Final Report Number: NCAP-TRC-14-002

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

Fuji Heavy Industries
2014 Subaru Forester 2.5i Premium MPV

NHTSA Number: O20145500

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

Report Date: August 12, 2013

FINAL REPORT

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

Notice

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Prepared By: Impact Laboratory Project Operations Group

Approved By: Jeffery W. Sankey

Approval Date: August 12, 2013

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 _____

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16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2014 Subaru Forester 2.5i Premium MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301 and foot well intrusion performance. This test was conducted at the Transportation Research Center Inc. in East Liberty, Ohio on July 29, 2013.

The impact velocity was 56.49 km/h, and the ambient temperature at the barrier face at the time of impact was 21.4° C. The target vehicle post-test maximum crush was 590 millimeters at vehicle centerline. The test vehicle's performance is as follows:

	Driver ATD			Passenger ATD		
Measurement Description	Units	Threshold	Result	Units	Threshold	Result
Head Injury Criteria (HIC_{15})	NA	700	317	NA	700	153
Maximum Chest Compression	mm	63	-20.3	mm	52	-18.3
3ms Chest Clip	Gs	60	39.4	Gs	60	43.0
Nij	NA	1	0.22	NA	1	0.52
Neck Tension	Newtons	4170	935.0	Newtons	2620	958.0
Neck Compression	Newtons	4000	-64.1	Newtons	2520	-596.2
Left Femur Force	Newtons	10008	-1380.3	Newtons	6805	-1685.0
Right Femur Force	Newtons	10008	-2053.2	Newtons	6805	-590.6

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35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833

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1: PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-12-D-00257. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

This 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Front NCAP Laboratory Test Procedure dated September 2012.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2014 Subaru Forester 2.5i Premium MPV at a velocity of 56.49 km/h. The test was performed at Transportation Research Center, Inc. on July 29, 2013. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 37), and the right-front passenger (position 2) ATD (Serial No. 426) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 136 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

There was 100.0 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 590 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: front airbag, headrest, and knee airbag. The passenger's visible contact points were as follows: front airbag, headrest, and glove box door.

The occupant data is summarized below:

ATD Position	HIC_{15}	Nij	Neck Tension (N)	Neck Compression (N)	3 ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50^{th} Male)	317	0.22	935.0	-64.1	39.4	-20.3	-1380.3	-2053.2
Passenger (5^{th} Female)	153	0.52	958.0	-596.2	43.0	-18.3	-1685.0	-590.6

2: OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

TEST VEHICLE INFORMATION

NHTSA No.	O20145500
Model Year	2014
Make	Subaru
Model	Forester 2.5i Premium
Body Style	MPV
VIN	JF2SJAEC3EH436916
Body Color	Blue
Odometer Reading (km/mi)	209 mi
Engine Displacement (L)	2.5
Type/No. Cylinders	Horizontally Opposed/4
Engine Placement	Front
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	No

TEST VEHICLE OPTIONS

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal 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
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured by	Fuji Heavy Industries, LTD
Date of Manufacture	04/13

GVWR (kg)	2032
GAWR Front (kg)	1048
GAWR Rear (kg)	1093

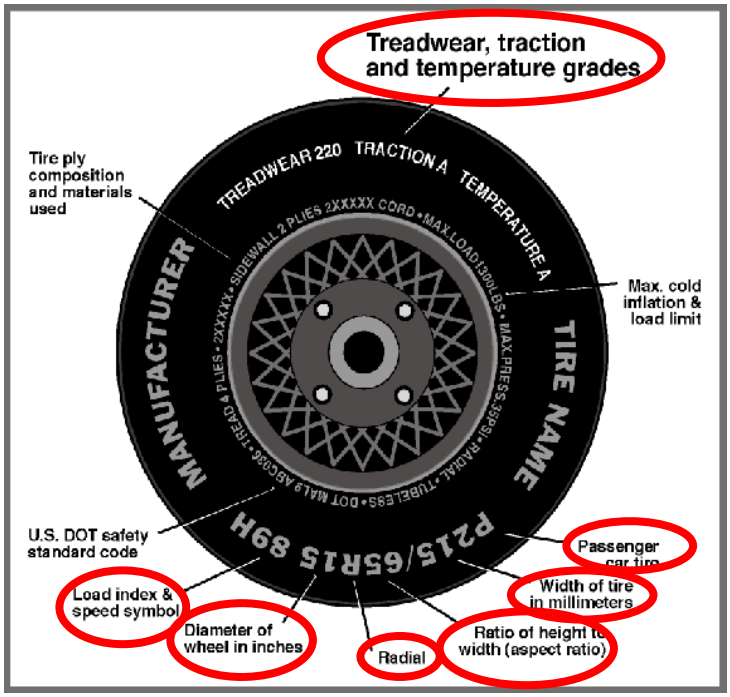
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				408
Cargo Wt. (RCLW) (kg)				67.8

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	210	200
Recommended Tire Size	P225/60R17	P225/60R17
Tire Size on Vehicle	P225/60R17	P225/60R17
Tire Fuji Heavy Industries	Yokohama	Yokohama
Tire Model	Geolander G91	Geolander G91
Treadwear	320	320
Traction Grade	B	B
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	3	3
Load Index/Speed Symbol	98H	98H
Tire Material	Polyester & Steel	Polyester & Steel
DOT Safety Code Right	FDFC-PE20813	FDFC-PE20813
DOT Safety Code Left	FDFC-PE20813	FDFC-PE20813

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	446.0	339.2		488.8	397.8	
Right	kg	440.6	317.0		474.2	384.2	
Ratio	%	57.5	42.5		55.2	44.8	
Totals	kg	886.6	656.2	1542.8	963.0	782.0	1745.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1542.8
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.3
Rated Cargo/Luggage Weight (RCLW)	kg	67.8
Vehicle Target Weight (TVTW)	kg	1749.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	765	769	798	809	1123
As Tested	mm	754	761	784	783	1183
Post Test	mm	799	791	773	765	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2640
Total Vehicle Length at Left Side	mm	4434
Total Vehicle Length at Centerline	mm	4580
Total Vehicle Length at Right Side	mm	4433
Weight of Ballast in Cargo Area	kg	0.0
Weight of Vehicle Components Removed	kg	31.0
Amount of Stoddard Solvent in Fuel Tank	liters	56.0

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: Rear bumper beam, rear bumper fascia, left and right rear door window assemblies, speakers, rear door inner trim panel, taillights, and rear windshield wiper assembly

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4580
2	Total Width	1790
3	Bumper Top Height	593
4	Bumper Bottom Height	513
5	Longitudinal Member Top Height	610
6	Distance Between Longitudinal Members	869
7	Longitudinal Member Width	70
8	Engine Top Height	910
9	Engine Bottom Height	265
10	Engine and Gearbox Width	800
11	Front Bumper-Engine Distance	470
12	Front Shock Absorber Fixing Height	928
13	Bonnet Leading Edge Height	912
14	Front Shock Absorber Fixing Width	1107
15	Front Bumper – Front Axle Distance	940
16	Front Axle – A-Pillar Distance	490
17	A-Pillar – B-Pillar Distance	1082
18	B-Pillar – Rear Axle Distance	1055
19	B-Pillar – C-Pillar Distance	928
20	Roof Sill Bottom Height	1505
21	Roof Sill Top Height	1565
22	Floor Sill Bottom Height	400
23	Floor Sill Top Height	430

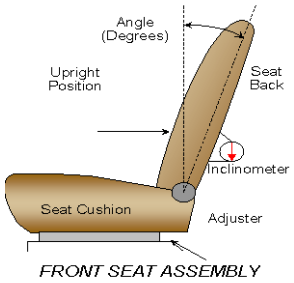
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

NORMAL DESIGN RIDING POSITION

For adjustable driver and passenger seat back. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



	Degree
Driver Seat back angle:	1.9 at Headrest
Passenger Seat back angle:	0.3 at Headrest

SEAT FORE/AFT POSITIONS

Describe the method used of determining seat for/aft positions.

Driver: Mid position, Positioned according to Form 1

Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	294	147
Passenger Seat	260	0

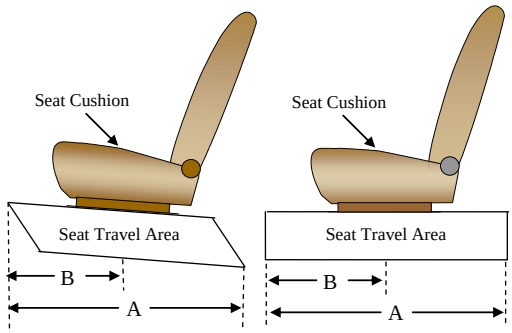
SEAT BELT UPPER ANCHORAGE

Describe the method of positioning seat belt upper anchorages.

Driver: Positioned according to Form 1

Passenger: Positioned according to Form 1

	Total No. of Positions	Placed in Position No.
Driver Seat	4 Numbered from 0 to 3	1
Passenger Seat	4 Numbered from 0 to 3	1



DATA SHEET NO. 2 (CONTINUED)

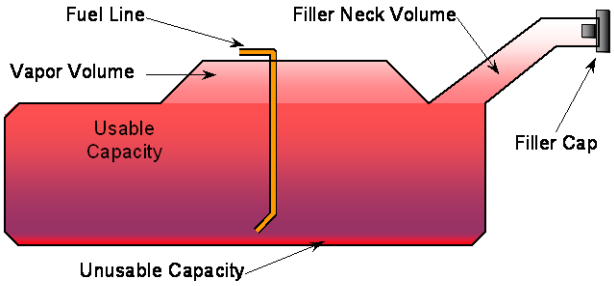
SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	60.2
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	56.0
Actual Amount of Solvent Used	56.0
1/3 of Usable Capacity	18.7

The vehicle is equipped with an electric fuel pump. If ignition key is at "ON" position and engine is not running, the fuel pump operates for 2 seconds. If the engine is running, then the fuel pump will run continuously.

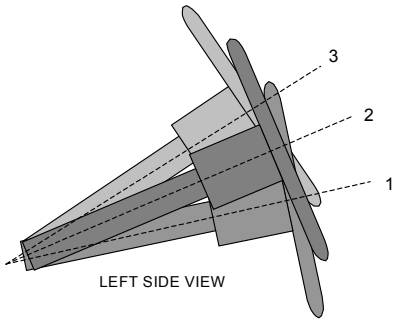


VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.

STEERING COLUMN POSITIONS



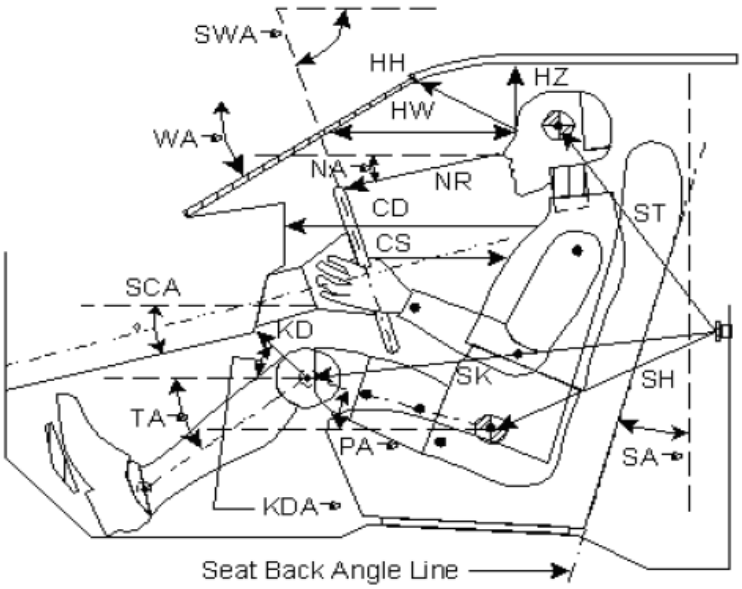
STEERING COLUMN ASSEMBLY

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	25.8	20
Geometric Center Position No. 2	27.3	20
Uppermost Position No. 3	28.7	20
Telescoping Steering Wheel Travel	N/A	40
Test Position	27.3	20

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

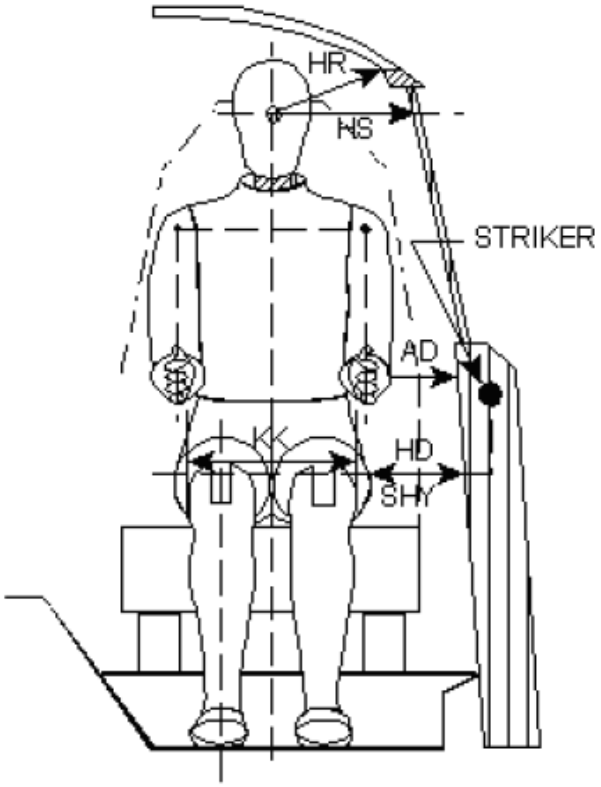


Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (º)	Length (mm)	Angle (º)
WAº	Windshield Angle		32.4		
SWAº	Steering Wheel Angle		62.7		
SCAº	Steering Column Angle		27.3		
SAº	Seat Back Angle (on headrest post)		1.9		0.3
HZ	Head to Roof (Z)	254	N/A	232	N/A
HH	Head to Header	415	N/A	373	N/A
HW	Head to Windshield	692	N/A	677	N/A
NR	Nose to Rim	409	10.8		
CD	Chest to Dash	523		449	
CS	Chest to Steering Hub	313	N/A		
RA	Rim to Abdomen	176	N/A		
KDL	Left Knee to Dash	178	25.2	118	36.5
KDR	Right Knee to Dash	173	25.2	133	37.8
PAº	Pelvic Angle		24.6		20.2
TAº	Tibia Angle		47.2		61.1
SK	Striker to Knee	632	11.4	699	11.4
ST	Striker to Head	445	-73.6	450	-63.7
SH	Striker to H-Point	327	467	390	26.0

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

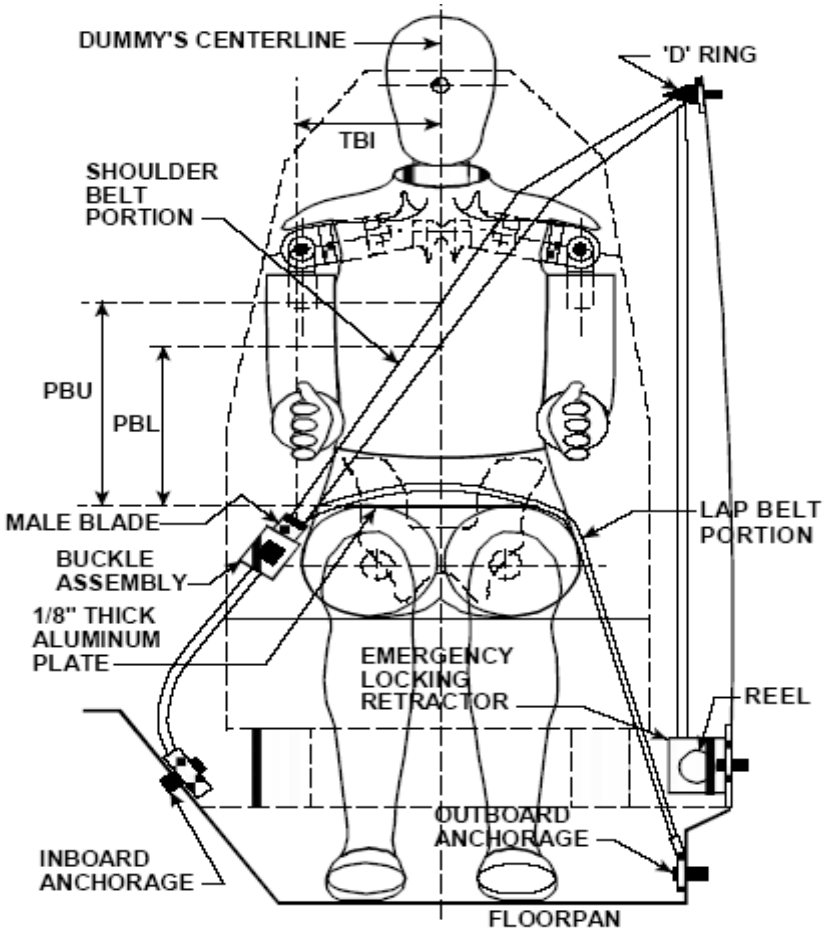


Code	Measurement Description	Driver	Passenger
AD	Arm to Door	156	103
HD	H-Point to Door	152	185
HR	Head to Side Header	278	279
HS	Head to Side Window	374	387
KK	Knee to Knee	309	196
SHY	Striker to H-Point (Y Direction)	264	302
AA	Ankle to Ankle	305	142

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	380	350
PBL – Top surface of reference to belt lower edge	mm	308	265

BELT LENGTH DATA

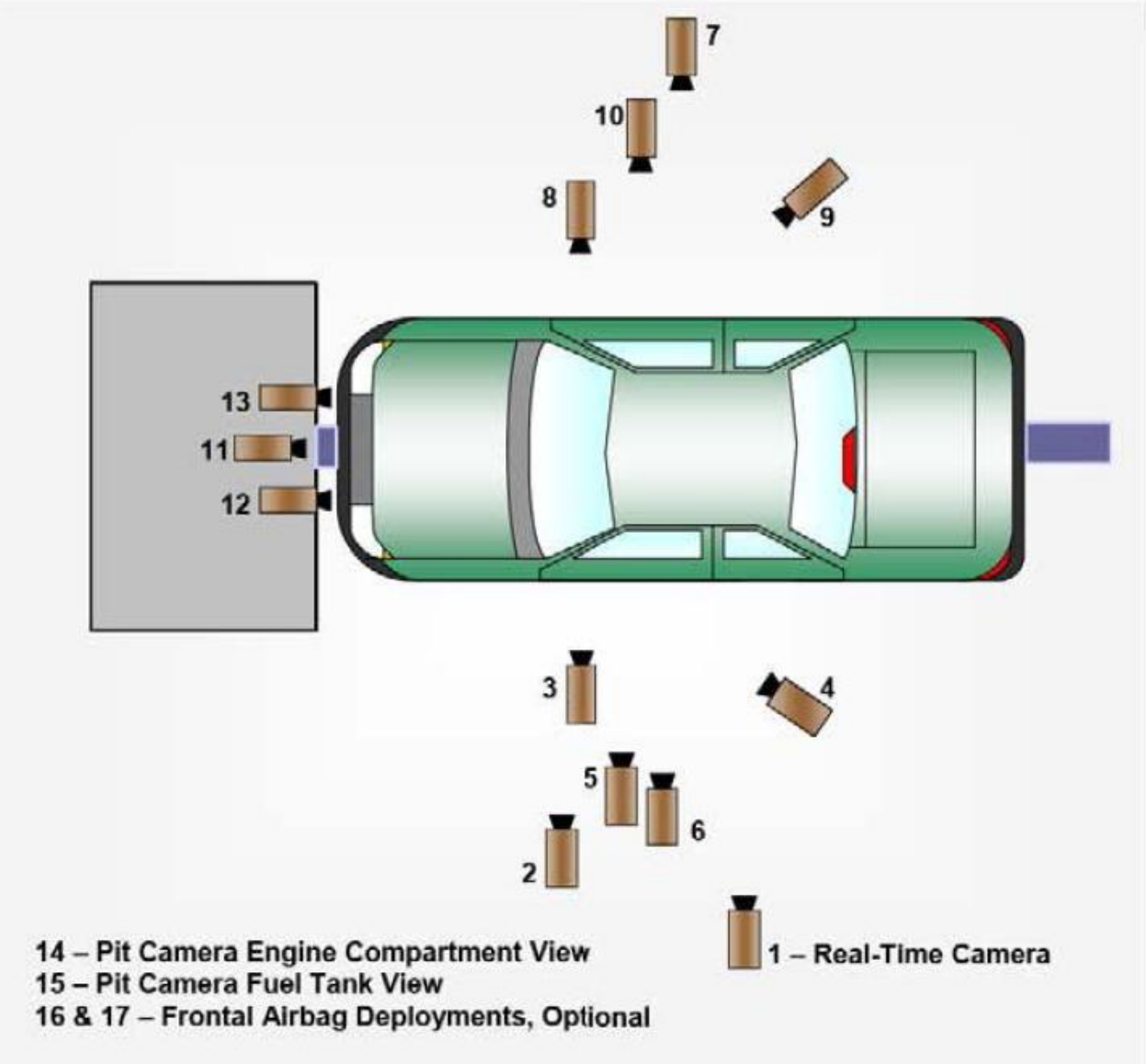
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	1055	1120
Lap belt length as measured on ATD	mm	812	752
Remainder of belt on reel	mm	943	1008
Total belt length for continuous webbing systems	mm	2810	2880

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2014 Subaru Forester 2.5i Premium MPV	NHTSA No.:	O20145500
Test Program:	NCAP Frontal Impact	Test Date:	07/29/2013

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

CAMERA LOCATIONS

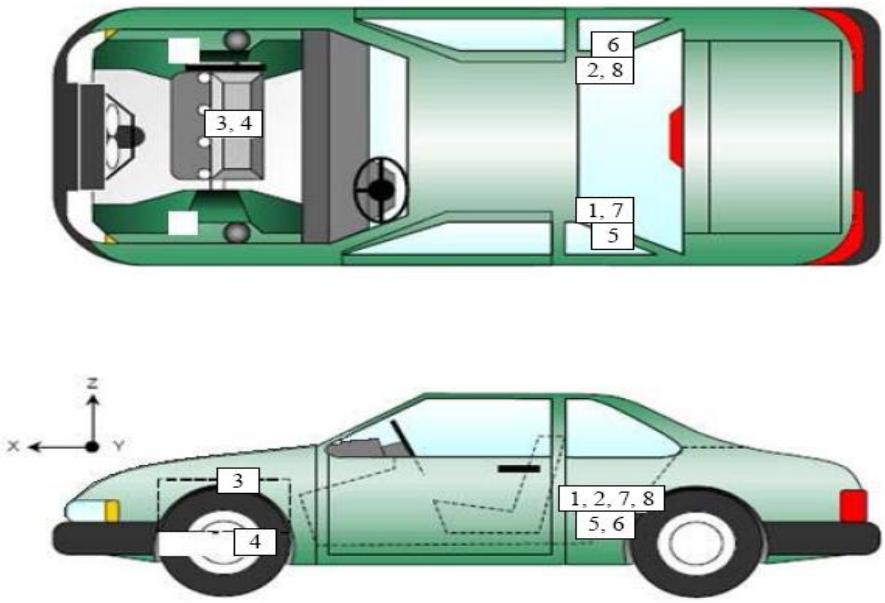
No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	186	-6593	-1313	Zoom	30
2	Driver Close-Up	1559	-5354	-1224	50	1000
3	Left Front Half	1307	-5288	-1177	25	1000
4	Left Angle	4234	-2935	-1915	25	1000
5	Steering Column - Top	2203	-5294	-1986	25	1000
6	Steering Column – Bottom	1927	-4926	-1295	25	1000
7	Right Overall	1722	4982	-1205	12.5	1000
8	Passenger Close-Up	1402	5557	-1082	50	1000
9	Right Front Half	3377	2989	-1925	25	1000
10	Right Angle	1148	5327	-1198	25	1000
11	Windshield	152	0	-2303	8.5	1000
12	Driver Windshield	152	-375	-2308	16	1000
13	Passenger Windshield	152	475	-2290	16	1000
14	Pit Front	535	0	3049	25	1000
15	Pit Rear	2817	0	3095	8.5	1000
16	Onboard Driver Airbag (Optional)				8.5	1000
17	Onboard Passenger Airbag (Optional)				8.5	1000

Reference Points: +X – forward of impact plane
+Y – right of monorail center
+Z – into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Camera View	Location (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1760	-430	-472
2	Right Rear Accelerometer – X Direction	1760	418	-470
3	Engine Top X	3960	-15	-703
4	Engine Bottom X	3903	25	-230
5	Left Rear Accelerometer – Z Direction	1760	-430	-448
6	Right Rear Accelerometer – Z Direction	1760	418	-435

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

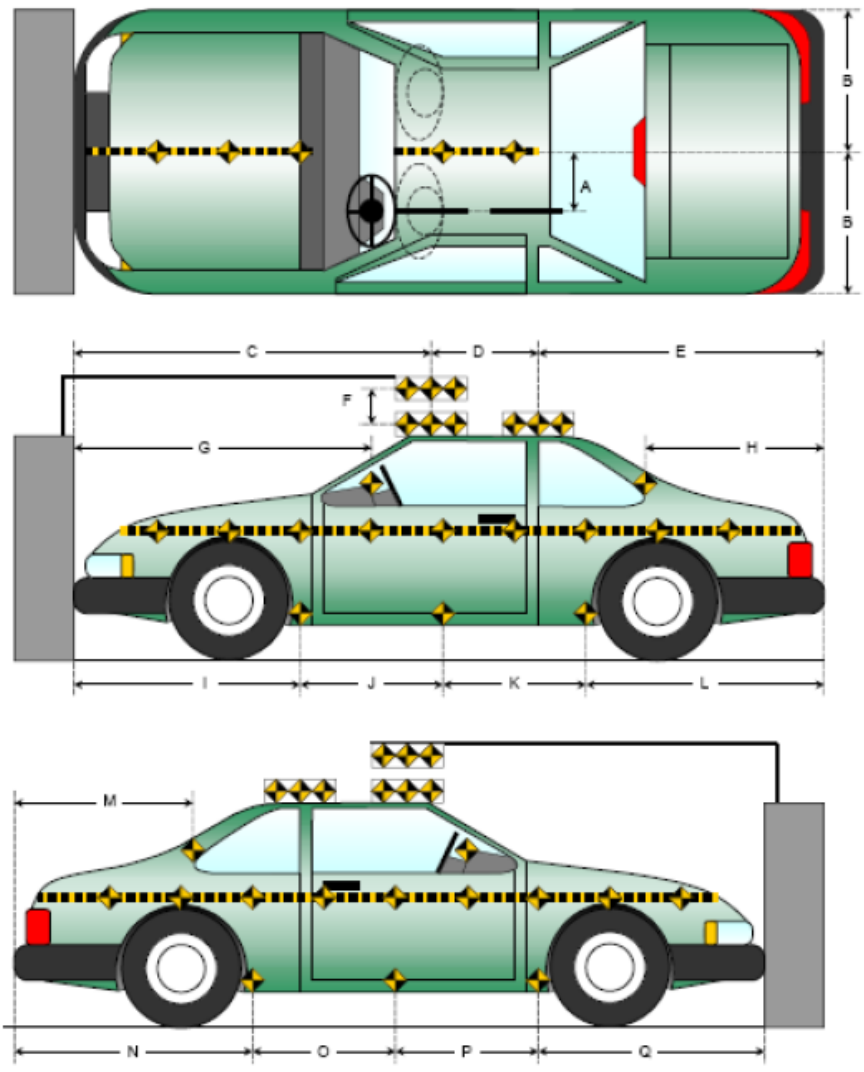
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

Item	Value
A	460
B	895
C	2371
D	610
E	1636
F	213
G	2875
H	1218
I	1429
J	855
K	847
L	1462
M	1221
N	1465
O	851
P	851
Q	1426

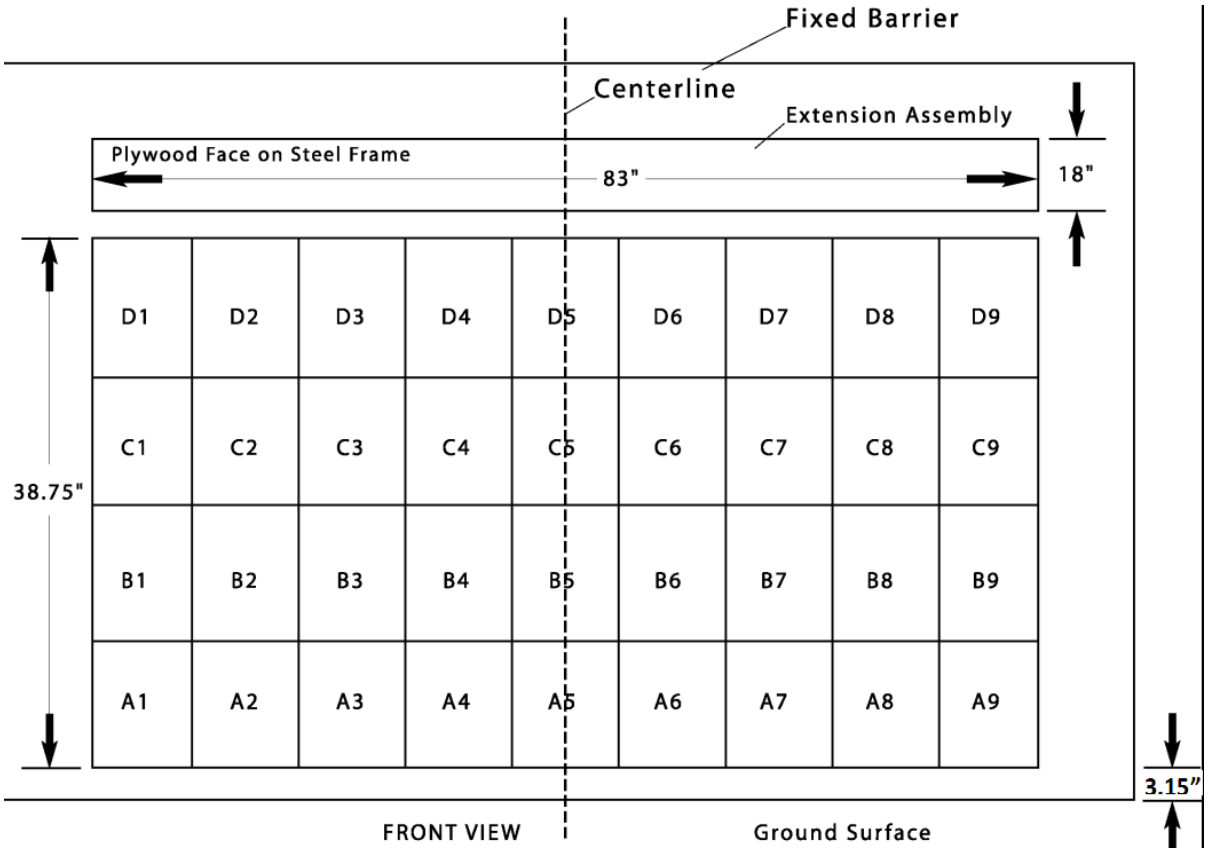
All units in millimeters



DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013



DATA SHEET NO. 10

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	42
Passenger Dummy Accelerometers	42
Vehicle Structure Accelerometers	8
Total	92

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time Panning	2
Total	18

DATA SHEET NO. 11

POST-TEST OBSERVATIONS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th/037	Hybrid III 5th/426
Head Contact	Airbag, headrest	Airbag, headrest
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Knee Contact	Knee airbag	Glove box door
Right Knee Contact	Knee airbag	Glove box door

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed, Fully functional	Closed, Fully functional
Rear Door Opening	Closed, Fully functional	Closed, Fully functional
Seat Track Shift (mm)	None	None
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Broken
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	828
Center	mm	698
Right Side	mm	760
Average	mm	762

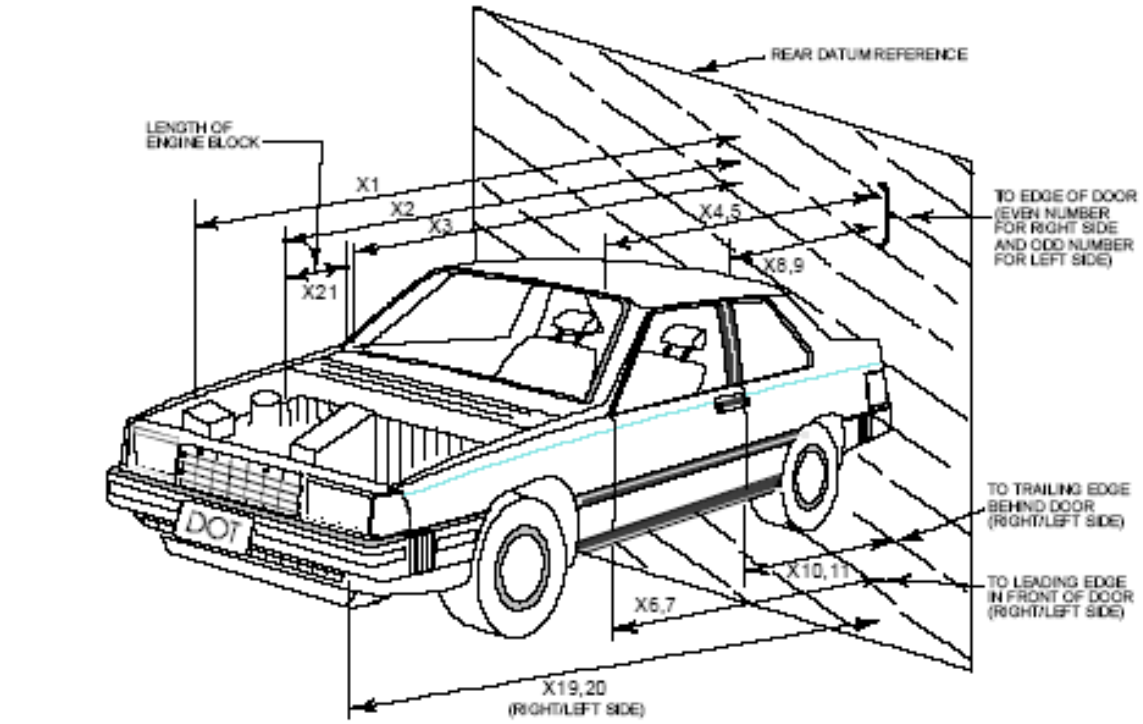
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

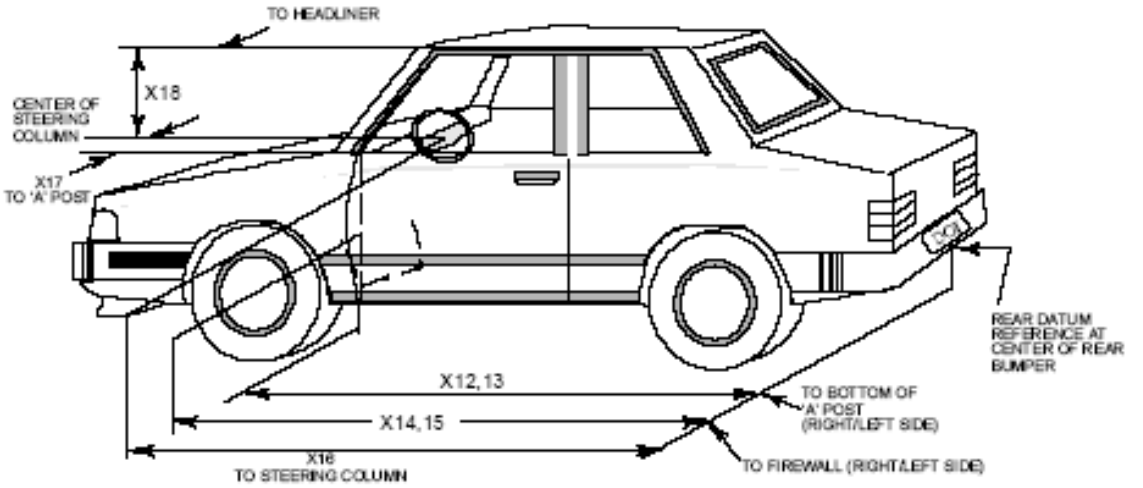
Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Side Curtain Airbag	Yes	No	Yes	No
Torso/Pelvis Airbag	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Shoulder	Yes	Shoulder/Lap	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other	N/A	N/A	N/A	N/A

DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2014 Subaru Forester 2.5i Premium MPV	NHTSA No.:	O20145500
Test Program:	NCAP Frontal Impact	Test Date:	07/29/2013





DATA SHEET NO. 12 (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4580	3990	590
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3933	3665	268
3	RSOV to Firewall	3502	3412	90
4	RSOV to Upper Leading Edge of Right Door	3144	3140	4
5	RSOV to Upper Leading Edge of Left Door	3149	3146	3
6	RSOV to Lower Leading Edge of Right Door	3096	3105	-9
7	RSOV to Lower Leading Edge of Left Door	3100	3118	-18
8	RSOV to Upper Trailing Edge of Right Door	2065	2062	3
9	RSOV to Upper Trailing Edge of Left Door	2068	2071	-3
10	RSOV to Lower Trailing Edge of Right Door	2095	2104	-9
11	RSOV to Lower Trailing Edge of Left Door	2099	2117	-18
12	RSOV to Bottom of “A” Post-of Right Side	3135	3143	-8
13	RSOV to Bottom of “A” Post-of Left Side	3137	3150	-13
14	RSOV to Firewall, Right Side	3491	3467	24
15	RSOV to Firewall, Left Side	3492	3470	22
16	RSOV to Steering Column	2667	2765	-98
17	Center of Steering Column to “A” Post	324	345	-21
18	Center of Steering Column to Headliner	475	475	0
19	RSOV to Right Side of Front Bumper	4433	3985	448
20	RSOV to Left Side of Front Bumper	4434	3990	444
21	Length of Engine Block	560	560	0
RD	RSOV to Right Side of Dash Panel	2998	2995	3
CD	RSOV to Center of Dash Panel	2952	2940	12
LD	RSOV to Left Side of Dash Panel	2998	2997	1

All Dimensions in mm

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

VEHICLE INFORMATION

VIN: JF2SJAEC3EH436916 Wheelbase: 2640
Vehicle Size Category: Small SUV Test Weight (kg): 1745.0

ACCELEROMETER DATA

Accelerometer Locations: As listed on Page 15 of this report.

Cal. Procedure/Interval: TRC procedure / 6 month interval

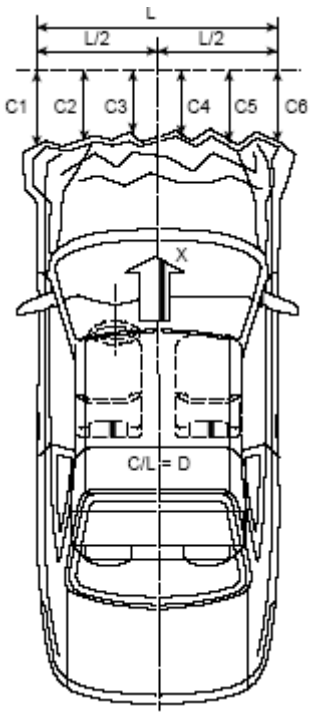
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.49

Velocity Change (km/h): 62.6

Time of Separation (ms): 187



CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: Centerline
Damage Region Length (mm): 1524
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4434	3990	444
C2	Crush zone 2 at left side	mm	4582	4000	582
C3	Crush zone 3 at left side	mm	4585	4000	585
C4	Crush zone 4 at right side	mm	4585	4015	570
C5	Crush zone 5 at right side	mm	4581	4000	581
C6	Crush zone 6 at right side	mm	4433	3985	448
L	C1 to C6	mm	1524	1524	0

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

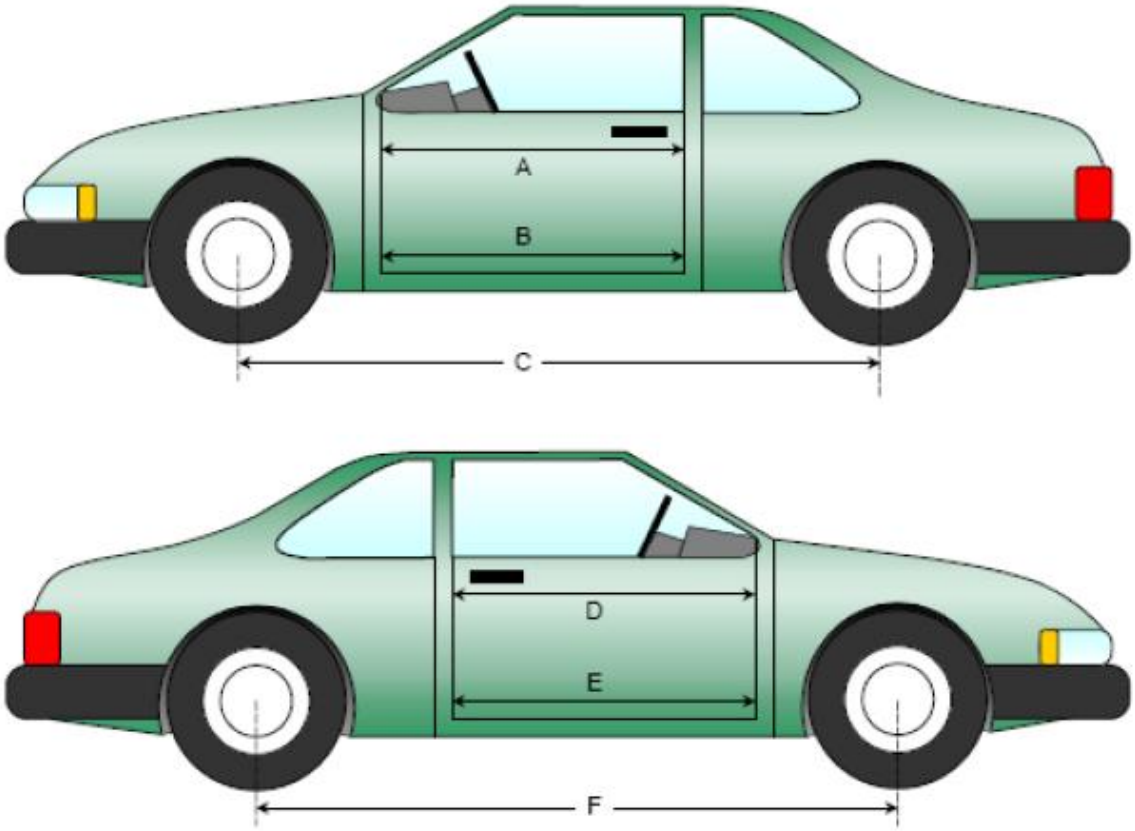
Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1050	1049	1
B	Left Side Lower	mm	890	890	0
C	Right Side Upper	mm	1050	1050	0
D	Right Side Lower	mm	890	890	0

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2640	2635	5
F	Right Side Wheelbase	mm	2640	2595	45



DATA SHEET NO. 14 (CONTINUED)

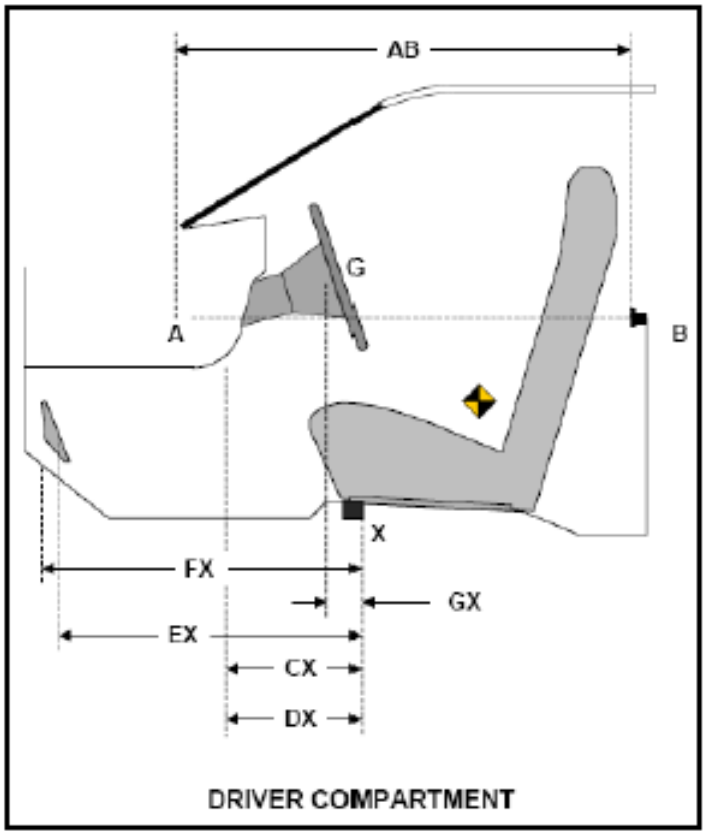
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1015	1015	0
CX	Left Knee Bolster to X	mm	274	300	-26
DX	Right Knee Bolster to X	mm	258	265	-7
EX	Brake Pedal to X	mm	575	560	15
FX	Foot Rest to X	mm	567	558	9
GX	Center of Steering Column Wheel Hub to X	mm	87	150	-63

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

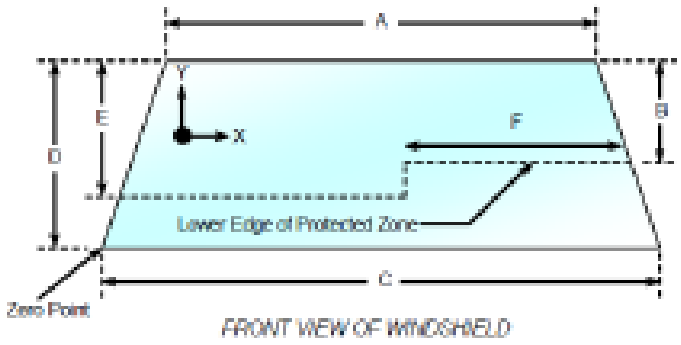
Please provide windshield mounting details. Windshield is mounted in vehicle with adhesive. No peripheral moldings present except contoured plastic molding along the bottom edge.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.
Temperature of windshield molding during test:

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2192	2192	100
Right Side	2205	2205	100
Total	4397	4397	100

Item	Units	Value
A	mm	1215
B	mm	572
C	mm	1500
D	mm	835
E	mm	578
F	mm	500



FRONT VIEW OF WINDSHIELD

AREAS OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

B. The inner surface of the windshield was penetrated by the hood support beneath the protected zone.

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

DATA SHEET NO. 15 (CONTINUED)

SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 69.7 Test Time: 17:48

Stoddard Solvent Spillage Measurements

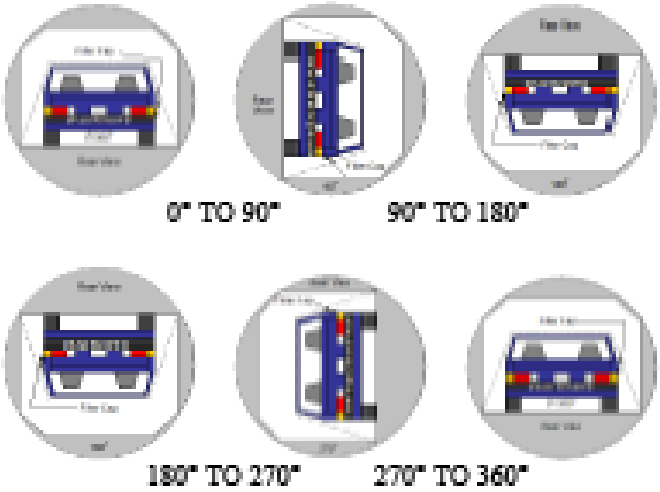
A	From impact until vehicle motion ceases: (maximum allowable – 1 oz.)	0	oz.
B	For the 5-minute period after motion ceases: (maximum allowable – 5 oz.)	0	oz.
C	For the following 25 minutes: (maximum allowable – 1 oz./minutes)	0	oz.
D	Spillage:	0	

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013

1. The specified fixture rollover rate for each 90º of rotation is 50 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage:
None



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0º to 90º	90	330	420
90º to 180º	90	330	840
180º to 270º	90	330	1260
270º to 360º	90	330	1680

