FINAL REPORT NUMBER: SINCAP-TRC-19-006

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

GENERAL MOTORS LLC
2019 Chevrolet Malibu 4-DR Sedan
NHTSA NUMBER: M20190118

PREPARED BY:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319

Report Date: December 5, 2019

FINAL REPORT

PREPARED FOR:
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, D.C. 20590

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Report Prepared By: ILO Project Operations Group

Report Approved By: 

John Shultz

Approval Date: December 5, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date:

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

Date:

Technical Report Documentation Page

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15. Supplemental Notes		

16. Abstract

This 55 / 28 km/h 90° Moving Deformable Barrier SINCAP Side Impact Test was conducted on the subject 2019 Chevrolet Malibu 4-DR Sedan, in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on June 4, 2019.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.18 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 21.2° C. The target vehicle post-test maximum crush was 286 mm at Level 3. The test vehicle's performance was as follows:

Driver ATD (ES-2re)

Measurement Description	**Units**	**IARV**	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	160
Maximum Thoracic Rib Deflection	mm	44	34.1
Total Abdominal Force	N	2500	1031.3
Pubic Symphysis Force	N	6000	-1057.1
Lower Spine Acceleration	G	82*	34.3

Passenger ATD (SID-IIs)

Measurement Description	**Units**	**IARV**	**Result**
Head Injury Criteria (HIC_{36})	N/A	1000	365
Lower Spine Resultant Acceleration	g's	82	61.9
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4969.1
Maximum Thoracic Rib Deflection	mm	38*	35.8
Maximum Abdominal Rib Deflection	mm	45*	32.2

* Proposed IARV

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

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590

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TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test was conducted as part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00354. The purpose of this test is to generate comparative side impact performance in a 2019 Chevrolet Malibu 4-DR Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A 2019 Chevrolet Malibu 4-DR Sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.18 km/h (38.64 mph). 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 the Transportation Research Center Inc. in East Liberty, Ohio, on June 4, 2019. Pre-test and post-test photographs of the test vehicle and the MDB and the dummies (ES-2-re 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 Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 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 tri-axial 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) tri-axial accelerometers
Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG triaxial accelerometers
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) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

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 of this report contains the test equipment and instrumenation calibration data.

Dummy injury readings were recorded as follows:

Measurement Description	Driver ATD (ES-2-re)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})	N/A	1000	160
Maximum Thoracic Rib Deflection	mm	44	34.1
Combined Abdominal Force	N	2500	1031.3
Pubic Symphysis Force	N	6000	-1057.1
Lower Spine (T12) Resultant Acceleration	G	82*	34.3

* Proposed IARV

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC_{36})	N/A	1000	365
Lower Spine (T12) Resultant Acceleration	G	82	61.9
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4969.1
Maximum Thoracic Rib Deflection	mm	38*	35.8
Maximum Abdominal Rib Deflection	mm	45*	32.2

* Proposed IARV

Supplemental Restraint Information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Side Pelvis Airbag	No	N/A	No	N/A
Knee Airbag	Yes	No	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Unknown	No	N/A
Other Safety Restraint	No	N/A	No	N/A

GENERAL COMMENTS

All doors remained closed throughout the test. No fuel spillage occurred during the impact or the static rollover test which followed. Injury values for both ATDs were within the established performance thresholds.

Left Side Sill at Rear Seat Acceleration (Y); Channel failed at 15.0 ms

Left Lower A-Post Acceleration (Y); Channel failed at 9.0 ms

Left Lower B-Post Acceleration (Y); Channel failed at 37.0 ms

Left Middle B-Post Acceleration (Y); Channel failed at 30.0 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20190118
Model Year	2019
Make	Chevrolet
Model	Malibu
Body Style	4-DR Sedan
VIN	1G1ZB5ST7KF201179
Body Color	Pacific Blue Metallic
Odometer Reading (km/mi)	4.0 mi
Engine Displacement (L)	1.5
Type/No. Cylinders	Gas/4
Engine Placement	Front Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	Yes
Rear Passenger Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Passenger Load Limiter	No
Other Safety Restraint	No

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

DATA FROM CERTIFICATION LABEL

Manufactured By	GENERAL MOTORS LLC
Date of Manufacture	04/19
Vehicle Type	PASS CAR

GVWR (kg)	1838
GAWR Front (kg)	946
GAWR Rear (kg)	892

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

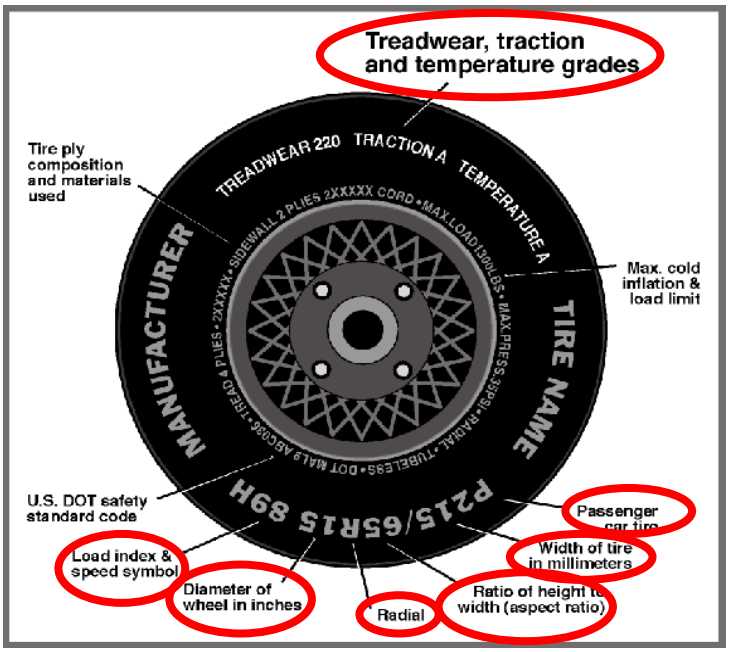
Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity DSC)	2	3	N/A	5
Capacity Weight (VCW) (kg)				408
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				67.8

VEHICLE SEAT TYPE

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

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P205/65R16 H	P205/65R16 H
Tire Size on Vehicle	205/65R16	205/65R16
Tire Manufacturer	Firestone	Firestone
Tire Model	FT140	FT140
Treadwear	560	560
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	5	5
Load Index/Speed Symbol	94H	94H
Tire Material	Polyester/Steel/ Nylon	Polyester/Steel/ Nylon
DOT Safety Code Left	8X84 FTO 0319	8X84 FTO 0319
DOT Safety Code Right	8X84 FTO 0319	8X84 FTO 0319

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	262	240	255	240
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

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21 kPa	207	207	207	207

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	433.8	296.0		486.2	365.0		465.0	386.8	
Right	kg	422.2	266.2		427.2	326.2		423.8	335.4	
Ratio	%	60.4	39.6		56.9	43.1		55.2	44.8	
Totals	kg	856.0	562.2	1418.2	913.4	691.2	1604.6	888.8	722.2	1611.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1418.2	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	125.0	(B)
Rated Cargo/Luggage Weight (RCLW)[1]	kg	67.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1611.0	(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 ☐ NO

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement
LF	mm	701	700	Yes
RF	mm	719	711	Yes
RR	mm	713	710	Yes
LR	mm	694	695	Yes
Vehicle CG (Aft of Front Axle)	mm	1267	1218	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	+46	+48	

***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. Indicate "Yes" or "No" for "Meets Requirement".

Test height adjustable suspension setting, if applicable: N/A

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: Steel plate mounted in cargo area	22.8
Removed: None	0.0

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

Test Vehicle:	2019 Chevrolet Malibu 4-DR Sedan	NHTSA No.:	M20190118
Test Program:	SINCAP Side Impact	Test Date:	6/4/2019

SEAT POSITIONING

The driver 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	18.4	13.7	16.1
Front Passenger Seat	19.0	14.8	17.1
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	17.6
Non-Struck Side Rear Seat	N/A	N/A	12.0
Rear Center Seat*	N/A	N/A	17.6

* If applicable.

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	16.1	115	Max	N/A	N/A	N/A
			Mid	110	115	128
			Min	N/A	N/A	N/A
Front Passenger Seat	17.1	117	Max	N/A	N/A	N/A
			Mid	110	117	127
			Min	N/A	N/A	N/A
Front Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Struck Side Rear Seat	17.6	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	12.0	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	17.6	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A

* If applicable.

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

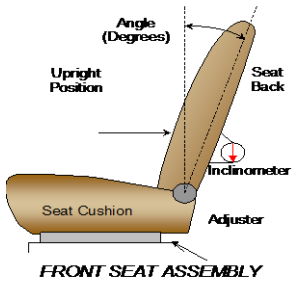
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents	mm	Detent
Driver Seat	263	27	130	13
Front Passenger Seat	241	25	120	12
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

* If applicable

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated seat back angle. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck side rear seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents	Degrees	Detent
Driver Seat w/ Seated Dummy	66.7	34	-13.0	8
Front Passenger Seat	65.4	34	-14.1	8
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat w/ Seated Dummy	0	Fixed	0	Fixed
Non-Struck Side Rear Seat	0	Fixed	0	Fixed
Rear Center Seat*	0	Fixed	0	Fixed

* If applicable

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	1; Fixed	1
Rear Seat	1; Fixed	1

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.

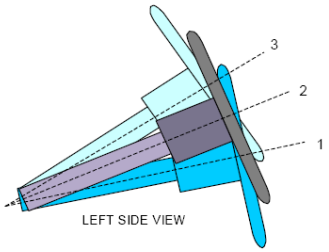
	Total # of Positions	Placed in Position #
Driver Seat	9	9, Uppermost
Rear Seat	2	1, Lowermost

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

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.



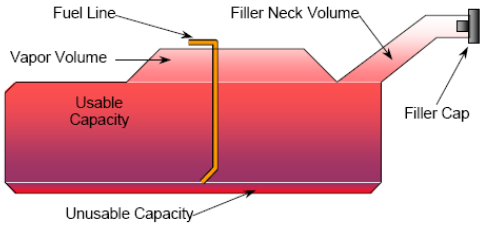
STEERING COLUMN ASSEMBLY

	Degrees	Fore/Aft Position (mm)
Lowermost, Position No. 1	20.0	0
Geometric Center, Position No. 2	22.7	30
Uppermost, Position No. 3	24.4	60
Telescoping Steering Wheel Travel		60
Test Position	22.7	30

FUEL PUMP

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

Pump will run for about 3 seconds when the key is turned on and then will not run unless the engine is cranking or running.



VEHICLE FUEL TANK ASSEMBLY

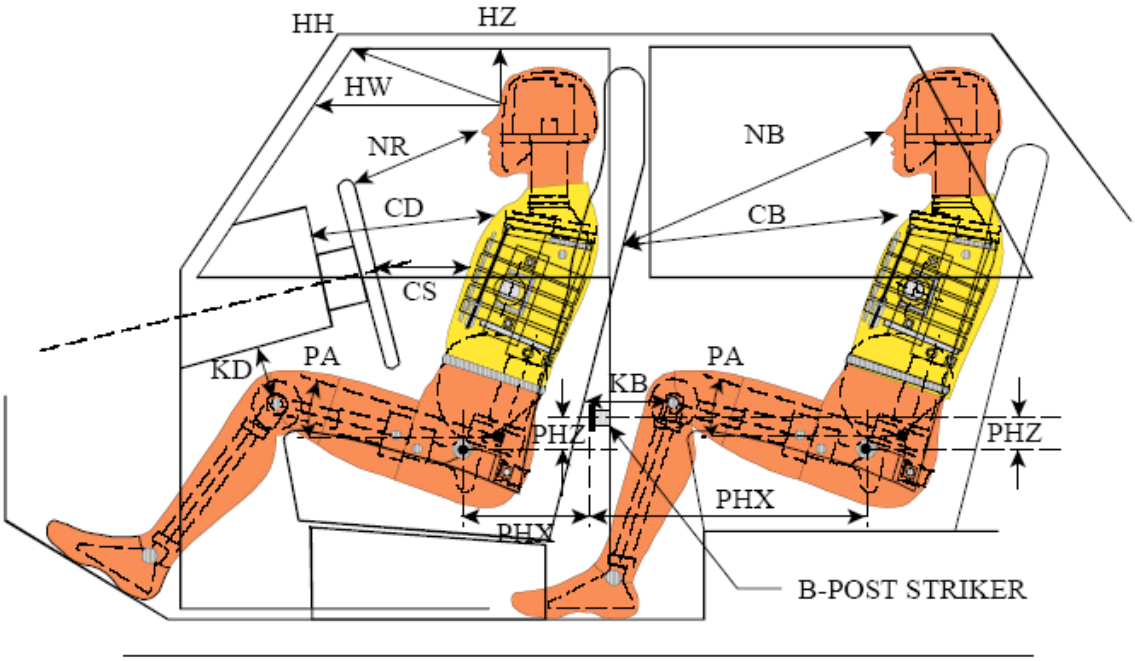
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	59.8
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	59.8
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	55.6
Actual Amount of Solvent Used in Test	55.6
1/3 of Usable Capacity	19.9

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in on Form No. 1? ☒ YES ☐ NO

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



LEFT SIDE VIEW

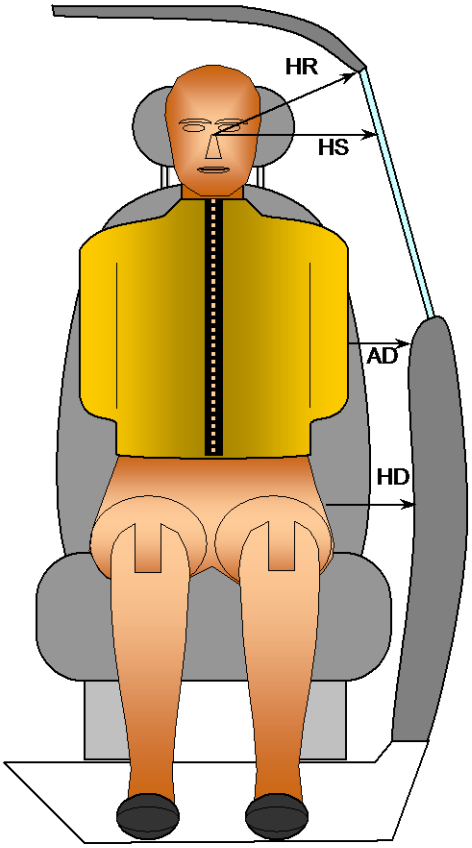
NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	433			
HW		Header to Windshield	721			
HZ	HZ	Head to Roof Liner	204		267	
NR	NB	Nose to Rim/Seat Back	522		588	
CD	CB	Chest to Dash/Seat Back	628		550	
CS		Chest to Steering Wheel	452			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	232	22.1	279	18.4
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	209	23.4	262	16.7
PAX°	PAX°	Pelvic Tilt Angle X		0.3		0.0
	PAY°	Pelvic Tilt Angle Y				22.2
PHX	PHX	Hip Point to Striker (X-Axis)	145		290	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	170		292	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

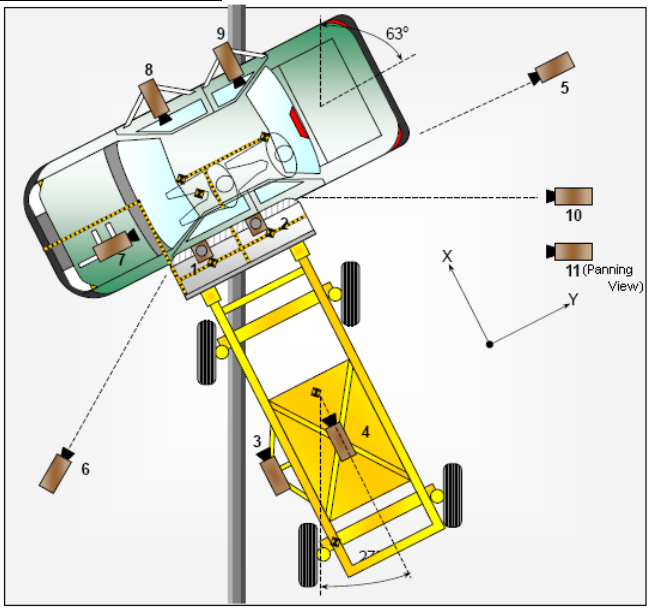


FRONT VIEW OF DUMMY

Code	Description	Units	Driver	Passenger
HR	Head to Side Header	mm	211	388
HS	Head to Side Window	mm	354	244
AD	Arm to Door	mm	115	180
HD	H-Point to Door	mm	155	186

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	-1578	0	-5692	8.5	1000
2	Overhead Close-up	1387	0	-5692	25	1000
3	Left Impact Point (MDB)	1535	919	-864	25	1000
4	Side Overall (MDB)	2370	0	-1473	12.5	1000
5	Rear	321	7488	-1246	20	1000
6	Left Front	1953	-4216	-1196	20	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	30
11	Real-time Inrun				Zoom	30

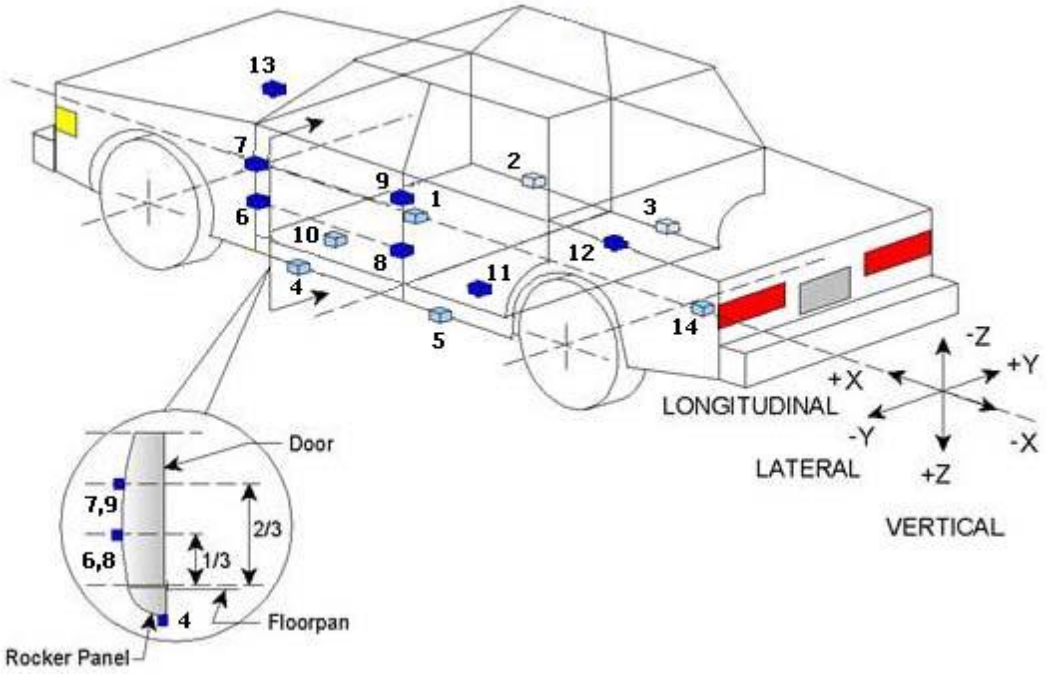
Reference: Impact Point projected to Ground; +X = To Front of MDB +Y = To Right of MDB; +Z = Down
*All measurements accurate to ± 6 mm.
If applicable, explain why camera(s) did not operate as intended: N/A

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MBD Accelerometers	5
TOTAL	60

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



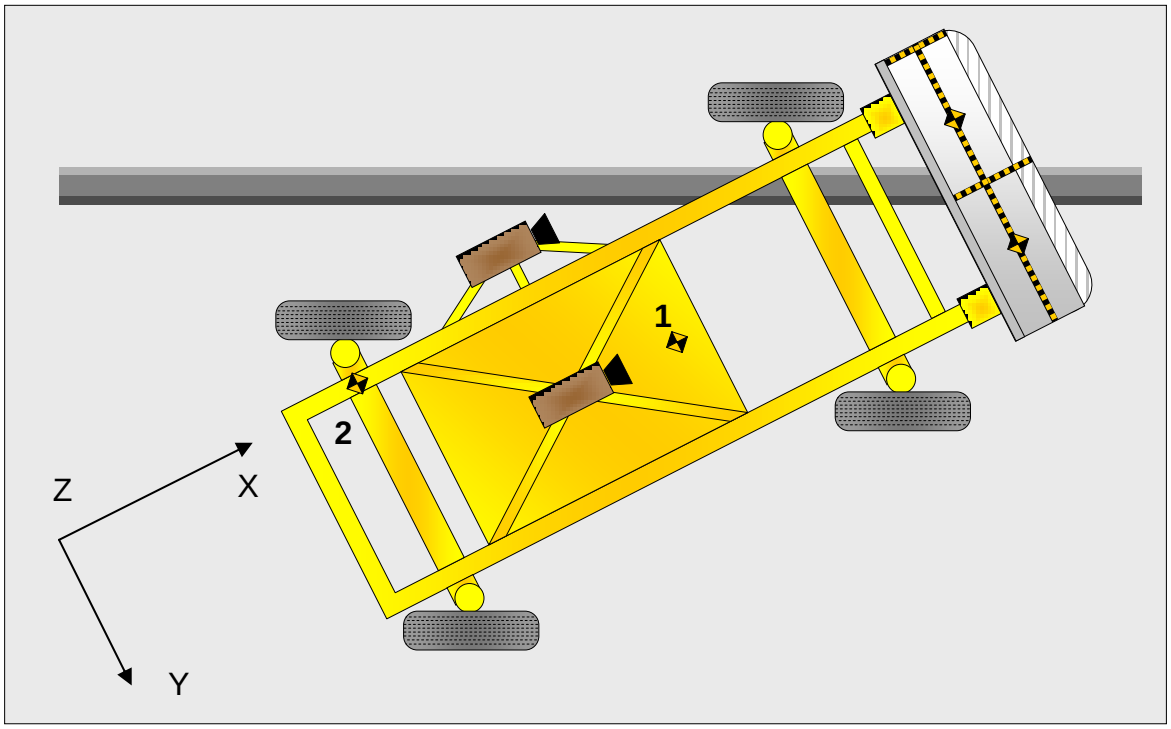
TEST VEHICLE ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3150	105	-313
2	Right Sill at Front Seat	3040	740	-310
3	Right Sill at Rear Seat	2043	745	-306
4	Left Sill at Front Door	3030	-717	-282
5	Left Sill at Rear Door	2055	-720	-294
6	A-Post Lower	3440	-846	-520
7	A-Post Middle	3468	-826	-878
8	B-Post Lower	2335	-845	-420
9	B-Post Middle	3192	-820	-820
10	Front Seat Track	2542	-575	-270
11	Rear Seat Structure	1860	-680	-310
12	Right Rear Occ. Compartment	1868	676	-331
13	Engine Block	4126	10	-804
14	Rear Above Axle	985	0	-494

Reference: X - Rear surface of vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	-2179	0	-505
2	MDB Rear	-3648	-650	-618

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES2-re)	Rear Seat Dummy (SID-IIs)
Face	SCAB, Headliner	SCAB
Top of Head	Headliner	SCAB, Headliner
Left Side of Head	SCAB, Headliner	SCAB
Back of Head	Headliner	Headrest, SCAB, Headliner
Left Shoulder	Door Trim	Seat, SAB
Upper Torso	Seat, SAB	Seat, SAB
Lower Torso	Seat	Seat
Left Hip	Seat, SAB	Seat
Left Knee	Door Trim	Door Trim

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Trunk Lid
	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	Good
Sill Separation	None
Windshield Damage	None
Side Window Damage	Driver & rear passenger windows broken out
Other Notable Effects	None

DATA SHEET NO. 8 (CONTINUED)
POST TEST OBSERVATIONS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2827
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		474
Actual Impact Point (Aft of Front Axle)	mm		473
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact point	+1
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact point	+1

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel Base of Framework Carriage	2591
C.G. Location aft of Front Axle	1098

MDB WEIGHTS

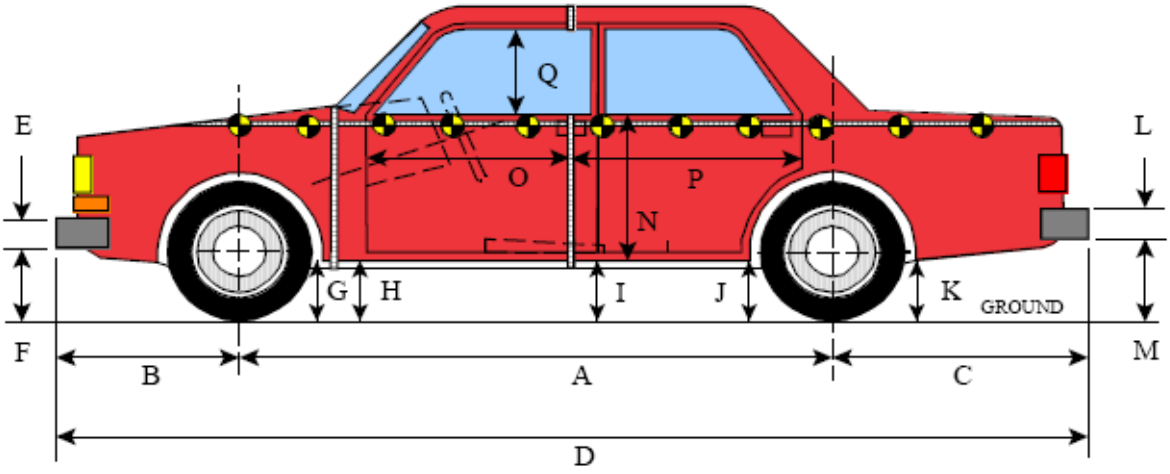
	Units	Front Axle	Rear Axle	Total
Left	kg	420.2	257.2	677.4
Right	kg	366.6	321.2	687.8
Ratio	%	57.6	42.4	100.0
Totals	kg	786.8	578.4	1365.2

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.18
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.17
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



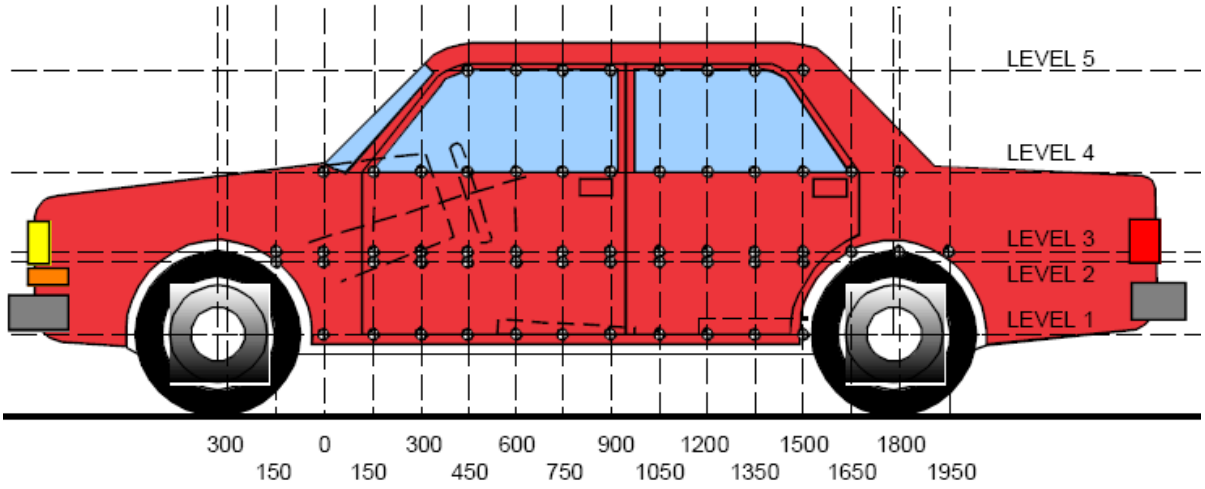
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2827	2829	-2
B	Front Axle to Front Surface of Vehicle	978	978	0
C	Rear Axle to Rear Surface of Vehicle	1135	1135	0
D	Total Length at Centerline	4940	4920	20
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	410	402	8
G	Sill Height at Front Wheel Well	257	273	-16
H	Sill Height at Front Door Leading Edge	265	377	-112
I	Sill Height at B-Pillar	298	381	-83
J1	Sill Height at Rear Wheel Well	240	271	-31
J2	Pinch Weld Height at Rear Wheel Well	145	176	-31
K	Sill Height Aft of Rear Wheel Well	316	362	-46
L	Rear Bumper Thickness	170	170	0
M	Rear Bumper Bottom to Ground	440	490	-50
N	Sill Height to Window Bottom Sill	768	670	98
O	Front Door Leading Edge to Impact CL	854	805	49
P	Rear Door Trailing Edge to Impact CL	1419	1340	79
Q	Front Window Opening	381	360	21
R	Right Side Length	4556	4560	-4
S	Left Side Length	4560	4580	-20
T	Vehicle Width	1858	1854	4

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance From Impact
1	Sill Top	268	139	300
2	Driver Hip Point	462	252	1650
3	Mid-Door	575	286	1800
4	Window Sill	845	223	1650
5	Window Top	1338	11	1350

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

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

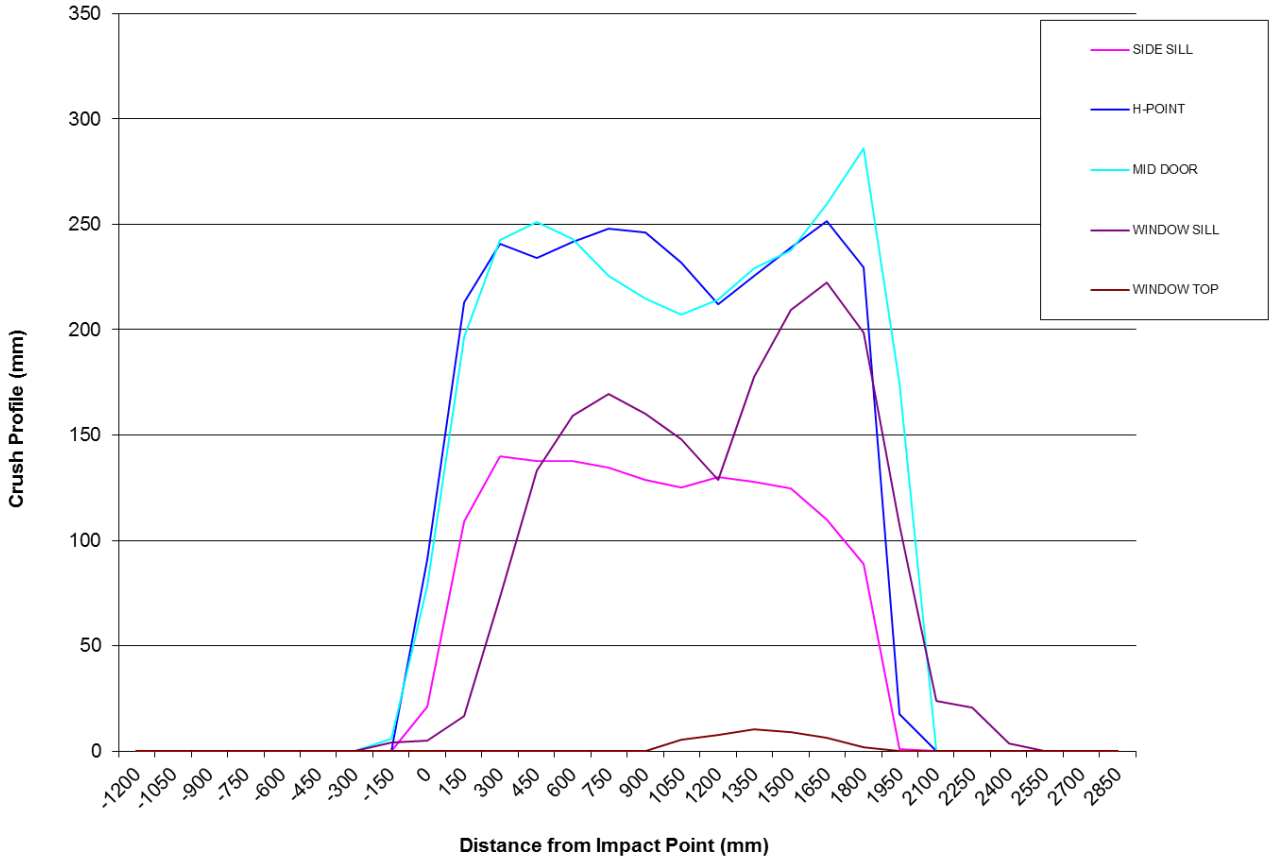
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-150	0	0	927	829	0	0	0	921	824	0	0	0	6	5	0
0	903	918	922	845	0	881	827	843	840	0	22	91	79	5	0
150	896	914	919	857	0	787	701	723	840	0	109	213	196	17	0
300	897	911	917	867	0	758	671	675	794	0	139	240	242	73	0
450	899	910	916	876	0	761	677	665	743	0	138	233	251	133	0
600	902	910	916	883	0	764	668	673	723	0	138	242	243	160	0
750	904	910	916	885	0	769	662	690	715	0	135	248	226	170	0
900	906	909	916	885	0	777	663	701	724	0	129	246	215	161	0
1050	908	909	916	885	633	782	677	709	737	627	126	232	207	148	6
1200	905	907	914	881	636	775	695	700	752	628	130	212	214	129	8
1350	902	907	914	877	636	774	681	685	699	625	128	226	229	178	11
1500	899	907	913	876	632	774	668	676	666	623	125	239	237	210	9
1650	895	909	915	874	626	785	657	655	651	620	110	252	260	223	6
1800	894	912	917	873	609	805	683	631	675	607	89	229	286	198	2
1950	902	916	920	863	0	901	898	746	756	0	1	18	174	107	0
2100	0	0	0	873	0	0	0	0	850	0	0	0	0	23	0
2250	0	0	0	875	0	0	0	0	854	0	0	0	0	21	0
2400	0	0	0	874	0	0	0	0	870	0	0	0	0	4	0

NOTE: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

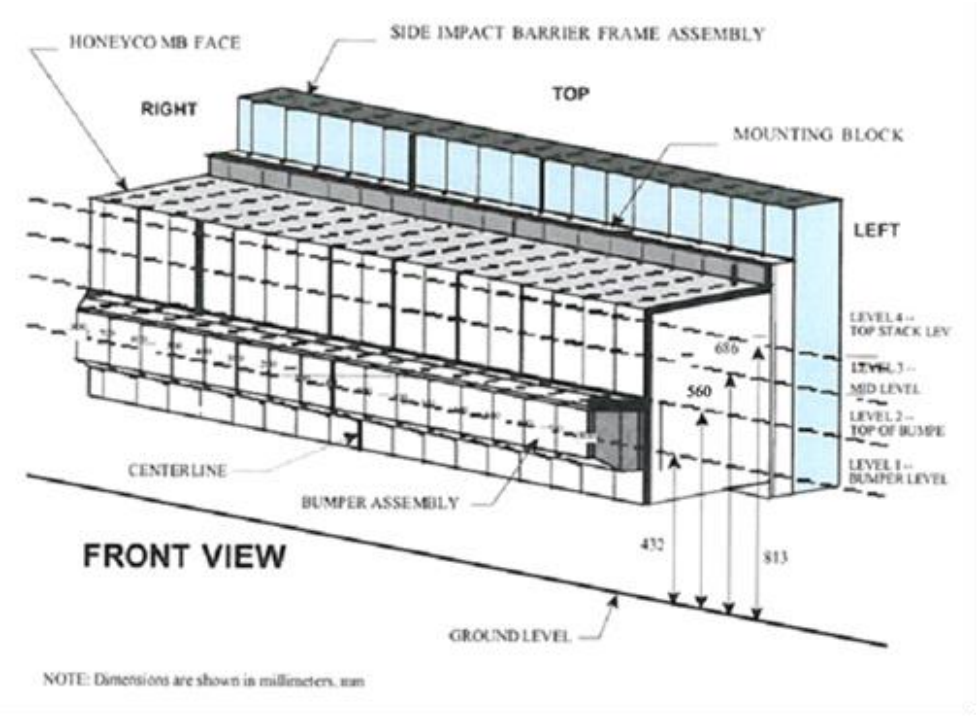
DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Right	158
B	Top of Bumper	560	500	Right	50
			200	Left	50
C	Mid-Level	686	200	Right	73
D	Top of Stack	813	800	Left	132

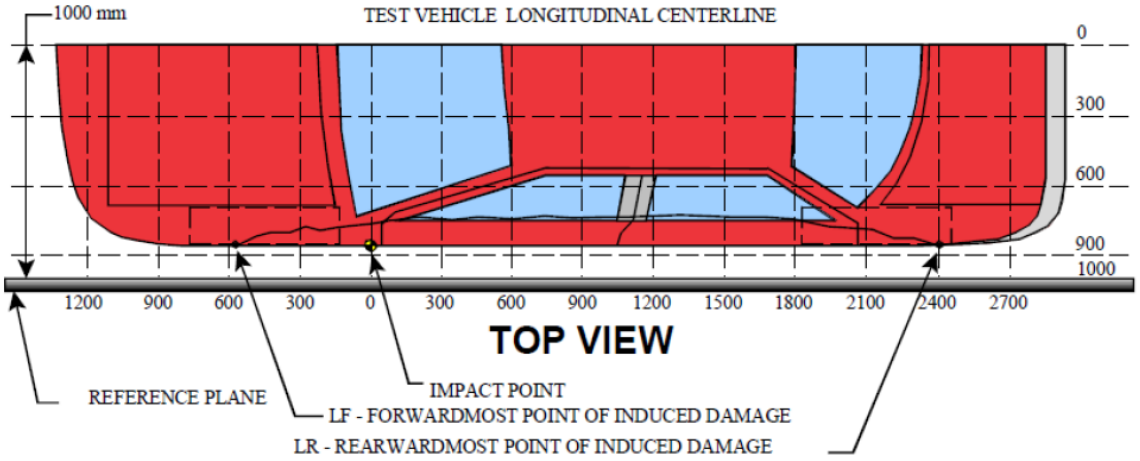
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	158	151	145	146	146	157	147	143	143	142	130	126	124	122	120	120	129
2	49	49	49	50	---[1]	---[1]	---[1]	---[1]	---[1]	---[1]	50	47	47	46	45	45	49
3	3	2	8	19	29	53	73	65	39	18	10	9	11	15	22	36	70
4	15	0	3	20	32	68	94	85	73	44	15	18	21	23	50	93	132

[1]Missing points 39-44

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	2400	4	870	874	4
2	1950	3	746	920	174
3	1350	3	685	914	229
4	900	2	663	909	246
5	300	3	675	917	242
6	-150	3	921	927	6

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm Left of Center	1	251	383	132
2	500 mm Left of Center	1	363	485	122
3	200 mm Left of Center	1	356	486	130
4	200 mm Right of Center	1	339	486	147
5	500 mm Right of Center	1	341	487	146
6	800 mm Right of Center	4	320	478	158

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019

Test Time: 14:14 **Temperature:** 21.7°C

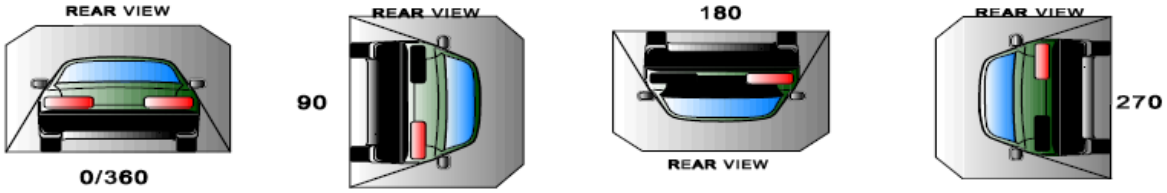
A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 ounce)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable is 5 ounces)

