

Final Report Number: NCAP-TRC-17-002

**New Car Assessment Program (NCAP)
Frontal Barrier Impact Test**

**General Motors LLC
2017 Chevrolet Camaro 2DR Coupe
NHTSA Number: M20170113**

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



Report Date: November 17, 2016

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

Transportation Research Center Inc. does not endorse or certify products of manufacturers. The manufacturer's name appears solely to identify the test article. Transportation Research Center Inc. assumes no liability for the report or use thereof. It is responsible for the facts and the accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.

Prepared By: ILO Project Operations Group

Approved By: John Shultz

Approval Date: November 17, 2016

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date _____

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

Date _____

1. Report No. NCAP-TRC-17-002	2. Government Accession No.	3. Recipient's Catalog No.																																																																									
4. Title and Subtitle Final Report of NEW CAR ASSESSMENT PROGRAM Frontal Impact Testing of a 2017 Chevrolet Camaro 2DR Coupe NHTSA No. M20170113			5. Report Date November 17, 2016		6. Performing Organization Code TRC Inc.																																																																						
			7. Author(s) John Shultz, Project Manager			8. Performing Organization Report No. 161007																																																																					
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319-0367			10. Work Unit No. (TRAIS)																																																																								
			11. Contract or Grant No. DTNH22-12-D-00257																																																																								
12. Sponsoring Agency Name and Address 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			13. Type of Report and Period Covered Final Report October 7, 2016 – November 17, 2016																																																																								
			14. Sponsoring Agency Code NRM-110																																																																								
15. Supplemental Notes																																																																											
16. Abstract A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2017 Chevrolet Camaro 2DR Coupe, 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 October 7, 2016. The impact velocity was 56.63 km/h, and the ambient temperature at the barrier face at the time of impact was 22.0° C. The target vehicle post-test maximum crush was 673 millimeters at crush centerline. The test vehicle's performance is as follows:																																																																											
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD</th> <th colspan="3">Passenger ATD</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>NA</td> <td>700</td> <td>258</td> <td>NA</td> <td>700</td> <td>317</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-23.2</td> <td>mm</td> <td>52</td> <td>-19.2</td> </tr> <tr> <td>3ms Chest Clip</td> <td>Gs</td> <td>60</td> <td>47.1</td> <td>Gs</td> <td>60</td> <td>45.0</td> </tr> <tr> <td>Nij</td> <td>NA</td> <td>1</td> <td>0.32</td> <td>NA</td> <td>1</td> <td>0.34</td> </tr> <tr> <td>Neck Tension</td> <td>Newtons</td> <td>4170</td> <td>944.2</td> <td>Newtons</td> <td>2620</td> <td>791.2</td> </tr> <tr> <td>Neck Compression</td> <td>Newtons</td> <td>4000</td> <td>-387.9</td> <td>Newtons</td> <td>2520</td> <td>-575.3</td> </tr> <tr> <td>Left Femur Force</td> <td>Newtons</td> <td>10000</td> <td>-2,132.5</td> <td>Newtons</td> <td>6800</td> <td>-141.7</td> </tr> <tr> <td>Right Femur Force</td> <td>Newtons</td> <td>10000</td> <td>-3,087.2</td> <td>Newtons</td> <td>6800</td> <td>-373.3</td> </tr> </tbody> </table>							Measurement Description	Driver ATD			Passenger ATD			Units	Threshold	Result	Units	Threshold	Result	Head Injury Criteria (HIC ₁₅)	NA	700	258	NA	700	317	Maximum Chest Compression	mm	63	-23.2	mm	52	-19.2	3ms Chest Clip	Gs	60	47.1	Gs	60	45.0	Nij	NA	1	0.32	NA	1	0.34	Neck Tension	Newtons	4170	944.2	Newtons	2620	791.2	Neck Compression	Newtons	4000	-387.9	Newtons	2520	-575.3	Left Femur Force	Newtons	10000	-2,132.5	Newtons	6800	-141.7	Right Femur Force	Newtons	10000	-3,087.2	Newtons	6800	-373.3
Measurement Description	Driver ATD			Passenger ATD																																																																							
	Units	Threshold	Result	Units	Threshold	Result																																																																					
Head Injury Criteria (HIC ₁₅)	NA	700	258	NA	700	317																																																																					
Maximum Chest Compression	mm	63	-23.2	mm	52	-19.2																																																																					
3ms Chest Clip	Gs	60	47.1	Gs	60	45.0																																																																					
Nij	NA	1	0.32	NA	1	0.34																																																																					
Neck Tension	Newtons	4170	944.2	Newtons	2620	791.2																																																																					
Neck Compression	Newtons	4000	-387.9	Newtons	2520	-575.3																																																																					
Left Femur Force	Newtons	10000	-2,132.5	Newtons	6800	-141.7																																																																					
Right Femur Force	Newtons	10000	-3,087.2	Newtons	6800	-373.3																																																																					
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)			18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																																																																								
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. Number of Pages 169	22. Price																																																																								

Table of Contents

<u>Section</u>		<u>Page</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212, 219 (Partial) Data, and 301 Data	25
16	FMVSS 301 Static Rollover Results	27
17	Dummy/Vehicle Temperature Stabilization Chart	28
<u>Appendix</u>		
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Calibration and Performance Verification Data	C-1

1: PURPOSE AND SUMMARY OF THE TEST

PURPOSE

This 56 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 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Front NCAP Laboratory Test Procedure dated October 2015.

SUMMARY

A 2017 Chevrolet Camaro 2DR Coupe impacted the barrier wall at a velocity of 56.63 km/h. The test was performed at Transportation Research Center, Inc. on October 7, 2016. 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 load cells, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and the passenger's lap belts to measure dummy pelvic section loading.

The driver (position 1) ATD (Serial No. 037), 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 100 channels of data were recorded on an on-board data acquisition system. The 288 barrier channels of data were recorded on an off-board high resolution barrier 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 673 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, side curtain airbag, headrest, headliner, and knee airbag. The passenger’s visible contact points were as follows: front airbag, side curtain airbag, headrest and headliner.

The occupant data is summarized below:

ATD Position	HIC₁₅	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)	258	0.32	944.2	-387.9	47.1	-23.2	-2,132.5	-3,087.2
Passenger (5 th Female)	317	0.34	791.2	-575.3	45.0	-19.2	-141.7	-373.3

2: OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

TEST VEHICLE INFORMATION

NHTSA No.	M20170113
Model Year	2017
Make	Chevrolet
Model	Camaro
Body Style	Coupe
VIN	1G1FB1RX1H0110232
Body Color	Garnet Red Tintcoat
Odometer Reading (km/mi)	73 mi
Engine Displacement (L)	2.0T
Type/No. Cylinders	Inline/4
Engine Placement	Front/Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	RWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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	Yes
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other:	No

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

No

DATA FROM CERTIFICATION LABEL

Manufactured by	General Motors LLC	GVWR (kg)	1855 (4090 lbs)
Date of Manufacture	07/16	GAWR Front (kg)	870 (1918 lbs)
		GAWR Rear (kg)	985 (2172 lbs)

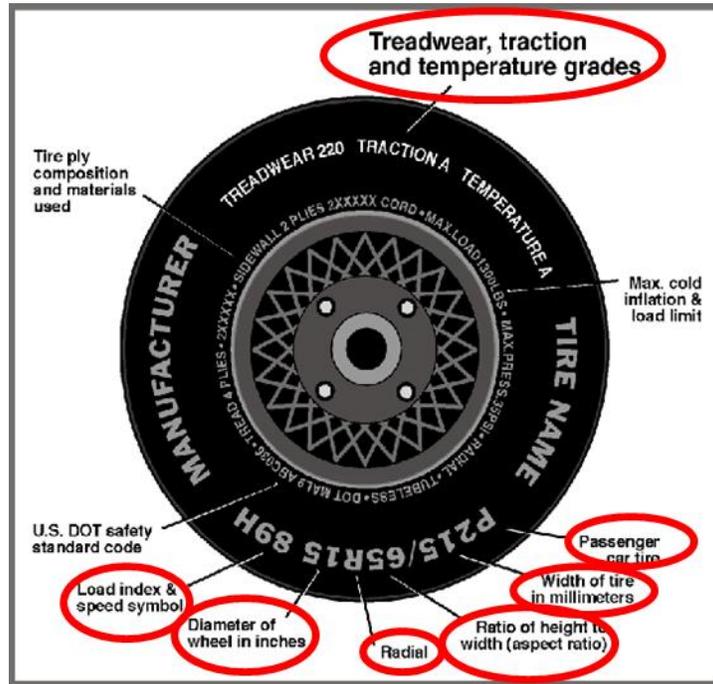
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	2	N/A	4
Capacity Wt. (VCW) (kg)				328
Cargo Wt. (RCLW) (kg)				55.84

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

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	220	220
Recommended Tire Size	245/50R18	245/50R18
Tire Size on Vehicle	245/50R18	245/50R18
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle Sport	Eagle Sport
Treadwear	560	560
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	100V	100V
Tire Material	Polyester, Steel & Polyamide	Polyester, Steel & Polyamide
DOT Safety Code Right	M6JW JU1R 1916	M6JW JU1R 1816
DOT Safety Code Left	M6JW JU1R 1916	M6JW JU1R 1916

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	384.2	356.8		416.4	418.8	
Right	kg	396.2	362.8		421.2	434.0	
Ratio	%	52.0	48.0		49.6	50.4	
Totals	kg	780.4	719.6	1500.0	837.6	852.8	1690.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1500.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.3
Rated Cargo/Luggage Weight (RCLW)	kg	55.84
Vehicle Target Weight (TVTW)	kg	1695.14

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	725	726	746	745	1354
As Tested	mm	718	722	725	720	1424
Post Test	mm	767	770	724	720	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2823
Total Vehicle Length at Left Side	mm	4567
Total Vehicle Length at Centerline	mm	4774
Total Vehicle Length at Right Side	mm	4567
Weight of Ballast in Cargo Area	kg	0.0
Weight of Vehicle Components Removed	kg	44.8
Amount of Stoddard Solvent in Fuel Tank	liters	24.0*

*Fuel Tank was filled to 1/3 capacity to achieve test weight (approved by COTR).

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: Trunk lid and liner, muffler, rear fascia, bumper reinforcement beam, rear tail lights and rear passenger retractor.

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4774
2	Total Width	1896
3	Bumper Top Height	640
4	Bumper Bottom Height	467
5	Longitudinal Member Top Height	507
6	Distance Between Longitudinal Members	752
7	Longitudinal Member Width	69
8	Engine Top Height	896
9	Engine Bottom Height	194
10	Engine and Gearbox Width	672
11	Front Bumper-Engine Distance	726
12	Front Shock Absorber Fixing Height	856
13	Bonnet Leading Edge Height	781
14	Front Shock Absorber Fixing Width	1154
15	Front Bumper – Front Axle Distance	962
16	Front Axle – A-Pillar Distance	816
17	A-Pillar – B-Pillar Distance	1237
18	B-Pillar – Rear Axle Distance	674
19	B-Pillar – C-Pillar Distance	557
20	Roof Sill Bottom Height	1159
21	Roof Sill Top Height	1316
22	Floor Sill Bottom Height	159
23	Floor Sill Top Height	372

DATA SHEET NO. 2

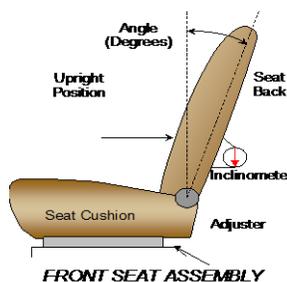
SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

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. Inclinometer measurement at the top of the backrest at the seat centerline, according to Form 1 attachment.



	Degree
Driver Seat back angle:	19.7
Passenger Seat back angle:	23.5

SEAT FORE/AFT POSITIONS

Describe the method used of determining seat fore/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	252	126
Passenger Seat	190	0

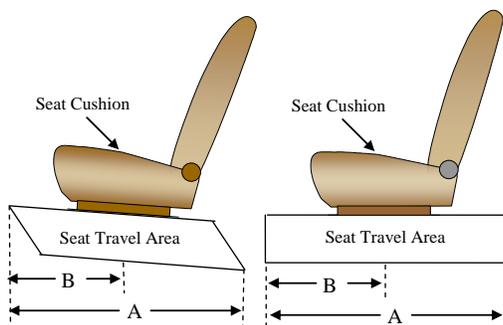
SEAT BELT UPPER ANCHORAGE

Describe the method of positioning seat belt upper anchorages.

Driver: Uppermost, Positioned according to Form 1

Passenger: Uppermost, Positioned according to Form 1.

	Total No. of Positions	Placed in Position No.
Driver Seat	1, Fixed	1, Fixed
Passenger Seat	1, Fixed	1, Fixed



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

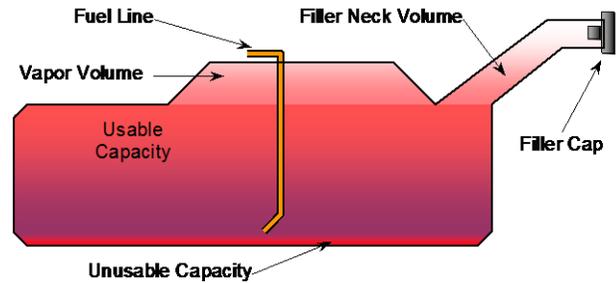
NHTSA No.: M20170113
 Test Date: 10/7/16

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	71.9
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	67.0
Actual Amount of Solvent Used	24.0*
1/3 of Usable Capacity	24.0

*Fuel Tank was filled to 1/3 capacity to achieve test weight (approved by COTR).

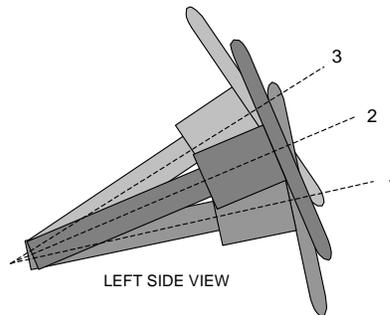
The vehicle is equipped with an electric fuel pump. The ECM supplies voltage to the fuel pump control module when the ECM detects that the ignition is ON. The voltage from the ECM to the fuel pump control module remains active for 2 seconds, unless the engine is in Crank or Run.



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. Steel square was placed across the rim of the steering wheel, an inclinometer was placed on the plate and the angle was measured. Telescope travel was measured full in and full out and set at the midpoint.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

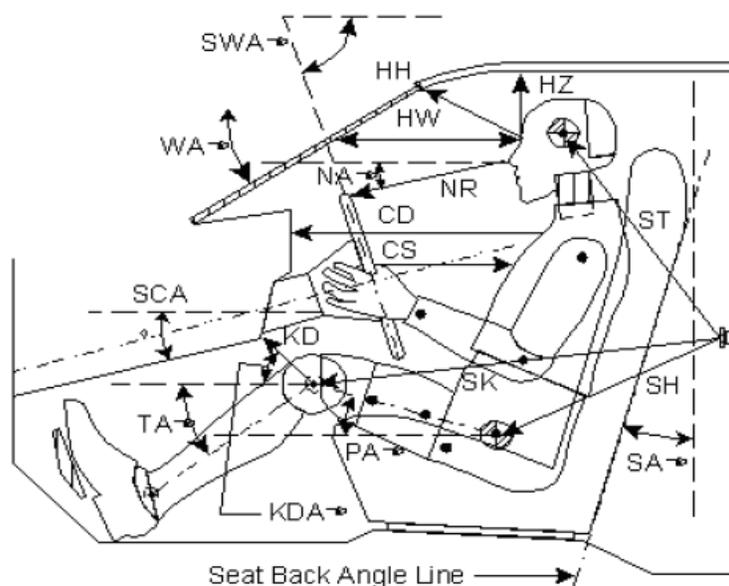
	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	12.6	
Geometric Center Position No. 2	15.0	
Uppermost Position No. 3	17.5	
Telescoping Steering Wheel Travel		40
Test Position	15.0	20

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16



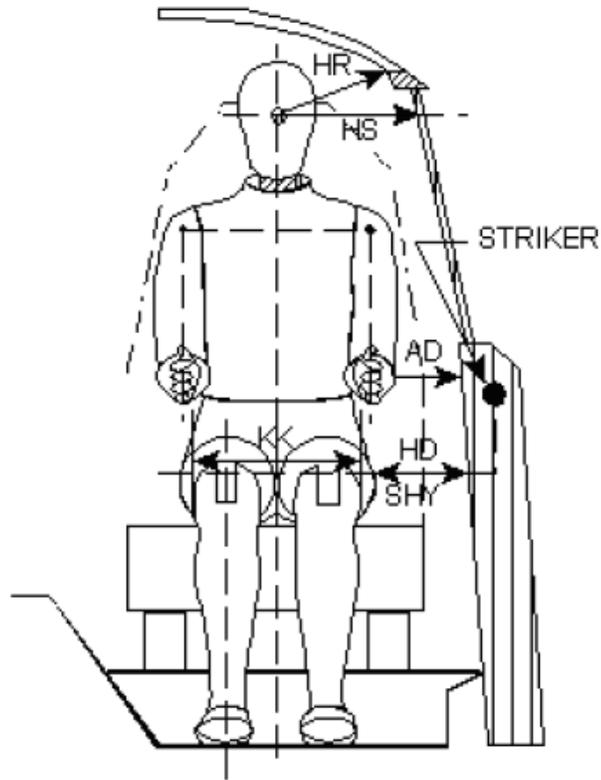
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		26.8		
SWA°	Steering Wheel Angle		15.0		
SCA°	Steering Column Angle		75.0		
SA°	Seat Back Angle (on headrest post)		19.7		24.5
HZ	Head to Roof (Z)	195		238	
HH	Head to Header	454		390	
HW	Head to Windshield	692		721	
NR	Nose to Rim	372	3.6		
CD	Chest to Dash	558		449	
CS	Chest to Steering Hub	323			
RA	Rim to Abdomen	238			
KDL	Left Knee to Dash	193	38.3	162	44.2
KDR	Right Knee to Dash	184	31.5	158	44.5
PA°	Pelvic Angle		23.3		21.3
TA°	Tibia Angle		33.0		34.7
SK	Striker to Knee	850	7.6	928	9.1
ST	Striker to Head	517	50.6	556	37.5
SH	Striker to H-Point	537	28.7	625	21.2

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16



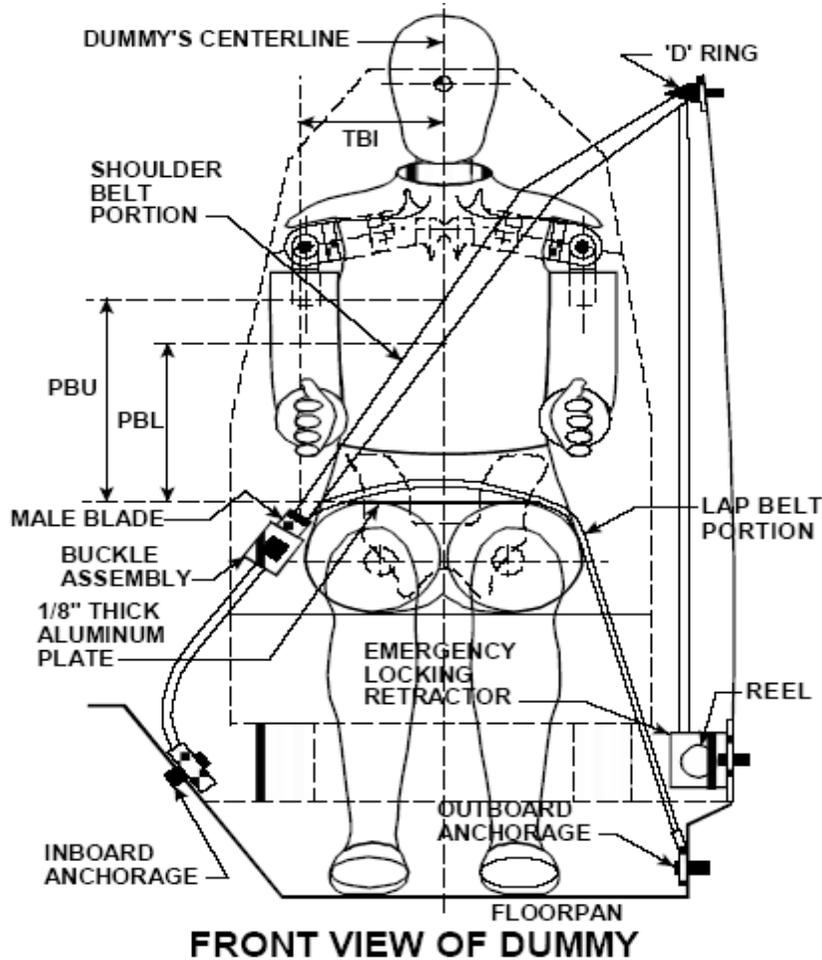
Code	Measurement Description	Driver	Passenger
AD	Arm to Door	74	111
HD	H-Point to Door	139	182
HR	Head to Side Header	202	253
HS	Head to Side Window	324	365
KK	Knee to Knee	257	165
SHY	Striker to H-Point (Y Direction)	229	260
AA	Ankle to Ankle	319	172

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	362	279
PBL – Top surface of reference to belt lower edge	mm	273	196

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	963	1039
Lap belt length as measured on ATD	mm	440	475
Remainder of belt on reel	mm	962	990
Total belt length for continuous webbing systems	mm	2365	2504

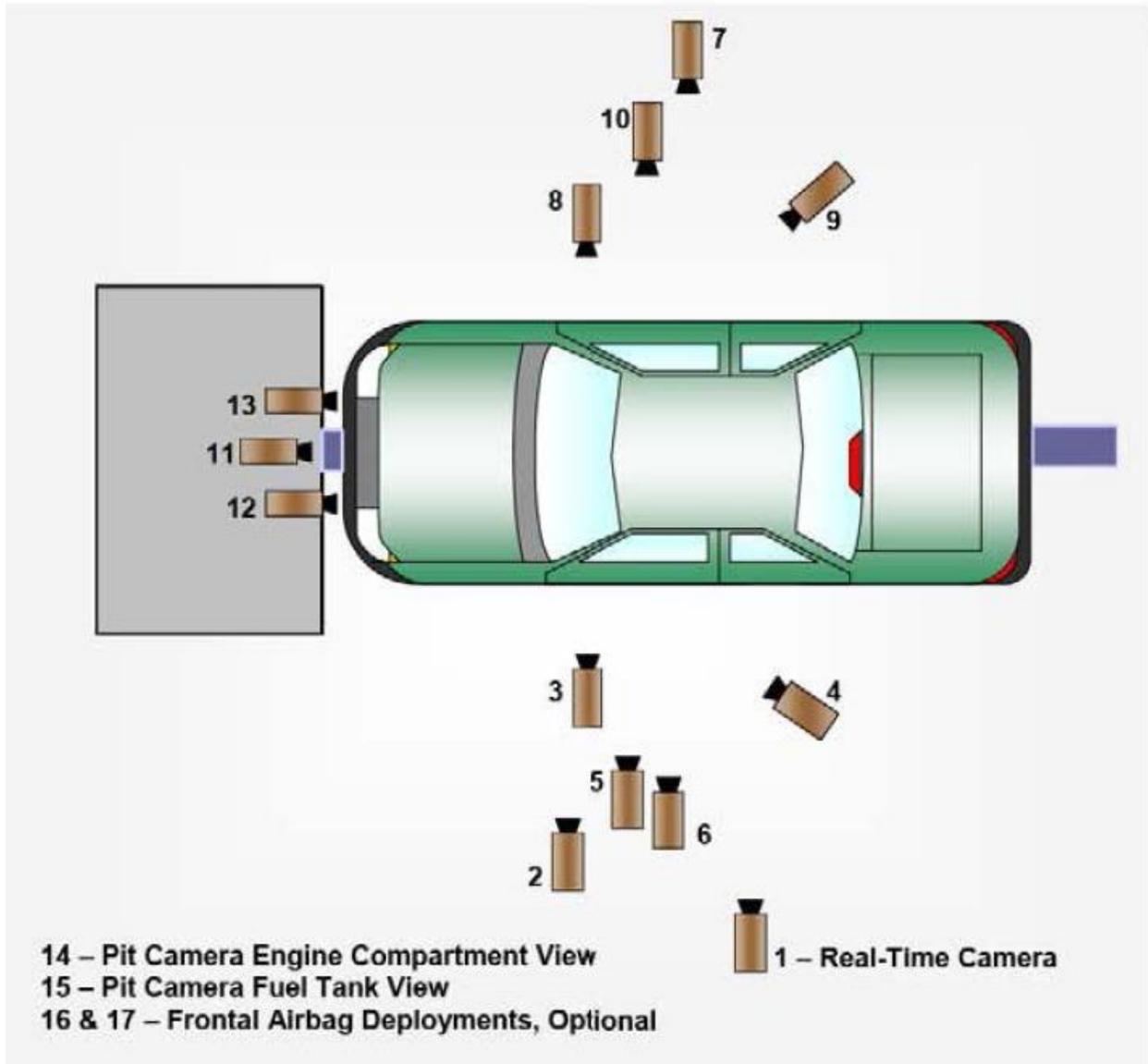
DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-4698	0	1200	Zoom	30
2	Driver Close-Up	1964	-4216	1209	35	1000
3	Left Front Half	1108	-4038	1139	20	1000
4	Left Angle	3788	2250	2012	Zoom	1000
5	Steering Column - Top	2504	-4830	2395	50	1000
6	Steering Column – Bottom	2264	-4388	1198	50	1000
7	Right Overall	2426	5996	1186	20	1000
8	Passenger Close-Up	1800	5367	1175	50	1000
9	Right Front Half	3980	2313	2200	Zoom	1000
10	Right Angle	1196	5547	1207	28	1000
11	Windshield	0	0	2680	20	1000
12	Driver Windshield	0	-310	2680	25	1000
13	Passenger Windshield	0	470	2680	25	1000
14	Pit Front	1240	0	3077	25	1000
15	Pit Rear	3043	0	3228	12.5	1000
16	Onboard Driver Airbag (Optional)				12.5	1000
17	Onboard Passenger Airbag (Optional)				12.5	1000

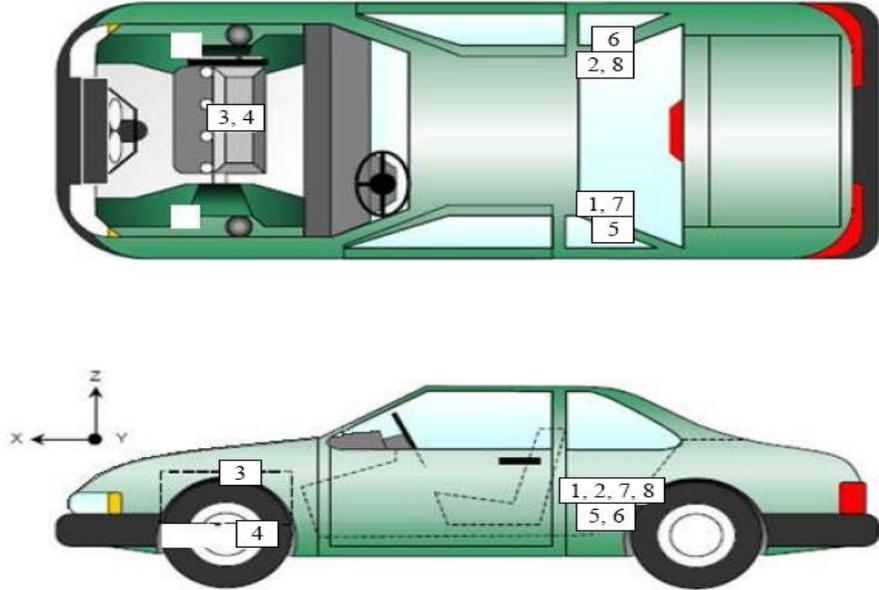
Reference Points: +X – forward of impact plane
 +Y – right of monorail center
 +Z – into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Location (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1943	-509	-502
2	Right Rear Accelerometer – X Direction	1940	513	-496
3	Engine Top X	3700	54	-855
4	Engine Bottom X	3637	0	-137
5	Left Rear Accelerometer – Z Direction	1943	-509	-502
6	Right Rear Accelerometer – Z Direction	1940	513	-496
7	Left Rear Accelerometer – X Direction Redundant	1943	-444	-502
8	Right Rear Accelerometer- X Direction Redundant	1940	442	-496

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

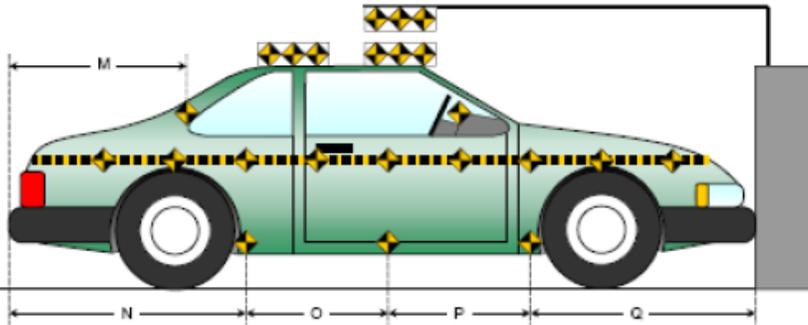
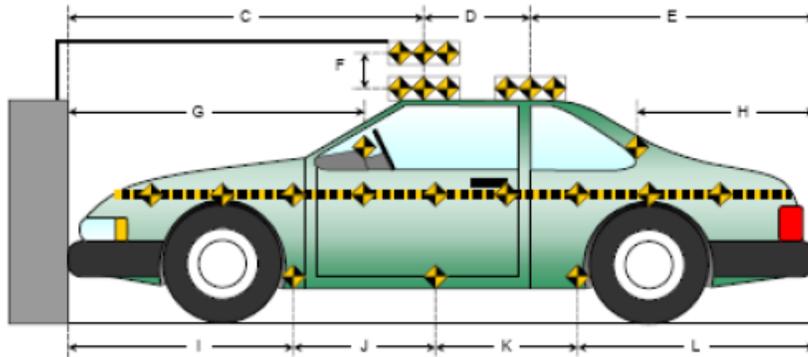
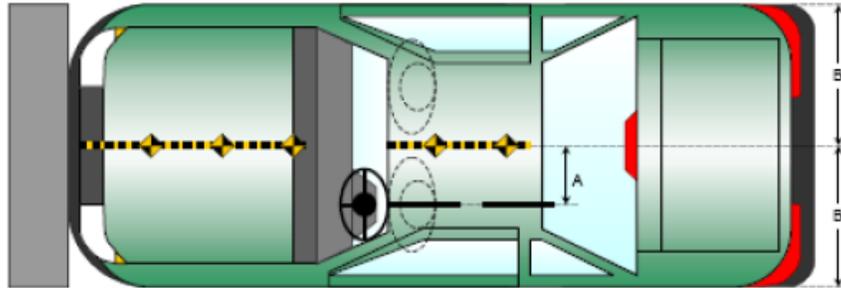
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

Item	Value
A	408
B	948
C	2491
D	608
E	1675
F	301
G	1982
H	1184
I	1365
J	960
K	953
L	1496
M	1176
N	1494
O	962
P	954
Q	1364



All units in millimeters

DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

Centerline

A-16	A-15	A-14	A-13	A-12	A-11	A-10	A-09	A-08	A-07	A-06	A-05	A-04	A-03	A-02	A-01
B-16	B-15	B-14	B-13	B-12	B-11	B-10	B-09	B-08	B-07	B-06	B-05	B-04	B-03	B-02	B-01
C-16	C-15	C-14	C-13	C-12	C-11	C-10	C-09	C-08	C-07	C-06	C-05	C-04	C-03	C-02	C-01
D-16	D-15	D-14	D-13	D-12	D-11	D-10	D-09	D-08	D-07	D-06	D-05	D-04	D-03	D-02	D-01
E-16	E-15	E-14	E-13	E-12	E-11	E-10	E-09	E-08	E-07	E-06	E-05	E-04	E-03	E-02	E-01
F-16	F-15	F-14	F-13	F-12	F-11	F-10	F-09	F-08	F-07	F-06	F-05	F-04	F-03	F-02	F-01
G-16	G-15	G-14	G-13	G-12	G-11	G-10	G-09	G-08	G-07	G-06	G-05	G-04	G-03	G-02	G-01
H-16	H-15	H-14	H-13	H-12	H-11	H-10	H-09	H-08	H-07	H-06	H-05	H-04	H-03	H-02	H-01
I-16	I-15	I-14	I-13	I-12	I-11	I-10	I-09	I-08	I-07	I-06	I-05	I-04	I-03	I-02	I-01
J-16	J-15	J-14	J-13	J-12	J-11	J-10	J-09	J-08	J-07	J-06	J-05	J-04	J-03	J-02	J-01
K-16	K-15	K-14	K-13	K-12	K-11	K-10	K-09	K-08	K-07	K-06	K-05	K-04	K-03	K-02	K-01

DATA SHEET NO. 10

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	44
Passenger Dummy Accelerometers	44
Vehicle Structure Accelerometers	8
Total	100

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time Panning	1
Total	17

DATA SHEET NO. 11

POST-TEST OBSERVATIONS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe

NHTSA No.: M20170113

Test Program: NCAP Frontal Impact

Test Date: 10/7/16

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th/ 037	Hybrid III 5th/ 426
Head Contact	Frontal Airbag, Head Restraint, SCAB, Head liner	Frontal Airbag, Head Restraint, SCAB, Head liner
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	None
Right Knee Contact	Knee Airbag	None

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed & latched, operational	Remained closed & latched, operational
Rear Door Opening	N/A	N/A
Seat Track Shift (mm)	None	None
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Slight cracking at base
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1282
Center	mm	1326
Right Side	mm	1273
Average	mm	1294

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	Yes	Yes	Yes
Torso/Pelvis Airbag	Yes	No	Yes	No
Pelvis Airbag	No	N/A	No	N/A
Knee Airbag	Yes	Yes	Yes	No ¹
Seat Belt Pretensioner	Yes	N/A	Yes	N/A
Seat Belt Load Limiter	Yes	N/A	Yes	N/A
Other Safety Restraint	No	N/A	No	N/A

