Final Report Number: NCAP-TRC-20-004

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

HYUNDAI MOTOR COMPANY

2020 Hyundai Venue 5-Door Hatchback

NHTSA Number: M20204209

PREPARED BY:
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Report Date: April 2, 2020

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

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Prepared By: ILO Project Operations Group

Approved By: John Shultz

Approval Date: April 2, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date _____

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

Date _____

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16. Abstract

A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2020 Hyundai Venue 5-Door Hatchback, in accordance with the specifications the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. This test was conducted to obtain data related to FMVSS Nos. 208, 212, 219 (partial), and 301 performance. The test was conducted at the Transportation Research Center Inc. in East Liberty, Ohio on January 21, 2020.

The impact velocity was 56.37 km/h, and the ambient temperature at the barrier face at the time of impact was 19.8° C. The target vehicle post-test maximum crush was 502 millimeters at crush zone 3 at left side. 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	335	NA	700	280
Maximum Chest Compression	mm	63	-27.8	mm	52	-21.4
3ms Chest Clip	Gs	60	45.9	Gs	60	56.1
Nij	NA	1	0.32	NA	1	0.48
Neck Tension	Newtons	4170	1200.0	Newtons	2620	916.0
Neck Compression	Newtons	4000	-811.7	Newtons	2520	-309.3
Left Femur Force	Newtons	10000	-3421.2	Newtons	6800	-676.9
Right Femur Force	Newtons	10000	-1557.5	Newtons	6800	-922.7

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56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP)	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590

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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. 693JJ919D000007. 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 Laboratory Test Procedure or NCAP Full Frontal Rigid Barrier Impact Testing dated May 2018.

SUMMARY

A load cell barrier consisting of 288 load cells was impacted by a 2020 Hyundai Venue 5-Door Hatchback at a velocity of 56.37 km/h. The test was performed at Transportation Research Center, Inc. on January 21, 2020. 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 Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, femur load cells, and lower leg instrumentation.

The driver (position 1) ATD (Serial No. 037), and the right-front passenger (position 2) ATD (Serial No. 070) were qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 104 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

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

The maximum static crush of the vehicle was 502 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 bolster. The passenger's visible contact points were as follows: front airbag, headrest and glove box.

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)	335	0.32	1200.0	-811.7	45.9	-27.8	-3421.2	-1557.5
Passenger (5^{th} Female)	280	0.48	916.0	-309.3	56.1	-21.4	-676.9	-922.7

TEST COMMENTS:

Driver Shoulder Belt Force; Channel failed after 16.0 ms
Vehicle Engine Top X; Channel failed after 30.0 ms
Vehicle Engine Bottom X; Channel failed after 30.0 ms

2.2 REPORT AREA 2: DATA SHEETS

DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

TEST VEHICLE INFORMATION

NHTSA No.	M20204209
Model Year	2020
Make	Hyundai
Model	Venue
Body Style	5HB
VIN	KMHRB8A37LU015953
Body Color	Galactic Gray
Odometer Reading (km/mi)	30 mi.
Engine Displacement (L)	1.6
Type/No. Cylinders	Straight/4
Engine Placement	Front Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
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	No
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other:	No

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

DATA FROM CERTIFICATION LABEL

Manufactured by	HYUNDAI MOTOR COMPANY
Date of Manufacture	SEP/30/19

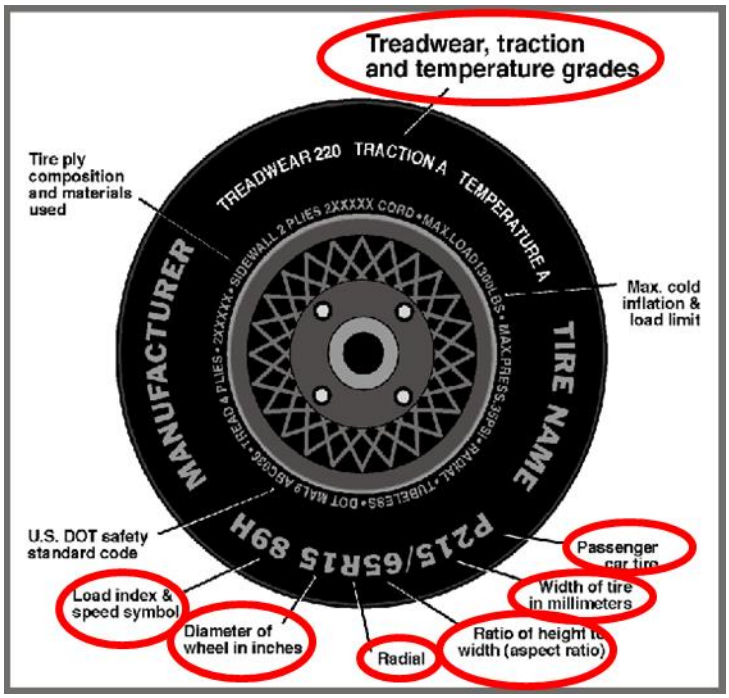
GVWR (lbs)	3770
GAWR Front (lbs)	2101
GAWR Rear (lbs)	1889

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)				380.0
Cargo Wt. (RCLW) (kg)				40.0

DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	250	250
Recommended Tire Size	185/65R15	185/65R15
Tire Size on Vehicle	185/65R15	185/65R15
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy GT	Kinergy GT
Treadwear	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index/Speed Symbol	88H	88H
Tire Material	Steel/Polyester/Nylon	Steel/Polyester/Nylon
DOT Safety Code Right	1T7DF 1B H0 3119	1T7DF 1B H0 3119
DOT Safety Code Left	1T7DF 1B H0 3019	1T7DF 1B H0 3119

DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	366.2	239.4		399.2	296.0	
Right	kg	356.0	229.4		383.2	283.8	
Ratio	%	60.6	39.4		57.4	42.6	
Totals	kg	722.2	468.8	1191.0	782.4	579.8	1362.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1191.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.3
Rated Cargo/Luggage Weight (RCLW)	kg	40.0
Vehicle Target Weight (TVTW)	kg	1370.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	715	712	714	718	992
As Tested	mm	705	700	685	688	1073
Post Test	mm	705	696	691	686	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2520
Total Vehicle Length at Left Side	mm	3855
Total Vehicle Length at Centerline	mm	4020
Total Vehicle Length at Right Side	mm	3855
Weight of Ballast in Cargo Area	kg	0.0
Weight of Vehicle Components Removed	kg	50.4
Amount of Stoddard Solvent in Fuel Tank	liters	42.0

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: Rear hatch, rear bumper beam & fascia, rear door interior panels, windows, motors & speakers, rear seat belts and exterior mirrors

DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

TARGET VEHICLE STRUCTURAL MEASUREMENT

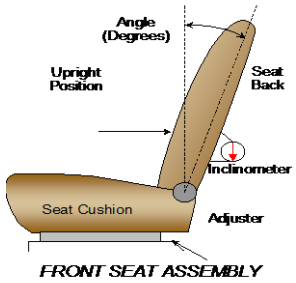
	Elements	Pre-Test (mm)
1	Total Length	4020
2	Total Width	1775
3	Bumper Top Height	565
4	Bumper Bottom Height	455
5	Longitudinal Member Top Height	340
6	Distance Between Longitudinal Members	920
7	Longitudinal Member Width	75
8	Engine Top Height	850
9	Engine Bottom Height	205
10	Engine and Gearbox Width	840
11	Front Bumper-Engine Distance	380
12	Front Shock Absorber Fixing Height	900
13	Bonnet Leading Edge Height	850
14	Front Shock Absorber Fixing Width	1140
15	Front Bumper – Front Axle Distance	603
16	Front Axle – A-Pillar Distance	520
17	A-Pillar – B-Pillar Distance	965
18	B-Pillar – Rear Axle Distance	1050
19	B-Pillar – C-Pillar Distance	970
20	Roof Sill Bottom Height	1410
21	Roof Sill Top Height	1368
22	Floor Sill Bottom Height	340
23	Floor Sill Top Height	380

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

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

NORMAL DESIGN RIDING POSITION

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



	Degree
Driver Seat back angle:	0.5
Passenger Seat back angle:	3.5

SEAT FORE/AFT POSITIONS

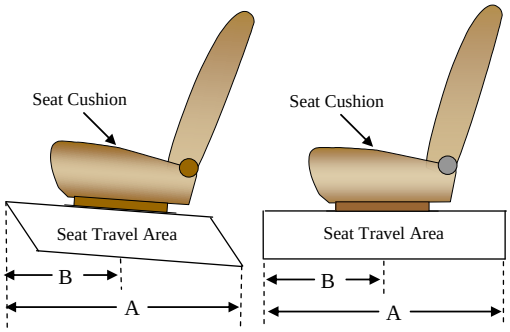
Describe the method of determining seat fore/aft positions.
Driver: Mid position, Positioned according to Form 1
Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	35 detents/230 mm	Detent 14
Passenger Seat	34 detents/215 mm	Detent 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	Fixed	Fixed
Passenger Seat	Fixed	Fixed



DATA SHEET NO. 2 - SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA (CONT'D)

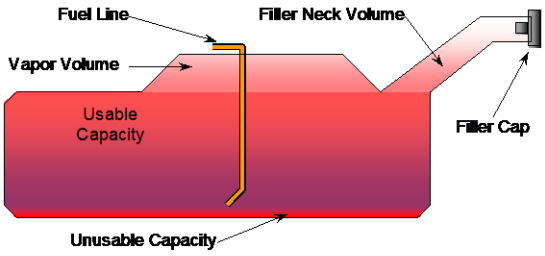
Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	45.0
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	41.9
Actual Amount of Solvent Used	42.0
1/3 of Usable Capacity	15.0

Describe the fuel system - what type of fuel pump, details about how it operates, etc.

Key is in the "ON" position

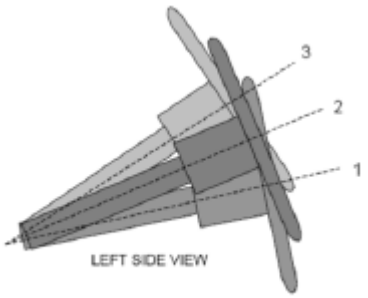


VEHICLE FUEL TANK ASSEMBLY

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. Describe how this measurement was taken.

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



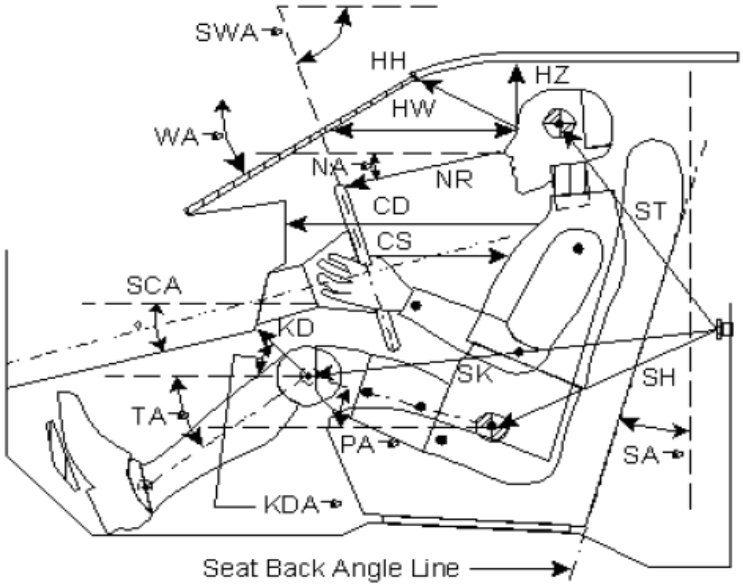
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	24.3	0
Geometric Center Position No. 2	27.0	24
Uppermost Position No. 3	29.7	48
Telescoping Steering Wheel Travel		48
Test Position	27.0	24

DATA SHEET NO. 3 - DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

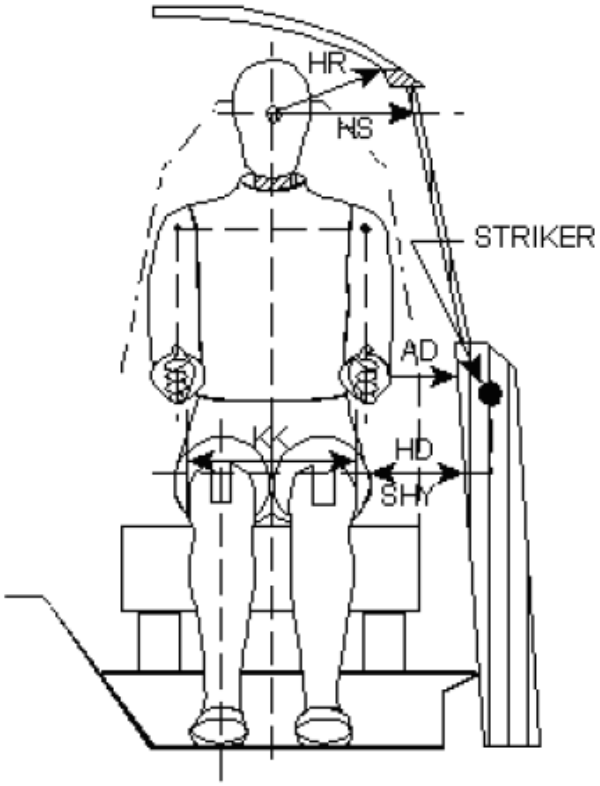
Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WAº	Windshield Angle		33.0		
SWAº	Steering Wheel Angle		27.0		
SCAº	Steering Column Angle		63.0		
SAº	Seat Back Angle (on head rest post)		0.5		3.5
HZ	Head to Roof (Z)	232		288	
HH	Head to Header	387		354	
HW	Head to Windshield	668		697	
NR	Nose to Rim	382	8.1		
CD	Chest to Dash	530		453	
CS	Chest to Steering Hub	319			
RA	Rim to Abdomen	180			
KDL	Left Knee to Dash	180	19.0	119	18.5
KDR	Right Knee to Dash	159	18.1	128	24.0
PAº	Pelvic Angle		24.4		20.9
TAº	Tibia Angle		53.7		63.4
SK	Striker to Knee	536	5.7	604	10.7
ST	Striker to Head	470	-83.4	405	-72.5
SH	Striker to H-Point	254	50.4	313	32.6

DATA SHEET NO. 4 - DUMMY LATERAL CLEARANCE DIMENSIONS

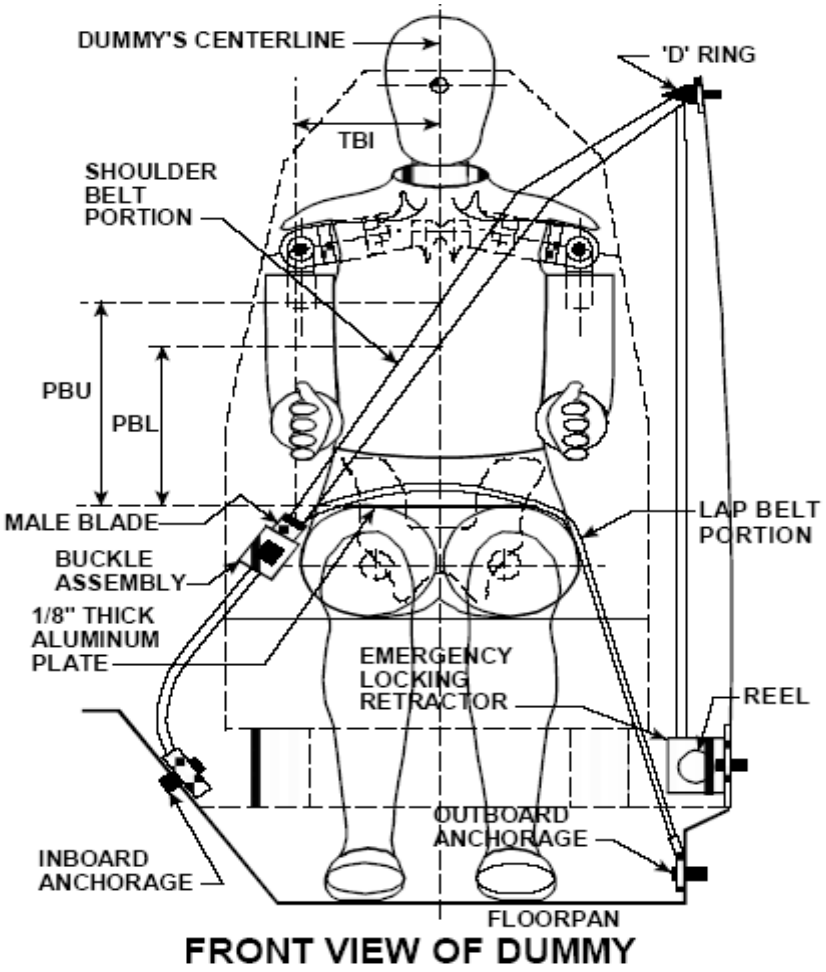
Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



Code	Measurement Description	Driver	Passenger
AD	Arm to Door	55	92
HD	H-Point to Door	150	189
HR	Head to Side Header	220	270
HS	Head to Side Window	321	358
KK	Knee to Knee	313	171
SHY	Striker to H-Point (Y Direction)	225	266
AA	Ankle to Ankle	330	204

DATA SHEET NO. 5 - SEAT BELT POSITIONING DATA

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	366	320
PBL – Top surface of reference to belt lower edge	mm	295	244

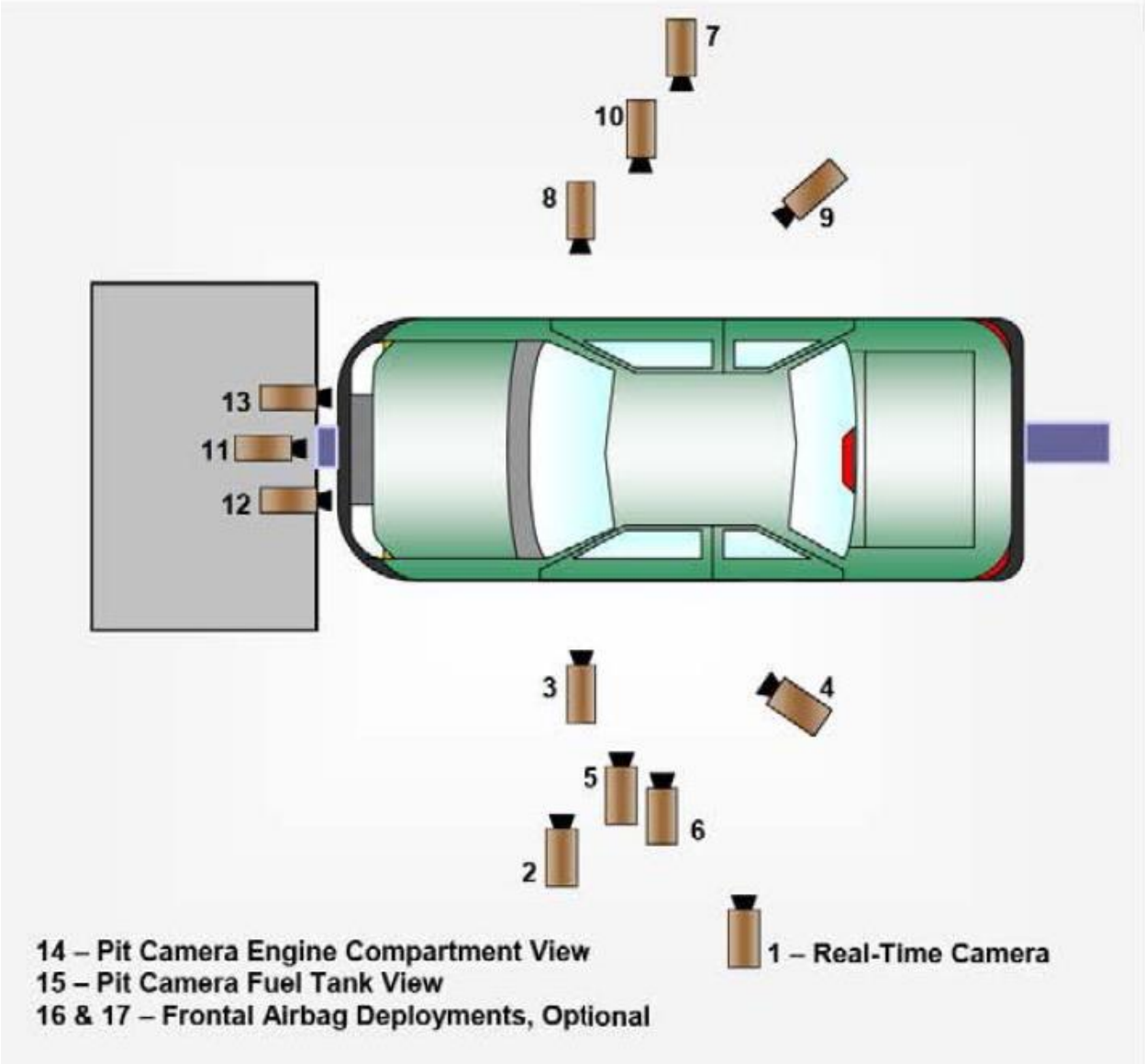
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	858	906
Lap belt length as measured on ATD	mm	768	873
Remainder of belt on reel	mm	974	821
Total belt length for continuous webbing systems	mm	2600	2600