C. For the following 25 minutes: 0 oz.
(Maximum allowable is 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	90	330	420
90 to 180	90	330	840
180 to 270	90	330	1260
270 to 360	90	330	1680

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

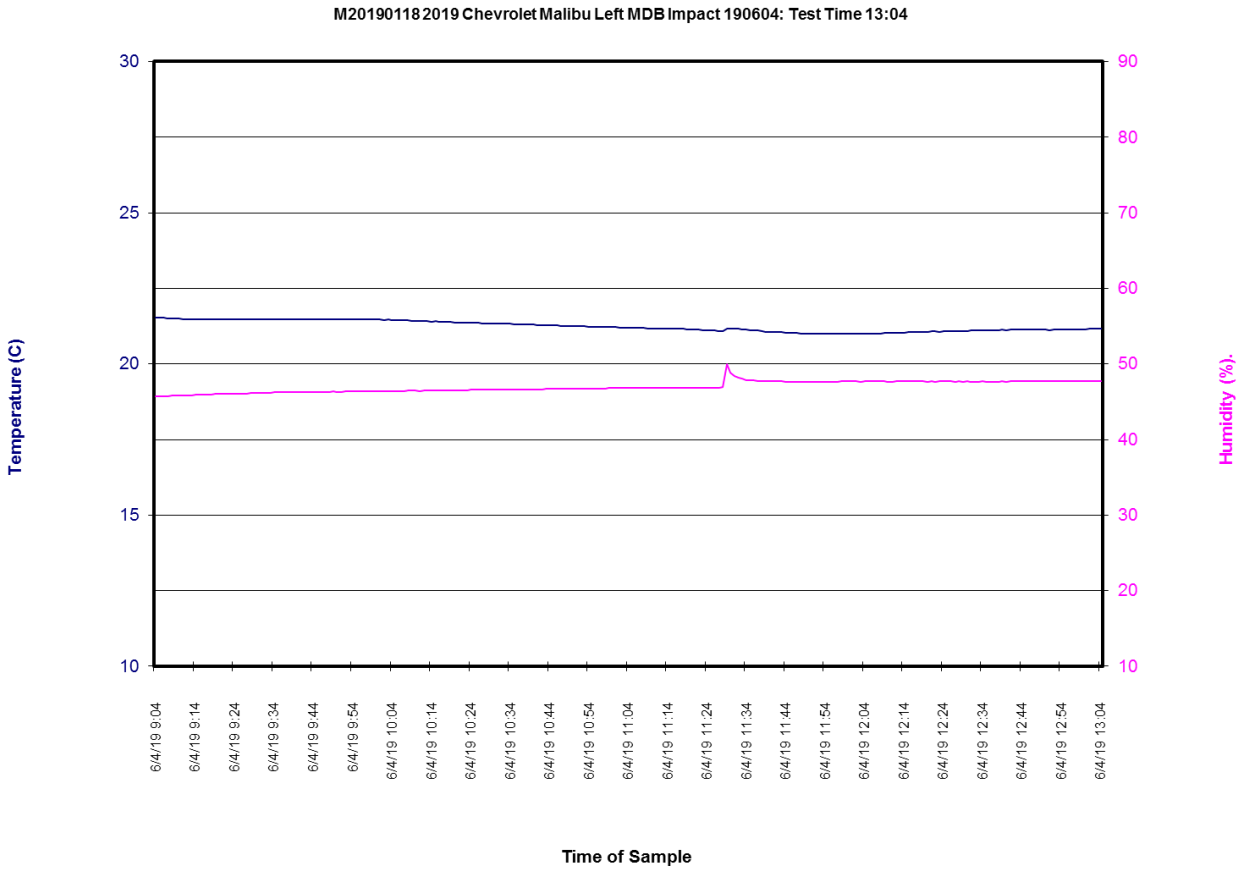
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	N/A
90 to 180	0	0	0	N/A
180 to 270	0	0	0	N/A
270 to 360	0	0	0	N/A

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	None
90 to 180	None
180 to 270	None
270 to 360	None

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan NHTSA No.: M20190118
Test Program: SINCAP Side Impact Test Date: 6/4/2019



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

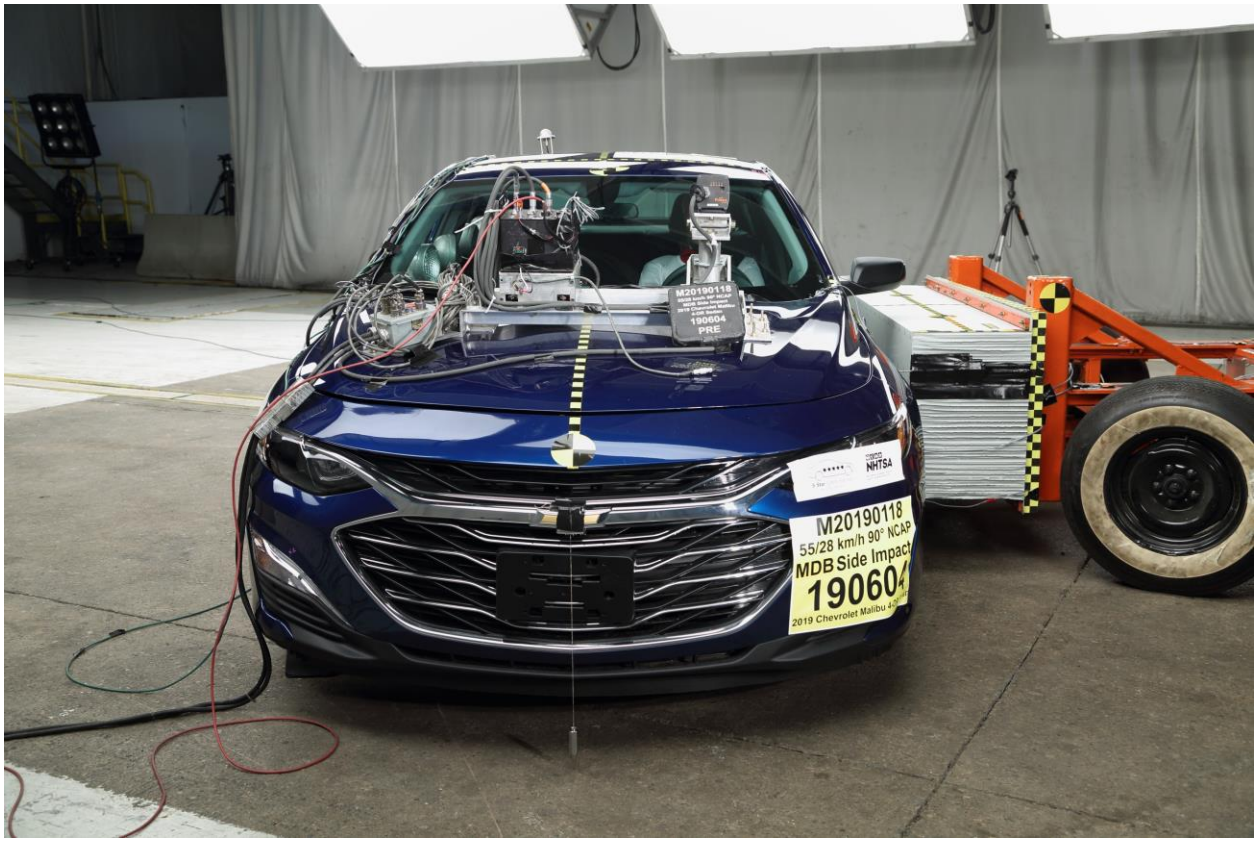
TABLE OF PHOTOGRAPHS (CONTINUED)

TABLE OF PHOTOGRAPHS (CONTINUED)

TABLE OF PHOTOGRAPHS (CONTINUED)

001 As-Delivered Right Front ¾ View of Test Vehicle

002 As-Delivered Left Rear ¾ View of Test Vehicle



003 Pre-Test Frontal View of Test Vehicle

004 Post-Test Frontal View of Test Vehicle

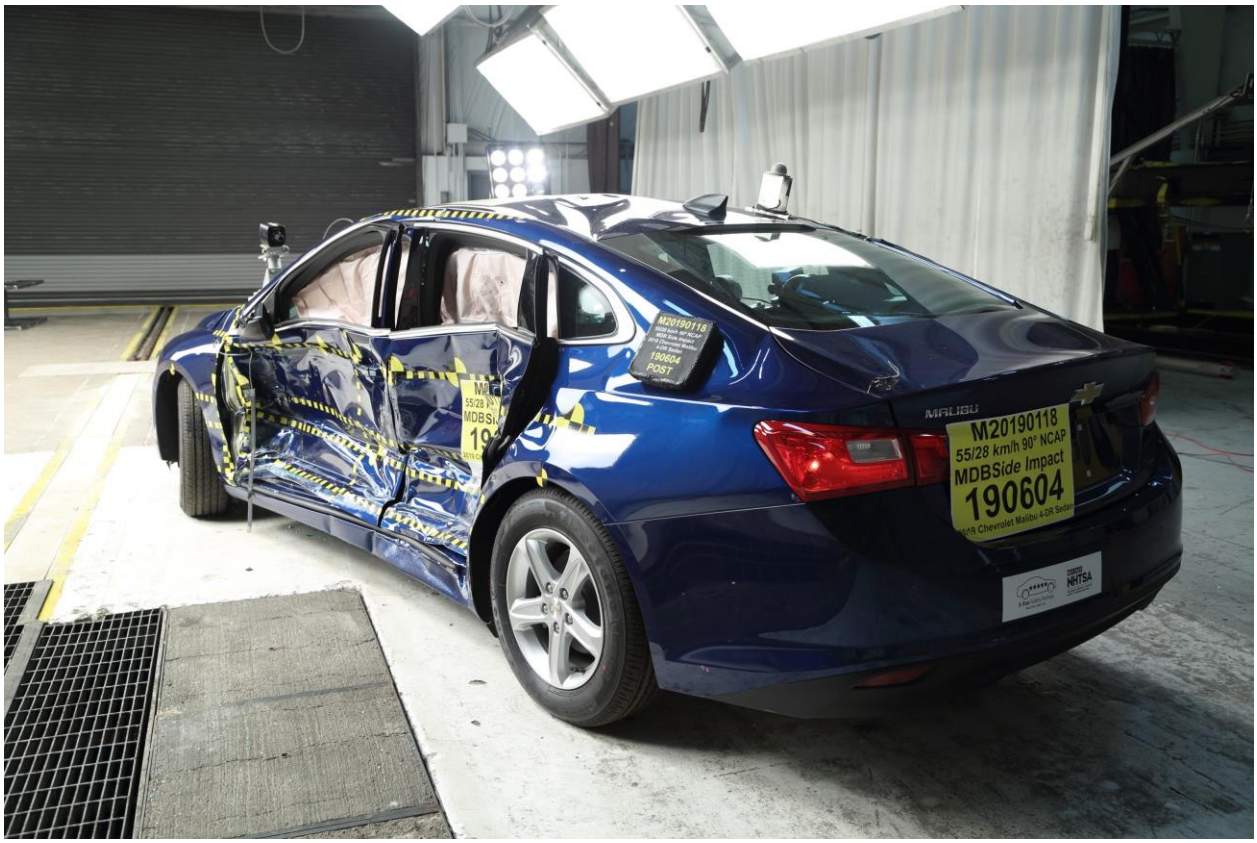
005 Pre-Test Left Front ¾ View of Test Vehicle

006 Post-Test Left Front ¾ View of Test Vehicle

007 Pre-Test Left Side View of Test Vehicle

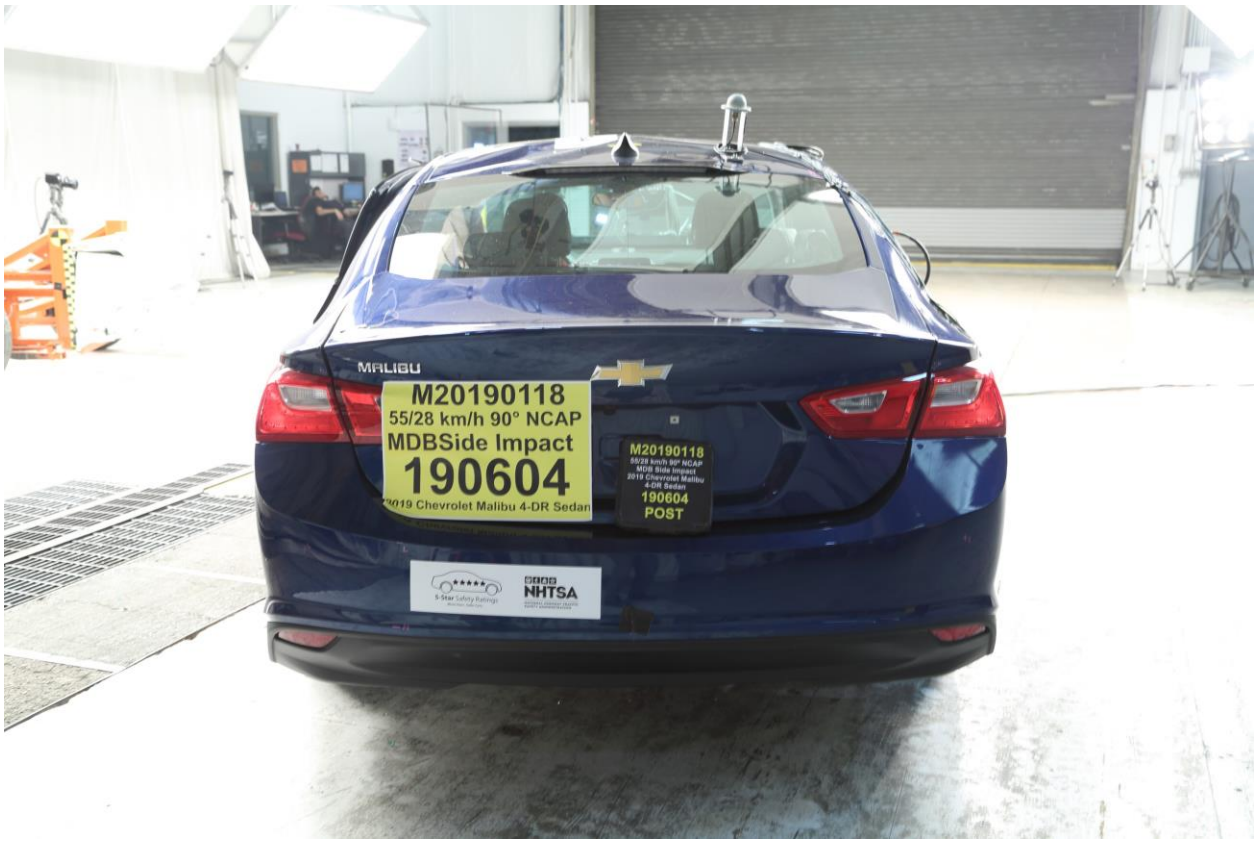
008 Post-Test Left Side View of Test Vehicle

009 Pre-Test Left Rear ¾ View of Test Vehicle



010 Post-Test Left Rear ¾ View of Test Vehicle

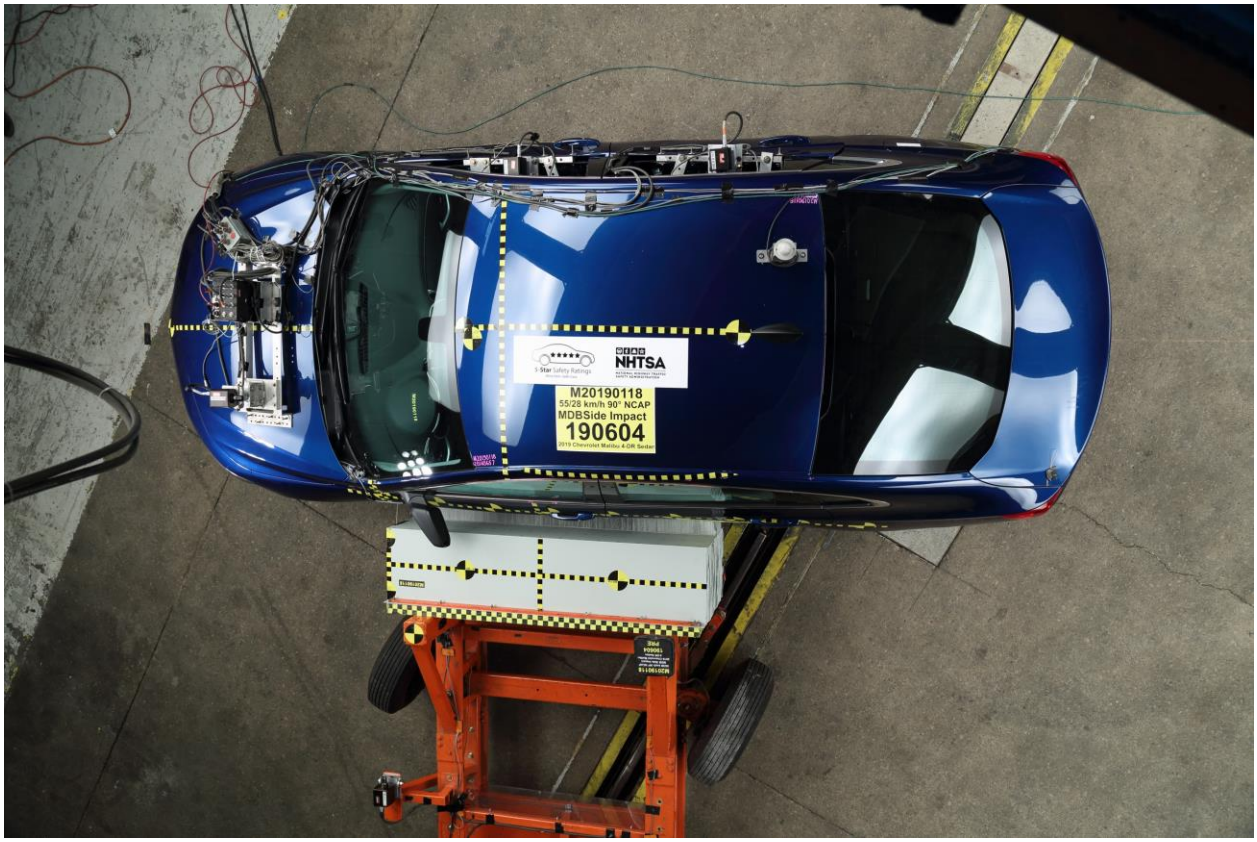
011 Pre-Test Rear View of Test Vehicle



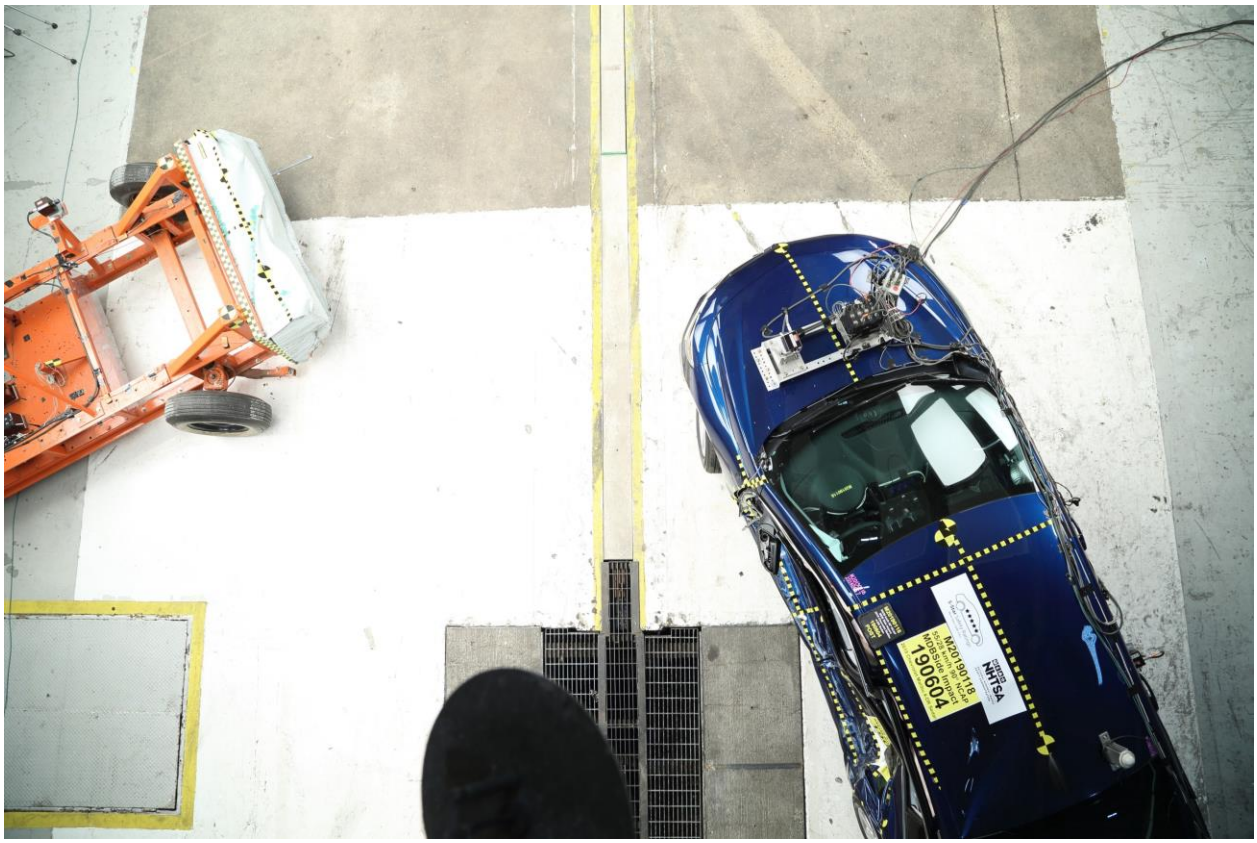
012 Post-Test Rear View of Test Vehicle

013 Pre-Test Right Side View of Test Vehicle

014 Post-Test Right Side View of Test Vehicle



015 Pre-Test Overhead View of Test Area



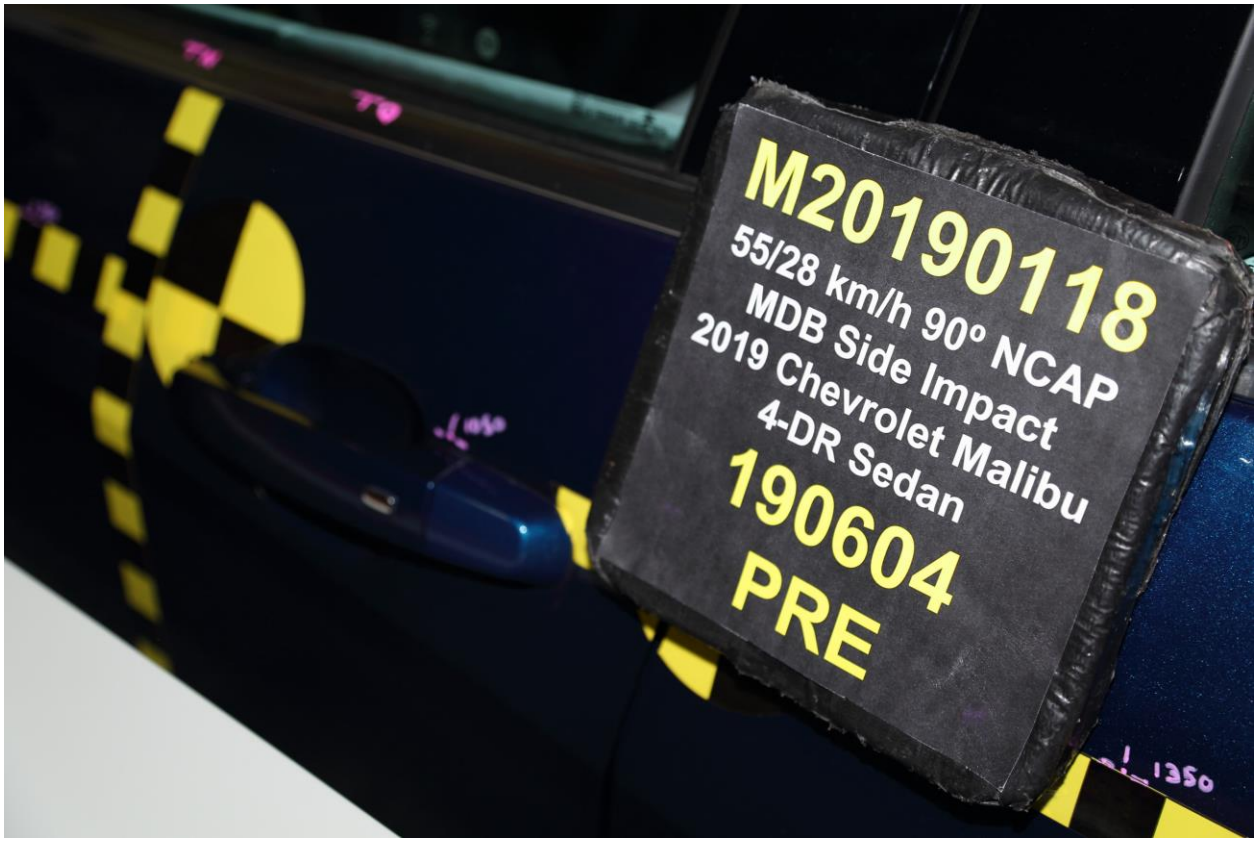
016 Post-Test Overhead View of Test Area

017 Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle

018 Pre-Test Right Side View MDB Positioned Against Side of Test Vehicle

019 Pre-Test Close-Up View of Impact Point Target

020 Post-Test Close-Up View of Impact Point Target



021 Pre-Test Left Front Door Latch Close-Up

022 Post-Test Left Front Door Latch Close-Up

023 Pre-Test Left Rear Door Latch Close-Up

024 Post-Test Left Rear Door Latch Close-Up

025 Pre-Test Front Close-Up View of Driver Dummy

026 Post-Test Front Close-Up View of Driver Dummy

027 Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking

Intentionally Left Blank

028 Pre-Test Left Side View of Driver Dummy Shoulder and Door Top

029 Post-Test Left Side View of Driver Dummy Shoulder and Door Top

030 Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

031 Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

032 Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

033 Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

034 Pre-Test Placement of Driver's Dummy Feet

035 Pre-Test View of Belt Anchorage for Driver Dummy

036 Pre-Test Left Side View of Steering Wheel

037 View of Disengaged Parking Brake

038 Pre-Test View of Parking Brake

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

040 Pre-Test Close-Up Left Side View of Driver Seat Back

041 Pre-Test Close-Up View of Driver Seat Back or Head Restraint

042 Pre-Test Driver Dummy and Door Clearance View

043 Post-Test Driver Dummy and Door Clearance View

044 Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

045 Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

046 Pre-Test Driver Inner Door Panel View

047 Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations

048 Post-Test Driver Dummy Close-Up Head Contact with Vehicle View

049 Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View

050 Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View

051 Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

052 Post-Test Driver Dummy Close-Up Pelvis Contact View

053 Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

054 Post-Test Driver Dummy Close-Up Knee Contact View

055 Pre-Test Left Side View of Passenger Dummy Showing Belt and Chalking

056 Pre-Test Left Side View of Passenger Dummy Shoulder and Door Top View

057 Post-Test Left Side View of Passenger Dummy Shoulder and Door Top View

058 Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

059 Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

060 Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

061 Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

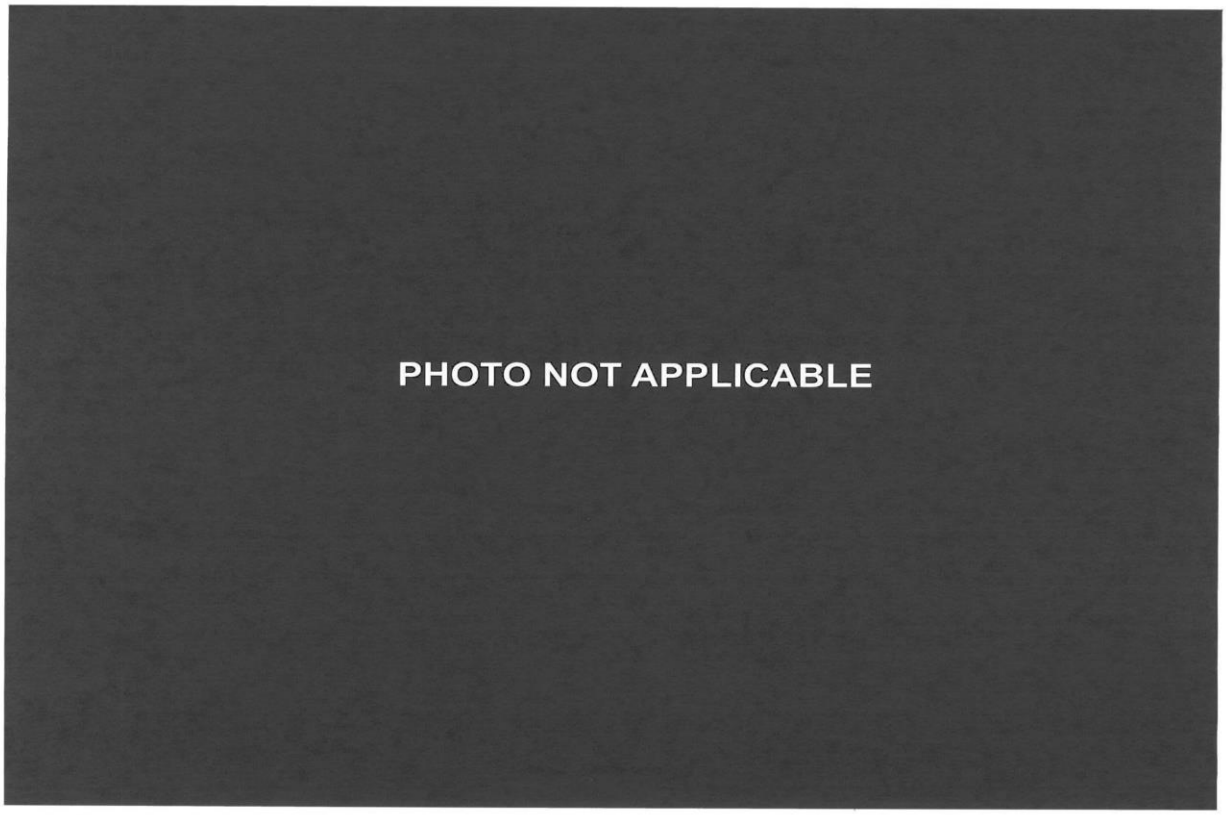
062 Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

063 Pre-Test View of Rear Passenger Dummy's Head Showing Dummy Head is Level

064 Pre-Test Placement of Rear Passenger Dummy's Feet

065 Pre-Test View of Belt Anchorage for Rear Passenger Dummy

066 Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



067 Pre-test Close-Up Left Side View of Rear Passenger Seat Back

068 Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

Intentionally Left Blank

069 Pre-Test Rear Passenger Dummy and Door Clearance View

070 Post-Test Rear Passenger Dummy and Door Clearance View

071 Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

072 Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

073 Pre-Test Rear Passenger Inner Door Panel View

074 Post-Test Rear Passenger Inner Door Panel View

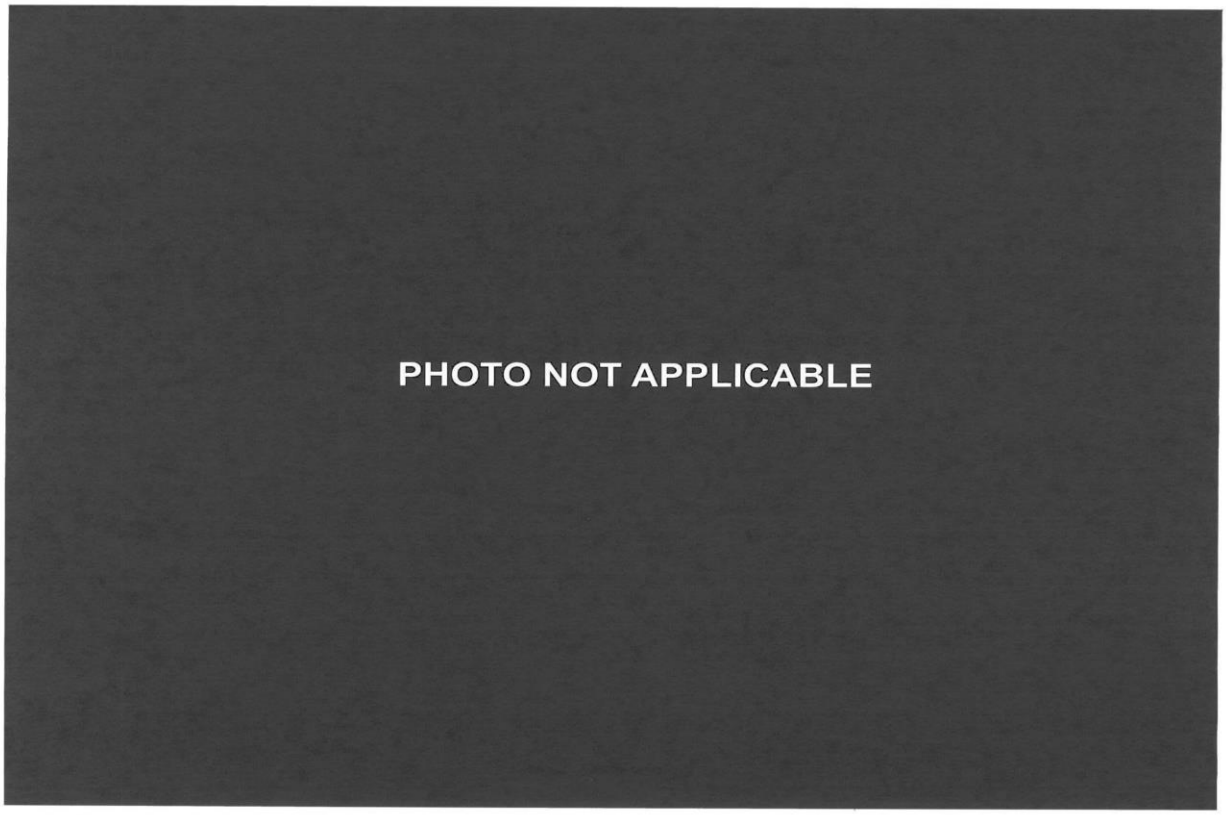
075 Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View

076 Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View

077 Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

078 Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View

079 Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View



080 Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View

081 Post-Test Rear Passenger Dummy Close-Up Knee Contact View

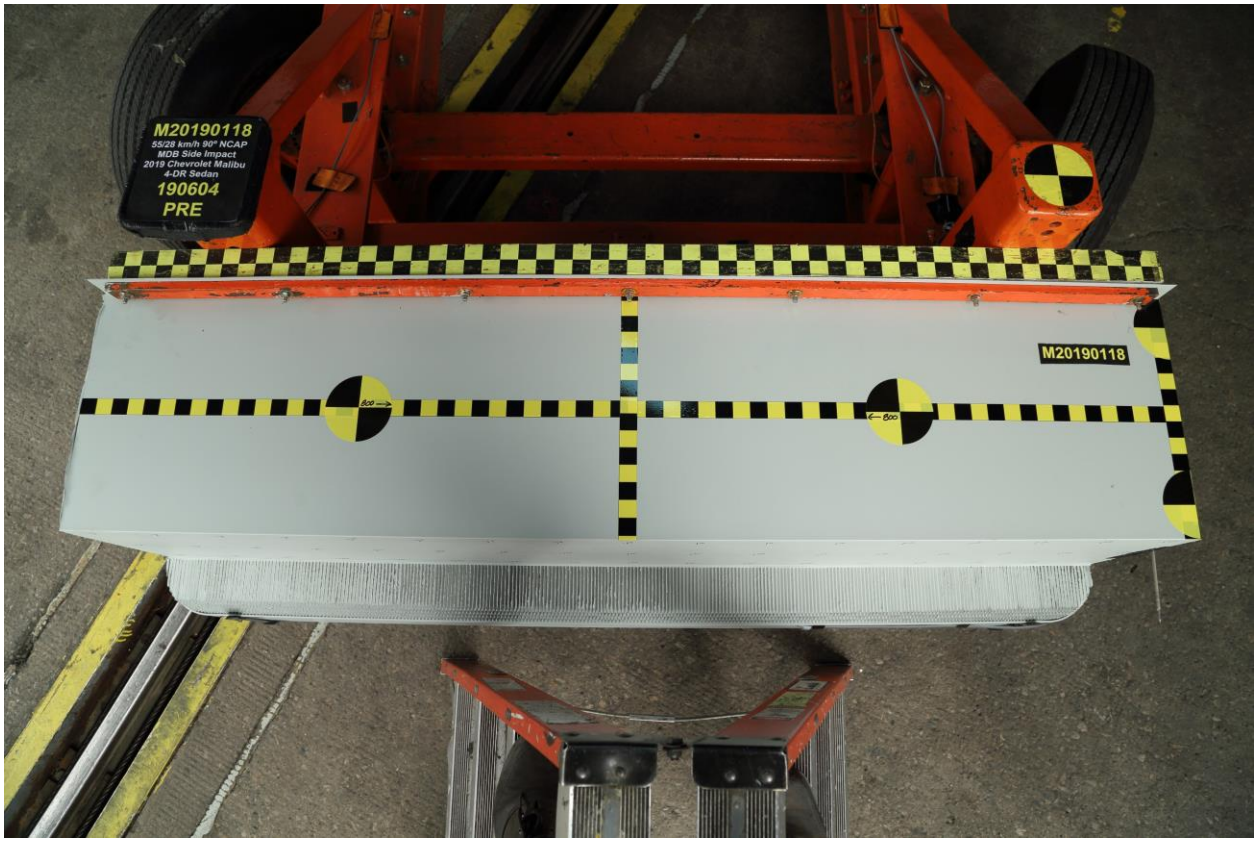
Intentionally Left Blank

082 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

083 Post-Test View of Fuel Filler Cap or Fuel Filler Neck

084 Pre-Test Front View of MDB Impactor Face

085 Post-Test Front View of MDB Impactor Face



086 Pre-Test Top View of MDB Impactor Face

087 Post-Test Top View of MDB Impactor Face

088 Pre-Test Left Side View of MDB Impactor Face

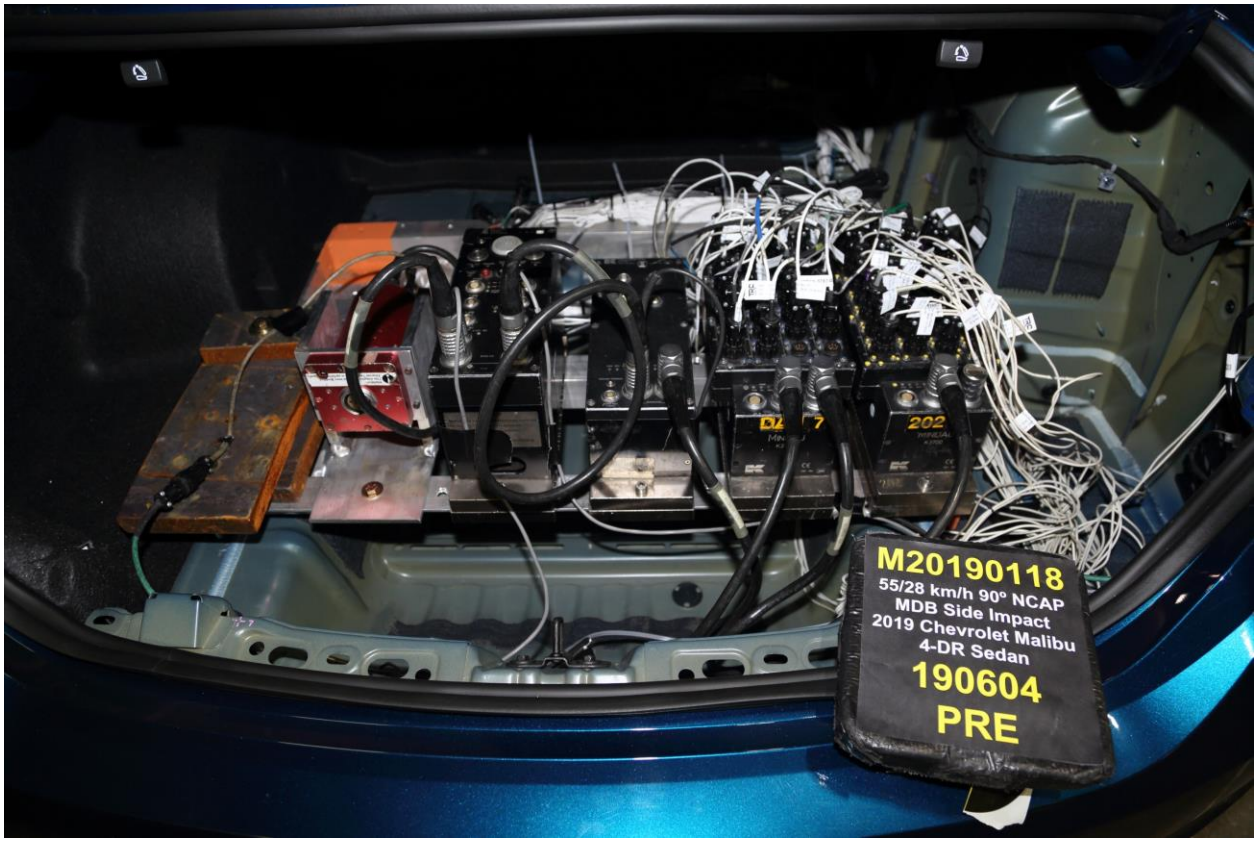
089 Post-Test Left Side View of MDB Impactor Face

