Final Report Number: NCAP-TRC-16-006

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

General Motors LLC

2016 Chevrolet Cruze

NHTSA Number: M20160103

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

Report Date: September 12, 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

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Prepared By: Impact Laboratory Project Operations Group

Approved By: Melinda Lackey

Approval Date: September 12, 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 _____

Technical Report Documentation Page

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Final Report of NEW CAR ASSESSMENT PROGRAM Frontal Impact Testing of a 2016 Chevrolet Cruze NHTSA No. M20160103	September 12, 2016
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15. Supplemental Notes

16. Abstract

A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2016 Chevrolet Cruze, 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 June 15, 2016.

The impact velocity was 56.50 km/h, and the ambient temperature at the barrier face at the time of impact was 21.4° C. The target vehicle post-test maximum crush was 488 millimeters at the centerline. The test vehicle's performance is as follows:

	Driver ATD			Passenger ATD		
Measurement Description	Units	Threshold	Result	Units	Threshold	Result
Head Injury Criteria (HIC_{15})	NA	700	165	NA	700	308
Maximum Chest Compression	mm	63	-21.5	mm	52	-11.5
3ms Chest Clip	Gs	60	50.2	Gs	60	42.2
Nij	NA	1	0.31	NA	1	0.35
Neck Tension	Newtons	4170	1,150.5	Newtons	2620	643.9
Neck Compression	Newtons	4000	-209.7	Newtons	2520	-158.3
Left Femur Force	Newtons	10000	-960.0	Newtons	6800	-982.1
Right Femur Force	Newtons	10000	-1,303.9	Newtons	6800	-1,230.2

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

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1: PURPOSE AND SUMMARY OF 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 2016 Chevrolet Cruze impacted the barrier wall at a velocity of 56.50 km/h. The test was performed at Transportation Research Center, Inc. on June 15, 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. 070) 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 488 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below:

ATD Position	**HIC_{15}**	**Nij**	**Neck Tension (N)**	**Neck Compression (N)**	**3 ms Chest Clip (Gs)**	**Chest Disp. (mm)**	**Left Femur (N)**	**Right Femur (N)**
Driver (50^{th} Male)	165	0.31	1,150.5	-209.7	50.2	-21.5	-960.0	-1,303.9
Passenger (5^{th} Female)	308	0.35	643.9	-158.3	42.2	-11.5	-982.1	-1,230.2

2: OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

TEST VEHICLE INFORMATION

NHTSA No.	M20160103
Model Year	2016
Make	Chevrolet
Model	Cruze
Body Style	Passenger Car
VIN	1G1BE5SM4G7248091
Body Color	Silver Ice Metallic
Odometer Reading (km/mi)	10 MI.
Engine Displacement (L)	1.4
Type/No. Cylinders	Gas/4
Engine Placement	Front/Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Driver only
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	No
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:	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured by	General Motors LLC
Date of Manufacture	03/16

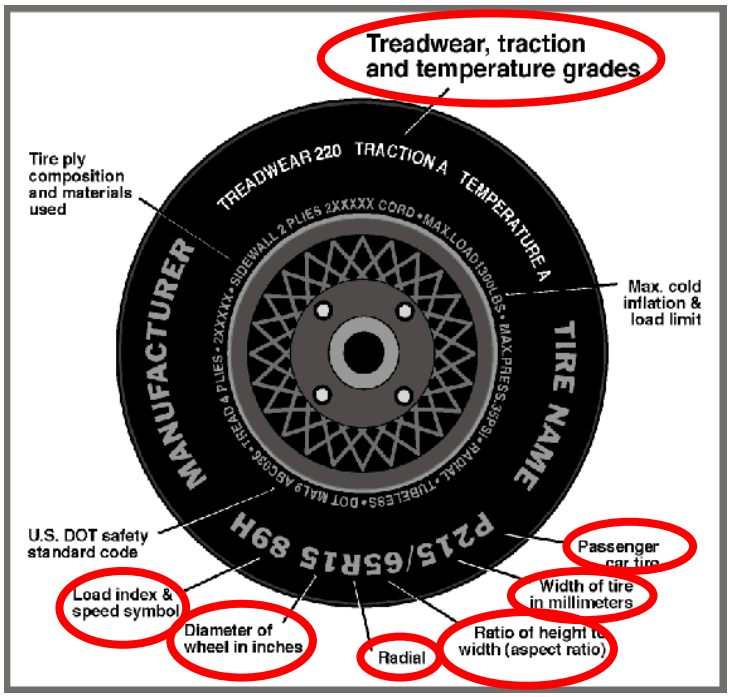
GVWR (kg)	1744.0 (3845 lbs)
GAWR Front (kg)	917.0 (2022 lbs)
GAWR Rear (kg)	827.0 (1823 lbs)

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				395
Cargo Wt. (RCLW) (kg)				54.8

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

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	240	240
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Assurance	Assurance
Treadwear	580	580
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	4	4
Load Index/Speed Symbol	91 H	91 H
Tire Material	Polyester,steel & polyamide	Polyester,steel & polyamide
DOT Safety Code Right	M60F VH1R 0716	M60F VH1R 0716
DOT Safety Code Left	M60F VH1R 0716	M60F VH1R 0716

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	409.2	263.2		438.0	327.0	
Right	kg	394.6	253.0		419.8	321.2	
Ratio	%	60.9	39.1		57.0	43.0	
Totals	kg	803.8	516.2	1320.0	857.8	648.2	1506.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1320.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.2
Rated Cargo/Luggage Weight (RCLW)	kg	54.8
Vehicle Target Weight (TVTW)	kg	1514.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	676	670	699	699	1055
As Tested	mm	667	668	665	658	1161
Post Test	mm	704	703	698	692	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2697
Total Vehicle Length at Left Side	mm	4351
Total Vehicle Length at Centerline	mm	4658
Total Vehicle Length at Right Side	mm	4353
Weight of Ballast in Cargo Area	kg	2.4
Weight of Vehicle Components Removed	kg	43.8
Amount of Stoddard Solvent in Fuel Tank	liters	46.8

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: Rear fascia, trunk lid, tail lights, rear door panels, windows, regulator assembly, weather strips and speakers, left & right OSRV mirrors and rear package tray

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4658
2	Total Width	1782
3	Bumper Top Height	608
4	Bumper Bottom Height	235
5	Longitudinal Member Top Height	241
6	Distance Between Longitudinal Members	913
7	Longitudinal Member Width	936
8	Engine Top Height	760
9	Engine Bottom Height	187
10	Engine and Gearbox Width	785
11	Front Bumper-Engine Distance	660
12	Front Shock Absorber Fixing Height	845
13	Bonnet Leading Edge Height	703
14	Front Shock Absorber Fixing Width	1150
15	Front Bumper – Front Axle Distance	1005
16	Front Axle – A-Pillar Distance	488
17	A-Pillar – B-Pillar Distance	942
18	B-Pillar – Rear Axle Distance	1306
19	B-Pillar – C-Pillar Distance	889
20	Roof Sill Bottom Height	1377
21	Roof Sill Top Height	1475
22	Floor Sill Bottom Height	190
23	Floor Sill Top Height	285

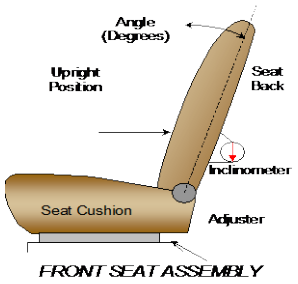
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

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:	12.9
Passenger Seat back angle:	20.1

SEAT FORE/AFT POSITIONS

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

Driver: Mid position, Positioned according to Form 1

Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	304	152
Passenger Seat	240	0

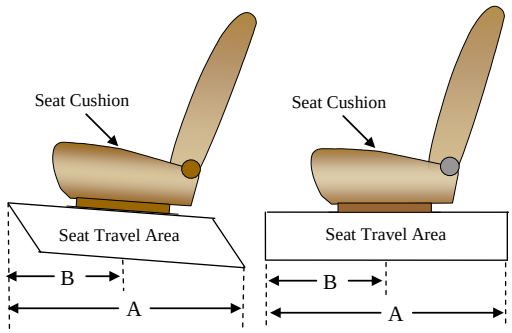
SEAT BELT UPPER ANCHORAGE

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)

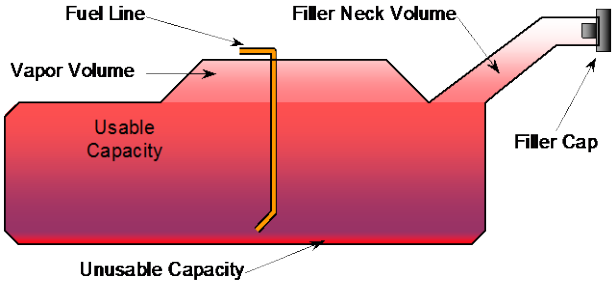
SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	50.3
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	46.8
Actual Amount of Solvent Used	46.8
1/3 of Usable Capacity	16.8

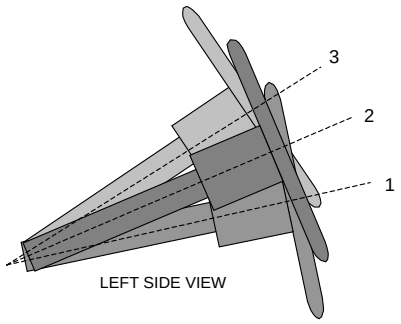
The vehicle is equipped with an electric fuel pump.



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

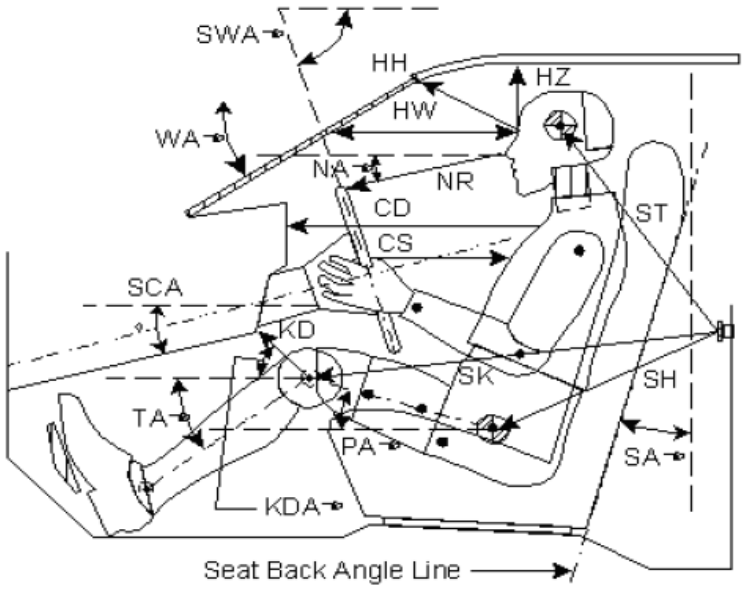
STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	25.1	0
Geometric Center Position No. 2	23.1	30
Uppermost Position No. 3	21.1	60
Telescoping Steering Wheel Travel		60
Test Position	23.1	30

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

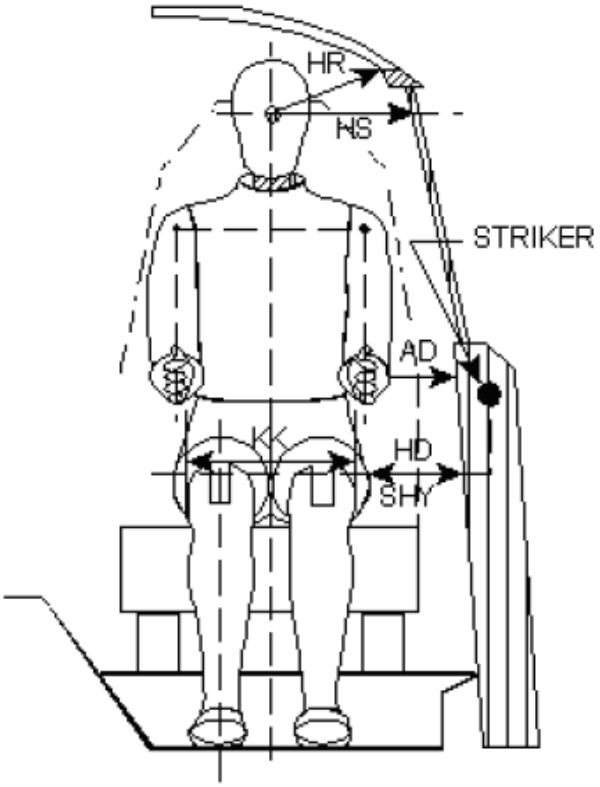


Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (º)	Length (mm)	Angle (º)
WAº	Windshield Angle		25.7		
SWAº	Steering Wheel Angle		22.0		
SCAº	Steering Column Angle		68.0		
SAº	Seat Back Angle (on headrest post)		12.9 FWD		20.1
HZ	Head to Roof (Z)	235		243	
HH	Head to Header	415		358	
HW	Head to Windshield	760		793	
NR	Nose to Rim	421	3.5		
CD	Chest to Dash	577		463	
CS	Chest to Steering Hub	342			
RA	Rim to Abdomen	241			
KDL	Left Knee to Dash	235	37.0	163	39.0
KDR	Right Knee to Dash	230	39.0	160	39.0
PAº	Pelvic Angle		22.7		21.8
TAº	Tibia Angle		35.9		39.4
SK	Striker to Knee	497	9.8	583	8.1
ST	Striker to Head	461	89.2	433	76.0
SH	Striker to H-Point	221	60.0	276	31.0

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

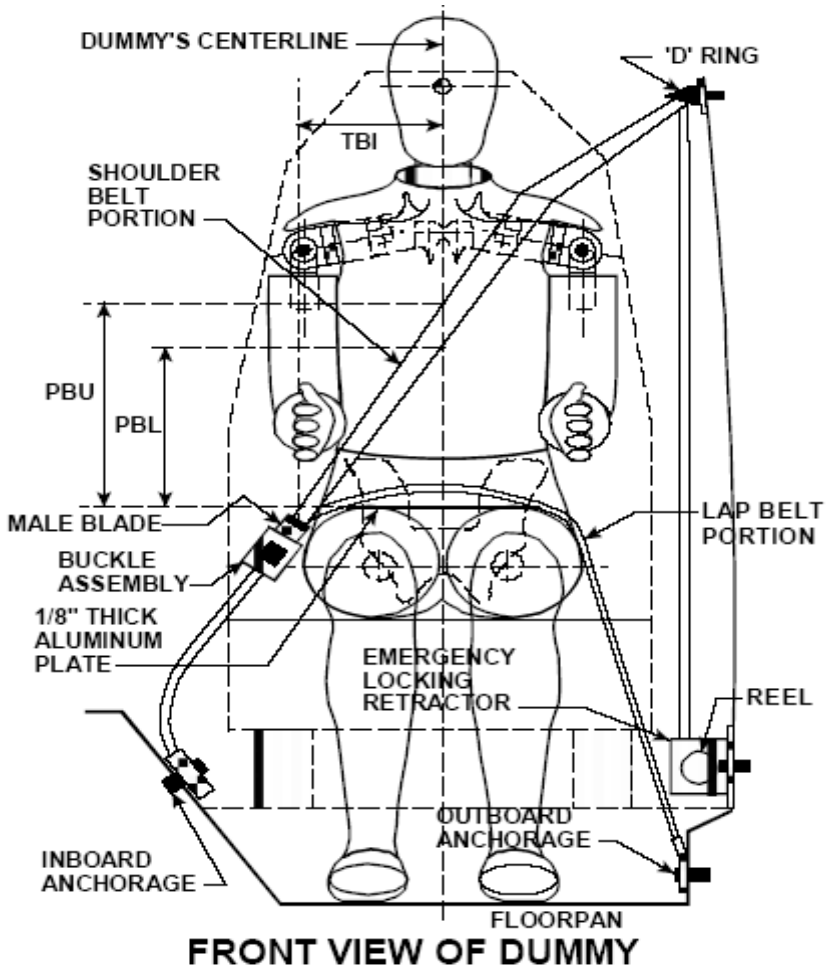


Code	Measurement Description	Driver	Passenger
AD	Arm to Door	96	113
HD	H-Point to Door	167	183
HR	Head to Side Header	209	242
HS	Head to Side Window	351	374
KK	Knee to Knee	283	165
SHY	Striker to H-Point (Y Direction)	258	165
AA	Ankle to Ankle	315	181

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	374	371
PBL – Top surface of reference to belt lower edge	mm	290	299

BELT LENGTH DATA

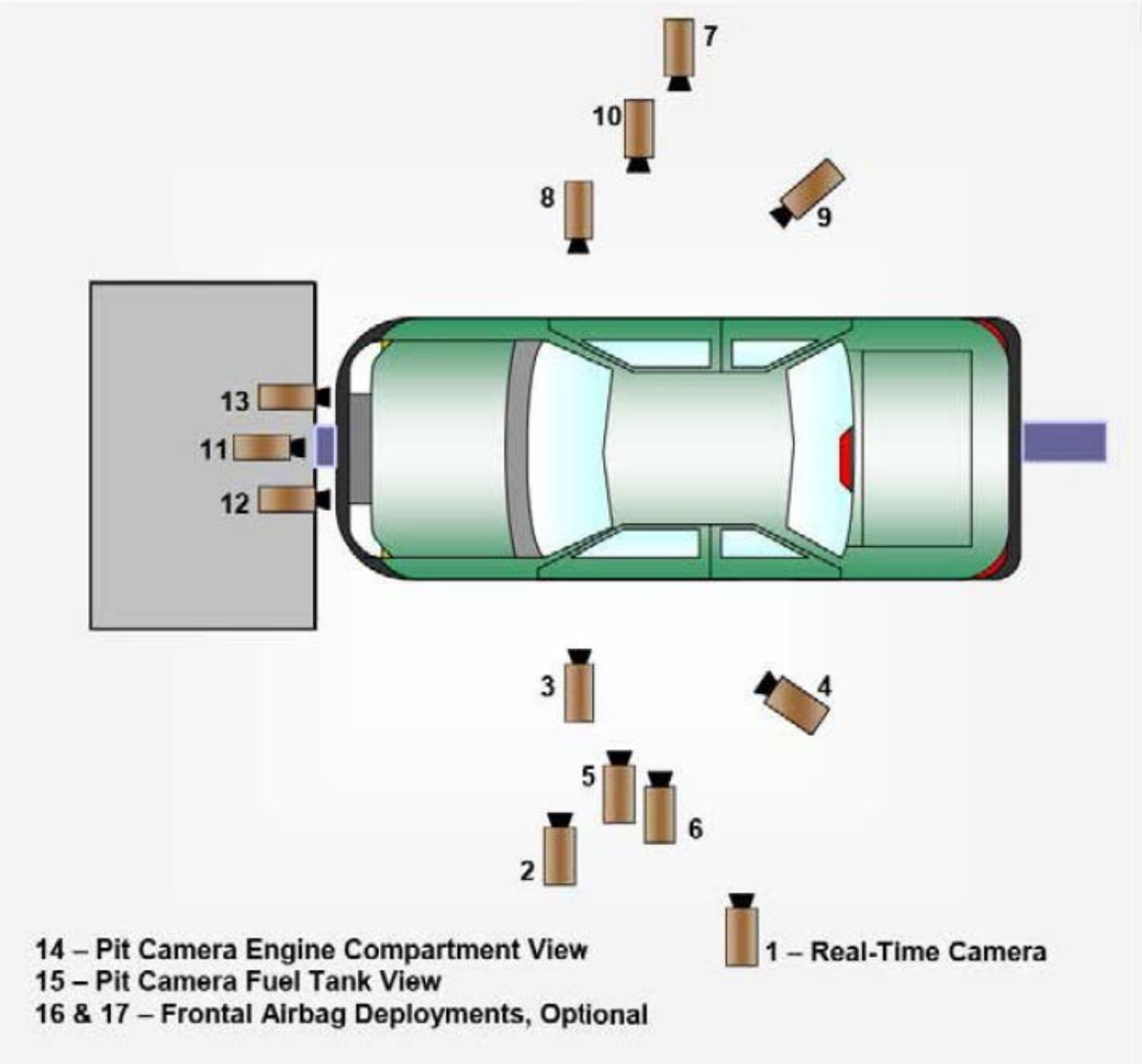
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	802	874
Lap belt length as measured on ATD	mm	443	516
Remainder of belt on reel	mm	1445	1260
Total belt length for continuous webbing systems	mm	2690	2650

DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2016 Chevrolet Cruze	NHTSA No.:	M20160103
Test Program:	NCAP Frontal Impact	Test Date:	6/15/16

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

CAMERA LOCATIONS

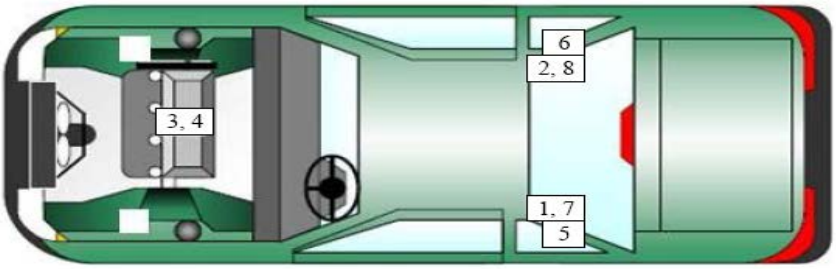
No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-732	-5812	-1339	Zoom	30
2	Driver Close-Up	-1332	-5812	-1256	50	1000
3	Left Front Half	-1023	-5702	-1284	20	1000
4	Left Angle	-4011	-2550	-1862	25	1000
5	Steering Column - Top	-1708	-5332	-2226	50	1000
6	Steering Column – Bottom	-1712	-5032	-1297	50	1000
7	Right Overall	-1766	5596	-1200	20	1000
8	Passenger Close-Up	-1332	5631	-1205	50	1000
9	Right Front Half	-4023	2765	-1857	25	1000
10	Right Angle	-1021	5706	-1171	Zoom	1000
11	Windshield	-100	0	-2658	12.5	1000
12	Driver Windshield	-110	-275	-2654	25	1000
13	Passenger Windshield	-110	396	-2654	25	1000
14	Pit Front	-709	45	3038	20	1000
15	Pit Rear	-3201	-30	3038	20	1000
16	Onboard Driver Airbag (Optional)	N/A	N/A	N/A	12.5	1000
17	Onboard Passenger Airbag (Optional)	N/A	N/A	N/A	12.5	1000

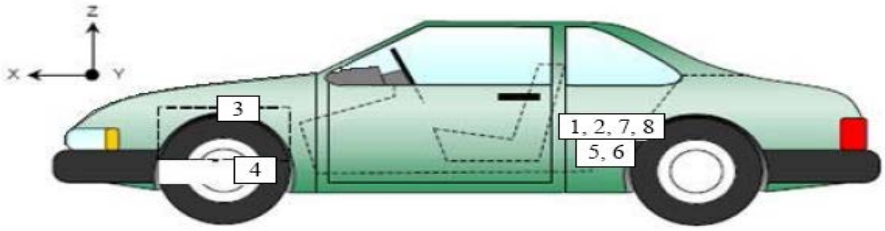
Reference Points: +X – forward of impact plane
+Y – right of monorail center
+Z – into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Camera View	Location (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1431	-300	-430
2	Right Rear Accelerometer – X Direction	1431	290	-430
3	Engine Top X	3585	+43	-701
4	Engine Bottom X	3420	+121	-166
5	Left Rear Accelerometer – Z Direction	1429	-300	-430
6	Right Rear Accelerometer – Z Direction	1429	+290	-430
7	Left Rear Accelerometer – X Direction Redundant	1431	-365	-430
8	Right Rear Accelerometer- X Direction Redundant	1431	+360	-430

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

[1] Measurement was not taken.

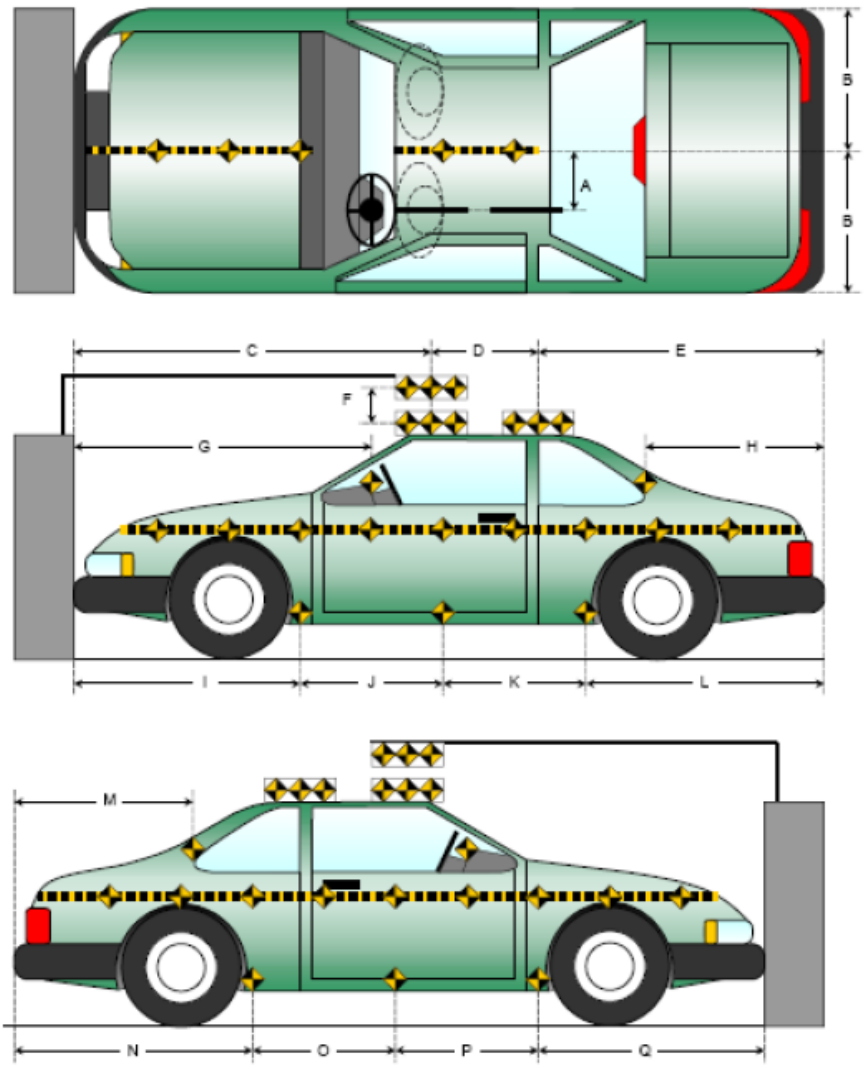
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

Item	Value
A	326
B	899
C	2361
D	603
E	1715
F	230
G	1746
H	367
I	1430
J	916
K	916
L	1426
M	867
N	1410
O	916
P	916
Q	1425

All units in millimeters



DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

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: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

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: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th/ 037	Hybrid III 5th/ 070
Head Contact	Frontal Airbag/Head Restraint	Frontal Airbag/Head Restraint
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST-TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1366
Center	mm	1247
Right Side	mm	1350
Average	mm	1321

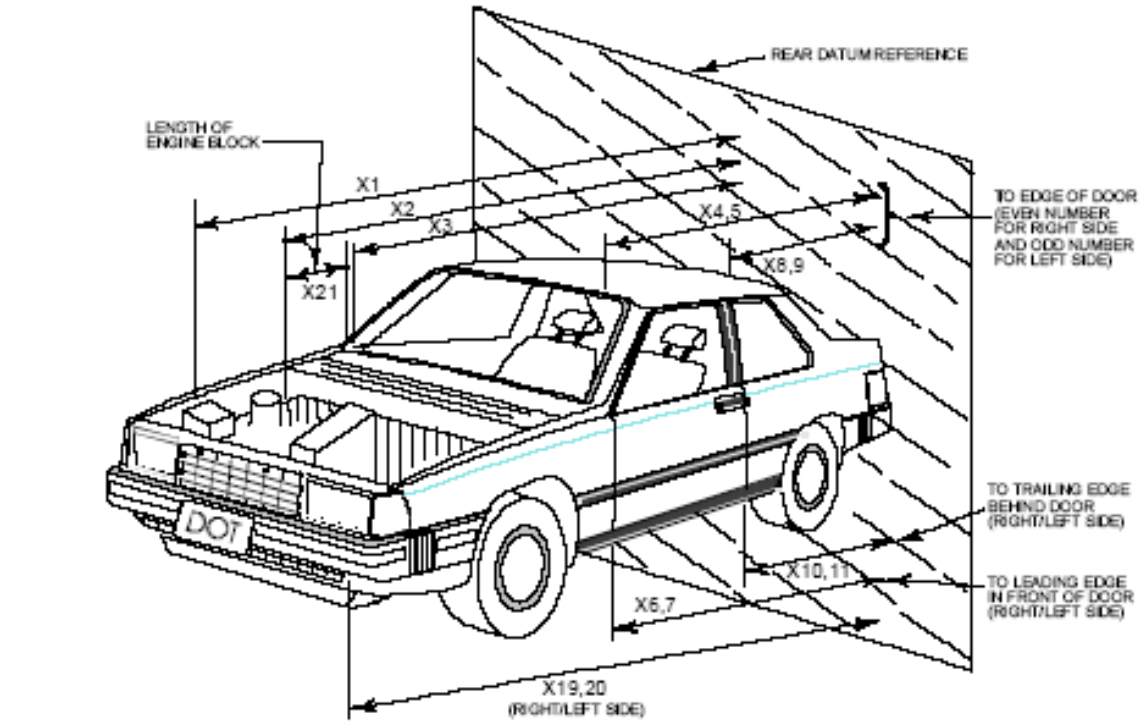
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

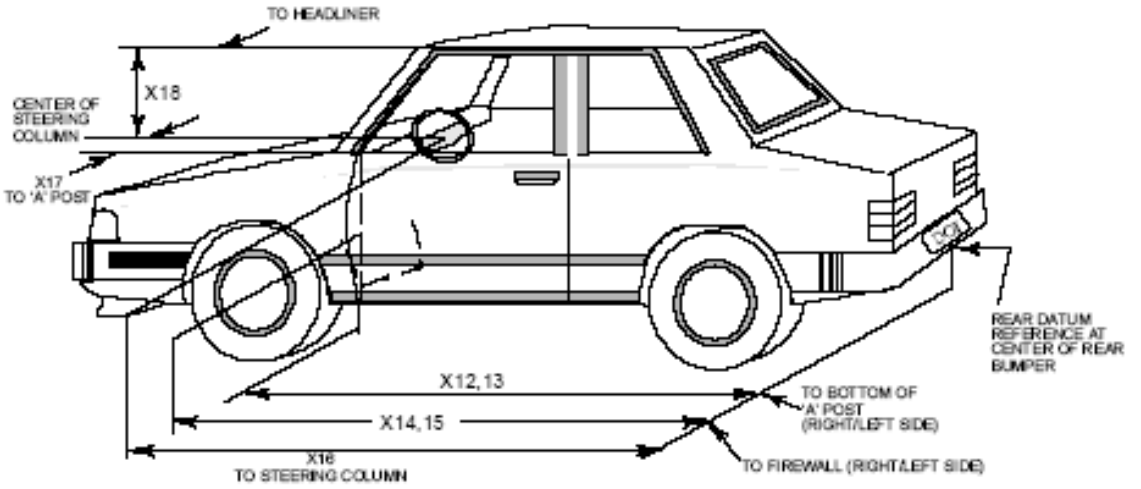
Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Side Curtain Airbag	Yes	Yes	Yes	Yes
Torso/Pelvis Airbag	Yes	No	Yes	No
Pelvis Airbag	No	N/A	No	N/A
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt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

DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2016 Chevrolet Cruze	NHTSA No.:	M20160103
Test Program:	NCAP Frontal Impact	Test Date:	6/15/16





DATA SHEET NO. 12 (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4658	4170	488
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4058	3855	203
3	RSOV to Firewall	3638	3675	-37
4	RSOV to Upper Leading Edge of Right Door	3211	3215	-4
5	RSOV to Upper Leading Edge of Left Door	3216	3218	-2
6	RSOV to Lower Leading Edge of Right Door	3171	3182	-11
7	RSOV to Lower Leading Edge of Left Door	3174	3177	-3
8	RSOV to Upper Trailing Edge of Right Door	2171	2178	-7
9	RSOV to Upper Trailing Edge of Left Door	2169	2175	-6
10	RSOV to Lower Trailing Edge of Right Door	2211	2232	-21
11	RSOV to Lower Trailing Edge of Left Door	2218	2227	-9
12	RSOV to Bottom of “A” Post-of Right Side	3211	3213	-2
13	RSOV to Bottom of “A” Post-of Left Side	3206	3210	-4
14	RSOV to Firewall, Right Side	3718	3724	-6
15	RSOV to Firewall, Left Side	3718	3711	7
16	RSOV to Steering Column	2846	2900	-54
17	Center of Steering Column to “A” Post	406	405	1
18	Center of Steering Column to Headliner	448	445	3
19	RSOV to Right Side of Front Bumper	4353	4082	271
20	RSOV to Left Side of Front Bumper	4351	4095	256
21	Length of Engine Block	749	750	-1
RD	RSOV to Right Side of Dash Panel	2986	2980	6
CD	RSOV to Center of Dash Panel	2981	3010	-29
LD	RSOV to Left Side of Dash Panel	2979	2996	-17

All Dimensions in mm

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

VEHICLE INFORMATION

VIN: 1G1BE5SM4G7248091 Wheelbase: 2697
Vehicle Size Category: Passenger Car Test Weight (kg): 1506.0

ACCELEROMETER DATA

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

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

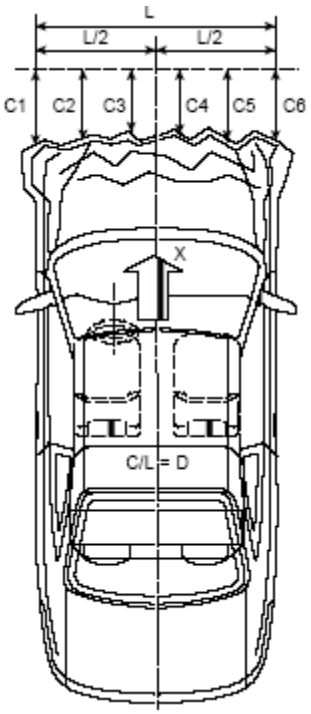
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.50

Velocity Change (km/h): 63.47

Time of Separation (ms): 110



CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1727
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4351	4095	256
C2	Crush zone 2 at left side	mm	4528	4160	368
C3	Crush zone 3 at left side	mm	4626	4167	459
C4	Crush zone 4 at right side	mm	4636	4153	483
C5	Crush zone 5 at right side	mm	4526	4120	406
C6	Crush zone 6 at right side	mm	4353	4082	271
L	C1 to C6	mm	1727	1768	-41

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

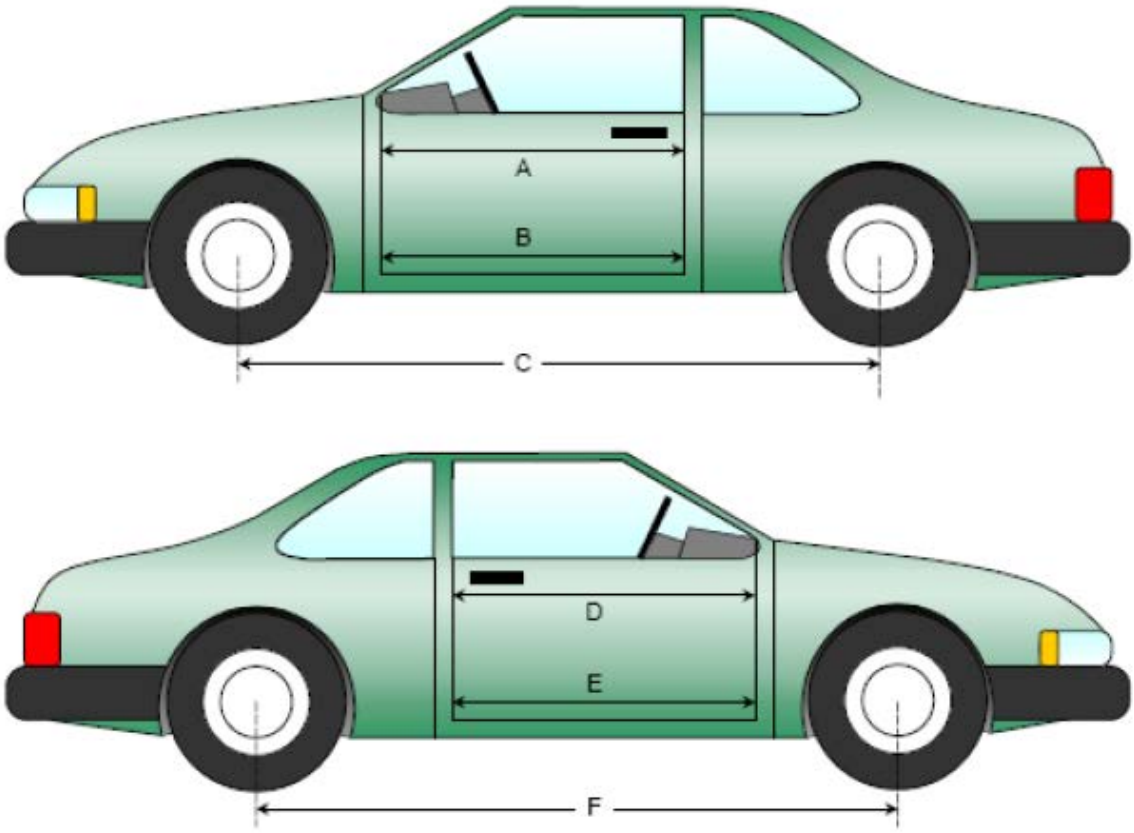
Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	942	942	0
B	Left Side Lower	mm	762	760	2
C	Right Side Upper	mm	942	941	1
D	Right Side Lower	mm	775	773	2

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2697	2670	27
F	Right Side Wheelbase	mm	2695	2698	-3



DATA SHEET NO. 14 (CONTINUED)

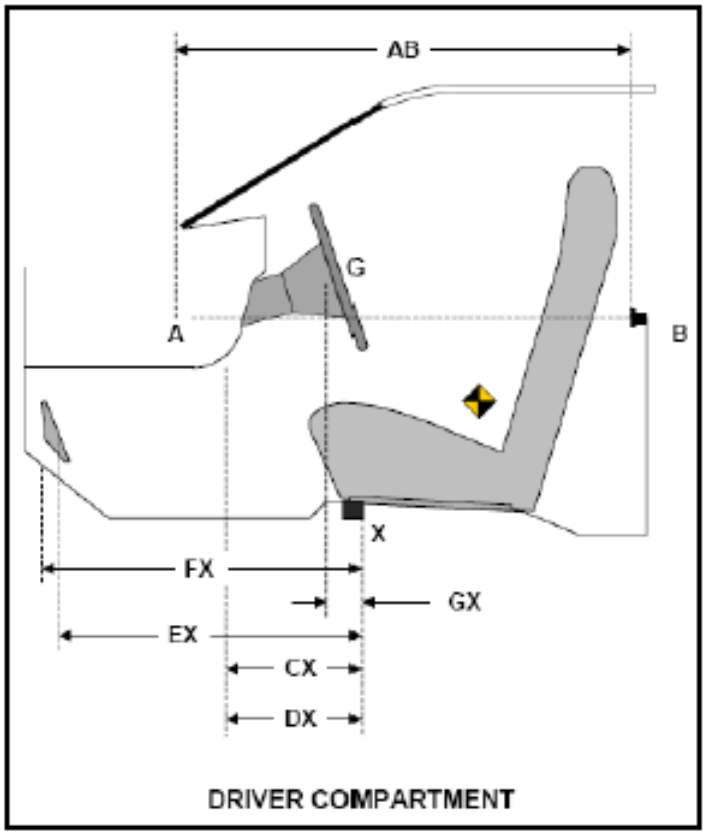
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	940	927	13
CX	Left Knee Bolster to X	mm	290	276	14
DX	Right Knee Bolster to X	mm	372	370	2
EX	Brake Pedal to X	mm	502	496	6
FX	Foot Rest to X	mm	545	487	58
GX	Center of Steering Column Wheel Hub to X	mm	596	590	6

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

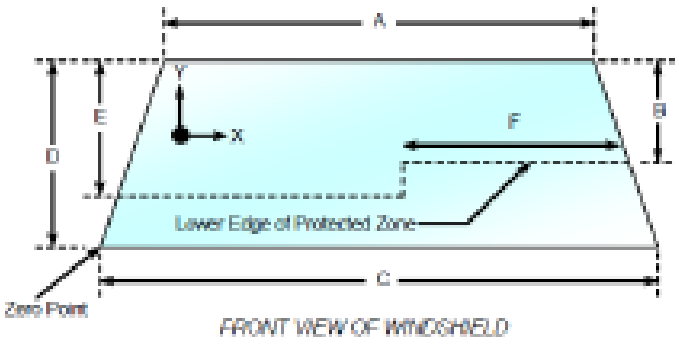
Please provide windshield mounting details.