DATA SHEET NO. 6 - HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2020 Hyundai Venue 5-Door Hatchback	NHTSA No.:	M20204209
Test Program:	NCAP Frontal Impact	Test Date:	1/21/2020

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 - HIGH SPEED CAMERA LOCATIONS AND DATA (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

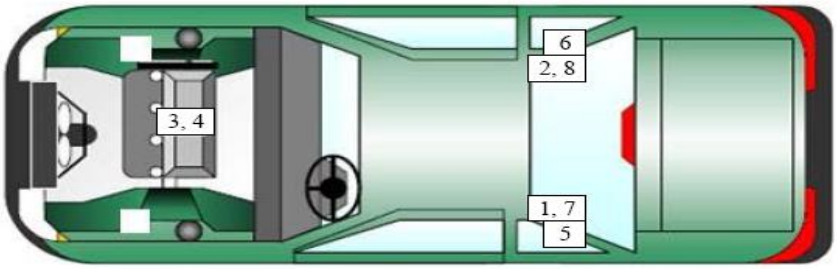
CAMERA LOCATIONS

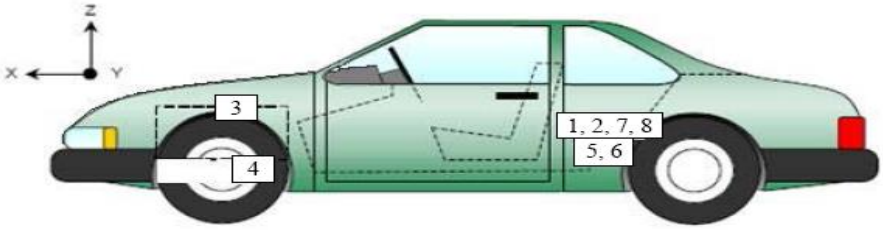
No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	REAL-TIME LEFT OVERALL	-1104	-5543	-1474	Zoom	30
2	LEFT OVERALL	-2763	-5692	-1549	20	1000
3	DRIVER CLOSE-UP	-1827	-5140	-1461	20	1000
4	LEFT FRONT HALF	-1026	-5157	-1492	28	1000
5	LEFT ANGLE	-3048	-2082	-1837	25	1000
6	STEERING COLUMN	-2192	-5263	-1483	20	1000
7	RIGHT OVERALL	-1991	5696	-1472	20	1000
8	PASSENGER CLOSE-UP	-1315	5232	-1507	50	1000
9	RIGHT FRONT HALF	-724	4838	-1463	28	1000
10	RIGHT ANGLE	-3026	1714	-1774	25	1000
11	WINDSHIELD	0	0	-2588	12.5	1000
12	DRIVER WINDSHIELD	0	-443	-2588	20	1000
13	PASSENGER WINDSHIELD	0	411	-2588	20	1000
14	PIT FRONT	-785	0	3165	18.5	1000
15	PIT REAR	-3067	0	3211	20	1000
16	DRIVER ONBOARD				12.5	1000
17	PASSENGER ONBOARD				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: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1410	-170	-532
2	Right Rear Accelerometer – X Direction	1410	175	-530
3	Engine Top X	3370	20	-850
4	Engine Bottom X	3410	100	-851
5	Left Rear Accelerometer – Z Direction	1410	-170	-538
6	Right Rear Accelerometer – Z Direction	1410	175	-536
7	Left Rear Accelerometer – X Direction Redundant	1410	-145	-532
8	Right Rear Accelerometer- X Direction Redundant	1410	150	-530

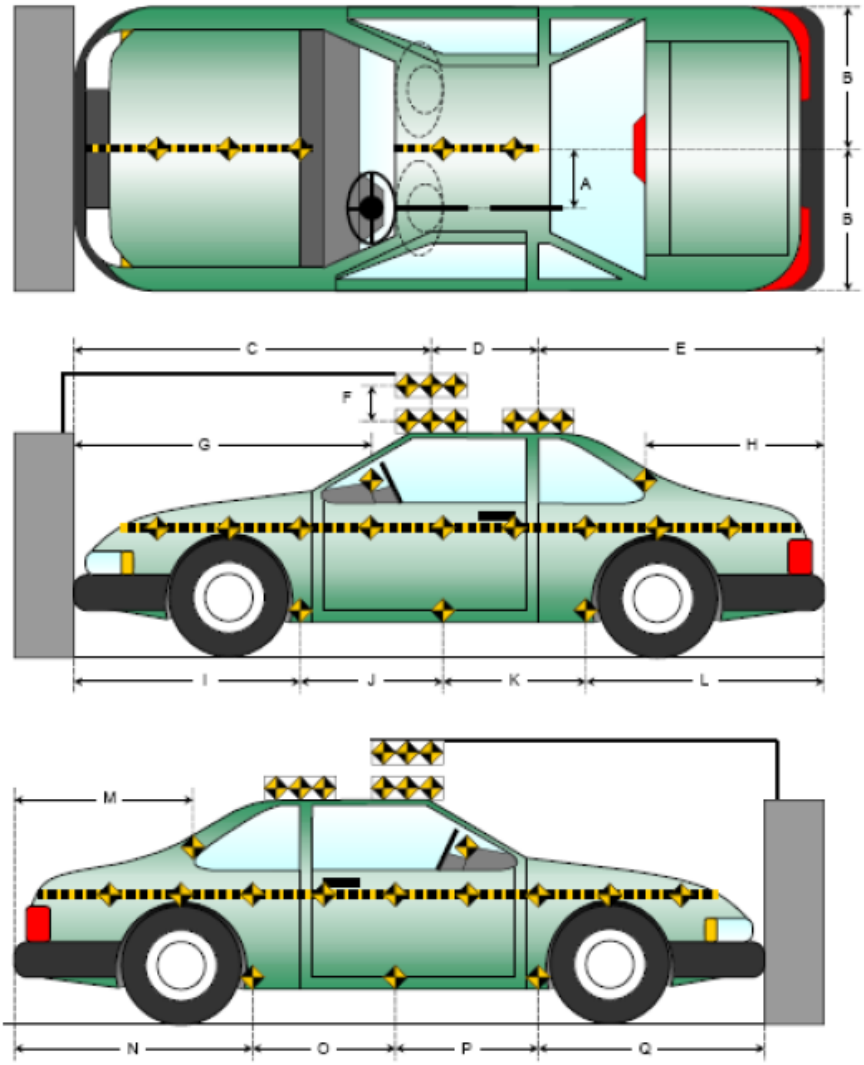
Reference Points: X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8 - PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

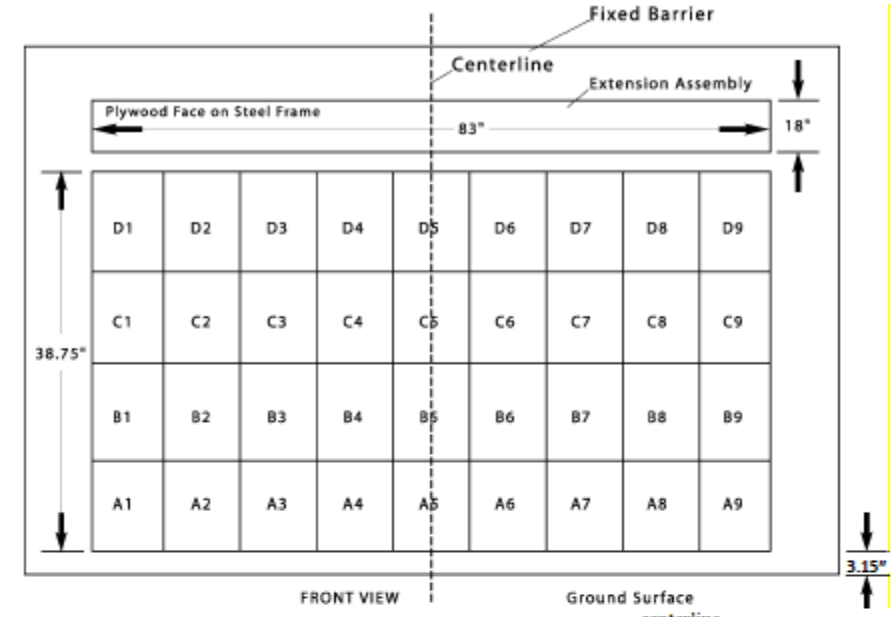
Item	Value
A	370
B	888
C	2026
D	610
E	1391
F	440
G	1519
H	940
I	1217
J	822
K	833
L	1155
M	942
N	1157
O	828
P	826
Q	1216

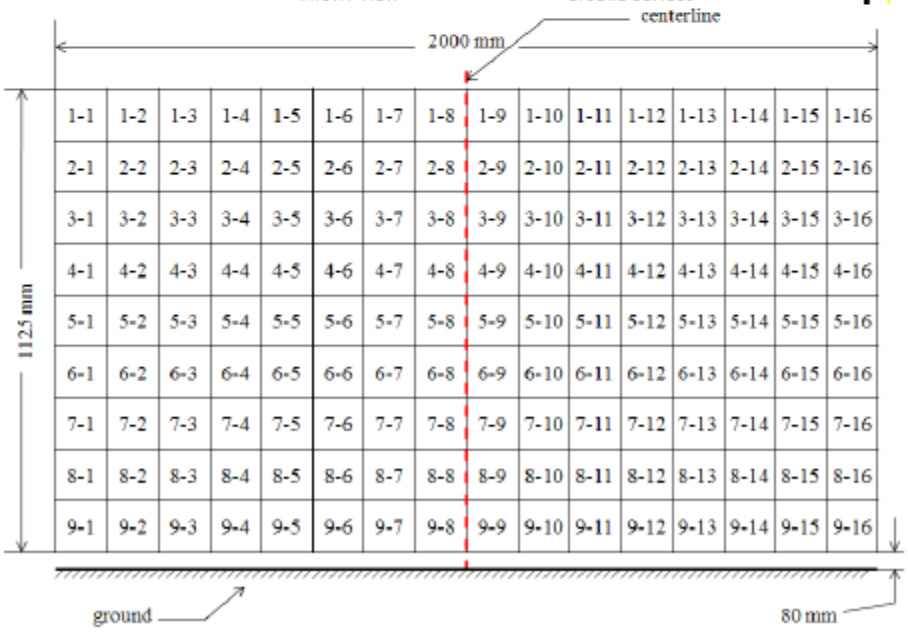
All units in millimeters



DATA SHEET NO. 9 - LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020





DATA SHEET NO. 10 - TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Total	102

CAMERA COVERAGE

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

DATA SHEET NO. 11 - POST-TEST OBSERVATIONS

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

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 and Head Restraint	Frontal Airbag and Head Restraint
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

Description	Driver	Passenger	Other
Locked/Unlocked Doors**	Unlocked	Unlocked	
Front Door Opening**	No	No	
Rear Door Opening**	No	No	
Trunk/Hatch/Tailgate Opening**			N/A
Seat Track Shift (mm) **	No	No	
Seat Back Movement from Initial Position**	No	No	

**NOTE: Indicate "No", "N/A, or "Yes", and if "Yes", describe

POST- OTHER VEHICLE POST-TEST OBSERVATIONS

Critical Areas of Performance	Observations
Windshield Damage	Star burst from passenger airbag, cracking along lower edge
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

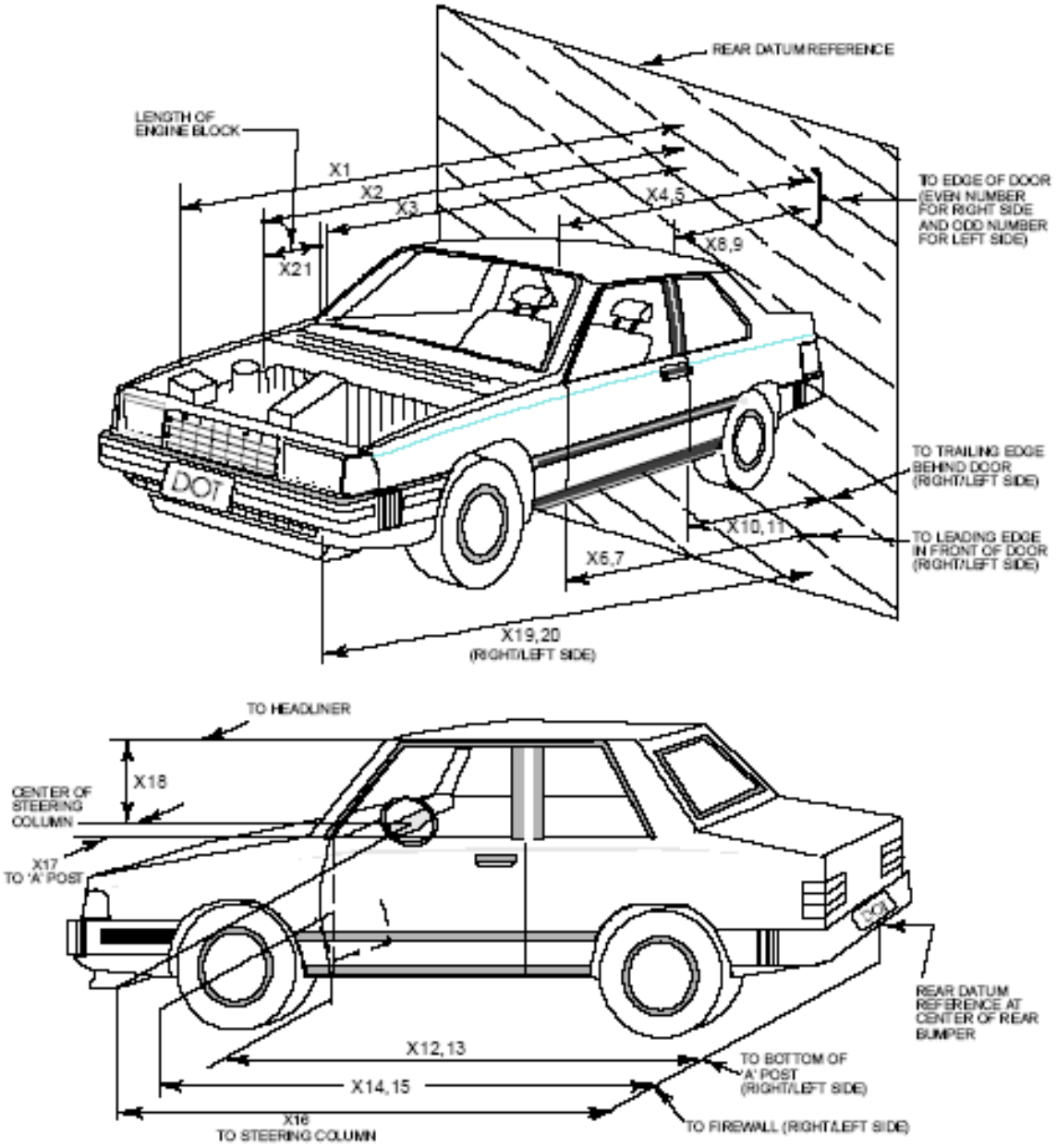
Measured Parameter	Units	Value
Left Side	mm	1724
Center	mm	1702
Right Side	mm	1773
Average	mm	1733

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 - VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



DATA SHEET NO. 12 - VEHICLE PROFILE MEASUREMENTS (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4020	3520	500
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3630	3440	190
3	RSOV to Firewall	3190	3135	55
4	RSOV to Upper Leading Edge of Right Door	2740	2738	2
5	RSOV to Upper Leading Edge of Left Door	2740	2735	5
6	RSOV to Lower Leading Edge of Right Door	2727	2712	15
7	RSOV to Lower Leading Edge of Left Door	2728	2706	22
8	RSOV to Upper Trailing Edge of Right Door	1779	1777	2
9	RSOV to Upper Trailing Edge of Left Door	1781	1774	7
10	RSOV to Lower Trailing Edge of Right Door	1802	1788	14
11	RSOV to Lower Trailing Edge of Left Door	1802	1782	20
12	RSOV to Bottom of "A" Post-of Right Side	2745	2743	2
13	RSOV to Bottom of "A" Post-of Left Side	2747	2738	9
14	RSOV to Firewall, Right Side	3185	3138	47
15	RSOV to Firewall, Left Side	3195	3138	57
16	RSOV to Steering Column	2501	2423	78
17	Center of Steering Column to "A" Post	280	305	-25
18	Center of Steering Column to Headliner	452	435	17
19	RSOV to Right Side of Front Bumper	3855	3509	346
20	RSOV to Left Side of Front Bumper	3855	3496	359
21	Length of Engine Block	600	600	0
RD	RSOV to Right Side of Dash Panel	2545	2545	0
CD	RSOV to Center of Dash Panel	2493	2495	-2
LD	RSOV to Left Side of Dash Panel	2545	2540	5

All Dimensions in mm

DATA SHEET NO. 13 - ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

VEHICLE INFORMATION

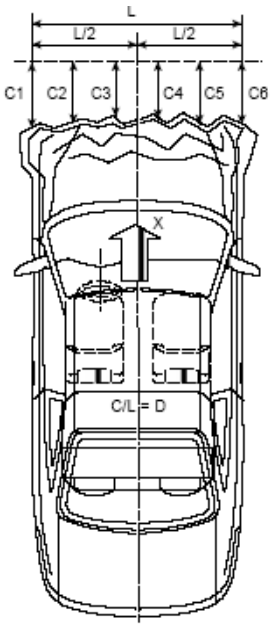
VIN: KMHRB8A37LU015953 Wheelbase: 2520
Vehicle Size Category: Passenger Car Test Weight (kg): 1362.2

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): 56.37
Velocity Change (km/h): 64.01
Time of Separation (ms): 108

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1524
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	3855	3496	359
C2	Crush zone 2 at left side	mm	3995	3501	494
C3	Crush zone 3 at left side	mm	4015	3513	502
C4	Crush zone 4 at right side	mm	4015	3515	500
C5	Crush zone 5 at right side	mm	3995	3510	485
C6	Crush zone 6 at right side	mm	3855	3509	346
L	C1 to C6	mm	1524	1155	369

DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS

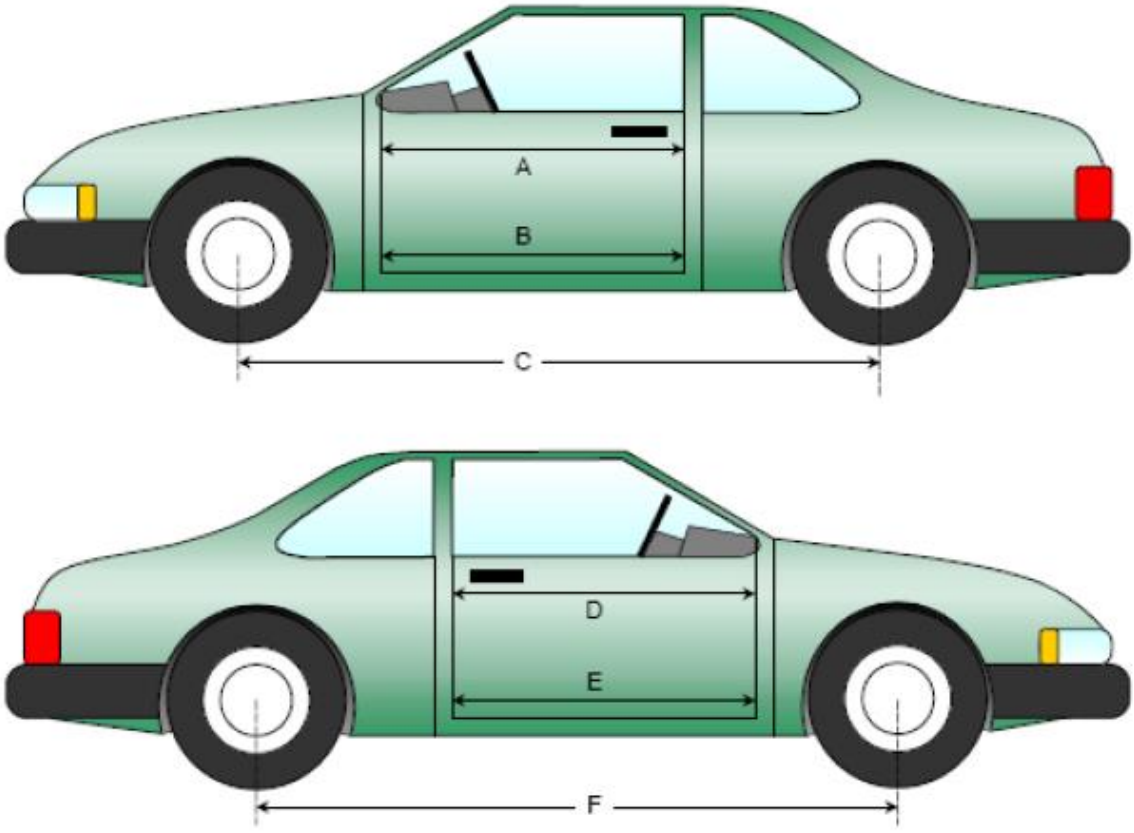
Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	925	925	0
B	Left Side Lower	mm	830	830	0
D	Right Side Upper	mm	925	925	0
E	Right Side Lower	mm	830	830	0

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2520	2470	50
F	Right Side Wheelbase	mm	2520	2495	25



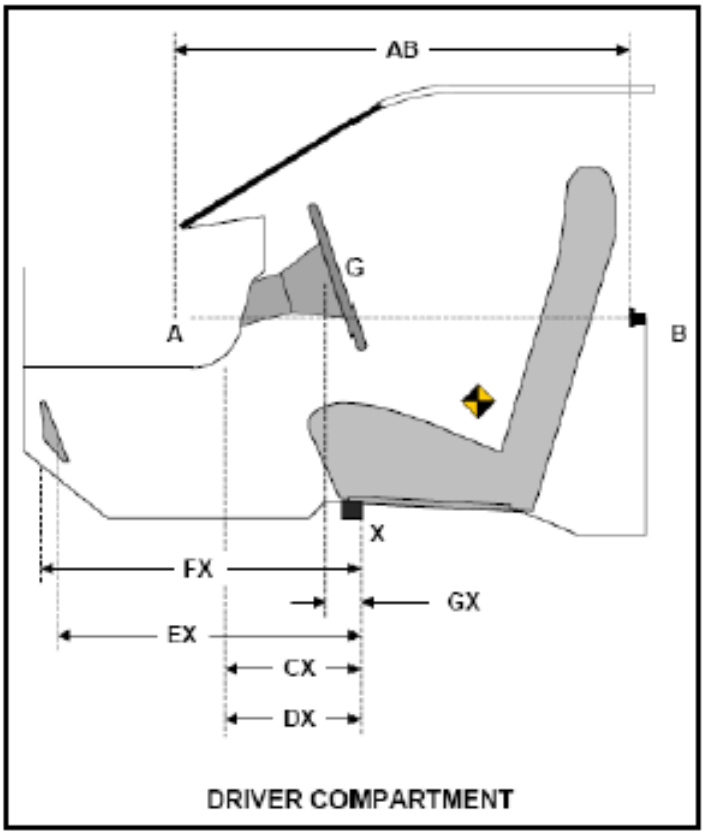
DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	905	905	0
CX	Left Knee Bolster to X	mm	280	302	-22
DX	Right Knee Bolster to X	mm	260	270	-10
EX	Brake Pedal to X	mm	538	465	73
FX	Foot Rest to X	mm	560	525	35
GX	Center of Steering Column Wheel Hub to X	mm	39	115	-76

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15 - SUMMARY OF INDICANT FMVSS 212 AND FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

Please provide windshield mounting details.

