

REPORT NUMBER: SINCAP-MGA-2019-016

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

**TOYOTA MOTOR CORPORATION
2019 Toyota Corolla Hatchback SE 5-Door Hatchback
NHTSA No.: O20195102**

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



Test Date: January 10, 2019

Final Report Date: April 12, 2019

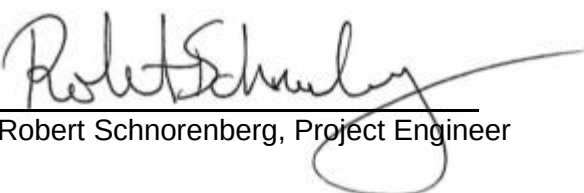
FINAL REPORT

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

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Approval Date: April 12, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

1. Report No. SINCAP-MGA-2019-016		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 2019 Toyota Corolla Hatchback SE 5-Door Hatchback, NHTSA No.: O20195102		5. Report Date April 12, 2019		6. Performing Organization Code MGA																																																									
		8. Performing Organization Report No. SINCAP-MGA-2019-016																																																											
7. Author(s) Ben Fischer, Project Engineer		10. Work Unit No.		11. Contract or Grant No. DTNH22-14-D-00353																																																									
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105																																																													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report January 10, 2019 to April 12, 2019		14. Sponsoring Agency Code NRM-110																																																									
15. Supplementary Notes																																																													
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2019 Toyota Corolla Hatchback SE 5-Door Hatchback in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on January 10, 2019. The impact velocity of the Moving Deformable Barrier (MDB) was 62.14 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 20.9°C. The target vehicle post-test maximum crush was 175 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th colspan="4" style="text-align: center;">Driver ATD (ES-2re)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">83</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">44</td> <td style="text-align: center;">22</td> </tr> <tr> <td>Total Abdominal Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">2500</td> <td style="text-align: center;">729</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">6000</td> <td style="text-align: center;">1642</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82*</td> <td style="text-align: center;">26</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th colspan="4" style="text-align: center;">Passenger ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">225</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82</td> <td style="text-align: center;">64</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">2837</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38*</td> <td style="text-align: center;">37</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45*</td> <td style="text-align: center;">37</td> </tr> </tbody> </table> *Proposed IARV						Driver ATD (ES-2re)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	83	Maximum Thorax Rib Deflection	mm	44	22	Total Abdominal Force	N	2500	729	Pubic Symphysis Force	N	6000	1642	Resultant Lower Spine Acceleration	Gs	82*	26	Passenger ATD (SID-IIs)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	225	Resultant Lower Spine Acceleration	Gs	82	64	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2837	Maximum Thoracic Rib Deflection	mm	38*	37	Maximum Abdomen Rib Deflection	mm	45*	37
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19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 227		22. Price																																																									

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2019 Toyota Corolla Hatchback SE 5-Door Hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated October 2015.

SECTION 2 SUMMARY OF TEST RESULTS

A 2019 Toyota Corolla Hatchback SE 5-Door Hatchback 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 62.14 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 January 10, 2019. Pre-test and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

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

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

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

PASSENGER ATD (SID-IIs)

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

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

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

Driver ATD (ES-2re)			
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	83
Maximum Thorax Rib Deflection	mm	44	22
Total Abdominal Force	N	2500	729
Pubic Symphysis Force	N	6000	1642
Resultant Lower Spine Acceleration	Gs	82*	26

Passenger ATD (SID-IIs)			
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	225
Resultant Lower Spine Acceleration	Gs	82	64
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2837
Maximum Thoracic Rib Deflection	mm	38*	37
Maximum Abdomen Rib Deflection	mm	45*	37

*Proposed IARV

Supplemental restraint information is given below:

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

GENERAL COMMENTS

Left Lower B-Post Y recorded questionable data.

Left Mid B-Post Y recorded questionable data.

MDB CG Z recorded questionable data.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
Test Date: 1/10/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20195102	Traction Control System (TCS)	Yes
Model Year	2019	Auto-Leveling System	No
Make	Toyota	Automatic Door Locks (ADL)	No
Model	Corolla Hatchback SE	Power Window Auto-Reverse	Yes
Body Style	5-Door Hatchback	Other Optional Feature	N/A
VIN	JTNK4RBE3K3016961	Driver Front Airbag	Yes
Body Color	Blue Flame	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	109km / 68mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0L	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds		Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

Does owner's manual provide instruction to turn off automatic door locks?	N/A
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DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR CORPORATION	GVWR (kg)	1844
Date of Manufacture	08/18	GAWR Front (kg)	1050
Vehicle Type	Passenger Car	GAWR Rear (kg)	971

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				384*	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				44	(A-B)

*Vehicle Capacity Weight (VCW) reduced by 6 kg to account for Load Carrying Capacity Reduction label.

VEHICLE SEAT TYPE

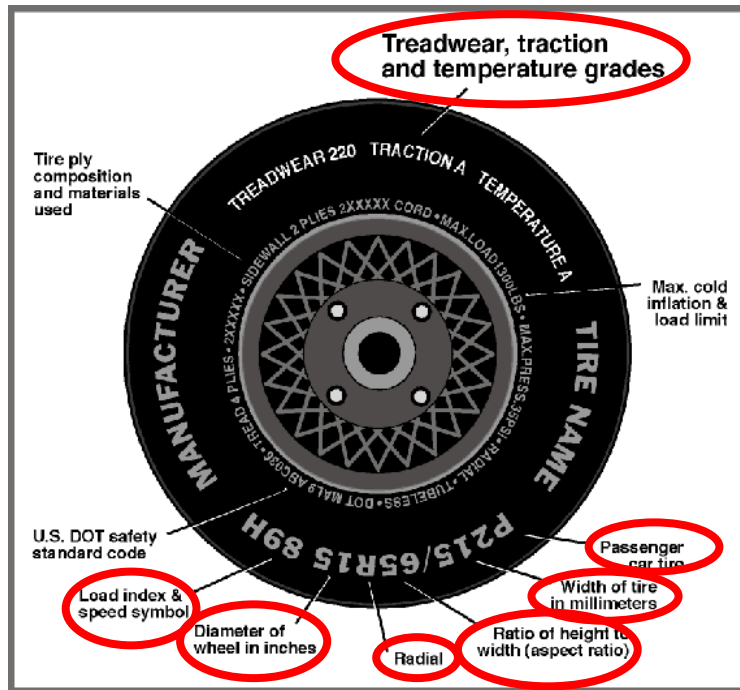
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X					w/ Lever	
Rear or Second Row Seat		X			X		
Third Row Seat							

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	230
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Dunlop	Dunlop
Tire Model	Enasave	Enasave
Treadwear	340	340
Traction	B	B
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Left	EU8K 3MMR 3318	EU8K 3MMR 3318
DOT Safety Code Right	EU8K 3MMR 3318	EU8K 3MMR 3318

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
 Test Date: 1/10/2019

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	250	250	250	250
Tire Placard	kPa	240	240	230	230
Owner's Manual	kPa	240	240	230	230
As Tested	kPa	240	240	230	230

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	422.5	277.0		462.5	348.0		464.5	353.5	
Right	kg	419.0	251.0		423.5	300.0		422.0	302.5	
Ratio	%	61.4%	38.6%		57.8%	42.2%		57.5%	42.5%	
Totals	kg	841.5	528.0	1369.5	886.0	648.0	1534.0	886.5	656.0	1542.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1369.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	44	(C)
Calculated Test Vehicle Target Weight (TV/TW)	kg	1542.5	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	660	663	Yes
Right Front	mm	674	661	No
Right Rear	mm	673	678	Yes
Left Rear	mm	653	655	Yes
Vehicle CG (Aft of Front Axle)	mm	1123	1115	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	47	44	

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

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback

NHTSA No. 020195102

Test Program: NCAP Side MDB Impact Test

Test Date: 1/10/2019

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	46
None	

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	20.2	15.0	17.6
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid)	As-Tested SCRIP Height (mm)	SCRIP Height Position	SCRIP Height (mm)		
				Rear-Most	Mid	Forward-Most
Driver Seat	17.6	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

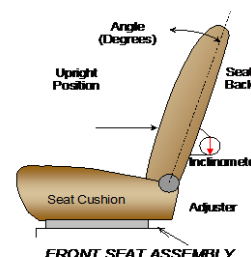
NHTSA No. 020195102
 Test Date: 1/10/2019

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-Most Position	
	mm	Detents (1 st as 1)	mm	Detent (1 st as 0)
Driver Seat	260	27	130	13
Front Passenger Seat	260	27	130	13
Front Center Seat				
Struck Side Rear Seat	Fixed		Fixed	
Non-Struck Side Rear Seat	Fixed		Fixed	
Rear Center Seat	Fixed		Fixed	

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	51.7	27	4.8	5
Front Passenger Seat	51.6	27	3.8	5
Front Center Seat				
Struck Side Rear Seat	Fixed		21.8	
Non-Struck Side Rear Seat	Fixed		21.8	
Rear Center Seat	Fixed		21.8	

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

DATA SHEET NO. 2 (CONTINUED)

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
 Test Date: 1/10/2019

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

HEAD RESTRAINT ADJUSTMENT

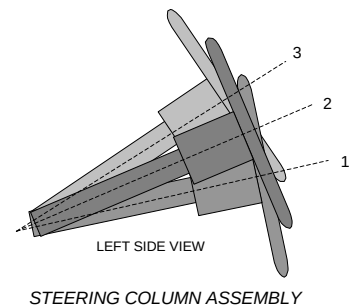
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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

STEERING COLUMN ADJUSTMENT

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

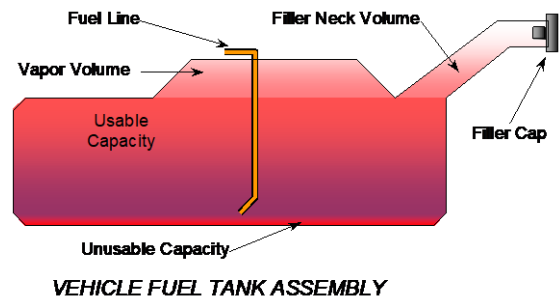
	Wheel Angle (deg)	Fore/Aft Position (mm)
Lowermost, Position 1	71.8	235
Geometric Center, Position 2	69.7	210
Uppermost, Position 3	67.5	185
Telescoping Steering Wheel Travel		50
Test Position	69.7	210



FUEL PUMP

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

The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel neck is located on the driver's side.



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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
Test Date: 1/10/2019

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	50.0
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	50.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	46.5
Actual Amount of Solvent Used	46.6
1/3 of Usable Capacity	16.7

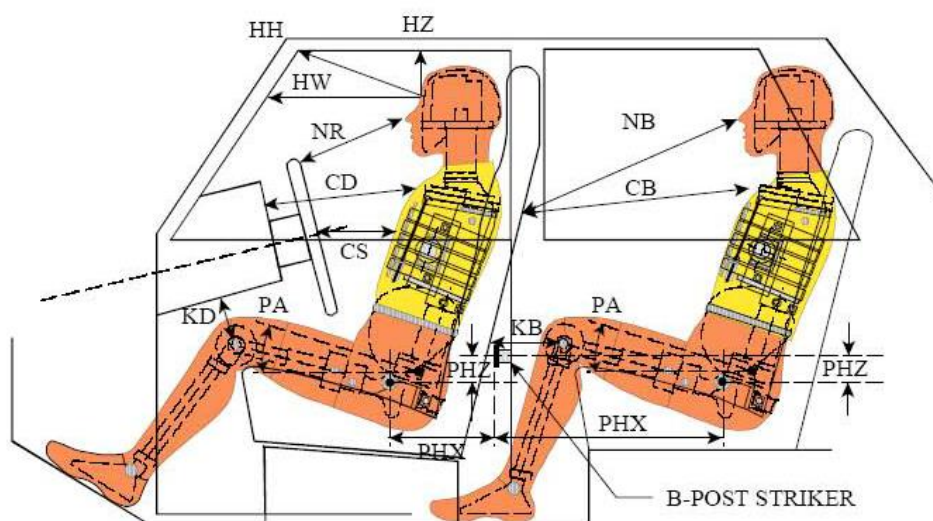
Is the actual amount of solvent used in the test equal to 93% + 1%
of the Usable Capacity stated in Form No. 1?

YES

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
Test Date: 1/10/2019



LEFT SIDE VIEW

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

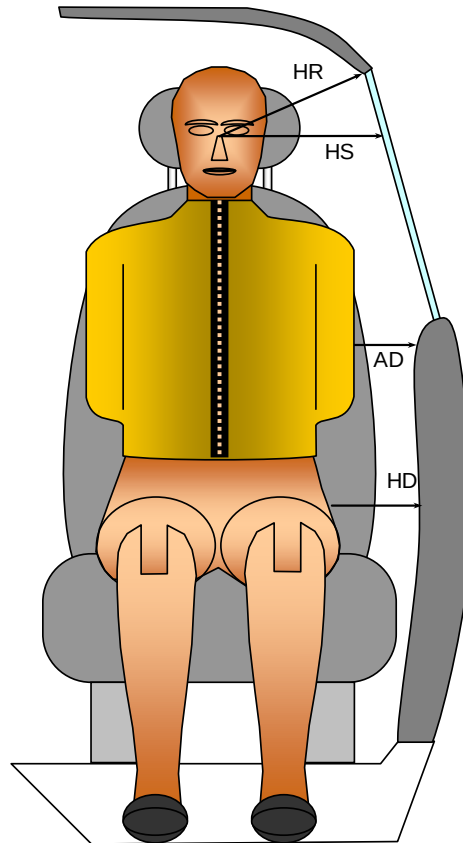
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	385	14.0		
HW		Head to Windshield	626	0		
HZ	HZ	Head to Roof Liner	128	90	249	90
NR	NB	Nose to Rim/Seat Back	443	16.4	487	3.5
CD	CB	Chest to Dashboard/Seat Back	565	8.8	480	19.7
CS		Chest to Steering Wheel	373	7.2		
KDL	KBL	Left Knee to Dash/Seat Back	150	39.2	236	23.9
KDR	KBR	Right Knee to Dash/Seat Back	157	39.2	230	24.2
PAX	PAX	Pelvic Tilt Angle X		19.4		25.6
PAY	PAY	Pelvic Tilt Angle Y		-1.6		-0.1
PHX	PHX	Hip Point to Striker (X-Axis)	193		253	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	198		301	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
Test Date: 1/10/2019



FRONT VIEW OF DUMMY

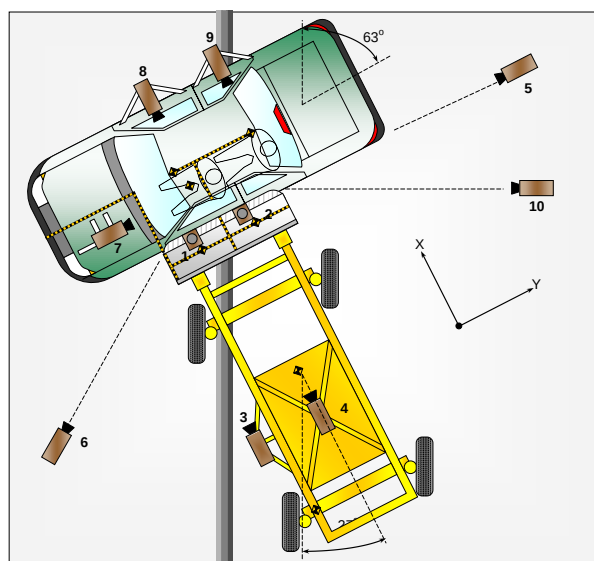
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	157	227
HS	Head to Side Window	mm	298	369
AD	Arm to Door	mm	87	186
HD	Hip Point to Door	mm	150	199

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
Test Date: 1/10/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	580	-730	-4995	14	1000
2	Overhead Close-Up	0	130	-4895	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-120	6840	-1400	24	1000
6	Left Front	-2610	-6670	-1580	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

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

* All measurements accurate to ± 6 mm

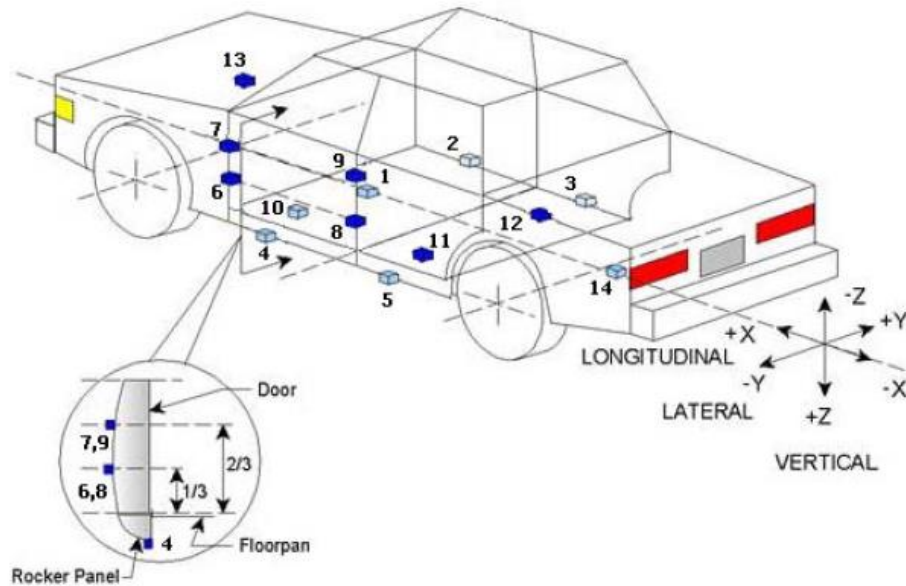
INSTRUMENTATION

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

DATA SHEET NO. 6 TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
Test Date: 1/10/2019



TEST VEHICLE ACCELEROMETER LOCATIONS

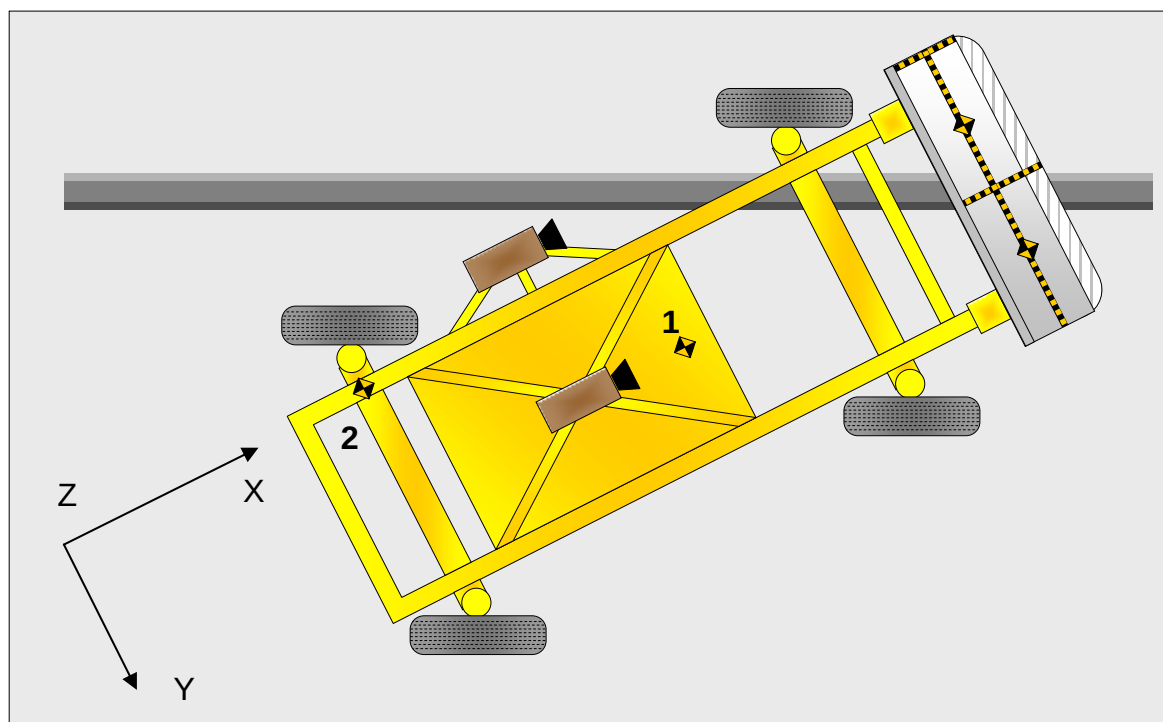
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2320	194	-185
2	Right Sill at Front Seat	1905	720	-202
3	Right Sill at Rear Seat	1205	720	-220
4	Left Sill at Front Door	2385	-720	-190
5	Left Sill at Rear Door	1515	-720	-209
6	Left Lower A-Post	2920	-819	-520
7	Left Middle A-Post	2923	-819	-740
8	Left Lower B-Post	1840	-711	-570
9	Left Middle B-Post	1830	-703	-815
10	Front Seat Track	2037	-328	-186
11	Rear Seat Structure	1674	-344	-314
12	Rt. Rear Occ. Compartment	1651	400	-223
13	Engine Block	3611	0	-797
14	Rear Above Axle	887	0	-538

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

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



MDB ACCELEROMETER LOCATIONS

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

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
Test Date: 1/10/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch / Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	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	LF Window Broken
Other Notable Effects	None

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
Test Date: 1/10/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side 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	
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		2640
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		380
Actual Impact Point (Aft of Front Axle)	mm		382
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-2
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	-0

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020195102
Test Date: 1/10/2019

MDB SPECIFICATIONS

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

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	427.9	264.0	
Right	kg	340.6	331.2	
Ratio	%	56.4	43.6	
Totals	kg	768.5	595.2	1363.7

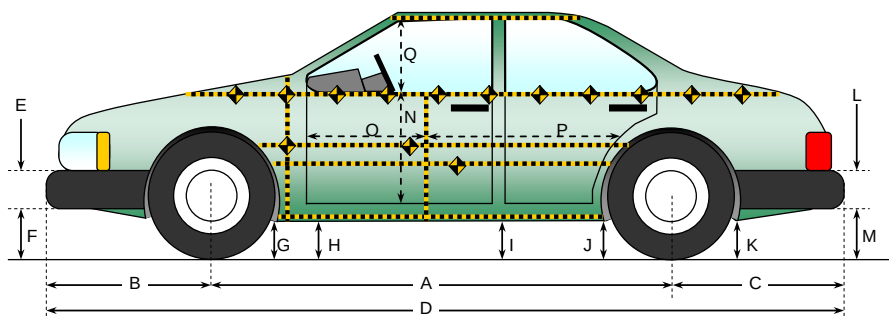
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.14
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.11
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.1
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.8
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.1

DATA SHEET NO. 10 **TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



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

LEFT SIDE VIEW

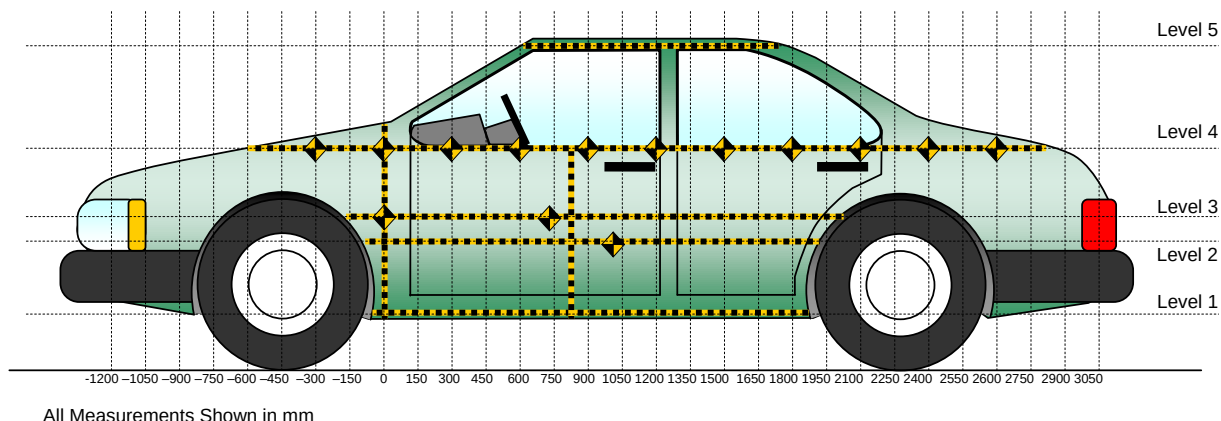
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2640	2631	9
B	Front Axle to FSOV	934	934	0
C	Rear Axle to RSOV	799	802	-3
D	Total Length at Centerline	4373	4367	6
E	Front Bumper Thickness	115	115	0
F	Front Bumper Bottom to Ground	170	168	2
G	Sill Height at Front Wheel Well	158	166	-8
H	Sill Height at Front Door Leading Edge	151	154	-3
I	Sill Height at B Pillar	157	169	-12
J1	Sill Height at Rear Wheel Well	168	164	4
J2	Pinch Weld Height at Rear Wheel Well	161	156	5
K	Sill Height Aft of Rear Wheel Well	202	210	-8
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	261	276	-15
N	Sill Height to Window Bottom Sill	718	652	66
O	Front Door Leading Edge to Impact CL	747	737	10
P	Rear Door Trailing Edge to Impact CL	1106	1049	57
Q	Front Window Opening	440	446	-6
R	Right Side Length	3340	3339	1
S	Left Side Length	3340	3320	20
T	Vehicle Width at B Post	1770	1640	130

DATA SHEET NO. 11 **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	277	68	600
2	Occupant H-Point	501	173	900
3	Mid Door	592	175	1650
4	Window Sill	878	167	1650
5	Window Top	1650	19	1500

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

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019

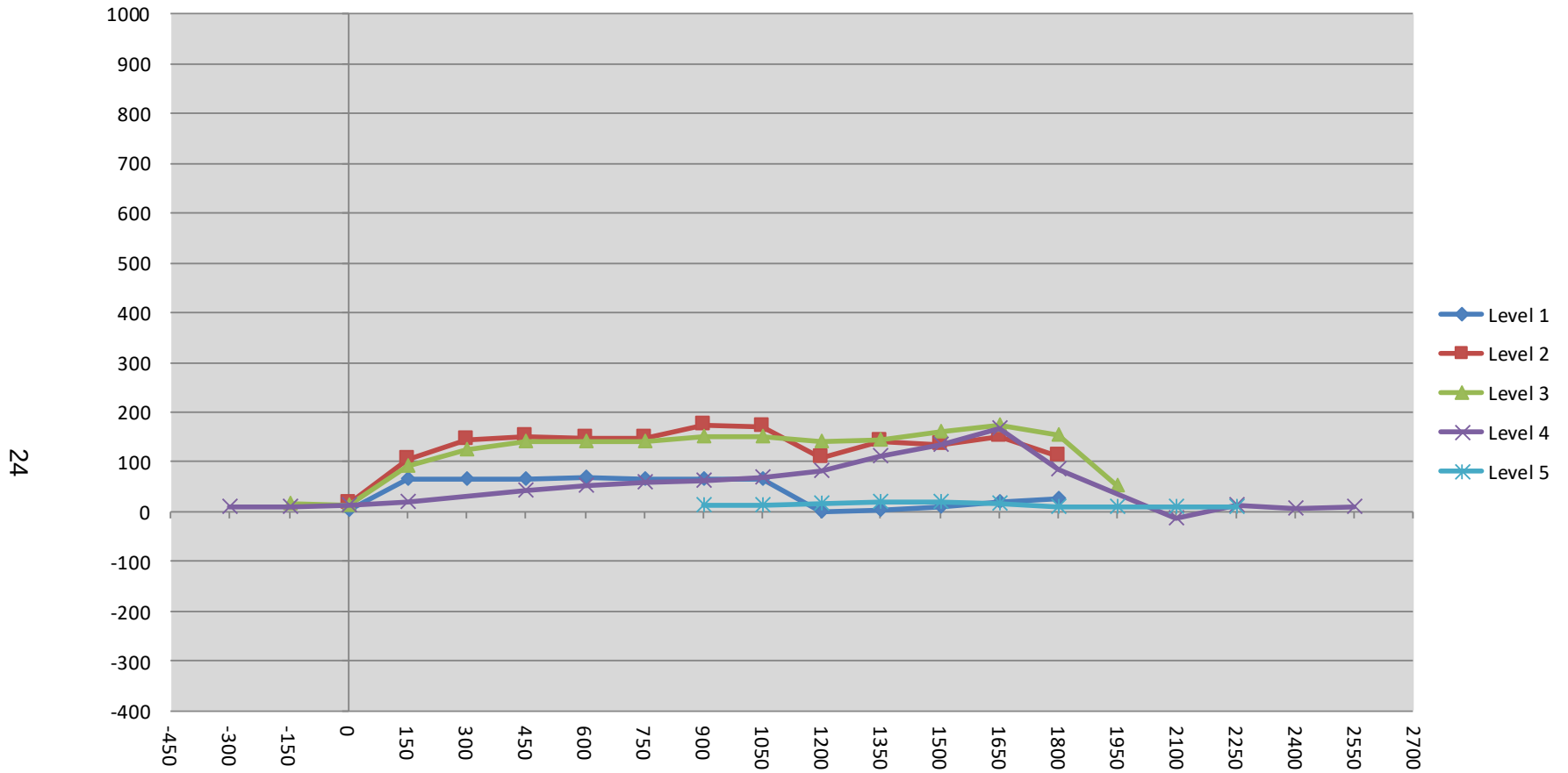
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600															
-450															
-300				342					351					9	
-150			213	320				228	331				15	11	
0	227	214	218	312		231	231	232	324		4	17	14	12	
150	235	218	217	305		301	322	309	326		66	104	92	21	
300	235	220	216			301	363	339			66	143	123		
450	230	221	215	285		294	372	356	328		64	151	141	43	
600	226	222	214	273		294	369	356	324		68	147	142	51	
750	226	221	213	262		293	367	353	320		67	146	140	58	
900	227	220	212	253	532	293	393	362	316	544	66	173	150	63	12
1050	229	221	213	246	523	293	391	363	316	536	64	170	150	70	13
1200	232	223	215	247	521	231	332	357	330	538	-1	109	142	83	17
1350	236	224	216	250	519	239	366	360	361	537	3	142	144	111	18
1500	241	225	218	254	519	249	360	380	389	538	8	135	162	135	19
1650	244	224	219	259	522	265	375	394	426	537	21	151	175	167	15
1800	236	219	216	268	532	261	331	370	354	542	25	112	154	86	10
1950			209		547			262		556			53		9
2100				258	570				246	580				-12	10
2250				263	608				277	617				14	9
2400				276					283					7	
2550				304					313					9	
2700															
2850															
3000															
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: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test

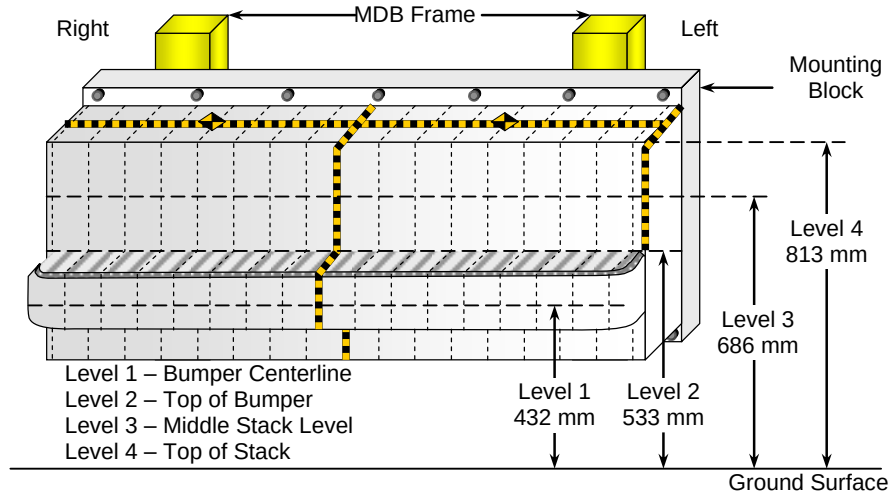
NHTSA No. O20195102
Test Date: 1/10/2019



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



FRONT VIEW

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	227
B	Top of Bumper	533	800	Left	166
C	Mid-Level	686	800	Left	168
D	Top of Stack	813	800	Left	155

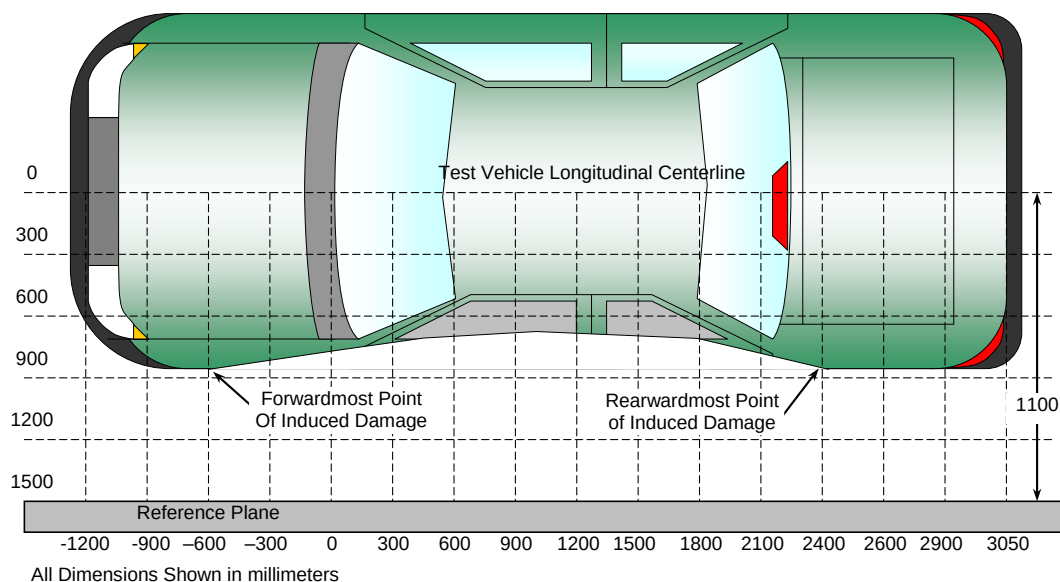
DEFORMABLE BARRIER STATIC CRUSH

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	30	21	28	43	60	99	108	100	78	90	112	110	109	108	117	126	155
3	30	22	26	41	66	65	82	59	47	42	41	45	51	62	76	106	168
2	133	131	129	108	88	93	92	95	110	124	122	122	122	122	131	147	166
1	179	179	172	172	170	170	170	169	168	169	170	169	169	172	185	222	227

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	1930	3	309	215	94
2	1562	3	358	218	140
3	1194	3	370	215	155
4	826	3	357	212	145
5	458	3	384	215	169
6	90	3	277	217	60

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	655	476	179
2	480 mm right of center	1	638	463	175
3	160 mm right of center	1	630	463	167
4	160 mm left of center	1	622	463	159
5	480 mm left of center	1	653	463	190
6	800 mm left of center	1	703	476	227

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

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

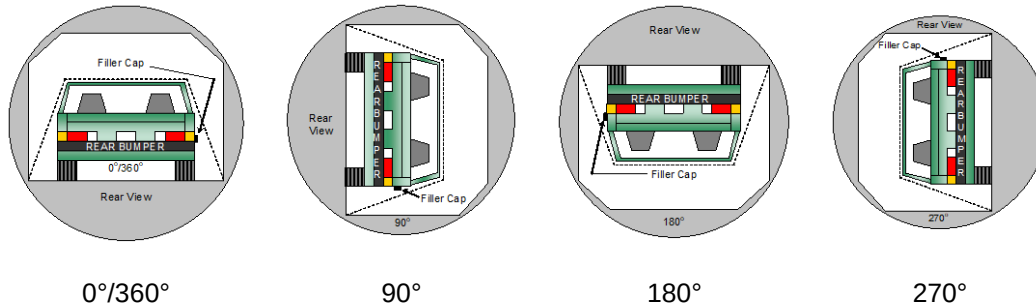
NHTSA No. O20195102
 Test Date: 1/10/2019

Test Time: 12:04 pm

Temperature: 20.9 °C

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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	115	300	415
180° to 270°	113	300	413
270° to 360°	116	300	416

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

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

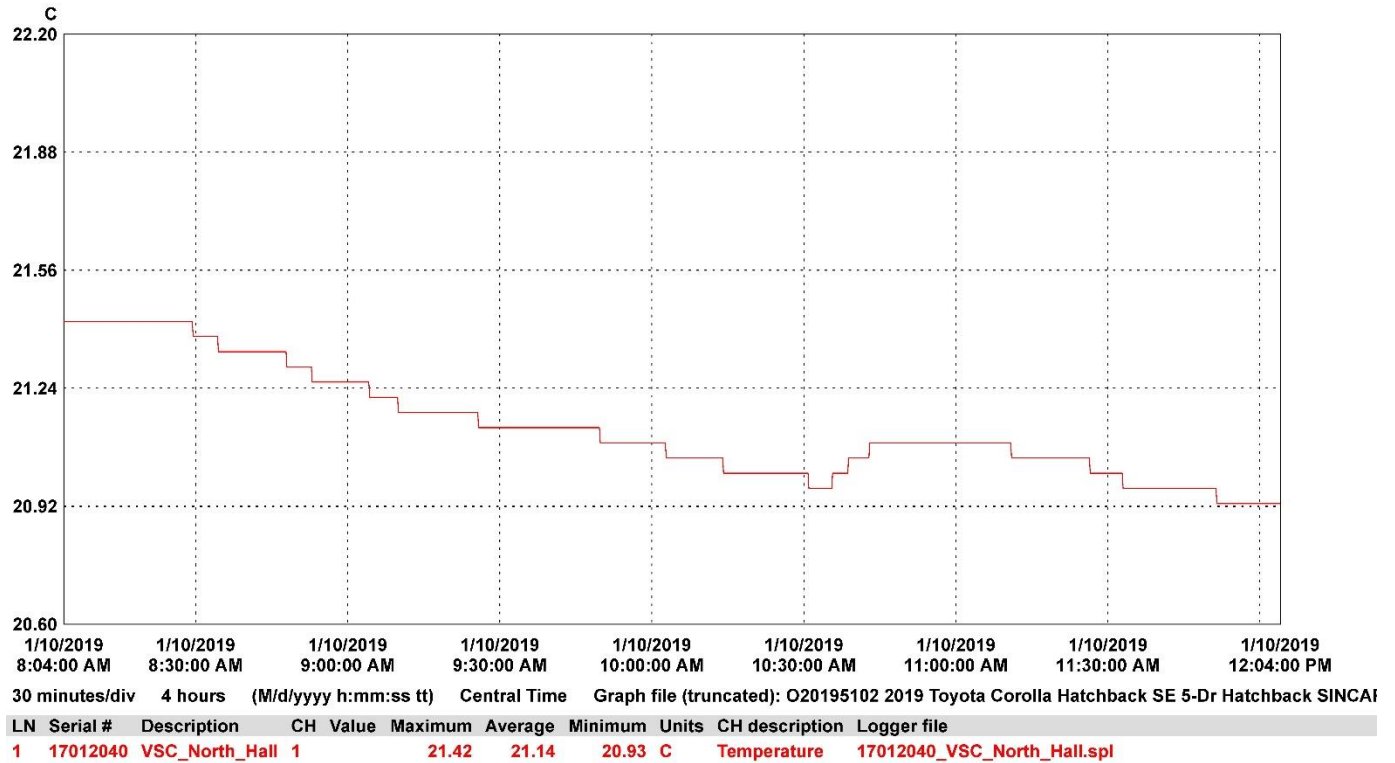
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15 **DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA**

Test Vehicle: 2019 Toyota Corolla Hatchback SE 5-Door Hatchback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20195102
 Test Date: 1/10/2019



APPENDIX A
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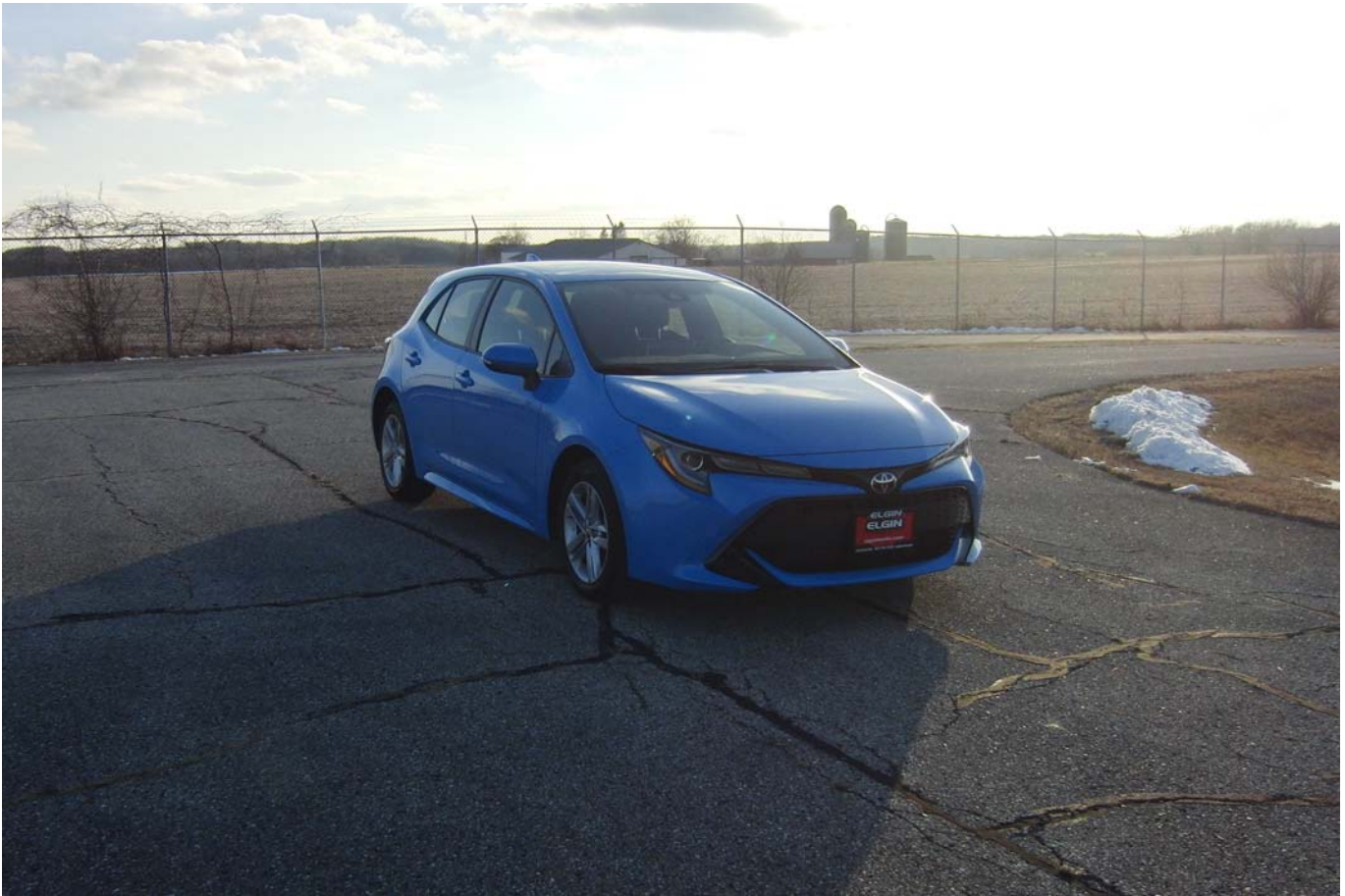