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: 21.4° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	1848	1848	100
Right Side	1848	1848	100
Total	3696	3696	100

Item	Units	Value
A	mm	1182
B	mm	570
C	mm	1374
D	mm	881
E	mm	548
F	mm	420



AREAS OF PROTECTED ZONE FAILURES

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

DATA SHEET NO. 15 (CONTINUED)

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

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 21.4°C Test Time: 16:50

Stoddard Solvent Spillage Measurements

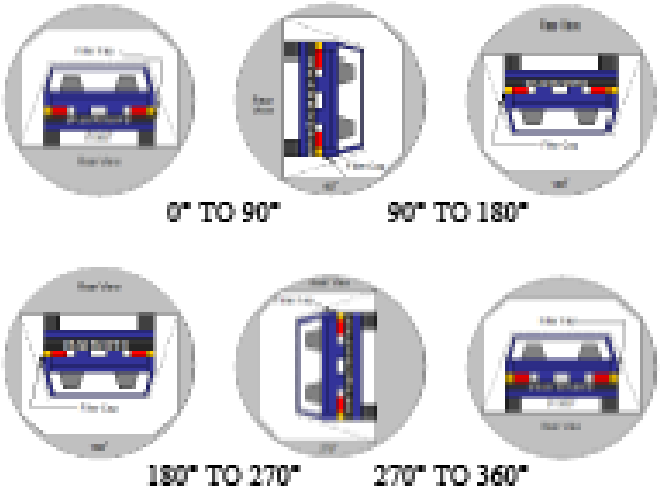
A	From impact until vehicle motion ceases: (maximum allowable – 1 oz.)	0 oz.
B	For the 5-minute period after motion ceases: (maximum allowable – 5 oz.)	0 oz.
C	For the following 25 minutes: (maximum allowable – 1 oz./minutes)	0 oz.
D	Spillage: None	

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16

1. The specified fixture rollover rate for each 90º 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
0º to 90º	90	330	420
90º to 180º	90	330	840
180º to 270º	90	330	1260
270º to 360º	90	330	1480

FMVSS 301 SPILLAGE TABLE

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

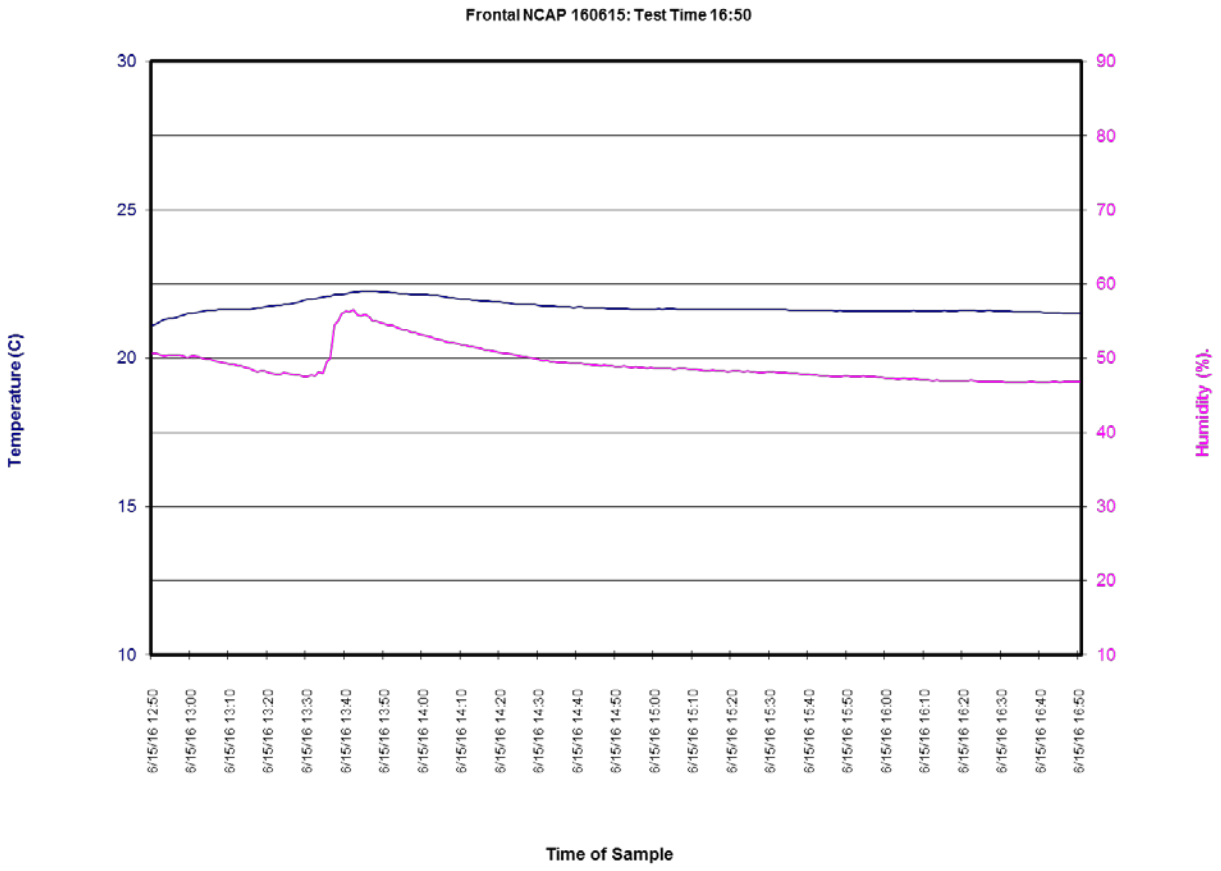
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17

DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2016 Chevrolet Cruze NHTSA No.: M20160103
Test Program: NCAP Frontal Impact Test Date: 6/15/16



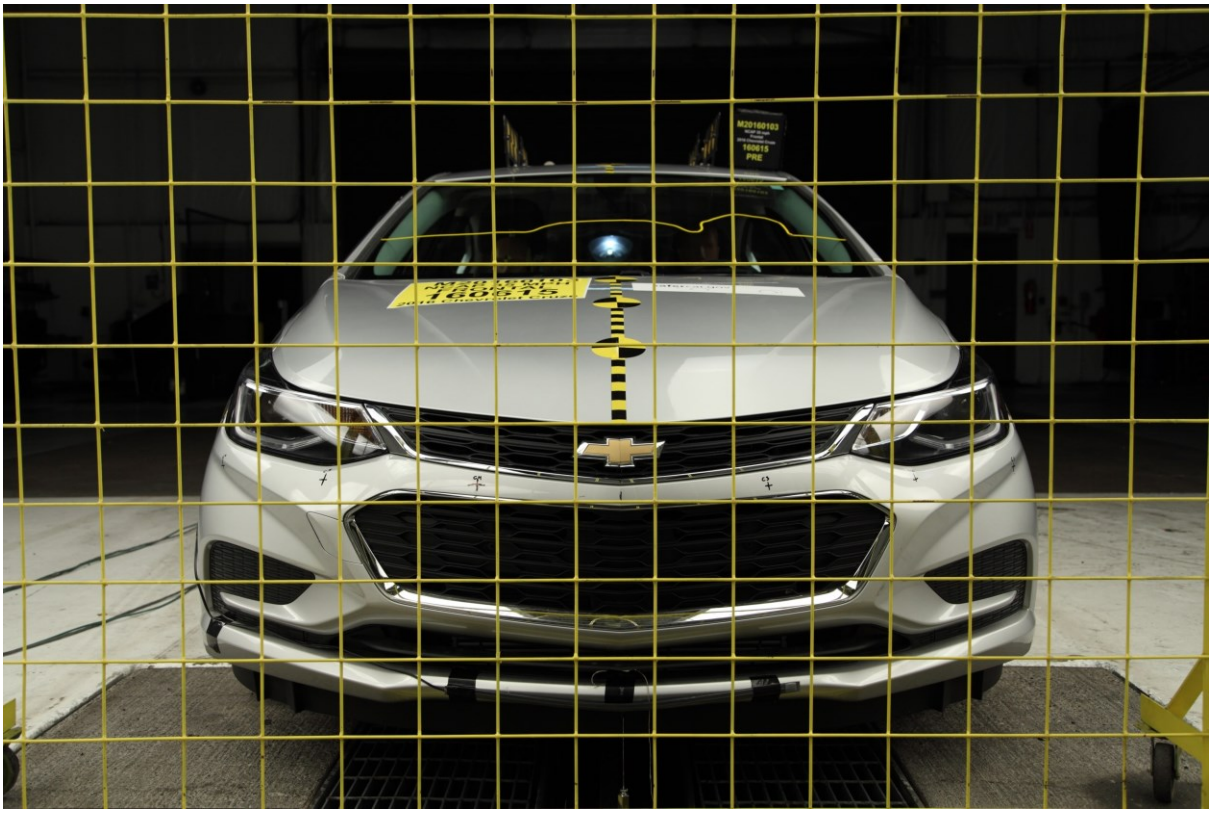
APPENDIX A

PHOTOGRAPHS

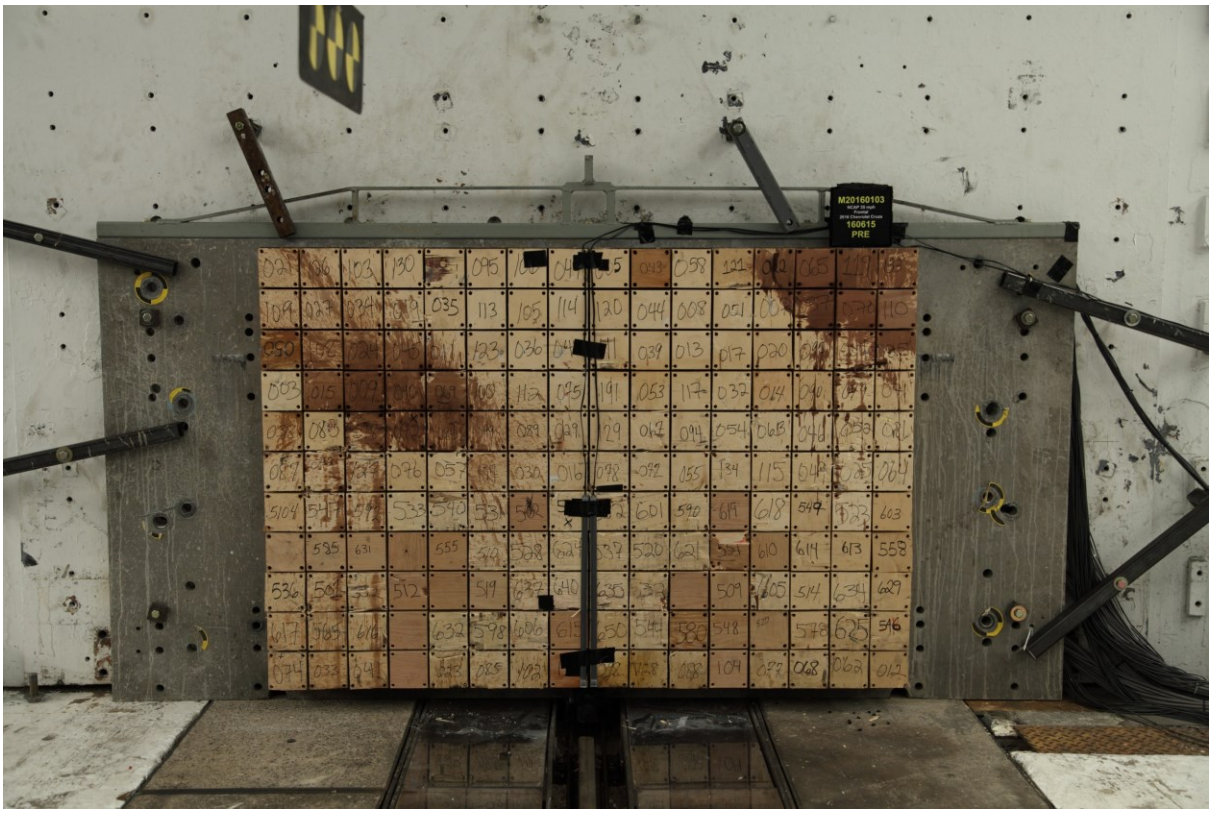
TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)

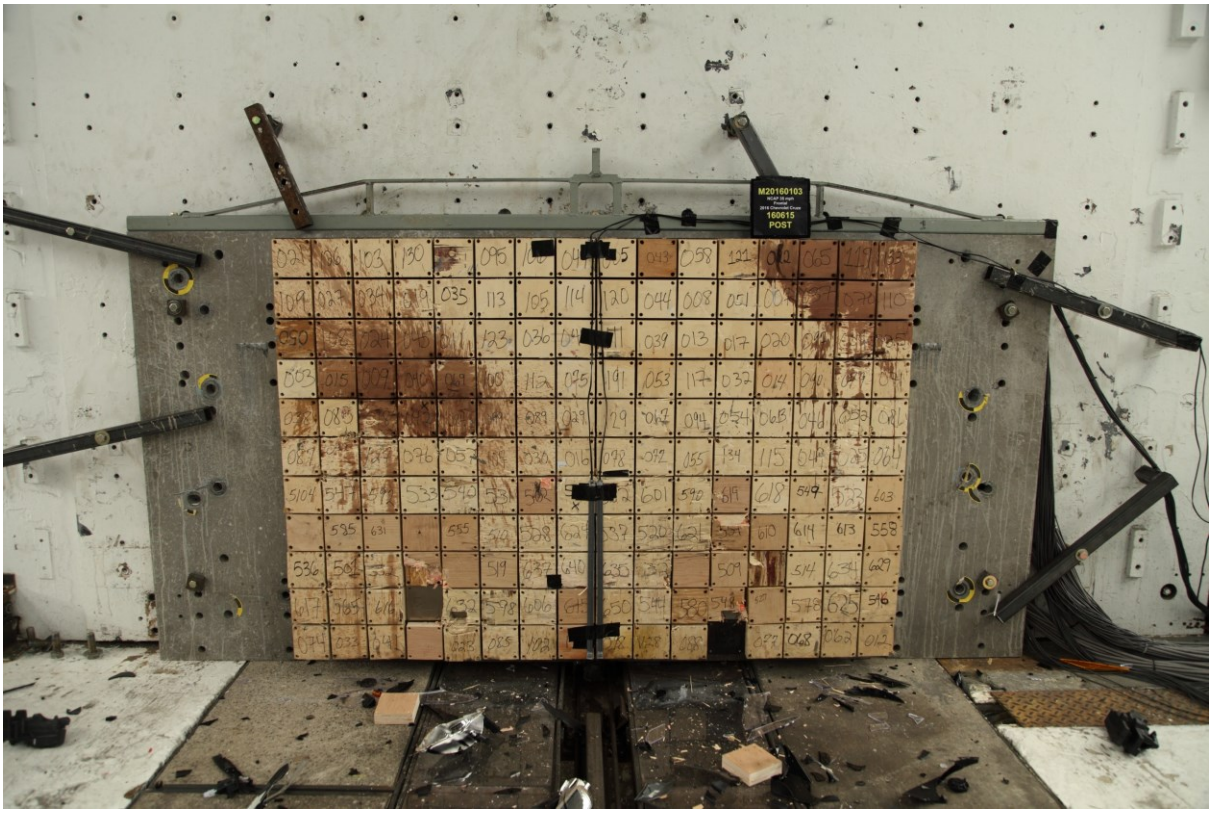
TABLE OF PHOTOGRAPHS (CONTINUED)



001 Load Cell Location



002 Pre-Test Load Cell Wall



003 Post-Test Load Cell Wall

004 Manufacturer's Label

005 Tire Placard

006 2016 Chevrolet Cruze Frontal As Delivered

007 Left 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

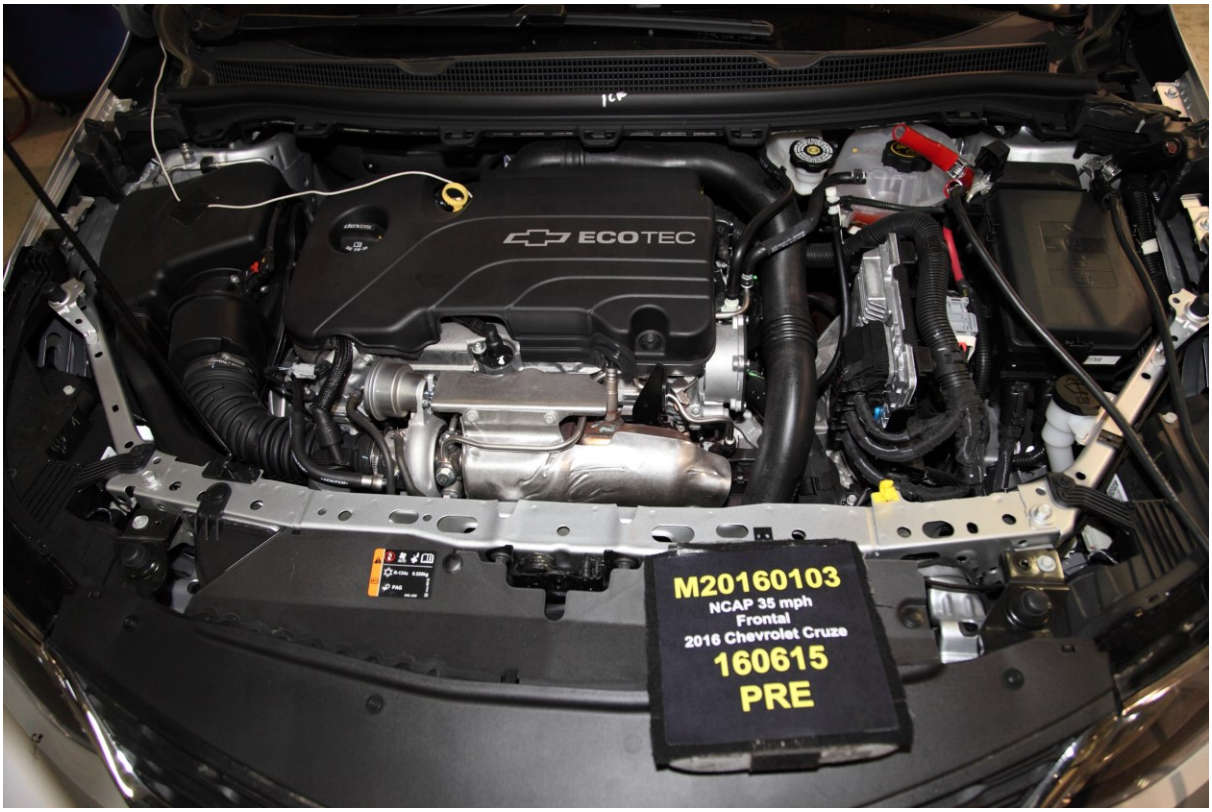
015 Post-Test Right Front 3-4 View[1]

016 Pre-Test Left Rear 3-4 View

017 Post-Test Left Rear 3-4 View[1]

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

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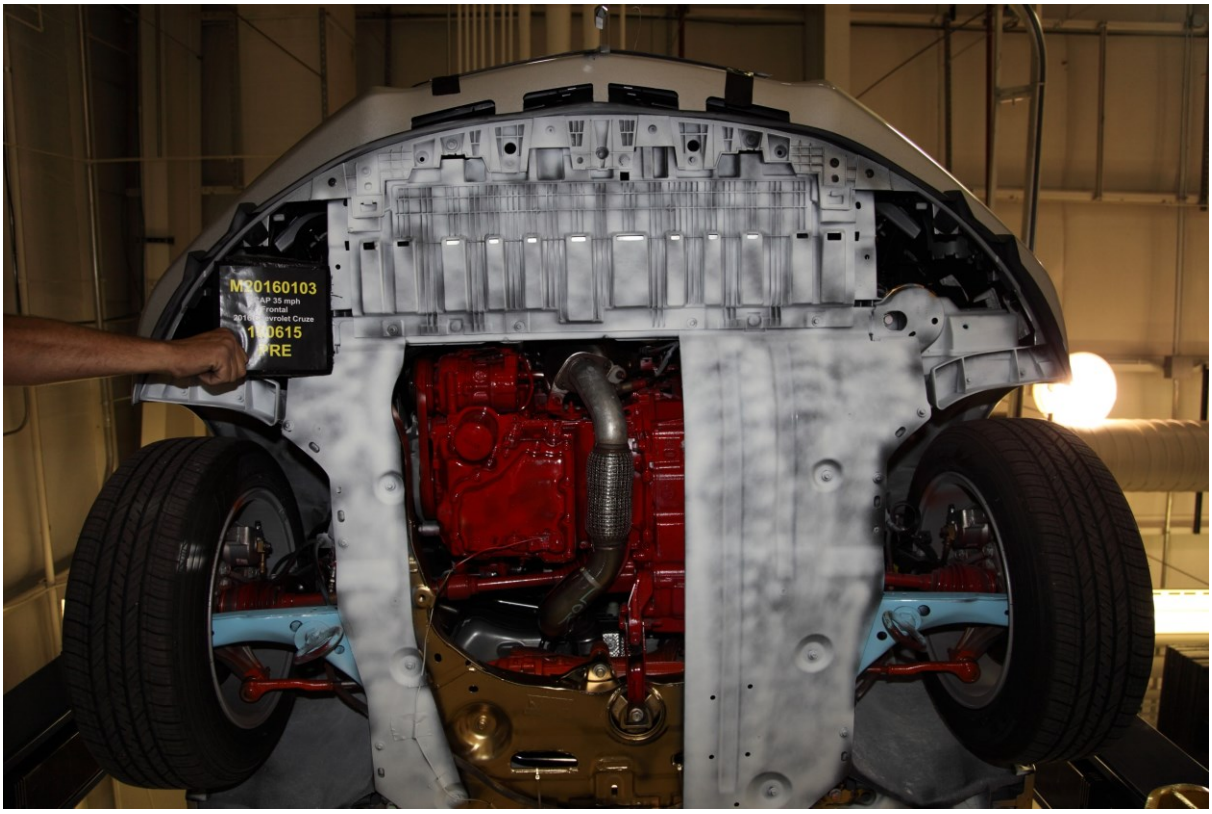
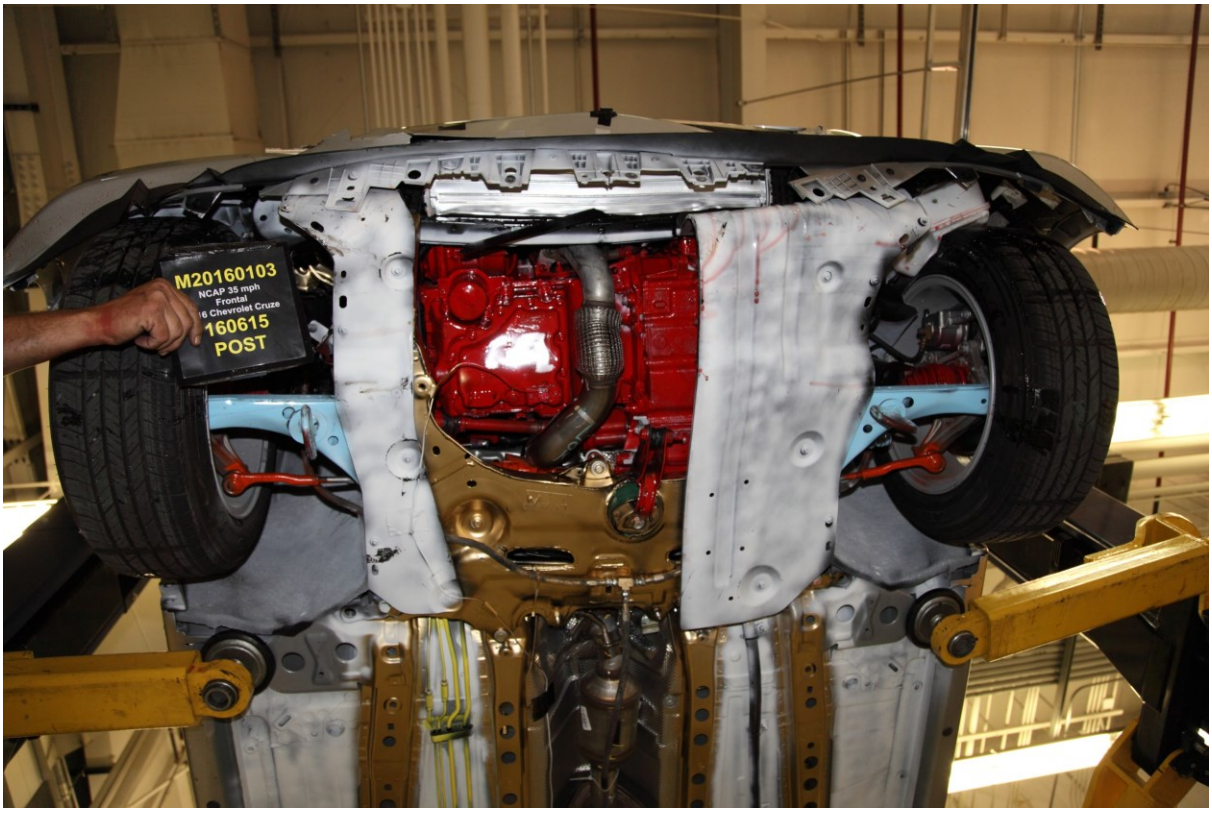
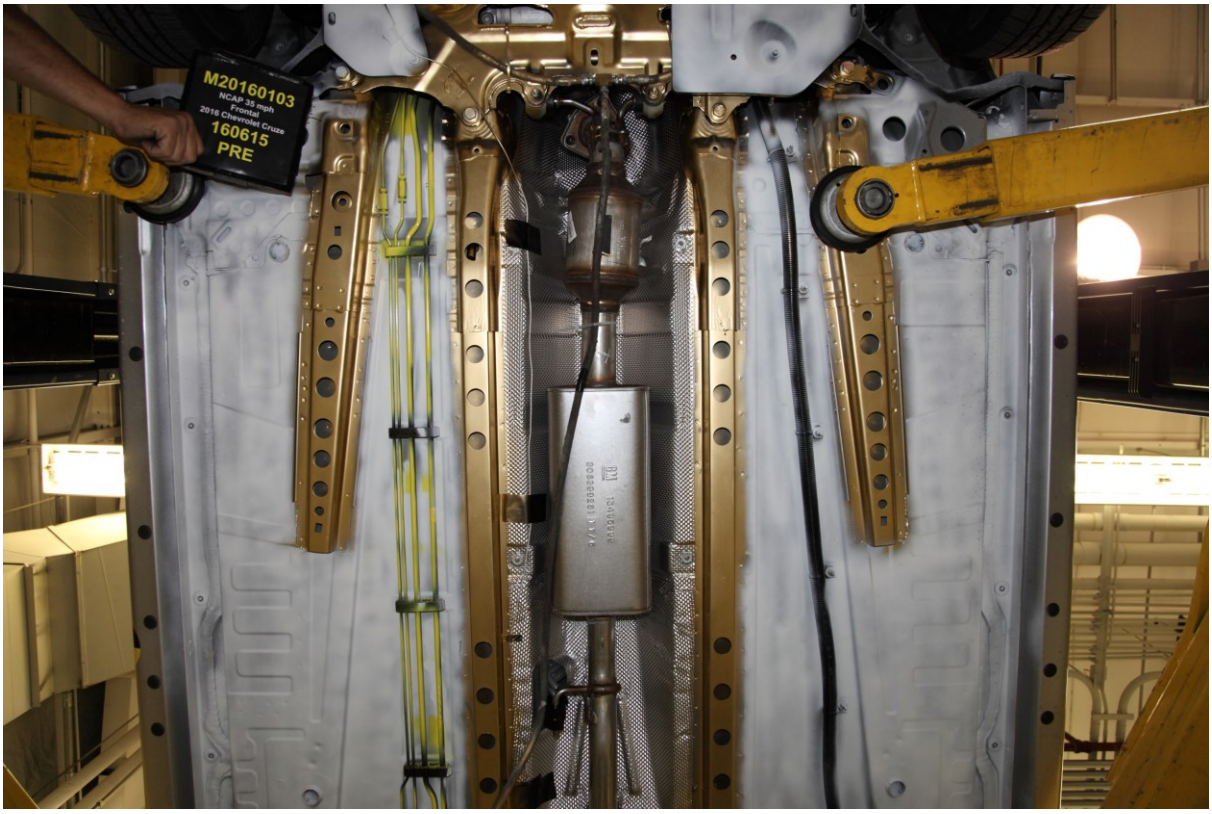


