

REPORT NUMBER: SPNCAP-MGA-2018-020

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test**

**BAYERISCHE MOTOREN WERKE AG
2018 BMW X1 sDrive28i 5-Door SUV
NHTSA No.: M20184101**

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



Test Date: December 1, 2017

Final Report Date: January 8, 2018

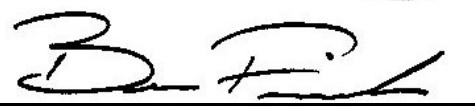
FINAL REPORT

**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: January 8, 2018

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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		14. Sponsoring Agency Code NRM-110																												
15. Supplementary Notes																														
16. Abstract A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2018 BMW X1 sDrive28i 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on December 1, 2017. The impact velocity was 32.39 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.1°C. The test vehicle post-test maximum crush was 338 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>278</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>39</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3625</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>21</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>18</td> </tr> </tbody> </table> *Proposed IARV				Measurement Description	Driver ATD (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	278	Resultant Lower Spine Acceleration	Gs	82	39	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3625	Maximum Thoracic Rib Deflection	mm	38*	21	Maximum Abdomen Rib Deflection	mm	45*	18
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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 Pole Part 572V 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																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2018 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 2018 BMW X1 sDrive28i 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2 SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2018 BMW X1 sDrive28i 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.39 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on December 1, 2017. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated October 2015. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Triaxial Accelerometers
 Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
 Abdomen Upper Rib and Lower Rib Displacement Potentiometers
 Lower Spine (T12) Triaxial Accelerometers
 Iliac Load Cell
 Acetabulum Load Cell

Appendix B contains the vehicle and 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.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Driver ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	278
Resultant Lower Spine Acceleration	Gs	82	39
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3625
Maximum Thoracic Rib Deflection	mm	38*	21
Maximum Abdominal Rib Deflection	mm	45*	18

*Proposed IARV

Supplemental restraint information is given below:

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

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

GENERAL COMMENTS

Left Lower B-Post Y was not installed.
Left Mid B-Post Y was not installed.
Firewall Y recorded no valid data after 32ms.
Load Cell Pole #1 FY recorded no valid data.
Load Cell Pole #2 FY recorded no valid data.
Load Cell Pole #3 FY recorded no valid data.
Load Cell Pole #4 FY recorded no valid data.
Load Cell Pole #5 FY recorded no valid data.
Load Cell Pole #6 FY recorded no valid data.
Load Cell Pole #7 FY recorded no valid data.
Load Cell Pole #8 FY recorded no valid data.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20184101	Traction Control System (TCS)	Yes
Model Year	2018	Auto-Leveling System	No
Make	BMW	Automatic Door Locks (ADL)	Yes
Model	X1 sDrive28i	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	N/A
VIN	WBXHU7C32J5H40357	Driver Front Airbag	Yes
Body Color	Mediterranean Blue Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	82km / 51mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0 L	Driver Torso Airbag	No
Type/No. Cylinders	I4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	8	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	FWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

Does owner's manual provide instructions to turn off automatic door locks?	Yes
--	-----

DATA FROM CERTIFICATION LABEL

Manufactured By	BAYERISCHE MOTOREN WERKE AG	GVWR (kg)	2075
Date of Manufacture	09/17	GAWR Front (kg)	1090
Vehicle Type	MPV	GAWR Rear (kg)	1035

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				408	(A)
DSC x 68.04 kg				340	(B)
Rated Cargo and Luggage Weight (RCLW) (kg)				68	(A-B)

VEHICLE SEAT TYPE

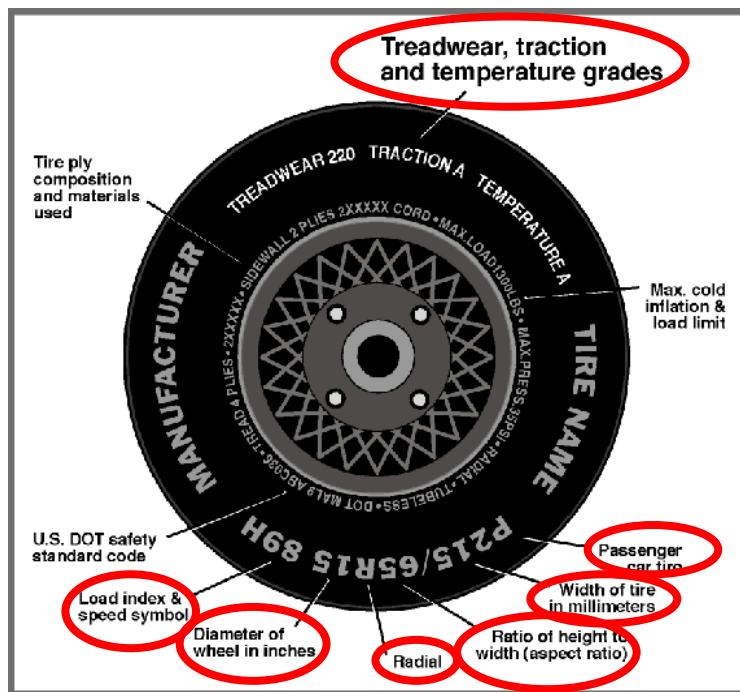
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X						X
Rear or Second Row			X			w/ Lever	
Third Row Seat							

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

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	225/50R18	225/50R18
Tire Size on Vehicle	225/50R18	225/50R18
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Cinturato	Cinturato
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Rayon	1 Rayon
Tire Plies Body	1 Rayon, 2 Steel, 1 Polyamide	1 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	95V	95V
Tire Material	Rubber	Rubber
DOT Safety Code Left	93Y7 T610 3417	93Y7 T610 3417
DOT Safety Code Right	93Y7 T610 3417	93Y7 T610 3417

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

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kpa	186	179	186	186
Tire Placard	kpa	220	220	220	220
Owner's Manual	kpa	220	220	220	220
As Tested	kpa	220	220	220	220

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	458.5	328.5		476.0	378.5		475.5	384.0	
Right	kg	458.5	321.0		460.0	366.0		459.5	367.0	
Ratio	%	58.5%	41.5%		55.7%	44.3%		55.5%	44.5%	
Totals	kg	917.0	649.5	1566.5	936.0	744.5	1680.5	935.0	751.0	1686.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1566.5	(A)
Actual Weight of 1 P572V ATD (SID-IIs) ATD Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	68	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1686.5	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	deg	-0.5	0.1	0.1	Yes
Front Pass. Sill Angle (front-to-rear)*	deg	-1.0	-0.4	-0.4	Yes
Front Bumper Angle (left-to-right)**	deg	-0.3	-0.4	-0.4	Yes
Rear Bumper Angle (left-to-right)**	deg	0.3	0.3	0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1117	1181	1186	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	4	13	15	

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

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast (if any)	17
None	

Test height adjustable suspension setting, if applicable:	Not Applicable
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DATA SHEET NO. 2
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, 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	21.6	11.9	16.8
Front Passenger Seat	20.8	10.8	15.8
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRIP Height (mm)	SCRIP Height Position	SCRIP Height (mm)		
				Rear- most	Mid- Fore/Aft	Forward- Most
Driver Seat	16.8	30	Max	60	60	60
			Mid	30	30	30
			Min	0	0	0
Front Passenger Seat	15.8	30	Max	60	60	60
			Mid	30	30	30
			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: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

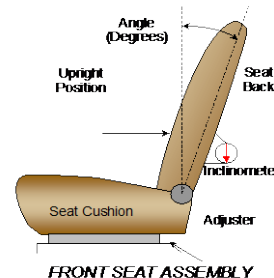
NHTSA No. M20184101
 Test Date: 12/01/2017

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-most Position	
	mm	Detents	mm	Detent
Driver Seat	250		0	
Front Passenger Seat	190		0	
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents	Degree	Detent
Driver Seat w/Seated Dummy	60.7		12.1	
Front Passenger Seat	60.5		12.3	
Front Center Seat				
Struck Side Rear Seat	6.0	4 (1 st as 1)	16.5	0 th (1 st as 0)
Non-Struck Side Rear Seat	6.0	4 (1 st as 1)	16.5	0 th (1 st as 0)
Rear Center Seat	6.0	4 (1 st as 1)	16.5	0 th (1 st as 0)

Seat back angles measured on seat back center.

SEAT BELT ANCHORAGE ADJUSTMENT

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

	Total # of Positions	Placed in Position #
Driver Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	4 detents (1 st as 1)	0 (Lowermost as 0)

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

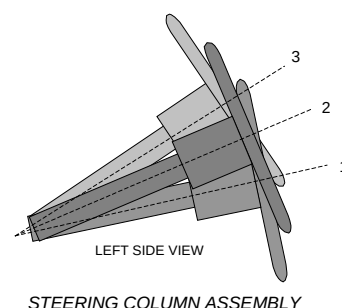
Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
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STEERING COLUMN ADJUSTMENT

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

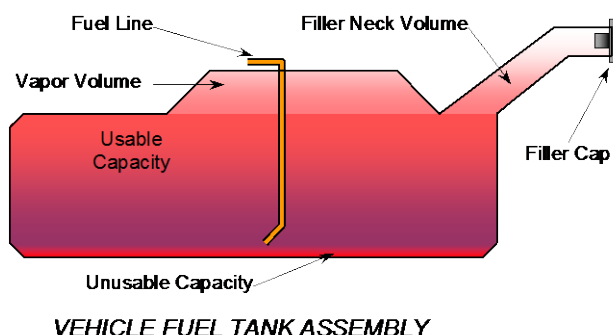
	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	67.4	235
Geometric Center, Position 2	65.1	205
Uppermost, Position 3	62.8	175
Telescoping Steering Wheel Travel		60
Test Position	65.1	205



FUEL PUMP

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

The vehicle is equipped with an electronic fuel pump. Fuel pump starts when ignition is on. The fuel pump will operate for 5 seconds. After pressure has been built up the fuel pump switches to sleep mode until the engine will be started or the pressure decreases. The filler neck is located on the passenger's side.



FUEL TANK CAPACITY DATA

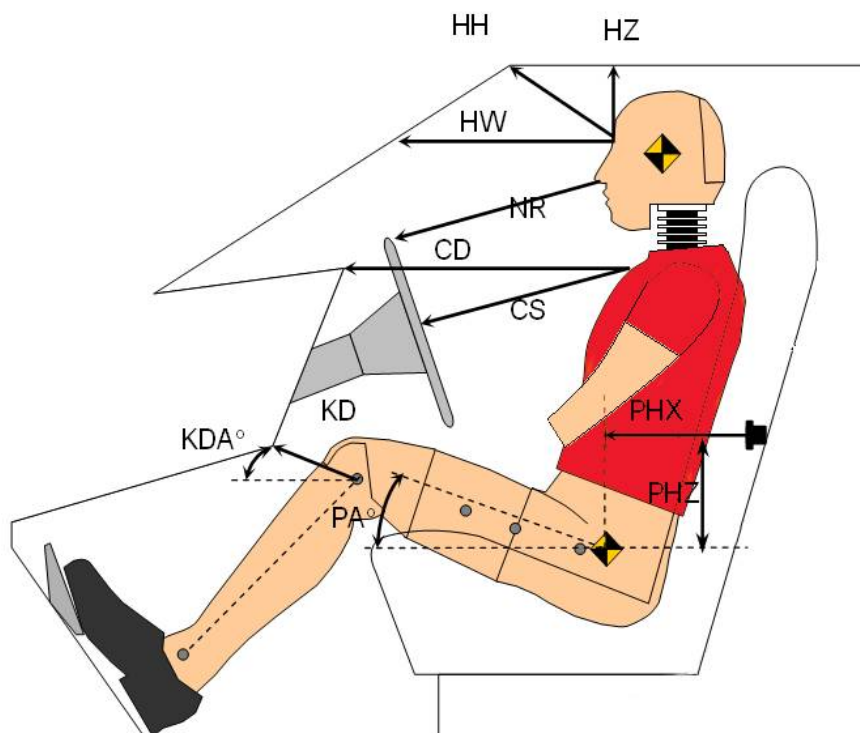
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	61.0
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	61.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	56.7
Actual Amount of Solvent Used	56.8
1/3 of Usable Capacity	20.3

Is the actual amount of solvent used in the test equal to 93% $\pm$ 1% of the Usable Capacity stated in Form No. 1? **YES**

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
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NHTSA No. M20184101
 Test Date: 12/01/2017



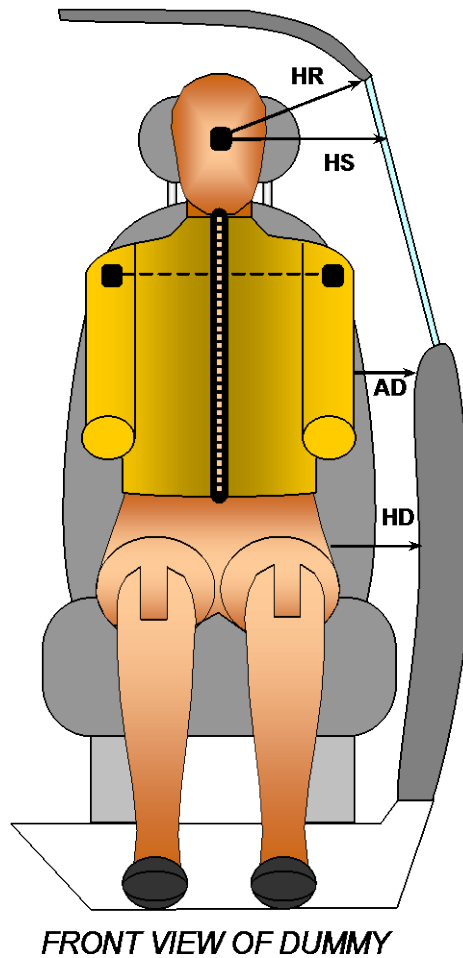
LEFT SIDE VIEW

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	281	
HW	Head to Windshield	576	
HZ	Head to Roof Liner	222	
NR	Nose to Rim	234	
CD	Chest to Dashboard	413	
CS	Chest to Steering Wheel	172	
KDL/KDAL°	Left Knee to Dash	145	36.4
KDR/KDAR°	Right Knee to Dash	143	28.8
PAX°	Pelvic Tilt Angle (X-Axis)		19.7
PAY°	Pelvic Tilt Angle (Y-Axis)		-0.2
PHX	Hip Point to Striker (X-Axis)	260	
PHZ	Hip Point to Striker (Z-Axis)	160	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017

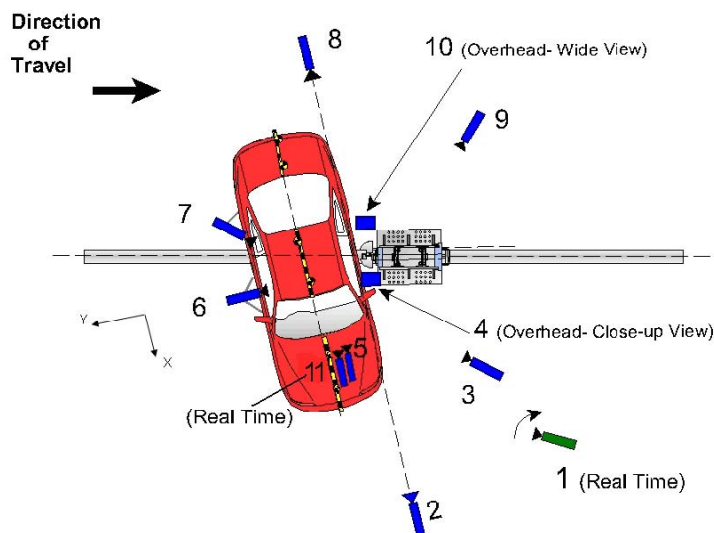


Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	277
HS	Head to Side Window	396
AD	Arm to Door	173
HD	Hip Point to Door	165

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

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017



Reference: (from Point of Impact for X and Y; from Ground for Z):
 +X = Forward of Impact, + Y = Right of Impact, +Z = Down

Camera No.	View	Coordinates (mm)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real-Time Pan View					30
2	Front Ground Level	6390	-120	-1950	24	1000
3	Impact Side 45° Forward	5030	-2030	-2030	20	1000
4	Overhead Closeup	0	50	-6670	70	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	-6680	0	-2040	24	1000
9	Impact Side 45° Rearward	-4100	-3660	-1950	20	1000
10	Overhead Wide View	-150	1090	-6650	14	1000
11	Real-Time Dummy Front View					30

*All measurements accurate to ± 6 mm

Note: Vehicle was at a 75° angle to the rigid pole.

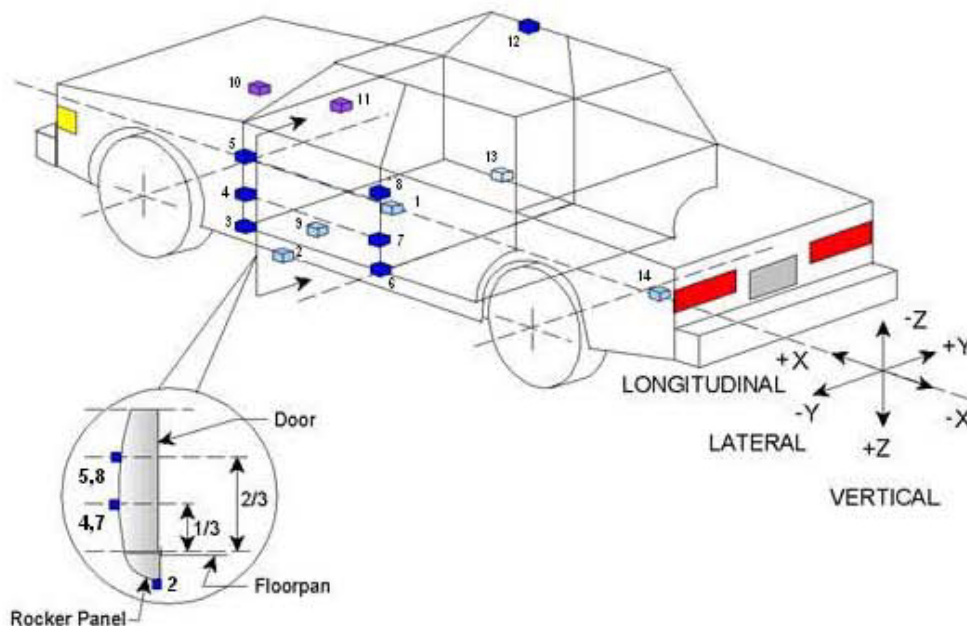
Explain why camera(s) did not operate as intended: None

INSTRUMENTATION	Number of Channels
Driver Dummy	19
Vehicle Structure	16
Pole Load Cells	8
TOTAL	43

DATA SHEET NO. 6 **VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017



	Accelerometer Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2395	180	-245
2	Left Floor Sill	2780	-676	-238
3	A Pillar Sill	3015	-676	-236
4	A Pillar Low	2982	-789	-610
5	A Pillar Mid	2985	-791	-793
6	B Pillar Sill	2048	-676	-239
7	B Pillar Low			
8	B Pillar Mid			
9	Driver Seat Track	2146	-358	-257
10	Engine Top	3700	-10	-871
11	Firewall	3248	0	-898
12	Right Roof	2083	613	-1562
13	Right Floor Sill	2780	676	-239
14	Rear Floorpan	961	0	-562

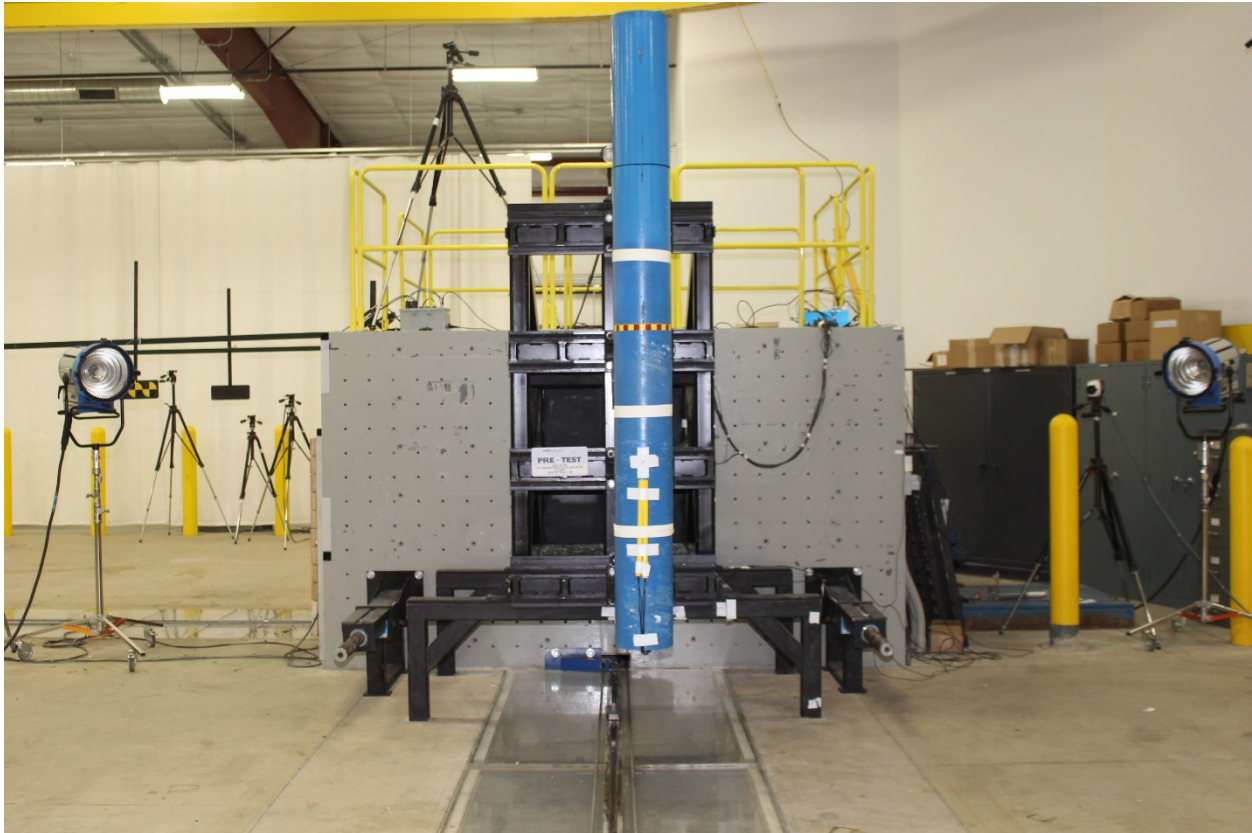
Reference:

X – Test Vehicle Rear Bumper (+forward)
 Y – Test Vehicle Centerline (+ to right)
 Z – Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017



254 mm Diameter Rigid Pole

Load Cell Locations	
ID	Height From Impact Surface (mm)
1	182
2	470
3	698
4	986
5	1212
6	1641
7	1854
8	2053

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

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver SID-IIs Dummy
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag, Headrest, Seat back
Left Shoulder	Side Torso/Pelvis Airbag, Seat back
Upper Torso	Side Torso/Pelvis Airbag, Seat back
Lower Torso	Side Torso/Pelvis Airbag, Seat back
Left Hip	Side Torso/Pelvis Airbag
Left Knee	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)	N/A	N/A	N/A	N/A	N/A

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	Left Front Window Broken
Other Notable Effects	None

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

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

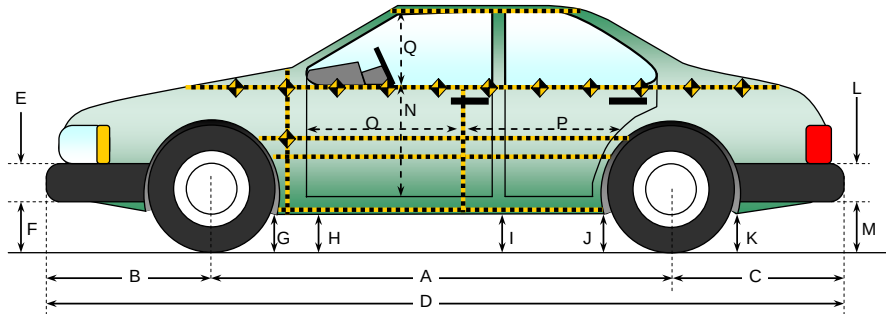
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1115
Actual Impact Point (Aft of Front Axle)	mm		1116
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-1
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.6
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.39
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.32

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
Test Date: 12/01/2017



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

LEFT SIDE VIEW

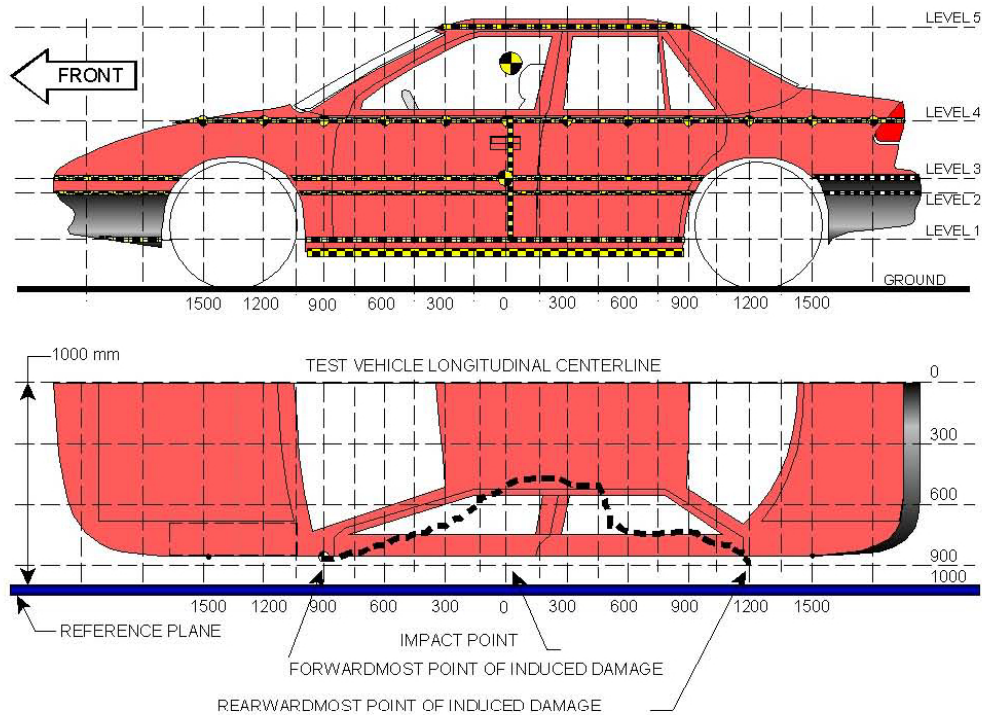
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2666	2593	73
B	Front Axle to FSOV	851	883	-32
C	Rear Axle to RSOV	926	929	-3
D	Total Vehicle Length at Centerline	4443	4405	38
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	207	221	-14
G	Sill Height at Front Wheel Well	N/A	N/A	N/A
H	Sill Height at Front Door Leading Edge	178	171	7
I	Sill Height at B-Pillar	222	216	6
J1	Sill Height at Rear Wheel Well	N/A	N/A	N/A
J2	Pinch Weld Height at Rear Wheel Well	180	178	2
K	Sill Height Aft of Rear Wheel Well	250	254	-4
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	348	338	10
N	Sill Height to Bottom of Front Window Sill	686	677	9
O	Front Door Leading Edge to Impact CL	571	443	128
P	Rear Door Trailing Edge to Impact CL	1284	1204	80
Q	Front Window Opening	430	393	37
R	Right Side Length	3512	3523	-11
S	Left Side Length	3512	3414	98
T	Vehicle Width at B-Pillars	1823	1744	79

DATA SHEET NO. 10 **VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017



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

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	426	311	75
2	Occupant Hip Point	636	332	75
3	Mid Door	675	338	75
4	Window Sill	990	295	75
5	Window Top	1500	114	75

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017

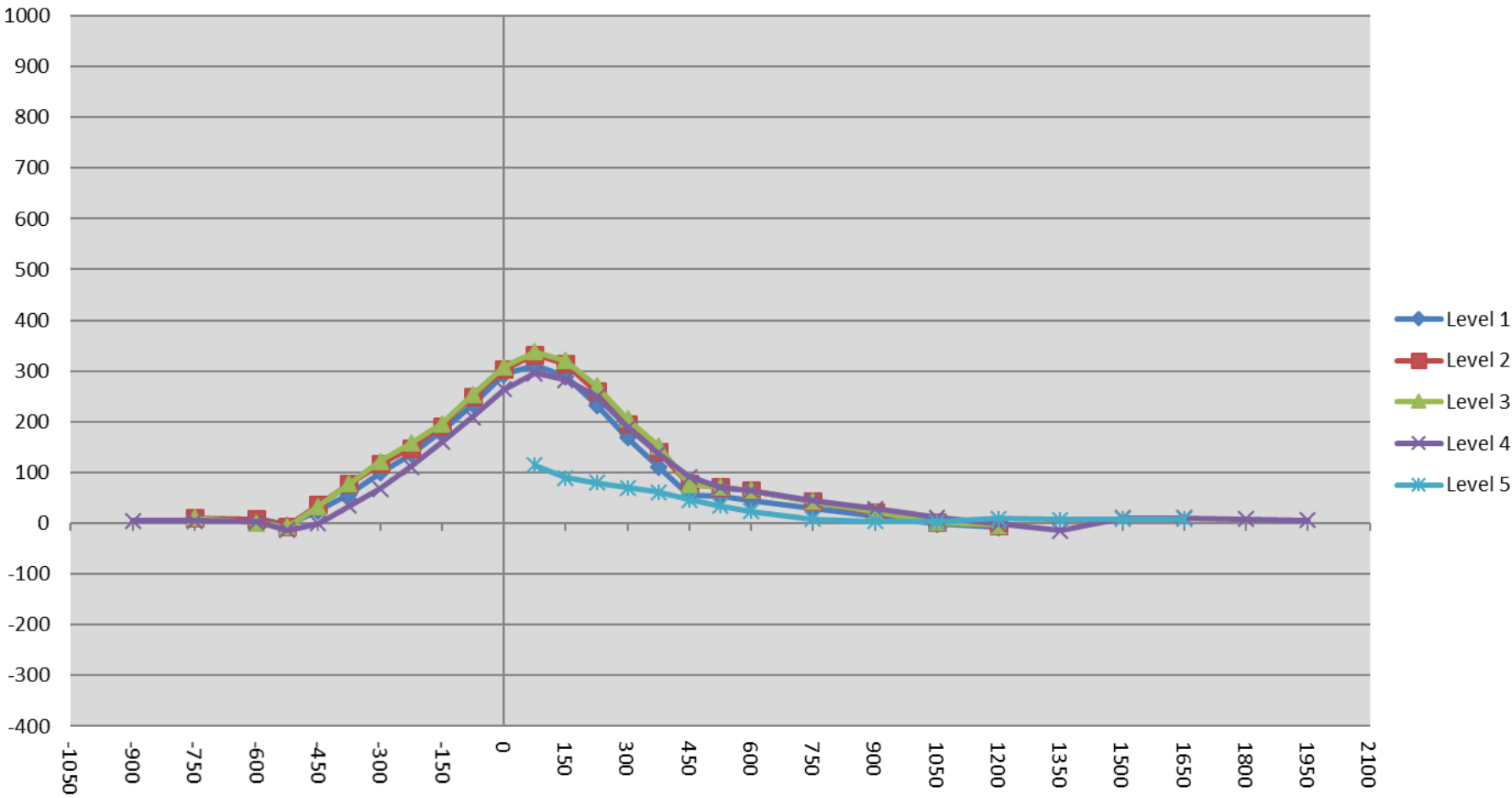
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800															
-1650															
-1500															
-1350															
-1200															
-1050															
-900				295					300					5	
-825															
-750		189	189	288			199	199	293			10	10	5	
-675															
-600	207	198	205	284		216	206	206	287		9	8	1	3	
-525	213	206	203	283		209	200	196	269		-4	-6	-7	-14	
-450	217	208	205	280		241	244	238	279		24	36	33	-1	
-375	216	207	203	278		273	285	281	312		57	78	78	34	
-300	212	205	201	275		311	321	323	343		99	116	122	68	
-225	210	203	199	271		346	351	357	382		136	148	158	111	
-150	208	202	198	264		389	393	394	424		181	191	196	160	
-75	208	200	197	258		442	450	450	467		234	250	253	209	
0	208	199	195	253		501	502	504	517		293	303	309	264	
75	210	199	195	245	499	521	531	533	540	613	311	332	338	295	114
150	211	198	194	239	485	500	512	514	522	574	289	314	320	283	89
225	213	198	193	232	475	446	458	464	482	555	233	260	271	250	80
300	213	198	193	229	470	382	393	398	418	540	169	195	205	189	70
375	217	198	193	225	468	328	339	345	363	529	111	141	152	138	61
450	219	200	194	220	467	274	277	270	312	513	55	77	76	92	46
525	221	200	194	217	467	273	271	265	288	501	52	71	71	71	34
600	222	200	195	214	468	267	264	259	278	491	45	64	64	64	23
675															
750	226	202	198	215	469	255	245	241	260	477	29	43	43	45	8
825															
900	225	203	200	219	473	240	224	222	248	477	15	21	22	29	4
1050	217	198	198	225	479	215	201	200	236	482	-2	3	2	11	3
1200	208	193	191	231	485	200	188	187	229	494	-8	-5	-4	-2	9
1350				236	498				221	505				-15	7
1500				240	512				250	520				10	8
1650				245	530				255	538				10	8
1800				252					260					8	
1950				265					271					6	
2100															
2250															
2400															
2550															
2700															

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 pile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
Test Program: NCAP Side Pole Impact Test

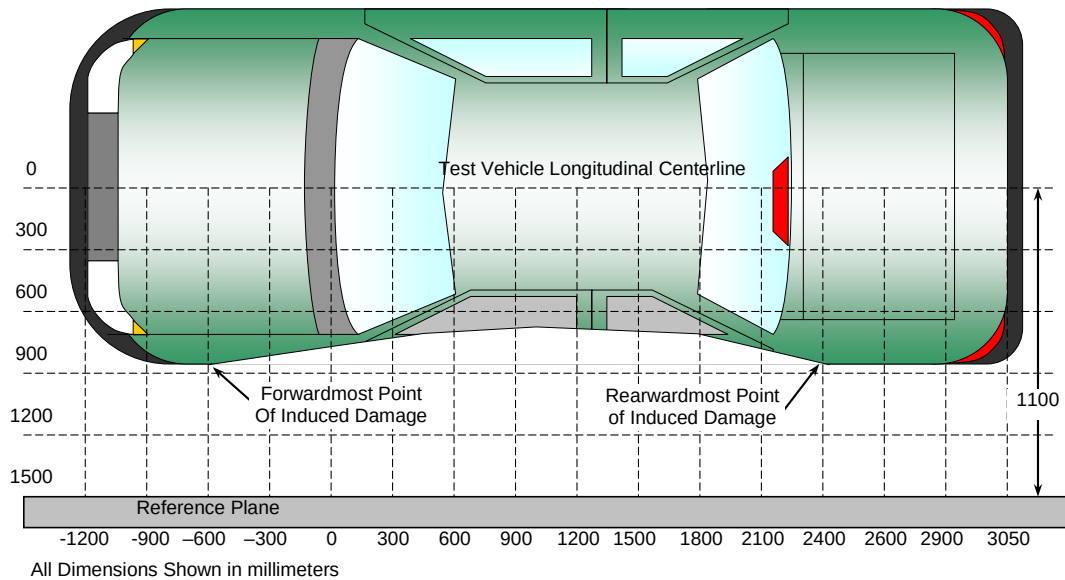
NHTSA No. M20184101
Test Date: 12/01/2017



DATA SHEET NO. 11 **VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	450	3	178	231	53
2	246	3	177	403	226
3	42	3	176	486	310
4	-162	3	176	347	171
5	-366	3	176	246	70
6	-570	3	171	146	-25

DATA SHEET NO. 12
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

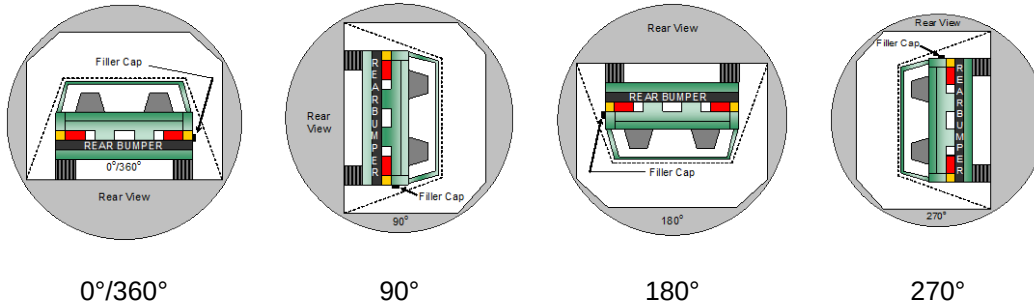
NHTSA No. M20184101
 Test Date: 12/01/2017

Test Time: 11:33 a.m.

Temperature: 22.1°C

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum Allowable = 1 ounce)
 B. For the 5 minute period after motion ceases: None
 (Maximum allowable = 5 ounces)
 C. For the following 25 minutes: None
 (Maximum allowable = 1 oz./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°	94	300	394
90° to 180°	92	300	392
180° to 270°	84	300	384
270° to 360°	85	300	385

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

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

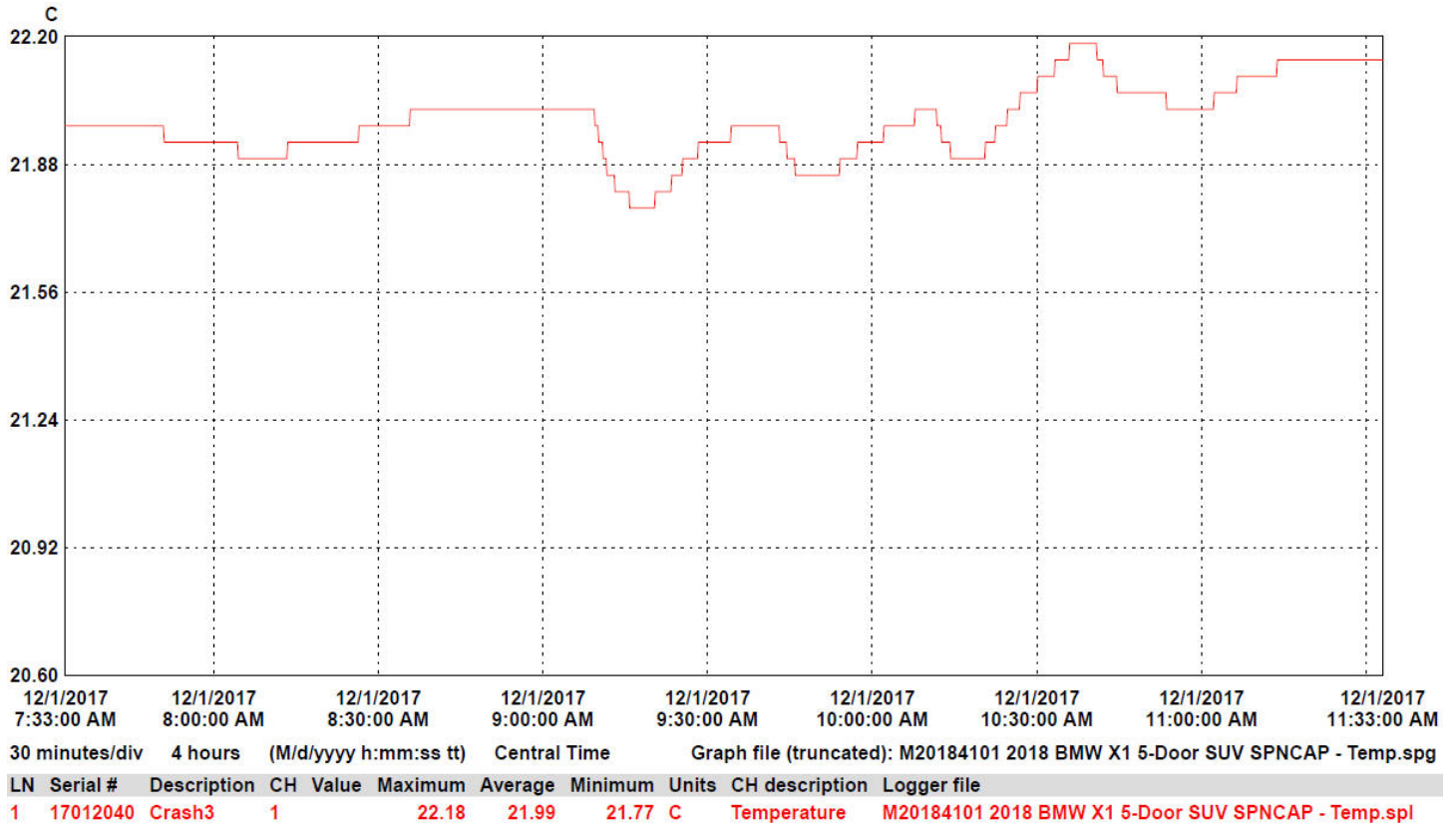
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2018 BMW X1 sDrive28i 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. M20184101
 Test Date: 12/01/2017



APPENDIX A
PHOTOGRAPHS

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



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



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



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



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



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



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



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



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



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



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



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

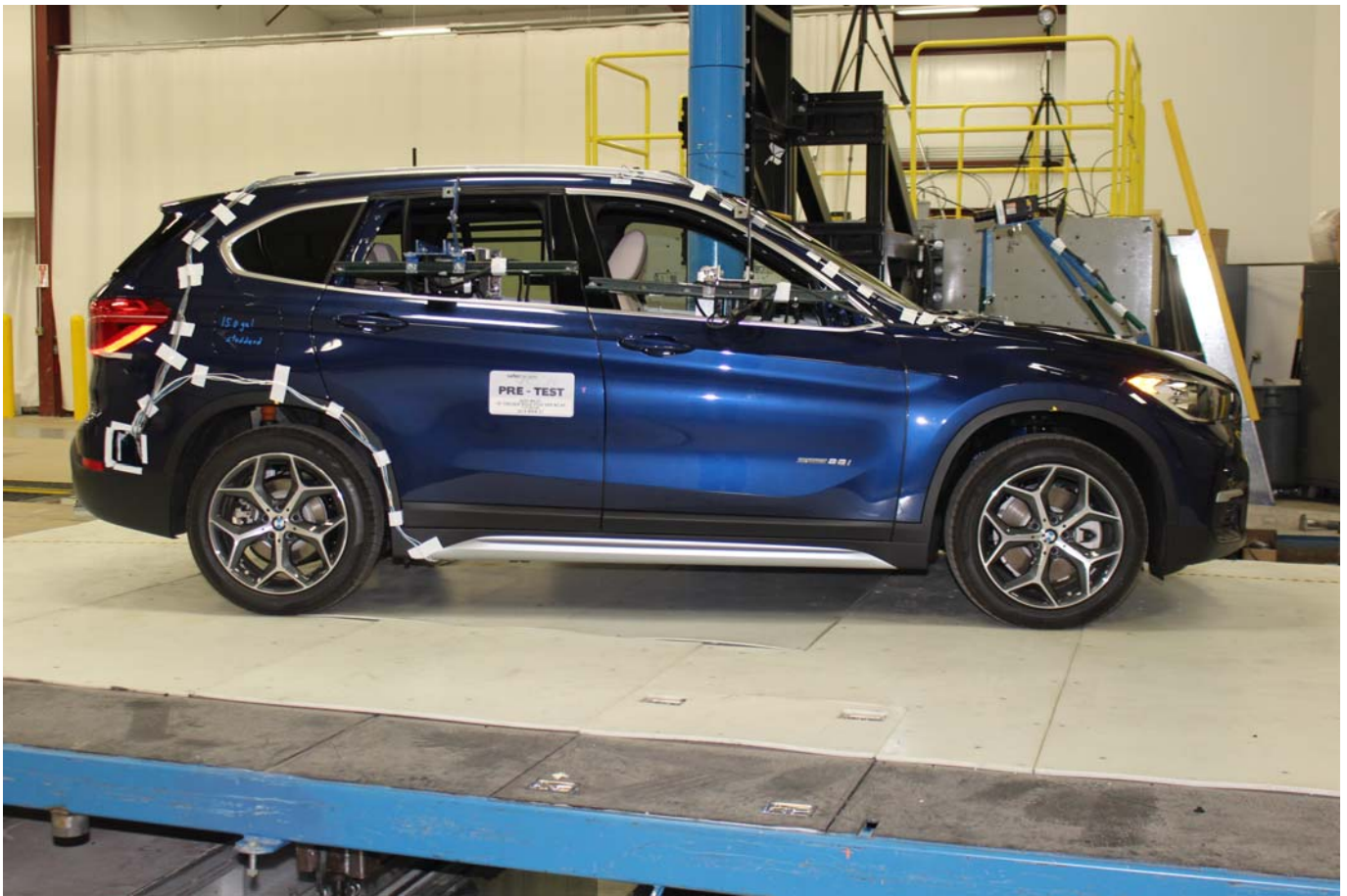


Photo No. 013 - Pre-Test Right Side View of Test Vehicle



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



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

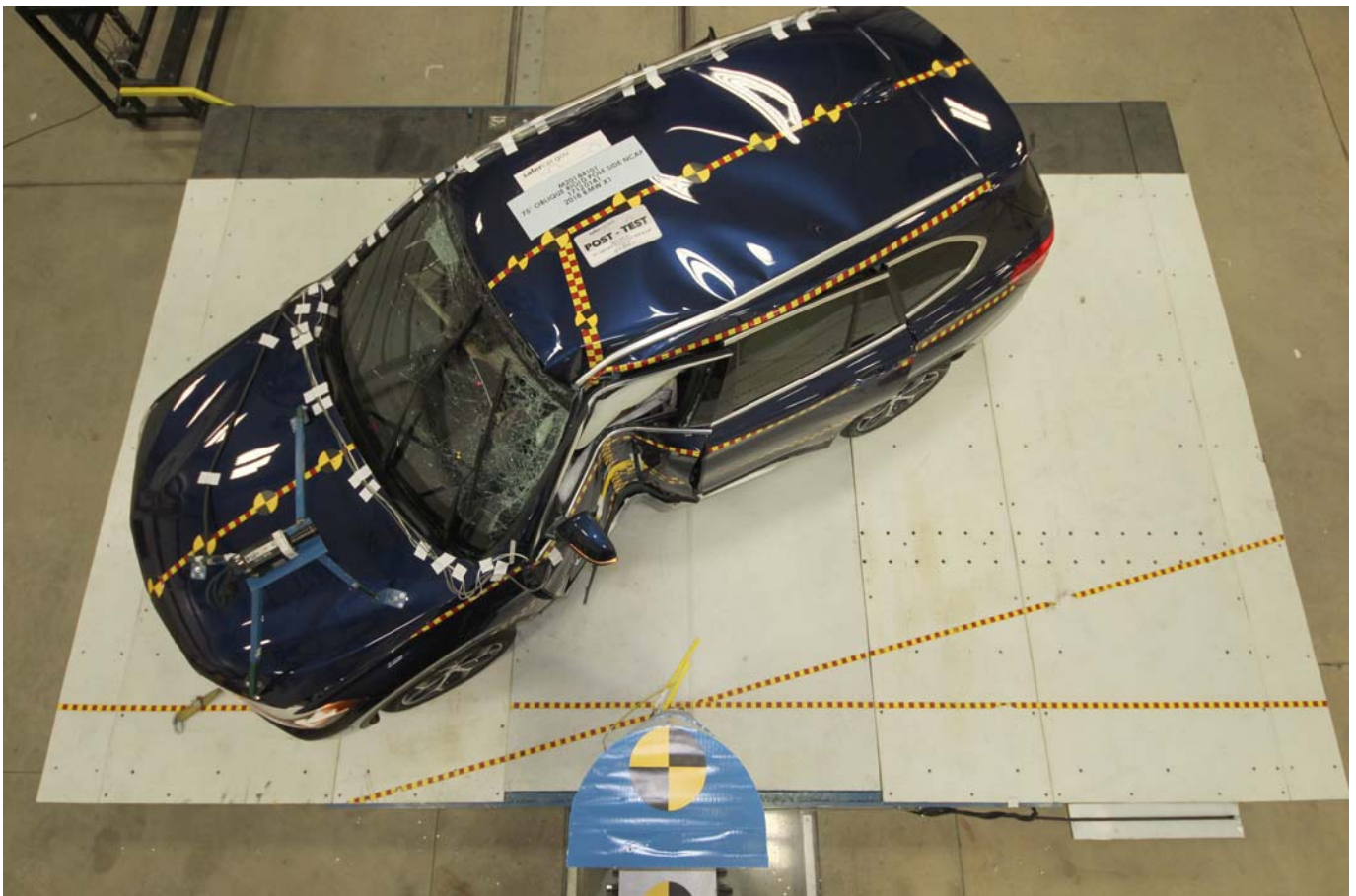


Photo No. 016 - Post-Test Overhead View of Test Area



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



Photo No. 018 - Pre-Test Right Side View of Pole Positioned Against Side of 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 Showing Impact Location



