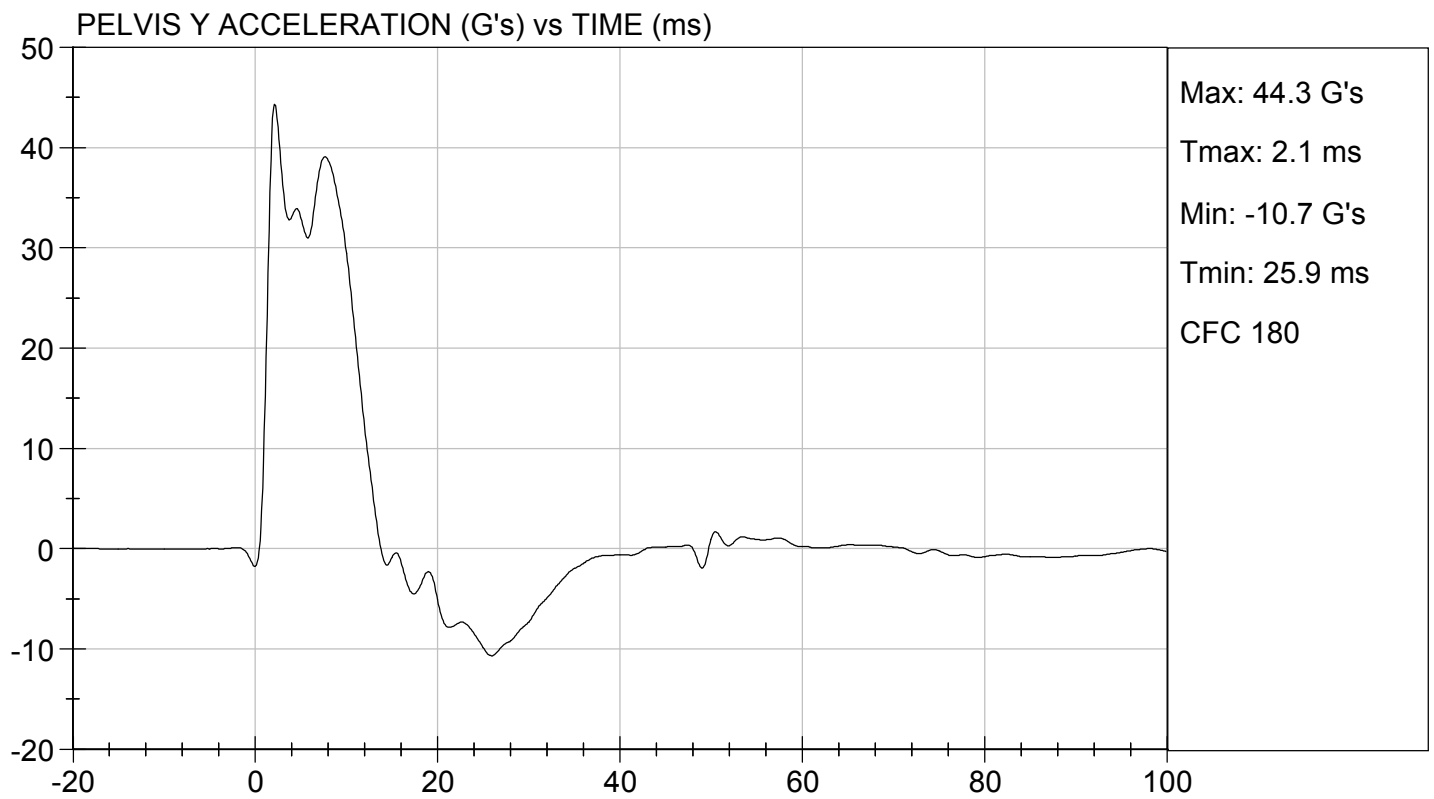
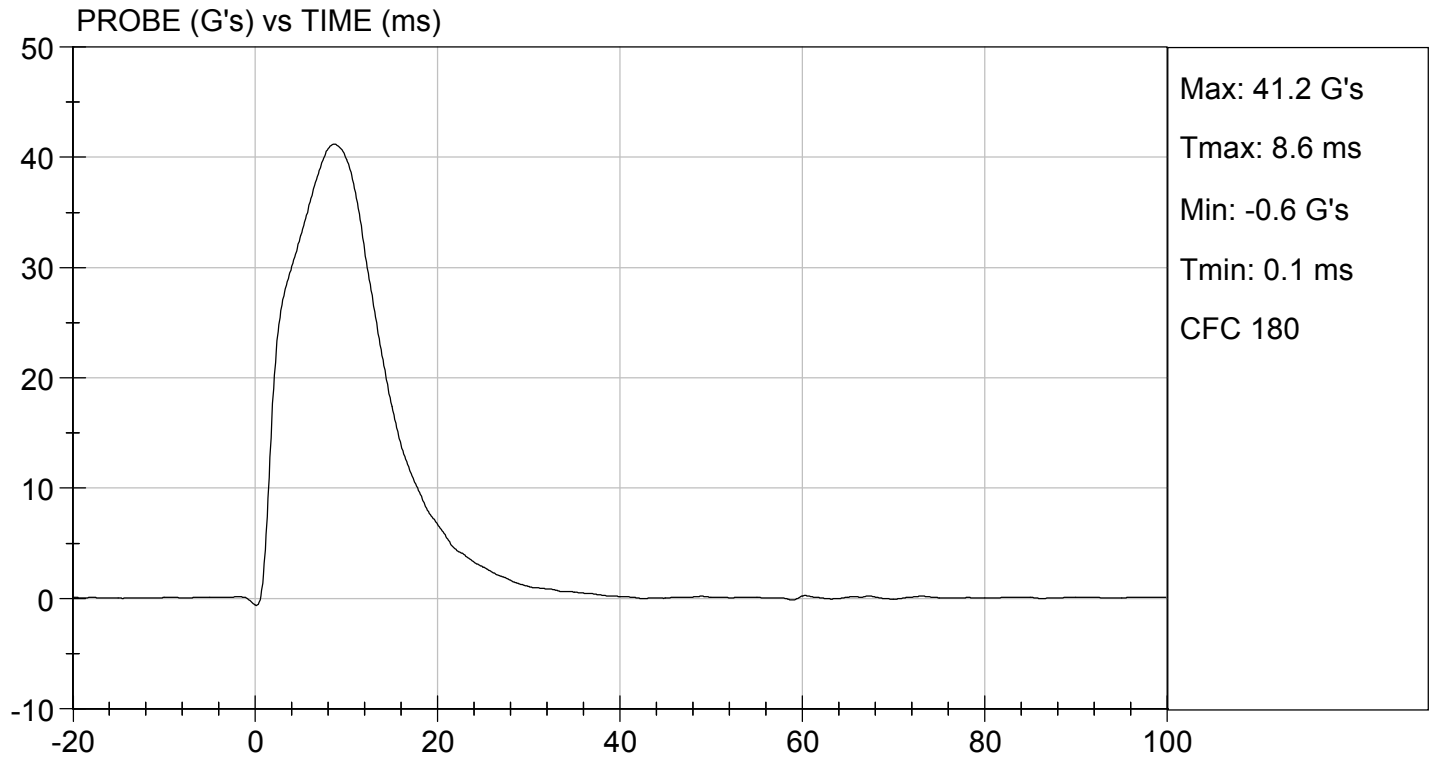


Approved By



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

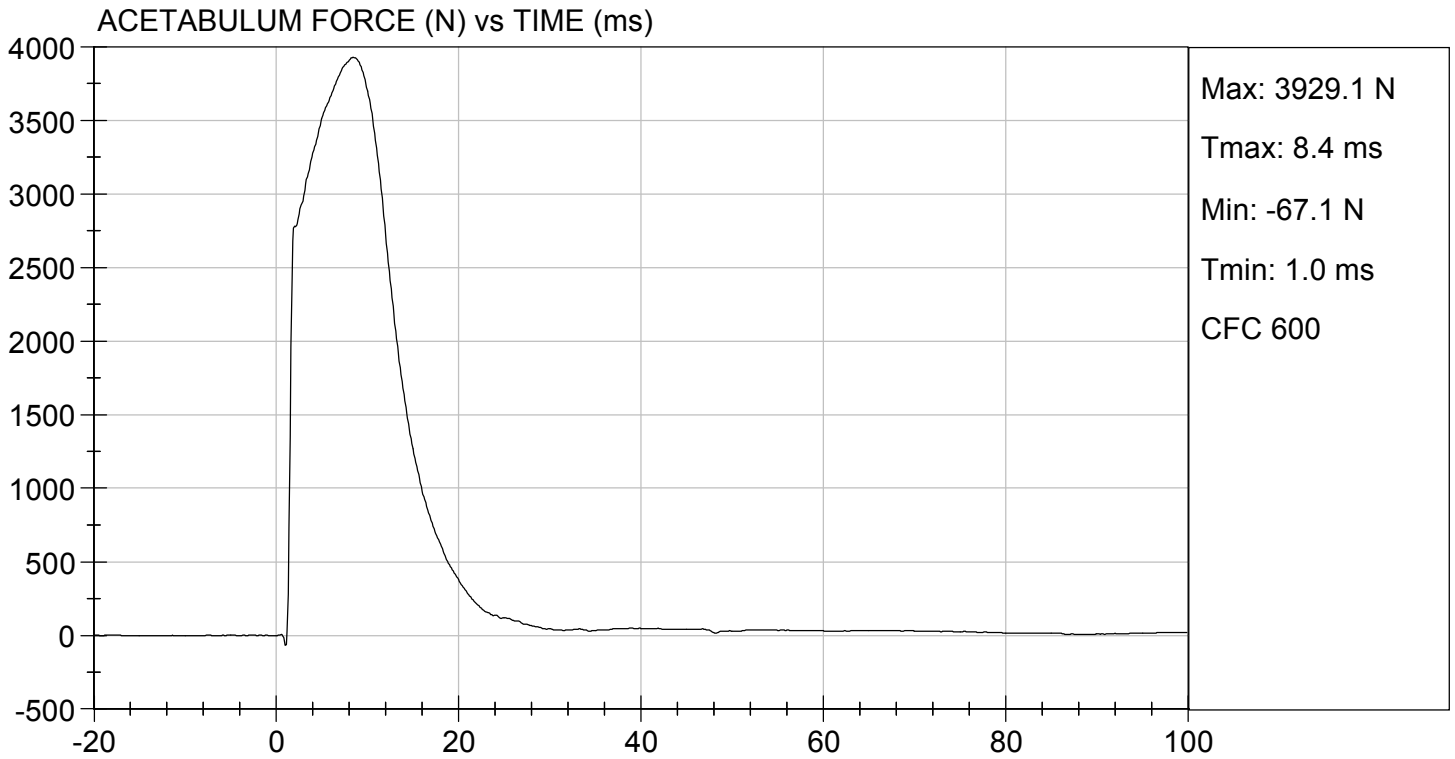
TEST DATE: 08/07/2020
TEST #: D201957





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

TEST DATE: 08/07/2020
TEST #: D201957



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D201958

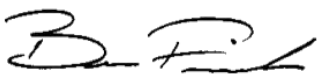
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Humidity	%	10 to 70	38	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,605	Pass
Overall Test Results				Pass



Laboratory Technician

08/13/2020

Test Date

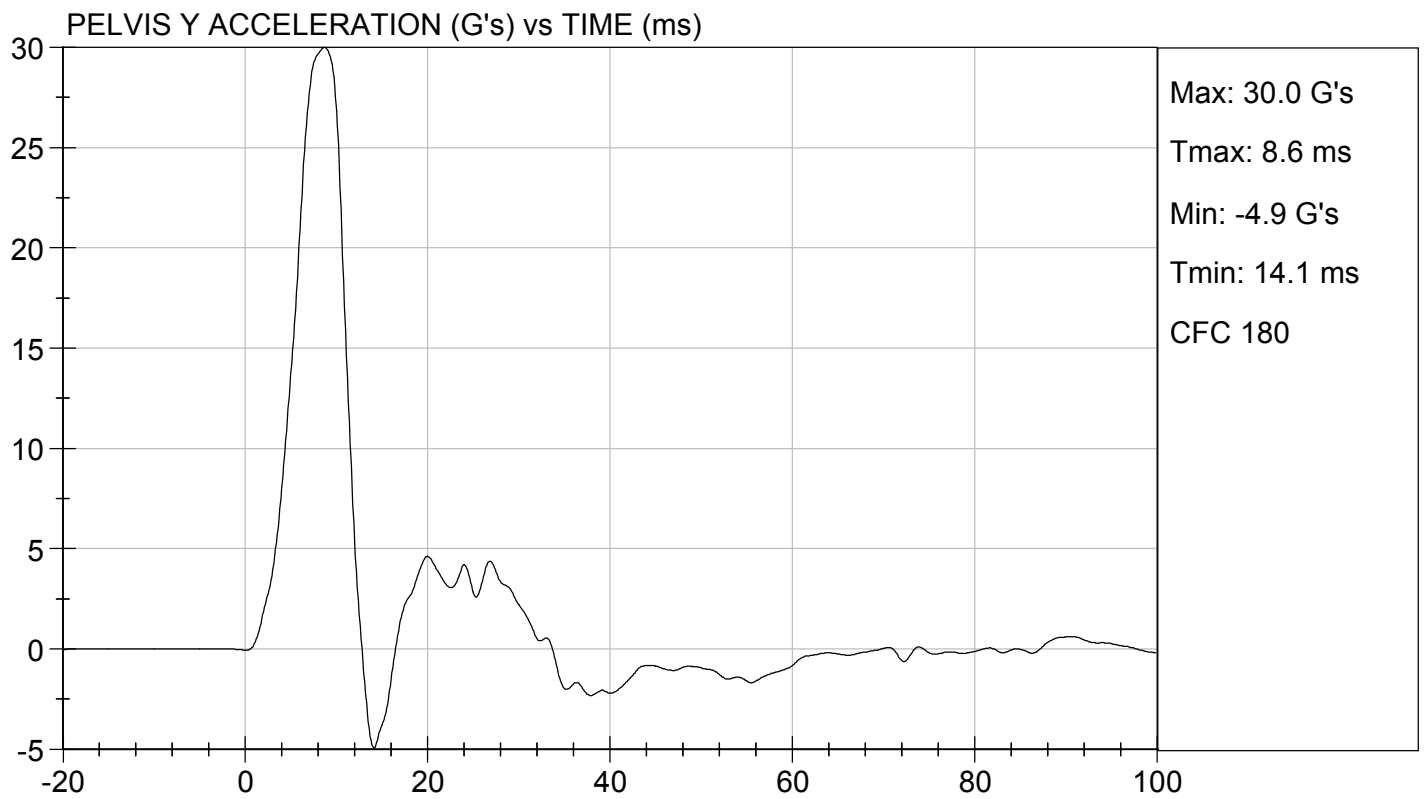
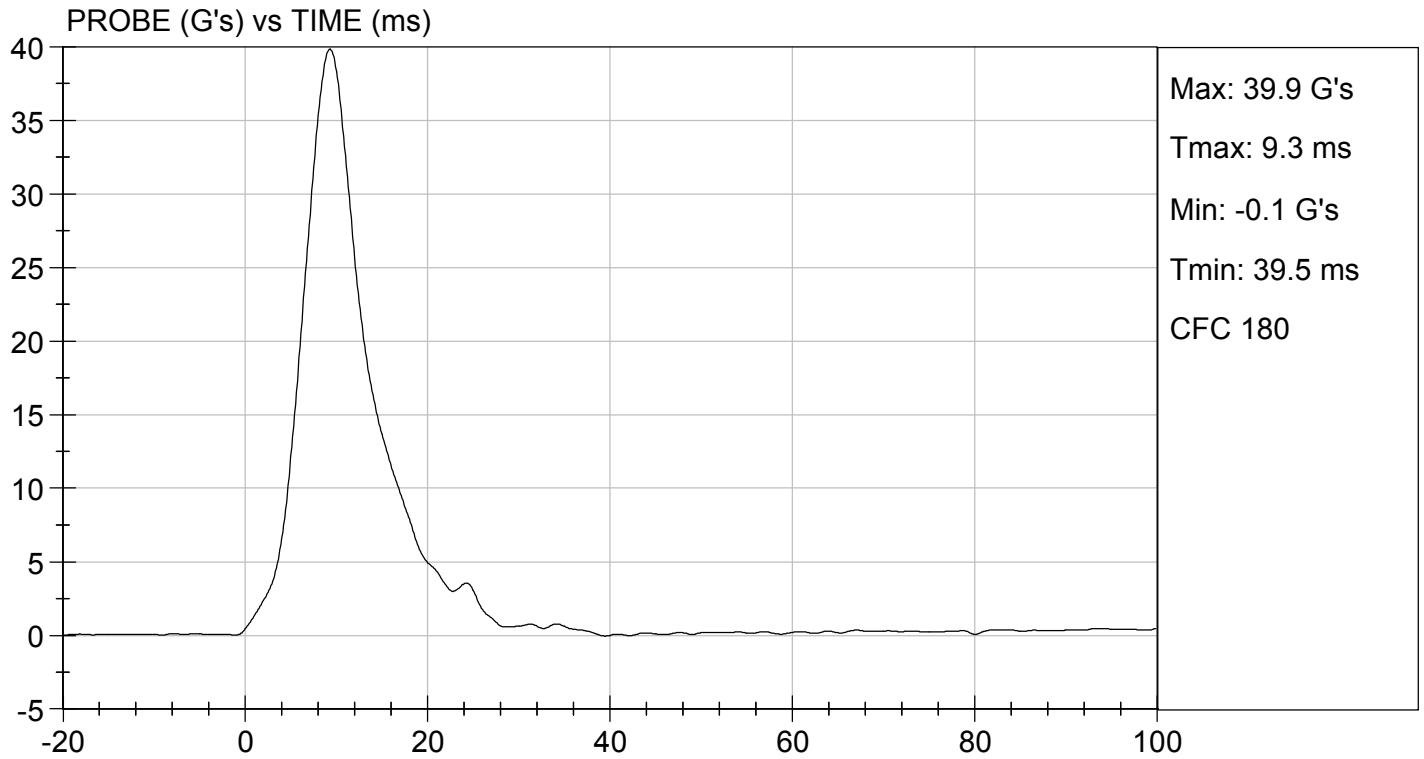


