

REPORT NUMBER: SINCAP-MGA-2016-059

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

**SAIC GENERAL MOTORS CORPORATION LIMITED
2016 Buick Envision AWD Premium II 5-Door SUV
NHTSA No.: O20160107**

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



Test Date: September 28, 2016

Final Report Date: October 27, 2016

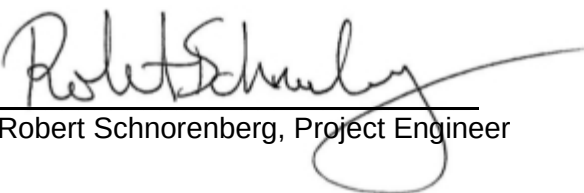
FINAL REPORT

**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: October 27, 2016

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-2016-059	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 2016 Buick Envision AWD Premium II 5-Dr SUV, NHTSA No.: O20160107		5. Report Date October 27, 2016																													
		6. Performing Organization Code MGA																													
7. Author(s) Ben Fischer, Project Engineer		8. Performing Organization Report No. SINCAP-MGA-2016-059																													
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																													
		11. Contract or Grant No. DTNH22-14-D-00353																													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report September 28, 2016 to October 27, 2016																													
		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 2016 Buick Envision AWD Premium II 5-Dr SUV 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 September 28, 2016. The impact velocity of the Moving Deformable Barrier (MDB) was 61.42 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.3°C. The target vehicle post-test maximum crush was 228 mm at level 3. The test vehicle's performance was as follows:																															
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The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.																															
17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																													
19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 223	22. Price																												

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2016 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 2016 Buick Envision AWD Premium II 5-Dr SUV. 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 2016 Buick Envision AWD Premium II 5-Dr SUV 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 61.42 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin on September 28, 2016. 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	76
Maximum Thorax Rib Deflection	mm	44	20
Total Abdominal Force	N	2500	690
Pubic Symphysis Force	N	6000	1322
Resultant Lower Spine Acceleration	Gs	82*	21

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	81
Resultant Lower Spine Acceleration	Gs	82	23
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2188
Maximum Thoracic Rib Deflection	mm	38*	17
Maximum Abdomen Rib Deflection	mm	45*	14

*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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

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

GENERAL COMMENTS

Left Lower B-Post Y recorded no valid data after 9ms.

Left Mid B-Post Y recorded no valid data after 9ms.

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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20160107	Traction Control System (TCS)	Yes
Model Year	2016	Auto-Leveling System	No
Make	Buick	Automatic Door Locks (ADL)	Yes
Model	Envision AWD Premium II	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	N/A
VIN	LRBFXFSX1GD192193	Driver Front Airbag	Yes
Body Color	Saffron Red Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	21km / 13mi	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	6	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

Does owner's manual provide instruction to turn off automatic door locks?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	SAIC GENERAL MOTORS CORPORATION LIMITED	GVWR (kg)	2380
Date of Manufacture	05/16	GAWR Front (kg)	1248
Vehicle Type	MPV	GAWR Rear (kg)	1300

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				523	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				183	(A-B)

VEHICLE SEAT TYPE

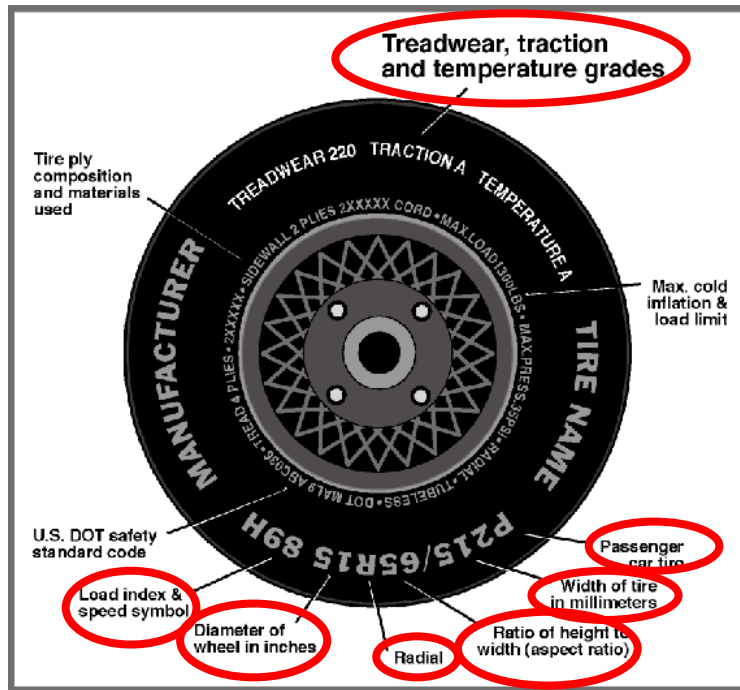
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X						X
Rear or Second Row Seat			X			w/ Lever	
Third Row Seat							

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	240	240
Tire Size on Vehicle	325/50 R19	325/50 R19
Tire Manufacturer	Hankook	Hankook
Tire Model	Ventus Si Noble	Ventus Si Noble
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 2 Nylon	2 Steel, 2 Polyester, 2 Nylon
Load Index/Speed Symbol	99H	99H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1G23 1AH 1416	1G23 1AH 1416
DOT Safety Code Right	1G23 1AH 1416	1G23 1AH 1416

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. 020160107
 Test Date: 9/28/2016

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	205	230	230
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

MDB TIRE SPECIFICATIONS

Requirement	Units	LF	RF	LR	RR
Tire Size	P205/75R15	N/A	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	200 ± 21	kPa	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	542.5	387.5		576.5	518.5		578.5	519.5	
Right	kg	532.0	362.0		525.5	463.5		526.5	464.5	
Ratio	%	58.9%	41.1%		52.9%	47.1%		52.9%	47.1%	
Totals	kg	1074.5	749.5	1824.0	1102.0	982.0	2084.0	1105.0	984.0	2089.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1824.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	183	(C)
Calculated Test Vehicle Target Weight (TWTW)	kg	2136.0	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	792	787	Yes
Right Front	mm	798	798	Yes
Right Rear	mm	785	785	Yes
Left Rear	mm	772	772	Yes
Vehicle CG (Aft of Front Axle)	mm	1296	1297	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	39	15	

*** 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: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	117
None	

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

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	19.7	9.5	14.6
Front Passenger Seat	22.4	11.4	16.9
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As-Tested SCRL Angle (Mid)	As-Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear-Most	Mid	Forward- Most
Driver Seat	14.6	0	Max	64	64	64
			Mid	32	32	32
			Min	0	0	0
Front Passenger Seat	16.9	0	Max	64	64	64
			Mid	32	32	32
			Min	0	0	0
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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

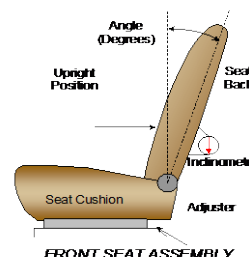
NHTSA No. O20160107
 Test Date: 9/28/2016

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	245		123	
Front Passenger Seat	245		123	
Front Center Seat				
Struck Side Rear Seat	180	19	180	18
Non-Struck Side Rear Seat	180	19	180	18
Rear Center Seat	180	19	180	18

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents (1 st as 1)	Degrees	Detent (1 st as 0)
Driver Seat	66.7		0.0	
Front Passenger Seat	66.2		0.0	
Front Center Seat				
Struck Side Rear Seat	18.0	10	1.5	0
Non-Struck Side Rear Seat	18.0	10	1.5	0
Rear Center Seat	18.0	10	1.5	0

Driver seat back angle measured with level on headrest post.
 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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

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

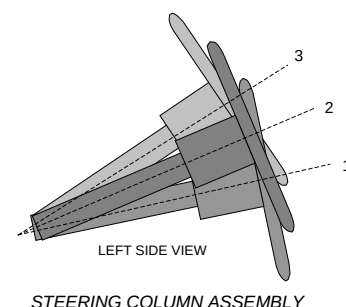
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	7	6 (Lowest as 0) / Foremost
Rear Seat	5	0 (Lowest as 0) / Fixed Fore-Aft

STEERING COLUMN ADJUSTMENT

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

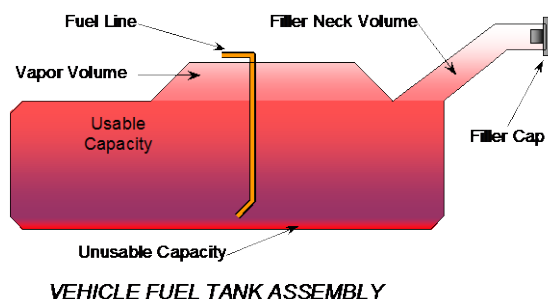
	Wheel Angle (deg)	Fore/Aft Position (mm)
Lowermost, Position 1	69.0	265
Geometric Center, Position 2	66.3	240
Uppermost, Position 3	63.6	215
Telescoping Steering Wheel Travel		50
Test Position	66.3	240



FUEL PUMP

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

The test vehicle is equipped with an electronic fuel pump. Pump operates for 3.0 seconds after the ignition is switched to "ON", and afterwards only while the engine is cranking or running. The filler neck is located on the passenger's side.



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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of Standard Tank (see Form No. 1)	65.5
Usable Capacity of Optional Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	65.5
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	60.9
Actual Amount of Solvent Used	60.9
1/3 of Usable Capacity	21.8

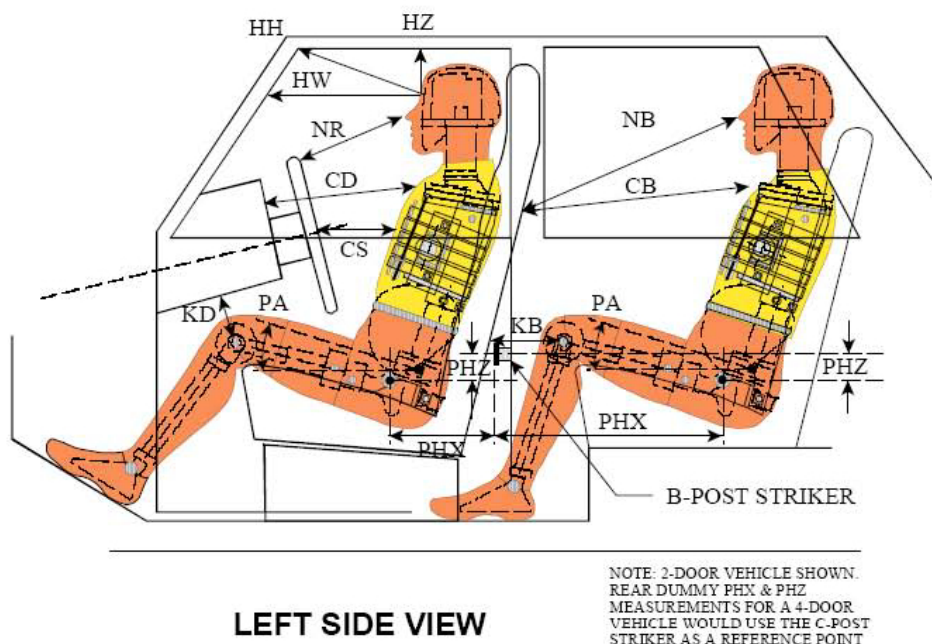
Is the actual amount of solvent used in the test equal to 93% + 1%
of the Usable Capacity stated in Form No. 1?

YES

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016



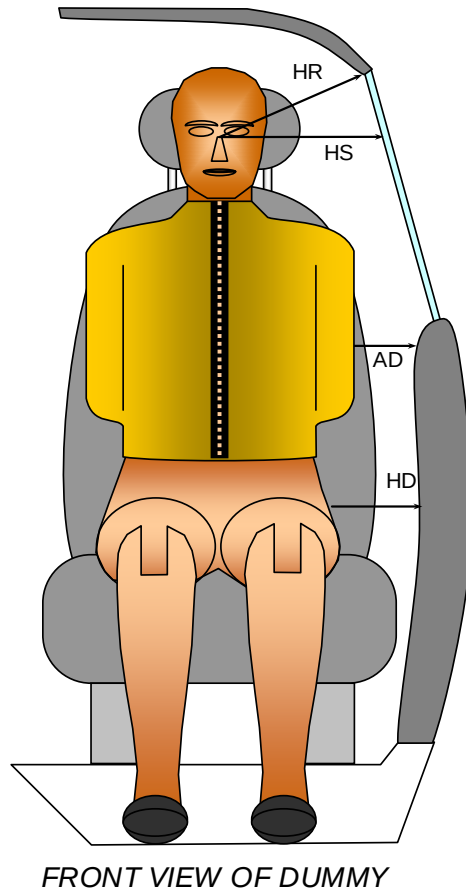
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	456	18.3		
HW		Head to Windshield	699	0		
HZ	HZ	Head to Roof Liner	200	90	262	90
NR	NB	Nose to Rim/Seat Back	497	15.6	488	13.1
CD	CB	Chest to Dashboard/Seat Back	634	5.5	487	4.1
CS		Chest to Steering Wheel	430	6.8		
KDL	KBL	Left Knee to Dash/Seat Back	226	27.6	263	31.5
KDR	KBR	Right Knee to Dash/Seat Back	190	55.0	265	31.9
PAX	PAX	Pelvic Tilt Angle X		23.3		20.1
PAY	PAY	Pelvic Tilt Angle Y		-1.3		-0.8
PHX	PHX	Hip Point to Striker (X-Axis)	134		153	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	104		160	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016



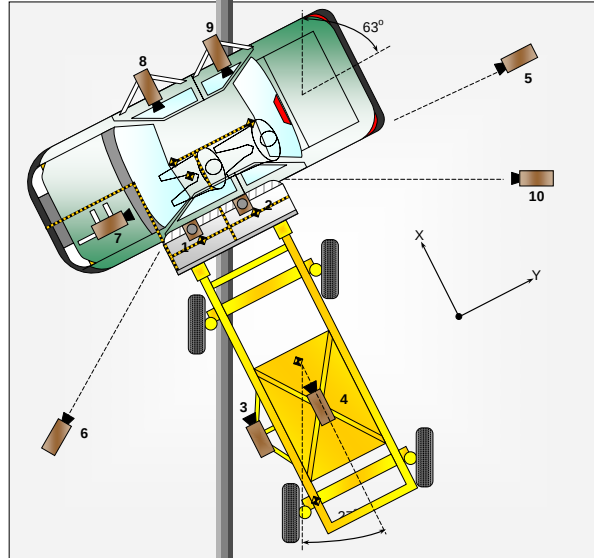
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	187	234
HS	Head to Side Window	mm	291	352
AD	Arm to Door	mm	104	166
HD	Hip Point to Door	mm	145	176

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	170	0	-4430	14	1000
2	Overhead Close-Up	120	150	-4330	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	-20	5780	-1250	24	1000
6	Left Front	-1420	-5390	-1260	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

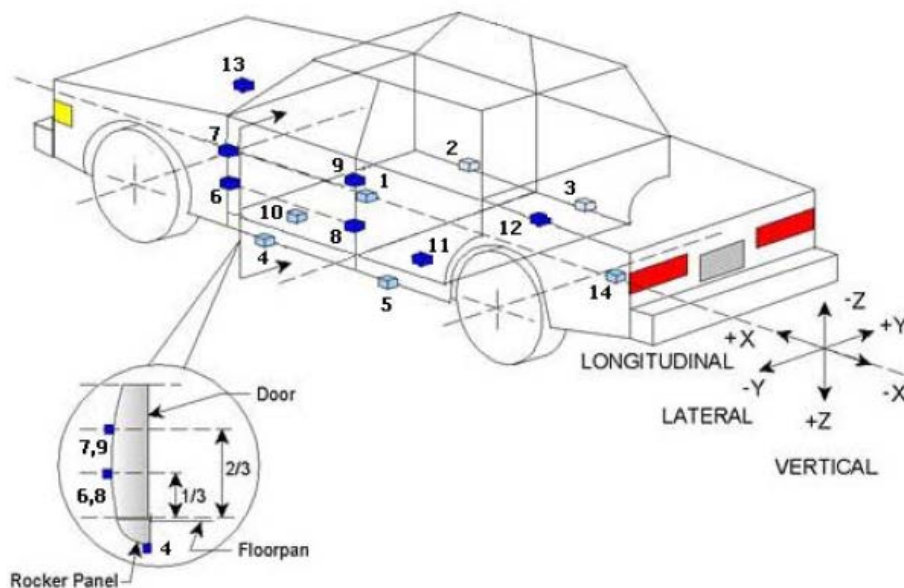
INSTRUMENTATION

	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: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
Test Date: 9/28/2016



TEST VEHICLE ACCELEROMETER LOCATIONS

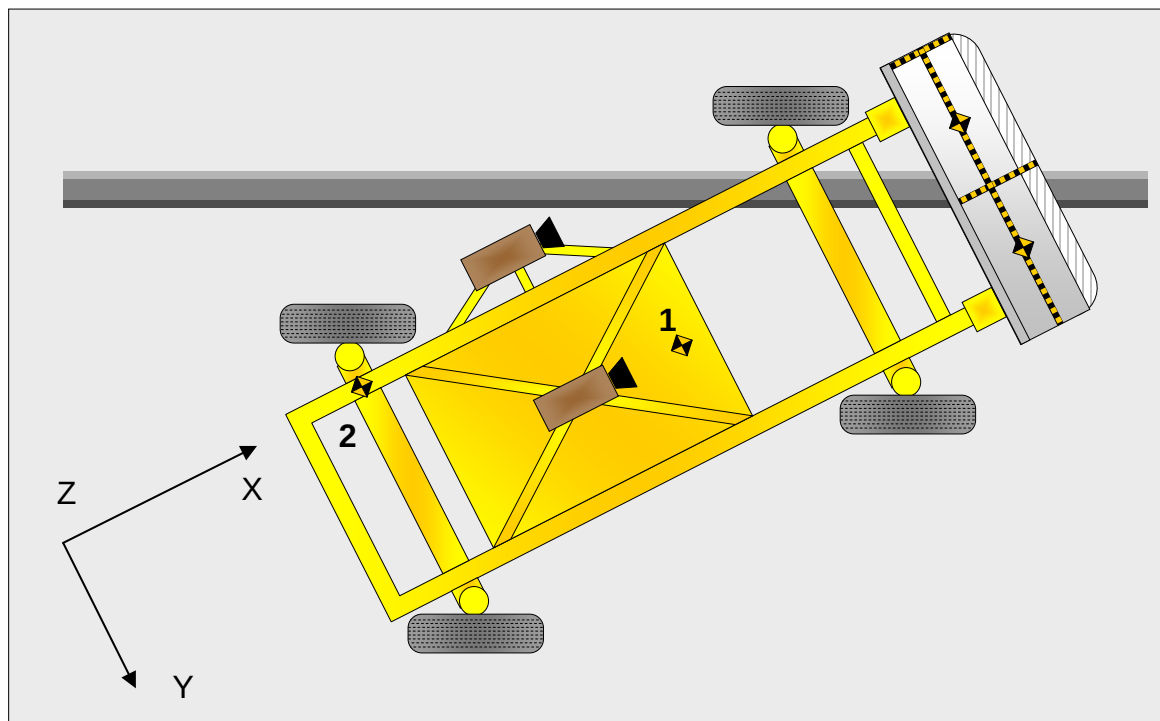
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2698	112	-466
2	Right Sill at Front Seat	2247	721	-276
3	Right Sill at Rear Seat	1405	721	-281
4	Left Sill at Front Door	2542	-721	-276
5	Left Sill at Rear Door	1667	-721	-280
6	Left Lower A-Post	3102	-838	-600
7	Left Middle A-Post	3110	-823	-853
8	Left Lower B-Post	2098	-770	-680
9	Left Middle B-Post	2022	-728	-934
10	Front Seat Track	2200	-354	-437
11	Rear Seat Structure	1705	-336	-442
12	Rt. Rear Occ. Compartment	1780	372	-370
13	Engine Block	3891	0	-888
14	Rear Above Axle	880	0	-526

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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



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: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020160107
Test Date: 9/28/2016

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch / Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	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	Cracked
Side Window Damage	LF Window Cracked
Other Notable Effects	None

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. 020160107
Test Date: 9/28/2016

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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other:	No		No	

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2752
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		436
Actual Impact Point (Aft of Front Axle)	mm		445
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-9
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	4

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4119
Wheelbase of Framework Carriage	2588
CG Location aft of Front Axle	1138

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	406.0	283.3	
Right	kg	357.9	316.4	
Ratio	%	56.0	44.0	
Totals	kg	763.9	599.7	1363.5

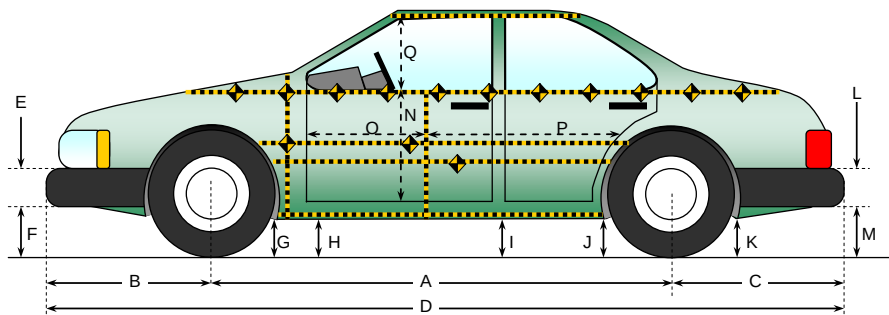
SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.42
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.72
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.8
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.2

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



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

LEFT SIDE VIEW

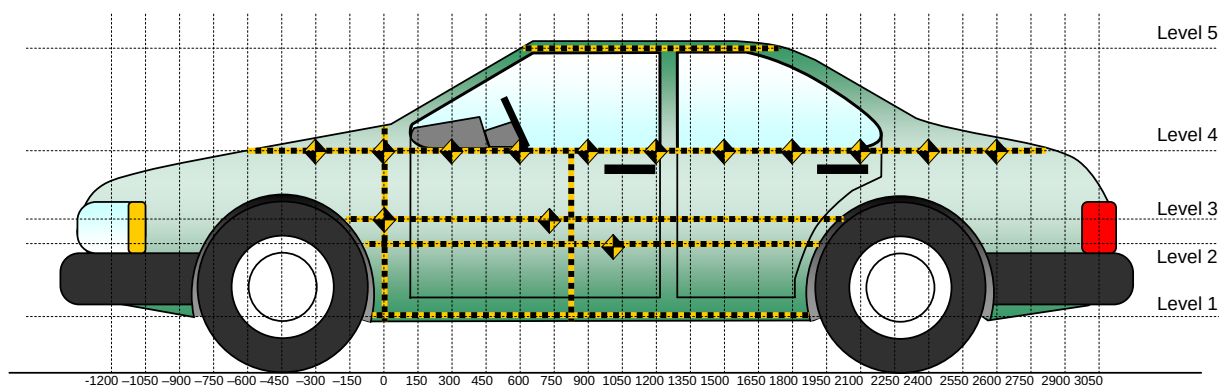
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2752	2752	0
B	Front Axle to FSOV	1000	1007	-7
C	Rear Axle to RSOV	929	935	-6
D	Total Length at Centerline	4681	4694	-13
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	289	288	1
G	Sill Height at Front Wheel Well	247	254	-7
H	Sill Height at Front Door Leading Edge	251	249	2
I	Sill Height at B Pillar	241	241	0
J1	Sill Height at Rear Wheel Well	234	241	-7
J2	Pinch Weld Height at Rear Wheel Well	236	240	-4
K	Sill Height Aft of Rear Wheel Well	251	246	5
L	Rear Bumper Thickness	114	114	0
M	Rear Bumper Bottom to Ground	296	308	-12
N	Sill Height to Window Bottom Sill	880	824	56
O	Front Door Leading Edge to Impact CL	790	757	33
P	Rear Door Trailing Edge to Impact CL	1170	1096	74
Q	Front Window Opening	487	459	28
R	Right Side Length	3699	3702	-3
S	Left Side Length	3699	3695	4
T	Vehicle Width at B Post	1810	1728	82

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	305	45	1650
2	Occupant H-Point	671	227	1650
3	Mid Door	696	228	1650
4	Window Sill	1075	41	1350
5	Window Top	1595	8	1200

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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016

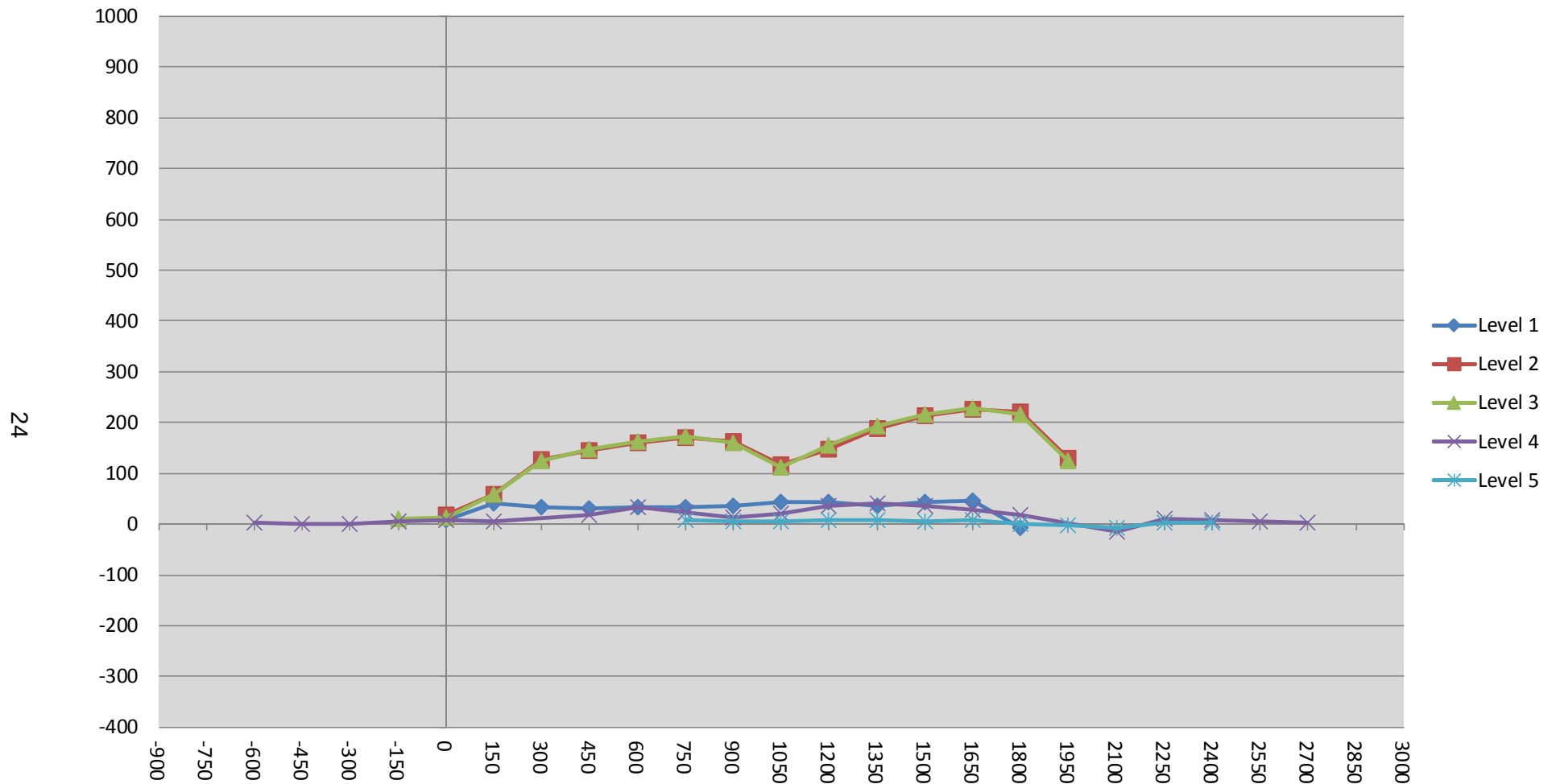
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900															
-750															
-600				301					303					2	
-450				290					290					0	
-300				285					286					1	
-150			183	286				193	292				10	6	
0	224	187	187	288		233	204	201	296		9	17	14	8	
150	243	199	201	281		283	257	259	287		40	58	58	6	
300	254	211	211			287	339	336			33	128	125		
450	255	211	211	274		286	357	358	292		31	146	147	18	
600	255	209	209	269		287	368	371	301		32	159	162	32	
750	254	207	206	265	526	288	378	379	288	533	34	171	173	23	7
900	254	205	204	259	515	291	367	365	273	521	37	162	161	14	6
1050	251	203	201	251	512	295	321	314	271	518	44	118	113	20	6
1200	252	202	201	246	510	296	349	355	283	518	44	147	154	37	8
1350	252	200	200	240	511	288	387	394	281	518	36	187	194	41	7
1500	245	198	198	235	512	289	411	413	272	518	44	213	215	37	6
1650	238	197	197	231	512	283	424	425	258	519	45	227	228	27	7
1800	224	194	194	229	521	217	416	411	247	522	-7	222	217	18	1
1950		188	187		528		317	311		527		129	124		-1
2100				231	539				217	531				-14	-8
2250				240	539				251	542				11	3
2400				248	550				257	553				9	3
2550				258					263					5	
2700				269					271					2	
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: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side MDB Impact Test

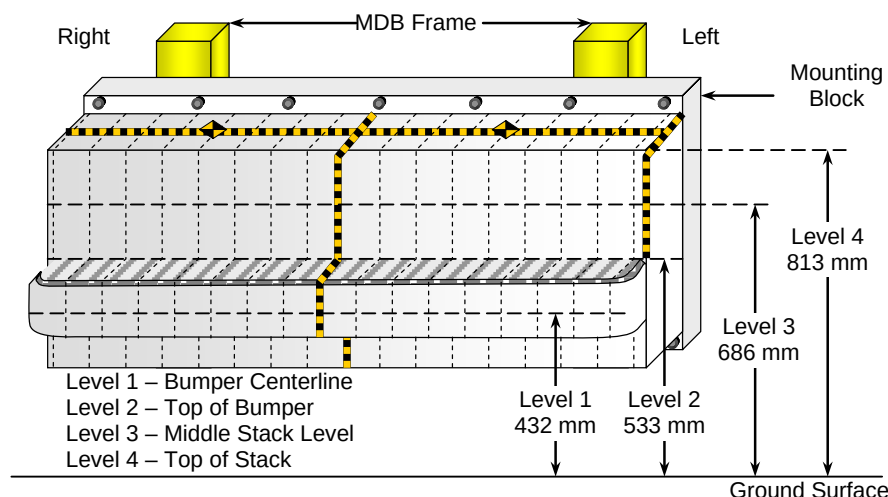
NHTSA No. O20160107
Test Date: 9/28/2016



DATA SHEET NO. 12 **MDB EXTERIOR STATIC CRUSH MEASUREMENTS**

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



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	268
B	Top of Bumper	533	800	Left	186
C	Mid-Level	686	800	Left	173
D	Top of Stack	813	800	Left	178

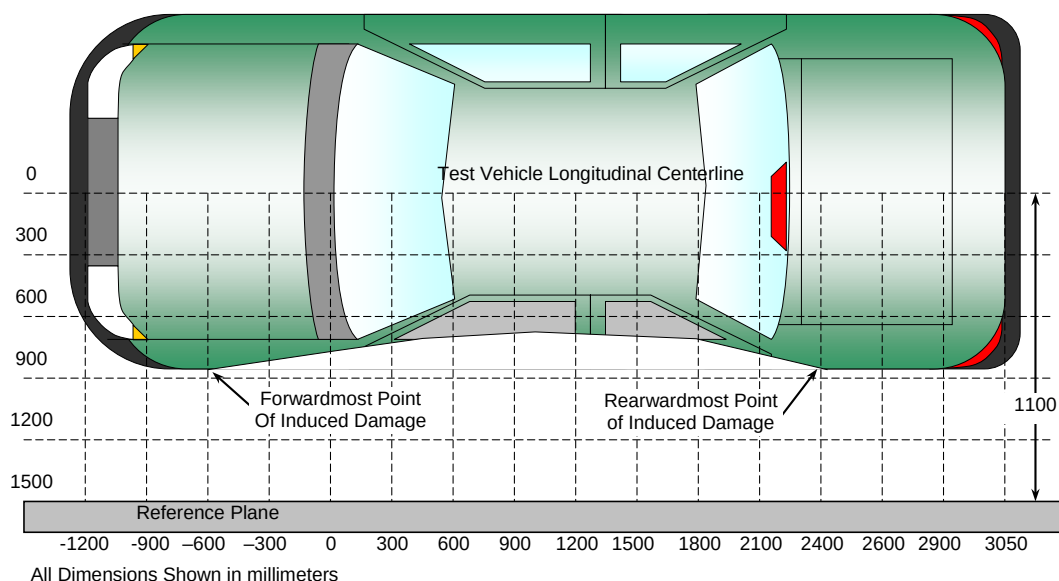
DEFORMABLE BARRIER STATIC CRUSH

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	87	79	67	64	75	79	139	138	130	115	106	113	111	129	145	157	178
3	67	61	67	75	79	95	117	125	117	90	80	80	88	96	108	134	173
2	61	161	155	150	149	137	137	149	145	151	147	167	167	167	169	169	186
1	254	256	252	254	259	258	256	259	258	255	257	259	259	258	257	256	268

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Max. Static Crush (mm)
1	2034	3	179	198	-19
2	1635	3	423	197	226
3	1235	3	366	201	165
4	836	3	375	205	170
5	436	3	356	211	145
6	37	3	204	190	14

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	730	476	254
2	480 mm right of center	1	721	465	256
3	160 mm right of center	1	719	461	258
4	160 mm left of center	1	717	461	256
5	480 mm left of center	1	724	465	259
6	800 mm left of center	1	744	476	268

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

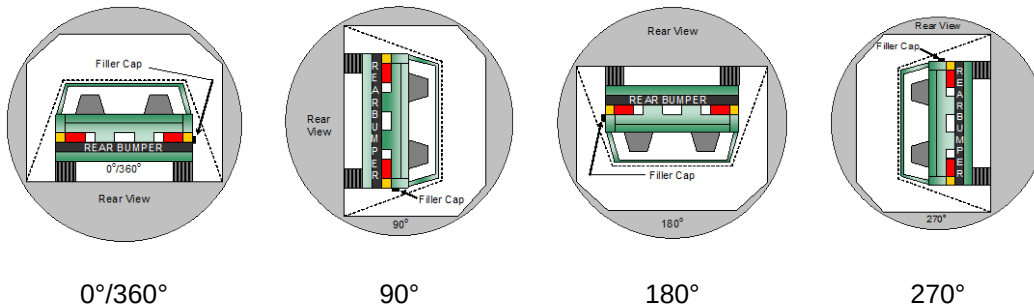
NHTSA No. O20160107
 Test Date: 9/28/2016

Test Time: 2:58 pm

Temperature: 21.3 °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.
 (Maximum Allowable = 1 ounce)
- 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°	118	300	418
90° to 180°	115	300	415
180° to 270°	116	300	416
270° to 360°	117	300	417

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	

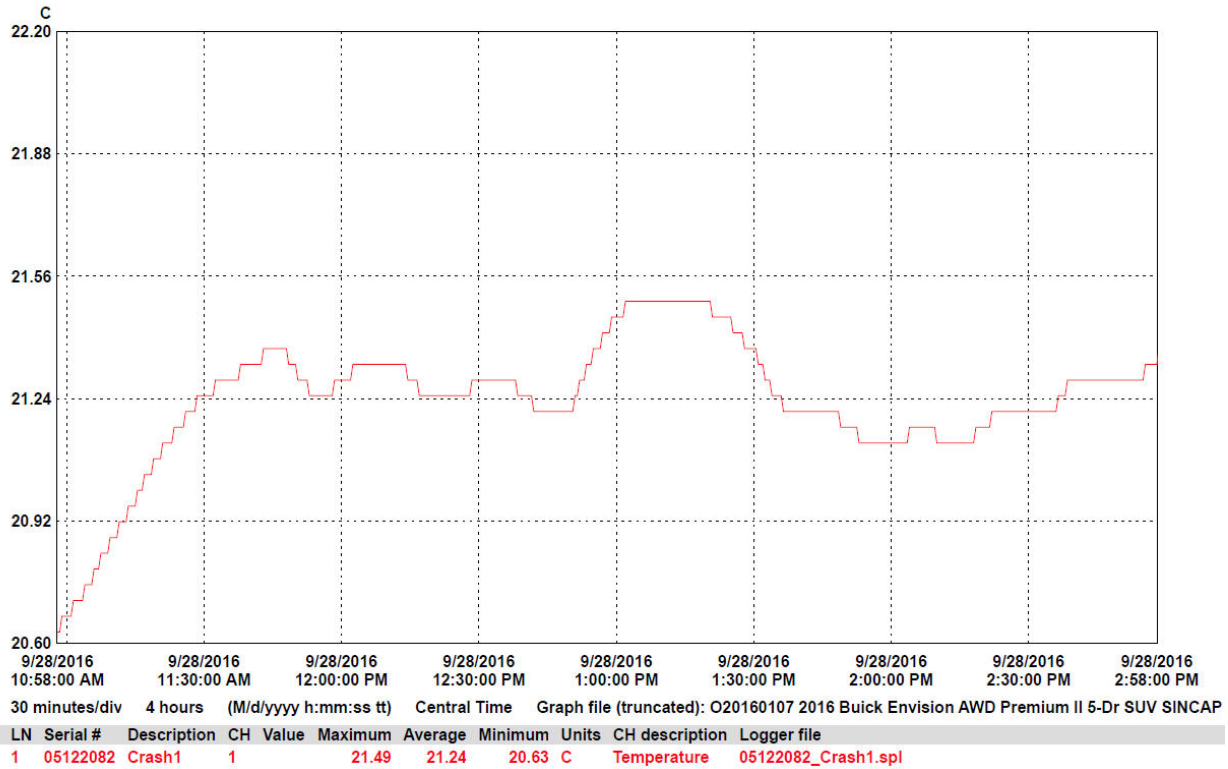
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20160107
 Test Date: 9/28/2016



**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

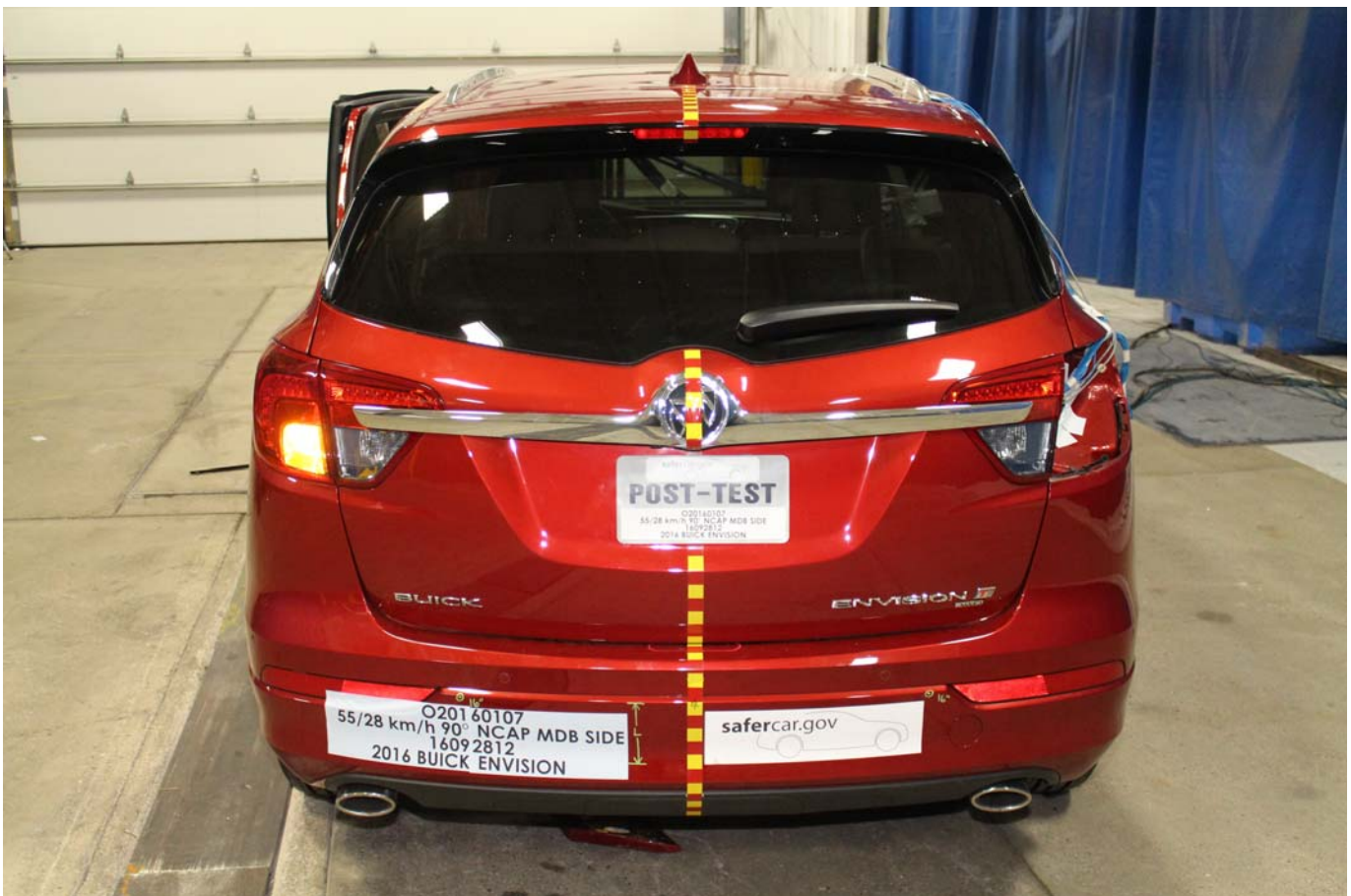


Photo No. 012 - Post-Test Rear View of Test Vehicle



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



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

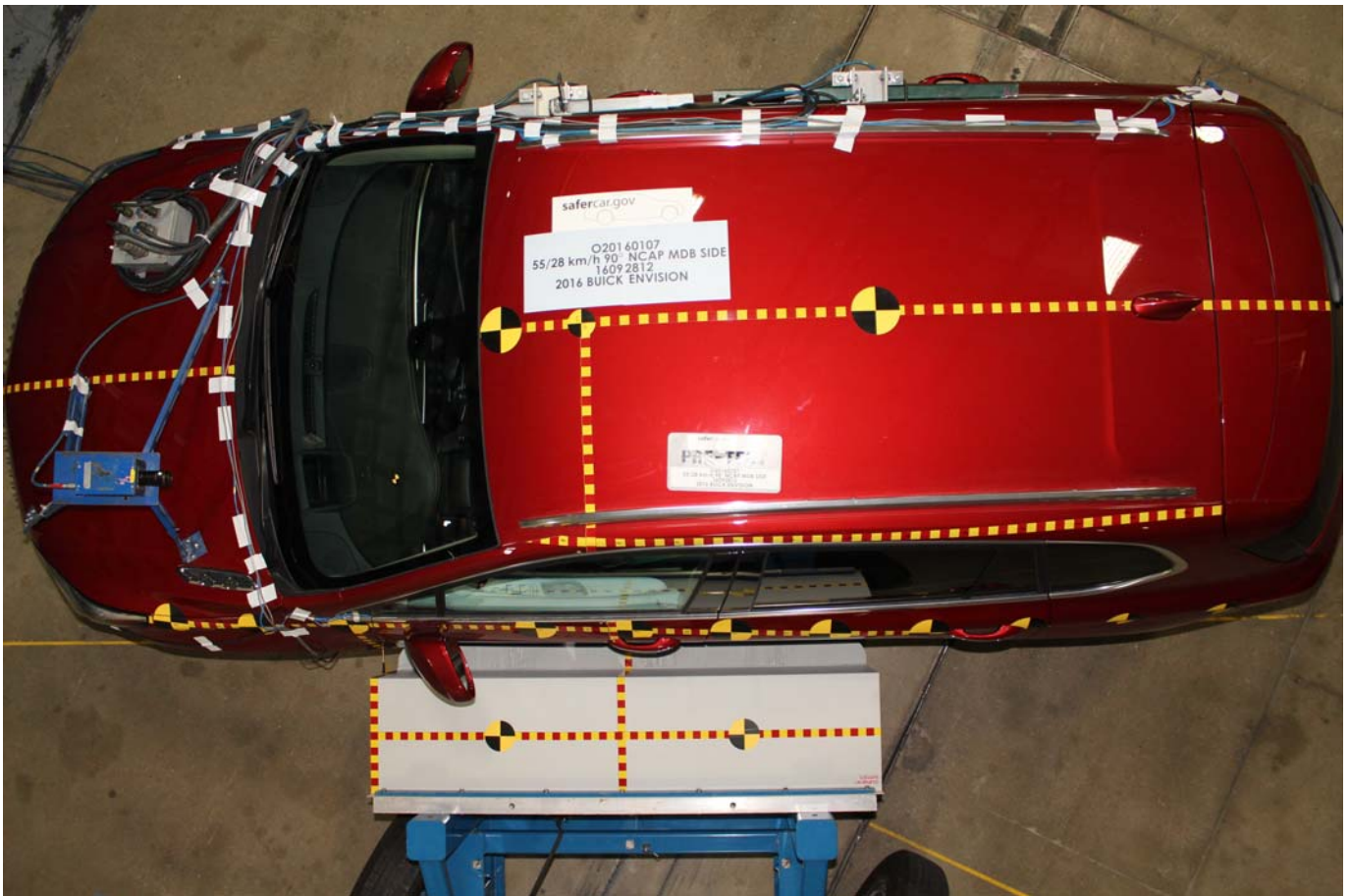


Photo No. 015 - Pre-Test Overhead View of Test Area

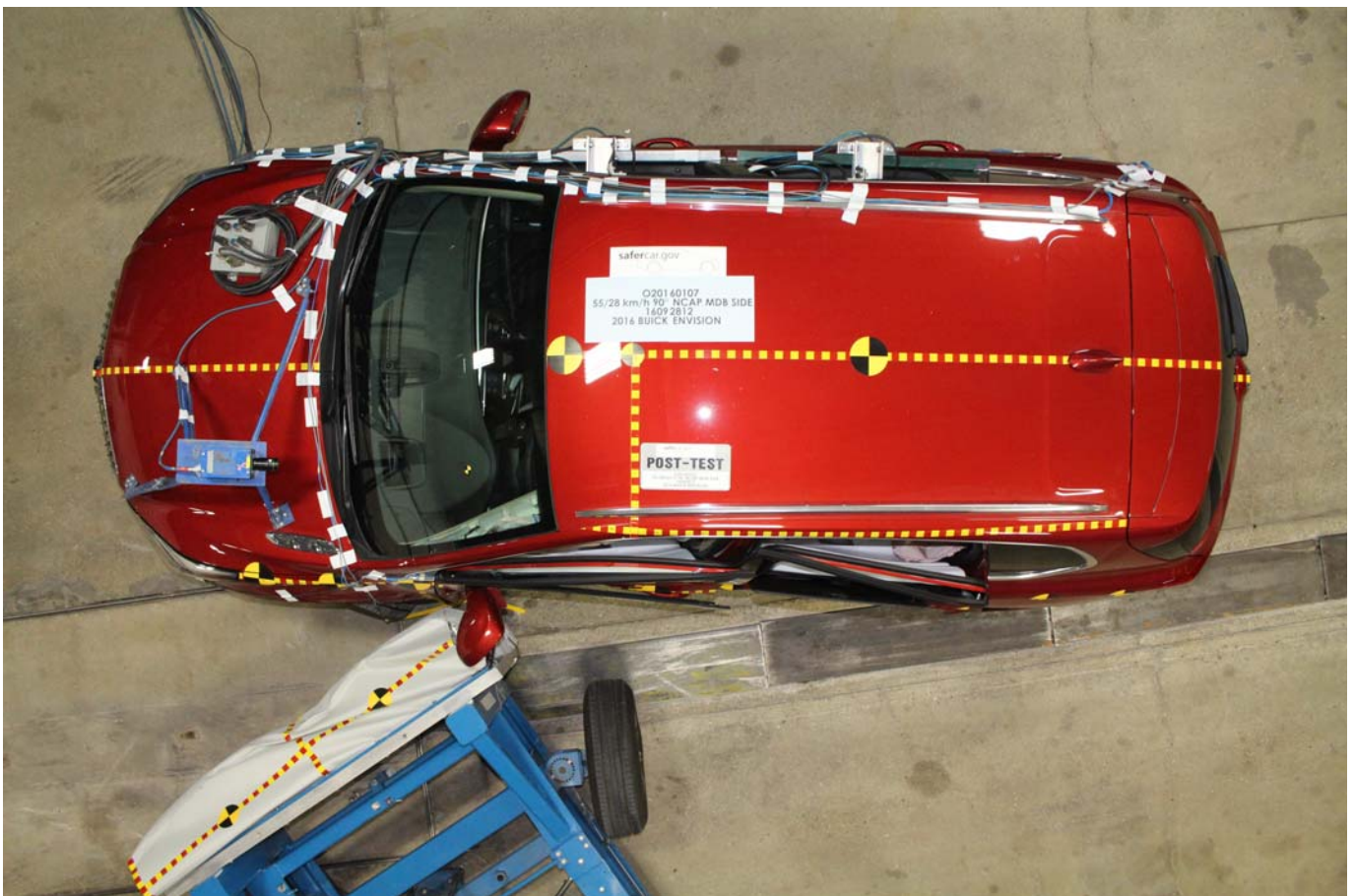


Photo No. 016 - Post-Test Overhead View of Test Area



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

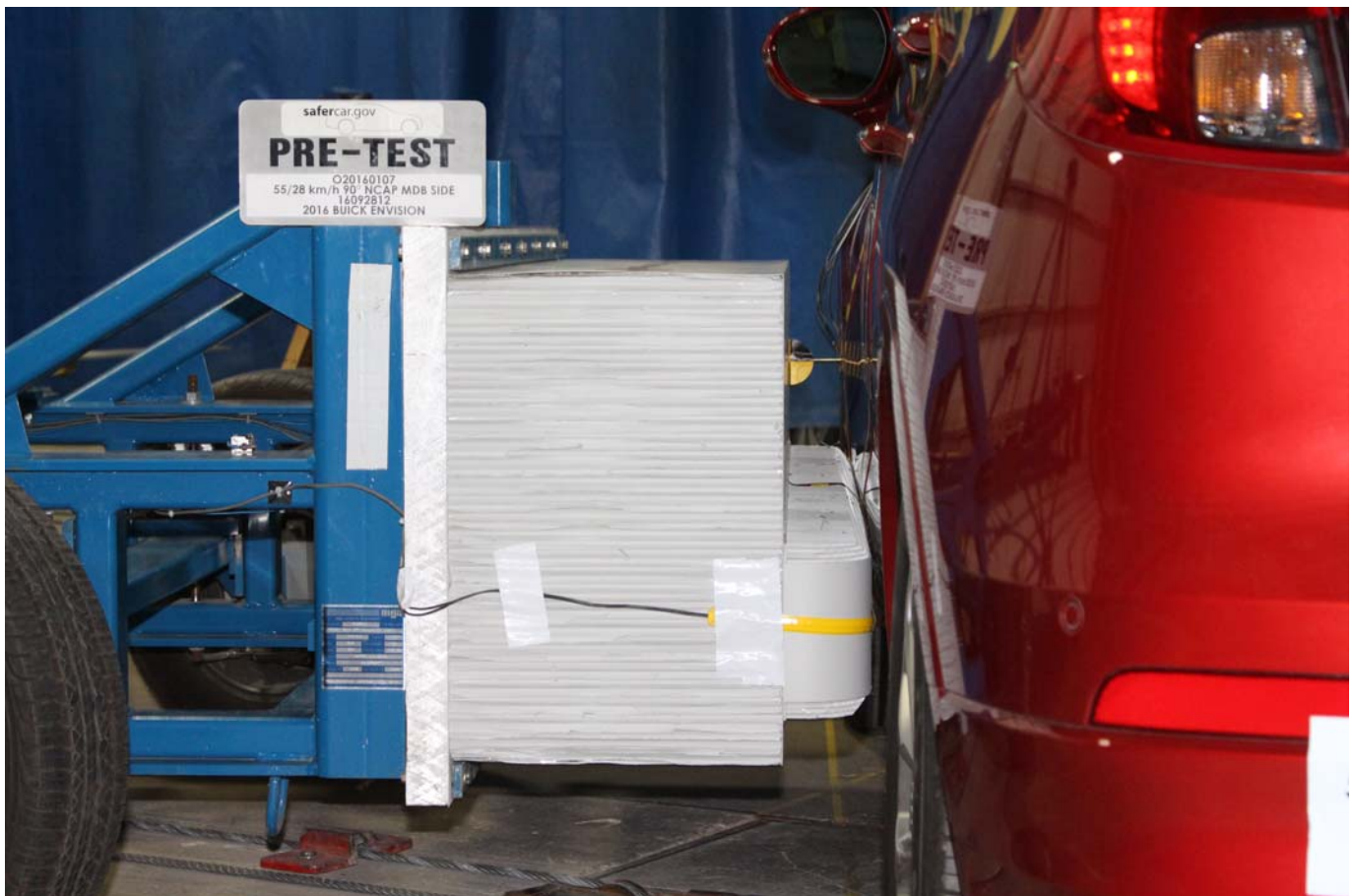


Photo No. 018 - Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle



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

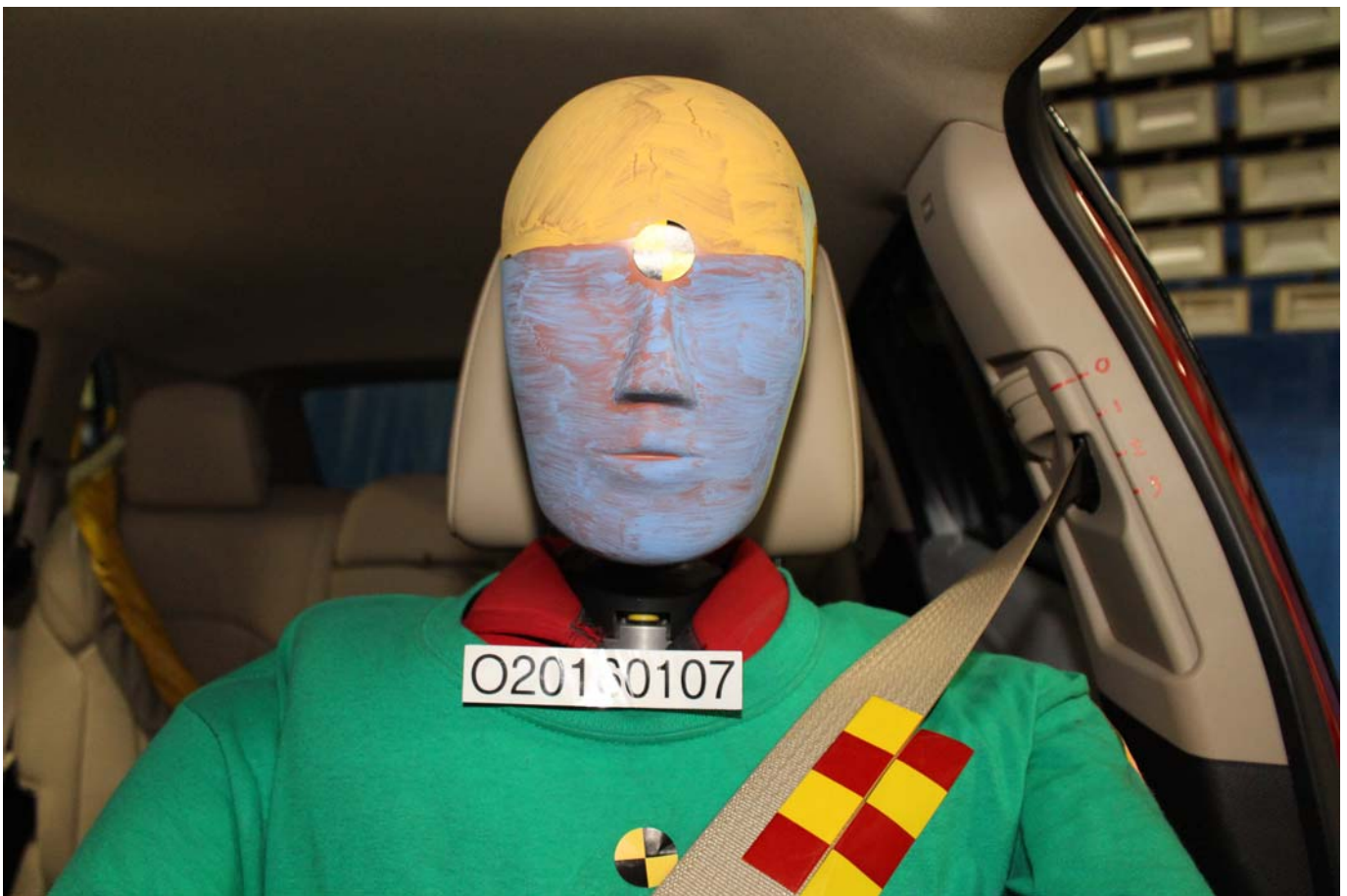


Photo No. 031 - Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



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

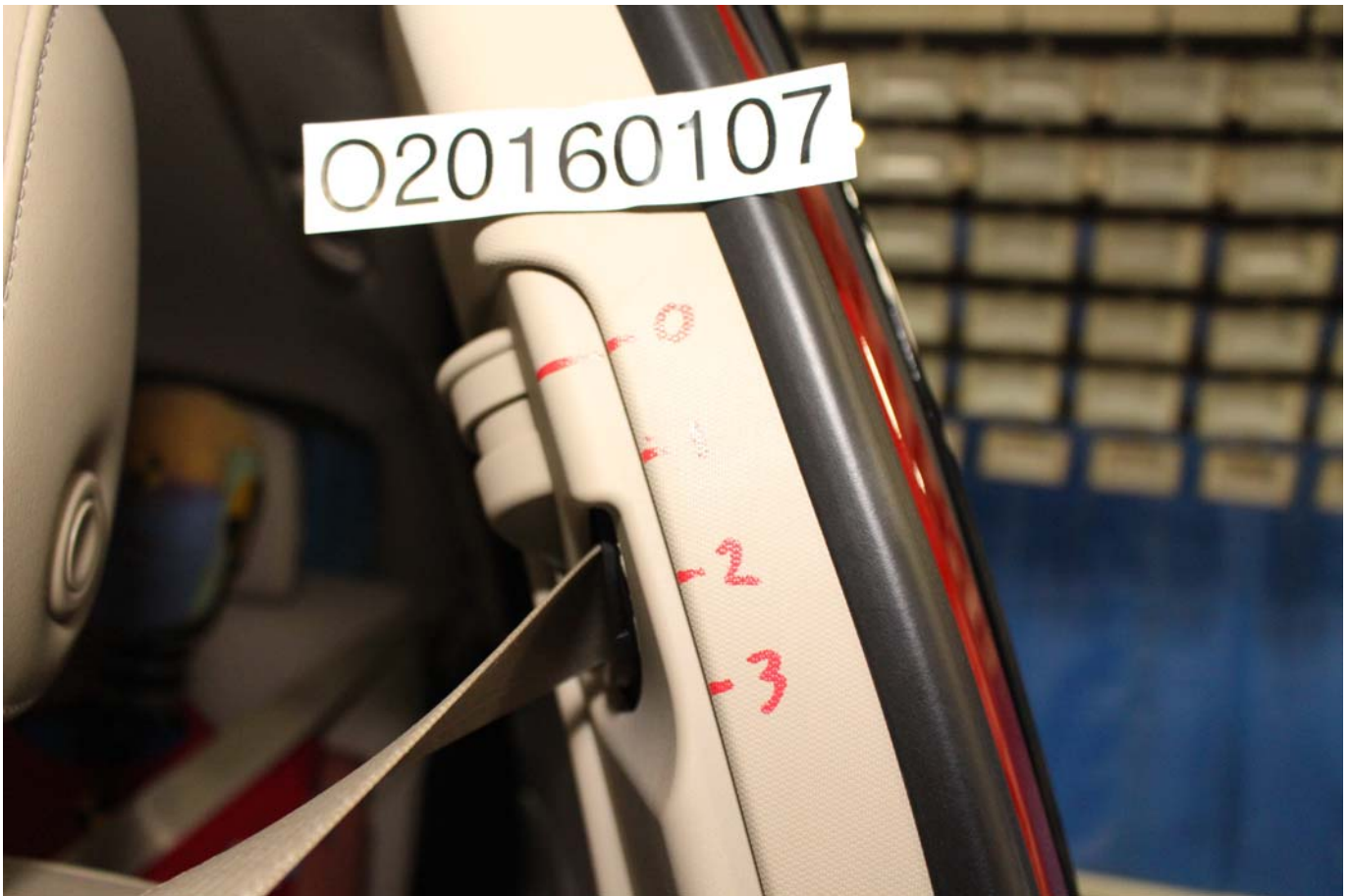


Photo No. 035 - Pre-Test View of Belt Anchorage for Driver Dummy



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



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

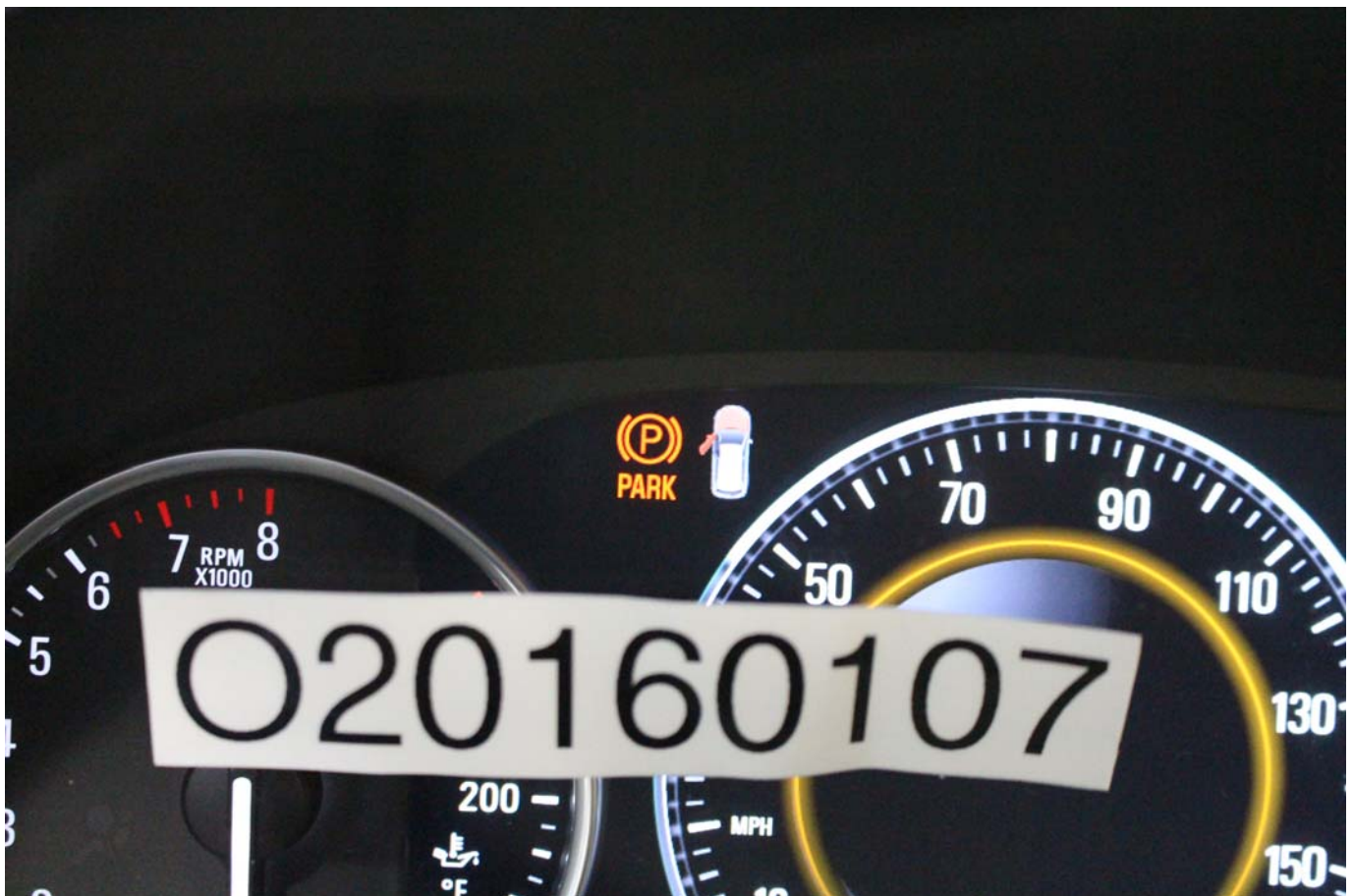


Photo No. 038 - Pre-Test View of Parking Brake

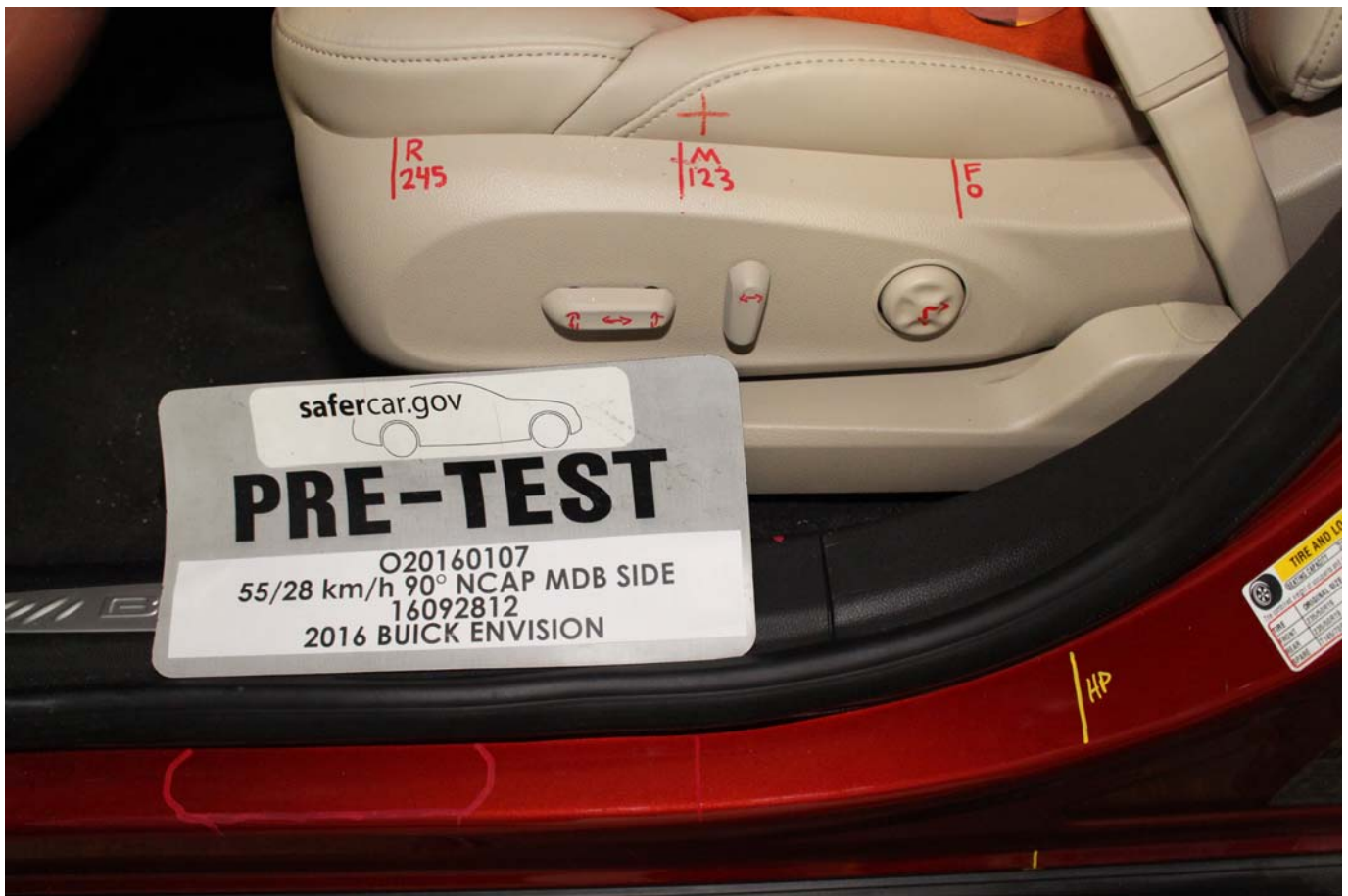


Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track



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

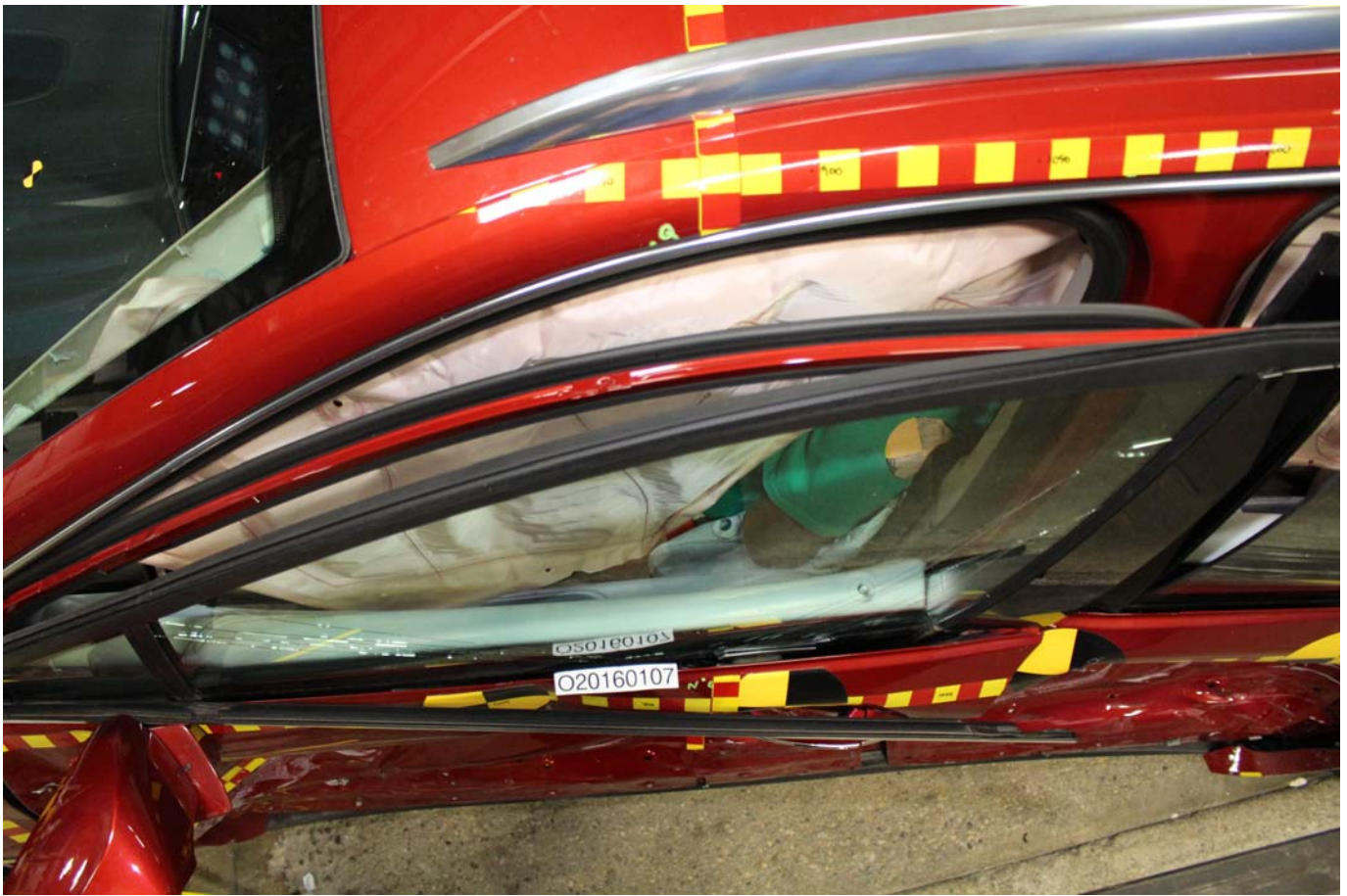


Photo No. 043 - Post-Test Driver Dummy and Door Clearance View



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

PHOTOGRAPH NOT APPLICABLE

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



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



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



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



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



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



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



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



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



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



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



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



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

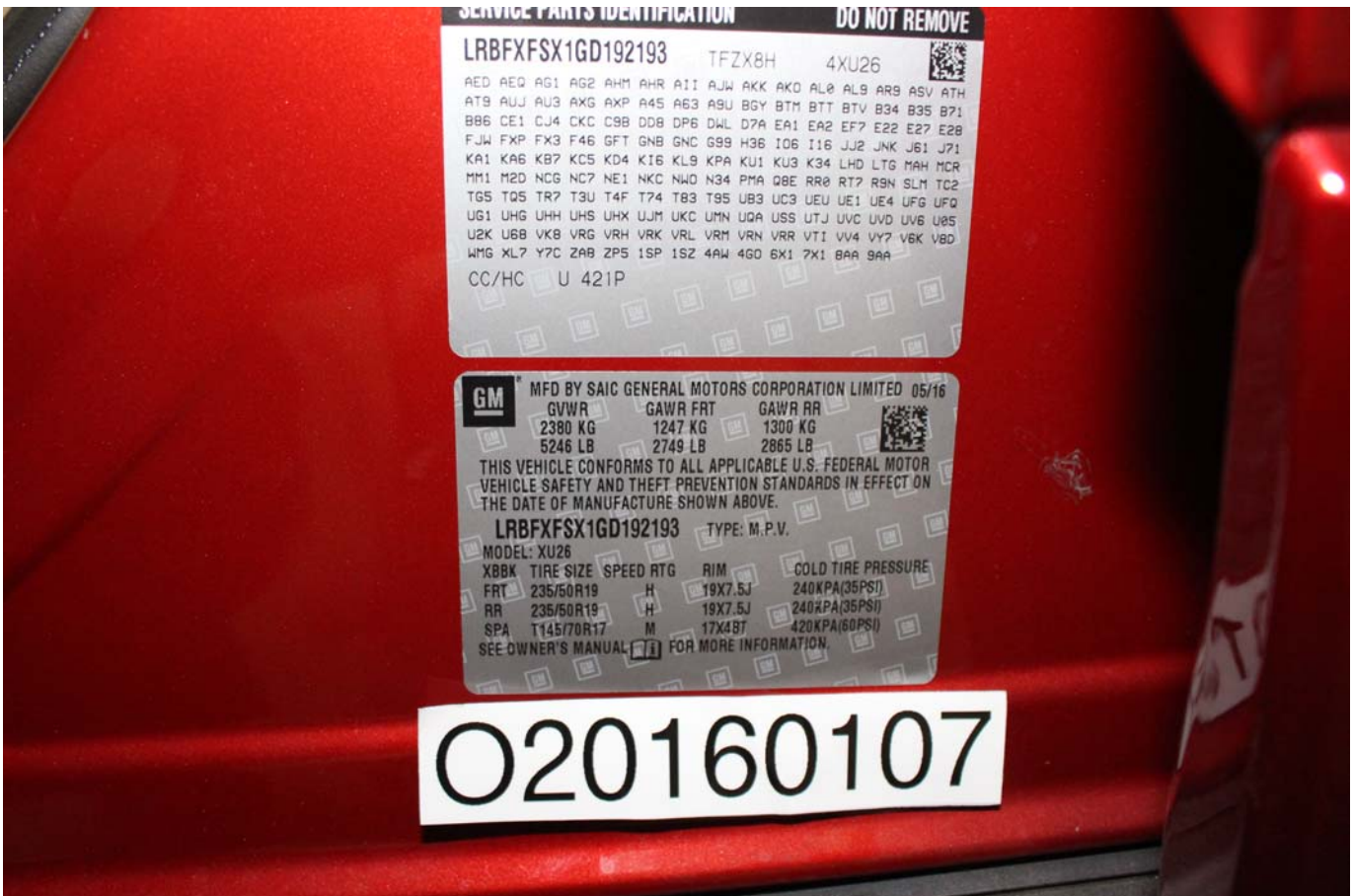


Photo No. 092 - Close-Up View of Vehicle Certification Label



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



Photo No. 094 - Pre-Test Ballast View



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

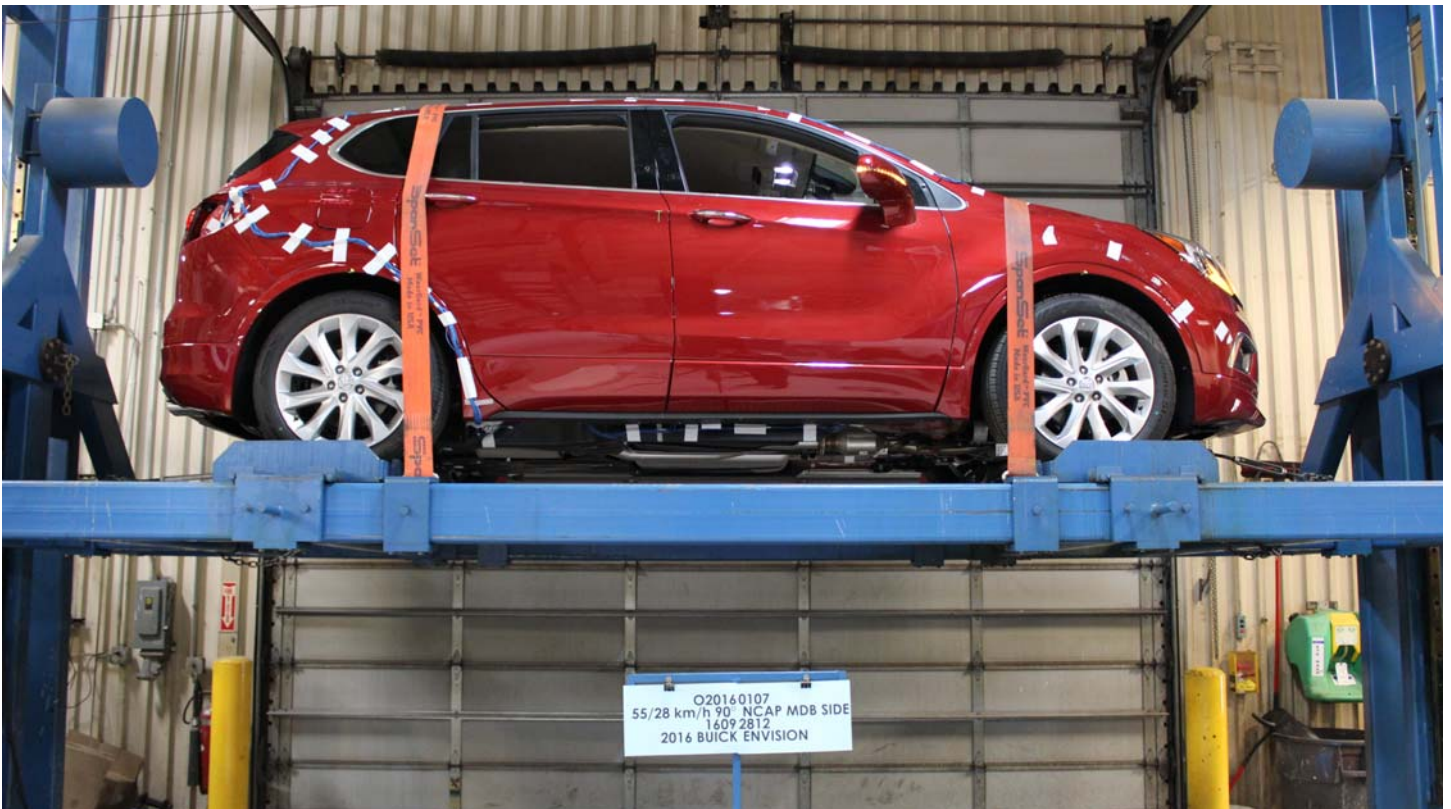


Photo No. 096 - FMVSS No. 301 Static Rollover 0 Degrees



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



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

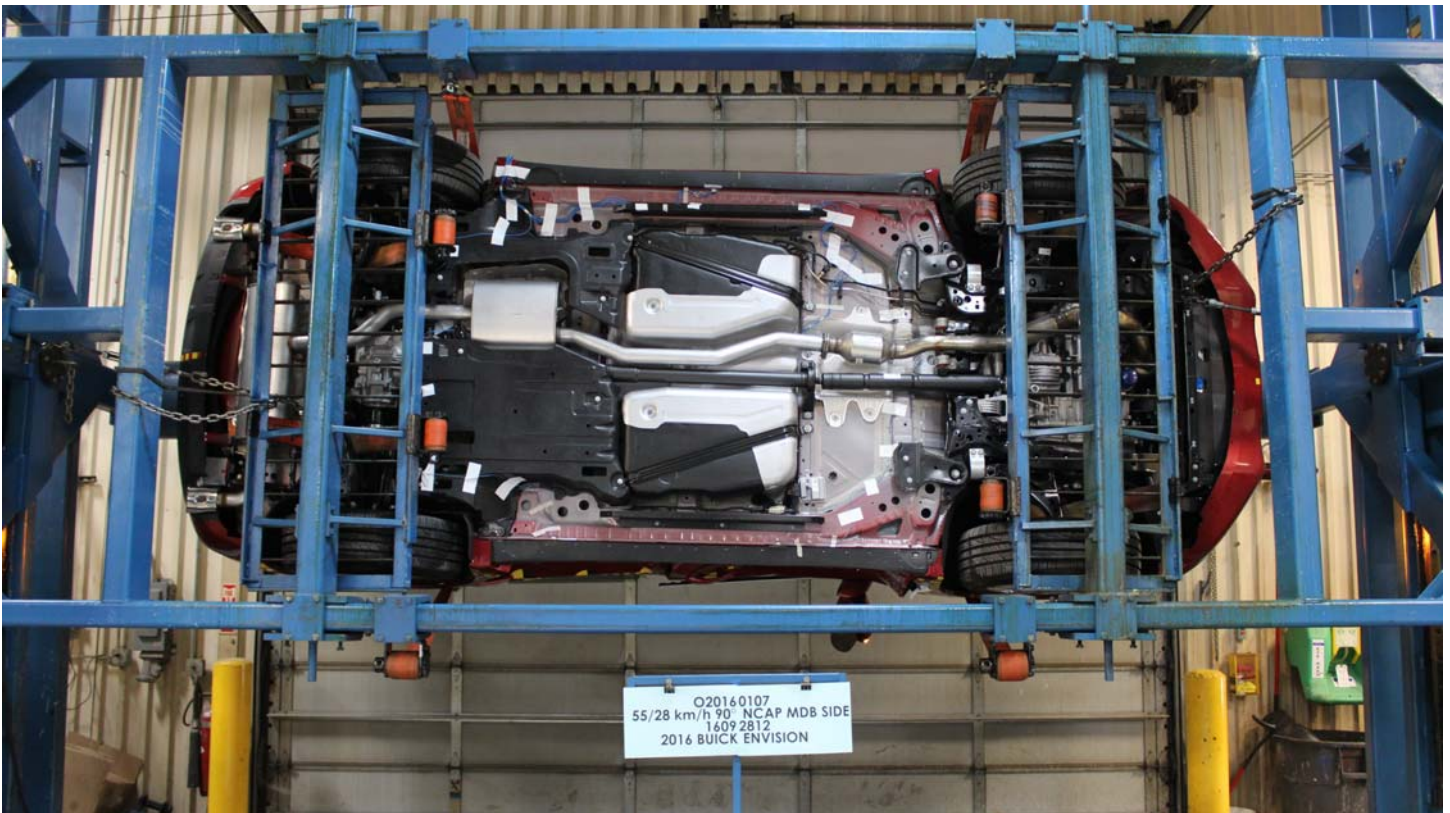


Photo No. 099 - FMVSS No. 301 Static Rollover 270 Degrees



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



Photo No. 101 - Impact Event



2016 ENVISION AWD PREMIUM II

EXTERIOR: SAFFRON RED METALLIC
INTERIOR: LIGHT NEUTRAL/EBONY ACCENTS

ENGINE: 2.0L TURBO DOHC 4-CYL
TRANSMISSION: 6-SPD AUTOMATIC

STANDARD EQUIPMENT

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

- DESIGN AND ENGINEERING LED BY BUICK IN THE UNITED STATES OF AMERICA
- 6 YEAR / 70,000 MILE POWERTRAIN LIMITED WARRANTY SEE DEALER FOR DETAILS
- TWO MAINTENANCE VISITS OIL & FILTER
- 4 WHEEL TIRE ROTATION SEE WWW.BUICK.COM OR DEALER FOR DETAILS
- 4 YEAR / 50,000 MILE LIMITED BUMPER-TO-BUMPER WARRANTY SEE DEALER FOR DETAILS

SAFETY & SECURITY

- AIRBAGS: FRONTAL, SINGLE-STAGE DRIVER & DUAL-STAGE FRONT PASSENGER; DRIVER & FRONT PASSENGER; FRONT & REAR SEAT-MOUNTED SIDE-IMPACT; & HEAD-

CURTAIN FOR OUTBOARD SEATING POSITIONS

- THEFT DETERRENT SYSTEM
- ANTILOCK BRAKE SYSTEM
- STABILITRAK-STABILITY CONTROL SYSTEM W/ TRACTION CONTROL
- EZ KEY PASSIVE ENTRY SYSTEM
- KEYLESS START
- REAR VISION CAMERA
- SIDE BLIND ZONE ALERT WITH LANE CHANGE ALERT
- LANE KEEP ASSIST WITH LANE DEPARTURE WARNING
- FORWARD COLLISION ALERT
- REAR CROSS TRAFFIC ALERT
- FOLLOWING DISTANCE INDICATOR
- SAFETY ALERT SEAT
- TIRE PRESSURE MONITOR (EXCL. SPARE TIRE)

INTERIOR

- BUICK QUIET TUNING
- LEATHER APPOINTED SEATING

- POWER SEAT ADJUSTER, FRONT DRIVER AND PASSENGER, 8-WAY
- SEATS, HEATED FRONT
- SEATS, COOLED FRONT
- SEATS, HEATED REAR OUTBOARD POSITIONS
- SEAT, REAR 60-40 SPLIT-FOLD, RECLINING AND SLIDING
- SEAT, REAR, 1-TOUCH FLAT-FOLD
- MEMORY SETTINGS, DRIVER SEAT, OUTSIDE MIRRORS
- POWER WINDOW W/ EXPRESS DRIVER UP/DOWN
- POWER WINDOW WITH FRONT PASSENGER EXPRESS DOWN
- PWR WINDOWS, REAR EXPRESS DOWN
- DISPLAY, DRIVER INSTRUMENT INFO, 8" COLOR CONFIGURABLE
- CLIMATE CONTROL, TRI-ZONE AUTO
- INSIDE REARVIEW MIRROR, AUTO DIMMING
- LEATHER WRAP STEERING WHEEL, HEATED, WITH AUDIO CONTROLS

EXTERIOR

- WHEELS, 19" 10-SPOKE ALUMINUM PREM MANOOGIAN SILVER FINISH
- LIFTGATE, POWER, HANDS FREE, PROGRAMMABLE
- HEADLAMPS, HIGH INTENSITY DISCHARGE
- HEADLAMPS, ARTICULATING
- HEADLAMPS, INTELLIBEAM AUTO HIGH BEAM CONTROL
- REMOTE VEHICLE STARTER SYSTEM
- MIRRORS, OUTSIDE HEATED POWER ADJUSTABLE & AUTO-DIM, MANUAL FOLD W/TURN SIGNAL INDICATORS
- AUTOMATIC PARKING ASSIST

CONNECTIVITY FEATURES

- ONSTAR® INCLUDES 5 YR BASIC PLAN PLUS 6 MTH SERVICE W/ AUTOMATIC CRASH RESPONSE,

NAVIGATION & MORE (SUBJECT TO TERMS SEE ONSTAR.COM)

- AUDIO - BUICK INTELLILINK RADIO W/ NAV, CD PLAYER, 8" DIAGONAL COLOR TOUCH SCREEN
- XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUSXM AFTER 3 MONTHS
- 4G LTE W/ 4MB HOTSPOT WITH LIMITED DATA TRIAL AND MORE. (SUBJECT TO TERMS SEE ONSTAR.COM)

TOTAL VEHICLE & OPTIONS		\$45,105.00
DESTINATION CHARGE		925.00
TOTAL VEHICLE PRICE*		\$46,030.00

EPA DOT Fuel Economy and Environment

Fuel Economy

22 MPG combined city/hwy

20 MPG city

26 MPG highway

4.5 gallons per 100 miles

You spend \$2,250 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,250

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

5 (Best)

Smog Rating (tailpipe only)

6 (Best)

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 25 MPG and costs \$9,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 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

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

Equipped with the safety and connectivity of OnStar®

Visit onstar.com for details.