Photo No. 021 - Pre-Test Front Close-Up View of Dummy Head and Chest

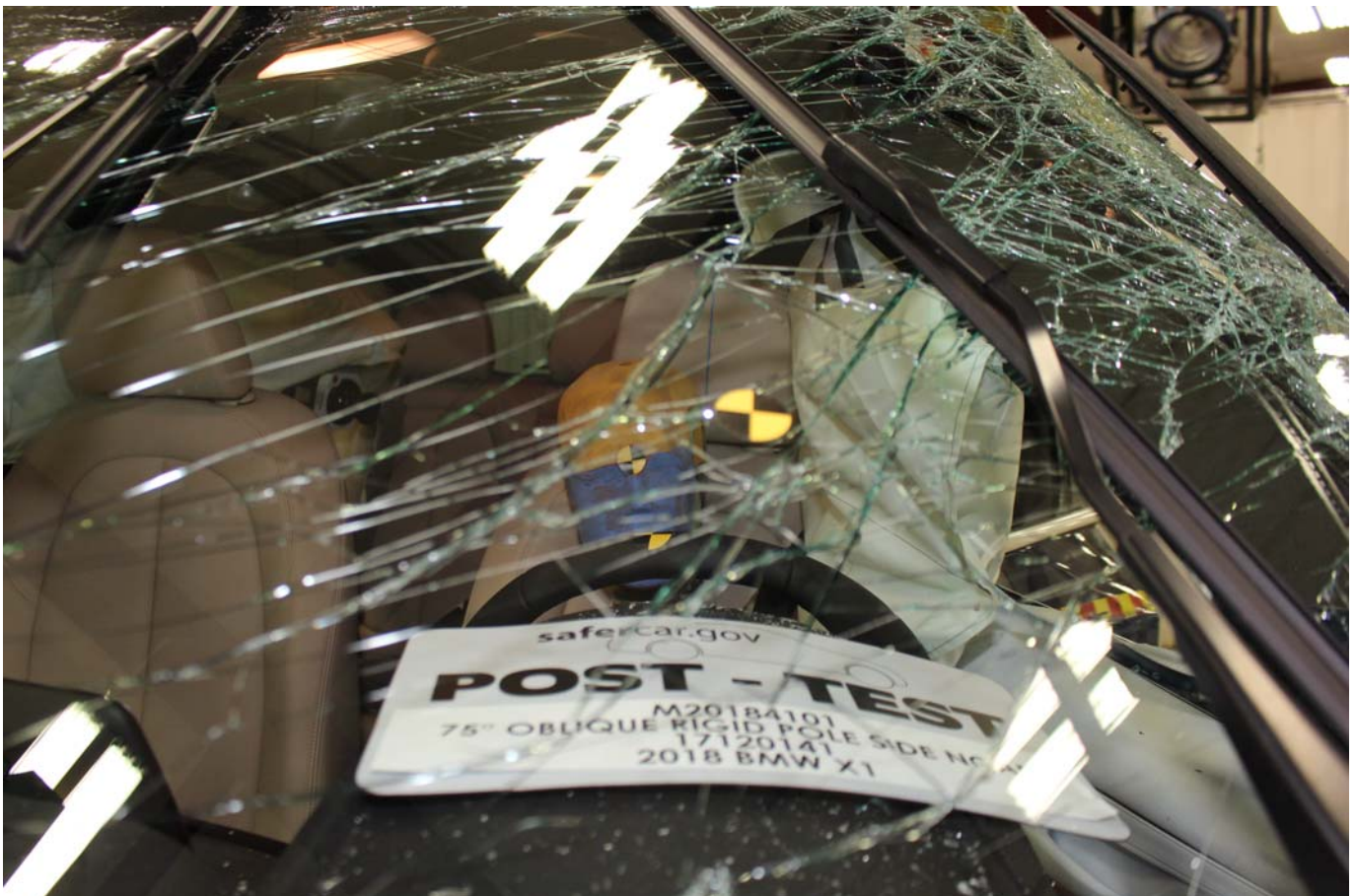


Photo No. 022 - Post-Test Front Close-Up View of Dummy



Photo No. 023 - Pre-Test Left Side View of Dummy Showing Belt and Chalking



Photo No. 024 - Pre-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 025 - Post-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 026 - Pre-Test Front View of Seat Back Prior to Dummy Positioning



Photo No. 027 - Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 028 - Pre-Test Front View of Seat Pan Prior to Dummy Positioning



Photo No. 029 - Pre-Test Overhead View of Dummy Thighs on Seat Pan



Photo No. 030 - Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket



Photo No. 031 - Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level



Photo No. 032 - Pre-Test Placement of Dummy Feet



Photo No. 033 - Pre-Test View of Belt Anchorage for Dummy



Photo No. 034 - Pre-Test Left Side View of Steering Wheel



Photo No. 035 - Pre-Test View of Disengaged Parking Brake



Photo No. 036 - Pre-Test View of Parking Brake

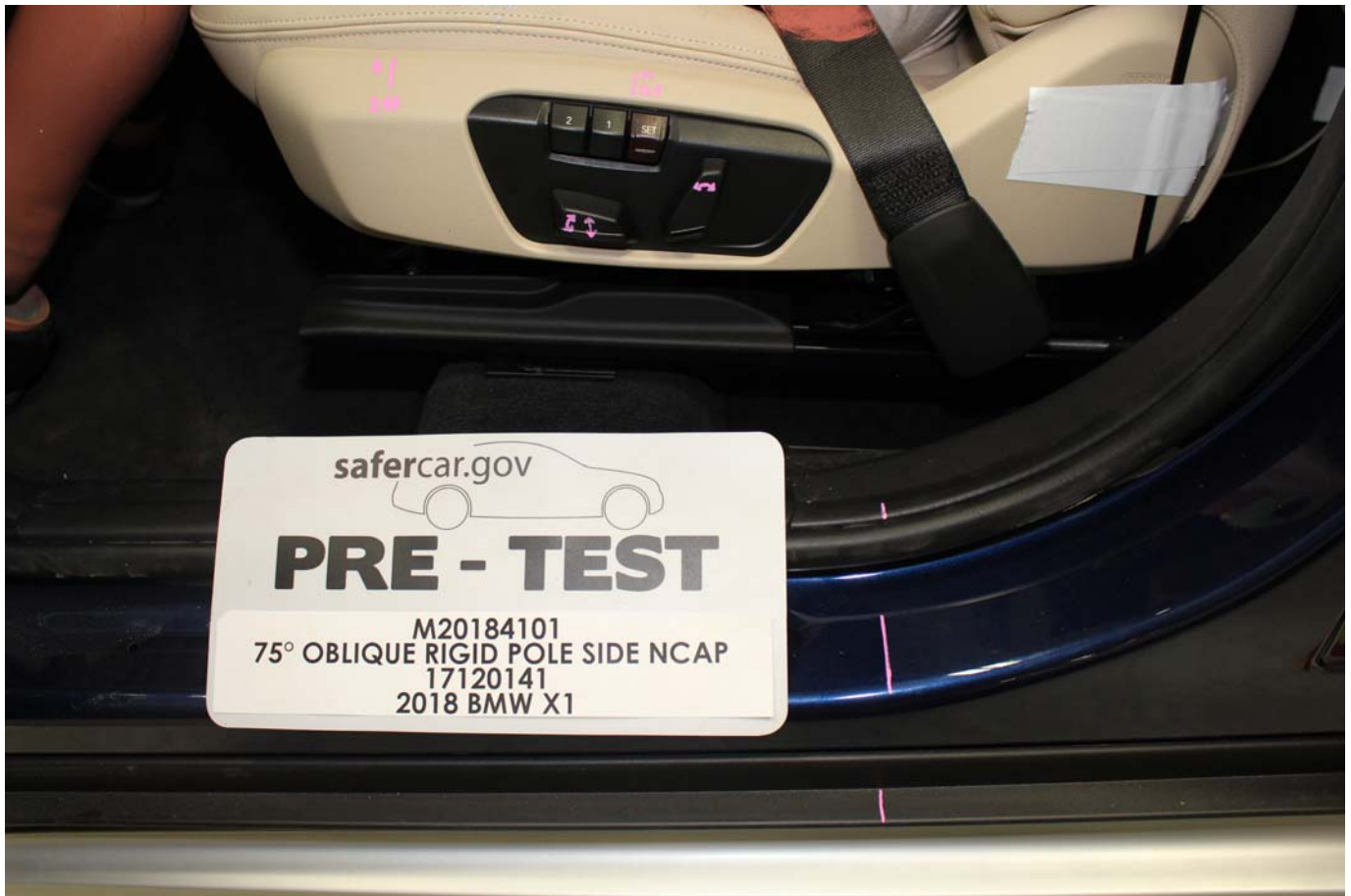


Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track

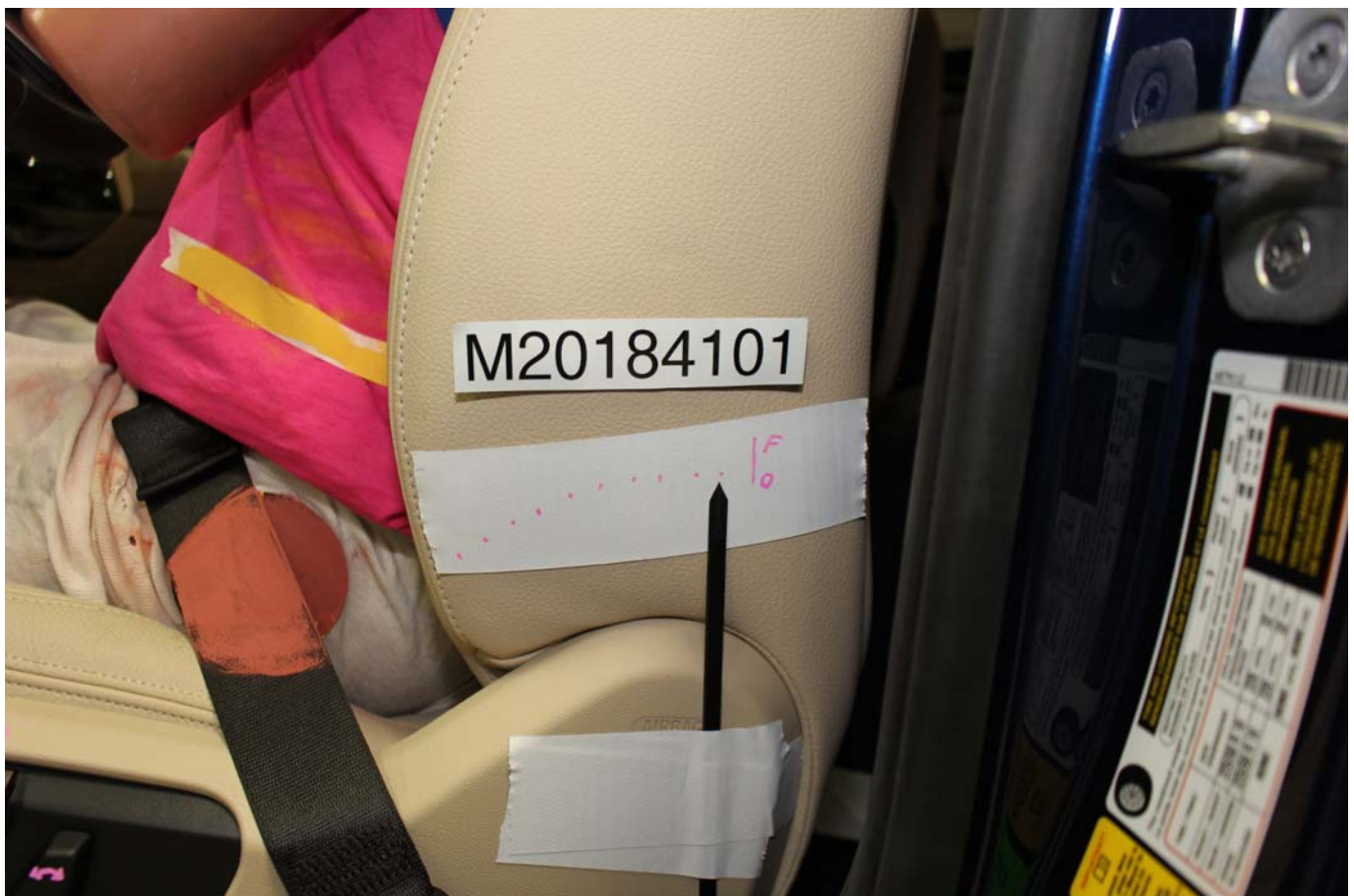


Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back



Photo No. 039 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Photo No. 040 - Pre-Test Dummy and Door Clearance View



Photo No. 041 - Post-Test Dummy and Door Clearance View



Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 043 - Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 044 - Pre-Test Inner Door Panel View



Photo No. 045 - Post-Test Inner Door Panel View Showing Dummy Contact Location



Photo No. 046 - Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Photo No. 047 - Post-Test Dummy Close-Up Head Contact with Side Air Bag View



Photo No. 048 - Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Photo No. 049 - Post-Test Dummy Close-Up Torso Contact with Side Air Bag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Photo No. 051 - Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View

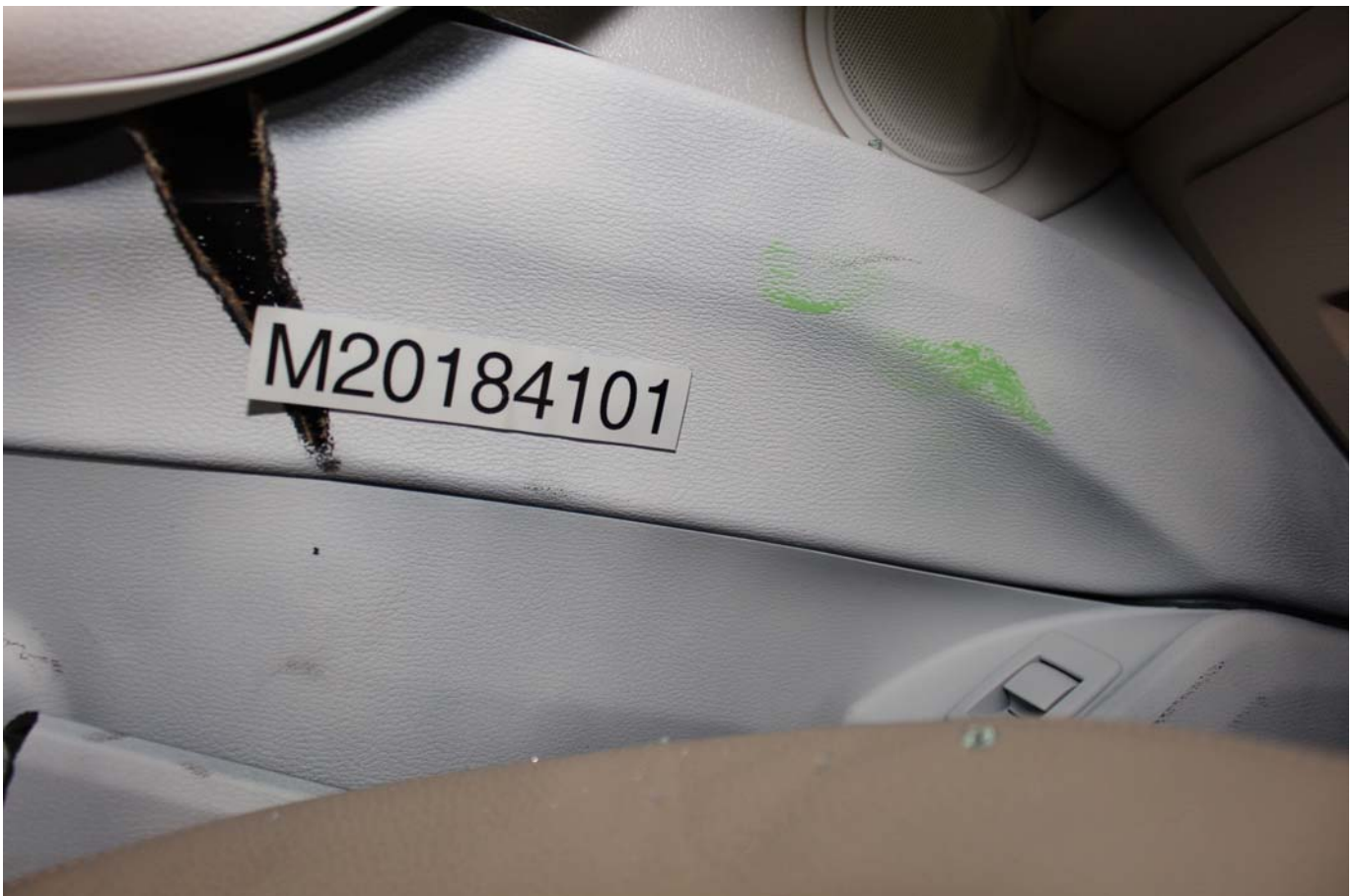


Photo No. 052 - Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

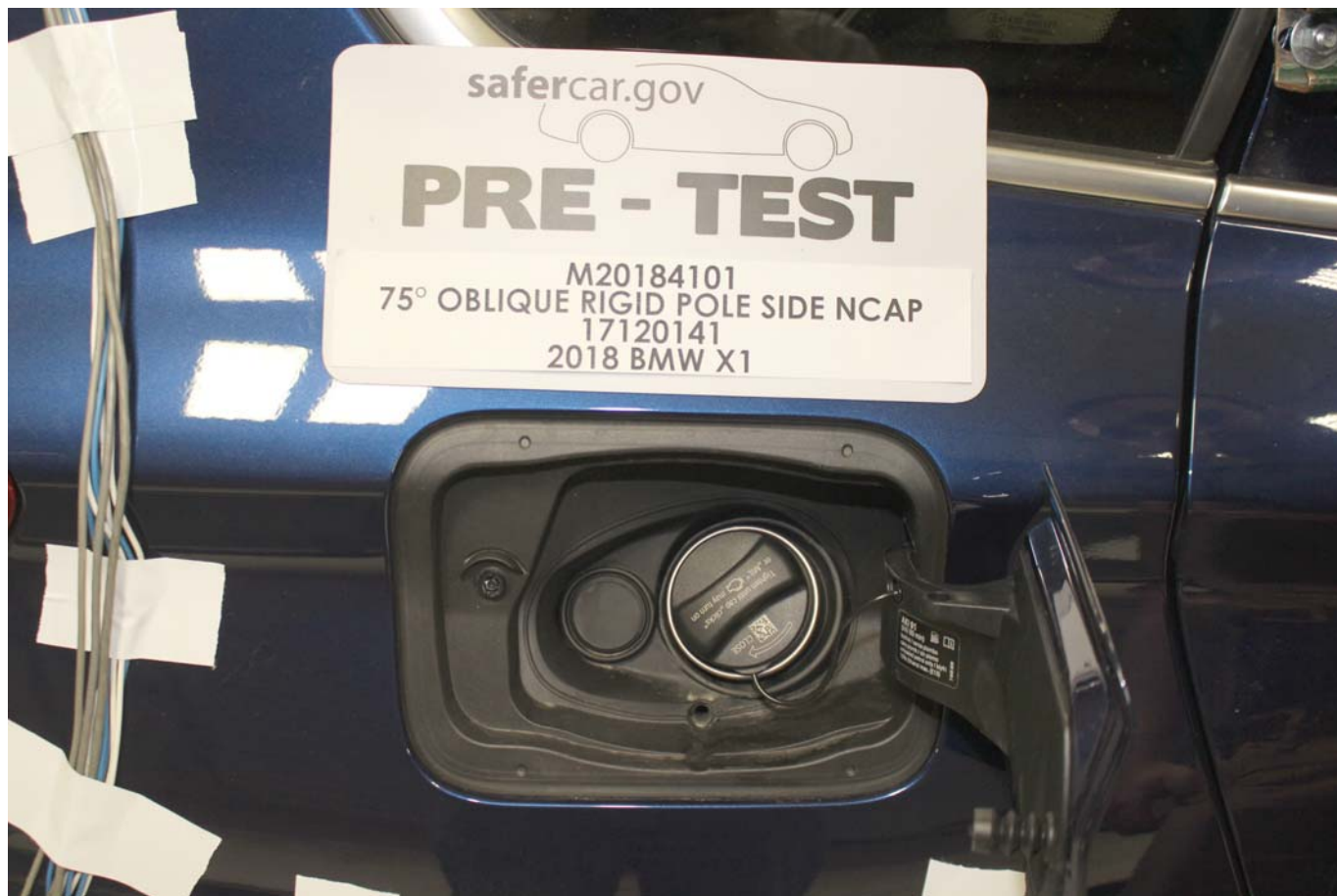


Photo No. 053 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

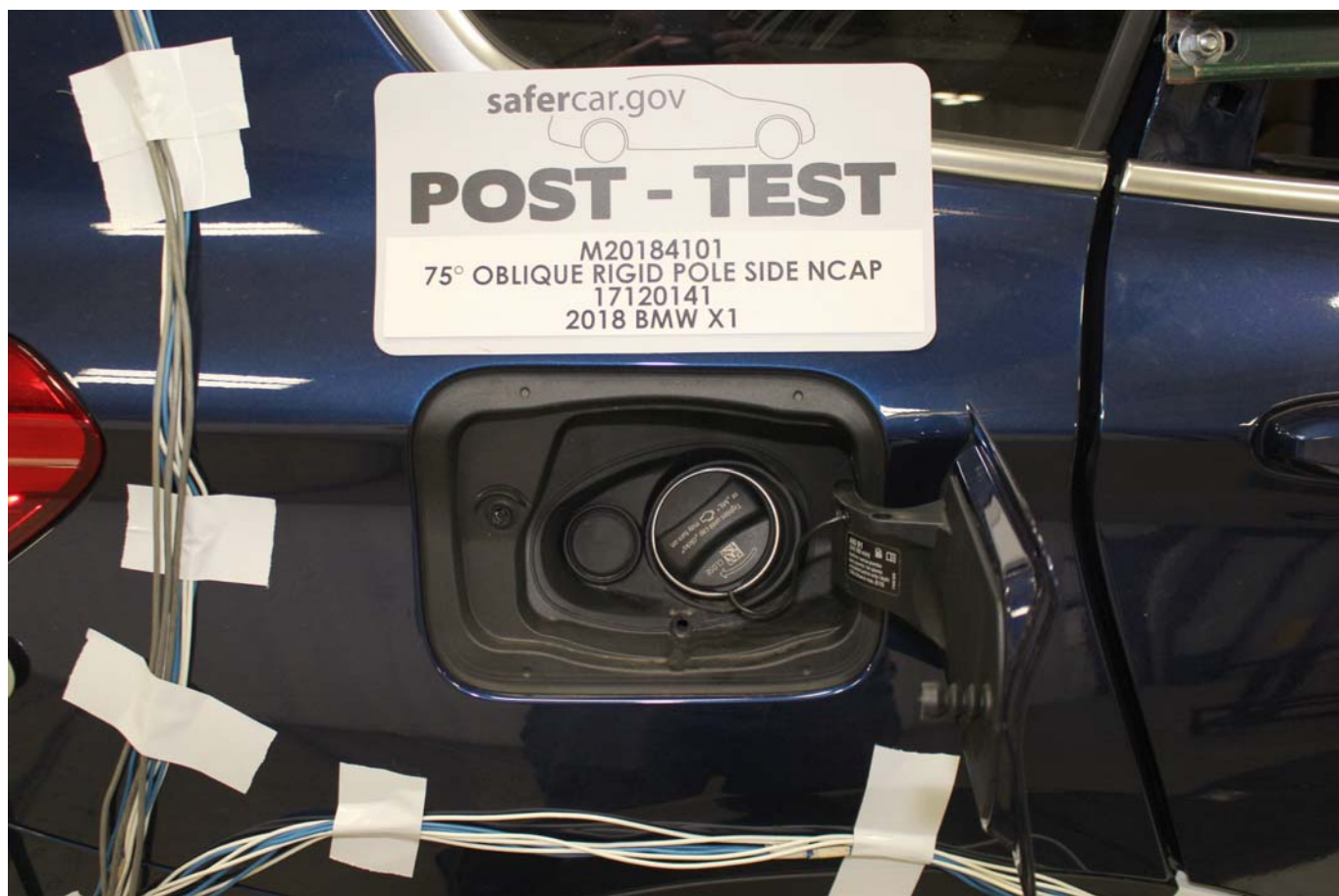


Photo No. 054 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 055 - Close-Up View of Vehicle Certification Label

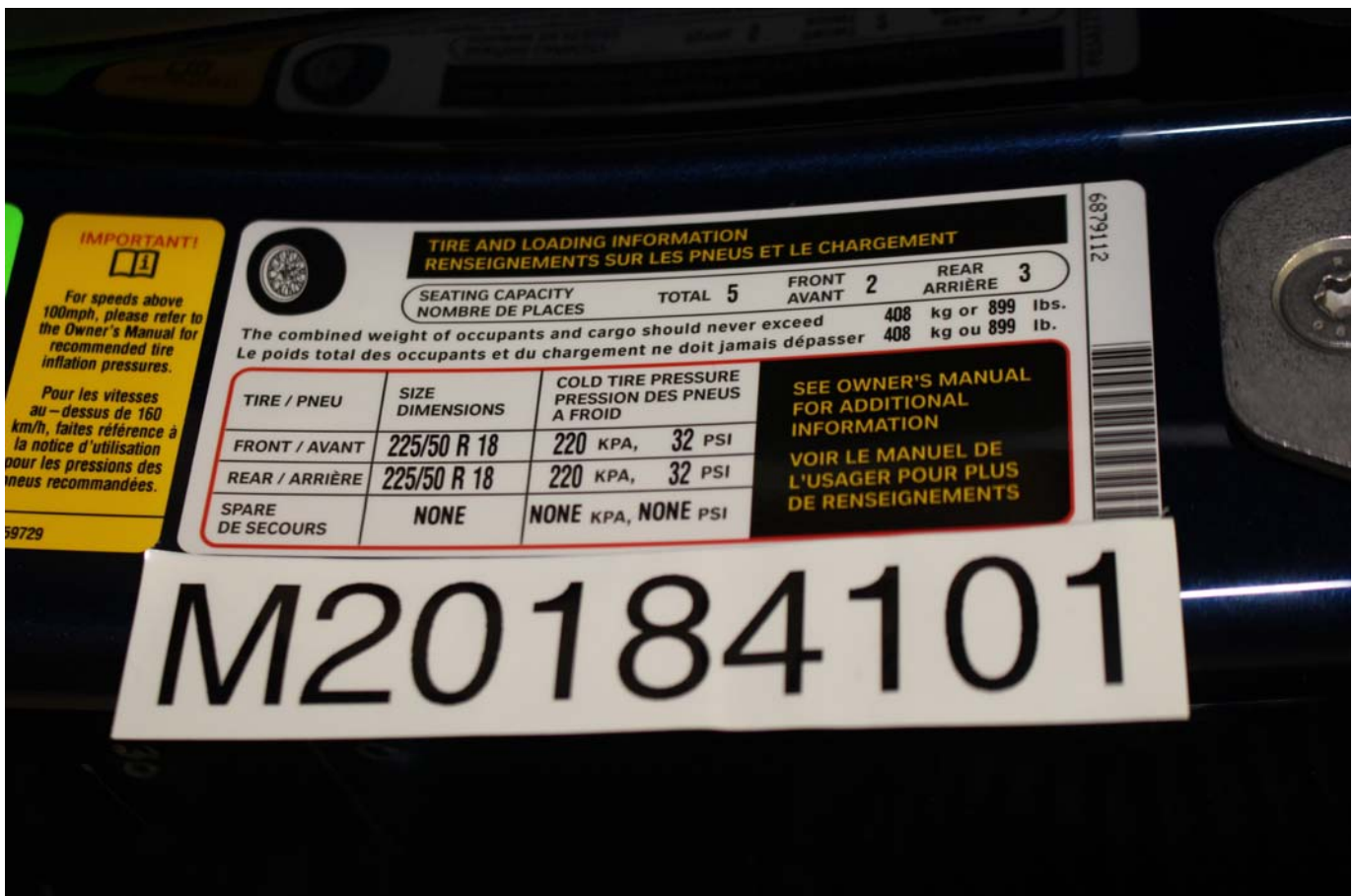


Photo No. 056 - Close-Up View of Vehicle Tire Information Placard or Label



Photo No. 057 - Pre-Test Pole Barrier Front View



Photo No. 058 - Post-Test Pole Barrier Front View



Photo No. 059 - Pre-Test Pole Barrier Side View



Photo No. 060 - Post-Test Pole Barrier Side View



Photo No. 061 - Pre-Test Ballast View



Photo No. 062 - Post-Test Primary and Redundant Speed Trap Read-Out



Photo No. 063 - FMVSS Photo No. 301 Static Rollover 0 Degrees



Photo No. 064 - FMVSS Photo No. 301 Static Rollover 90 Degrees



Photo No. 065 - FMVSS Photo No. 301 Static Rollover 180 Degrees

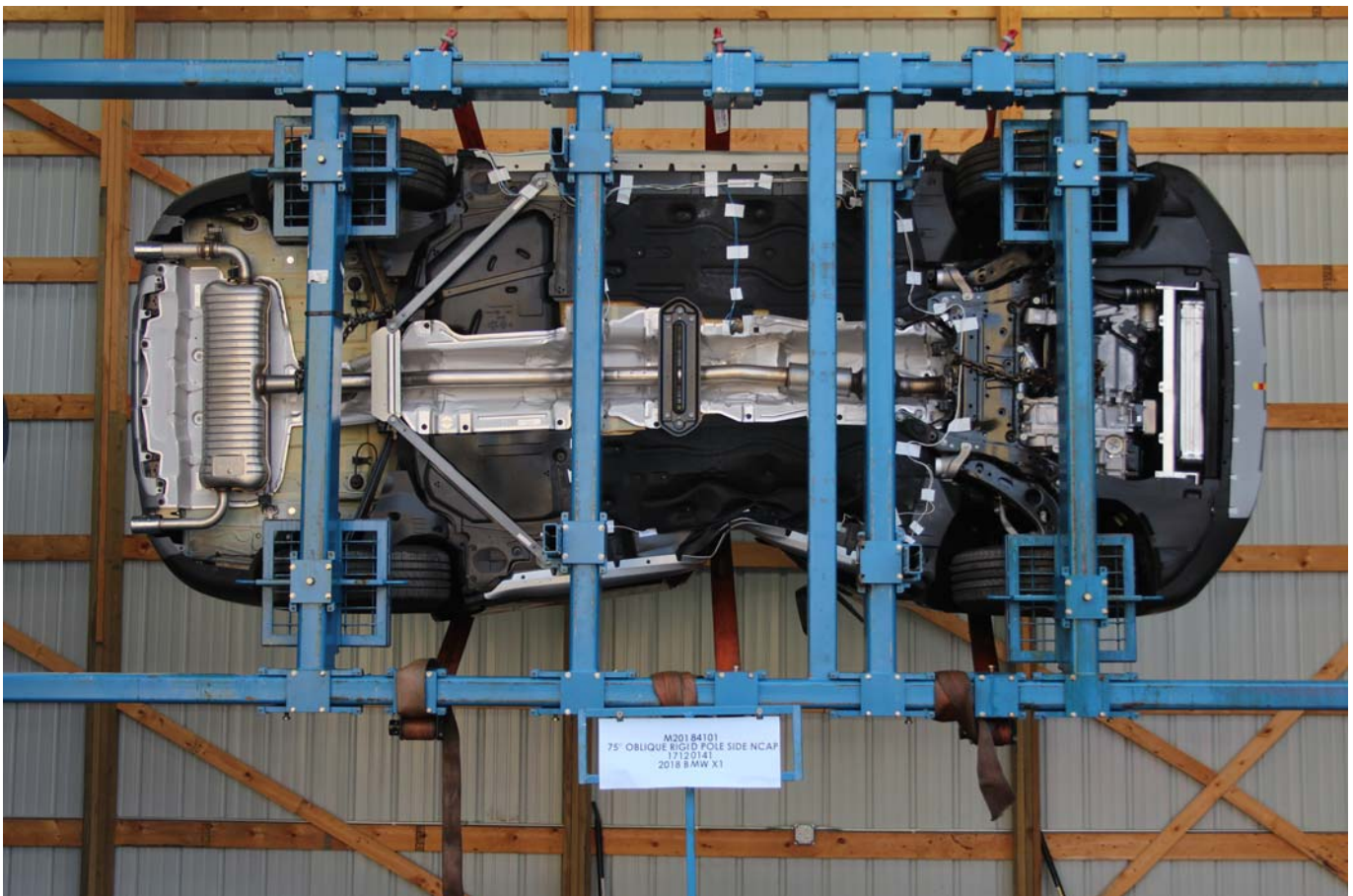


Photo No. 066 - FMVSS Photo No. 301 Static Rollover 270 Degrees



Photo No. 067 - FMVSS Photo No. 301 Static Rollover 360 Degrees



Photo No. 068 - Impact Event

The Ultimate Driving Machine®

2018 BMW X1 sDrive28i

Manufacturer's Suggested Retail Price	\$ 33,900.00
Options and Additional Charges: (Optional equipment may supersede standard equipment; check with your authorized BMW center).	
Mediterranean Blue Metallic	\$ 550.00
Canberra Beige SensaTec	Included
Larger-capacity fuel tank	Included
Performance Control	Included
STEPTONIC Automatic Trans.	Included
Sport leather steering wheel	Included
Runflat tires	Included
18" Alloy Wheel Y Spoke	Included
Rear view camera	Included
Roof rails in Satin Aluminum	Included
Matte Chrome Exterior Trim	Included
Power tailgate	Included
Black High-gloss Trim	Included
Power Front Seats	Included
Center armrest	Included
Parking Assistant	Included
Park Distance Control	\$ 800.00
Automatic climate control	Included
Anthracite headliner	Included
Refrigerant	Included
All-season tires	\$ 240.00
Black Kidney Grilles	\$ 150.00
Luggage Compartment Mat	\$ 250.00
Floor Liners-Black	\$ 45.00
BMW First Aid Kit	\$ 995.00
Destination Charge	\$ 36,930.00
Total Suggested Retail Price	\$ 36,930.00

VIN: WBXHU7C32J5H40357

Standard Features	Audio system
Performance and efficiency	- AM/FM/CD player HIFI Sound System with HD Radio
- 2.0-liter BMW TwinPower Turbo inline 4-cylinder, 16-valve engine with variable valve control (Double-VANOS and Valvetronic) and high-precision direct injection	Instrumentation and controls
- 8-speed STEPTONIC automatic transmission with Sport and Manual shift modes	- 3-spoke leather-wrapped multi-function sport steering wheel
Handling, ride and braking	- Drive system with on-board computer, 6.5" center screen, Controller and 8 programmable memory buttons
- Servotronic vehicle-speed-sensitive power steering	- USB audio connection and hands-free Bluetooth
- Driving Dynamics Control with ECO PRO, COMFORT, and SPORT settings	- Dynamic Cruise Control
- Dynamic Stability Control (DSC), including Brake Drying, Brake Stand-by, Start-off Assistant and Brake Fade Compensation	- Rear-view Camera
- 4-wheel ventilated anti-lock disc brakes with Dynamic Brake Control	Comfort and convenience
Exterior	- Automatic climate control
- Halogen high- and low-beam headlights	- Rain-sensing windshield wipers with adjustable speed and automatic headlight control
- Halogen free-form fog lights	Safety and security
- Satin Aluminum roof rails	- Front and rear Head Protection System (HPS)
- Matte Chrome exterior trim	- Driver's and passenger's front airbag supplemental restraint system (SRS) with advanced technology
Interior seating and trim	- Front-seat-mounted side-impact airbags
- 8-way power front seats with driver's seat and mirror memory	Warranty
- SensaTec upholstery	- 4-year/50,000-mile New Vehicle Limited Warranty for Passenger Cars and Light Trucks 2018 Models
- High-gloss Black trim with Pearl Gloss Chrome highlight	- 12-year Unlimited Mileage Rust Perforation Limited Warranty
	- 4-year Unlimited Mileage Roadside Assistance Program

BMW Ultimate Care™	Your Maintenance Costs:
\$0	Engine Oil Services: \$0 Air Filter: \$0
Maintenance Program	Cabin Microfilter: \$0 Spark Plugs: \$0
For the first 3 years or	Vehicle Checks: \$0 Brake Fluid: \$0
36,000 miles, whichever	
comes first on scheduled	
maintenance*	

EPA DOT Fuel Economy and Environment

Fuel Economy

26 MPG combined city/hwy

23 city 32 highway

3.8 gallons per 100 miles

You spend \$1,250 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,600

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

5 Best

This vehicle emits 337 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuelconomy.gov.

Smog Rating (tailpipe only)

7 Best

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and cost \$1,250 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.80 per gallon. MPG is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles

PARTS CONTENT INFORMATION
For Vehicles in this Car Line:
US/Canadian Parts Content: 5%
Major Source of Foreign Parts Content: GERMANY: 45%
Note: Parts content does not include final assembly, distribution, or other non-parts costs.
For this Vehicle:
Final Assembly Point: REGENSBURG, GERMANY
Country of Origin: GERMANY
Engine: JAPAN
Transmission: JAPAN

GOVERNMENT 5-STAR SAFETY RATINGS		
Overall Vehicle Score		Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.		
Frontal Crash	Driver Passenger	Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover		Not Rated
Based on the risk of rollover in a single-vehicle crash.		
Star ratings range from 1 to 5 stars(★ ★ ★ ★ ★)with 5 being the highest Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236		

This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

BMW of North America, LLC
Woodcliff Lake, NJ 07677

VPC Location: GALVESTON, TX

Port of Entry: GALVESTON, TEXAS
Carrier: UNITED ROAD SERVICES

Sold To:
BMW of Corpus Christi
4225 S Staples St
Corpus Christi TX
(361) 991-5555 78411-2701

Ship To:
BMW of Corpus Christi
4225 S Staples St
Corpus Christi TX
(361) 991-5555 78411-2701

Photo No. 069 - Monroney Label

Settings

Controls

Controls

Settings

Safety belt reminder for driver's and passenger's seat

Display

The indicator light lights up and a signal sounds. Make sure that the safety belts are positioned correctly. The safety belt reminder can also be activated if objects are placed on the front passenger seat.

Front head restraints

Safety information

WARNING
A missing protective effect due to removed or not correctly adjusted head restraints can cause injuries in the head and neck area. There is a risk of injury.

- Before driving, install the removed head restraints on the occupied seats.
- Adjust the head restraint so its center supports the back of the head at as close to eye level as possible.
- Adjust the distance so that the head restraint is as close as possible to the back of the head. If necessary, adjust the distance by adjusting the tilt of the backrest.

WARNING
Body parts can be jammed when moving the head restraint. There is a risk of injury. Make sure that the area of movement is clear when moving the head restraint.

WARNING
Objects on the head restraint reduce the protective effect in the head and neck area. There is a risk of injury.

- Do not use seat or head restraint covers.
- Do not hang objects, for instance clothes hangers, directly on the head restraint.

Adjusting the height

- To raise: push the head restraint up.
- To lower: press button, arrow 1, and push head restraint down.

Removing

- Raise the head restraint up against the resistance.
- Press the button, arrow 1, and pull the head restraint out completely.

Rear head restraints

Safety information

WARNING
A missing protective effect due to removed or not correctly adjusted head restraints can cause injuries in the head and neck area. There is a risk of injury.

- Before driving, install the removed head restraints on the occupied seats.
- Adjust the head restraint so its center supports the back of the head at as close to eye level as possible.
- Adjust the distance so that the head restraint is as close as possible to the back of the head. If necessary, adjust the distance by adjusting the tilt of the backrest.

WARNING
Body parts can be jammed when moving the head restraint. There is a risk of injury. Make sure that the area of movement is clear when moving the head restraint.

WARNING
Objects on the head restraint reduce the protective effect in the head and neck area. There is a risk of injury.

- Do not use seat or head restraint covers.
- Do not hang objects, for instance clothes hangers, directly on the head restraint.
- Only use accessories that have been determined to be safe for attachment to a head restraint.
- Do not use any accessories, for instance pillows, while driving.

Height

Settings

- To lower: press the button, arrow 1, and push the head restraint down.
- To raise: push the head restraint up.

Folding down the head restraint

Only fold the head restraint back if no one will be sitting in the seat in question.

- To the back: press the button, arrow 1, and fold the head restraint back, arrow 2.
- To the front: fold head restraint forward until the head restraint engages.

Removing

Only remove the head restraint if no one will be sitting in the seat in question.