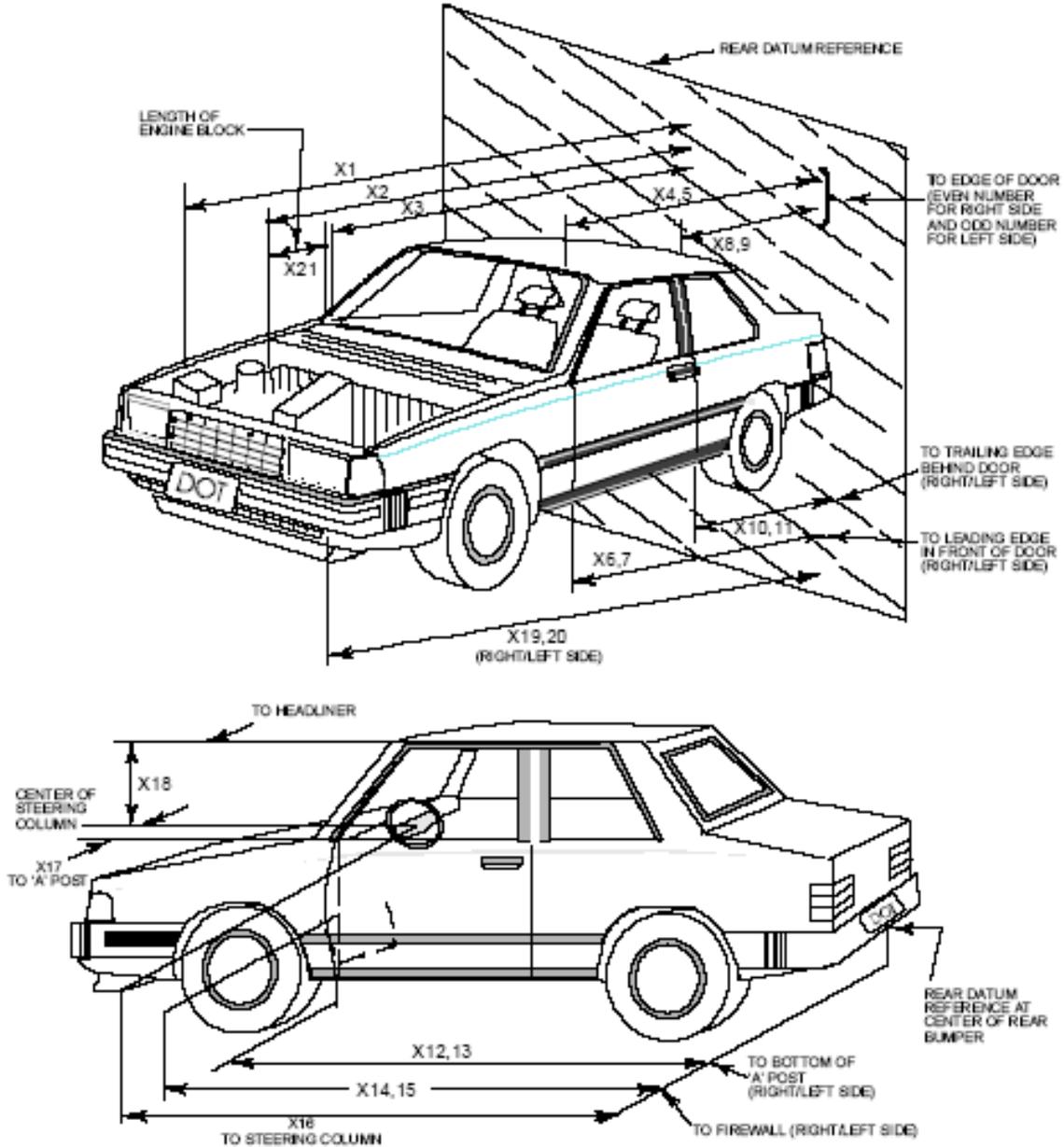
¹Passenger Knee airbag is not designed to deploy when the seat is in full forward position

DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4774	4101	673
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3979	3917	62
3	RSOV to Firewall	3291	3278	13
4	RSOV to Upper Leading Edge of Right Door	3051	3046	5
5	RSOV to Upper Leading Edge of Left Door	3057	3054	3
6	RSOV to Lower Leading Edge of Right Door	3064	3073	-9
7	RSOV to Lower Leading Edge of Left Door	3063	3075	-12
8	RSOV to Upper Trailing Edge of Right Door	1779	1778	1
9	RSOV to Upper Trailing Edge of Left Door	1783	1782	1
10	RSOV to Lower Trailing Edge of Right Door	1950	1958	-8
11	RSOV to Lower Trailing Edge of Left Door	1948	1955	-7
12	RSOV to Bottom of "A" Post-of Right Side	3009	3015	-6
13	RSOV to Bottom of "A" Post-of Left Side	3012	3018	-6
14	RSOV to Firewall, Right Side	1415	3326	-1911
15	RSOV to Firewall, Left Side	1415	3339	-1924
16	RSOV to Steering Column	2599	2669	-70
17	Center of Steering Column to "A" Post	415	320	95
18	Center of Steering Column to Headliner	386	386	0
19	RSOV to Right Side of Front Bumper	4394	4079	315
20	RSOV to Left Side of Front Bumper	4394	4063	331
21	Length of Engine Block	520	520	0
RD	RSOV to Right Side of Dash Panel	2830	2809	21
CD	RSOV to Center of Dash Panel	2844	2850	-6
LD	RSOV to Left Side of Dash Panel	2838	2832	6

All Dimensions in mm

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

VEHICLE INFORMATION

VIN: 1G1FB1RX1H0110232
 Vehicle Size Category: Passenger Car

Wheelbase: 2823
 Test Weight (kg): 1690.4

ACCELEROMETER DATA

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

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

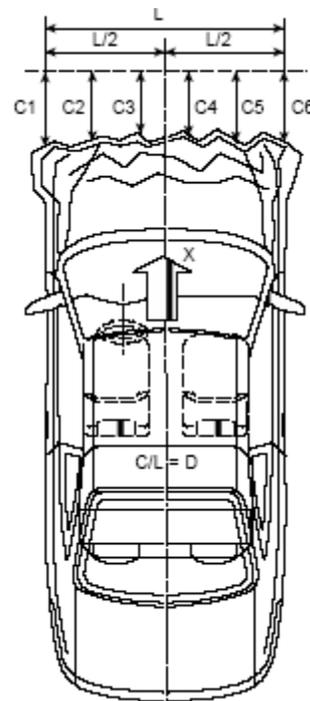
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.63

Velocity Change (km/h): 66.62

Time of Separation (ms): 120



CRUSH PROFILE

Collision Deformation Classification: 12FDEW2

Midpoint of Damage: Centerline

Damage Region Length (mm): 1684

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4394	4053	341
C2	Crush zone 2 at left side	mm	4567	4107	460
C3	Crush zone 3 at left side	mm	4676	4102	574
C4	Crush zone 4 at right side	mm	4676	4096	580
C5	Crush zone 5 at right side	mm	4567	4104	463
C6	Crush zone 6 at right side	mm	4394	4069	325
L	C1 to C6	mm	1684	1116	568

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

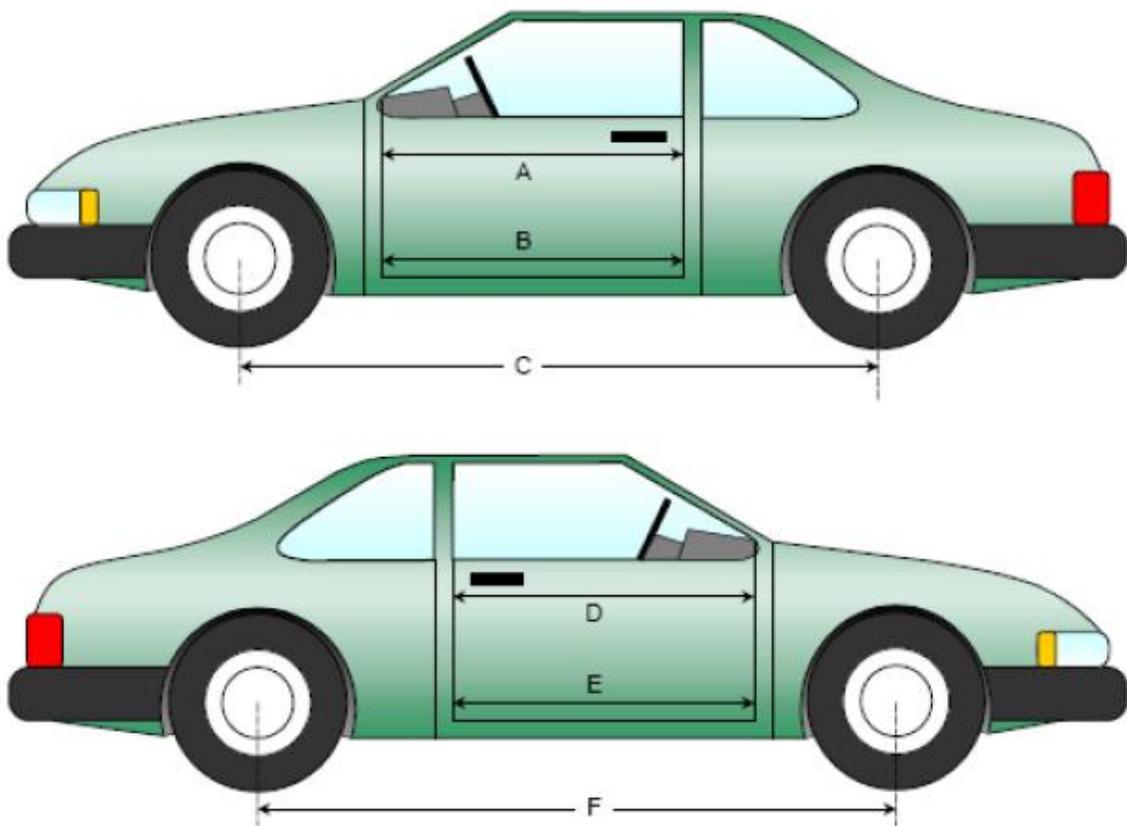
NHTSA No.: M20170113
 Test Date: 10/7/16

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1242	1242	0
B	Left Side Lower	mm	1165	1165	0
C	Right Side Upper	mm	1242	1242	0
D	Right Side Lower	mm	1165	1165	0

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2820	2730	90
F	Right Side Wheelbase	mm	2823	2715	108



DATA SHEET NO. 14 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

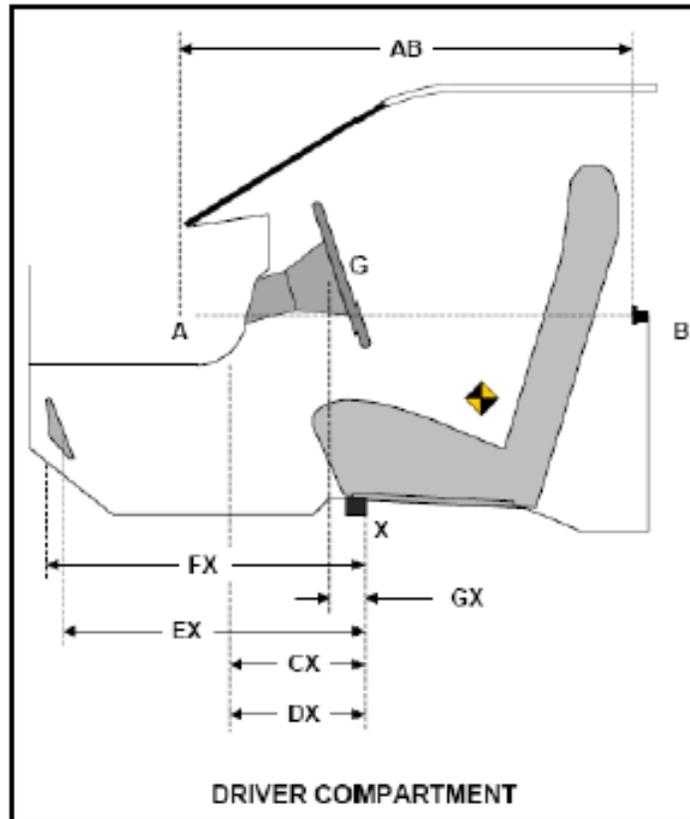
Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1084	1084	0
CX	Left Knee Bolster to X	mm	309	300	9
DX	Right Knee Bolster to X	mm	316	308	8
EX	Brake Pedal to X	mm	569	584	-15
FX	Foot Rest to X	mm	598	636	-38
GX	Center of Steering Column Wheel Hub to X	mm	24	37	-13

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

Please provide windshield mounting details.

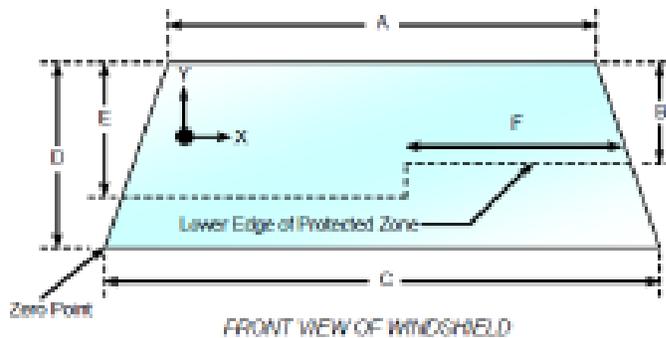
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 22.0° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2085	2085	100.0
Right Side	2085	2085	100.0
Total	4170	4170	100.0

Item	Units	Value
A	mm	1228
B	mm	199
C	mm	1542
D	mm	700
E	mm	405
F	mm	565



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

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

X	Y
NA	NA

DATA SHEET NO. 15 (CONTINUED)

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

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 22.0°C

Test Time: 14:47

Stoddard Solvent Spillage Measurements

- A From impact until vehicle motion ceases: 0 oz.
(maximum allowable – 1 oz.)
- B For the 5-minute period after motion ceases: 0 oz.
(maximum allowable – 5 oz.)
- C For the following 25 minutes: 0 oz.
(maximum allowable – 1 oz./minutes)
- D Spillage: None

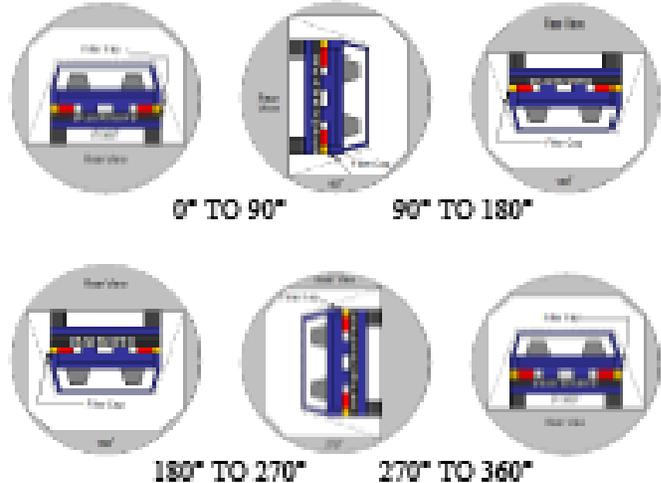
DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
 Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
 Test Date: 10/7/16

1. The specified fixture rollover rate for each 90° of rotation is 60 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
0° to 90°	90	330	420
90° to 180°	90	330	840
180° to 270°	90	330	1260
270° to 360°	90	330	1480

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

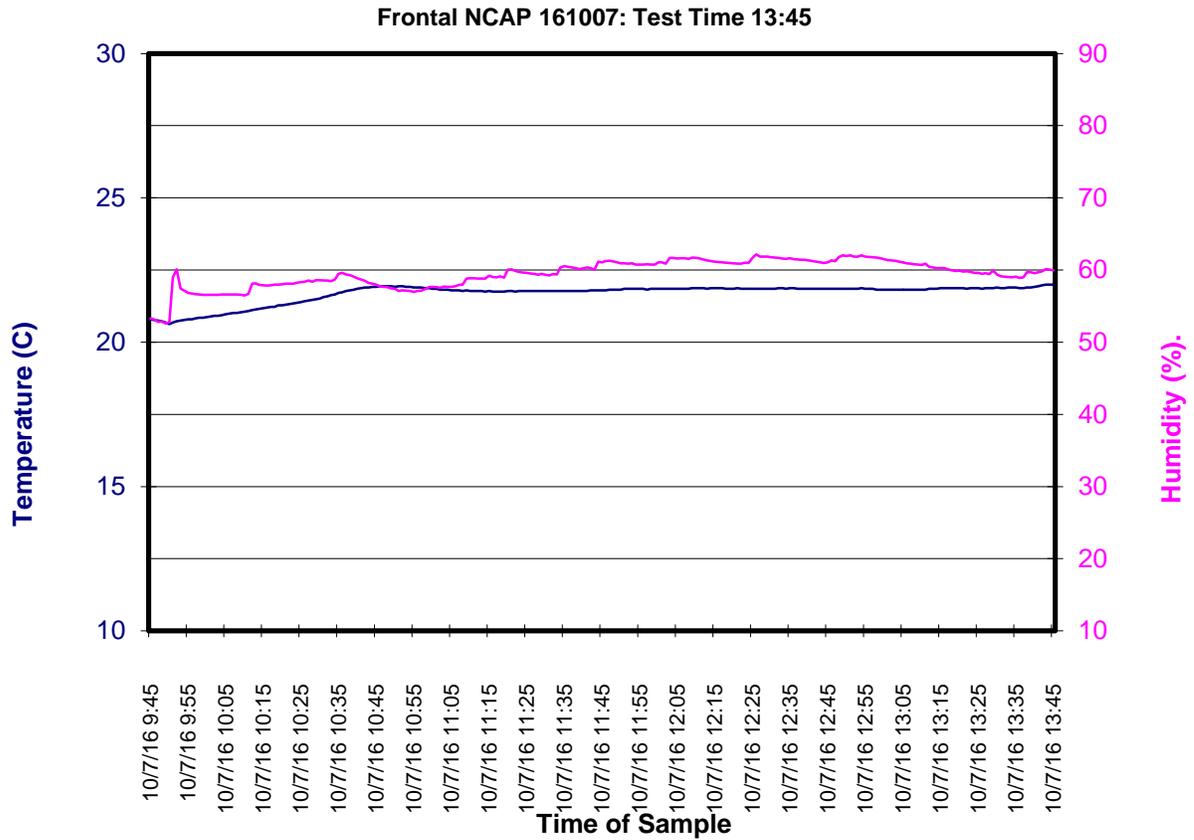
Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17

DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2017 Chevrolet Camaro 2DR Coupe
Test Program: NCAP Frontal Impact

NHTSA No.: M20170113
Test Date: 10/7/16



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

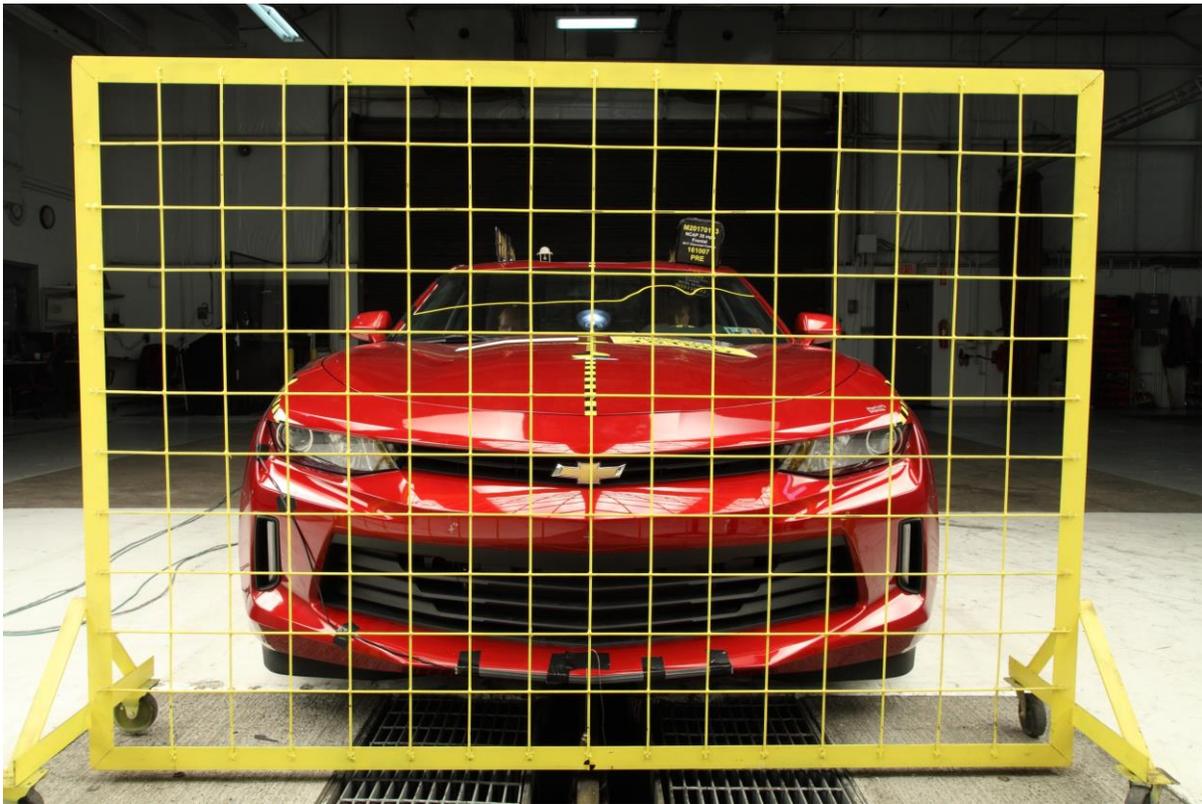
No.	Description	Page
1	Load Cell Location	A-5
2	Pre-Test Load Cell Wall	A-5
3	Post-Test Load Cell Wall	A-6
4	Manufacturer's Label	A-6
5	Tire Placard	A-7
6	2017 Chevrolet Camaro 2DR Coupe Frontal as Delivered	A-7
7	Right Rear 3-4 View, as Received	A-8
8	Pre-Test Front View of Test Vehicle	A-8
9	Post-Test Front View of Test Vehicle	A-9
10	Pre-Test Left View of Test Vehicle	A-9
11	Post-Test Left View of Test Vehicle	A-10
12	Pre-Test Right View of Test Vehicle	A-10
13	Post-Test Right View of Test Vehicle	A-11
14	Pre-Test Right Front 3-4 View	A-11
15	Post-Test Right Front 3-4 View	A-12
16	Pre-Test Left Rear 3-4 View	A-12
17	Post-Test Left Rear 3-4 View	A-13
18	Pre-Test Windshield View	A-13
19	Post-Test Windshield View	A-14
20	Pre-Test Engine Compartment View	A-14
21	Post-Test Engine Compartment View	A-15
22	Pre-Test Fuel Filler Cap View	A-15
23	Post-Test Fuel Filler Cap View	A-16
24	Pre-Test Front Underbody View	A-17
25	Post-Test Front Underbody View	A-17
25a	Pre-Test Mid Underbody View	A-18
25b	Post-Test Mid Underbody View	A-18
26	Pre-Test Rear Underbody View	A-19
27	Post-Test Rear Underbody View	A-19
28	Pre-Test Dummy Cable Routing	A-20
29	Post-Test Dummy Cable Routing	A-20
30	Pre-Test Driver Dummy Front View	A-21
31	Post-Test Driver Dummy Front View	A-21

TABLE OF PHOTOGRAPHS (CONTINUED)

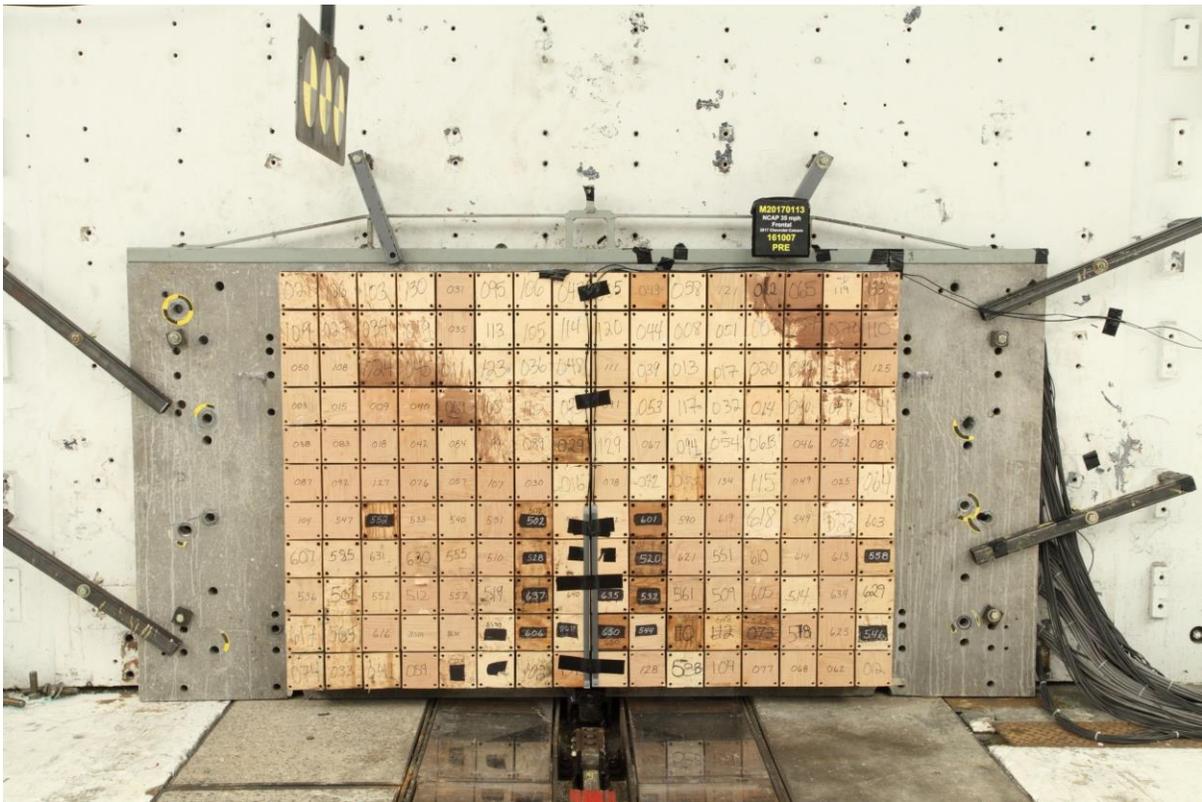
No.	Description	Page
32	Pre-Test Driver Dummy Window View	A-22
33	Post-Test Driver Dummy Window View	A-22
34	Pre-Test Driver Dummy and Vehicle Interior View	A-23
35	Post-Test Driver Dummy and Vehicle Interior View	A-23
36	Pre-Test Driver's Seat Fore-Aft Markings	A-24
37	Post-Test Driver's Seat Fore-Aft Markings	A-24
38	Pre-Test View of Belt Anchorage for Driver Dummy	A-25
39	Post-Test View of Belt Anchorage for Driver Dummy	A-25
40	Pre-Test Driver Dummy Feet	A-26
41	Post-Test Driver Dummy Feet	A-26
42	Pre-Test Driver's Side Knee Bolster	A-27
43	Post-Test Driver's Side Knee Bolster	A-27
44	Pre-Test Driver's Side Floorpan	A-28
45	Post-Test Driver's Side Floorpan	A-28
46	Post-Test Driver Dummy Face	A-29
47	Post-Test Driver Dummy Contact with Airbag	A-29
48	Post-Test Driver Dummy Contact with Headrest	A-30
48a	Post-Test Driver Dummy Contact with Vehicle Interior	A-30
49	Pre-Test View of the Steering Wheel	A-31
50	Post-Test View of the Steering Wheel	A-31
51	Pre-Test Passenger Dummy Front View	A-32
52	Post-Test Passenger Dummy Front View	A-32
53	Pre-Test Passenger Dummy Window View	A-33
54	Post-Test Passenger Dummy Window View	A-33
55	Pre-Test Passenger Dummy and Vehicle Interior View	A-34
56	Post-Test Passenger Dummy and Vehicle Interior View	A-34
57	Pre-Test Passenger Seat Fore-Aft Markings	A-35
58	Post-Test Passenger Seat Fore-Aft Markings	A-35
59	Pre-Test View of Belt Anchorage for Passenger Dummy	A-36
60	Post-Test View of Belt Anchorage for Passenger Dummy	A-36
61	Pre-Test Passenger Dummy Feet	A-37
62	Post-Test Passenger Dummy Feet	A-37
63	Pre-Test Passenger Side Knee Bolster	A-38
64	Post-Test Passenger Side Knee Bolster	A-38
65	Pre-Test Passenger Side Floorpan	A-39
66	Post-Test Passenger Side Floorpan	A-39

TABLE OF PHOTOGRAPHS (CONTINUED)

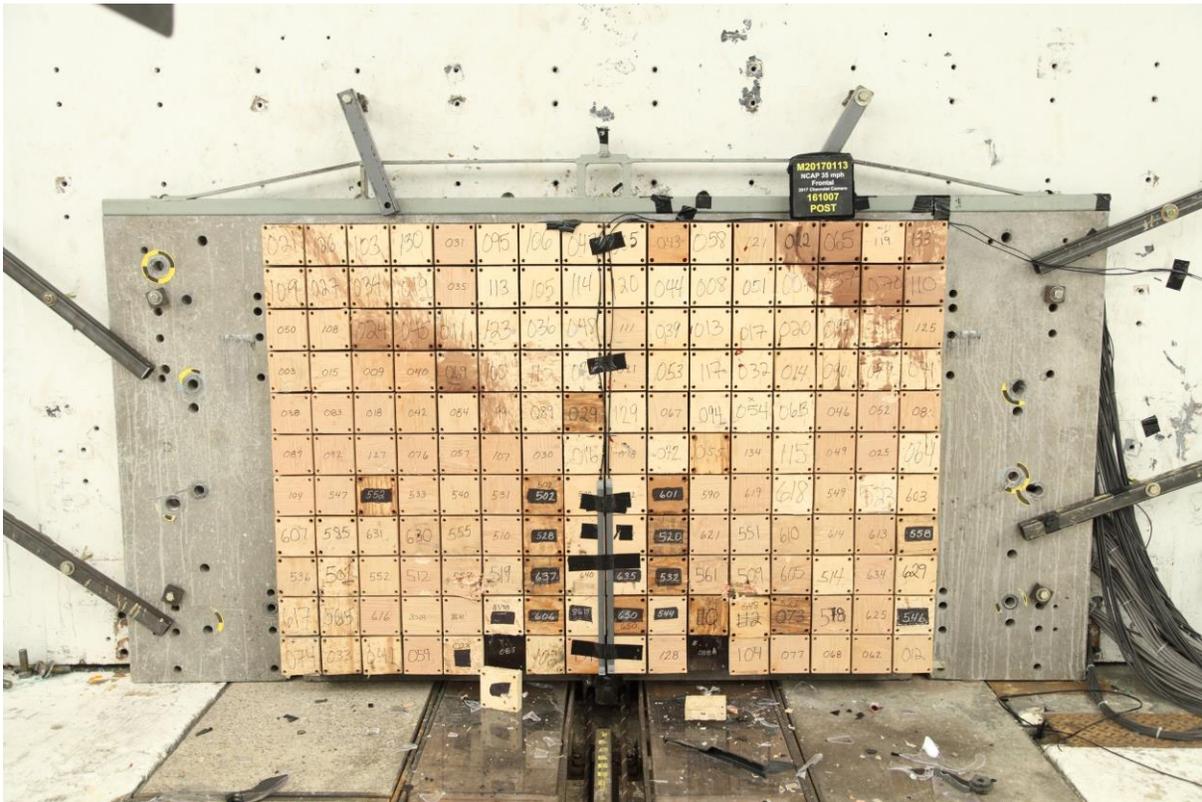
No.	Description	Page
67	Post-Test Passenger Dummy Face	A-40
68	Post-Test Passenger Dummy Contact With Airbag	A-40
69	Post-Test Passenger Dummy Contact With Headrest	A-41
69a	Post-Test Passenger Dummy Contact With Side Airbag	A-41
70	Photograph of Ballast Installed in Vehicle View	A-42
71	Post-Test Stoddard Solvent Spillage Location view, if required	A-42
72	Post-Test Speed Trap Read-out	A-43
73	Vehicle at 0° on Static Rollover Device	A-43
74	Vehicle at 90° on Static Rollover Device	A-44
75	Vehicle at 180° on Static Rollover Device	A-44
76	Vehicle at 270° on Static Rollover Device	A-45
77	Vehicle at 360° on Static Rollover Device	A-45
78	2017 Chevrolet Camaro 2DR Coupe Frontal Impact Event	A-46
79	Monroney Label Photograph	A-46