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 5%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: CHINA 85%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
YANTAI ETDZ P.R., CHINA
COUNTRY OF ORIGIN:
ENGINE: CHINA
TRANSMISSION: CHINA

© 2009 General Motors LLC
 GM, R, "P" logo, 2009 - 2010/01/09

Photo No. 102 - Monroney Label

Head Restraints

Front Seats

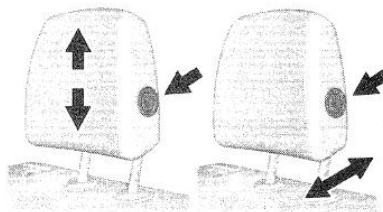
The vehicle's front seats have adjustable head restraints in the outboard seating positions.

Warning

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



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



To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or

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

To adjust the head restraint forward and rearward, press the button located on the side facing of the head restraint and move it forward or rearward until the desired locking position is reached. Try to move the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Seats

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

The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.

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

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
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Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
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Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
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Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
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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.dot.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)

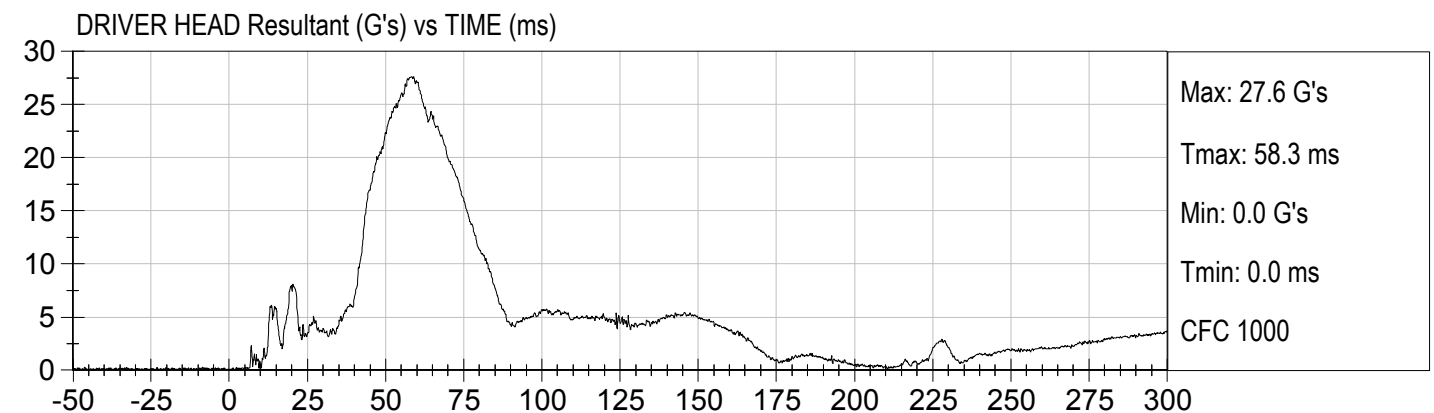
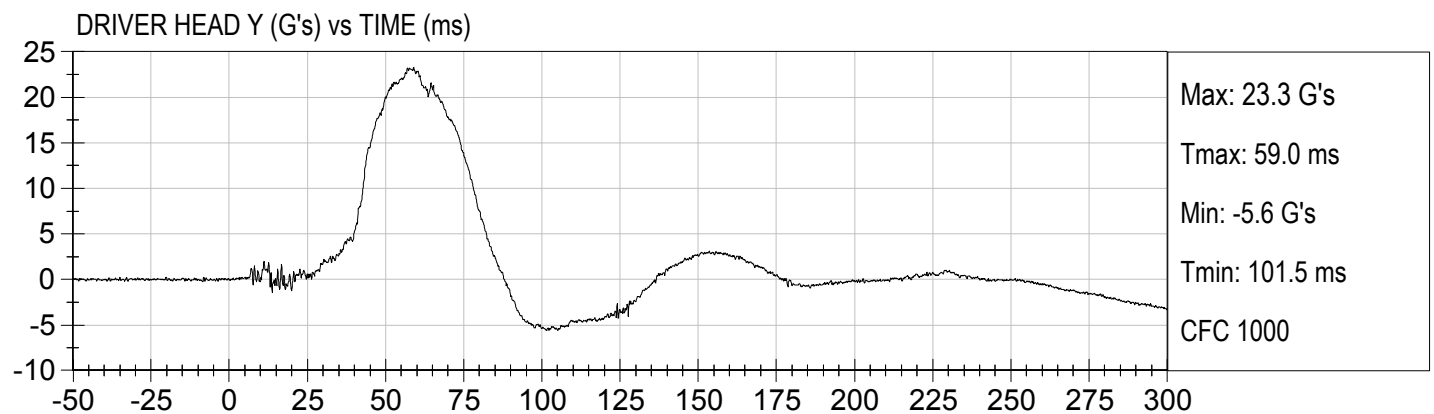
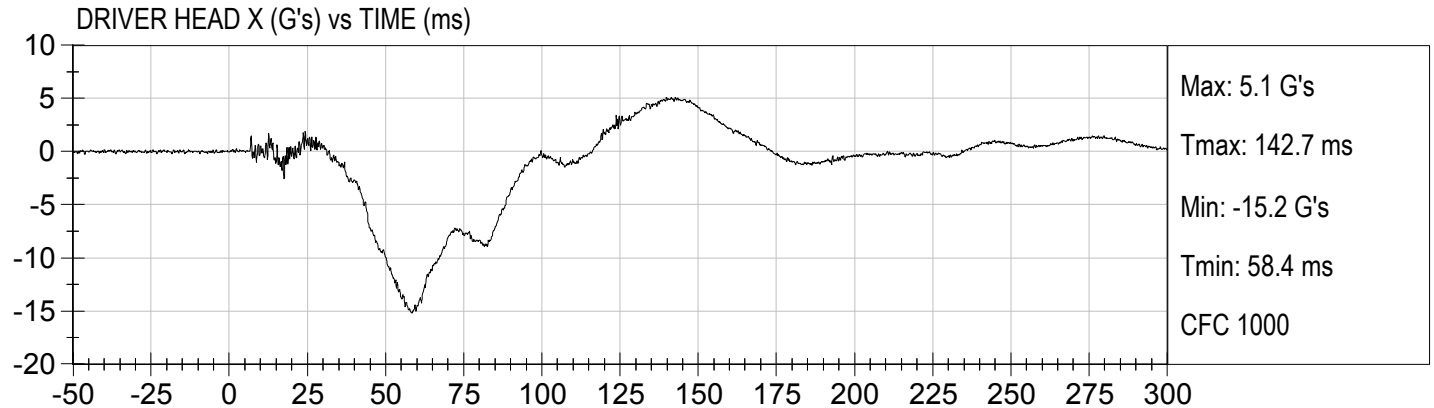
MDB Center of Gravity Acceleration (Z)

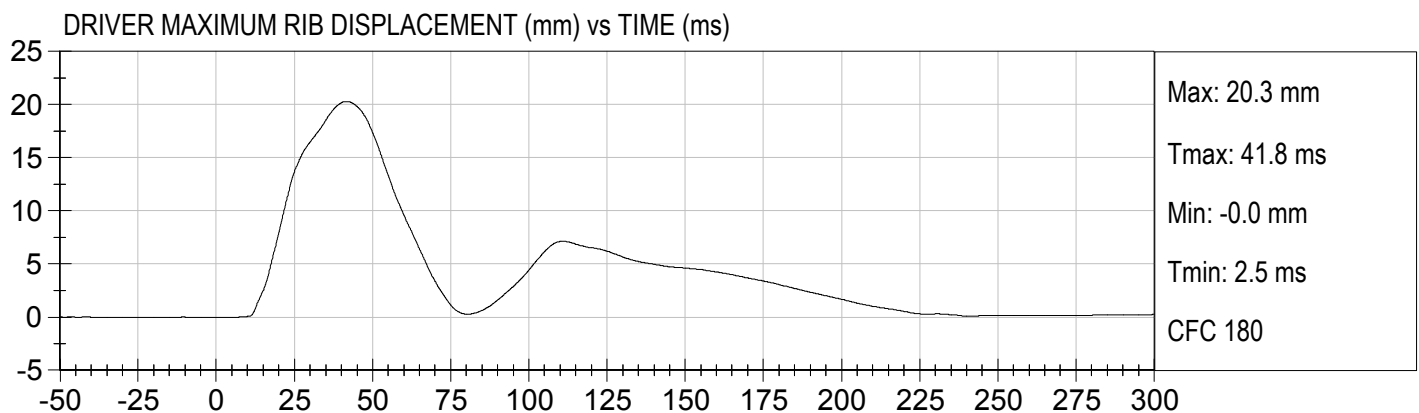
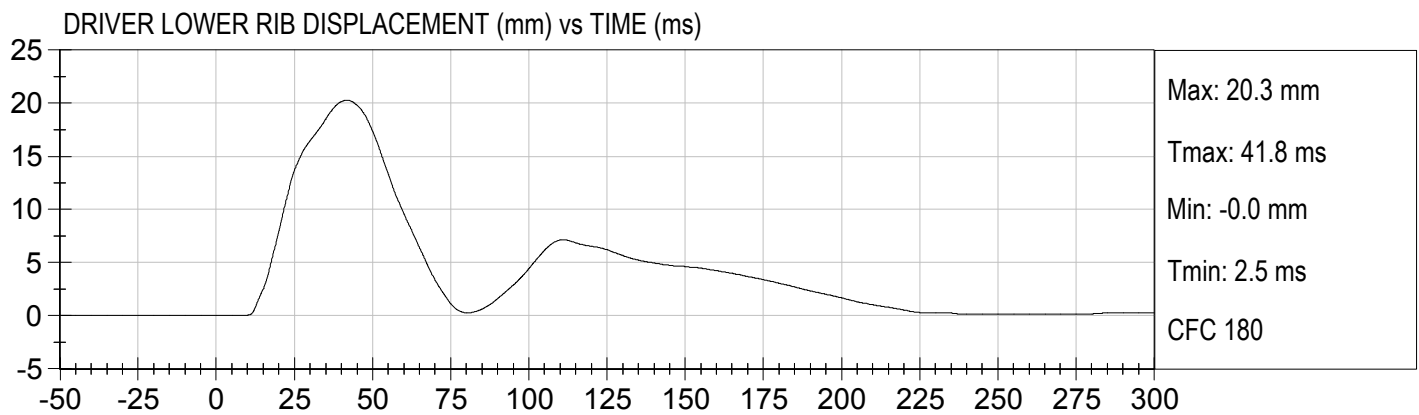
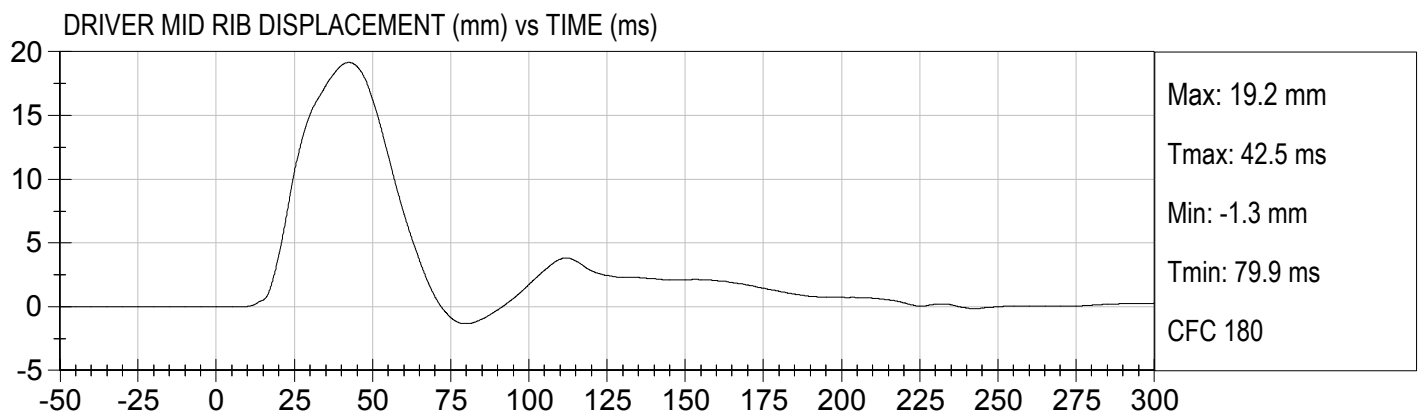
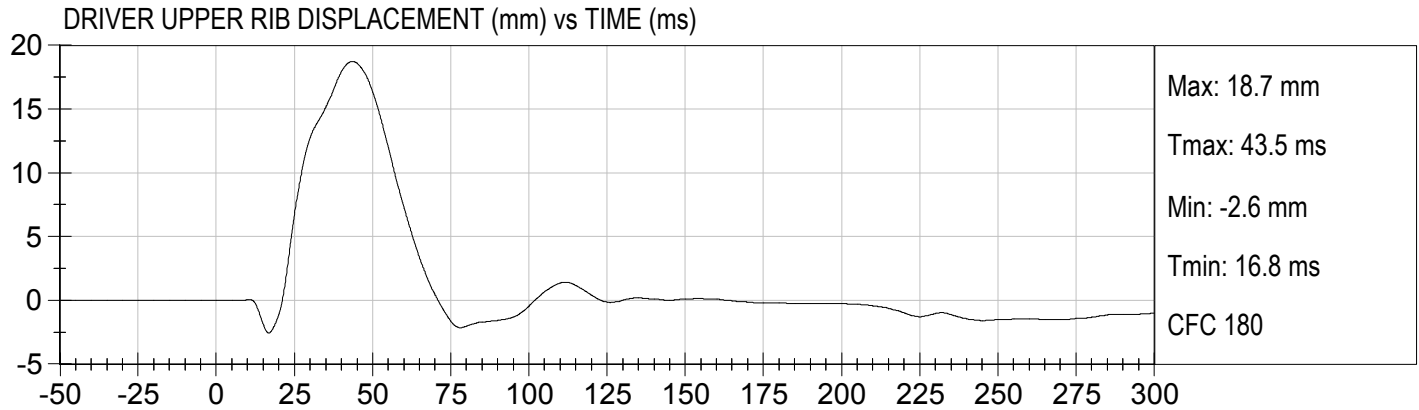
MDB Rear Acceleration (X)

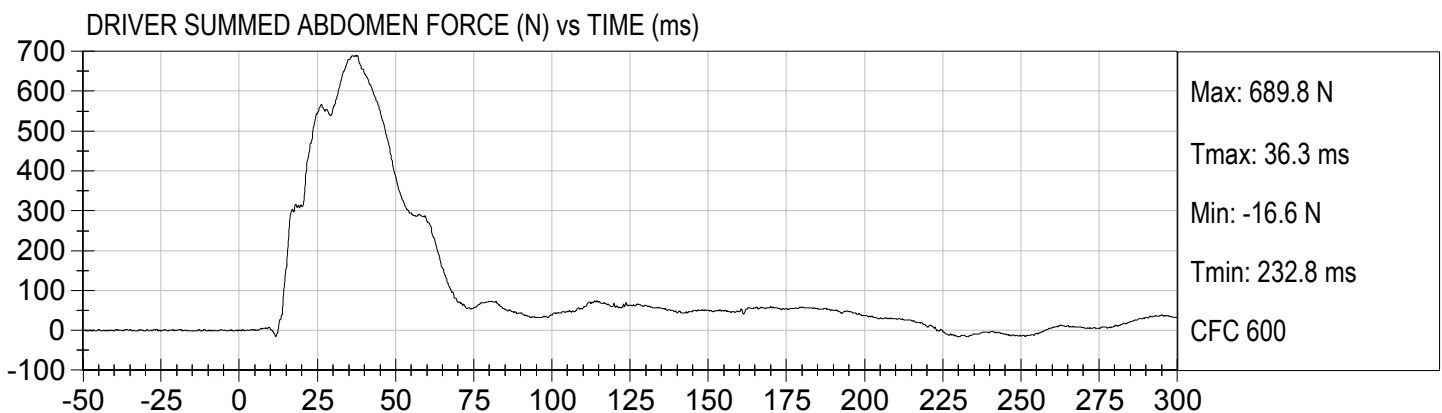
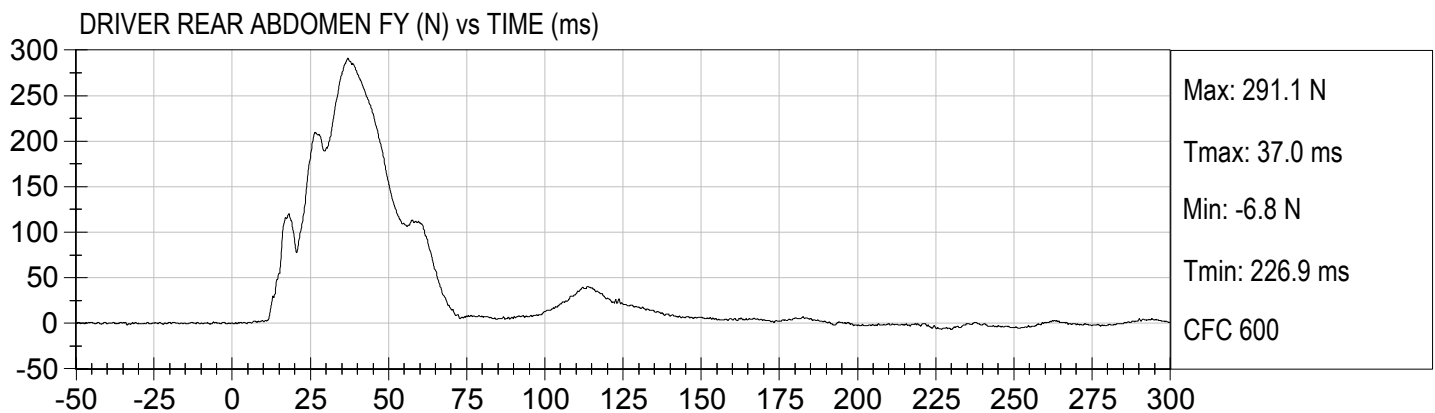
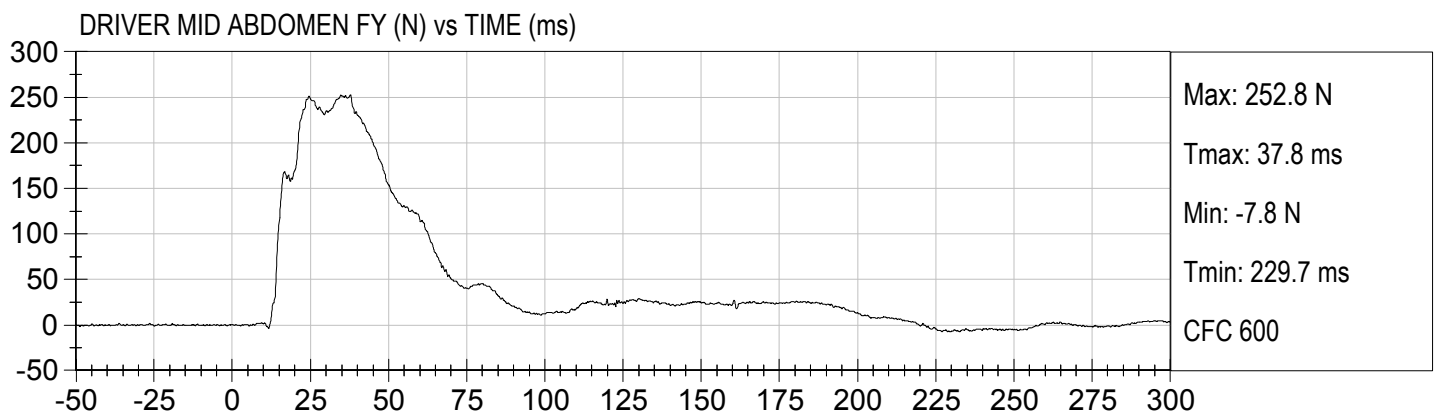
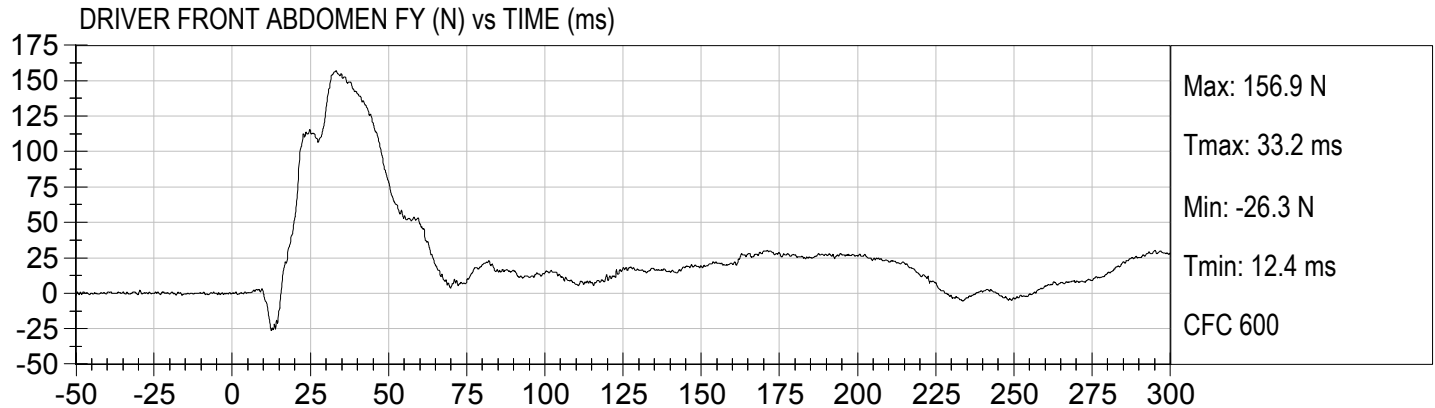
MDB Rear Acceleration (Y)

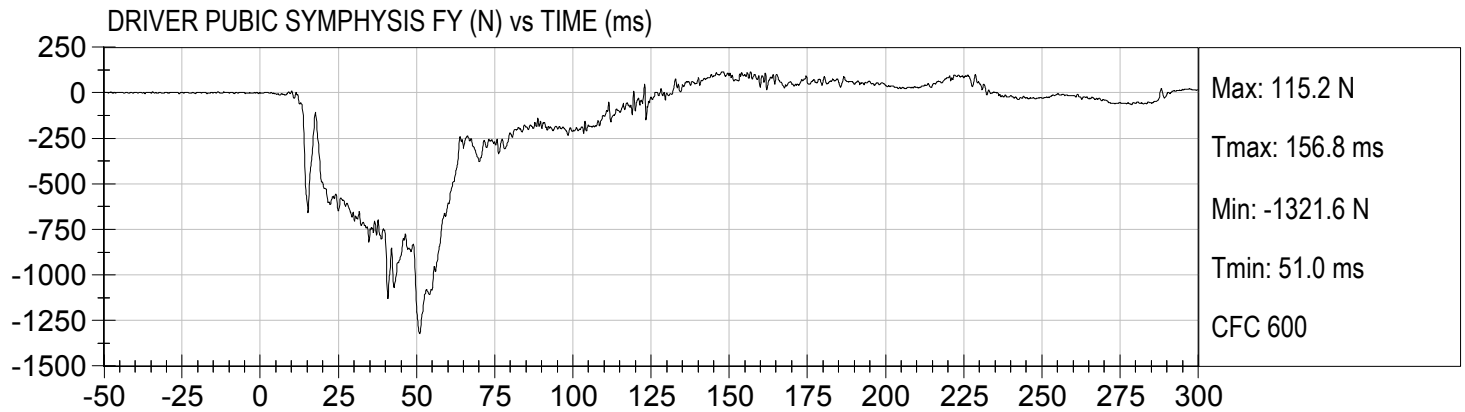
Left MDB Contact Switch

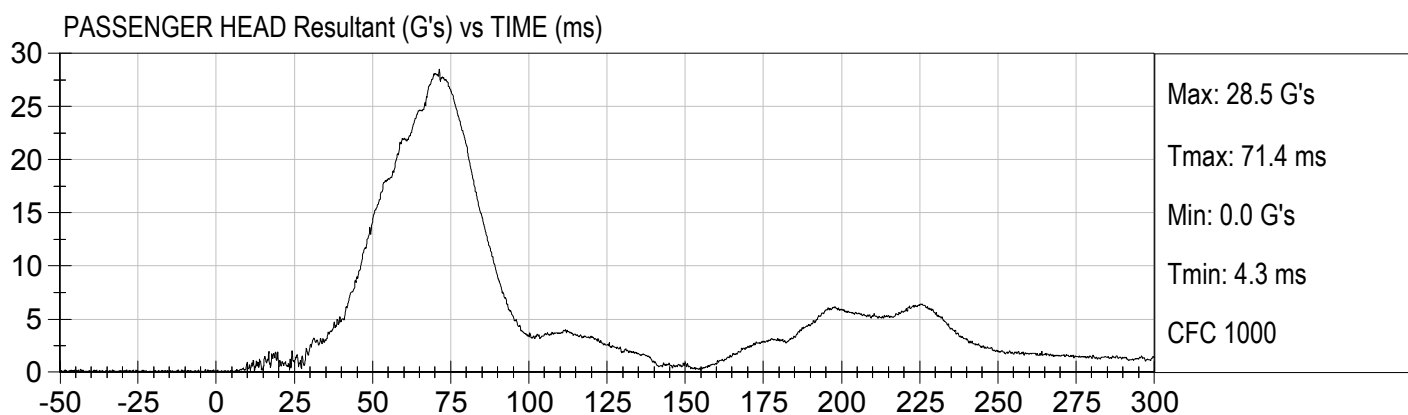
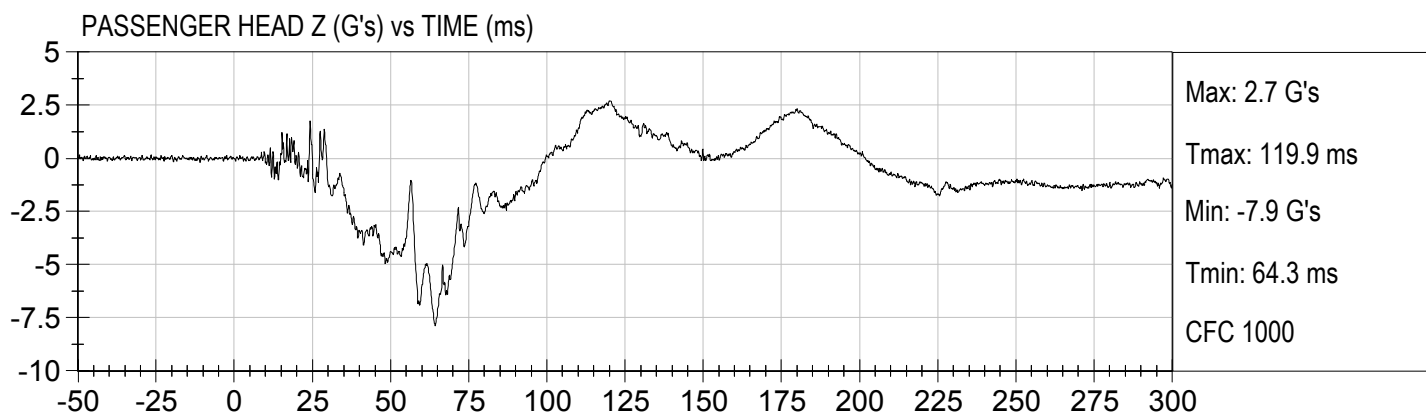
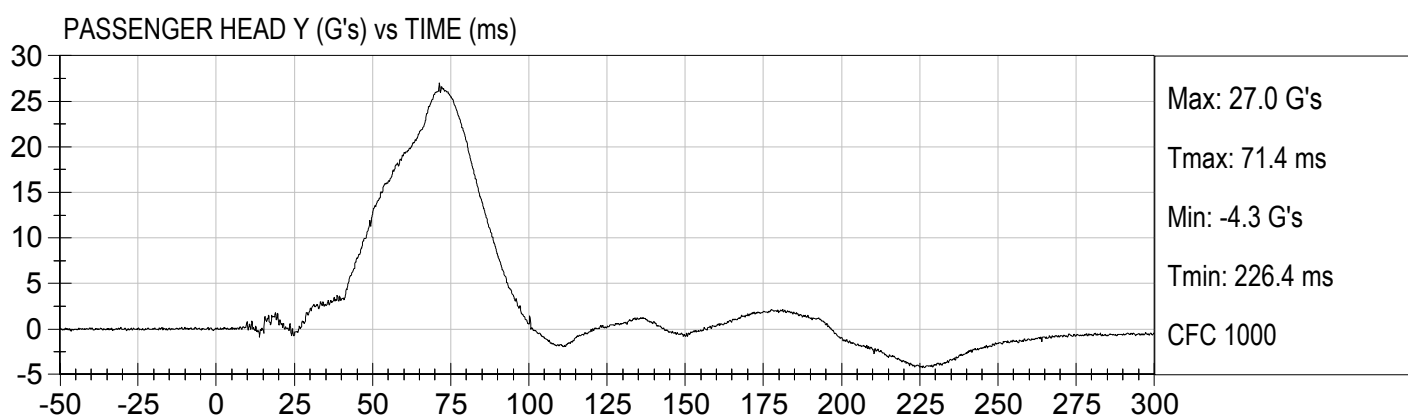
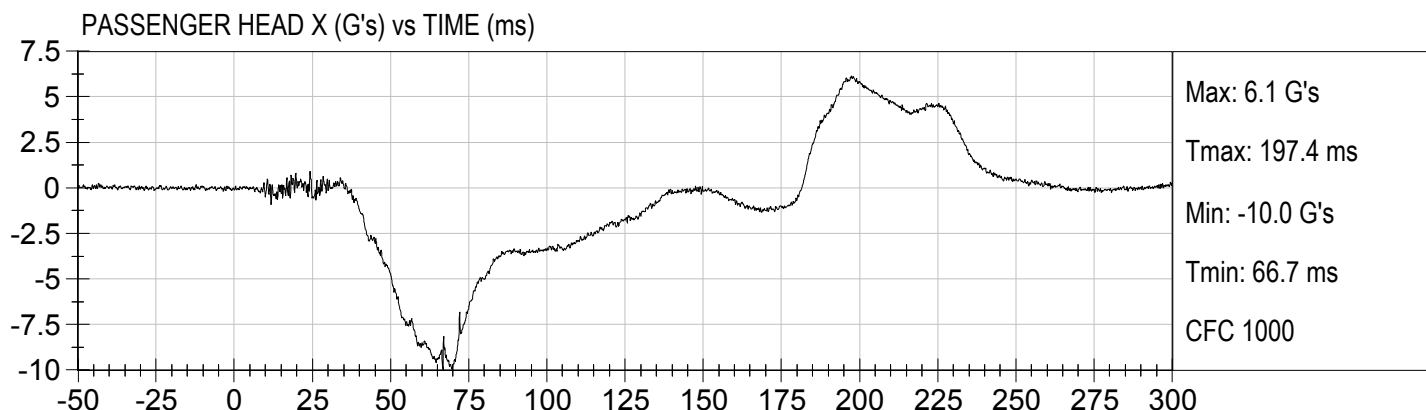
Right MDB Contact Switch

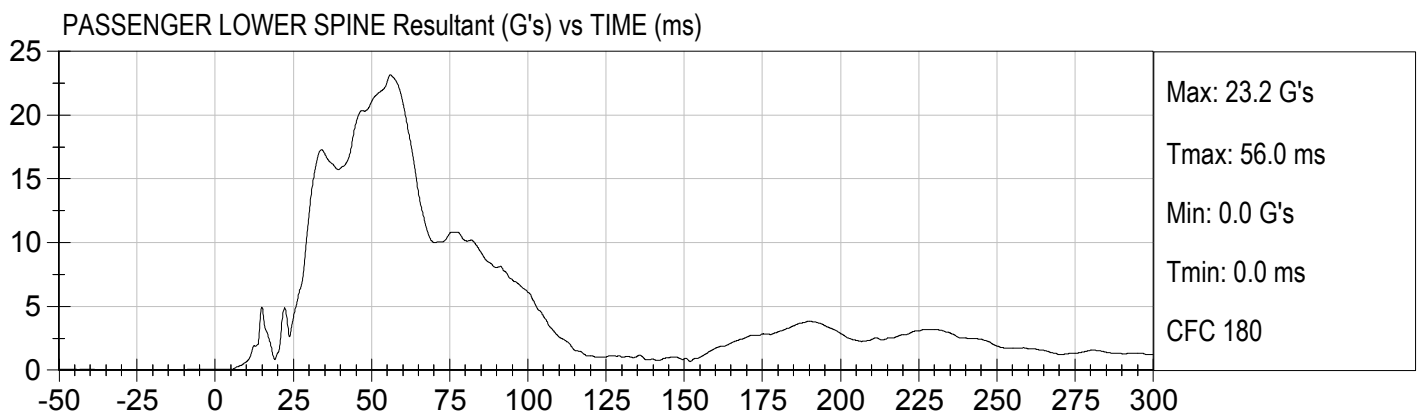
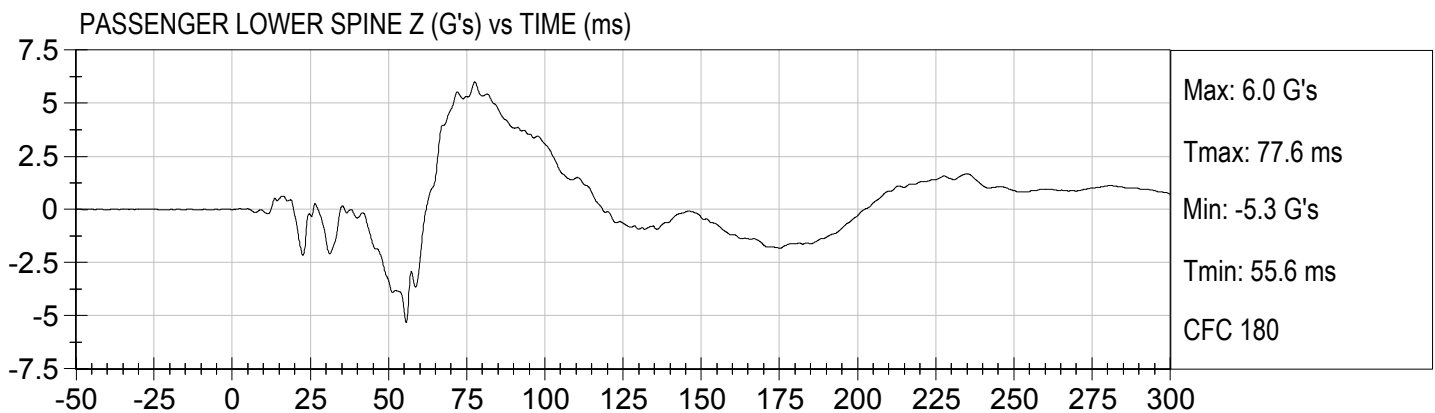
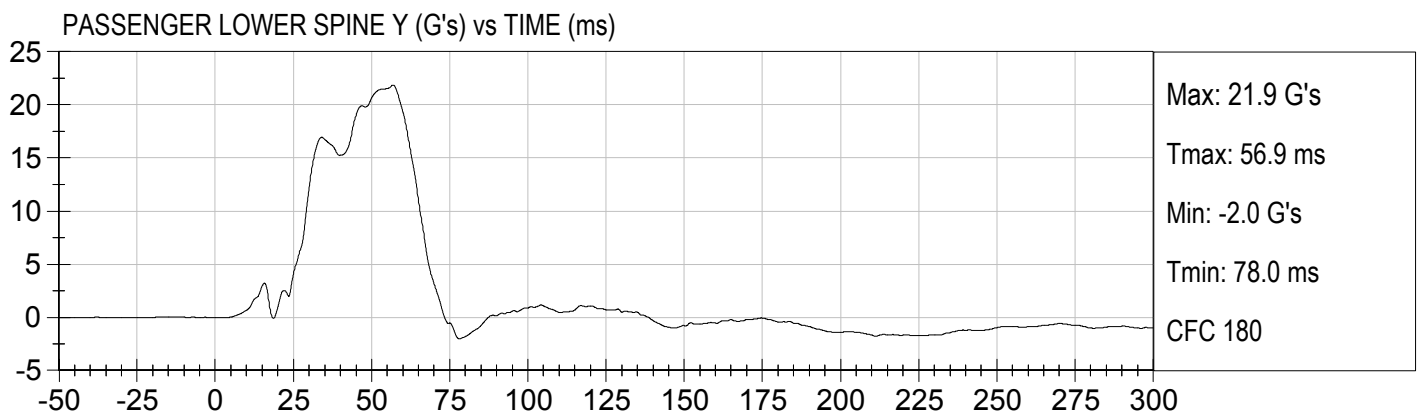
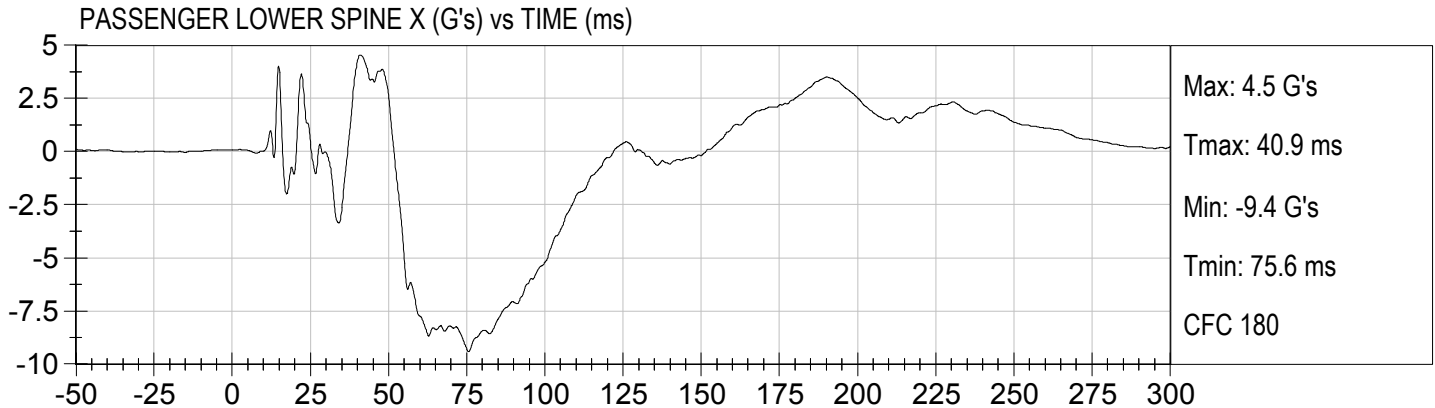


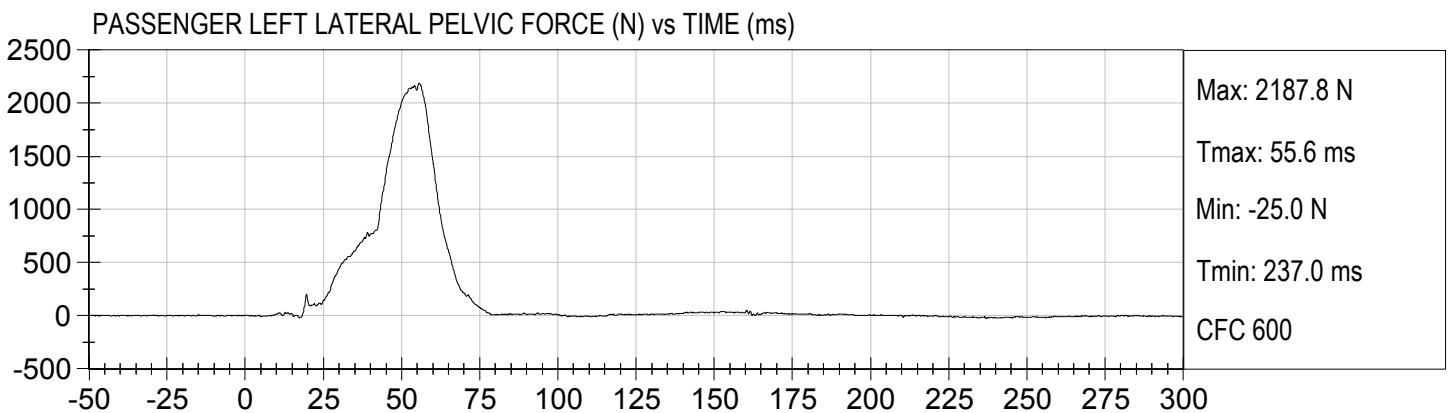
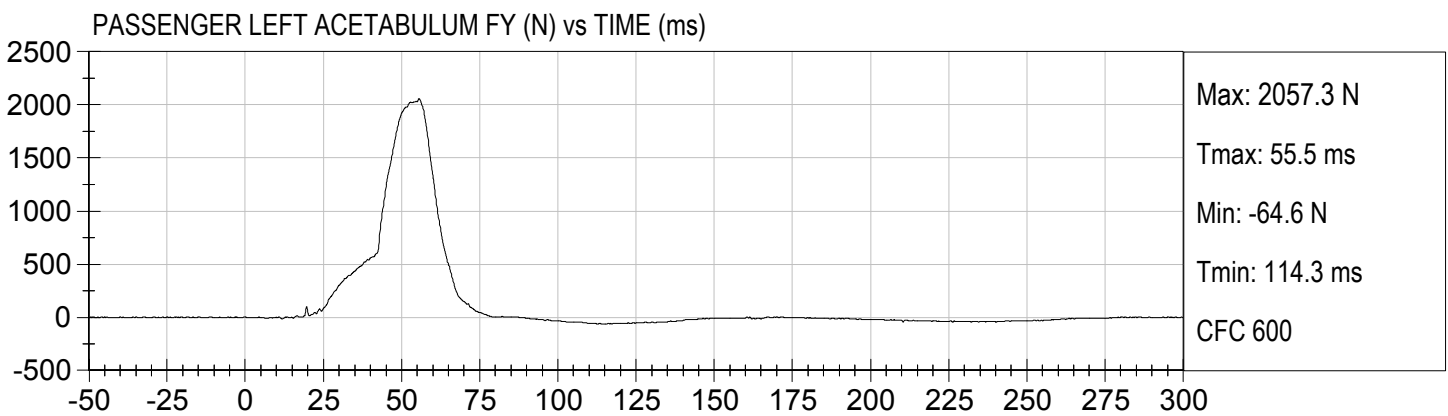
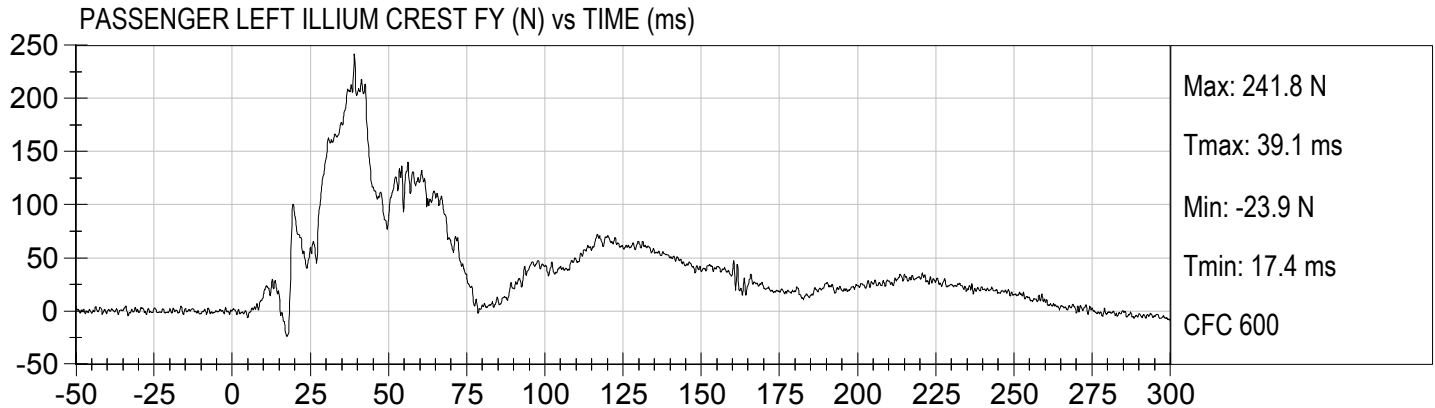












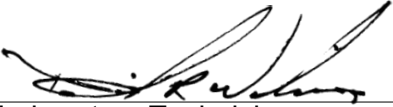
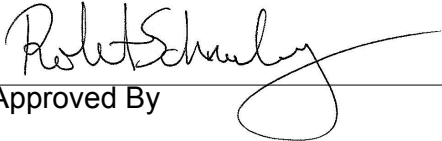
APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

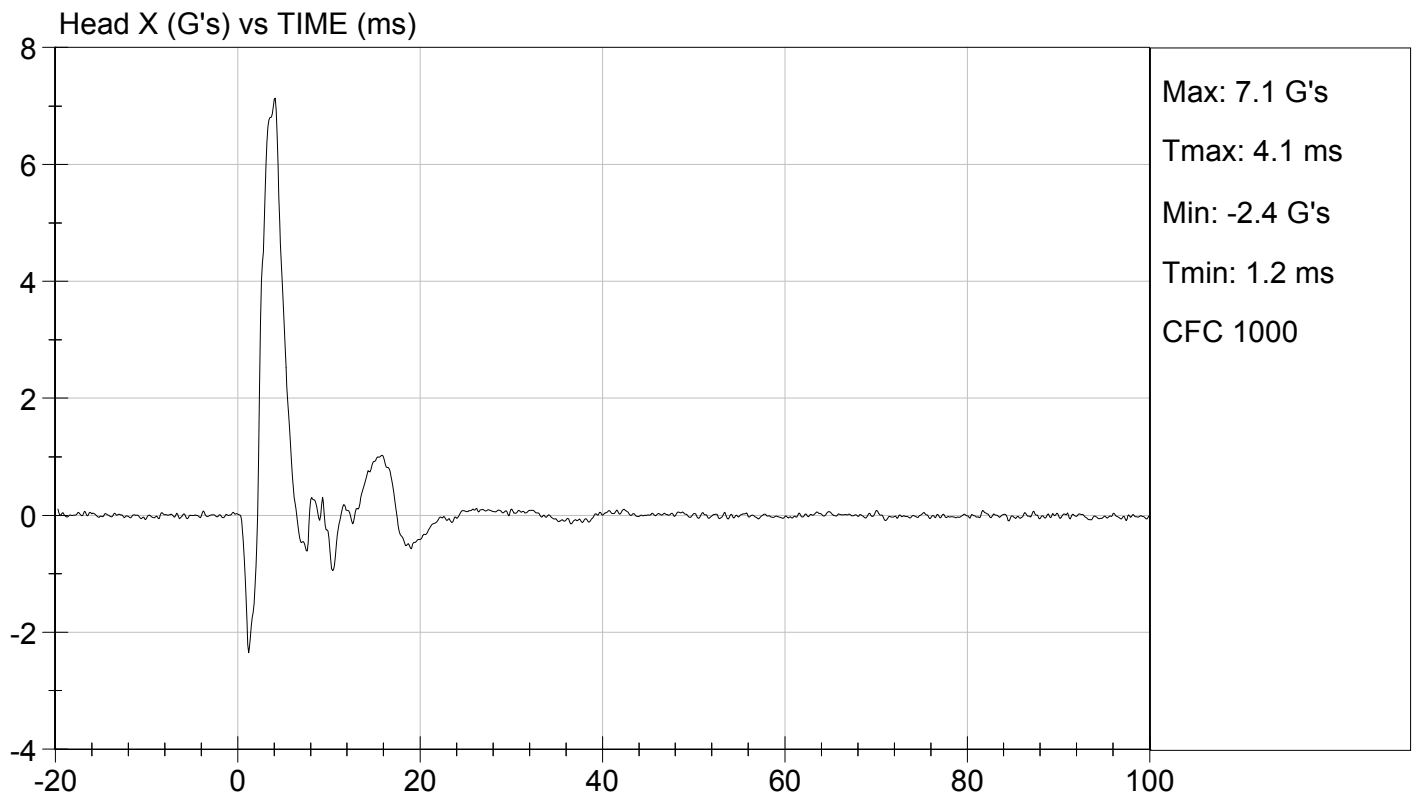
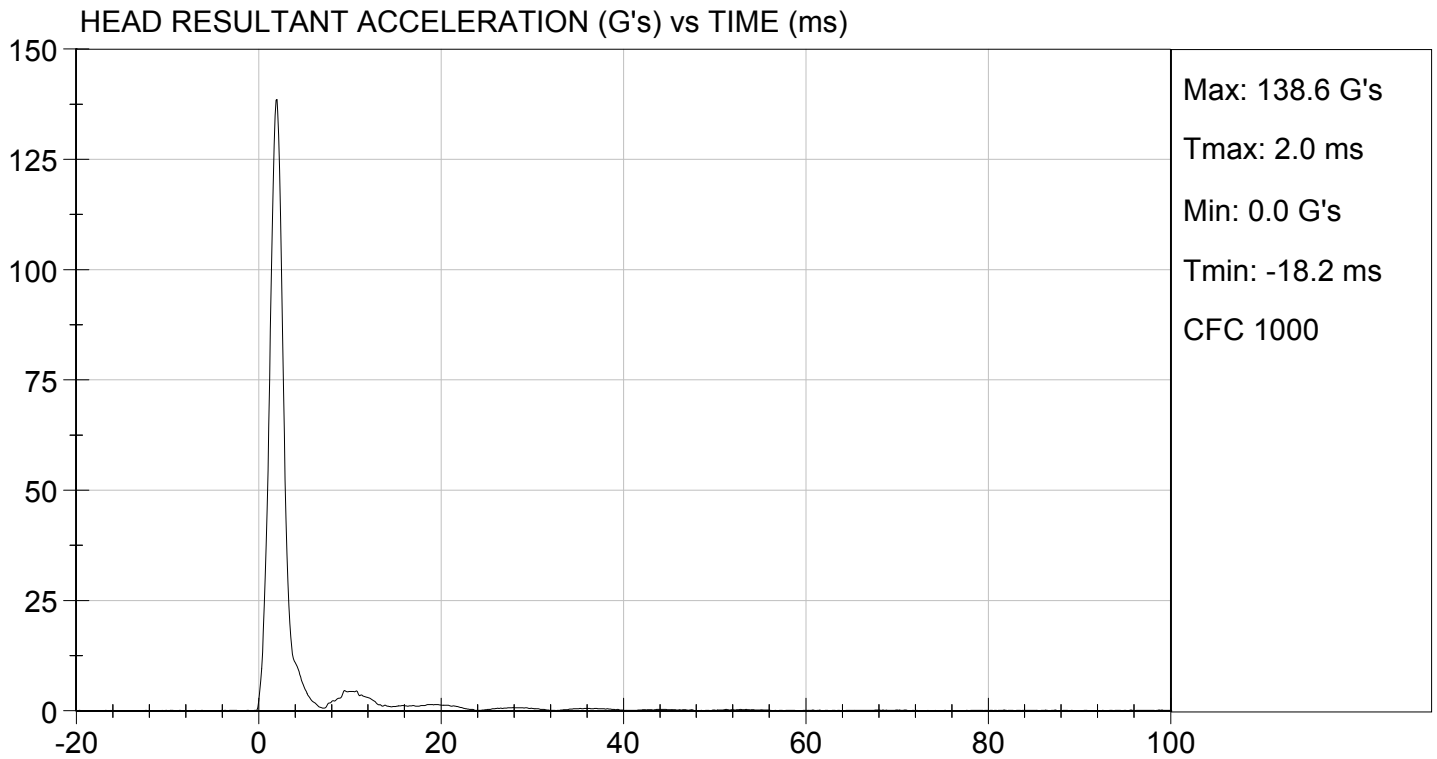
ES-2re External Measurements
SN: 032

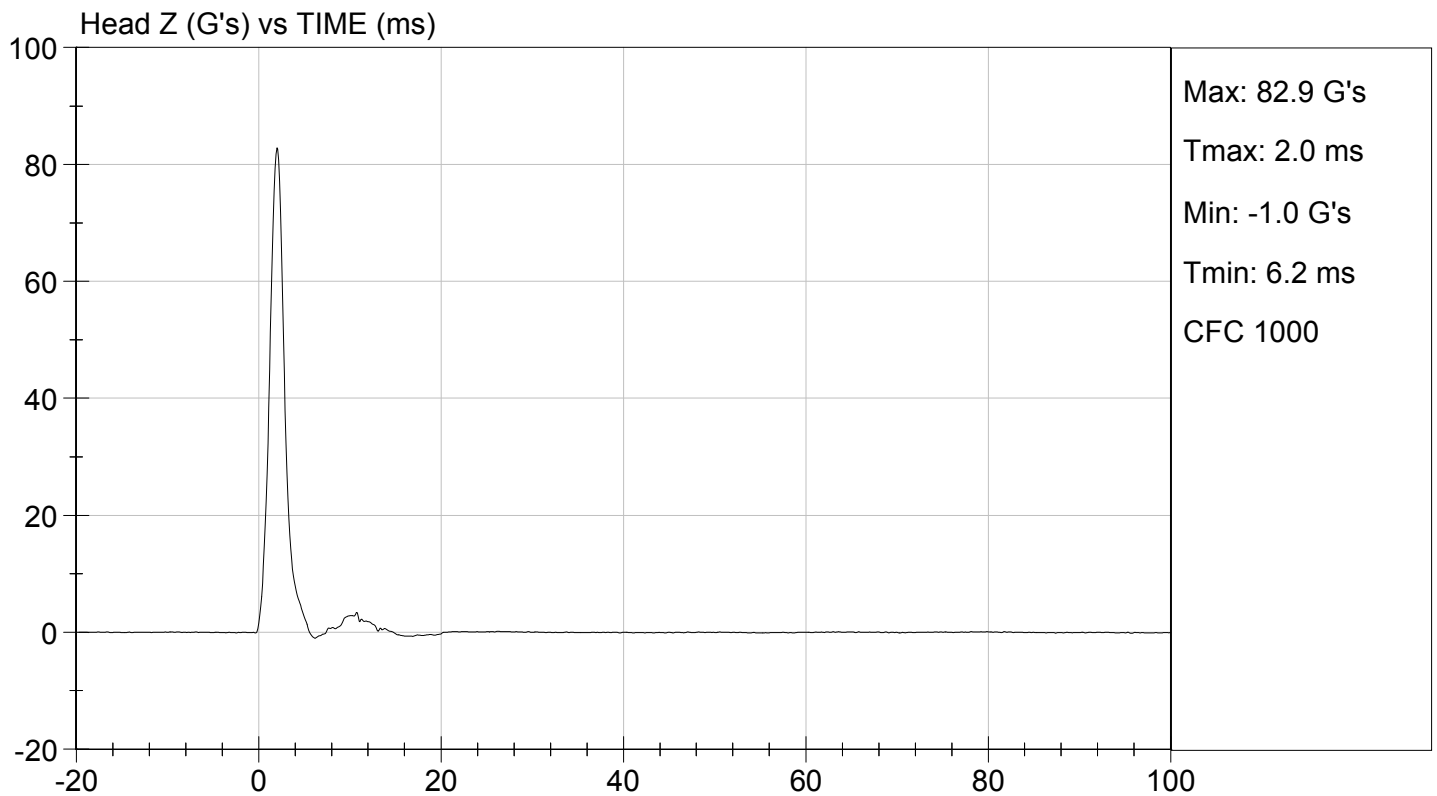
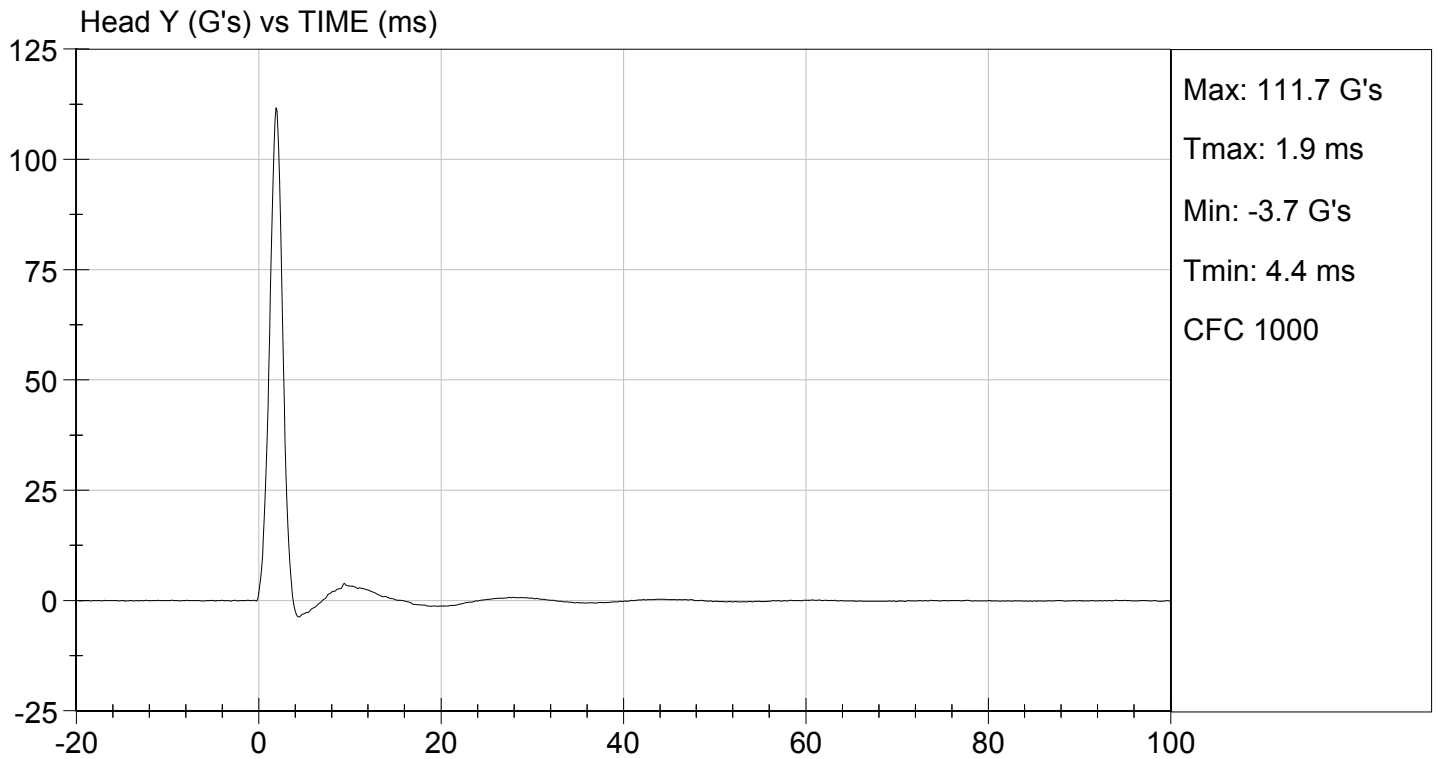
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	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:** D162861

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	125 to 155	139	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	7.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician08/25/2016
Test Date
Approved By



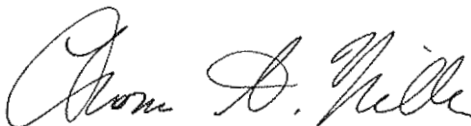


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

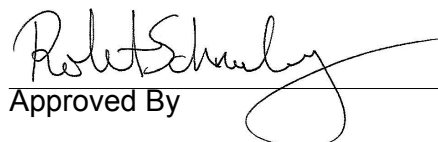
ATD Serial No: 032

Test I.D: D162862

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	46	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.43	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.03	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.27	Pass
	17 ms	m/s	>= -3.70	-3.37	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.0	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	63.8	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	63.7	Pass
Overall Results					Pass


 Laboratory Technician

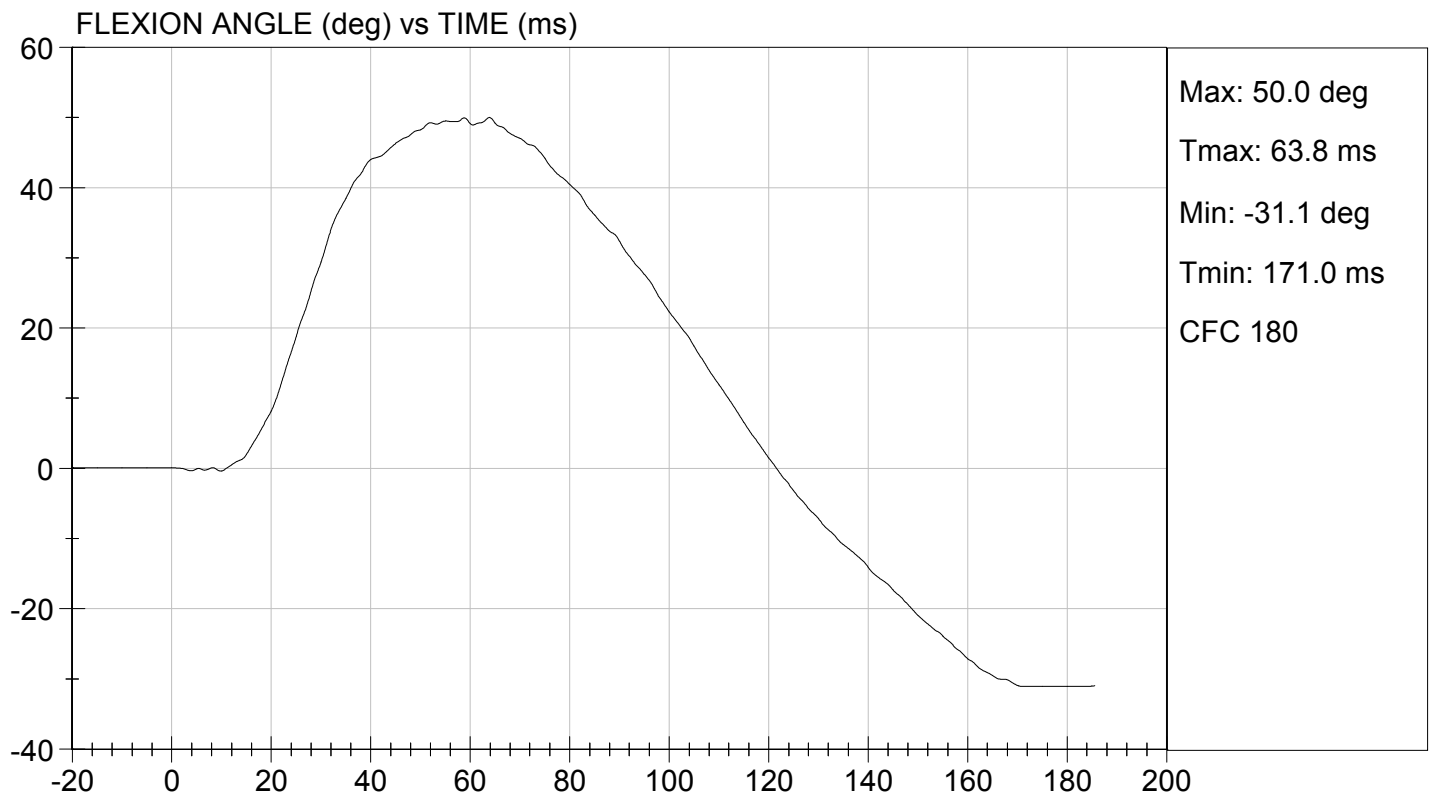
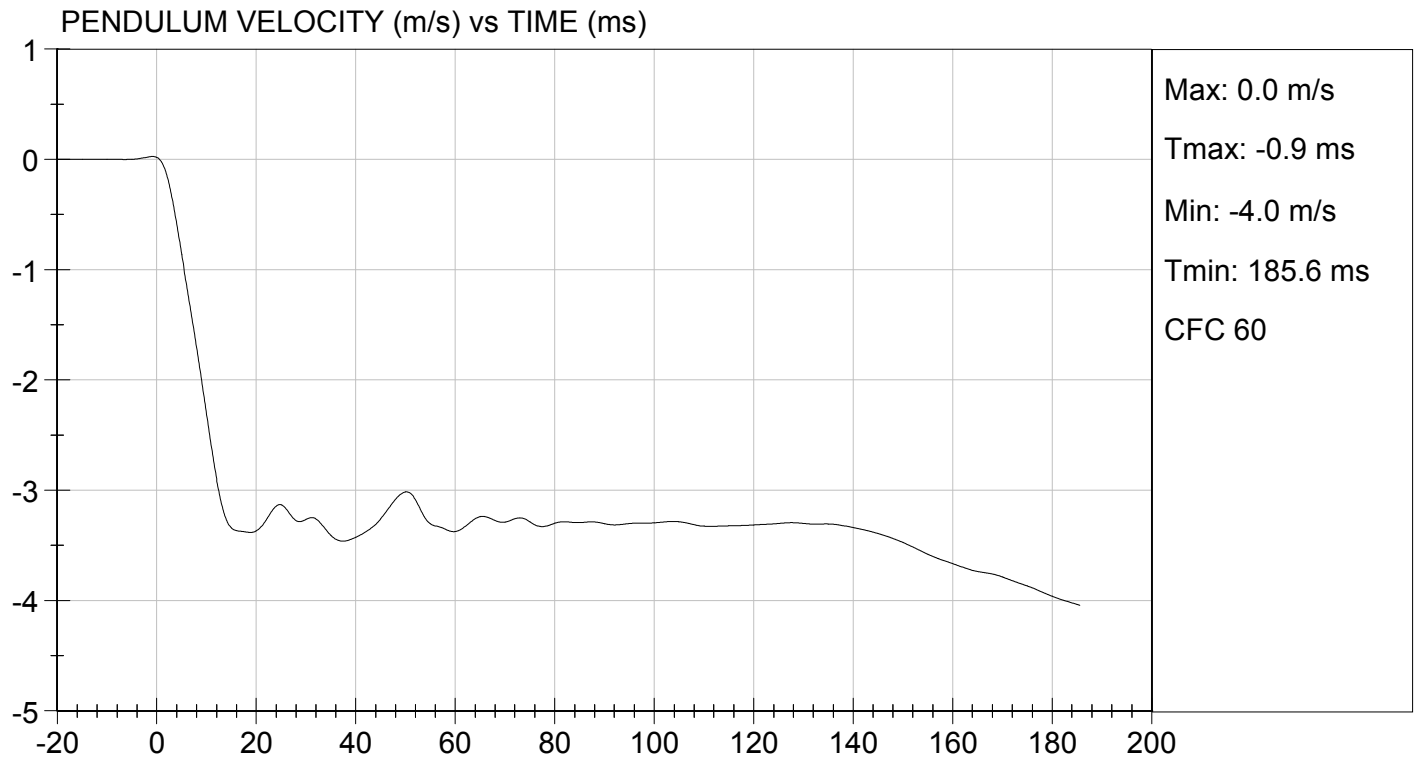
08/26/2016
 Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