Photo No. 070 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

A-35



Photo No. 071 - Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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Figure No. 1.	Driver Head CG Acceleration (X) vs. Time	B-1
Figure No. 2.	Driver Head CG Acceleration (Y) vs. Time	B-1
Figure No. 3.	Driver Head CG Acceleration (Z) vs. Time	B-1
Figure No. 4.	Driver Head CG Resultant Acceleration (X) vs. Time	B-1
Figure No. 5.	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
Figure No. 6.	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
Figure No. 8.	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
Figure No. 9.	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
Figure No. 10.	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
Figure No. 11.	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

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 Dummy Instrumentation Data

Driver Head CG Redundant Acceleration (X) vs. Time
Driver Head CG Redundant Acceleration (Y) vs. Time
Driver Head CG Redundant Acceleration (Z) vs. Time
Driver Head Angular Velocity X (Deg/Sec) vs. Time
Driver Head Angular Velocity Y (Deg/Sec) vs. Time
Driver Head Angular Velocity Z (Deg/Sec) vs. Time
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

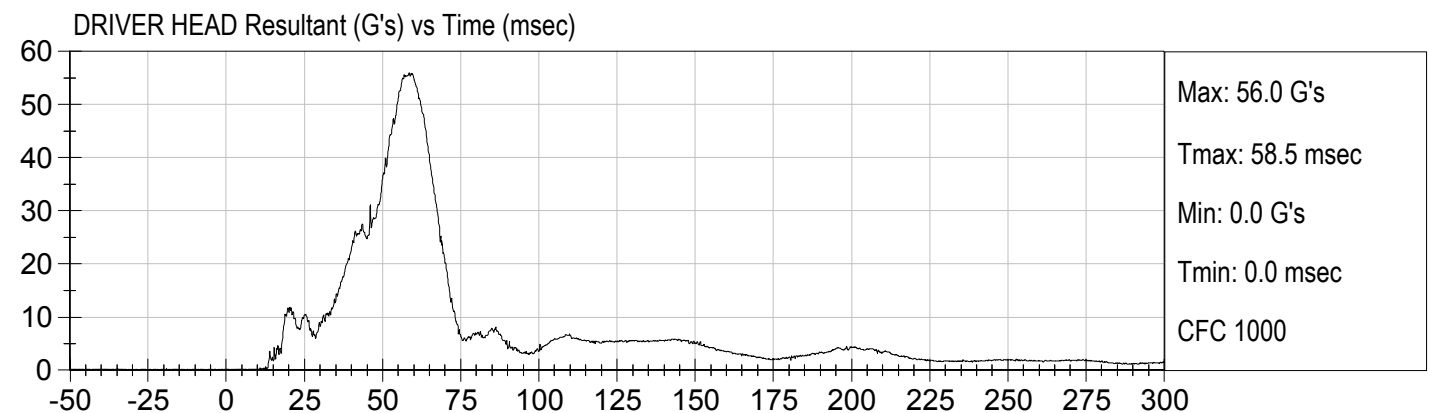
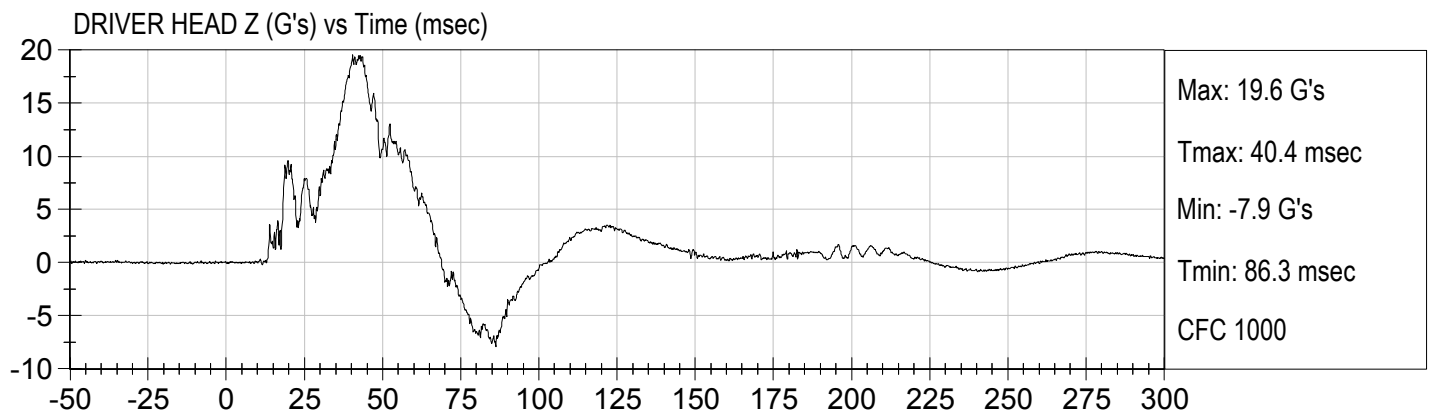
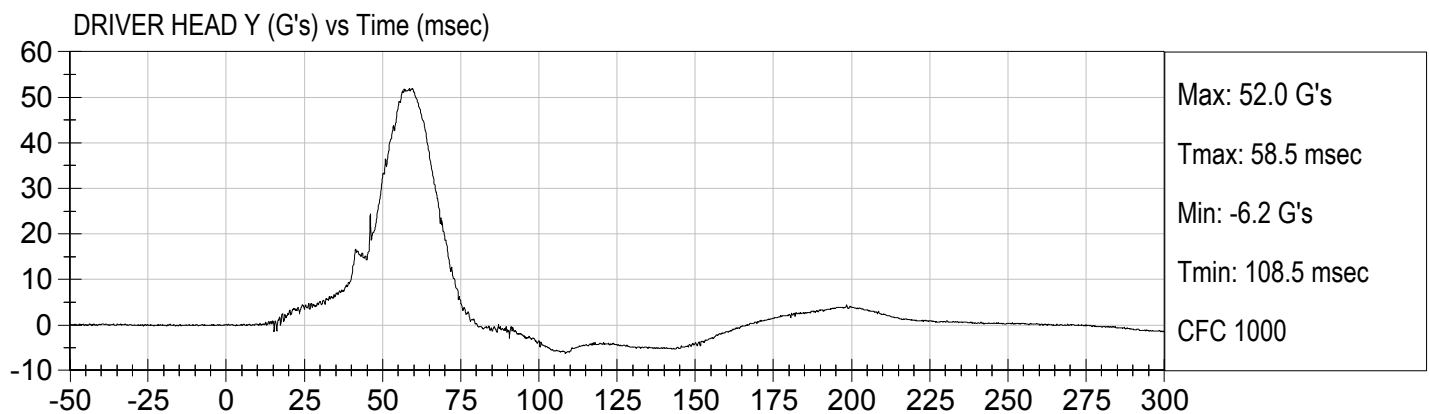
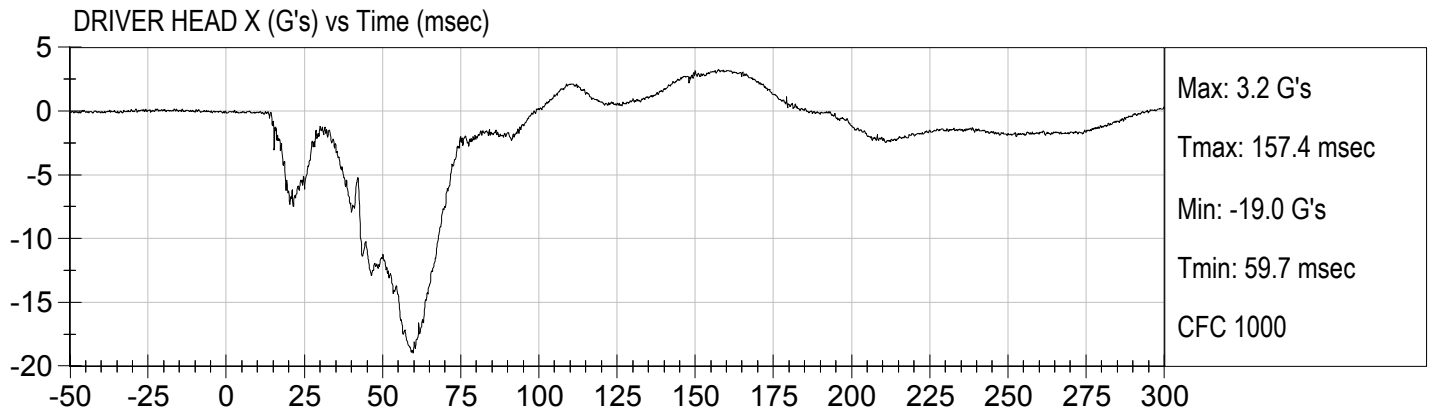
Load Cell Pole Barrier #4 Force (Y)

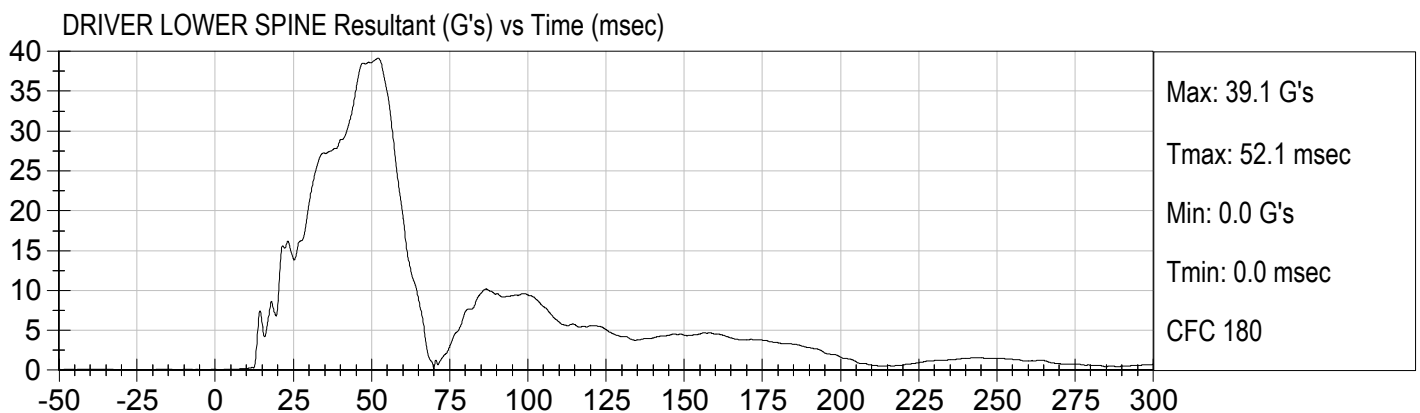
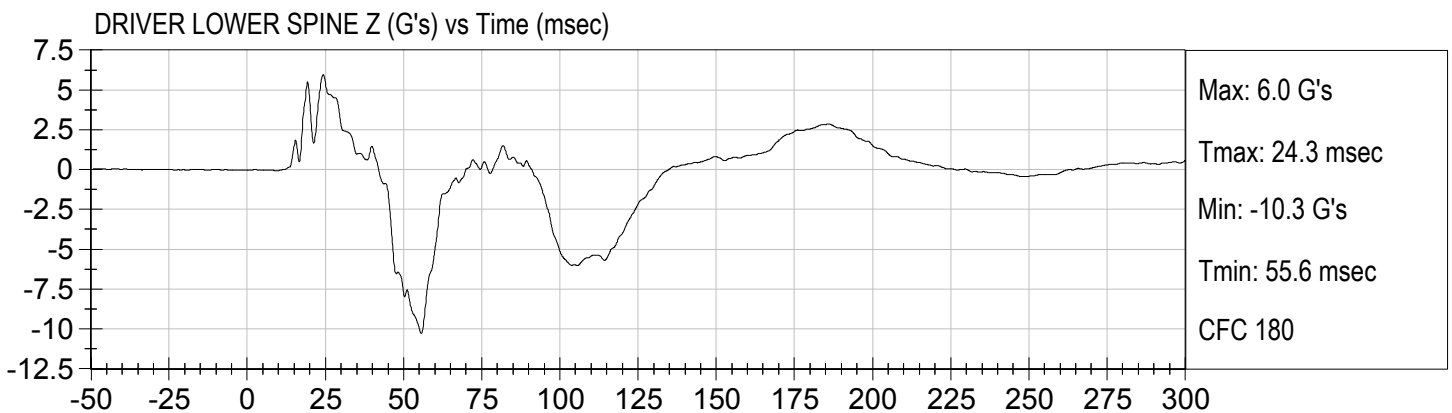
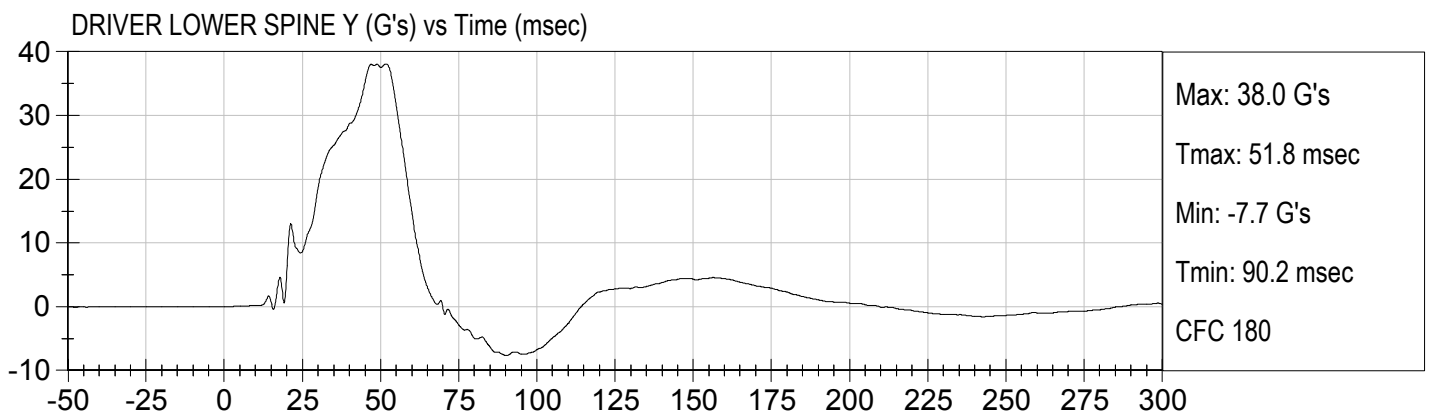
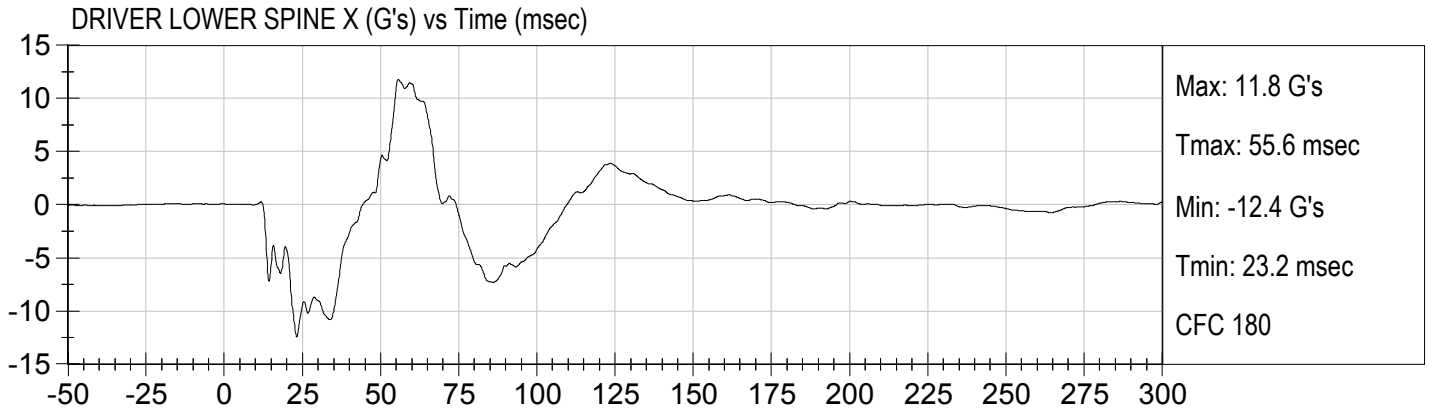
Load Cell Pole Barrier #5 Force (Y)

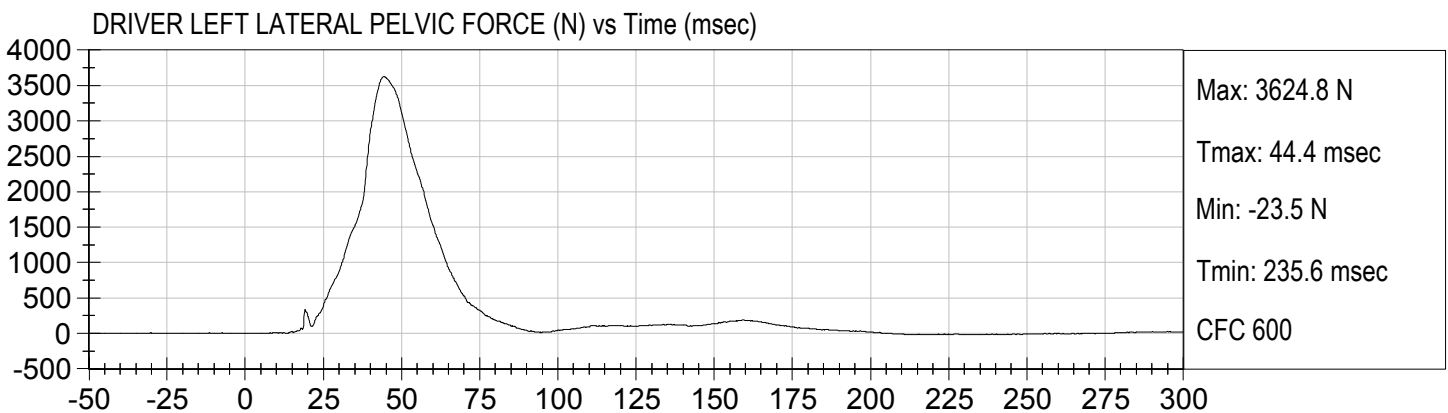
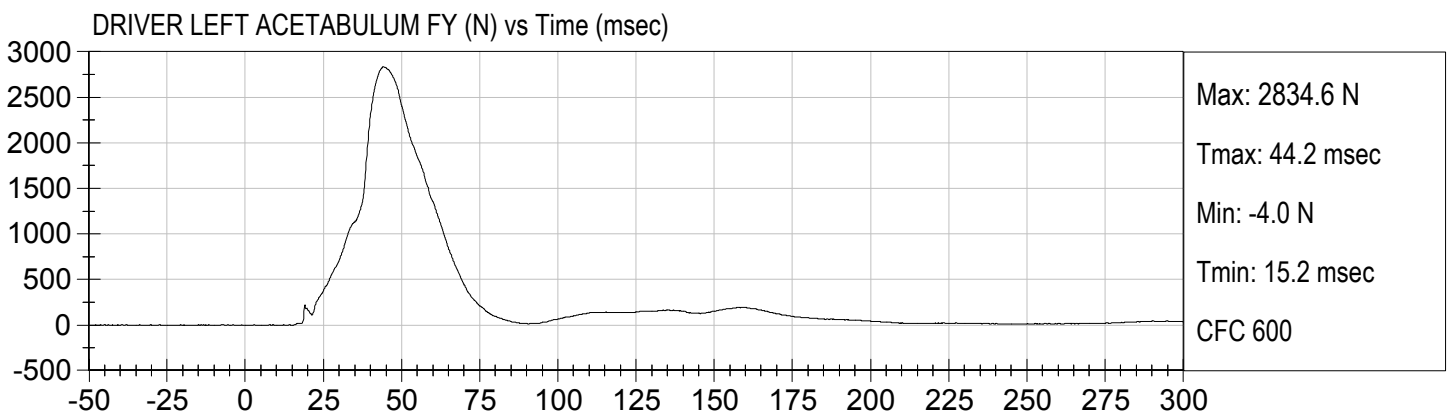
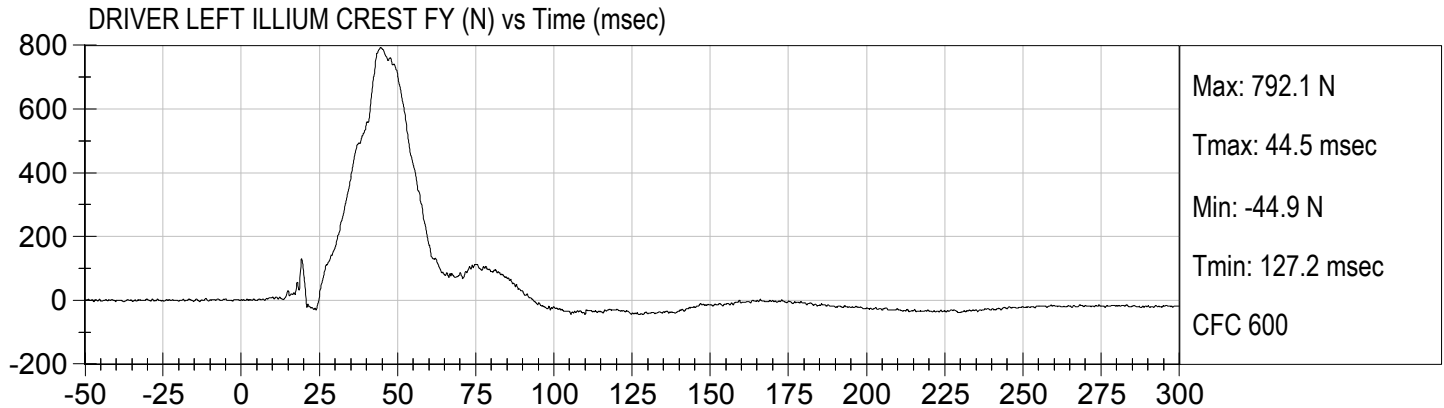
Load Cell Pole Barrier #6 Force (Y)

Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)







APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SID-IIsD External Measurements
SN: 306

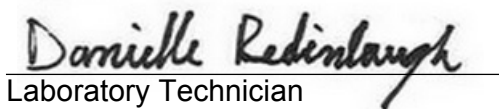
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

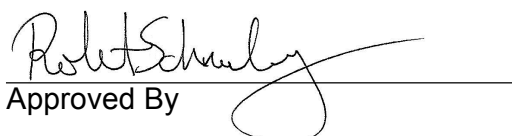
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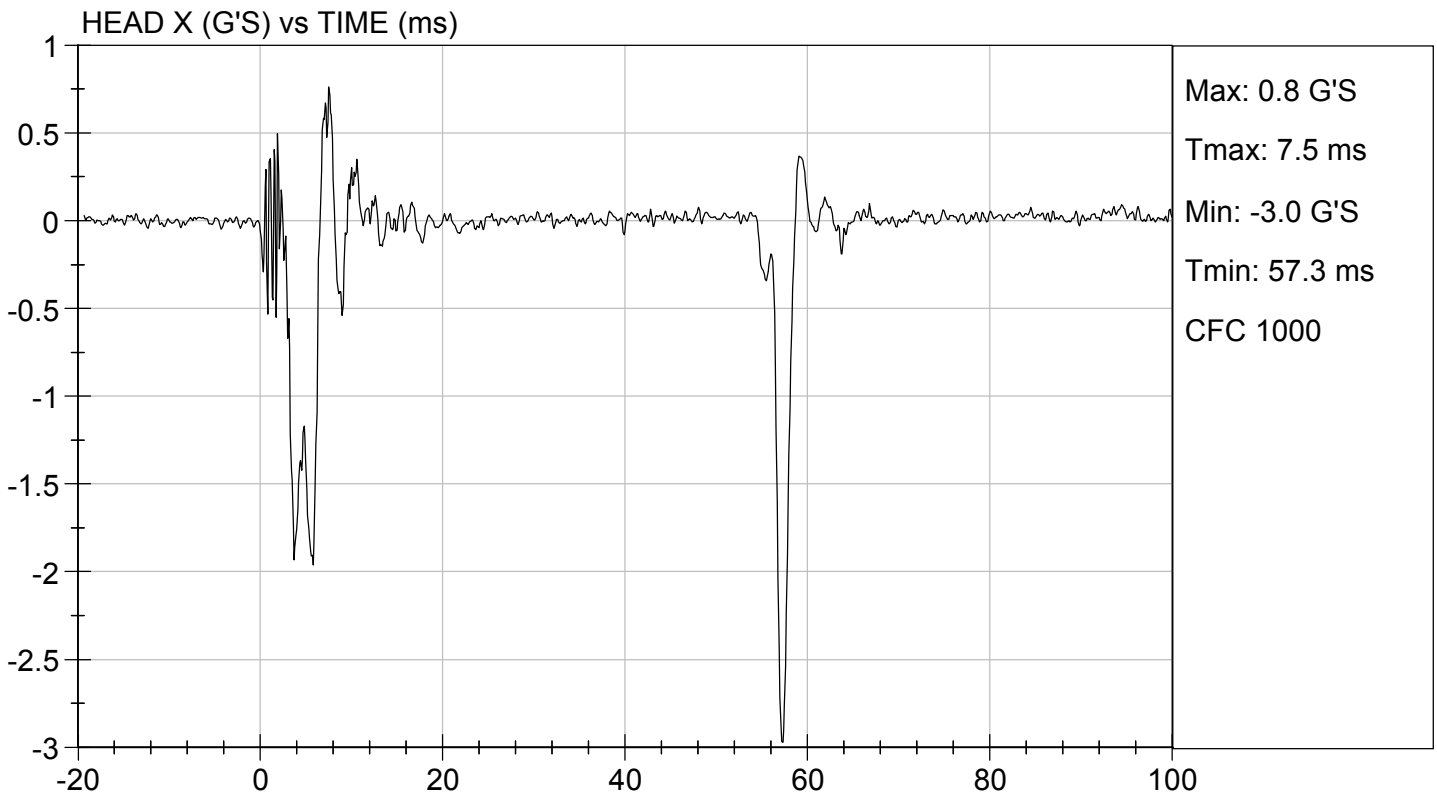
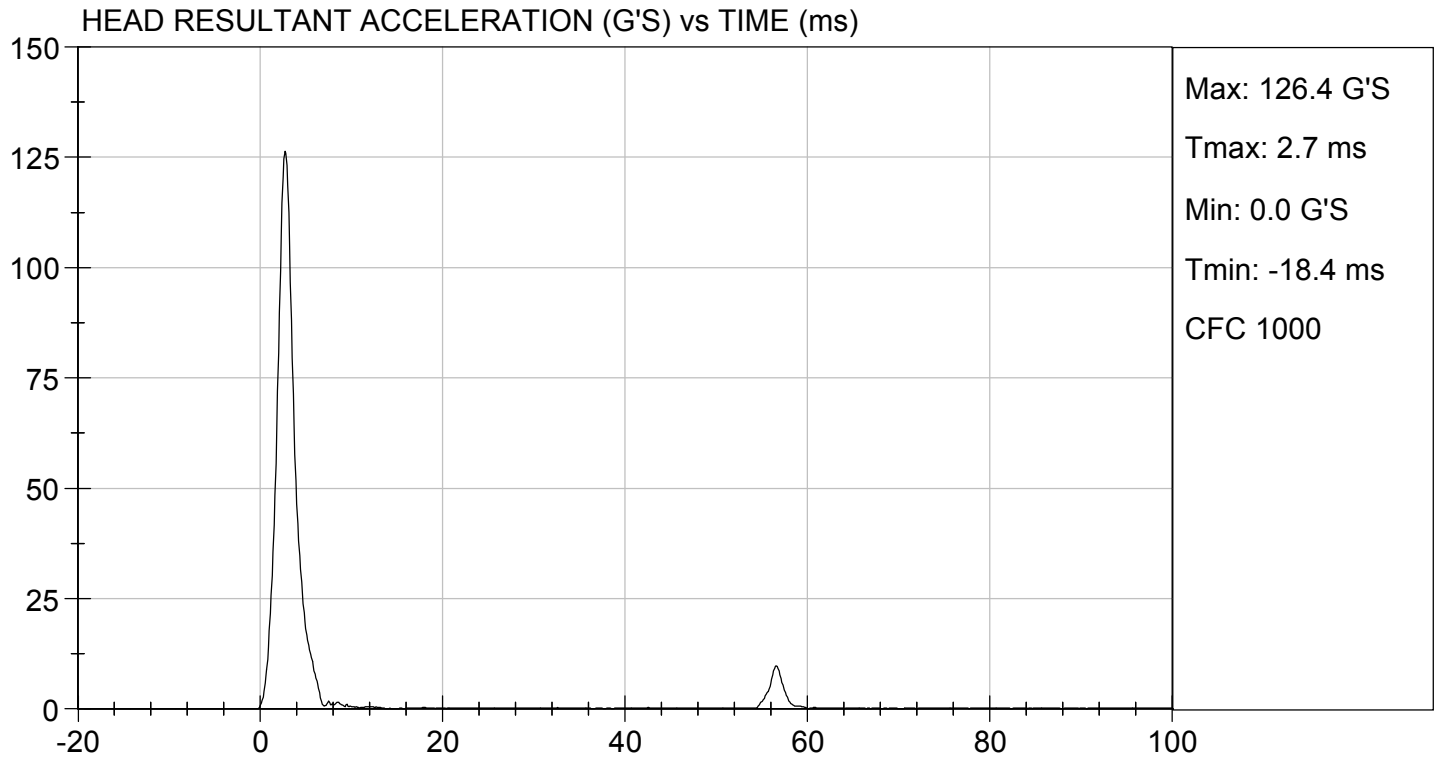
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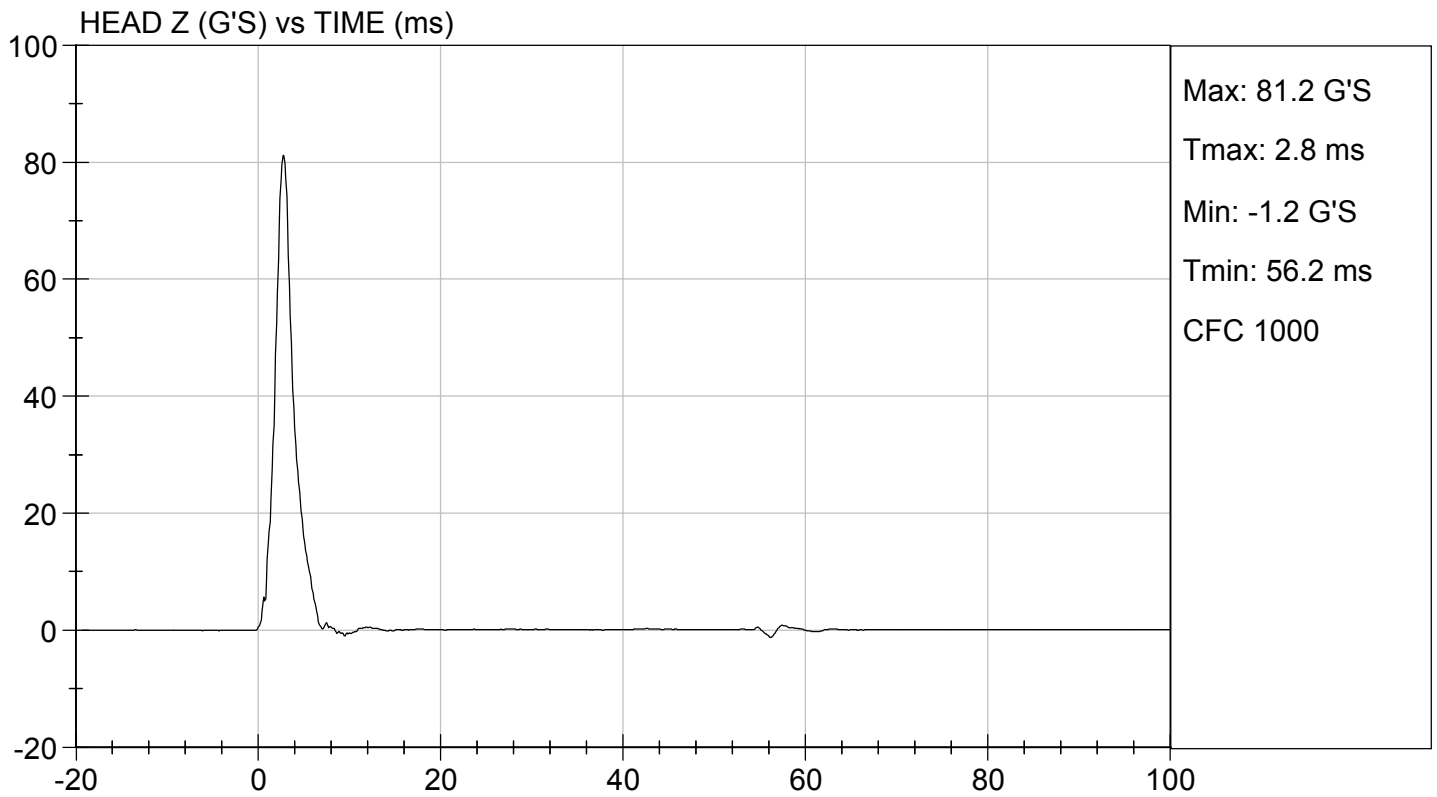
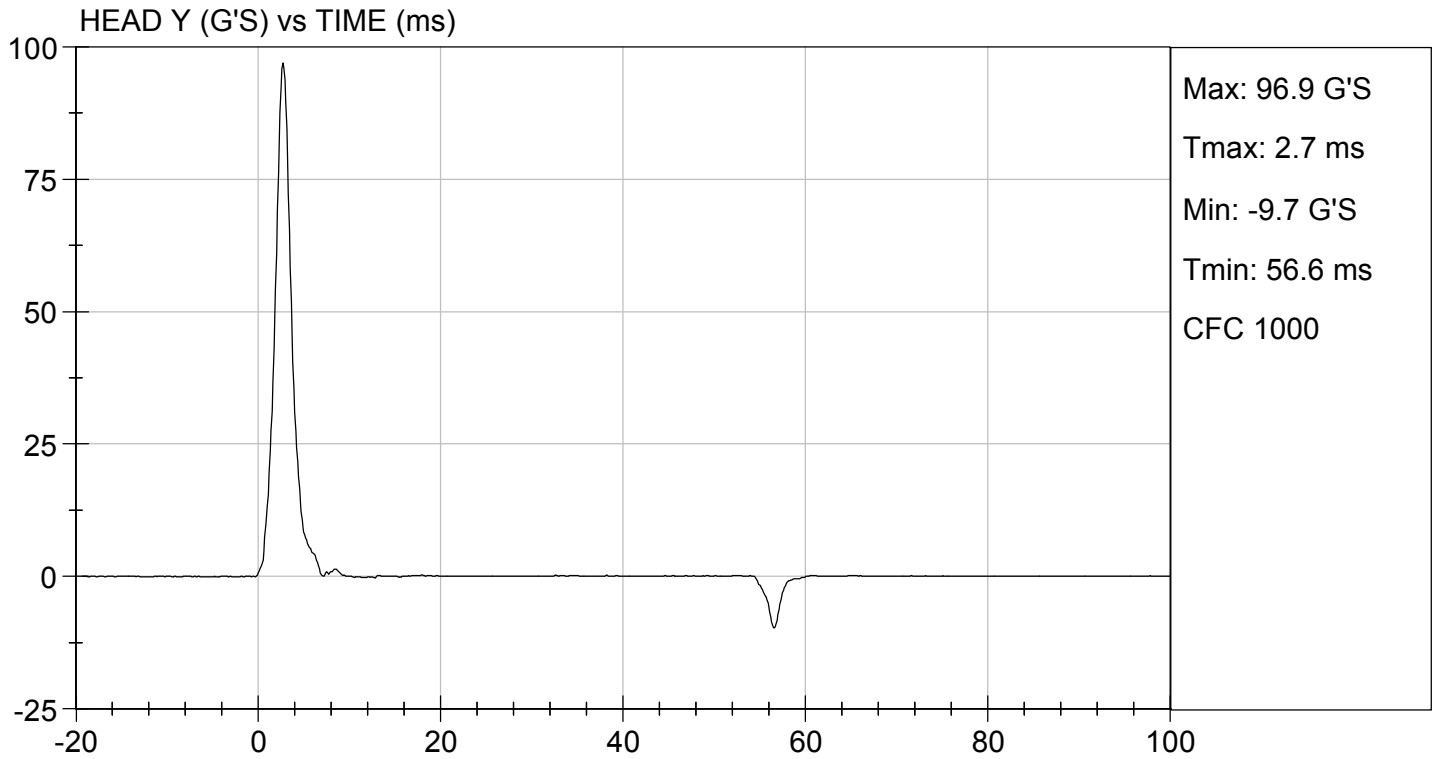
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity	%	10 to 70	22.2	Pass
Peak Resultant Acceleration	G's	115 to 137	126	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-3.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

11/20/2017
Test Date


Approved By





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

ATD Serial No: 306

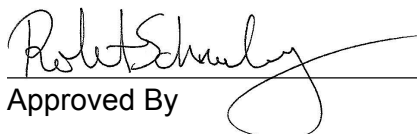
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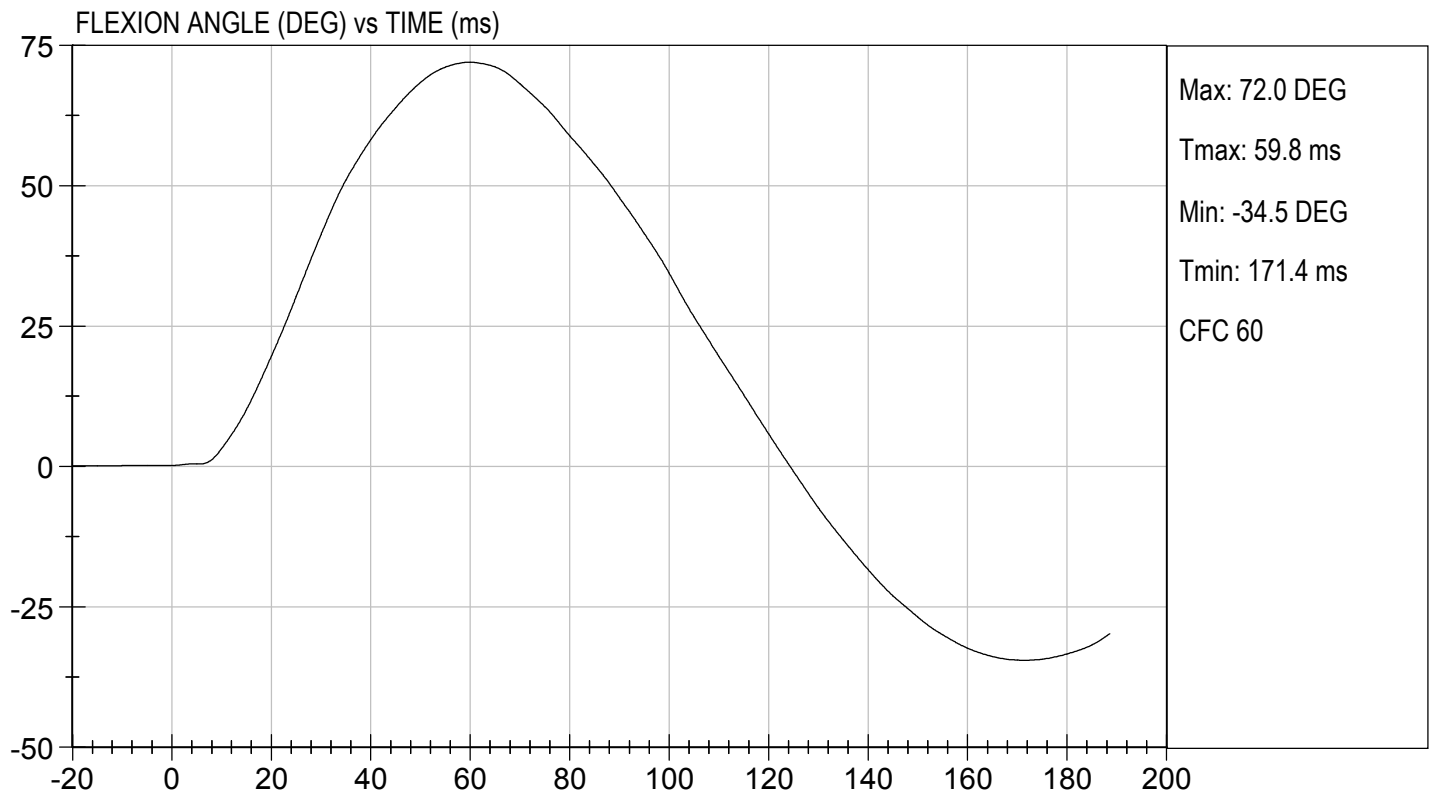
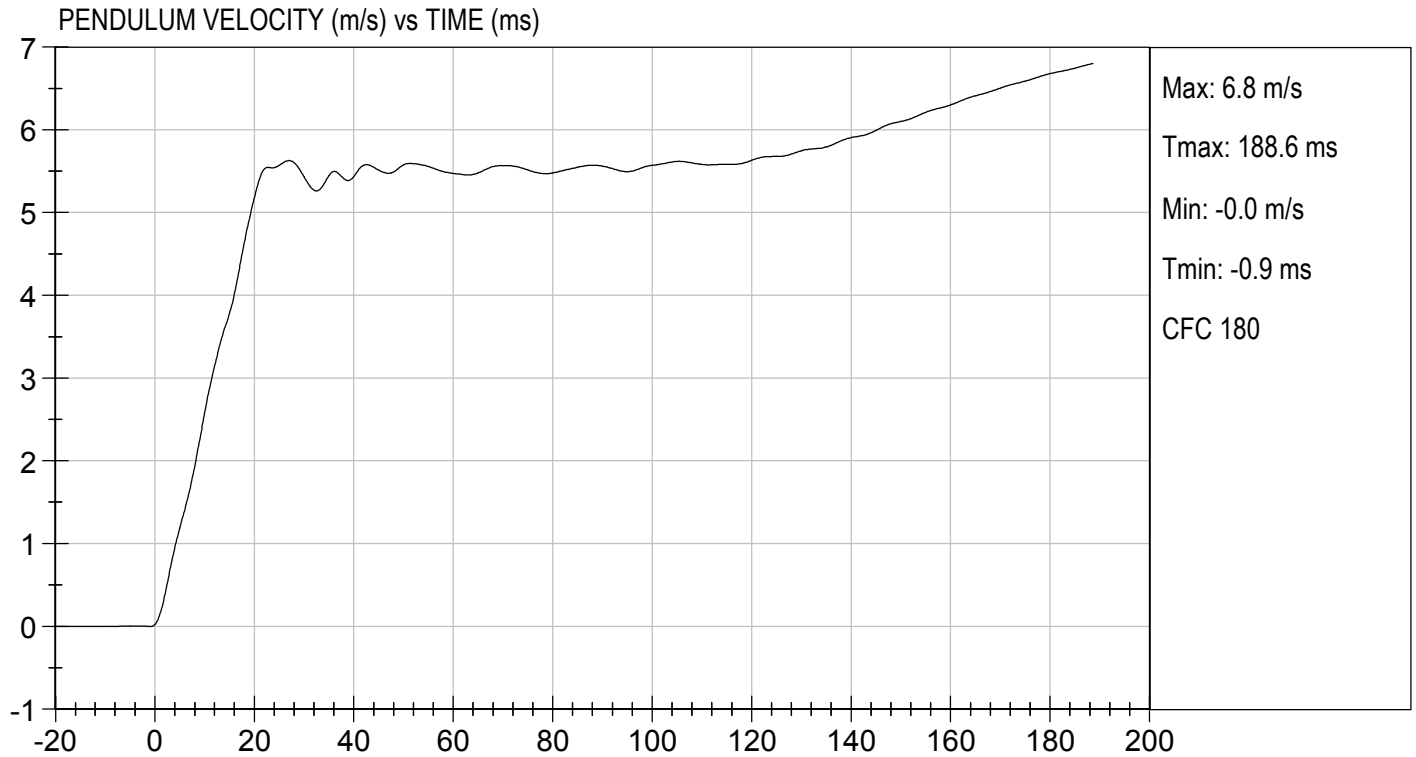
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.8	Pass
Humidity		%	10 to 70	30	Pass
Impact Velocity		m/s	5.51 to 5.63	5.52	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.58	Pass
	15 ms	m/s	3.30 to 4.10	3.78	Pass
	20 ms	m/s	4.40 to 5.40	5.18	Pass
	25 ms	m/s	5.40 to 6.10	5.57	Pass
	25-100 ms	m/s	5.50 to 6.20	5.63	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	112	Pass
Overall Test Results					Pass