001 Load Cell Location



002 Pre-Test Load Cell Wall



003 Post-Test Load Cell Wall



004 Manufacturer's Label



005 Tire Placard



006 2017 Chevrolet Camaro Frontal As Delivered



007 Right Rear 3-4 View, as Received



008 Pre-Test Front View of Test Vehicle



009 Post-Test Front View of Test Vehicle



010 Pre-Test Left View of Test Vehicle



011 Post-Test Left View of Test Vehicle



012 Pre-Test Right View of Test Vehicle



013 Post-Test Right View of Test Vehicle



014 Pre-Test Right Front 3-4 View



015 Post-Test Right Front 3-4 View



016 Pre-Test Left Rear 3-4 View



017 Post-Test Left Rear 3-4 View



018 Pre-Test Windshield View



019 Post-Test Windshield View



020 Pre-Test Engine Compartment View



021 Post-Test Engine Compartment View

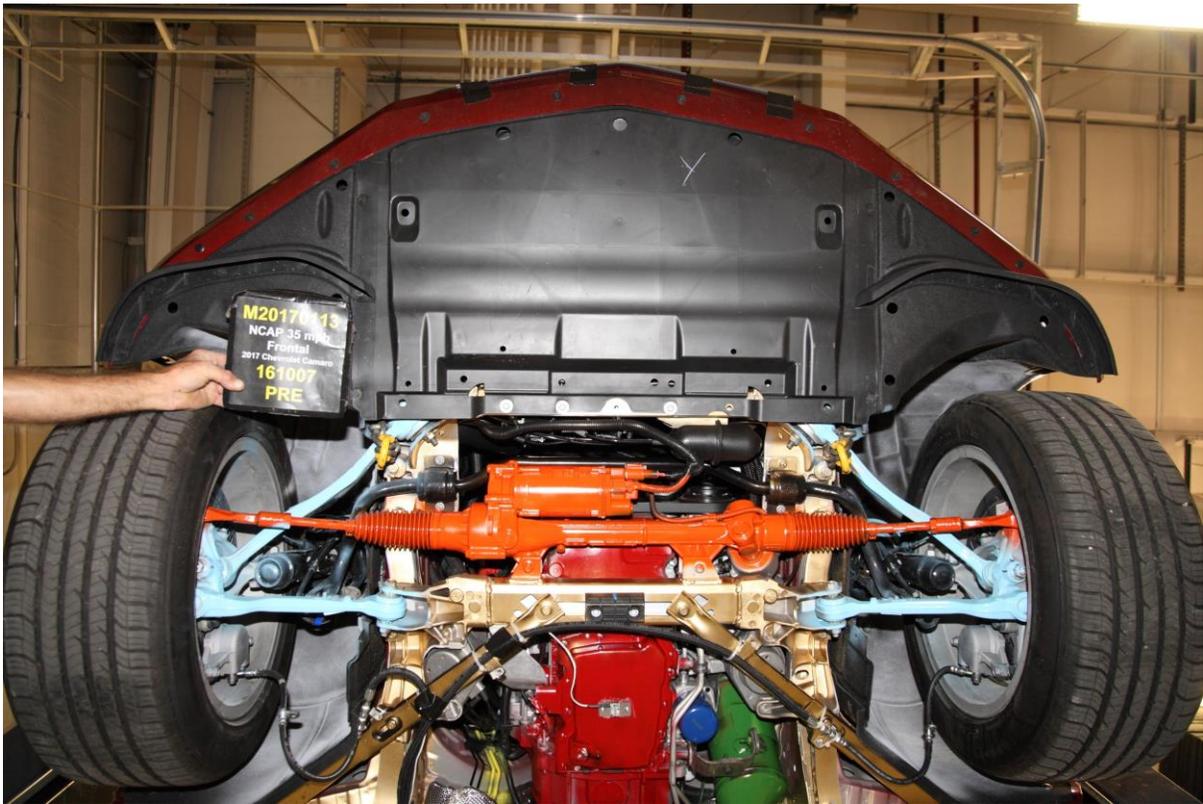


022 Pre-Test Fuel Filler Cap View



023 Post-Test Fuel Filler Cap View

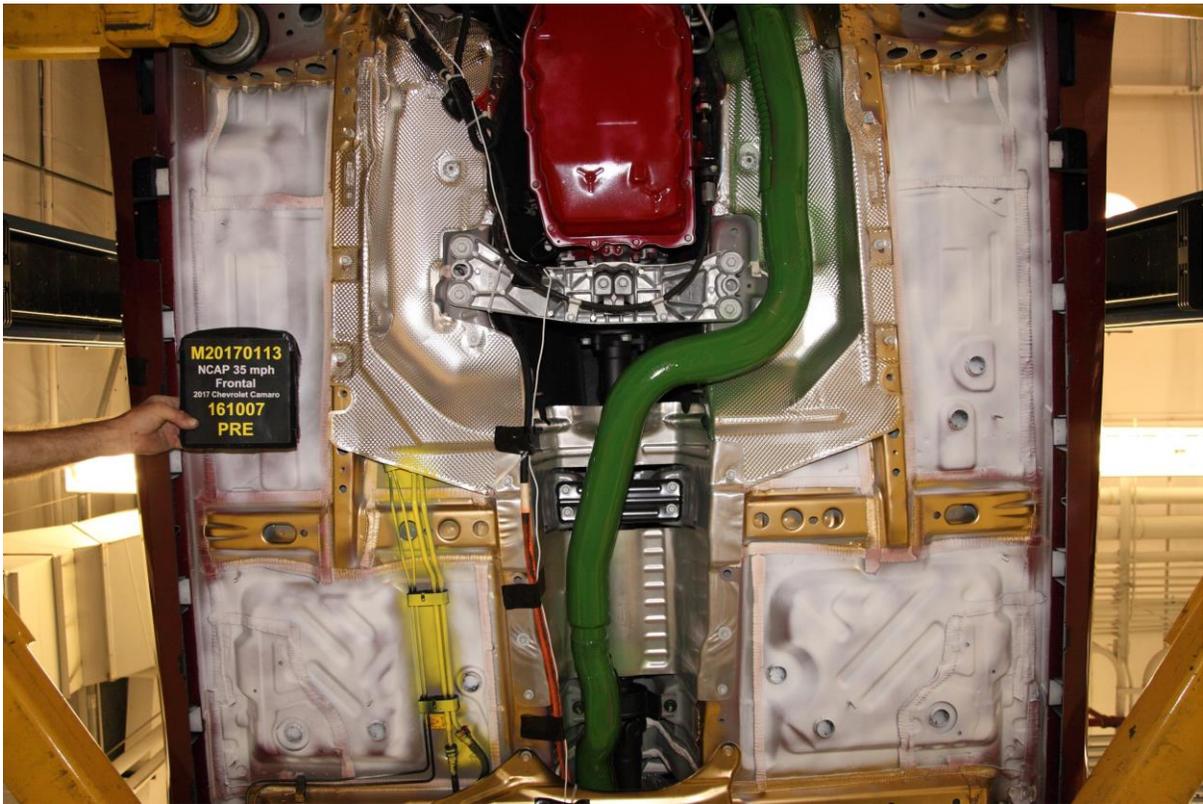
Intentionally Left Blank



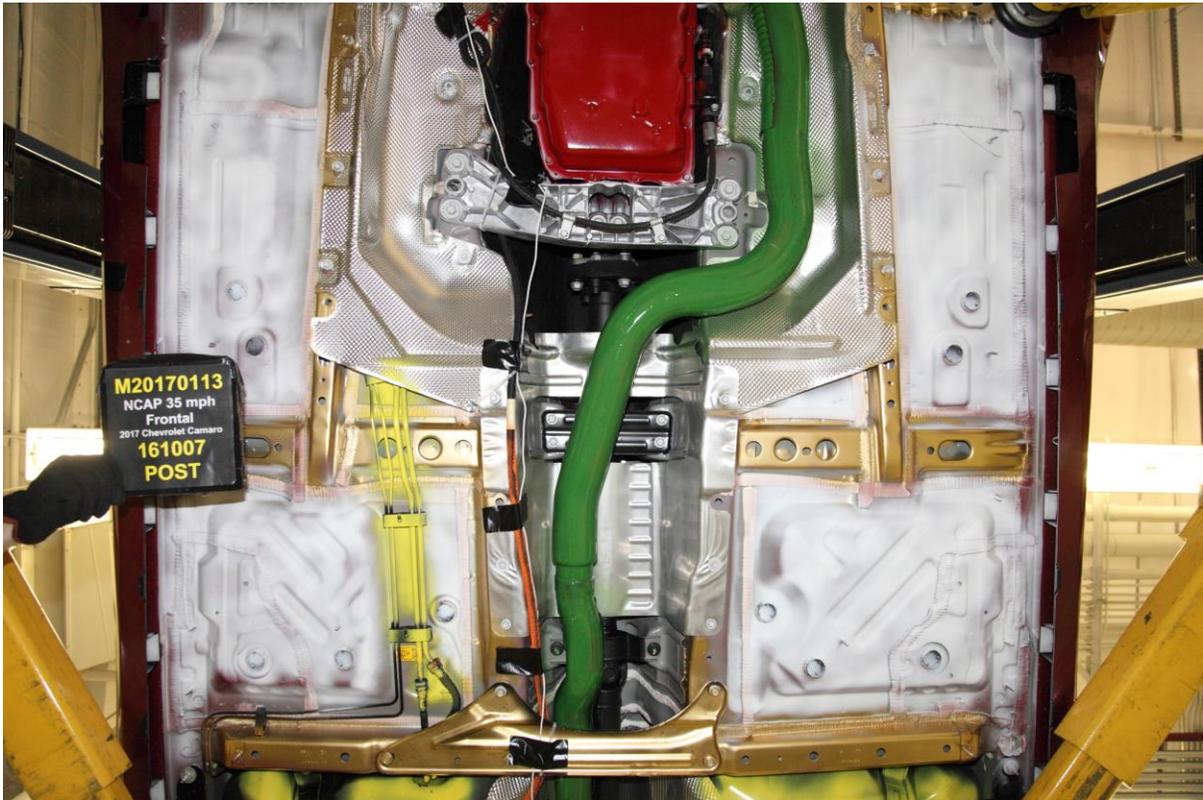
024 Pre-Test Front Underbody View



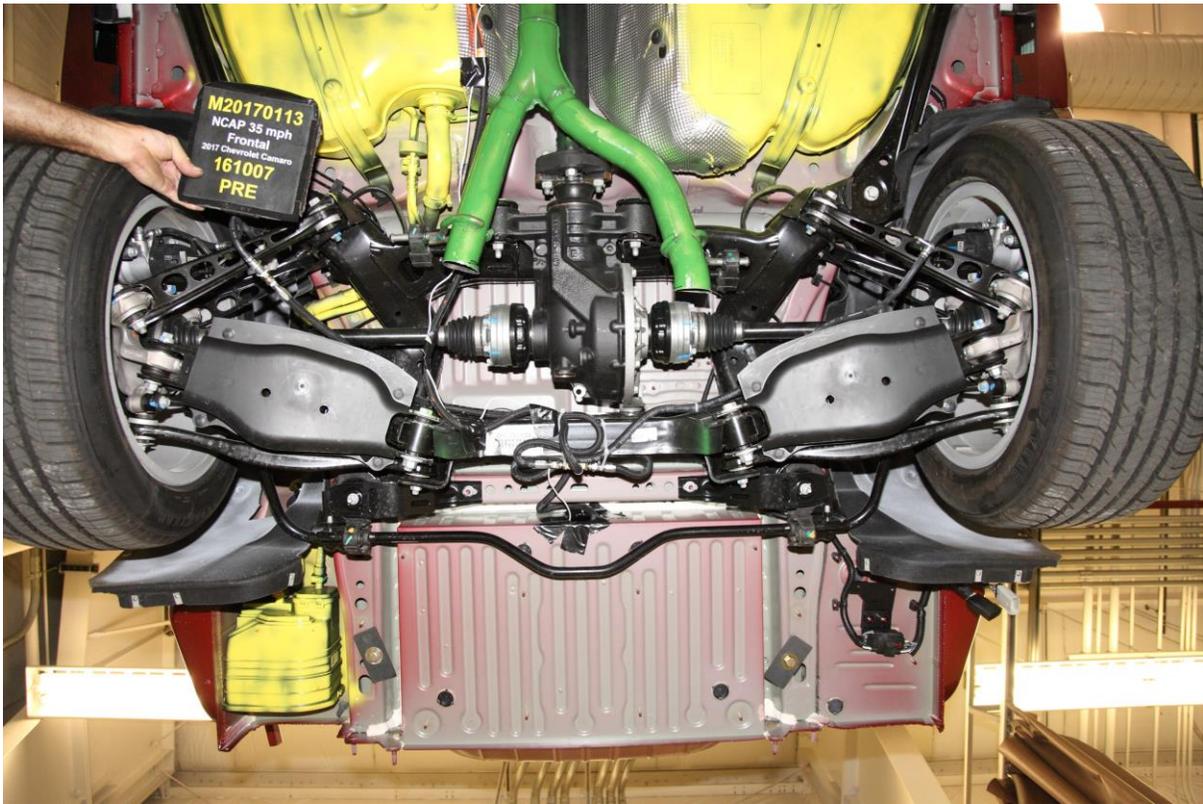
025 Post-Test Front Underbody View



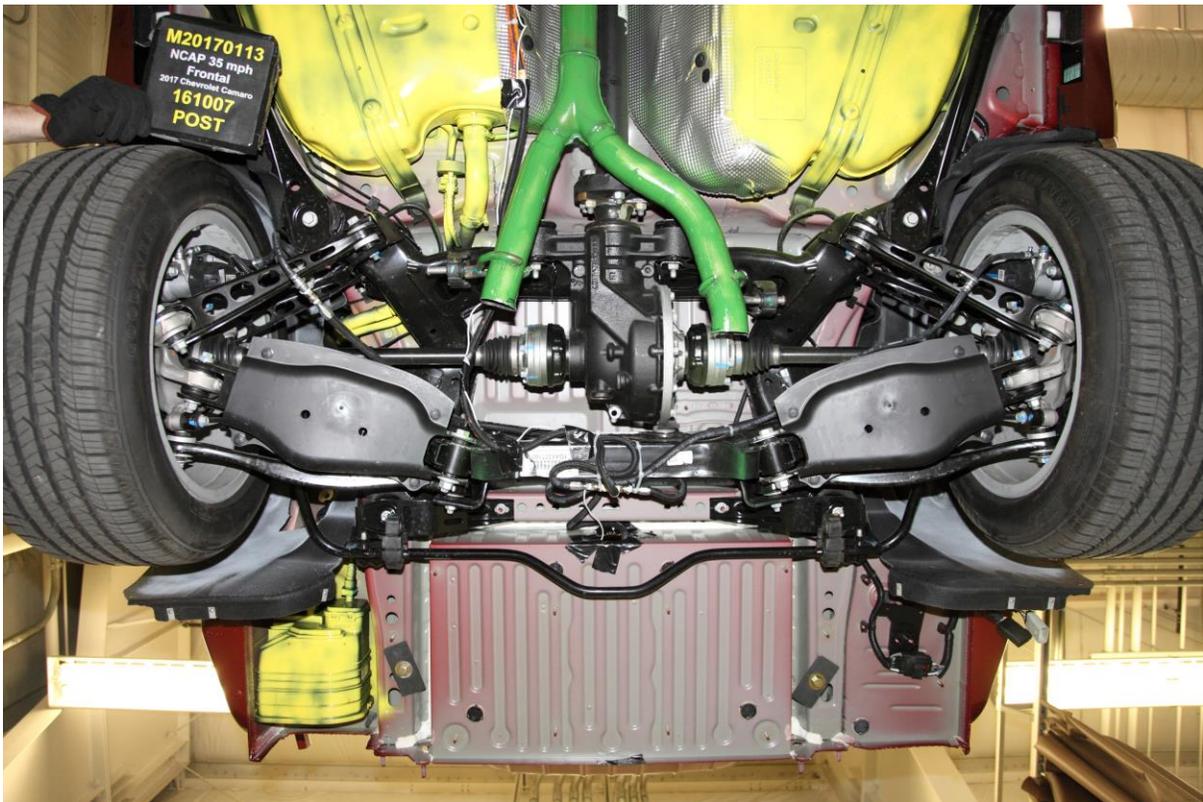
025a Pre-Test Mid Underbody View



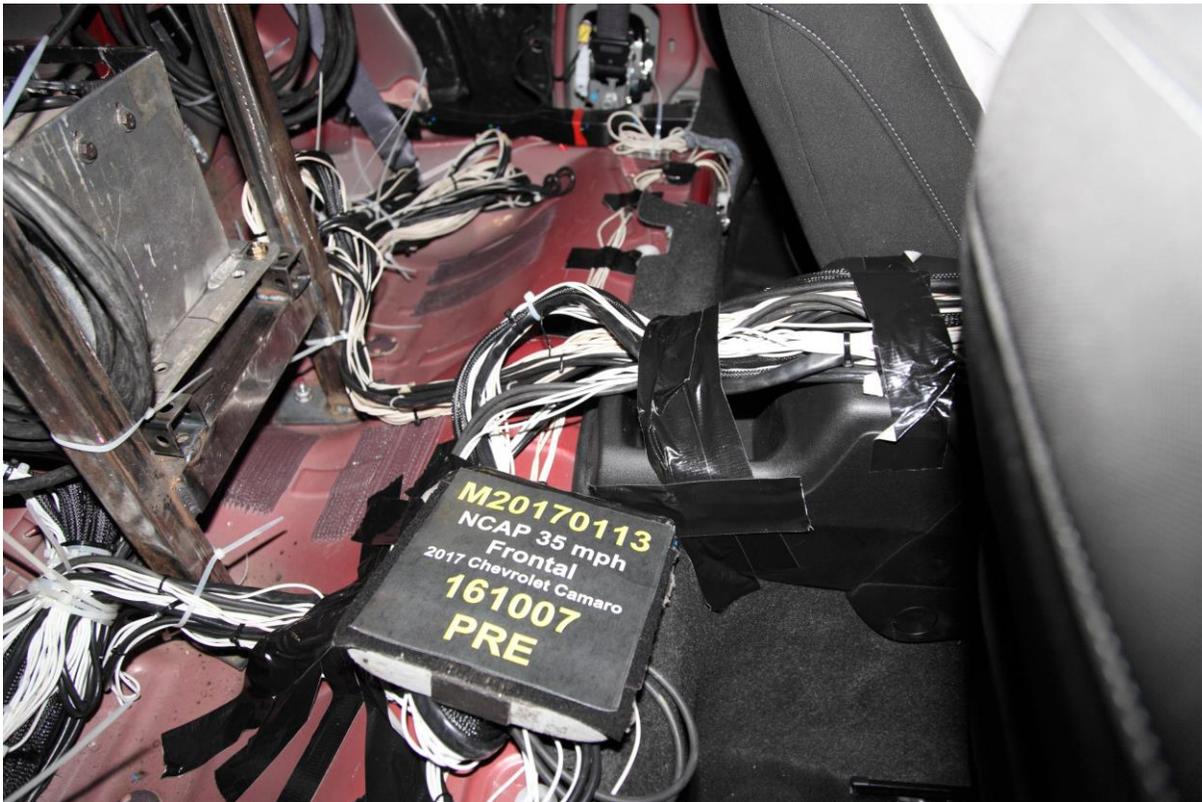
025b Post-Test Mid Underbody View



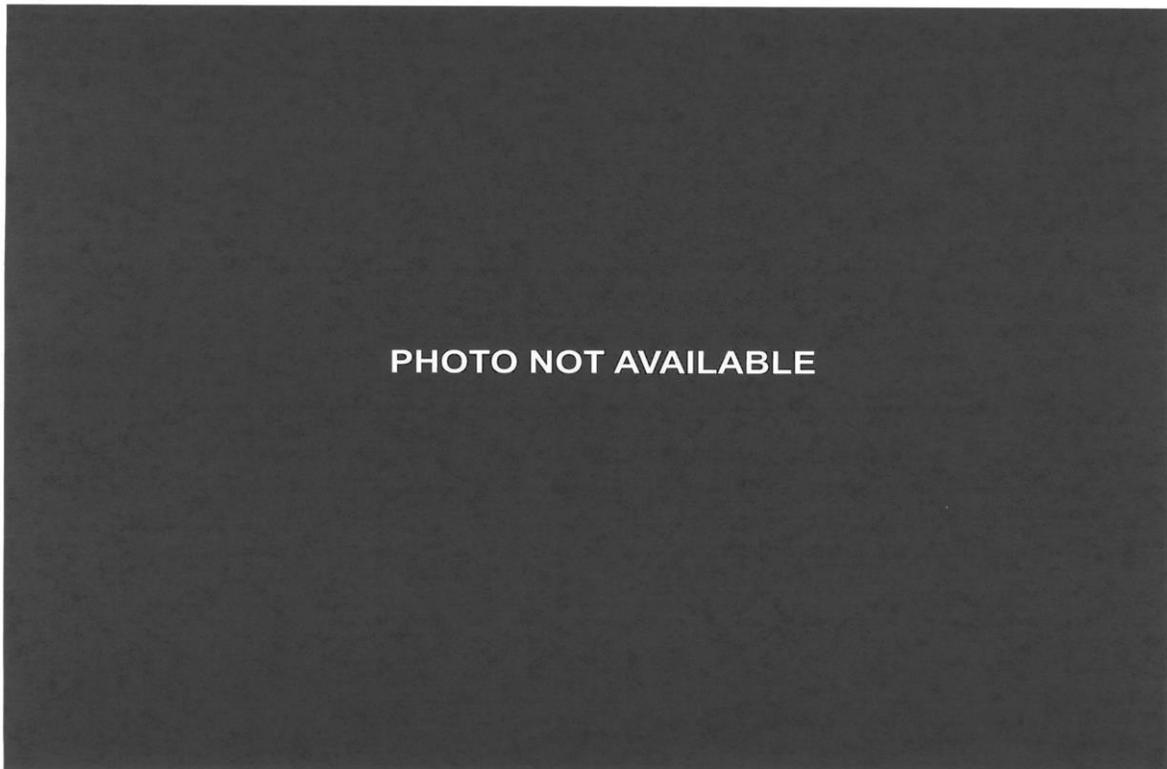
026 Pre-Test Rear Underbody View



027 Post-Test Rear Underbody View



028 Pre-Test Dummy Cable Routing



029 Post-Test Dummy Cable Routing



030 Pre-Test Driver Dummy Front View



031 Post-Test Driver Dummy Front View



032 Pre-Test Driver Dummy Window View



033 Post-Test Driver Dummy Window View



034 Pre-Test Driver Dummy and Vehicle Interior View



035 Post-Test Driver Dummy and Vehicle Interior View



036 Pre-Test Driver's Seat Fore-Aft Markings



037 Post-Test Driver's Seat Fore-Aft Markings



038 Pre-Test View of Belt Anchorage for Driver Dummy



039 Post-Test View of Belt Anchorage for Driver Dummy



040 Pre-Test Driver Dummy Feet



041 Post-Test Driver Dummy Feet



042 Pre-Test Driver's Side Knee Bolster



043 Post-Test Driver's Side Knee Bolster



044 Pre-Test Driver's Side Floorpan



045 Post-Test Driver's Side Floorpan



046 Post-Test Driver Dummy Face



047 Post-Test Driver Dummy Contact With Airbag



048 Post-Test Driver Dummy Contact With Headrest



048a Post-Test Driver Dummy Contact With Vehicle Interior



049 Pre-Test View of the Steering Wheel



050 Post-Test View of the Steering Wheel



051 Pre-Test Passenger Dummy Front View



052 Post-Test Passenger Dummy Front View



053 Pre-Test Passenger Dummy Window View



054 Post-Test Passenger Dummy Window View



055 Pre-Test Passenger Dummy and Vehicle Interior View



056 Post-Test Passenger Dummy and Vehicle Interior View



057 Pre-Test Passenger's Seat Fore-Aft Markings



058 Post-Test Passenger's Seat Fore-Aft Markings



059 Pre-Test View of Belt Anchorage for Passenger Dummy



060 Post-Test View of Belt Anchorage for Passenger Dummy



061 Pre-Test Passenger Dummy Feet



062 Post-Test Passenger Dummy Feet



063 Pre-Test Passenger's Side Knee Bolster



064 Post-Test Passenger's Side Knee Bolster



065 Pre-Test Passenger's Side Floorpan



066 Post-Test Passenger's Side Floorpan



067 Post-Test Passenger Dummy Face



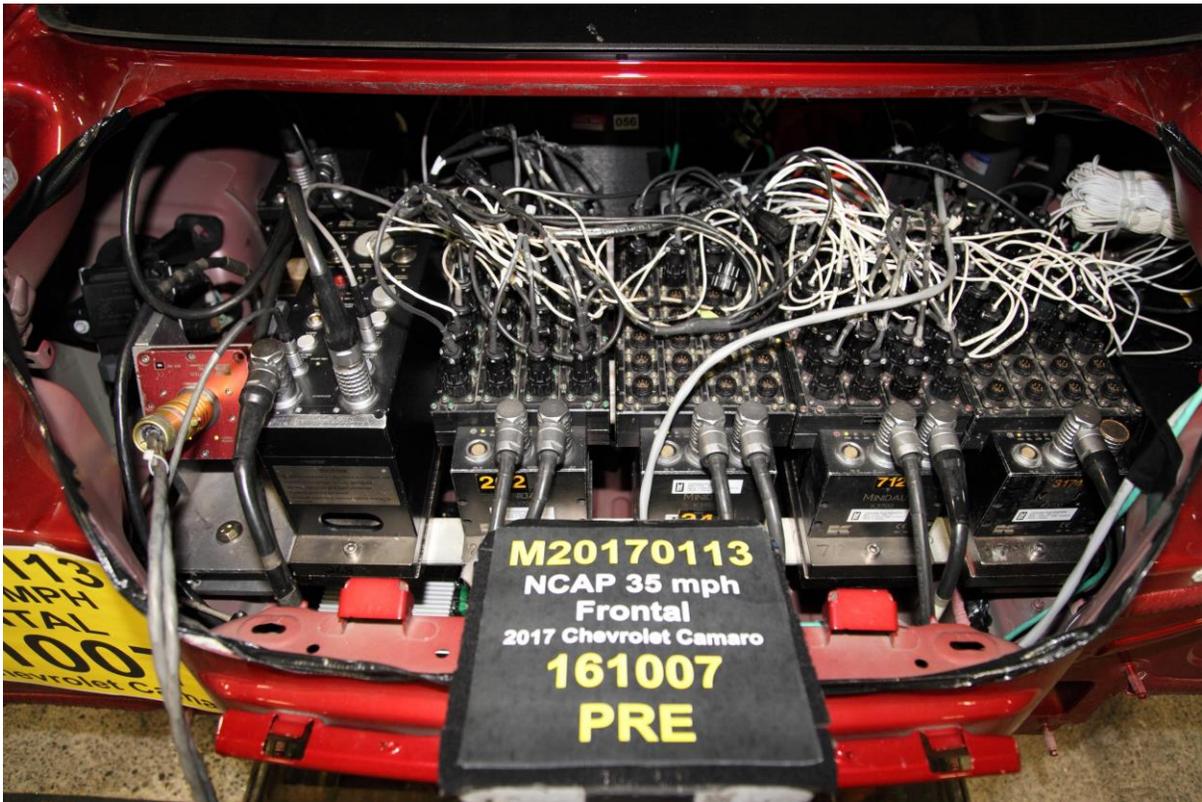
068 Post-Test Passenger Dummy Contact With Airbag



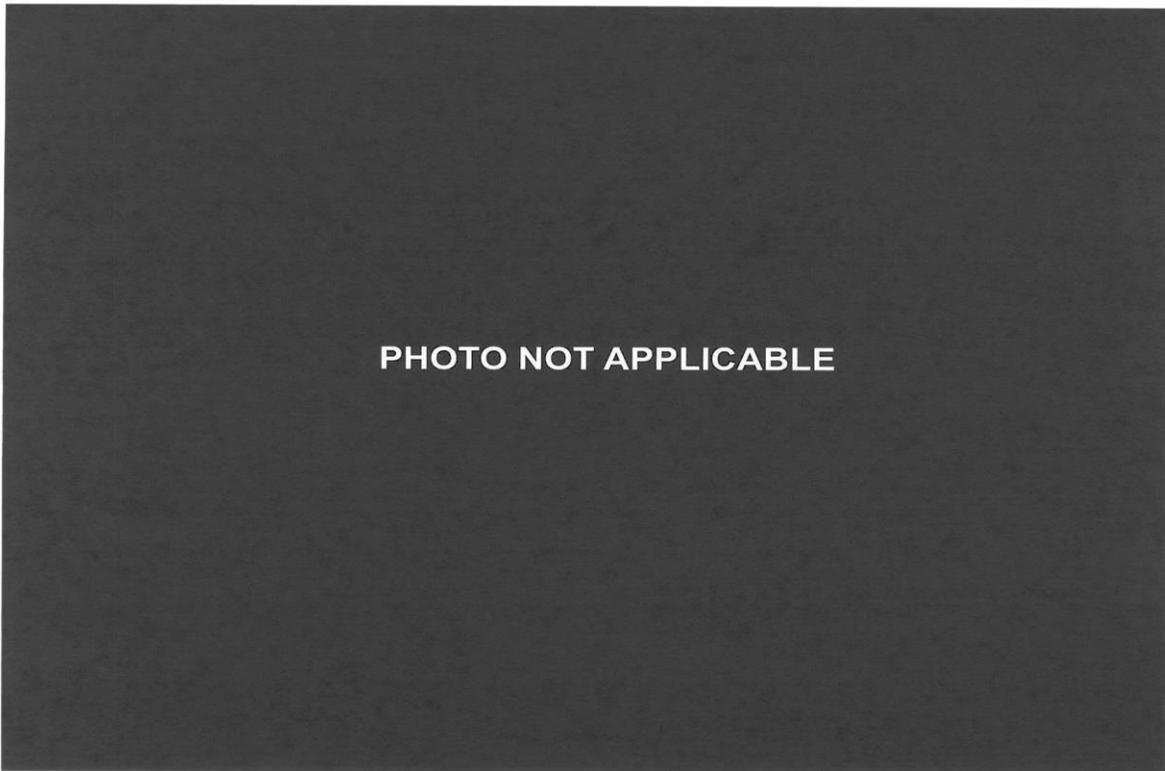
069 Post Test Passenger Dummy Contact With Headrest



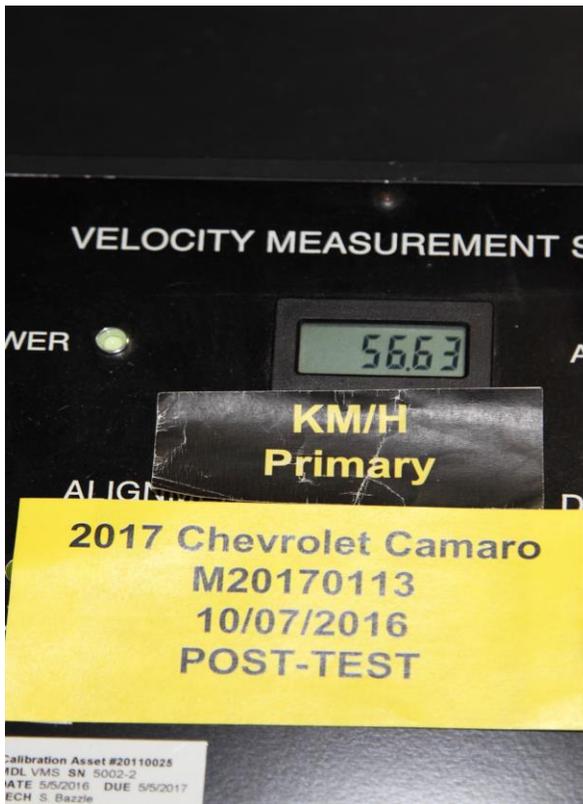
069a Post Test Passenger Dummy Contact With Side Curtain Airbag



070 Photograph of Ballast Installed in Vehicle View



071 Post-Test Stoddard Solvent Spillage Location View



072 Post-Test Speed Trap Readout



073 Vehicle at 0° on Static Rollover Device



074 Vehicle at 90° on Static Rollover Device



075 Vehicle at 180° on Static Rollover Device



076 Vehicle at 270° on Static Rollover Device



077 Vehicle at 360° on Static Rollover Device



078 2017 Chevrolet Camaro Frontal Impact Event



CHEVROLET

2017 CAMARO 1LT COUPE



EXTERIOR: GARNET RED TINTCOAT
INTERIOR: JET BLACK

ENGINE: 2.0L TURBO, 4-CYL
8-SPD AUTOMATIC TRANSMISSION

Visit us at www.chevy.com

<p>STANDARD EQUIPMENT</p> <p><small>FORMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN.</small></p> <ul style="list-style-type: none"> • CHEVROLET COMPLETE CARE • SEE WWW.CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS • TWO MAINTENANCE VISITS • OIL & FILTER CHANGE • 4-WHEEL TIRE ROTATION • 27 POINT INSPECTION • 3 YR/50,000 MILES BUMPER-TO-BUMPER WARRANTY • 5 YR/100,000 MILES POWERTRAIN LIMITED WARRANTY • ROADSIDE ASSISTANCE • COURTESY TRANSPORTATION <p>MECHANICAL</p> <ul style="list-style-type: none"> • ENGINE, 2.0L TURBO, 4-CYL • SIDE VVT • 8-SPEED MANUAL TRANSMISSION • SPORT SUSPENSION • TIRE SEALANT AND INFLATOR KIT • PWR STEERING, ELECTRIC 	<ul style="list-style-type: none"> • DRIVER MODE SELECTOR • CARLESS FUELING <p>SAFETY & SECURITY</p> <ul style="list-style-type: none"> • STABILITRAK-STABILITY CONTROL INCLUDES TRACTION CONTROL • AIR BAGS, DRIVER AND FRONT PASSENGER DUAL-STAGE FRONTAL, THORAX SIDE-IMPACT, KNEE, AND HEAD CURTAIN SIDE-IMPACT • ANTI LOCK BRAKE SYSTEM, 4-WHEEL DISC • REAR CHILD SEAT LATCH ANCHORS • BATTERY RUNDOWN PROTECTION • THEFT DETERRENT SYSTEM • REAR VISION CAMERA <p>EXTERIOR</p> <ul style="list-style-type: none"> • HEADLAMPS, HALOGEN PROJECTOR • DAYTIME RUNNING LAMPS, LED • WHEELS, 18" SILVER PAINTED ALUMINUM • POWER OUTSIDE ADJUSTABLE MIRRORS 	<ul style="list-style-type: none"> • EXHAUST, DUAL TIPS <p>INTERIOR</p> <ul style="list-style-type: none"> • KEYSLESS OPEN AND START • 8-WAY POWER DRIVER SEAT • 6-WAY POWER PASSENGER SEAT • AIR CONDITIONING, SINGLE ZONE AUTOMATIC • WINDOWS, POWER WITH EXPRESS UP/DOWN • LEATHER WRAP STEERING WHEEL • LEATHER TRIMMED SHFT KNOB • COLOR DRIVER INFORMATION CTR • TRUNK RELEASE, POWER • COMPASS DISPLAY • STEERING COLUMN, MANUAL RAKE AND TELESCOPING • REAR SEAT, FOLDING • FLOORBOARDS, LOCKABLE • FLOOR MATS, FRONT <p>CONNECTIVITY FEATURES</p> <ul style="list-style-type: none"> • CHEVROLET MYLINK AUDIO SYSTEM • 7" DIAGONAL COLOR TOUCHSCREEN 	<p>SELECT BLUETOOTH STREAMING, APPLE CARPLAY CAPABILITY AND ANDROID AUTO CAPABILITY PROVIDED BY APPLE AND GOOGLE AVAILABLE WITH COMPATIBLE SMARTPHONES</p> <ul style="list-style-type: none"> • XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUSXM AFTER 12 MTHS • ONSTAR™ INCLUDES 5 YR BASIC PLAN PLUS 6 MTH SERVICE W/ AUTOMATIC CRASH RESPONSE, NAVIGATION & MORE. (SUBJECT TO TERMS SEE ONSTAR.COM) • 4G LTE W/HIPV HOTSPOT WITH LIMITED DATA TRIAL AND MORE. (SUBJECT TO TERMS SEE ONSTAR.COM) • BLUETOOTH FOR PHONE <p>OPTIONS & PRICING</p>
--	--	--	--

<p>STANDARD VEHICLE PRICE \$26,305.00</p> <p><small>OPTIONS INSTALLED BY THE MANUFACTURER MAY REPLACE STANDARD EQUIPMENT SHOWN.</small></p> <table style="width: 100%;"> <tr> <td>8-SPD AUTOMATIC TRANSMISSION</td> <td style="text-align: right;">1,495.00</td> </tr> <tr> <td>W/REMOTE VEHICLE START</td> <td></td> </tr> <tr> <td>GARNET RED TINTCOAT</td> <td style="text-align: right;">395.00</td> </tr> <tr> <td>TOTAL OPTIONS</td> <td style="text-align: right;">\$1,890.00</td> </tr> <tr> <td>TOTAL VEHICLE & OPTIONS</td> <td style="text-align: right;">\$28,195.00</td> </tr> <tr> <td>DESTINATION CHARGE</td> <td style="text-align: right;">995.00</td> </tr> <tr> <td>TOTAL VEHICLE PRICE*</td> <td style="text-align: right;">\$29,190.00</td> </tr> </table>	8-SPD AUTOMATIC TRANSMISSION	1,495.00	W/REMOTE VEHICLE START		GARNET RED TINTCOAT	395.00	TOTAL OPTIONS	\$1,890.00	TOTAL VEHICLE & OPTIONS	\$28,195.00	DESTINATION CHARGE	995.00	TOTAL VEHICLE PRICE*	\$29,190.00	<p><small>MANUFACTURER'S SUGGESTED RETAIL PRICE</small></p>
8-SPD AUTOMATIC TRANSMISSION	1,495.00														
W/REMOTE VEHICLE START															
GARNET RED TINTCOAT	395.00														
TOTAL OPTIONS	\$1,890.00														
TOTAL VEHICLE & OPTIONS	\$28,195.00														
DESTINATION CHARGE	995.00														
TOTAL VEHICLE PRICE*	\$29,190.00														

<p>EPA DOT Fuel Economy and Environment</p> <p><small>These estimates reflect new EPA methods beginning with 2017 models.</small></p> <p>Fuel Economy</p> <p>25 MPG combined city/hwy</p> <p>22 city 31 highway</p> <p>4.0 gallons per 100 miles</p> <p>You spend \$250 more in fuel costs over 5 years compared to the average new vehicle.</p>	<p>GOVERNMENT 5-STAR SAFETY RATINGS</p> <p>This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.</p> <p>Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236</p>	<p>PARTS CONTENT INFORMATION</p> <p>FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 60% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 17%</p> <p>NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.</p> <p>FOR THIS VEHICLE: FINAL ASSEMBLY POINT: LANSING, MI U.S.A. COUNTRY OF ORIGIN: ENGINE: UNITED STATES TRANSMISSION: UNITED STATES</p> <p><small>© 2016 General Motors LLC. GM, Buick, Pontiac, Saturn, Opel, Buick</small></p>
--	---	--

<p>Annual fuel cost \$1,450</p> <p>Fuel Economy & Greenhouse Gas Rating (tailpipe only) 5</p> <p>Smog Rating (tailpipe only) 6</p> <p><small>This vehicle emits 367 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions. Learn more at safercar.gov.</small></p> <p><small>Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.45 per gallon. MPG is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.</small></p> <p>fuelconomy.gov <small>Calculate personalized estimates and compare vehicles</small></p>	<p>ORDER NO TAG/INT: SALES CODE E SALES MODEL CODE 1A027 DEALER NO 2086 FRONT ASSEMBLY: U.S.A. VIN 1G1F1R1X1H0110232 DEALER TO WHICH DELIVERED: VALLEY CHEVROLET, INC. PO BOX 5A WILKES BARRE, PA 18703-3056</p> <p>4G LTE Equipped with the safety and connectivity of OnStar! Visit onstar.com for details.</p> <p>LY 1GA1227102</p>
--	---