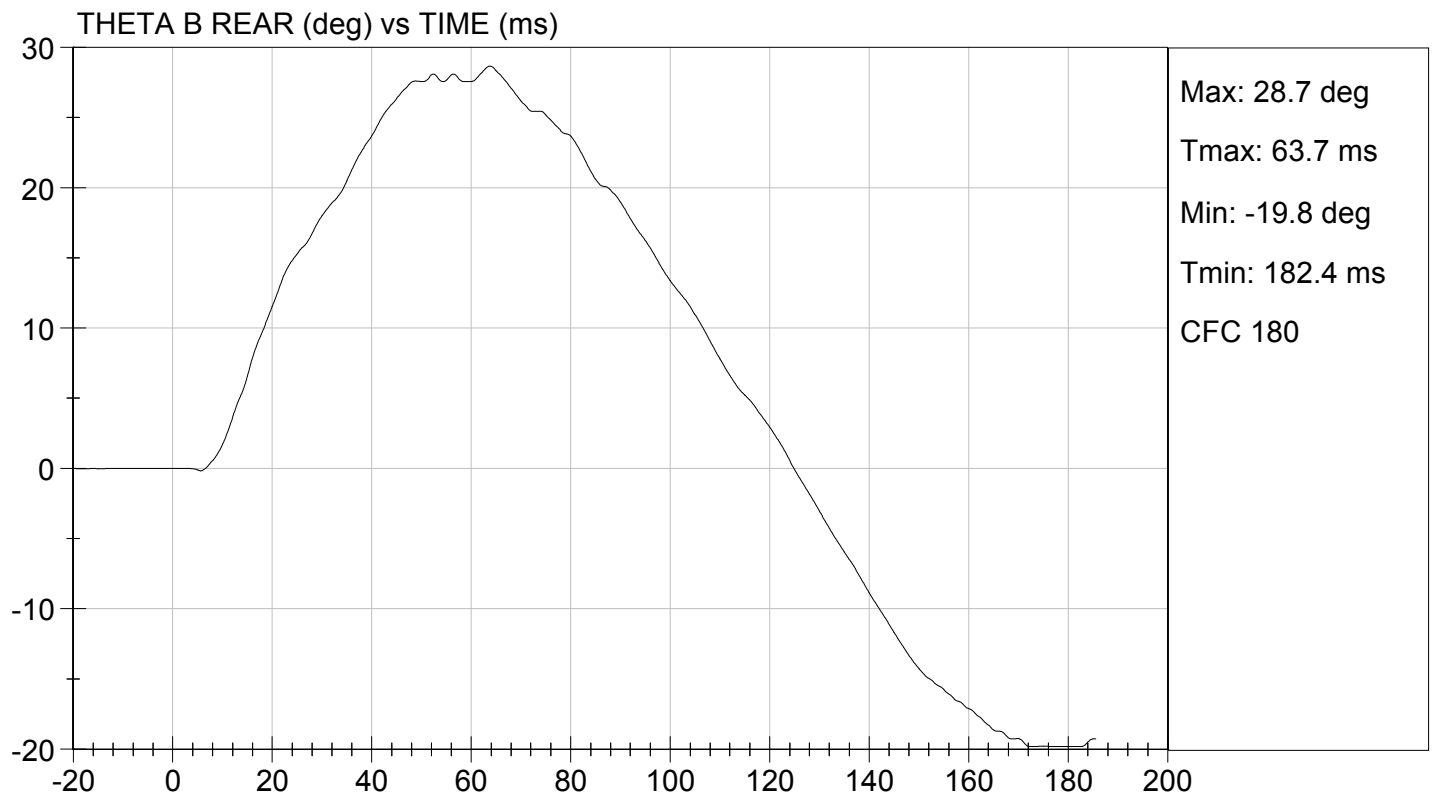
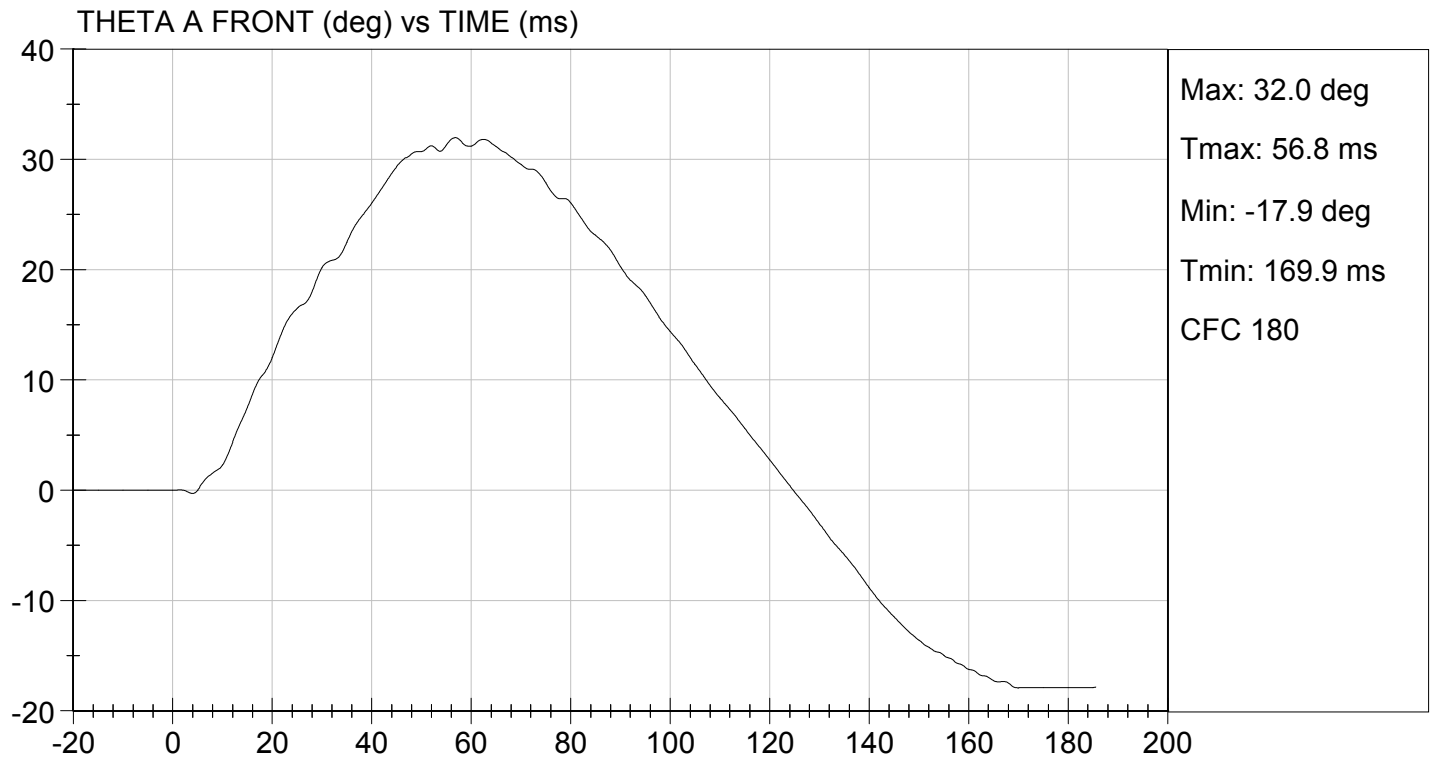
TEST DATE: 08/26/2016
TEST #: D162862





TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

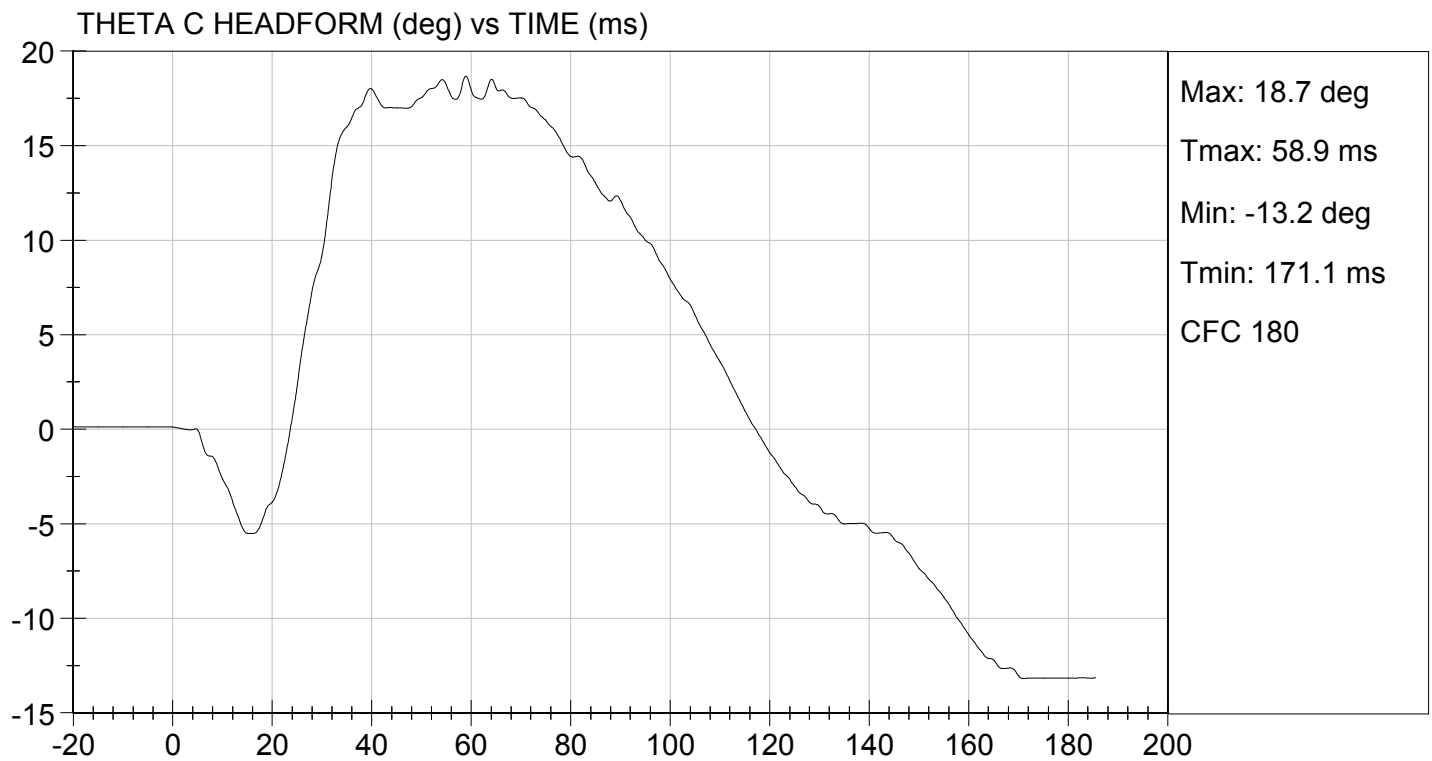
TEST DATE: 08/26/2016
TEST #: D162862





TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

TEST DATE: 08/26/2016
TEST #: D162862

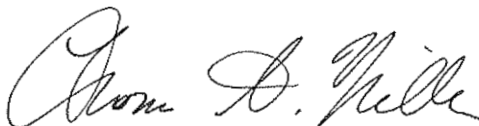


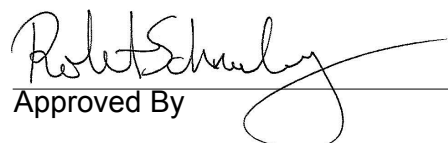
MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D162863

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	45	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.3	Pass
Overall Test Results				Pass


Laboratory Technician

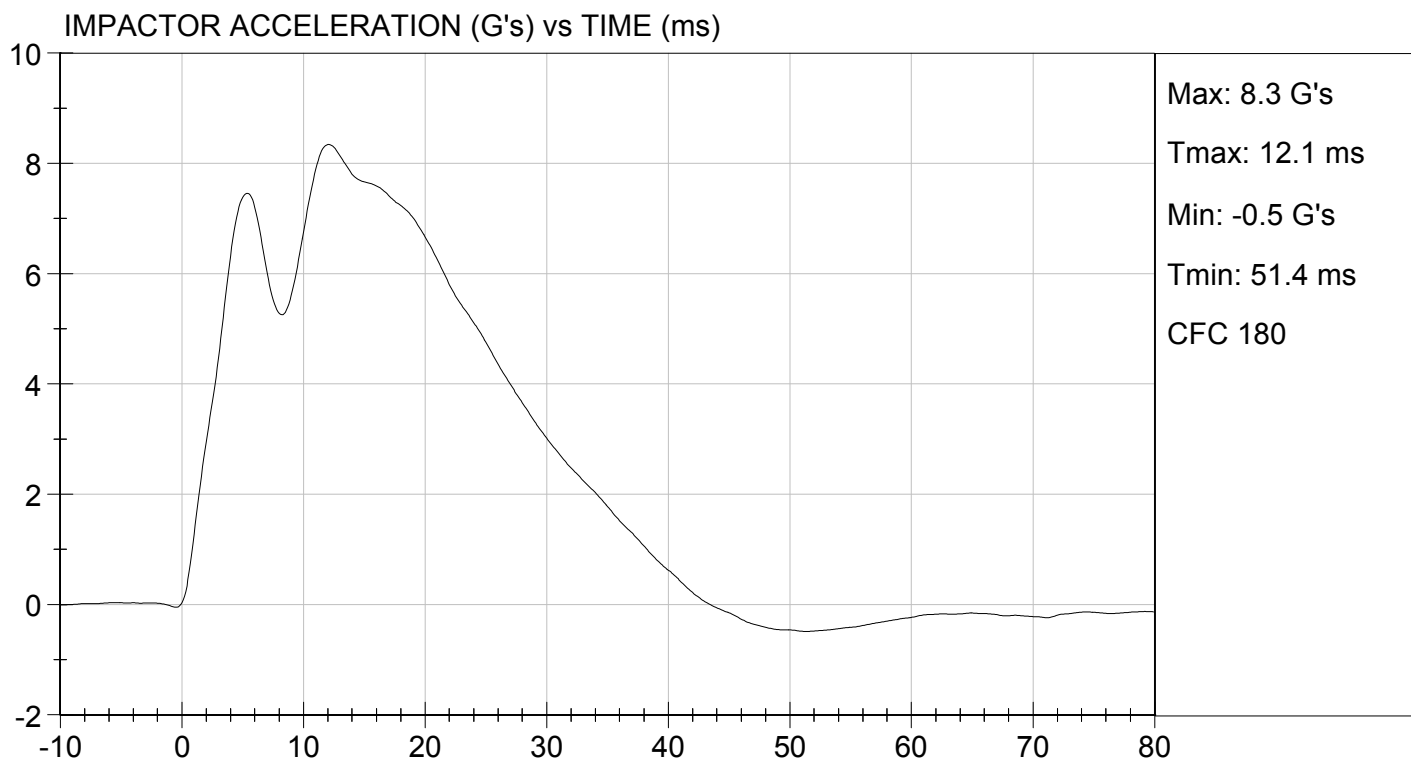

Approved By

08/26/2016
Test Date



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

TEST DATE: 08/26/2016
TEST #: D162863



MGA RESEARCH CORPORATION

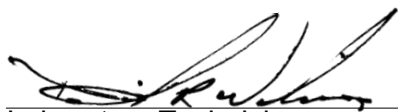
UPPER RIB TEST

ES-2re DUMMY

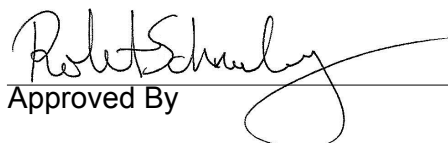
ATD Serial No: 032

Test I.D: D162864

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	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.6	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.9	Pass
Overall Test Results				Pass

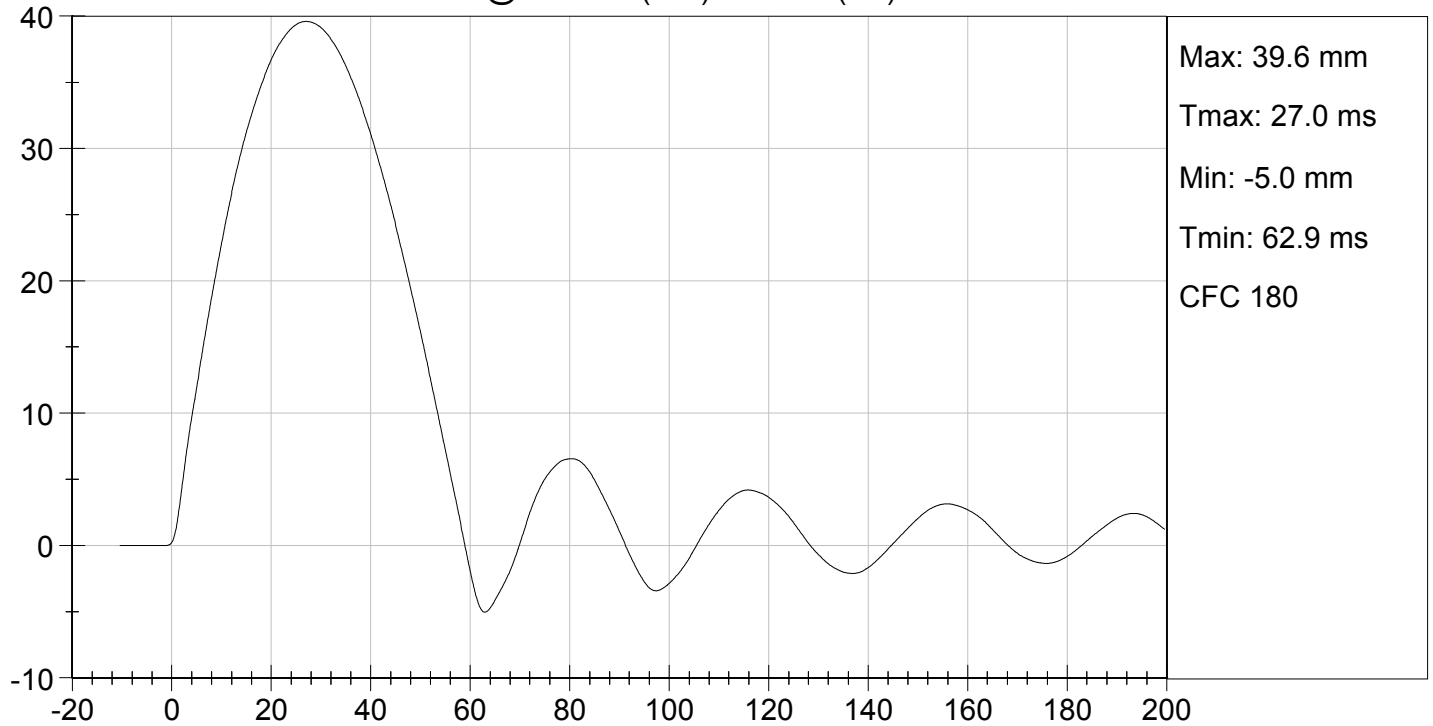

Laboratory Technician

08/25/2016
Test Date

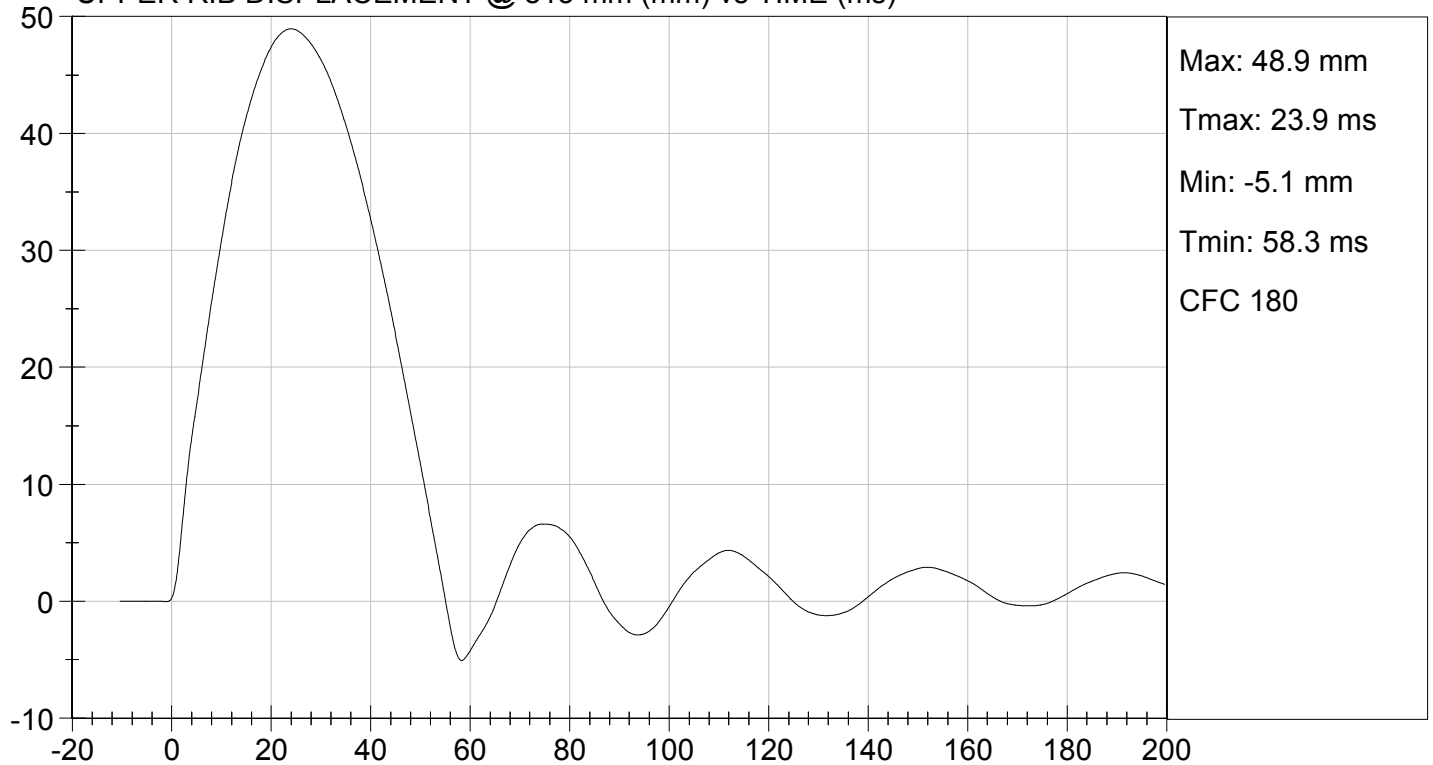

Approved By



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



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



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D162865

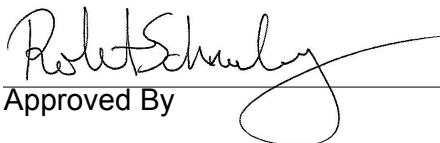
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.6	Pass
Overall Test Results				Pass



Laboratory Technician

08/25/2016

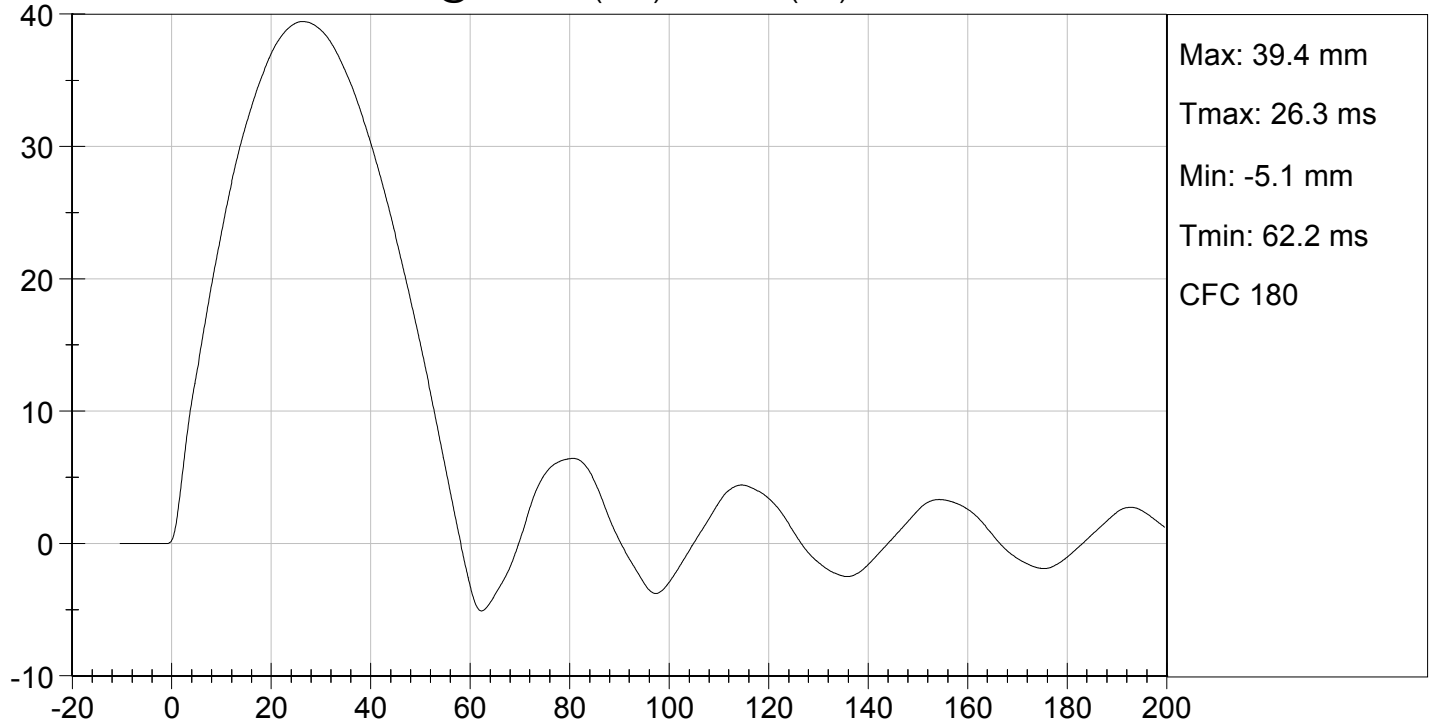
Test Date



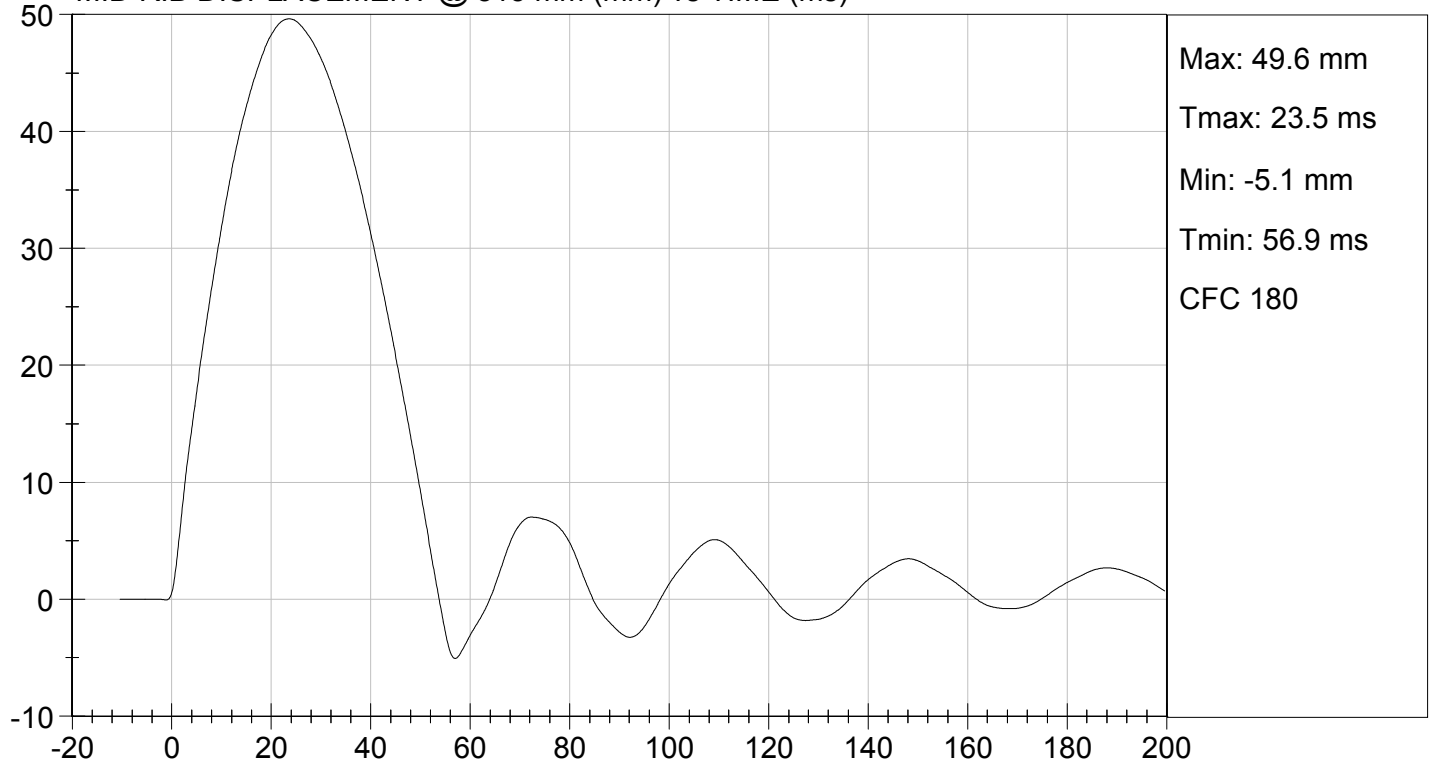
Approved By



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



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



MGA RESEARCH CORPORATION

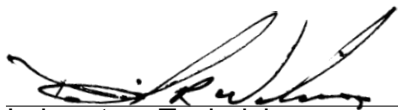
LOWER RIB TEST

ES-2re DUMMY

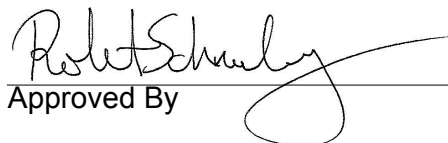
ATD Serial No: 032

Test I.D: D162866

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	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.0	Pass
Overall Test Results				Pass

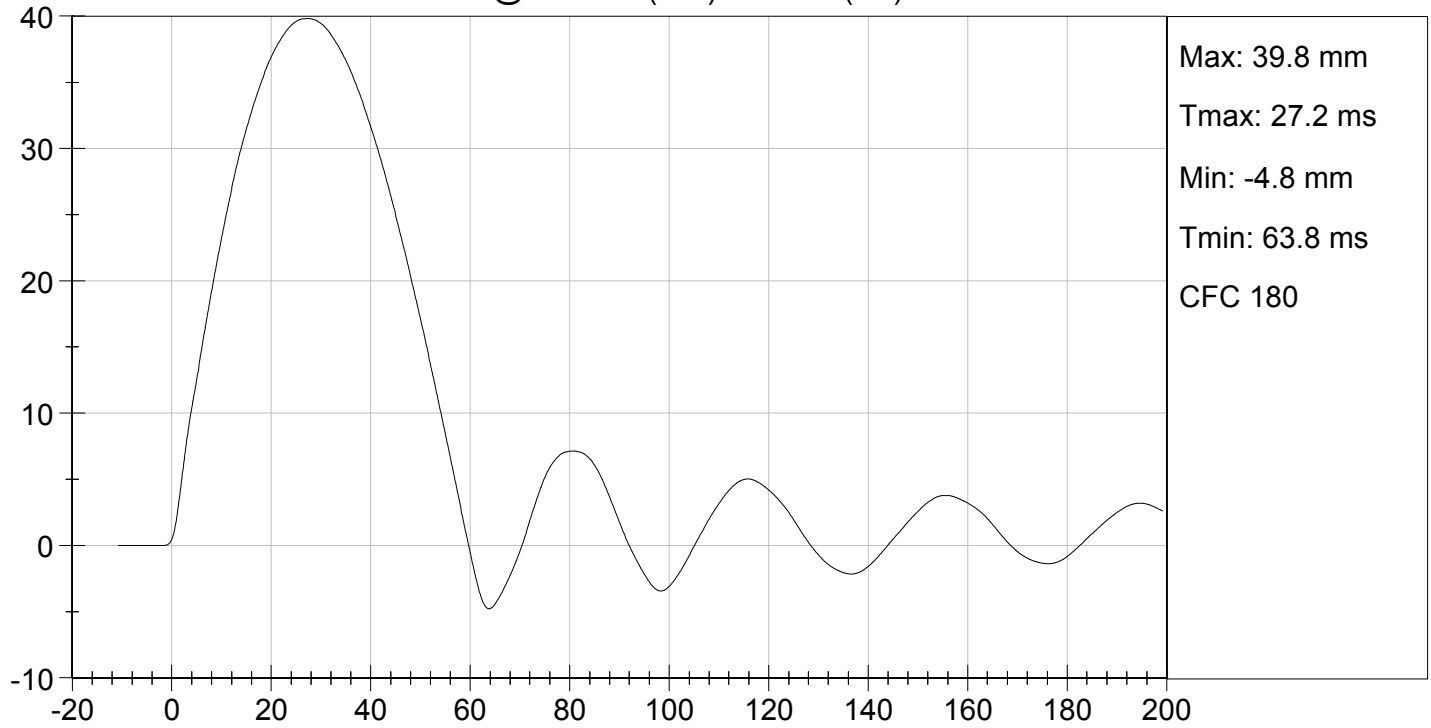

Laboratory Technician

08/25/2016
Test Date

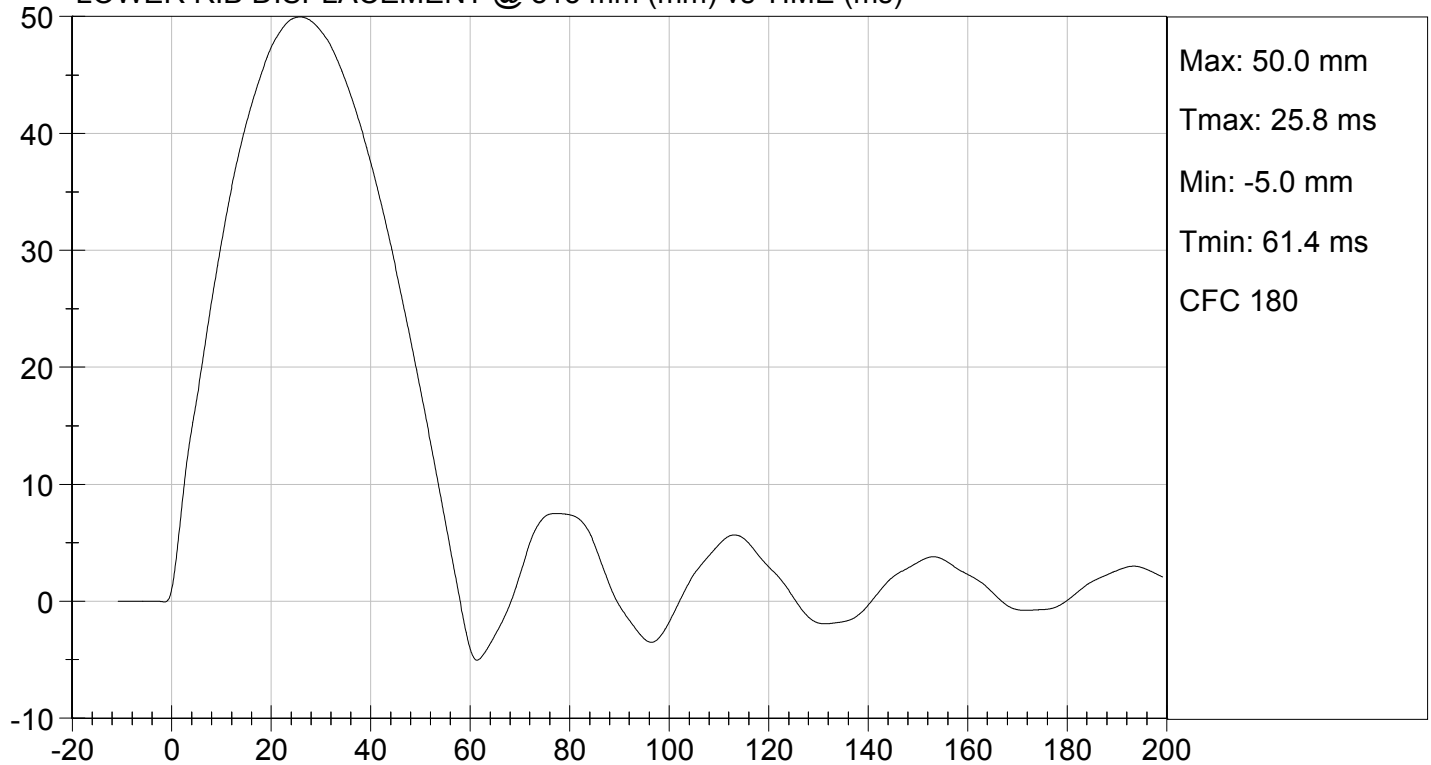

Approved By



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



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



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032

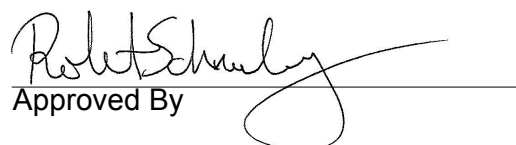
Test I.D: D162860

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	6042	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.7	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.2	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.7	Pass
Overall Test Results				Pass


Laboratory Technician

08/26/2016

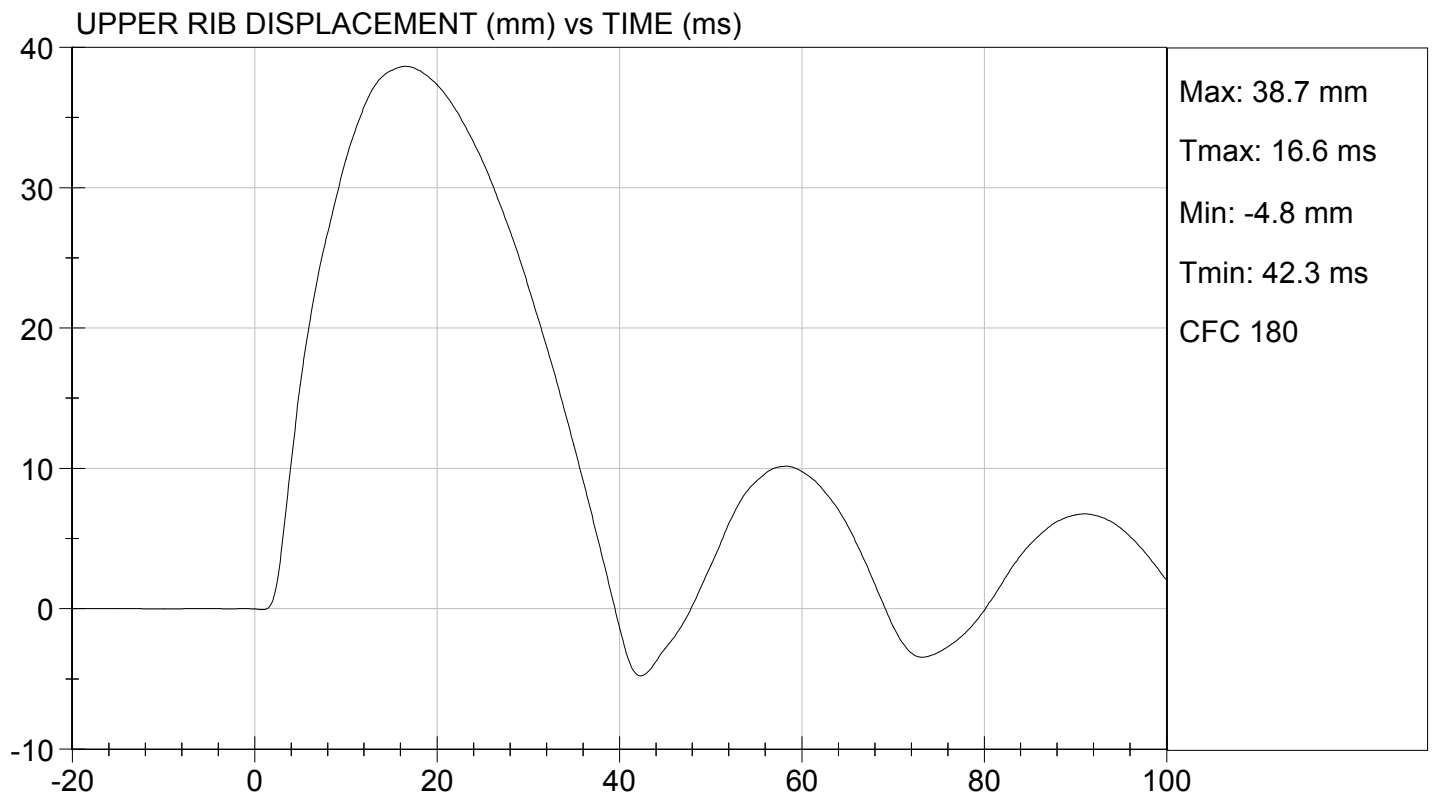
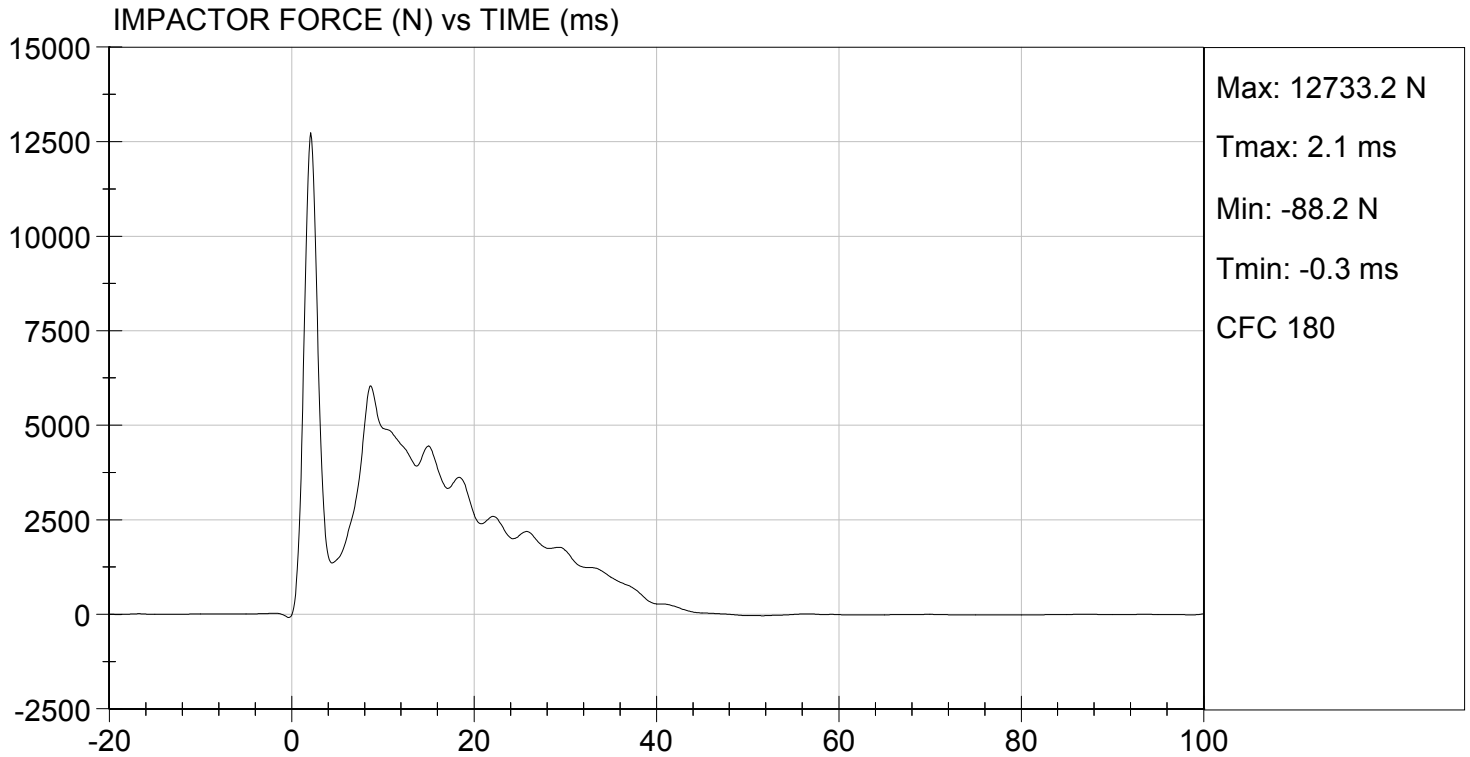
Test Date


Approved By



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

TEST DATE: 08/26/2016
TEST #: D162860

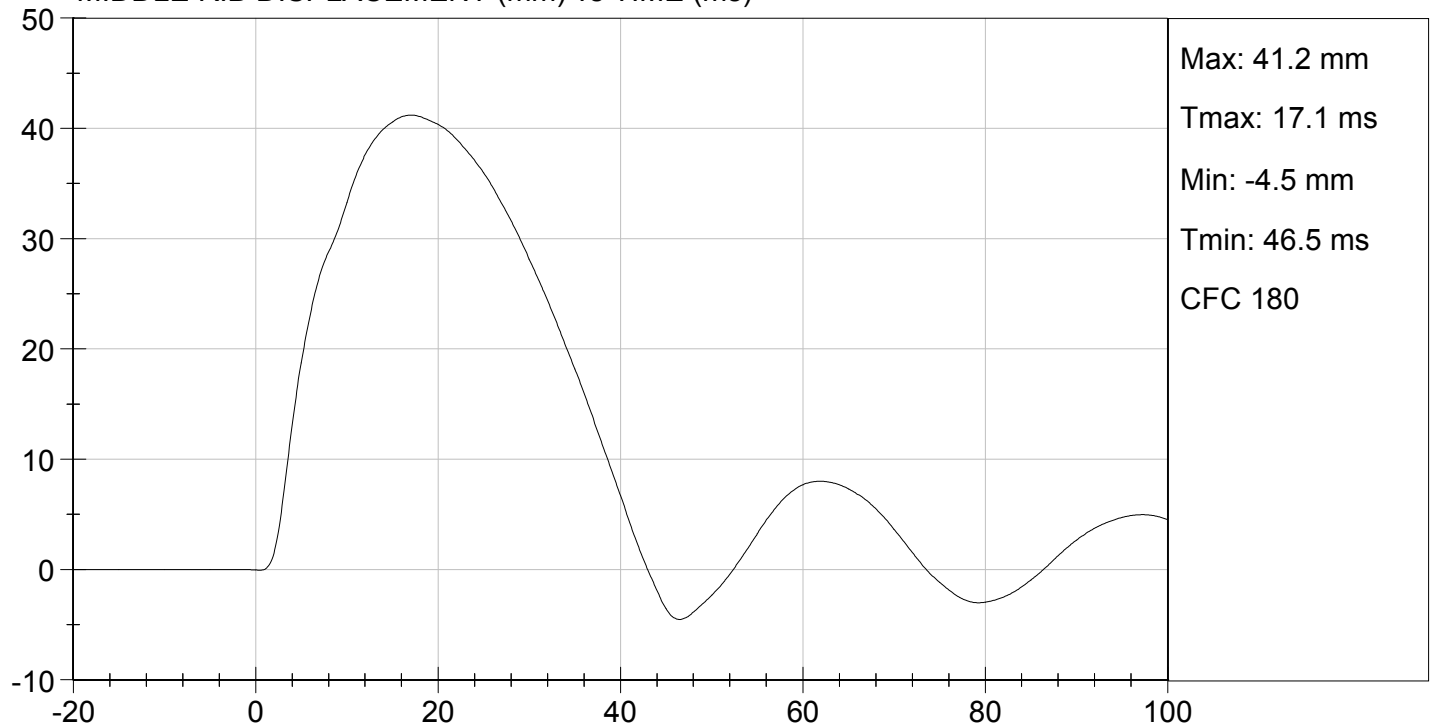




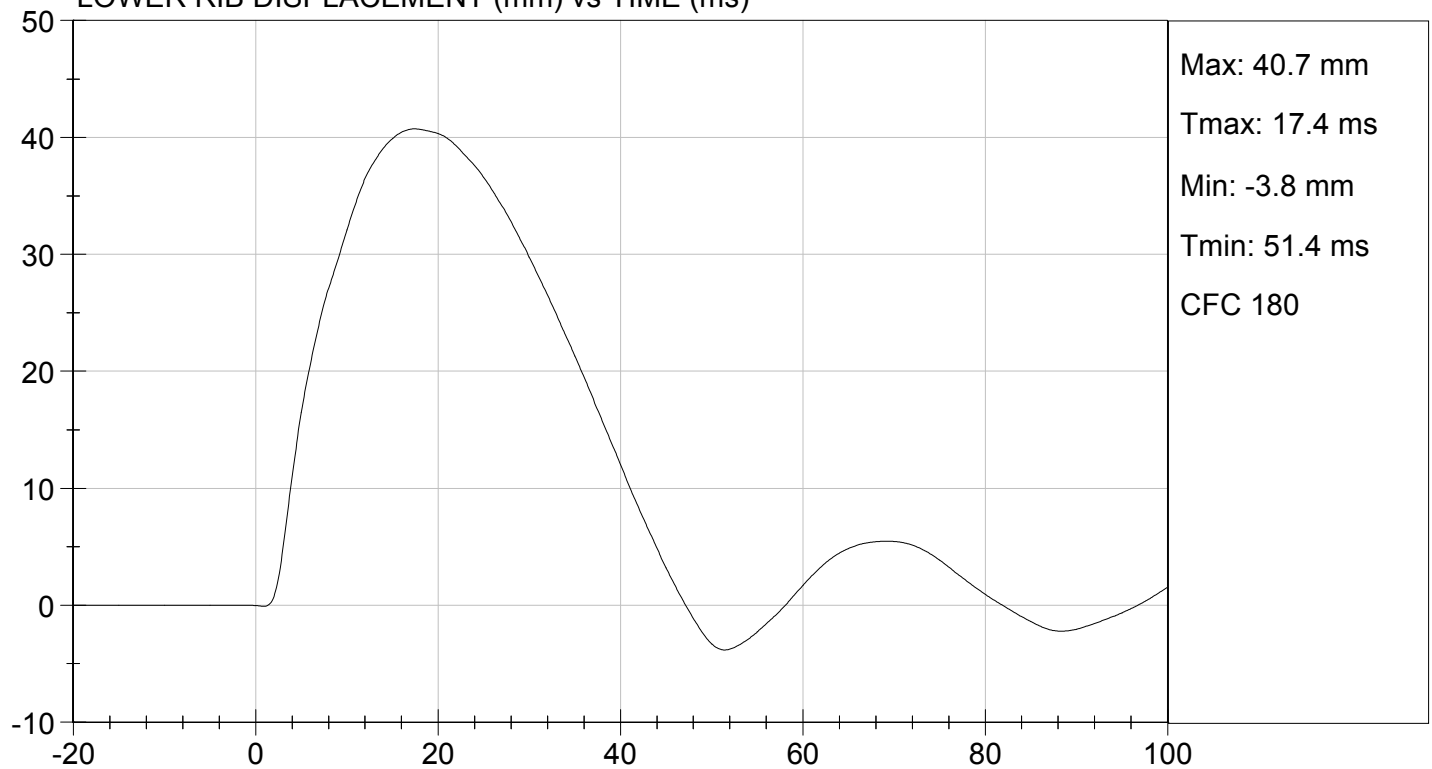
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 08/26/2016
TEST #: D162860

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

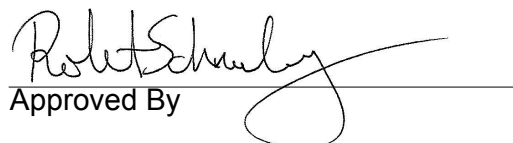
ATD Serial No: 032

Test I.D: D162867

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	45	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4426	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.1	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2325	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	12.1	Pass
Overall Test Results				Pass


Laboratory Technician

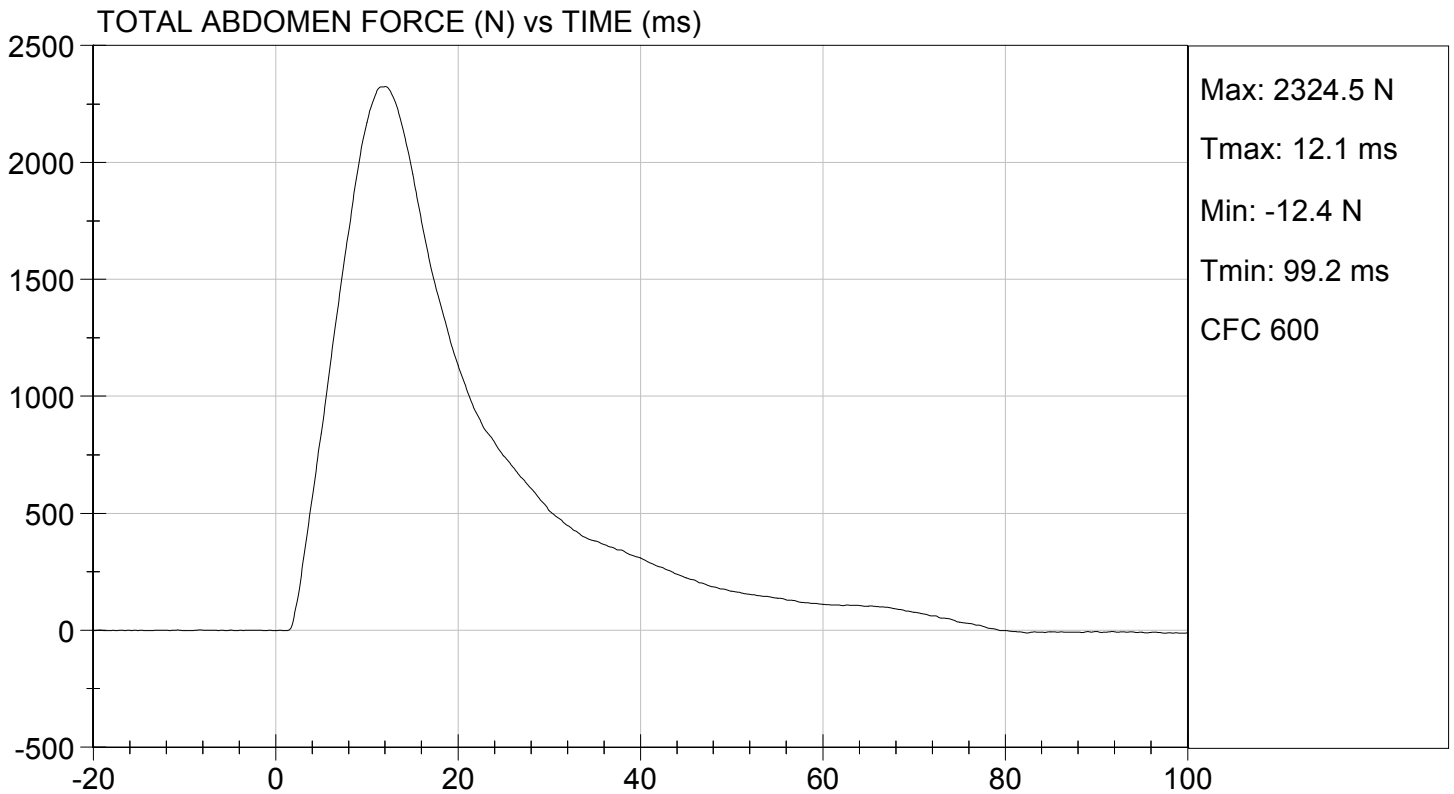
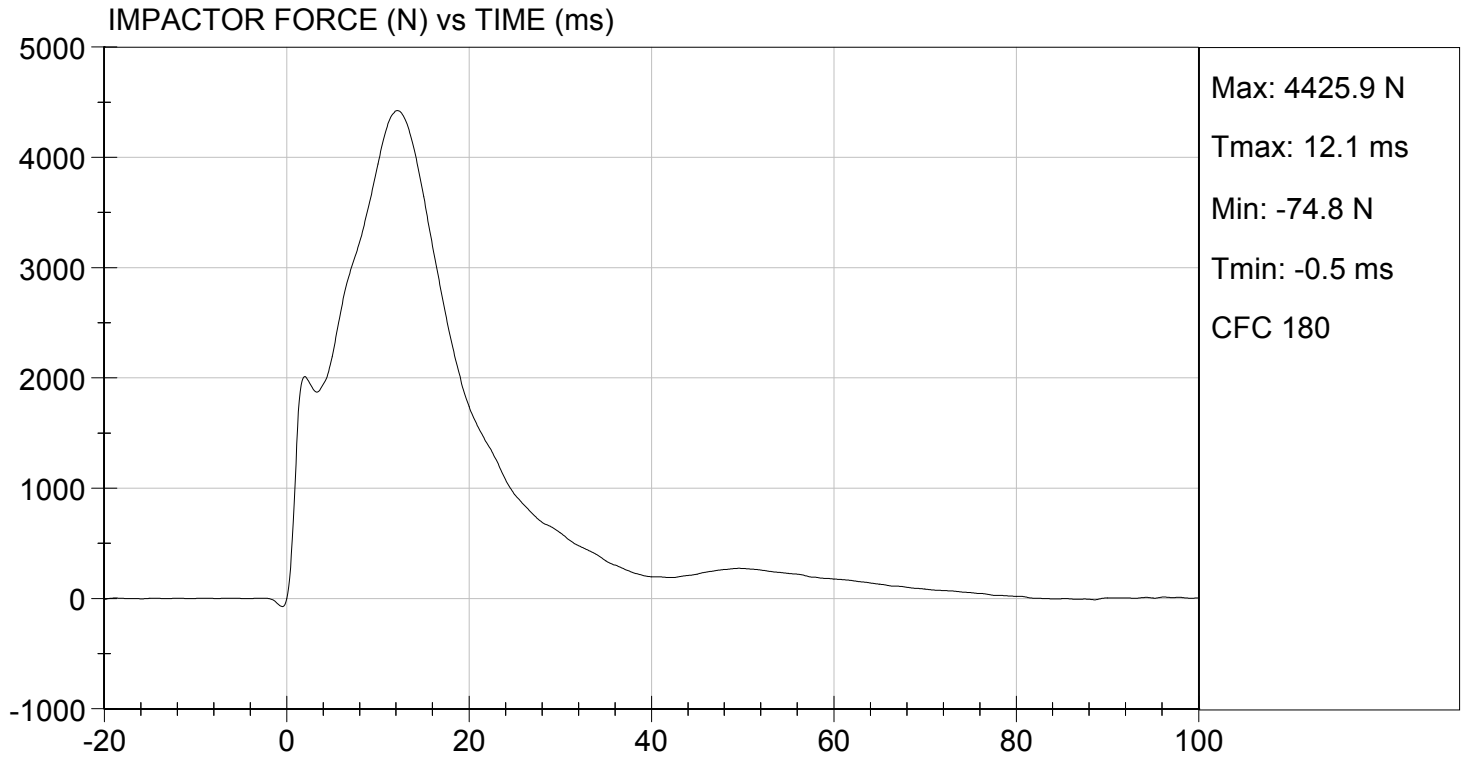
08/26/2016
Test Date


Approved By



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

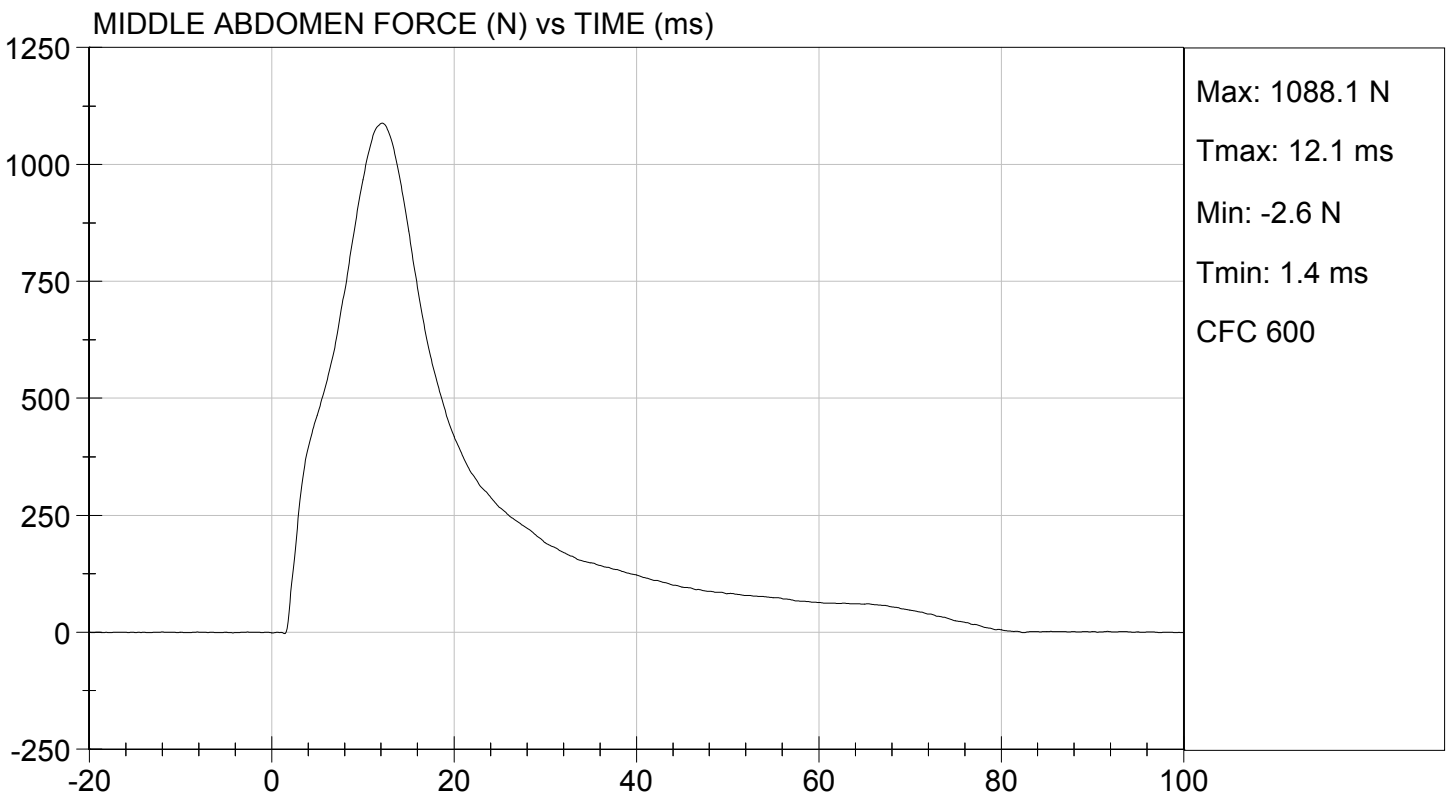
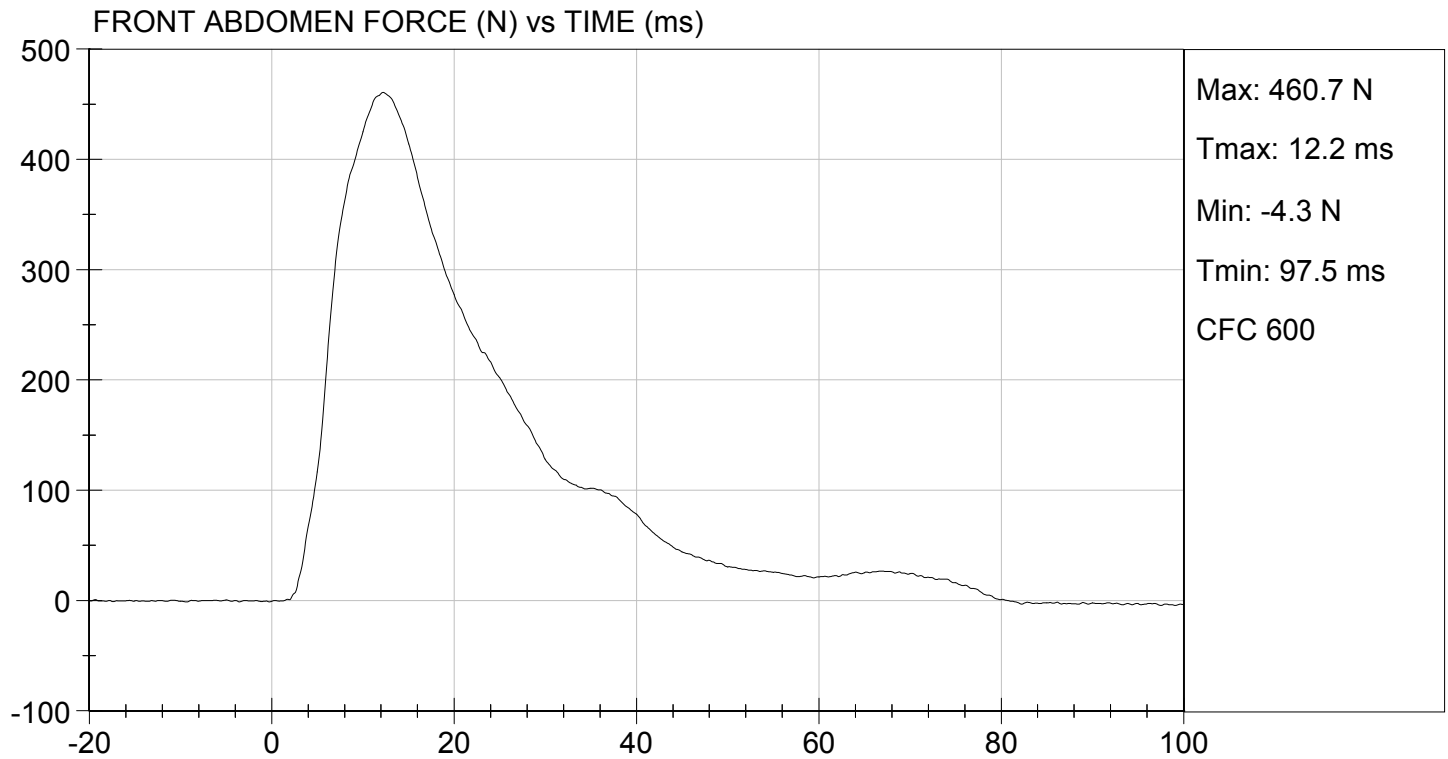
TEST DATE: 08/26/2016
TEST #: D162867





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

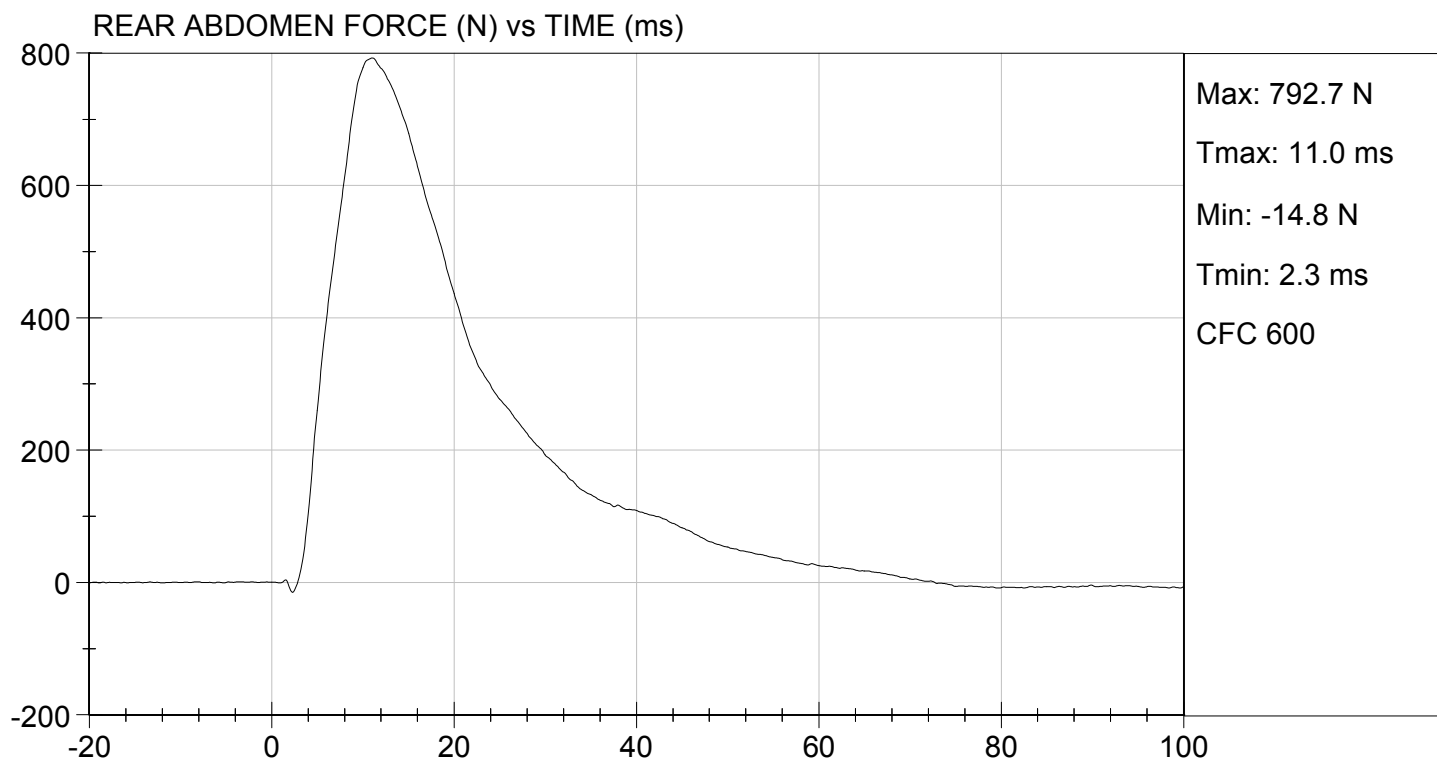
TEST DATE: 08/26/2016
TEST #: D162867





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

TEST DATE: 08/26/2016
TEST #: D162867

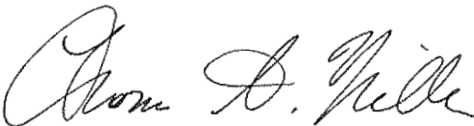


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

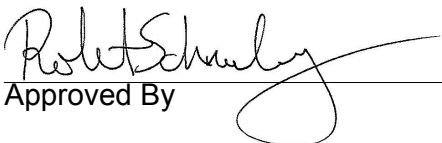
ATD Serial No: 032

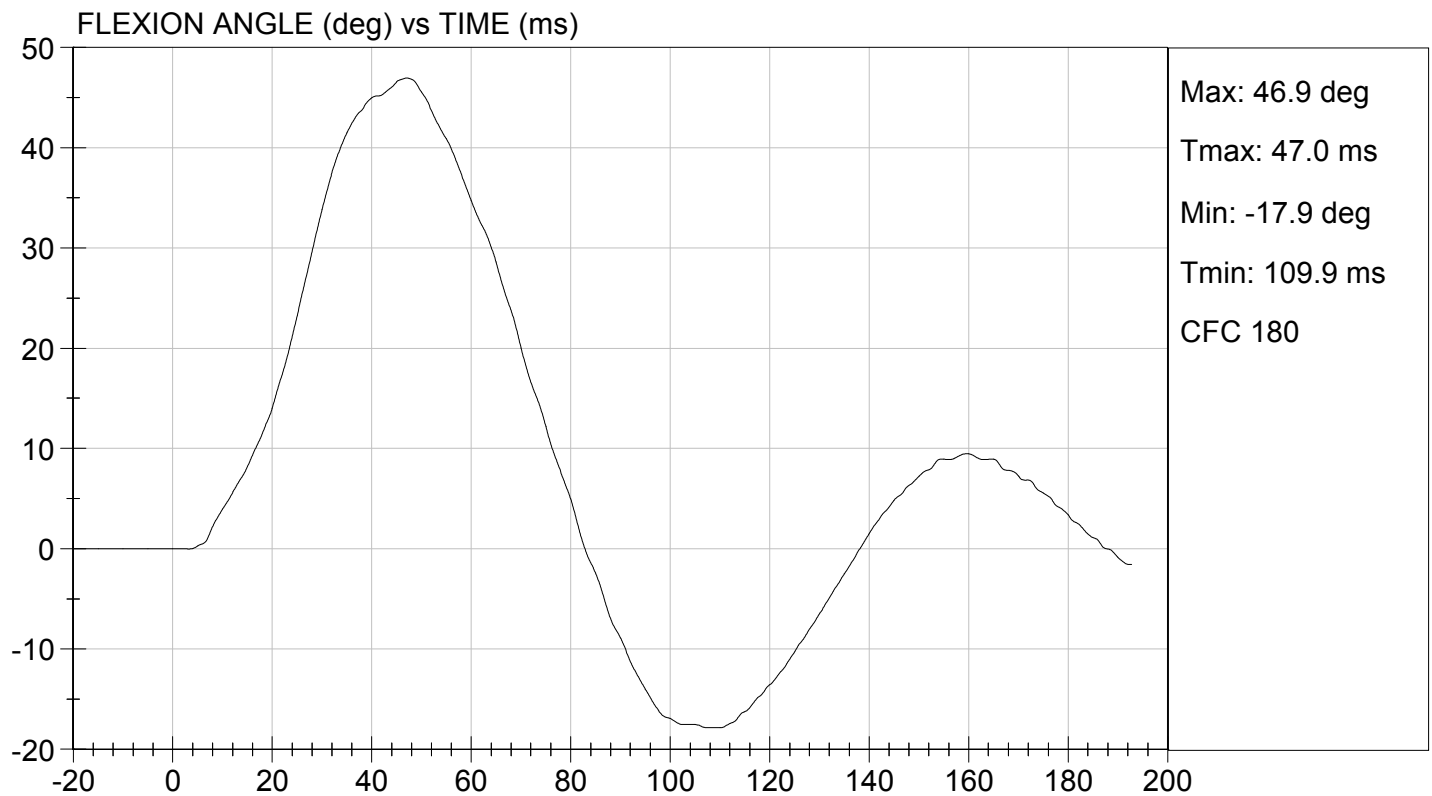
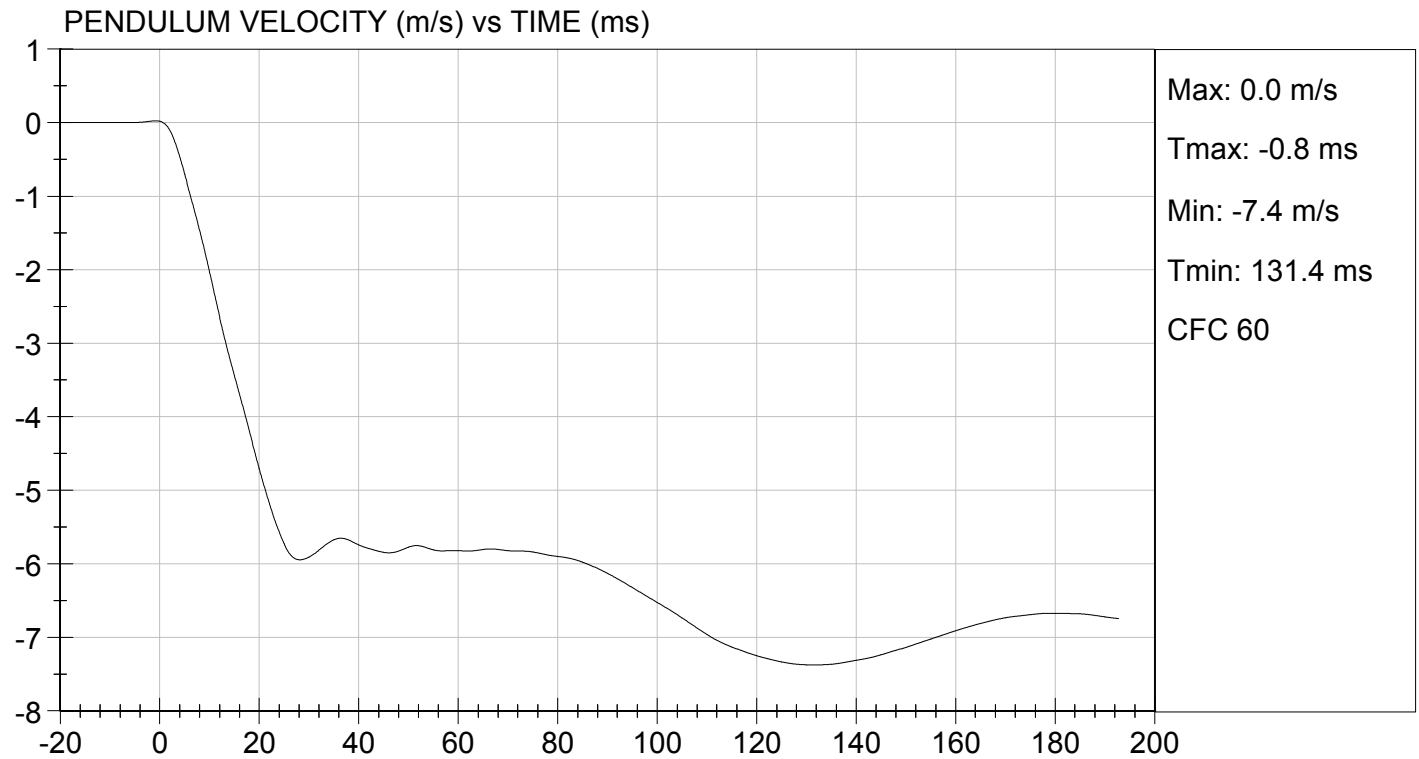
Test I.D: D162868

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	46	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.399	Pass
	27 ms	m/s	-6.50 to -5.80	-5.92	Pass
	30 ms	m/s	>= -6.50	-5.91	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.9	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	47.0	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	47	Pass
Overall Results					Pass