FMVSS 301 SPILLAGE TABLE

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

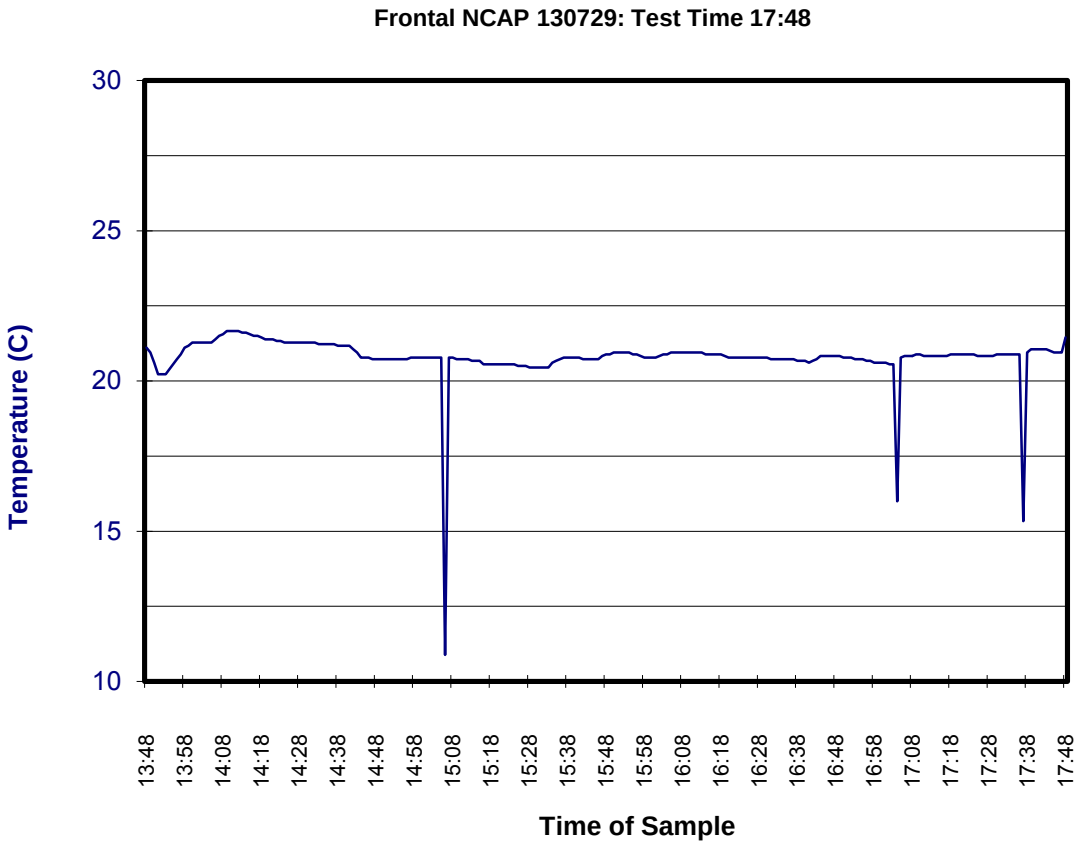
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17

DUMMY/VEHICLE TEMPERATURE STABILIZATION

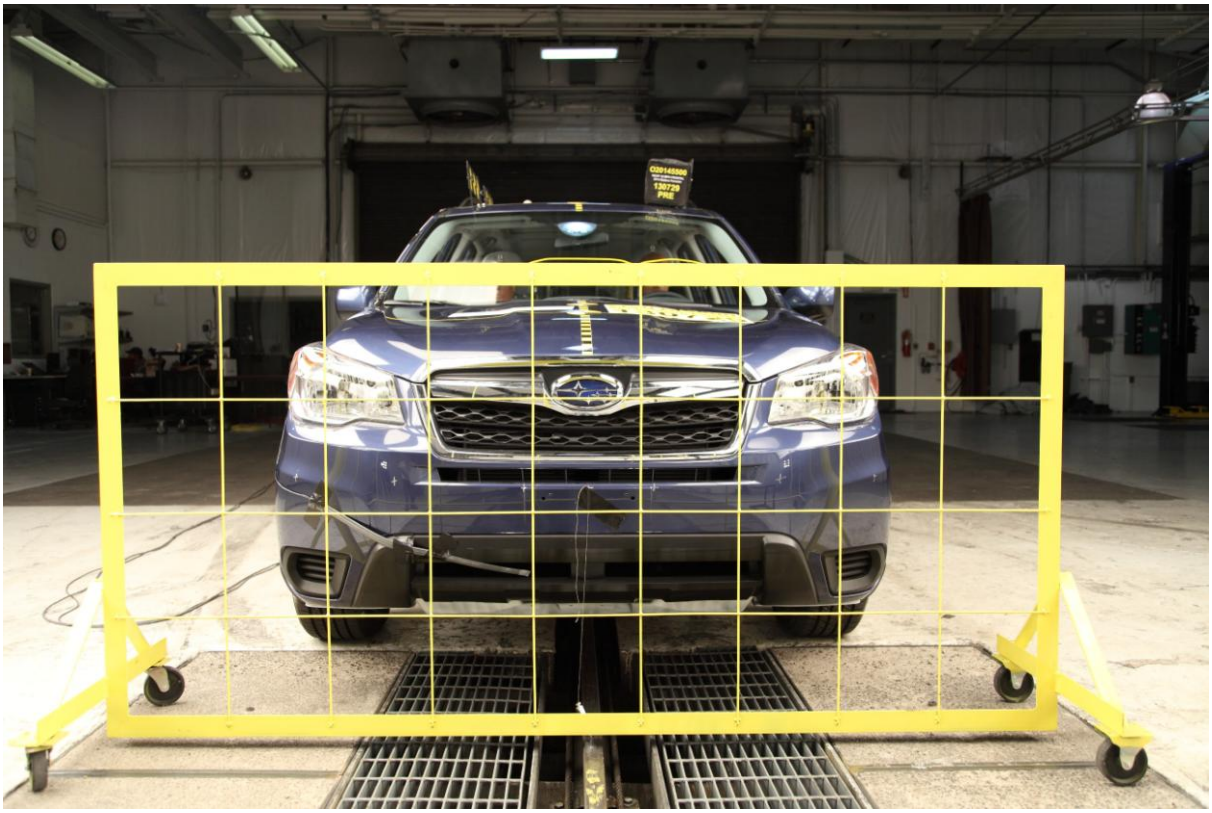
Test Vehicle: 2014 Subaru Forester 2.5i Premium MPV NHTSA No.: O20145500
Test Program: NCAP Frontal Impact Test Date: 07/29/2013



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)