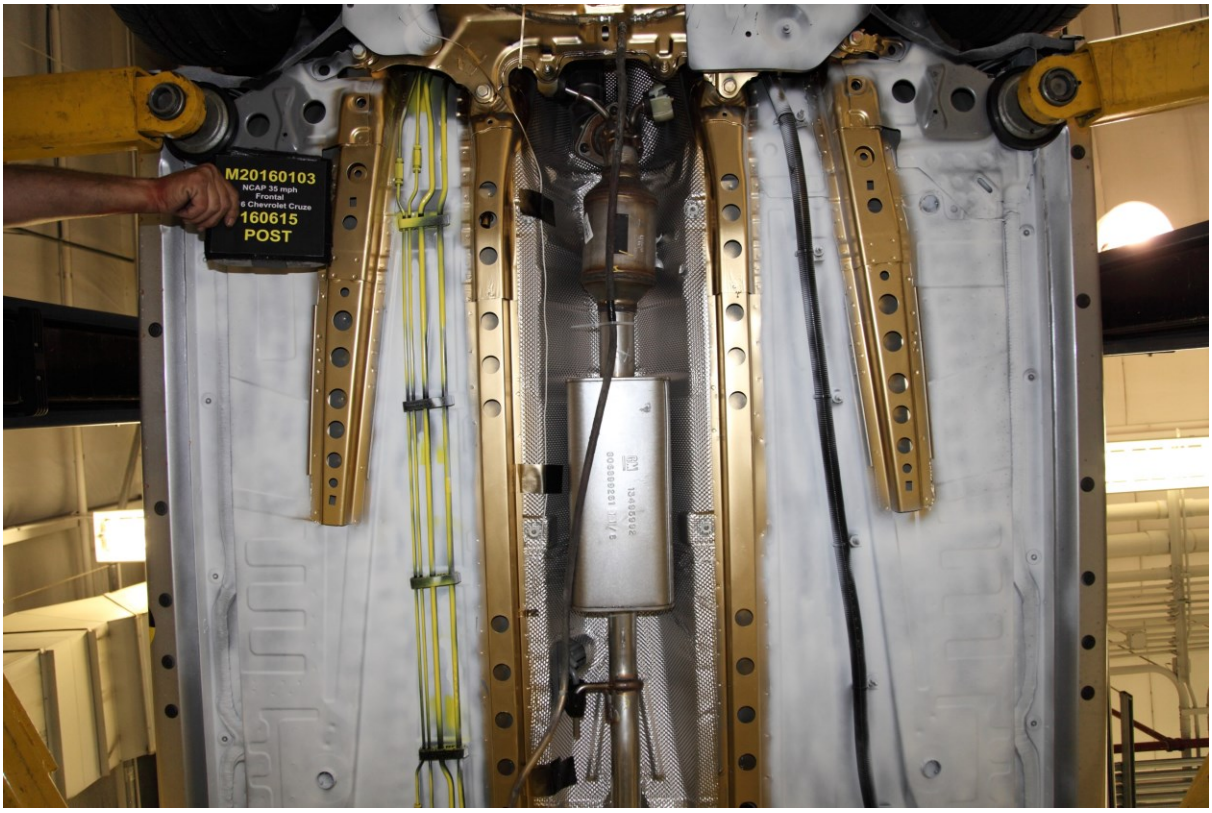
024 Pre-Test Front Underbody View



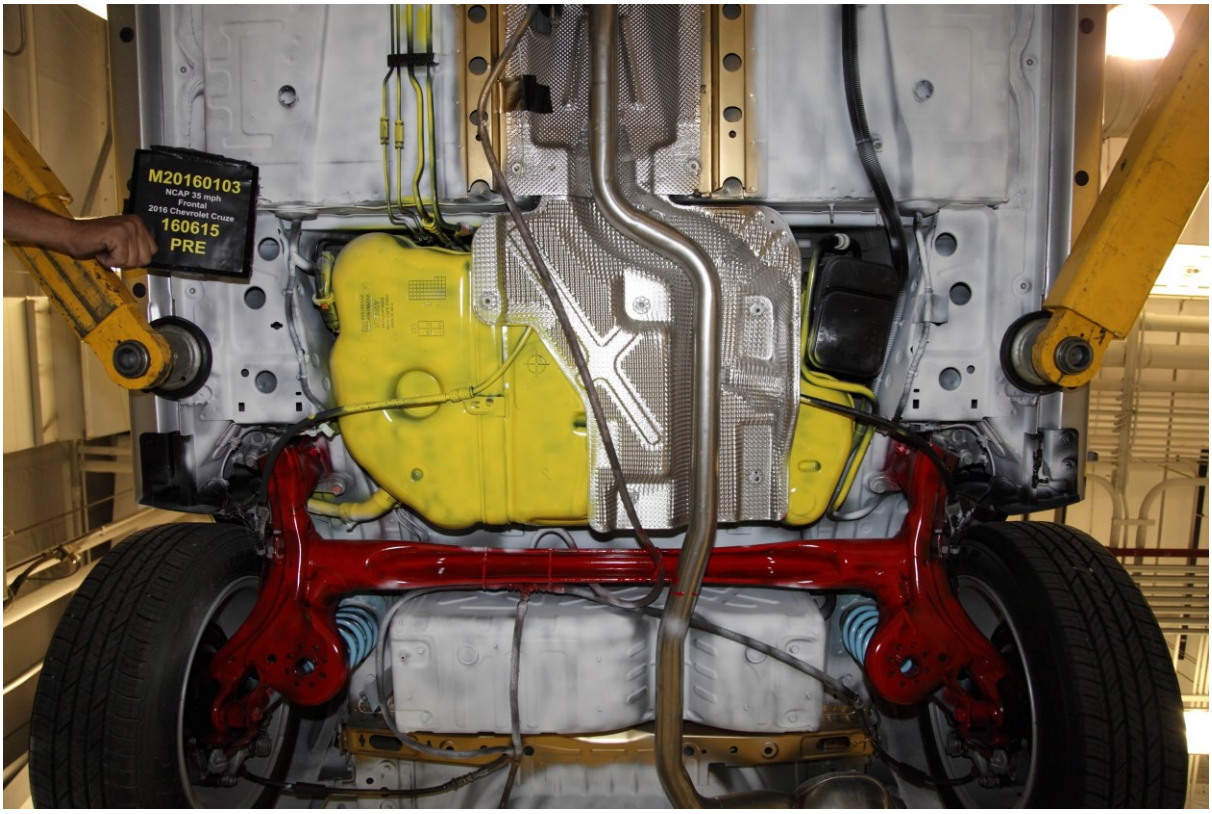
025 Post-Test Front Underbody View



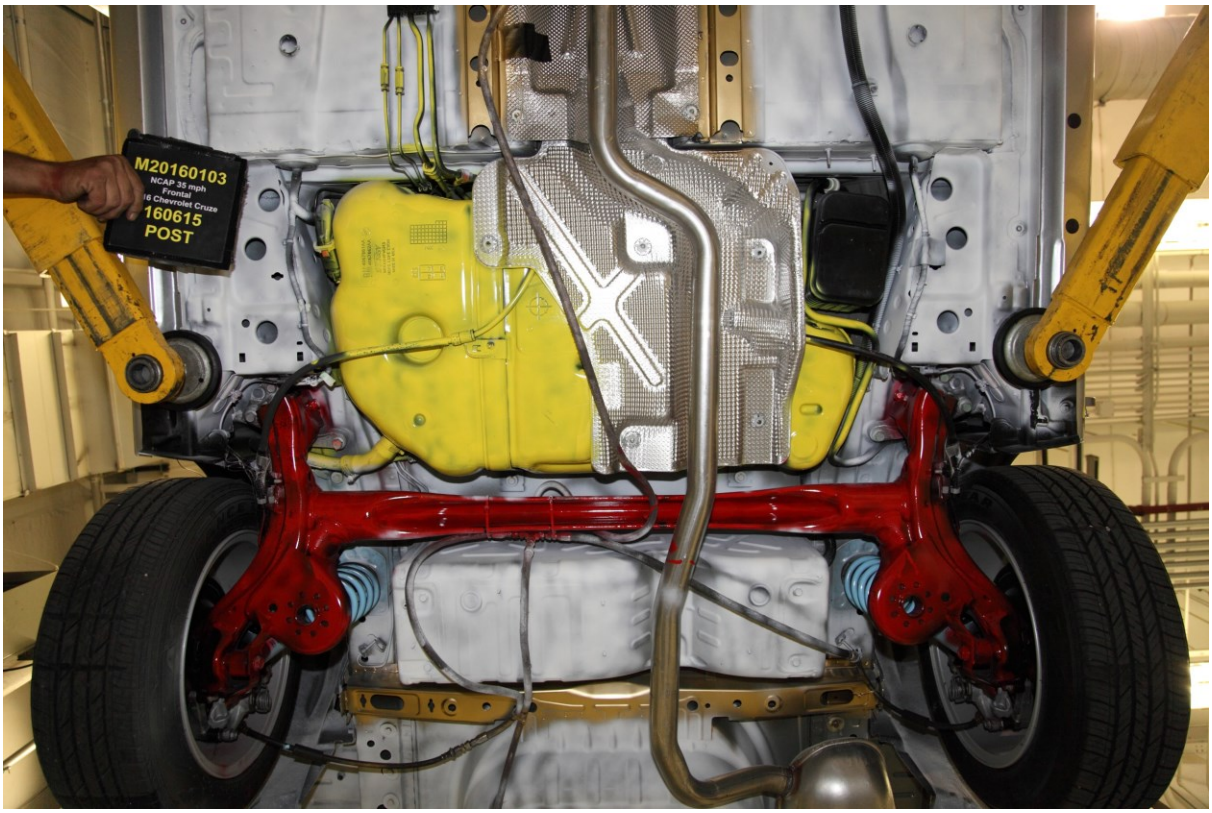
025a Pre-Test Mid Front Underbody View



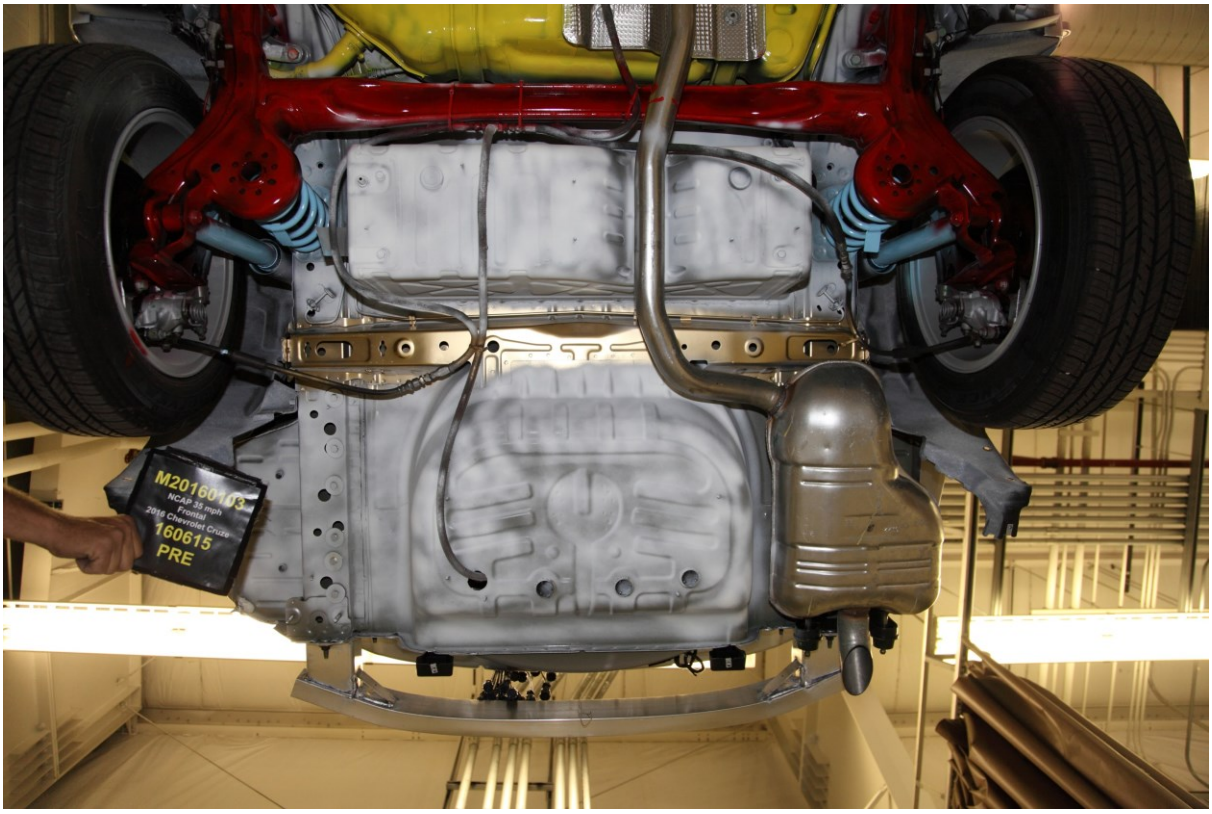
025b Post-Test Mid Front Underbody View



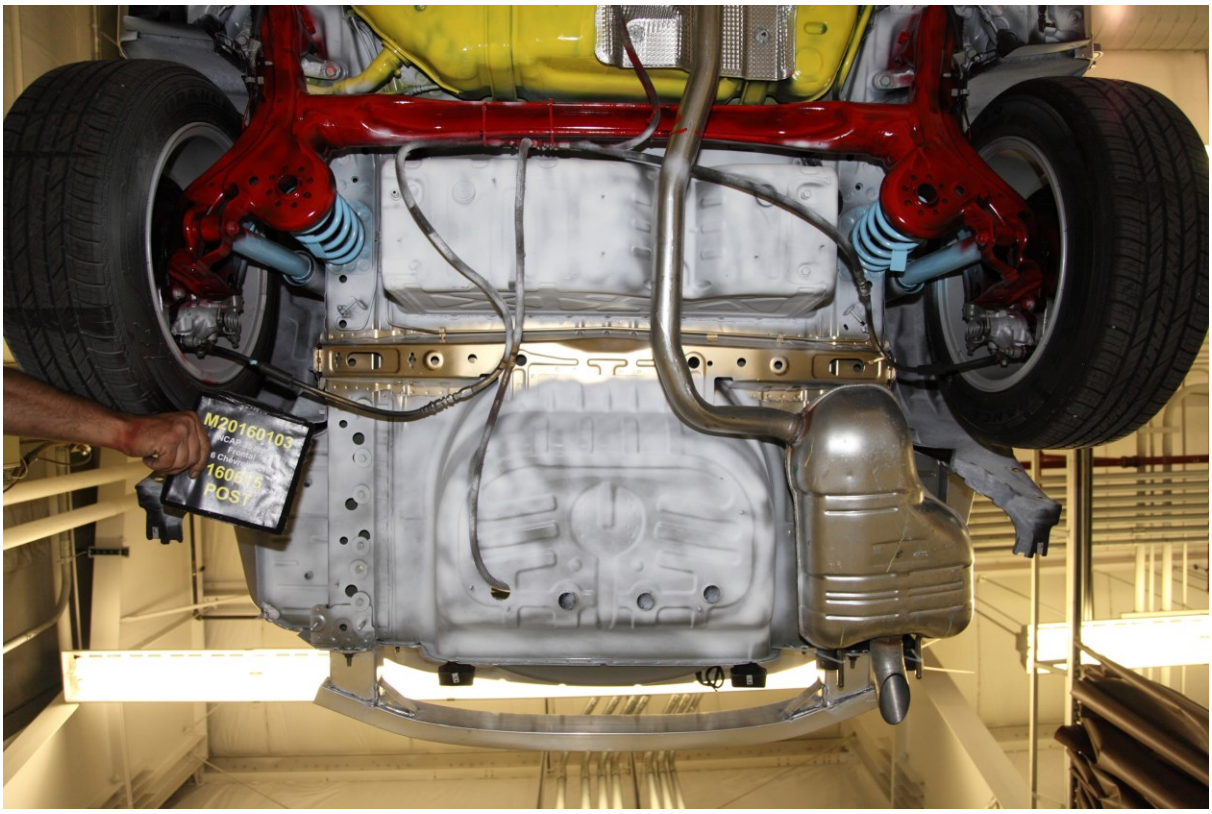
025c Pre-Test Mid Rear Underbody View



025d Post-Test Mid Rear Underbody View



026 Pre-Test Rear Underbody View

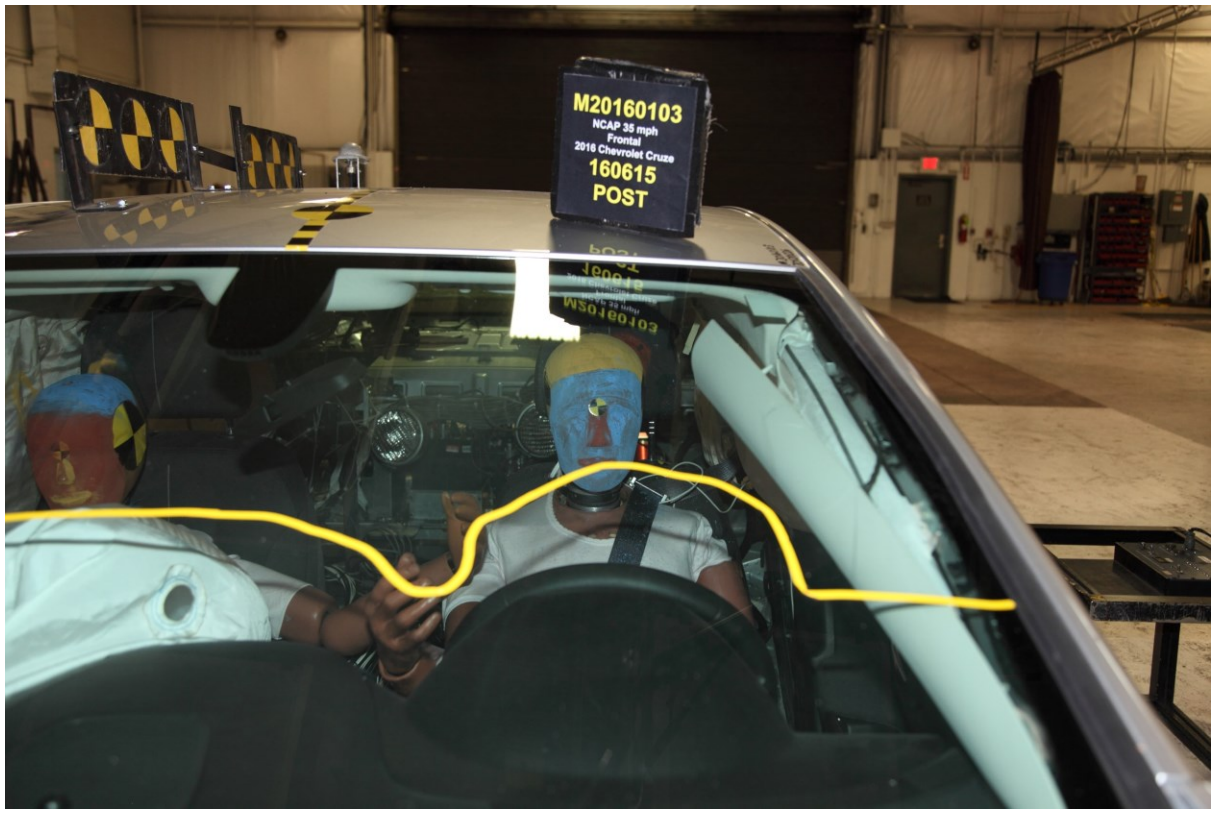


027 Post-Test Rear Underbody View

028 Pre-Test Dummy Cable Routing

029 Post-Test Dummy Cable Routing

030 Pre-Test Driver Dummy Front View



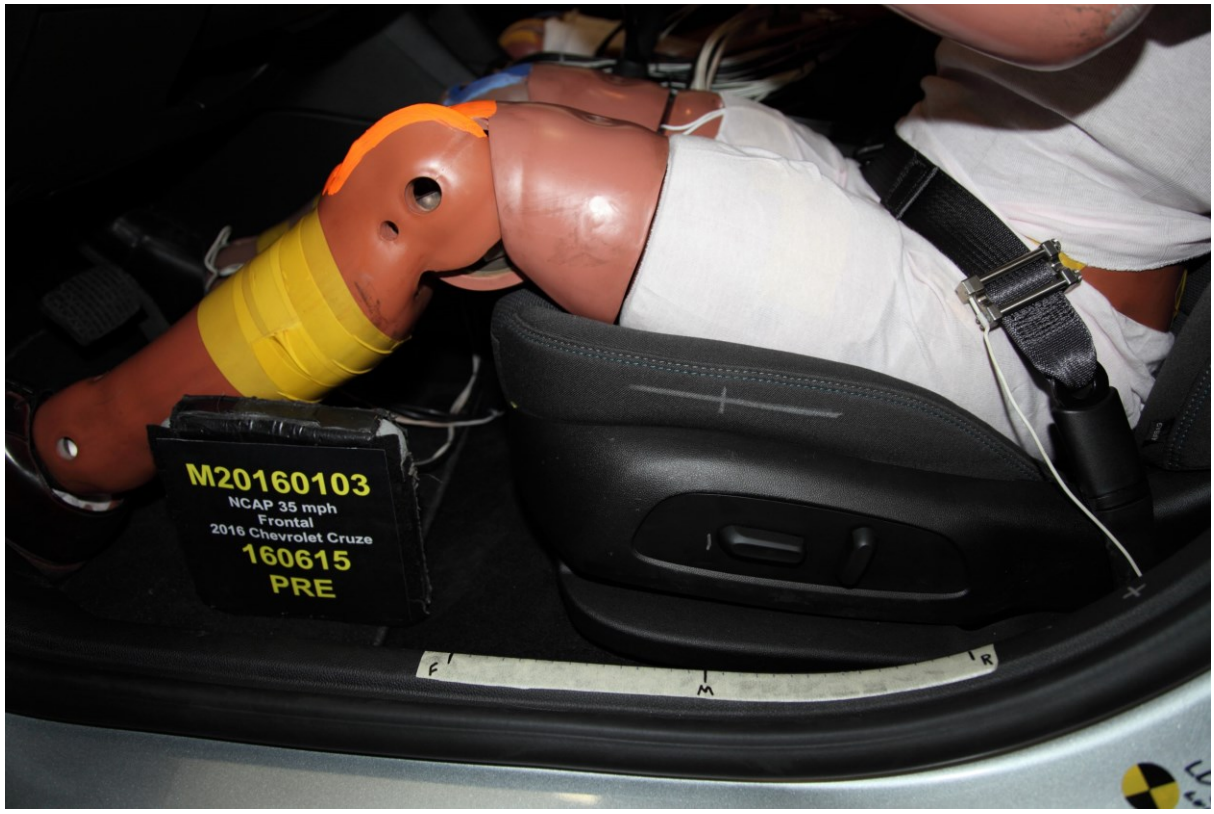
031 Post-Test Driver Dummy Front View

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

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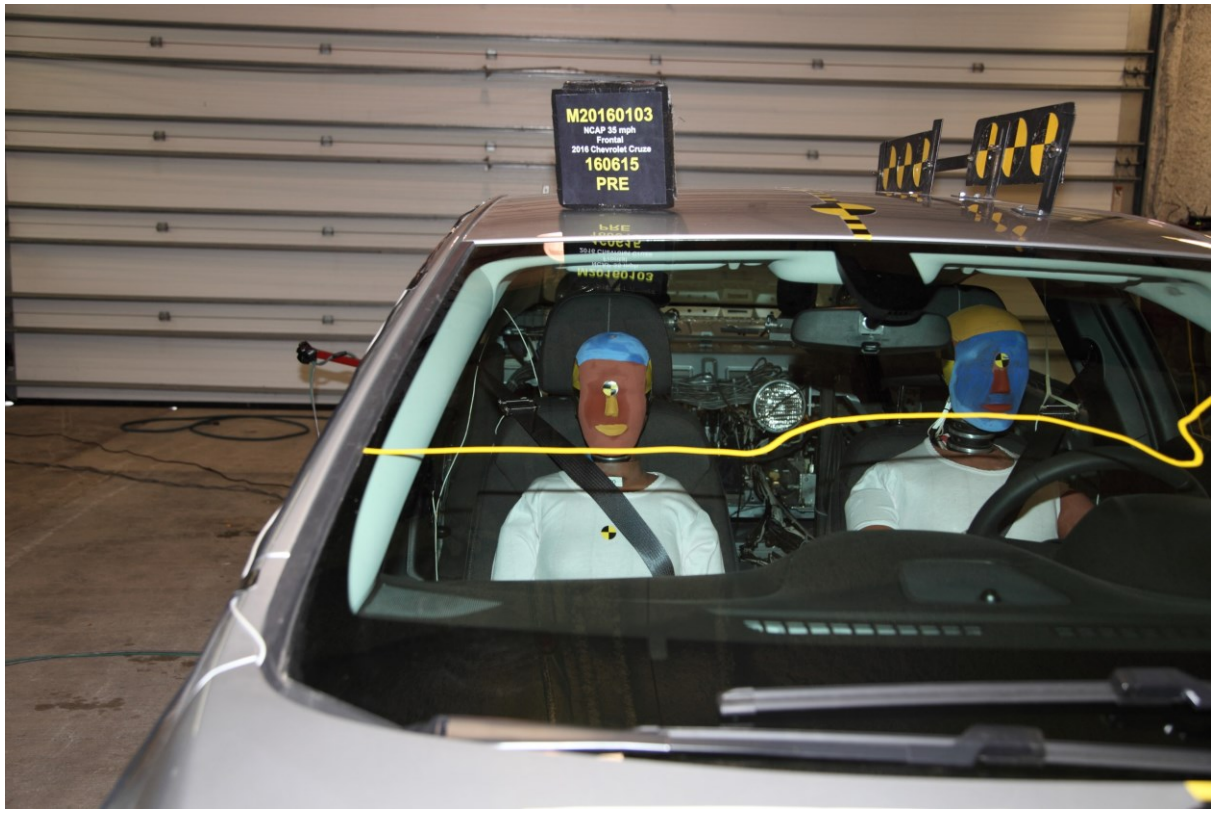
049 Pre-Test View of the Steering Wheel

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

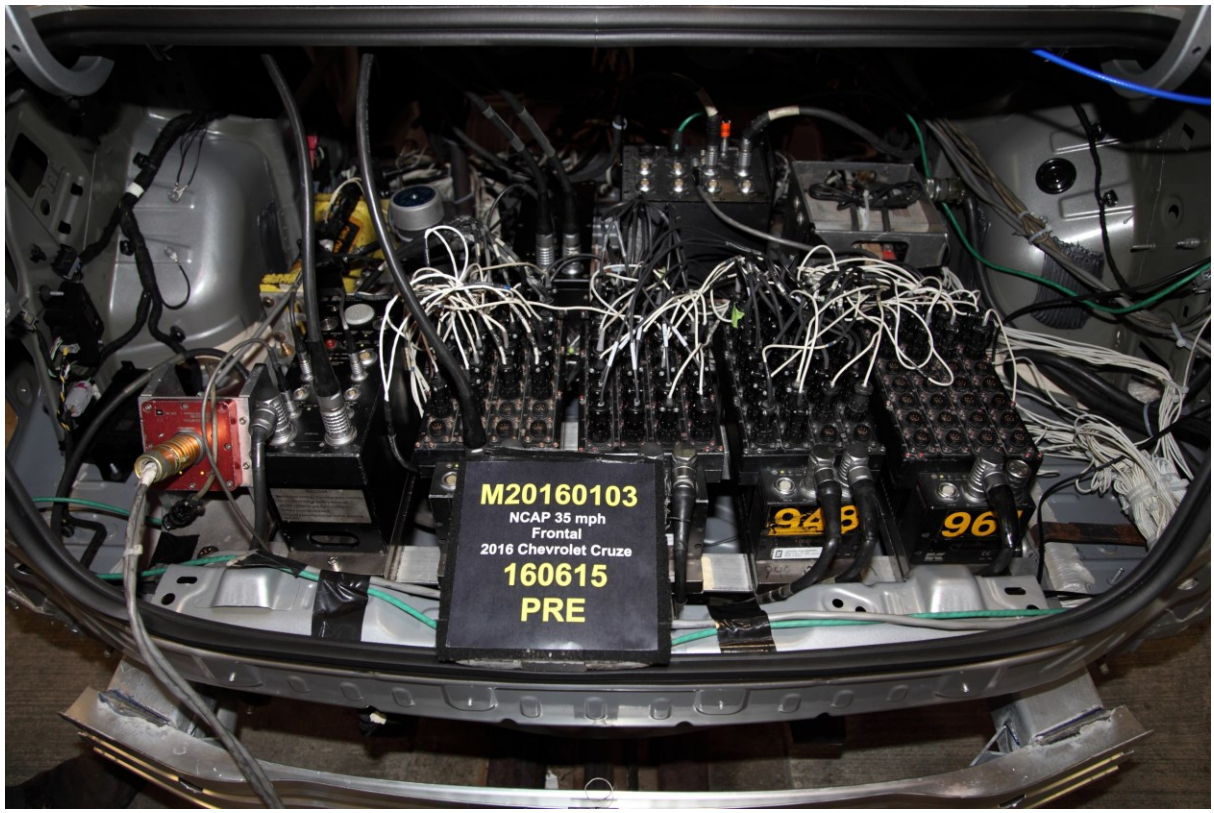
065 Pre-Test Passenger's Side Floorpan

066 Post-Test Passenger's Side Floorpan

067 Post-Test Passenger Dummy Face

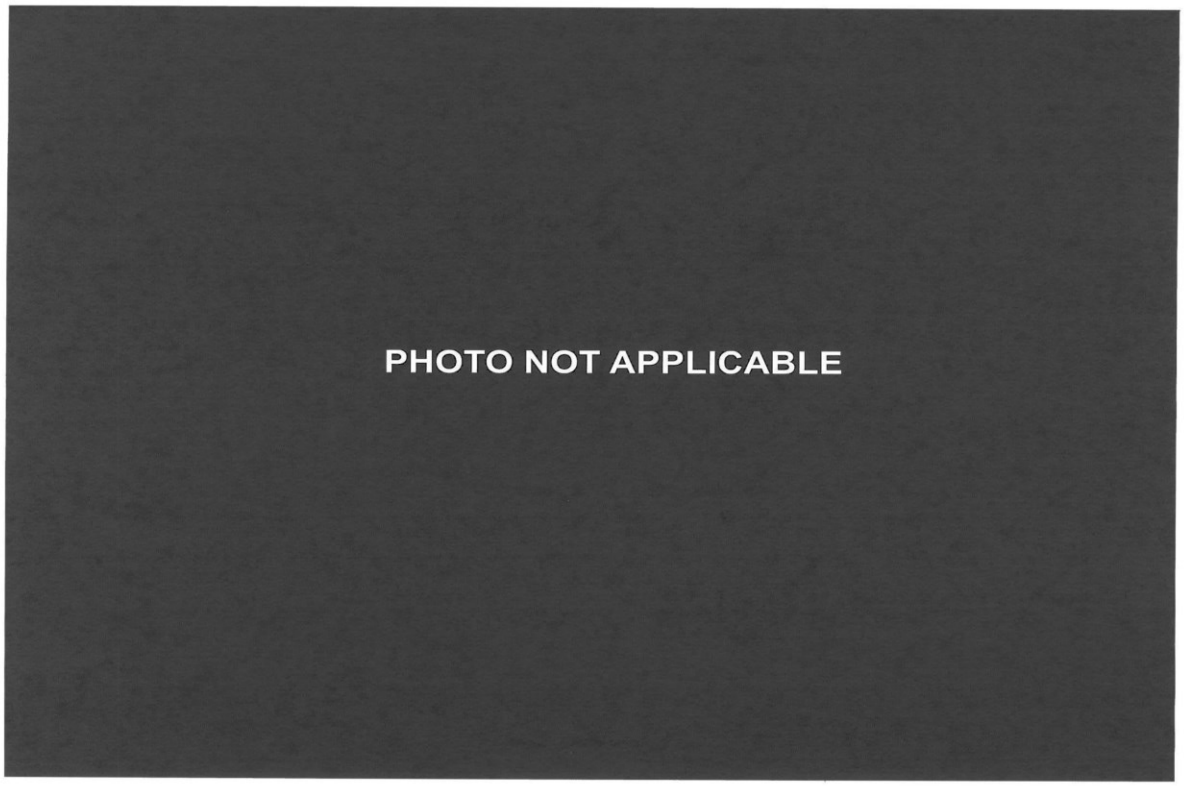
068 Post-Test Passenger Dummy Contact With Airbag

069 Post Test Passenger Dummy Contact With Headrest

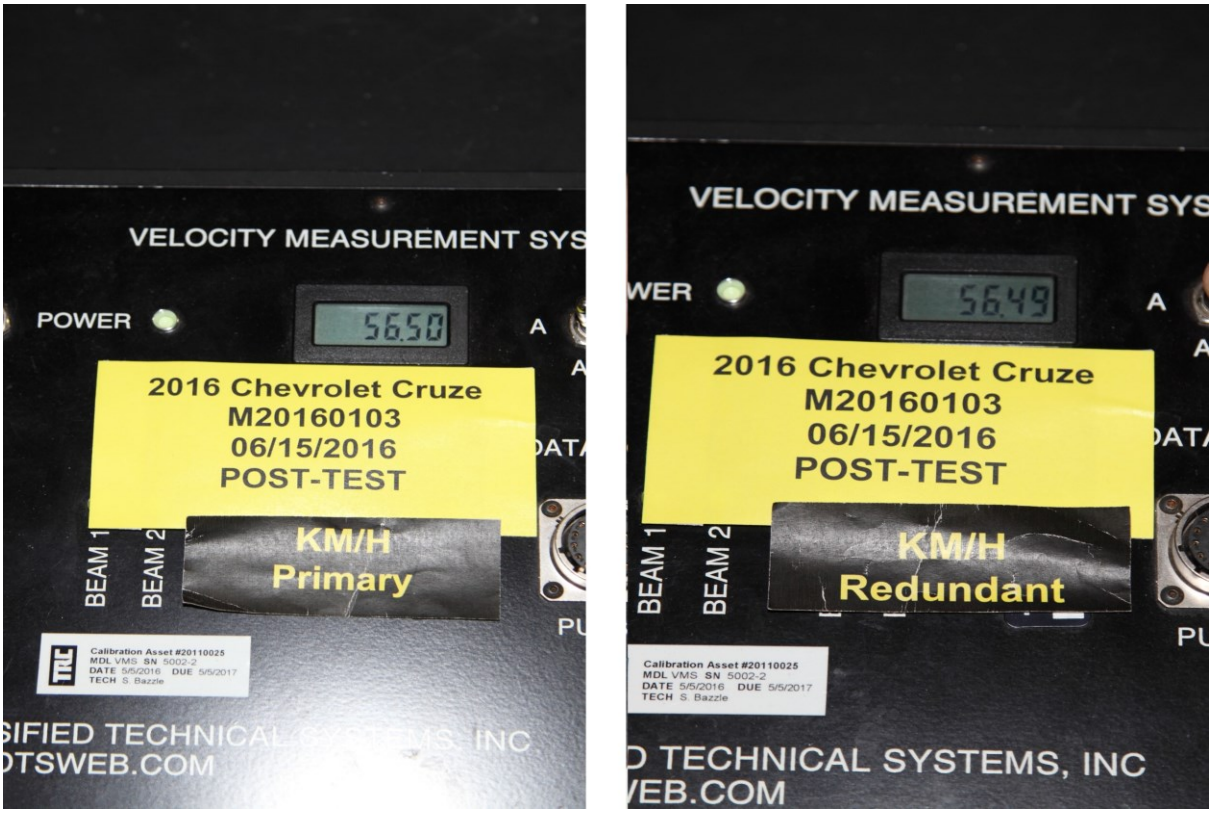


070 Photograph of Ballast Installed in Vehicle View 1

070a Photograph of Ballast Installed in Vehicle View 2



071 Post-Test Stoddard Solvent Spillage Location View



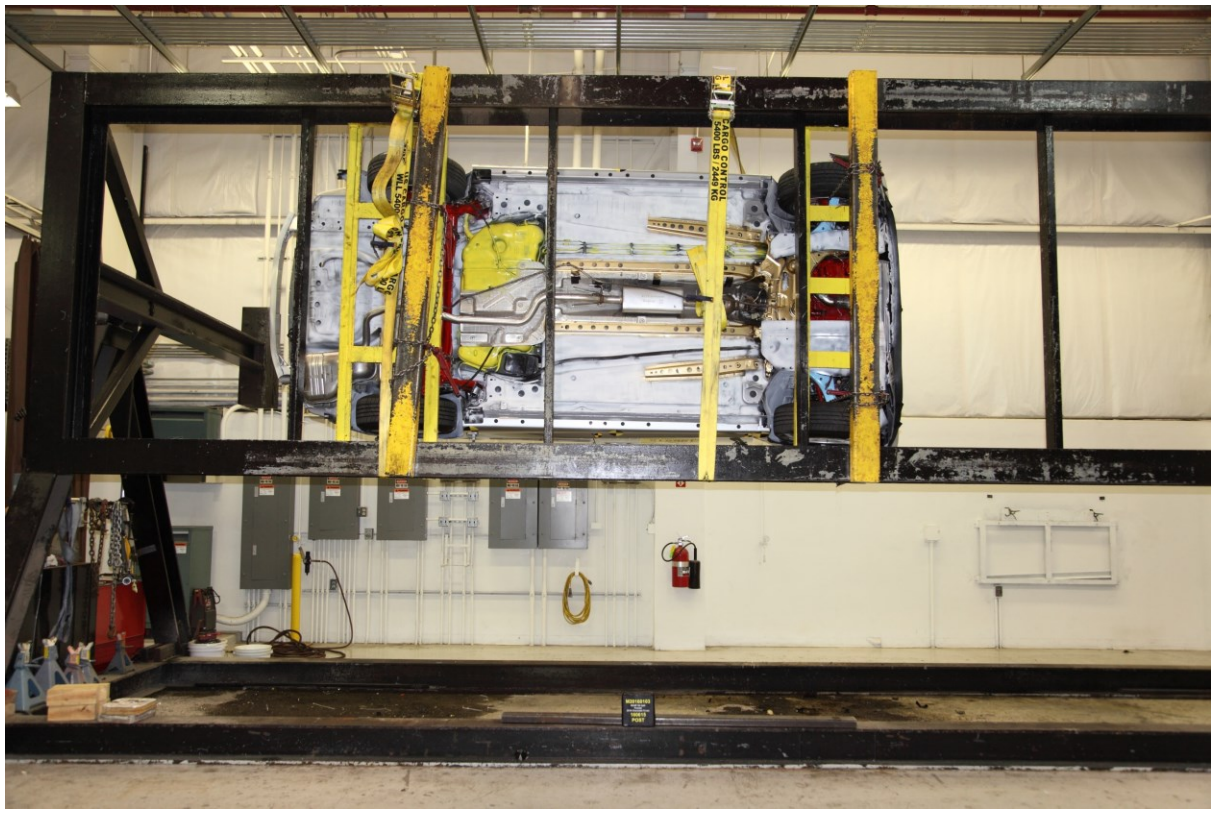
072 Post-Test Speed Trap Readout

Intentionally Left Blank

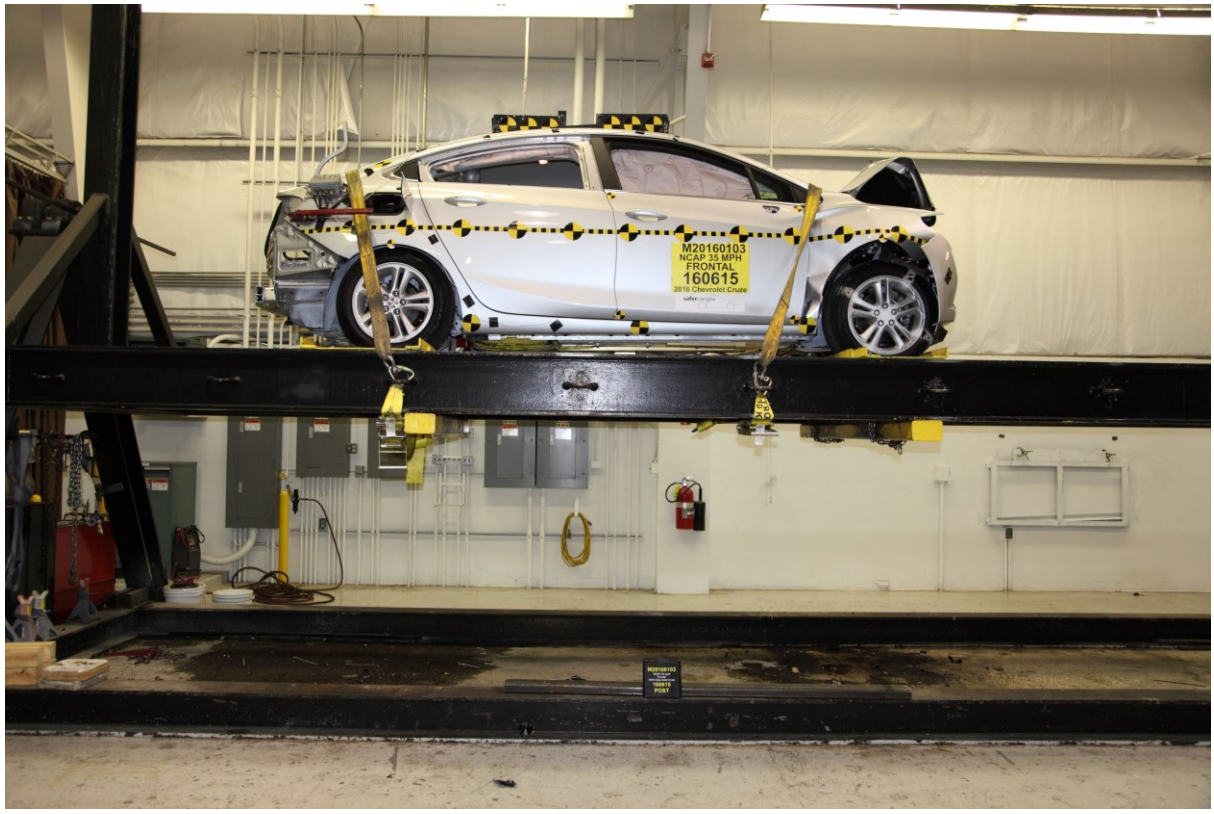
073 Vehicle at 0º on Static Rollover Device