090 Pre-Test Right Side View of MDB Impactor Face

091 Post-Test Right Side View of MDB Impactor Face

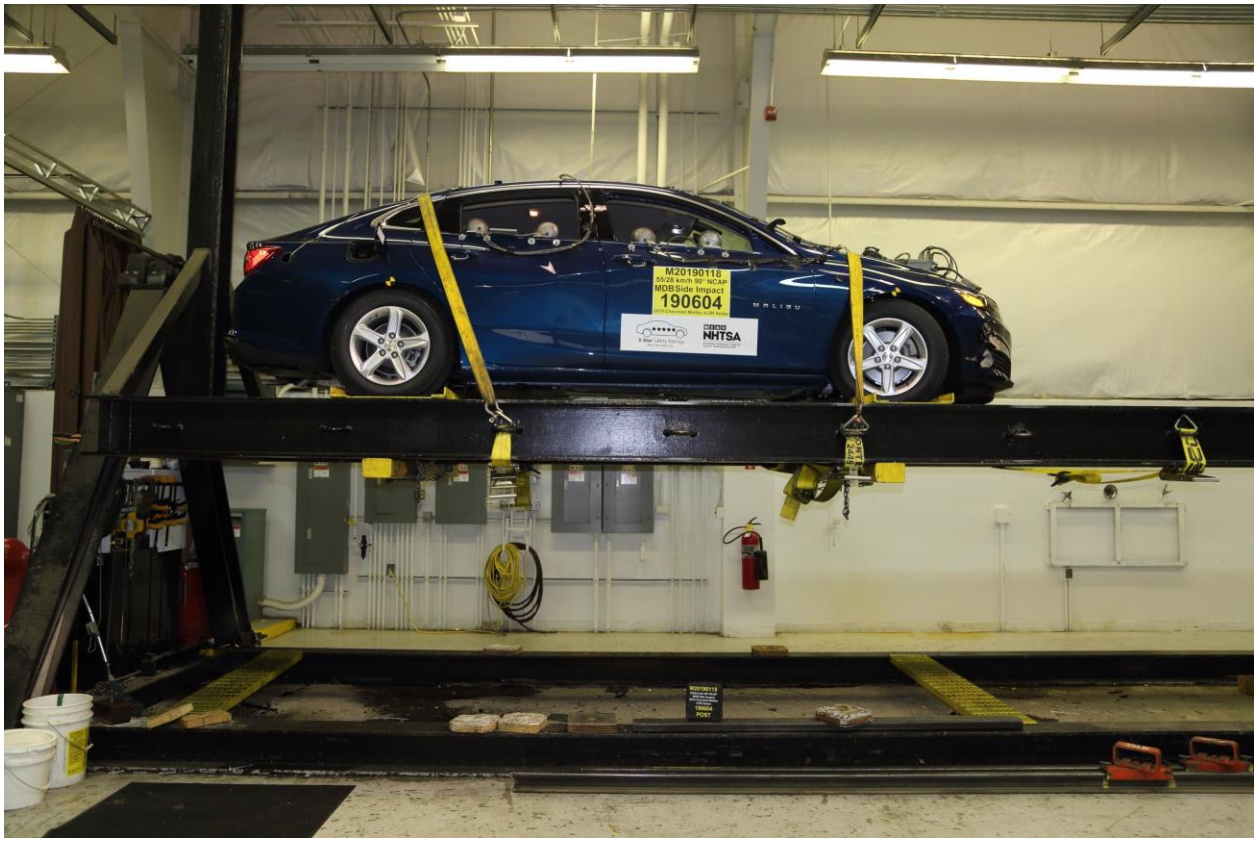
092 Close-Up View of Vehicle's Certification Label

093 Close-Up View of Vehicle's Tire Information Placard or Label

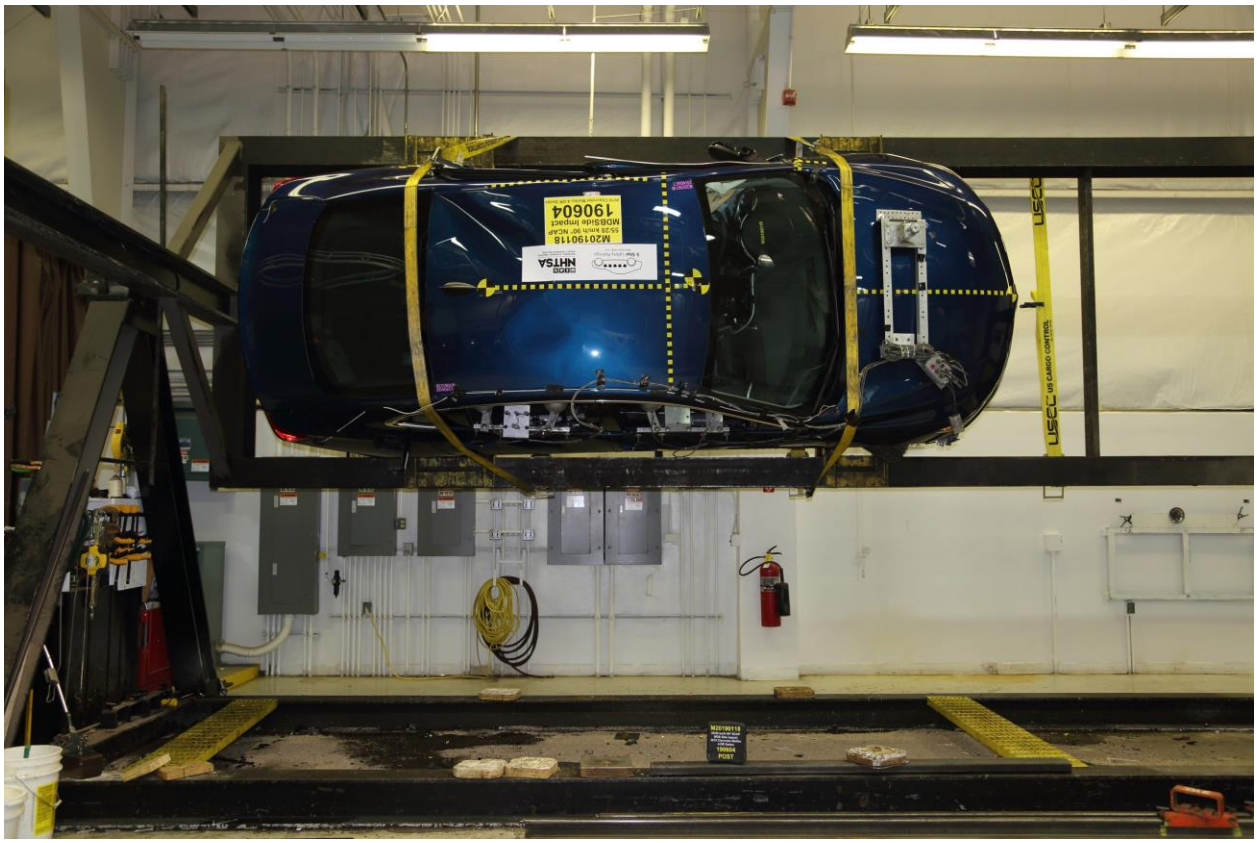


094 Pre-Test Ballast View

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

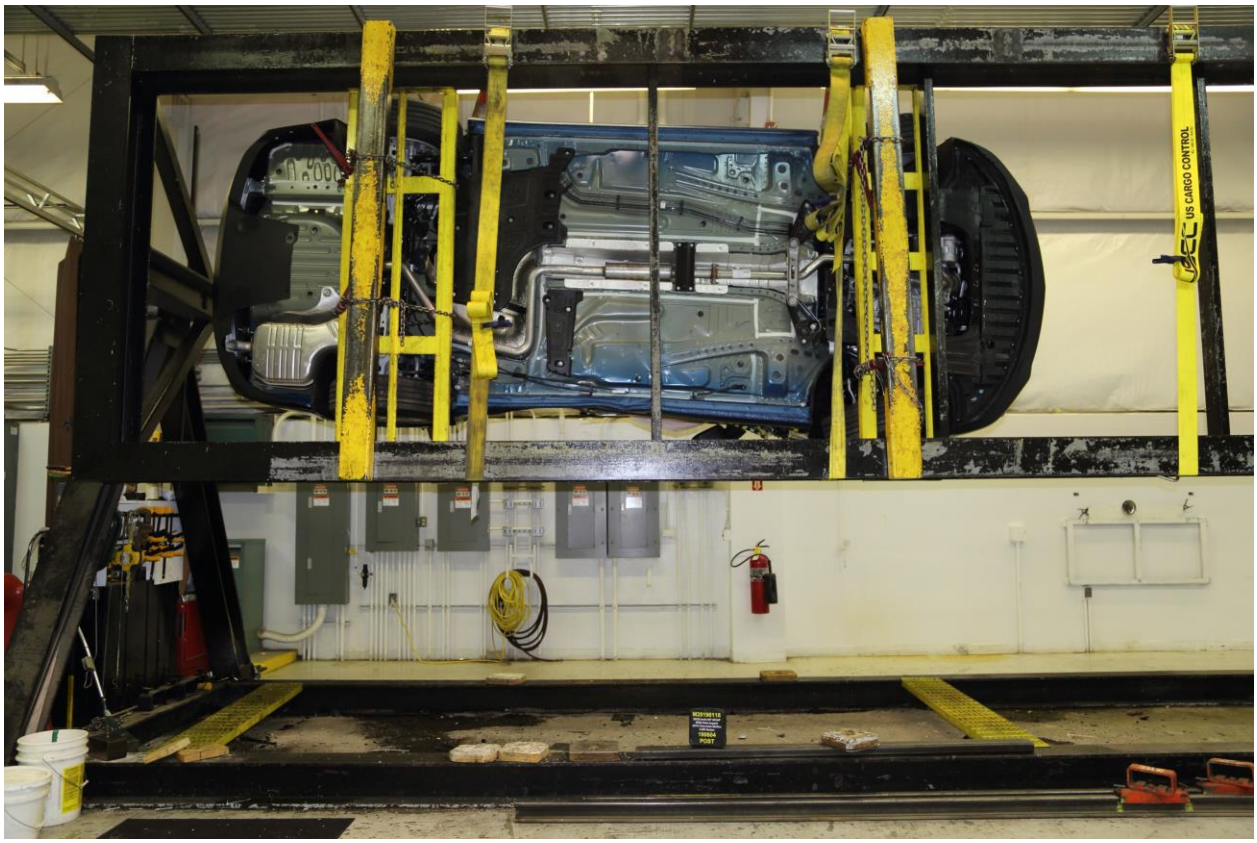


096 FMVSS No. 301 Static Rollover 0 Degrees

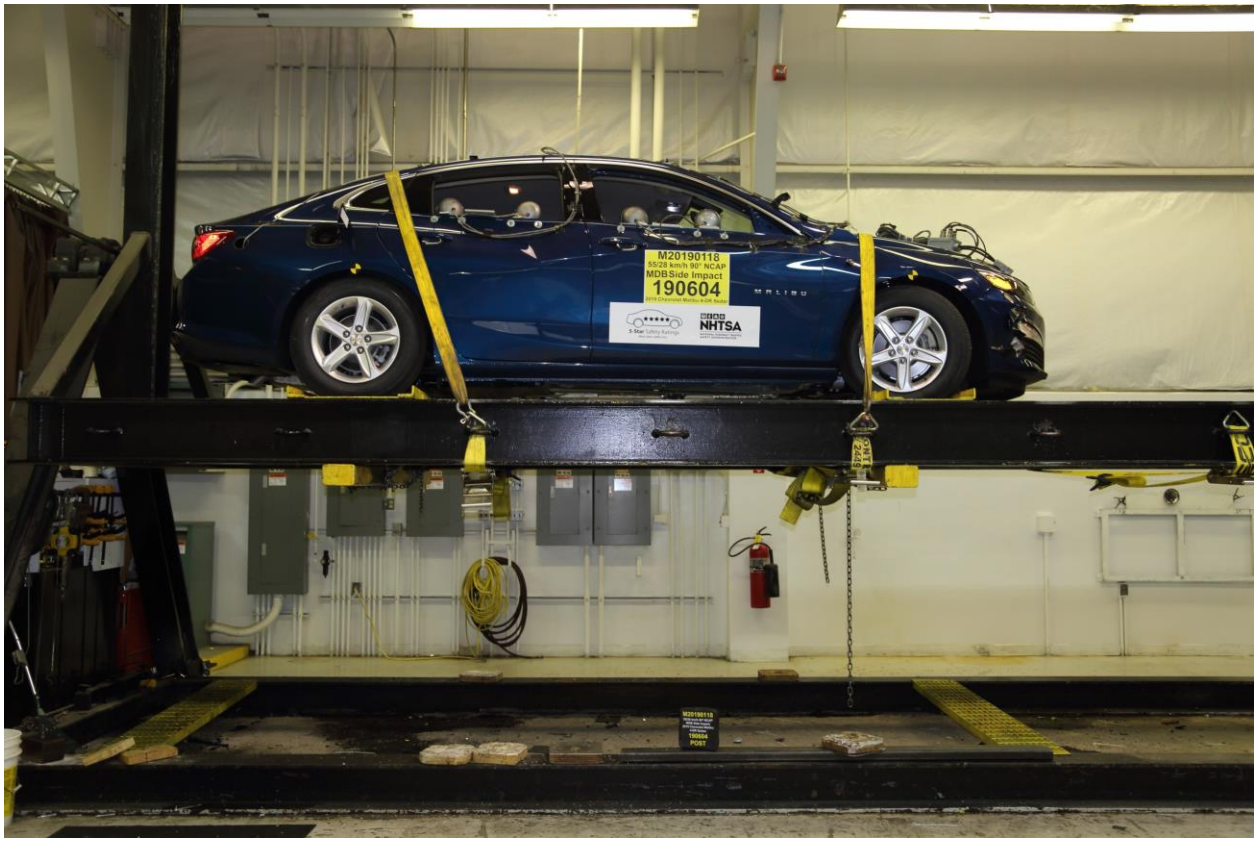


097 FMVSS No. 301 Static Rollover 90 Degrees

098 FMVSS No. 301 Static Rollover 180 Degrees



099 FMVSS No. 301 Static Rollover 270 Degrees



100 FMVSS No. 301 Static Rollover 360 Degrees

101 Impact Event

CHEVROLET

2019 MALIBU LS

EXTERIOR: PACIFIC BLUE METALLIC
INTERIOR: JET BLACK

ENGINE, 1.5L TURBO DOHC 4-CYL
TRANSMISSION, CONTINUOUSLY

Visit us at www.chevy.com

STANDARD EQUIPMENT

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

- CHEVROLET COMPLETE CARE
- SEE WWW.CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS
- FIRST MAINTENANCE VISIT OIL CHANGE AND TIRE ROTATION MULTI-POINT VEH. INSPECTION
- 3 YR/36,000 MILES BUMPER-TO-BUMPER WARRANTY
- 5 YR/60,000 MILES POWERTRAIN LIMITED WARRANTY
- ROADSIDE ASSISTANCE
- COURTESY TRANSPORTATION

MECHANICAL

- ENGINE, 1.5L TURBO DOHC 4-CYL
- STOP/START ENGINE SYSTEM

SAFETY & SECURITY

- STABILITRAK-STABILITY CONTROL INCLUDES TRACTION CONTROL
- ANTILOCK BRAKE SYSTEM, 4 WHEEL DISC
- THEFT DETERRENT SYSTEM, CONTENT THEFT ALARM
- REAR DR LOCKS,CHILD SECURITY
- TIRE, COMPACT SPARE
- REMOTE PANIC ALARM
- TIRE PRESSURE MONITOR SYSTEM
- REAR VISION CAMERA
- AIRBAGS

EXTERIOR

- HEADLAMPS, HALOGEN
- DAYTIME RUNNING LAMPS
- POWER DUAL OUTSIDE MIRRORS
- HEADLAMP CONTROL AUTOMATIC ON & OFF
- WHEELS, 16" ALUMINUM

INTERIOR

- KEYLESS START
- SEAT ADJUSTER, DRIVER 6-WAY MANUAL
- SEAT ADJUSTER, FRONT PASSENGER 6-WAY MANUAL
- VISORS, INCL VANITY MIRRORS
- STEERING COLUMN, TILT & TELESCOPIC
- DRIVER INFORMATION CENTER
- STEERING WHEEL CONTROLS, AUDIO, CRUISE, BLUETOOTH
- REAR SEAT, 60/40 SPLIT FOLDING SEATBACK
- WINDOWS, POWER WITH EXPRESS DOWN ALL

CONNECTIVITY FEATURES

- ONSTAR (R) SERVICES CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM)
- 4G LTE WI-FI (R) HOTSPOT CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM)
- CHEVROLET INFOTAINMENT 3 8" DIAG COLOR TOUCHSCREEN ADDITIONAL FEATURES FOR COMPATIBLE PHONES INCLUDE: BLUETOOTH AUDIO STREAMING VOICE COMMAND PASSTHROUGH TO PHONE, ANDROID, AUTO AND APPLE CARPLAY CAPABLE

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE	**$23,220.00**

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

CONVENIENCE PACKAGE 1 (DEALER INSTALLED) • REMOTE START KIT • CARGO NET	350.00
TOTAL OPTIONS	$350.00
TOTAL VEHICLE & OPTIONS	$23,570.00
DESTINATION CHARGE	875.00
TOTAL VEHICLE PRICE*	**$24,445.00**

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **32 MPG** combined city/hwy (29 city, 36 highway)

3.1 gallons per 100 miles

Mid-size cars range from 14 to 136 MPG. The best vehicle rates 136 MPGe.

You save **$1,000** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,200**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 7 (1 – 10, Best)

Smog Rating (tailpipe only): 6 (1 – 10, Best)

This vehicle emits 280 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

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

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score — Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver ★★★★★ / Passenger ★★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat: Not Rated / Rear seat: Not Rated
Based on the risk of injury in a side impact.

Rollover ★★★★
Based on the risk of rollover in a single-vehicle crash.

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

Equipped with the safety and security of OnStar®.
Visit onstar.com for details.
onstar.com/privacy

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 49%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 28%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
KANSAS CITY, KS U.S.A.
COUNTRY OF ORIGIN:
ENGINE: UNITED STATES
TRANSMISSION: MEXICO

This label has been applied pursuant to Federal law. Do not remove prior to delivery to the ultimate purchaser. "Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

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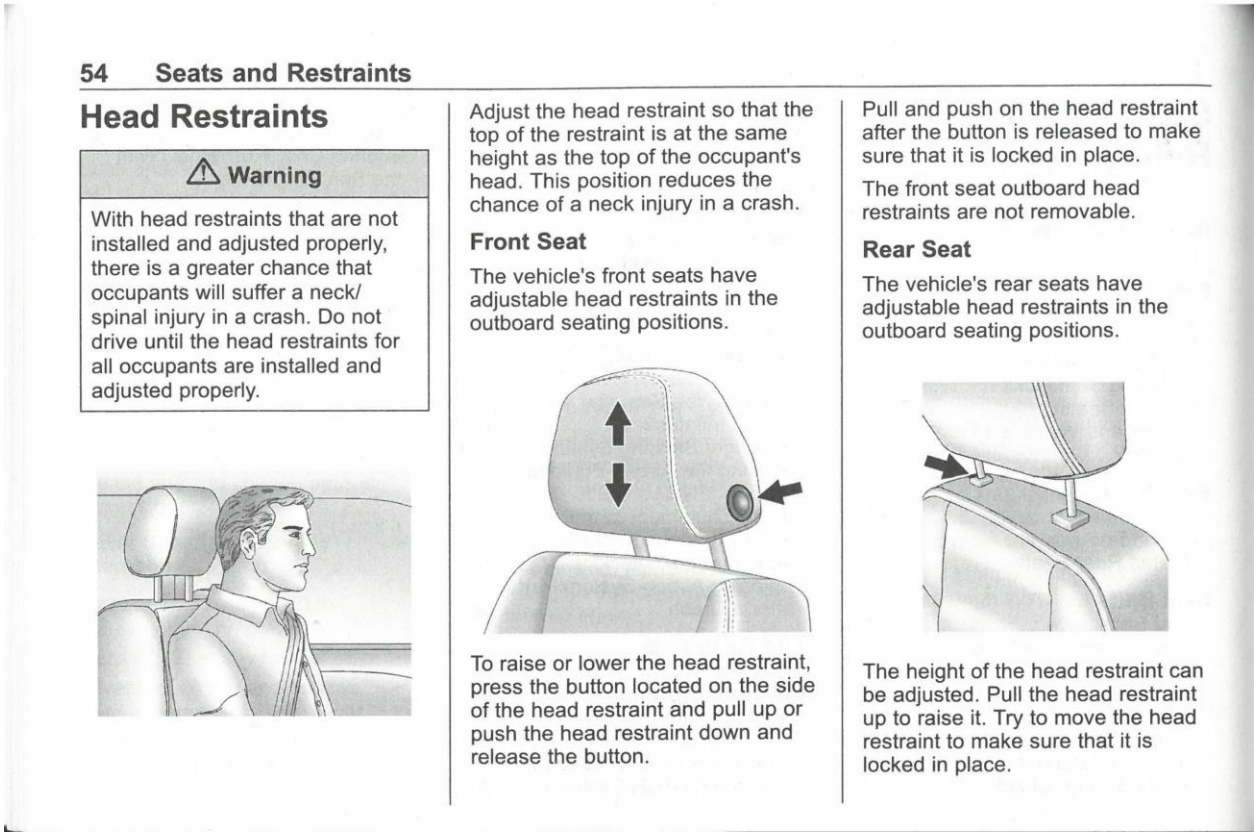
ORDER NO WTRCKF SALES CODE E
SALES MODEL CODE 1ZD69
DEALER NO 11461
FINAL ASSEMBLY: KANSAS CITY, KS U.S.A.

VIN 1G1ZB5ST7KF201179

DEALER TO WHOM DELIVERED
RAY CHEVROLET, INC.
39 N RTE 12
FOX LAKE, IL 60020-1222

CE
1AG3470932

102 Monroney Label



54 Seats and Restraints

Head Restraints

⚠ 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.

Front Seat

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

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.

The front seat outboard head restraints are not removable.

Rear Seat

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.

103 Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

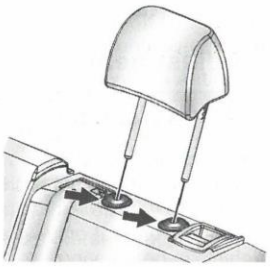
To lower the head restraint, press the button, located on the top of the seatback, and push the head restraint down. Try to move the head restraint after the button is released to make sure that it is locked in place.

The rear seat outboard head restraints are not intended to be removed. If removal is required see your dealer for assistance with removal. In the event of an emergency, the following can be used as removal and installation instructions. Store the removed head restraints in a secure place. Reinstall the head restraints before the seating position is occupied.

Head Restraint Removal and Reinstallation

To remove the head restraint:

1. Partially fold the seatback forward. See *Rear Seats ⇨ 63* for additional information.



2. Press both buttons on the head restraint posts at the same time, and pull up on the head restraint.
3. Store the head restraint in a secure place.

⚠ Warning

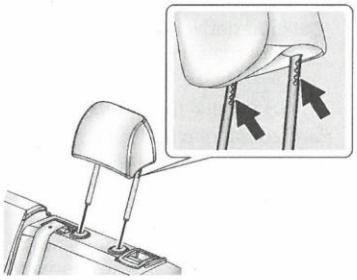
With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/ spinal injury in a crash. Do not

(Continued)

Warning (Continued)

drive until the head restraints for all occupants are installed and adjusted properly.

To reinstall the head restraint:



1. Insert the head restraint posts into the holes in the top of the seatback. The notches on the posts must face the driver side of the vehicle.
2. Push the head restraint down.

104 Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

The following additional data can be obtained from the Research and Development section of the NHTSA website (www.nhtsa.gov)

Additional Driver & Passenger Dummy Instrumentation Data

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)
Passenger Head Angular Velocity (X)
Passenger Head Angular Velocity (Y)
Passenger Head Angular Velocity (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 Structure 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

NHTSA

Test Date: 06/04/2019

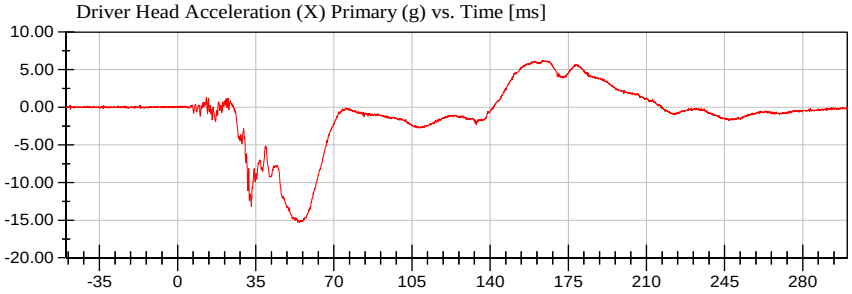
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Driver Head Acceleration (X) Primary (g) vs. Time [ms]



<Max>

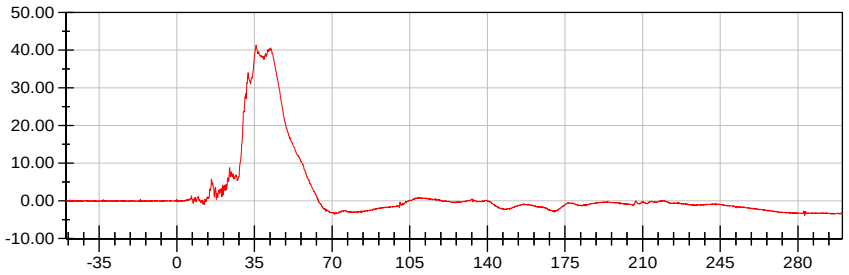
6.26 g at 163.68 ms

<Min>

-15.34 g at 54.56 ms

CFC_1000

Driver Head Acceleration (Y) Primary (g) vs. Time [ms]



<Max>

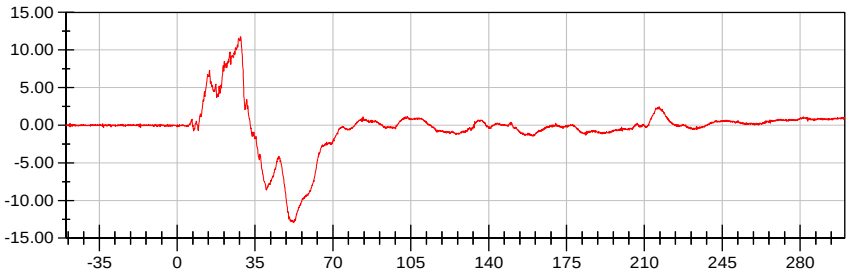
41.37 g at 35.68 ms

<Min>

-3.90 g at 283.04 ms

CFC_1000

Driver Head Acceleration (Z) Primary (g) vs. Time [ms]



<Max>

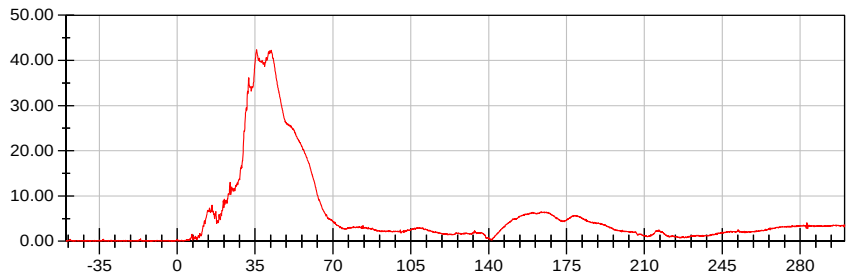
11.78 g at 28.40 ms

<Min>

-12.93 g at 52.24 ms

CFC_1000

Driver Head Resultant Acceleration Primary (g) vs. Time [ms]



<Max>

42.38 g at 35.68 ms

<Min>

0.02 g at -49.84 ms

CFC_1000

NHTSA

Test Date: 06/04/2019

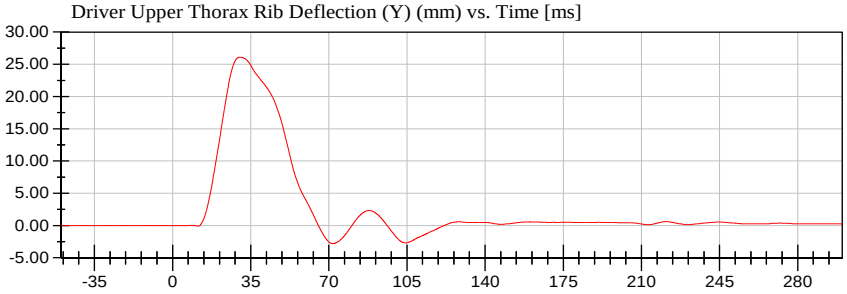
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Driver Upper Thorax Rib Deflection (Y) (mm) vs. Time [ms]



<Max>

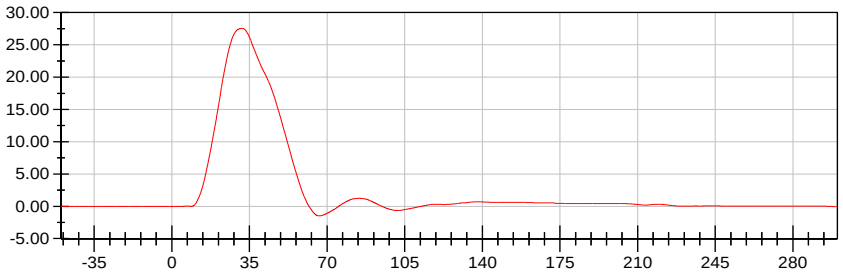
26.08 mm at 30.32 ms

<Min>

-2.80 mm at 71.84 ms

CFC_180

Driver Middle Thorax Rib Deflection (Y) (mm) vs. Time [ms]



<Max>

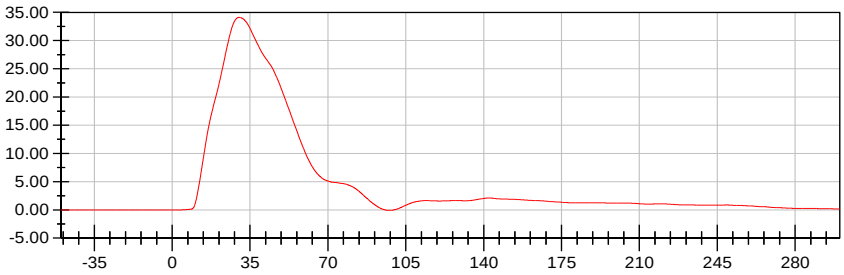
27.55 mm at 31.60 ms

<Min>

-1.49 mm at 66.48 ms

CFC_180

Driver Lower Thorax Rib Deflection (Y) (mm) vs. Time [ms]



<Max>

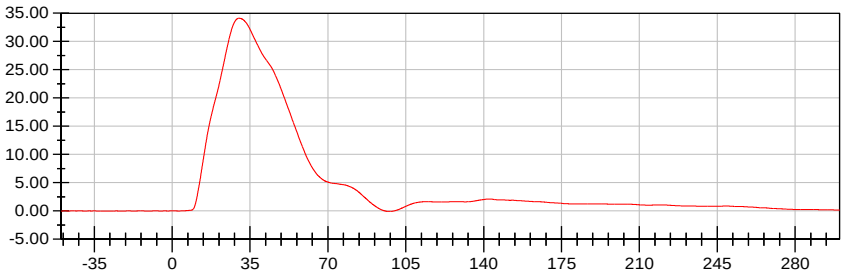
34.10 mm at 30.08 ms

<Min>

-0.08 mm at 97.92 ms

CFC_180

Driver Thorax Rib Deflection Maximum (mm) vs. Time [ms]



<Max>

34.10 mm at 30.08 ms

<Min>

-0.08 mm at 97.92 ms

CFC_180

NHTSA

Test Date: 06/04/2019

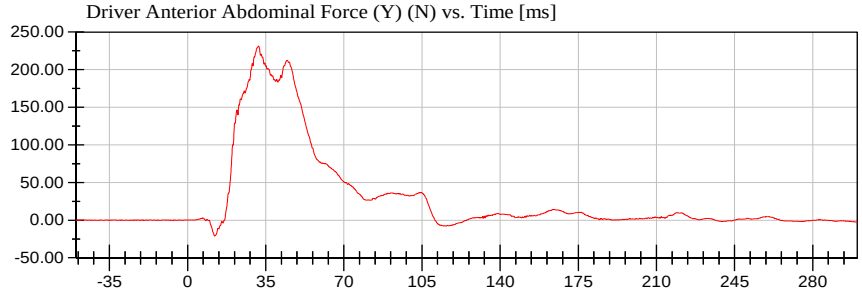
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Driver Anterior Abdominal Force (Y) (N) vs. Time [ms]



<Max>

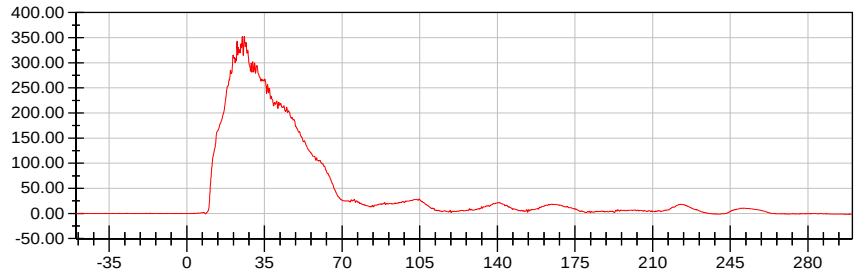
231.15 N at 31.76 ms

<Min>

-21.04 N at 12.08 ms

CFC_600

Driver Middle Abdominal Force (Y) (N) vs. Time [ms]



<Max>

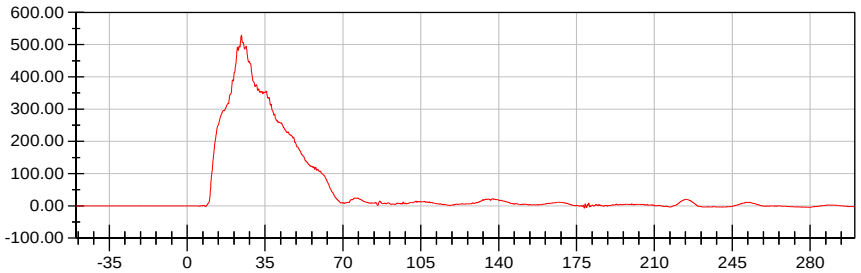
352.80 N at 25.92 ms

<Min>

-2.01 N at 296.80 ms

CFC_600

Driver Posterior Abdominal Force (Y) (N) vs. Time [ms]



<Max>

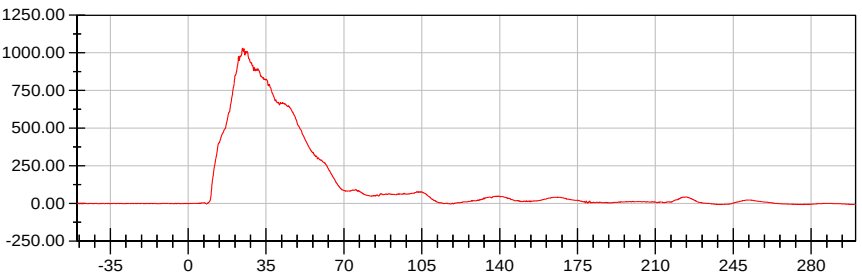
529.30 N at 24.40 ms

<Min>

-6.88 N at 178.48 ms

CFC_600

Driver Total Abdmoninal Force (Y) (N) vs. Time [ms]



<Max>

1,031.34 N at 24.40 ms

<Min>

-6.85 N at 276.24 ms

CFC_600

NHTSA

Test Date: 06/04/2019

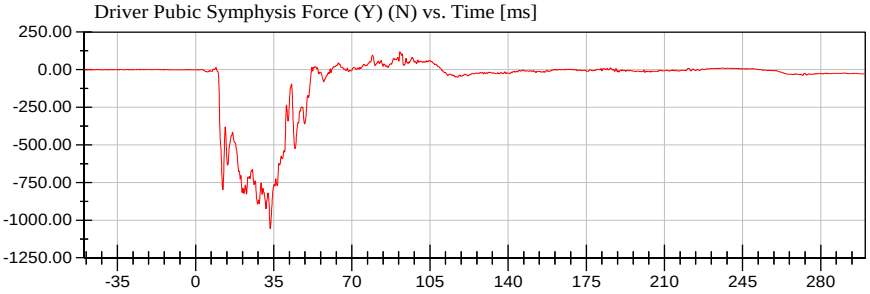
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Driver Pubic Symphysis Force (Y) (N) vs. Time [ms]



<Max>

119.58 N at 91.52 ms

<Min>

-1,057.14 N at 33.44 ms

CFC_600

NHTSA

Test Date: 06/04/2019

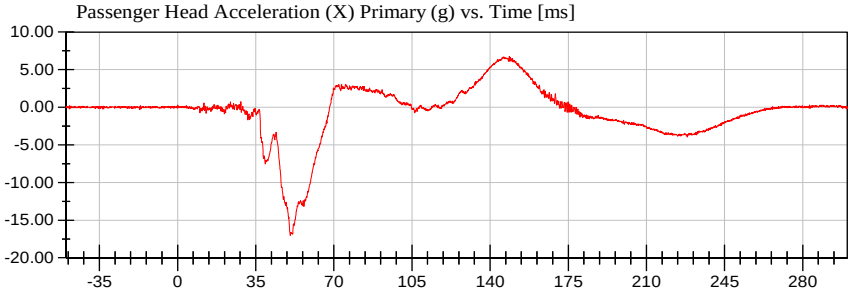
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Passenger Head Acceleration (X) Primary (g) vs. Time [ms]