001 Load Cell Location

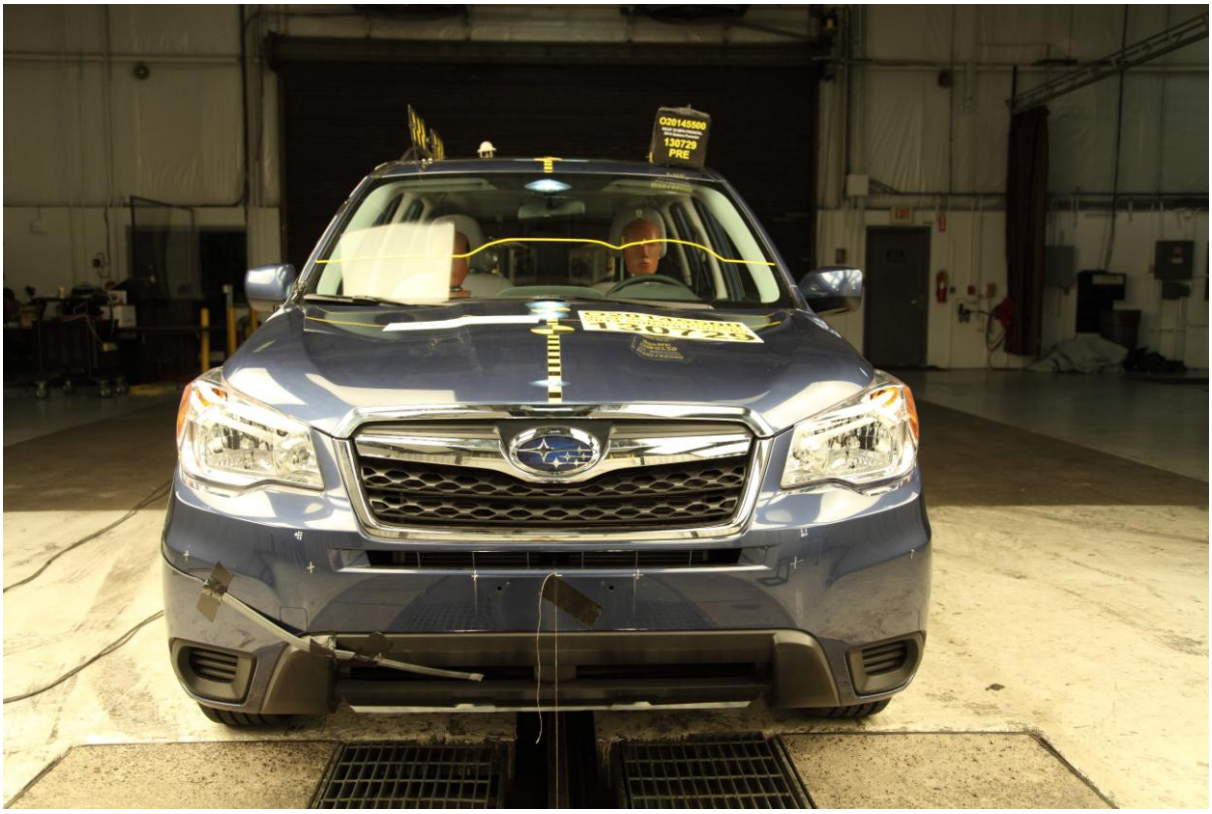
002 Load Cell Wall

003 Manufacturer's Label

004 Tire Placard

No. 005 2014 Subaru Forester 2.5i Premium MPV Frontal As Delivered

006 Left Rear 3-4 View, as Received



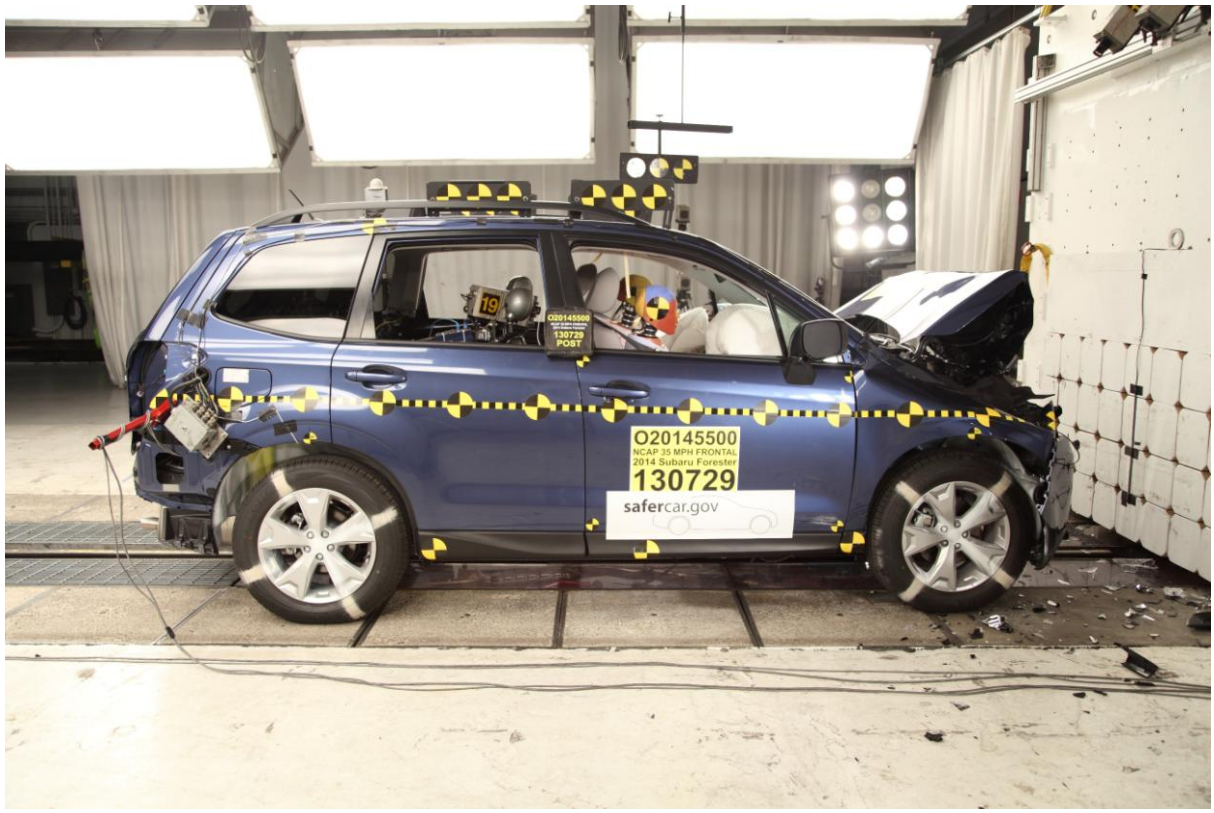
007 Pre-test Front View of Test Vehicle

008 Post-test Front View of Test Vehicle

009 Pre-test Left View of Test Vehicle

010 Post-test Left View of Test Vehicle

011 Pre-test Right View of Test Vehicle



012 Post-test Right View of Test Vehicle

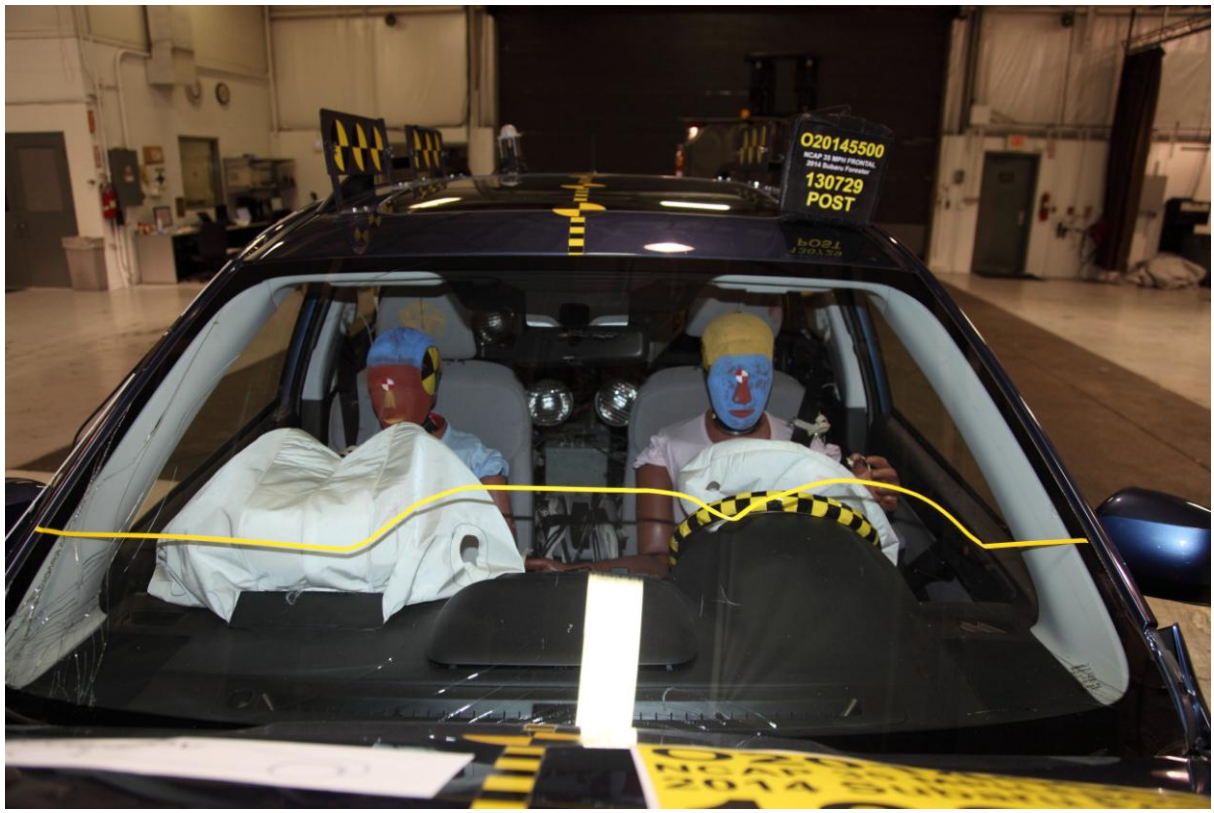
013 Pre-test Right Front 3-4 View

014 Post-test Right Front 3-4 View

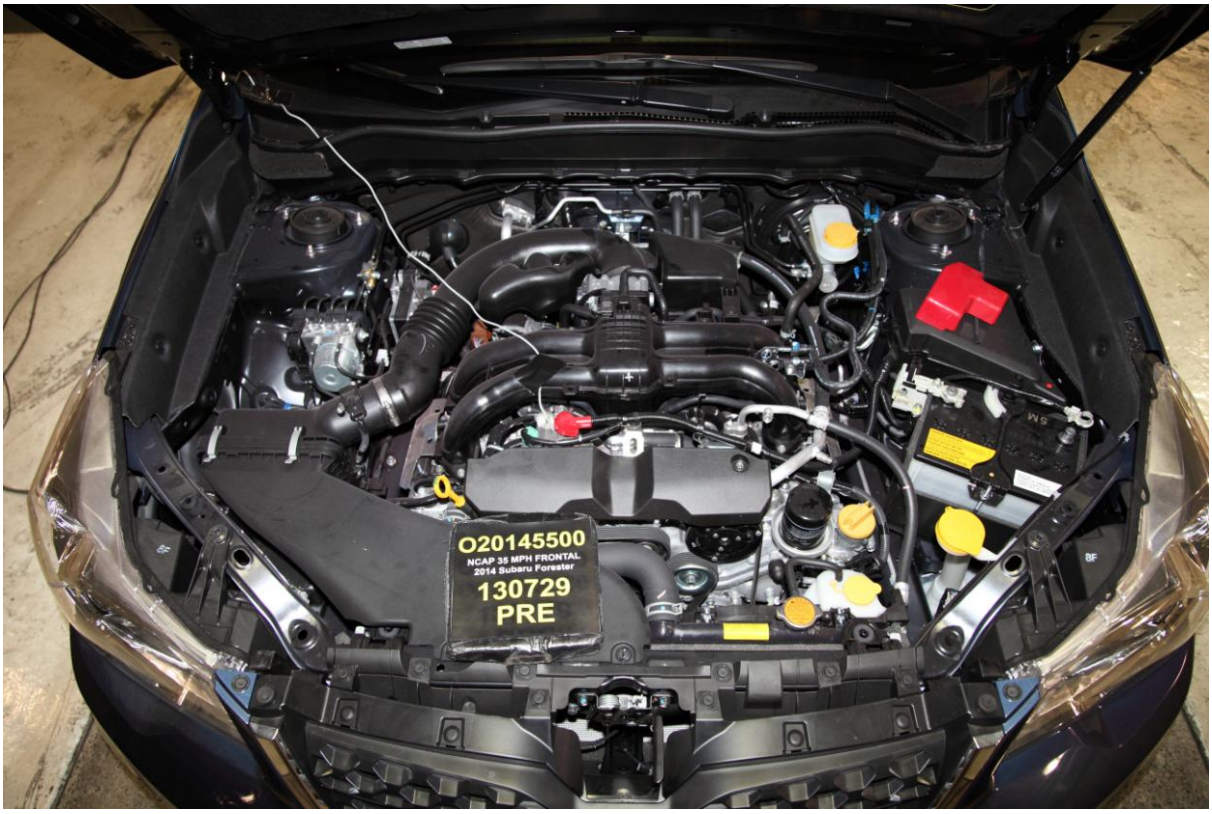
015 Pre-test Left Rear 3-4 View

016 Post-test Left Rear 3-4 View

017 Pre-test Windshield View



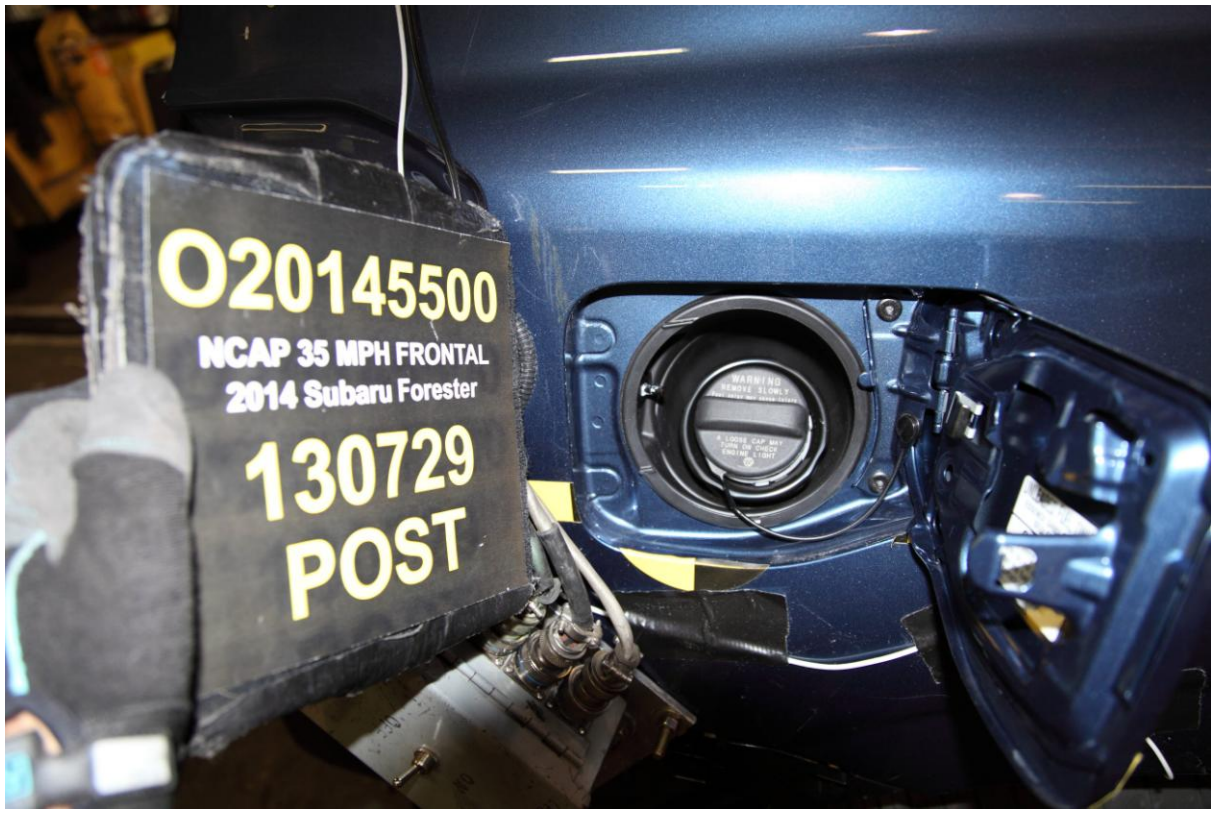
018 Post-test Windshield View



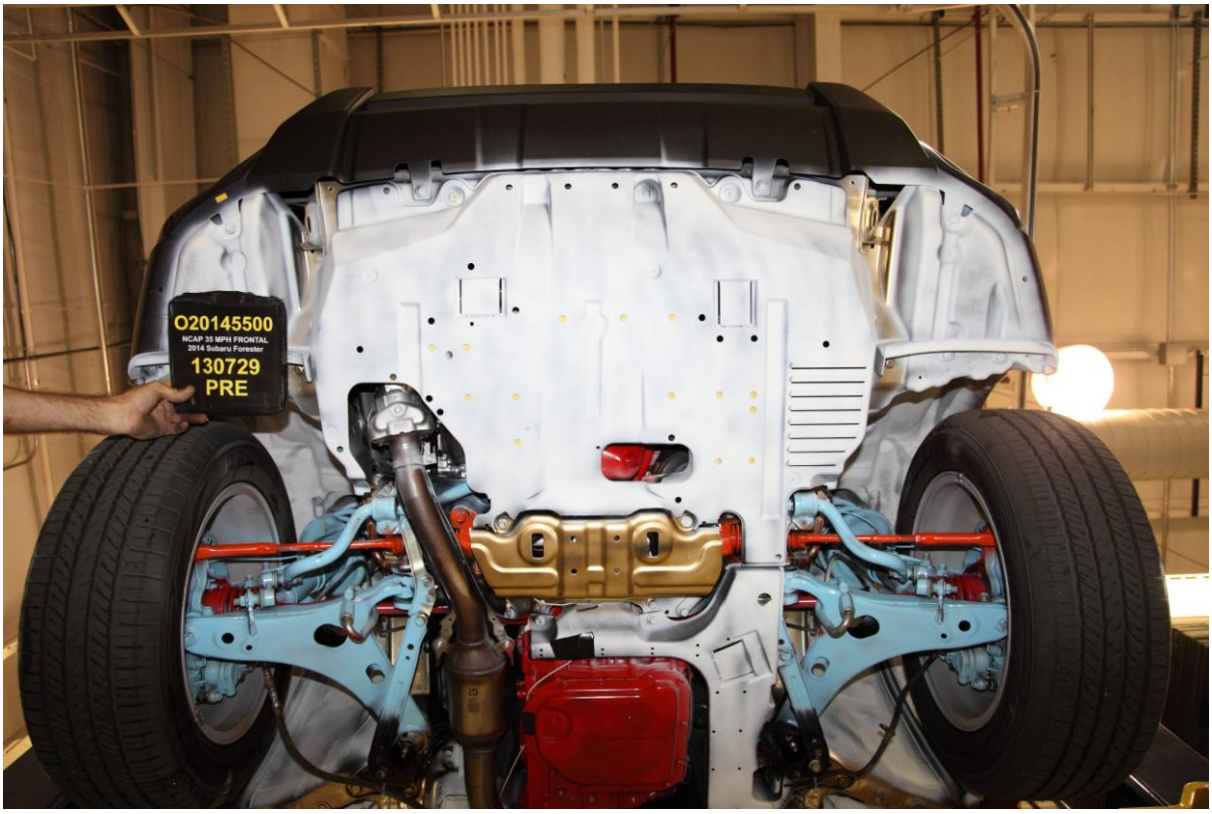
019 Pre-test Engine Compartment View

020 Post-test Engine Compartment View

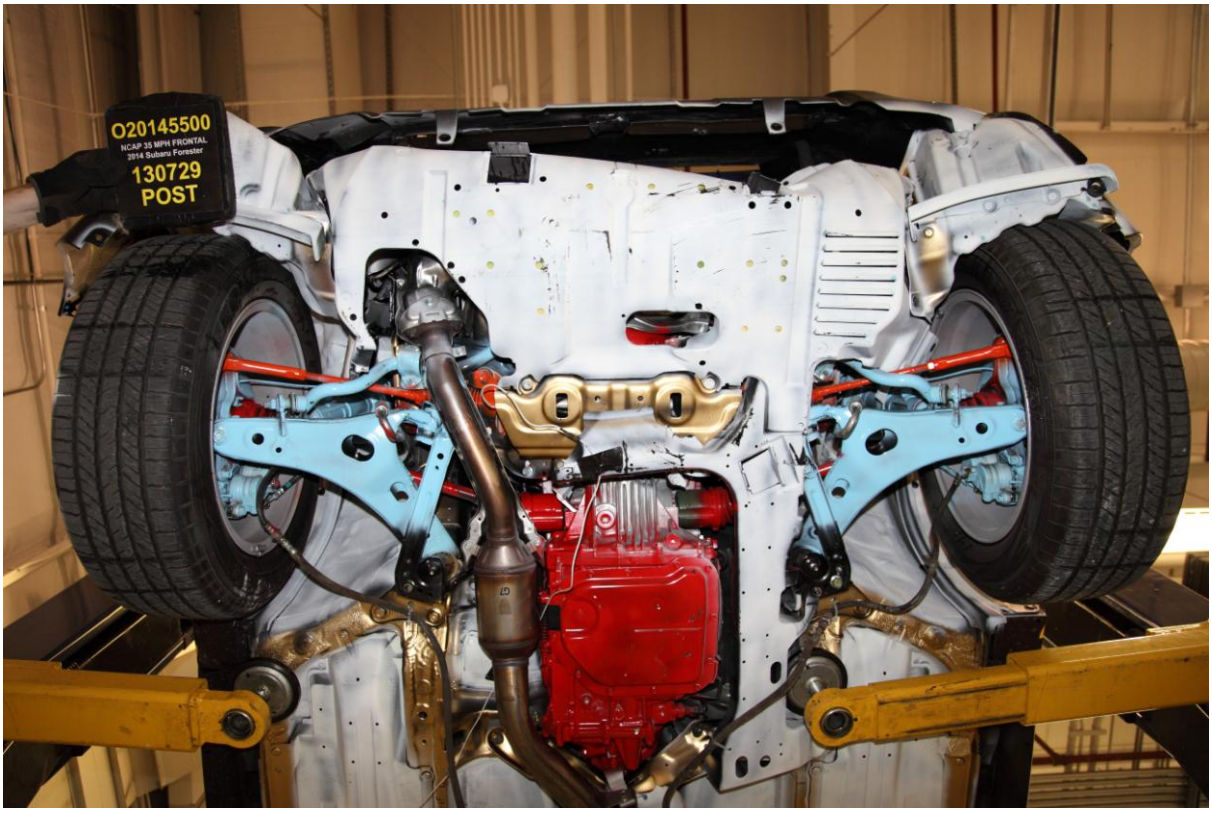
021 Pre-test Fuel Filler Cap View



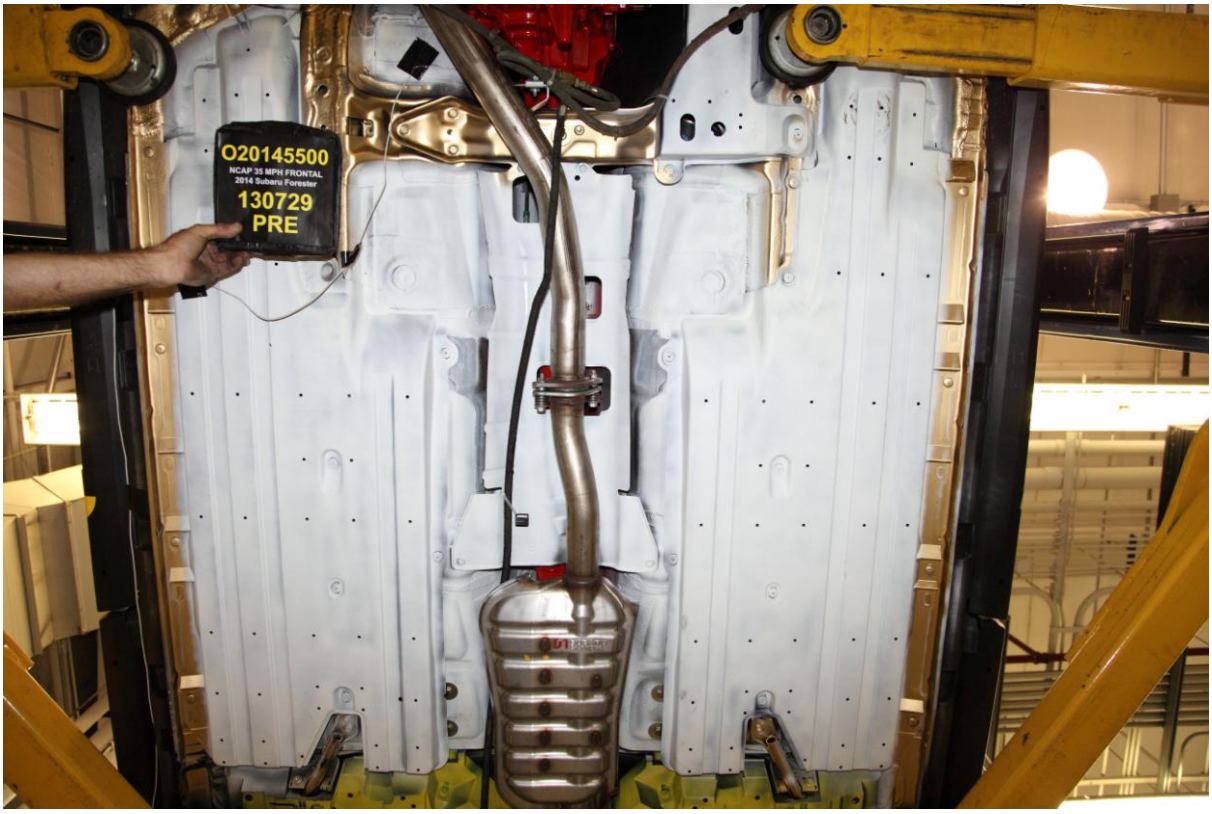
022 Post-test Fuel Filler Cap View



023 Pre-test Front Underbody View

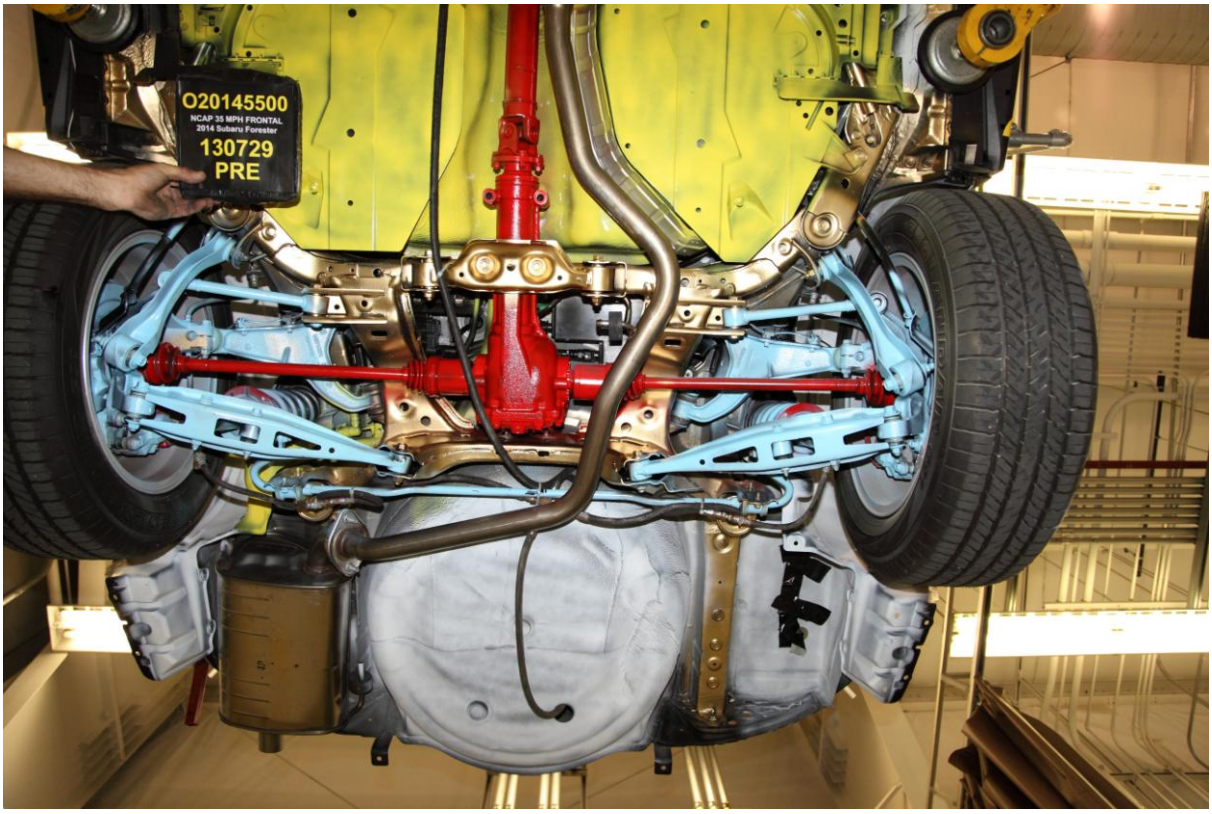


024 Post-test Front Underbody View

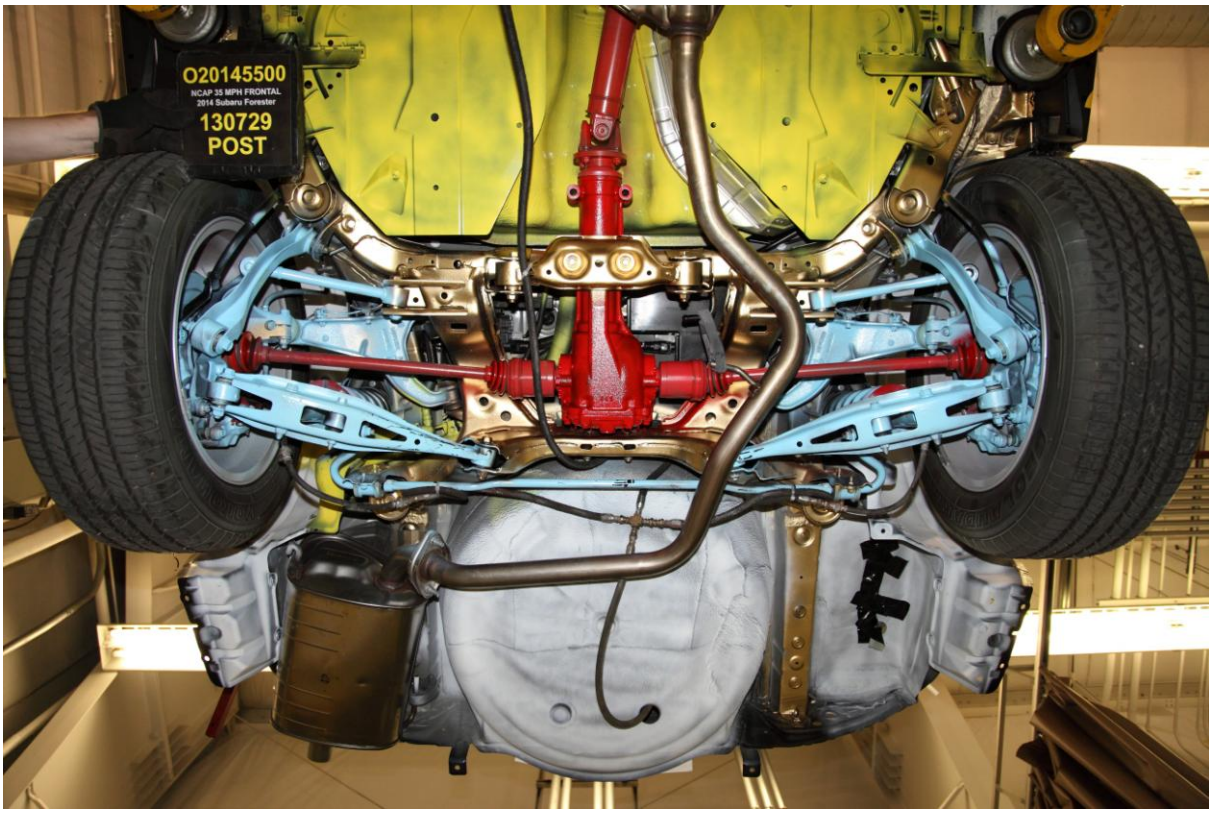


024a Pre Test Mid Underbody View

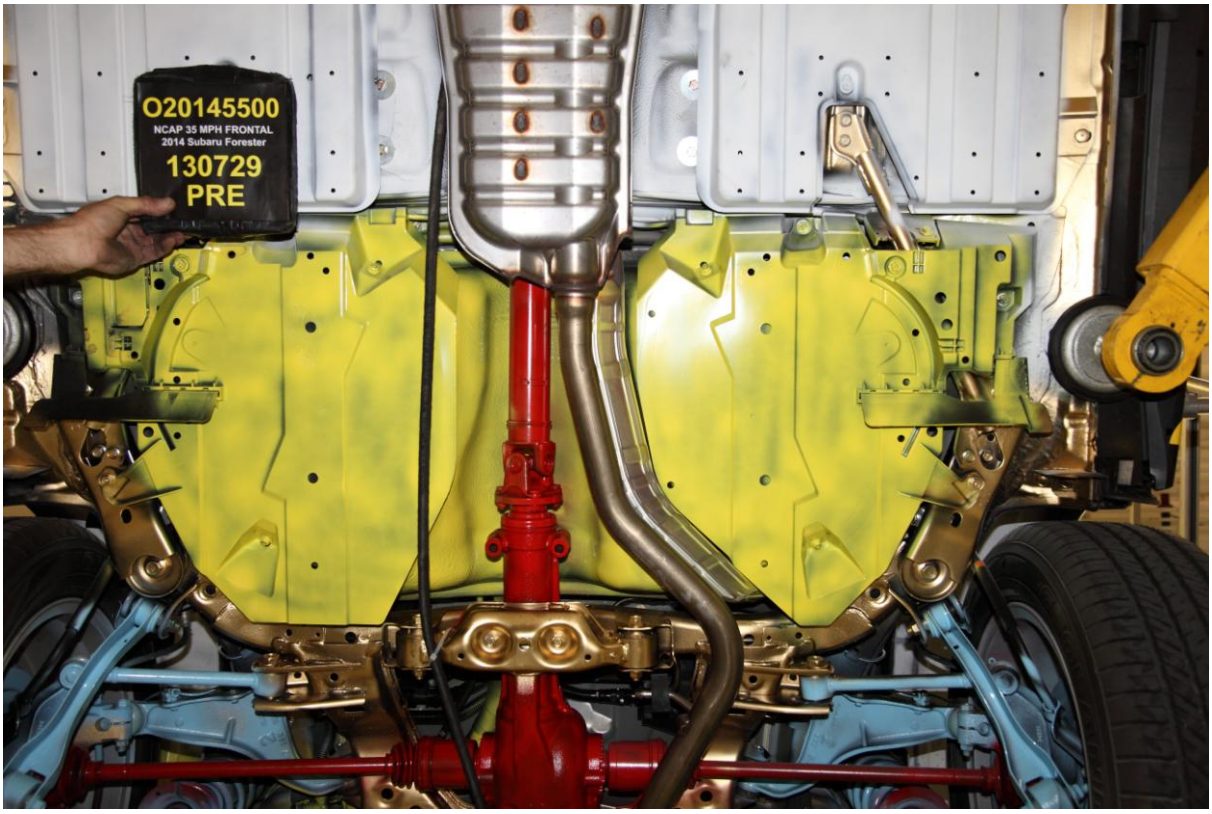
024b Post Test Mid Underbody View



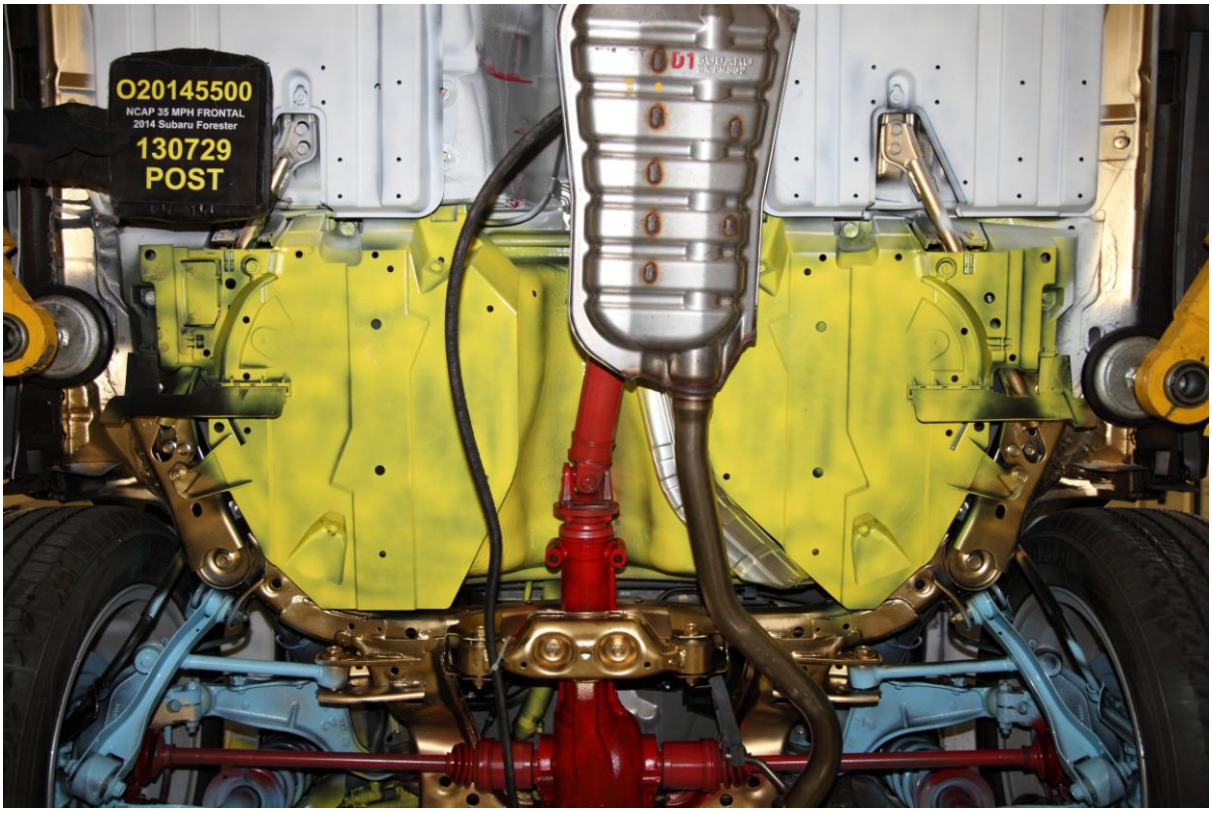
024c Pre Test Mid Rear Underbody View



024d Post Test Mid Rear Underbody View

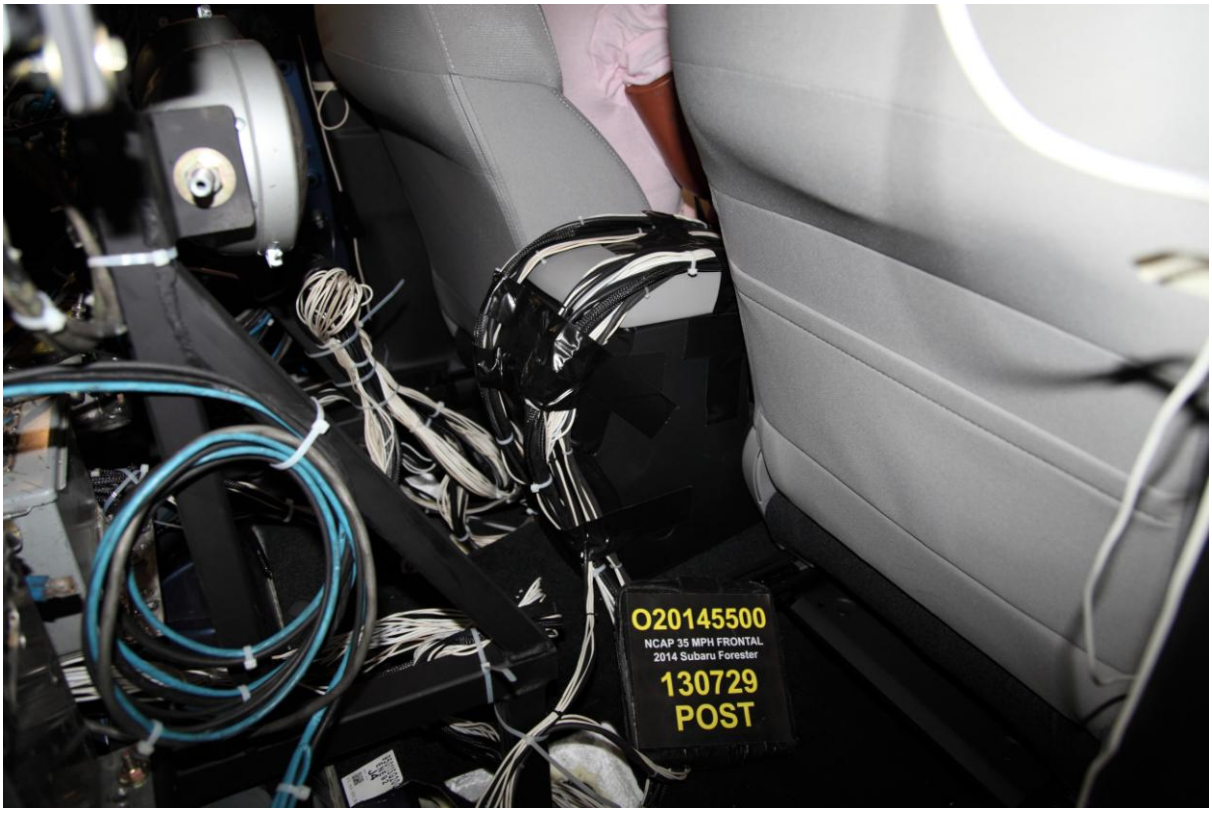


025 Pre-test Rear Underbody View



026 Post-test Rear Underbody View

027 Pre-test Dummy Cable Routing



028 Post-test Dummy Cable Routing

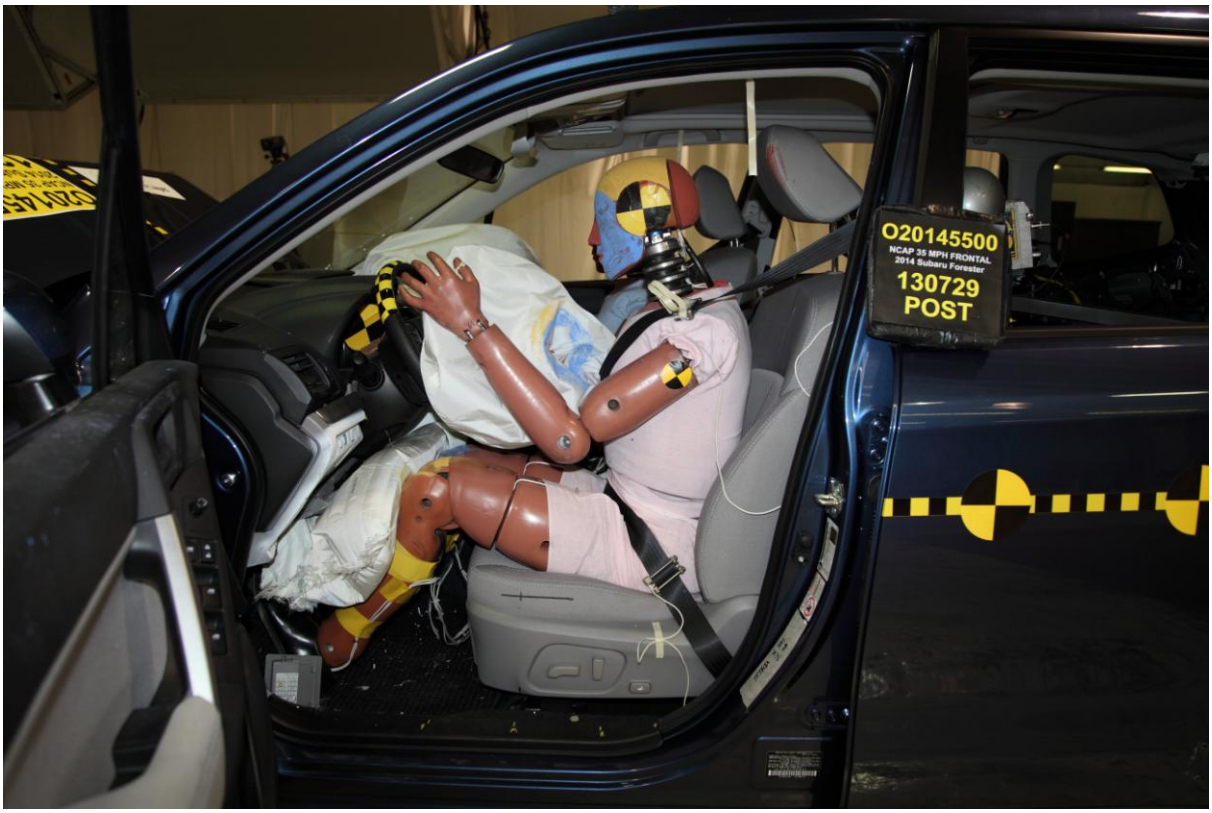
029 Pre-test Driver Dummy Front View

030 Post-test Driver Dummy Front View

031 Pre-test Driver Dummy Window View

032 Post-test Driver Dummy Window View

033 Pre-test Driver Dummy and Vehicle Interior View



034 Post-test Driver Dummy and Vehicle Interior View

035 Pre-test Driver's Seat Fore-Aft Markings

036 Post-test Driver's Seat Fore-Aft Markings

037 Pre-Test View of Belt Anchorage for Driver Dummy

038 Post-Test View of Belt Anchorage for Driver Dummy

039 Pre-test Driver Dummy Feet

040 Post-test Driver Dummy Feet

041 Pre-test Driver's Side Knee Bolster

042 Post-test Driver's Side Knee Bolster

043 Pre-test Driver's Side Floorpan

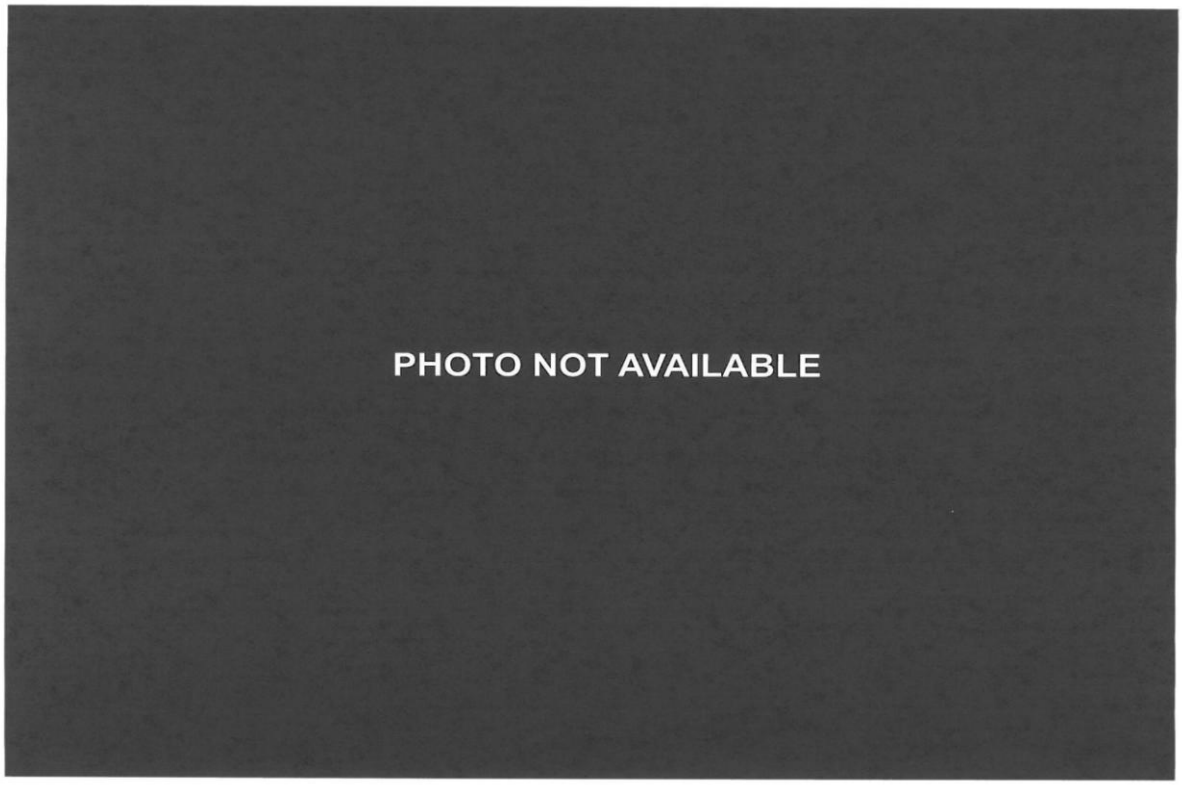
044 Post-test Driver's Side Floorpan

045 Post-Test Driver Dummy Face

046 Post-test Driver Dummy Contact With Airbag

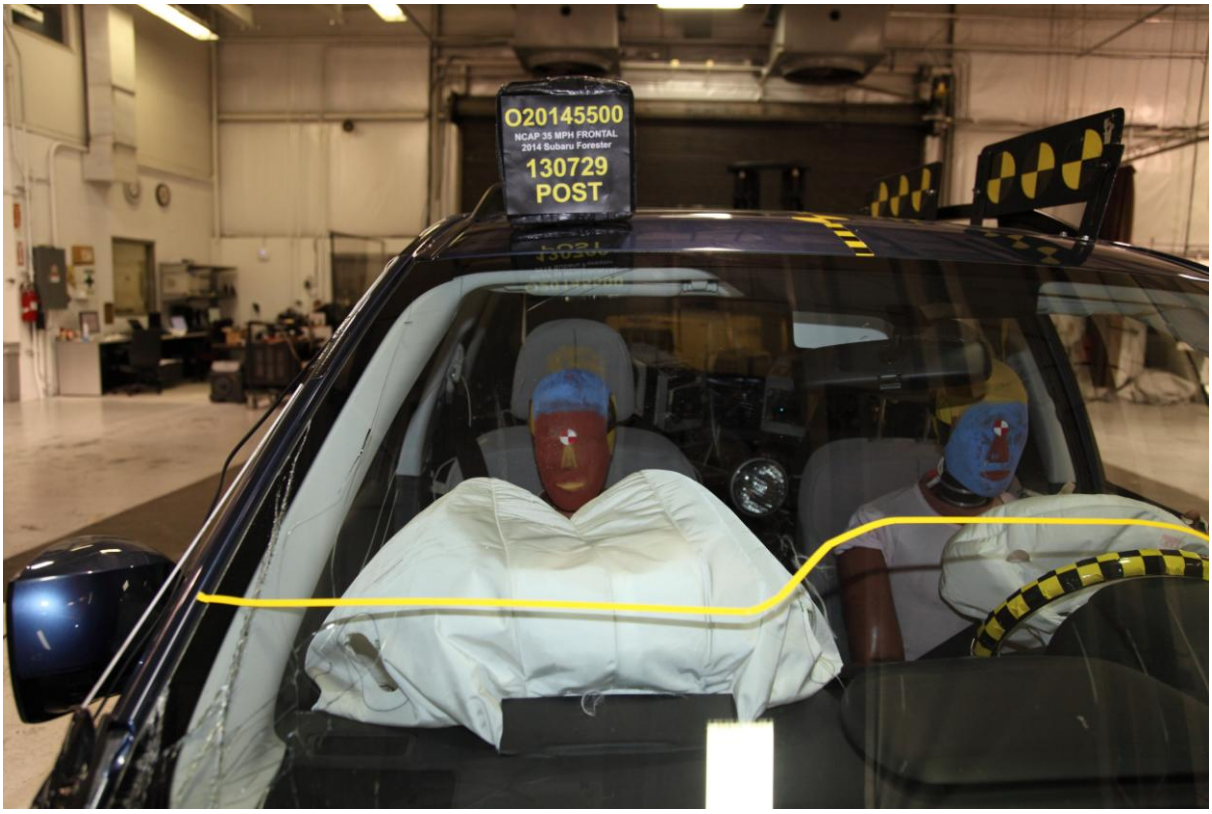
047 Post-test Driver Dummy Contact With Headrest

048 Pre-test View of the Steering Wheel



049 Post-test View of the Steering Wheel

050 Pre-test Passenger Dummy Front View



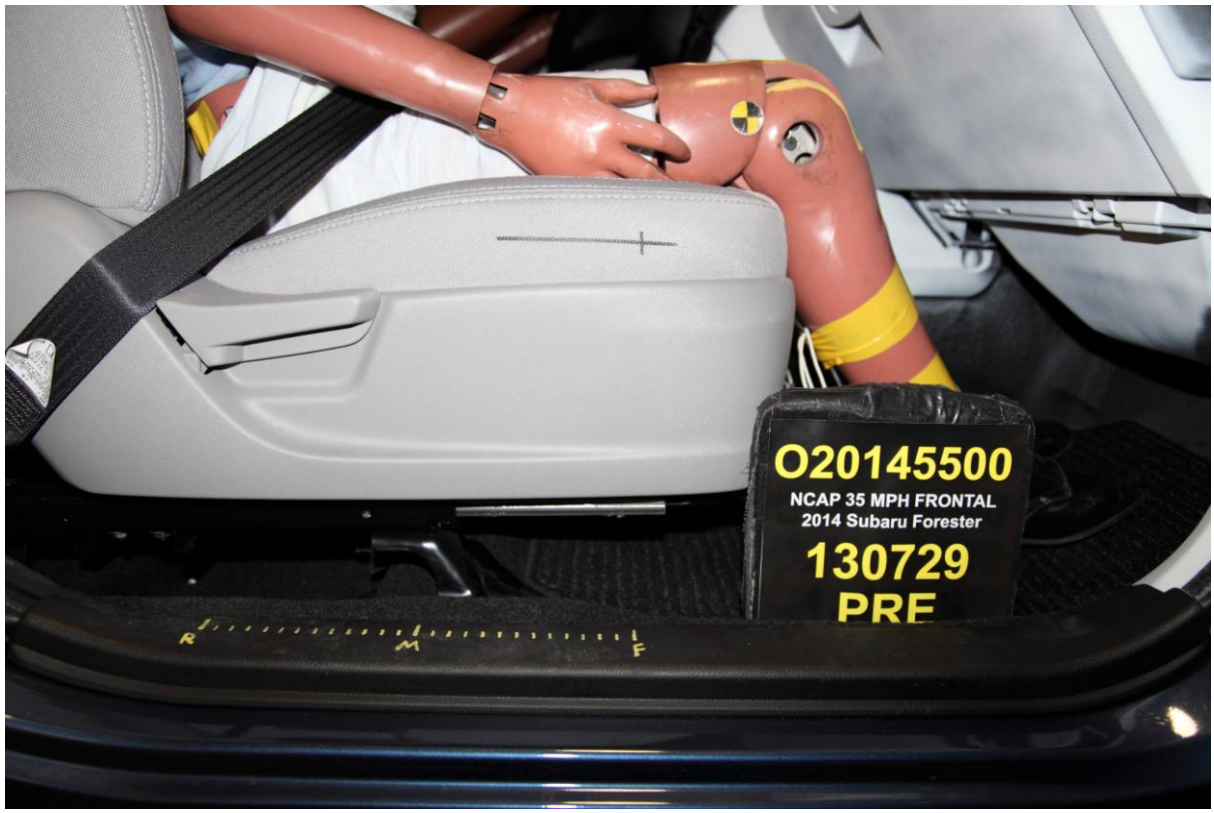
051 Post-test Passenger Dummy Front View

052 Pre-test Passenger Dummy Window View

053 Post-test Passenger Dummy Window View

054 Pre-test Passenger Dummy and Vehicle Interior View

055 Post-test Passenger Dummy and Vehicle Interior View

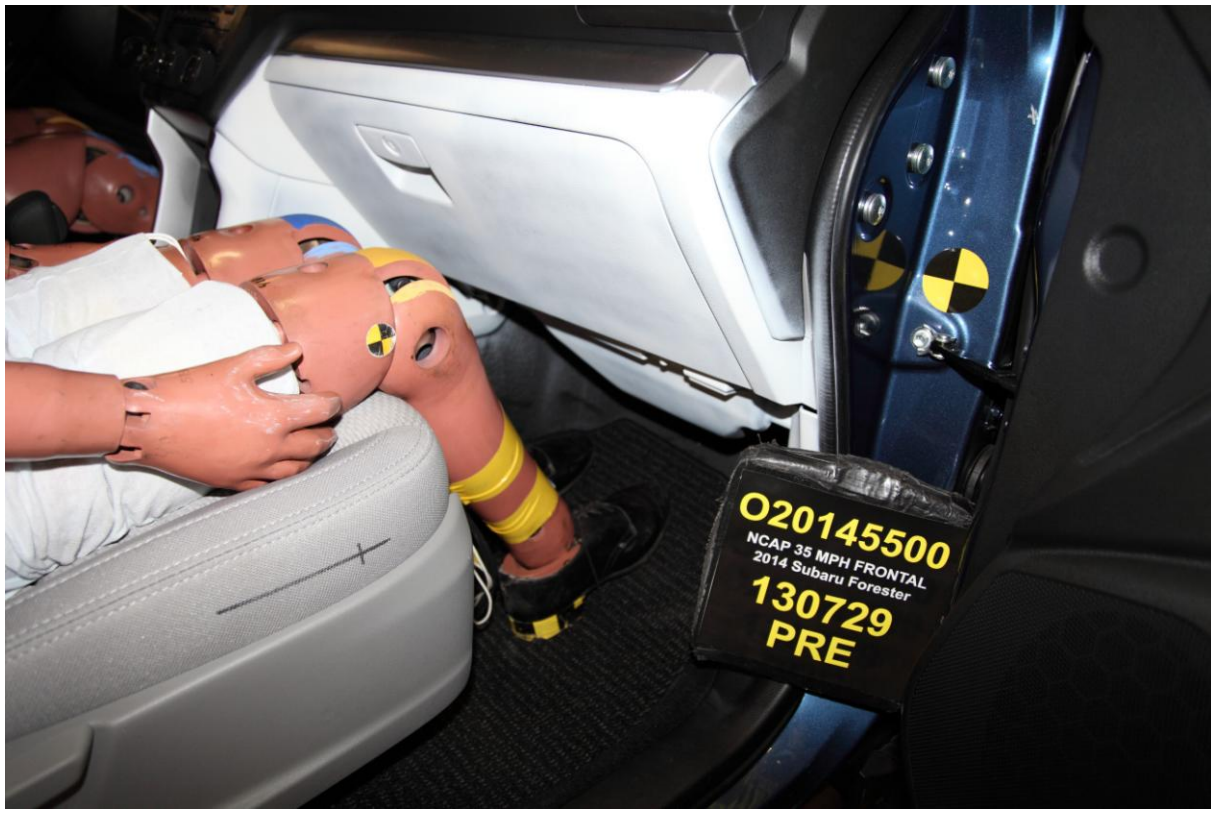


056 Pre-test Passenger's Seat Fore-Aft Markings

057 Post-test Passenger's Seat Fore-Aft Markings

058 Pre-Test View of Belt Anchorage for Passenger Dummy

059 Post-Test View of Belt Anchorage for Passenger Dummy



060 Pre-test Passenger Dummy Feet

061 Post-test Passenger Dummy Feet

062 Pre-test Passenger's Side Knee Bolster

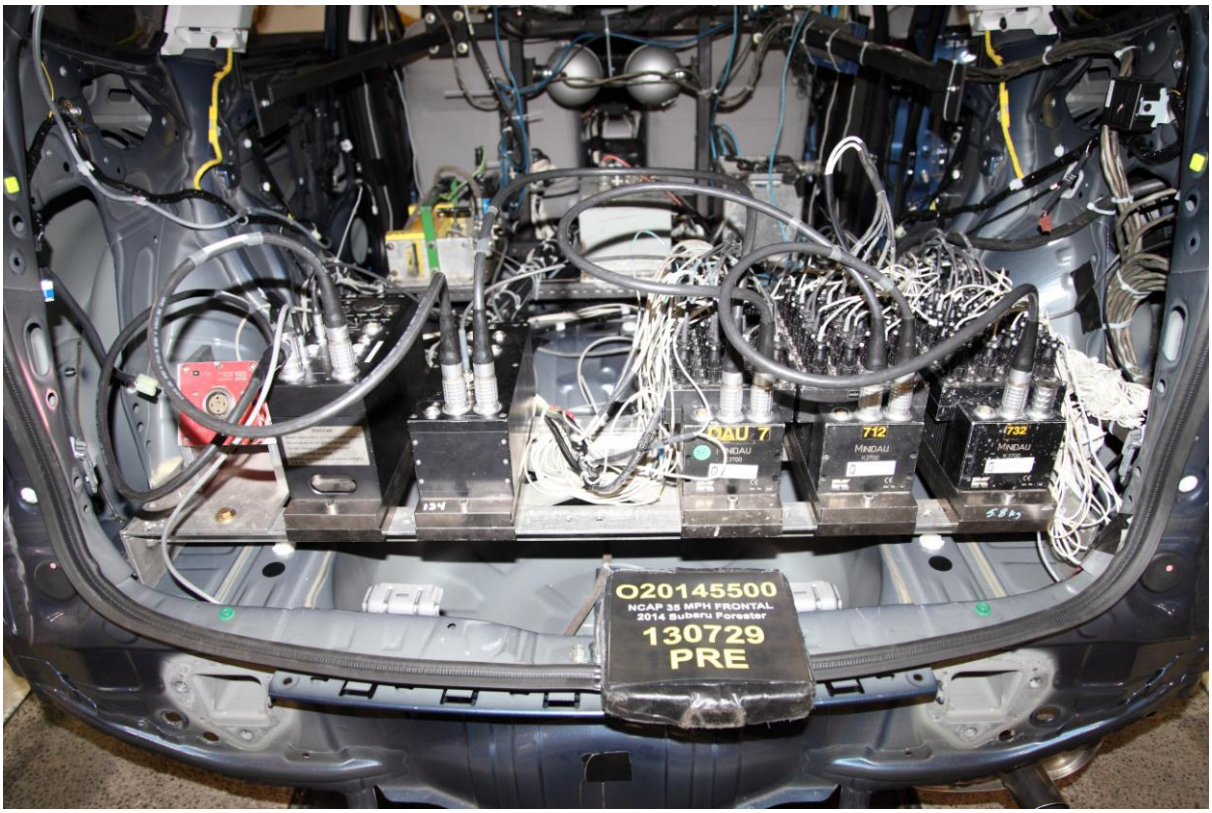
063 Post-test Passenger's Side Knee Bolster

064 Pre-test Passenger's Side Floorpan

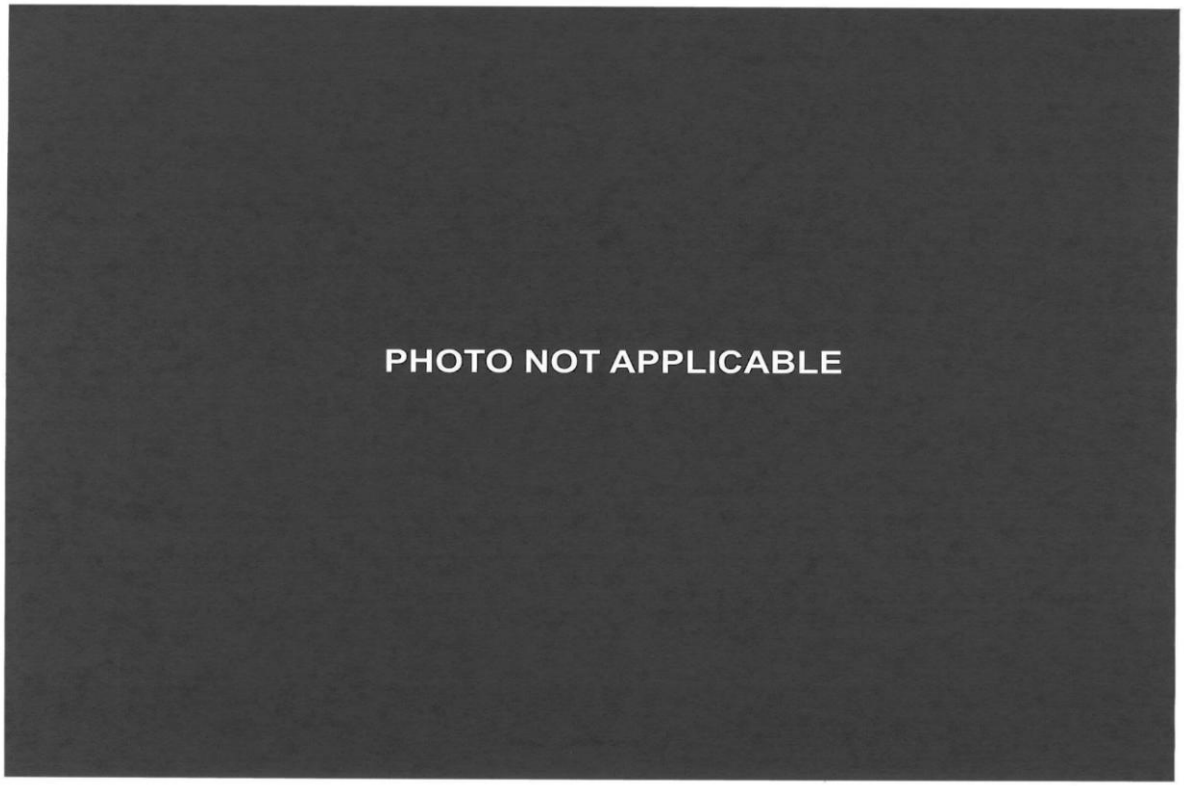
065 Post-test Passenger's Side Floorpan

066 Post-test Passenger Dummy Contact With Headrest

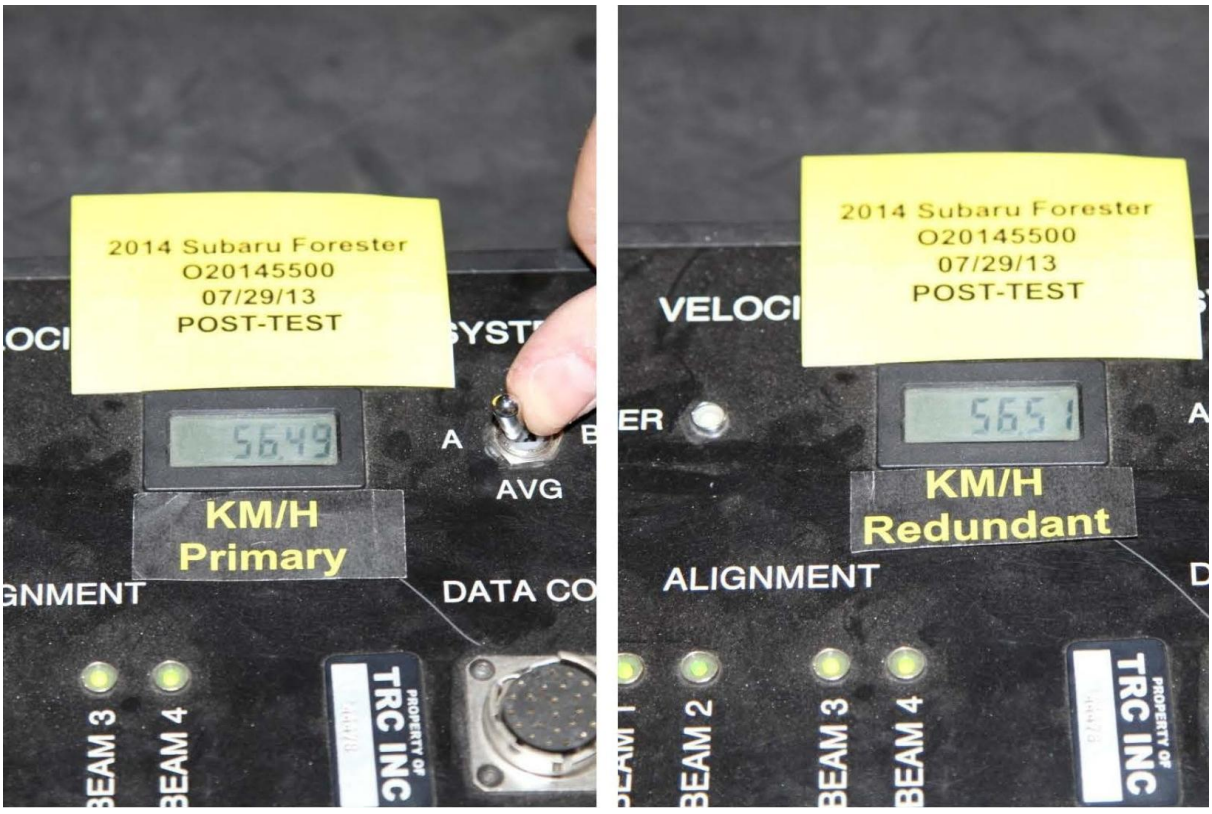
066a Post-test Passenger Dummy Contact With Airbag



067 Photograph of Ballast Installed in Vehicle



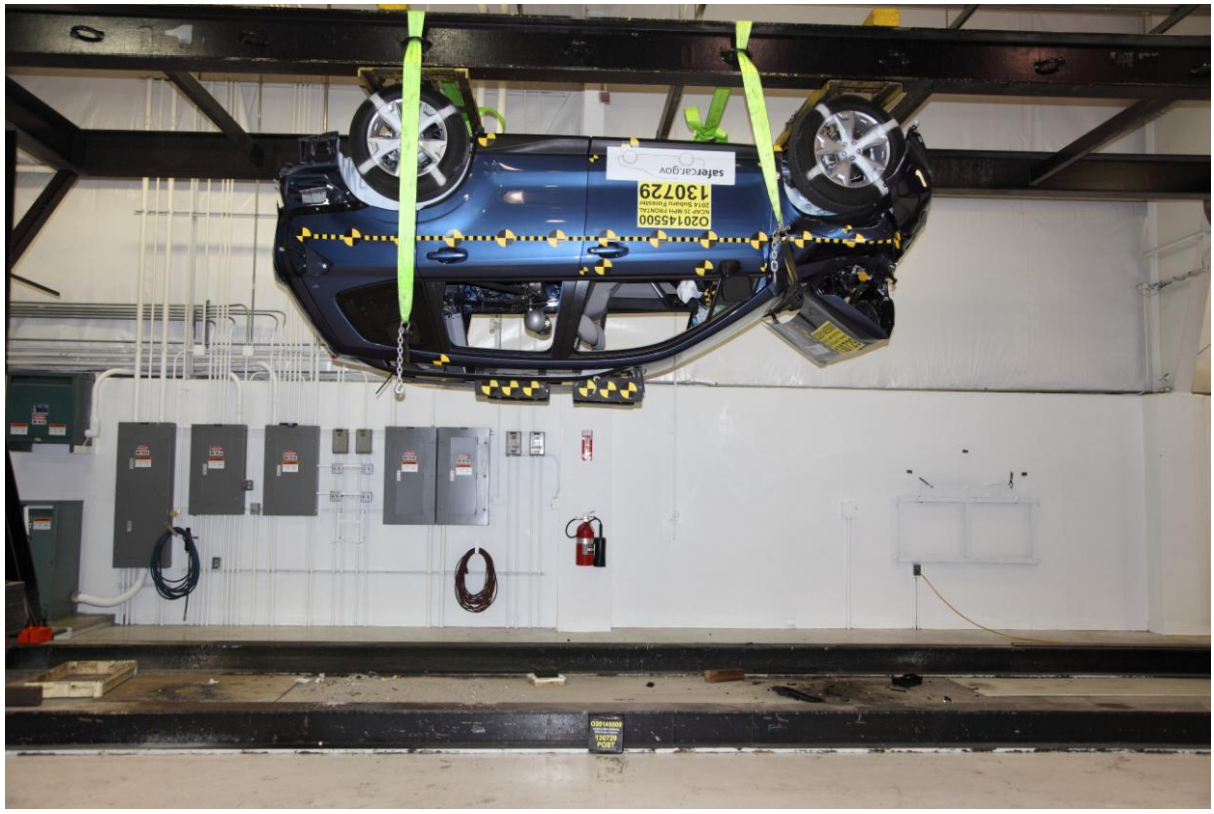
068 Post-test Stoddard Solvent Spillage Location View, if required



069 Post-test Speed Trap Read-out

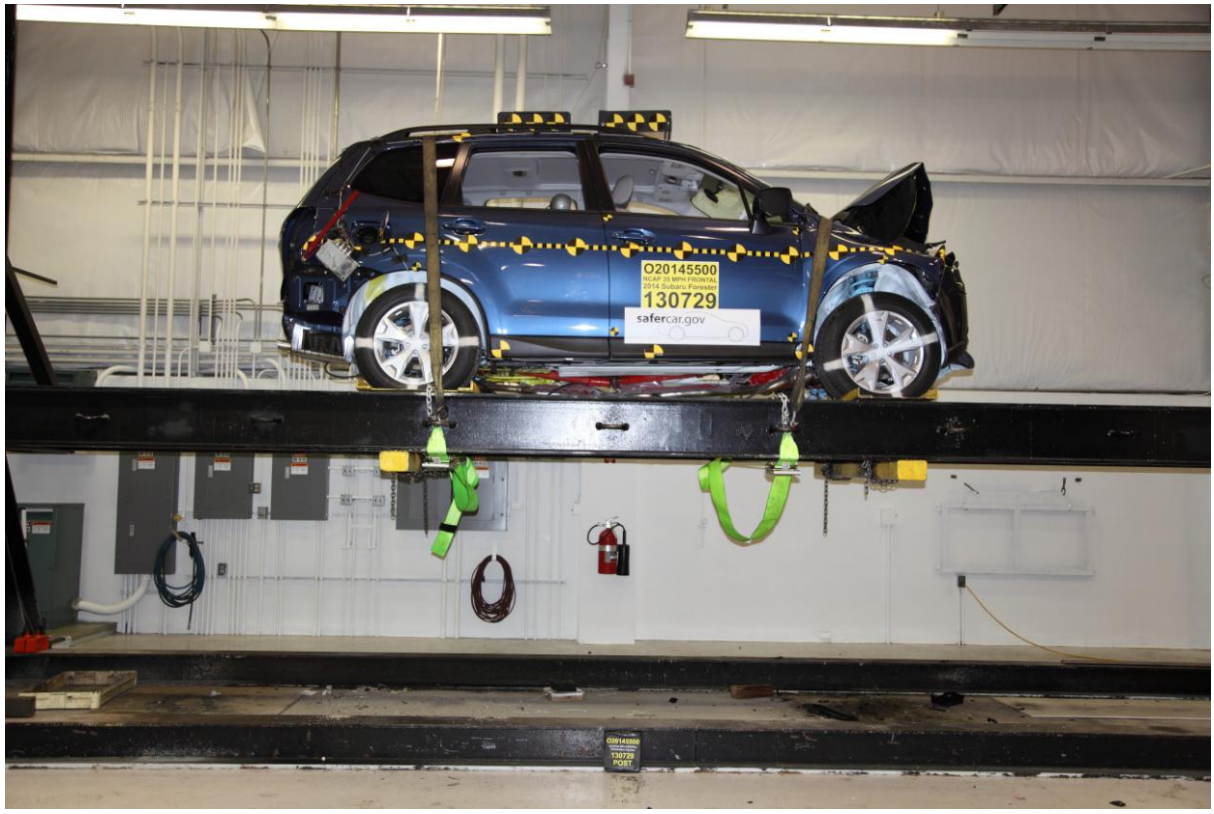
070 Vehicle at 0º on Static Rollover Device

071 Vehicle at 90º on Static Rollover Device

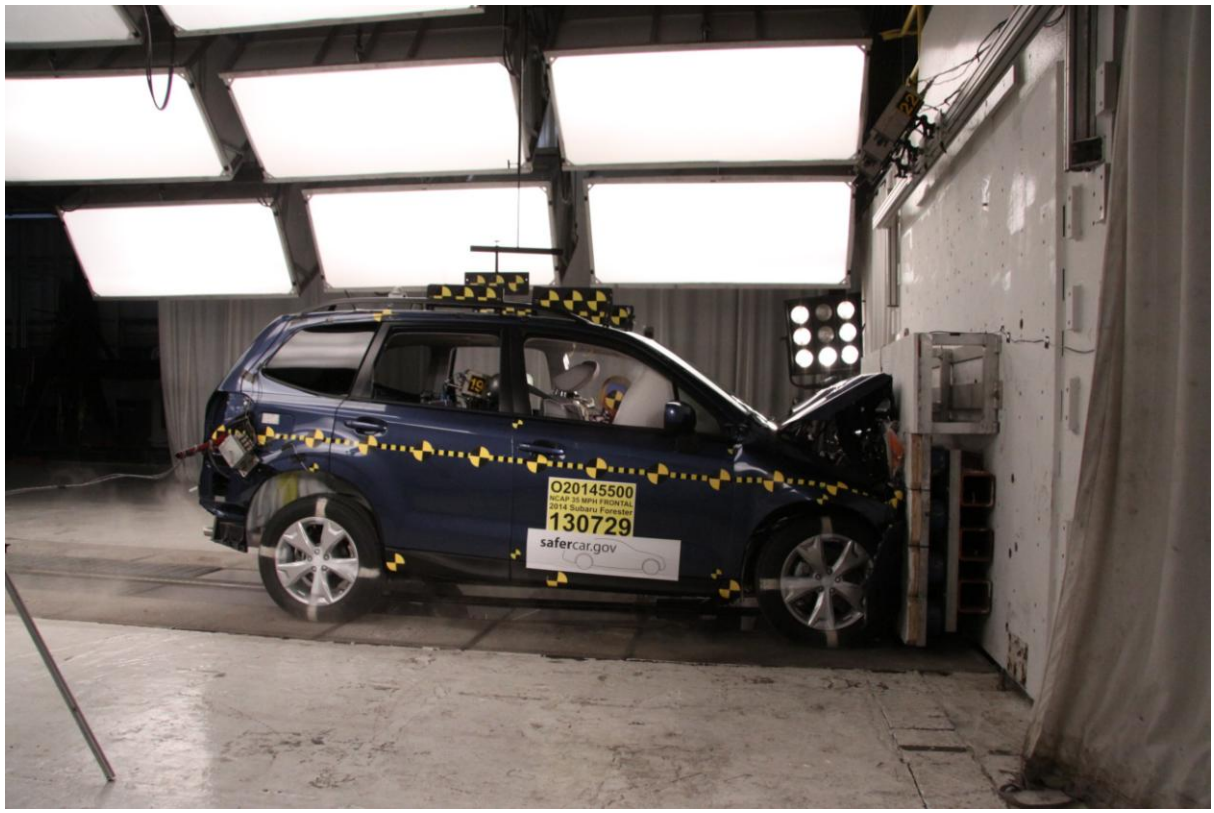


072 Vehicle at 180º on Static Rollover Device

073 Vehicle at 270º on Static Rollover Device



074 Vehicle at 360º on Static Rollover Device



No. 075 2014 Subaru Forester 2.5i Premium MPV Frontal Impact Event

No. 076 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

The following additional dummy and vehicle response data can be found in the R & D section of the NHTSA website at: www.nhtsa.dot.gov.

Driver Head Acceleration X Redundant
Driver Head Acceleration Y Redundant
Driver Head Acceleration Z Redundant
Driver Upper Neck Force Y

Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Shoulder Belt Force
Driver Lap Belt Force
Passenger Head Acceleration X Redundant
Passenger Head Acceleration Y Redundant
Passenger Head Acceleration Z Redundant
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Upper Tibia Moment X

Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
BARRIER LOAD A1
BARRIER LOAD A2
BARRIER LOAD A3
BARRIER LOAD A4
BARRIER LOAD A5
BARRIER LOAD A6
BARRIER LOAD A7
BARRIER LOAD A8
BARRIER LOAD A9
BARRIER LOAD B1
BARRIER LOAD B2
BARRIER LOAD B3
BARRIER LOAD B4
BARRIER LOAD B5

BARRIER LOAD B6
BARRIER LOAD B7
BARRIER LOAD B8
BARRIER LOAD B9
BARRIER LOAD C1
BARRIER LOAD C2
BARRIER LOAD C3
BARRIER LOAD C4
BARRIER LOAD C5
BARRIER LOAD C6
BARRIER LOAD C7
BARRIER LOAD C8
BARRIER LOAD C9
BARRIER LOAD D1
BARRIER LOAD D2
BARRIER LOAD D3
BARRIER LOAD D4
BARRIER LOAD D5
BARRIER LOAD D6
BARRIER LOAD D7
BARRIER LOAD D8
BARRIER LOAD D9

NHTSA

Test Date: 07/29/2013

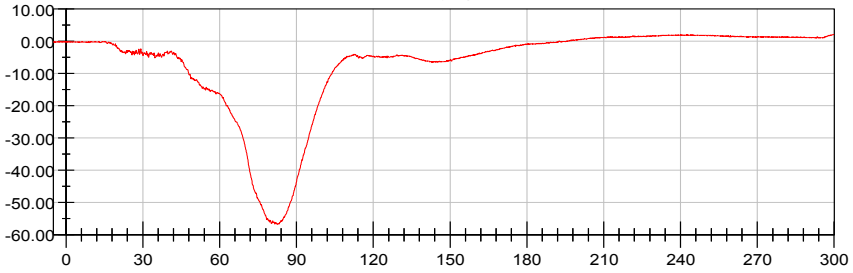
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

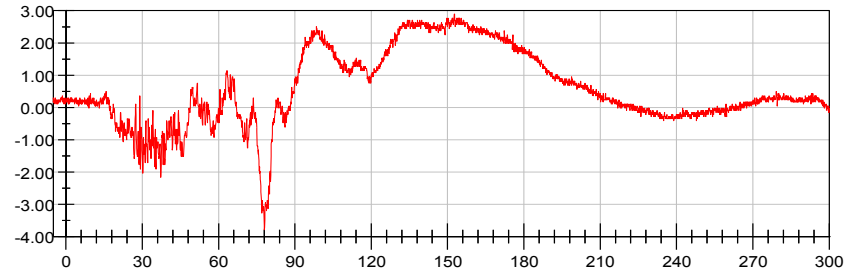
2.13 g at 242.40 ms

<Min>

-56.70 g at 82.56 ms

CFC_1000

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



<Max>

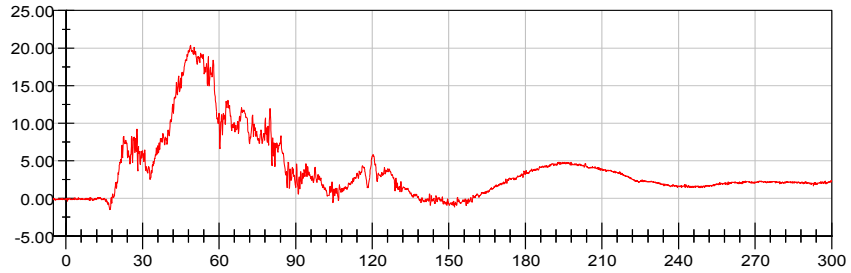
2.90 g at 152.64 ms

<Min>

-3.79 g at 78.00 ms

CFC_1000

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



<Max>

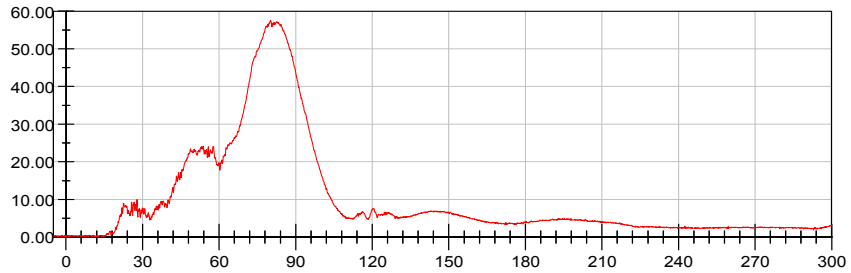
20.36 g at 48.80 ms

<Min>

-1.50 g at 17.20 ms

CFC_1000

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



<Max>

57.54 g at 80.16 ms

<Min>

0.15 g at 11.60 ms

CFC_1000

NHTSA

Test Date: 07/29/2013

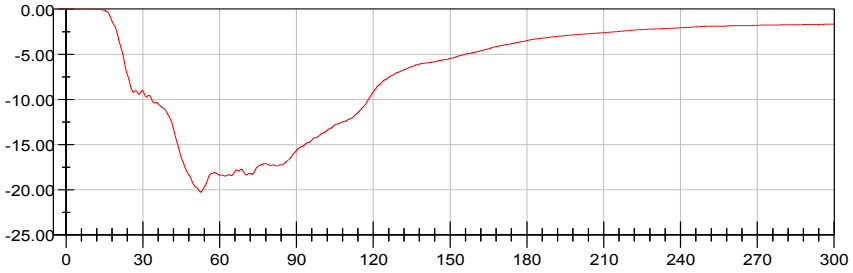
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Driver Chest X Deflection vs. Time (mm) vs. Time [ms]



<Max>

0.00 mm at -4.96 ms

<Min>

-20.27 mm at 52.56 ms

CFC_600

NHTSA

Test Date: 07/29/2013

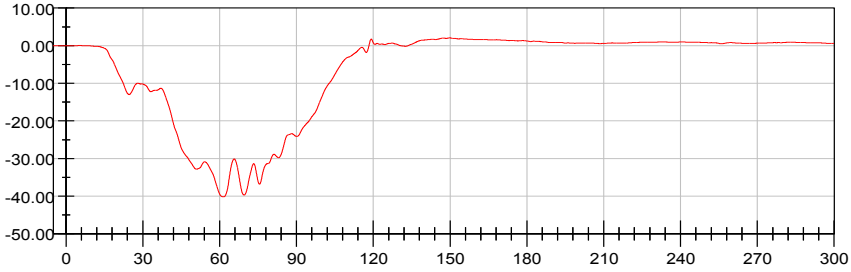
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

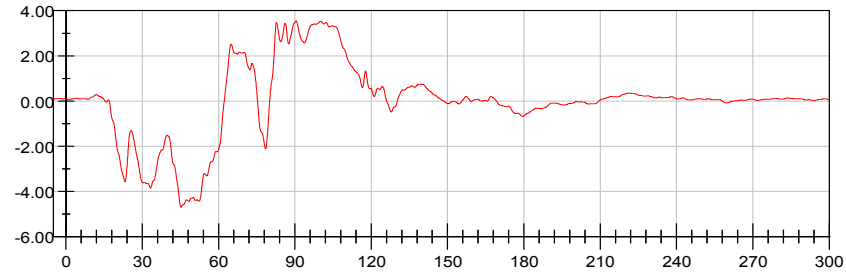
2.07 g at 149.84 ms

<Min>

-40.17 g at 61.44 ms

CFC_180

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



<Max>

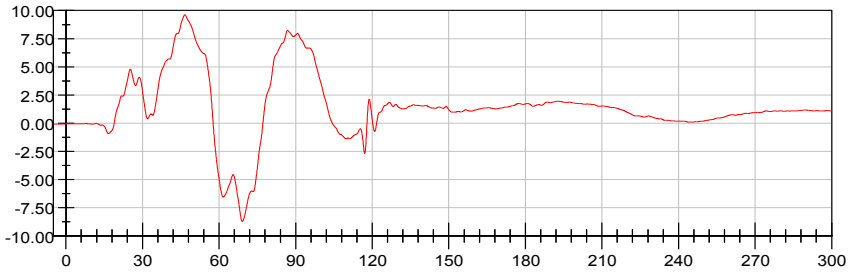
3.54 g at 90.48 ms

<Min>

-4.71 g at 45.20 ms

CFC_180

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



<Max>

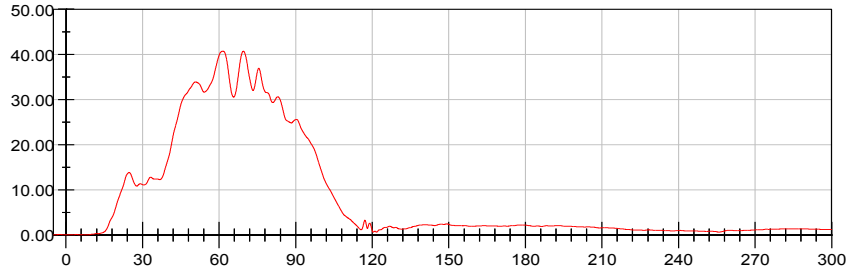
9.62 g at 46.56 ms

<Min>

-8.72 g at 69.12 ms

CFC_180

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



<Max>

40.71 g at 61.44 ms

<Min>

0.09 g at 1.36 ms

CFC_180

NHTSA

Test Date: 07/29/2013

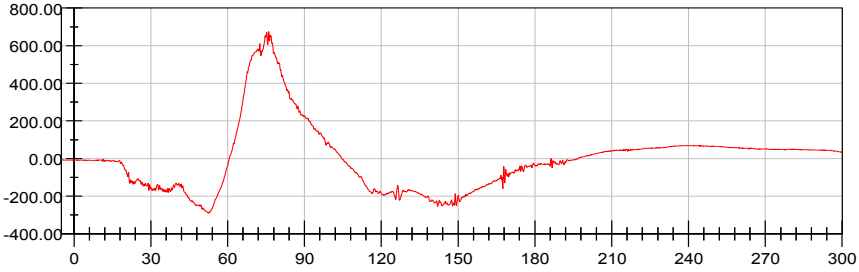
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Driver Upper Neck Force X vs. Time (N) vs. Time [ms]



<Max>

674.92 N at 76.00 ms

<Min>

-290.68 N at 52.48 ms

CFC_1000

Driver Upper Neck Force Z vs. Time (N) vs. Time [ms]

<Max>

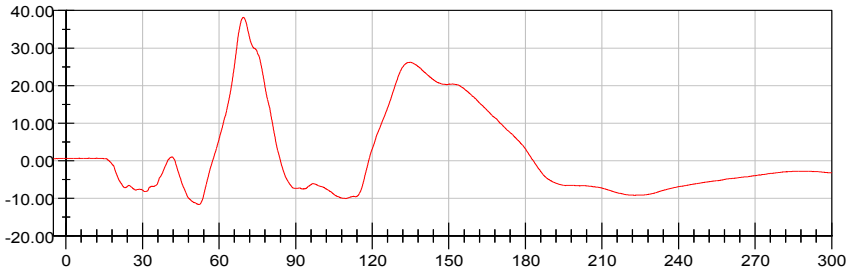
935.02 N at 53.44 ms

<Min>

-64.10 N at 17.44 ms

CFC_1000

Driver Upper Neck Moment Y vs. Time (Nm) vs. Time [ms]



<Max>

38.14 Nm at 69.52 ms

<Min>

-11.62 Nm at 52.24 ms

CFC_600

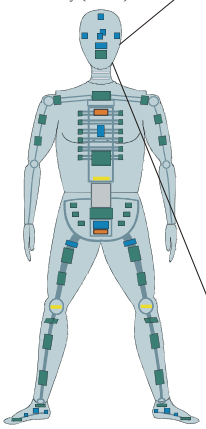
Date: 07/29/2013
Time: 17:53

Neck Injury Predictor (NIJ)