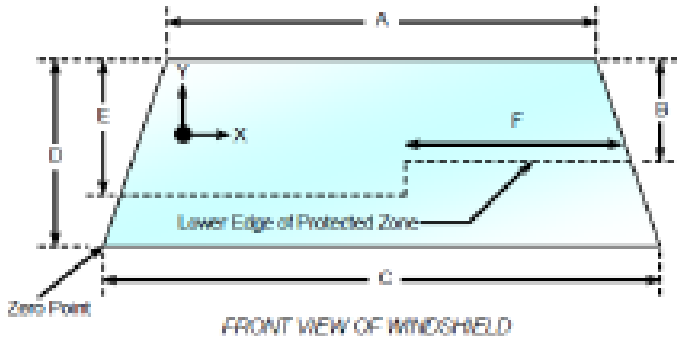
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.2°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2075	2075	100.0
Right Side	2075	2075	100.0
Total	4150	4150	100.0

Item	Units	Value
A	mm	1155
B	mm	492
C	mm	1485
D	mm	755
E	mm	460
F	mm	400



FRONT VIEW OF WINDSHIELD

AREAS OF PROTECTED ZONE FAILURES

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

DATA SHEET NO. 16 - FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 21.2°C Test Time: 18:38

Stoddard Solvent Spillage Measurements

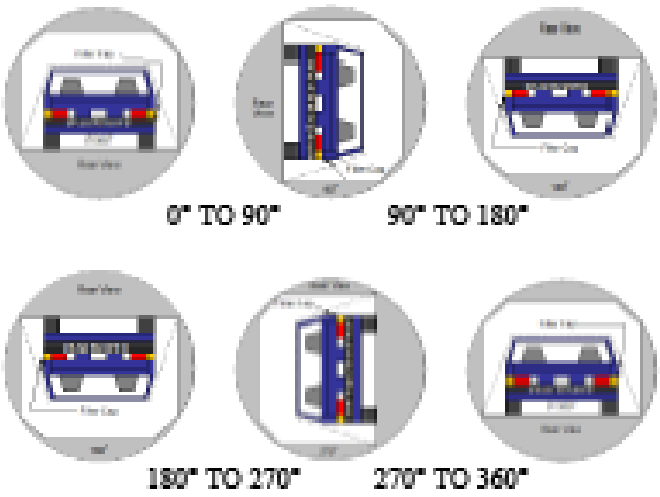
A	From impact until vehicle motion ceases: (maximum allowable – 1 oz.)	0 oz.
B	For the 5-minute period after motion ceases: (maximum allowable – 5 oz.)	0 oz.
C	For the following 25 minutes: (maximum allowable – 1 oz./minutes)	0 oz.
D	Spillage: None	

DATA SHEET NO. 16 - FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS (CONT'D)

Test Vehicle: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020

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

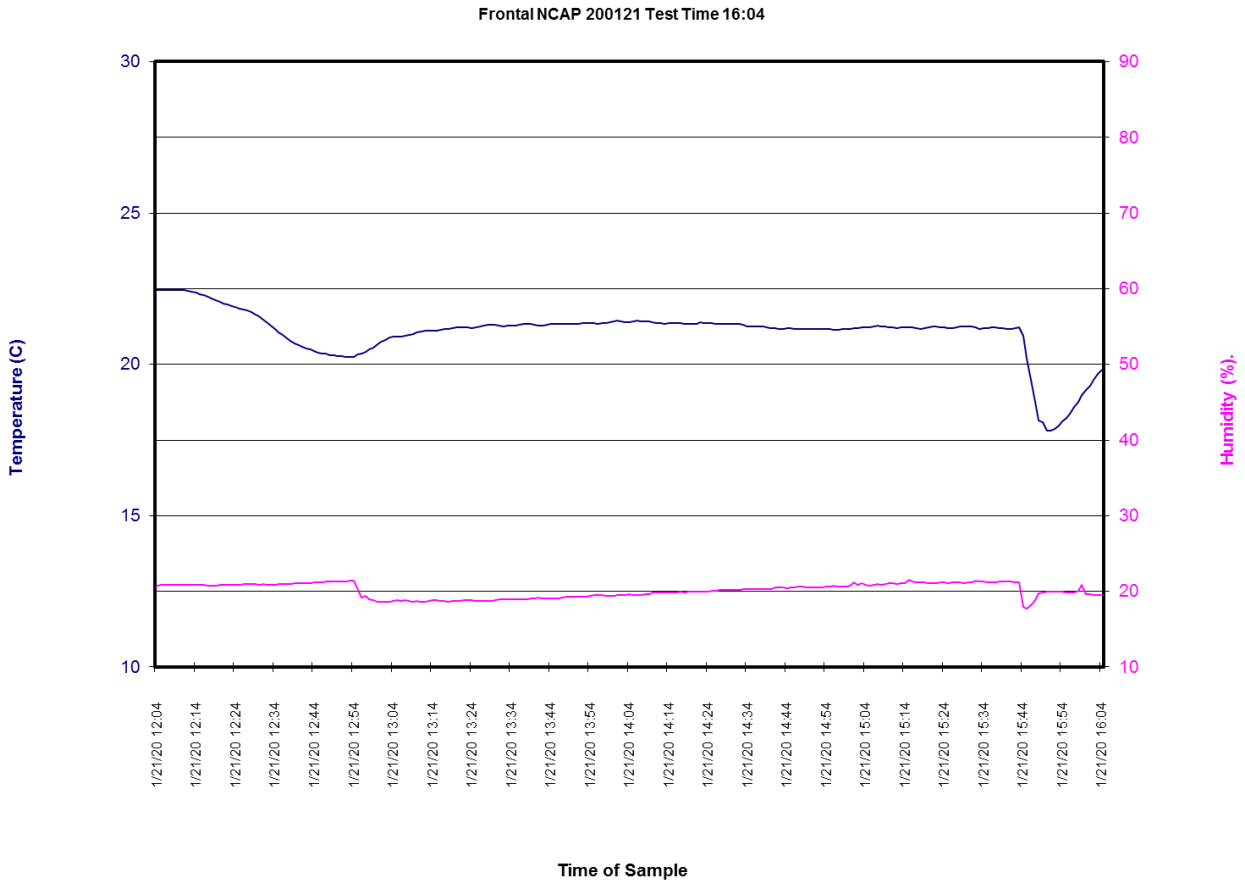
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0º to 90º	0	0	0	N/A
90º to 180º	0	0	0	N/A
180º to 270º	0	0	0	N/A
270º to 360º	0	0	0	N/A

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: 2020 Hyundai Venue 5-Door Hatchback NHTSA No.: M20204209
Test Program: NCAP Frontal Impact Test Date: 1/21/2020



APPENDIX A

PHOTOGRAPHS

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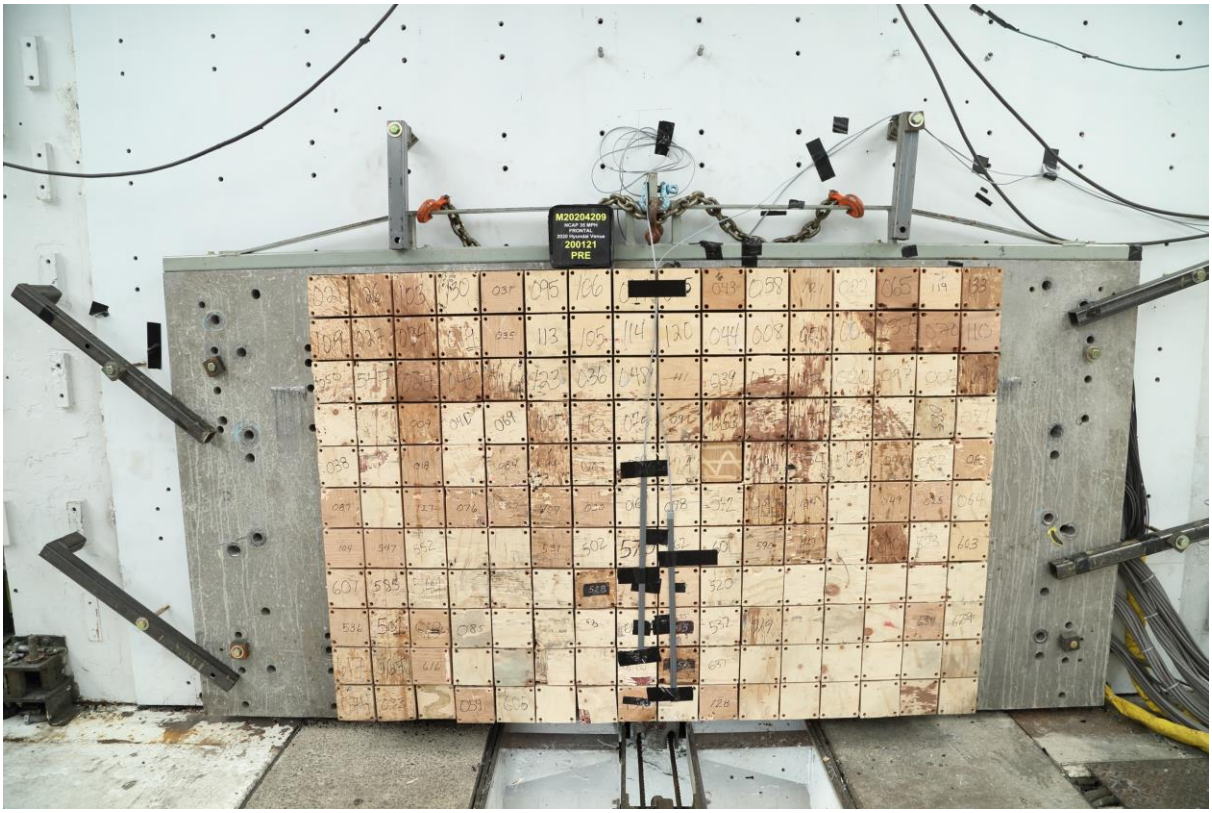
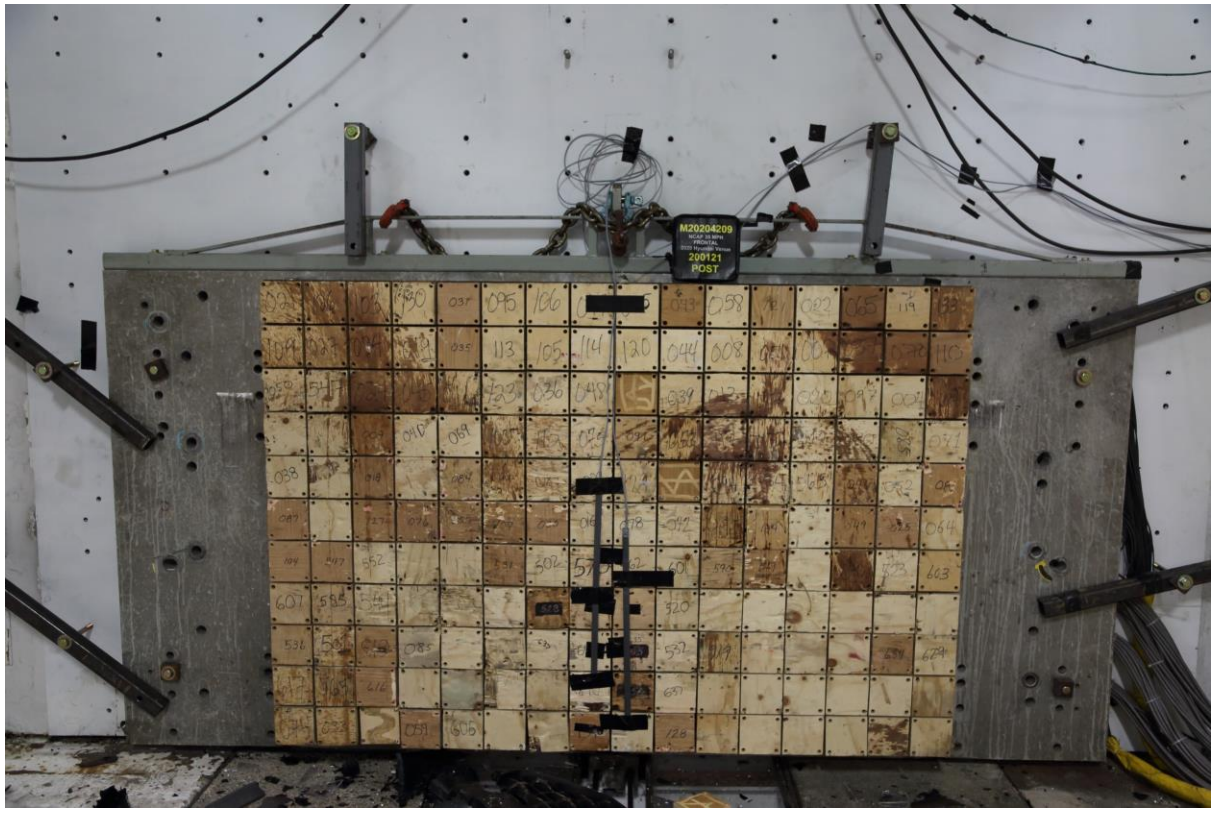
001 Load Cell Location