 Laboratory Technician

11/20/2017

Test Date

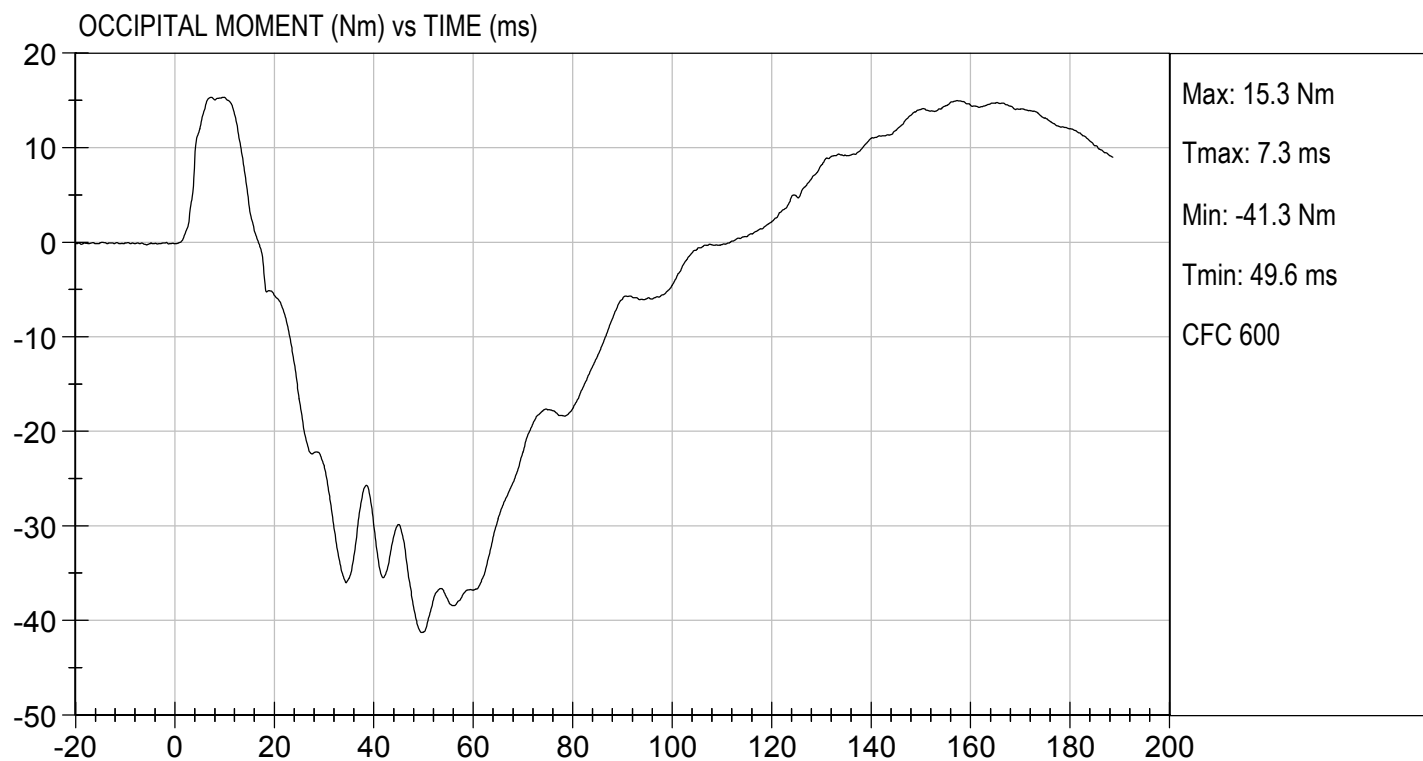

 Approved By





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

TEST DATE: 11/20/2017
TEST #: D173362



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

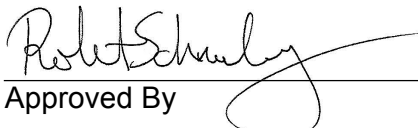
ATD Serial No: 306

Test ID: D173363

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass


Laboratory Technician

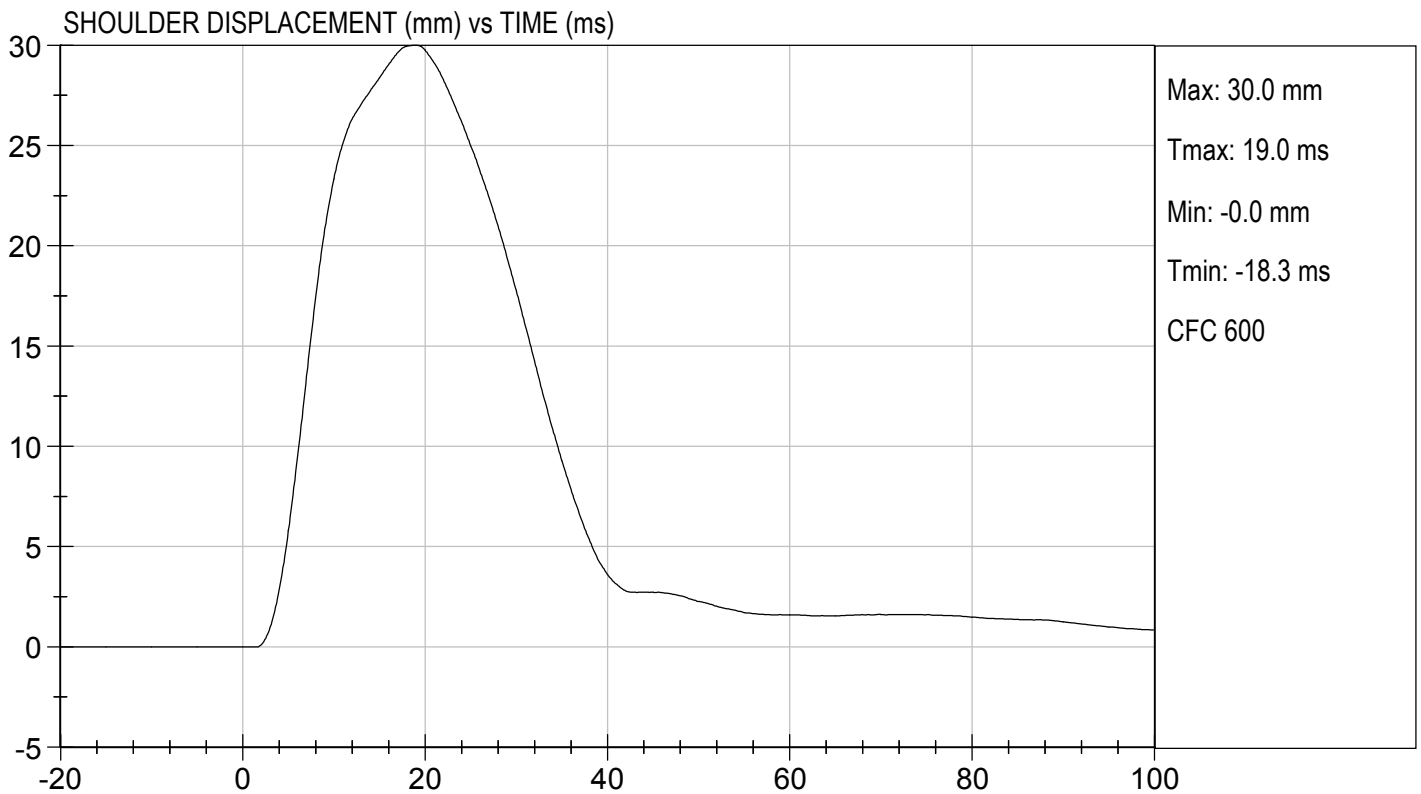
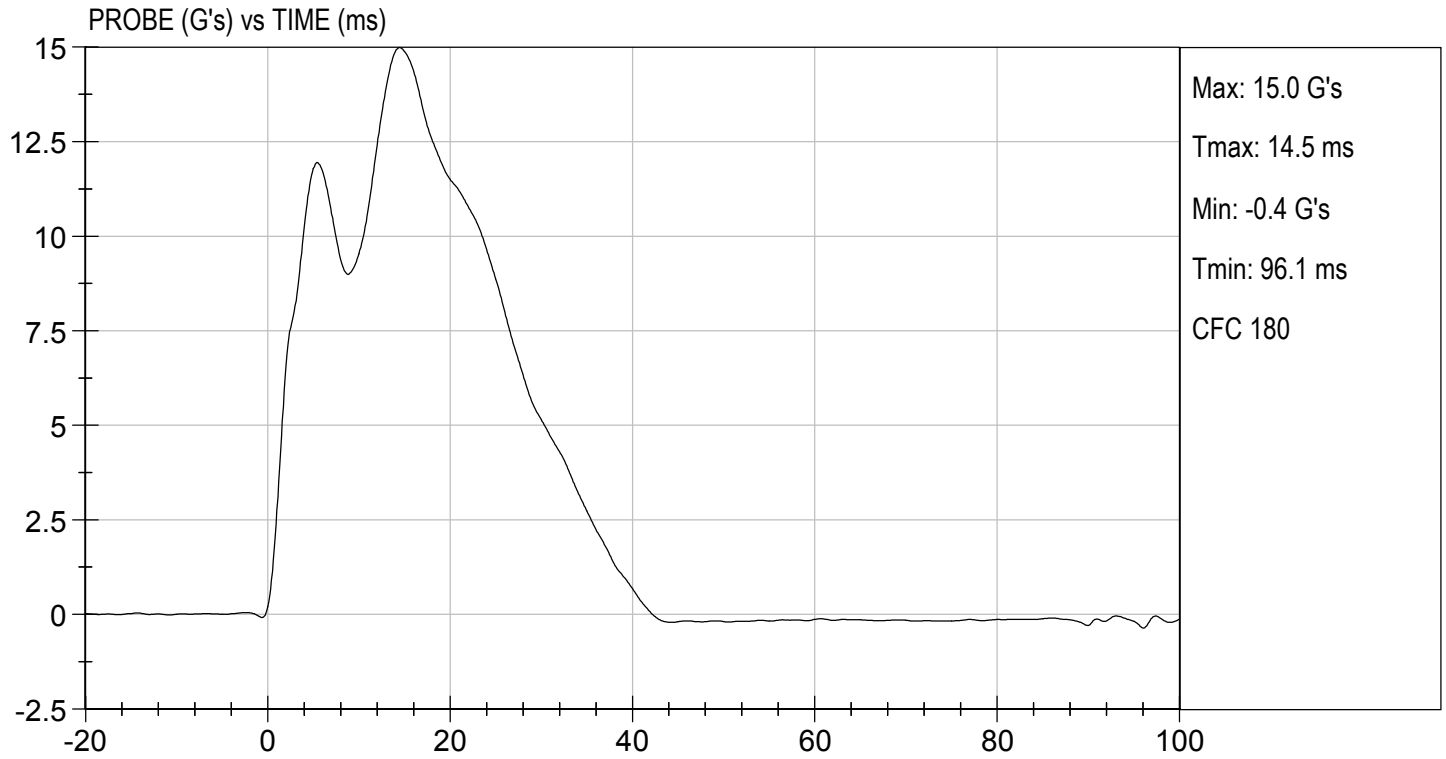
11/21/2017
Test Date


Approved By



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

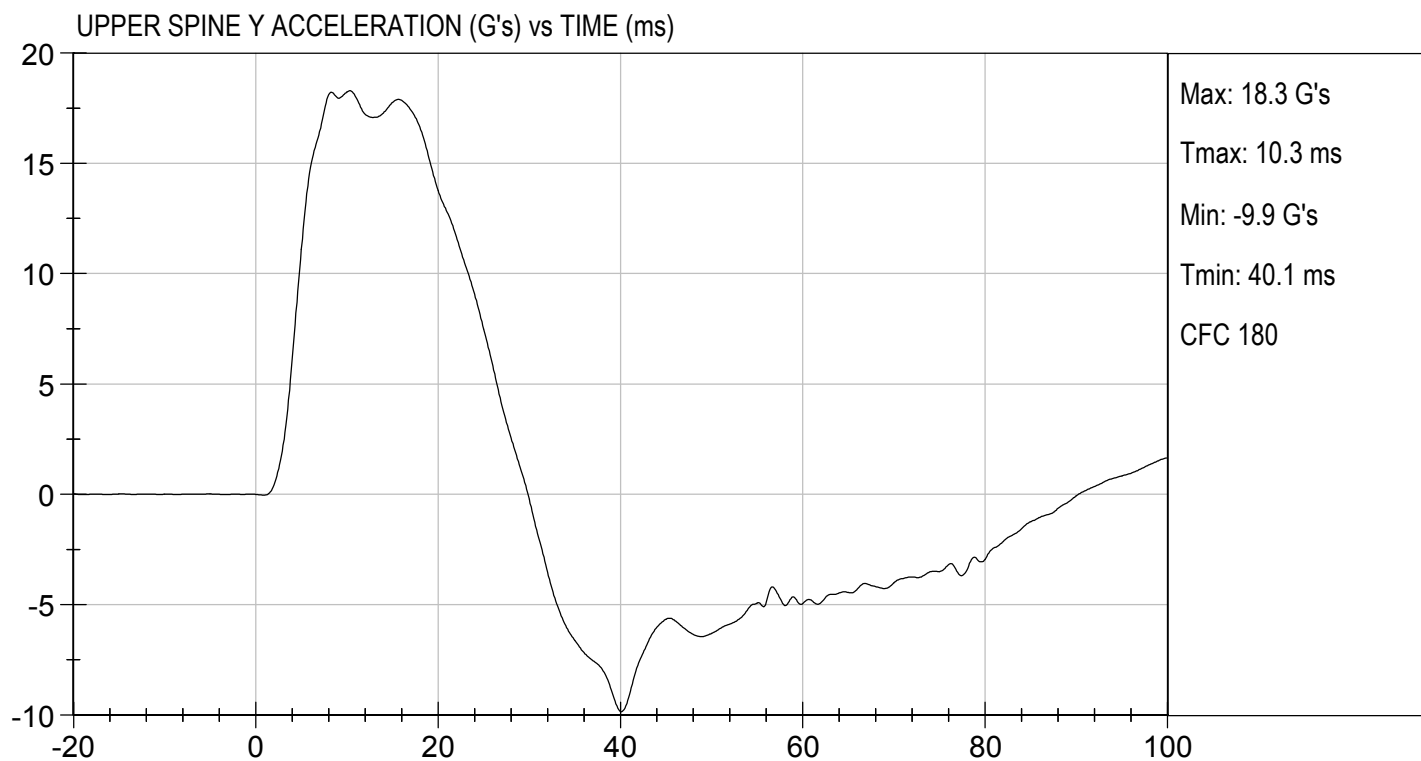
TEST DATE: 11/21/2017
TEST #: D173363





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

TEST DATE: 11/21/2017
TEST #: D173363

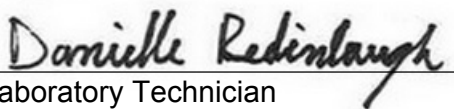


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

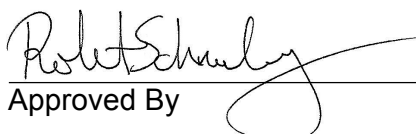
Test I.D: D173364

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


Laboratory Technician

11/21/2017

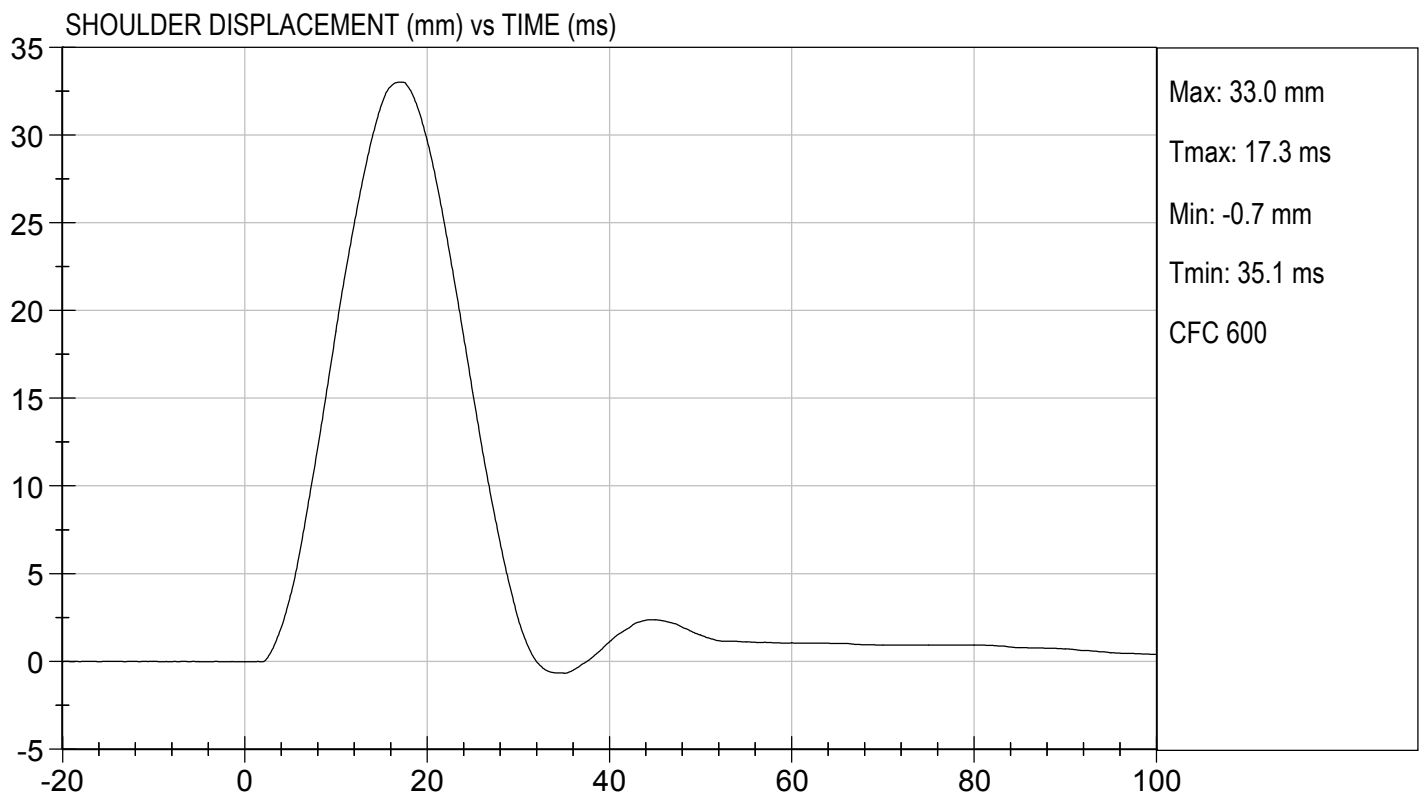
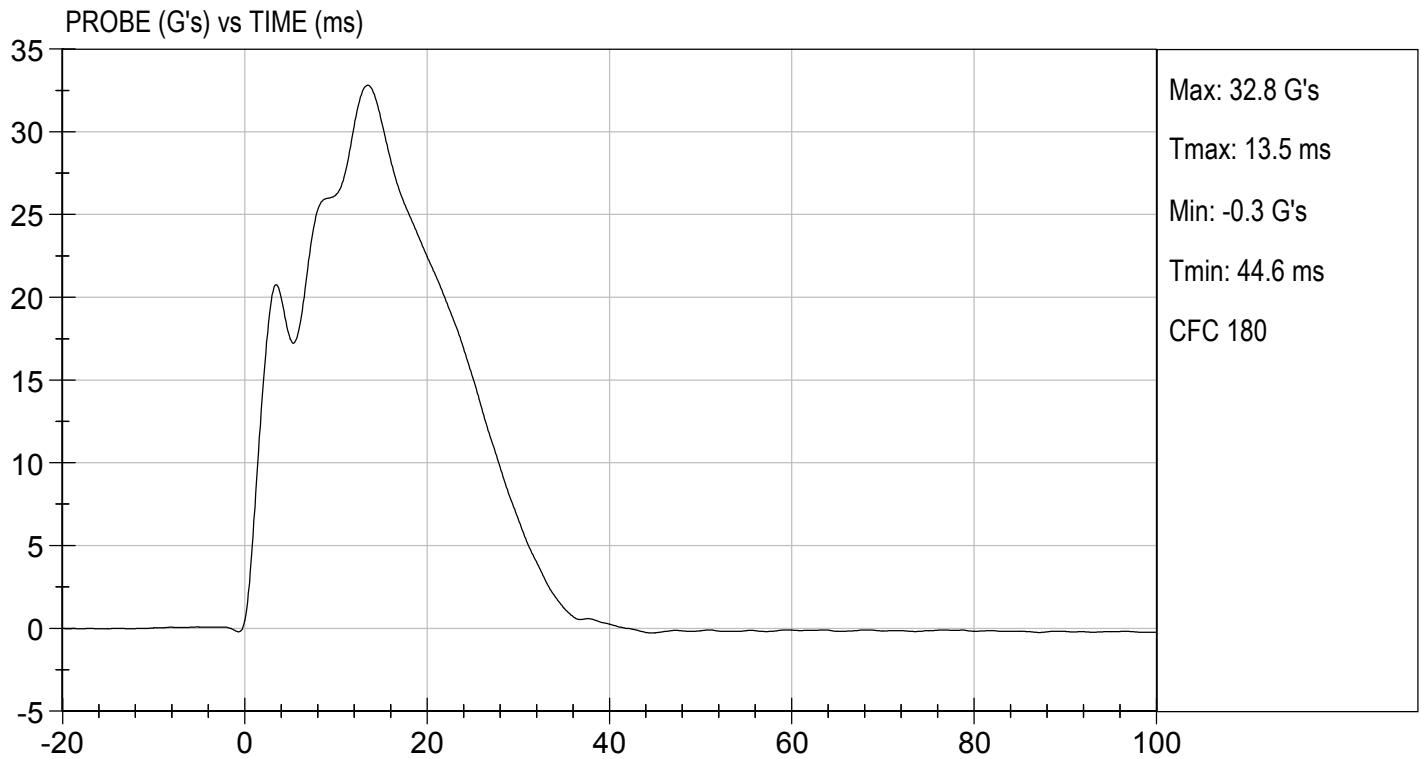
Test Date


Approved By



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

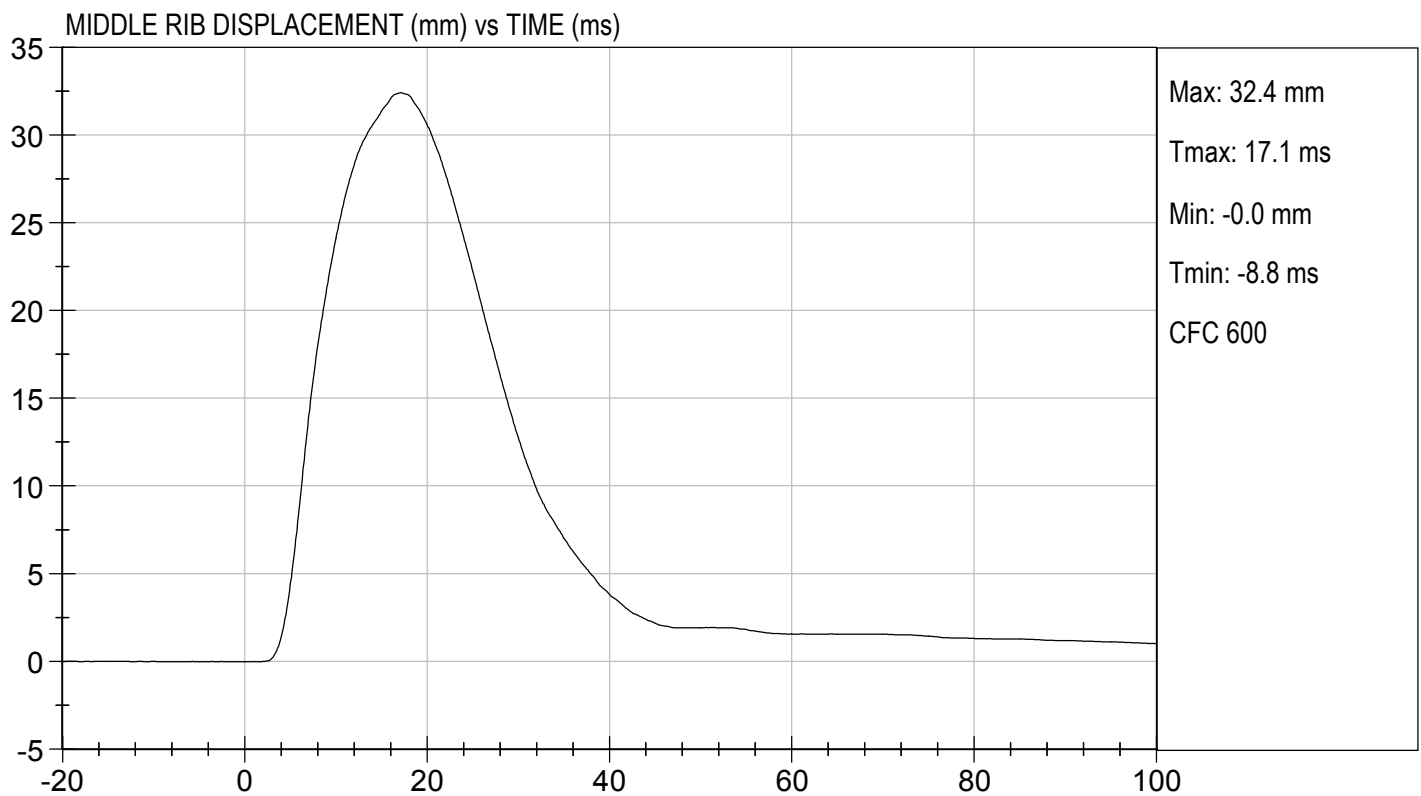
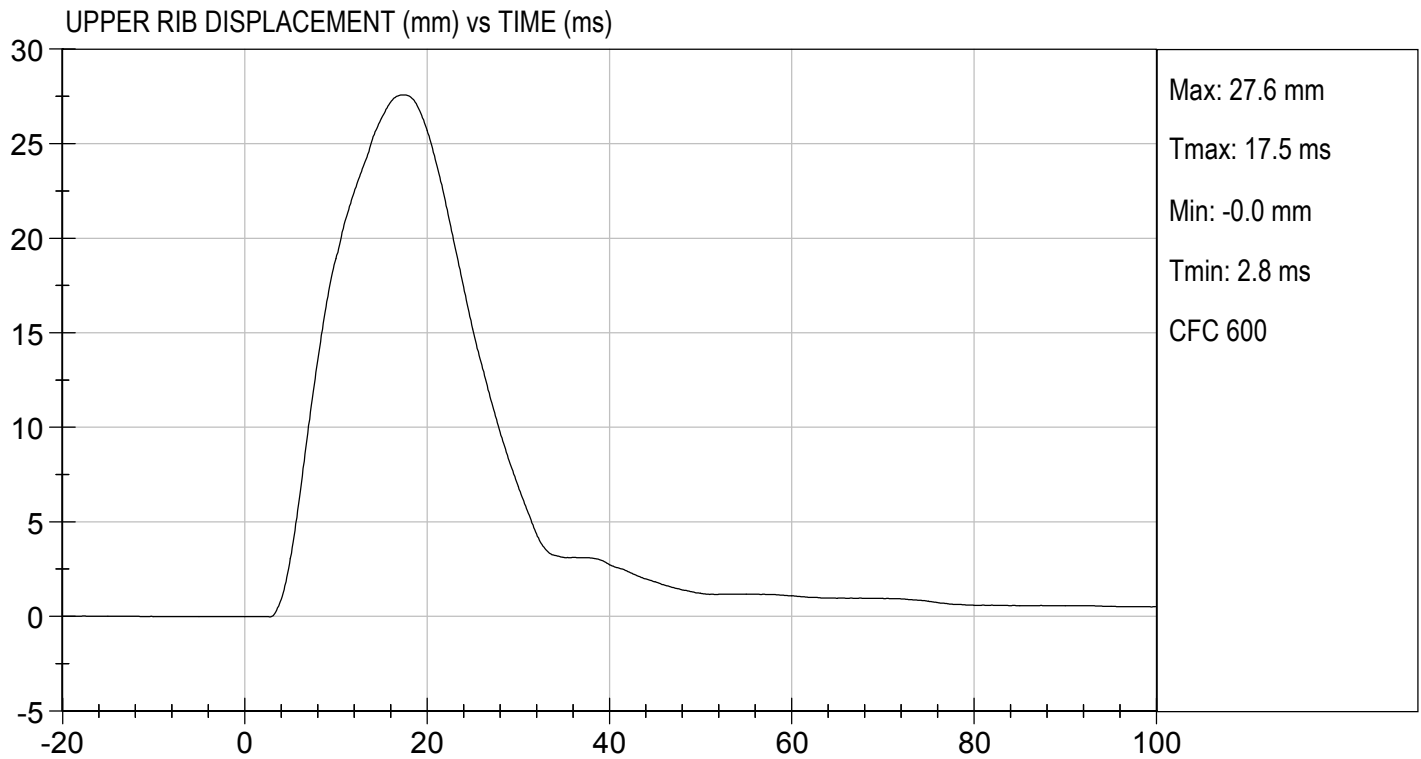
TEST DATE: 11/21/2017
TEST #: D173364





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

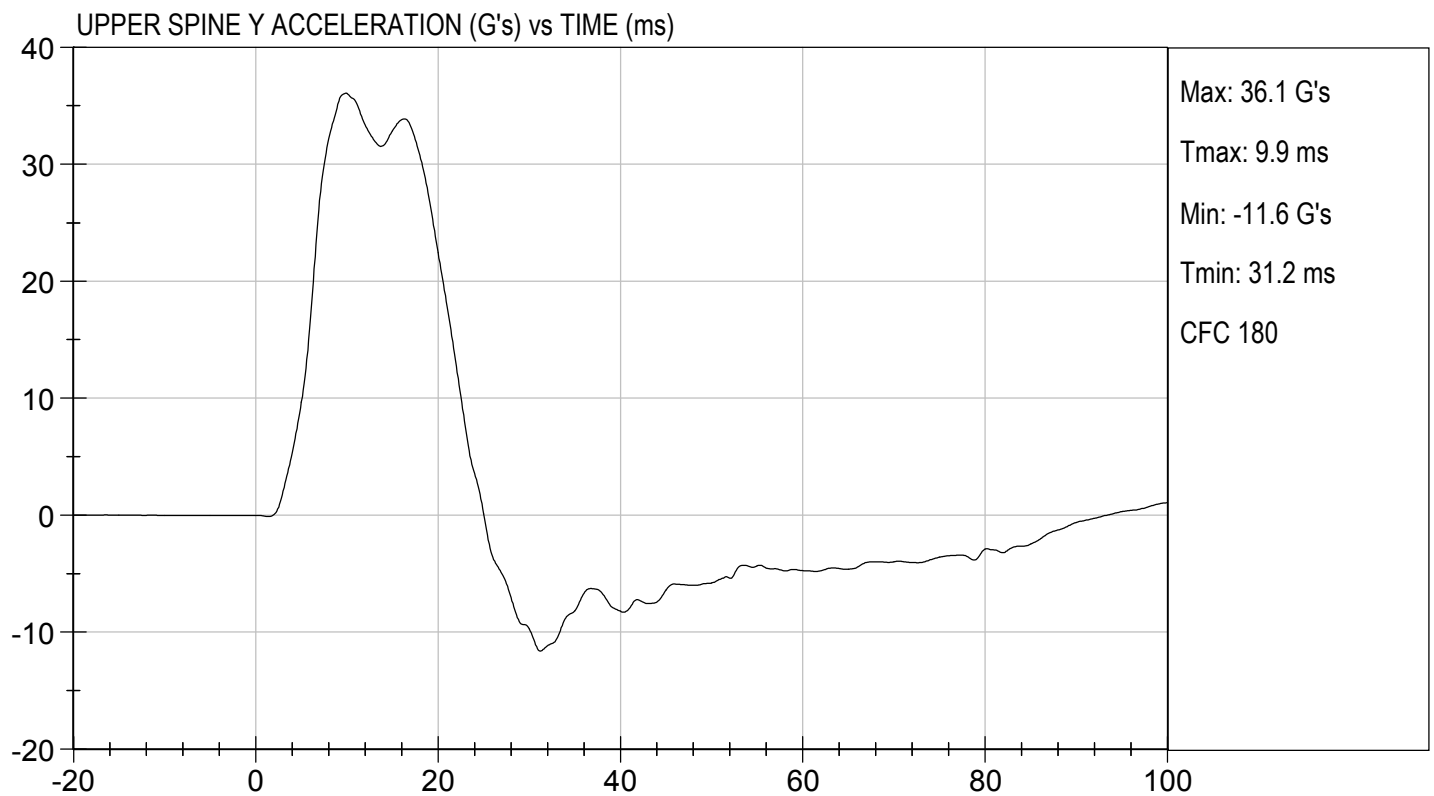
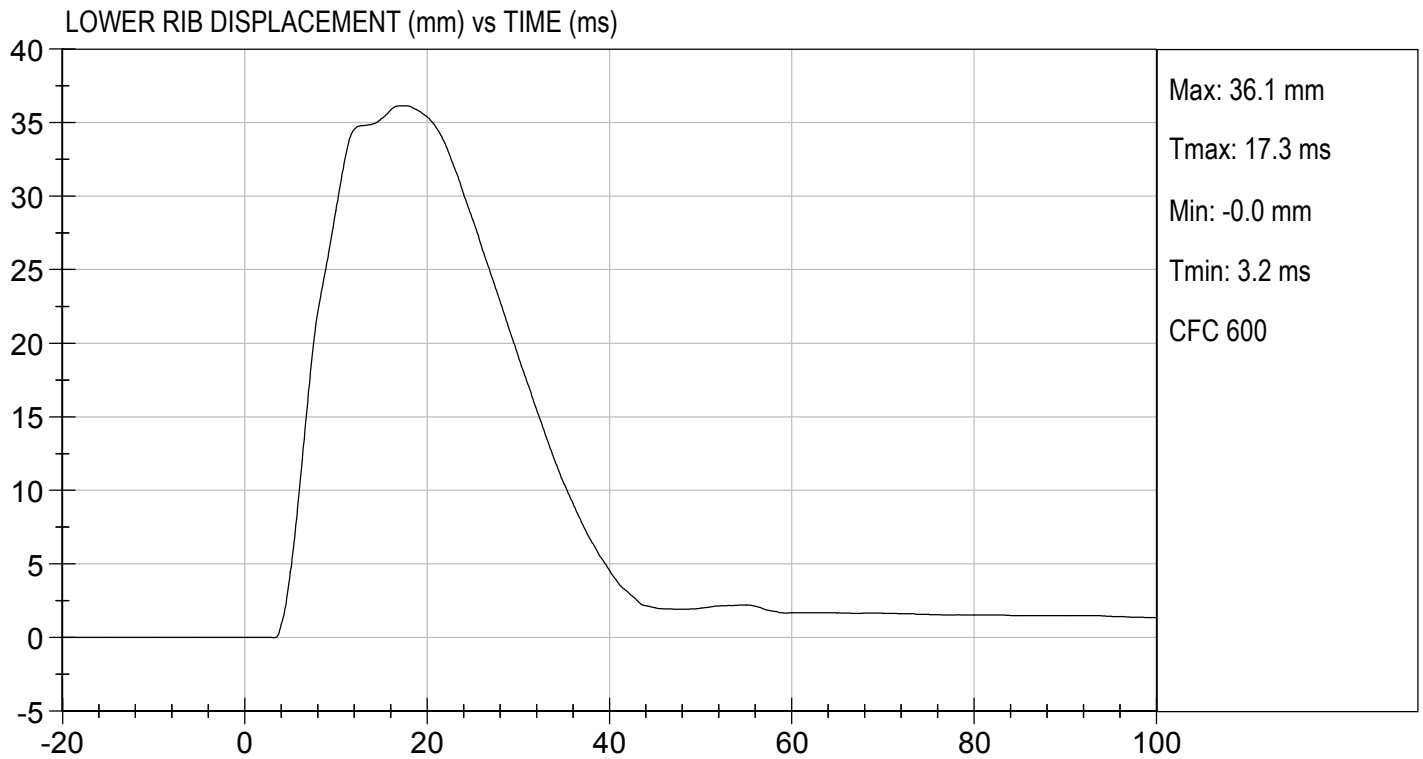
TEST DATE: 11/21/2017
TEST #: D173364





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

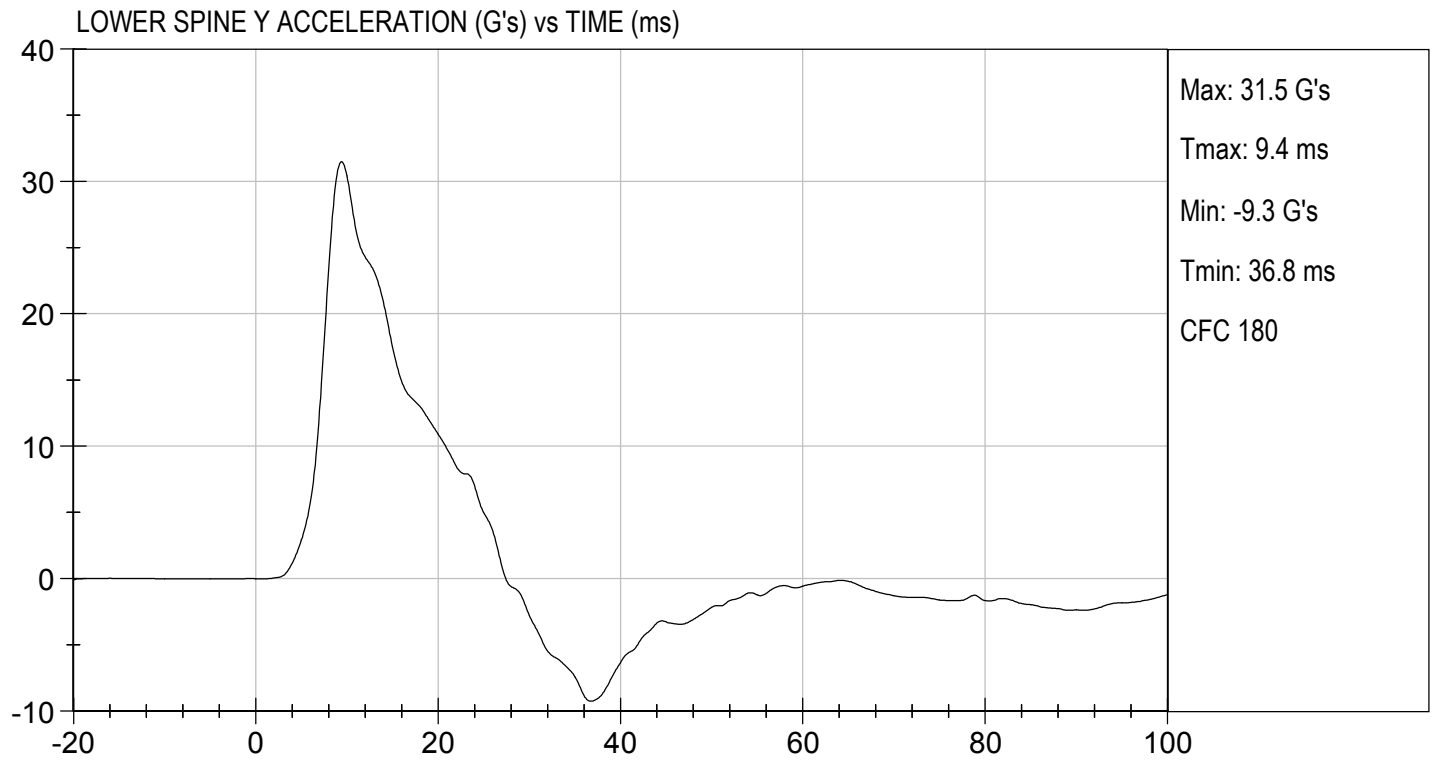
TEST DATE: 11/21/2017
TEST #: D173364





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

TEST DATE: 11/21/2017
TEST #: D173364



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

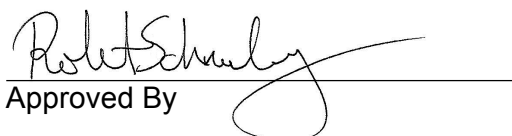
ATD Serial No: 306

Test I.D: D173365

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	36	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	41	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

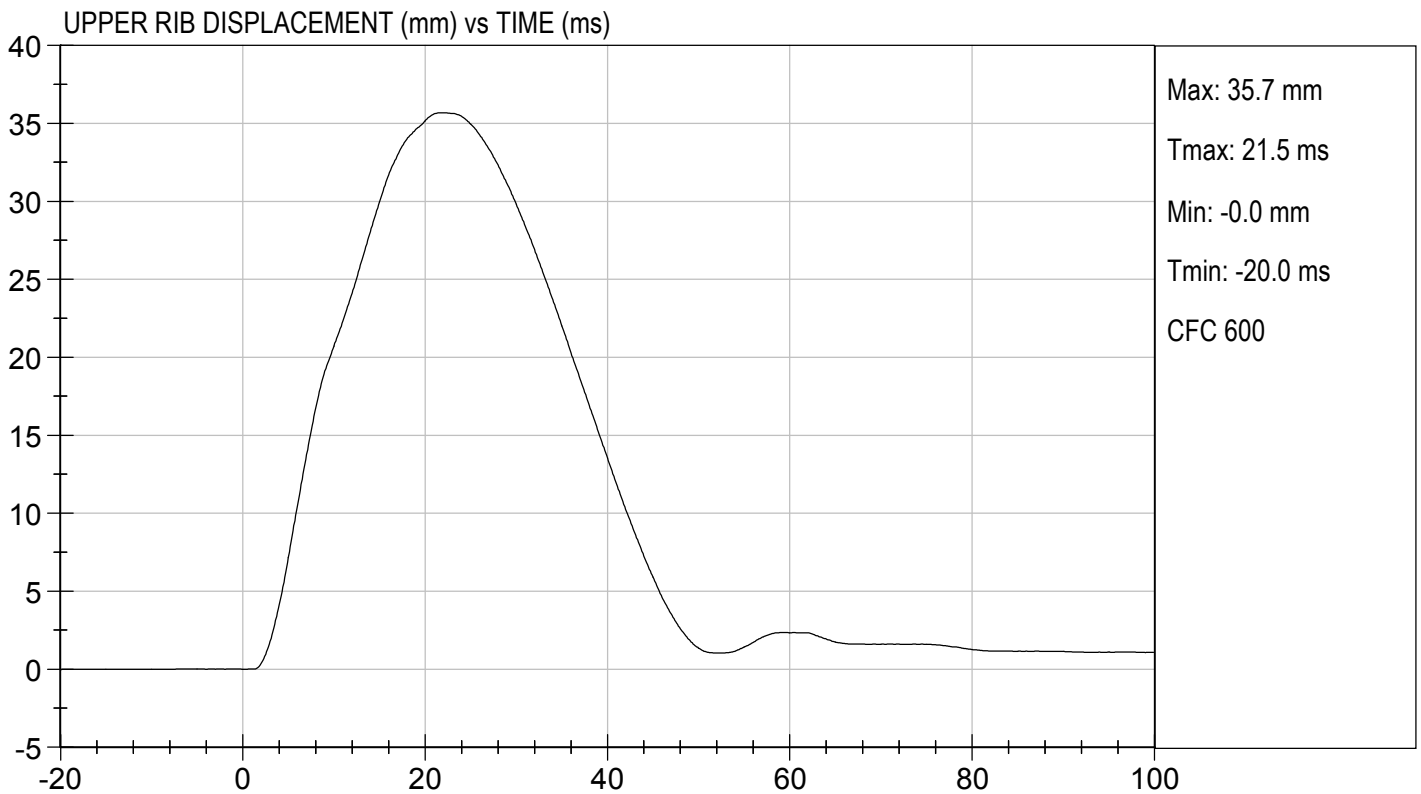
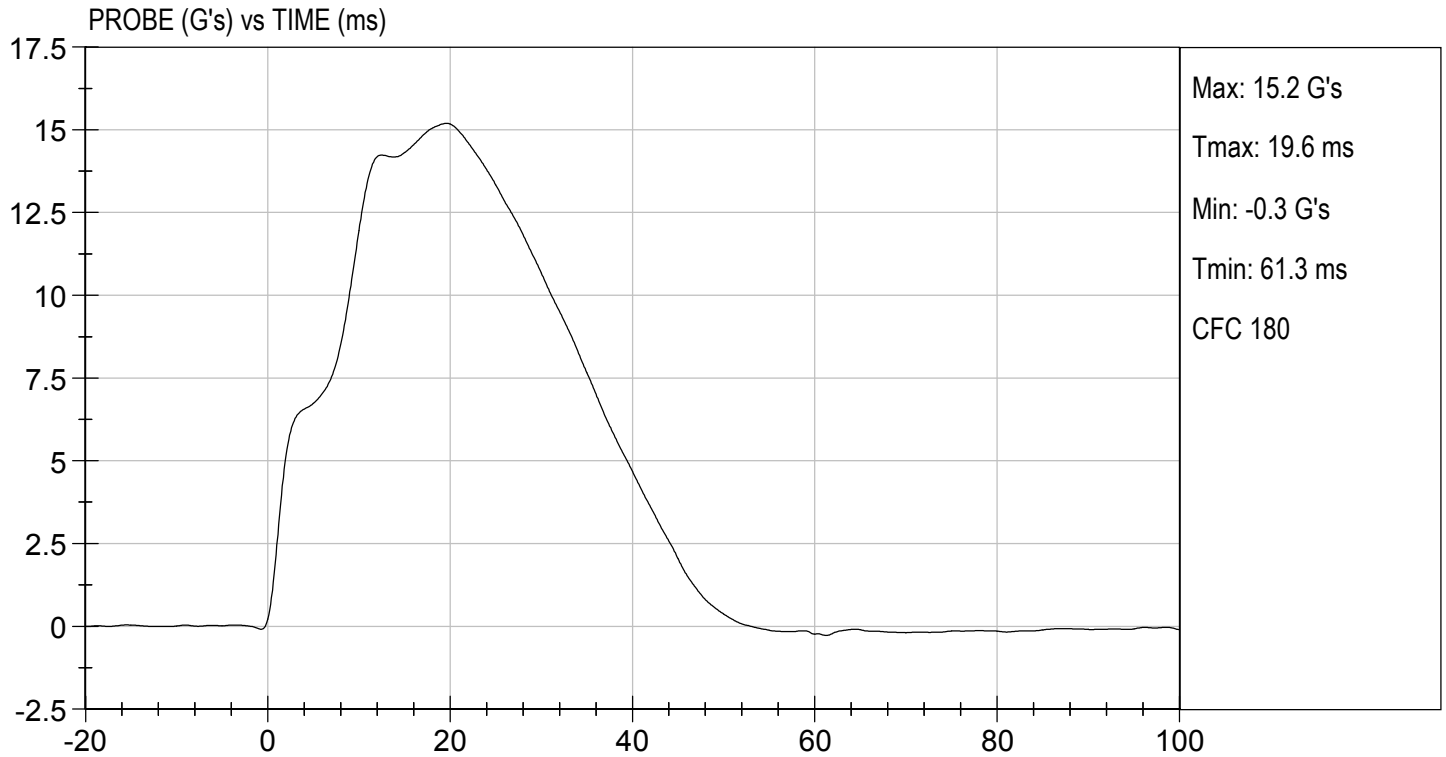
11/21/2017
Test Date