Photo No. 001 - As Delivered Right Front Three-Quarter View of Test Vehicle

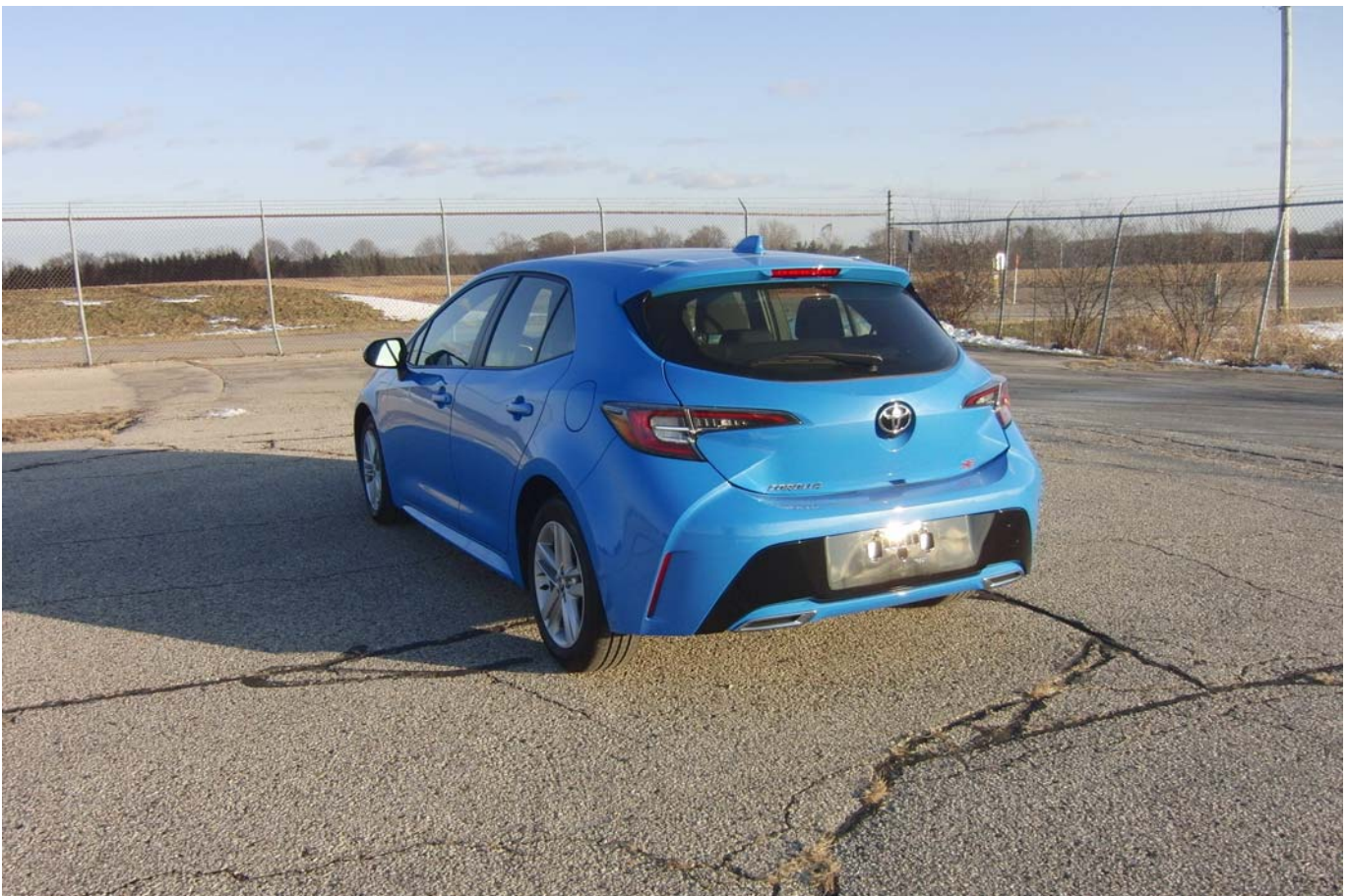


Photo No. 002 - As Delivered Left Rear Three-Quarter View of Test Vehicle



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

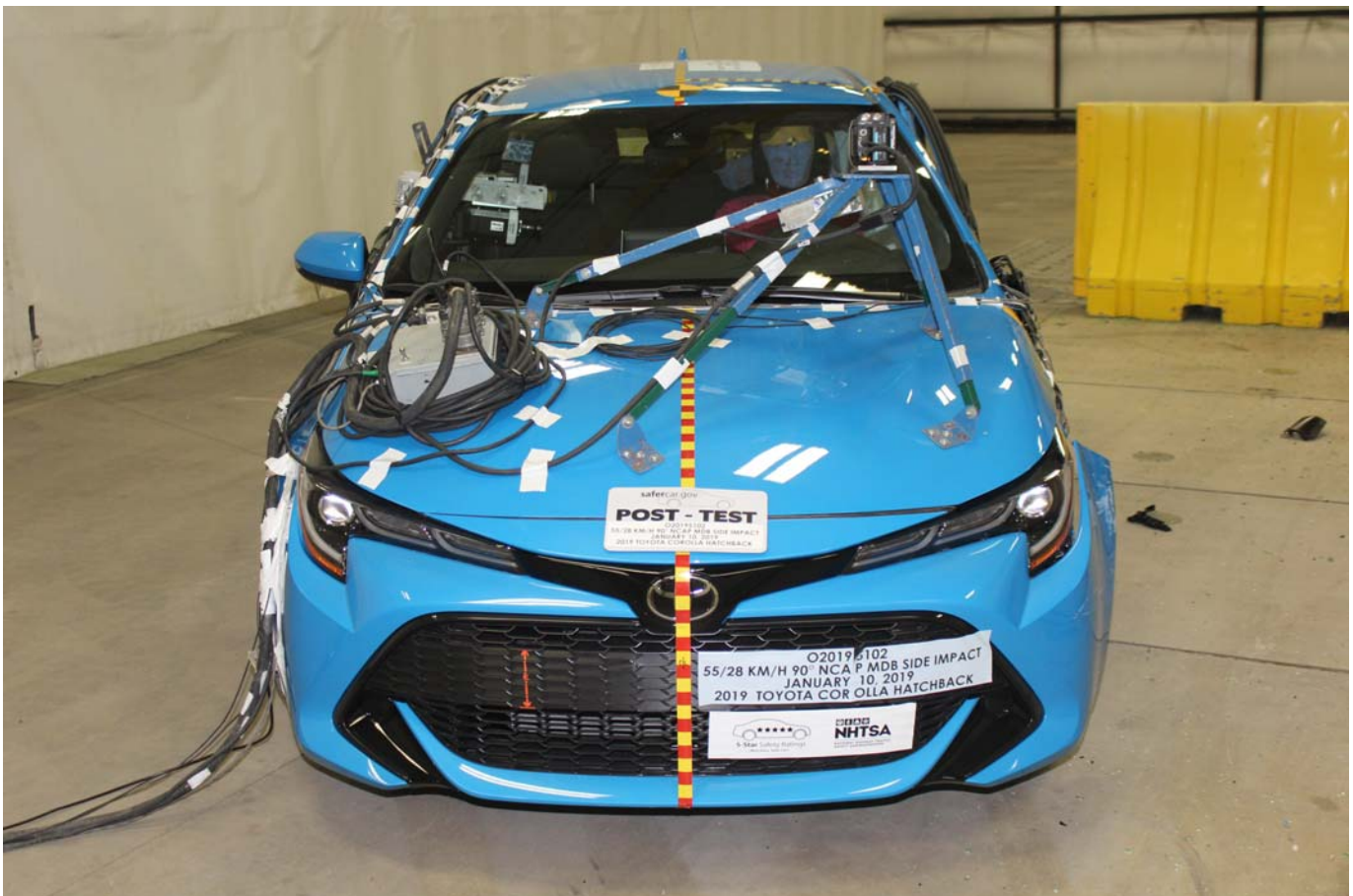


Photo No. 004 - Post-Test Frontal View of Test Vehicle



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



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



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



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



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



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



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



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



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

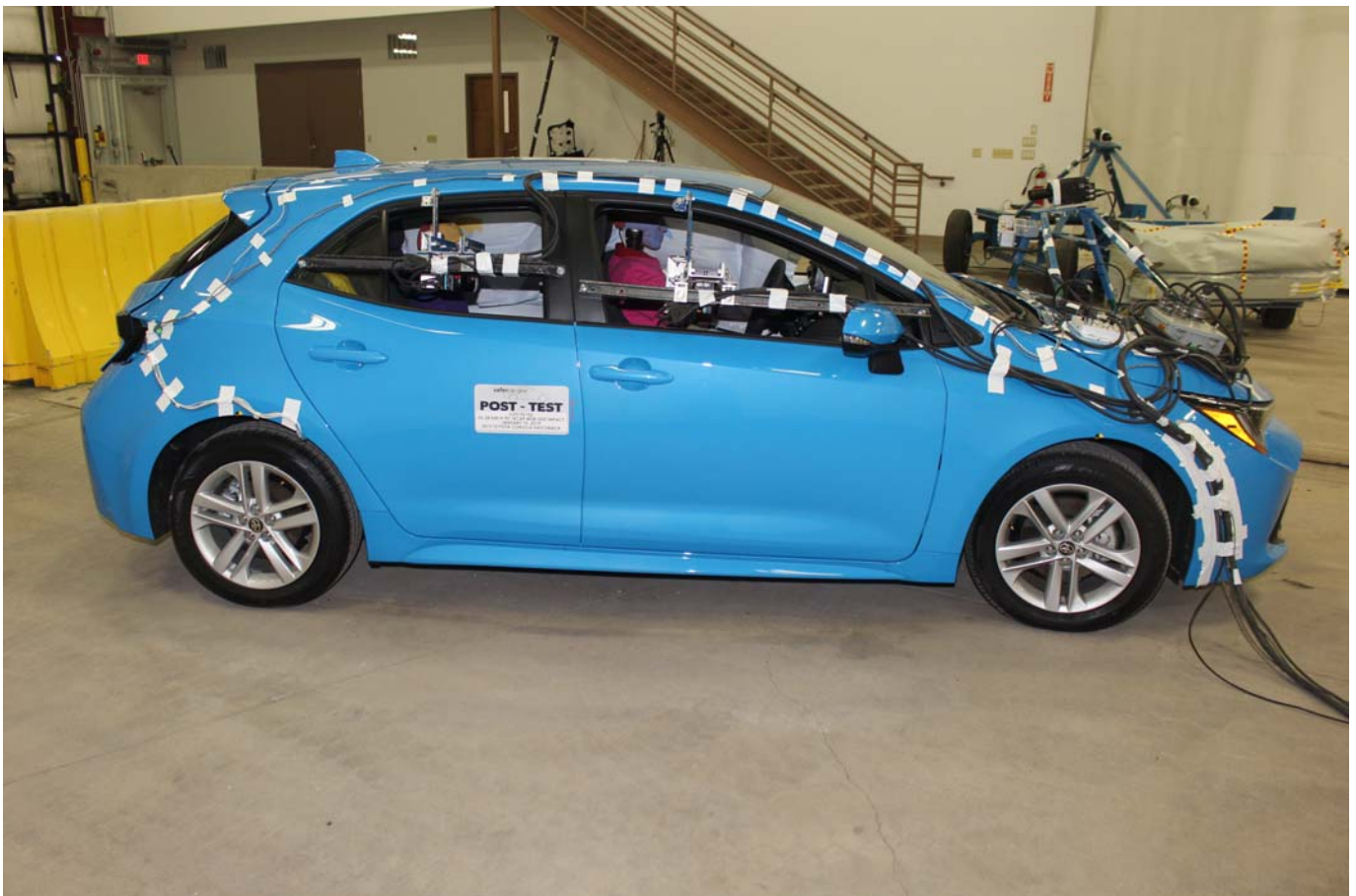


Photo No. 014 - Post-Test Right Side View of Test Vehicle

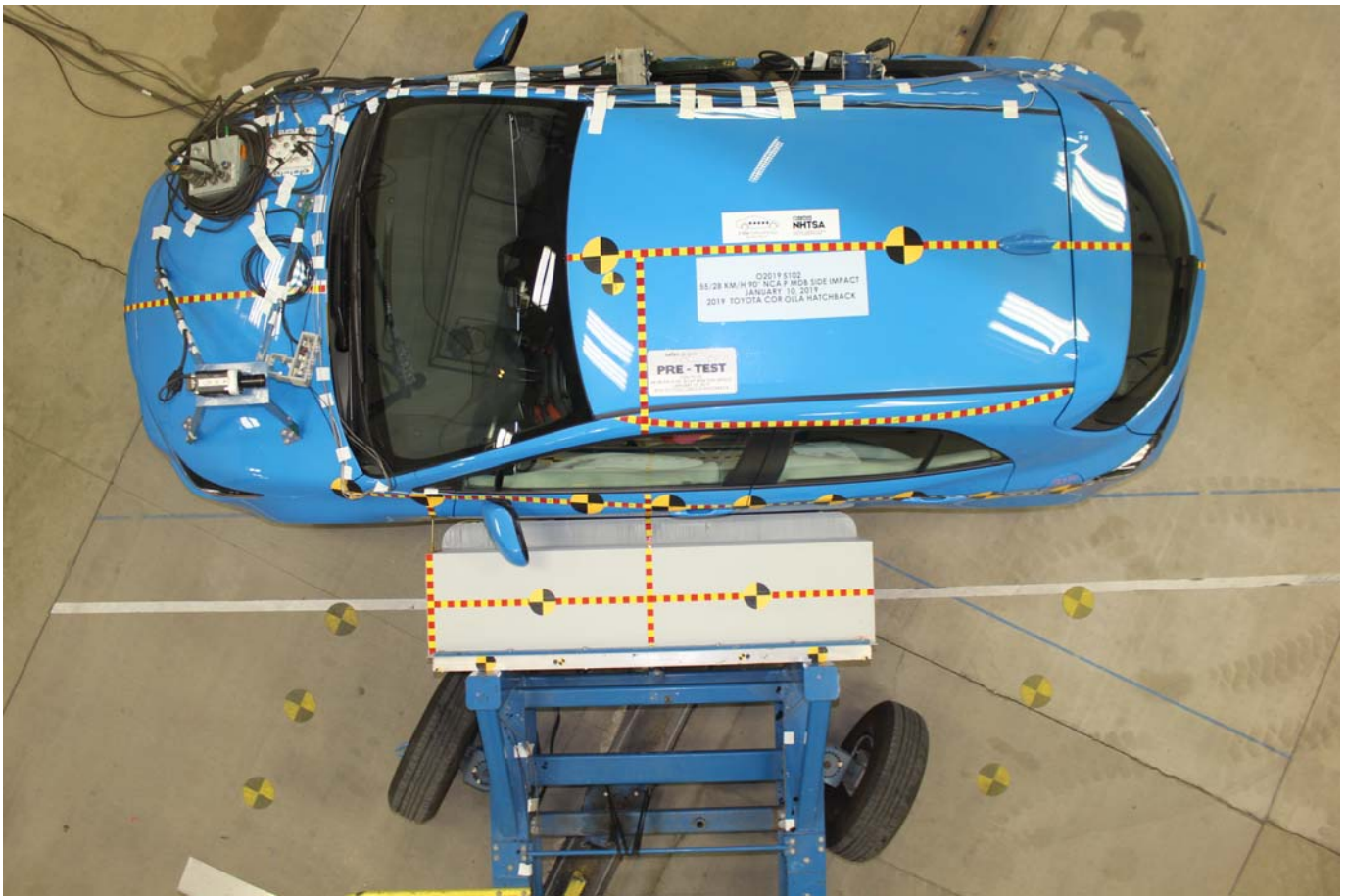


Photo No. 015 - Pre-Test Overhead View of Test Area

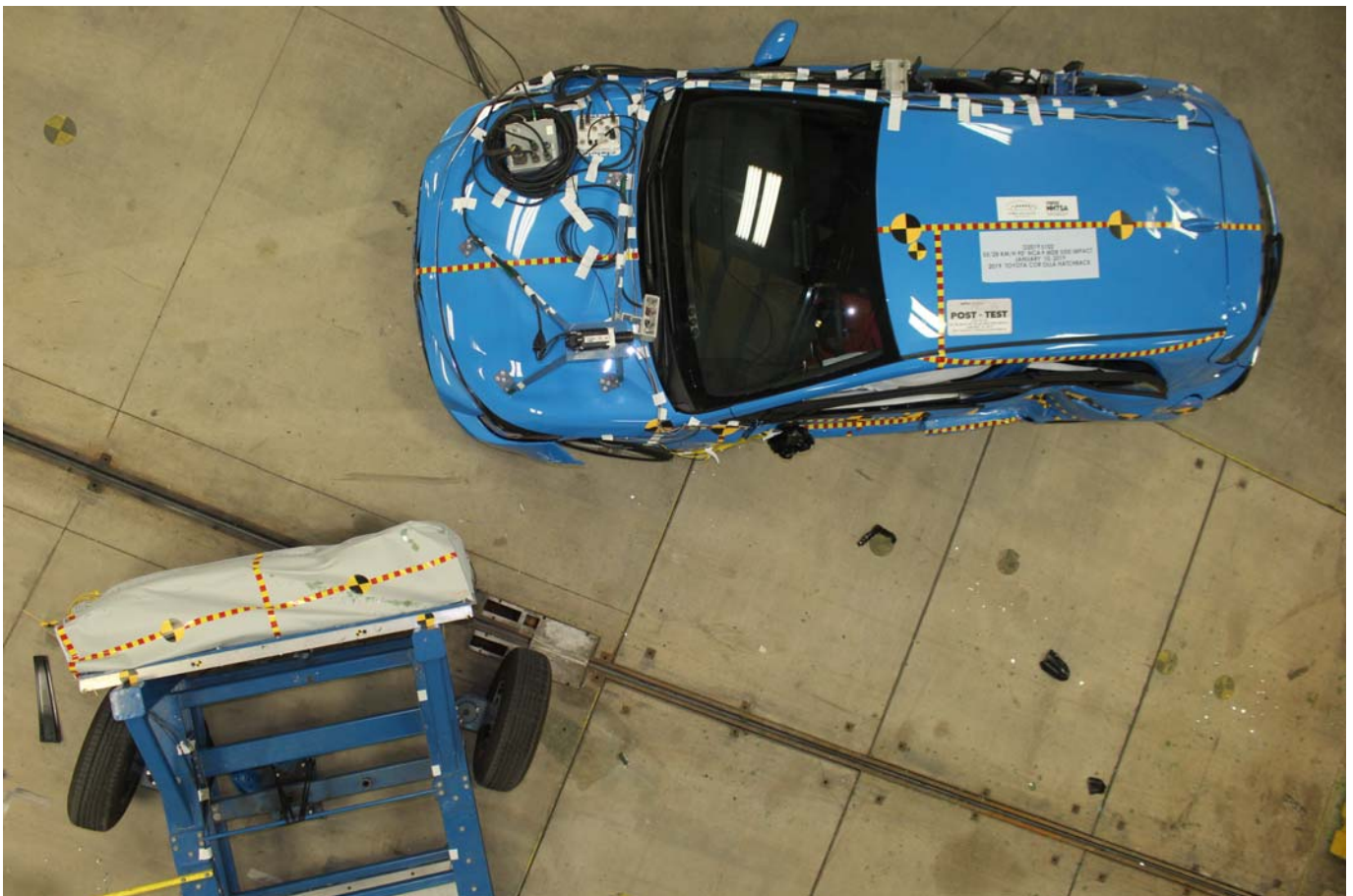


Photo No. 016 - Post-Test Overhead View of Test Area



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



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



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

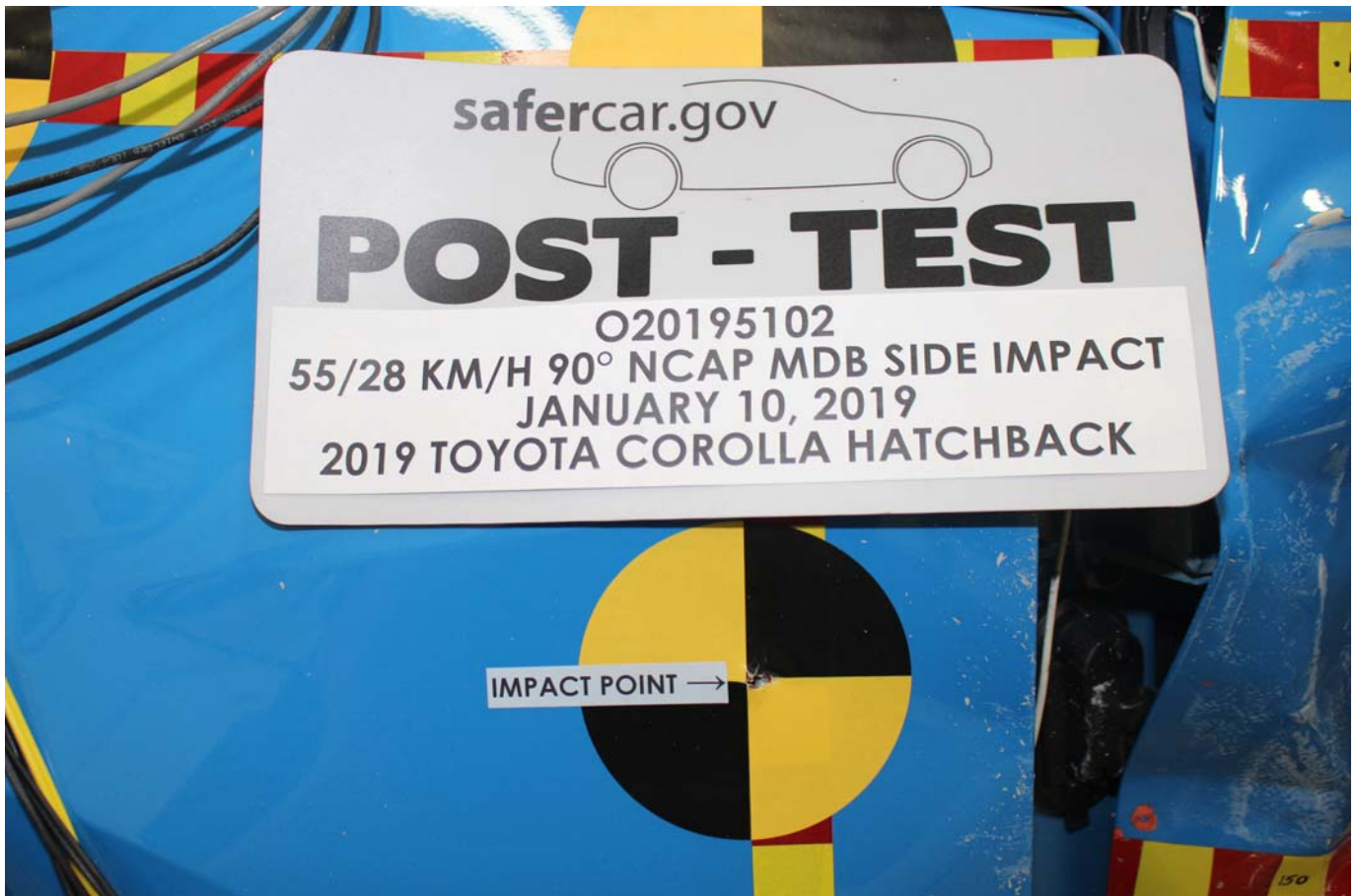


Photo No. 020 - Post-Test Close-Up View of Impact Point Target



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

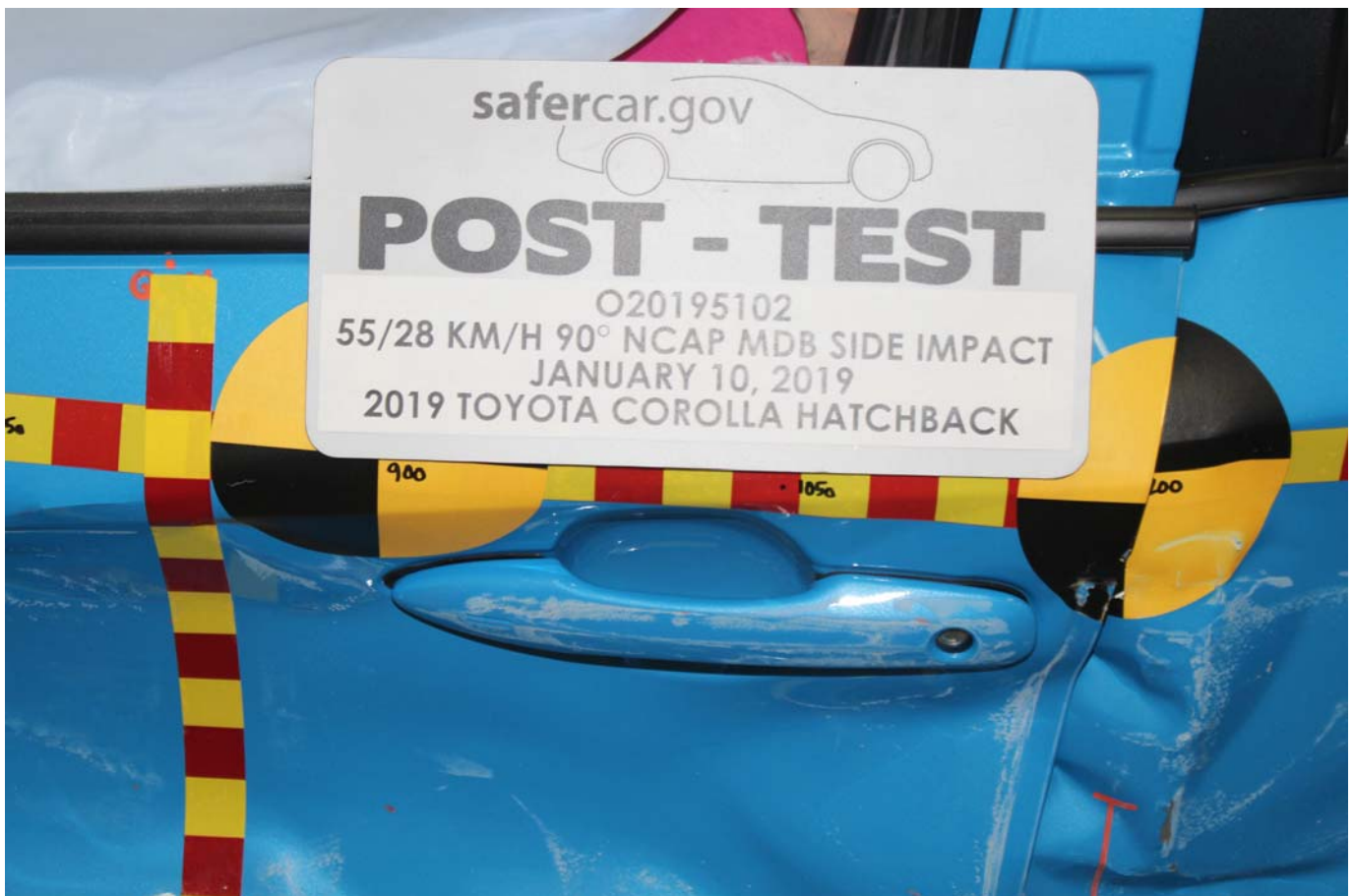


Photo No. 022 - Post-Test Left Front Door Latch Close-Up



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

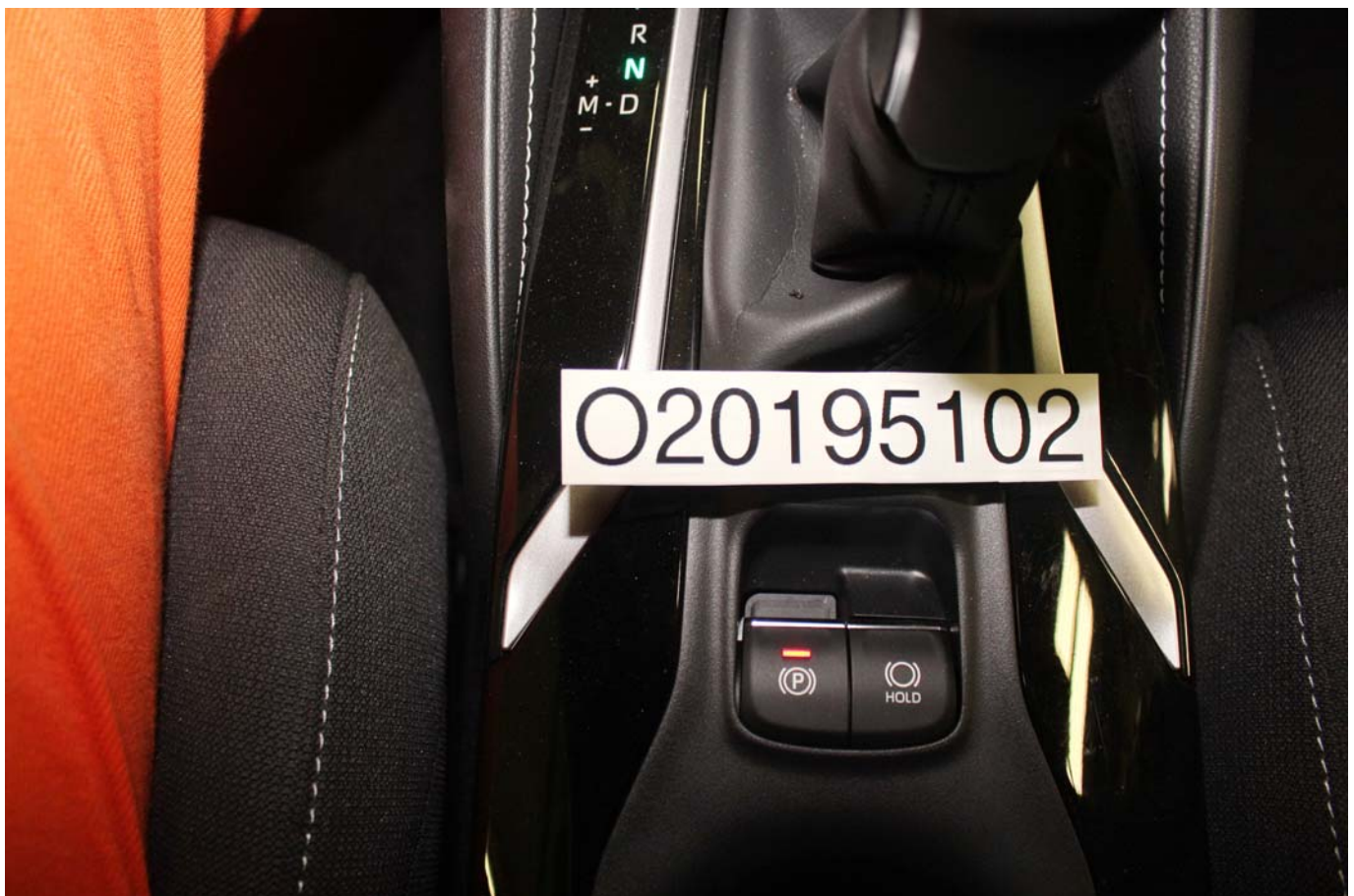


Photo No. 038 - Pre-Test View of Parking Brake



Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track



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



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



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



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



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



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



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



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



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



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



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



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

PHOTOGRAPH NOT APPLICABLE

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



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

PHOTOGRAPH NOT APPLICABLE

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



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



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



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



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



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



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



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



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



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



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



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



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

PHOTOGRAPH NOT AVAILABLE

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

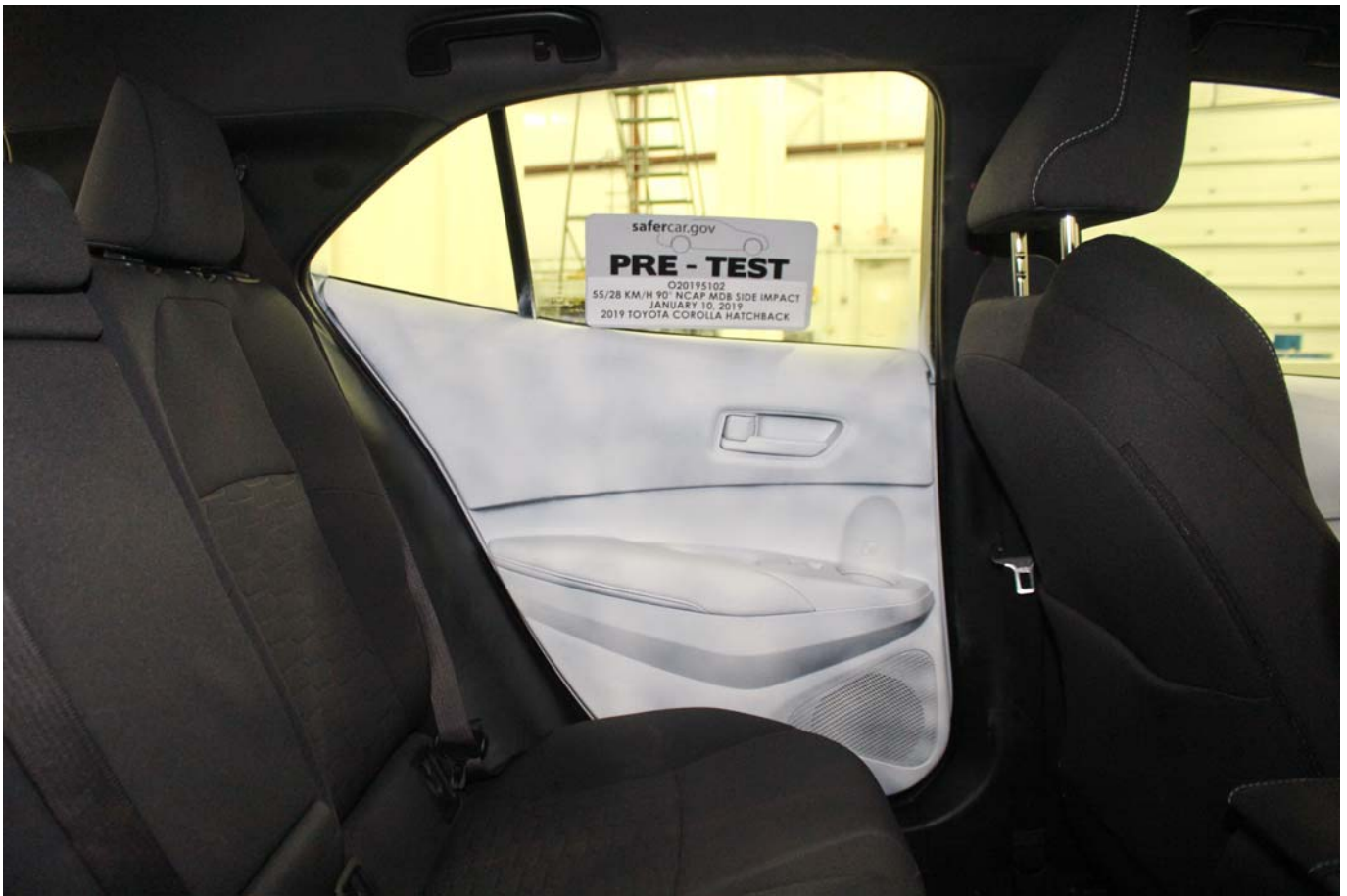


Photo No. 073 - Pre-Test Rear Passenger Inner Door Panel View



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

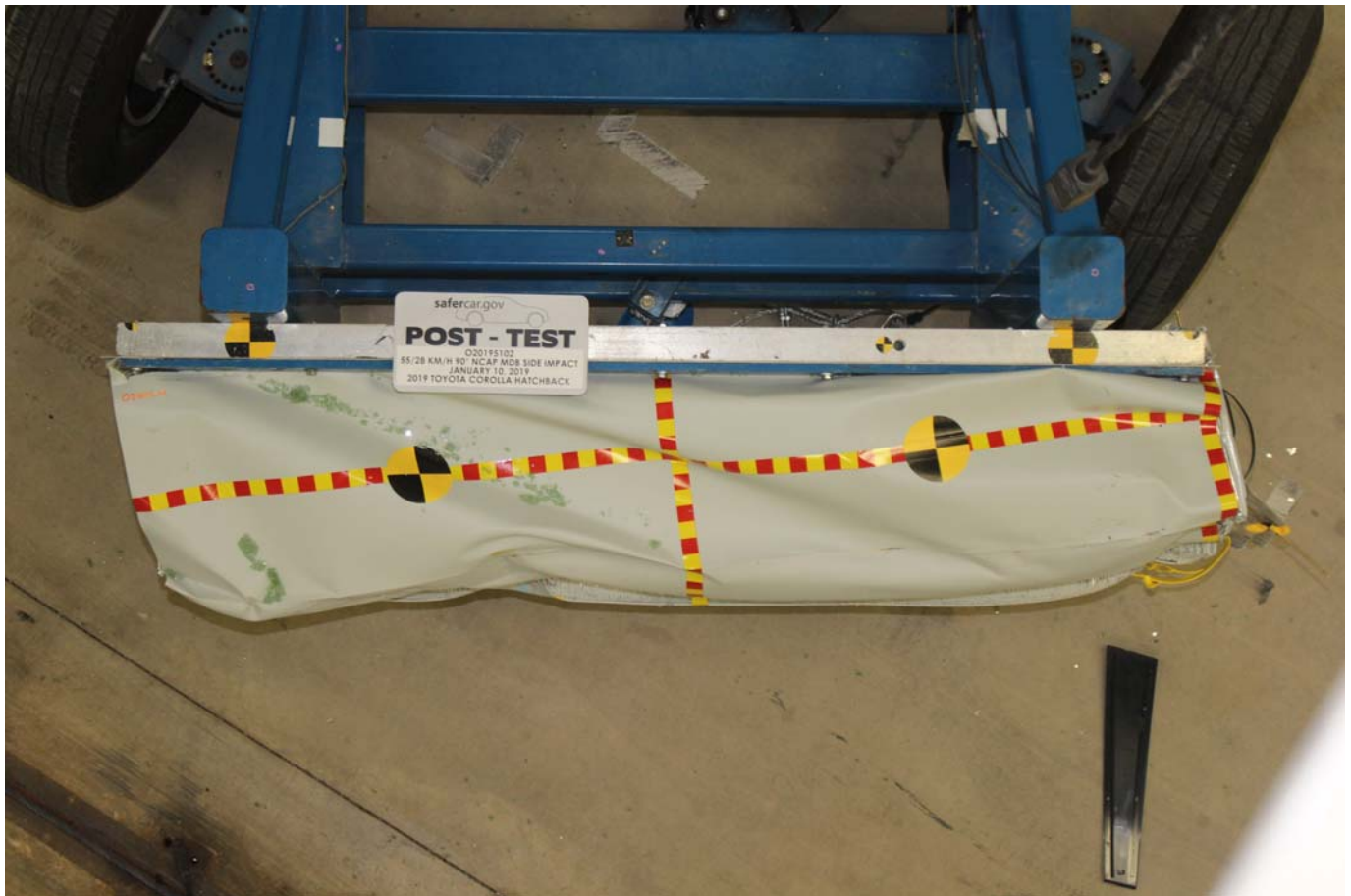


Photo No. 087 - Post-Test Top View of MDB Impactor Face



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

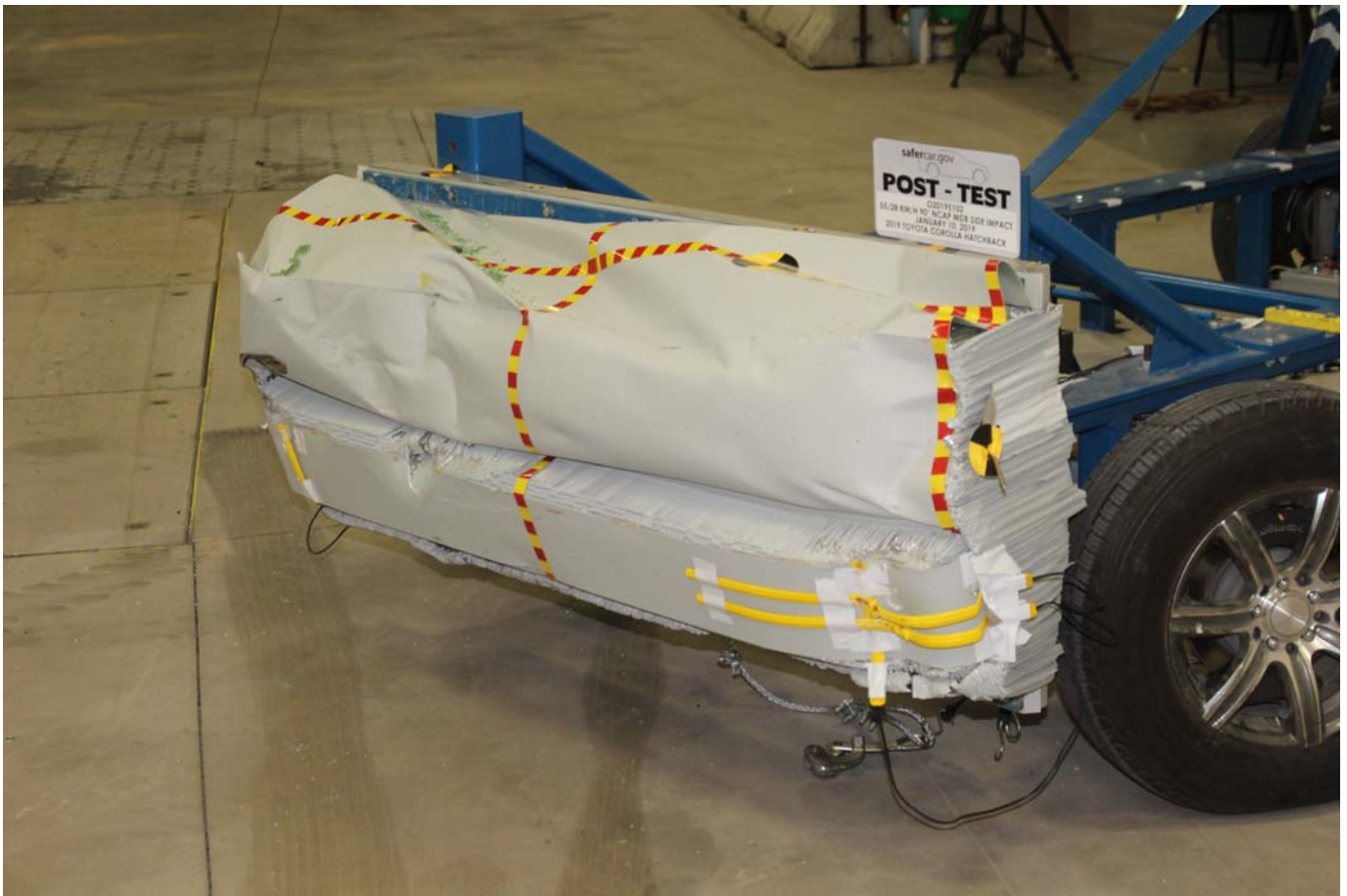


Photo No. 089 - Post-Test Left Side View of MDB Impactor Face



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

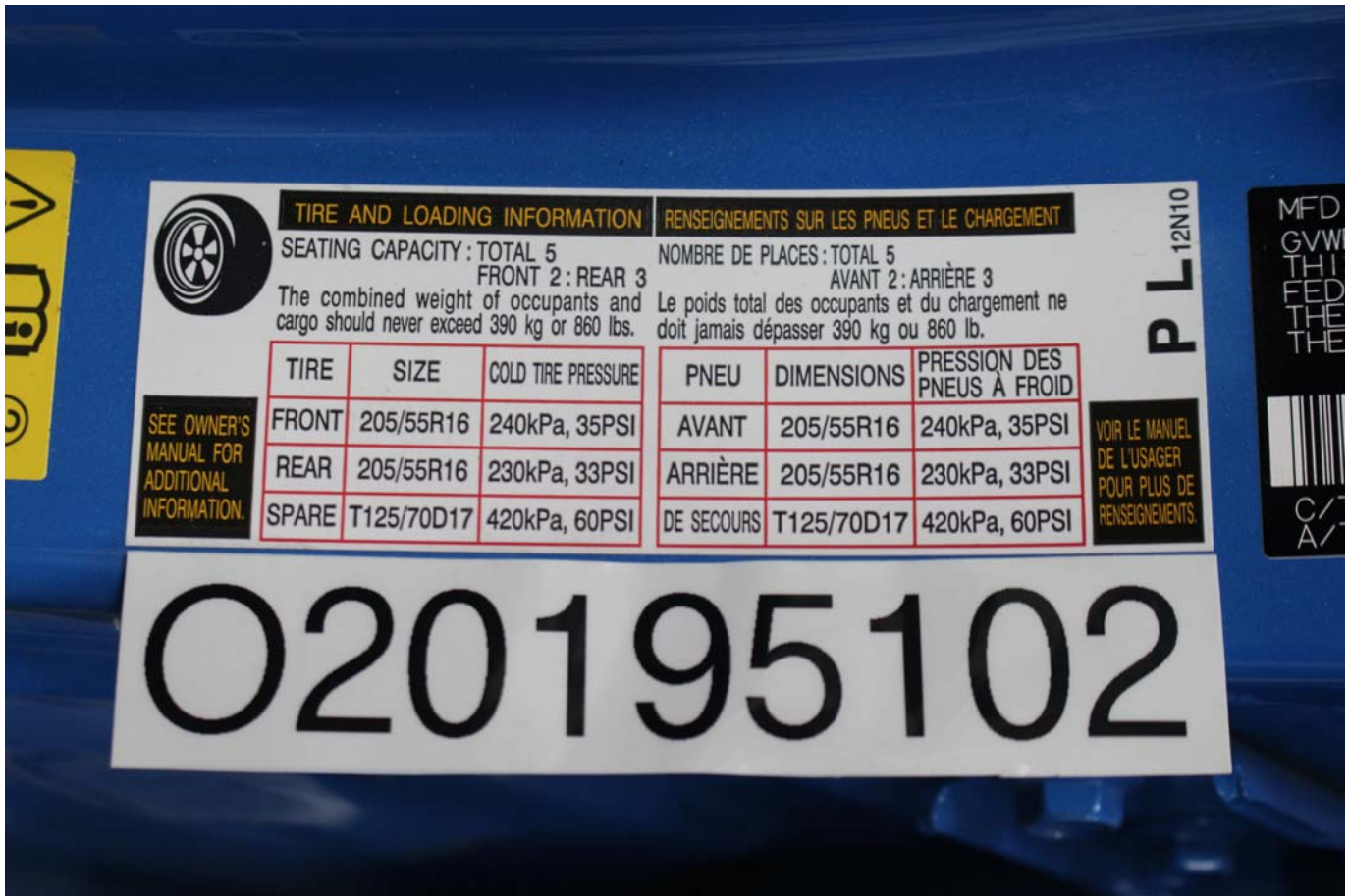


Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label

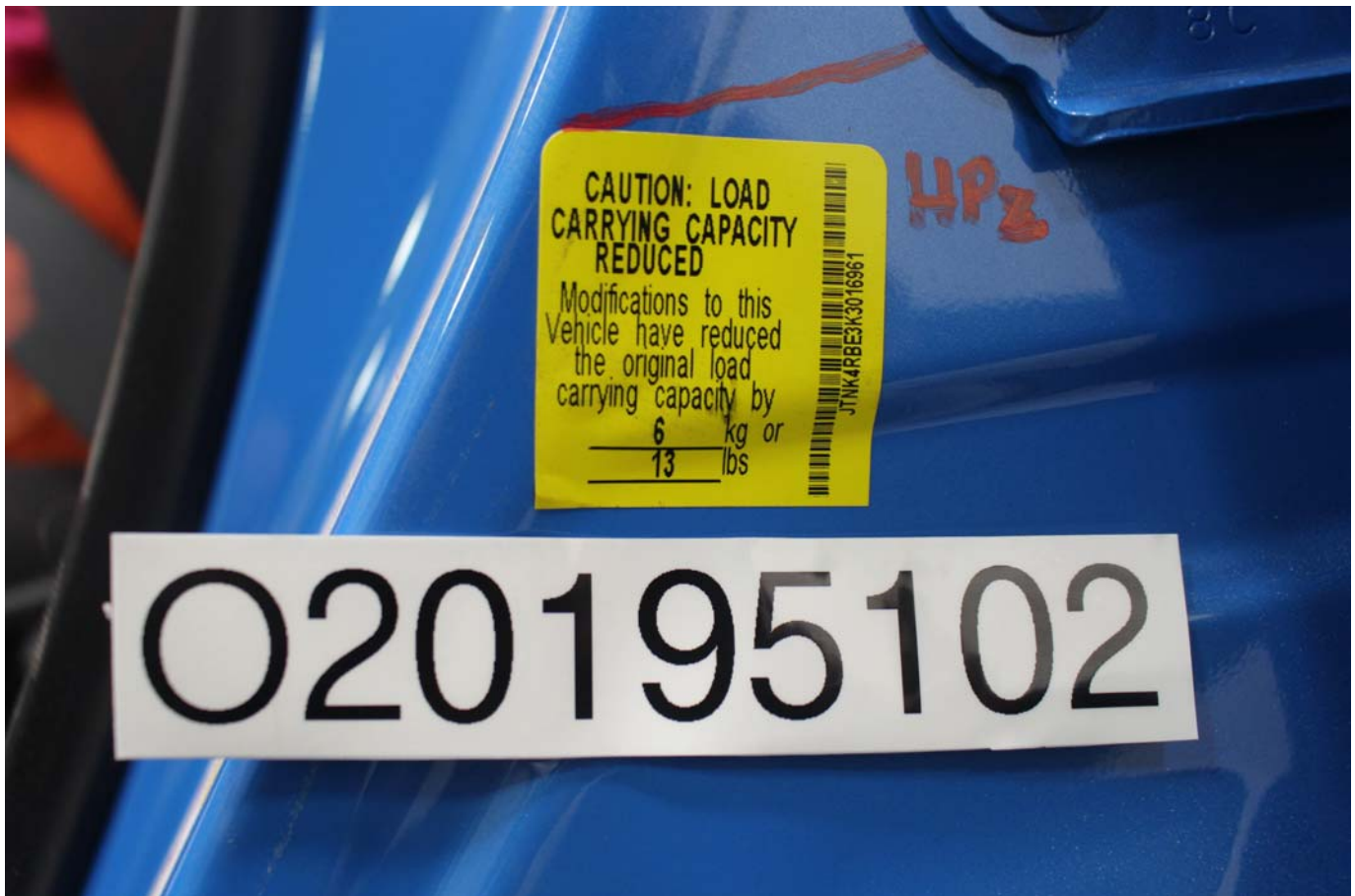


Photo No. 093a - Close-Up View of Vehicle Load Carrying Capacity Reduction Label



Photo No. 094 - Pre-Test Ballast View



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



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

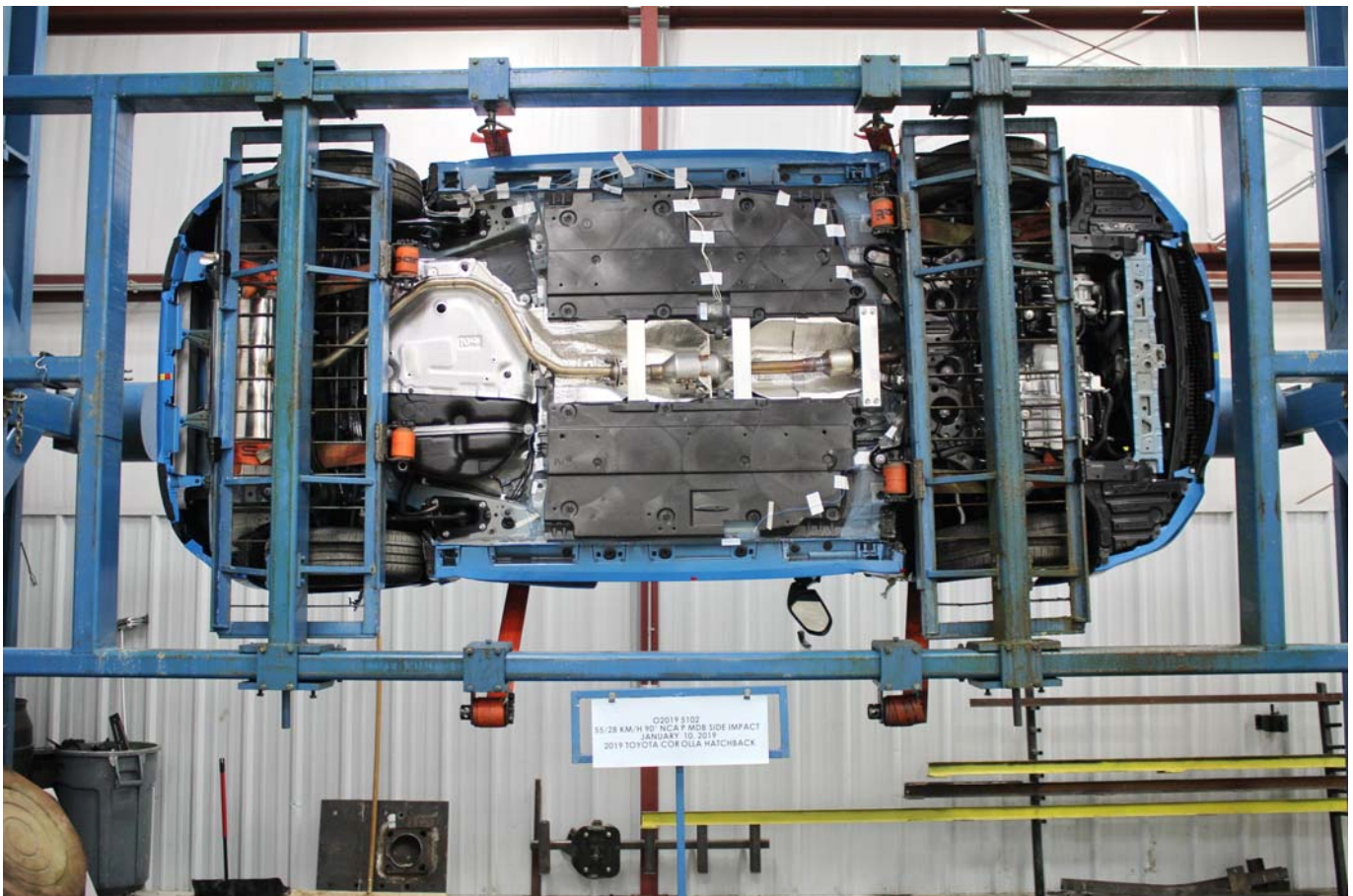


Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees



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



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



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



Photo No. 101 - Impact Event

TOYOTA
Let's Go Places

DESC.: COROLLA HATCHBACK SE 5Dr HATCHBACK
VIN: JTNK4RBE3K3016961
YR/MDL: 2019/6272A
CLR: BLUE FLAME/FA20 (08W9/20)
FINAL ASSEMBLY POINT: TOYOTA, AICHI, JAPAN

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

STANDARD EQUIPMENT

MECHANICAL AND PERFORMANCE

- 2.0L 168HP 4Cyl DOHC 16V D4S Dual Inject
- Dynamic Shift CVT with First Launch Gear
- Sport Drive Mode
- Front Wheel Drive
- Steering: Electronic Power Assisted
- Per-Assist FR/Vent RR/Solid Disc Brakes
- Independent MacPherson Strut Front Sus
- Multi-link Rear Sus w/ Stabilizer Bar
- 16" Alloy Wheels With 205/55R16 Tires

SAFETY AND CONVENIENCE

- Toyota Safety Sense 2.0: Pre-Collision Sys w/Pedestrian Detection, Full-Speed Range Dynamic Radar Cruise Control, Lane Departure Alert w/Steering Assist, Lane Tracing Assist, Automatic High Beams, Road Sign Assist
- Star Safety System: VSC, TRAC, ABS, EBD, SA & Smart Stop Technology
- 7 Airbags
- LATCH(Lwr Anchor & Tethers for Children) on Outboard Rear Seats

EXTERIOR

- LED Head & Tail Lamps w/ Auto On/Off
- Dual Chrome Rear Diffuser
- Color-Keyed Heated Outside Mirrors w/ Integrated Turn Signal Indicator
- Front Gun Metal Grille Surround

INTERIOR

- Single Zone Auto Climate Control
- Entune 3.0 Audio w/App Suite
- 8" Touch Screen, 6 Speakers, HandsFree Bluetooth Phone/Music, USB Media Port, 1 USB Charge-Port
- Siri Eyes Free, Apple CarPlay Comp.
- 4.2" Color TFT Multi-Info Display
- Tilt & Telescopic Leather Wrapped Steering Wheel w/ Paddle Shifters
- Sport Fabric Trimmed 6-Way Adjustable Drivers Seat, 4-Way Adj Front Passenger
- Smart Key System with Push Button Start
- ***Full Tank of Gas***

MANUFACTURER'S SUGGESTED RETAIL PRICE \$21,090.00

OPTIONAL EQUIPMENT

FE 50 State Emissions 229.00

ZT All Weather Floor Liner Package 229.00

EPA DOT Fuel Economy and Environment

Fuel Economy

36 MPG combined city/hwy

City 32 MPG Highway 42 MPG

2.8 gallons per 100 miles

You save \$1,750 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,050

Fuel Economy & Greenhouse Gas Rating (better only) 8

Smog Rating (better only) 6

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

fuel economy.gov

Calculate personalized estimates and compare vehicles

Gasoline Vehicle

DELIVERY PROCESSING AND HANDLING FEE 920.00

TOTAL \$22,239.00

The New Vehicle Limited Warranty provides 3-year/50,000 mile basic coverage, 5-year/100,000 mile powertrain coverage, plus 5-year/unlimited mile corrosion perforation coverage. See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle. Ask dealer for details. Manufacturer's suggested price includes manufacturer's recommended pre-delivery service. Gasoline, insurance and title fees, registration, license and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

ToyotaCare, which covers normal factory scheduled maintenance for two years or 25,000 miles, whichever occurs first, is included as part of the sales price of the vehicle for qualifying buyers. See participating dealer for eligibility and coverage details.

Delivered by Truck to: 12102 ARLINGTON TOYOTA 2095 N. RAND ROAD PALATINE IL 60074

Photo No. 102 - Monroney Label

112 3-3. Adjusting the seats

Head restraints

Head restraints are provided for all seats.

WARNING

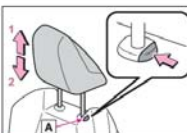
Head restraint precautions

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

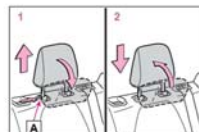
Adjusting a head restraint

Front seats



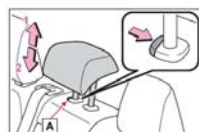
- Up
Pull the head restraints up.
- Down
Push the head restraint down while pressing the lock release button A.

Rear outside seats



- Folding the rear outside seat head restraints
Pull the head restraint up while pressing only the right-side lock release button A and then fold it forward.
- Setting up the rear outside seat head restraints
Fold back the head restraint and then push it down to the lock position.

Rear center seat



- Up
Pull the head restraint up.
- Down
Push the head restraint down while pressing the lock release button A.

Adjusting the height of the head restraints (front seats)

Make sure that the center of

the head restraint is closest to the top of your ears.



Adjusting the rear center seat head restraint

Always raise the head restraint one level from the stowed position when using.

Removing the head restraints

Front seats

Pull the head restraint up while pressing the lock release button A.

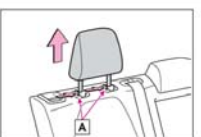


Rear outside seats

Pull the head restraint up while pressing the lock release buttons A.

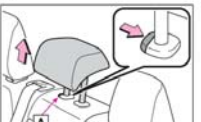


3-3. Adjusting the seats 113



Rear center seat

Pull the head restraint up while pressing the lock release button A.



Installing the head restraints

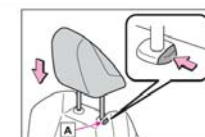
Front seats

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button A when lowering the head restraint.

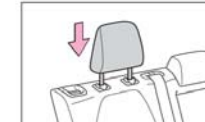


114 3-3. Adjusting the seats



Rear outside seats

Align the head restraint with the installation holes and push it down to the lock position.



Rear center seat

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button A when lowering the head restraint.

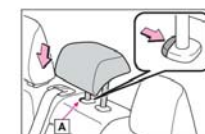


Photo No. 103 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

Additional Driver & Passenger Dummy Instrumentation Data

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

Vehicle Instrumentation Data

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

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

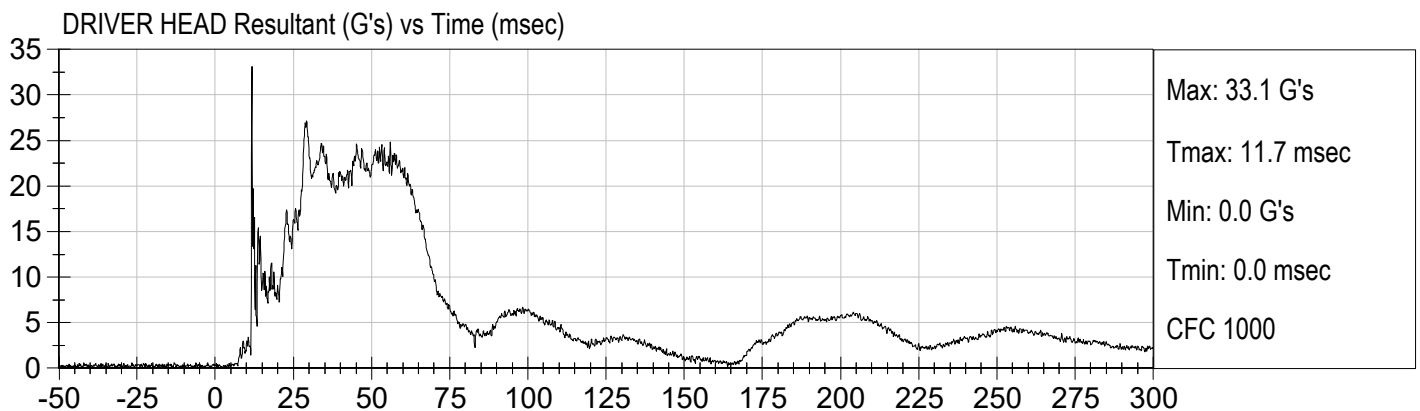
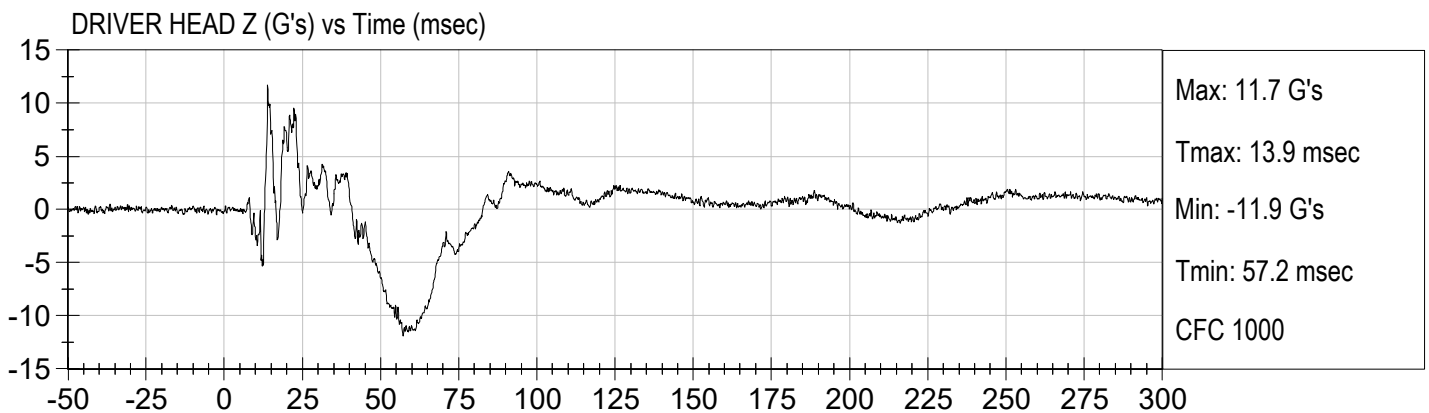
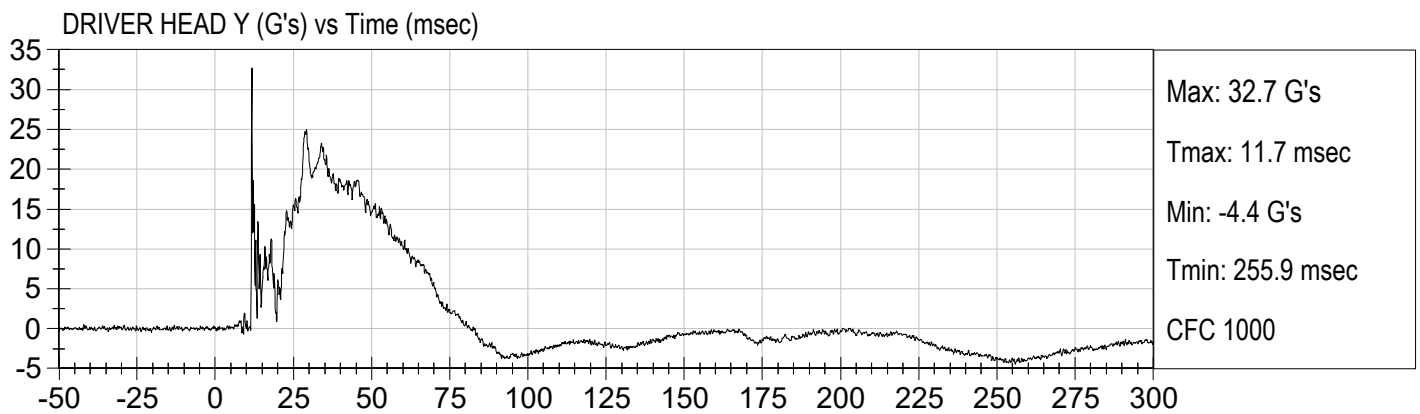
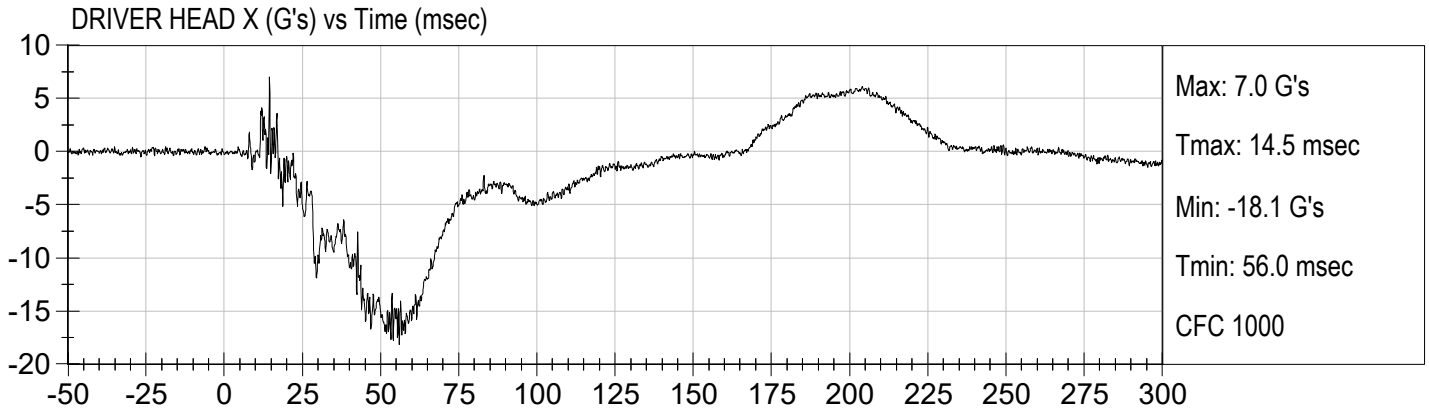
MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

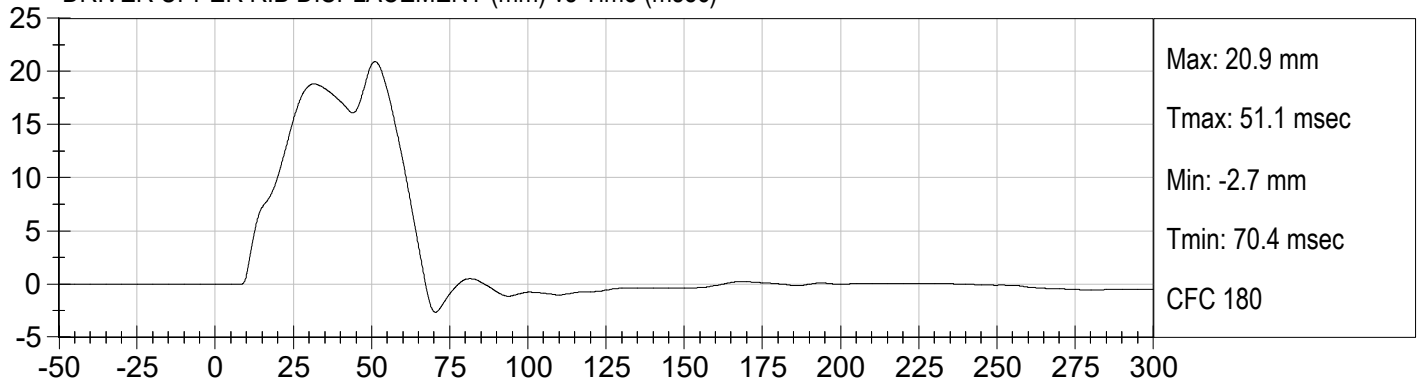
MDB Rear Acceleration (Y)

Left MDB Contact Switch

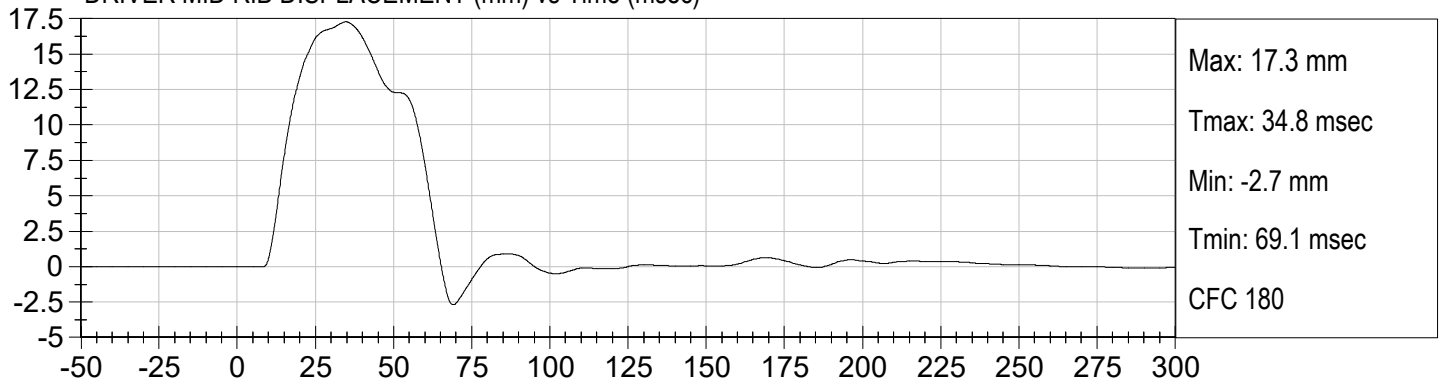
Right MDB Contact Switch



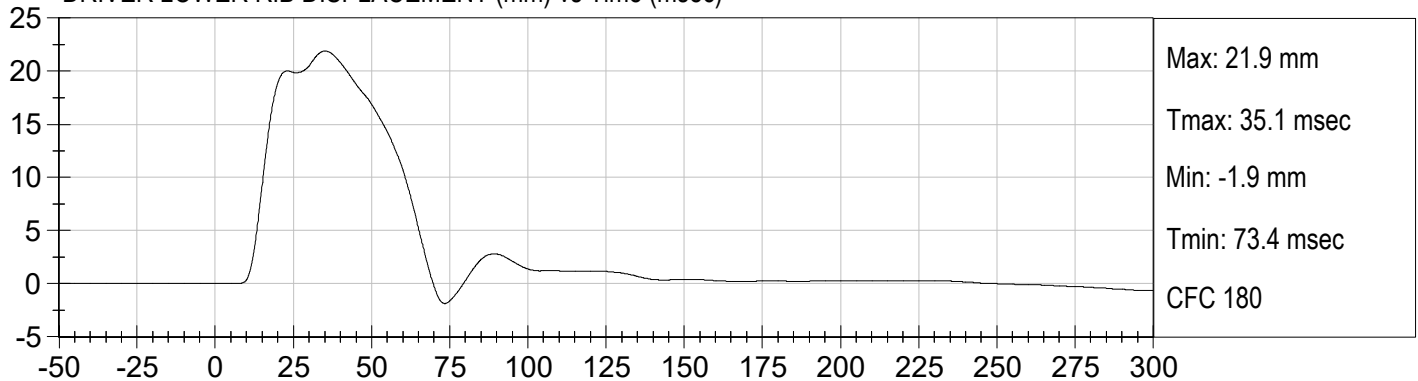
DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (msec)



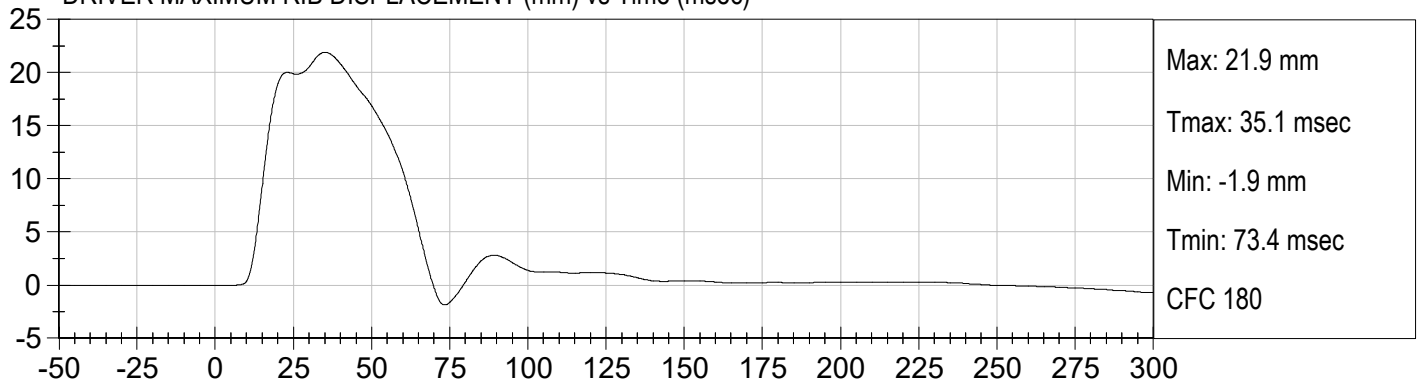
DRIVER MID RIB DISPLACEMENT (mm) vs Time (msec)

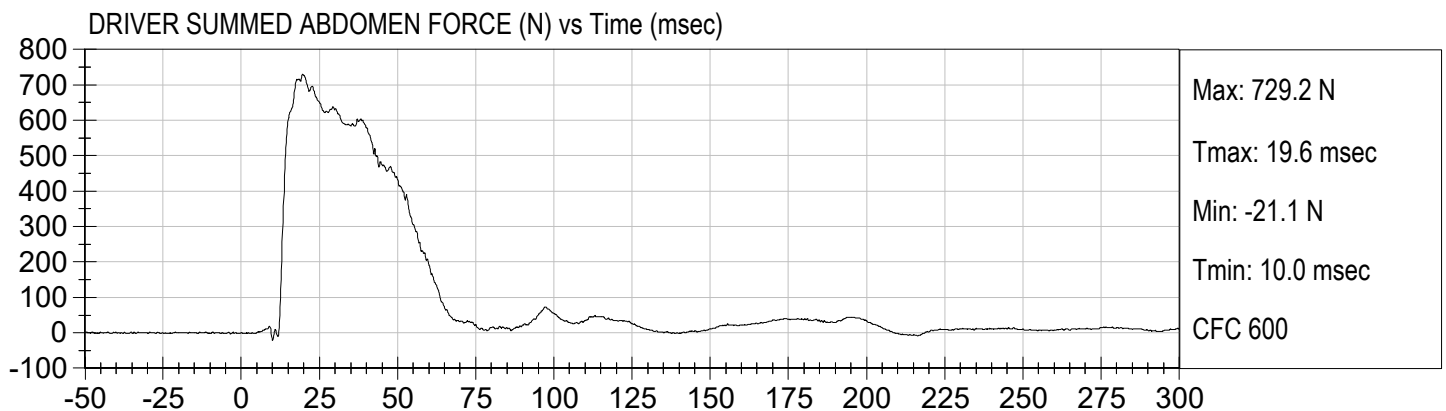
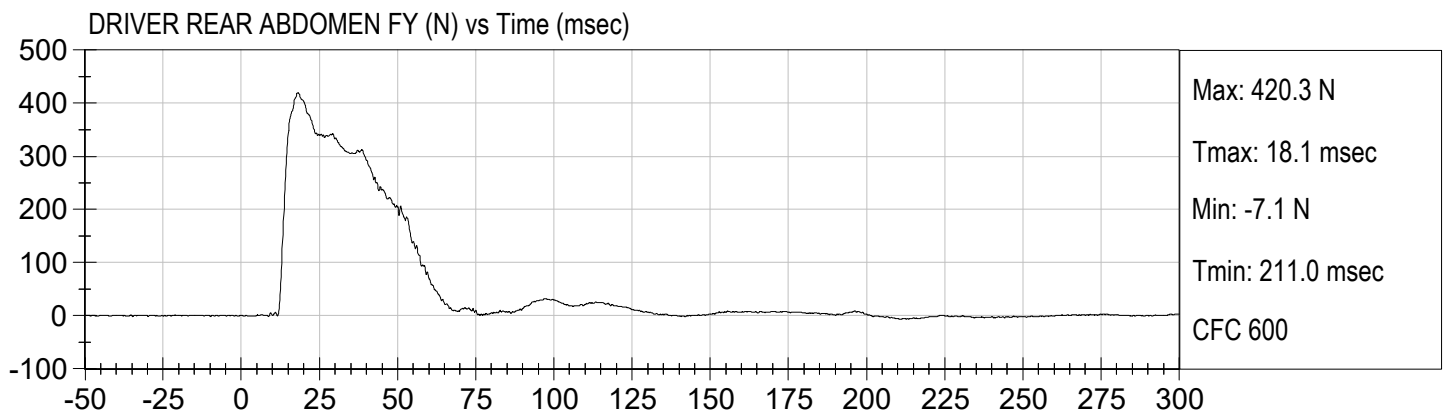
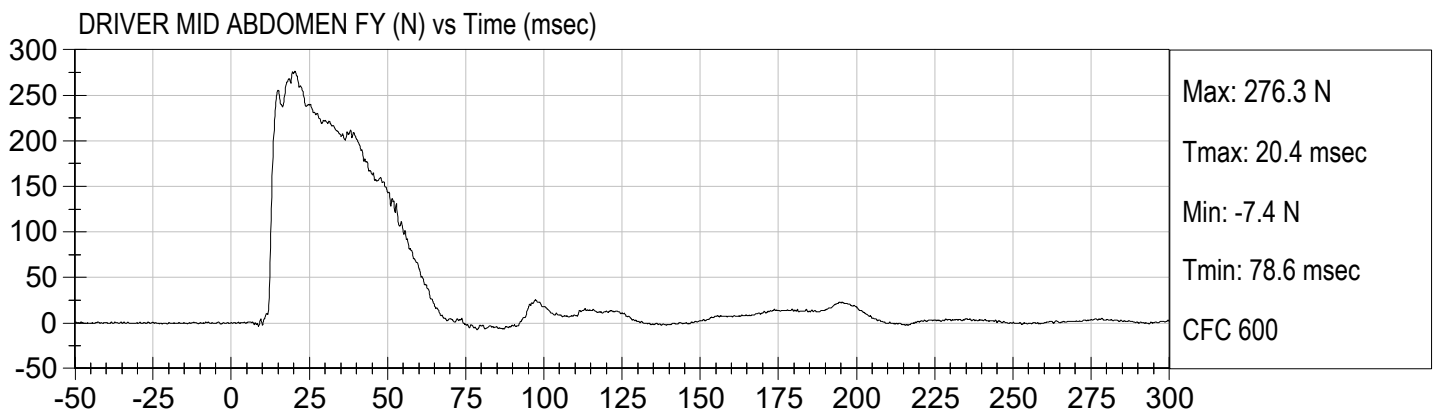
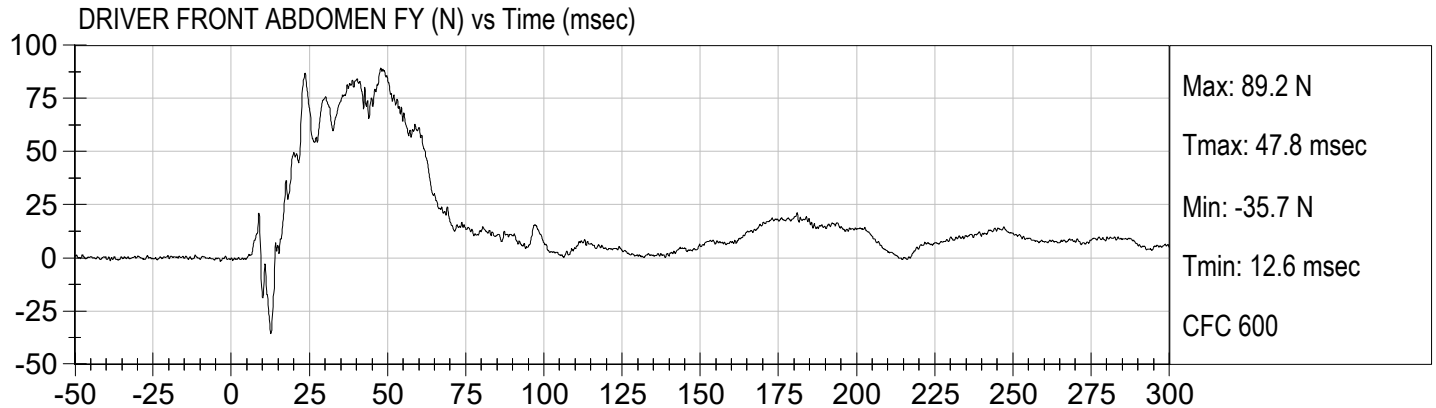


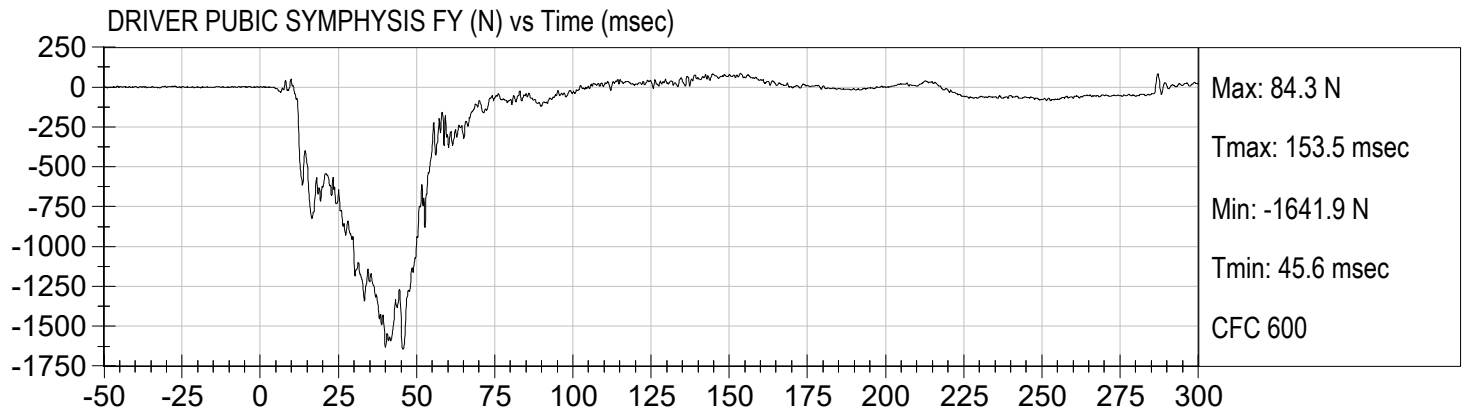
DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (msec)

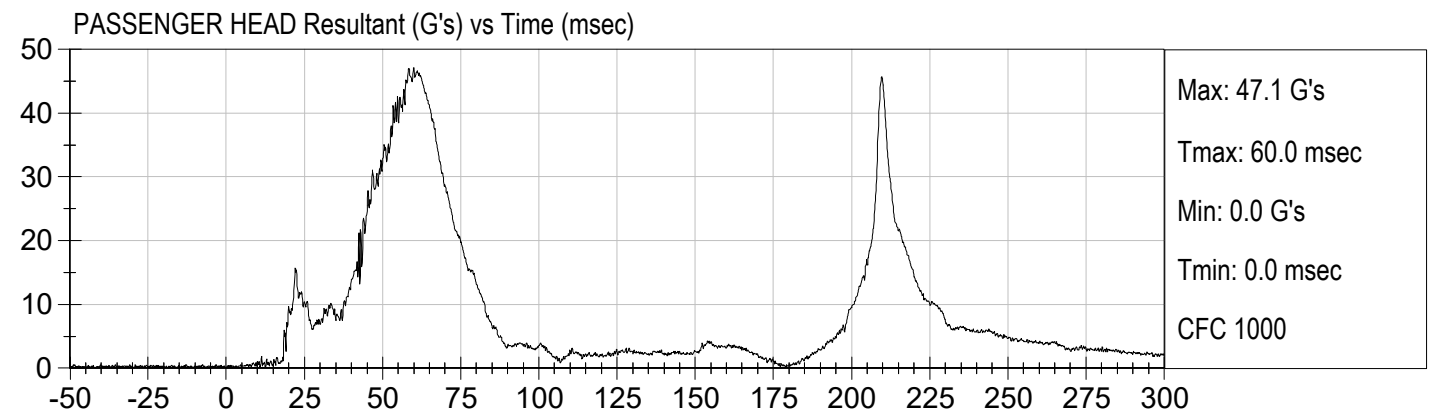
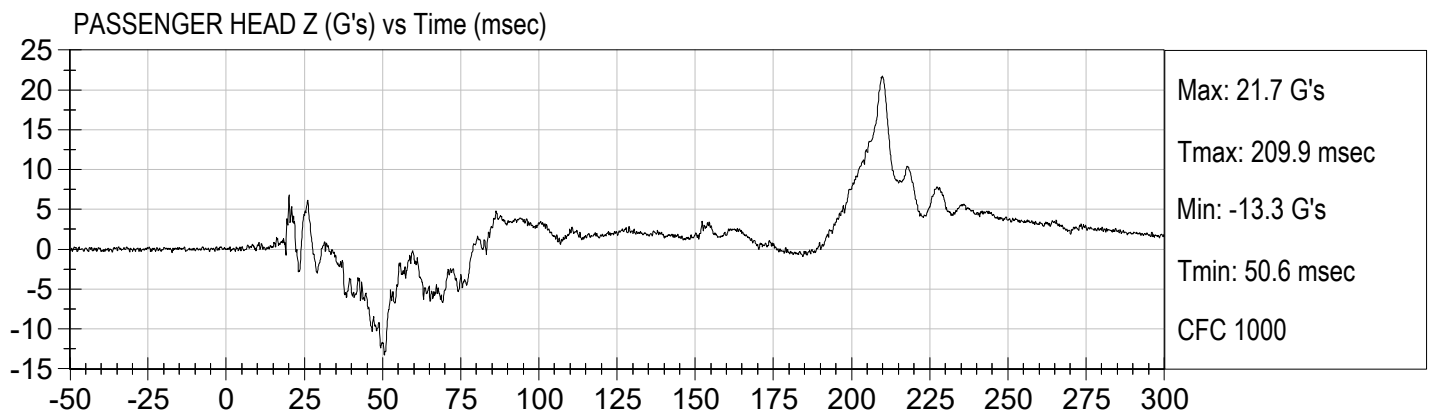
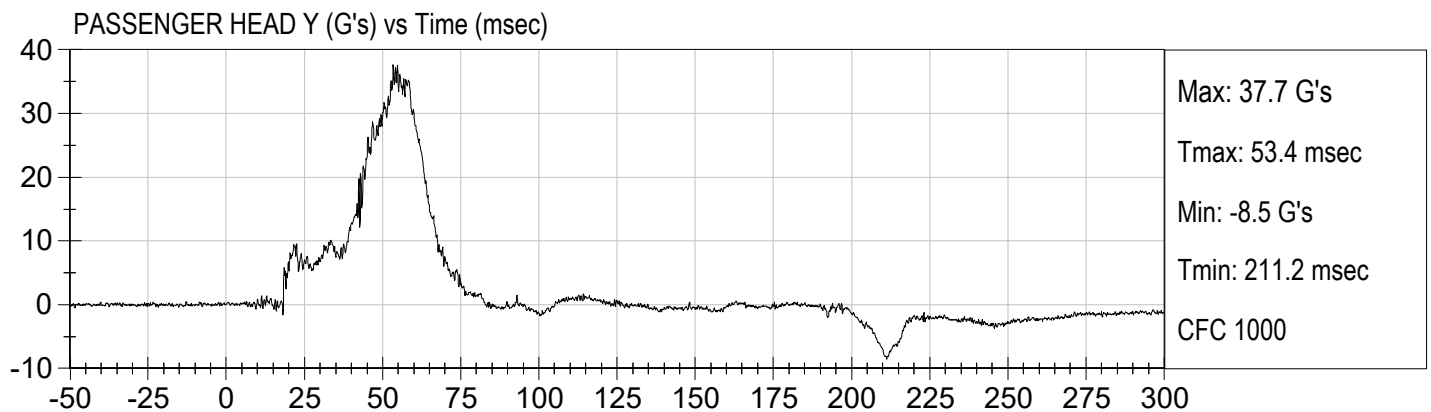
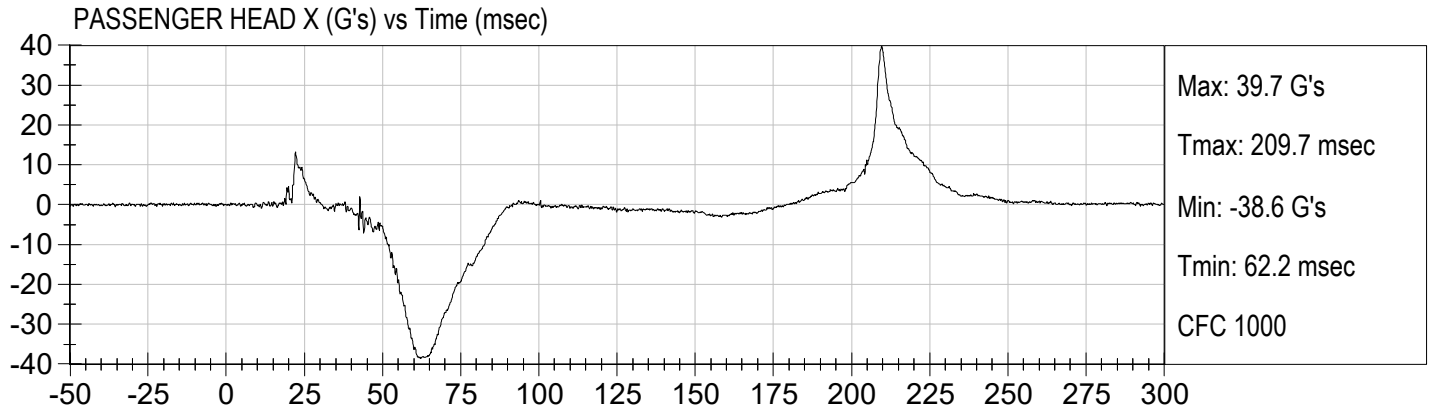


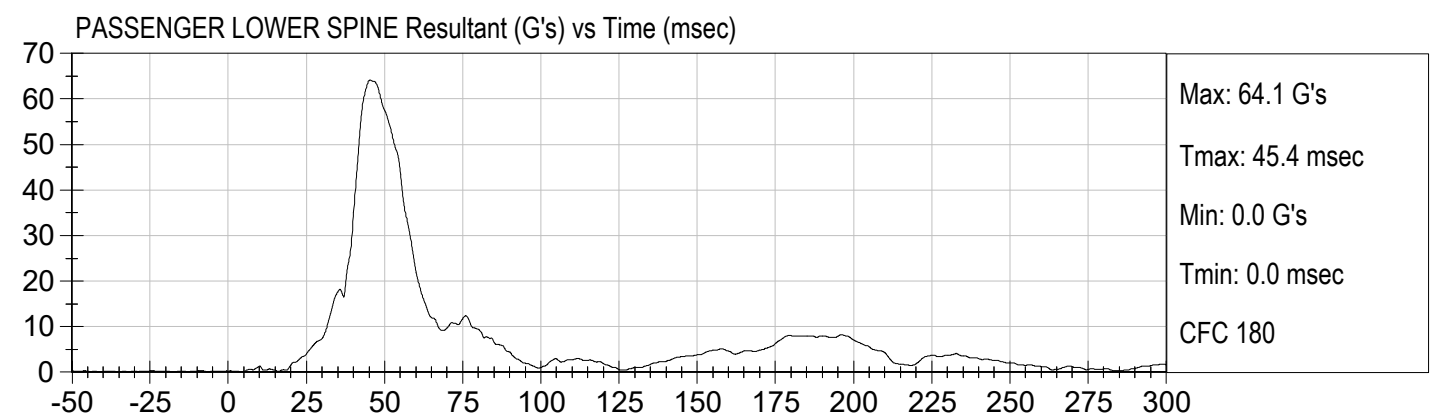
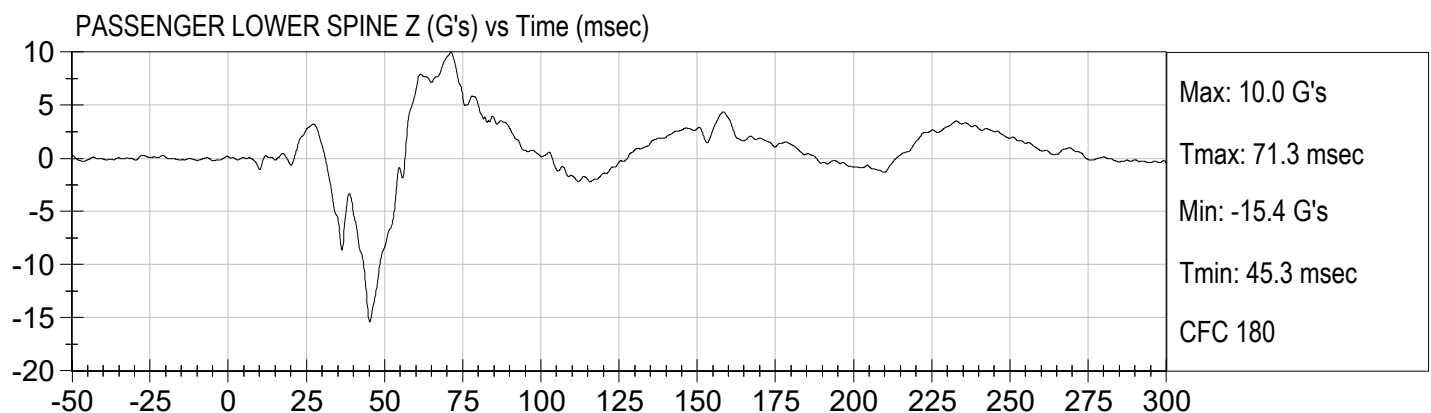
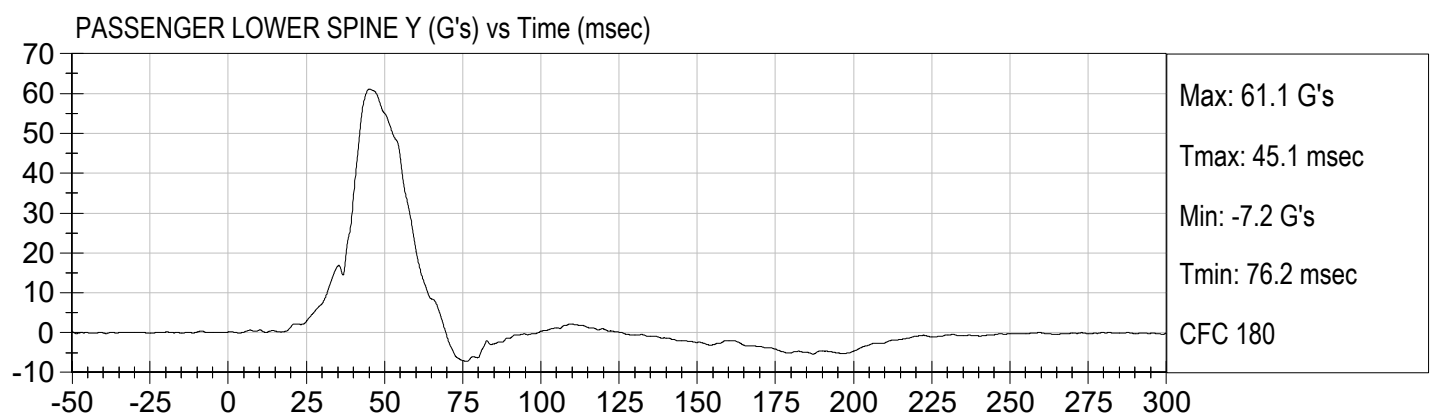
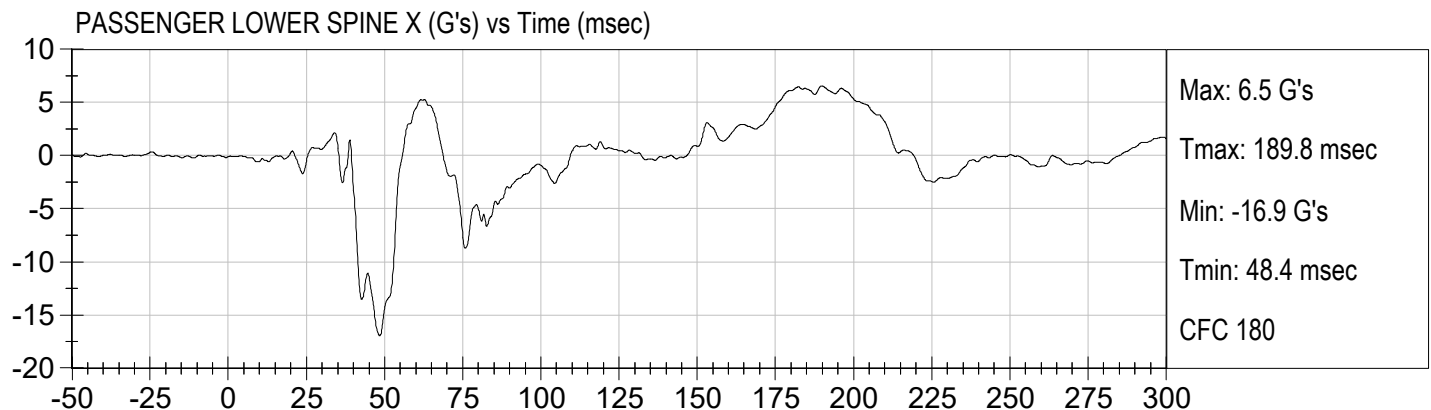
DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (msec)

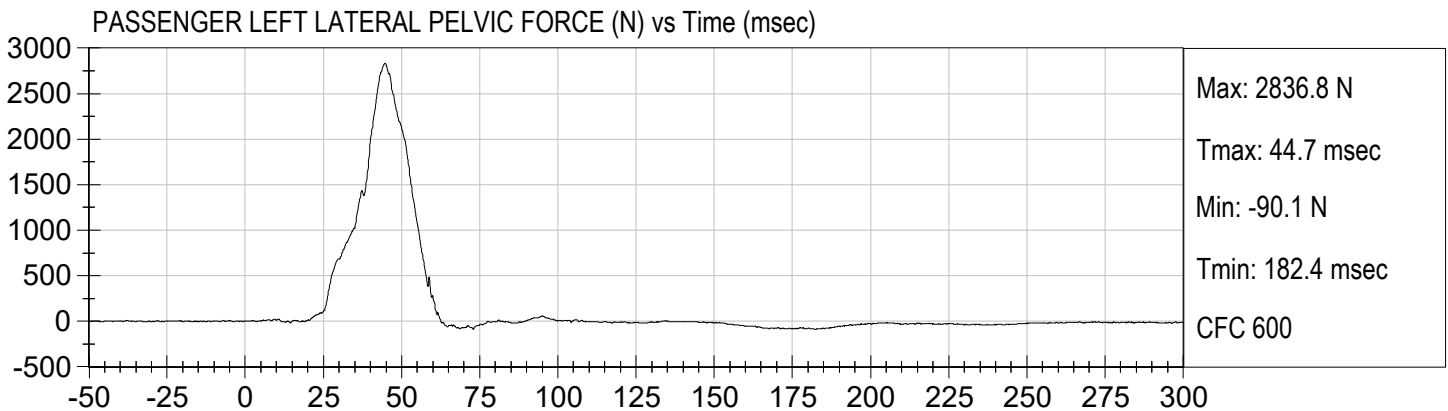
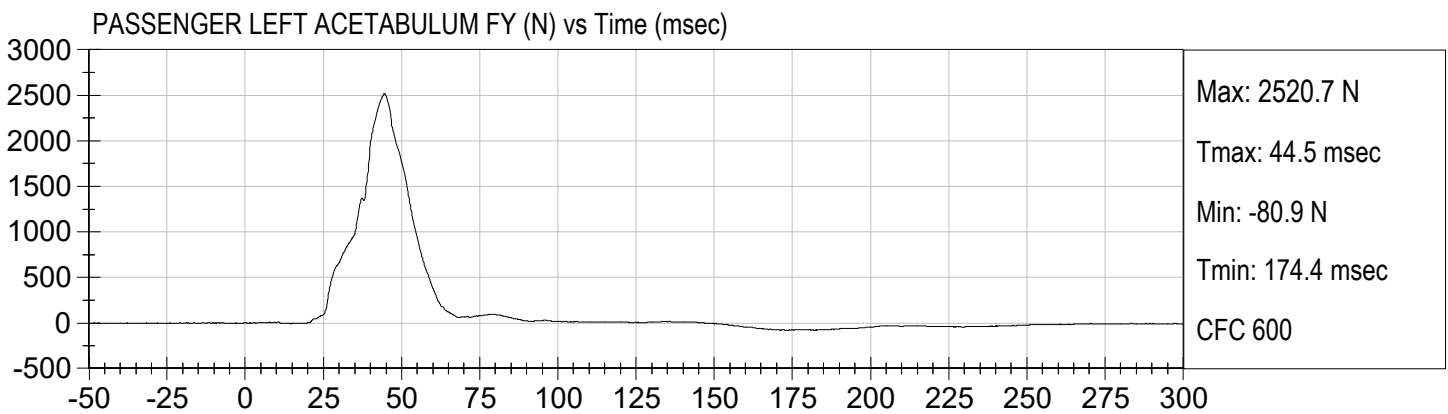
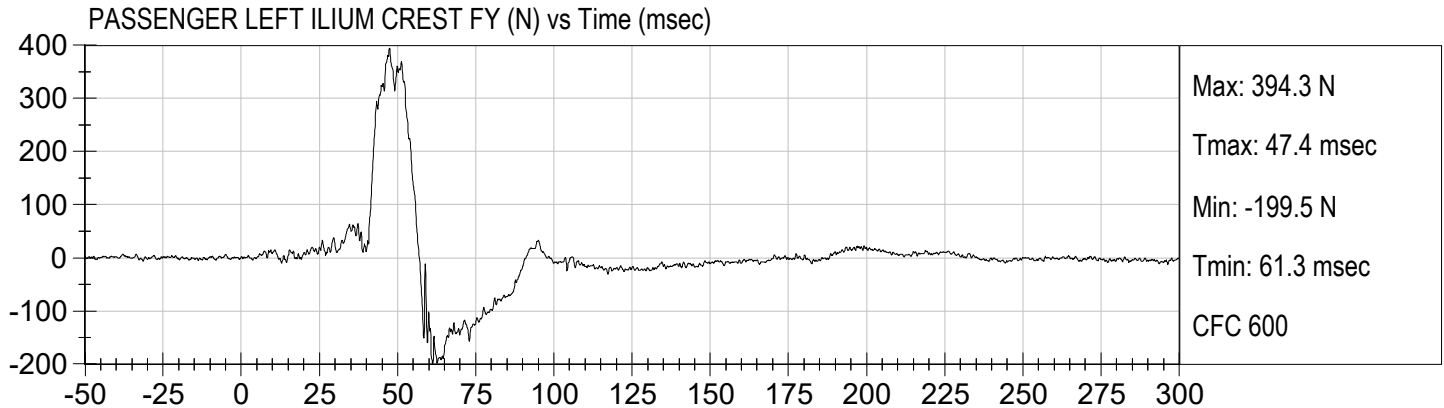












APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 032

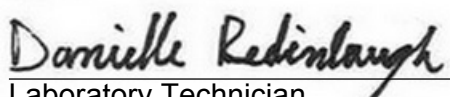
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157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

MGA RESEARCH CORPORATION
HEAD DROP TEST
ES-2re DUMMY

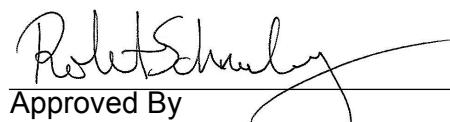
ATD Serial No: 032

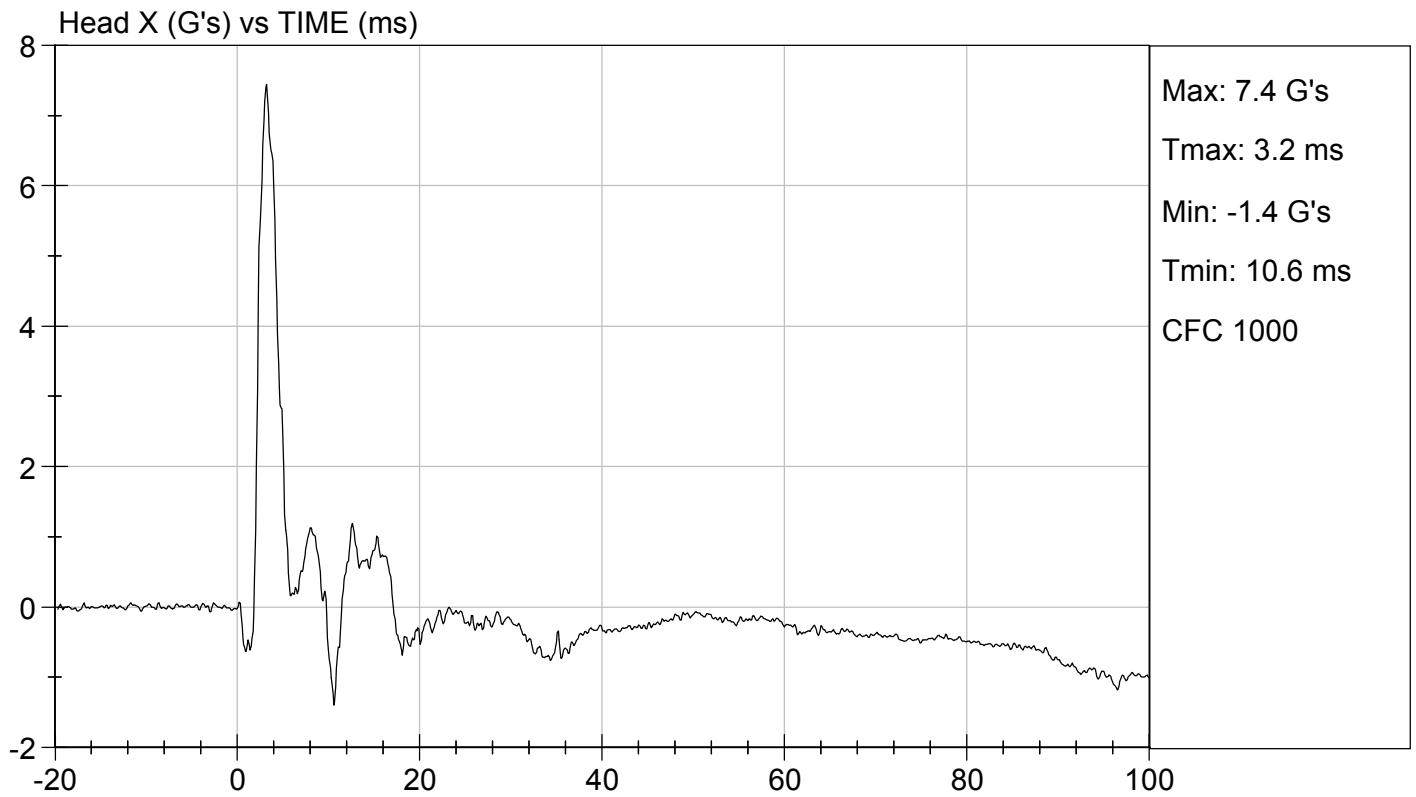
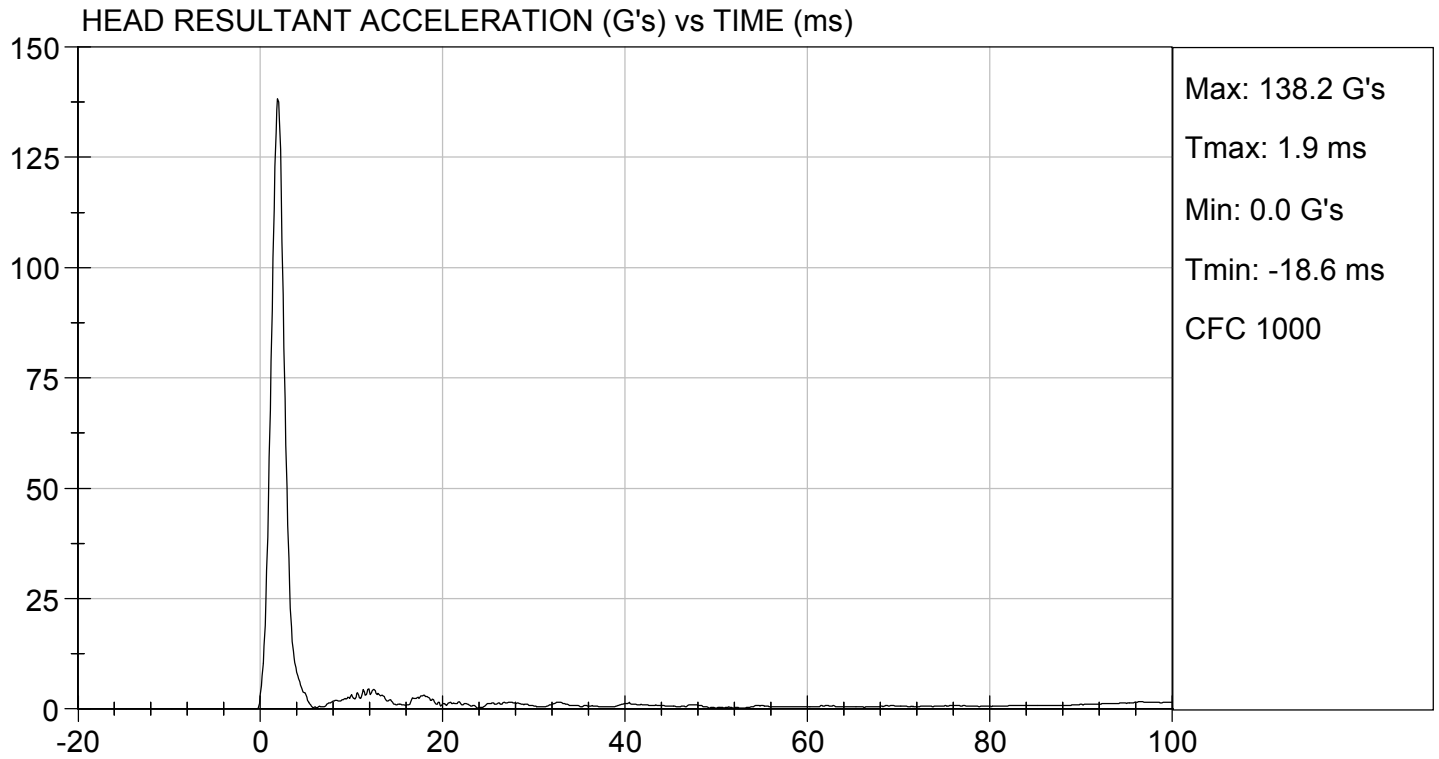
Test ID: D190091

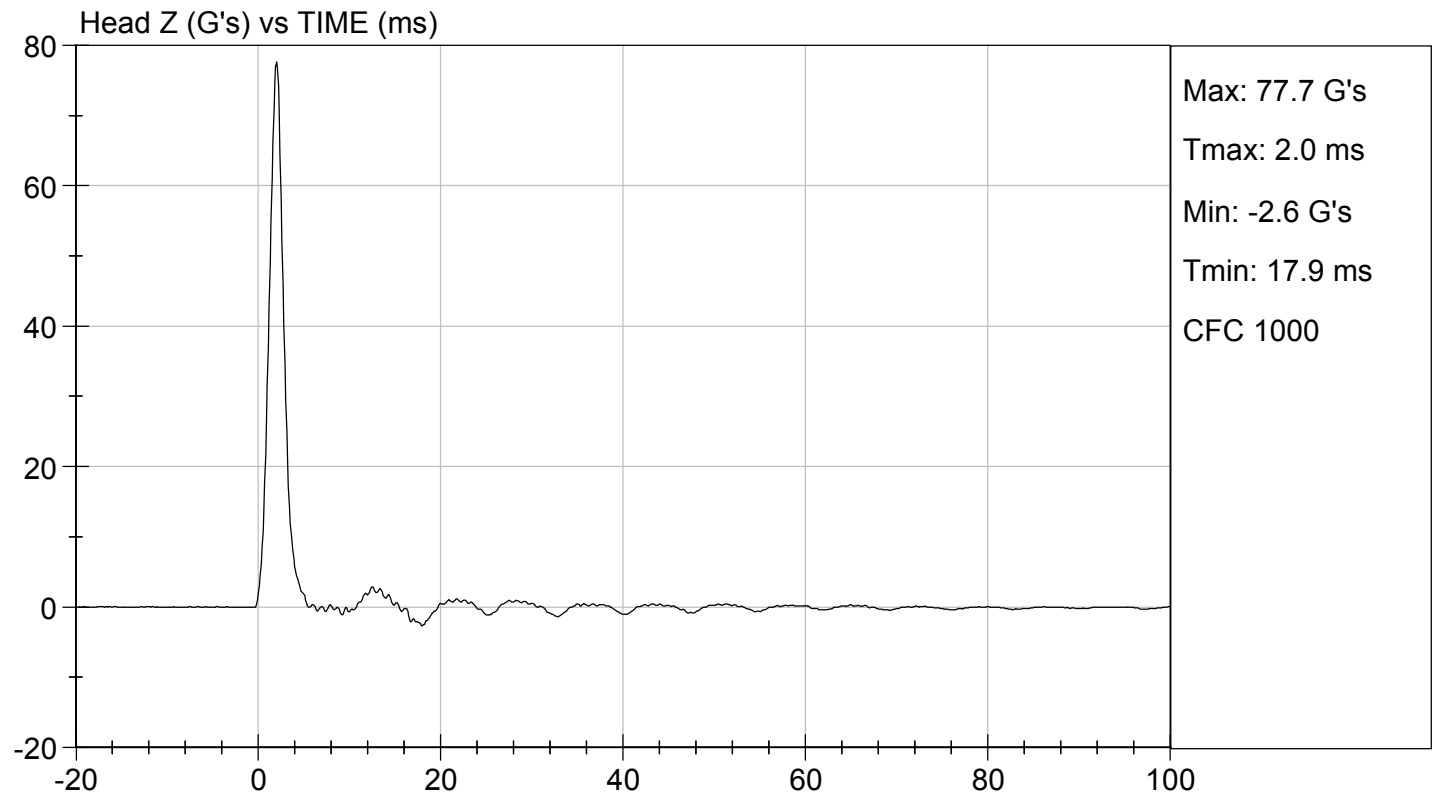
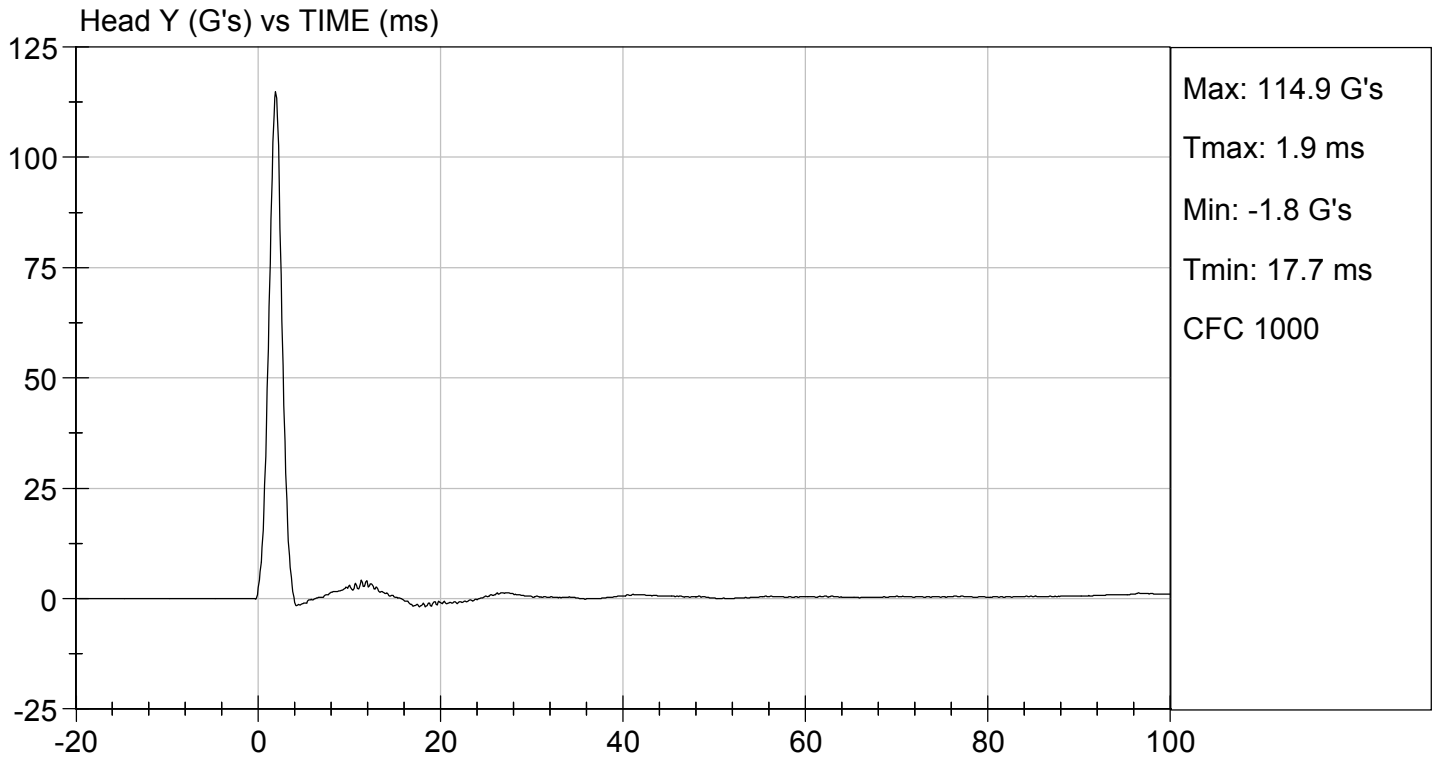
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	125 to 155	138	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