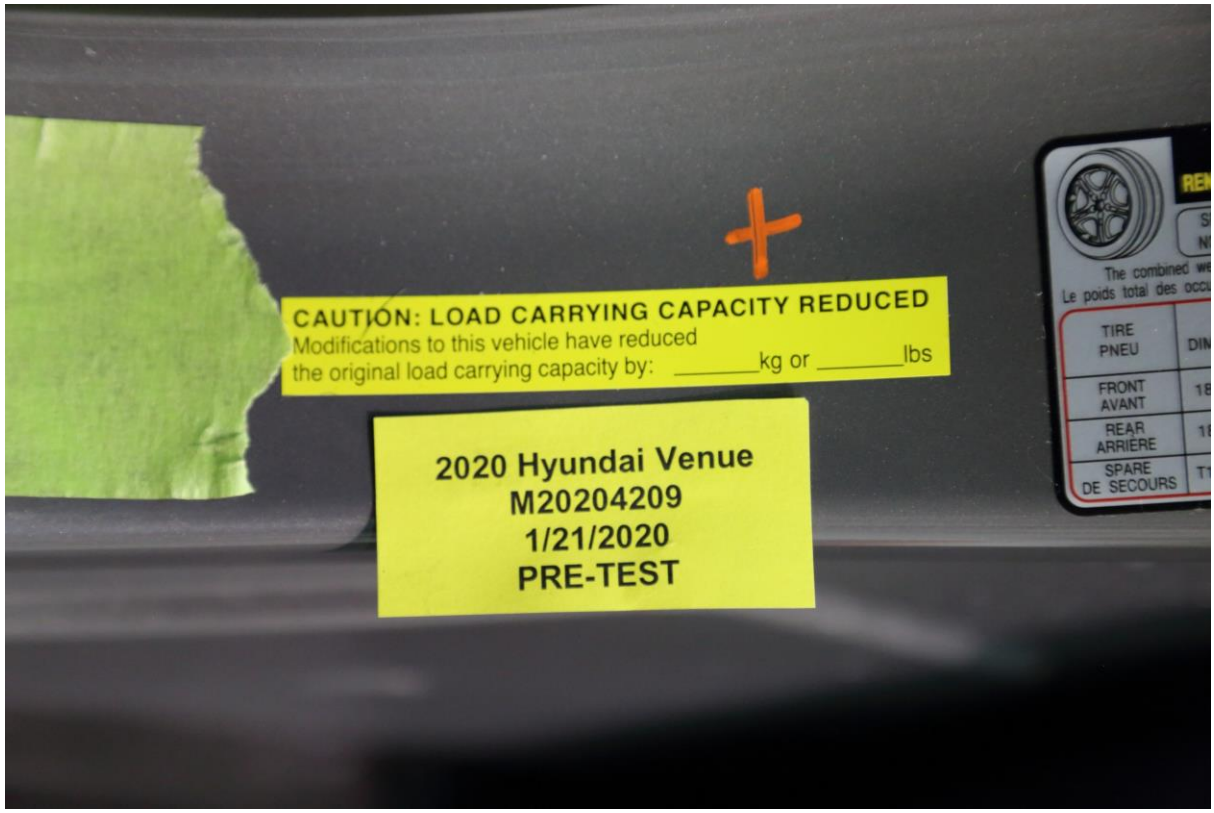
002 Pre-Test Load Cell Wall



003 Post-Test Load Cell Wall

004 Manufacturer's Label

005 Tire Placard



005a Reduced Load Carrying Capacity Label

006 2020 Hyundai Venue Frontal As Delivered

007 Left Rear 3-4 View, as Received

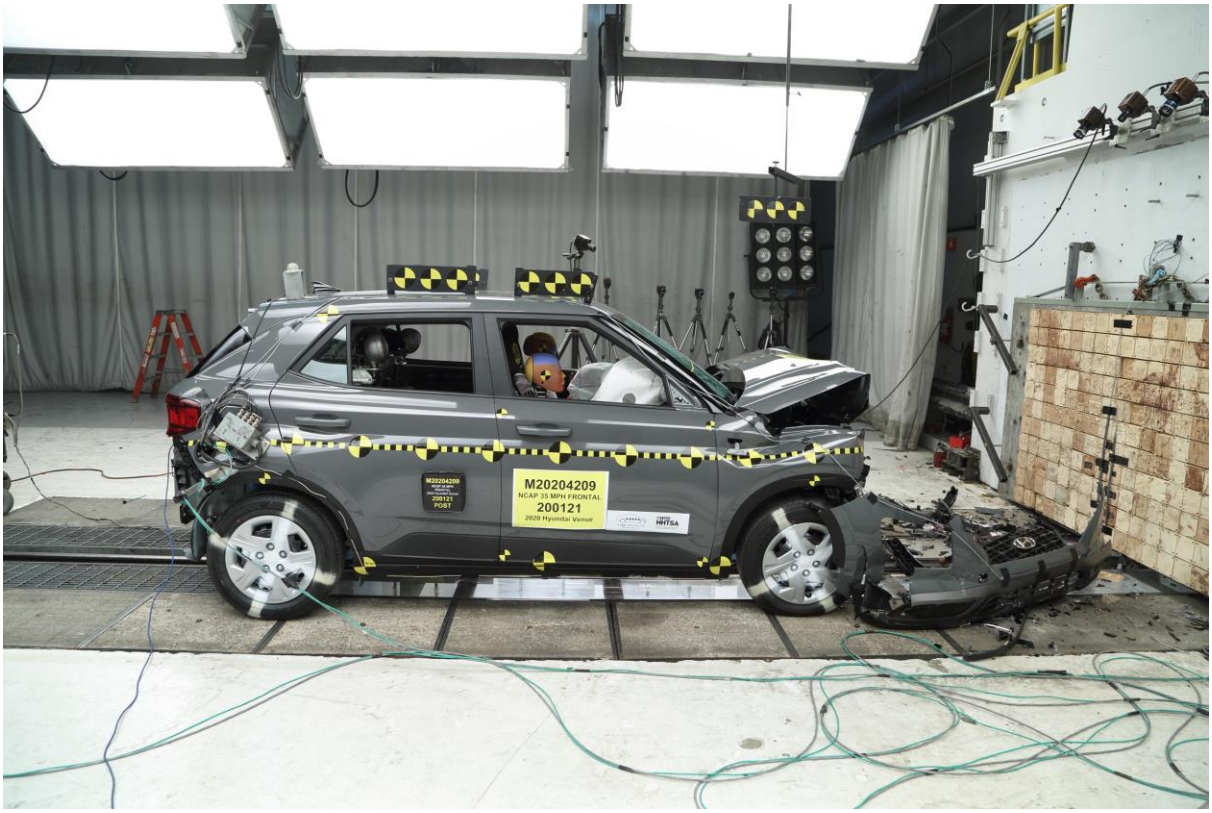
008 Pre-Test Front View of Test Vehicle

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

016 Pre-Test Left Rear 3-4 View

017 Post-Test Left Rear 3-4 View

018 Pre-Test Windshield View

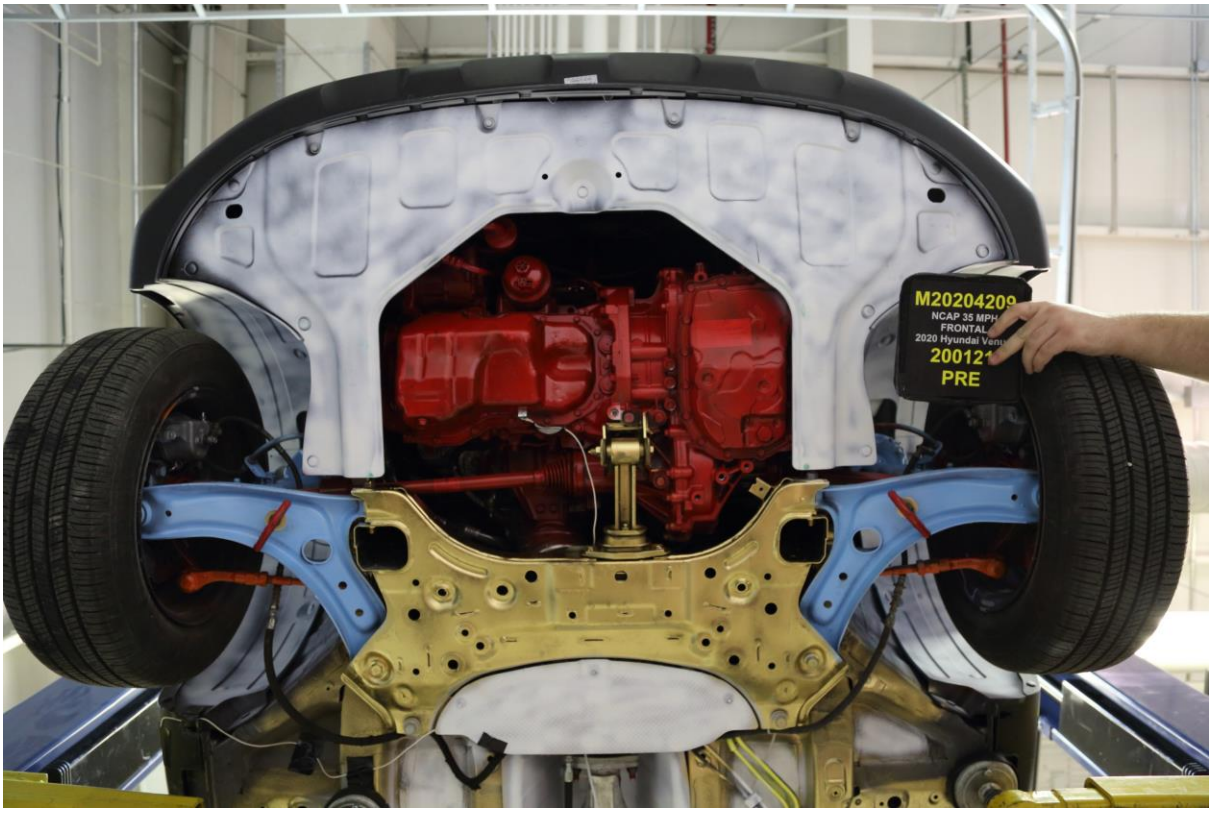
019 Post-Test Windshield View

020 Pre-Test Engine Compartment View

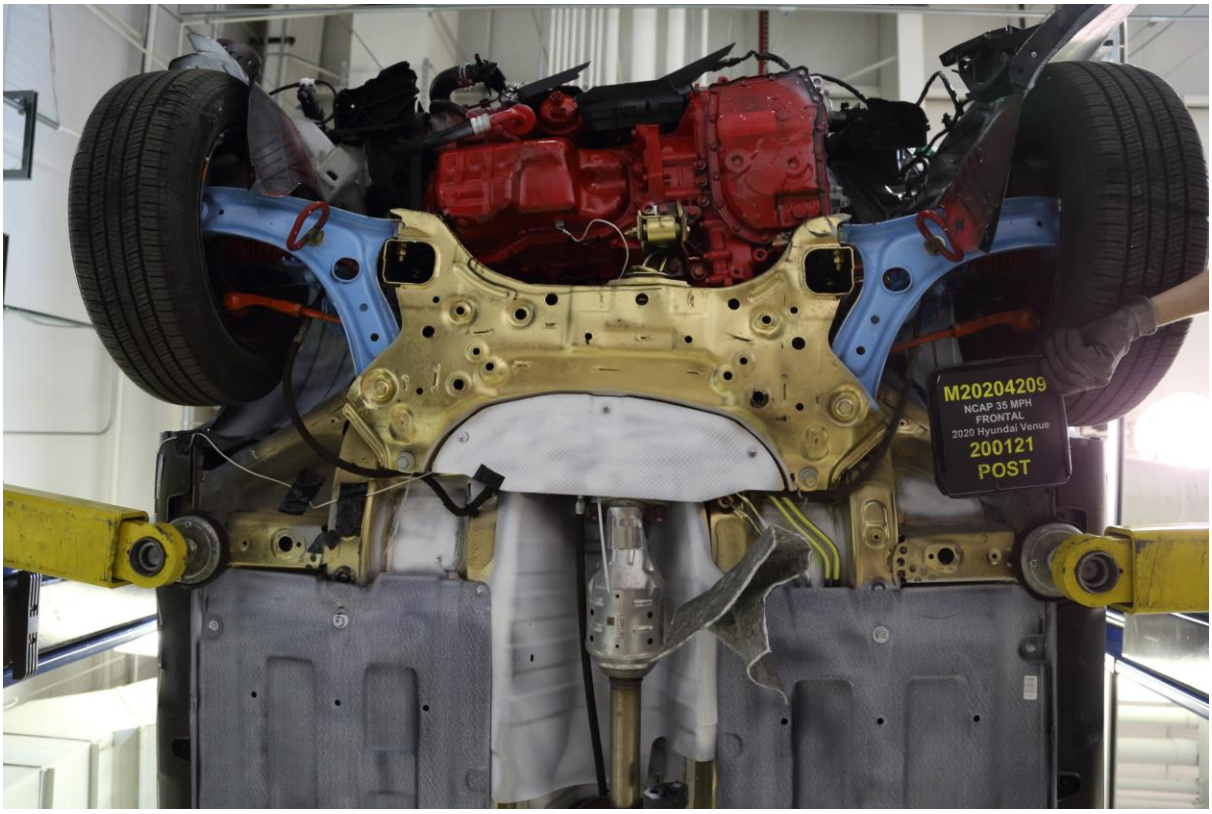
021 Post-Test Engine Compartment View

022 Pre-Test Fuel Filler Cap View

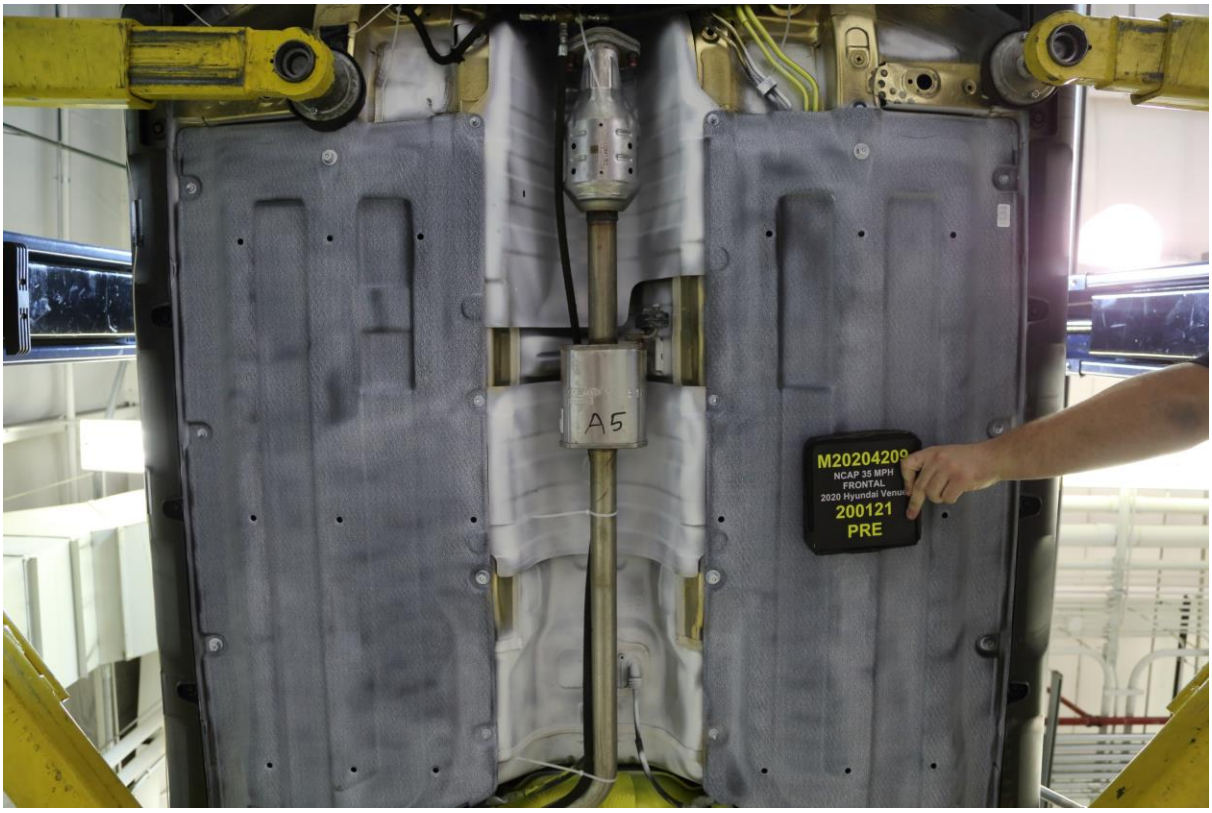
023 Post-Test Fuel Filler Cap View



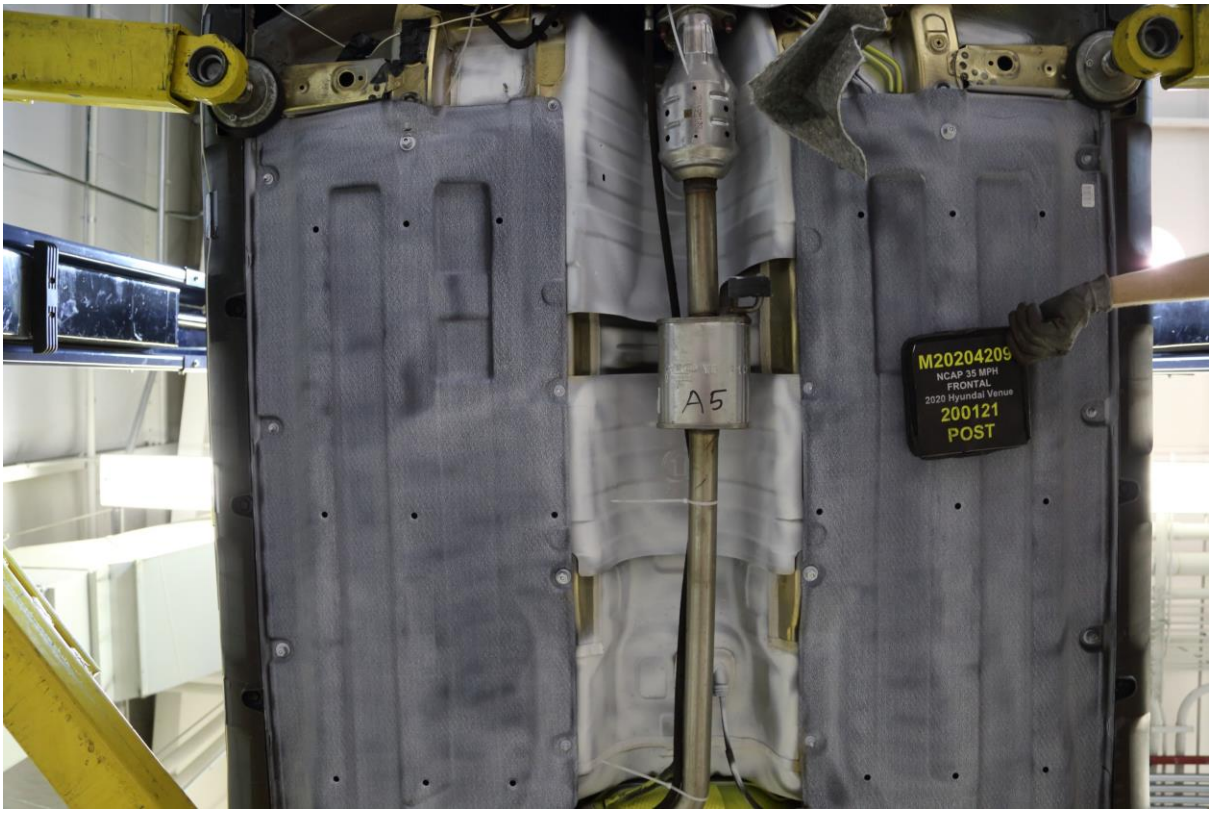
024 Pre-Test Front Underbody View



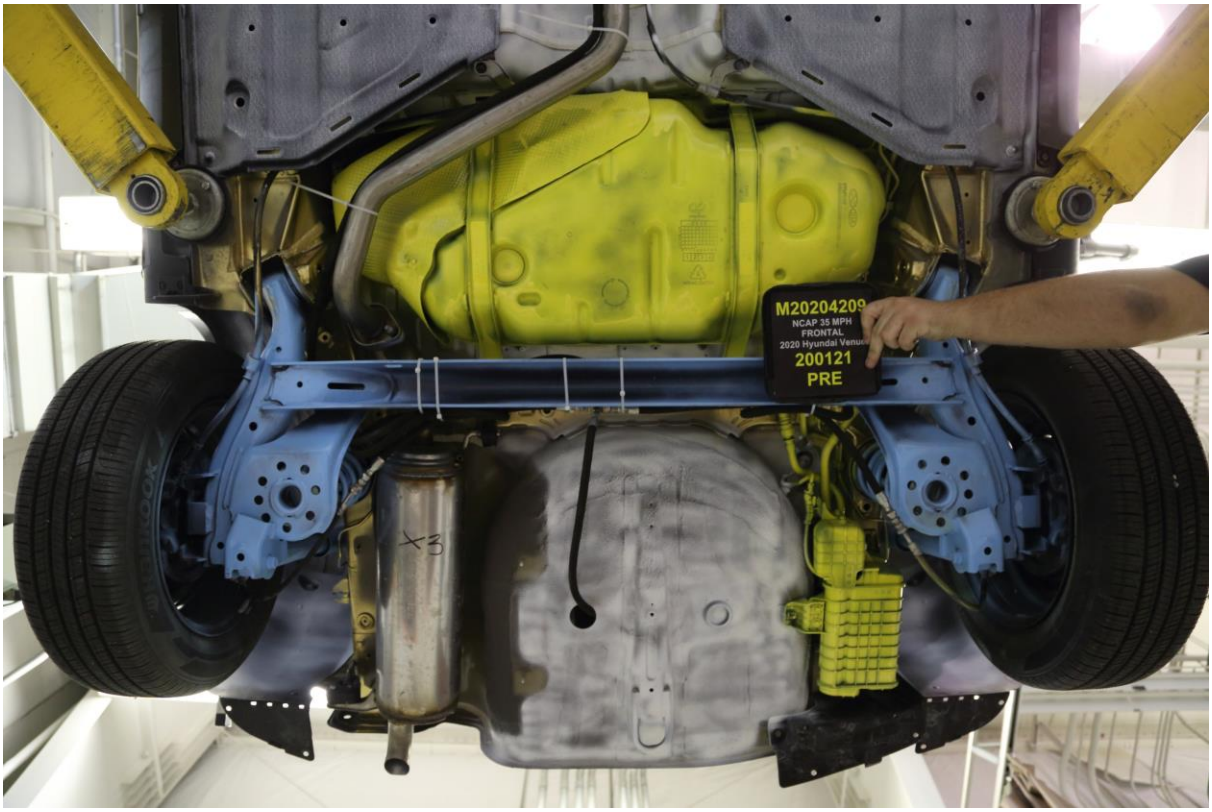
025 Post-Test Front Underbody View



025a Pre-Test Mid Underbody View

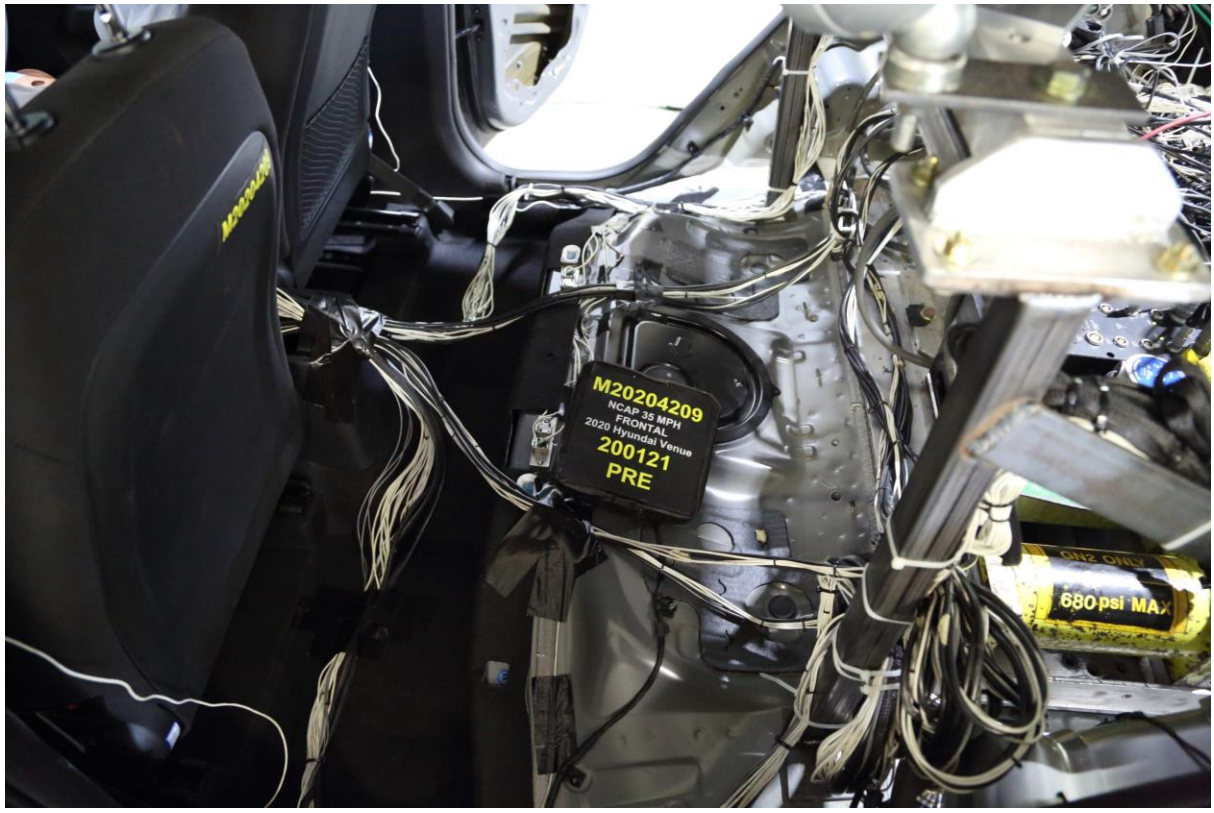


025b Post-Test Mid Underbody View

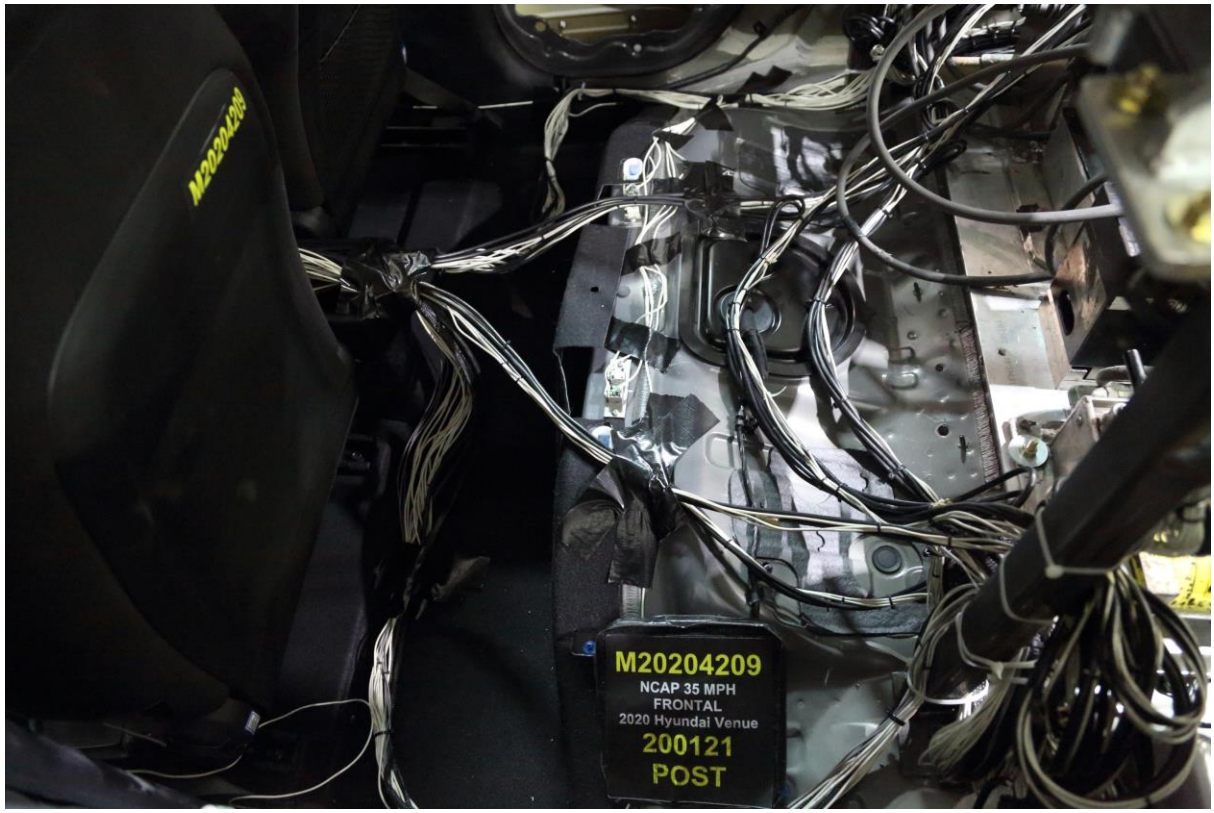


026 Pre-Test Rear Underbody View

027 Post-Test Rear Underbody View

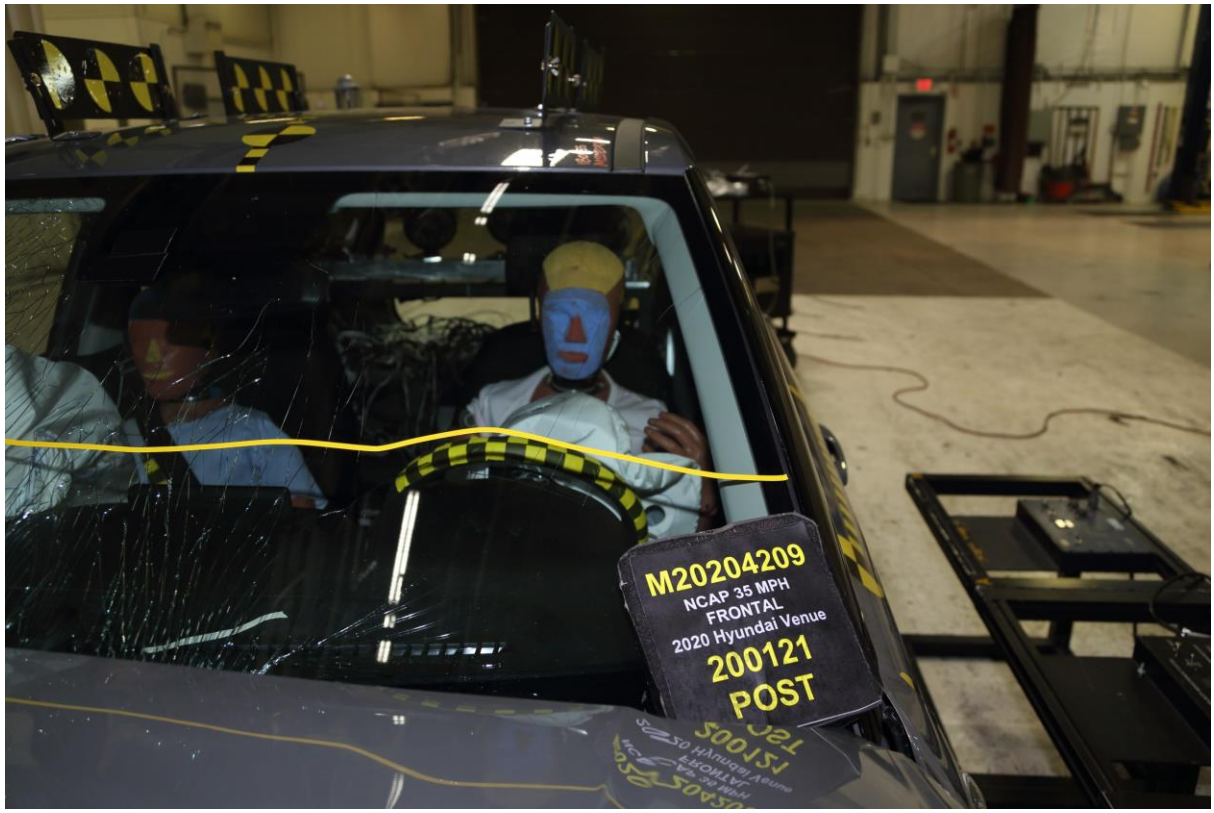


028 Pre-Test Dummy Cable Routing



029 Post-Test Dummy Cable Routing

030 Pre-Test Driver Dummy Front View



031 Post-Test Driver Dummy Front View

032 Pre-Test Driver Dummy Window View