 Laboratory Technician

08/25/2016
 Test Date

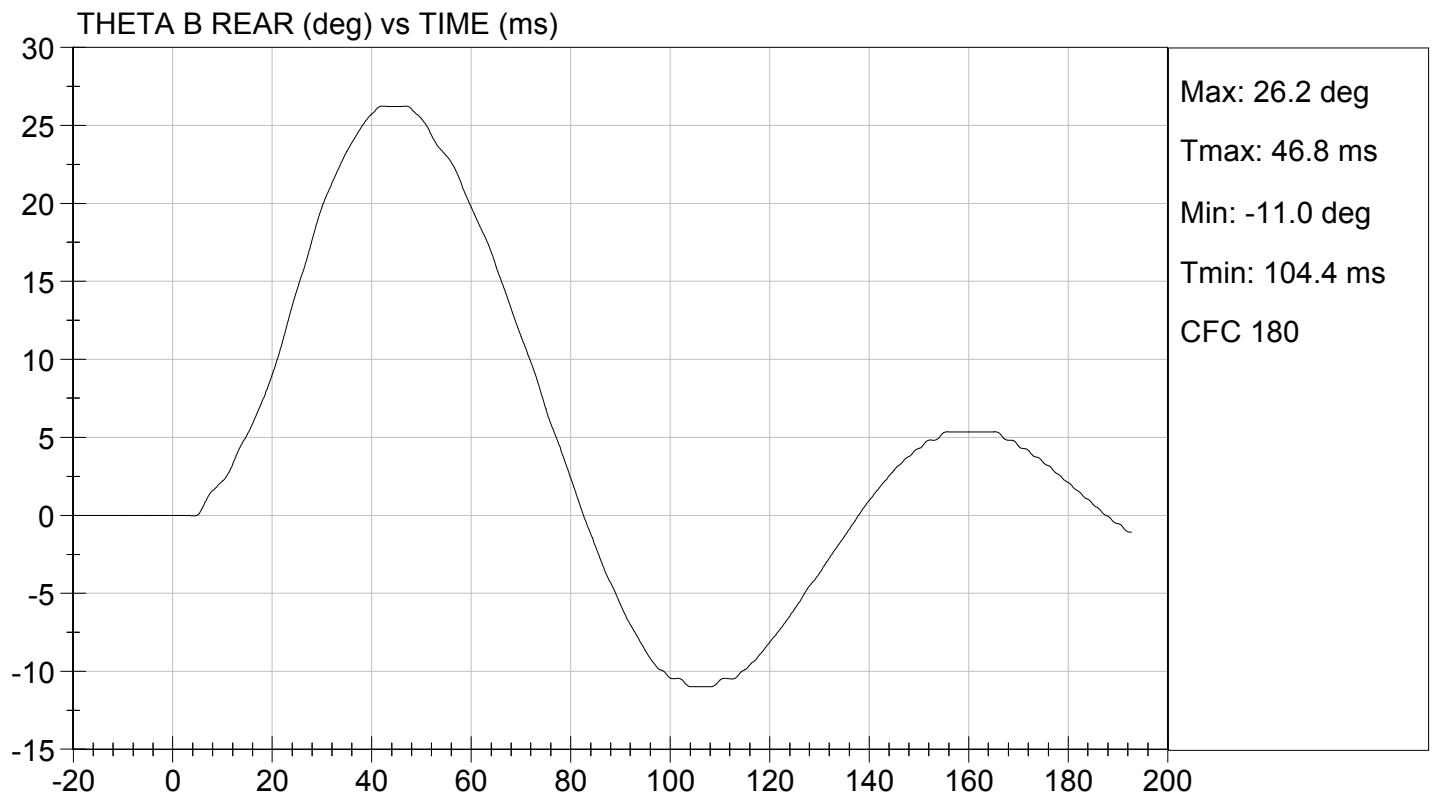
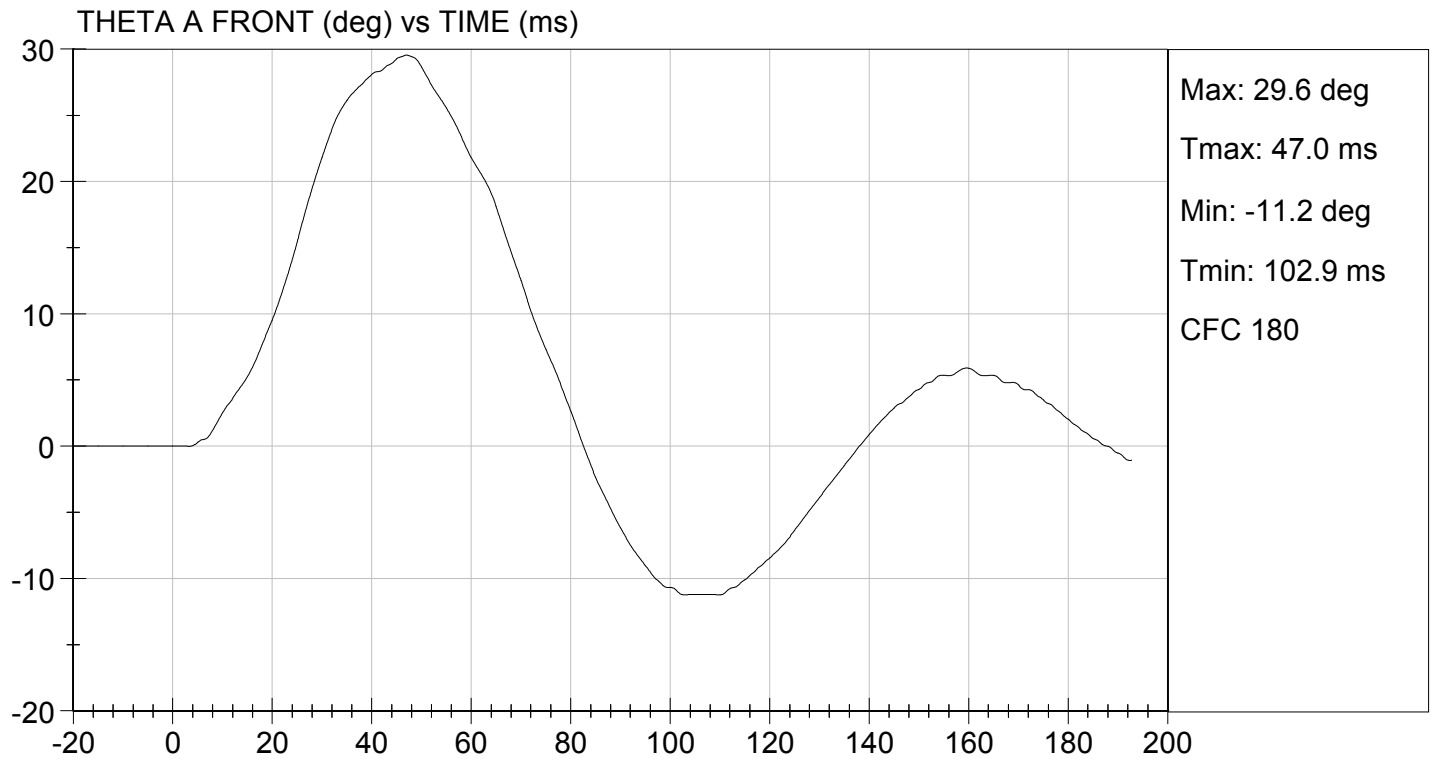

 Approved By





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

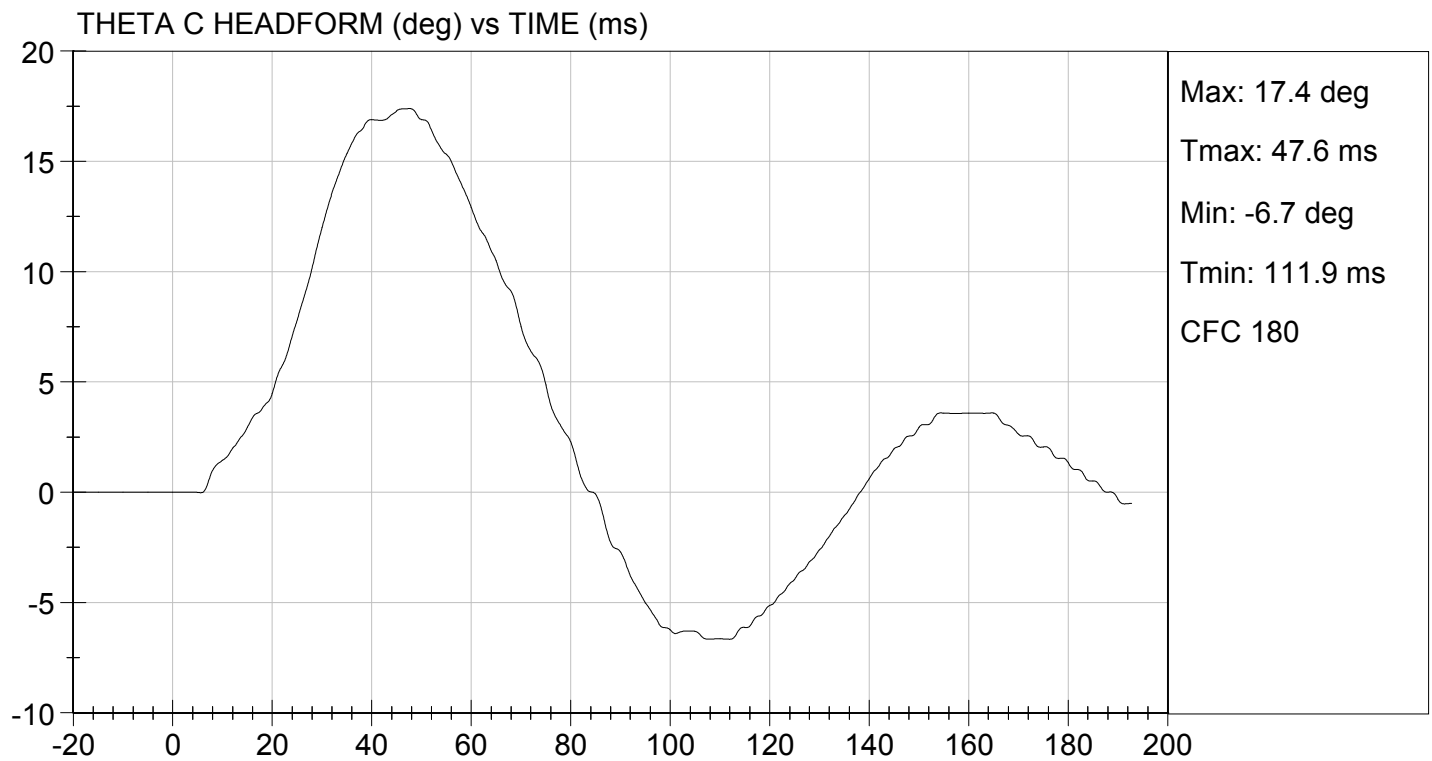
TEST DATE: 08/25/2016
TEST #: D162868





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

TEST DATE: 08/25/2016
TEST #: D162868



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

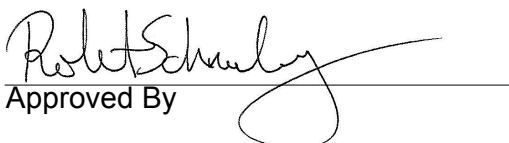
ATD Serial No: 032

Test I.D: D162869

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	45	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	N	4700 to 5400	4780	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.3	Pass
Maximum Pubic Force	N	1230 to 1590	1273	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.6	Pass
Overall Test Results				Pass


Laboratory Technician

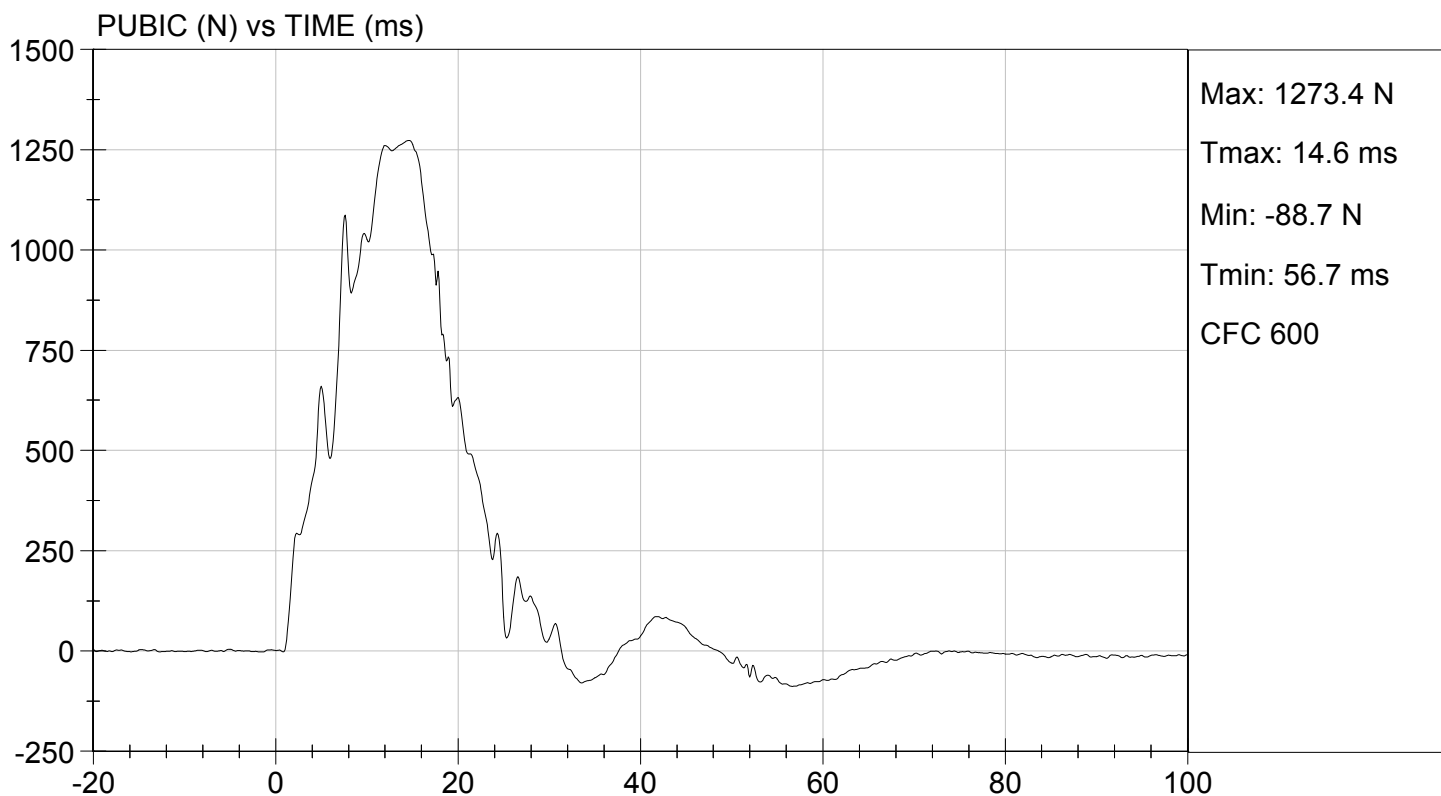
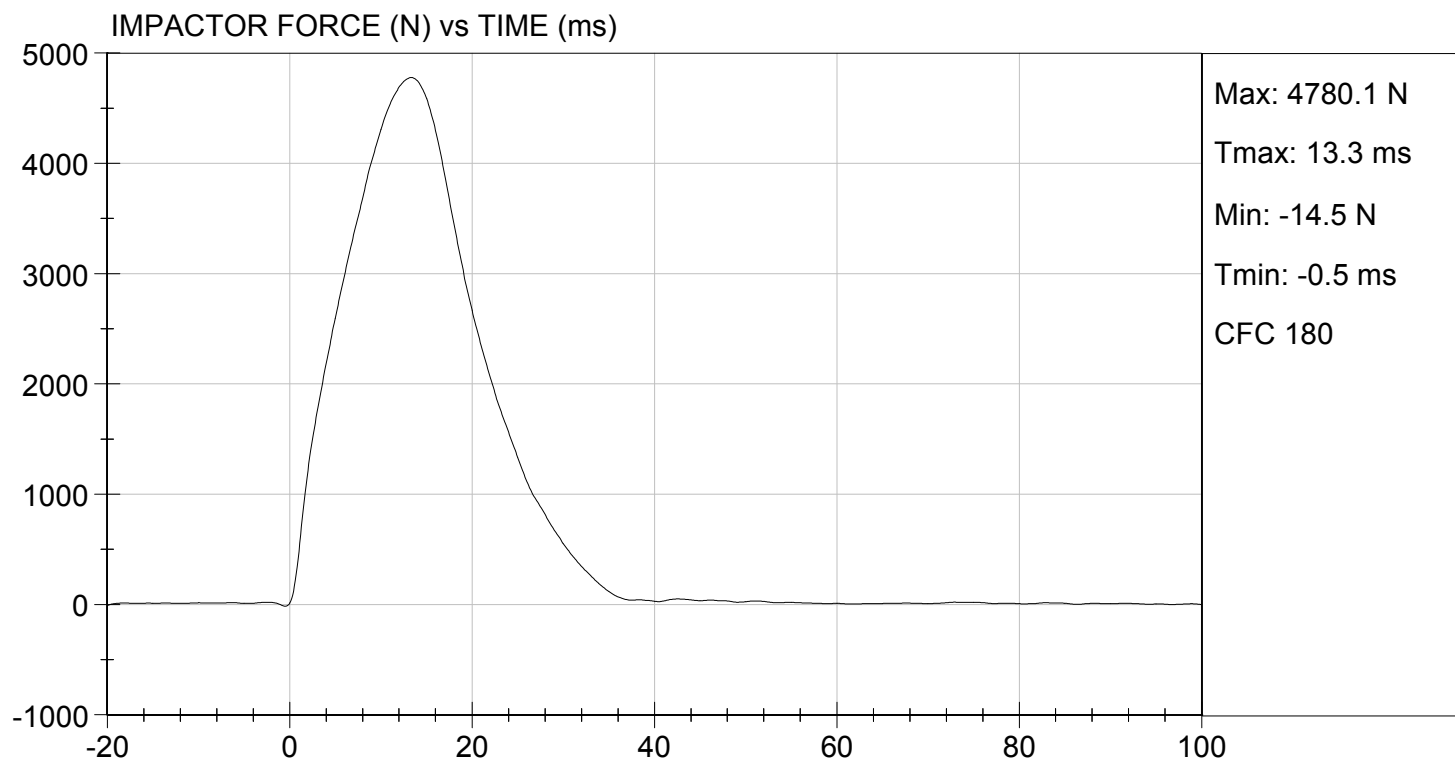
08/26/2016
Test Date


Approved By



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

TEST DATE: 08/26/2016
TEST #: D162869



ES-2re External Measurements
SN: 032

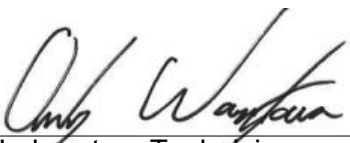
No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157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

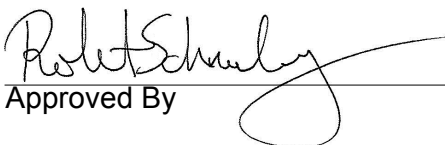
ATD Serial No: 032

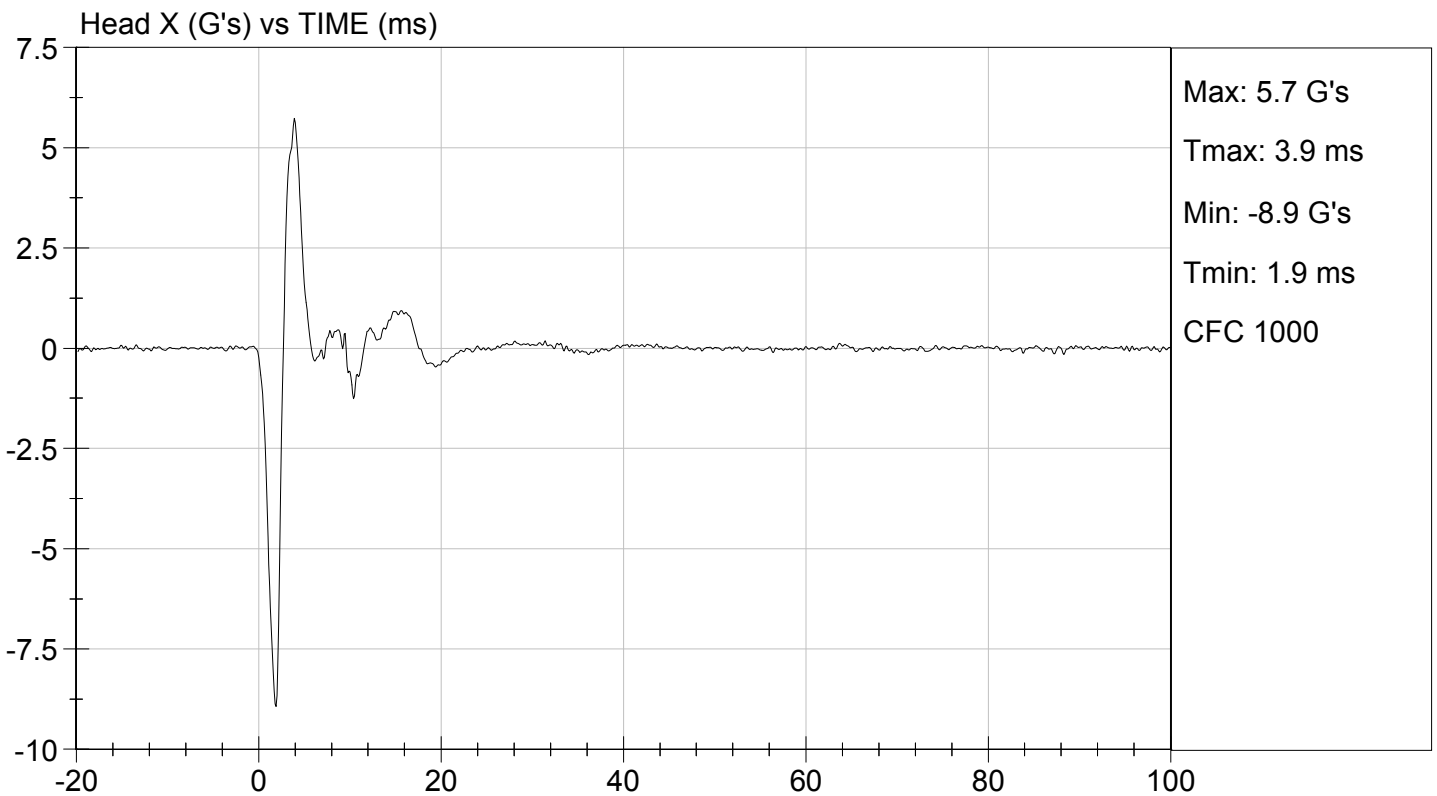
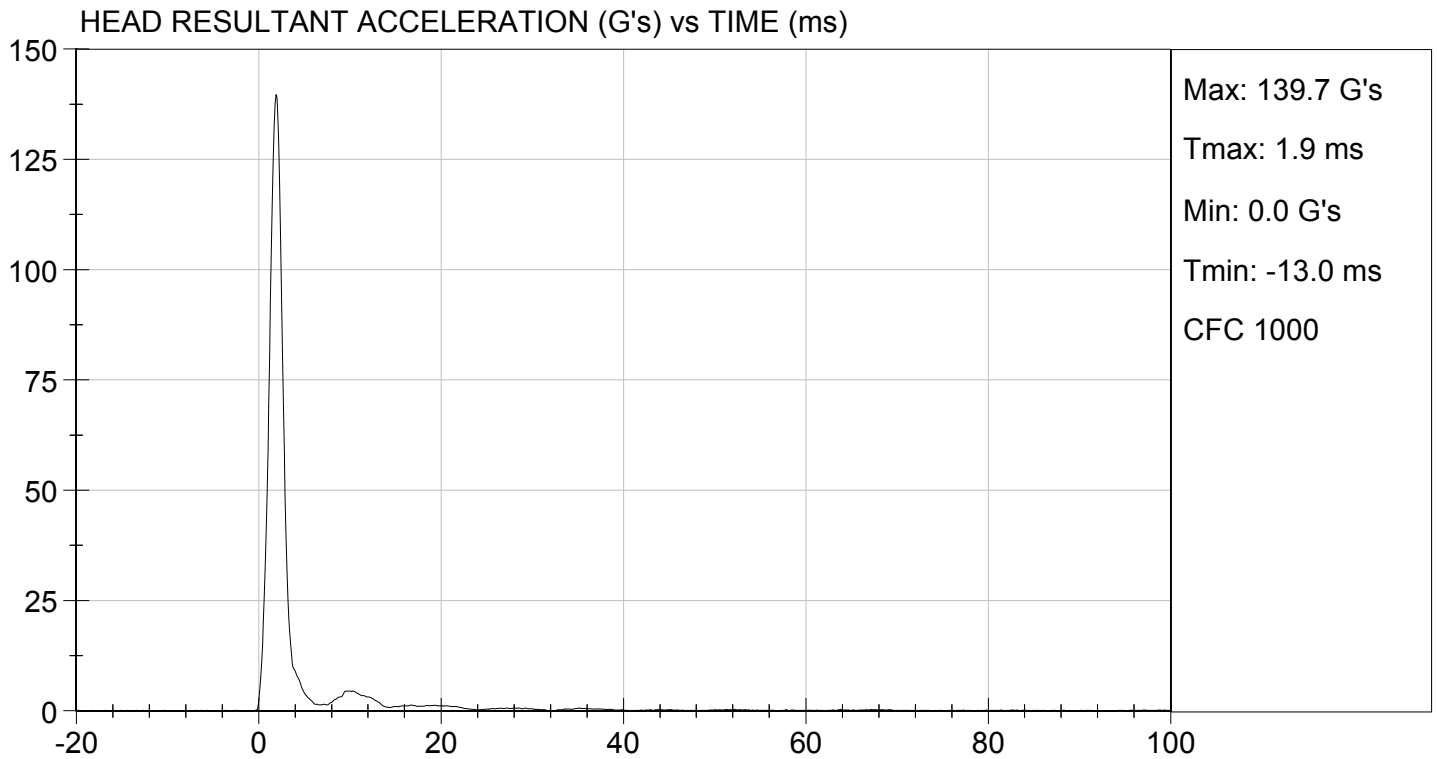
Test ID: D163311

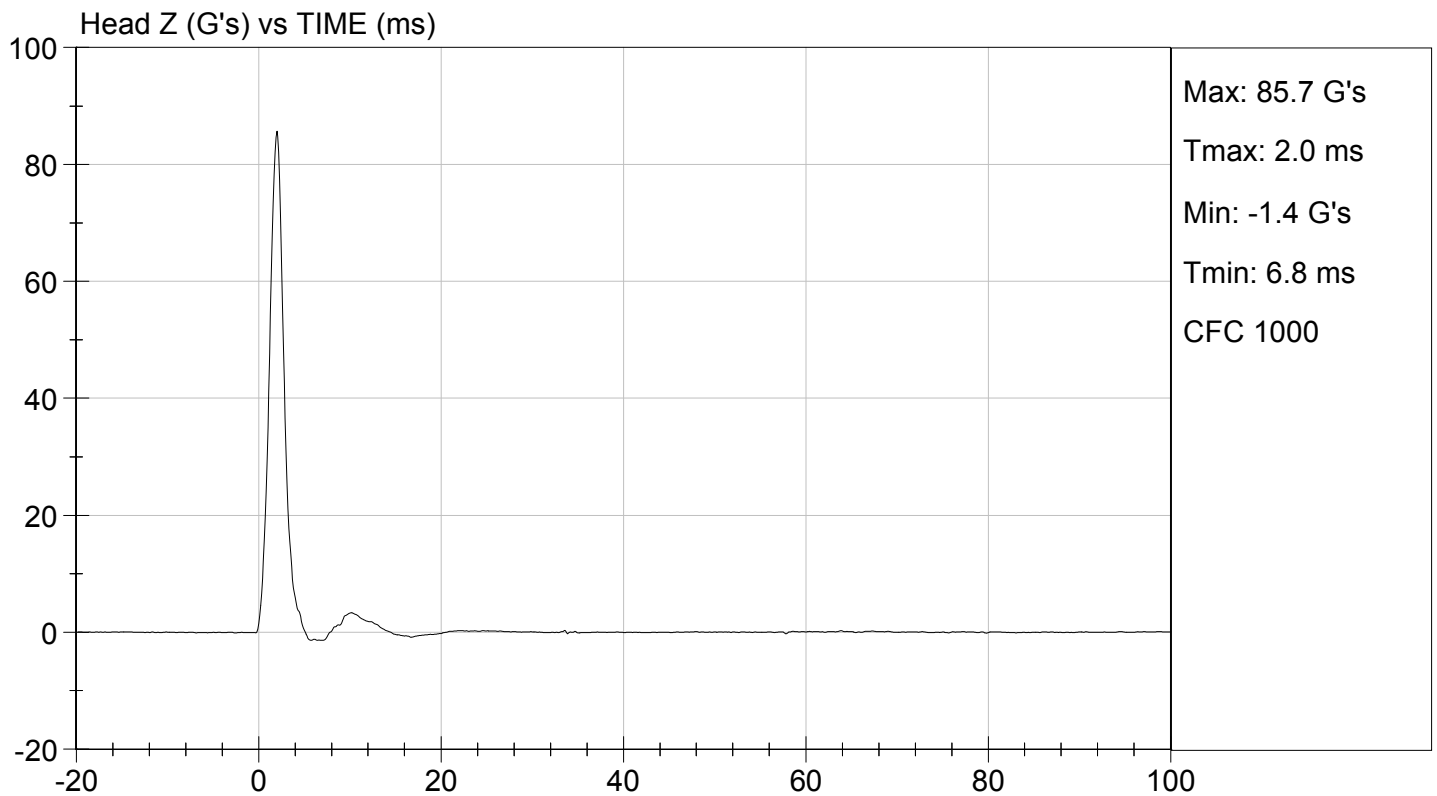
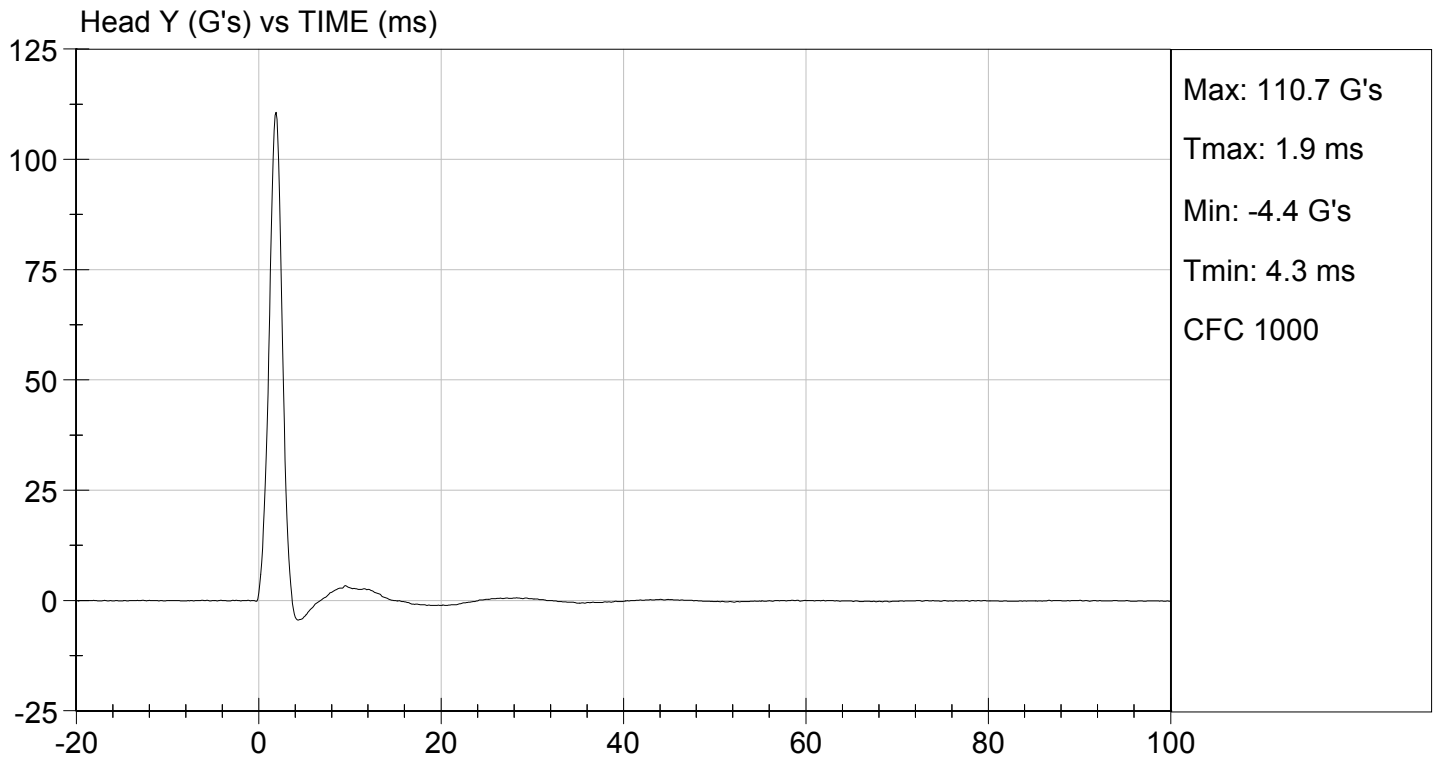
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	125 to 155	140	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	-8.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

09/28/2016
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D163312

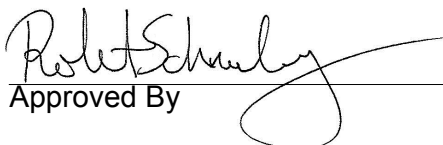
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.48	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.32	Pass
	14 ms	m/s	-3.20 to -3.70	-3.32	Pass
	17 ms	m/s	>= -3.70	-3.35	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	50.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.5	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	56.7	Pass
Overall Results					Pass



Laboratory Technician

09/29/2016

Test Date



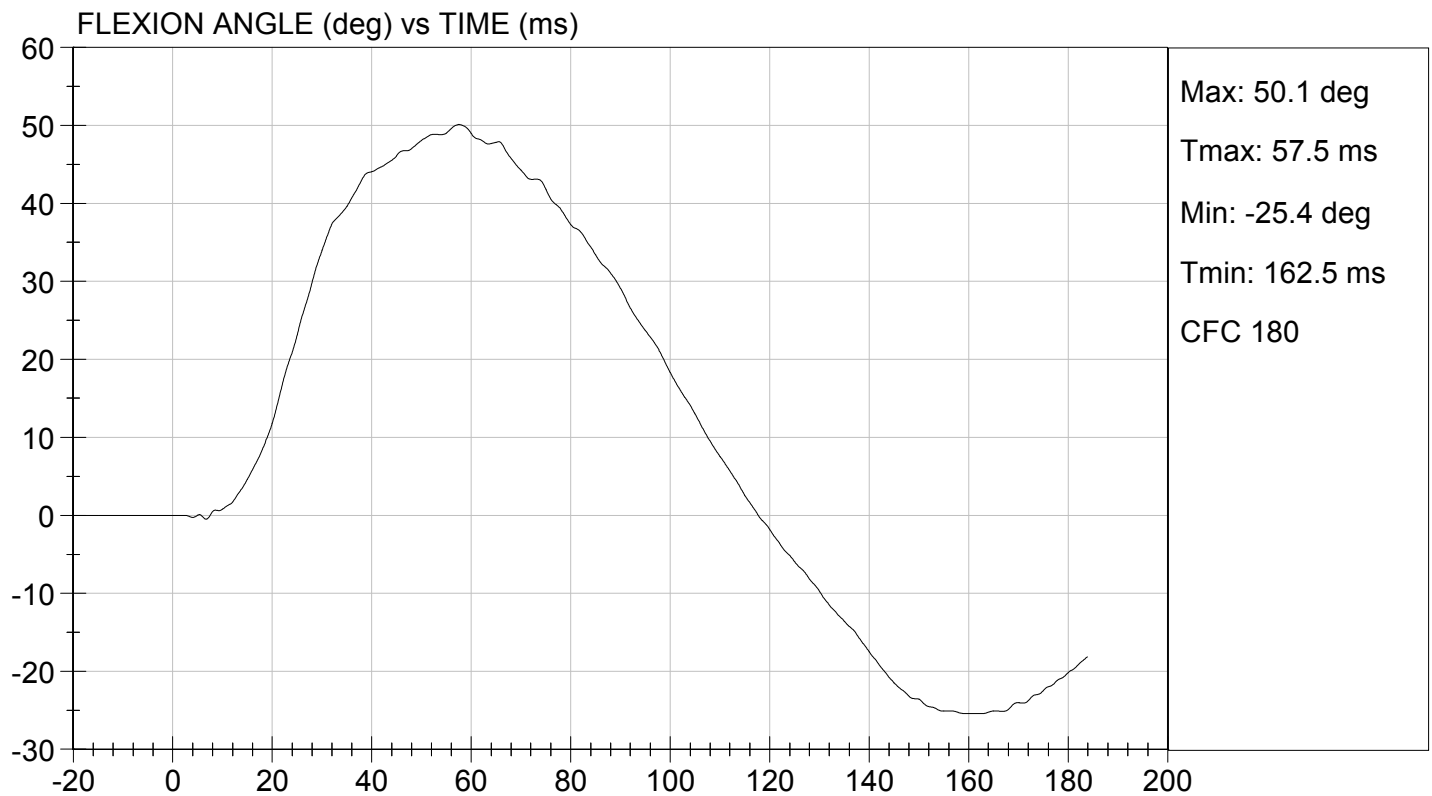
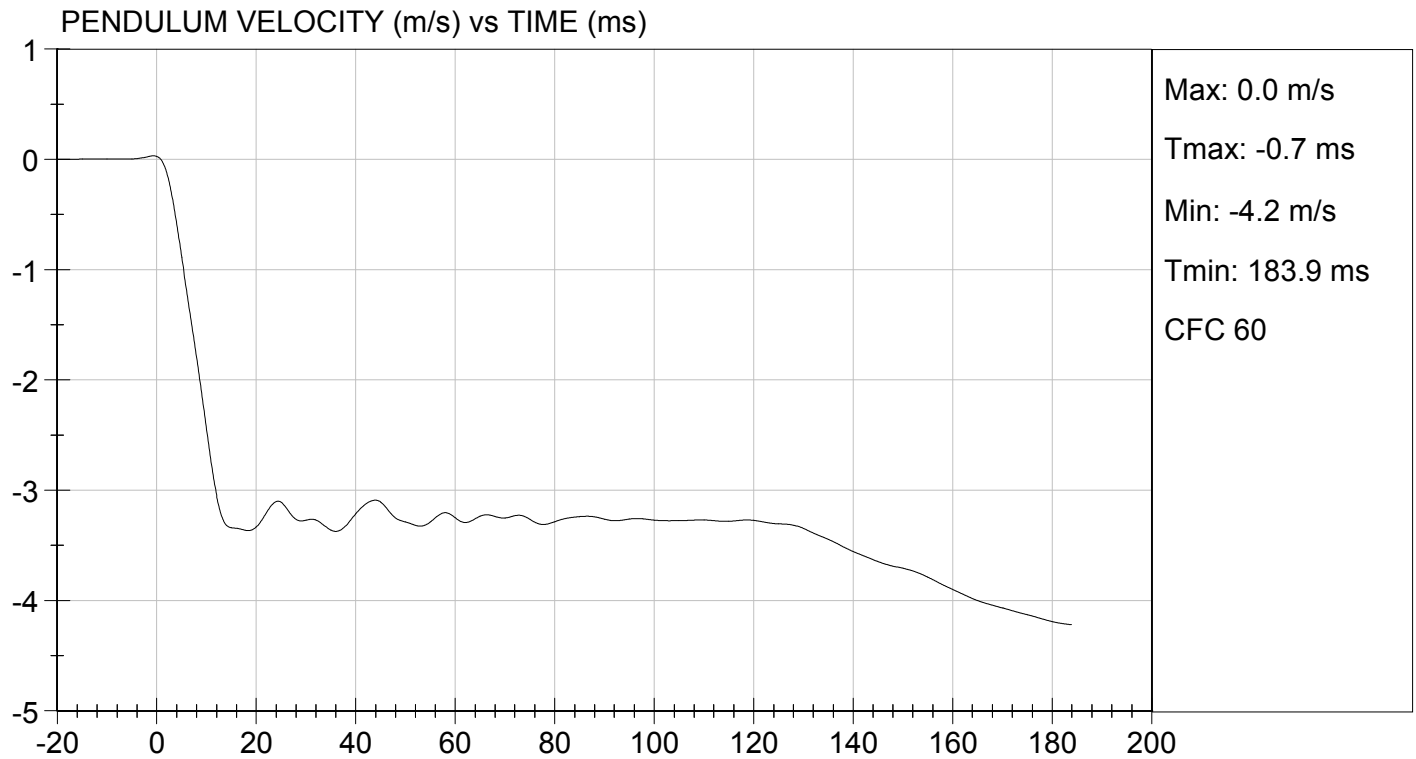
Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

TEST DATE: 09/29/2016

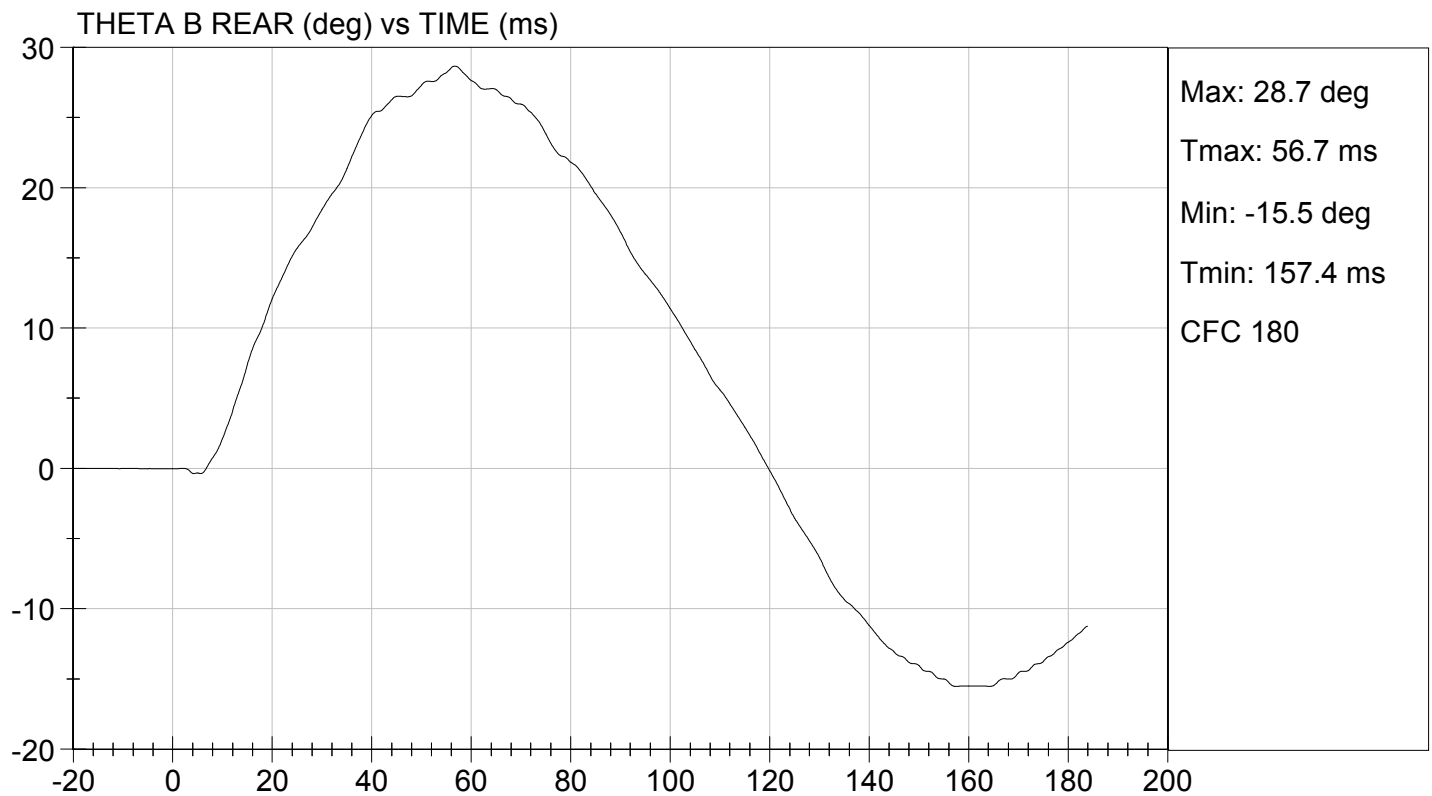
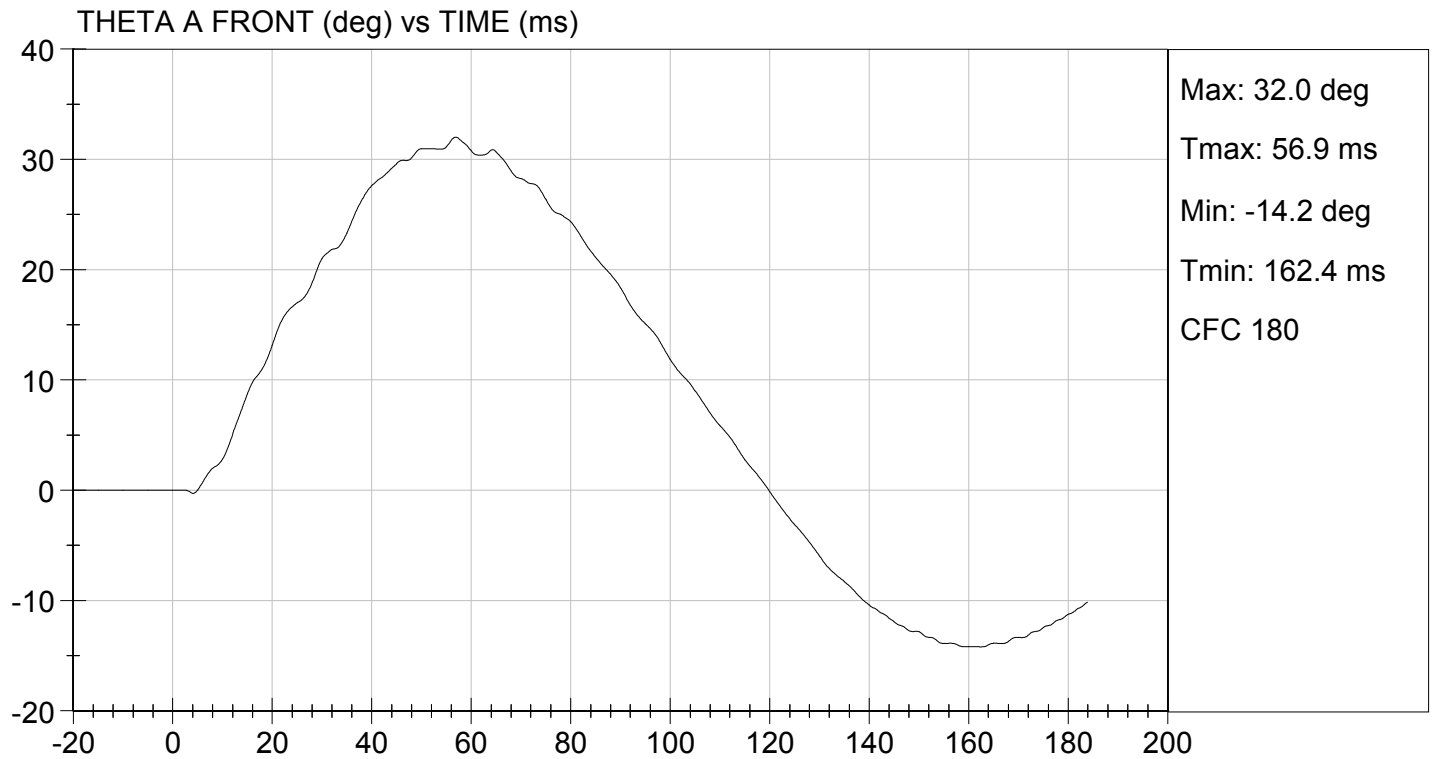
TEST #: D163312





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

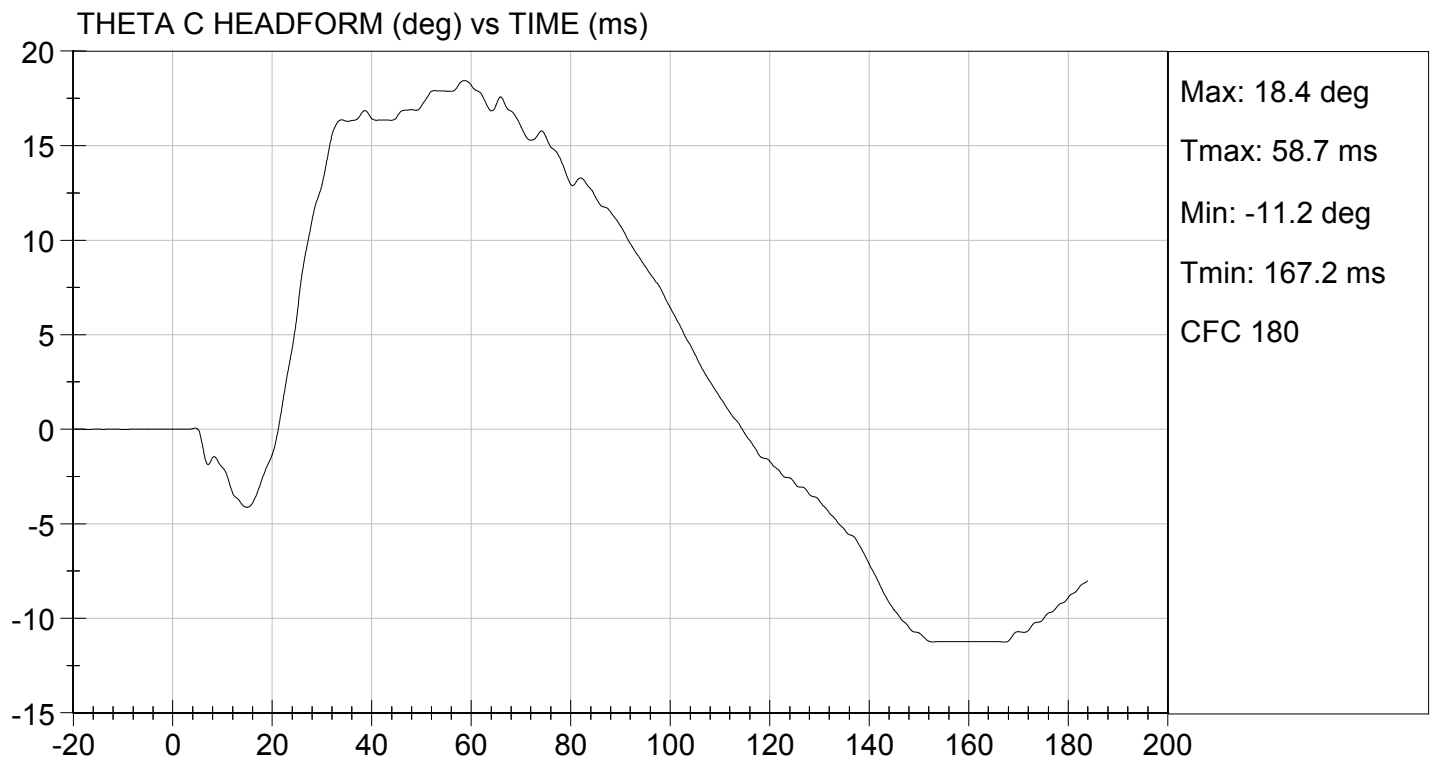
TEST DATE: 09/29/2016
TEST #: D163312





TEST DESC: NECK BENDING
VELOCITY: 11.42 ft/s, 3.48 m/s

TEST DATE: 09/29/2016
TEST #: D163312



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

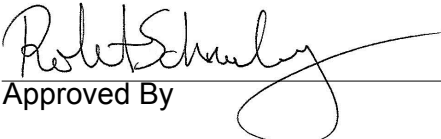
ATD Serial No: 032

Test I.D: D163313

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.7	Pass
Overall Test Results				Pass


Laboratory Technician

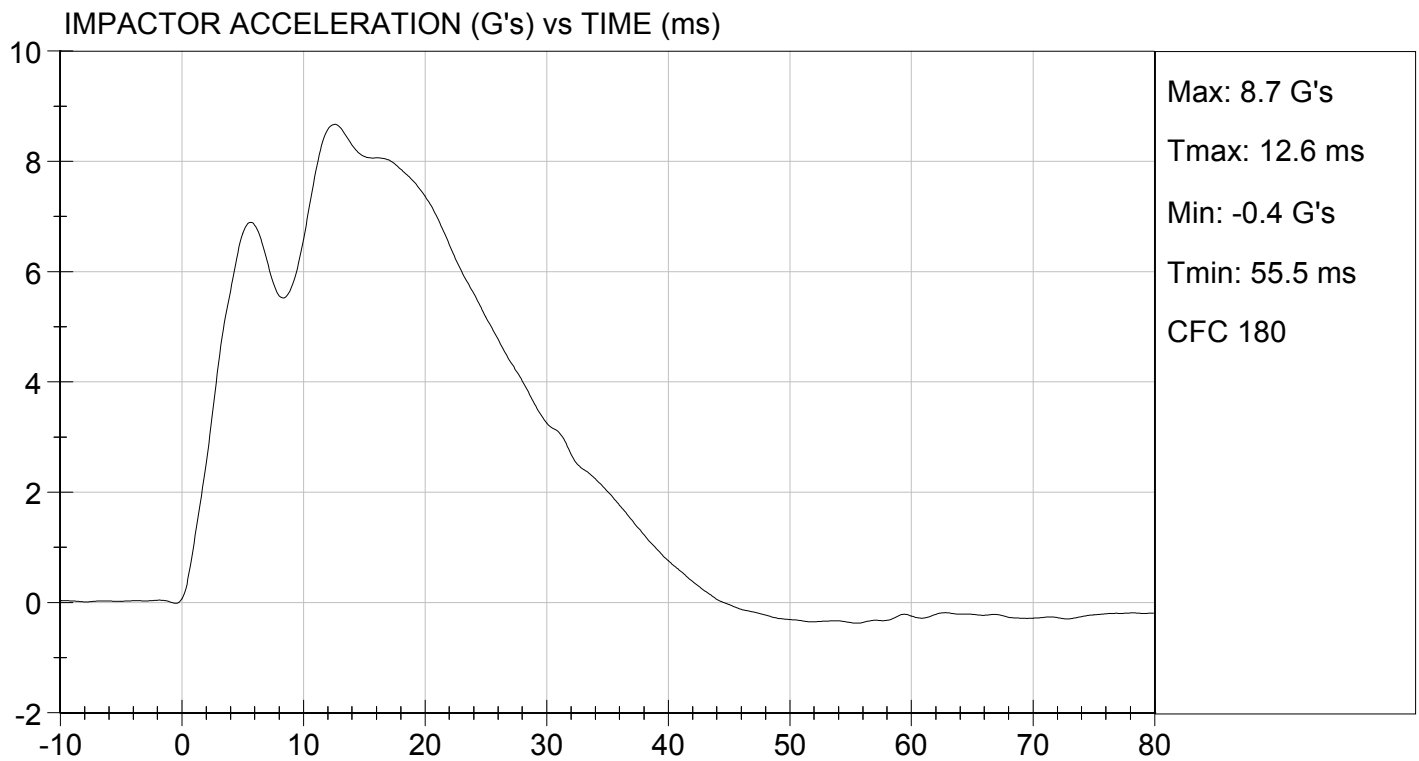
09/29/2016
Test Date


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163313



MGA RESEARCH CORPORATION

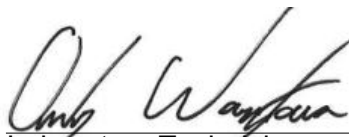
UPPER RIB TEST

ES-2re DUMMY

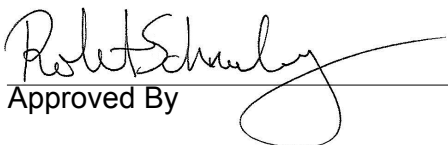
ATD Serial No: 032

Test I.D: D163314

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Displacement at 459 mm	mm	36.0 to 40.0	36.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.2	Pass
Overall Test Results				Pass

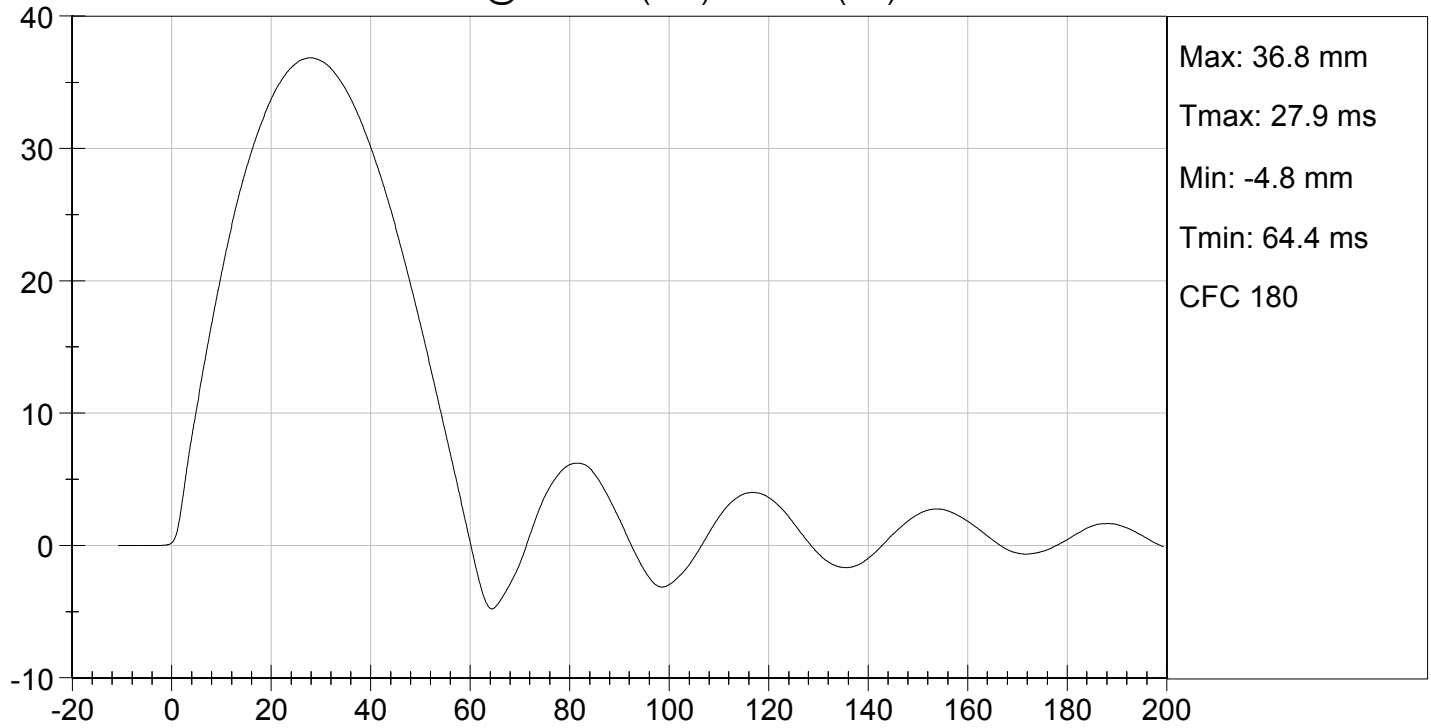

Laboratory Technician

09/29/2016
Test Date

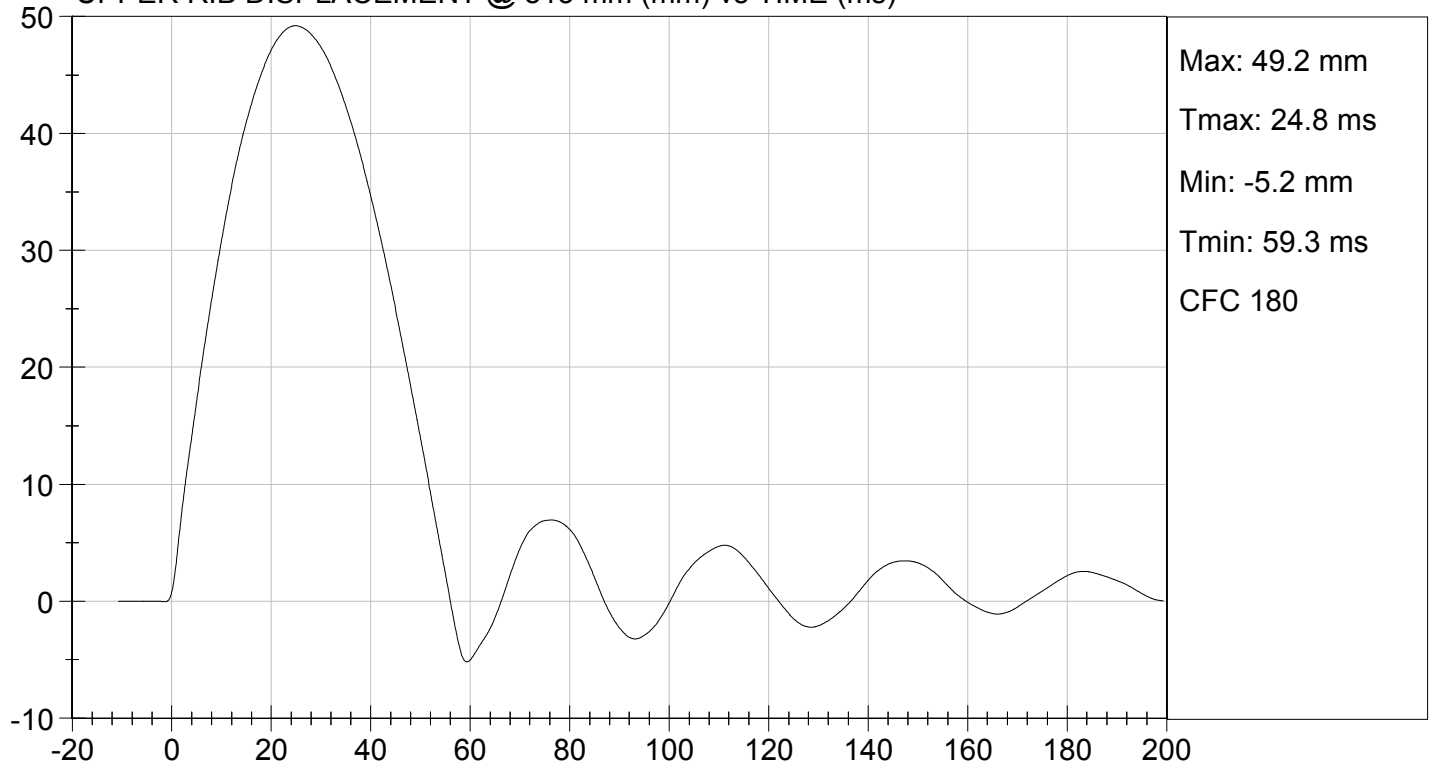

Approved By



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



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



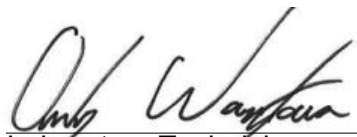
MGA RESEARCH CORPORATION

**MID RIB TEST
ES-2re DUMMY**

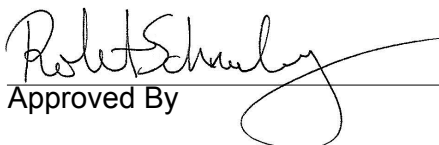
ATD Serial No: 032

Test I.D: D163315

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.3	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.2	Pass
Overall Test Results				Pass

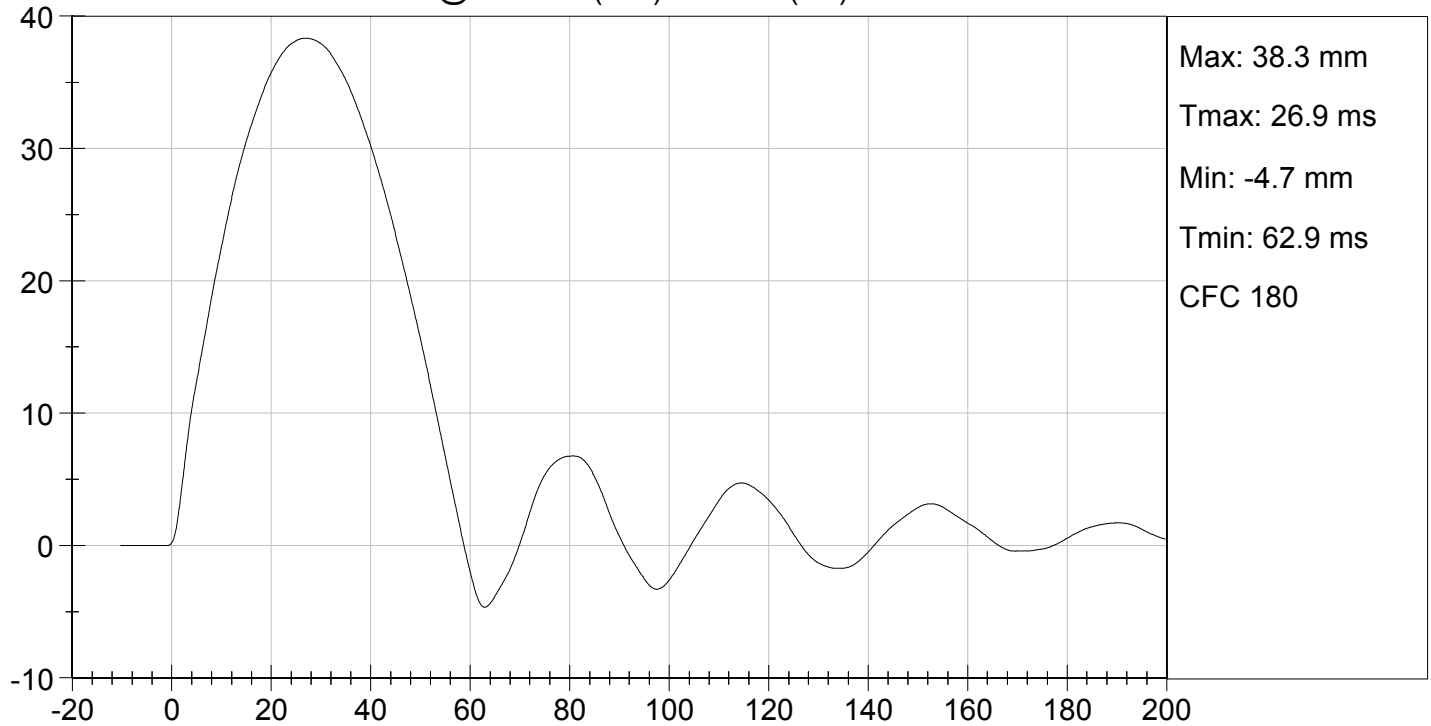

Laboratory Technician

09/29/2016
Test Date

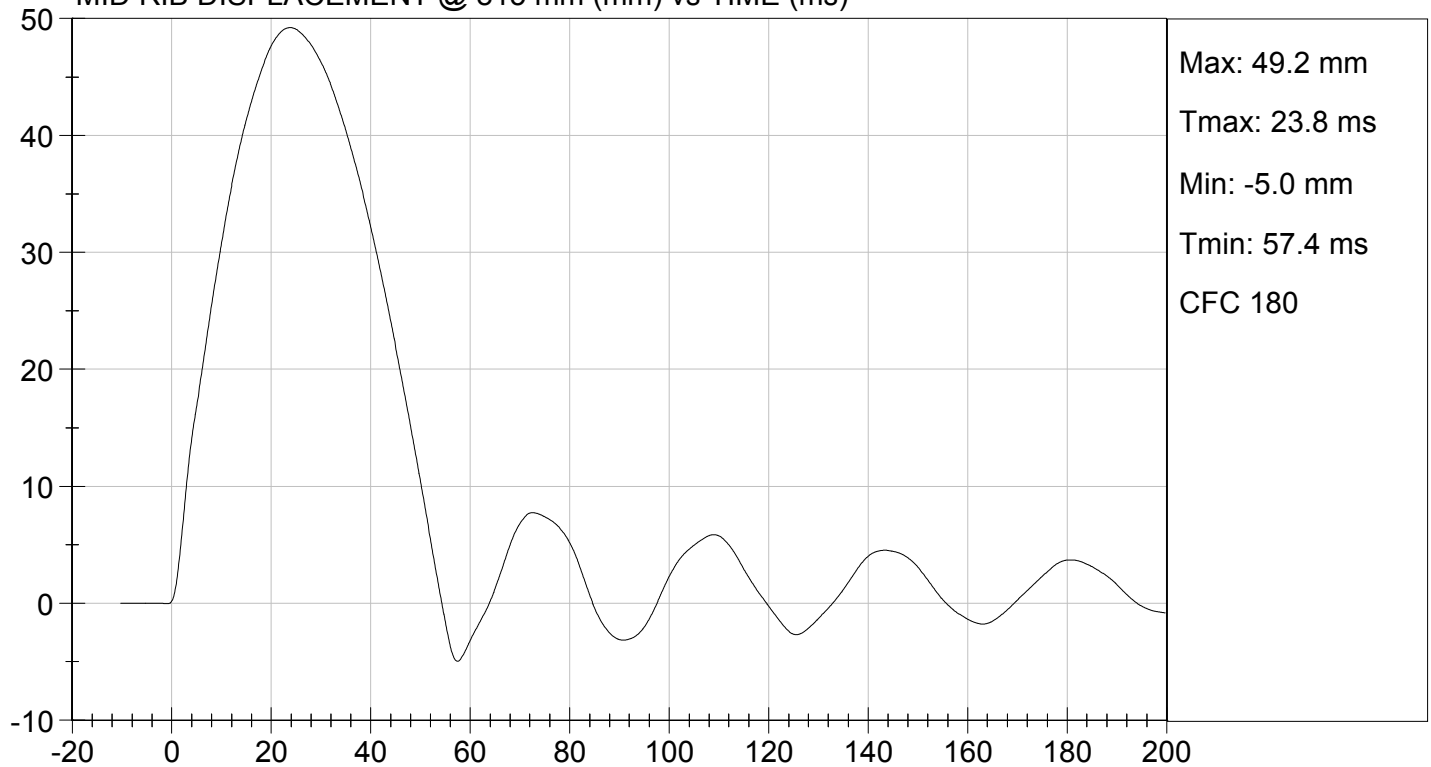

Approved By



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



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



MGA RESEARCH CORPORATION

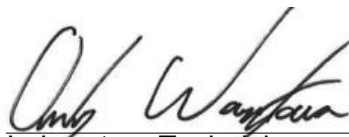
LOWER RIB TEST

ES-2re DUMMY

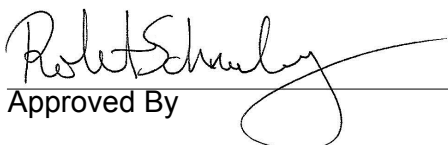
ATD Serial No: 032

Test I.D: D163316

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	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

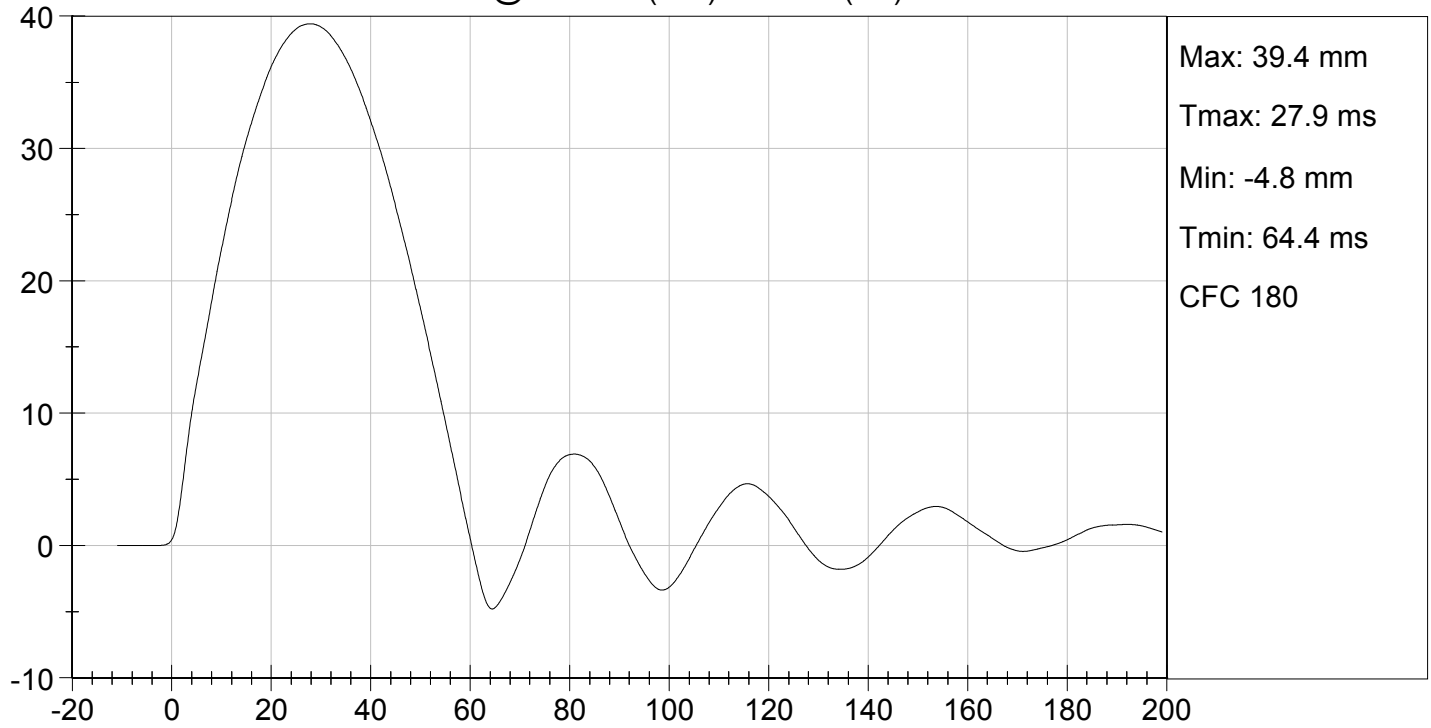

Laboratory Technician

09/29/2016
Test Date

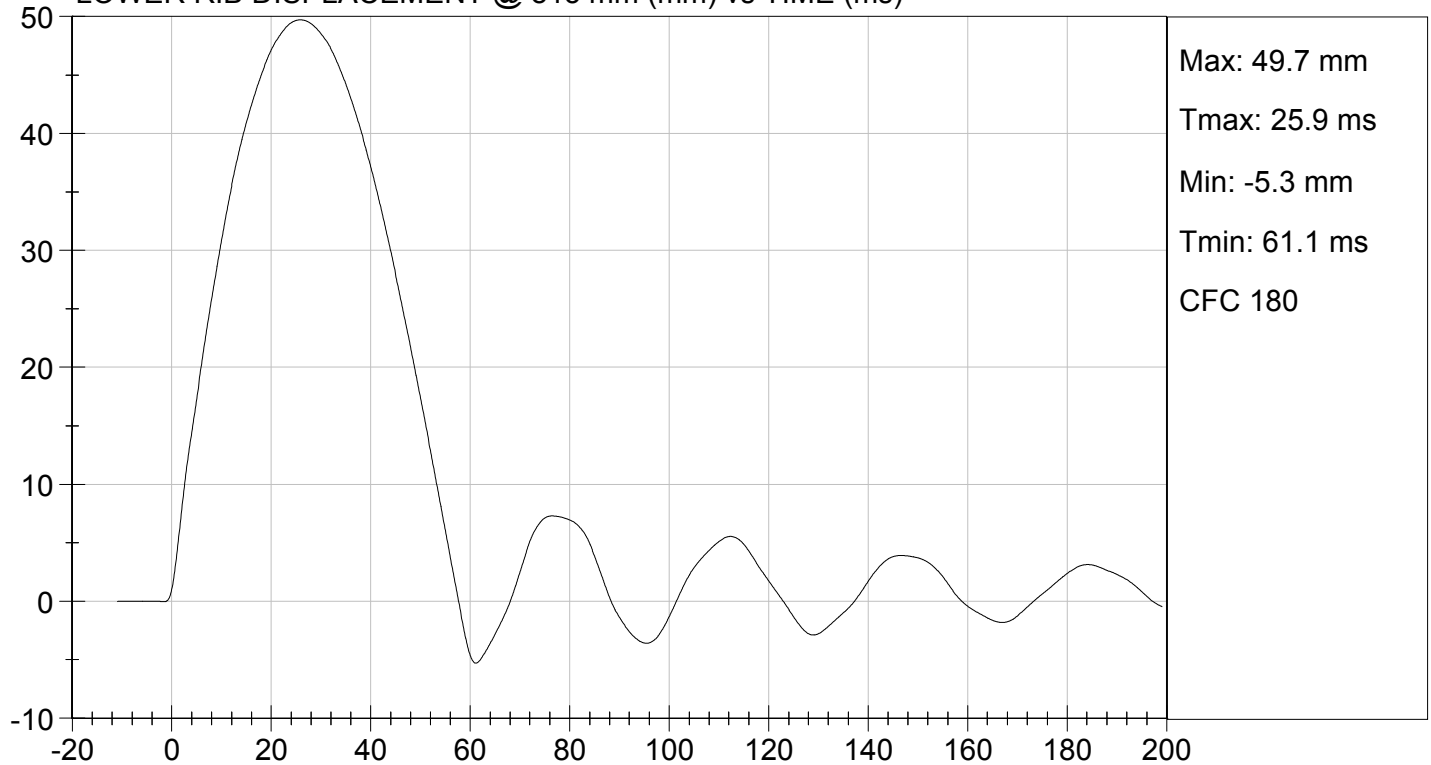

Approved By



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



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



MGA RESEARCH CORPORATION

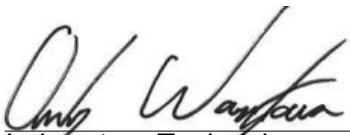
ABDOMEN TEST

ES-2re DUMMY

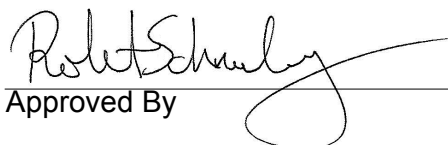
ATD Serial No: 032

Test I.D: D163317

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4339	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.8	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2331	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.6	Pass
Overall Test Results				Pass