079 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

No.	List of Data Plots Provided in the Test Report	Page
1	Driver Head X Acceleration vs. Time Primary	B-5
2	Driver Head Y Acceleration vs. Time Primary	B-5
3	Driver Head Z Acceleration vs. Time Primary	B-5
4	Driver Head Resultant Acceleration vs. Time Primary	B-5
5	Driver Chest X Deflection vs. Time	B-6
6	Driver Chest X Acceleration vs. Time Primary	B-7
7	Driver Chest Y Acceleration vs. Time Primary	B-7
8	Driver Chest Z Acceleration vs. Time Primary	B-7
9	Driver Chest Resultant Acceleration vs. Time Primary	B-7
10	Driver Upper Neck Force X vs. Time	B-8
11	Driver Upper Neck Force Z vs. Time	B-8
12	Driver Upper Neck Moment Y vs. Time	B-8
13	Driver Nij vs. Time	B-9
14	Driver Left Femur Force vs. Time	B-10
15	Driver Right Femur Force vs. Time	B-10
16	Passenger Head X Acceleration vs. Time Primary	B-11
17	Passenger Head Y Acceleration vs. Time Primary	B-11
18	Passenger Head Z Acceleration vs. Time Primary	B-11
19	Passenger Head Resultant Acceleration vs. Time Primary	B-11
20	Passenger Chest X Deflection vs. Time	B-12
21	Passenger Chest X Acceleration vs. Time Primary	B-13
22	Passenger Chest Y Acceleration vs. Time Primary	B-13
23	Passenger Chest Z Acceleration vs. Time Primary	B-13
24	Passenger Chest Resultant Acceleration vs. Time Primary	B-13
25	Passenger Upper Neck Force X vs. Time	B-14
26	Passenger Upper Neck Force Z vs. Time	B-14
27	Passenger Upper Neck Moment Y vs. Time	B-14
28	Passenger Nij vs. Time	B-15
29	Passenger Left Femur Force vs. Time	B-16
30	Passenger Right Femur Force vs. Time	B-16

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 Acceleration
Driver Pelvis Y Acceleration
Driver Pelvis Z Acceleration
Driver Left Femur Force Redundant
Driver Right Femur Force Redundant
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 Femur Force Redundant
Passenger Right Femur Force Redundant
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
Load Cell Barrier Forces and Moments

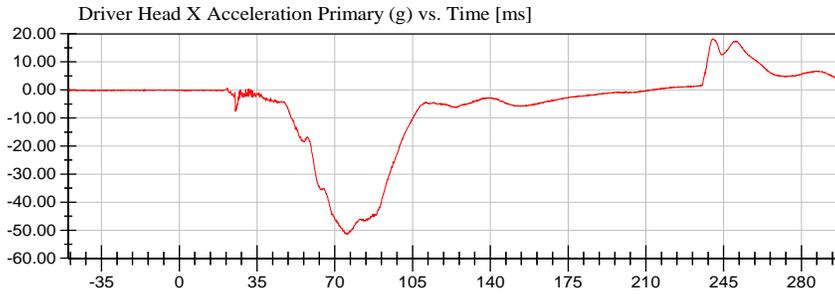
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



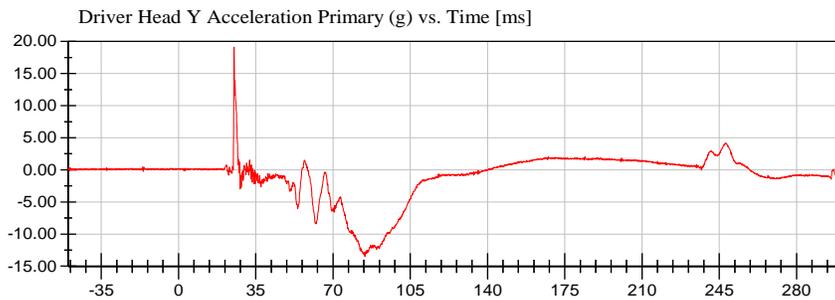
<Max>

18.23 g at 240.00 ms

<Min>

-51.41 g at 75.12 ms

CFC_1000



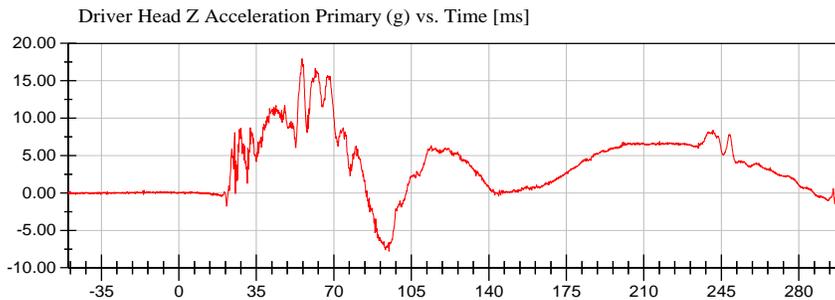
<Max>

19.13 g at 25.20 ms

<Min>

-13.50 g at 84.40 ms

CFC_1000



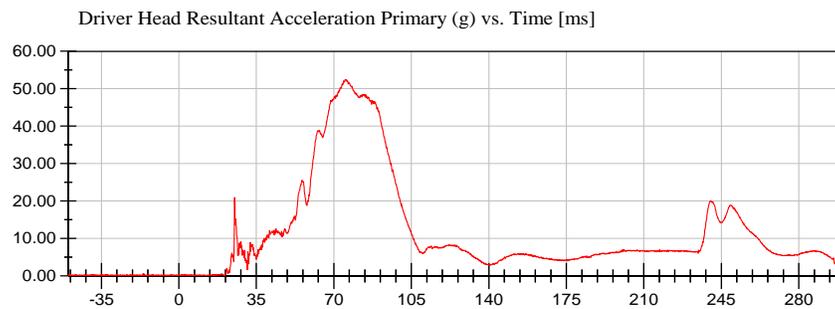
<Max>

17.96 g at 55.60 ms

<Min>

-7.78 g at 94.88 ms

CFC_1000



<Max>

52.49 g at 75.20 ms

<Min>

0.05 g at 12.32 ms

CFC_1000



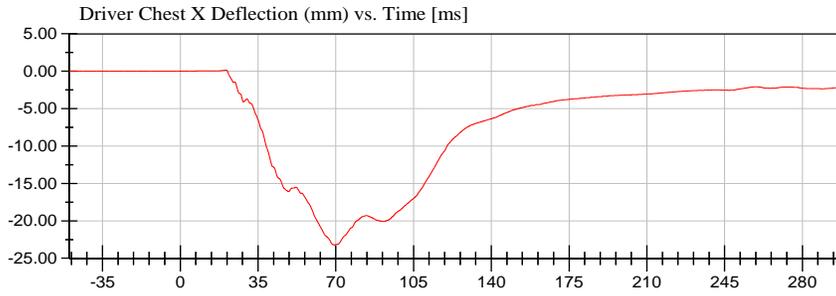
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



<Max>

0.14 mm at 20.64 ms

<Min>

-23.21 mm at 69.36 ms

CFC_600



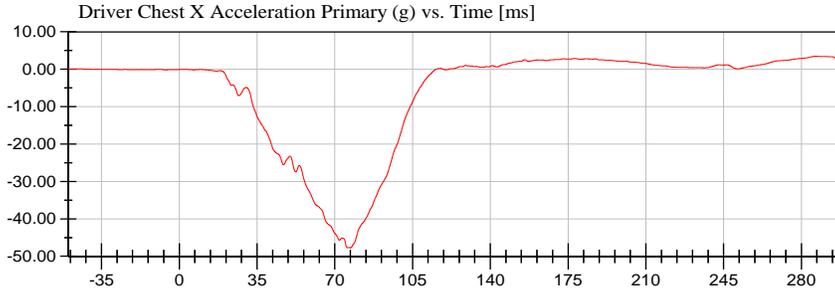
NHTSA

Test Date: 10/07/2016

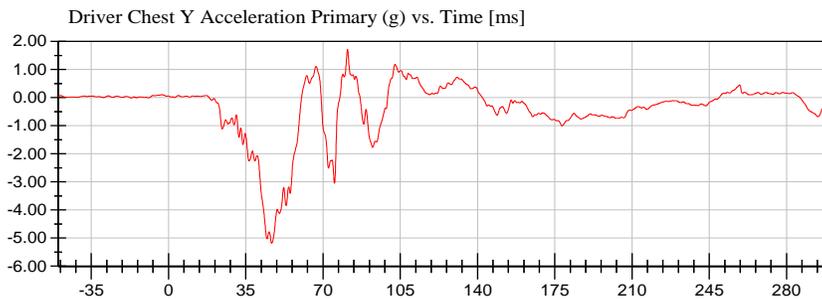
Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

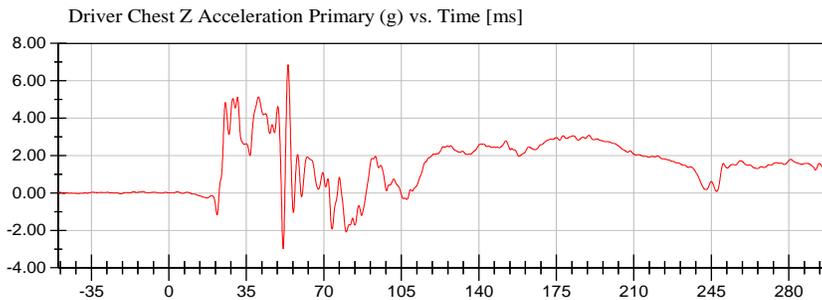
Test Number: 161007 (M20170113)



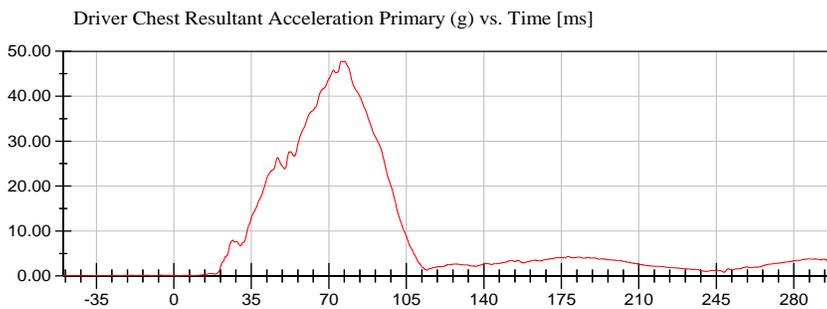
<Max>
3.45 g at 286.40 ms
<Min>
-47.79 g at 77.04 ms
CFC_180



<Max>
1.72 g at 81.12 ms
<Min>
-5.19 g at 46.64 ms
CFC_180



<Max>
6.85 g at 53.84 ms
<Min>
-2.98 g at 51.68 ms
CFC_180



<Max>
47.80 g at 77.04 ms
<Min>
0.03 g at -9.04 ms
CFC_180



NHTSA

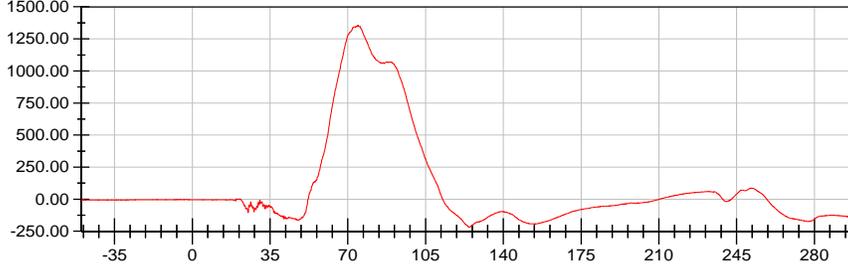
Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)

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



<Max>

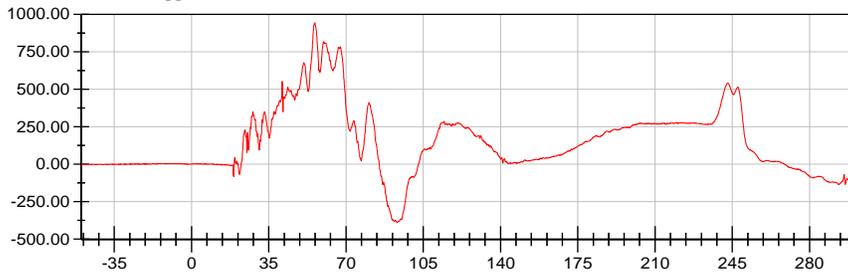
1,357.42 N at 74.56 ms

<Min>

-217.67 N at 124.88 ms

CFC_1000

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



<Max>

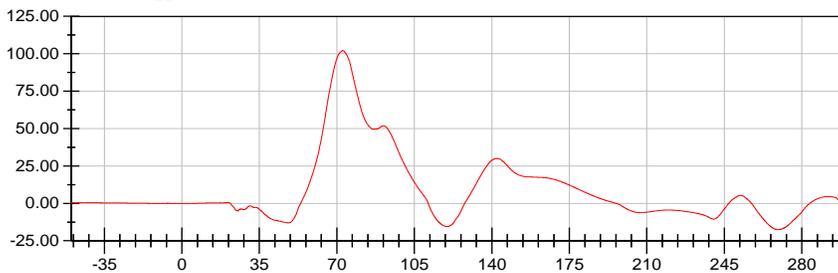
944.15 N at 55.84 ms

<Min>

-387.92 N at 93.20 ms

CFC_1000

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



<Max>

102.08 Nm at 72.72 ms

<Min>

-17.49 Nm at 269.28 ms

CFC_600



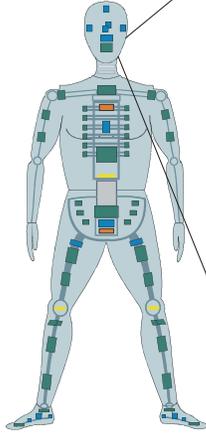


2017 Chevrolet Camaro NCAP 35 mph Frontal Impact Neck Injury Predictor (NIJ)

Date: 10/07/2016
Time: 13:45

Customer: NHTSA
Test Number: M20170113

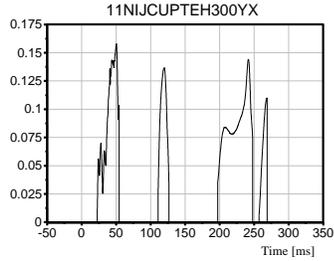
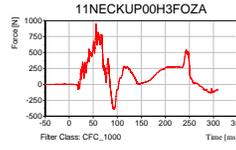
Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310



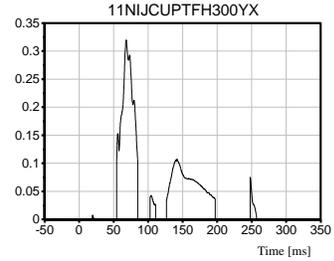
Dummy: HIII 50th Male
Seating Position:
Driver

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

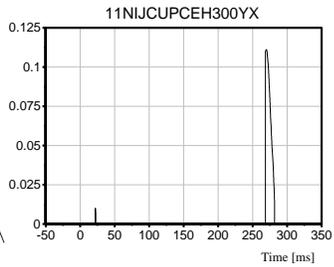
TRC Inc. Test Lab: CTF
Test Number: 161007



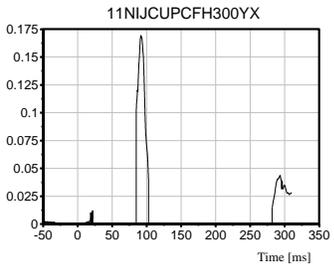
Max [NTE] 0.1579 at 50.40 ms



Max [NTF] 0.3193 at 68.32 ms



Max [NCE] 0.1113 at 269.92 ms



Max [NCF] 0.1693 at 91.84 ms

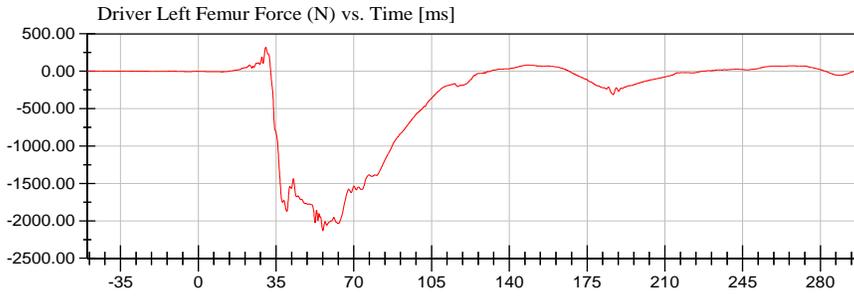
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



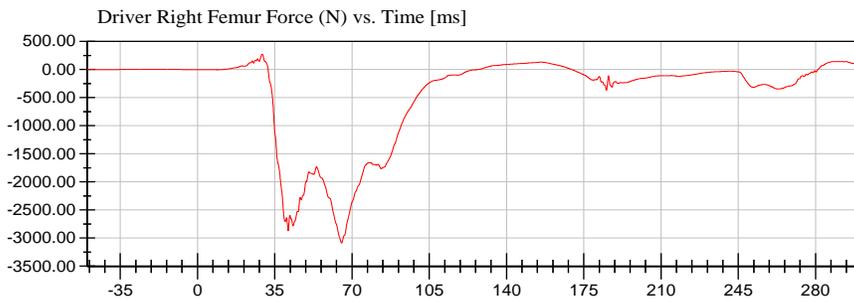
<Max>

320.23 N at 30.32 ms

<Min>

-2,132.50 N at 56.08 ms

CFC_600



<Max>

274.19 N at 29.36 ms

<Min>

-3,087.17 N at 65.28 ms

CFC_600



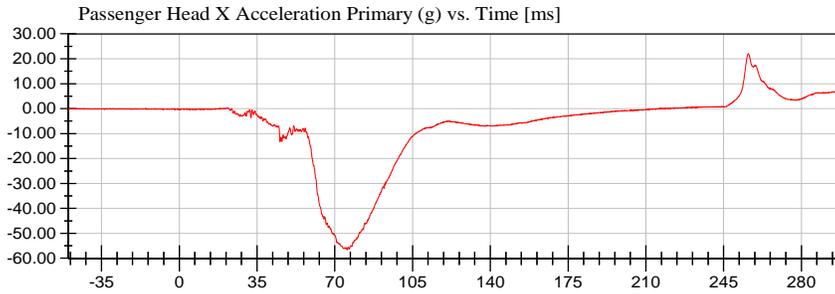
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



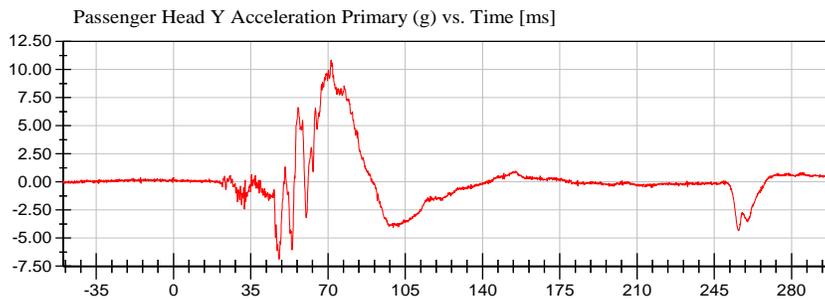
<Max>

22.01 g at 256.16 ms

<Min>

-56.63 g at 75.52 ms

CFC_1000



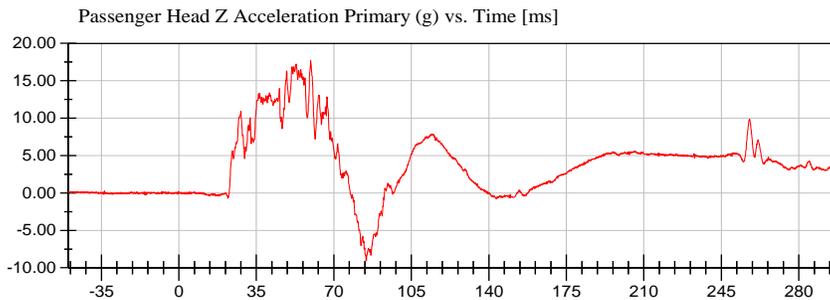
<Max>

10.85 g at 71.36 ms

<Min>

-6.88 g at 47.76 ms

CFC_1000



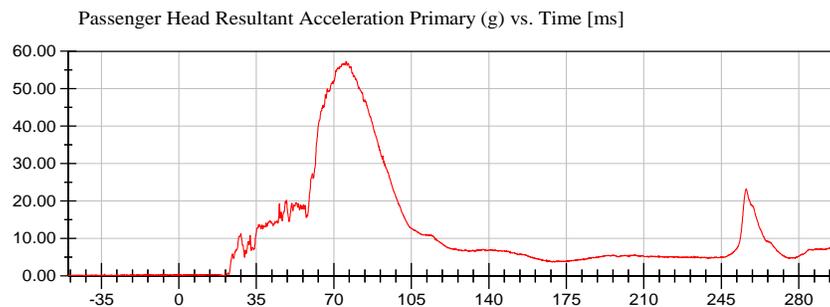
<Max>

17.67 g at 59.52 ms

<Min>

-9.08 g at 84.64 ms

CFC_1000



<Max>

57.31 g at 75.52 ms

<Min>

0.04 g at -46.88 ms

CFC_1000



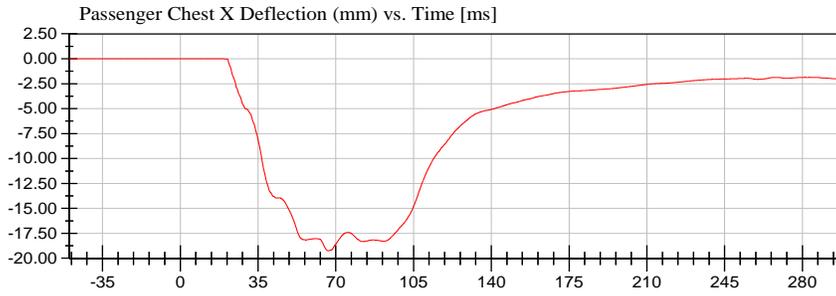
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



<Max>

0.00 mm at -29.12 ms

<Min>

-19.24 mm at 66.64 ms

CFC_600



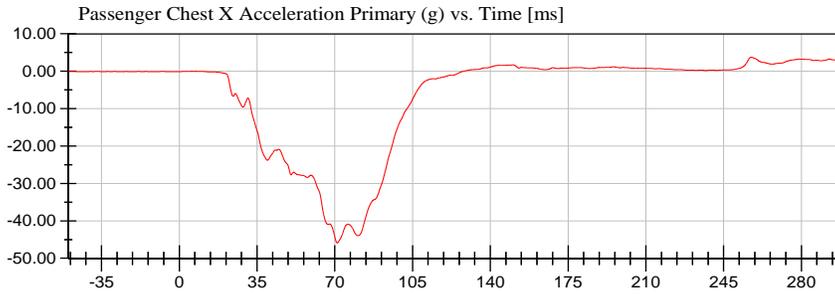
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



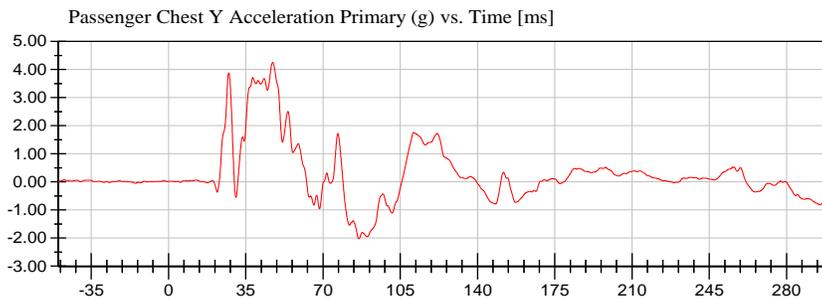
<Max>

3.76 g at 257.36 ms

<Min>

-45.91 g at 71.12 ms

CFC_180



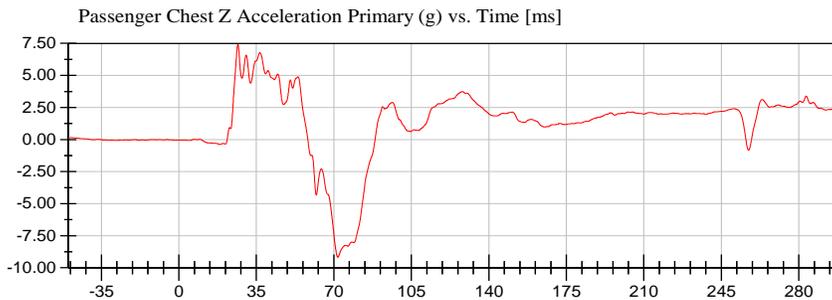
<Max>

4.25 g at 47.20 ms

<Min>

-2.03 g at 86.16 ms

CFC_180



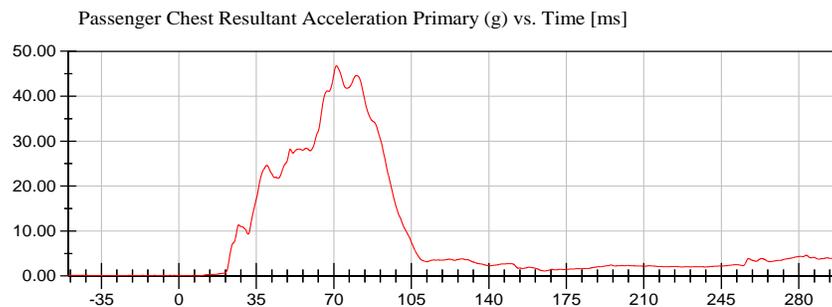
<Max>

7.44 g at 26.64 ms

<Min>

-9.17 g at 71.76 ms

CFC_180



<Max>

46.76 g at 71.20 ms

<Min>

0.02 g at 6.08 ms

CFC_180



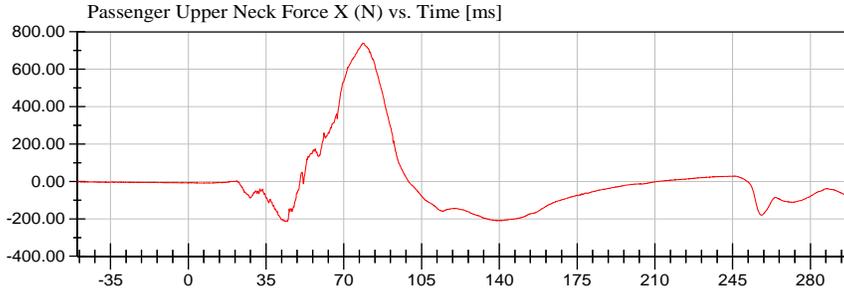
NHTSA

Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)



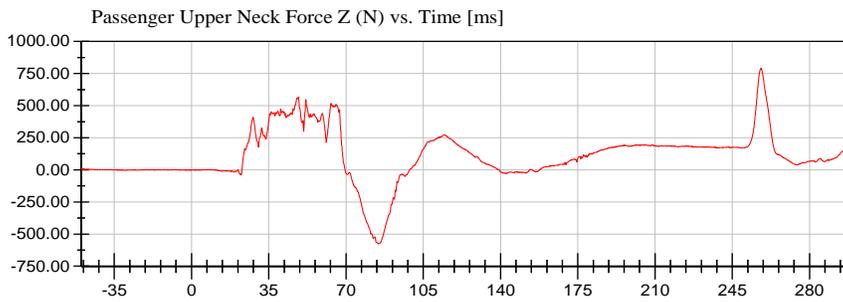
<Max>

738.53 N at 78.72 ms

<Min>

-215.86 N at 43.84 ms

CFC_1000



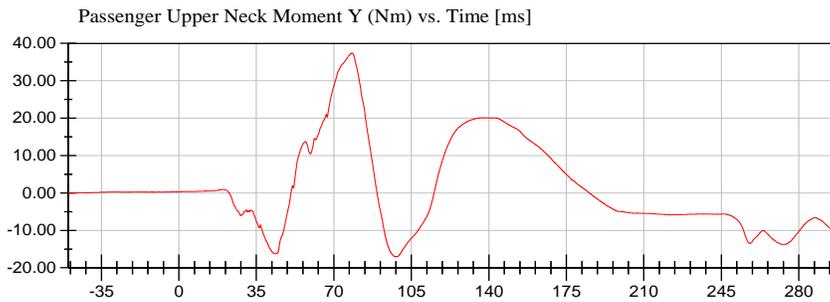
<Max>

791.17 N at 258.08 ms

<Min>

-575.30 N at 84.64 ms

CFC_1000



<Max>

37.39 Nm at 78.16 ms

<Min>

-17.04 Nm at 98.00 ms

CFC_600



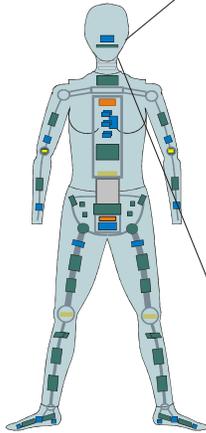


2017 Chevrolet Camaro NCAP 35 mph Frontal Impact Neck Injury Predictor (NIJ)

Date: 10/07/2016
Time: 13:45

Customer: NHTSA
Test Number: M20170113

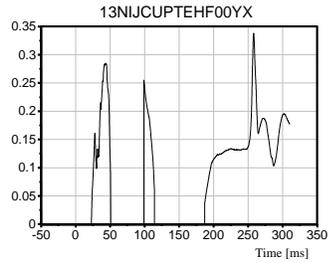
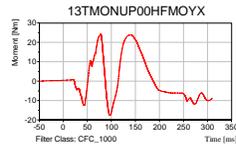
Test Orientation = Frontal
Fzc(Tension) = 4287
Fzc(Compression) = 3880
Myc(Extension) = 67
Myc(Flexion) = 155



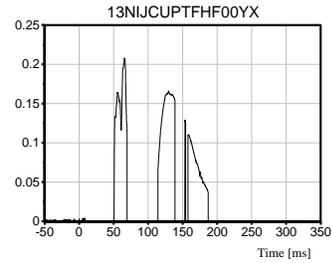
Dummy: HIII 5th Female
Seating Position:
Right Front Passenger

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

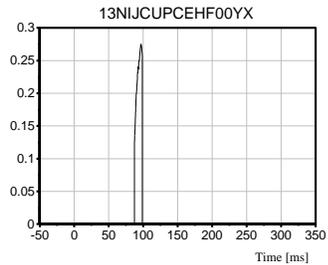
TRC Inc. Test Lab: CTF
Test Number: 161007



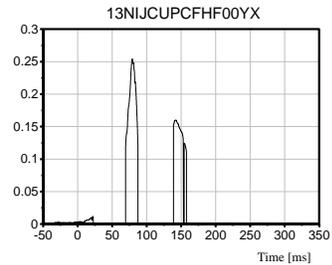
Max [NTE] 0.3376 at 257.92 ms



Max [NTF] 0.2079 at 65.68 ms



Max [NCE] 0.2750 at 96.80 ms



Max [NCF] 0.2543 at 79.20 ms

NHTSA

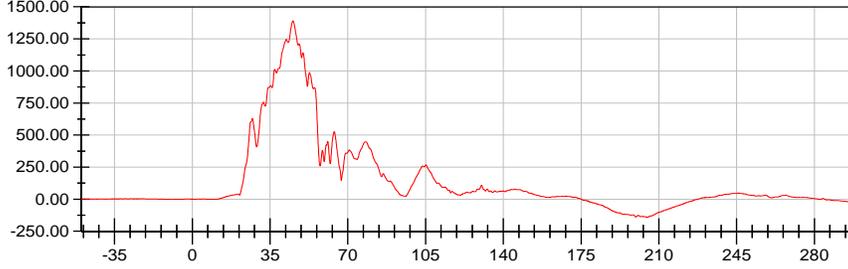
Test Date: 10/07/2016

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Lab: Transportation Research Center, Inc. Position #2 Hybrid III Small Adult Female (426)

Test Number: 161007 (M20170113)

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



<Max>

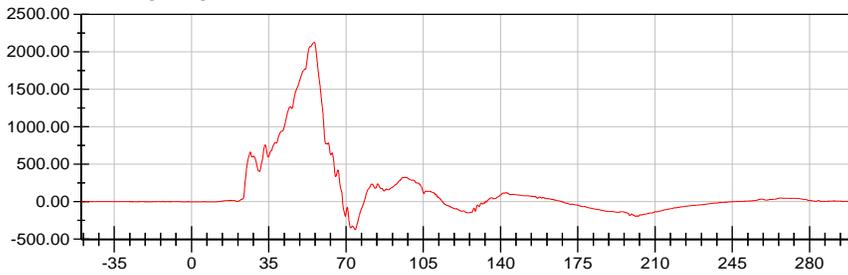
1,391.20 N at 45.28 ms

<Min>

-141.72 N at 204.80 ms

CFC_600

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



<Max>

2,129.21 N at 55.60 ms

<Min>

-373.26 N at 74.16 ms

CFC_600



APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION

Pre-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 39

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	881	Yes
B	Shoulder Pivot Height	505.5 - 520.7	515	Yes
C	H-Point Height	83.8 - 88.9	87	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	151	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	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	599	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	429	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	990	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:



Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 39-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	259.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	8.1 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

08.31.2016 08:32:58 614

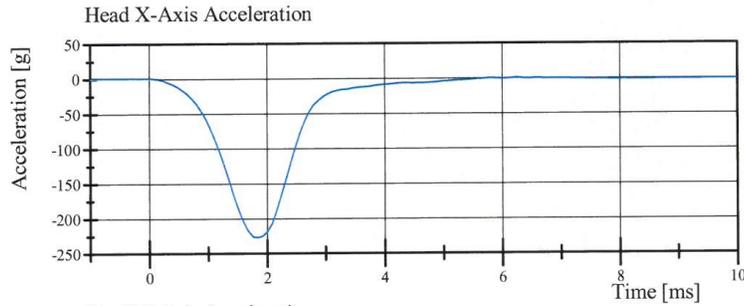


Transportation Research Center Inc.