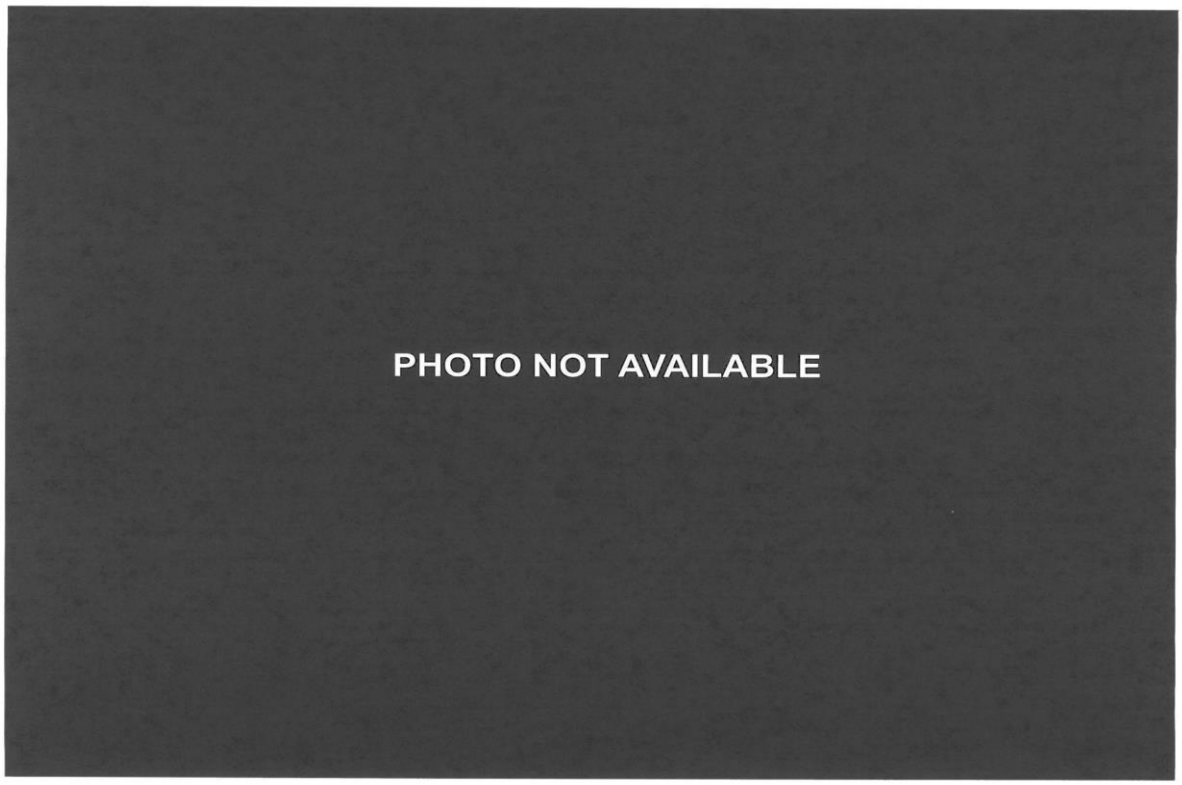
033 Post-Test Driver Dummy Window View

034 Pre-Test Driver Dummy and Vehicle Interior View

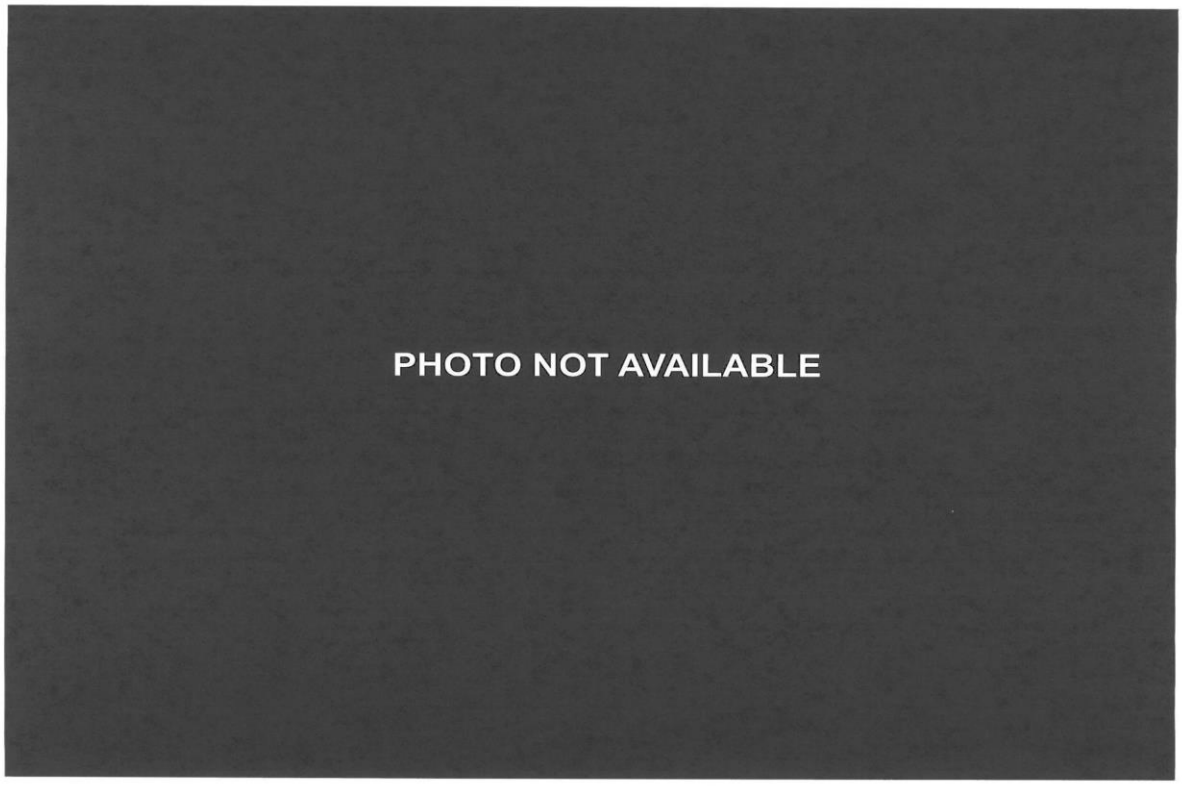
035 Post-Test Driver Dummy and Vehicle Interior View

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

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



038 Pre-Test View of Belt Anchorage for Driver Dummy



039 Post-Test View of Belt Anchorage for Driver Dummy

040 Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy

041 Post-Test View of Belt Buckle and Latch Plate for Driver Dummy

042 Pre-Test Driver Dummy Feet

043 Post-Test Driver Dummy Feet

044 Pre-Test Driver's Side Knee Bolster

045 Post-Test Driver's Side Knee Bolster

046 Pre-Test Driver's Side Floorpan

047 Post-Test Driver's Side Floorpan

048 Post-Test Driver Dummy Face

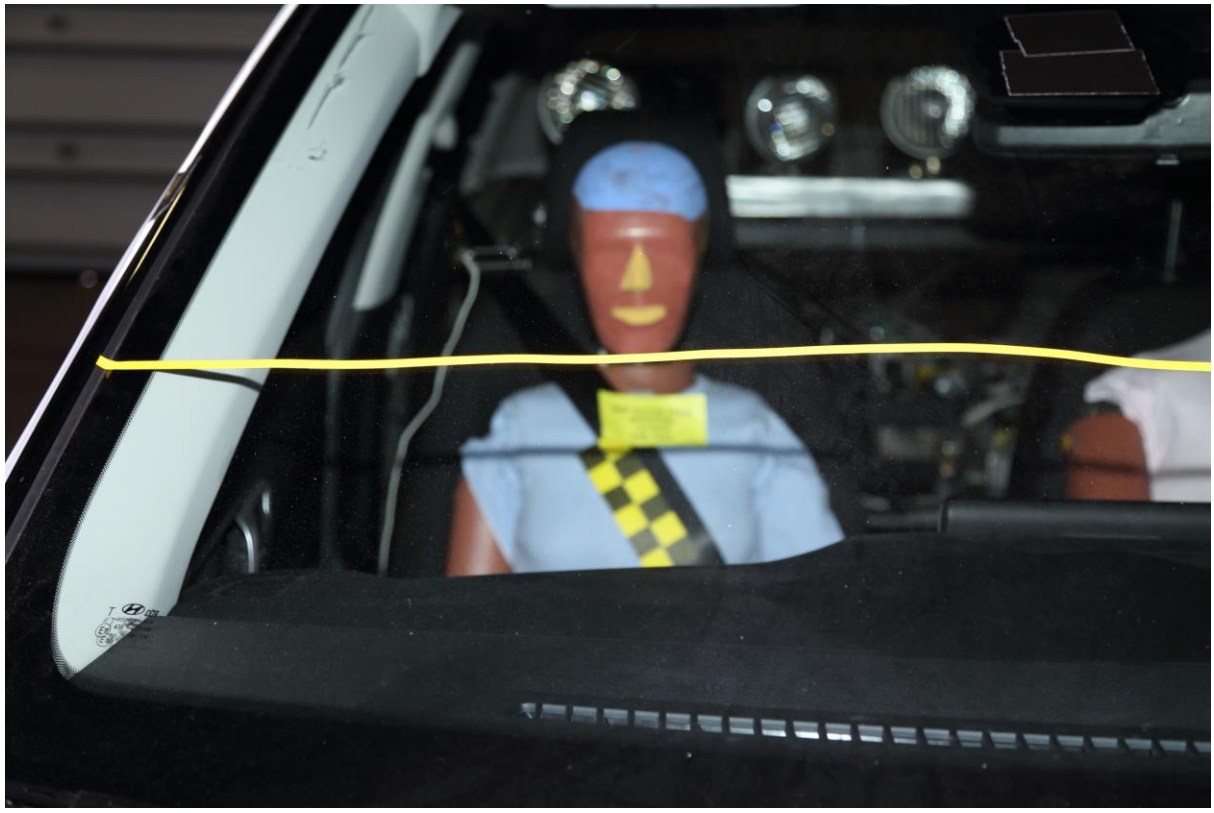
049 Post-Test Driver Dummy Contact with Airbag

050 Post-Test Driver Dummy Contact with Headrest

Intentionally Left Blank

051 Pre-Test View of the Steering Wheel

052 Post-Test View of the Steering Wheel



53 Pre-Test Passenger Dummy Front View

054 Post-Test Passenger Dummy Front View

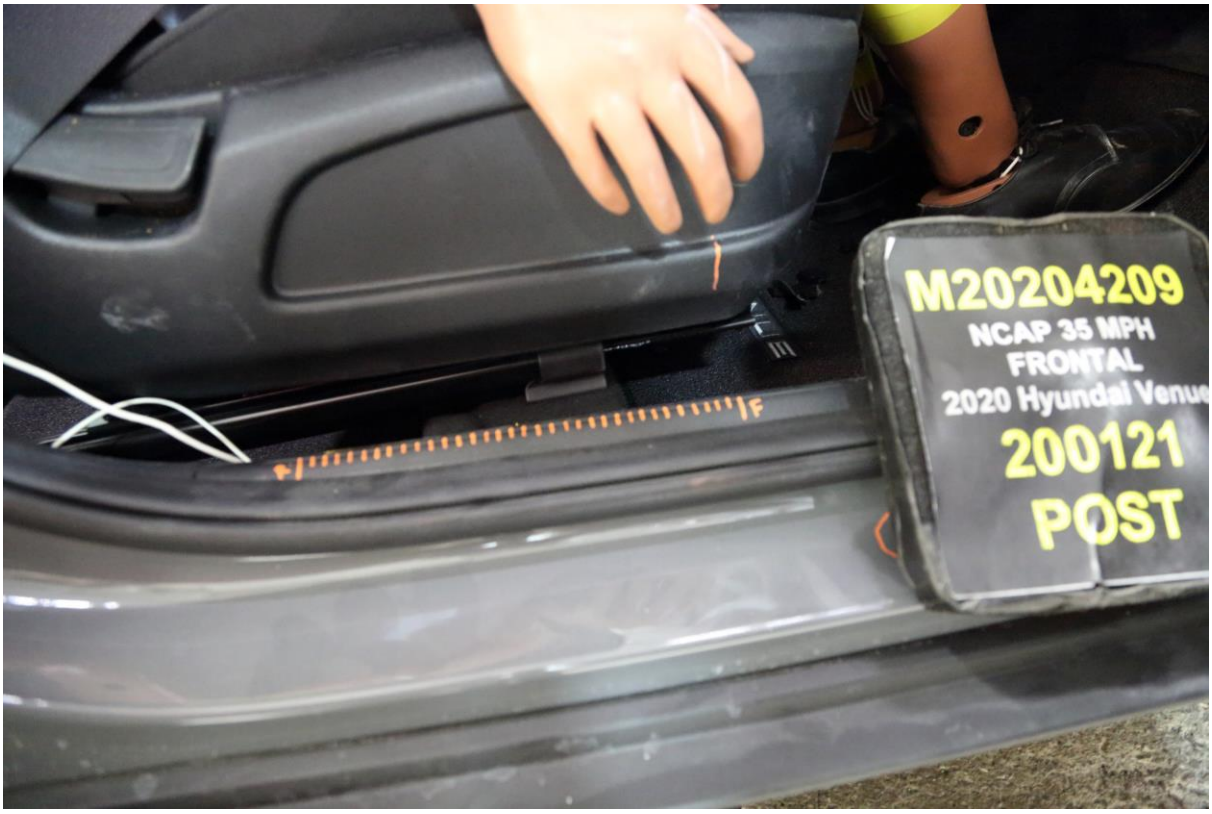
055 Pre-Test Passenger Dummy Window View

056 Post-Test Passenger Dummy Window View

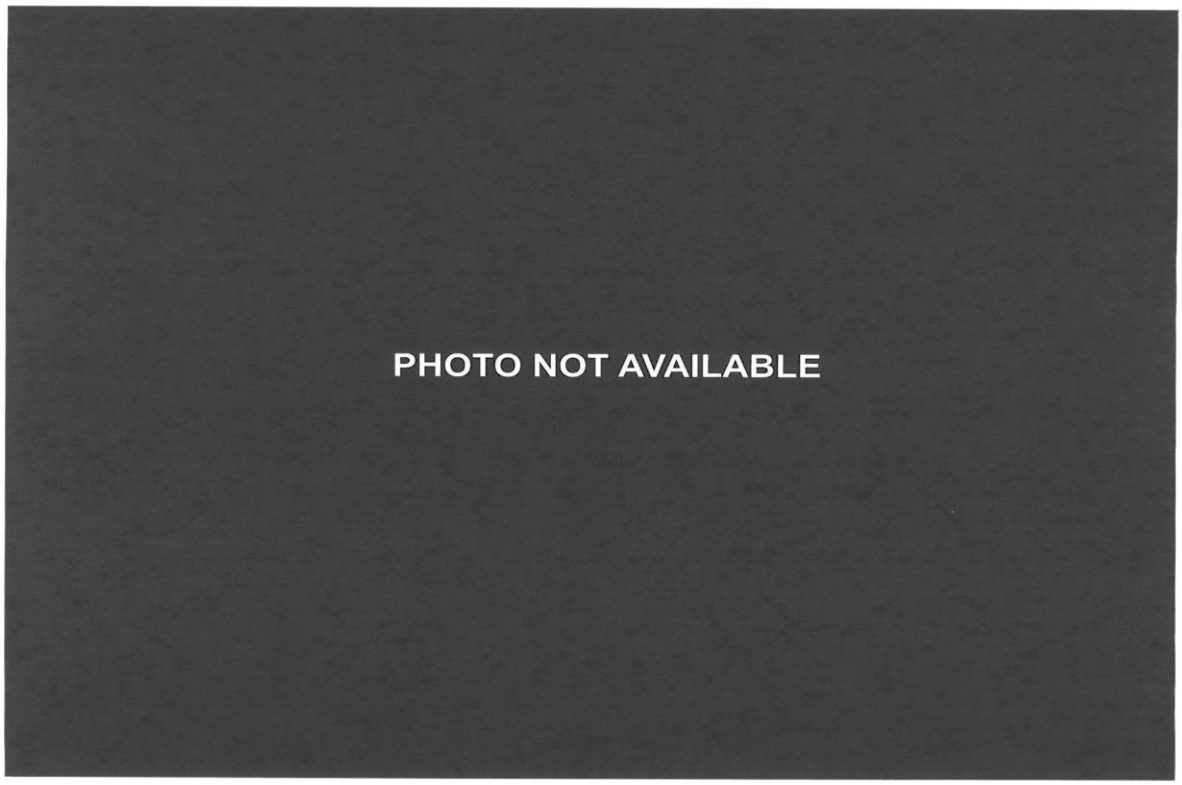
057 Pre-Test Passenger Dummy and Vehicle Interior View