Laboratory Technician

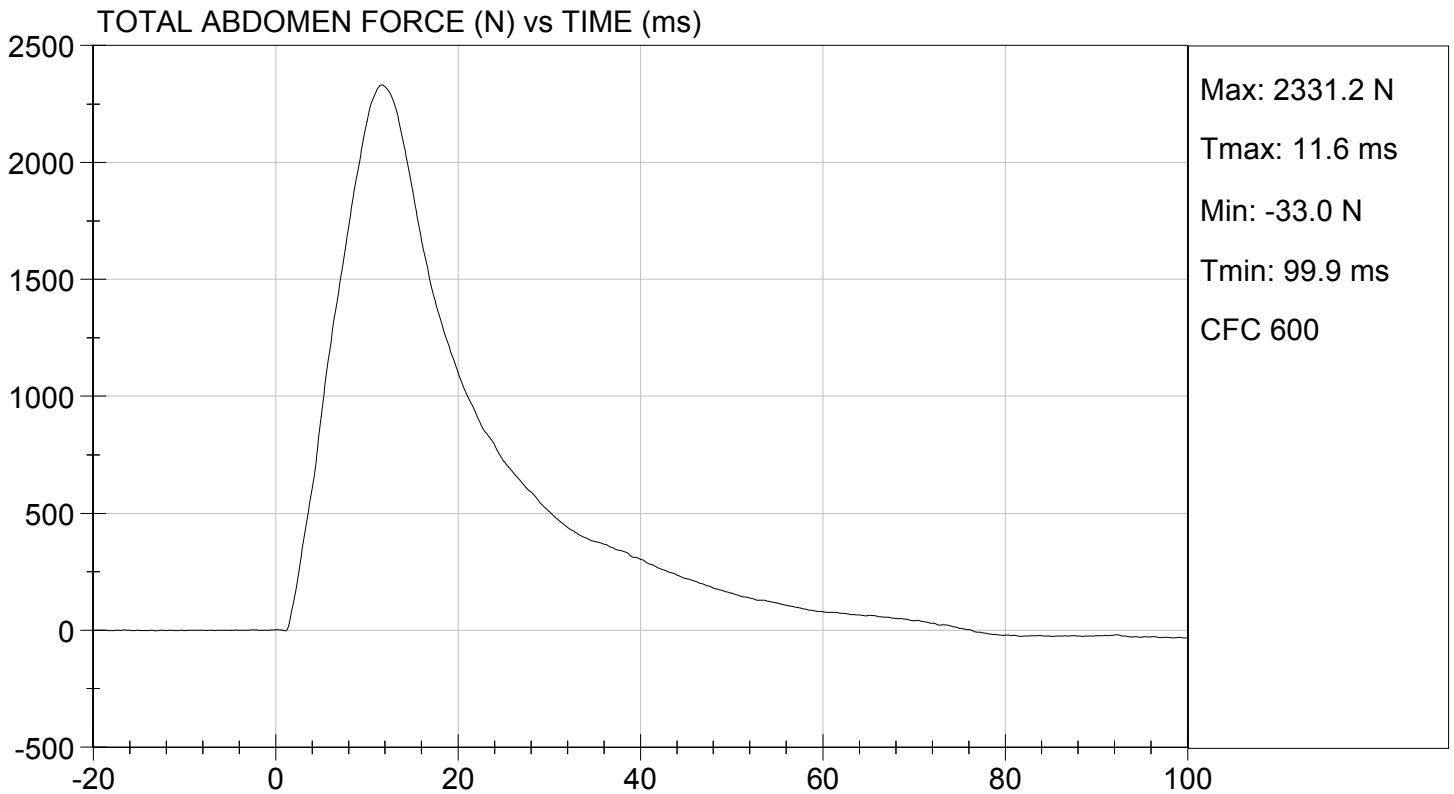
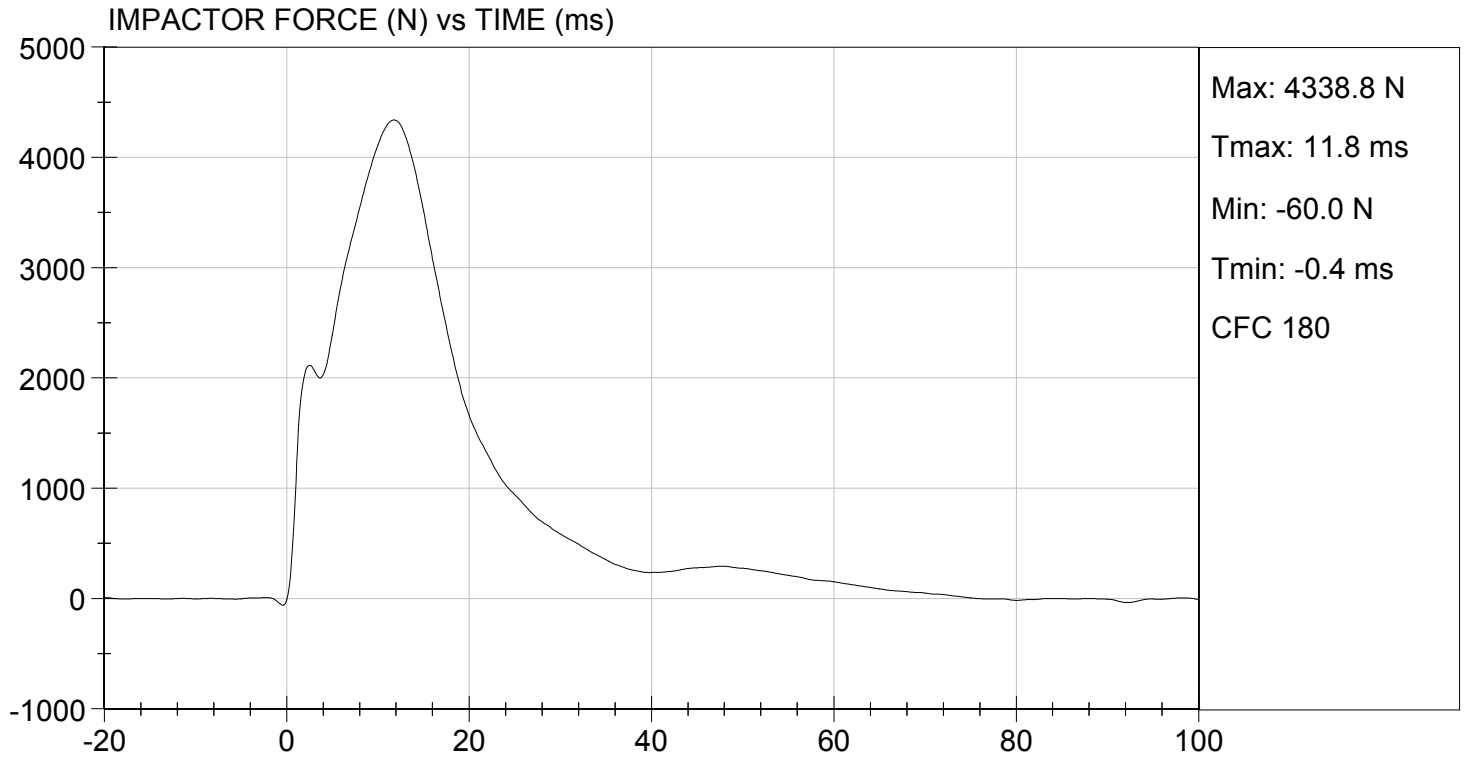
09/29/2016
Test Date


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163317

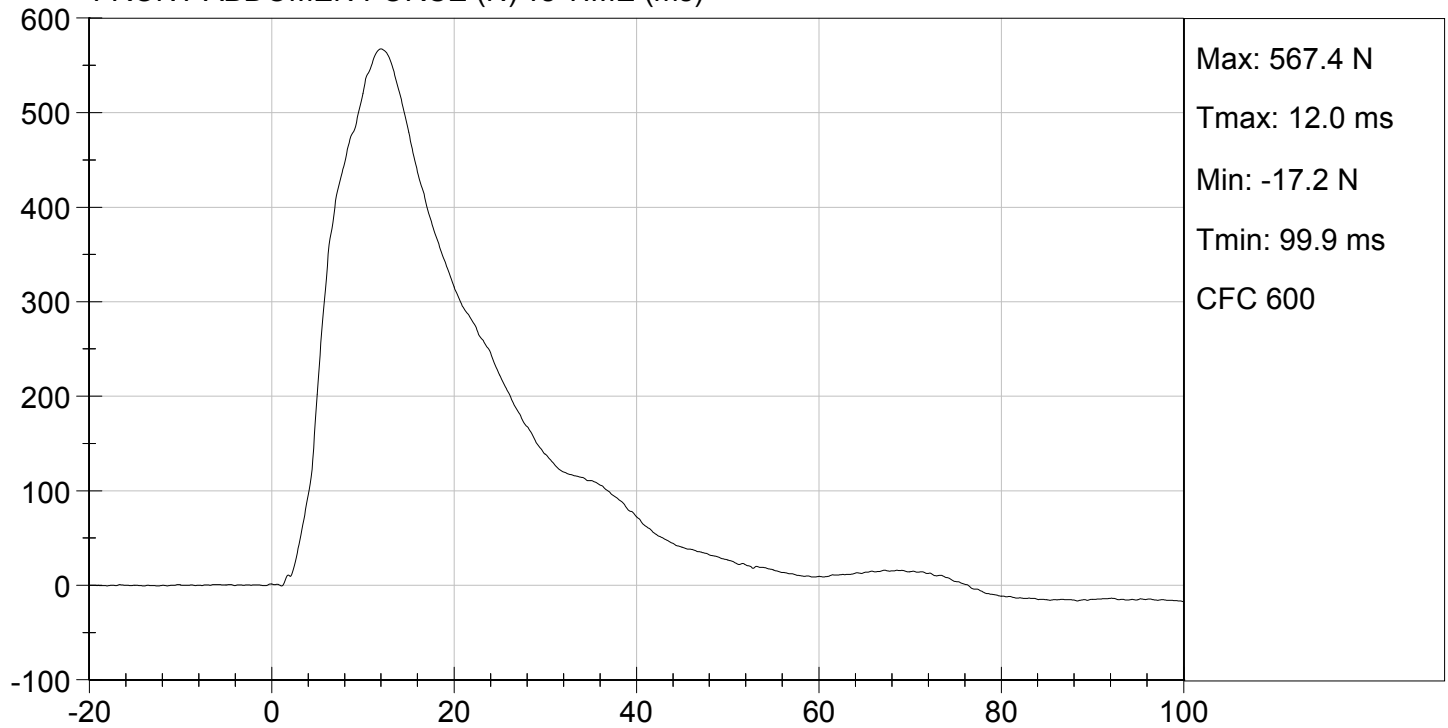




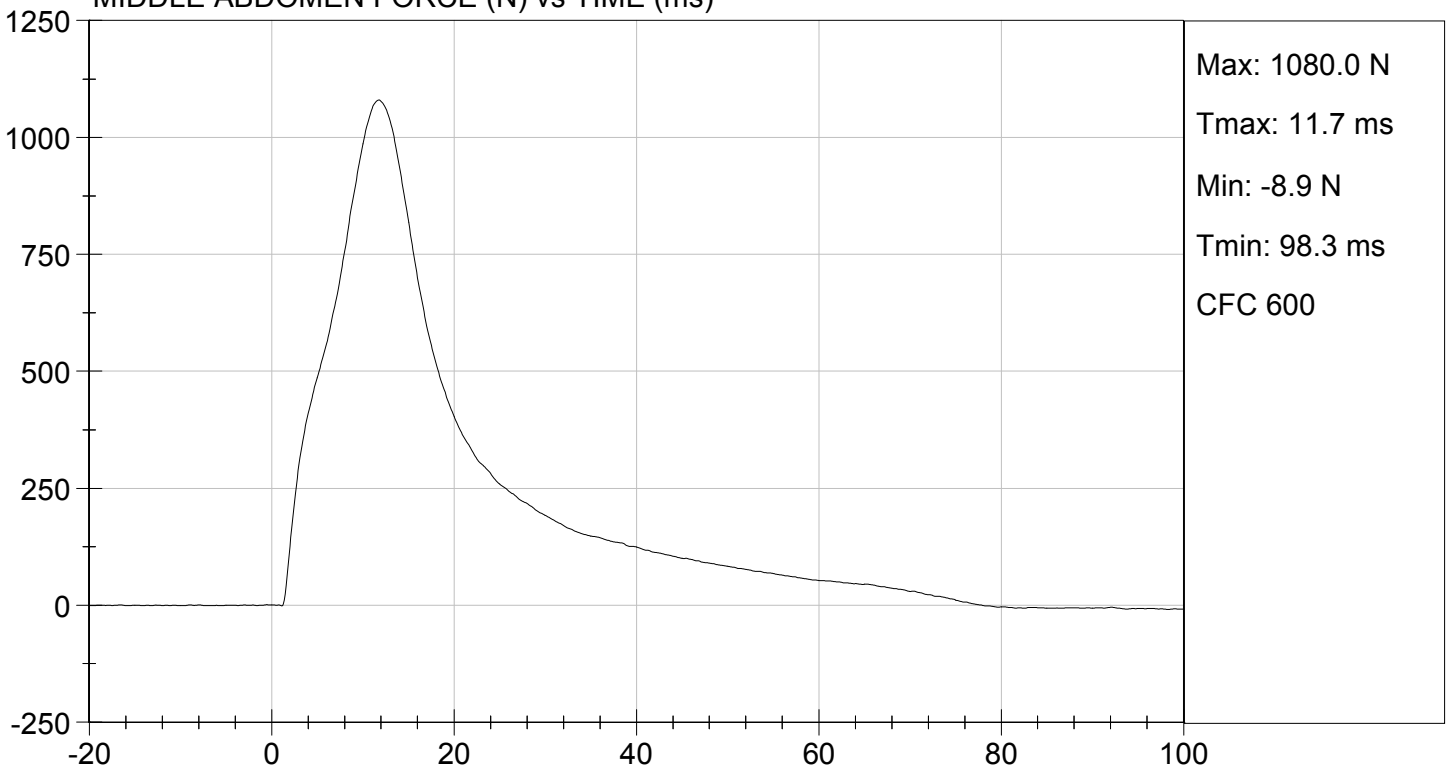
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 09/29/2016
TEST #: D163317

FRONT ABDOMEN FORCE (N) vs TIME (ms)



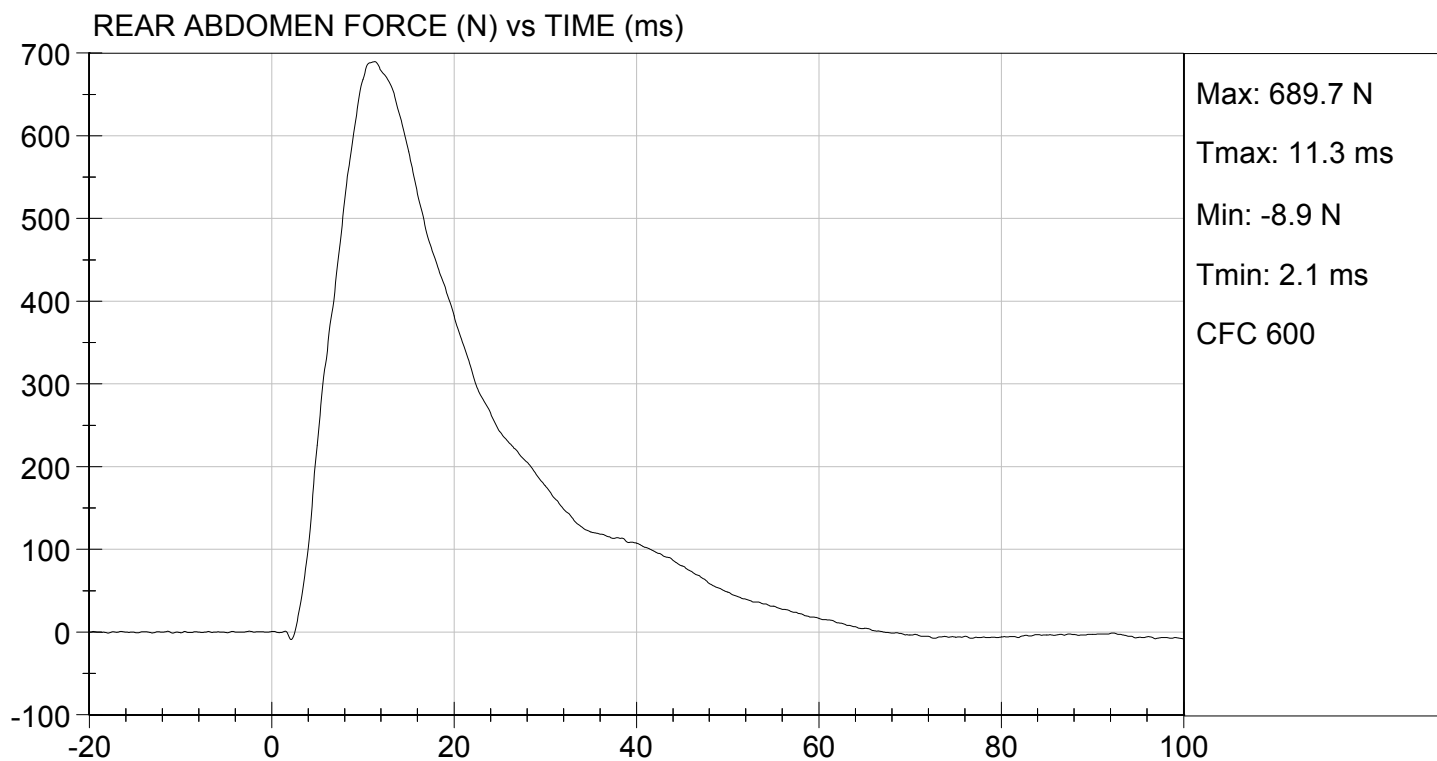
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)





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

TEST DATE: 09/29/2016
TEST #: D163317



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

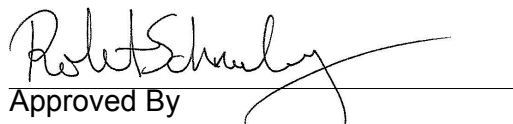
ATD Serial No: 032

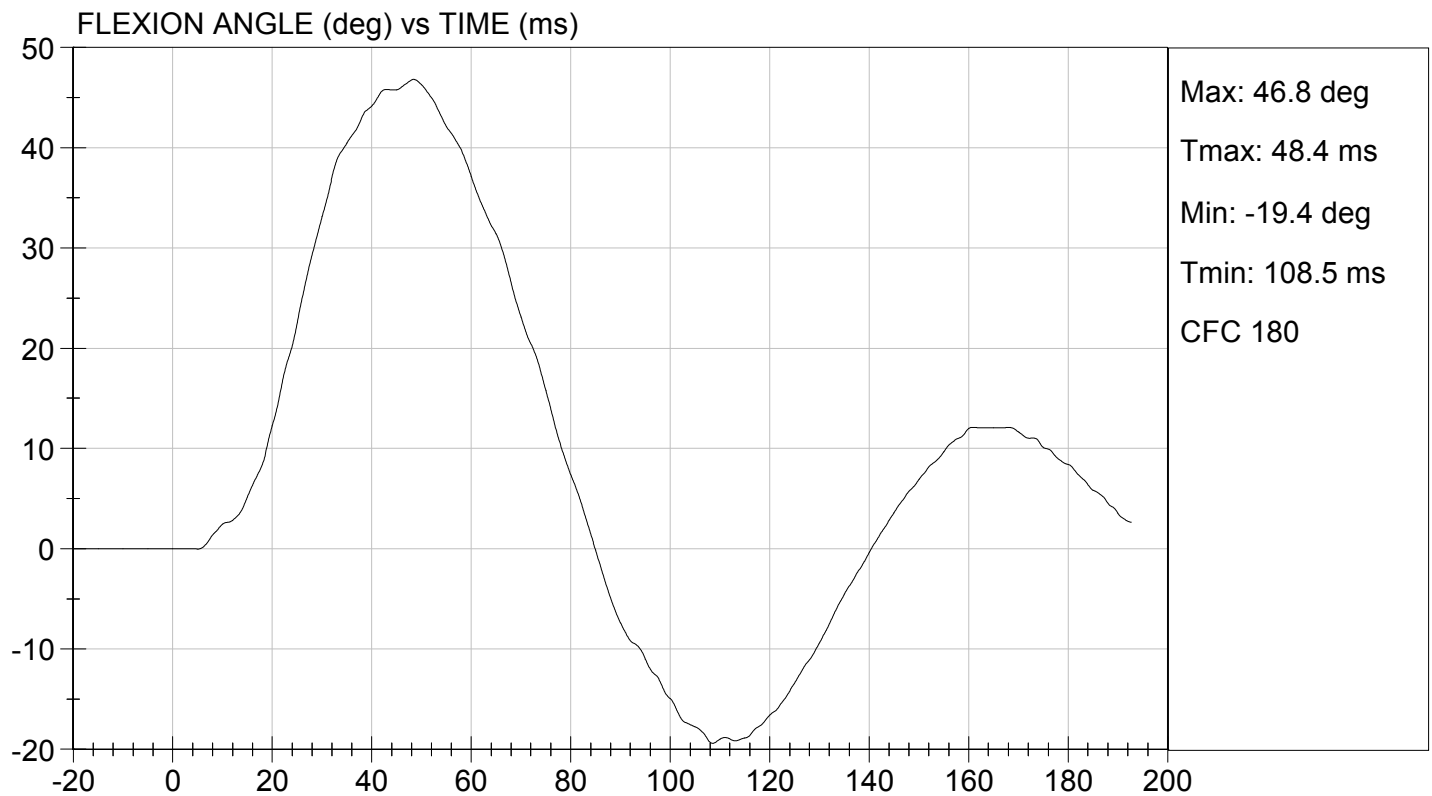
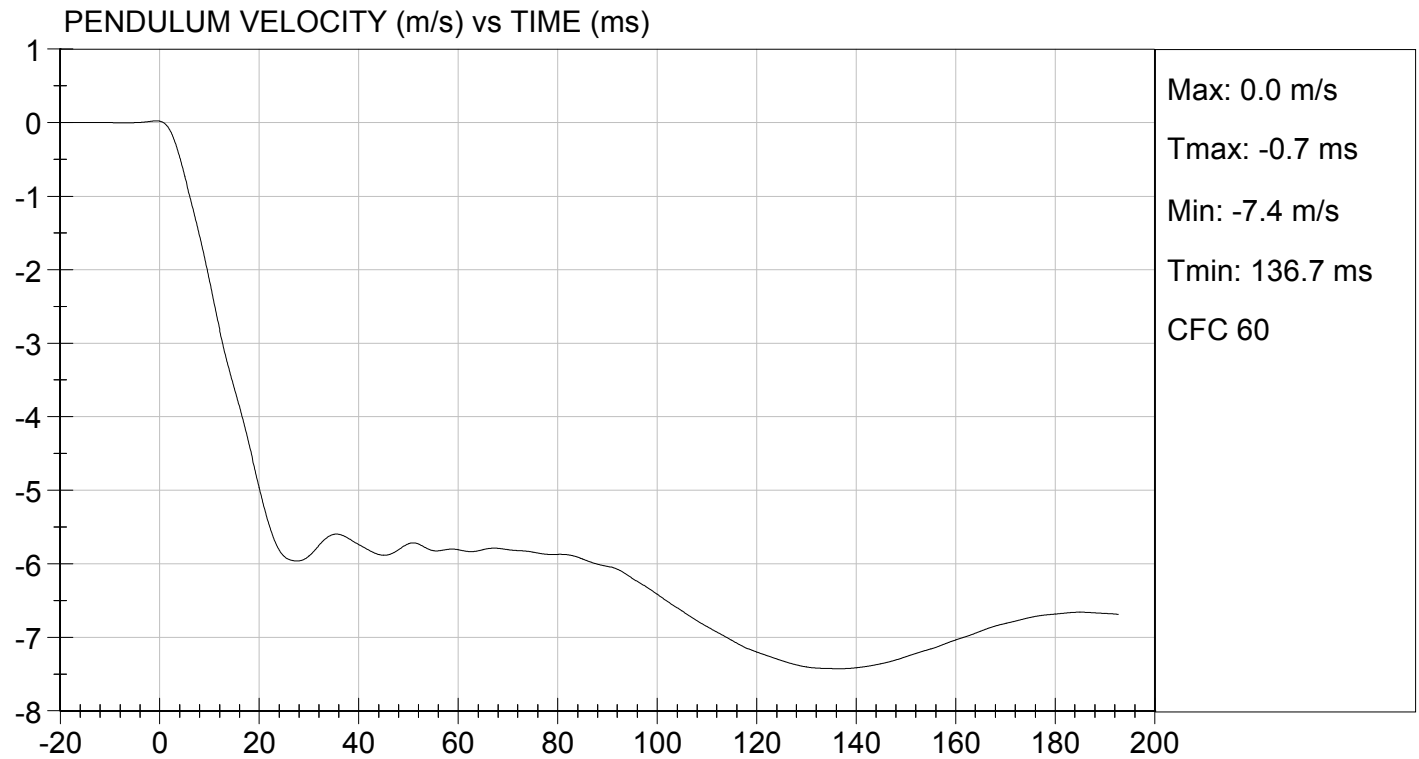
Test I.D: D163318

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.404	Pass
	27 ms	m/s	-6.50 to -5.80	-5.96	Pass
	30 ms	m/s	>= -6.50	-5.89	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.8	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	48.4	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	48	Pass
Overall Results					Pass


 Laboratory Technician

09/29/2016
 Test Date

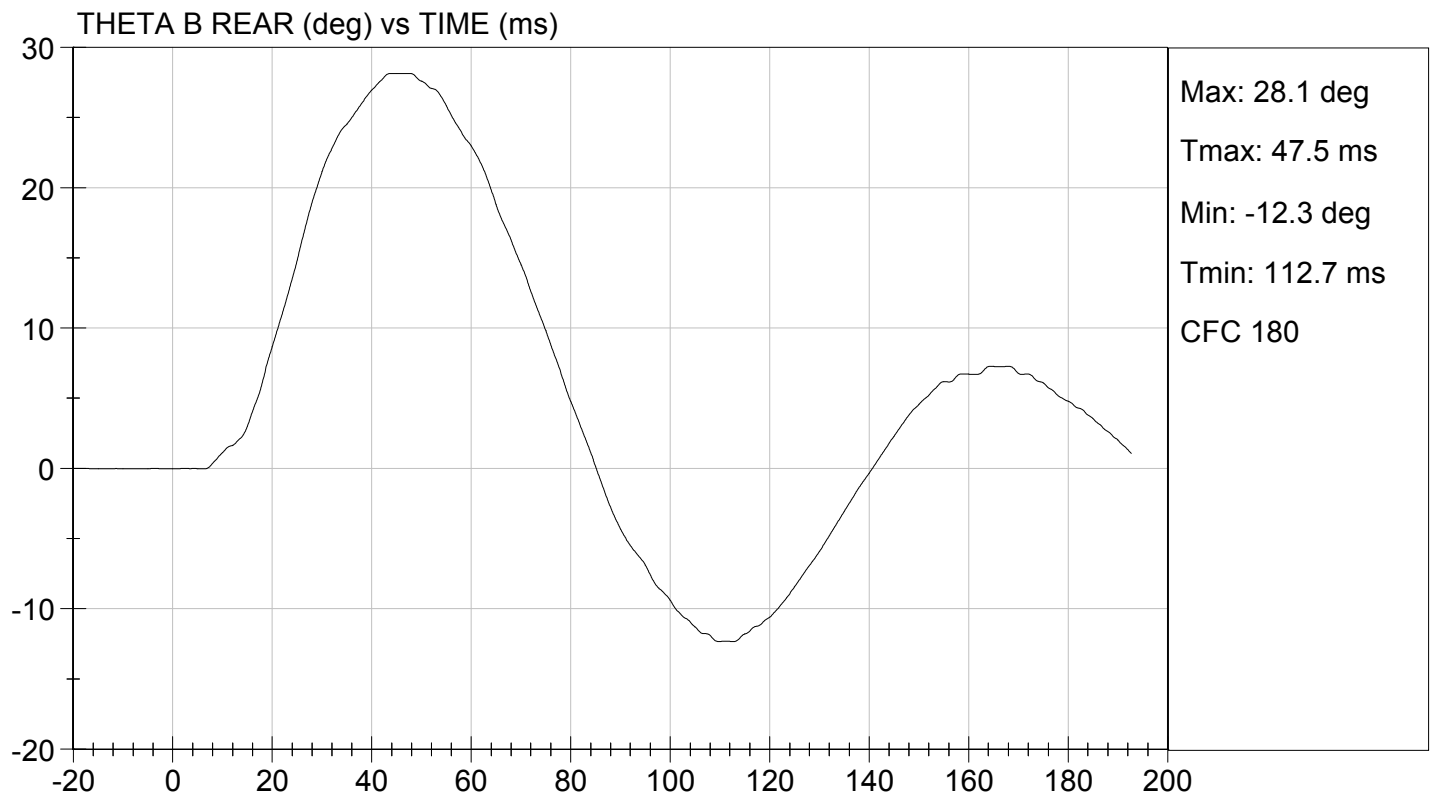
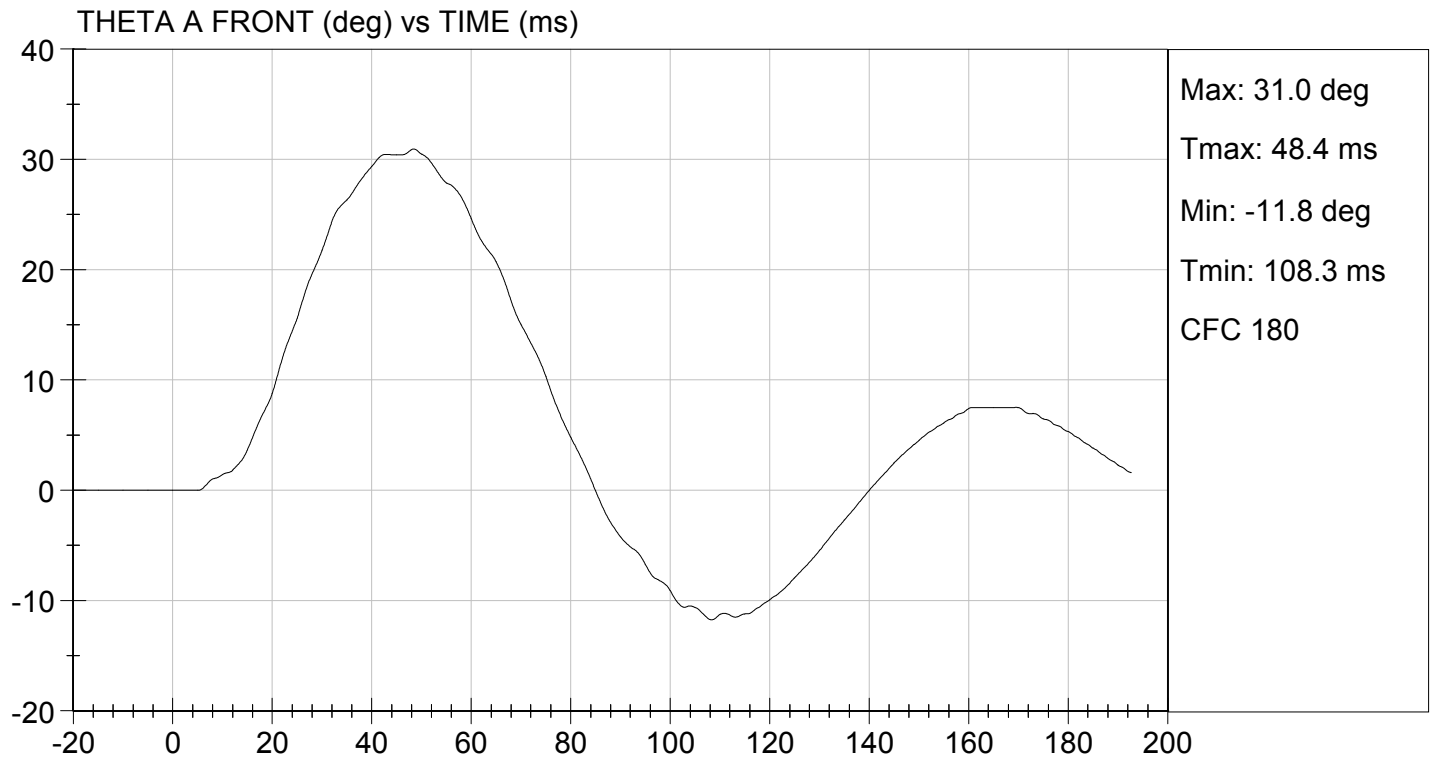

 Approved By





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

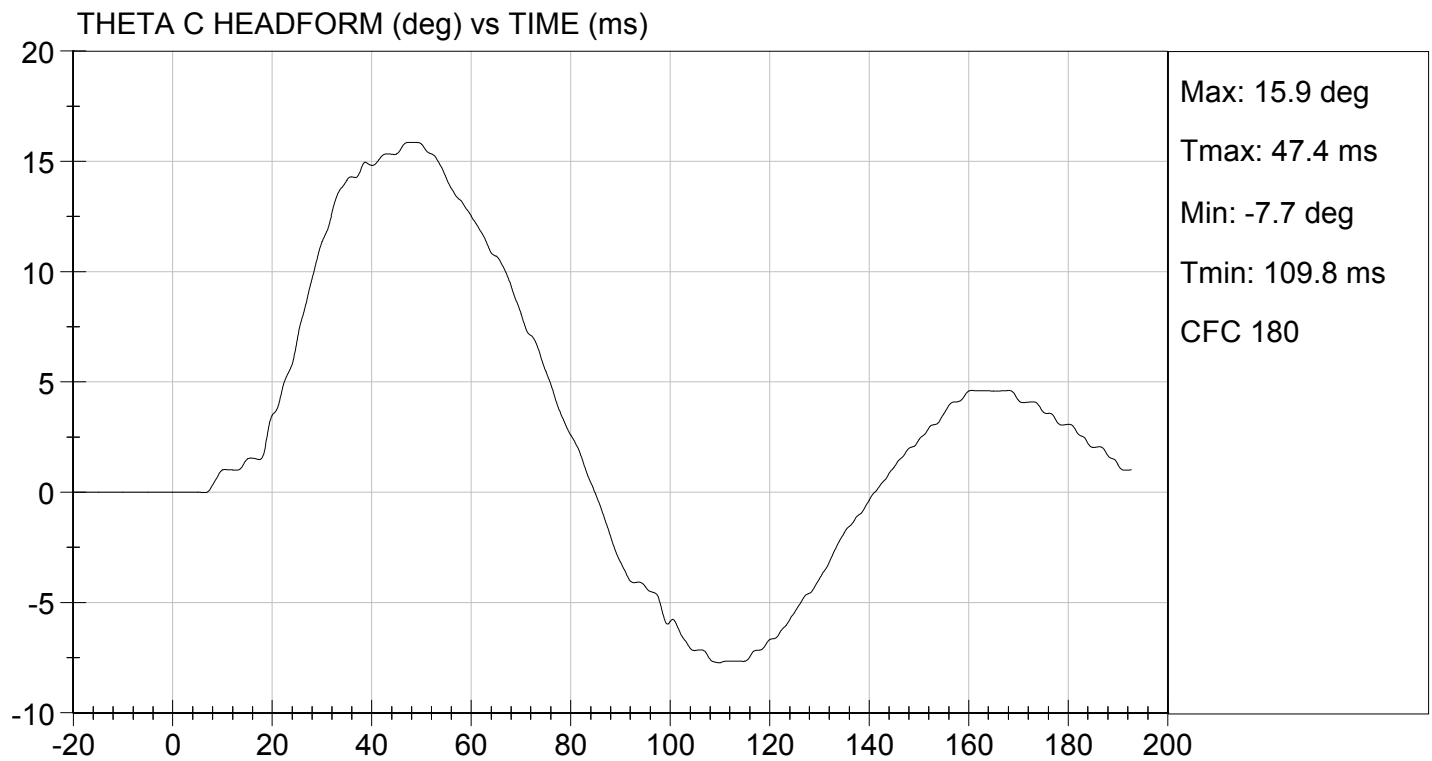
TEST DATE: 09/29/2016
TEST #: D163318





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

TEST DATE: 09/29/2016
TEST #: D163318



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

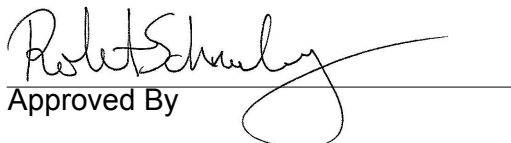
ATD Serial No: 032

Test I.D: D163319

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	N	4700 to 5400	4714	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	13.6	Pass
Maximum Pubic Force	N	1230 to 1590	1297	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.0	Pass
Overall Test Results				Pass


Laboratory Technician

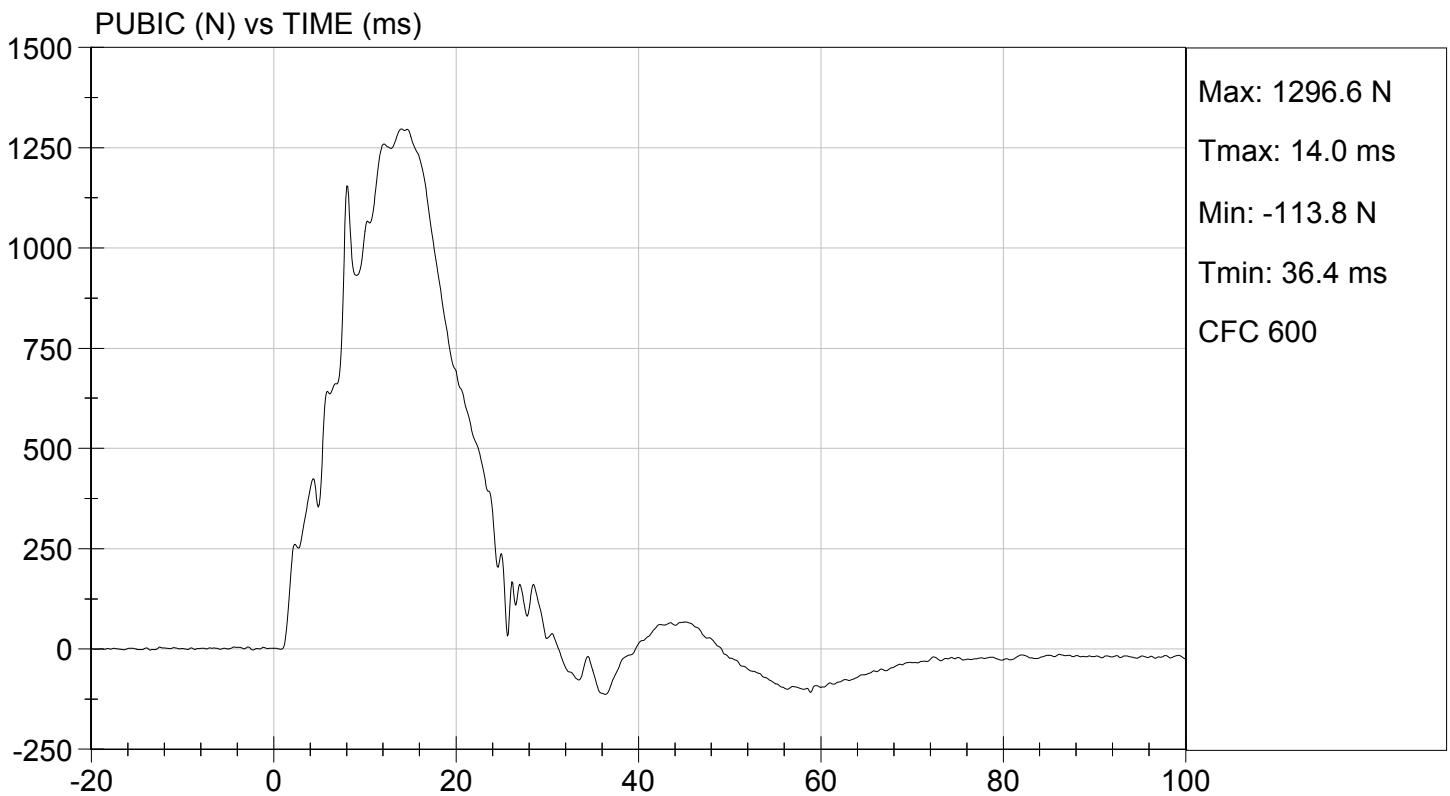
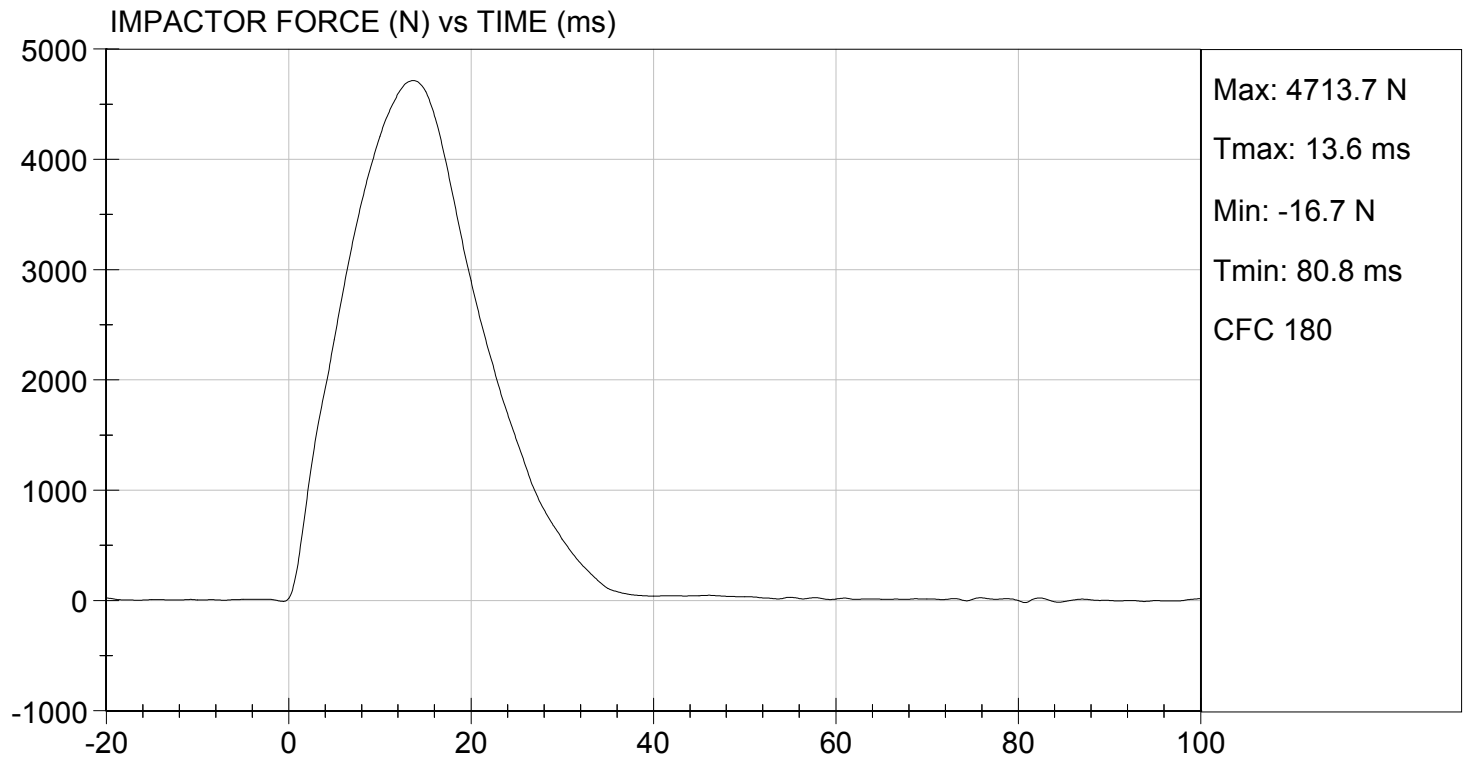
09/29/2016
Test Date


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163319

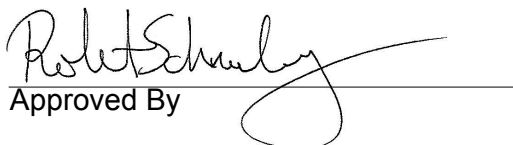


MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D163310

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	5.40 to 5.60	5.52	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5868	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.9	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.3	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.1	Pass
Overall Test Results				Pass


Laboratory Technician09/29/2016

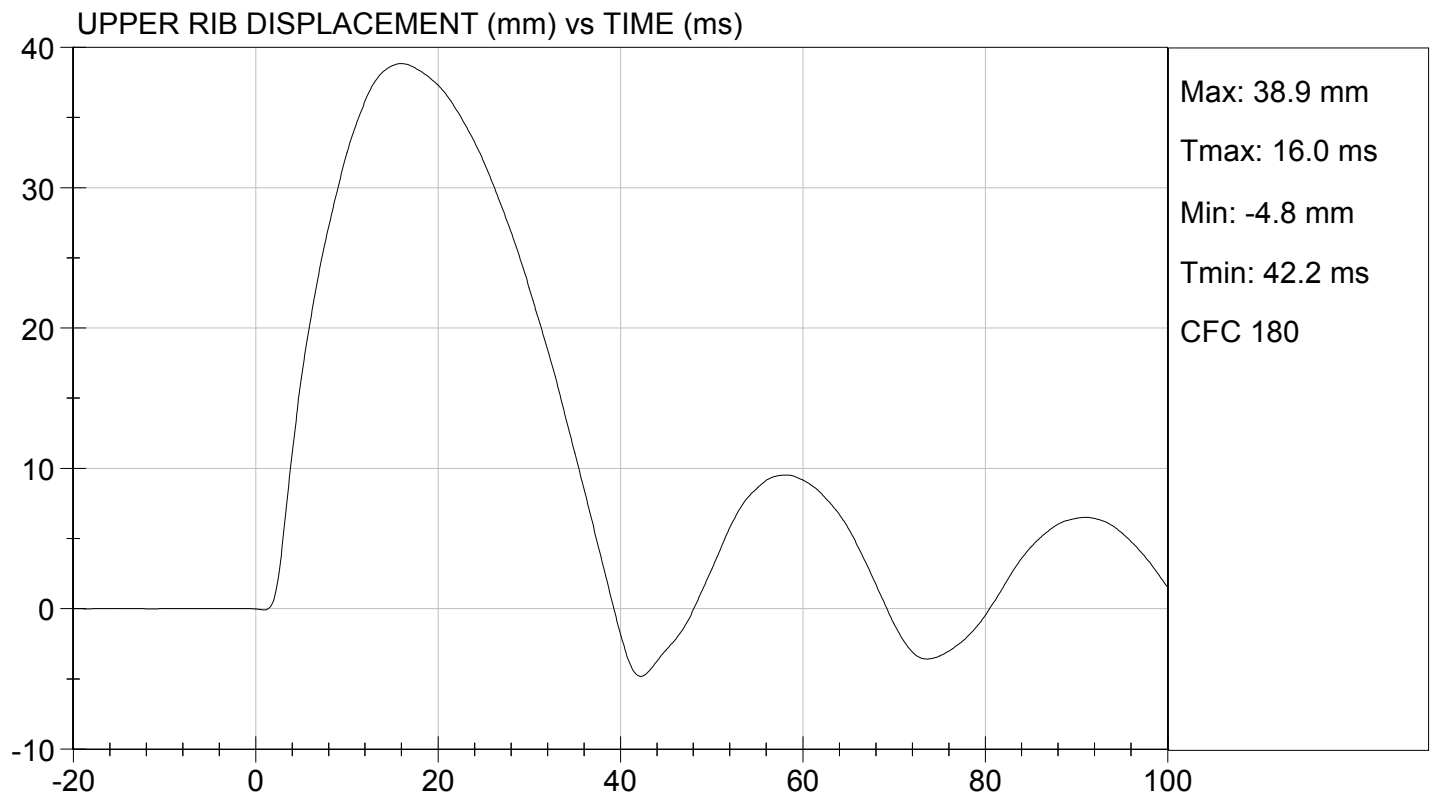
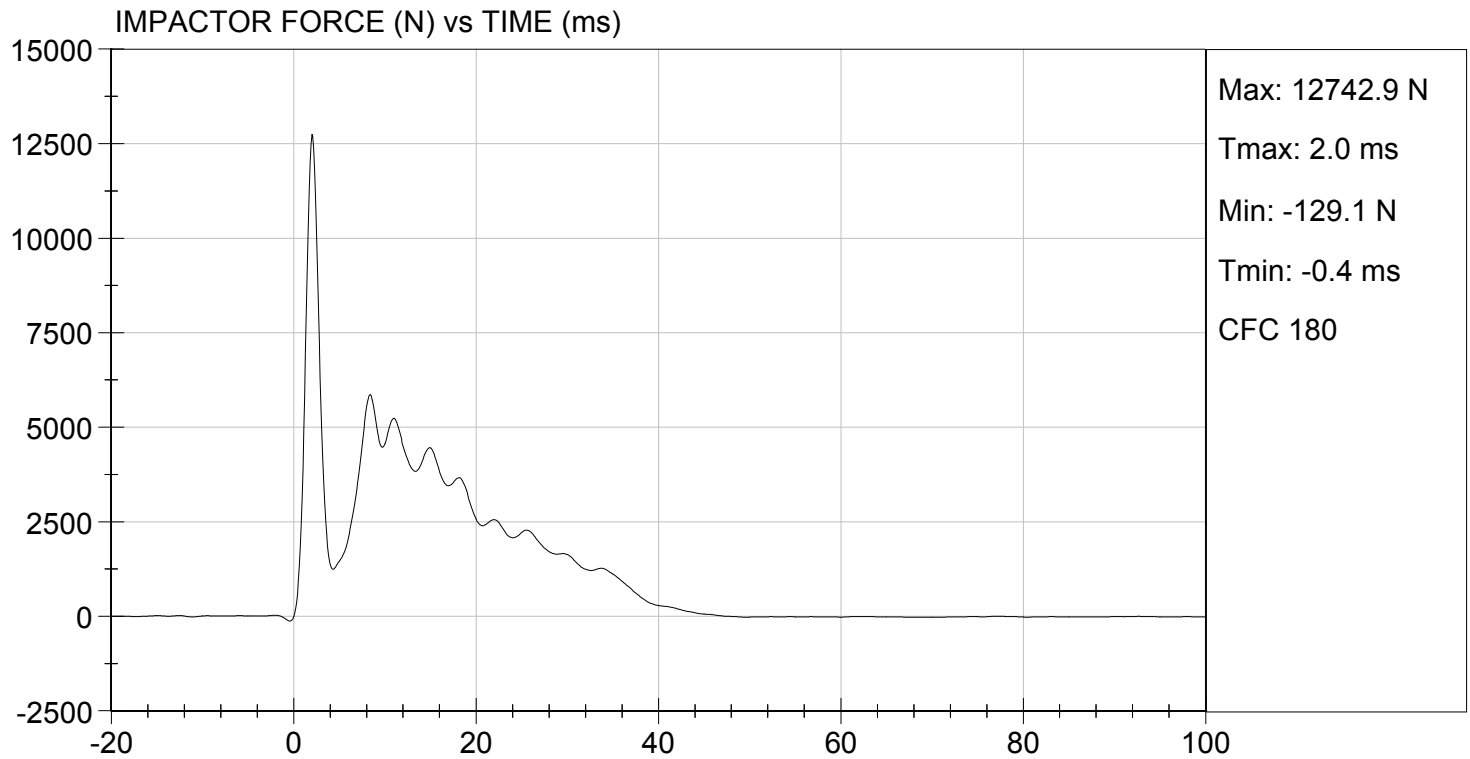
Test Date


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163310

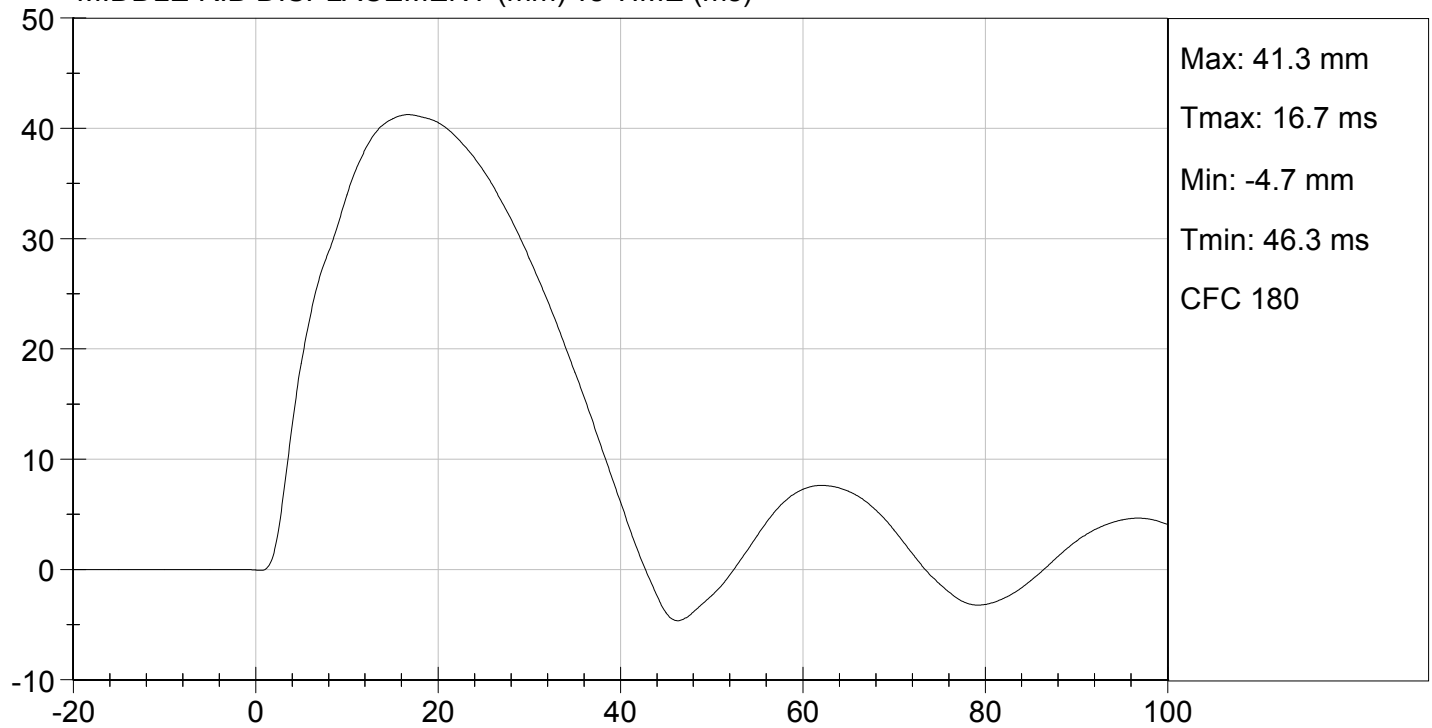




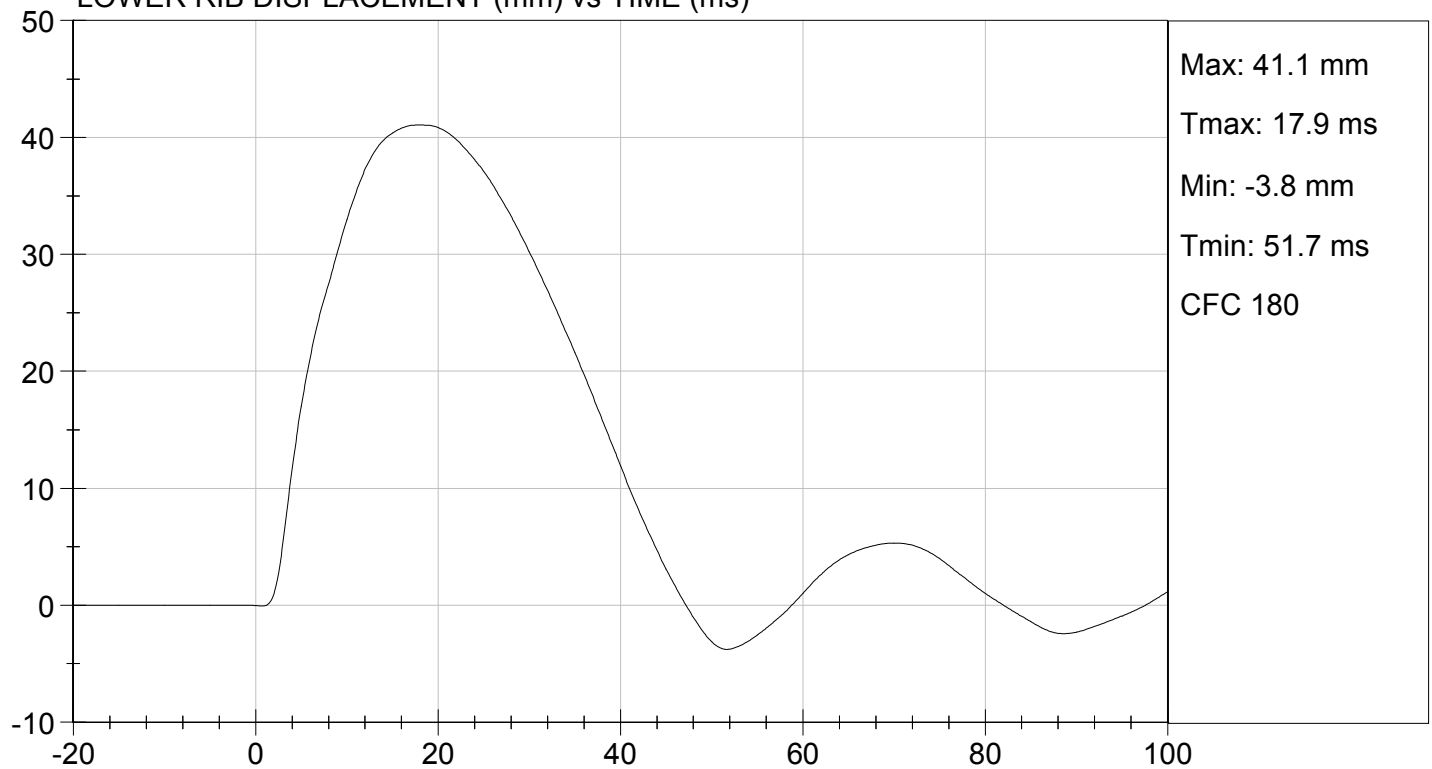
TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 09/29/2016
TEST #: D163310

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



SID-IIsD External Measurements
SN: 306

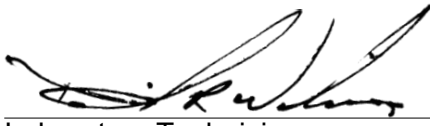
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

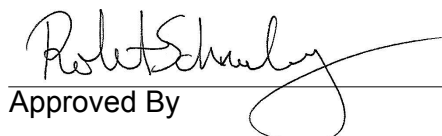
ATD Serial No: 306

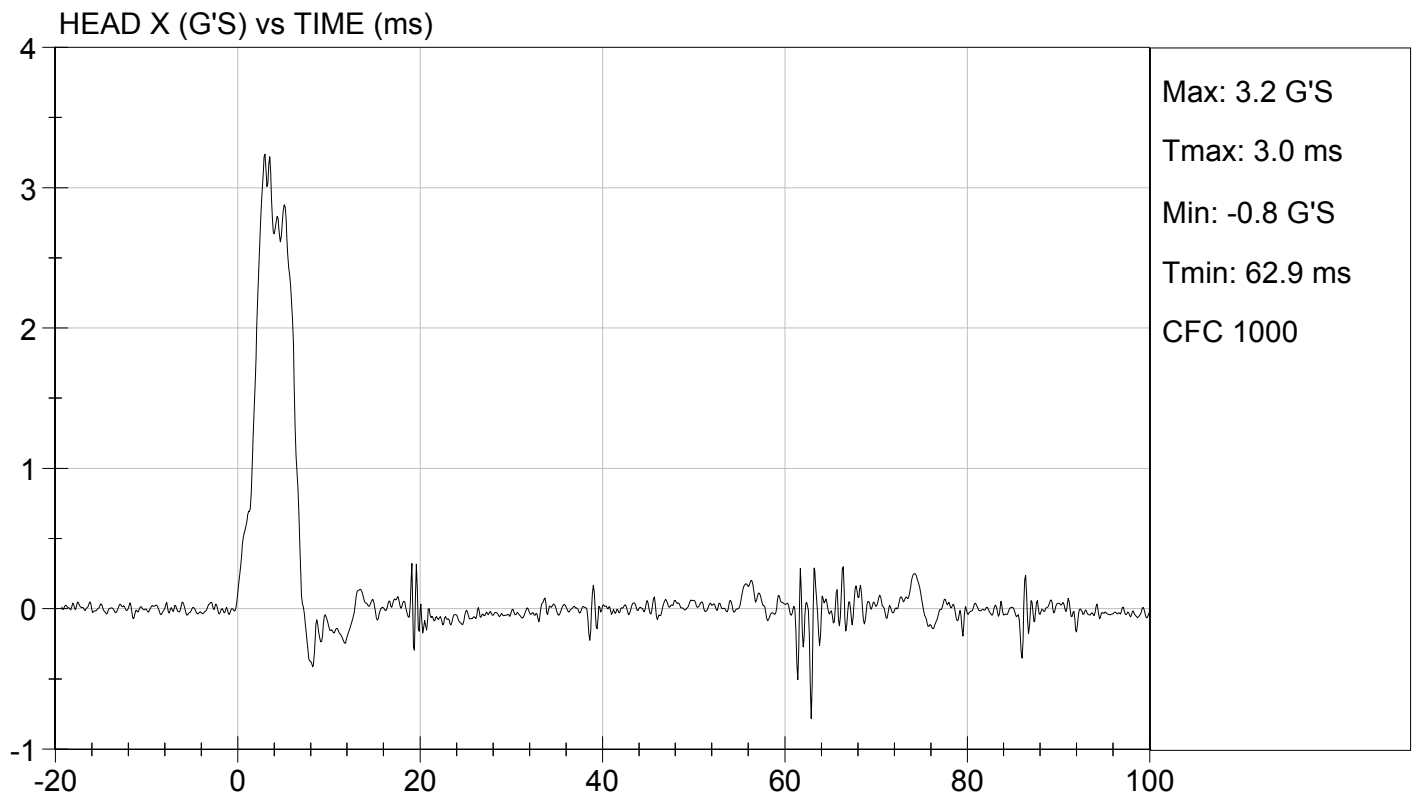
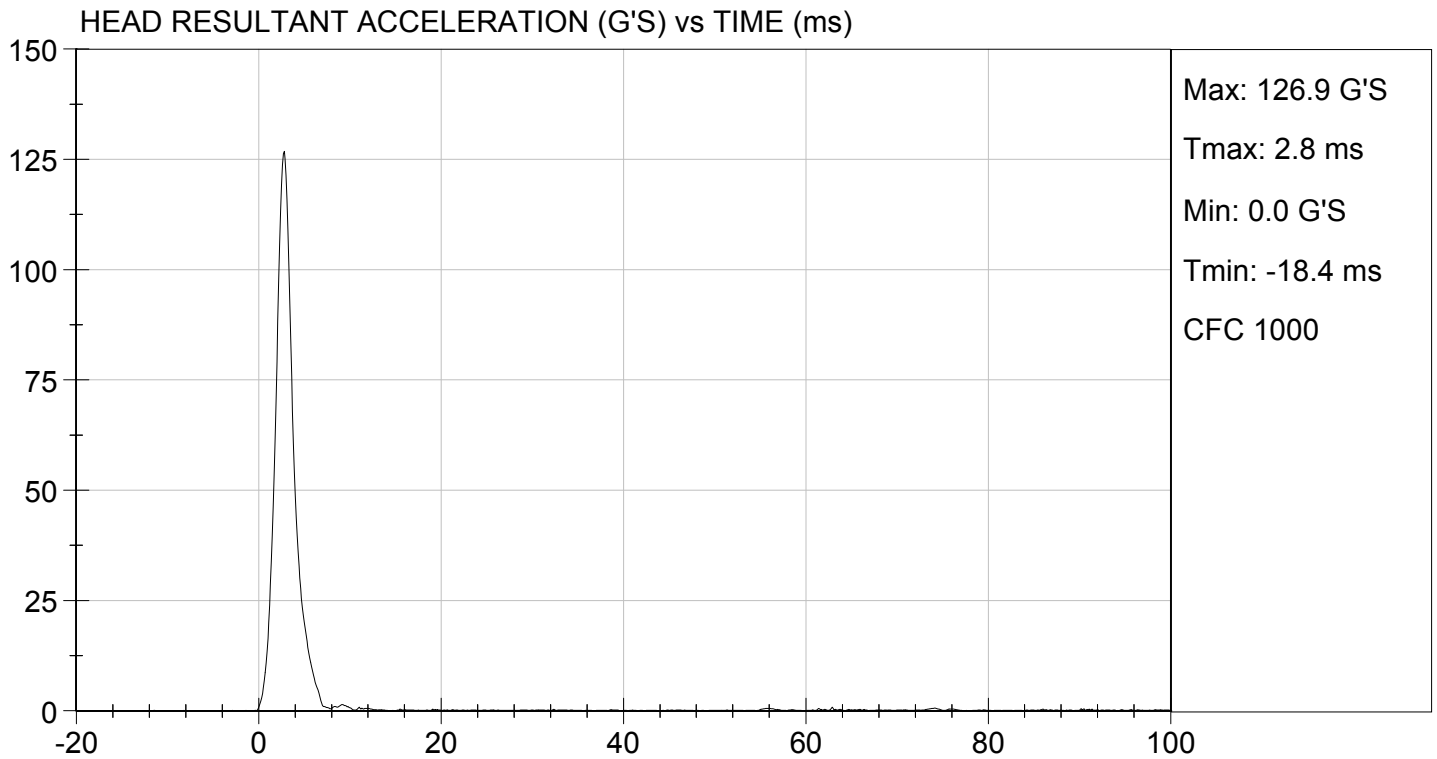
Test ID: D162851

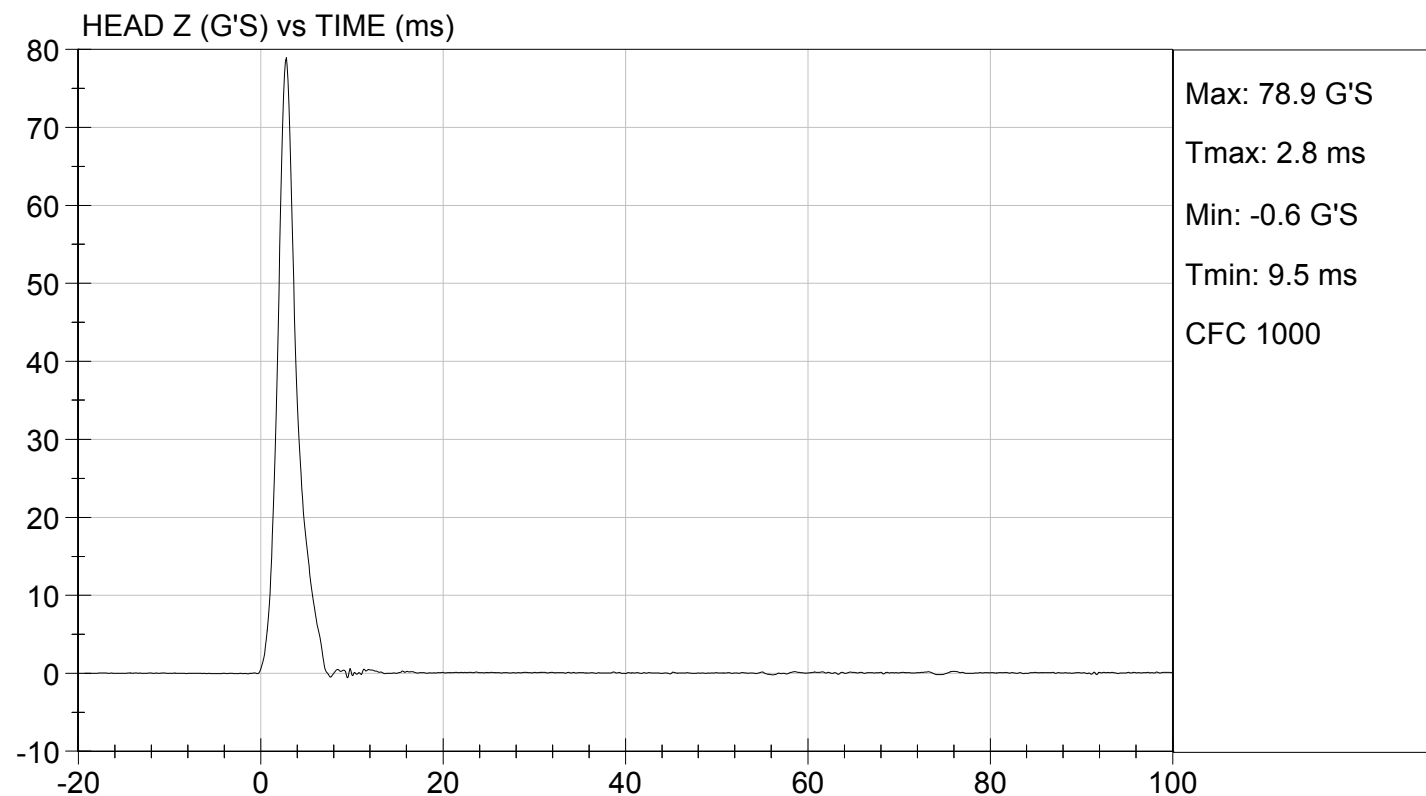
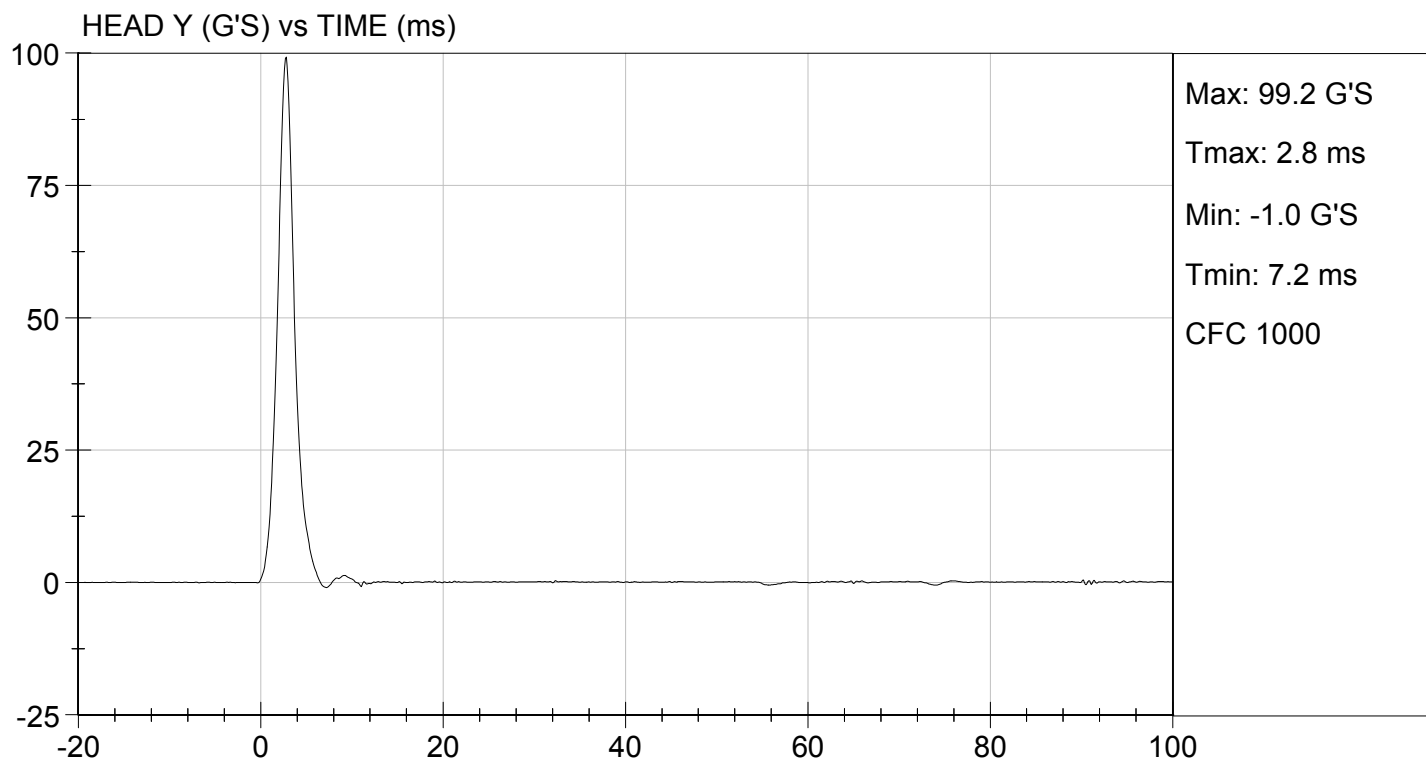
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	115 to 137	127	Pass
Peak Longitudinal Acceleration	G's	+/- 15	3.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

08/25/2016
Test Date


Approved By





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

ATD Serial No: 306

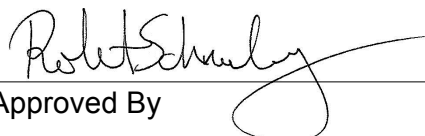
Test I.D: D162852

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	5.51 to 5.63	5.52	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.59	Pass
	15 ms	m/s	3.30 to 4.10	3.73	Pass
	20 ms	m/s	4.40 to 5.40	5.07	Pass
	25 ms	m/s	5.40 to 6.10	5.50	Pass
	25-100 ms	m/s	5.50 to 6.20	5.53	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	112	Pass
Overall Test Results					Pass


 Laboratory Technician

08/25/2016

Test Date

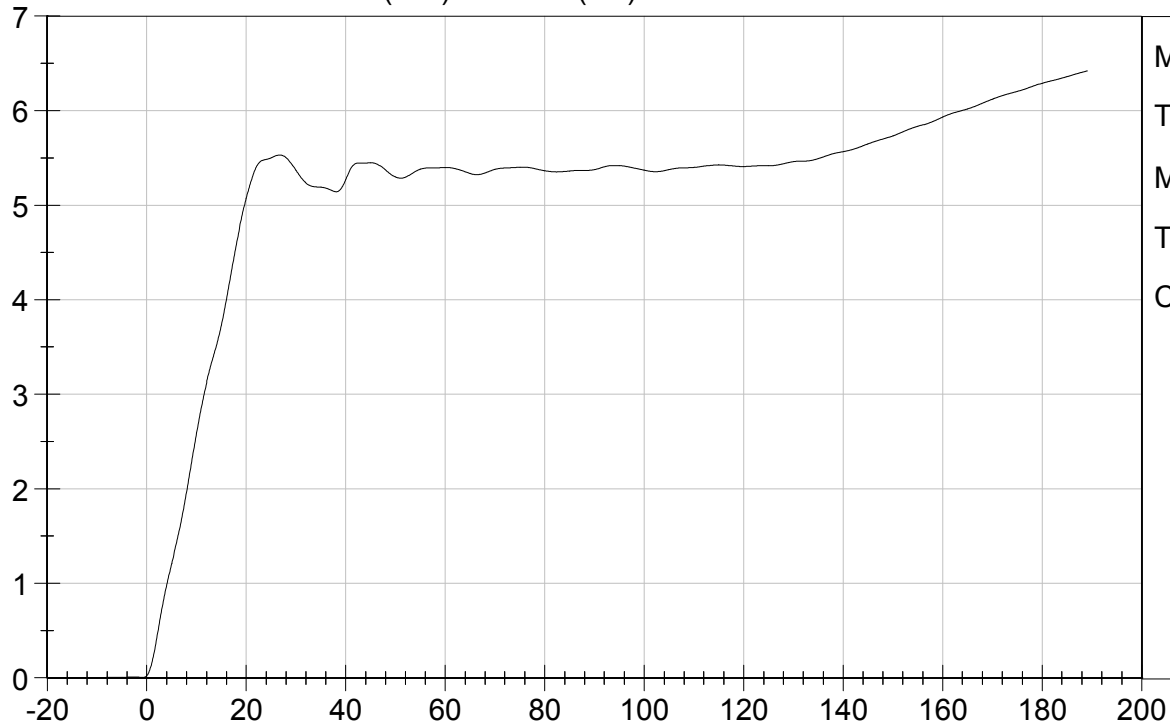

 Approved By



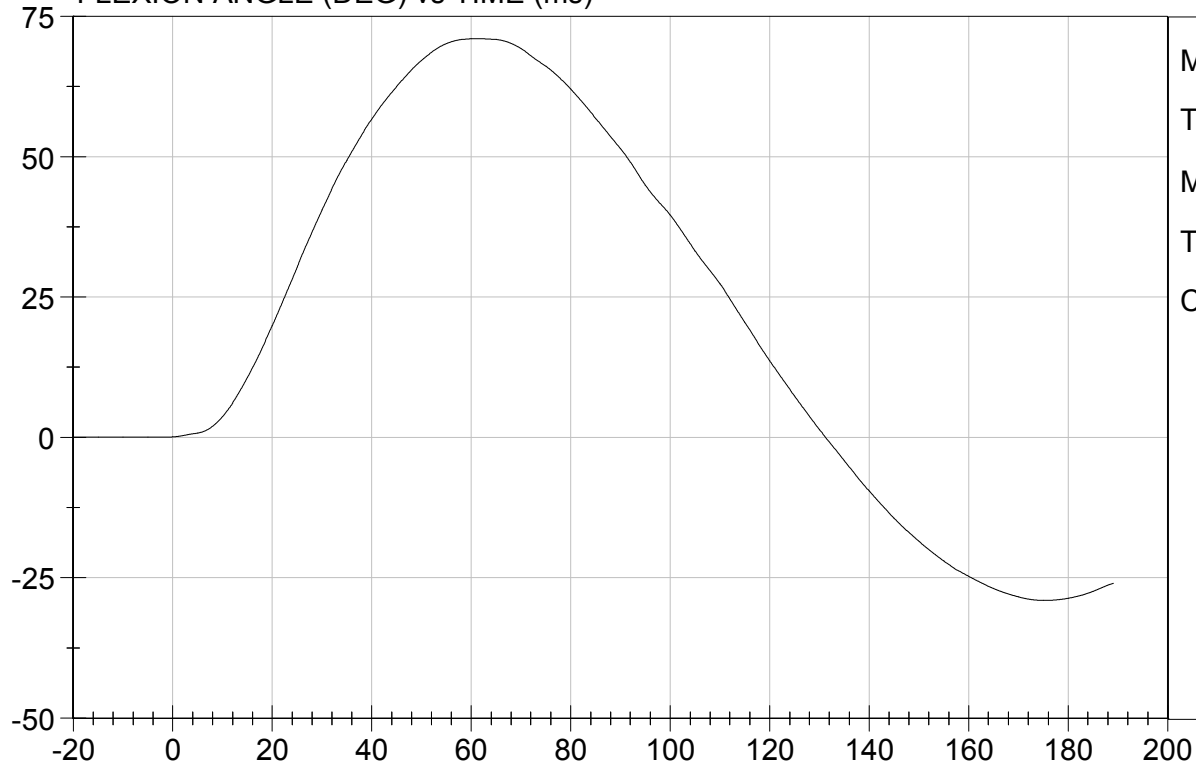
TEST DESC: NECK BENDING
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 08/25/2016
TEST #: D162852