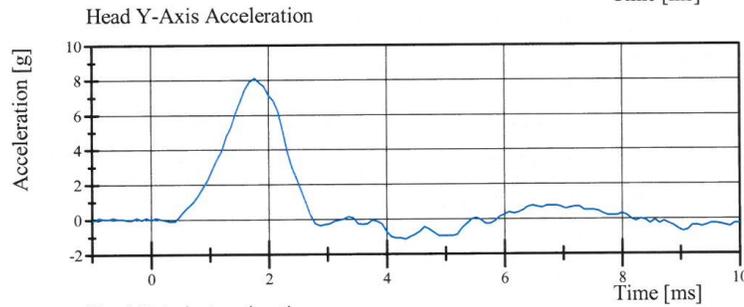
Front Head Drop

HIII 50th Serial No. 037 Certification No. 39-1

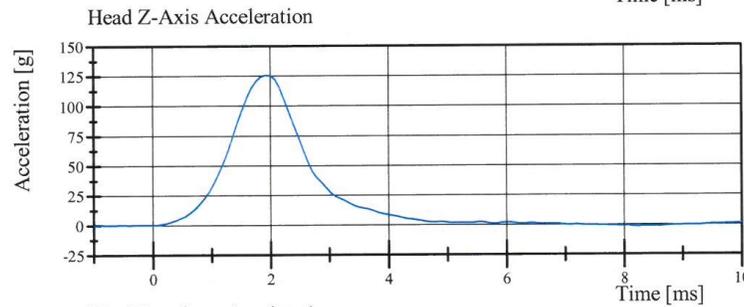
Test Date: 8/31/2016



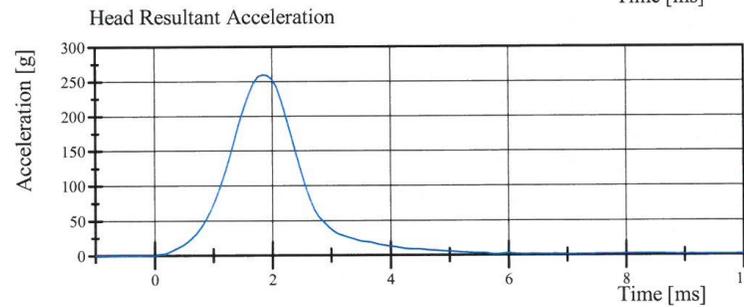
Filter Class: CFC_1000
Max: 0.4 g at 6.2 ms
Min: -227.7 g at 1.8 ms



Filter Class: CFC_1000
Max: 8.1 g at 1.8 ms
Min: -1.2 g at 4.3 ms



Filter Class: CFC_1000
Max: 125.4 g at 1.9 ms
Min: -1.3 g at 8.2 ms



Filter Class: CFC_1000
Max: 259.5 g at 1.8 ms
Min: 0.0 g at -0.7 ms

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

08.31.2016 08:33:04 614



Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 39-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.955 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	39.1 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.42 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-20.18 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.00 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.00 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-65.9 °	Yes
Time of Peak	57 - 64 ms	59.7 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	113 - 128 ms	120.2 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	100.1 N·m	Yes
Time of Peak	47 - 58 ms	51.8 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	97 - 107 ms	100.6 ms	Yes

Test meets specifications.

Comments:

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

08.31.2016 08:48:15 3037

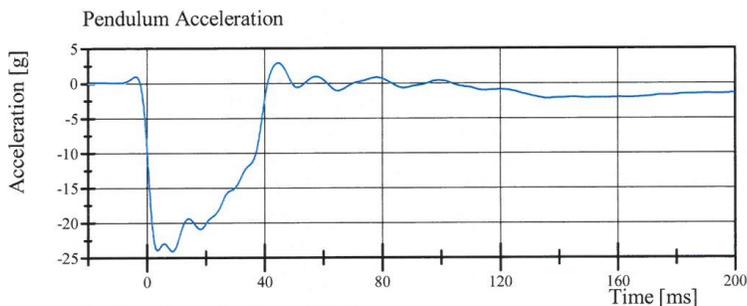


Transportation Research Center Inc.

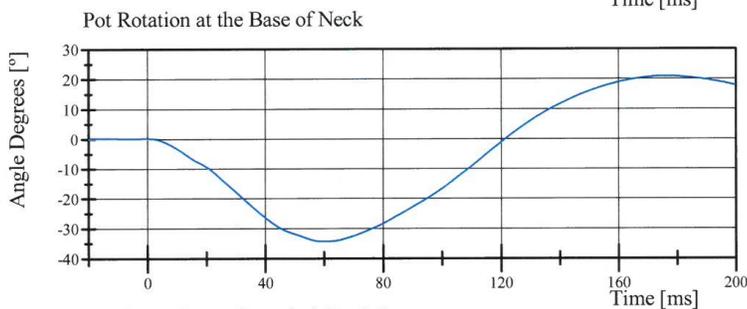
Neck Flexion

HIII 50th Serial No. 037 Certification No. 39-1

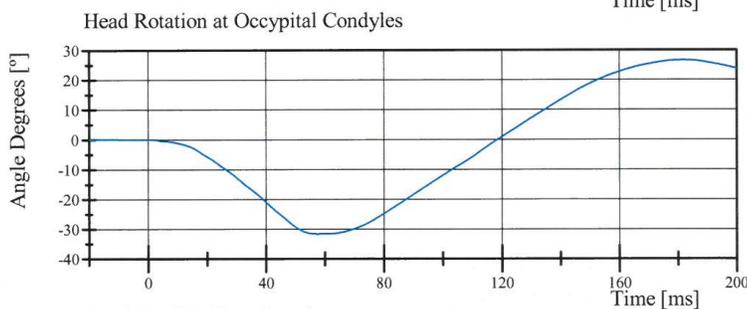
Test Date: 8/31/2016



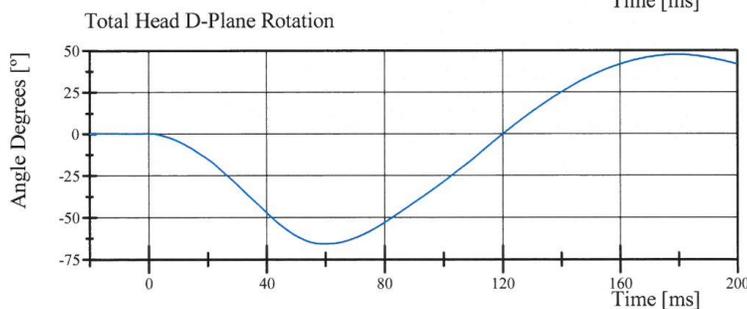
Filter Class: CFC_60
Max: 2.8 g at 44.6 ms
Min: -24.1 g at 8.6 ms



Filter Class: CFC_60
Max: 21.0 ° at 176.0 ms
Min: -34.4 ° at 60.2 ms



Filter Class: CFC_60
Max: 26.6 ° at 181.8 ms
Min: -31.6 ° at 57.6 ms



Filter Class: CFC_60
Max: 47.5 ° at 179.5 ms
Min: -65.9 ° at 59.7 ms

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

08.31.2016 08:48:21 3037

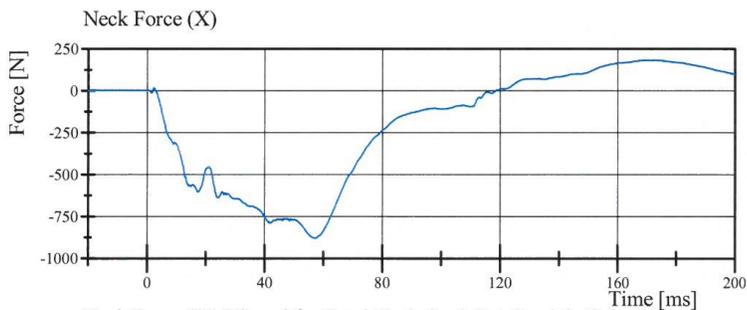


Transportation Research Center Inc.

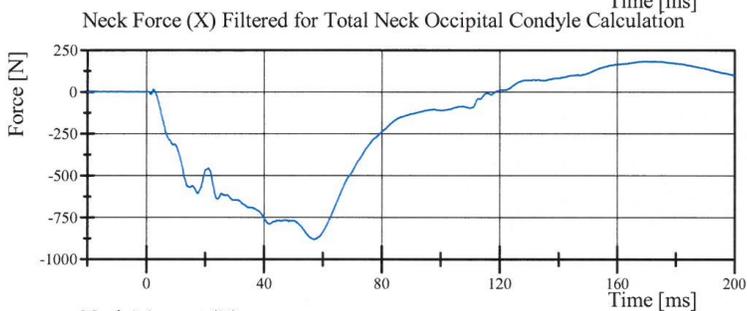
Neck Flexion

HIII 50th Serial No. 037 Certification No. 39-1

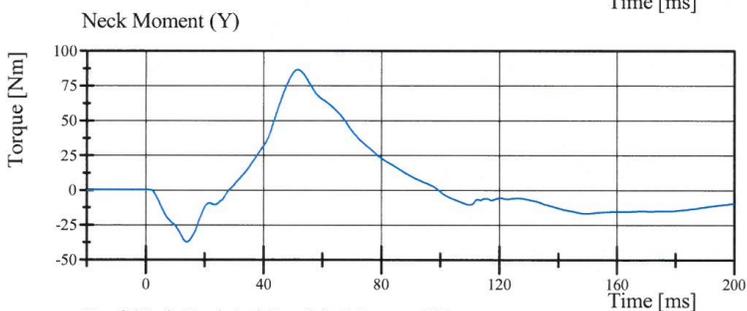
Test Date: 8/31/2016



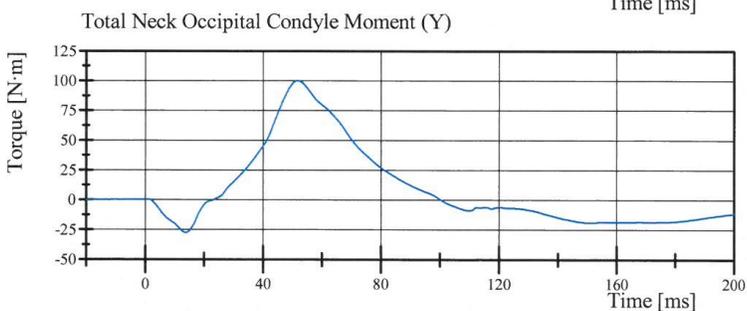
Filter Class: CFC_1000
Max: 183.5 N at 172.7 ms
Min: -881.2 N at 57.0 ms



Filter Class: CFC_600
Max: 183.0 N at 172.7 ms
Min: -881.1 N at 57.0 ms



Filter Class: CFC_600
Max: 86.2 Nm at 51.6 ms
Min: -37.6 Nm at 13.9 ms



Filter Class: Without_(Consta
Max: 100.1 N·m at 51.8 ms
Min: -27.7 N·m at 13.8 ms

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

08.31.2016 08:48:22 3037



Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 39-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-6.000 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	42.3 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.70 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.64 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.28 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.28 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	91.2 °	Yes
Time of Peak	72 - 82 ms	77.8 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	147 - 174 ms	158.7 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-68.3 N·m	Yes
Time of Peak	65 - 79 ms	72.2 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	120 - 148 ms	144.7 ms	Yes

Test meets specifications.

Comments:

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

08.31.2016 09:22:57 3126

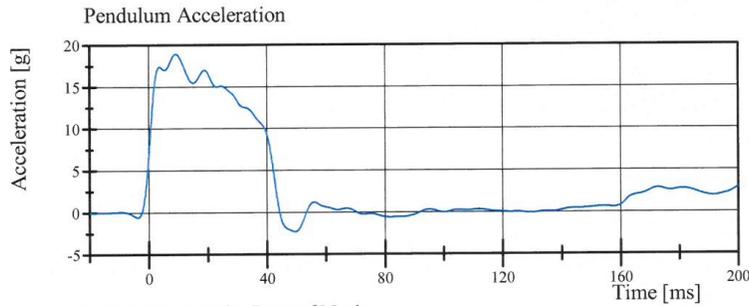


Transportation Research Center Inc.

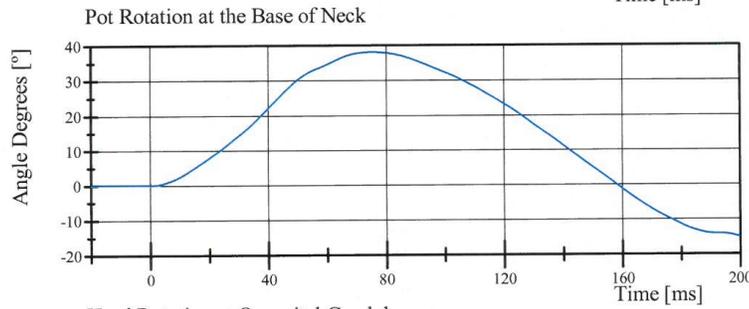
Neck Extension

HIII 50th Serial No. 037 Certification No. 39-1

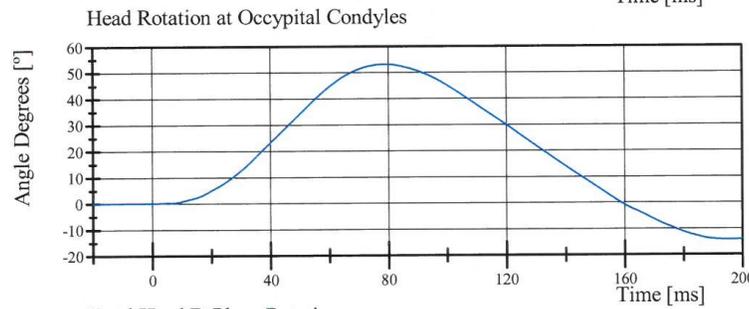
Test Date: 8/31/2016



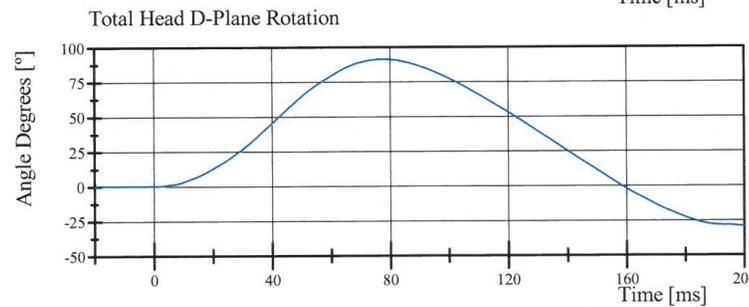
Filter Class: CFC_60
Max: 18.9 g at 9.2 ms
Min: -2.3 g at 49.6 ms



Filter Class: CFC_60
Max: 38.0 ° at 75.5 ms
Min: -15.0 ° at 200.0 ms



Filter Class: CFC_60
Max: 53.2 ° at 79.0 ms
Min: -14.1 ° at 196.0 ms



Filter Class: CFC_60
Max: 91.2 ° at 77.8 ms
Min: -28.9 ° at 200.0 ms

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

08.31.2016 09:23:09 3126

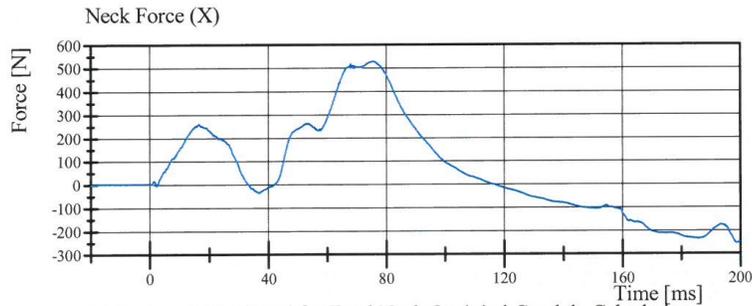


Transportation Research Center Inc.

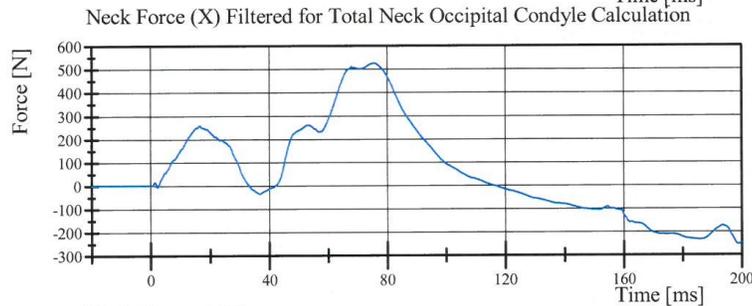
Neck Extension

HIII 50th Serial No. 037 Certification No. 39-1

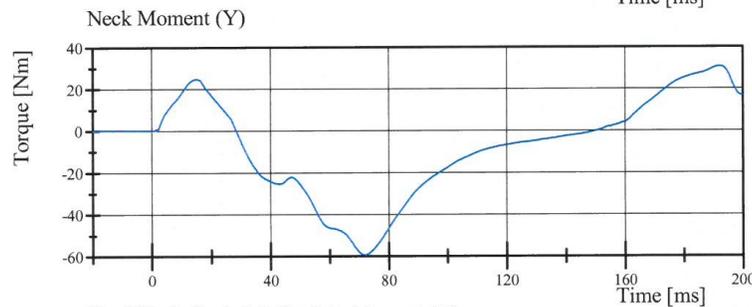
Test Date: 8/31/2016



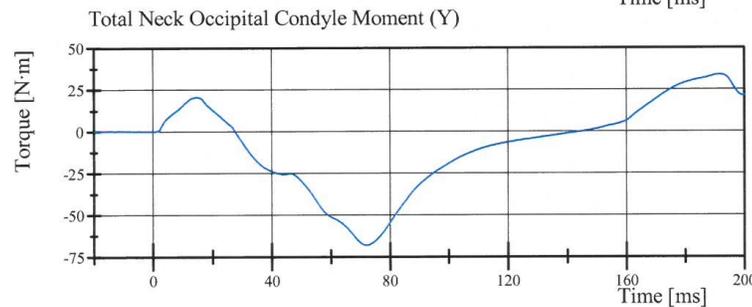
Filter Class: CFC_1000
Max: 526.1 N at 75.4 ms
Min: -254.1 N at 198.9 ms



Filter Class: CFC_600
Max: 525.7 N at 75.8 ms
Min: -253.4 N at 198.9 ms



Filter Class: CFC_600
Max: 30.7 Nm at 192.3 ms
Min: -59.3 Nm at 72.1 ms



Filter Class: Without_(Consta
Max: 34.0 N·m at 191.7 ms
Min: -68.3 N·m at 72.2 ms

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

08.31.2016 09:23:10 3126



Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 39-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.669 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,503.7 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.88 mm	Yes
Internal Hysteresis	65 - 85 %	72.4 %	Yes

Test meets specifications.

Comments:

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

08.31.2016 10:03:42 421



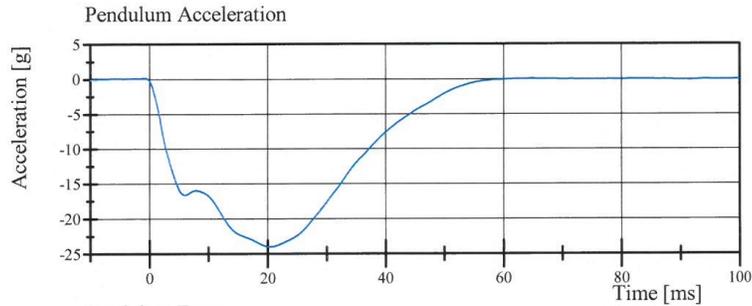
Page 11 of 19

Transportation Research Center Inc.

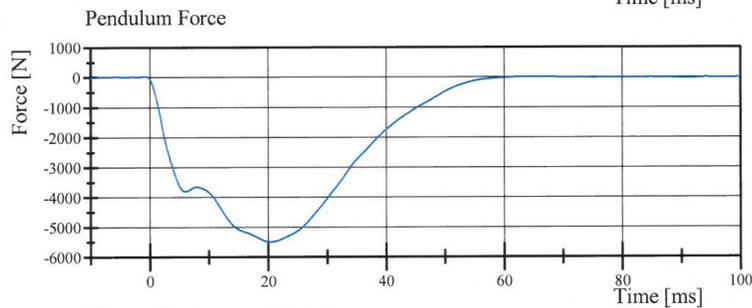
Front Thorax

HIII 50th Serial No. 037 Certification No. 39-1

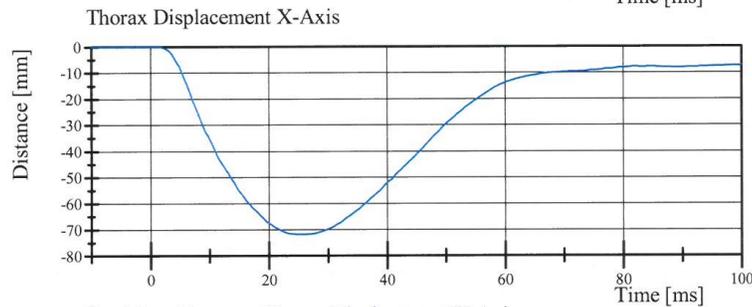
Test Date: 8/31/2016



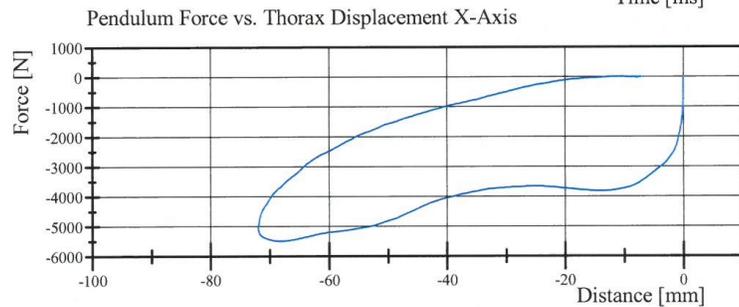
Filter Class: CFC_180
Max: 0.1 g at -0.7 ms
Min: -24.0 g at 20.4 ms



Filter Class: CFC_180
Max: 14.9 N at -0.7 ms
Min: -5,503.7 N at 20.4 ms



Filter Class: CFC_600
Max: 0.0 mm at -5.6 ms
Min: -71.9 mm at 25.5 ms



Filter Class: CFC_180
Max: 14.9 N at -0.0 mm
Min: -5,503.7 N at -68.0 mm

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

08.31.2016 10:03:51 421



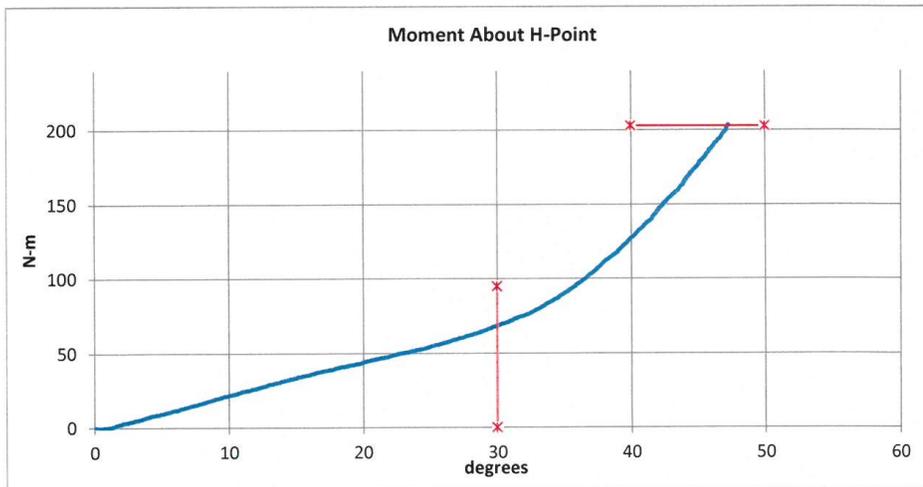
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

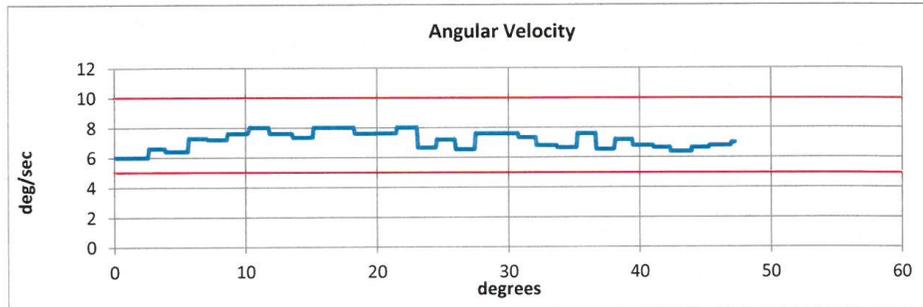


Serial Number: 037 Date: 31-Aug-2016
 Side Tested: Left Hip Time: 7:44
 Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.6 °C Pass
Humidity	10 - 70	52 % Pass
Moment at 30°	0 ≤ 94.9	68.54 N-m Pass
Angle at 203 Nm	40 - 50	47.29 deg Pass
Average Velocity	5 - 10	7.1 deg/sec Pass



Max: 8 deg/sec Min: 6 deg/sec



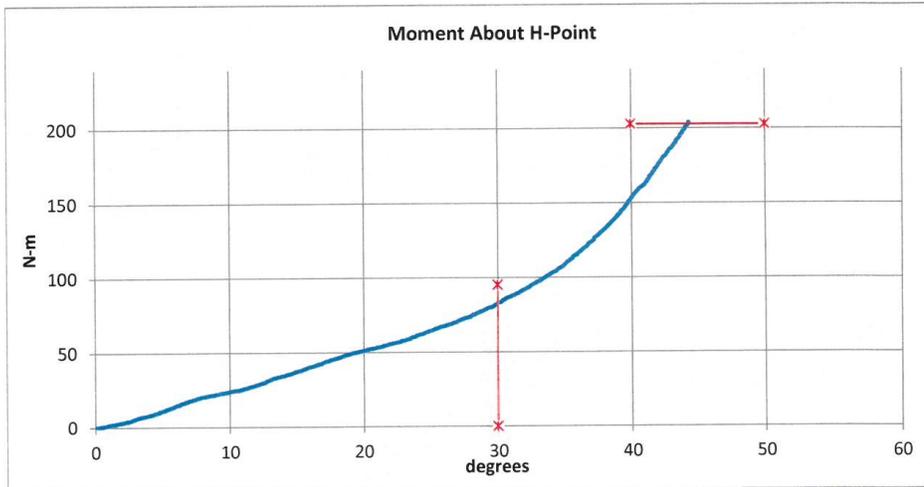
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

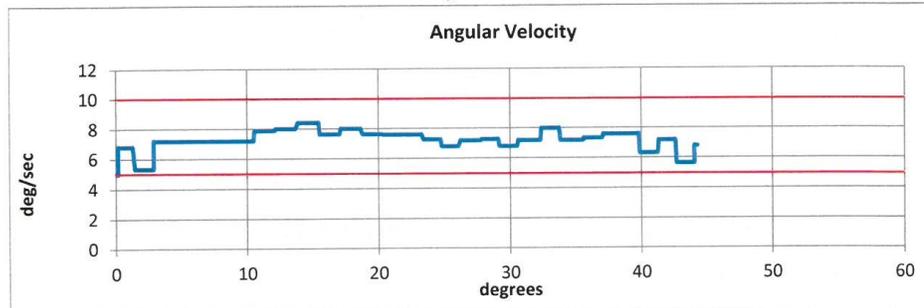


Serial Number: 037 Date: 31-Aug-2016
 Side Tested: Right Hip Time: 8:44
 Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.1 °C Pass
Humidity	10 - 70	52 % Pass
Moment at 30°	0 ≤ 94.9	82.78 N-m Pass
Angle at 203 Nm	40 - 50	44.33 deg Pass
Average Velocity	5 - 10	7.23 deg/sec Pass



Max: 8.4 deg/sec Min: 5 deg/sec



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 39-1
Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.104 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,674.73 N	Yes

Test meets specifications.

Comments:

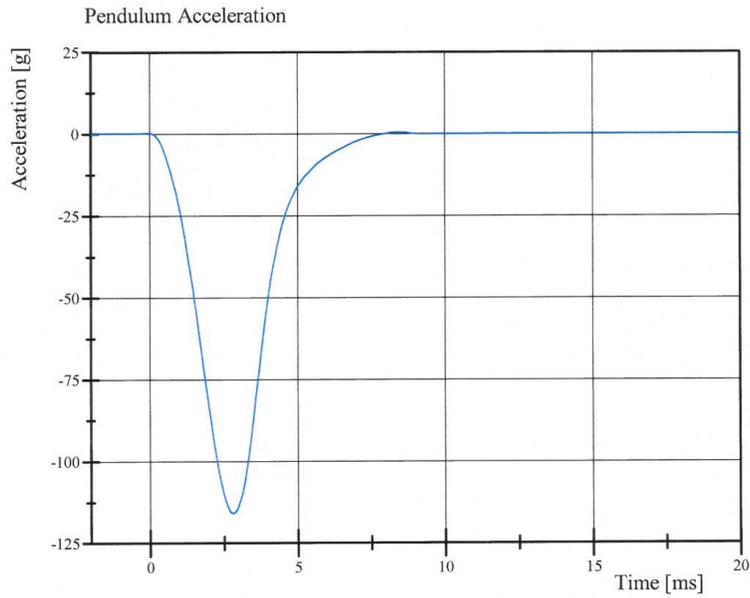
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

08.31.2016 08:17:04 1855

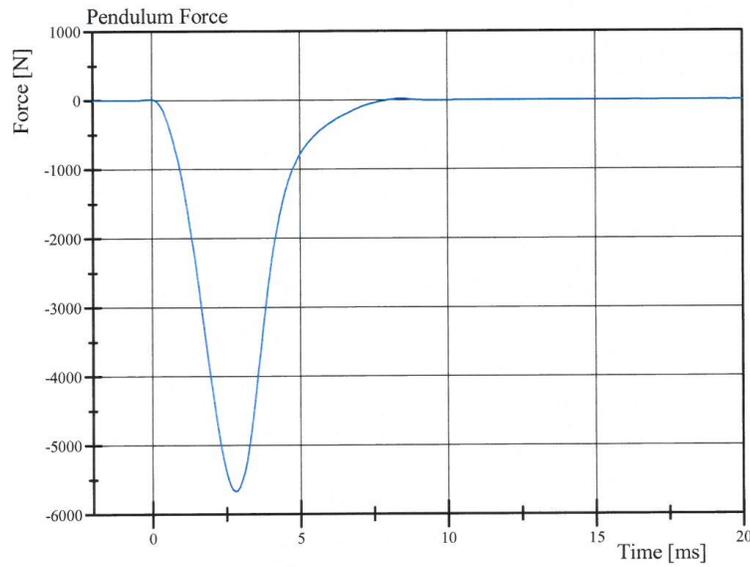


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 39-1
Test Date: 8/31/2016



Filter Class: CFC_600
Max: 0.4 g at 8.4 ms
Min: -116.0 g at 2.8 ms



Filter Class: CFC_600
Max: 19.7 N at 8.4 ms
Min: -5,674.7 N at 2.8 ms

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

08.31.2016 08:17:17 1855



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 39-1
Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.103 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,698.55 N	Yes

Test meets specifications.

Comments:

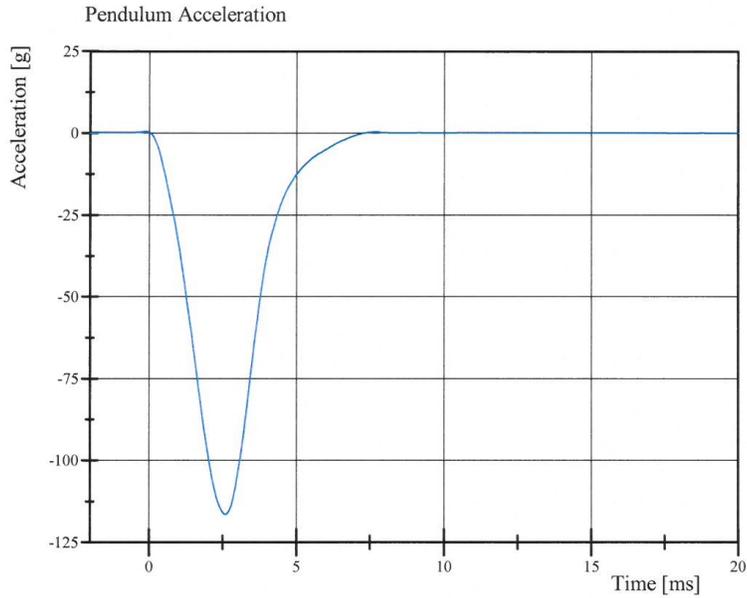
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

08.31.2016 08:19:48 1856

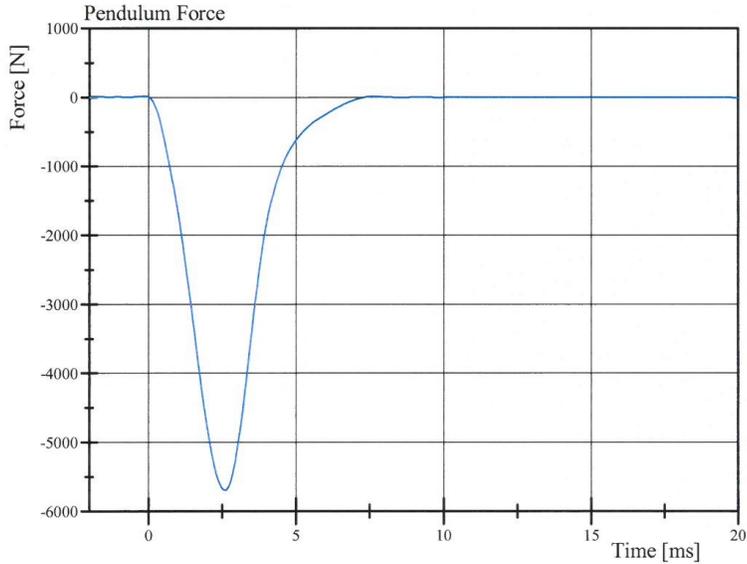


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 39-1
Test Date: 8/31/2016



Filter Class: CFC_600
Max: 0.2 g at 7.7 ms
Min: -116.5 g at 2.6 ms



Filter Class: CFC_600
Max: 12.1 N at 7.7 ms
Min: -5,698.6 N at 2.6 ms

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

08.31.2016 08:20:31 1856



Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 40

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	880	Yes
B	Shoulder Pivot Height	505.5 - 520.7	514	Yes
C	H-Point Height	83.8 - 88.9	87	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	295	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	198	Yes
K	Buttock Knee Length	579.1 - 604.5	599	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	429	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	990	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:



Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 40-1

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	265.0 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:

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

10.11.2016 08:14:30 614

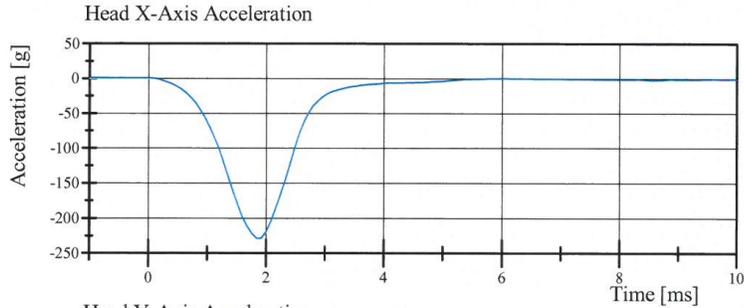


Transportation Research Center Inc.