058 Post-Test Passenger Dummy and Vehicle Interior View

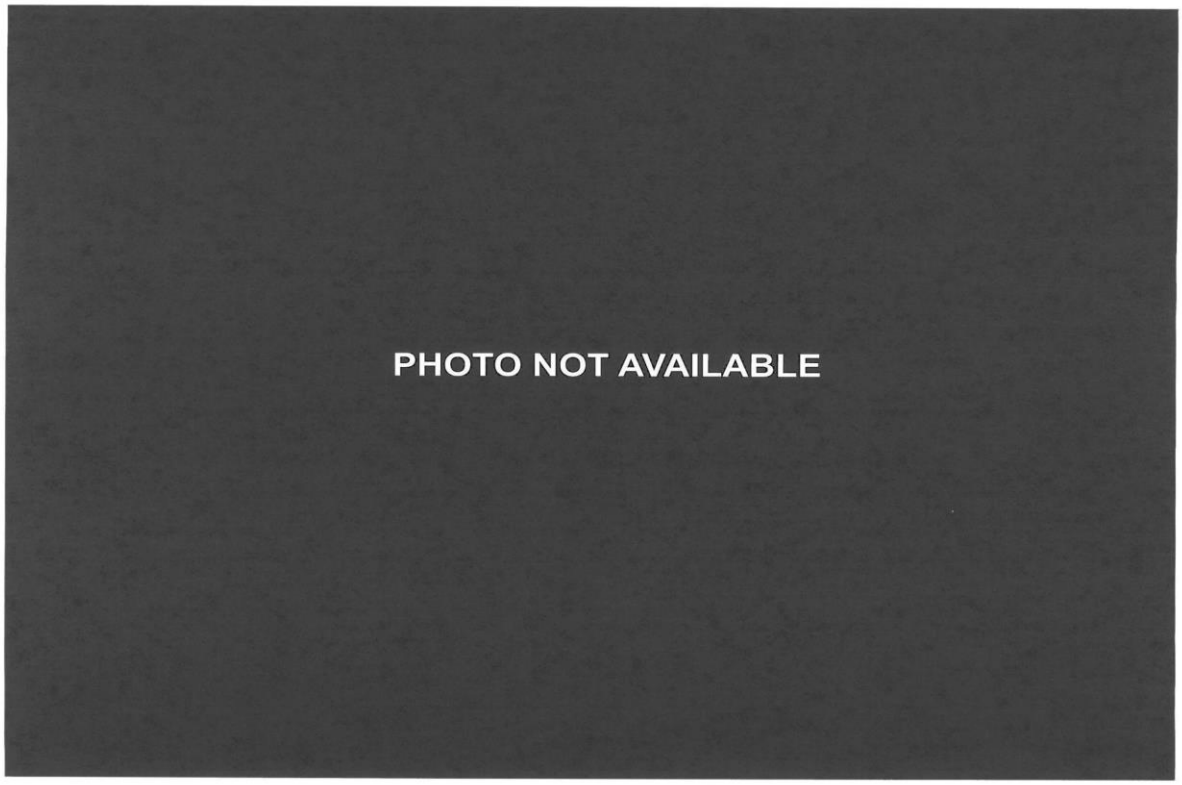
059 Pre-Test Passenger's Seat Fore-Aft Markings



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



061 Pre-Test View of Belt Anchorage for Passenger Dummy



062 Post-Test View of Belt Anchorage for Passenger Dummy

063 Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy

064 Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy

065 Pre-Test Passenger Dummy Feet

066 Post-Test Passenger Dummy Feet

067 Pre-Test Passenger's Side Knee Bolster

068 Post-Test Passenger's Side Knee Bolster

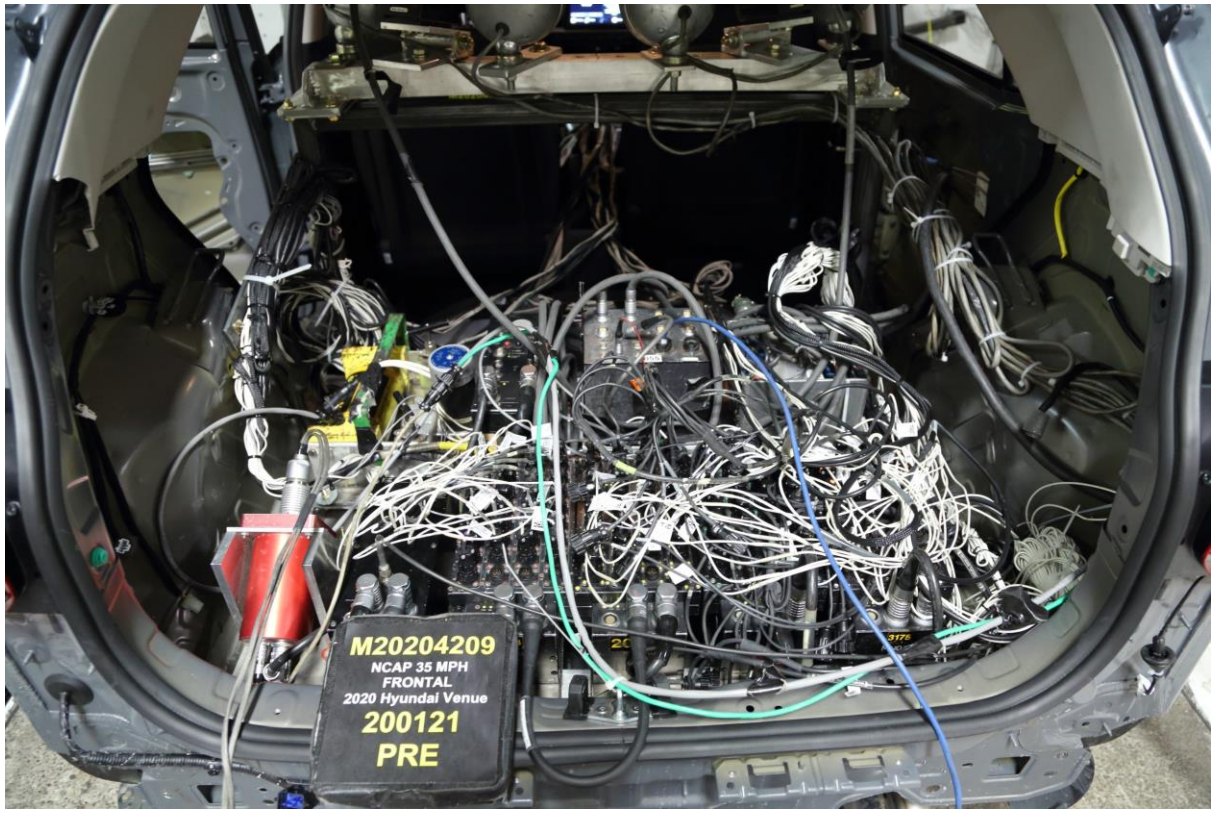
069 Pre-Test Passenger's Side Floorpan

070 Post-Test Passenger's Side Floorpan

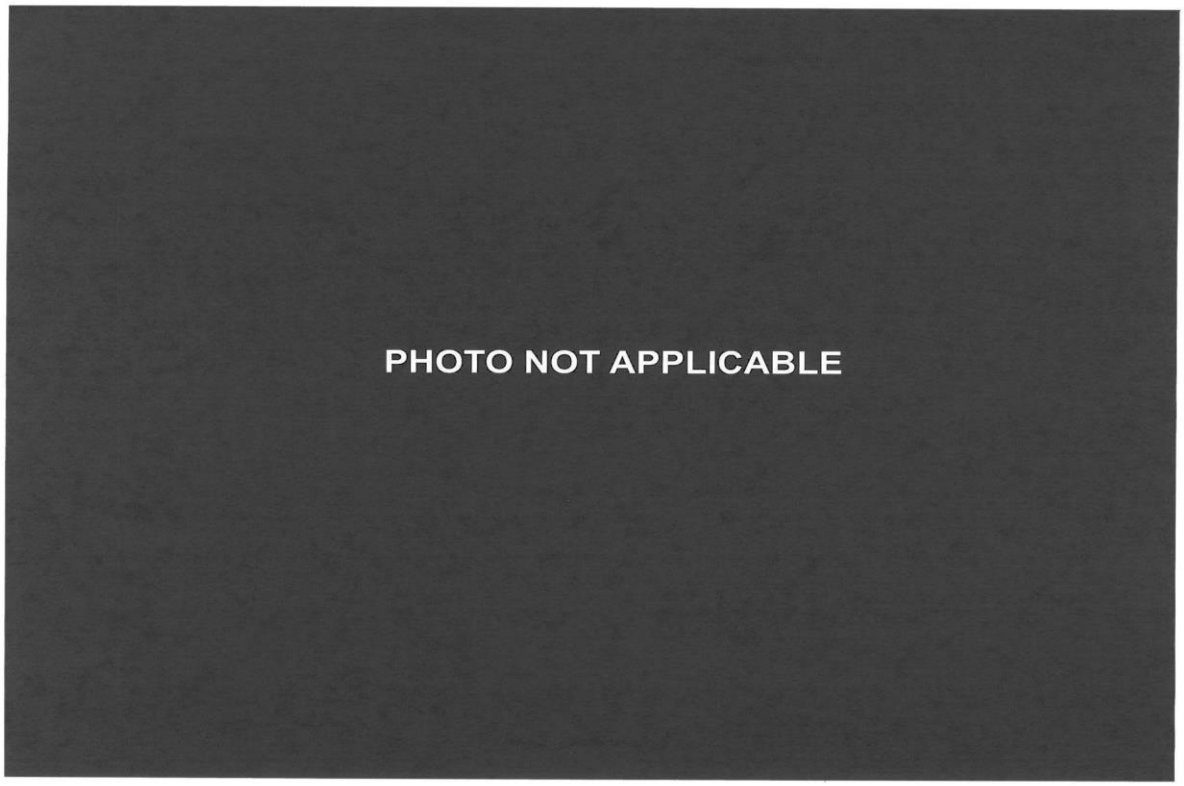
071 Post-Test Passenger Dummy Face

072 Post-Test Passenger Dummy Contact with Airbag

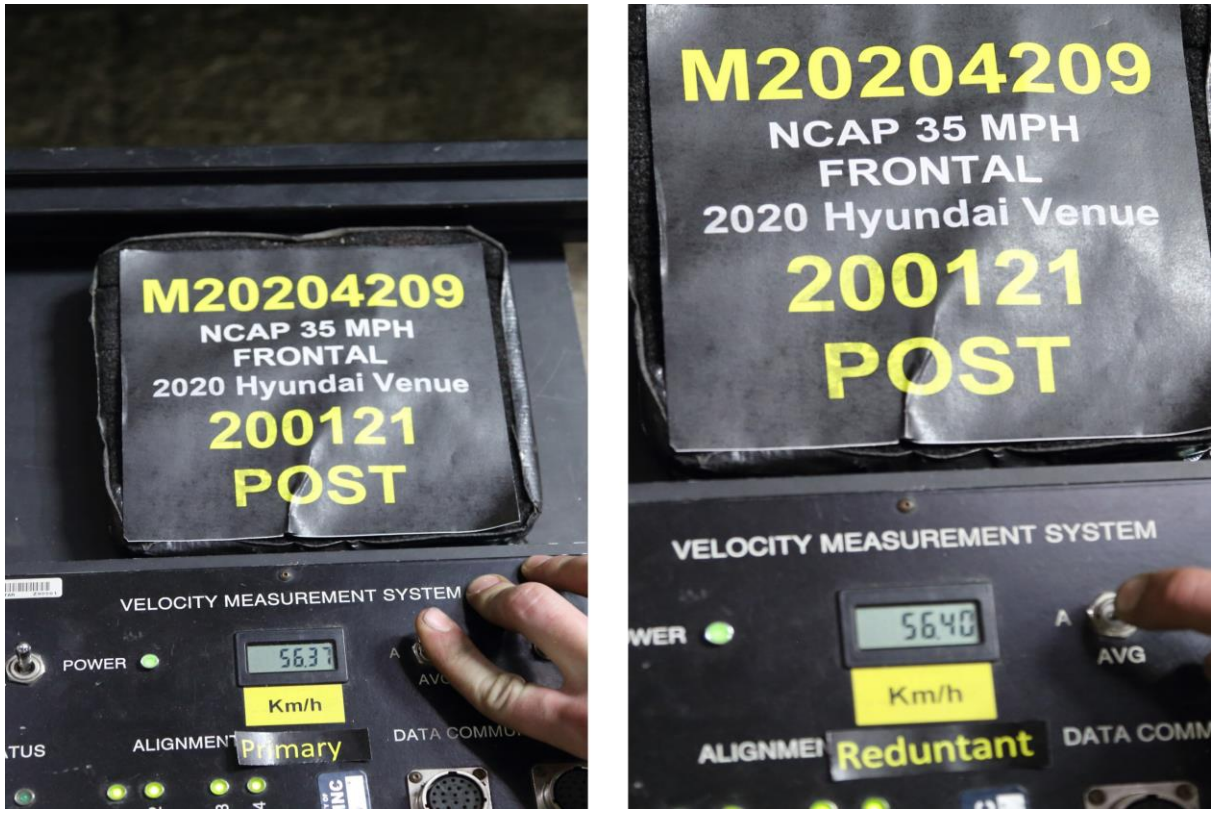
073 Post-Test Passenger Dummy Contact with Headrest



074 Photograph of Ballast Installed in Vehicle



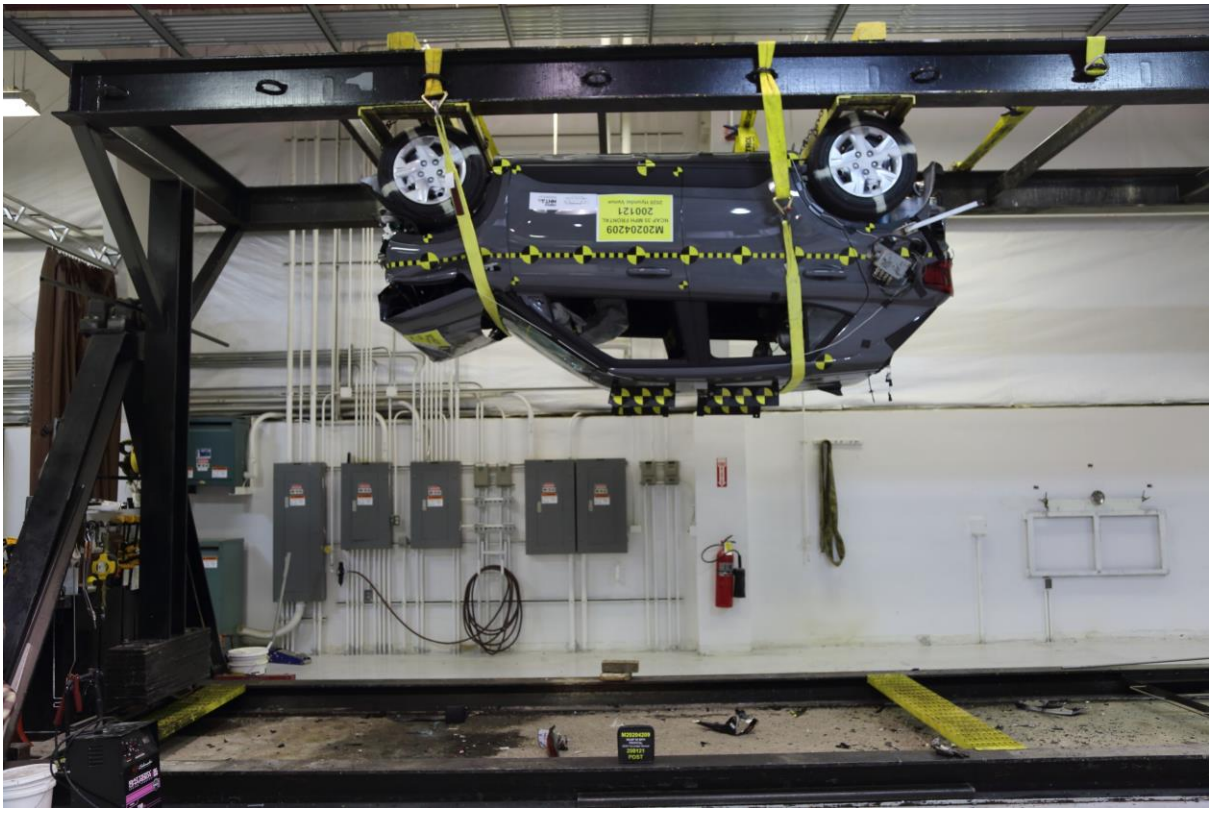
075 Post-Test Stoddard Spillage Location View



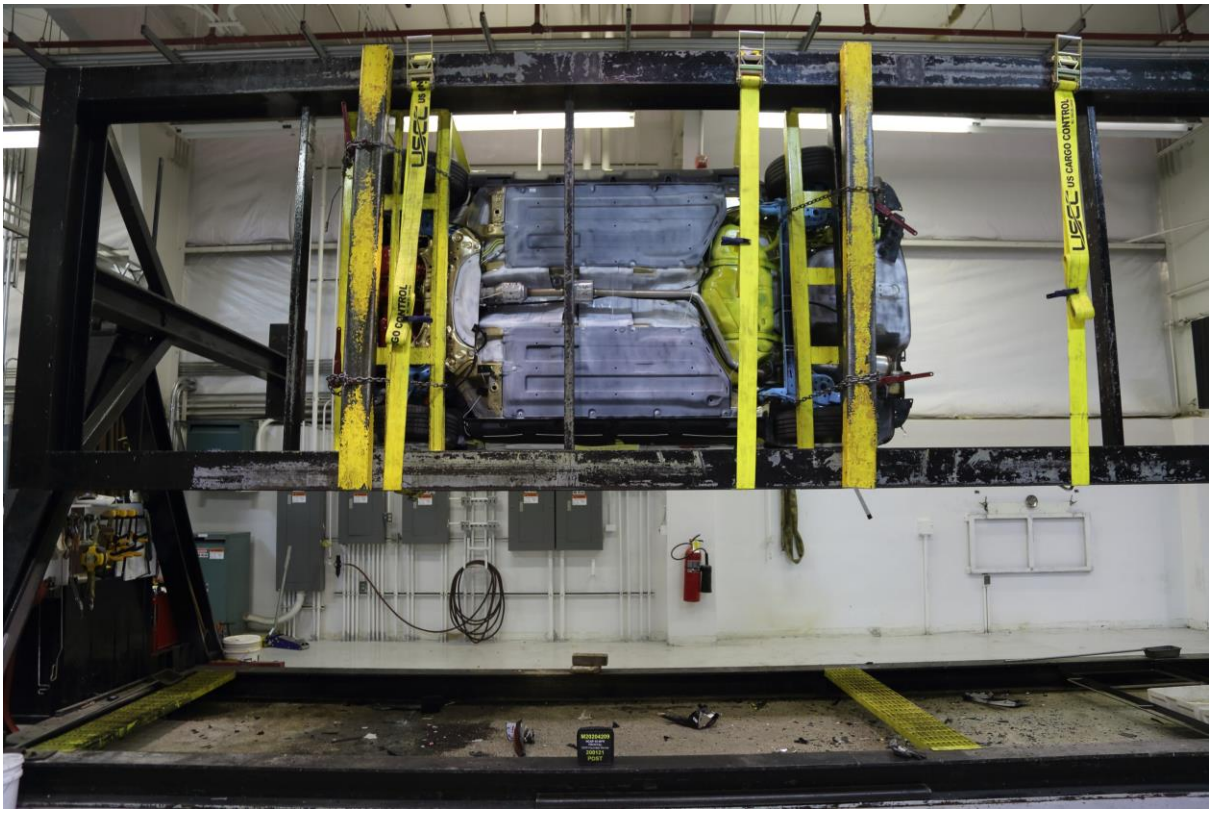
076 Post-Test Speed Trap Read out

077 Vehicle at 0º on Static Rollover Device

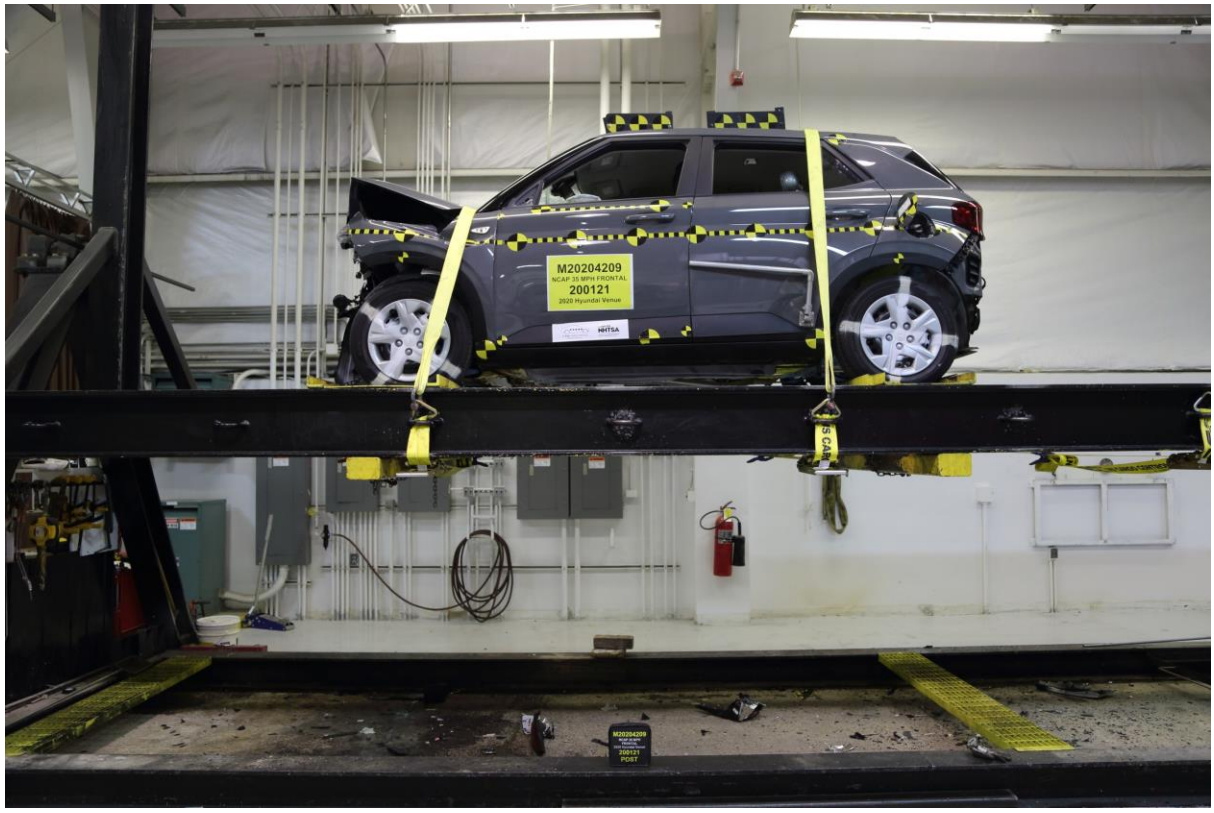
078 Vehicle at 90º on Static Rollover Device