074 Vehicle at 90º on Static Rollover Device

075 Vehicle at 180º on Static Rollover Device

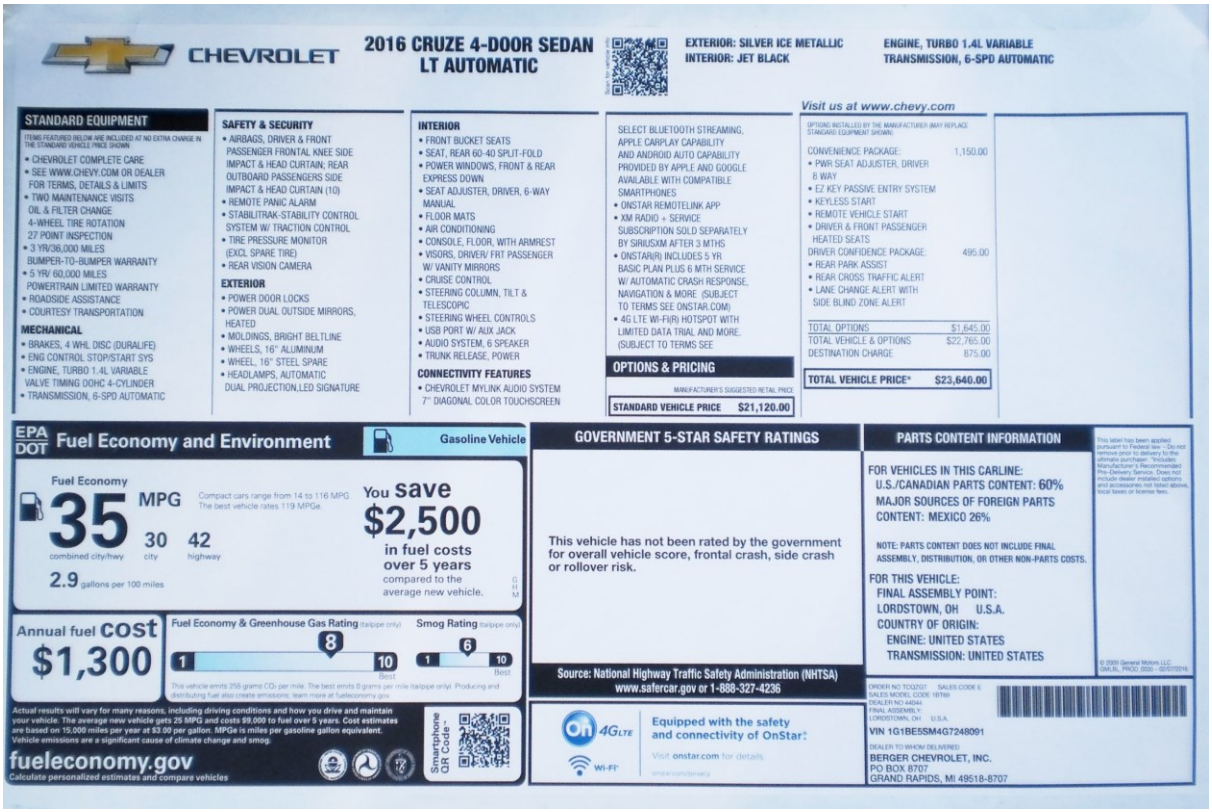


076 Vehicle at 270º on Static Rollover Device



077 Vehicle at 360º on Static Rollover Device

078 2016 Chevrolet Cruze Frontal Impact Event



079 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

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

Driver Head Acceleration X Redundant
Driver Head Acceleration Y Redundant
Driver Head Acceleration Z Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X 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: 06/15/2016

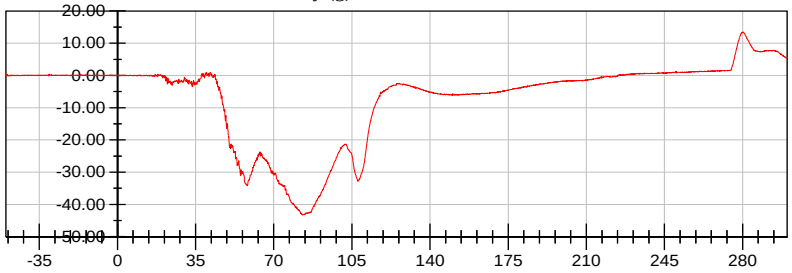
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

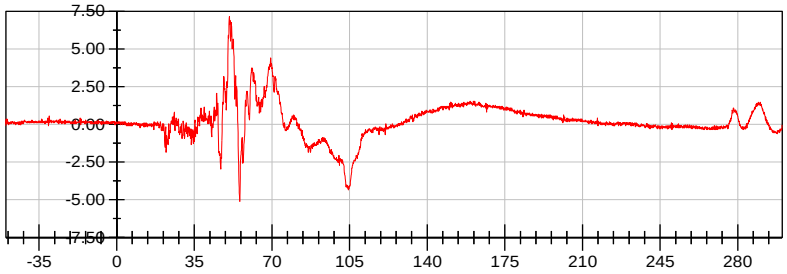
13.45 g at 280.16 ms

<Min>

-43.27 g at 82.72 ms

CFC_1000

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



<Max>

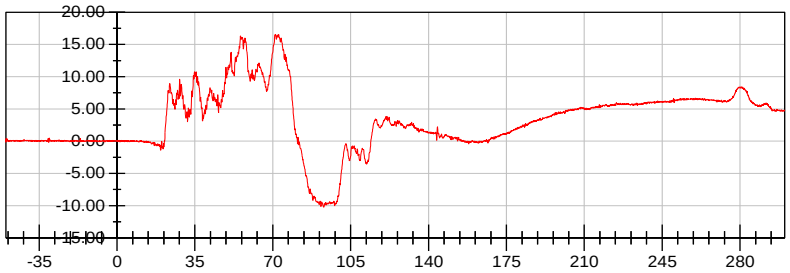
7.17 g at 50.80 ms

<Min>

-5.13 g at 55.44 ms

CFC_1000

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



<Max>

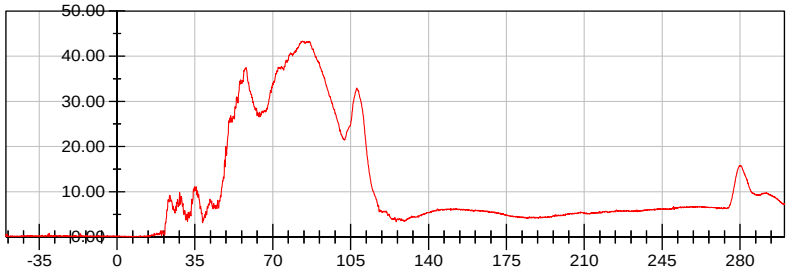
16.51 g at 70.96 ms

<Min>

-10.26 g at 92.88 ms

CFC_1000

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



<Max>

43.31 g at 83.44 ms

<Min>

0.04 g at -43.28 ms

CFC_1000

NHTSA

Test Date: 06/15/2016

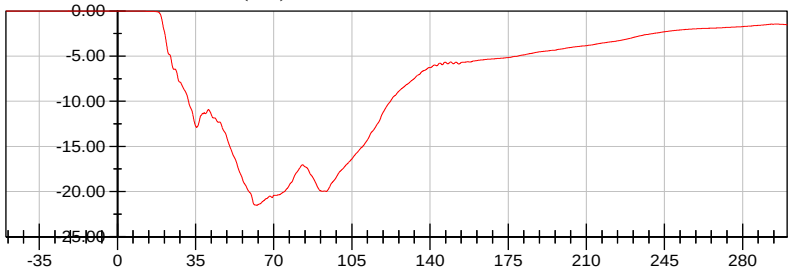
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

0.00 mm at -21.76 ms

<Min>

-21.52 mm at 62.48 ms

CFC_600

NHTSA

Test Date: 06/15/2016

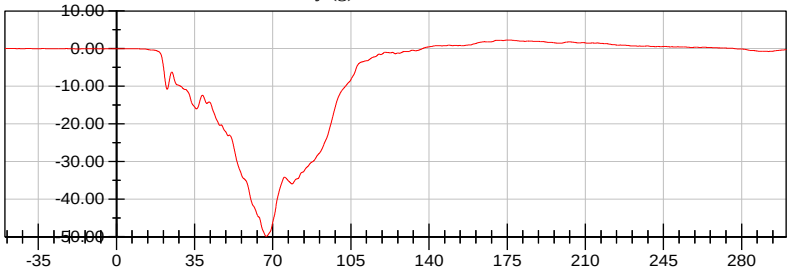
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

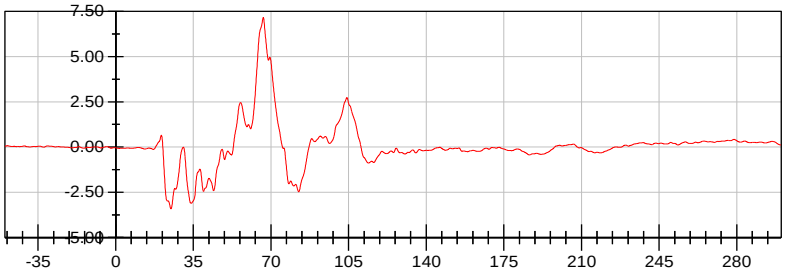
2.27 g at 175.12 ms

<Min>

-49.91 g at 67.04 ms

CFC_180

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



<Max>

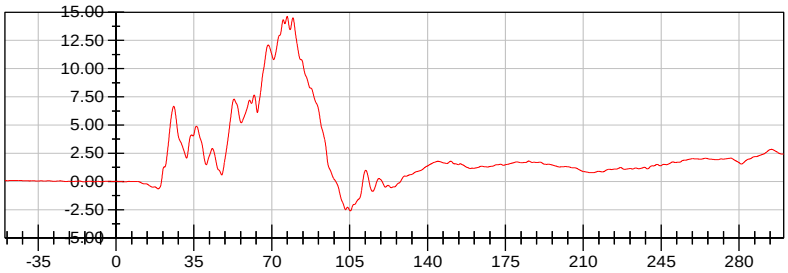
7.17 g at 66.56 ms

<Min>

-3.41 g at 24.96 ms

CFC_180

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



<Max>

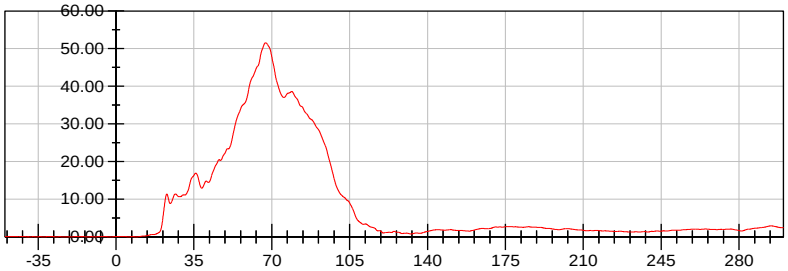
14.62 g at 76.88 ms

<Min>

-2.60 g at 105.28 ms

CFC_180

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



<Max>

51.54 g at 67.12 ms

<Min>

0.01 g at -22.16 ms

CFC_180

NHTSA

Test Date: 06/15/2016

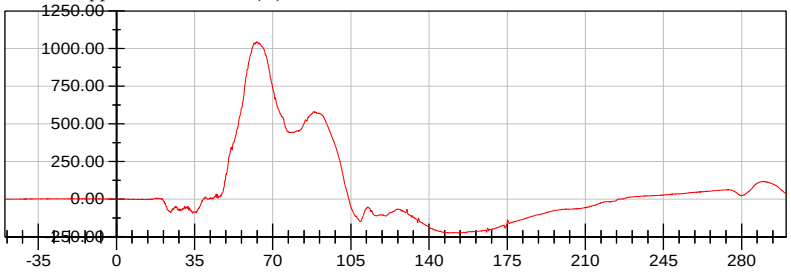
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

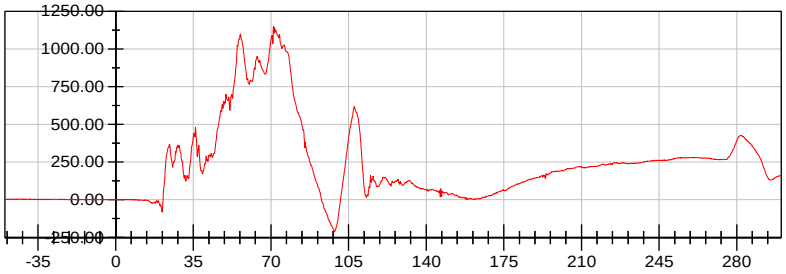
1,046.04 N at 62.88 ms

<Min>

-224.91 N at 148.56 ms

CFC_1000

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



<Max>

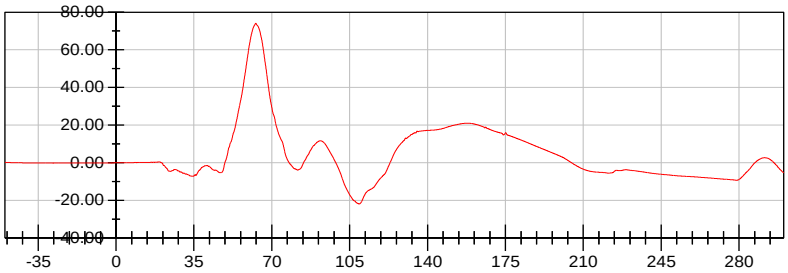
1,150.48 N at 71.12 ms

<Min>

-209.72 N at 98.56 ms

CFC_1000

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



<Max>

74.14 Nm at 62.80 ms

<Min>

-21.98 Nm at 109.28 ms

CFC_600

2016 Chevrolet Cruze NCAP 35 mph Frontal Impact

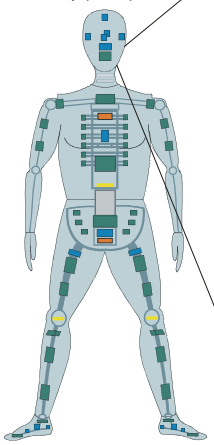
Neck Injury Predictor (NIJ)

Date: 06/15/2016
Time: 16:50

Customer: NHTSA
Test Number: M20160103

TRC Inc. Test Lab: CTF
Test Number: 160615

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

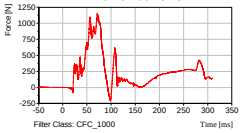


Dummy:HIII 50th Male
Seating Position:
Driver

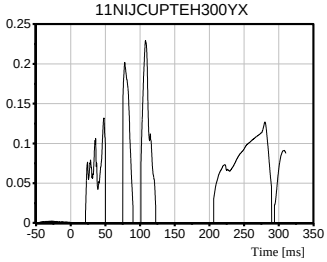
NIJ Source Code: (Fz/Fzc)+(My/Myc)

11TMONUP00H3MOYX

11NECKUP00H3FOZA

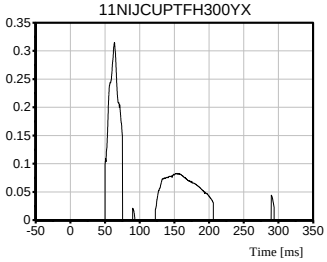


11NIJCUPTEH300YX



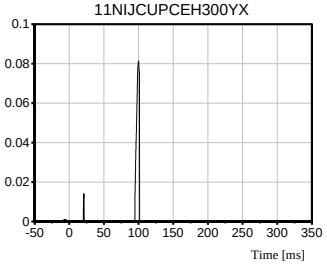
Max [NTE] 0.2294 at 107.76 ms

11NIJCUPTFH300YX



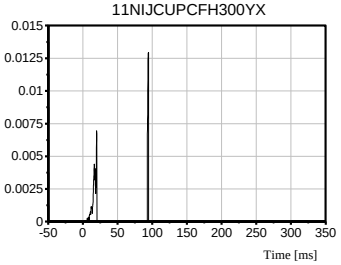
Max [NTF] 0.3148 at 63.68 ms

11NIJCUPCEH300YX



Max [NCE] 0.0813 at 99.92 ms

11NIJCUPCFH300YX



Max [NCF] 0.0129 at 94.72 ms

NHTSA

Test Date: 06/15/2016

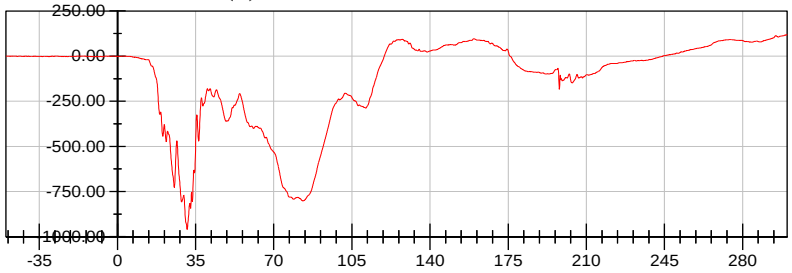
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

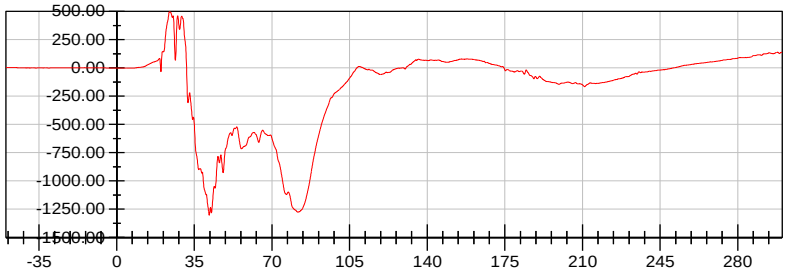
118.65 N at 299.84 ms

<Min>

-960.02 N at 31.20 ms

CFC_600

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



<Max>

497.57 N at 23.76 ms

<Min>

-1,303.86 N at 41.76 ms

CFC_600

NHTSA

Test Date: 06/15/2016

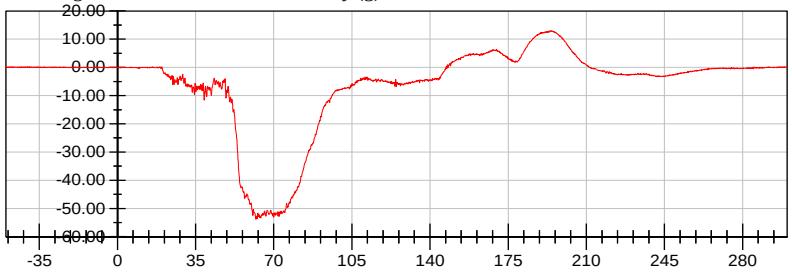
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

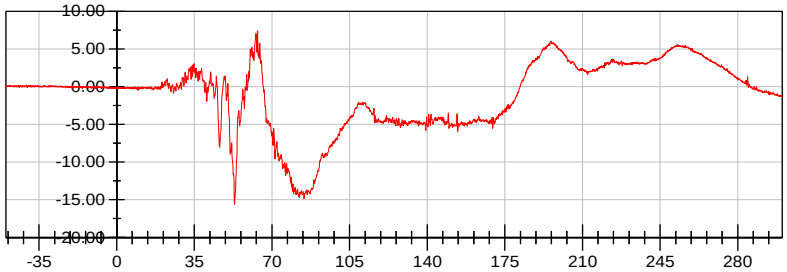
13.00 g at 193.76 ms

<Min>

-53.85 g at 62.00 ms

CFC_1000

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



<Max>

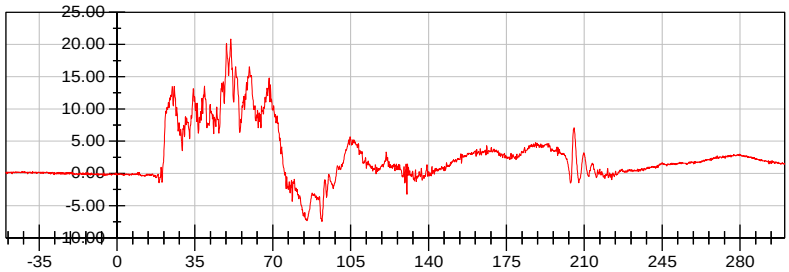
7.41 g at 63.52 ms

<Min>

-15.60 g at 53.12 ms

CFC_1000

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



<Max>

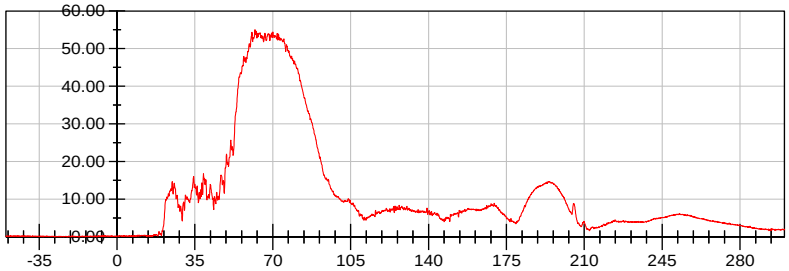
20.82 g at 51.12 ms

<Min>

-7.46 g at 92.08 ms

CFC_1000

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



<Max>

55.00 g at 62.00 ms

<Min>

0.03 g at -28.16 ms

CFC_1000

NHTSA

Test Date: 06/15/2016

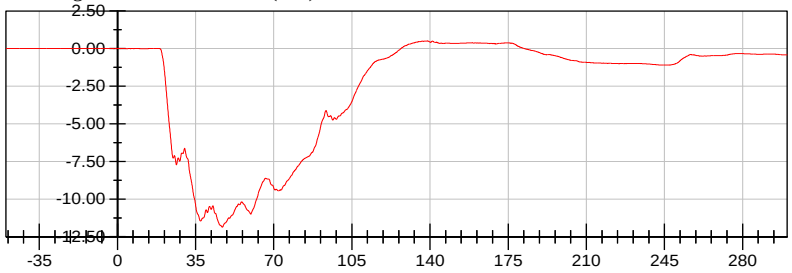
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

0.51 mm at 138.88 ms

<Min>

-11.87 mm at 46.96 ms

CFC_600

NHTSA

Test Date: 06/15/2016

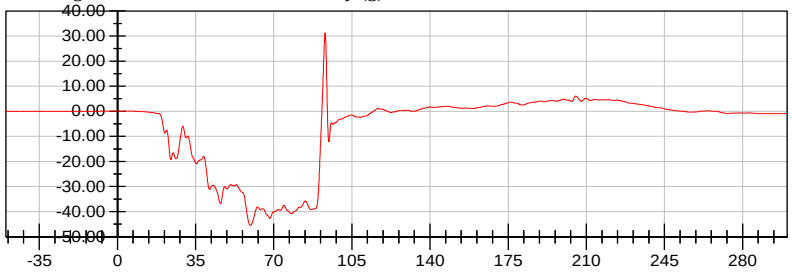
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

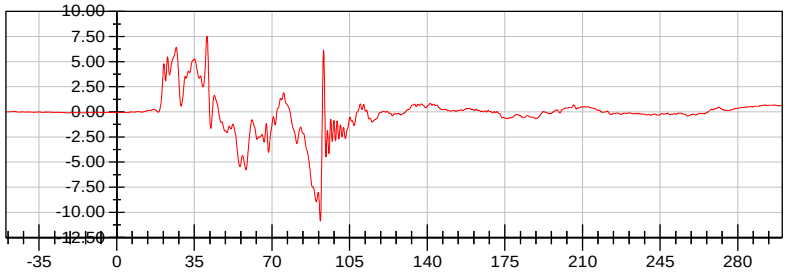
31.19 g at 93.04 ms

<Min>

-45.47 g at 59.52 ms

CFC_180

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



<Max>

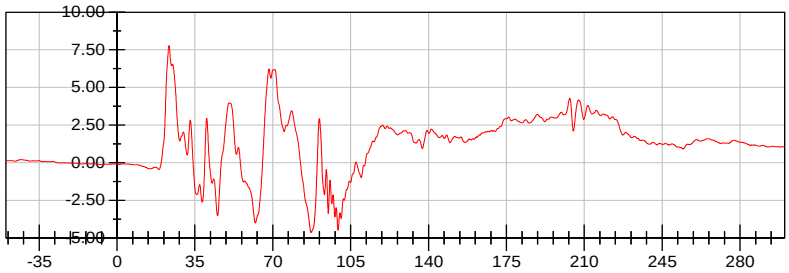
7.53 g at 40.72 ms

<Min>

-10.87 g at 91.84 ms

CFC_180

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



<Max>

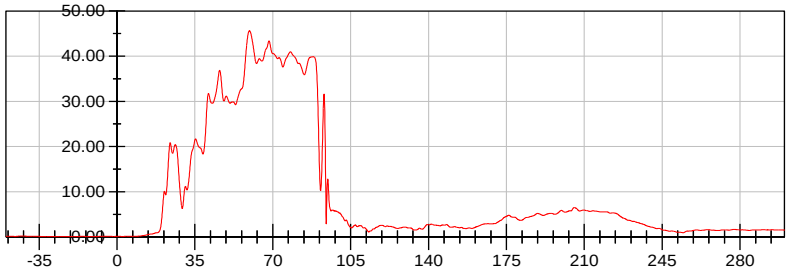
7.78 g at 23.36 ms

<Min>

-4.64 g at 87.20 ms

CFC_180

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



<Max>

45.62 g at 59.52 ms

<Min>

0.06 g at -27.52 ms

CFC_180

NHTSA

Test Date: 06/15/2016

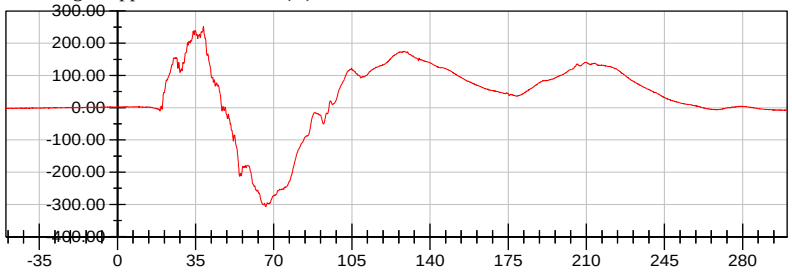
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

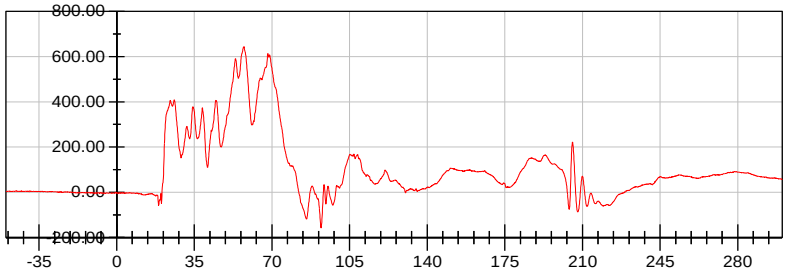
252.09 N at 38.48 ms

<Min>

-306.32 N at 66.48 ms

CFC_1000

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



<Max>

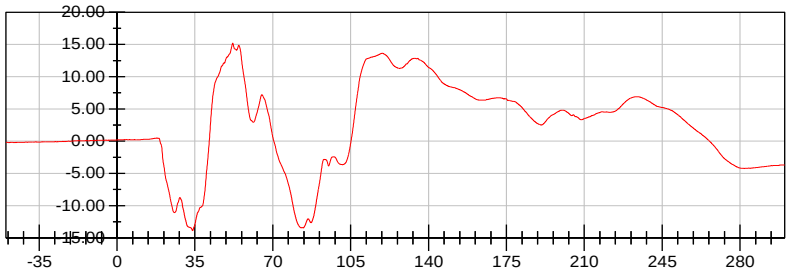
643.93 N at 57.44 ms

<Min>

-158.28 N at 92.08 ms

CFC_1000

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



<Max>

15.19 Nm at 52.00 ms

<Min>

-13.86 Nm at 34.00 ms

CFC_600

2016 Chevrolet Cruze NCAP 35 mph Frontal Impact

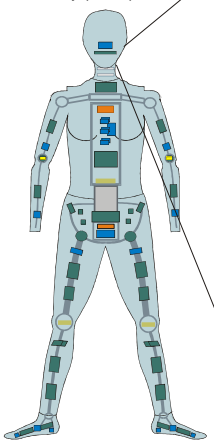
Neck Injury Predictor (NIJ)

Date: 06/15/2016
Time: 16:50

Customer: NHTSA
Test Number: M20160103

TRC Inc. Test Lab: CTF
Test Number: 160615

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



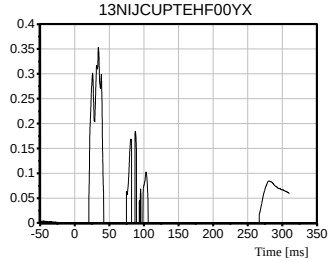
Dummy:HIII 5th Female
Seating Position:
Right Front Passenger

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

13TMONUP00HFMOYX

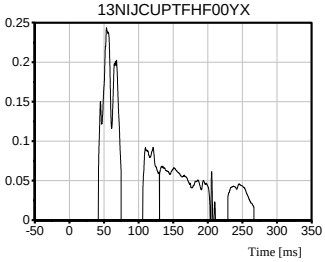
13NECKUP00HFFOZA

13NIJCUPTEHF00YX



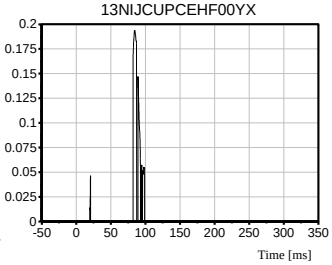
Max [NTE] 0.3530 at 34.16 ms

13NIJCUPTFHF00YX



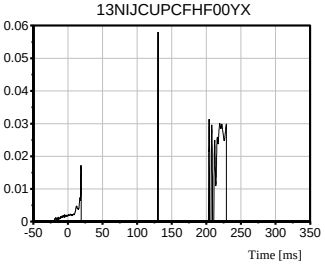
Max [NTF] 0.2437 at 53.68 ms

13NIJCUPCEHF00YX



Max [NCE] 0.1936 at 84.08 ms

13NIJCUPCFHF00YX



Max [NCF] 0.0579 at 130.24 ms

NHTSA

Test Date: 06/15/2016

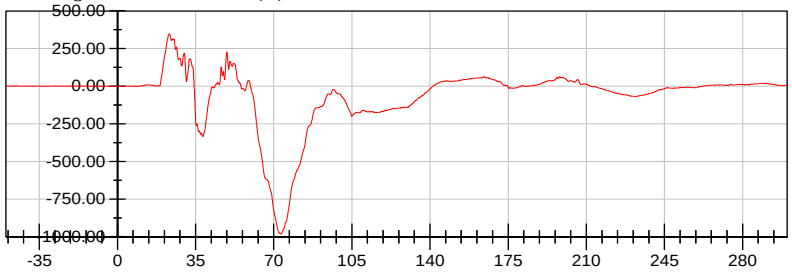
Test Lab: TRC Inc.