<Max>

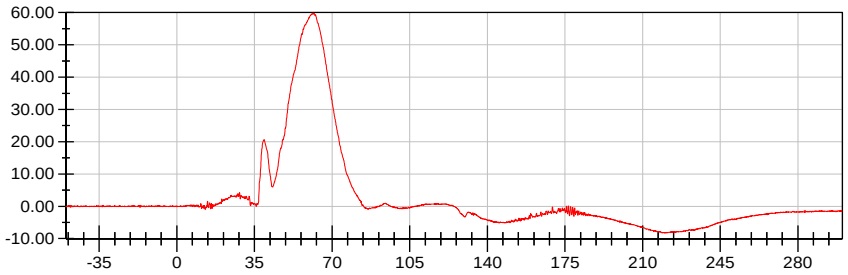
6.73 g at 148.56 ms

<Min>

-17.07 g at 50.56 ms

CFC_1000

Passenger Head Acceleration (Y) Primary (g) vs. Time [ms]



<Max>

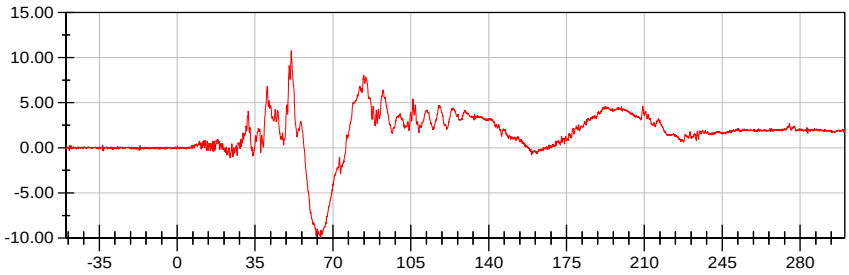
59.79 g at 61.84 ms

<Min>

-8.26 g at 219.60 ms

CFC_1000

Passenger Head Acceleration (Z) Primary (g) vs. Time [ms]



<Max>

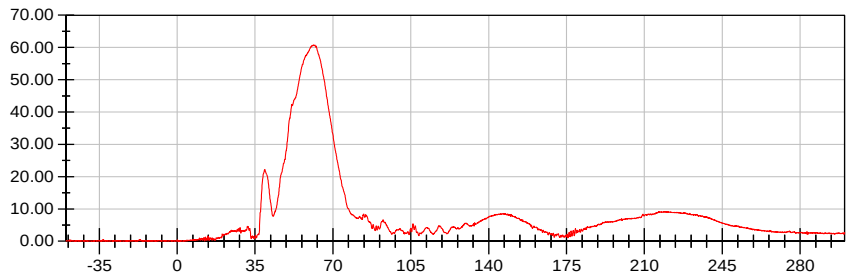
10.75 g at 51.28 ms

<Min>

-9.95 g at 64.40 ms

CFC_1000

Passenger Head Resultant Acceleration Primary (g) vs. Time [ms]



<Max>

60.80 g at 61.20 ms

<Min>

0.03 g at -49.92 ms

CFC_1000

NHTSA

Test Date: 06/04/2019

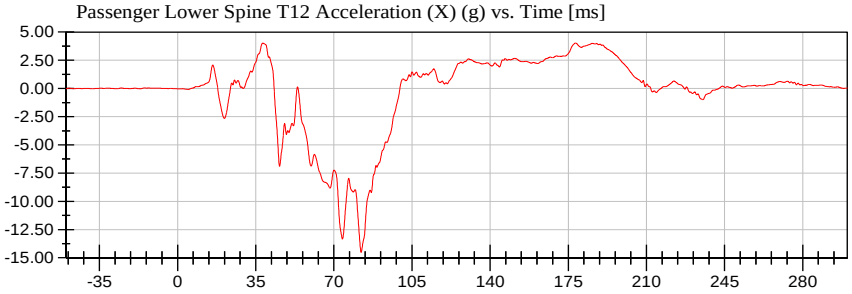
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Passenger Lower Spine T12 Acceleration (X) (g) vs. Time [ms]



<Max>

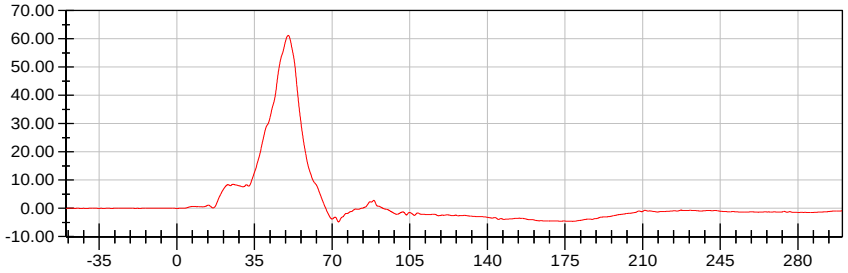
4.02 g at 178.24 ms

<Min>

-14.52 g at 82.24 ms

CFC_180

Passenger Lower Spine T12 Acceleration (Y) (g) vs. Time [ms]



<Max>

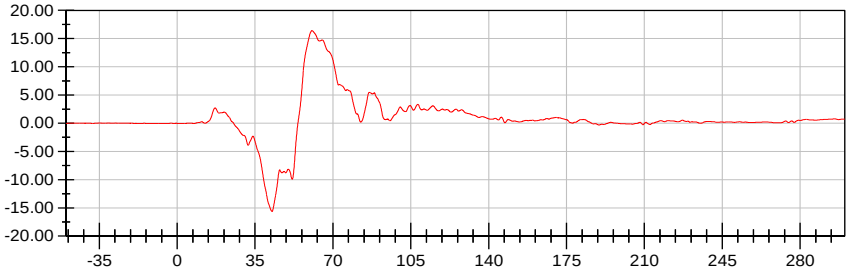
61.23 g at 50.16 ms

<Min>

-4.80 g at 72.96 ms

CFC_180

Passenger Lower Spine T12 Acceleration (Z) (g) vs. Time [ms]



<Max>

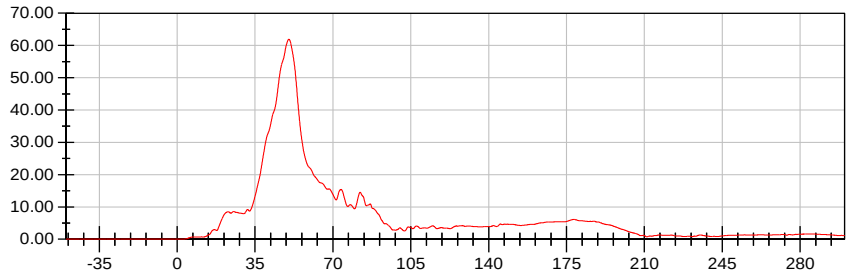
16.40 g at 60.64 ms

<Min>

-15.64 g at 42.64 ms

CFC_180

Passenger Lower Spine T12 Resultant Acceleration (g) vs. Time [ms]



<Max>

61.89 g at 50.16 ms

<Min>

0.00 g at -39.60 ms

CFC_180

NHTSA

Test Date: 06/04/2019

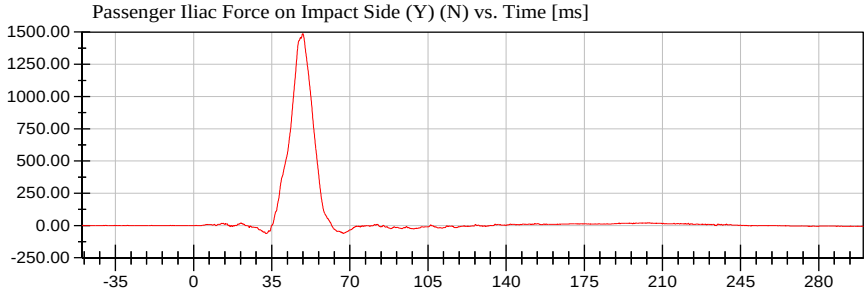
Test Lab: CTF

Position #1 ES-2 Dummy with Rib Extension (F030)

Test Number: 190604 (M20190118)

Position #4 SID IIs Dummy (305)

Passenger Iliac Force on Impact Side (Y) (N) vs. Time [ms]



<Max>

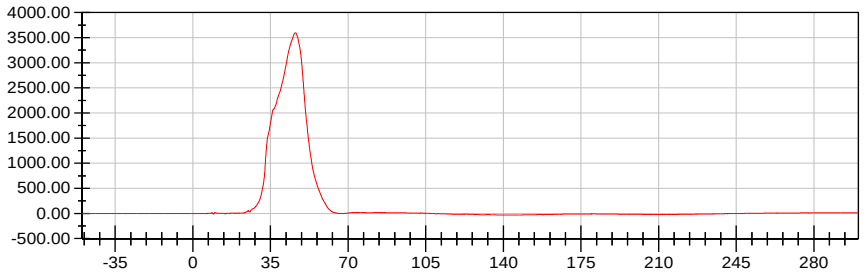
1,487.32 N at 48.88 ms

<Min>

-62.02 N at 32.56 ms

CFC_600

Passenger Acetabulum Force on Impact Side (Y) (N) vs. Time [ms]



<Max>

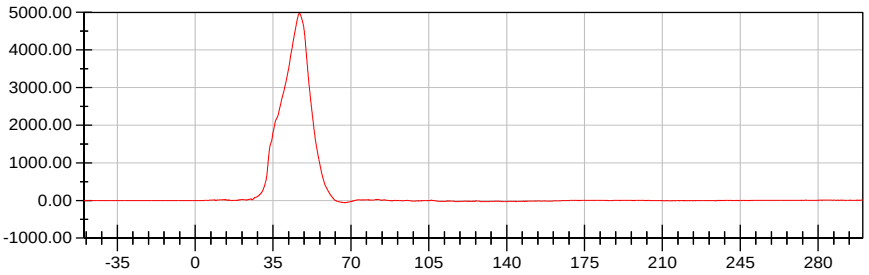
3,598.36 N at 46.32 ms

<Min>

-32.78 N at 143.52 ms

CFC_600

Passenger Total Pelvic Force on Impact Side (Y) (N) vs. Time [ms]



<Max>

4,969.12 N at 46.88 ms

<Min>

-61.20 N at 67.20 ms

CFC_600

APPENDIX C
DUMMY PERFORMANCE CALIBRATION TEST DATA

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS

ES-2re (Driver) Dummy

Description

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS

SID-IIs (Rear Passenger) Dummy

Description

Table 1. External Measurements
Table 2. Head Drop Test
- Head (X) Acceleration (G's) vs. Time (ms)
- Head (Y) Acceleration (G's) vs. Time (ms)
- Head (Z) Acceleration (G's) vs. Time (ms)
- Resultant Head Acceleration (G's) vs. Time (ms)

Table 3. Lateral Neck Pendulum Test
- Pendulum Velocity (m/s) vs. Time (ms)
- Flexion Angle (°) vs. Time (ms)
- Moment About Occipital Condyle (Nm) vs. Time (ms)

Table 4. Shoulder Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)

Table 5. Thorax (With Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 6. Thorax (Without Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 7. Abdomen Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

Table 8. Pelvis Plug Quasi-Static Test (Optional*)
Table 9. Pelvis Acetabulum Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Acetabulum Force (N) vs. Time (ms)

Table 10. Pelvis Iliac Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Iliac Force (N) vs. Time (ms)

Pre-Test Calibration Sheets
Driver S/N F030

Transportation Research Center Inc.
572U ES-2re Dummy
External Dimensions
Serial No. F030 Calibration No. 64

Symbol	Description	Specification	Results	Pass
		mm	mm	
1	Sitting Height	900.0 - 918.0	911	Yes
2	Seat to Shoulder Joint	558.0 - 572.0	561	Yes
3	Seat to Lower Face of Thoracic Spine Box	346.0 - 356.0	347	Yes
4	Seat to Hip Joint (center of bolt)	97.0 - 103.0	97	Yes
5	Sole to Seat, Sitting	433.0 - 451.0	445	Yes
6	Head Width	152.0 - 158.0	155	Yes
7	Shoulder/Arm Width	461.0 - 479.0	475	Yes
8	Thorax Width	322.0 - 332.0	328	Yes
9	Abdomen Width	273.0 - 287.0	280	Yes
10	Pelvis Lap Width	359.0 - 373.0	367	Yes
11	Head Depth	196.0 - 206.0	201	Yes
12	Thorax Depth	262.0 - 272.0	262	Yes
13	Abdomen Depth	194.0 - 204.0	199	Yes
14	Pelvis Depth	235.0 - 245.0	242	Yes
15	Back of Buttocks to Hip Joint (center of bolt)	150.0 - 160.0	156	Yes
16	Back of Buttocks to Front of Knee	597.0 - 615.0	605	Yes

Baseline 10/07/05

Transportation Research Center Inc.

Left Lateral Head Drop
ES-2re Serial No. F030 Certification No. 64-2
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Resultant Acceleration	125 - 155 g	132.0 g	Yes
Peak Longitudinal Acceleration	(-15) - 15 g	8.6 g	Yes
Is Resultant Acceleration Curve Unimodal within 15% of Main Pulse?	Yes	Yes	Yes

Test meets specifications.

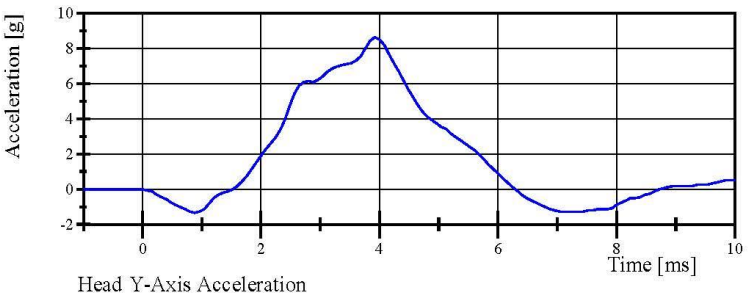
Condition: Used

Comments:
Head Skin S/N: DP6812

Transportation Research Center Inc.

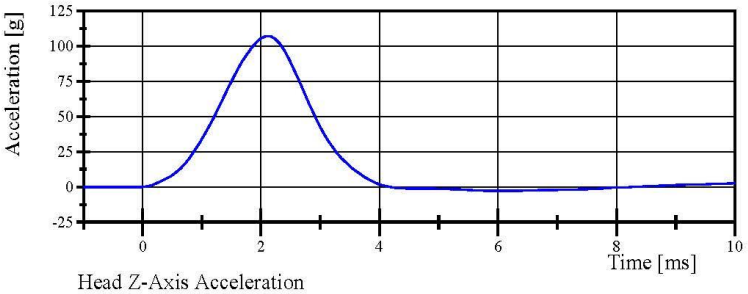
Left Lateral Head Drop
ES-2re Serial No. F030 Certification No. 64-2
Test Date: 5/20/2019

Head X-Axis Acceleration



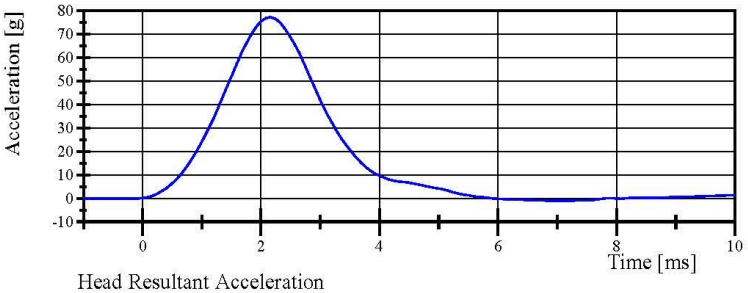
Filter Class: CFC_1000
Max: 8.6 g at 3.9 ms
Min: -1.3 g at 0.9 ms

Head Y-Axis Acceleration



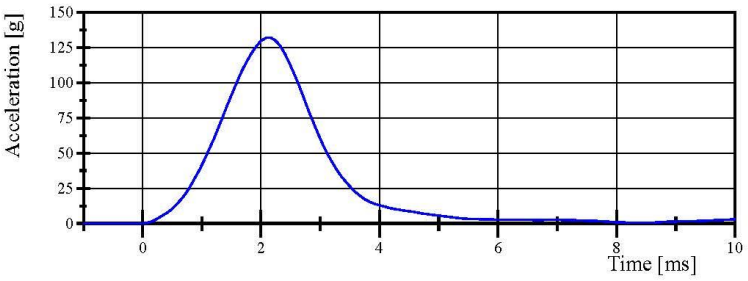
Filter Class: CFC_1000
Max: 107.2 g at 2.1 ms
Min: -2.6 g at 5.8 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 77.2 g at 2.2 ms
Min: -0.9 g at 6.9 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 132.0 g at 2.2 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 14:06:26 327

Transportation Research Center Inc.

Left Lateral Neck
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-3.3) - (-3.5) m/s	-3.35 m/s	Yes
Maximum Headform Flexion			
Peak	(-49) - (-59) deg	-51.3 deg	Yes
Time of Peak	54 - 66 ms	54.2 ms	Yes
Headform Flexion Decay - Peak to Zero	53 - 88 ms	62.8 ms	Yes

Test meets specifications.

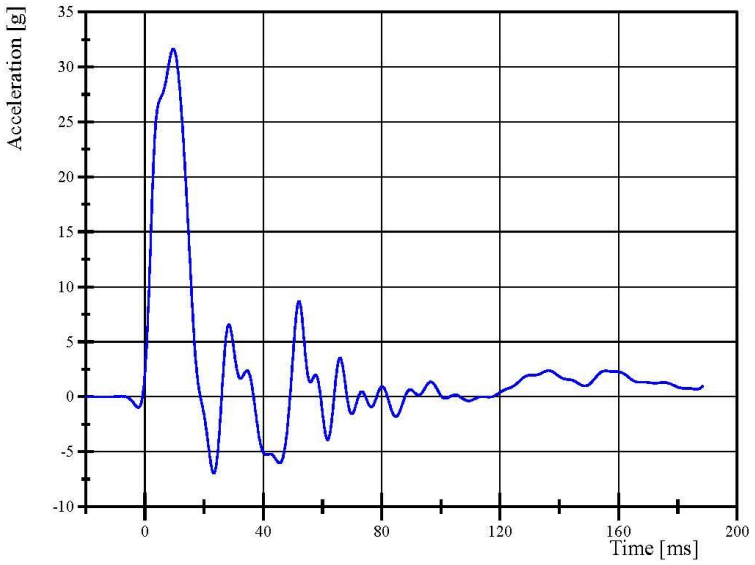
Condition: Used

Comments:
Neck S/N: DS5463

Transportation Research Center Inc.

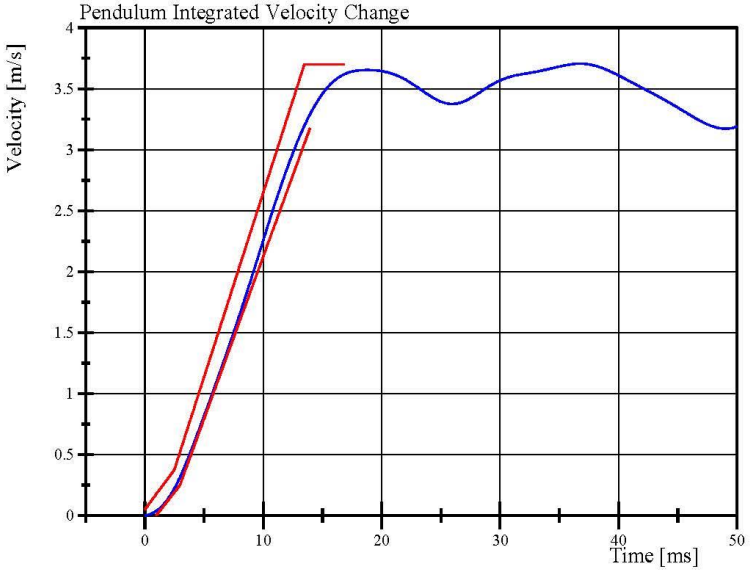
Left Lateral Neck
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Pendulum Acceleration



Filter Class: CFC_60
Max: 31.6 g at 9.6 ms
Min: -7.0 g at 23.3 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_60
Max: 3.7 m/s at 36.7 ms
Min: 0.0 m/s at 0.0 ms

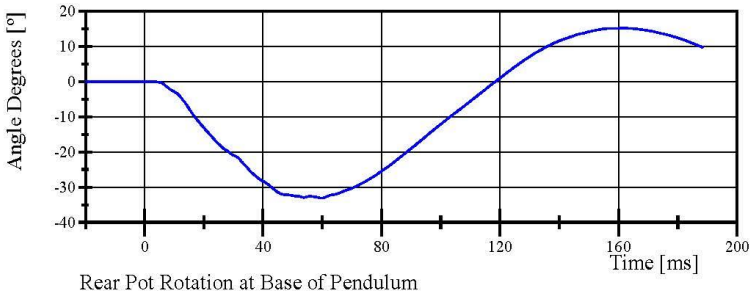
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 13:48:37 1468

Transportation Research Center Inc.

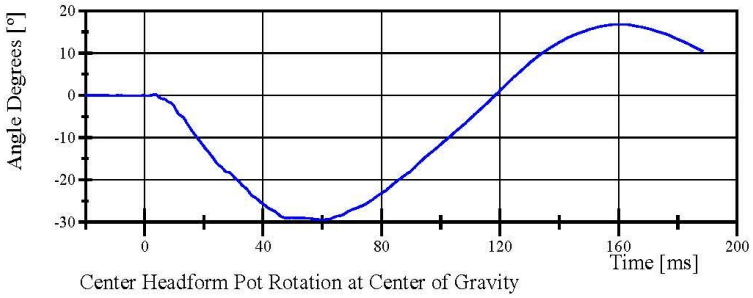
Left Lateral Neck
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Forward Pot Rotation at Base of Pendulum



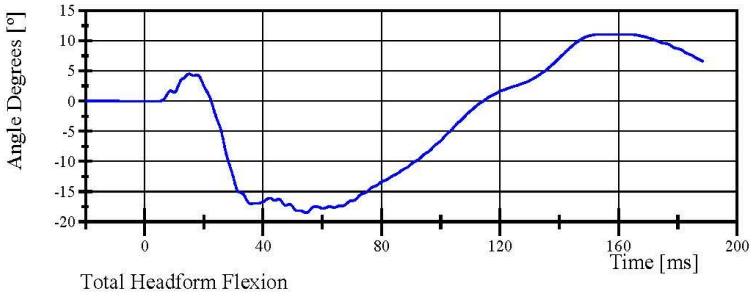
Filter Class: CFC_180
Max: 15.2 ° at 161.8 ms
Min: -33.1 ° at 59.7 ms

Rear Pot Rotation at Base of Pendulum



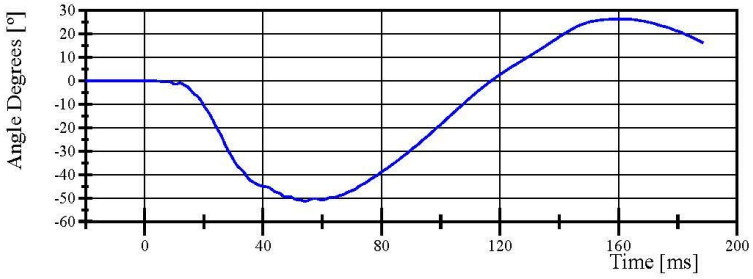
Filter Class: CFC_180
Max: 16.8 ° at 160.5 ms
Min: -29.4 ° at 60.0 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_180
Max: 11.1 ° at 157.0 ms
Min: -18.5 ° at 54.6 ms

Total Headform Flexion



Filter Class: CFC_180
Max: 26.3 ° at 161.9 ms
Min: -51.3 ° at 54.2 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 13:48:38 1468

Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Test Probe Acceleration	(-7.5) - (-10.5) g	-9.38 g	Yes

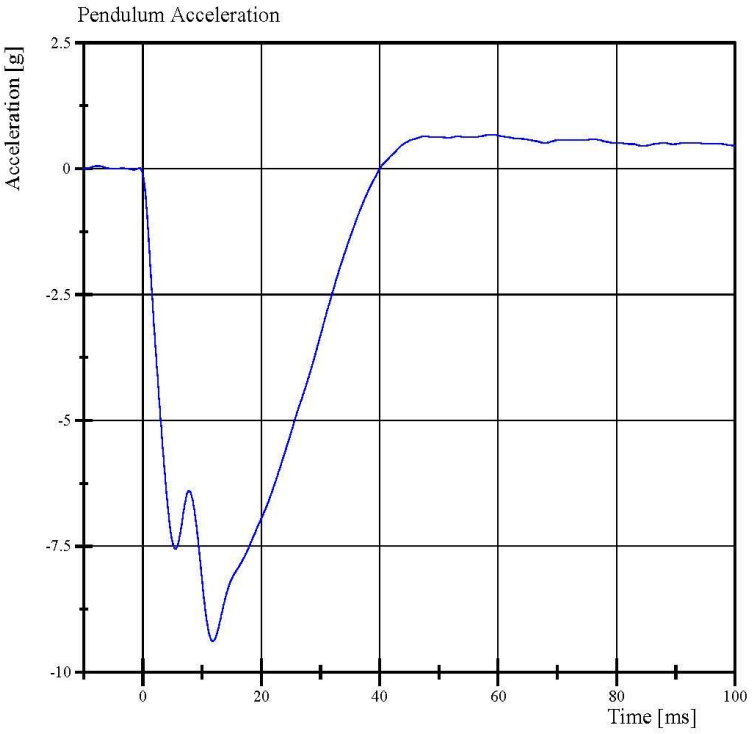
Test meets specifications.

Condition: Used

Comments:
Arm S/N: 175-3501-07014

Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 0.7 g at 59.4 ms
Min: -9.4 g at 11.8 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 16:02:12 531

Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 ℃	21.1 ℃	Yes
Relative Humidity	10 - 70 %	50 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.0 mm	Yes

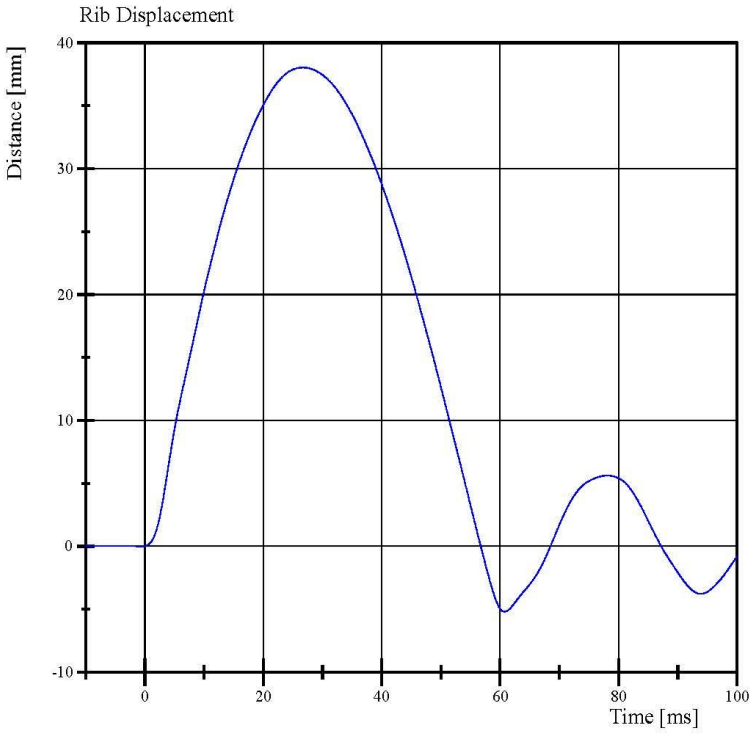
Test meets specifications.

Condition: Used

Comments:
Drop Height: 462mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 38.0 mm at 26.7 ms
Min: -5.2 mm at 60.7 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.23.2019 12:55:18 484

Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	47.3 mm	Yes

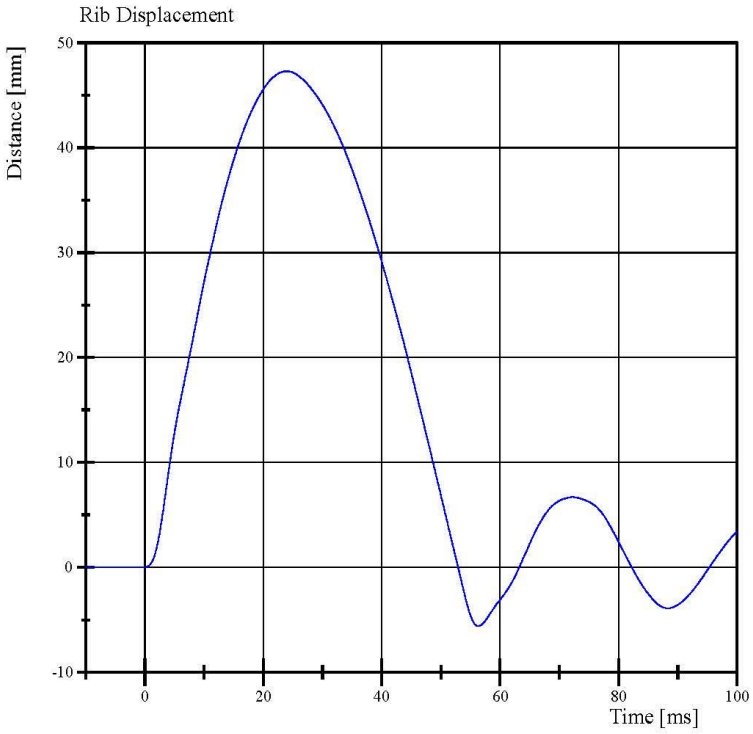
Test meets specifications.

Condition: Used

Comments:
Drop Height: 816mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 47.3 mm at 23.9 ms
Min: -5.6 mm at 56.3 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.23.2019 13:01:40 409

Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

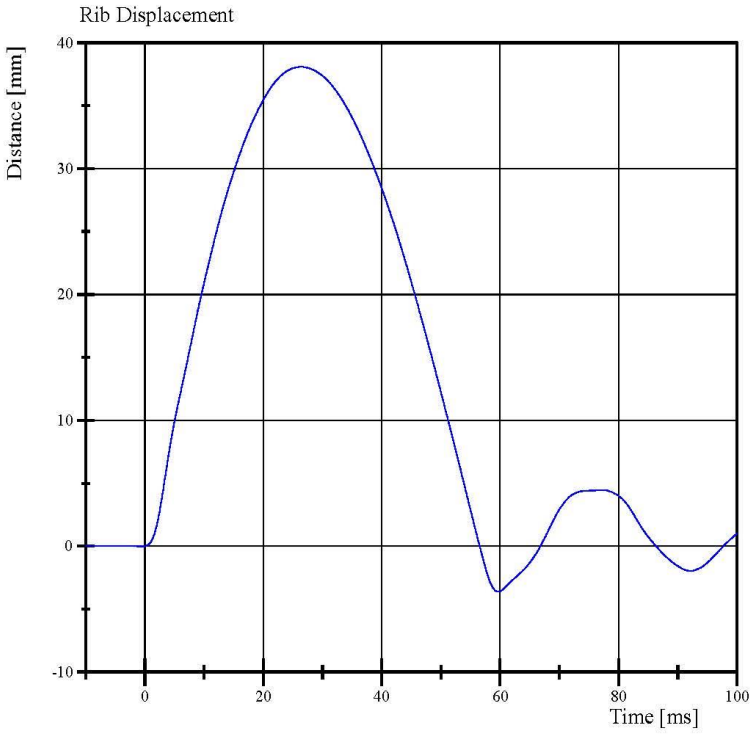
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.1 mm	Yes

Test meets specifications.

Condition: Used
Comments:
Drop Height: 462mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 38.1 mm at 26.4 ms
Min: -3.6 mm at 59.7 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.22.2019 11:19:58 501

Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

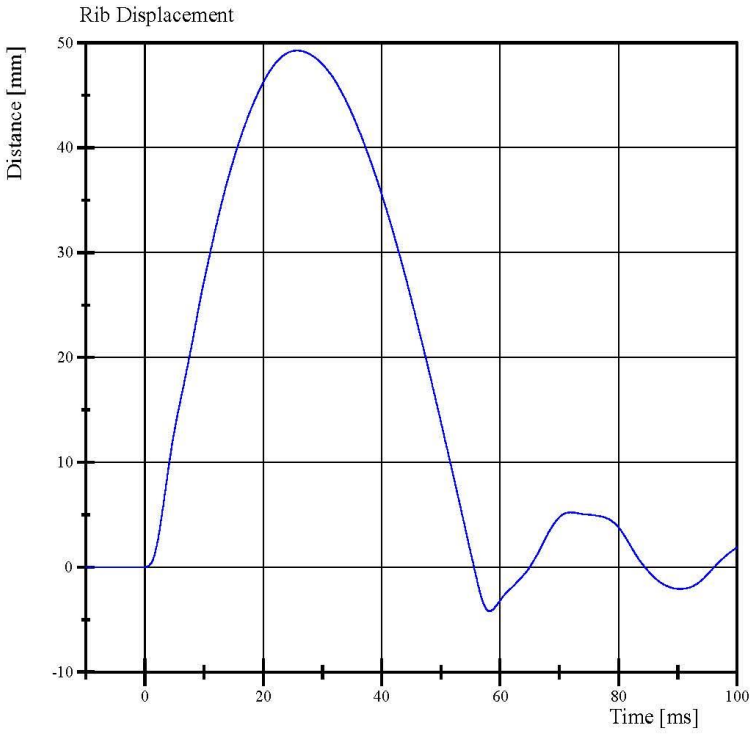
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	49.3 mm	Yes

Test meets specifications.

Condition: Used
Comments:
Drop Height: 816 mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 49.3 mm at 25.8 ms
Min: -4.2 mm at 58.2 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.22.2019 11:18:32 407

Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	39.2 mm	Yes

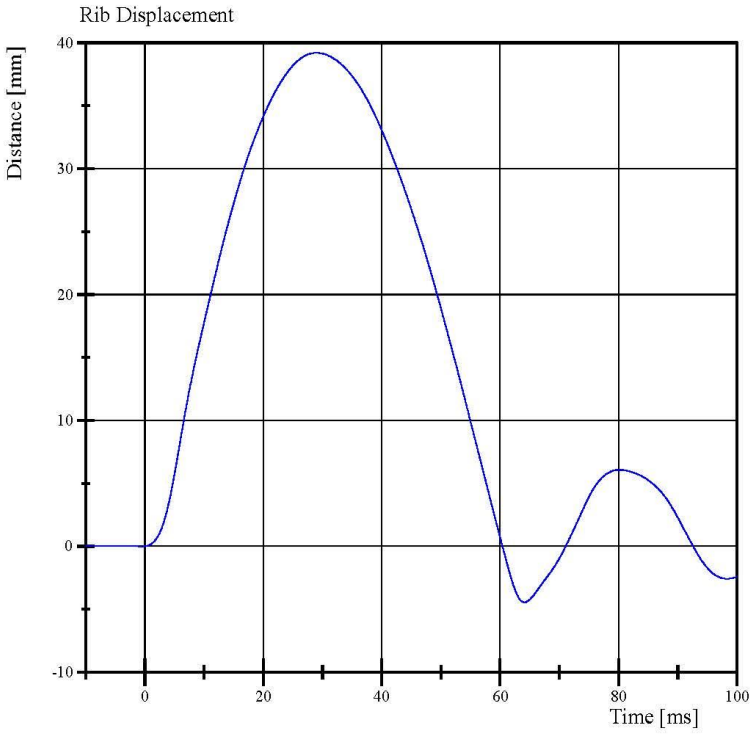
Test meets specifications.

Condition: Used

Comments:
Drop Height: 462 mm
Rib Module: 175-4008-A-06-017

Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 39.2 mm at 29.0 ms
Min: -4.4 mm at 64.1 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 11:32:52 482

Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	50.0 mm	Yes

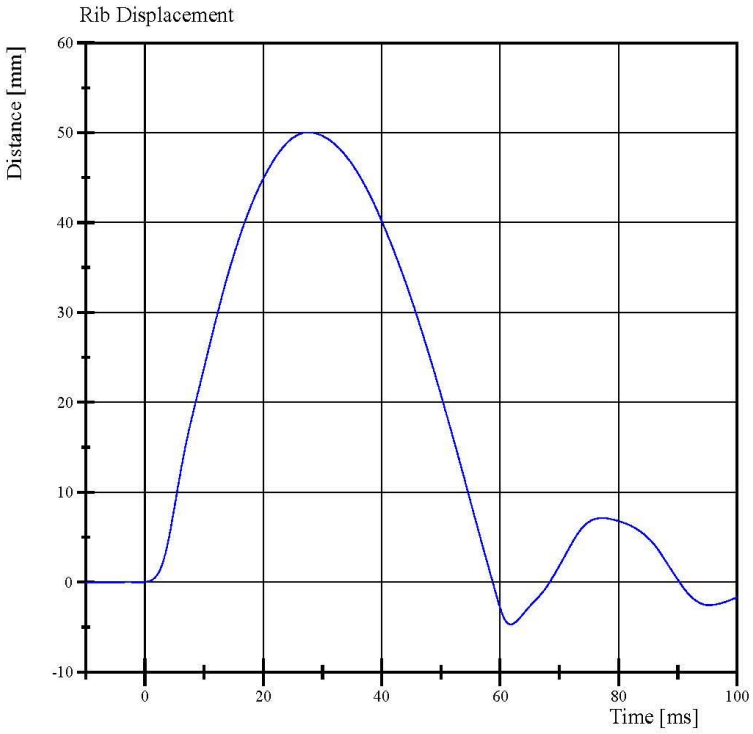
Test meets specifications.

Condition: Used

Comments:
Drop Height: 816 mm
Rib Module: 175-4008-A-06-017

Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 50.0 mm at 27.6 ms
Min: -4.7 mm at 61.8 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 11:18:09 401

Transportation Research Center Inc.

Left Lower Thorax
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Impactor Velocity	5.4 - 5.60 m/s	5.510 m/s	Yes
Peak Impactor Force after 6 ms	(-5,100) - (-6,200) N	-5,595.9 N	Yes
Upper Rib Displacement	34 - 41 mm	38.4 mm	Yes
Center Rib Displacement	37 - 45 mm	43.0 mm	Yes
Lower Rib Displacement	37 - 44 mm	43.0 mm	Yes

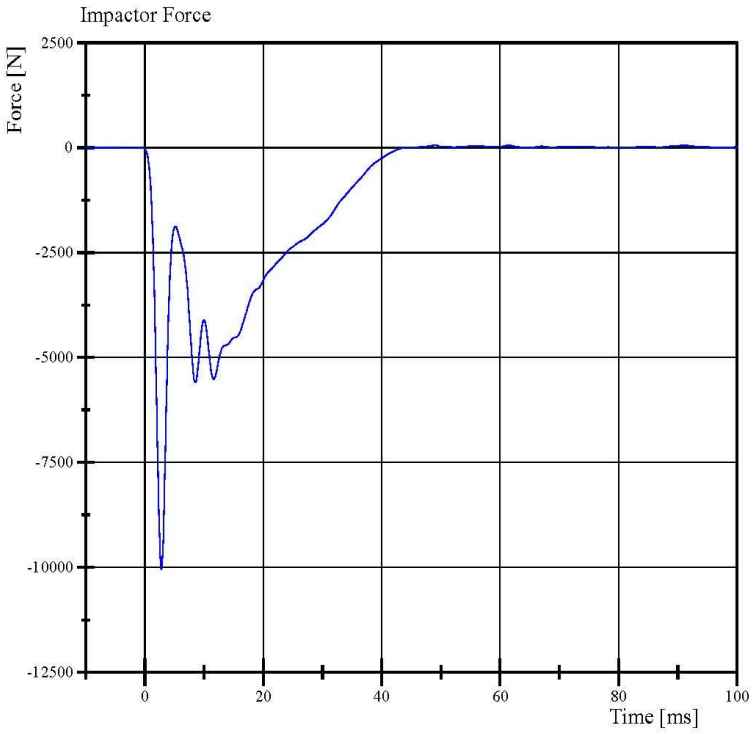
Test meets specifications.

Condition: Used

Comments:
Upper Rib Module S/N: 175-4008-A
Middle Rib Module S/N: 175-4008-A
Lower Rib Module S/N: 175-4008-A-06-017

Transportation Research Center Inc.