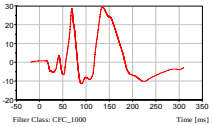
Customer: NHTSA
Test Number: O20145500

TRC Inc. Test Lab: CTF
Test Number: 130729

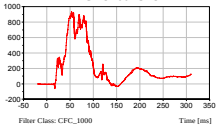
Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310



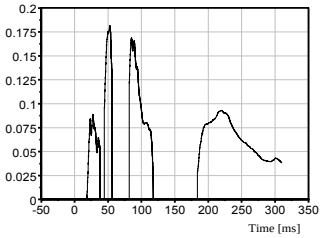
11TMONUP00H3MOYX



11NECKUP00H3FOZA

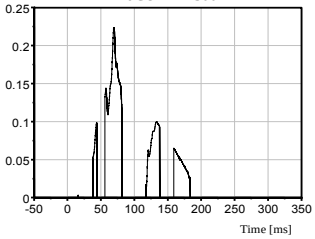


11NIJCUPTEH300YX



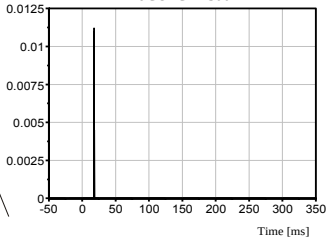
Max [NTE] 0.1817 at 52.48 ms

11NIJCUPTFH300YX



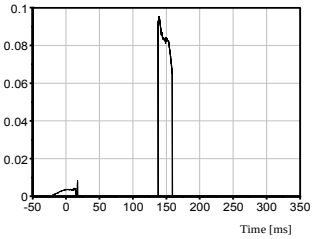
Max [NTF] 0.2238 at 69.44 ms

11NIJCUPCEH300YX



Max [NCE] 0.0112 at 17.52 ms

11NIJCUPCFH300YX



Max [NCF] 0.0954 at 138.96 ms

Dummy:HIII 50th Male
Seating Position:
Driver

NIJ Source Code: (Fz/Fzc)+(My/Myc)

NHTSA

Test Date: 07/29/2013

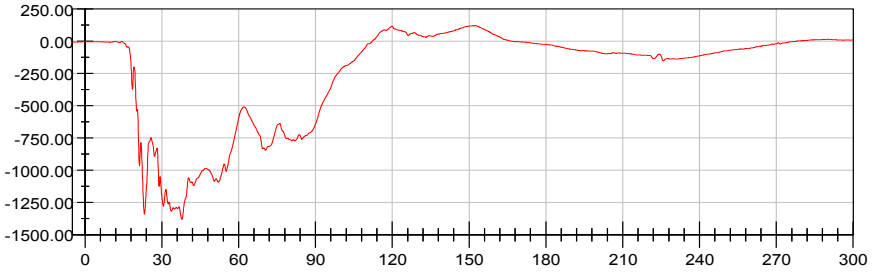
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Driver Left Femur Force vs. Time (N) vs. Time [ms]



<Max>

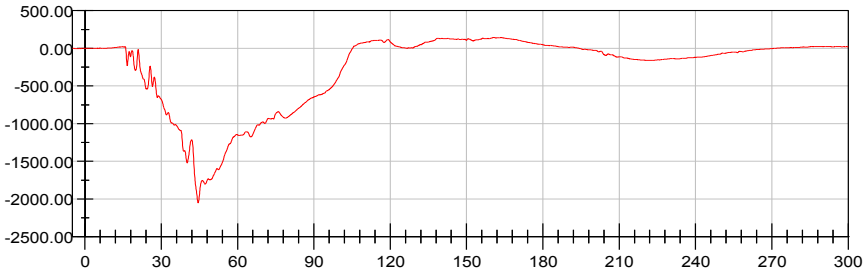
121.35 N at 152.24 ms

<Min>

-1,380.26 N at 37.84 ms

CFC_600

Driver Right Femur Force vs. Time (N) vs. Time [ms]



<Max>

144.35 N at 160.72 ms

<Min>

-2,053.22 N at 44.48 ms

CFC_600

NHTSA

Test Date: 07/29/2013

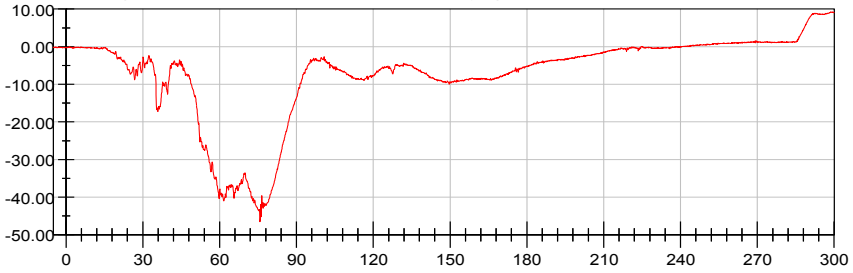
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

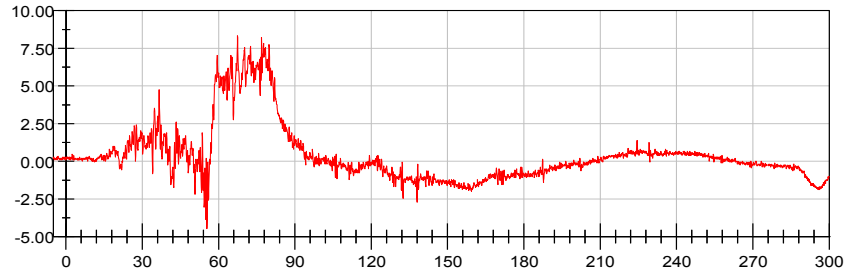
9.23 g at 298.64 ms

<Min>

-46.54 g at 75.76 ms

CFC_1000

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



<Max>

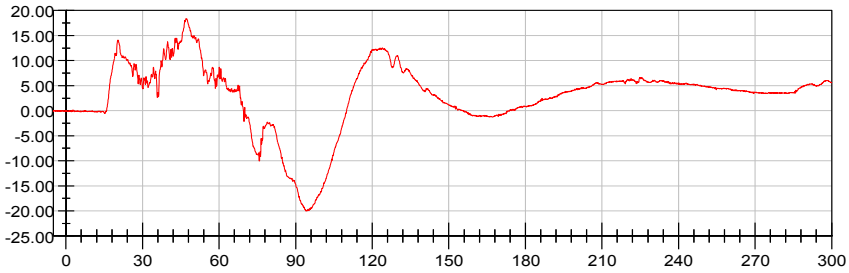
8.34 g at 67.44 ms

<Min>

-4.49 g at 55.44 ms

CFC_1000

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



<Max>

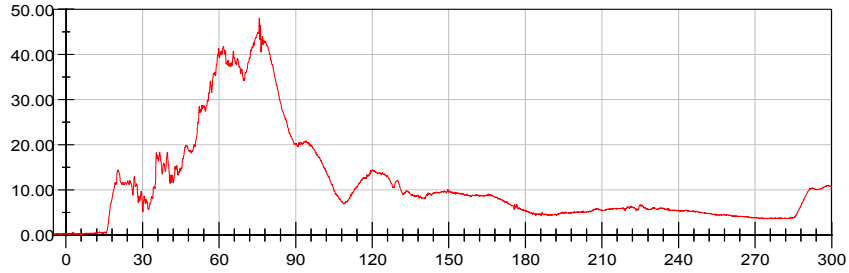
18.38 g at 46.96 ms

<Min>

-20.05 g at 94.08 ms

CFC_1000

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



<Max>

48.00 g at 75.76 ms

<Min>

0.16 g at 2.80 ms

CFC_1000

NHTSA

Test Date: 07/29/2013

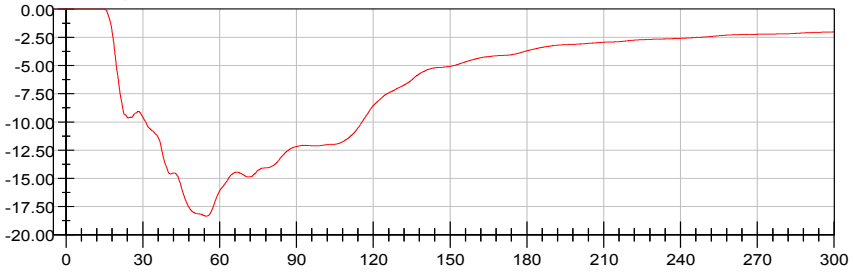
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Passenger Chest X Deflection vs. Time (mm) vs. Time [ms]



<Max>

0.00 mm at -3.20 ms

<Min>

-18.34 mm at 54.64 ms

CFC_600

NHTSA

Test Date: 07/29/2013

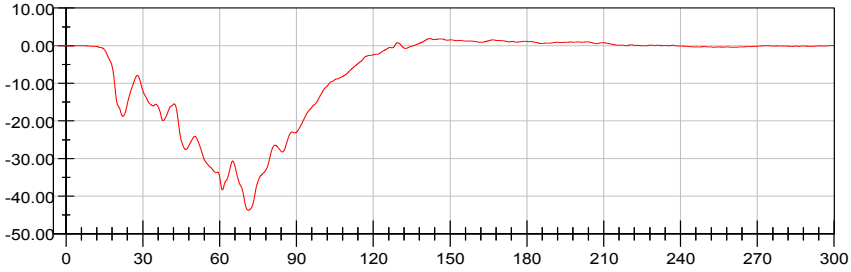
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

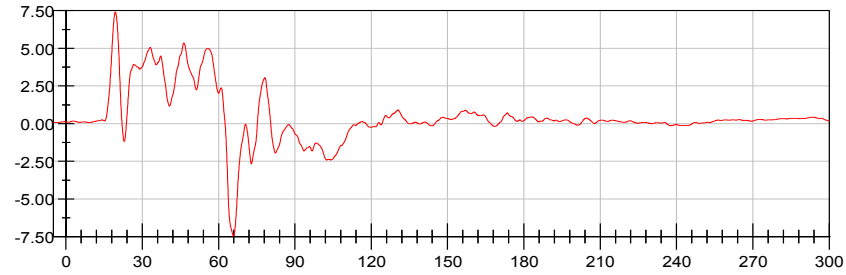
1.89 g at 142.08 ms

<Min>

-43.76 g at 71.20 ms

CFC_180

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



<Max>

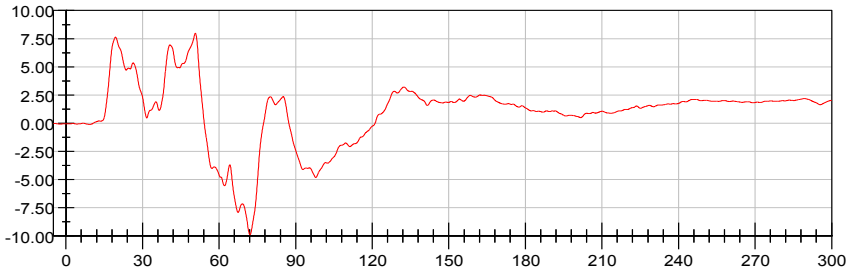
7.41 g at 19.44 ms

<Min>

-7.48 g at 65.84 ms

CFC_180

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



<Max>

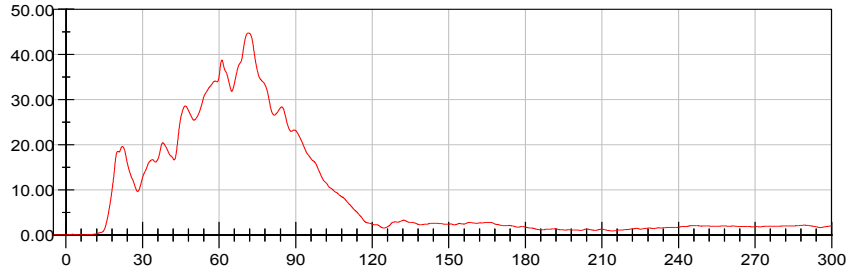
7.98 g at 50.72 ms

<Min>

-9.88 g at 72.16 ms

CFC_180

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



<Max>

44.73 g at 71.52 ms

<Min>

0.08 g at -4.32 ms

CFC_180

NHTSA

Test Date: 07/29/2013

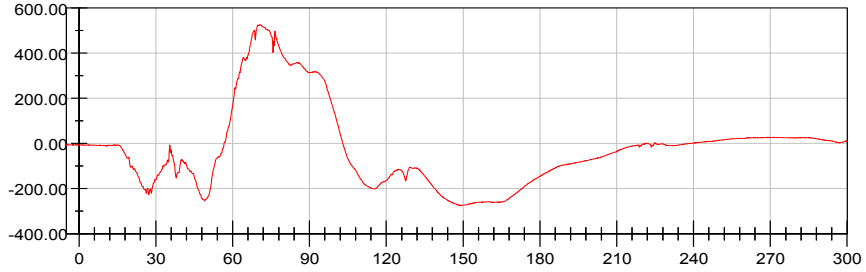
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Passenger Upper Neck Force X vs. Time (N) vs. Time [ms]



<Max>

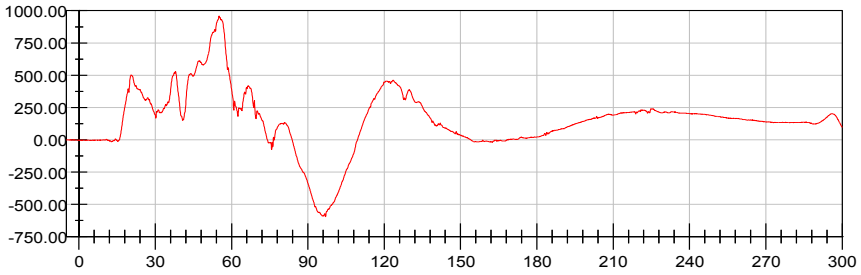
526.42 N at 70.64 ms

<Min>

-276.48 N at 148.80 ms

CFC_1000

Passenger Upper Neck Force Z vs. Time (N) vs. Time [ms]



<Max>

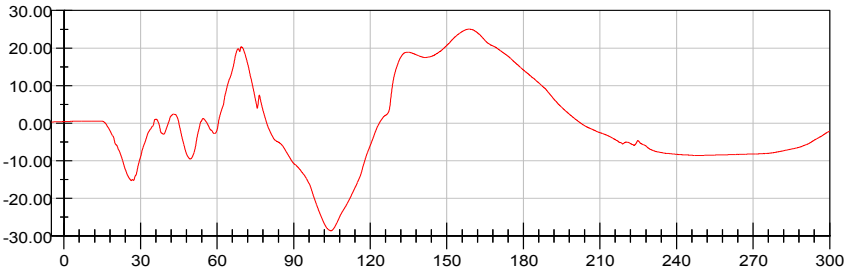
958.02 N at 55.04 ms

<Min>

-596.22 N at 96.96 ms

CFC_1000

Passenger Upper Neck Moment Y vs. Time (Nm) vs. Time [ms]



<Max>

25.06 Nm at 158.72 ms

<Min>

-28.67 Nm at 104.64 ms

CFC_600

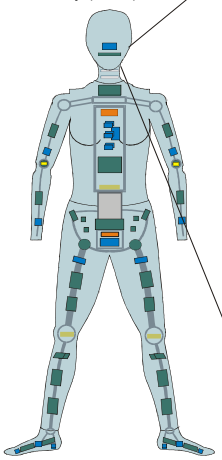
Date: 07/29/2013
Time: 17:53

Neck Injury Predictor (NIJ)

Customer: NHTSA
Test Number: O20145500

TRC Inc. Test Lab: CTF
Test Number: 130729

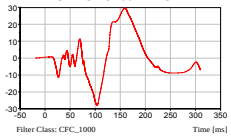
Test Orientation = Frontal
Fzc(Tension) = 4287
Fzc(Compression) = 3880
Myc(Extension) = 67
Myc(Flexion) = 155



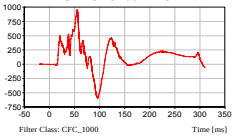
Dummy:HIII 5th Female
Seating Position:
Right Front Passenger

NIJ Source Code: (Fz/Fzc)+(My/Myc)

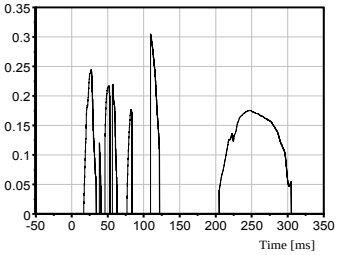
13TMONUP00HFMOYX



13NECKUP00HFFOZA

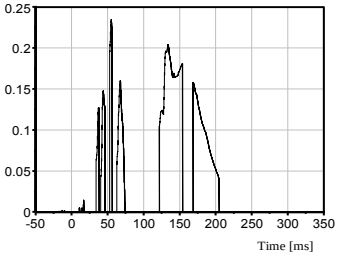


13NIJCUPTEHF00YX



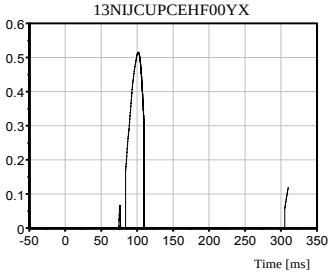
Max [NTE] 0.3049 at 109.52 ms

13NIJCUPTFHF00YX



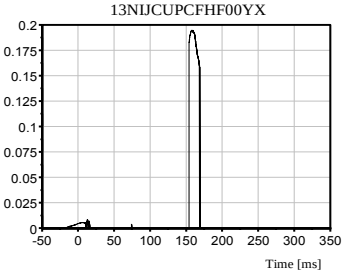
Max [NTF] 0.2348 at 55.04 ms

13NIJCUPCEHF00YX



Max [NCE] 0.5163 at 101.44 ms

13NIJCUPCFHF00YX



Max [NCF] 0.1946 at 158.24 ms

NHTSA

Test Date: 07/29/2013

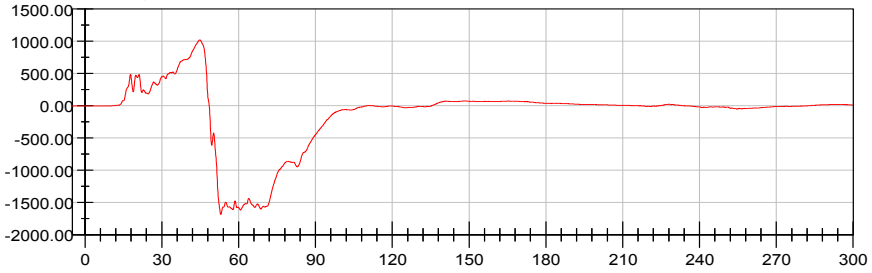
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (37)

Test Number: 130729 (O20145500)

Position #2 Hybrid III Small Adult Female (426)

Passenger Left Femur Force vs. Time (N) vs. Time [ms]



<Max>

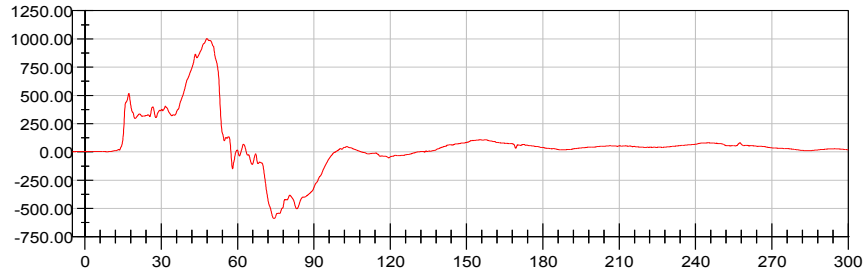
1,020.99 N at 44.80 ms

<Min>

-1,685.03 N at 53.04 ms

CFC_600

Passenger Right Femur Force vs. Time (N) vs. Time [ms]



<Max>

1,001.79 N at 48.00 ms

<Min>

-590.55 N at 74.32 ms

CFC_600

APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION

Pre-Test Calibration Sheets
Driver S/N 037

Transportation Research Center Inc.

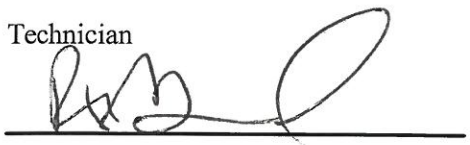
Front Head Drop
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	259.8 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	7.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

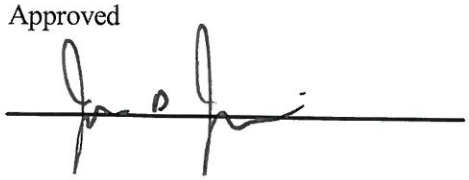
Test meets specifications.

Comments:

Technician



Approved



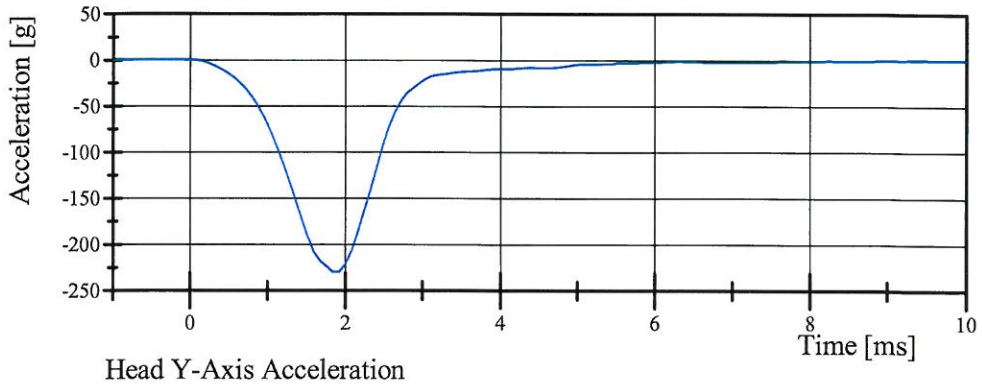
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.18.2013 11:33:01 614

Transportation Research Center Inc.

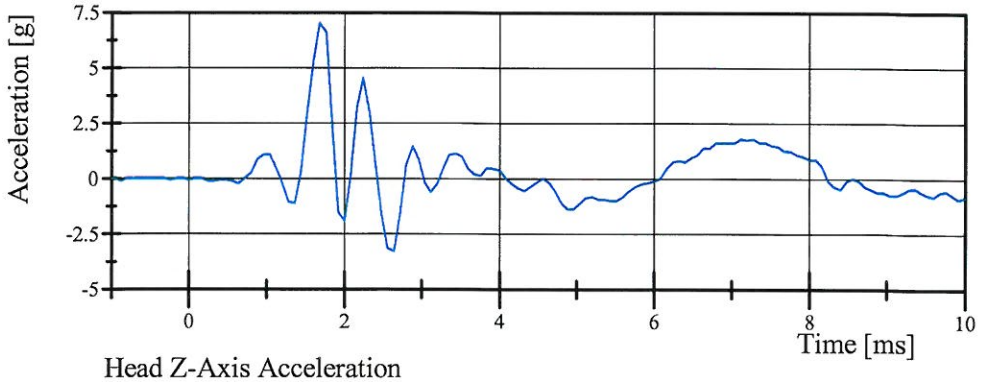
Front Head Drop
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Head X-Axis Acceleration



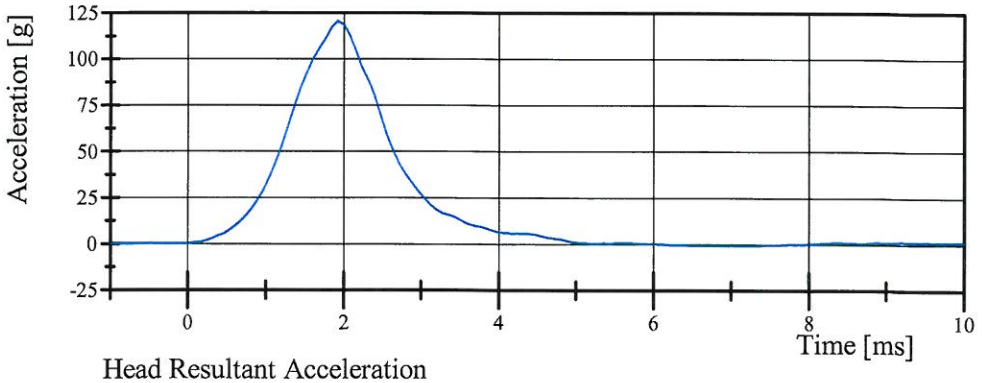
Filter Class: CFC_1000
Max: 0.5 g at 9.4 ms
Min: -230.2 g at 1.8 ms

Head Y-Axis Acceleration



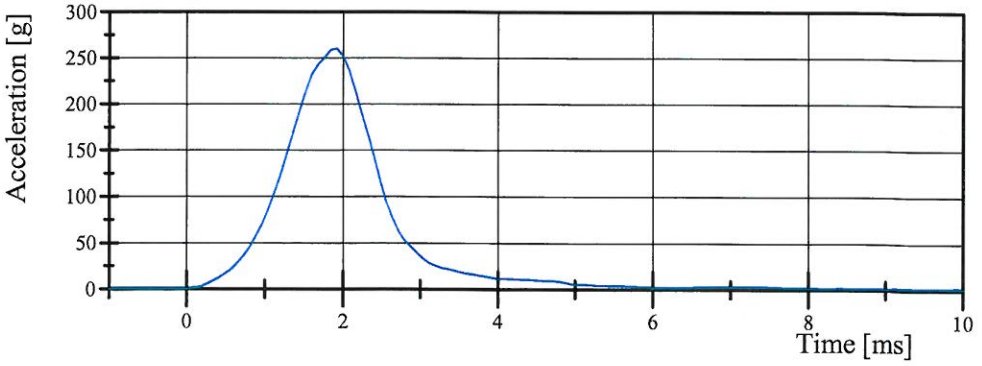
Filter Class: CFC_1000
Max: 7.0 g at 1.7 ms
Min: -3.3 g at 2.6 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 120.4 g at 1.9 ms
Min: -0.8 g at 7.0 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 259.8 g at 1.9 ms
Min: 0.0 g at -0.2 ms

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

06.18.2013 11:33:22 614

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 18-3
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.970 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	37.9 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.91 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.00 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.41 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.41 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-70.7 °	Yes
Time of Peak	57 - 64 ms	58.7 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	118.1 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	105.7 N·m	Yes
Time of Peak	47 - 58 ms	50.2 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	98.1 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

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

06.18.2013 15:14:57 2946

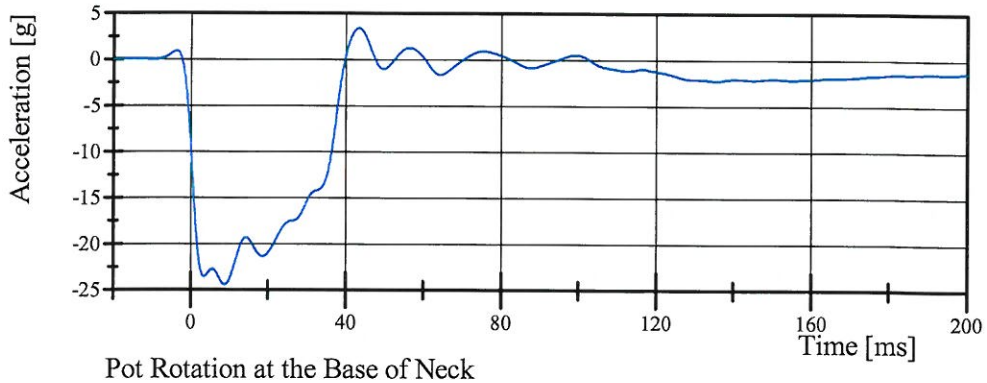
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 18-3

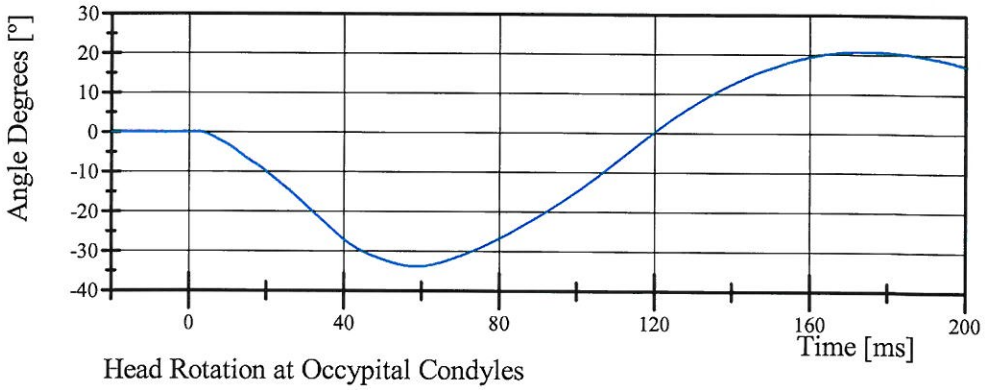
Test Date: 6/18/2013

Pendulum Acceleration



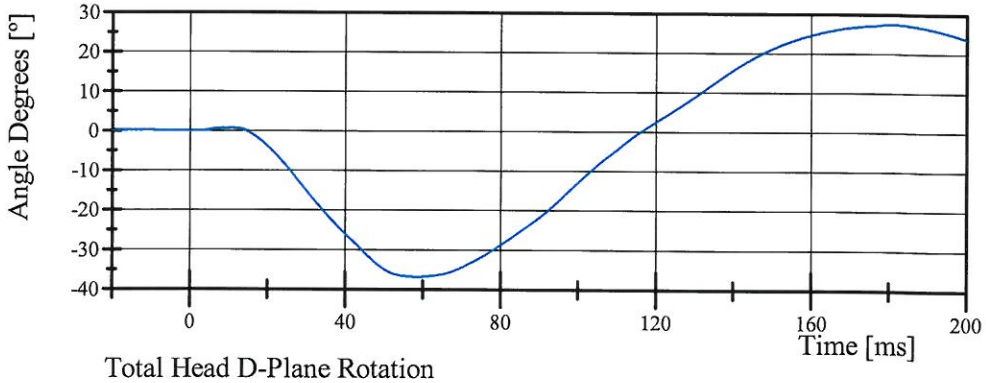
Filter Class: CFC_60
Max: 3.3 g at 43.3 ms
Min: -24.5 g at 8.8 ms

Pot Rotation at the Base of Neck



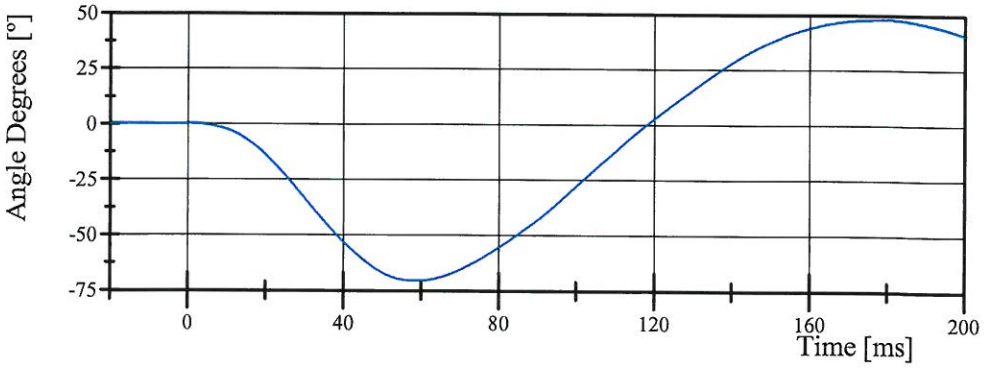
Filter Class: CFC_60
Max: 20.8 ° at 173.9 ms
Min: -33.9 ° at 58.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 27.4 ° at 181.3 ms
Min: -36.8 ° at 58.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 47.9 ° at 179.4 ms
Min: -70.7 ° at 58.7 ms

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

06.18.2013 15:15:04 2946

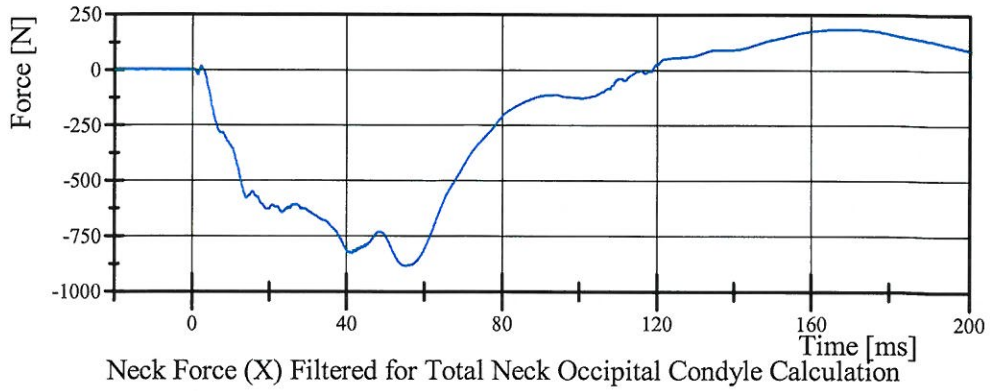
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 18-3

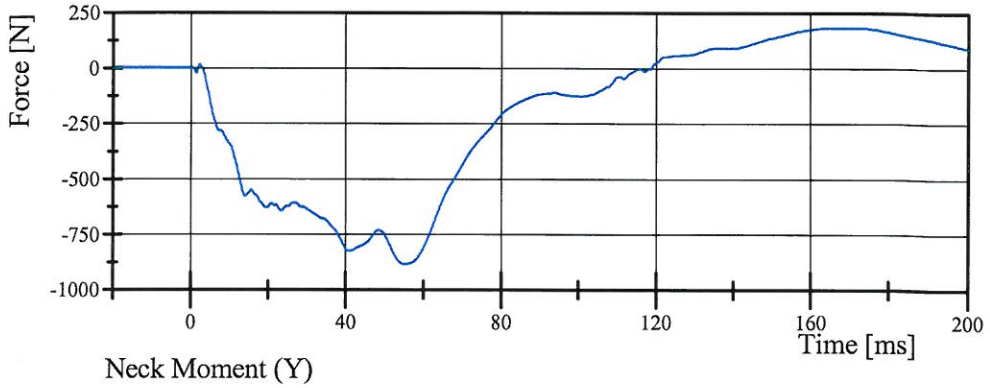
Test Date: 6/18/2013

Neck Force (X)



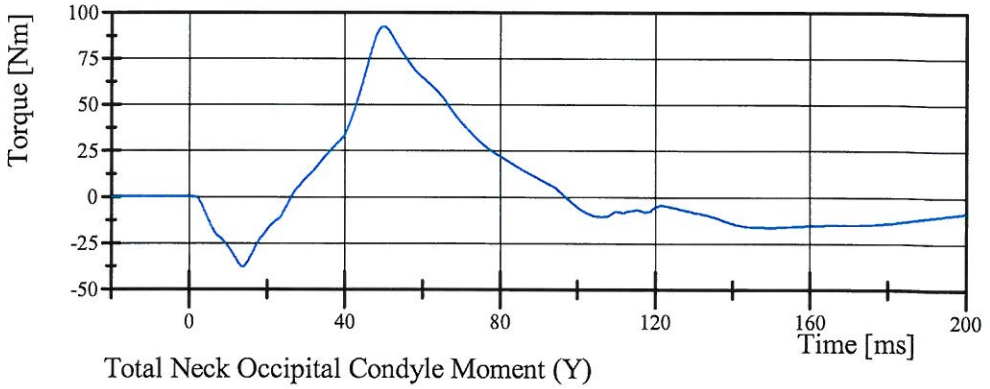
Filter Class: CFC_1000
Max: 184.7 N at 167.4 ms
Min: -886.3 N at 55.3 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



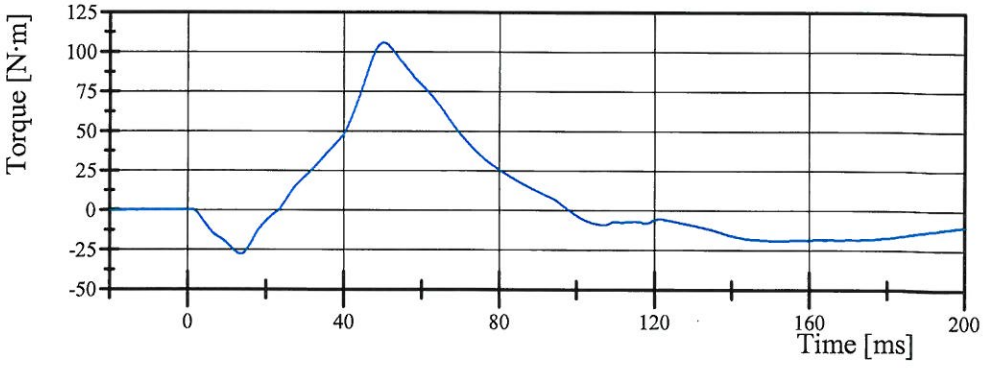
Filter Class: CFC_600
Max: 183.9 N at 167.4 ms
Min: -885.7 N at 55.2 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 92.3 Nm at 50.0 ms
Min: -38.0 Nm at 13.8 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 105.7 N·m at 50.2 ms
Min: -27.9 N·m at 13.5 ms

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

06.18.2013 15:15:05 2946

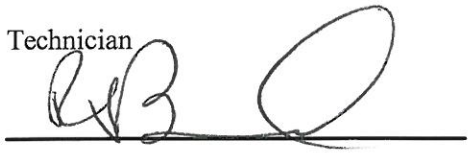
Transportation Research Center Inc.

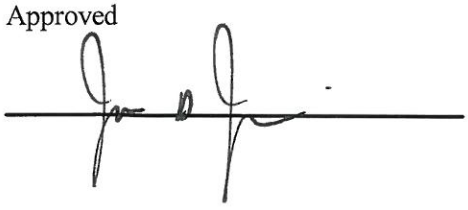
Neck Extension
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.969 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	44.2 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	17.84 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	15.05 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	12.21 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	12.21 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	94.3 °	Yes
Time of Peak	72 - 82 ms	78.7 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	159.6 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-64.9 N·m	Yes
Time of Peak	65 - 79 ms	73.0 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	143.3 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

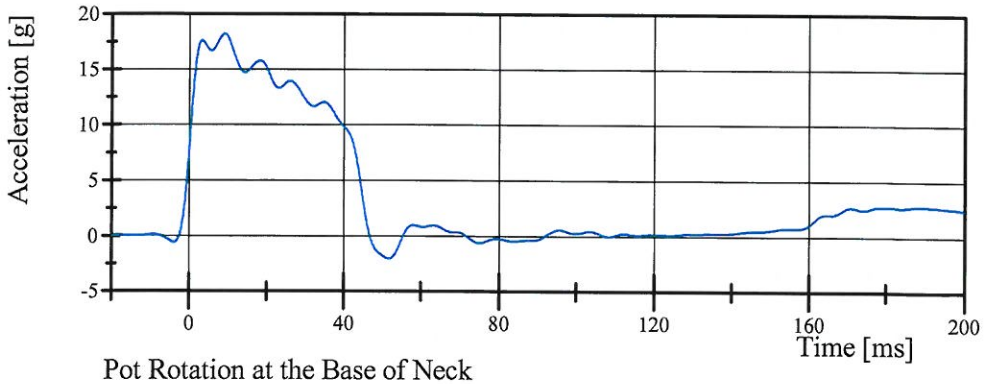
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.18.2013 15:48:58 3029

Transportation Research Center Inc.

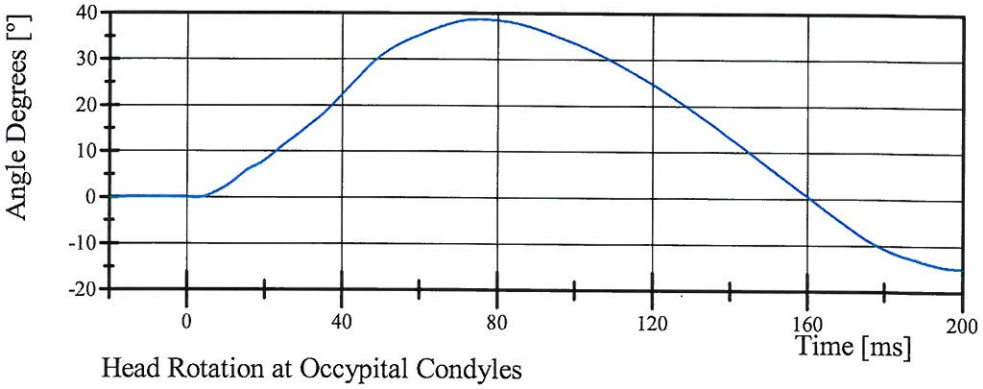
Neck Extension
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Pendulum Acceleration



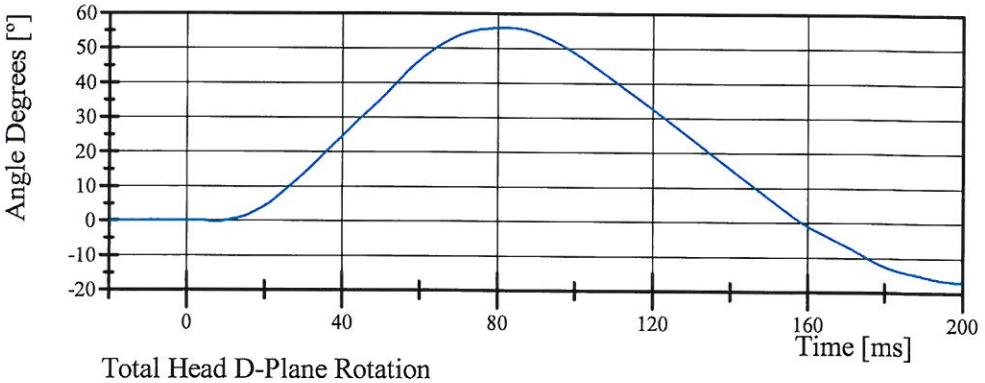
Filter Class: CFC_60
Max: 18.2 g at 9.0 ms
Min: -2.1 g at 51.7 ms

Pot Rotation at the Base of Neck



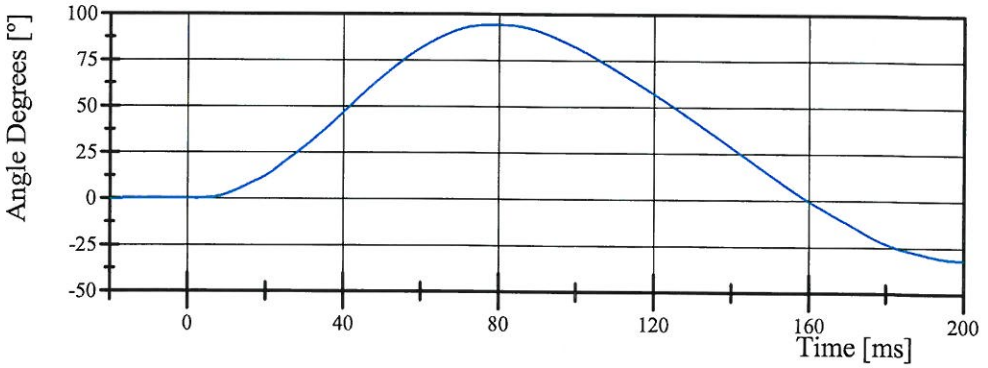
Filter Class: CFC_60
Max: 38.6 ° at 75.4 ms
Min: -15.0 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 55.9 ° at 82.6 ms
Min: -16.9 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 94.3 ° at 78.7 ms
Min: -31.9 ° at 200.0 ms

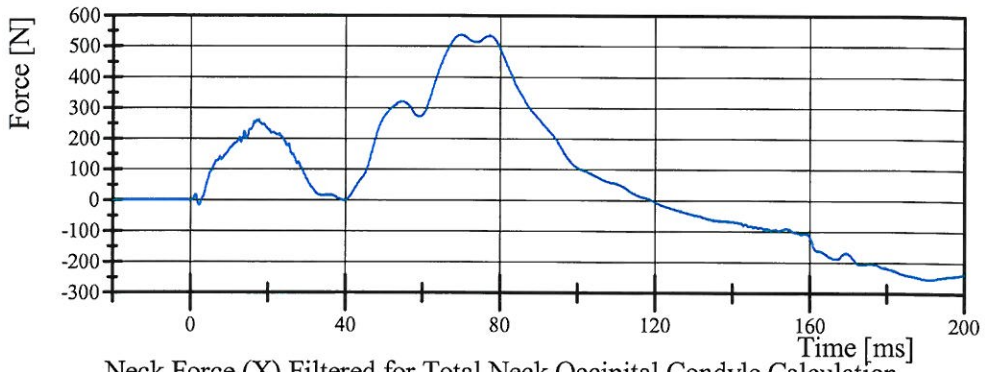
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.18.2013 15:49:05 3029

Transportation Research Center Inc.

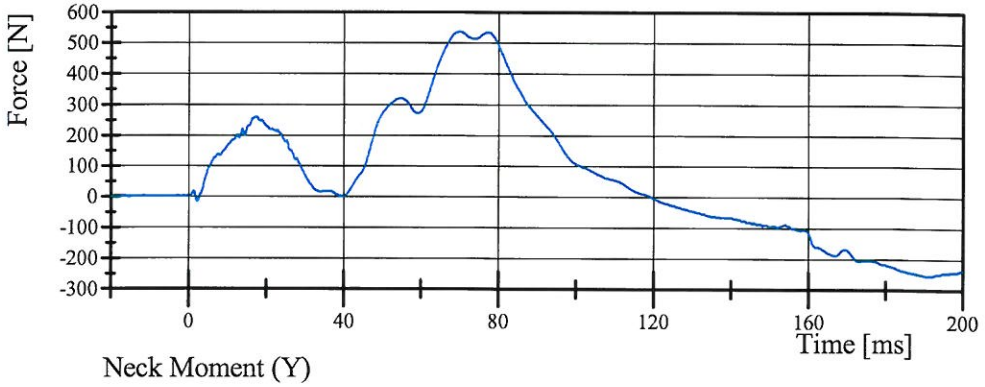
Neck Extension
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Neck Force (X)



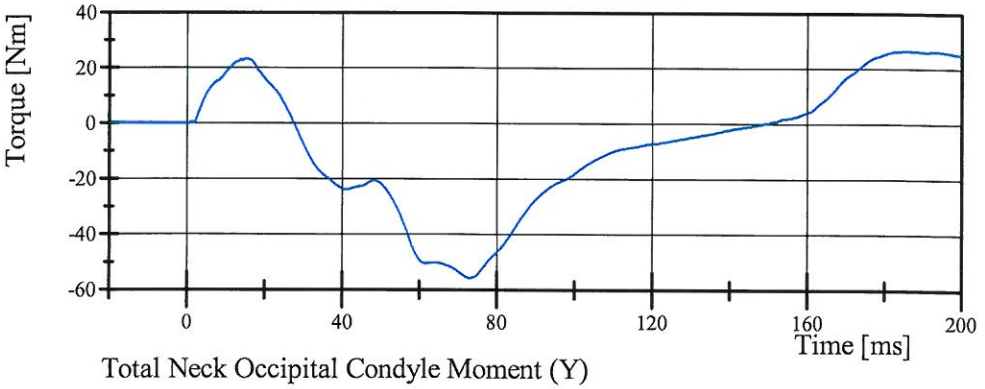
Filter Class: CFC_1000
Max: 537.0 N at 70.2 ms
Min: -255.4 N at 191.3 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



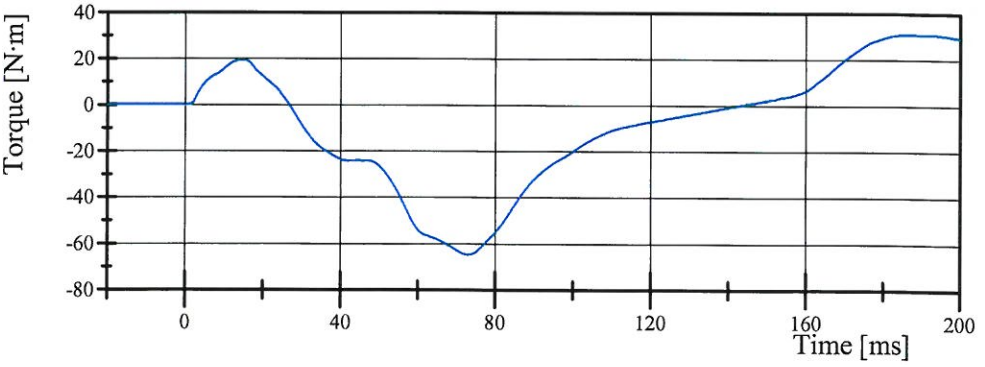
Filter Class: CFC_600
Max: 536.5 N at 70.1 ms
Min: -255.0 N at 191.4 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 26.5 Nm at 185.5 ms
Min: -55.8 Nm at 73.0 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 30.8 N·m at 187.4 ms
Min: -64.9 N·m at 73.0 ms

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

06.18.2013 15:49:06 3029

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.628 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,484.1 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-68.22 mm	Yes
Internal Hysteresis	65 - 85 %	74.3 %	Yes

Test meets specifications.

