

FINAL REPORT NUMBER: SINCAP-TRC-23-004

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

**BAYERISCHE MOTOREN WERKE AG
2023 MINI Countryman 5HB
NHTSA NUMBER: M20234105**

**PREPARED BY:
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10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319**



Report Date: January 22, 2024

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
Washington, D.C. 20590**

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Report Prepared By: ILO Project Operations Group

Report Approved By: 

John Shultz

Approval Date: January 22, 2024

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 2023 MINI Countryman 5HB, 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 15, 2023. The impact velocity of the Moving Deformable Barrier (MDB) was 61.85 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 21.7° C. The target vehicle post-test maximum crush was 173 mm at Level 3. The test vehicle's performance was as follows: Driver ATD (ES-2re) <table border="1"> <thead> <tr> <th>Measurement Description</th><th>Units</th><th>IARV</th><th>Result</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td><td>N/A</td><td>1000</td><td>154.683</td></tr> <tr> <td>Maximum Thoracic Rib Deflection</td><td>mm</td><td>44</td><td>16.960</td></tr> <tr> <td>Total Abdominal Force</td><td>N</td><td>2500</td><td>666.010</td></tr> <tr> <td>Pubic Symphysis Force</td><td>N</td><td>6000</td><td>-919.490</td></tr> <tr> <td>Lower Spine Acceleration</td><td>G</td><td>82*</td><td>25.400</td></tr> </tbody> </table> Passenger ATD (SID-IIs) <table border="1"> <thead> <tr> <th>Measurement Description</th><th>Units</th><th>IARV</th><th>Result</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td><td>N/A</td><td>1000</td><td>232.498</td></tr> <tr> <td>Lower Spine Resultant Acceleration</td><td>g's</td><td>82</td><td>50.900</td></tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td><td>N</td><td>5525</td><td>2206.330</td></tr> <tr> <td>Maximum Thoracic Rib Deflection</td><td>mm</td><td>38*</td><td>28.020</td></tr> <tr> <td>Maximum Abdominal Rib Deflection</td><td>mm</td><td>45*</td><td>19.280</td></tr> </tbody> </table> * 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.			Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	154.683	Maximum Thoracic Rib Deflection	mm	44	16.960	Total Abdominal Force	N	2500	666.010	Pubic Symphysis Force	N	6000	-919.490	Lower Spine Acceleration	G	82*	25.400	Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	232.498	Lower Spine Resultant Acceleration	g's	82	50.900	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2206.330	Maximum Thoracic Rib Deflection	mm	38*	28.020	Maximum Abdominal Rib Deflection	mm	45*	19.280
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SECTION 1

TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test was conducted as part of the MY 2023 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000018. The purpose of this test is to generate comparative side impact performance in a 2023 MINI Countryman 5HB. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A 2023 MINI Countryman 5HB was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.85 km/h (38.43 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 15, 2023. Pre-test and post-test photographs of the test vehicle and the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated March 2020. 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 instrumentation calibration data.

Dummy injury readings were recorded as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	154.683
Maximum Thoracic Rib Deflection	mm	44	16.960
Combined Abdominal Force	N	2500	666.010
Pubic Symphysis Force	N	6000	-919.490
Lower Spine (T12) Resultant Acceleration	G	82*	25.400

* Proposed IARV

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	232.498
Lower Spine (T12) Resultant Acceleration	G	82	50.900
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2206.330
Maximum Thoracic Rib Deflection	mm	38*	28.020
Maximum Abdominal Rib Deflection	mm	45*	19.280

* 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	No	N/A
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	N/A	No	N/A
Other	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 LOWER A-POST AY – CF after 20.0 ms

LEFT MID A-POST AY – CF after 43.0 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2023 MINI Countryman 5HB
Test Program: SINCAP Side Impact

NHTSA No.: M20234105
Test Date: 6/15/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20234105
Model Year	2023
Make	Mini
Model	Countryman
Body Style	MPV
VIN	WMZ53BR09P3R24800
Body Color	Melting Silver III metallic
Odometer Reading (km/mi)	16 mi.
Engine Displacement (L)	2.0
Type/No. Cylinders	Straight/4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	7
Overdrive	Yes
Final Drive	FWD
Roof Rack	Yes
Sunroof/T-Top	Yes
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	No
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	No

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	BAYERISCHE MOTOREN WERKE AG
Date of Manufacture	02/23
Vehicle Type	MPV

GVWR (kg)	2060
GAWR Front (kg)	1090
GAWR Rear (kg)	1025

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)				430.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				89.8

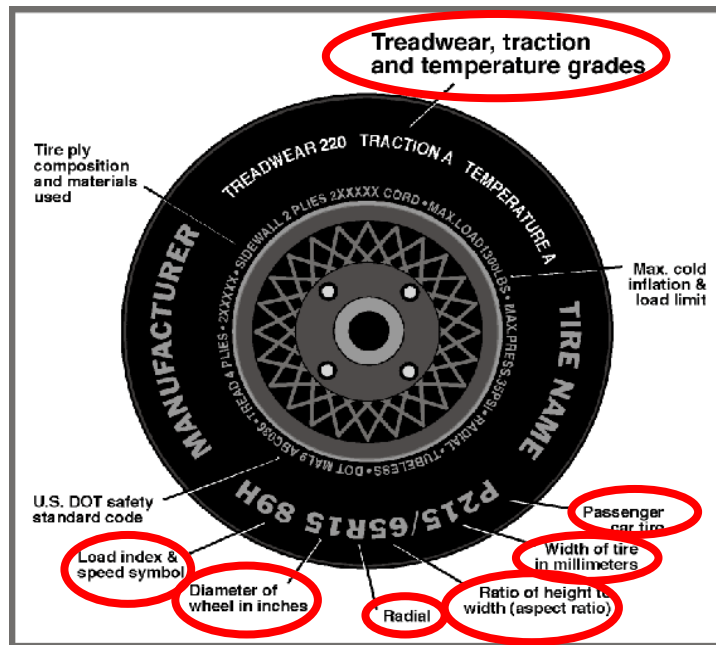
VEHICLE SEAT TYPE

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	N/A	N/A	Yes	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: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	225/50R18 95	225/50R18 95
Tire Size on Vehicle	225/50R18	225/50R18
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle Sport	Eagle Sport
Treadwear	400	400
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index/Speed Symbol	95V	95V
Tire Material	Polyamide/Polyester/Steel	Polyamide/Polyester/Steel
DOT Safety Code Left	K578 JN1R 4822	K578 JN1R 4822
DOT Safety Code Right	K578 JN1R 4822	K578 JN1R 4822

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

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	234	248	248	248
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	454.6	334.2		492.4	432.2		501.0	437.6	
Right	kg	466.8	318.0		458.6	398.8		462.6	387.2	
Ratio	%	58.6	41.4		53.4	46.6		53.9	46.1	
Totals	kg	921.4	652.2	1573.6	951.0	831.0	1782.0	963.6	824.8	1788.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1573.6	(A)
Sum of Actual Weight of 2 P572 ATDS Used	kg	125.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	89.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1788.4	(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	762	763	Yes
RF	mm	768	772	Yes
RR	mm	750	752	Yes
LR	mm	754	749	Yes
Vehicle CG (Aft of Front Axle)	mm	1108	1247	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	+2	+30	

***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

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

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: Steel plates	30.2
Removed: None	0.0

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	903
Aft 25 mm target	905
Pre-Impact Angle Line	225

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	1796	3516
C	3924	3516
D	3924	0

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

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

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	21.6	16.1	18.8
Front Passenger Seat	22.1	16.9	19.5
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	12.7	12.7	12.7
Non-Struck Side Rear Seat	13.5	13.5	13.5
Rear Center Seat*	8.2	8.2	8.2

* 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	18.8	223	Max	N/A	N/A	N/A
			Mid	213	223	230
			Min	N/A	N/A	N/A
Front Passenger Seat	19.5	215	Max	N/A	N/A	N/A
			Mid	212	215	219
			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	12.7	220	Max	N/A	N/A	N/A
			Mid	228	224	220
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	13.5	222	Max	N/A	N/A	N/A
			Mid	228	226	222
			Min	N/A	N/A	N/A
Rear 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

* If applicable.

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

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

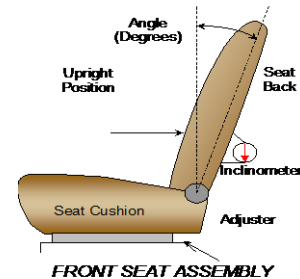
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents	mm	Detent
Driver Seat	250	25	127	13
Front Passenger Seat	220	23	110	11
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	144	14	144	13
Non-Struck Side Rear Seat	144	14	144	13
Rear Center Seat*	144	14	144	13

* 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	50	26	20.2	6
Front Passenger Seat	50	26	20.1	6
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat w/ Seated Dummy	30.2	8	16.4	0
Non-Struck Side Rear Seat	29.9	8	16.4	0
Rear Center Seat*	30.1	8	16.4	0

* 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	1
Rear Seat	1	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	5	4, Full Up
Rear Seat	5	0, Full Down

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

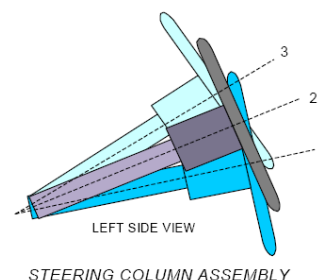
Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

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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.

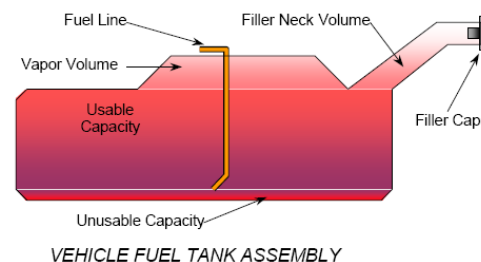
	Degrees	Fore/Aft Position (mm)
Lowermost, Position No. 1	39.3	
Geometric Center, Position No. 2	26.2	
Uppermost, Position No. 3	13.1	
Telescoping Steering Wheel Travel		60
Test Position	26.2	30



FUEL PUMP

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

Fuel pump starts when ignition is on. The fuel pump will operate for 5 seconds. After pressure has been built up the fuel pump switches to sleep mode until the engine will be started or the pressure decreases



FUEL TANK CAPACITY

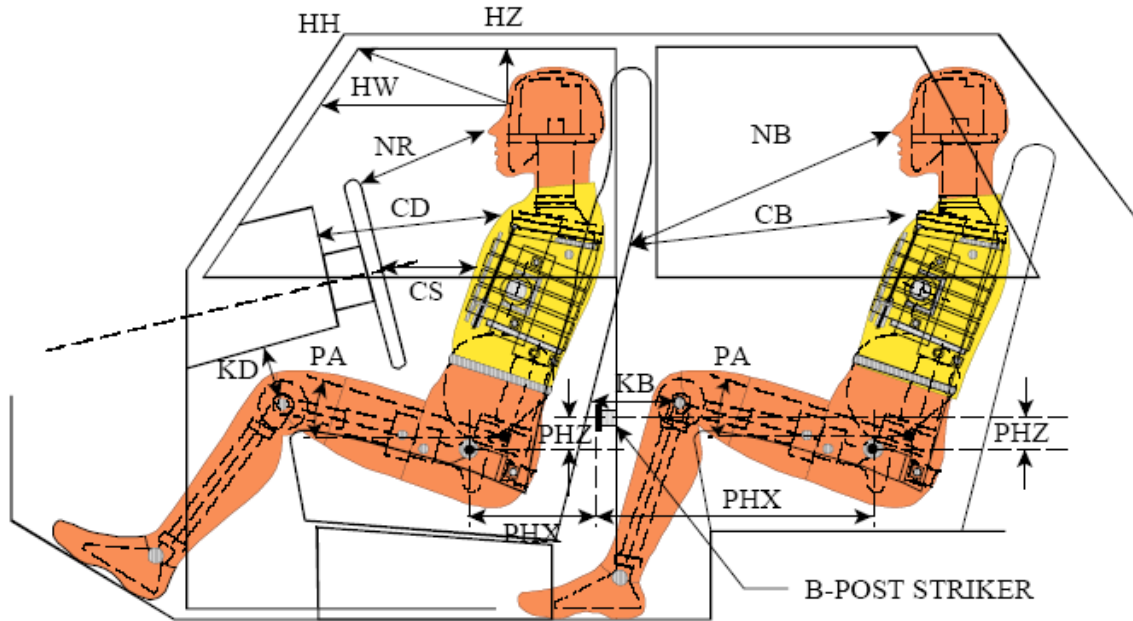
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	60.9
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	60.9
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	56.7
Actual Amount of Solvent Used in Test	56.7
1/3 of Usable Capacity	20.3

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



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

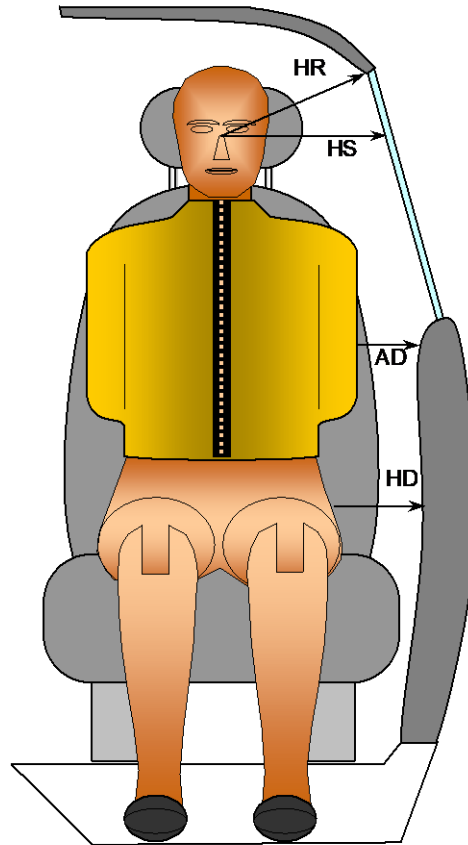
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	504			
HW		Header to Windshield	662			
HZ	HZ	Head to Roof Liner	156		256	
NR	NB	Nose to Rim/Seat Back	452		513	
CD	CB	Chest to Dash/Seat Back	587		534	
CS		Chest to Steering Wheel	341			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	152	9.9	296	2.4
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	82	44.2	299	9.8
PAX°	PAX°	Pelvic Tilt Angle X		1.2		0.6
	PAY°	Pelvic Tilt Angle Y				18.3
PHX	PHX	Hip Point to Striker (X-Axis)	169		153	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	162		142	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



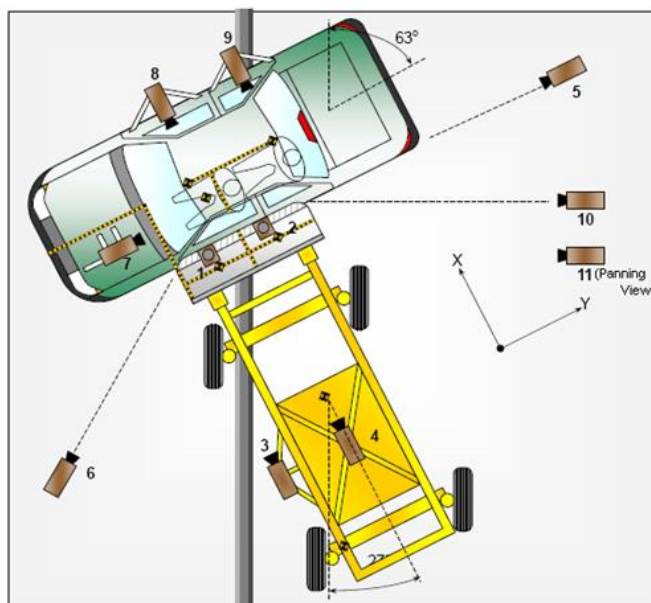
FRONT VIEW OF DUMMY

Code	Description	Units	Driver	Passenger
HR	Head to Side Header	mm	193	260
HS	Head to Side Window	mm	337	373
AD	Arm to Door	mm	69	131
HD	H-Point to Door	mm	140	148

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1601	0	-5622	20	1000
2	Overhead Close-up	1452	0	-5891	20	1000
3	Left Impact Point (MDB)	1632	-920	-934	25	1000
4	Side Overall (MDB)	2310	0	-1389	8.5	1000
5	Rear	0	7517	-1656	20	1000
6	Left Front	0	-7412	-1578	20	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				8.5	1000
9	Passenger Side (OB)				8.5	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: Camera 10 ran as high-speed rather than real time

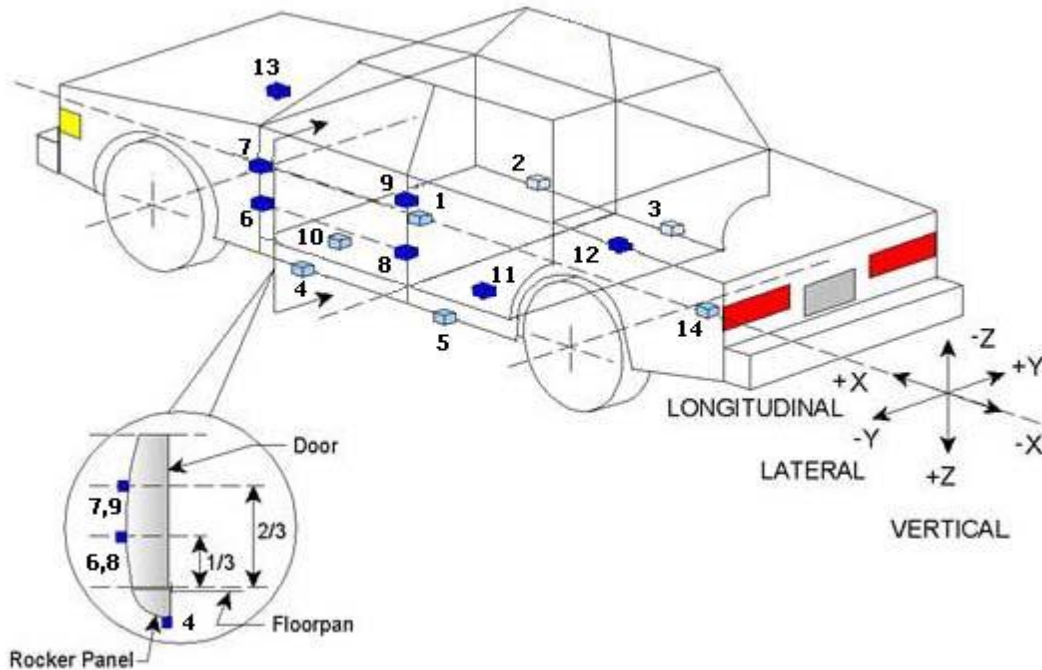
INSTRUMENTATION

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: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



TEST VEHICLE ACCELEROMETER LOCATIONS

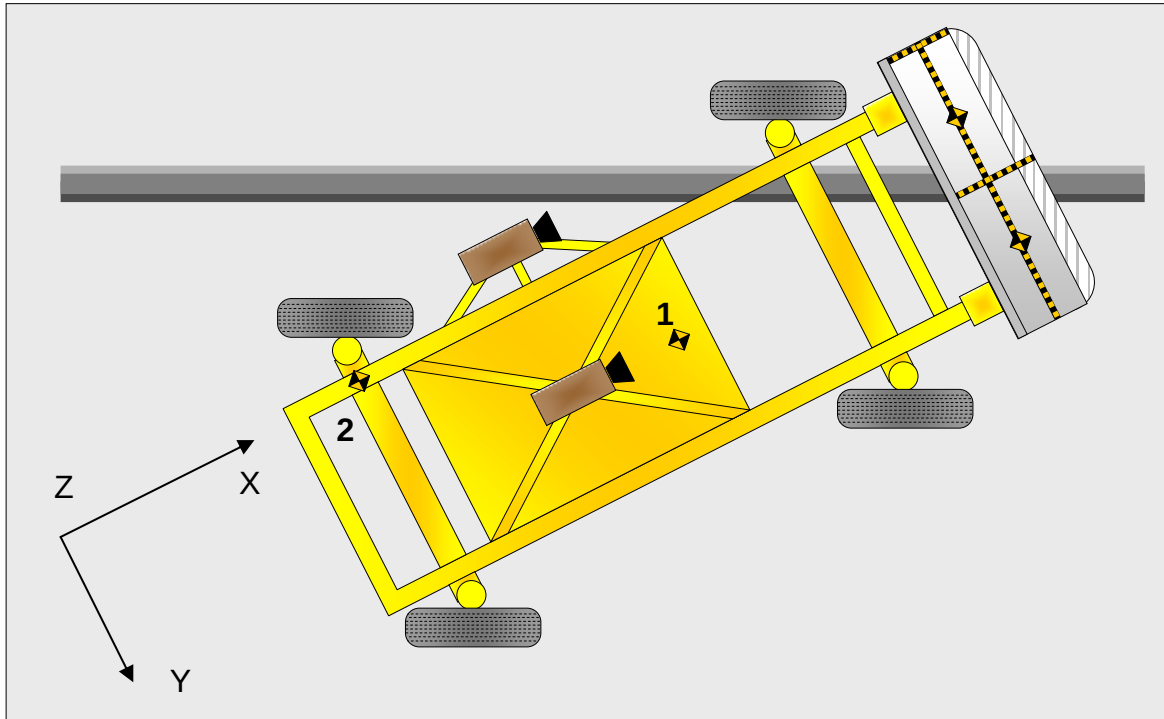
Loc. No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2634	146	-382
2	Right Sill at Front Seat	2590	708	-394
3	Right Sill at Rear Seat	1543	701	-393
4	Left Sill at Front Door	2572	-708	-381
5	Left Sill at Rear Door	1638	-702	-382
6	A-Post Lower	2905	-796	-521
7	A-Post Middle	2903	-793	-858
8	B-Post Lower	1935	-803	-596
9	B-Post Middle	1883	-800	-944
10	Front Seat Track	2179	-573	-416
11	Rear Seat Structure	1611	-346	-440
12	Right Rear Occ. Compartment	1594	376	-457
13	Engine Block	3612	125	-882
14	Rear Above Axle	685	-6	-475

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: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	-2196	0	-500
2	MDB Rear	-3585	-645	-620

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

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

Test Vehicle: 2023 MINI Countryman 5HB
Test Program: SINCAP Side Impact

NHTSA No.: M20234105
Test Date: 6/15/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES2-re)	Rear Seat Dummy (SID-IIs)
Face	None	SCAB
Top of Head	SCAB, Side Header	SCAB, Side Header, Center Seatback
Left Side of Head	SCAB, Side Header	SCAB
Back of Head	SCAB, Side Header, Head Restraint	Head Restraint, SCAB, Center Seatback
Left Shoulder	Door Panel	Door Panel
Upper Torso	SAB, Side Seat Bolster	Door Panel
Lower Torso	SAB, Side Seat Bolster	Door Panel
Left Hip	SAB	Door Panel
Left Knee	Door Panel	Door Panel

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 side none, passenger side blown out
Other Notable Effects	None

DATA SHEET NO. 8 (CONTINUED)
POST TEST OBSERVATIONS

Test Vehicle: 2023 MINI Countryman 5HB
Test Program: SINCAP Side Impact

NHTSA No.: M20234105
Test Date: 6/15/2023

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2674
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		404
Actual Impact Point (Aft of Front Axle)	mm		399
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact point	+5
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact point	-2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2023 MINI Countryman 5HB
Test Program: SINCAP Side Impact

NHTSA No.: M20234105
Test Date: 6/15/2023

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	1112

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	418.8	264.8	683.6
Right	kg	362.0	322.4	684.4
Ratio	%	57.1	42.9	100.0
Totals	kg	780.8	587.2	1368.0

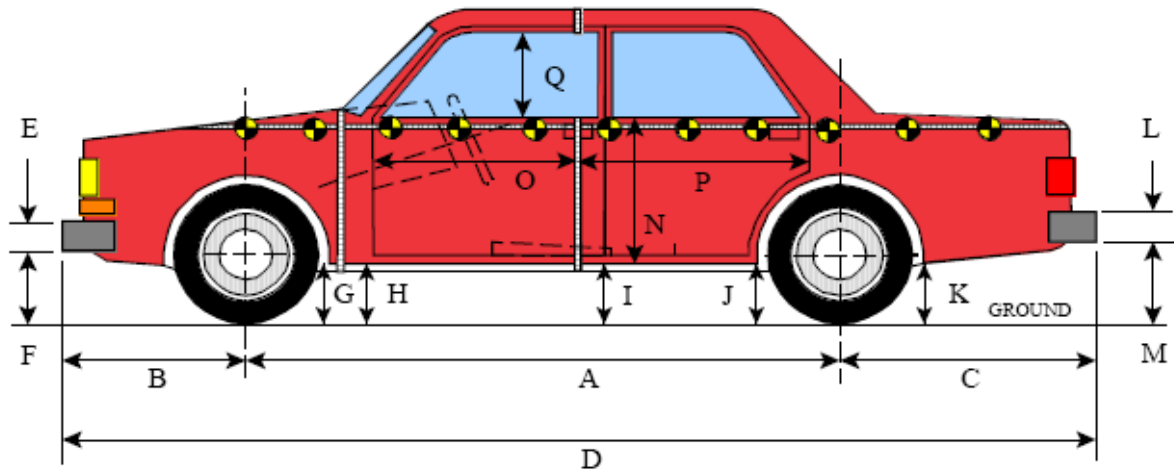
SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.85
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.83
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.0

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



LEFT SIDE VIEW

All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

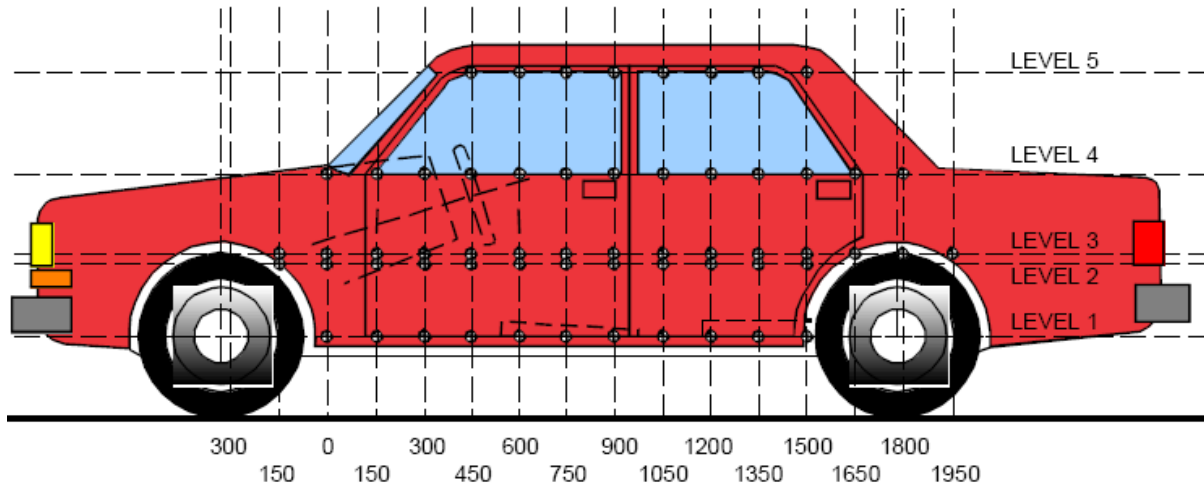
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2674	2670	-4
B	Front Axle to Front Surface of Vehicle	851	851	0
C	Rear Axle to Rear Surface of Vehicle	792	792	0
D	Total Length at Centerline	4317	4312	-5
E	Front Bumper Thickness	90	90	0
F	Front Bumper Bottom to Ground	466	470	4
G	Sill Height at Front Wheel Well	296	320	24
H	Sill Height at Front Door Leading Edge	297	325	28
I	Sill Height at B-Pillar	307	357	50
J1	Sill Height at Rear Wheel Well	312	372	60
J2	Pinch Weld Height at Rear Wheel Well	199	247	48
K	Sill Height Aft of Rear Wheel Well	410	455	45
L	Rear Bumper Thickness	106	106	0
M	Rear Bumper Bottom to Ground	458	504	46
N	Sill Height to Window Bottom Sill	785	740	-45
O	Front Door Leading Edge to Impact CL	693	700	7
P	Rear Door Trailing Edge to Impact CL	1301	1240	-61
Q	Front Window Opening	400	400	0
R	Right Side Length	4138	4140	2
S	Left Side Length	4130	4134	4
T	Vehicle Width	1820	1822	2
U	Front Wheel Track Width	1565	1565	0
V	Rear Wheel Track Width	1566	1566	0

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance From Impact
1	Sill Top	407	125	900
2	Driver Hip Point	635	154	1650
3	Mid Door	727	173	1500
4	Window Sill	1050	53	1800
5	Window Top	1485	6	1200

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: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

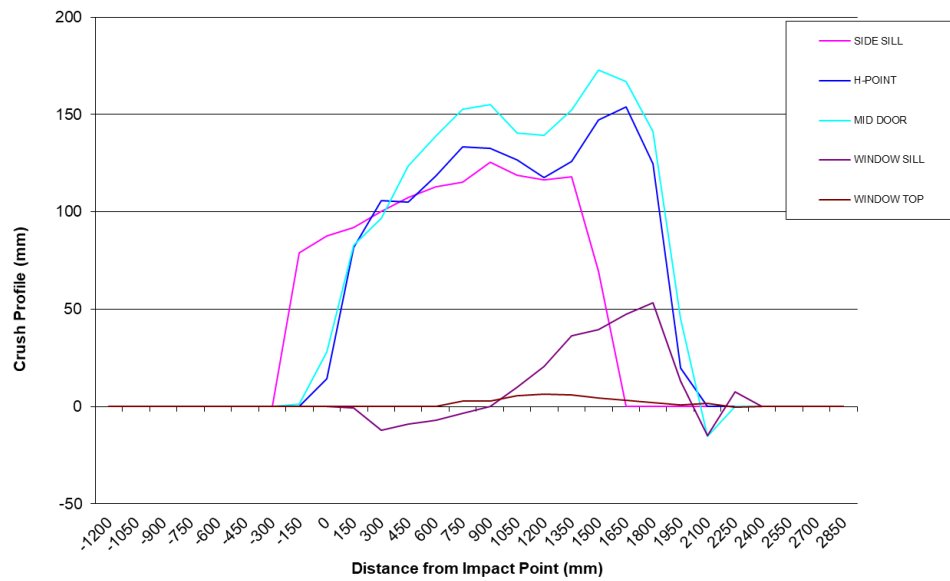
	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-150	865	0	905	0	0	786	0	904	0	0	79	0	1	0	0
0	860	894	888	0	0	773	880	860	0	0	87	14	28	0	0
150	861	877	875	758	0	769	795	792	759	0	92	82	83	-1	0
300	865	877	877	779	0	765	771	780	791	0	100	106	97	-12	0
450	869	882	882	789	0	762	777	759	797	0	107	105	123	-8	0
600	872	887	887	797	0	759	768	749	804	0	113	119	138	-7	0
750	874	890	891	803	593	759	757	738	807	590	115	133	153	-4	3
900	871	893	894	810	602	746	760	739	810	599	125	133	155	0	3
1050	868	894	895	815	608	750	767	754	805	603	118	127	141	10	5
1200	864	892	894	818	612	748	775	755	798	606	116	117	139	20	6
1350	863	889	891	819	613	745	763	738	782	608	118	126	153	37	5
1500	882	884	885	817	611	813	737	712	777	607	69	147	173	40	4
1650	0	880	881	814	606	0	726	714	767	603	0	154	167	47	3
1800	0	884	884	816	598	0	759	743	763	596	0	125	141	53	2
1950	0	901	891	825	585	0	881	846	812	585	0	20	45	13	0
2100	0	0	904	821	569	0	0	920	836	567	0	0	-16	-15	2
2250	0	0	0	813	536	0	0	0	806	536	0	0	0	7	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: 2023 MINI Countryman 5HB
Test Program: SINCAP Side Impact

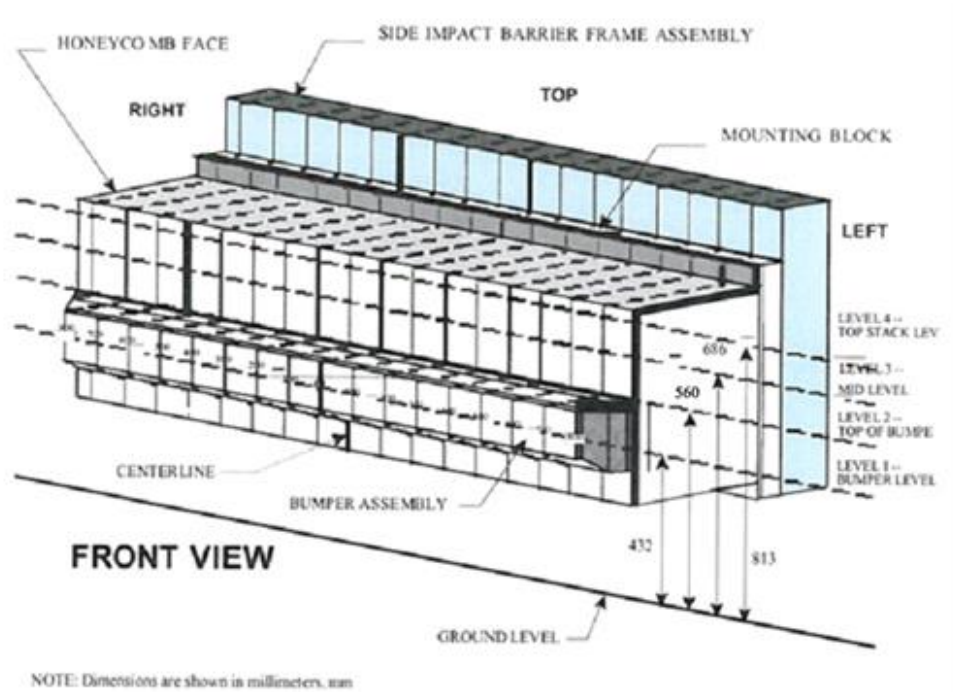
NHTSA No.: M20234105
Test Date: 6/15/2023



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



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	200
B	Top of Bumper	560	800	Right	130
			700	Right	130
C	Mid-Level	686	800	Left	92
D	Top of Stack	813	800	Left	132

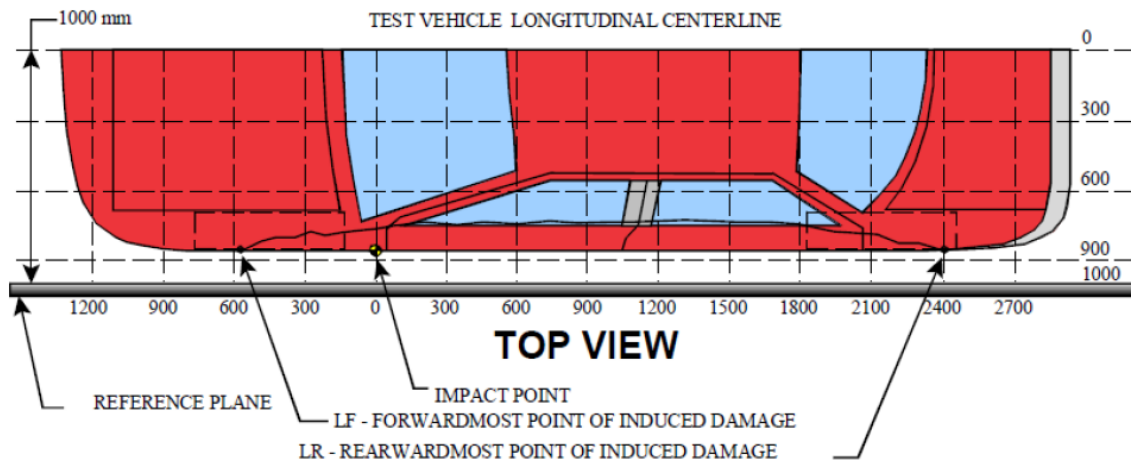
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	200	194	187	183	179	176	172	167	158	154	151	147	144	142	143	157	148
2	130	130	122	118	115	115	107	99	93	90	89	86	83	81	82	90	100
3	85	68	60	68	85	85	81	63	47	35	35	37	42	50	64	92	92
4	85	62	63	70	82	104	111	92	80	80	75	82	84	83	100	120	132

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



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	2250	4	806	813	7
2	1800	3	743	884	141
3	1350	3	738	891	153
4	750	3	738	891	153
5	300	2	771	877	106
6	-150	1	786	865	79

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	322	470	148
2	500 mm Left of Center	1	343	485	142
3	200 mm Left of Center	1	334	485	151
4	200 mm Right of Center	1	313	485	172
5	500 mm Right of Center	1	303	486	183
6	800 mm Right of Center	1	275	475	200