Left Lower Thorax
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019



Filter Class: CFC_180
Max: 59.8 N at 49.0 ms
Min: -10,054.9 N at 2.8 ms

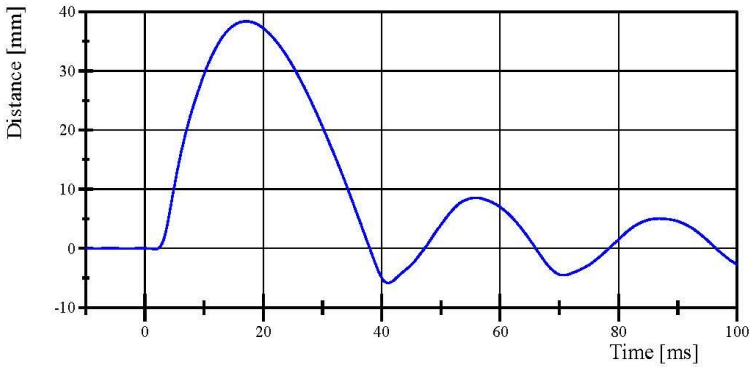
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 15:59:09 448

Transportation Research Center Inc.

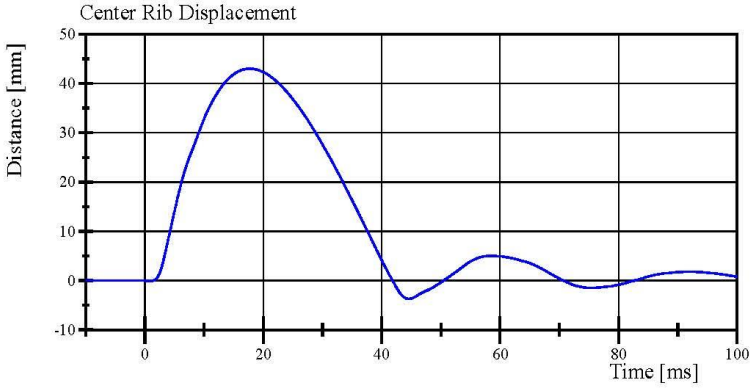
Left Lower Thorax
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Upper Rib Displacement



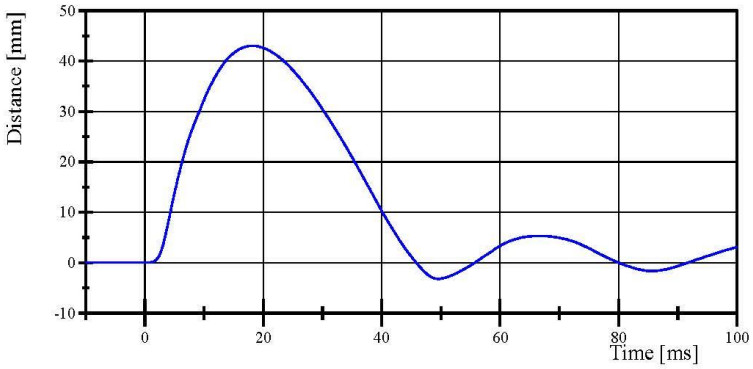
Filter Class: CFC_180
Max: 38.4 mm at 17.1 ms
Min: -5.8 mm at 41.0 ms

Center Rib Displacement



Filter Class: CFC_180
Max: 43.0 mm at 17.8 ms
Min: -3.7 mm at 44.6 ms

Lower Rib Displacement



Filter Class: CFC_180
Max: 43.0 mm at 18.2 ms
Min: -3.2 mm at 49.6 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 64-3
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-5.95) - (-6.15) m/s	-6.105 m/s	Yes
Maximum Headform Flexion			
Peak	(-45) - (-55) deg	-49.0 deg	Yes
Time of Peak	39 - 53 ms	43.4 ms	Yes
Headform Flexion Decay - Peak to Zero	37 - 57 ms	38.7 ms	Yes

Test meets specifications.

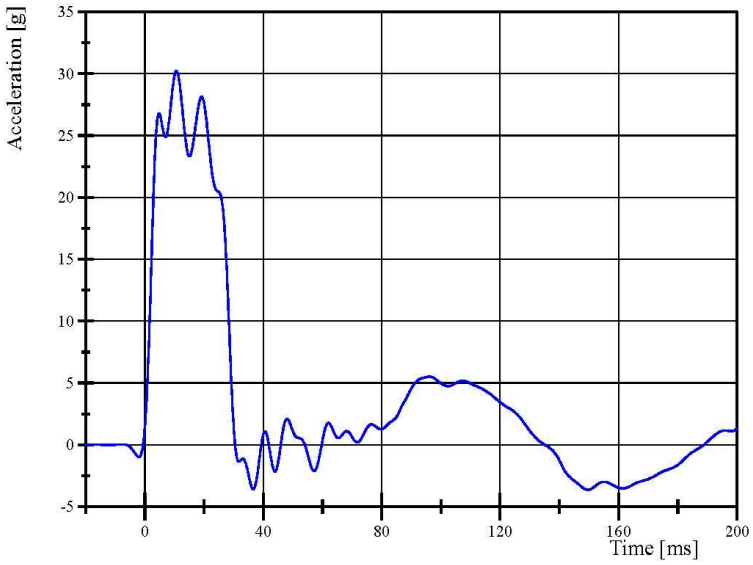
Condition: Used

Comments:
Lumbar S/N: DM3011

Transportation Research Center Inc.

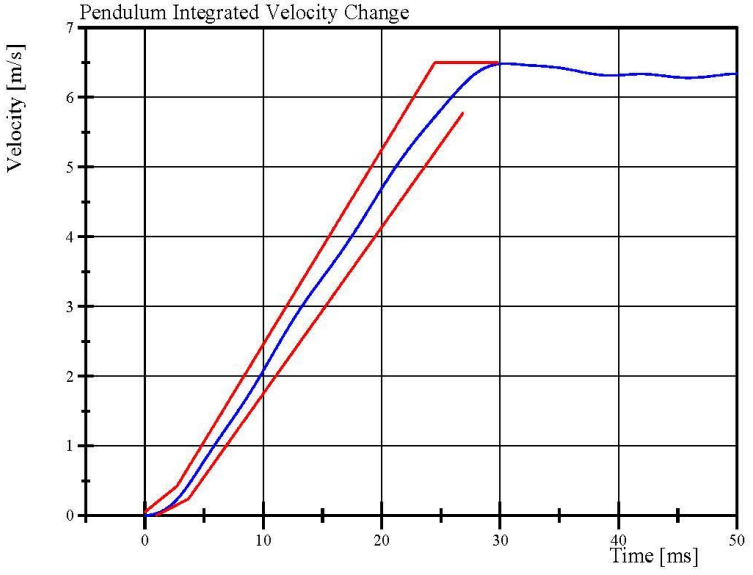
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 64-3
Test Date: 5/20/2019

Pendulum Acceleration



Filter Class: CFC_60
Max: 30.2 g at 10.6 ms
Min: -3.6 g at 149.6 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_60
Max: 6.5 m/s at 30.5 ms
Min: 0.0 m/s at 0.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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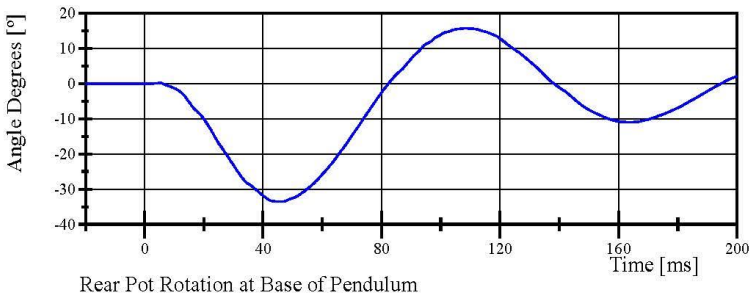
Transportation Research Center Inc.

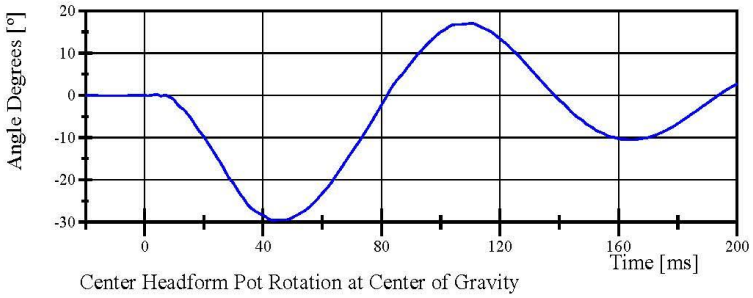
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 64-3
Test Date: 5/20/2019

Forward Pot Rotation at Base of Pendulum



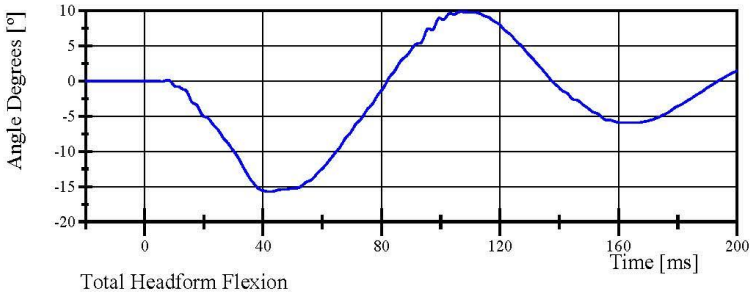
Filter Class: CFC_180
Max: 15.7 ° at 108.3 ms
Min: -33.5 ° at 46.2 ms

Rear Pot Rotation at Base of Pendulum



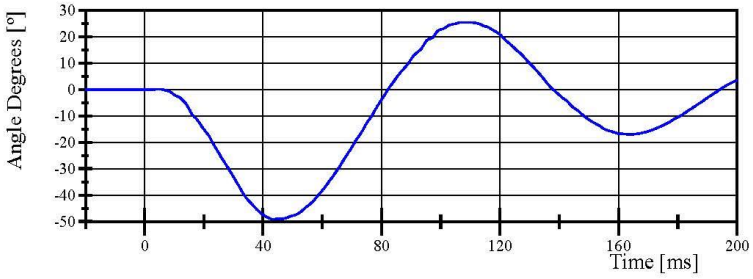
Filter Class: CFC_180
Max: 17.0 ° at 110.4 ms
Min: -29.5 ° at 43.6 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_180
Max: 9.9 ° at 106.7 ms
Min: -15.7 ° at 42.4 ms

Total Headform Flexion



Filter Class: CFC_180
Max: 25.5 ° at 108.2 ms
Min: -49.0 ° at 43.4 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.20.2019 10:45:23 637

Transportation Research Center Inc.

Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Test Probe Velocity	3.9 - 4.1 m/s	4.05 m/s	Yes
Test Probe Force			
Peak	4,000 - 4,800 N	4,162.4 N	Yes
Time of Peak	10.6 - 13.0 ms	11.84 ms	Yes
Total Abdominal Force			
Peak	2,200 - 2,700 N	2,487.4 N	Yes
Time of Peak	10.0 - 12.3 ms	11.60 ms	Yes

Test meets specifications.

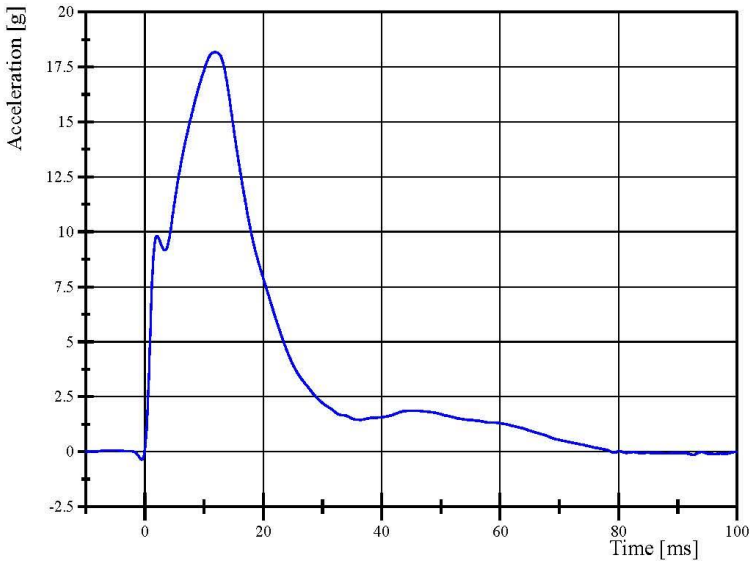
Condition: Used

Comments:
Abdomen S/N: 1066

Transportation Research Center Inc.

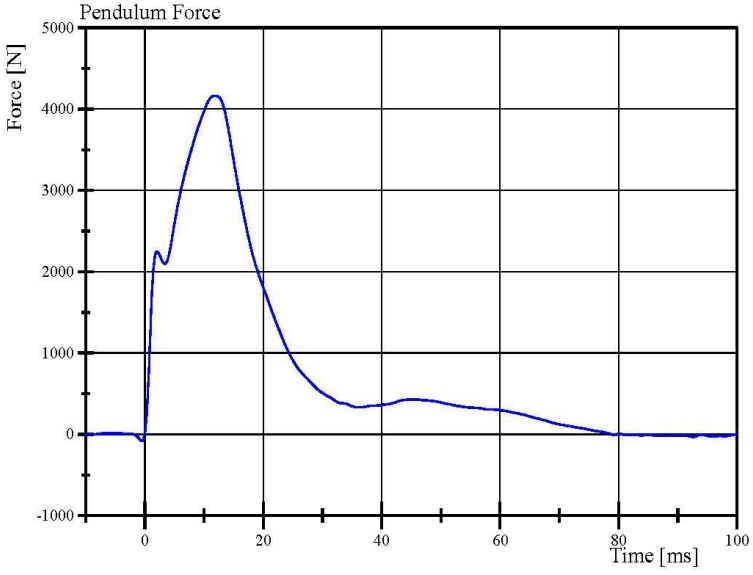
Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 18.2 g at 11.8 ms
Min: -0.4 g at -0.5 ms

Pendulum Force



Filter Class: CFC_180
Max: 4,162.4 N at 11.8 ms
Min: -80.5 N at -0.5 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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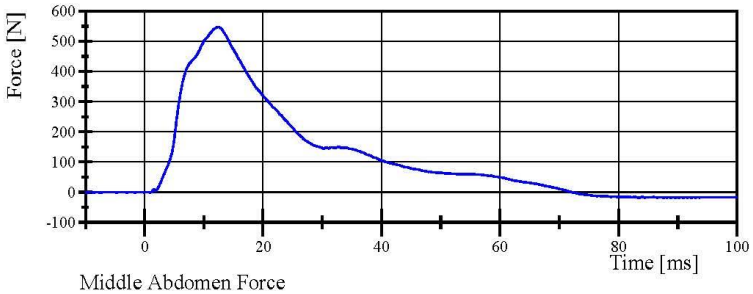
Transportation Research Center Inc.

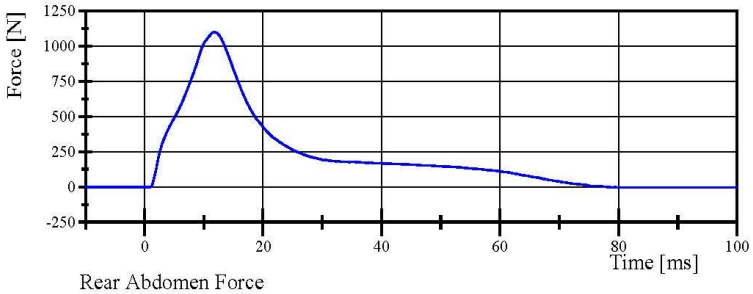
Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Front Abdomen Force



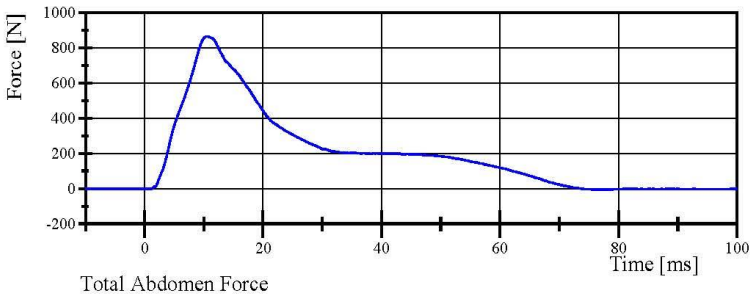
Filter Class: CFC_600
Max: 547.6 N at 12.4 ms
Min: -17.5 N at 90.2 ms

Middle Abdomen Force



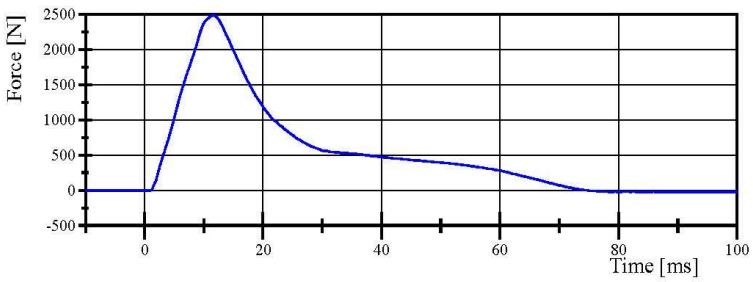
Filter Class: CFC_600
Max: 1,098.9 N at 11.8 ms
Min: -4.7 N at 83.4 ms

Rear Abdomen Force



Filter Class: CFC_600
Max: 864.8 N at 10.6 ms
Min: -6.2 N at 77.0 ms

Total Abdomen Force



Filter Class: CFC_600
Max: 2,487.4 N at 11.6 ms
Min: -24.7 N at 83.4 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Test Probe Force			
Peak	4,700 - 5,400 N	5,257.7 N	Yes
Time of Peak	11.8 - 16.1 ms	12.96 ms	Yes
Pubic Symphysis Force			
Peak	(-1,230) - (-1,590) N	-1,333.2 N	Yes
Time of Peak	12.2 - 17.0 ms	13.68 ms	Yes

Test meets specifications.

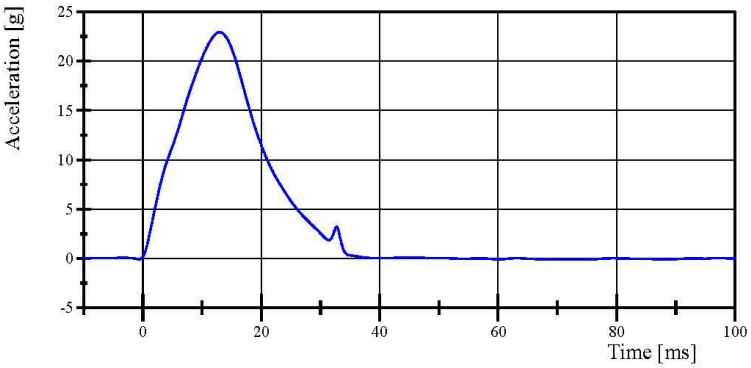
Condition: Used

Comments:
Pelvis Skin S/N: N/A

Transportation Research Center Inc.

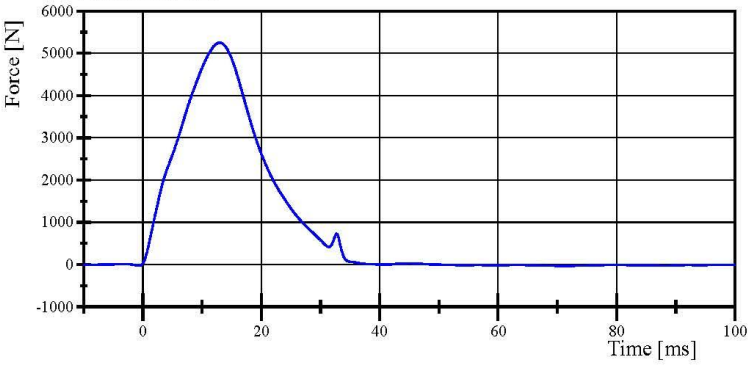
Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 64-1
Test Date: 5/20/2019

Pendulum Acceleration



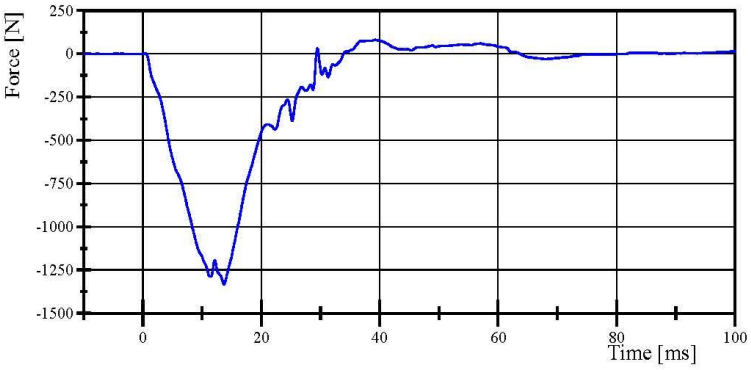
Filter Class: CFC_180
Max: 22.9 g at 13.0 ms
Min: -0.1 g at 71.0 ms

Pendulum Force



Filter Class: CFC_180
Max: 5,257.7 N at 13.0 ms
Min: -33.7 N at 71.0 ms

Pubic Symphysis Force



Filter Class: CFC_600
Max: 80.8 N at 39.3 ms
Min: -1,333.2 N at 13.7 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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Post-Test Calibration Sheets
Driver S/N F030

Transportation Research Center Inc.
572U ES-2re Dummy
External Dimensions
Serial No. F030 Calibration No. 65

Symbol	Description	Specification	Results	Pass
		mm	mm	
1	Sitting Height	900.0 - 918.0	911	Yes
2	Seat to Shoulder Joint	558.0 - 572.0	561	Yes
3	Seat to Lower Face of Thoracic Spine Box	346.0 - 356.0	347	Yes
4	Seat to Hip Joint (center of bolt)	97.0 - 103.0	97	Yes
5	Sole to Seat, Sitting	433.0 - 451.0	445	Yes
6	Head Width	152.0 - 158.0	155	Yes
7	Shoulder/Arm Width	461.0 - 479.0	475	Yes
8	Thorax Width	322.0 - 332.0	328	Yes
9	Abdomen Width	273.0 - 287.0	280	Yes
10	Pelvis Lap Width	359.0 - 373.0	367	Yes
11	Head Depth	196.0 - 206.0	201	Yes
12	Thorax Depth	262.0 - 272.0	262	Yes
13	Abdomen Depth	194.0 - 204.0	199	Yes
14	Pelvis Depth	235.0 - 245.0	242	Yes
15	Back of Buttocks to Hip Joint (center of bolt)	150.0 - 160.0	156	Yes
16	Back of Buttocks to Front of Knee	597.0 - 615.0	605	Yes

Baseline 10/07/05

Transportation Research Center Inc.

Left Lateral Head Drop
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Peak Resultant Acceleration	125 - 155 g	132.3 g	Yes
Peak Longitudinal Acceleration	(-15) - 15 g	7.6 g	Yes
Is Resultant Acceleration Curve Unimodal within 15% of Main Pulse?	Yes	Yes	Yes

Test meets specifications.

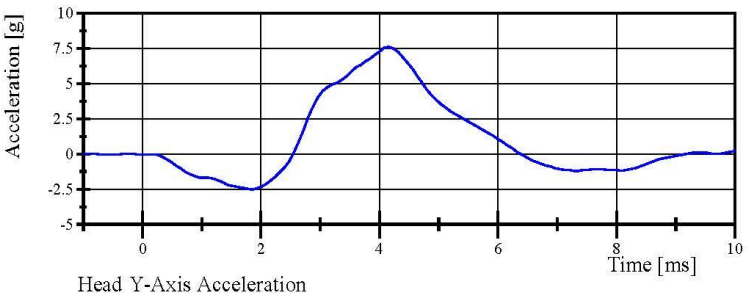
Condition: Used

Comments:
Head Skin S/N: DP6812

Transportation Research Center Inc.

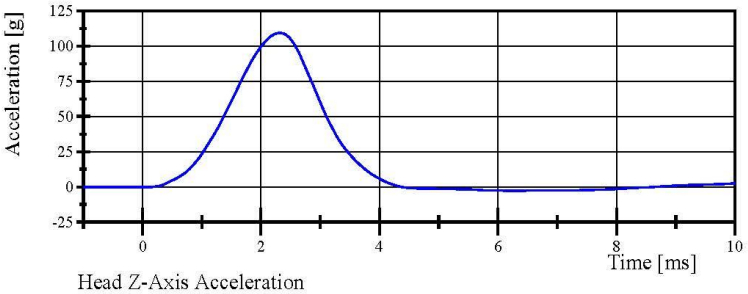
Left Lateral Head Drop
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Head X-Axis Acceleration



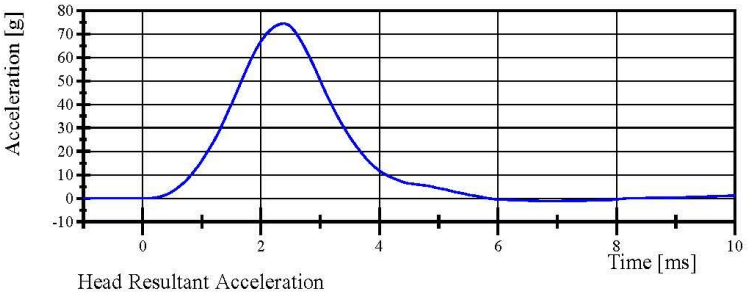
Filter Class: CFC_1000
Max: 7.6 g at 4.2 ms
Min: -2.5 g at 1.8 ms

Head Y-Axis Acceleration



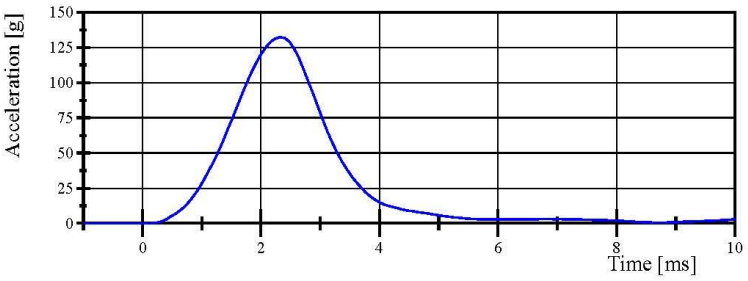
Filter Class: CFC_1000
Max: 109.4 g at 2.3 ms
Min: -2.8 g at 6.2 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 74.5 g at 2.4 ms
Min: -1.2 g at 6.8 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 132.3 g at 2.3 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.07.2019 07:29:10 325

Transportation Research Center Inc.

Left Lateral Neck
ES-2re Serial No. F030 Certification No. 65-2
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-3.3) - (-3.5) m/s	-3.38 m/s	Yes
Maximum Headform Flexion			
Peak	(-49) - (-59) deg	-49.3 deg	Yes
Time of Peak	54 - 66 ms	57.5 ms	Yes
Headform Flexion Decay - Peak to Zero	53 - 88 ms	56.7 ms	Yes

Test meets specifications.

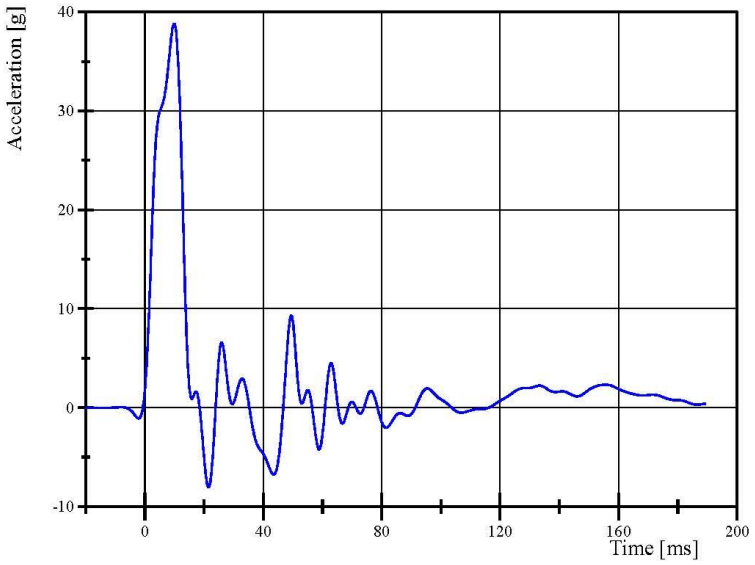
Condition: Used

Comments:
Neck S/N: DS5463

Transportation Research Center Inc.

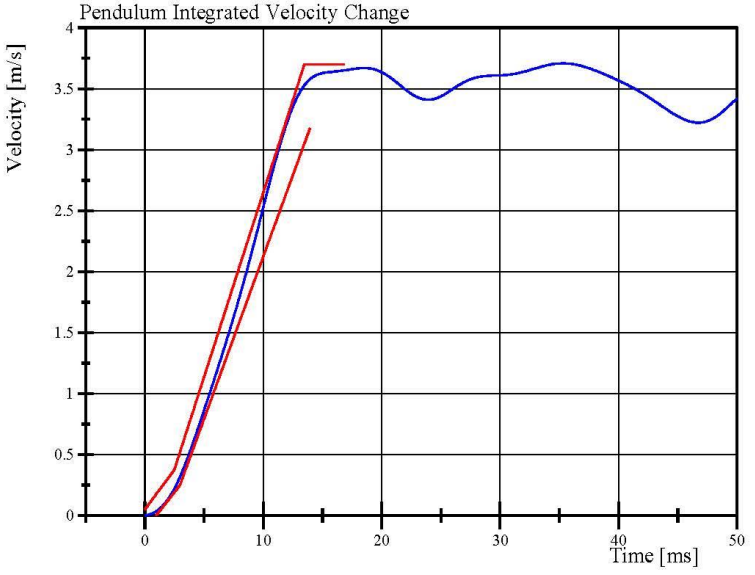
Left Lateral Neck
ES-2re Serial No. F030 Certification No. 65-2
Test Date: 6/5/2019

Pendulum Acceleration



Filter Class: CFC_60
Max: 38.8 g at 9.9 ms
Min: -8.0 g at 21.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_60
Max: 3.7 m/s at 35.3 ms
Min: 0.0 m/s at 0.0 ms

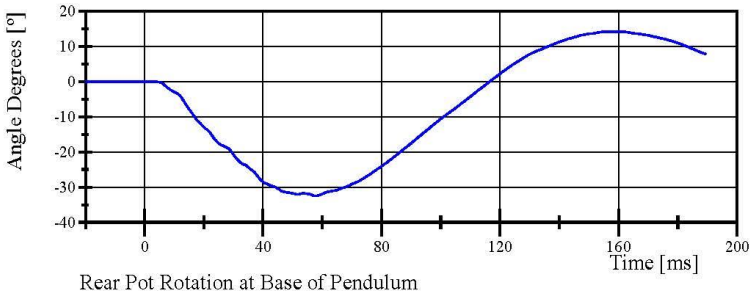
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 14:02:29 1457

Transportation Research Center Inc.

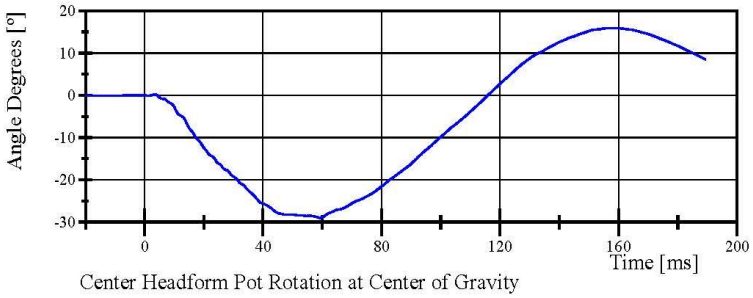
Left Lateral Neck
ES-2re Serial No. F030 Certification No. 65-2
Test Date: 6/5/2019

Forward Pot Rotation at Base of Pendulum



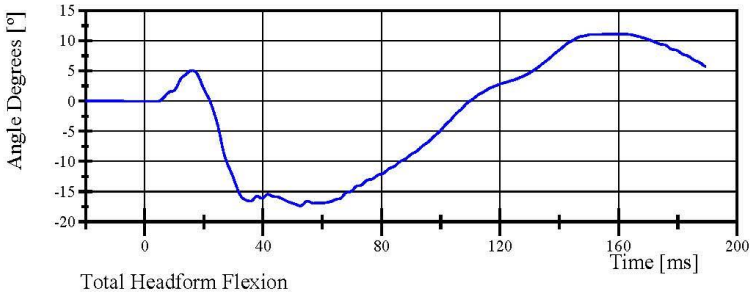
Filter Class: CFC_180
Max: 14.2 ° at 159.3 ms
Min: -32.4 ° at 57.7 ms

Rear Pot Rotation at Base of Pendulum



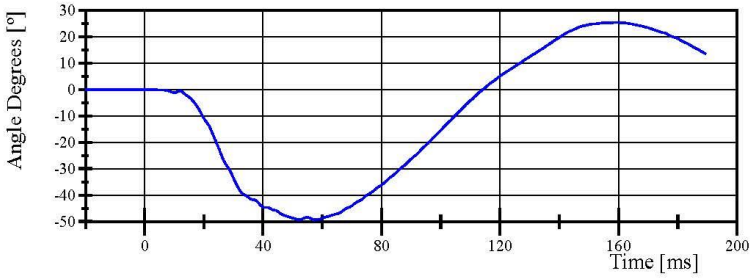
Filter Class: CFC_180
Max: 16.0 ° at 158.0 ms
Min: -29.0 ° at 59.4 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_180
Max: 11.1 ° at 161.9 ms
Min: -17.3 ° at 52.5 ms

Total Headform Flexion



Filter Class: CFC_180
Max: 25.3 ° at 159.5 ms
Min: -49.3 ° at 57.5 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 14:02:30 1457

Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.28 m/s	Yes
Test Probe Acceleration	(-7.5) - (-10.5) g	-9.64 g	Yes

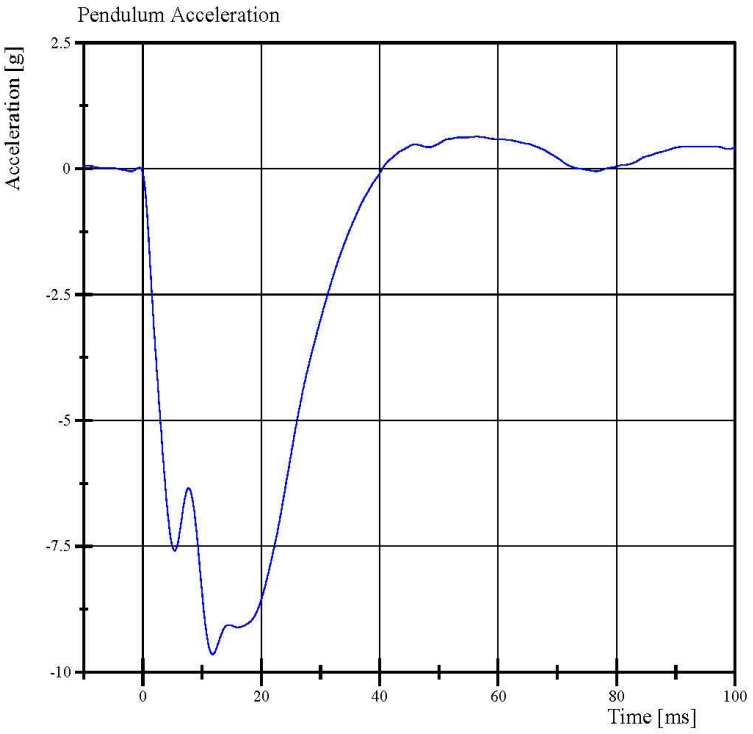
Test meets specifications.

Condition: Used

Comments:
Arm S/N: 175-3501-07014

Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 0.6 g at 56.3 ms
Min: -9.6 g at 11.8 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.07.2019 12:24:12 508

Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.3 mm	Yes

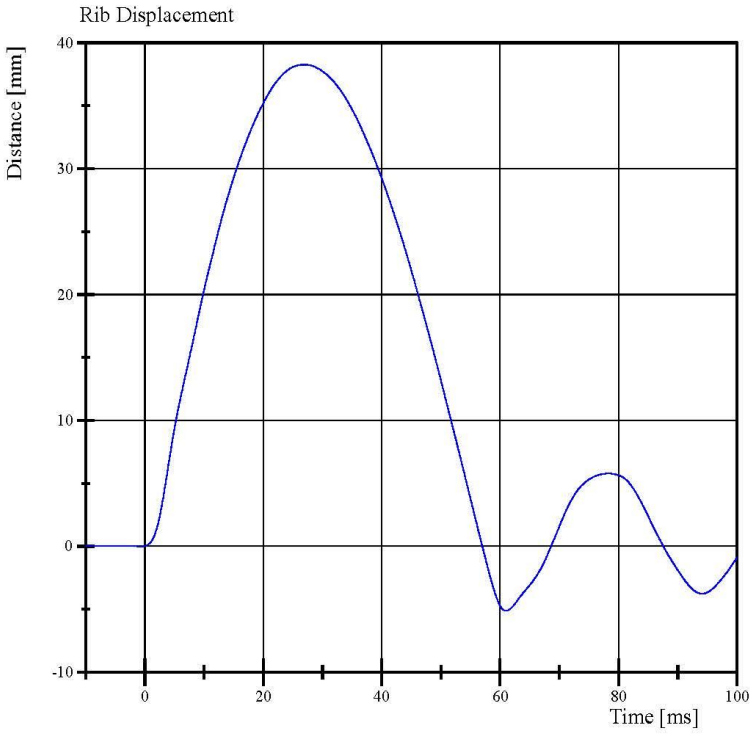
Test meets specifications.

Condition: Used

Comments:
Drop Height: 462mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 38.3 mm at 26.9 ms
Min: -5.1 mm at 61.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 08:36:41 489

Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	46.8 mm	Yes

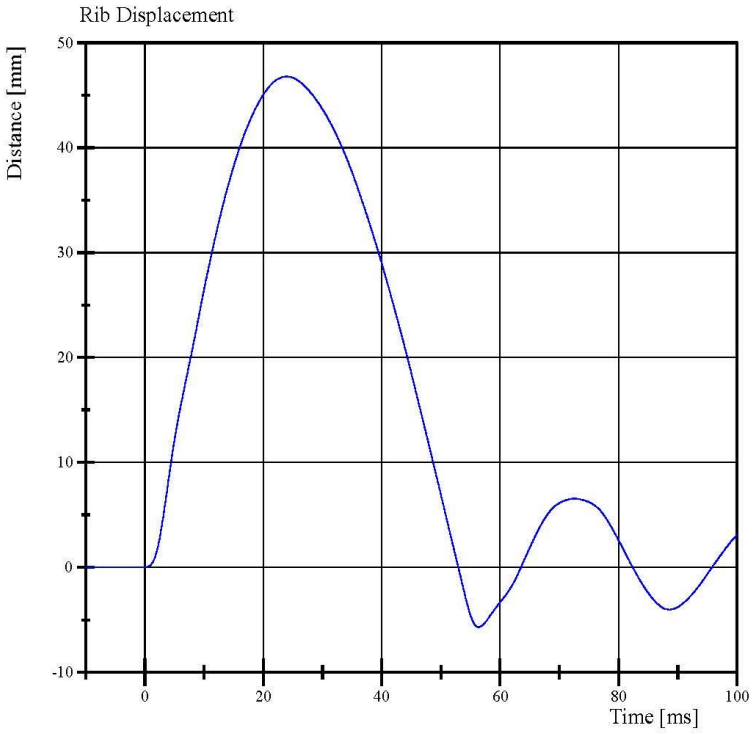
Test meets specifications.