Comments:

Technician

Approved

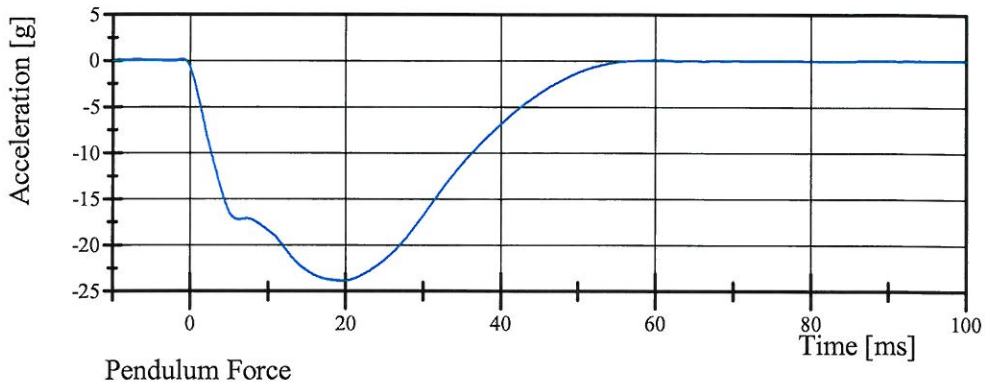
Specification Source: CFR49 Part 572 Subpart P
with Polarity in accordance with J211

06.18.2013 12:55:37 439

Transportation Research Center Inc.

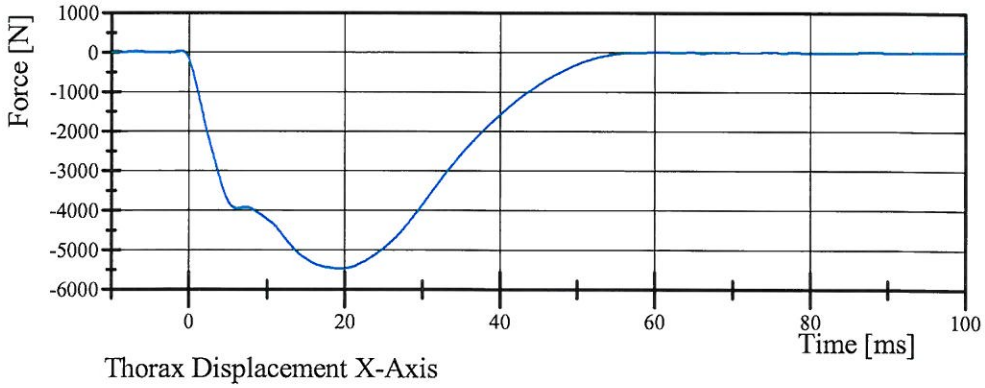
Front Thorax
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Pendulum Acceleration



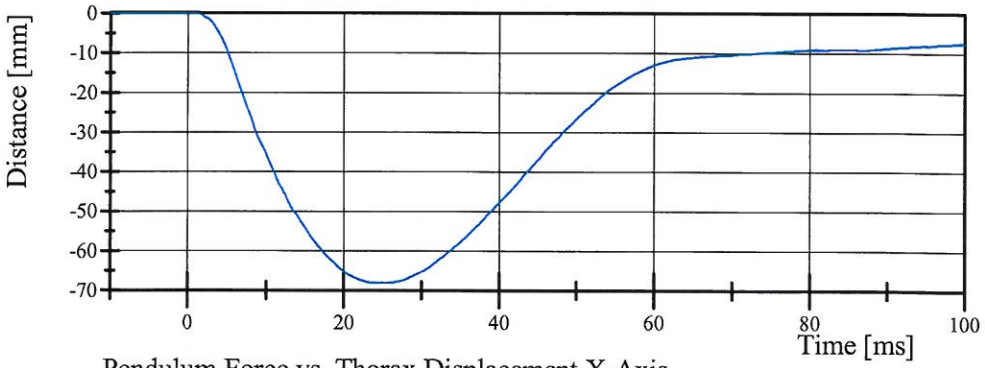
Filter Class: CFC_180
Max: 0.1 g at -1.0 ms
Min: -23.9 g at 19.4 ms

Pendulum Force



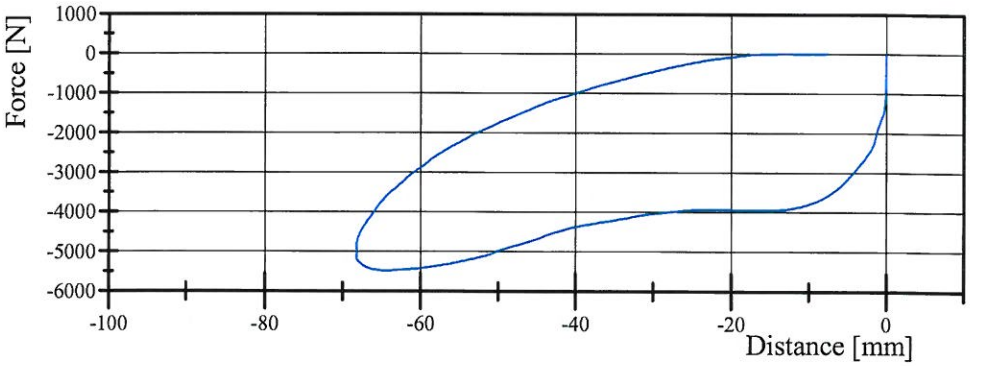
Filter Class: CFC_180
Max: 17.1 N at -1.0 ms
Min: -5,484.1 N at 19.4 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -10.0 ms
Min: -68.2 mm at 23.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 17.1 N at -0.0 mm
Min: -5,484.1 N at -64.4 mm

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

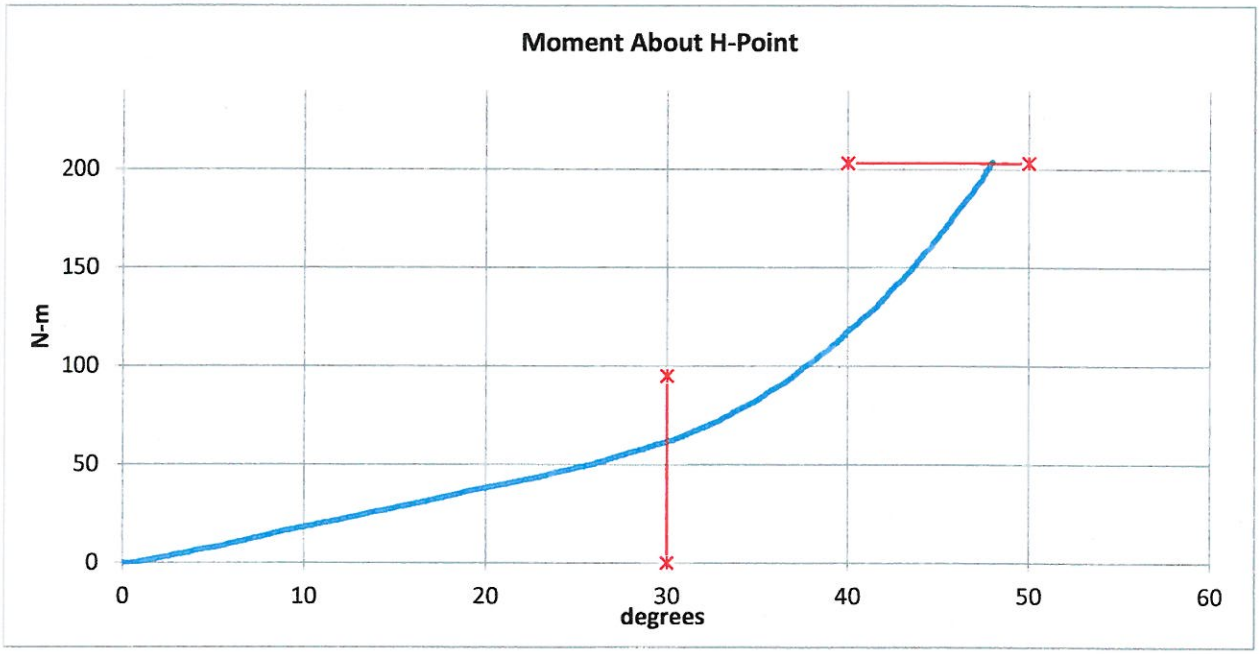
06.18.2013 12:55:45 439

Transportation Research Center Inc.

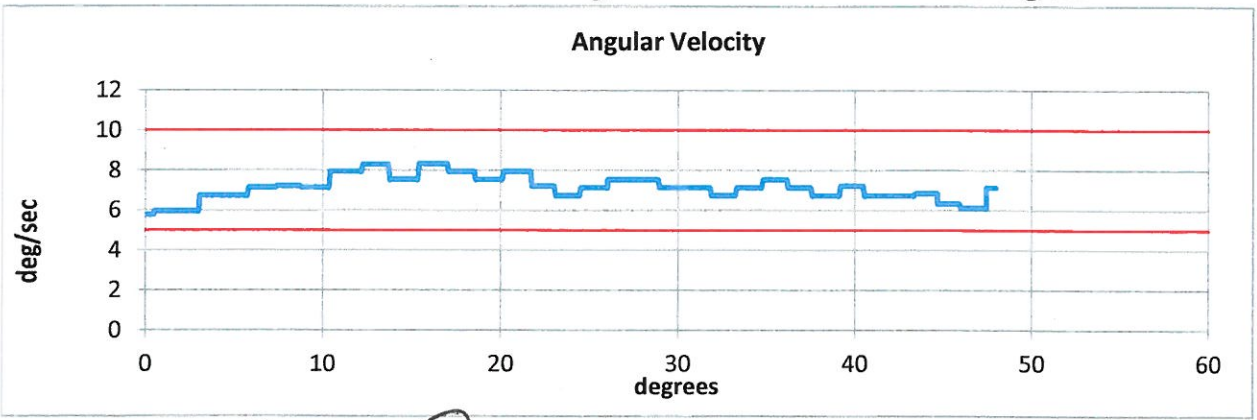
Hybrid III 50th Male Hip Range of Motion

Serial Number:	37	Date:	18-Jun-2013
Test Number:	1	Time:	9:11
Comments:	Left		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.9	°C	Pass
Humidity	10	-	70	55	%	Pass
Moment at 30°	0	≤	94.9	61.94	N-m	Pass
Angle at 203 Nm	40	-	50	47.99	deg	Pass
Average Velocity	5	-	10	7.11	deg/sec	Pass



Max: 8.33 deg/sec Min: 5.77 deg/sec



Technician

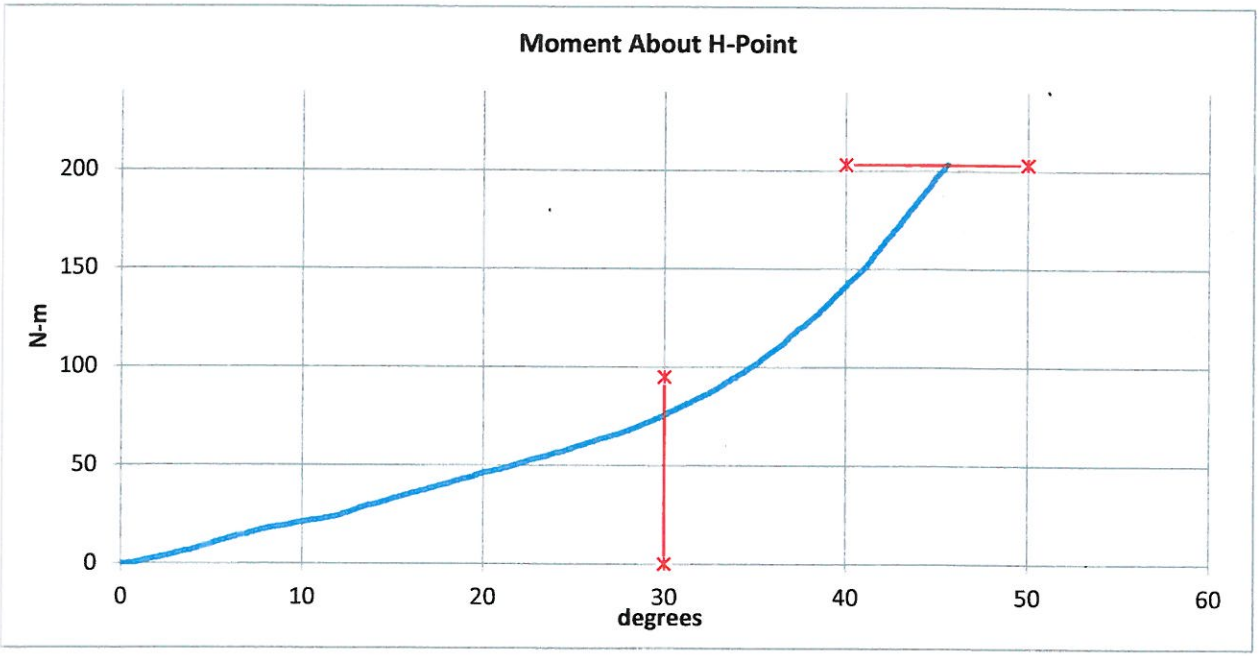
Approved

Transportation Research Center Inc.

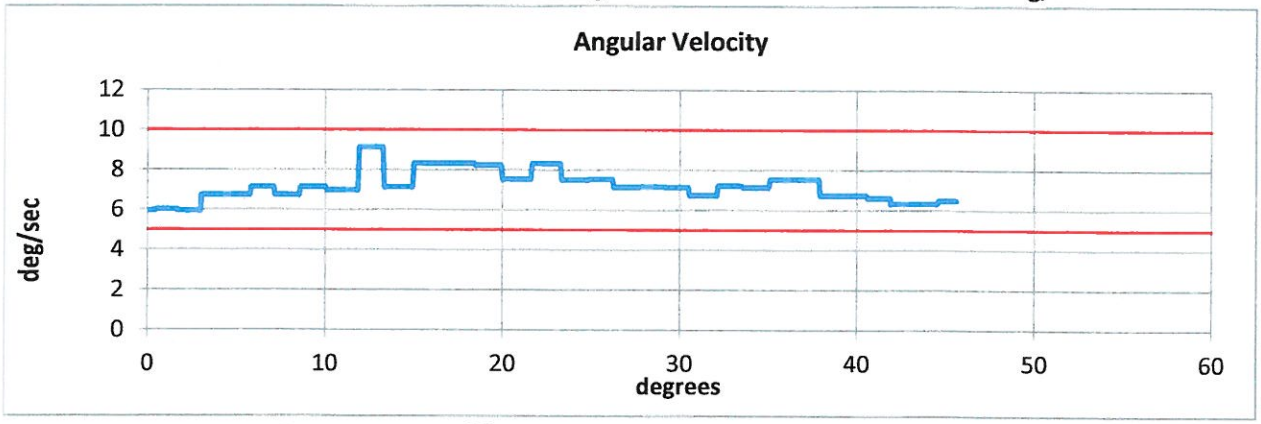
Hybrid III 50th Male Hip Range of Motion

Serial Number:	37	Date:	18-Jun-2013
Test Number:	1	Time:	10:14
Comments:	Right		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	22.1	°C	Pass
Humidity	10	-	70	56	%	Pass
Moment at 30°	0	≤	94.9	75.98	N-m	Pass
Angle at 203 Nm	40	-	50	45.62	deg	Pass
Average Velocity	5	-	10	7.16	deg/sec	Pass



Max: 9.12 deg/sec Min: 5.95 deg/sec



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.096 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,508.69 N	Yes

Test meets specifications.

Comments:

Technician

Approved

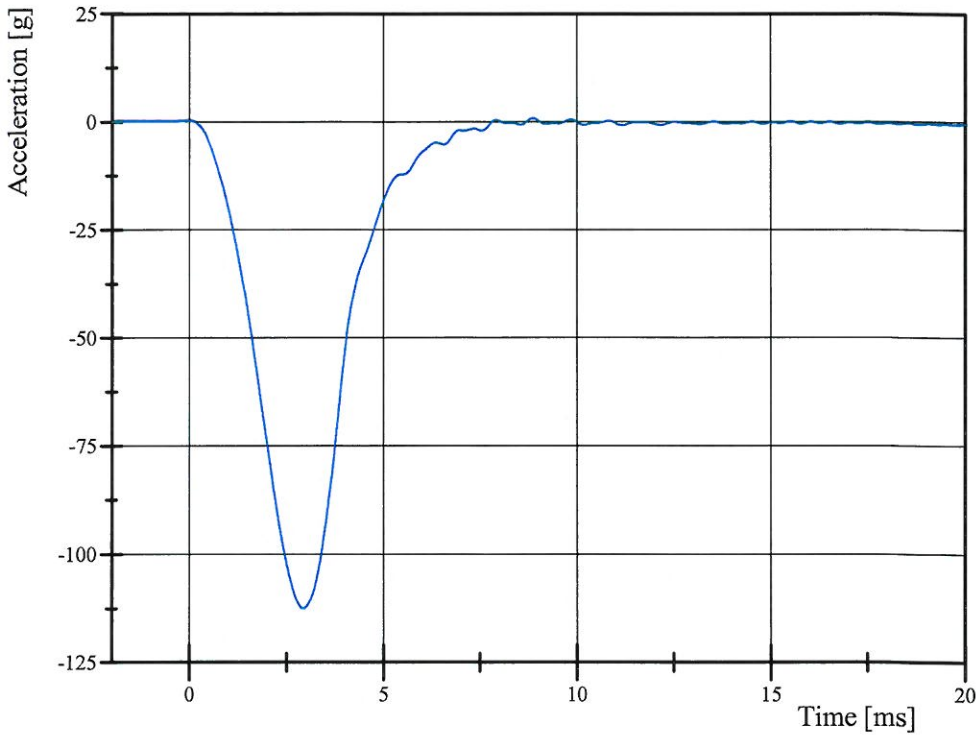
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.18.2013 10:43:01 1828

Transportation Research Center Inc.

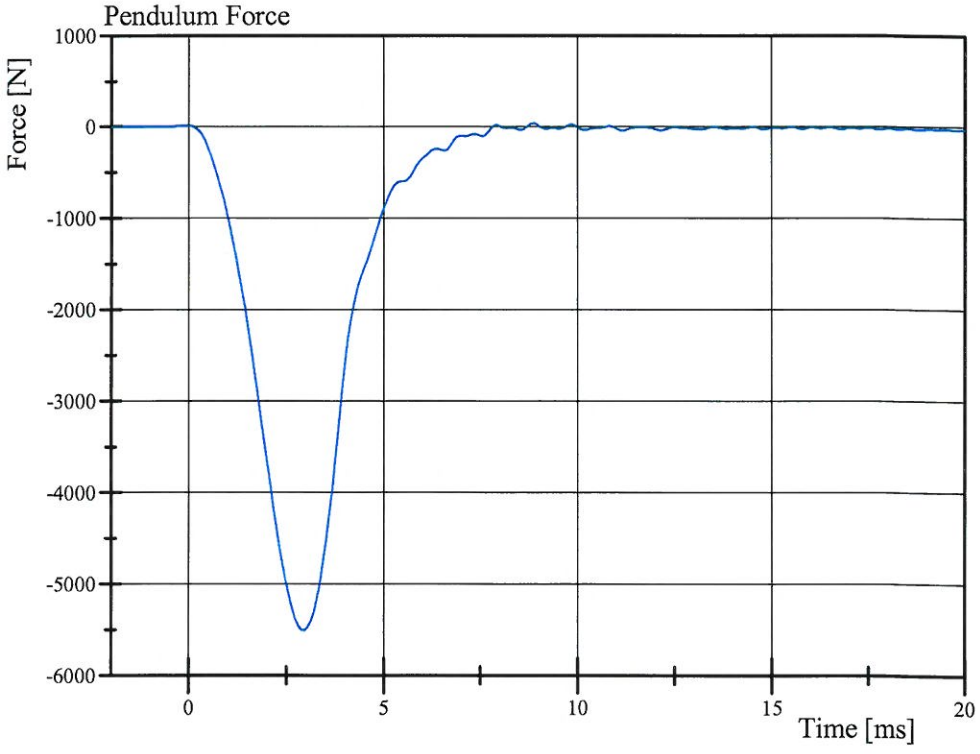
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.8 g at 8.9 ms
Min: -112.6 g at 3.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 37.3 N at 8.9 ms
Min: -5,508.7 N at 3.0 ms

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

06.18.2013 10:43:09 1828

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.096 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,463.31 N	Yes

Test meets specifications.

Comments:

Technician

Approved

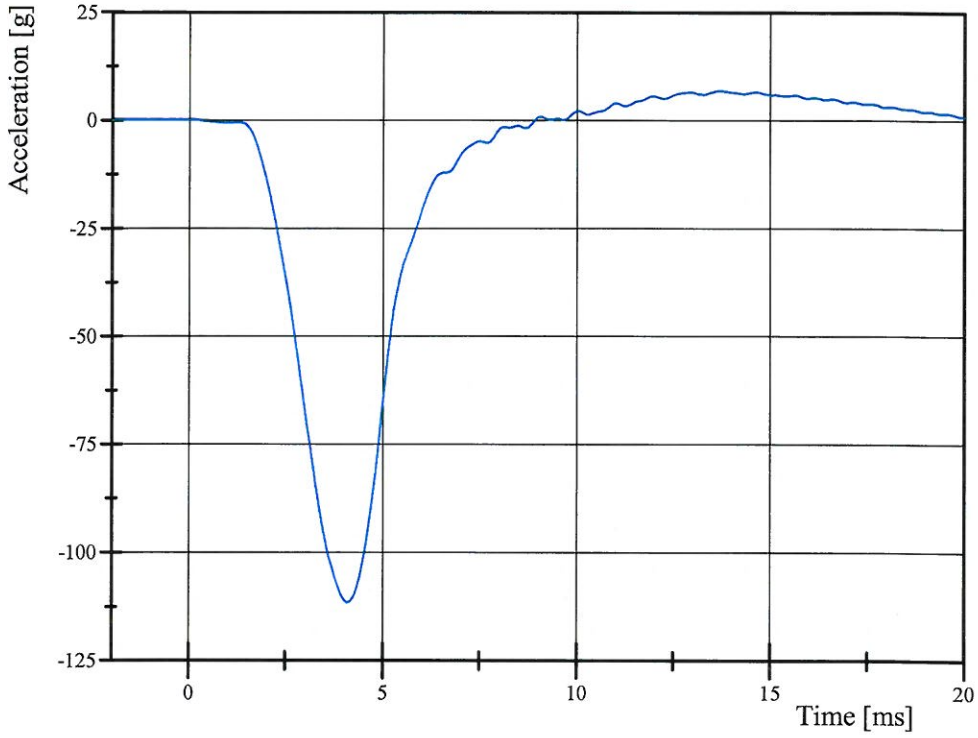
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.18.2013 10:50:33 1812

Transportation Research Center Inc.

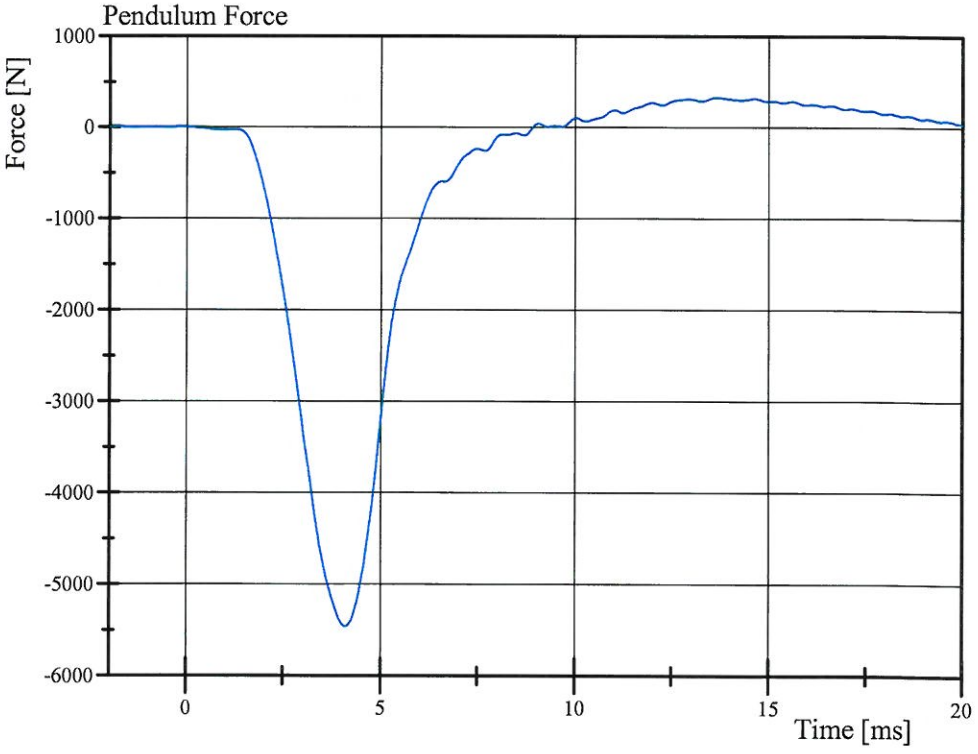
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 18-1
Test Date: 6/18/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 6.7 g at 13.7 ms
Min: -111.7 g at 4.1 ms

Pendulum Force



Filter Class: CFC_600
Max: 327.8 N at 13.7 ms
Min: -5,463.3 N at 4.1 ms

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

06.18.2013 10:50:40 1812

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 18

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	885	Yes
B	Shoulder Pivot Height	505.5 - 520.7	520	Yes
C	H-Point Height	83.8 - 88.9	85	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	92	Yes
F	Thigh Clearance	139.7 - 154.9	150	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	294	Yes
H	Skull Cap To Backline	40.6 - 45.7	45	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	340	Yes
J	Elbow Rest Height	190.5 - 210.8	199	Yes
K	Buttock Knee Length	579.1 - 604.5	600	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	495	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	226	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	427	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	987	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	430	Yes
BB	Location For Waist Circumference	226.1 - 231.1	230	Yes

Comments:

Technician

Approved

Revised 8/10/12

Driver S/N 037

Post-Test Calibration Sheets

Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	259.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-3.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

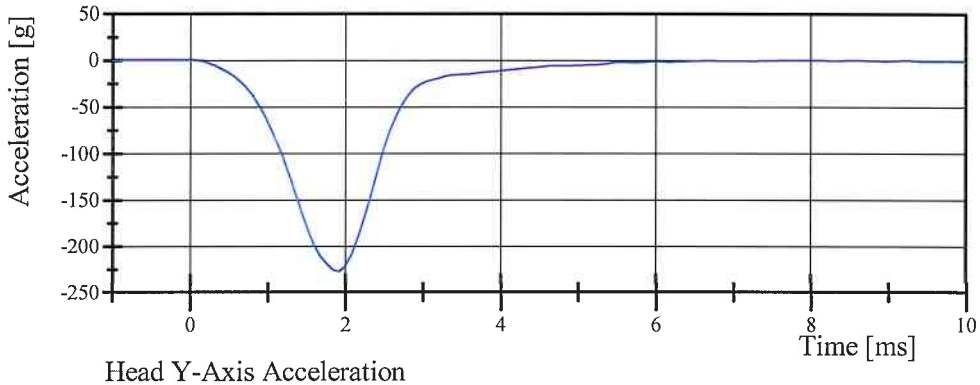
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

07.30.2013 08:18:59 614

Transportation Research Center Inc.

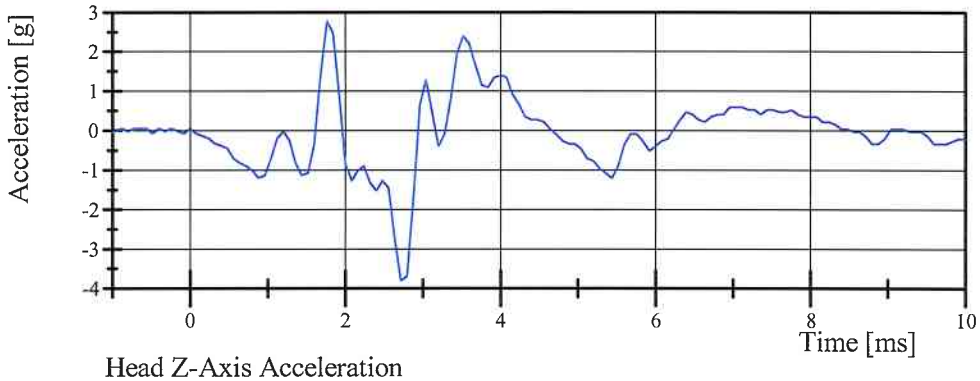
Front Head Drop
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Head X-Axis Acceleration



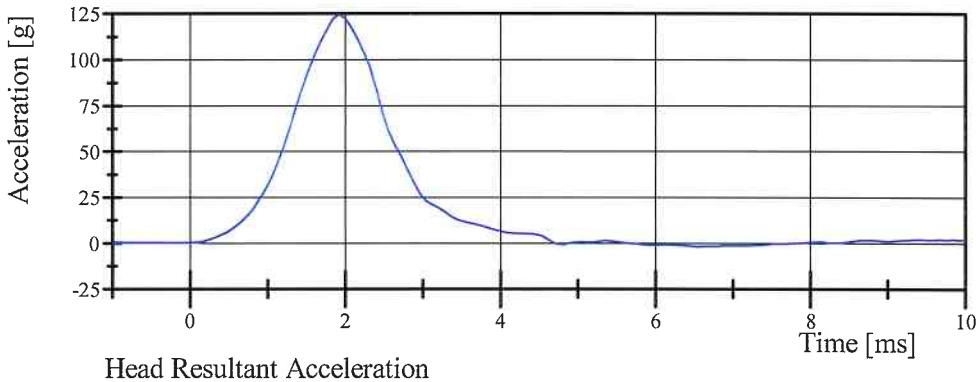
Filter Class: CFC_1000
Max: 0.2 g at 8.6 ms
Min: -227.8 g at 1.9 ms

Head Y-Axis Acceleration



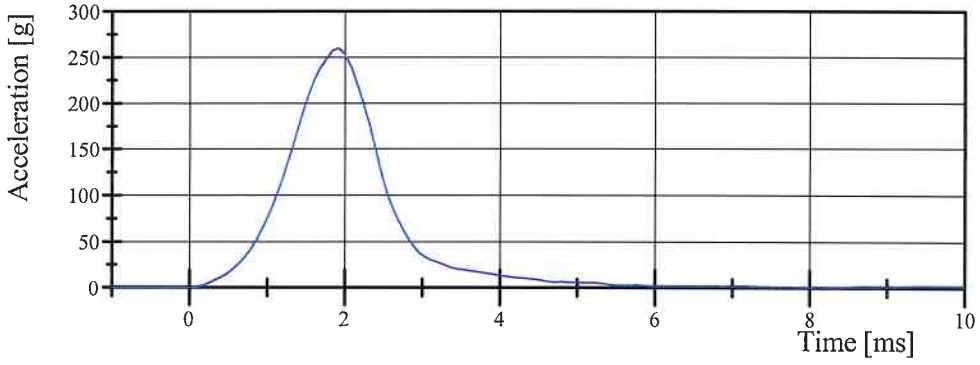
Filter Class: CFC_1000
Max: 2.8 g at 1.8 ms
Min: -3.8 g at 2.7 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 124.3 g at 1.9 ms
Min: -1.9 g at 6.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 259.6 g at 1.9 ms
Min: 0.0 g at -0.8 ms

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

07.30.2013 08:19:06 614

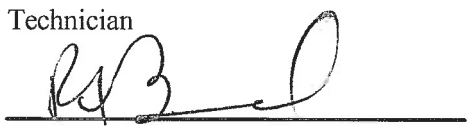
Transportation Research Center Inc.

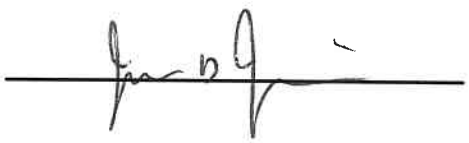
Neck Flexion
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	22.0 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.963 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	36.8 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-25.28 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-20.63 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.47 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.47 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-73.3 °	Yes
Time of Peak	57 - 64 ms	58.2 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	116.2 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	105.4 N·m	Yes
Time of Peak	47 - 58 ms	49.1 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	97.2 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

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

07.30.2013 11:40:41 2947

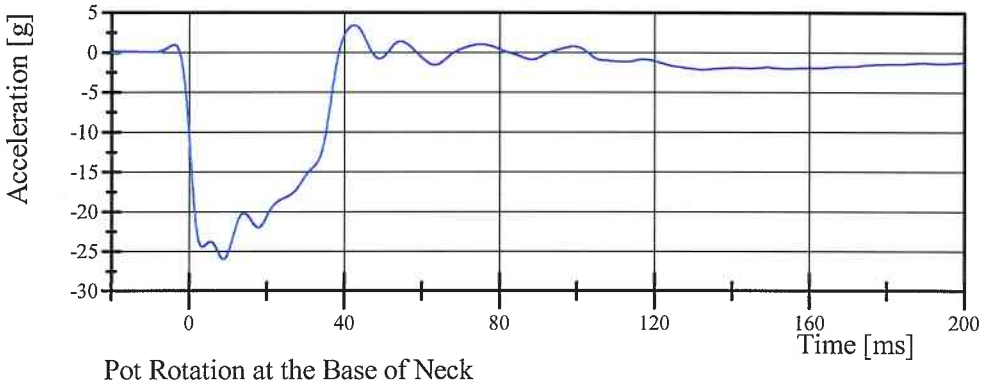
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 19-1

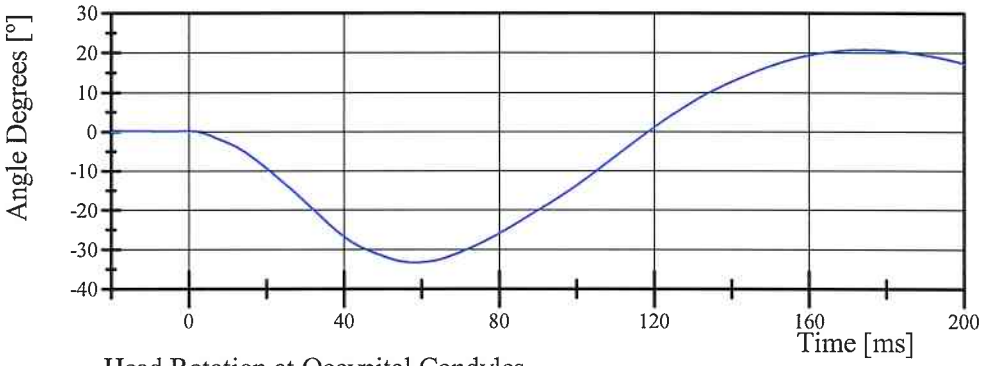
Test Date: 7/30/2013

Pendulum Acceleration



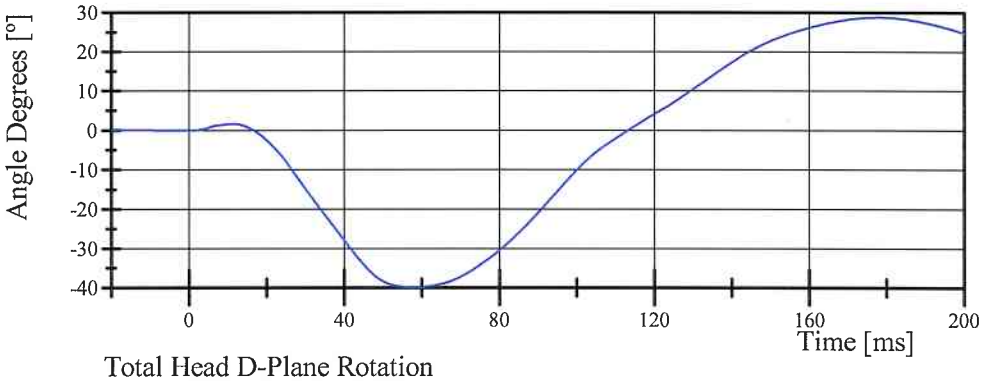
Filter Class: CFC_60
Max: 3.4 g at 42.5 ms
Min: -26.0 g at 8.9 ms

Pot Rotation at the Base of Neck



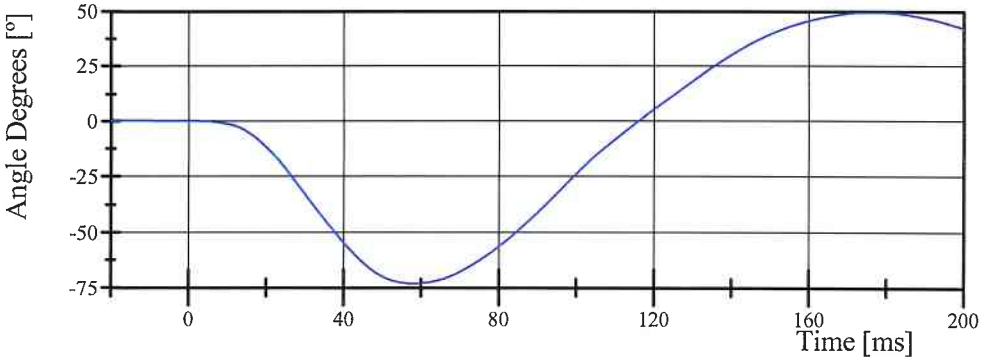
Filter Class: CFC_60
Max: 20.8 ° at 174.5 ms
Min: -33.4 ° at 58.1 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 28.7 ° at 178.1 ms
Min: -40.0 ° at 58.2 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 49.5 ° at 176.4 ms
Min: -73.3 ° at 58.2 ms

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

07.30.2013 11:40:47 2947

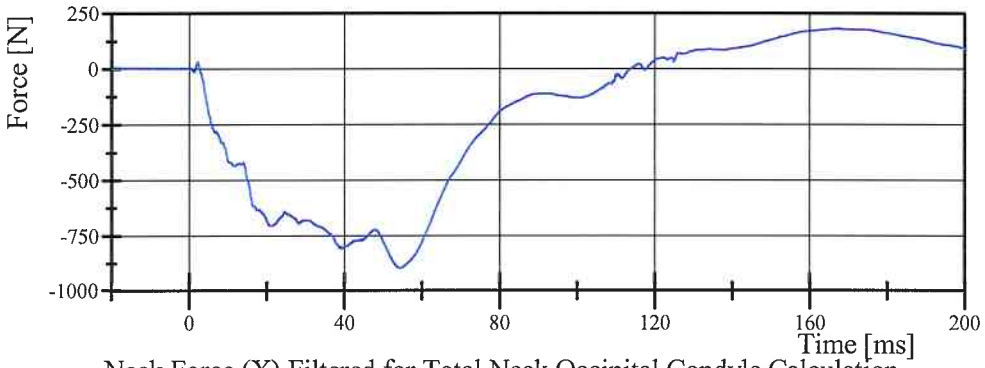
Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 19-1

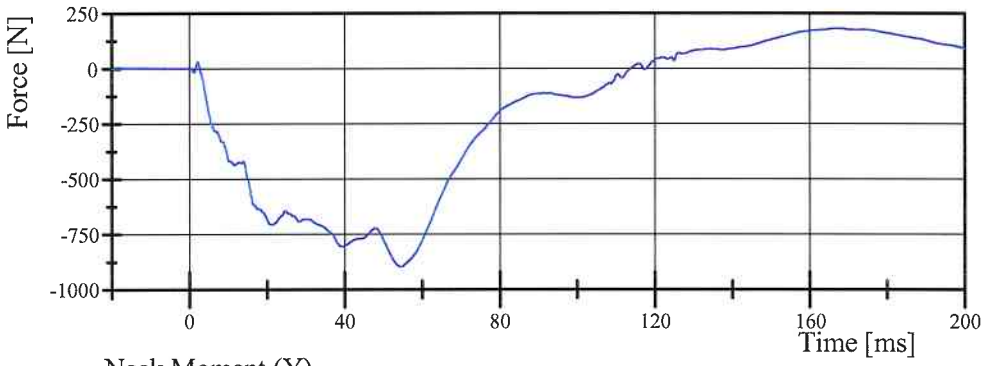
Test Date: 7/30/2013

Neck Force (X)



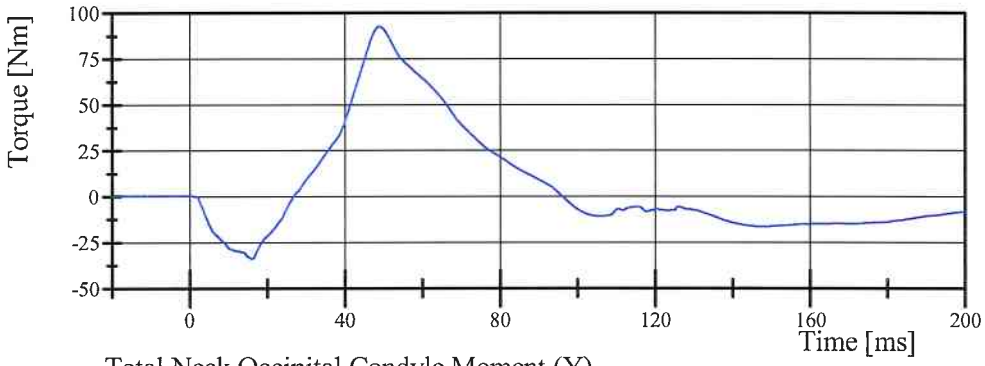
Filter Class: CFC_1000
Max: 181.7 N at 167.1 ms
Min: -897.7 N at 54.5 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



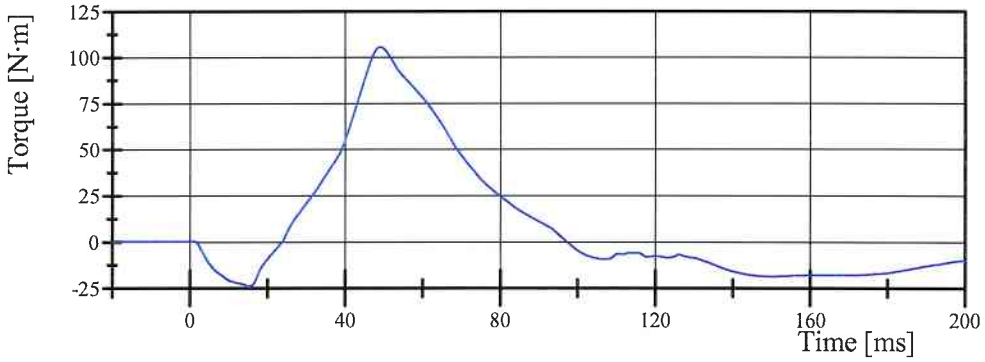
Filter Class: CFC_600
Max: 181.2 N at 167.2 ms
Min: -897.5 N at 54.4 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 92.3 Nm at 48.9 ms
Min: -34.1 Nm at 16.1 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 105.4 N·m at 49.1 ms
Min: -24.2 N·m at 15.1 ms

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

07.30.2013 11:40:48 2947

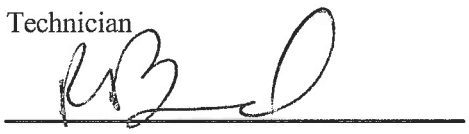
Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.969 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	41.9 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.78 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.55 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	12.74 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	12.74 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	95.9 °	Yes
Time of Peak	72 - 82 ms	76.7 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	158.6 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-67.1 N·m	Yes
Time of Peak	65 - 79 ms	72.1 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	143.4 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

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

07.30.2013 12:43:35 3027

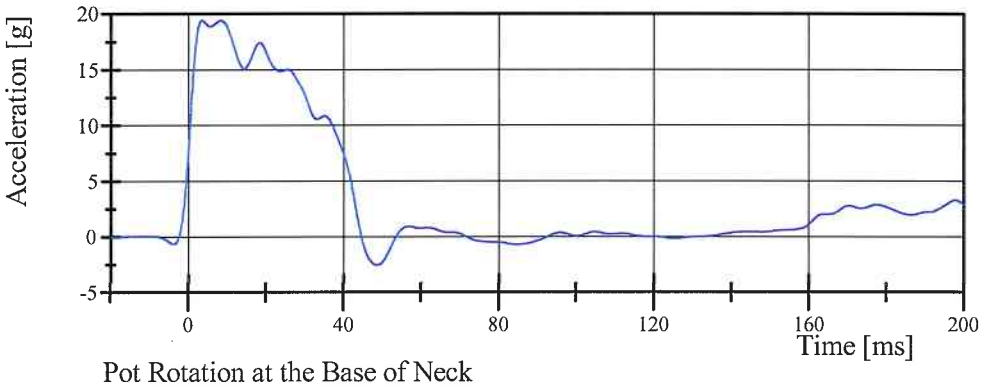
Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 19-1

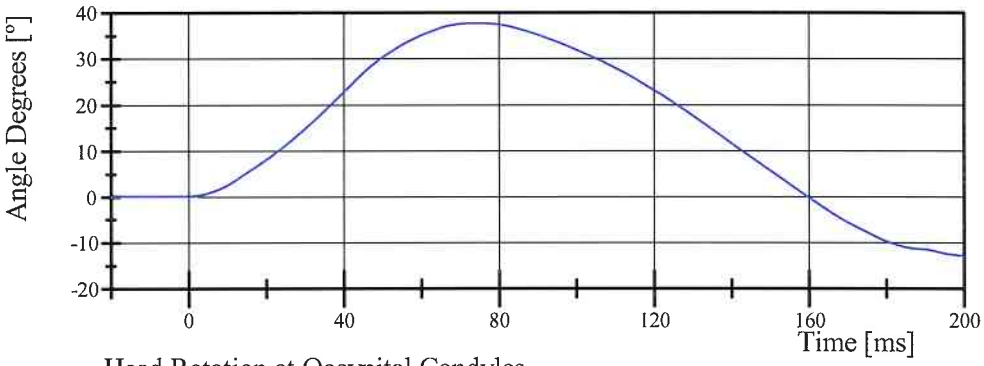
Test Date: 7/30/2013

Pendulum Acceleration



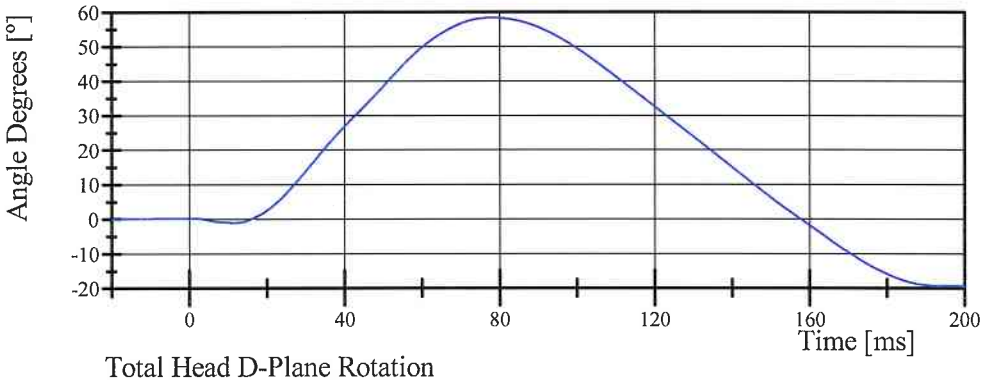
Filter Class: CFC_60
Max: 19.4 g at 3.4 ms
Min: -2.6 g at 48.6 ms

Pot Rotation at the Base of Neck



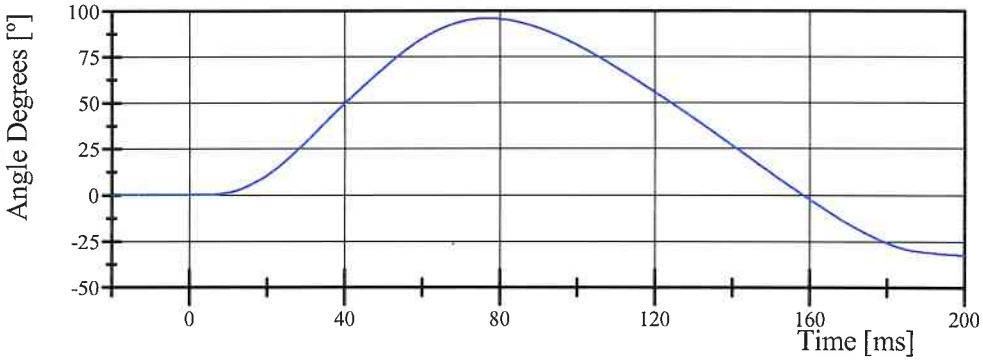
Filter Class: CFC_60
Max: 37.7 ° at 74.2 ms
Min: -12.9 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 58.4 ° at 78.2 ms
Min: -19.5 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 95.9 ° at 76.7 ms
Min: -32.4 ° at 200.0 ms

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

07.30.2013 12:43:42 3027

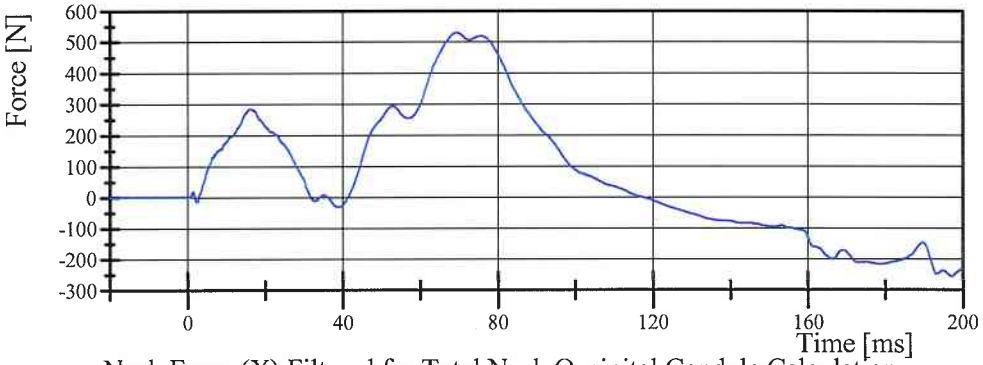
Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 19-1

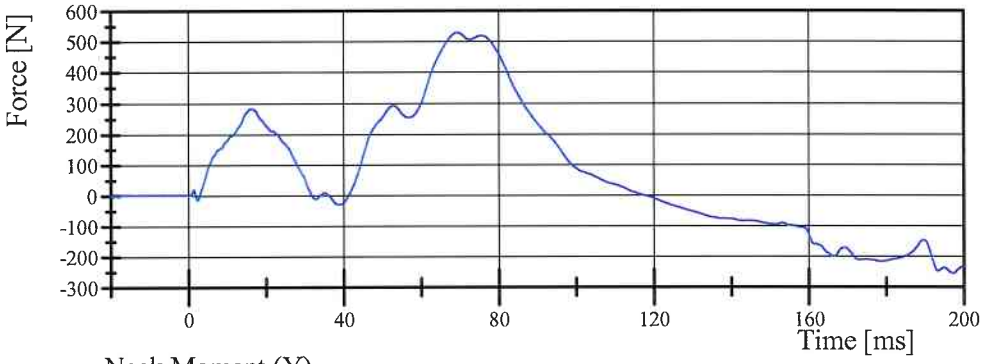
Test Date: 7/30/2013

Neck Force (X)



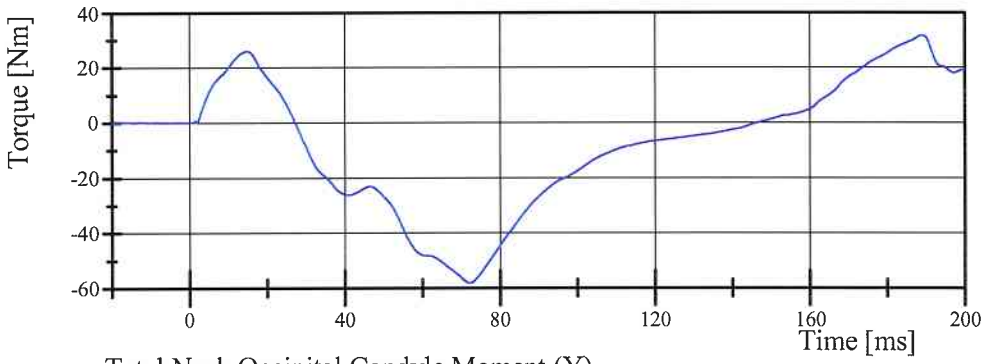
Filter Class: CFC_1000
Max: 529.1 N at 69.3 ms
Min: -257.0 N at 197.3 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



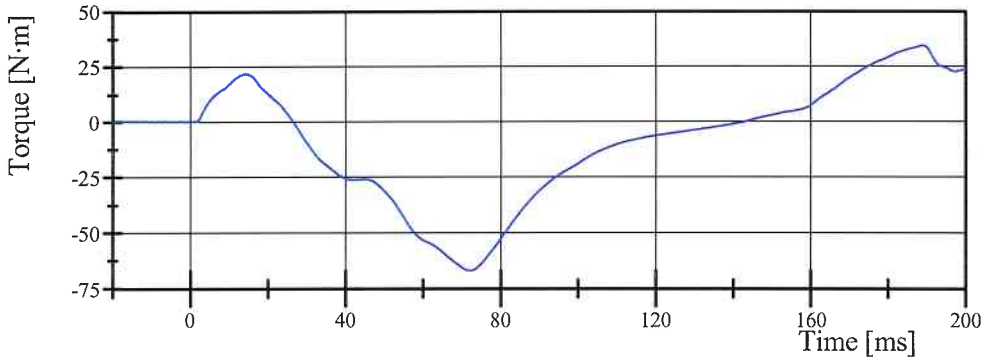
Filter Class: CFC_600
Max: 528.9 N at 69.3 ms
Min: -256.4 N at 197.3 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 31.6 Nm at 189.1 ms
Min: -58.2 Nm at 72.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 34.3 N·m at 189.0 ms
Min: -67.1 N·m at 72.1 ms

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

07.30.2013 12:43:43 3027

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 19-7
Test Date: 8/1/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.628 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,533.5 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.85 mm	Yes
Internal Hysteresis	65 - 85 %	72.2 %	Yes

Test meets specifications.