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

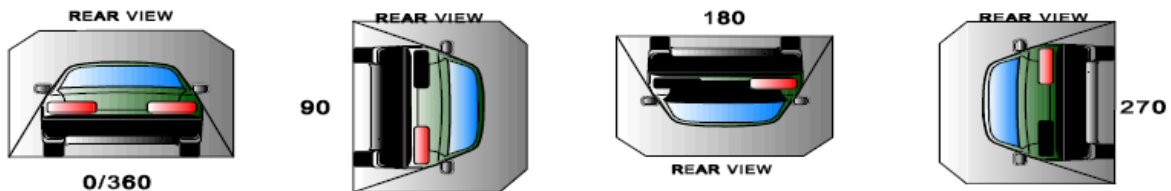
Test Vehicle: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023

Test Time: 15:30 **Temperature:** 21.7C

- 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

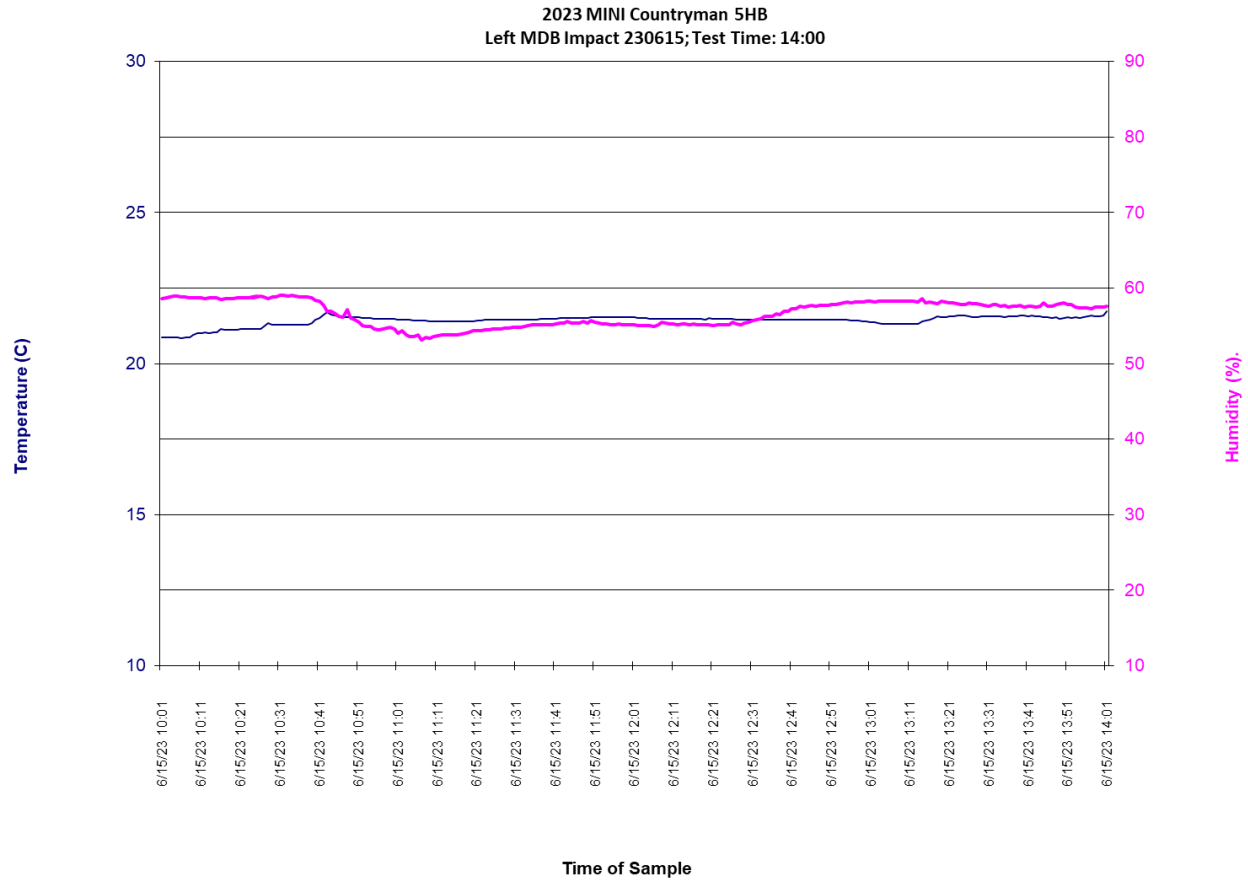
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2023 MINI Countryman 5HB
 Test Program: SINCAP Side Impact

NHTSA No.: M20234105
 Test Date: 6/15/2023



APPENDIX A
PHOTOGRAPHS

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002 As-Delivered Left Rear $\frac{3}{4}$ 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 $\frac{3}{4}$ View of Test Vehicle



006 Post-Test Left Front $\frac{3}{4}$ 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 $\frac{3}{4}$ View of Test Vehicle



010 Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



011 Pre-Test Rear View of Test Vehicle



012 Post-Test Rear View of Test Vehicle



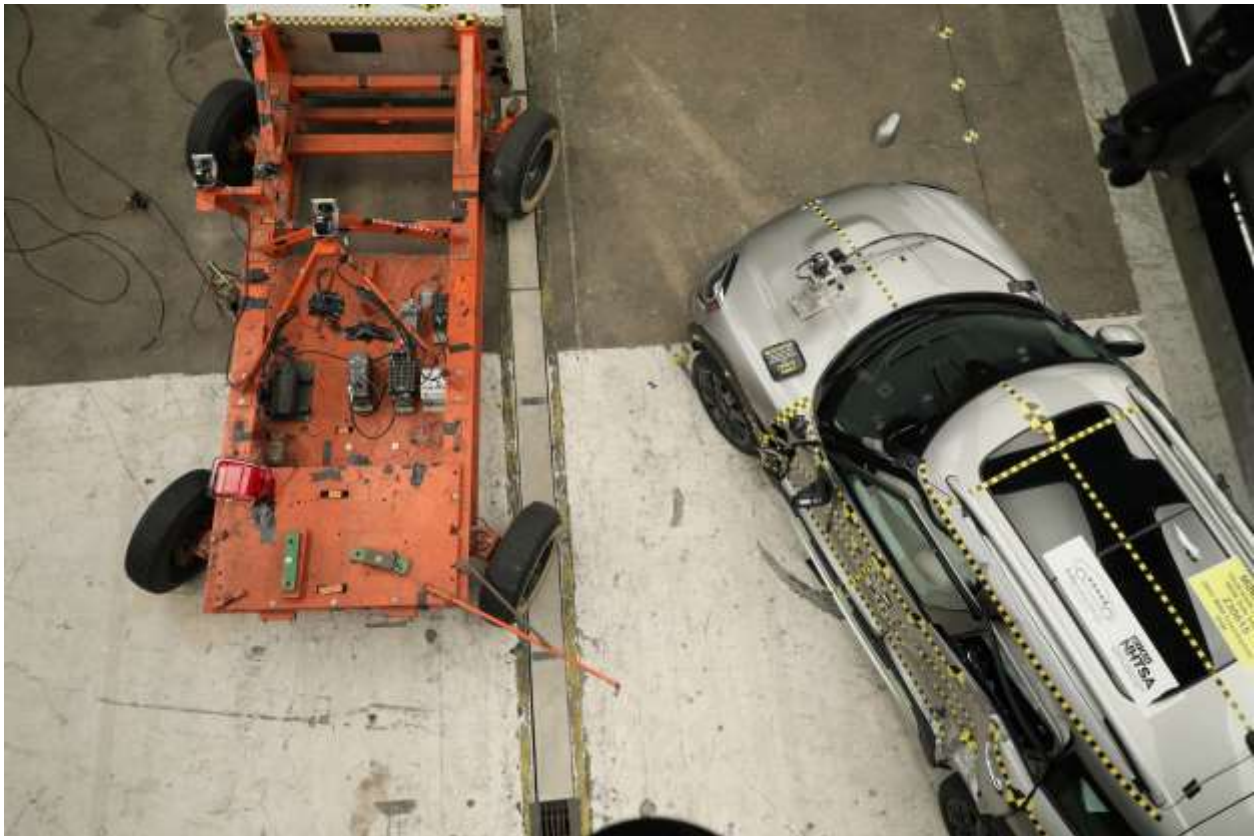
013 Pre-Test Right Side View of Test Vehicle



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 of 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



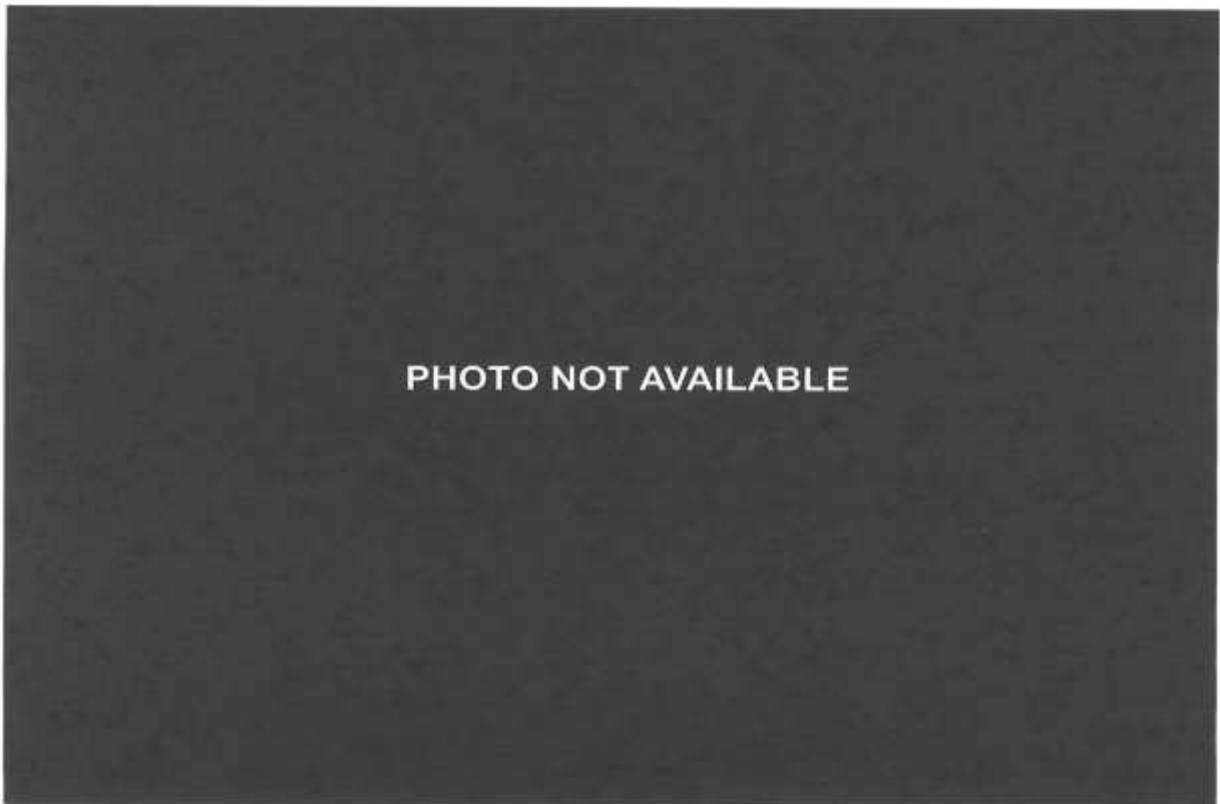
032 Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning



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



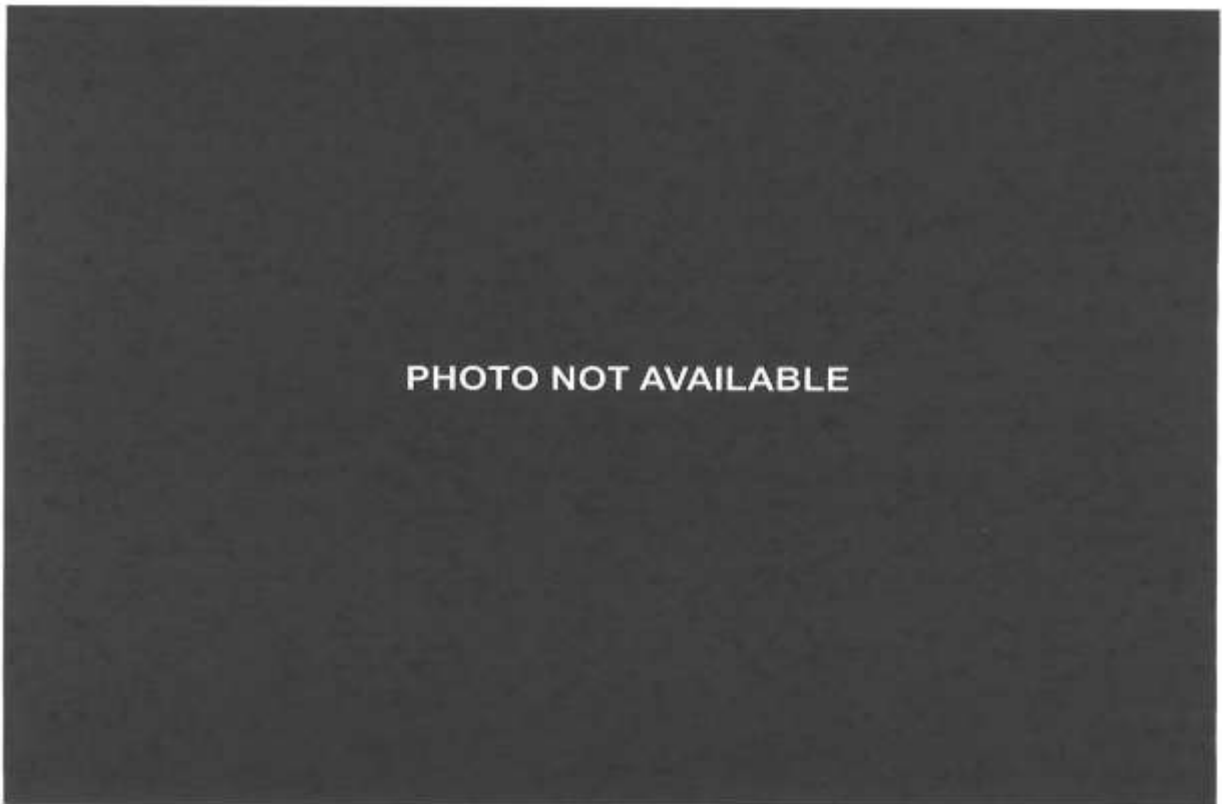
038 Pre-Test View of Parking Brake



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



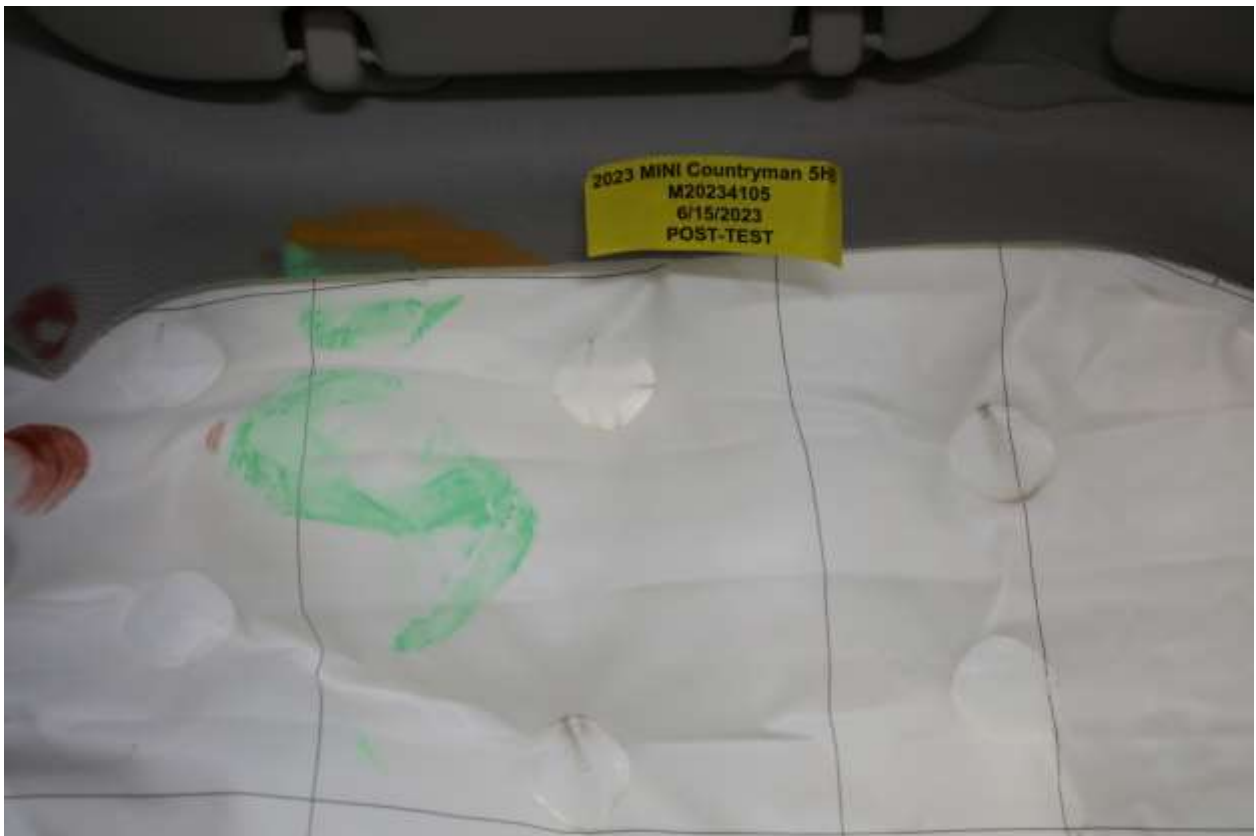
046 Pre-Test Driver Inner Door Panel View



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



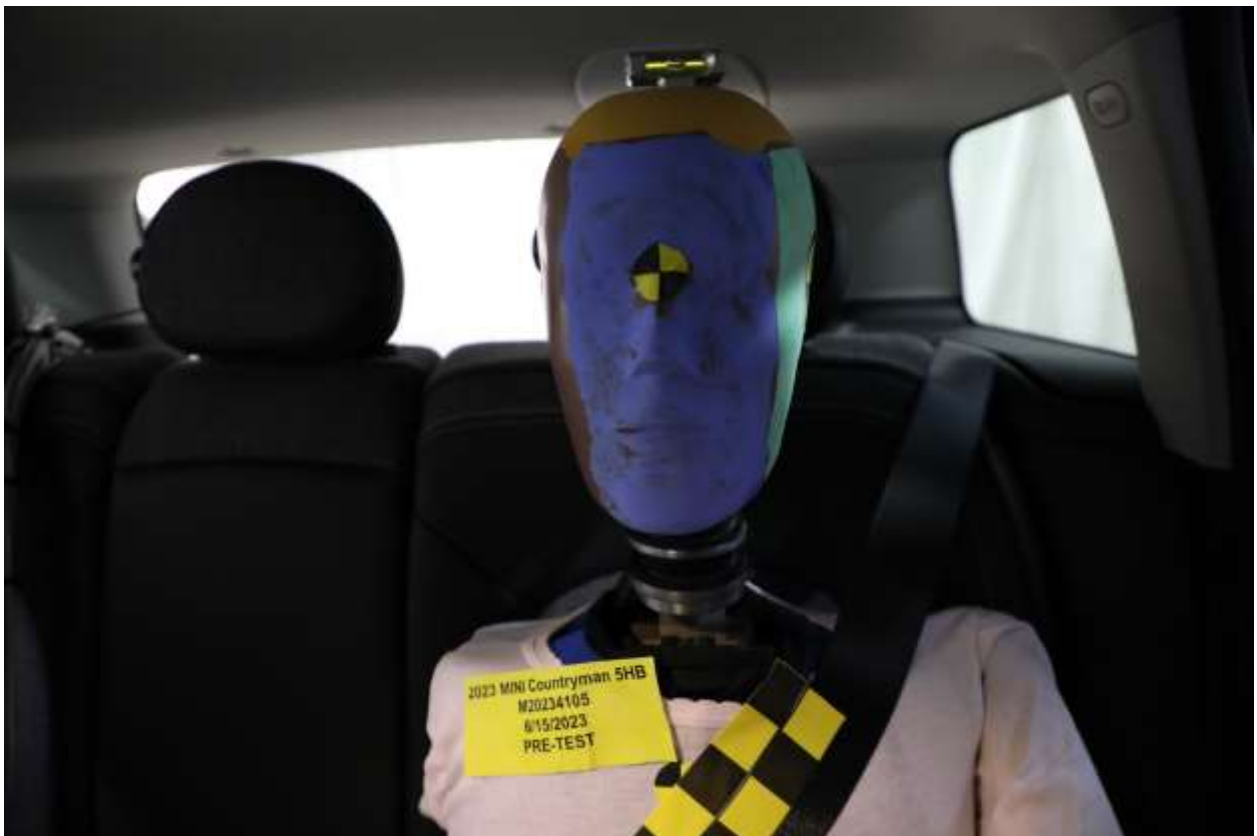
056 Pre-Test Left Side View of Passenger Dummy Shoulder and Door Top View



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



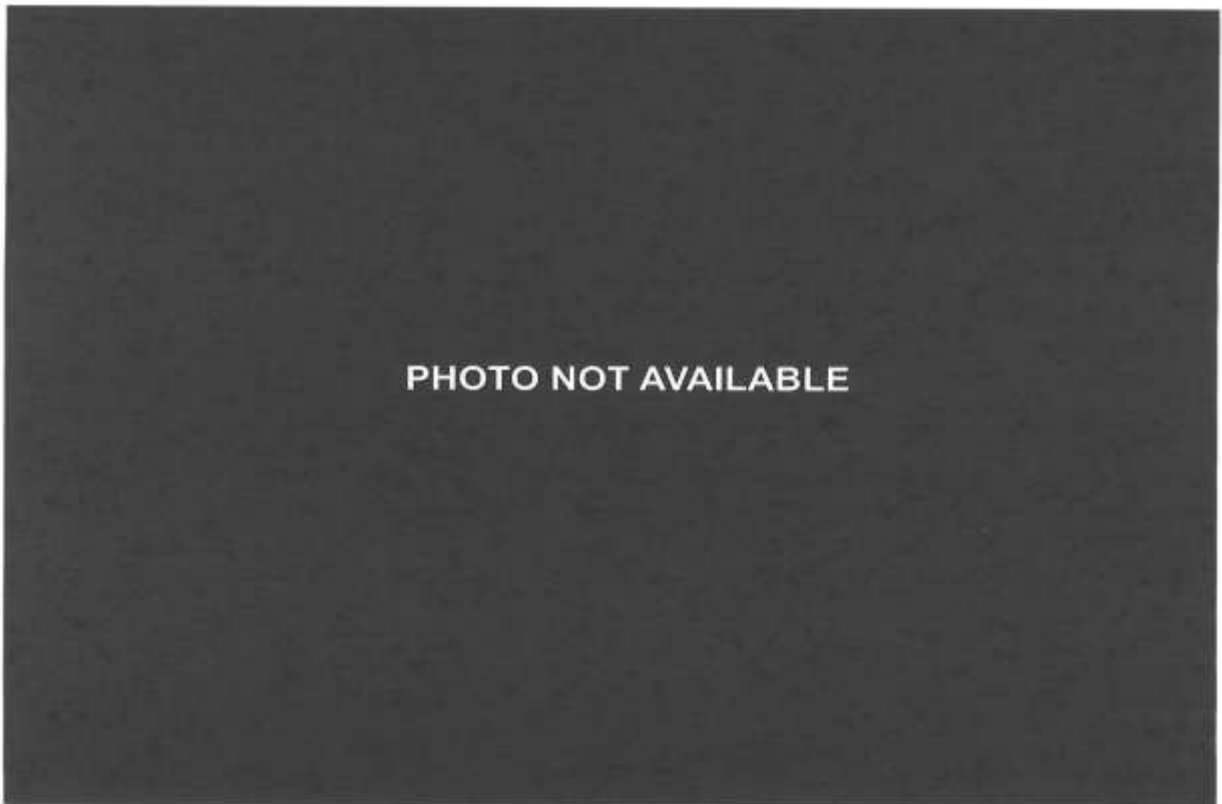
062 Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



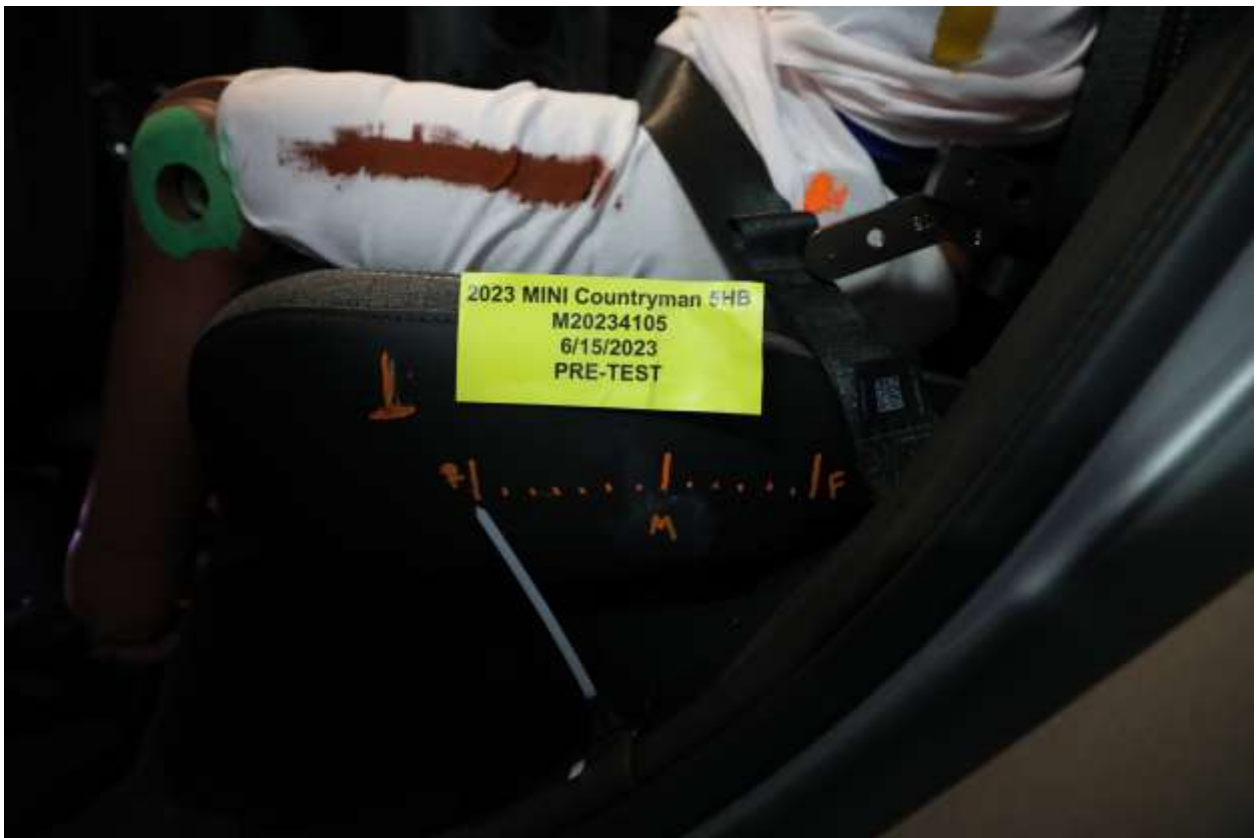
063 Pre-Test View of Rear Passenger Dummy's Head Showing Dummy Head is Level



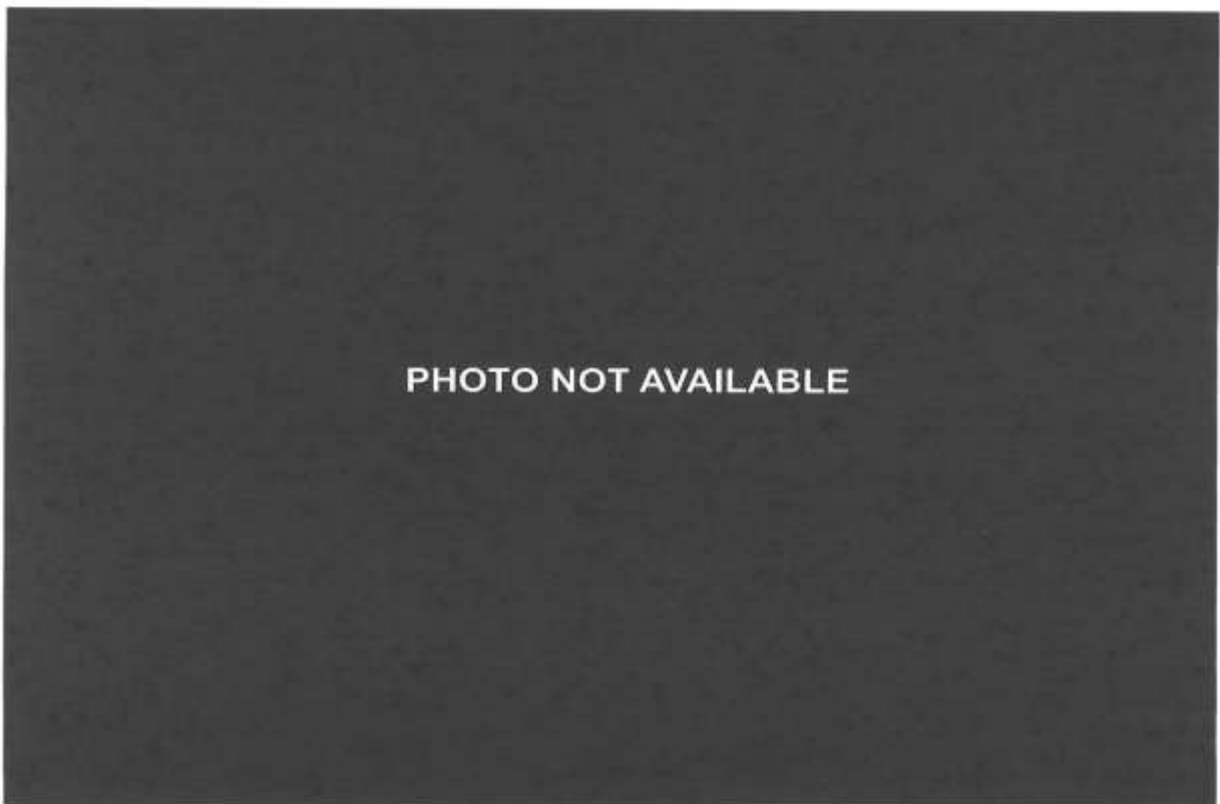
064 Pre-Test Placement of Rear Passenger Dummy's Feet



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

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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



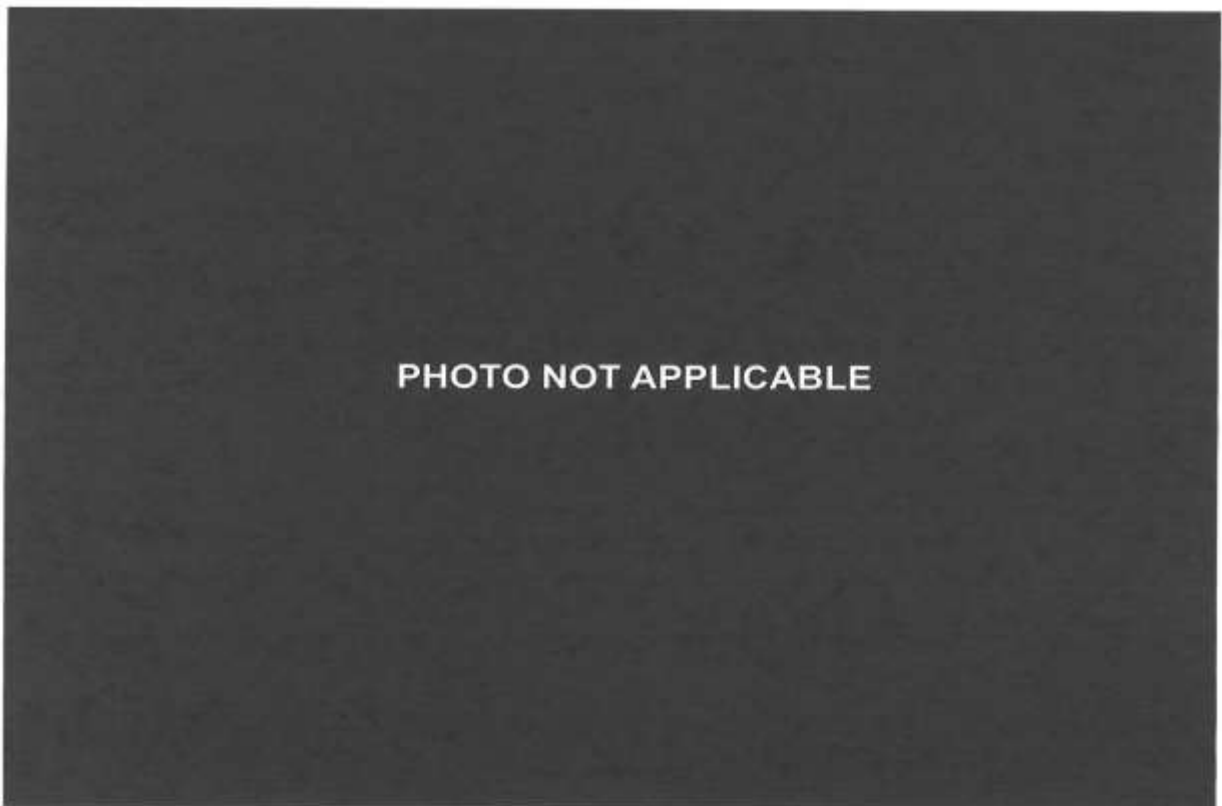
075 Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View



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



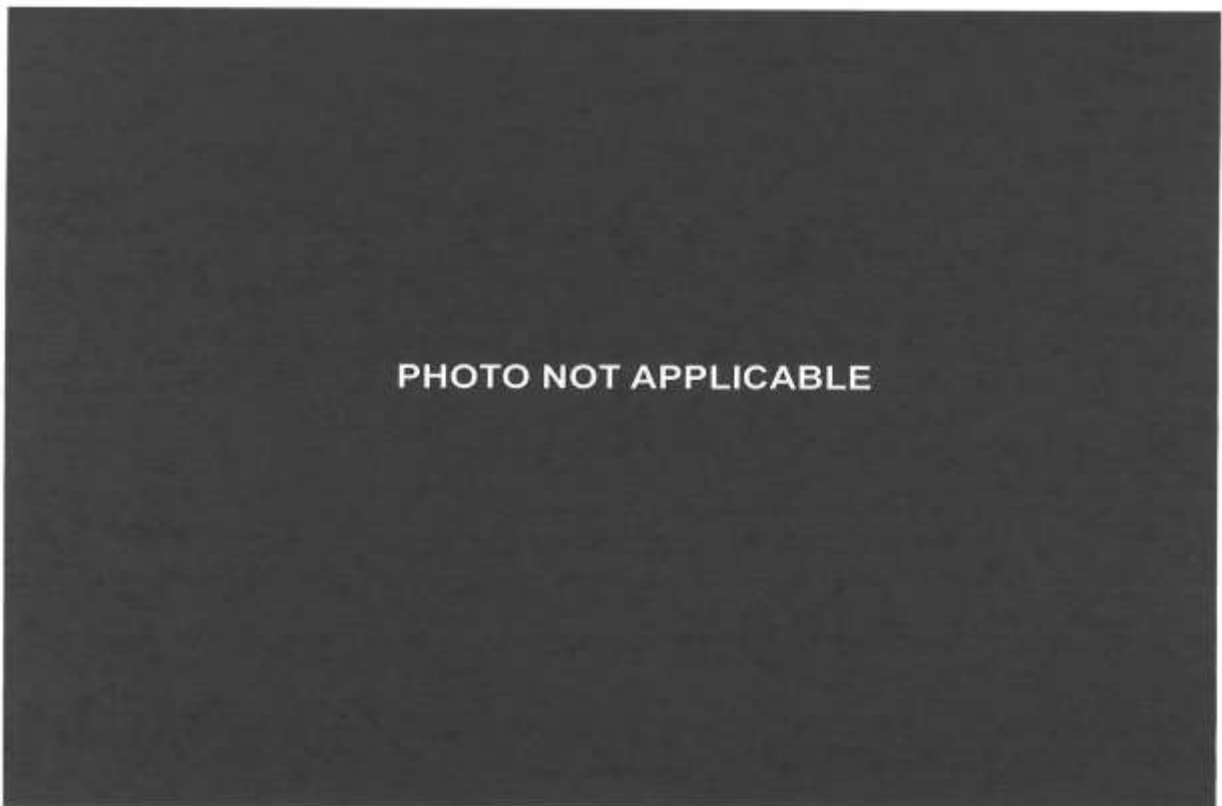
077 Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View