PENDULUM VELOCITY (m/s) vs TIME (ms)



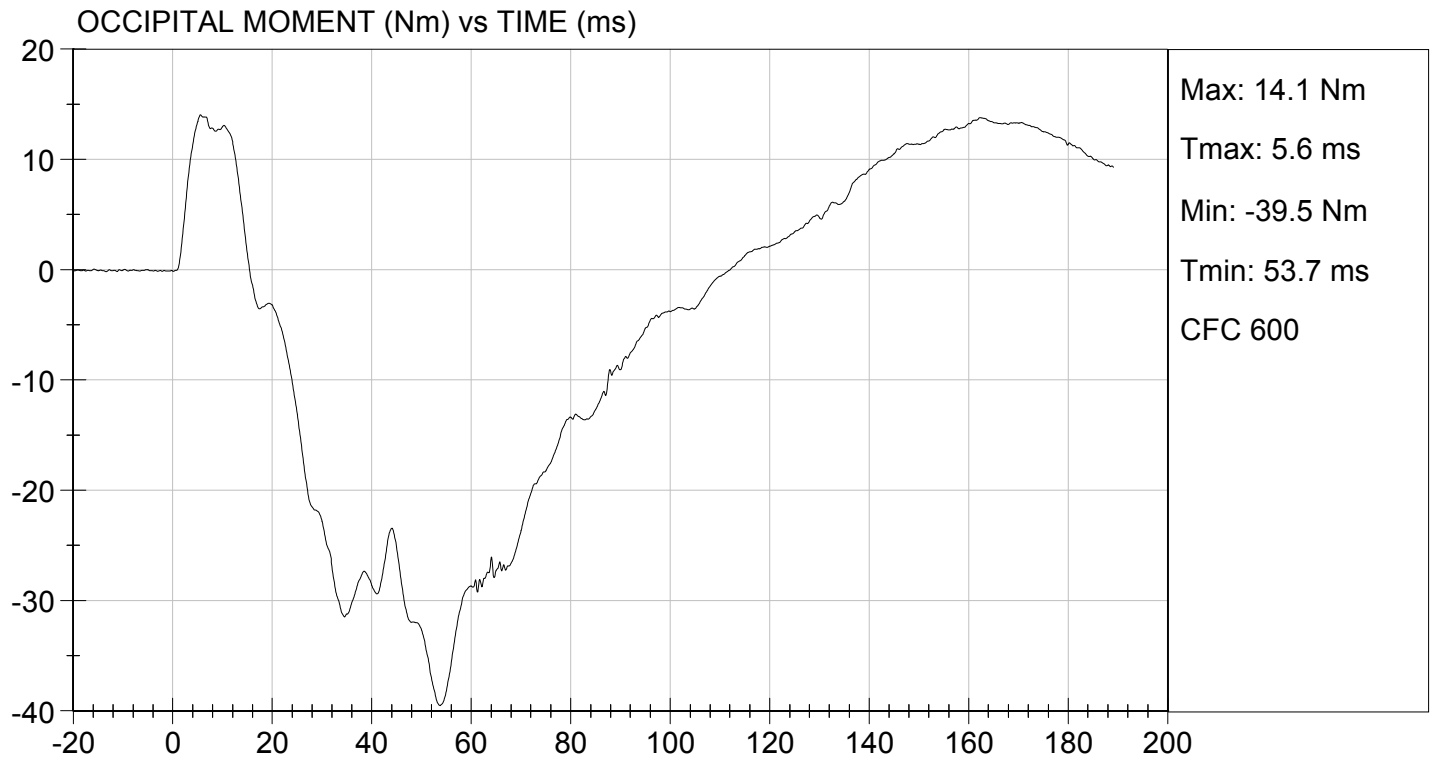
FLEXION ANGLE (DEG) vs TIME (ms)





TEST DESC: NECK BENDING
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 08/25/2016
TEST #: D162852

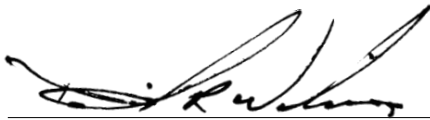


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

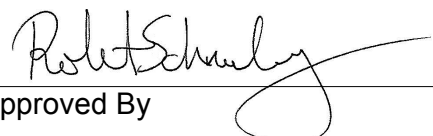
ATD Serial No: 306

Test ID: D162853

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results			Pass	


Laboratory Technician

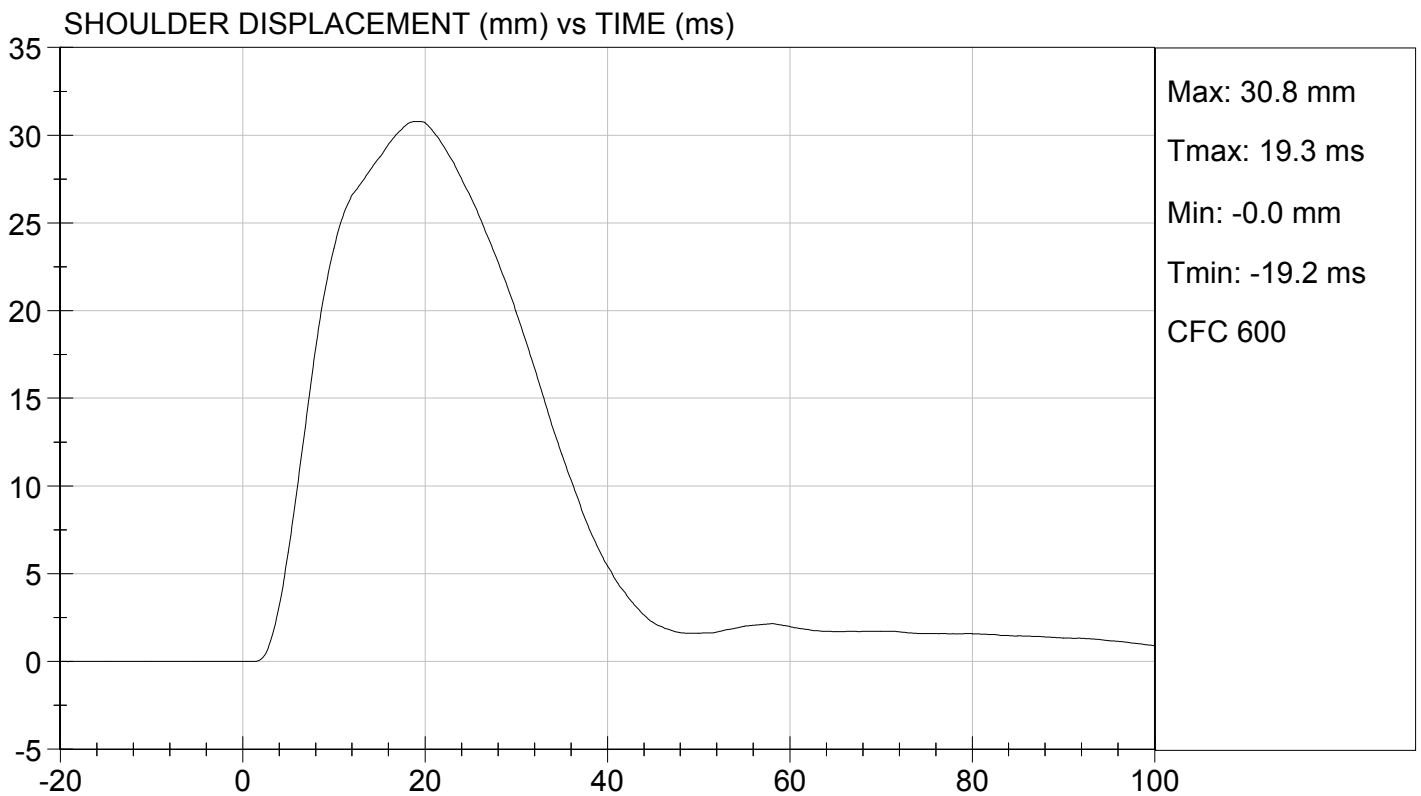
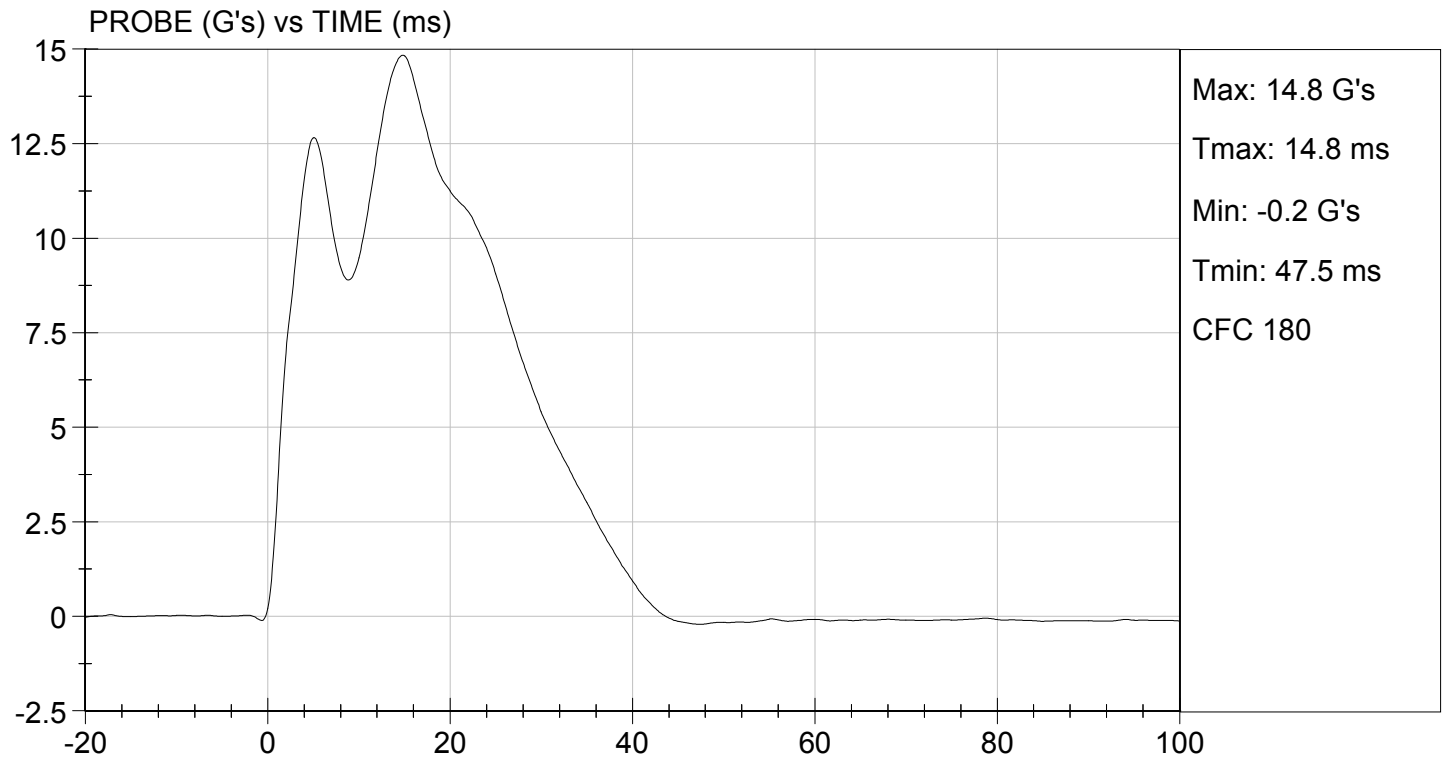
08/25/2016
Test Date


Approved By



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

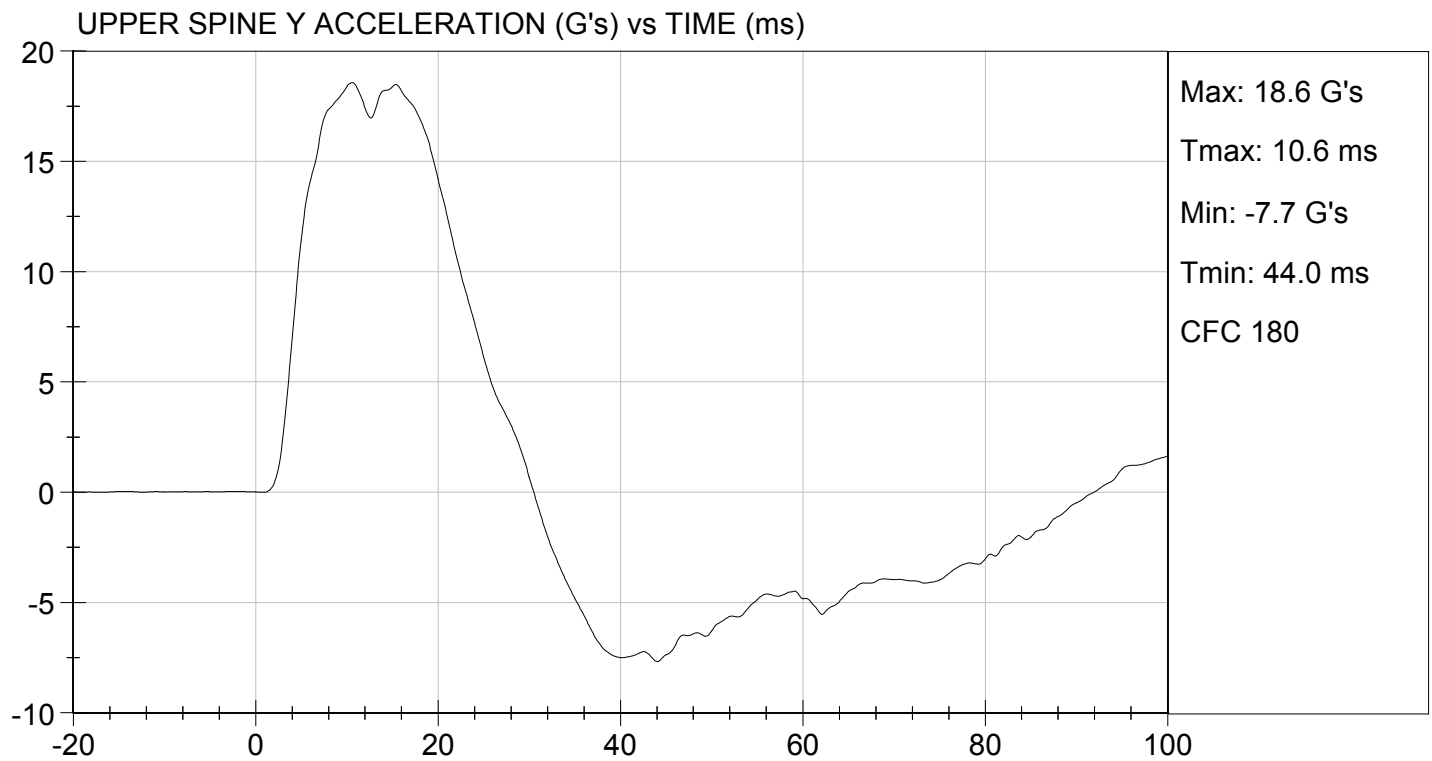
TEST DATE: 08/25/2016
TEST #: D162853





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

TEST DATE: 08/25/2016
TEST #: D162853

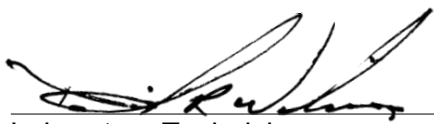


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

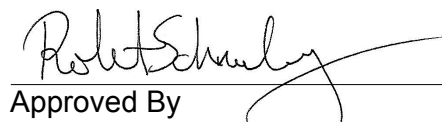
ATD Serial No: 306

Test I.D: D162854

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	28	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results				Pass


Laboratory Technician

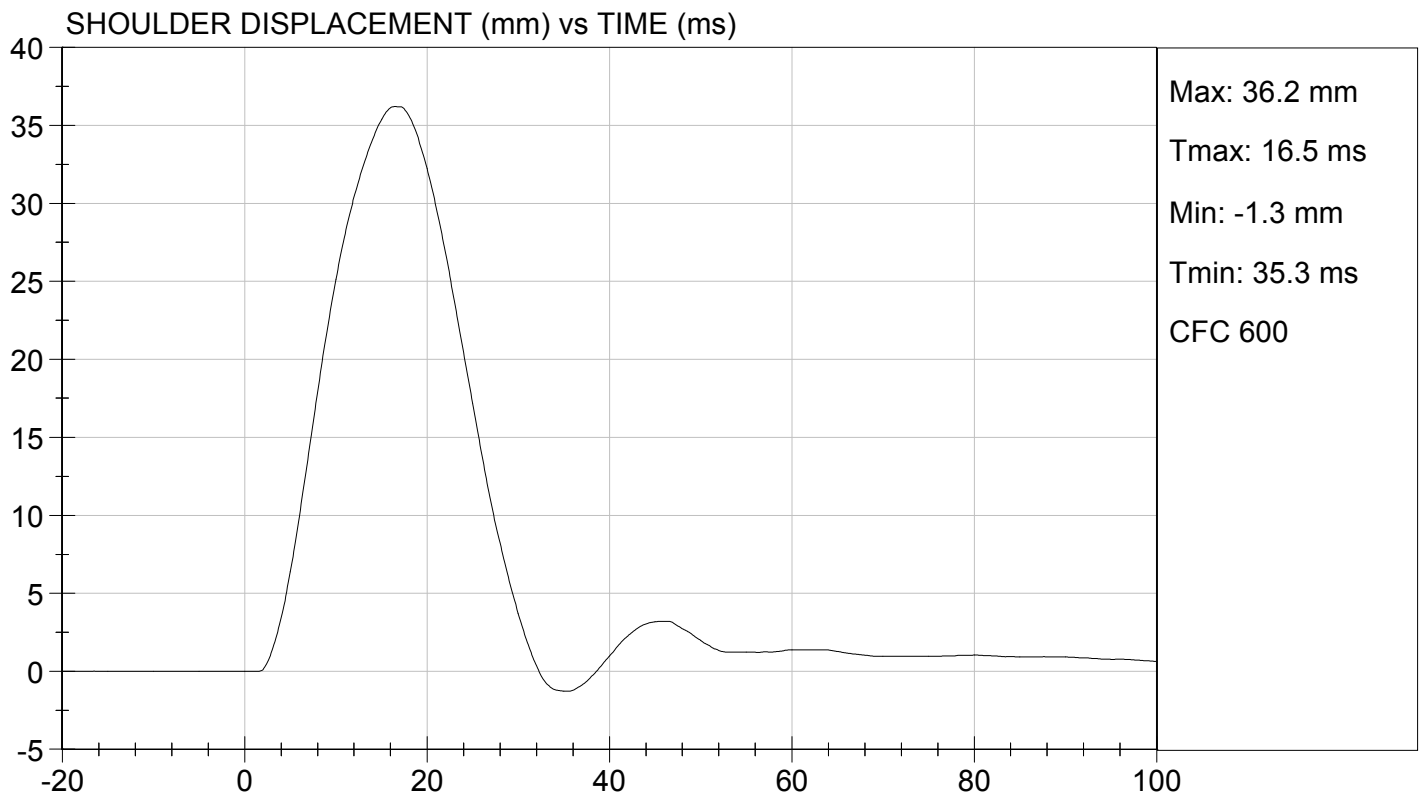
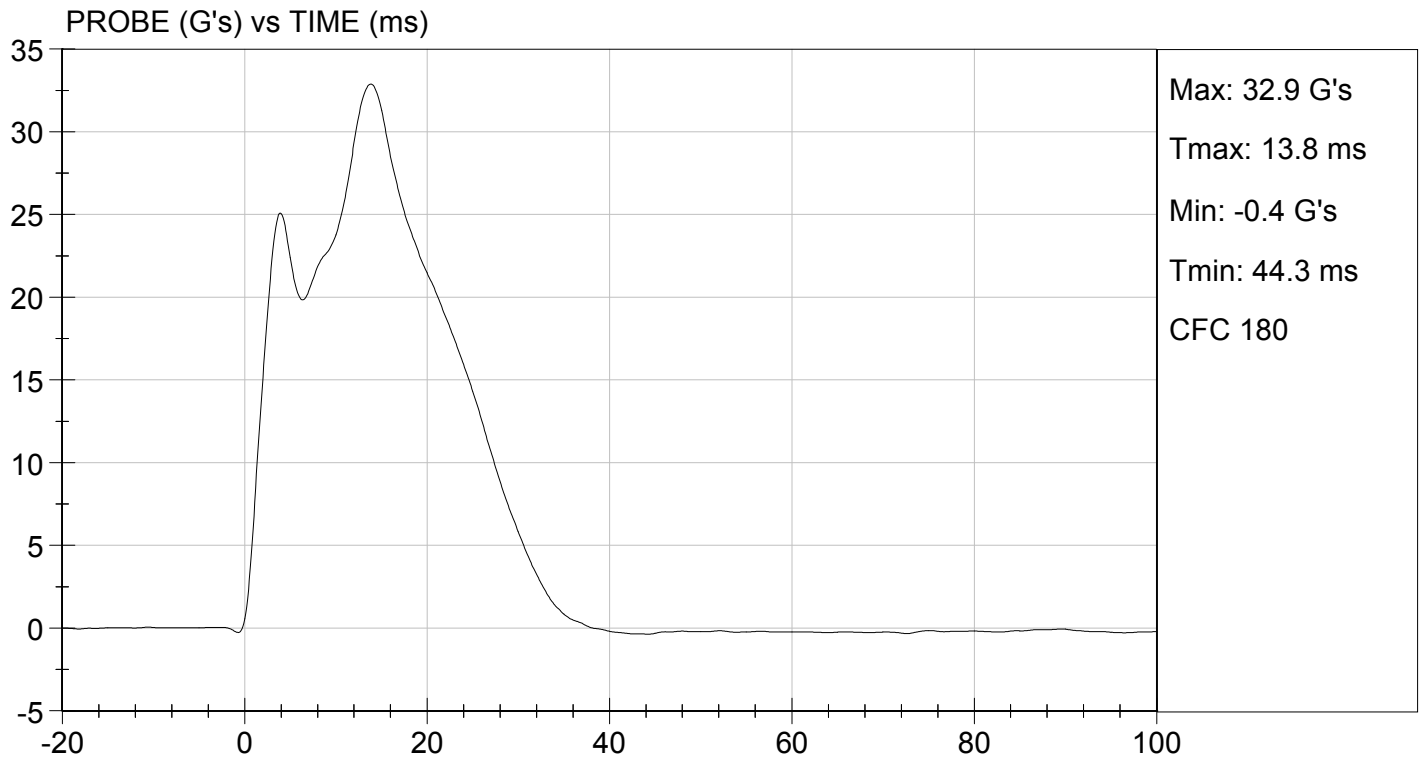
08/25/2016
Test Date


Approved By



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

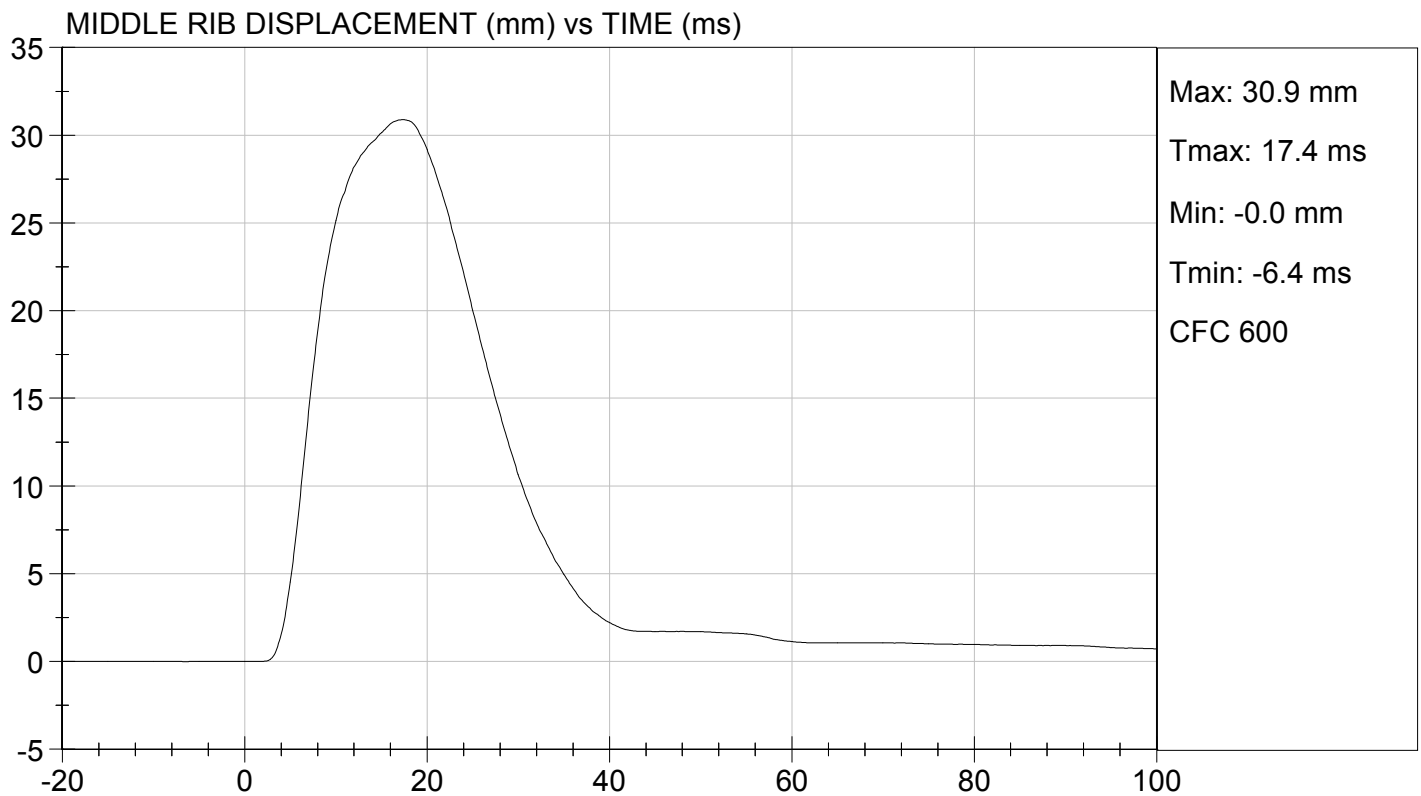
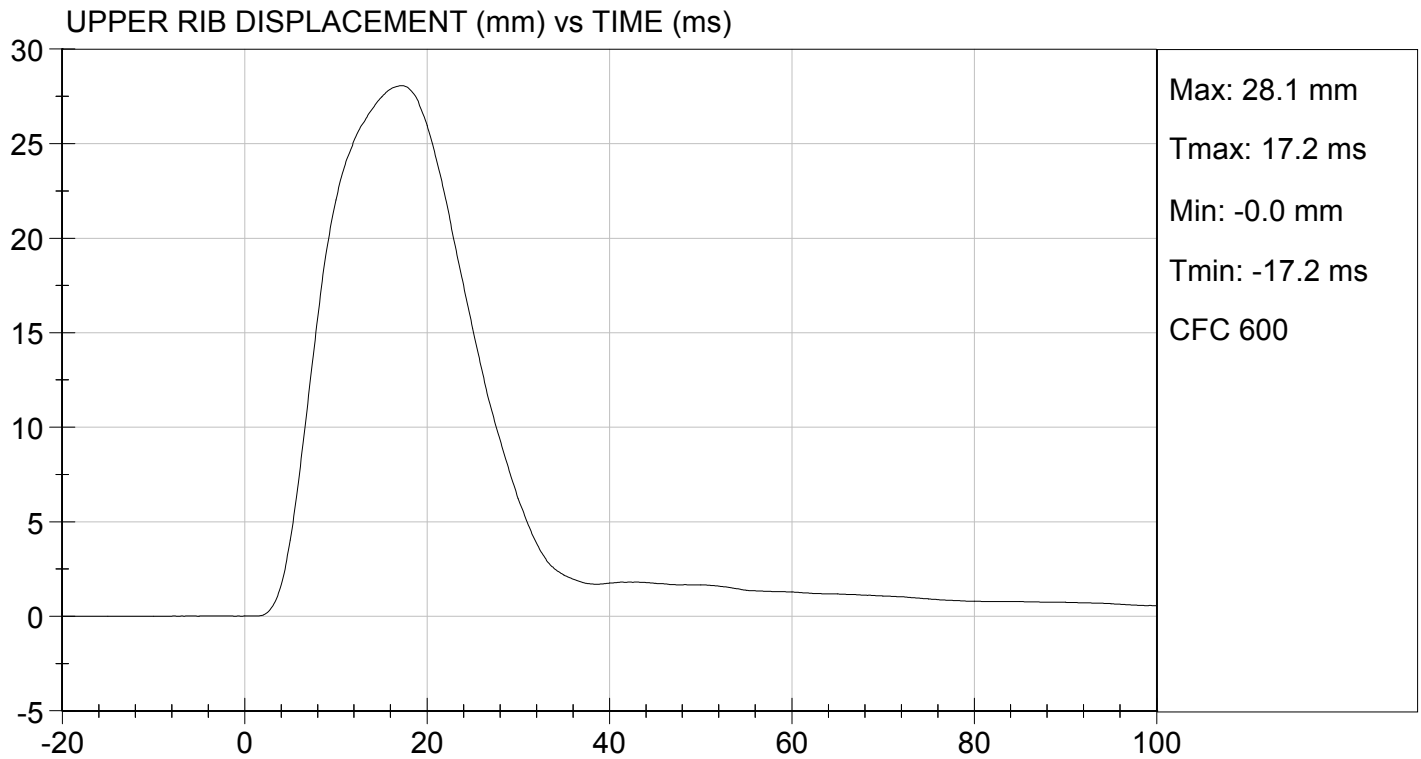
TEST DATE: 08/25/2016
TEST #: D162854





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

TEST DATE: 08/25/2016
TEST #: D162854

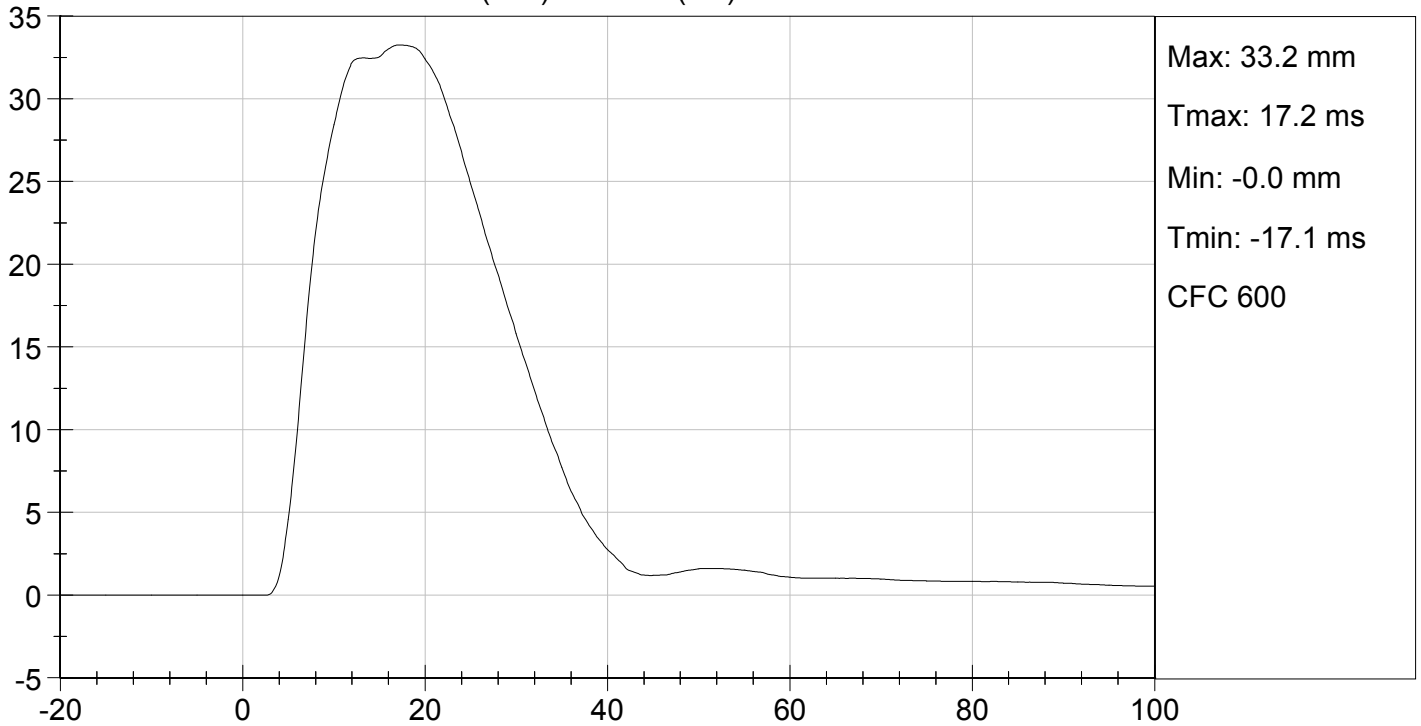




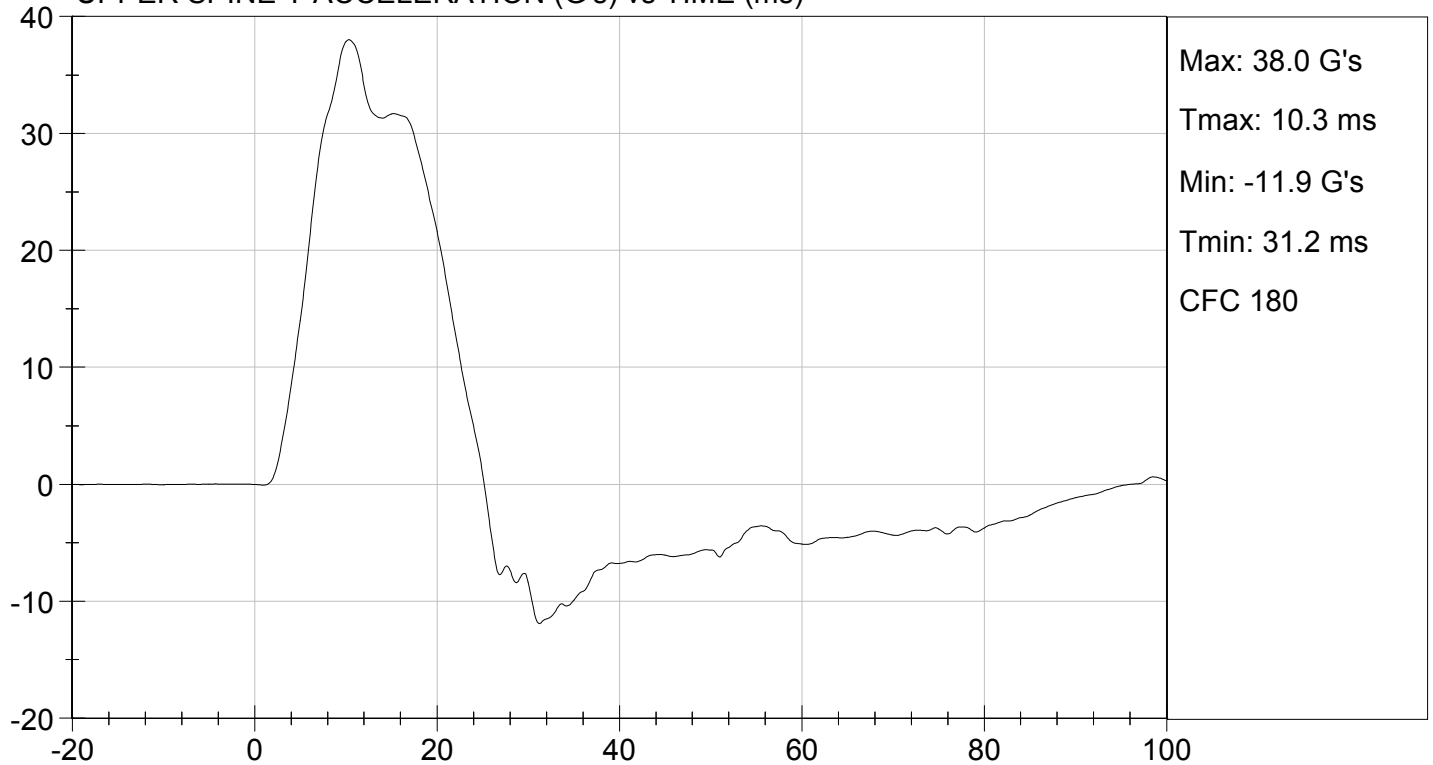
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/25/2016
TEST #: D162854

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



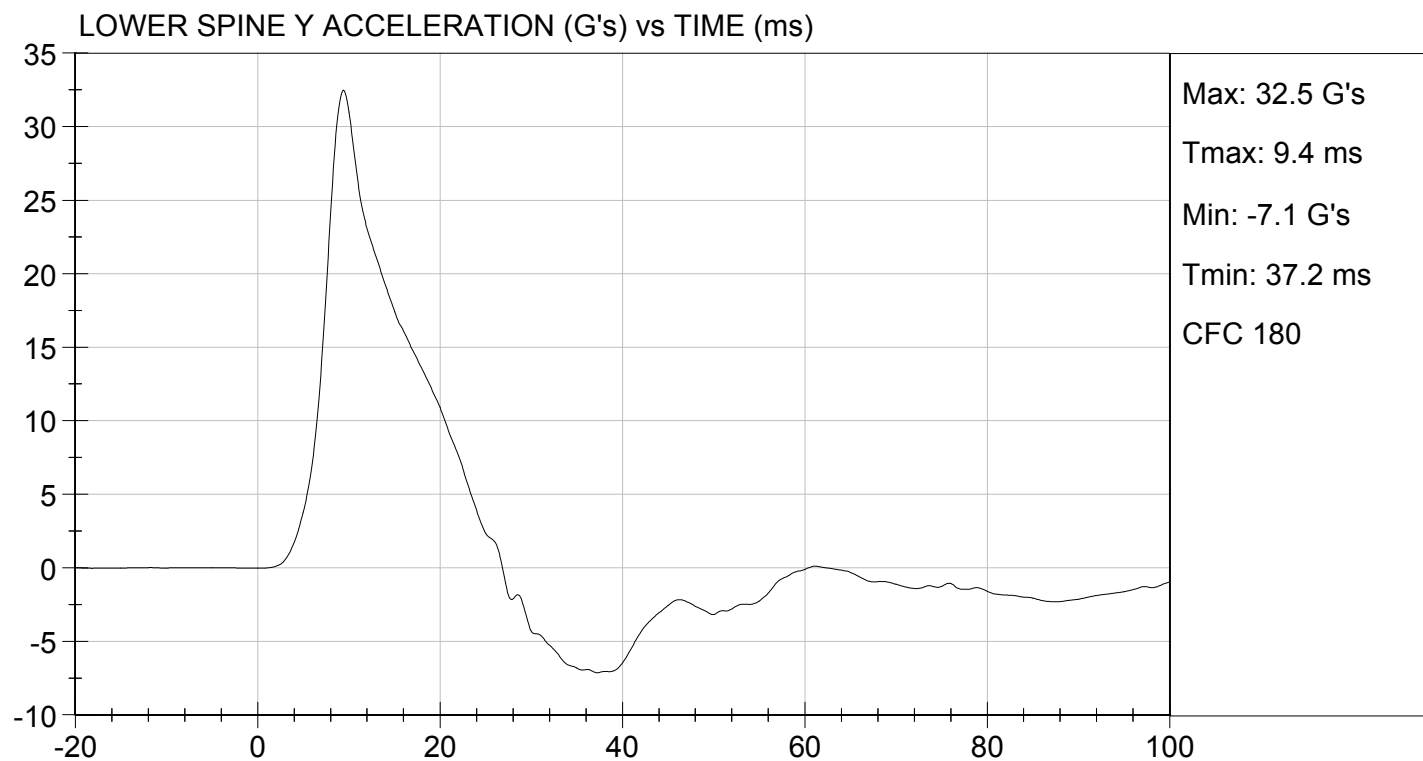
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)





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

TEST DATE: 08/25/2016
TEST #: D162854



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

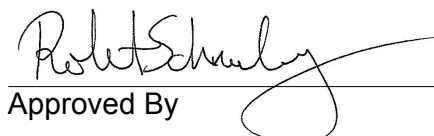
ATD Serial No: 306

Test I.D: D162855

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	38	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	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

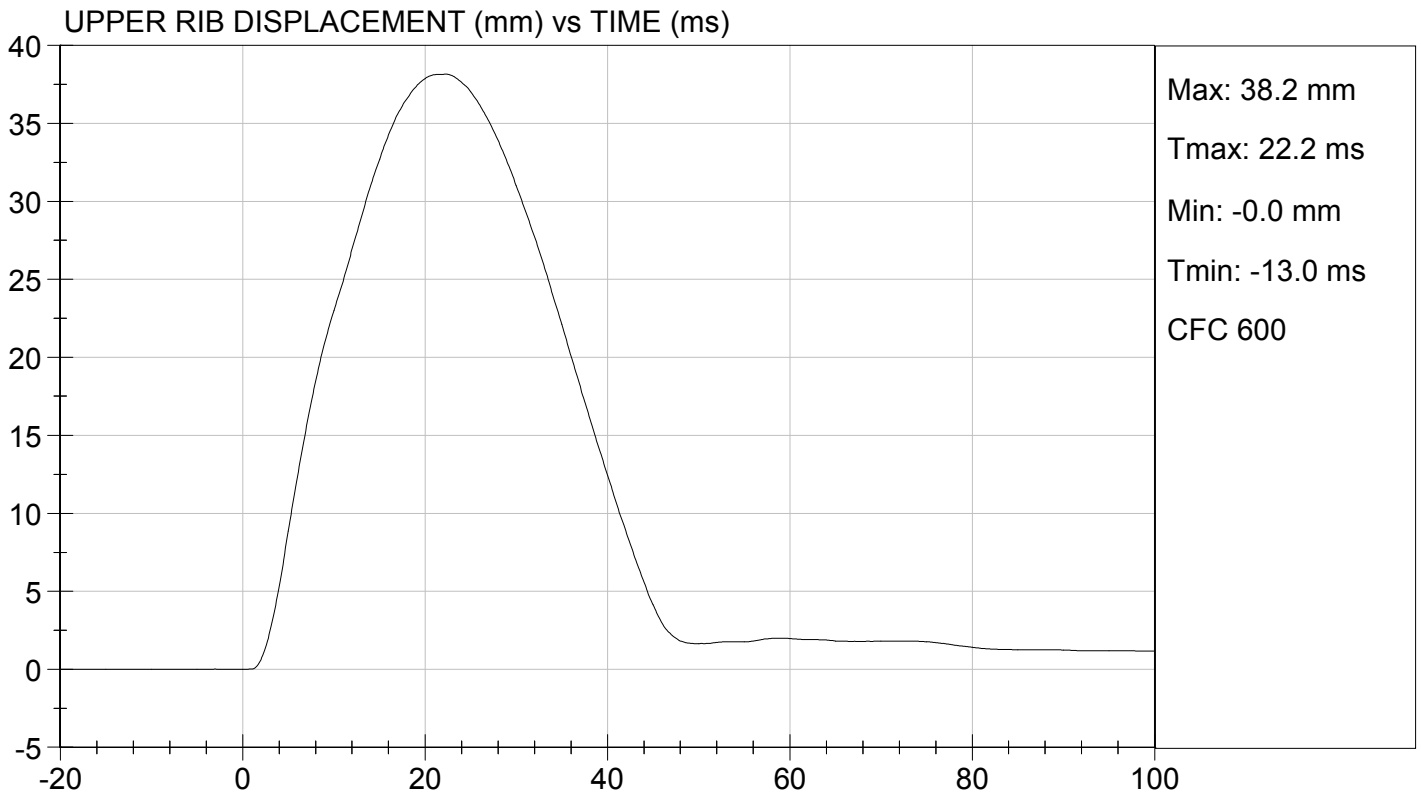
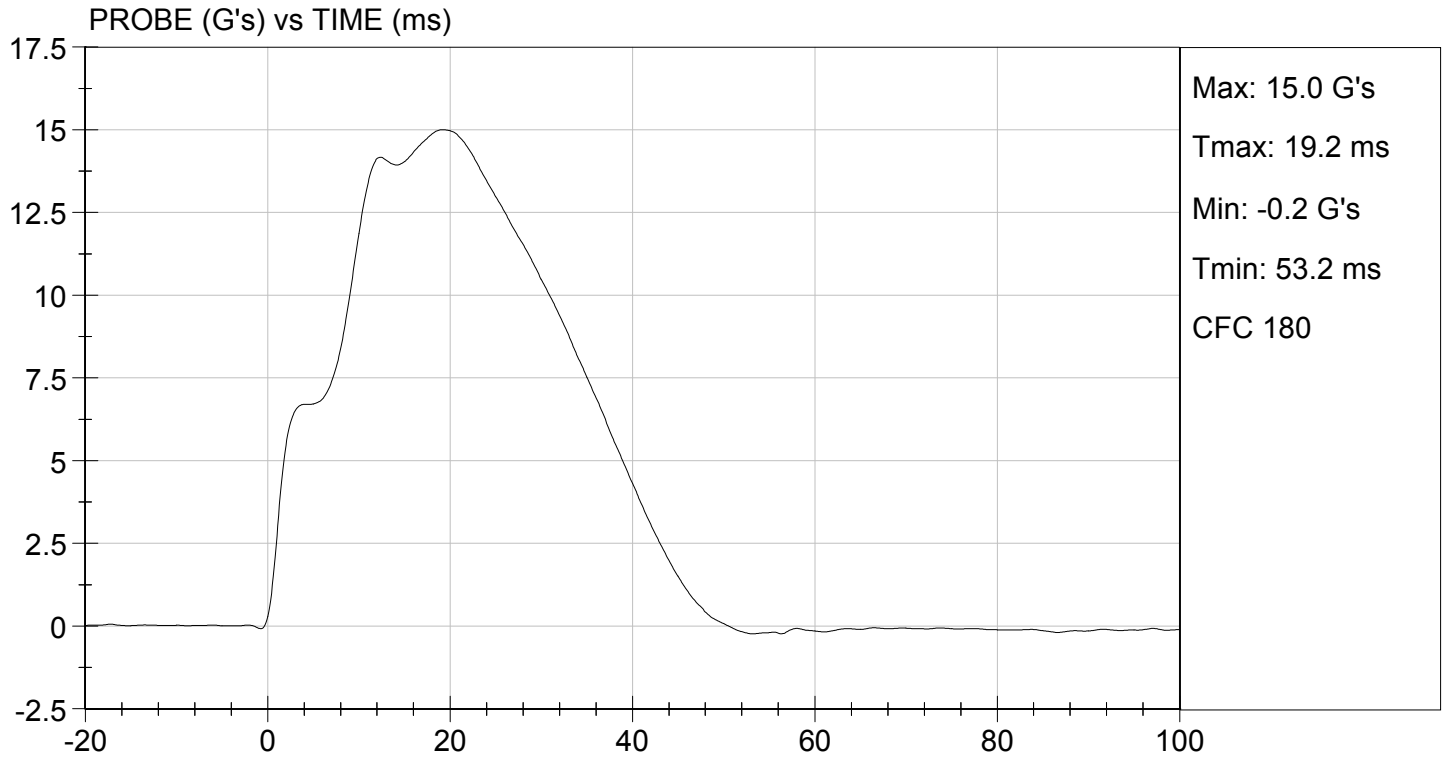
08/25/2016
Test Date


Approved By



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

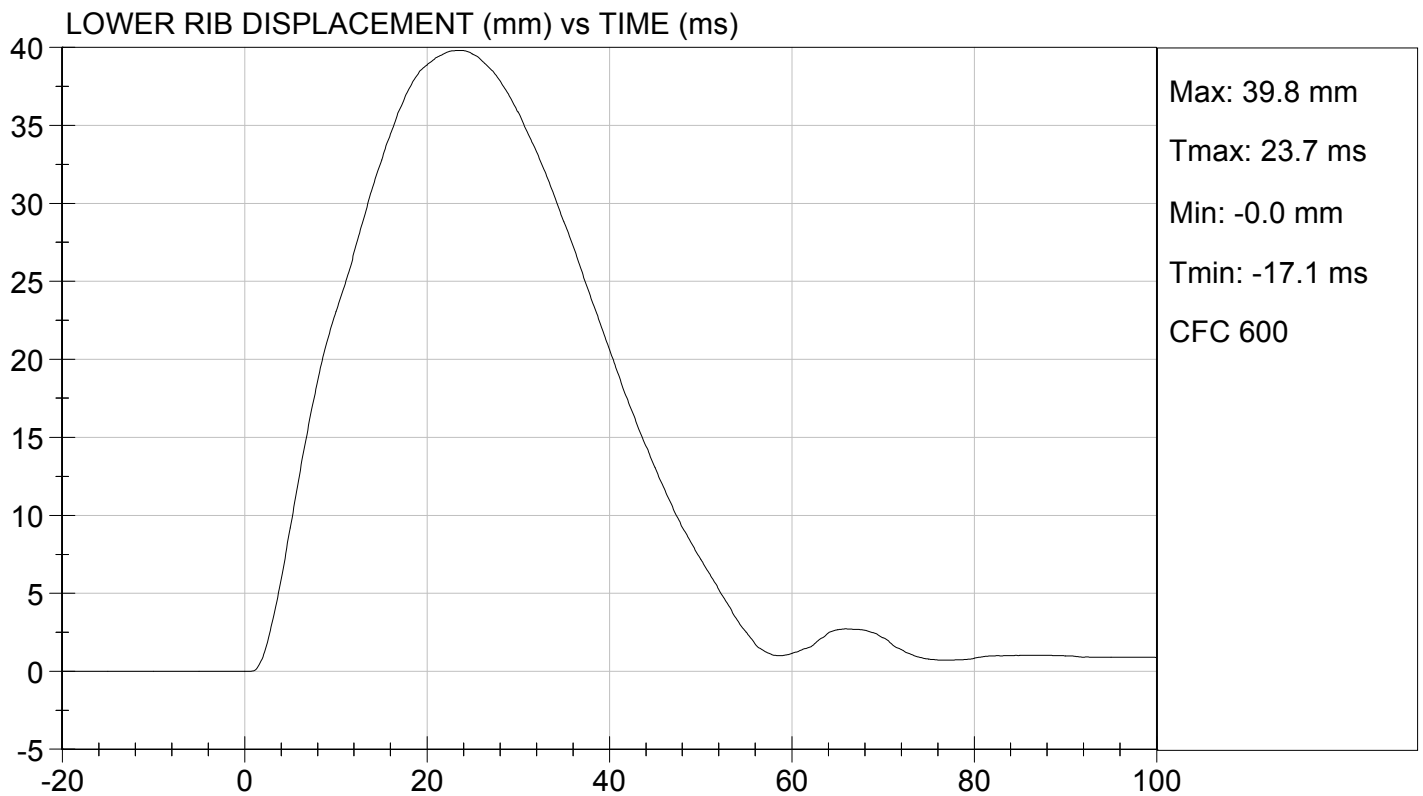
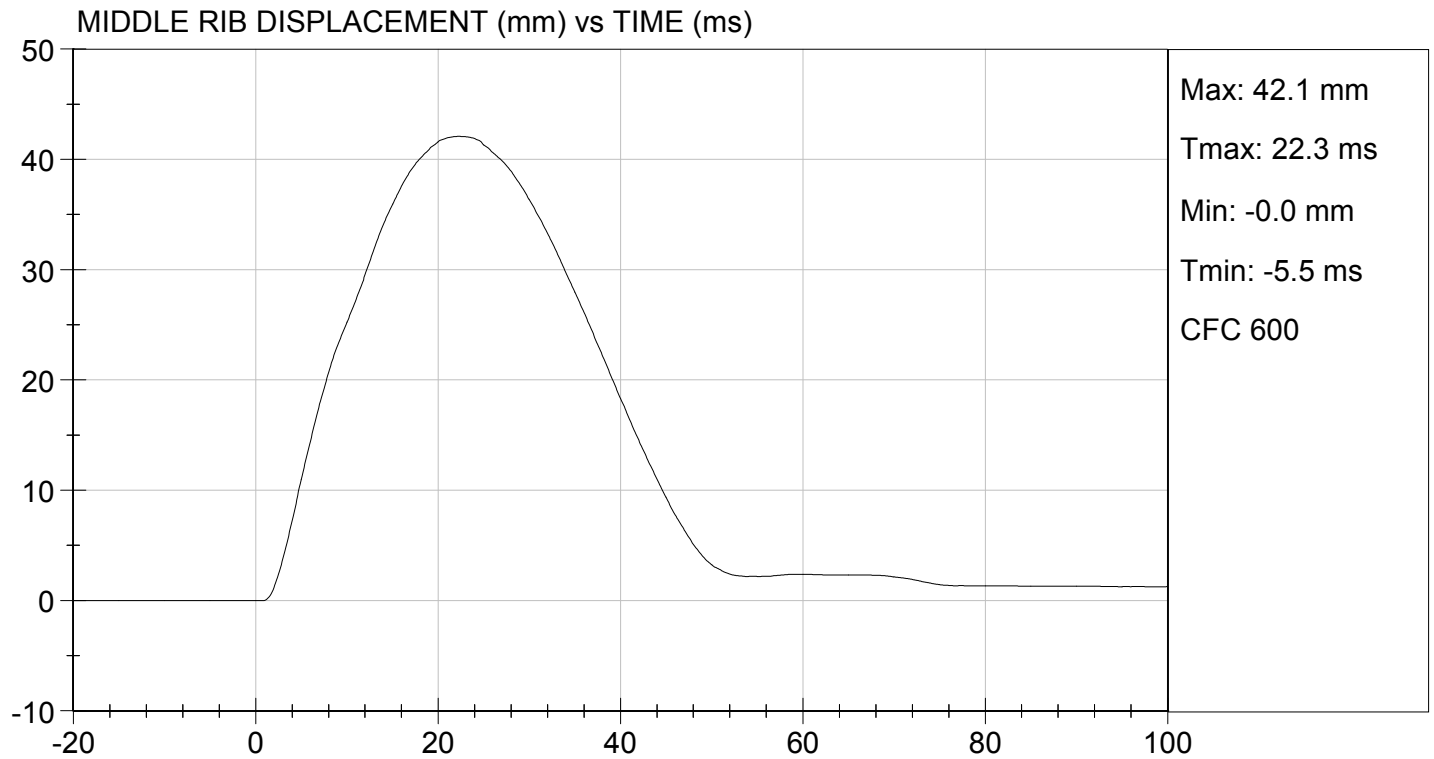
TEST DATE: 08/25/2016
TEST #: D162855





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

TEST DATE: 08/25/2016
TEST #: D162855

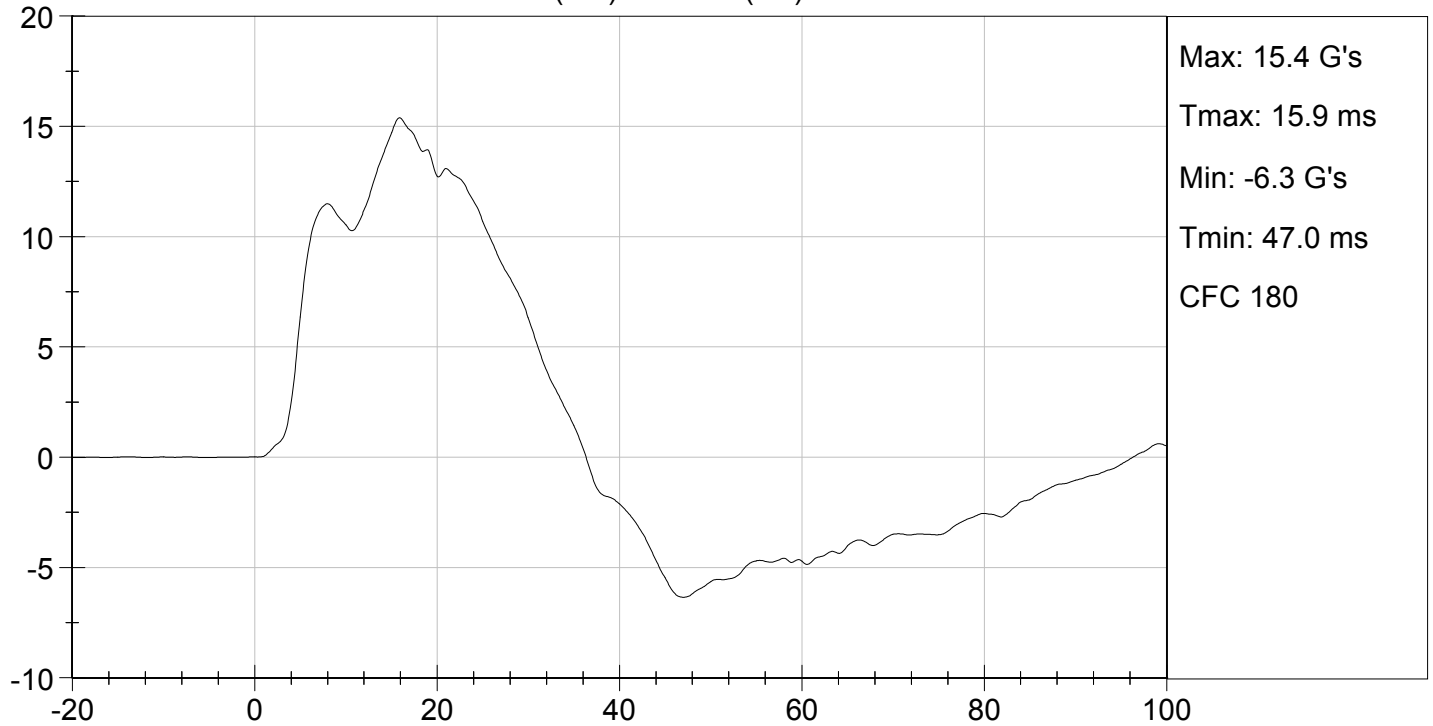




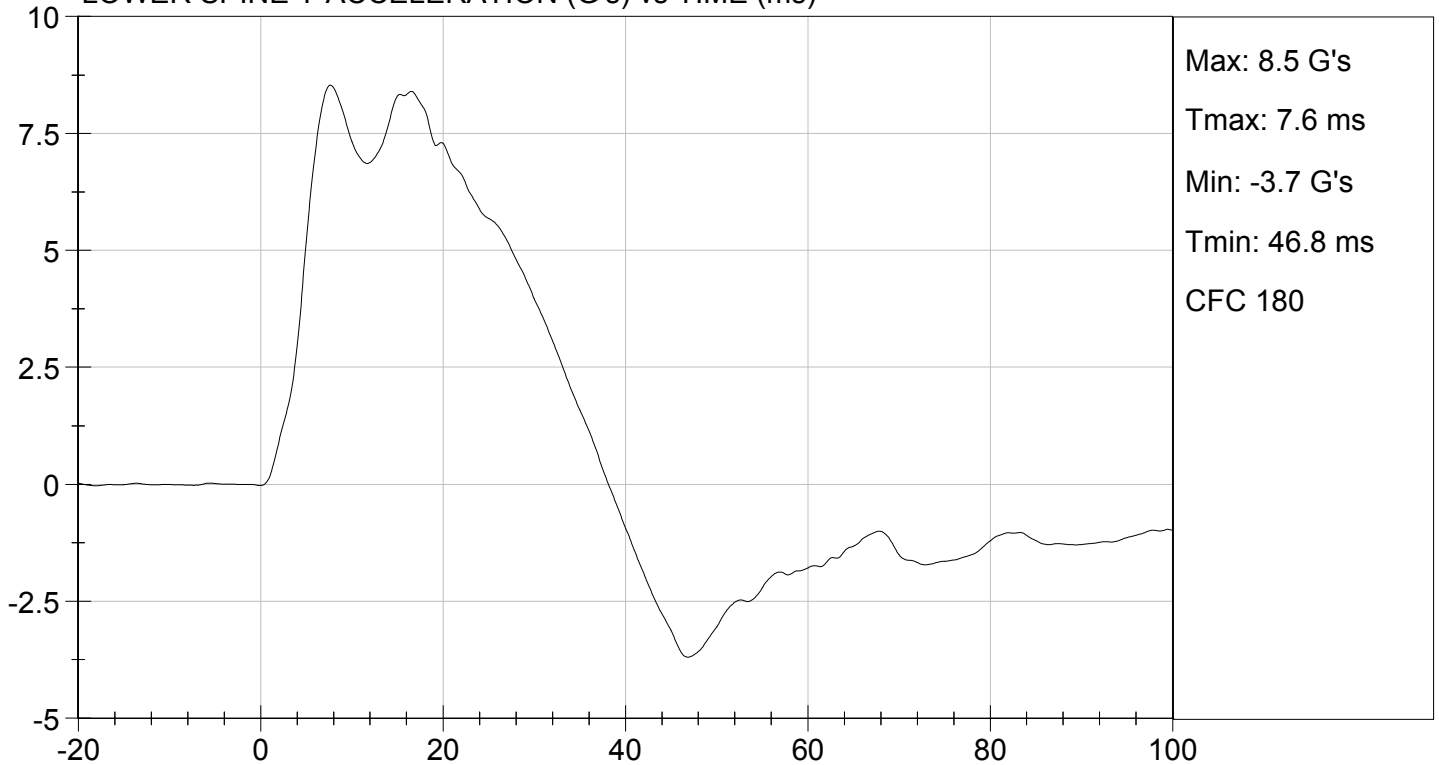
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/25/2016
TEST #: D162855

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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



MGA RESEARCH CORPORATION

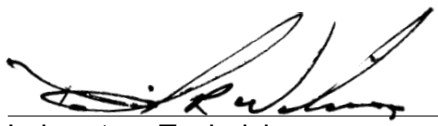
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

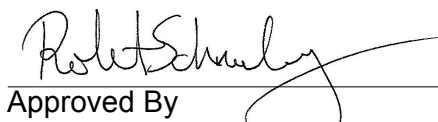
Test I.D: D162856

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

08/25/2016

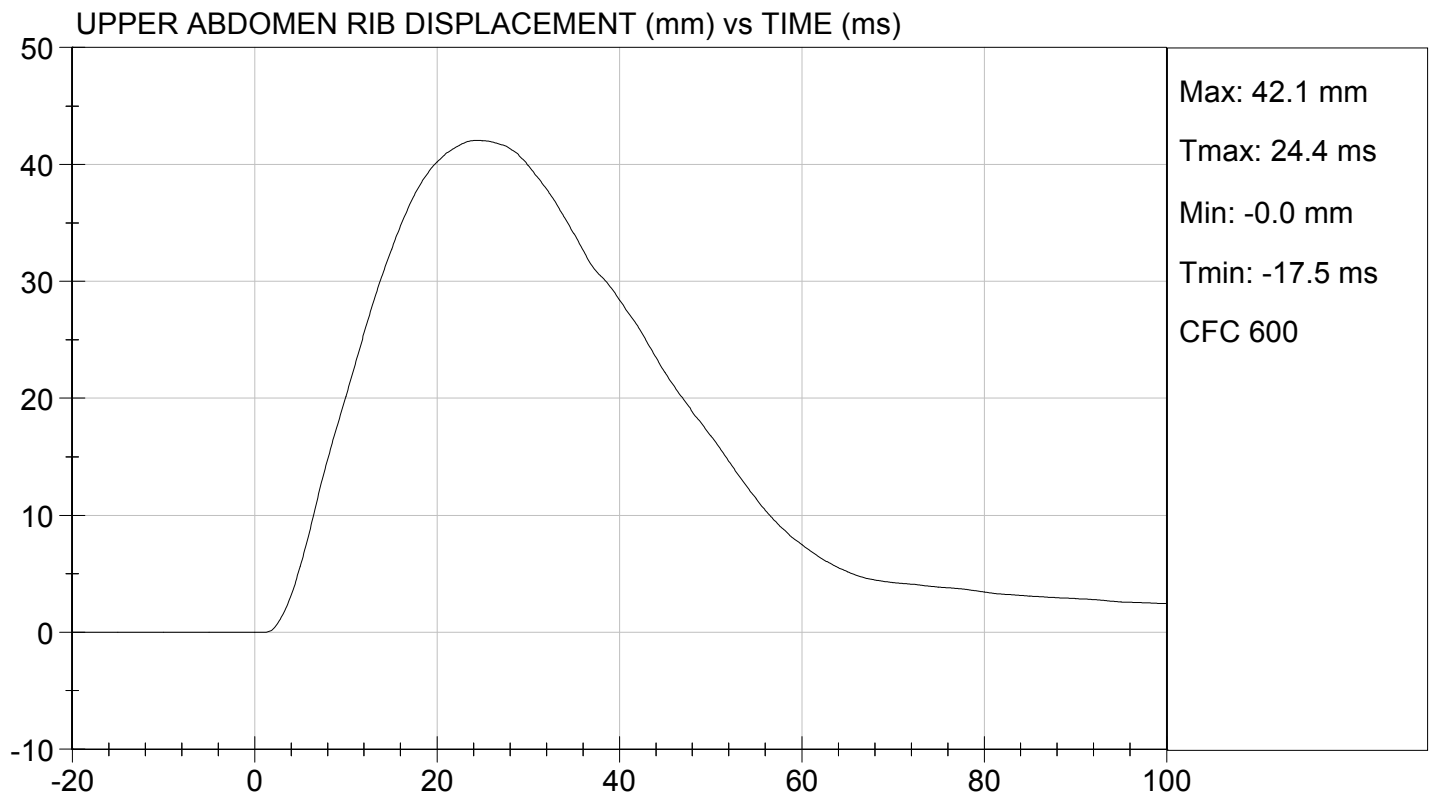
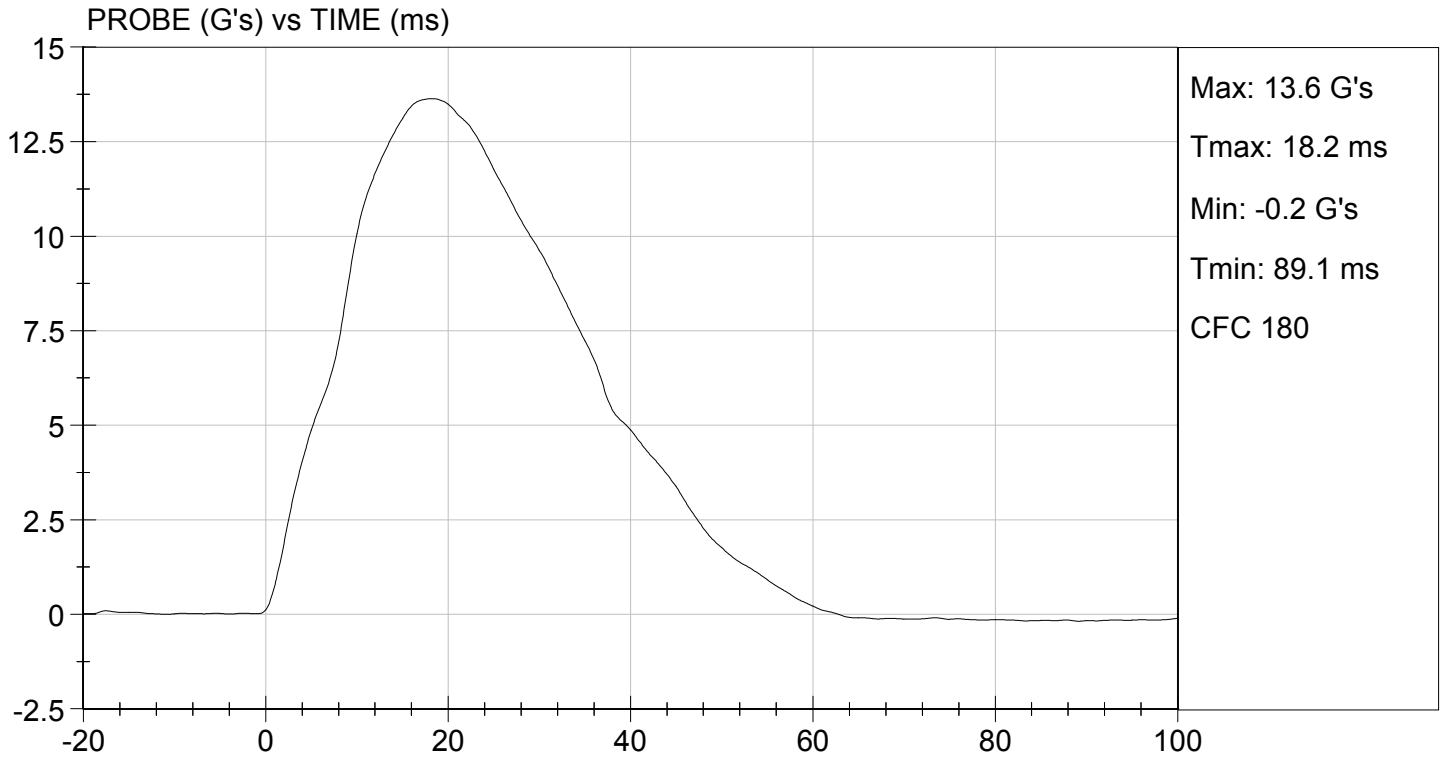
Test Date


Approved By



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

TEST DATE: 08/25/2016
TEST #: D162856

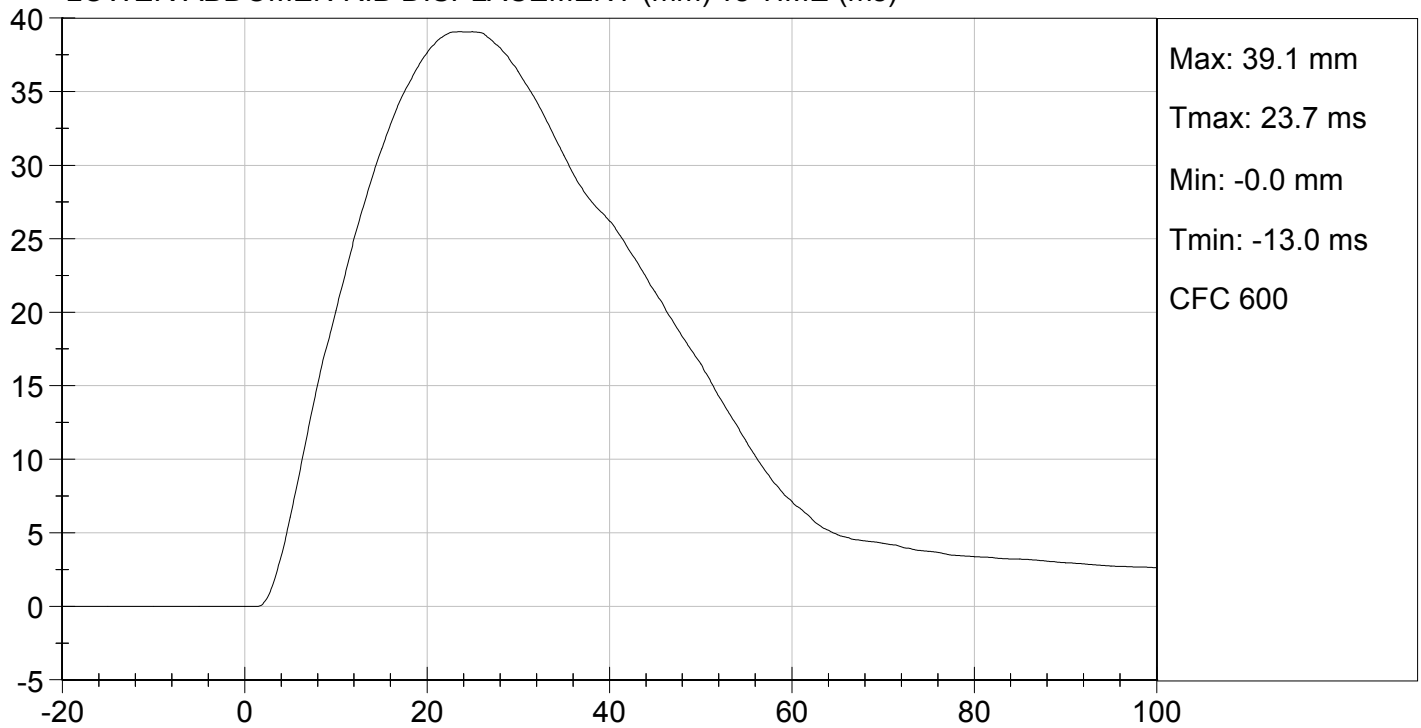




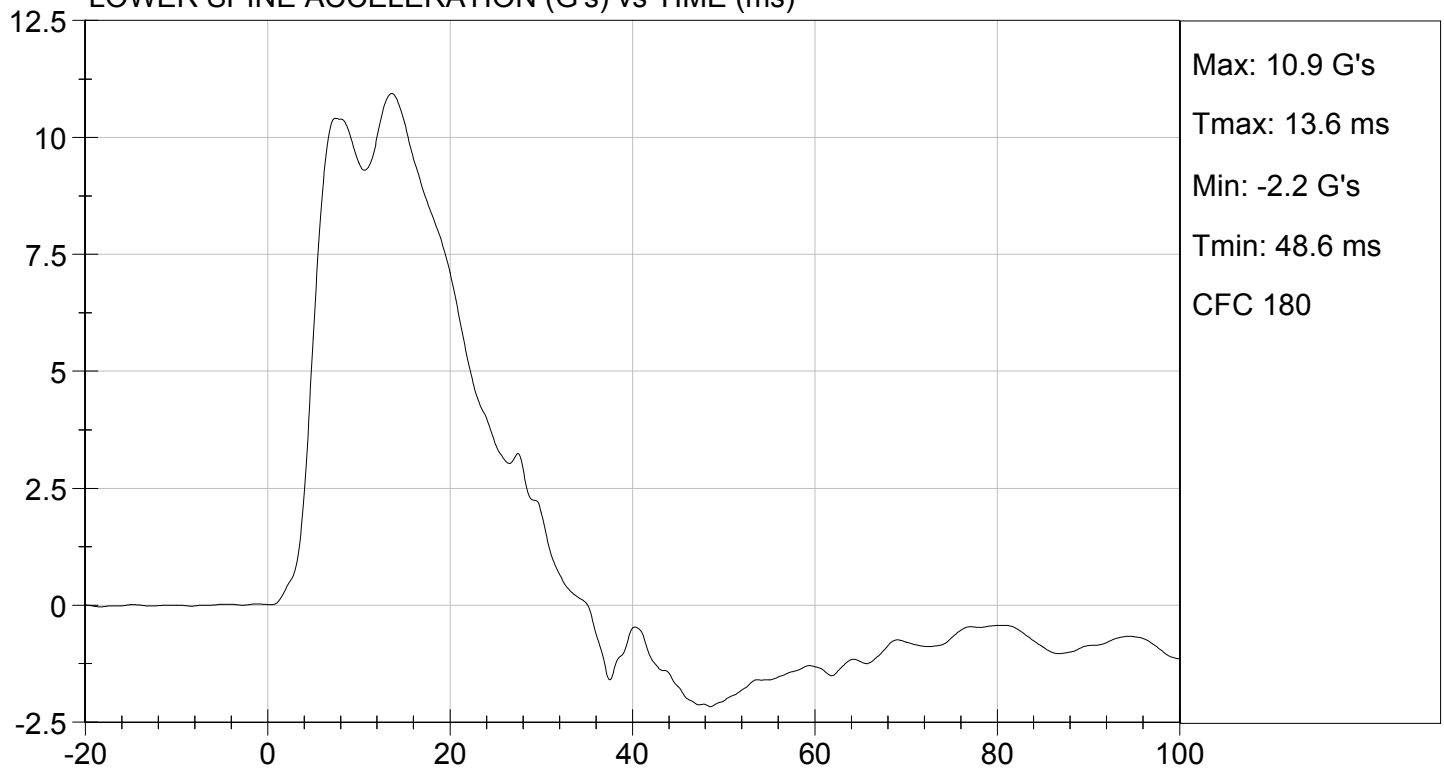
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 08/25/2016
TEST #: D162856