Approved By



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

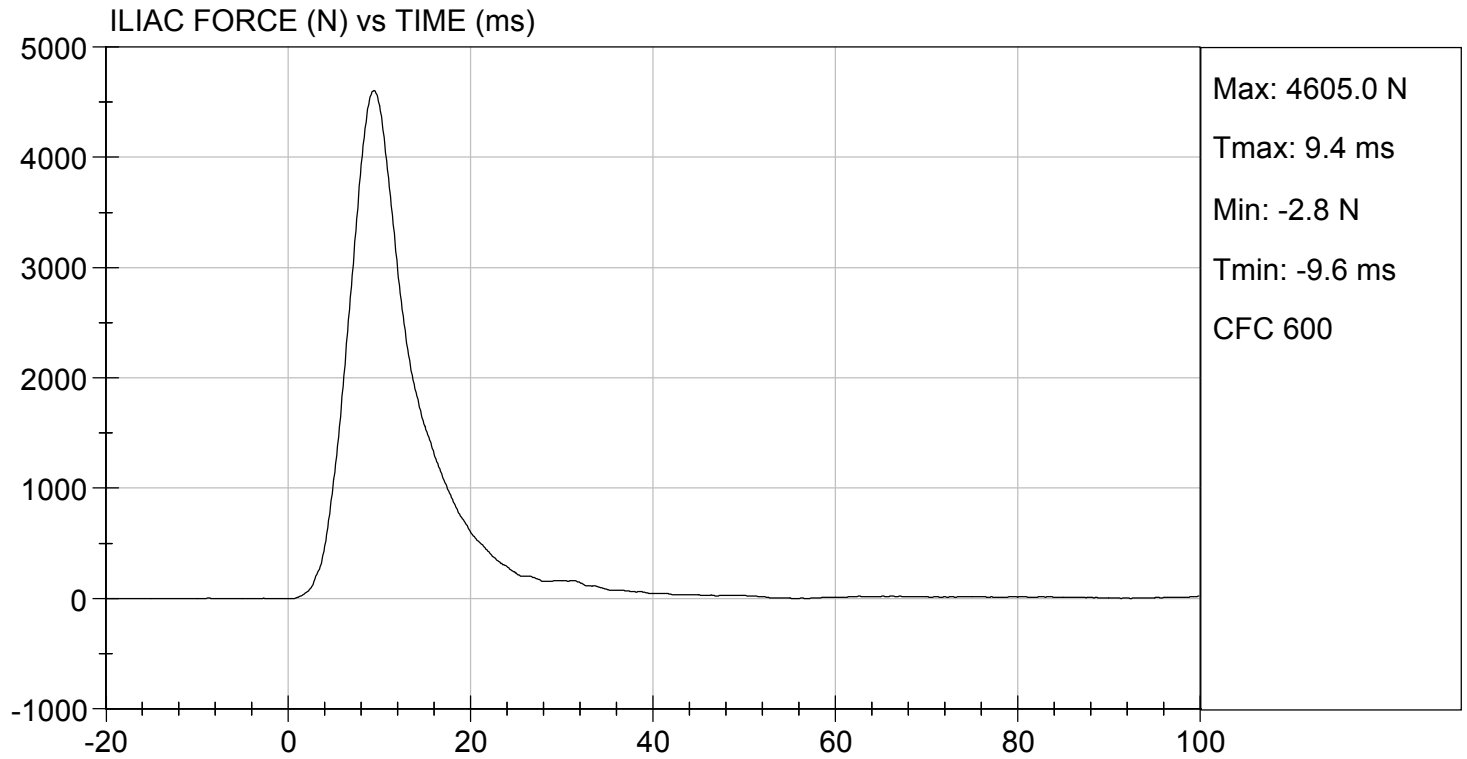
TEST DATE: 08/13/2020
TEST #: D201958





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

TEST DATE: 08/13/2020
TEST #: D201958



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 296

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

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

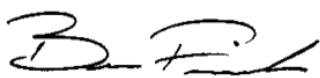
ATD Serial No: 296

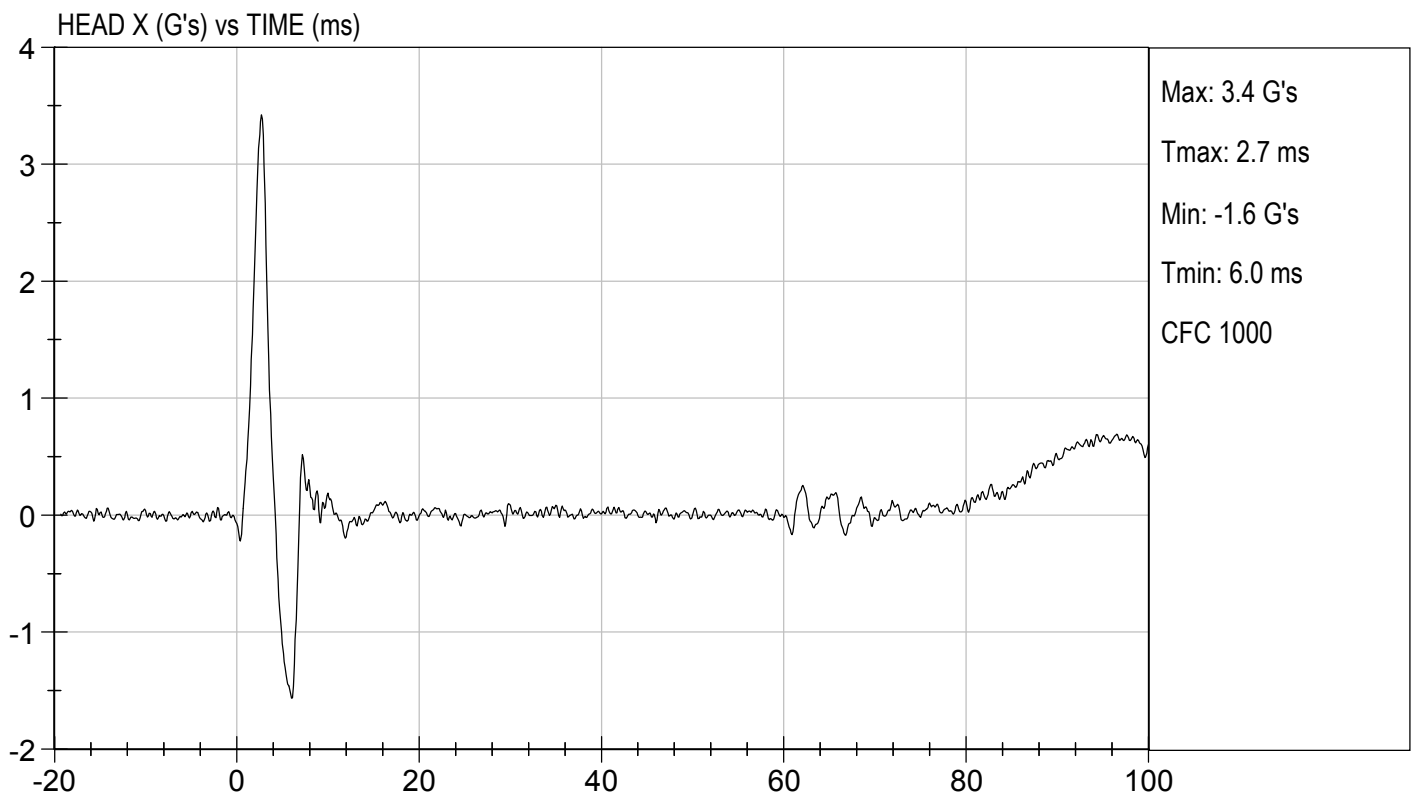
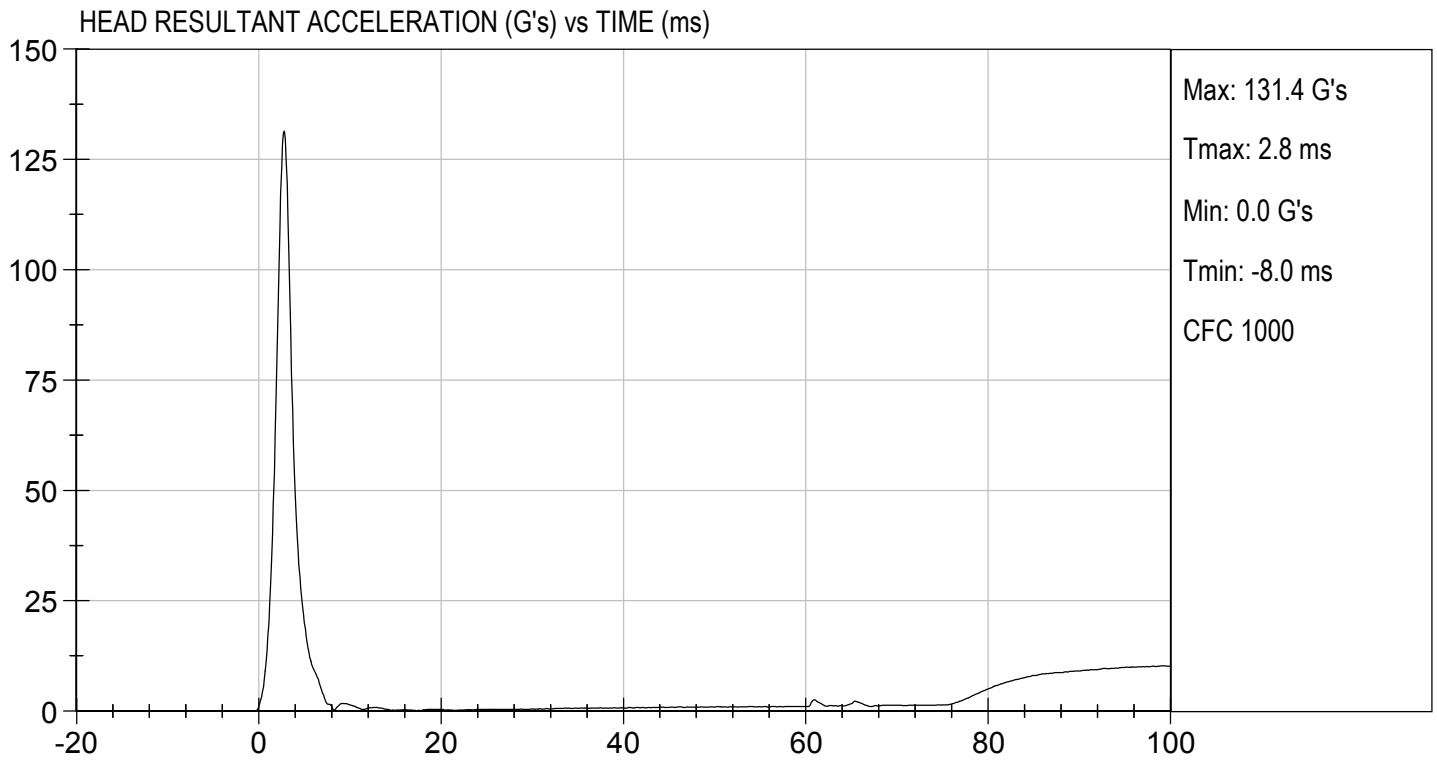
Test ID: D202451

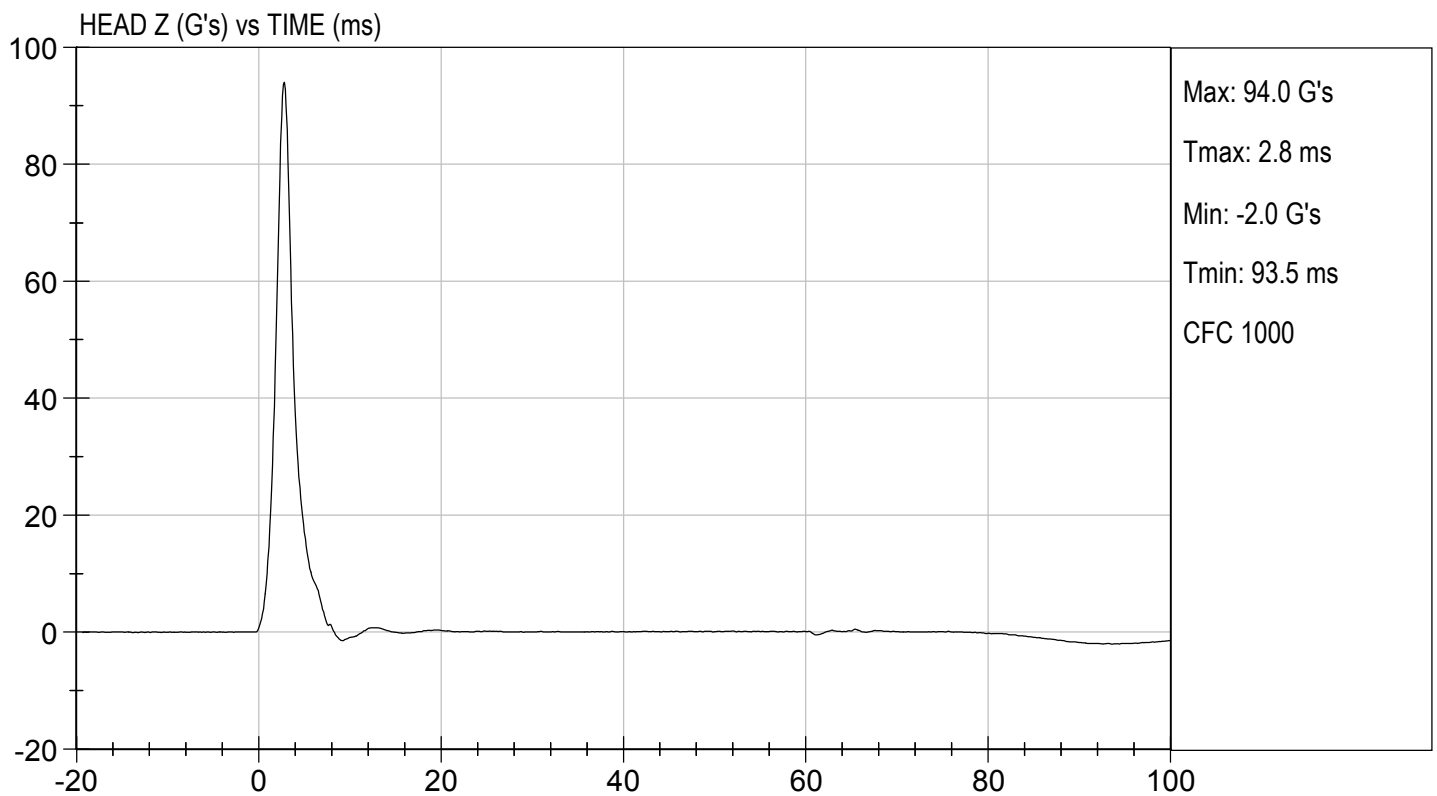
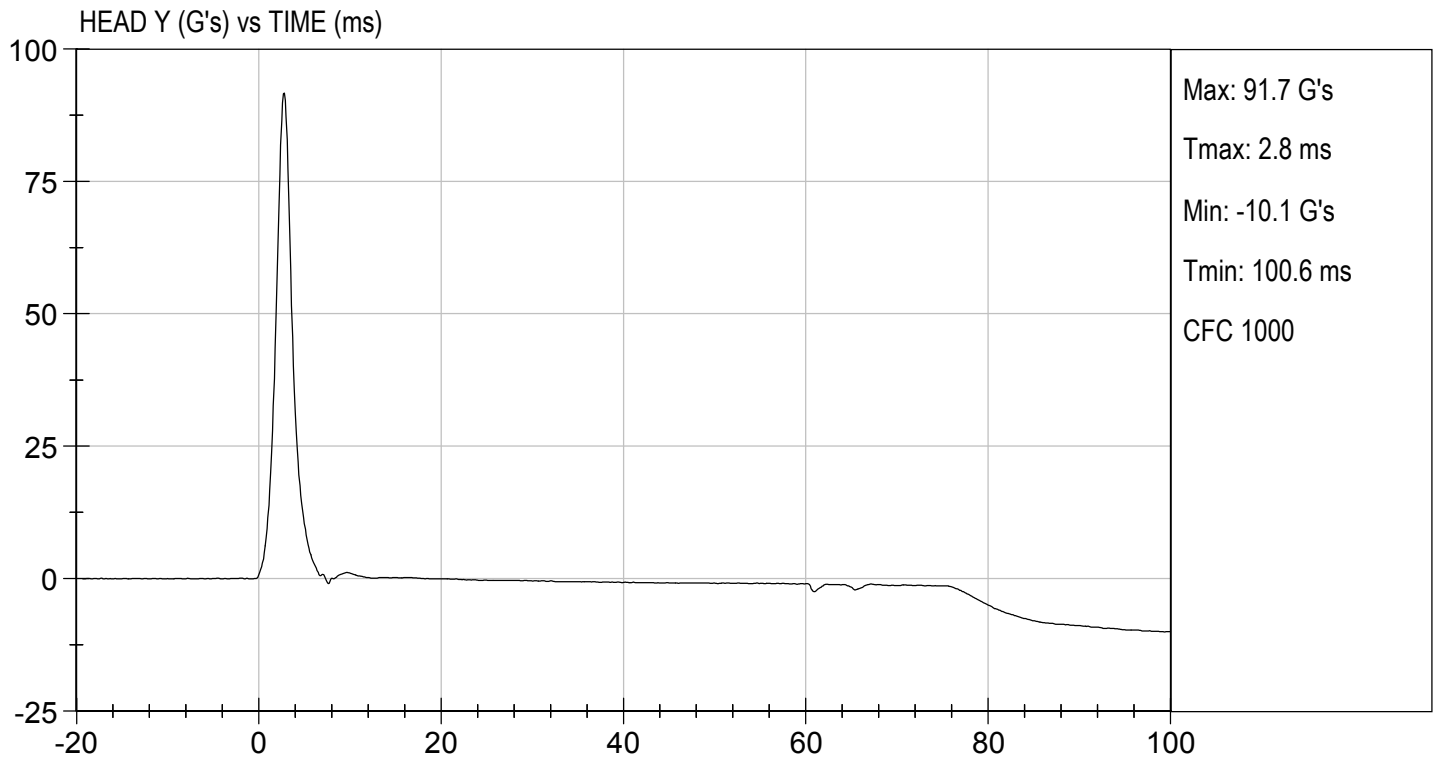
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Peak Resultant Acceleration	G's	115 to 137	131	Pass
Peak Longitudinal Acceleration	G's	+/- 15	3.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

10/03/2020
Test Date


Approved By





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

ATD Serial No: 296

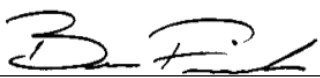
Test I.D: D202452

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	33	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.58	Pass
	15 ms	m/s	3.30 to 4.10	3.77	Pass
	20 ms	m/s	4.40 to 5.40	5.27	Pass
	25 ms	m/s	5.40 to 6.10	5.59	Pass
	25-100 ms	m/s	5.50 to 6.20	5.62	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-38	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	119	Pass
Overall Test Results					Pass