Comments:

Technician

Approved

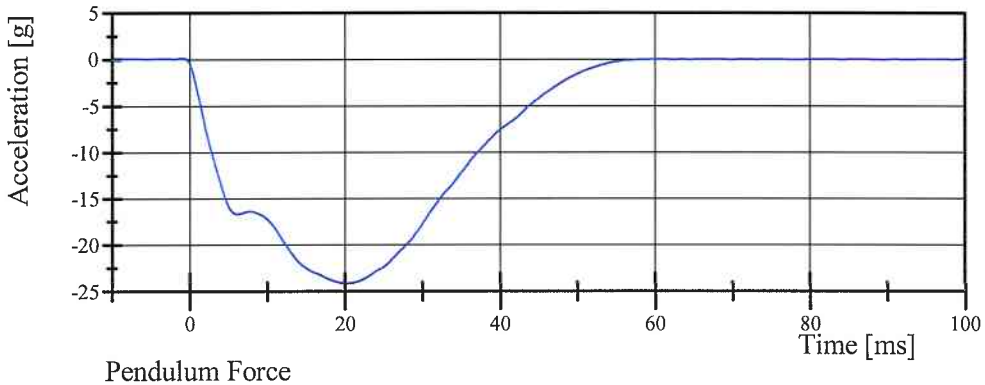
Specification Source: CFR49 Part 572 Subpart P
with Polarity in accordance with J211

08.01.2013 14:51:20 431

Transportation Research Center Inc.

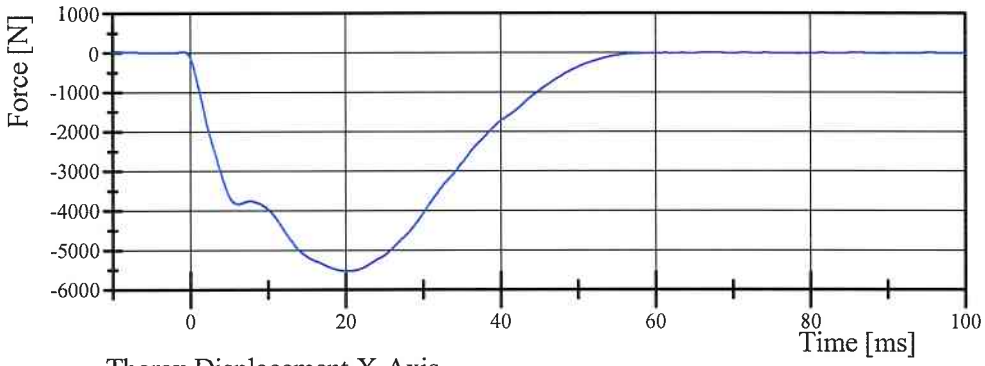
Front Thorax
HIII 50th Serial No. 037 Certification No. 19-7
Test Date: 8/1/2013

Pendulum Acceleration



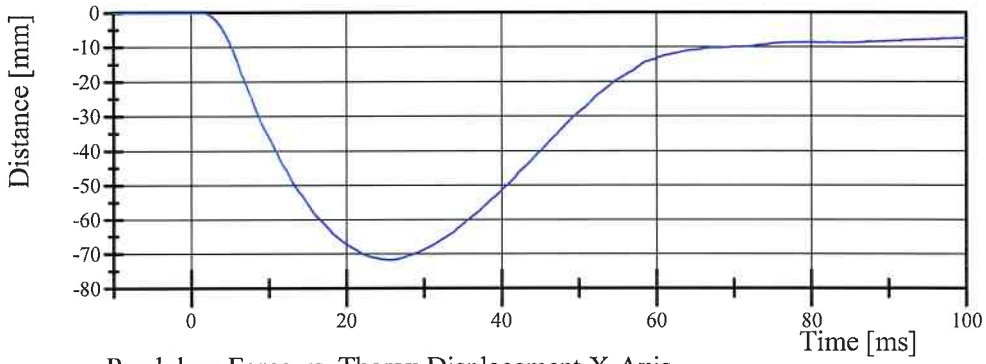
Filter Class: CFC_180
Max: 0.1 g at -0.9 ms
Min: -24.1 g at 20.1 ms

Pendulum Force



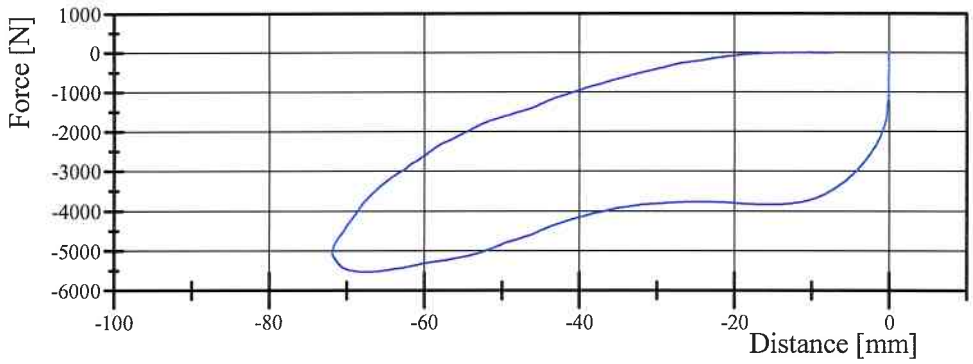
Filter Class: CFC_180
Max: 14.4 N at -0.9 ms
Min: -5,533.5 N at 20.1 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -8.3 ms
Min: -71.9 mm at 25.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 14.4 N at -0.0 mm
Min: -5,533.5 N at -67.4 mm

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

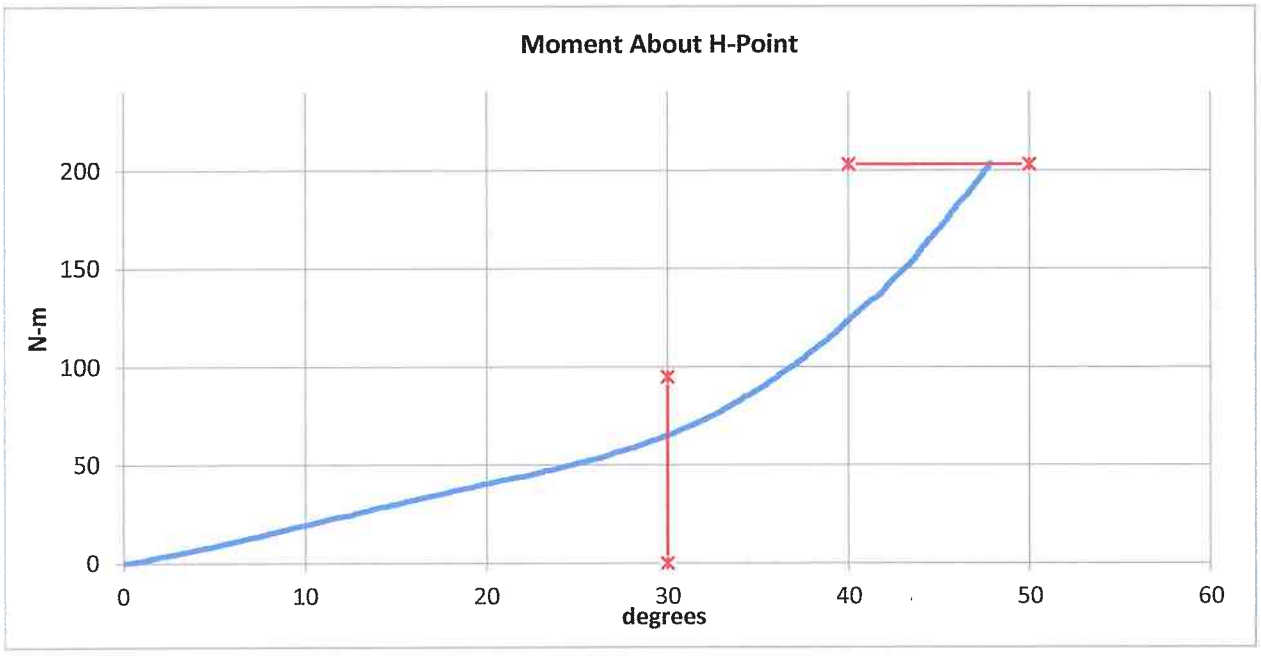
08.01.2013 14:51:33 431

Transportation Research Center Inc.

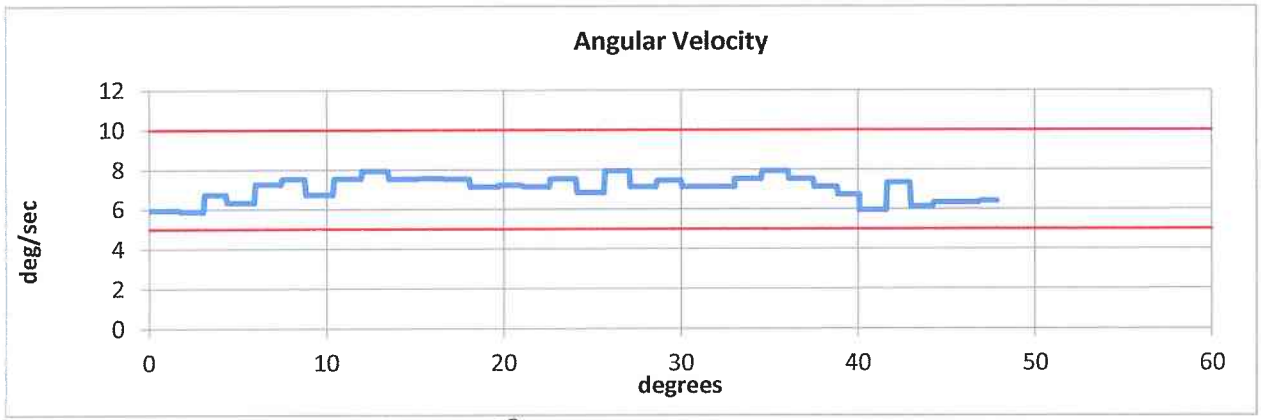
Hybrid III 50th Male Hip Range of Motion

Serial Number:	37	Date:	30-Jul-2013
Test Number:	1	Time:	9:42
Comments:	Left		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.7	°C	Pass
Humidity	10	-	70	55	%	Pass
Moment at 30°	0	≤	94.9	65.24	N-m	Pass
Angle at 203 Nm	40	-	50	47.84	deg	Pass
Average Velocity	5	-	10	7.04	deg/sec	Pass



Max: 7.93 deg/sec Min: 5.89 deg/sec



Technician

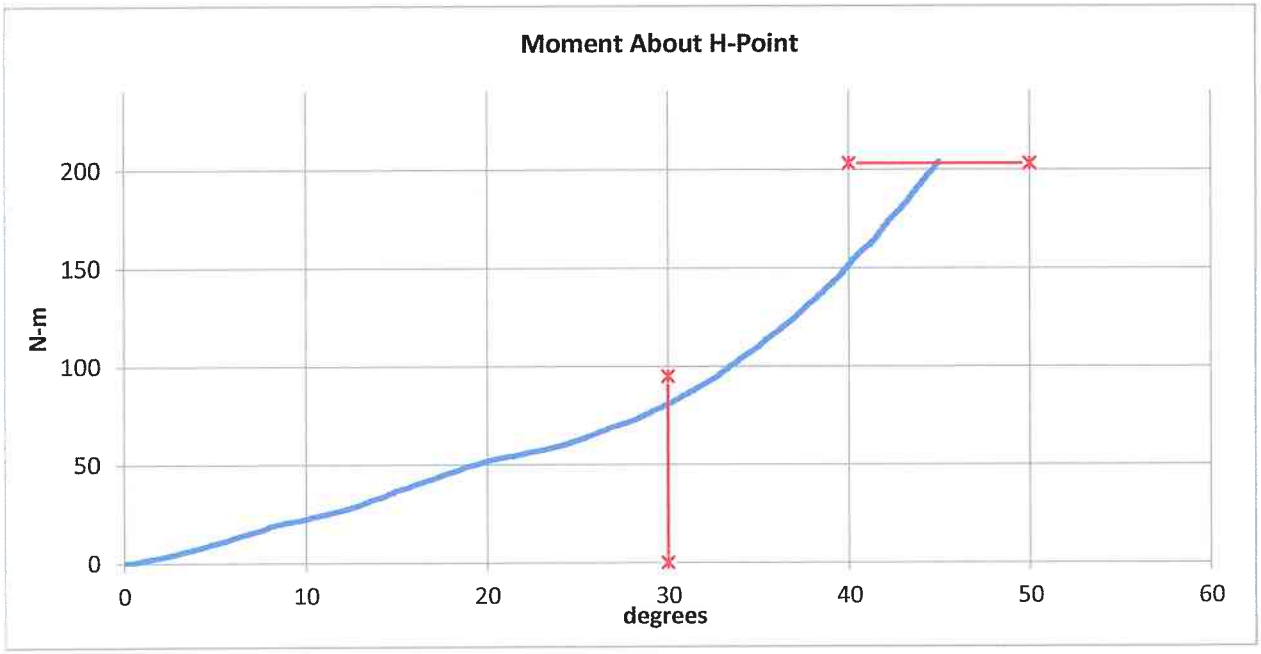
Approved

Transportation Research Center Inc.

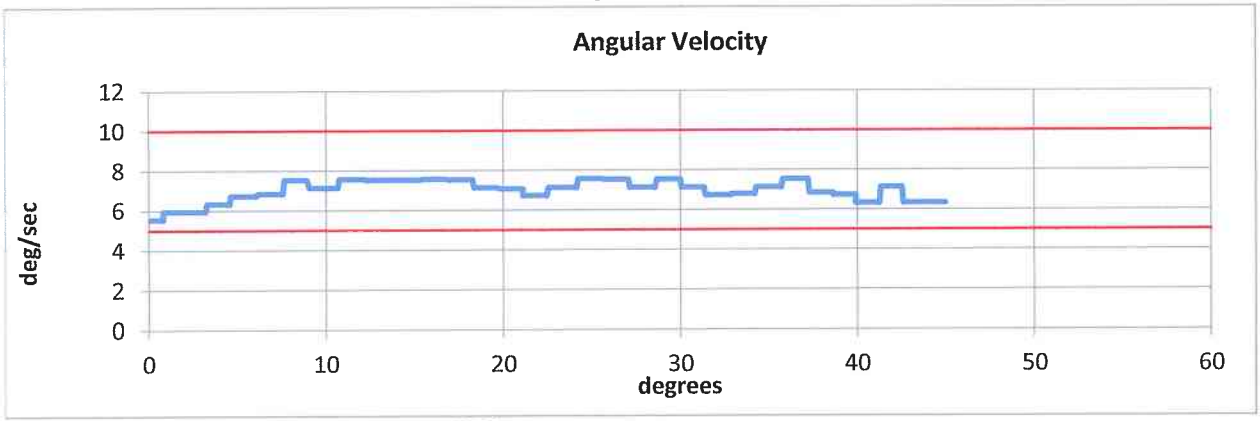
Hybrid III 50th Male Hip Range of Motion

Serial Number:	37	Date:	30-Jul-2013
Test Number:	1	Time:	10:34
Comments:	Right		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.2	°C	Pass
Humidity	10	-	70	54	%	Pass
Moment at 30°	0	≤	94.9	81.21	N-m	Pass
Angle at 203 Nm	40	-	50	44.98	deg	Pass
Average Velocity	5	-	10	6.98	deg/sec	Pass



Max: 7.57 deg/sec Min: 5.55 deg/sec



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,746.40 N	Yes

Test meets specifications.

Comments:

Technician

Approved

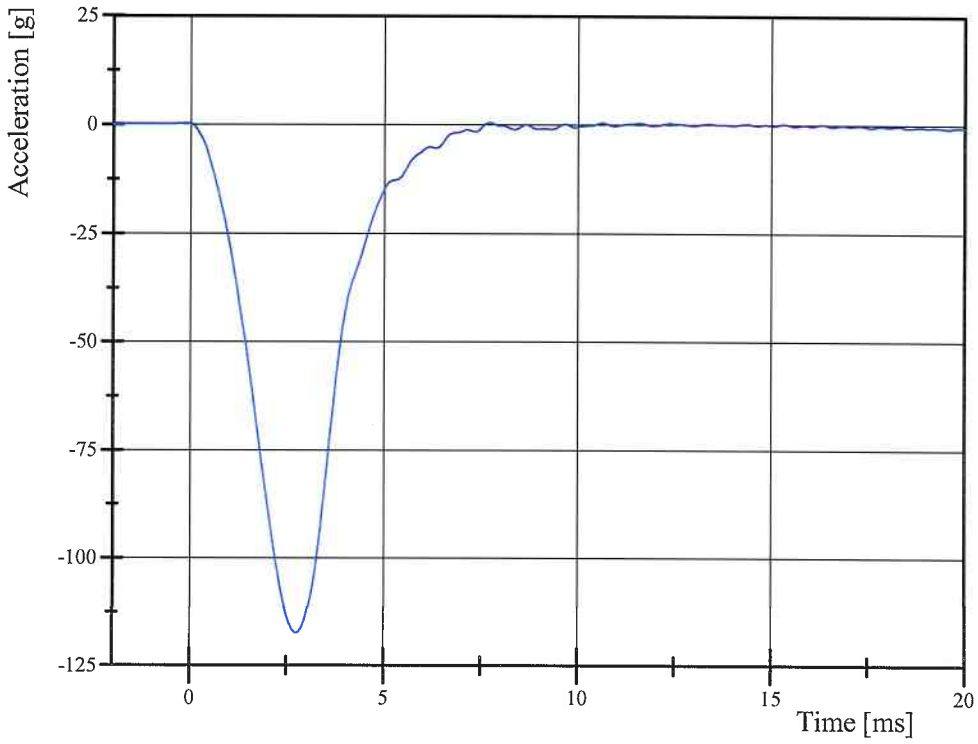
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

07.30.2013 13:11:42 1778

Transportation Research Center Inc.

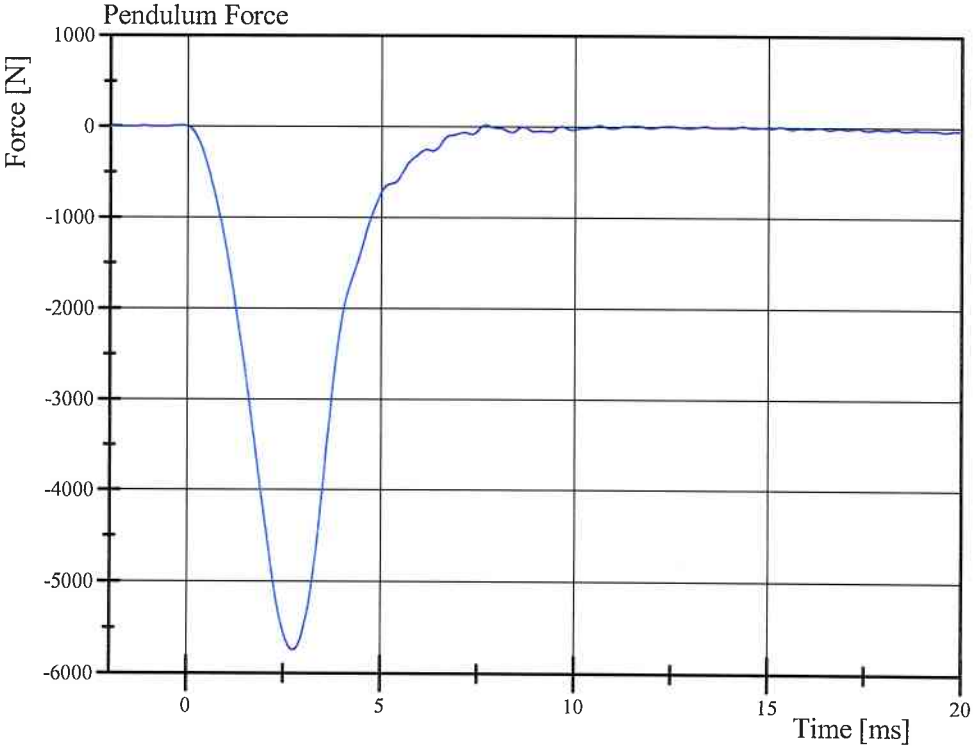
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.5 g at 7.7 ms
Min: -117.4 g at 2.7 ms

Pendulum Force



Filter Class: CFC_600
Max: 22.1 N at 7.7 ms
Min: -5,746.4 N at 2.7 ms

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

07.30.2013 13:11:48 1778

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,608.00 N	Yes

Test meets specifications.

Comments:

Technician

Approved

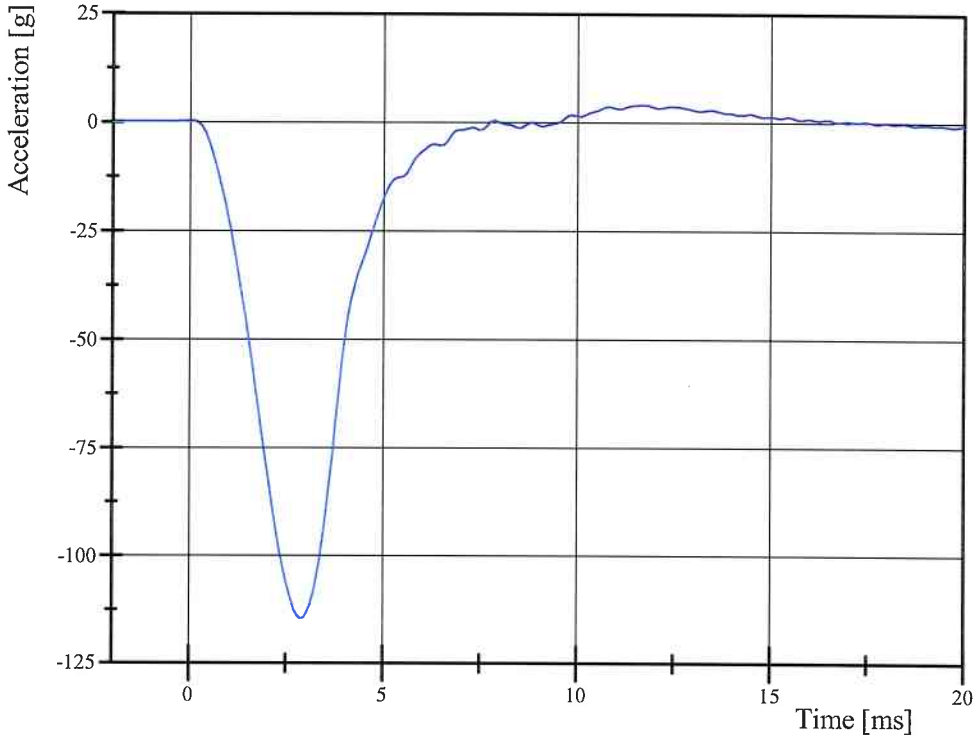
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

07.30.2013 13:41:25 1774

Transportation Research Center Inc.

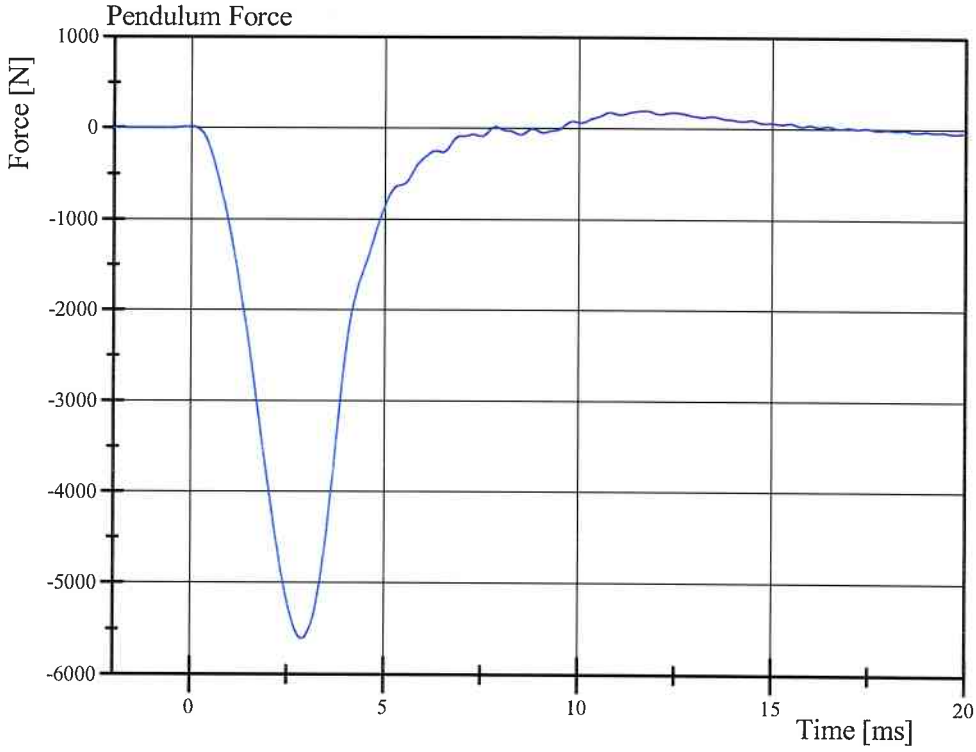
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 19-1
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 4.0 g at 11.7 ms
Min: -114.6 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 193.8 N at 11.7 ms
Min: -5,608.0 N at 2.9 ms

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

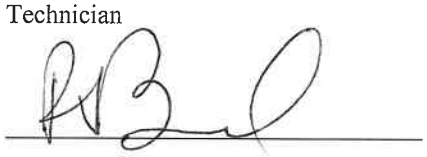
07.30.2013 13:41:33 1774

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 19

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	885	Yes
B	Shoulder Pivot Height	505.5 - 520.7	519	Yes
C	H-Point Height	83.8 - 88.9	85	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	92	Yes
F	Thigh Clearance	139.7 - 154.9	152	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	294	Yes
H	Skull Cap To Backline	40.6 - 45.7	45	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	340	Yes
J	Elbow Rest Height	190.5 - 210.8	200	Yes
K	Buttock Knee Length	579.1 - 604.5	600	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	495	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	225	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	428	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	987	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	430	Yes
BB	Location For Waist Circumference	226.1 - 231.1	230	Yes

Comments:

Technician



Approved

Revised 8/10/12

Pre-Test Calibration Sheets
Front Passenger S/N 426

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 426 Certification No. 20-3
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	275.1 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-5.7 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

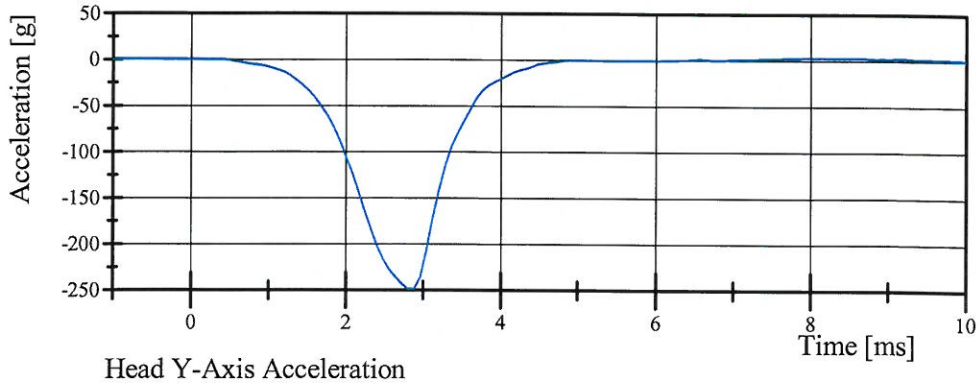
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.18.2013 15:44:16 606

Transportation Research Center Inc.

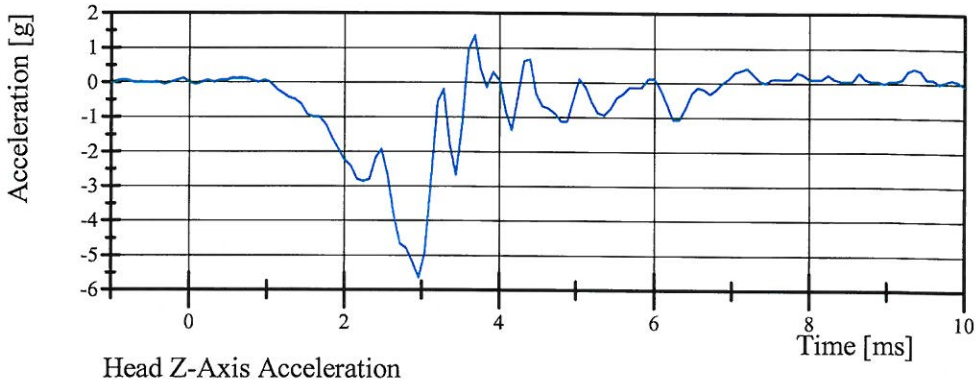
Front Head Drop
HIII 5th Serial No. 426 Certification No. 20-3
Test Date: 6/18/2013

Head X-Axis Acceleration



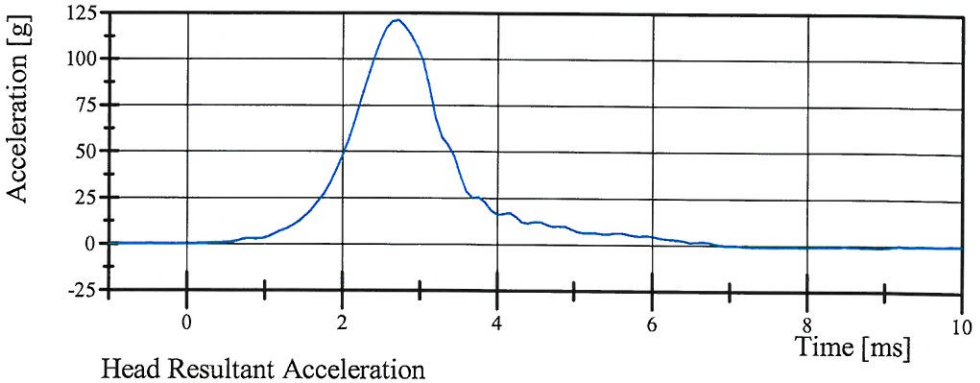
Filter Class: CFC_1000
Max: 2.6 g at 8.0 ms
Min: -248.9 g at 2.9 ms

Head Y-Axis Acceleration



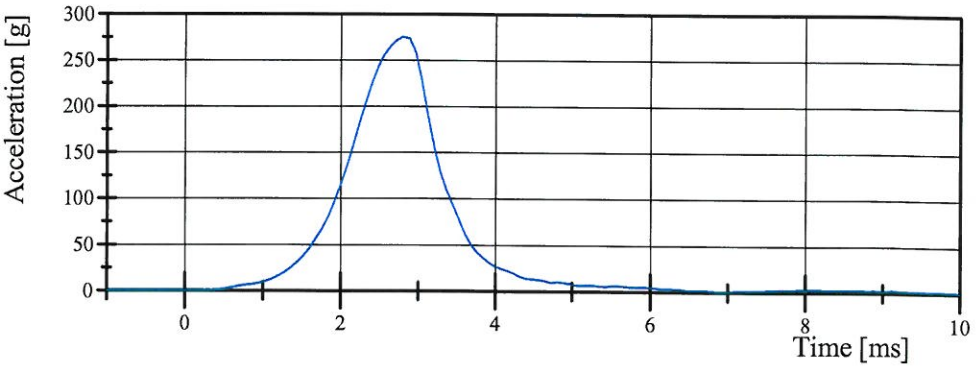
Filter Class: CFC_1000
Max: 1.4 g at 3.7 ms
Min: -5.7 g at 3.0 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 121.0 g at 2.7 ms
Min: -1.0 g at 8.9 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 275.1 g at 2.8 ms
Min: 0.0 g at -0.6 ms

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

06.18.2013 15:44:22 606

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 426 Certification No. 20-3
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.018 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.45 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.93 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.98 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-78.0 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	76.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	86.6 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

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

06.18.2013 12:24:05 1695

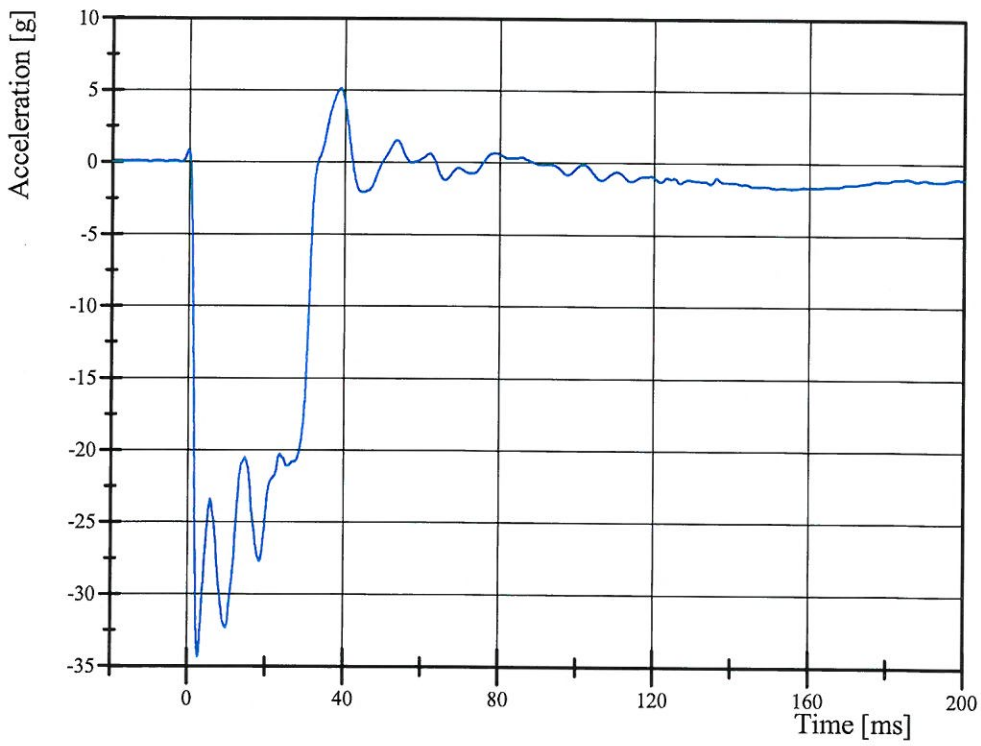
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 20-3

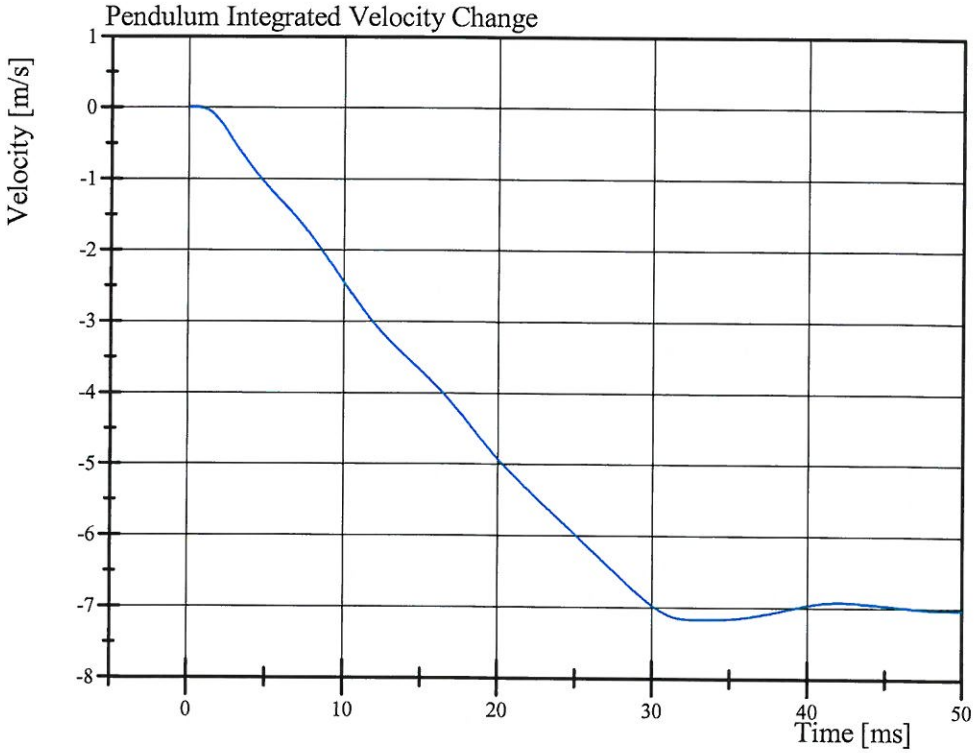
Test Date: 6/18/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 5.1 g at 39.0 ms
Min: -34.4 g at 2.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.4 ms
Min: -7.2 m/s at 33.2 ms

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

06.18.2013 12:24:14 1695

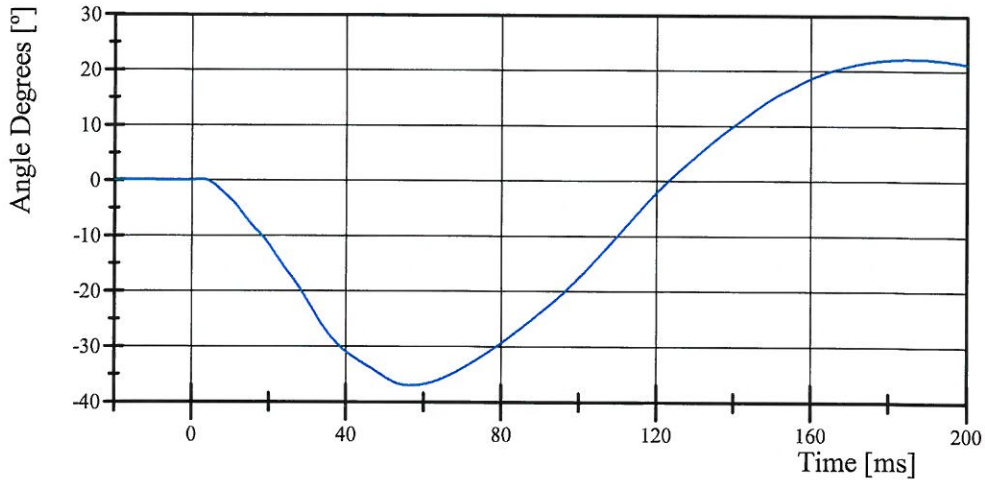
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 20-3

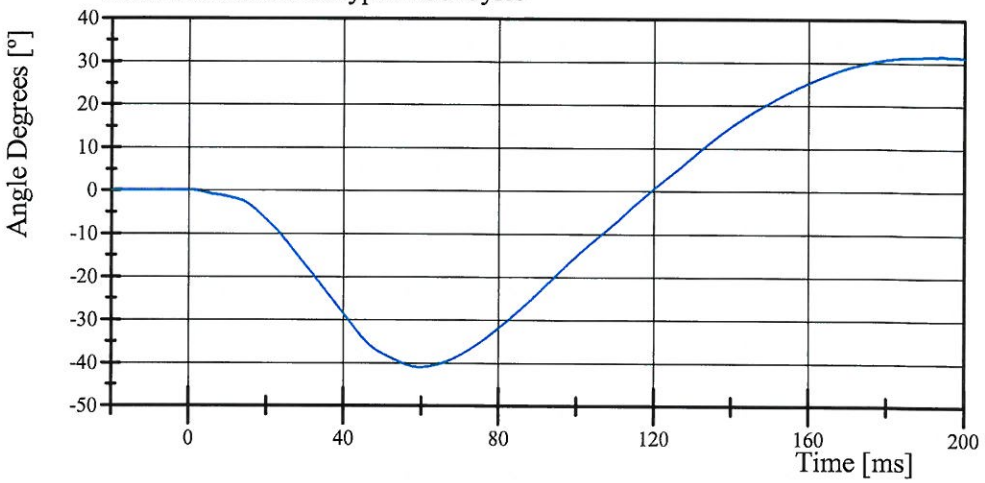
Test Date: 6/18/2013

Pot Rotation at the Base of Neck



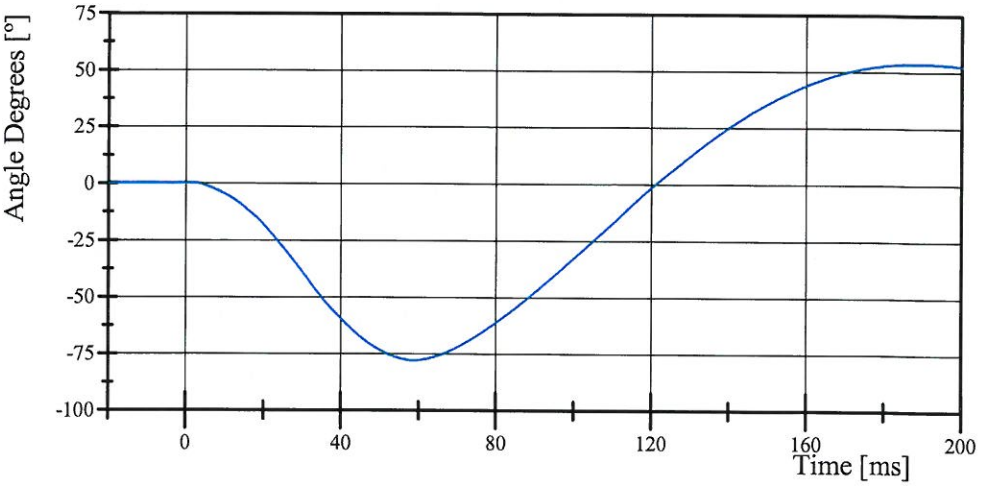
Filter Class: CFC_60
Max: 22.2 ° at 185.8 ms
Min: -37.1 ° at 56.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.5 ° at 194.2 ms
Min: -41.1 ° at 59.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 53.5 ° at 188.3 ms
Min: -78.0 ° at 58.7 ms

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

06.18.2013 12:24:15 1695

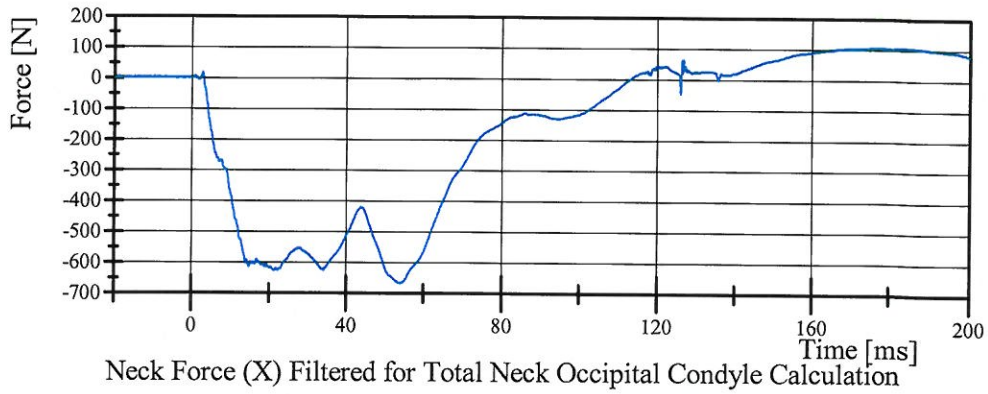
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 20-3

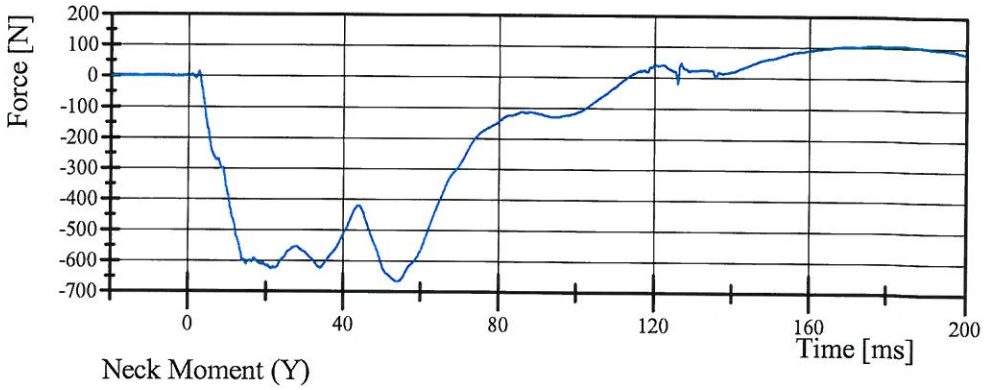
Test Date: 6/18/2013

Neck Force (X)



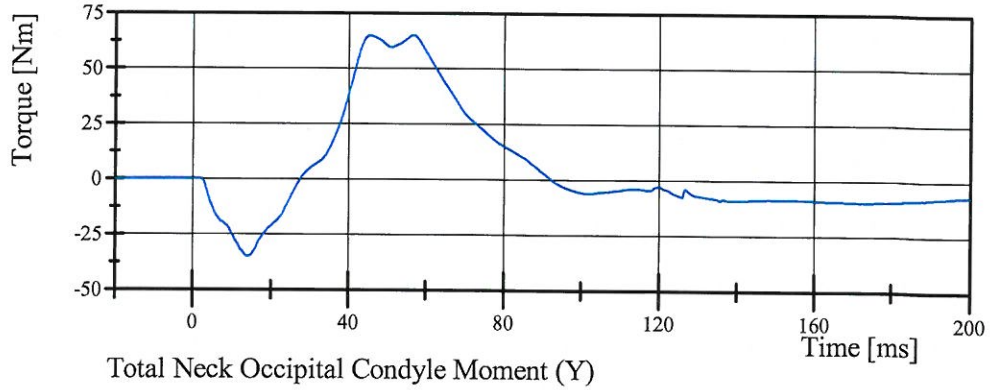
Filter Class: CFC_1000
Max: 106.2 N at 175.8 ms
Min: -667.6 N at 54.1 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



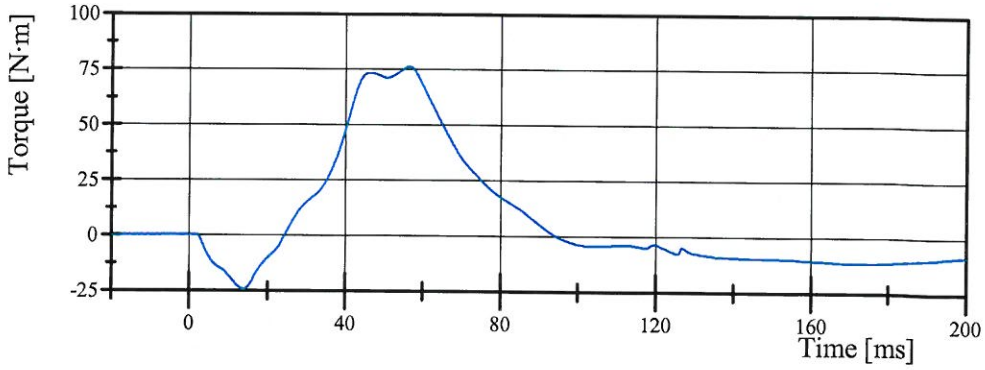
Filter Class: CFC_600
Max: 105.7 N at 177.1 ms
Min: -667.2 N at 54.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 65.0 Nm at 56.7 ms
Min: -35.2 Nm at 13.9 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 76.1 N·m at 56.5 ms
Min: -24.5 N·m at 13.8 ms

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

06.18.2013 12:24:16 1695

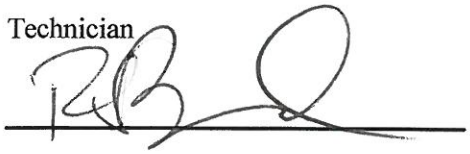
Transportation Research Center Inc.