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



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



MGA RESEARCH CORPORATION

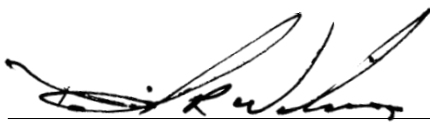
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D162857

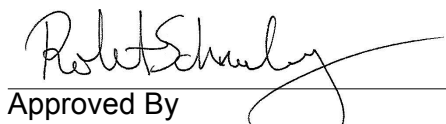
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	4,023	Pass
Overall Test Results				Pass



Laboratory Technician

08/25/2016

Test Date

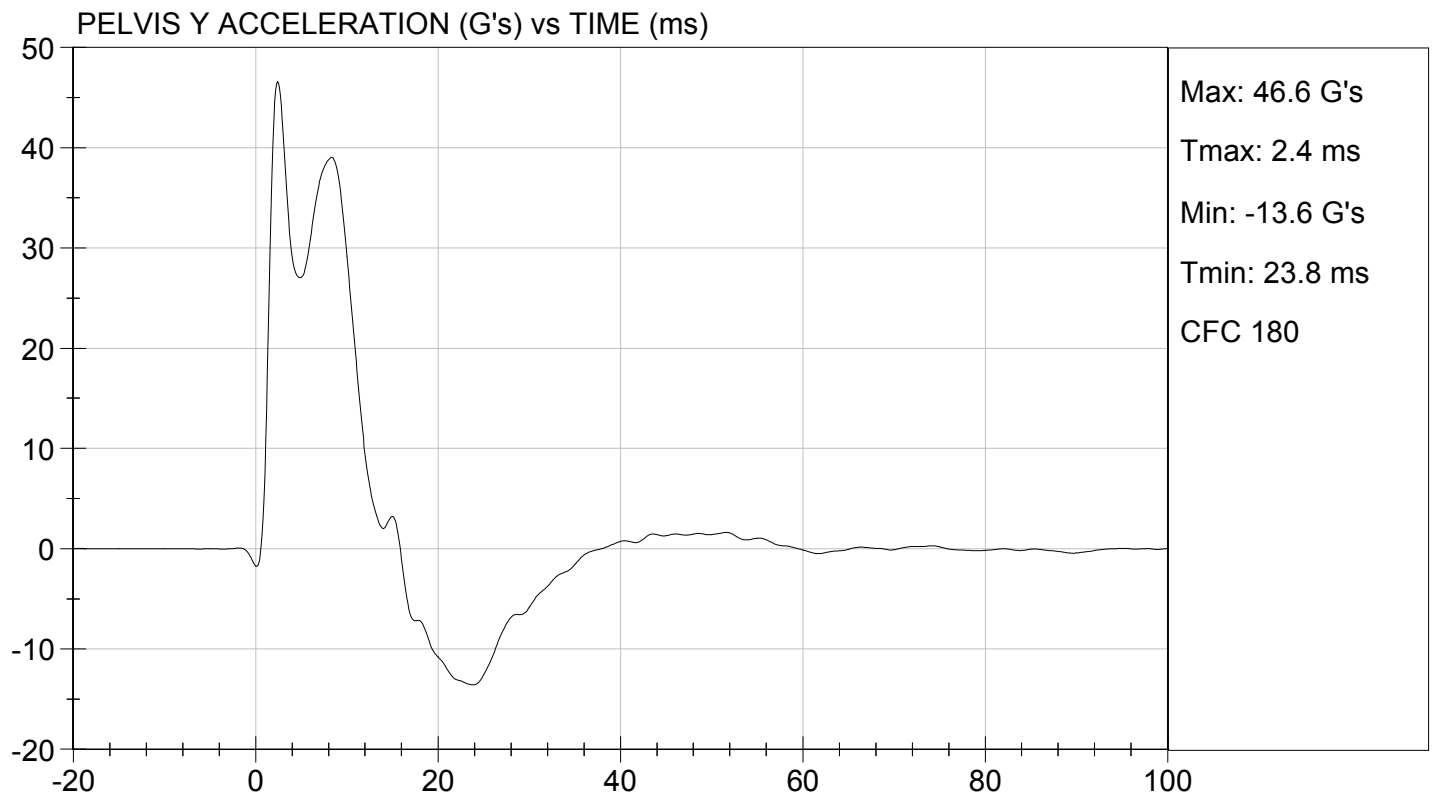
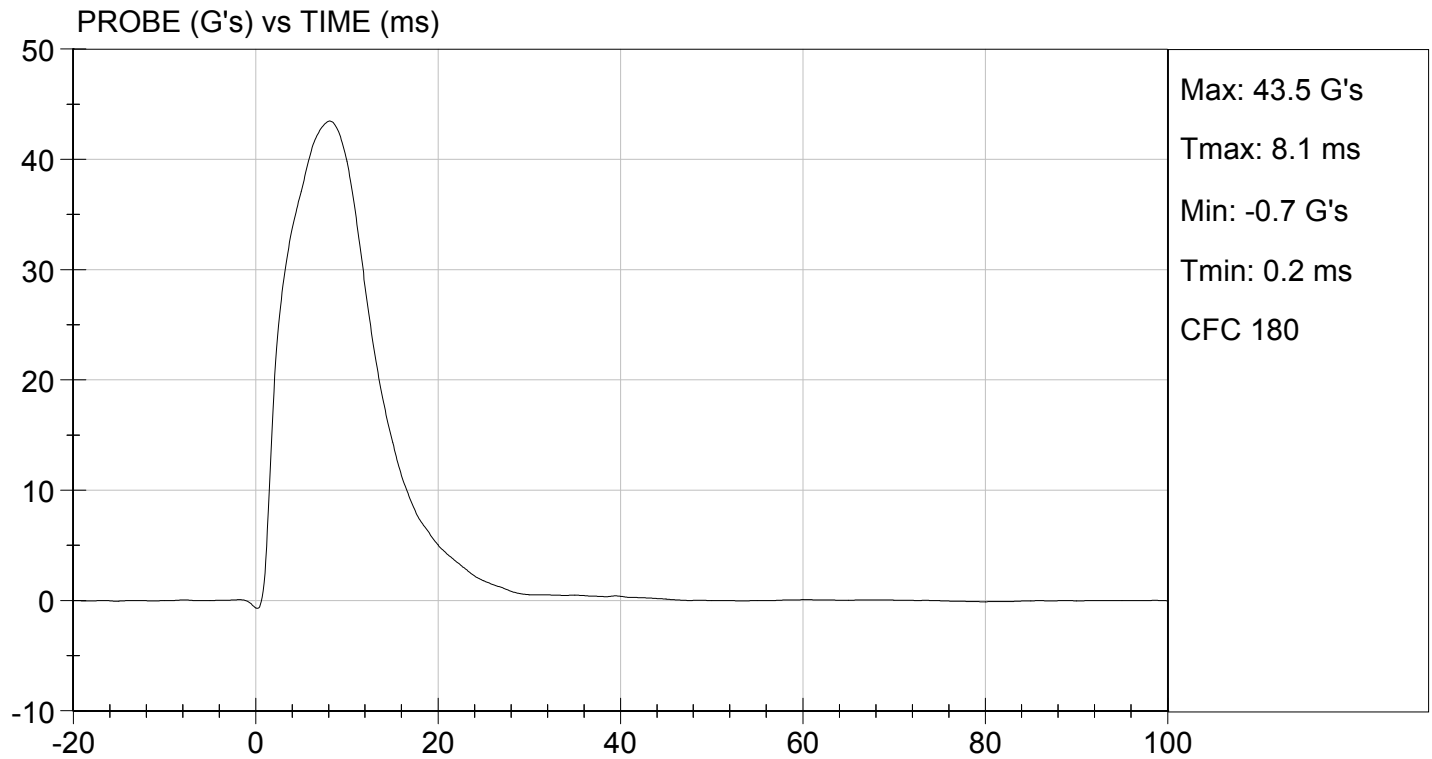


Approved By



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

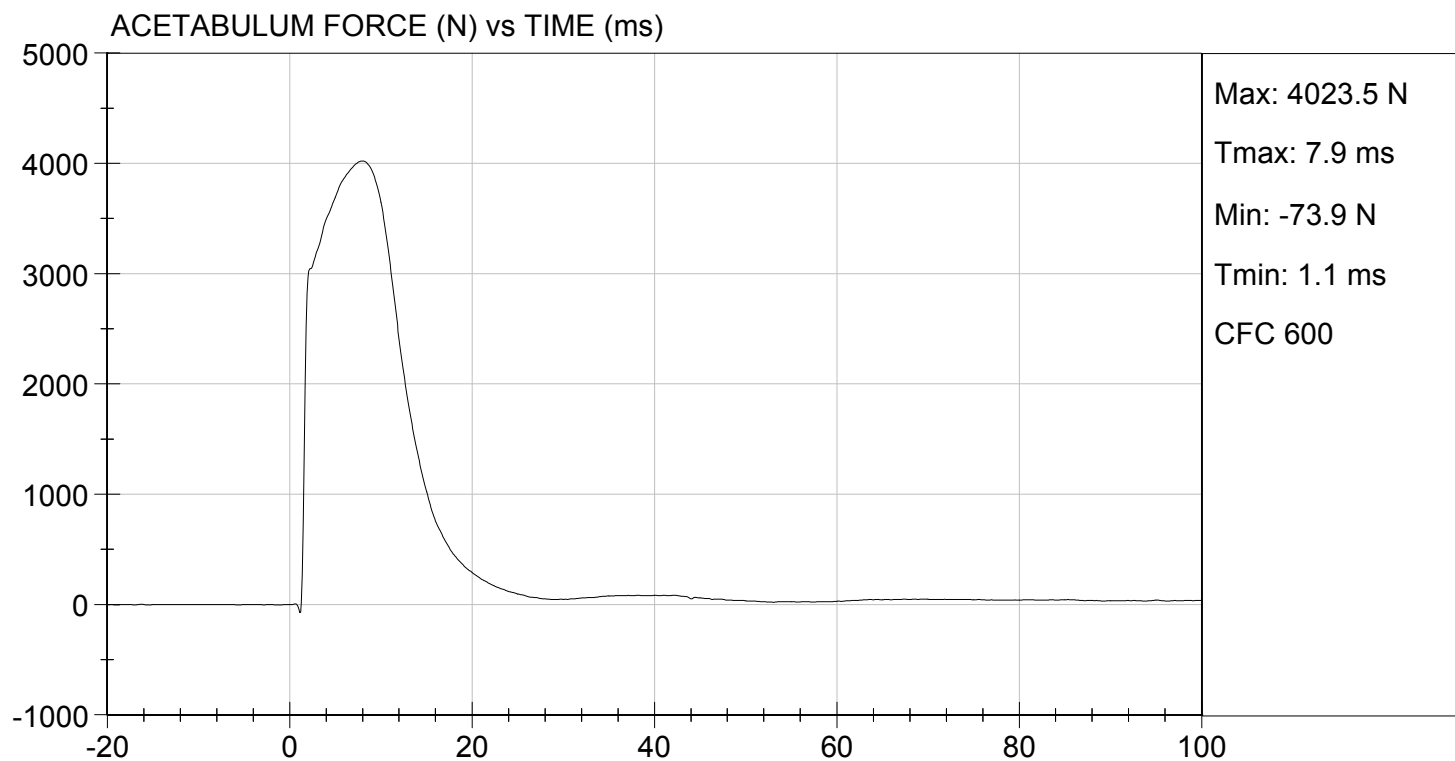
TEST DATE: 08/25/2016
TEST #: D162857





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

TEST DATE: 08/25/2016
TEST #: D162857



MGA RESEARCH CORPORATION

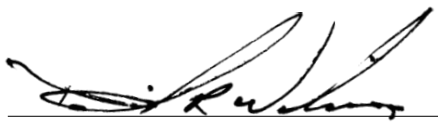
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

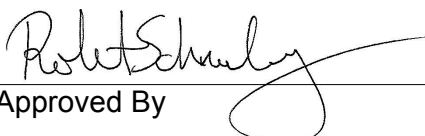
Test I.D: D162858

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,512	Pass
Overall Test Results				Pass


Laboratory Technician

08/25/2016

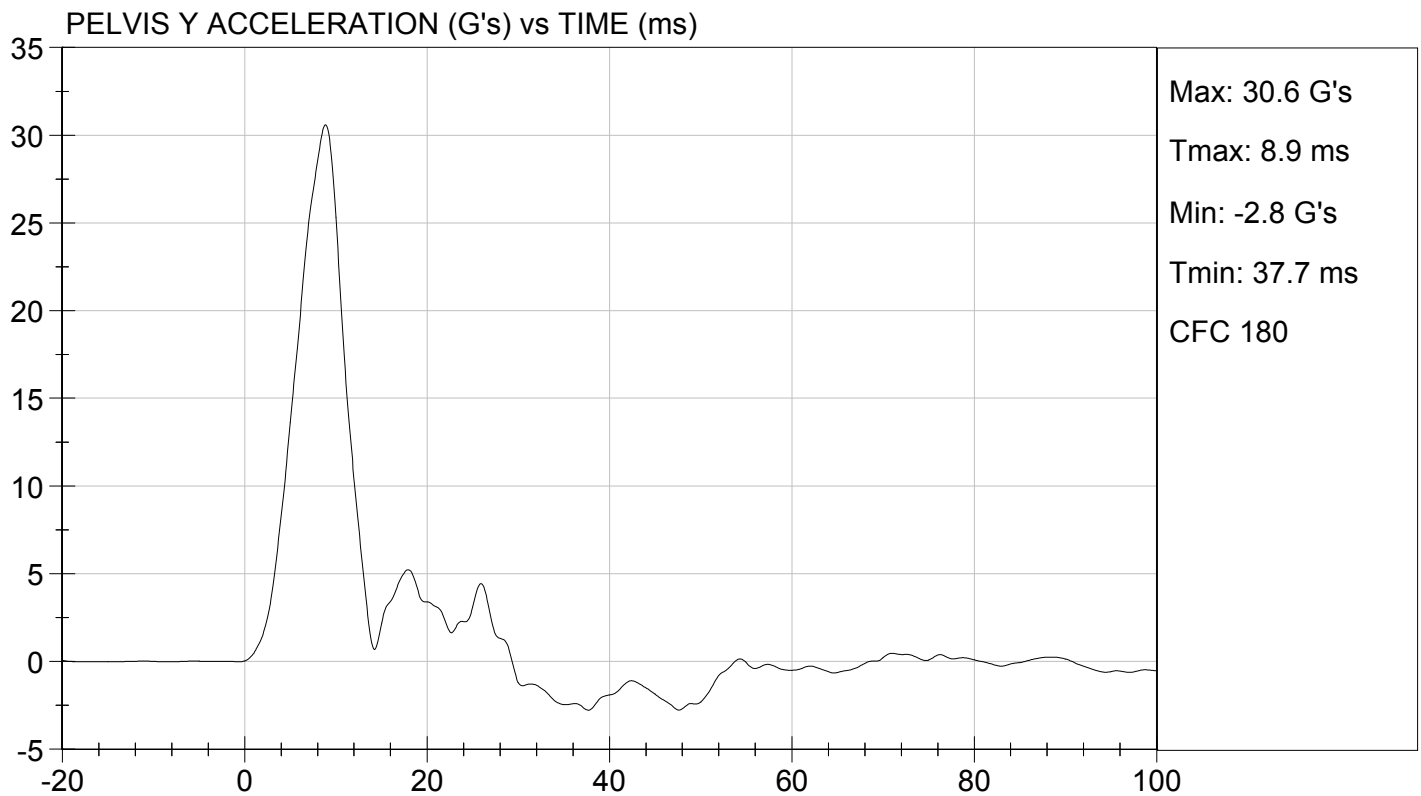
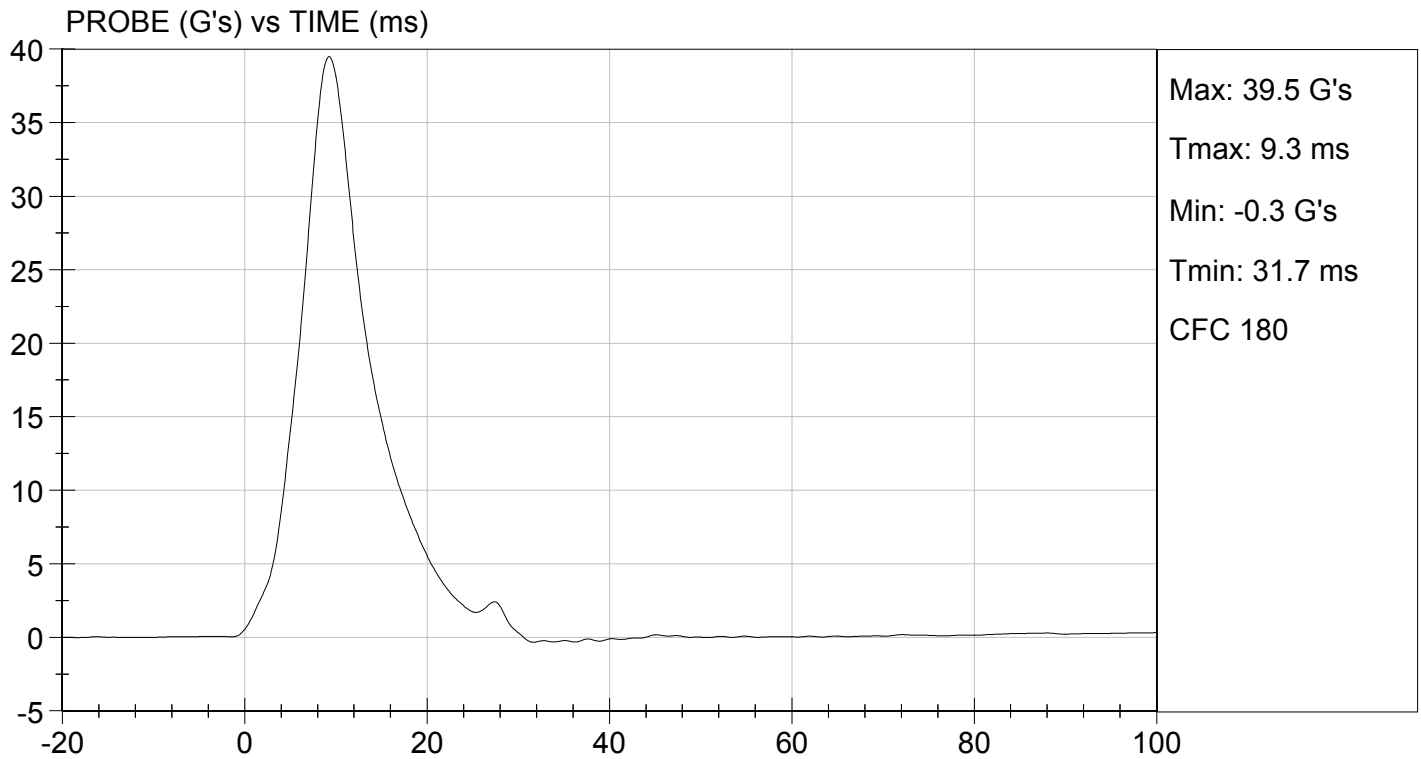
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

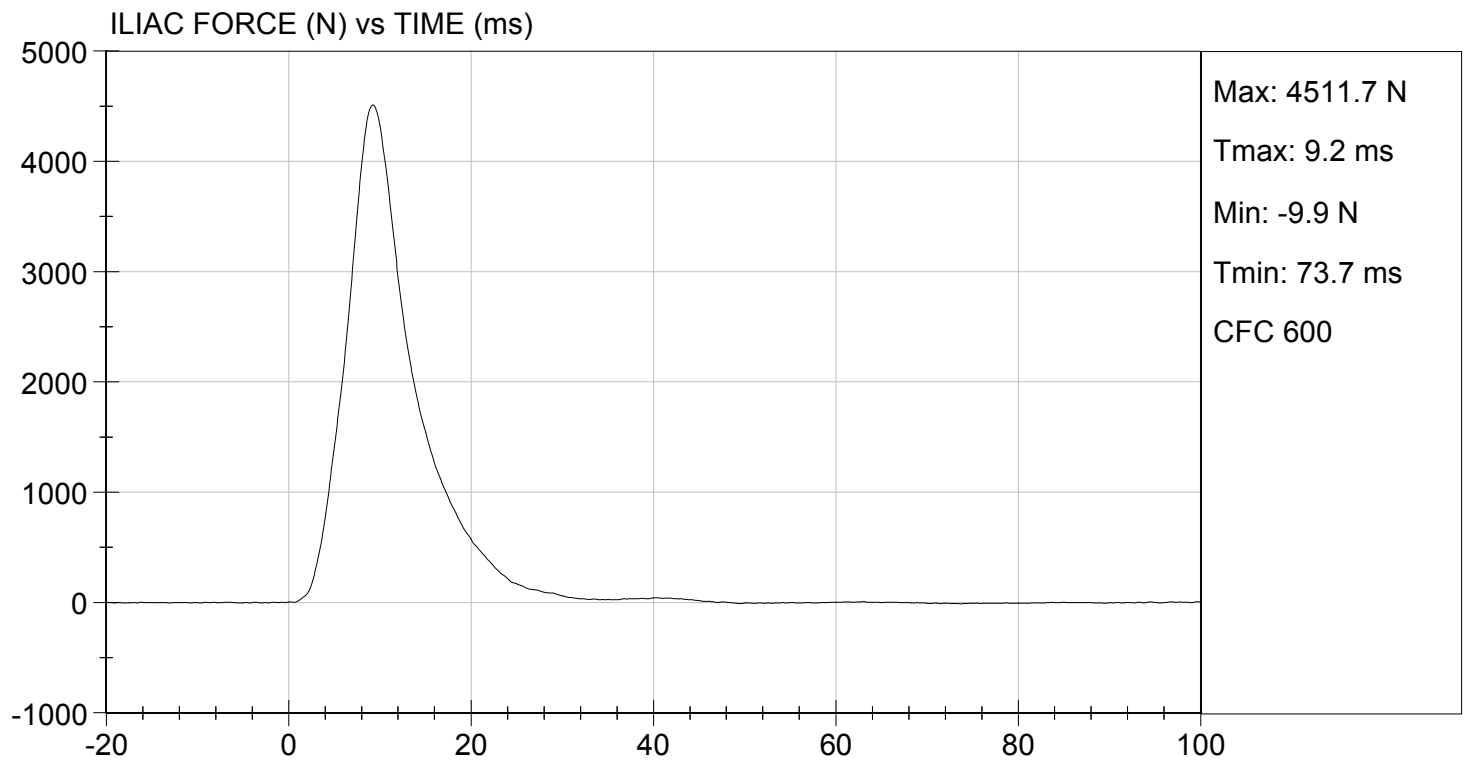
TEST DATE: 08/25/2016
TEST #: D162858





TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/25/2016
TEST #: D162858



SID-IIsD External Measurements
SN: 306

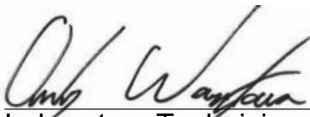
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

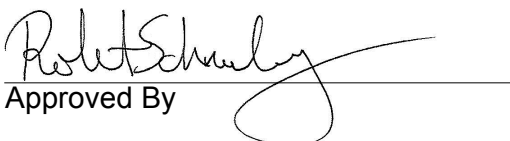
ATD Serial No: 306

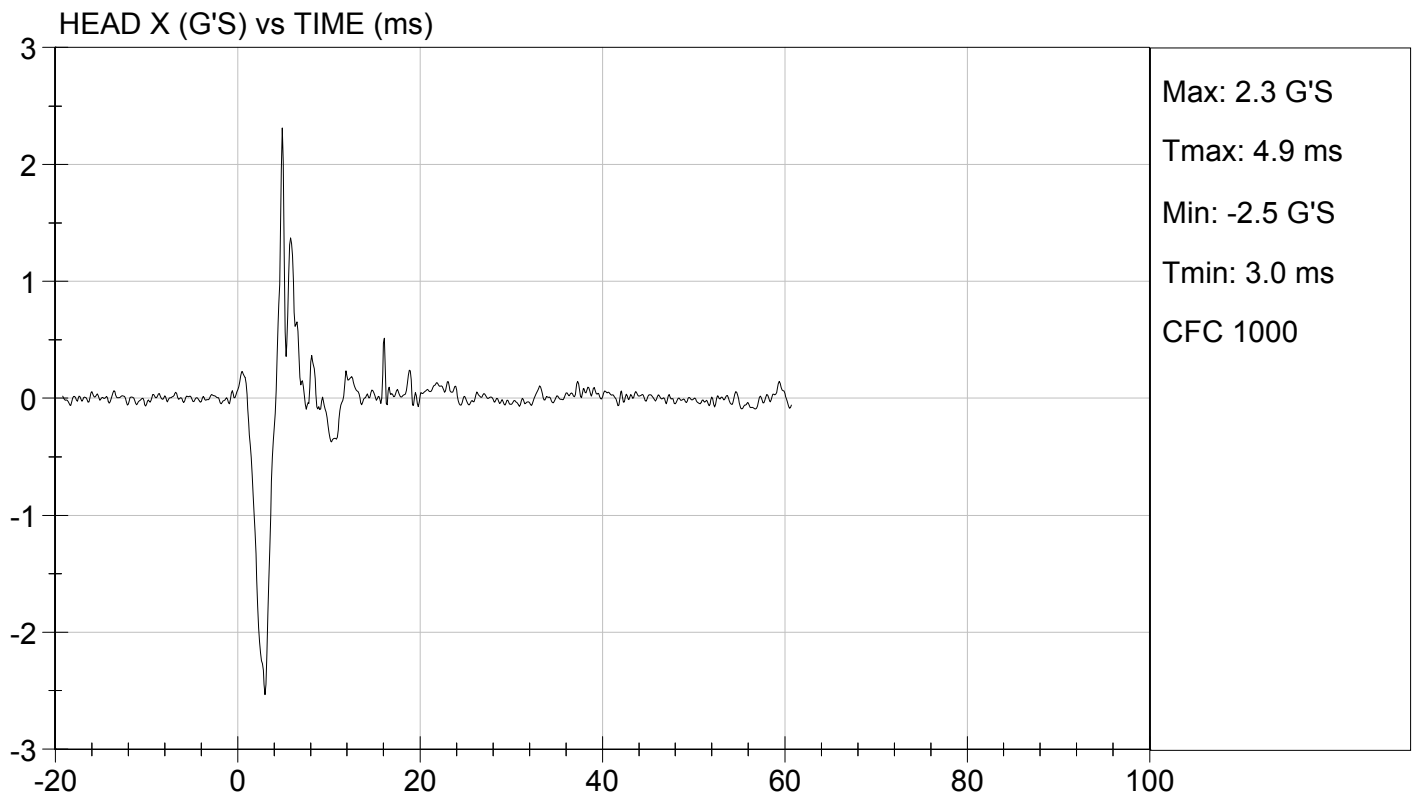
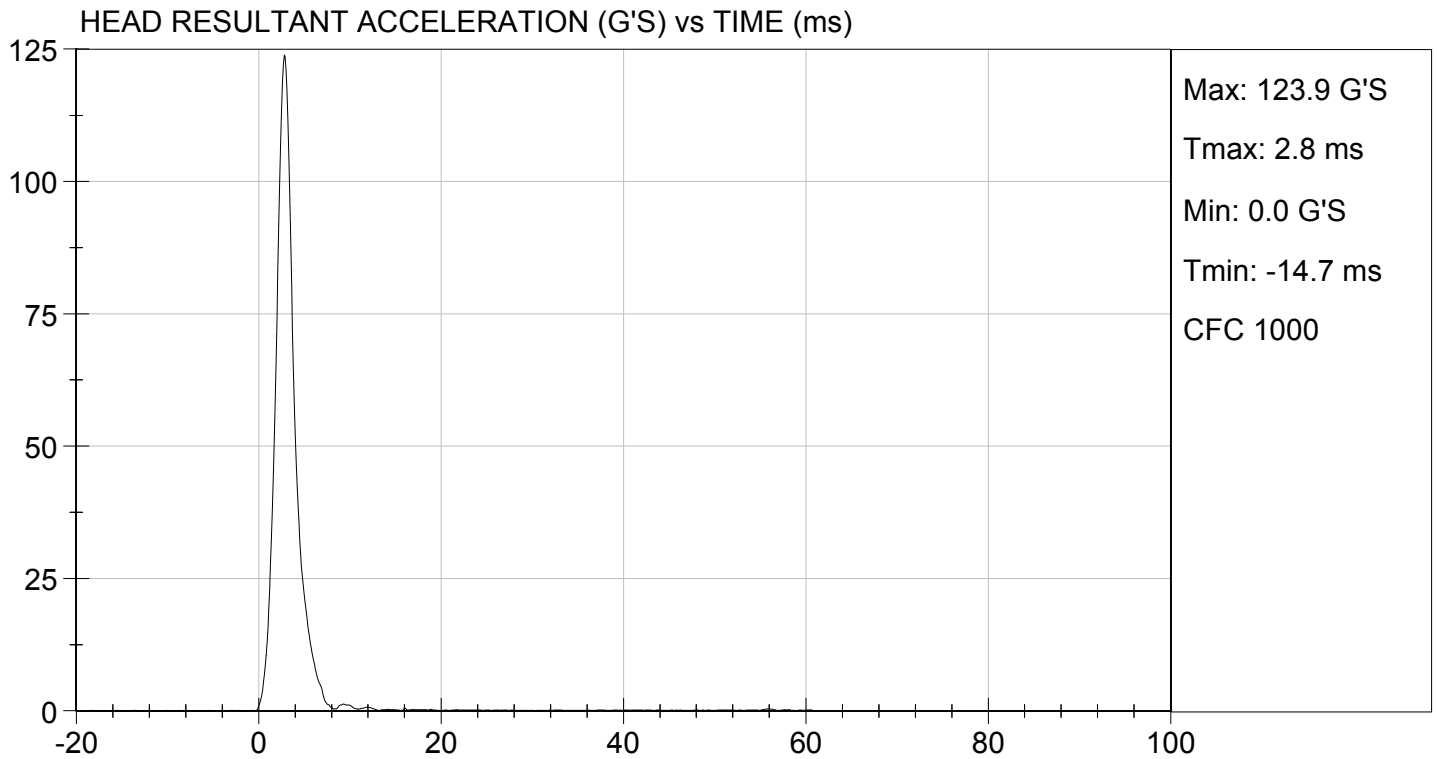
Test ID: D163301

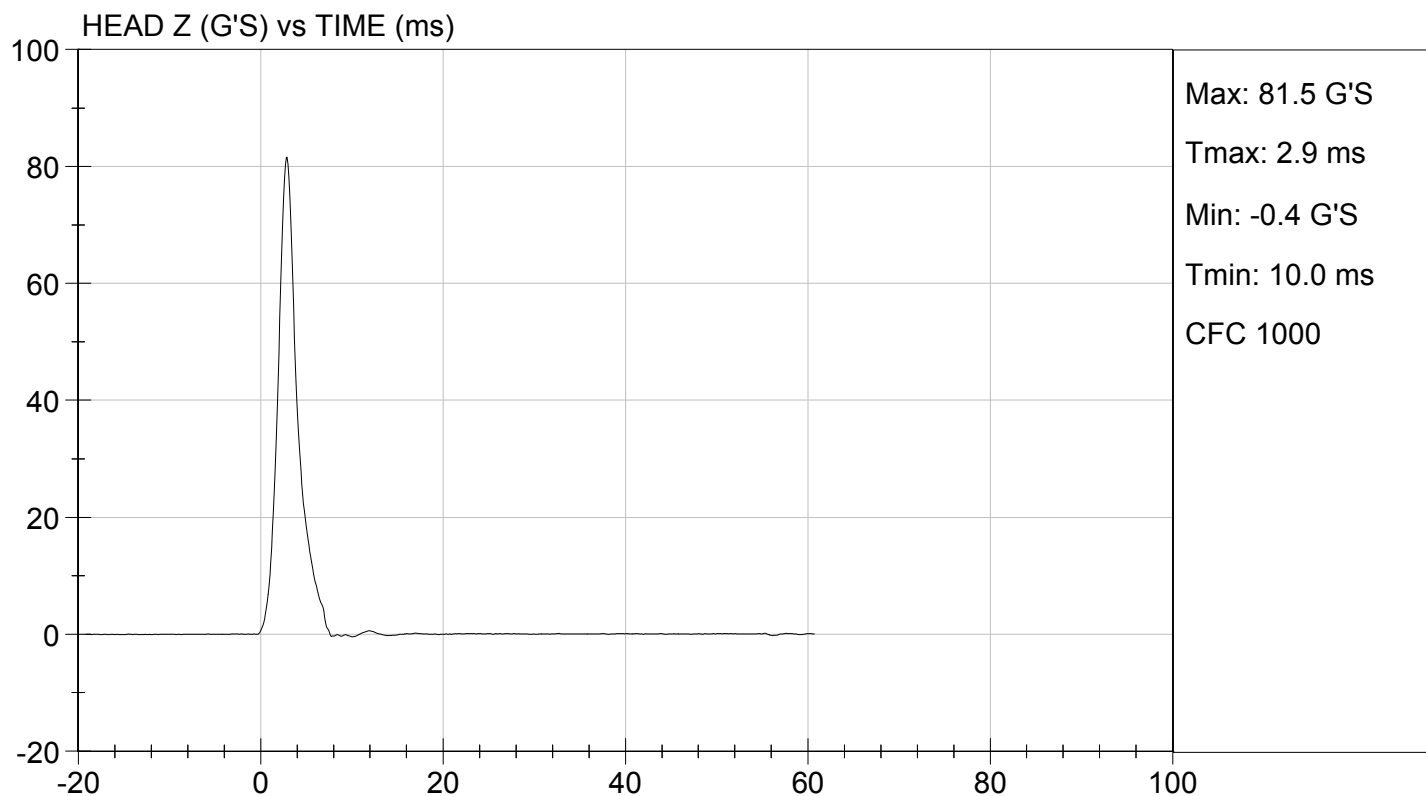
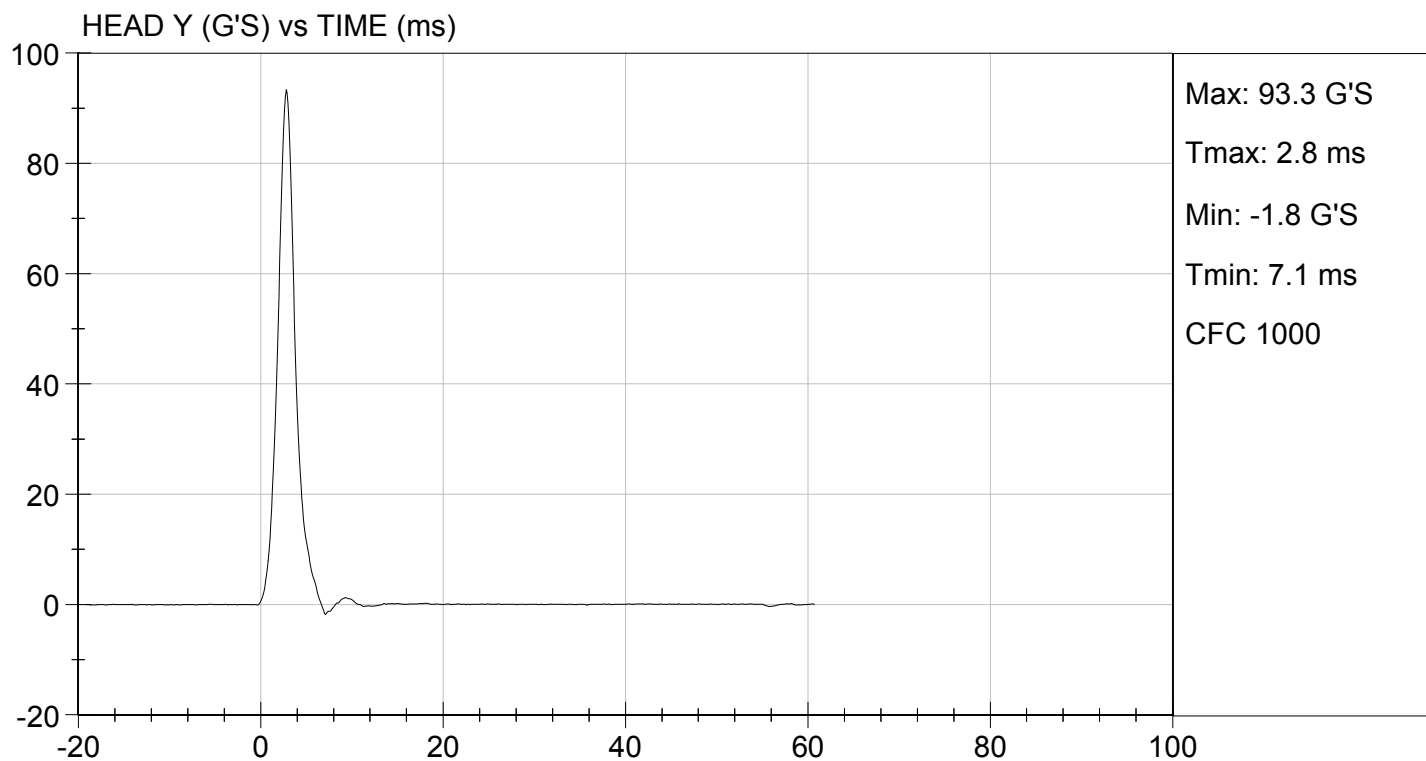
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

09/29/2016
Test Date


Approved By





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

ATD Serial No: 306

Test I.D: D163302

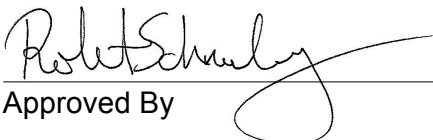
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	48	Pass
Impact Velocity		m/s	5.51 to 5.63	5.52	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.77	Pass
	15 ms	m/s	3.30 to 4.10	4.04	Pass
	20 ms	m/s	4.40 to 5.40	5.40	Pass
	25 ms	m/s	5.40 to 6.10	5.50	Pass
	25-100 ms	m/s	5.50 to 6.20	5.52	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
Overall Test Results					Pass



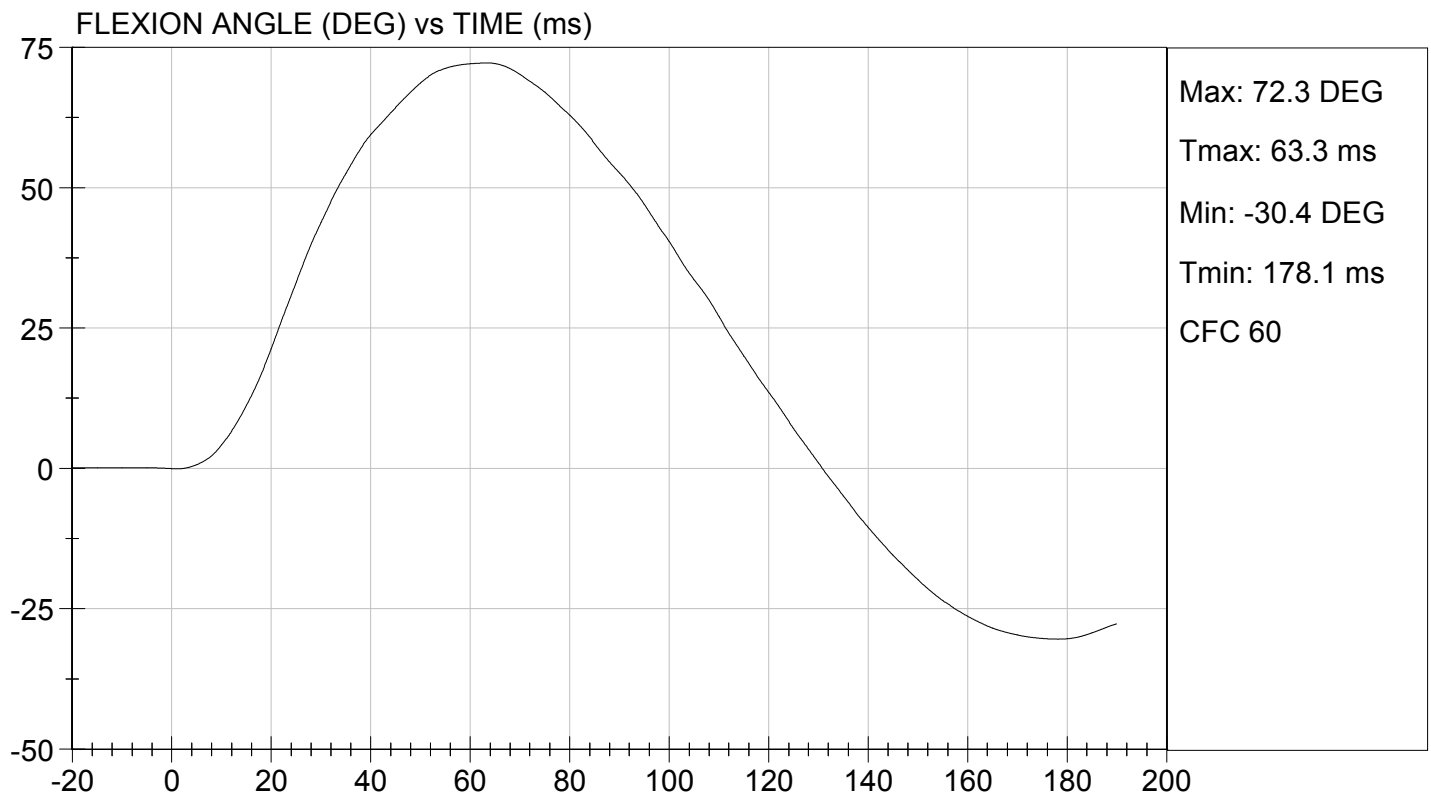
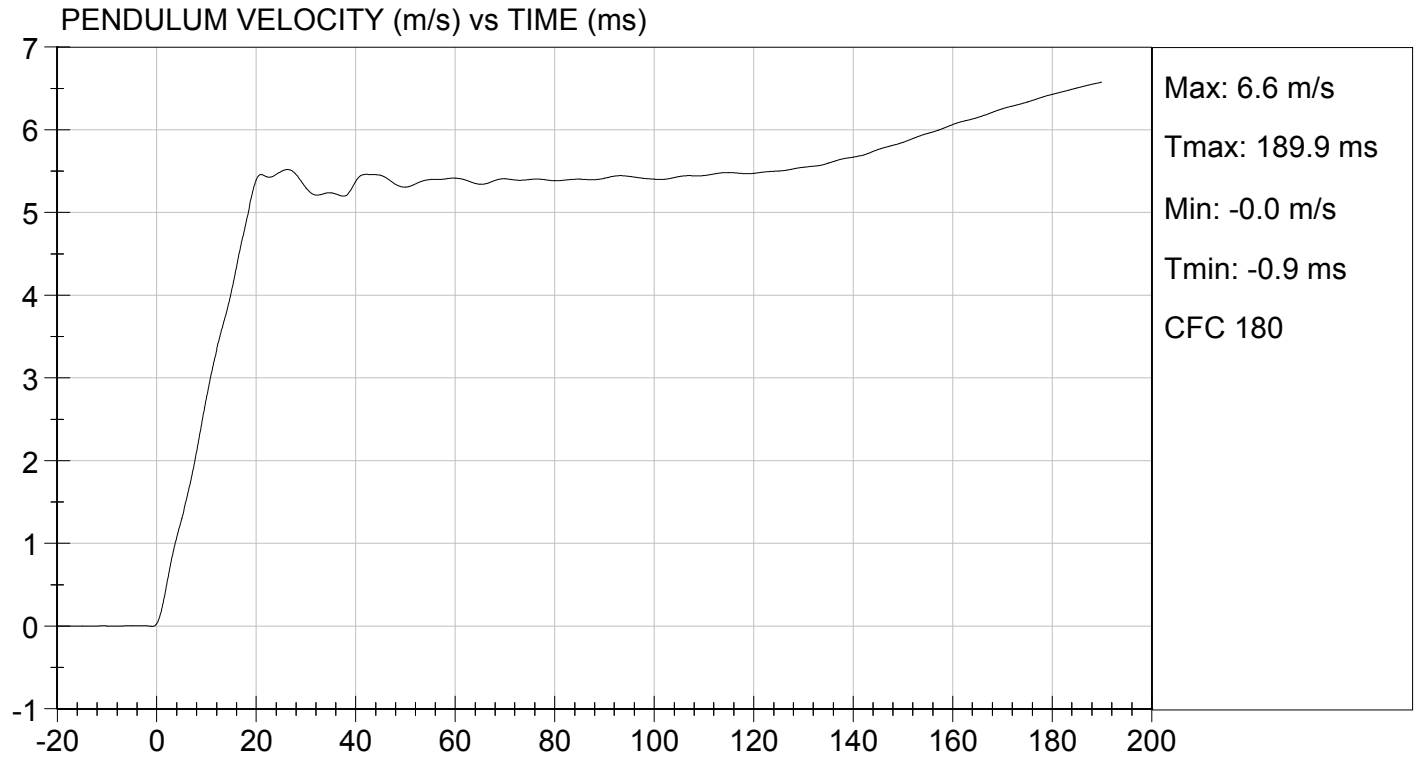
Laboratory Technician

09/29/2016

Test Date



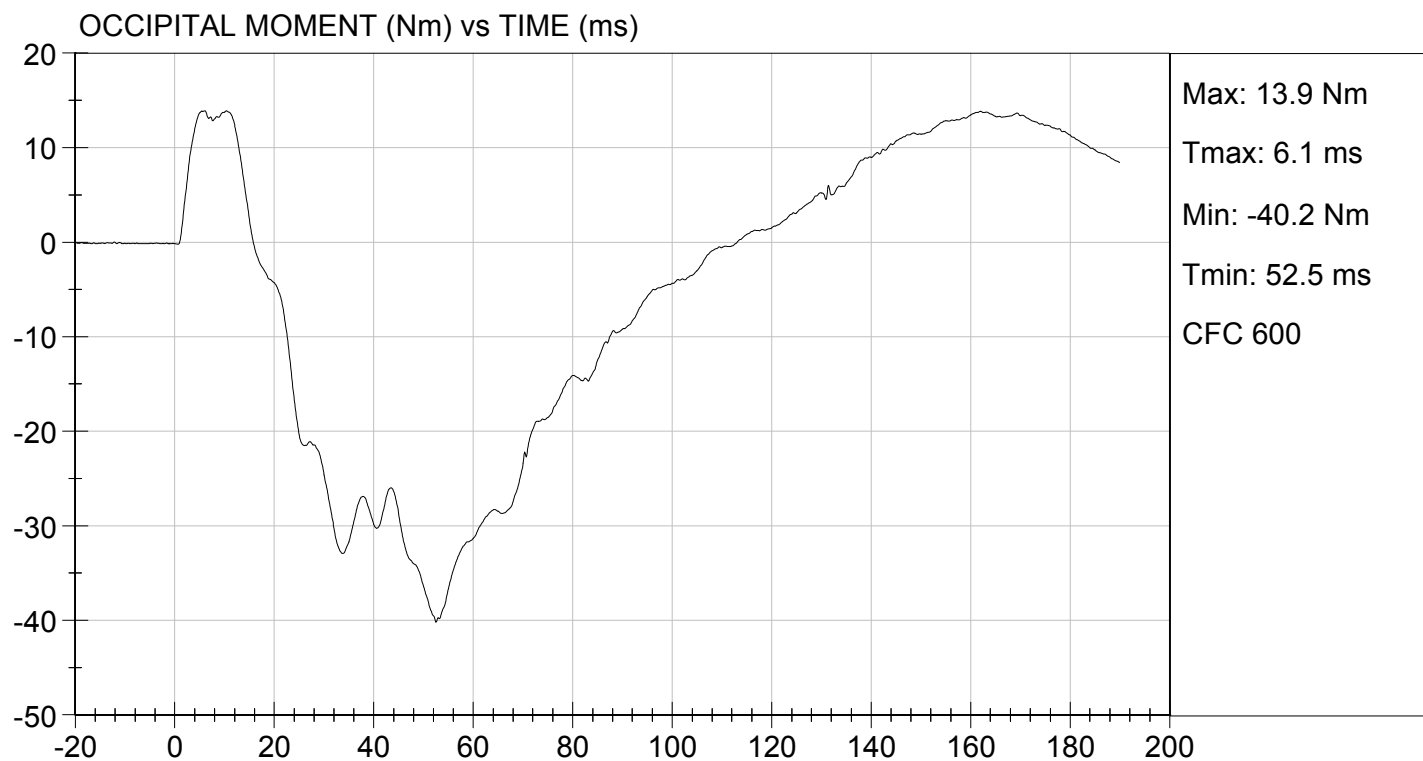
Approved By





TEST DESC: NECK BENDING
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 09/29/2016
TEST #: D163302

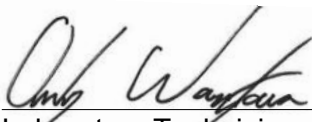


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

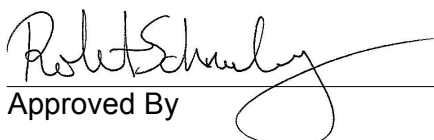
ATD Serial No: 306

Test ID: D163303

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	29	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results			Pass	


Laboratory Technician

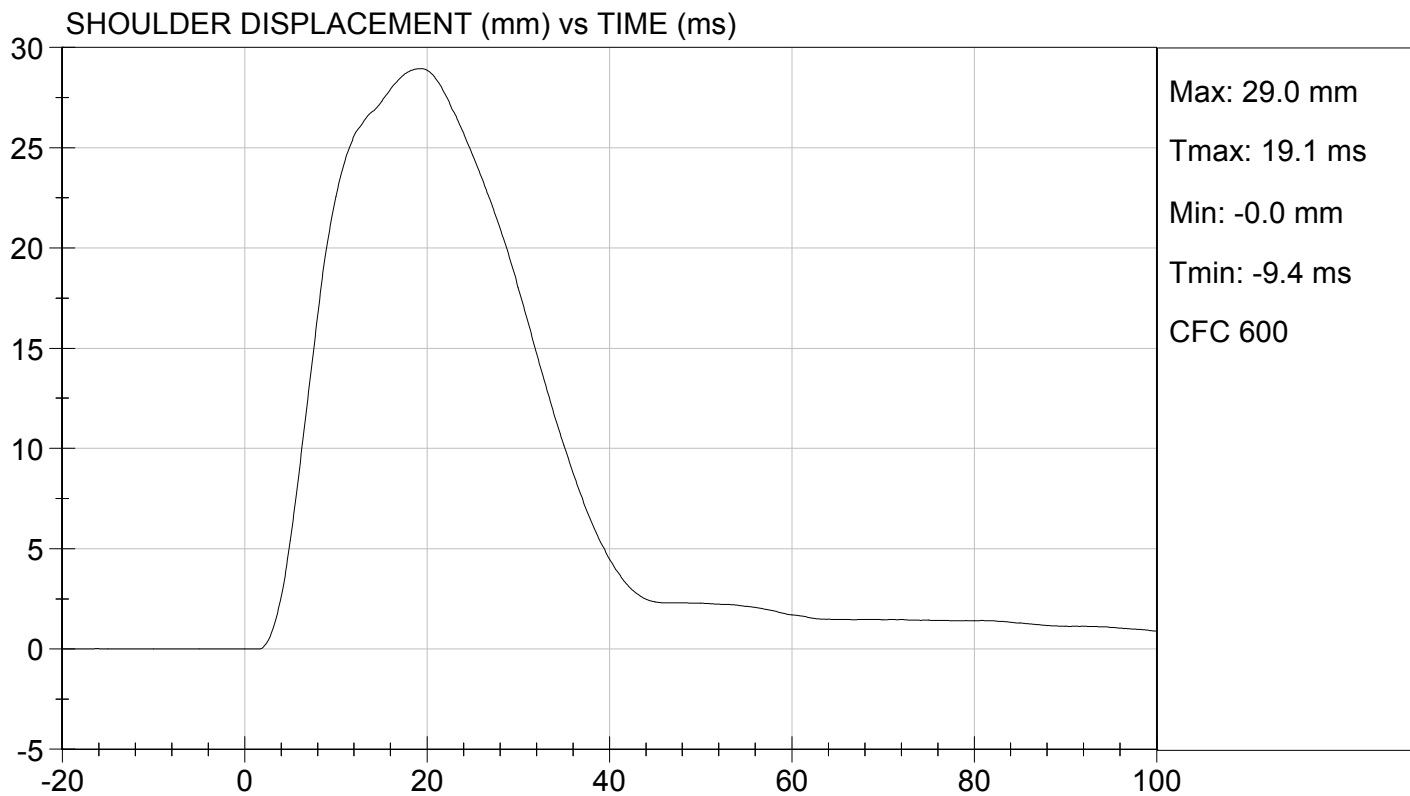
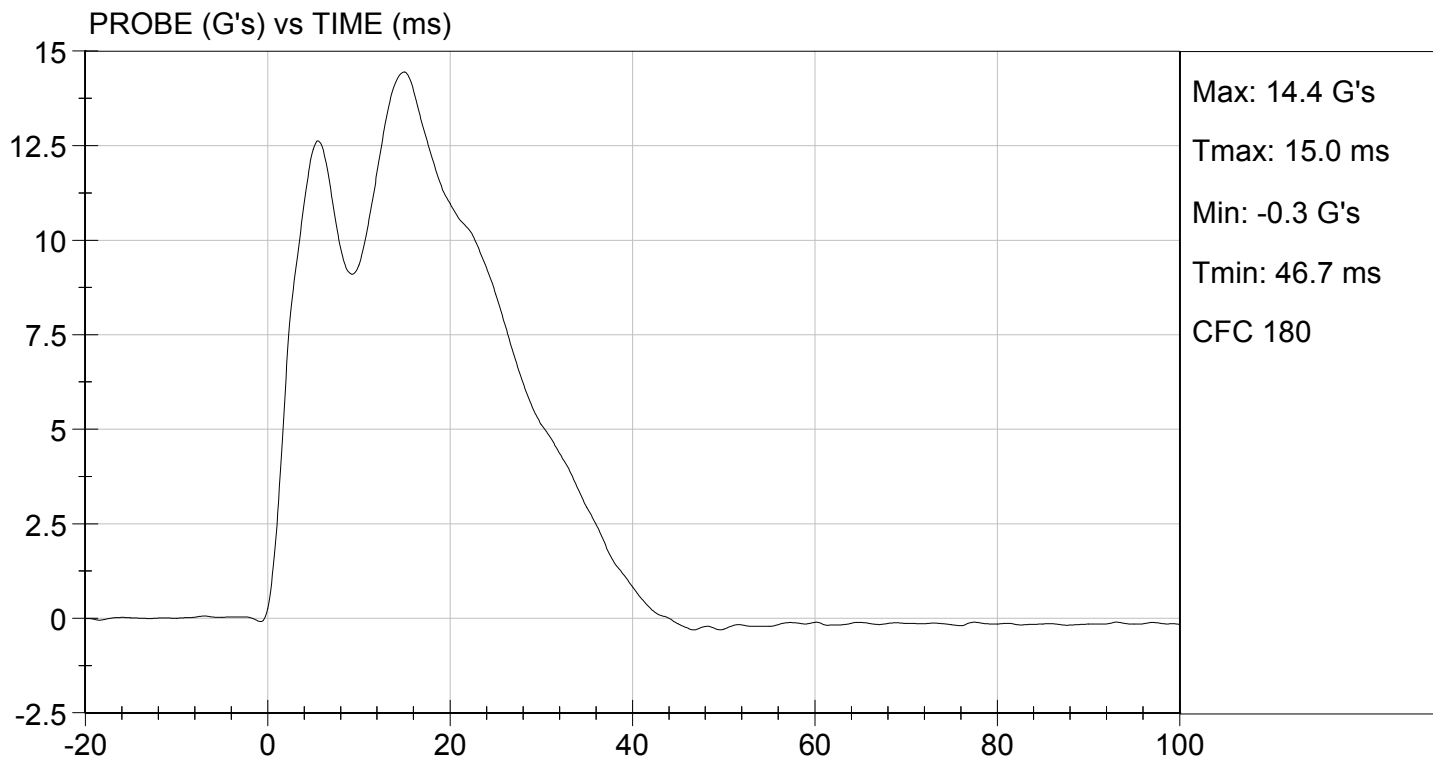
09/29/2016
Test Date


Approved By



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

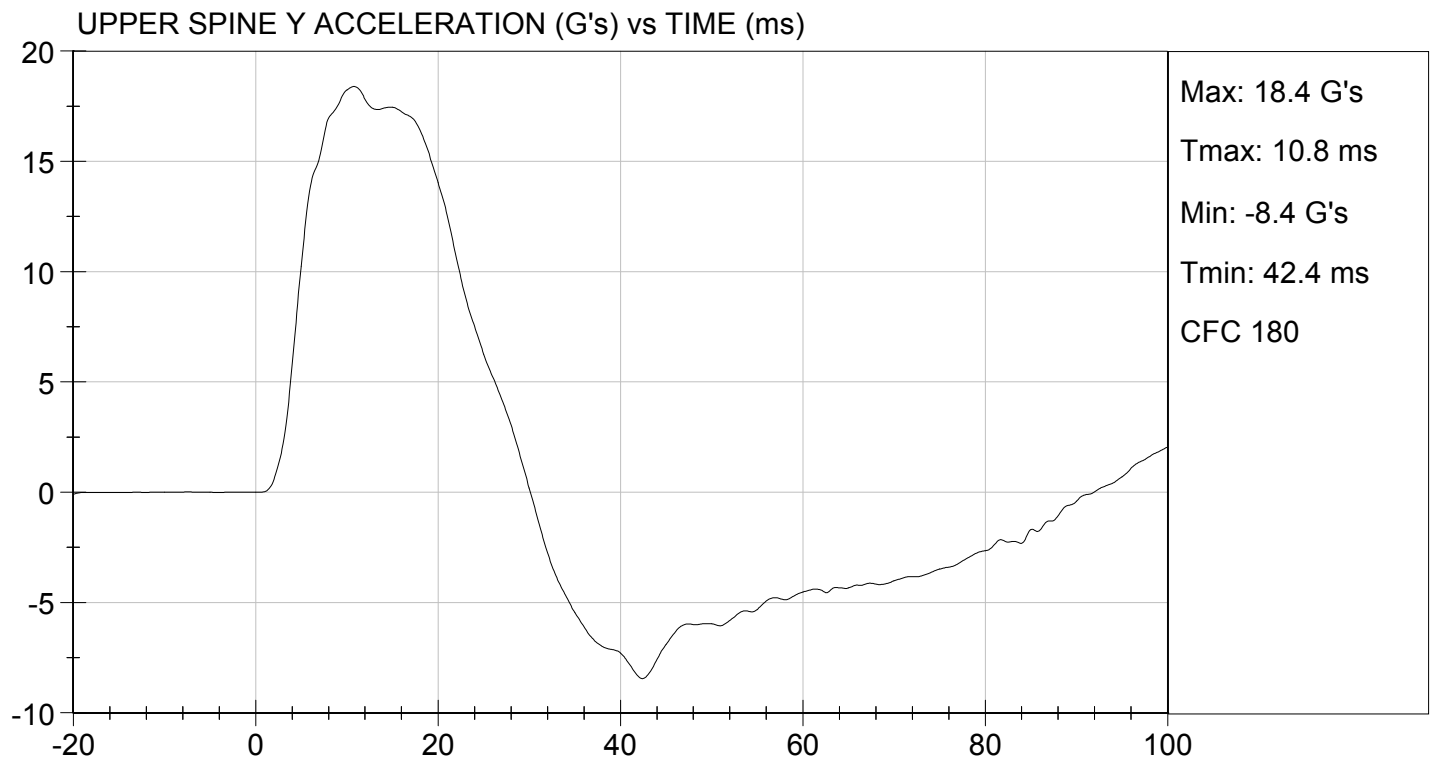
TEST DATE: 09/29/2016
TEST #: D163303





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

TEST DATE: 09/29/2016
TEST #: D163303

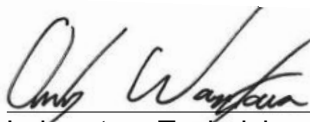


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D163304

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	37	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
Overall Test Results				Pass


Laboratory Technician

09/29/2016

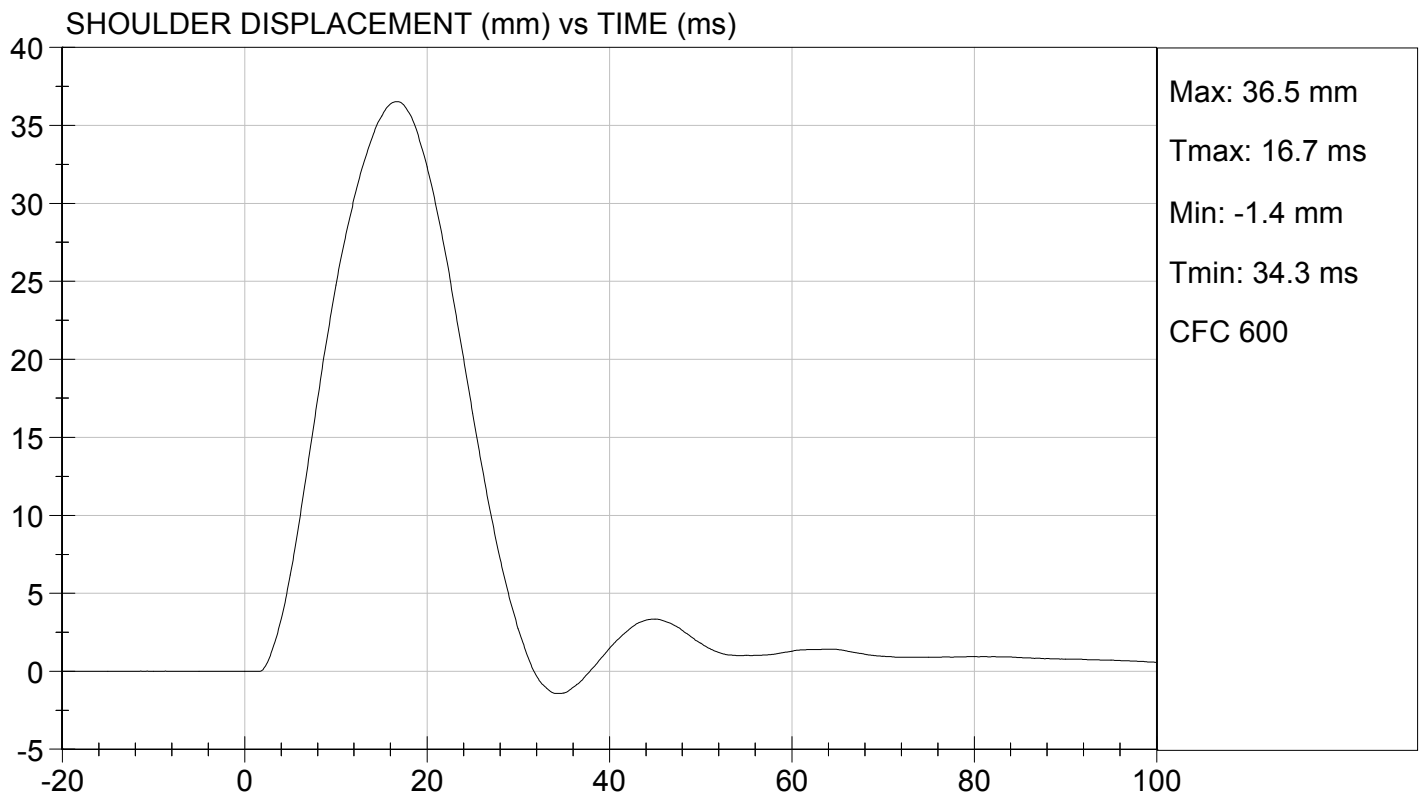
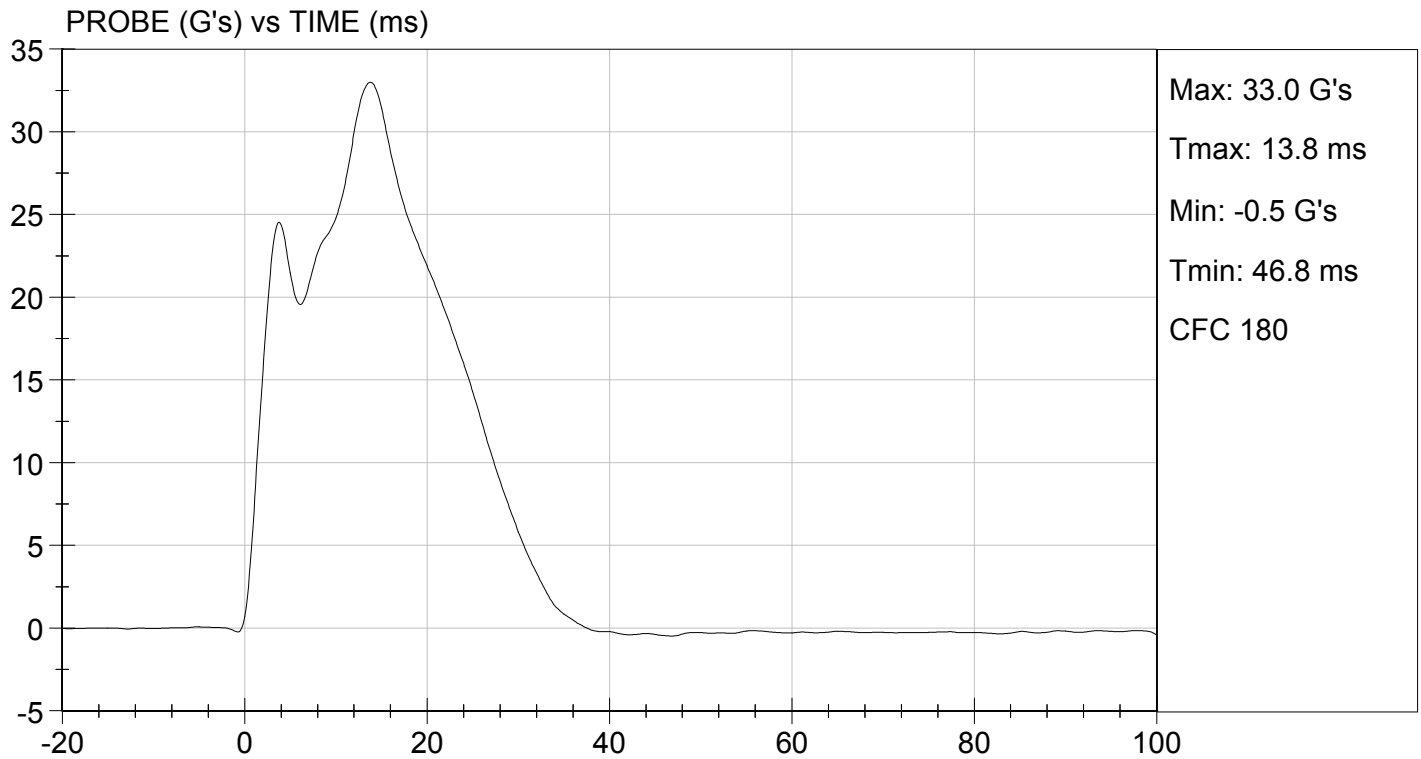
Test Date


Approved By



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

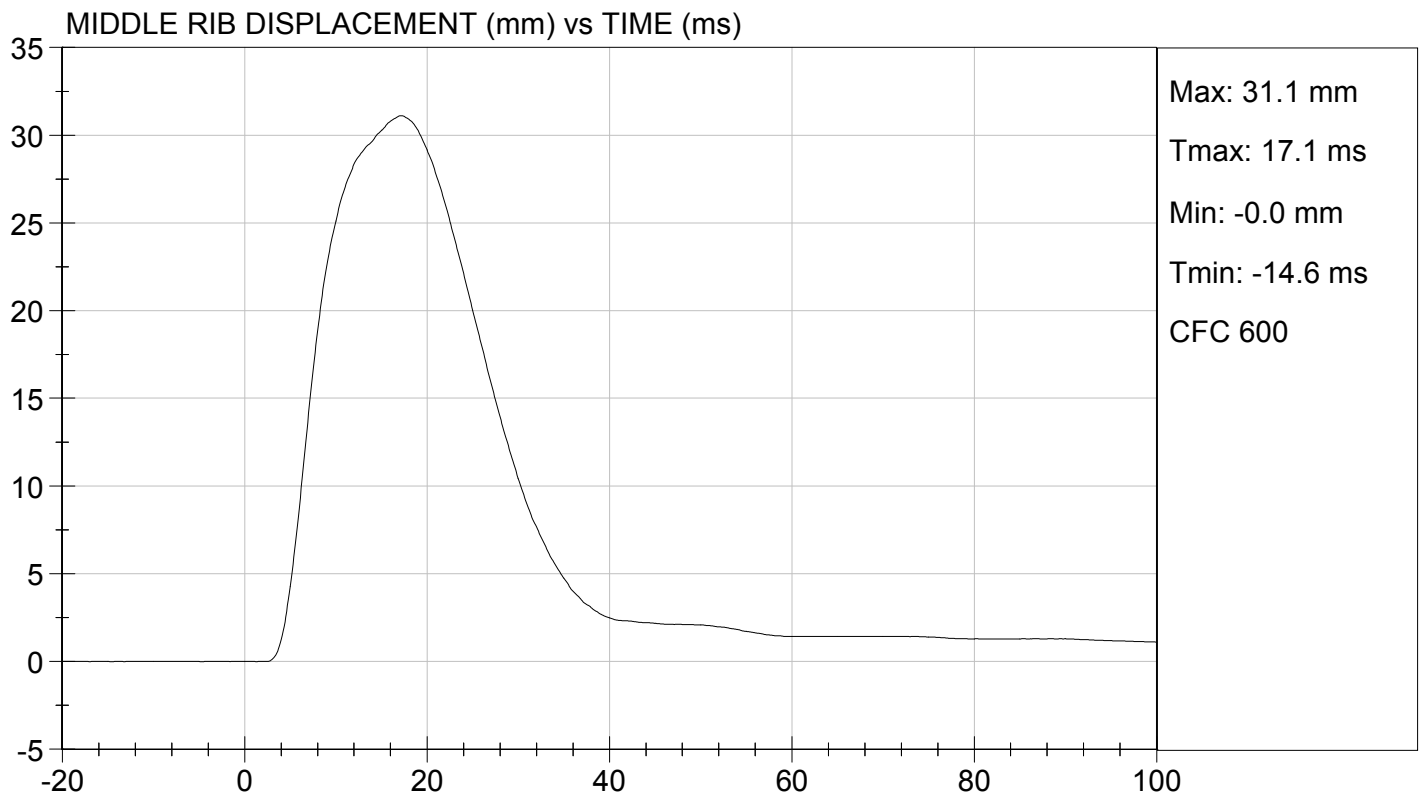
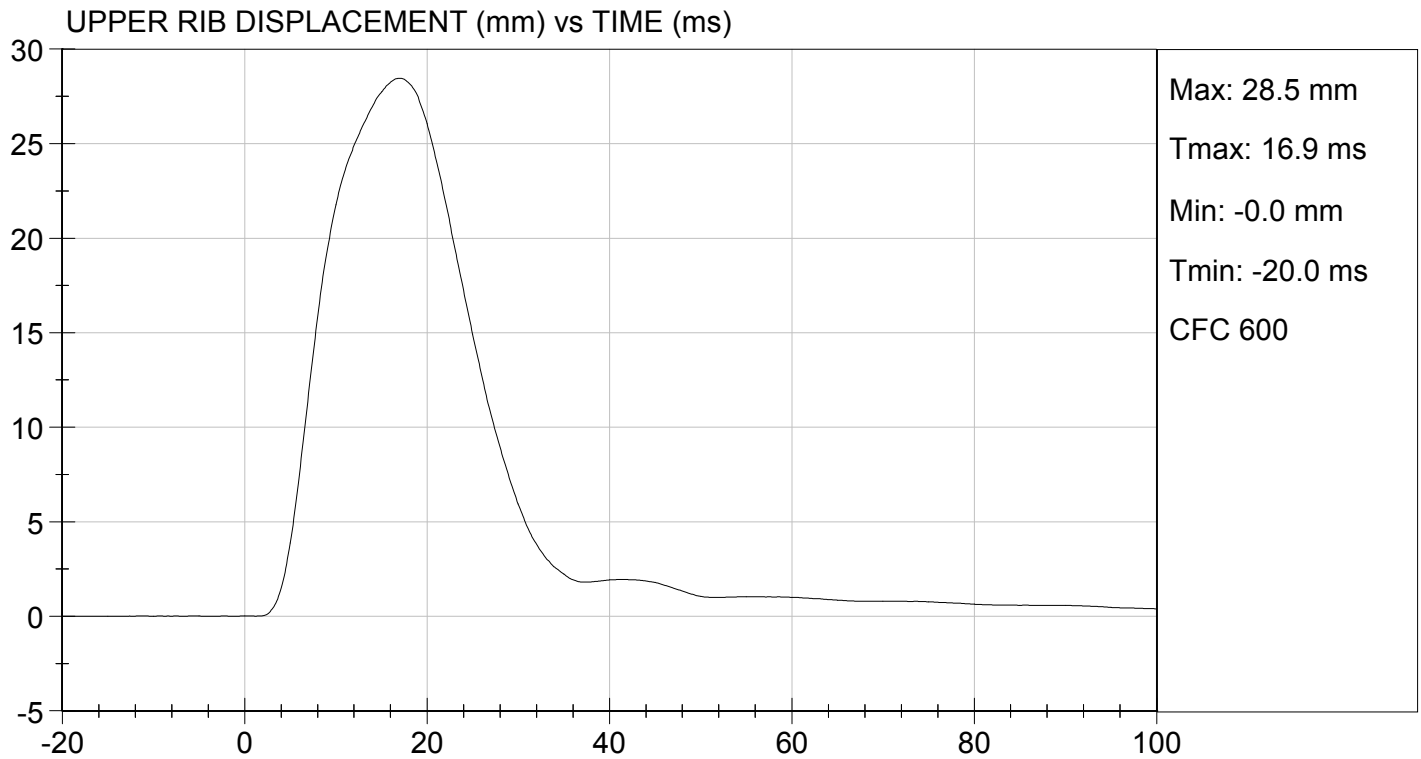
TEST DATE: 09/29/2016
TEST #: D163304