 Laboratory Technician

10/03/2020

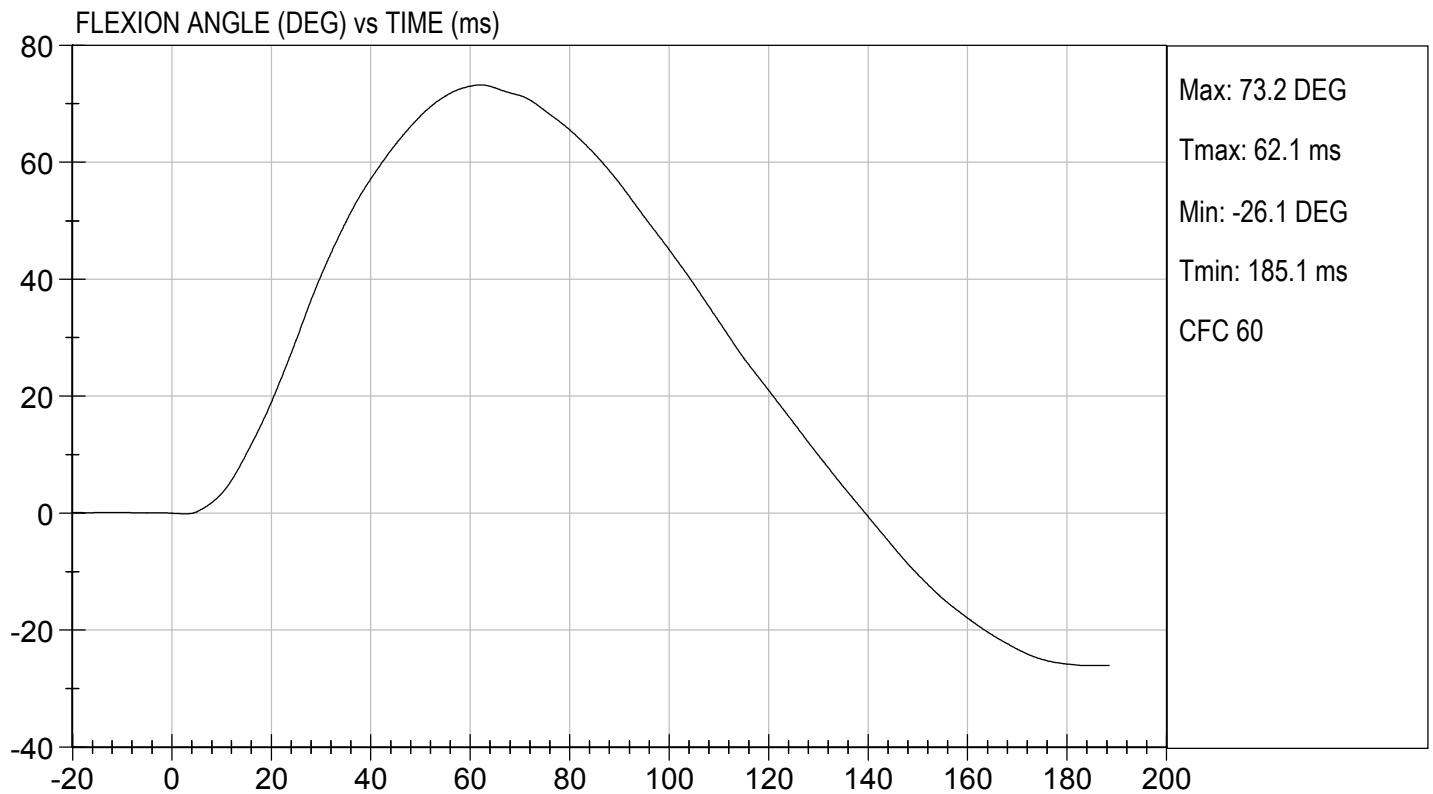
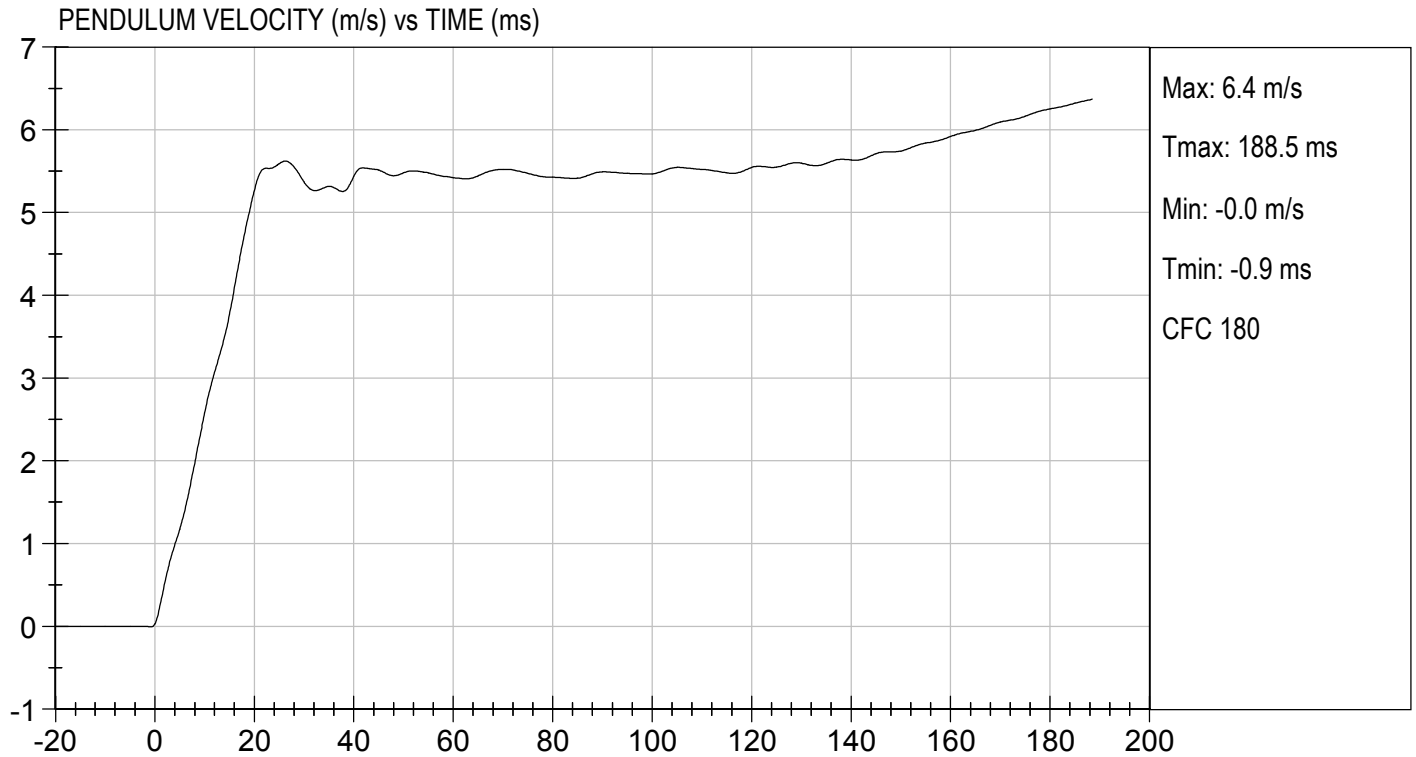
Test Date


 Approved By



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

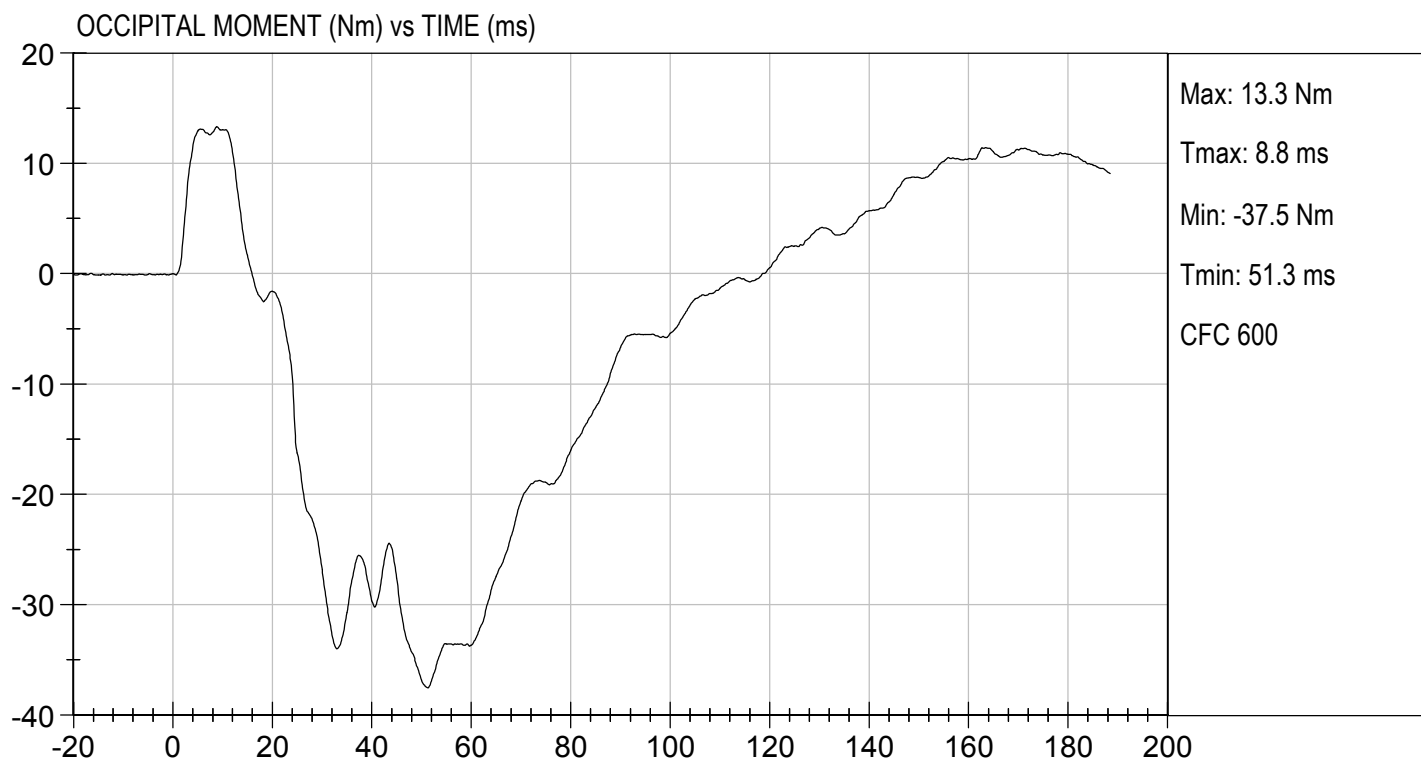
TEST DATE: 10/03/2020
TEST #: D202452





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

TEST DATE: 10/03/2020
TEST #: D202452



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

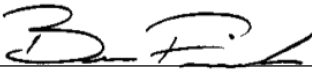
ATD Serial No: 296

Test ID: D202453

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	36	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
			Overall Test Results	Pass


Laboratory Technician

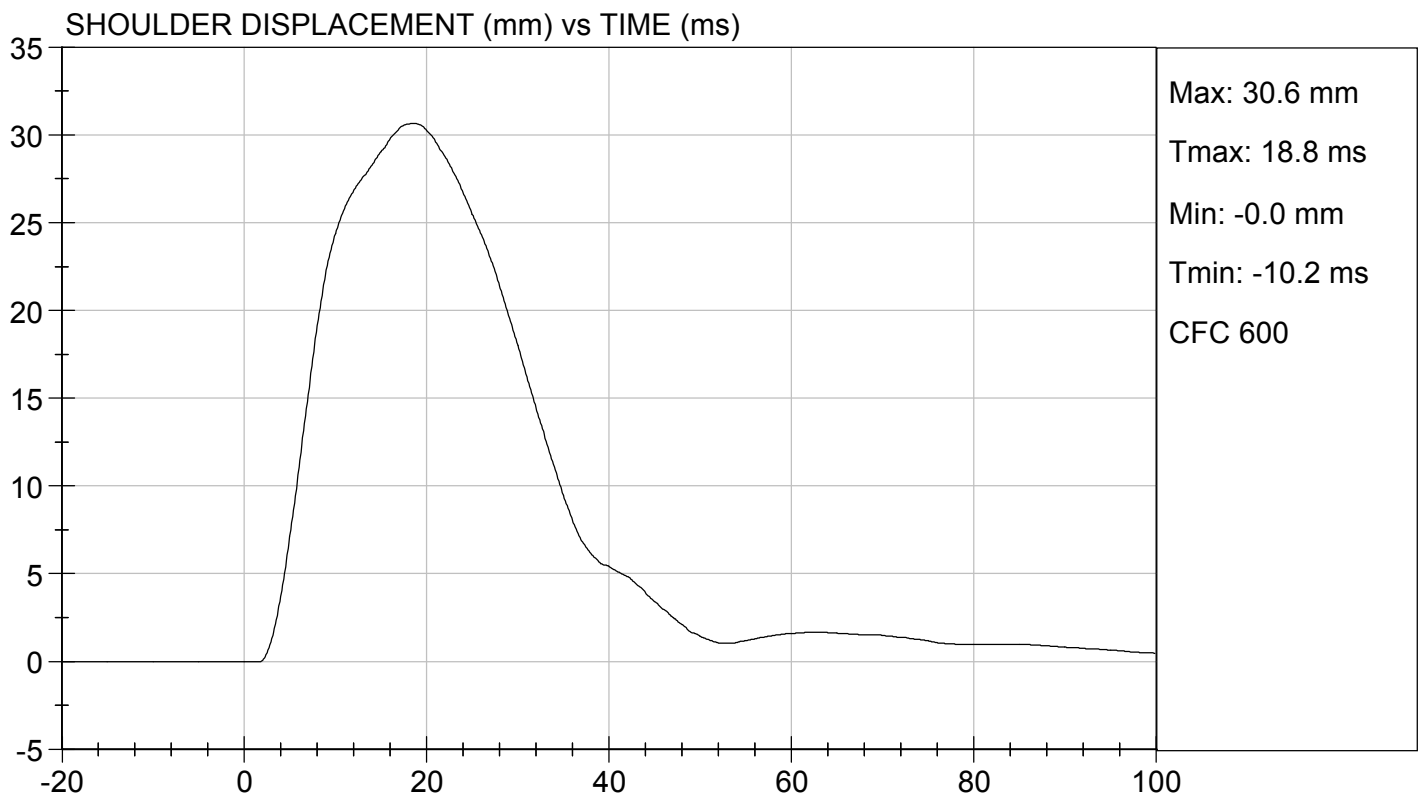
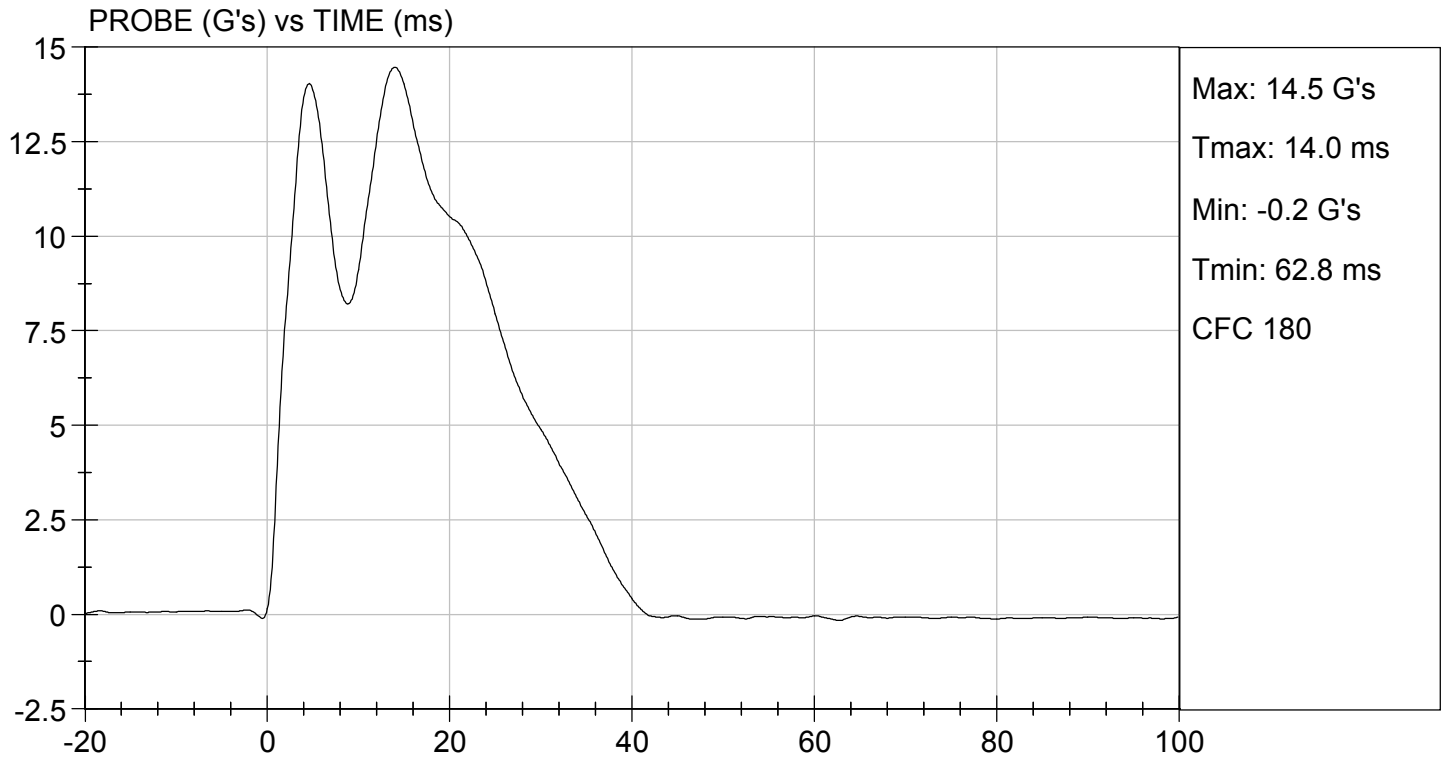
10/02/2020
Test Date