01/07/2019
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

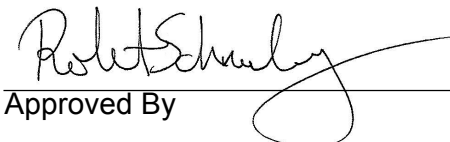
ATD Serial No: 032

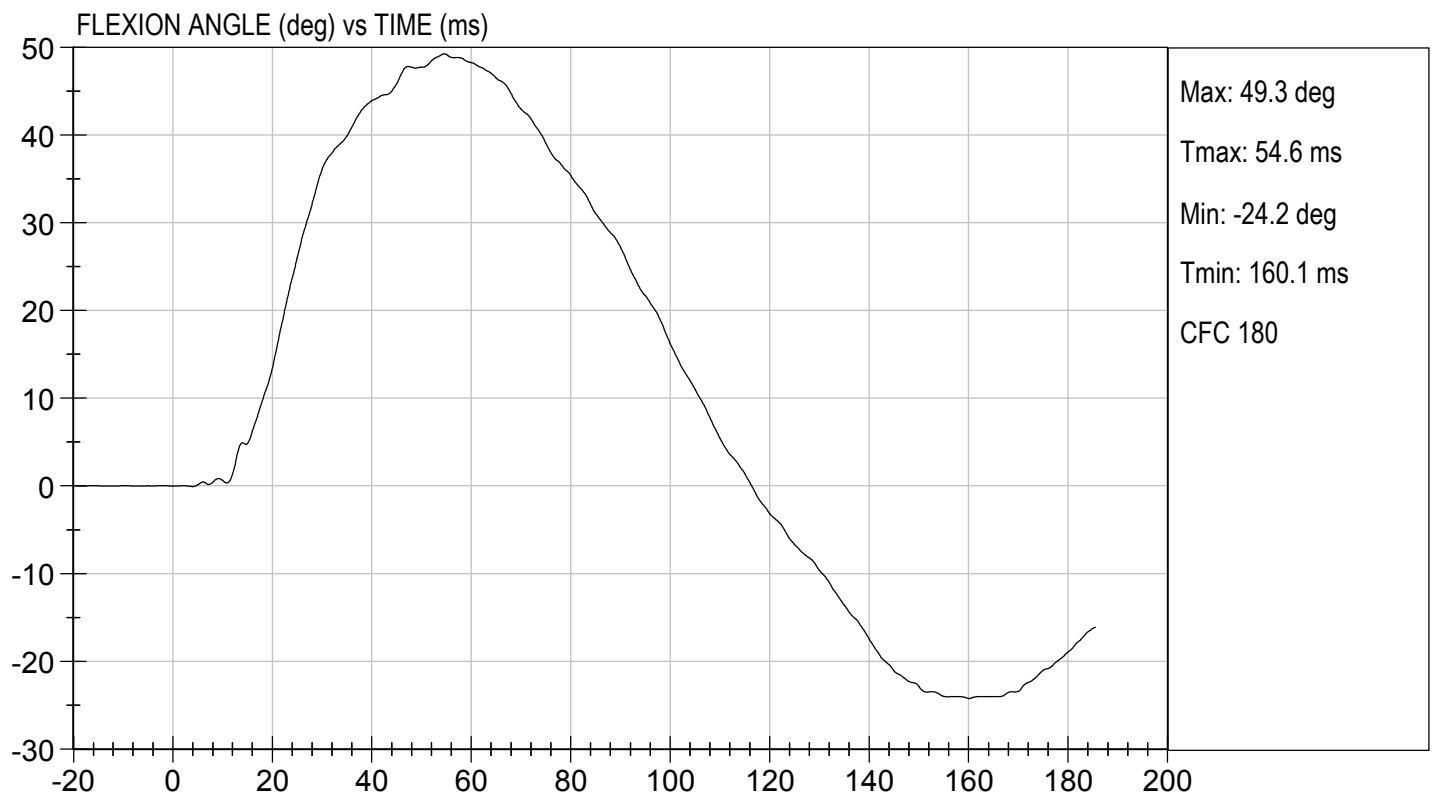
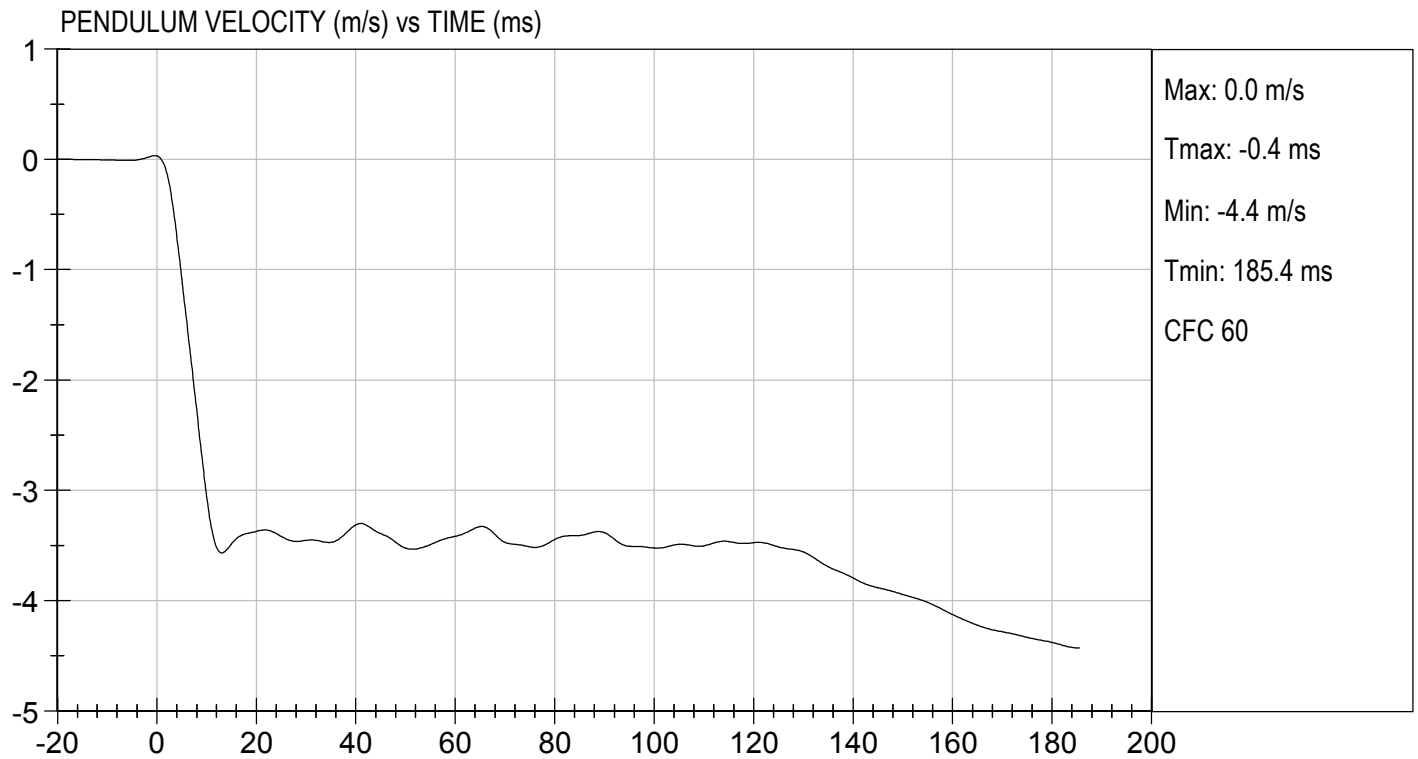
Test I.D: D190092

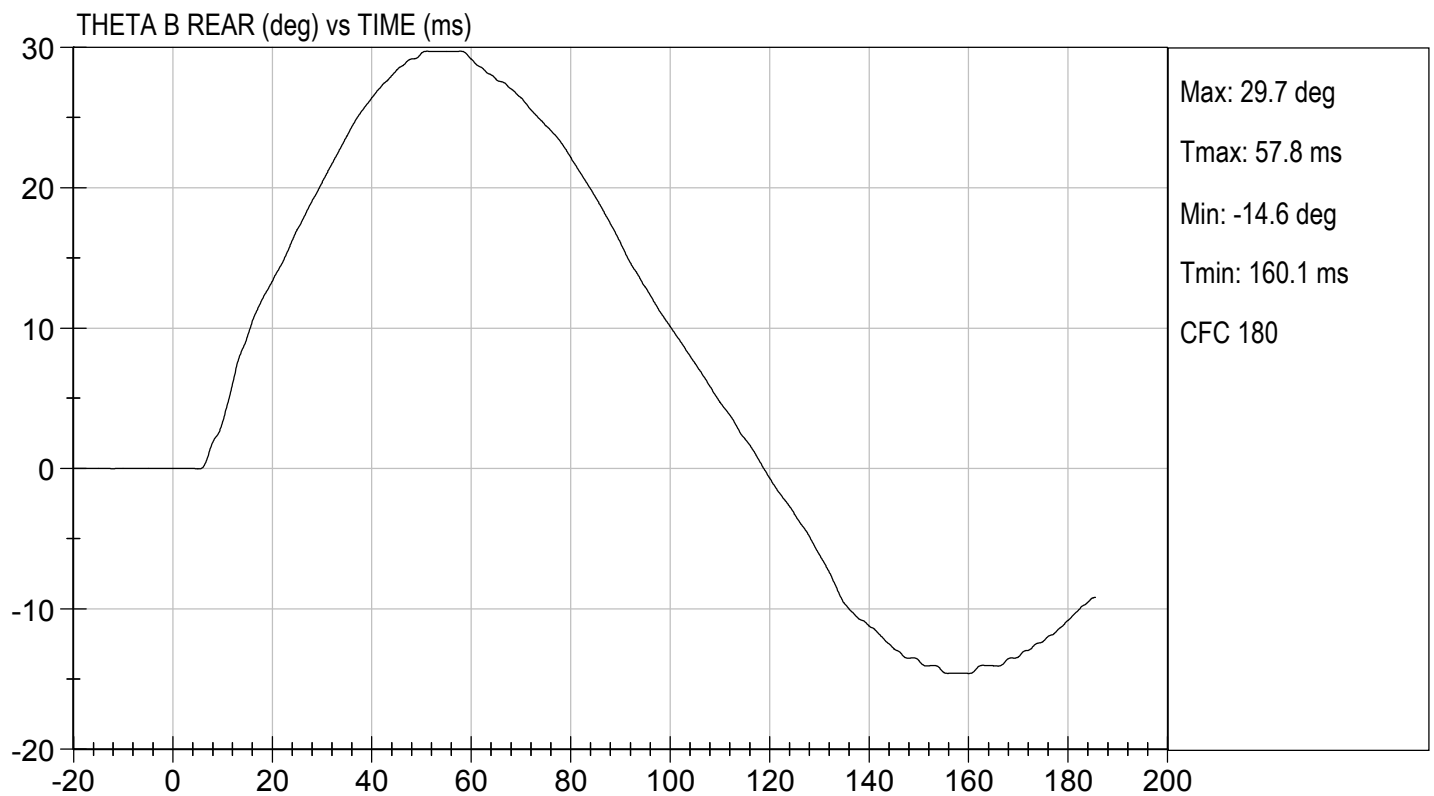
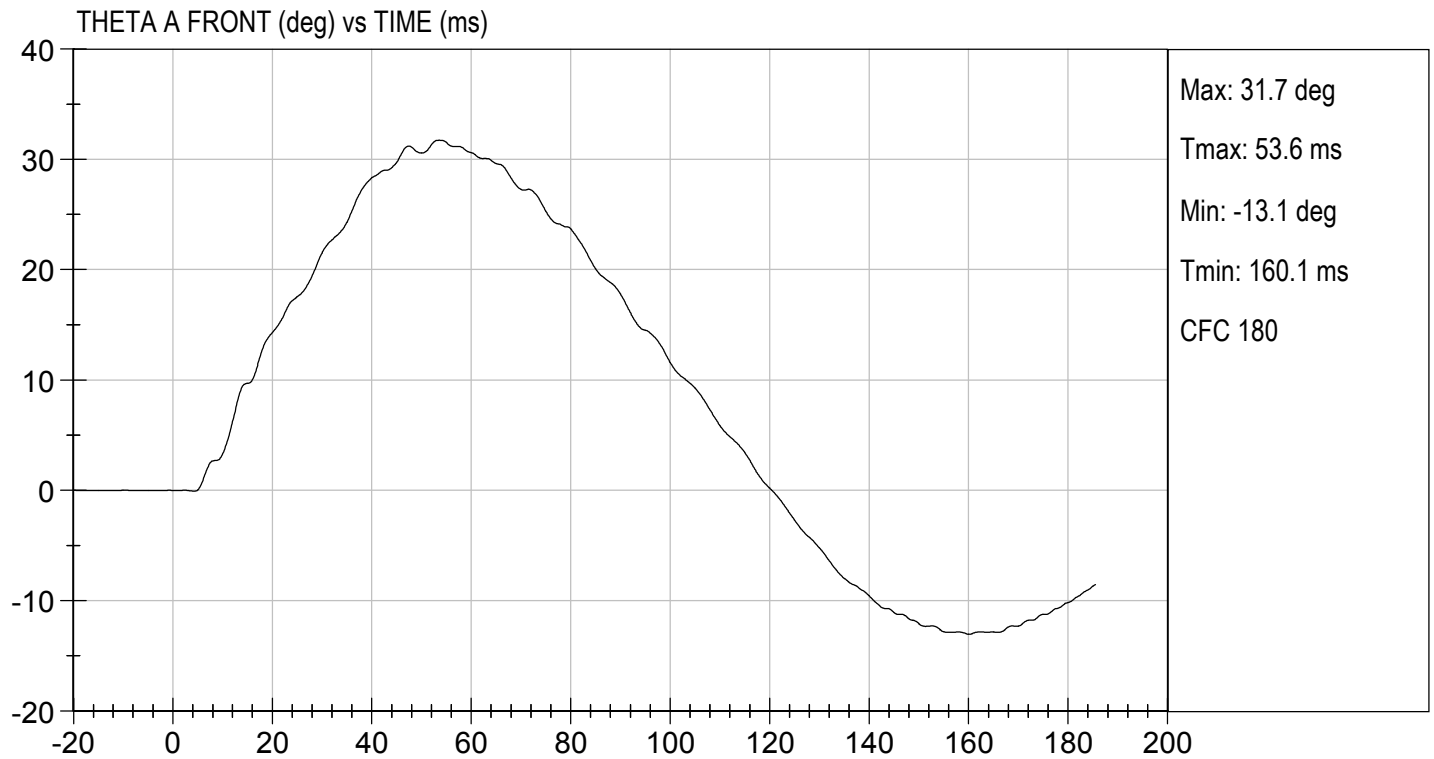
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.41	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.36	Pass
	14 ms	m/s	-3.20 to -3.70	-3.54	Pass
	17 ms	m/s	>= -3.70	-3.41	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	49.3	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	54.6	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	61.9	Pass
Overall Results					Pass


 Laboratory Technician

01/07/2019
 Test Date


 Approved By

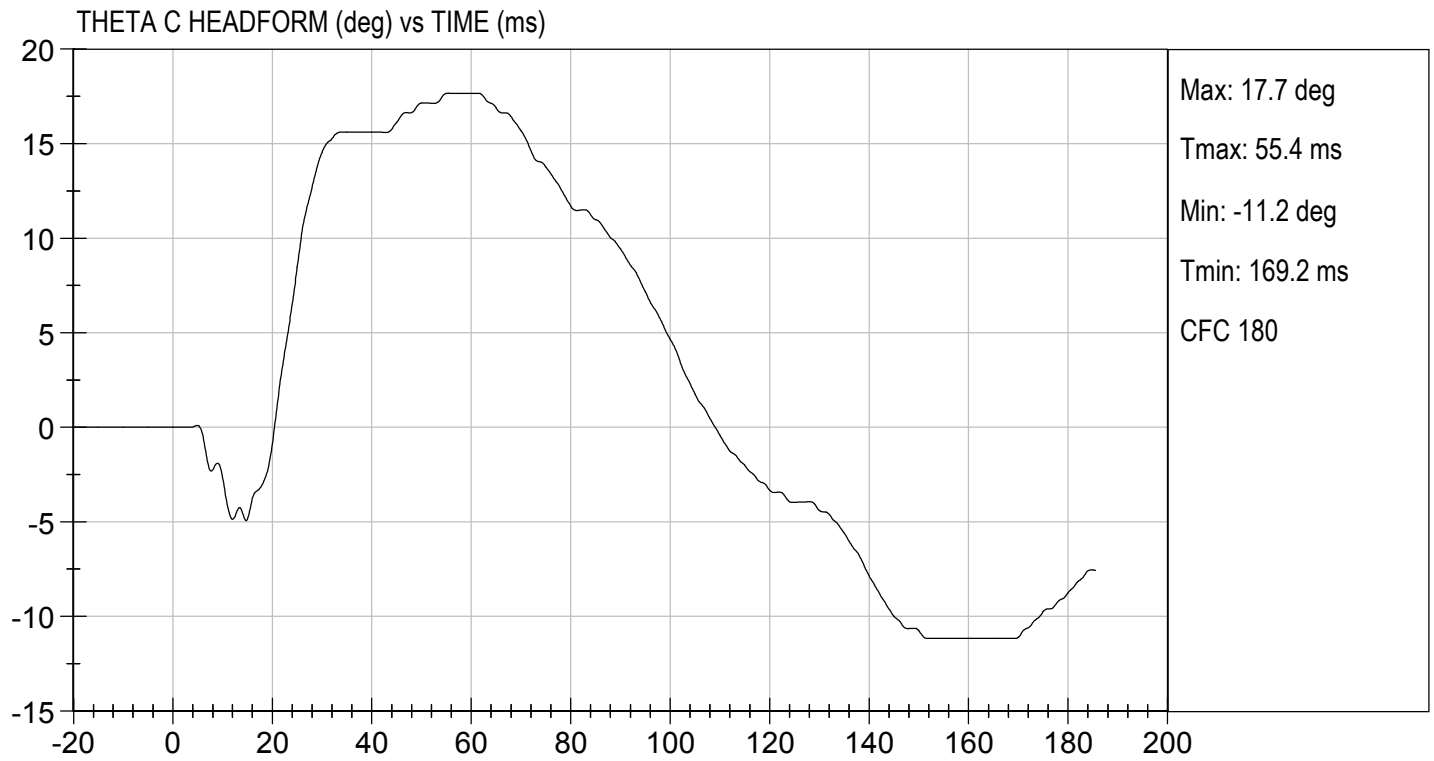






TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

TEST DATE: 01/07/2019
TEST #: D190092



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

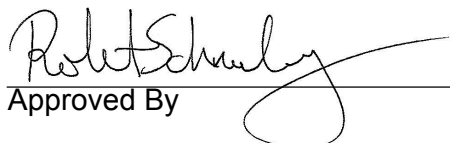
ATD Serial No: 032

Test I.D: D190093

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.23	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.0	Pass
Overall Test Results				Pass


Laboratory Technician

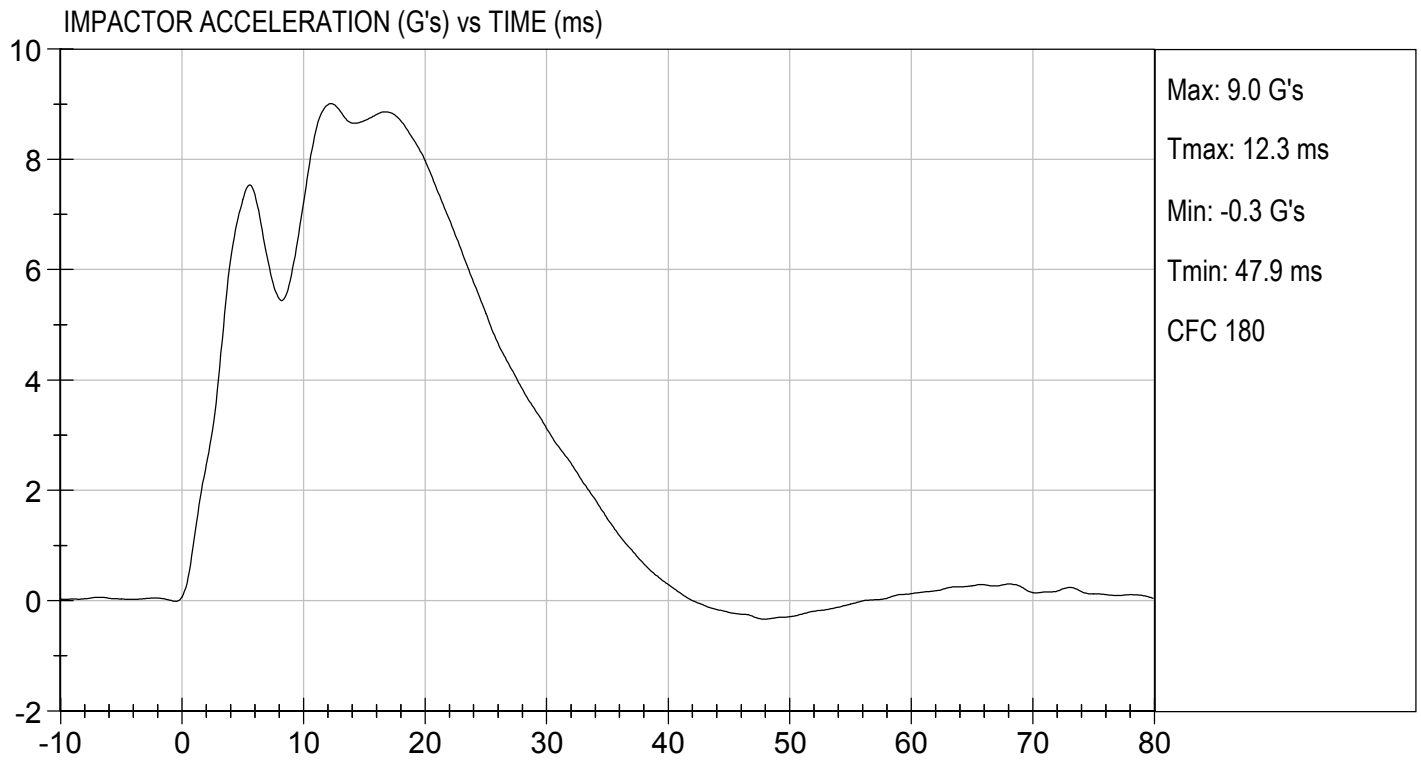
01/08/2019
Test Date


Approved By



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

TEST DATE: 01/08/2019
TEST #: D190093



MGA RESEARCH CORPORATION

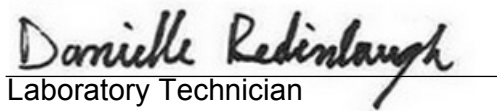
UPPER RIB TEST

ES-2re DUMMY

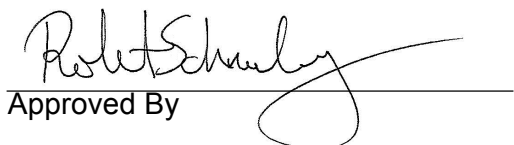
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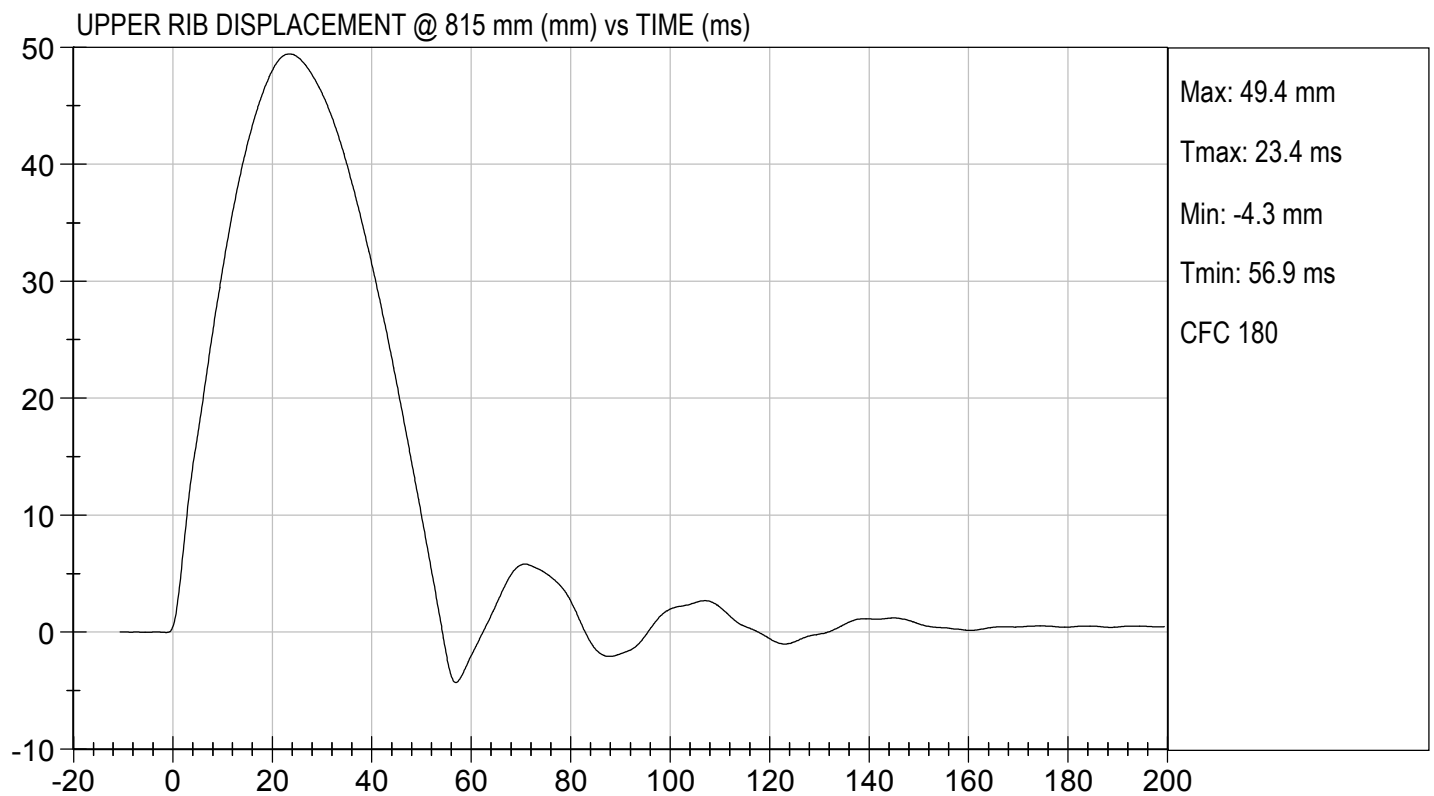
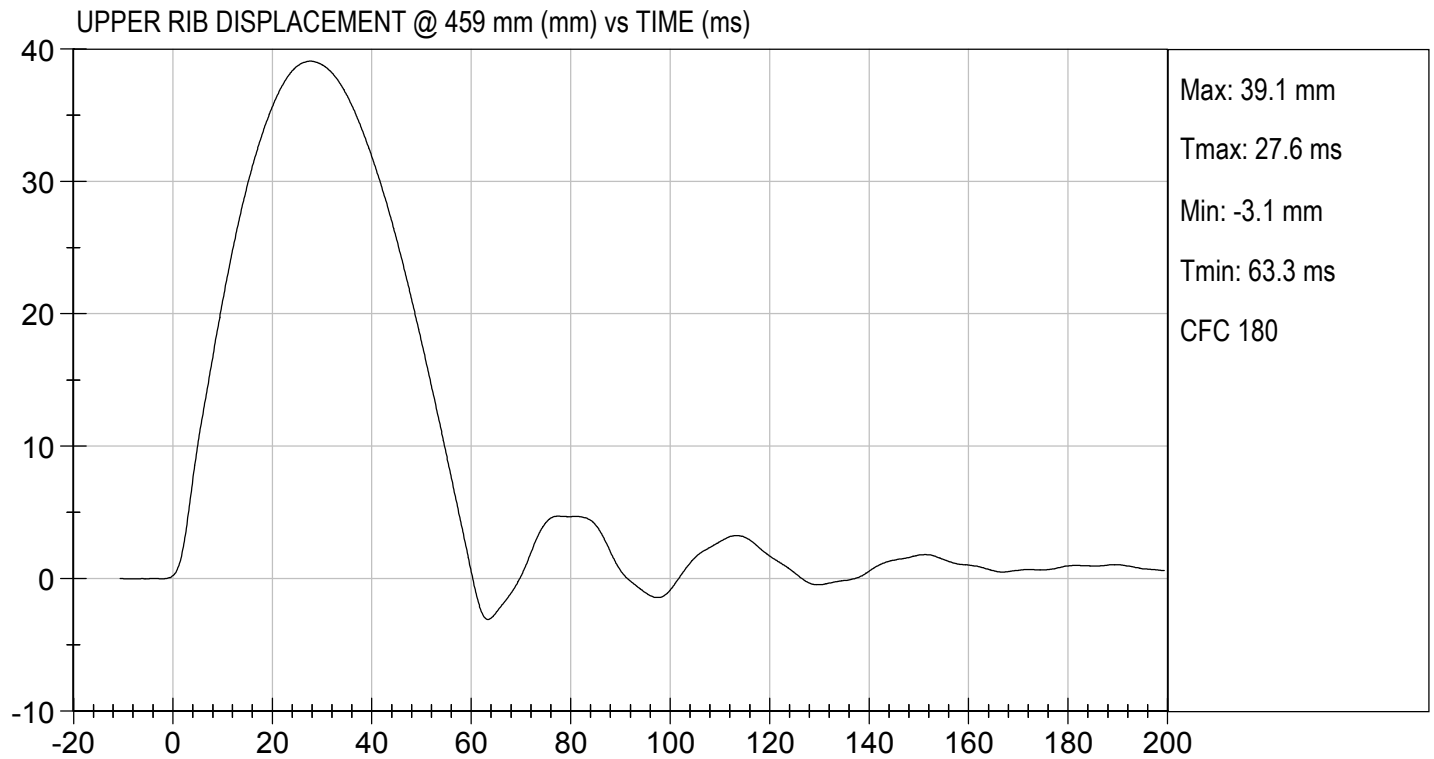
Test I.D: D190094

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	34	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.1	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.4	Pass
Overall Test Results				Pass


Laboratory Technician

01/07/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

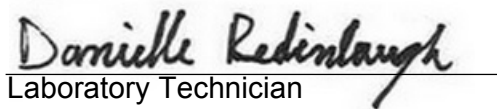
MID RIB TEST

ES-2re DUMMY

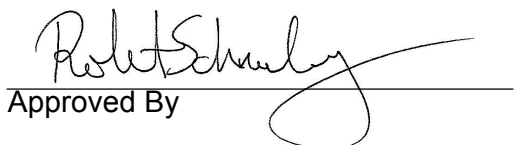
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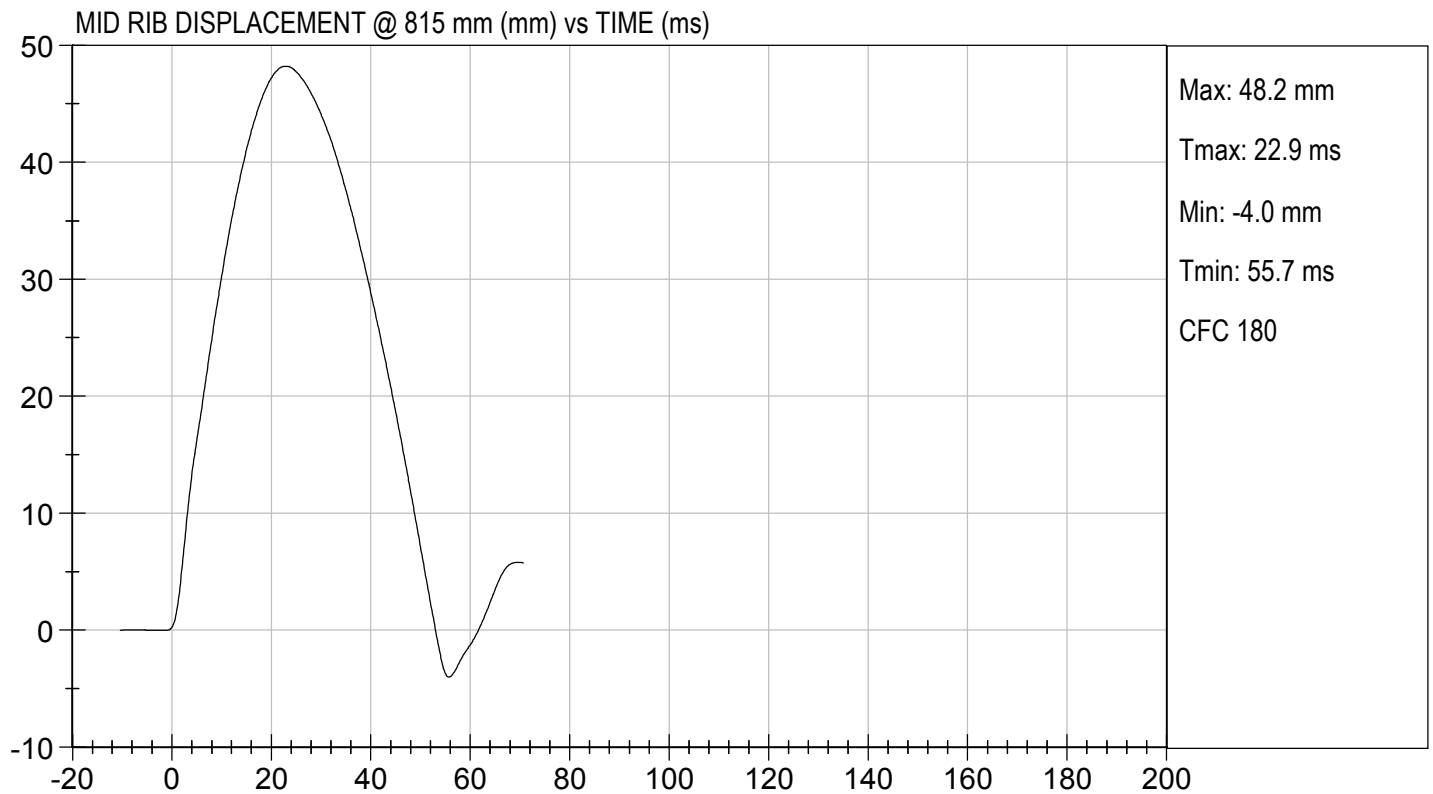
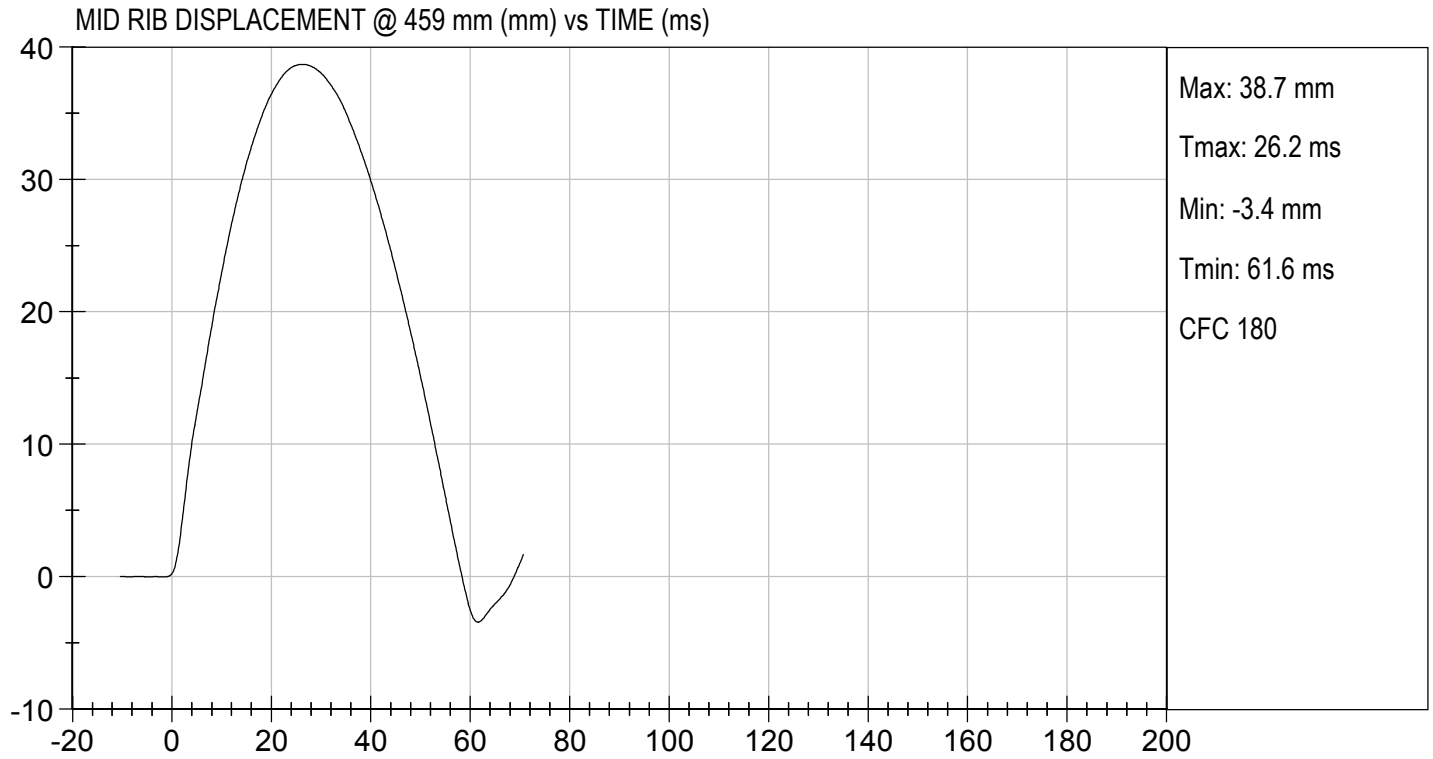
Test I.D: D190095

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	34	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.2	Pass
Overall Test Results				Pass


Laboratory Technician

01/07/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

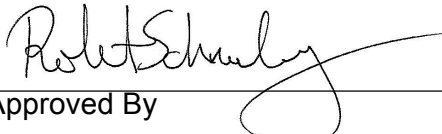
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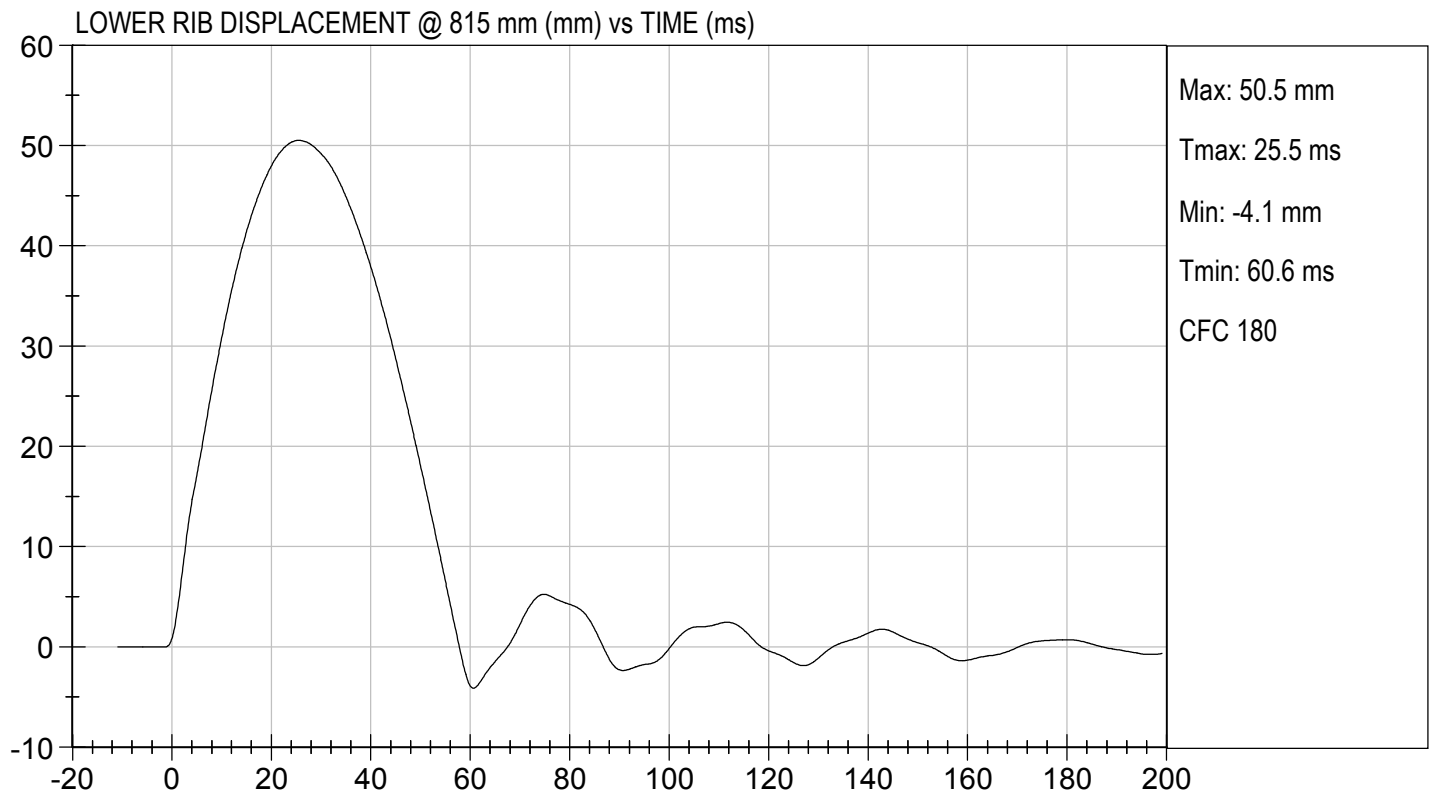
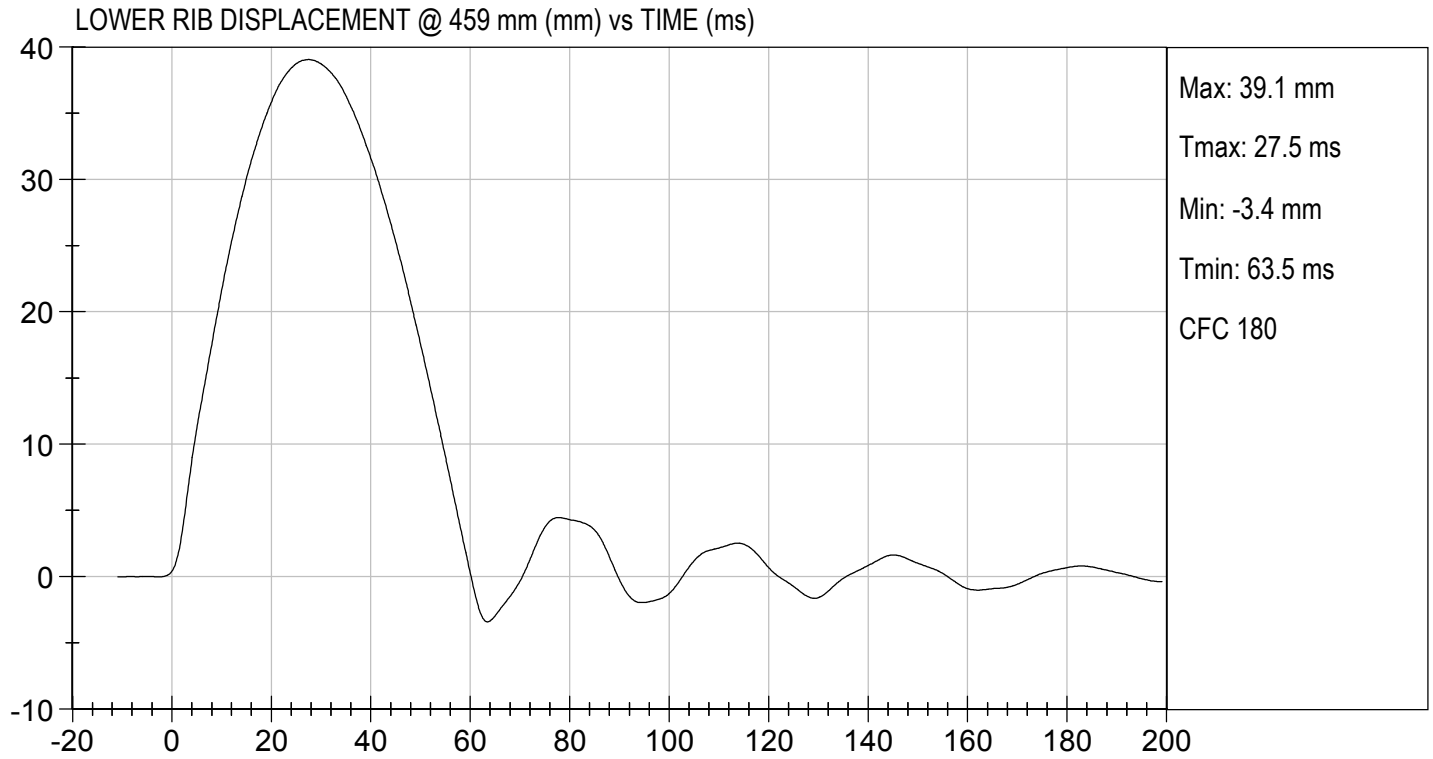
Test I.D: D190096

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	34	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.1	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.5	Pass
Overall Test Results				Pass


Laboratory Technician

01/07/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

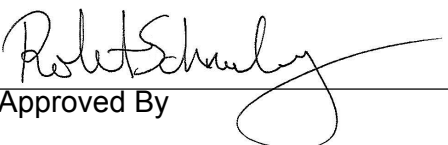
ATD Serial No: 032

Test I.D: D190097

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4219	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.5	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2326	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.3	Pass
Overall Test Results				Pass


Laboratory Technician

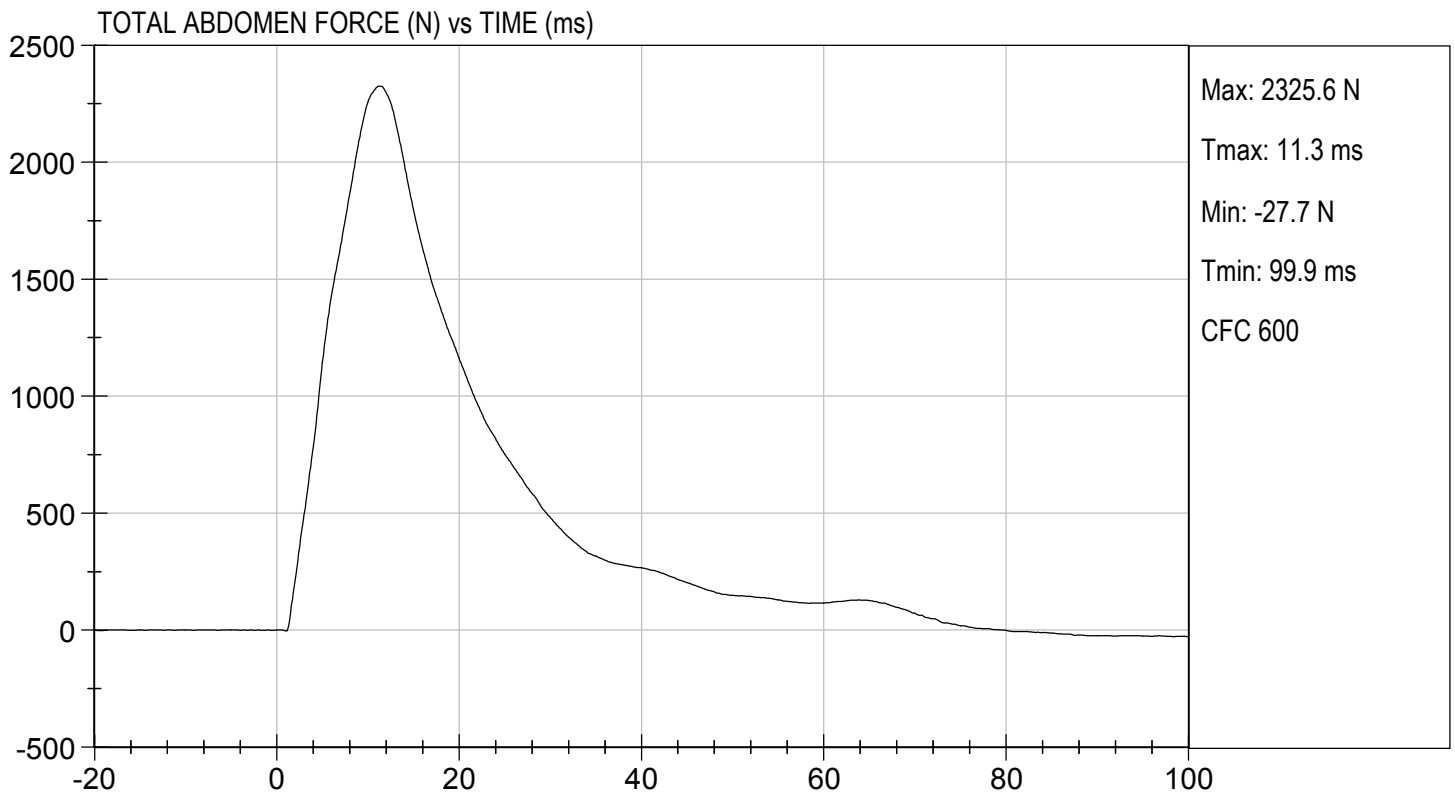
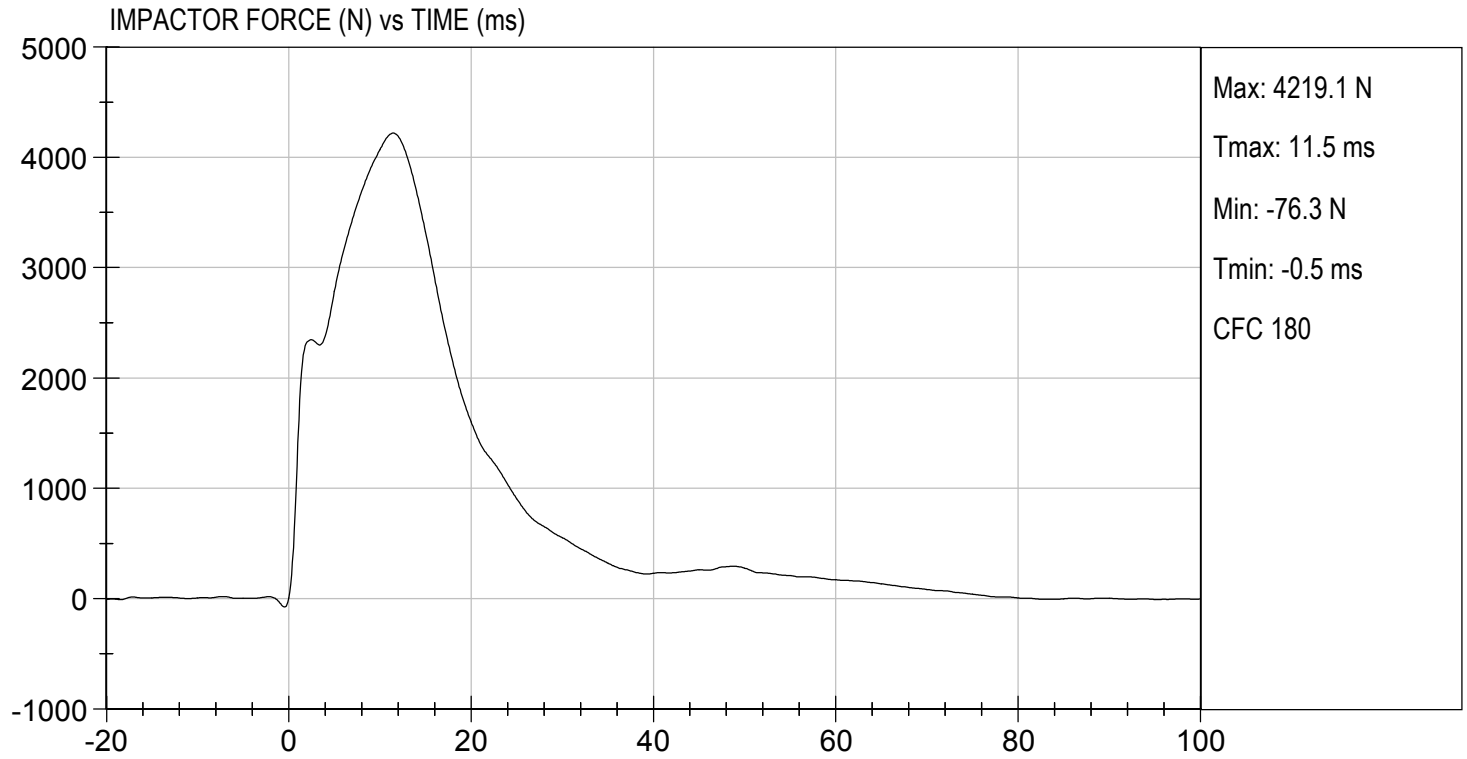
01/08/2019
Test Date


Approved By



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

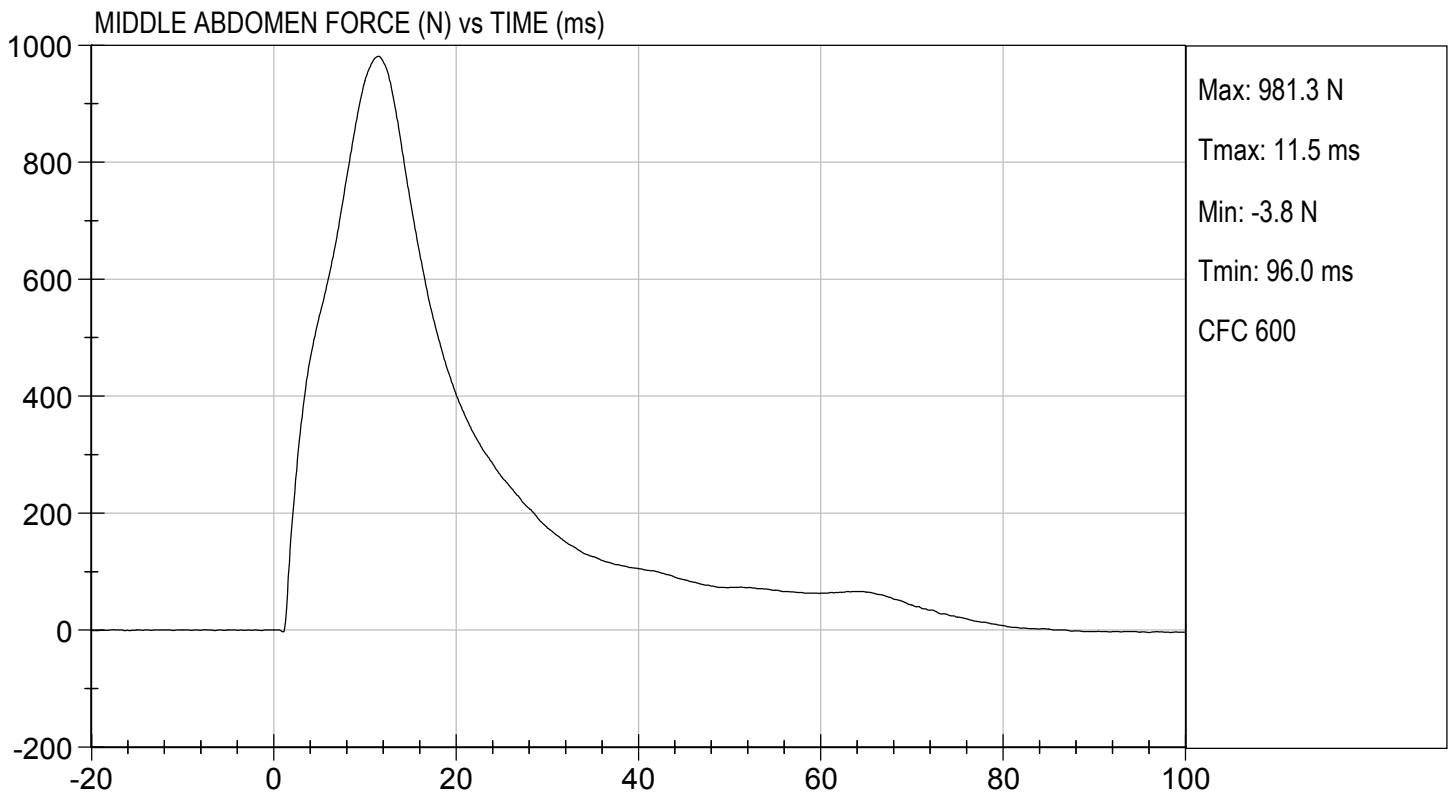
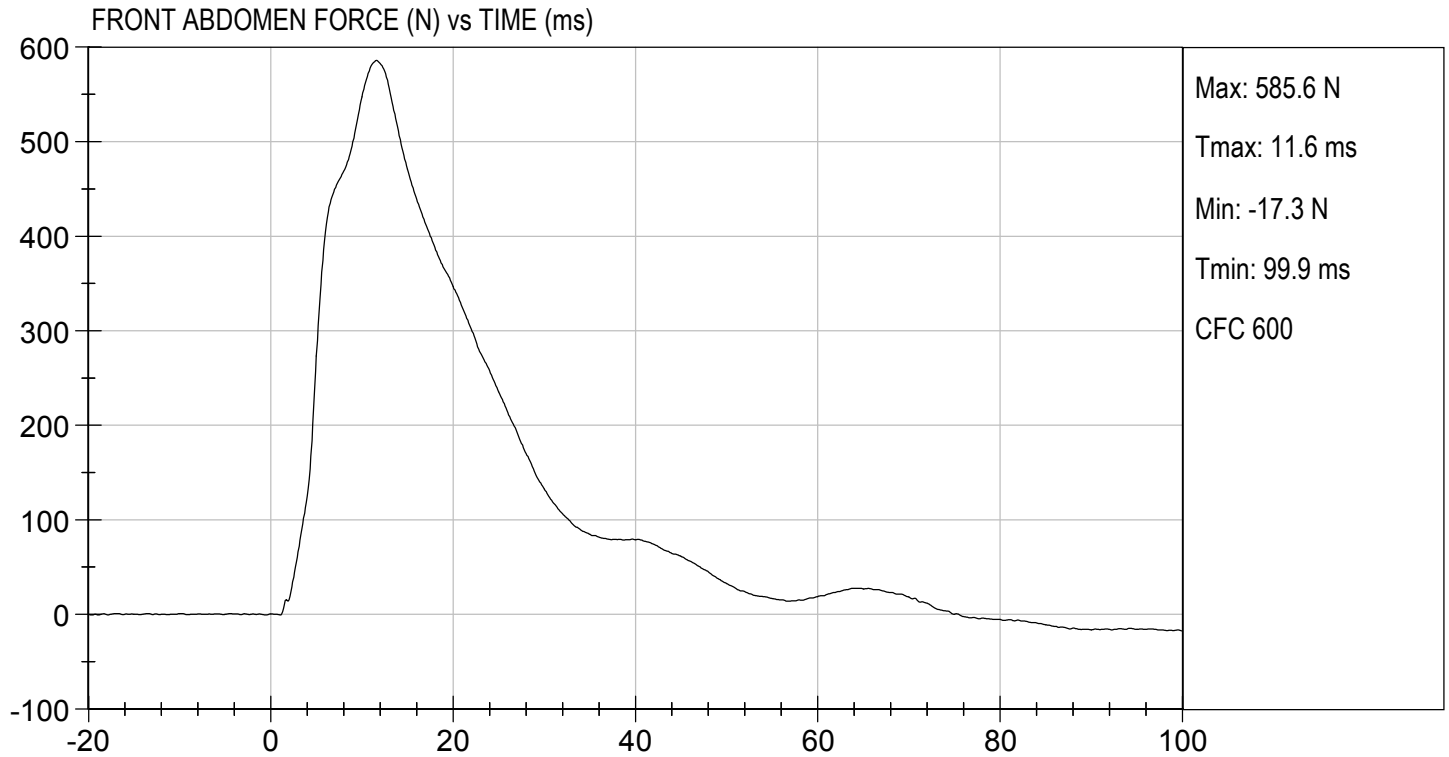
TEST DATE: 01/08/2019
TEST #: D190097





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

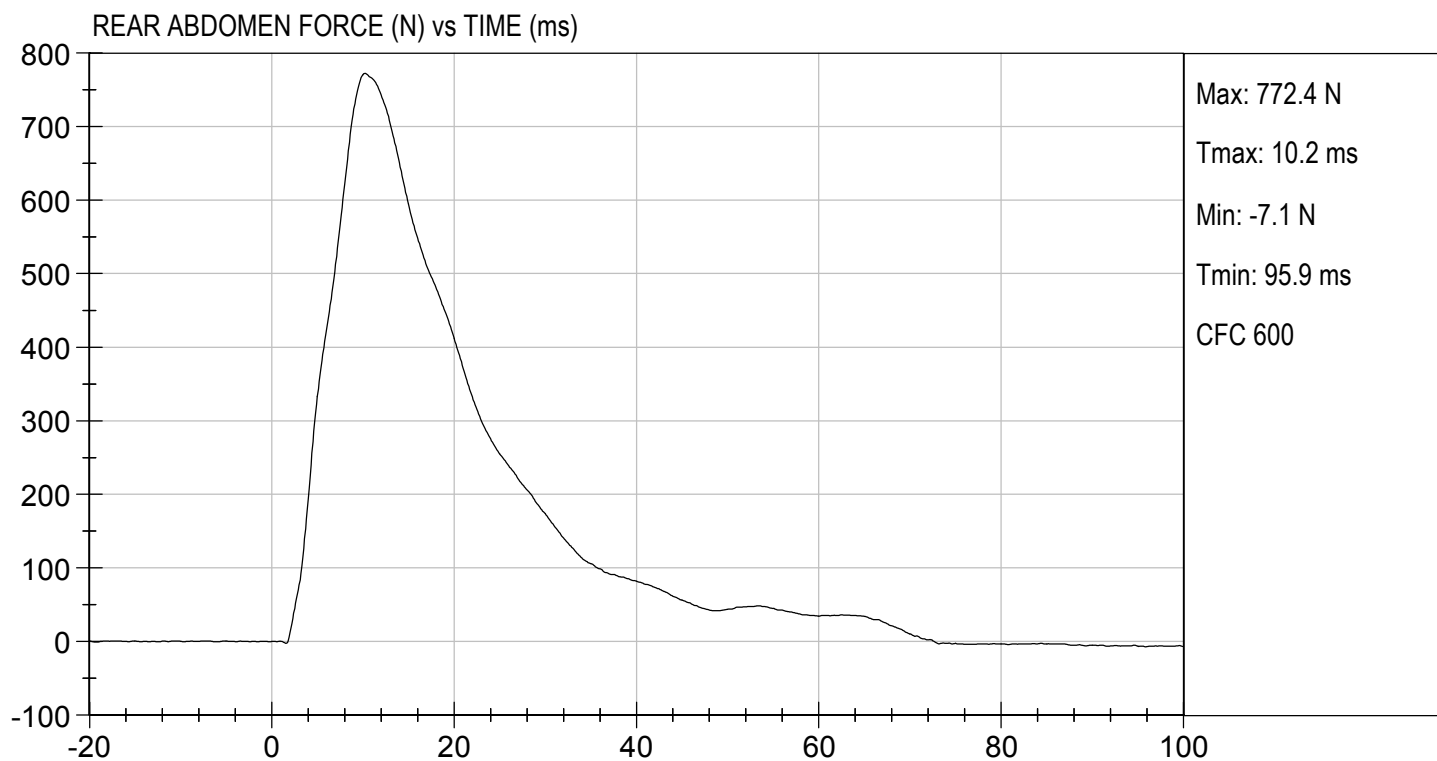
TEST DATE: 01/08/2019
TEST #: D190097





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

TEST DATE: 01/08/2019
TEST #: D190097

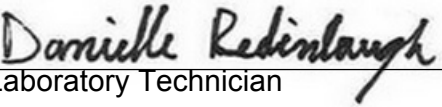


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

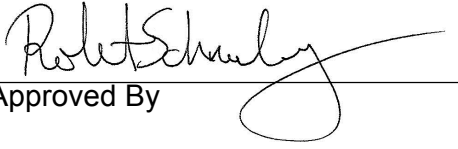
ATD Serial No: 032

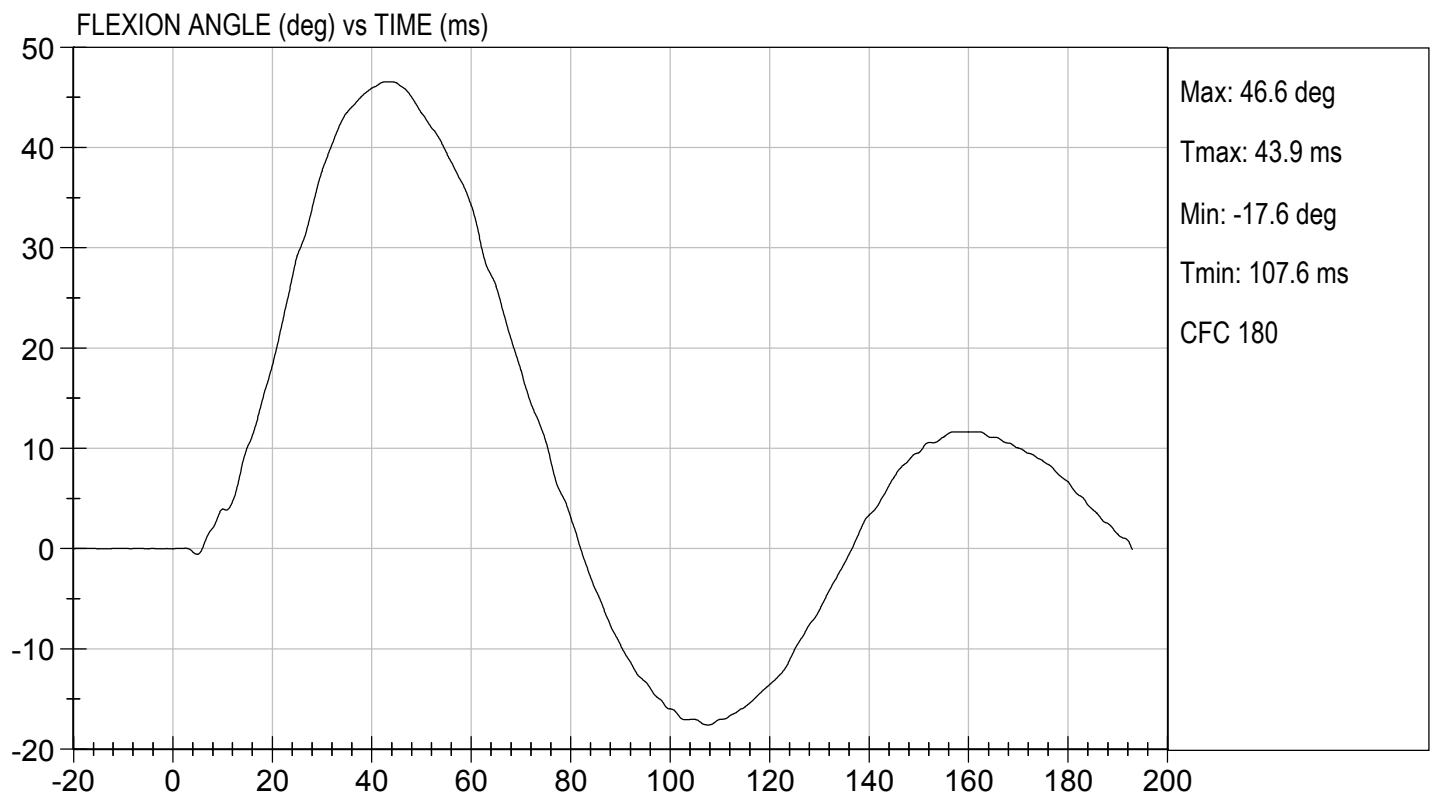
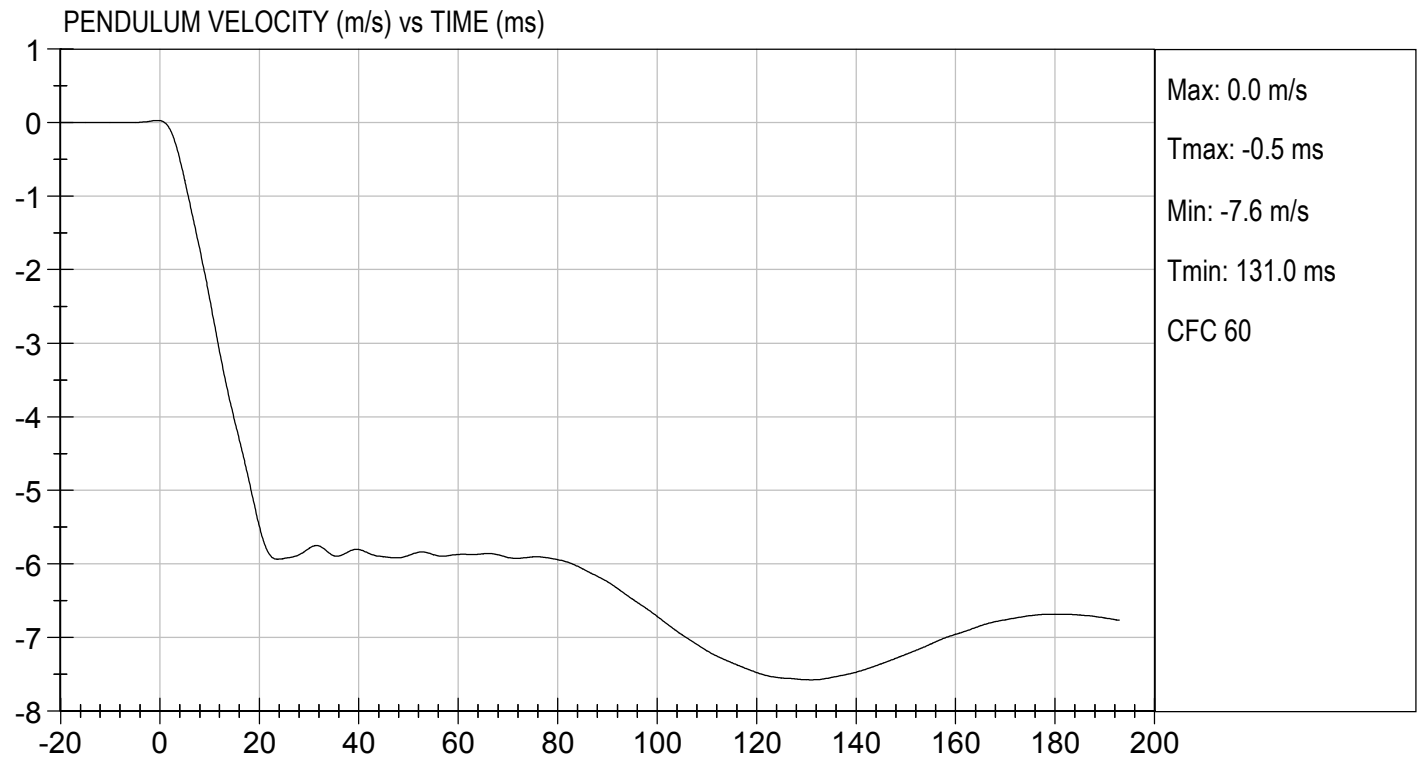
Test I.D: D190098

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	28	Pass
Pendulum Speed		m/s	5.95 to 6.15	5.98	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.418	Pass
	27 ms	m/s	-6.50 to -5.80	-5.90	Pass
	30 ms	m/s	>= -6.50	-5.79	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.6	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	43.9	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	38	Pass
Overall Results					Pass


Laboratory Technician

01/07/2019
Test Date

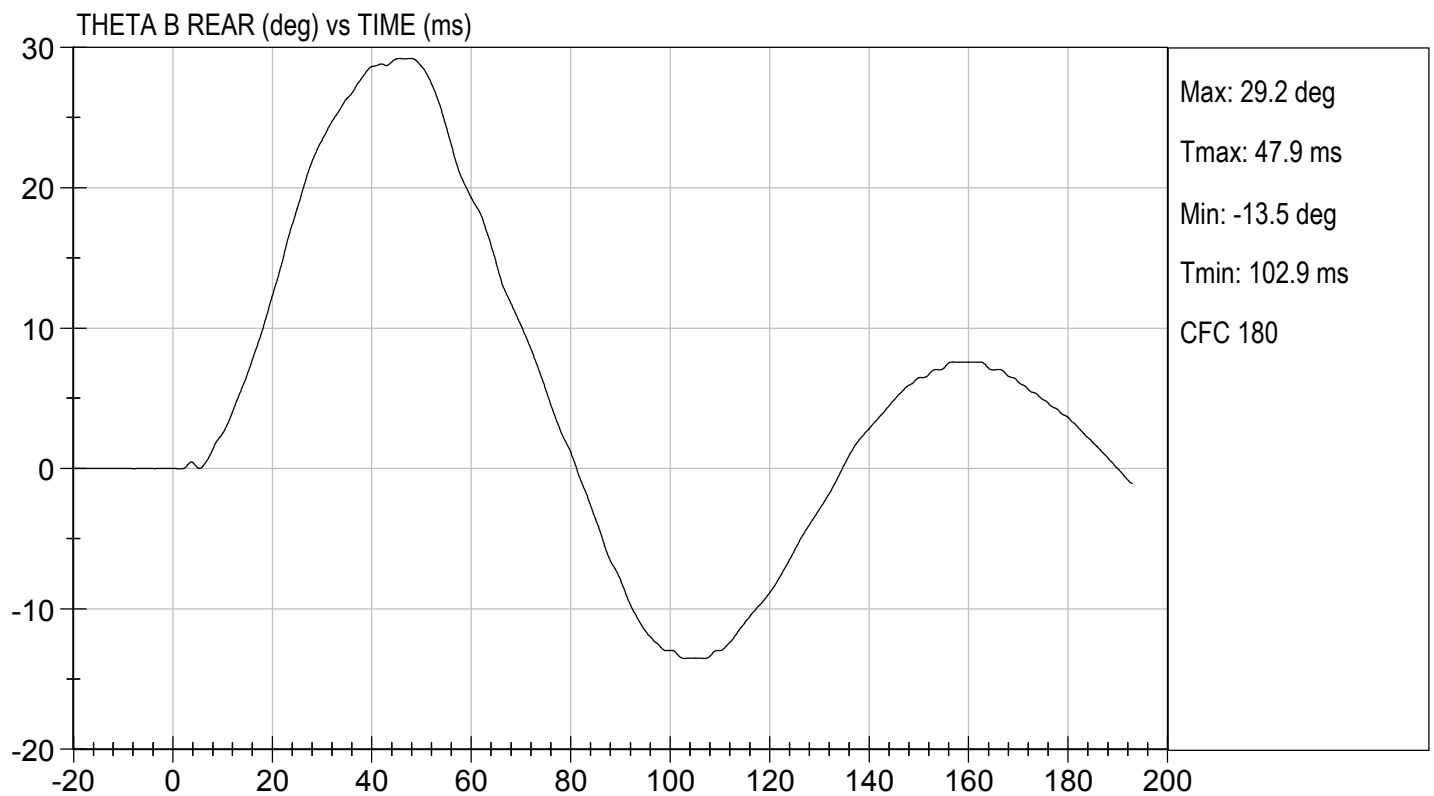
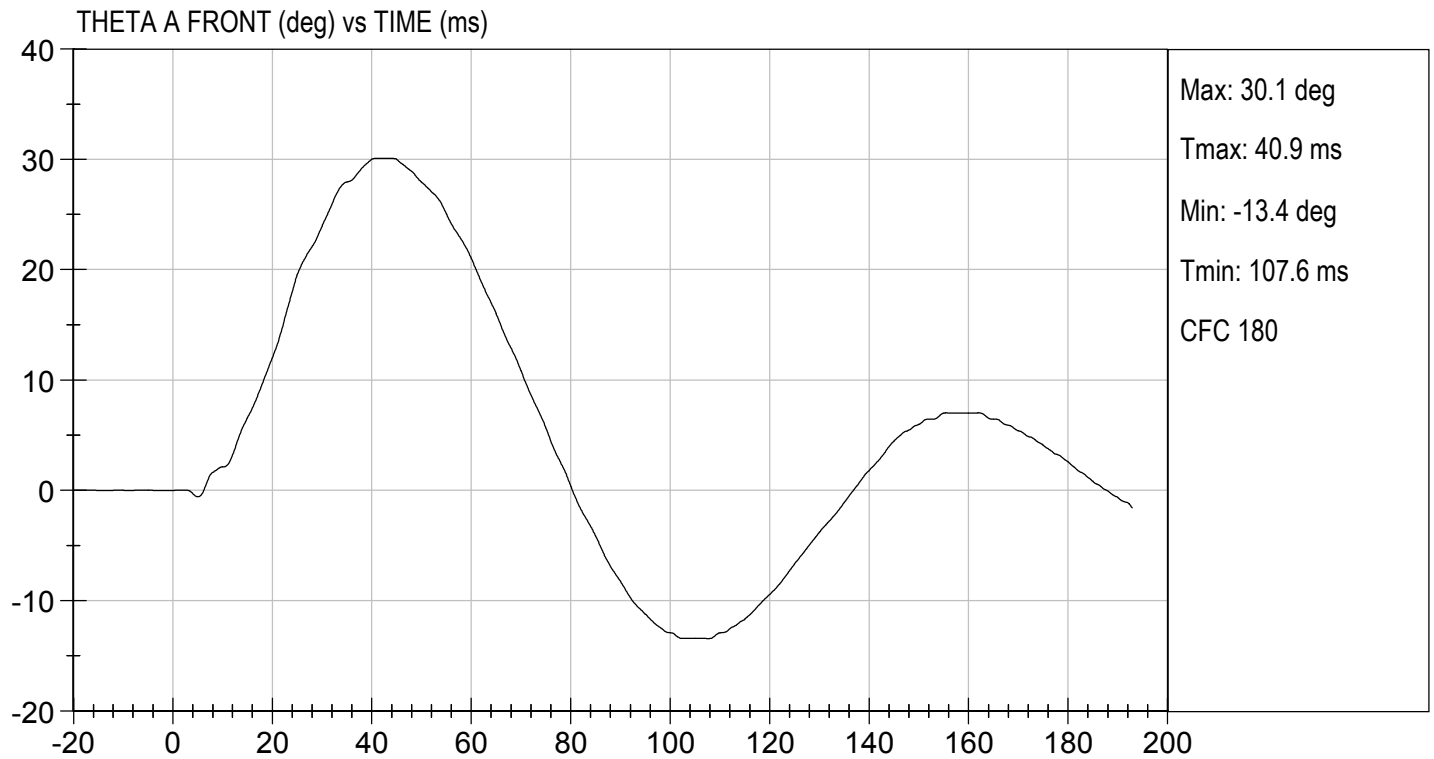

Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 19.61 ft/s, 5.98 m/s

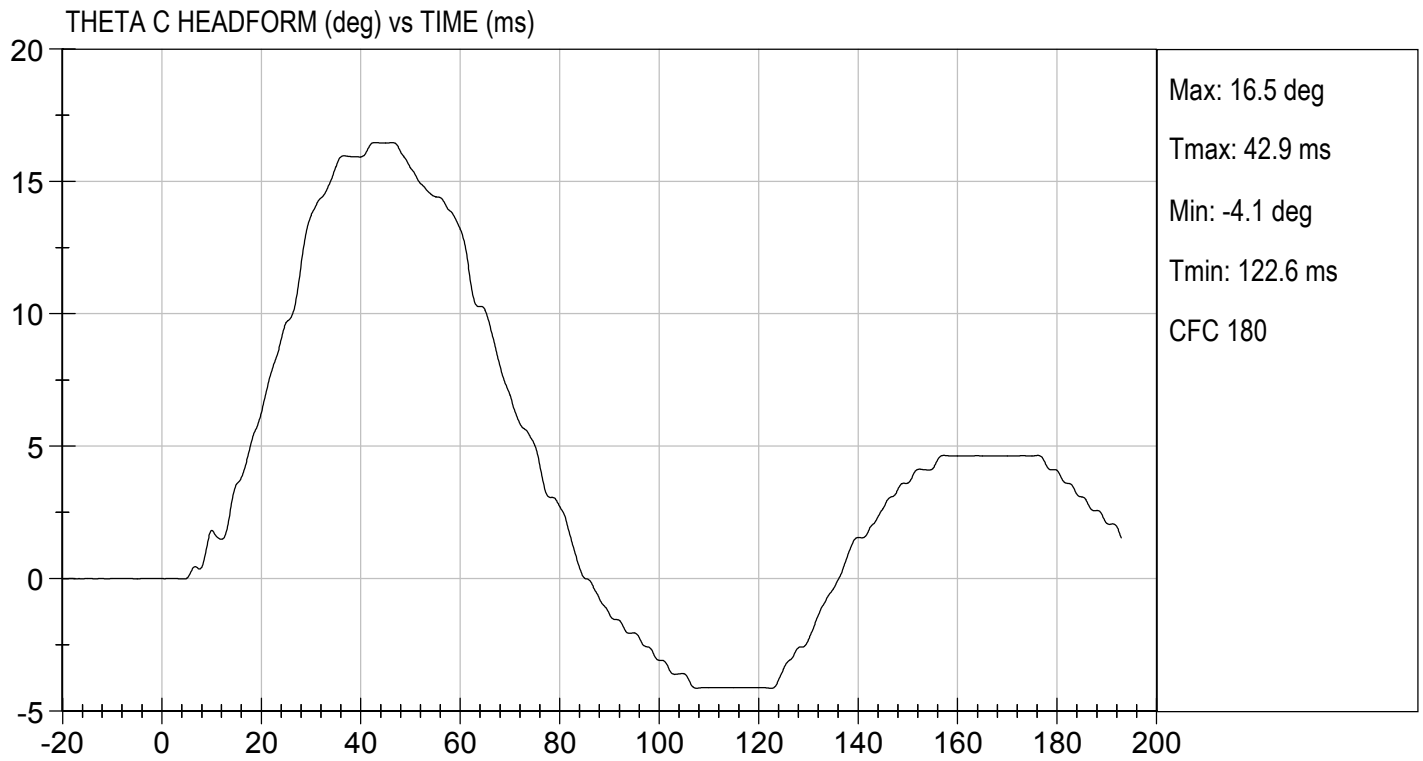
TEST DATE: 01/07/2019
TEST #: D190098





TEST DESC: LUMBAR BENDING
VELOCITY: 19.61 ft/s, 5.98 m/s

TEST DATE: 01/07/2019
TEST #: D190098



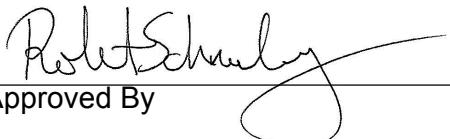
MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D190099

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	4.20 to 4.40	4.39	Pass
Maximum Impactor Force	N	4700 to 5400	5267	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.2	Pass
Maximum Pubic Force	N	1230 to 1590	1427	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.1	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

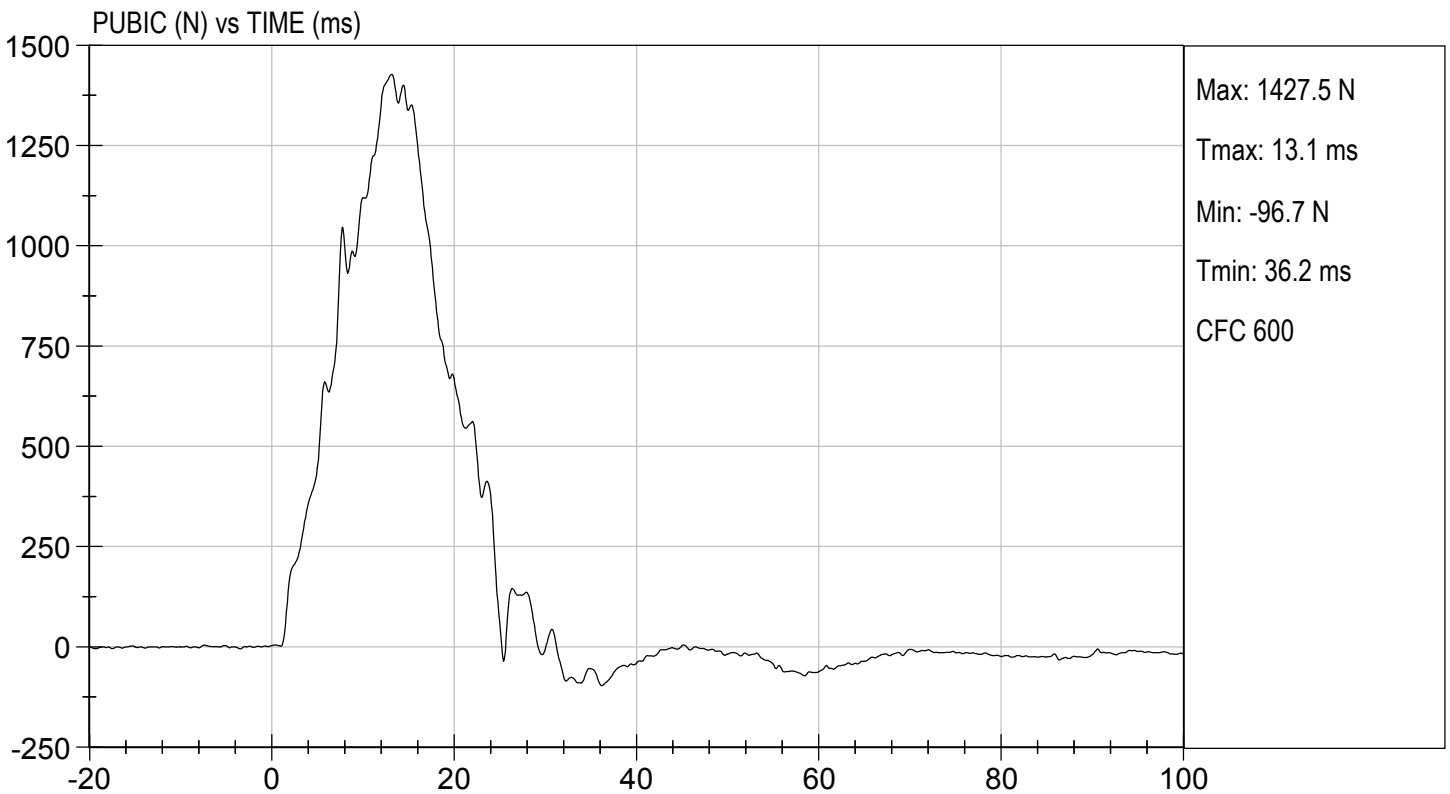
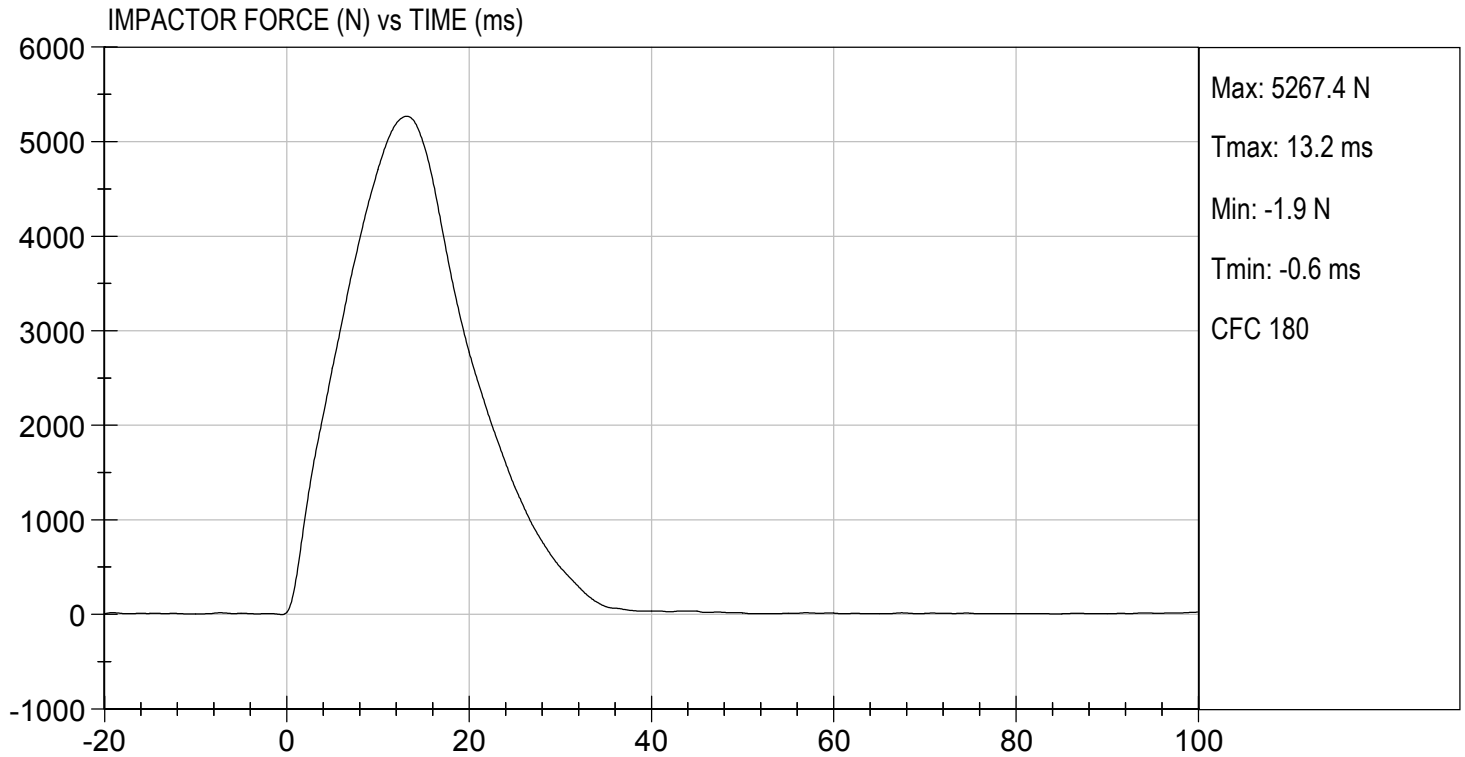
Test Date


Approved By



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

TEST DATE: 01/08/2019
TEST #: D190099



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

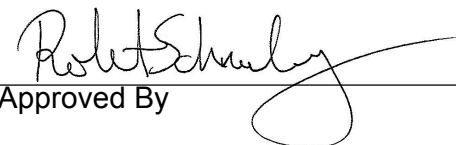
ATD Serial No: 032

Test I.D: D190090

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5558	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.7	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.9	Pass
Overall Test Results				Pass


Laboratory Technician

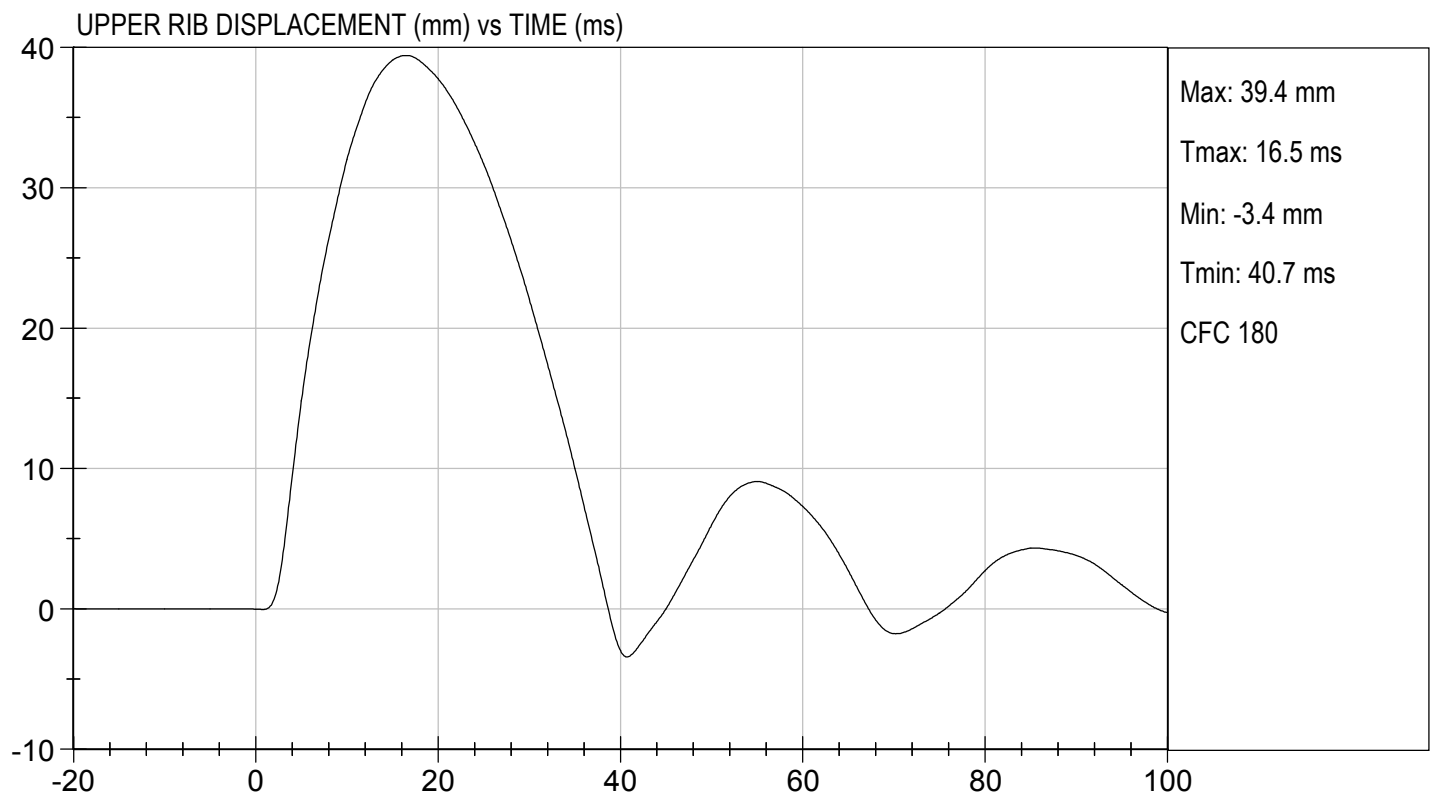
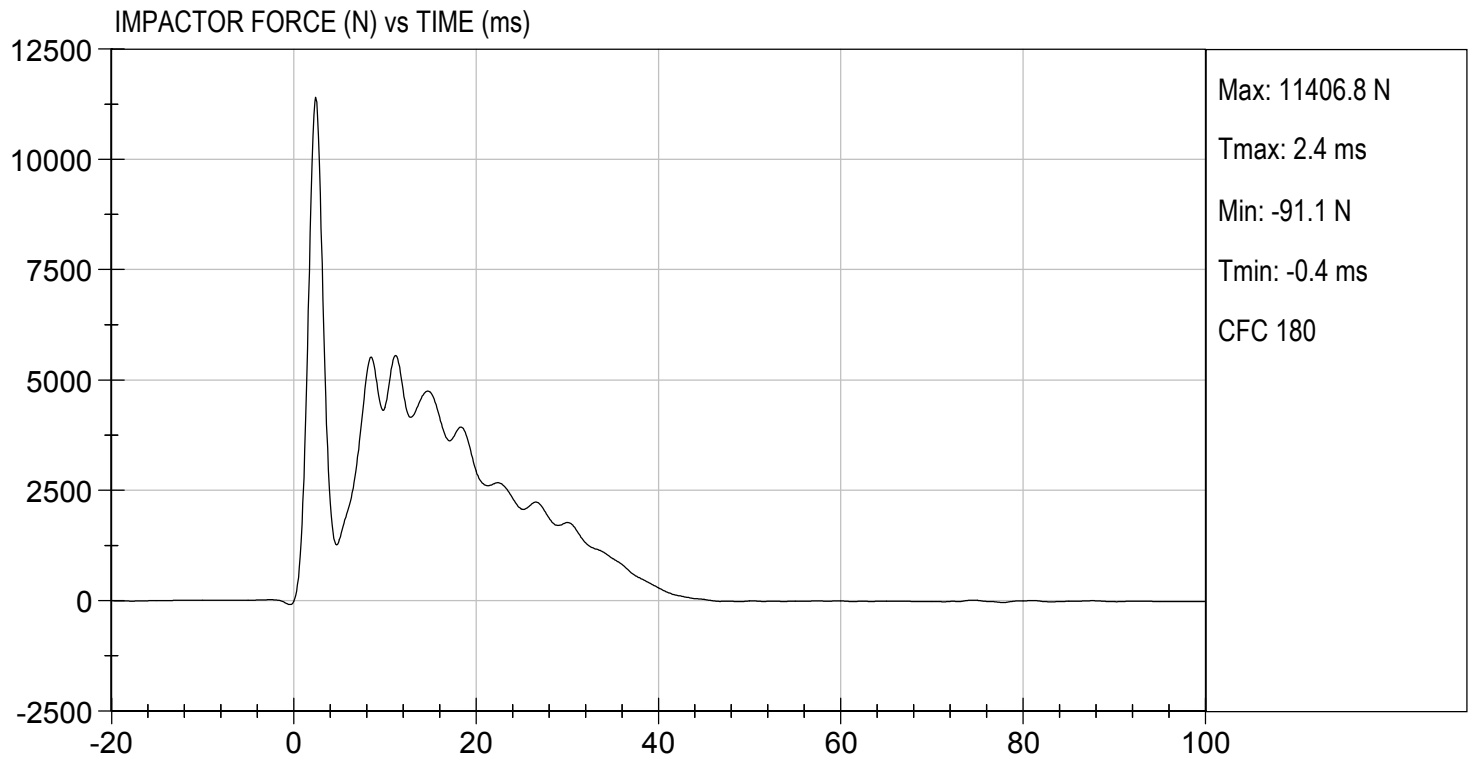
01/08/2019
Test Date


Approved By



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

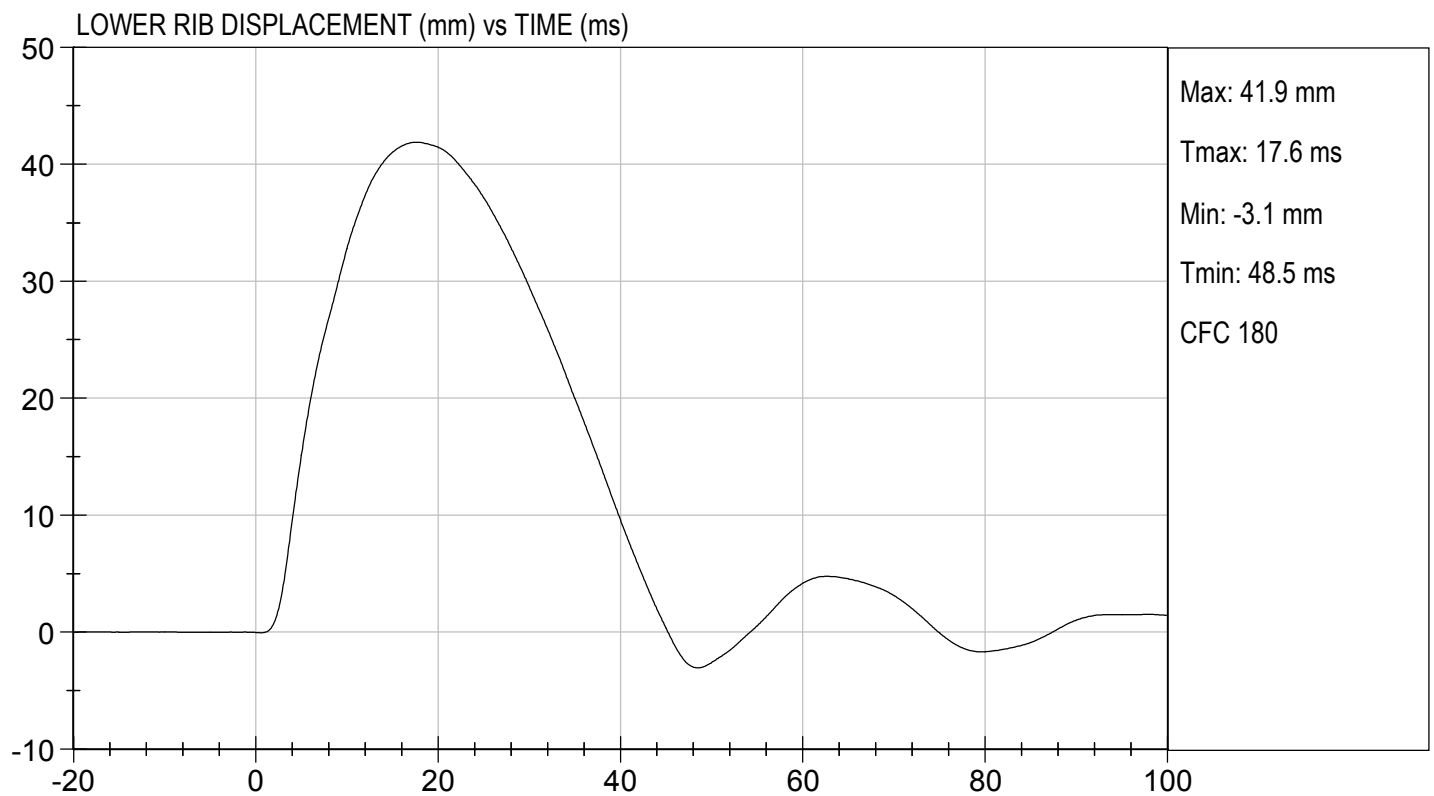
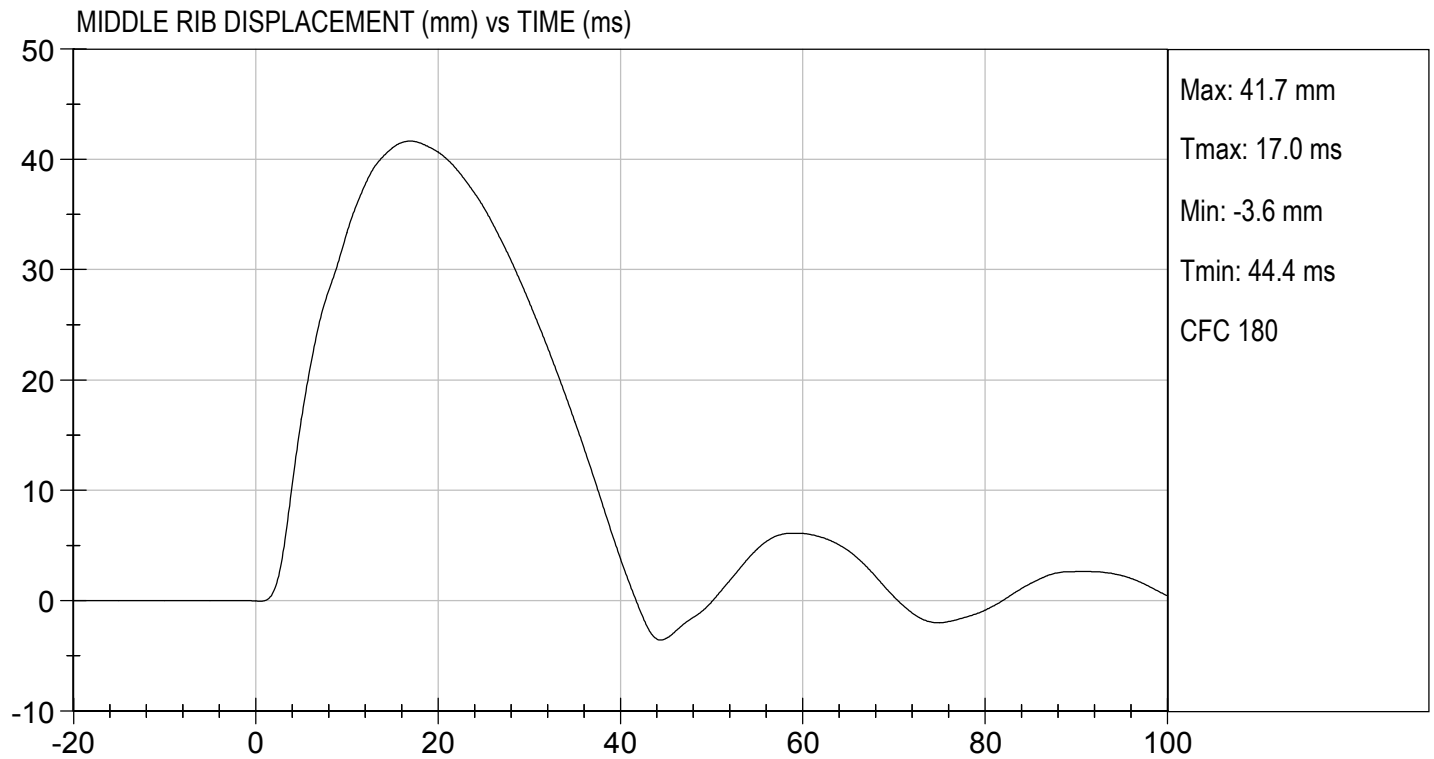
TEST DATE: 01/08/2019
TEST #: D190090





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

TEST DATE: 01/08/2019
TEST #: D190090



CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

ES-2re External Measurements
SN: 032

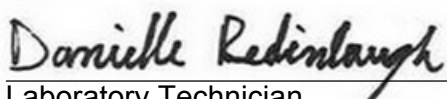
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157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

MGA RESEARCH CORPORATION
HEAD DROP TEST
ES-2re DUMMY

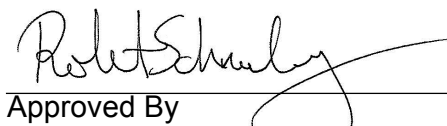
ATD Serial No: 032

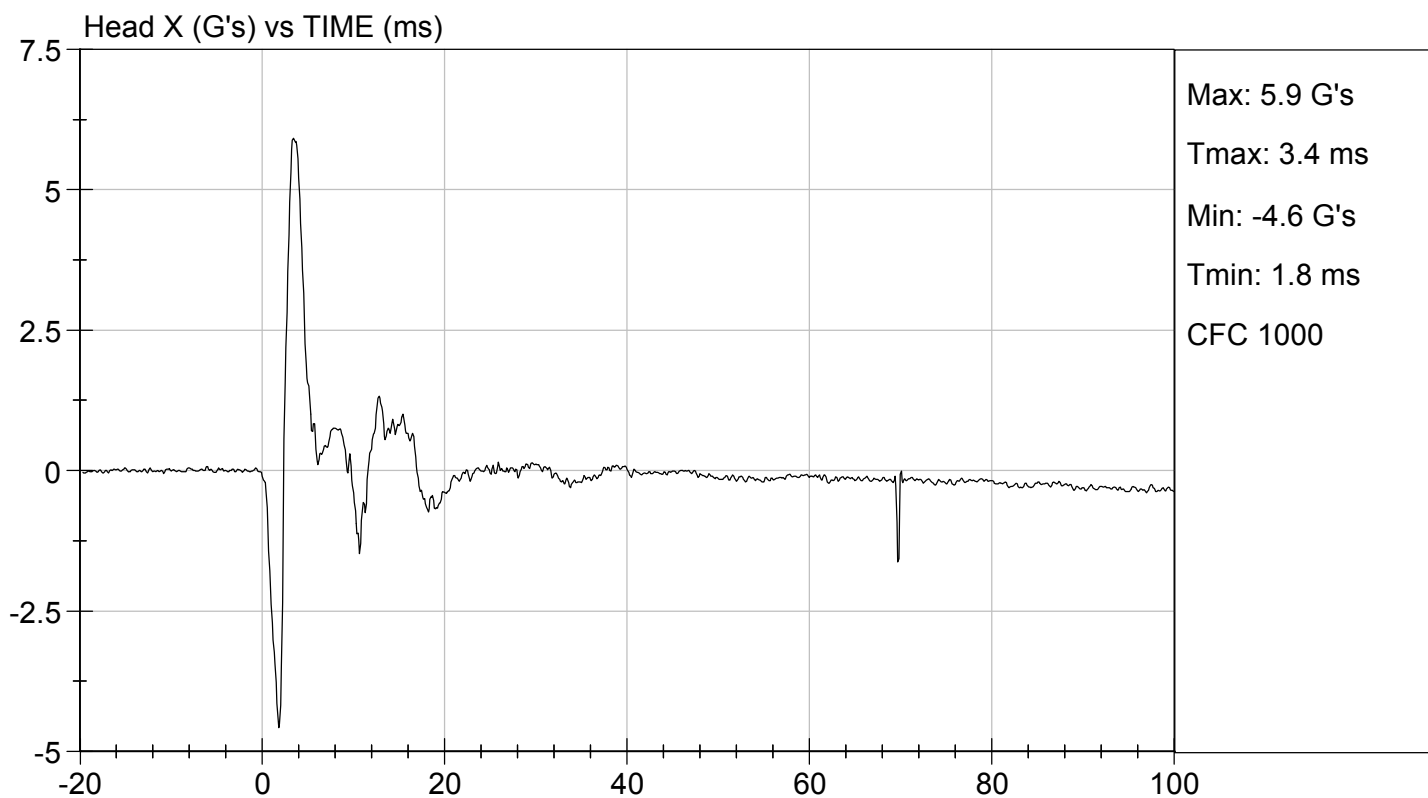
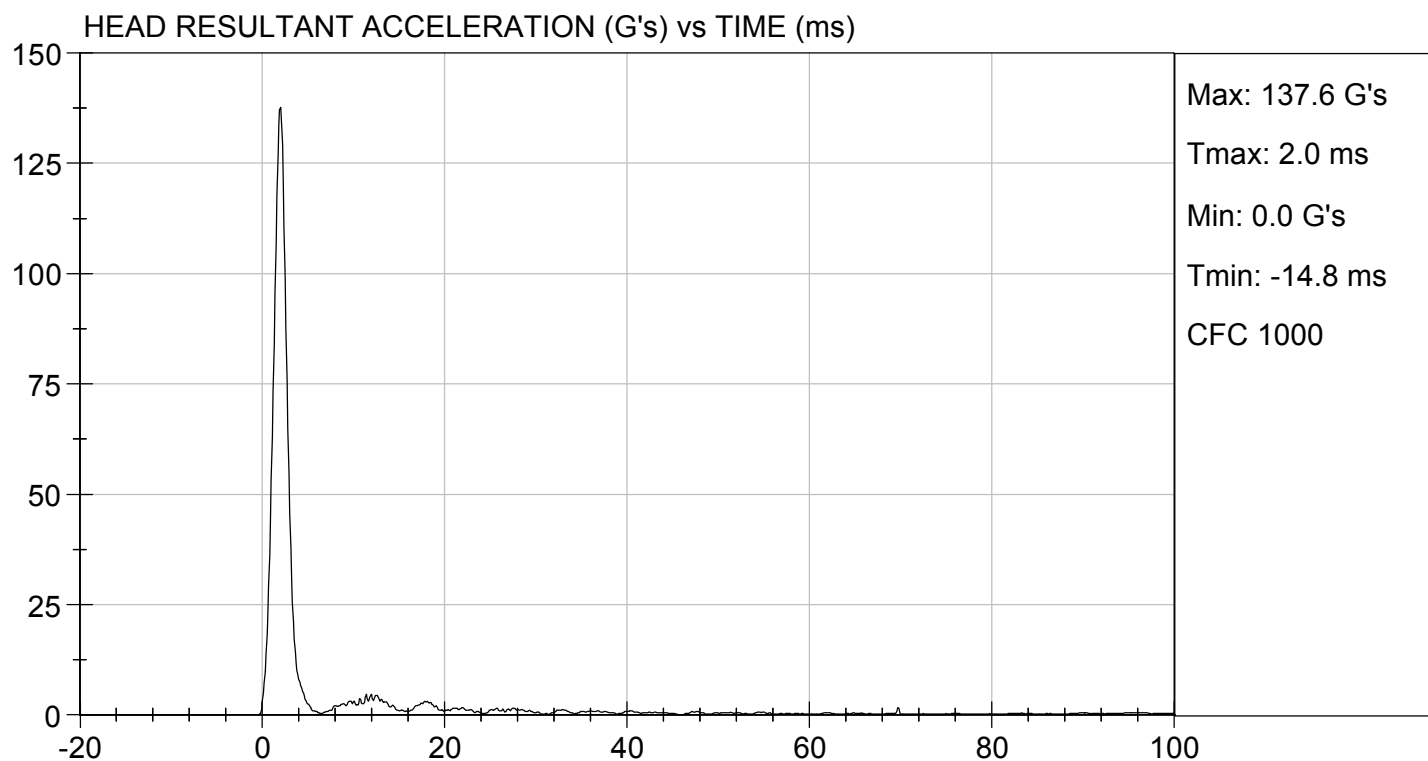
Test ID: D190151

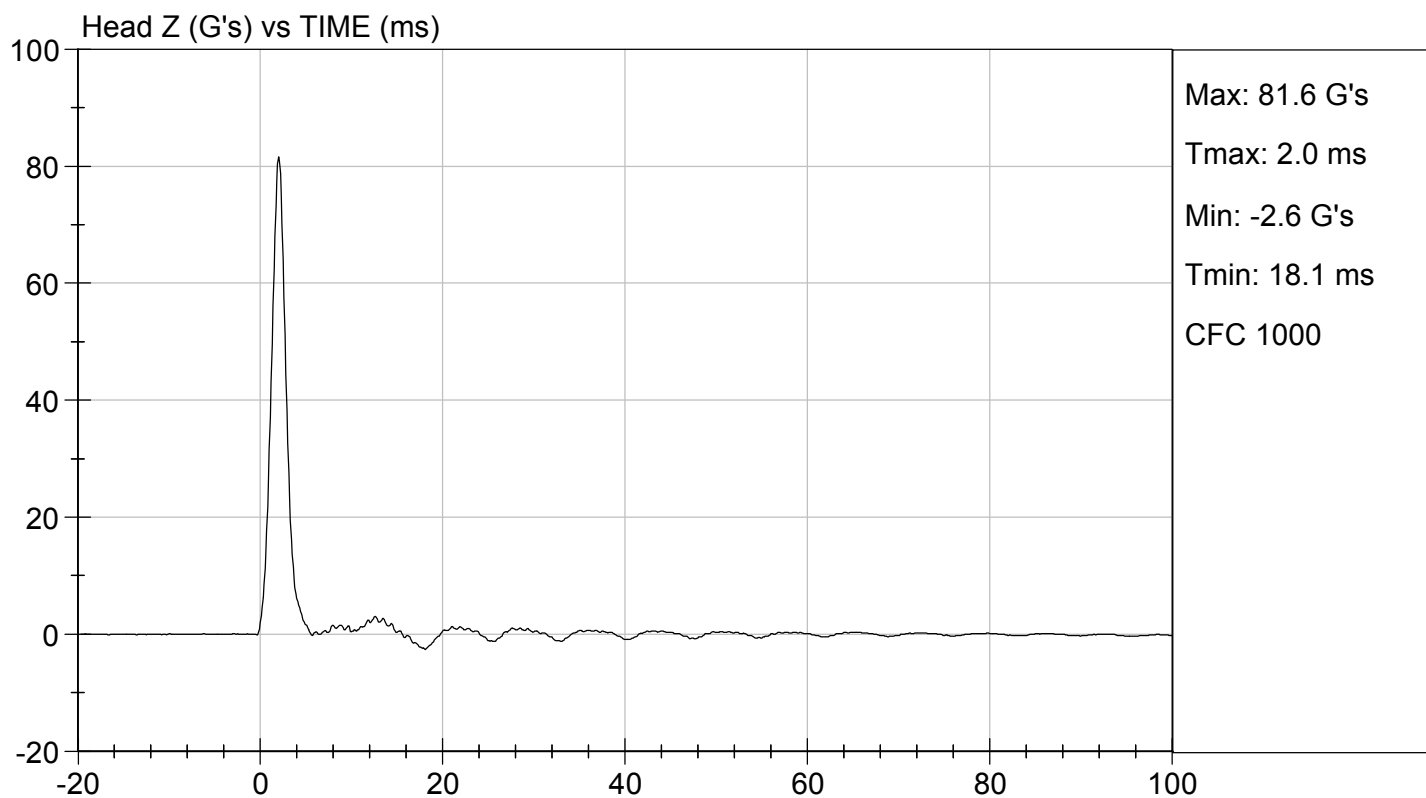
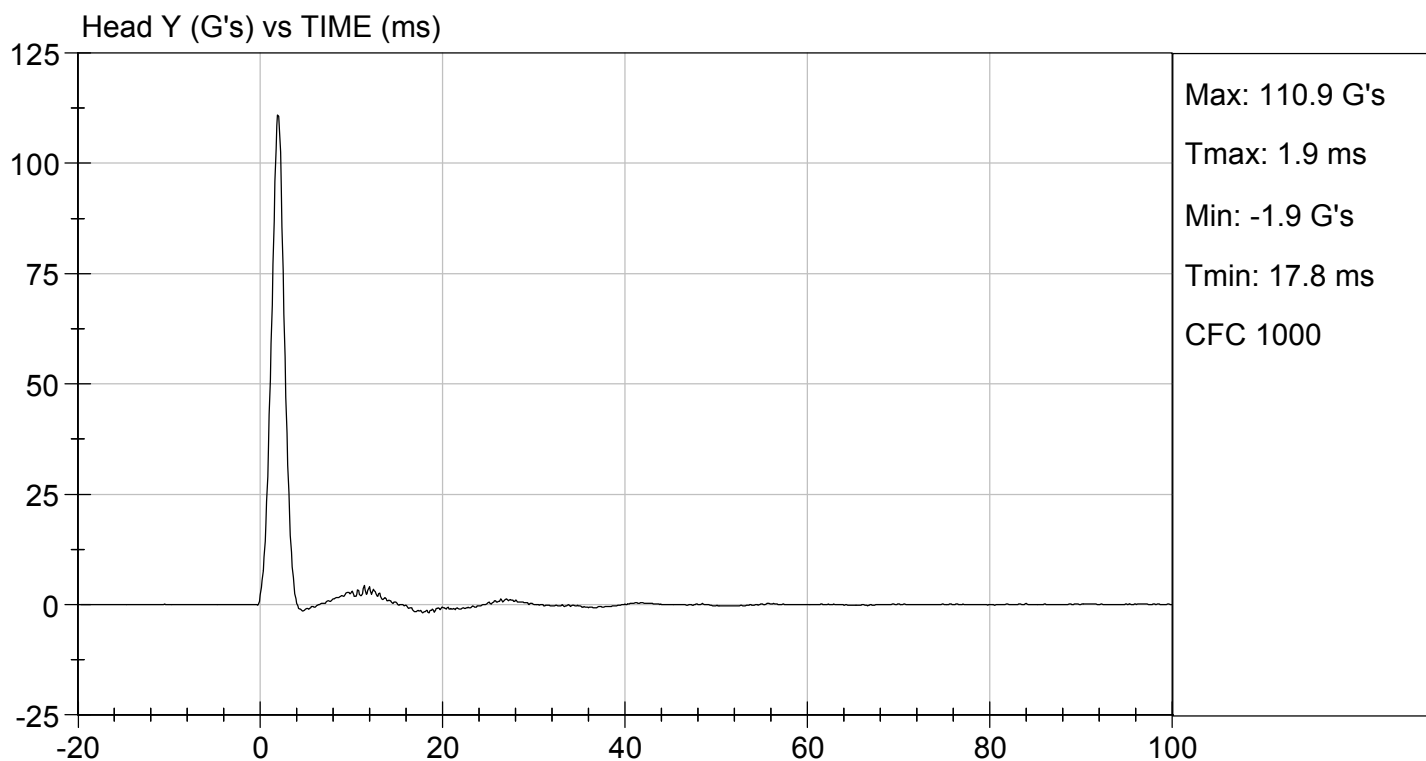
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	125 to 155	138	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	5.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

01/10/2019
Test Date


Approved By



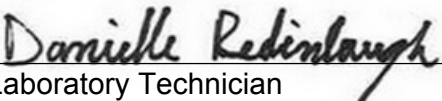


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

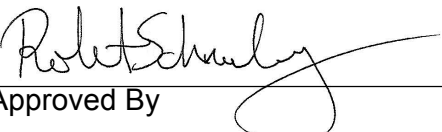
ATD Serial No: 032

Test I.D: D190152

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.84	Pass
Laboratory Relative Humidity		%	10 to 70	21.5	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.47	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	-3.54	Pass
	17 ms	m/s	>= -3.70	-3.39	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.6	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	55.1	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	62.8	Pass
Overall Results					Pass


Laboratory Technician

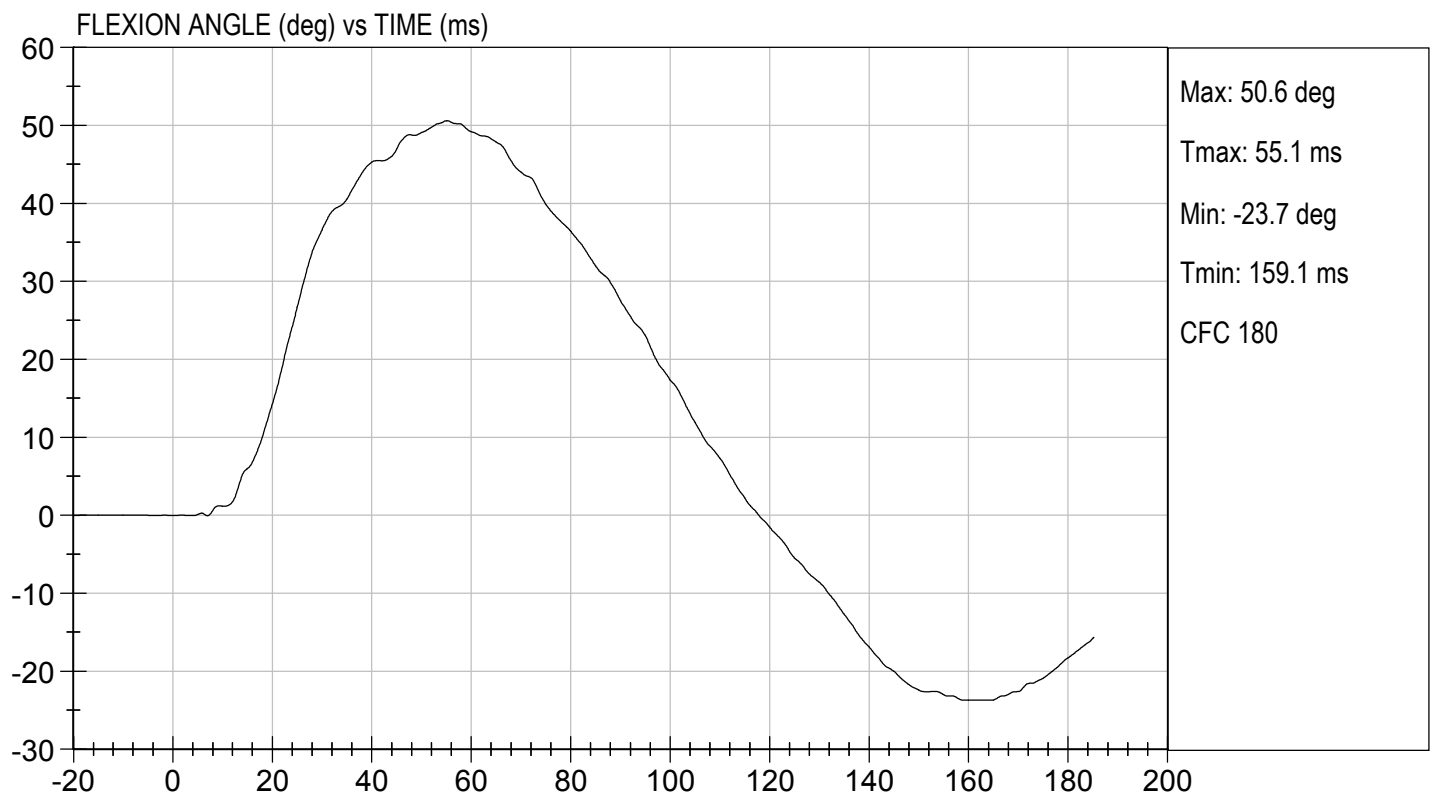
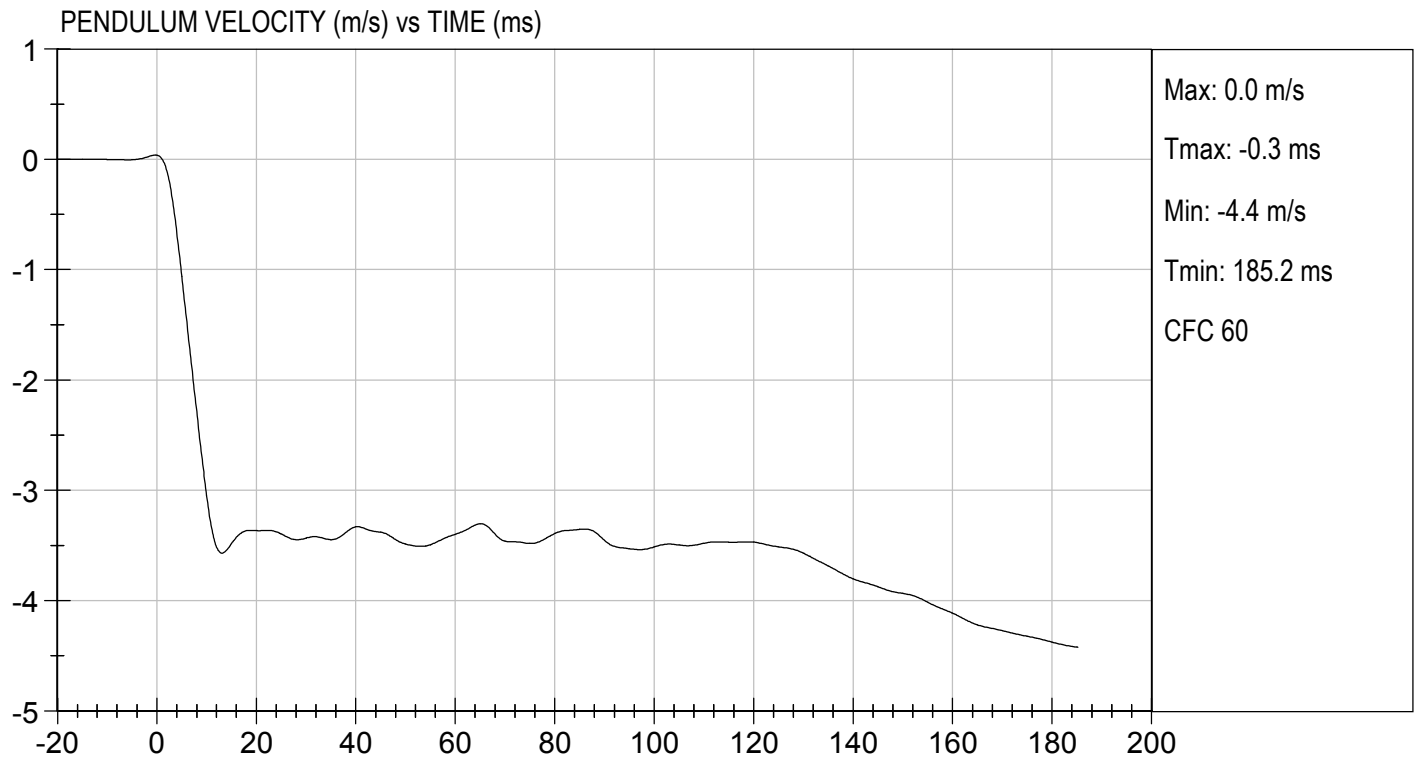
01/10/2019
Test Date


Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.40 ft/s, 3.47 m/s

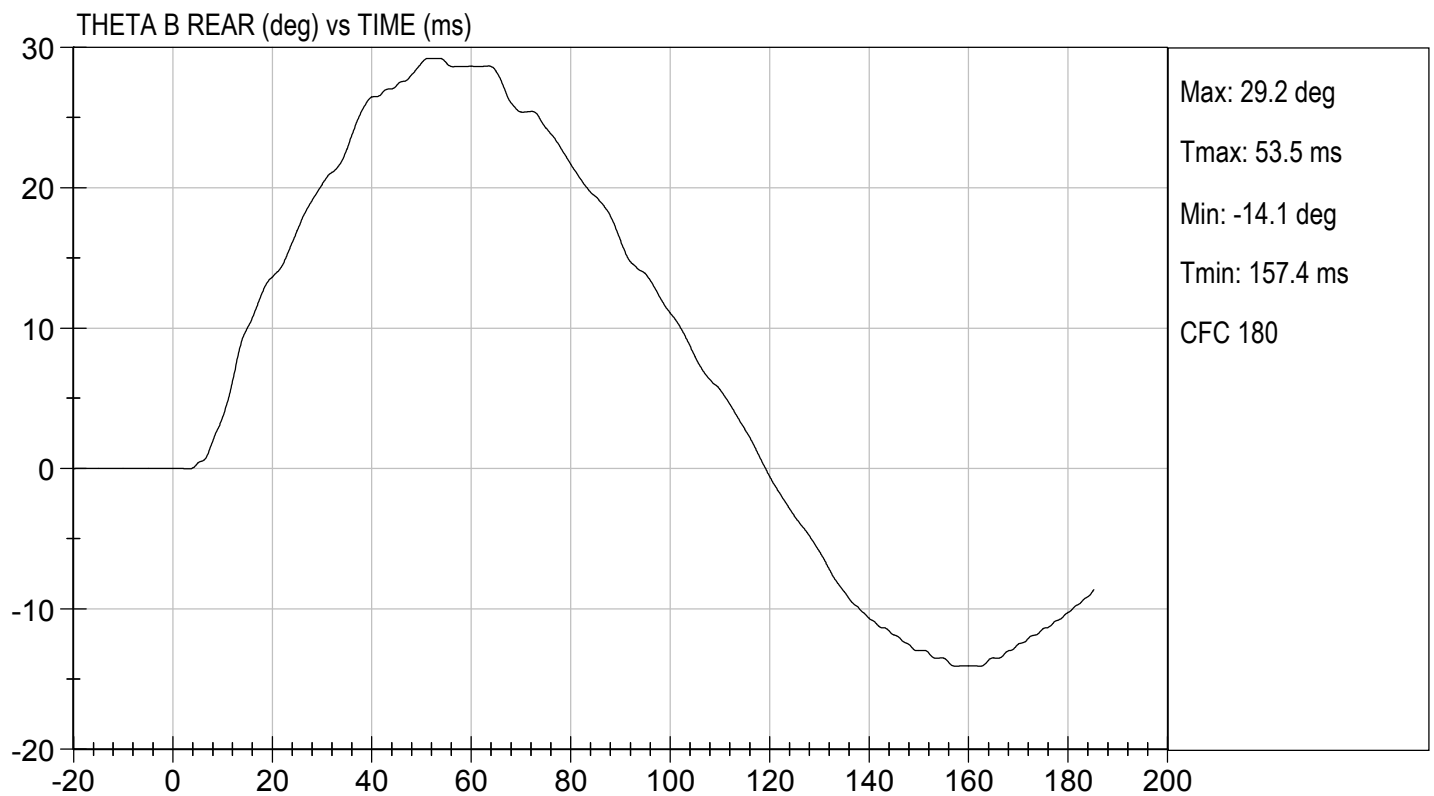
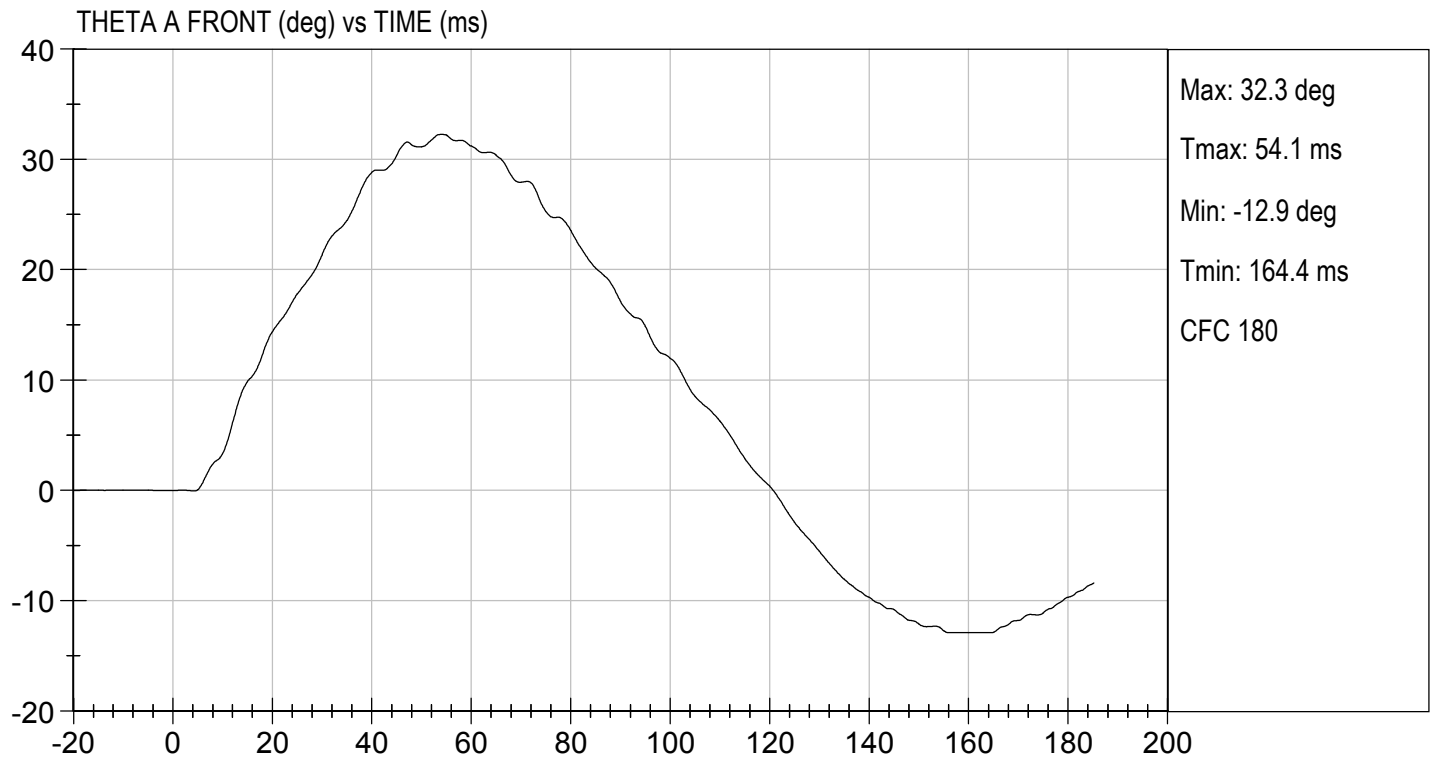
TEST DATE: 01/10/2019
TEST #: D190152





TEST DESC: NECK BENDING
VELOCITY: 11.40 ft/s, 3.47 m/s

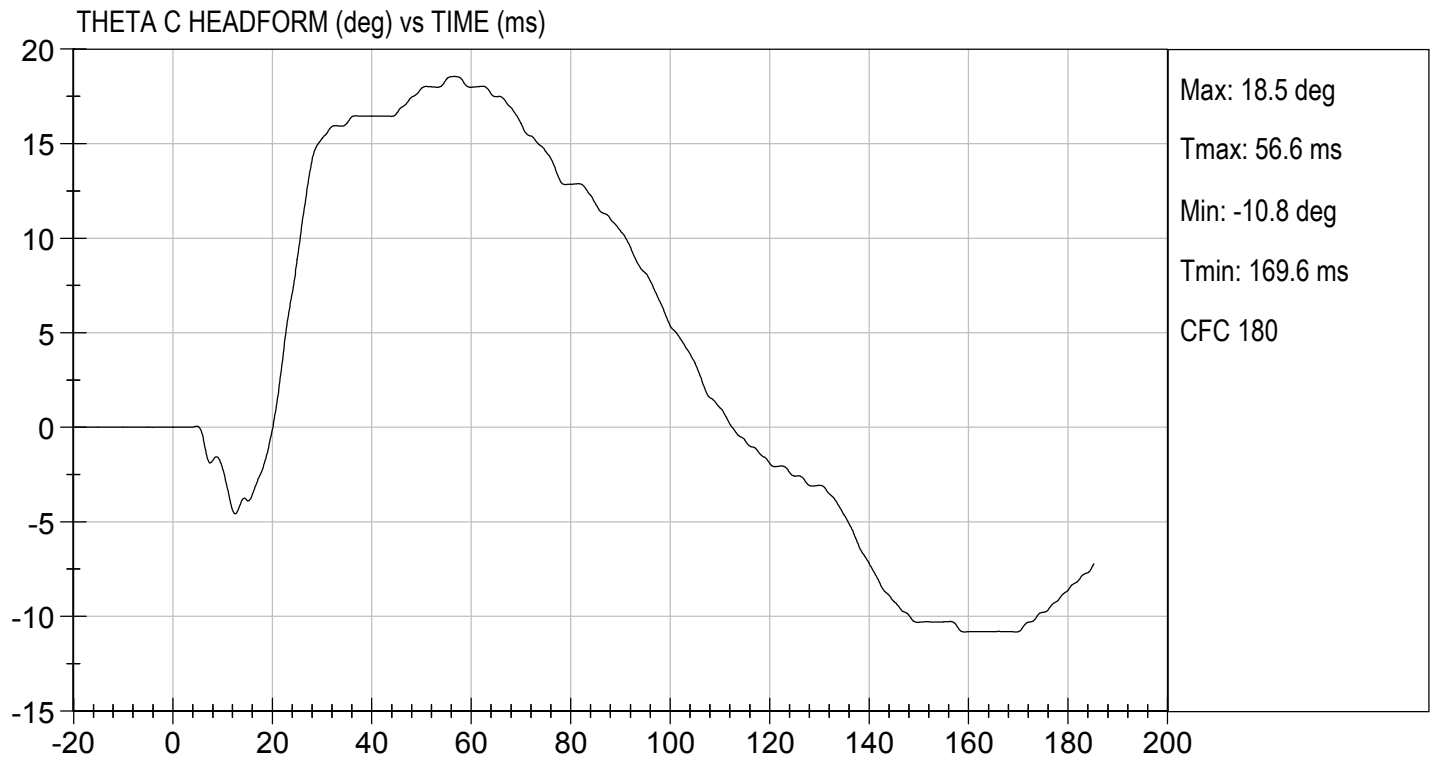
TEST DATE: 01/10/2019
TEST #: D190152





TEST DESC: NECK BENDING
VELOCITY: 11.40 ft/s, 3.47 m/s

TEST DATE: 01/10/2019
TEST #: D190152



MGA RESEARCH CORPORATION

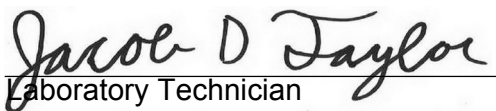
SHOULDER IMPACT TEST

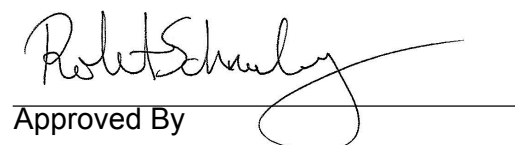
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D190153

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.1	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

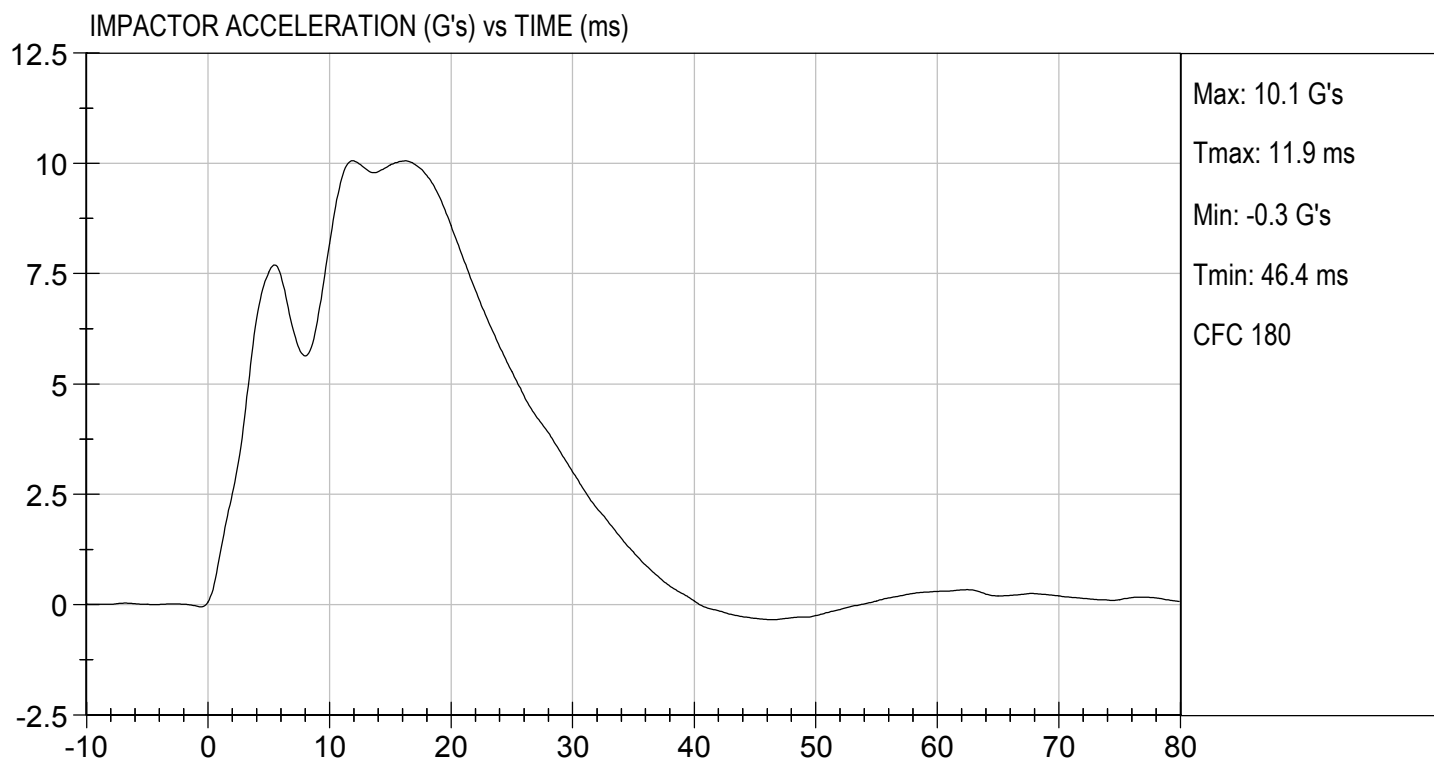
01/11/2019

Test Date



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

TEST DATE: 01/11/2019
TEST #: D190153



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

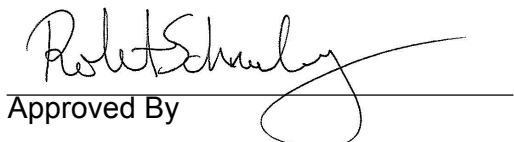
ATD Serial No: 032

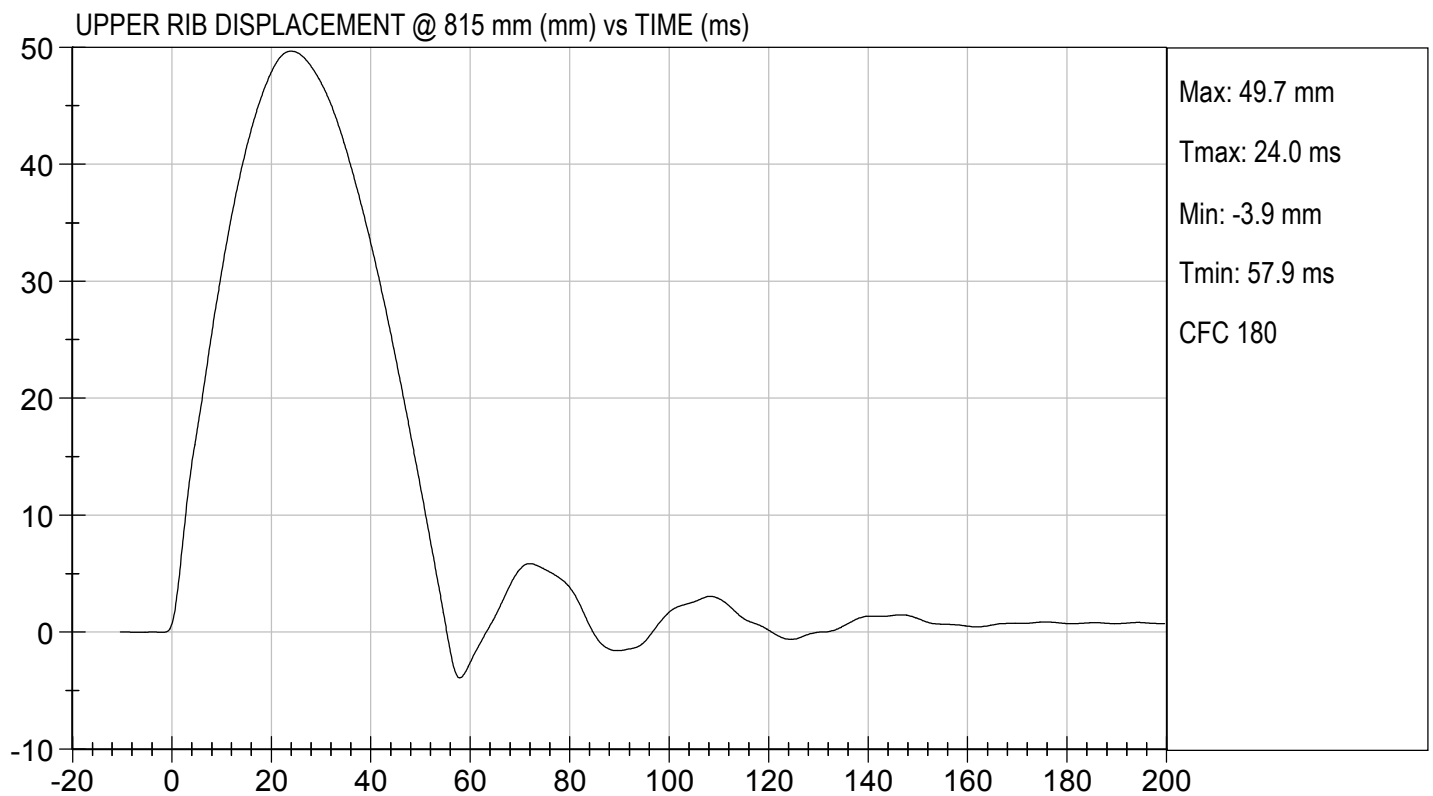
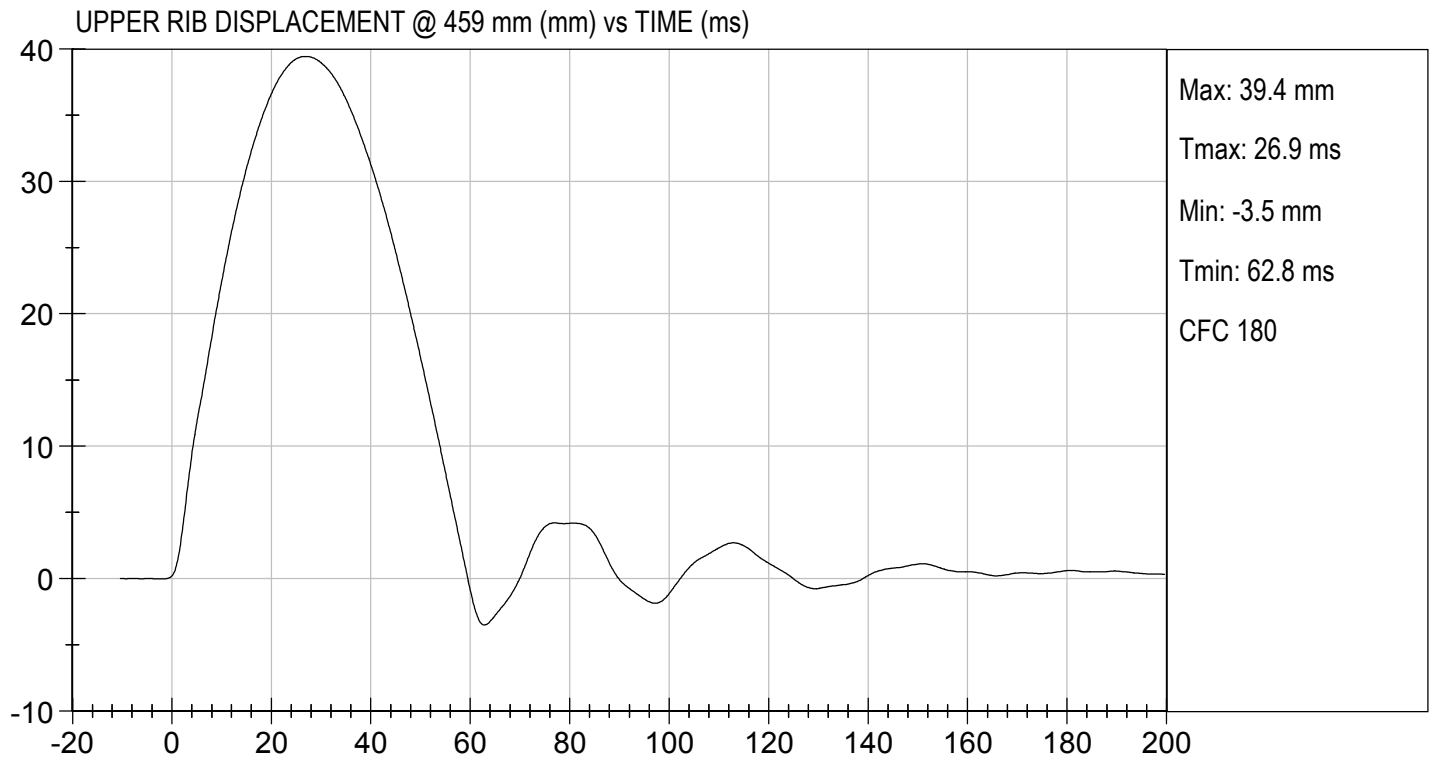
Test I.D: D190154

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.84	Pass
Laboratory Relative Humidity	%	10 to 70	21.5	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.7	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

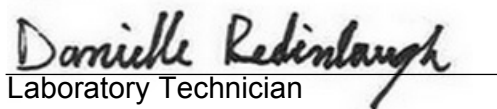
MID RIB TEST

ES-2re DUMMY

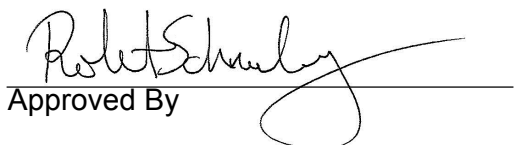
ATD Serial No: 032

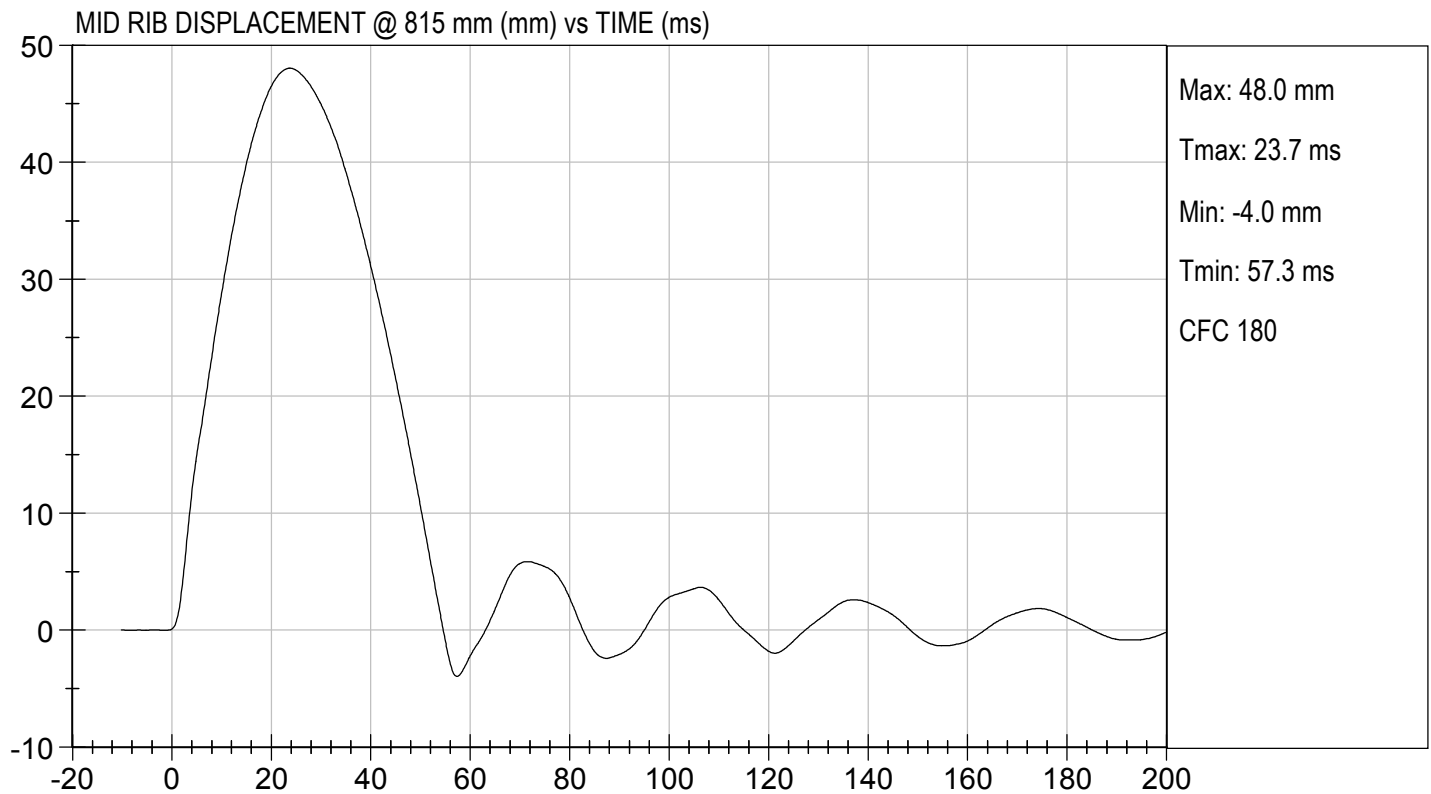
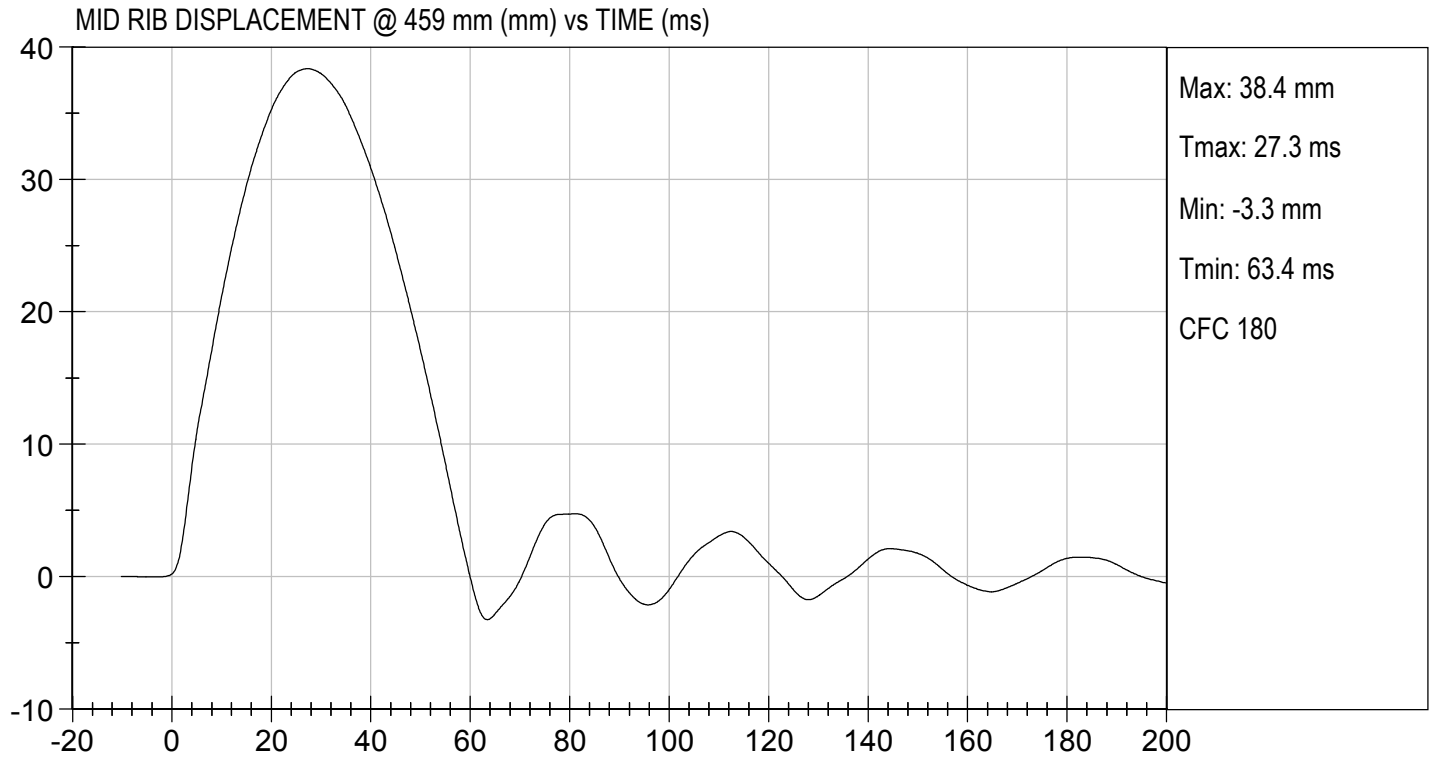
Test I.D: D190155

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.84	Pass
Laboratory Relative Humidity	%	10 to 70	21.5	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.0	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