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

Test Number: 160615 (M20160103)

Position #2 Hybrid III Small Adult Female (70)

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



<Max>

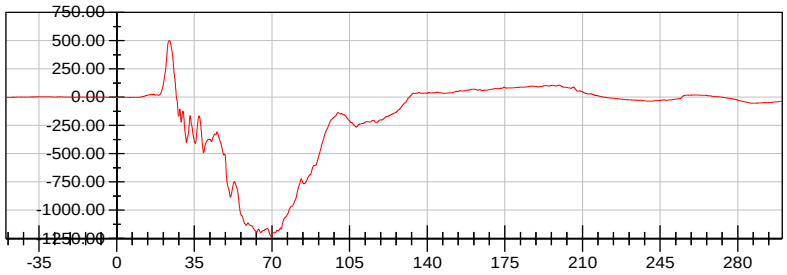
349.31 N at 23.28 ms

<Min>

-982.11 N at 73.20 ms

CFC_600

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



<Max>

501.25 N at 23.76 ms

<Min>

-1,230.20 N at 69.60 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. 36

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	516	Yes
C	H-Point Height	83.8 - 88.9	86	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	201	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:

Technician

Approved

Revised 8/10/12

Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	244.3 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-3.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

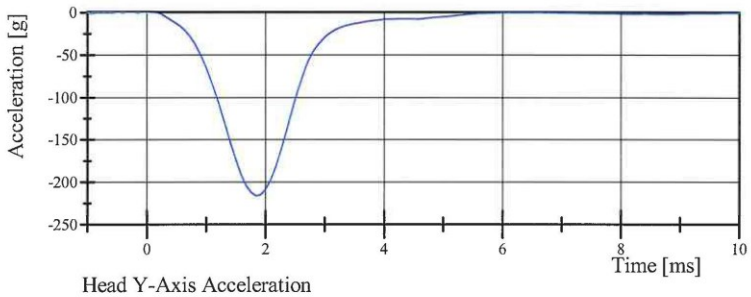
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 10:01:32 614

Transportation Research Center Inc.

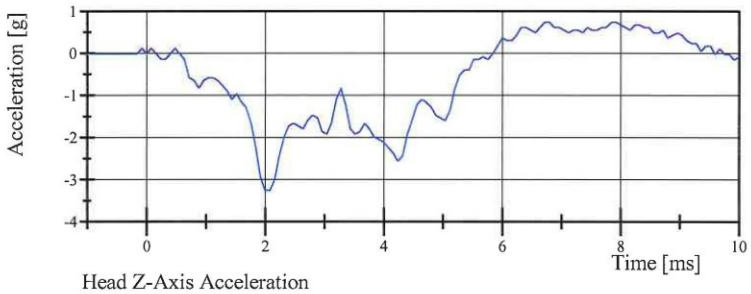
Front Head Drop
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/23/2016

Head X-Axis Acceleration



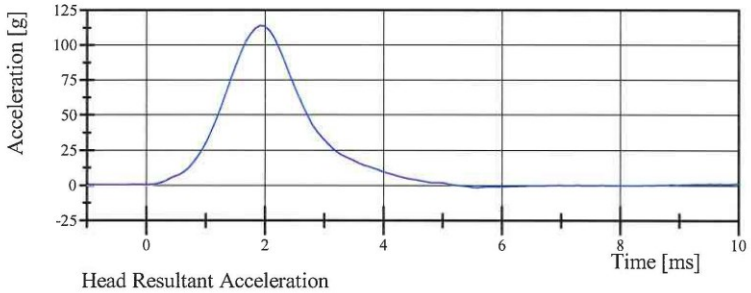
Filter Class: CFC_1000
Max: 0.0 g at -0.9 ms
Min: -217.1 g at 1.8 ms

Head Y-Axis Acceleration



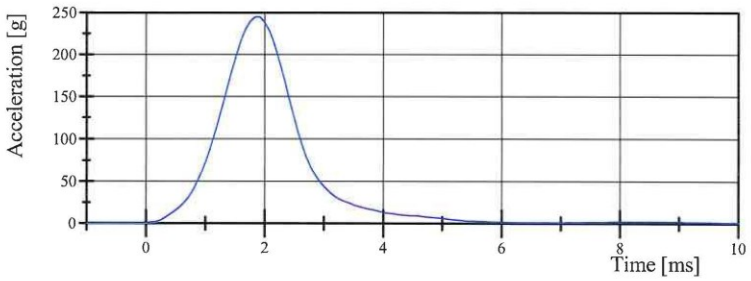
Filter Class: CFC_1000
Max: 0.7 g at 6.7 ms
Min: -3.3 g at 2.0 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 113.7 g at 1.9 ms
Min: -1.7 g at 5.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 244.3 g at 1.8 ms
Min: 0.0 g at 0.0 ms

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

05.23.2016 10:02:09 614

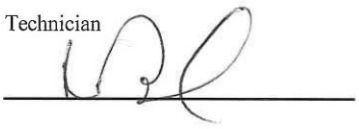
Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.955 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.4 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-24.68 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.28 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-14.95 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-14.95 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-67.1 °	Yes
Time of Peak	57 - 64 ms	59.4 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	119.5 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	102.0 N·m	Yes
Time of Peak	47 - 58 ms	51.4 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	100.2 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

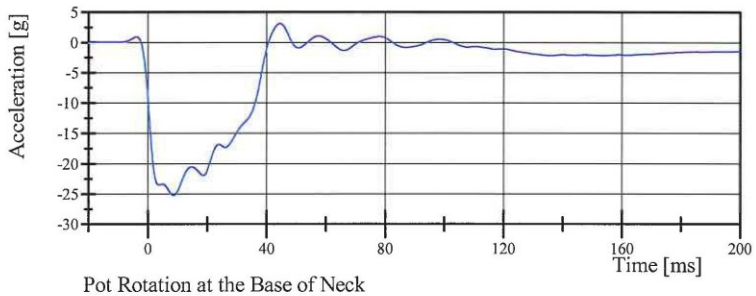
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 14:11:54 3038

Transportation Research Center Inc.

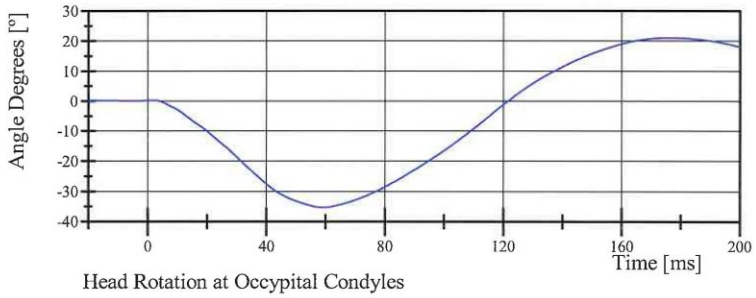
Neck Flexion
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Pendulum Acceleration



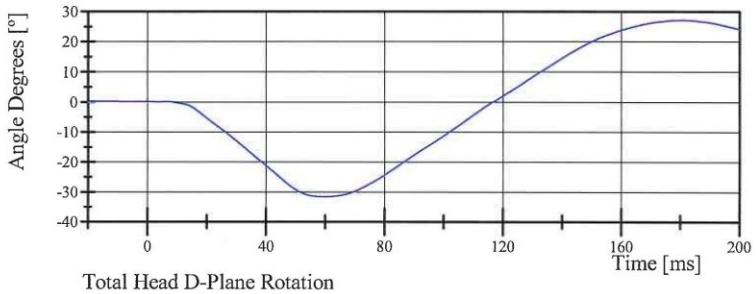
Filter Class: CFC_60
Max: 3.1 g at 44.6 ms
Min: -25.3 g at 8.7 ms

Pot Rotation at the Base of Neck



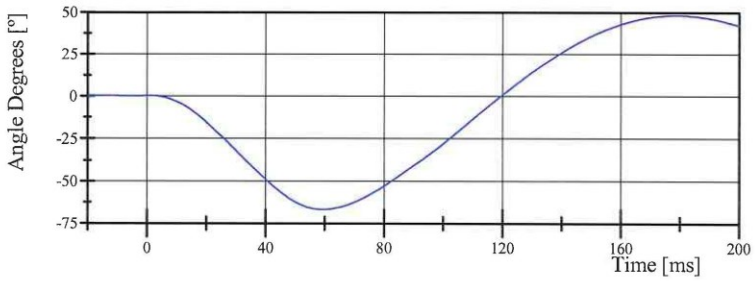
Filter Class: CFC_60
Max: 21.1 ° at 176.3 ms
Min: -35.4 ° at 59.2 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 27.1 ° at 180.5 ms
Min: -31.7 ° at 59.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 48.1 ° at 178.8 ms
Min: -67.1 ° at 59.4 ms

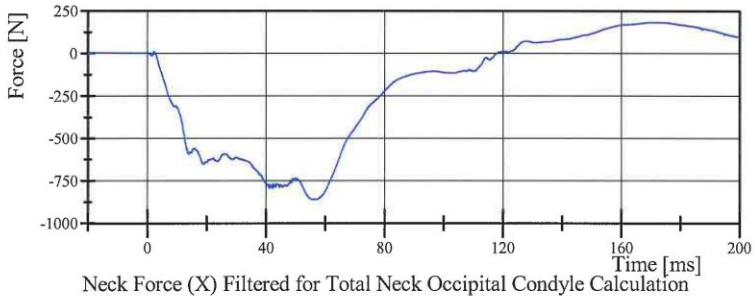
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 14:12:00 3038

Transportation Research Center Inc.

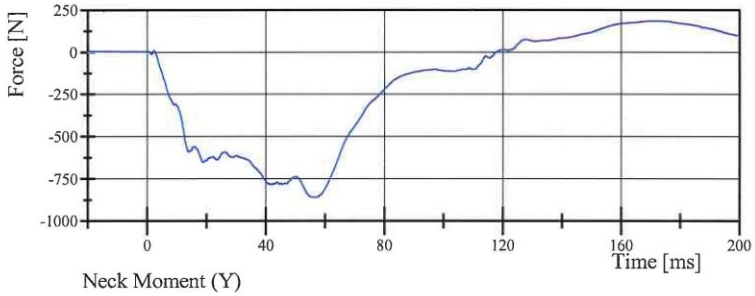
Neck Flexion
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Neck Force (X)



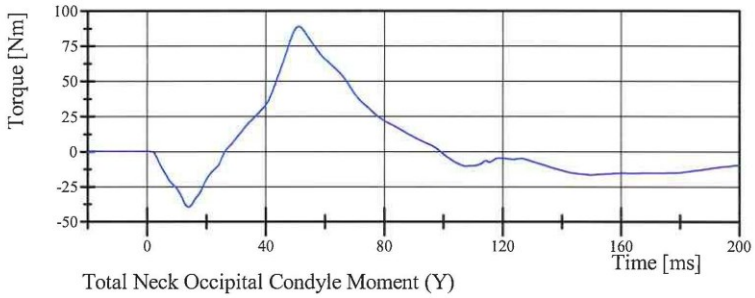
Filter Class: CFC_1000
Max: 183.8 N at 170.3 ms
Min: -863.2 N at 55.8 ms

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



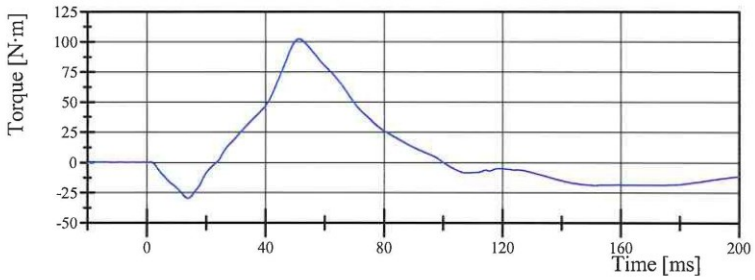
Filter Class: CFC_600
Max: 183.5 N at 171.9 ms
Min: -862.7 N at 56.9 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 88.7 Nm at 51.2 ms
Min: -40.2 Nm at 14.0 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 102.0 N·m at 51.4 ms
Min: -29.6 N·m at 14.0 ms

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

05.23.2016 14:12:00 3038

Transportation Research Center Inc.

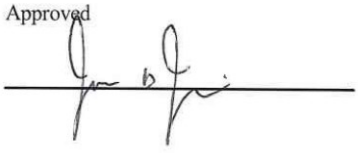
Neck Extension
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	22.1 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-6.011 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	39.8 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	19.09 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.94 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.97 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.97 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.1 °	Yes
Time of Peak	72 - 82 ms	76.5 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	157.5 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-72.1 N·m	Yes
Time of Peak	65 - 79 ms	71.0 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	143.3 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

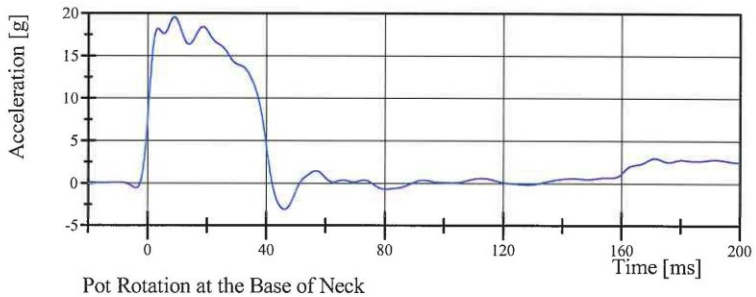
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 15:26:59 3129

Transportation Research Center Inc.

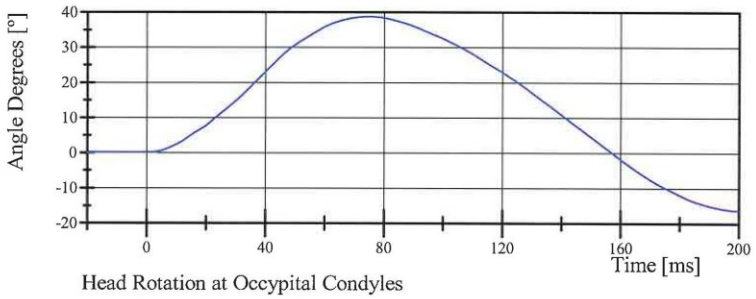
Neck Extension
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Pendulum Acceleration



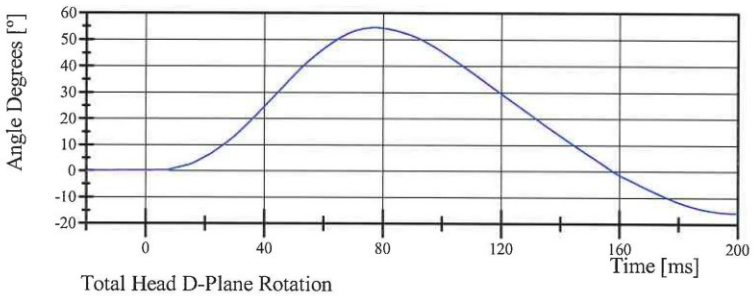
Filter Class: CFC_60
Max: 19.5 g at 9.0 ms
Min: -3.2 g at 46.2 ms

Pot Rotation at the Base of Neck



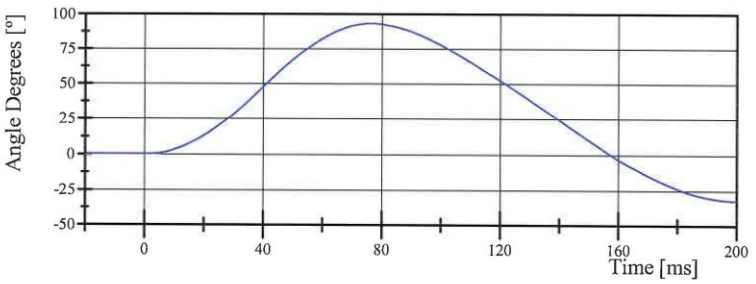
Filter Class: CFC_60
Max: 38.7 ° at 75.0 ms
Min: -16.3 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 54.5 ° at 77.3 ms
Min: -15.8 ° at 199.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 93.1 ° at 76.5 ms
Min: -32.1 ° at 200.0 ms

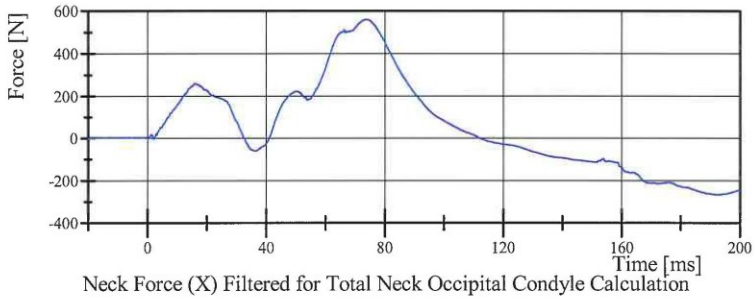
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 15:27:05 3129

Transportation Research Center Inc.

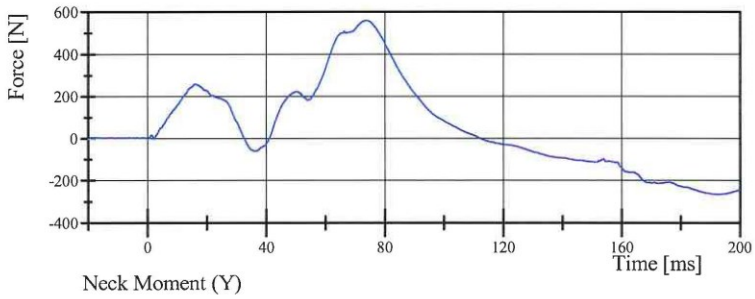
Neck Extension
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Neck Force (X)



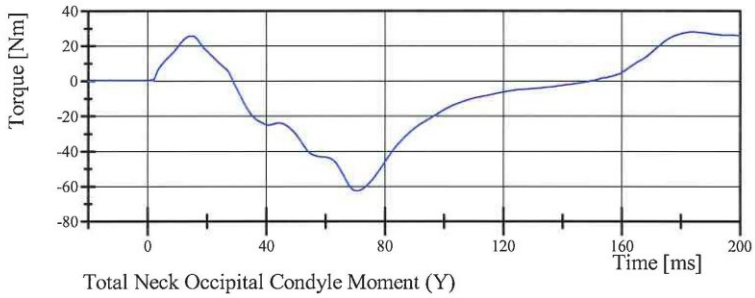
Filter Class: CFC_1000
Max: 558.0 N at 73.9 ms
Min: -266.3 N at 192.2 ms

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



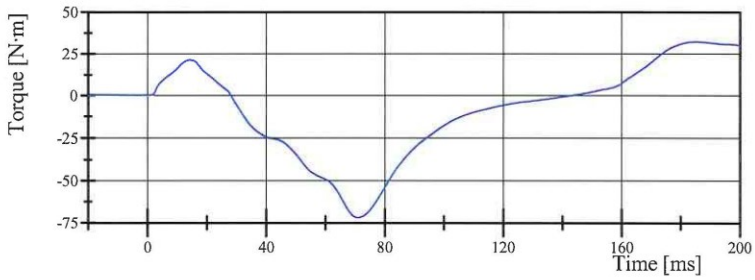
Filter Class: CFC_600
Max: 557.8 N at 73.9 ms
Min: -266.1 N at 193.4 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 27.9 Nm at 184.4 ms
Min: -62.7 Nm at 70.7 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 32.2 N·m at 185.1 ms
Min: -72.1 N·m at 71.0 ms

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

05.23.2016 15:27:06 3129

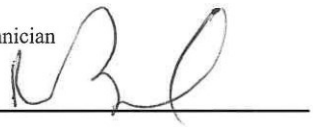
Transportation Research Center Inc.

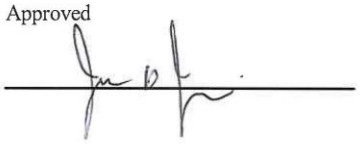
Front Thorax
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/25/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.655 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,556.1 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.19 mm	Yes
Internal Hysteresis	65 - 85 %	72.2 %	Yes

Test meets specifications.

Comments:

Technician 

Approved 

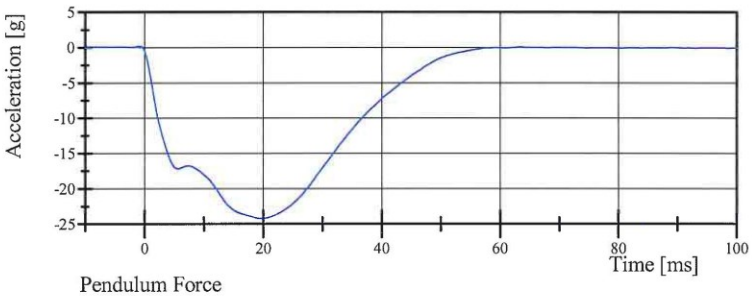
Specification Source: CFR49 Part 572 Subpart P
with Polarity in accordance with J211

05.25.2016 16:46:05 435

Transportation Research Center Inc.

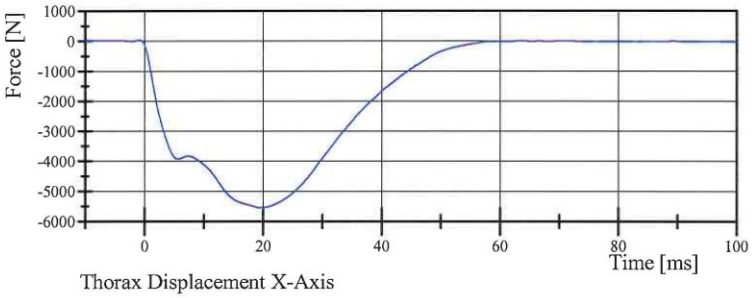
Front Thorax
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/25/2016

Pendulum Acceleration



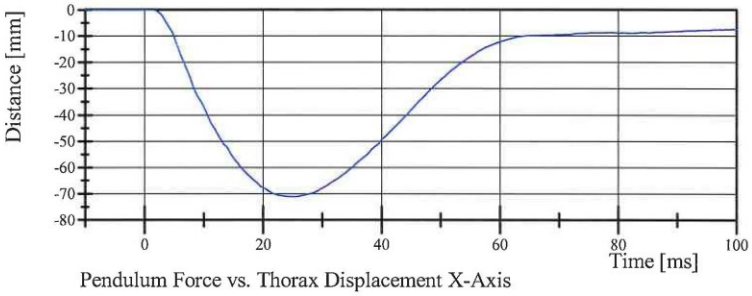
Filter Class: CFC_180
Max: 0.1 g at -0.8 ms
Min: -24.2 g at 19.5 ms

Pendulum Force



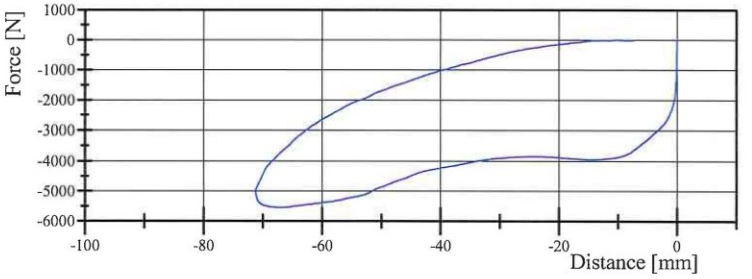
Filter Class: CFC_180
Max: 26.6 N at -0.8 ms
Min: -5,556.1 N at 19.5 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -10.0 ms
Min: -71.2 mm at 25.3 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 26.6 N at -0.0 mm
Min: -5,556.1 N at -67.2 mm

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

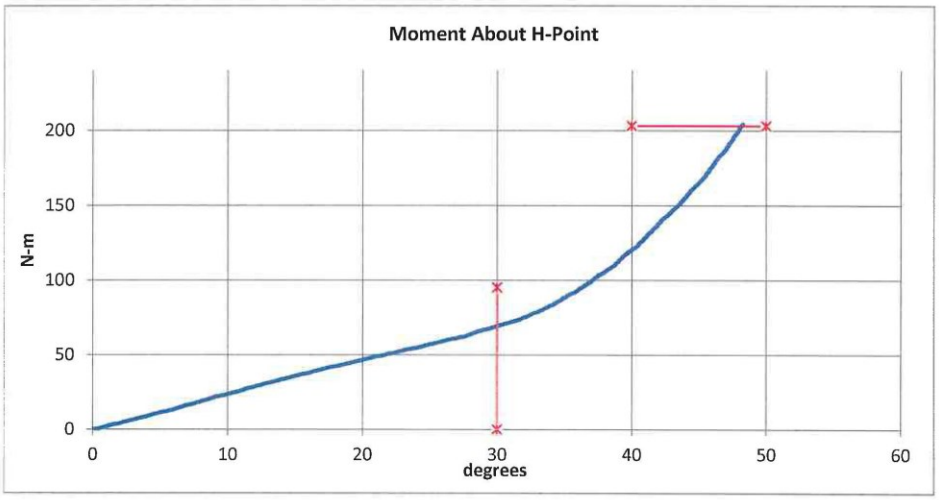
05.25.2016 16:46:10 435

Transportation Research Center Inc.

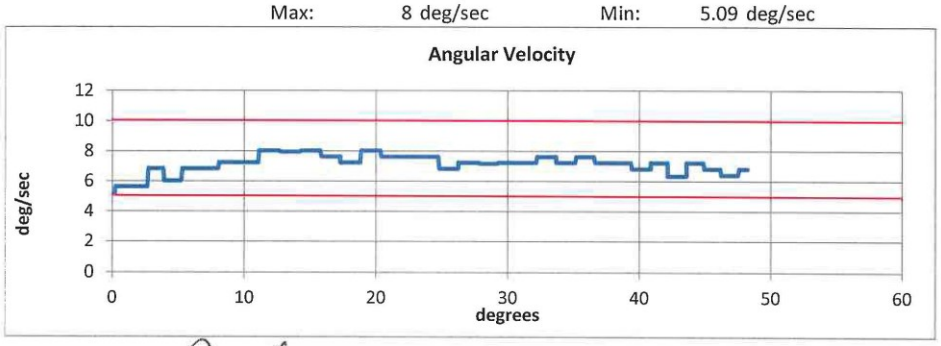
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	25-May-2016
Side Tested:	Left Hip	Time:	10:06
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.4	°C	Pass
Humidity	10	-	70	36	%	Pass
Moment at 30°	0	≤	94.9	69.13	N-m	Pass
Angle at 203 Nm	40	-	50	48.25	deg	Pass
Average Velocity	5	-	10	7.09	deg/sec	Pass



Max: 8 deg/sec Min: 5.09 deg/sec



Technician

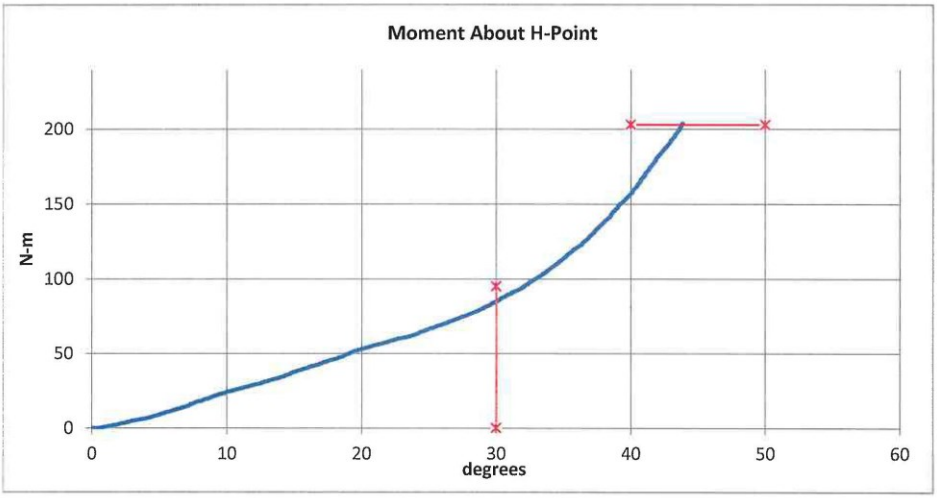
Approved

Transportation Research Center Inc.

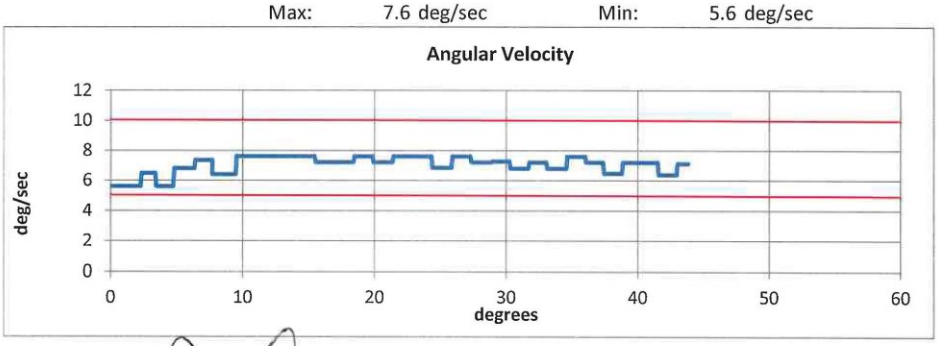
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	25-May-2016
Side Tested:	Right Hip	Time:	11:14
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.4	°C	Pass
Humidity	10	-	70	45	%	Pass
Moment at 30°	0	≤	94.9	84.85	N-m	Pass
Angle at 203 Nm	40	-	50	43.85	deg	Pass
Average Velocity	5	-	10	7.02	deg/sec	Pass



Max: 7.6 deg/sec Min: 5.6 deg/sec



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	22.1 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.124 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,699.85 N	Yes

Test meets specifications.

Comments:

Technician

Approved

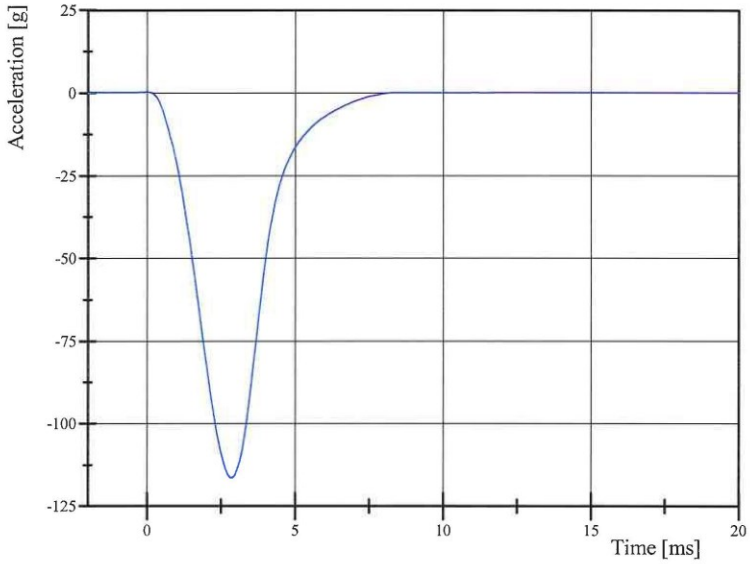
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 11:48:37 1761

Transportation Research Center Inc.

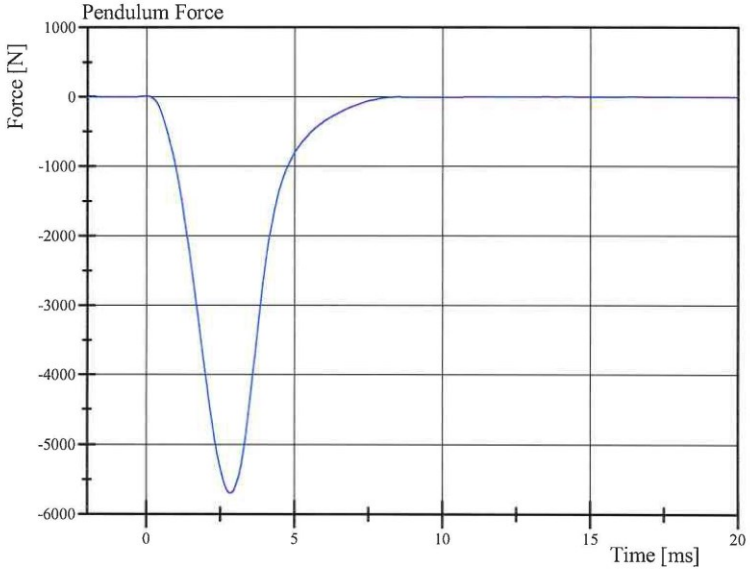
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 36-2
Test Date: 5/23/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 0.0 ms
Min: -116.5 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 7.7 N at 0.0 ms
Min: -5,699.8 N at 2.9 ms

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

05.23.2016 11:48:43 1761

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.122 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,633.29 N	Yes

Test meets specifications.

Comments:

Technician

Approved

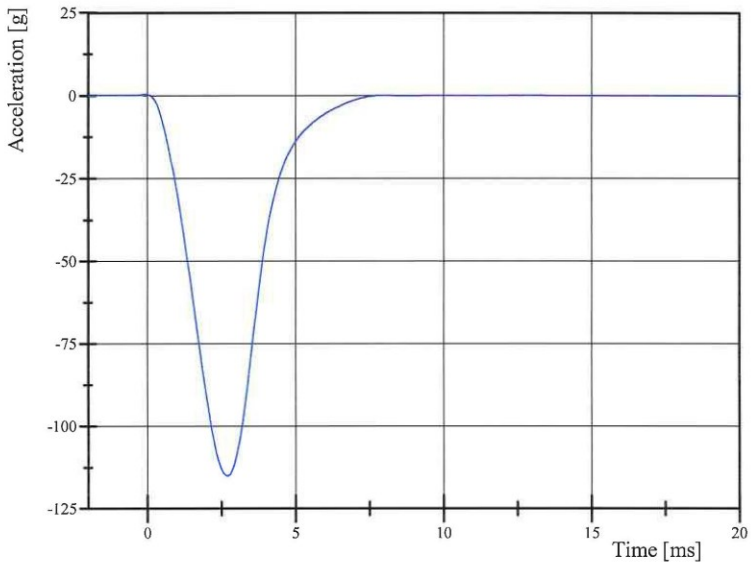
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.23.2016 09:46:53 1762

Transportation Research Center Inc.

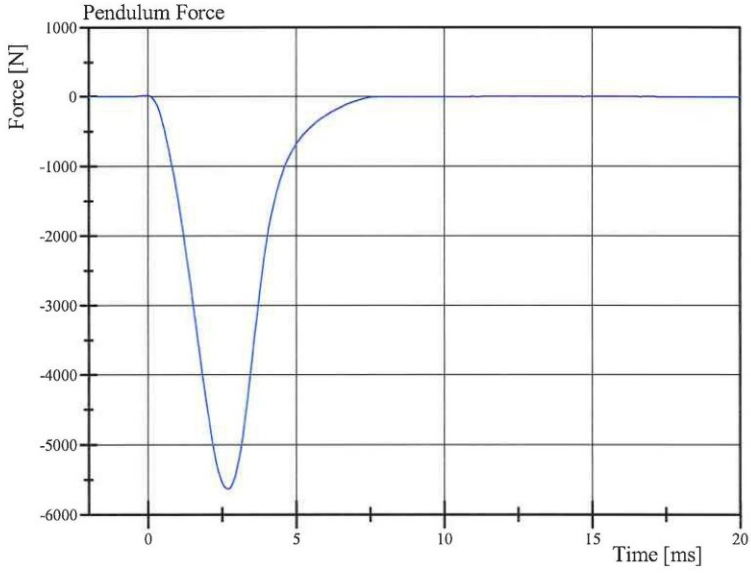
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 36-1
Test Date: 5/23/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at -0.1 ms
Min: -115.1 g at 2.7 ms

Pendulum Force



Filter Class: CFC_600
Max: 10.7 N at -0.1 ms
Min: -5,633.3 N at 2.7 ms

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

05.23.2016 09:46:59 1762

Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 37

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	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	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	200	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:

Technician

Approved

Revised 8/10/12

Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	260.9 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	9.5 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

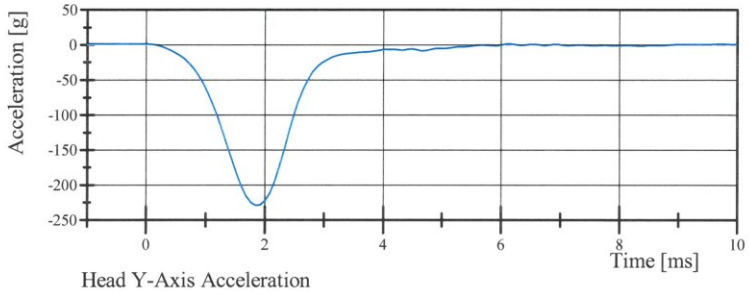
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.16.2016 11:22:42 614

Transportation Research Center Inc.