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

PHOTO NOT APPLICABLE

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

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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

102 Monroney Label

Set-up and use

Seats, mirrors and steering wheel

Manually adjustable seats



- 1 Longitudinal direction
- 2 Thigh support
- 3 Height
- 4 Backrest tilt

Electrically adjustable seats



- 1 Memory function
- 2 Lumbar support
- 3 Backrest tilt
- 4 Forward/backward, height, seat tilt

Adjusting the head restraint

Height



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

Adjusting the exterior mirrors



- 1 Adjusting
- 2 Selecting a mirror, Automatic Curb Monitor
- 3 Folding In and out

Set-up and use

Seats, mirrors and steering wheel

Manually adjustable seats



- 1 Longitudinal direction
- 2 Thigh support
- 3 Height
- 4 Backrest tilt

Electrically adjustable seats



- 1 Memory function
- 2 Lumbar support
- 3 Backrest tilt
- 4 Forward/backward, height, seat tilt

Adjusting the head restraint Height



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

Adjusting the exterior mirrors



- 1 Adjusting
- 2 Selecting a mirror, Automatic Curb Monitor
- 3 Folding in and out

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

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Driver & Passenger Dummy Instrumentation Plots

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2	Driver Head Acceleration (Y) Primary vs. Time	B-5
3	Driver Head Acceleration (Z) Primary vs. Time	B-5
4	Driver Head Resultant Acceleration Primary vs. Time	B-5
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6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-6
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-6
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15	Passenger Head Acceleration (Y) Primary vs. Time	B-9
16	Passenger Head Acceleration (Z) Primary vs. Time	B-9
17	Passenger Head Resultant Acceleration Primary vs. Time	B-9
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-10
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-10
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22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-11
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24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-11

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 Lab: CTF

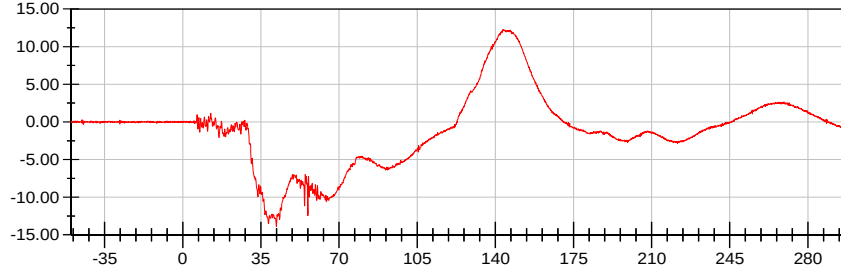
Test Number: 230615 (M20234105)

Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)

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



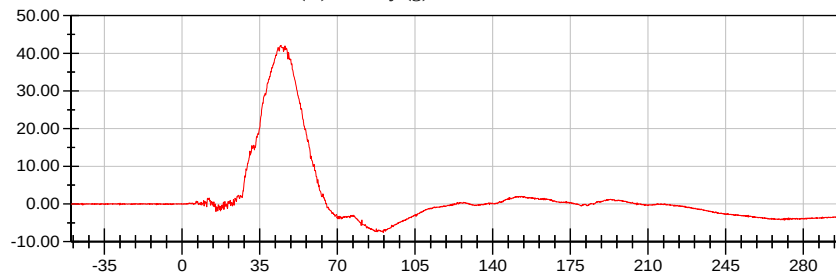
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-13.91 g at 41.92 ms

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



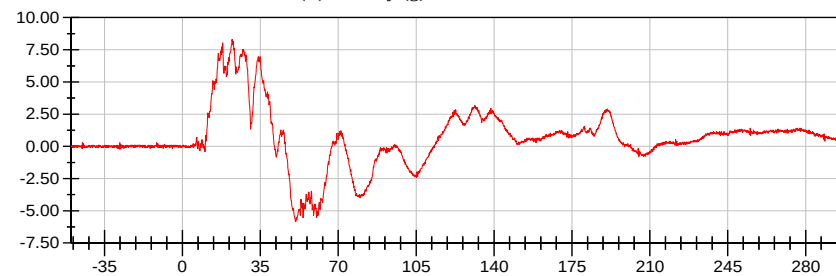
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-7.60 g at 90.64 ms

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



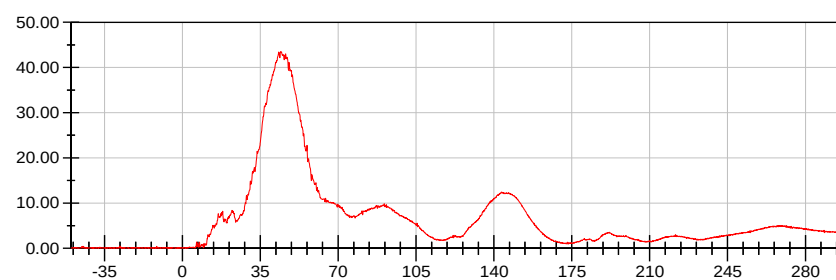
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8.29 g at 22.24 ms

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-5.85 g at 50.88 ms

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



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0.04 g at -46.64 ms



NHTSA

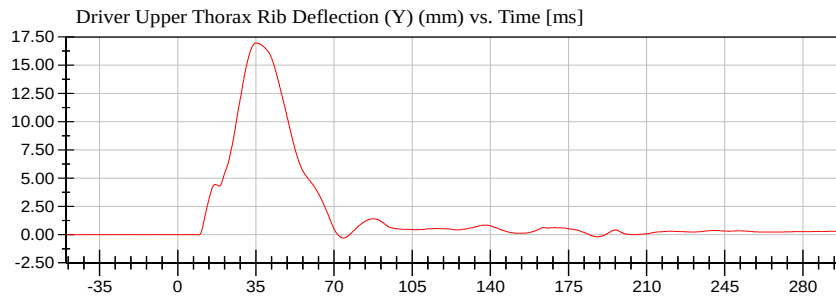
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Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)



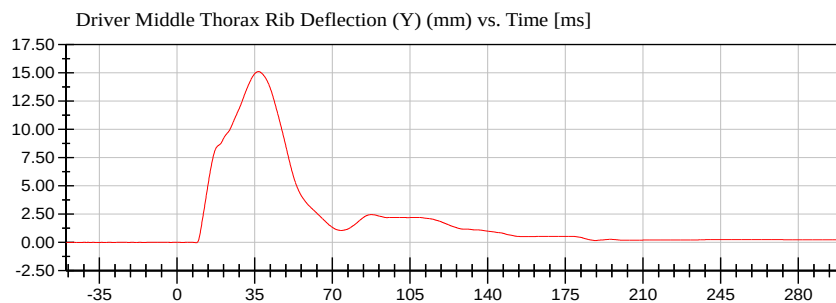
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CFC_180



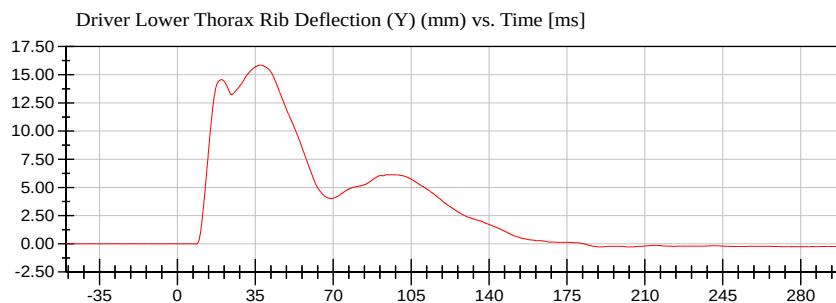
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-0.03 mm at 8.72 ms

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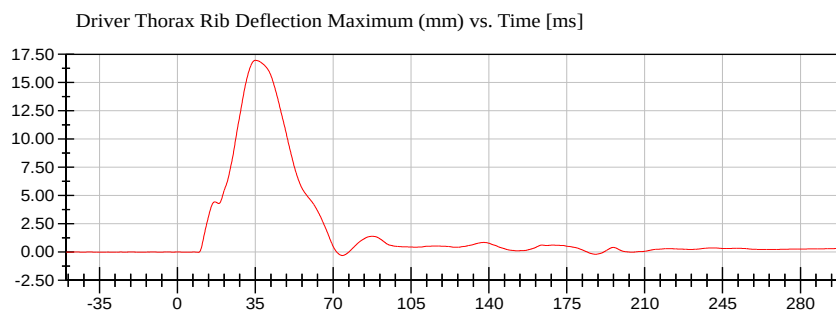
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-0.28 mm at 190.40 ms

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-0.31 mm at 74.16 ms

CFC_180



NHTSA

Test Lab: CTF

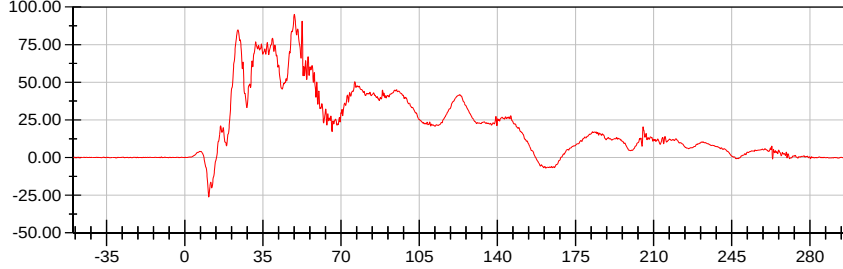
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Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)

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



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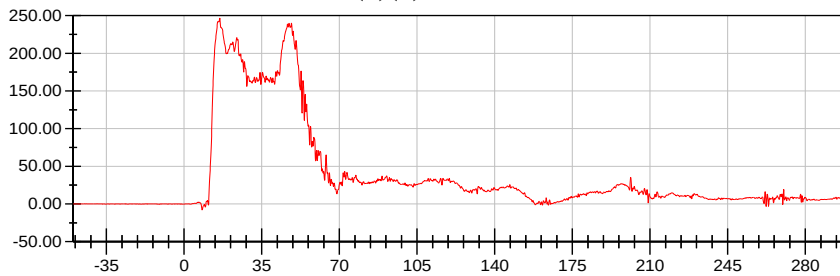
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CFC_600

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



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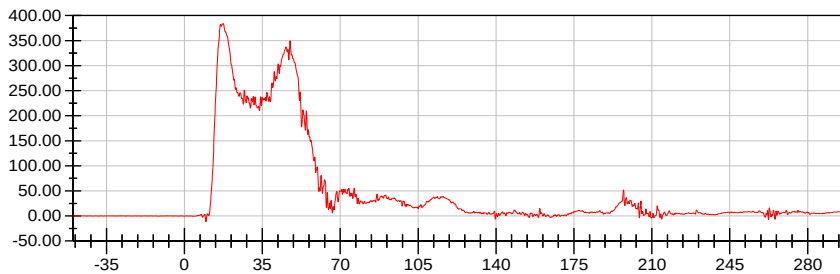
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-7.93 N at 8.16 ms

CFC_600

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



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383.97 N at 17.52 ms

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-11.19 N at 9.68 ms

CFC_600

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



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-25.11 N at 10.88 ms

CFC_600



NHTSA

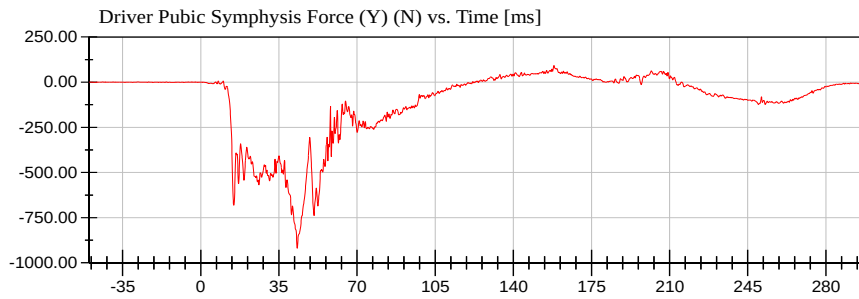
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Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)



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92.44 N at 158.16 ms

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-919.49 N at 43.20 ms

CFC_600



NHTSA

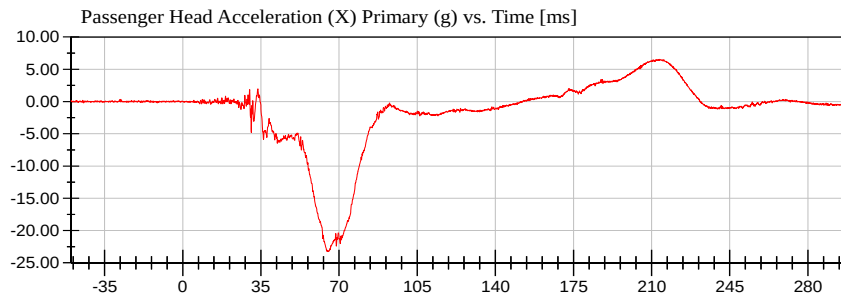
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Test Number: 230615 (M20234105)

Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)

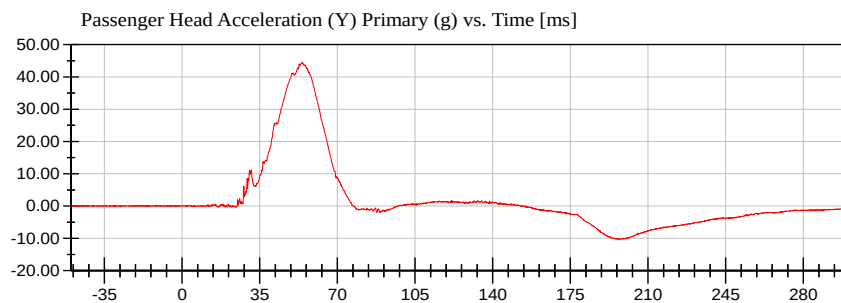


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-23.23 g at 64.72 ms

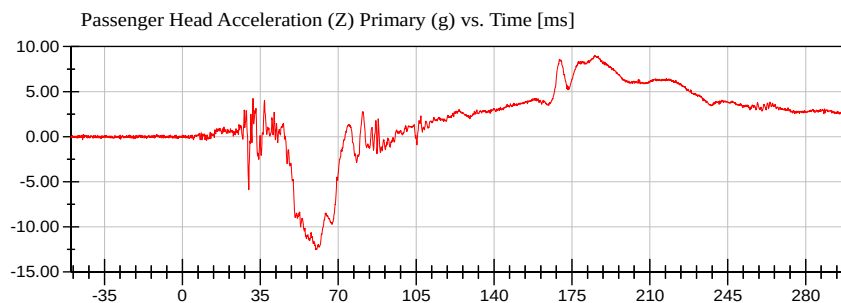


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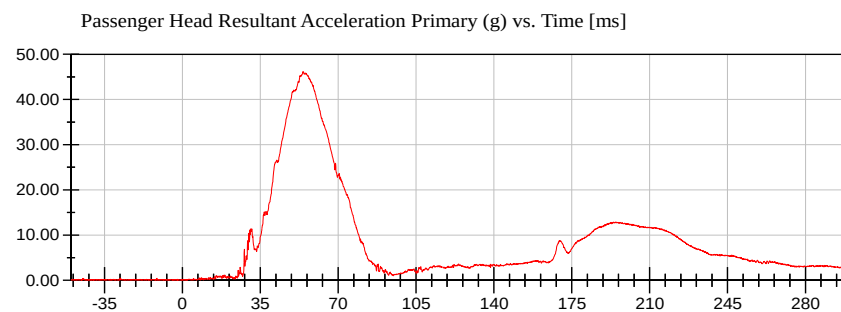


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9.02 g at 185.36 ms

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46.16 g at 54.16 ms

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0.02 g at -41.04 ms



NHTSA

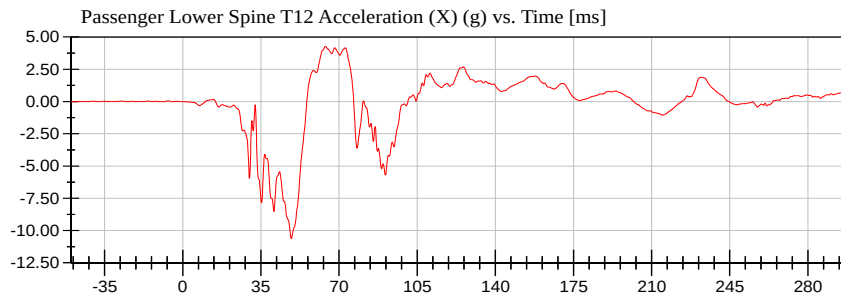
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Test Number: 230615 (M20234105)

Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)



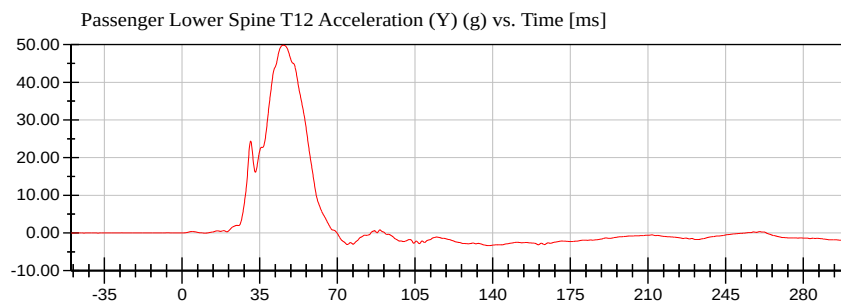
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CFC_180



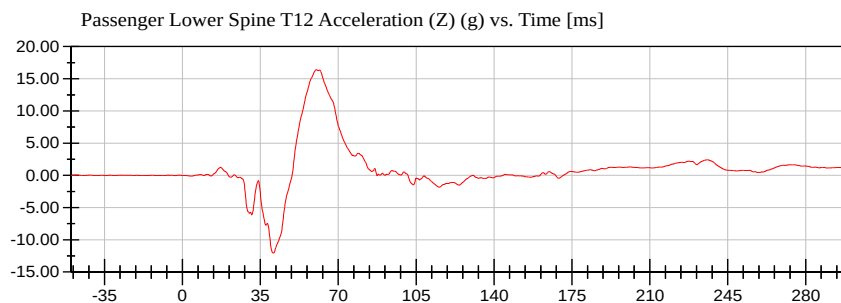
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-3.33 g at 138.72 ms

CFC_180



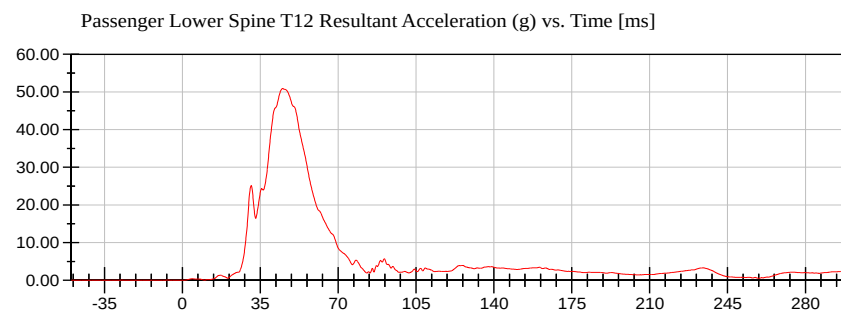
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CFC_180



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CFC_180



NHTSA

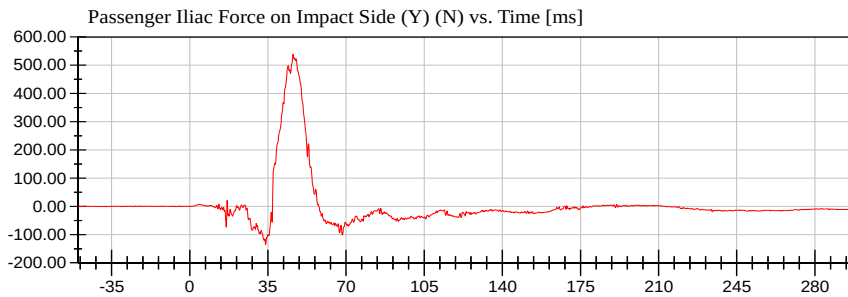
Test Lab: CTF

Test Number: 230615 (M20234105)

Test Date: 06/15/2023

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

Position #4 SID IIs Dummy (DQ0570)



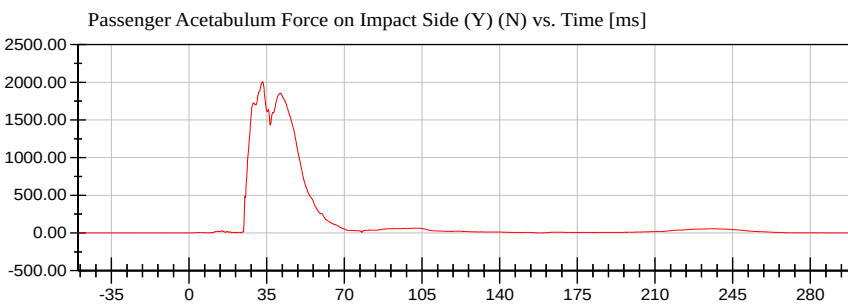
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<Min>

-134.47 N at 34.00 ms

CFC_600



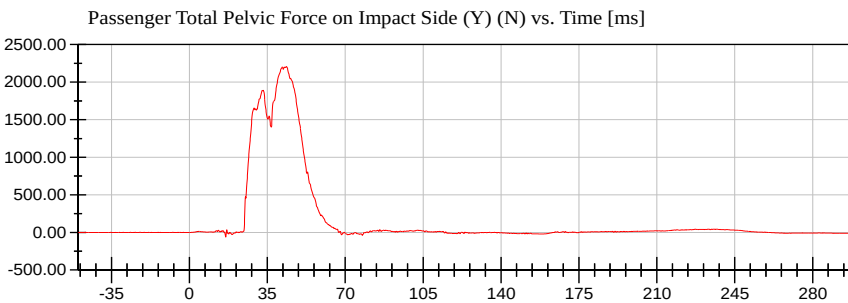
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2,008.15 N at 33.20 ms

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-0.69 N at -29.20 ms

CFC_600



<Max>

2,206.33 N at 43.60 ms

<Min>

-62.25 N at 16.32 ms

CFC_600



APPENDIX C
DUMMY PERFORMANCE CALIBRATION TEST DATA

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS

ES-2re (Driver) 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 Neck Pendulum Test

- Pendulum Velocity (m/s) vs. Time (ms)
- Flexion Angle (°) vs. Time (ms)
- Potentiometer A (°) vs. Time (ms)
- Potentiometer B (°) vs. Time (ms)
- Potentiometer C (°) vs. Time (ms)

Table 4. Shoulder Impact Test

- Impactor Acceleration (G's) vs. Time (ms)

Table 5. Thorax – Upper Rib Drop Test

- Upper Rib Displacement @ 459 mm Drop Height (mm) vs. Time (ms)
- Upper Rib Displacement @ 815 mm Drop Height (mm) vs. Time (ms)

Table 6. Thorax – Middle Rib Drop Test

- Middle Rib Displacement @ 459 mm Drop Height (mm) vs. Time (ms)
- Middle Rib Displacement @ 815 mm Drop Height (mm) vs. Time (ms)

Table 7. Thorax – Lower Rib Drop Test

- Lower Rib Displacement @ 459 mm Drop Height (mm) vs. Time (ms)
- Lower Rib Displacement @ 815 mm Drop Height (mm) vs. Time (ms)

Table 8. Thorax – Full Body Impact Test

- Pendulum Acceleration (G's) vs. Time (ms)
- Impactor Force (kN) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)

Table 9. Abdomen Impact Test

- Impactor Force (kN) vs. Time (ms)
- Front Abdomen Force (kN) vs. Time (ms)
- Middle Abdomen Force (kN) vs. Time (ms)
- Rear Abdomen Force (kN) vs. Time (ms)
- Total Abdomen Force (kN) vs. Time (ms)

Table 10. Lumbar Spine Flexion Test

- Pendulum Velocity (m/s) vs. Time (ms)
- Spine Flexion Angle (°) vs. Time (ms)
- Potentiometer A (°) vs. Time (ms)
- Potentiometer B (°) vs. Time (ms)
- Potentiometer C (°) vs. Time (ms)

Table 11. Pelvis Impact Test

- Pendulum Acceleration (G's) vs. Time (ms)
- Impactor Force (kN) vs. Time (ms)
- Pubic Symphysis (Y) Force (kN) vs. Time (ms)

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. 89

Symbol	Description	Specification	Results	Pass
		mm	mm	
1	Sitting Height	900.0 - 918.0	909	Yes
2	Seat to Shoulder Joint	558.0 - 572.0	560	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	98	Yes
5	Sole to Seat, Sitting	433.0 - 451.0	443	Yes
6	Head Width	152.0 - 158.0	154	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	279	Yes
10	Pelvis Lap Width	359.0 - 373.0	366	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. 89-2

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	63 %	Yes
Peak Resultant Acceleration	125 - 155 g	131.3 g	Yes
Peak Longitudinal Acceleration	(-15) - 15 g	8.4 g	Yes
Is Resultant Acceleration Curve Unimodal within 15% of Main Pulse?	< 15 %	4.16 %	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: DP6812

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

05.31.2023 11:18:21 361

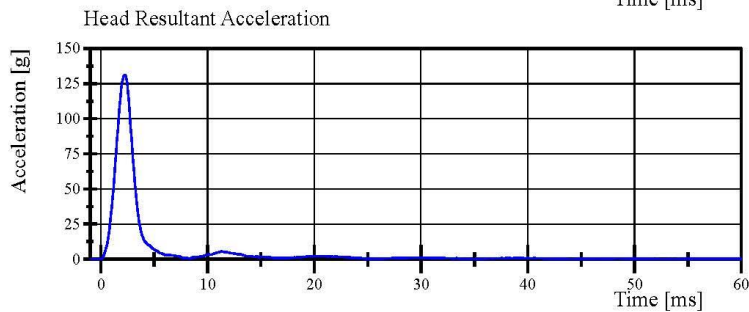
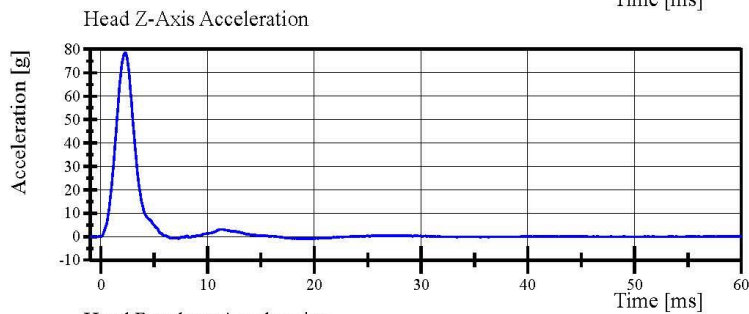
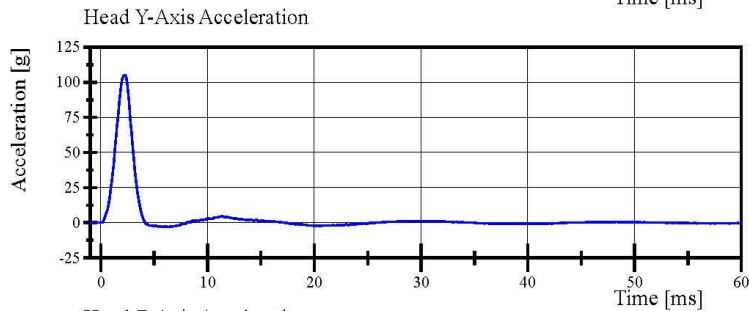
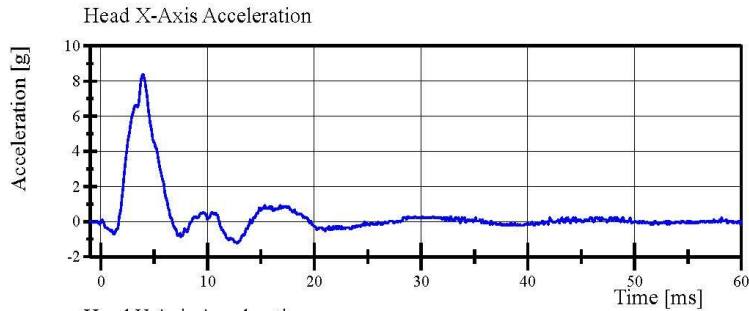


Transportation Research Center Inc.

Left Lateral Head Drop

ES-2re Serial No. F030 Certification No. 89-2

Test Date: 5/31/2023



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

05.31.2023 11:19:00 361



Transportation Research Center Inc.

Left Lateral Neck

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-3.3) - (-3.5) m/s	-3.34 m/s	Yes
Maximum Headform Flexion			
Peak	(-49) - (-59) deg	-51.0 deg	Yes
Time of Peak	54 - 66 ms	54.2 ms	Yes
Headform Flexion Decay			
- Peak to Zero	53 - 88 ms	57.4 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 05053

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

05.31.2023 12:36:48 1498

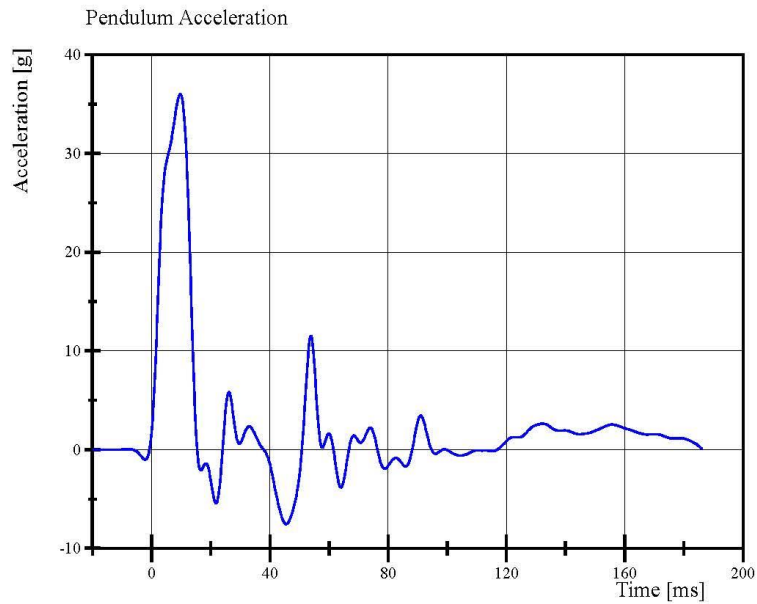


Transportation Research Center Inc.

Left Lateral Neck

ES-2re Serial No. F030 Certification No. 89-1

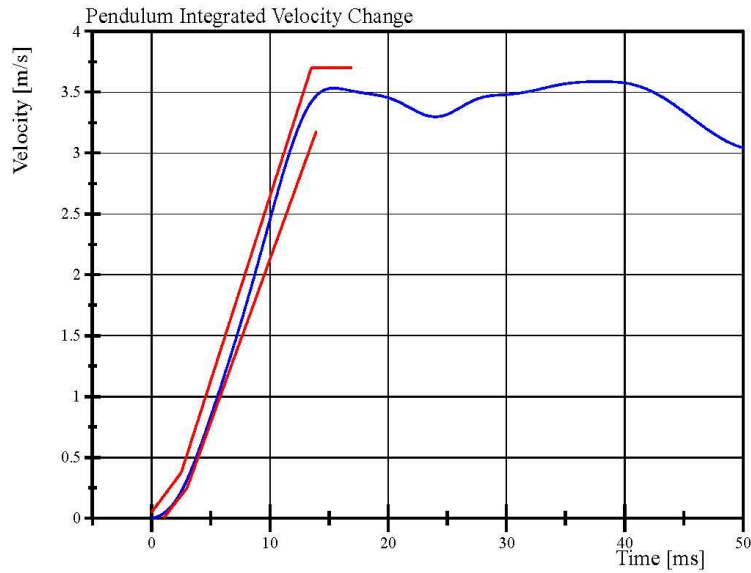
Test Date: 5/31/2023



Filter Class: CFC_60

Max: 36.0 g at 9.7 ms

Min: -7.5 g at 45.5 ms



Filter Class: CFC_60

Max: 3.6 m/s at 37.9 ms

Min: 0.0 m/s at 0.0 ms

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

05.31.2023 12:37:16 1498

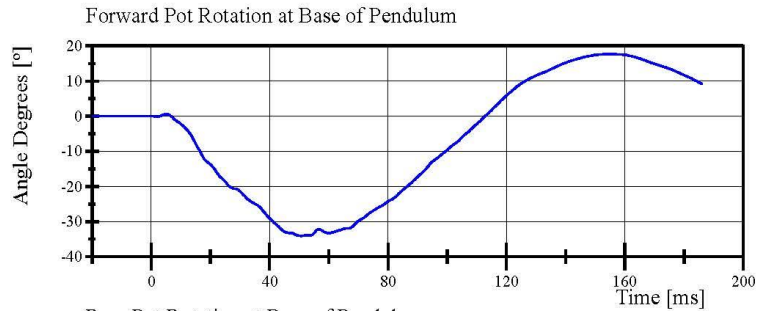


Transportation Research Center Inc.

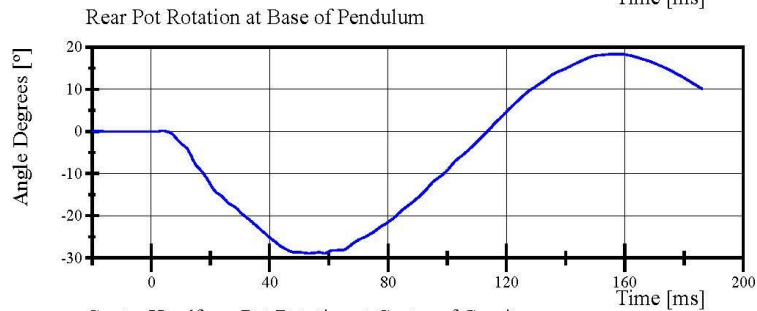
Left Lateral Neck

ES-2re Serial No. F030 Certification No. 89-1

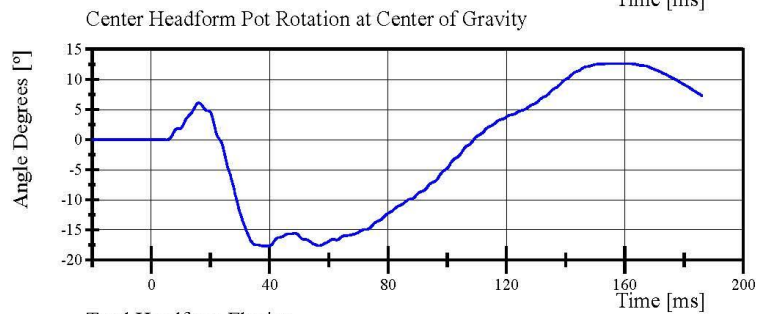
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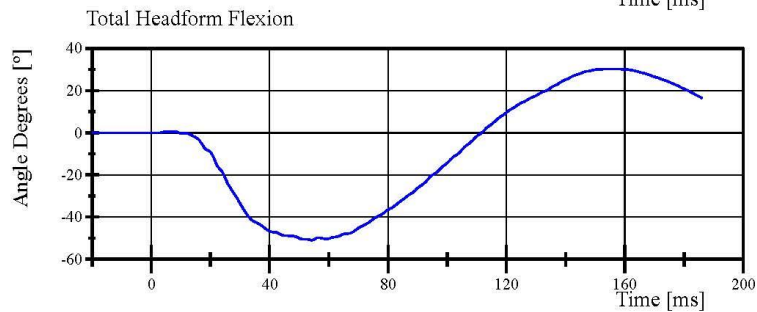
Filter Class: CFC_180
Max: 17.7 ° at 154.7 ms
Min: -34.1 ° at 50.7 ms



Filter Class: CFC_180
Max: 18.4 ° at 157.8 ms
Min: -28.9 ° at 58.6 ms



Filter Class: CFC_180
Max: 12.6 ° at 159.9 ms
Min: -17.7 ° at 39.5 ms



Filter Class: CFC_180
Max: 30.3 ° at 154.8 ms
Min: -51.0 ° at 54.2 ms

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

05.31.2023 12:37:16 1498



Transportation Research Center Inc.