Approved By



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

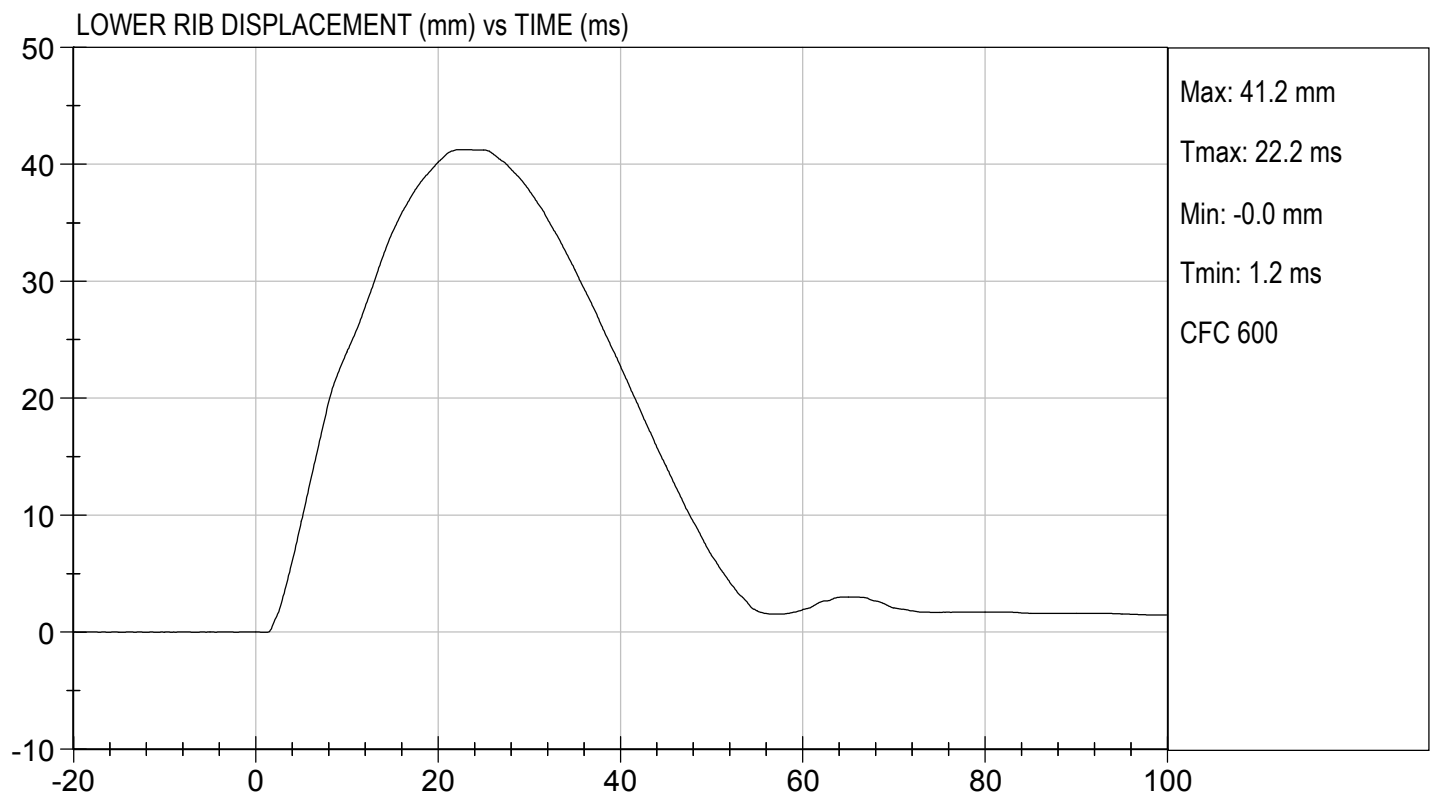
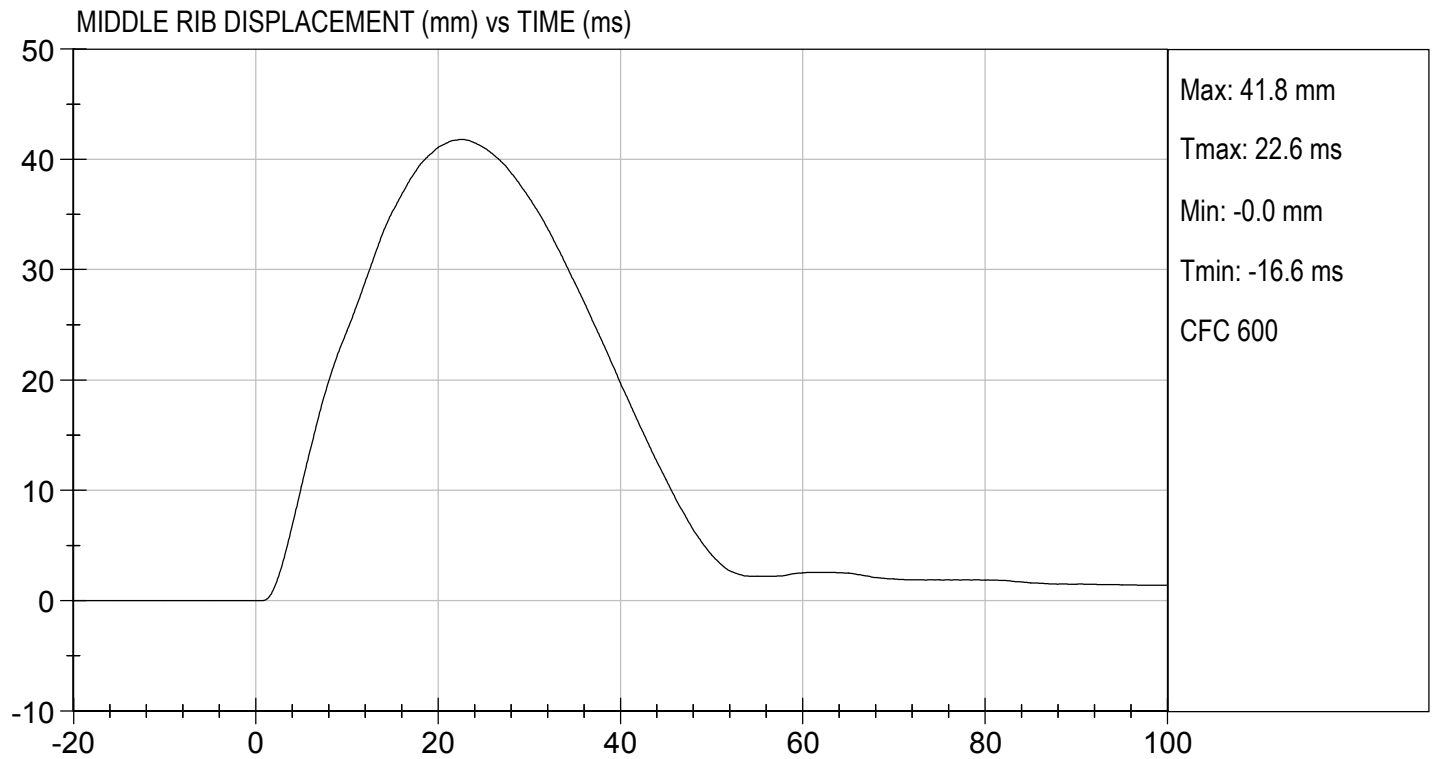
TEST DATE: 11/21/2017
TEST #: D173365





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

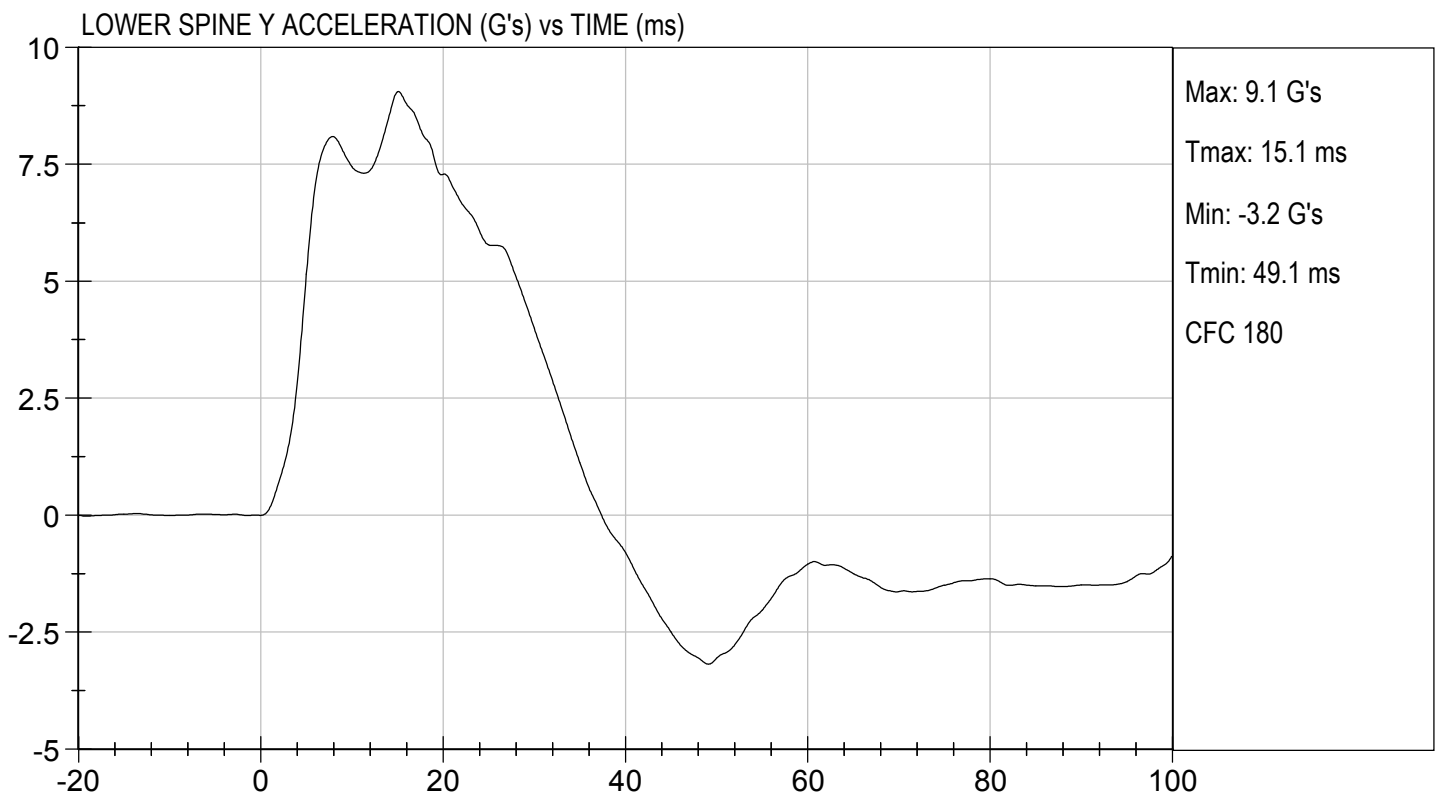
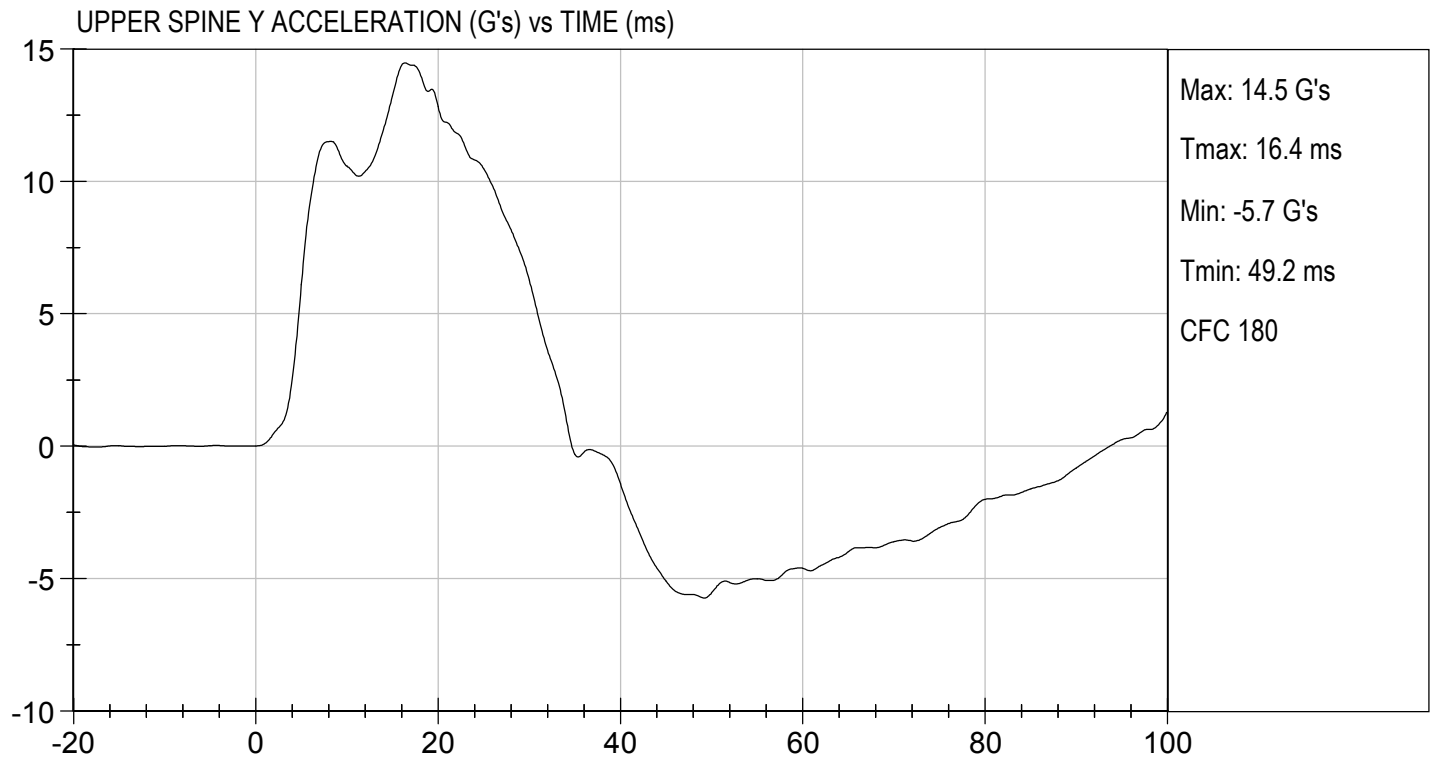
TEST DATE: 11/21/2017
TEST #: D173365





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

TEST DATE: 11/21/2017
TEST #: D173365



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

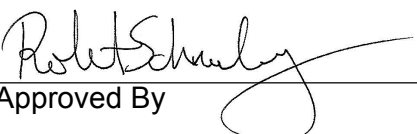
Test I.D: D173366

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

11/21/2017

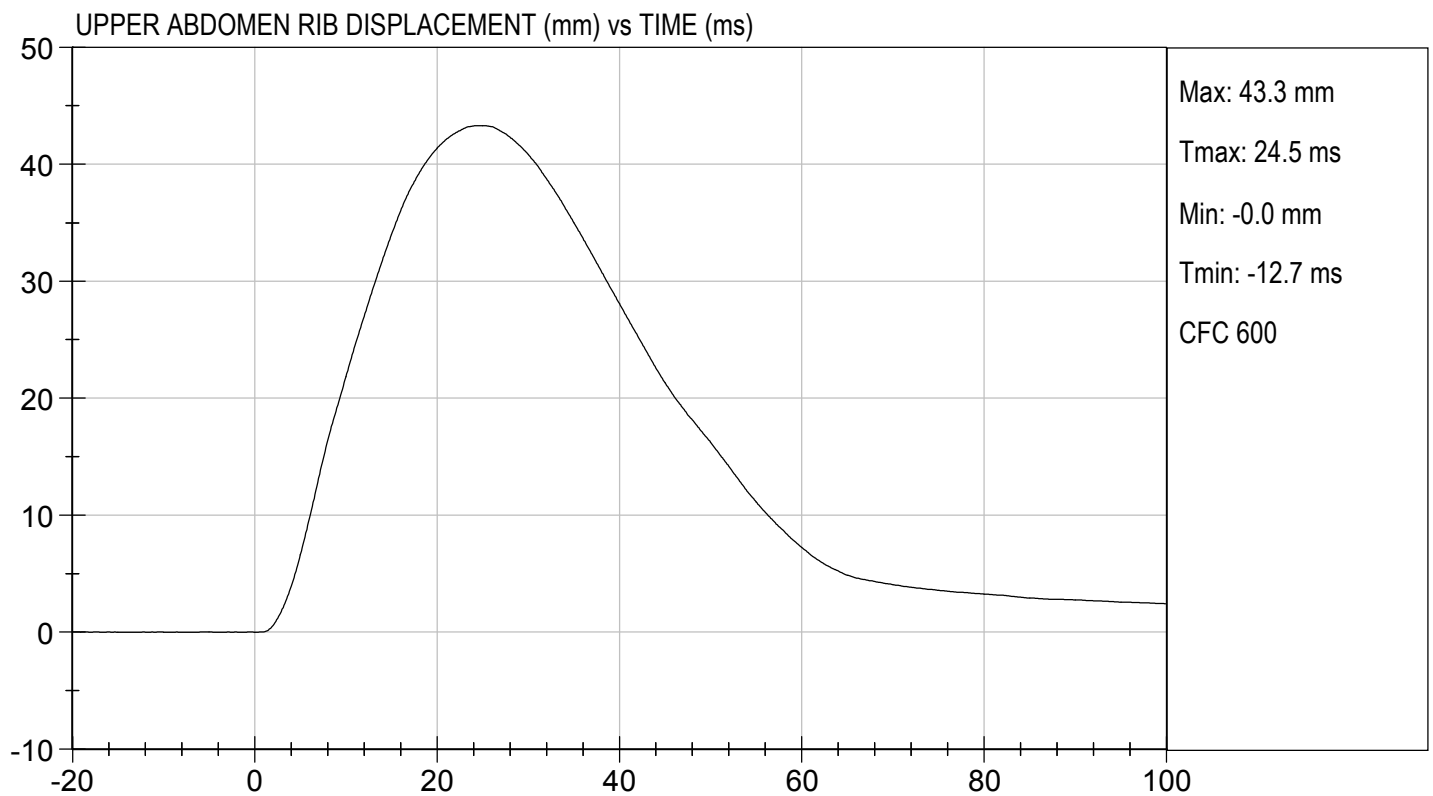
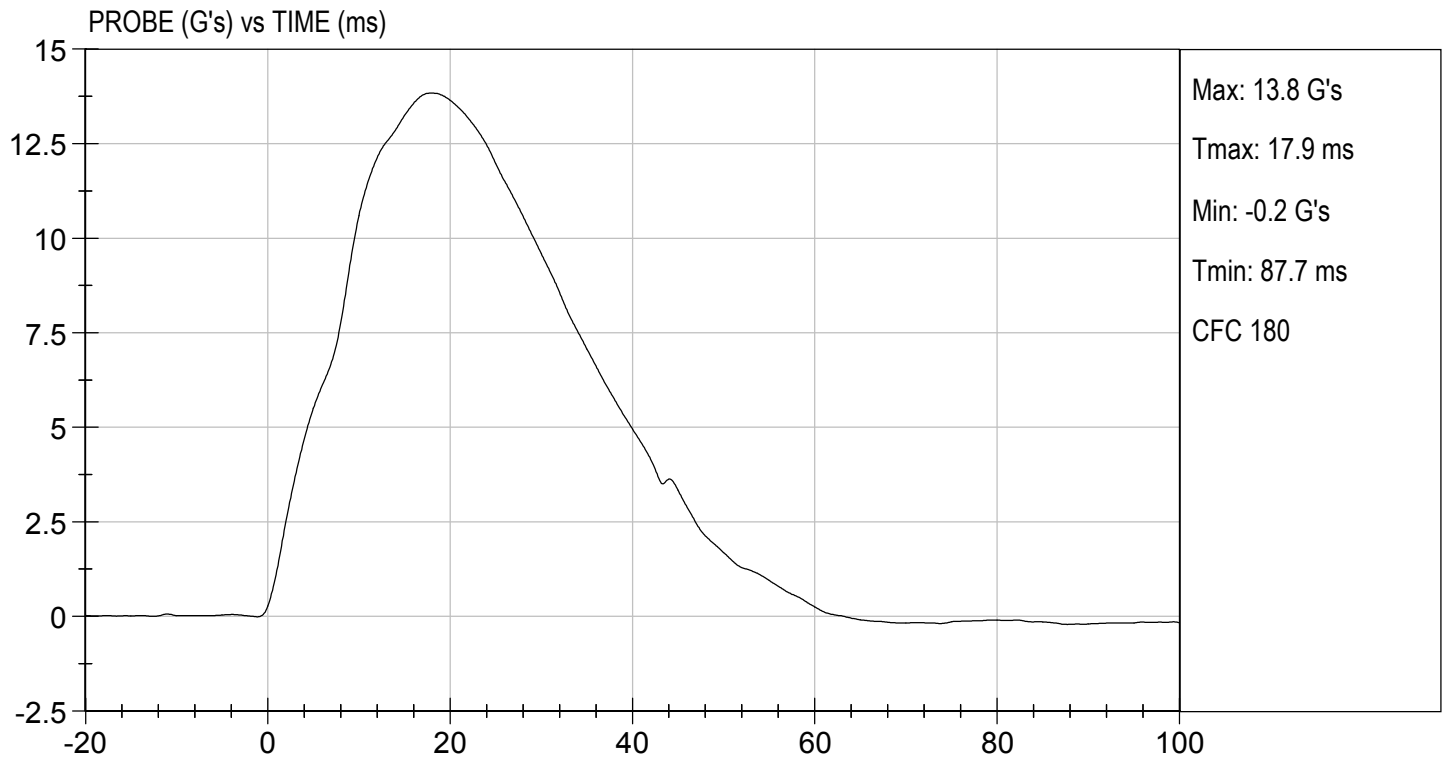
Test Date


Approved By



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

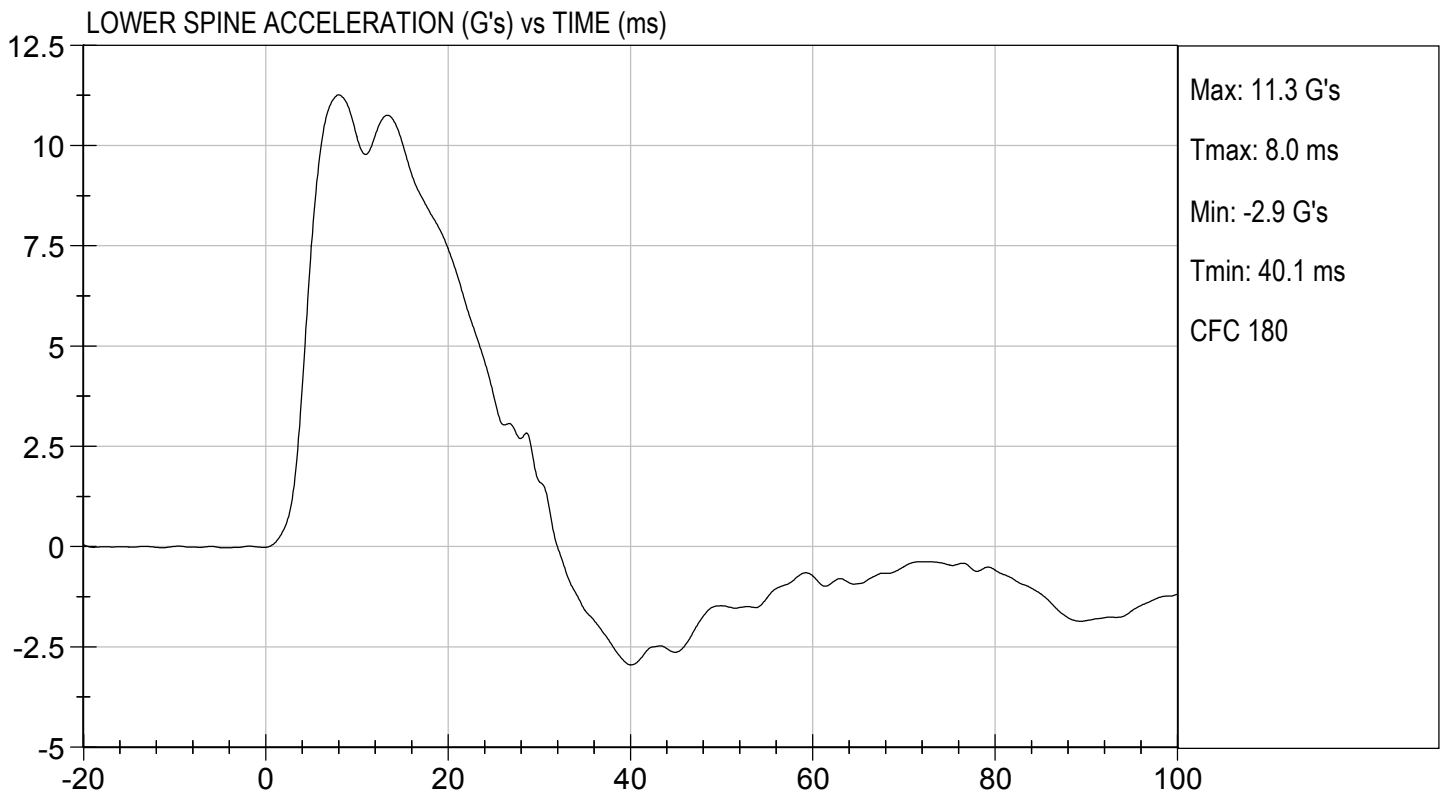
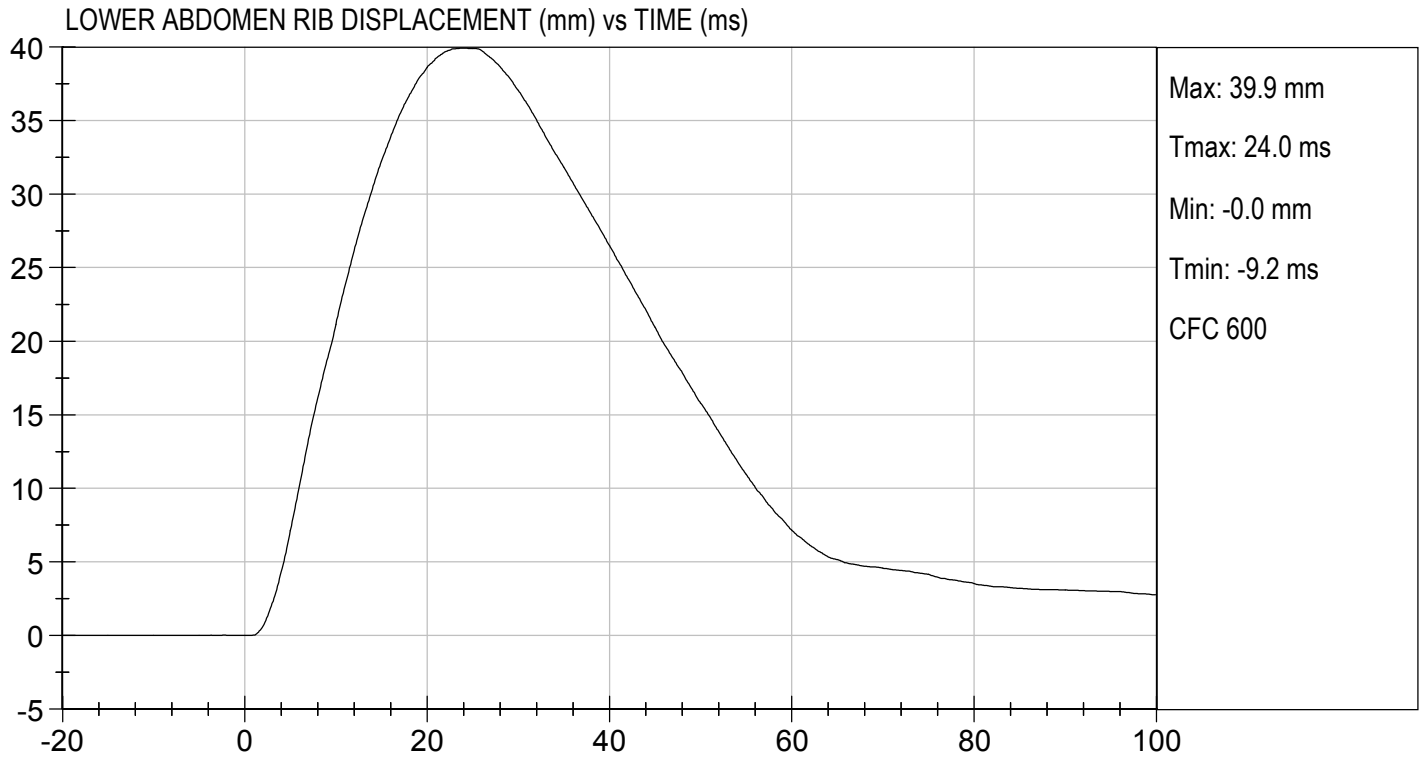
TEST DATE: 11/21/2017
TEST #: D173366





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

TEST DATE: 11/21/2017
TEST #: D173366



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

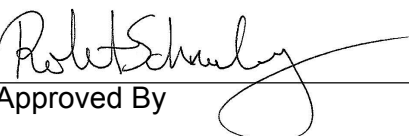
Test I.D: D173367

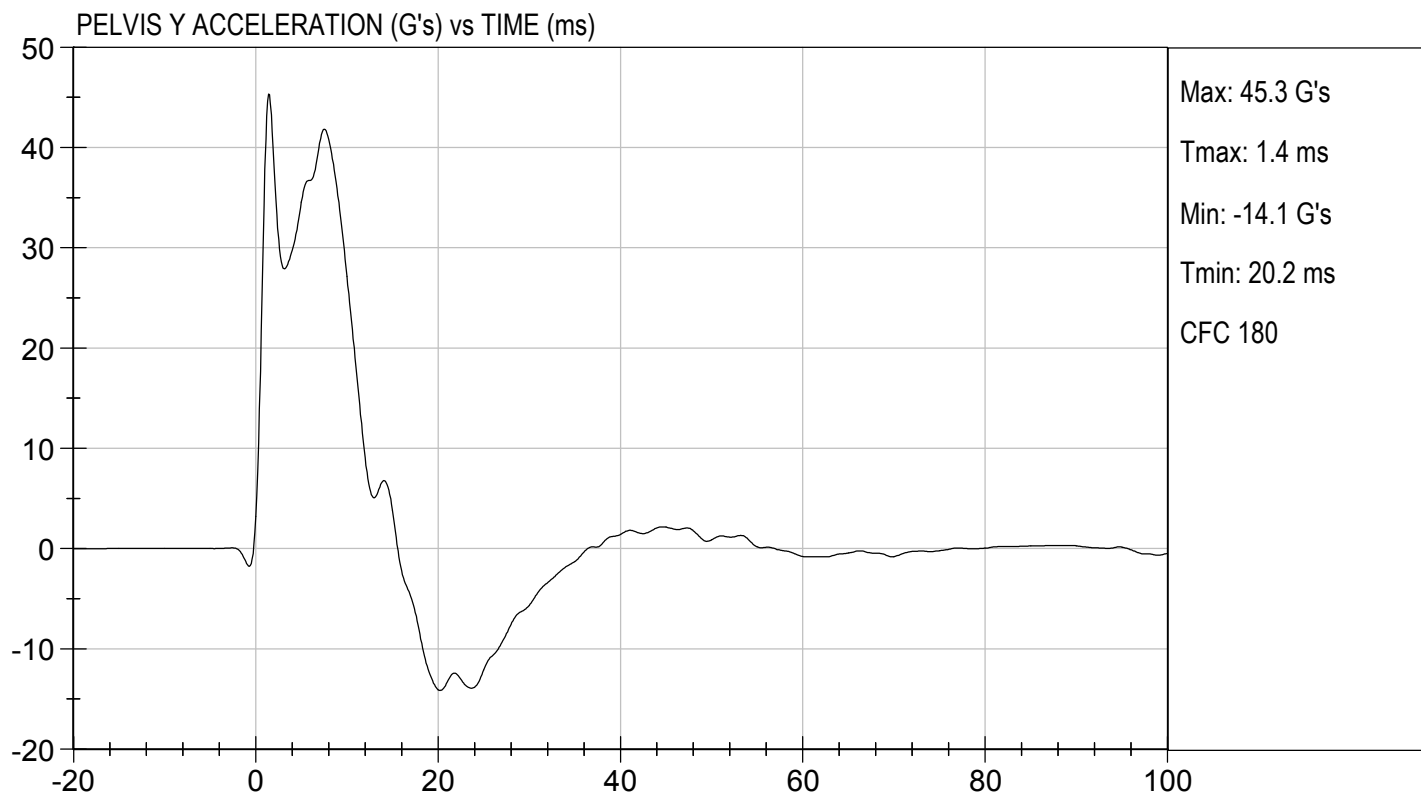
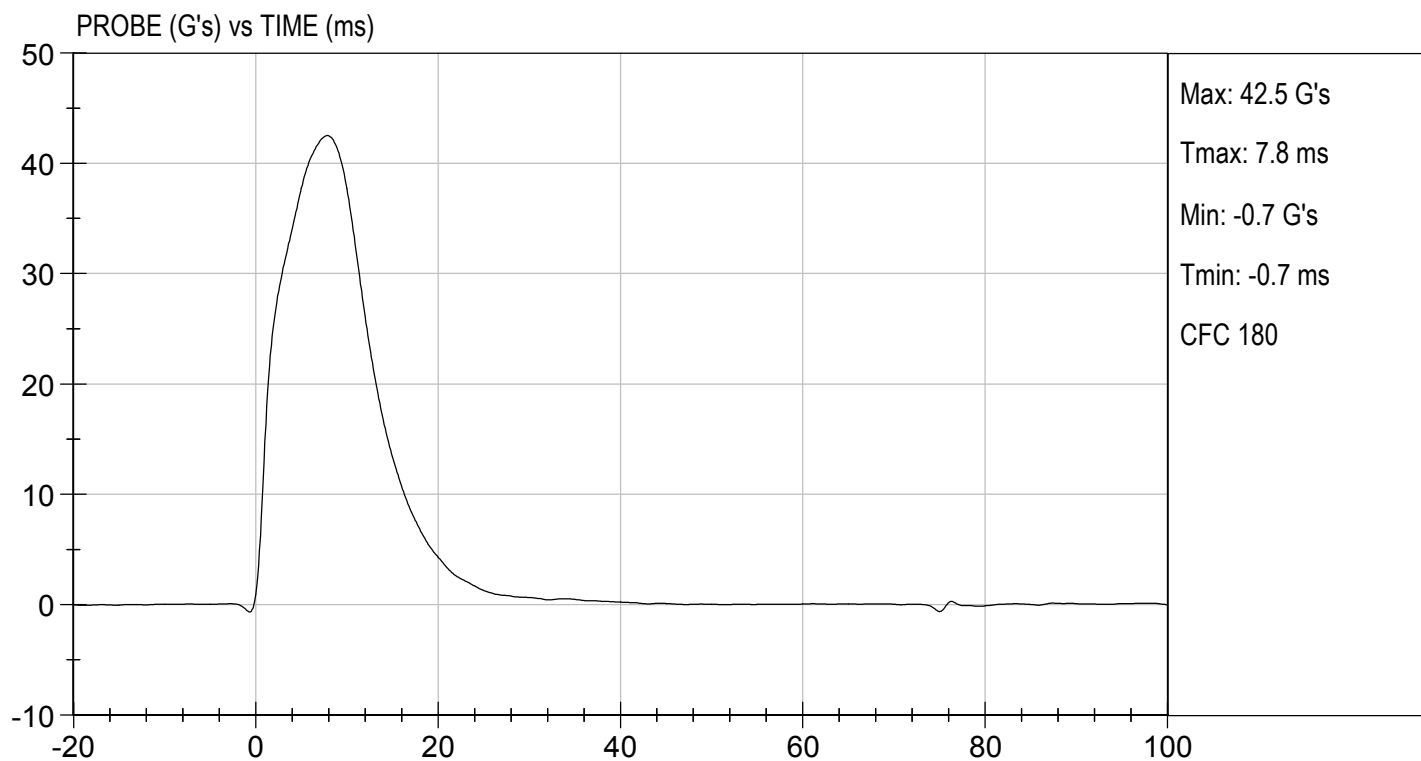
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	3,688	Pass
Overall Test Results				Pass


Laboratory Technician

11/21/2017

Test Date

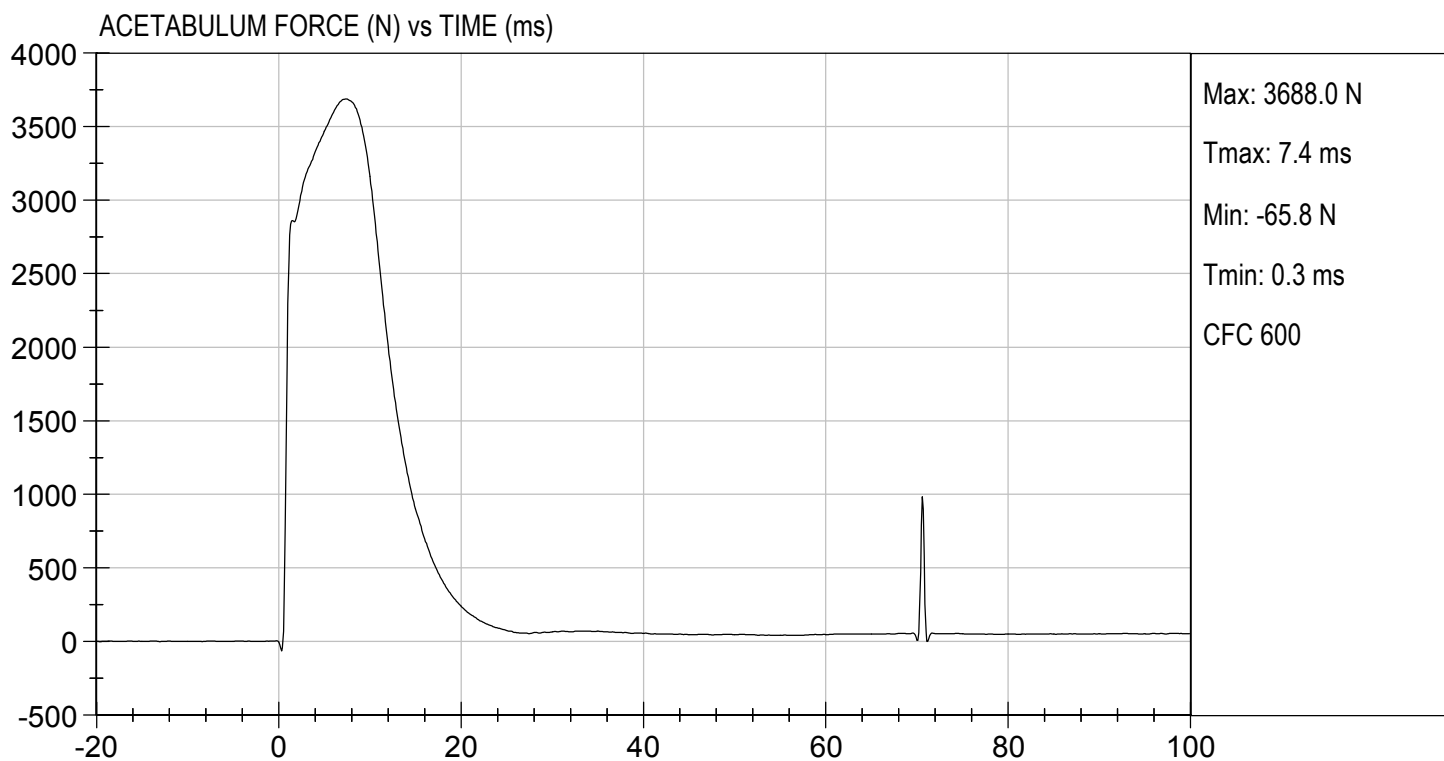

Approved By





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

TEST DATE: 11/21/2017
TEST #: D173367



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

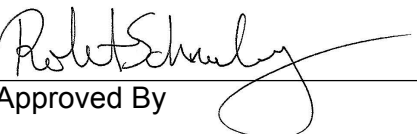
Test I.D: D173368

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	30	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,994	Pass
Overall Test Results				Pass


Laboratory Technician

11/21/2017

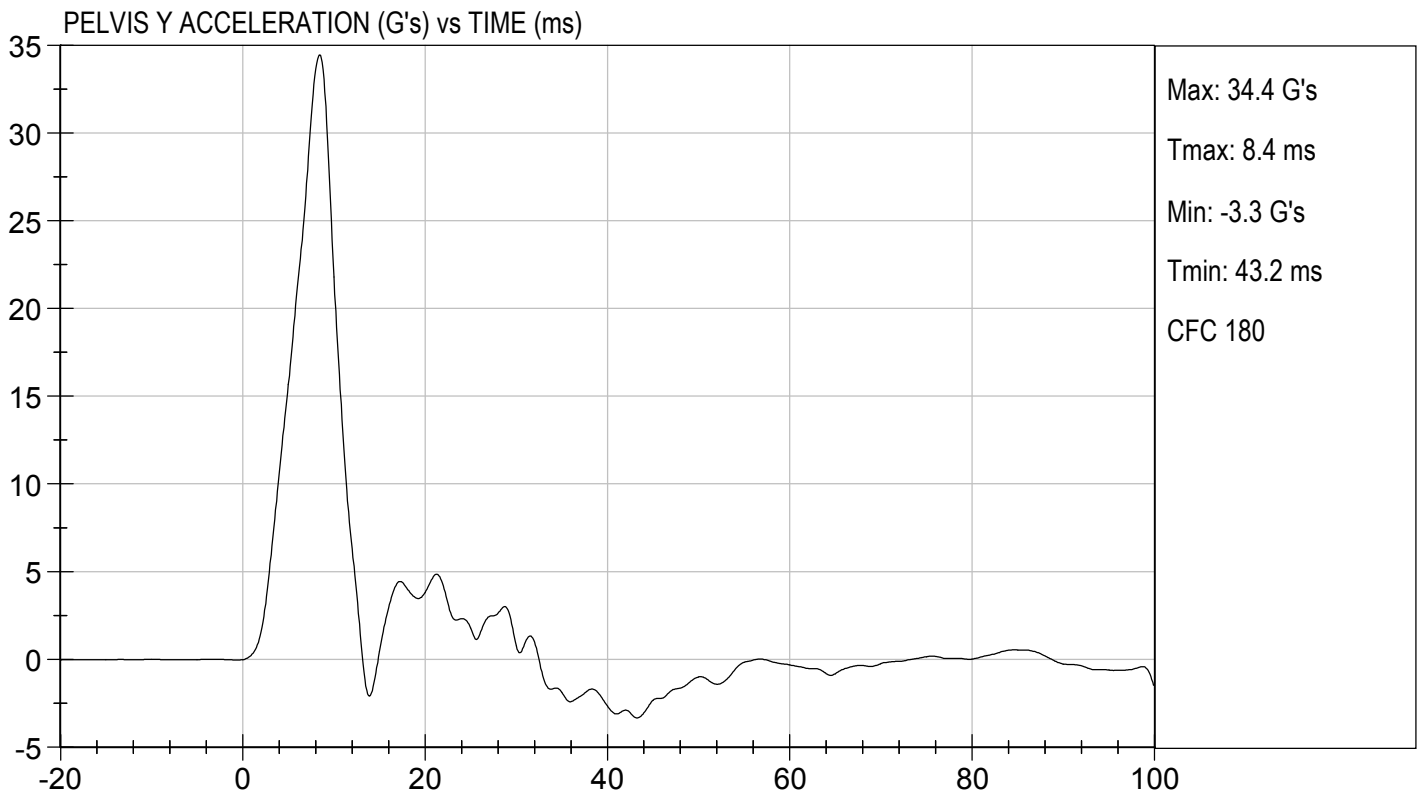
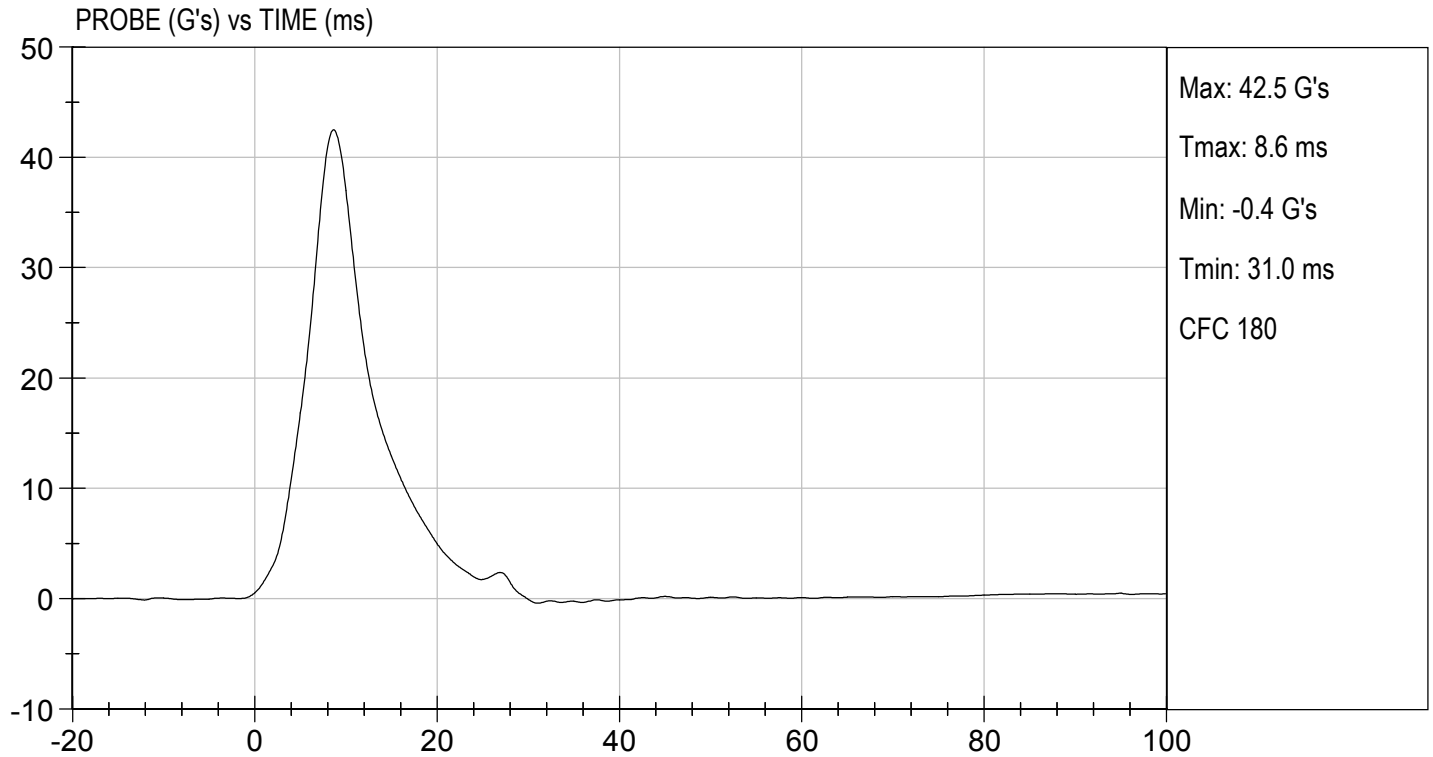
Test Date