Condition: Used

Comments:
Drop Height: 816mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 46.8 mm at 23.9 ms
Min: -5.7 mm at 56.3 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 08:18:57 405

Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.0 mm	Yes

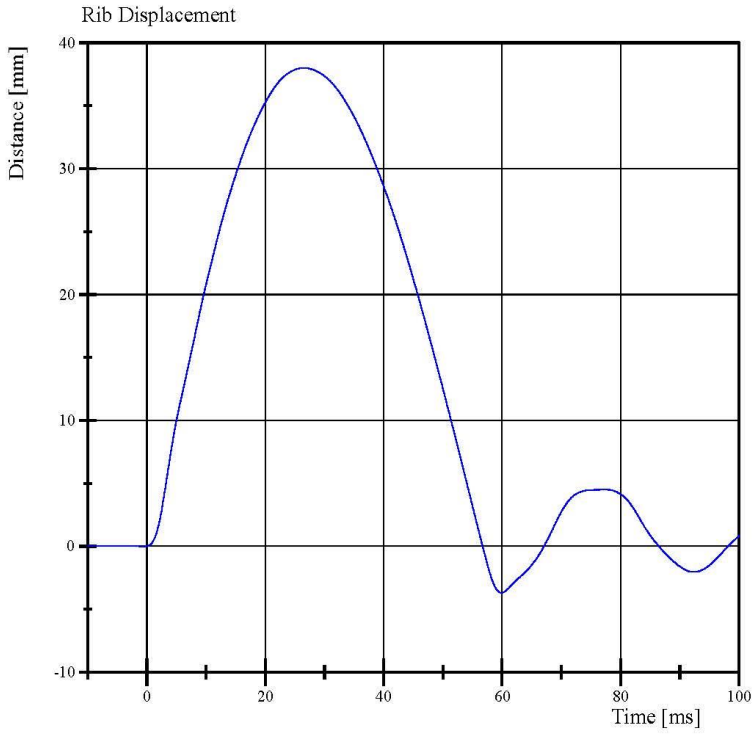
Test meets specifications.

Condition: Used

Comments:
Drop Height: 462 mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 38.0 mm at 26.6 ms
Min: -3.7 mm at 59.8 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 09:37:53 481

Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	49.0 mm	Yes

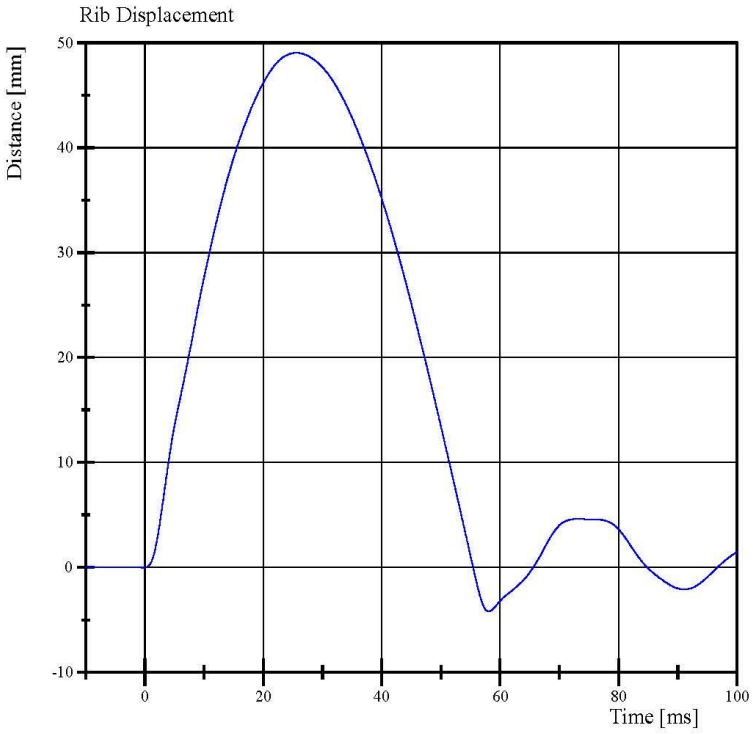
Test meets specifications.

Condition: Used

Comments:
Drop Height: 816 mm
Rib Module: 175-4008-A

Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 49.0 mm at 25.6 ms
Min: -4.2 mm at 58.1 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 09:20:07 414

Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	39.1 mm	Yes

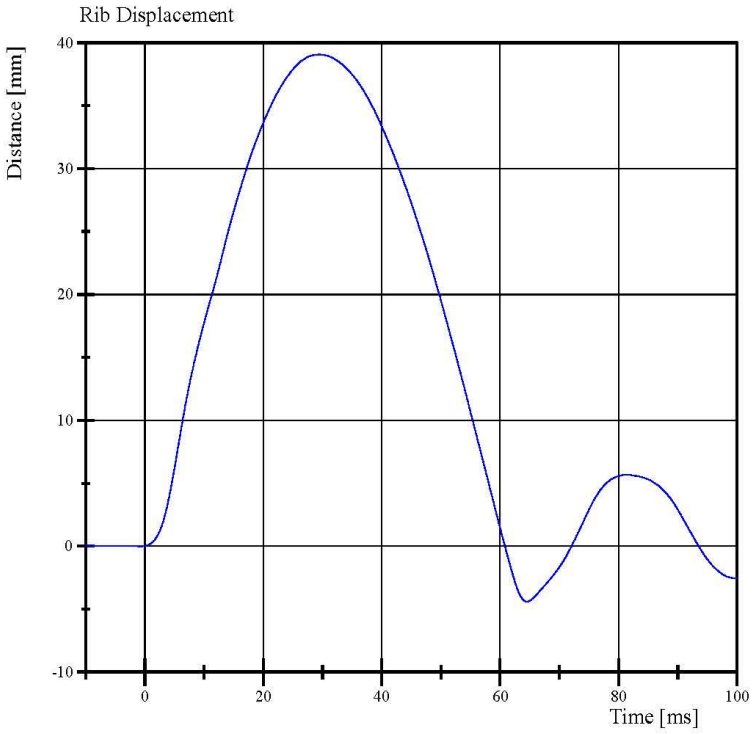
Test meets specifications.

Condition: Used

Comments:
Drop Height: 462 mm
Rib Module: 175-4008-A-06-017

Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 39.1 mm at 29.4 ms
Min: -4.4 mm at 64.5 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 10:03:34 470

Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	50.1 mm	Yes

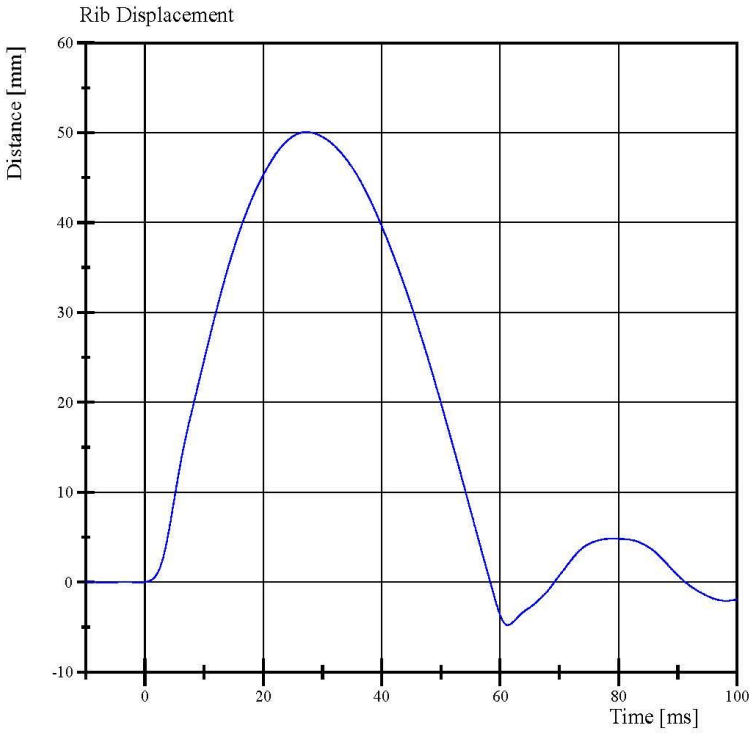
Test meets specifications.

Condition: Used

Comments:
Drop Height: 816 mm
Rib Module: 175-4008-A-06-017

Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 50.1 mm at 27.3 ms
Min: -4.7 mm at 61.3 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 09:45:38 391

Transportation Research Center Inc.

Left Lower Thorax
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Impactor Velocity	5.4 - 5.60 m/s	5.491 m/s	Yes
Peak Impactor Force after 6 ms	(-5,100) - (-6,200) N	-5,355.2 N	Yes
Upper Rib Displacement	34 - 41 mm	38.0 mm	Yes
Center Rib Displacement	37 - 45 mm	42.4 mm	Yes
Lower Rib Displacement	37 - 44 mm	41.2 mm	Yes

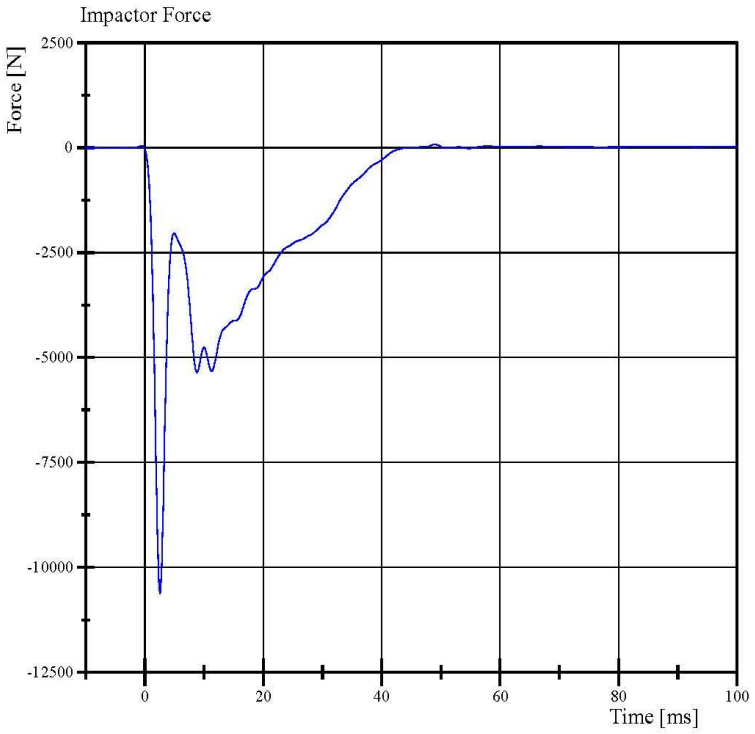
Test meets specifications.

Condition: Used

Comments:
Upper Rib Module S/N: 175-4008-A
Middle Rib Module S/N: 175-4008-A
Lower Rib Module S/N: 175-4008-A-06-017

Transportation Research Center Inc.

Left Lower Thorax
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019



Filter Class: CFC_180
Max: 75.5 N at 49.0 ms
Min: -10,633.2 N at 2.6 ms

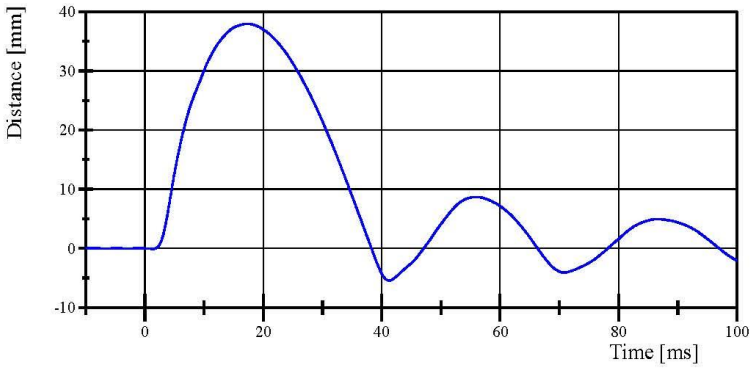
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 16:00:02 444

Transportation Research Center Inc.

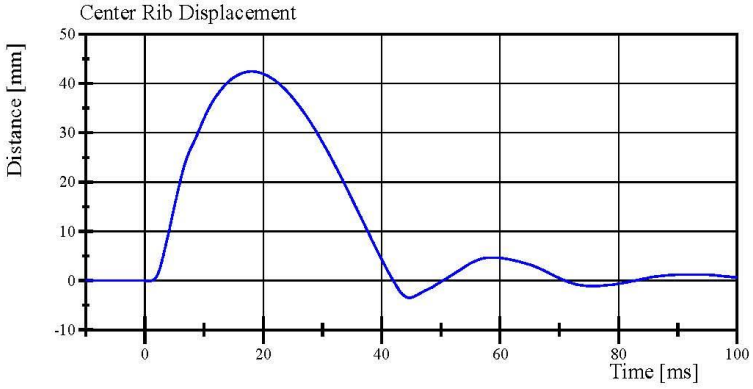
Left Lower Thorax
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Upper Rib Displacement



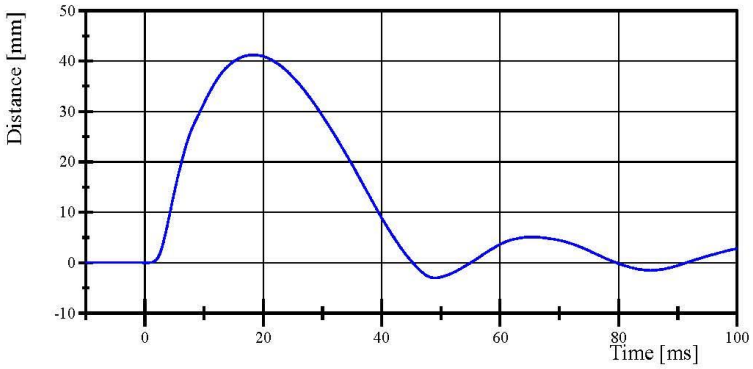
Filter Class: CFC_180
Max: 38.0 mm at 17.3 ms
Min: -5.4 mm at 41.2 ms

Center Rib Displacement



Filter Class: CFC_180
Max: 42.4 mm at 18.1 ms
Min: -3.5 mm at 44.6 ms

Lower Rib Displacement



Filter Class: CFC_180
Max: 41.2 mm at 18.3 ms
Min: -3.0 mm at 49.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 16:00:03 444

Transportation Research Center Inc.

Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-5.95) - (-6.15) m/s	-6.105 m/s	Yes
Maximum Headform Flexion			
Peak	(-45) - (-55) deg	-48.3 deg	Yes
Time of Peak	39 - 53 ms	44.6 ms	Yes
Headform Flexion Decay - Peak to Zero	37 - 57 ms	37.1 ms	Yes

Test meets specifications.

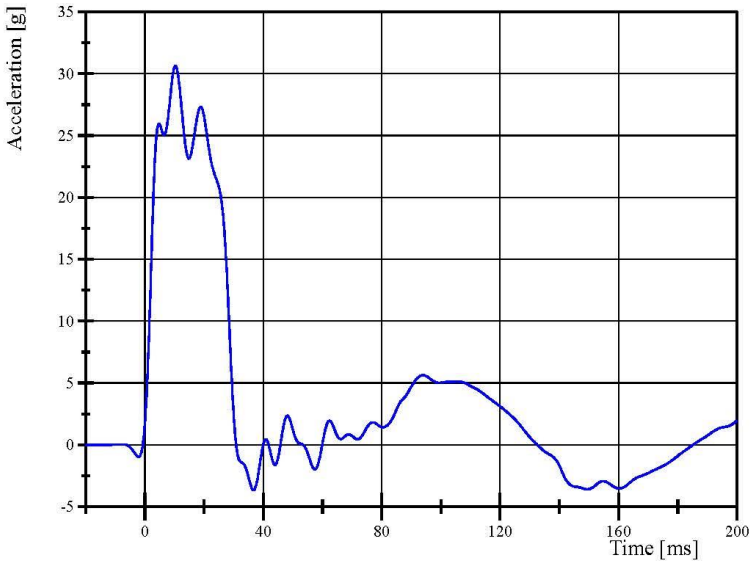
Condition: Used

Comments:
Lumbar S/N: DM3011

Transportation Research Center Inc.

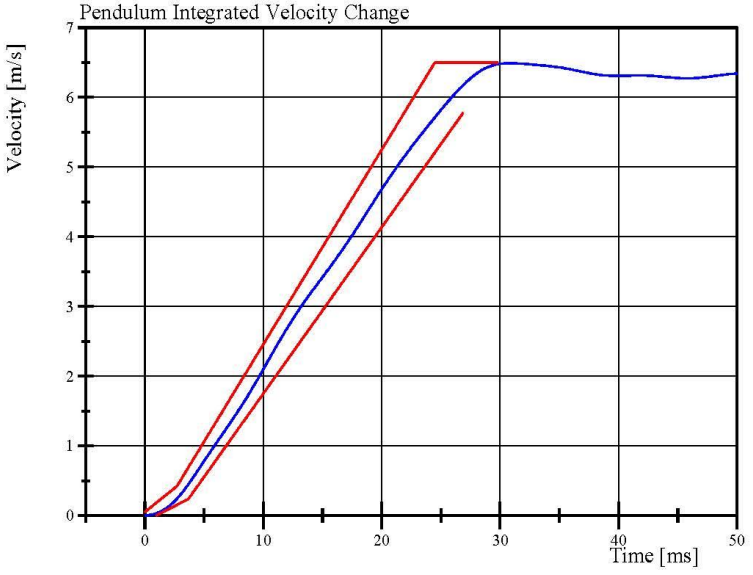
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Pendulum Acceleration



Filter Class: CFC_60
Max: 30.6 g at 10.3 ms
Min: -3.7 g at 36.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_60
Max: 6.5 m/s at 30.8 ms
Min: 0.0 m/s at 0.0 ms

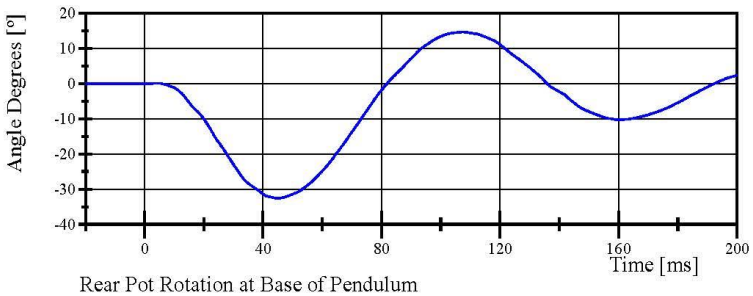
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 11:09:12 641

Transportation Research Center Inc.

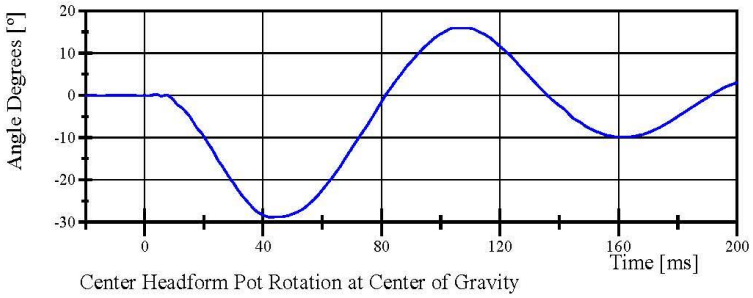
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Forward Pot Rotation at Base of Pendulum



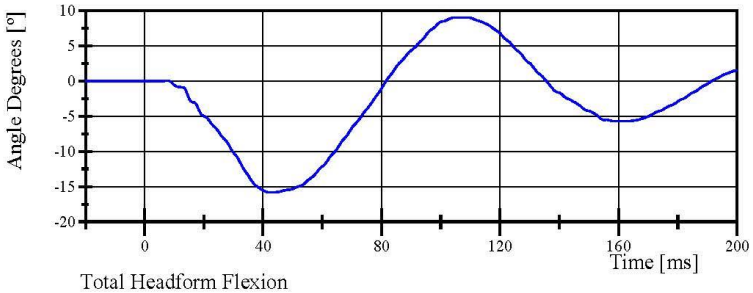
Filter Class: CFC_180
Max: 14.6 ° at 107.4 ms
Min: -32.5 ° at 44.9 ms

Rear Pot Rotation at Base of Pendulum



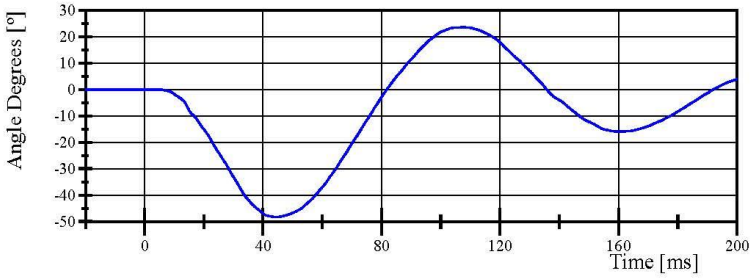
Filter Class: CFC_180
Max: 16.0 ° at 105.1 ms
Min: -28.8 ° at 42.5 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_180
Max: 9.0 ° at 108.6 ms
Min: -15.8 ° at 42.4 ms

Total Headform Flexion



Filter Class: CFC_180
Max: 23.6 ° at 107.5 ms
Min: -48.3 ° at 44.6 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 11:09:13 641

Transportation Research Center Inc.

Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Test Probe Velocity	3.9 - 4.1 m/s	4.04 m/s	Yes
Test Probe Force			
Peak	4,000 - 4,800 N	4,119.0 N	Yes
Time of Peak	10.6 - 13.0 ms	12.00 ms	Yes
Total Abdominal Force			
Peak	2,200 - 2,700 N	2,519.3 N	Yes
Time of Peak	10.0 - 12.3 ms	11.76 ms	Yes

Test meets specifications.

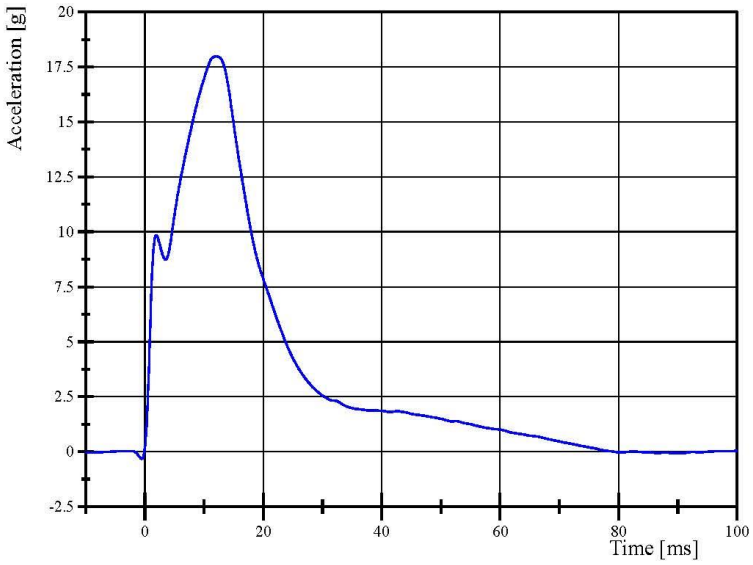
Condition: Used

Comments:
Abdomen S/N: 1066

Transportation Research Center Inc.

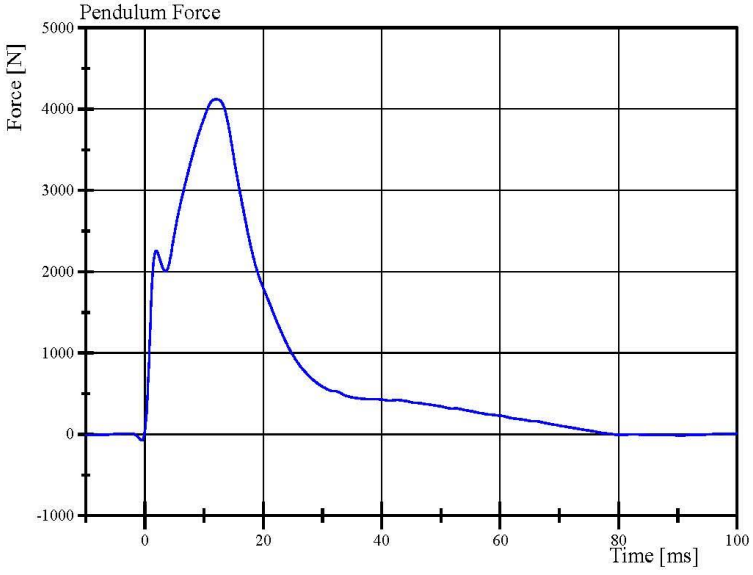
Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 18.0 g at 12.0 ms
Min: -0.3 g at -0.6 ms

Pendulum Force



Filter Class: CFC_180
Max: 4,119.0 N at 12.0 ms
Min: -74.1 N at -0.6 ms

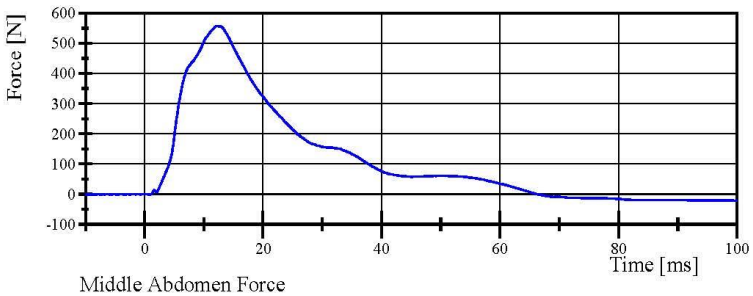
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 16:05:27 539

Transportation Research Center Inc.

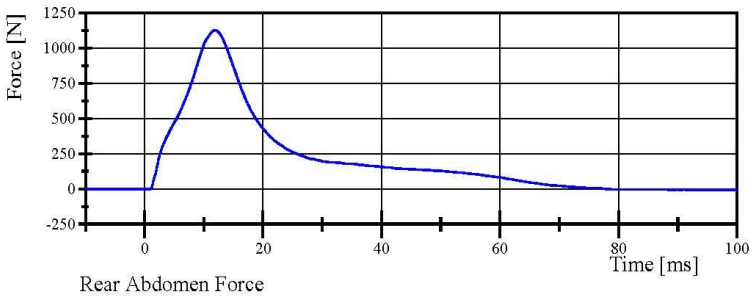
Left Lateral Abdomen
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Front Abdomen Force



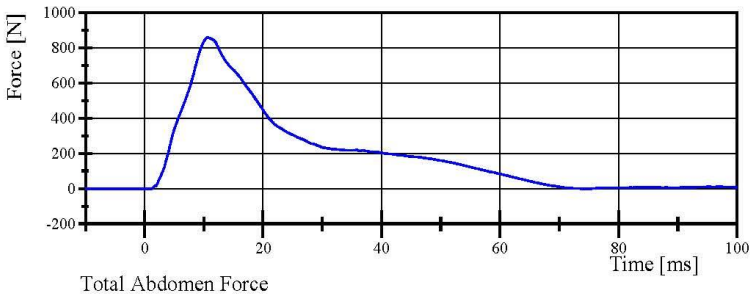
Filter Class: CFC_600
Max: 558.0 N at 12.2 ms
Min: -21.2 N at 100.0 ms

Middle Abdomen Force



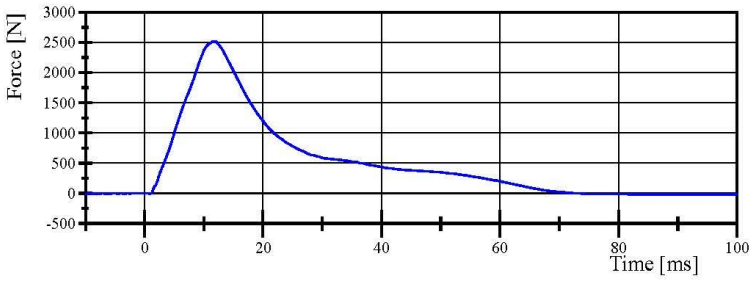
Filter Class: CFC_600
Max: 1,127.3 N at 12.0 ms
Min: -6.7 N at 95.8 ms

Rear Abdomen Force



Filter Class: CFC_600
Max: 859.6 N at 10.7 ms
Min: -1.0 N at 74.4 ms

Total Abdomen Force



Filter Class: CFC_600
Max: 2,519.3 N at 11.8 ms
Min: -19.7 N at 100.0 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 16:05:28 539

Transportation Research Center Inc.

Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Test Probe Force			
Peak	4,700 - 5,400 N	5,293.2 N	Yes
Time of Peak	11.8 - 16.1 ms	13.36 ms	Yes
Pubic Symphysis Force			
Peak	(-1,230) - (-1,590) N	-1,381.9 N	Yes
Time of Peak	12.2 - 17.0 ms	14.24 ms	Yes

Test meets specifications.

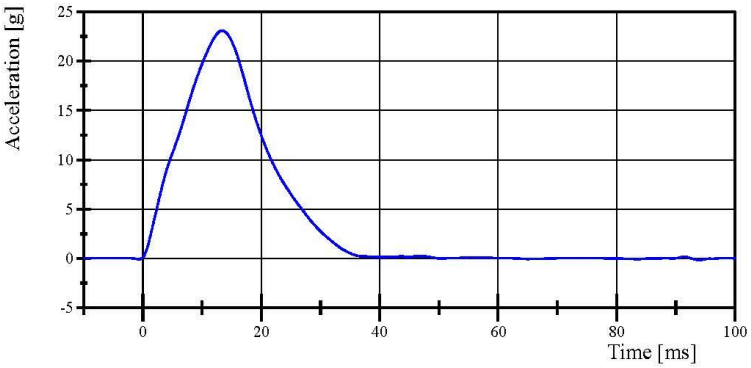
Condition: Used

Comments:
Pelvis Skin S/N: N/A

Transportation Research Center Inc.

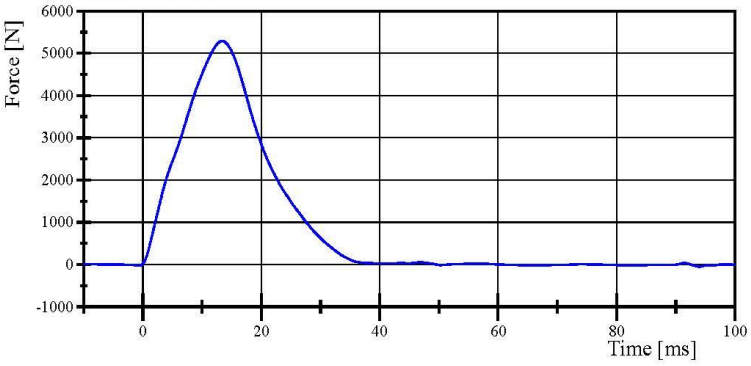
Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 65-1
Test Date: 6/5/2019

Pendulum Acceleration



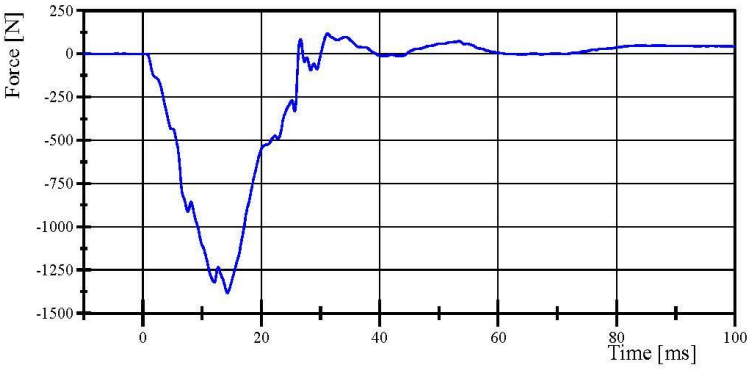
Filter Class: CFC_180
Max: 23.1 g at 13.4 ms
Min: -0.2 g at 94.1 ms

Pendulum Force



Filter Class: CFC_180
Max: 5,293.2 N at 13.4 ms
Min: -45.4 N at 94.1 ms

Pubic Symphysis Force



Filter Class: CFC_600
Max: 116.0 N at 31.2 ms
Min: -1,381.9 N at 14.2 ms

Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.05.2019 15:51:40 551

Pre-Test Calibration Sheets
Passenger S/N 305

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 305 Calibration No. 72

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	781	Yes
B	Shoulder Pivot Height	437.0 - 453.0	448	Yes
C	H-Point Height	79.0 - 89.0	86	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	131	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	44	Yes
I	Head Depth	178.0 - 188.0	185	Yes
J	Head Circumference	541.0 - 551.0	543	Yes
K	Buttock to Knee Length	514.0 - 540.0	534	Yes
L	Popliteal Height	343.0 - 369.0	348	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	396	Yes
N	Buttock Popliteal Length	416.0 - 442.0	434	Yes
O	Chest Depth without Jacket	195.0 - 211.0	197	Yes
P	Foot Length (right)	216.0 - 232.0	222	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	320	Yes
R	Arm Length	249.0 - 259.0	252	Yes
S	Knee Joint to seat Back	478.0 - 493.0	482	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	878	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	119.1 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-2.0 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

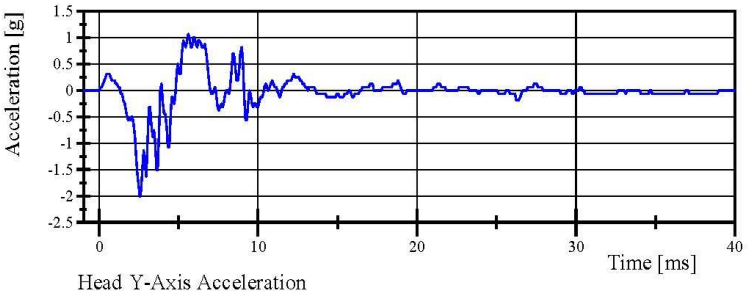
Condition: Used

Comments:
Head Skin S/N: 1253

Transportation Research Center Inc.

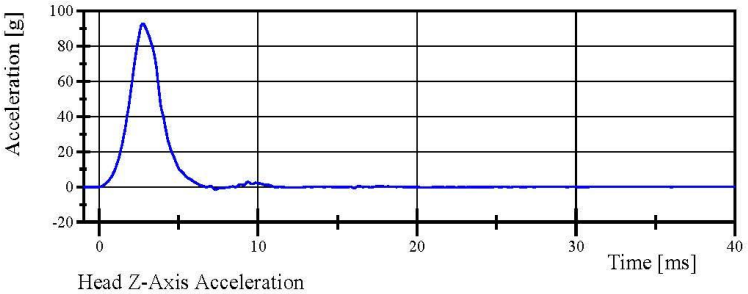
Left Lateral Head Drop
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Head X-Axis Acceleration



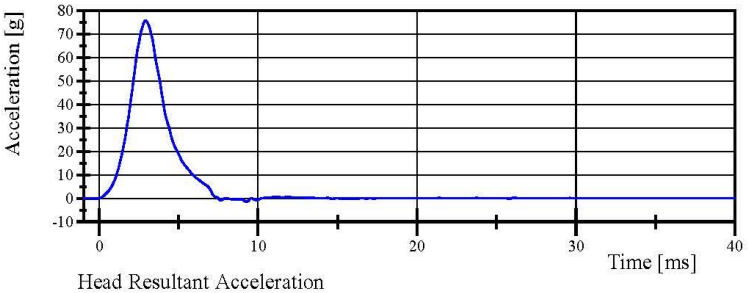
Filter Class: CFC_1000
Max: 1.1 g at 5.6 ms
Min: -2.0 g at 2.6 ms

Head Y-Axis Acceleration



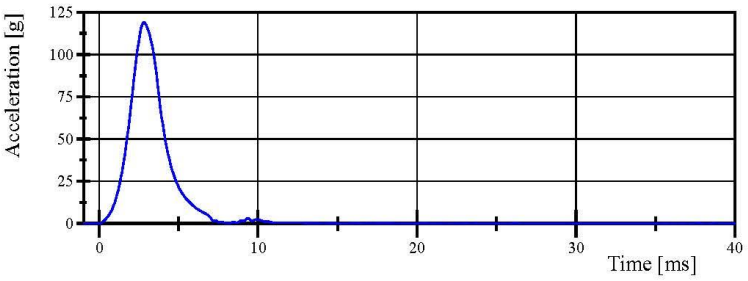
Filter Class: CFC_1000
Max: 92.8 g at 2.7 ms
Min: -1.5 g at 7.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 75.7 g at 2.9 ms
Min: -1.5 g at 9.3 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 119.1 g at 2.8 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 305 Certification No. 72-2
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.603 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.394 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.553 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.762 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.748 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.994 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-74.5 deg	Yes
Time of Peak	50 - 70 ms	68.1 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	40.2 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	123.0 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 180-2001-606

Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

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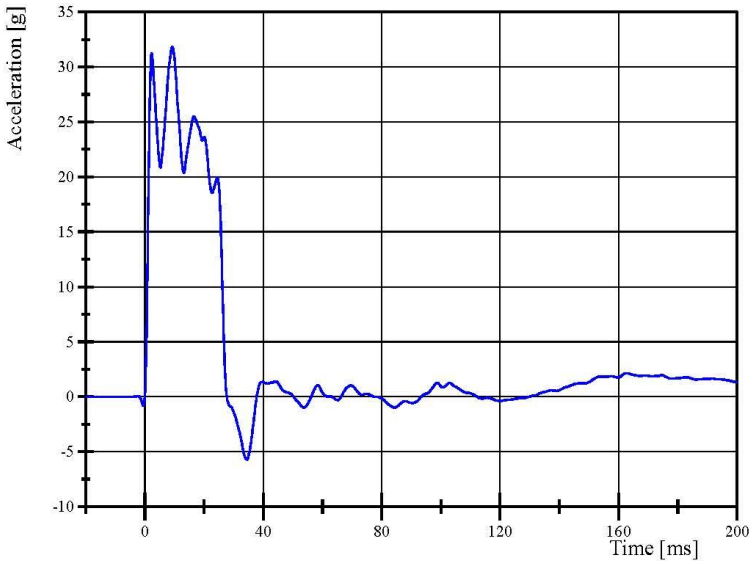
Transportation Research Center Inc.

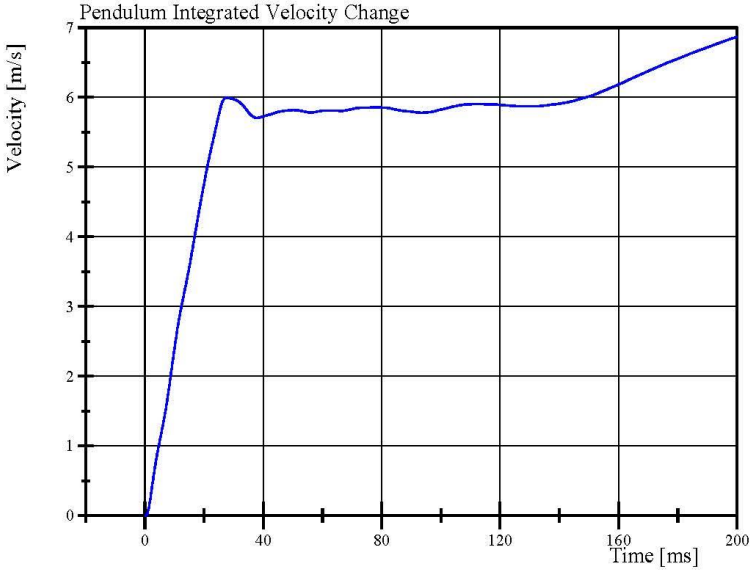
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 72-2
Test Date: 5/20/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 31.8 g at 9.3 ms
Min: -5.7 g at 34.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.9 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

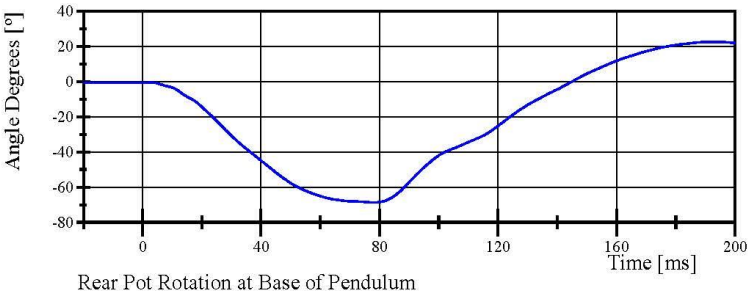
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 15:19:35 713

Transportation Research Center Inc.