Left Lateral Shoulder

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.21 m/s	Yes
Test Probe Acceleration	(-7.5) - (-10.5) g	-8.72 g	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: 175-3501-07014

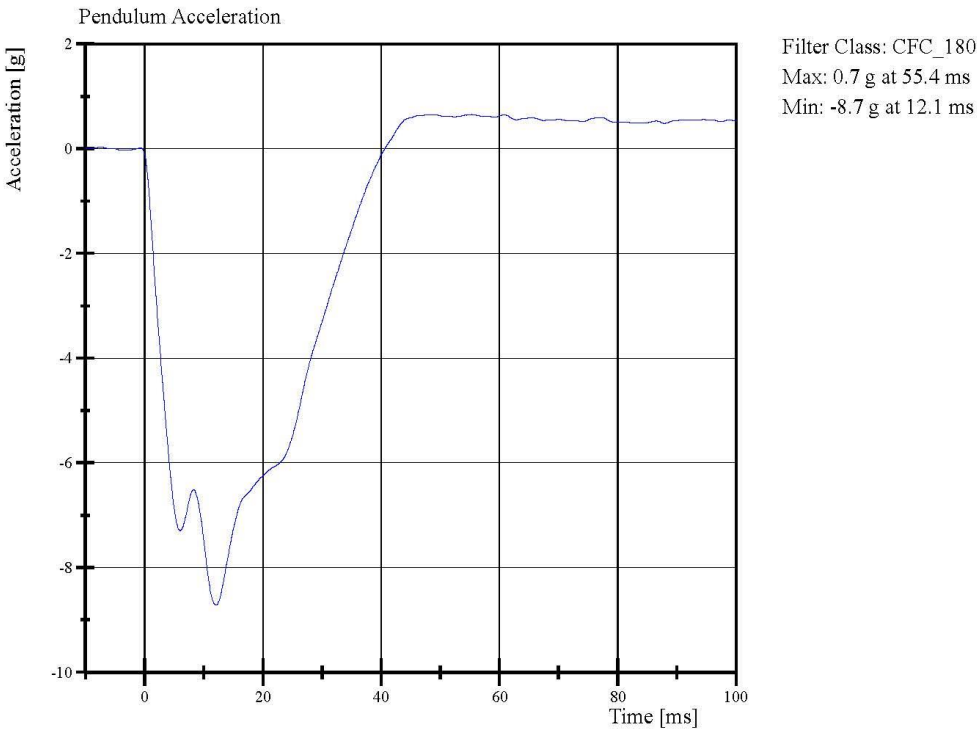
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 13:21:27 603



Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



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

05.31.2023 13:22:37 603



Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	63 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.9 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 462mm

Rib Foam S/N: EK6973

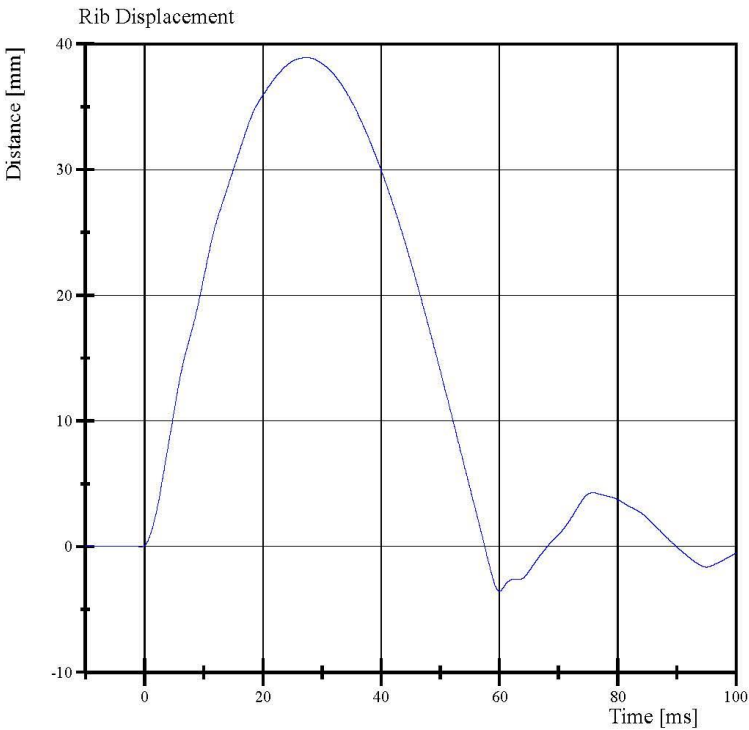
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 08:55:24 631



Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 38.9 mm at 27.4 ms
Min: -3.6 mm at 60.0 ms

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

05.31.2023 08:56:24 631



Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	47.6 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 816 mm

Rib Foam S/N: EK6973

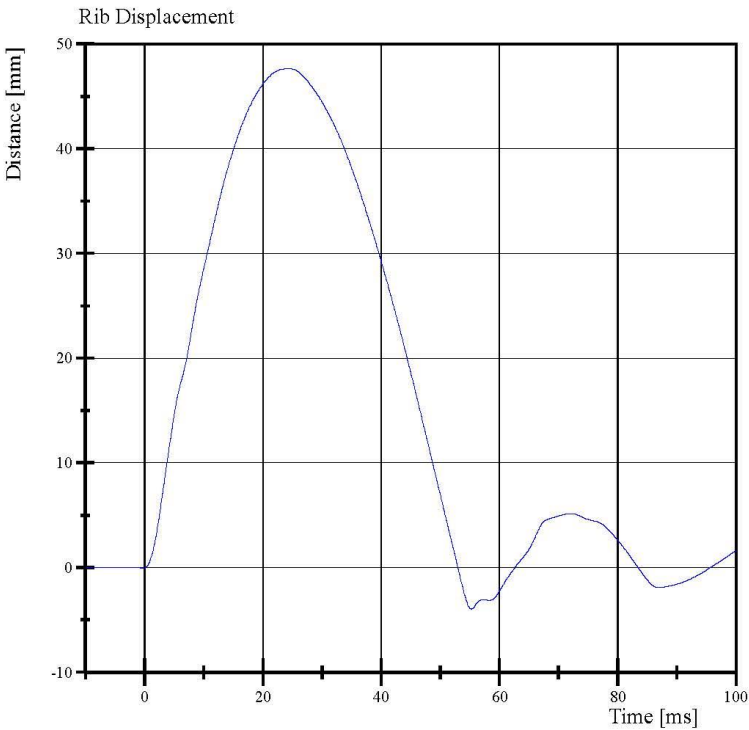
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 08:49:47 513



Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 47.6 mm at 24.5 ms
Min: -4.0 mm at 55.3 ms

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

05.31.2023 08:50:45 513



Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.5 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 462 mm

Rib Foam S/N: EK6970

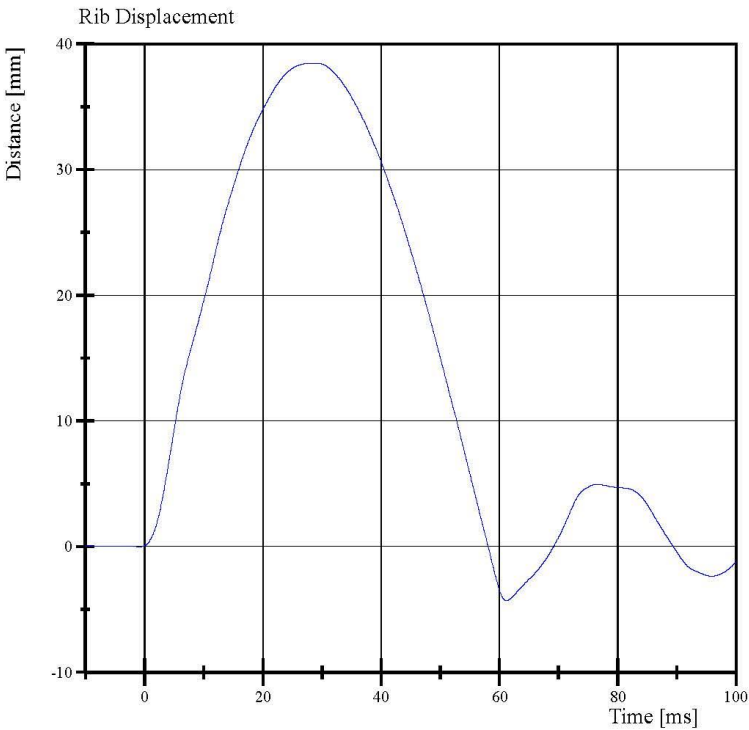
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 09:07:03 624



Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 38.5 mm at 29.0 ms
Min: -4.3 mm at 61.2 ms

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

05.31.2023 09:07:51 624



Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	62 %	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 Foam S/N: EK6970

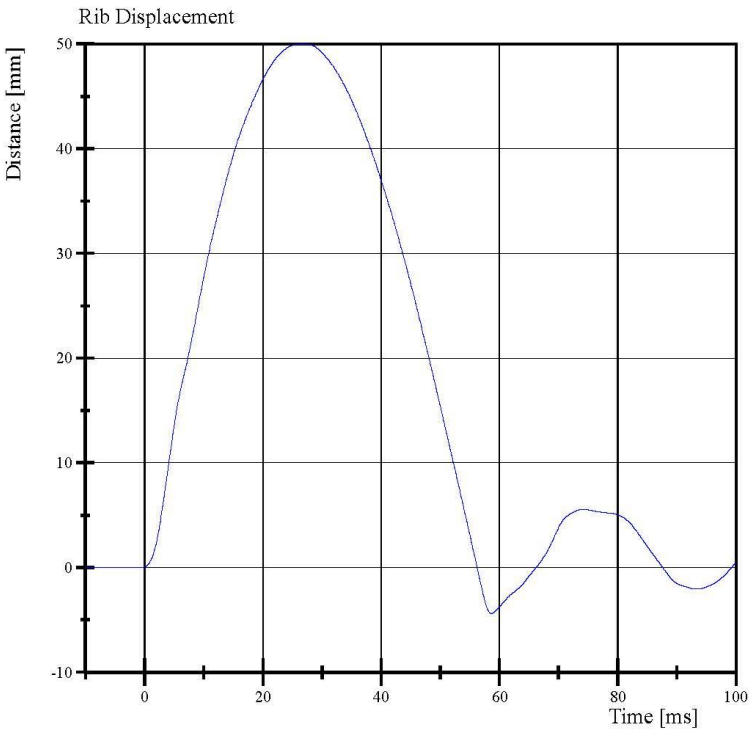
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 09:00:07 530



Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 50.0 mm at 27.4 ms
Min: -4.4 mm at 58.6 ms

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

05.31.2023 09:00:58 530



Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023

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	38.1 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 462 mm

Rib Foam S/N: EK6971

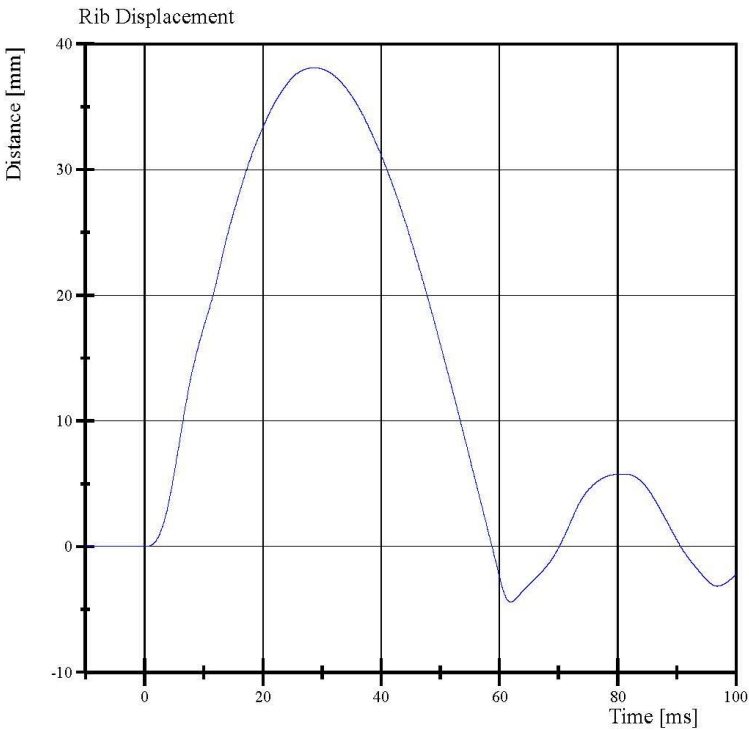
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 09:18:55 623



Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 38.1 mm at 28.6 ms
Min: -4.4 mm at 61.8 ms

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

05.31.2023 09:19:44 623



Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	47.2 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 816 mm

Rib Foam S/N: EK6971

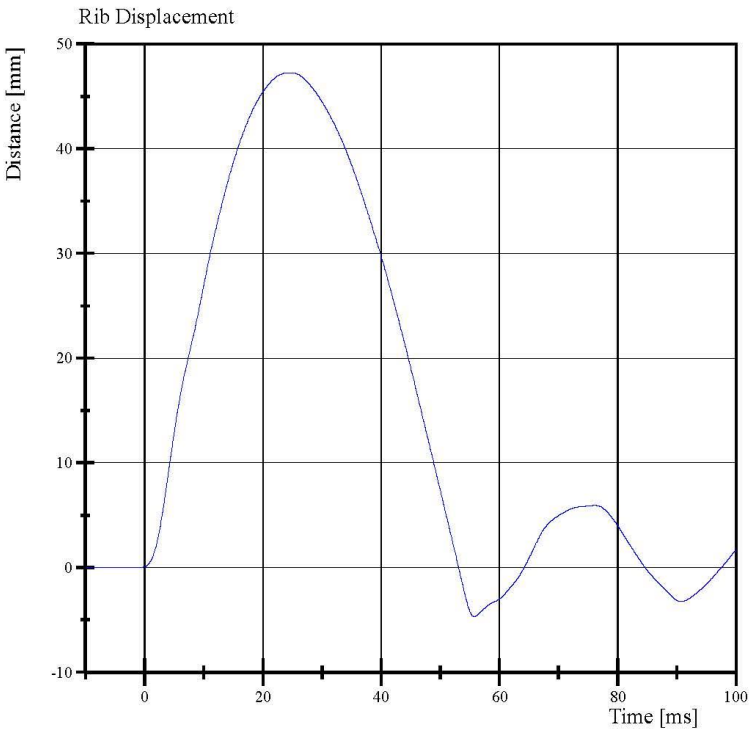
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 09:11:45 520



Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



Filter Class: CFC_180
Max: 47.2 mm at 24.6 ms
Min: -4.7 mm at 55.8 ms

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

05.31.2023 09:12:27 520



Transportation Research Center Inc.

Left Lateral Thorax

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Impactor Velocity	5.4 - 5.60 m/s	5.435 m/s	Yes
Peak Impactor Force after 6 ms	(-5,100) - (-6,200) N	-5,284.6 N	Yes
Upper Rib Displacement	34 - 41 mm	37.9 mm	Yes
Center Rib Displacement	37 - 45 mm	41.3 mm	Yes
Lower Rib Displacement	37 - 44 mm	41.0 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Rib Module S/N: 175-4008-A

Upper Rib Foam S/N: 175-4003-EK6973

Middle Rib Module S/N: 175-4008-A

Middle Rib Foam S/N: 175-4003-EK6970

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

Lower Rib Foam S/N: 175-4008-EK6971

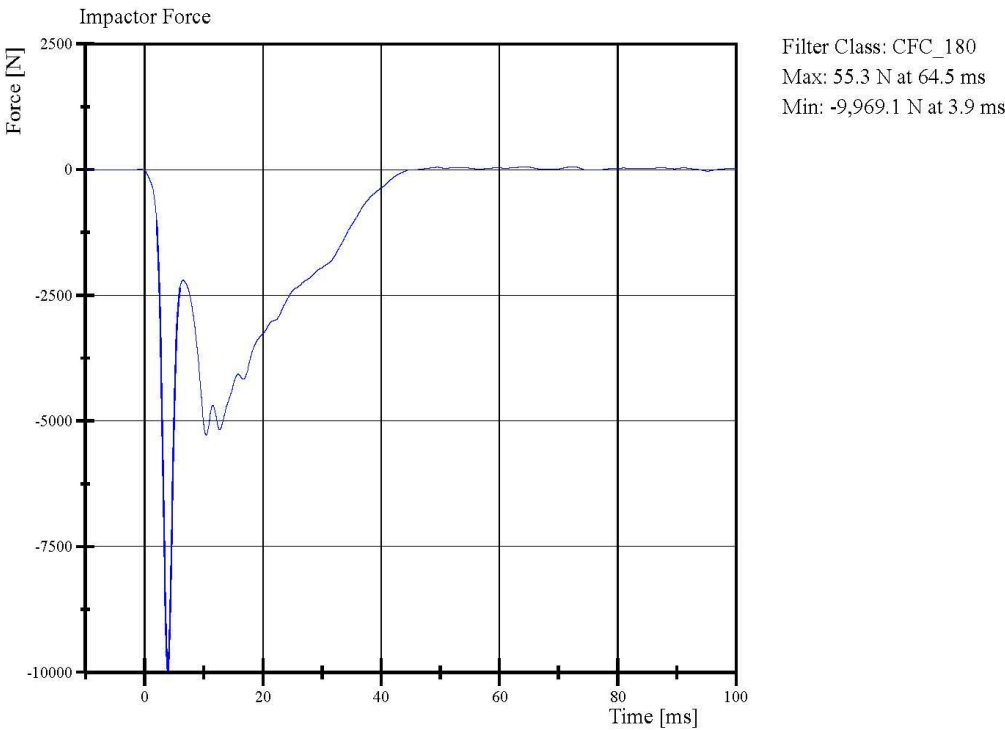
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 13:26:26 536



Transportation Research Center Inc.

Left Lateral Thorax
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



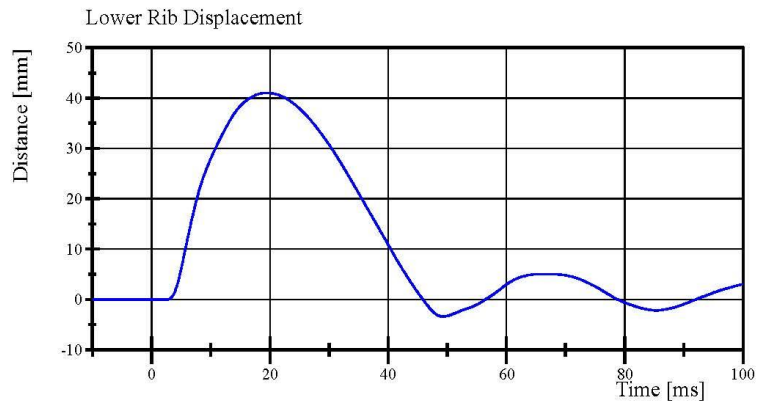
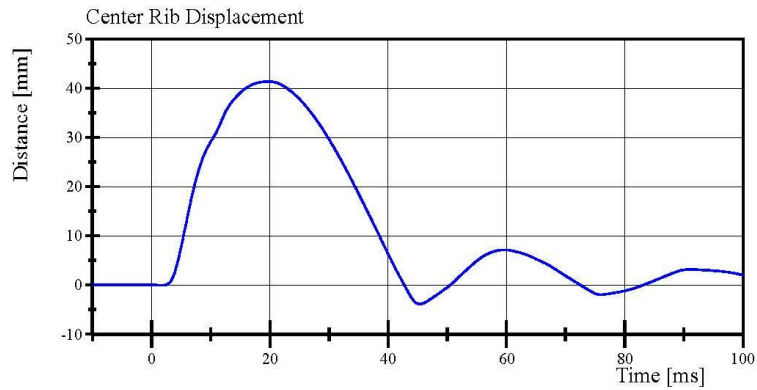
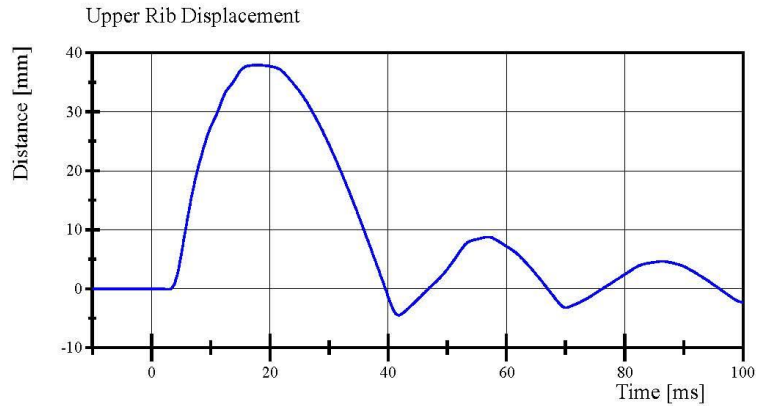
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 13:27:50 536



Transportation Research Center Inc.

Left Lateral Thorax
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



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

05.31.2023 13:27:51 536



Transportation Research Center Inc.

Left Lateral Lumbar

ES-2re Serial No. F030 Certification No. 89-3

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-5.95) - (-6.15) m/s	-6.148 m/s	Yes
Maximum Headform Flexion			
Peak	(-45) - (-55) deg	-46.2 deg	Yes
Time of Peak	39 - 53 ms	42.1 ms	Yes
Headform Flexion Decay			
- Peak to Zero	37 - 57 ms	37.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Lumbar S/N: DS3472

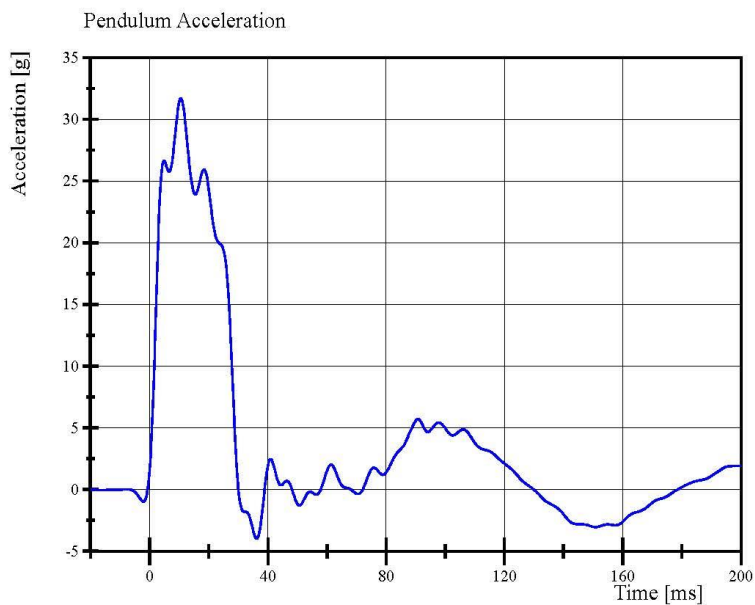
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 11:43:54 665

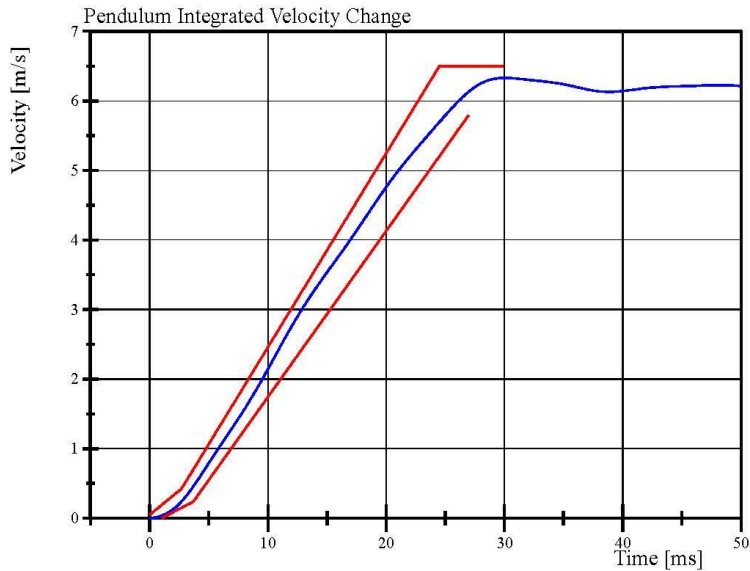


Transportation Research Center Inc.

Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 89-3
Test Date: 5/31/2023



Filter Class: CFC_60
Max: 31.7 g at 10.6 ms
Min: -4.0 g at 36.2 ms



Filter Class: CFC_60
Max: 6.3 m/s at 30.0 ms
Min: 0.0 m/s at 0.0 ms

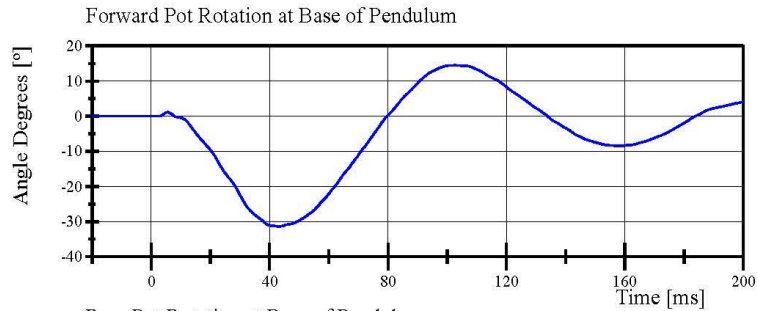
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

05.31.2023 11:44:44 665

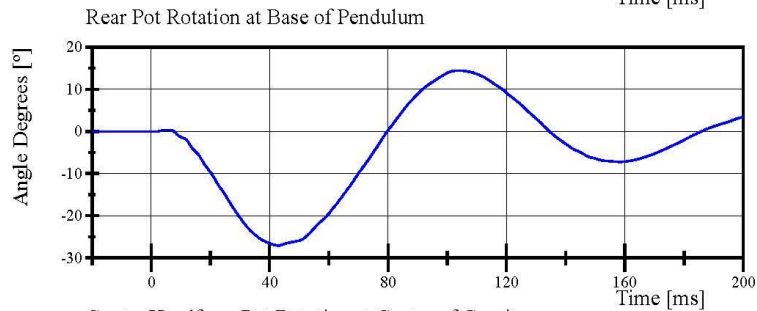


Transportation Research Center Inc.

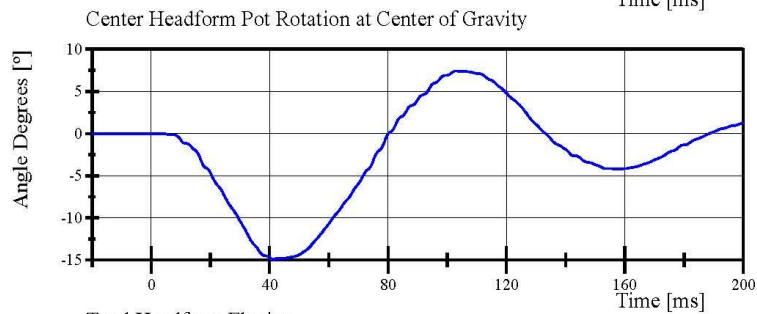
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 89-3
Test Date: 5/31/2023



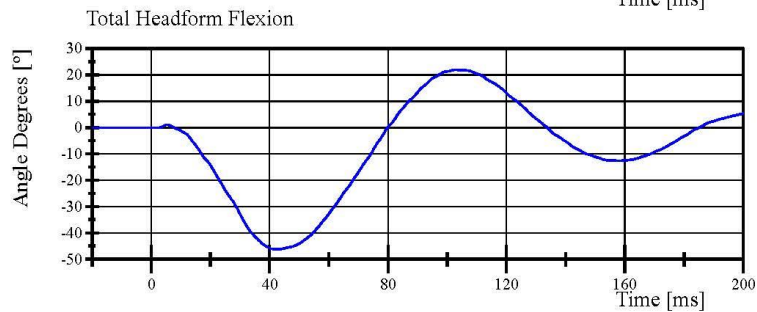
Filter Class: CFC_180
Max: 14.5 ° at 102.6 ms
Min: -31.4 ° at 43.2 ms



Filter Class: CFC_180
Max: 14.4 ° at 103.8 ms
Min: -27.0 ° at 42.9 ms



Filter Class: CFC_180
Max: 7.4 ° at 103.0 ms
Min: -14.9 ° at 41.2 ms



Filter Class: CFC_180
Max: 21.9 ° at 102.8 ms
Min: -46.2 ° at 42.1 ms

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

05.31.2023 11:44:45 665



Transportation Research Center Inc.

Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
Test Probe Velocity	3.9 - 4.1 m/s	4.03 m/s	Yes
Test Probe Force			
Peak	4,000 - 4,800 N	4,170.8 N	Yes
Time of Peak	10.6 - 13.0 ms	12.40 ms	Yes
Total Abdominal Force			
Peak	2,200 - 2,700 N	2,495.9 N	Yes
Time of Peak	10.0 - 12.3 ms	11.44 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Abdomen S/N: 1066

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

05.31.2023 13:31:58 631

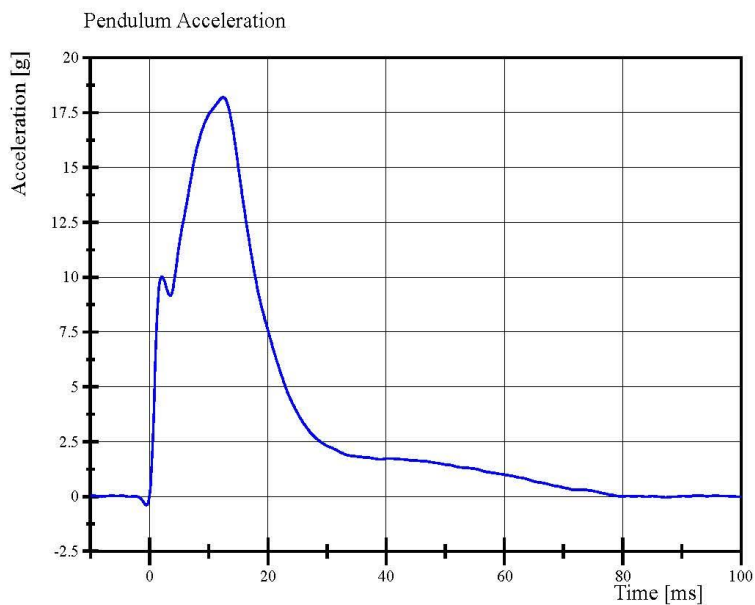


Transportation Research Center Inc.

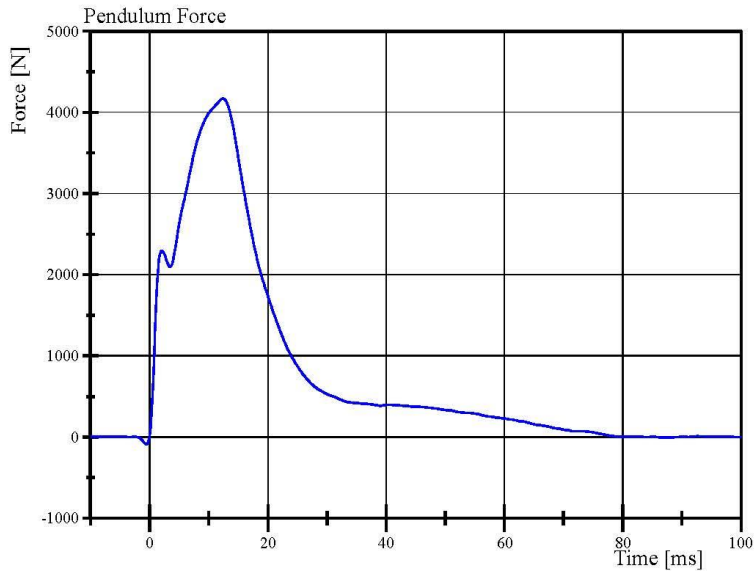
Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023



Filter Class: CFC_180
Max: 18.2 g at 12.4 ms
Min: -0.4 g at -0.6 ms



Filter Class: CFC_180
Max: 4,170.8 N at 12.4 ms
Min: -89.4 N at -0.6 ms

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

05.31.2023 13:32:29 631

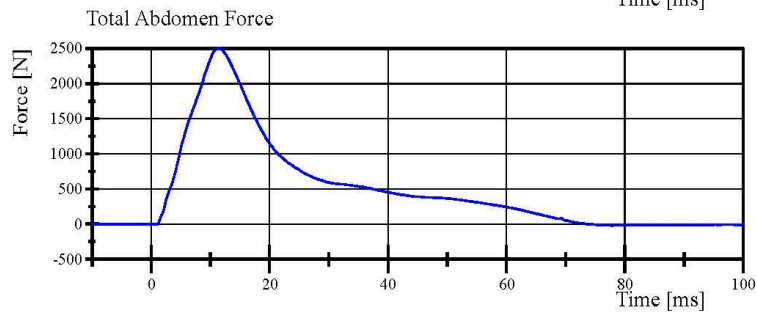
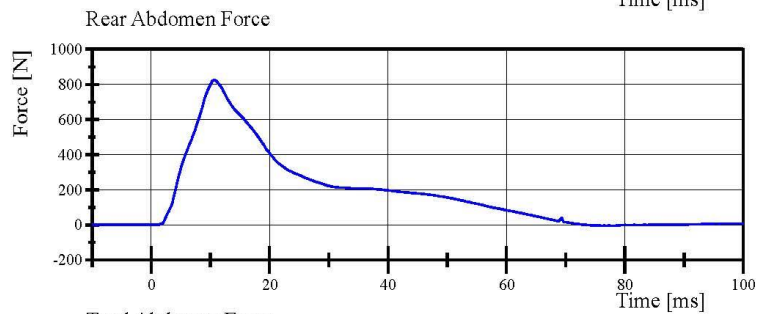
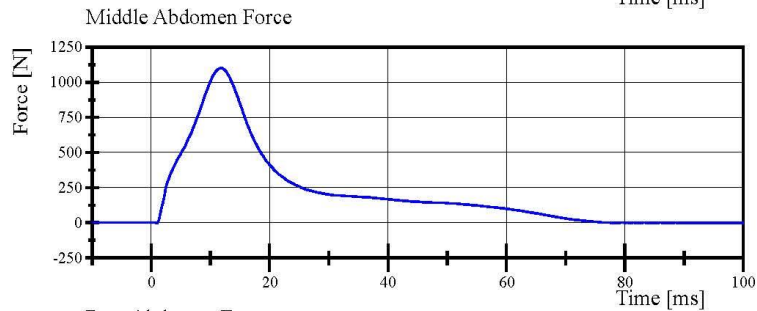
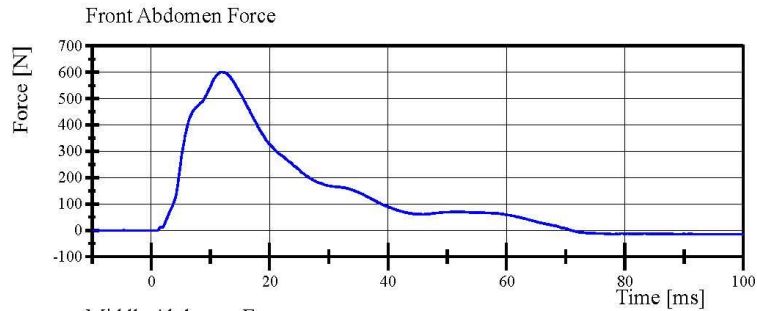


Transportation Research Center Inc.

Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 89-1

Test Date: 5/31/2023



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. 89-1

Test Date: 5/31/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	63 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.36 m/s	Yes
Test Probe Force			
Peak	4,700 - 5,400 N	5,224.1 N	Yes
Time of Peak	11.8 - 16.1 ms	12.88 ms	Yes
Pubic Symphysis Force			
Peak	(-1,230) - (-1,590) N	-1,377.7 N	Yes
Time of Peak	12.2 - 17.0 ms	13.36 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: N/A

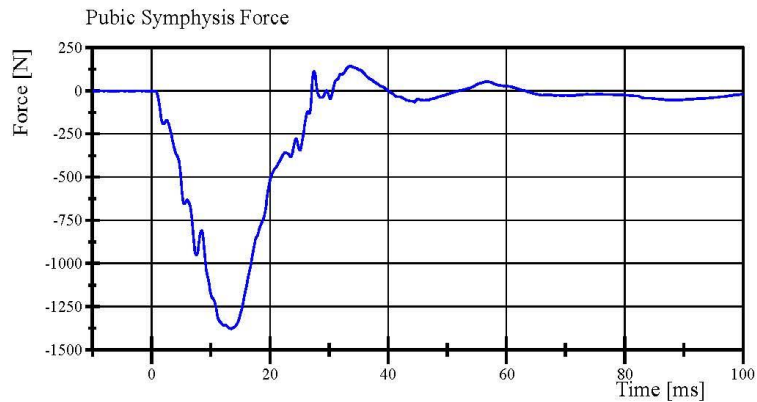
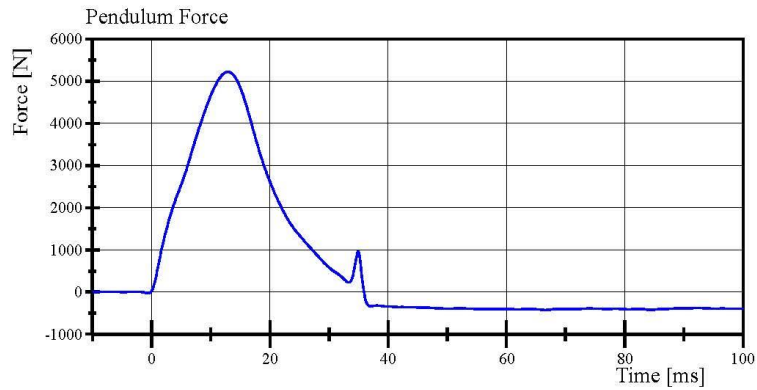
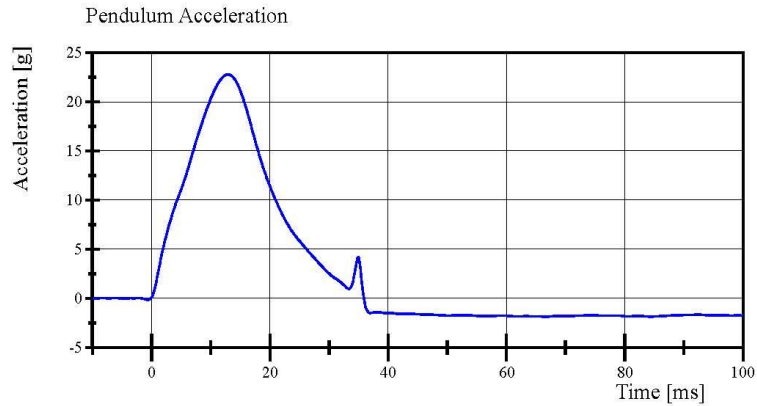
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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Transportation Research Center Inc.

Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 89-1
Test Date: 5/31/2023



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. 90

Symbol	Description	Specification	Results	Pass
		mm	mm	
1	Sitting Height	900.0 - 918.0	909	Yes
2	Seat to Shoulder Joint	558.0 - 572.0	560	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	98	Yes
5	Sole to Seat, Sitting	433.0 - 451.0	443	Yes
6	Head Width	152.0 - 158.0	154	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	279	Yes
10	Pelvis Lap Width	359.0 - 373.0	366	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. 90-1

Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Resultant Acceleration	125 - 155 g	127.4 g	Yes
Peak Longitudinal Acceleration	(-15) - 15 g	9.4 g	Yes
Is Resultant Acceleration Curve Unimodal within 15% of Main Pulse?	< 15 %	4.14 %	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: DP6812

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

06.19.2023 09:35:39 363

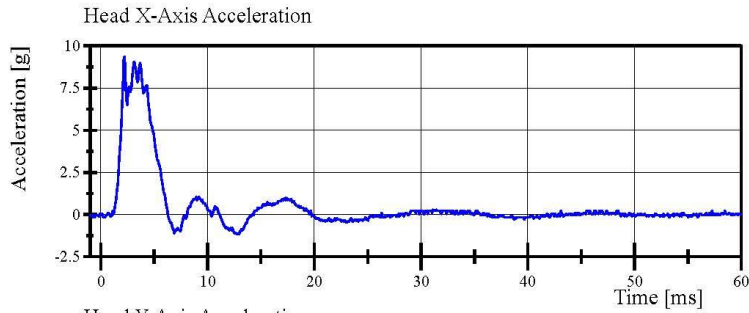


Transportation Research Center Inc.

Left Lateral Head Drop

ES-2re Serial No. F030 Certification No. 90-1

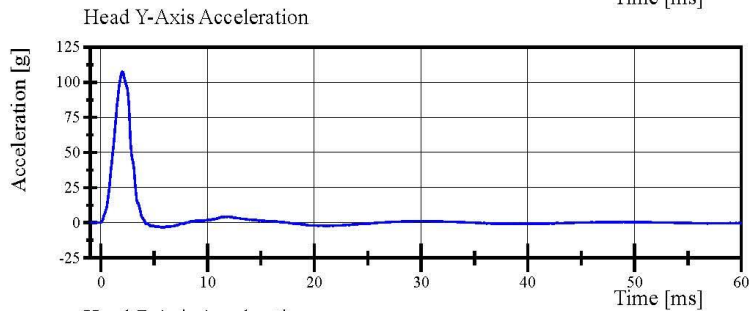
Test Date: 6/19/2023



Filter Class: CFC_1000

Max: 9.4 g at 2.2 ms

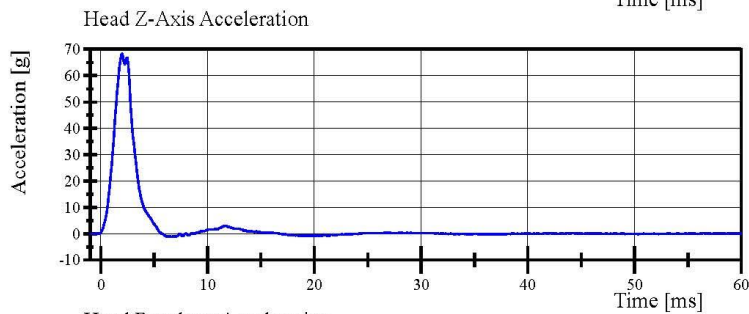
Min: -1.2 g at 12.8 ms



Filter Class: CFC_1000

Max: 107.4 g at 2.0 ms

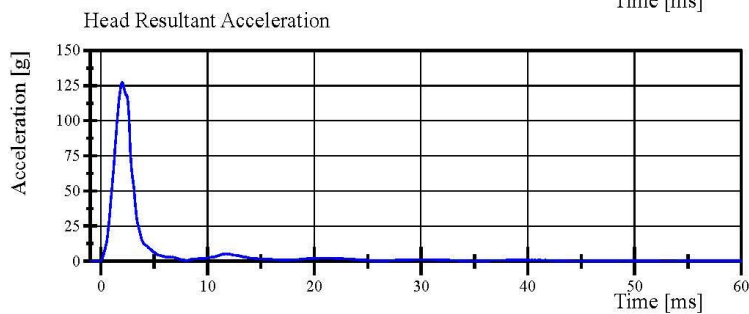
Min: -3.2 g at 5.8 ms



Filter Class: CFC_1000

Max: 68.3 g at 2.0 ms

Min: -1.2 g at 6.6 ms



Filter Class: CFC_1000

Max: 127.4 g at 2.0 ms

Min: 0.0 g at -1.0 ms

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

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Transportation Research Center Inc.

Left Lateral Neck

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	58 %	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	-52.0 deg	Yes
Time of Peak	54 - 66 ms	55.0 ms	Yes
Headform Flexion Decay			
- Peak to Zero	53 - 88 ms	57.7 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 05053

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

06.19.2023 13:24:10 1497

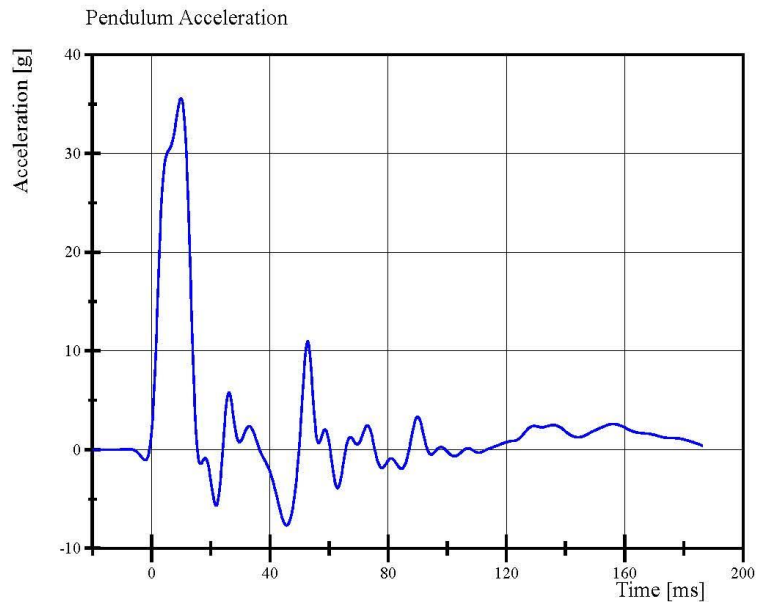


Transportation Research Center Inc.

Left Lateral Neck

ES-2re Serial No. F030 Certification No. 90-1

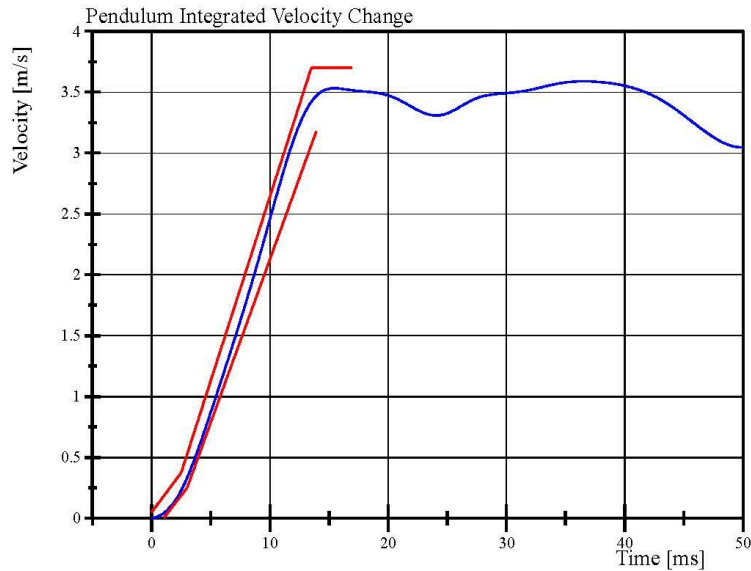
Test Date: 6/19/2023



Filter Class: CFC_60

Max: 35.6 g at 9.9 ms

Min: -7.7 g at 45.6 ms



Filter Class: CFC_60

Max: 3.6 m/s at 36.5 ms

Min: 0.0 m/s at 0.0 ms

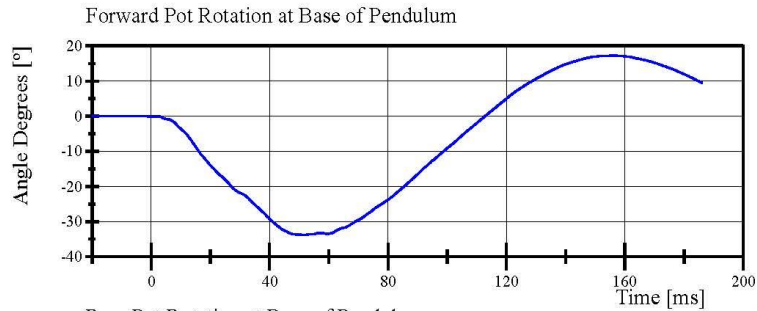
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 13:24:37 1497

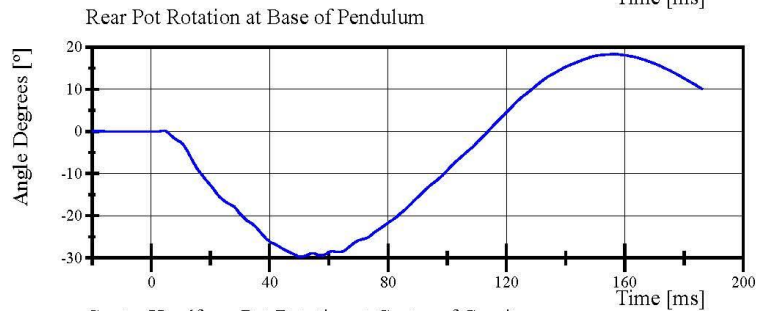


Transportation Research Center Inc.

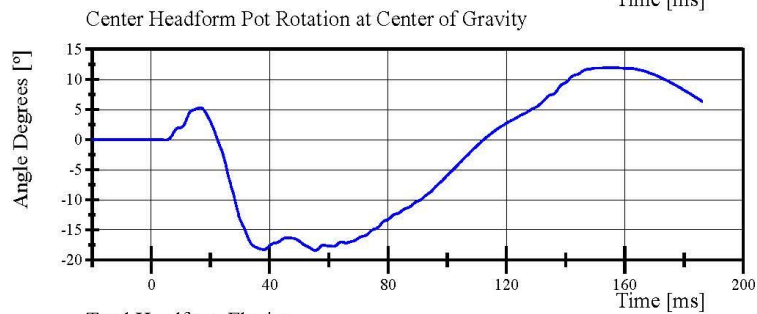
Left Lateral Neck
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



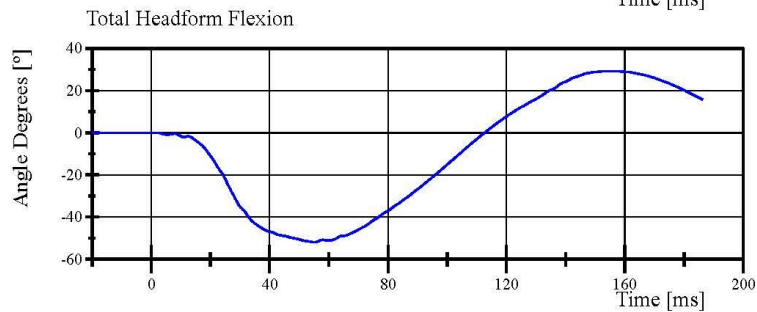
Filter Class: CFC_180
Max: 17.3 ° at 156.4 ms
Min: -33.8 ° at 51.6 ms



Filter Class: CFC_180
Max: 18.3 ° at 156.6 ms
Min: -29.7 ° at 50.6 ms



Filter Class: CFC_180
Max: 11.9 ° at 154.8 ms
Min: -18.4 ° at 55.4 ms



Filter Class: CFC_180
Max: 29.2 ° at 156.3 ms
Min: -52.0 ° at 55.0 ms

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

06.19.2023 13:24:37 1497



Transportation Research Center Inc.

Left Lateral Shoulder

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.22 m/s	Yes
Test Probe Acceleration	(-7.5) - (-10.5) g	-10.19 g	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: 175-3501-07014

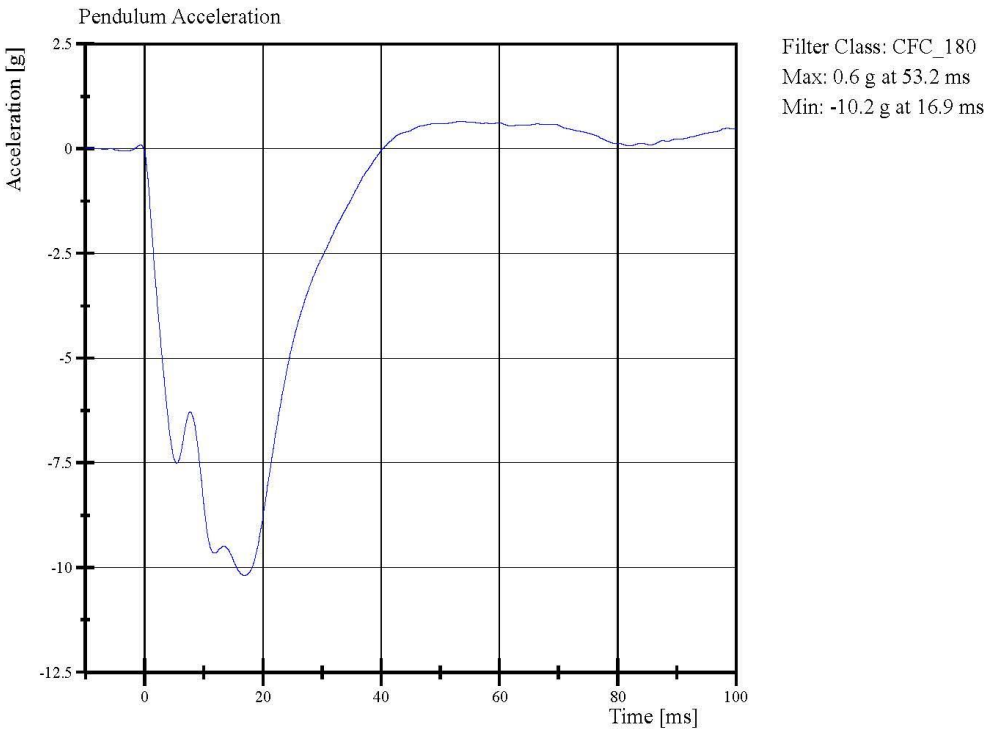
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 14:16:06 616



Transportation Research Center Inc.

Left Lateral Shoulder
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



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

06.19.2023 14:16:31 616



Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	38.8 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 462 mm

Rib Foam S/N: EK6973

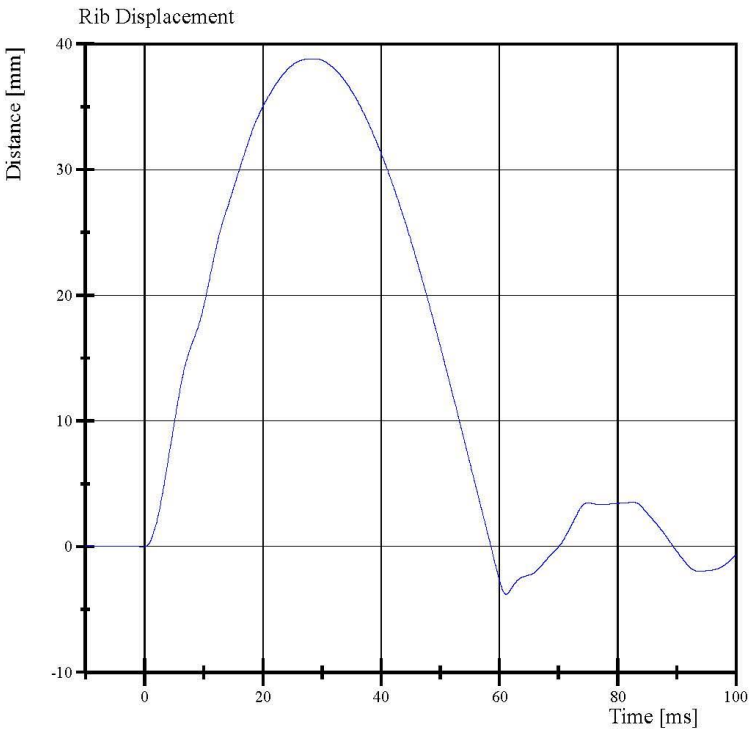
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 10:26:04 613



Transportation Research Center Inc.

3.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 38.8 mm at 28.6 ms
Min: -3.8 mm at 61.1 ms

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

06.19.2023 10:26:31 613



Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	47.6 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 816 mm

Rib Foam S/N: EK6973

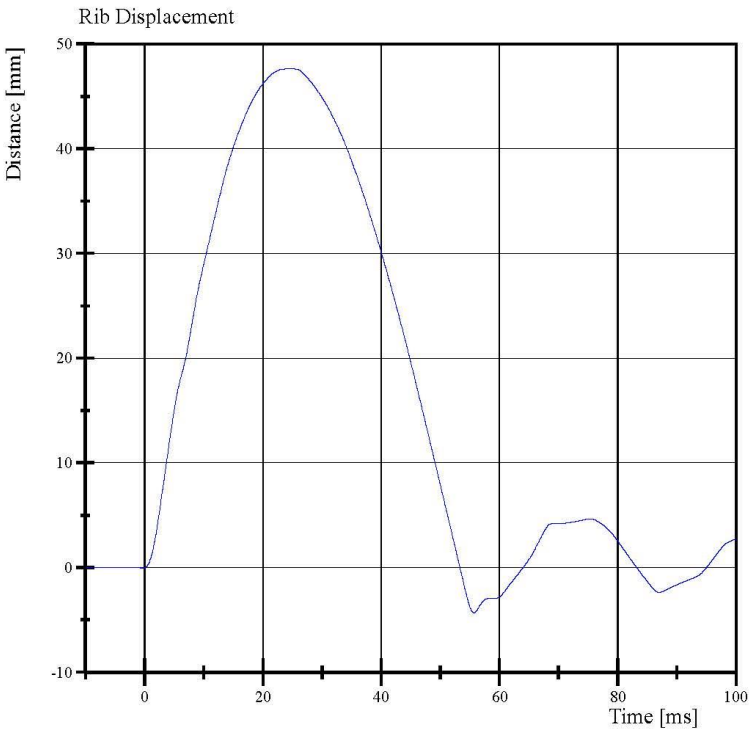
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 10:20:11 539



Transportation Research Center Inc.

4.0 m/s Upper Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 47.6 mm at 25.0 ms
Min: -4.3 mm at 55.7 ms

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

06.19.2023 10:20:48 539



Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	60 %	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: 462 mm

Rib Foam S/N: EK6970

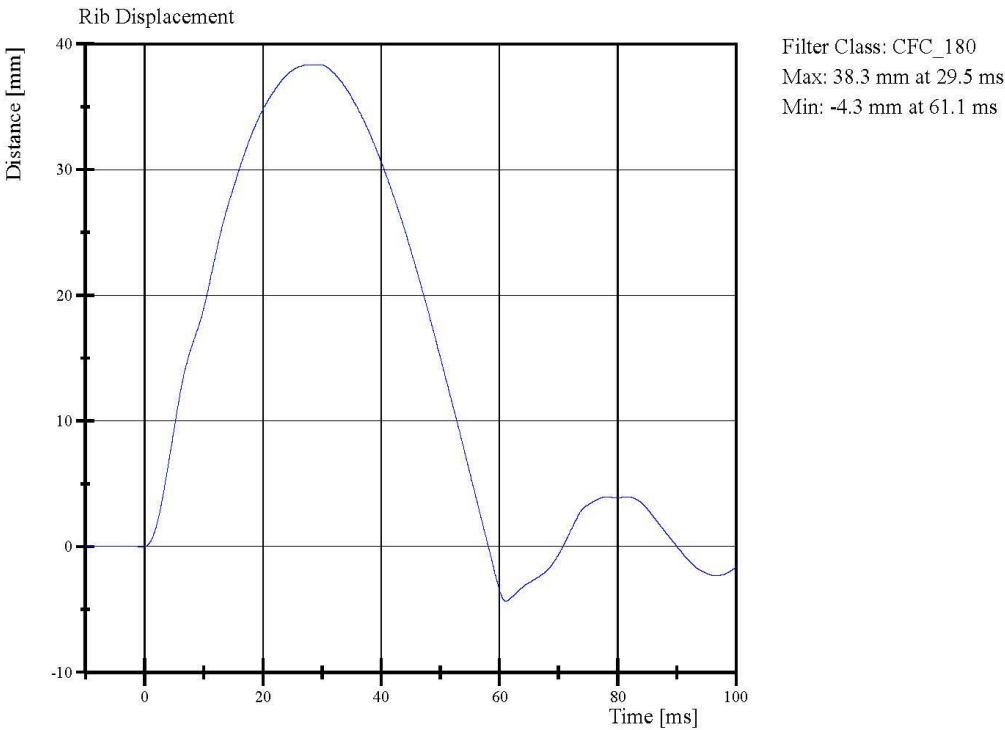
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 10:36:15 633



Transportation Research Center Inc.

3.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



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

06.19.2023 10:36:40 633



Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	61 %	Yes
4.0 m/s Test Rib Displacement (807 mm to 823 mm)	46 - 51 mm	49.5 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 816 mm

Rib Foam S/N: EK6970

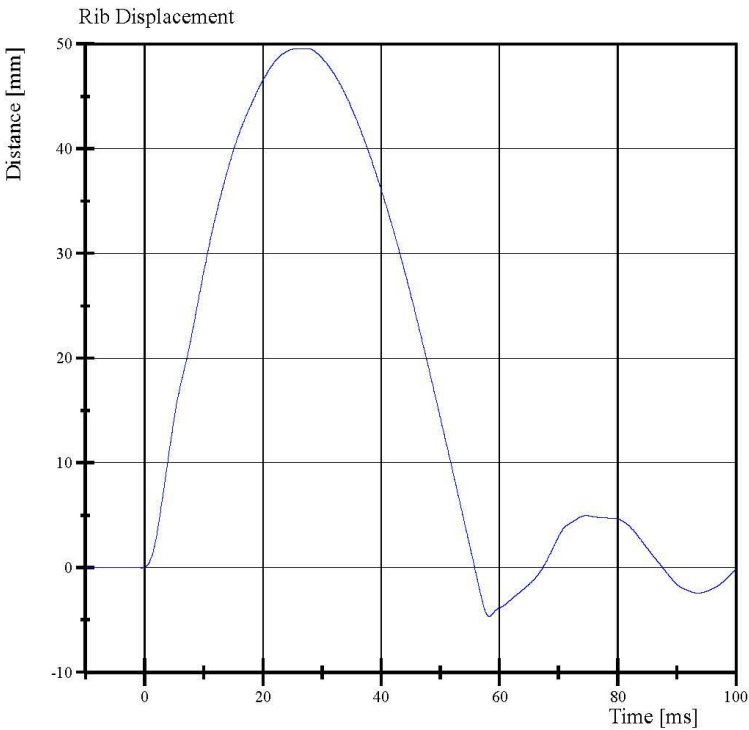
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 10:30:36 534



Transportation Research Center Inc.

4.0 m/s Middle Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 49.5 mm at 27.4 ms
Min: -4.7 mm at 58.2 ms

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

06.19.2023 10:31:08 534



Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
3.0 m/s Test Rib Displacement (454 mm to 464 mm)	36 - 40 mm	37.9 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Drop Height: 462 mm

Rib Foam S/N: EK6971

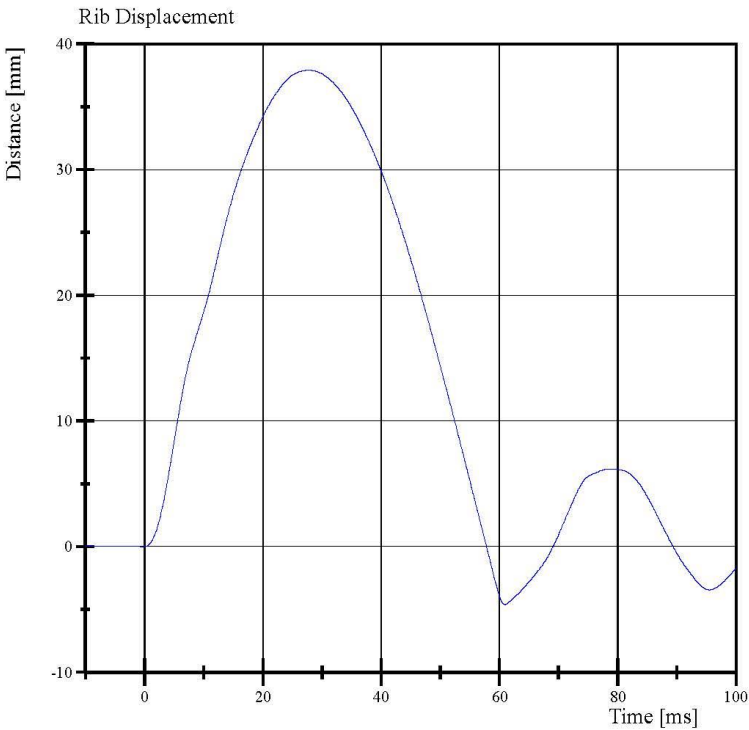
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

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Transportation Research Center Inc.

3.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 37.9 mm at 27.7 ms
Min: -4.6 mm at 61.0 ms

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

06.19.2023 10:48:50 610



Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	60 %	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: 816 mm

Rib Foam S/N: EK6971

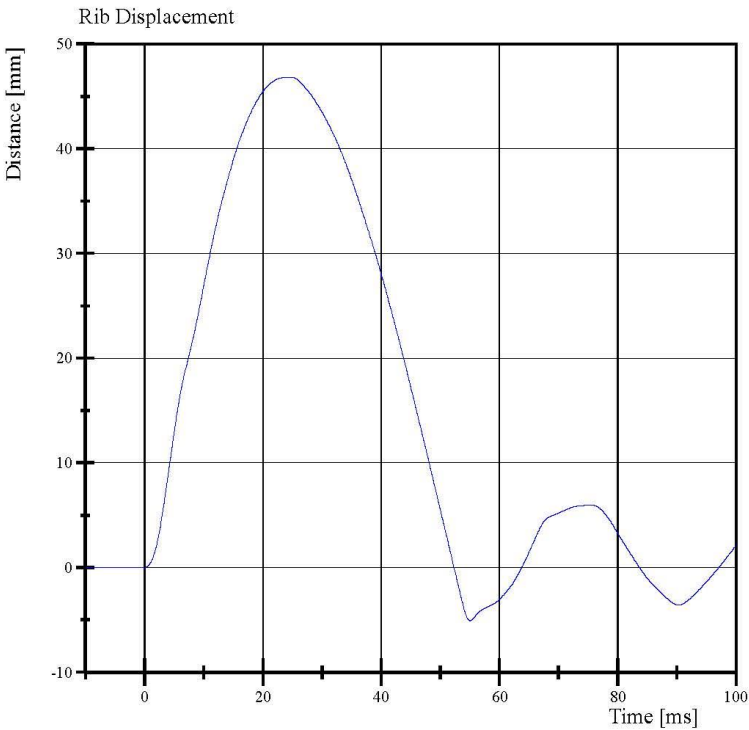
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 10:41:27 521



Transportation Research Center Inc.

4.0 m/s Lower Full Rib Module
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 46.8 mm at 24.6 ms
Min: -5.1 mm at 55.0 ms

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

06.19.2023 10:42:01 521



Transportation Research Center Inc.

Left Lateral Thorax
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Impactor Velocity	5.4 - 5.60 m/s	5.453 m/s	Yes
Peak Impactor Force after 6 ms	(-5,100) - (-6,200) N	-5,673.0 N	Yes
Upper Rib Displacement	34 - 41 mm	37.4 mm	Yes
Center Rib Displacement	37 - 45 mm	40.2 mm	Yes
Lower Rib Displacement	37 - 44 mm	40.6 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Rib Module S/N: 175-4008-A

Upper Rib Foam S/N: 175-4003-EK6973

Middle Rib Module S/N: 175-4008-A

Middle Rib Foam S/N: 175-4003-EK6970

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

Lower Rib Foam S/N: 175-4008-EK6971

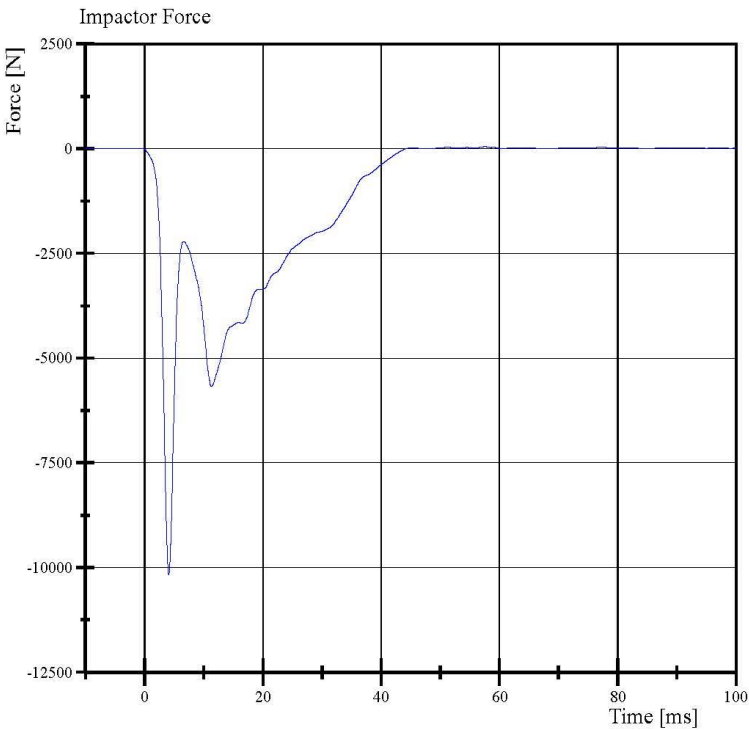
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 14:22:53 490



Transportation Research Center Inc.

Left Lateral Thorax
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



Filter Class: CFC_180
Max: 50.4 N at 57.5 ms
Min: -10,182.7 N at 4.1 ms

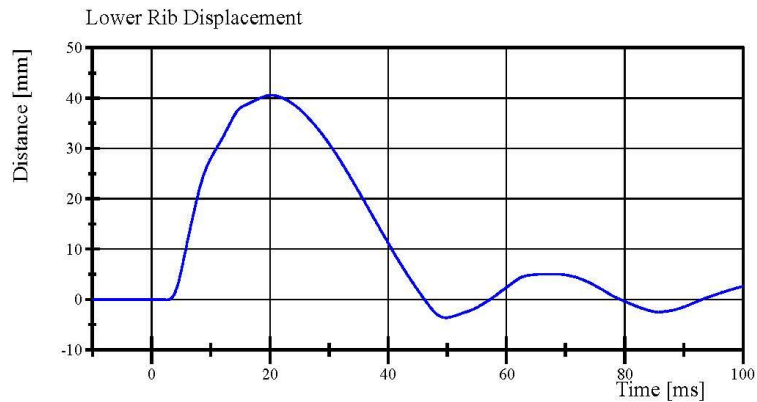
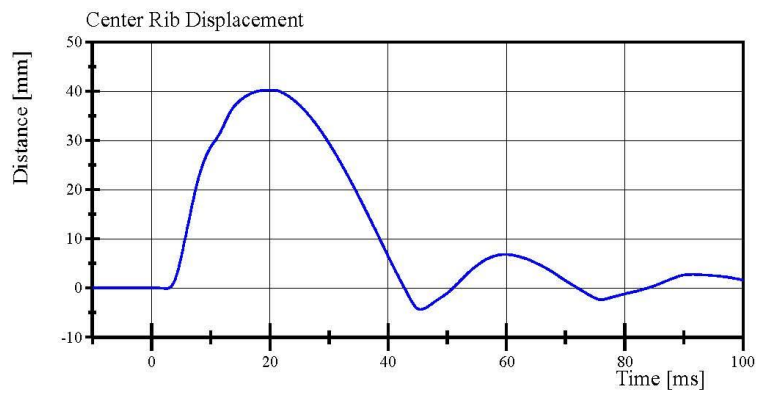
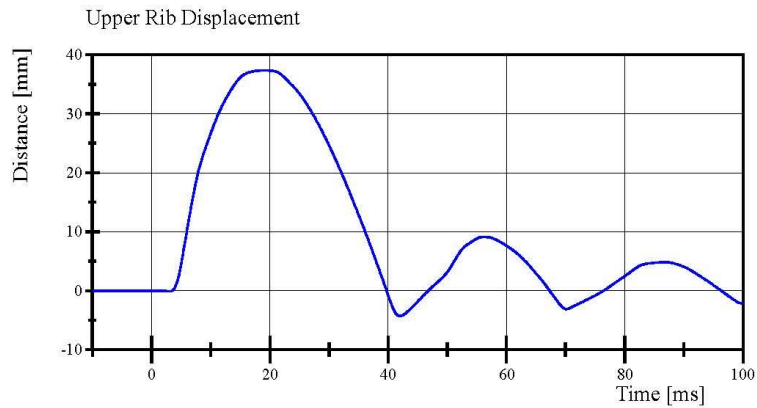
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 14:23:46 490



Transportation Research Center Inc.

Left Lateral Thorax
ES-2re Serial No. F030 Certification No. 90-1
Test Date: 6/19/2023



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

06.19.2023 14:23:46 490



Transportation Research Center Inc.

Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 90-2
Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Integrated Velocity Change within Corridor	Yes	Yes	Yes
Pendulum Velocity	(-5.95) - (-6.15) m/s	-6.139 m/s	Yes
Maximum Headform Flexion			
Peak	(-45) - (-55) deg	-45.8 deg	Yes
Time of Peak	39 - 53 ms	43.0 ms	Yes
Headform Flexion Decay			
- Peak to Zero	37 - 57 ms	38.6 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Lumbar S/N: DS3472

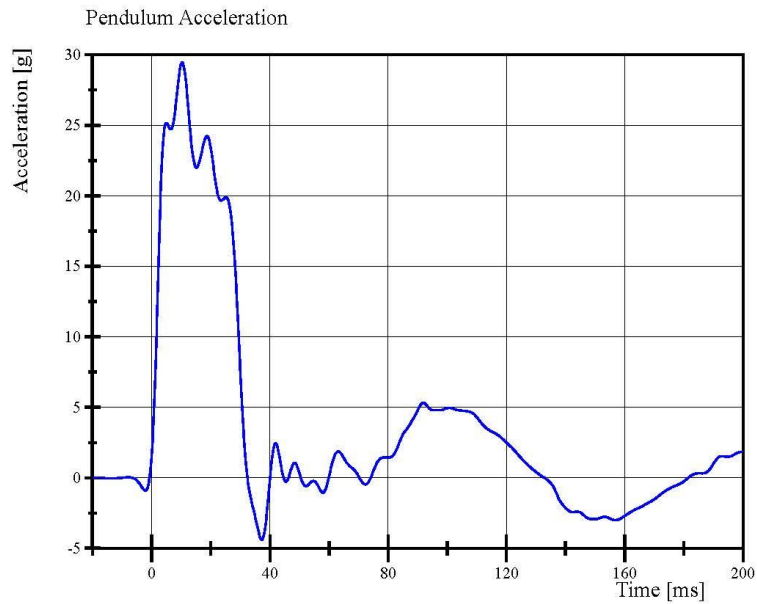
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 13:10:51 666

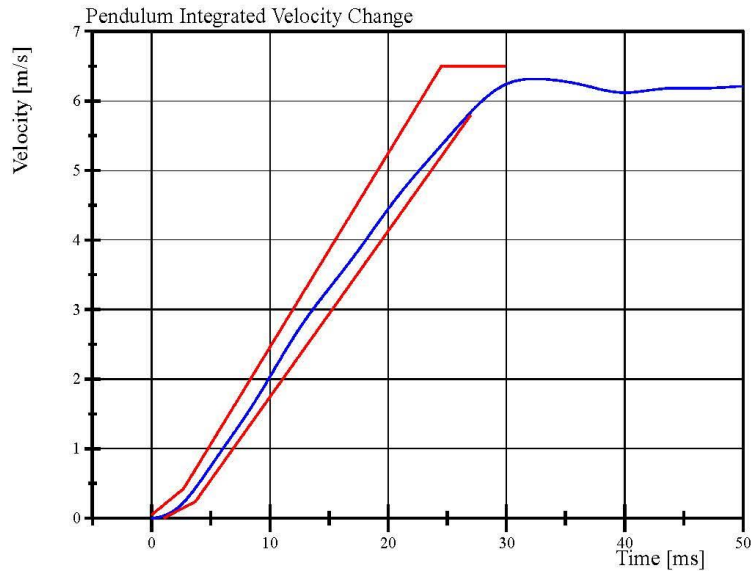


Transportation Research Center Inc.

Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 90-2
Test Date: 6/19/2023



Filter Class: CFC_60
Max: 29.5 g at 10.3 ms
Min: -4.4 g at 37.3 ms



Filter Class: CFC_60
Max: 6.3 m/s at 32.4 ms
Min: 0.0 m/s at 0.0 ms

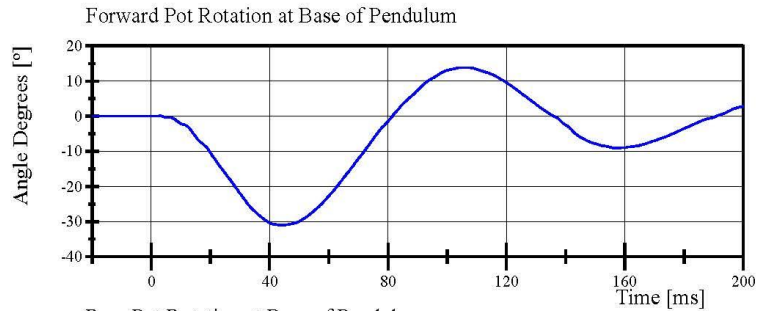
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.19.2023 13:11:17 666

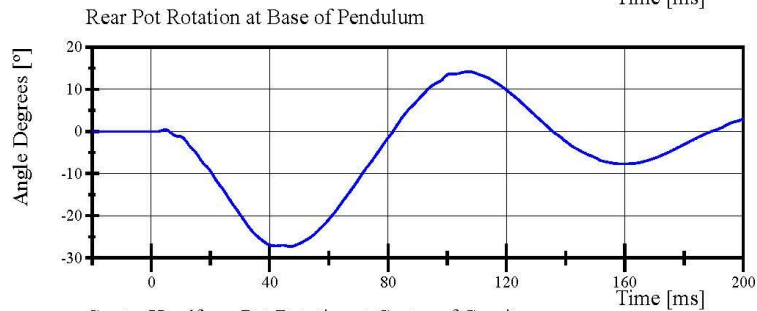


Transportation Research Center Inc.

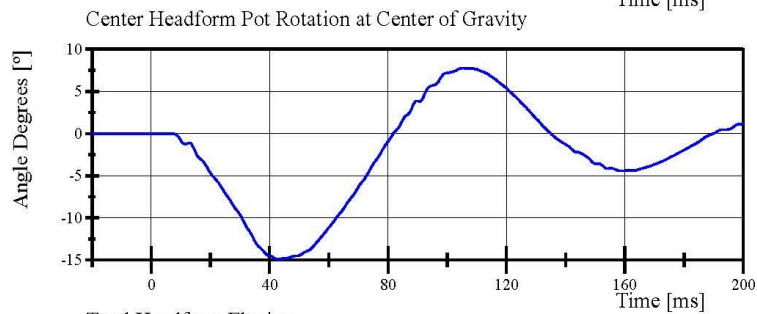
Left Lateral Lumbar
ES-2re Serial No. F030 Certification No. 90-2
Test Date: 6/19/2023



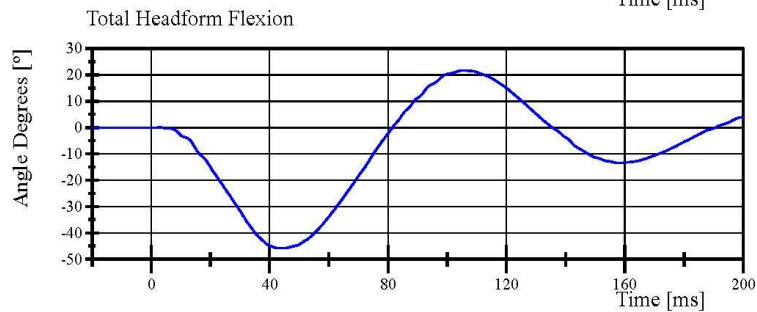
Filter Class: CFC_180
Max: 13.9 ° at 105.4 ms
Min: -30.9 ° at 44.8 ms



Filter Class: CFC_180
Max: 14.2 ° at 107.3 ms
Min: -27.3 ° at 47.0 ms



Filter Class: CFC_180
Max: 7.8 ° at 105.2 ms
Min: -14.9 ° at 42.8 ms



Filter Class: CFC_180
Max: 21.7 ° at 105.3 ms
Min: -45.8 ° at 43.0 ms

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

06.19.2023 13:11:17 666



Transportation Research Center Inc.

Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Test Probe Velocity	3.9 - 4.1 m/s	4.02 m/s	Yes
Test Probe Force			
Peak	4,000 - 4,800 N	4,227.7 N	Yes
Time of Peak	10.6 - 13.0 ms	12.48 ms	Yes
Total Abdominal Force			
Peak	2,200 - 2,700 N	2,507.9 N	Yes
Time of Peak	10.0 - 12.3 ms	12.00 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Abdomen S/N: 1066

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

06.19.2023 14:30:21 590

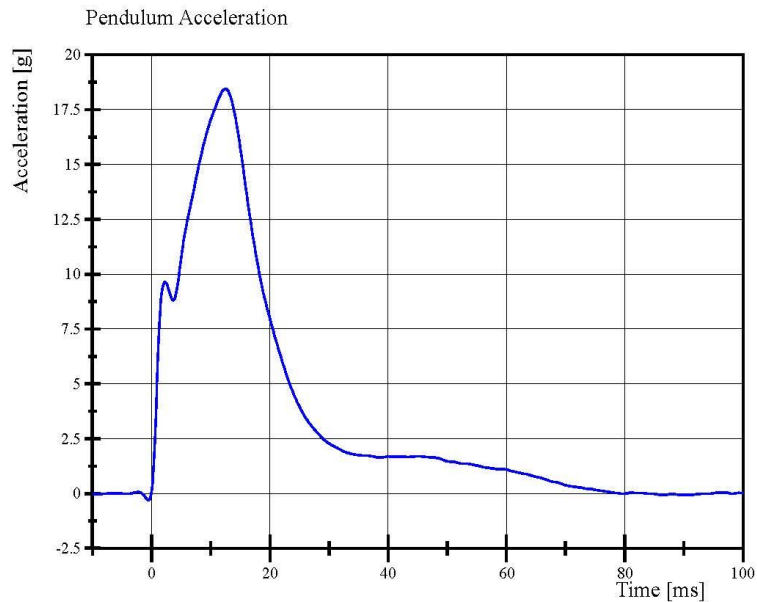


Transportation Research Center Inc.

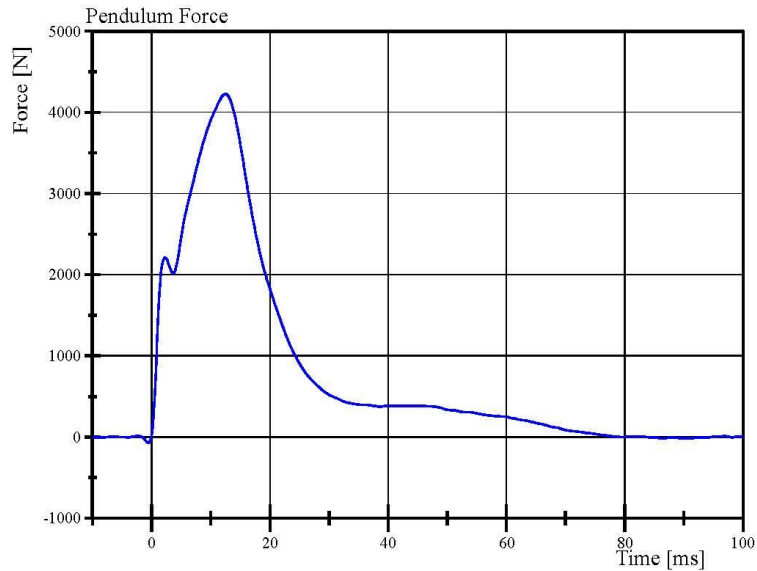
Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023



Filter Class: CFC_180
Max: 18.4 g at 12.5 ms
Min: -0.3 g at -0.6 ms



Filter Class: CFC_180
Max: 4,227.7 N at 12.5 ms
Min: -70.3 N at -0.6 ms

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

06.19.2023 14:30:47 590

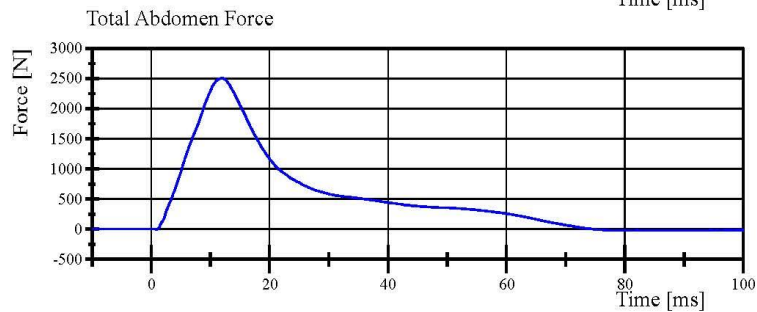
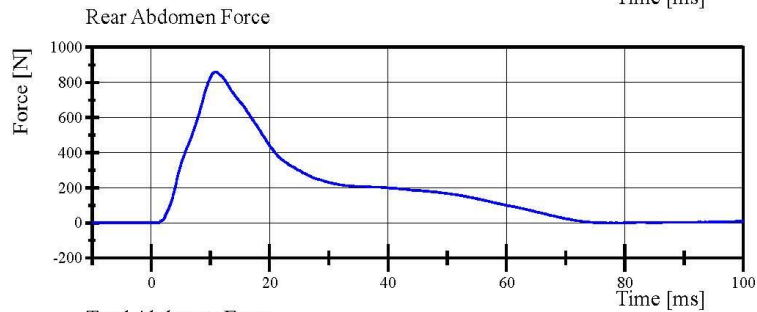
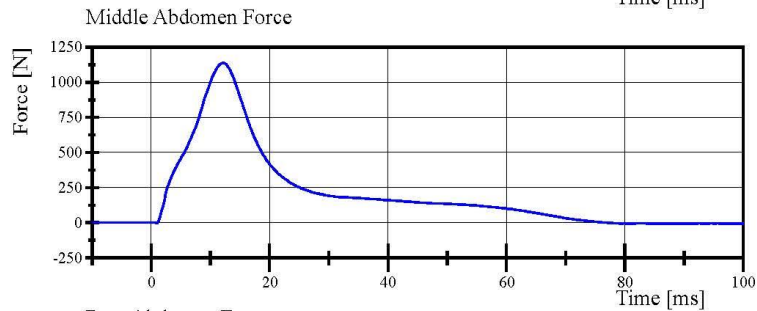
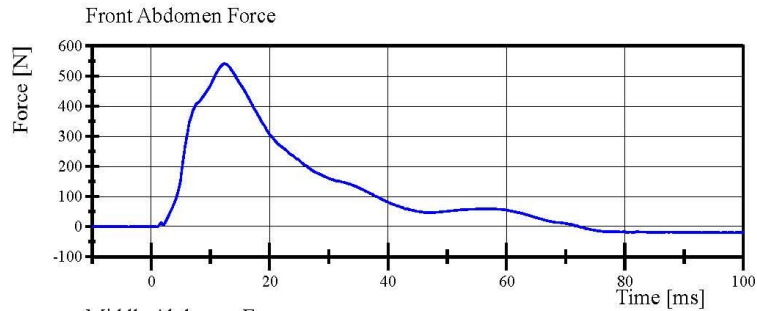


Transportation Research Center Inc.

Left Lateral Abdomen

ES-2re Serial No. F030 Certification No. 90-1

Test Date: 6/19/2023



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

06.19.2023 14:30:48 590



Transportation Research Center Inc.

Left Lateral Pelvis

ES-2re Serial No. F030 Certification No. 90-3

Test Date: 6/20/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
Test Probe Velocity	4.2 - 4.4 m/s	4.28 m/s	Yes
Test Probe Force			
Peak	4,700 - 5,400 N	5,306.4 N	Yes
Time of Peak	11.8 - 16.1 ms	13.60 ms	Yes
Pubic Symphysis Force			
Peak	(-1,230) - (-1,590) N	-1,369.7 N	Yes
Time of Peak	12.2 - 17.0 ms	14.32 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: N/A

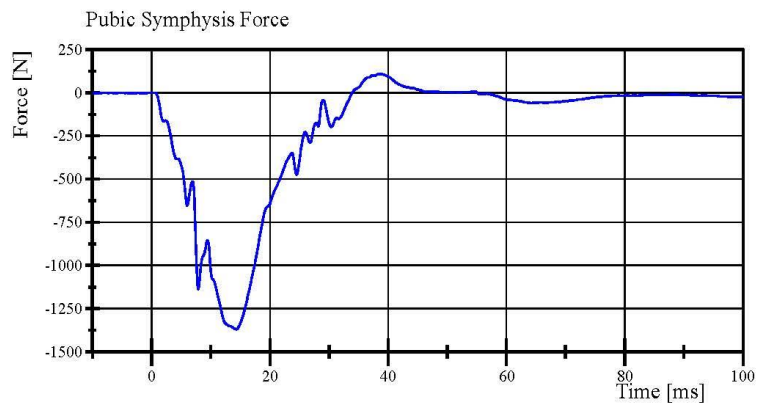
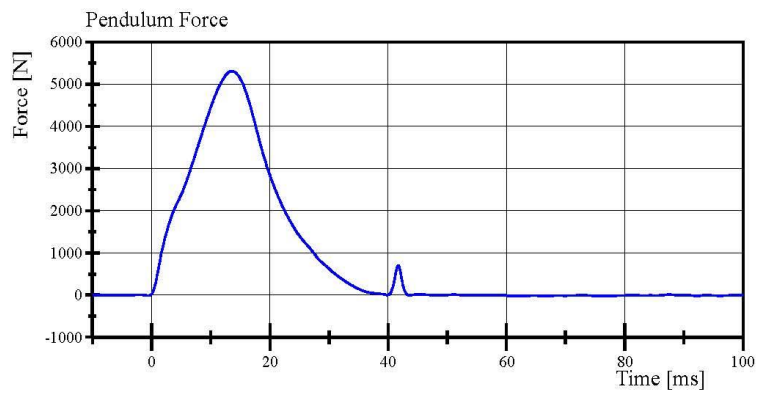
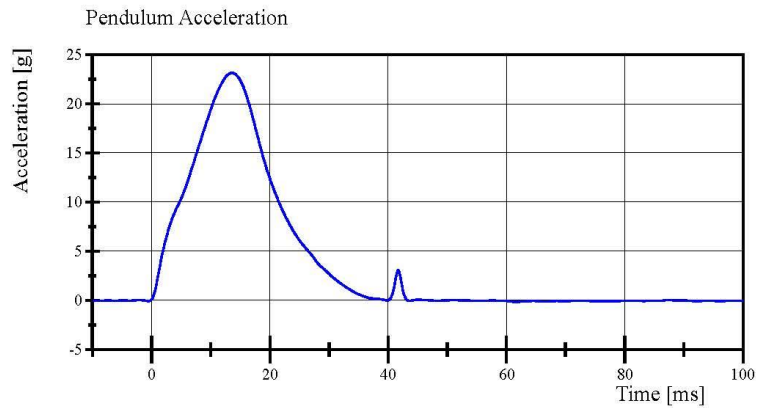
Specification Source: CFR49 Part 572 Subpart U
with Polarity in accordance with J211

06.20.2023 10:08:27 631



Transportation Research Center Inc.

Left Lateral Pelvis
ES-2re Serial No. F030 Certification No. 90-3
Test Date: 6/20/2023



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

06.20.2023 10:08:49 631



Pre-Test Calibration Sheets
Driver S/N DQ5070

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. DQ0570 Calibration No. 22

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	445	Yes
C	H-Point Height	79.0 - 89.0	83	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	101	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	184	Yes
J	Head Circumference	541.0 - 551.0	545	Yes
K	Buttock to Knee Length	514.0 - 540.0	533	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	427	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	316	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	486	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	349	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Revised 9/29/2005



Report Number: DQ0570_S2H22

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Transportation Research Center Inc.

Left Lateral Head Drop

SID IIS Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	132.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	4.5 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	< 15 %	1.30 %	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: DP8345

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

05.30.2023 08:16:09 230

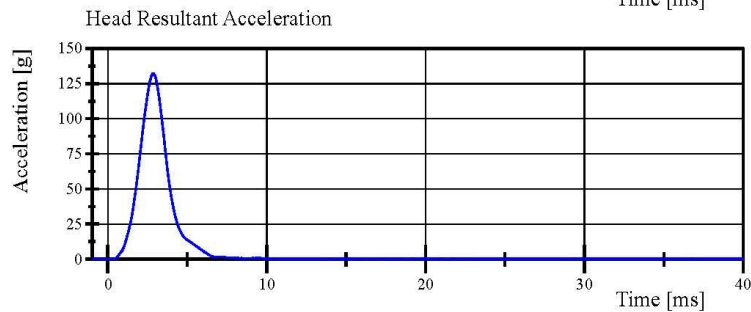
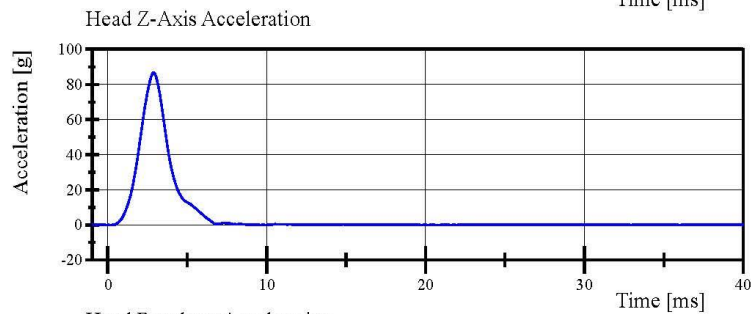
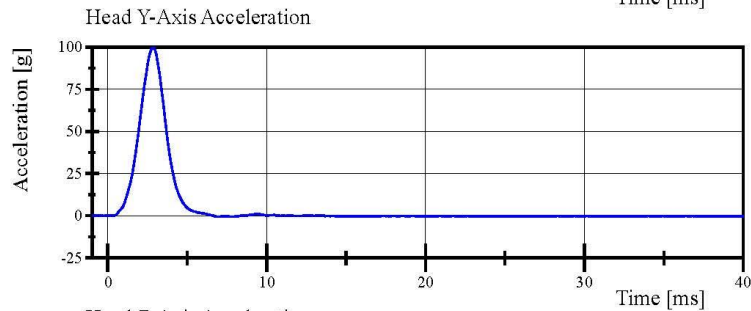
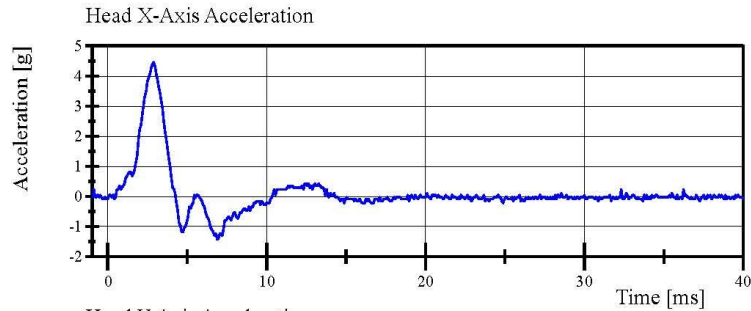


Transportation Research Center Inc.

Left Lateral Head Drop

SID IIS Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023



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

05.30.2023 08:16:50 230



Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.592 m/s	Yes
Pendulum Integrated Velocity			
Change at 10 ms	2.20 - 2.80 m/s	2.624 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.897 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.225 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.818 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.832 m/s	Yes
Maximum Headform Flexion			
Peak	(-71) - (-81) deg	-71.0 deg	Yes
Time of Peak	50 - 70 ms	60.7 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	39.9 N·m	Yes
Decay to 0 N·m	102 - 126 ms	107.5 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 717

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

06.20.2023 10:23:38 747

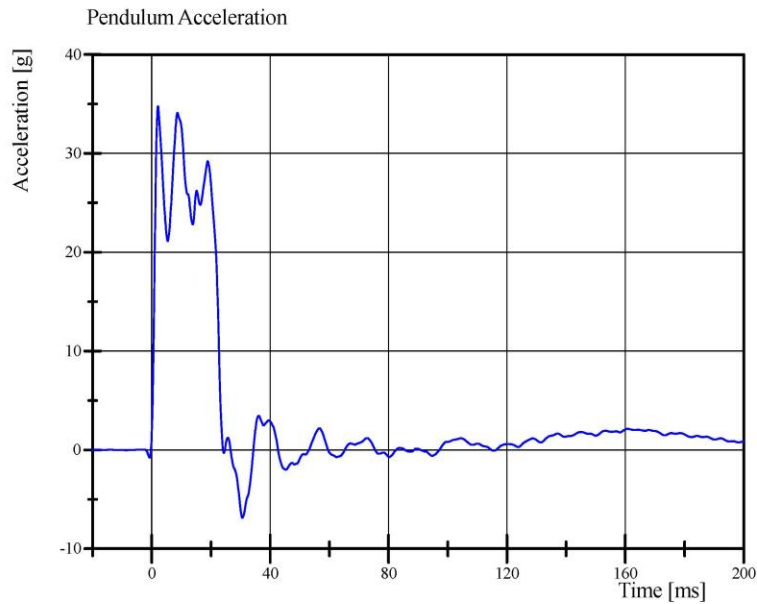


Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 22-1

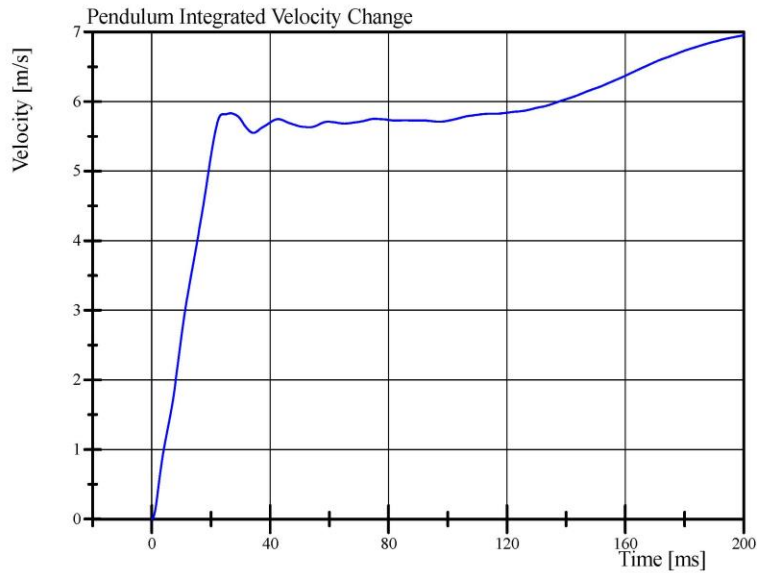
Test Date: 5/30/2023



Filter Class: CFC_180

Max: 34.8 g at 2.1 ms

Min: -6.9 g at 30.6 ms



Filter Class: CFC_180

Max: 7.0 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

06.20.2023 10:25:06 747

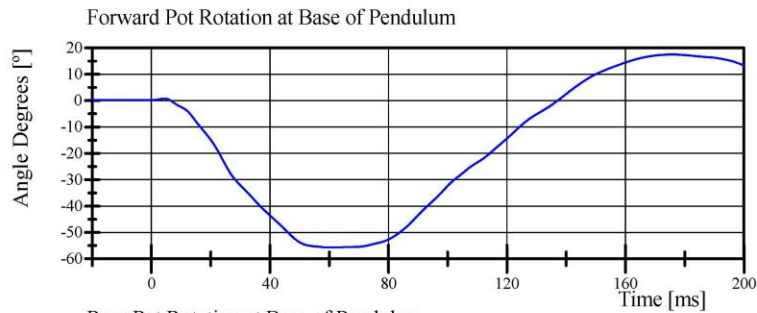


Transportation Research Center Inc.

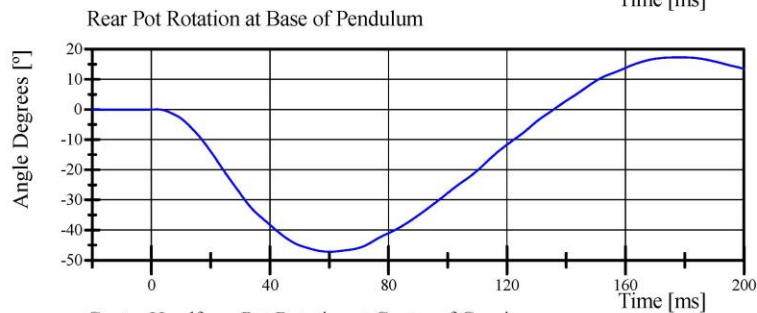
Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 22-1

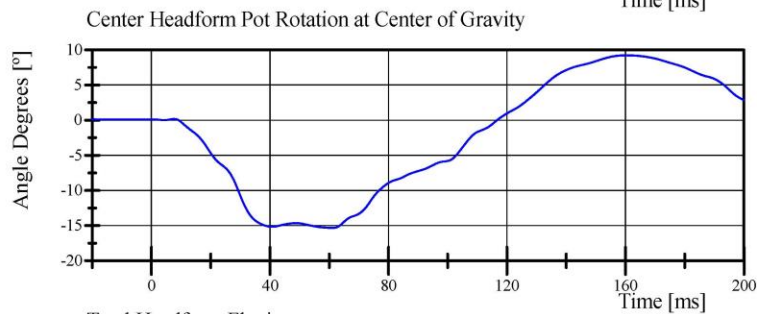
Test Date: 5/30/2023



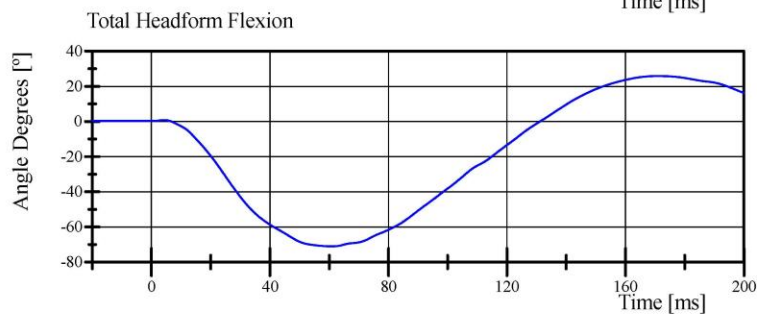
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Max: 17.5 ° at 175.8 ms
Min: -55.7 ° at 59.6 ms



Filter Class: CFC_60
Max: 17.3 ° at 179.0 ms
Min: -47.2 ° at 60.2 ms



Filter Class: CFC_60
Max: 9.2 ° at 160.3 ms
Min: -15.3 ° at 61.0 ms



Filter Class: CFC_60
Max: 25.9 ° at 171.0 ms
Min: -71.0 ° at 60.7 ms

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

06.20.2023 10:25:07 747

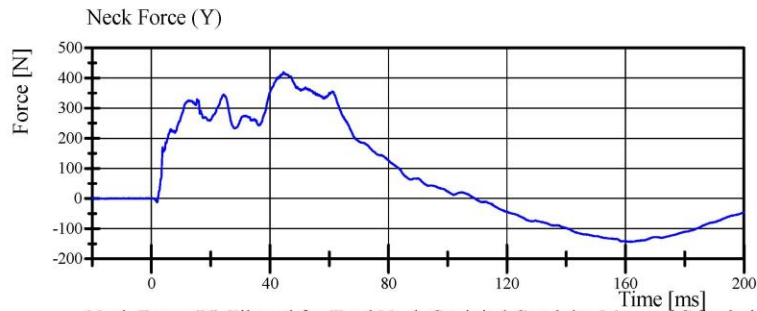


Transportation Research Center Inc.

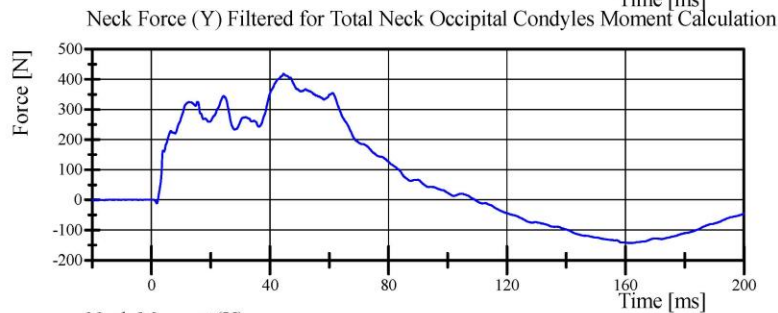
Left Lateral Neck

SID II_s Serial No. DQ0570 Certification No. 22-1

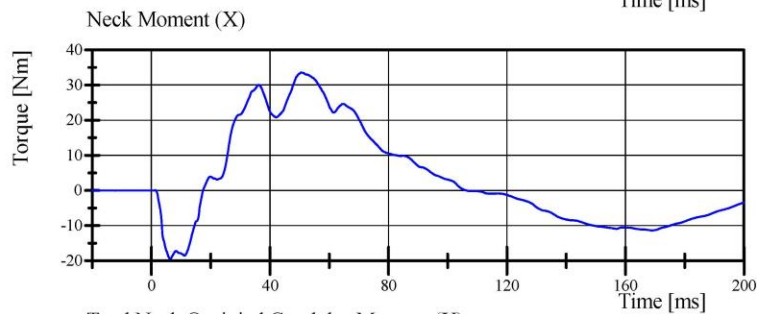
Test Date: 5/30/2023



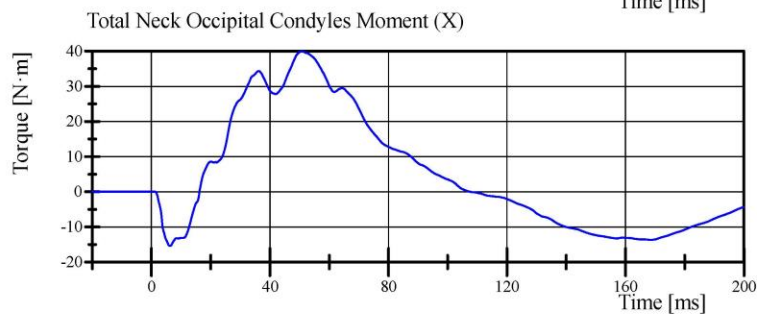
Filter Class: CFC_1000
Max: 419.4 N at 44.6 ms
Min: -143.8 N at 162.4 ms



Filter Class: CFC_600
Max: 418.0 N at 44.6 ms
Min: -143.3 N at 162.3 ms



Filter Class: CFC_600
Max: 33.5 Nm at 50.5 ms
Min: -19.4 Nm at 6.4 ms



Filter Class: Without_(Constar
Max: 39.9 N·m at 50.8 ms
Min: -15.4 N·m at 6.2 ms

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

06.20.2023 10:25:07 747



Transportation Research Center Inc.

Left Lateral Shoulder

SID IIS Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.0 g	Yes
Shoulder Displacement	28 - 37 mm	31.5 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	18.4 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: DP8451

Shoulder Rib S/N: DO9814

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

05.30.2023 10:28:25 886

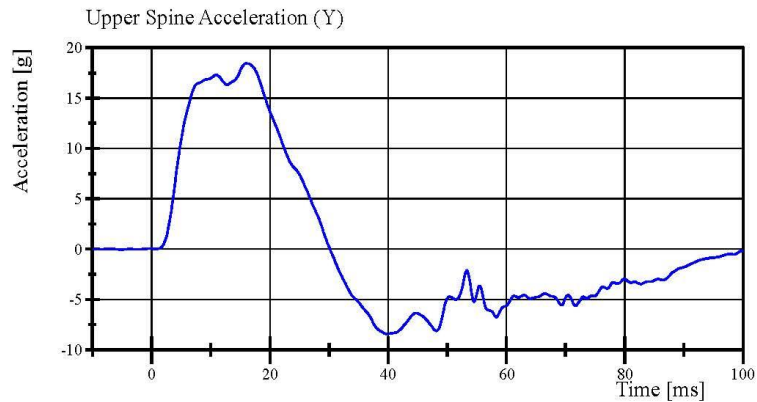
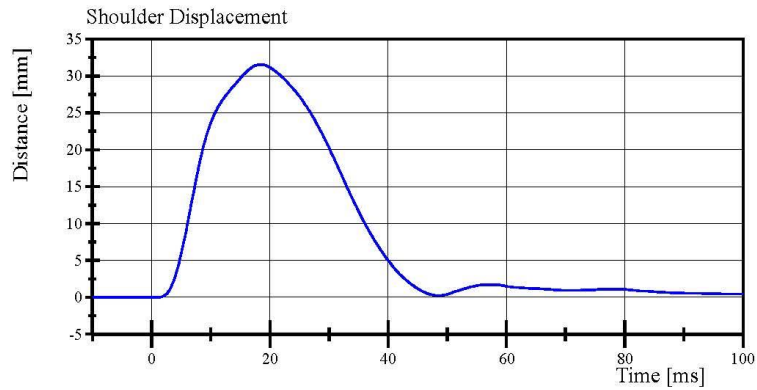
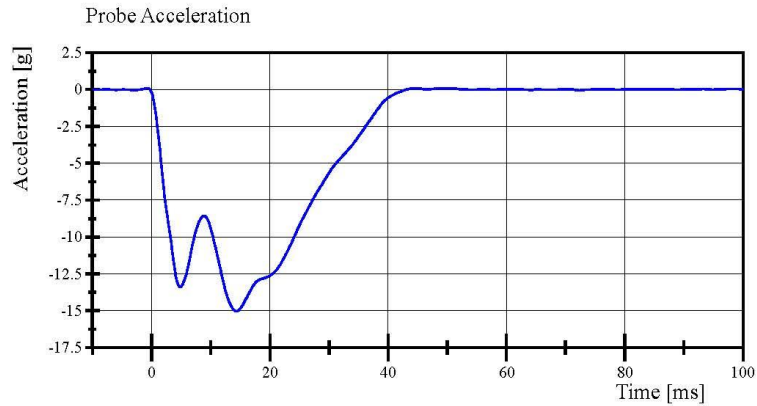


Transportation Research Center Inc.