Approved By



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

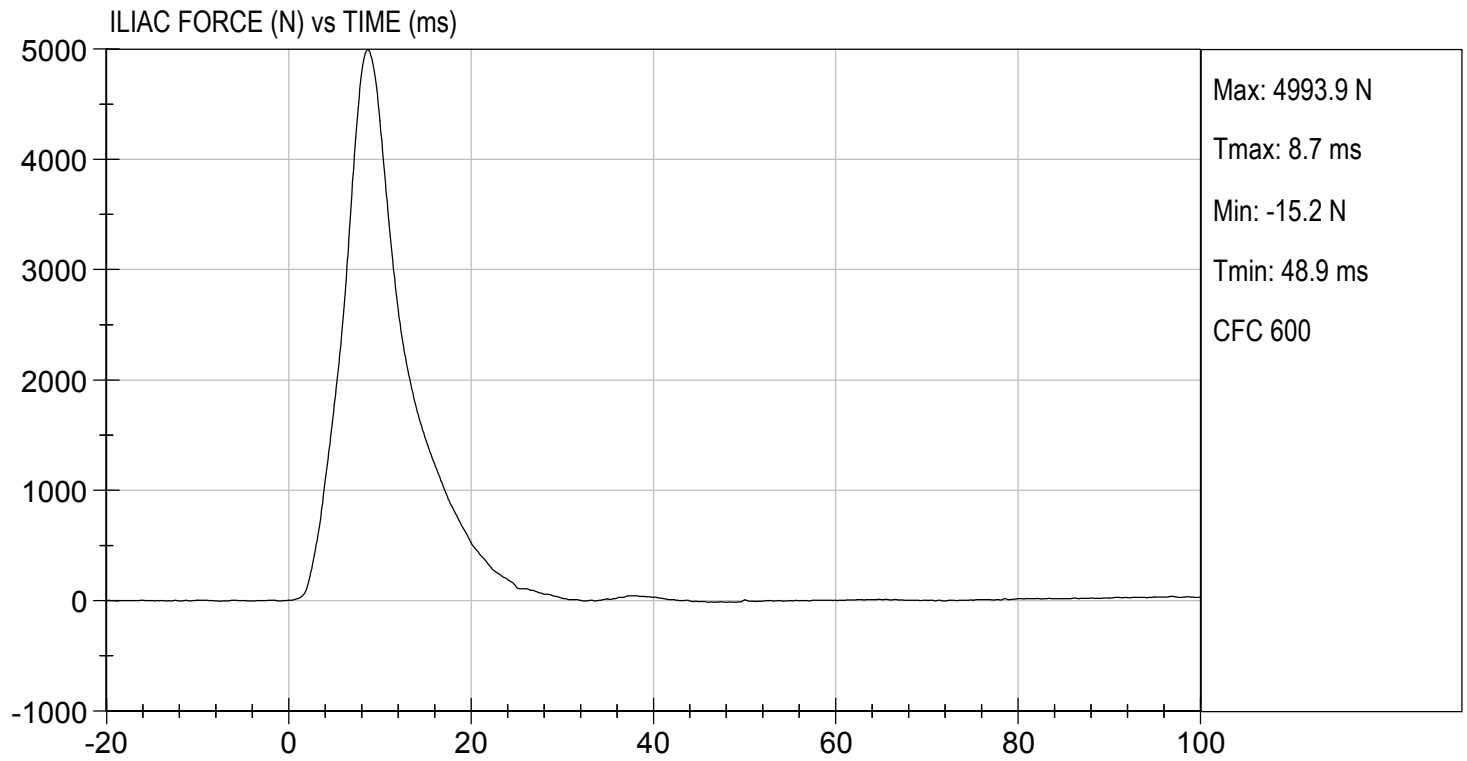
TEST DATE: 11/21/2017
TEST #: D173368





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

TEST DATE: 11/21/2017
TEST #: D173368



SID-IIsD External Measurements
SN: 306

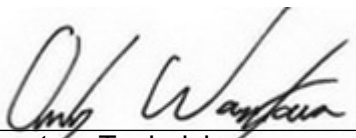
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148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

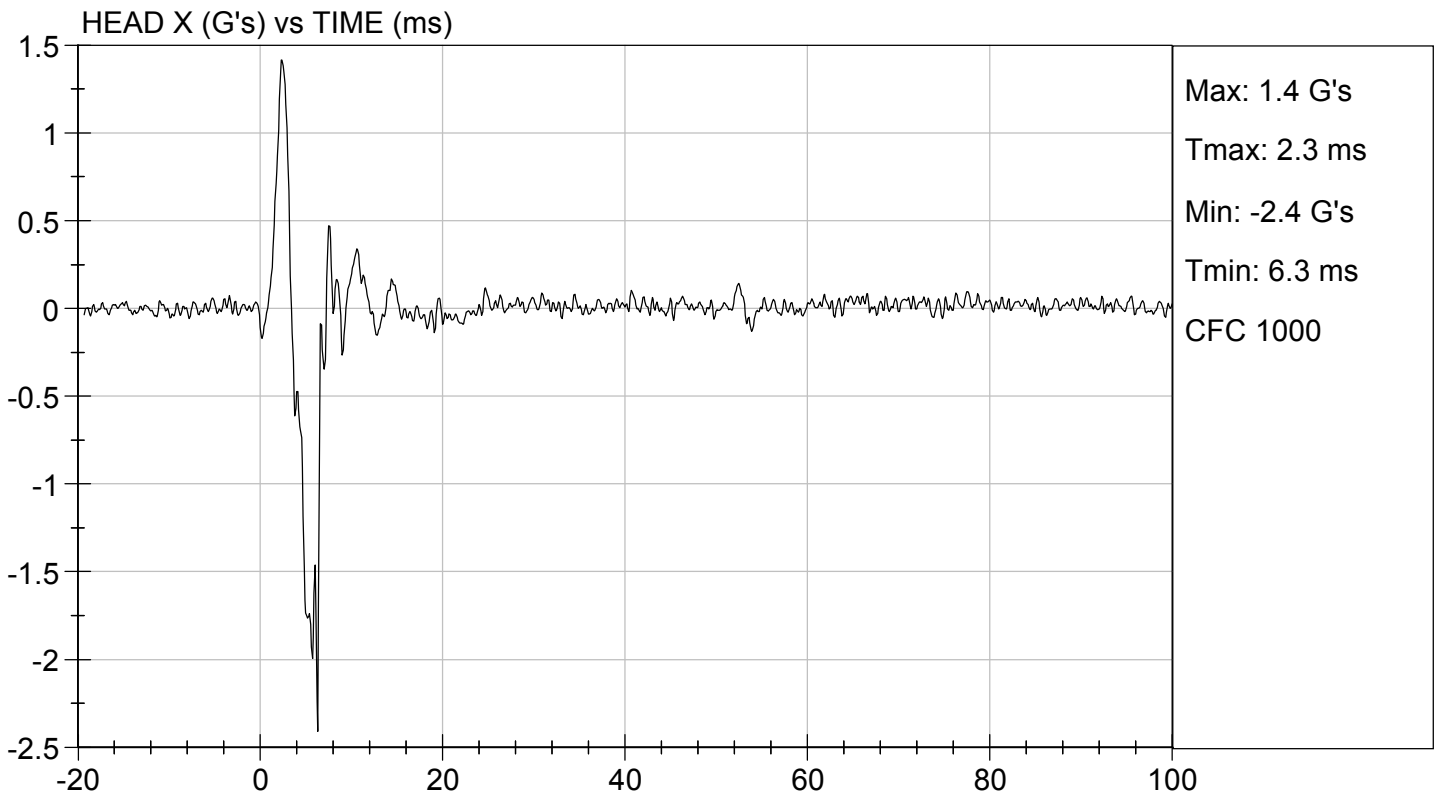
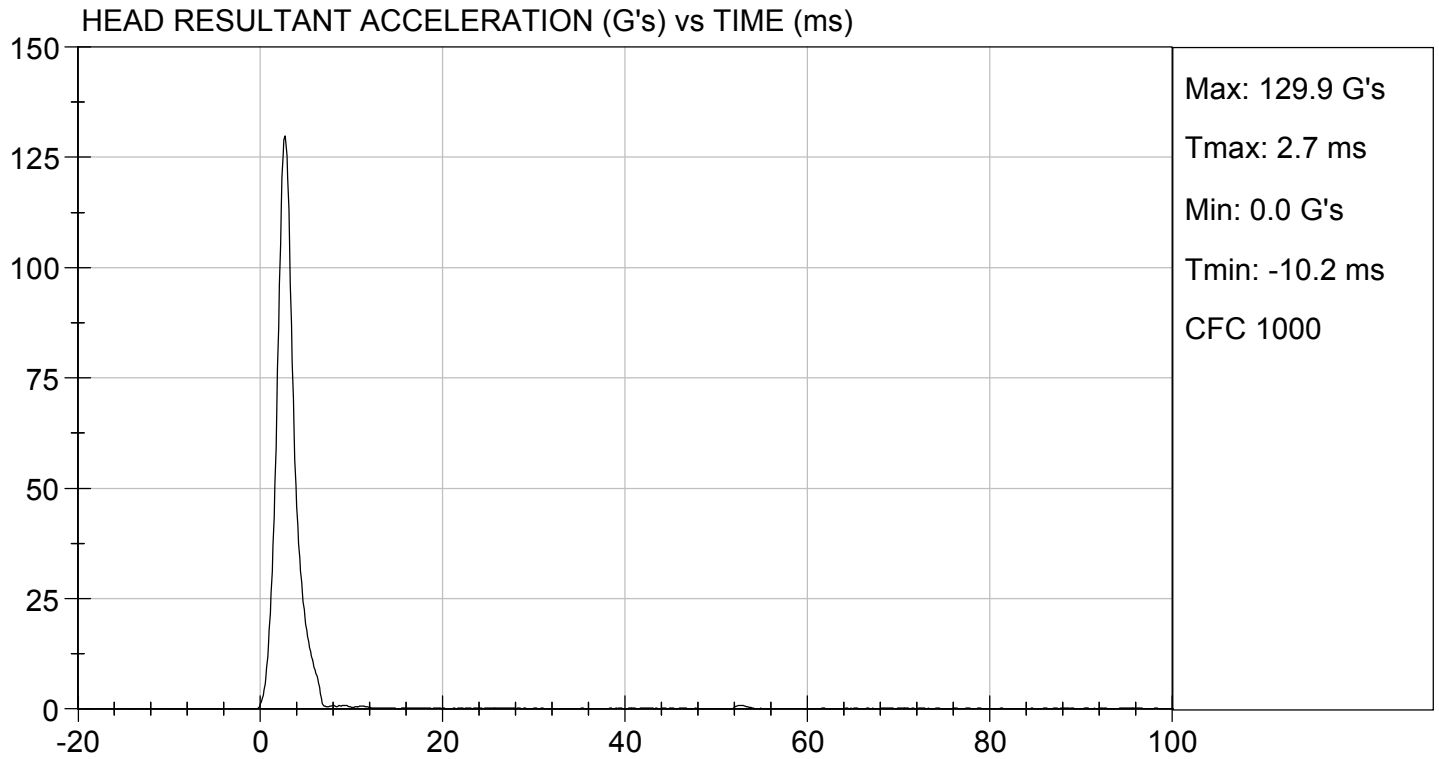
Test ID: D173531

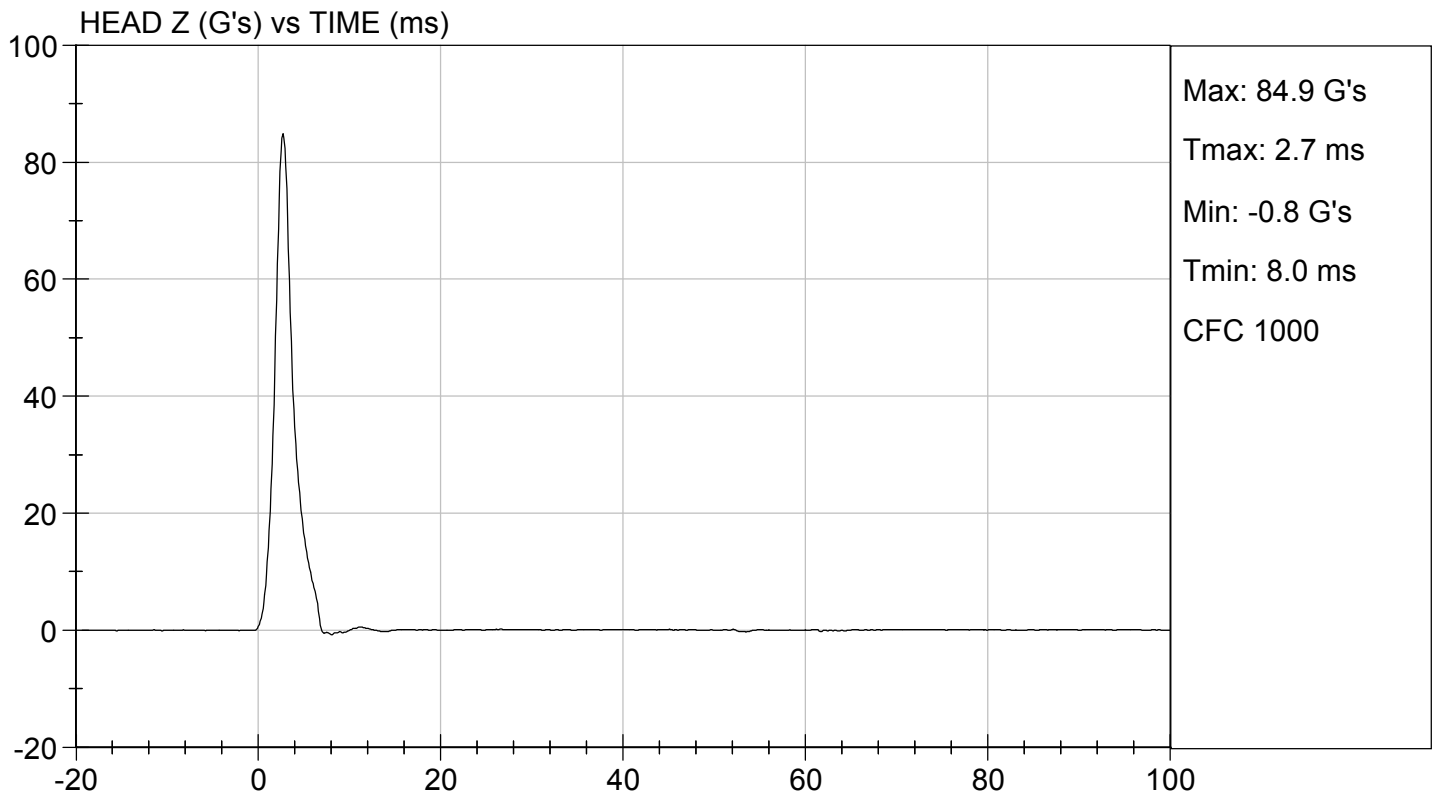
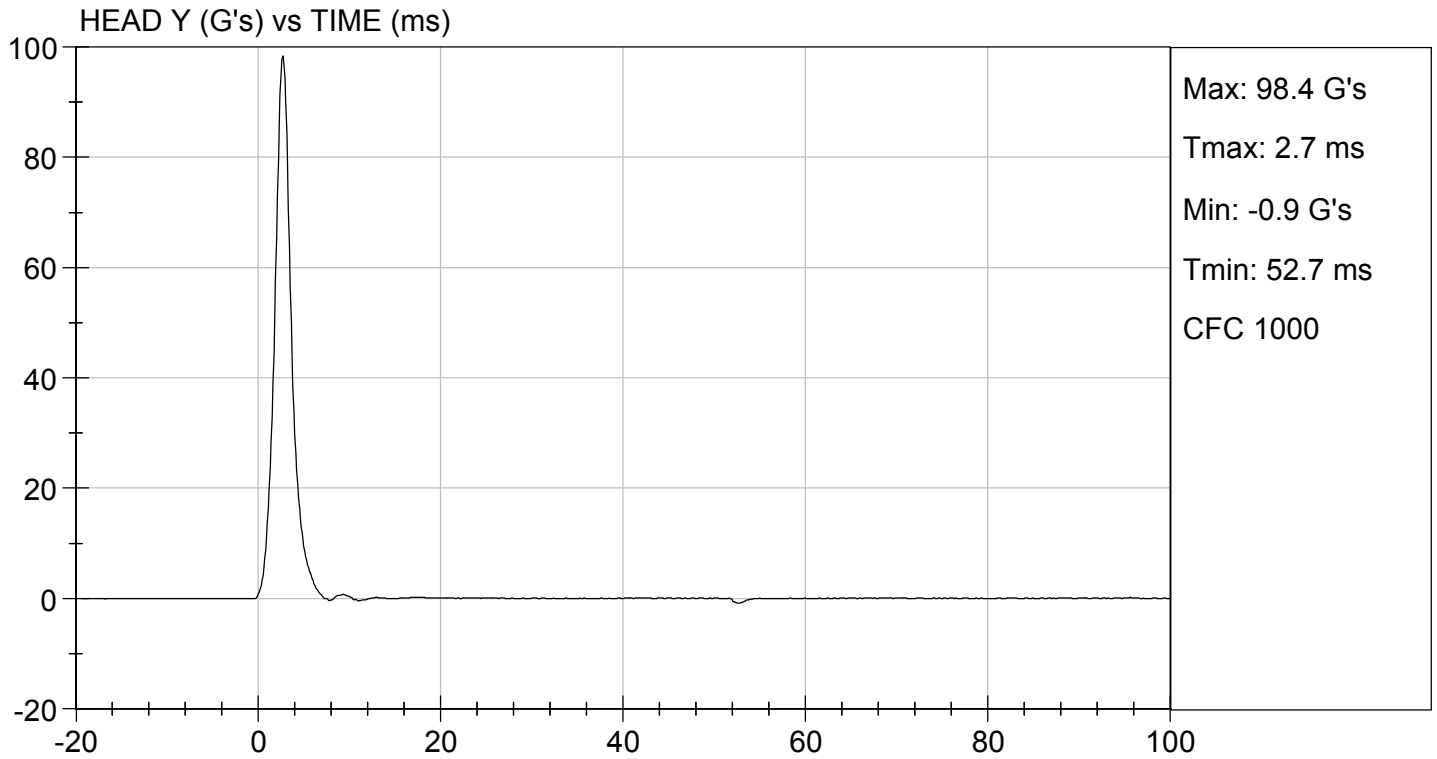
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	115 to 137	130	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-2.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

12/01/2017
Test Date


Approved By



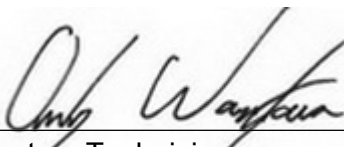


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

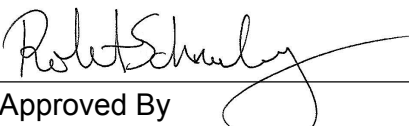
Test I.D: D173532

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	22	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.51	Pass
	15 ms	m/s	3.30 to 4.10	3.79	Pass
	20 ms	m/s	4.40 to 5.40	5.15	Pass
	25 ms	m/s	5.40 to 6.10	5.56	Pass
	25-100 ms	m/s	5.50 to 6.20	5.59	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	116	Pass
Overall Test Results					Pass


 Laboratory Technician

12/01/2017

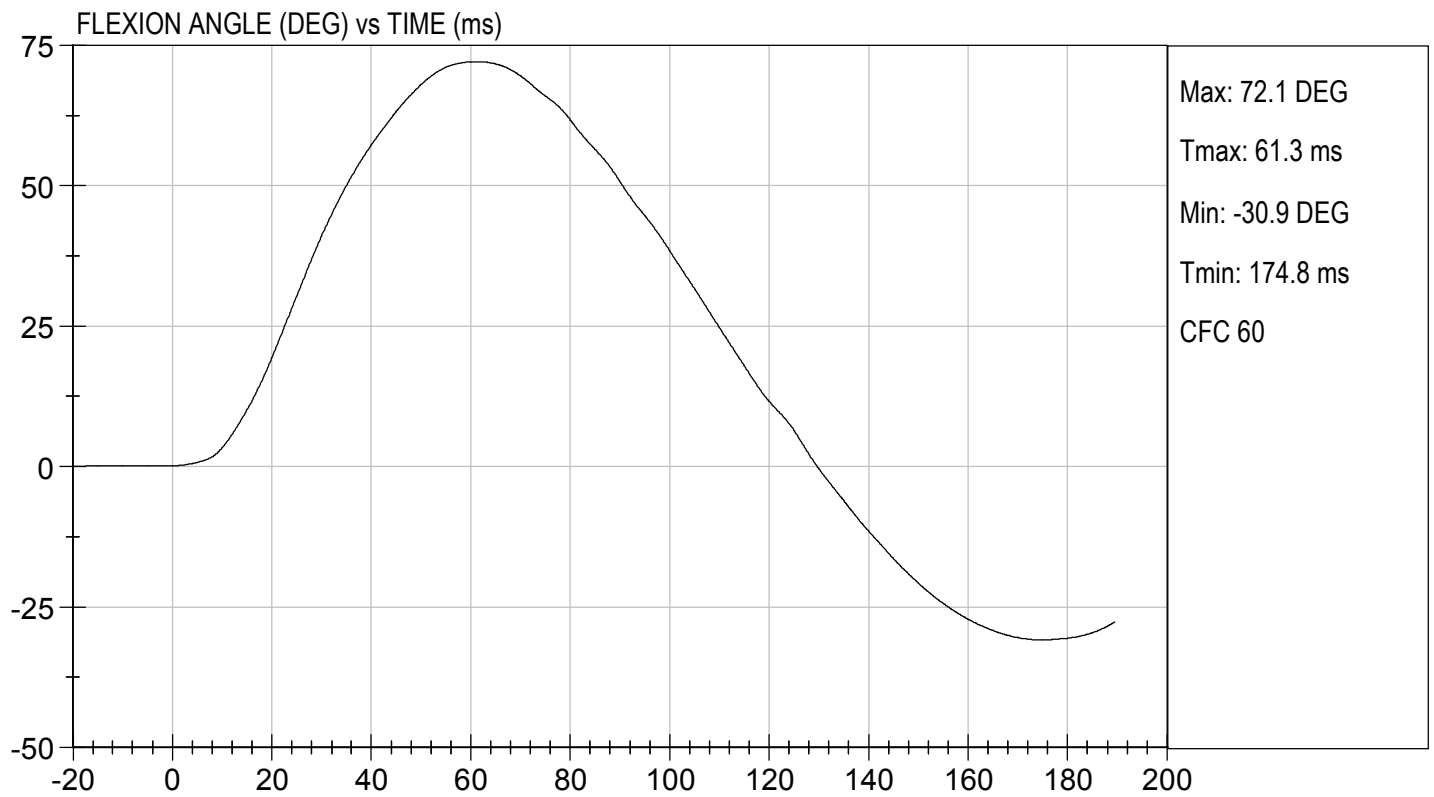
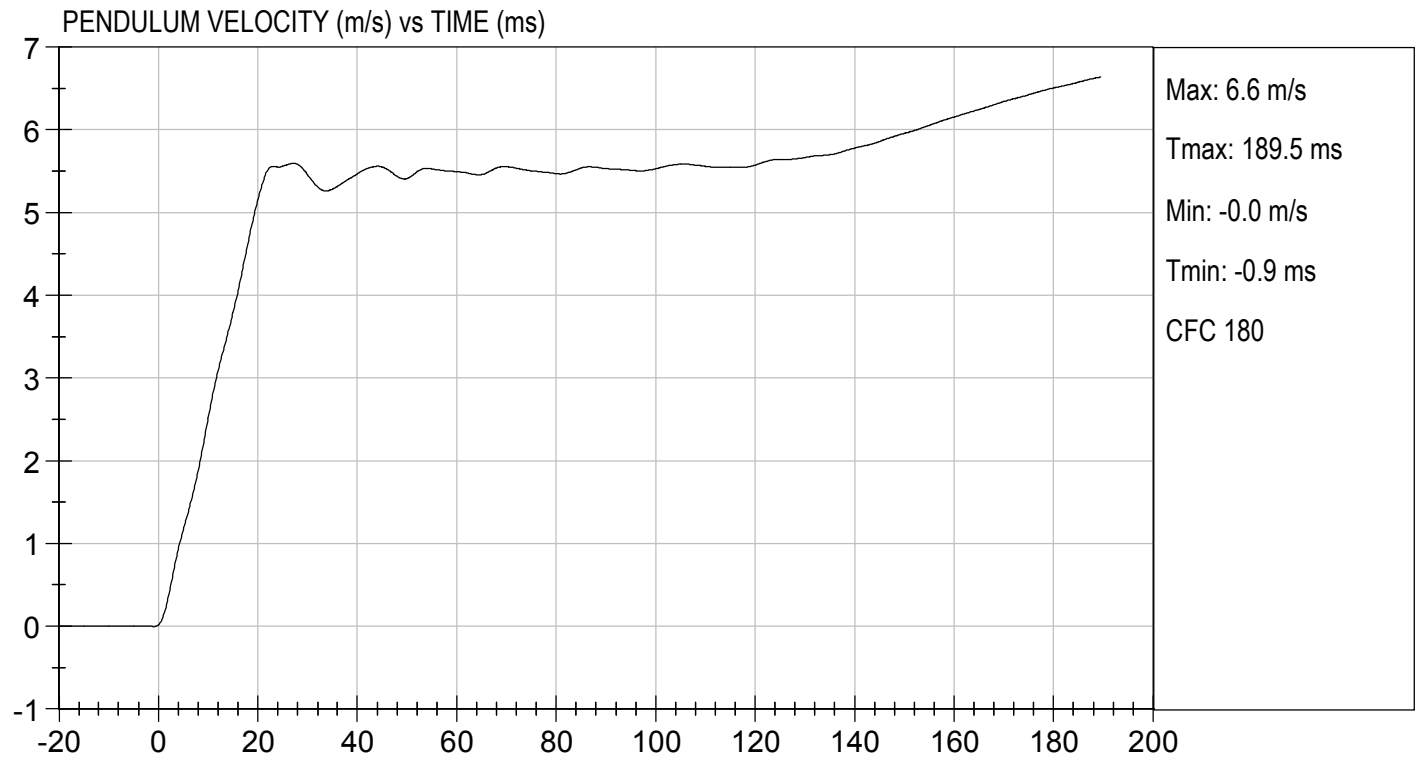
Test Date


 Approved By



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

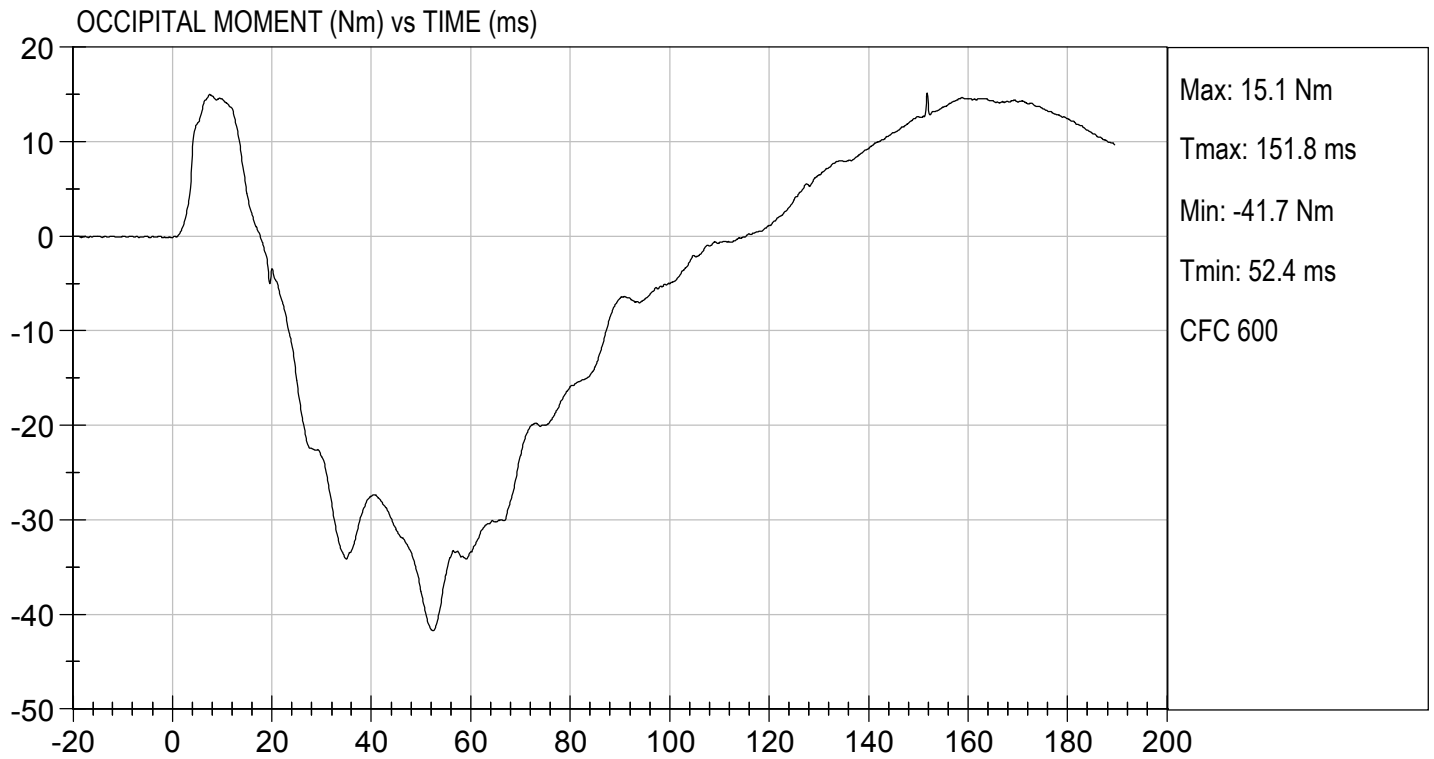
TEST DATE: 12/01/2017
TEST #: D173532





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

TEST DATE: 12/01/2017
TEST #: D173532

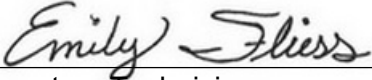


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

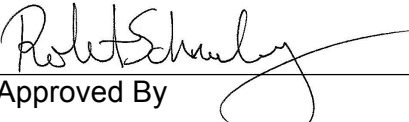
ATD Serial No: 306

Test ID: D173533

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	37	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	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

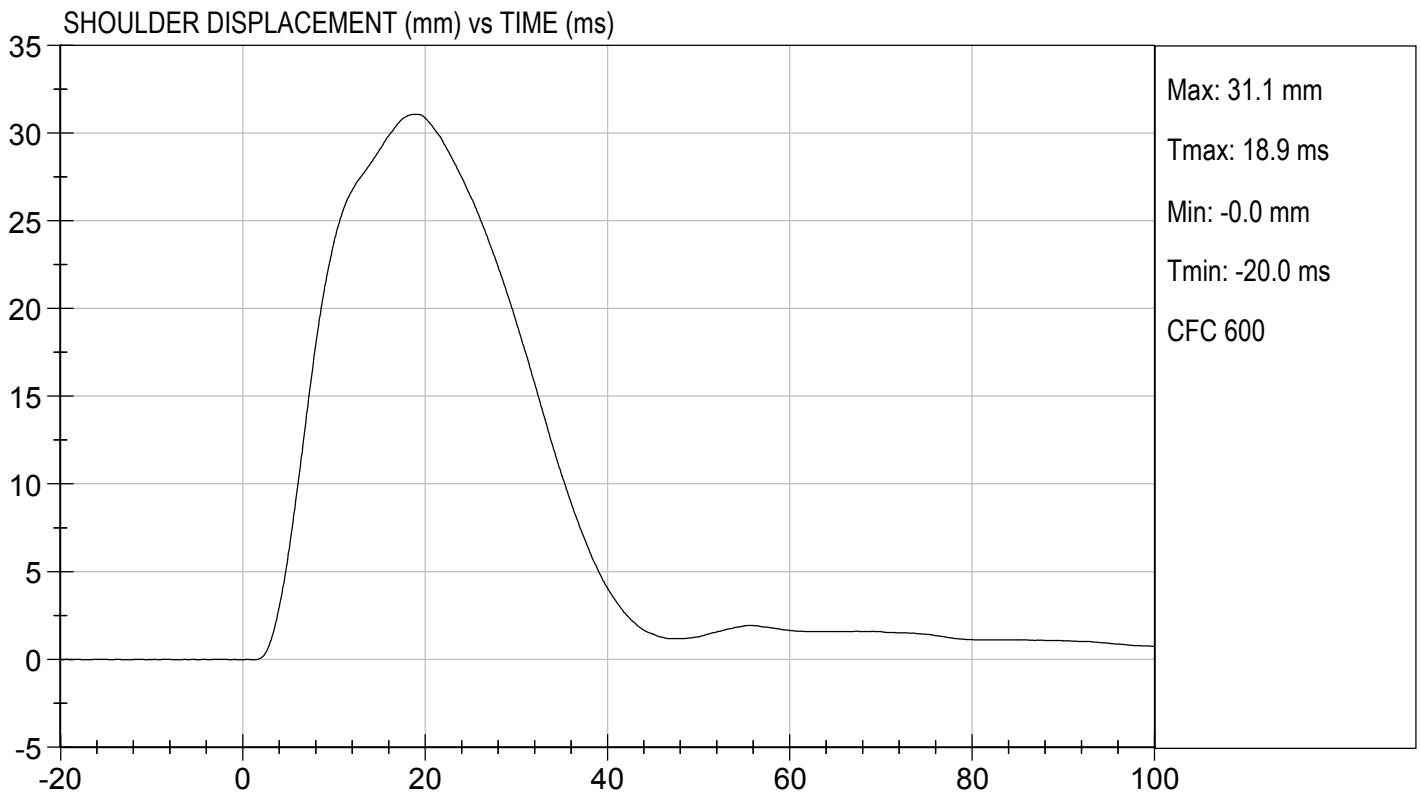
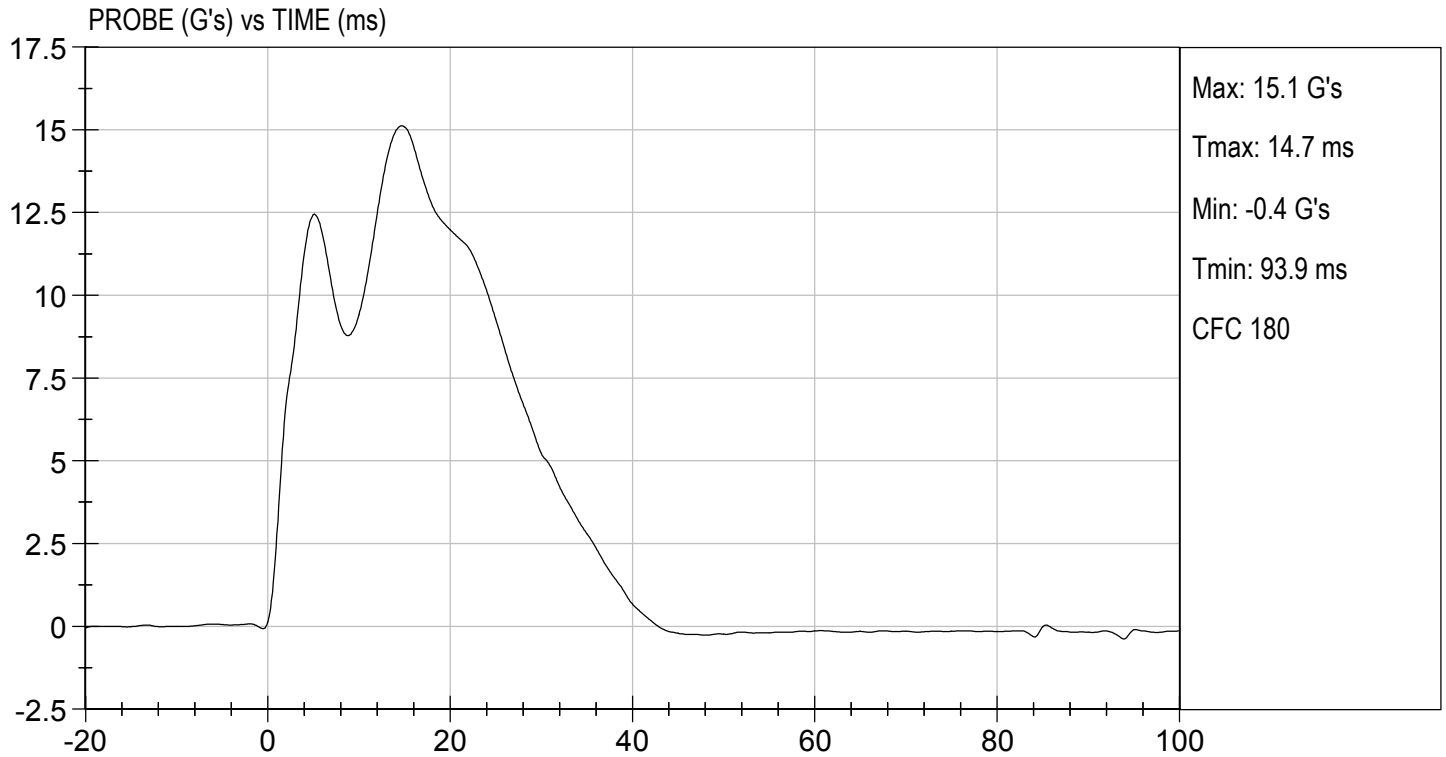
12/05/2017
Test Date


Approved By



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

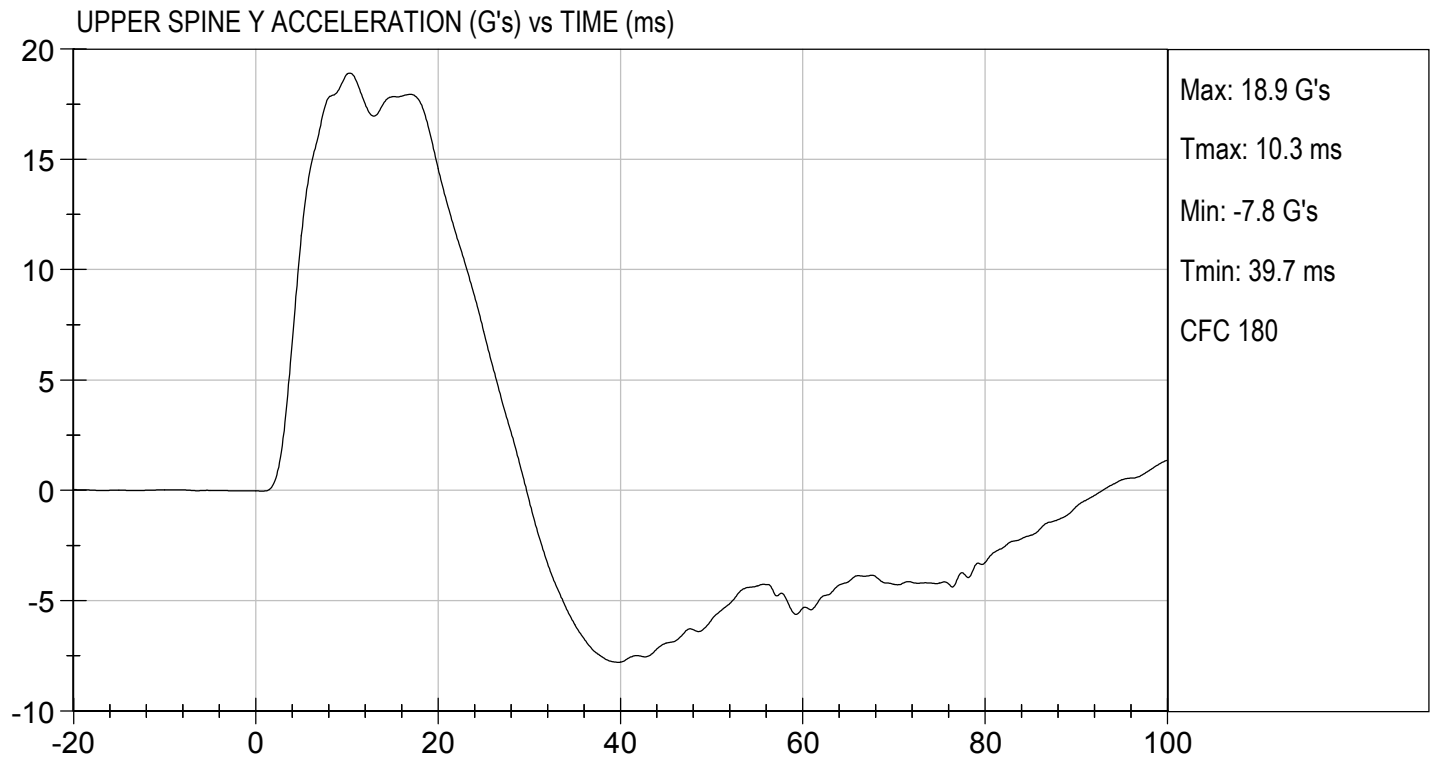
TEST DATE: 12/05/2017
TEST #: D173533





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

TEST DATE: 12/05/2017
TEST #: D173533

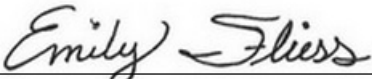


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

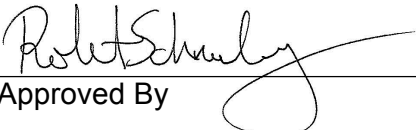
ATD Serial No: 306

Test I.D: D173534

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	35	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results				Pass