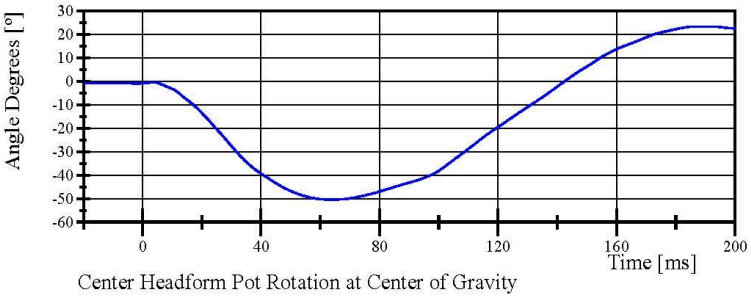
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 72-2
Test Date: 5/20/2019

Forward Pot Rotation at Base of Pendulum



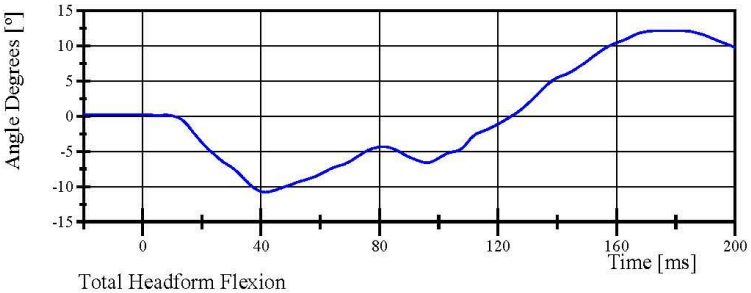
Filter Class: CFC_60
Max: 22.5 ° at 192.8 ms
Min: -68.6 ° at 78.1 ms

Rear Pot Rotation at Base of Pendulum



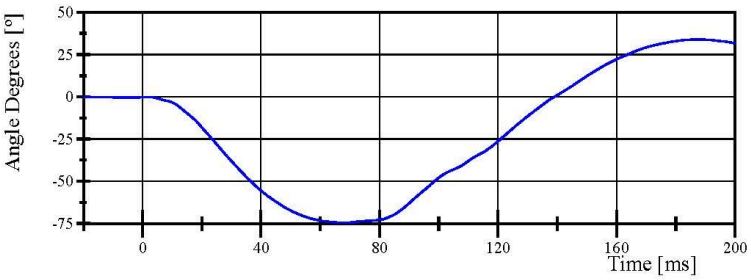
Filter Class: CFC_60
Max: 23.4 ° at 191.2 ms
Min: -50.5 ° at 63.8 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 12.2 ° at 180.9 ms
Min: -10.8 ° at 41.5 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 34.0 ° at 187.6 ms
Min: -74.5 ° at 68.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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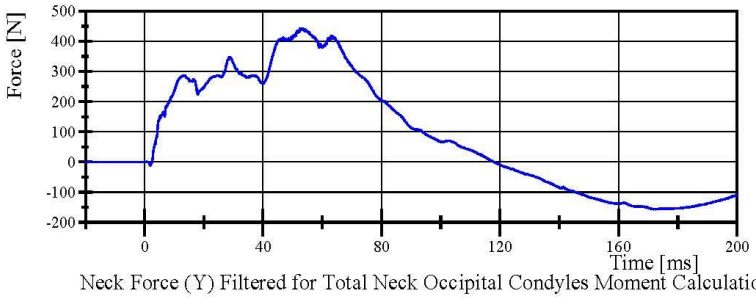
Transportation Research Center Inc.

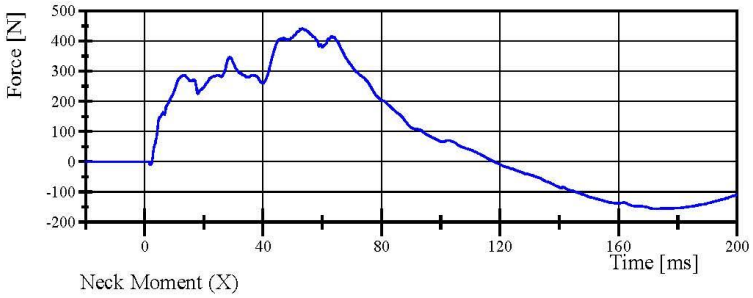
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 72-2
Test Date: 5/20/2019

Neck Force (Y)



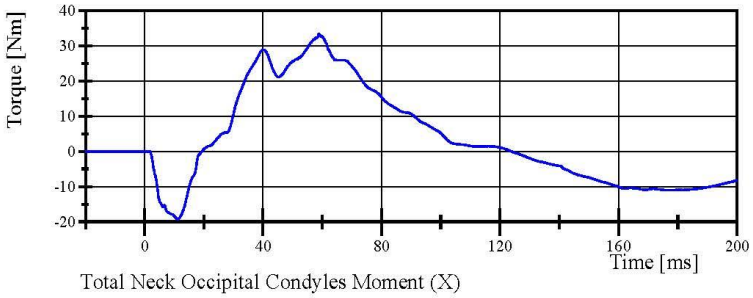
Filter Class: CFC_1000
Max: 443.9 N at 53.3 ms
Min: -156.1 N at 171.8 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



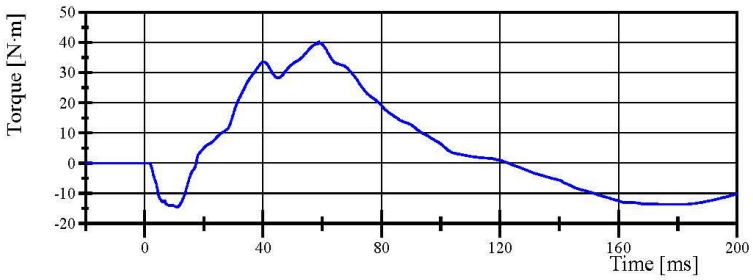
Filter Class: CFC_600
Max: 441.6 N at 53.3 ms
Min: -155.9 N at 171.9 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 33.4 Nm at 58.9 ms
Min: -19.2 Nm at 11.2 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 40.2 N·m at 58.8 ms
Min: -14.5 N·m at 11.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.6 g	Yes
Shoulder Displacement	28 - 37 mm	32.2 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	17.3 g	Yes

Test meets specifications.

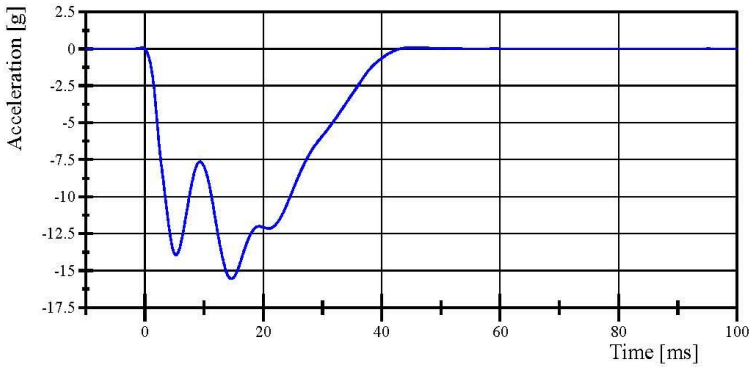
Condition: Used

Comments:
Left Arm S/N: 952
Shoulder Rib S/N: 180-3355 DM4450

Transportation Research Center Inc.

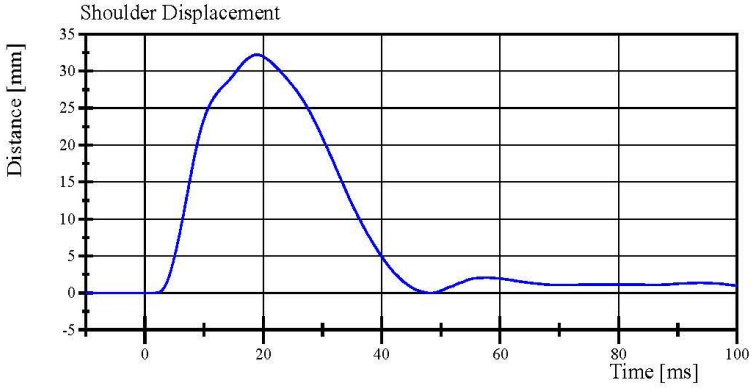
Left Lateral Shoulder
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



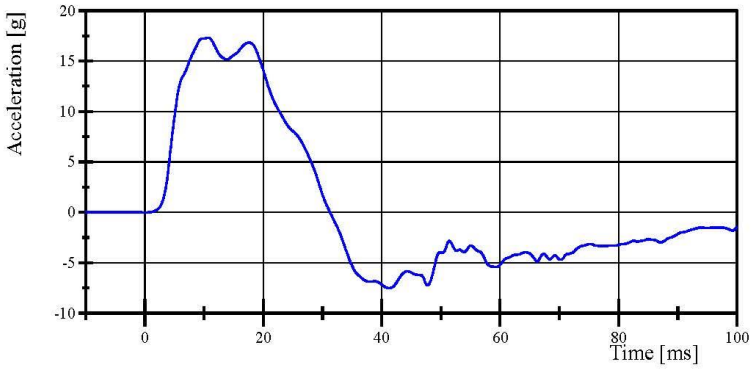
Filter Class: CFC_180
Max: 0.1 g at 44.8 ms
Min: -15.6 g at 14.6 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 32.2 mm at 19.0 ms
Min: -0.0 mm at 48.2 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 17.3 g at 10.6 ms
Min: -7.5 g at 41.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 07:41:22 876

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.724 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-31.8 g	Yes
Shoulder Displacement	31 - 40 mm	37.1 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.1 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.6 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.1 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	37.0 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	32.2 g	Yes

Test meets specifications.

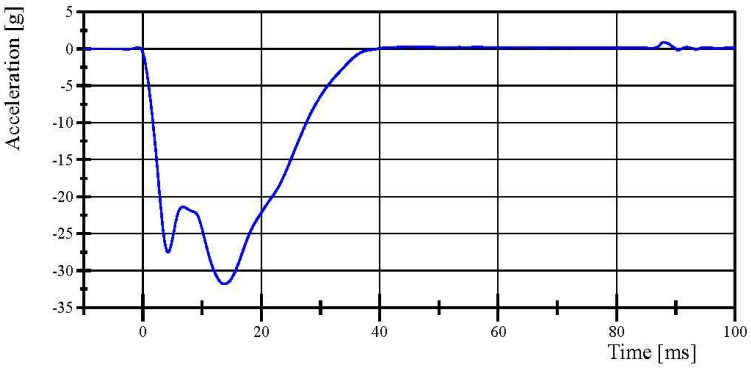
Condition: Used

Comments:
Left Arm S/N: 952
Shoulder Rib S/N: 180-3355 DM4450
Upper Thorax Rib S/N: 2135
Middle Thorax Rib S/N: 2136
Lower Thorax Rib S/N: 2137

Transportation Research Center Inc.

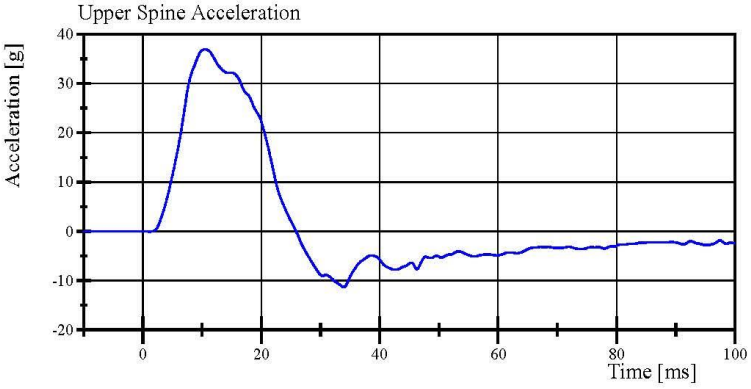
Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



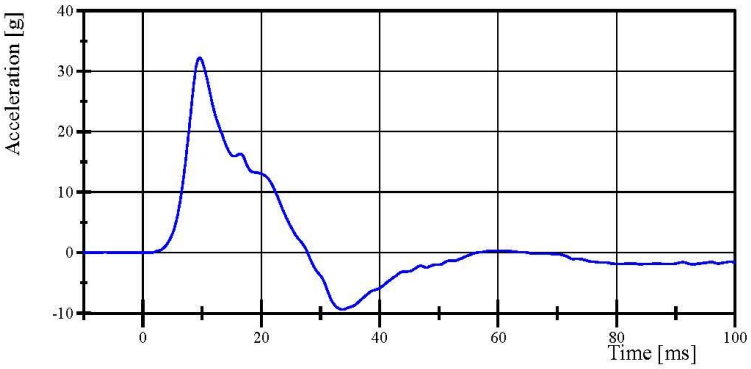
Filter Class: CFC_180
Max: 0.9 g at 88.0 ms
Min: -31.8 g at 13.8 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 37.0 g at 10.6 ms
Min: -11.3 g at 33.9 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 32.2 g at 9.6 ms
Min: -9.4 g at 33.7 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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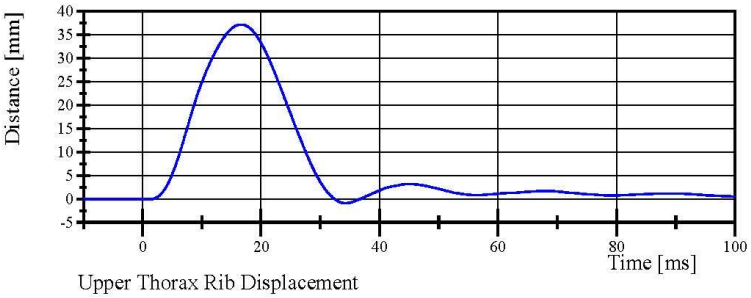
Transportation Research Center Inc.

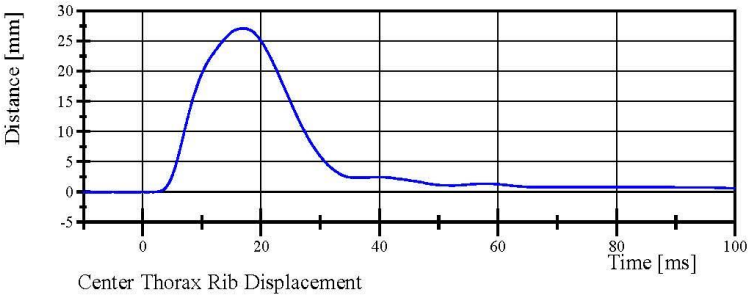
Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Shoulder Rib Displacement



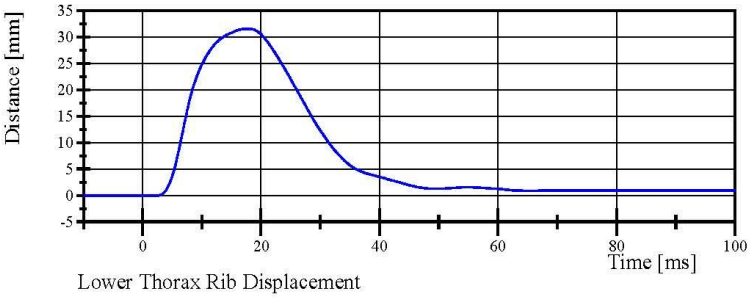
Filter Class: CFC_600
Max: 37.1 mm at 16.6 ms
Min: -0.9 mm at 34.2 ms

Upper Thorax Rib Displacement



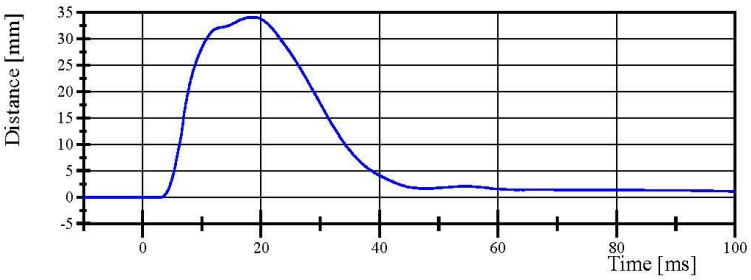
Filter Class: CFC_600
Max: 27.1 mm at 17.3 ms
Min: -0.0 mm at 1.8 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.6 mm at 17.5 ms
Min: -0.0 mm at 2.5 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 34.1 mm at 18.2 ms
Min: -0.0 mm at 1.9 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 08:29:33 627

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.264 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.9 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	33.4 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	40.1 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.2 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.4 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.7 g	Yes

Test meets specifications.

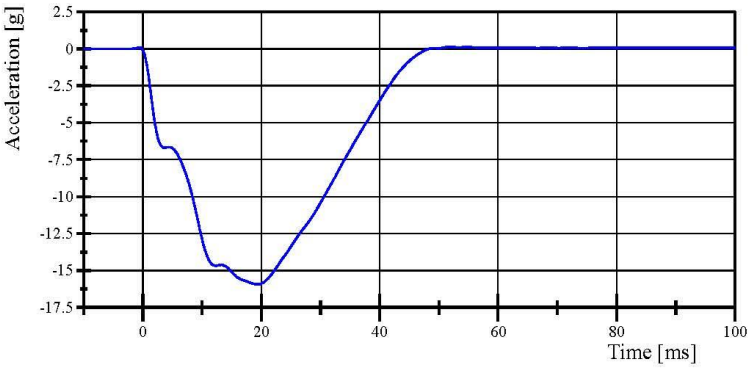
Condition: Used

Comments:
Upper Thorax Rib S/N: 2135
Middle Thorax Rib S/N: 2136
Lower Thorax Rib S/N: 2137

Transportation Research Center Inc.

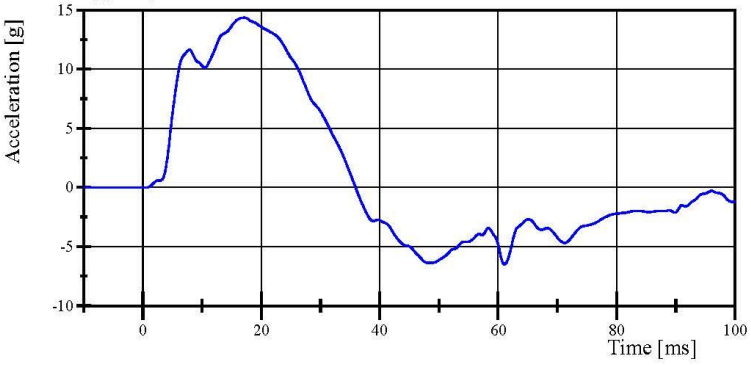
Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



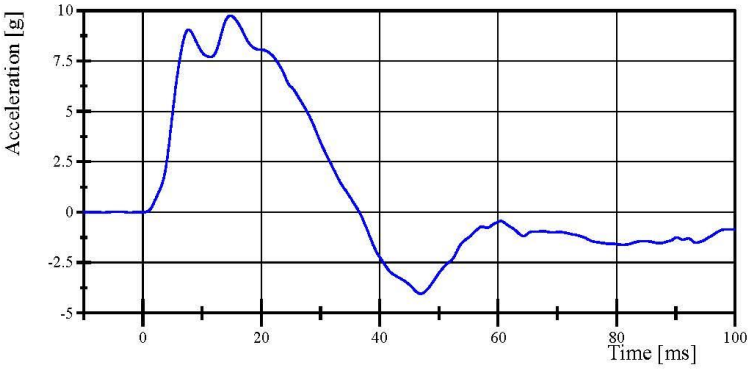
Filter Class: CFC_180
Max: 0.1 g at 51.8 ms
Min: -15.9 g at 19.3 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.4 g at 17.1 ms
Min: -6.5 g at 61.0 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.7 g at 14.8 ms
Min: -4.0 g at 46.9 ms

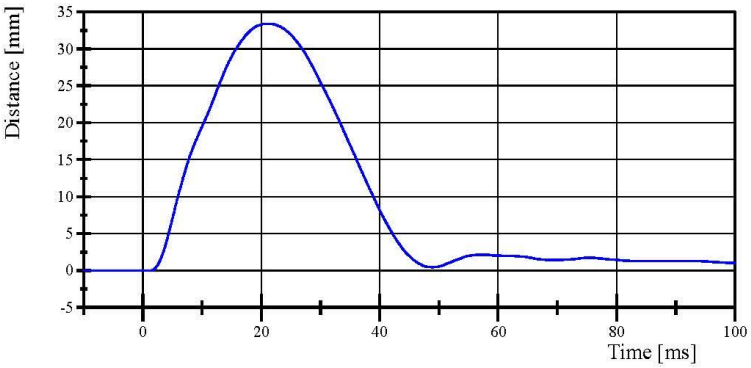
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 07:58:35 885

Transportation Research Center Inc.

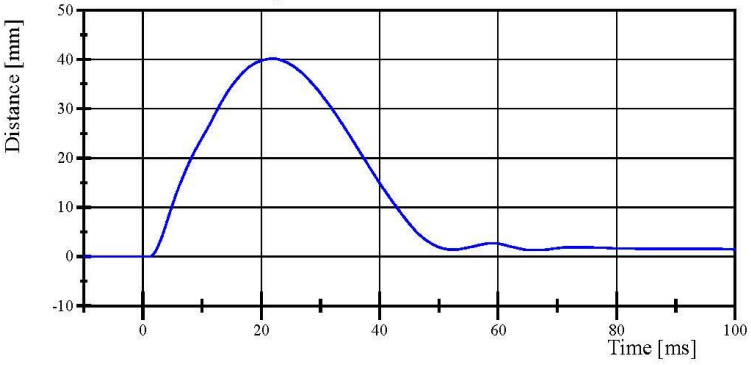
Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Upper Thorax Rib Displacement



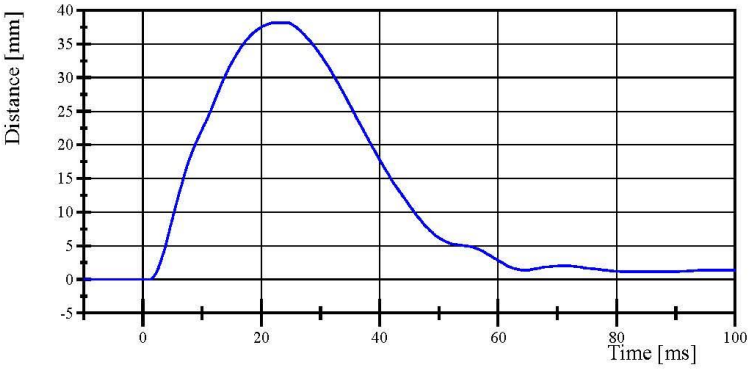
Filter Class: CFC_600
Max: 33.4 mm at 21.3 ms
Min: -0.0 mm at 1.2 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 40.1 mm at 21.9 ms
Min: -0.0 mm at 1.0 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 38.2 mm at 22.6 ms
Min: -0.0 mm at 1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 07:58:36 885

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 ℃	21.4 ℃	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.26 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-13.2 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	45.6 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	40.9 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.07 g	Yes

Test meets specifications.

Condition: Used

Comments:
Upper Abdominal Rib S/N: 1997
Lower Abdominal Rib S/N: DS1234

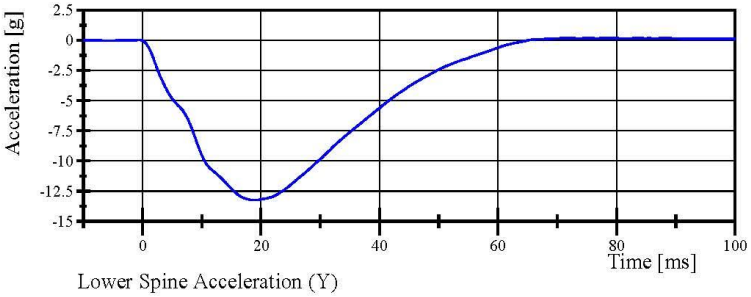
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 07:49:31 675

Transportation Research Center Inc.

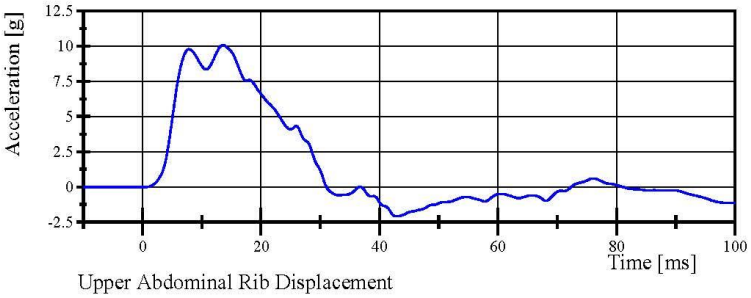
Left Lateral Abdomen
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



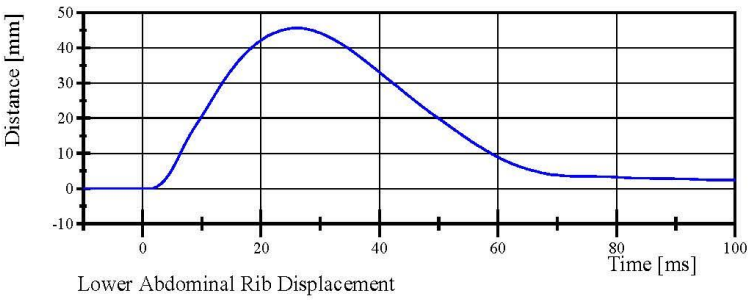
Filter Class: CFC_180
Max: 0.2 g at 78.3 ms
Min: -13.2 g at 18.9 ms

Lower Spine Acceleration (Y)



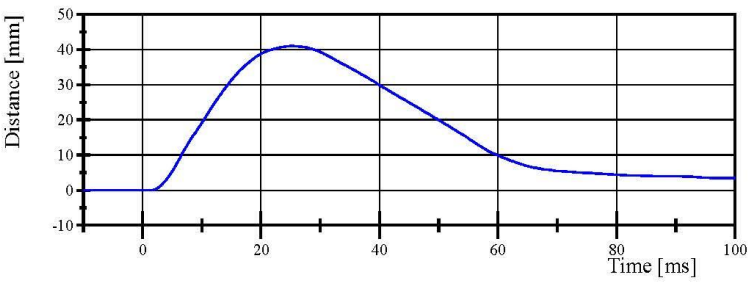
Filter Class: CFC_180
Max: 10.1 g at 13.6 ms
Min: -2.1 g at 42.8 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 45.6 mm at 26.1 ms
Min: -0.0 mm at 1.1 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 40.9 mm at 25.2 ms
Min: -0.0 mm at 1.3 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 07:50:06 675

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.60 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.98 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	36.8 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,108.4 N	Yes

Test meets specifications.

Condition: Used

Comments:
Pelvis Skin S/N: 884
Pelvis Plug Info:
Manufacturer: SACO
S/N: 11735
Cal Date: 20171206

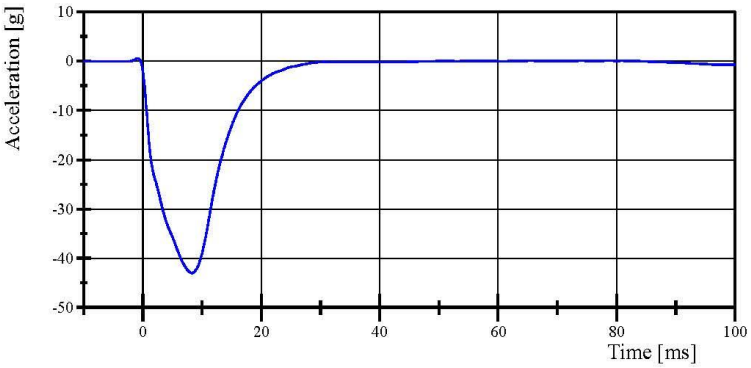
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

05.20.2019 09:35:46 459

Transportation Research Center Inc.

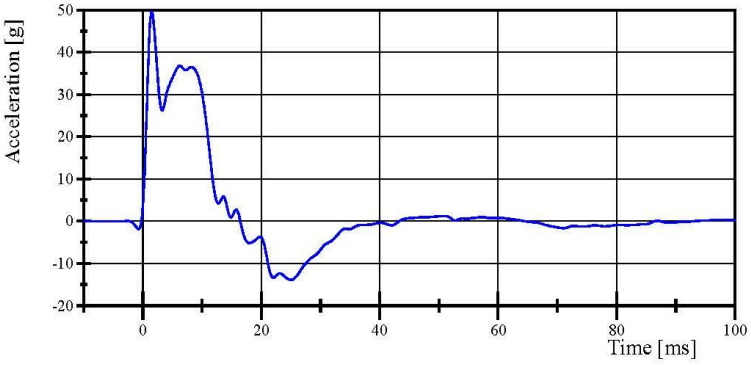
Left Lateral Pelvis
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



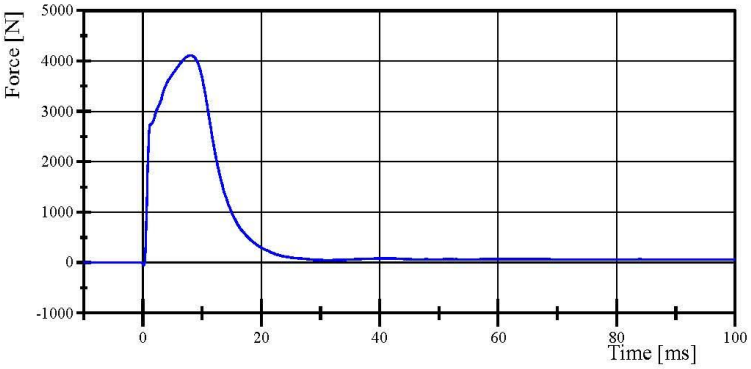
Filter Class: CFC_180
Max: 0.6 g at -0.9 ms
Min: -43.0 g at 8.2 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 49.6 g at 1.5 ms
Min: -13.9 g at 25.0 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,108.4 N at 8.1 ms
Min: -49.0 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.20.2019 09:37:11 459

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-37.5 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	29.1 g	Yes
Iliac Force	4,100 - 5,100 N	4,445.8 N	Yes

Test meets specifications.

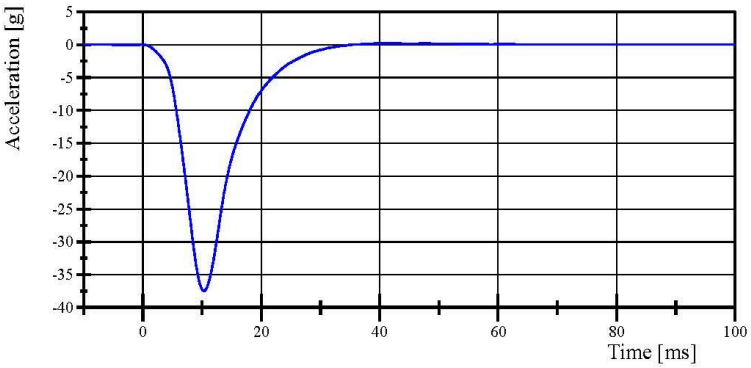
Condition: Used

Comments:
Pelvis Skin S/N: 884

Transportation Research Center Inc.

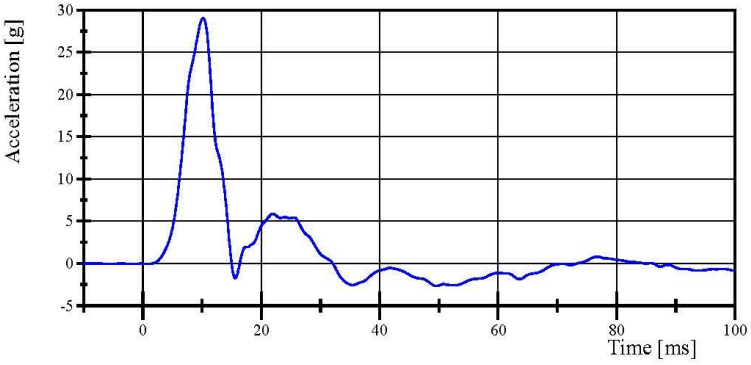
Left Lateral Iliac
SID IIs Serial No. 305 Certification No. 72-1
Test Date: 5/20/2019

Probe Acceleration



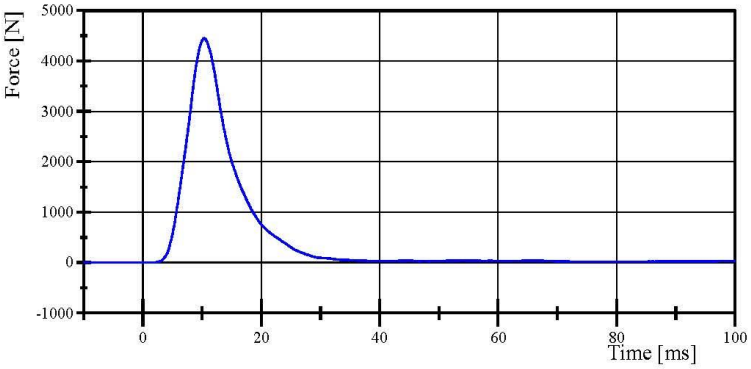
Filter Class: CFC_180
Max: 0.2 g at 41.8 ms
Min: -37.5 g at 10.3 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 29.1 g at 10.2 ms
Min: -2.7 g at 49.5 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,445.8 N at 10.4 ms
Min: -0.6 N at -0.9 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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Post-Test Calibration Sheets
Passenger S/N 305

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 305 Calibration No. 73

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	448	Yes
C	H-Point Height	79.0 - 89.0	86	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	44	Yes
I	Head Depth	178.0 - 188.0	185	Yes
J	Head Circumference	541.0 - 551.0	543	Yes
K	Buttock to Knee Length	514.0 - 540.0	534	Yes
L	Popliteal Height	343.0 - 369.0	348	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	396	Yes
N	Buttock Popliteal Length	416.0 - 442.0	434	Yes
O	Chest Depth without Jacket	195.0 - 211.0	197	Yes
P	Foot Length (right)	216.0 - 232.0	222	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	320	Yes
R	Arm Length	249.0 - 259.0	252	Yes
S	Knee Joint to seat Back	478.0 - 493.0	482	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	877	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	116.0 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-2.2 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

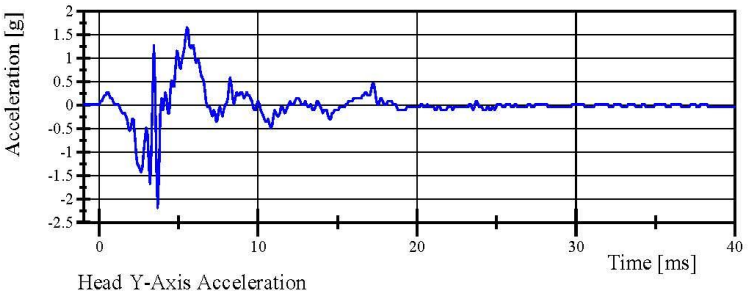
Condition: Used

Comments:
Head Skin S/N: 1253

Transportation Research Center Inc.

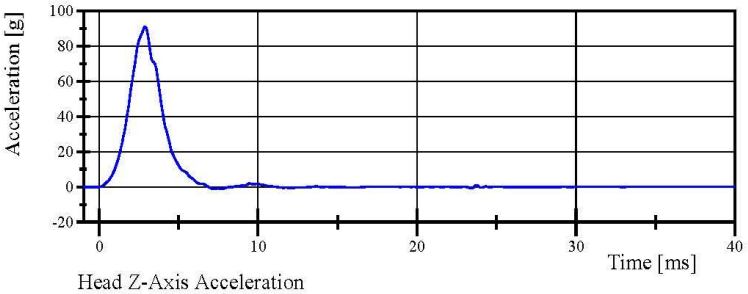
Left Lateral Head Drop
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Head X-Axis Acceleration



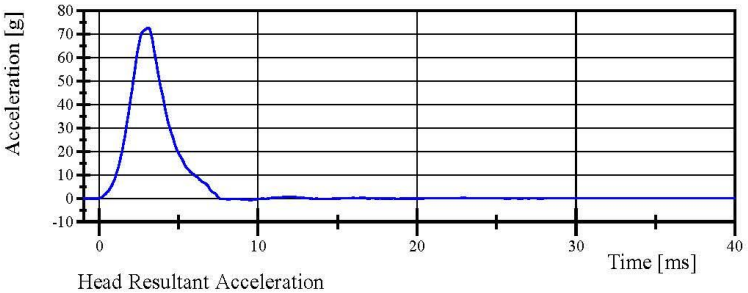
Filter Class: CFC_1000
Max: 1.7 g at 5.5 ms
Min: -2.2 g at 3.7 ms

Head Y-Axis Acceleration



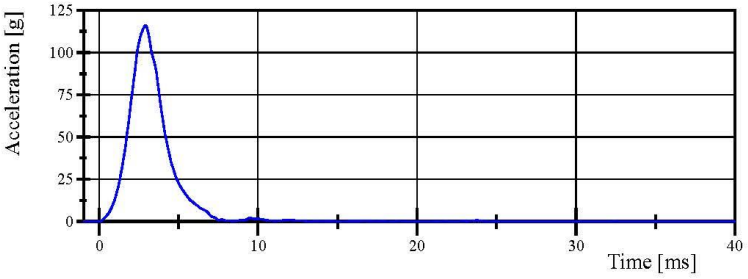
Filter Class: CFC_1000
Max: 91.2 g at 2.9 ms
Min: -1.2 g at 7.2 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 72.6 g at 3.0 ms
Min: -0.7 g at 9.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 116.0 g at 2.9 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.06.2019 07:05:28 197

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.614 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.237 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.371 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.665 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.615 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	6.019 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-71.7 deg	Yes
Time of Peak	50 - 70 ms	65.0 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	38.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	125.1 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 180-2001-606

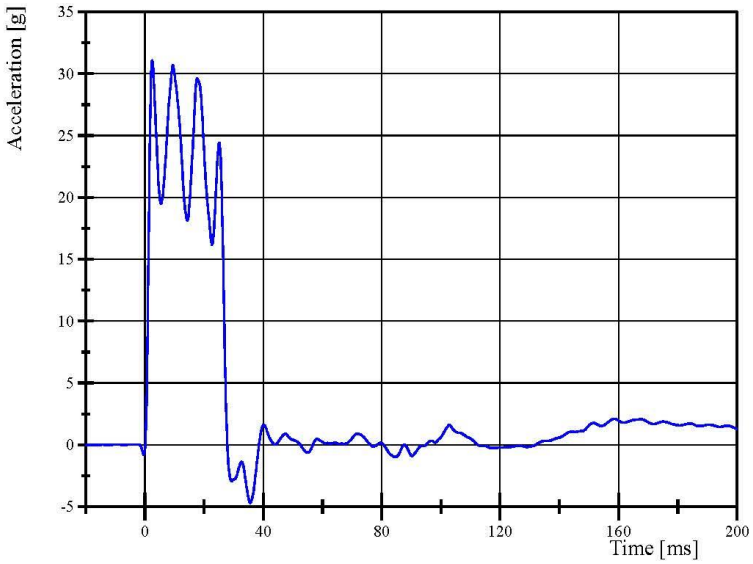
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

06.06.2019 07:36:37 709

Transportation Research Center Inc.