Approved By



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

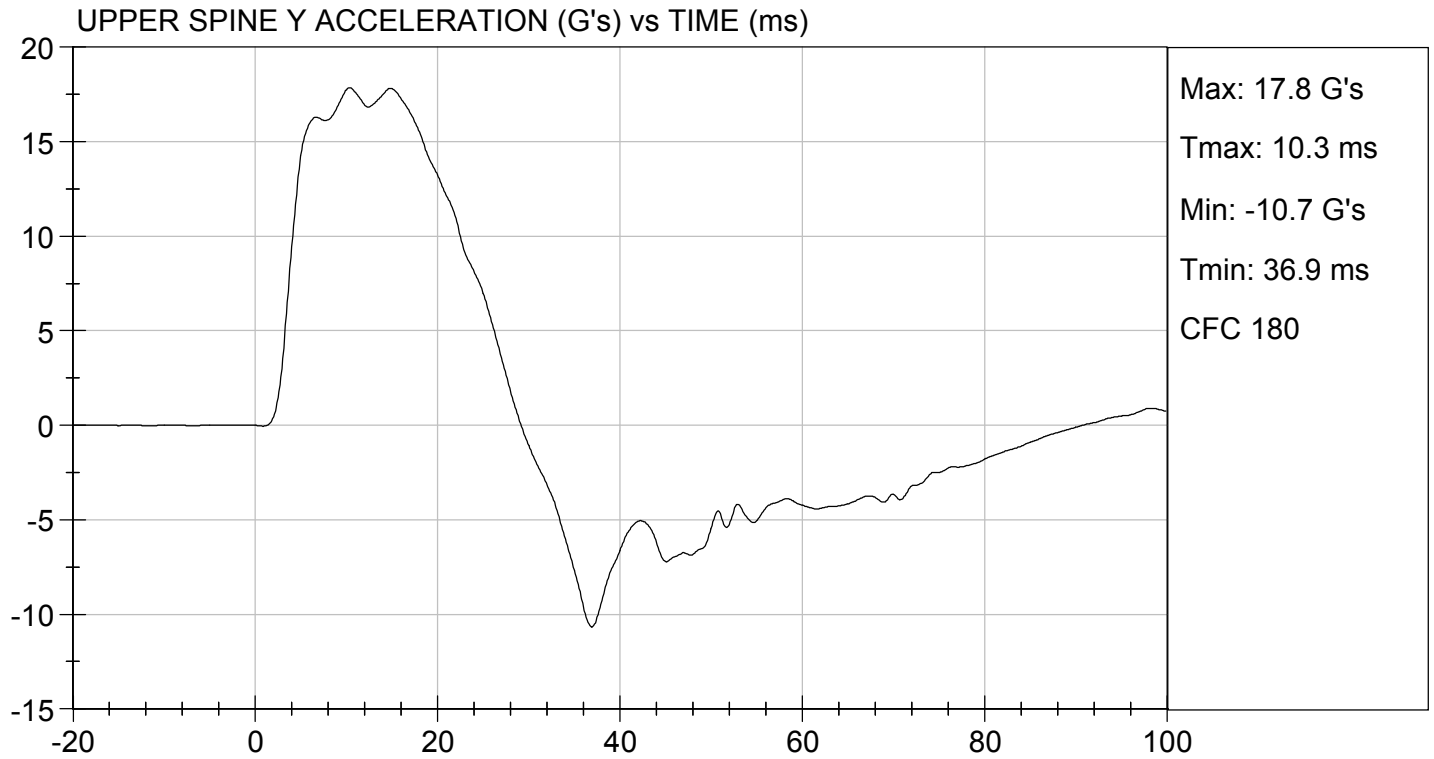
TEST DATE: 10/02/2020
TEST #: D202453





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

TEST DATE: 10/02/2020
TEST #: D202453



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

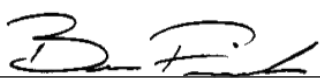
ATD Serial No: 296

Test I.D: D202454

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


Laboratory Technician

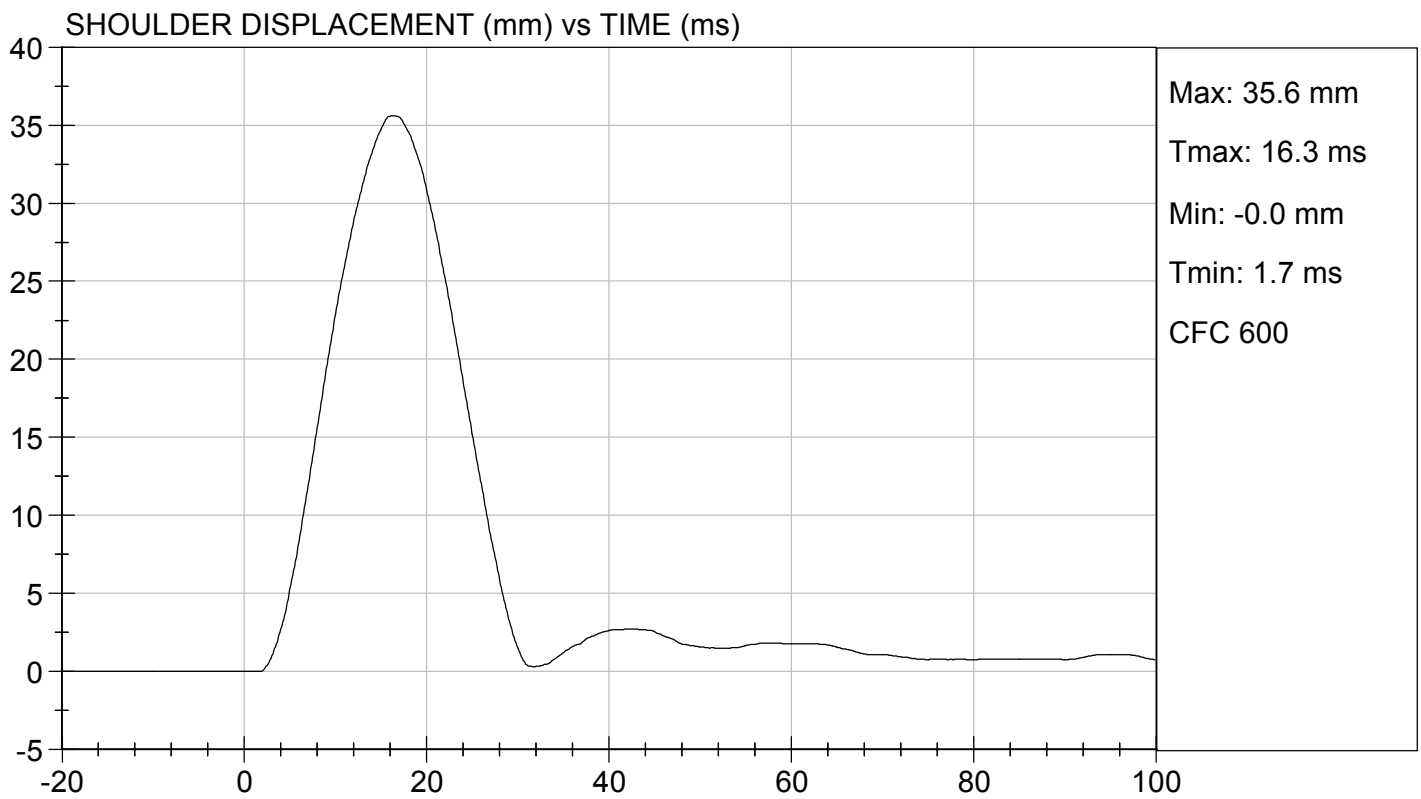
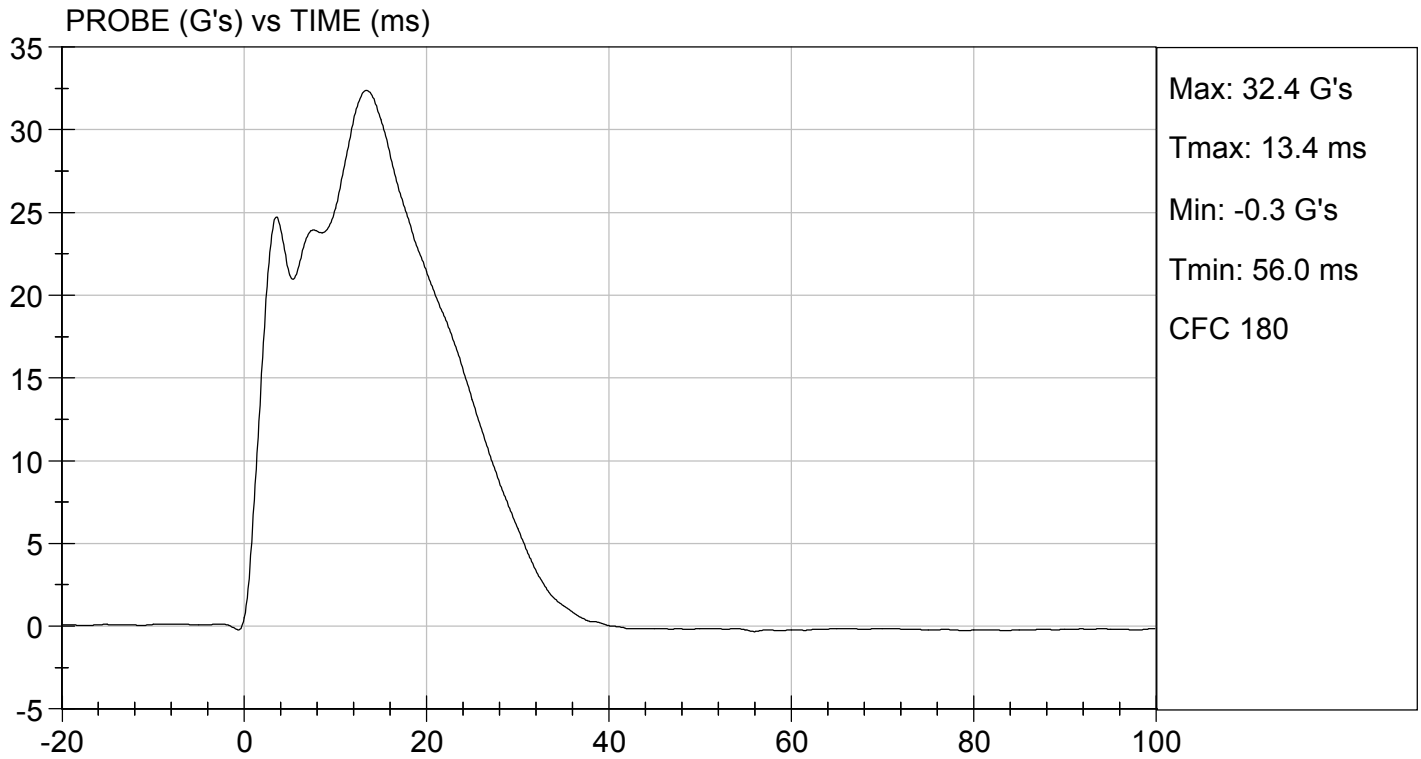
10/02/2020
Test Date

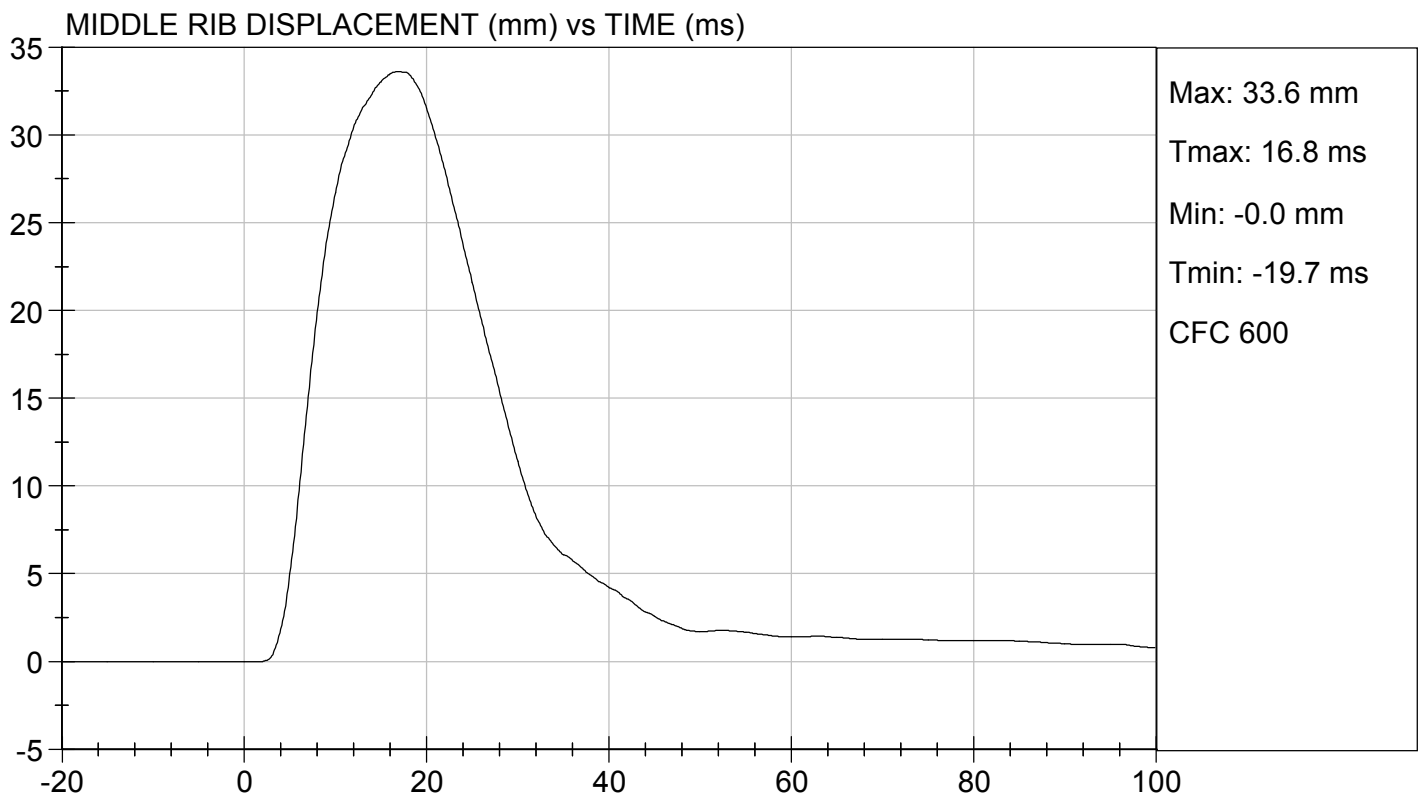
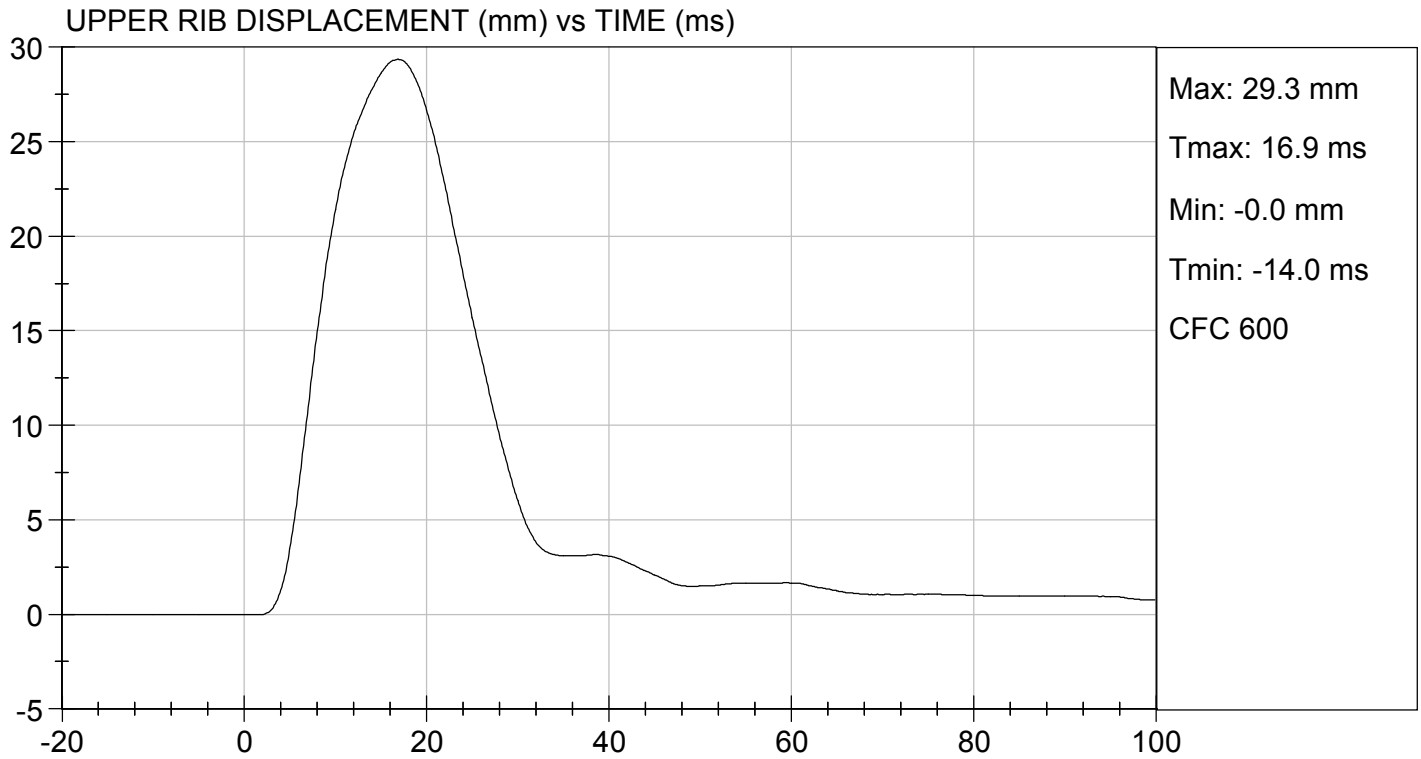