 Laboratory Technician

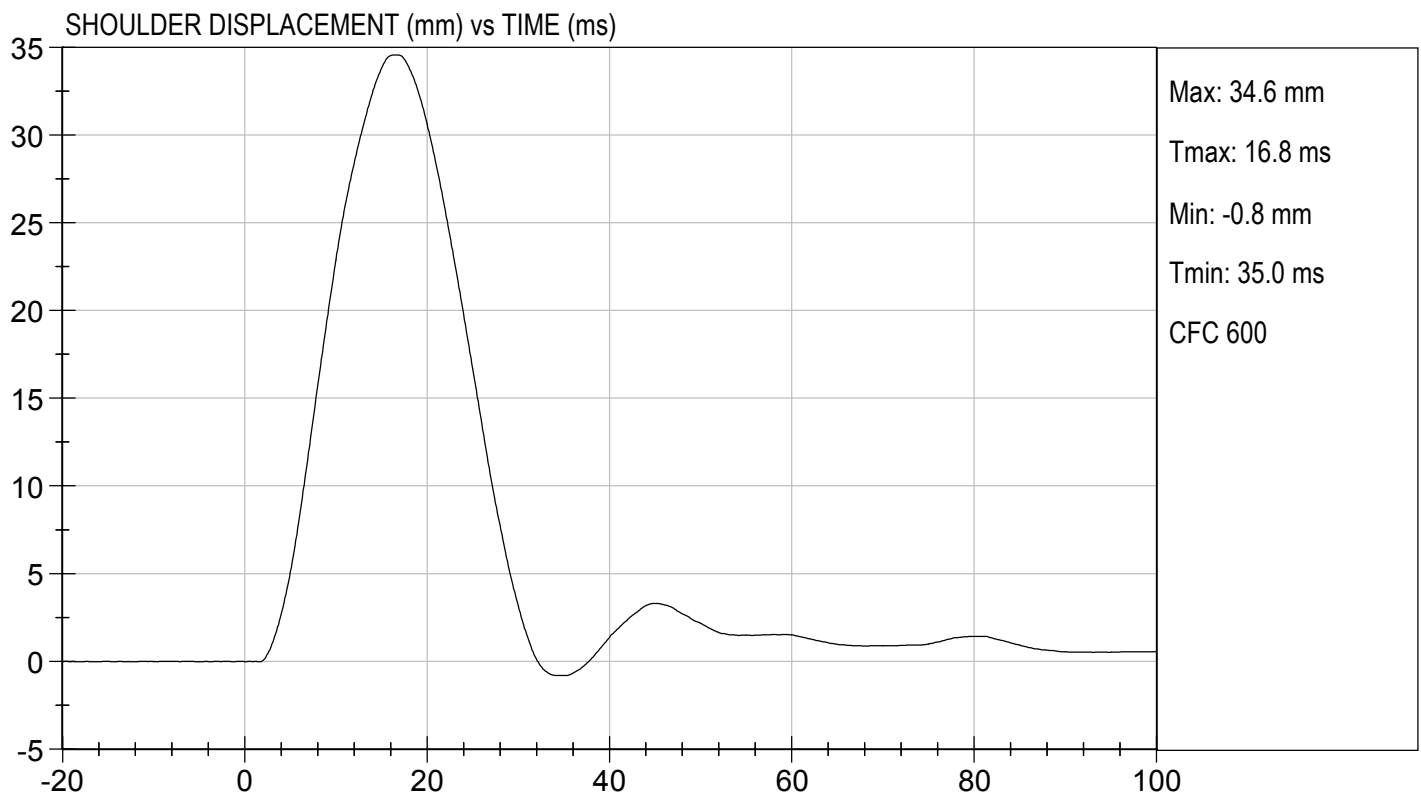
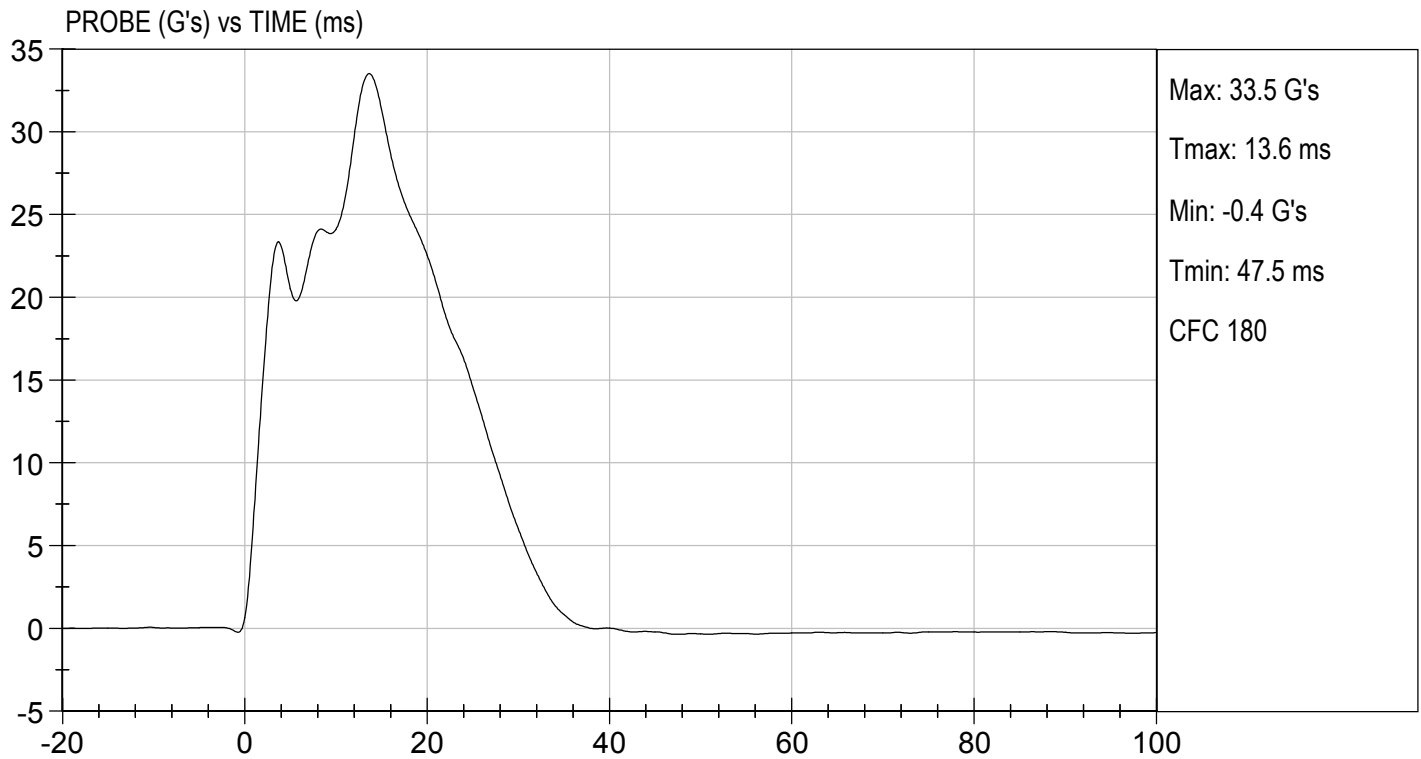
12/05/2017
 Test Date


 Approved By



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

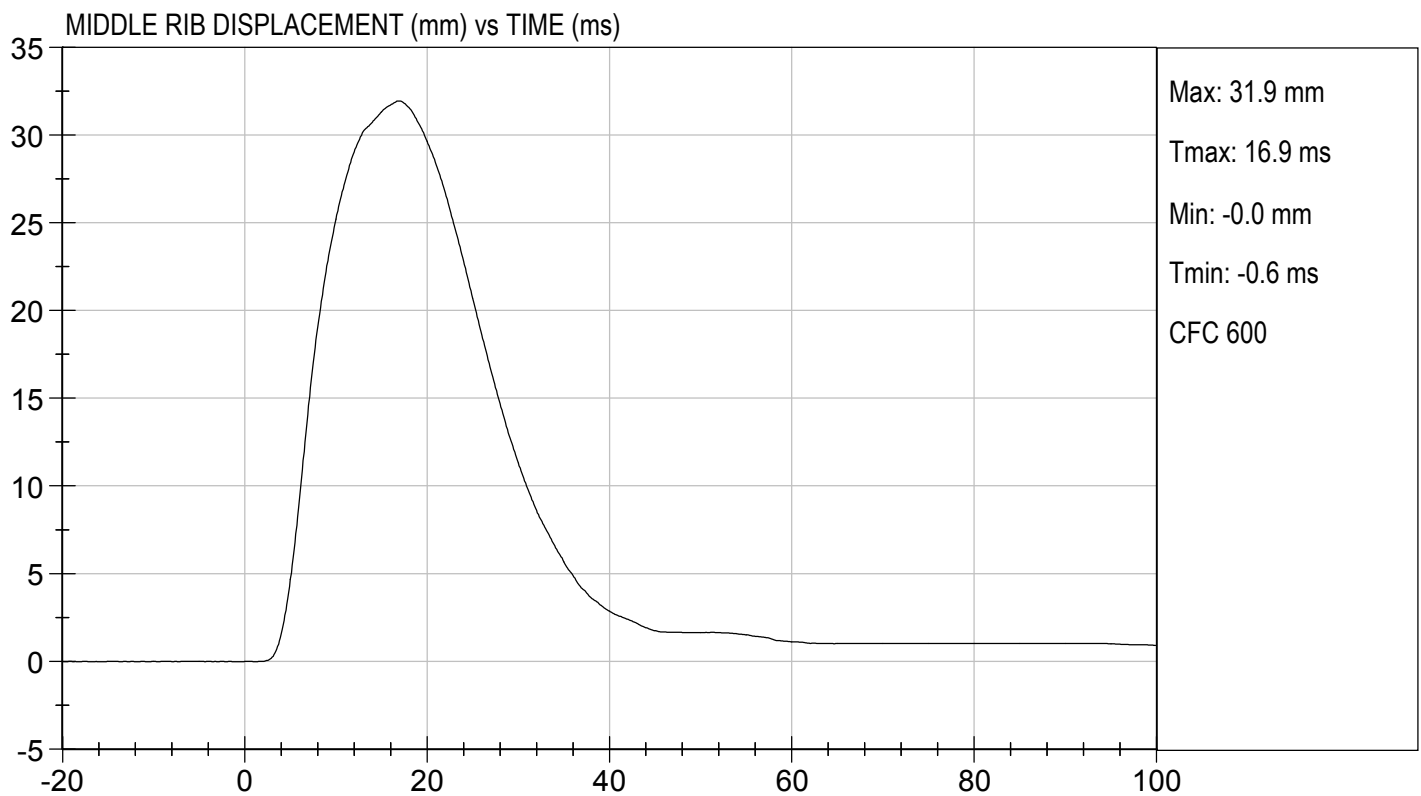
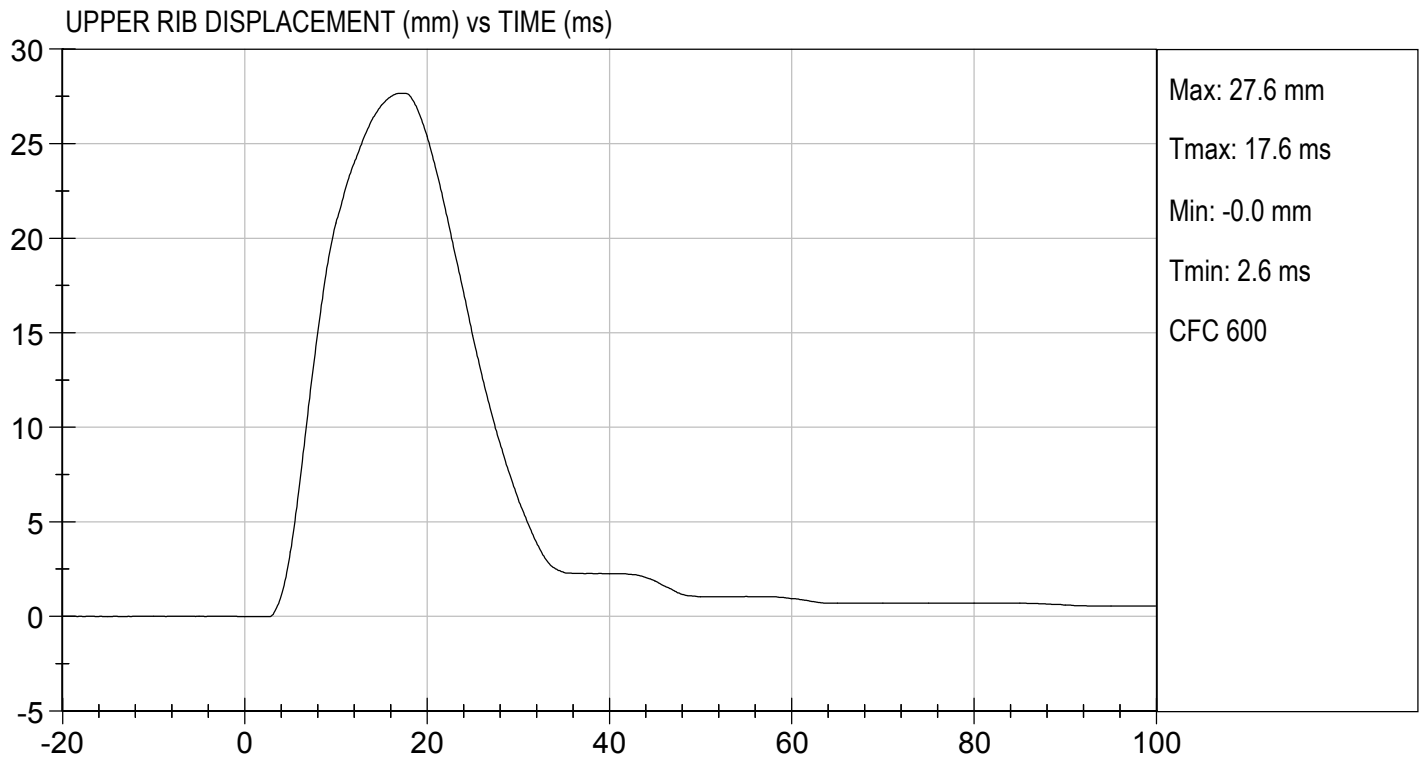
TEST DATE: 12/05/2017
TEST #: D173534





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

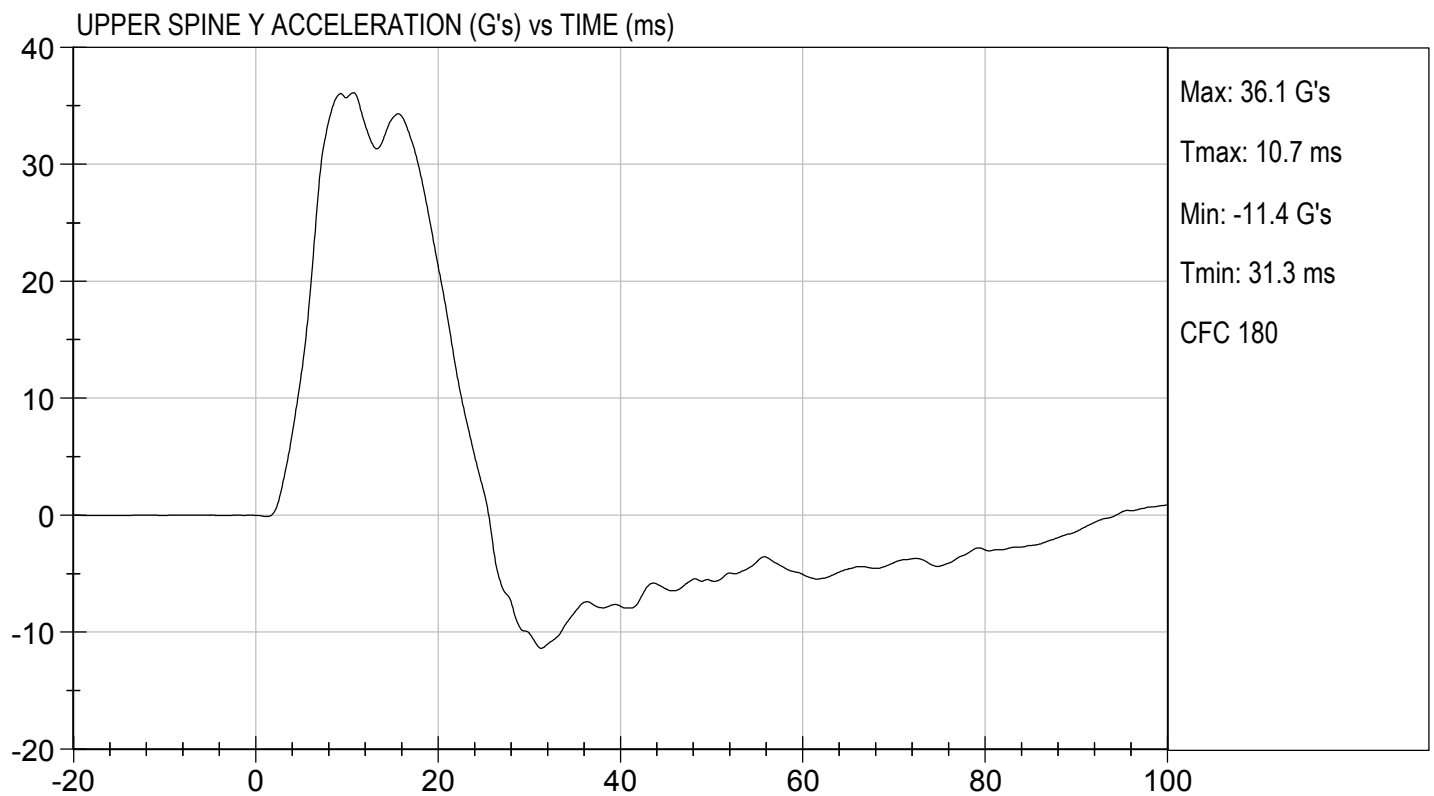
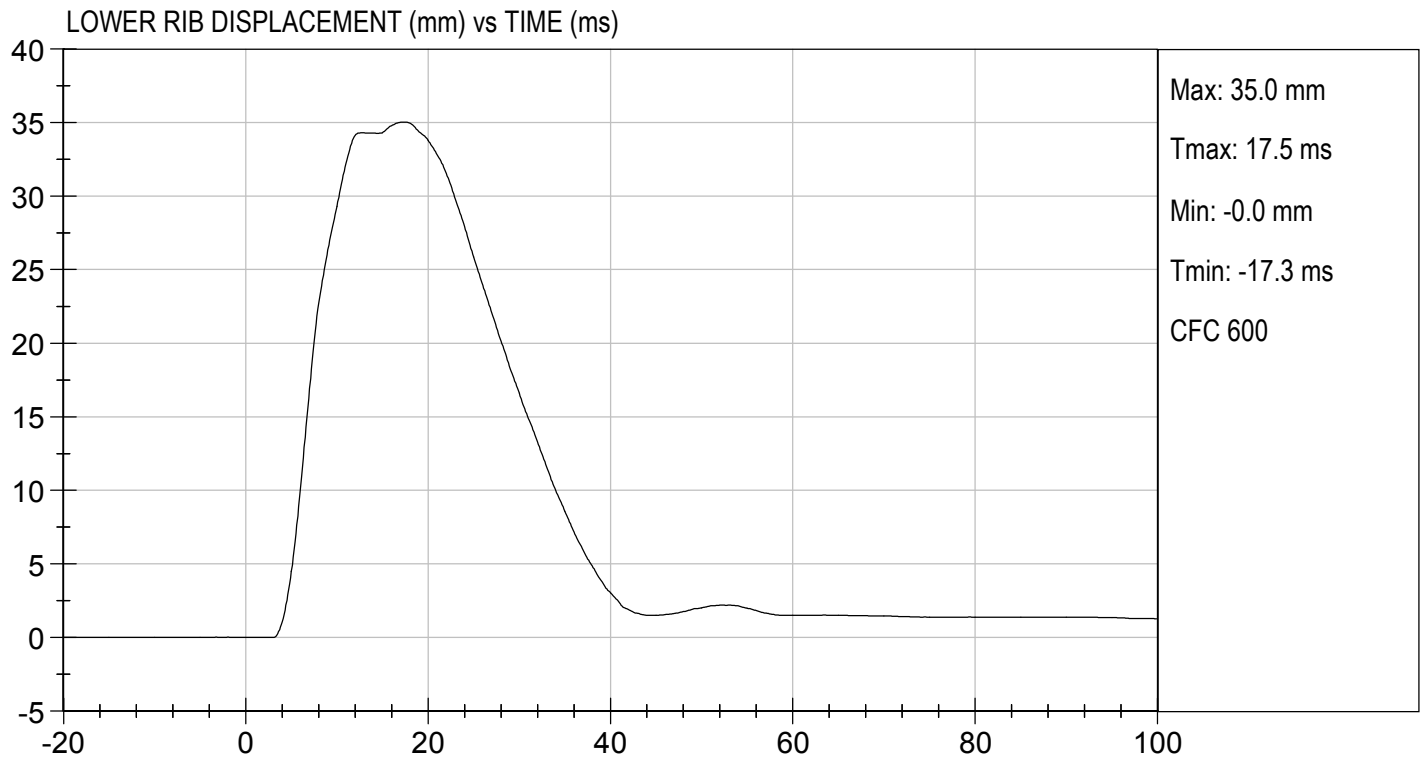
TEST DATE: 12/05/2017
TEST #: D173534





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

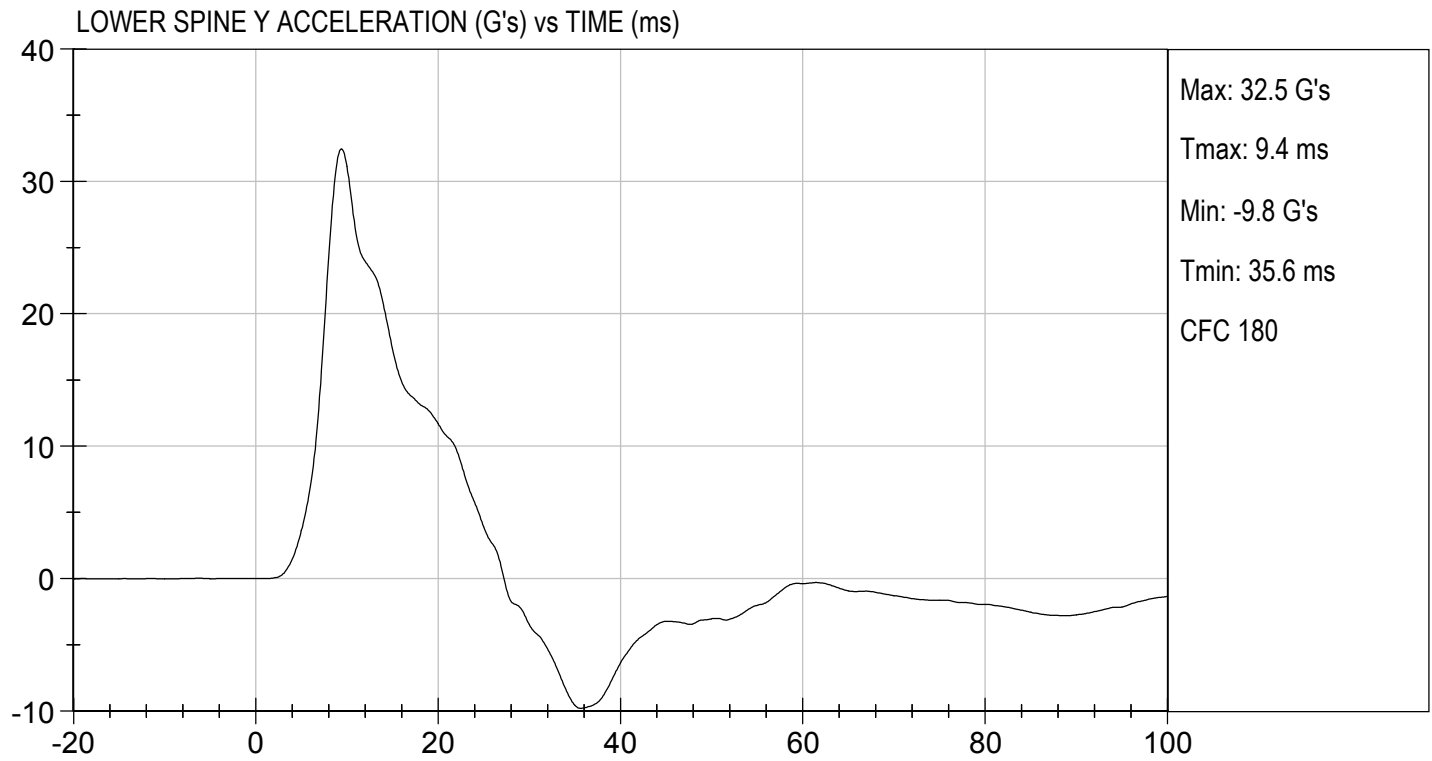
TEST DATE: 12/05/2017
TEST #: D173534





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

TEST DATE: 12/05/2017
TEST #: D173534

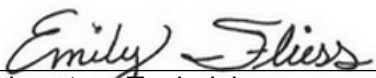


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

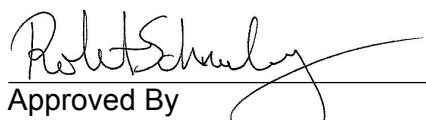
Test I.D: D173535

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	37	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

12/06/2017

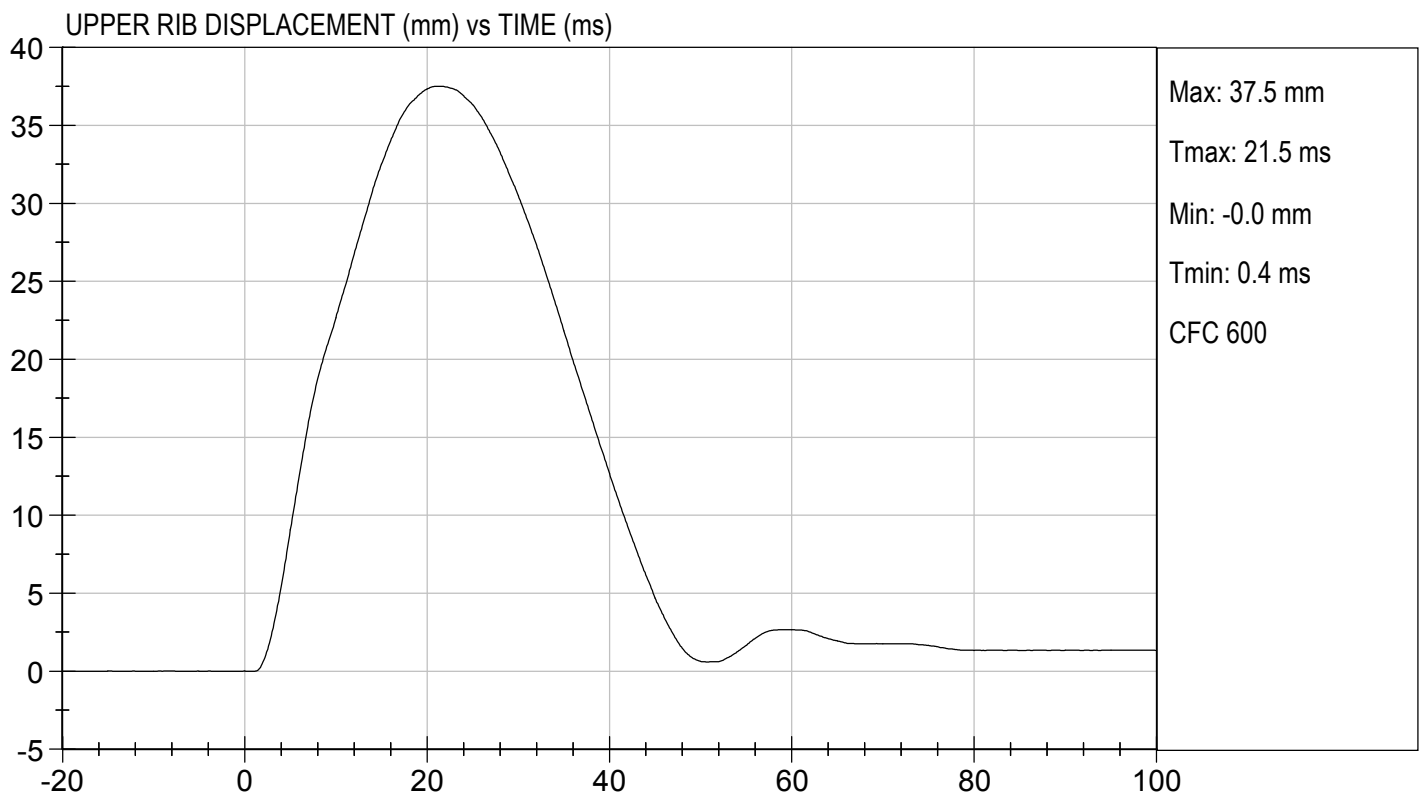
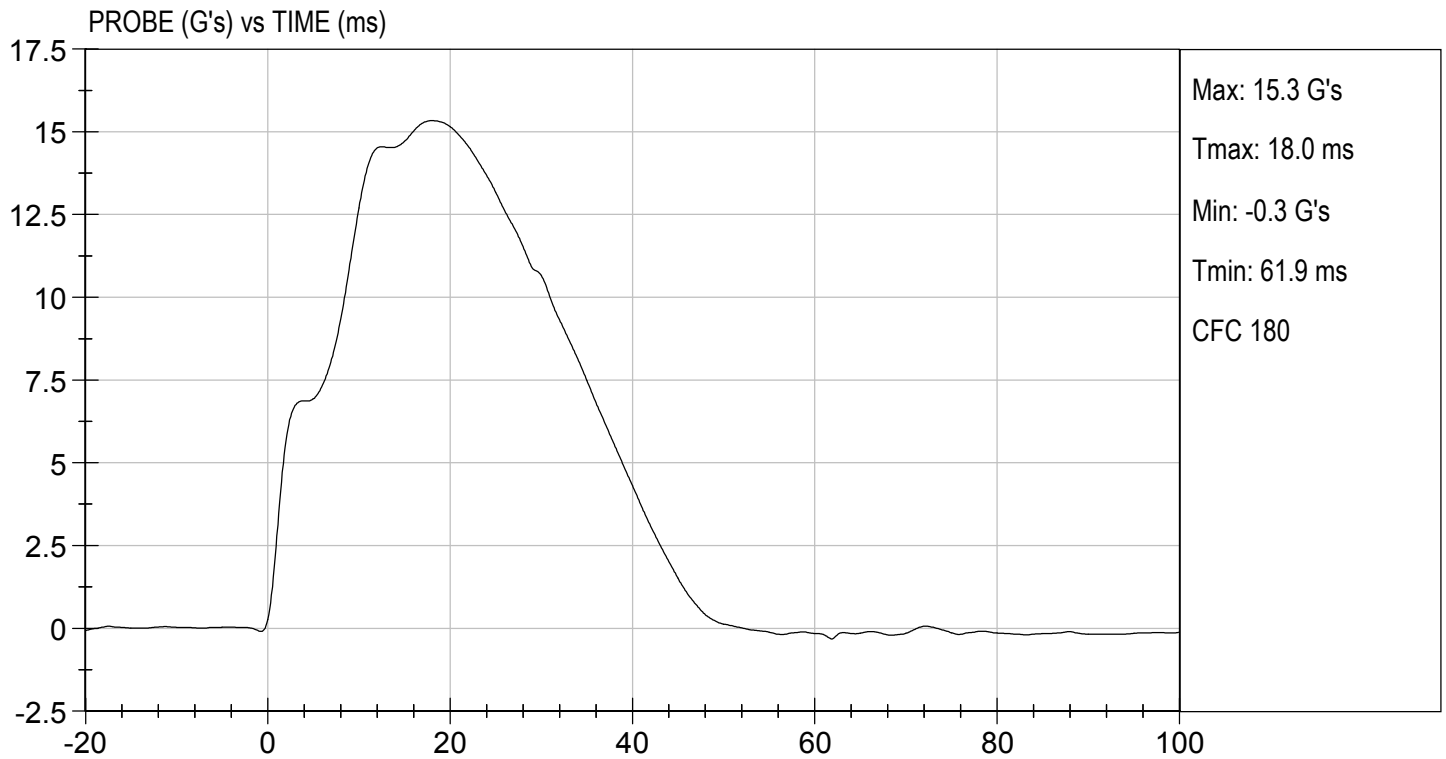
Test Date


Approved By



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

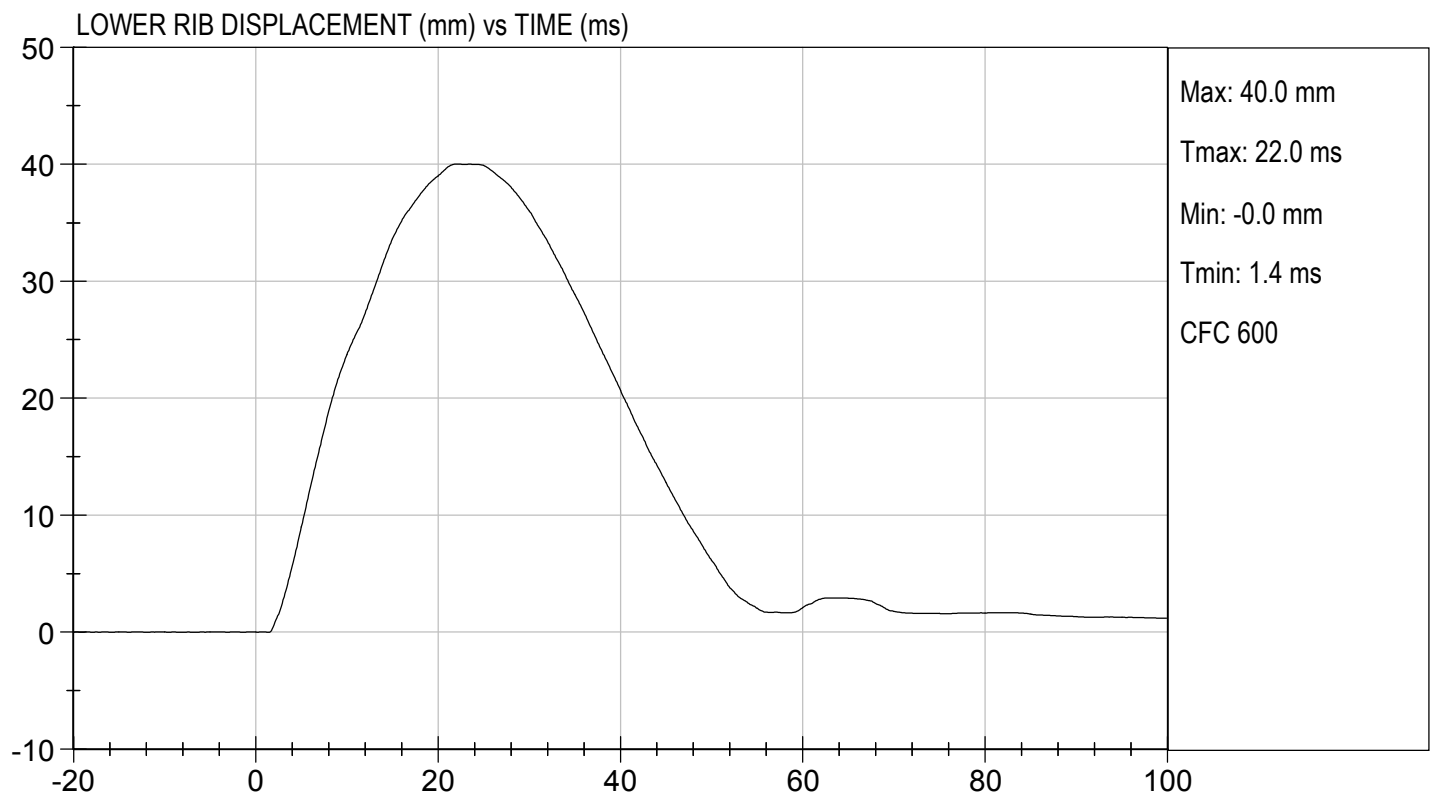
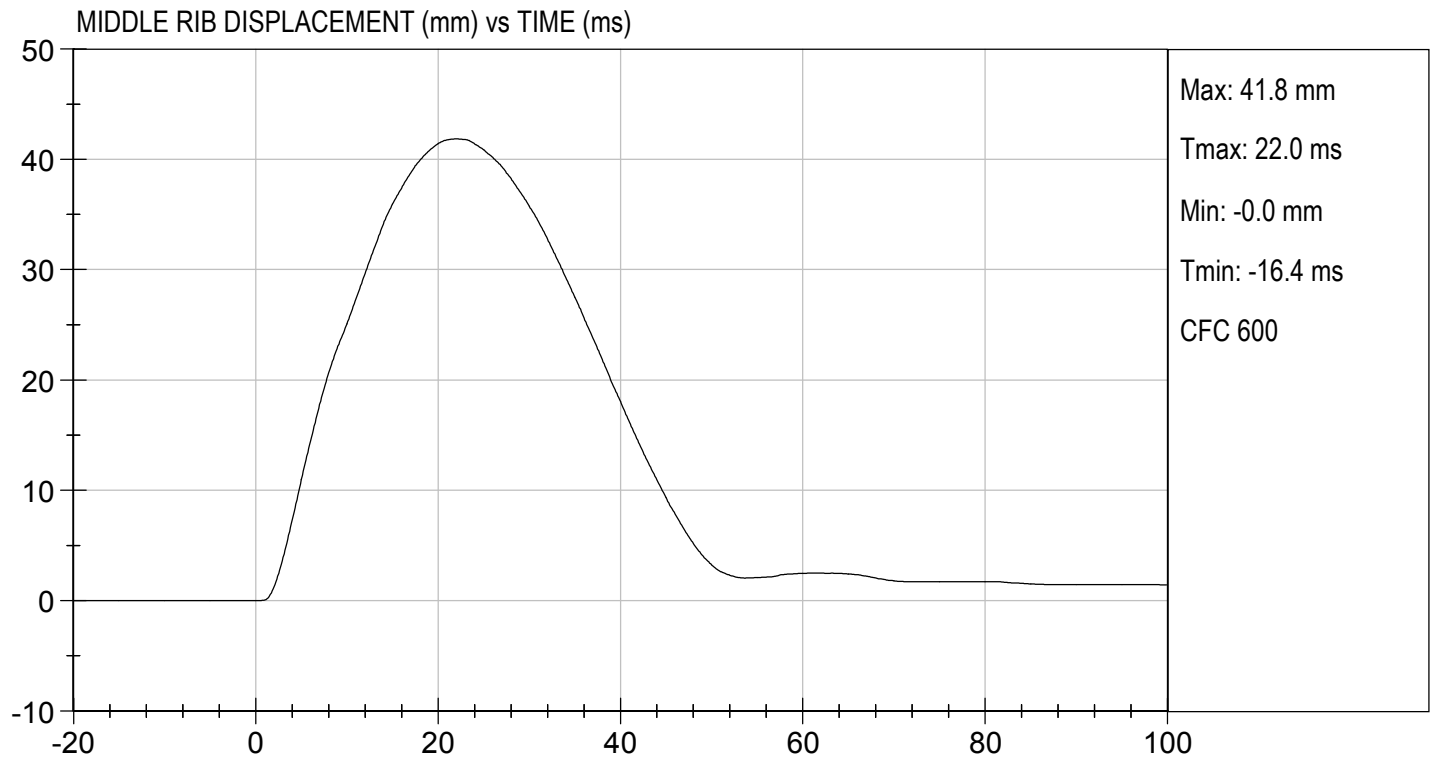
TEST DATE: 12/06/2017
TEST #: D173535





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

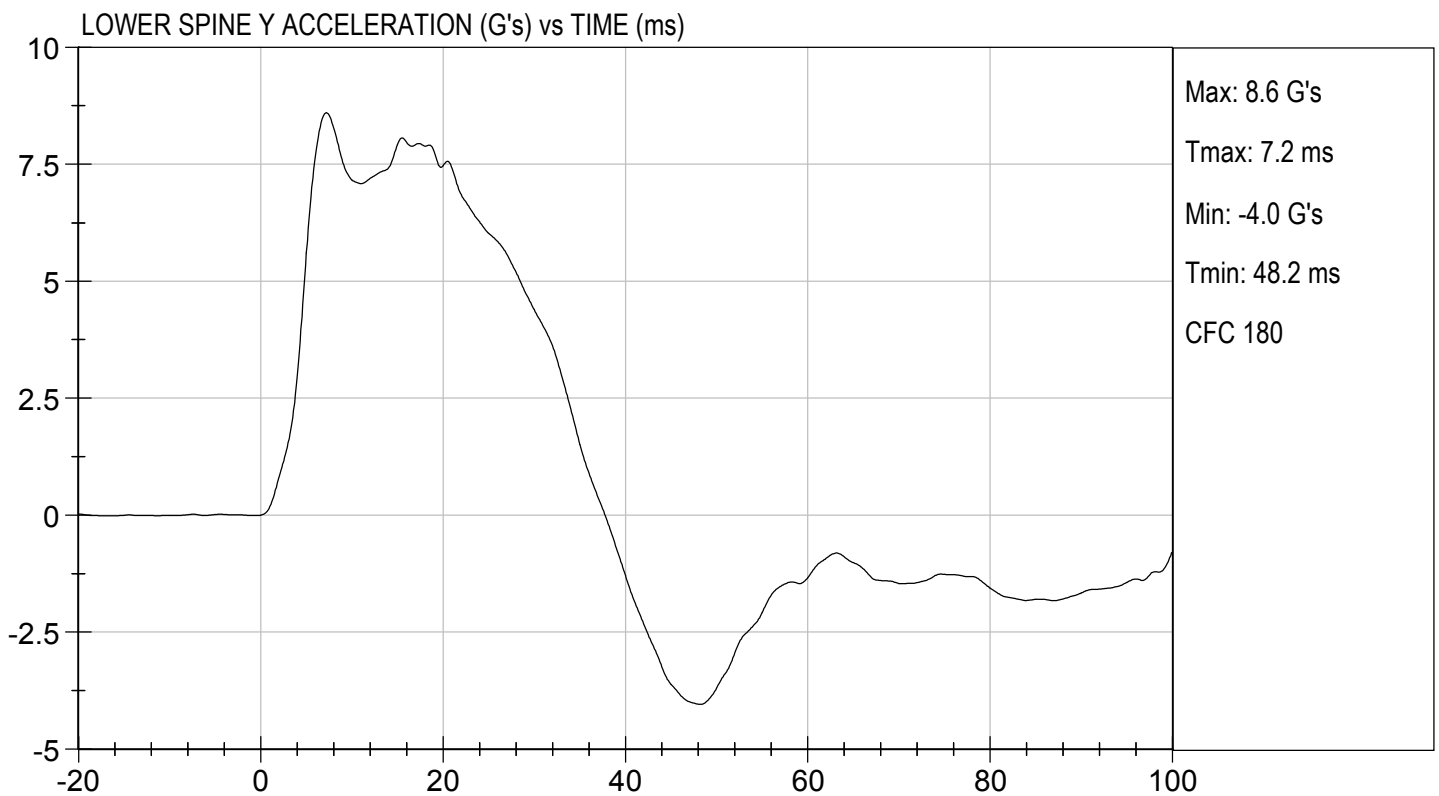
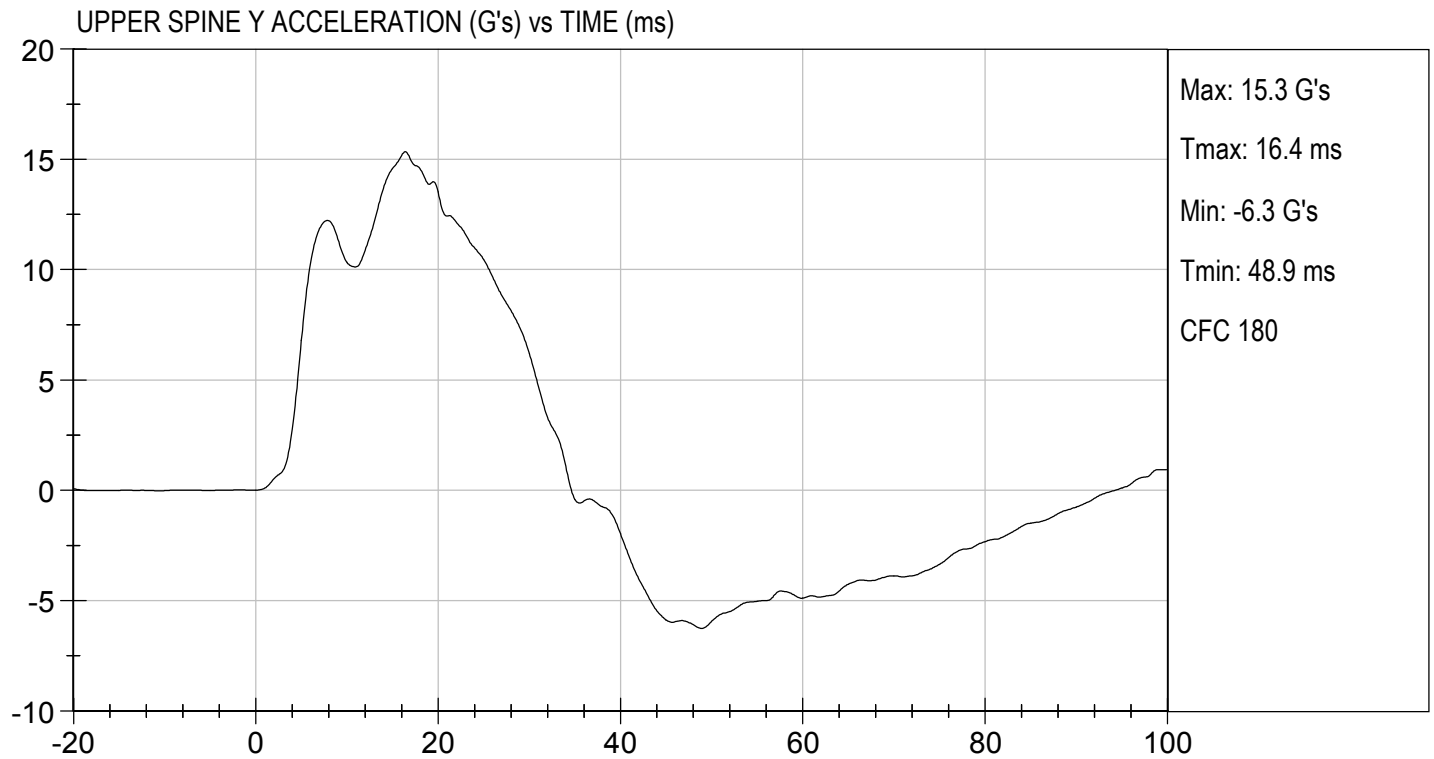
TEST DATE: 12/06/2017
TEST #: D173535