Left Lateral Shoulder

SID IIs Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023



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

05.30.2023 10:28:49 886



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIS Serial No. DQ0570 Certification No. 22-1
Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.684 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-32.6 g	Yes
Shoulder Displacement	31 - 40 mm	35.9 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	29.1 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	32.2 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.3 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	35.9 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	34.1 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: DP8451

Shoulder Rib S/N: 180-3355 DO9814

Upper Thorax Rib S/N: 180-3362 DP6492

Middle Thorax Rib S/N: 180-3362 DP6493

Lower Thorax Rib S/N: 180-3362 DP7664

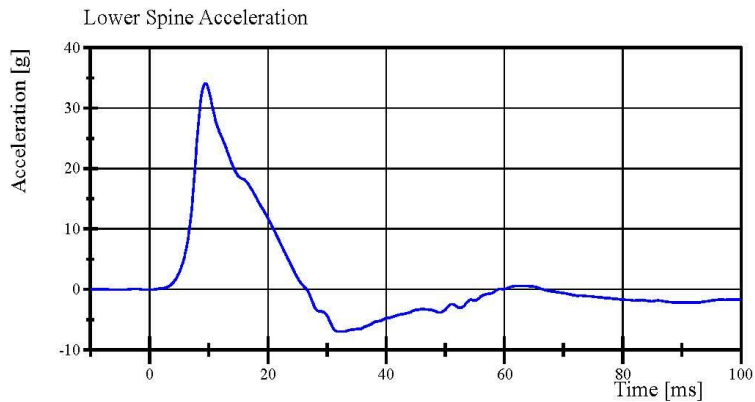
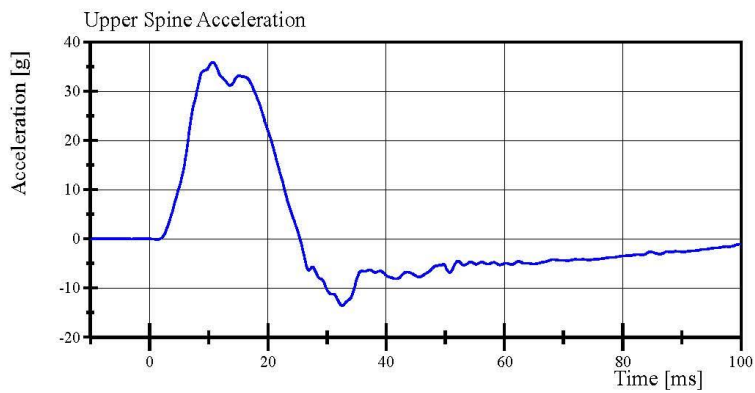
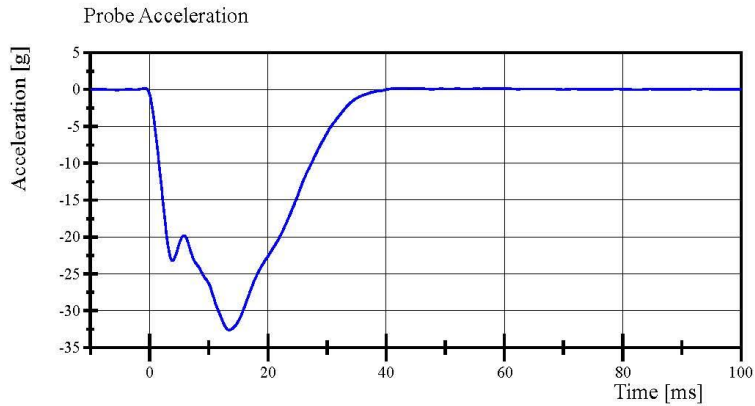
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.30.2023 11:51:45 640



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. DQ0570 Certification No. 22-1
Test Date: 5/30/2023



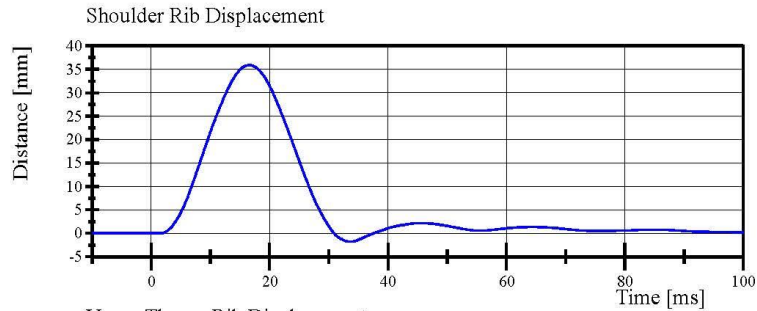
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.30.2023 11:52:58 640

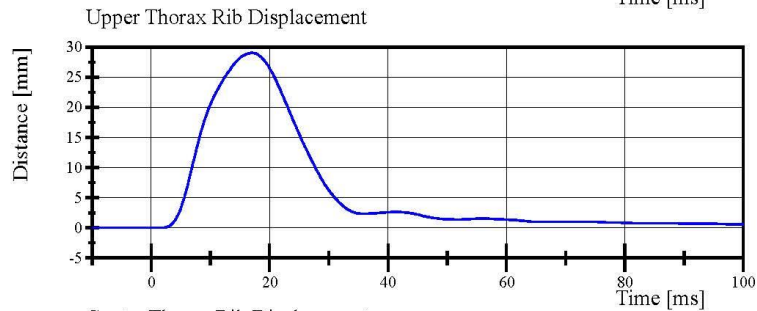


Transportation Research Center Inc.

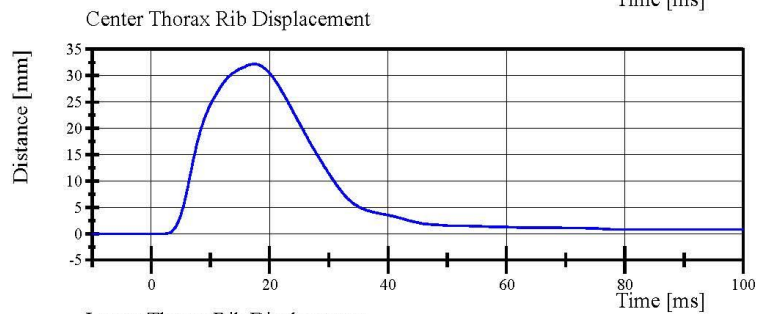
Left Lateral Thorax with Arm
SID IIs Serial No. DQ0570 Certification No. 22-1
Test Date: 5/30/2023



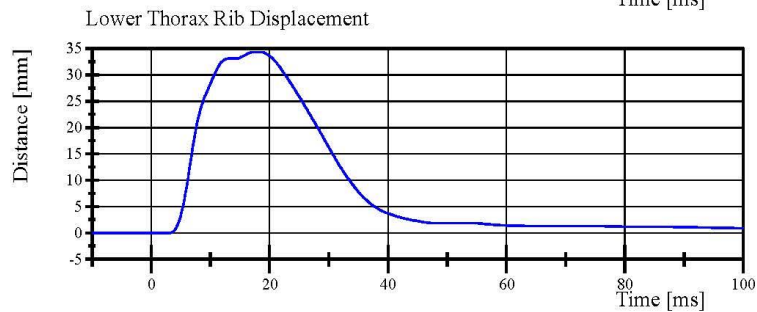
Filter Class: CFC_600
Max: 35.9 mm at 16.6 ms
Min: -1.8 mm at 33.6 ms



Filter Class: CFC_600
Max: 29.1 mm at 17.0 ms
Min: -0.0 mm at -4.3 ms



Filter Class: CFC_600
Max: 32.2 mm at 17.4 ms
Min: -0.0 mm at -0.8 ms



Filter Class: CFC_600
Max: 34.3 mm at 17.7 ms
Min: -0.0 mm at 3.1 ms

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

05.30.2023 11:52:58 640



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DQ0570 Certification No. 22-2
Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.335 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.9 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	38.2 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	42.0 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.5 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.6 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.7 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Thorax Rib S/N: 180-3362 DP6492

Middle Thorax Rib S/N: 180-3362 DP6493

Lower Thorax Rib S/N: 180-3362 DP7664

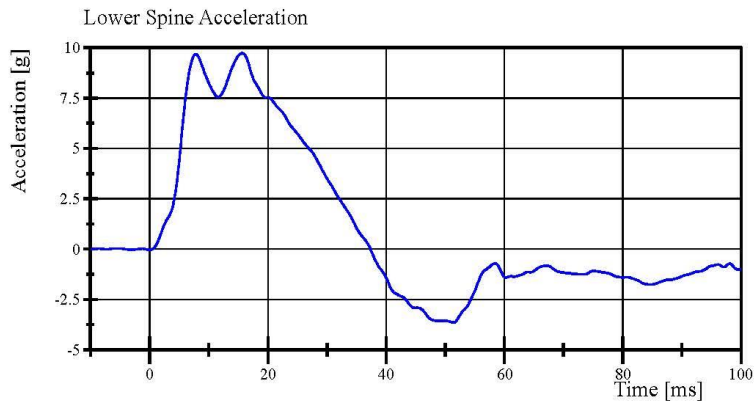
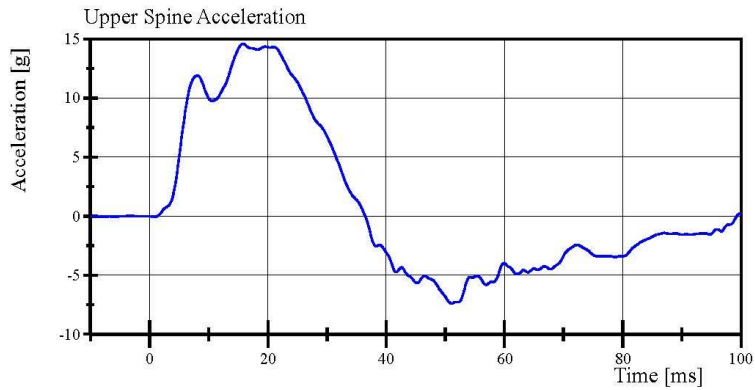
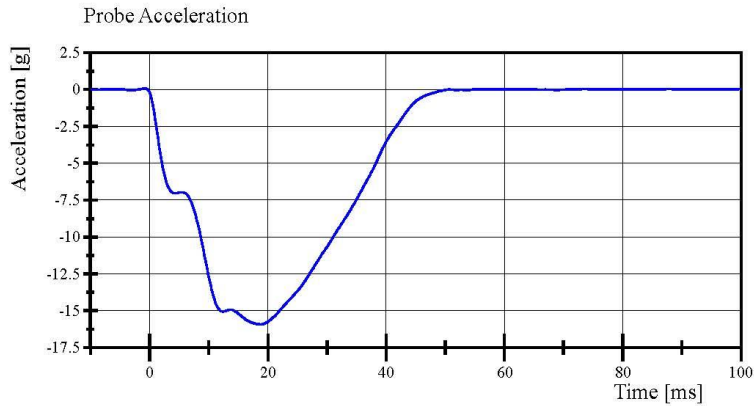
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.30.2023 11:14:31 874



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DQ0570 Certification No. 22-2
Test Date: 5/30/2023



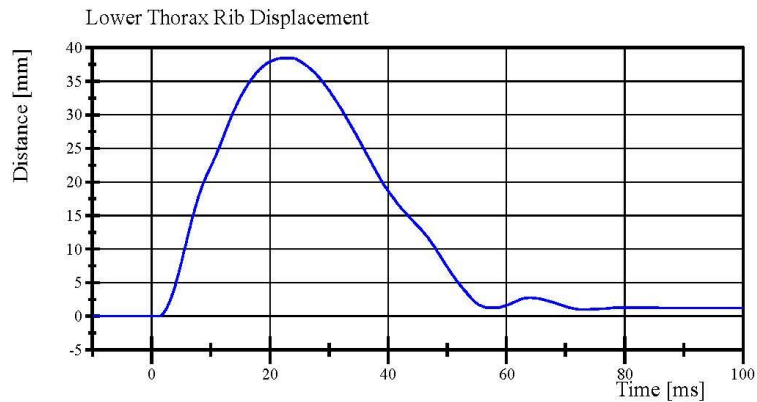
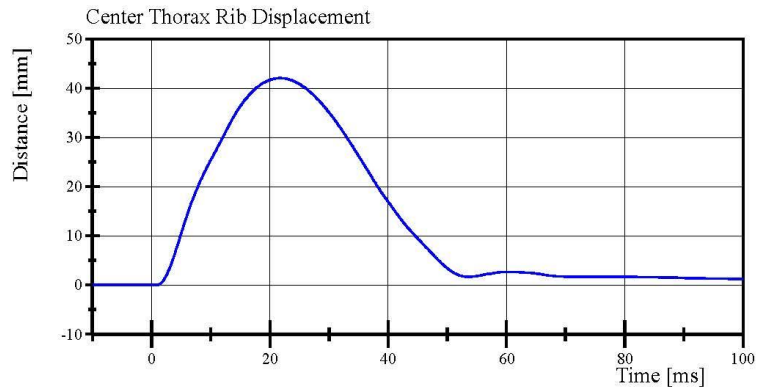
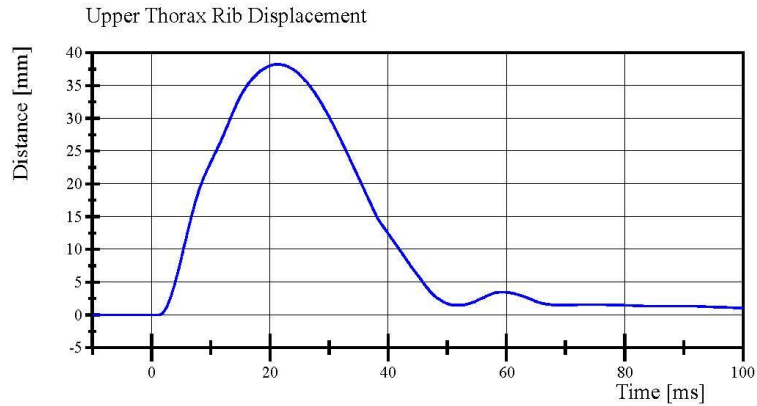
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.30.2023 11:15:33 874



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DQ0570 Certification No. 22-2
Test Date: 5/30/2023



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

05.30.2023 11:15:33 874



Transportation Research Center Inc.

Left Lateral Abdomen

SID IIs Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	51 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.5 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	39.1 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	38.8 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	11.14 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Abdominal Rib S/N: 180-3368 DP5142

Lower Abdominal Rib S/N: 180-3368 DP5143

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

05.30.2023 10:23:16 706

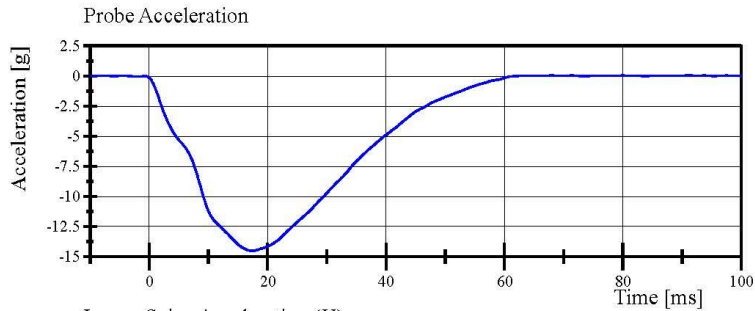


Transportation Research Center Inc.

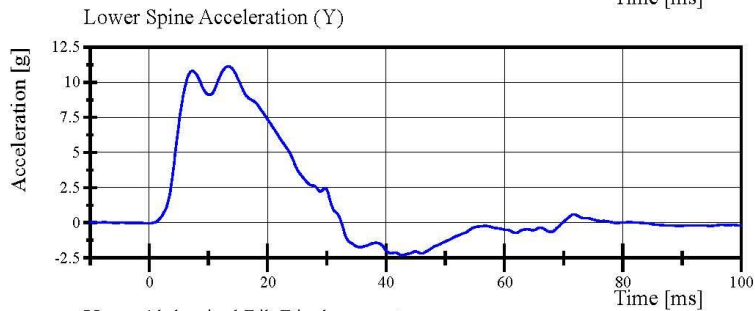
Left Lateral Abdomen

SID IIs Serial No. DQ0570 Certification No. 22-1

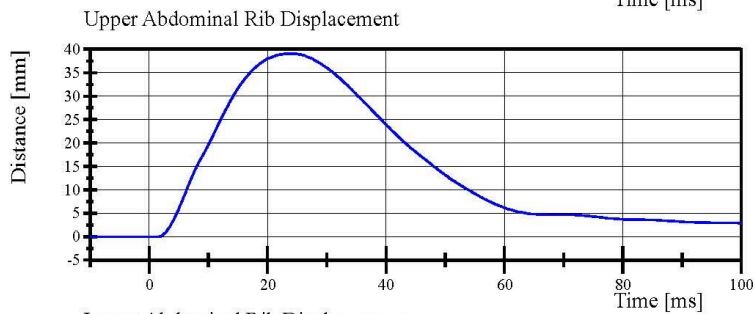
Test Date: 5/30/2023



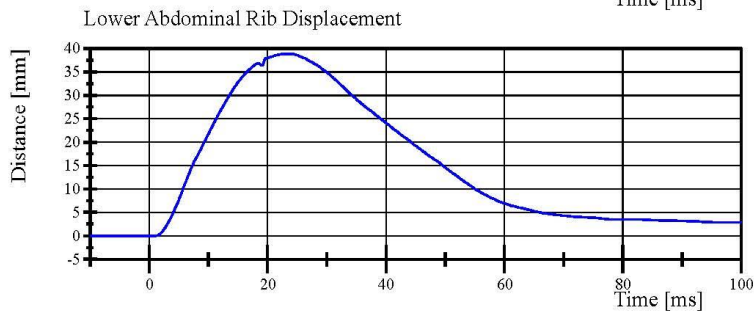
Filter Class: CFC_180
Max: 0.1 g at 91.1 ms
Min: -14.5 g at 17.4 ms



Filter Class: CFC_180
Max: 11.1 g at 13.4 ms
Min: -2.3 g at 42.7 ms



Filter Class: CFC_600
Max: 39.1 mm at 23.8 ms
Min: -0.0 mm at 1.4 ms



Filter Class: CFC_600
Max: 38.8 mm at 23.6 ms
Min: -0.0 mm at -2.8 ms

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

05.30.2023 10:23:38 706



Transportation Research Center Inc.

Left Lateral Pelvis

SID IIS Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.61 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-43.13 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	36.5 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,744.8 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: 1173

Pelvis Plug Info:

Manufacturer: SACO

S/N: 14562

Cal Date: 20201221

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

05.30.2023 12:32:23 474

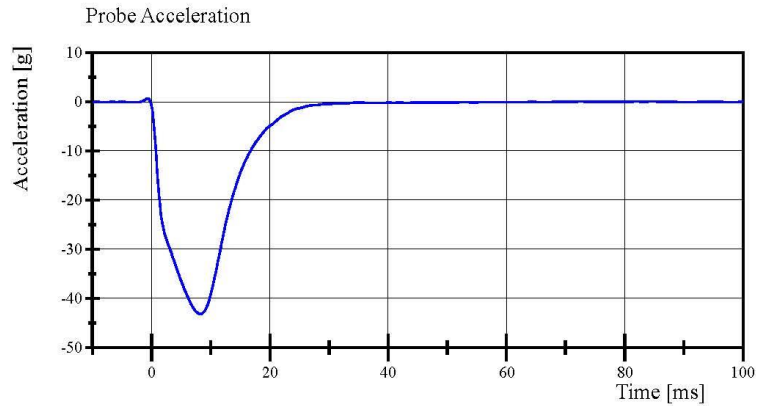


Transportation Research Center Inc.

Left Lateral Pelvis

SID IIs Serial No. DQ0570 Certification No. 22-1

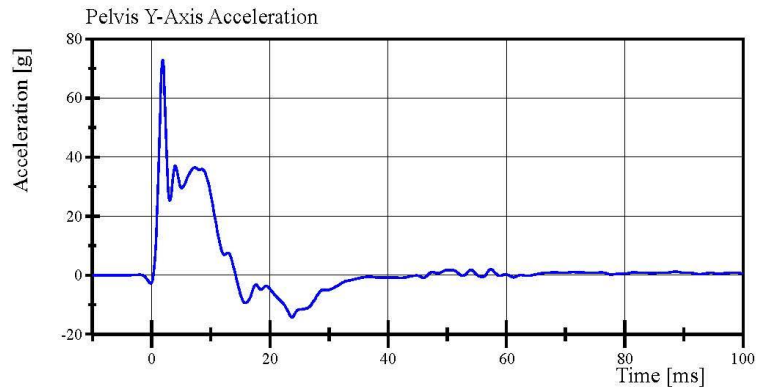
Test Date: 5/30/2023



Filter Class: CFC_180

Max: 0.7 g at -0.6 ms

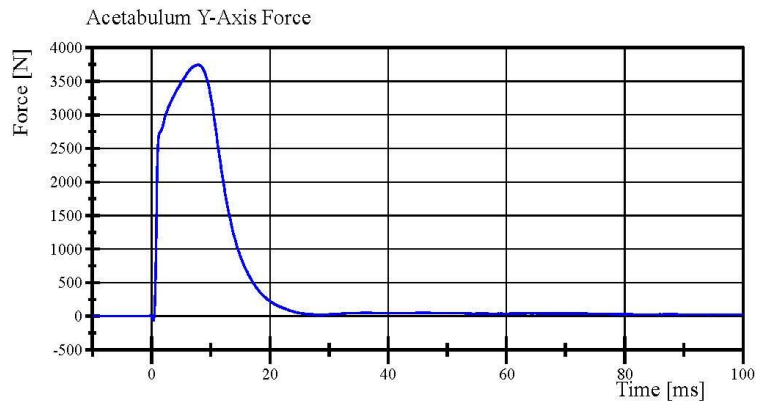
Min: -43.1 g at 8.2 ms



Filter Class: CFC_180

Max: 72.9 g at 1.8 ms

Min: -14.3 g at 23.8 ms



Filter Class: CFC_600

Max: 3,744.8 N at 7.9 ms

Min: -65.5 N at 0.3 ms

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

05.30.2023 12:33:44 474



Transportation Research Center Inc.

Left Lateral Iliac

SID IIs Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-41.9 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	34.4 g	Yes
Iliac Force	4,100 - 5,100 N	4,881.3 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: 1173

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

05.30.2023 10:25:29 688

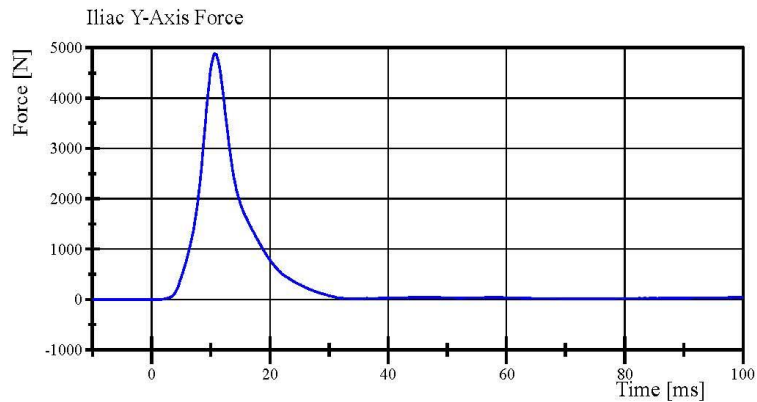
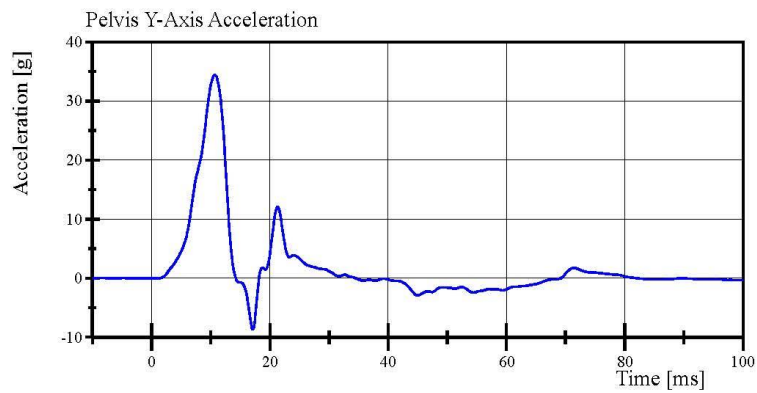
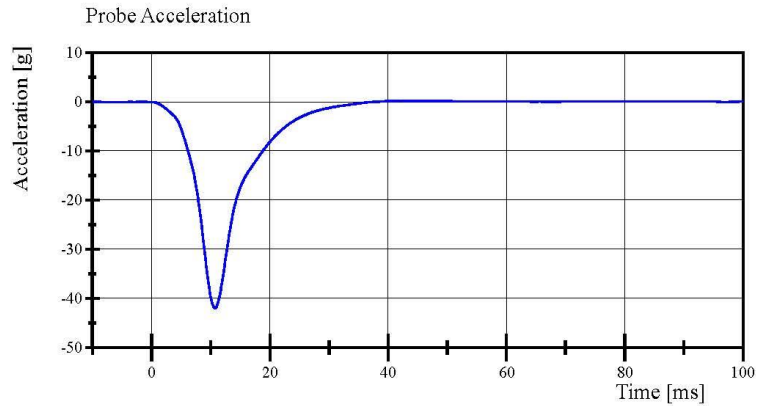


Transportation Research Center Inc.

Left Lateral Iliac

SID IIS Serial No. DQ0570 Certification No. 22-1

Test Date: 5/30/2023



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

05.30.2023 10:26:55 688



Post-Test Calibration Sheets
Driver S/N DQ5070

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. DQ0570 Calibration No. 23

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	445	Yes
C	H-Point Height	79.0 - 89.0	83	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	101	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	184	Yes
J	Head Circumference	541.0 - 551.0	545	Yes
K	Buttock to Knee Length	514.0 - 540.0	533	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	427	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	316	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	486	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	349	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Revised 9/29/2005



Report Number: DQ0570_S2H23

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Transportation Research Center Inc.

Left Lateral Head Drop

SID IIS Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	136.4 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	3.1 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	< 15 %	12.33 %	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: DP8345

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

06.16.2023 13:05:40 233

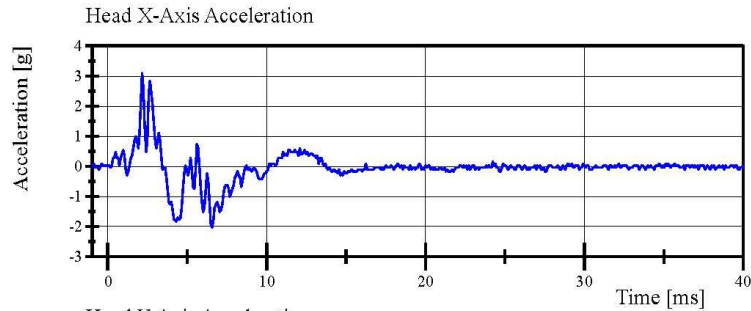


Transportation Research Center Inc.

Left Lateral Head Drop

SID IIS Serial No. DQ0570 Certification No. 23-1

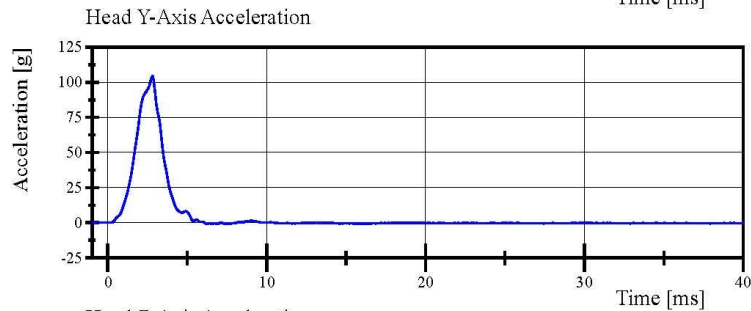
Test Date: 6/16/2023



Filter Class: CFC_1000

Max: 3.1 g at 2.2 ms

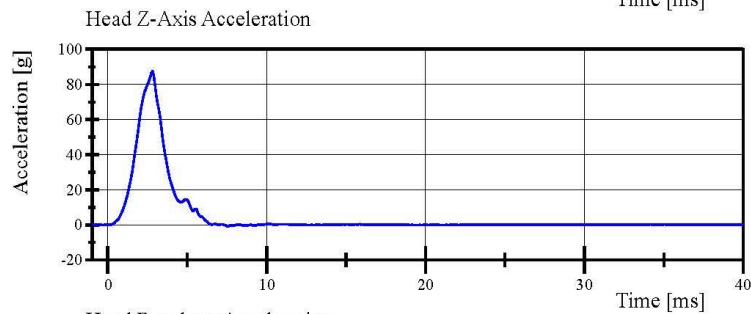
Min: -2.0 g at 6.6 ms



Filter Class: CFC_1000

Max: 104.5 g at 2.8 ms

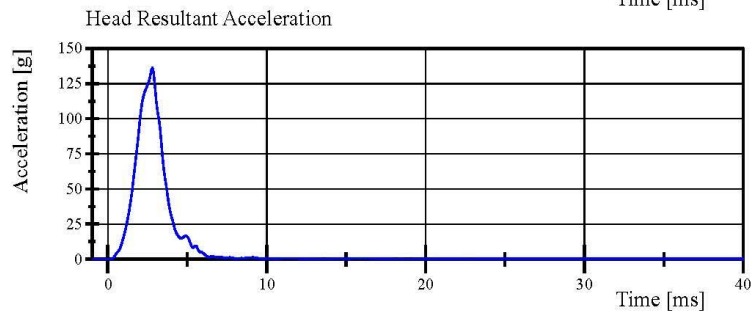
Min: -0.8 g at 6.2 ms



Filter Class: CFC_1000

Max: 87.6 g at 2.8 ms

Min: -0.8 g at 7.5 ms



Filter Class: CFC_1000

Max: 136.4 g at 2.8 ms

Min: 0.0 g at 0.0 ms

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

06.16.2023 13:06:11 233



Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 23-2

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.587 m/s	Yes
Pendulum Integrated Velocity			
Change at 10 ms	2.20 - 2.80 m/s	2.666 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.983 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.374 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.757 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.762 m/s	Yes
Maximum Headform Flexion			
Peak	(-71) - (-81) deg	-71.5 deg	Yes
Time of Peak	50 - 70 ms	59.5 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	41.3 N·m	Yes
Decay to 0 N·m	102 - 126 ms	109.3 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 717

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

06.20.2023 10:28:58 752

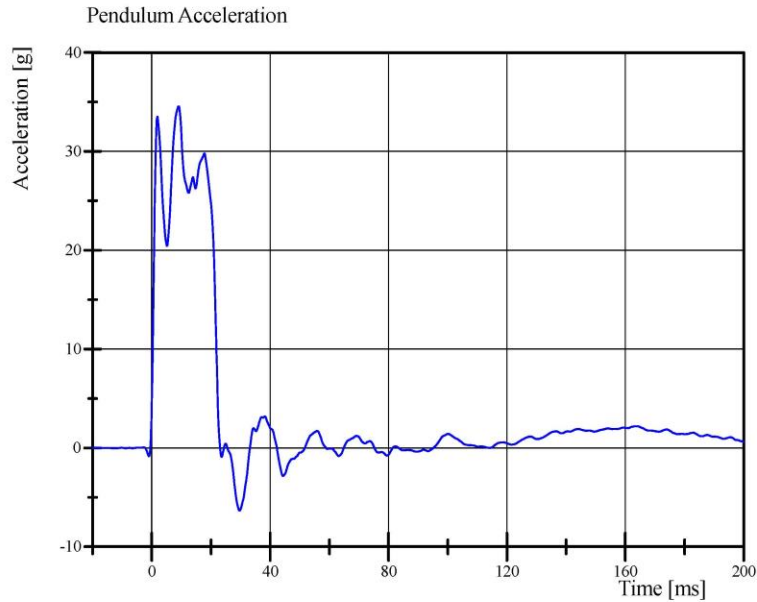


Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 23-2

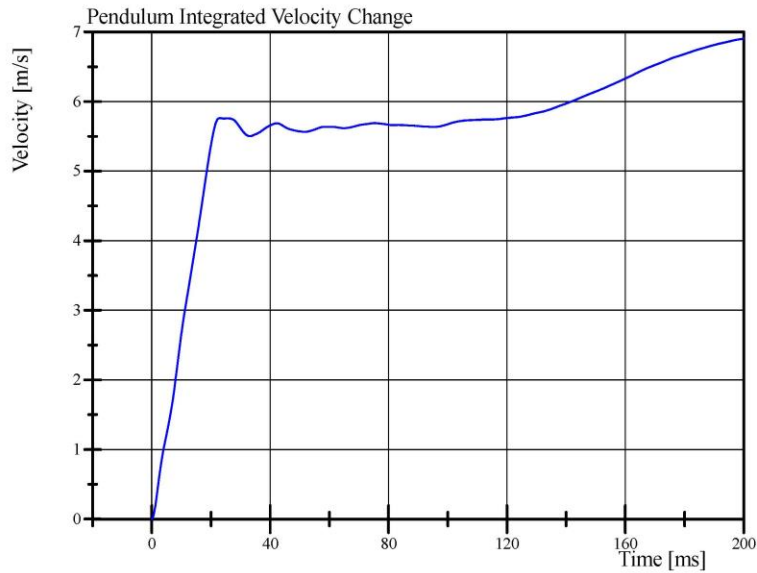
Test Date: 6/16/2023



Filter Class: CFC_180

Max: 34.6 g at 9.0 ms

Min: -6.3 g at 29.7 ms



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

06.20.2023 10:29:19 752

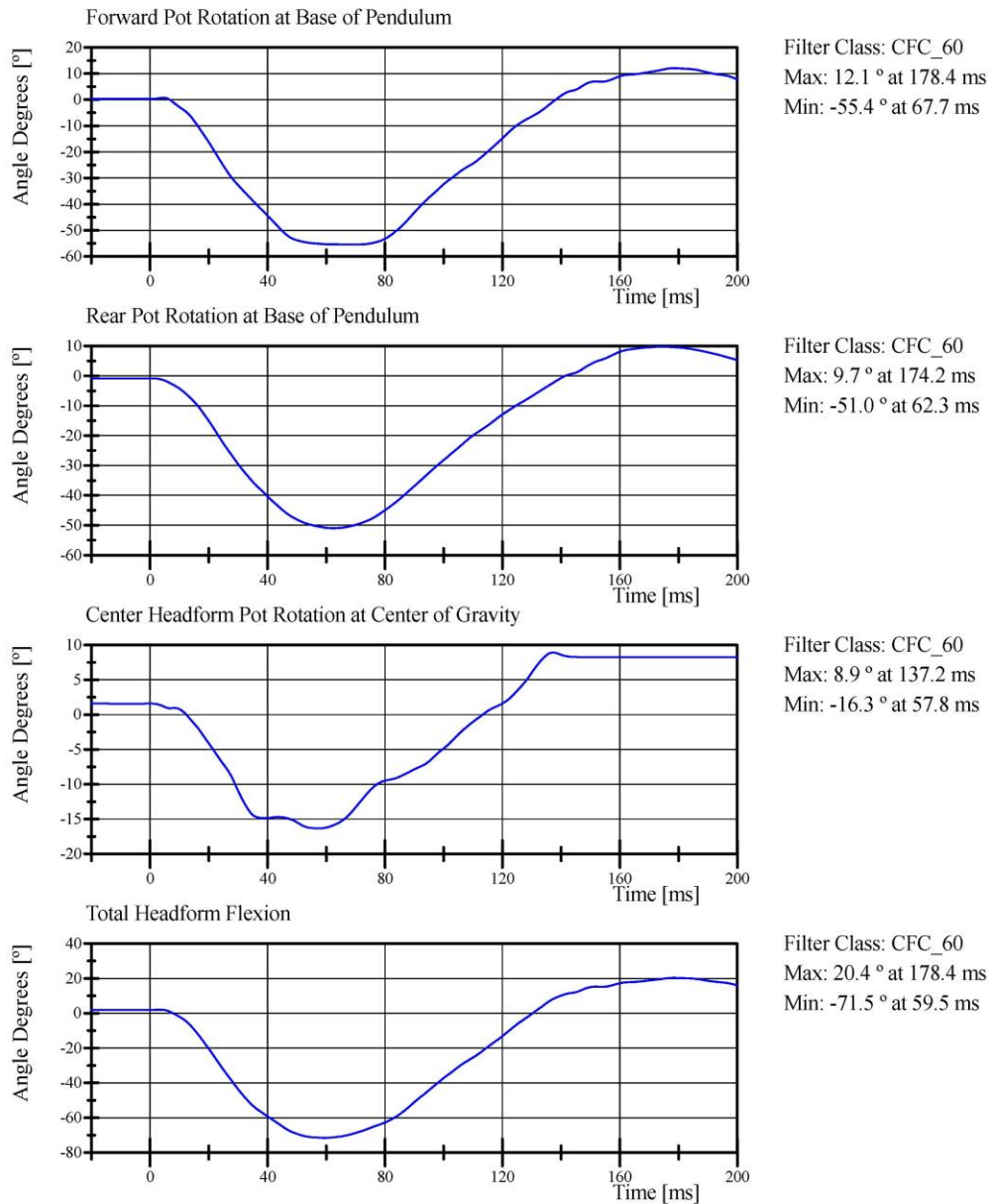


Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 23-2

Test Date: 6/16/2023



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

06.20.2023 10:29:19 752

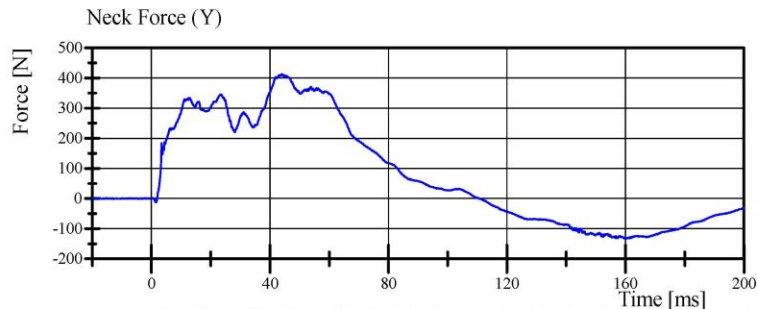


Transportation Research Center Inc.