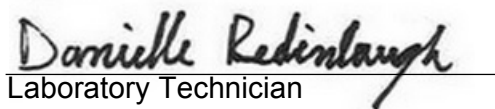
LOWER RIB TEST

ES-2re DUMMY

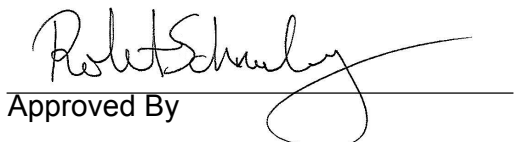
ATD Serial No: 032

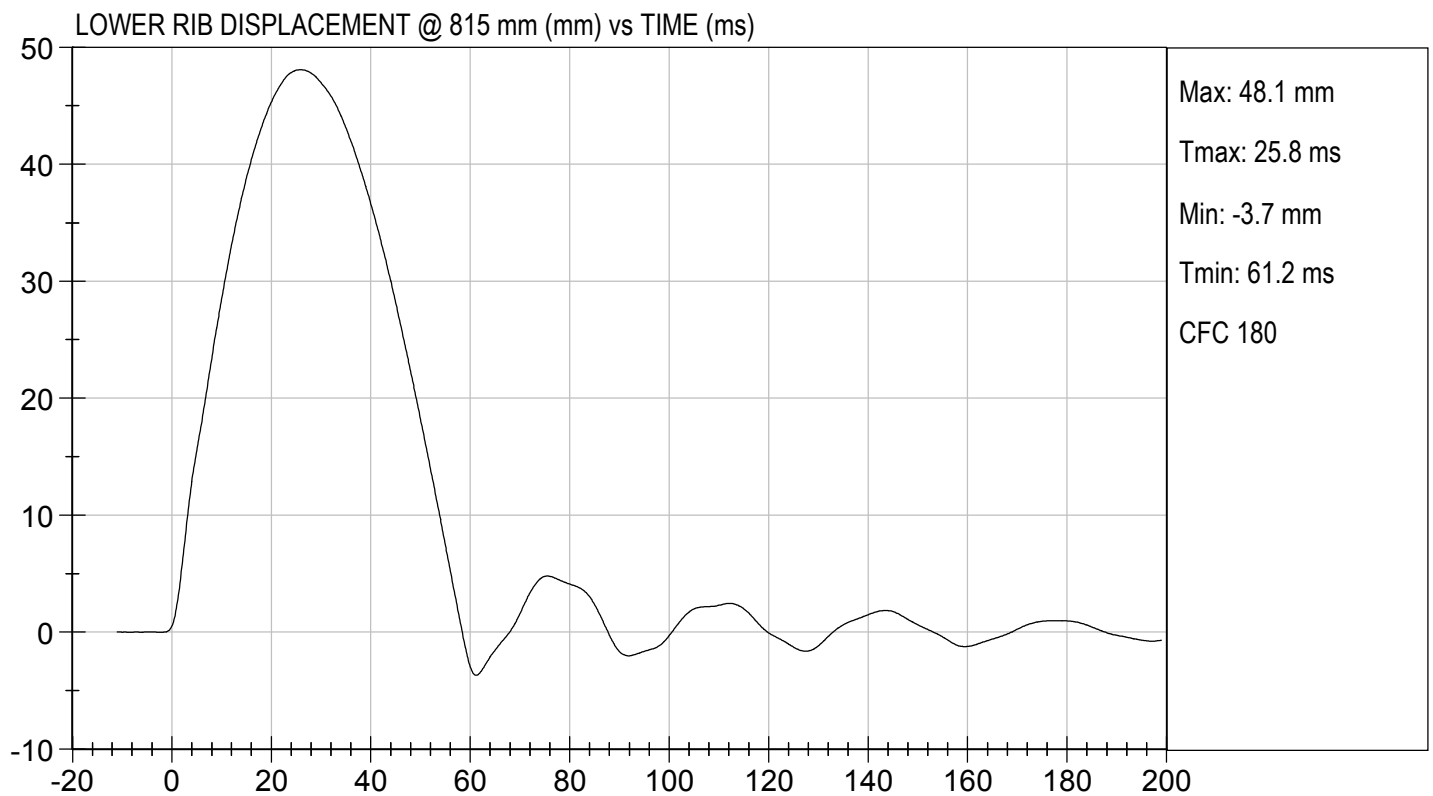
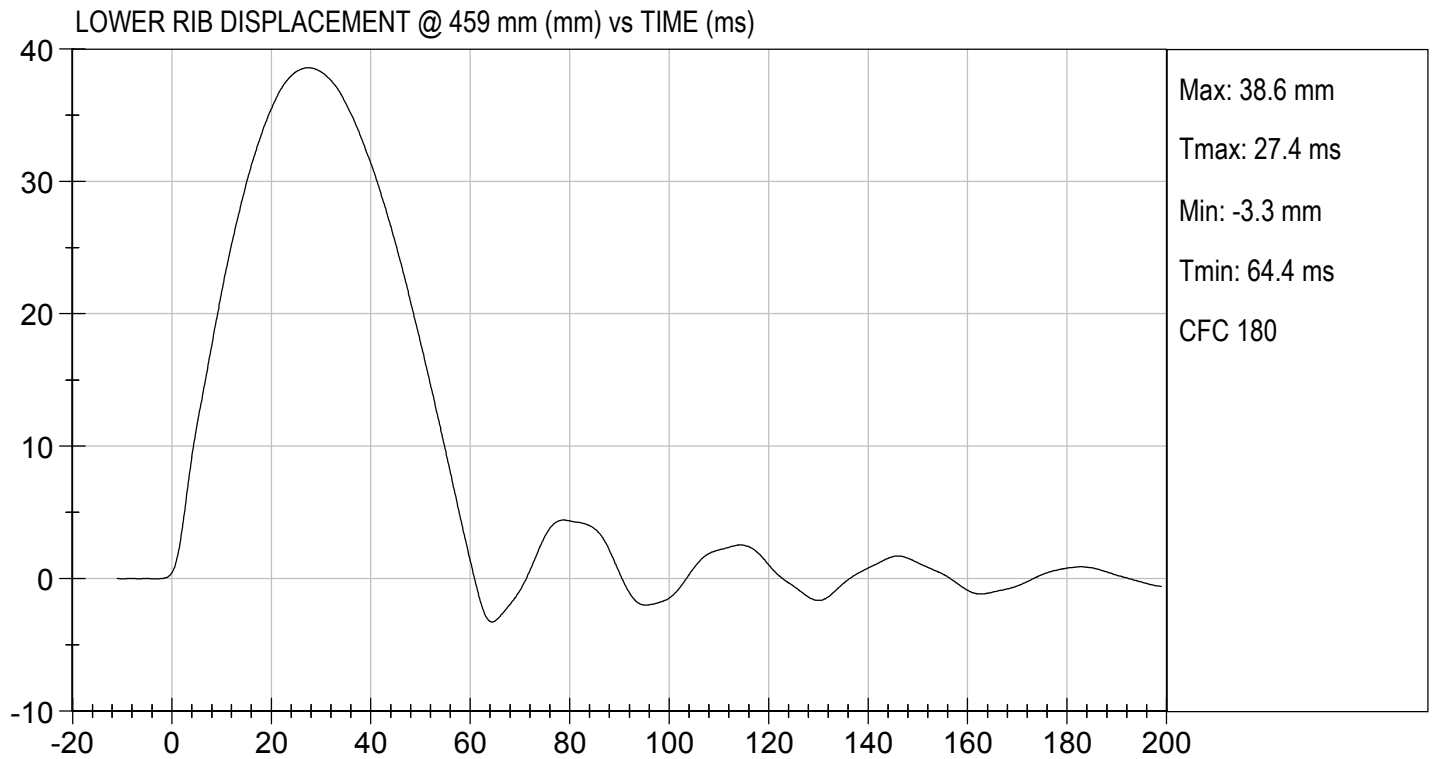
Test I.D: D190156

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.84	Pass
Laboratory Relative Humidity	%	10 to 70	21.5	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.1	Pass
Overall Test Results				Pass


Laboratory Technician

01/10/2019
Test Date


Approved By



MGA RESEARCH CORPORATION

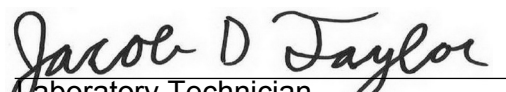
ABDOMEN TEST

ES-2re DUMMY

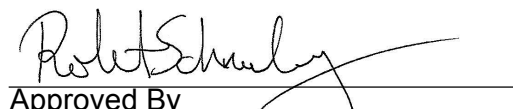
ATD Serial No: 032

Test I.D: D190157

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4380	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	10.9	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2269	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass


Laboratory Technician

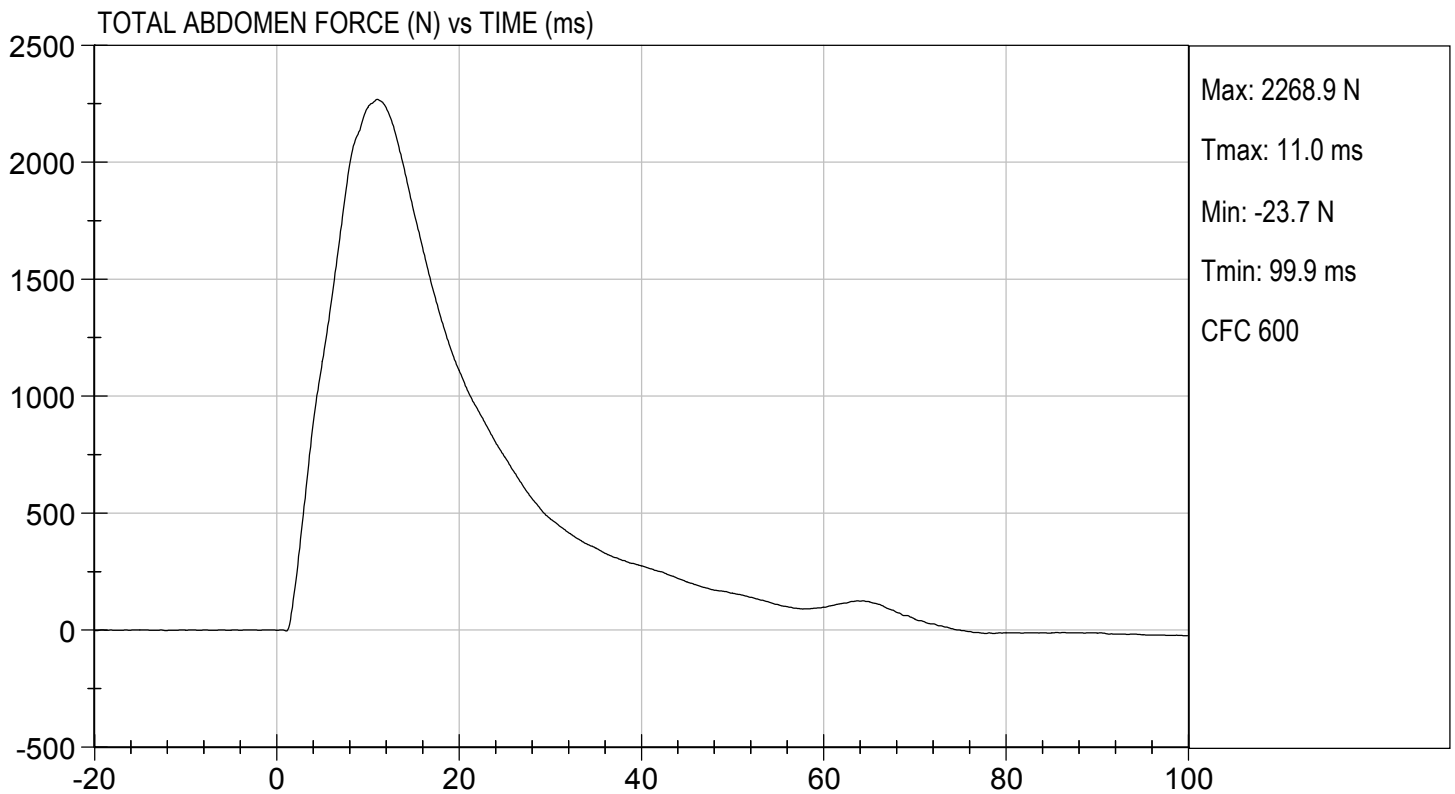
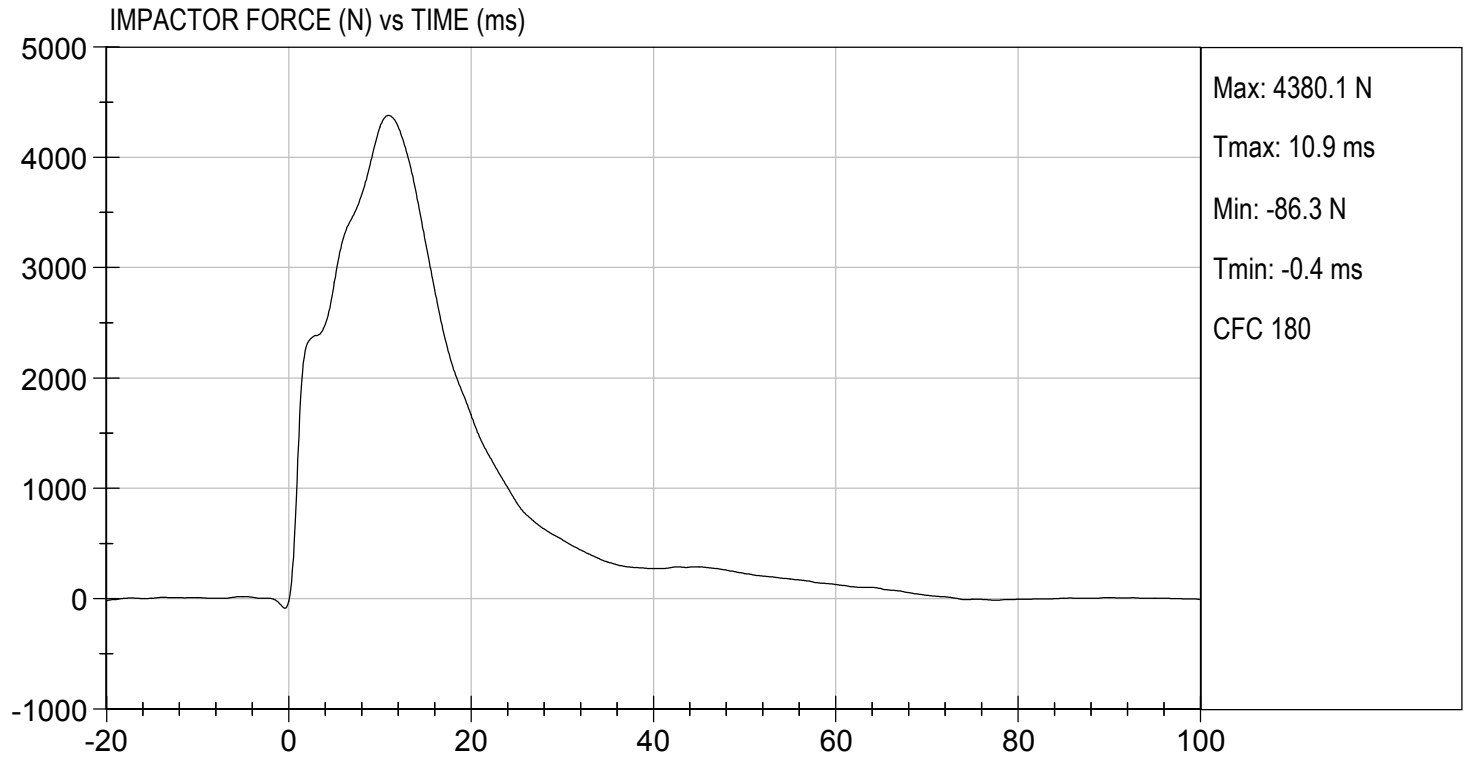
01/11/2019
Test Date


Approved By



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

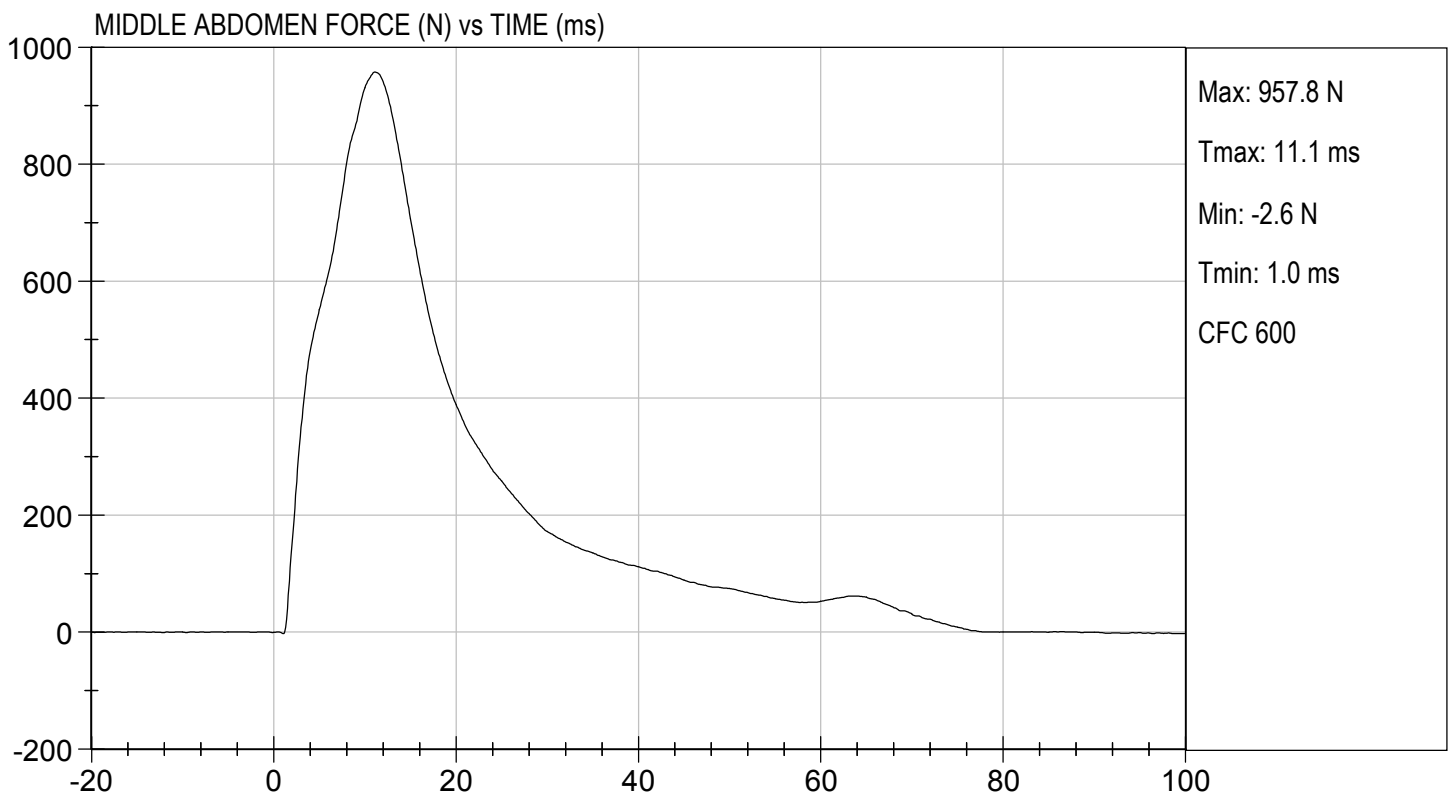
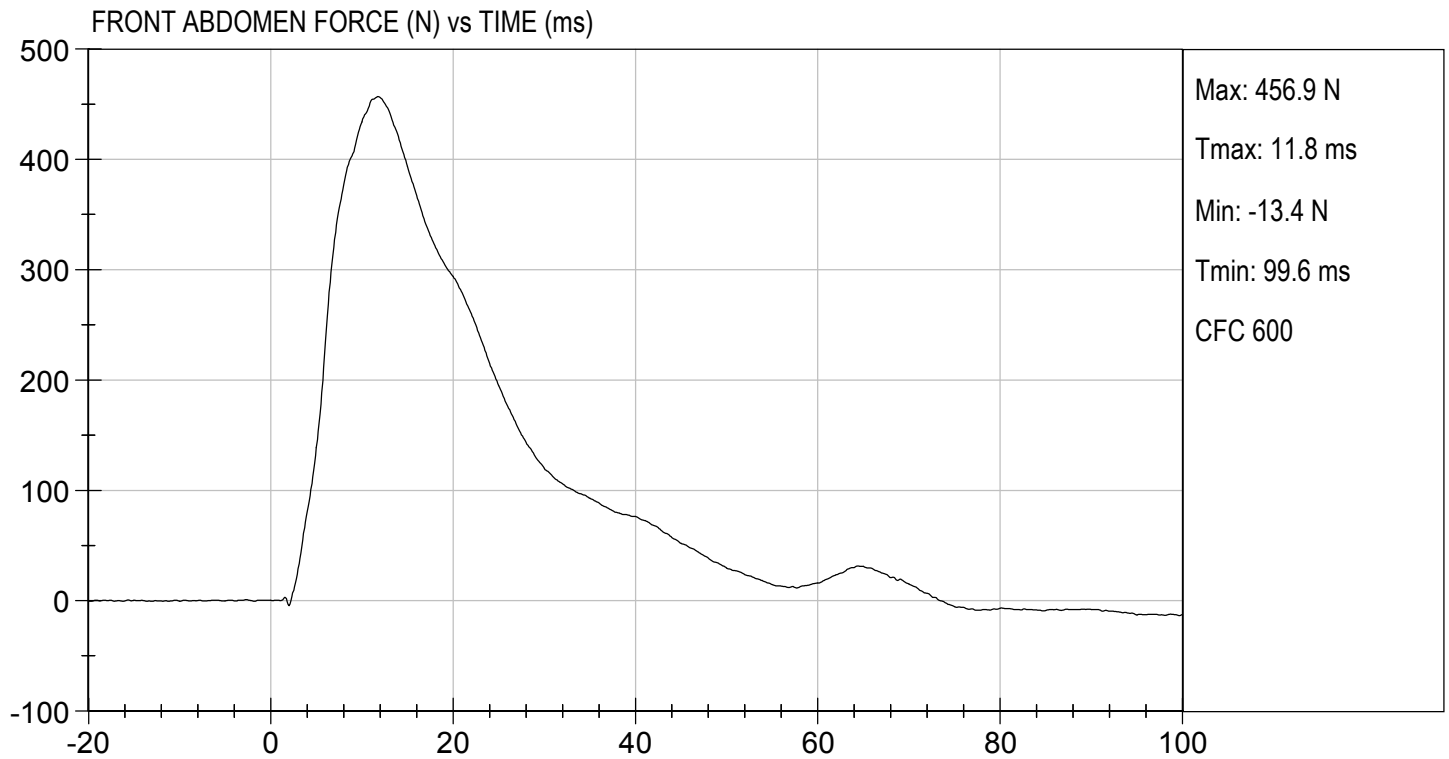
TEST DATE: 01/11/2019
TEST #: D190157





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

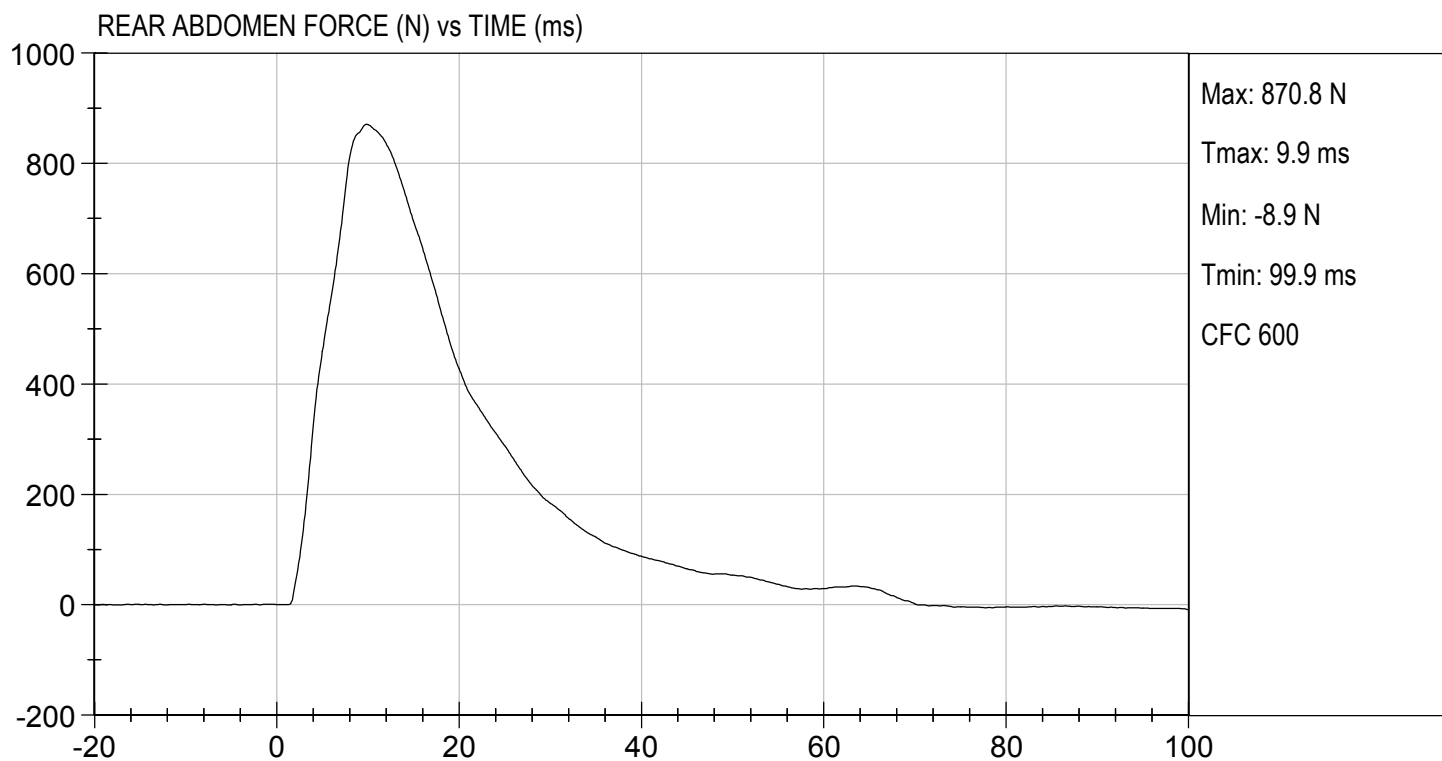
TEST DATE: 01/11/2019
TEST #: D190157





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

TEST DATE: 01/11/2019
TEST #: D190157



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

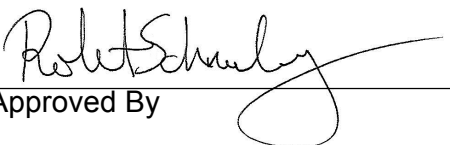
ATD Serial No: 032

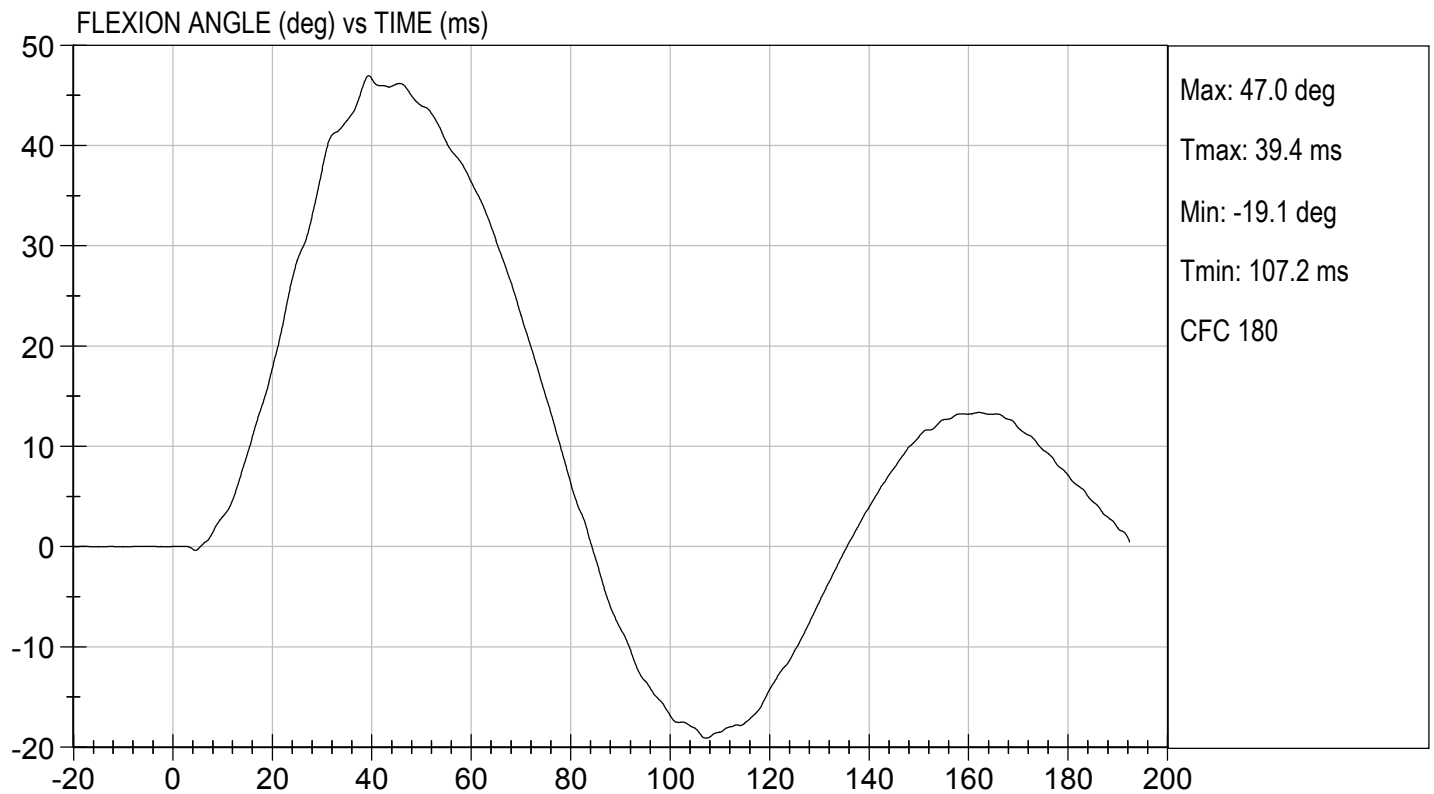
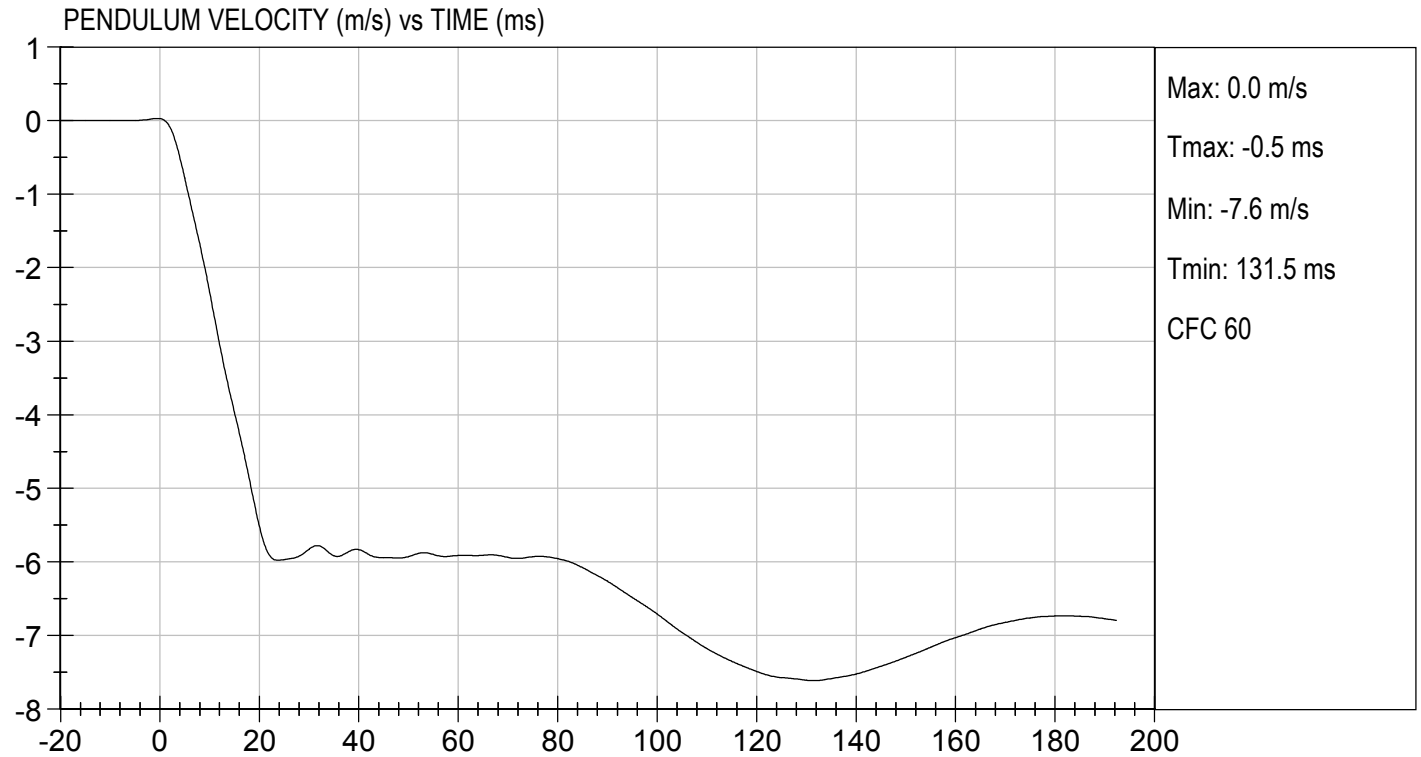
Test I.D: D190158

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.84	Pass
Laboratory Relative Humidity		%	10 to 70	21.5	Pass
Pendulum Speed		m/s	5.95 to 6.15	5.97	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.419	Pass
	27 ms	m/s	-6.50 to -5.80	-5.95	Pass
	30 ms	m/s	>= -6.50	-5.83	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	39.4	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	45	Pass
Overall Results					Pass


Laboratory Technician

01/10/2019
Test Date

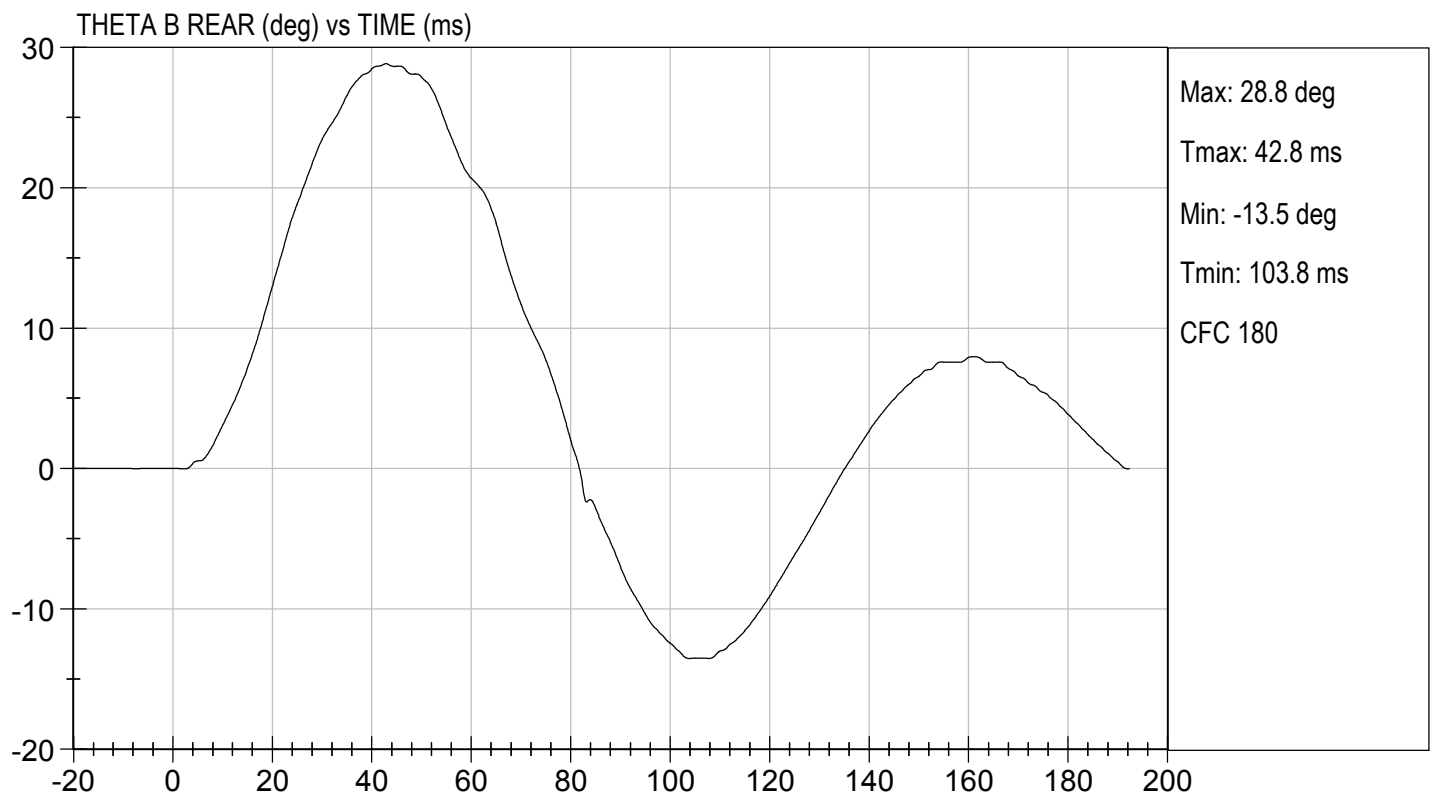
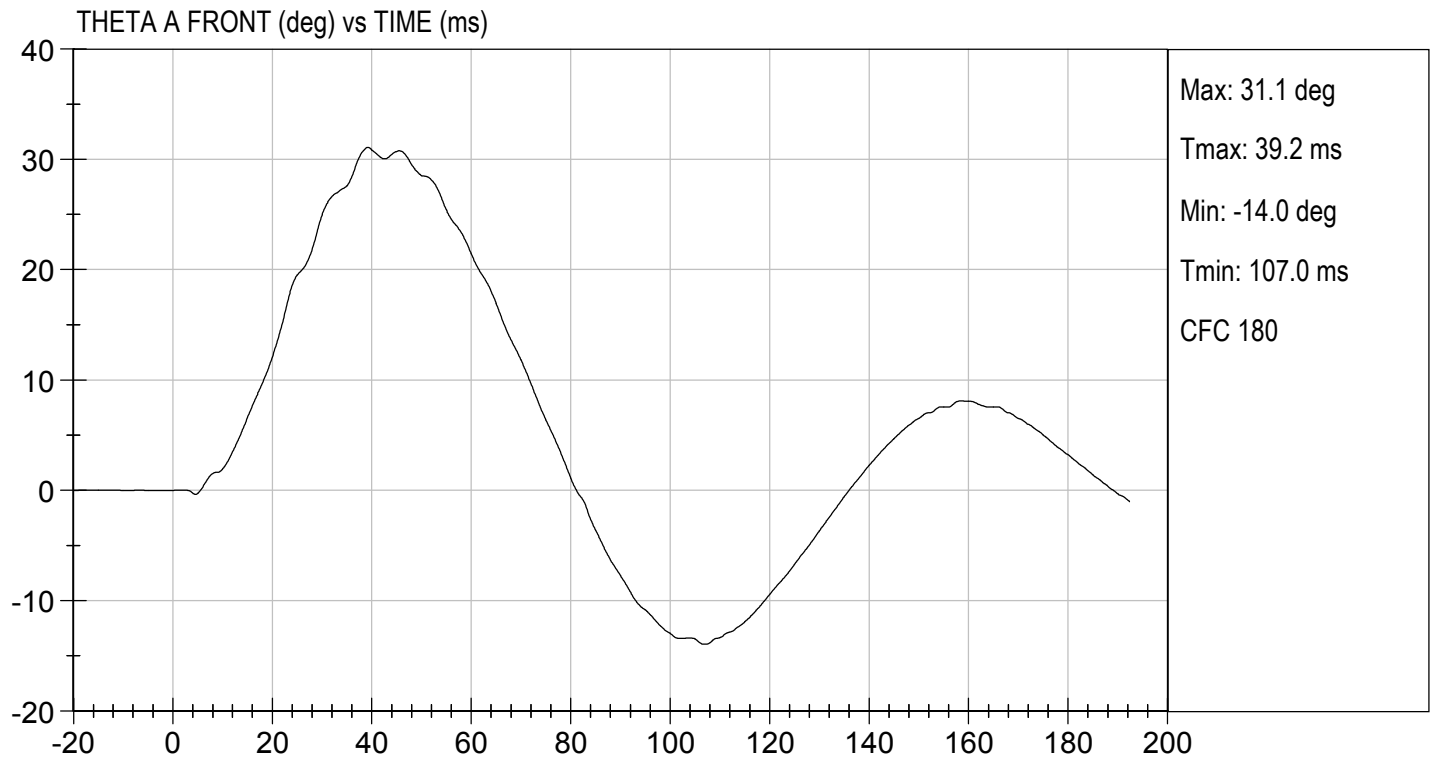

Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 19.60 ft/s, 5.97 m/s

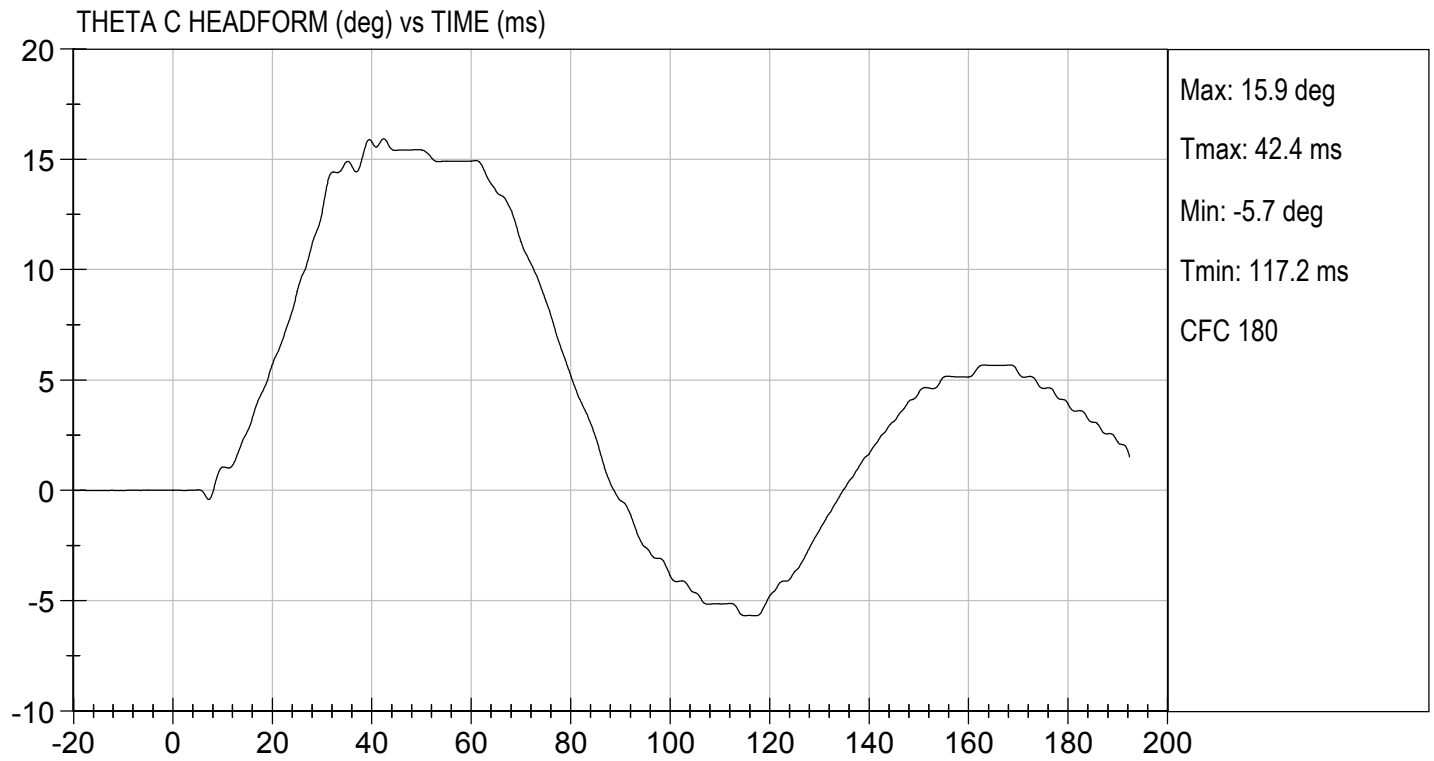
TEST DATE: 01/10/2019
TEST #: D190158





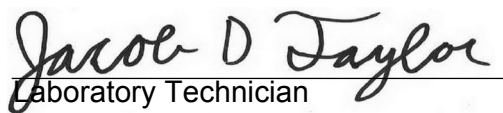
TEST DESC: LUMBAR BENDING
VELOCITY: 19.60 ft/s, 5.97 m/s

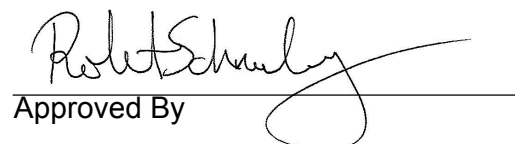
TEST DATE: 01/10/2019
TEST #: D190158



MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D190159

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	4.20 to 4.40	4.34	Pass
Maximum Impactor Force	N	4700 to 5400	5241	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.1	Pass
Maximum Pubic Force	N	1230 to 1590	1360	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.1	Pass
Overall Test Results				Pass


Laboratory Technician

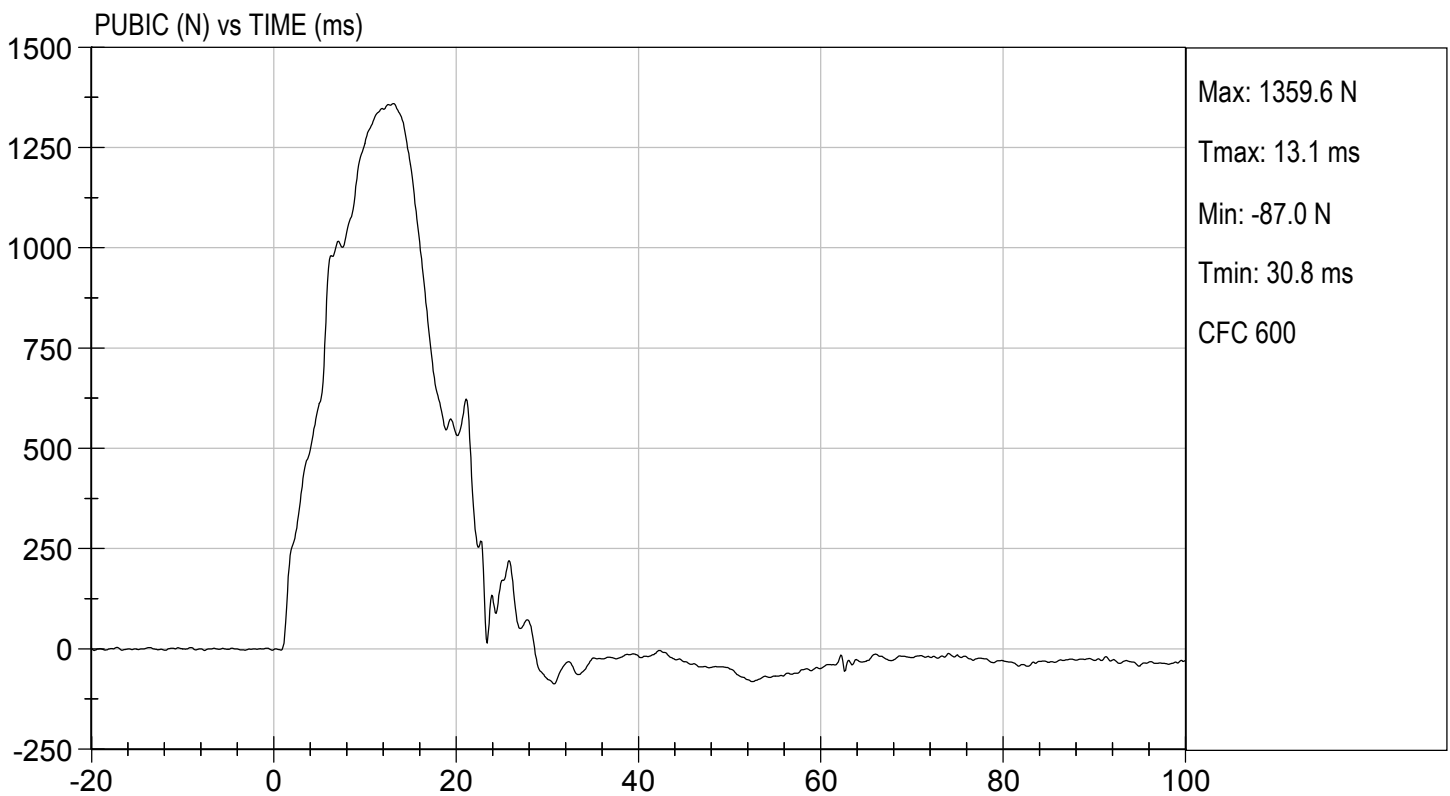
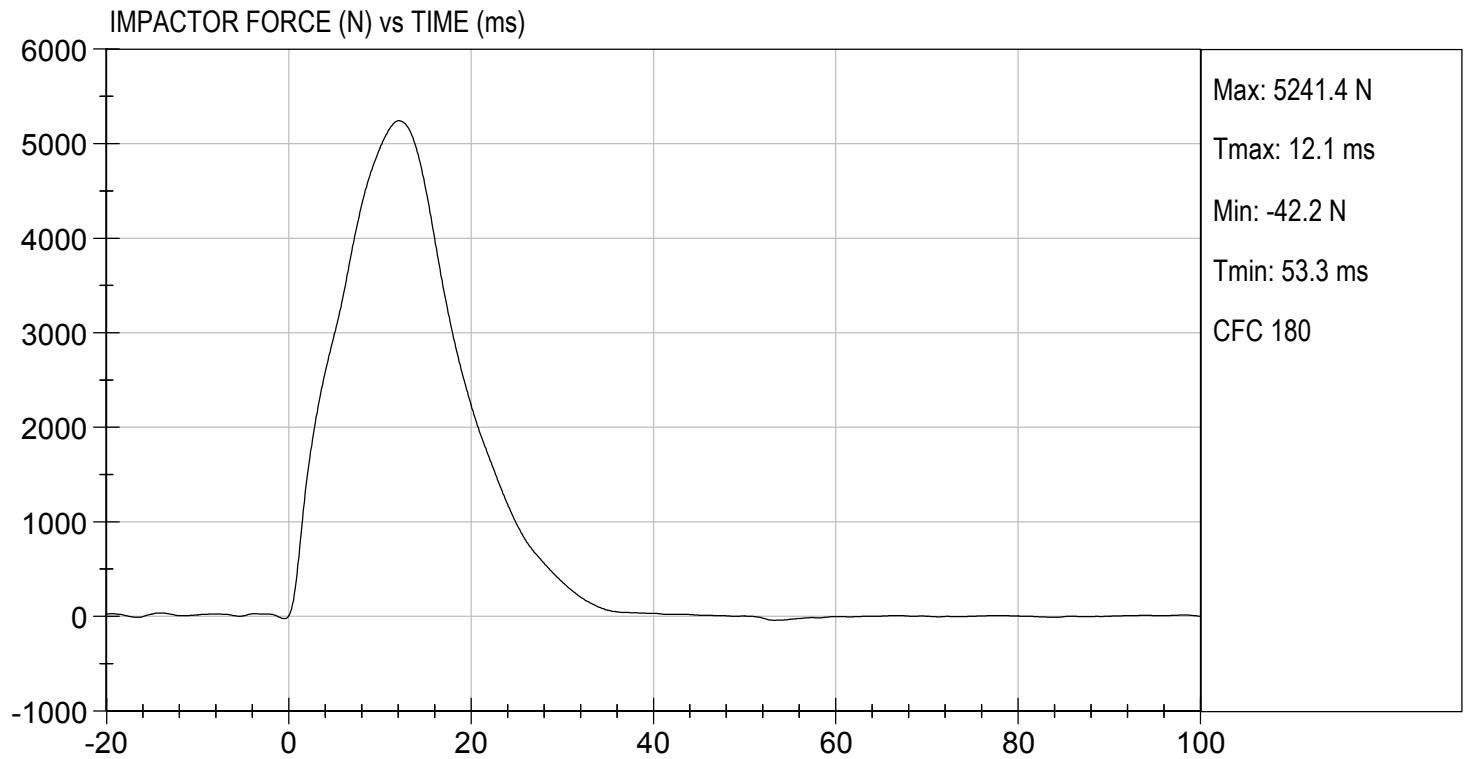

Approved By

01/11/2019
Test Date



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

TEST DATE: 01/11/2019
TEST #: D190159



MGA RESEARCH CORPORATION

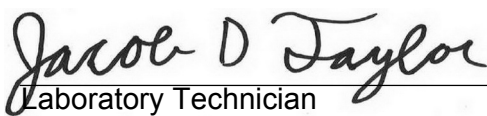
THORAX IMPACT TEST

ES-2re DUMMY

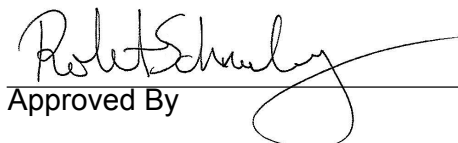
ATD Serial No: 032

Test I.D: D190150

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	5.40 to 5.60	5.52	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5510	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.3	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.5	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.8	Pass
Overall Test Results				Pass


Laboratory Technician

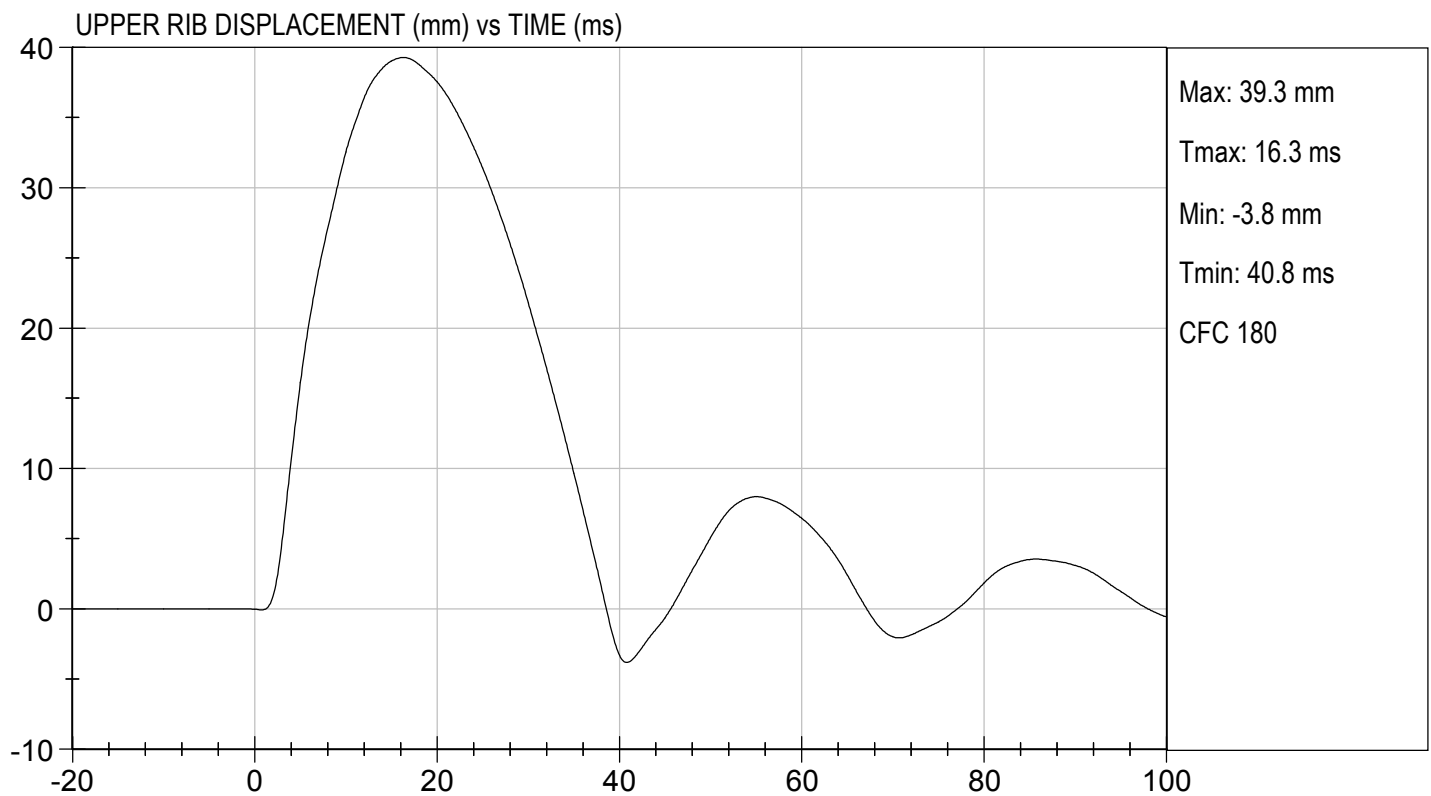
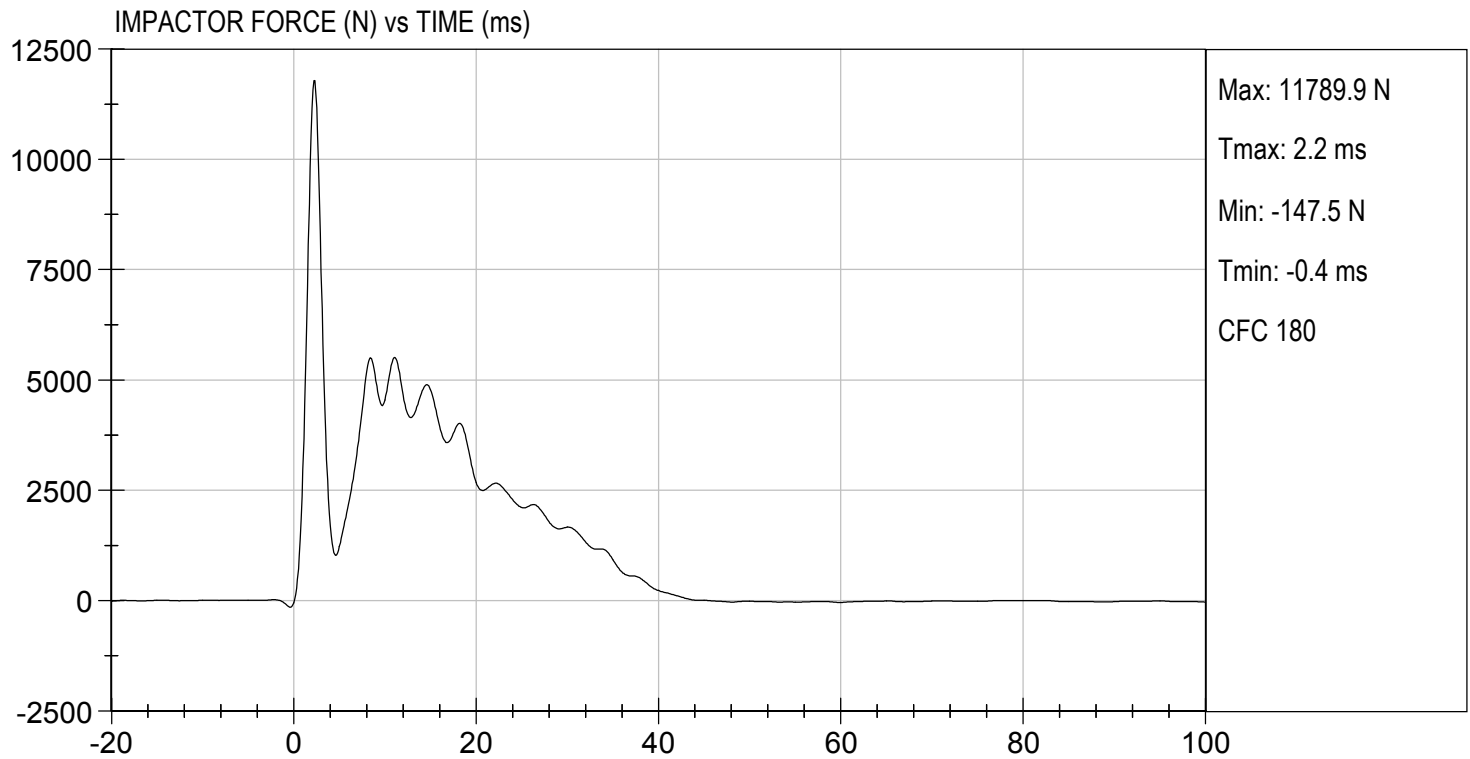
01/11/2019
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

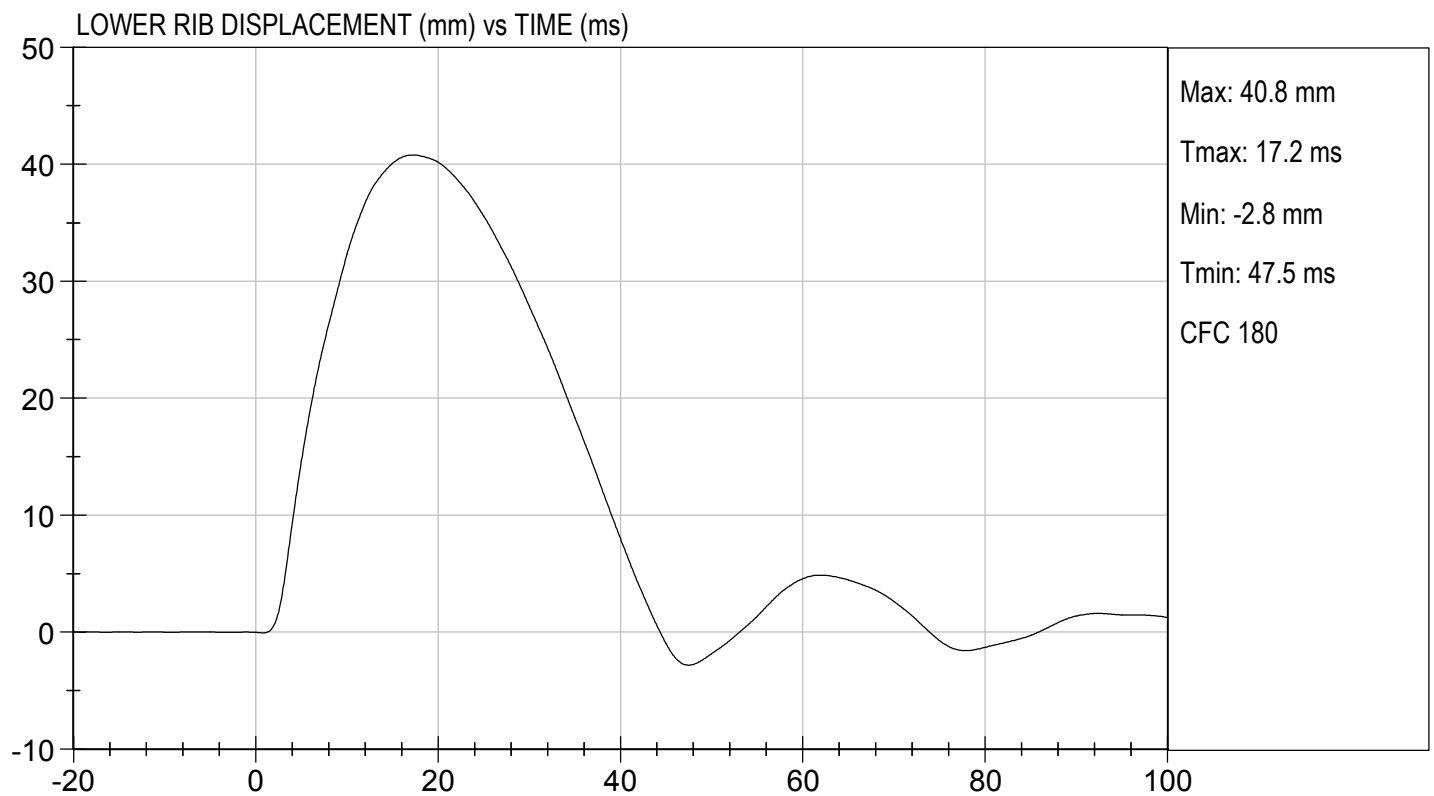
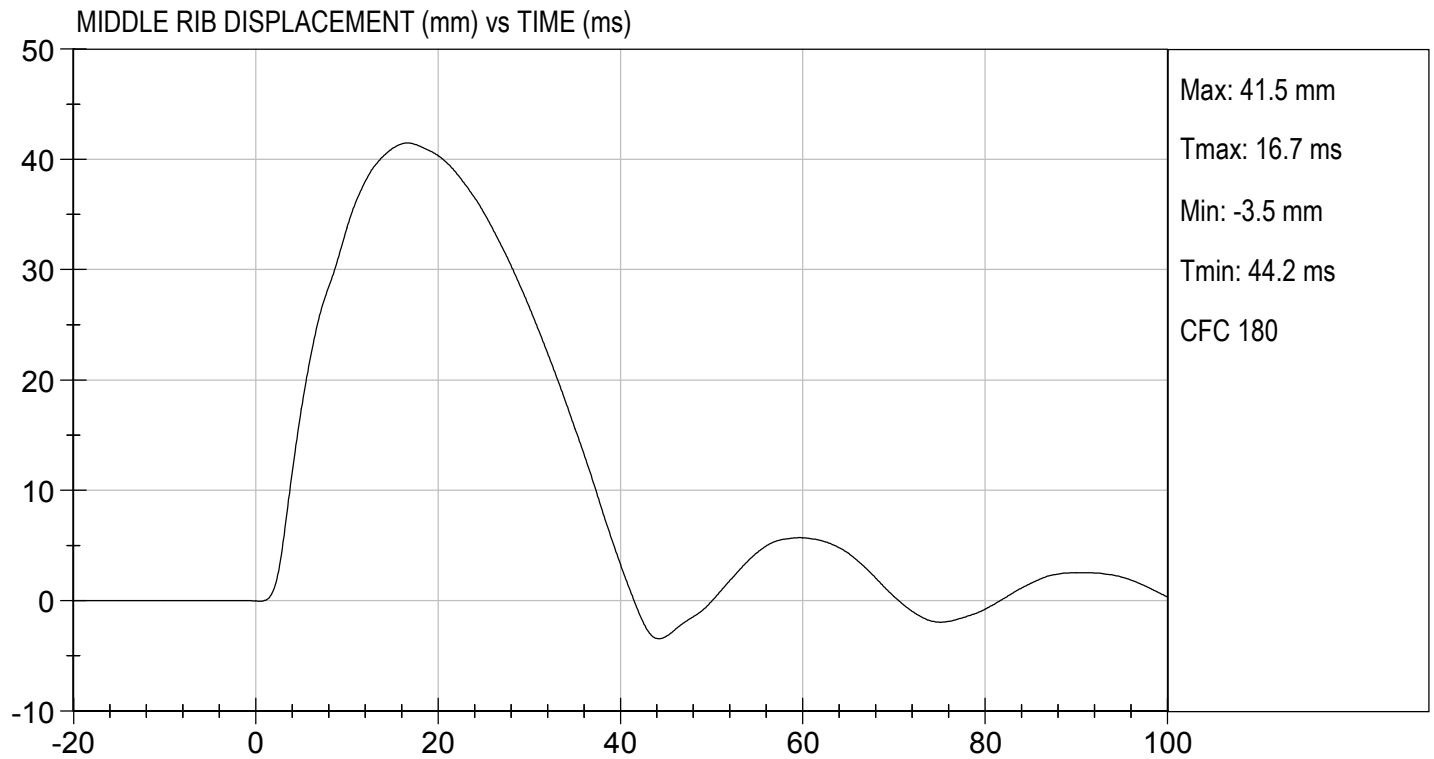
TEST DATE: 01/11/2019
TEST #: D190150





TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 01/11/2019
TEST #: D190150



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

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

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

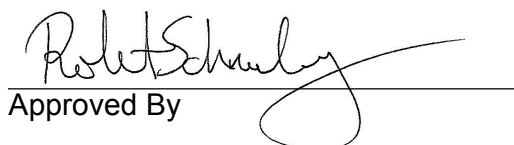
ATD Serial No: 306

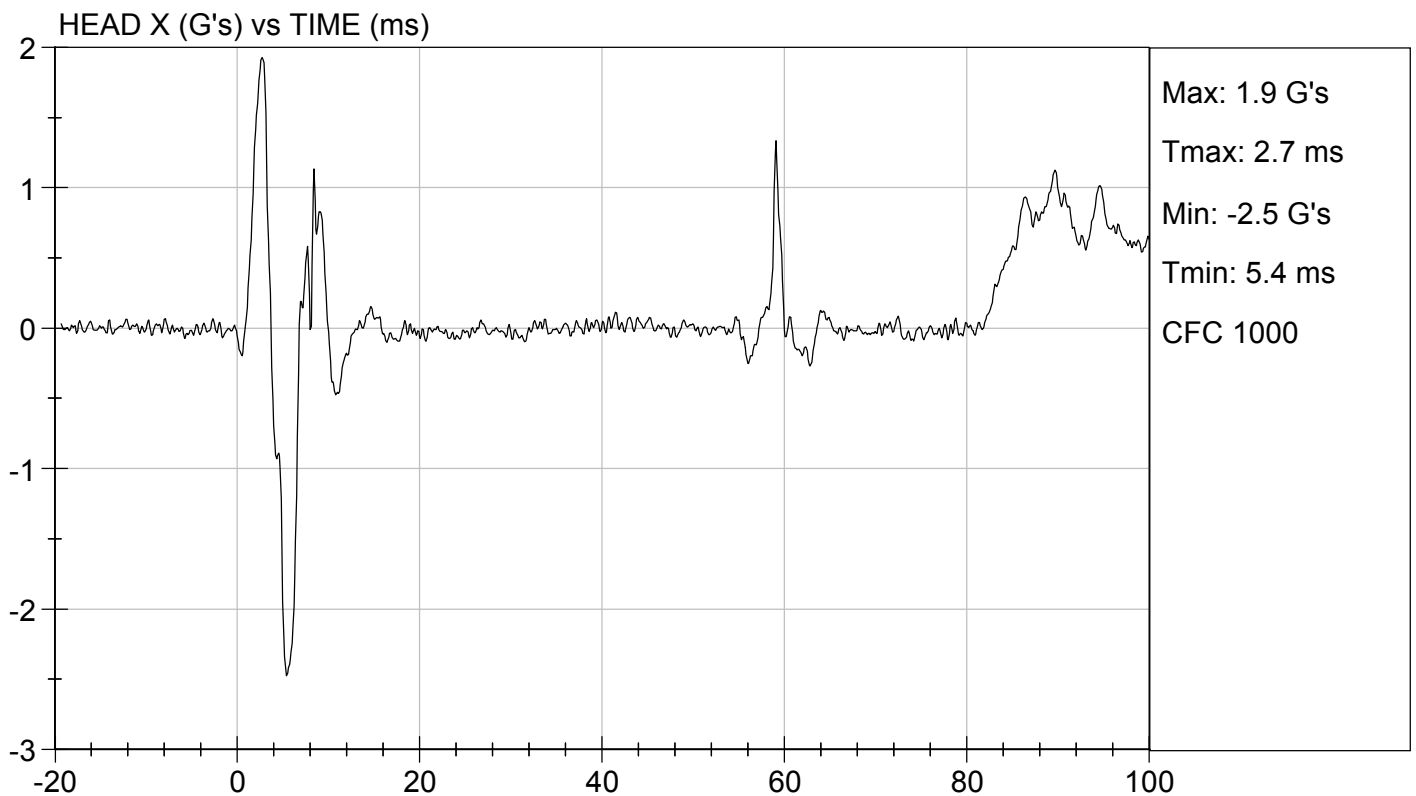
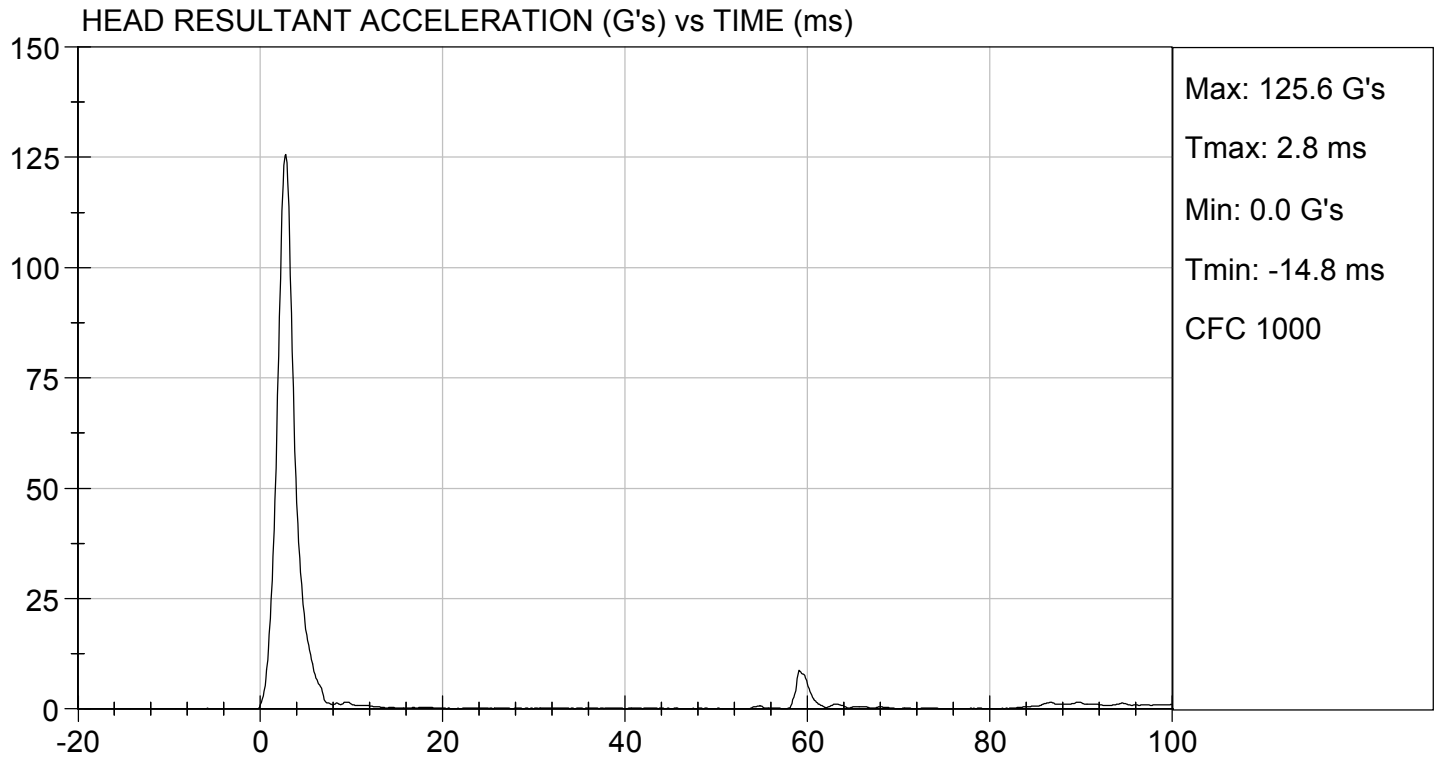
Test ID: D190081

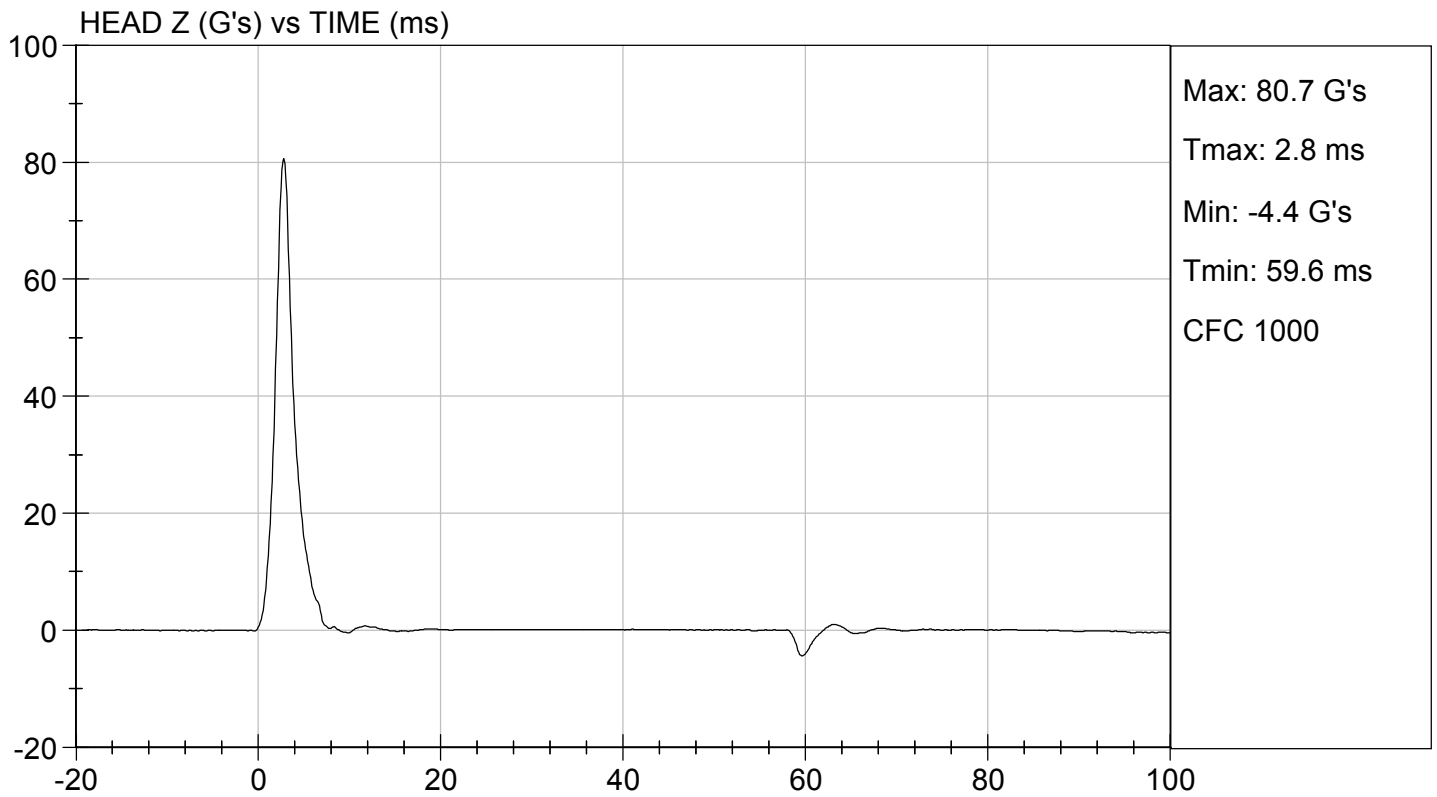
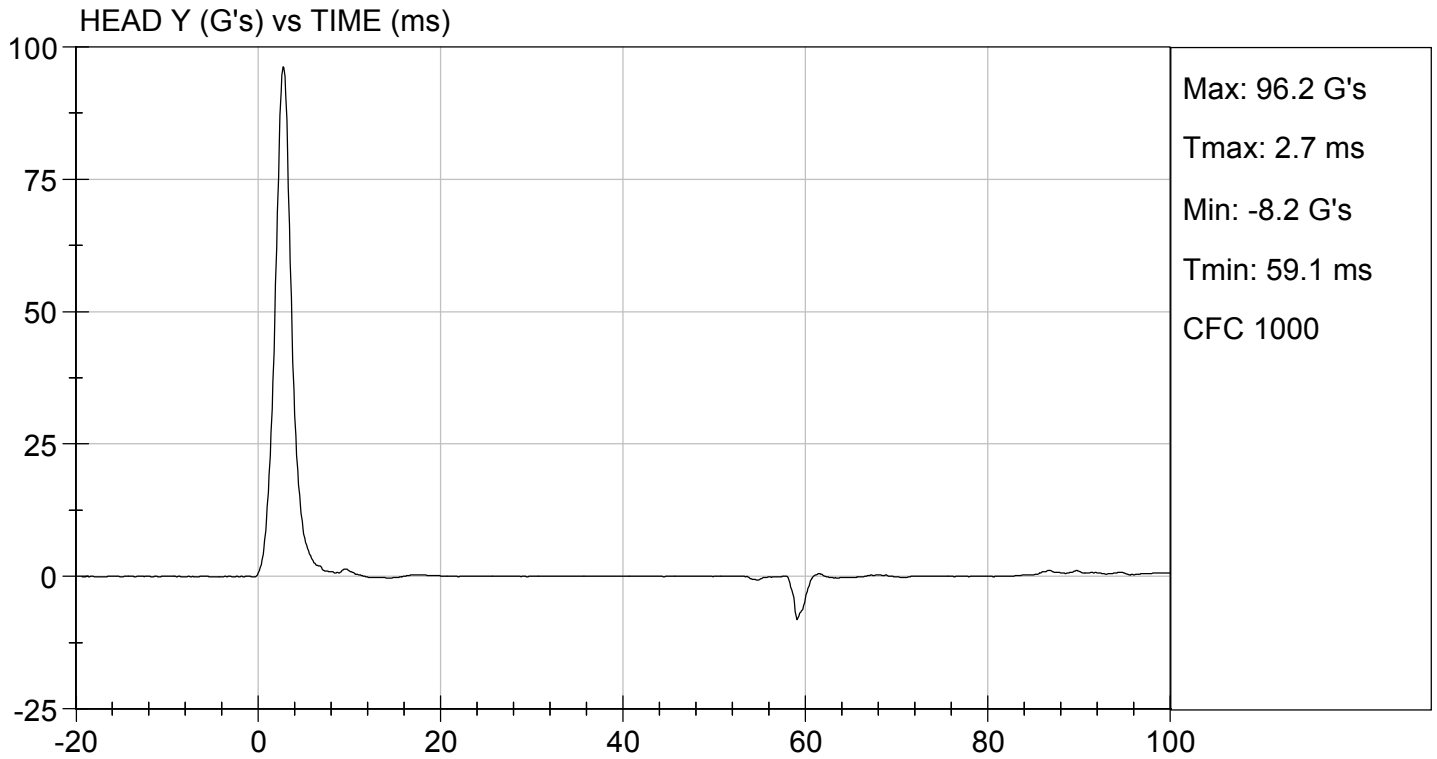
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	115 to 137	126	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