079 Vehicle at 180º on Static Rollover Device

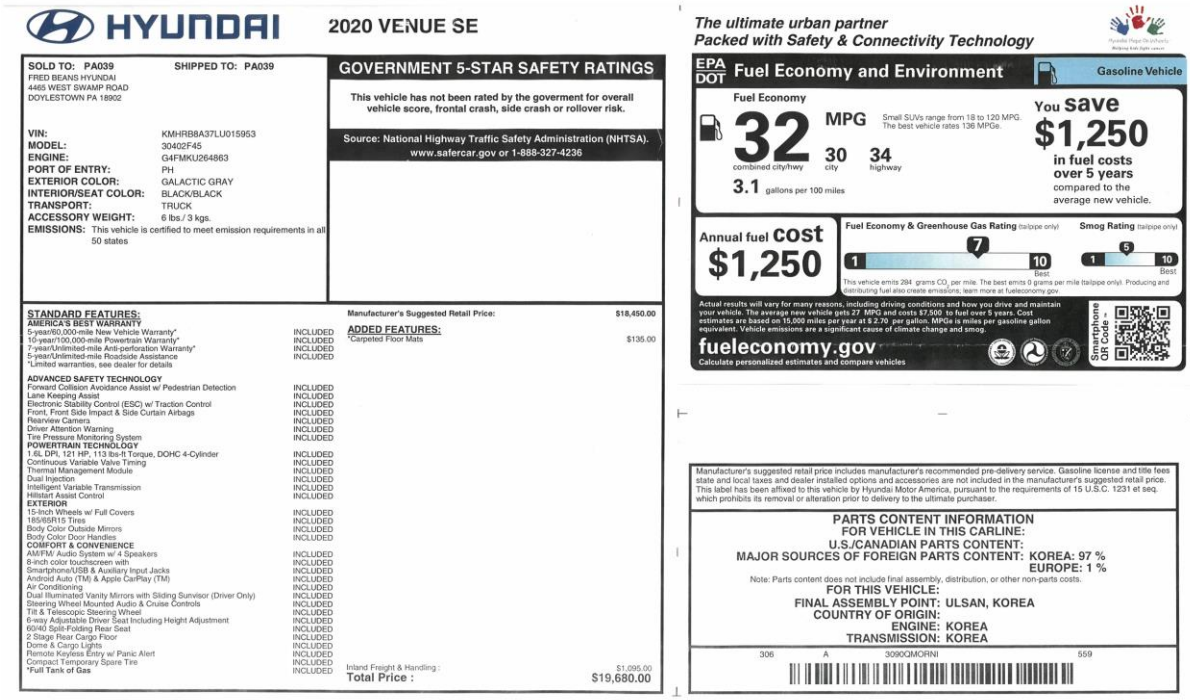


080 Vehicle at 270º on Static Rollover Device



081 Vehicle at 360º on Static Rollover Device

082 2020 Hyundai Venue Frontal Impact Event



HYUNDAI

2020 VENUE SE

SOLD TO: PA039
FRED BEANS HYUNDAI
4465 WEST SWAMP ROAD
DOYLESTOWN PA 18902

SHIPPED TO: PA039

VIN: KMHRB8A37LU015953
MODEL: 30402F45
ENGINE: G4FMKU264863
PORT OF ENTRY: PH
EXTERIOR COLOR: GALACTIC GRAY
INTERIOR/SEAT COLOR: BLACK/BLACK
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 6 lbs./ 3 kgs.
EMISSIONS: This vehicle is certified to meet emission requirements in all 50 states

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the goverment for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

STANDARD FEATURES:

AMERICA'S BEST WARRANTY
5-year/60,000-mile New Vehicle Warranty* INCLUDED
10-year/100,000-mile Powertrain Warranty* INCLUDED
7-year/Unlimited-mile Anti-perforation Warranty* INCLUDED
5-year/Unlimited-mile Roadside Assistance INCLUDED
*Limited warranties, see dealer for details

ADVANCED SAFETY TECHNOLOGY
Forward Collision Avoidance Assist w/ Pedestrian Detection INCLUDED
Lane Keeping Assist INCLUDED
Electronic Stability Control (ESC) w/ Traction Control INCLUDED
Front, Front Side Impact & Side Curtain Airbags INCLUDED
Rearview Camera INCLUDED
Driver Attention Warning INCLUDED
Tire Pressure Monitoring System INCLUDED

POWERTRAIN TECHNOLOGY
1.6L DPI, 121 HP, 113 lbs-ft Torque, DOHC 4-Cylinder INCLUDED
Continuous Variable Valve Timing INCLUDED
Thermal Management Module INCLUDED
Dual Injection INCLUDED
Intelligent Variable Transmission INCLUDED
Hillstart Assist Control INCLUDED

EXTERIOR
15-Inch Wheels w/ Full Covers INCLUDED
185/65R15 Tires INCLUDED
Body Color Outside Mirrors INCLUDED
Body Color Door Handles INCLUDED

COMFORT & CONVENIENCE
AM/FM/ Audio System w/ 4 Speakers INCLUDED
8-inch color touchscreen with INCLUDED
Smartphone/USB & Auxiliary Input Jacks INCLUDED
Android Auto (TM) & Apple CarPlay (TM) INCLUDED
Air Conditioning INCLUDED
Dual Illuminated Vanity Mirrors with Sliding Sunvisor (Driver Only) INCLUDED
Steering Wheel Mounted Audio & Cruise Controls INCLUDED
Tilt & Telescopic Steering Wheel INCLUDED
6-way Adjustable Driver Seat Including Height Adjustment INCLUDED
60/40 Split-Folding Rear Seat INCLUDED
2 Stage Rear Cargo Floor INCLUDED
Dome & Cargo Lights INCLUDED
Remote Keyless Entry w/ Panic Alert INCLUDED
Compact Temporary Spare Tire INCLUDED
*Full Tank of Gas INCLUDED

Manufacturer's Suggested Retail Price: $18,450.00

ADDED FEATURES:
*Carpeted Floor Mats $135.00

Inland Freight & Handling: $1,095.00
Total Price : $19,680.00

The ultimate urban partner
Packed with Safety & Connectivity Technology

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy
32 MPG combined city/hwy
30 city
34 highway
3.1 gallons per 100 miles

Small SUVs range from 18 to 120 MPG. The best vehicle rates 136 MPGe.

You save $1,250 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $1,250

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 7 (1 – 10, Best)
Smog Rating (tailpipe only) 5 (1 – 10, Best)

This vehicle emits 284 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions, learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $ 2.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline license and title fees state and local taxes and dealer installed options and accessories are not included in the manufacturer's suggested retail price. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements of 15 U.S.C. 1231 et seq. which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

PARTS CONTENT INFORMATION
FOR VEHICLE IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT:
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA: 97 %
EUROPE: 1 %
Note: Parts content does not include final assembly, distribution, or other non-parts costs.
FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: ULSAN, KOREA
COUNTRY OF ORIGIN:
ENGINE: KOREA
TRANSMISSION: KOREA

306 A 3090QMORNI 559

083 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

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

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

Driver Head Acceleration X Redundant
Driver Head Acceleration Y Redundant
Driver Head Acceleration Z Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Pelvis Resultant
Driver Left Femur Redundant
Driver Right Femur 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 Head Angular Velocity X
Driver Head Angular Velocity Y
Driver Head Angular Velocity Z
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 Pelvis Resultant
Passenger Left Femur Redundant
Passenger Right Femur 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 Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
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: 01/21/2020

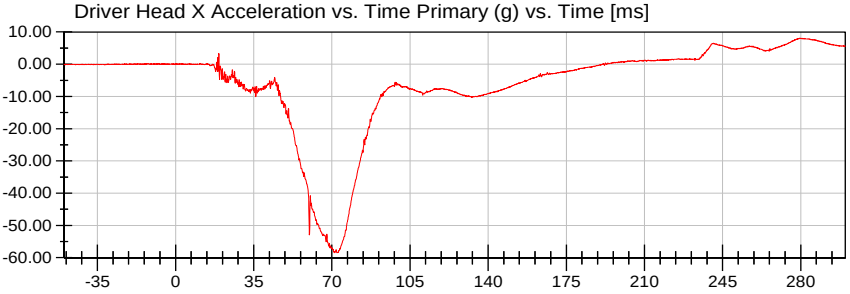
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

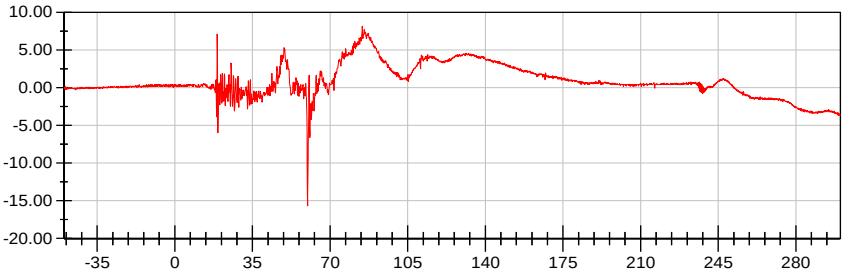
8.05 g at 279.52 ms

<Min>

-58.50 g at 71.20 ms

CFC_1000

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



<Max>

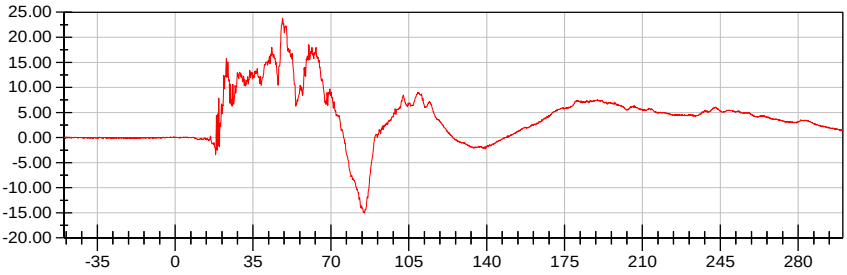
8.17 g at 84.48 ms

<Min>

-15.66 g at 59.84 ms

CFC_1000

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



<Max>

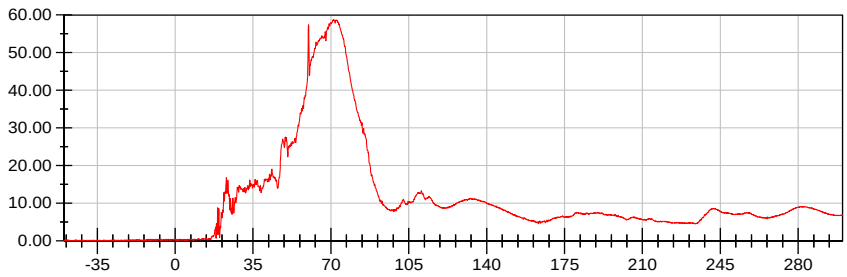
23.79 g at 48.24 ms

<Min>

-15.04 g at 85.04 ms

CFC_1000

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



<Max>

58.83 g at 71.20 ms

<Min>

0.04 g at -49.12 ms

CFC_1000

NHTSA

Test Date: 01/21/2020

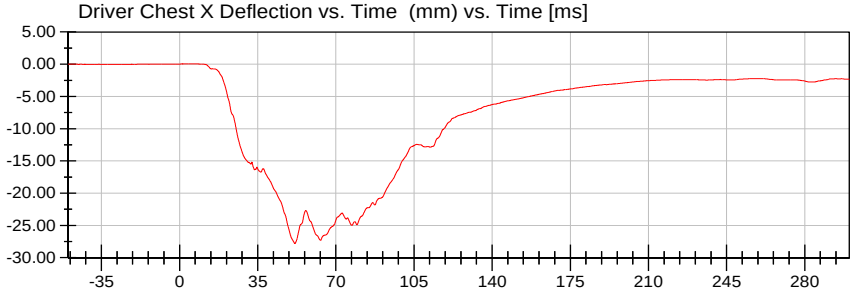
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

0.04 mm at 4.00 ms

<Min>

-27.79 mm at 51.68 ms

CFC_600

NHTSA

Test Date: 01/21/2020

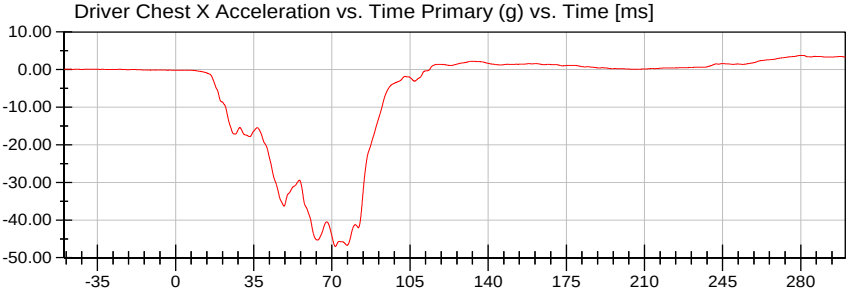
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

3.76 g at 280.48 ms

<Min>

-47.01 g at 71.60 ms

CFC_180

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

<Max>

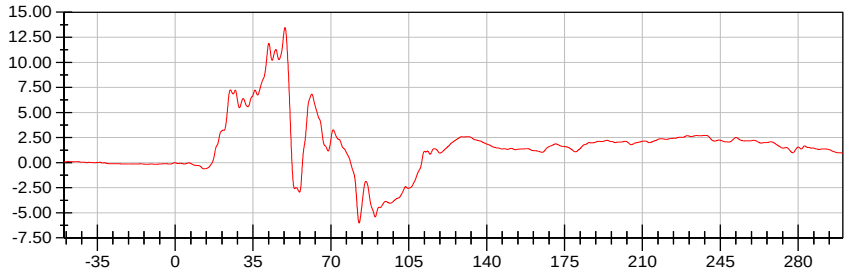
8.65 g at 60.80 ms

<Min>

-4.88 g at 34.80 ms

CFC_180

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



<Max>

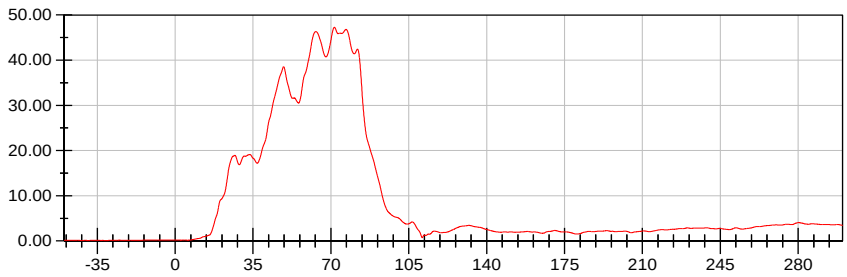
13.45 g at 49.36 ms

<Min>

-6.01 g at 82.64 ms

CFC_180

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



<Max>

47.27 g at 71.52 ms

<Min>

0.08 g at -31.20 ms

CFC_180

NHTSA

Test Date: 01/21/2020

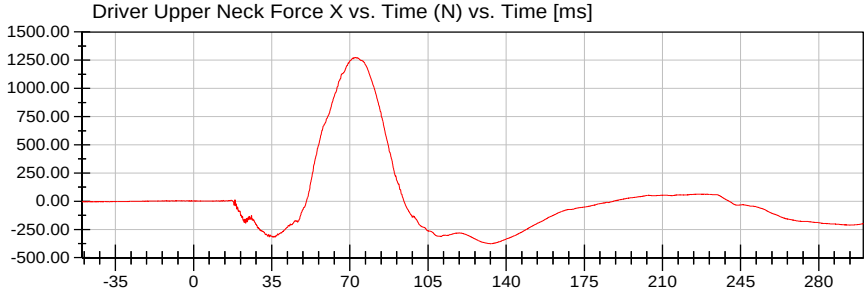
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

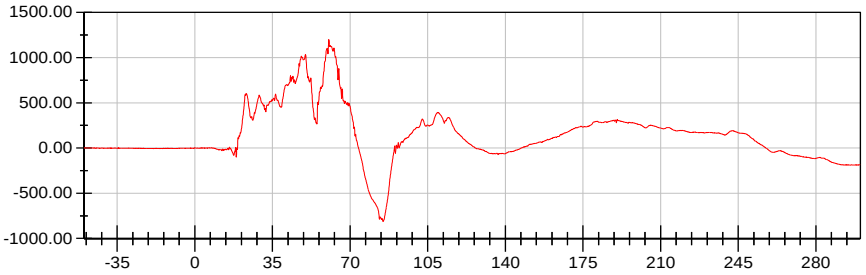
1,274.32 N at 72.00 ms

<Min>

-376.73 N at 132.96 ms

CFC_1000

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



<Max>

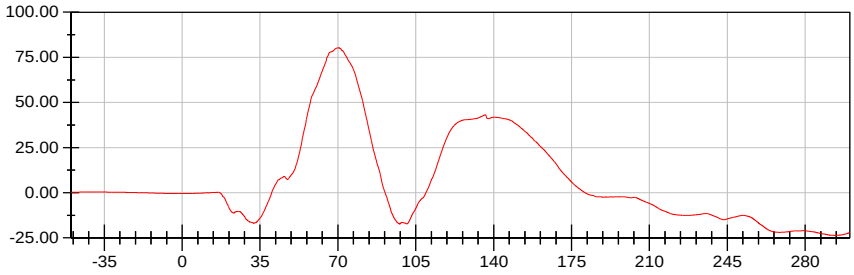
1,199.99 N at 60.40 ms

<Min>

-811.71 N at 84.88 ms

CFC_1000

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



<Max>

80.27 Nm at 70.48 ms

<Min>

-23.60 Nm at 293.36 ms

CFC_600

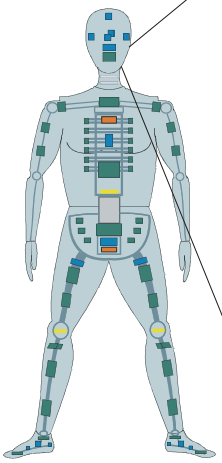
2020 Hyundai Venue NCAP 35 mph Frontal Impact

Neck Injury Predictor (NIJ)

Date: 01/21/2020
Time: 16:04

Customer: NHTSA
Test Number: M20204209

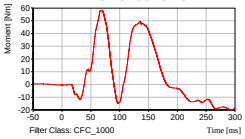
Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310