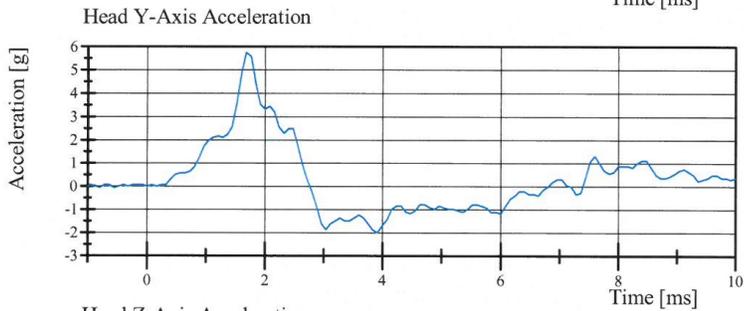
Front Head Drop

HIII 50th Serial No. 037 Certification No. 40-1

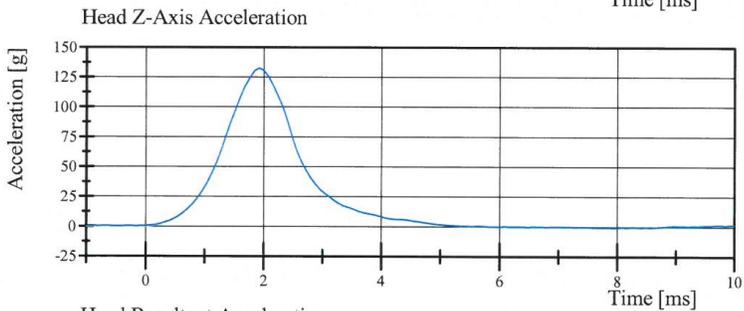
Test Date: 10/11/2016



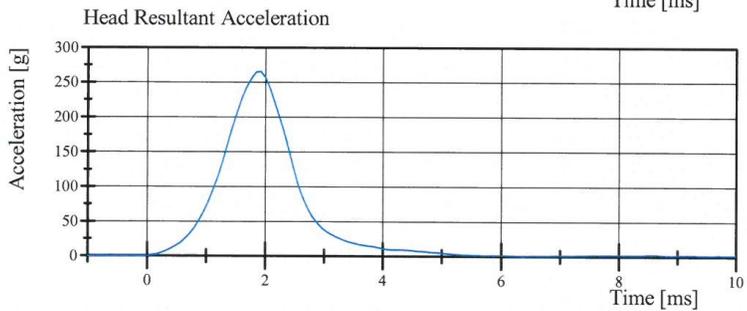
Filter Class: CFC_1000
Max: 0.1 g at -1.0 ms
Min: -229.8 g at 1.8 ms



Filter Class: CFC_1000
Max: 5.7 g at 1.7 ms
Min: -2.0 g at 3.9 ms



Filter Class: CFC_1000
Max: 132.5 g at 1.9 ms
Min: -0.8 g at 7.9 ms



Filter Class: CFC_1000
Max: 265.0 g at 1.9 ms
Min: 0.0 g at -0.4 ms

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

10.11.2016 08:14:39 614



Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 40-3

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.941 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.9 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.47 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-19.84 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.74 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.74 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-67.7 °	Yes
Time of Peak	57 - 64 ms	60.4 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	121.0 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	101.6 N·m	Yes
Time of Peak	47 - 58 ms	51.6 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	101.6 ms	Yes

Test meets specifications.

Comments:

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

10.11.2016 12:43:24 3039

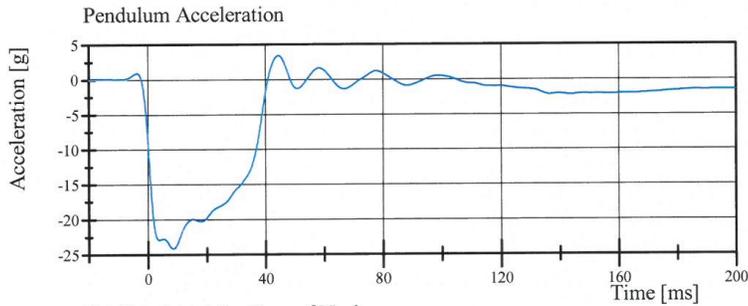


Transportation Research Center Inc.

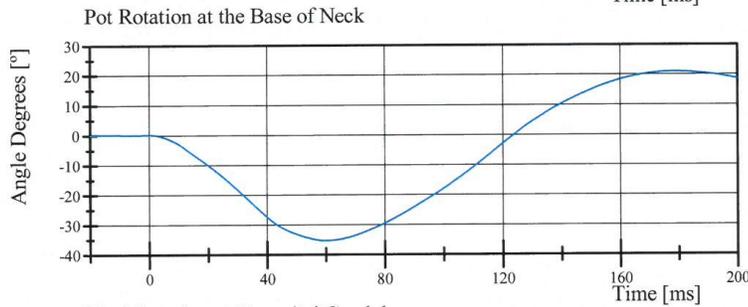
Neck Flexion

HIII 50th Serial No. 037 Certification No. 40-3

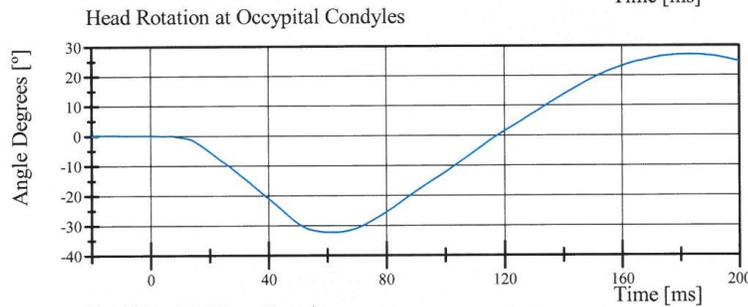
Test Date: 10/11/2016



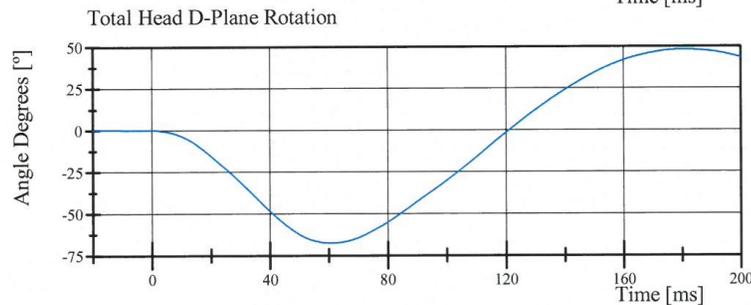
Filter Class: CFC_60
Max: 3.4 g at 44.4 ms
Min: -24.2 g at 8.6 ms



Filter Class: CFC_60
Max: 21.0 ° at 178.7 ms
Min: -35.4 ° at 59.8 ms



Filter Class: CFC_60
Max: 27.0 ° at 183.0 ms
Min: -32.4 ° at 61.4 ms



Filter Class: CFC_60
Max: 48.0 ° at 180.6 ms
Min: -67.7 ° at 60.4 ms

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

10.11.2016 12:43:50 3039

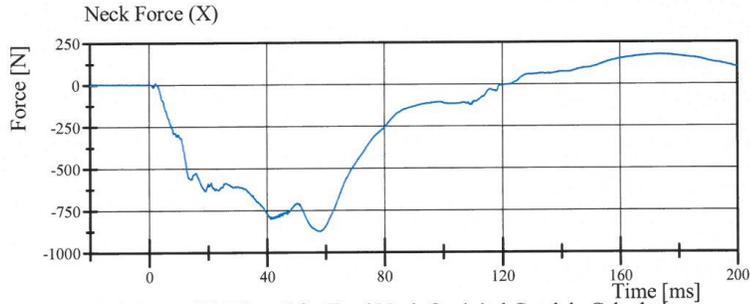


Transportation Research Center Inc.

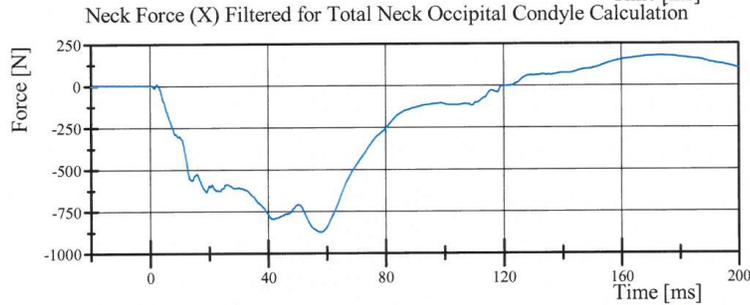
Neck Flexion

HIII 50th Serial No. 037 Certification No. 40-3

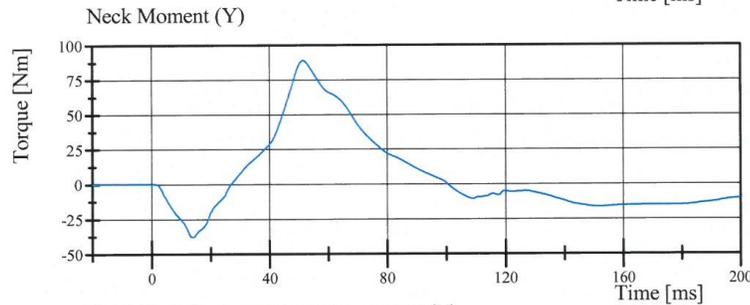
Test Date: 10/11/2016



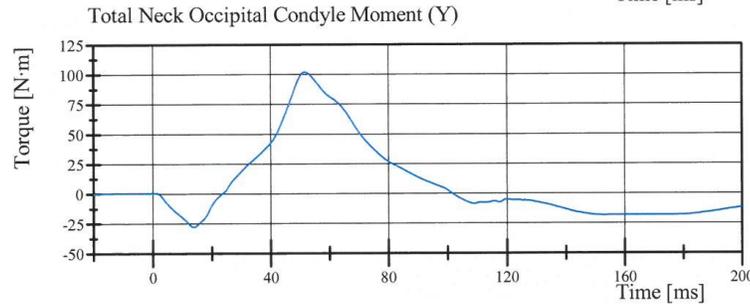
Filter Class: CFC_1000
Max: 177.5 N at 173.5 ms
Min: -874.7 N at 57.9 ms



Filter Class: CFC_600
Max: 177.2 N at 173.6 ms
Min: -874.2 N at 57.8 ms



Filter Class: CFC_600
Max: 88.8 Nm at 51.4 ms
Min: -38.2 Nm at 13.9 ms



Filter Class: Without_(Consta
Max: 101.6 N.m at 51.6 ms
Min: -28.2 N.m at 13.8 ms

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

10.11.2016 12:43:51 3039



Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 40-1

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-6.005 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	42.1 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.35 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.97 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.25 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.25 g	Yes
Total Head D-Plane Rotation Peak	81 - 106 °	93.0 °	Yes
Time of Peak	72 - 82 ms	78.2 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	159.8 ms	Yes
Total Neck Occipital Condyles Moment Peak	(-53) - (-80) N·m	-67.6 N·m	Yes
Time of Peak	65 - 79 ms	72.0 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	145.6 ms	Yes

Test meets specifications.

Comments:

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

10.11.2016 13:13:24 3126

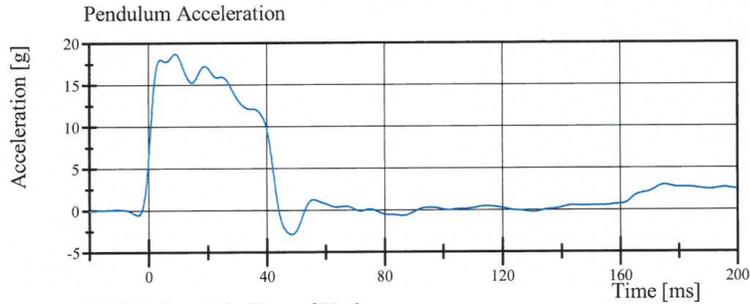


Transportation Research Center Inc.

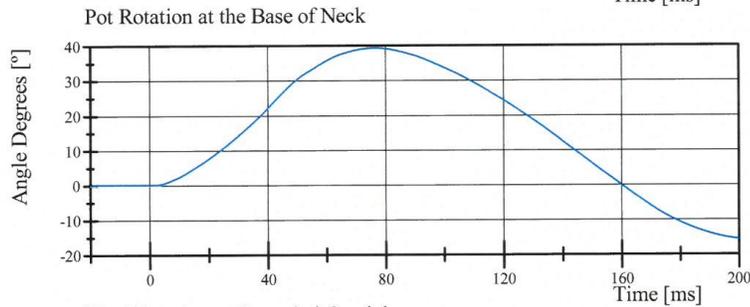
Neck Extension

HIII 50th Serial No. 037 Certification No. 40-1

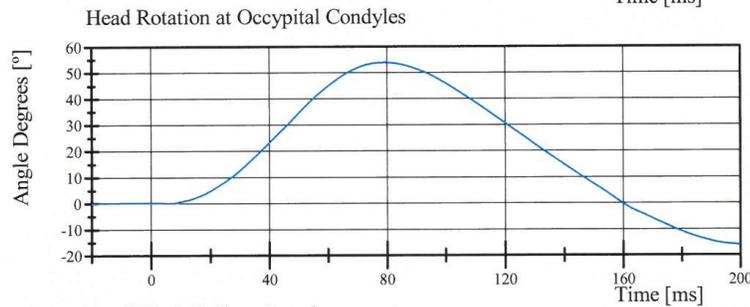
Test Date: 10/11/2016



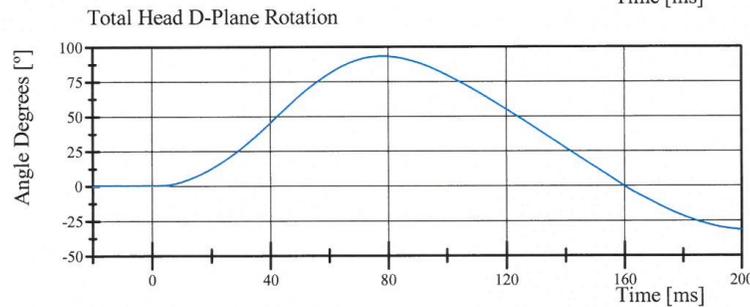
Filter Class: CFC_60
Max: 18.6 g at 9.0 ms
Min: -2.9 g at 48.4 ms



Filter Class: CFC_60
Max: 39.3 ° at 76.3 ms
Min: -15.6 ° at 200.0 ms



Filter Class: CFC_60
Max: 53.8 ° at 79.2 ms
Min: -16.0 ° at 200.0 ms



Filter Class: CFC_60
Max: 93.0 ° at 78.2 ms
Min: -31.6 ° at 200.0 ms

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

10.11.2016 13:13:35 3126

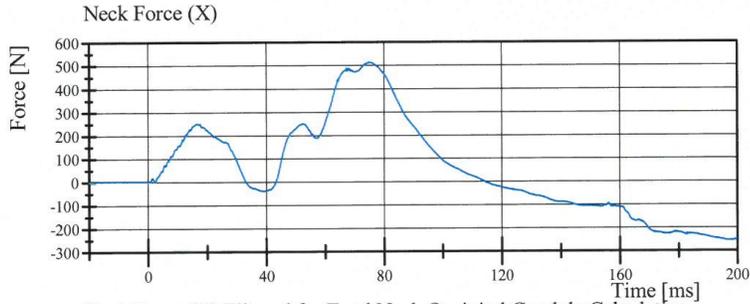


Transportation Research Center Inc.

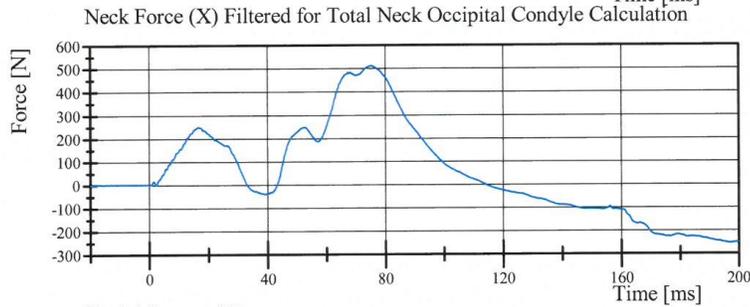
Neck Extension

HIII 50th Serial No. 037 Certification No. 40-1

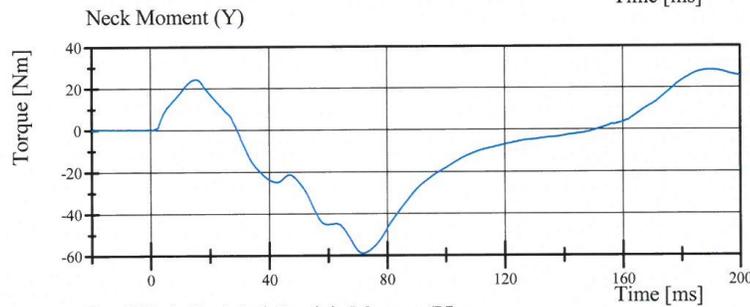
Test Date: 10/11/2016



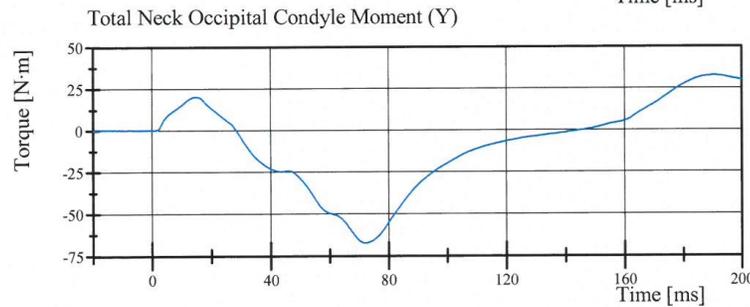
Filter Class: CFC_1000
Max: 511.7 N at 75.0 ms
Min: -253.6 N at 196.8 ms



Filter Class: CFC_600
Max: 511.3 N at 75.1 ms
Min: -253.2 N at 196.9 ms



Filter Class: CFC_600
Max: 28.3 Nm at 189.8 ms
Min: -59.1 Nm at 71.8 ms



Filter Class: Without_(Consta
Max: 32.6 N·m at 190.7 ms
Min: -67.6 N·m at 72.0 ms

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

10.11.2016 13:13:35 3126



Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 40-1

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.644 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,460.8 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.07 mm	Yes
Internal Hysteresis	65 - 85 %	72.8 %	Yes

Test meets specifications.

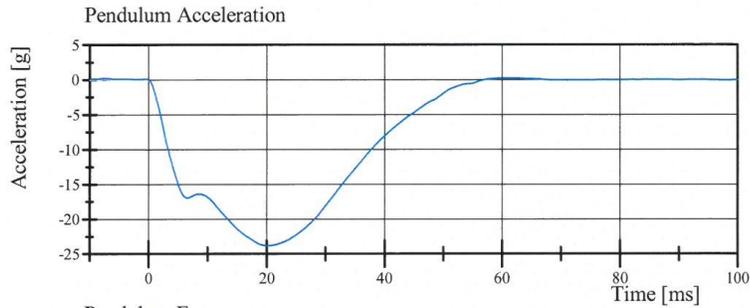
Comments:

Transportation Research Center Inc.

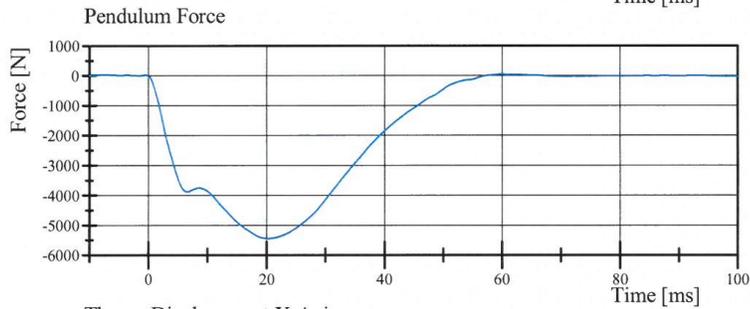
Front Thorax

HIII 50th Serial No. 037 Certification No. 40-1

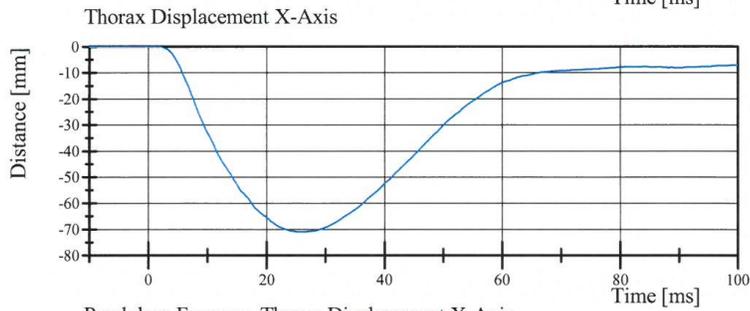
Test Date: 10/11/2016



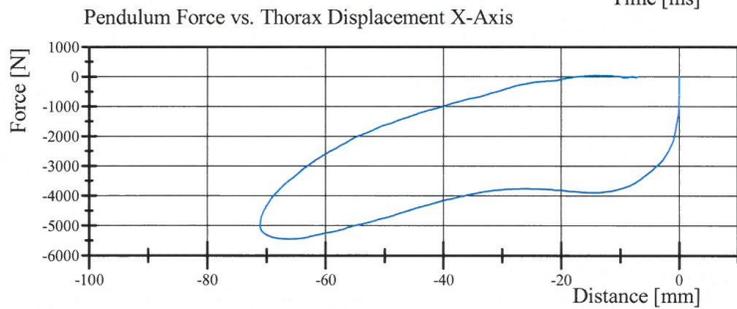
Filter Class: CFC_180
Max: 0.2 g at 59.8 ms
Min: -23.8 g at 20.2 ms



Filter Class: CFC_180
Max: 41.2 N at 59.8 ms
Min: -5,460.8 N at 20.2 ms



Filter Class: CFC_600
Max: 0.0 mm at -9.8 ms
Min: -71.1 mm at 25.8 ms



Filter Class: CFC_180
Max: 41.2 N at -14.1 mm
Min: -5,460.8 N at -66.0 mm

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

10.11.2016 09:43:22 437



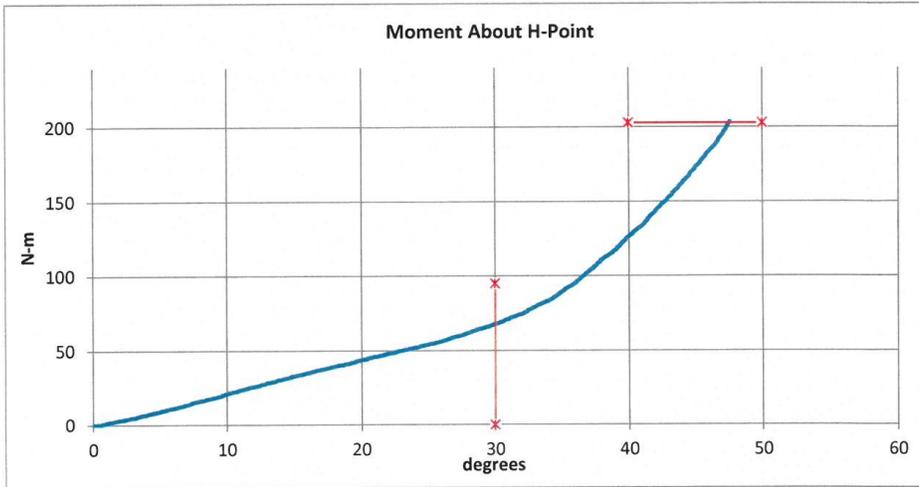
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

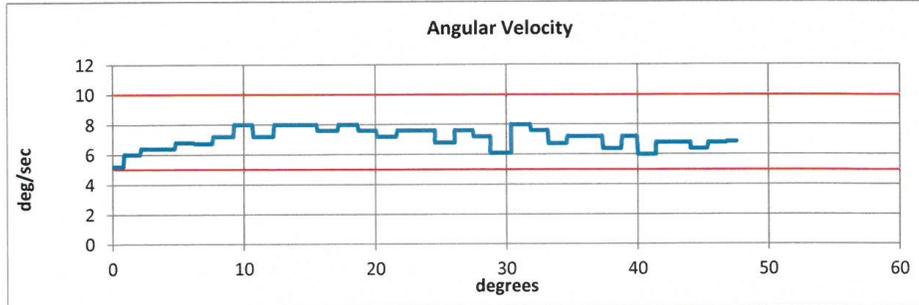


Serial Number: 037 Date: 10-Oct-2016
 Side Tested: Left Hip Time: 15:39
 Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.7 °C Pass
Humidity	10 - 70	38 % Pass
Moment at 30°	0 ≤ 94.9	67.86 N-m Pass
Angle at 203 Nm	40 - 50	47.56 deg Pass
Average Velocity	5 - 10	7.04 deg/sec Pass



Max: 7.99 deg/sec Min: 5.19 deg/sec



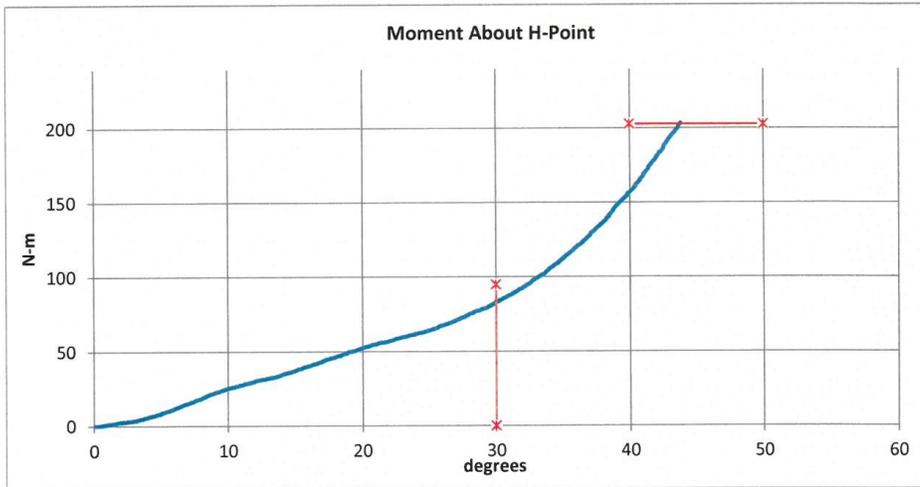
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

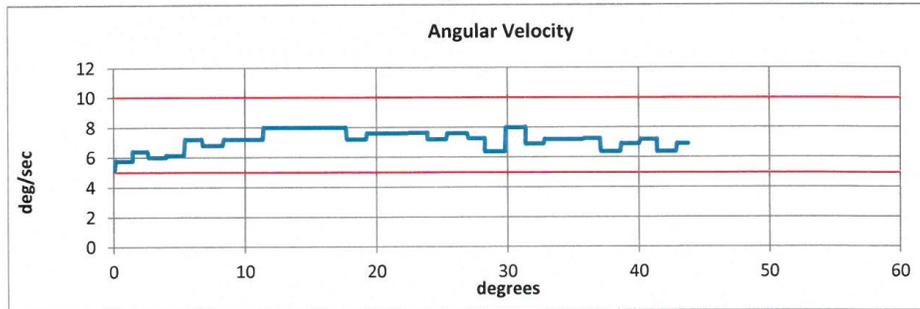


Serial Number: 037 Date: 11-Oct-2016
 Side Tested: Right Hip Time: 6:49
 Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.7 °C Pass
Humidity	10 - 70	35 % Pass
Moment at 30°	0 ≤ 94.9	83.27 N-m Pass
Angle at 203 Nm	40 - 50	43.8 deg Pass
Average Velocity	5 - 10	7.1 deg/sec Pass



Max: 7.99 deg/sec Min: 5.19 deg/sec



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 40-1
Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.117 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,718.16 N	Yes

Test meets specifications.

Comments:

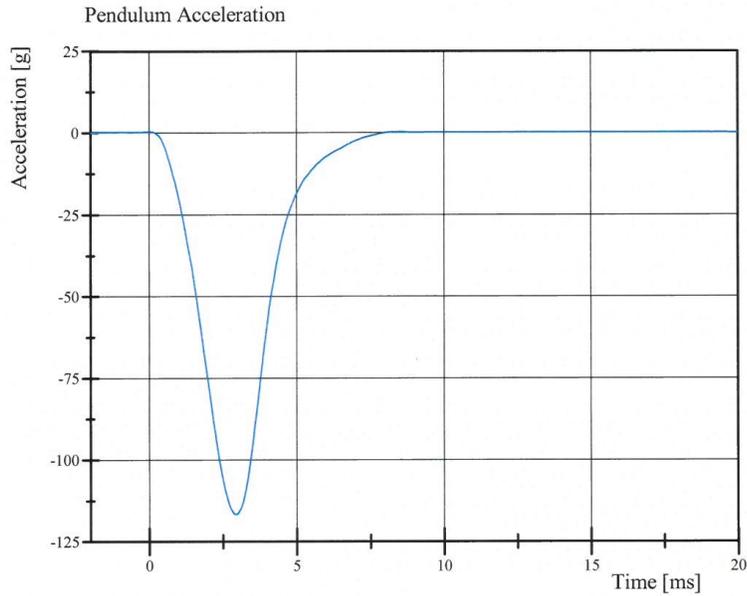
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

10.11.2016 07:26:54 1746

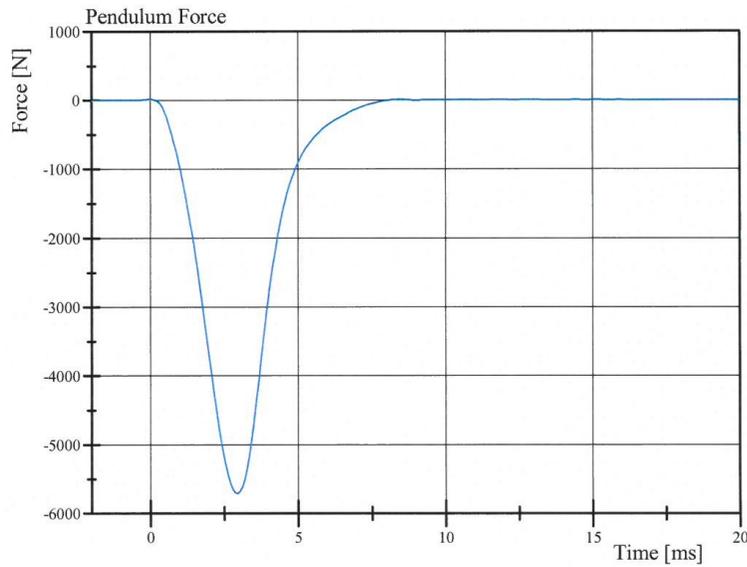


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 40-1
Test Date: 10/11/2016



Filter Class: CFC_600
Max: 0.2 g at 8.5 ms
Min: -116.9 g at 3.0 ms



Filter Class: CFC_600
Max: 10.2 N at 8.5 ms
Min: -5,718.2 N at 3.0 ms

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

10.11.2016 07:27:07 1746



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 40-1
Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.118 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,573.60 N	Yes

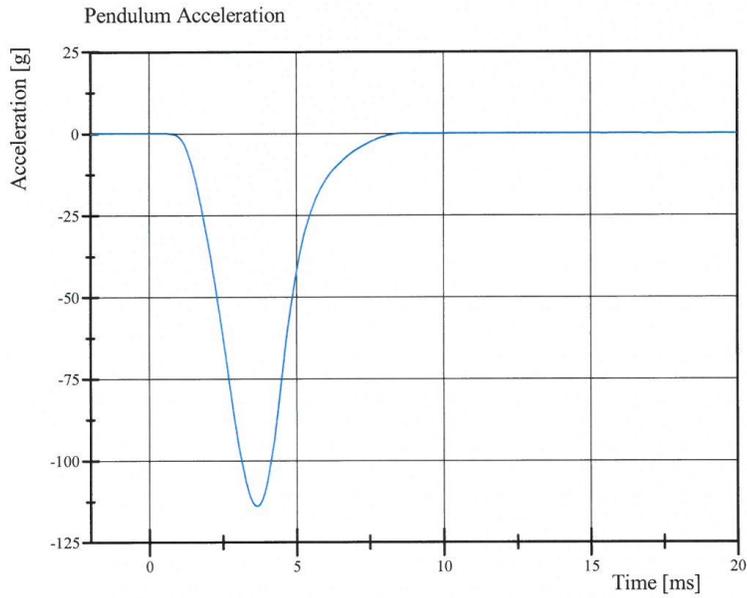
Test meets specifications.

Comments:

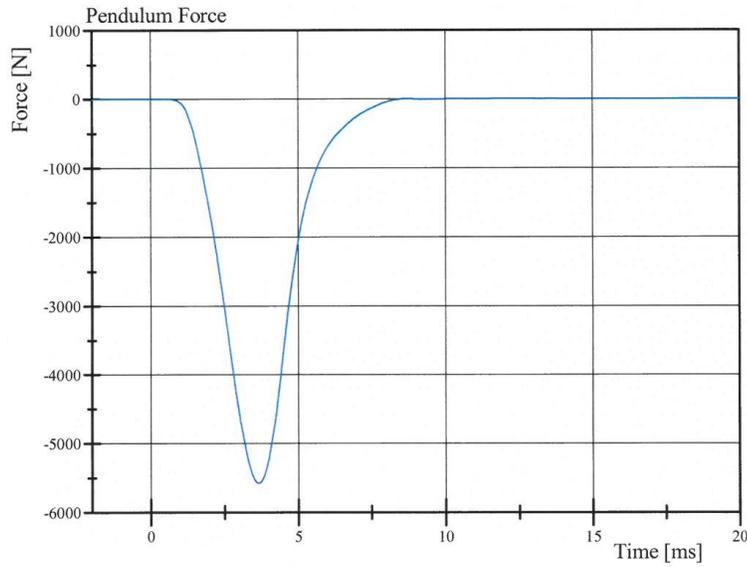


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 40-1
Test Date: 10/11/2016



Filter Class: CFC_600
Max: 0.1 g at 12.7 ms
Min: -113.9 g at 3.7 ms



Filter Class: CFC_600
Max: 4.8 N at 12.7 ms
Min: -5,573.6 N at 3.7 ms

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

10.11.2016 07:30:12 1735



Pre-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
5720 HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 37

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	781	Yes
B	Shoulder Pivot Height	431.8 - 457.2	445	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	129	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	250	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	196	Yes
K	Buttock Knee Length	520.7 - 546.1	535	Yes
L	Popliteal Height	355.6 - 376.0	367	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	431	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	224	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	141	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	357	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	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	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



Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 37-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	275.0 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	6.4 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

08.31.2016 16:10:09 609

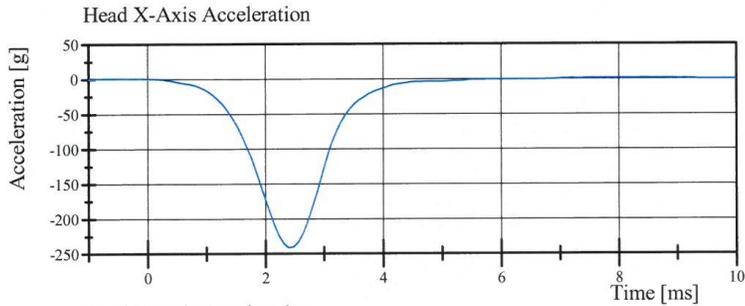


Transportation Research Center Inc.

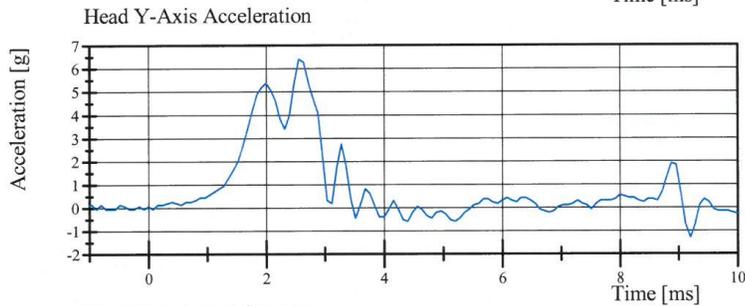
Front Head Drop

HIII 5th Serial No. 426 Certification No. 37-1

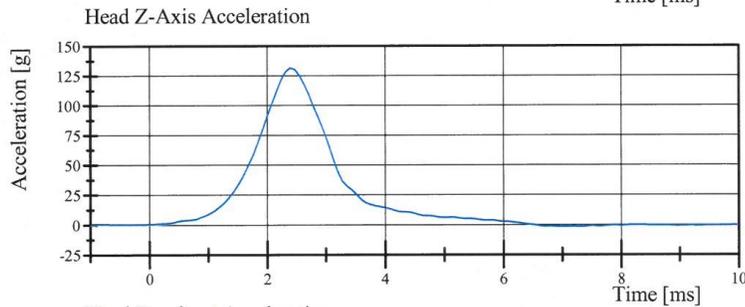
Test Date: 8/31/2016



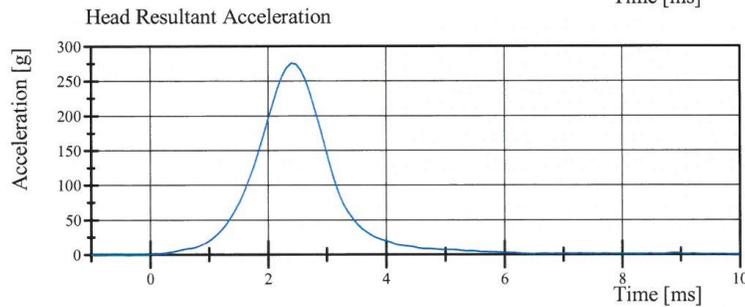
Filter Class: CFC_1000
Max: 1.2 g at 8.4 ms
Min: -241.5 g at 2.4 ms



Filter Class: CFC_1000
Max: 6.4 g at 2.6 ms
Min: -1.3 g at 9.2 ms



Filter Class: CFC_1000
Max: 131.5 g at 2.4 ms
Min: -1.7 g at 7.0 ms



Filter Class: CFC_1000
Max: 275.0 g at 2.4 ms
Min: 0.1 g at -0.2 ms

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

08.31.2016 16:10:18 609



Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 37-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.098 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.44 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.85 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.85 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-77.8 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	71.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	86.7 ms	Yes

Test meets specifications.