01/07/2019
Test Date


Approved By





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

ATD Serial No: 306

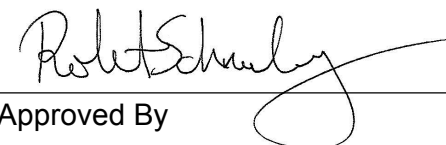
Test I.D: D190082

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.7	Pass
Humidity		%	10 to 70	28	Pass
Impact Velocity		m/s	5.51 to 5.63	5.61	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.57	Pass
	15 ms	m/s	3.30 to 4.10	3.74	Pass
	20 ms	m/s	4.40 to 5.40	5.29	Pass
	25 ms	m/s	5.40 to 6.10	5.63	Pass
	25-100 ms	m/s	5.50 to 6.20	5.67	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	59	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	107	Pass
Overall Test Results					Pass


Laboratory Technician

01/07/2019

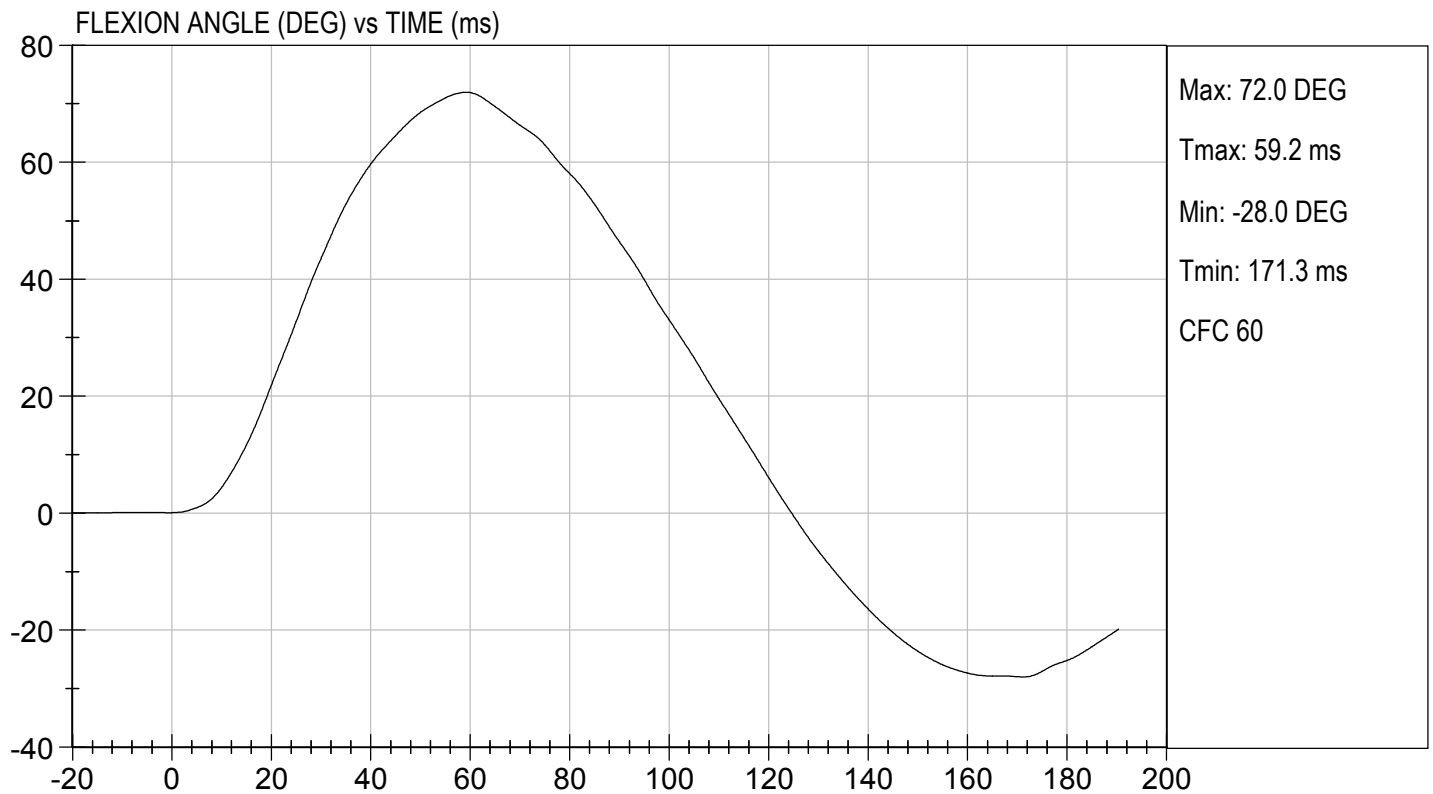
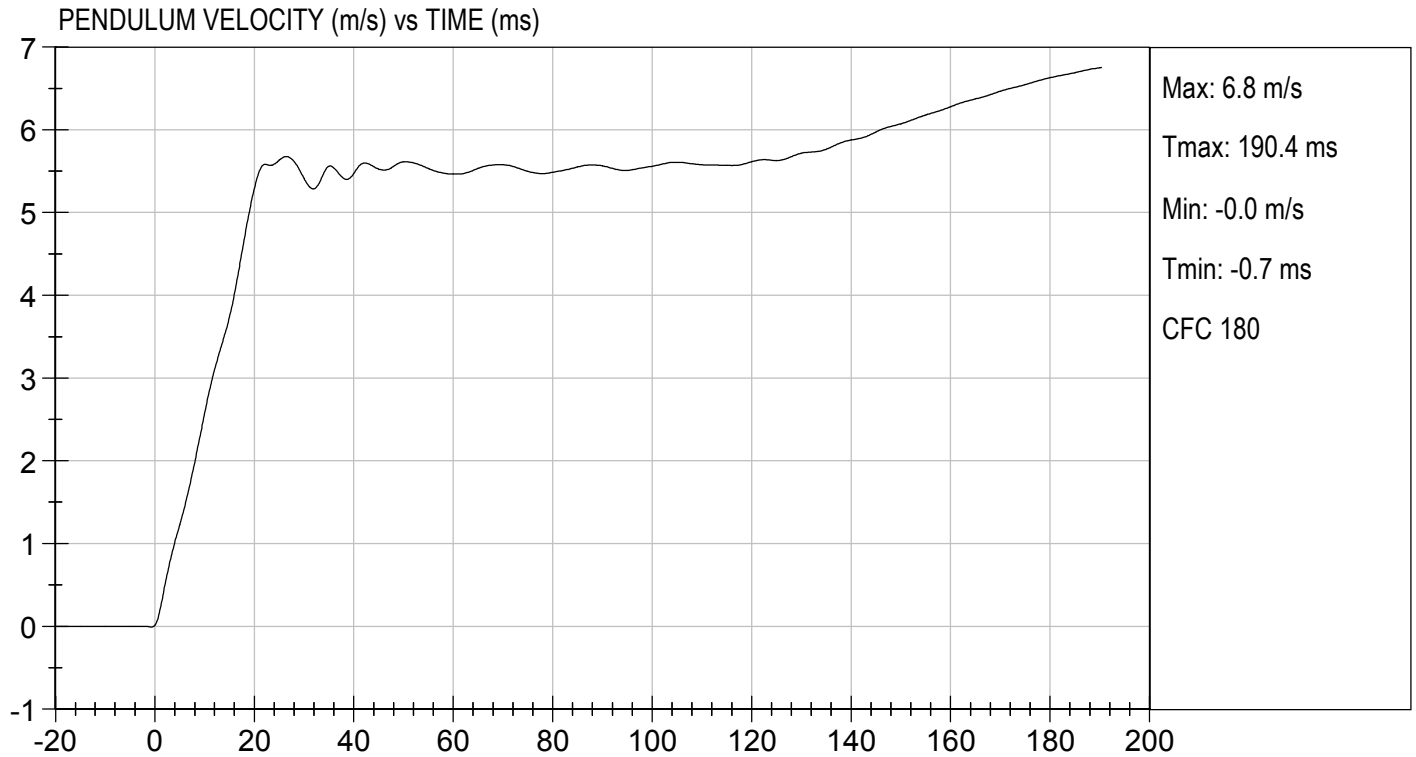
Test Date


Approved By



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

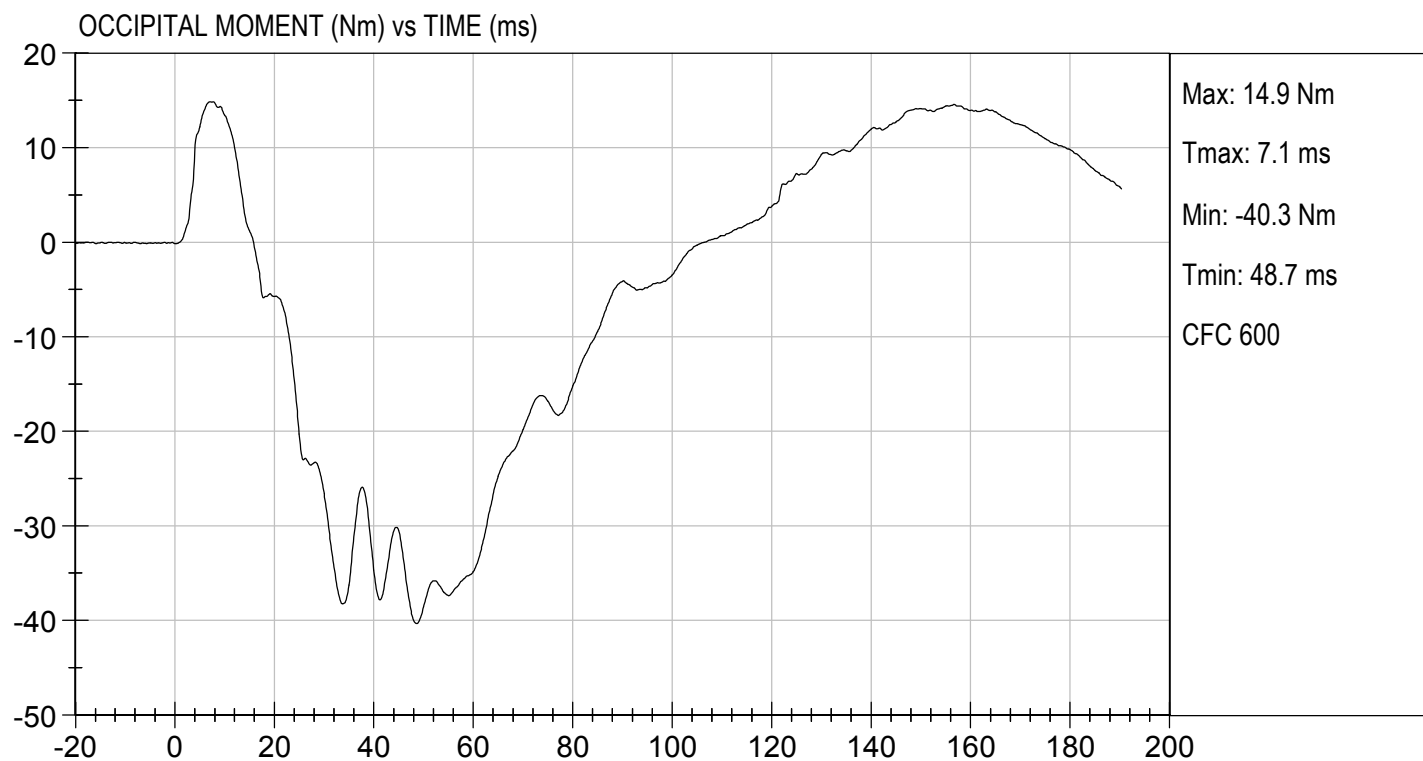
TEST DATE: 01/07/2019
TEST #: D190082





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

TEST DATE: 01/07/2019
TEST #: D190082



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

ATD Serial No: 306

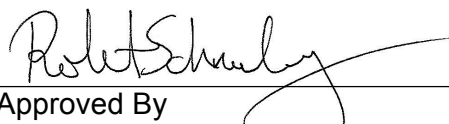
Test ID: D190083

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	21	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

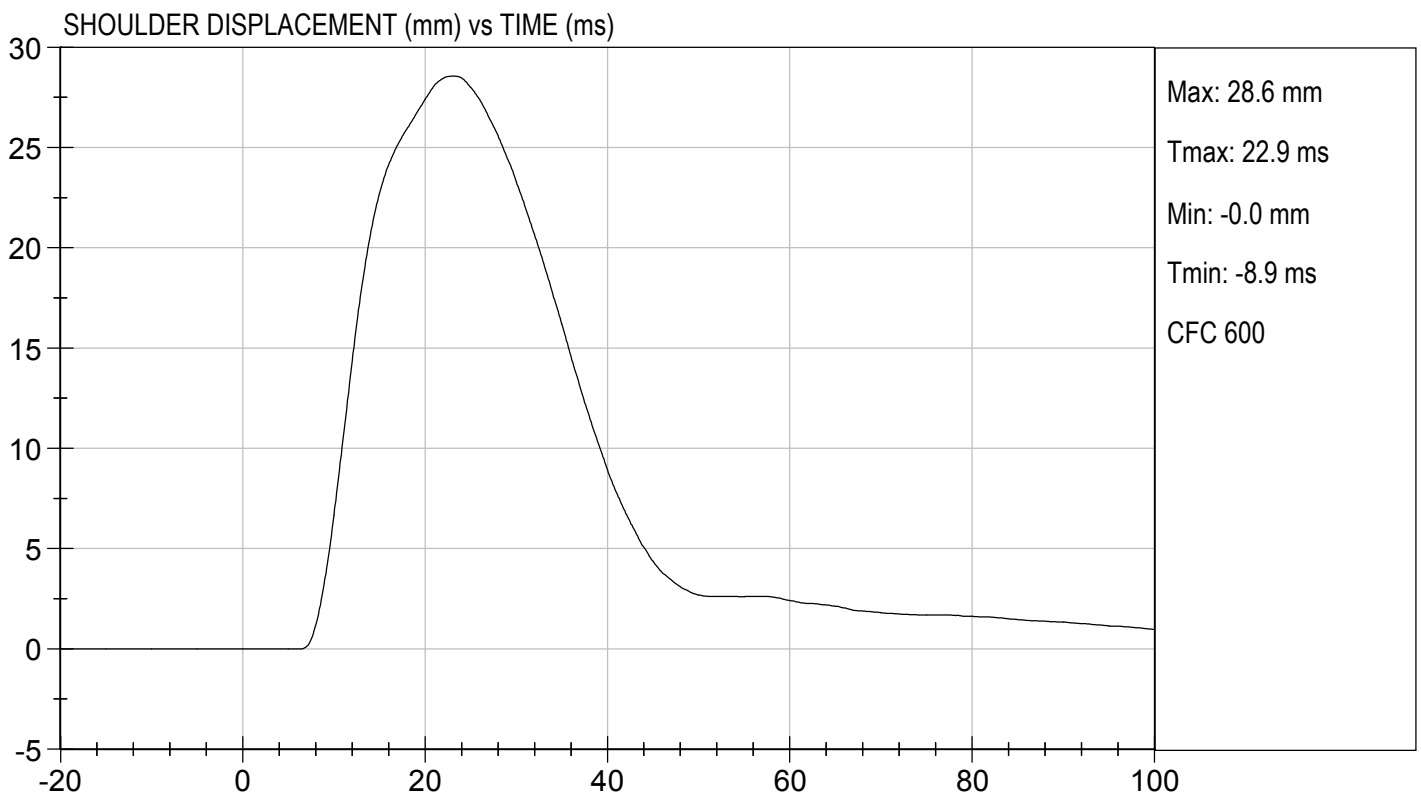
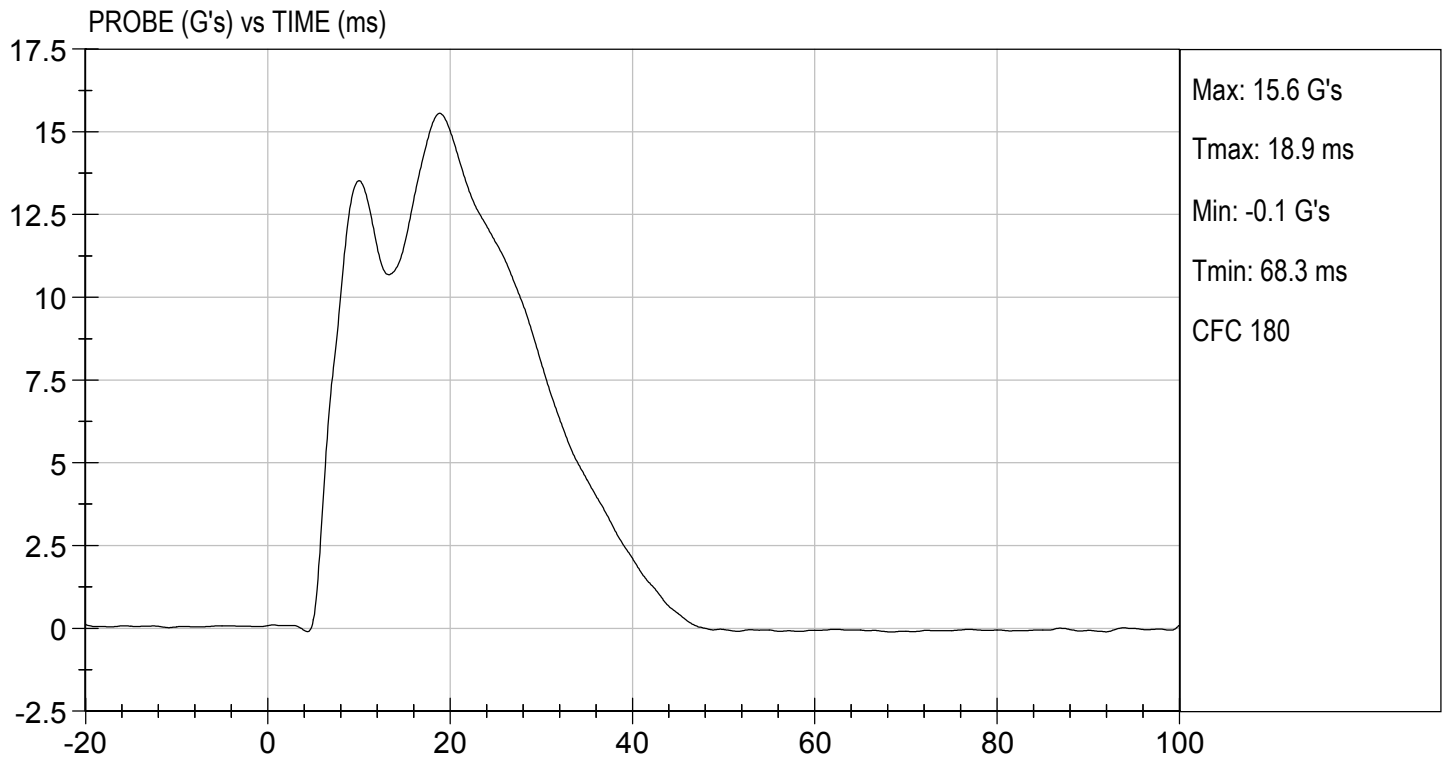
Test Date


Approved By



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

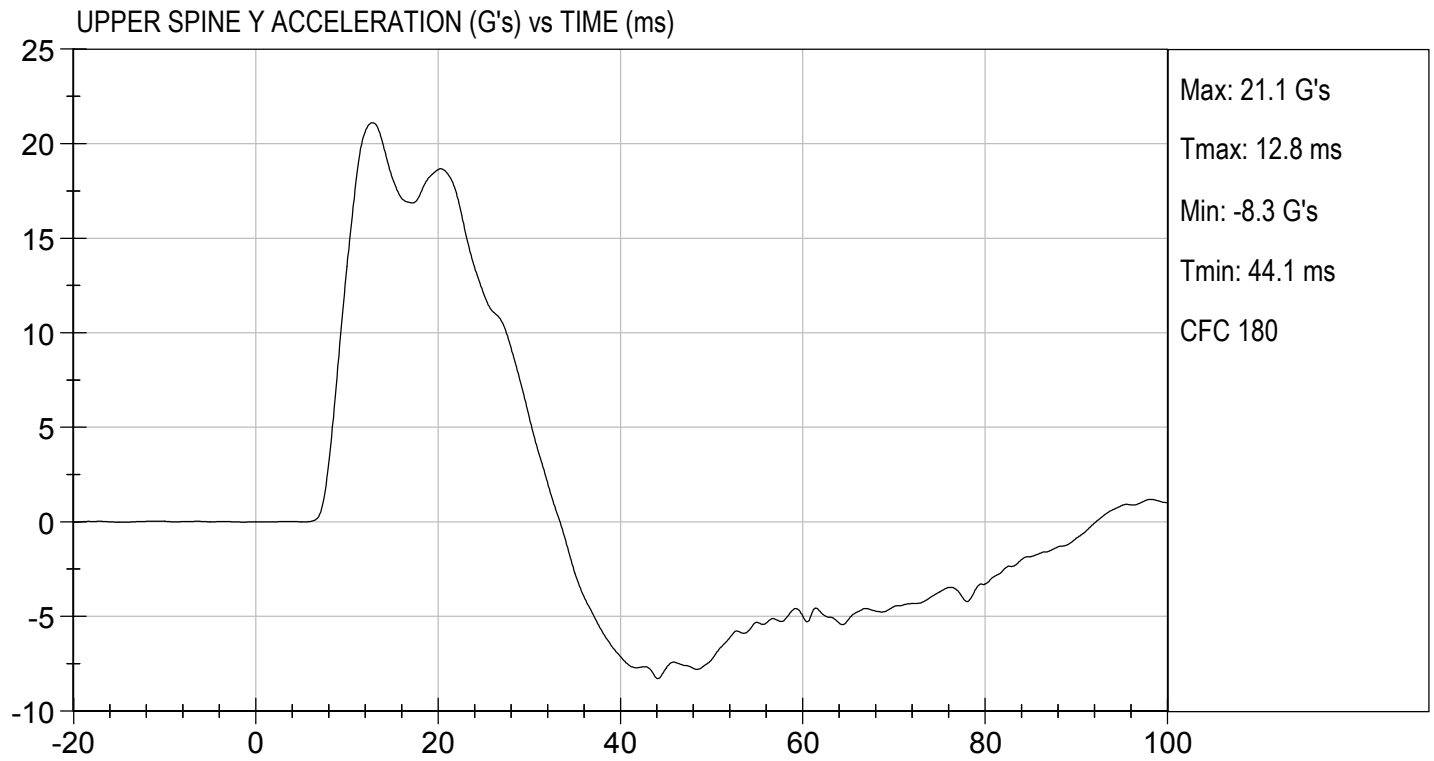
TEST DATE: 01/08/2019
TEST #: D190083





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

TEST DATE: 01/08/2019
TEST #: D190083

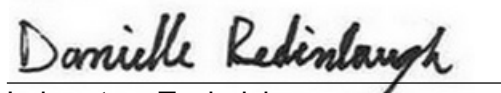


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D190084

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	30	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	42	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

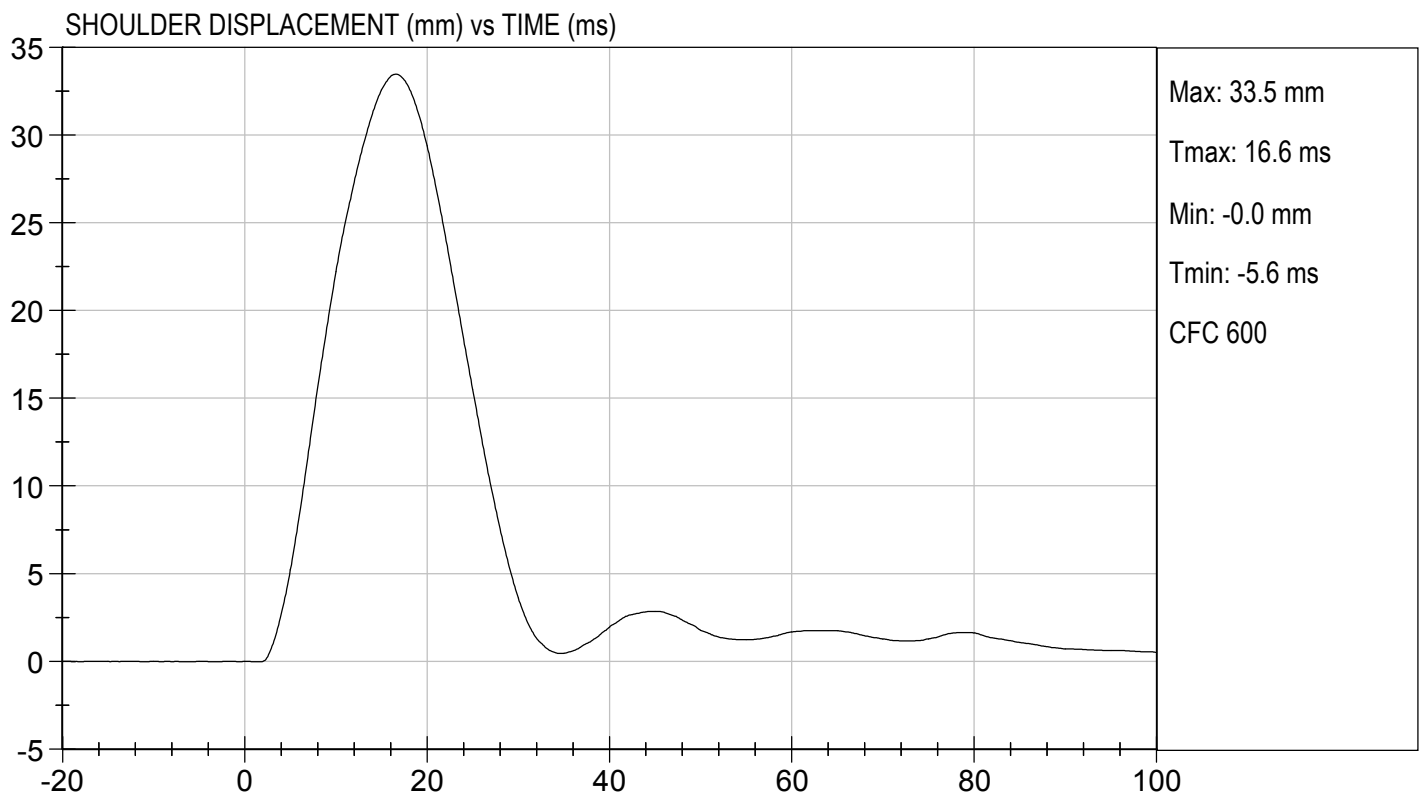
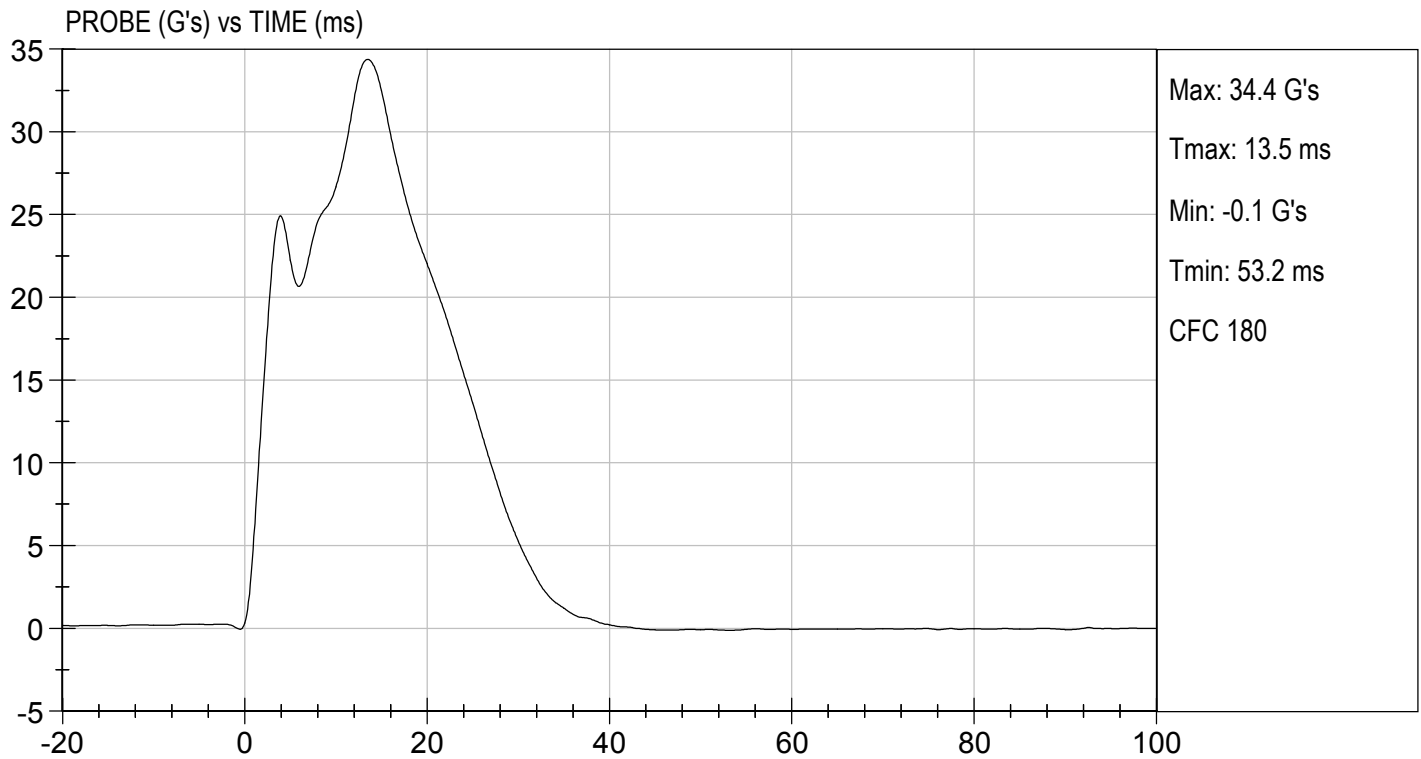
Test Date


Approved By



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

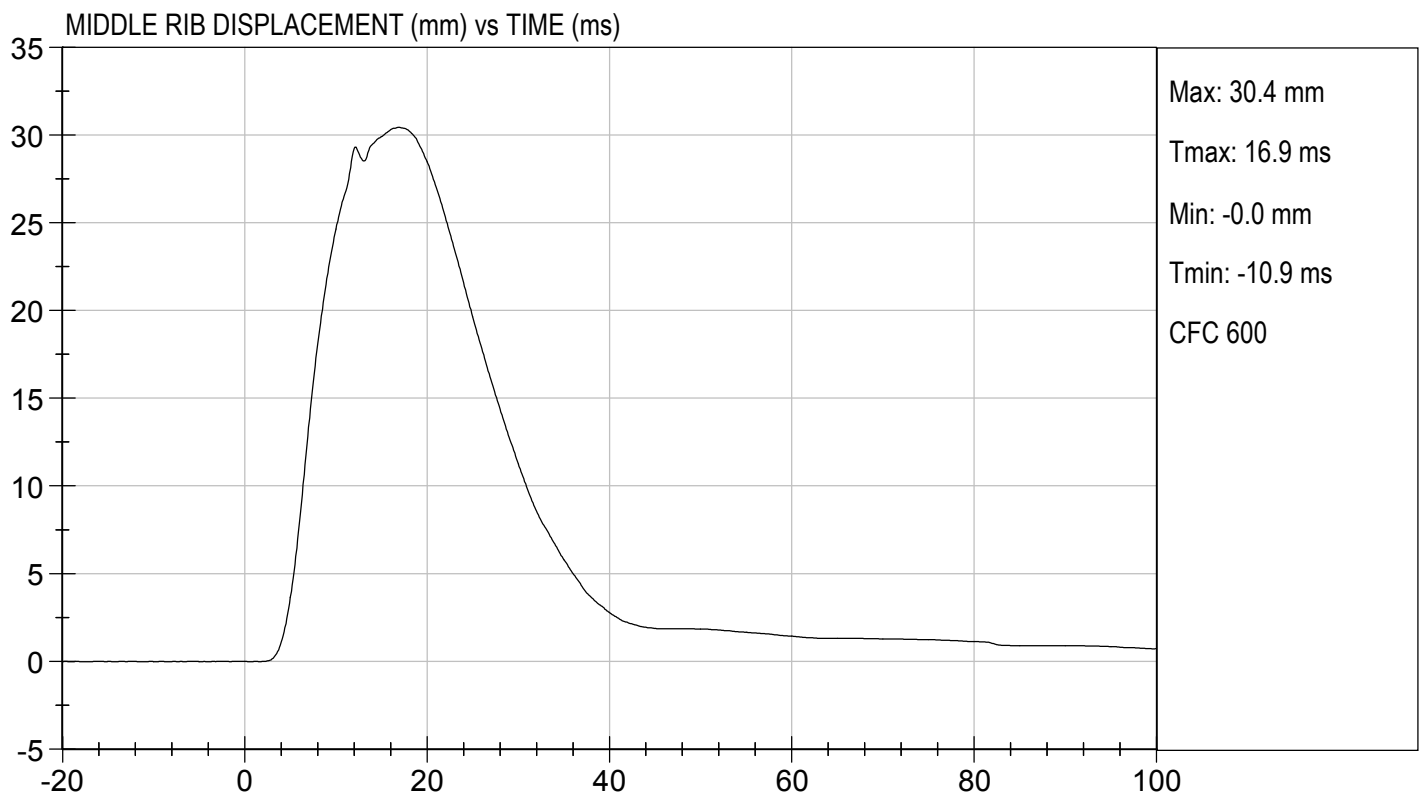
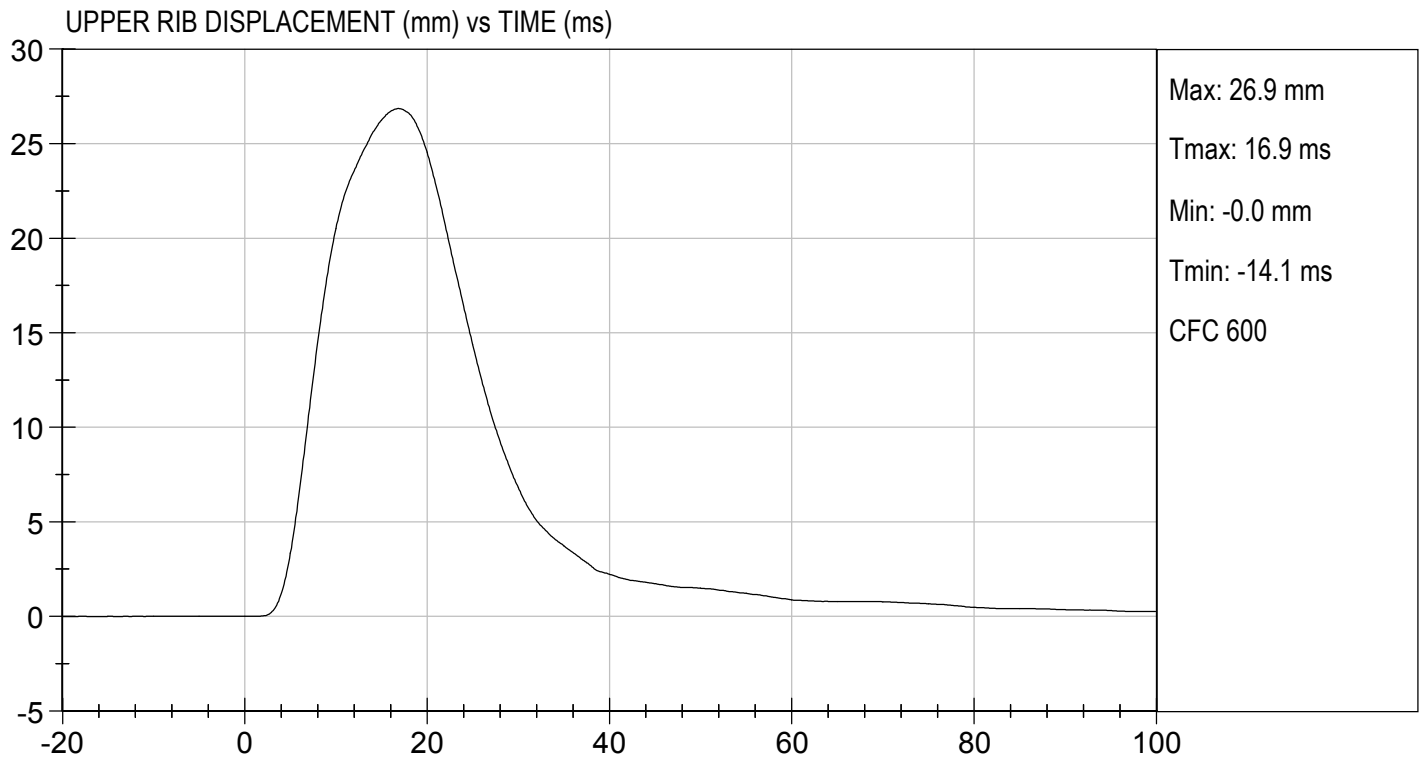
TEST DATE: 01/08/2019
TEST #: D190084





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

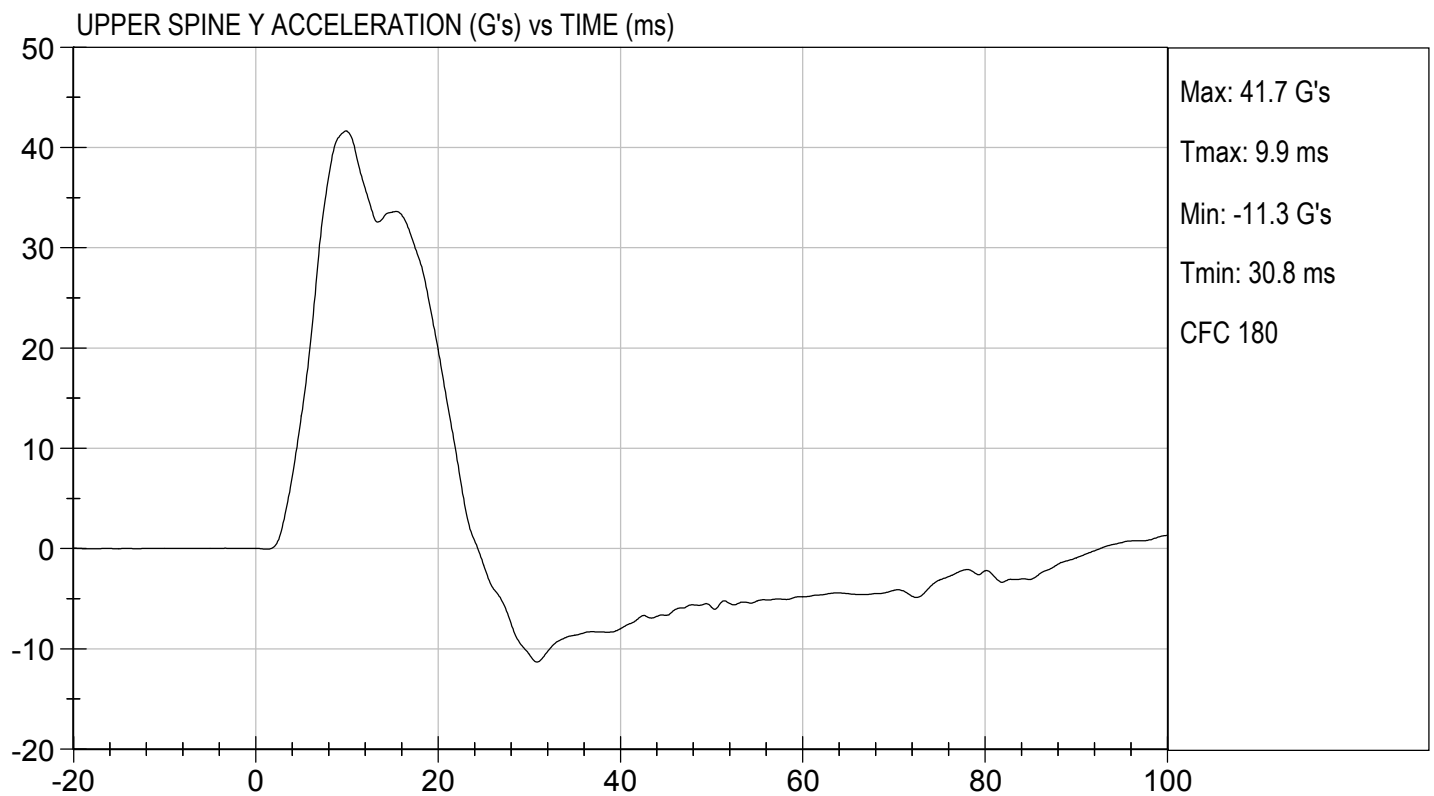
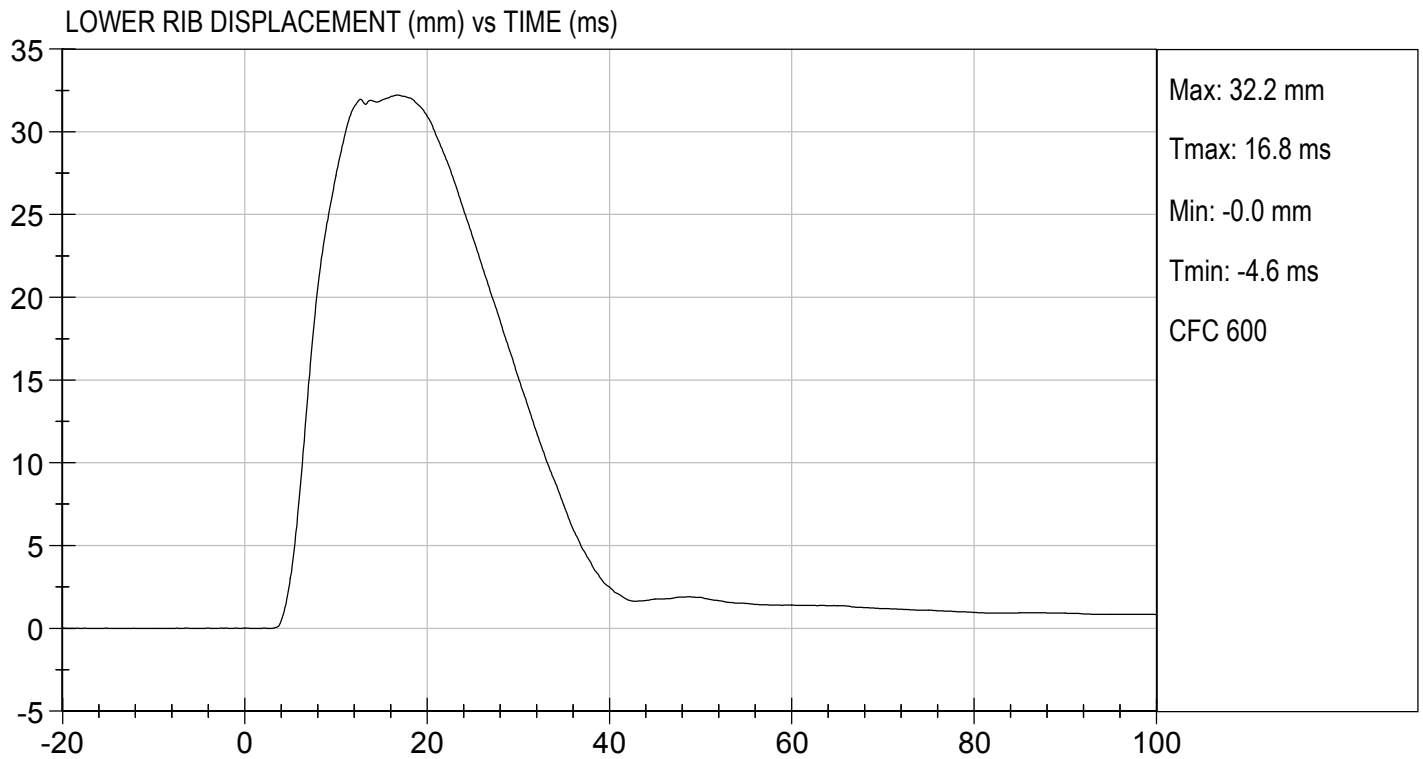
TEST DATE: 01/08/2019
TEST #: D190084





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

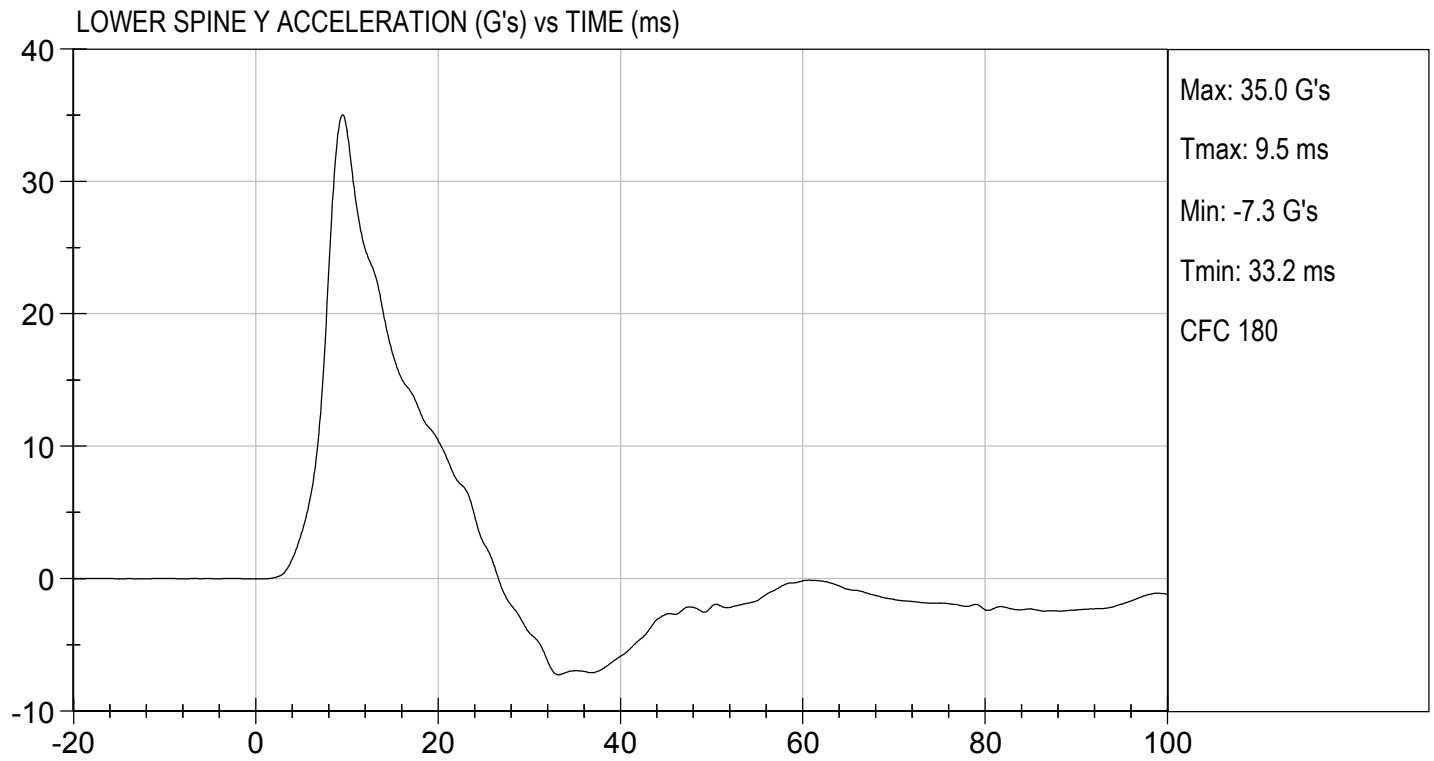
TEST DATE: 01/08/2019
TEST #: D190084





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

TEST DATE: 01/08/2019
TEST #: D190084



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

ATD Serial No: 306

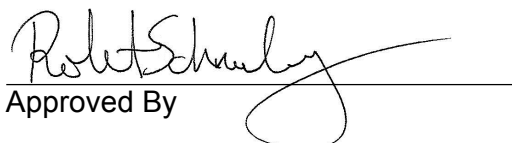
Test I.D: D190085

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	37	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

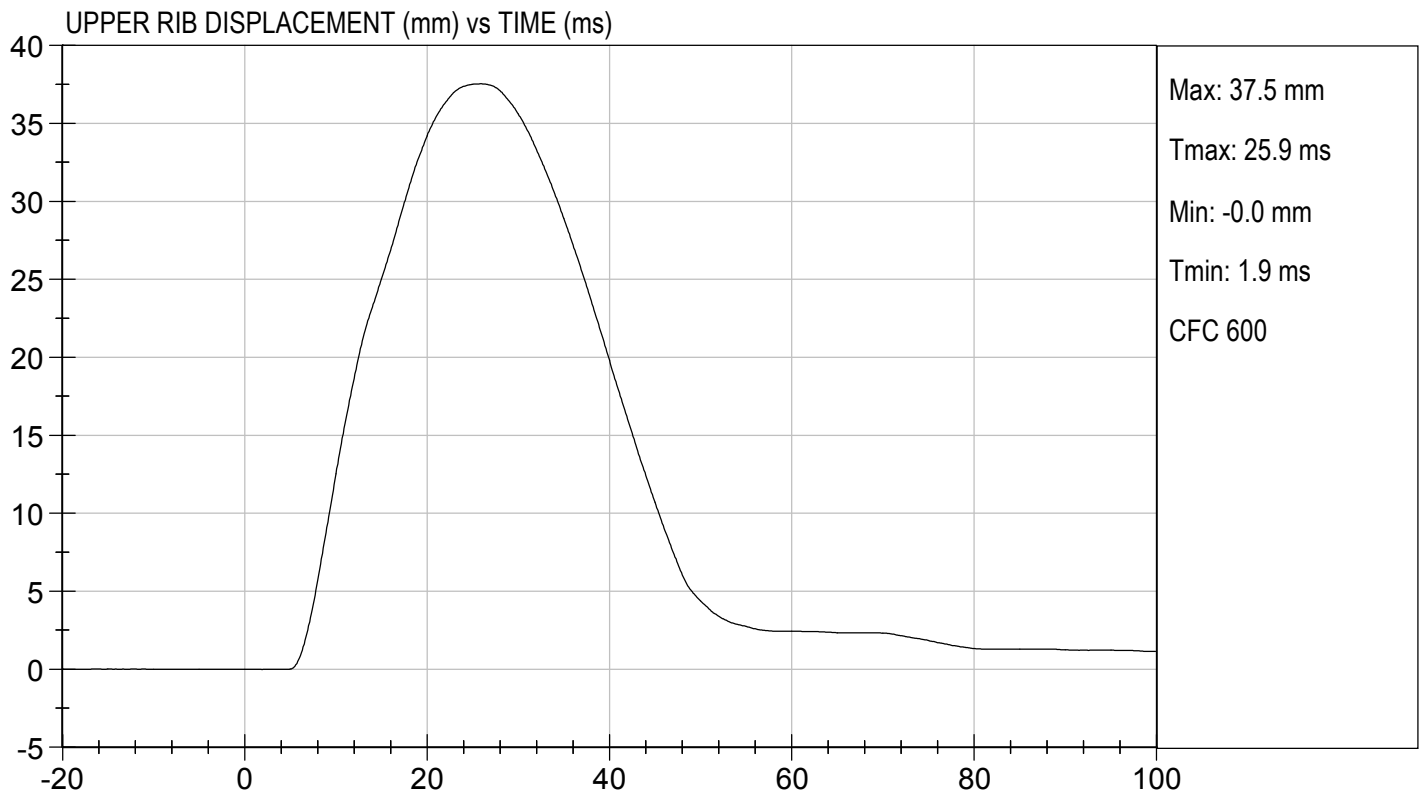
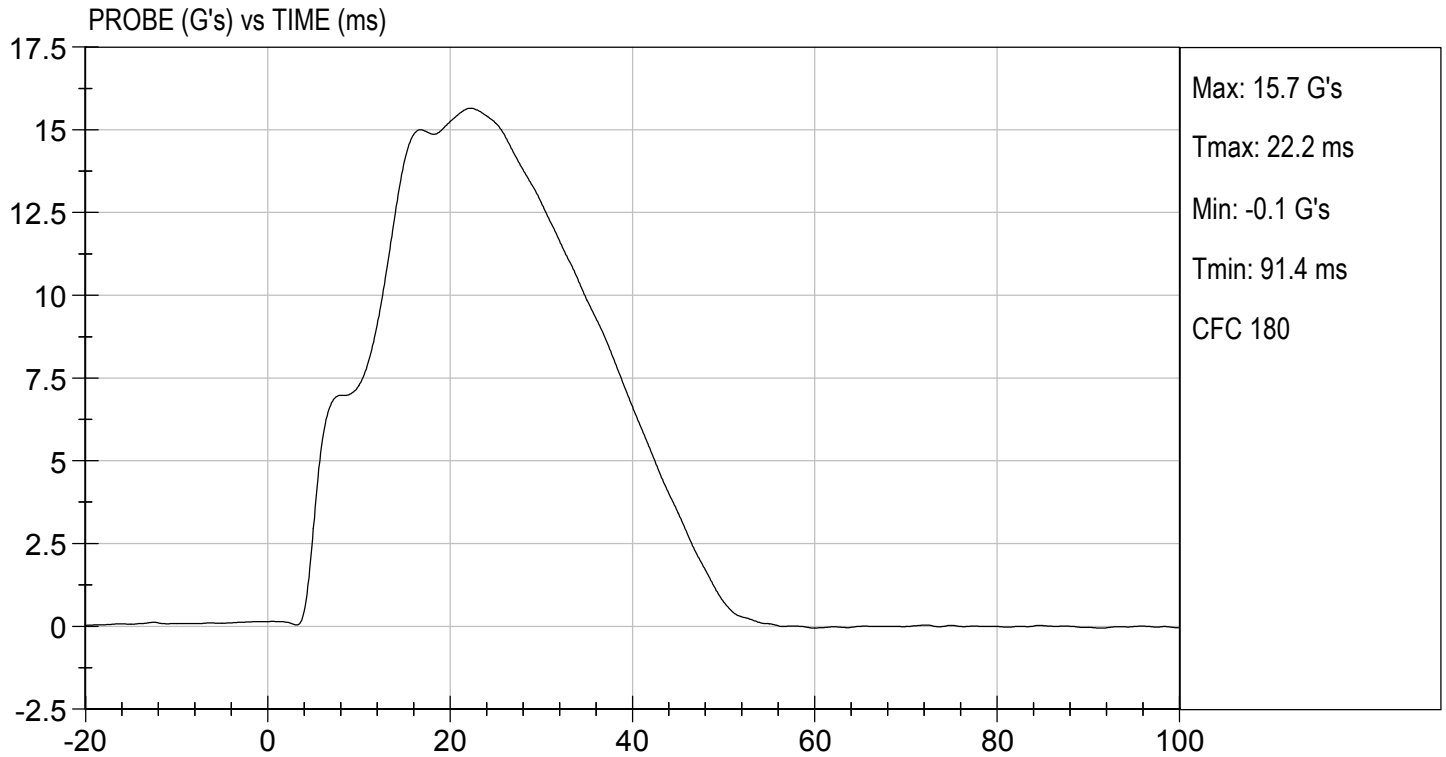
Test Date


Approved By



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

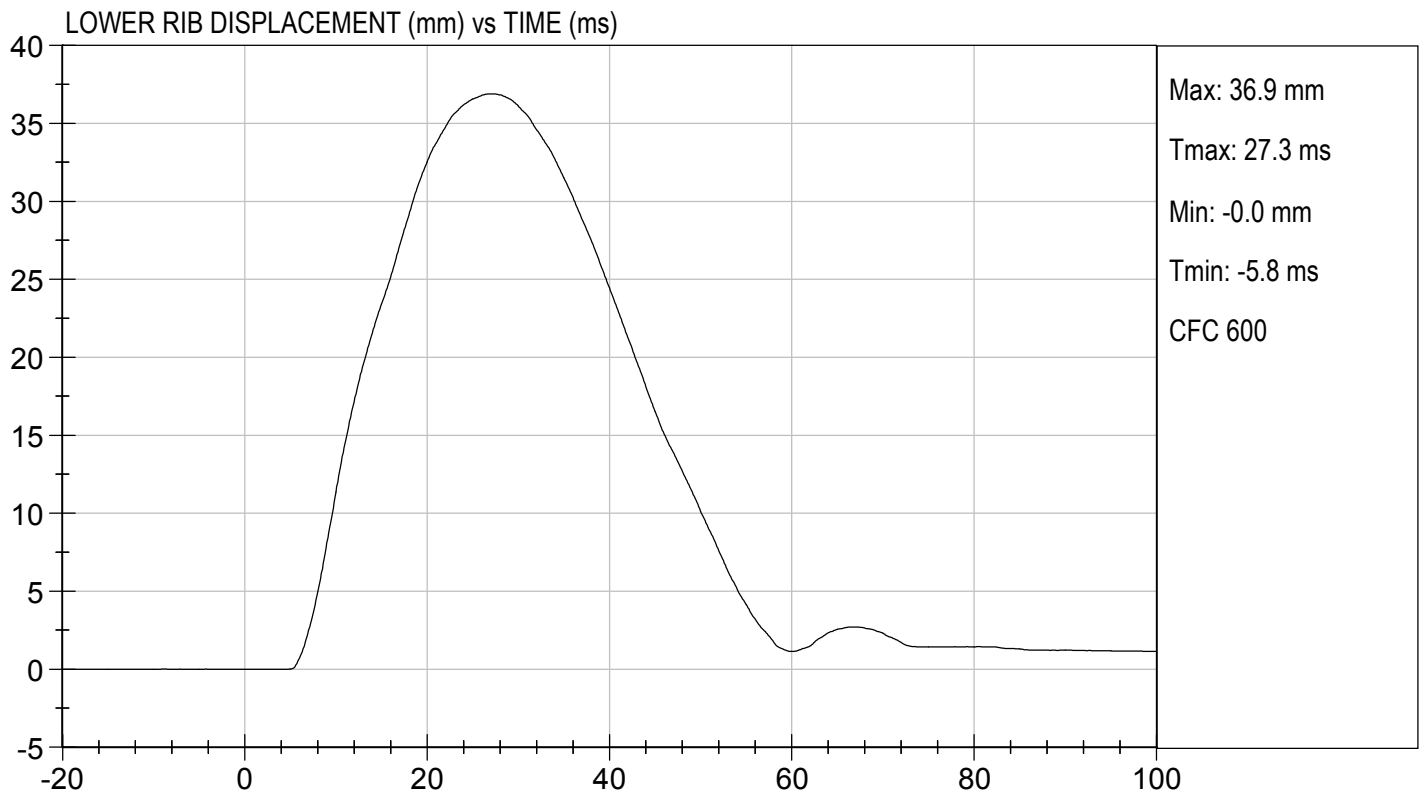
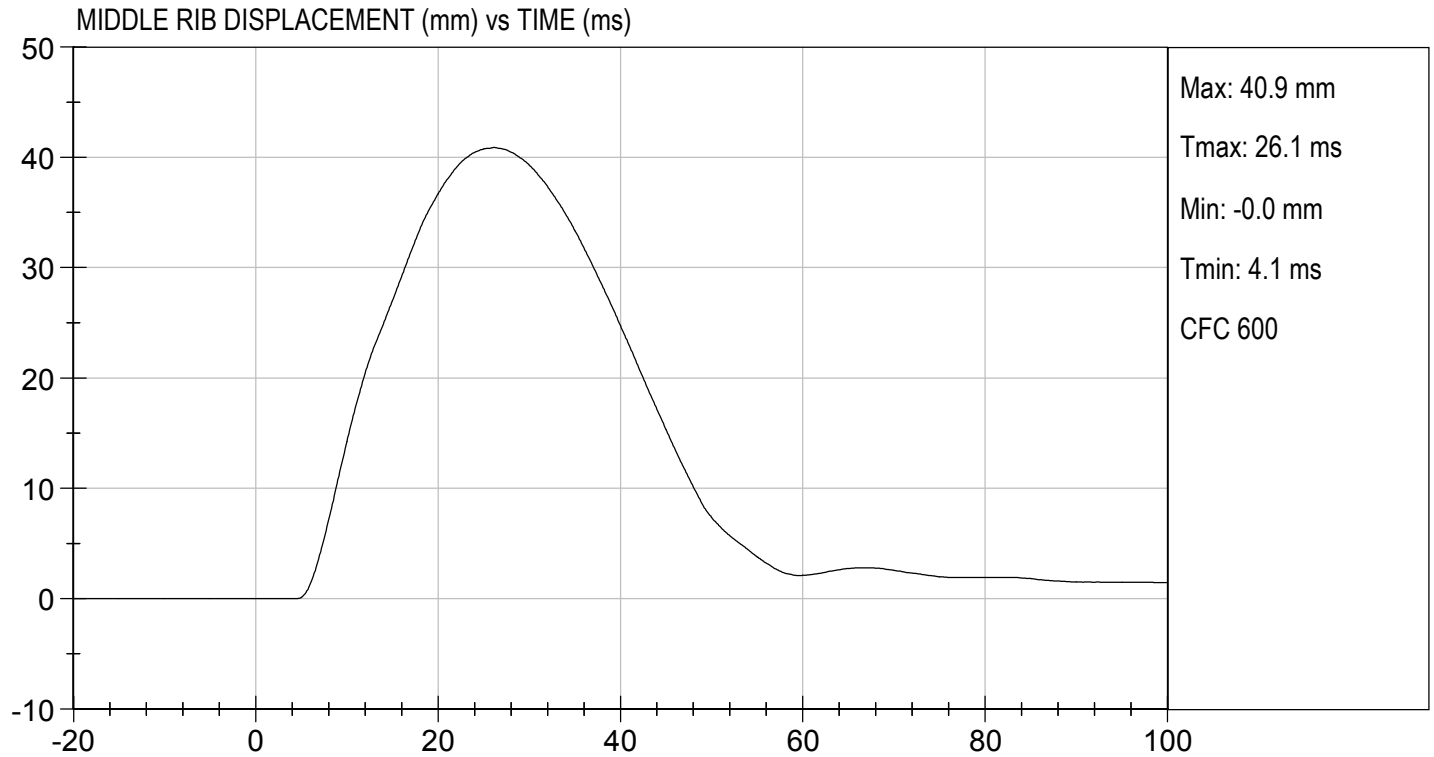
TEST DATE: 01/08/2019
TEST #: D190085





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

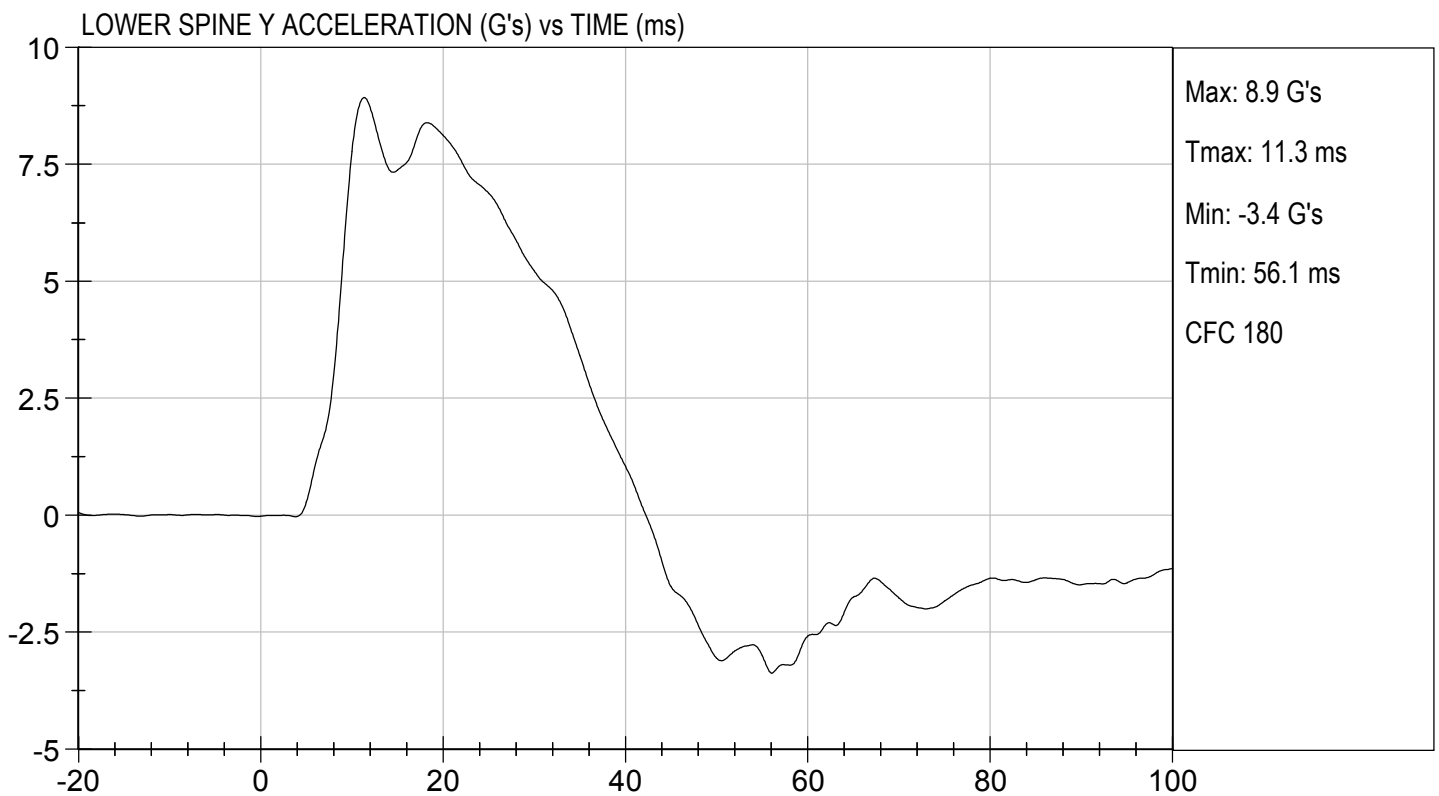
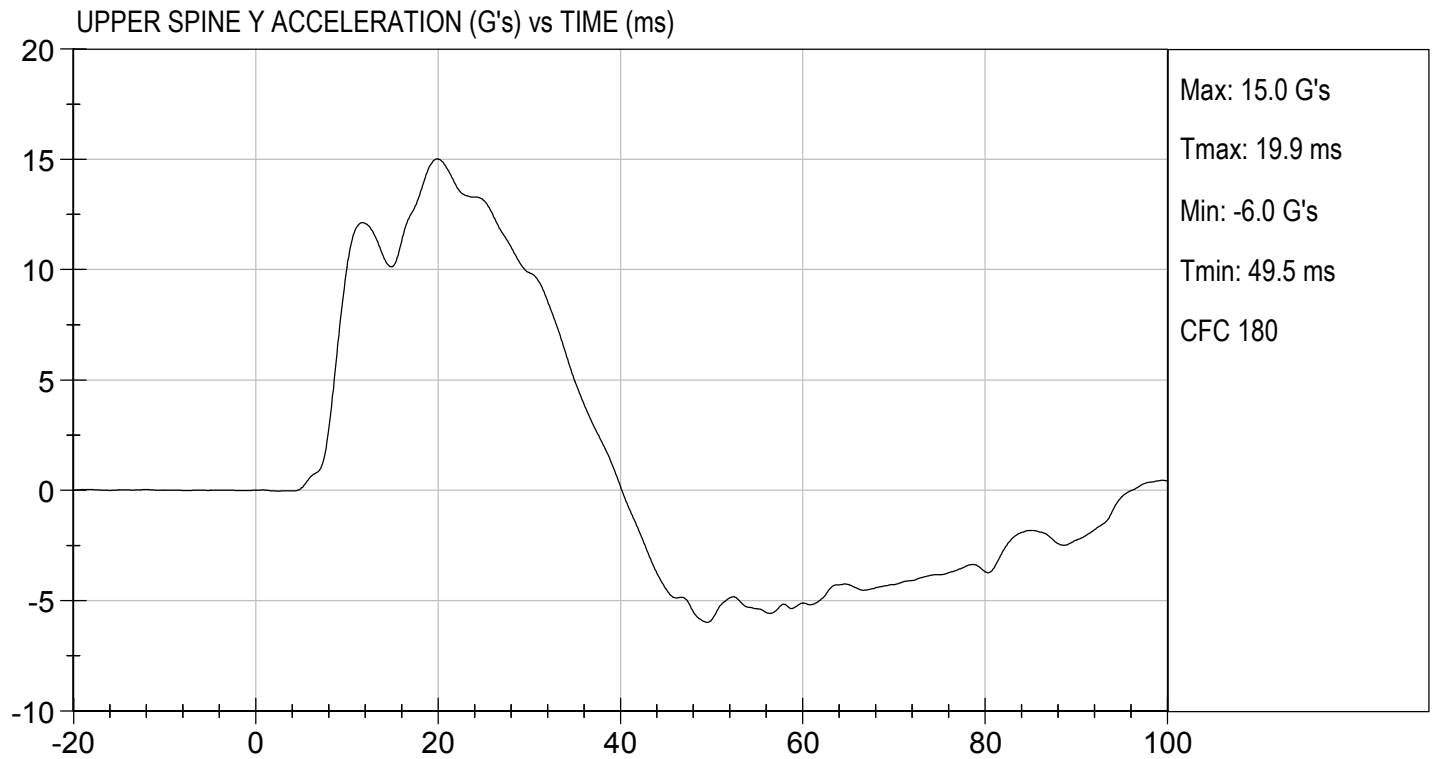
TEST DATE: 01/08/2019
TEST #: D190085





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

TEST DATE: 01/08/2019
TEST #: D190085



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D190086

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	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

01/08/2019

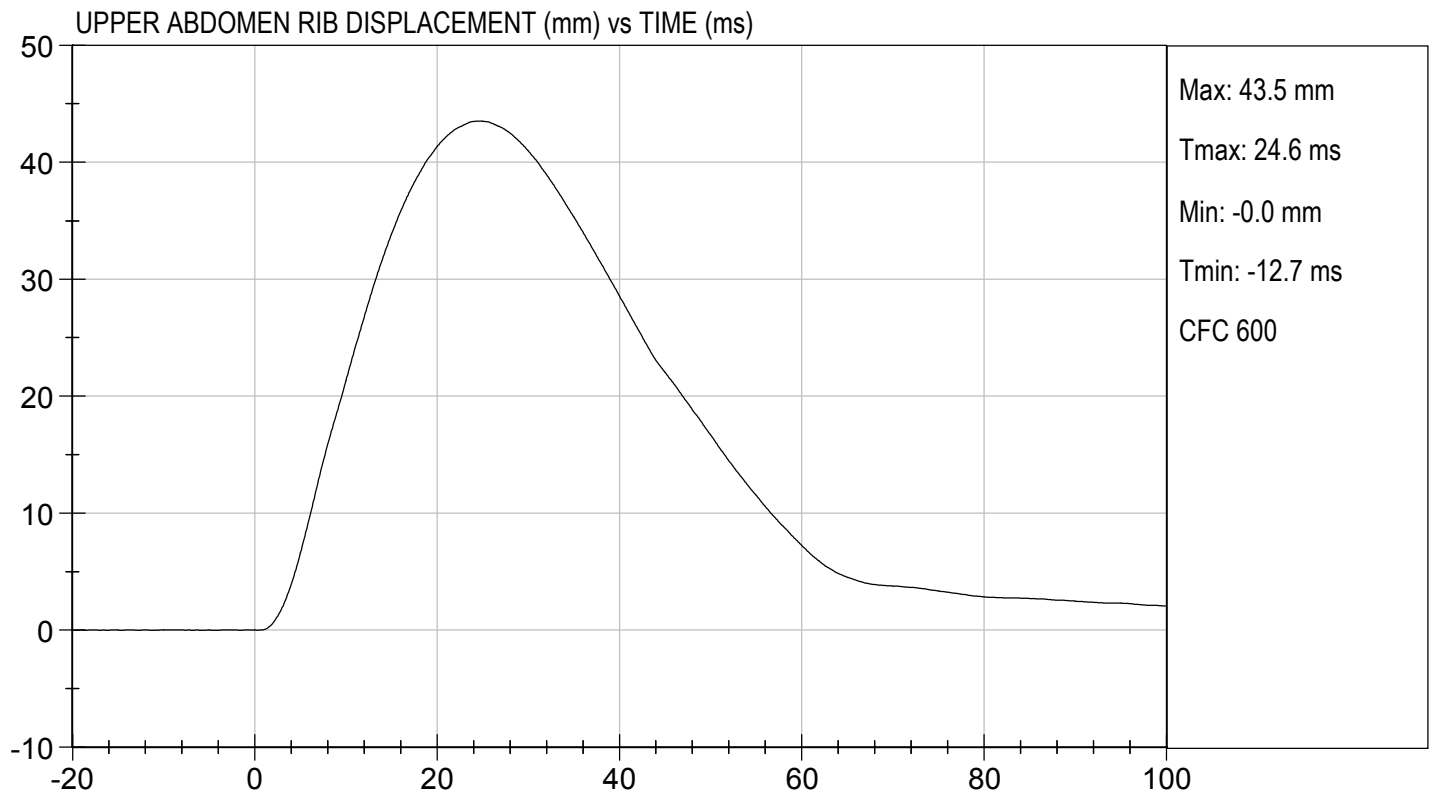
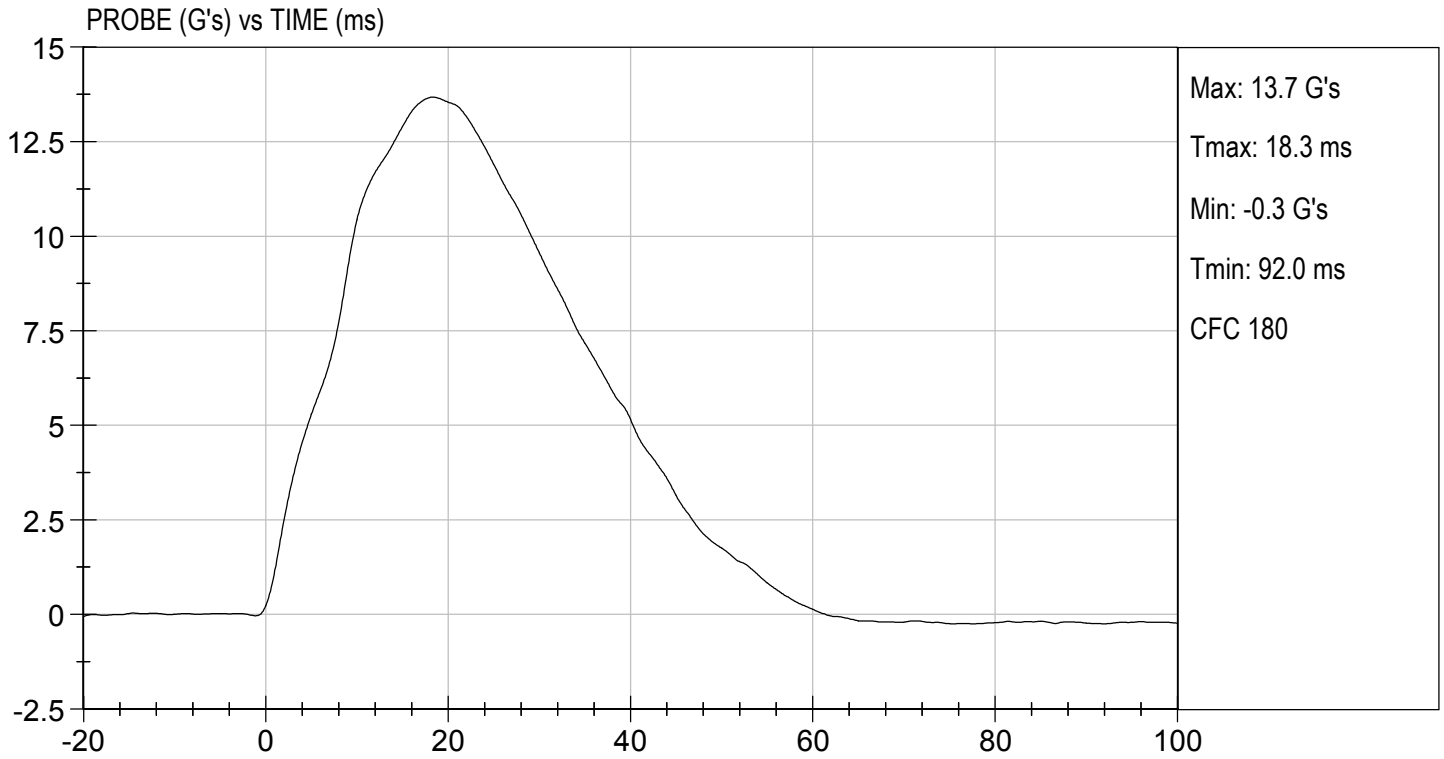
Test Date