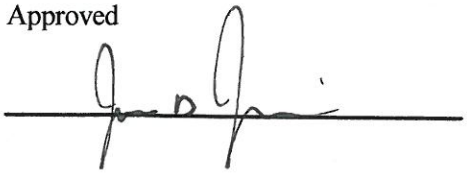
Neck Extension
HIII 5th Serial No. 426 Certification No. 20-3
Test Date: 6/19/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.151 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.87 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.84 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.60 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	106.8 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-63.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	102.6 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

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

06.19.2013 08:36:19 1803

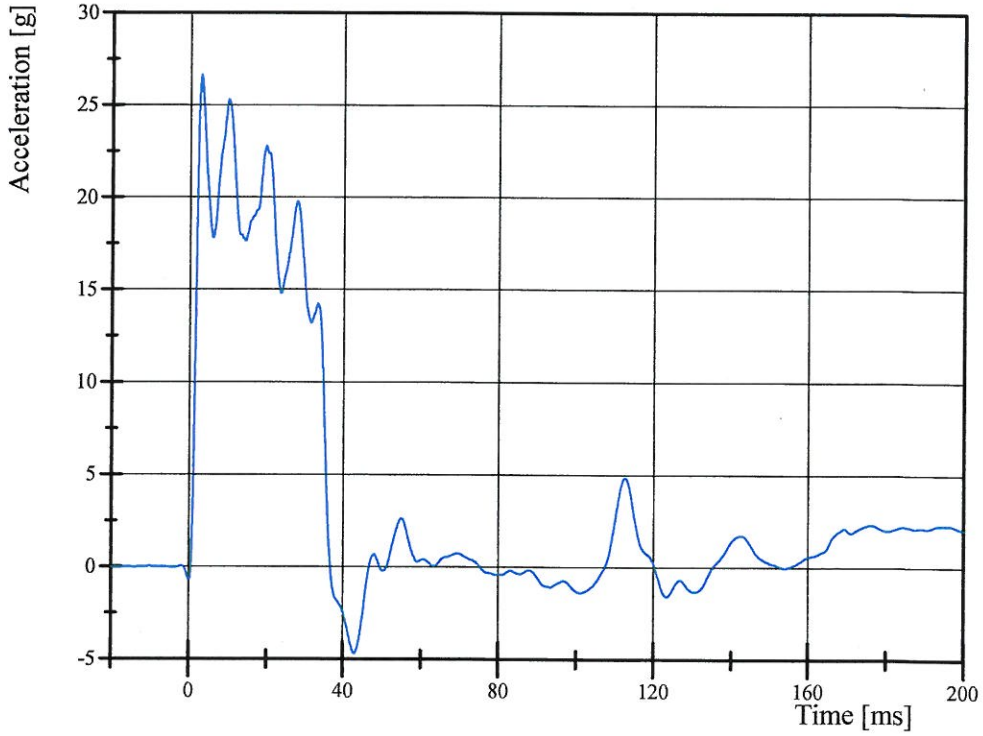
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 20-3

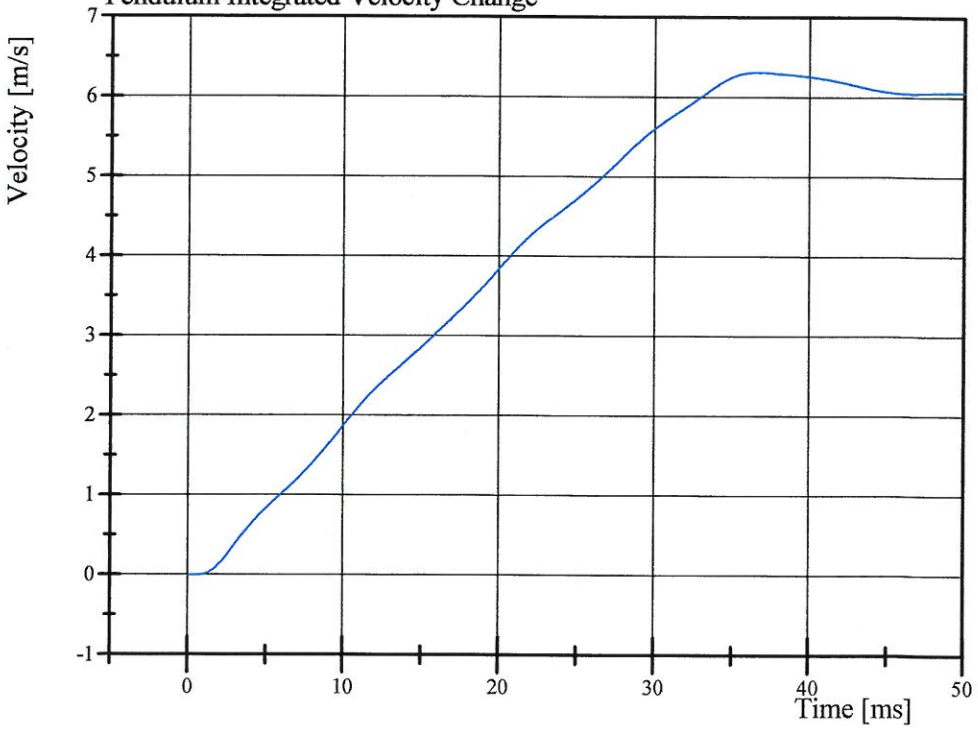
Test Date: 6/19/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 26.6 g at 2.9 ms
Min: -4.7 g at 42.9 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.3 m/s at 36.7 ms
Min: -0.0 m/s at 0.5 ms

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

06.19.2013 08:36:34 1803

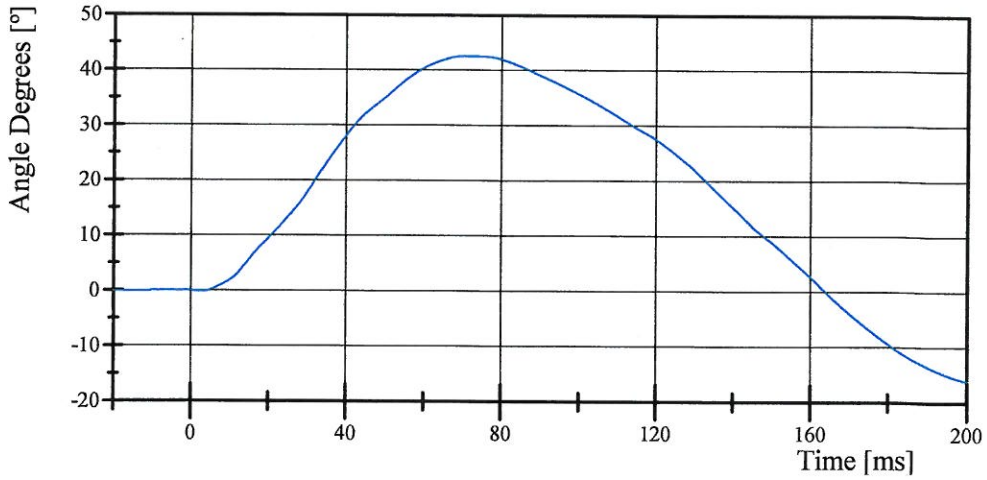
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 20-3

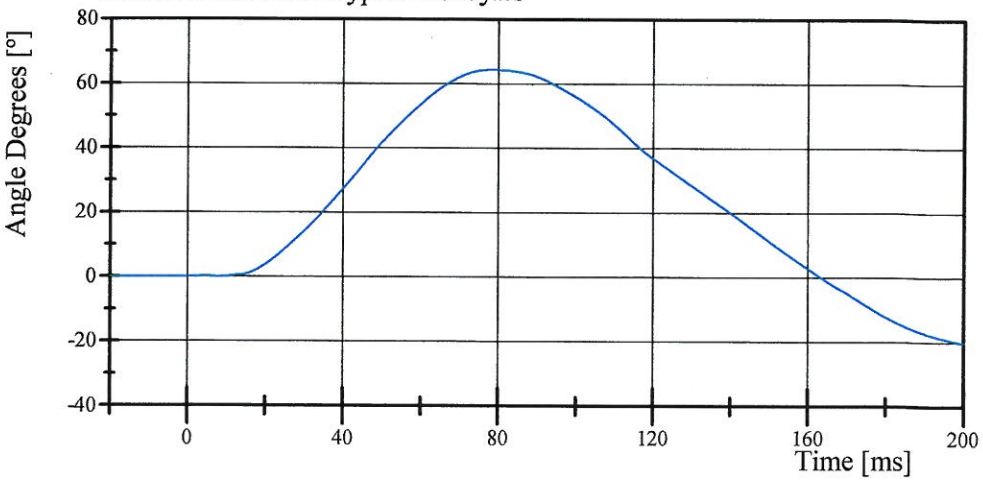
Test Date: 6/19/2013

Pot Rotation at the Base of Neck



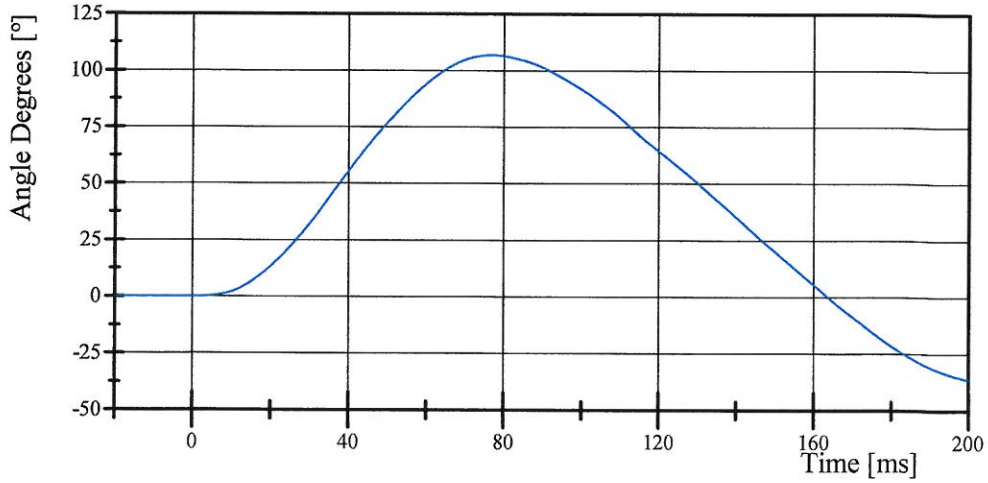
Filter Class: CFC_60
Max: 42.6 ° at 70.8 ms
Min: -16.0 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 64.4 ° at 78.5 ms
Min: -20.2 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 106.8 ° at 76.9 ms
Min: -36.2 ° at 200.0 ms

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

06.19.2013 08:36:34 1803

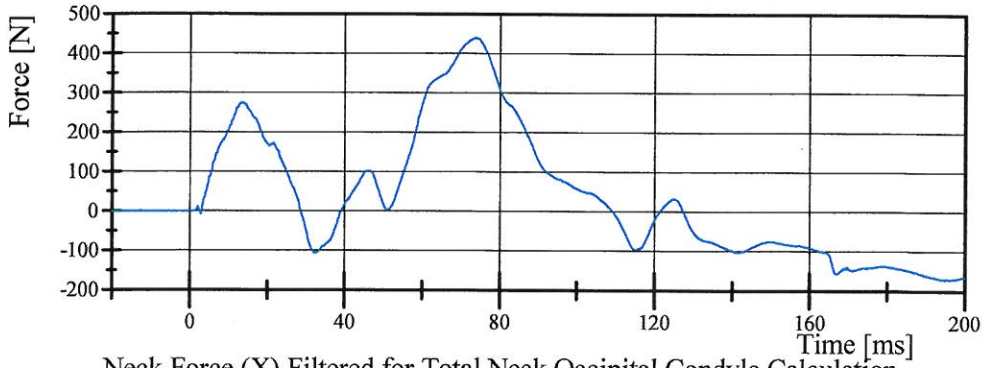
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 20-3

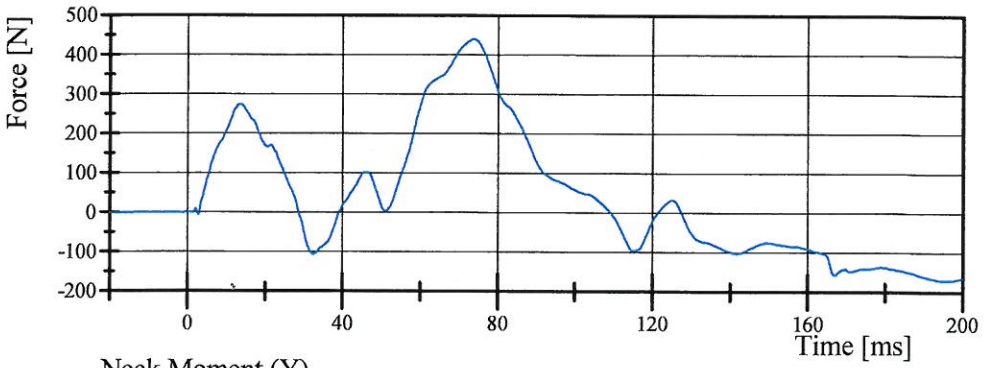
Test Date: 6/19/2013

Neck Force (X)



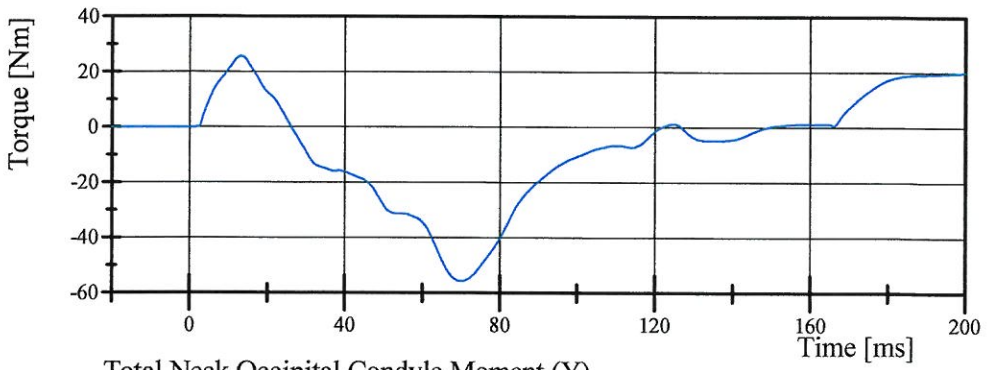
Filter Class: CFC_1000
Max: 440.9 N at 73.7 ms
Min: -170.7 N at 196.1 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



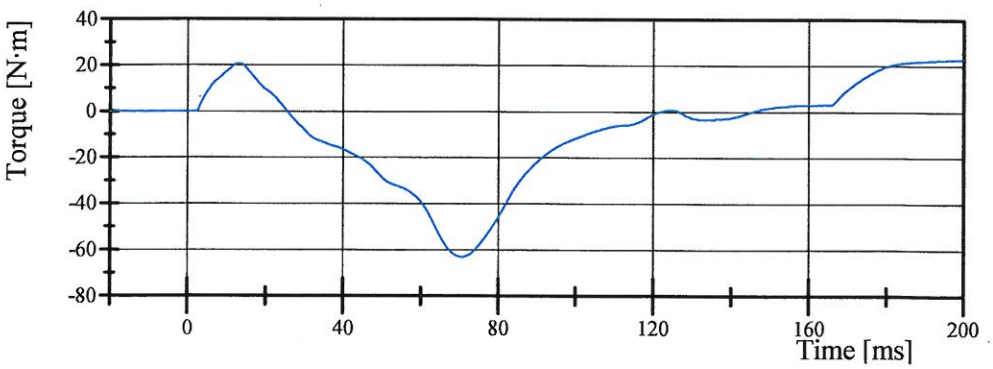
Filter Class: CFC_600
Max: 440.5 N at 73.7 ms
Min: -170.0 N at 196.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 25.6 Nm at 13.2 ms
Min: -55.7 Nm at 70.3 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Consta
Max: 22.9 N·m at 199.7 ms
Min: -63.1 N·m at 70.4 ms

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

06.19.2013 08:36:35 1803

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.736 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,348.6 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,301.3 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-53.5 mm	Yes
Internal Hysteresis	69 - 85 %	76.5 %	Yes

Test meets specifications.

Comments:

Technician

Approved

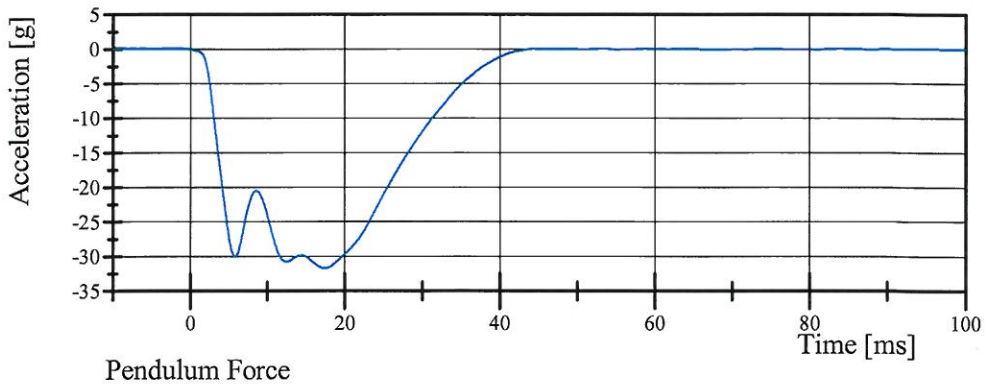
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.18.2013 13:55:46 380

Transportation Research Center Inc.

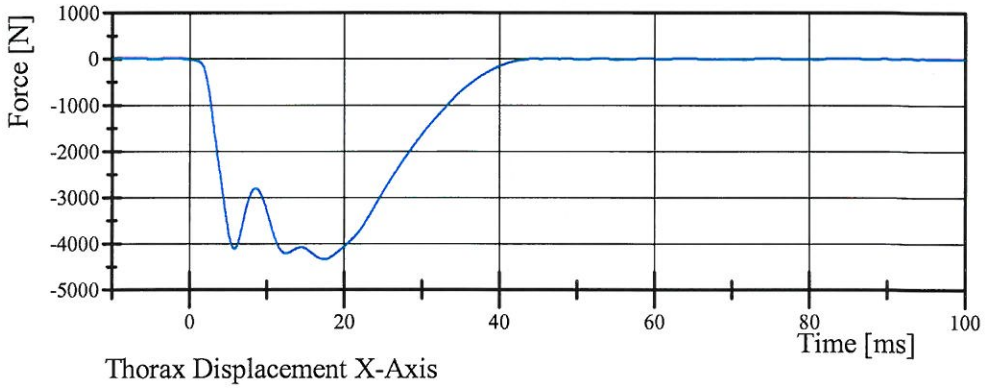
Front Thorax
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Pendulum Acceleration



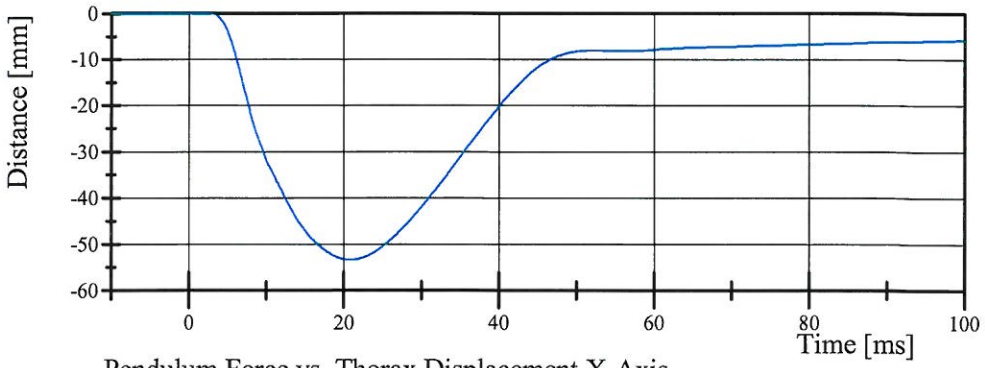
Filter Class: CFC_180
Max: 0.1 g at 53.4 ms
Min: -31.7 g at 17.4 ms

Pendulum Force



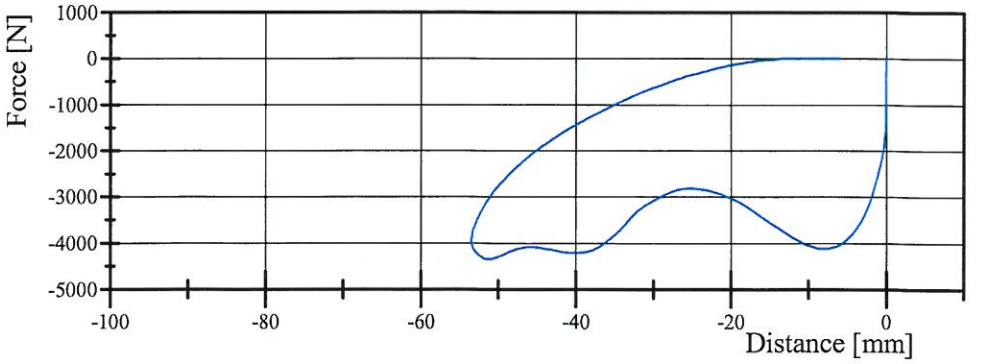
Filter Class: CFC_180
Max: 9.7 N at 53.4 ms
Min: -4,348.6 N at 17.4 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.9 ms
Min: -53.5 mm at 20.7 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 9.7 N at -8.1 mm
Min: -4,348.6 N at -51.2 mm

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

06.18.2013 13:55:59 380

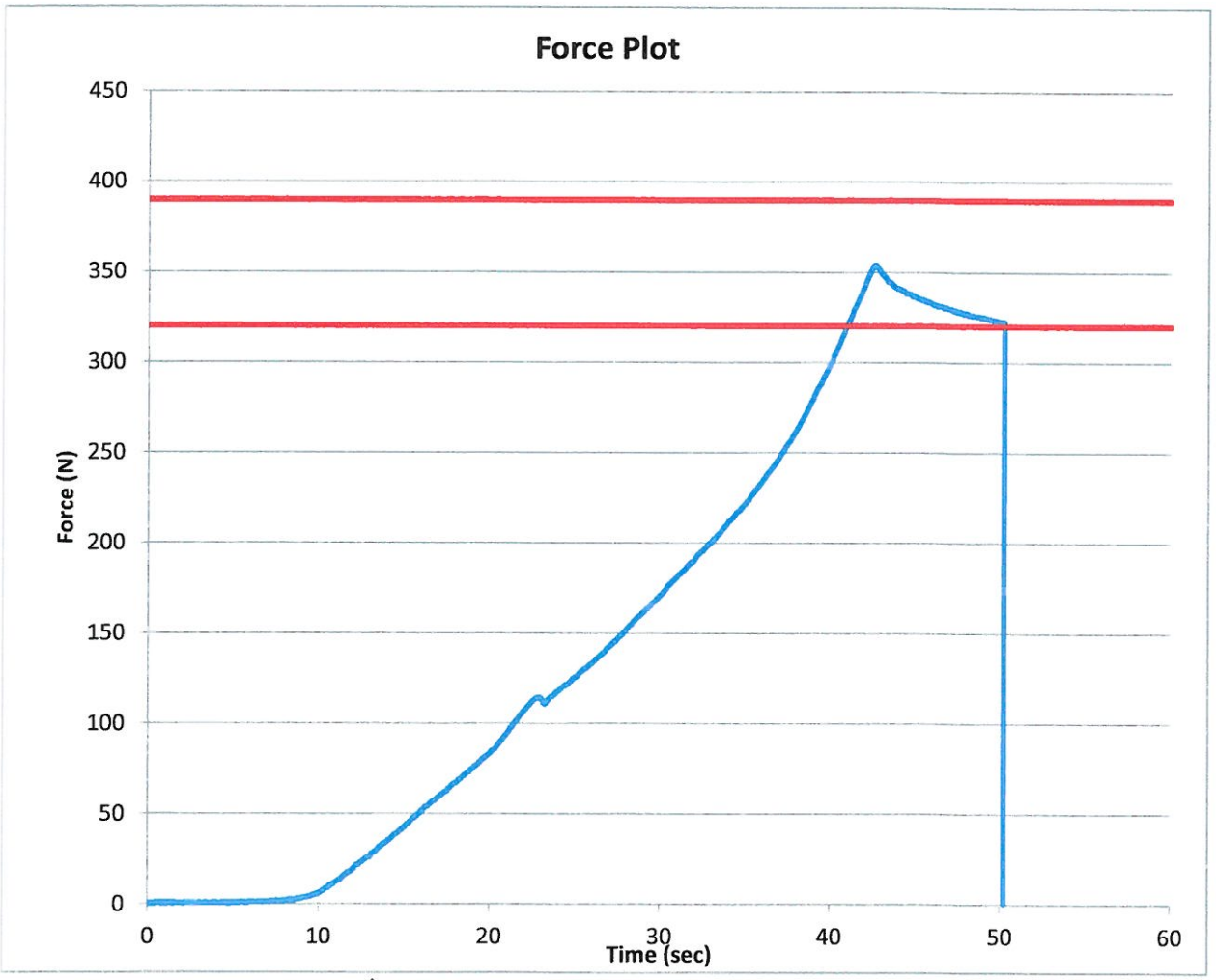
Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Serial Number:
Test Number:
Comments:

Date: 6/18/2013
Time: 11:38

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.8	°C	Pass
Humidity	10	-	70	55	%	Pass
Average Angular Velocity	0.5	-	1.5	0.93	deg/sec	Pass
Initial Angle	0	-	20	13.97	deg	Pass
Peak Force at 45.14°	320	-	390	354.16	N	Pass
Final Angle	-8	-	8	5.82	deg	Pass



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.113 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,902.8 N	Yes

Test meets specifications.

Comments:

Technician

Approved

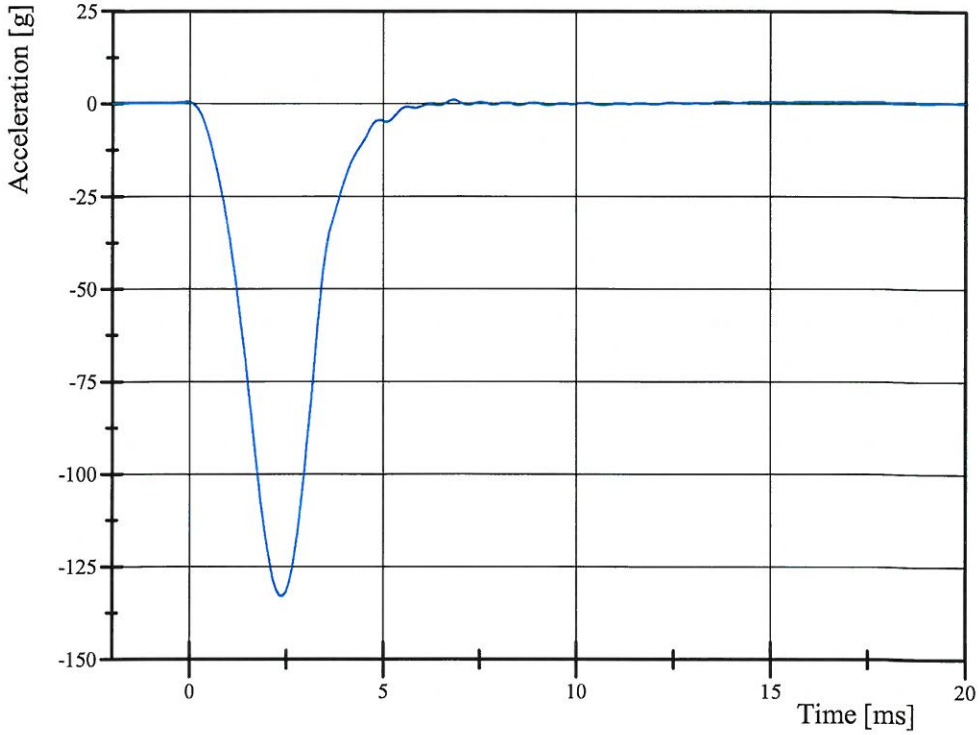
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.18.2013 08:39:25 1793

Transportation Research Center Inc.

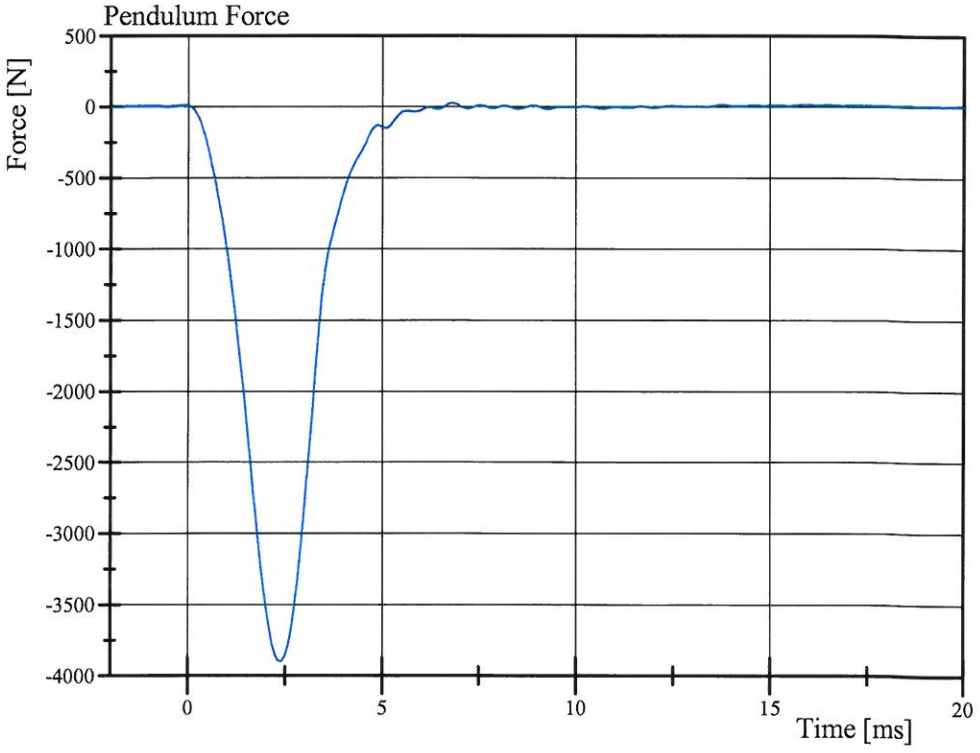
Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.9 g at 6.8 ms
Min: -133.1 g at 2.4 ms

Pendulum Force



Filter Class: CFC_600
Max: 26.0 N at 6.8 ms
Min: -3,902.8 N at 2.4 ms

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

06.18.2013 08:39:34 1793

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.112 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,717.9 N	Yes

Test meets specifications.

Comments:

Technician

Approved

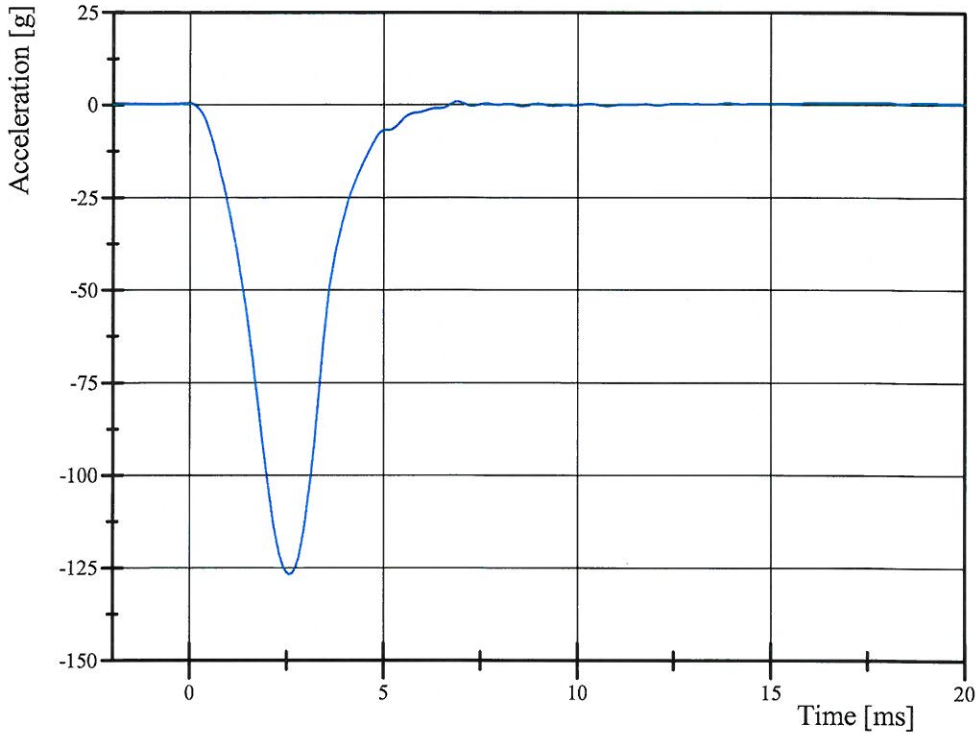
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.18.2013 08:45:47 1791

Transportation Research Center Inc.

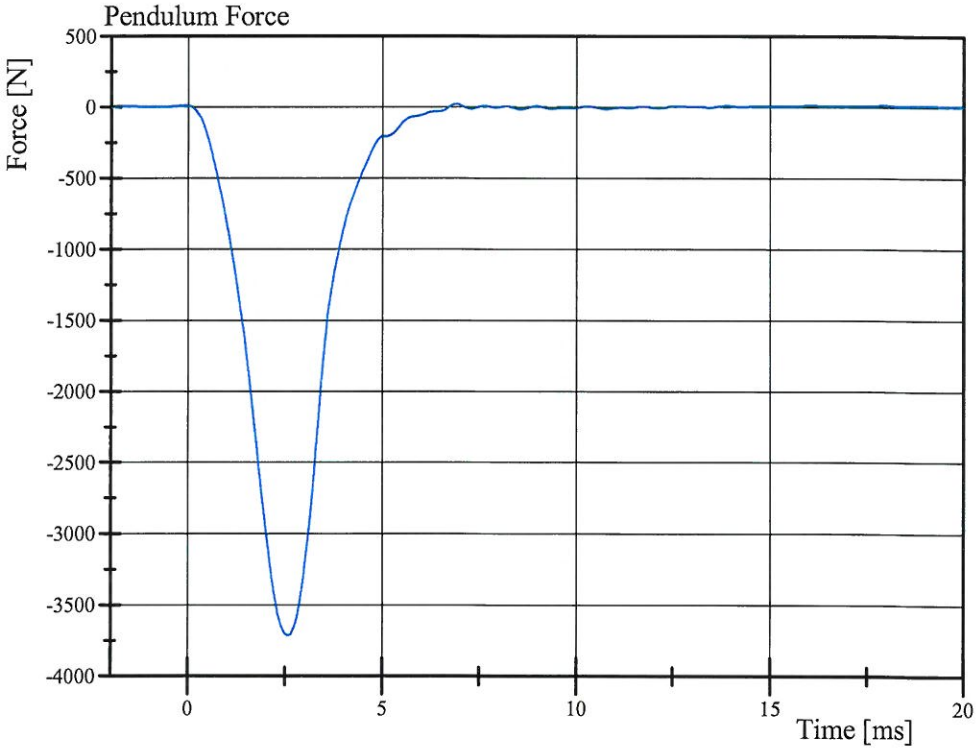
Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 20-1
Test Date: 6/18/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.7 g at 6.9 ms
Min: -126.8 g at 2.6 ms

Pendulum Force



Filter Class: CFC_600
Max: 20.4 N at 6.9 ms
Min: -3,717.9 N at 2.6 ms

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

06.18.2013 08:45:55 1791

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 20

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	444	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	78	Yes
F	Thigh Clearance	119.4 - 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	283	Yes
J	Elbow Rest Height	182.8 - 203.2	193	Yes
K	Buttock Knee Length	520.7 - 546.1	534	Yes
L	Popliteal Height	355.6 - 376.0	368	Yes
M	Knee Pivot Height	393.7 - 419.1	411	Yes
N	Buttock Popliteal Length	414.0 - 439.4	436	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	222	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	140	Yes
T	Head Depth	177.8 - 188.0	182	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	359	Yes
W	Foot Breadth	78.8 - 94.0	83	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	867	Yes
Z	Waist Circumference	759.5 - 789.9	773	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Technician

Approved

Revised 8/10/12

Passenger S/N 426

Post-Test Calibration Sheets

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	261.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	2.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

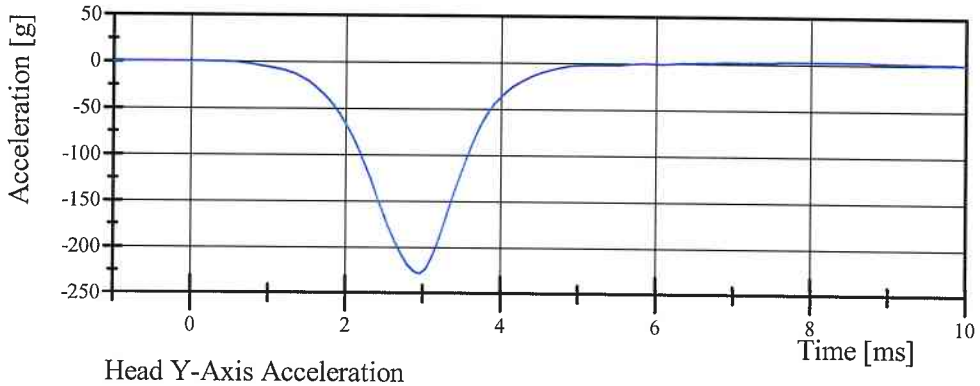
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.30.2013 12:56:30 604

Transportation Research Center Inc.