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

TEST DATE: 12/06/2017
TEST #: D173535



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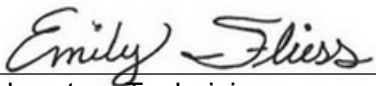
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

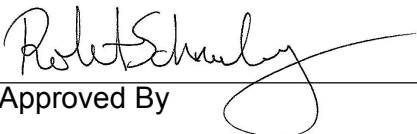
Test I.D: D173536

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	44	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	43	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

12/06/2017

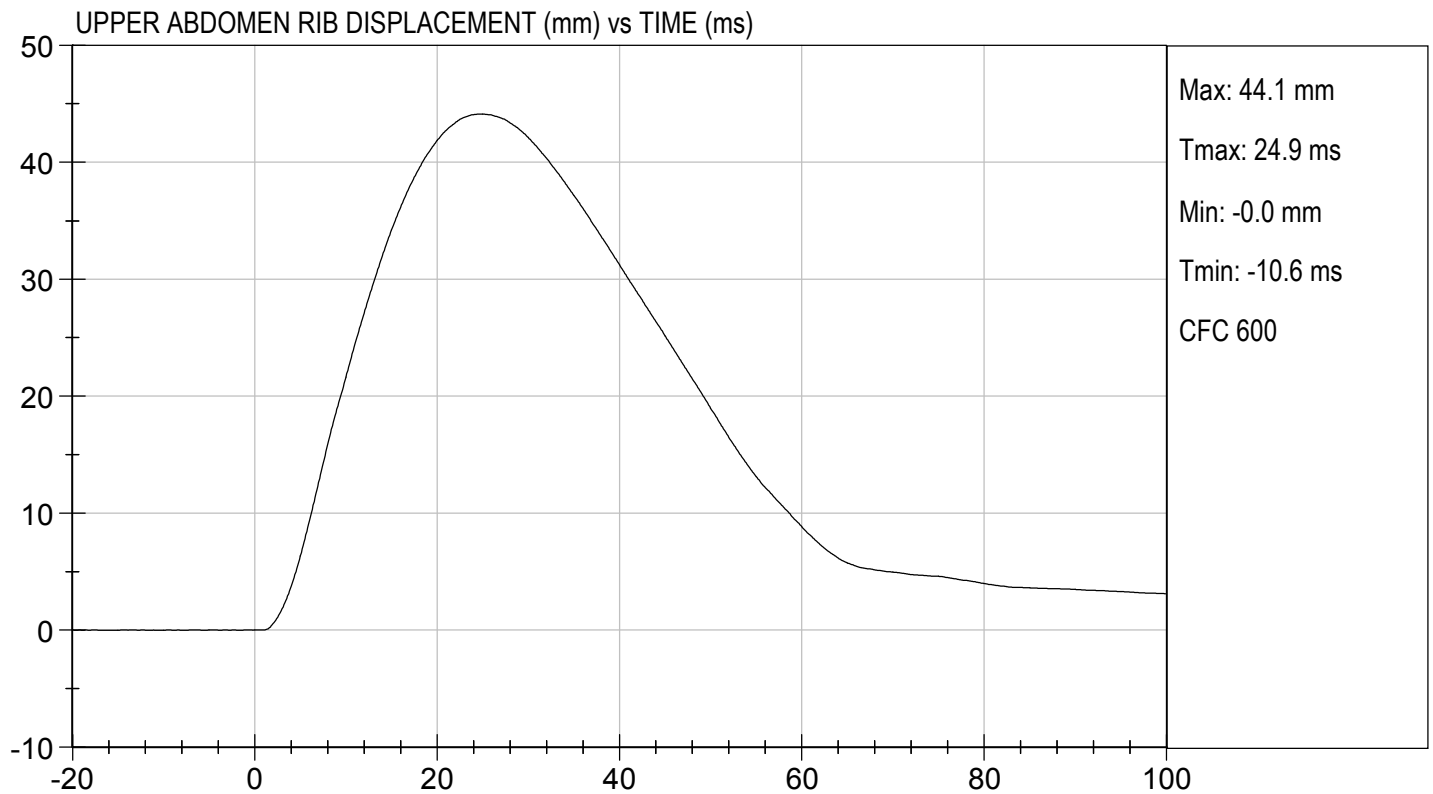
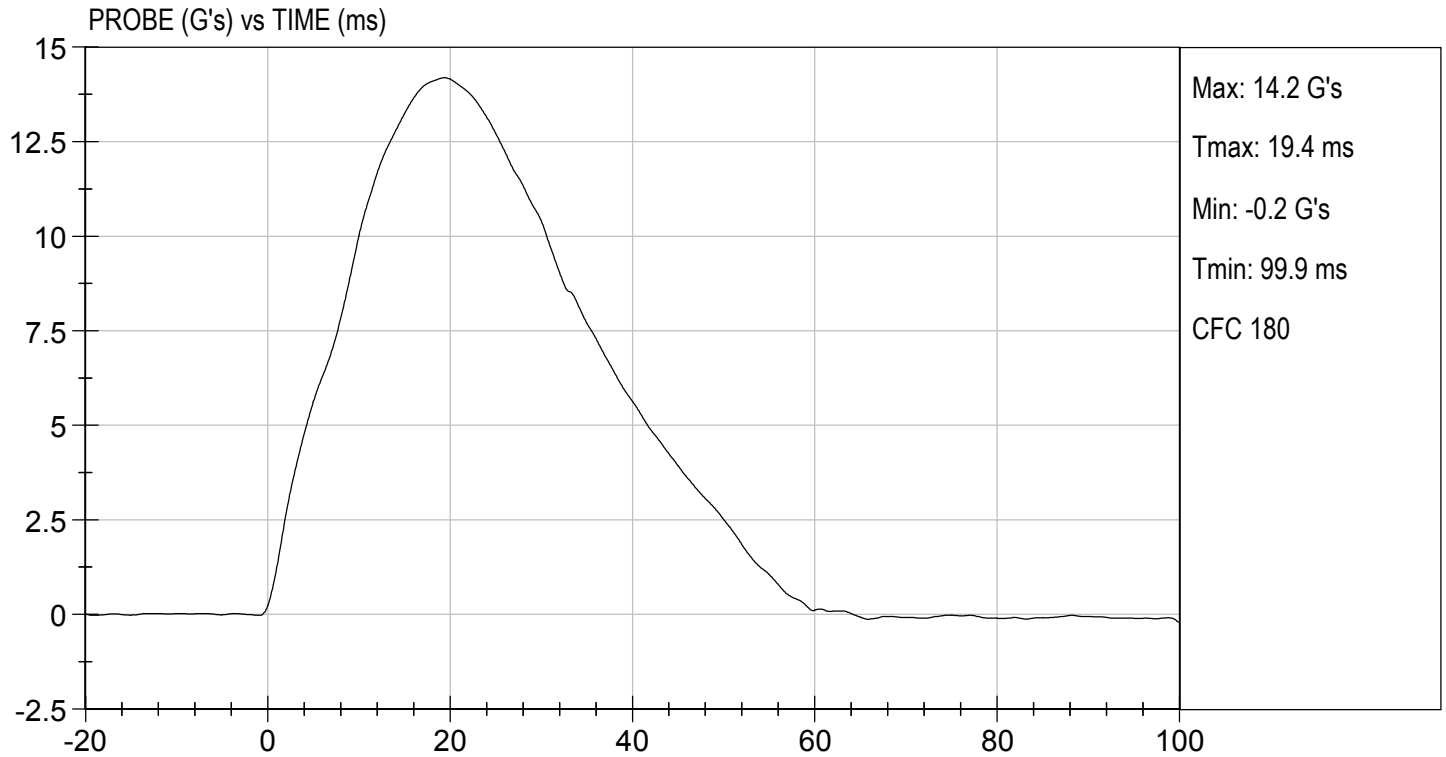
Test Date


Approved By



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

TEST DATE: 12/06/2017
TEST #: D173536

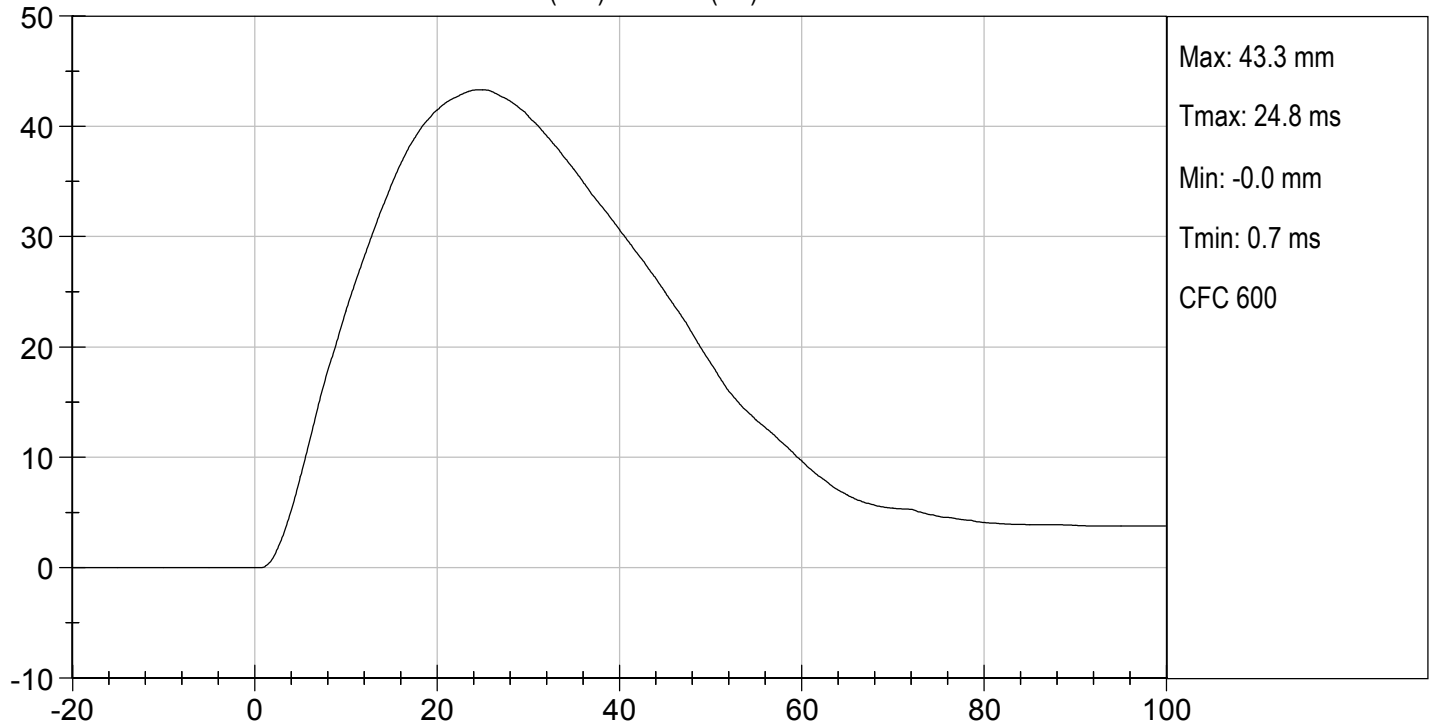




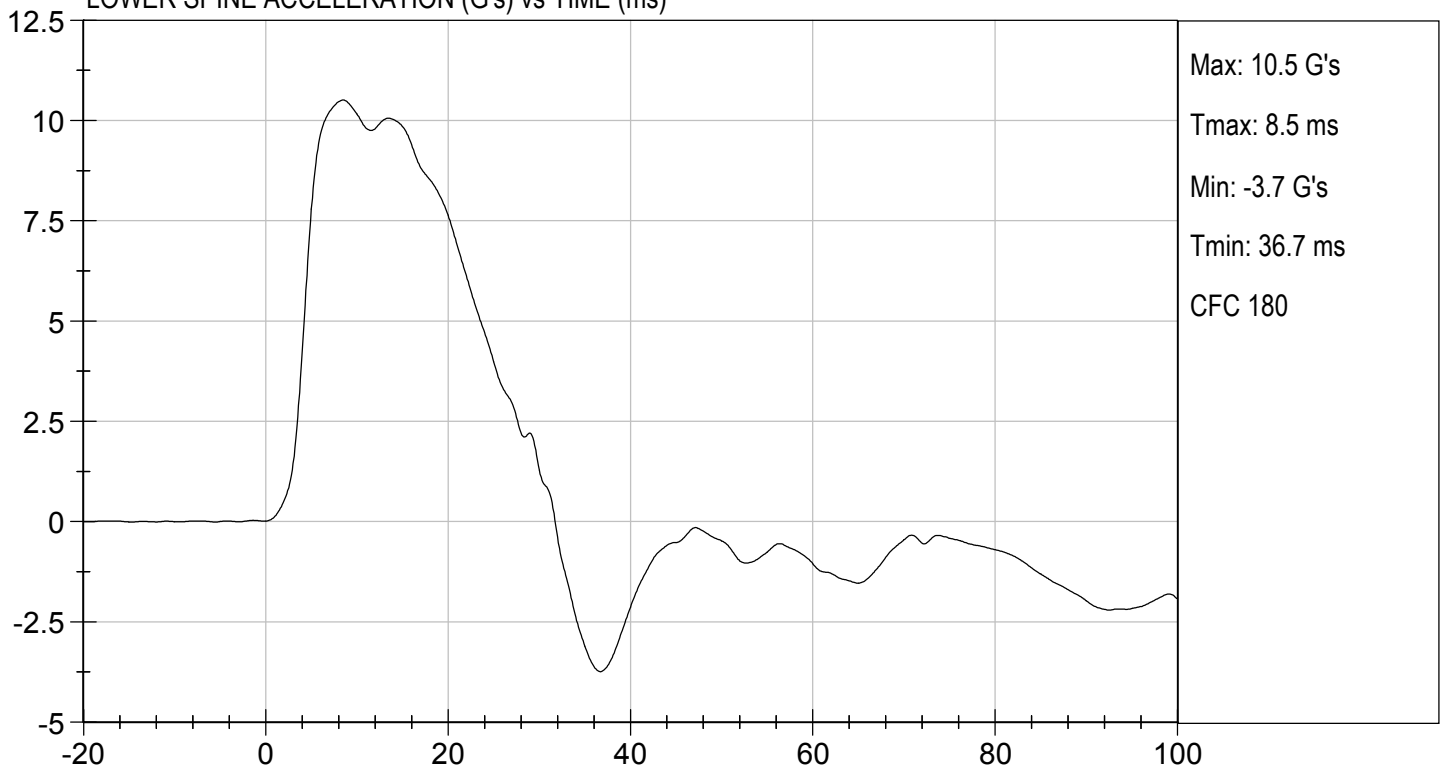
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 12/06/2017
TEST #: D173536

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

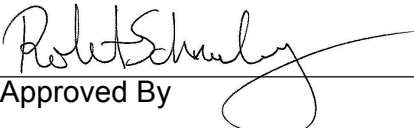
Test I.D: D173537

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3,775	Pass
Overall Test Results				Pass


Laboratory Technician

12/06/2017

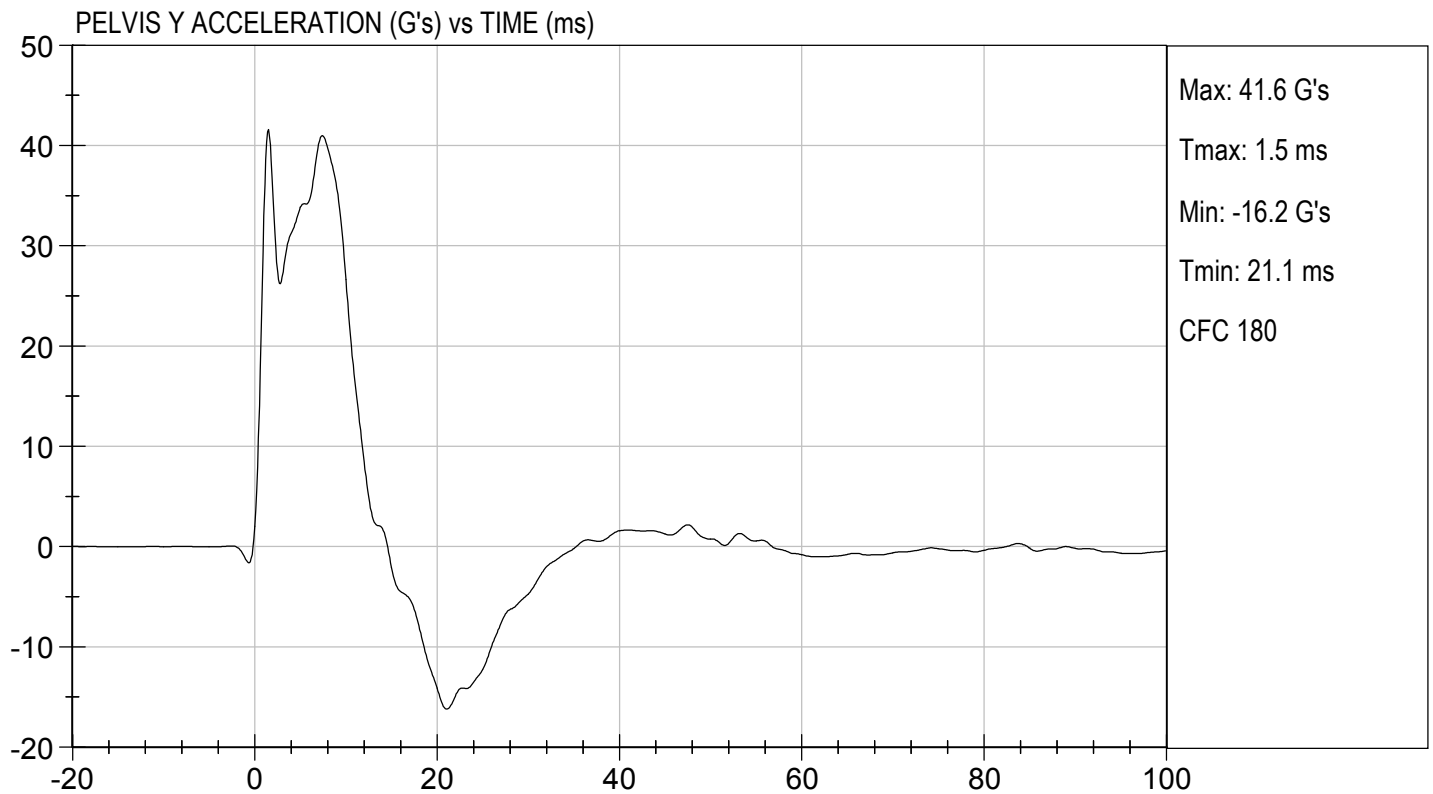
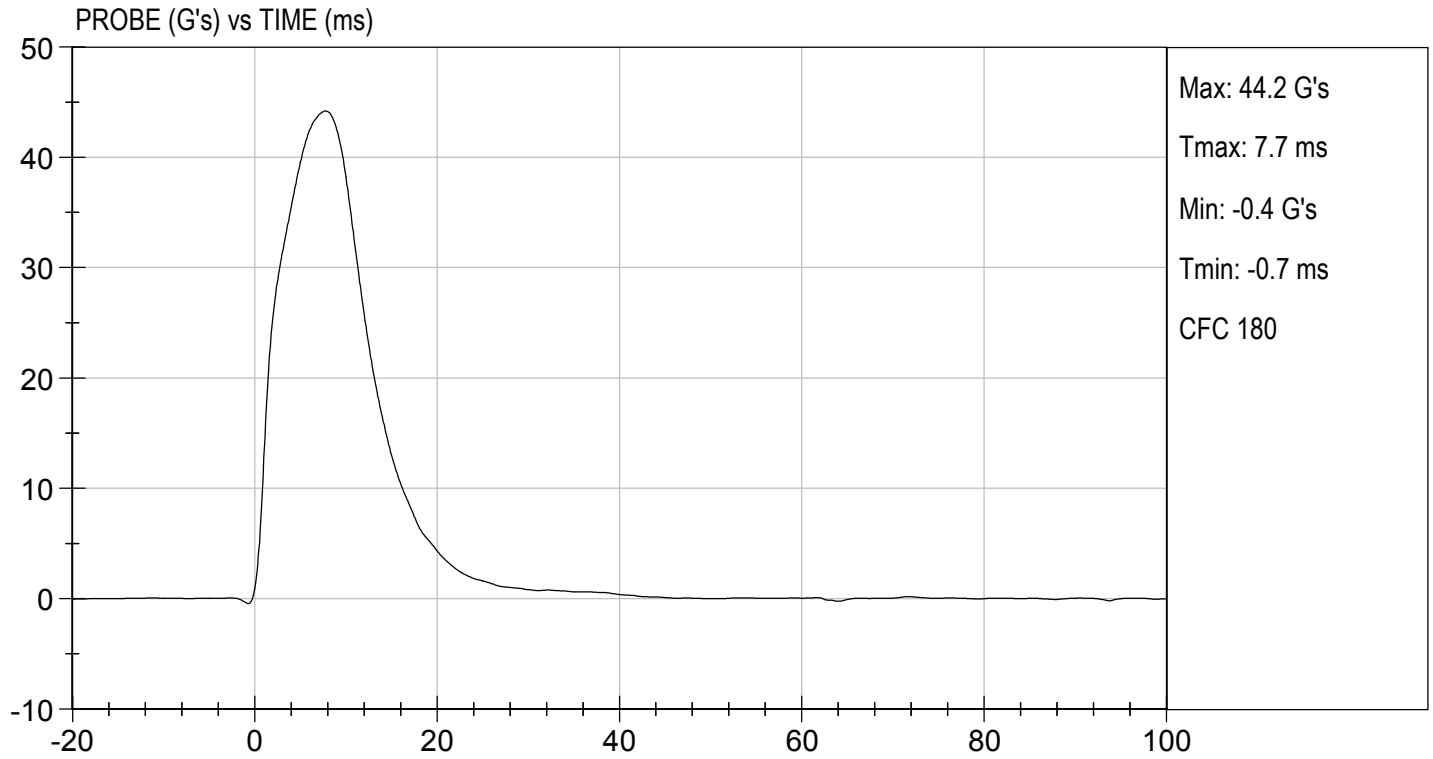
Test Date


Approved By



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

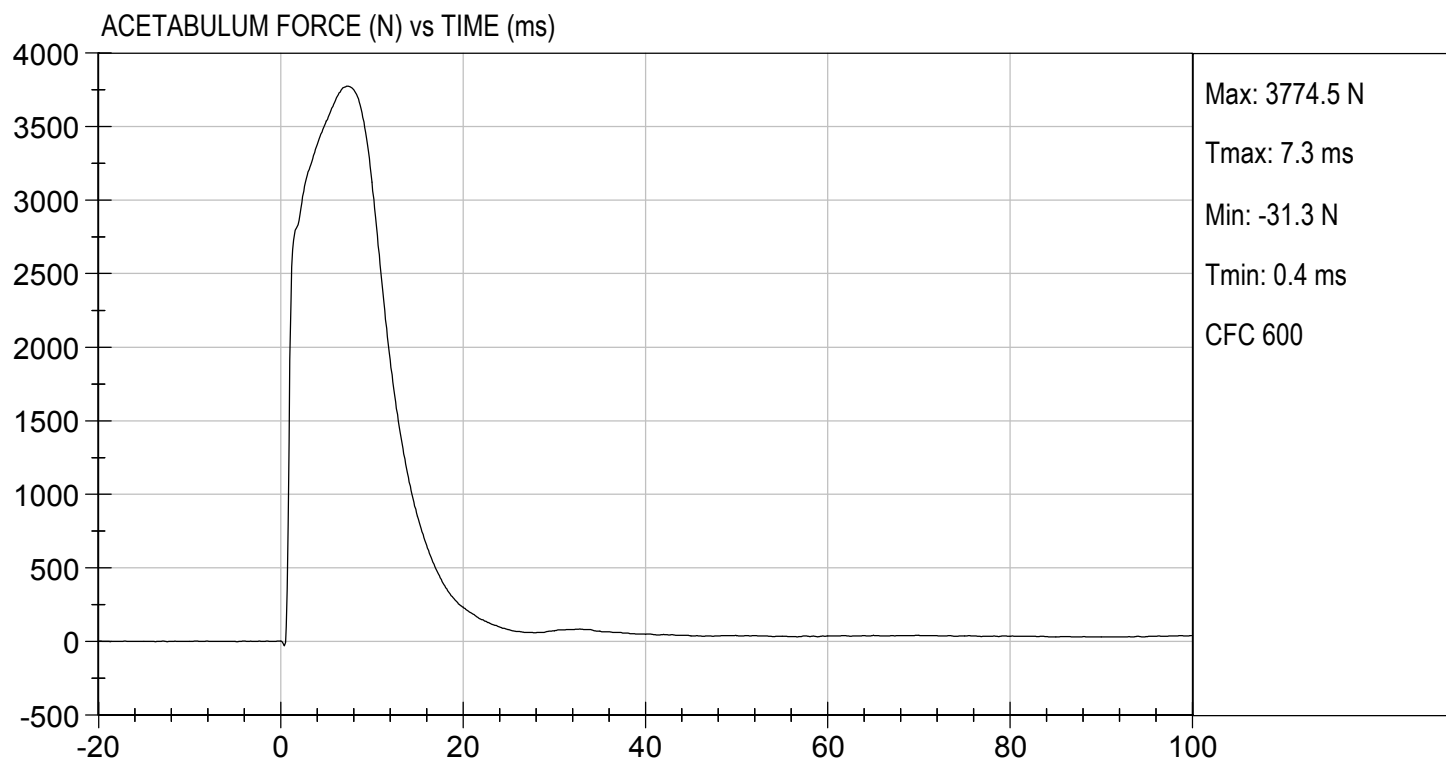
TEST DATE: 12/06/2017
TEST #: D173537





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

TEST DATE: 12/06/2017
TEST #: D173537



MGA RESEARCH CORPORATION

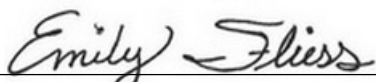
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

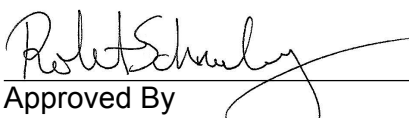
Test I.D: D173538

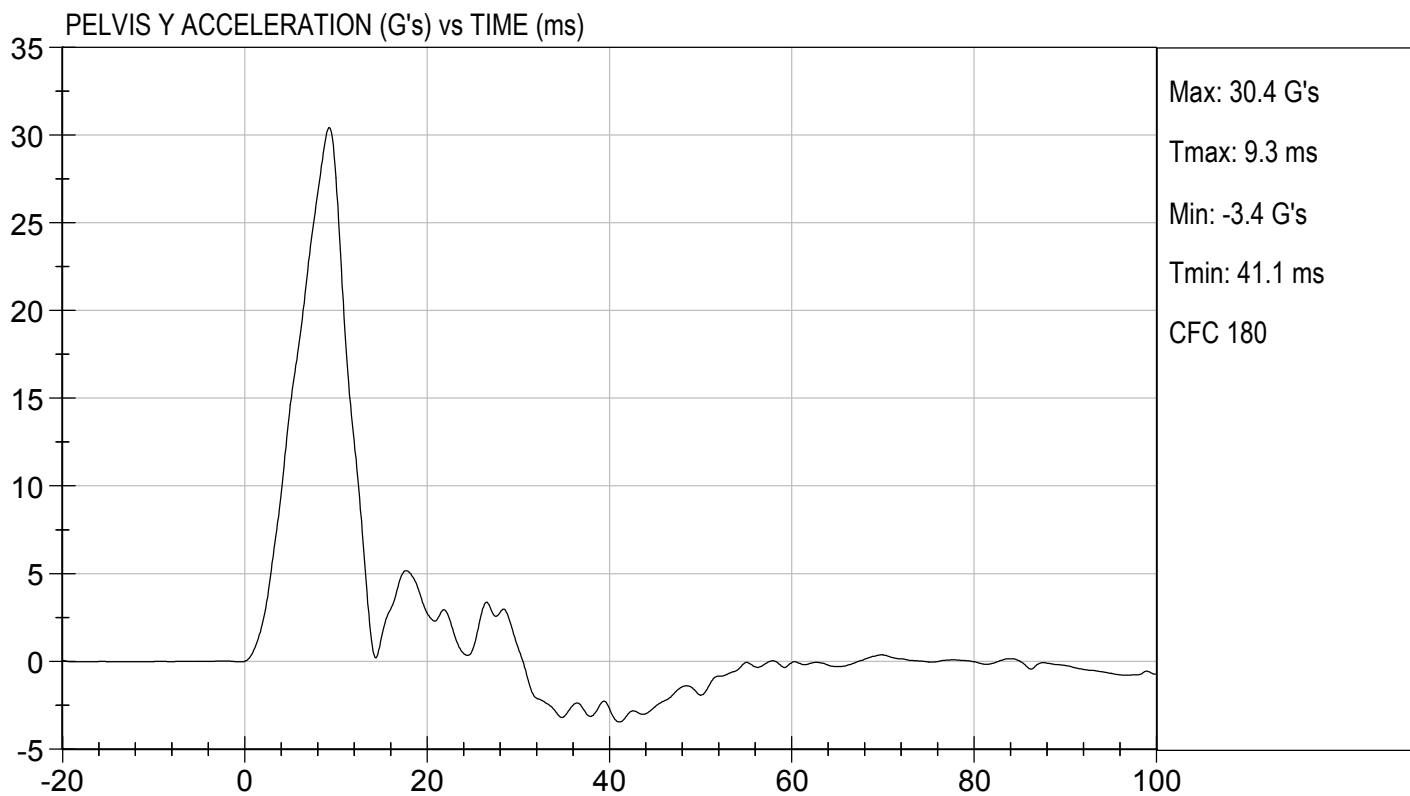
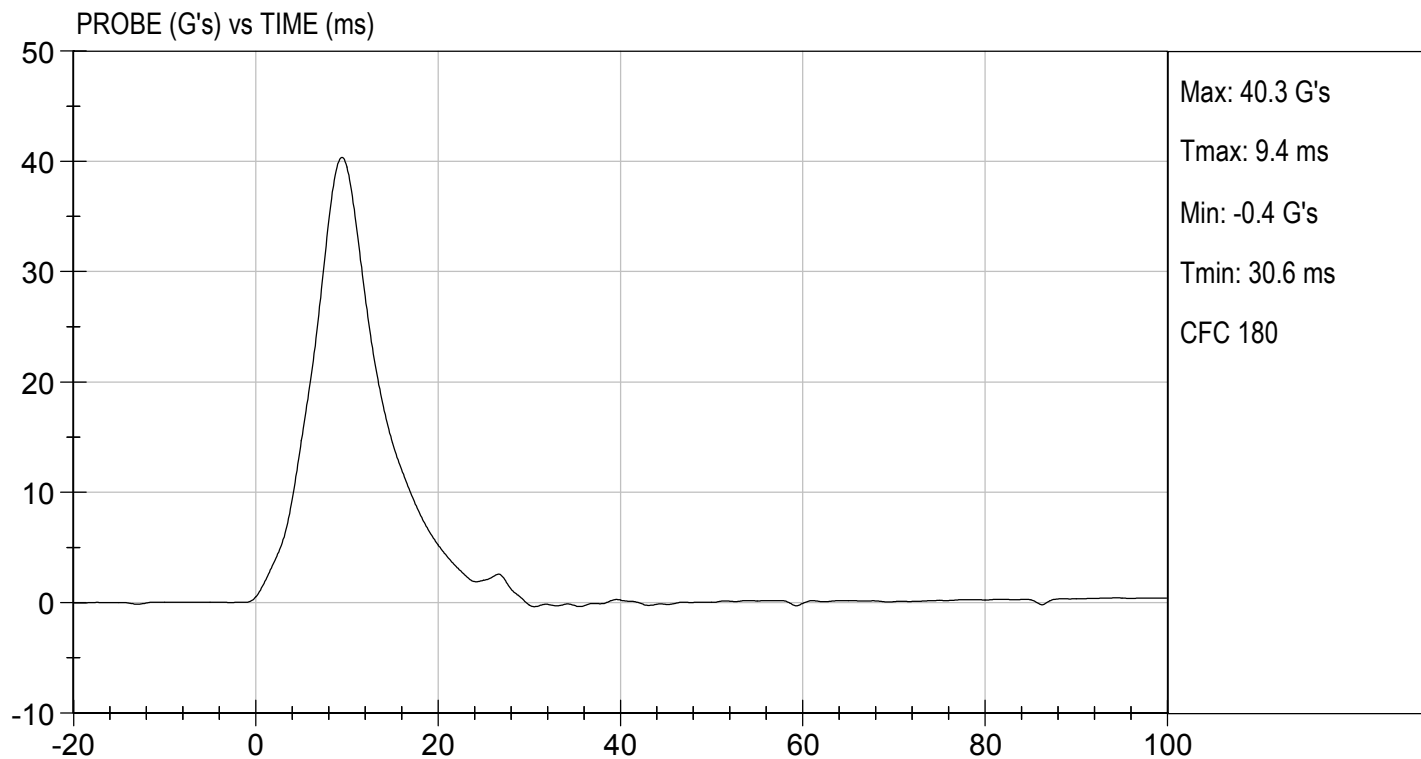
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,526	Pass
Overall Test Results				Pass


Laboratory Technician

12/04/2017

Test Date

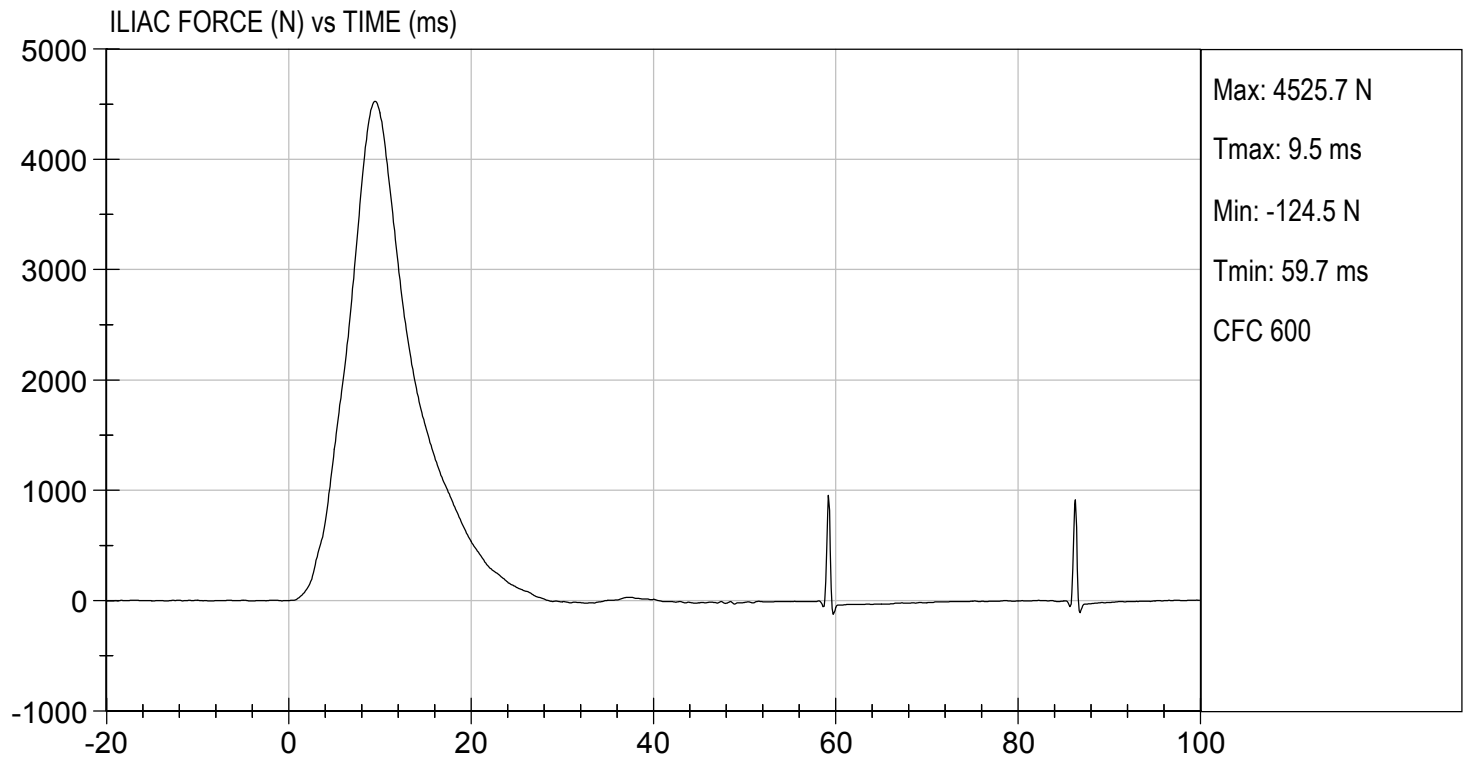

Approved By





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

TEST DATE: 12/04/2017
TEST #: D173538





SID-IIs Pelvis Plug Certification Test

Plug S/N 11245

Test Number 2645

Report Number 2641

Test Date 4/29/2016 8:21:18 AM

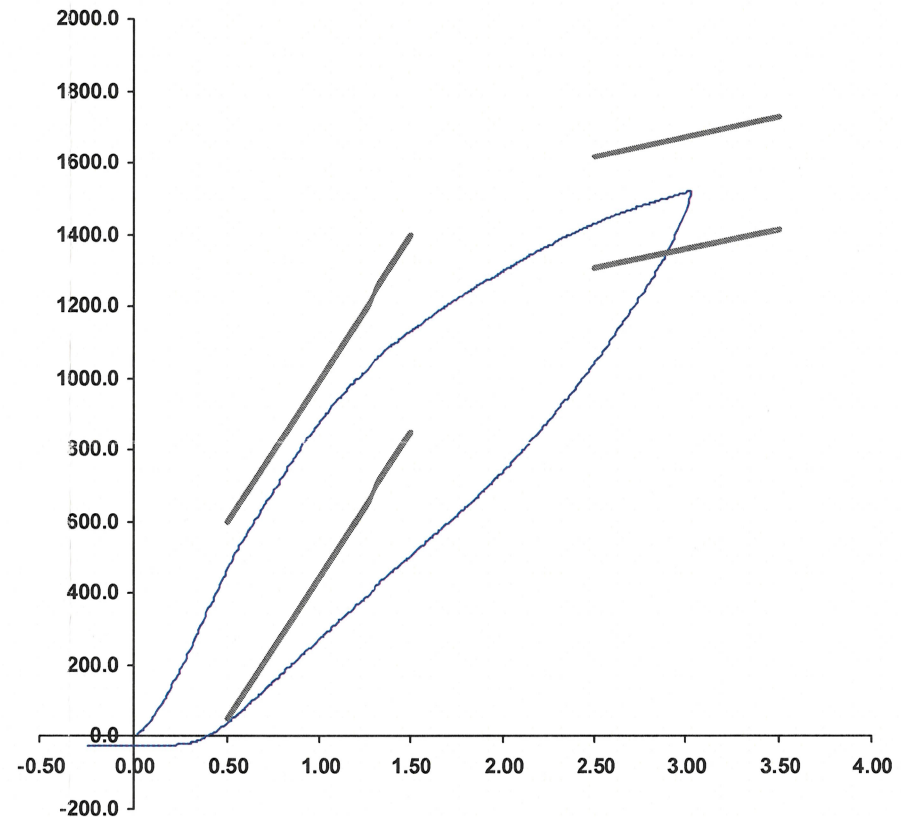
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	470.64	50.00	600.00
Force @ 1.5 mm (N)	1,132.87	850.00	1,400.00
Force @ 2.5 mm (N)	1,429.97	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,518.09	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), Units (LBS) 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107

29-Apr-16

SACO Research

By : DC

Date : 4/29/16

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



SID-IIs Pelvis Plug Certification Test

Plug S/N 11384

Test Number 2853

Report Number 2850

Test Date 8/29/2016 9:10:34 AM

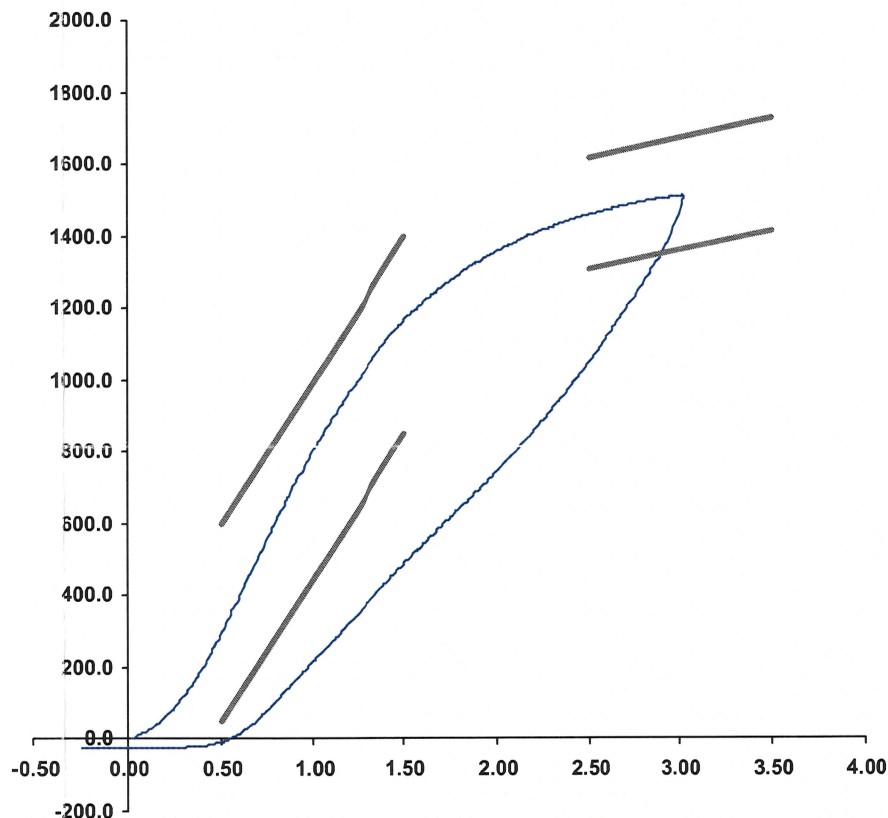
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	298.58	50.00	600.00
Force @ 1.5 mm (N)	1,169.60	850.00	1,400.00
Force @ 2.5 mm (N)	1,459.43	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,512.11	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (TI240813), Units (LBS) 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107 29-Aug-16

SACO Research

By :

DC

Date :

8/29/16

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

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation

				SID-IIs S/N 306			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P79445	Endevco	08/28/17
				Y	P79721	Endevco	08/28/17
				Z	P79724	Endevco	08/28/17
				Xr	P84999	Endevco	08/28/17
				Yr	P85000	Endevco	08/28/17
				Zr	P85001	Endevco	08/28/17
Head Angular Rate Sensors				X	ARS7416	DTS	07/15/14
				Y	ARS7442	DTS	07/15/14
				Z	ARS7475	DTS	07/08/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G033	FTSS	09/05/17	
		Middle	Y	G1261	FTSS	09/05/17	
		Lower	Y	G1270	FTSS	09/05/17	
	Abdominal Rib	Upper	Y	G032	FTSS	09/05/17	
		Lower	Y	G1304	FTSS	09/05/17	
Lower Spine Accelerometers (T12)				X	P96332	Endevco	08/28/17
				Y	P96335	Endevco	08/28/17
				Z	P96341	Endevco	08/28/17
Acetabulum Load Cell				Y	ACG268	FTSS	12/20/16
Iliac Wing Load Cell				Y	IWG273	FTSS	12/20/16
Pelvis Plug (struck side)					11245	SACO	04/29/16
Pelvis Plug (non-struck side)					11384	SACO	08/29/16

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	PCB874	PCB	11/01/17
Vehicle Center of Gravity	Y	PCB407	PCB	09/07/17
Vehicle Center of Gravity	Z	PCB572	PCB	09/07/17
Left Floor Sill	Y	T12250	Endevco	11/24/17
A-Pillar Sill	Y	T12209	Endevco	11/24/17
A-Pillar Low	Y	T11700	Endevco	10/06/17
A-Pillar Mid	Y	T11629	Endevco	10/06/17
B-Pillar Sill	Y	T12251	Endevco	11/22/17
B-Pillar Low	Y			
B-Pillar Mid	Y			
Driver Seat	Y	T12240	Endevco	11/24/17
Engine Top	X	PCB813	PCB	11/15/17
Engine Top	Y	PCB963	PCB	09/07/17
Firewall	Y	T12229	Endevco	11/24/17
Right Roof	Y	PCB632	PCB	09/14/17
Right Floor Sill	Y	T11713	Endevco	11/24/17
Rear Floorpan	X	PCB355	PCB	08/14/17
Rear Floorpan	Y	PCB563	PCB	08/14/17

Table 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DG6277	FTSS	07/19/17
Load Cell 2	DG6278	FTSS	07/19/17
Load Cell 3	DG6279	FTSS	07/19/17
Load Cell 4	DG6280	FTSS	07/19/17
Load Cell 5	DG6281	FTSS	07/19/17
Load Cell 6	DG6283	FTSS	07/19/17
Load Cell 7	DG6284	FTSS	07/19/17
Load Cell 8	DG6582	FTSS	07/19/17