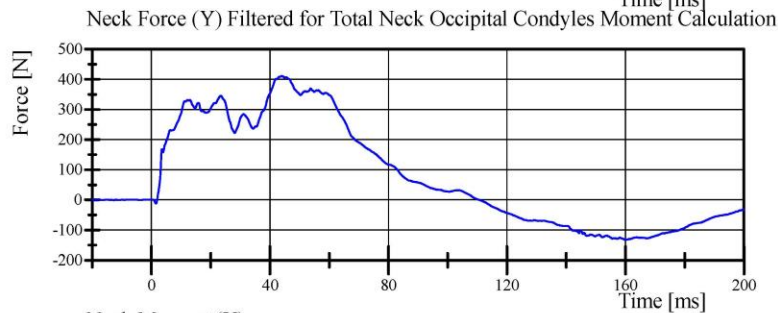
Left Lateral Neck

SID IIs Serial No. DQ0570 Certification No. 23-2

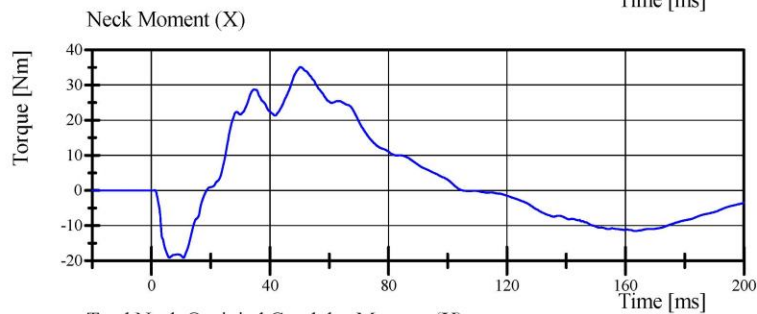
Test Date: 6/16/2023



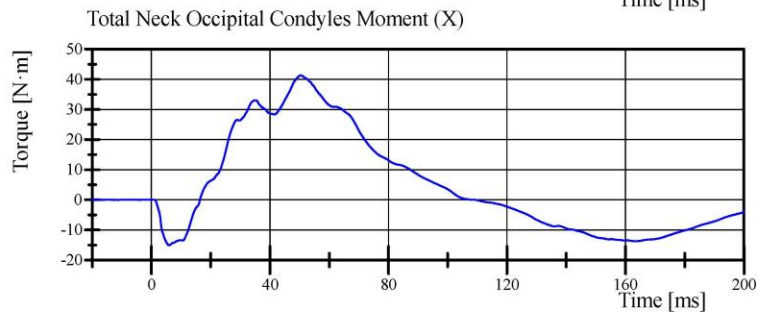
Filter Class: CFC_1000
Max: 412.9 N at 44.0 ms
Min: -132.9 N at 159.6 ms



Filter Class: CFC_600
Max: 411.2 N at 44.0 ms
Min: -131.8 N at 159.7 ms



Filter Class: CFC_600
Max: 35.1 Nm at 50.2 ms
Min: -19.2 Nm at 6.1 ms



Filter Class: Without_(Constar
Max: 41.3 N·m at 50.3 ms
Min: -15.1 N·m at 6.0 ms

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

06.20.2023 10:29:19 752



Transportation Research Center Inc.

Left Lateral Shoulder

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.2 g	Yes
Shoulder Displacement	28 - 37 mm	31.6 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	18.9 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: DP8451

Shoulder Rib S/N: DO9814

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

06.16.2023 09:43:37 878

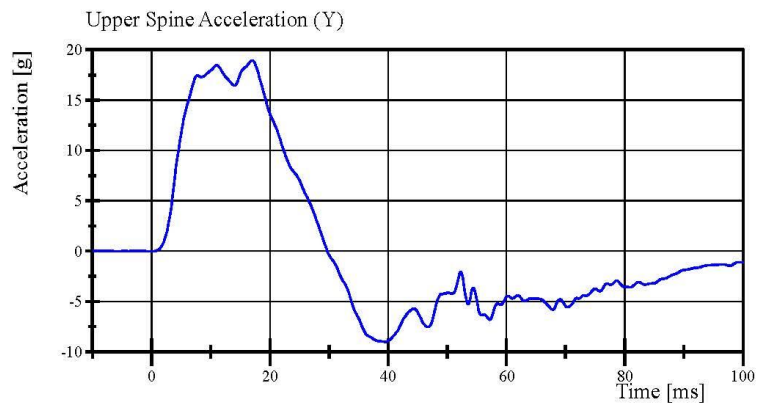
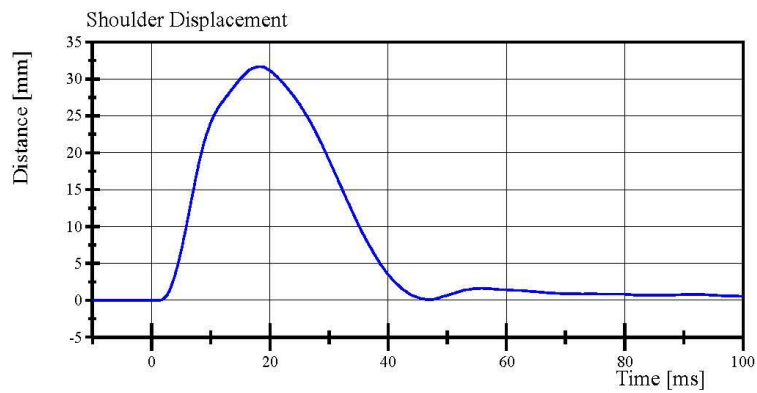
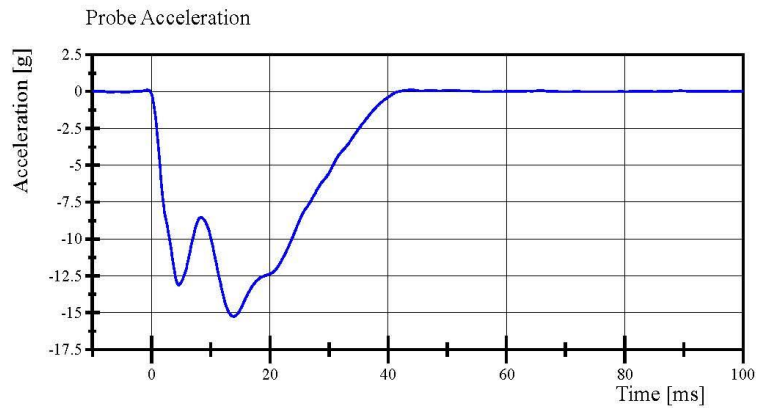


Transportation Research Center Inc.

Left Lateral Shoulder

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023



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

06.16.2023 09:44:09 878



Transportation Research Center Inc.

Left Lateral Thorax with Arm

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.692 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-35.0 g	Yes
Shoulder Displacement	31 - 40 mm	36.8 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	29.3 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	32.4 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.1 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	37.5 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	34.9 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: DP8451

Shoulder Rib S/N: 180-3355 DO9814

Upper Thorax Rib S/N: 180-3362 DP6492

Middle Thorax Rib S/N: 180-3362 DP6493

Lower Thorax Rib S/N: 180-3362 DP7664

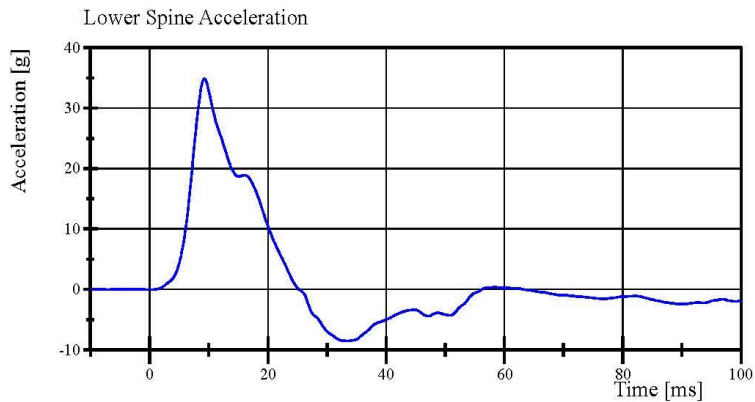
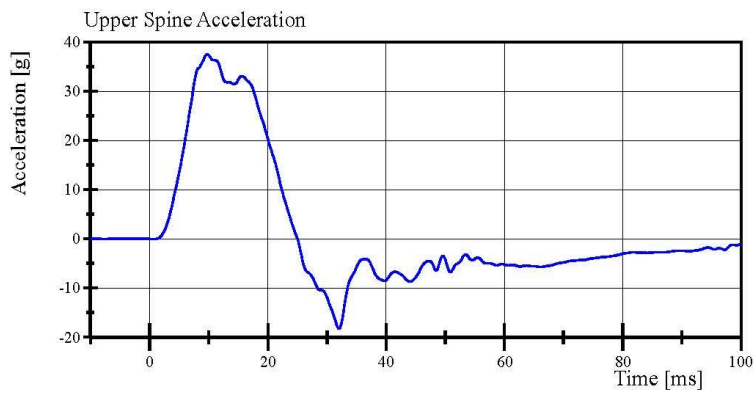
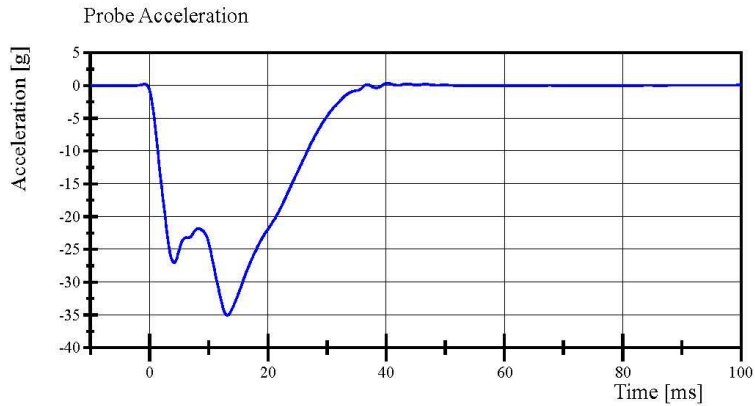
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.16.2023 10:39:01 634



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. DQ0570 Certification No. 23-1
Test Date: 6/16/2023



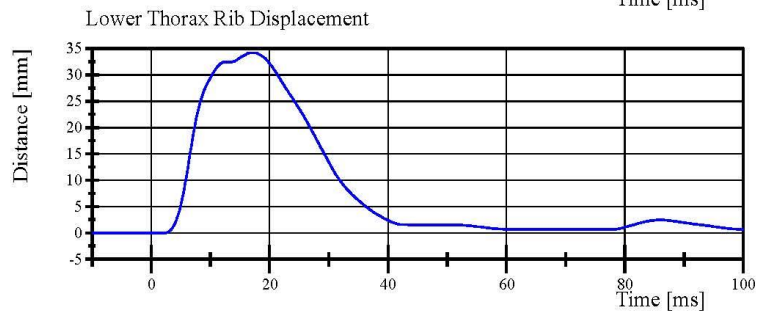
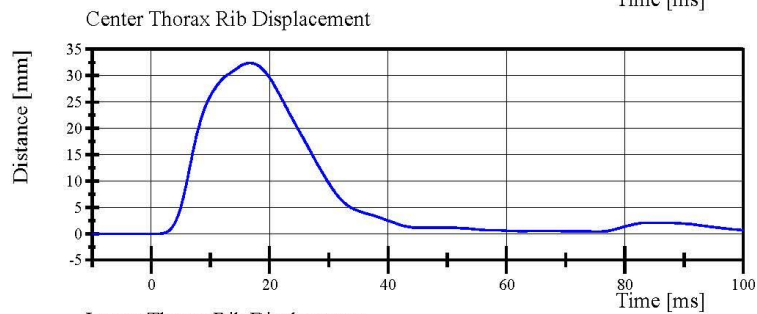
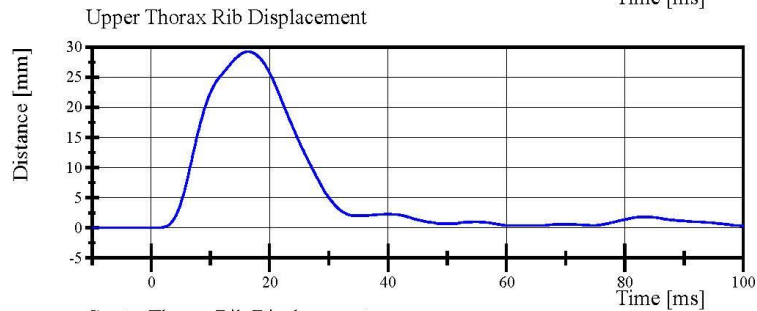
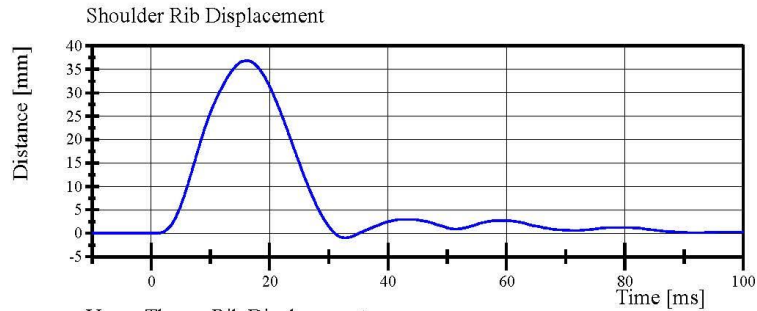
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.16.2023 10:39:48 634



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. DQ0570 Certification No. 23-1
Test Date: 6/16/2023



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

06.16.2023 10:39:48 634



Transportation Research Center Inc.

Left Lateral Thorax without Arm

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.332 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-16.1 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	36.9 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.9 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	39.5 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	15.2 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.7 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Thorax Rib S/N: 180-3362 DP6492

Middle Thorax Rib S/N: 180-3362 DP6493

Lower Thorax Rib S/N: 180-3362 DP7664

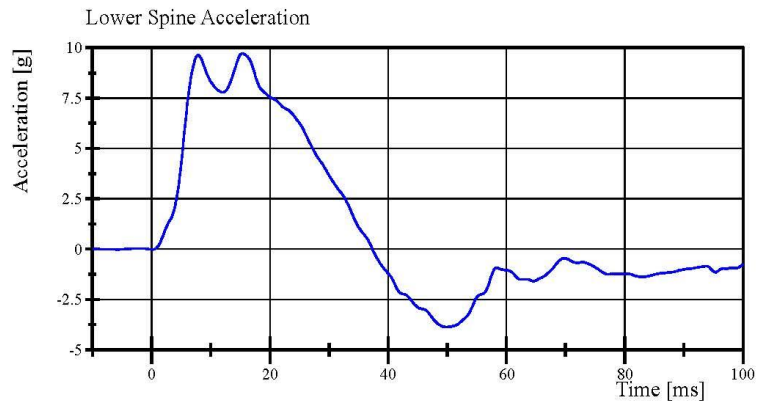
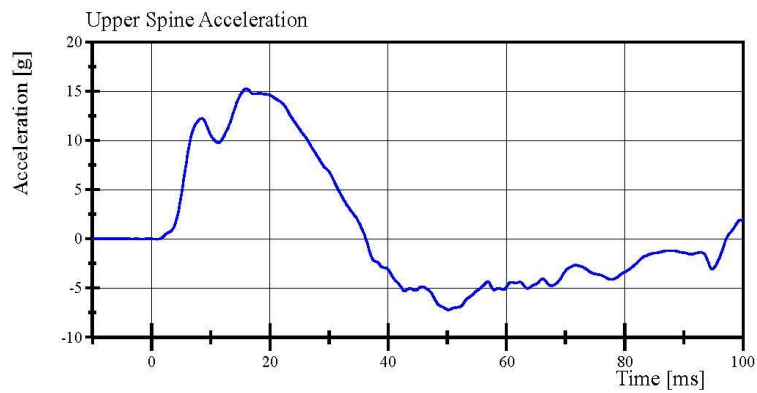
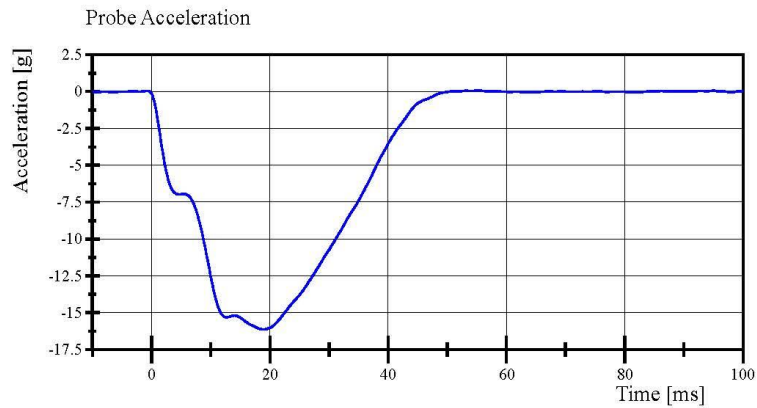
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.16.2023 09:59:11 875



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DQ0570 Certification No. 23-1
Test Date: 6/16/2023



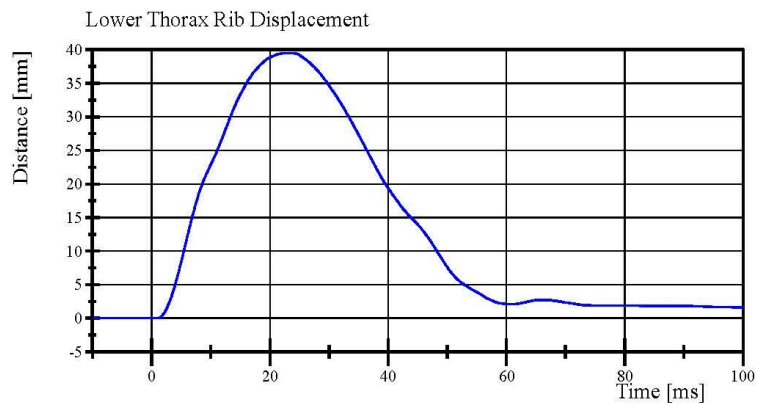
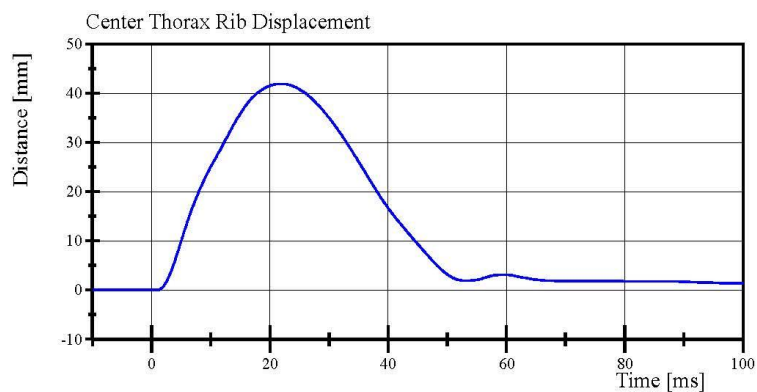
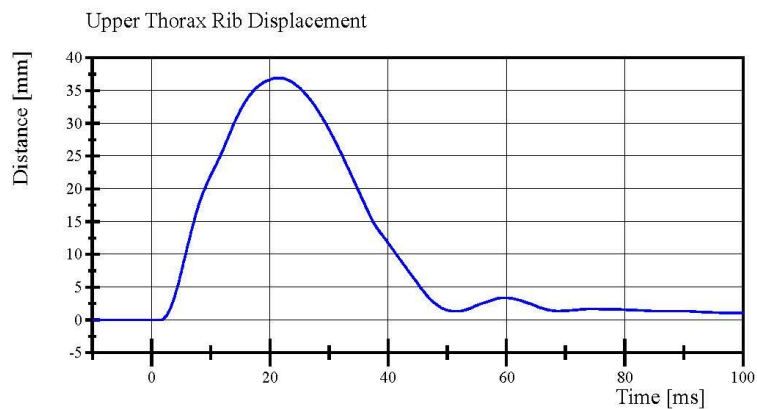
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

06.16.2023 10:00:10 875



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DQ0570 Certification No. 23-1
Test Date: 6/16/2023



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

06.16.2023 10:00:10 875



Transportation Research Center Inc.

Left Lateral Abdomen

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.9 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	40.6 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	38.5 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	11.46 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Abdominal Rib S/N: 180-3368 DP5142

Lower Abdominal Rib S/N: 180-3368 DP5143

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

06.16.2023 09:51:00 670

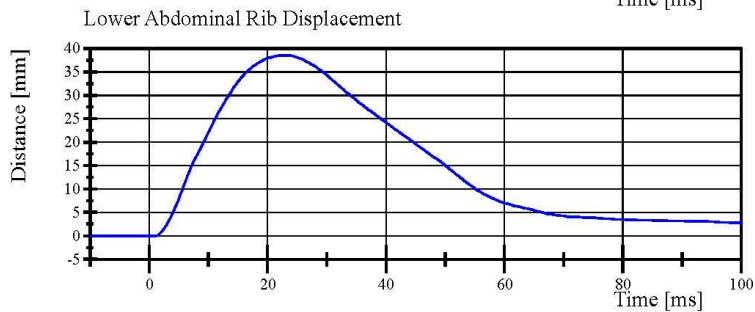
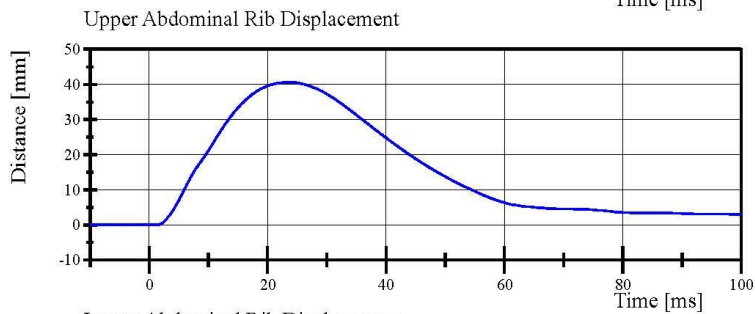
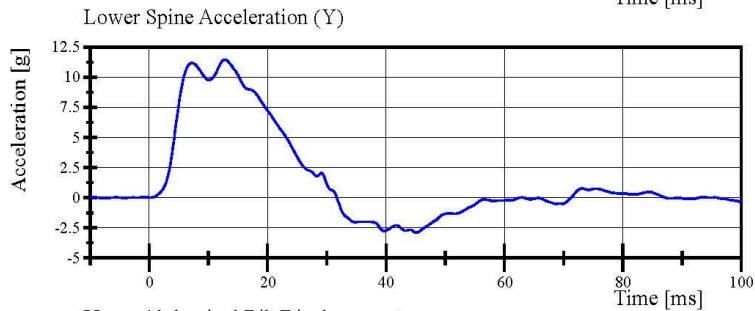
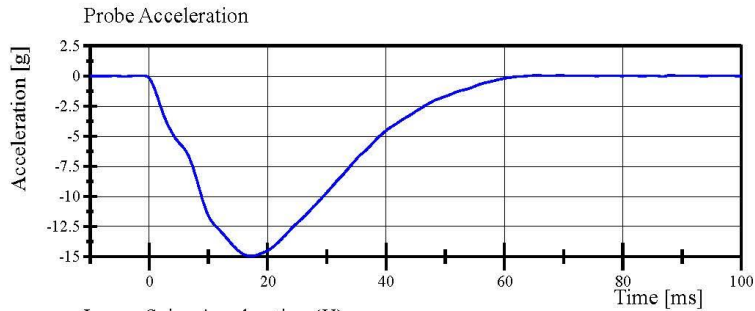


Transportation Research Center Inc.

Left Lateral Abdomen

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023



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

06.16.2023 09:51:29 670



Transportation Research Center Inc.

Left Lateral Pelvis

SID IIS Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.62 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.85 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	35.3 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,760.6 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: 1173

Pelvis Plug Info:

Manufacturer: SACO

S/N: 14544

Cal Date: 20201218

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

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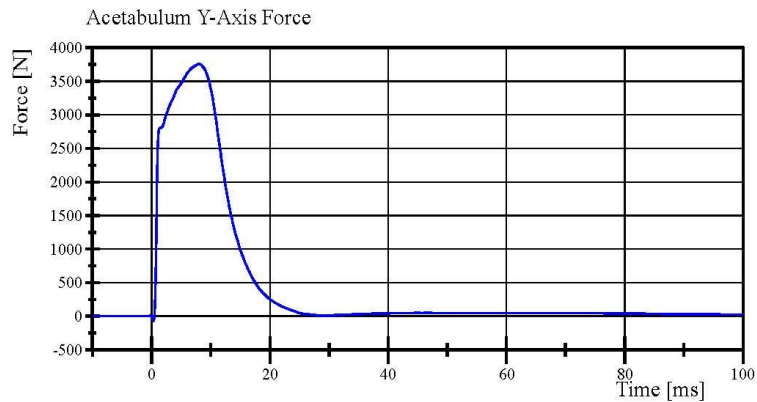
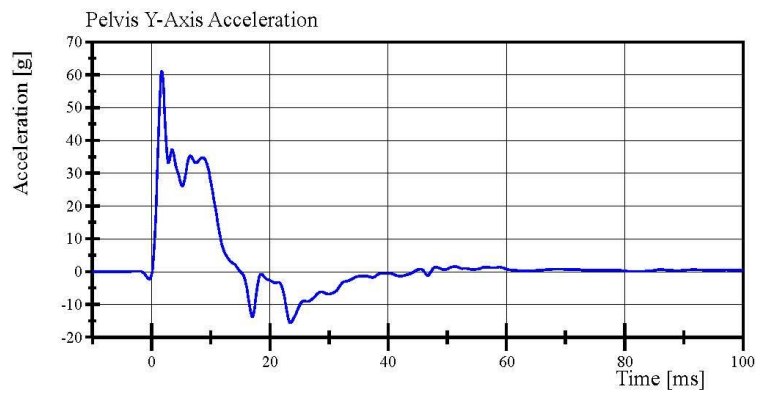
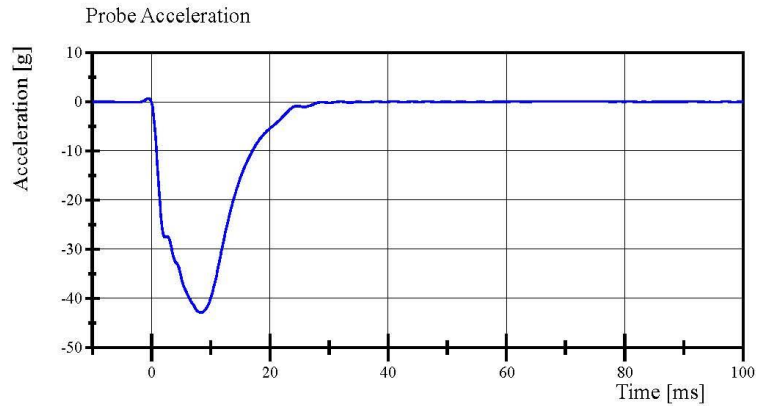


Transportation Research Center Inc.

Left Lateral Pelvis

SID IIs Serial No. DQ0570 Certification No. 23-1

Test Date: 6/16/2023



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. DQ0570 Certification No. 23-2

Test Date: 6/16/2023

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	58 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-43.7 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	38.2 g	Yes
Iliac Force	4,100 - 5,100 N	5,093.1 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: 1173

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

06.16.2023 13:37:47 693

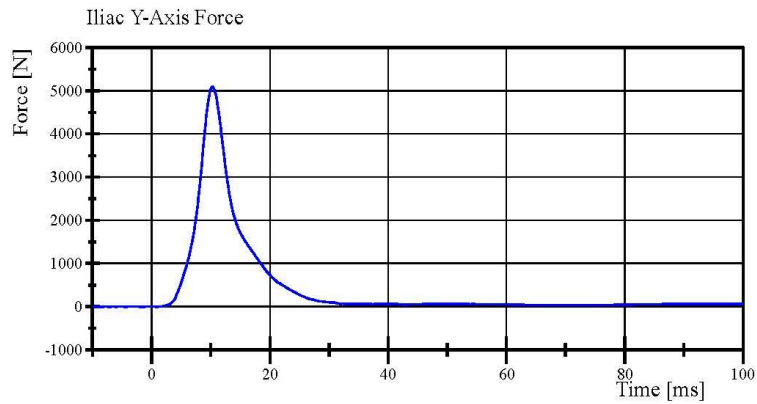
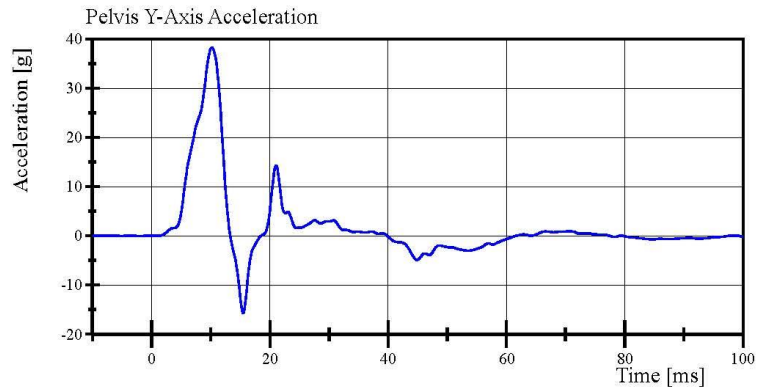
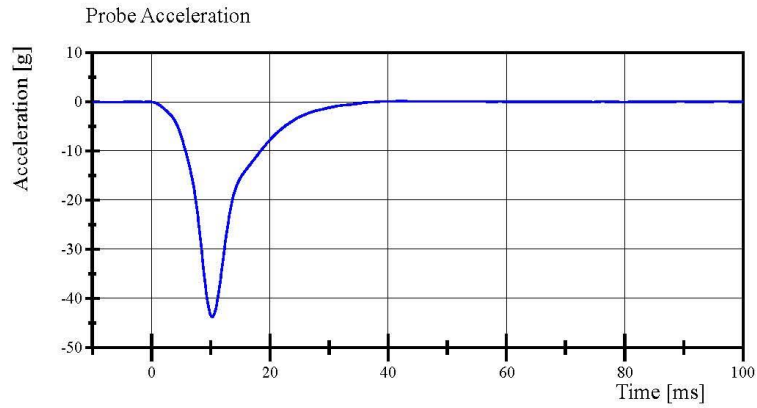


Transportation Research Center Inc.

Left Lateral Iliac

SID IIS Serial No. DQ0570 Certification No. 23-2

Test Date: 6/16/2023



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

06.16.2023 13:38:15 693



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	13-Feb-2023
	Y		T10352	Endevco	13-Feb-2023
	Z		P87064	Endevco	14-Feb-2023
Redundant Head Accelerometers	X		T16771	Endevco	13-Feb-2023
	Y		P83368	Endevco	13-Feb-2023
	Z		P91904	Endevco	13-Feb-2023
Thoracic Rib Displacement Potentiometers	Upper	Y	111	Honeywell	14-Feb-2023
	Middle	Y	174	FTSS	14-Feb-2023
	Lower	Y	0913	Honeywell	14-Feb-2023
Abdomen Load Cells	Front	Y	1441	Denton	14-Feb-2023
	Middle	Y	1436	Denton	14-Feb-2023
	Rear	Y	1437	Denton	14-Feb-2023
Lower Spine Accelerometers (T12)	X		T11866	Endevco	13-Feb-2023
	Y		P91615	Endevco	13-Feb-2023
	Z		P64884	Endevco	13-Feb-2023
Acetabulum Load Cell		Y	N/A	N/A	N/A
Pubic Symphysis Load Cell		Y	465-FY	Denton	14-Feb-2023

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N DQ0570			
				Serial Number	Manufacturer	Calibration Date	
Head Accelerometers				X	T11432	Endevco	10-Feb-2023
				Y	P93774	Endevco	10-Feb-2023
				Z	P91566	Endevco	10-Feb-2023
Redundant Head Accelerometers				X	P93766	Endevco	10-Feb-2023
				Y	P93762	Endevco	10-Feb-2023
				Z	P93761	Endevco	10-Feb-2023
Displacement Potentiometers	Shoulder			N/A	N/A	N/A	N/A
	Thoracic Rib	Upper	Y	007	Servo	13-Feb-2023	
		Middle	Y	037	Servo	13-Feb-2023	
		Lower	Y	048	Servo	13-Feb-2023	
	Abdominal Rib	Upper	Y	1295	Servo	13-Feb-2023	
		Lower	Y	1136	Servo	13-Feb-2023	
Lower Spine Accelerometers (T12)				X	P94545	Endevco	10-Feb-2023
				Y	P94647	Endevco	10-Feb-2023
				Z	P94530	Endevco	10-Feb-2023
Acetabulum Load Cell				Y	DK7483S-FY	FTSS	13-Feb-2023
Iliac Wing Load Cell				Y	287-FY	Denton	13-Feb-2023
Pelvis Plug (struck side)					14574	SACO	18-Dec-2020
Pelvis Plug (non-struck side)					14555	SACO	18-Dec-2020

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A377538	Measurement Specialties	28-Mar-2023
	Vehicle Center of Gravity	Y	A300456	Measurement Specialties	28-Mar-2023
	Vehicle Center of Gravity	Z	A318460	Measurement Specialties	27-Mar-2023
2	Right Sill at Front Seat	X	A298330	Measurement Specialties	4-Jan-2023
	Right Sill at Front Seat	Y	A386351	Measurement Specialties	2-Feb-2023
	Right Sill at Front Seat	Z	A367454	Measurement Specialties	28-Mar-2023
3	Right Sill at Rear Seat	X	A298542	Measurement Specialties	2-Feb-2023
	Right Sill at Rear Seat	Y	A377197	Measurement Specialties	28-Mar-2023
	Right Sill at Rear Seat	Z	A254898	Measurement Specialties	27-Mar-2023
4	Left Sill at Front Door	Y	A367452	Measurement Specialties	2-Feb-2023
5	Left Sill at Rear Door	Y	A367450	Measurement Specialties	2-Feb-2023
6	Left A-Post Lower	Y	A386354	Measurement Specialties	28-Mar-2023
7	Left A-Post Middle	Y	A297048	Measurement Specialties	3-Feb-2023
8	Left B-Post Lower	Y	A378323	Measurement Specialties	27-Mar-2023
9	B-Post Middle	Y	A378327	Measurement Specialties	2-Feb-2023
10	Front Seat Track	Y	A300452	Measurement Specialties	29-Mar-2023
11	Rear Seat Track or Structure	Y	A400097	Measurement Specialties	2-Feb-2023
12	Right Rear Occupant Compartment	Y	A349795	Measurement Specialties	2-Feb-2023
13	Engine Block	X	A378311	Measurement Specialties	29-Mar-2023
	Engine Block	Y	A349806	Measurement Specialties	9-Feb-2023
14	Rear Floorpan Above Axle	X	A349788	Measurement Specialties	27-Mar-2023
	Rear Floorpan Above Axle	Y	A349782	Measurement Specialties	3-Feb-2023
	Rear Floorpan Above Axle	Z	A386358	Measurement Specialties	3-Feb-2023

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A381823	Measurement Specialties	28-Mar-2023
MDB Center of Gravity	Y	A400088	Measurement Specialties	28-Mar-2023
MDB Center of Gravity	Z	A230699	Measurement Specialties	28-Mar-2023
Left Frame Rail at Rear Axle Centerline	X	A318488	Measurement Specialties	28-Mar-2023
Left Frame Rail at Rear Axle Centerline	Y	A318447	Measurement Specialties	28-Mar-2023