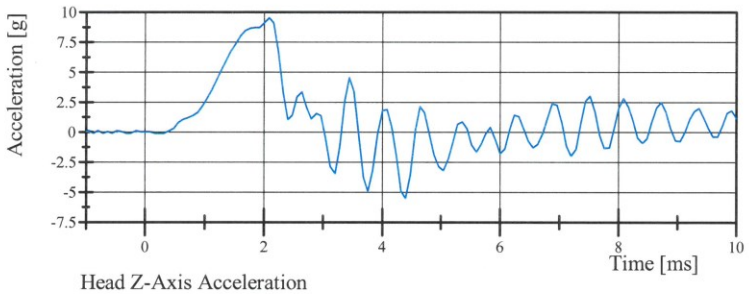
Front Head Drop
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Head X-Axis Acceleration



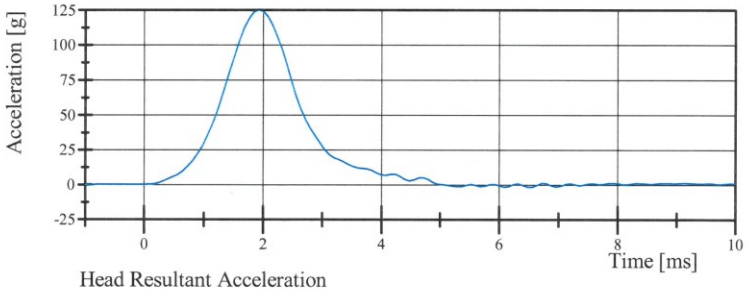
Filter Class: CFC_1000
Max: 1.0 g at 6.1 ms
Min: -229.7 g at 1.8 ms

Head Y-Axis Acceleration



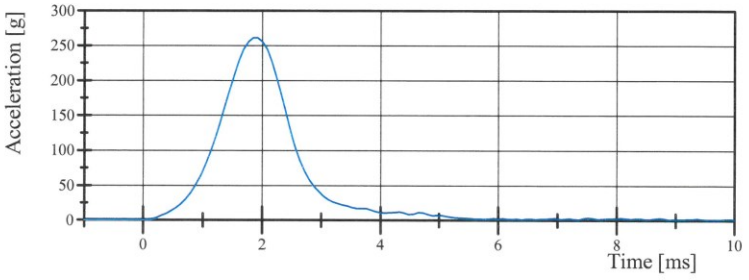
Filter Class: CFC_1000
Max: 9.5 g at 2.1 ms
Min: -5.5 g at 4.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 124.9 g at 1.9 ms
Min: -1.6 g at 6.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 260.9 g at 1.8 ms
Min: 0.0 g at -0.6 ms

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

06.16.2016 11:22:50 614

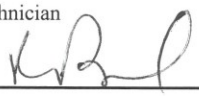
Transportation Research Center Inc.

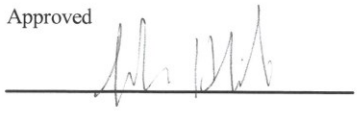
Neck Flexion
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

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	6.948 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	36.2 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-25.08 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-19.88 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-16.17 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-16.17 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-67.1 °	Yes
Time of Peak	57 - 64 ms	58.7 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	118.6 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	103.4 N·m	Yes
Time of Peak	47 - 58 ms	49.4 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	98.9 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

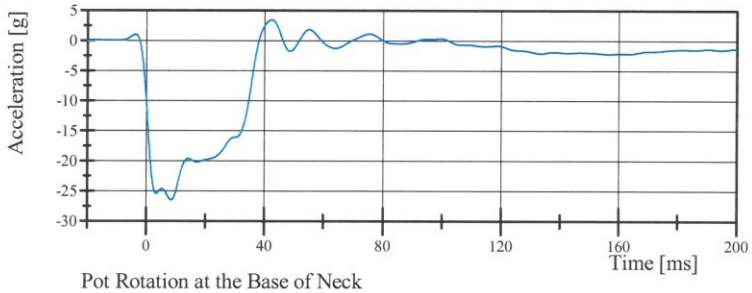
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.17.2016 09:18:27 3039

Transportation Research Center Inc.

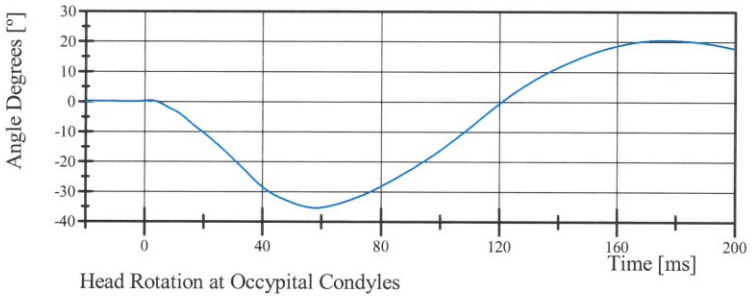
Neck Flexion
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

Pendulum Acceleration



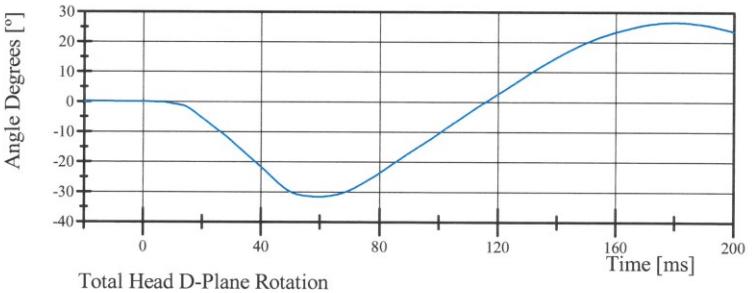
Filter Class: CFC_60
Max: 3.4 g at 42.4 ms
Min: -26.6 g at 8.4 ms

Pot Rotation at the Base of Neck



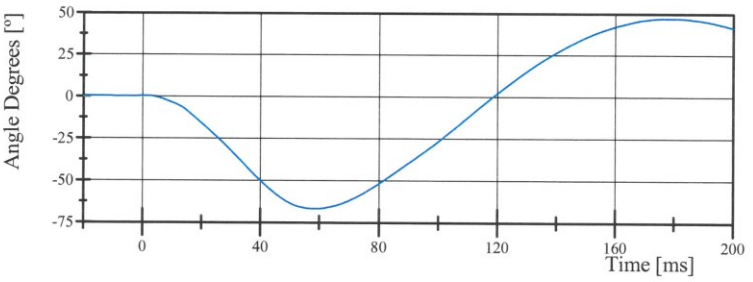
Filter Class: CFC_60
Max: 20.6 ° at 175.6 ms
Min: -35.5 ° at 58.2 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 26.6 ° at 180.0 ms
Min: -31.7 ° at 59.6 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 47.1 ° at 178.2 ms
Min: -67.1 ° at 58.7 ms

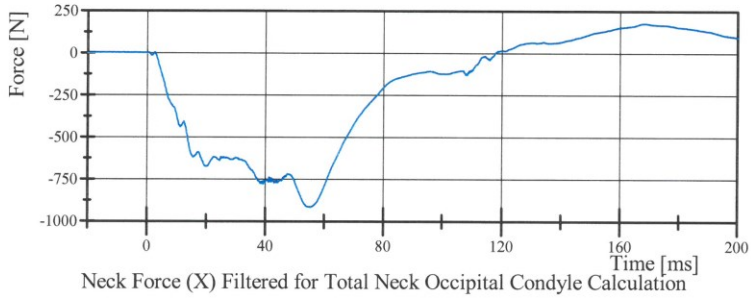
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.17.2016 09:18:37 3039

Transportation Research Center Inc.

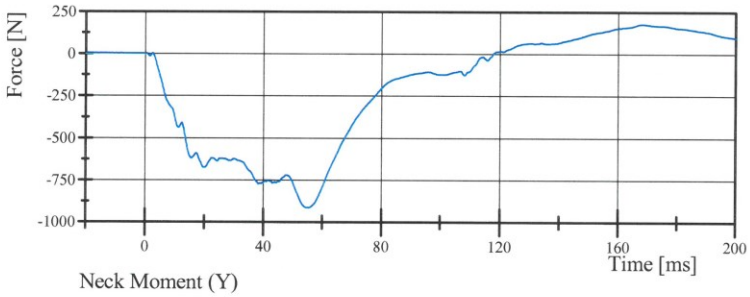
Neck Flexion
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

Neck Force (X)



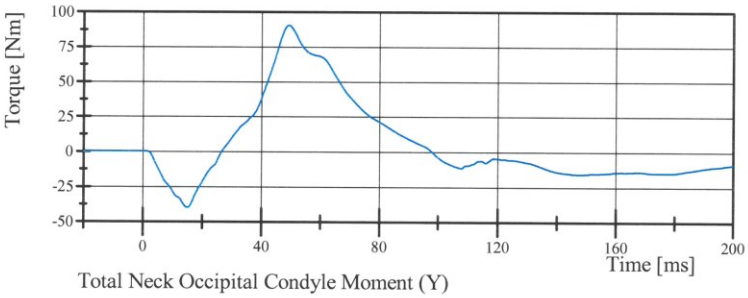
Filter Class: CFC_1000
Max: 178.3 N at 168.0 ms
Min: -916.7 N at 55.3 ms

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



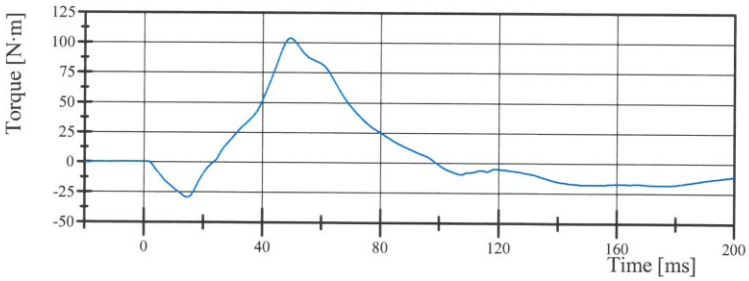
Filter Class: CFC_600
Max: 177.8 N at 168.1 ms
Min: -916.4 N at 55.3 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 90.4 Nm at 49.1 ms
Min: -40.1 Nm at 14.9 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Consta
Max: 103.4 N·m at 49.4 ms
Min: -29.6 N·m at 14.6 ms

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

06.17.2016 09:18:39 3039

Transportation Research Center Inc.

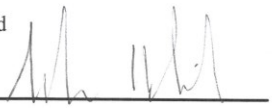
Neck Extension
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °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	40.1 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	20.64 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	18.00 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.49 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.49 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	92.6 °	Yes
Time of Peak	72 - 82 ms	77.2 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	158.2 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-71.8 N·m	Yes
Time of Peak	65 - 79 ms	70.9 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	143.3 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

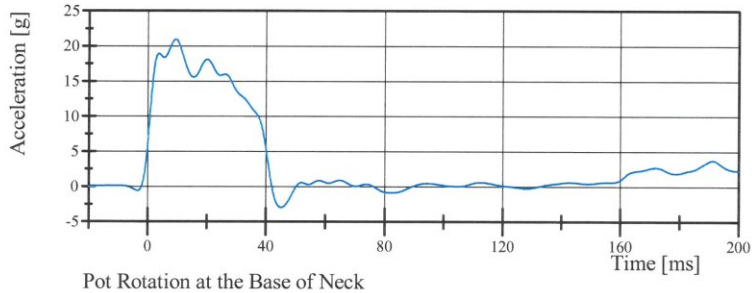
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

06.17.2016 10:33:36 3126

Transportation Research Center Inc.

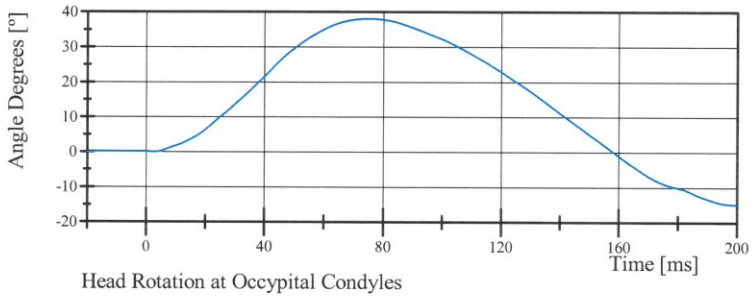
Neck Extension
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

Pendulum Acceleration



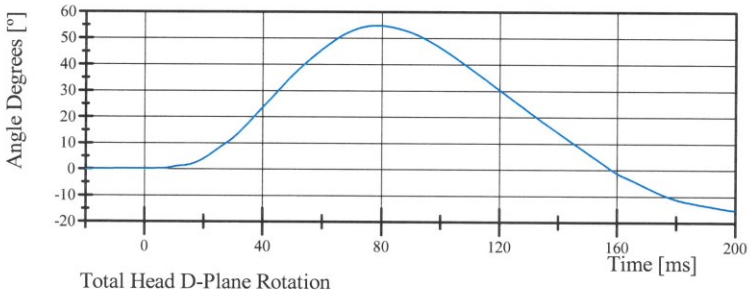
Filter Class: CFC_60
Max: 20.8 g at 9.3 ms
Min: -3.0 g at 45.0 ms

Pot Rotation at the Base of Neck



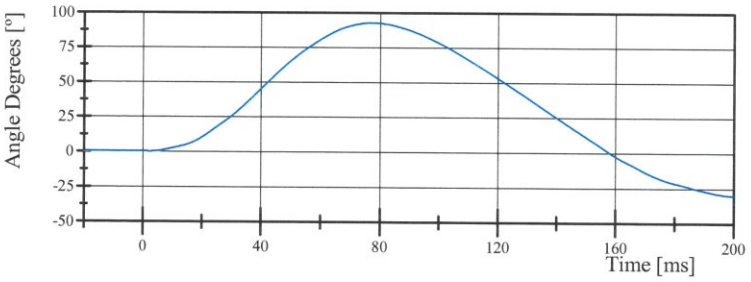
Filter Class: CFC_60
Max: 38.0 ° at 75.0 ms
Min: -14.9 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 54.7 ° at 78.2 ms
Min: -15.3 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 92.6 ° at 77.2 ms
Min: -30.2 ° at 200.0 ms

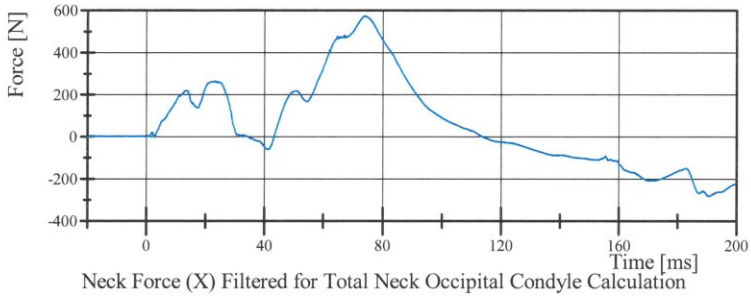
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.17.2016 10:33:47 3126

Transportation Research Center Inc.

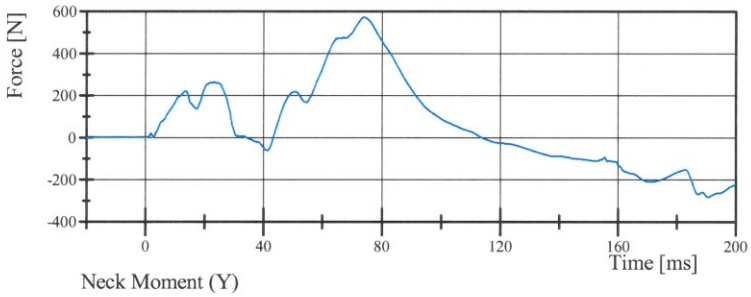
Neck Extension
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/17/2016

Neck Force (X)



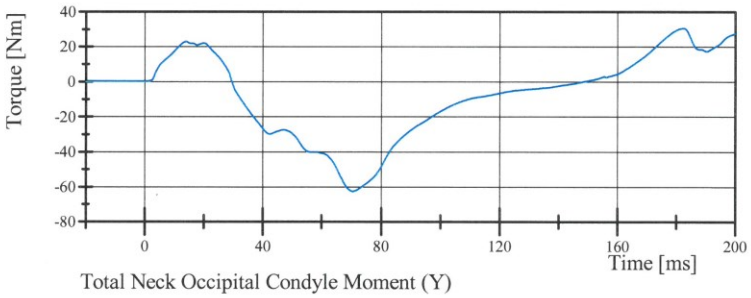
Filter Class: CFC_1000
Max: 570.7 N at 74.2 ms
Min: -283.8 N at 190.6 ms

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



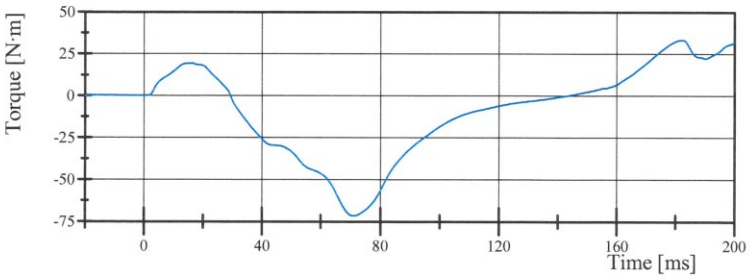
Filter Class: CFC_600
Max: 570.3 N at 74.1 ms
Min: -282.6 N at 190.6 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 30.7 Nm at 182.3 ms
Min: -62.7 Nm at 70.6 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 33.4 N·m at 182.2 ms
Min: -71.8 N·m at 70.9 ms

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

06.17.2016 10:33:50 3126

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.694 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,586.5 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.37 mm	Yes
Internal Hysteresis	65 - 85 %	72.2 %	Yes

Test meets specifications.

Comments:

Technician

Approved

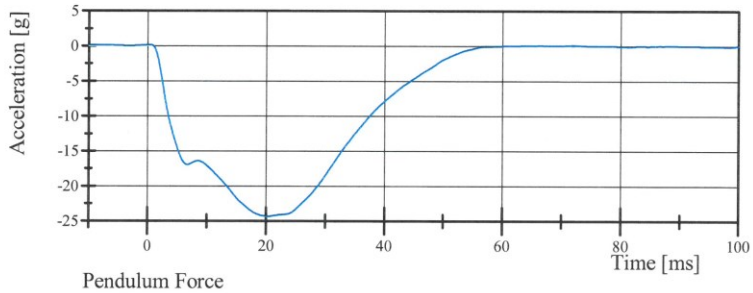
Specification Source: CFR49 Part 572 Subpart P
with Polarity in accordance with J211

06.16.2016 14:15:20 406

Transportation Research Center Inc.

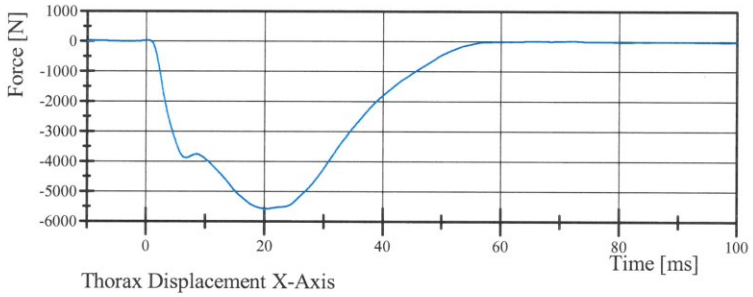
Front Thorax
HIII 50th Serial No. 037 Certification No. 37-2
Test Date: 6/16/2016

Pendulum Acceleration



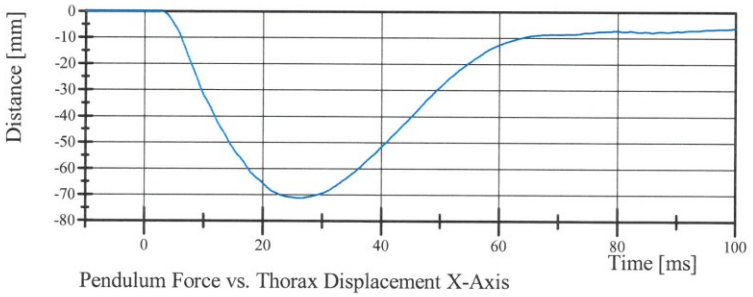
Filter Class: CFC_180
Max: 0.1 g at 71.9 ms
Min: -24.4 g at 20.3 ms

Pendulum Force



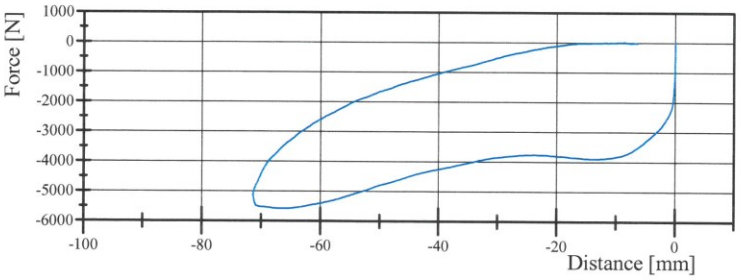
Filter Class: CFC_180
Max: 18.8 N at 71.9 ms
Min: -5,586.5 N at 20.3 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.9 ms
Min: -71.4 mm at 26.2 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 18.8 N at -8.6 mm
Min: -5,586.5 N at -66.5 mm

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

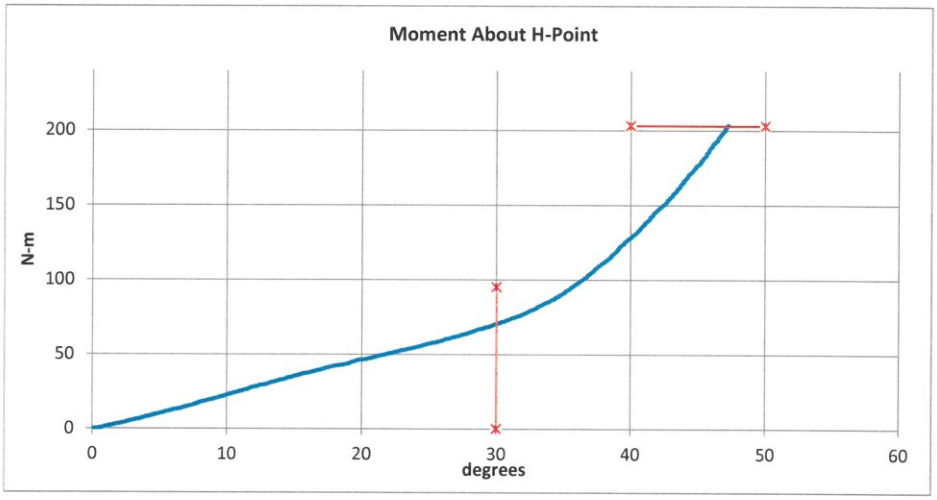
06.16.2016 14:15:28 406

Transportation Research Center Inc.

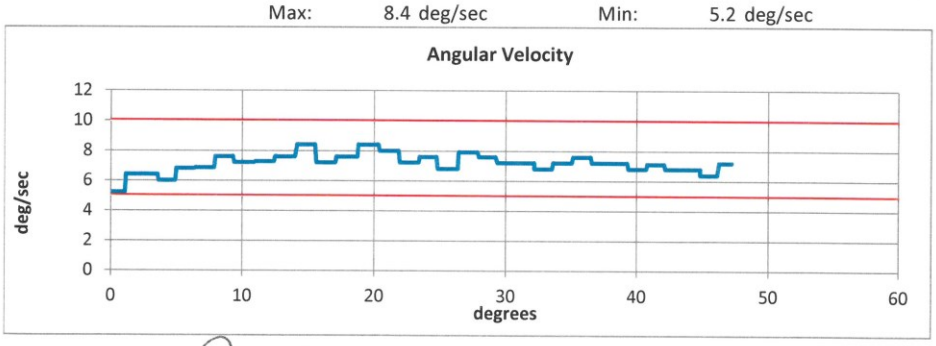
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	16-Jun-2016
Side Tested:	Left Hip	Time:	9:52
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.1	°C	Pass
Humidity	10	-	70	53	%	Pass
Moment at 30°	0	≤	94.9	70.61	N-m	Pass
Angle at 203 Nm	40	-	50	47.21	deg	Pass
Average Velocity	5	-	10	7.15	deg/sec	Pass



Max: 8.4 deg/sec Min: 5.2 deg/sec



Technician

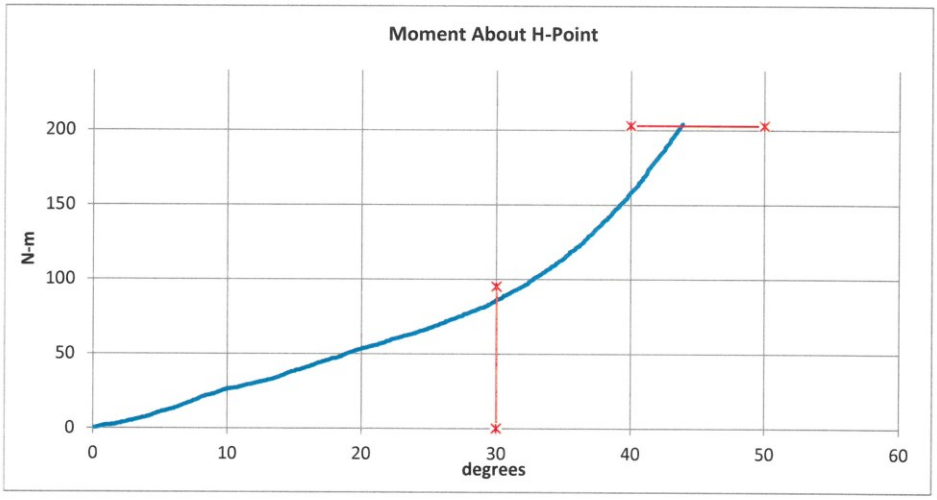
Approved

Transportation Research Center Inc.

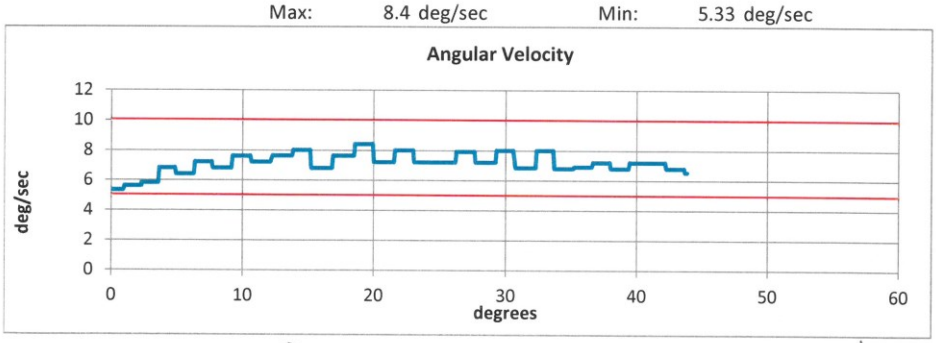
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	16-Jun-2016
Side Tested:	Right Hip	Time:	10:57
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.9	°C	Pass
Humidity	10	-	70	51	%	Pass
Moment at 30°	0	≤	94.9	86.04	N-m	Pass
Angle at 203 Nm	40	-	50	43.85	deg	Pass
Average Velocity	5	-	10	7.12	deg/sec	Pass



Max: 8.4 deg/sec Min: 5.33 deg/sec



Technician _____ Approved _____

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,399.49 N	Yes

Test meets specifications.

Comments:

Technician

Approved

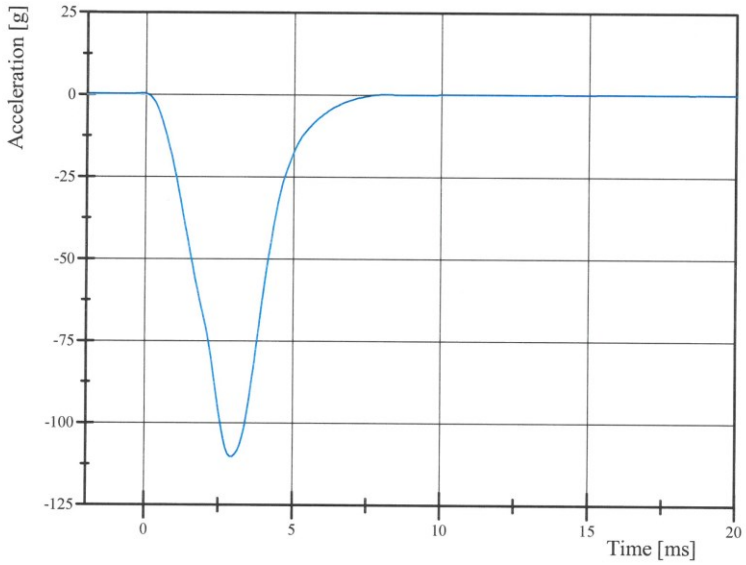
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.16.2016 12:36:37 1747

Transportation Research Center Inc.

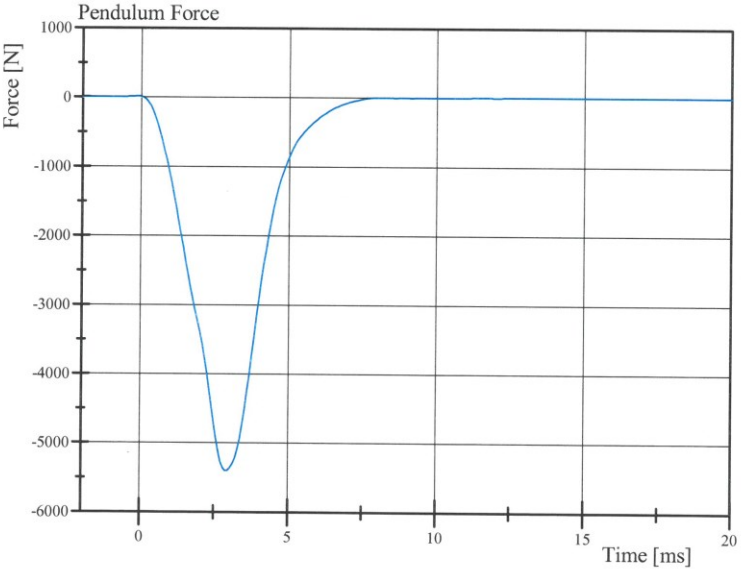
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.1 g at -0.1 ms
Min: -110.4 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 6.4 N at -0.1 ms
Min: -5,399.5 N at 2.9 ms

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

06.16.2016 12:36:43 1747

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 ºC	20.7 ºC	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.126 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,587.14 N	Yes

Test meets specifications.

Comments:

Technician

Approved

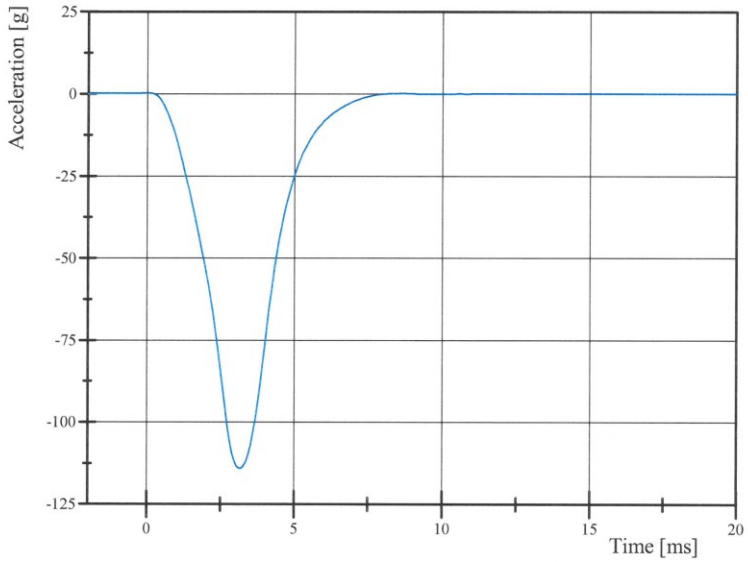
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

06.16.2016 12:39:57 1742

Transportation Research Center Inc.

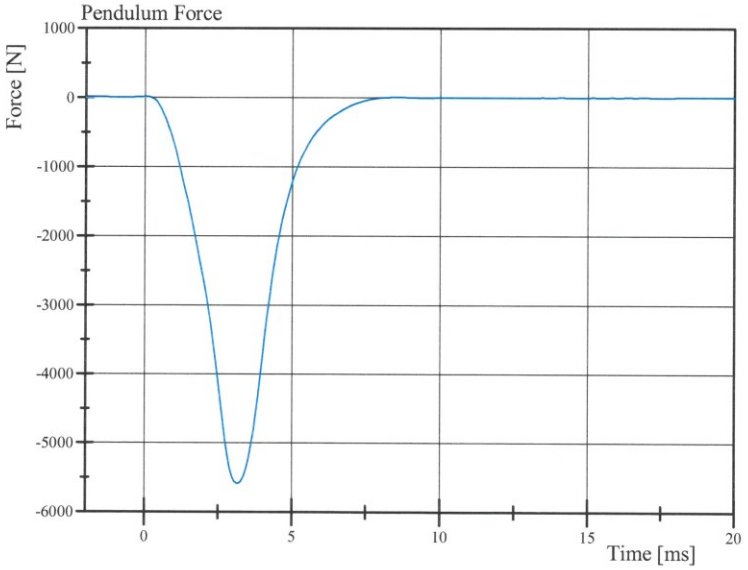
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 37-1
Test Date: 6/16/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.1 g at 0.0 ms
Min: -114.2 g at 3.1 ms

Pendulum Force



Filter Class: CFC_600
Max: 5.4 N at 0.0 ms
Min: -5,587.1 N at 3.1 ms

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

06.16.2016 12:40:03 1742

Pre-Test Calibration Sheets

Front Passenger S/N 070

Transportation Research Center Inc.
572O HIII 5th Female Dummy
External Dimensions
Serial No. 070 Calibration No. 29

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	446	Yes
C	Hip Pivot Height	81.3 - 86.3	83	Yes
D	Hip Pivot from Backline	144.8 - 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	130	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	282	Yes
J	Elbow Rest Height	182.8 - 203.2	186	Yes
K	Buttock Knee Length	520.7 - 546.1	538	Yes
L	Popliteal Height	355.6 - 376.0	365	Yes
M	Knee Pivot Height	393.7 - 419.1	403	Yes
N	Buttock Popliteal Length	414.0 - 439.4	430	Yes
O	Chest Depth without Jacket	175.3 - 190.5	181	Yes
P	Foot Length	218.5 - 233.7	220	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	140	Yes
T	Head Depth	177.8 - 188.0	180	Yes
U	Hip Breadth	299.7 - 314.9	305	Yes
V	Shoulder Breadth	350.5 - 365.7	360	Yes
W	Foot Breadth	78.8 - 94.0	85	Yes
X	Head Circumference	528.3 - 548.7	538	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	870	Yes
Z	Waist Circumference	759.5 - 789.9	780	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	355	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Technician

Approved

Revised 8/10/2012

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 29-4
Test Date: 5/27/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	265.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	4.6 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

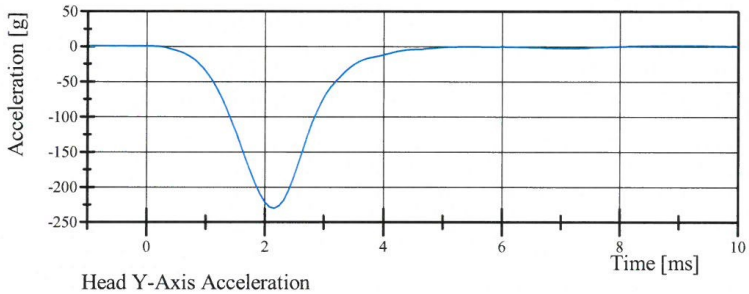
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.27.2016 13:22:53 611

Transportation Research Center Inc.