Approved By



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

TEST DATE: 10/02/2020
TEST #: D202454

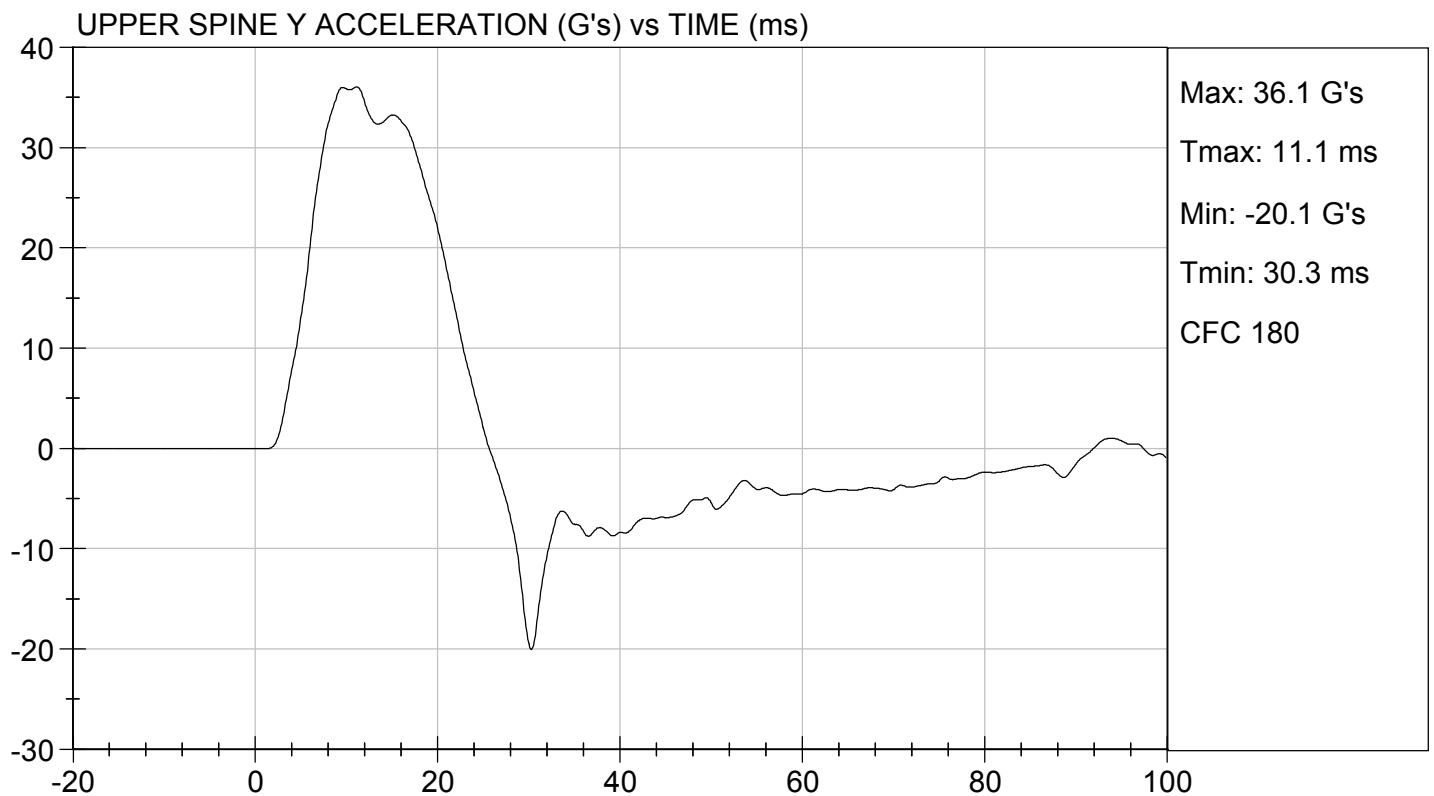
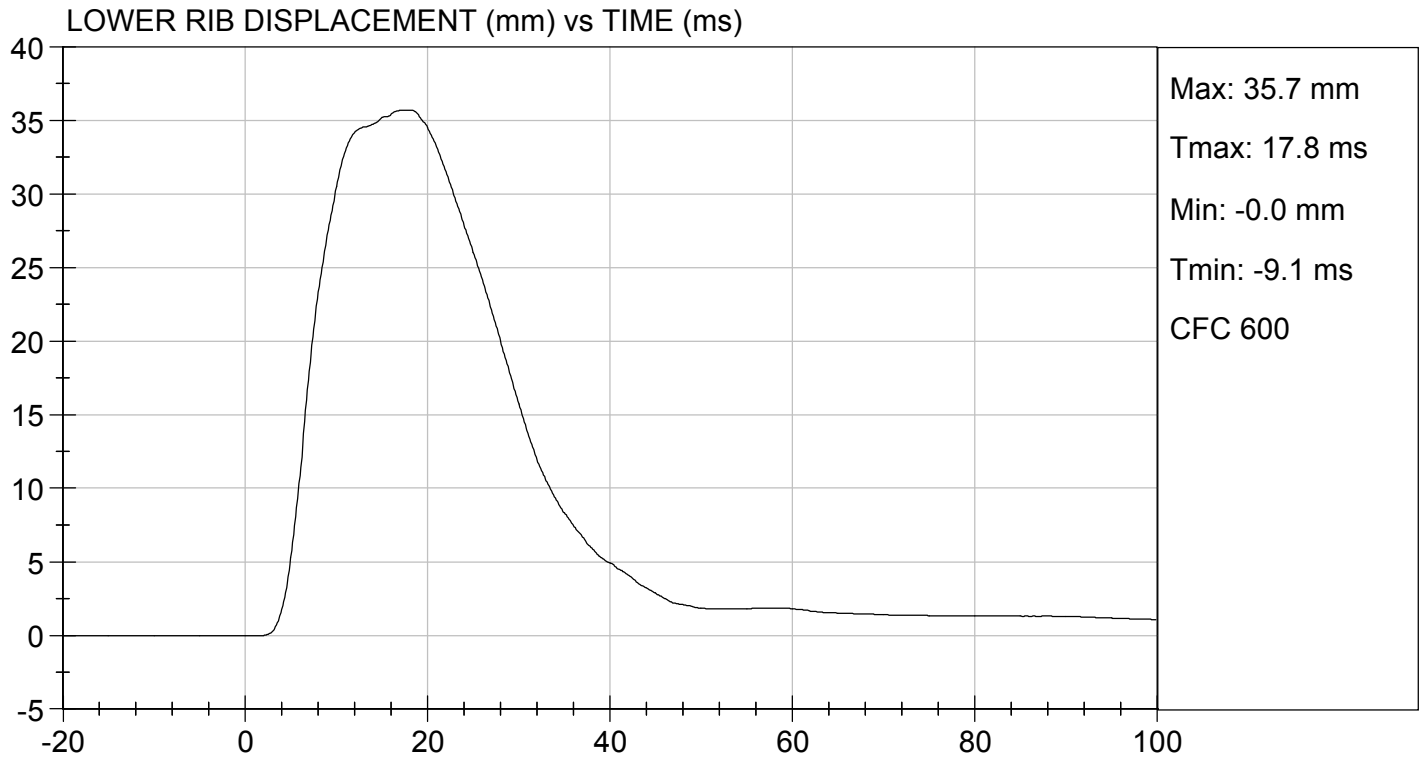






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

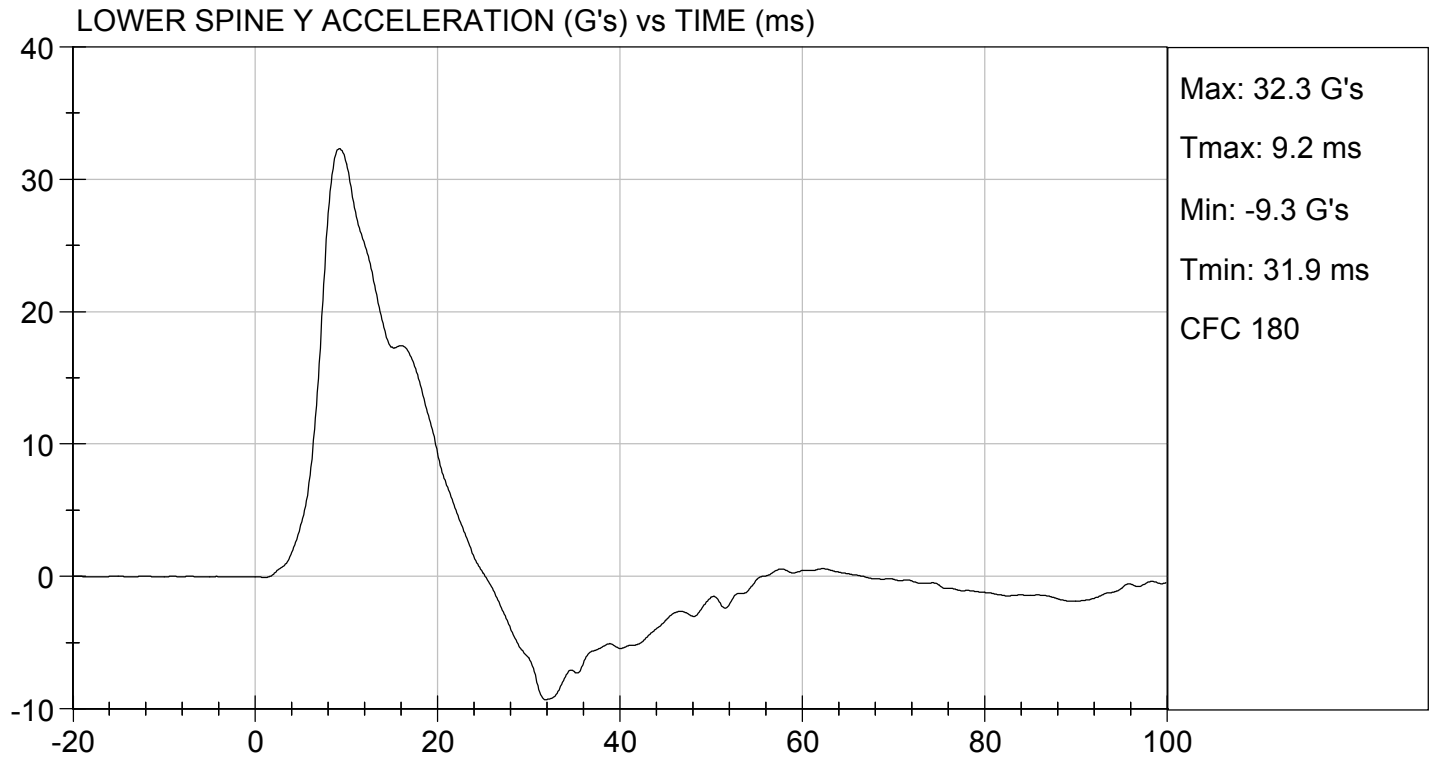
TEST DATE: 10/02/2020
TEST #: D202454





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

TEST DATE: 10/02/2020
TEST #: D202454



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

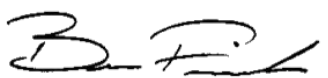
ATD Serial No: 296

Test I.D: D202455

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	36	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	45	Pass
Lower Rib Displacement	mm	35 to 43	42	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

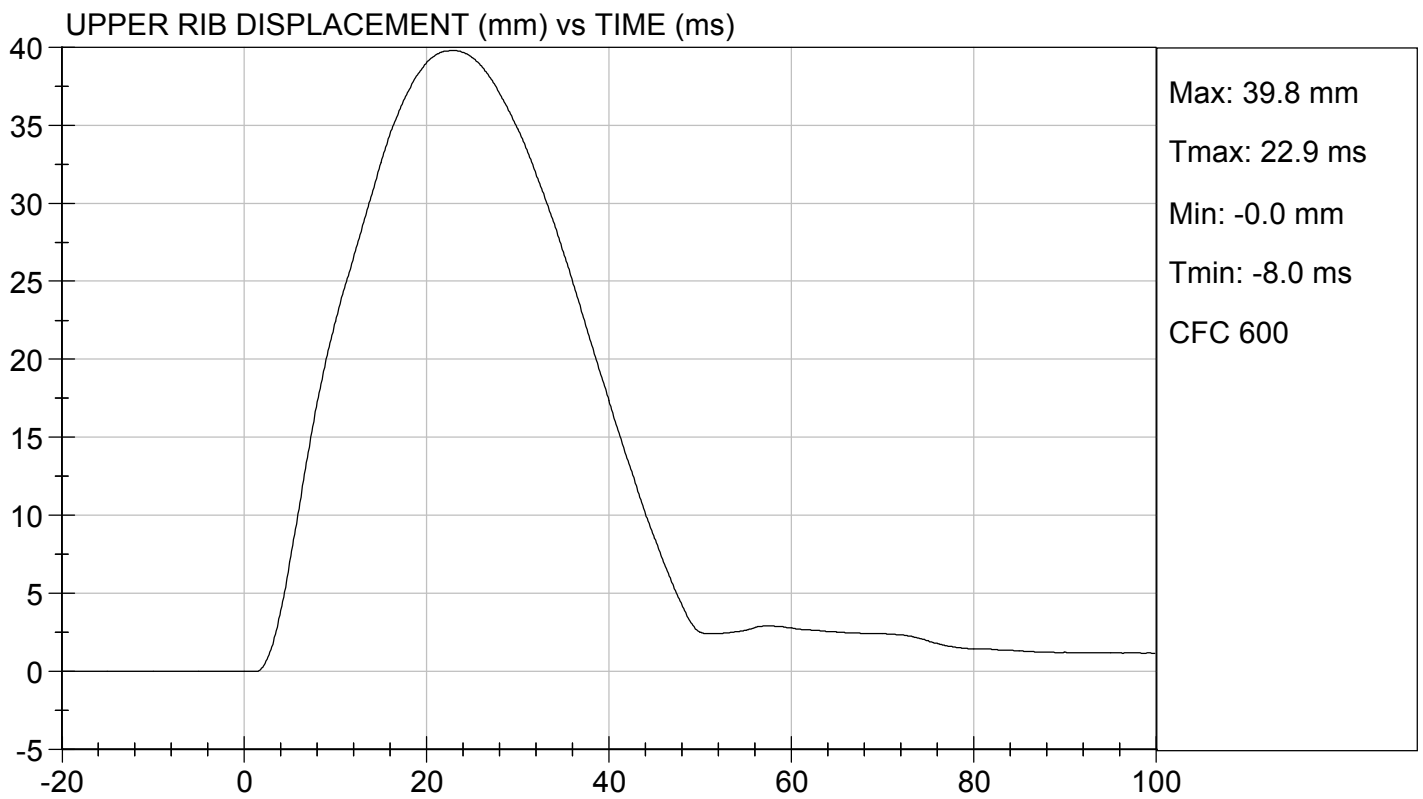
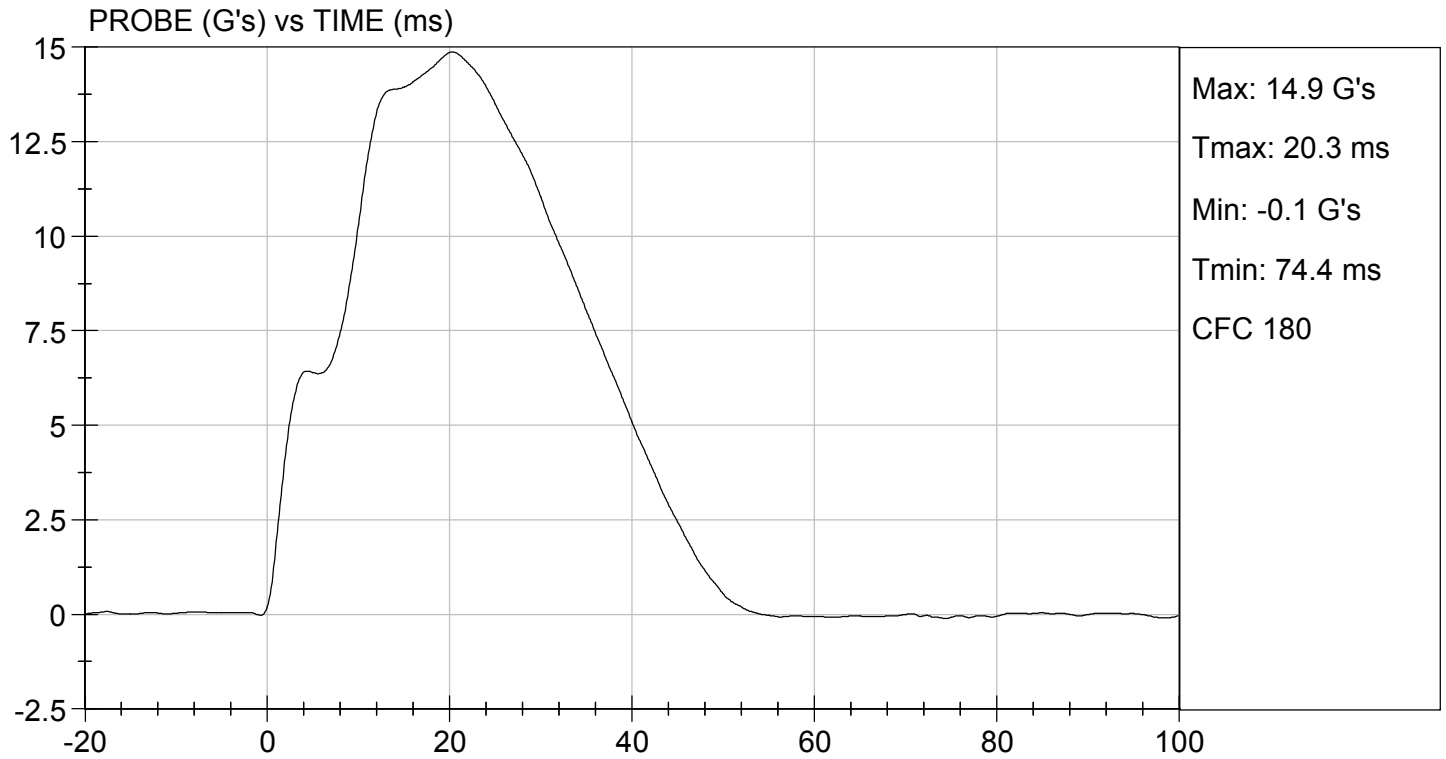
10/02/2020
Test Date


Approved By



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

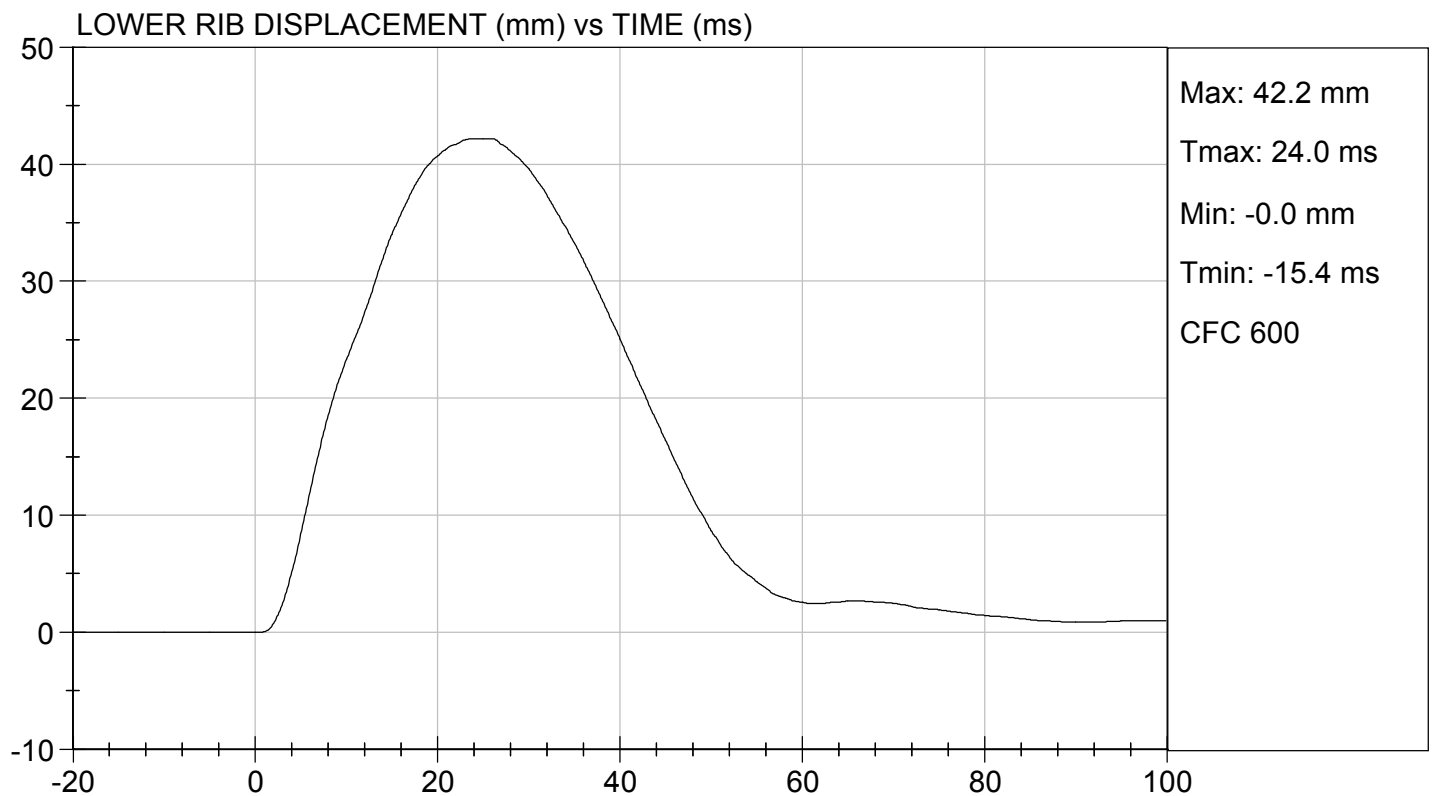
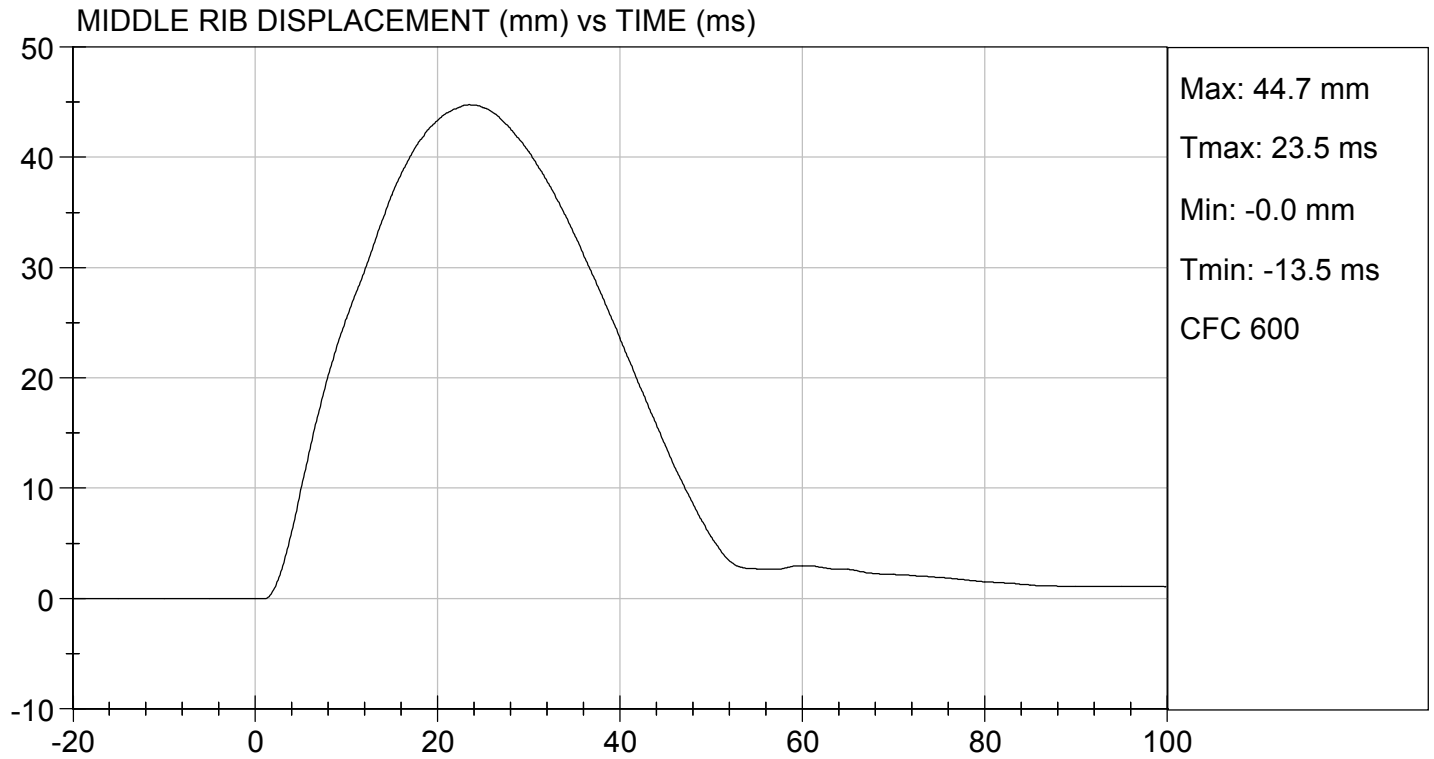
TEST DATE: 10/02/2020
TEST #: D202455