Approved By



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

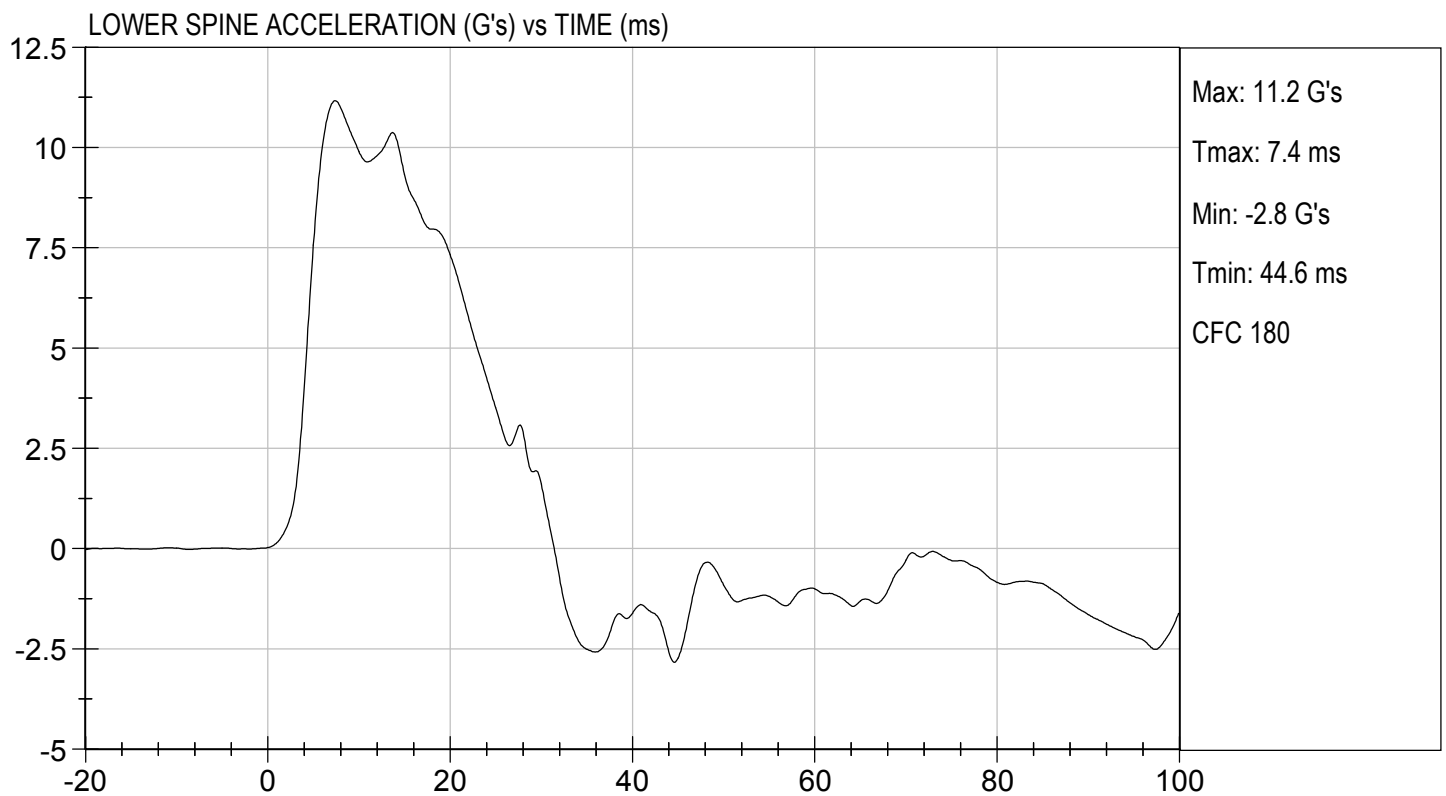
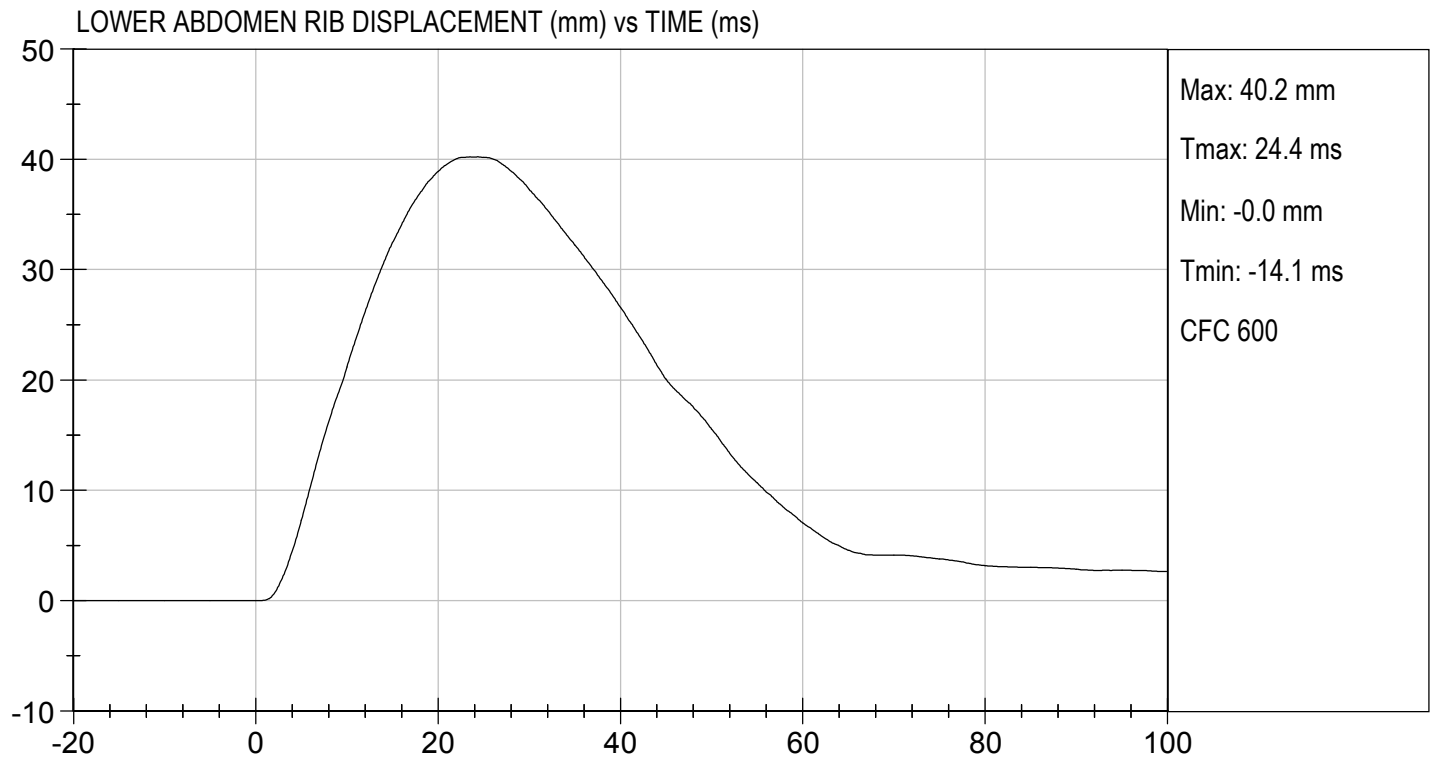
TEST DATE: 01/08/2019
TEST #: D190086





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

TEST DATE: 01/08/2019
TEST #: D190086



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

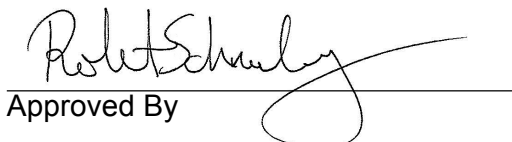
Test I.D: D190087

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	4,170	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

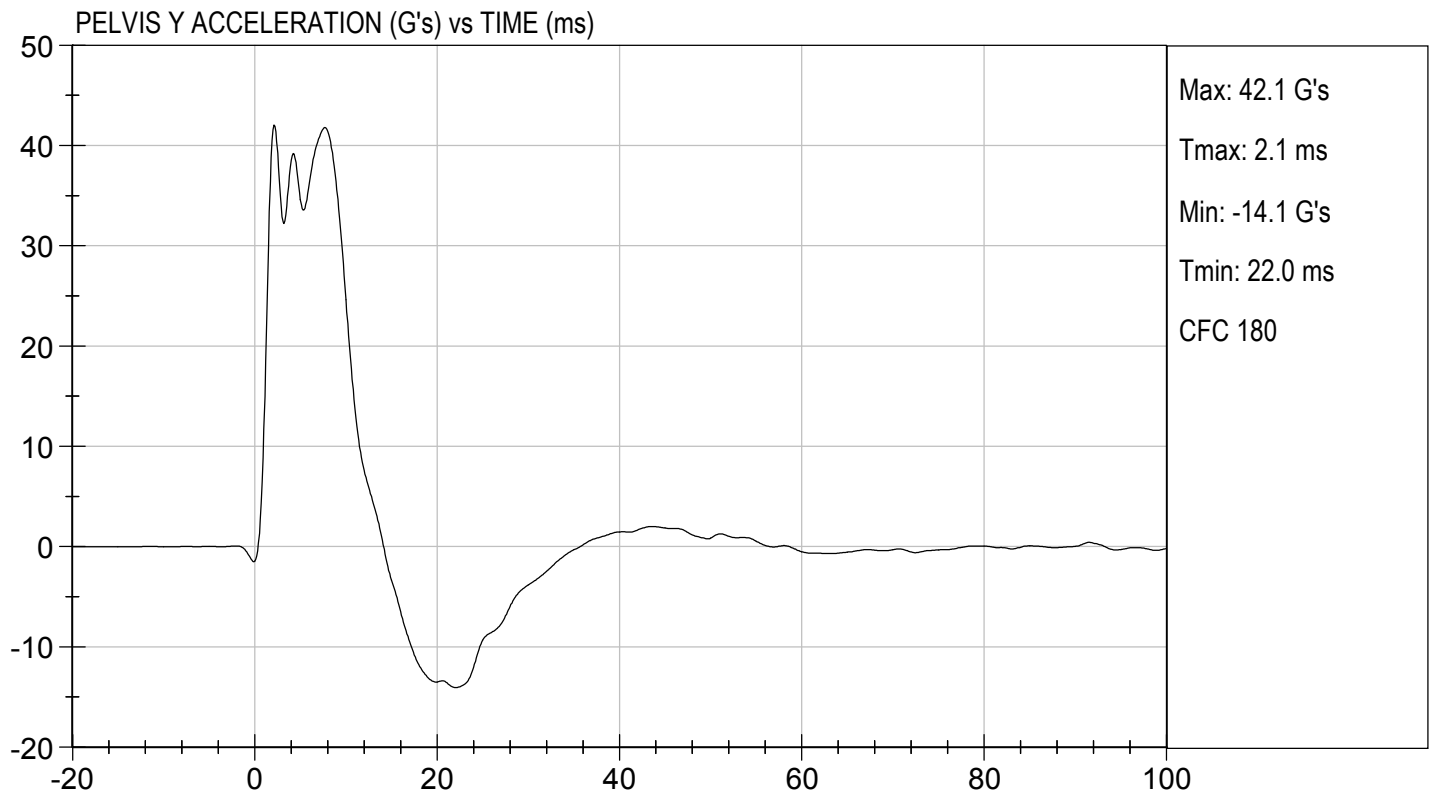
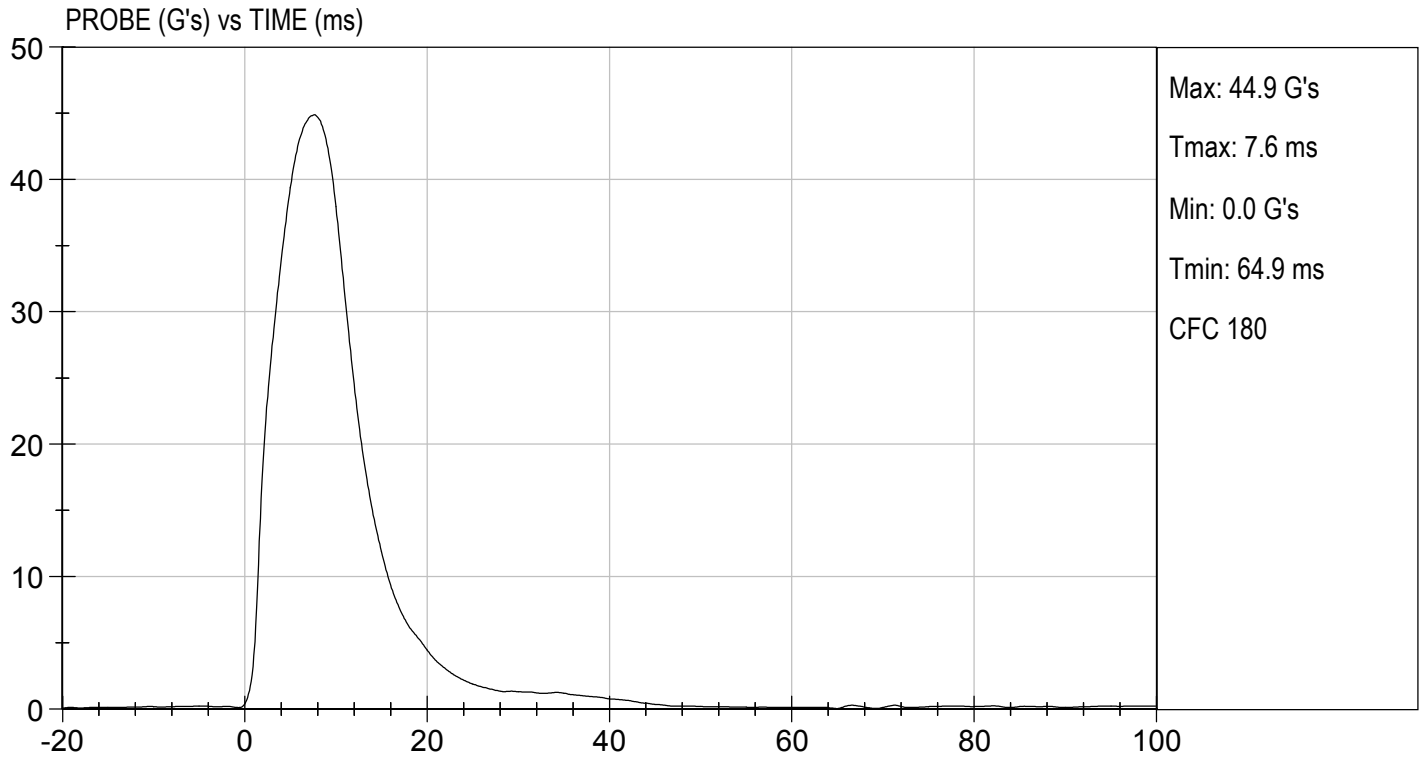
Test Date


Approved By



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

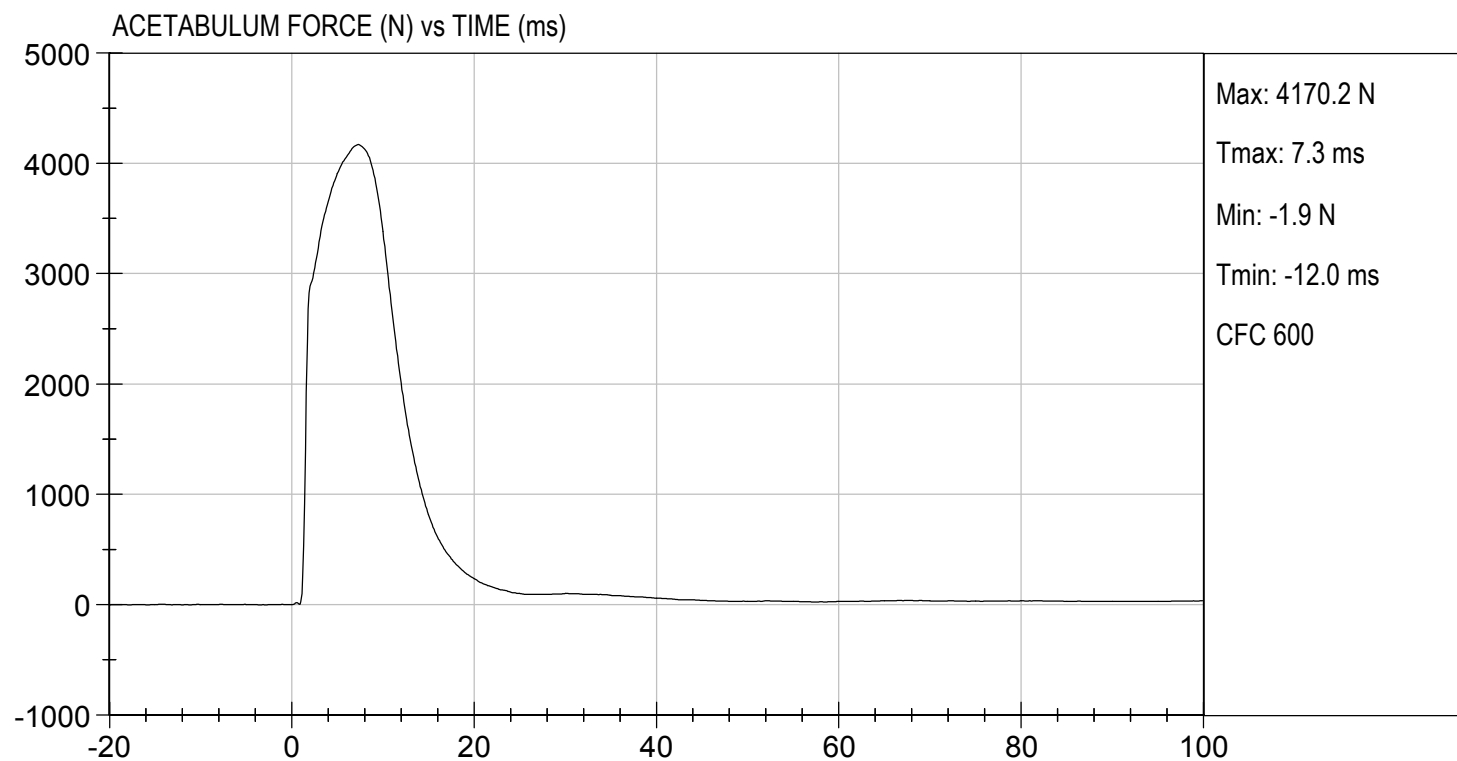
TEST DATE: 01/08/2019
TEST #: D190087





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

TEST DATE: 01/08/2019
TEST #: D190087



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

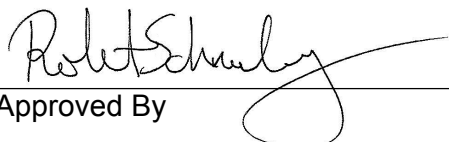
Test I.D: D190088

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,532	Pass
Overall Test Results				Pass


Laboratory Technician

01/08/2019

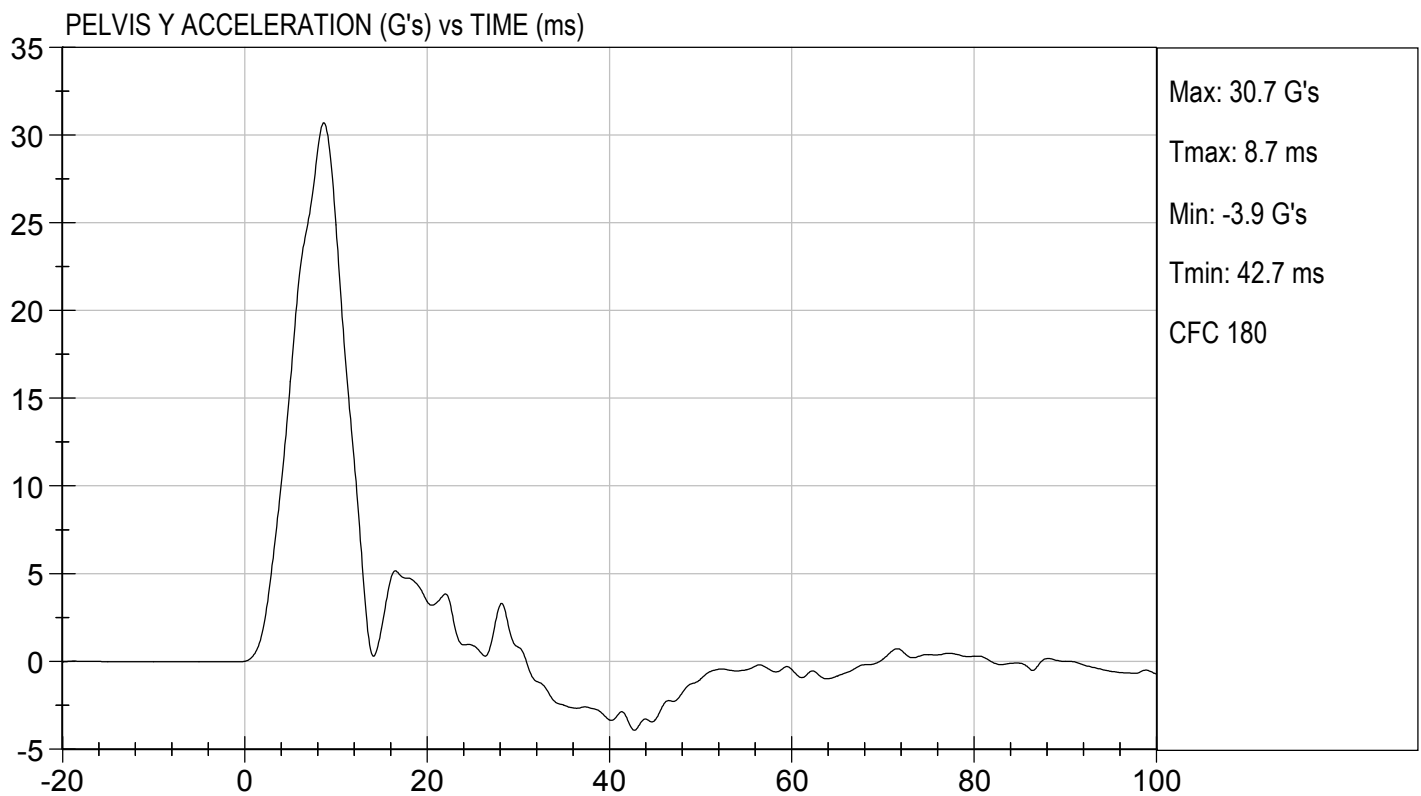
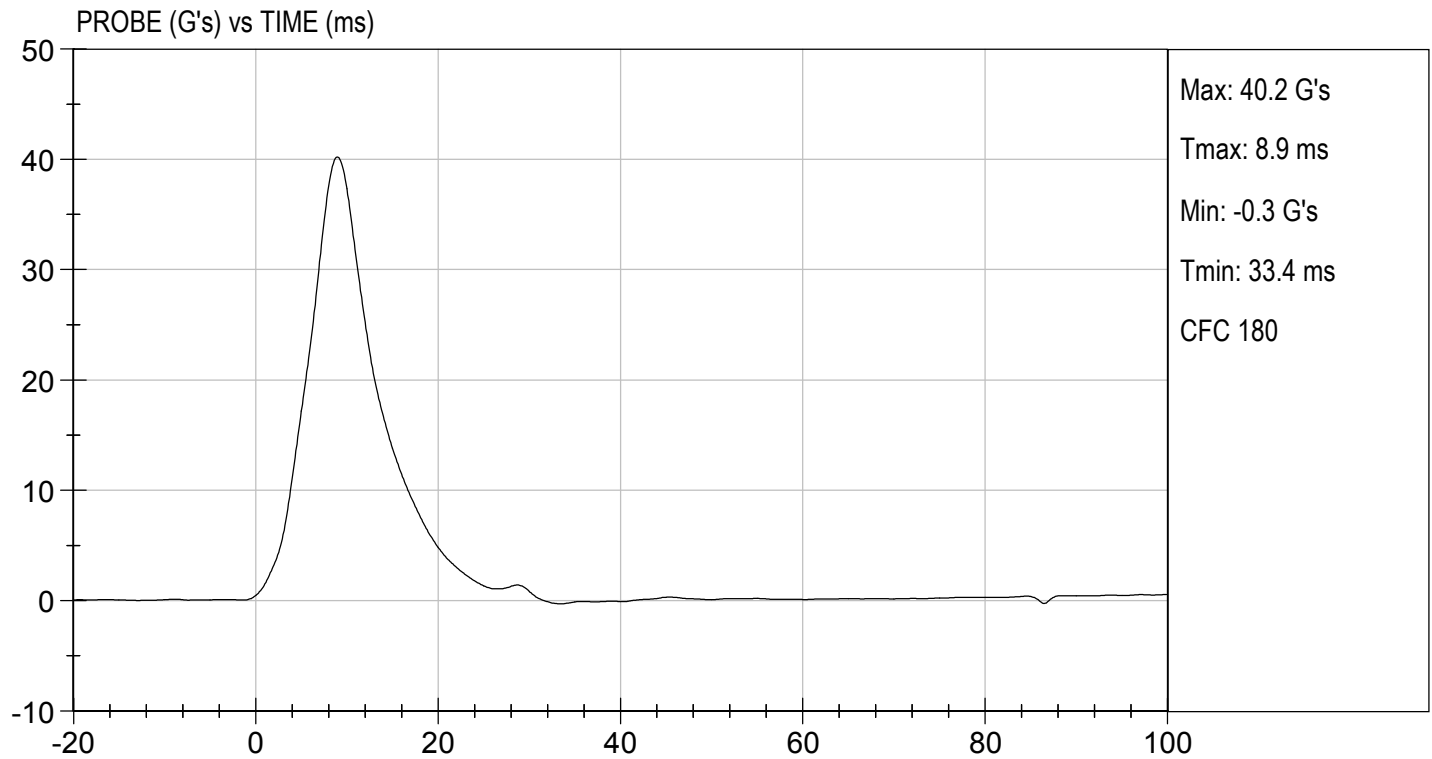
Test Date


Approved By



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

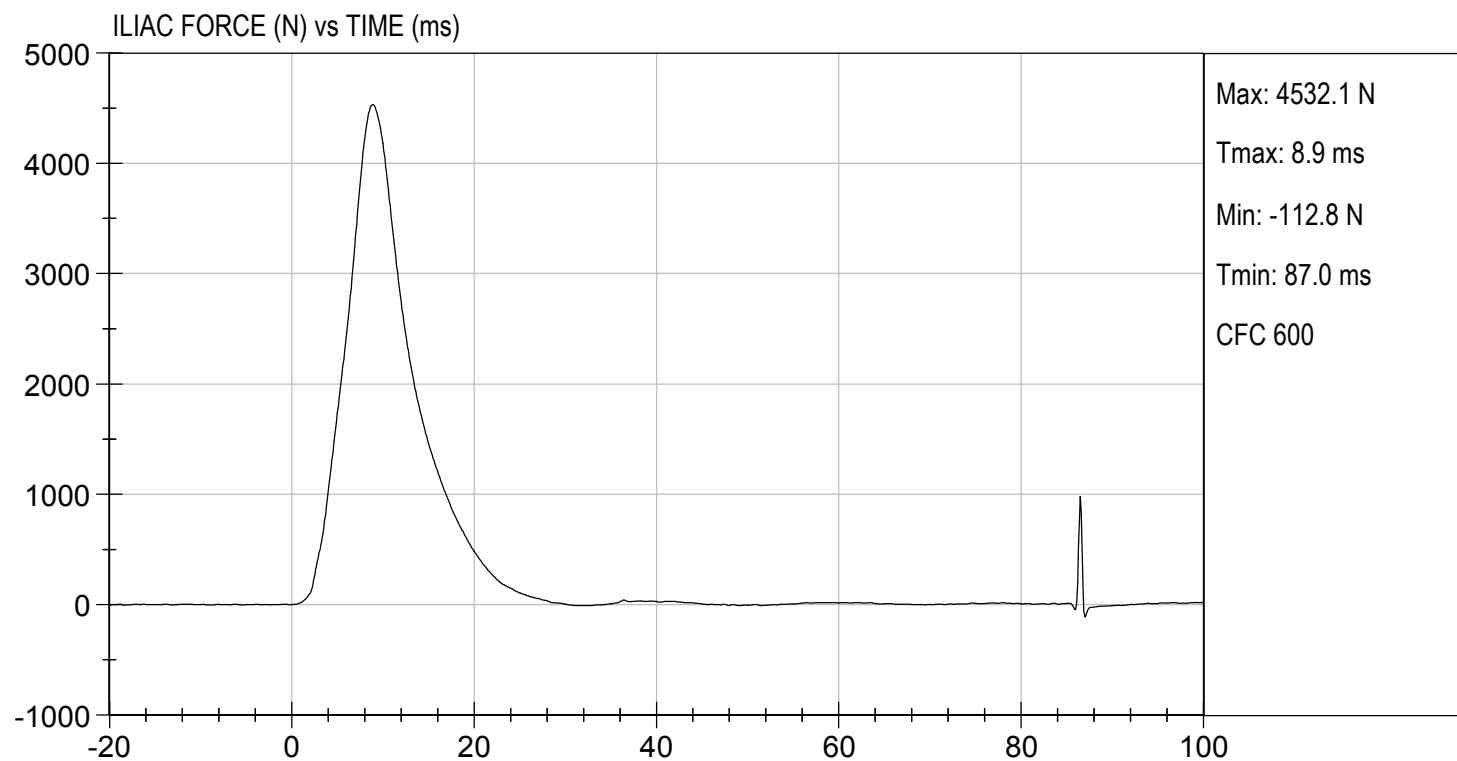
TEST DATE: 01/08/2019
TEST #: D190088





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

TEST DATE: 01/08/2019
TEST #: D190088



CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SID-IIsD External Measurements
SN: 306

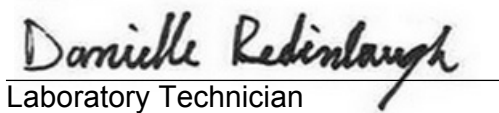
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

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

ATD Serial No: 306

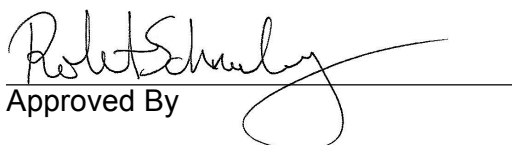
Test ID: D190161

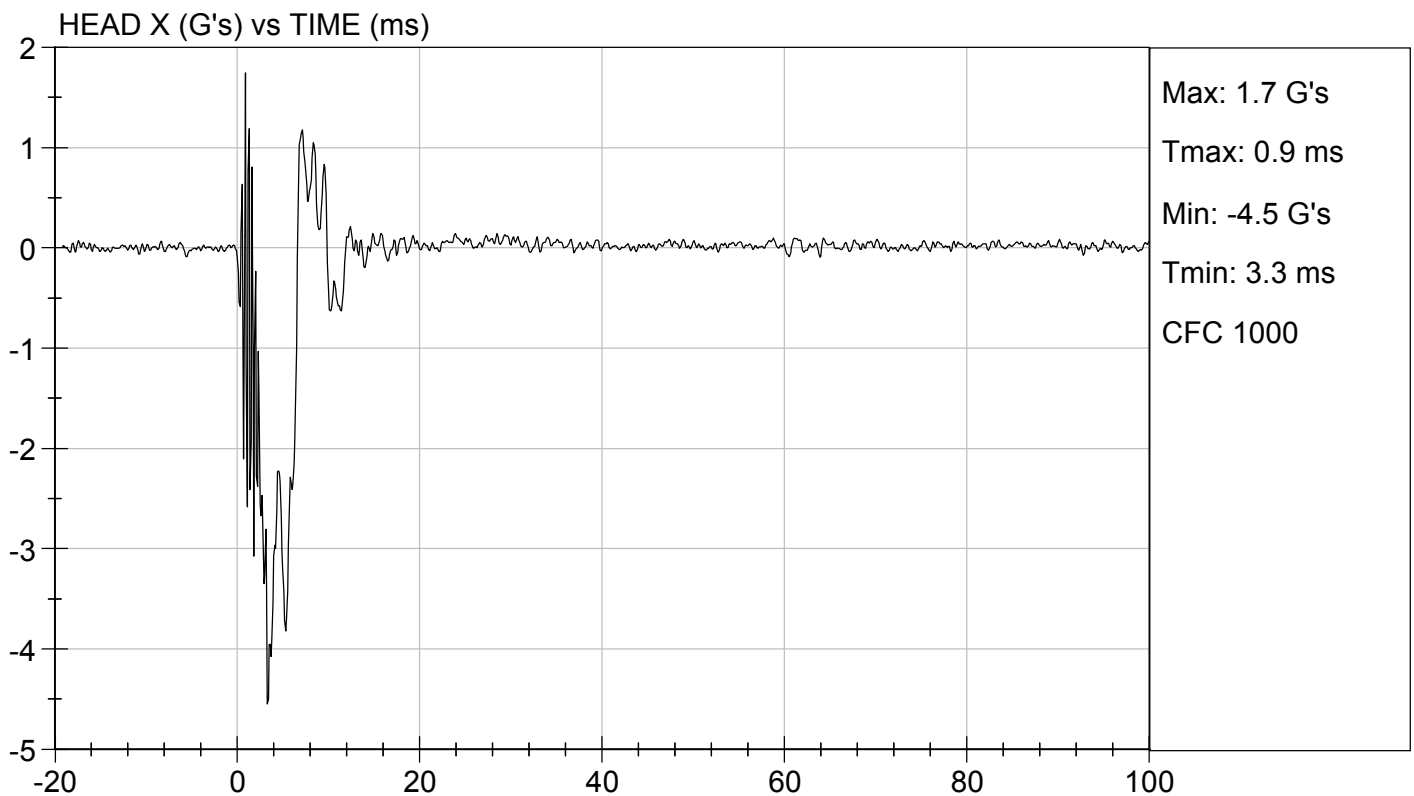
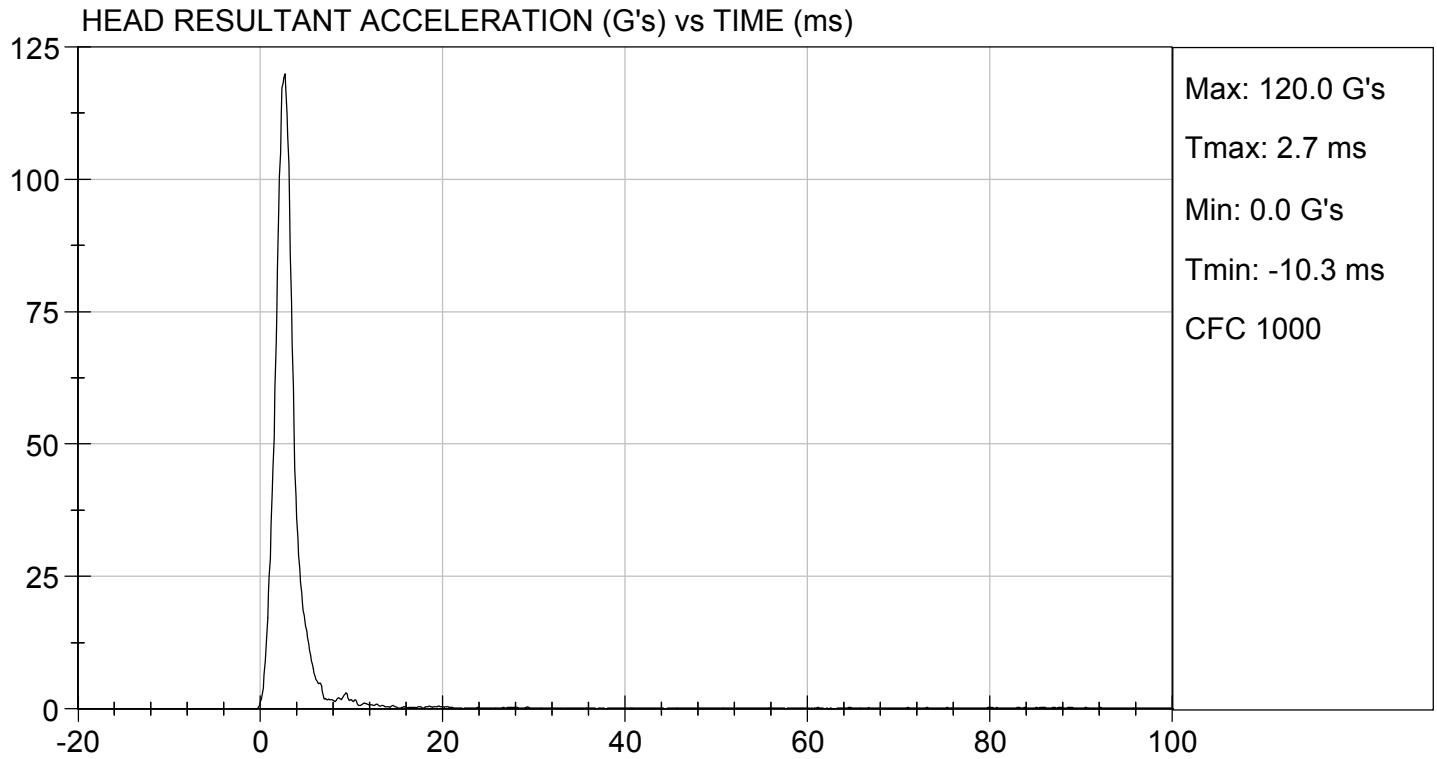
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21.4	Pass
Peak Resultant Acceleration	G's	115 to 137	120	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-4.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass

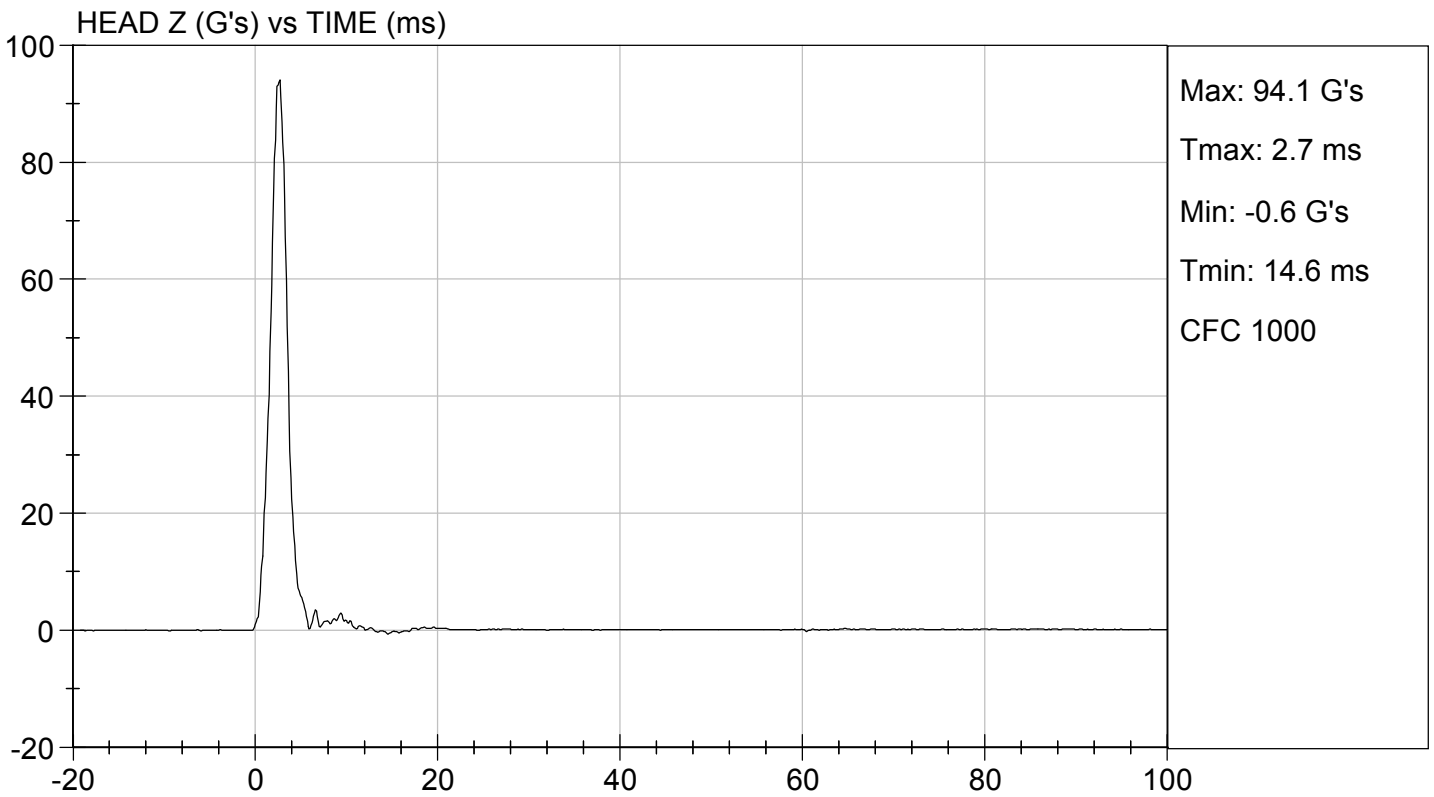
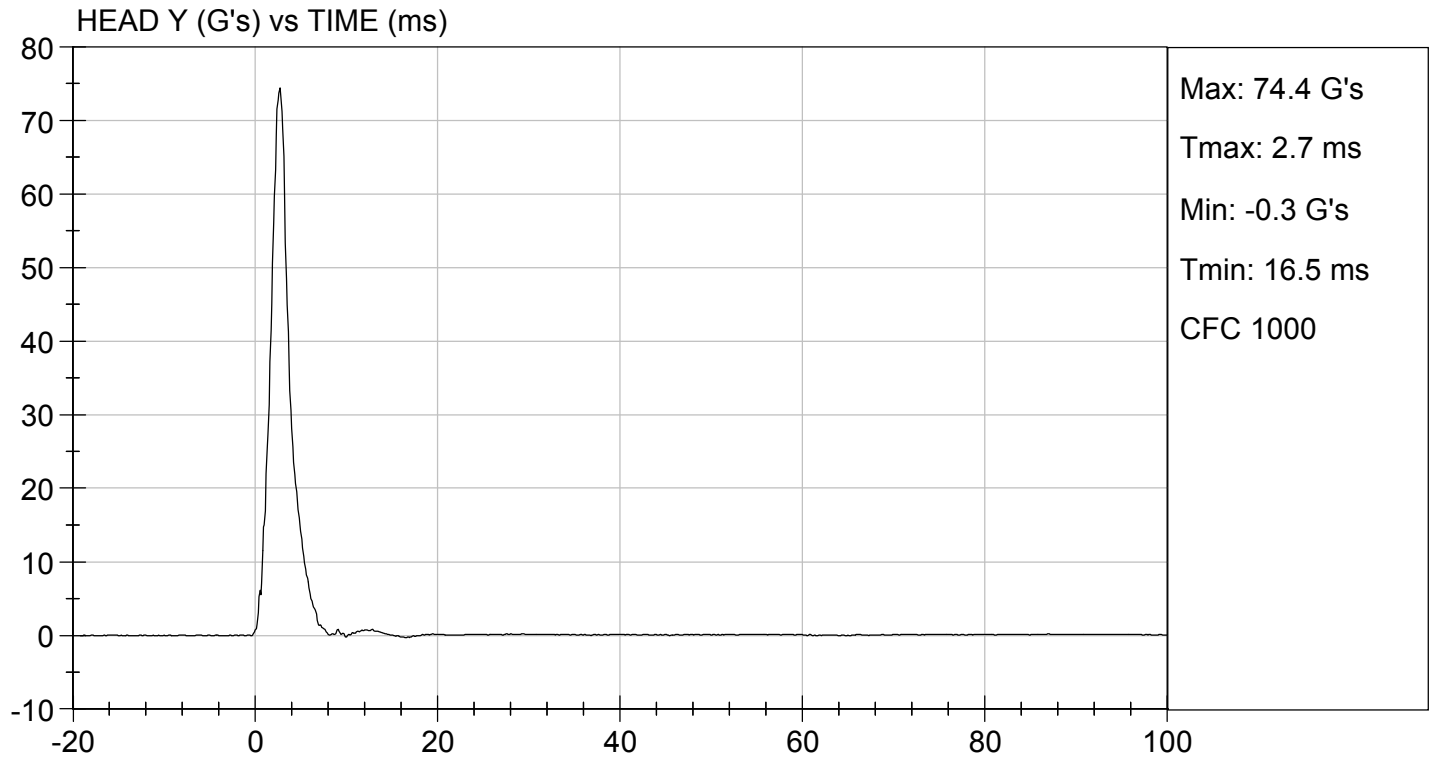

Laboratory Technician

01/11/2019

Test Date


Approved By



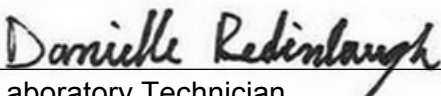


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

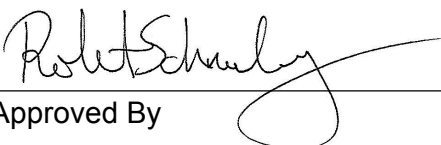
Test I.D: D190162

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.9	Pass
Humidity		%	10 to 70	21.4	Pass
Impact Velocity		m/s	5.51 to 5.63	5.52	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.46	Pass
	15 ms	m/s	3.30 to 4.10	3.63	Pass
	20 ms	m/s	4.40 to 5.40	5.08	Pass
	25 ms	m/s	5.40 to 6.10	5.66	Pass
	25-100 ms	m/s	5.50 to 6.20	5.66	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	59	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	106	Pass
Overall Test Results					Pass


 Laboratory Technician

01/11/2019

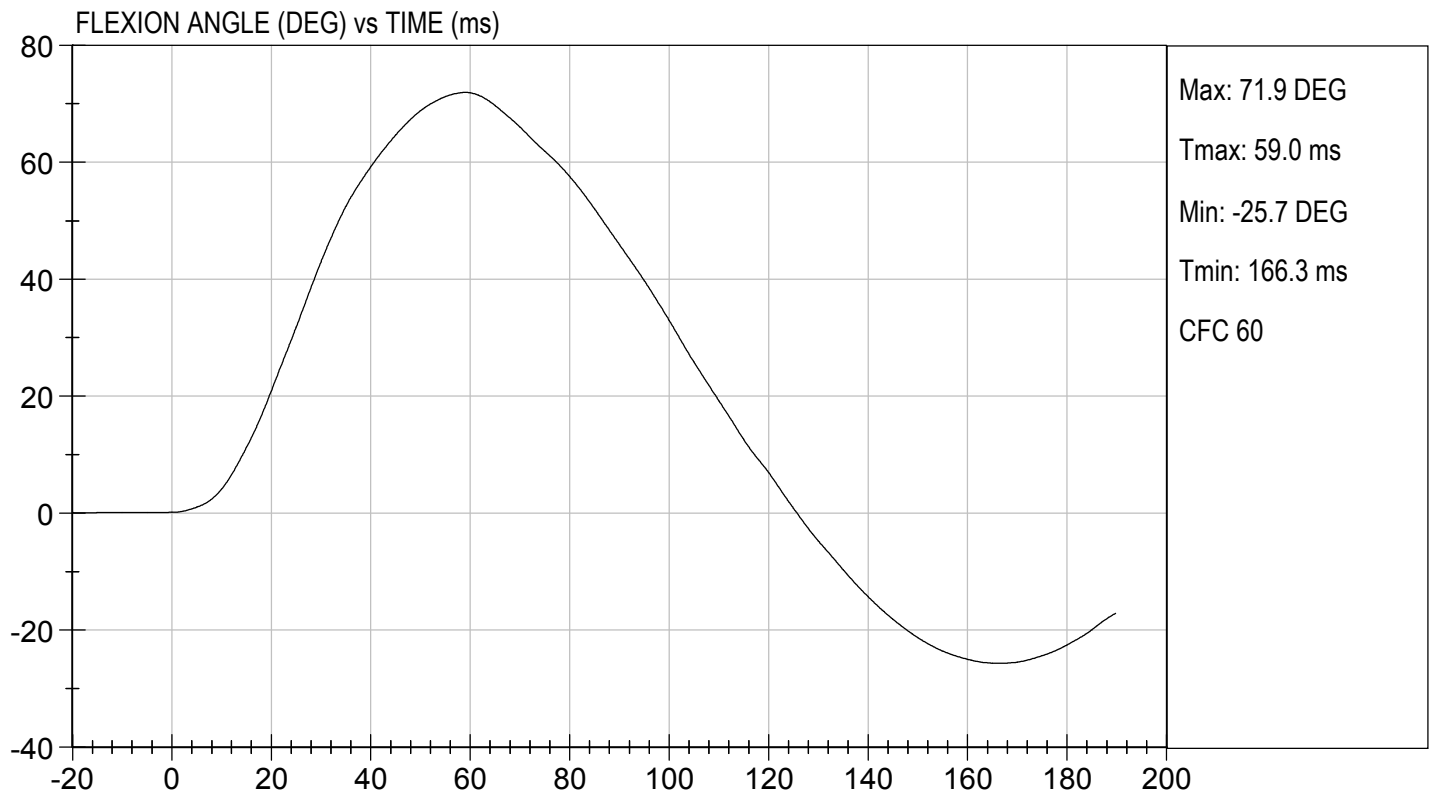
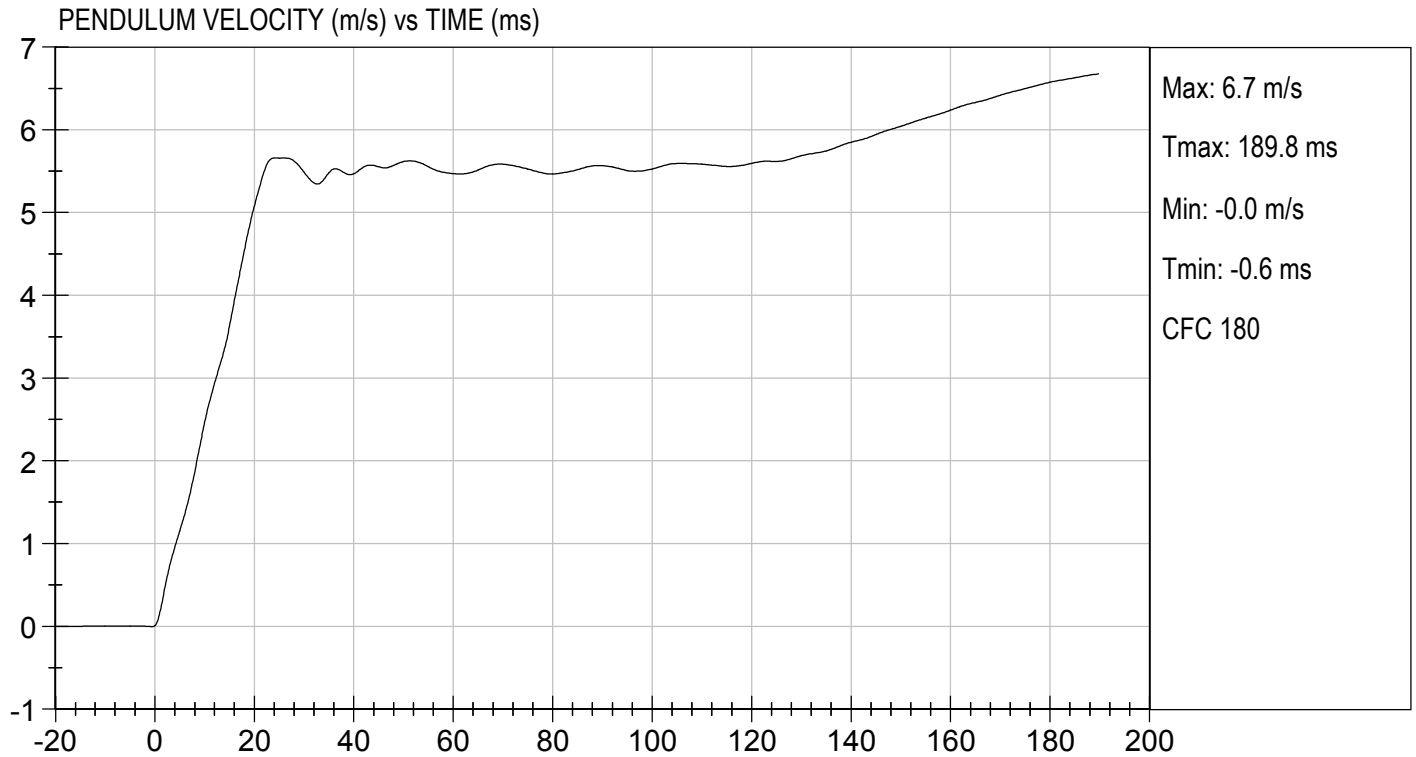
Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.10 ft/s, 5.52 m/s

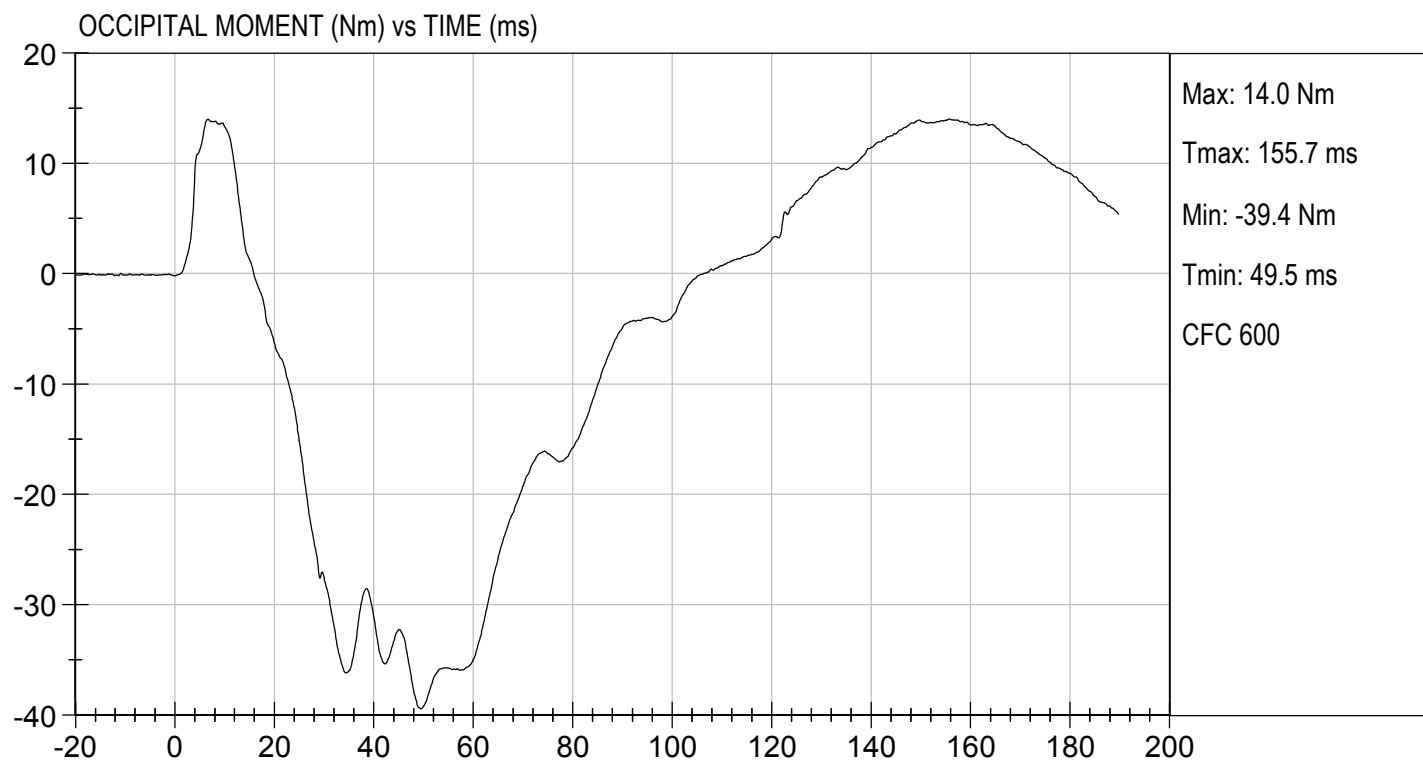
TEST DATE: 01/11/2019
TEST #: D190162





TEST DESC: NECK BENDING
VELOCITY: 18.10 ft/s, 5.52 m/s

TEST DATE: 01/11/2019
TEST #: D190162

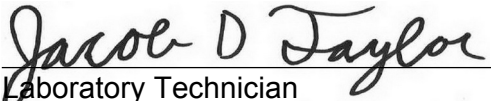


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

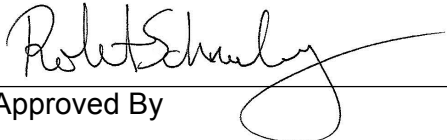
Test ID: D190163

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	21	Pass
Overall Test Results				Pass


Laboratory Technician

01/14/2019

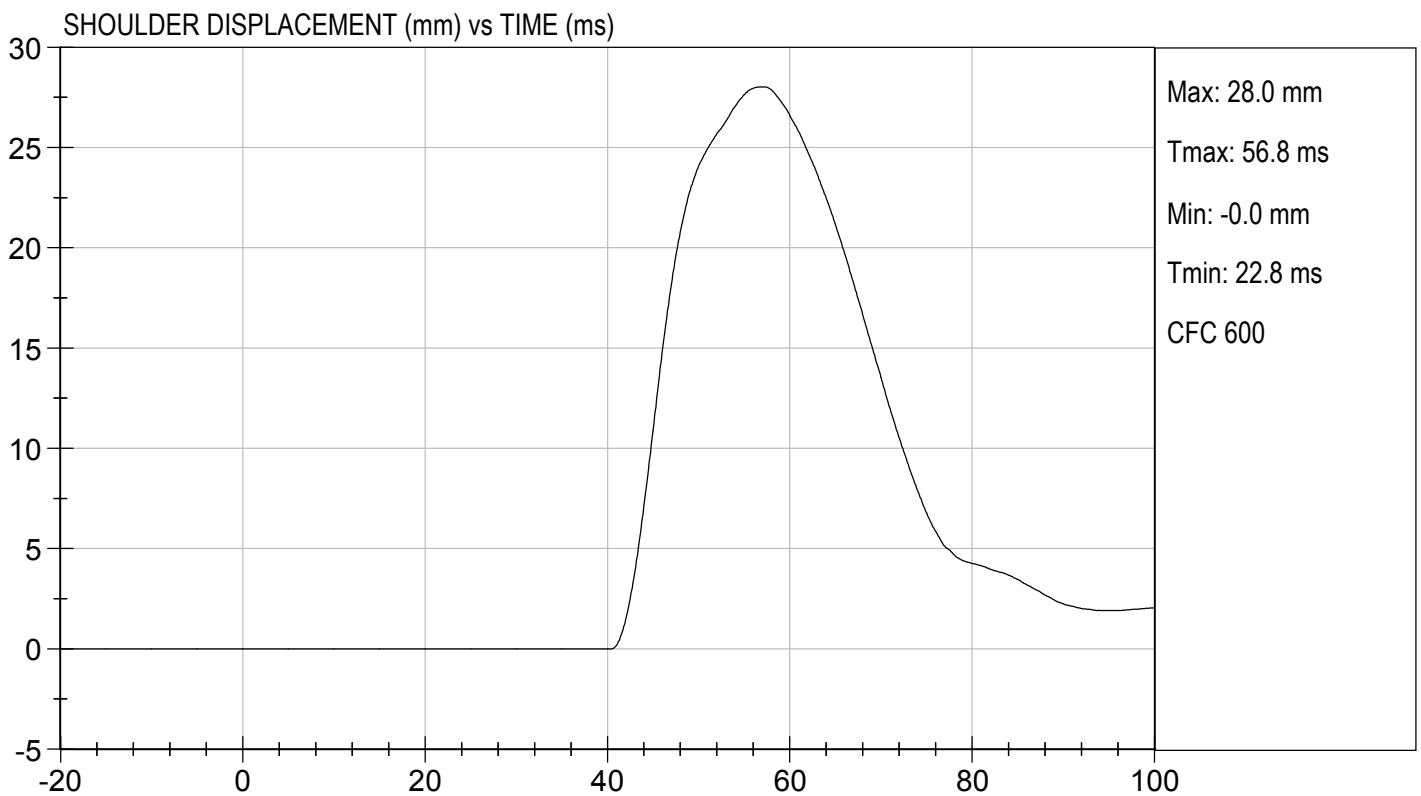
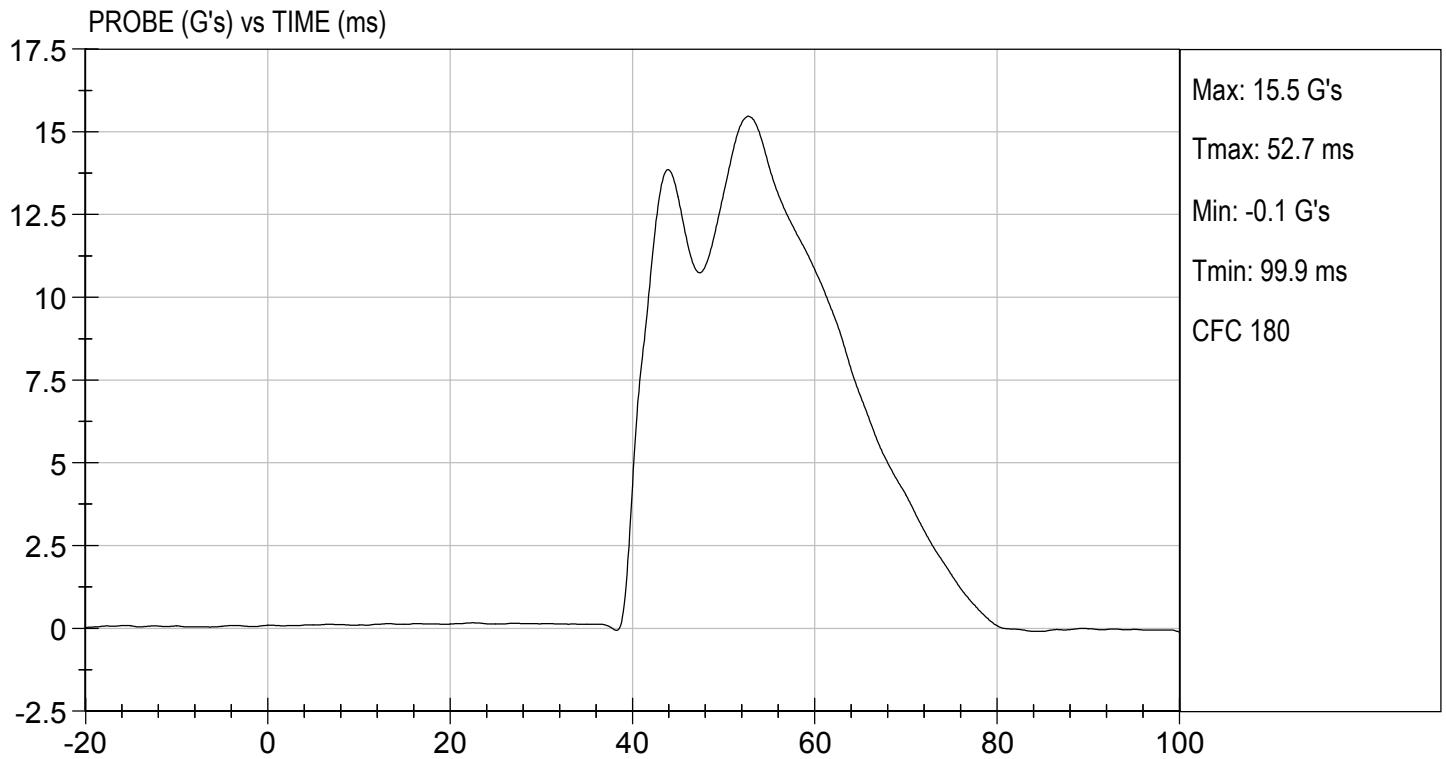
Test Date


Approved By



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

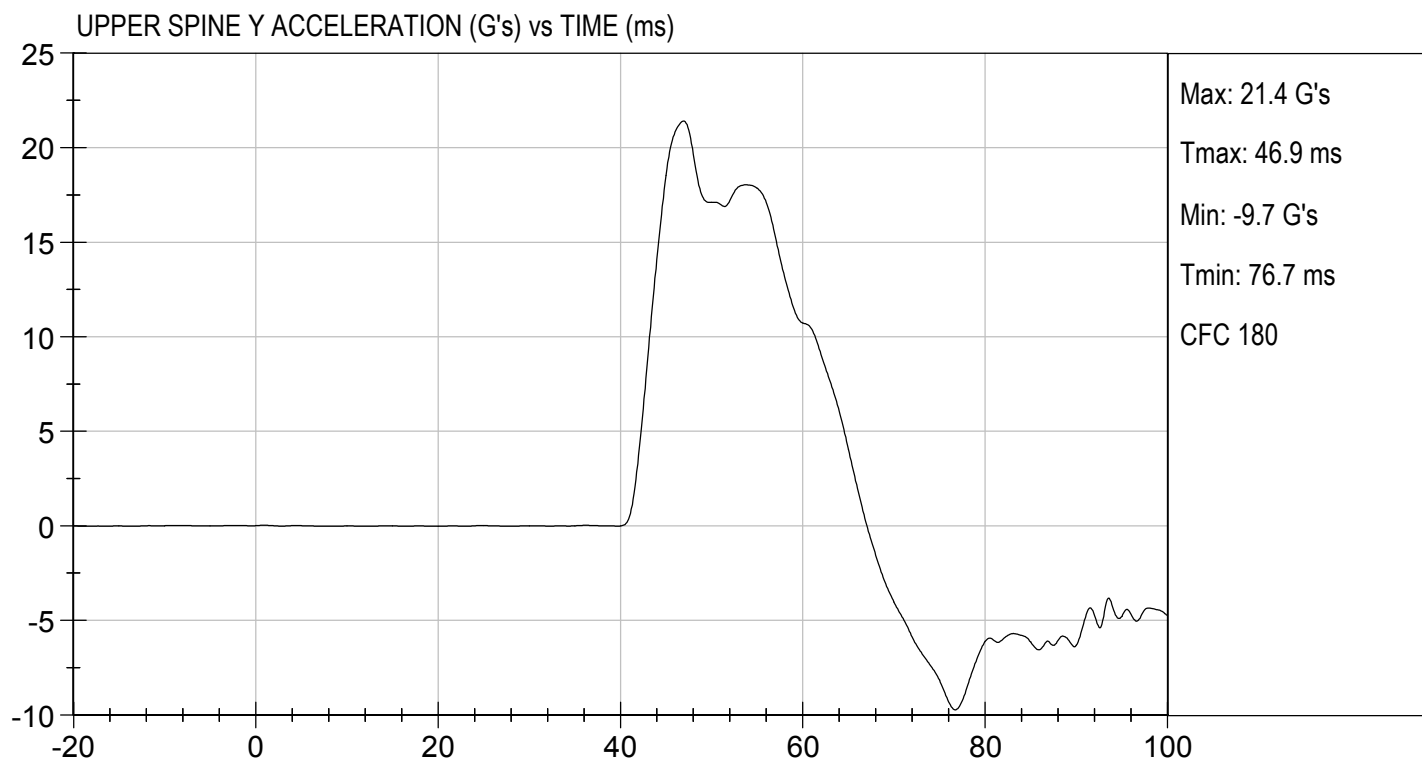
TEST DATE: 01/14/2019
TEST #: D190163





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

TEST DATE: 01/14/2019
TEST #: D190163



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

ATD Serial No: 306

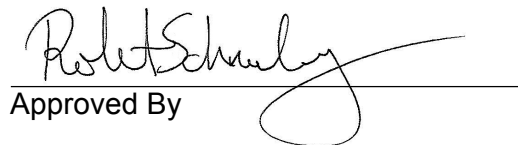
Test I.D: D190164

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	35	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	42	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	35	Pass
Overall Test Results				Pass


Laboratory Technician

01/14/2019

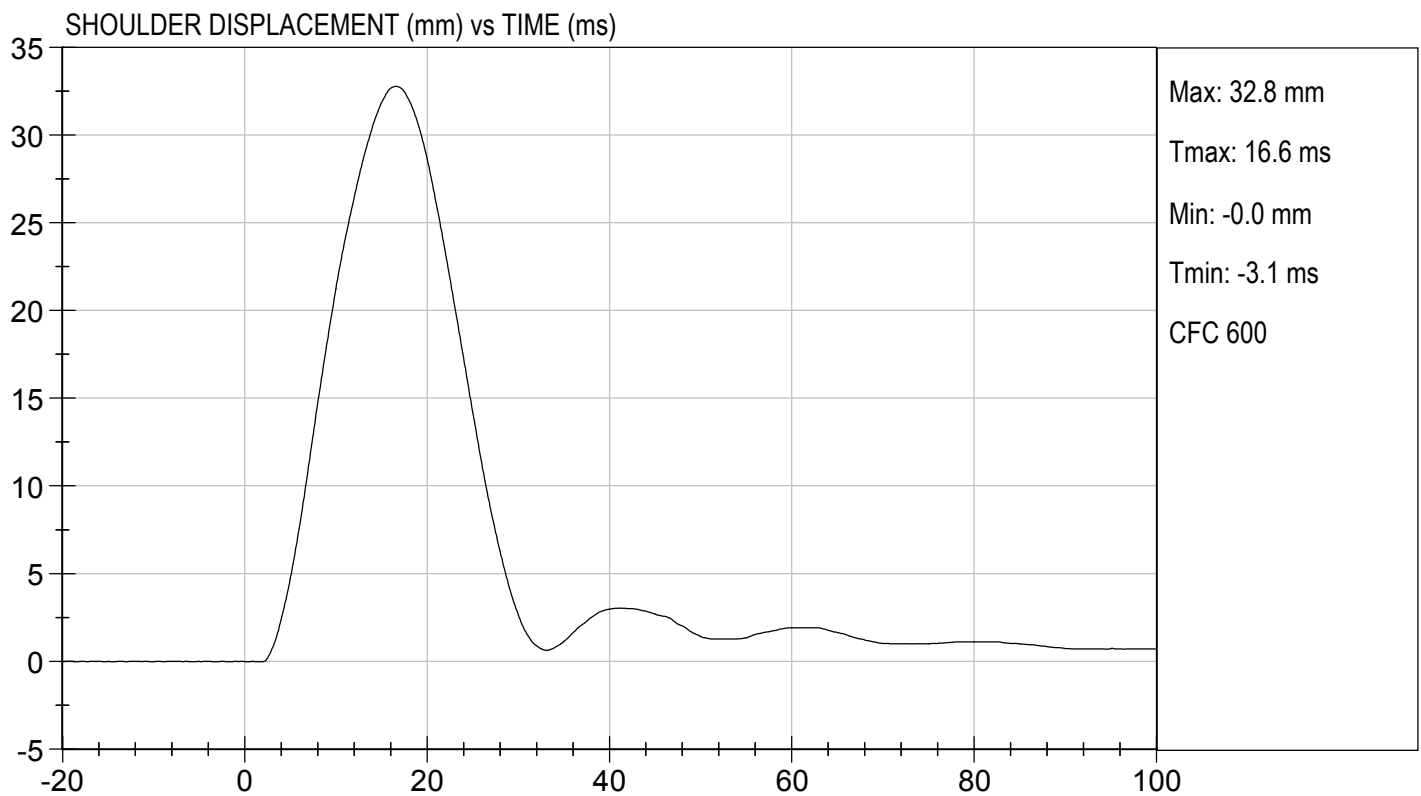
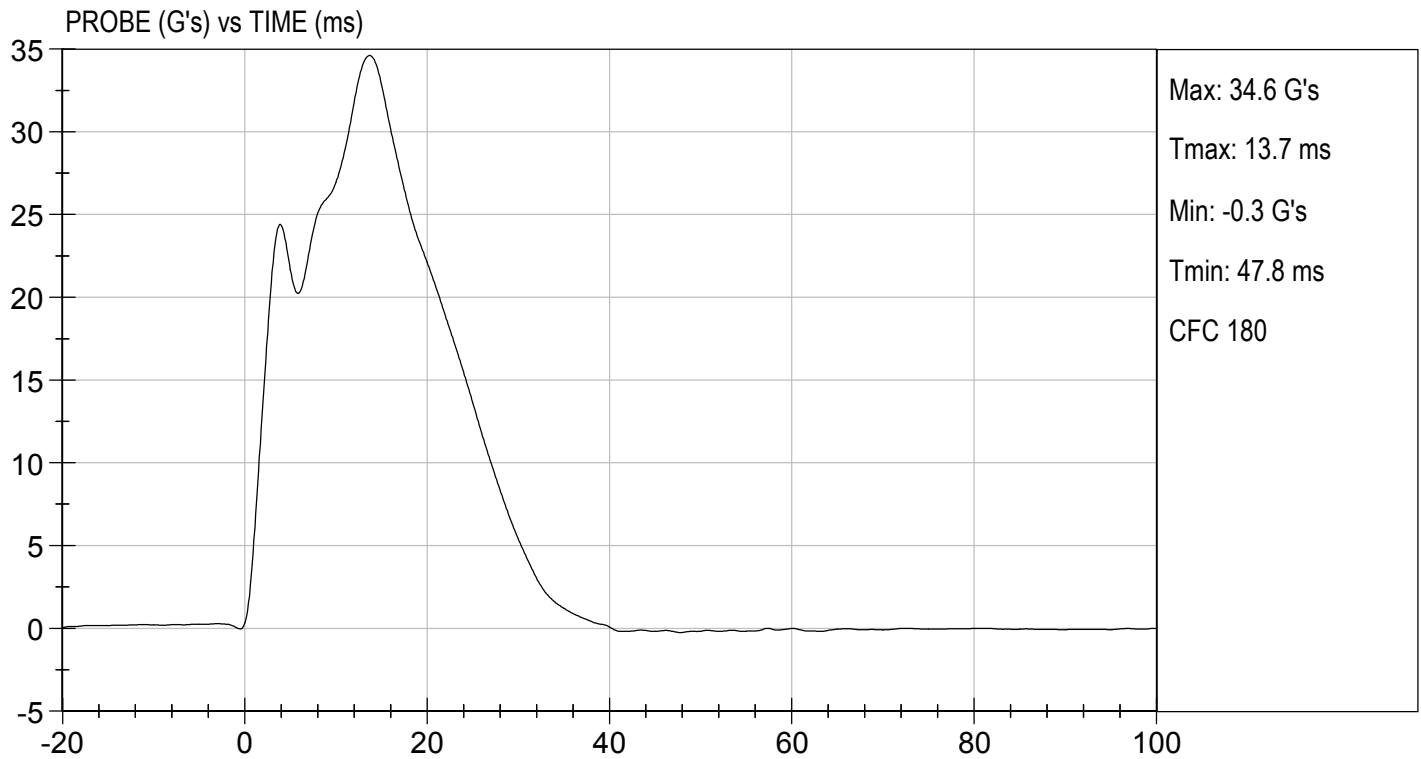
Test Date

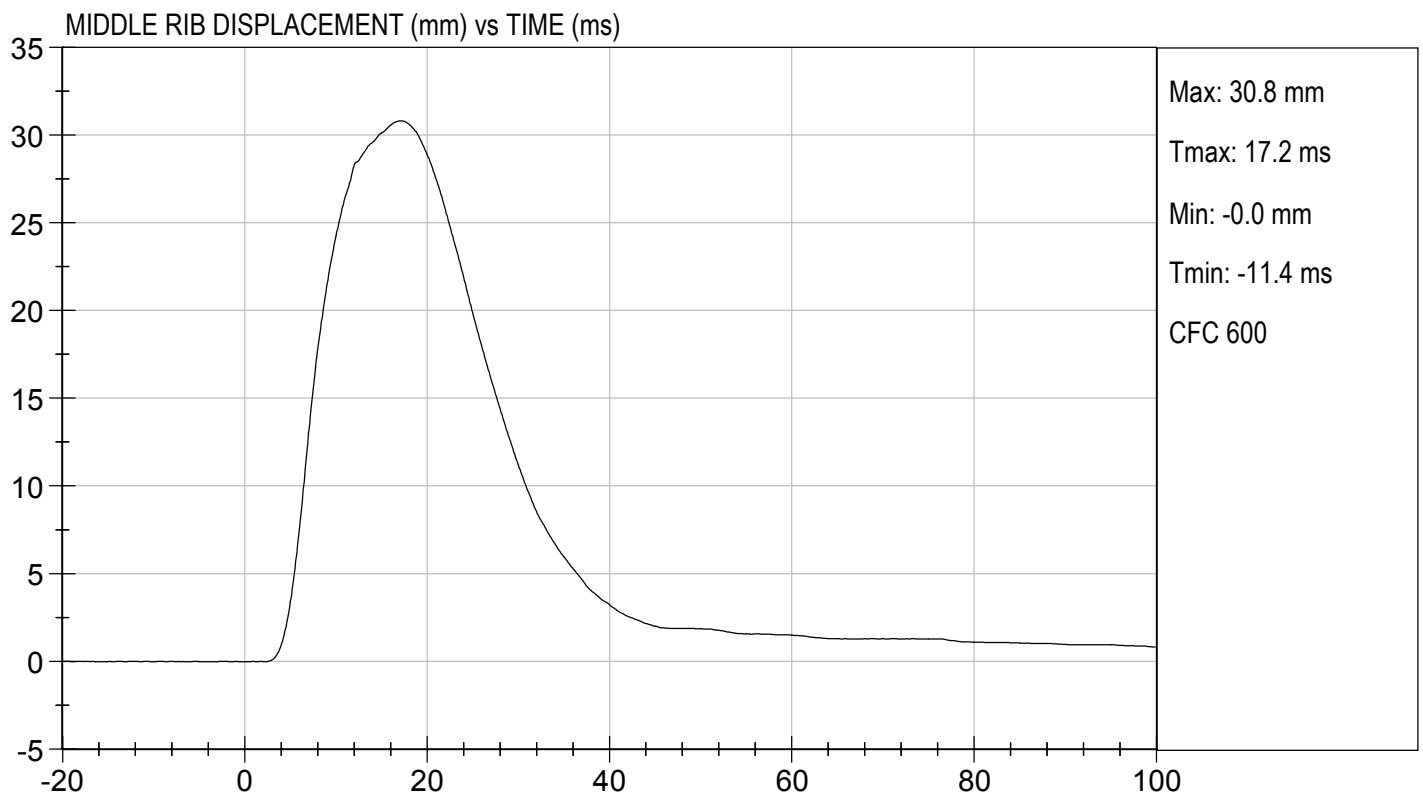
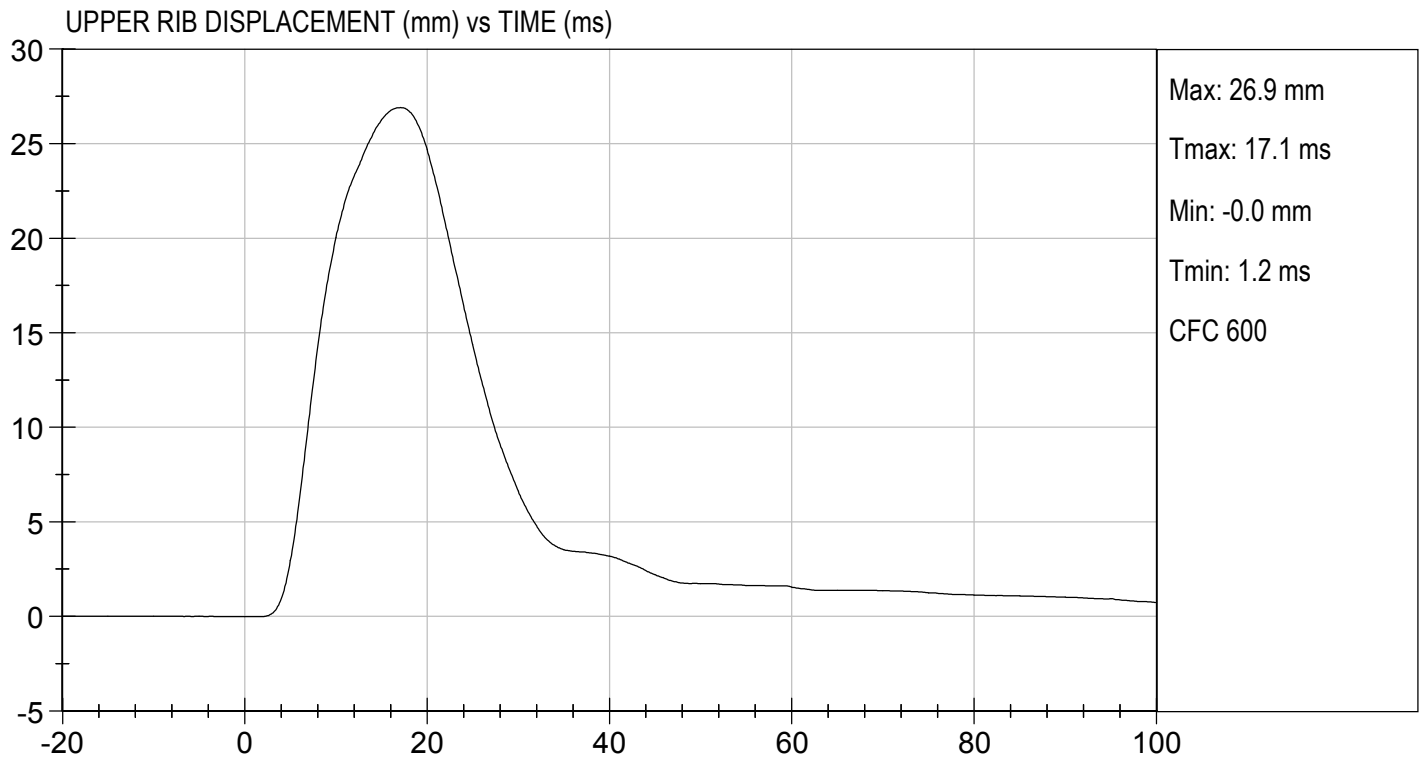