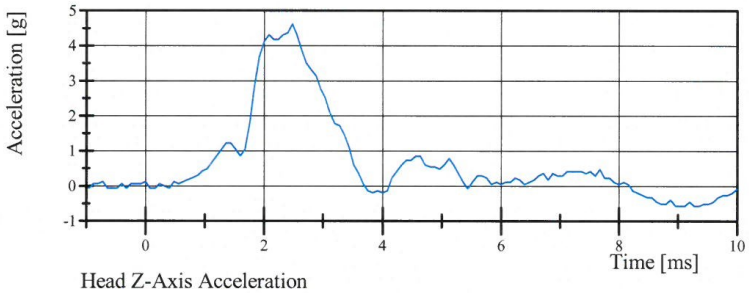
Front Head Drop
HIII 5th Serial No. 070 Certification No. 29-4
Test Date: 5/27/2016

Head X-Axis Acceleration



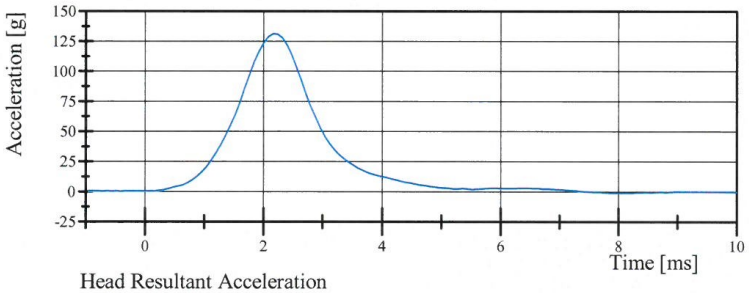
Filter Class: CFC_1000
Max: 1.4 g at 9.0 ms
Min: -231.0 g at 2.2 ms

Head Y-Axis Acceleration



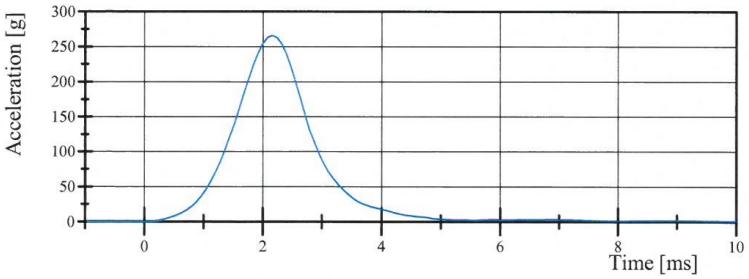
Filter Class: CFC_1000
Max: 4.6 g at 2.5 ms
Min: -0.6 g at 9.0 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 130.9 g at 2.2 ms
Min: -1.2 g at 8.2 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 265.6 g at 2.2 ms
Min: 0.1 g at -0.9 ms

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

05.27.2016 13:22:57 611

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.042 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.39 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.66 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.58 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-82.9 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	76.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	85.8 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

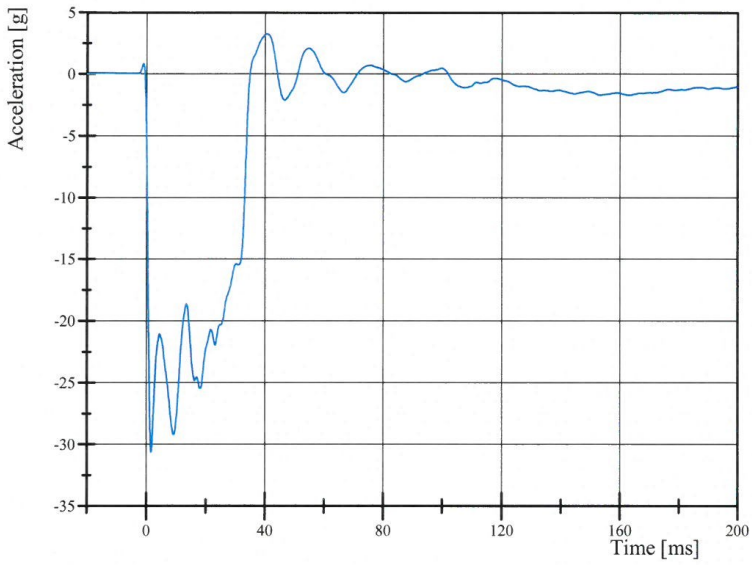
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 13:28:27 1856

Transportation Research Center Inc.

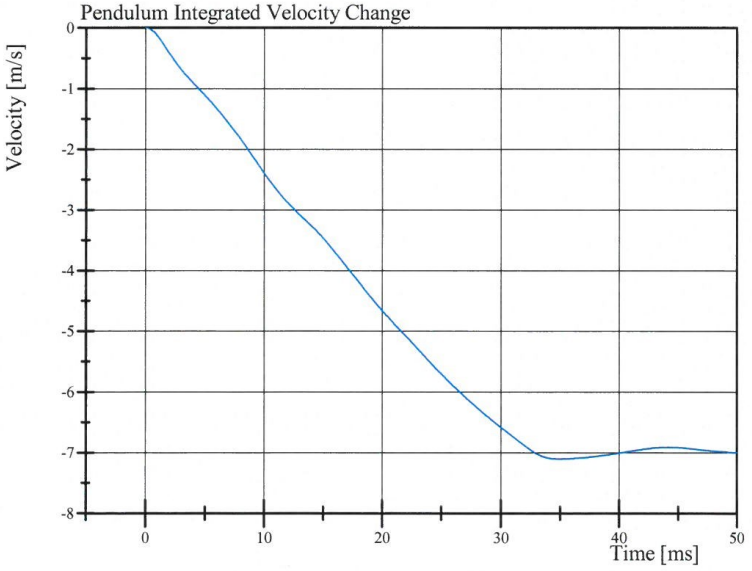
Neck Flexion
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.2 g at 40.4 ms
Min: -30.7 g at 1.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.1 m/s at 34.9 ms

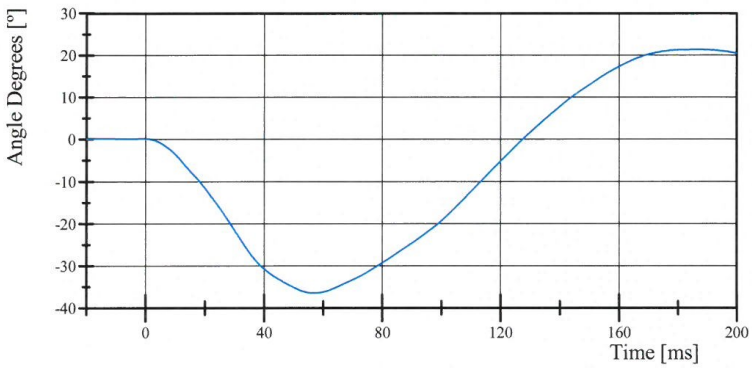
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 13:28:32 1856

Transportation Research Center Inc.

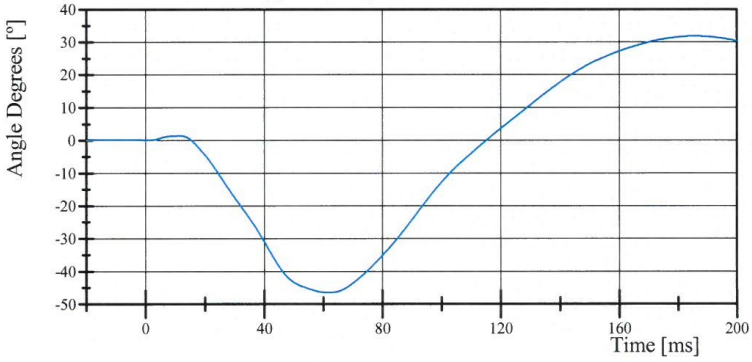
Neck Flexion
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Pot Rotation at the Base of Neck



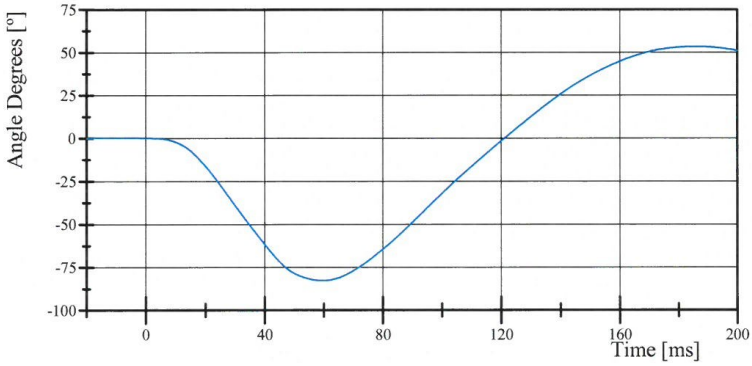
Filter Class: CFC_60
Max: 21.3 ° at 186.8 ms
Min: -36.5 ° at 56.9 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.9 ° at 185.3 ms
Min: -46.7 ° at 61.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 53.2 ° at 185.7 ms
Min: -82.9 ° at 59.5 ms

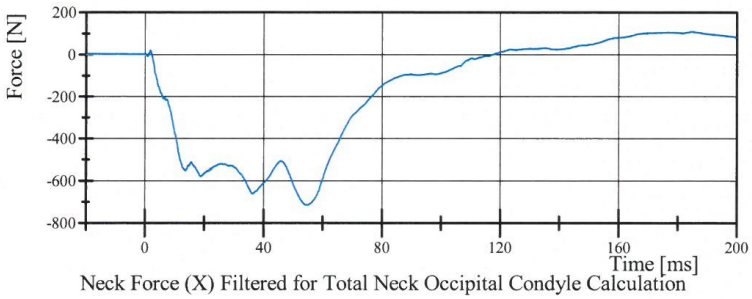
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 13:28:33 1856

Transportation Research Center Inc.

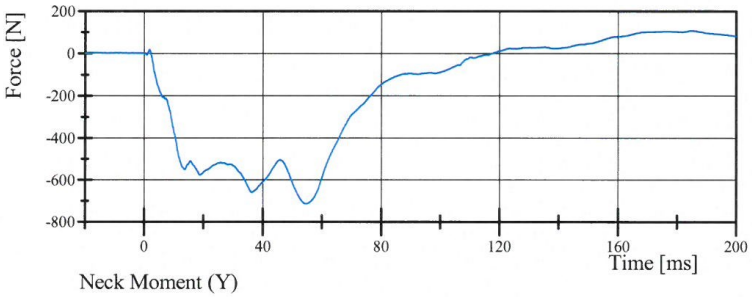
Neck Flexion
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Neck Force (X)



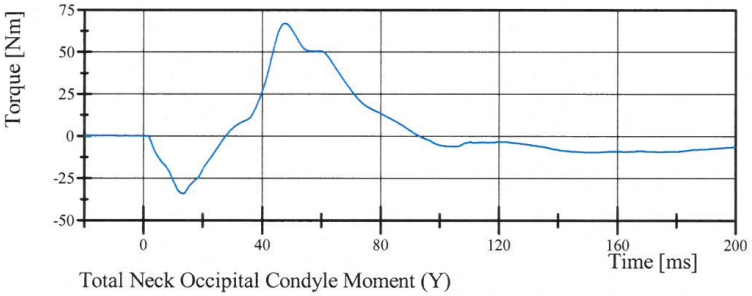
Filter Class: CFC_1000
Max: 108.1 N at 184.4 ms
Min: -715.9 N at 54.9 ms

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



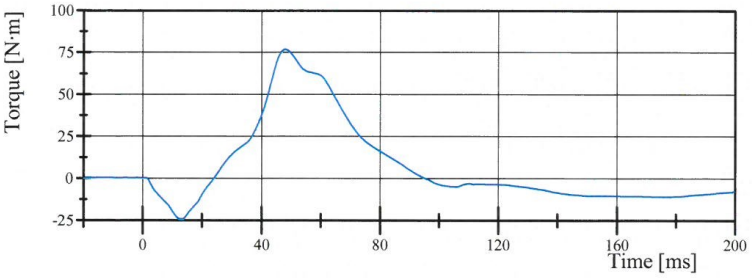
Filter Class: CFC_600
Max: 107.7 N at 184.8 ms
Min: -715.5 N at 54.9 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 66.9 Nm at 47.7 ms
Min: -34.3 Nm at 13.4 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 76.5 N·m at 48.0 ms
Min: -24.6 N·m at 13.2 ms

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

05.26.2016 13:28:34 1856

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.114 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.75 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.47 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.06 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	110.6 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-54.9 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	103.8 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

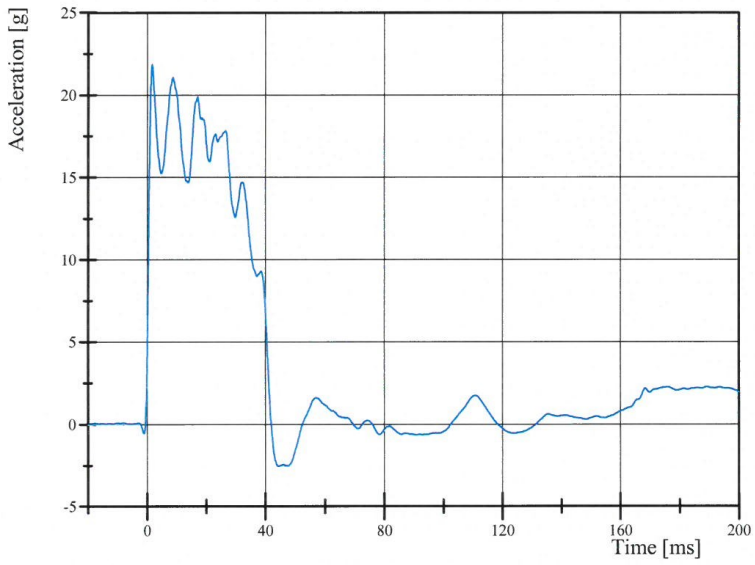
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 14:29:28 1993

Transportation Research Center Inc.

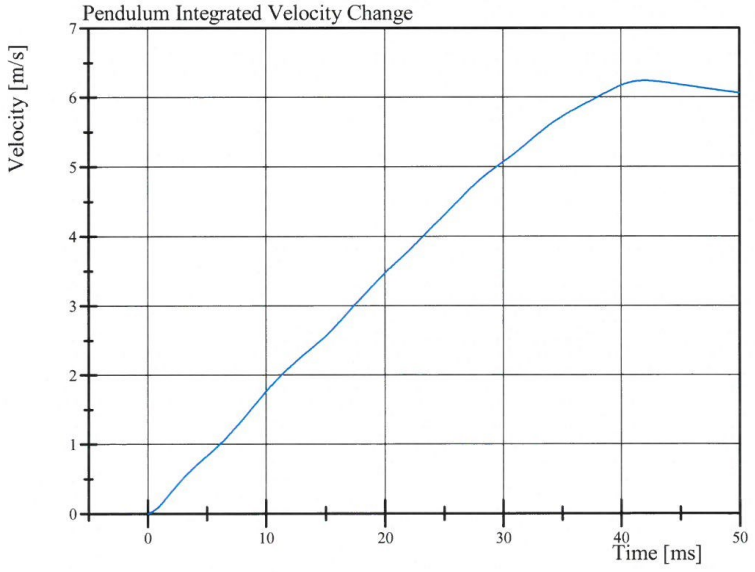
Neck Extension
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Pendulum Acceleration



Filter Class: CFC_180
Max: 21.8 g at 1.8 ms
Min: -2.6 g at 44.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.2 m/s at 42.0 ms
Min: 0.0 m/s at 0.0 ms

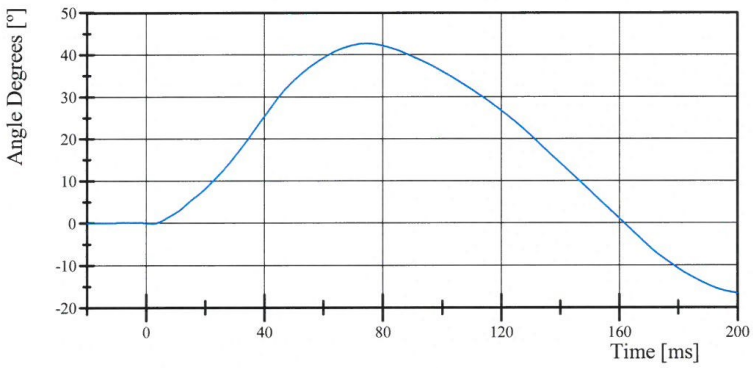
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 14:29:33 1993

Transportation Research Center Inc.

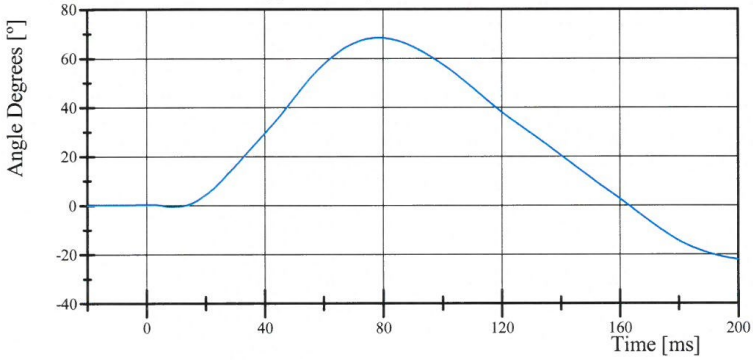
Neck Extension
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Pot Rotation at the Base of Neck



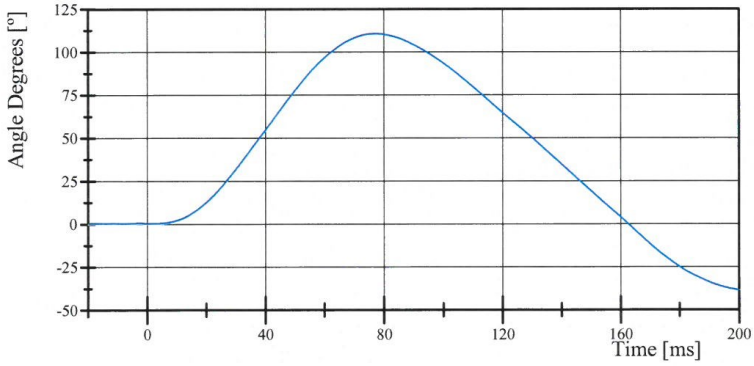
Filter Class: CFC_60
Max: 42.6 ° at 74.4 ms
Min: -16.7 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 68.2 ° at 78.7 ms
Min: -22.0 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 110.6 ° at 77.3 ms
Min: -38.7 ° at 200.0 ms

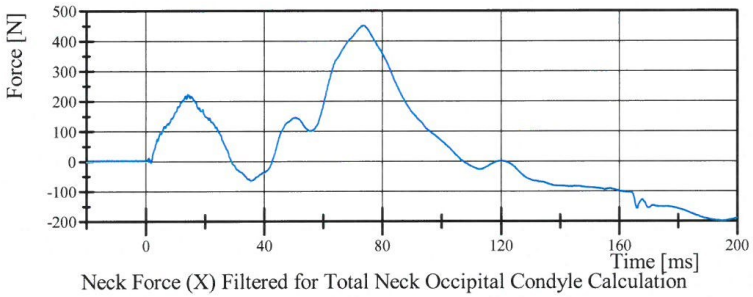
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 14:29:33 1993

Transportation Research Center Inc.

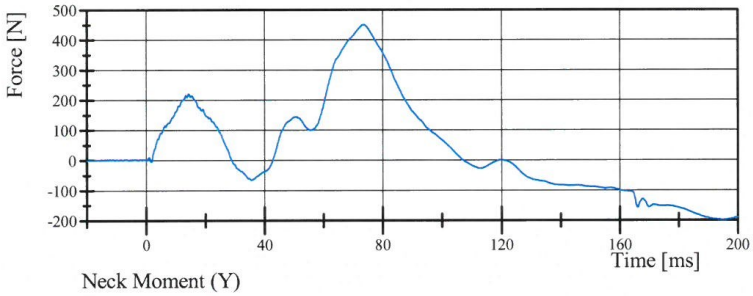
Neck Extension
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Neck Force (X)



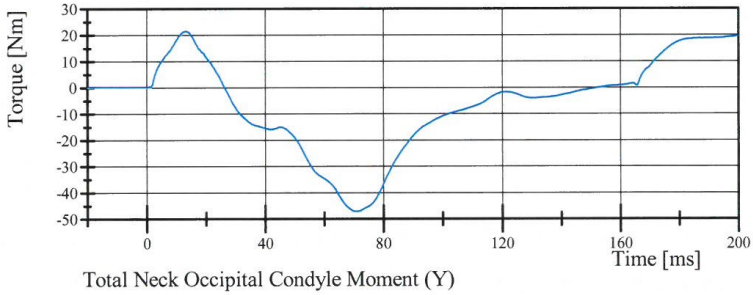
Filter Class: CFC_1000
Max: 450.2 N at 73.6 ms
Min: -199.2 N at 195.1 ms

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



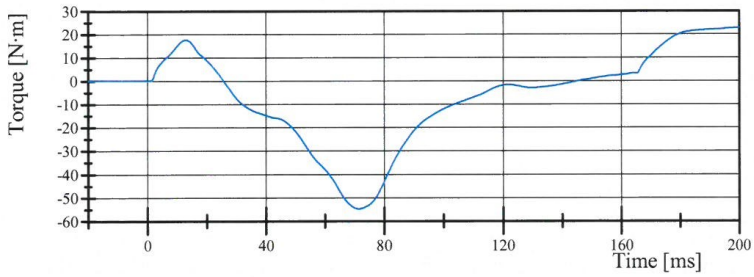
Filter Class: CFC_600
Max: 449.8 N at 73.7 ms
Min: -198.6 N at 195.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 21.3 Nm at 13.3 ms
Min: -47.3 Nm at 70.8 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 22.8 N·m at 200.0 ms
Min: -54.9 N·m at 71.4 ms

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

05.26.2016 14:29:34 1993

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 29-1
Test Date: 5/26/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.735 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,043.4 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,042.2 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-52.7 mm	Yes
Internal Hysteresis	69 - 85 %	71.8 %	Yes

Test meets specifications.

Comments:

Technician

Approved

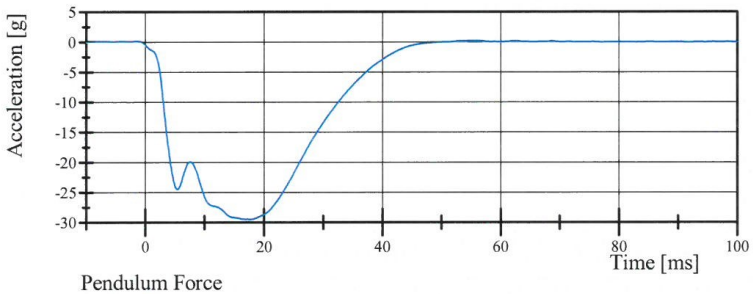
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 09:08:07 418

Transportation Research Center Inc.

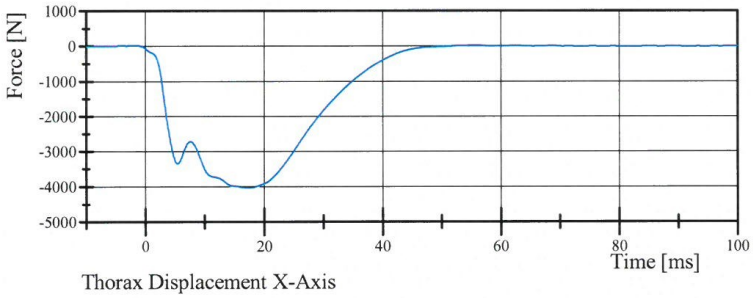
Front Thorax
HIII 5th Serial No. 070 Certification No. 29-1
Test Date: 5/26/2016

Pendulum Acceleration



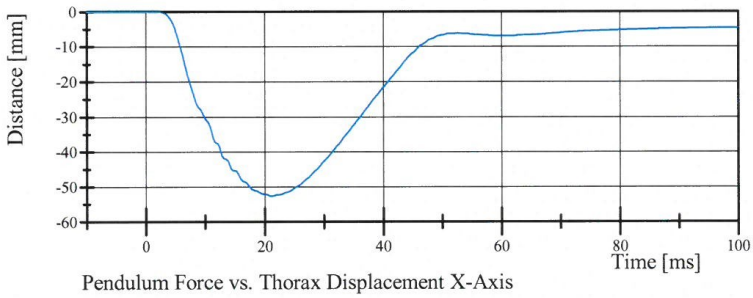
Filter Class: CFC_180
Max: 0.1 g at 55.6 ms
Min: -29.5 g at 17.7 ms

Pendulum Force



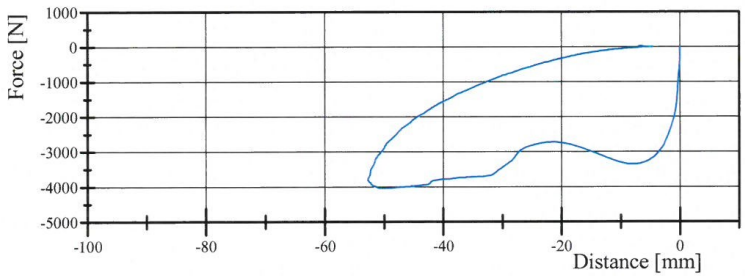
Filter Class: CFC_180
Max: 20.3 N at 55.6 ms
Min: -4,043.4 N at 17.7 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -5.4 ms
Min: -52.7 mm at 21.2 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 20.3 N at -6.6 mm
Min: -4,043.4 N at -50.4 mm

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

05.26.2016 09:09:13 418

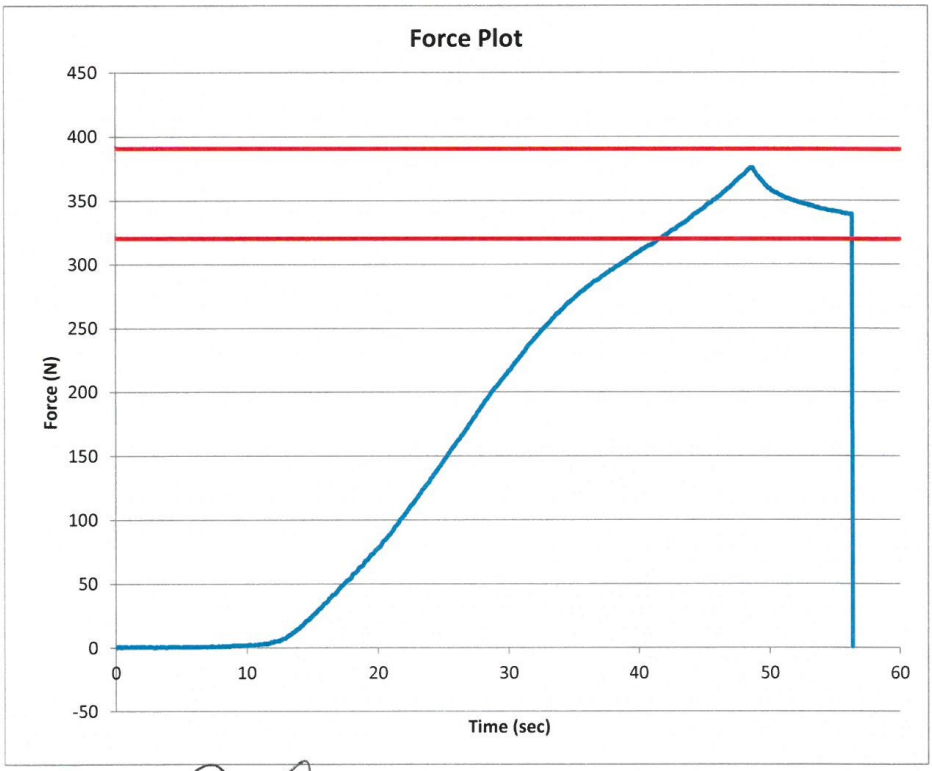
Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

VRTC

Serial Number:	070	Date:	5/27/2016
Test Number:	1	Time:	13:59
Comments:			

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.9	°C	Pass
Humidity	10	-	70	47	%	Pass
Average Angular Velocity	0.5	-	1.5	0.82	deg/sec	Pass
Initial Angle	0	-	20	15.83	deg	Pass
Peak Force at 45.31°	320	-	390	375.32	N	Pass
Final Angle	-8	-	8	3.61	deg	Pass



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	20.8 ºC	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.120 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,853.8 N	Yes

Test meets specifications.

Comments:

Technician

Approved

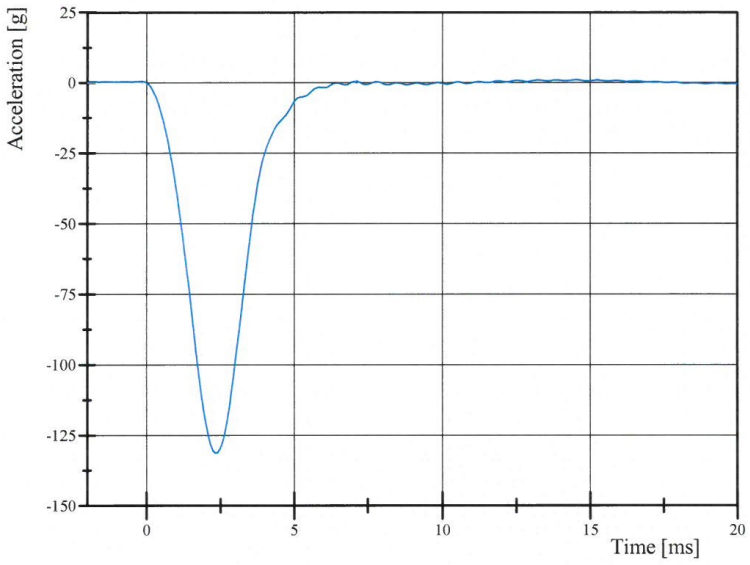
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 14:24:11 1740

Transportation Research Center Inc.

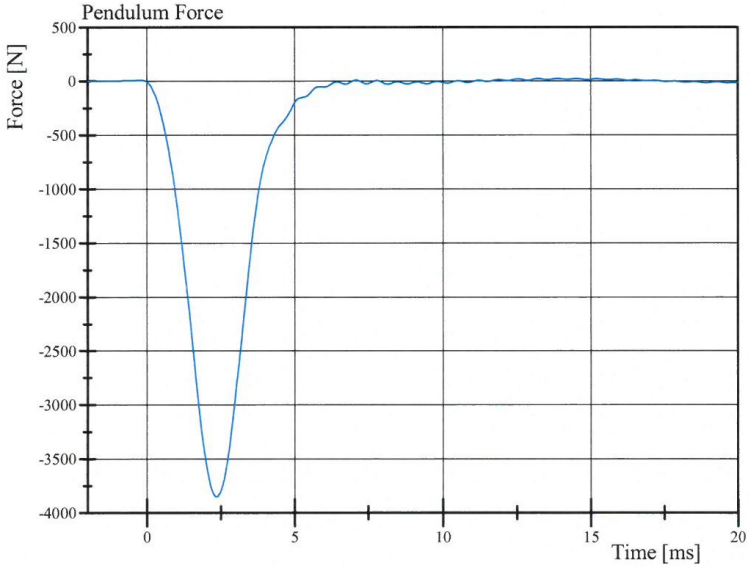
Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 29-2
Test Date: 5/26/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.8 g at 14.6 ms
Min: -131.4 g at 2.3 ms

Pendulum Force



Filter Class: CFC_600
Max: 23.8 N at 14.6 ms
Min: -3,853.8 N at 2.3 ms

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

05.26.2016 14:24:16 1740

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 29-1
Test Date: 5/26/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	21.3 ºC	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.105 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,840.0 N	Yes

Test meets specifications.

Comments:

Technician

Approved

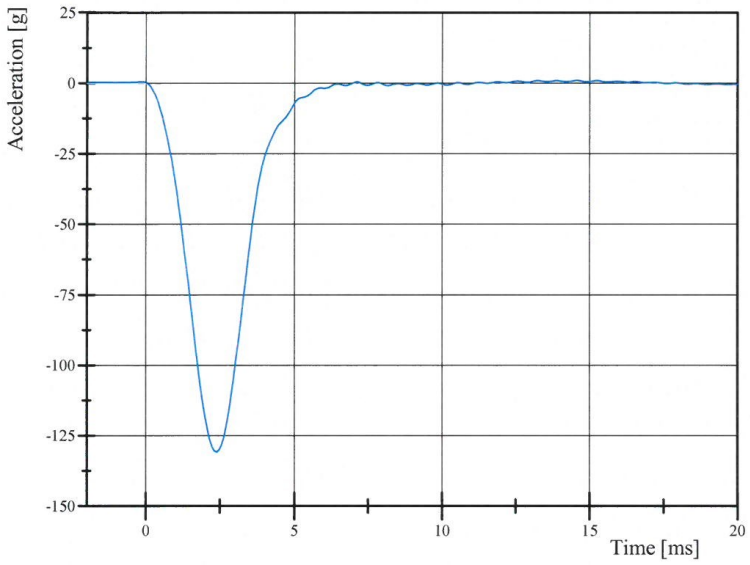
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.26.2016 13:41:43 1747

Transportation Research Center Inc.

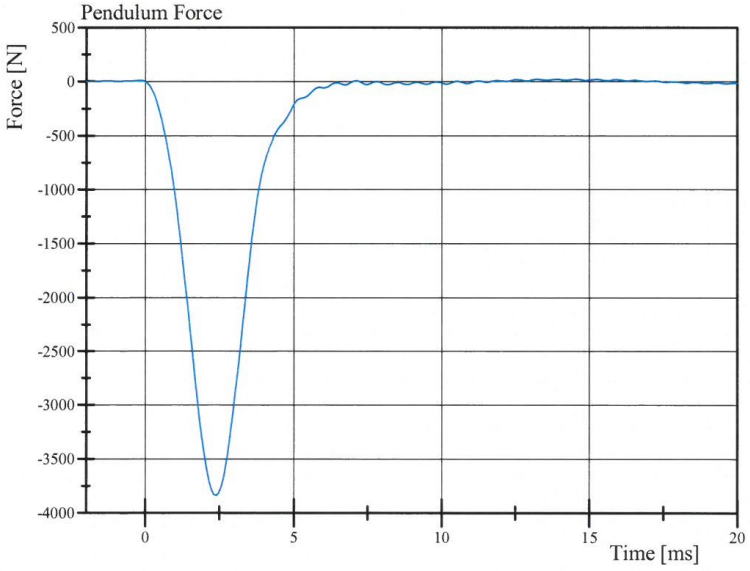
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 29-1
Test Date: 5/26/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.8 g at 14.6 ms
Min: -131.0 g at 2.4 ms

Pendulum Force



Filter Class: CFC_600
Max: 22.8 N at 14.6 ms
Min: -3,840.0 N at 2.4 ms

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

05.26.2016 13:41:49 1747

Post-Test Calibration Sheets

Front Passenger S/N 070

Transportation Research Center Inc.
572O HIII 5th Female Dummy
External Dimensions
Serial No. 070 Calibration No. 30

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	445	Yes
C	Hip Pivot Height	81.3 - 86.3	83	Yes
D	Hip Pivot from Backline	144.8 - 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	128	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	282	Yes
J	Elbow Rest Height	182.8 - 203.2	185	Yes
K	Buttock Knee Length	520.7 - 546.1	538	Yes
L	Popliteal Height	355.6 - 376.0	365	Yes
M	Knee Pivot Height	393.7 - 419.1	403	Yes
N	Buttock Popliteal Length	414.0 - 439.4	430	Yes
O	Chest Depth without Jacket	175.3 - 190.5	180	Yes
P	Foot Length	218.5 - 233.7	220	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	140	Yes
T	Head Depth	177.8 - 188.0	180	Yes
U	Hip Breadth	299.7 - 314.9	305	Yes
V	Shoulder Breadth	350.5 - 365.7	360	Yes
W	Foot Breadth	78.8 - 94.0	85	Yes
X	Head Circumference	528.3 - 548.7	538	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	869	Yes
Z	Waist Circumference	759.5 - 789.9	780	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	355	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Technician

Approved

Revised 8/10/2012

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	252.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	10.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

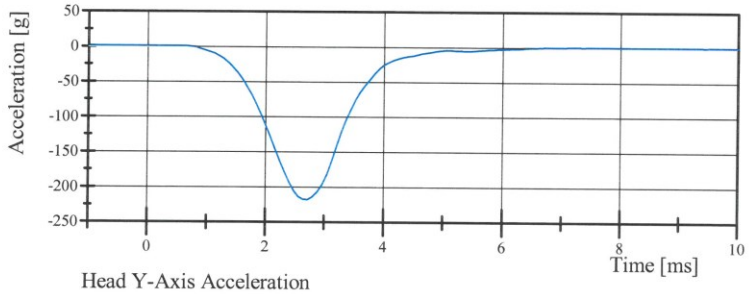
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.16.2016 16:04:19 605

Transportation Research Center Inc.