Comments:

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

08.31.2016 16:29:21 1837

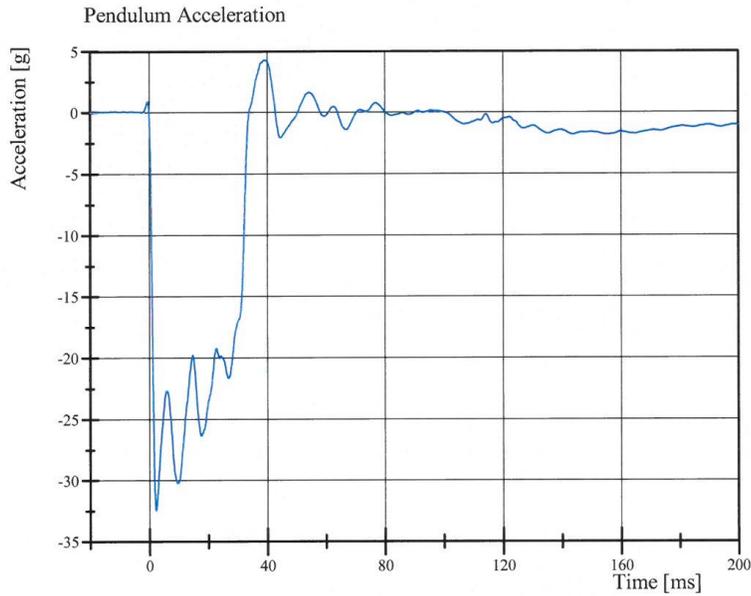


Transportation Research Center Inc.

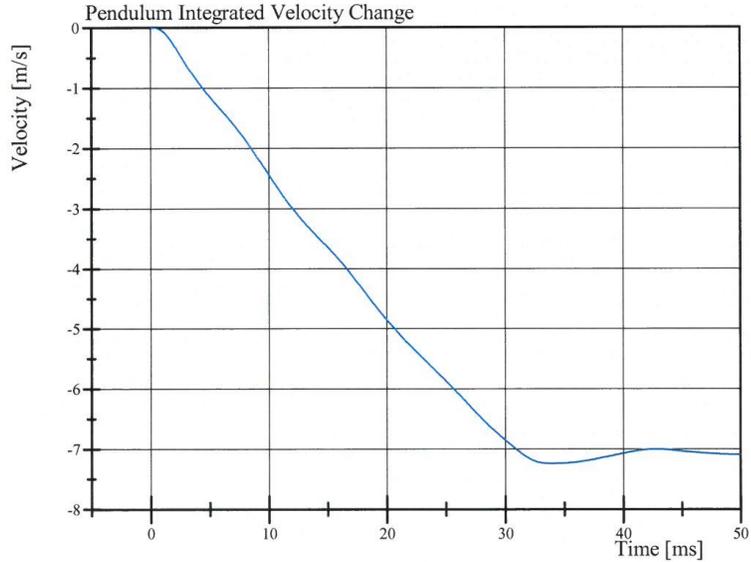
Neck Flexion

HIII 5th Serial No. 426 Certification No. 37-1

Test Date: 8/31/2016



Filter Class: CFC_180
Max: 4.2 g at 39.2 ms
Min: -32.5 g at 2.3 ms



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.2 m/s at 33.9 ms

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

08.31.2016 16:29:31 1837



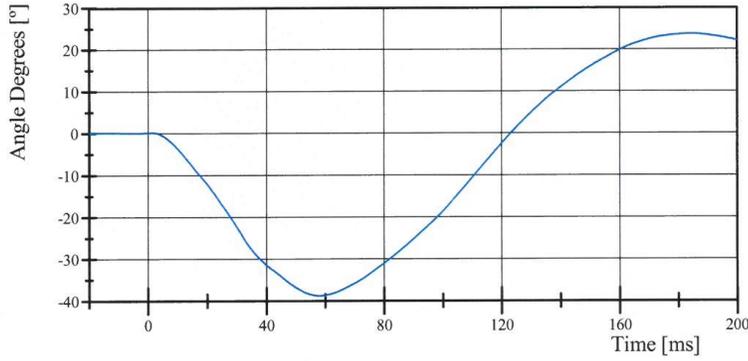
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 37-1

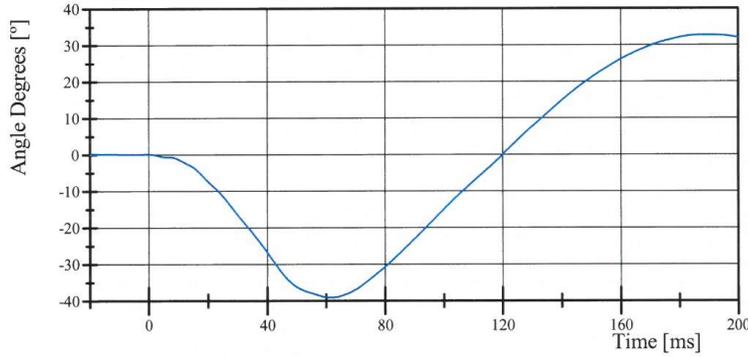
Test Date: 8/31/2016

Pot Rotation at the Base of Neck



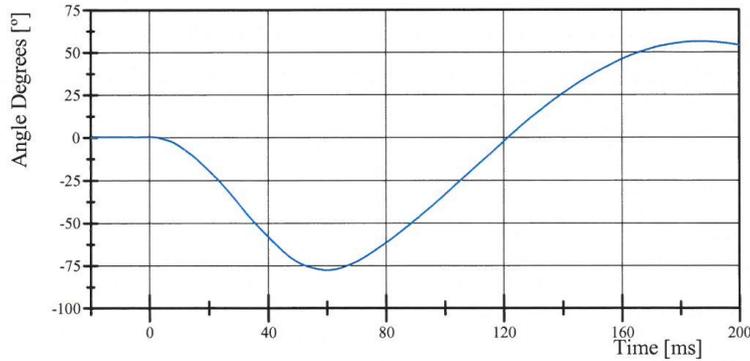
Filter Class: CFC_60
Max: 23.7 ° at 184.5 ms
Min: -38.9 ° at 58.0 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 32.7 ° at 189.1 ms
Min: -39.2 ° at 61.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 56.3 ° at 186.4 ms
Min: -77.8 ° at 60.0 ms

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

08.31.2016 16:29:32 1837

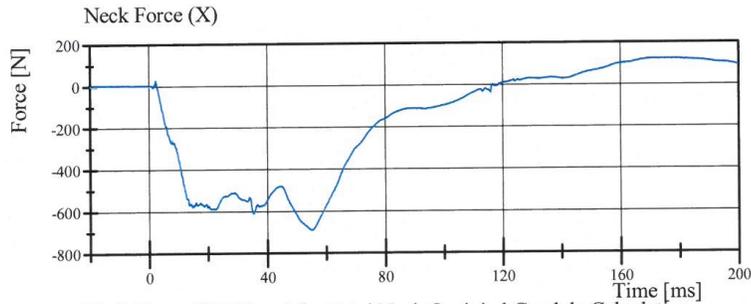


Transportation Research Center Inc.

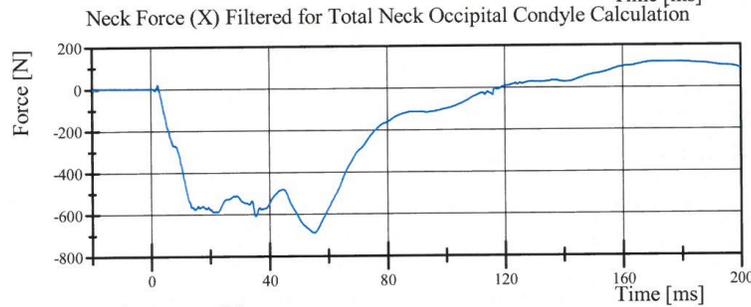
Neck Flexion

HIII 5th Serial No. 426 Certification No. 37-1

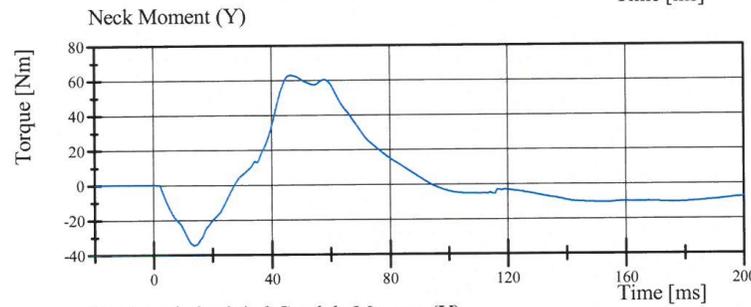
Test Date: 8/31/2016



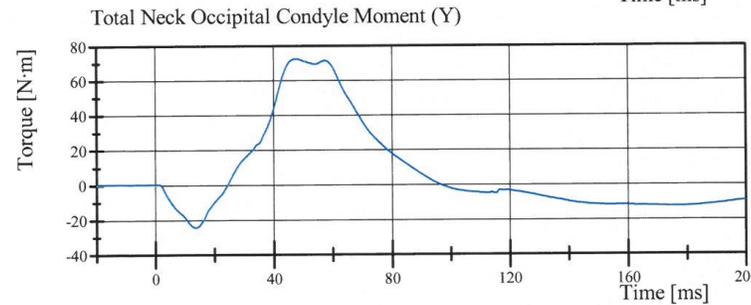
Filter Class: CFC_1000
Max: 121.8 N at 179.0 ms
Min: -690.5 N at 54.8 ms



Filter Class: CFC_600
Max: 121.2 N at 171.2 ms
Min: -690.1 N at 55.3 ms



Filter Class: CFC_600
Max: 62.8 Nm at 46.6 ms
Min: -34.8 Nm at 13.8 ms



Filter Class: Without_(Consta
Max: 72.4 N·m at 47.8 ms
Min: -24.7 N·m at 13.8 ms

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

08.31.2016 16:29:33 1837



Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 37-1

Test Date: 8/31/2016

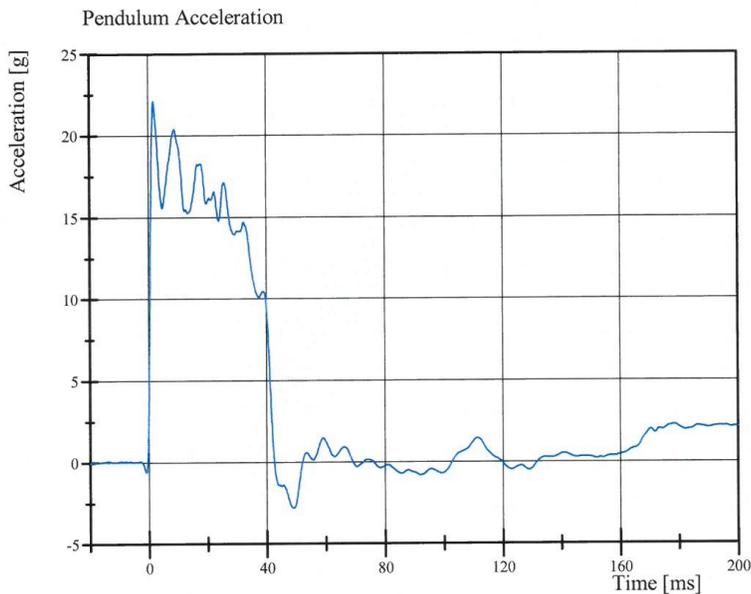
Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.140 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.74 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.40 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	4.92 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	101.8 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-55.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	105.8 ms	Yes

Test meets specifications.

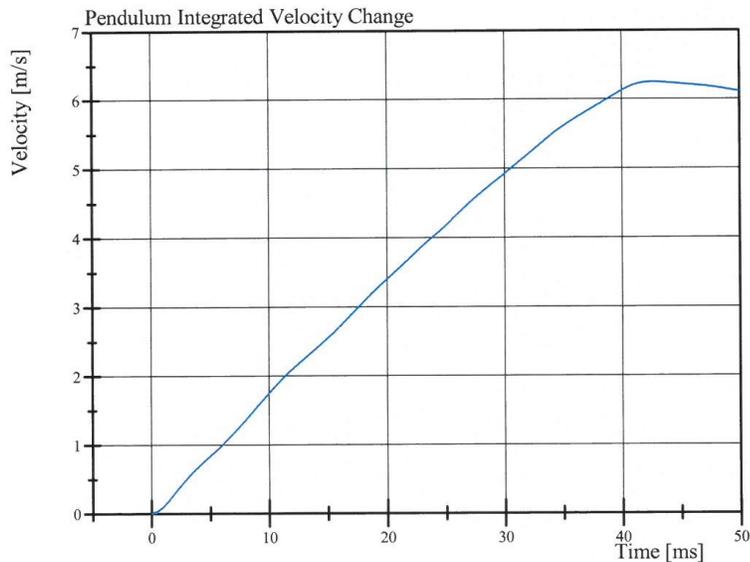
Comments:

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 426 Certification No. 37-1
Test Date: 8/31/2016



Filter Class: CFC_180
Max: 22.1 g at 1.8 ms
Min: -2.8 g at 49.1 ms



Filter Class: CFC_180
Max: 6.2 m/s at 42.6 ms
Min: 0.0 m/s at 0.0 ms

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

08.31.2016 17:01:12 3112



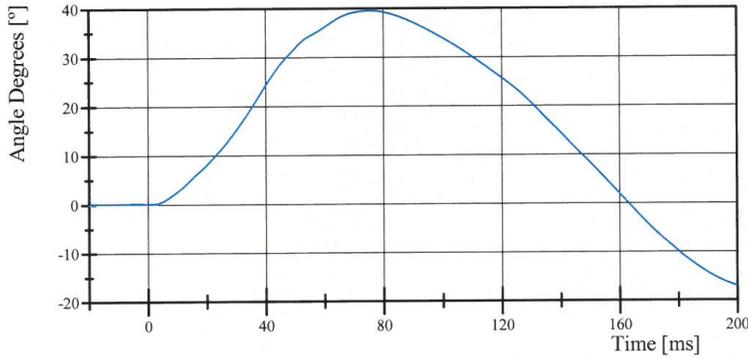
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 37-1

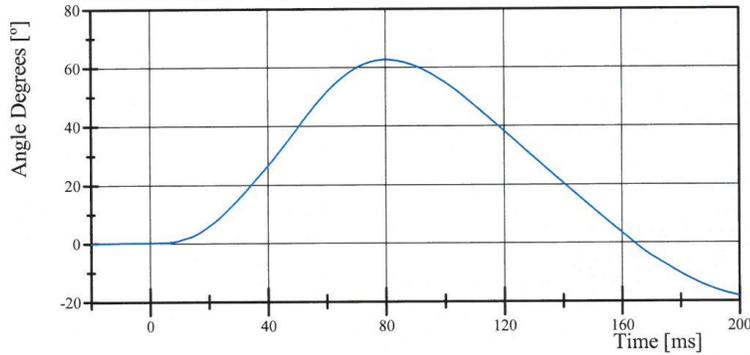
Test Date: 8/31/2016

Pot Rotation at the Base of Neck



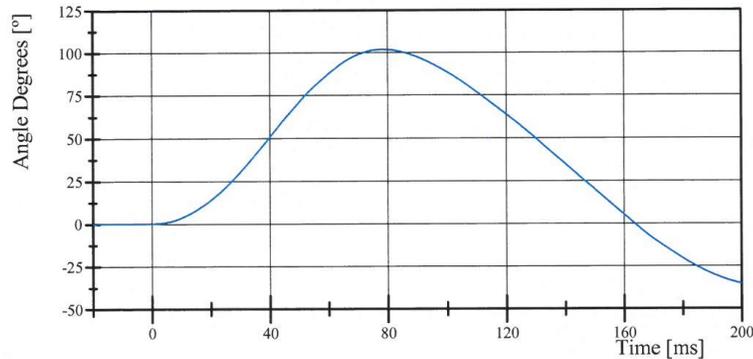
Filter Class: CFC_60
Max: 39.4 ° at 75.7 ms
Min: -17.1 ° at 200.0 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 62.6 ° at 80.2 ms
Min: -18.2 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 101.8 ° at 78.3 ms
Min: -35.2 ° at 200.0 ms

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

08.31.2016 17:01:13 3112

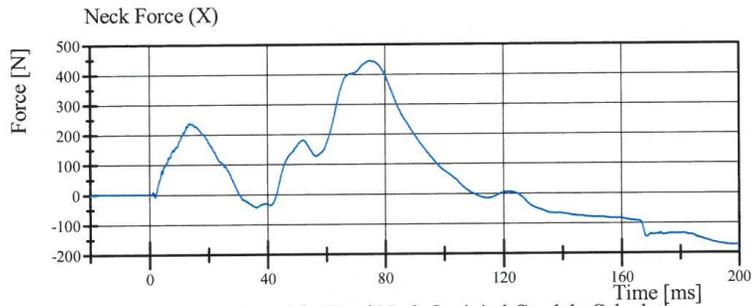


Transportation Research Center Inc.

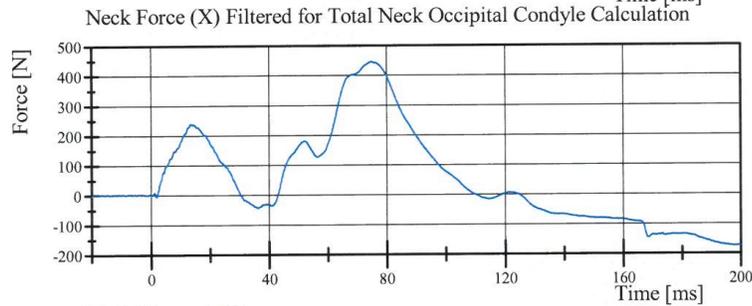
Neck Extension

HIII 5th Serial No. 426 Certification No. 37-1

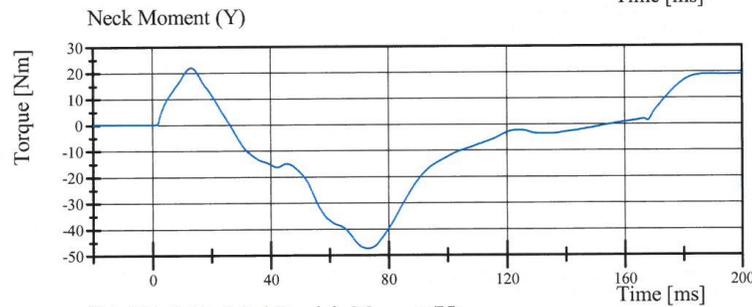
Test Date: 8/31/2016



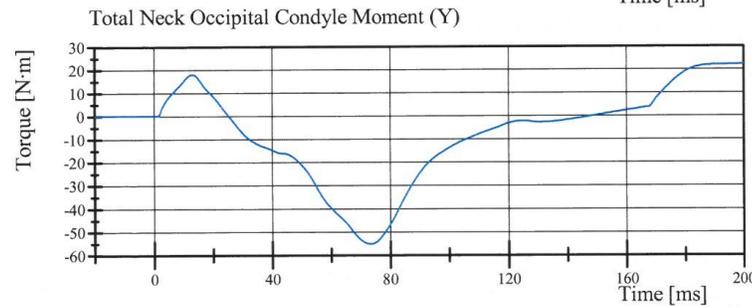
Filter Class: CFC_1000
Max: 445.4 N at 74.9 ms
Min: -173.5 N at 197.7 ms



Filter Class: CFC_600
Max: 444.9 N at 75.0 ms
Min: -173.1 N at 197.7 ms



Filter Class: CFC_600
Max: 21.9 Nm at 13.4 ms
Min: -47.5 Nm at 73.3 ms



Filter Class: Without_(Consta
Max: 22.3 N·m at 200.0 ms
Min: -55.3 N·m at 73.4 ms

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

08.31.2016 17:01:14 3112



Transportation Research Center Inc.

Front Thorax

HIII 5th Serial No. 426 Certification No. 37-1

Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.615 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,324.2 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,399.2 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-50.9 mm	Yes
Internal Hysteresis	69 - 85 %	74.5 %	Yes

Test meets specifications.

Comments:

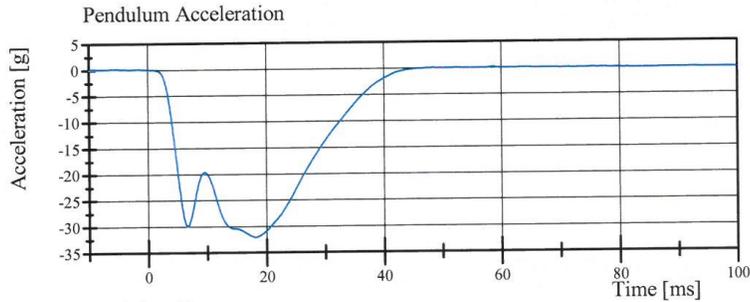


Transportation Research Center Inc.

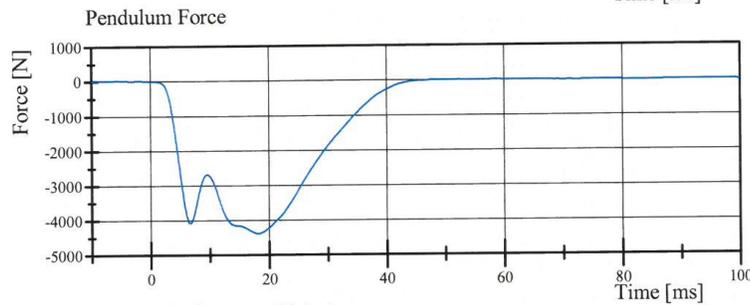
Front Thorax

HIII 5th Serial No. 426 Certification No. 37-1

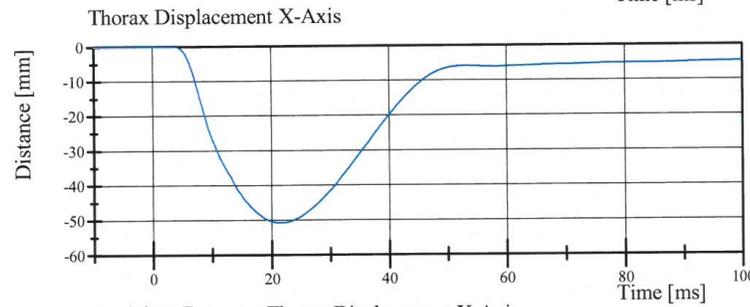
Test Date: 8/31/2016



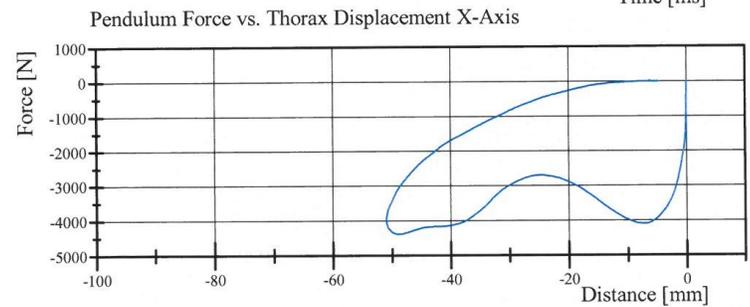
Filter Class: CFC_180
Max: 0.1 g at 58.6 ms
Min: -32.1 g at 18.2 ms



Filter Class: CFC_180
Max: 15.5 N at 58.6 ms
Min: -4,399.2 N at 18.2 ms



Filter Class: CFC_600
Max: 0.0 mm at -3.7 ms
Min: -50.9 mm at 21.4 ms



Filter Class: CFC_180
Max: 15.5 N at -6.2 mm
Min: -4,399.2 N at -48.8 mm

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

08.31.2016 17:34:31 401



Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

NHTSA

Serial Number: 426

Date: 9/1/2016

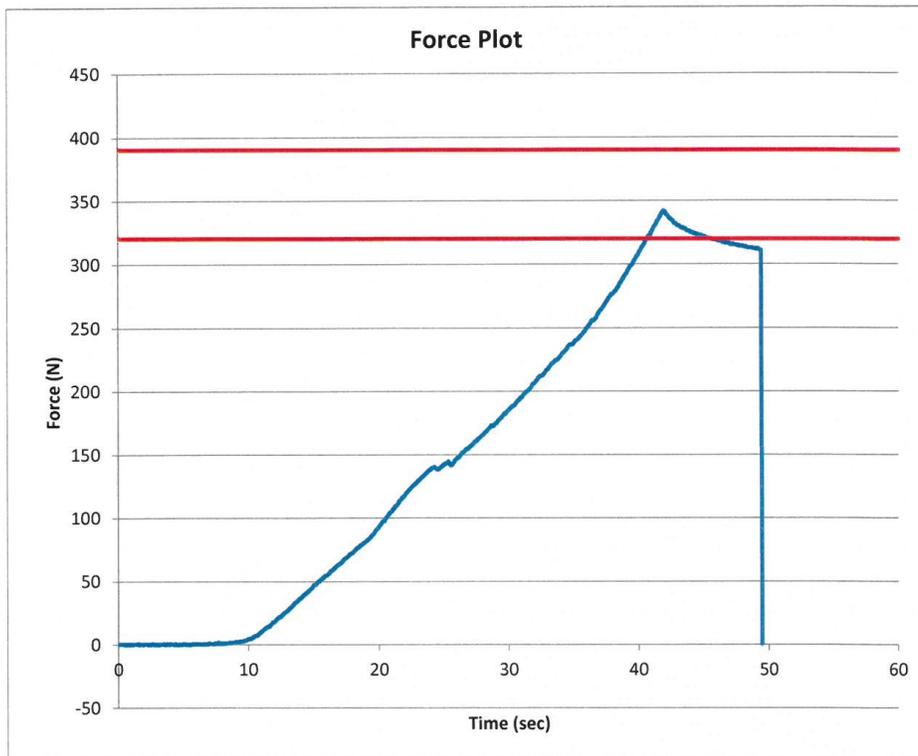
Test Number: 1

Time: 7:02

Comments:



TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.2 °C Pass
Humidity	10 - 70	53 % Pass
Average Angular Velocity	0.5 - 1.5	0.91 deg/sec Pass
Initial Angle	0 - 20	15.72 deg Pass
Peak Force at 45.21°	320 - 390	342.12 N Pass
Final Angle	-8 - 8	5.26 deg Pass



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 37-1
Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.123 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,546.5 N	Yes

Test meets specifications.

Comments:

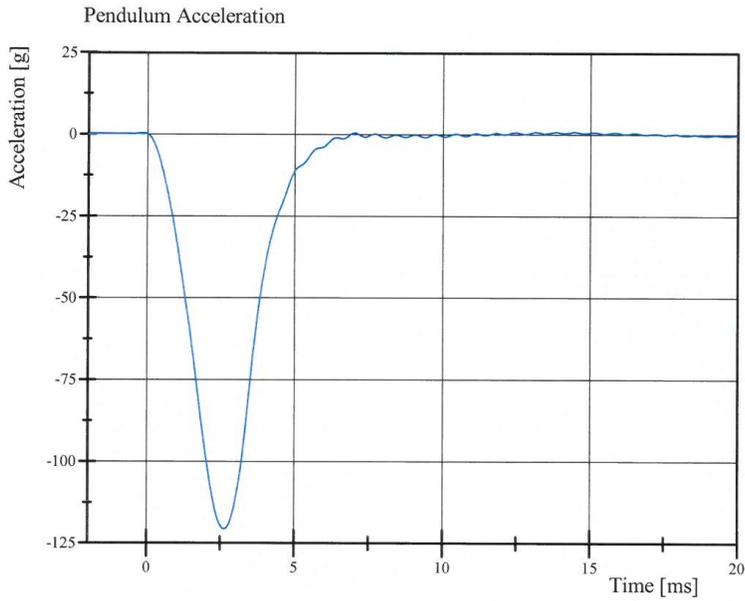
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.31.2016 15:59:00 1739

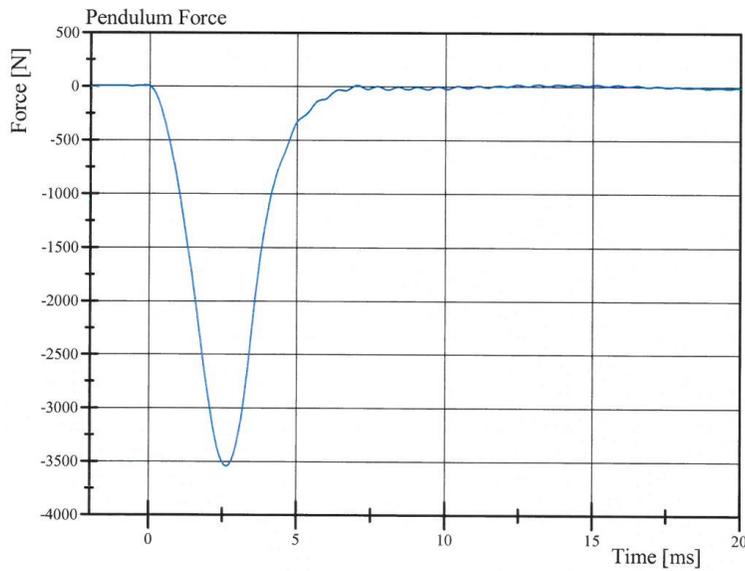


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 37-1
Test Date: 8/31/2016



Filter Class: CFC_600
Max: 0.7 g at 14.5 ms
Min: -121.0 g at 2.6 ms



Filter Class: CFC_600
Max: 21.8 N at 14.5 ms
Min: -3,546.5 N at 2.6 ms

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

08.31.2016 15:59:10 1739



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 37-1
Test Date: 8/31/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.122 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,574.1 N	Yes

Test meets specifications.

Comments:

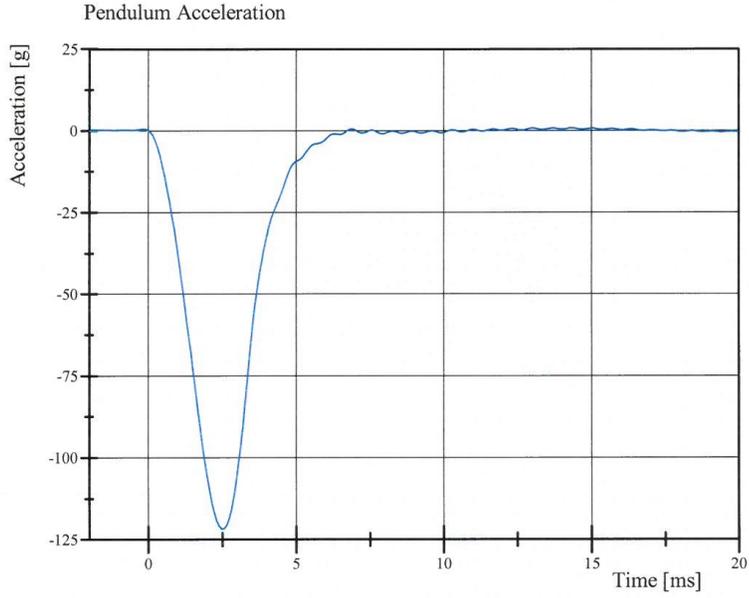
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.31.2016 16:01:30 1743

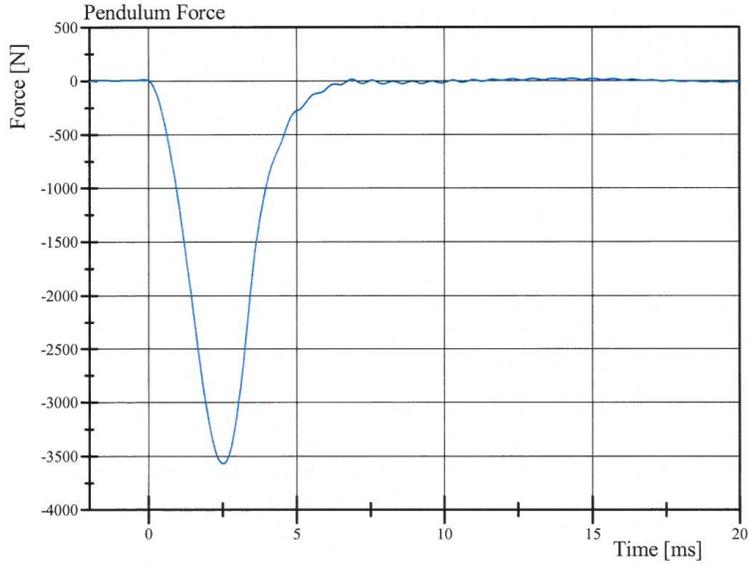


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 37-1
Test Date: 8/31/2016



Filter Class: CFC_600
Max: 0.7 g at 14.3 ms
Min: -121.9 g at 2.5 ms



Filter Class: CFC_600
Max: 21.7 N at 14.3 ms
Min: -3,574.1 N at 2.5 ms

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

08.31.2016 16:01:42 1743



Post-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
5720 HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 38

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	781	Yes
B	Shoulder Pivot Height	431.8 - 457.2	445	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	129	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	250	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	196	Yes
K	Buttock Knee Length	520.7 - 546.1	535	Yes
L	Popliteal Height	355.6 - 376.0	367	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	431	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	224	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	141	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	357	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	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	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

Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 38-1

Test Date: 10/10/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	282.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-1.2 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

10.10.2016 15:09:40 609

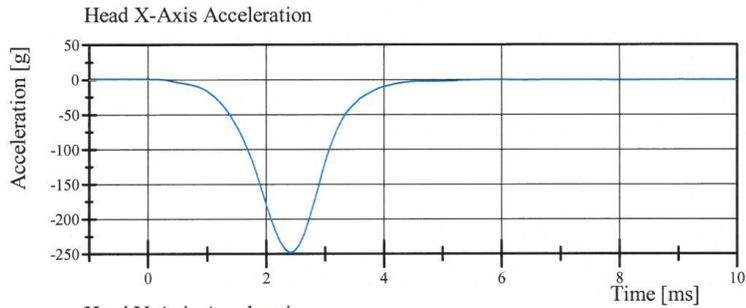


Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 38-1

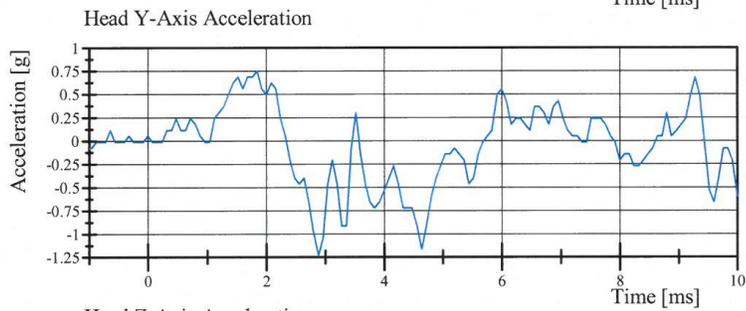
Test Date: 10/10/2016



Filter Class: CFC_1000

Max: 0.1 g at -0.2 ms

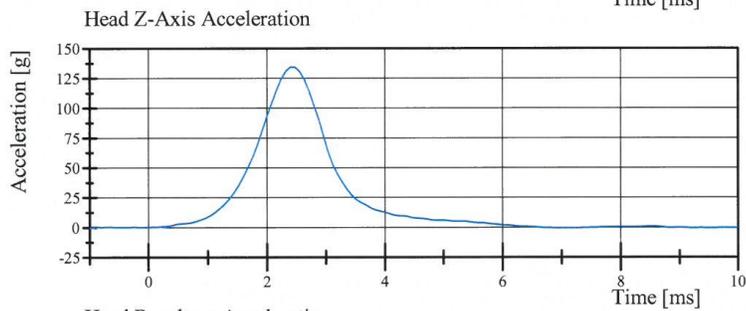
Min: -248.3 g at 2.4 ms



Filter Class: CFC_1000

Max: 0.8 g at 1.8 ms

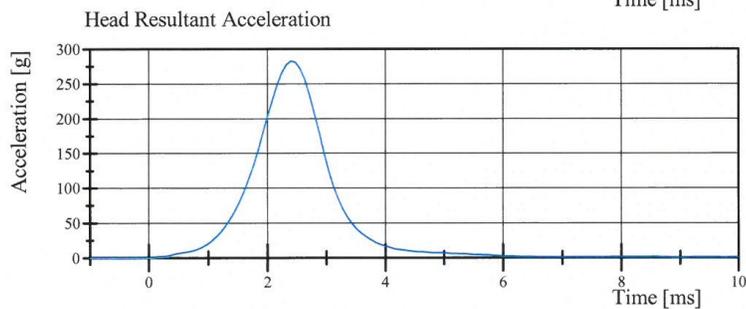
Min: -1.2 g at 2.9 ms



Filter Class: CFC_1000

Max: 134.1 g at 2.4 ms

Min: -0.5 g at 6.9 ms



Filter Class: CFC_1000

Max: 282.2 g at 2.4 ms

Min: 0.0 g at -0.8 ms

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

10.10.2016 15:09:53 609



Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 38-1

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.089 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	-4.67 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.48 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-79.5 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	72.9 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	87.2 ms	Yes

Test meets specifications.