Approved By



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

TEST DATE: 01/14/2019
TEST #: D190164

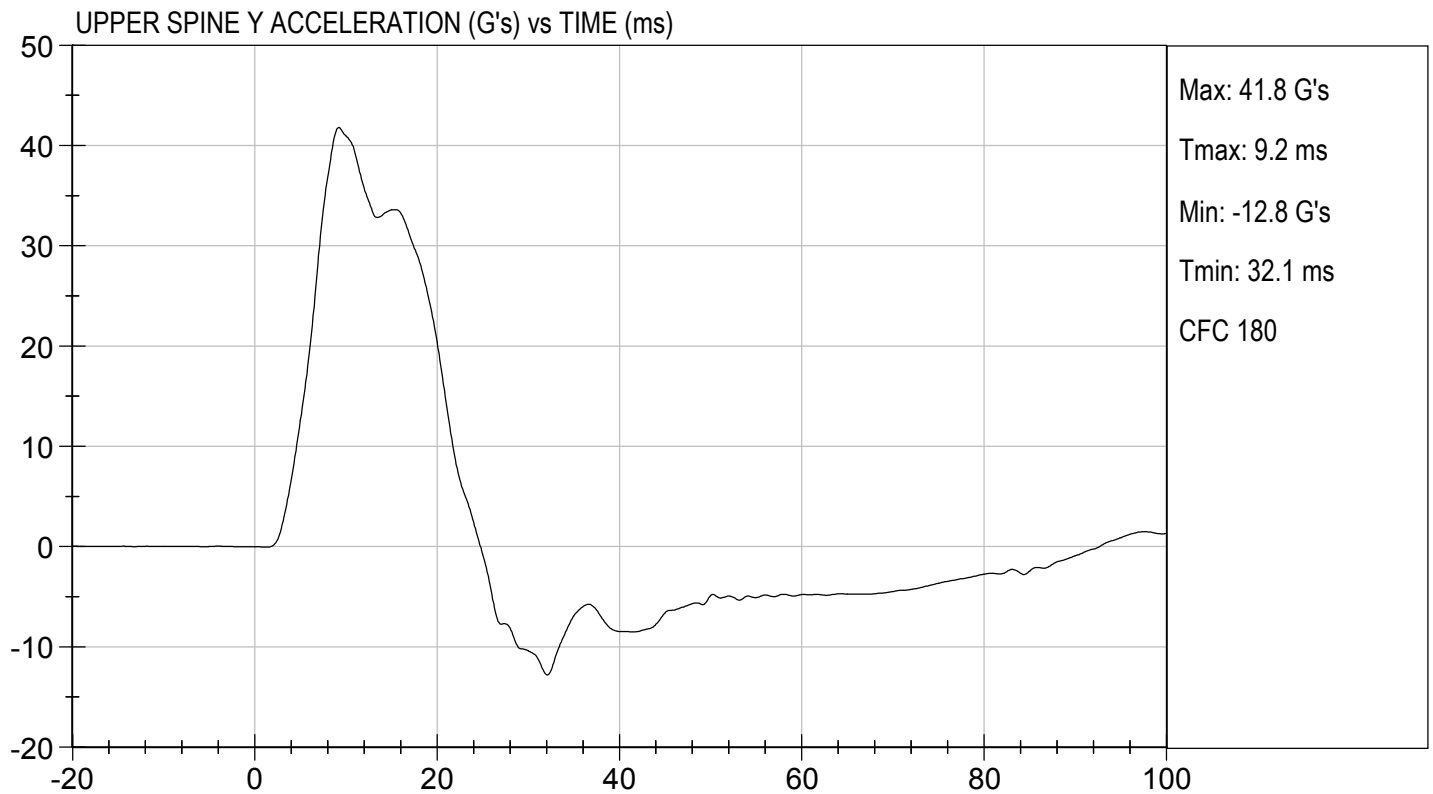
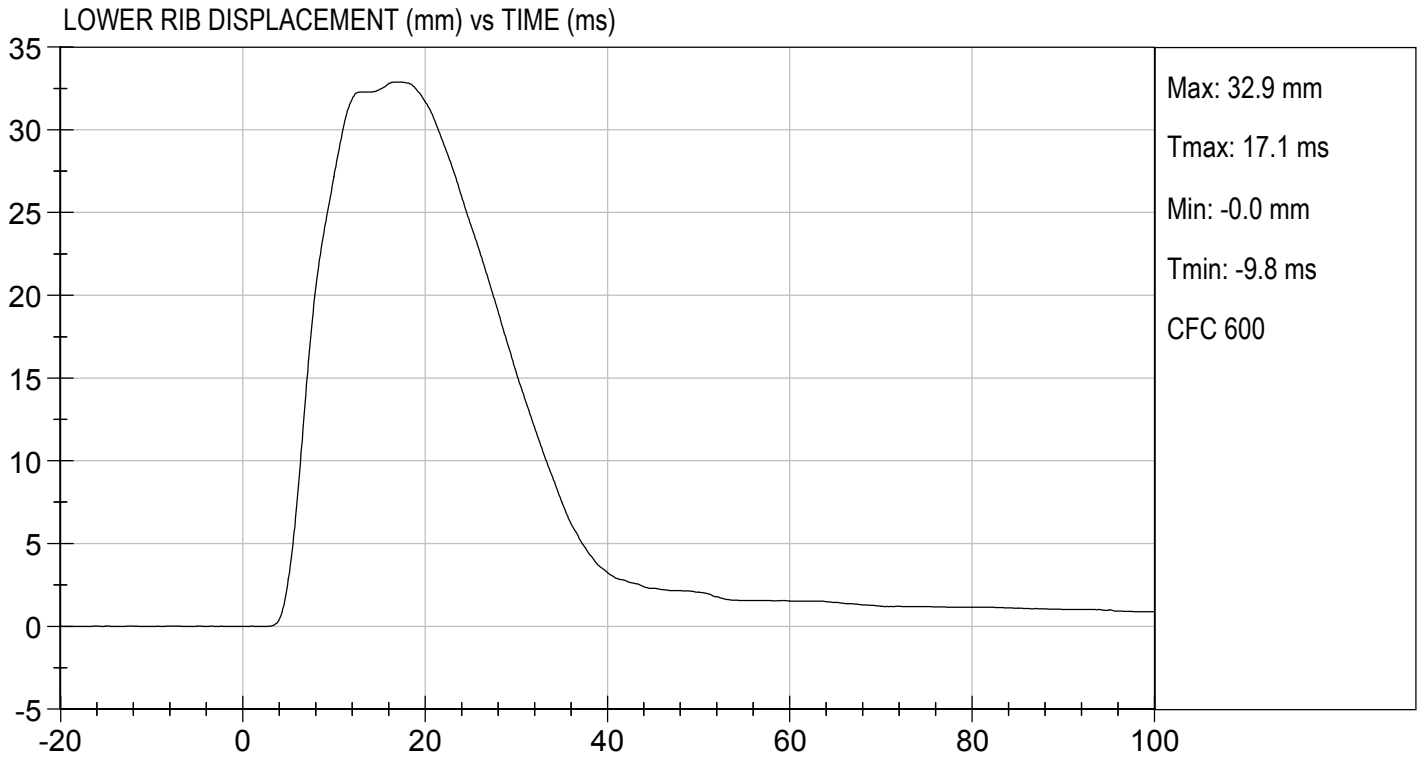






TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

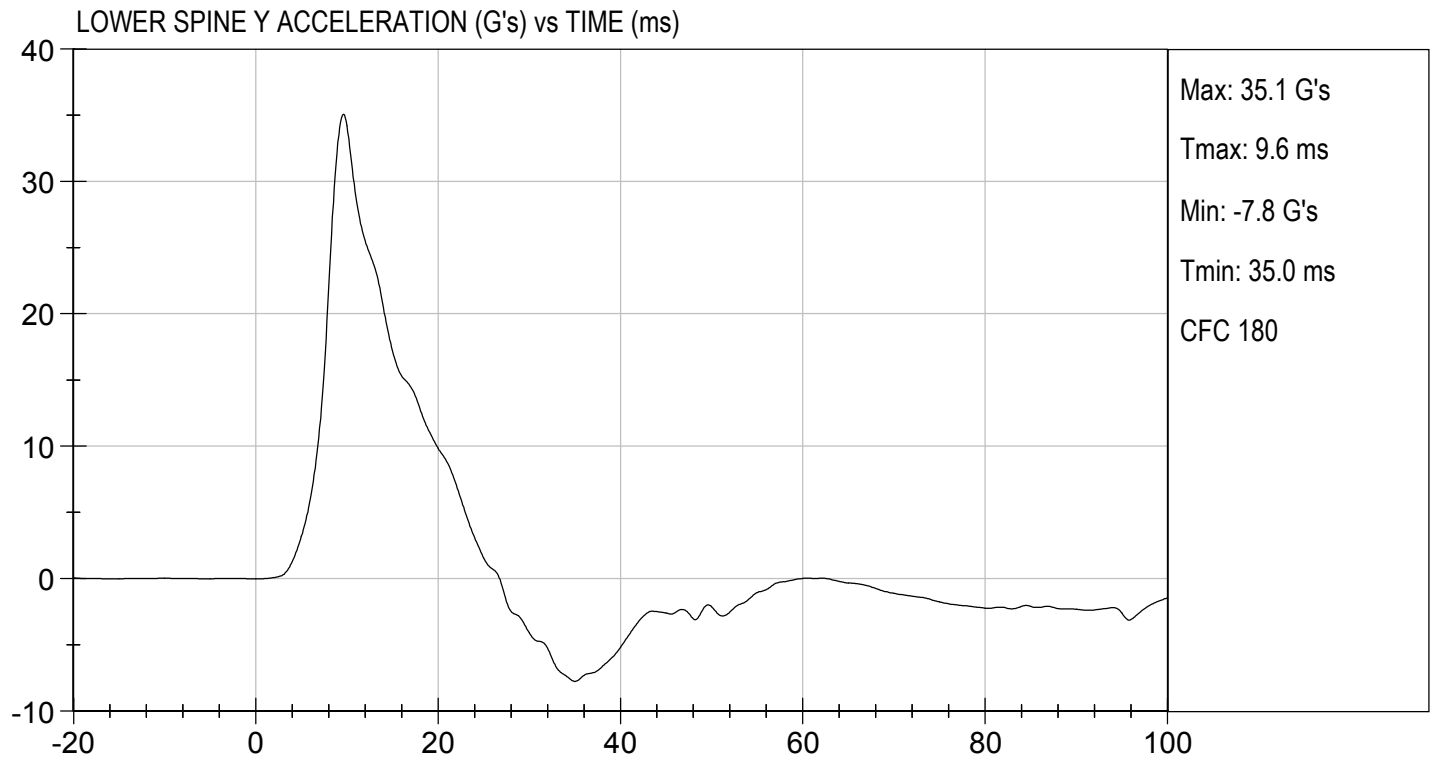
TEST DATE: 01/14/2019
TEST #: D190164





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

TEST DATE: 01/14/2019
TEST #: D190164

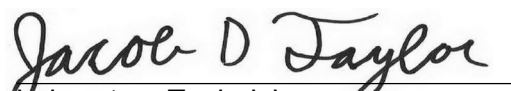


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

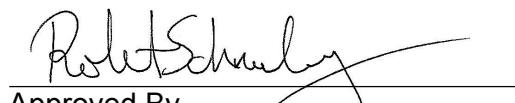
Test I.D: D190165

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

01/14/2019

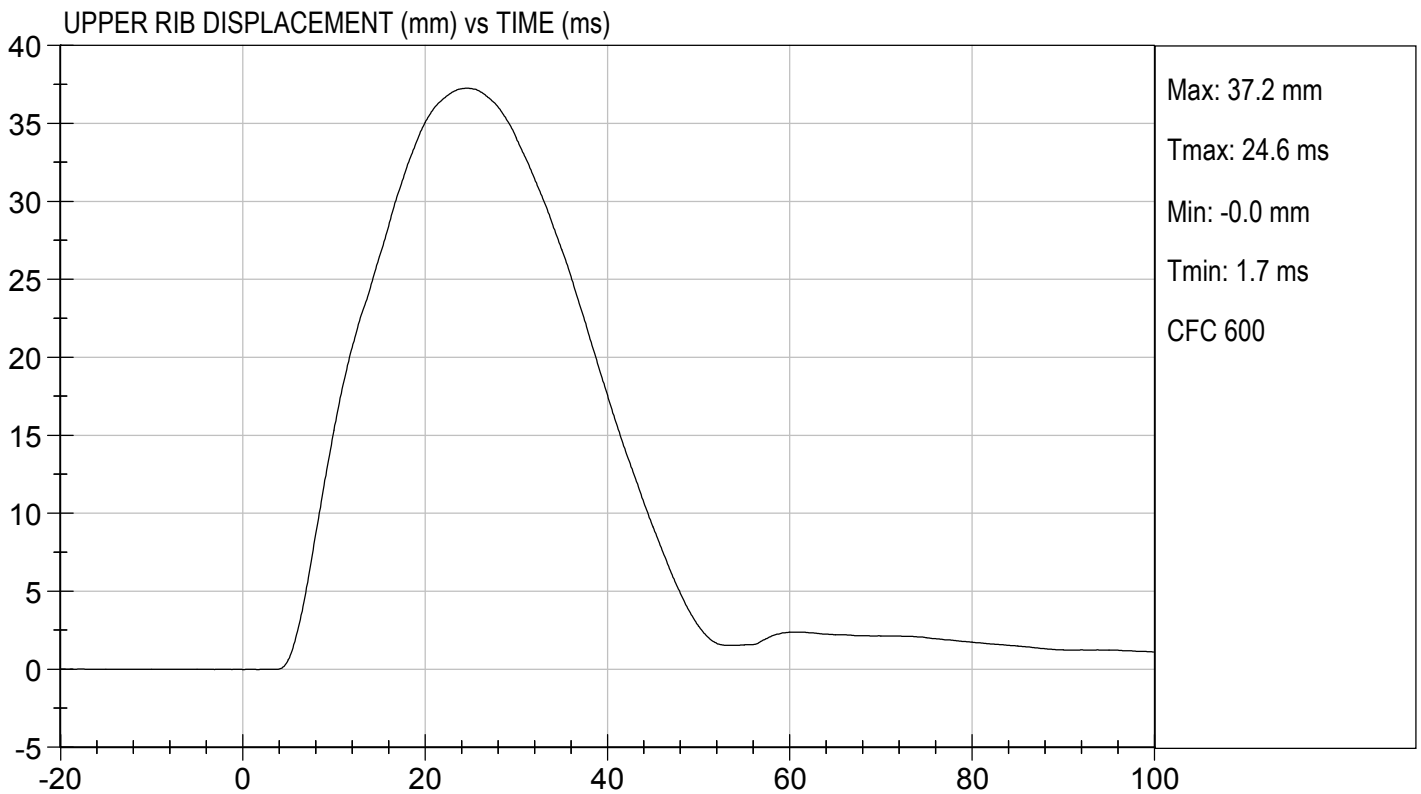
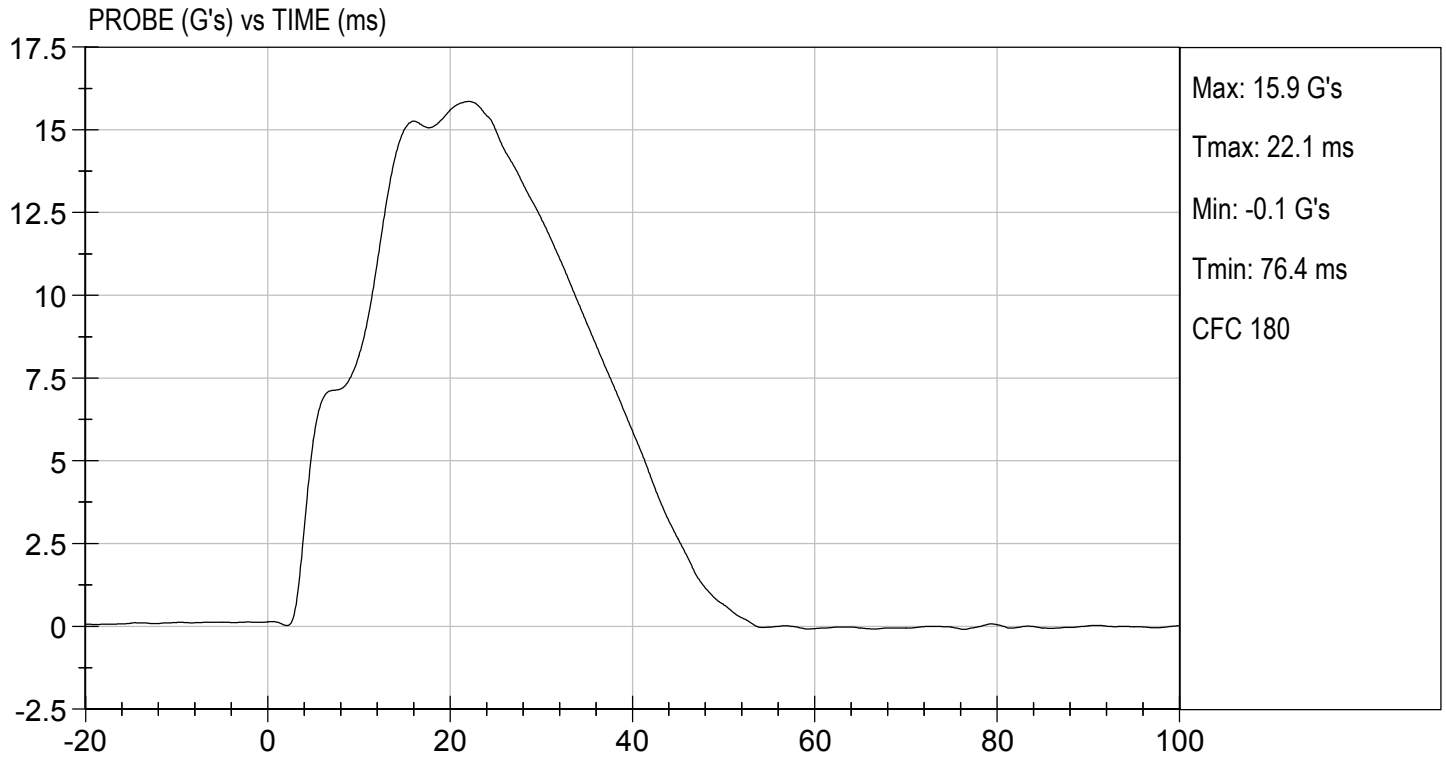
Test Date

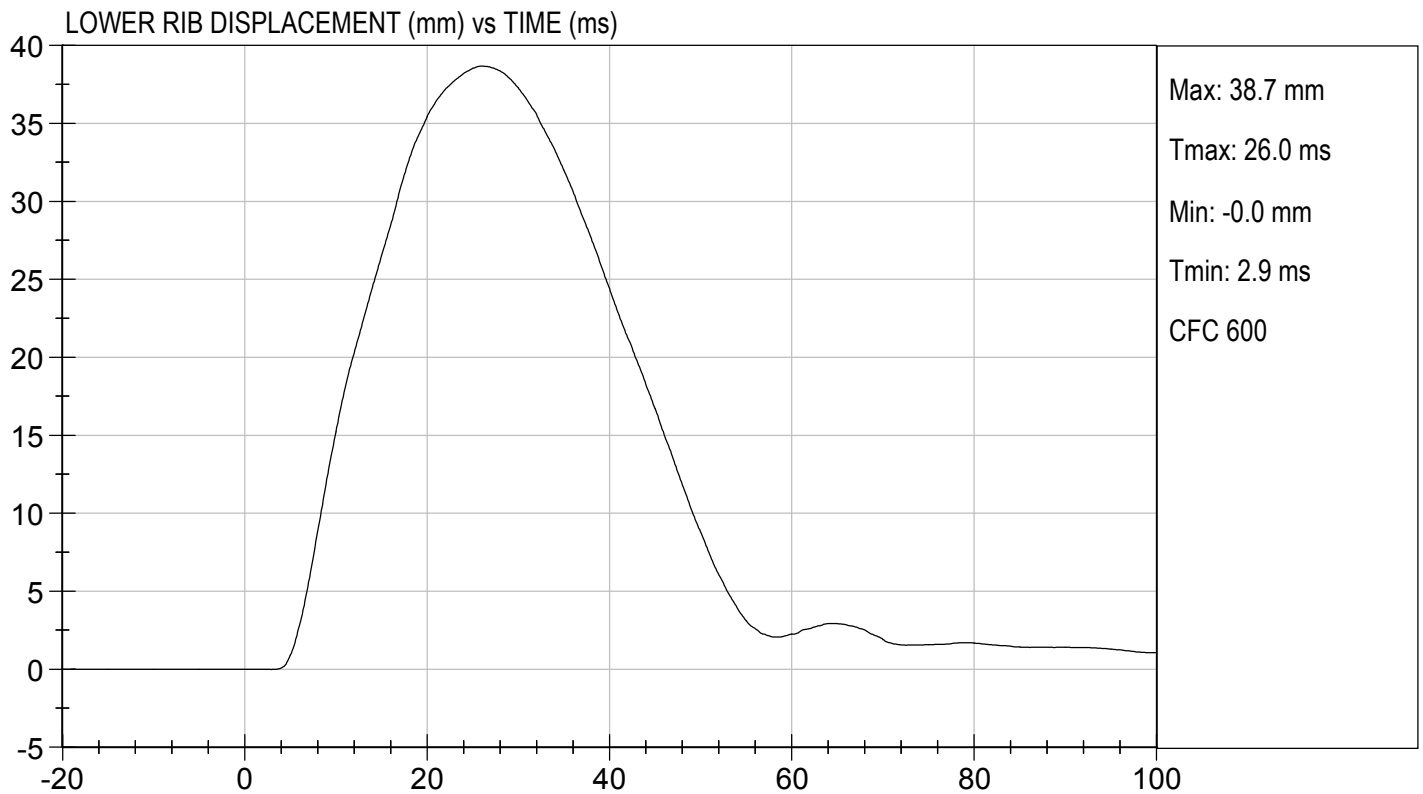
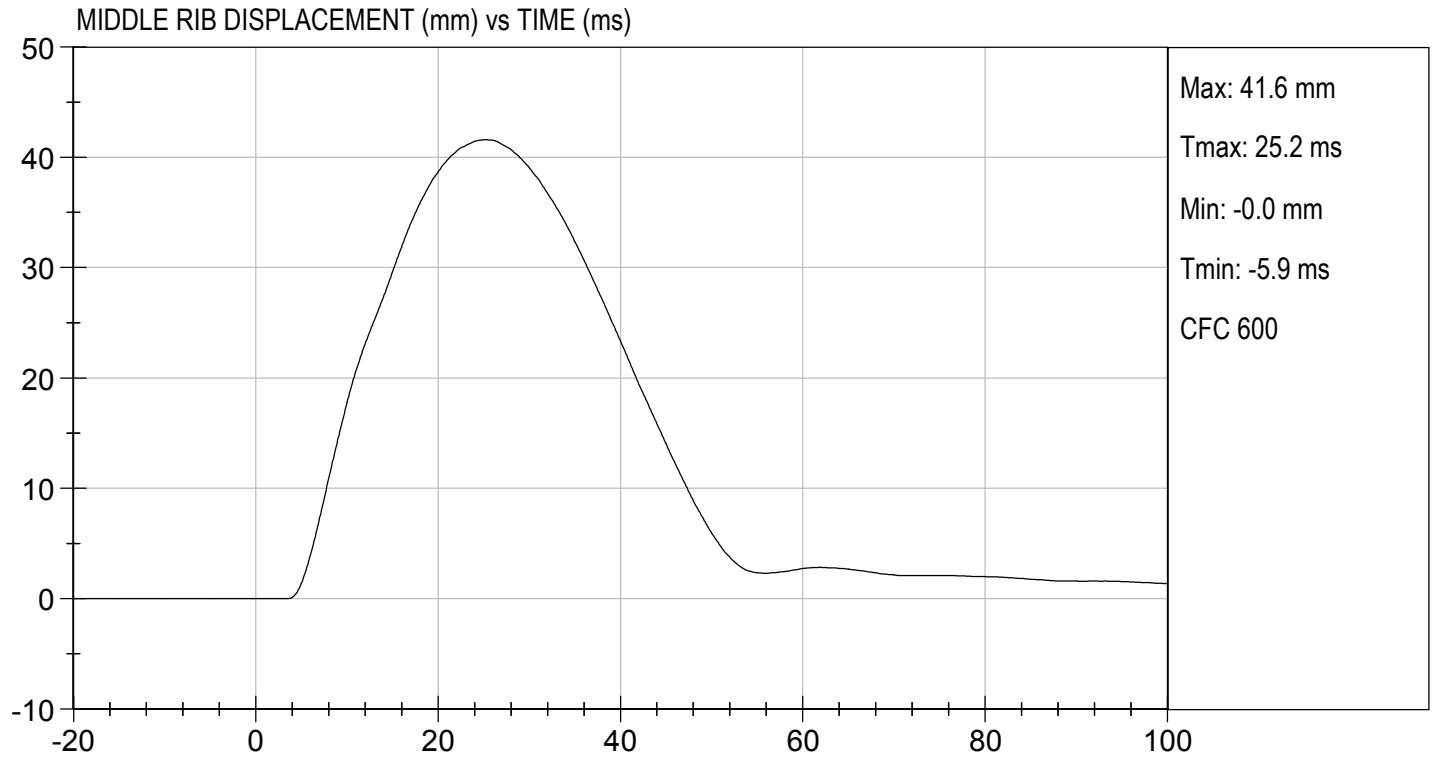

Approved By



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

TEST DATE: 01/14/2019
TEST #: D190165

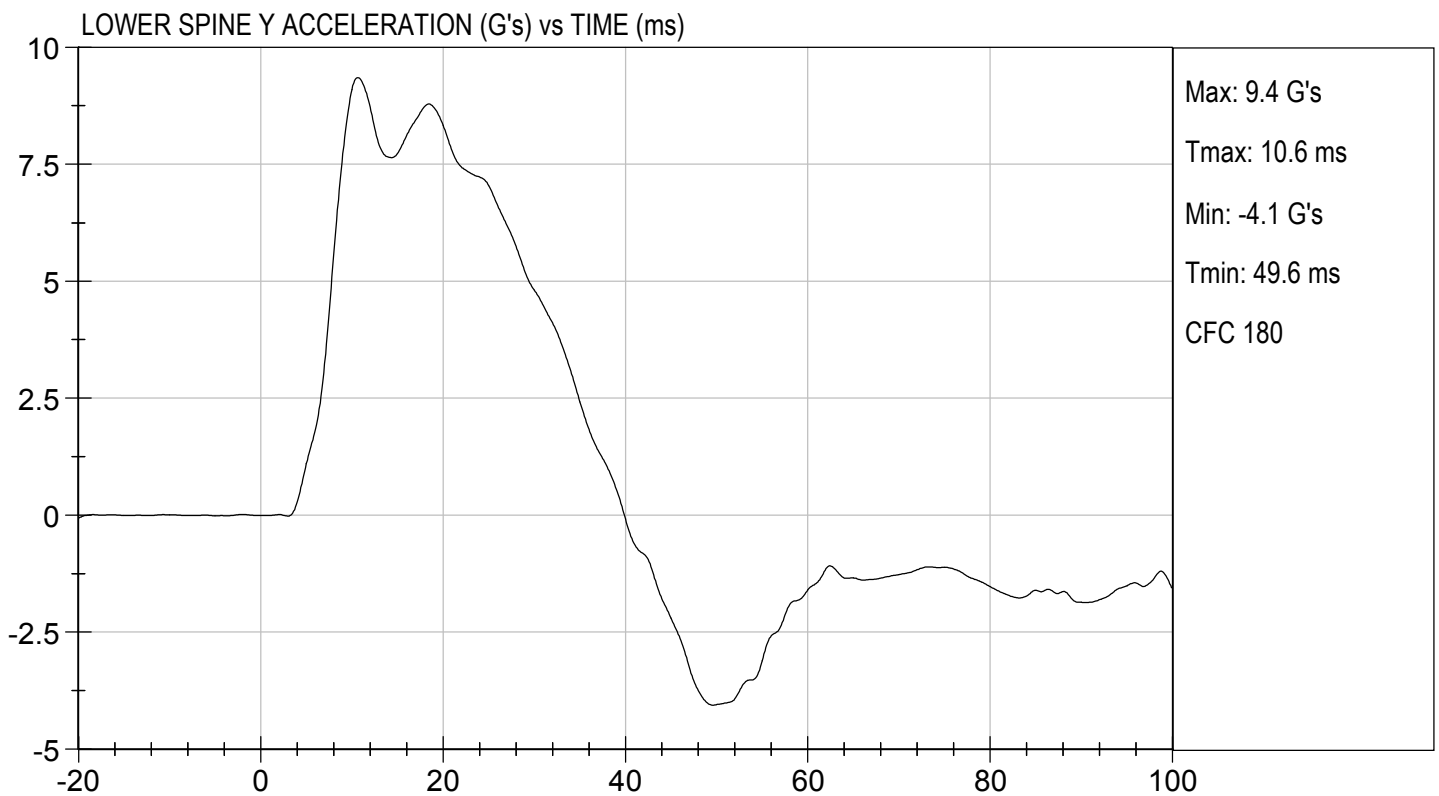
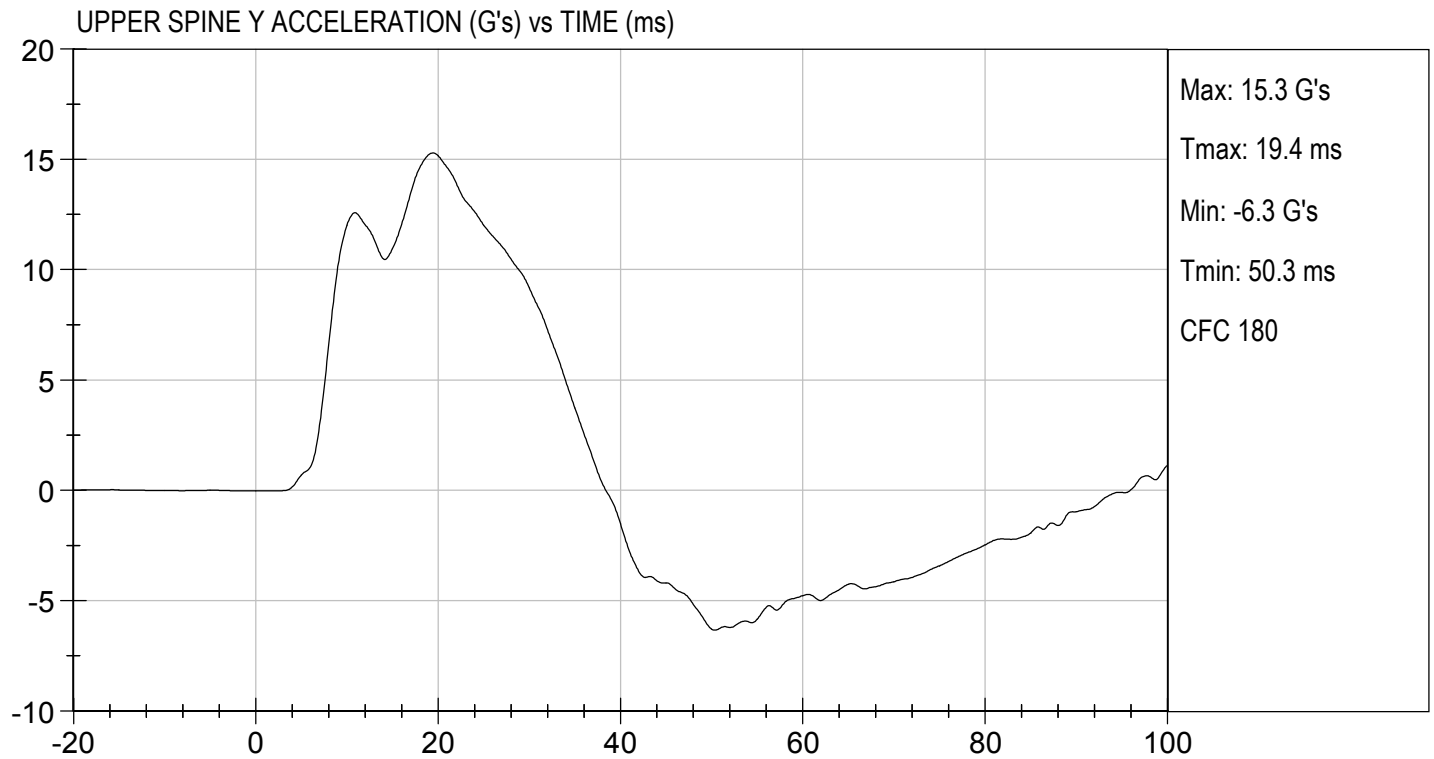






TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/14/2019
TEST #: D190165



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

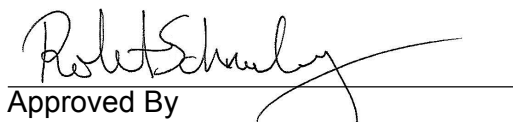
Test I.D: D190166

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	41	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

01/14/2019

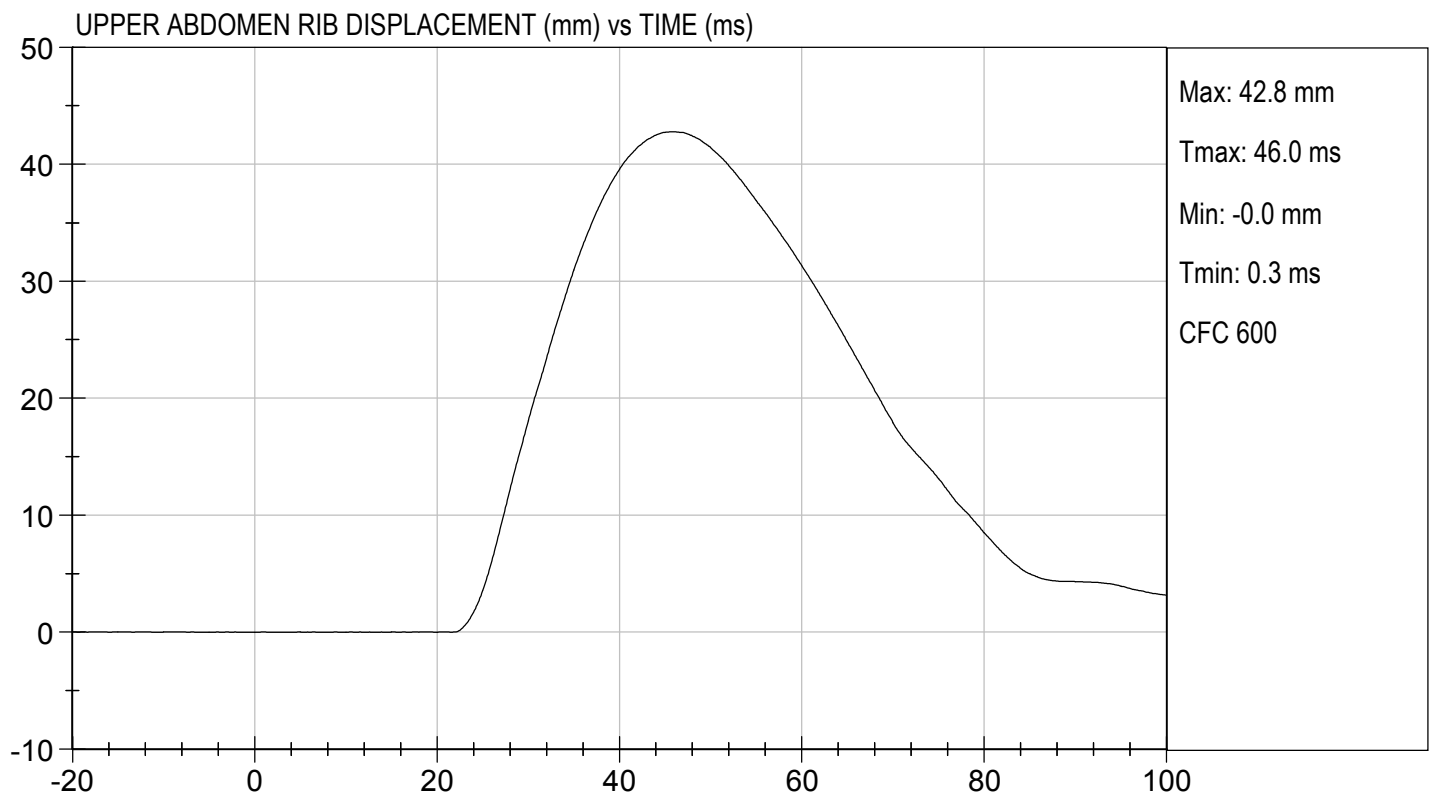
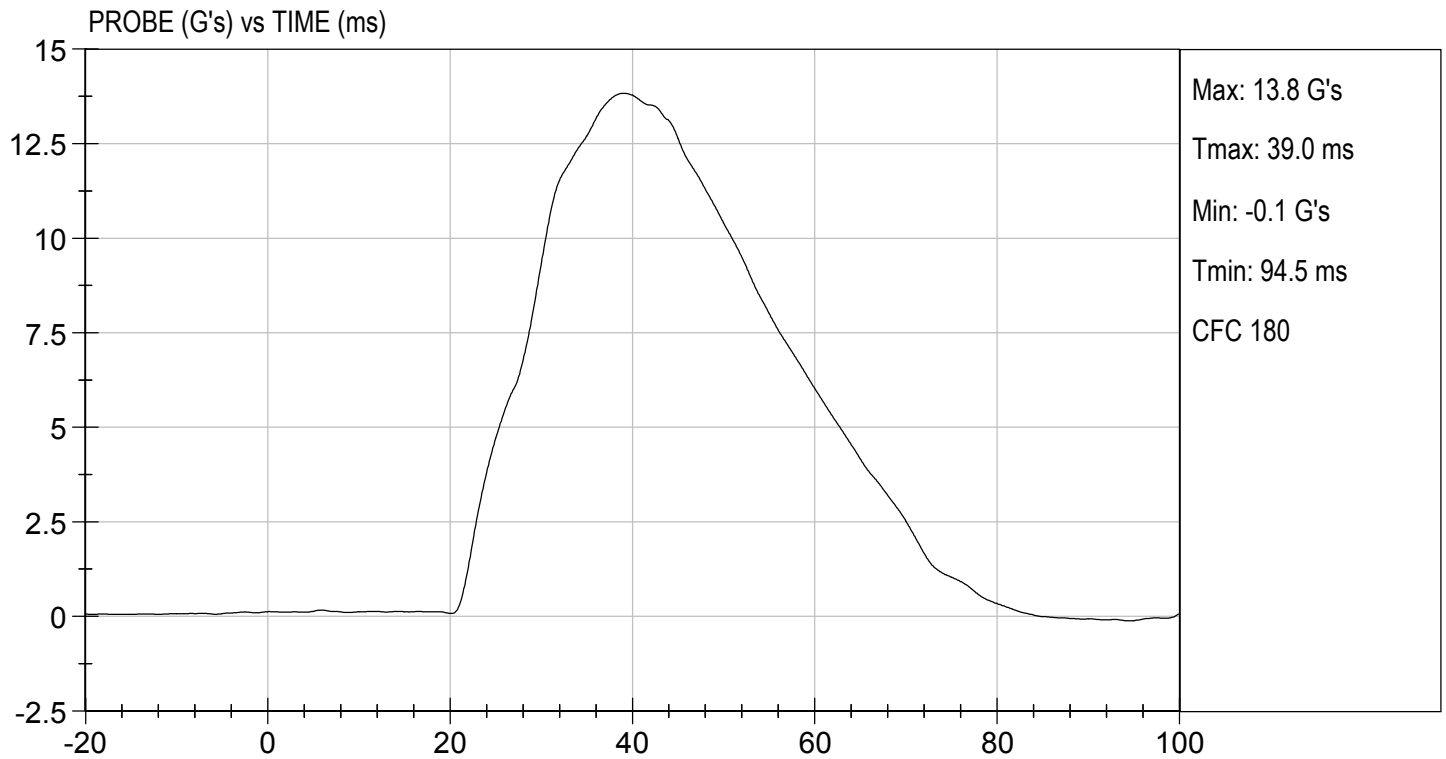
Test Date


Approved By



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

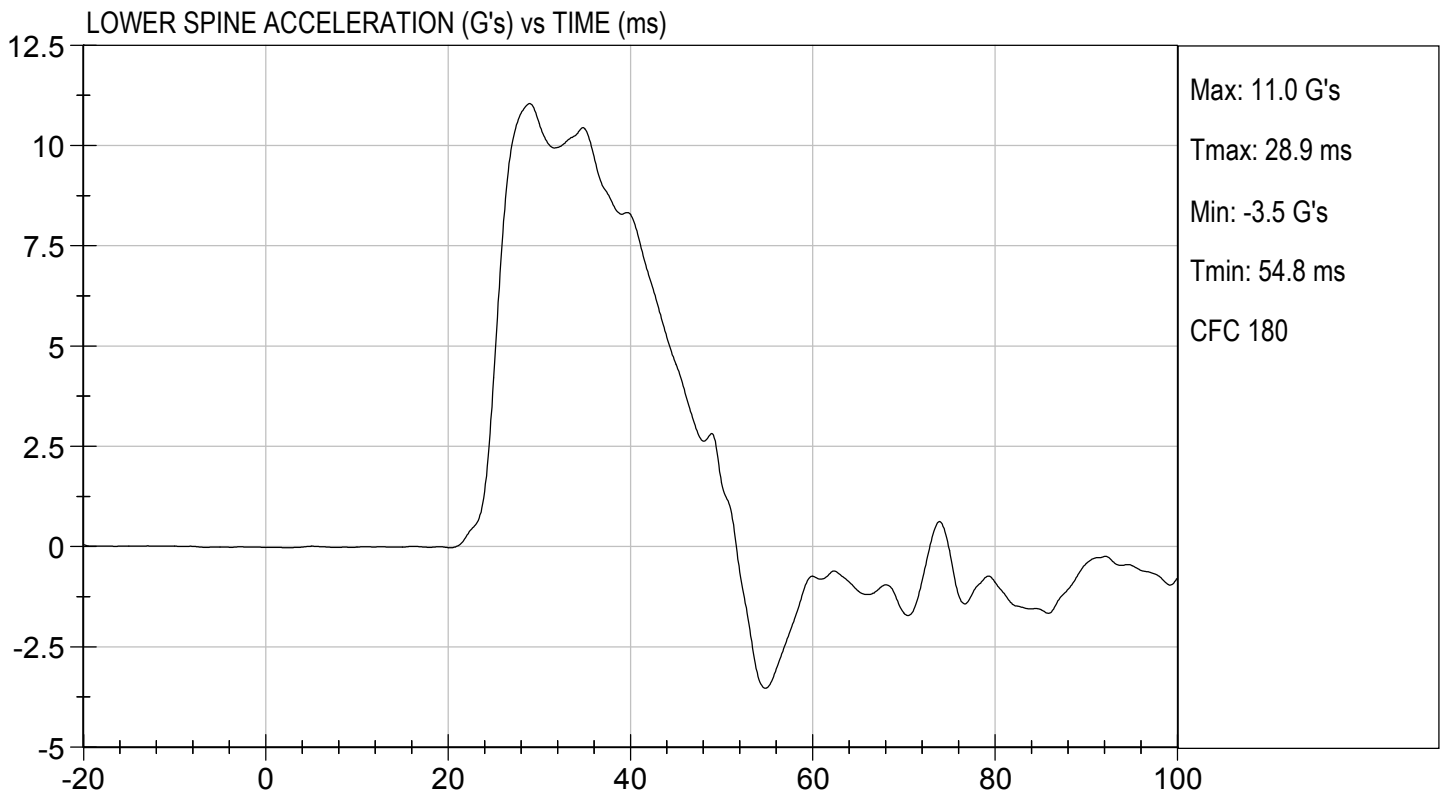
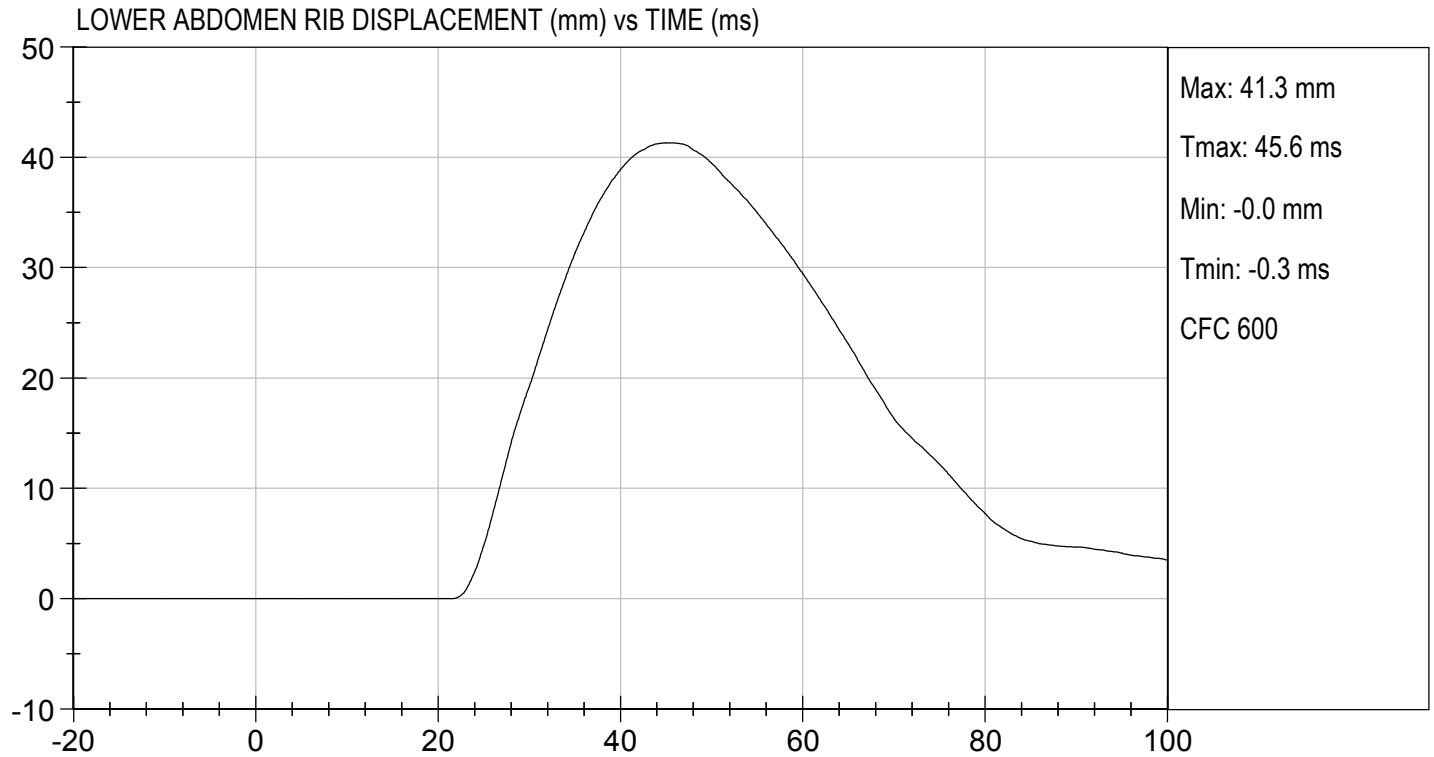
TEST DATE: 01/14/2019
TEST #: D190166





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

TEST DATE: 01/14/2019
TEST #: D190166



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

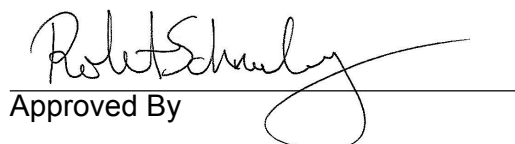
Test I.D: D190167

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	22	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	44.05	Fail
Peak Acetabulum Force	N	3600 to 4300	4,185	Pass
Overall Test Results				Fail


Laboratory Technician

01/15/2019

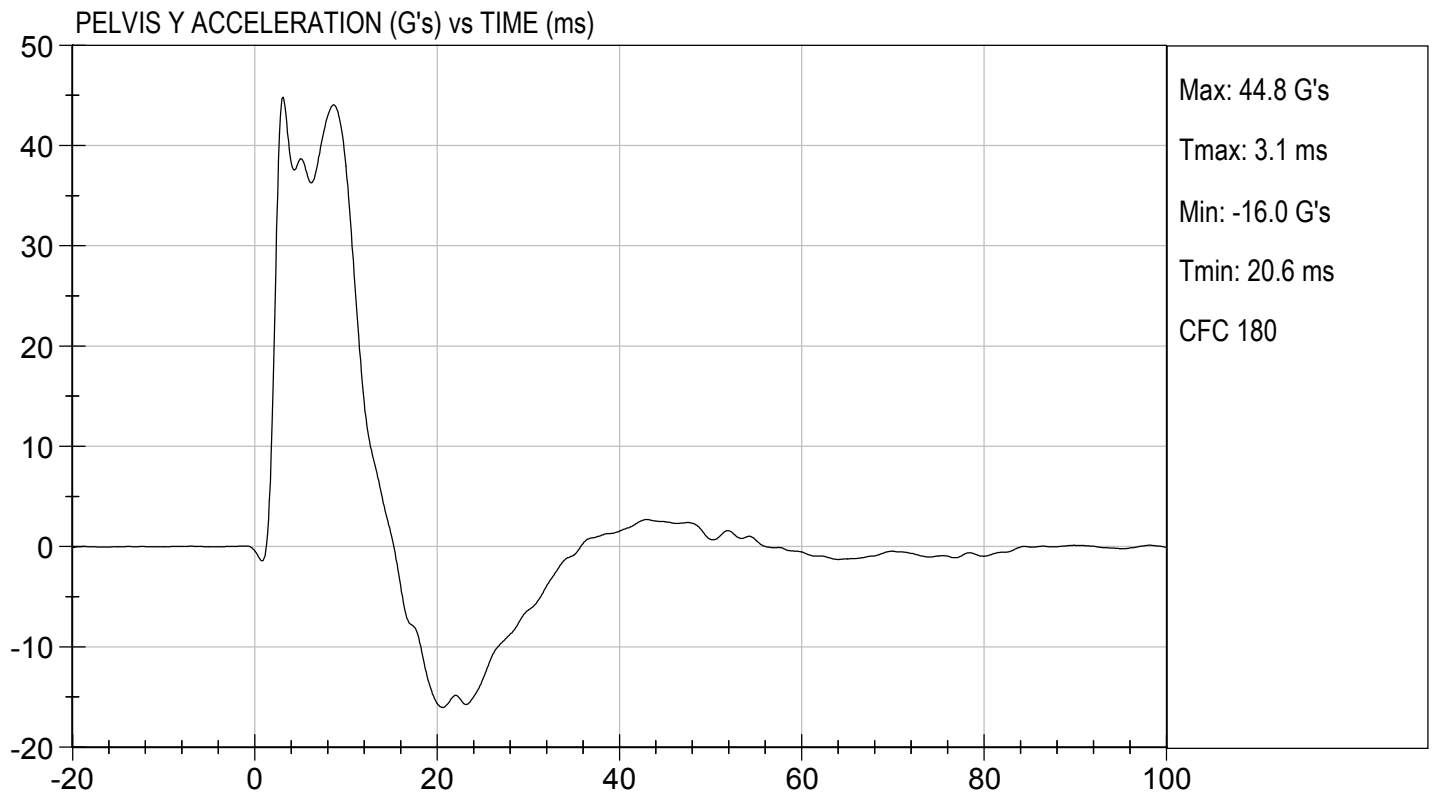
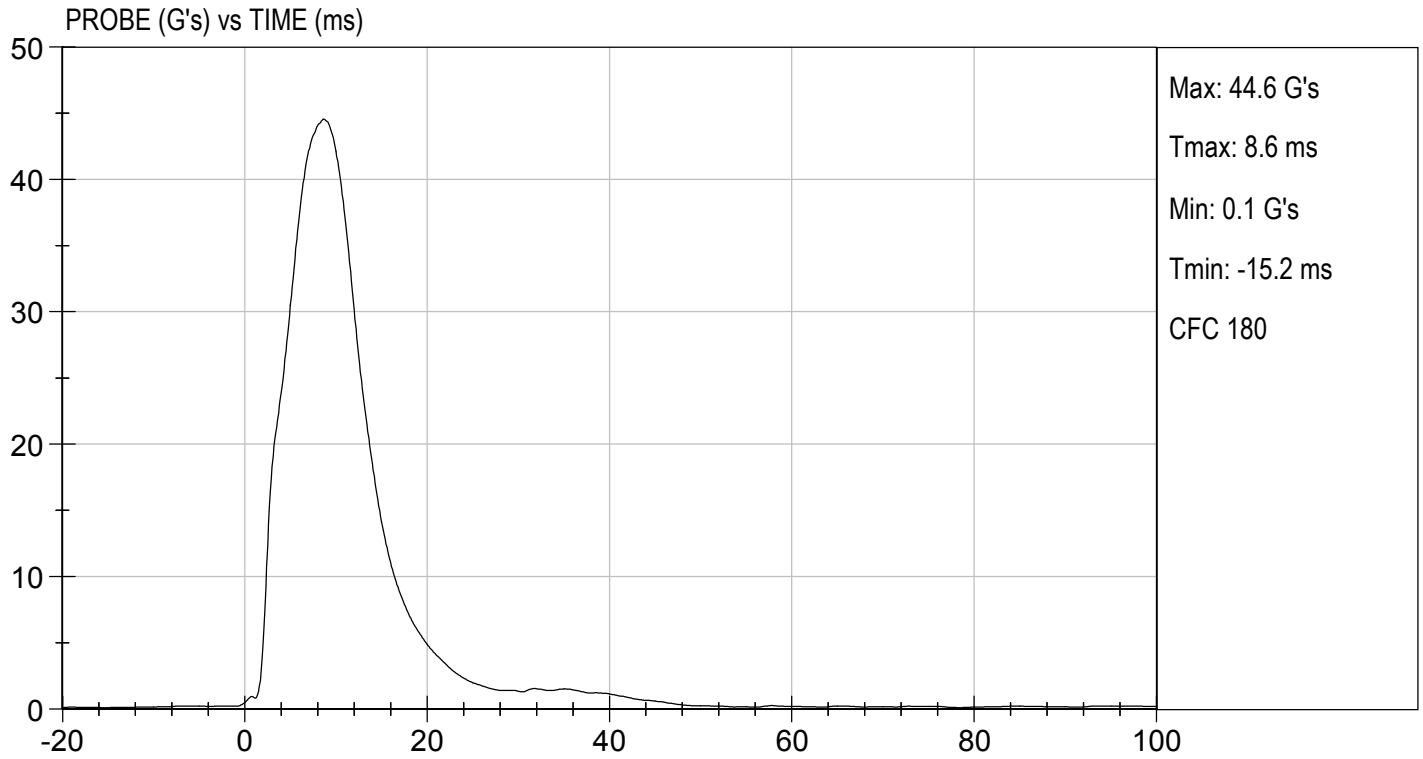
Test Date


Approved By



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

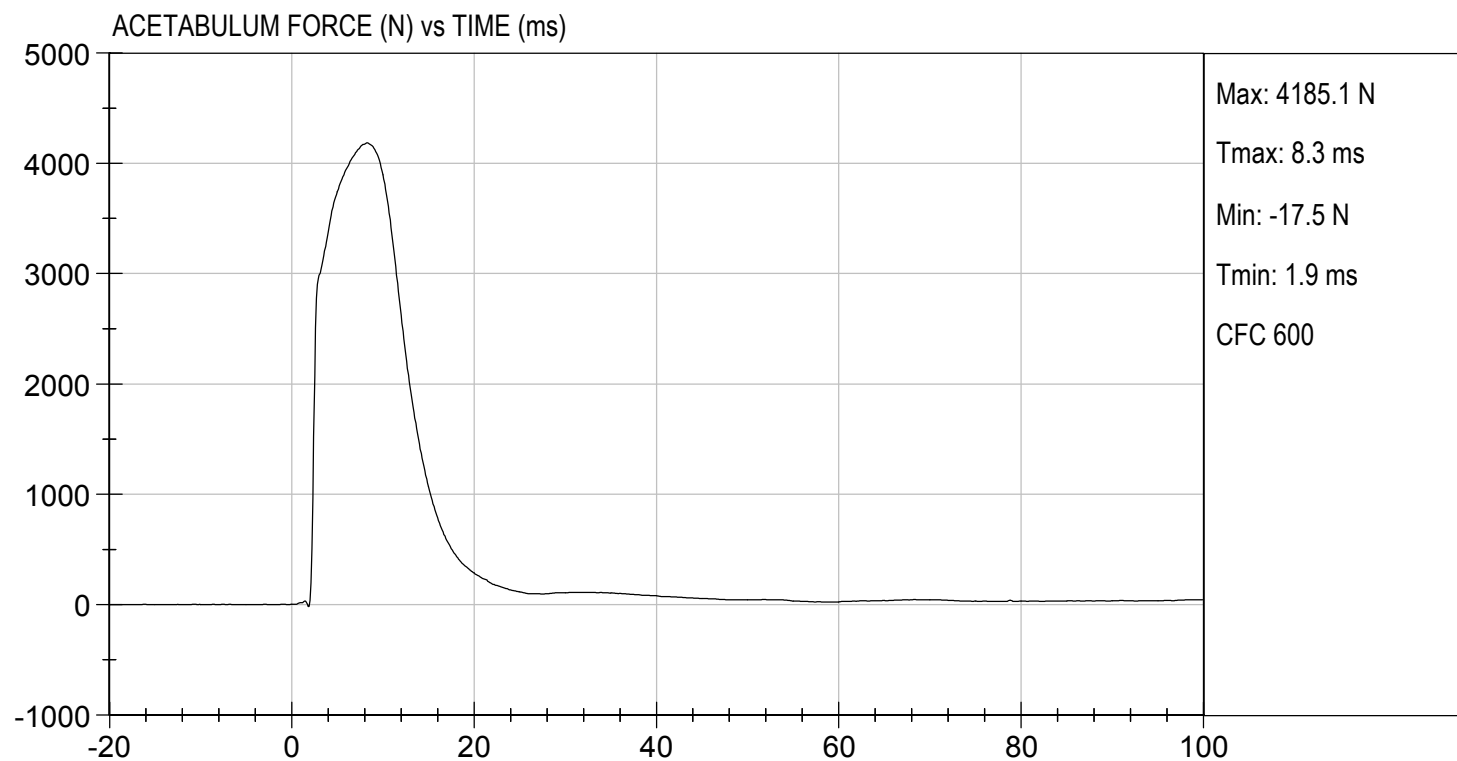
TEST DATE: 01/15/2019
TEST #: D190167





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

TEST DATE: 01/15/2019
TEST #: D190167



MGA RESEARCH CORPORATION

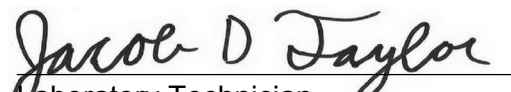
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

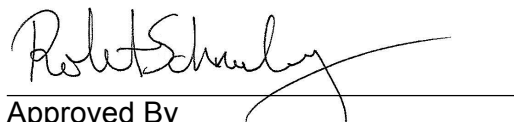
Test I.D: D190168

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	25	Pass
Impact Velocity	m/s	4.20 to 4.40	4.40	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	4,819	Pass
Overall Test Results				Pass


Laboratory Technician

01/14/2019

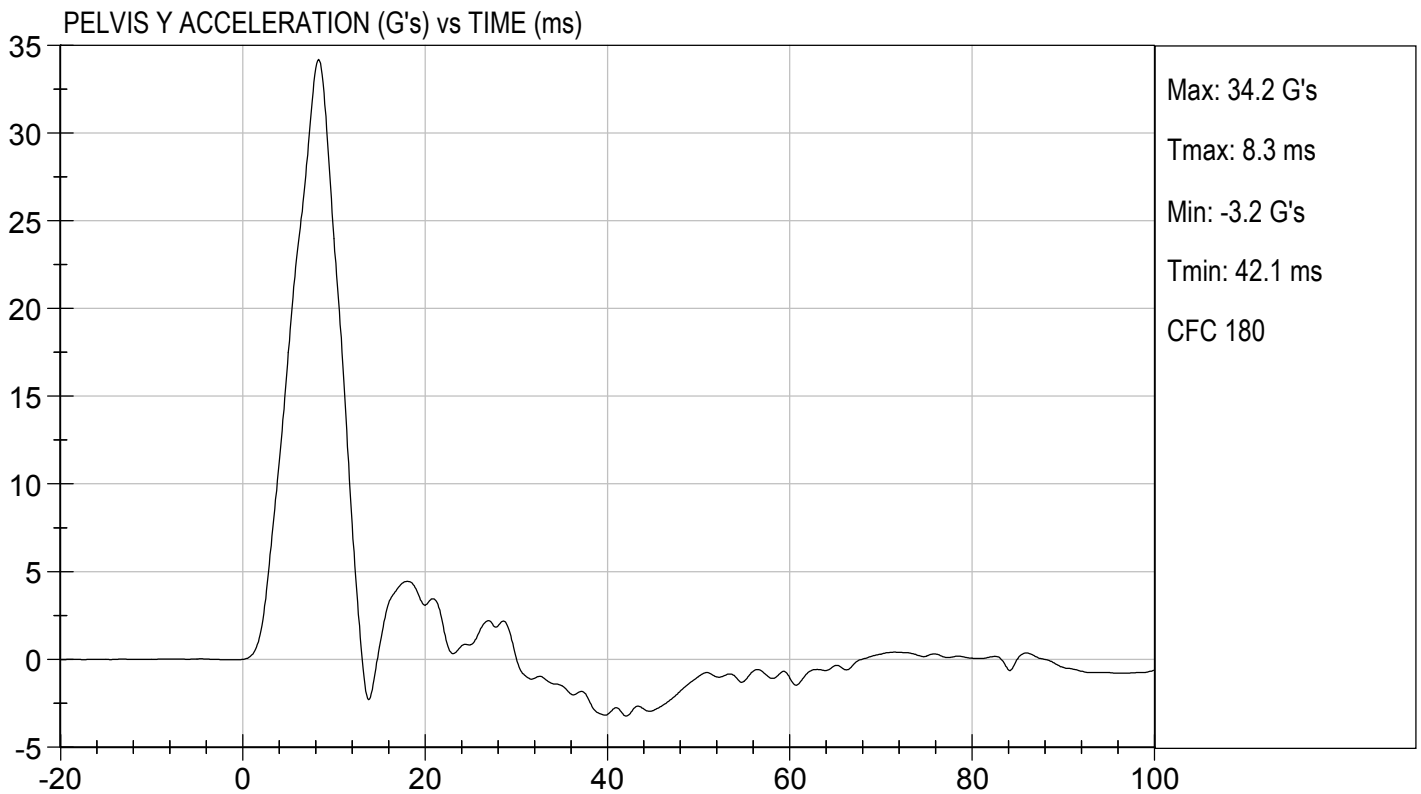
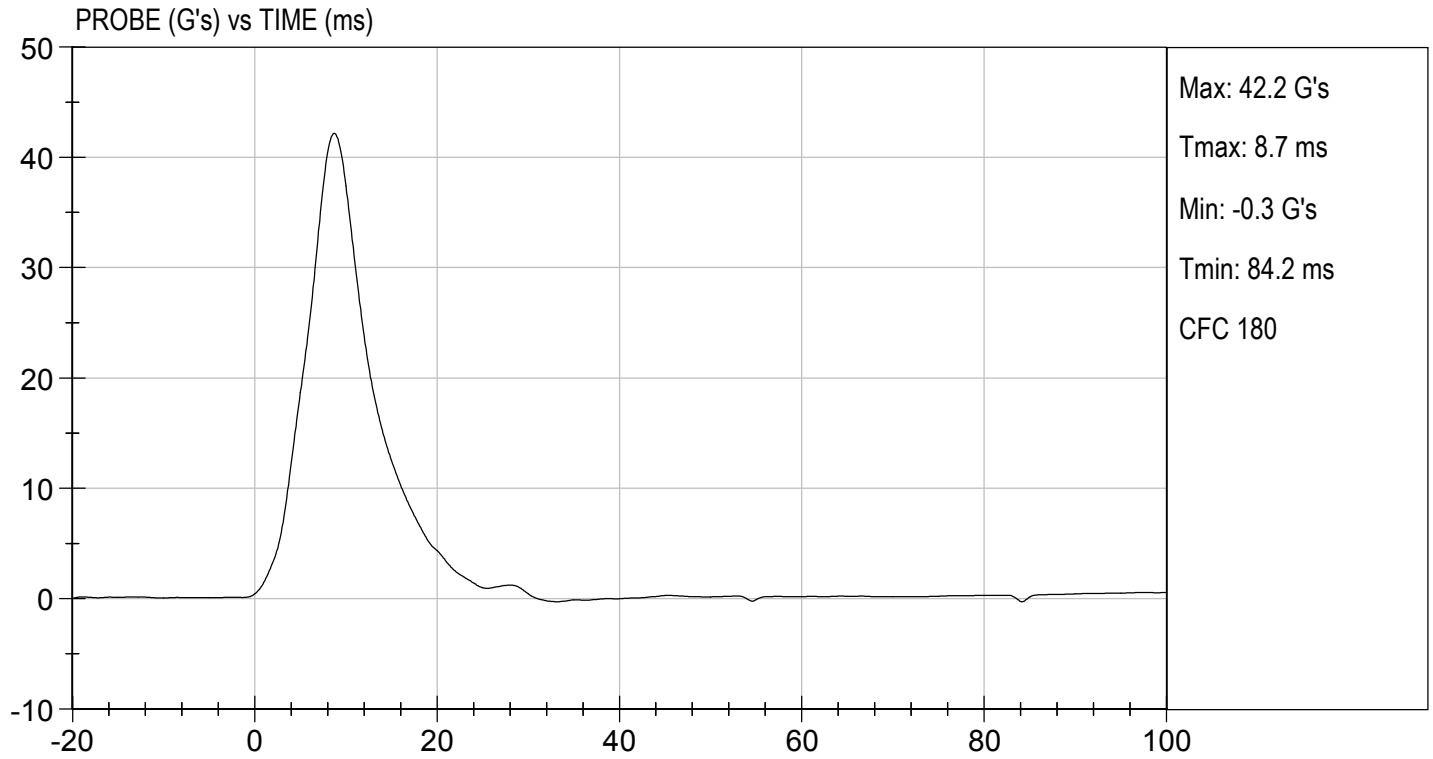
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.45 ft/s, 4.40 m/s

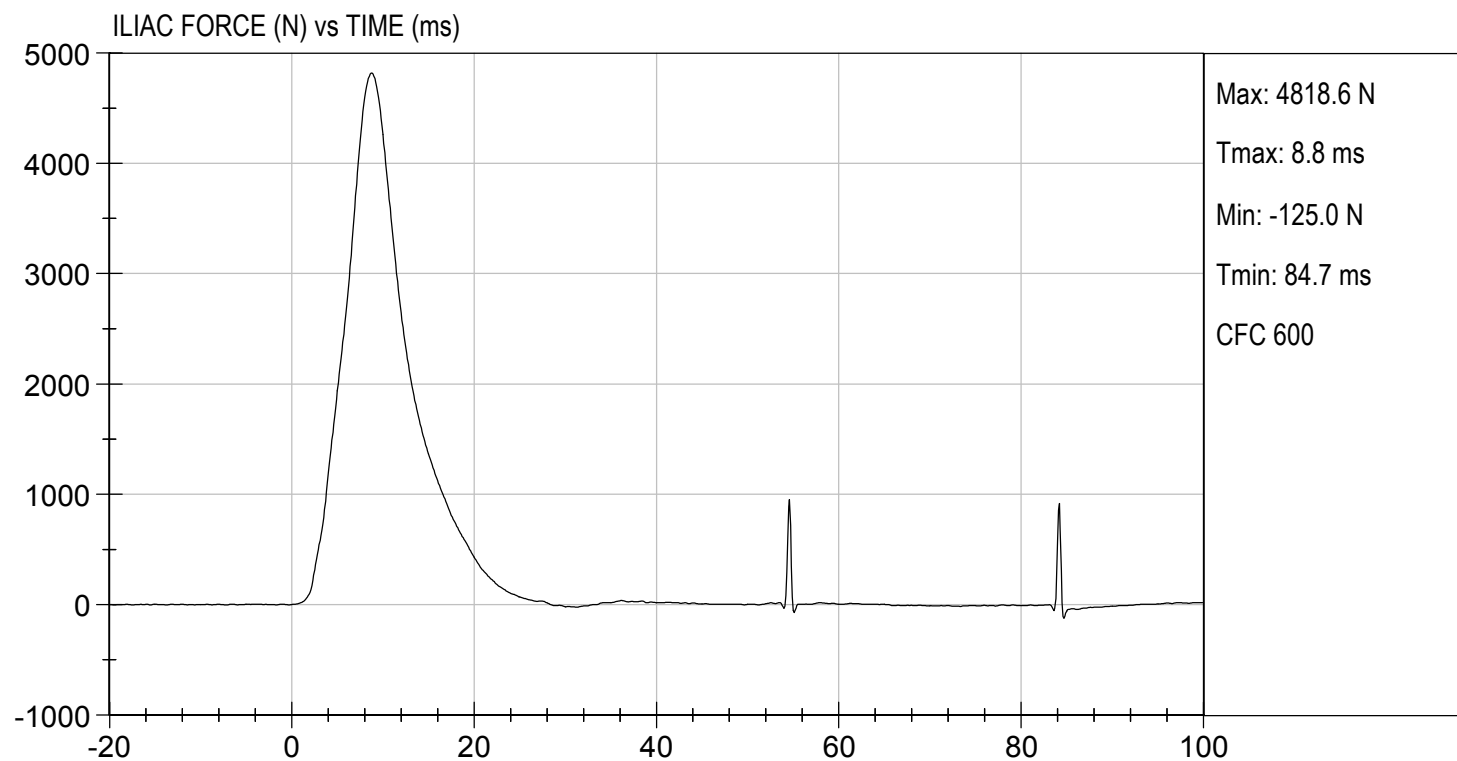
TEST DATE: 01/14/2019
TEST #: D190168





TEST DESC: ILLIAC
VELOCITY: 14.45 ft/s, 4.40 m/s

TEST DATE: 01/14/2019
TEST #: D190168





SID-IIs Pelvis Plug Certification Test

Plug S/N 11929

Test Number 6117

Report Number 6134

Test Date 2/1/2018 9:36:52 AM

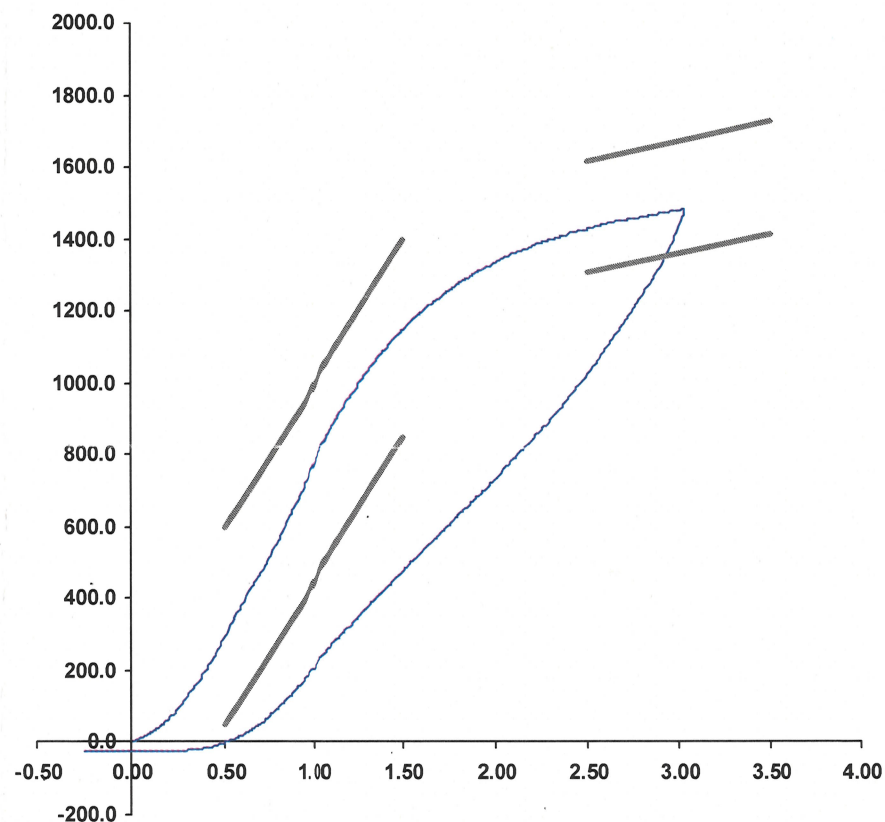
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	294.12	50.00	600.00
Force @ 1.5 mm (N)	1,149.87	850.00	1,400.00
Force @ 2.5 mm (N)	1,427.97	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,479.45	1,361.00	1,673.00

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
SACO Research

01-Feb-18

By : DC

Date : 2/1/18

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 12065

Test Number 6421

Report Number 6436

Test Date 2/27/2018 10:15:51 AM

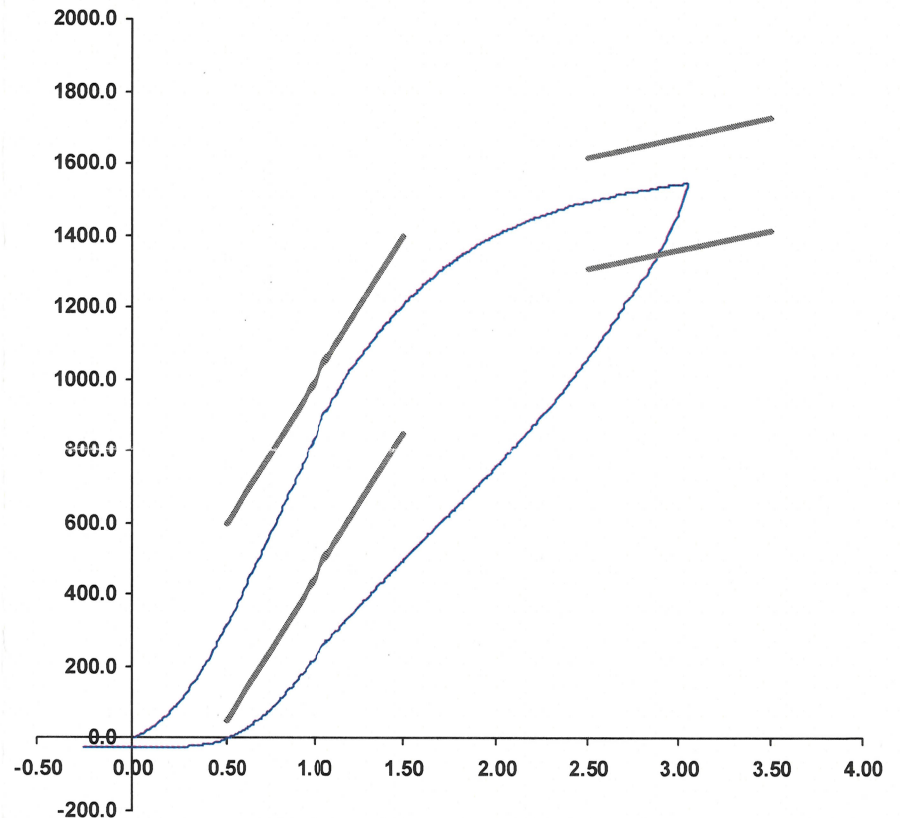
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	314.44	50.00	600.00
Force @ 1.5 mm (N)	1,214.51	850.00	1,400.00
Force @ 2.5 mm (N)	1,494.24	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,543.96	1,361.00	1,673.00

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

27-Feb-18

SACO Research

By : DC

Date : 2/27/18

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

C-120

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N 032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79711	Endevco	07/19/18
		Y	P79712	Endevco	07/19/18
		Z	P88170	Endevco	07/19/18
		Xr	P79750	Endevco	07/19/18
		Yr	P79751	Endevco	07/19/18
		Zr	P79753	Endevco	07/19/18
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	07/31/18
	Middle	Y	G169	Honeywell	07/31/18
	Lower	Y	G164	Honeywell	07/31/18
Abdomen Load Cells	Forward	Y	ABG1513FY	Denton	09/12/18
	Middle	Y	ABG1531FY	Denton	09/12/18
	Rear	Y	ABG1536FY	Denton	09/12/18
Lower Spine Accelerometers (T12)		X	P79574	Endevco	07/19/18
		Y	P82097	Endevco	07/19/18
		Z	P82603	Endevco	07/19/18
Public Symphysis Load Cell		Y	PG462FY	Denton	09/12/18

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 306			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P79445	Endevco	07/20/18
				Y	P79721	Endevco	07/20/18
				Z	P79724	Endevco	07/20/18
				Xr	P84999	Endevco	07/20/18
				Yr	P85000	Endevco	07/20/18
				Zr	P85001	Endevco	07/20/18
Head Angular Rate Sensors				X	ARS7416	DTS	07/15/14
				Y	ARS7442	DTS	07/15/14
				Z	ARS7475	DTS	07/08/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	07/31/18	
		Middle	Y	G1261	FTSS	07/31/18	
		Lower	Y	G1270	FTSS	07/31/18	
	Abdominal Rib	Upper	Y	G032	FTSS	07/31/18	
		Lower	Y	G1304	FTSS	07/31/18	
Lower Spine Accelerometers (T12)				X	P96332	Endevco	07/20/18
				Y	P96335	Endevco	07/20/18
				Z	P96341	Endevco	07/20/18
Acetabulum Load Cell				Y	ACG268	Denton	12/04/18
Iliac Wing Load Cell				Y	IWG273	Denton	12/04/18
Pelvis Plug (struck side)					11929	SACO	02/01/18
Pelvis Plug (non-struck side)					12065	SACO	02/27/18

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	T17839	Endevco	12/05/18
	Vehicle Center of Gravity	Y	T11233	Endevco	08/06/18
	Vehicle Center of Gravity	Z	T16910	Endevco	12/05/18
2	Right Sill at Front Seat	X	PCB1275	PCB	12/21/18
	Right Sill at Front Seat	Y	PCB1282	PCB	12/21/18
	Right Sill at Front Seat	Z	PCB899	PCB	12/21/18
3	Right Sill at Rear Seat	X	T16835	Endevco	08/15/18
	Right Sill at Rear Seat	Y	T16856	Endevco	08/16/18
	Right Sill at Rear Seat	Z	T16877	Endevco	08/15/18
4	Left Sill at Front Door	Y	PCB1100	PCB	10/01/18
5	Left Sill at Rear Door	Y	PCB510	PCB	09/24/18
6	Left A-Post Lower	Y	T10547	Endevco	08/03/18
7	Left A-Post Middle	Y	PCB1351	PCB	08/20/18
8	Left B-Post Lower	Y	PCB1128	PCB	12/04/18
9	Left B-Post Middle	Y	PCB1276	PCB	12/21/18
10	Front Seat Track	Y	PCB1382	PCB	08/17/18
11	Rear Seat Track or Structure	Y	PCB1119	PCB	10/01/18
12	Right Rear Occ. Compartment	Y	T17576	Endevco	12/19/18
13	Engine Block	X	PCB1259	PCB	12/21/18
	Engine Block	Y	PCB1254	PCB	12/21/18
14	Rear Floorpan Above Axle	X	T16849	Endevco	08/15/18
	Rear Floorpan Above Axle	Y	P95356	Endevco	10/01/18
	Rear Floorpan Above Axle	Z	T16837	Endevco	08/14/18

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB511D	PCB	09/24/18
MDB Center of Gravity	Y	PCB753D	PCB	09/24/18
MDB Center of Gravity	Z	PCB557D	PCB	09/24/18
Left Frame at Rear Axle Centerline	X	PCB660D	PCB	09/26/18
Left Frame at Rear Axle Centerline	Y	PCB659D	PCB	09/26/18