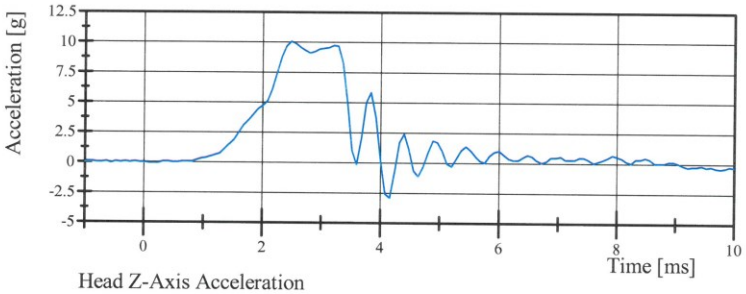
Front Head Drop
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Head X-Axis Acceleration



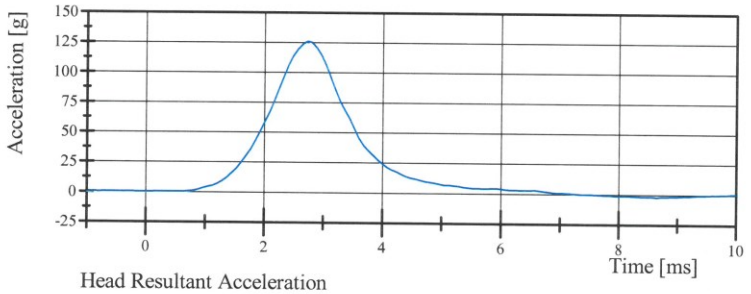
Filter Class: CFC_1000
Max: 0.2 g at 8.2 ms
Min: -218.3 g at 2.7 ms

Head Y-Axis Acceleration



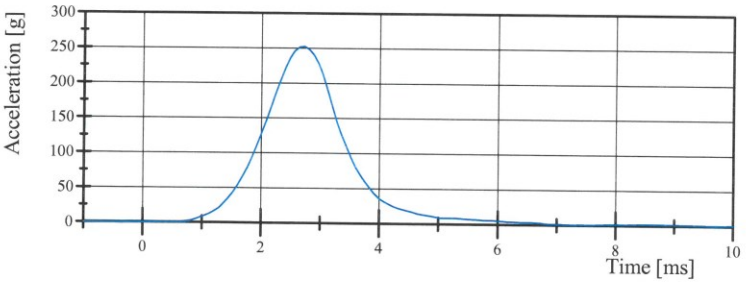
Filter Class: CFC_1000
Max: 10.0 g at 2.5 ms
Min: -2.9 g at 4.2 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 125.9 g at 2.7 ms
Min: -2.0 g at 8.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 252.2 g at 2.7 ms
Min: 0.0 g at 0.5 ms

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

06.16.2016 16:04:26 605

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/17/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.033 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.33 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.48 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.37 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-80.3 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	72.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	87.6 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

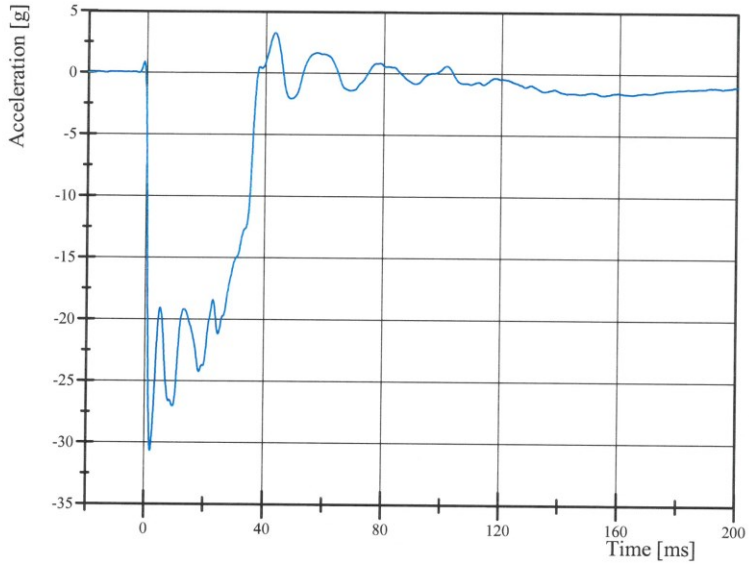
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 10:51:24 1854

Transportation Research Center Inc.

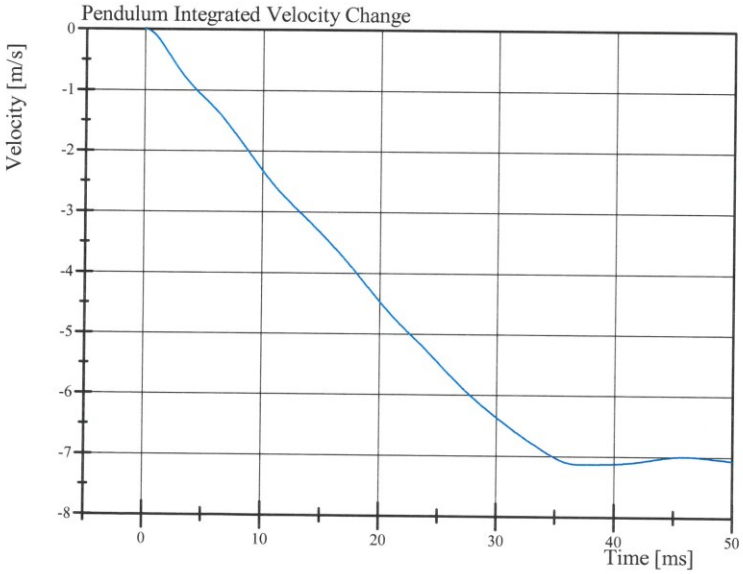
Neck Flexion
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/17/2016

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.2 g at 43.0 ms
Min: -30.7 g at 2.0 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.1 m/s at 37.4 ms

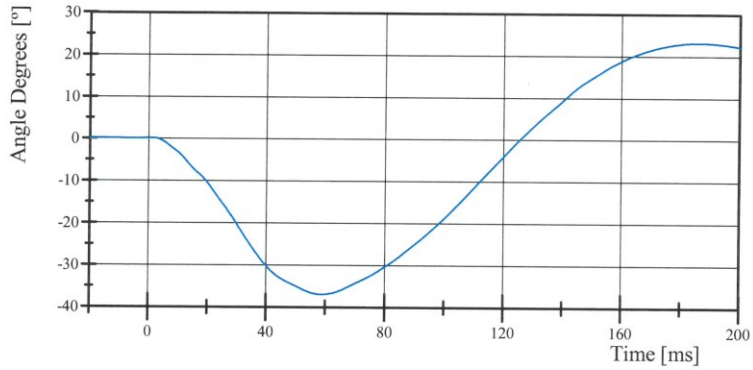
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 10:51:32 1854

Transportation Research Center Inc.

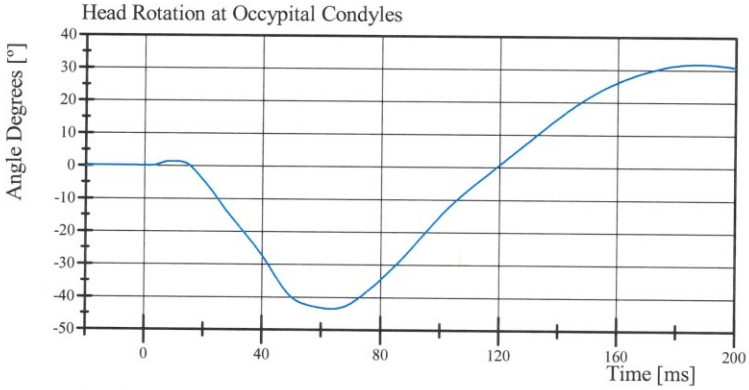
Neck Flexion
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/17/2016

Pot Rotation at the Base of Neck



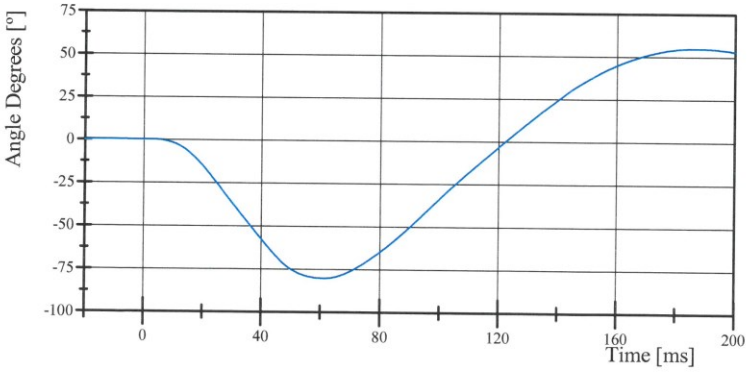
Filter Class: CFC_60
Max: 23.1 ° at 186.0 ms
Min: -37.0 ° at 58.8 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 31.8 ° at 187.4 ms
Min: -43.6 ° at 63.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 54.9 ° at 186.8 ms
Min: -80.3 ° at 61.1 ms

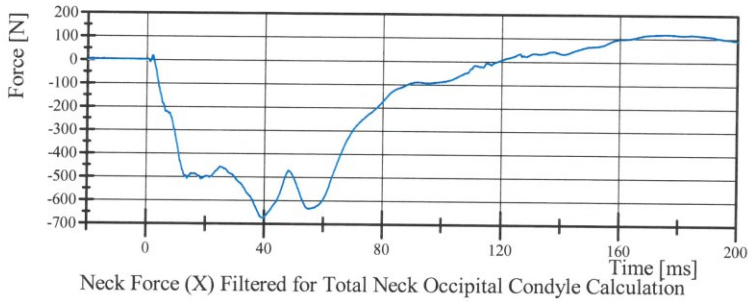
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 10:51:34 1854

Transportation Research Center Inc.

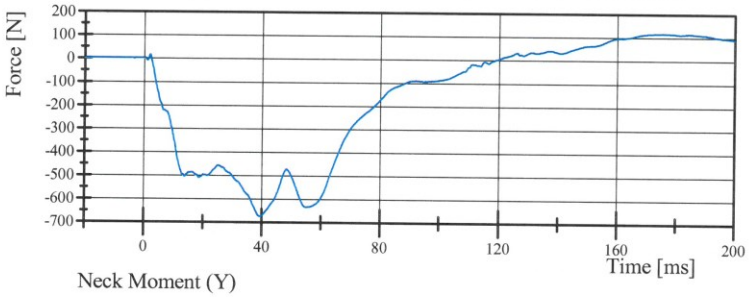
Neck Flexion
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/17/2016

Neck Force (X)



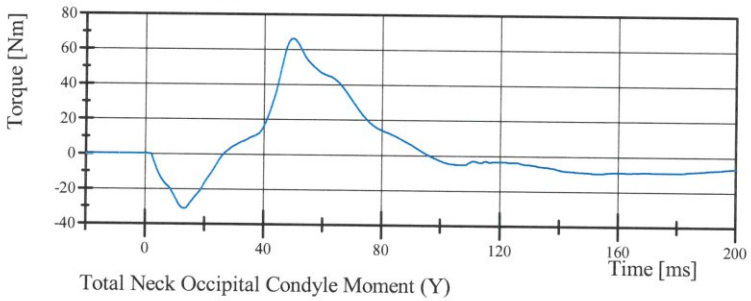
Filter Class: CFC_1000
Max: 118.7 N at 175.2 ms
Min: -675.9 N at 39.6 ms

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



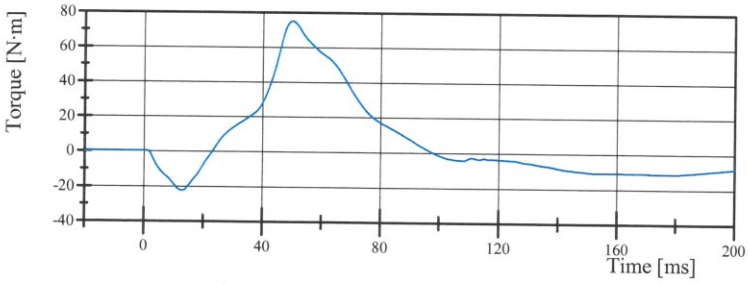
Filter Class: CFC_600
Max: 118.2 N at 175.2 ms
Min: -675.4 N at 39.5 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 66.1 Nm at 49.6 ms
Min: -31.4 Nm at 12.9 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 74.9 N·m at 49.9 ms
Min: -22.6 N·m at 12.8 ms

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

06.17.2016 10:51:37 1854

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 30-2
Test Date: 6/17/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.108 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.85 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.66 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.35 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	111.8 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-56.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	102.0 ms	Yes

Test meets specifications.

Comments:

Technician

Approved

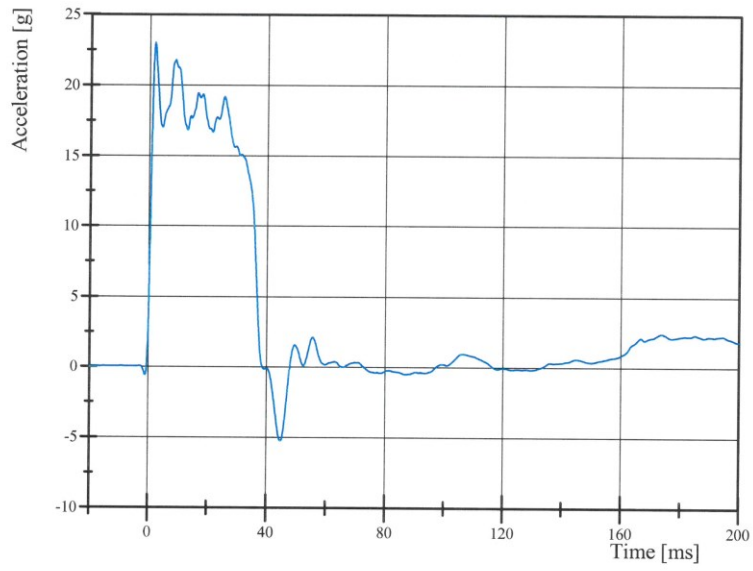
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 11:56:14 1995

Transportation Research Center Inc.

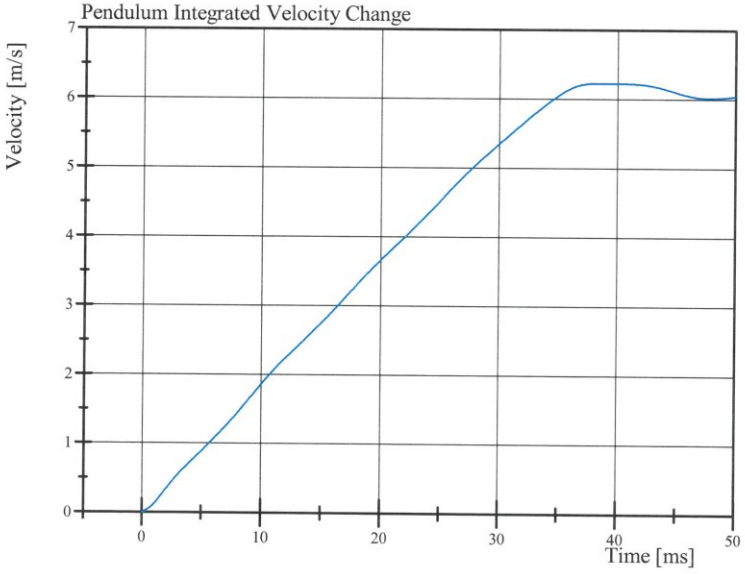
Neck Extension
HIII 5th Serial No. 070 Certification No. 30-2
Test Date: 6/17/2016

Pendulum Acceleration



Filter Class: CFC_180
Max: 23.0 g at 1.8 ms
Min: -5.3 g at 44.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.2 m/s at 38.5 ms
Min: 0.0 m/s at 0.0 ms

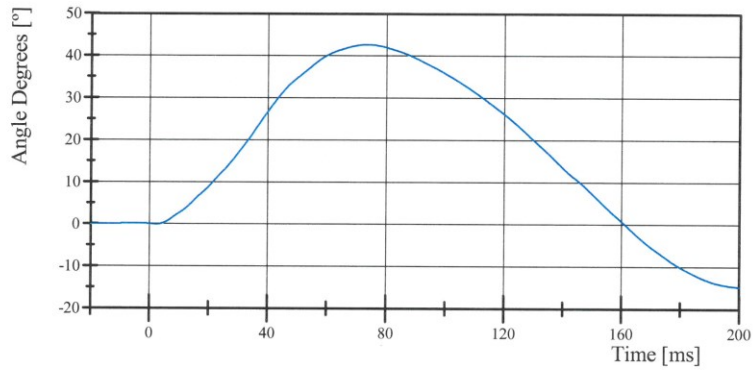
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 11:56:24 1995

Transportation Research Center Inc.

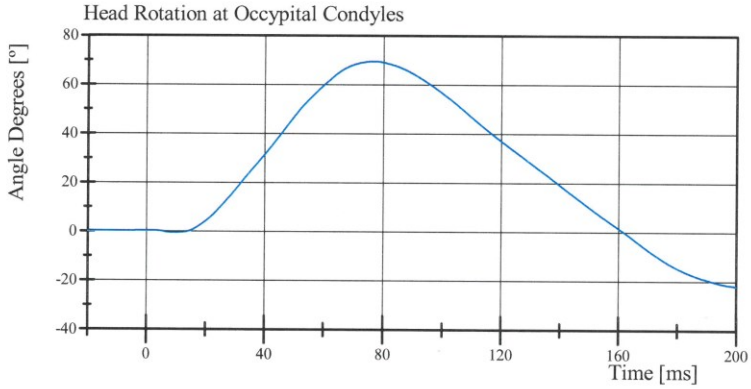
Neck Extension
HIII 5th Serial No. 070 Certification No. 30-2
Test Date: 6/17/2016

Pot Rotation at the Base of Neck



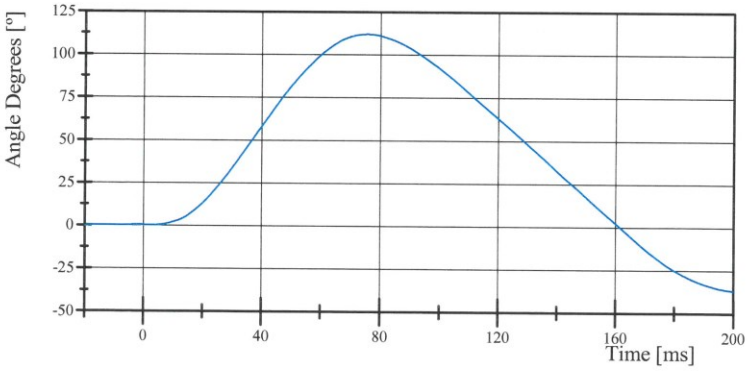
Filter Class: CFC_60
Max: 42.5 ° at 73.3 ms
Min: -14.8 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 69.3 ° at 76.7 ms
Min: -22.0 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 111.8 ° at 75.5 ms
Min: -36.8 ° at 200.0 ms

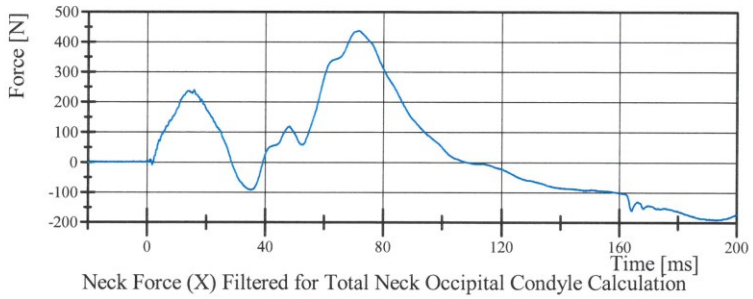
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.17.2016 11:56:25 1995

Transportation Research Center Inc.

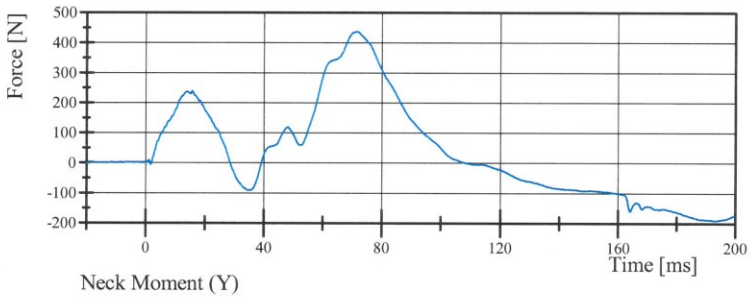
Neck Extension
HIII 5th Serial No. 070 Certification No. 30-2
Test Date: 6/17/2016

Neck Force (X)



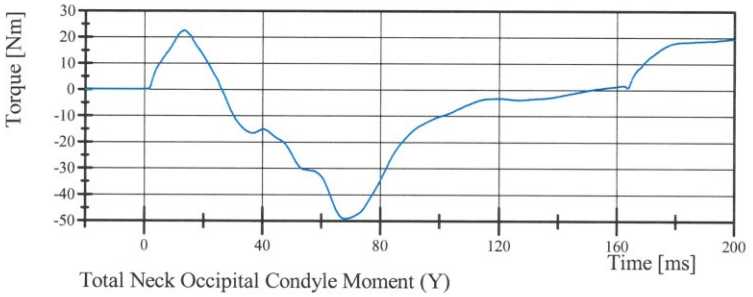
Filter Class: CFC_1000
Max: 435.7 N at 71.1 ms
Min: -191.0 N at 193.4 ms

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



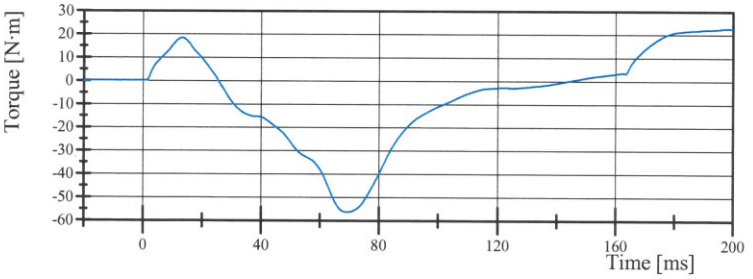
Filter Class: CFC_600
Max: 435.6 N at 71.3 ms
Min: -190.4 N at 193.3 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 22.4 Nm at 13.4 ms
Min: -49.2 Nm at 68.1 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constai
Max: 22.6 N·m at 199.0 ms
Min: -56.5 N·m at 69.5 ms

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

06.17.2016 11:56:28 1995

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.725 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-3,999.0 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,032.7 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-52.5 mm	Yes
Internal Hysteresis	69 - 85 %	72.3 %	Yes

Test meets specifications.

Comments:

Technician

Approved

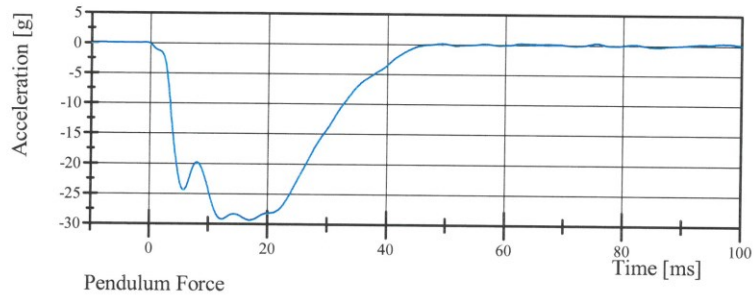
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.16.2016 15:15:02 437

Transportation Research Center Inc.

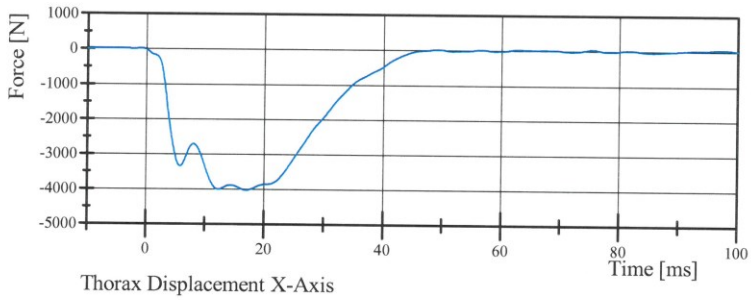
Front Thorax
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Pendulum Acceleration



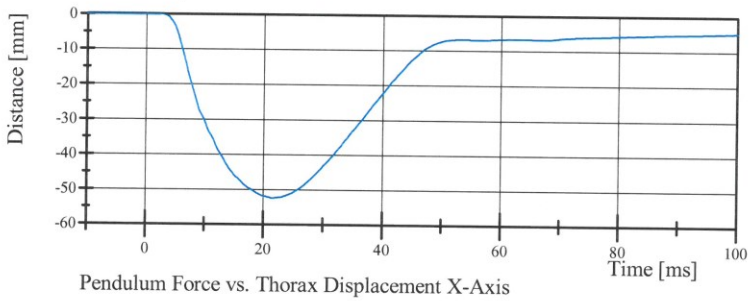
Filter Class: CFC_180
Max: 0.4 g at 96.8 ms
Min: -29.4 g at 17.0 ms

Pendulum Force



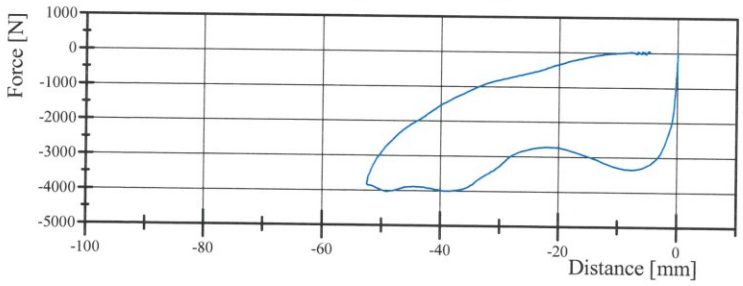
Filter Class: CFC_180
Max: 48.0 N at 96.8 ms
Min: -4,032.7 N at 17.0 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -7.0 ms
Min: -52.5 mm at 21.5 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 48.0 N at -4.8 mm
Min: -4,032.7 N at -49.1 mm

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

06.16.2016 15:15:12 437

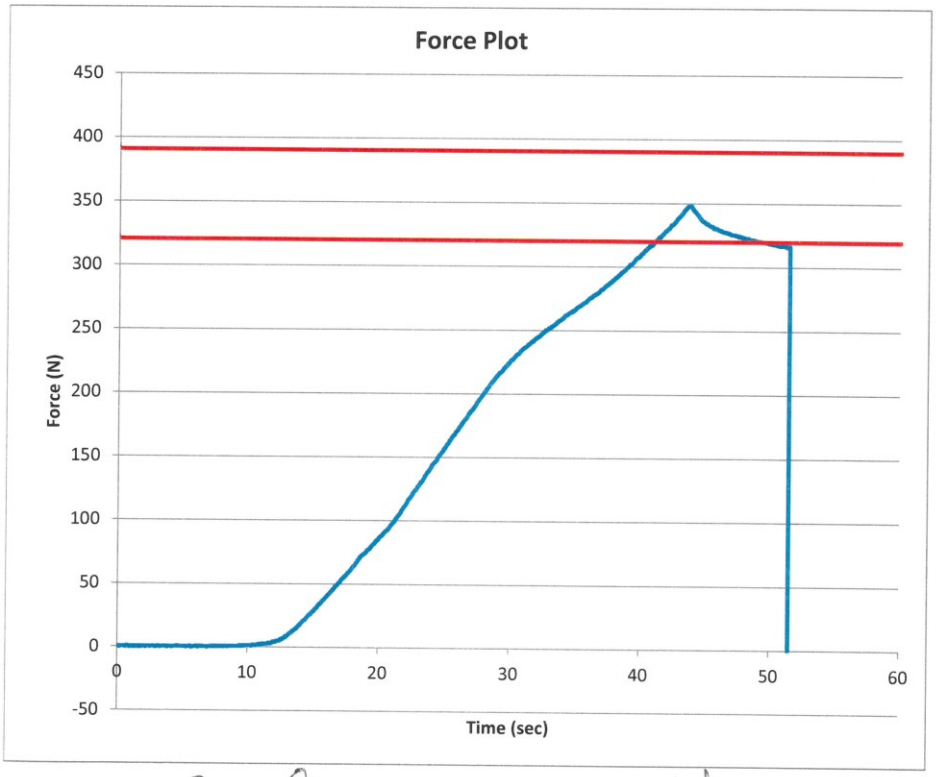
Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

NHTSA

Serial Number:	070	Date:	6/16/2016
Test Number:	1	Time:	10:21
Comments:			

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.8	°C	Pass
Humidity	10	-	70	52	%	Pass
Average Angular Velocity	0.5	-	1.5	0.89	deg/sec	Pass
Initial Angle	0	-	20	17.27	deg	Pass
Peak Force at 45.31°	320	-	390	348.01	N	Pass
Final Angle	-8	-	8	3.3	deg	Pass



Technician

Approved

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	21.1 ºC	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.120 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,584.4 N	Yes

Test meets specifications.

Comments:

Technician

Approved

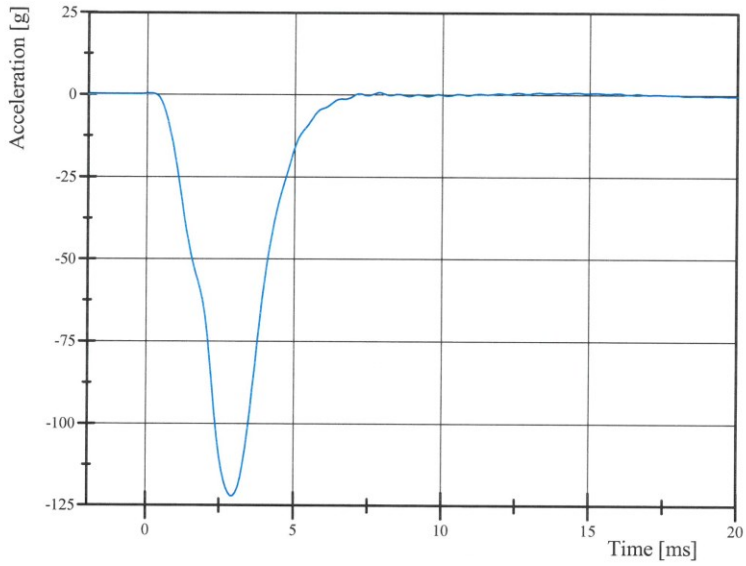
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.16.2016 15:38:56 1656

Transportation Research Center Inc.

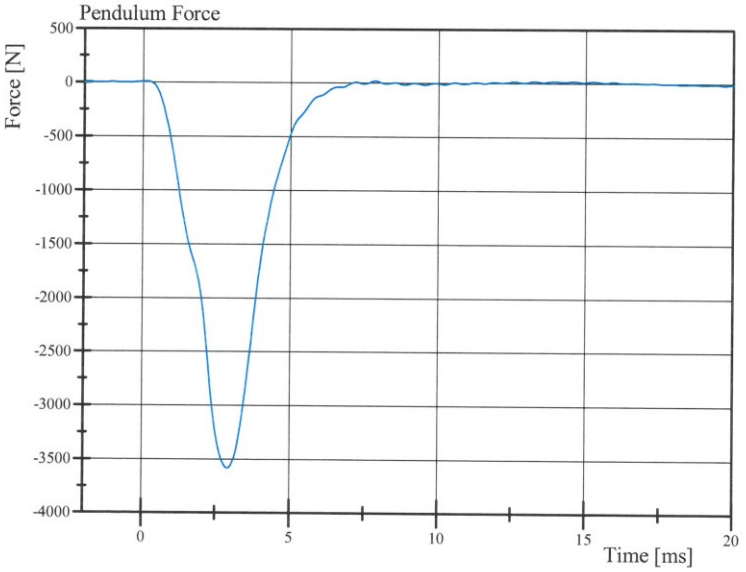
Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.6 g at 14.6 ms
Min: -122.2 g at 3.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 18.4 N at 14.6 ms
Min: -3,584.4 N at 3.0 ms

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

06.16.2016 15:39:05 1656

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	20.8 ºC	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.121 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,549.4 N	Yes

Test meets specifications.

Comments:

Technician

Approved

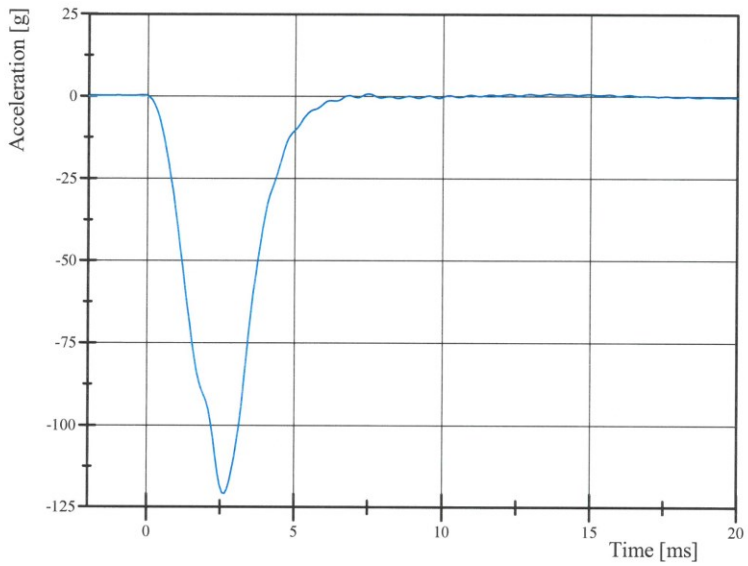
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

06.16.2016 15:44:06 1659

Transportation Research Center Inc.

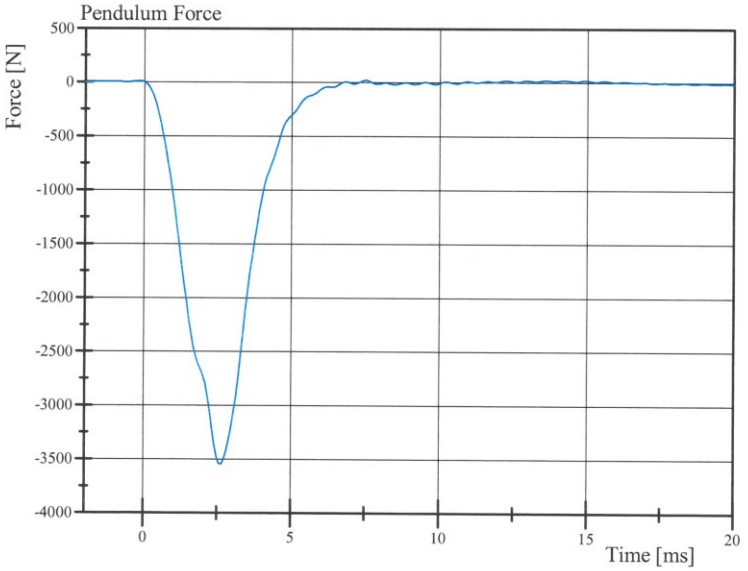
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 30-1
Test Date: 6/16/2016

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.7 g at 13.6 ms
Min: -121.0 g at 2.6 ms

Pendulum Force



Filter Class: CFC_600
Max: 19.8 N at 13.6 ms
Min: -3,549.4 N at 2.6 ms

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

06.16.2016 15:44:12 1659