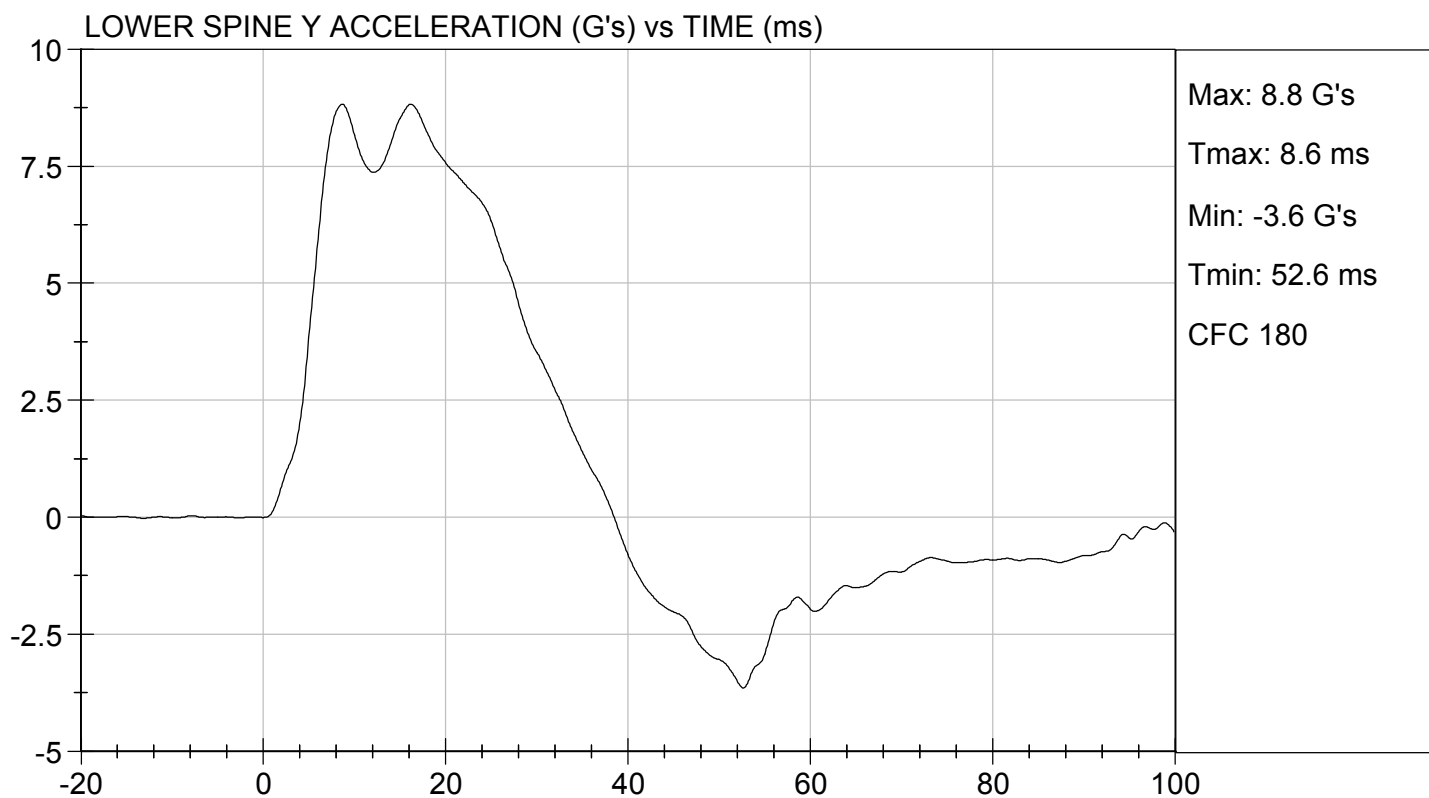
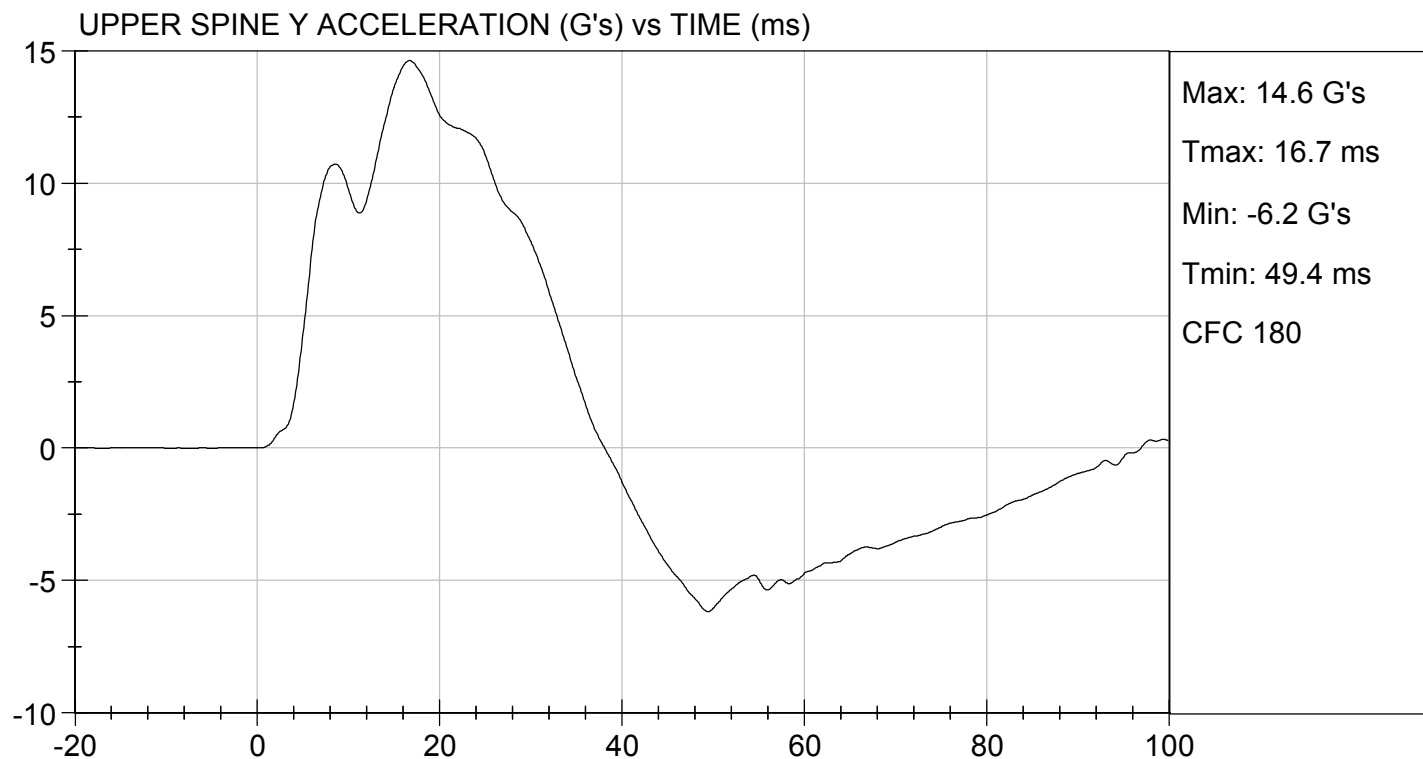




TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 10/02/2020
TEST #: D202455





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

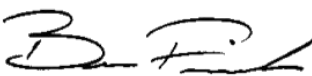
ATD Serial No: 296

Test I.D: D202456

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	36	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	44	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
			Overall Test Results	Pass


Laboratory Technician

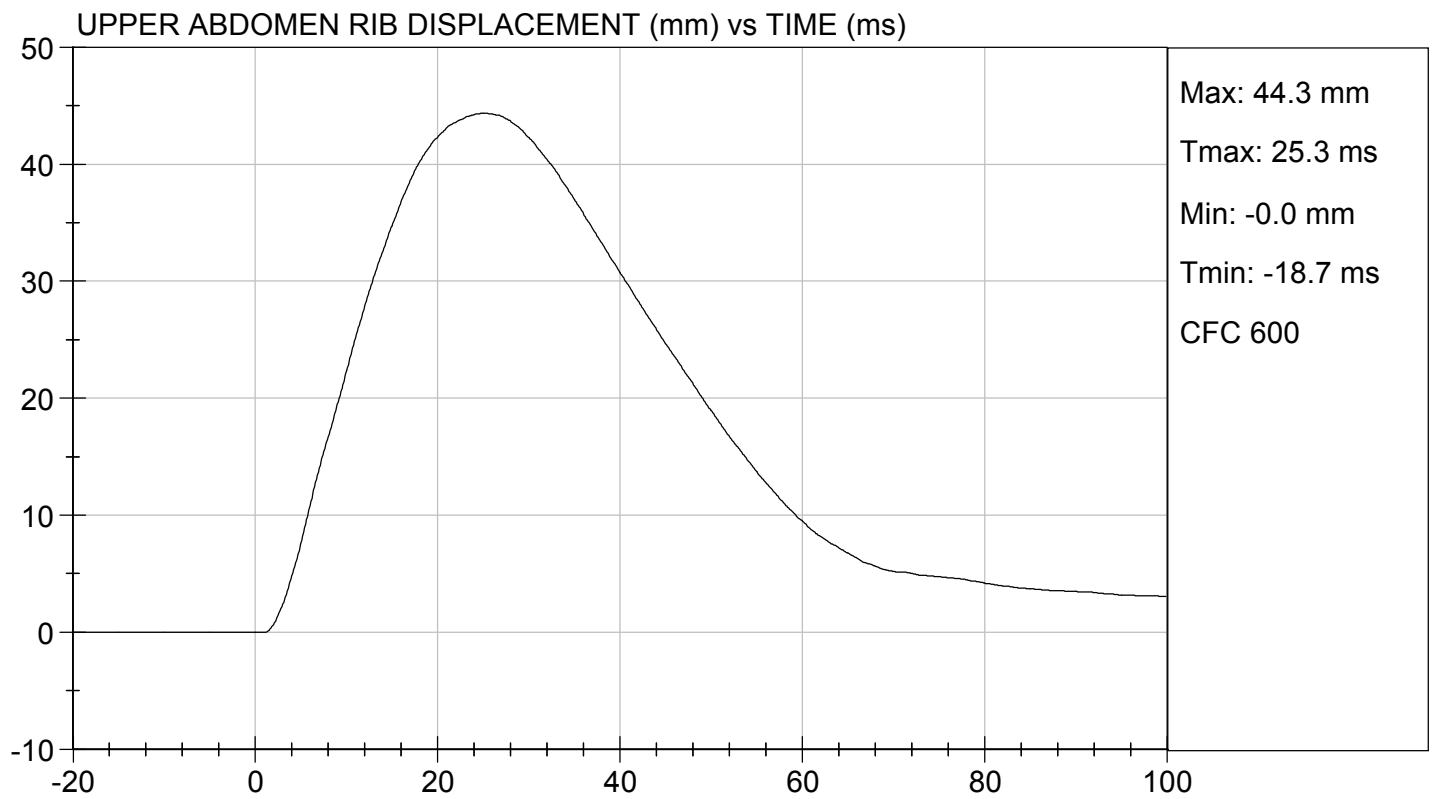
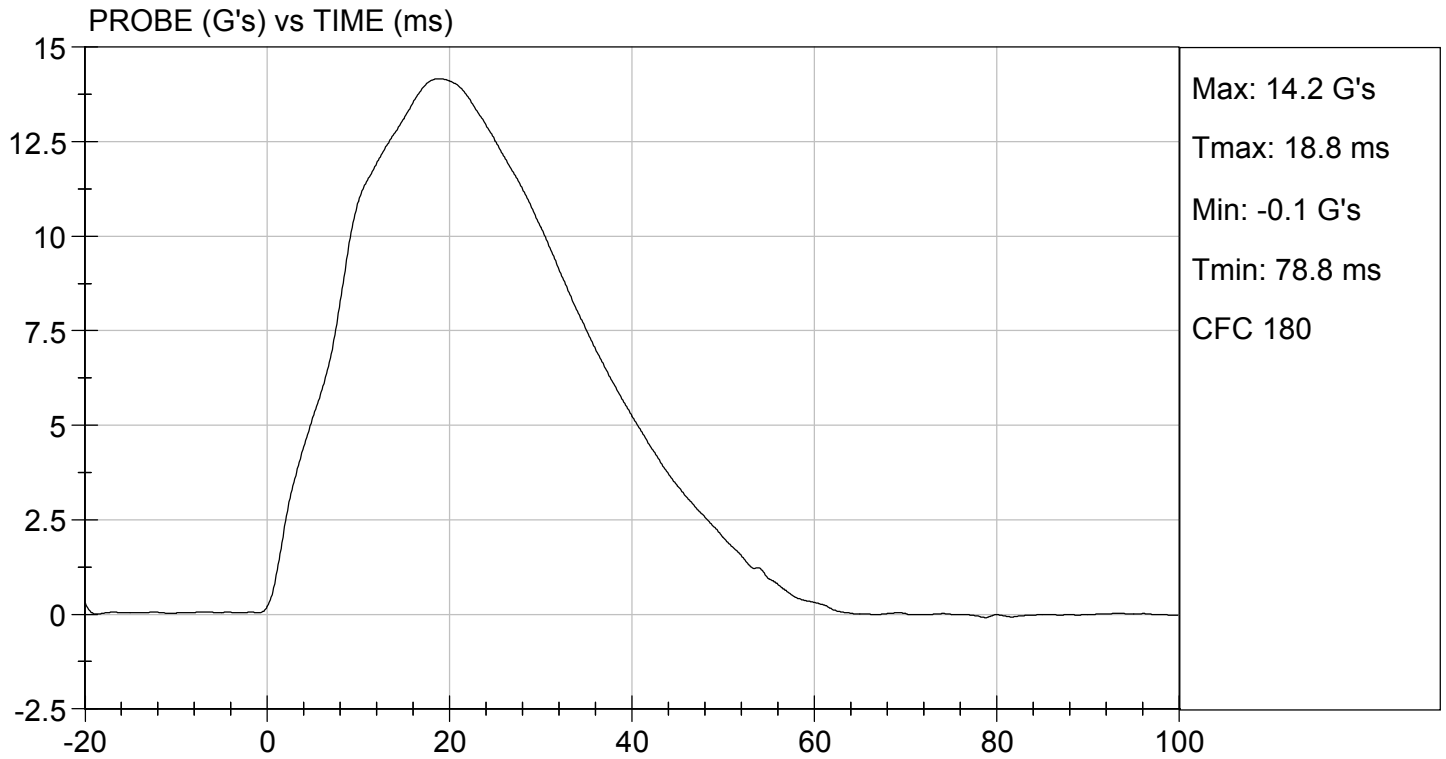
10/02/2020
Test Date