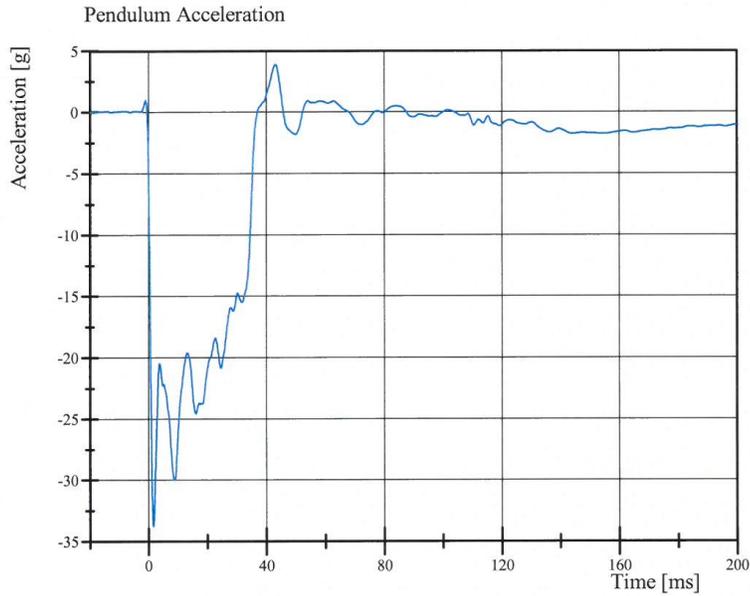
Comments:

Transportation Research Center Inc.

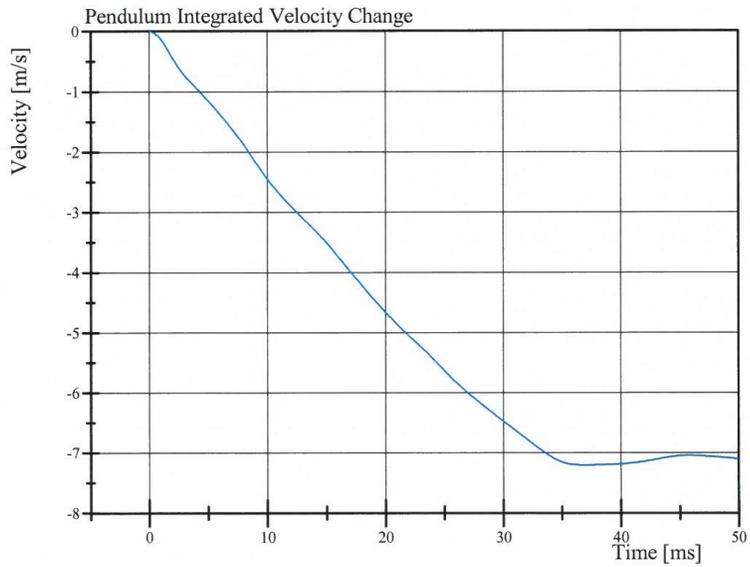
Neck Flexion

HIII 5th Serial No. 426 Certification No. 38-1

Test Date: 10/11/2016



Filter Class: CFC_180
Max: 3.8 g at 43.1 ms
Min: -33.8 g at 1.8 ms



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.2 m/s at 37.0 ms

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

10.11.2016 13:34:46 1848



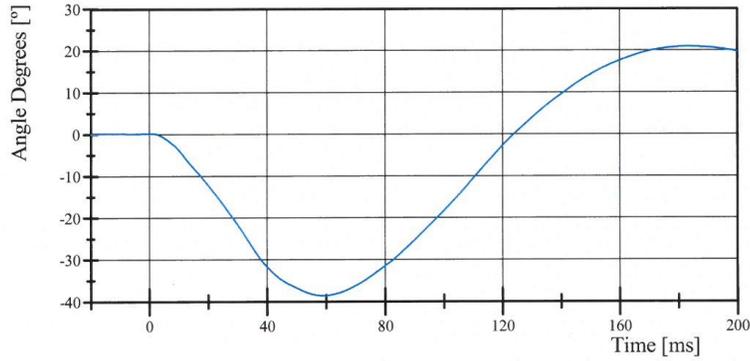
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 38-1

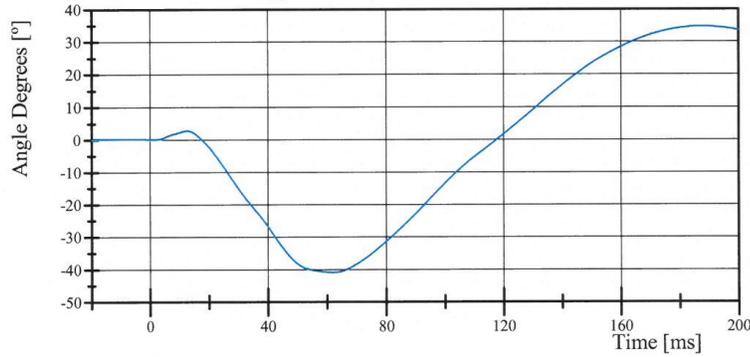
Test Date: 10/11/2016

Pot Rotation at the Base of Neck



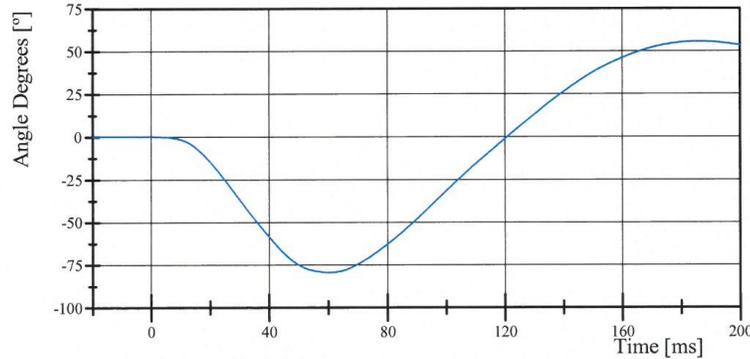
Filter Class: CFC_60
Max: 20.9 ° at 183.3 ms
Min: -38.6 ° at 59.1 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 34.8 ° at 187.3 ms
Min: -41.0 ° at 62.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 55.6 ° at 186.0 ms
Min: -79.5 ° at 60.3 ms

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

10.11.2016 13:34:47 1848

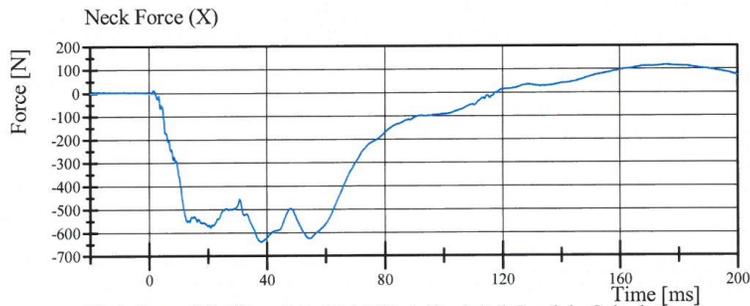


Transportation Research Center Inc.

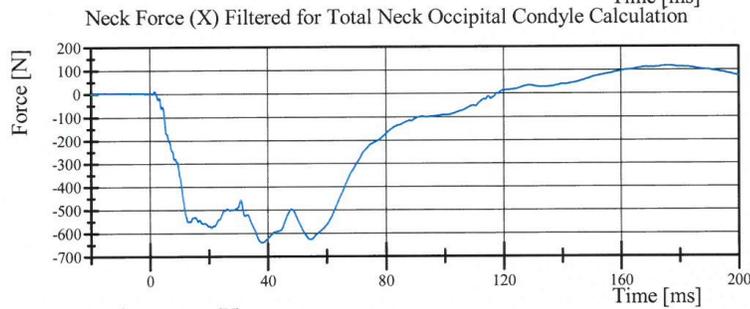
Neck Flexion

HIII 5th Serial No. 426 Certification No. 38-1

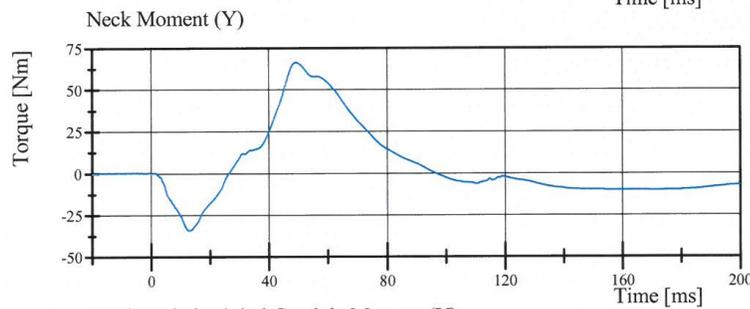
Test Date: 10/11/2016



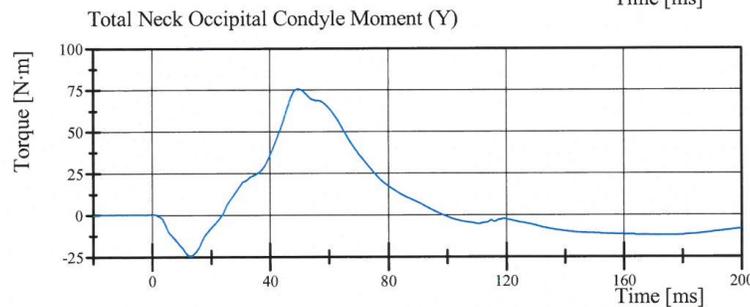
Filter Class: CFC_1000
Max: 117.9 N at 176.2 ms
Min: -642.5 N at 38.1 ms



Filter Class: CFC_600
Max: 117.4 N at 176.1 ms
Min: -641.8 N at 38.1 ms



Filter Class: CFC_600
Max: 66.3 Nm at 49.3 ms
Min: -34.5 Nm at 12.9 ms



Filter Class: Without_(Consta
Max: 75.6 N.m at 49.7 ms
Min: -24.6 N.m at 12.9 ms

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

10.11.2016 13:34:48 1848



Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 38-3

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.140 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.86 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.75 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.40 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	109.2 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-59.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	100.6 ms	Yes

Test meets specifications.

Comments:

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

10.11.2016 15:30:48 3116

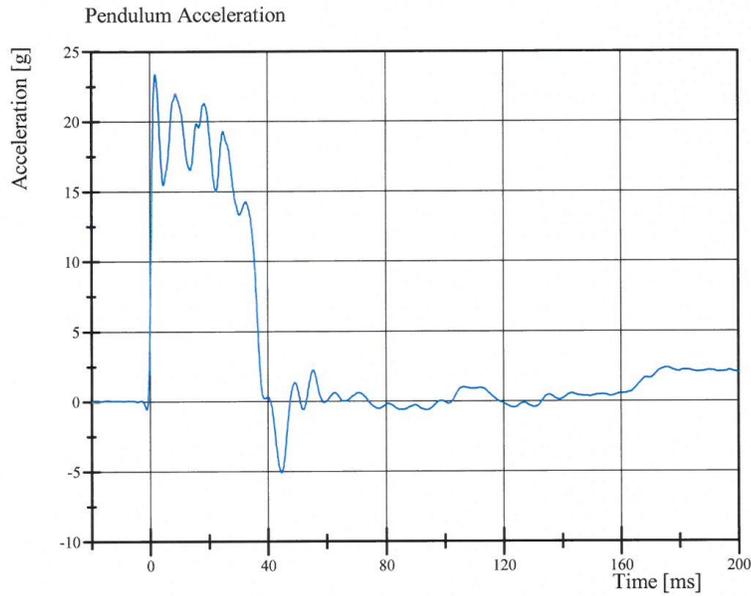


Transportation Research Center Inc.

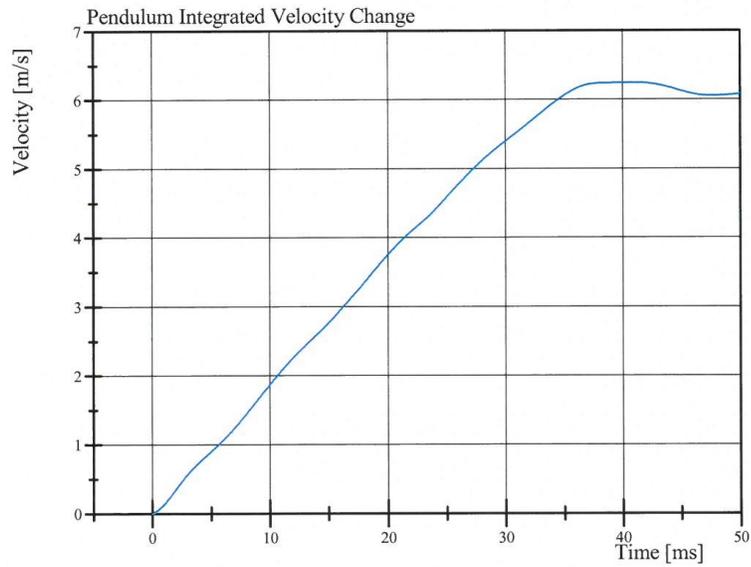
Neck Extension

HIII 5th Serial No. 426 Certification No. 38-3

Test Date: 10/11/2016



Filter Class: CFC_180
Max: 23.3 g at 1.8 ms
Min: -5.1 g at 44.6 ms



Filter Class: CFC_180
Max: 6.2 m/s at 40.9 ms
Min: 0.0 m/s at 0.0 ms

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

10.11.2016 15:30:58 3116



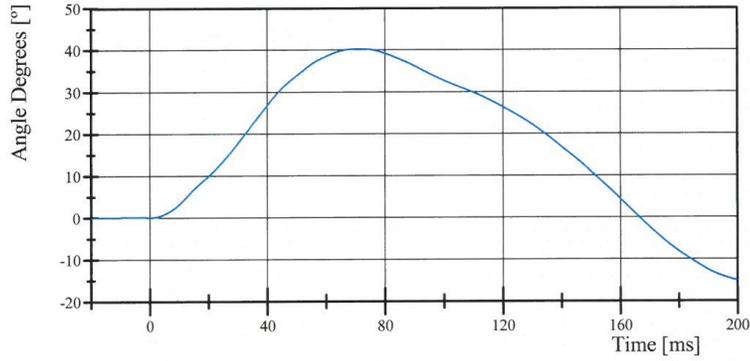
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 38-3

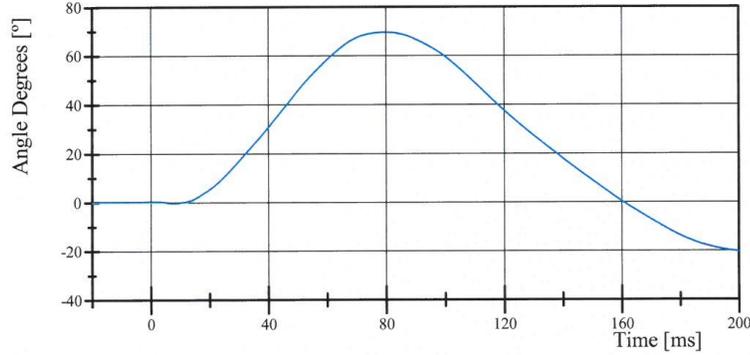
Test Date: 10/11/2016

Pot Rotation at the Base of Neck



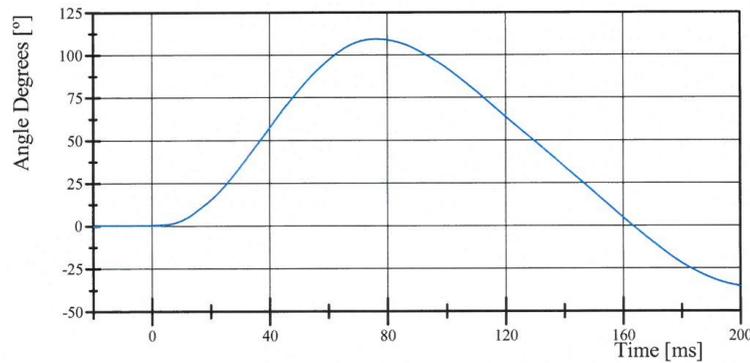
Filter Class: CFC_60
Max: 40.2 ° at 71.4 ms
Min: -15.1 ° at 200.0 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 69.5 ° at 79.9 ms
Min: -20.3 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 109.2 ° at 76.2 ms
Min: -35.4 ° at 200.0 ms

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

10.11.2016 15:30:59 3116

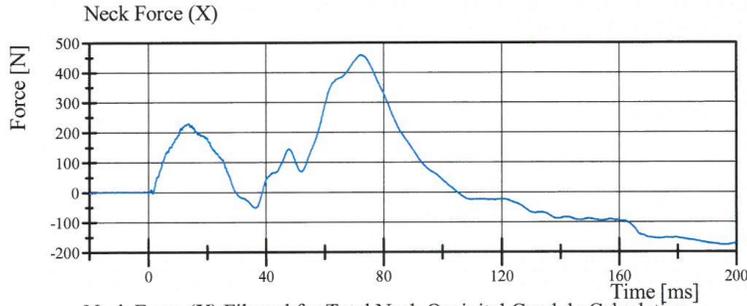


Transportation Research Center Inc.

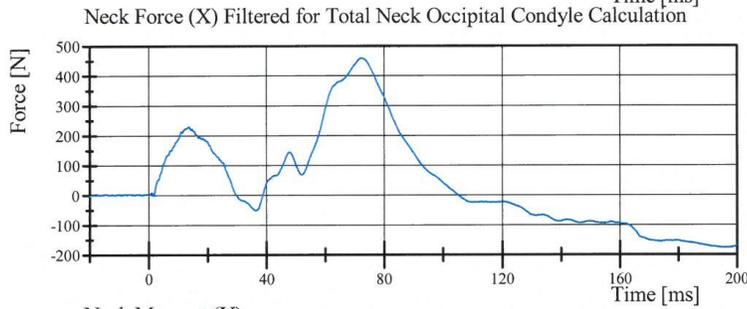
Neck Extension

HIII 5th Serial No. 426 Certification No. 38-3

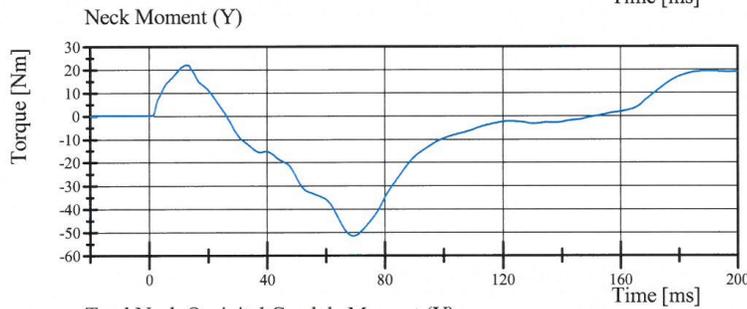
Test Date: 10/11/2016



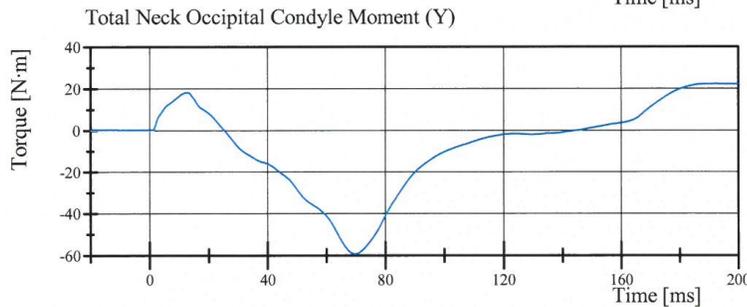
Filter Class: CFC_1000
Max: 458.7 N at 72.6 ms
Min: -175.9 N at 195.0 ms



Filter Class: CFC_600
Max: 458.3 N at 72.2 ms
Min: -175.8 N at 196.6 ms



Filter Class: CFC_600
Max: 21.9 Nm at 12.5 ms
Min: -51.7 Nm at 69.4 ms



Filter Class: Without_(Consta
Max: 22.3 N·m at 192.1 ms
Min: -59.4 N·m at 69.8 ms

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

10.11.2016 15:31:00 3116



Transportation Research Center Inc.

Front Thorax

HIII 5th Serial No. 426 Certification No. 38-1

Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.616 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,273.7 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	\geq (-4,600) N	-4,301.2 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-51.4 mm	Yes
Internal Hysteresis	69 - 85 %	75.2 %	Yes

Test meets specifications.

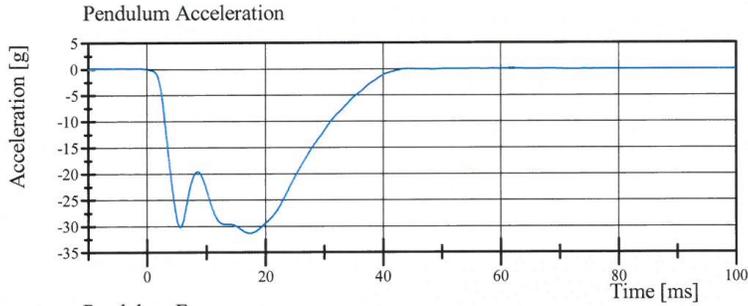
Comments:

Transportation Research Center Inc.

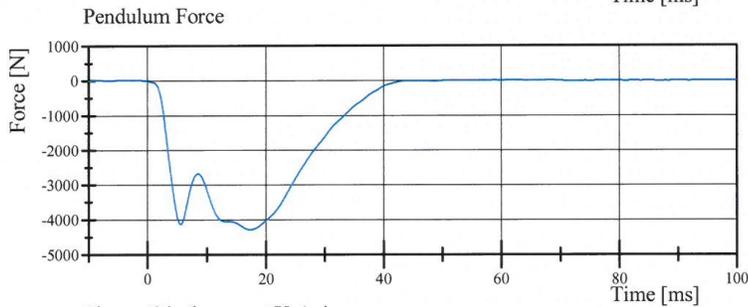
Front Thorax

HIII 5th Serial No. 426 Certification No. 38-1

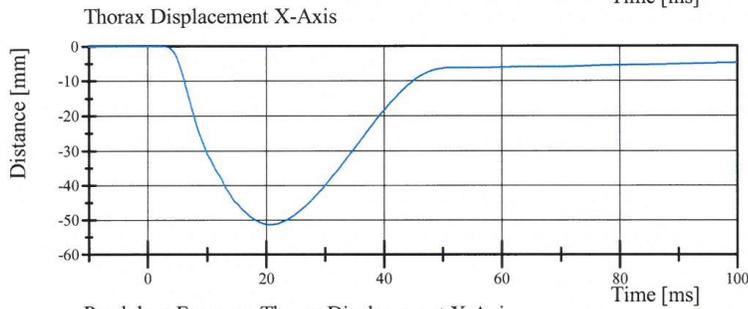
Test Date: 10/11/2016



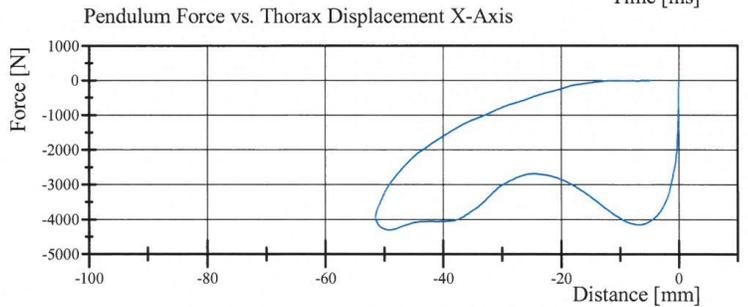
Filter Class: CFC_180
Max: 0.1 g at 61.8 ms
Min: -31.4 g at 17.3 ms



Filter Class: CFC_180
Max: 14.2 N at 61.8 ms
Min: -4,301.2 N at 17.3 ms



Filter Class: CFC_600
Max: 0.0 mm at -5.2 ms
Min: -51.4 mm at 20.6 ms



Filter Class: CFC_180
Max: 14.2 N at -6.1 mm
Min: -4,301.2 N at -49.1 mm

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

10.11.2016 13:35:58 420



Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

NHTSA

Serial Number: 426

Date: 10/12/2016

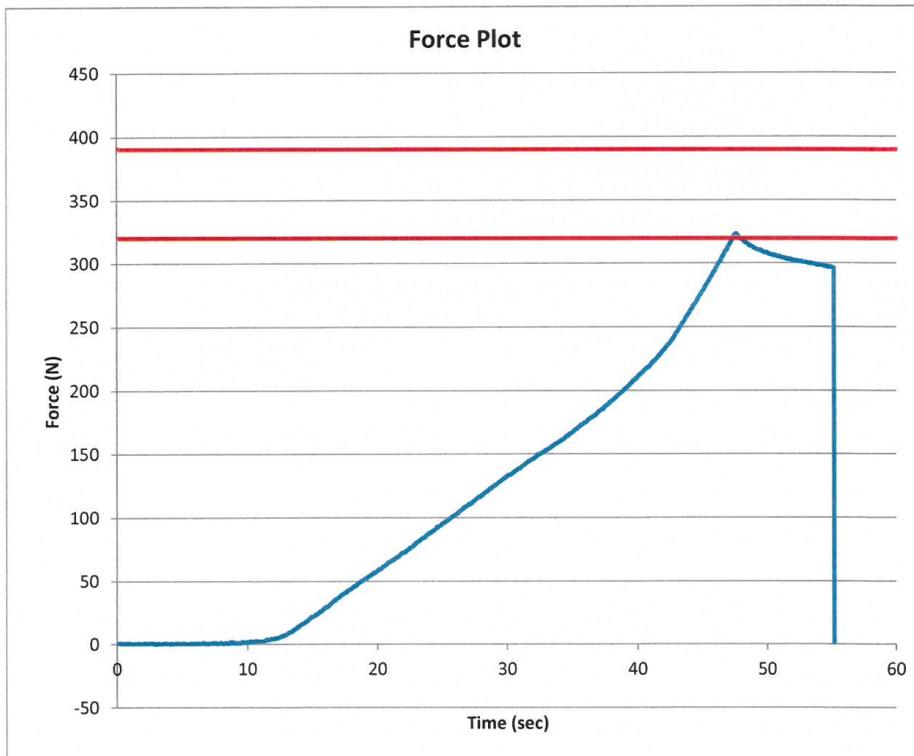
Test Number: 01

Time: 7:39

Comments:



TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.6 °C Pass
Humidity	10 - 70	41 % Pass
Average Angular Velocity	0.5 - 1.5	0.82 deg/sec Pass
Initial Angle	0 - 20	15.76 deg Pass
Peak Force at 45.12°	320 - 390	323.15 N Pass
Final Angle	-8 - 8	4.94 deg Pass



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 38-4
Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	22.0 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.114 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,788.0 N	Yes

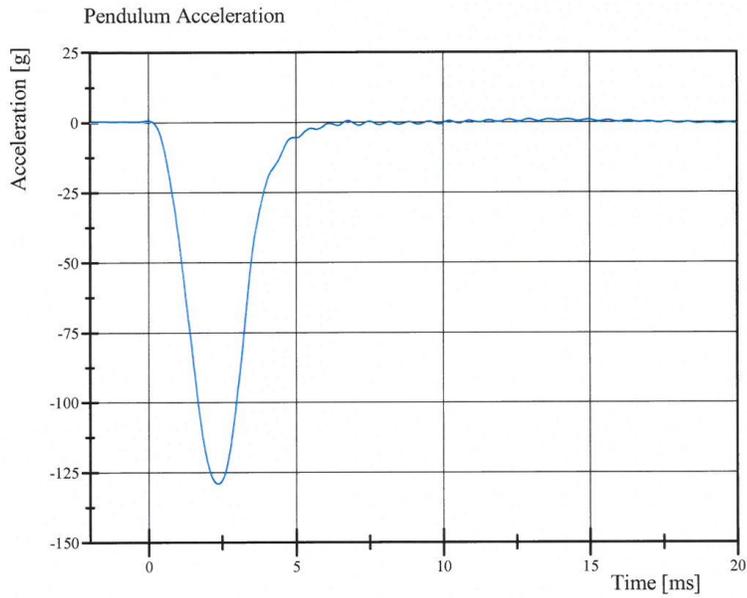
Test meets specifications.

Comments:

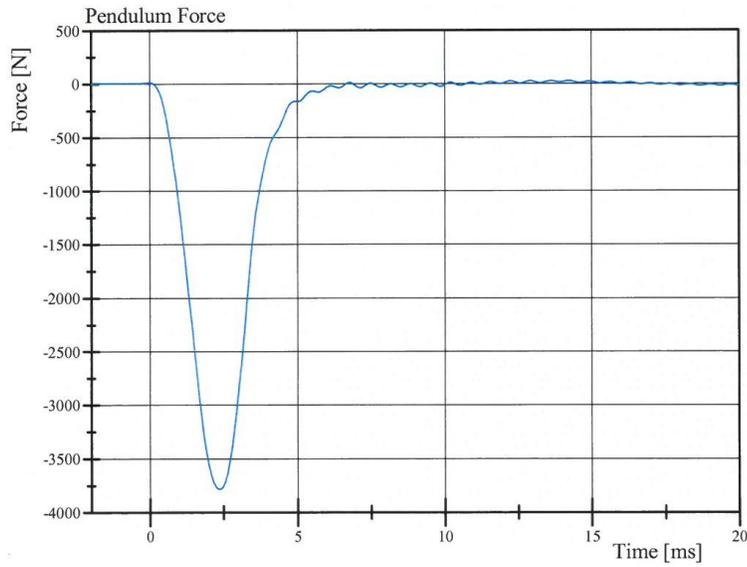


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 38-4
Test Date: 10/11/2016



Filter Class: CFC_600
Max: 0.9 g at 13.6 ms
Min: -129.2 g at 2.4 ms



Filter Class: CFC_600
Max: 26.8 N at 13.6 ms
Min: -3,788.0 N at 2.4 ms

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

10.11.2016 11:45:26 1766



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 38-1
Test Date: 10/11/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.114 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,785.1 N	Yes

Test meets specifications.

Comments:

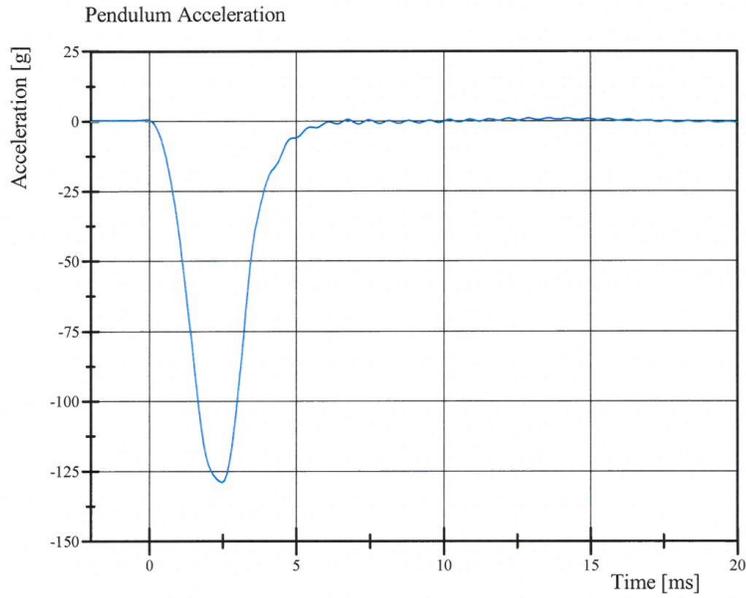
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

10.11.2016 10:20:01 1768

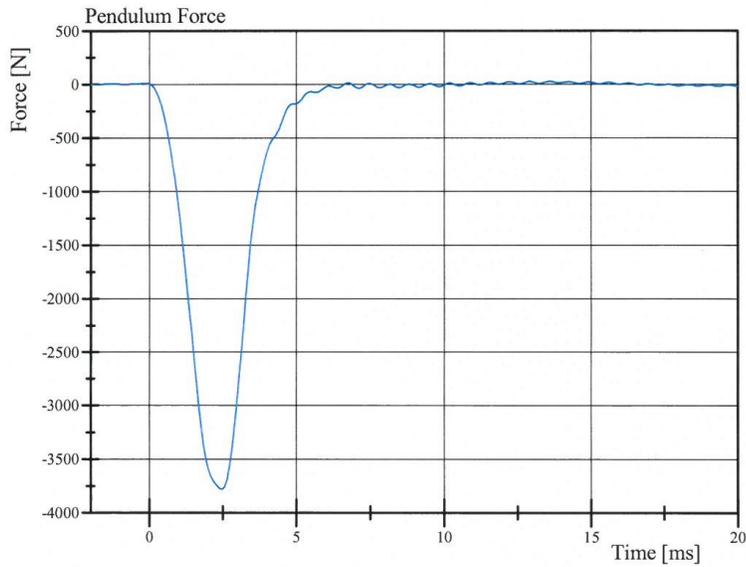


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 38-1
Test Date: 10/11/2016



Filter Class: CFC_600
Max: 0.9 g at 13.6 ms
Min: -129.1 g at 2.5 ms



Filter Class: CFC_600
Max: 27.2 N at 13.6 ms
Min: -3,785.1 N at 2.5 ms

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

10.11.2016 10:20:12 1768