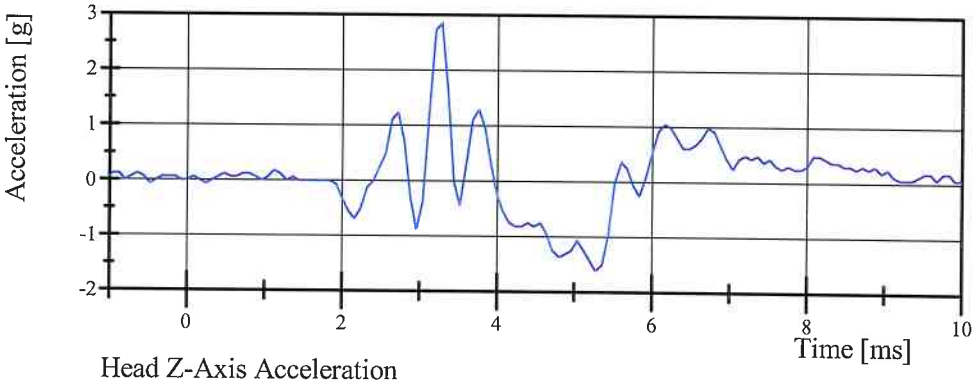
Front Head Drop
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Head X-Axis Acceleration



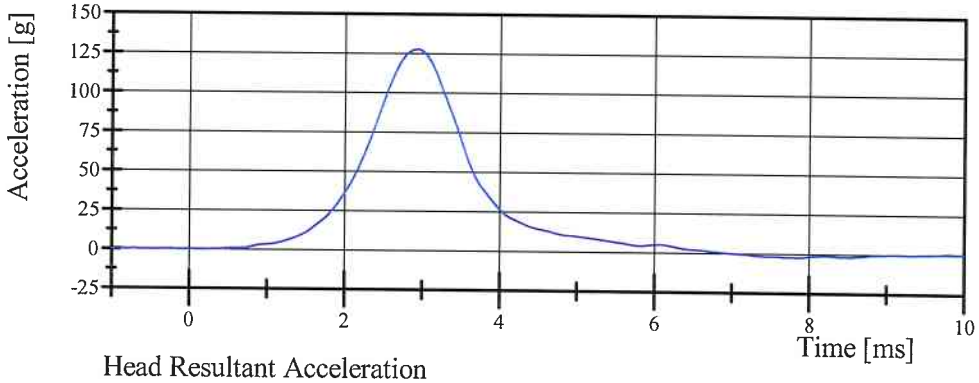
Filter Class: CFC_1000
Max: 2.3 g at 8.0 ms
Min: -228.5 g at 3.0 ms

Head Y-Axis Acceleration



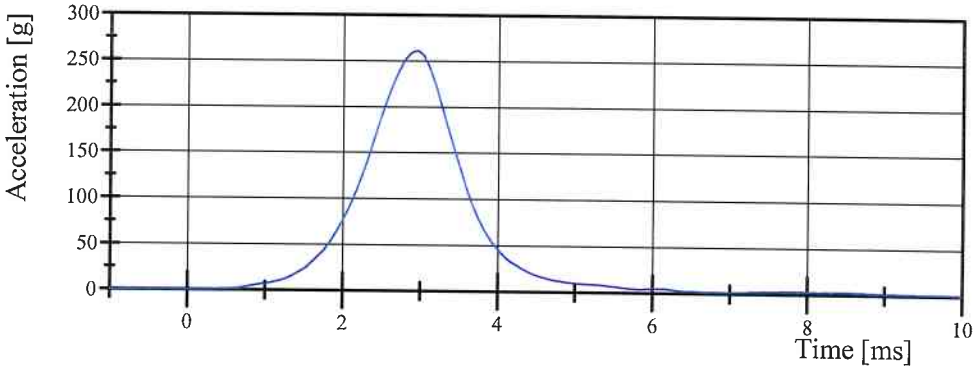
Filter Class: CFC_1000
Max: 2.8 g at 3.3 ms
Min: -1.6 g at 5.3 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 127.5 g at 3.0 ms
Min: -2.4 g at 7.8 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 261.7 g at 3.0 ms
Min: 0.0 g at -0.8 ms

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

07.30.2013 12:56:41 604

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 426 Certification No. 21-2
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.002 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.49 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.83 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.93 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-78.8 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	75.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	87.5 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

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

07.30.2013 14:03:02 1710

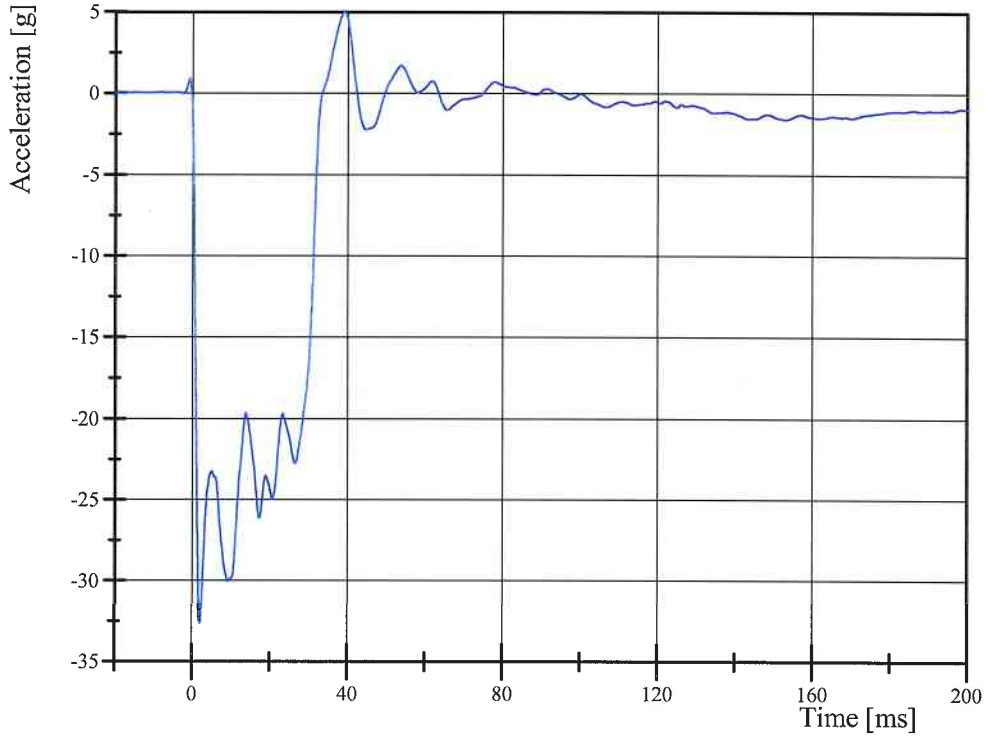
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 21-2

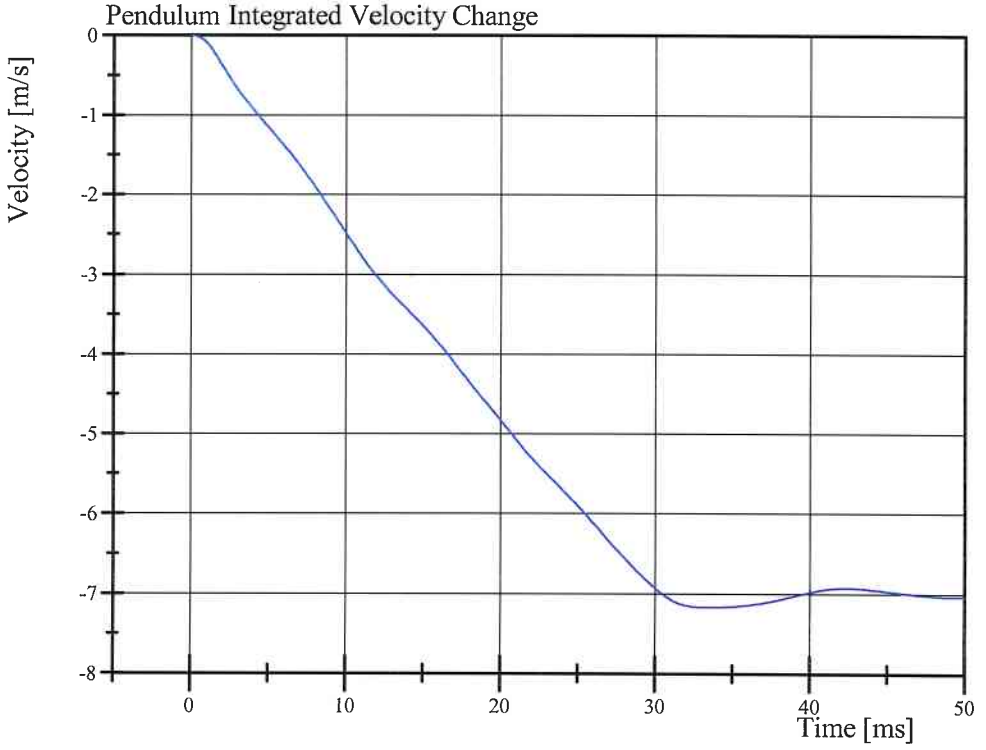
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 5.0 g at 39.1 ms
Min: -32.6 g at 2.0 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.2 m/s at 33.4 ms

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

07.30.2013 14:03:10 1710

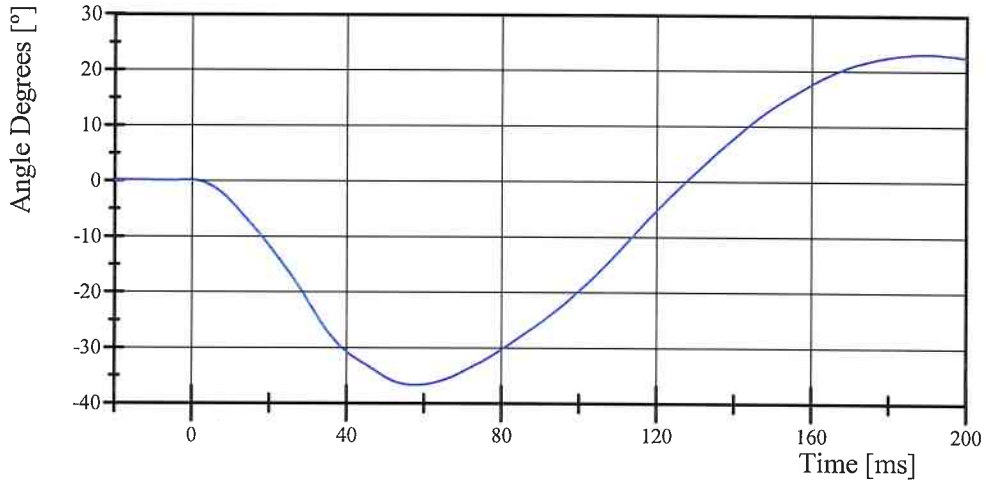
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 21-2

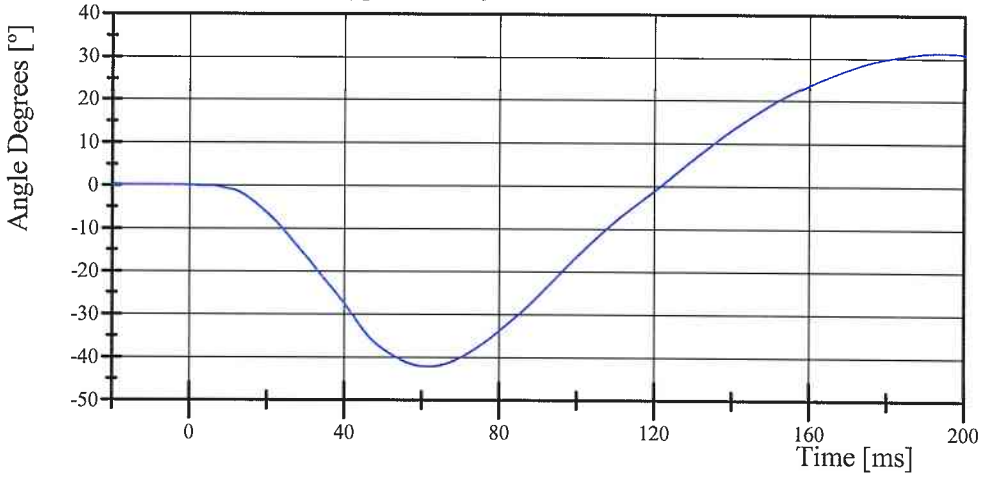
Test Date: 7/30/2013

Pot Rotation at the Base of Neck



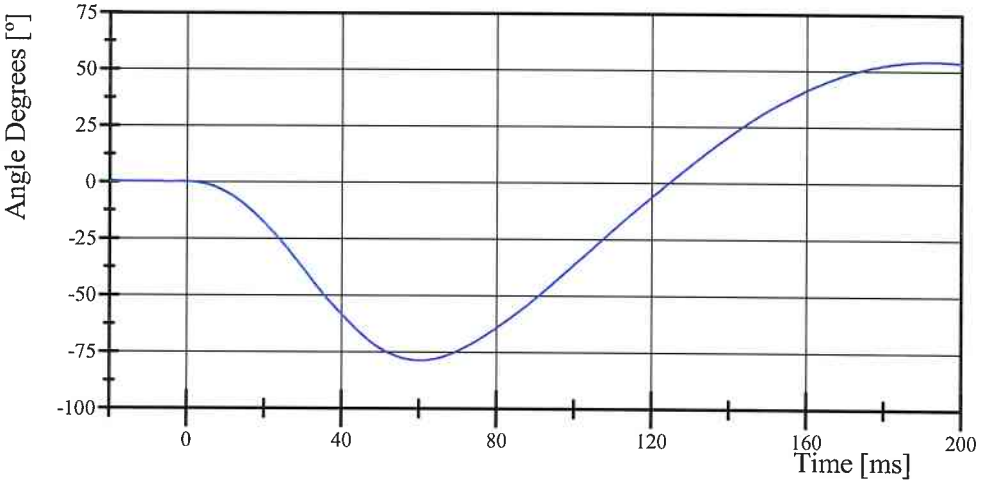
Filter Class: CFC_60
Max: 23.0 ° at 189.7 ms
Min: -36.8 ° at 57.6 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.2 ° at 193.8 ms
Min: -42.3 ° at 61.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 54.2 ° at 191.9 ms
Min: -78.8 ° at 60.4 ms

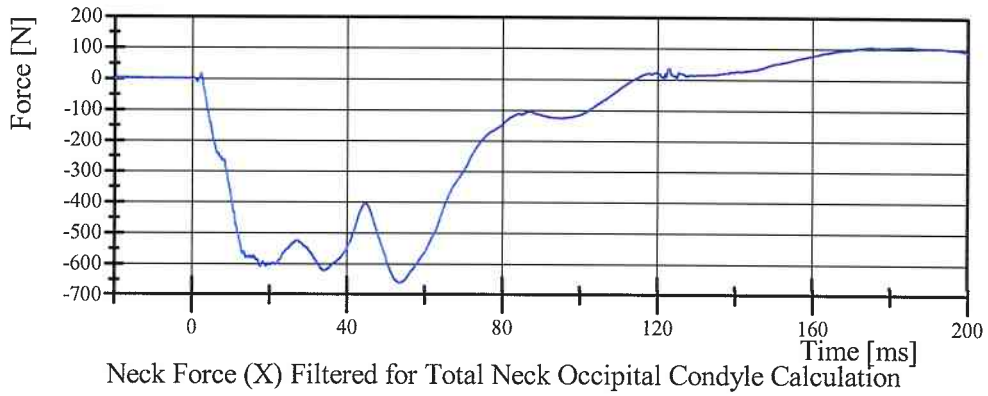
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.30.2013 14:03:11 1710

Transportation Research Center Inc.

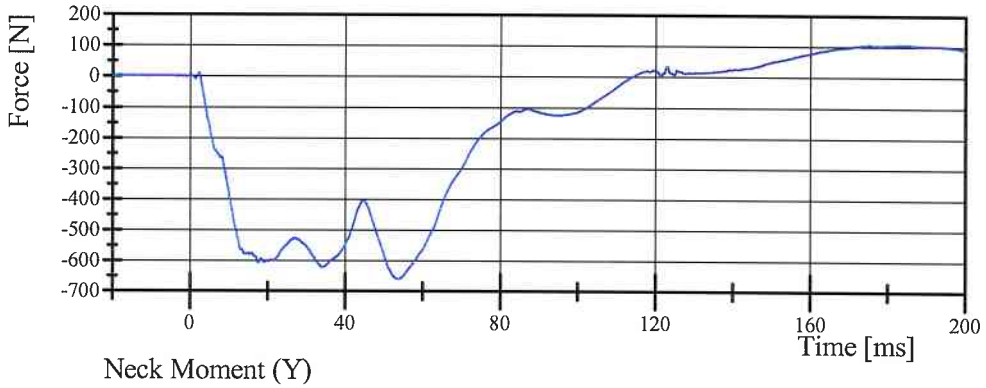
Neck Flexion
HIII 5th Serial No. 426 Certification No. 21-2
Test Date: 7/30/2013

Neck Force (X)



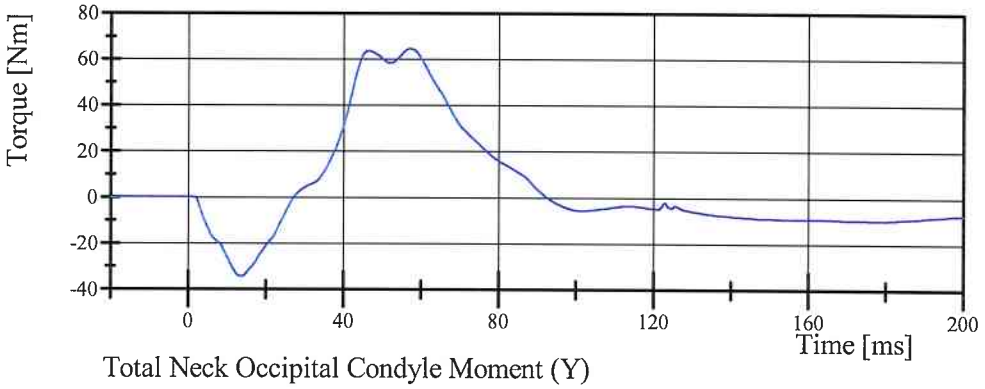
Filter Class: CFC_1000
Max: 106.4 N at 184.5 ms
Min: -660.8 N at 53.4 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



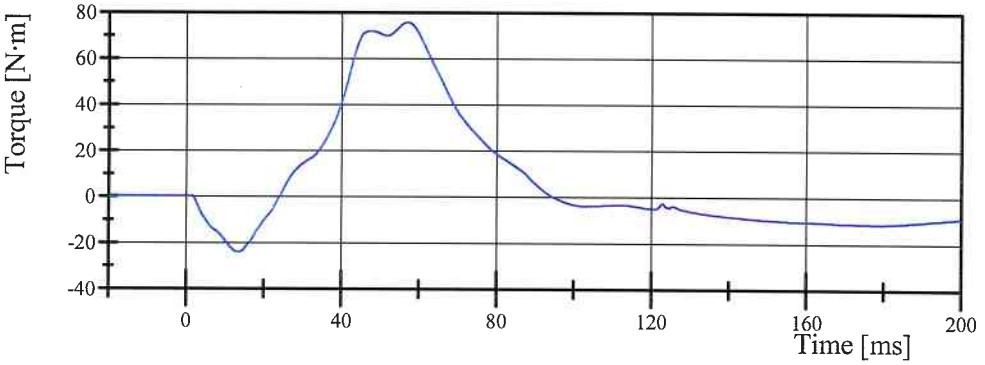
Filter Class: CFC_600
Max: 106.1 N at 184.9 ms
Min: -660.8 N at 53.6 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 64.6 Nm at 57.2 ms
Min: -34.6 Nm at 13.9 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 75.6 N·m at 56.9 ms
Min: -24.3 N·m at 13.3 ms

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

07.30.2013 14:03:12 1710

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 426 Certification No. 21-2
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.129 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.89 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.79 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.48 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	106.3 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-62.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	101.8 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

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

07.30.2013 15:42:37 1813

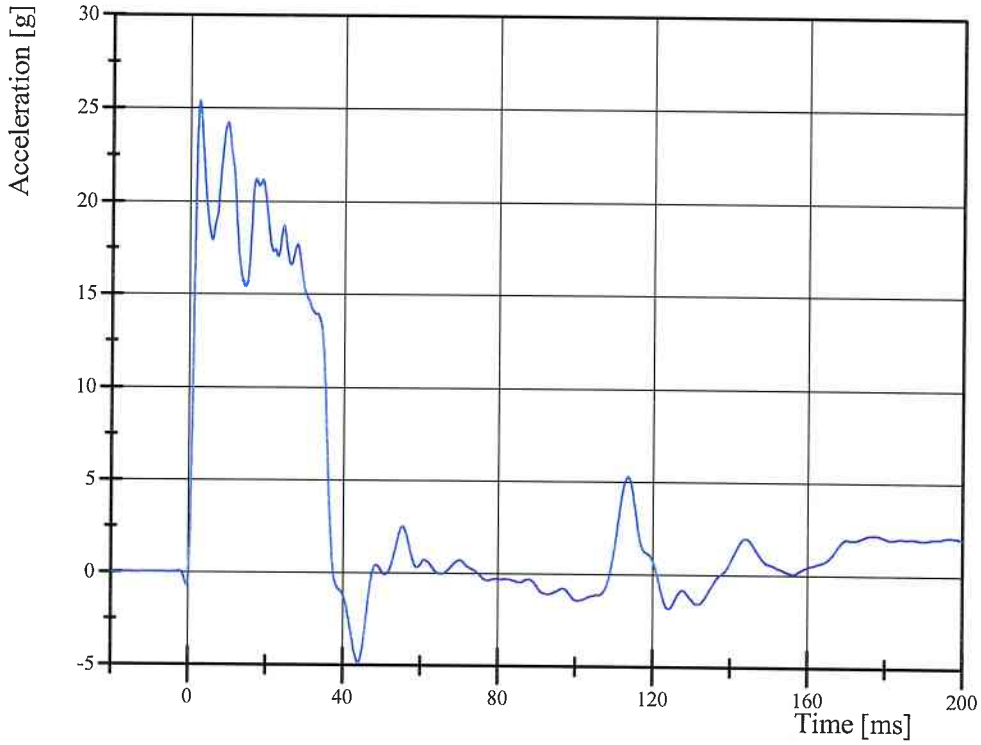
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 21-2

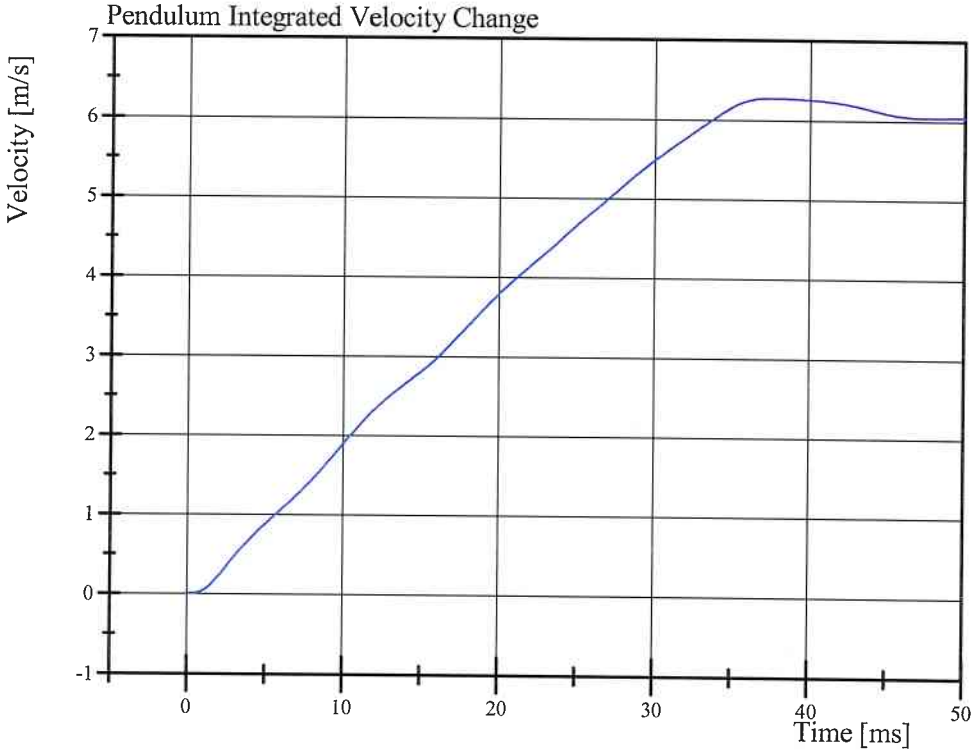
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 25.4 g at 2.4 ms
Min: -4.9 g at 44.0 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.3 m/s at 37.4 ms
Min: -0.0 m/s at 0.1 ms

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

07.30.2013 15:42:45 1813

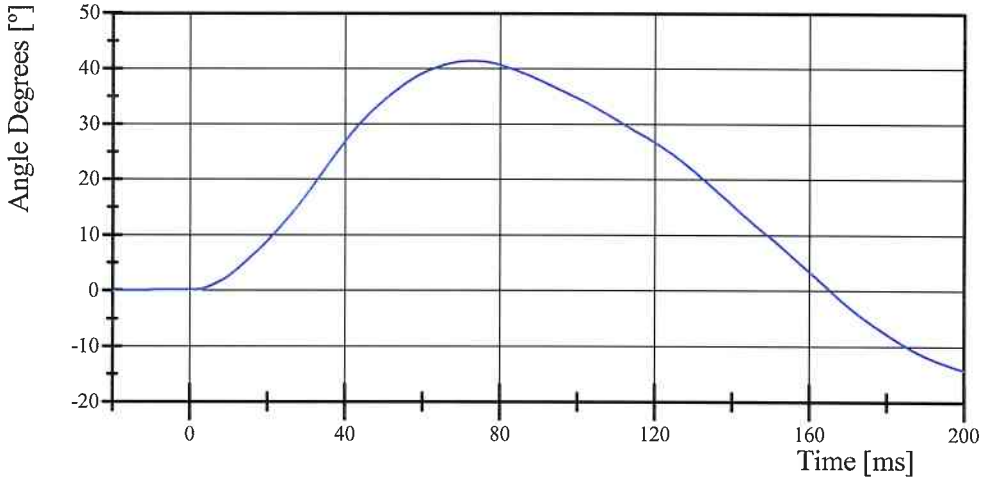
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 21-2

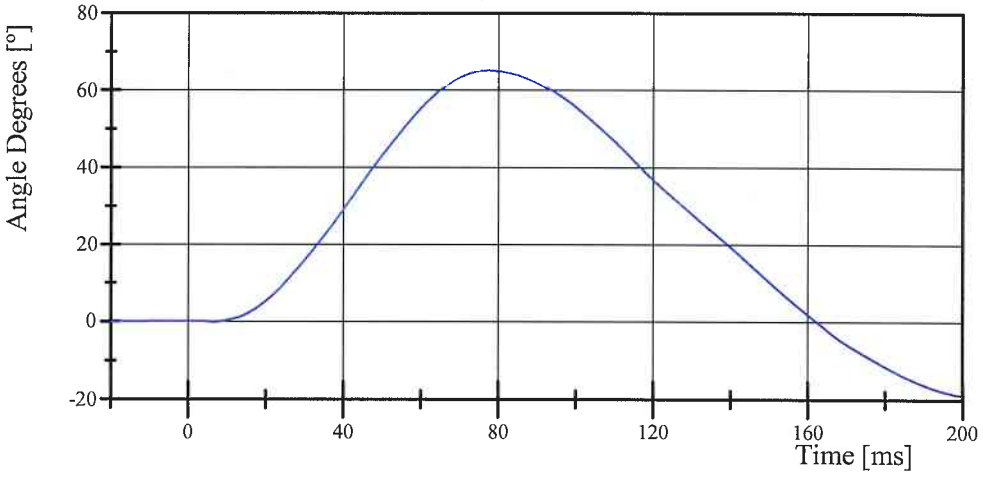
Test Date: 7/30/2013

Pot Rotation at the Base of Neck



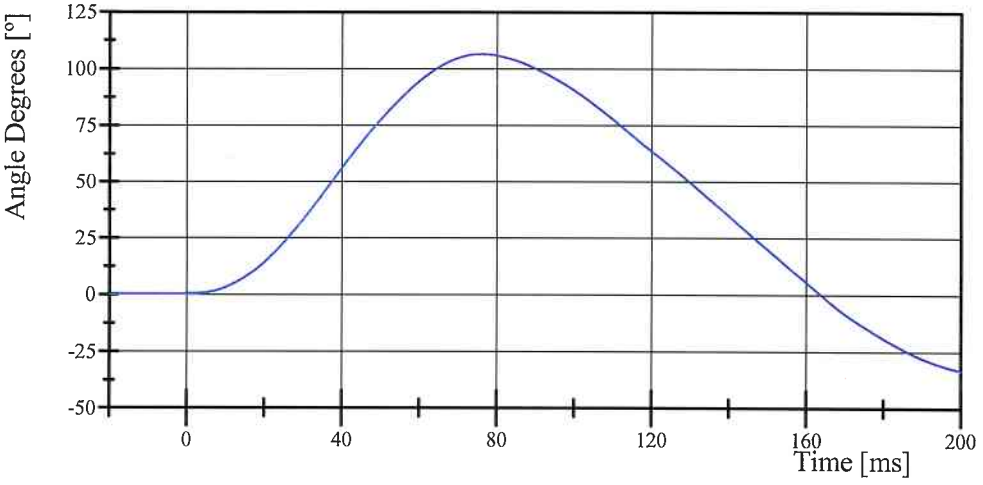
Filter Class: CFC_60
Max: 41.3 ° at 72.9 ms
Min: -14.3 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 65.2 ° at 77.4 ms
Min: -19.1 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 106.3 ° at 76.1 ms
Min: -33.3 ° at 200.0 ms

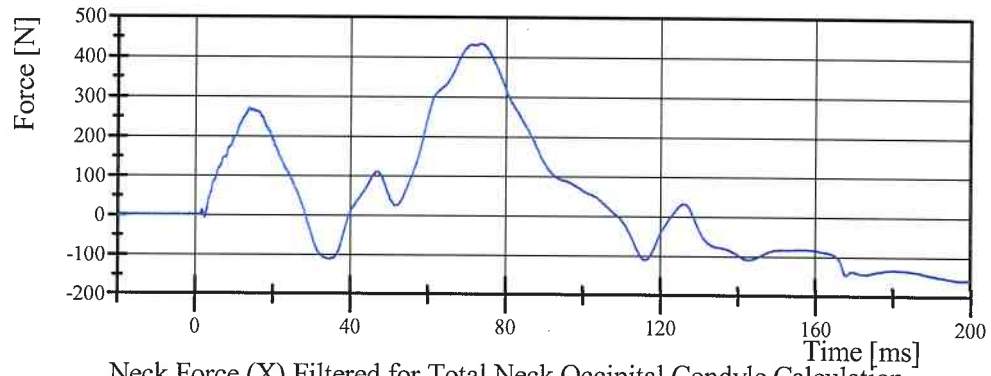
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.30.2013 15:42:46 1813

Transportation Research Center Inc.

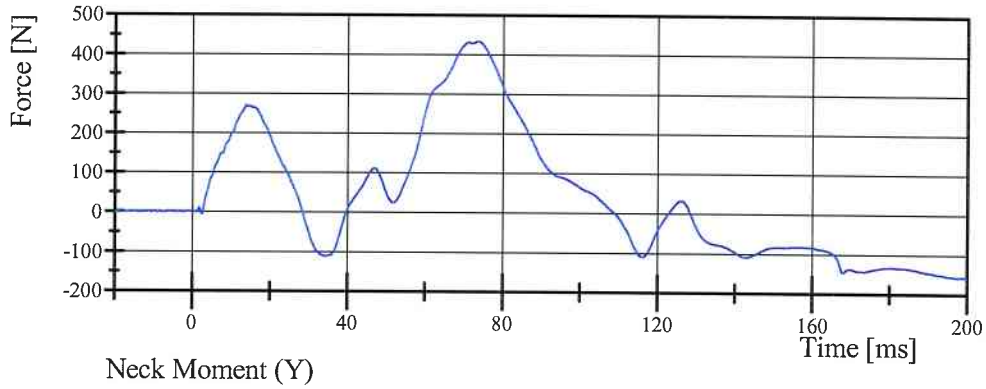
Neck Extension
HIII 5th Serial No. 426 Certification No. 21-2
Test Date: 7/30/2013

Neck Force (X)



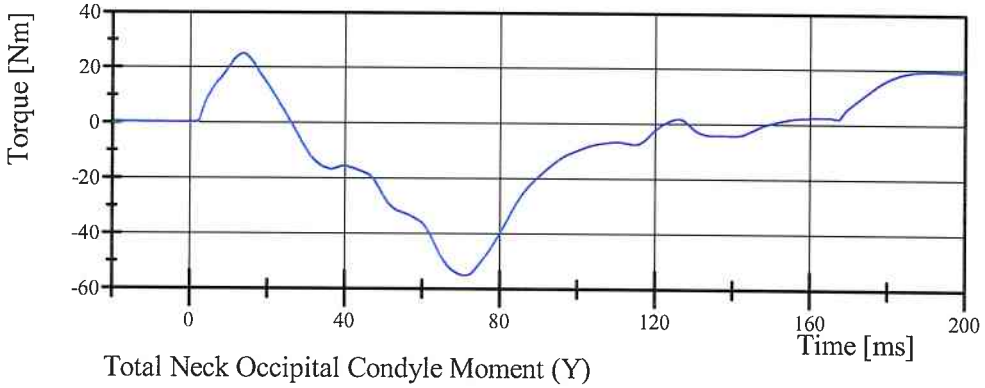
Filter Class: CFC_1000
Max: 434.4 N at 73.5 ms
Min: -158.9 N at 197.2 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



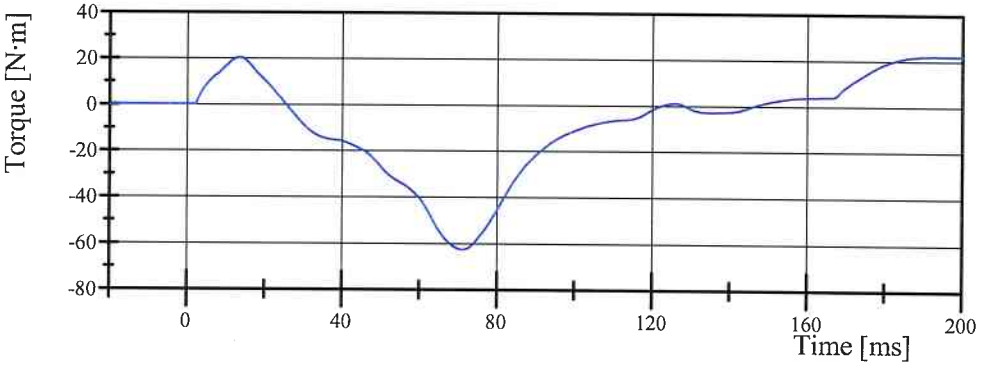
Filter Class: CFC_600
Max: 434.2 N at 73.6 ms
Min: -158.7 N at 197.9 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 25.0 Nm at 13.7 ms
Min: -55.1 Nm at 71.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 22.0 N·m at 193.3 ms
Min: -62.8 N·m at 71.2 ms

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

07.30.2013 15:42:47 1813

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/31/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.732 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,374.7 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,346.0 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-53.1 mm	Yes
Internal Hysteresis	69 - 85 %	76.1 %	Yes

Test meets specifications.

Comments:

Technician

Approved

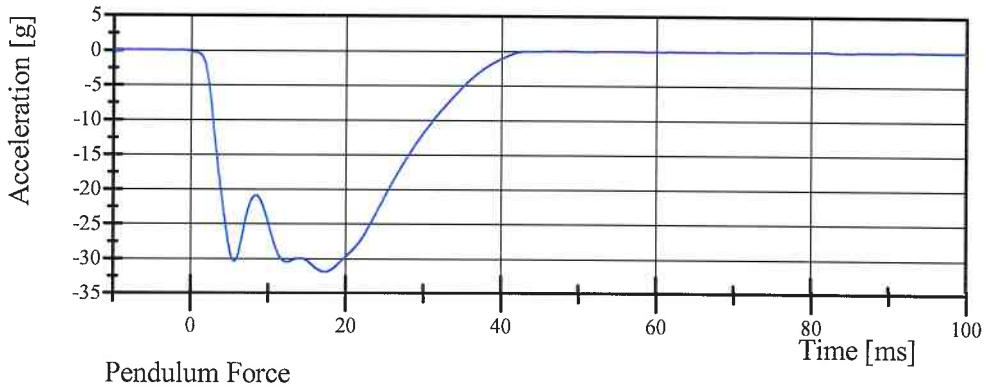
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.31.2013 09:25:53 388

Transportation Research Center Inc.

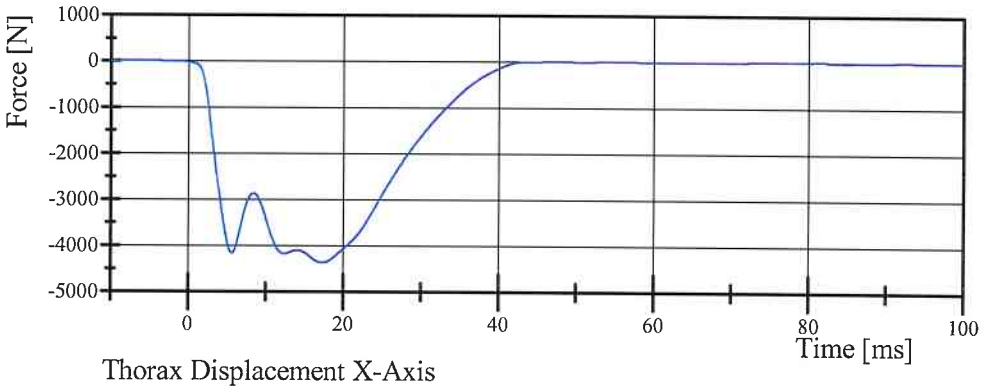
Front Thorax
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/31/2013

Pendulum Acceleration



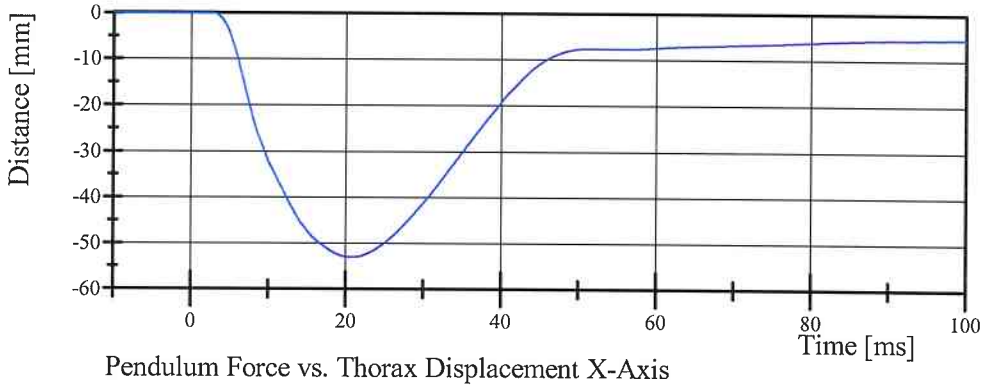
Filter Class: CFC_180
Max: 0.1 g at 81.4 ms
Min: -31.9 g at 17.3 ms

Pendulum Force



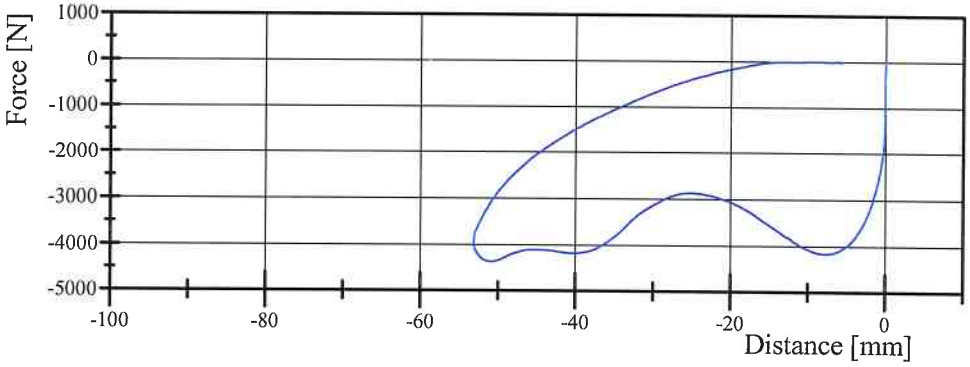
Filter Class: CFC_180
Max: 10.2 N at 81.4 ms
Min: -4,374.7 N at 17.3 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -3.0 ms
Min: -53.1 mm at 20.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 10.2 N at -6.1 mm
Min: -4,374.7 N at -50.8 mm

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

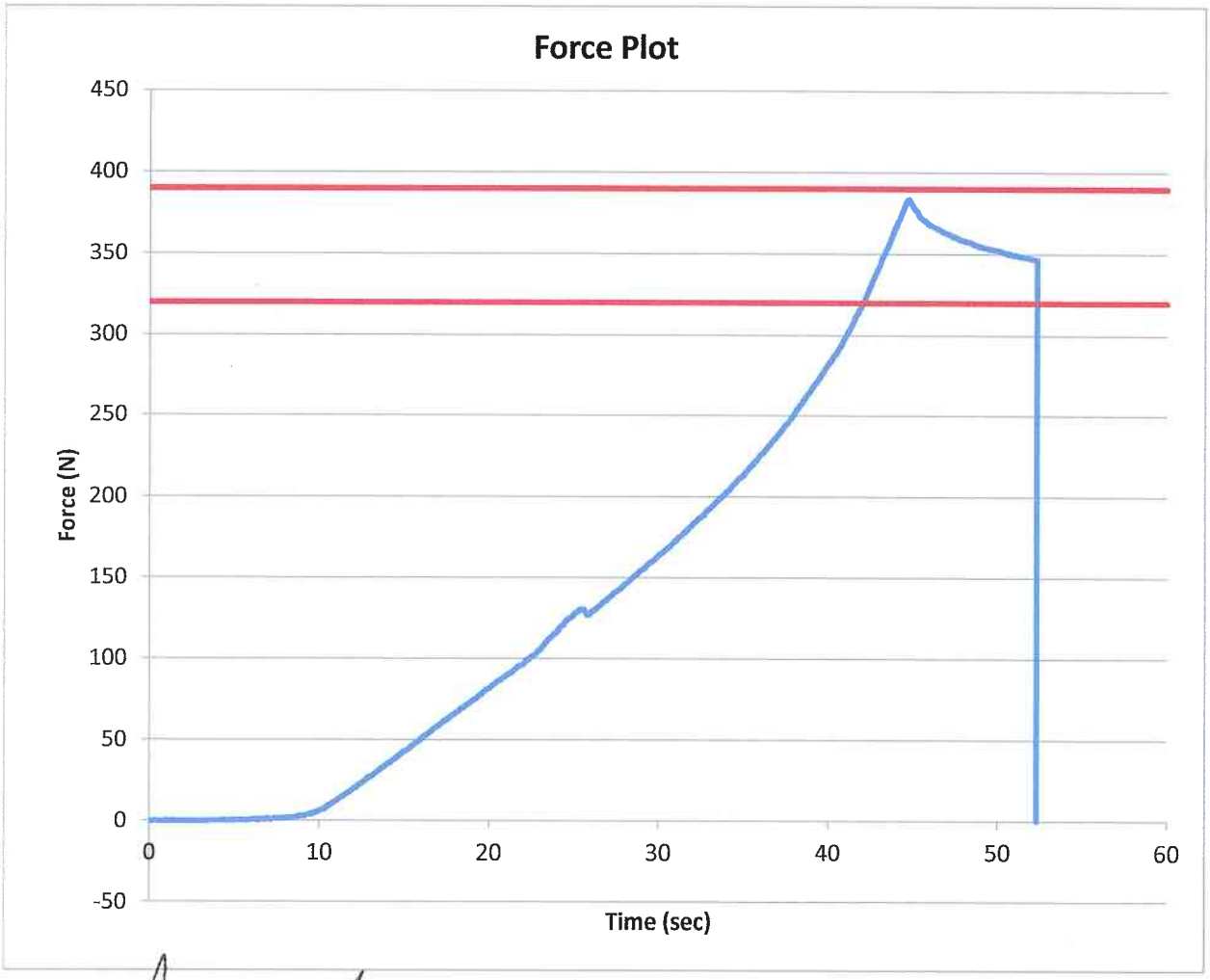
07.31.2013 09:26:12 388

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Serial Number:	426	Date:	7/30/2013
Test Number:	1	Time:	9:52
Comments:			

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.3	°C	Pass
Humidity	10	-	70	57	%	Pass
Average Angular Velocity	0.5	-	1.5	0.92	deg/sec	Pass
Initial Angle	0	-	20	12.93	deg	Pass
Peak Force at 45.21°	320	-	390	383.32	N	Pass
Final Angle	-8	-	8	5.6	deg	Pass



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.103 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,647.7 N	Yes

Test meets specifications.

Comments:

Technician

Approved

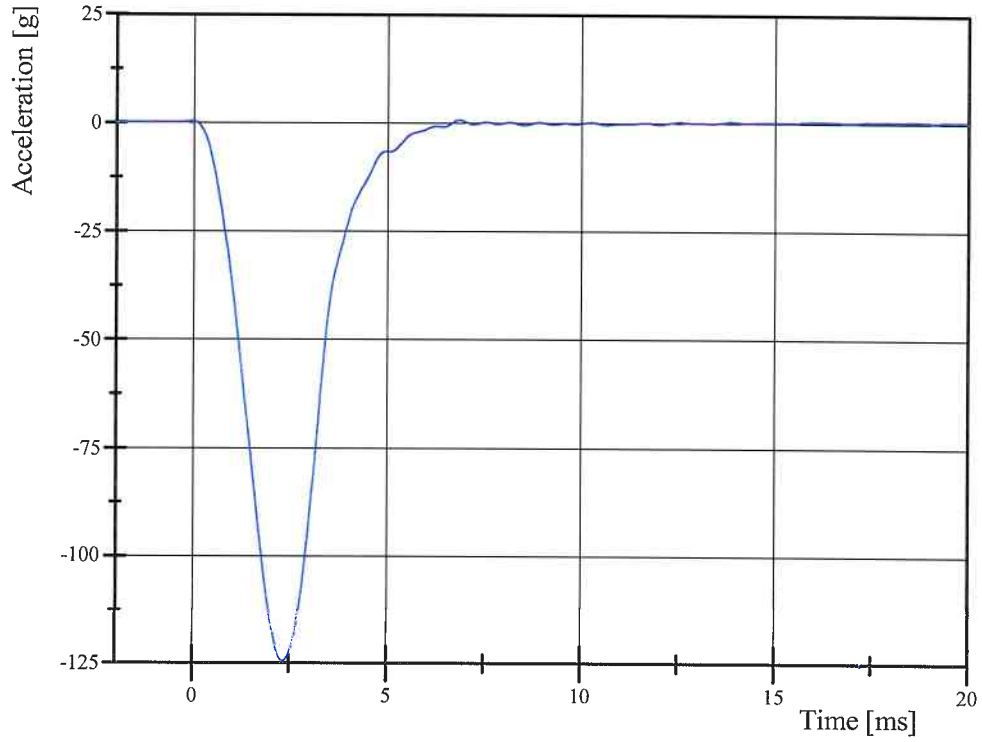
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.30.2013 15:54:11 1856

Transportation Research Center Inc.

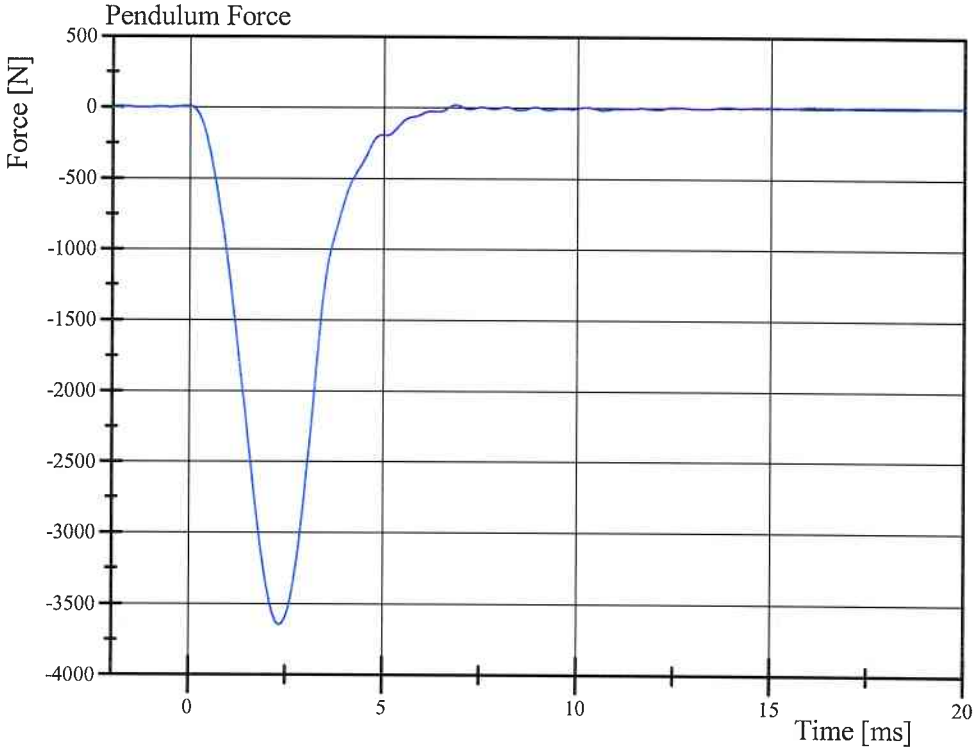
Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.6 g at 6.9 ms
Min: -124.4 g at 2.3 ms

Pendulum Force



Filter Class: CFC_600
Max: 18.5 N at 6.9 ms
Min: -3,647.7 N at 2.3 ms

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

07.30.2013 15:54:23 1856

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	55 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.099 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,629.1 N	Yes

Test meets specifications.

Comments:

Technician

Approved

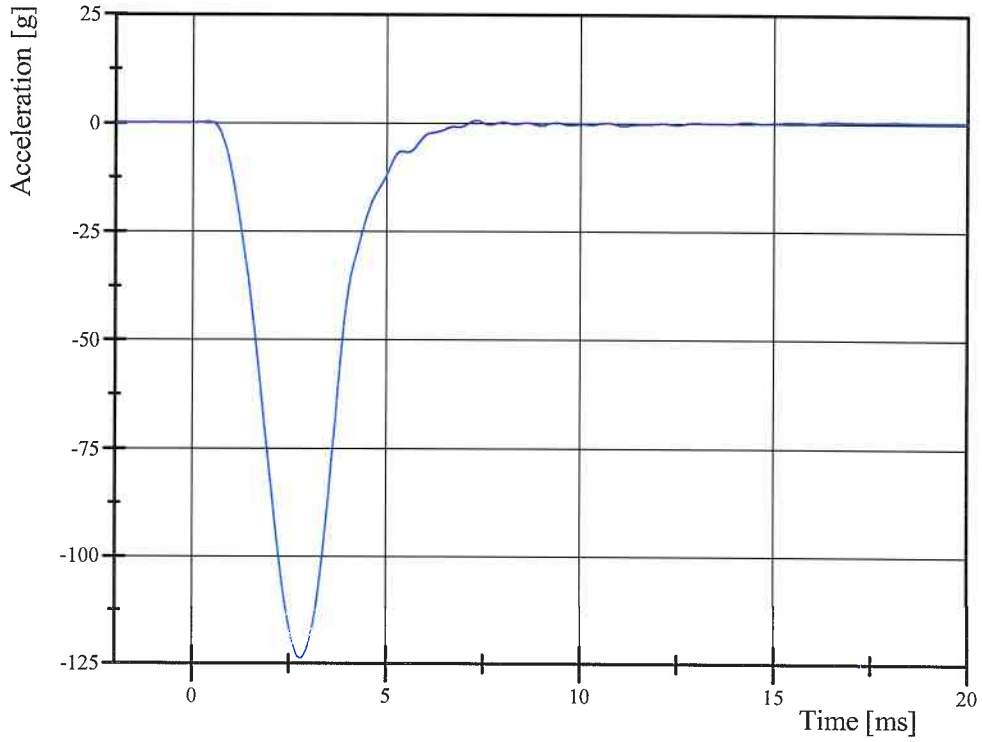
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

07.30.2013 16:07:14 1852

Transportation Research Center Inc.

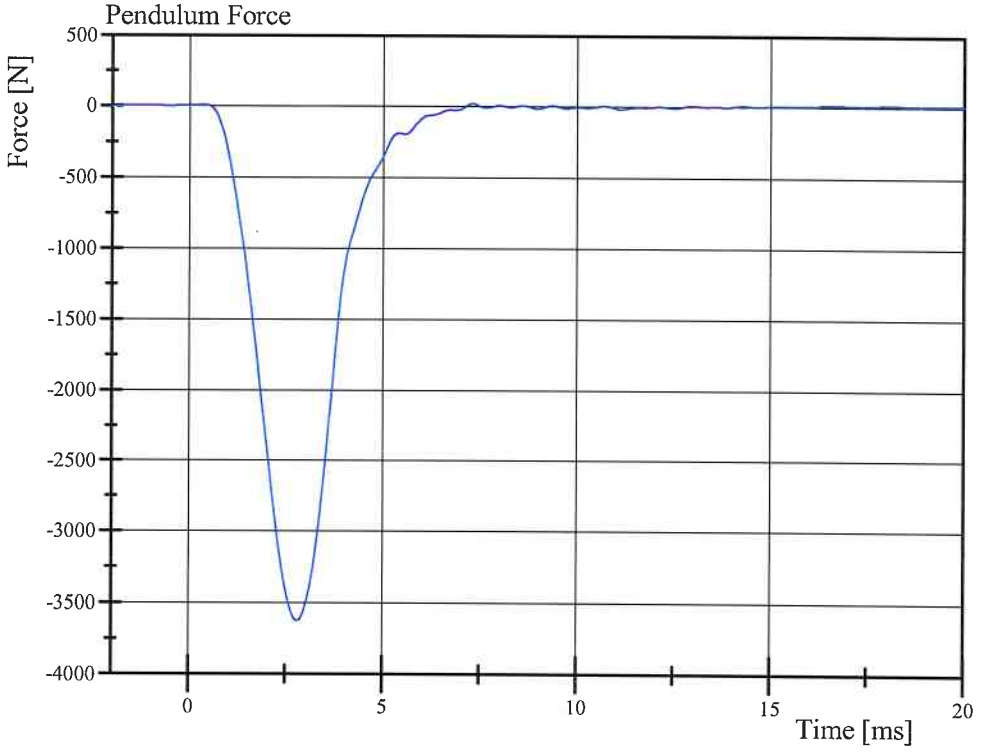
Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 21-1
Test Date: 7/30/2013

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.6 g at 7.3 ms
Min: -123.8 g at 2.8 ms

Pendulum Force



Filter Class: CFC_600
Max: 18.7 N at 7.3 ms
Min: -3,629.1 N at 2.8 ms

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

07.30.2013 16:07:21 1852

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 21

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	444	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	78	Yes
F	Thigh Clearance	119.4 - 134.6	127	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	283	Yes
J	Elbow Rest Height	182.8 - 203.2	193	Yes
K	Buttock Knee Length	520.7 - 546.1	534	Yes
L	Popliteal Height	355.6 - 376.0	367	Yes
M	Knee Pivot Height	393.7 - 419.1	411	Yes
N	Buttock Popliteal Length	414.0 - 439.4	436	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	222	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	140	Yes
T	Head Depth	177.8 - 188.0	182	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	359	Yes
W	Foot Breadth	78.8 - 94.0	83	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	866	Yes
Z	Waist Circumference	759.5 - 789.9	773	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Technician

Approved

Revised 8/10/12