Approved By



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

TEST DATE: 10/02/2020
TEST #: D202456

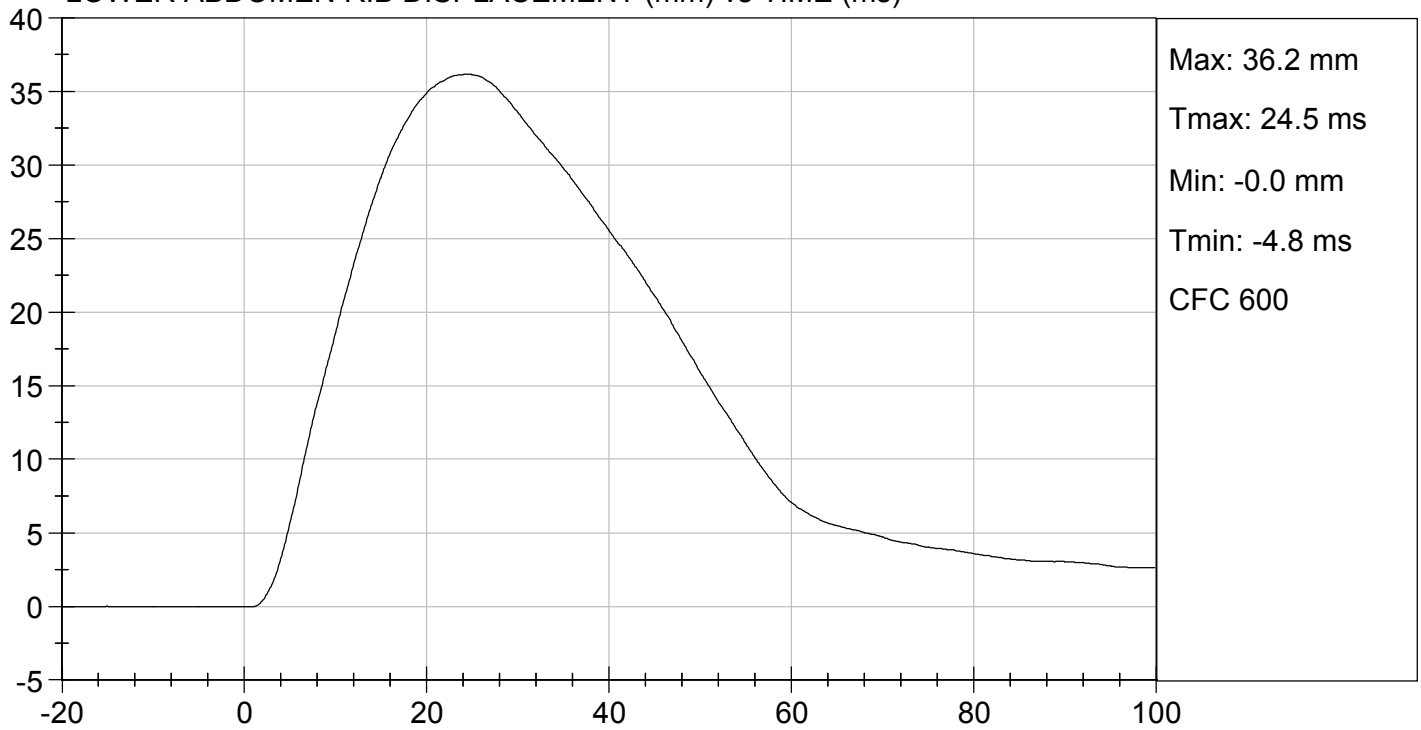




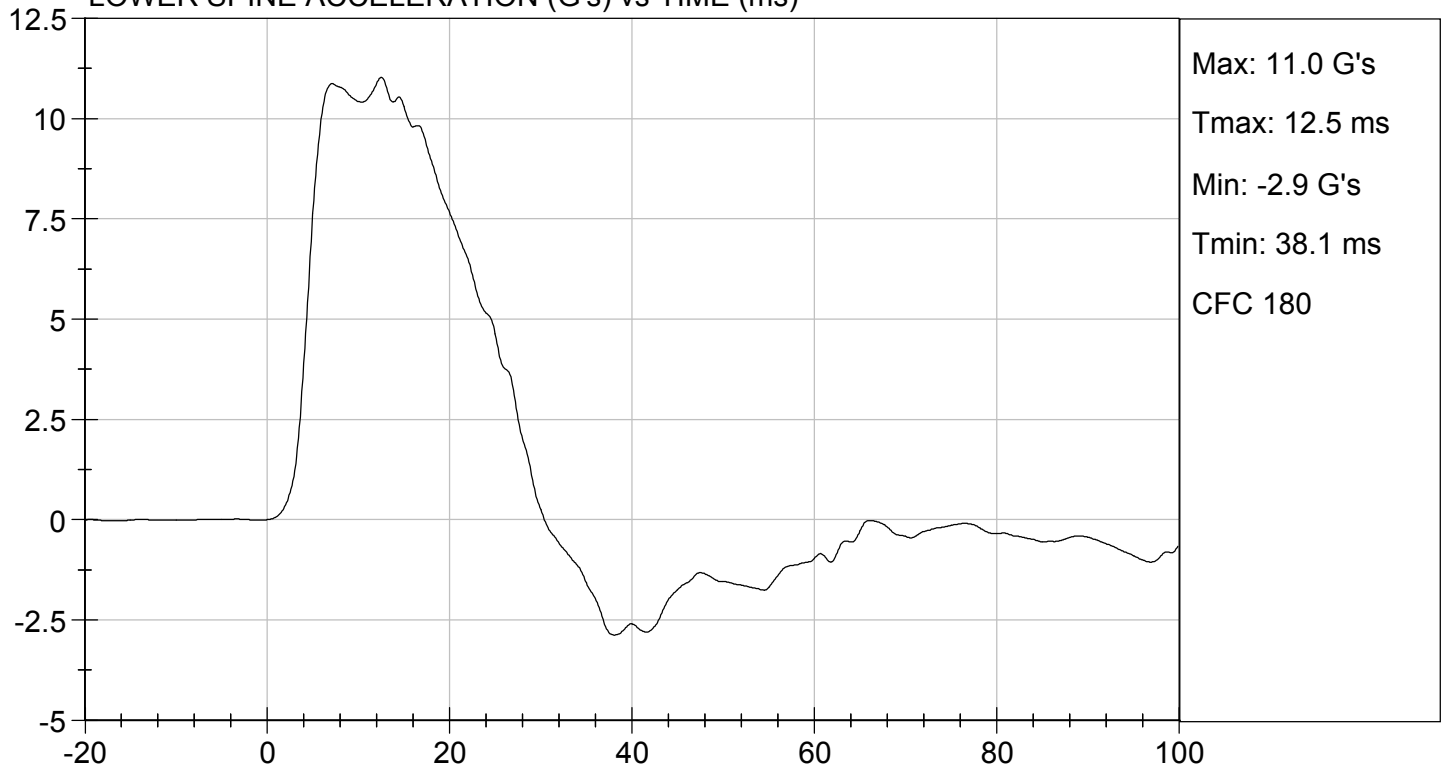
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 10/02/2020
TEST #: D202456

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



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



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

ATD Serial No: 296

Test I.D: D202457

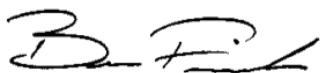
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	36	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3,842	Pass
Overall Test Results				Pass



Laboratory Technician

10/02/2020

Test Date

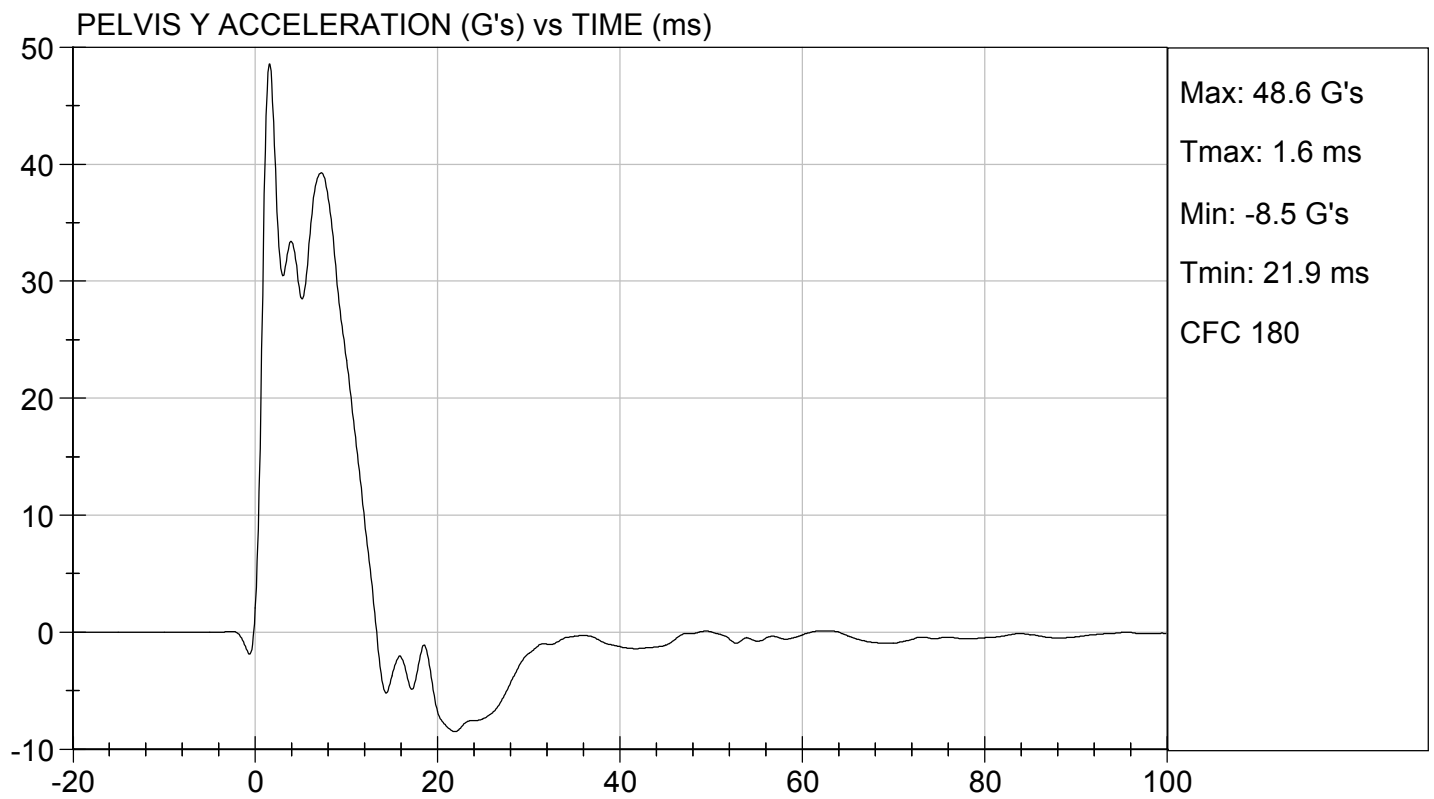
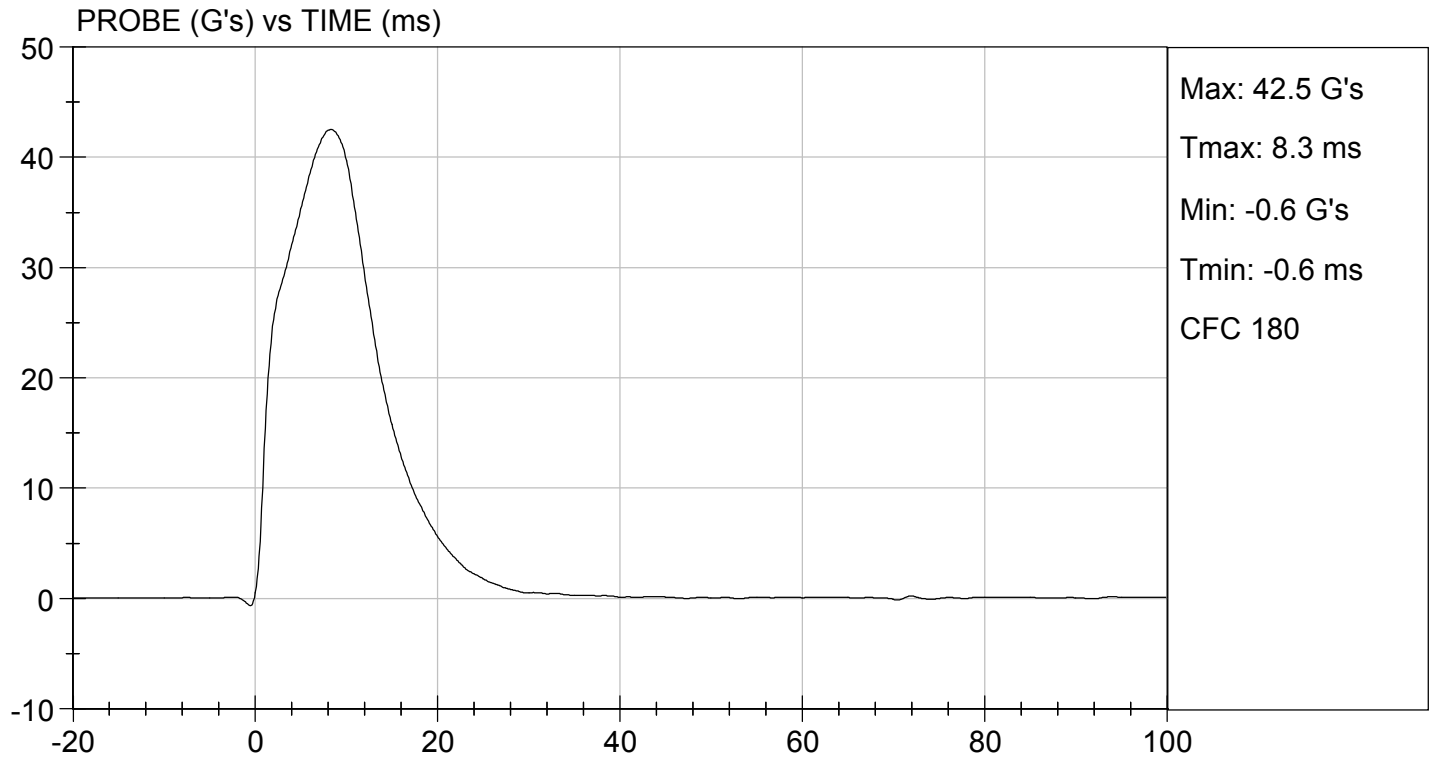


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

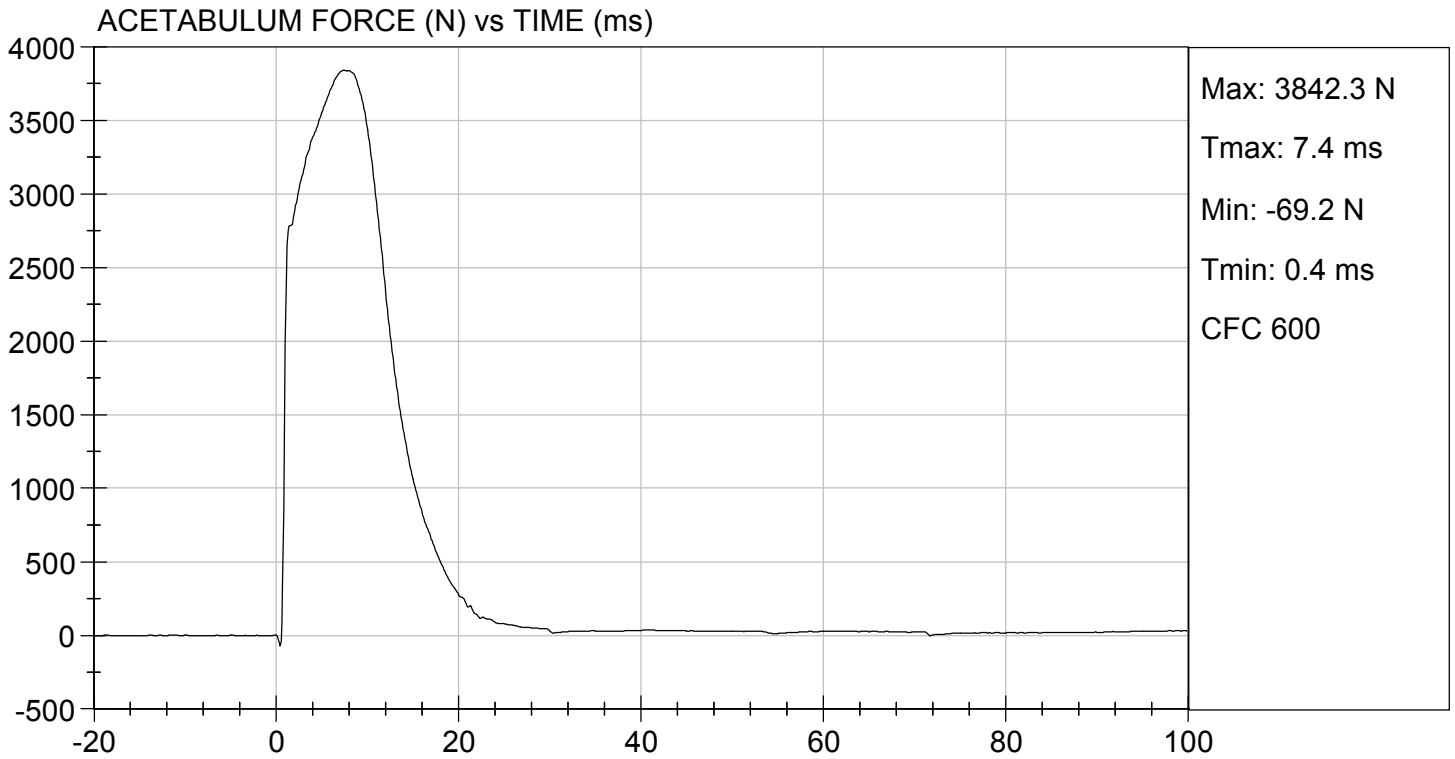
TEST DATE: 10/02/2020
TEST #: D202457





TEST DESC: PELVIS IMPACT
VELOCITY: 21.64 ft/s, 6.60 m/s

TEST DATE: 10/02/2020
TEST #: D202457



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

ATD Serial No: 296

Test I.D: D202458

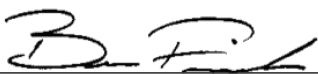
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,935	Pass
Overall Test Results				Pass