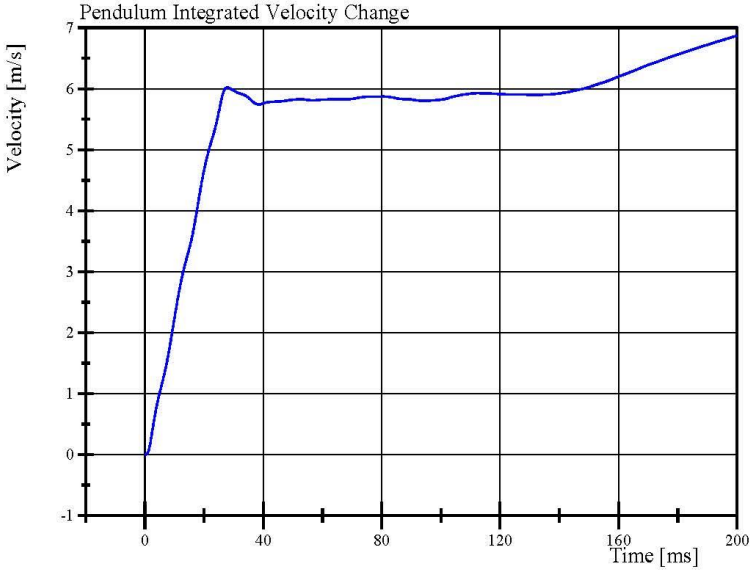
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 31.1 g at 2.5 ms
Min: -4.7 g at 35.6 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.9 m/s at 200.0 ms
Min: -0.0 m/s at 0.2 ms

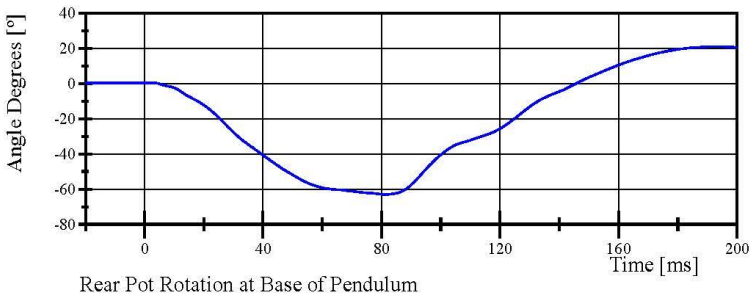
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.06.2019 07:37:05 709

Transportation Research Center Inc.

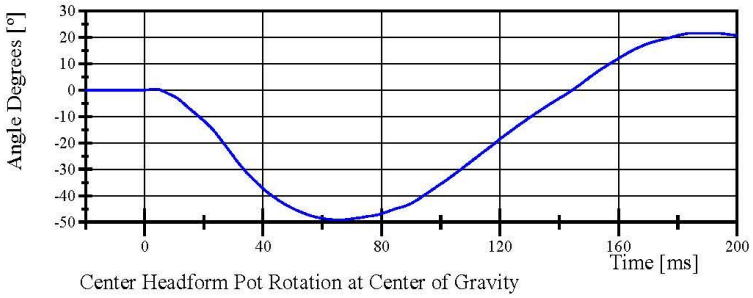
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Forward Pot Rotation at Base of Pendulum



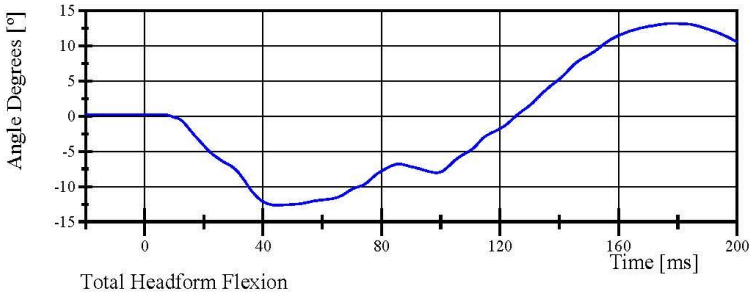
Filter Class: CFC_60
Max: 21.1 ° at 192.2 ms
Min: -62.9 ° at 81.4 ms

Rear Pot Rotation at Base of Pendulum



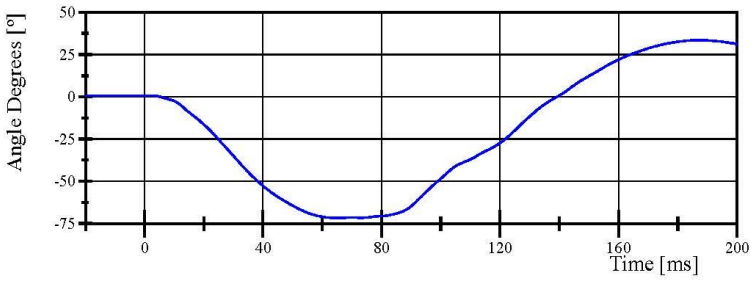
Filter Class: CFC_60
Max: 21.7 ° at 190.3 ms
Min: -49.1 ° at 65.6 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 13.2 ° at 177.7 ms
Min: -12.6 ° at 44.8 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 33.5 ° at 187.0 ms
Min: -71.7 ° at 65.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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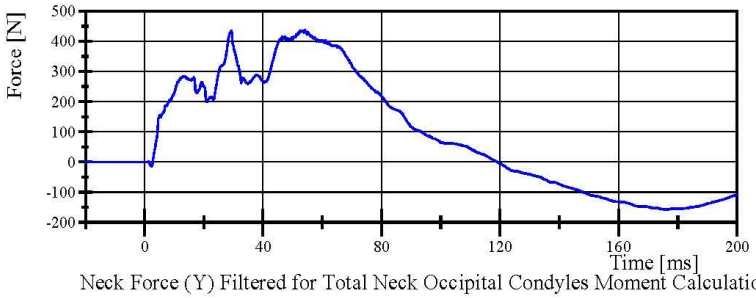
Transportation Research Center Inc.

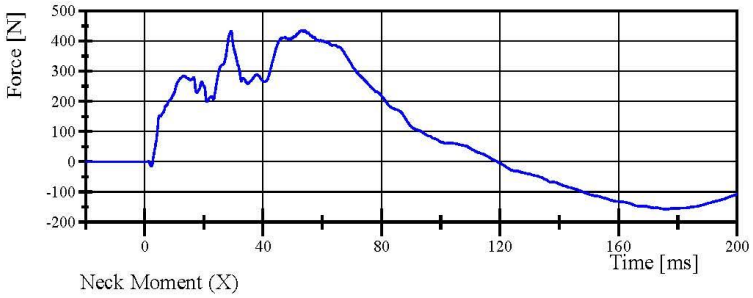
Left Lateral Neck
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/6/2019

Neck Force (Y)



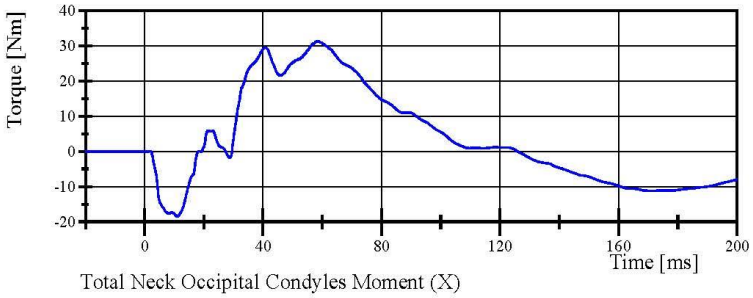
Filter Class: CFC_1000
Max: 437.3 N at 54.1 ms
Min: -156.7 N at 176.0 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



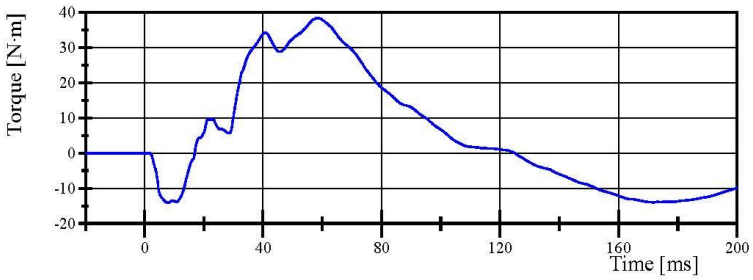
Filter Class: CFC_600
Max: 435.6 N at 53.2 ms
Min: -156.5 N at 176.0 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 31.3 Nm at 58.8 ms
Min: -18.5 Nm at 11.0 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 38.4 N·m at 58.8 ms
Min: -14.1 N·m at 7.9 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.06.2019 07:37:07 709

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.28 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.6 g	Yes
Shoulder Displacement	28 - 37 mm	31.9 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	17.2 g	Yes

Test meets specifications.

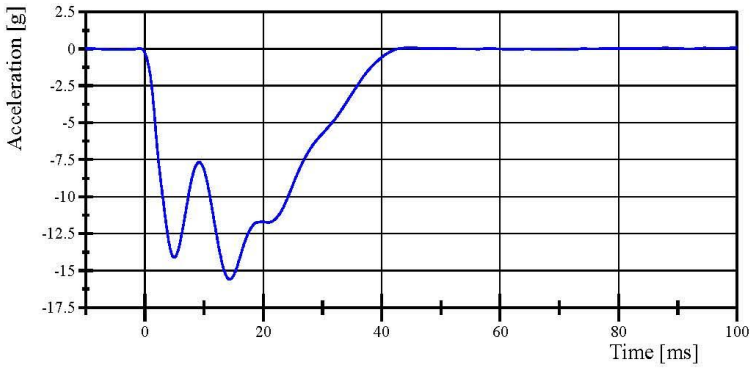
Condition: Used

Comments:
Left Arm S/N: 952
Shoulder Rib S/N: 180-3355 DM4450

Transportation Research Center Inc.

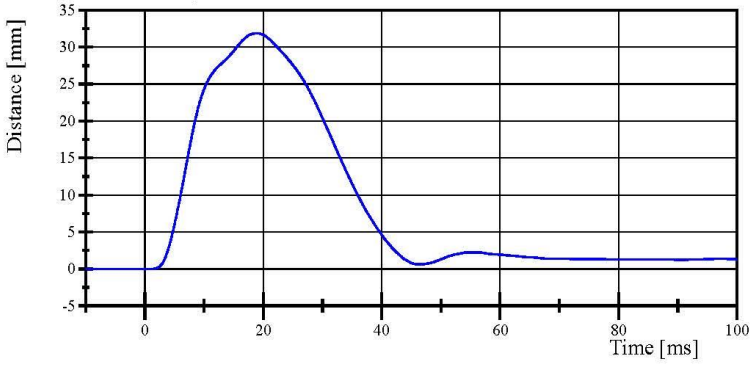
Left Lateral Shoulder
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



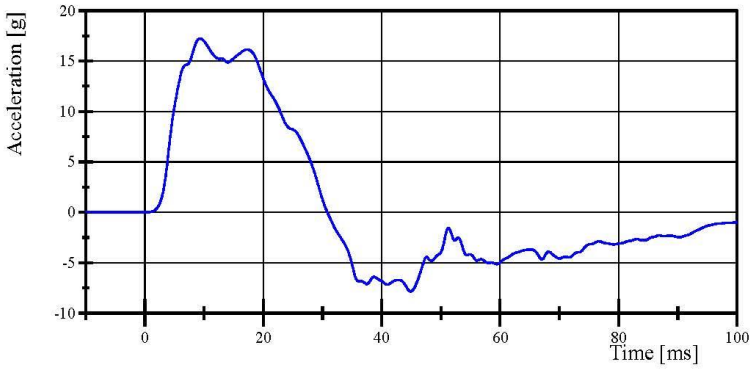
Filter Class: CFC_180
Max: 0.1 g at 100.0 ms
Min: -15.6 g at 14.3 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 31.9 mm at 18.8 ms
Min: -0.0 mm at 1.1 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 17.2 g at 9.4 ms
Min: -7.8 g at 44.9 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.05.2019 14:11:45 794

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.733 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-31.2 g	Yes
Shoulder Displacement	31 - 40 mm	36.2 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	26.9 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.7 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.0 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	37.0 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	31.8 g	Yes

Test meets specifications.

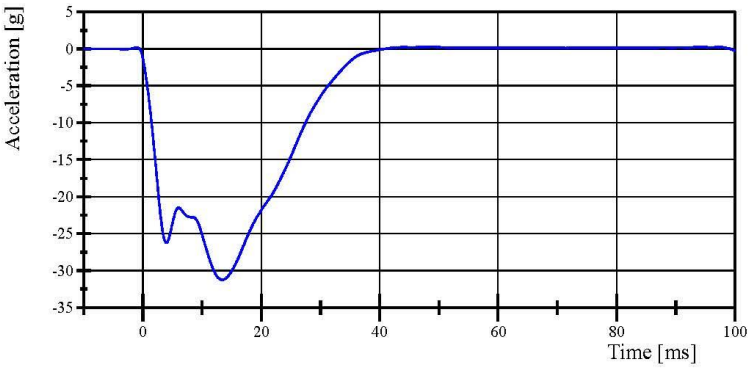
Condition: Used

Comments:
Left Arm S/N: 952
Shoulder Rib S/N: 180-3355 DM4450
Upper Thorax Rib S/N: 2135
Middle Thorax Rib S/N: 2136
Lower Thorax Rib S/N: 2137

Transportation Research Center Inc.

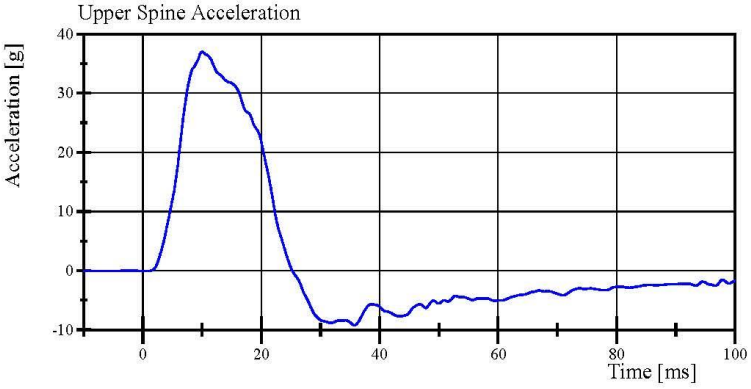
Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



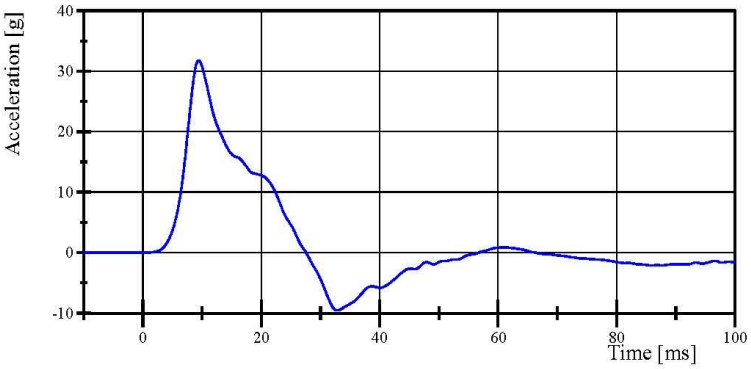
Filter Class: CFC_180
Max: 0.3 g at 48.8 ms
Min: -31.2 g at 13.4 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 37.0 g at 10.0 ms
Min: -9.2 g at 35.8 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 31.8 g at 9.4 ms
Min: -9.5 g at 32.9 ms

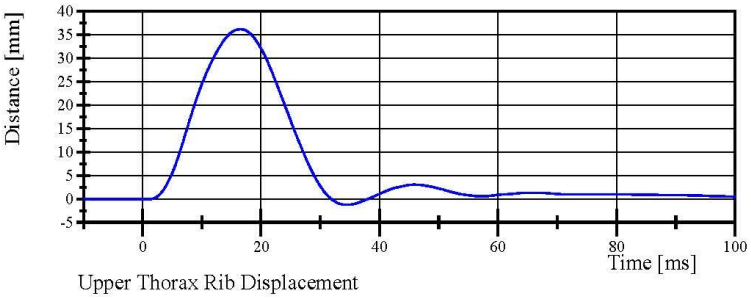
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.05.2019 15:11:52 564

Transportation Research Center Inc.

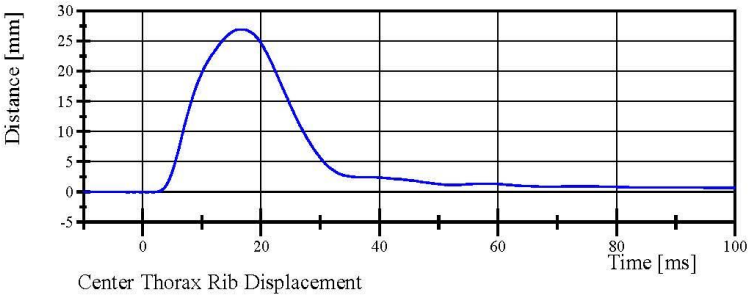
Left Lateral Thorax with Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Shoulder Rib Displacement



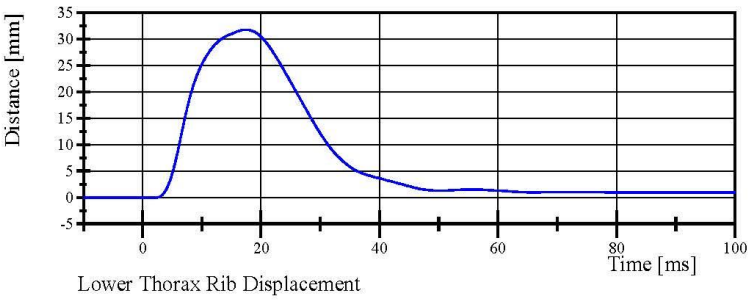
Filter Class: CFC_600
Max: 36.2 mm at 16.5 ms
Min: -1.2 mm at 34.5 ms

Upper Thorax Rib Displacement



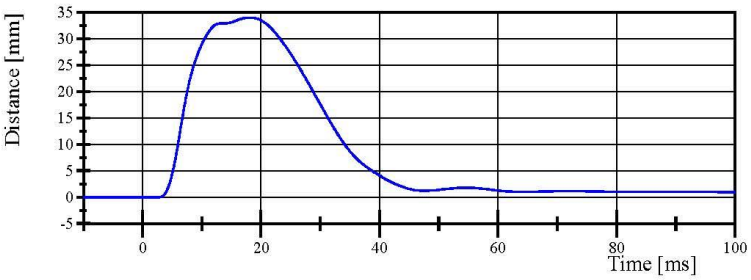
Filter Class: CFC_600
Max: 26.9 mm at 16.4 ms
Min: -0.0 mm at 1.9 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.7 mm at 17.5 ms
Min: -0.0 mm at 2.2 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 34.0 mm at 18.1 ms
Min: -0.0 mm at -10.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.05.2019 15:11:53 564

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.275 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.7 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	36.4 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	40.8 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	37.0 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.5 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.4 g	Yes

Test meets specifications.

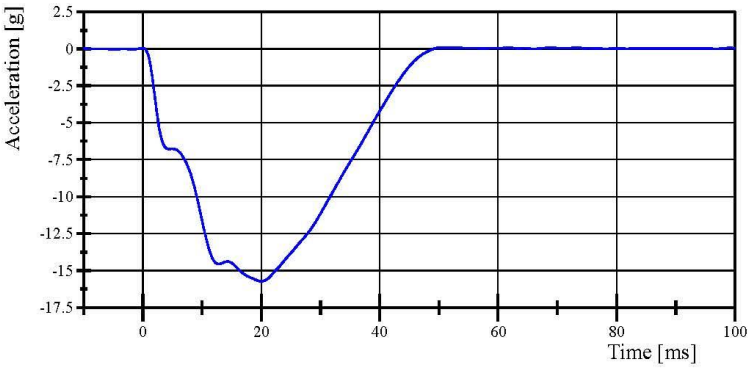
Condition: Used

Comments:
Upper Thorax Rib S/N: 2135
Middle Thorax Rib S/N: 2136
Lower Thorax Rib S/N: 2137

Transportation Research Center Inc.

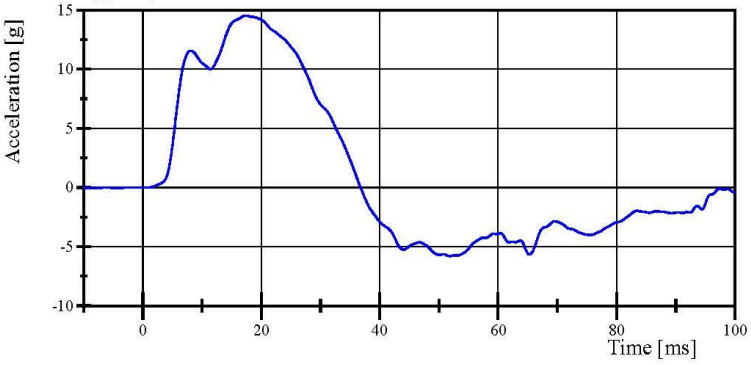
Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



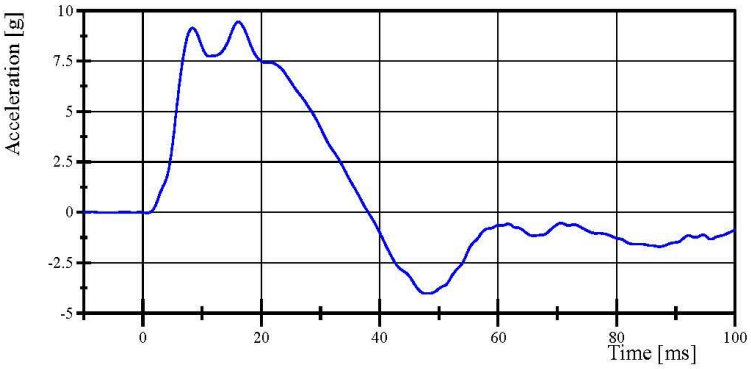
Filter Class: CFC_180
Max: 0.1 g at 52.7 ms
Min: -15.7 g at 20.0 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.5 g at 17.4 ms
Min: -5.8 g at 51.8 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.4 g at 16.1 ms
Min: -4.0 g at 47.8 ms

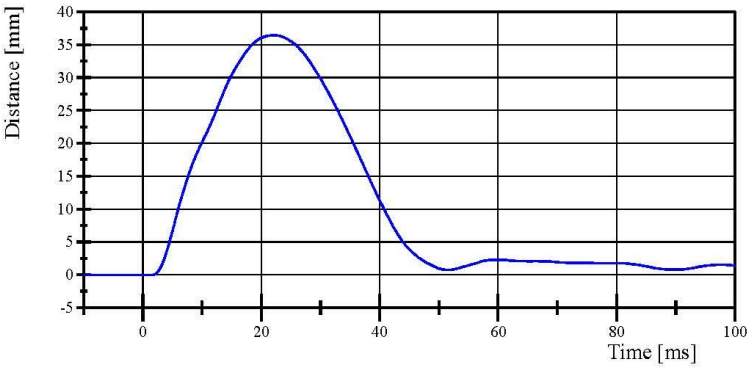
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.05.2019 14:37:10 796

Transportation Research Center Inc.

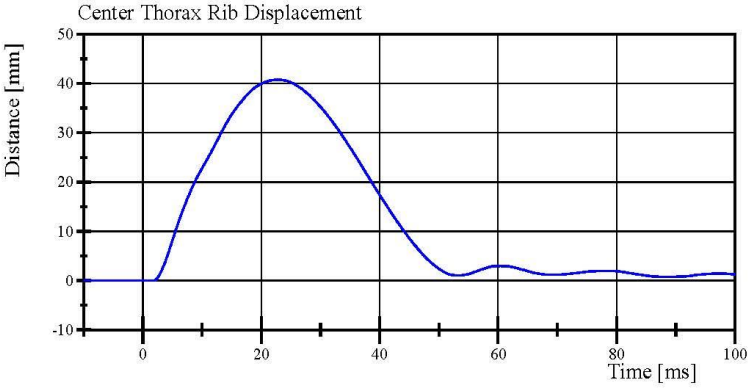
Left Lateral Thorax without Arm
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Upper Thorax Rib Displacement



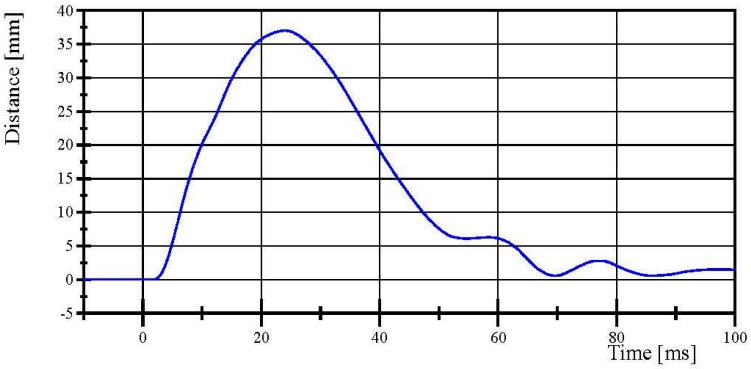
Filter Class: CFC_600
Max: 36.4 mm at 22.2 ms
Min: -0.0 mm at 1.6 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 40.8 mm at 22.9 ms
Min: -0.0 mm at 1.7 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 37.0 mm at 23.9 ms
Min: -0.0 mm at 1.4 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.05.2019 14:37:10 796

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-12.9 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	45.6 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	43.4 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	9.55 g	Yes

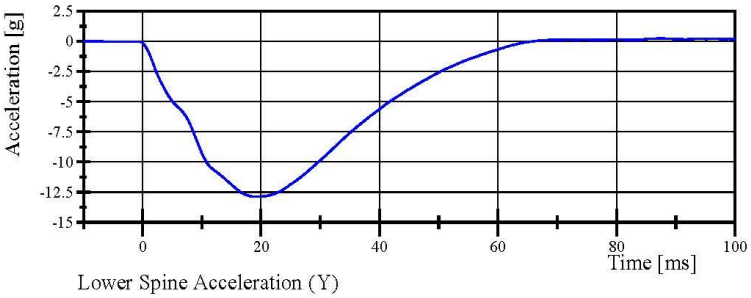
Test meets specifications.

Condition: Used
Comments:
Upper Abdominal Rib S/N: 1997
Lower Abdominal Rib S/N: DS1234

Transportation Research Center Inc.

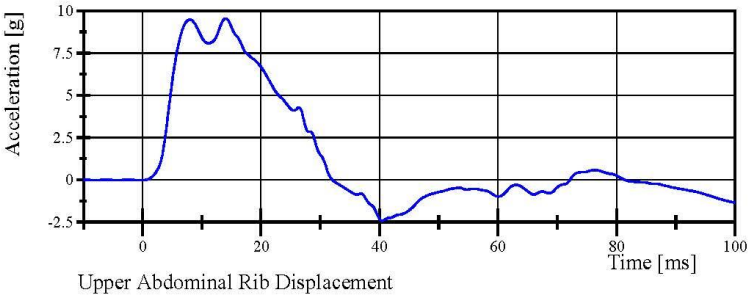
Left Lateral Abdomen
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



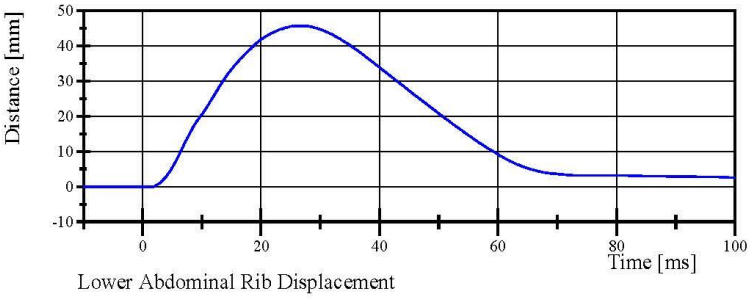
Filter Class: CFC_180
Max: 0.3 g at 87.4 ms
Min: -12.9 g at 19.2 ms

Lower Spine Acceleration (Y)



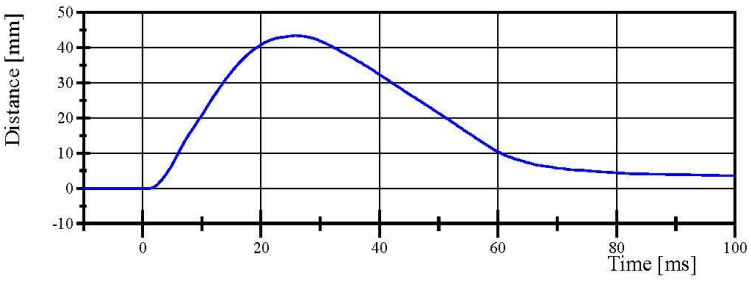
Filter Class: CFC_180
Max: 9.6 g at 14.1 ms
Min: -2.4 g at 40.4 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 45.6 mm at 26.2 ms
Min: -0.0 mm at 1.7 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 43.4 mm at 25.8 ms
Min: -0.0 mm at 0.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.62 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.31 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	36.7 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,059.2 N	Yes

Test meets specifications.

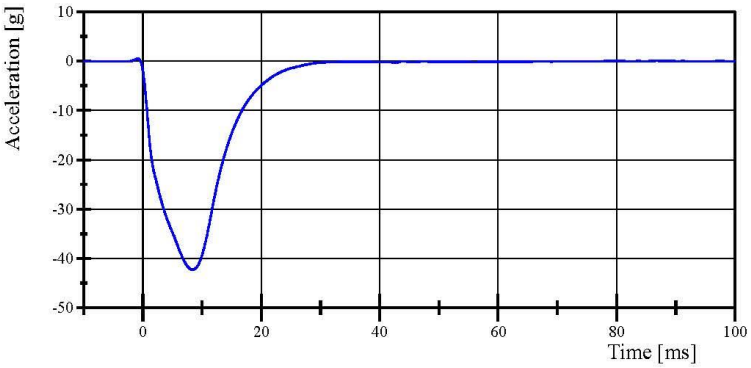
Condition: Used

Comments:
Pelvis Skin S/N: 884
Pelvis Plug Info:
Manufacturer: SACO
S/N: 11632
Cal Date: 20171020

Transportation Research Center Inc.

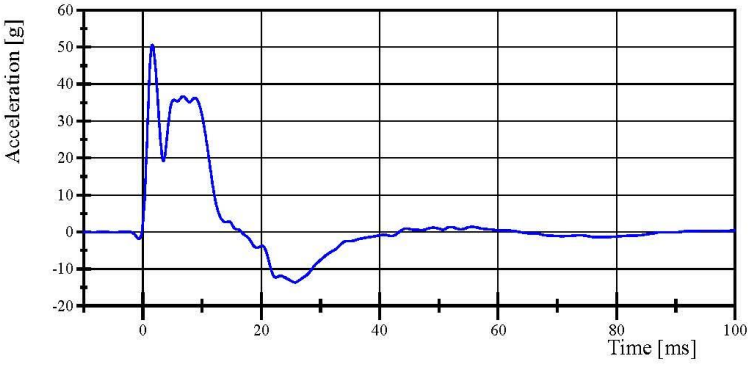
Left Lateral Pelvis
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



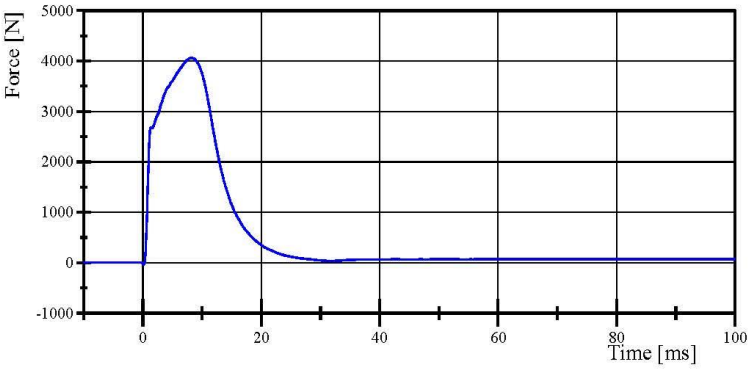
Filter Class: CFC_180
Max: 0.5 g at -0.9 ms
Min: -42.3 g at 8.4 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 50.7 g at 1.6 ms
Min: -13.6 g at 25.7 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,059.2 N at 8.2 ms
Min: -32.5 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-41.4 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	35.4 g	Yes
Iliac Force	4,100 - 5,100 N	4,930.3 N	Yes

Test meets specifications.

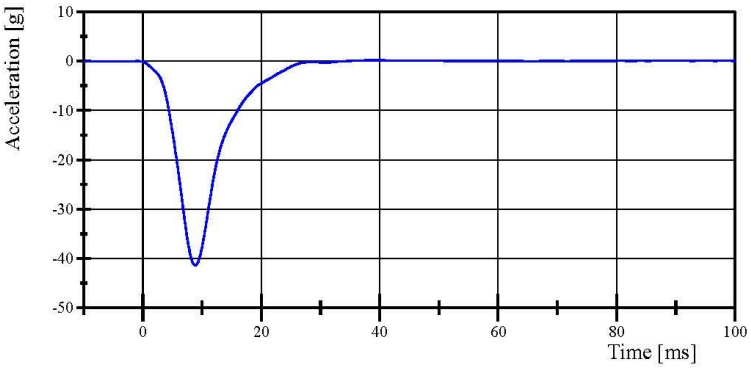
Condition: Used

Comments:
Pelvis Skin S/N: 884

Transportation Research Center Inc.

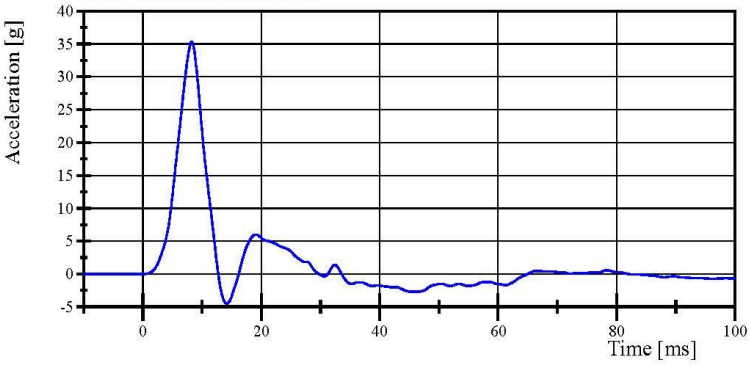
Left Lateral Iliac
SID IIs Serial No. 305 Certification No. 73-1
Test Date: 6/5/2019

Probe Acceleration



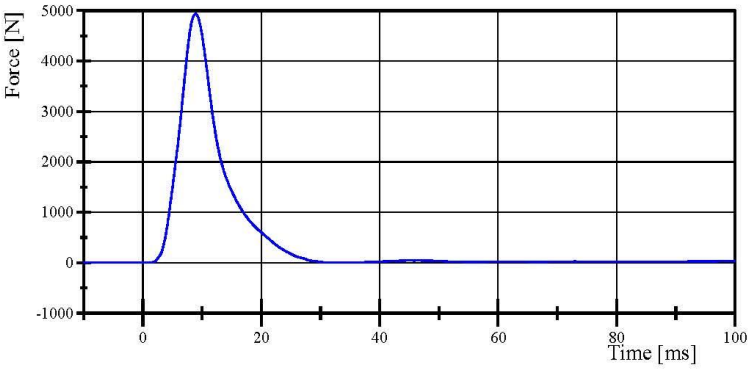
Filter Class: CFC_180
Max: 0.2 g at 39.8 ms
Min: -41.4 g at 8.9 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 35.4 g at 8.2 ms
Min: -4.5 g at 14.2 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,930.3 N at 9.0 ms
Min: -0.7 N at -5.3 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N F030		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		X	P87680	Endevco	16-Apr-2019
		Y	T10352	Endevco	16-Apr-2019
		Z	P91950	Endevco	16-Apr-2019
Redundant Head Accelerometers		X	P94566	Endevco	16-Apr-2019
		Y	P83368	Endevco	16-Apr-2019
		Z	P94483	Endevco	16-Apr-2019
Thoracic Rib Displacement Potentiometers	Upper	Y	111	Honeywell	16-Apr-2019
	Middle	Y	174	FTSS	16-Apr-2019
	Lower	Y	173	FTSS	16-Apr-2019
Abdomen Load Cells	Front	Y	1441	Denton	16-Apr-2019
	Middle	Y	1436	Denton	16-Apr-2019
	Rear	Y	1437	Denton	16-Apr-2019
Lower Spine Accelerometers (T12)		X	P89126	Endevco	16-Apr-2019
		Y	P87139	Endevco	16-Apr-2019
		Z	P64884	Endevco	16-Apr-2019
Acetabulum Load Cell		Y	N/A	N/A	N/A
Pubic Symphysis Load Cell		Y	457-FY	Denton	16-Apr-2019

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 305		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	T11432	Endevco	18-Apr-2019
			Y	P93774	Endevco	18-Apr-2019
			Z	P91566	Endevco	18-Apr-2019
Redundant Head Accelerometers			X	P91615	Endevco	18-Apr-2019
			Y	P93762	Endevco	18-Apr-2019
			Z	P93761	Endevco	18-Apr-2019
Displacement Potentiometers	Shoulder		N/A	N/A	N/A	N/A
	Thoracic Rib	Upper	Y	007	Servo	18-Apr-2019
		Middle	Y	037	Servo	18-Apr-2019
		Lower	Y	1161	Servo	18-Apr-2019
	Abdominal Rib	Upper	Y	1295	Servo	18-Apr-2019
		Lower	Y	1136	Servo	18-Apr-2019
Lower Spine Accelerometers (T12)			X	P94545	Endevco	18-Apr-2019
			Y	P94647	Endevco	18-Apr-2019
			Z	P94530	Endevco	18-Apr-2019
Acetabulum Load Cell			Y	DK7483S-FY	FTSS	18-Apr-2019
Iliac Wing Load Cell			Y	287-FY	Denton	18-Apr-2019
Pelvis Plug (struck side)				12501	SACO	02-Oct-2018
Pelvis Plug (non-struck side)				36473	FTSS	29-Sep-2010

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	P91180	Endevco	6-May-2019
	Vehicle Center of Gravity	Y	P91482	Endevco	6-May-2019
	Vehicle Center of Gravity	Z	P97539	Endevco	6-May-2019
2	Right Sill at Front Seat	X	P88460	Endevco	21-Dec-2018
	Right Sill at Front Seat	Y	P87822	Endevco	21-Dec-2018
	Right Sill at Front Seat	Z	P94524	Endevco	21-Dec-2018
3	Right Sill at Rear Seat	X	T11837	Endevco	8-Jan-2019
	Right Sill at Rear Seat	Y	T11825	Endevco	8-Jan-2019
	Right Sill at Rear Seat	Z	T11833	Endevco	8-Jan-2019
4	Left Sill at Front Door	Y	P73587	Endevco	15-Apr-2019
5	Left Sill at Rear Door	Y	T11396	Endevco	19-Mar-2019
6	Left A-Post Lower	Y	P97681	Endevco	2-Apr-2019
7	Left A-Post Middle	Y	P94600	Endevco	8-May-2019
8	Left B-Post Lower	Y	P88043	Endevco	15-Apr-2019
9	B-Post Middle	Y	P97876	Endevco	3-Jan-2019
10	Front Seat Track	Y	P94485	Endevco	21-Dec-2018
11	Rear Seat Track or Structure	Y	T11397	Endevco	19-Mar-2019
12	Right Rear Occupant Compartment	Y	T11835	Endevco	8-Jan-2019
13	Engine Block	X	P75115	Endevco	25-Mar-2019
	Engine Block	Y	P94567	Endevco	25-Mar-2019
14	Rear Floorpan Above Axle	X	P50400	Endevco	7-May-2019
	Rear Floorpan Above Axle	Y	T10347	Endevco	6-May-2019
	Rear Floorpan Above Axle	Z	P91909	Endevco	6-May-2019

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	P75713	Endevco	19-Mar-2019
MDB Center of Gravity	Y	P76171	Endevco	19-Mar-2019
MDB Center of Gravity	Z	P76114	Endevco	19-Mar-2019
Left Frame Rail at Rear Axle Centerline	X	P81065	Endevco	3-Jan-2019
Left Frame Rail at Rear Axle Centerline	Y	P57192	Endevco	3-Jan-2019