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

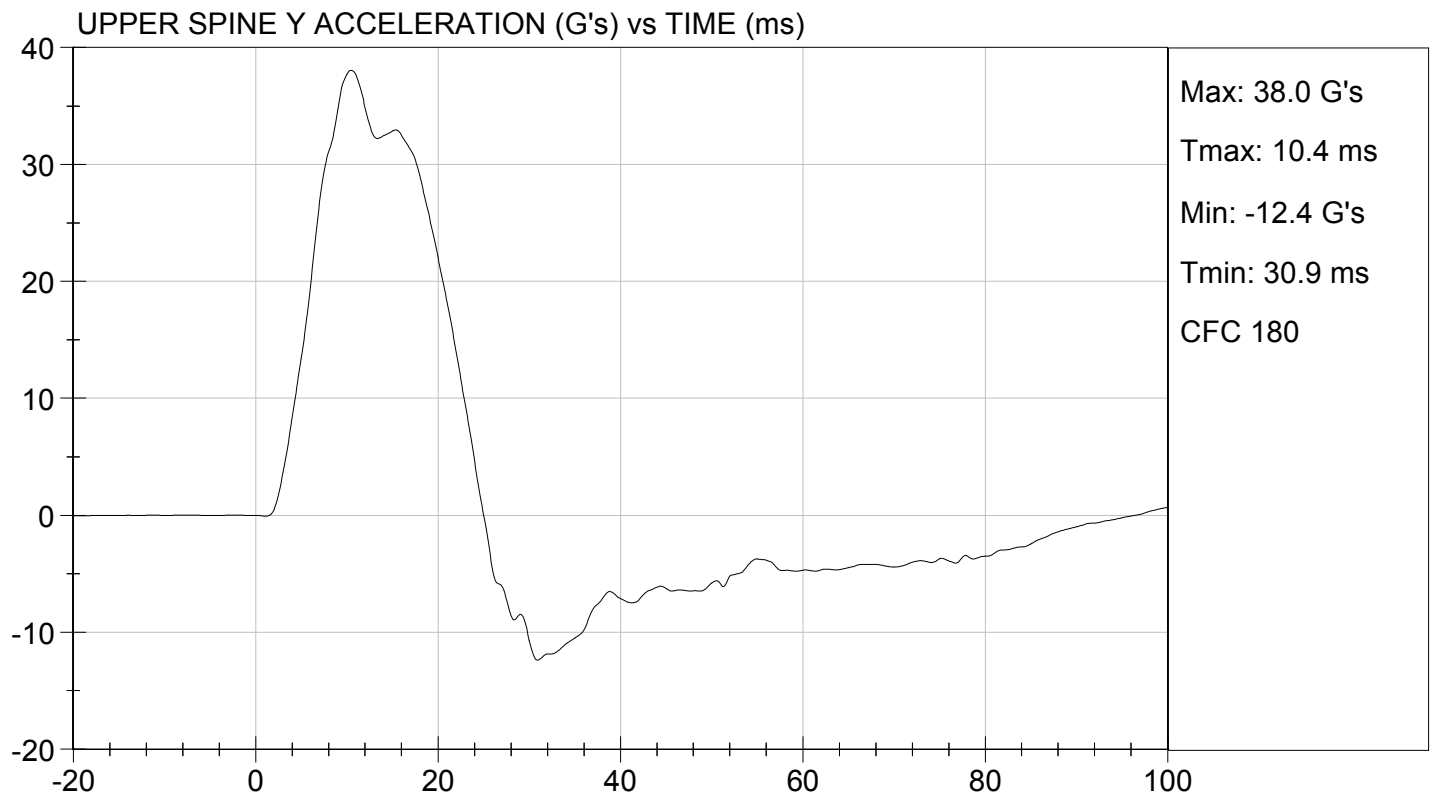
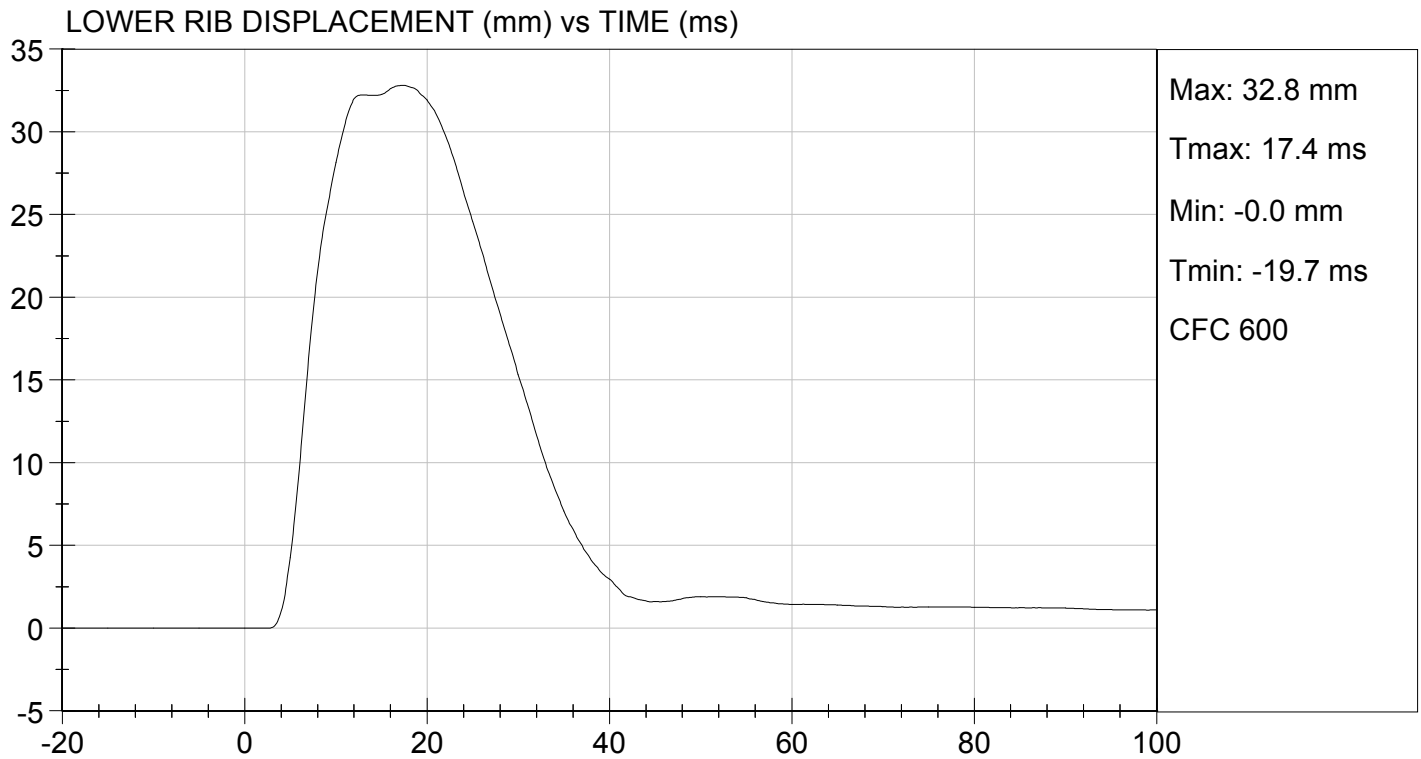
TEST DATE: 09/29/2016
TEST #: D163304





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

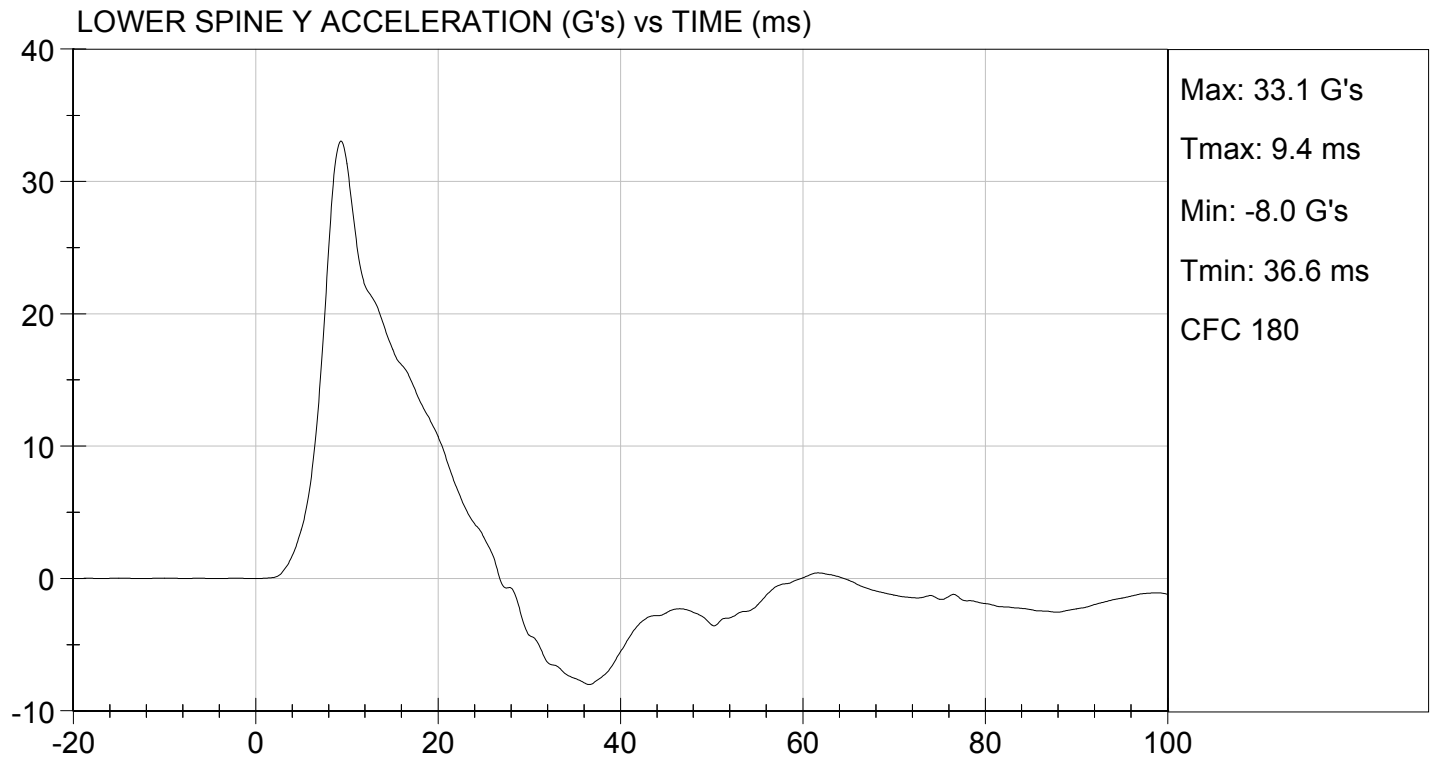
TEST DATE: 09/29/2016
TEST #: D163304





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

TEST DATE: 09/29/2016
TEST #: D163304

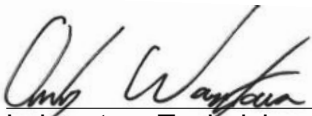


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D163305

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results				Pass


Laboratory Technician

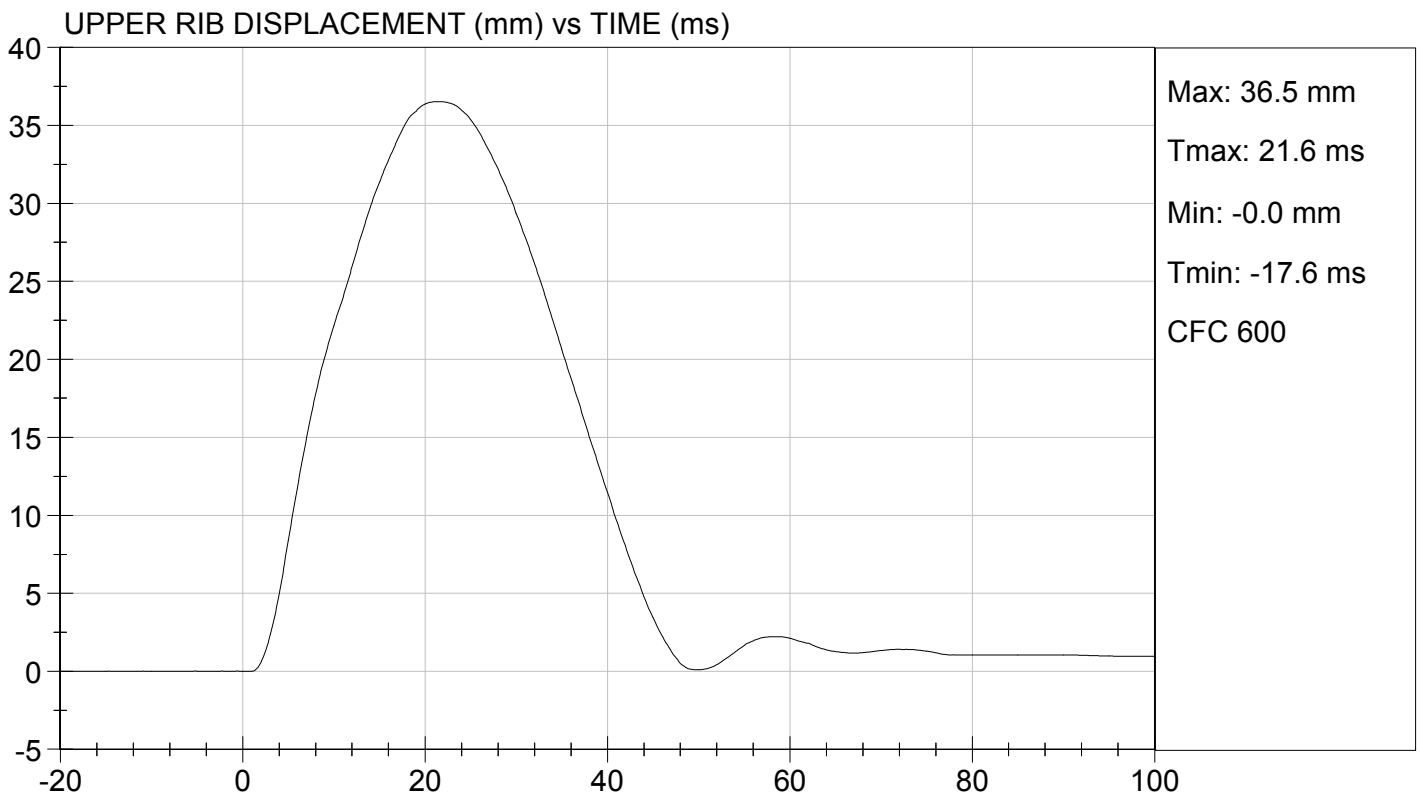
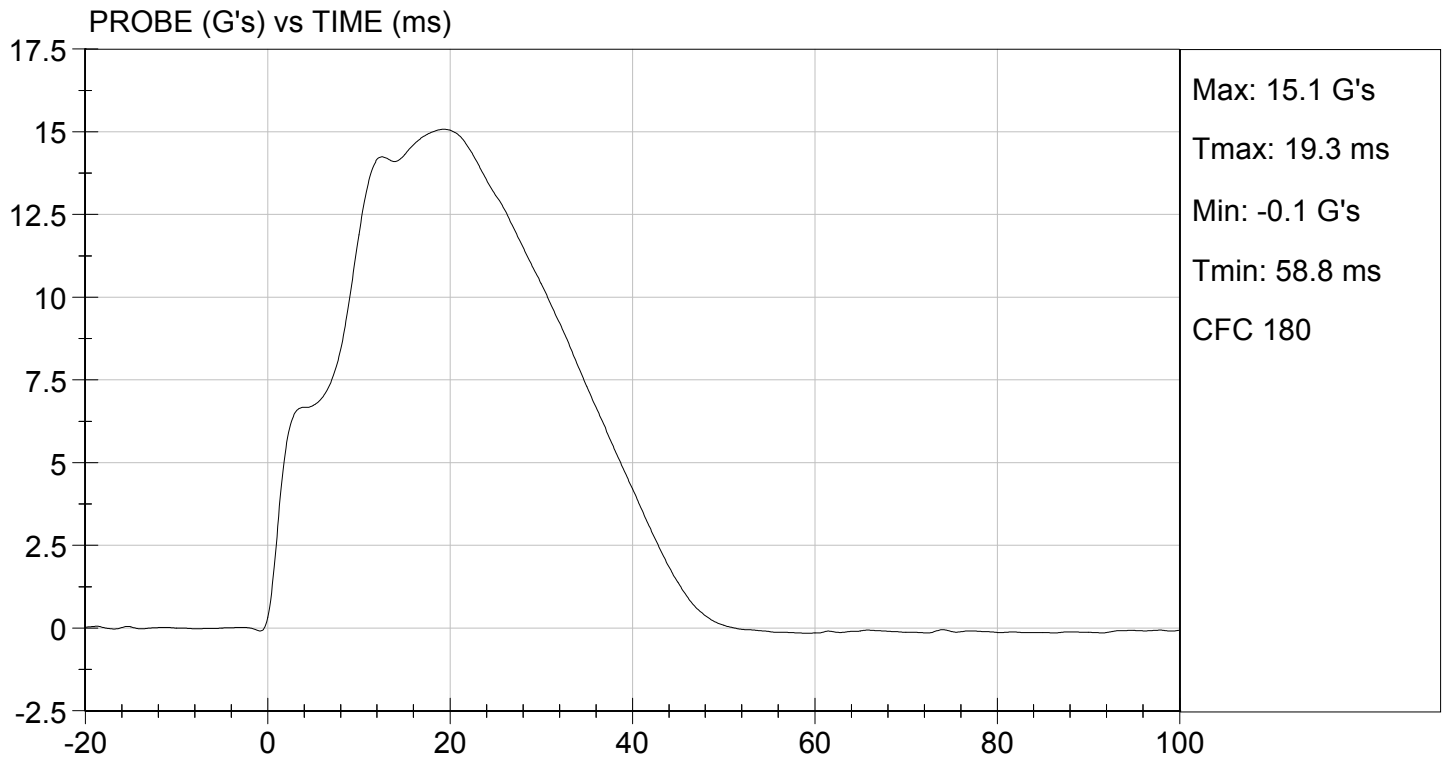
09/29/2016
Test Date


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163305

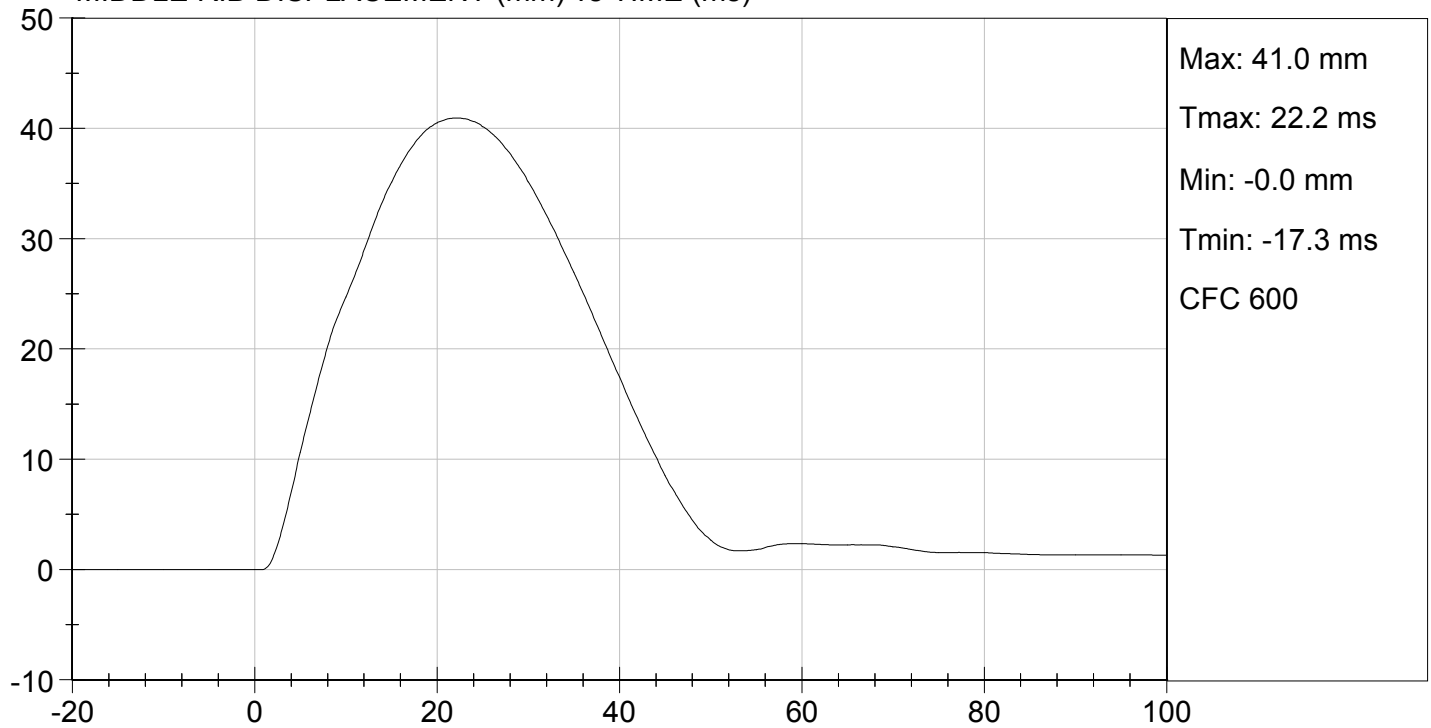




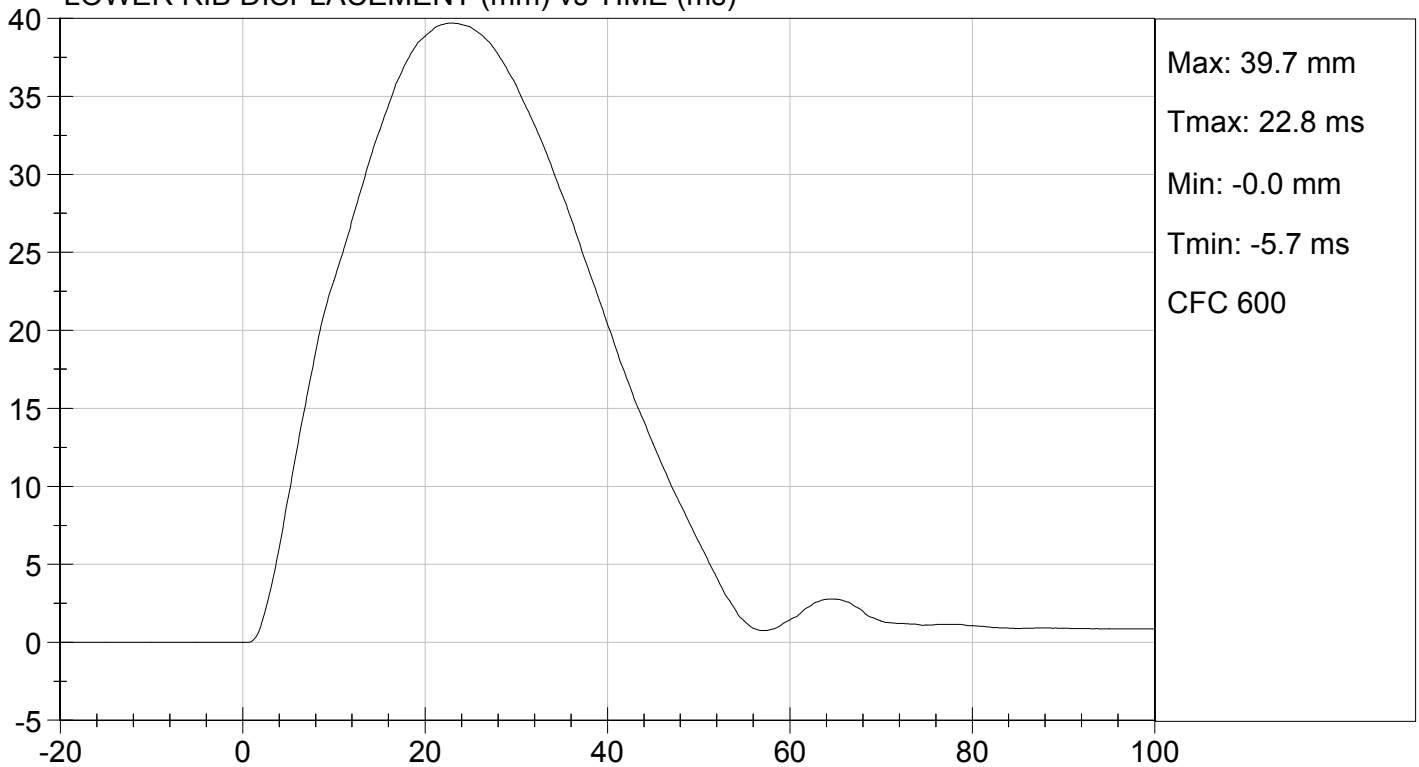
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 09/29/2016
TEST #: D163305

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

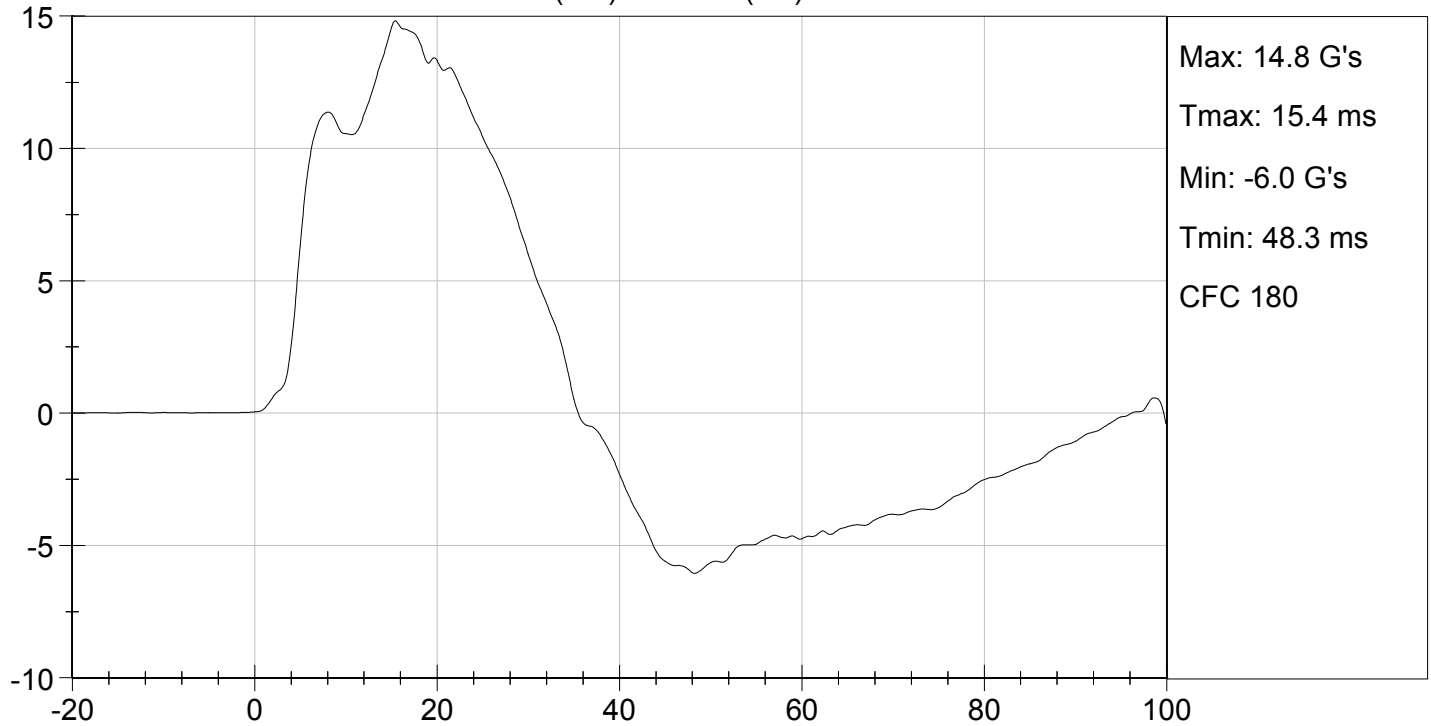




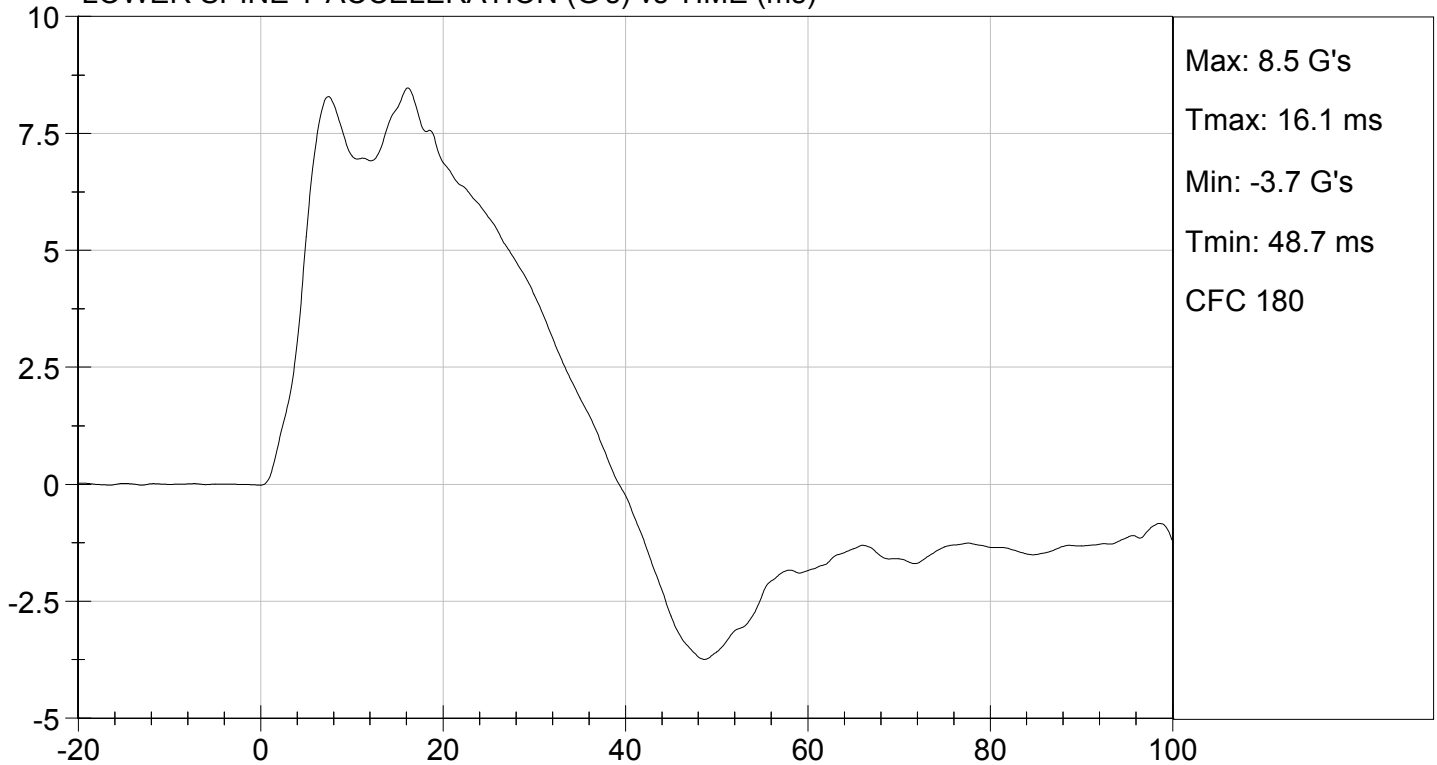
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 09/29/2016
TEST #: D163305

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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



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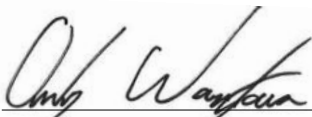
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D163306

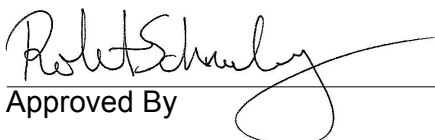
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass



Laboratory Technician

09/29/2016

Test Date

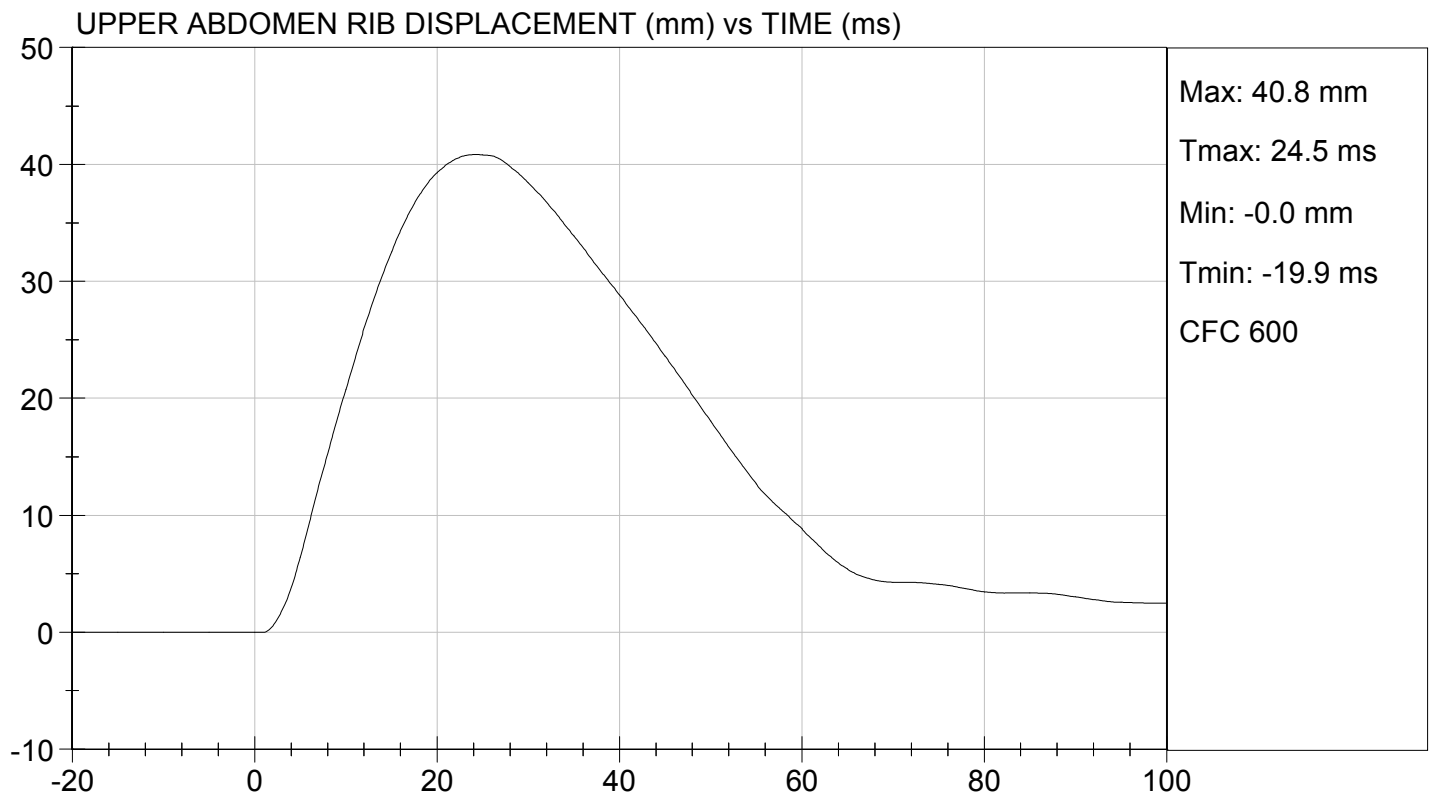
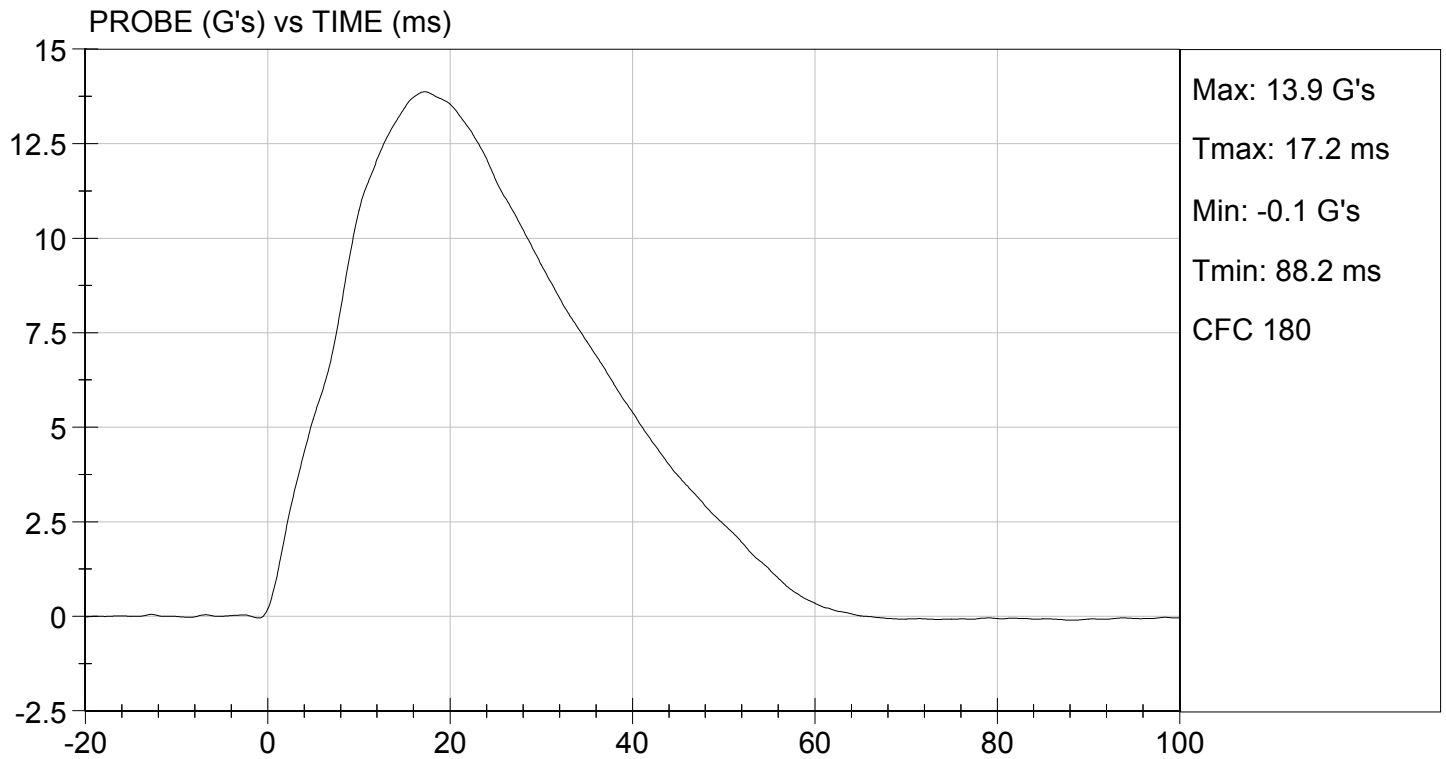


Approved By



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

TEST DATE: 09/29/2016
TEST #: D163306

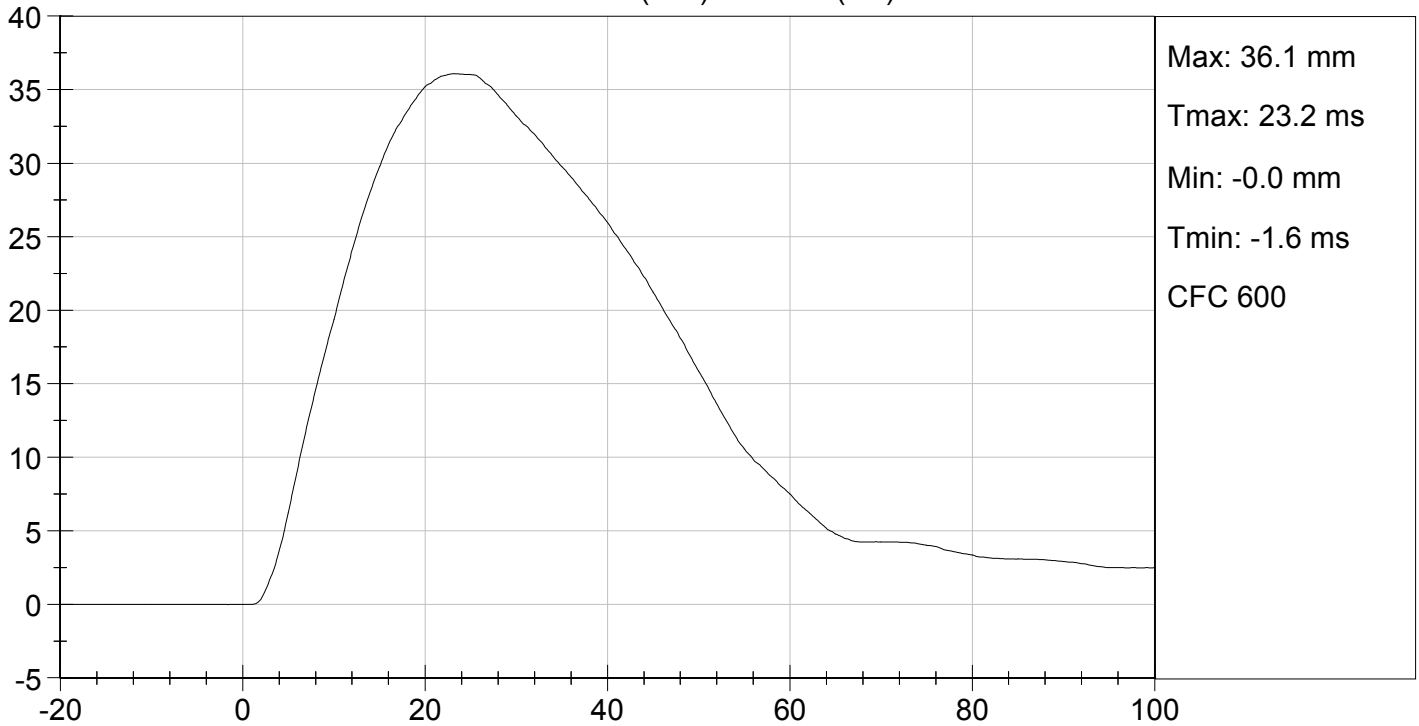




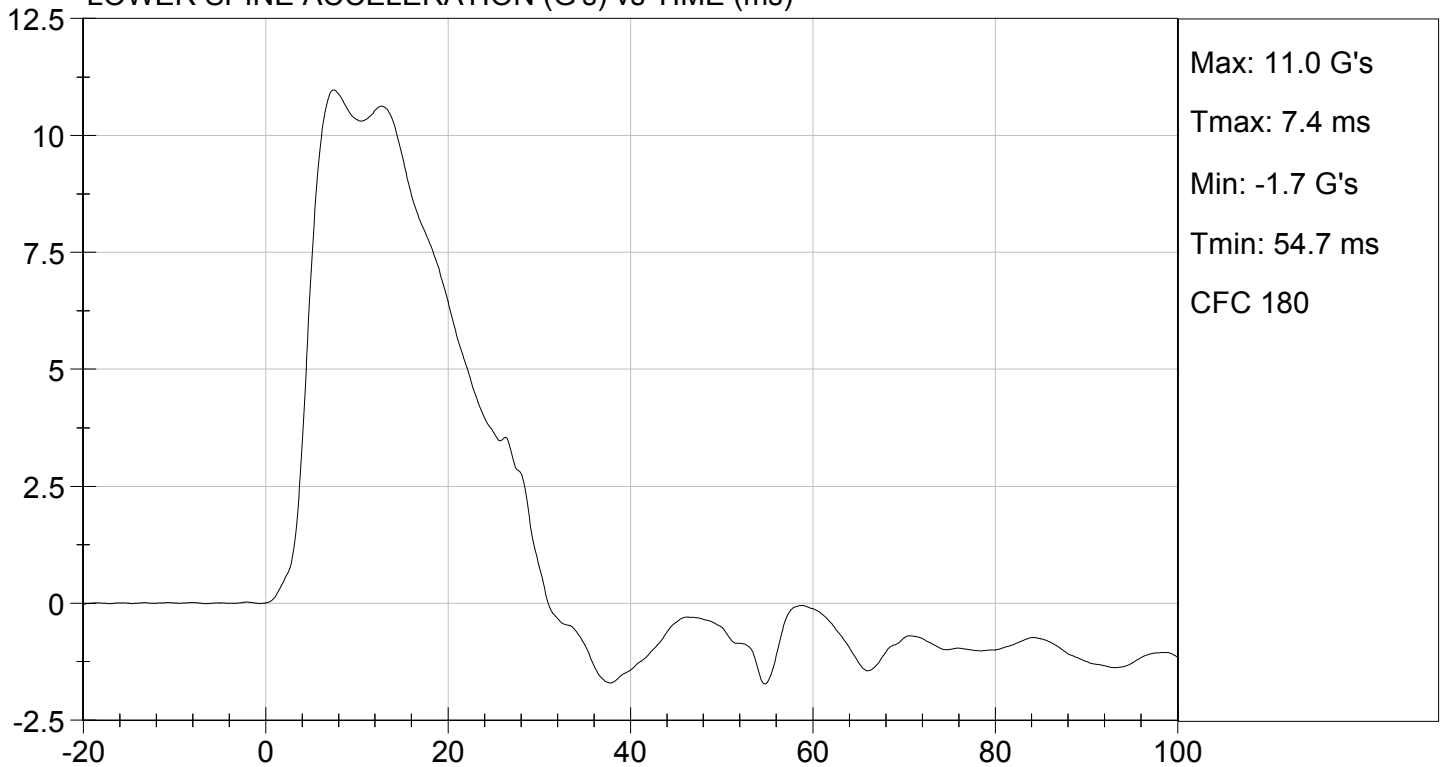
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 09/29/2016
TEST #: D163306

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



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



MGA RESEARCH CORPORATION

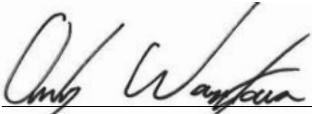
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

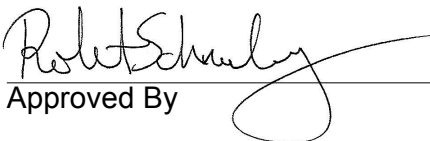
ATD Serial No: 306

Test I.D: D163307

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	4,034	Pass
Overall Test Results				Pass


Laboratory Technician

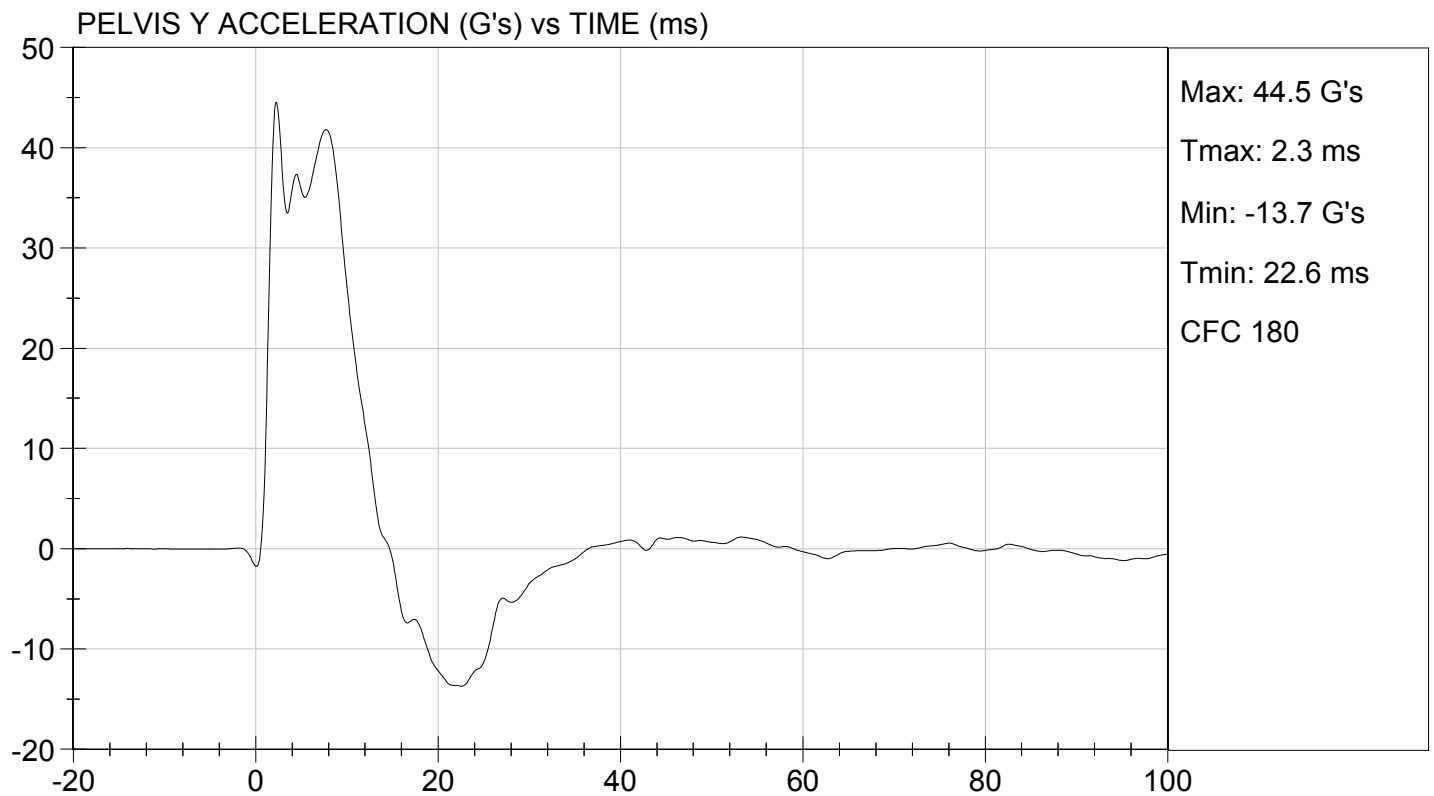
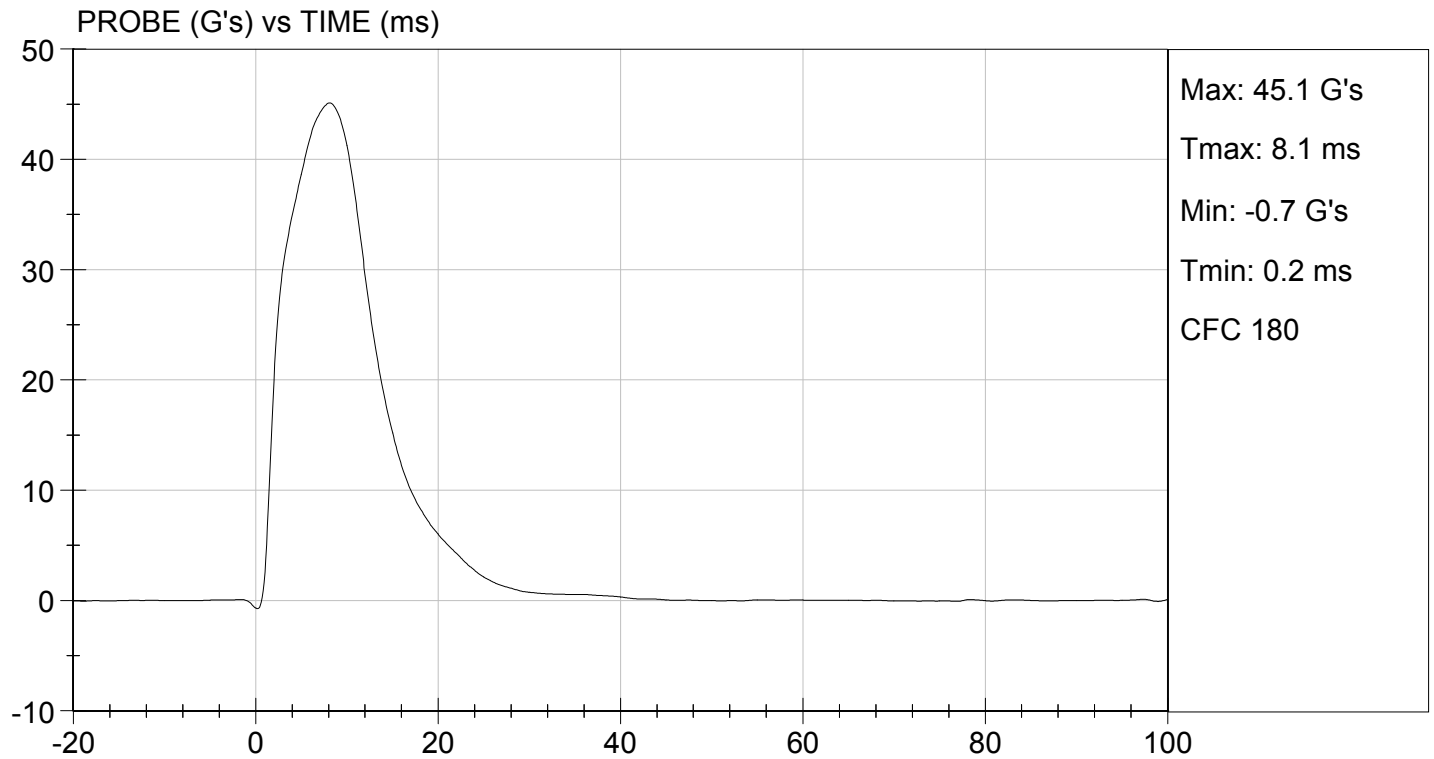
09/29/2016
Test Date


Approved By



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

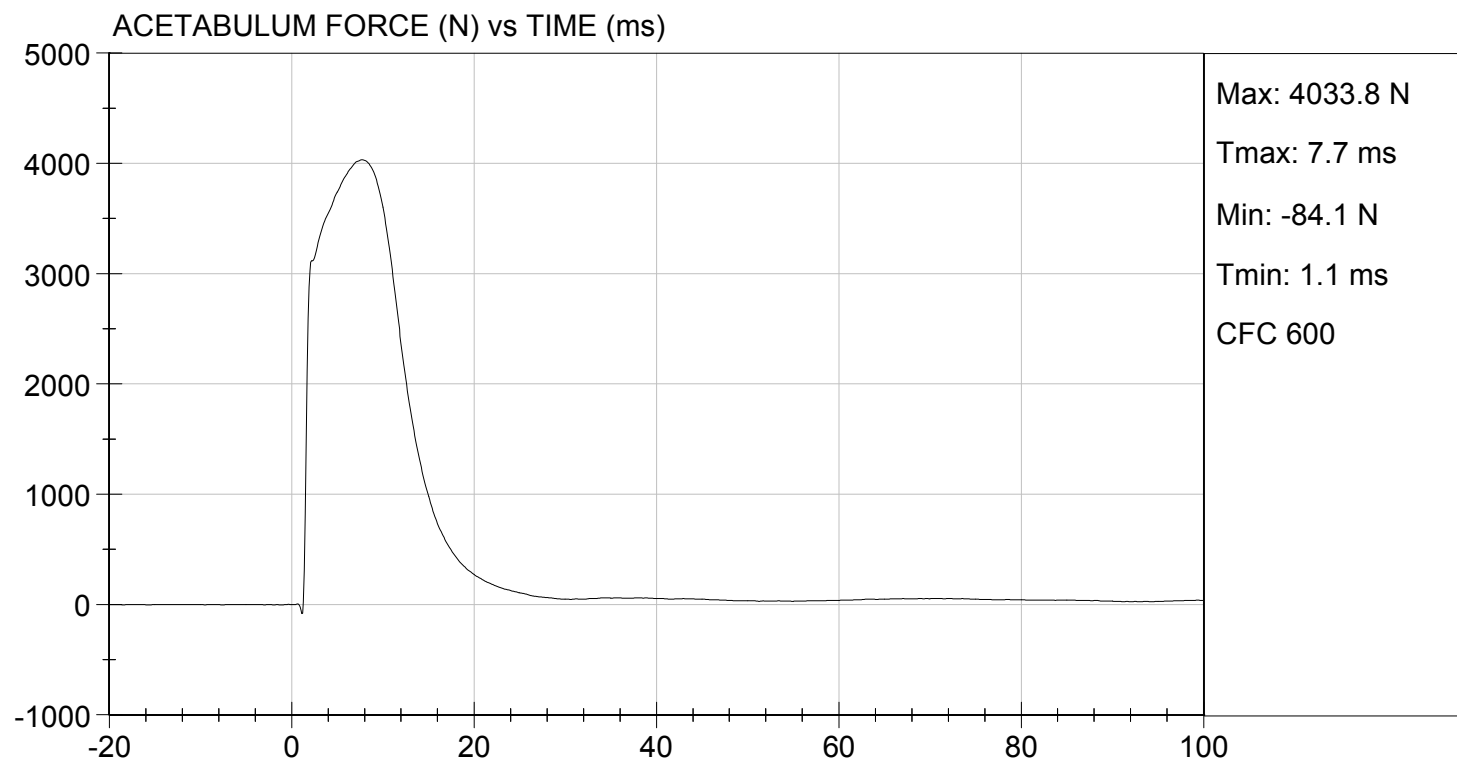
TEST DATE: 09/29/2016
TEST #: D163307





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

TEST DATE: 09/29/2016
TEST #: D163307



MGA RESEARCH CORPORATION

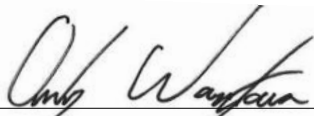
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D163308

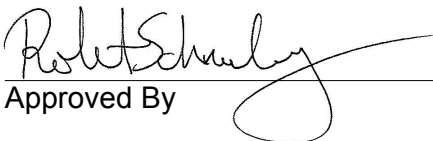
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	36 to 45	38	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,286	Pass
Overall Test Results				Pass



Laboratory Technician

09/29/2016

Test Date

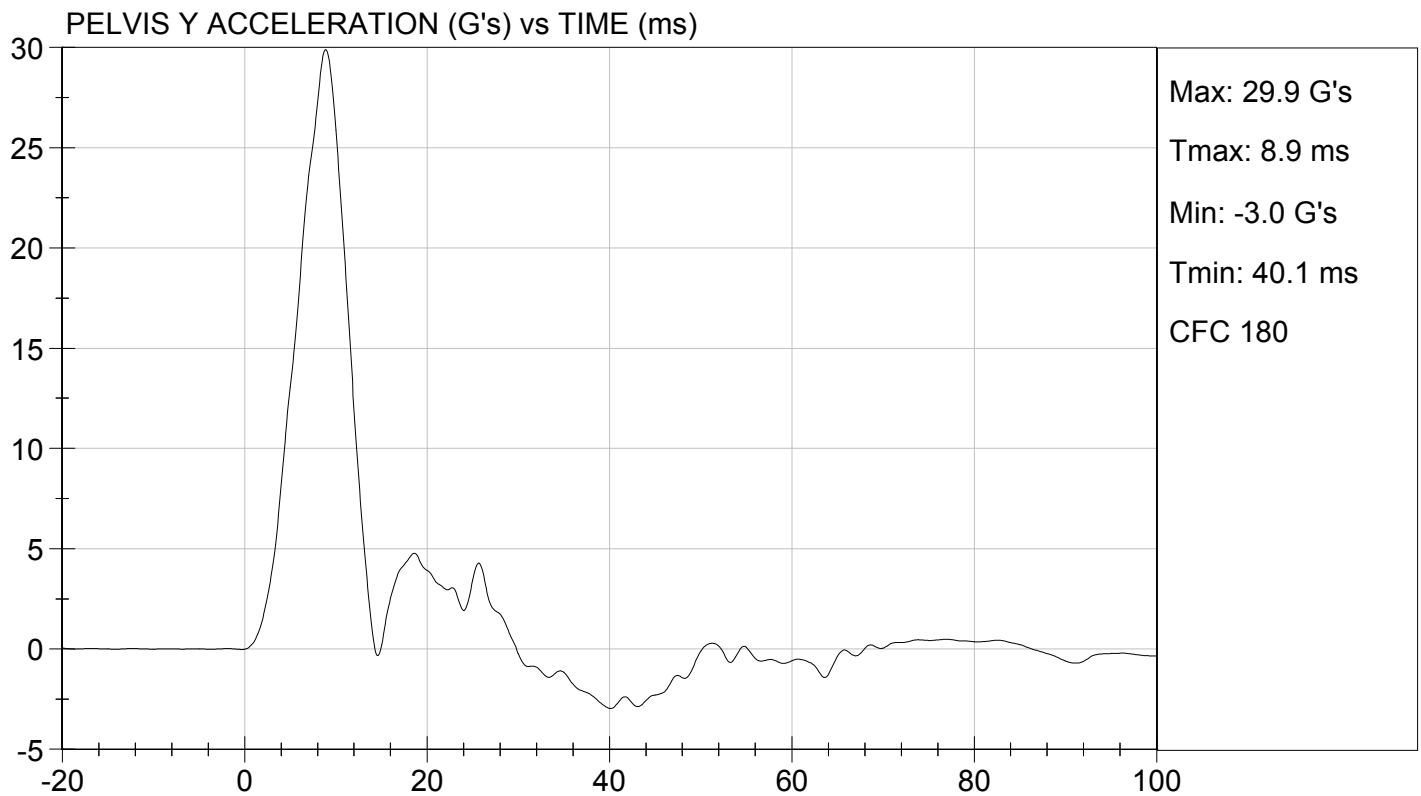
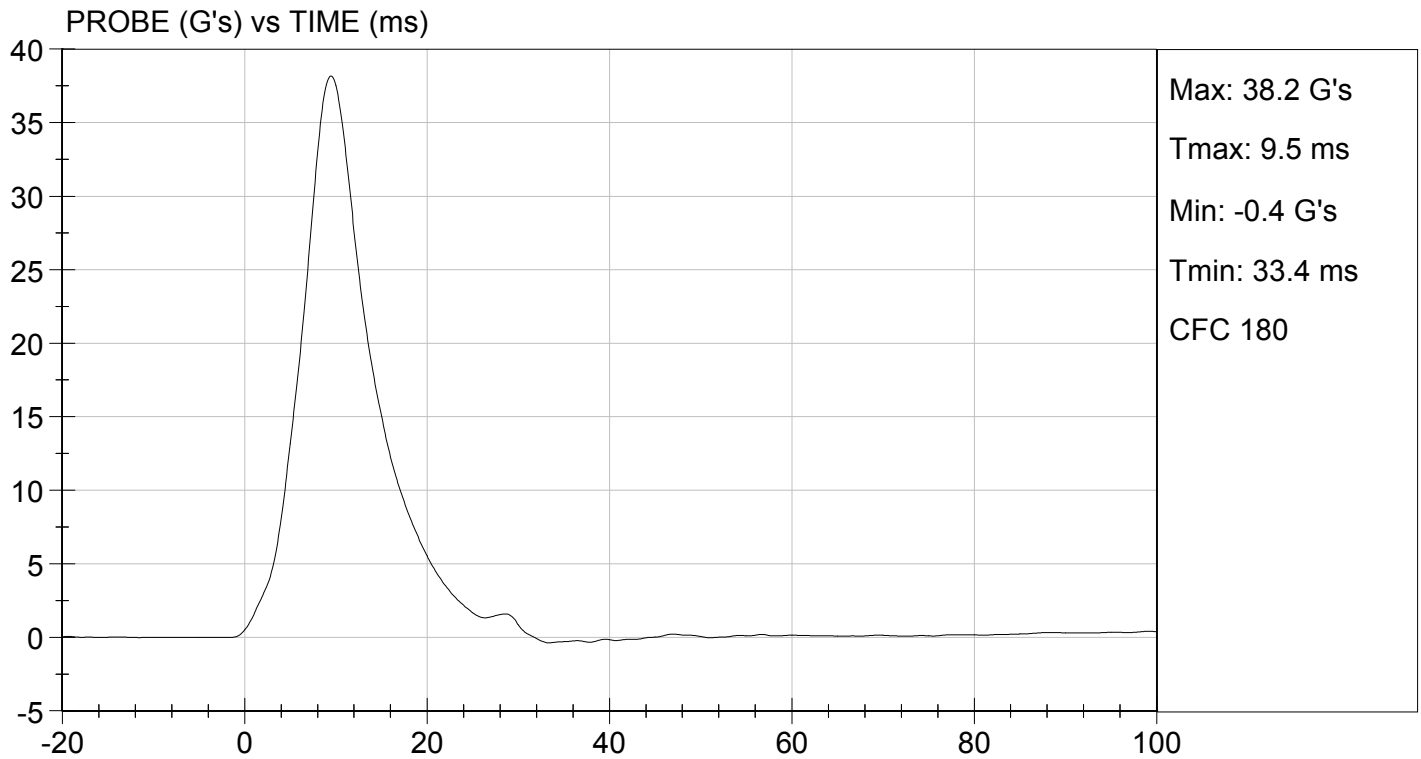


Approved By



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

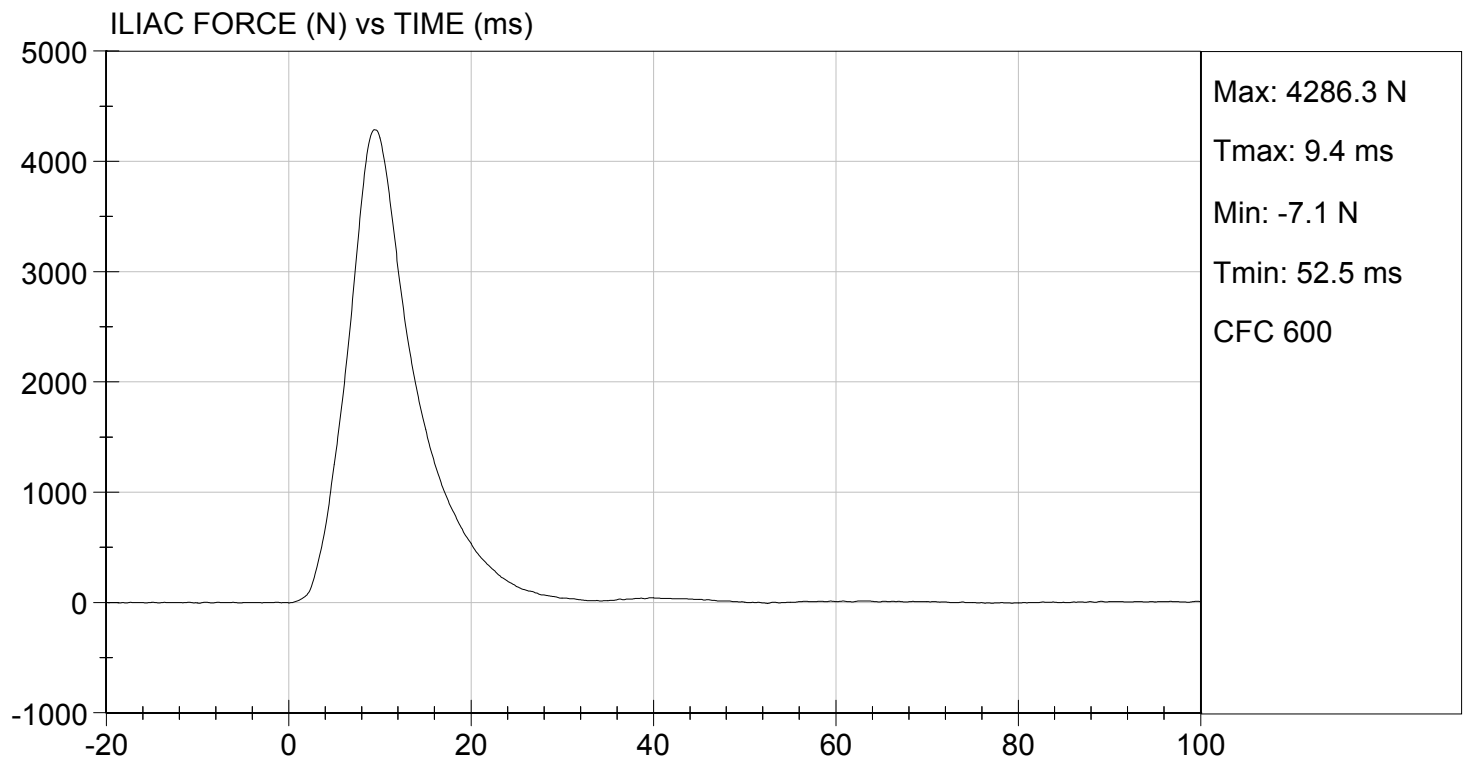
TEST DATE: 09/29/2016
TEST #: D163308



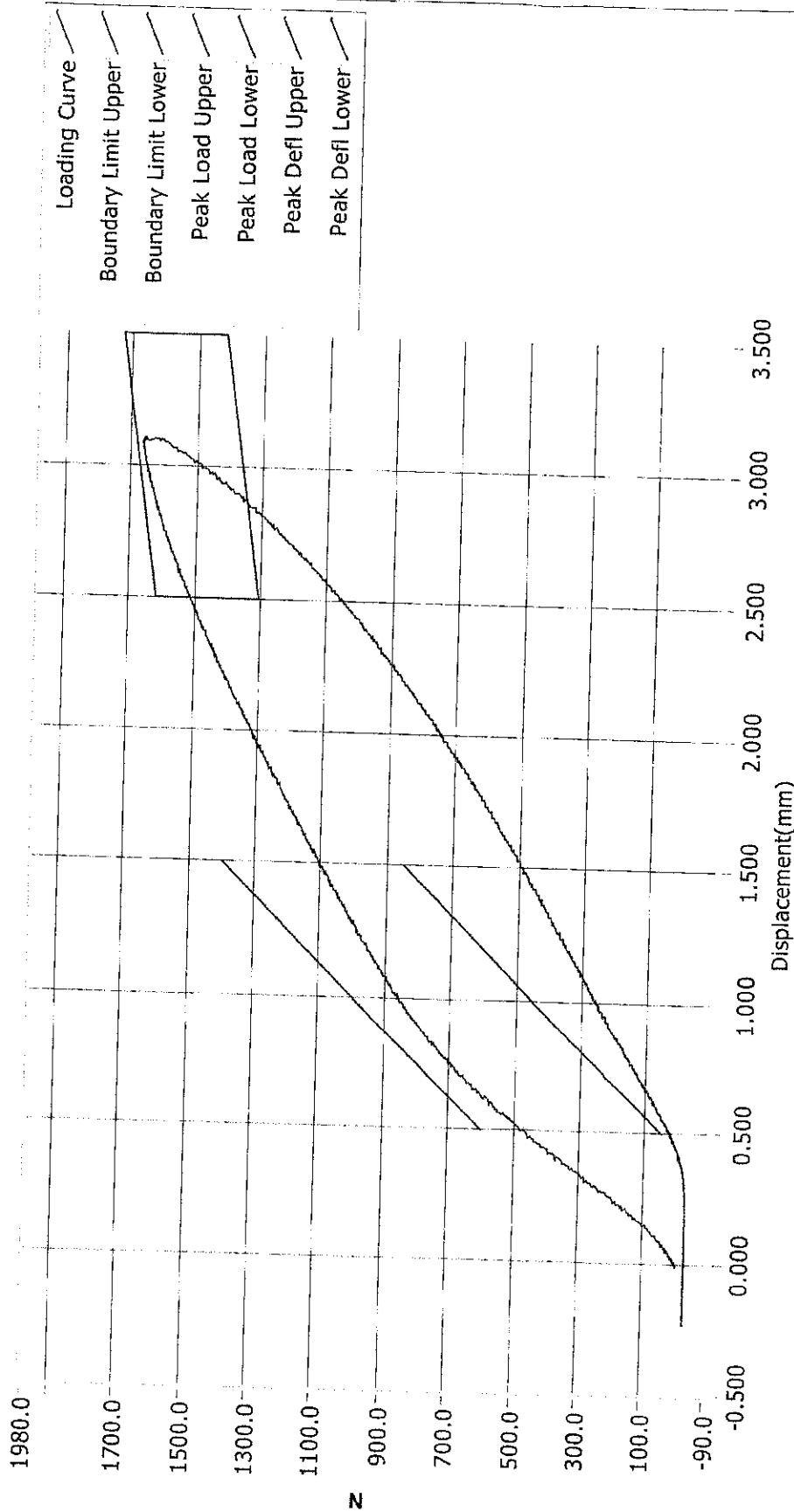


TEST DESC: ILLIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 09/29/2016
TEST #: D163308



Resultant Data - SIDIIs Plug Compression



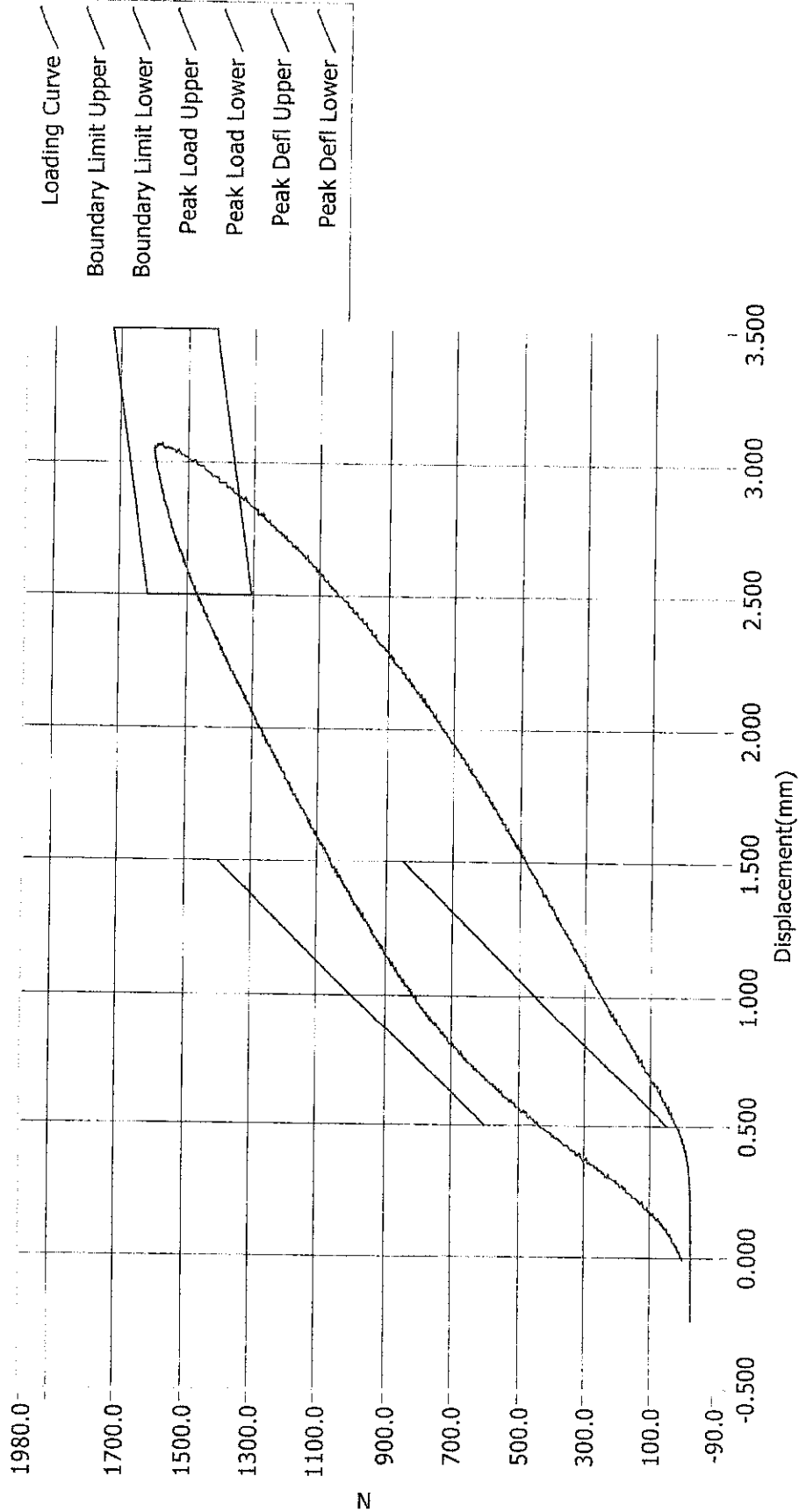
ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	80992	12/3/2014	10:34 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 12/3/2014

Current Time : 22:39:52

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	80707	11/20/2014	9:41 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 11/20/2014 Current Time : 21:43:46

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	P79741	Endevco	07/08/16
		Y	P79743	Endevco	07/08/16
		Z	P79744	Endevco	07/08/16
		Xr	P79586	Endevco	07/08/16
		Yr	P79590	Endevco	07/08/16
		Zr	P79592	Endevco	07/08/16
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	07/14/16
	Middle	Y	G169	Honeywell	07/14/16
	Lower	Y	G164	Honeywell	07/14/16
Abdomen Load Cells	Forward	Y	ABG1532	Denton	11/19/15
	Middle	Y	ABG1534	Denton	11/19/15
	Rear	Y	ABG1535	Denton	11/19/15
Lower Spine Accelerometers (T12)		X	P85161	Endevco	06/07/16
		Y	P85162	Endevco	06/07/16
		Z	P85163	Endevco	06/07/16
Public Symphysis Load Cell		Y	PG461	Denton	11/19/15

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P86769	Endevco	09/15/16
				Y	P86770	Endevco	09/15/16
				Z	P86774	Endevco	09/15/16
				Xr	P86775	Endevco	09/15/16
				Yr	P86776	Endevco	09/15/16
				Zr	P86777	Endevco	09/15/16
Head Angular Rate Sensors				X	ARS7416	DTS	07/15/14
				Y	ARS7442	DTS	07/15/14
				Z	ARS7475	DTS	07/15/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	03/29/16	
		Middle	Y	G1261	FTSS	03/29/16	
		Lower	Y	G1270	FTSS	03/29/16	
	Abdominal Rib	Upper	Y	G032	FTSS	03/29/16	
		Lower	Y	G1304	FTSS	03/29/16	
Lower Spine Accelerometers (T12)				X	P92715	Endevco	09/21/16
				Y	P92971	Endevco	09/21/16
				Z	P93965	Endevco	09/21/16
Acetabulum Load Cell				Y	ACG269	Denton	05/06/16
Iliac Wing Load Cell				Y	IWG282	Denton	01/08/16
Pelvis Plug (struck side)					80992	FTSS	12/03/14
Pelvis Plug (non-struck side)					80707	FTSS	11/20/14

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	PCB516	PCB	04/27/2016
	Vehicle Center of Gravity	Y	PCB518	PCB	04/27/2016
	Vehicle Center of Gravity	Z	PCB520	PCB	04/27/2016
2	Right Sill at Front Seat	X	PCB283	PCB	08/22/2016
	Right Sill at Front Seat	Y	PCB582	PCB	08/11/2016
	Right Sill at Front Seat	Z	PCB285	PCB	08/22/2016
3	Right Sill at Rear Seat	X	PCB383	PCB	04/25/2016
	Right Sill at Rear Seat	Y	PCB384	PCB	04/25/2016
	Right Sill at Rear Seat	Z	PCB260	PCB	06/07/2016
4	Left Sill at Front Door	Y	PCB568	PCB	04/26/2016
5	Left Sill at Rear Door	Y	PCB441	PCB	04/08/2016
6	Left A-Post Lower	Y	PCB826	PCB	08/11/2016
7	Left A-Post Middle	Y	PCB827	PCB	08/11/2016
8	Left B-Post Lower	Y	PCB327	PCB	04/15/2016
9	Left B-Post Middle	Y	PCB328	PCB	04/15/2016
10	Front Seat Track	Y	P66859	Endevco	06/24/2016
11	Rear Seat Track or Structure	Y	P88166	Endevco	04/06/2016
12	Right Rear Occ. Compartment	Y	P82670	Endevco	08/29/2016
13	Engine Block	X	PCB803	PCB	08/11/2016
	Engine Block	Y	PCB802	PCB	08/11/2016
14	Rear Floorpan Above Axle	X	PCB783	PCB	08/10/2016
	Rear Floorpan Above Axle	Y	PCB782	PCB	08/10/2016
	Rear Floorpan Above Axle	Z	P88728	Endevco	08/29/2016

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	PCB677D	PCB	08/05/2016
MDB Center of Gravity	Y	PCB676D	PCB	08/05/2016
MDB Center of Gravity	Z	PCB675D	PCB	08/05/2016
Left Frame at Rear Axle Centerline	X	PCB495D	PCB	08/05/2016
Left Frame at Rear Axle Centerline	Y	PCB494D	PCB	08/05/2016