Laboratory Technician

10/05/2020

Test Date

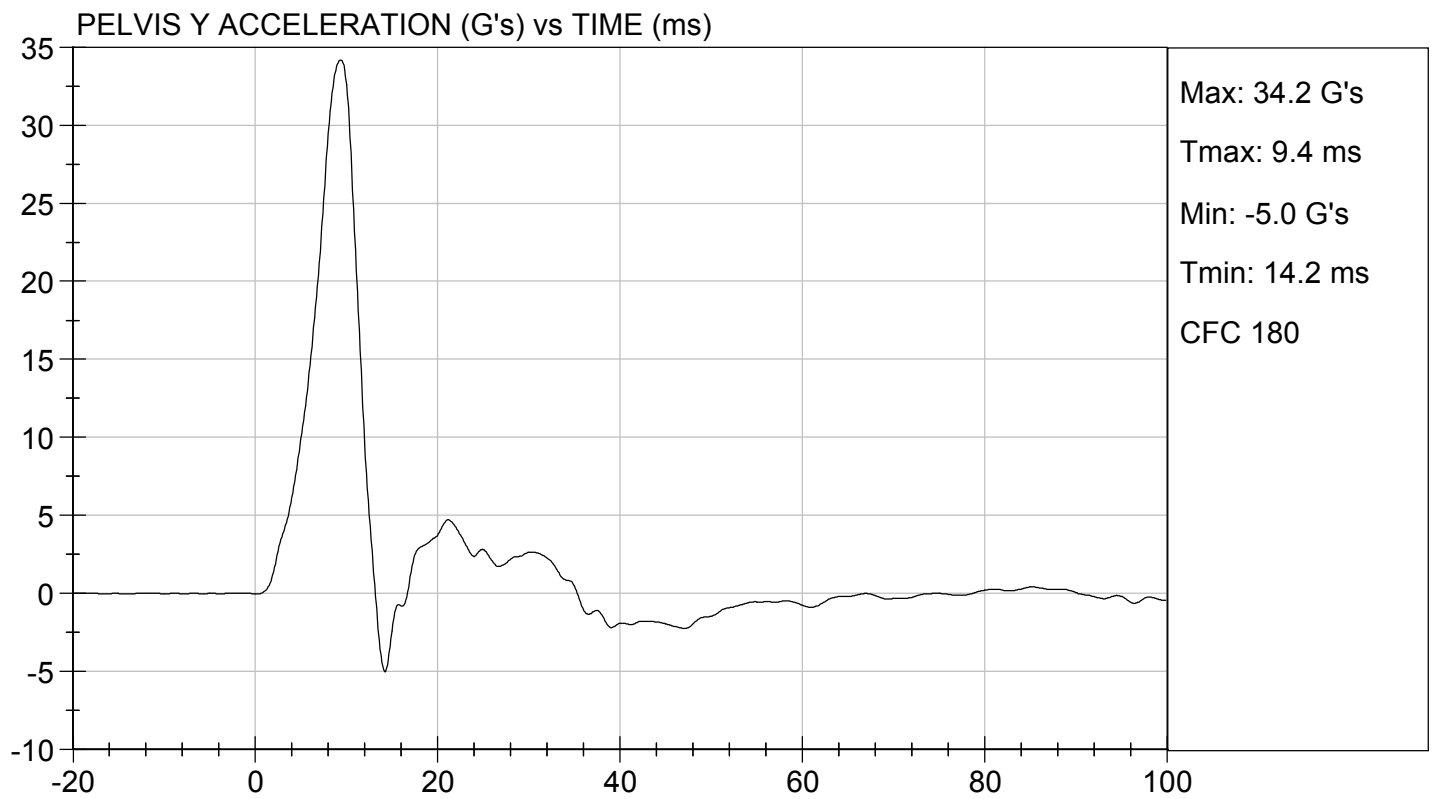
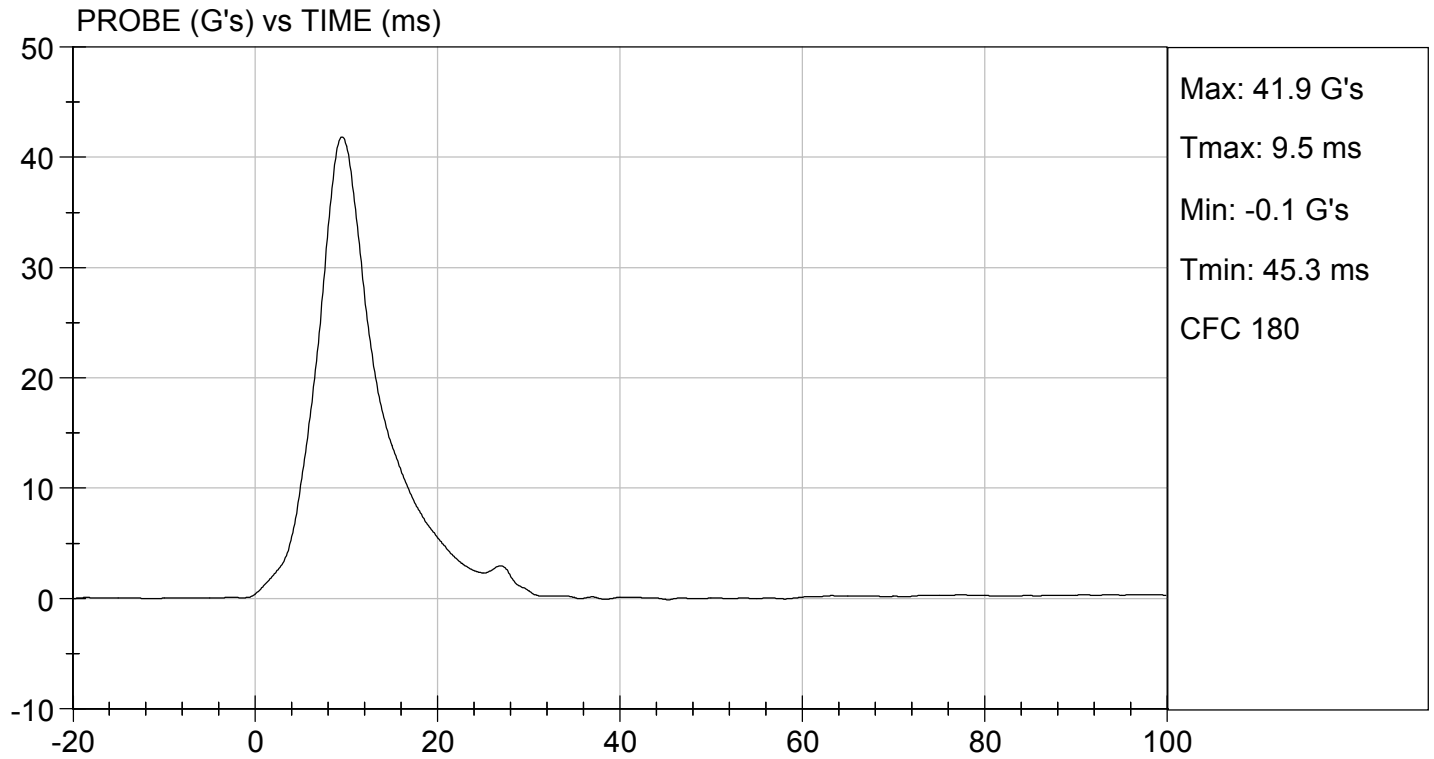


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.24 ft/s, 4.34 m/s

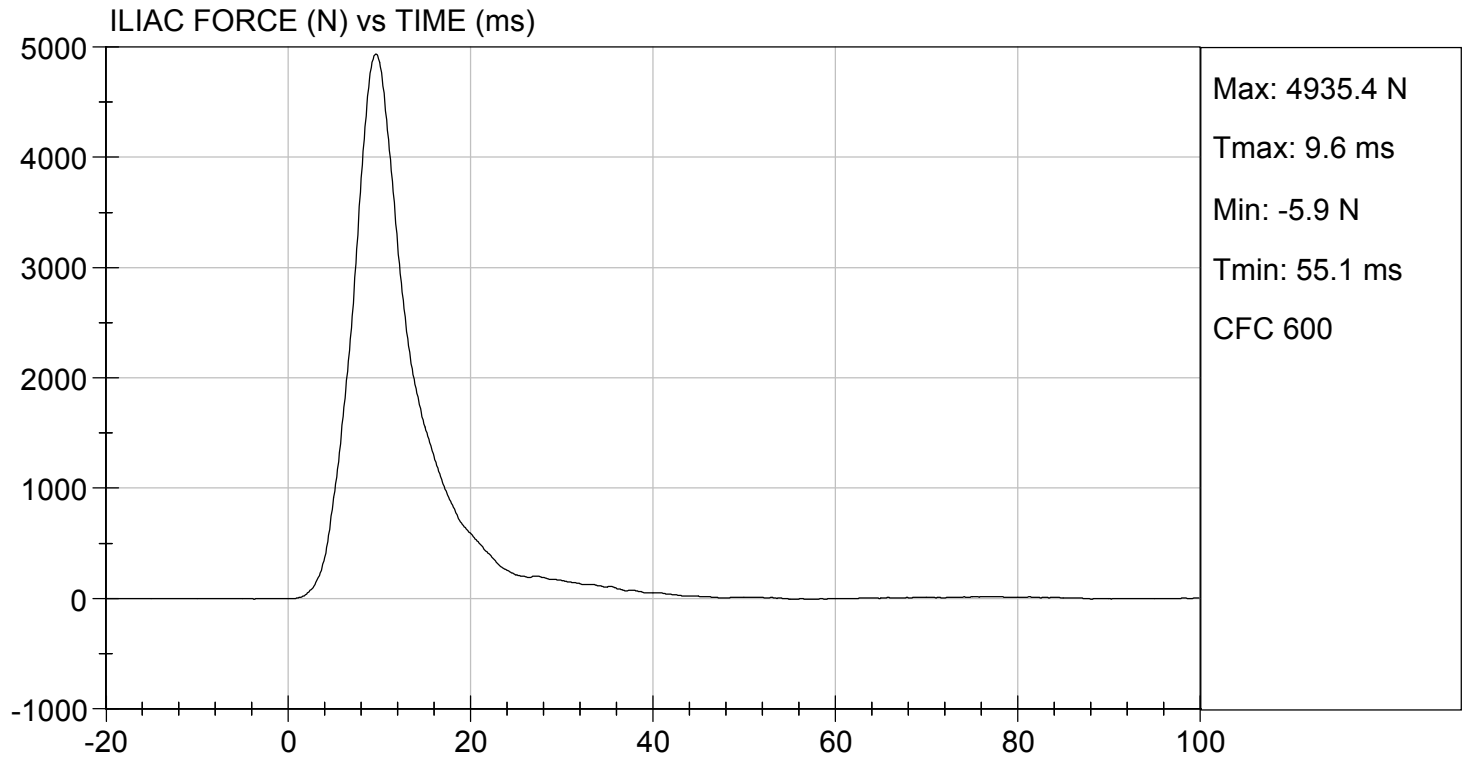
TEST DATE: 10/05/2020
TEST #: D202458





TEST DESC: ILLIAC
VELOCITY: 14.24 ft/s, 4.34 m/s

TEST DATE: 10/05/2020
TEST #: D202458





SID-IIs Pelvis Plug Certification Test

Plug S/N 13523

Test Number 11167

Report Number 11205

Test Date 9/23/2019 10:37:20 AM

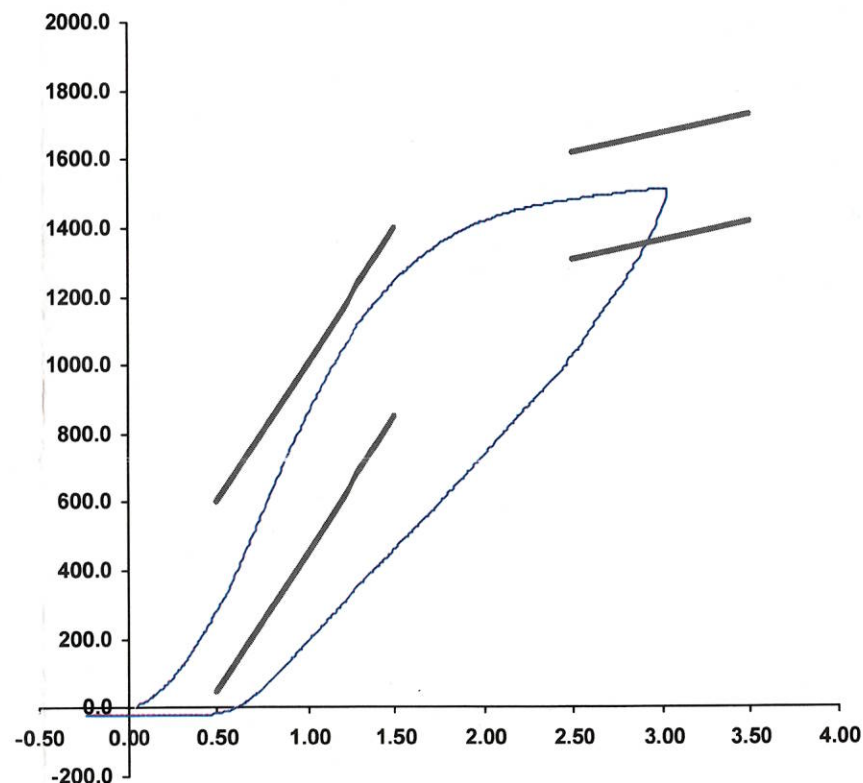
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	295.25	50.00	600.00
Force @ 1.5 mm (N)	1,242.75	850.00	1,400.00
Force @ 2.5 mm (N)	1,480.71	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,509.93	1,361.00	1,673.00

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

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

23-Sep-19

SACO Research

By : DC Date : 9/23/2019

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 13505

Test Number 11148

Report Number 11186

Test Date 9/23/2019 10:06:31 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	302.79	50.00	600.00
Force @ 1.5 mm (N)	1,249.53	850.00	1,400.00
Force @ 2.5 mm (N)	1,494.35	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,524.38	1,361.00	1,673.00

Testing Machine STM-20 5965542

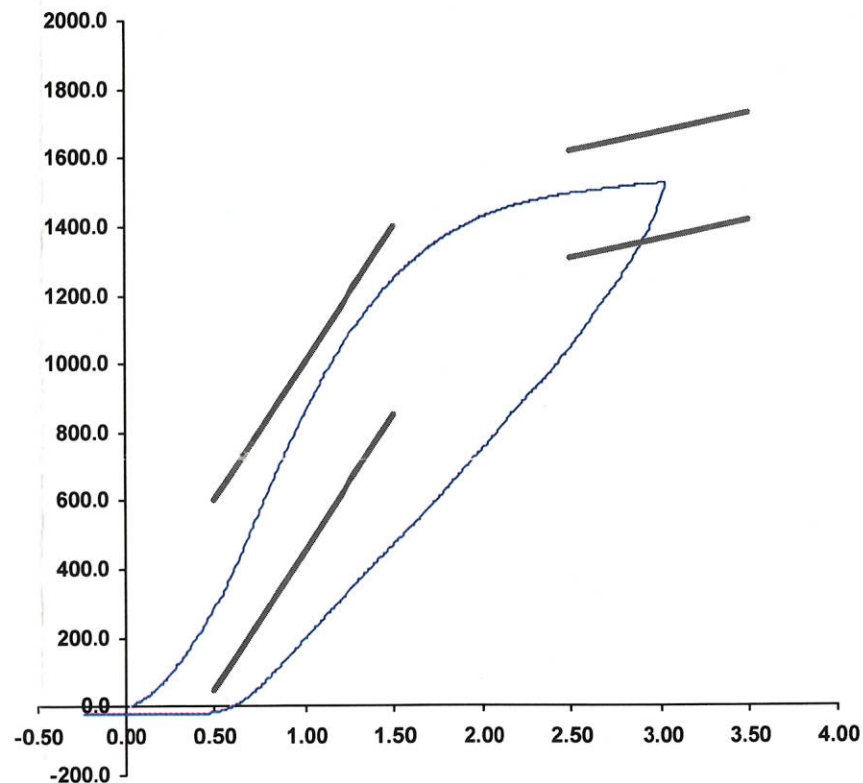
Load Cell S/N (FI360947), Units (LBS 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107

23-Sep-19

SACO Research

By :

DC

Date :

9/23/2019

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N F032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79711	Endevco	06/12/2020
		Y	P79712	Endevco	06/12/2020
		Z	P79750	Endevco	06/12/2020
		Xr	P79751	Endevco	06/12/2020
		Yr	P79753	Endevco	06/12/2020
		Zr	P88170	Endevco	06/12/2020
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	06/12/2020
	Middle	Y	G169	Honeywell	06/12/2020
	Lower	Y	G164	Honeywell	06/12/2020
Abdomen Load Cells	Forward	Y	ABG1513	Denton	07/27/2020
	Middle	Y	ABG1531	Denton	07/27/2020
	Rear	Y	ABG1536	Denton	07/27/2020
Lower Spine Accelerometers (T12)		X	P79574	Endevco	06/12/2020
		Y	P82603	Endevco	06/12/2020
		Z	P82097	Endevco	06/12/2020
Public Symphysis Load Cell		Y	PG462	Denton	07/27/2020

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P85003	Endevco	06/30/2020
				Y	P94783	Endevco	06/30/2020
				Z	P94786	Endevco	06/30/2020
				Xr	P94938	Endevco	06/30/2020
				Yr	P96854	Endevco	06/30/2020
				Zr	P97386	Endevco	06/30/2020
Head Angular Rate Sensors				X	ARS7502	DTS	11/04/2019
				Y	ARS7566	DTS	11/04/2019
				Z	ARS7602	DTS	11/04/2019
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	06/30/2020	
		Middle	Y	G1163	Servo	06/30/2020	
		Lower	Y	G1158	Servo	06/30/2020	
	Abdominal Rib	Upper	Y	G1146	FTSS	06/30/2020	
		Lower	Y	G1126	FTSS	06/30/2020	
Lower Spine Accelerometers (T12)				X	P79418	Endevco	06/30/2020
				Y	P79439	Endevco	06/30/2020
				Z	P79614	Endevco	06/30/2020
Acetabulum Load Cell				Y	ACG111	FTSS	02/24/2020
Iliac Wing Load Cell				Y	IWG226	FTSS	02/24/2020
Pelvis Plug (struck side)					13523	SACO	09/23/2019
Pelvis Plug (non-struck side)					13505	SACO	09/23/2019

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	PCB1431	PCB	07/20/2020
	Vehicle Center of Gravity	Y	PCB1447	PCB	07/20/2020
	Vehicle Center of Gravity	Z	PCB1400	PCB	07/21/2020
2	Right Sill at Front Seat	X	PCB1391	PCB	07/20/2020
	Right Sill at Front Seat	Y	PCB1436	PCB	07/17/2020
	Right Sill at Front Seat	Z	PCB1244	PCB	09/17/2020
3	Right Sill at Rear Seat	X	PCB1411	PCB	07/21/2020
	Right Sill at Rear Seat	Y	PCB1396	PCB	07/20/2020
	Right Sill at Rear Seat	Z	PCB1390	PCB	07/20/2020
4	Left Sill at Front Door	Y	T19012	Endevco	09/04/2020
5	Left Sill at Rear Door	Y	T22580	Endevco	09/04/2020
6	Left A-Post Lower	Y	T22632	Endevco	06/30/2020
7	Left A-Post Middle	Y	T20376	Endevco	06/30/2020
8	Left B-Post Lower	Y	T19954	Endevco	06/02/2020
9	Left B-Post Middle	Y	T19518	Endevco	05/29/2020
10	Front Seat Track	Y	T20754	Endevco	06/02/2020
11	Rear Seat Track or Structure	Y	T19016	Endevco	09/17/2020
12	Right Rear Occ. Compartment	Y	PCB1446	PCB	07/21/2020
13	Engine Block	X	T20732	Endevco	07/13/2020
	Engine Block	Y	T20724	Endevco	07/13/2020
14	Rear Floorpan Above Axle	X	PCB1438	PCB	07/17/2020
	Rear Floorpan Above Axle	Y	PCB1444	PCB	07/17/2020
	Rear Floorpan Above Axle	Z	PCB1426	PCB	07/17/2020

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB796D	PCB	06/03/2020
MDB Center of Gravity	Y	PCB246D	PCB	06/03/2020
MDB Center of Gravity	Z	PCB794D	PCB	06/03/2020
Left Frame at Rear Axle Centerline	X	PCB1653D	PCB	06/03/2020
Left Frame at Rear Axle Centerline	Y	PCB1423D	PCB	06/03/2020