Dummy:HIII 50th Male
Seating Position:
Driver

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

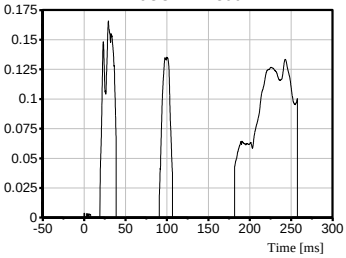
11TMONUP00H3MOYX



11NECKUP00H3FOZA

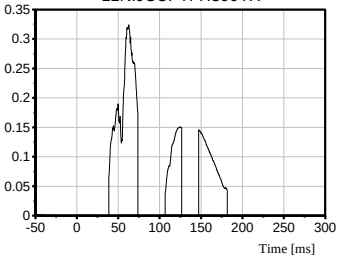
TRC Inc. Test Lab: CTF
Test Number: 200121

11NIJCUPTEH300YX



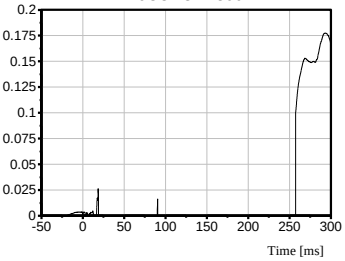
Max [NTE] 0.1659 at 29.28 ms

11NIJCUPTFH300YX



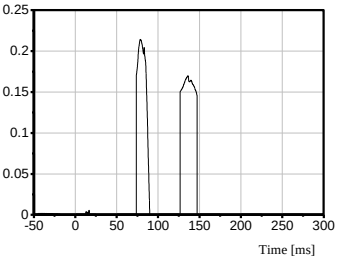
Max [NTF] 0.3240 at 62.72 ms

11NIJCUPCEH300YX



Max [NCE] 0.1775 at 292.88 ms

11NIJCUPCFH300YX



Max [NCF] 0.2144 at 78.56 ms

NHTSA

Test Date: 01/21/2020

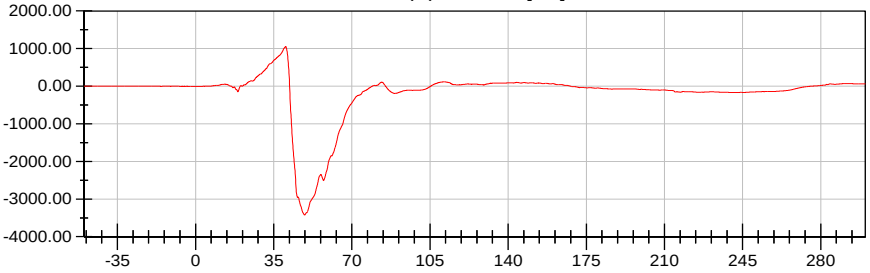
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

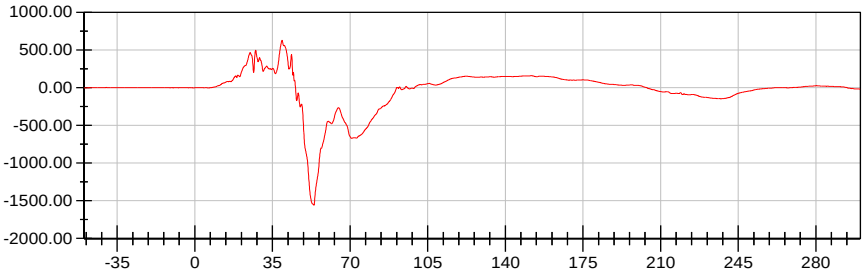
1,054.39 N at 40.40 ms

<Min>

-3,421.21 N at 48.80 ms

CFC_600

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



<Max>

630.27 N at 39.28 ms

<Min>

-1,557.51 N at 53.68 ms

CFC_600

NHTSA

Test Date: 01/21/2020

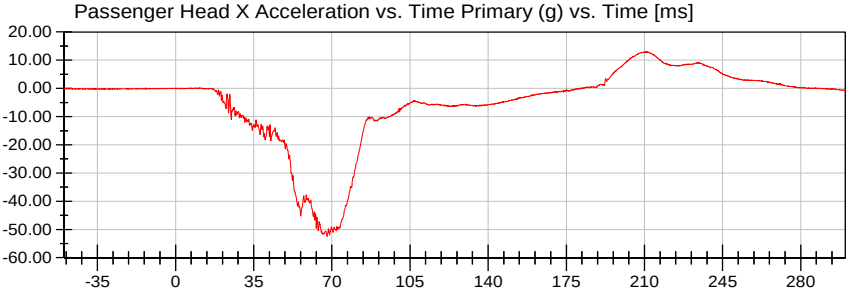
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

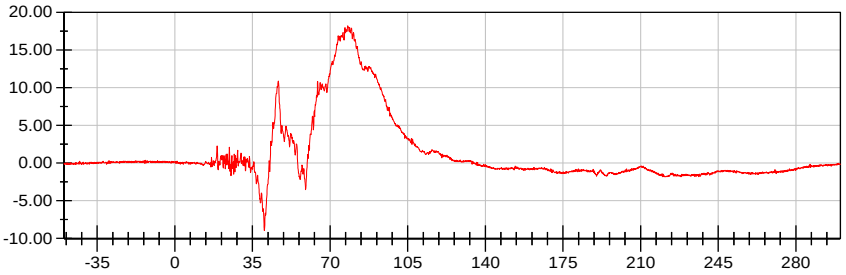
13.02 g at 210.72 ms

<Min>

-52.56 g at 67.84 ms

CFC_1000

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



<Max>

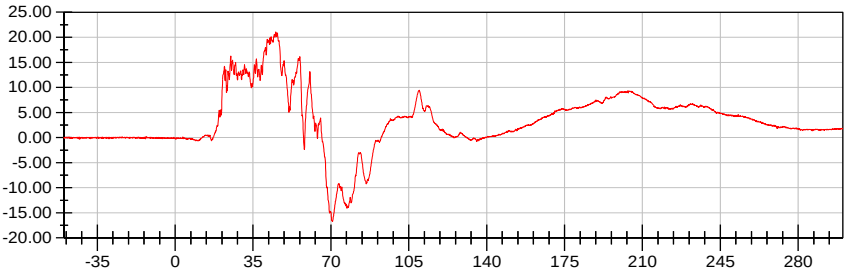
18.24 g at 77.92 ms

<Min>

-8.94 g at 40.40 ms

CFC_1000

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



<Max>

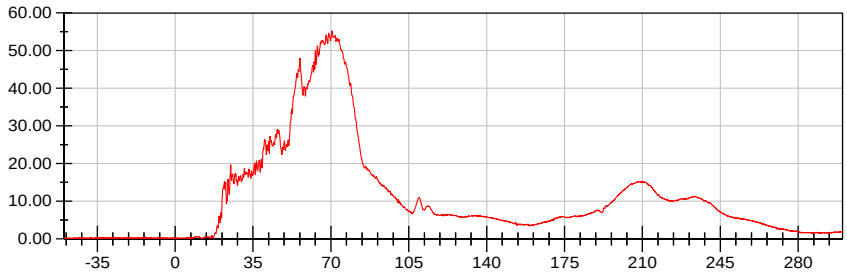
21.09 g at 45.20 ms

<Min>

-16.70 g at 70.72 ms

CFC_1000

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



<Max>

55.24 g at 70.48 ms

<Min>

0.02 g at -49.60 ms

CFC_1000

NHTSA

Test Date: 01/21/2020

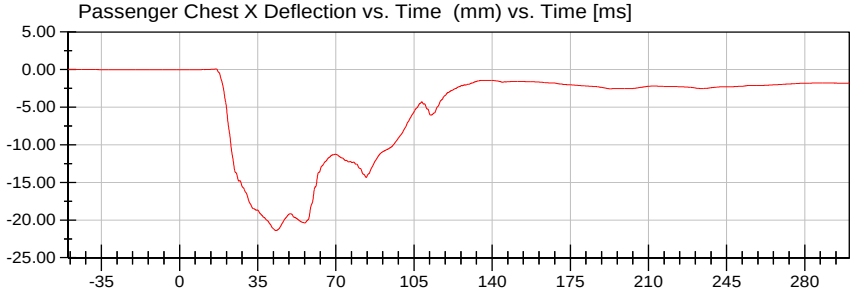
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

0.09 mm at 16.48 ms

<Min>

-21.39 mm at 43.20 ms

CFC_600

NHTSA

Test Date: 01/21/2020

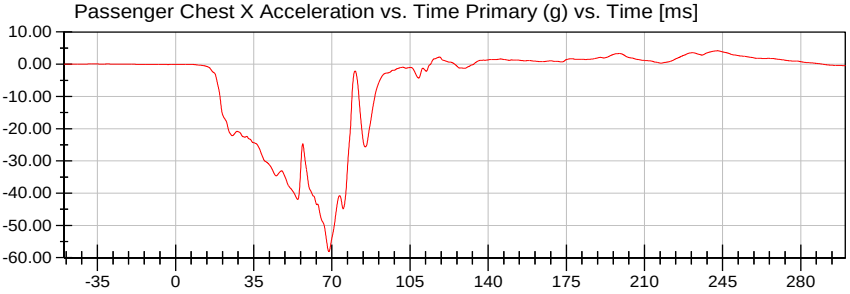
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

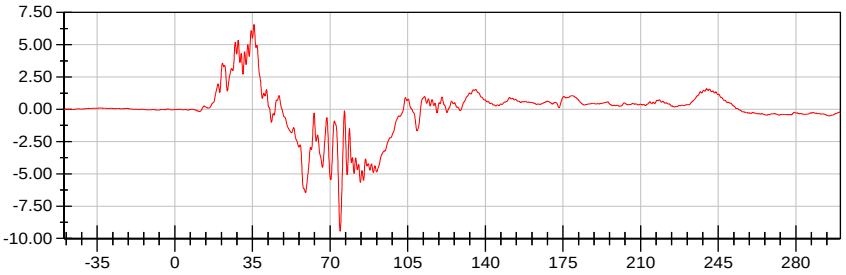
4.17 g at 242.72 ms

<Min>

-58.11 g at 68.72 ms

CFC_180

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



<Max>

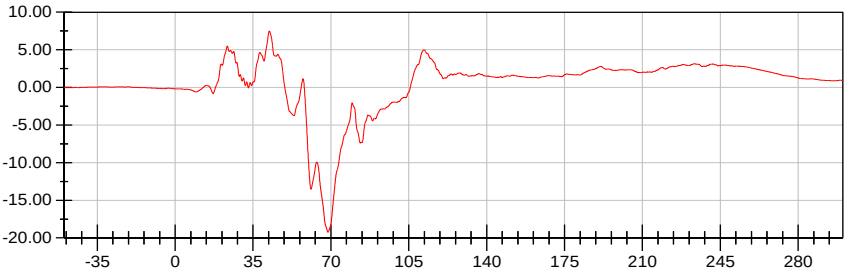
6.56 g at 35.68 ms

<Min>

-9.44 g at 74.56 ms

CFC_180

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



<Max>

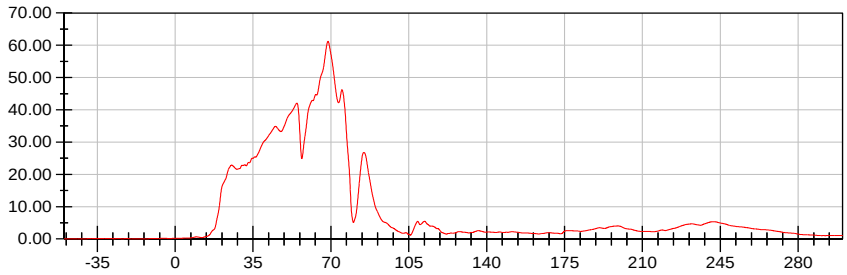
7.49 g at 42.32 ms

<Min>

-19.23 g at 68.72 ms

CFC_180

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



<Max>

61.21 g at 68.72 ms

<Min>

0.01 g at -44.96 ms

CFC_180

NHTSA

Test Date: 01/21/2020

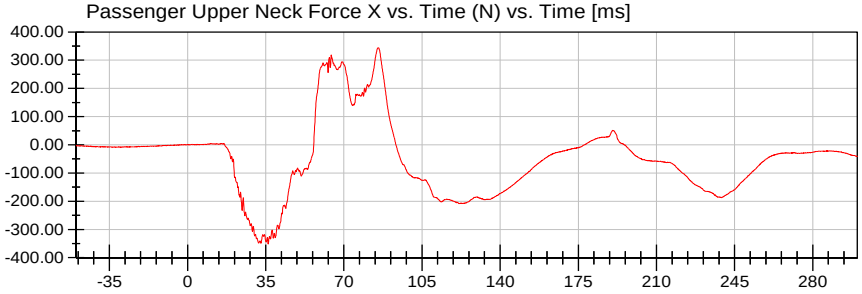
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

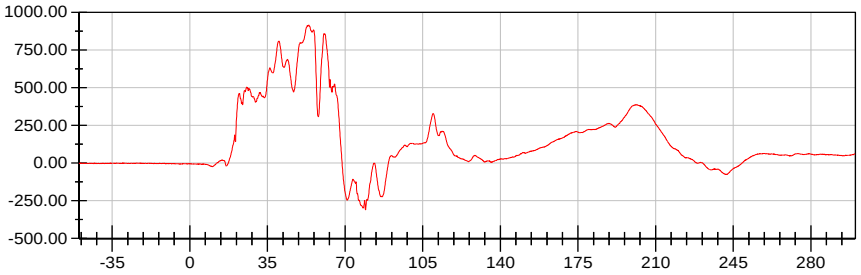
343.73 N at 85.52 ms

<Min>

-352.18 N at 36.08 ms

CFC_1000

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



<Max>

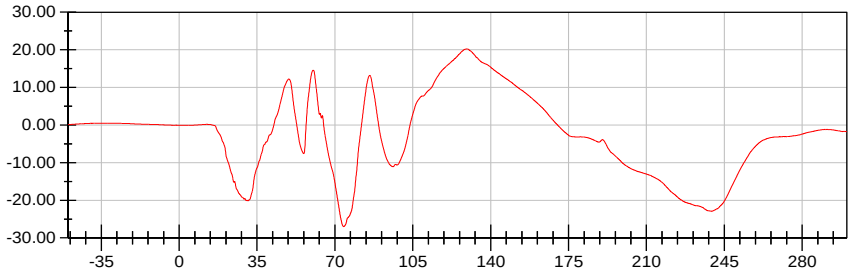
916.04 N at 53.68 ms

<Min>

-309.32 N at 79.20 ms

CFC_1000

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



<Max>

20.23 Nm at 129.36 ms

<Min>

-26.99 Nm at 73.92 ms

CFC_600

2020 Hyundai Venue NCAP 35 mph Frontal Impact

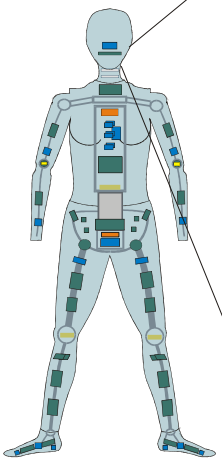
Neck Injury Predictor (NIJ)

Date: 01/21/2020
Time: 16:04

Customer: NHTSA
Test Number: M20204209

TRC Inc. Test Lab: CTF
Test Number: 200121

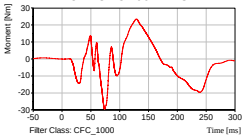
Test Orientation = Frontal
Fzc(Tension) = 4287
Fzc(Compression) = 3880
Myc(Extension) = 67
Myc(Flexion) = 155



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

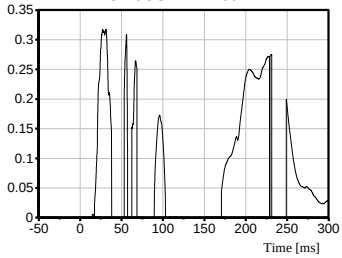
NIJ Source Code: (Fz/Fzc)+(My/Myc)

13TMONUP00HFMOYX



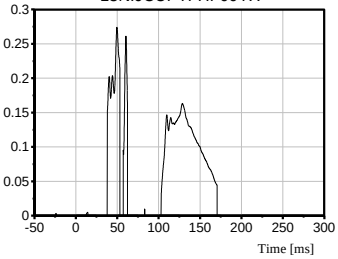
13NECKUP00HFFOZA

13NIJCUPTEHF00YX



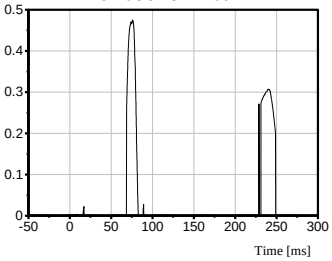
Max [NTE] 0.3176 at 27.12 ms

13NIJCUPTFHF00YX



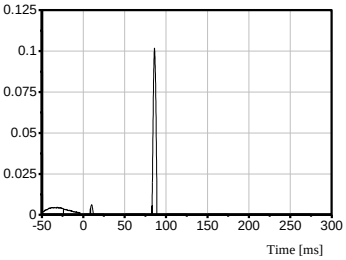
Max [NTF] 0.2740 at 49.68 ms

13NIJCUPCEHF00YX



Max [NCE] 0.4751 at 76.08 ms

13NIJCUPCFHF00YX



Max [NCF] 0.1018 at 86.00 ms

NHTSA

Test Date: 01/21/2020

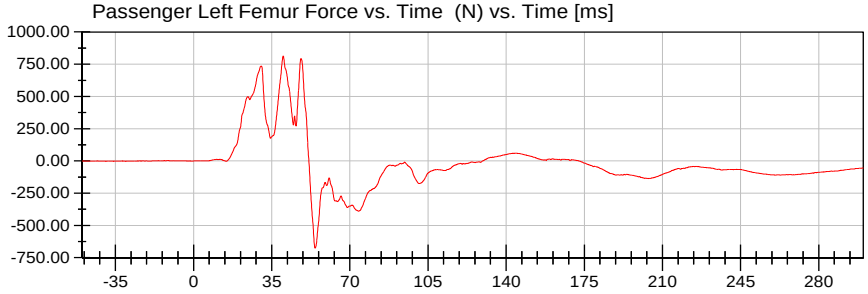
Test Lab: CTF

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

Test Number: 200121 (M20204209)

Position #2 Hybrid III Small Adult Female (070)

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



<Max>

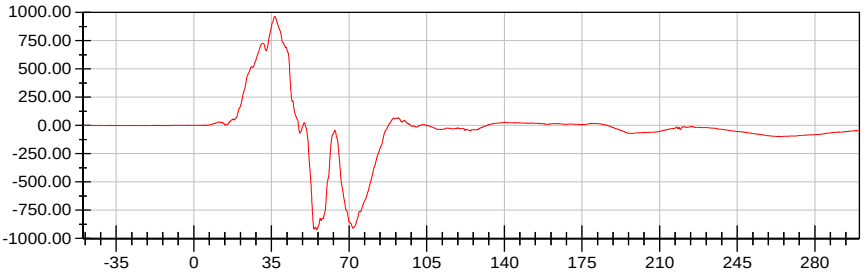
813.47 N at 40.16 ms

<Min>

-676.93 N at 54.48 ms

CFC_600

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



<Max>

965.82 N at 36.48 ms

<Min>

-922.70 N at 55.44 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. 65

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	510	Yes
C	H-Point Height	83.8 - 88.9	85	Yes
D	H-Point From Seatback	134.6 - 139.7	137	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	91	Yes
F	Thigh Clearance	139.7 - 154.9	147	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	337	Yes
J	Elbow Rest Height	190.5 - 210.8	199	Yes
K	Buttock Knee Length	579.1 - 604.5	601	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	494	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	223	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	425	Yes
W	Foot Breadth	91.4 - 106.7	96	Yes
Y	Chest Circumference	970.3 - 1000.8	991	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	252.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	6.4 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	3.85 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: N/A

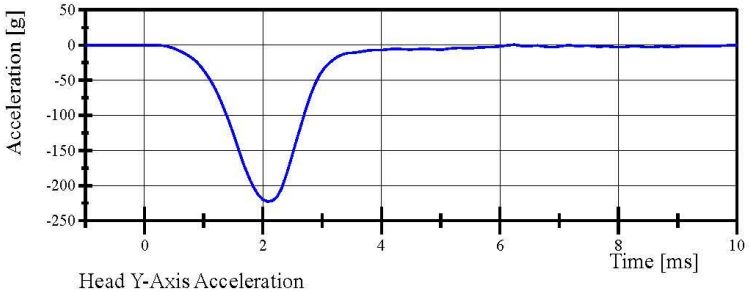
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

12.13.2019 09:00:10 576

Transportation Research Center Inc.

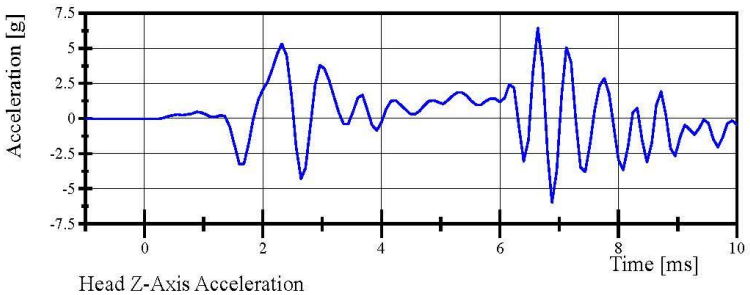
Front Head Drop
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Head X-Axis Acceleration



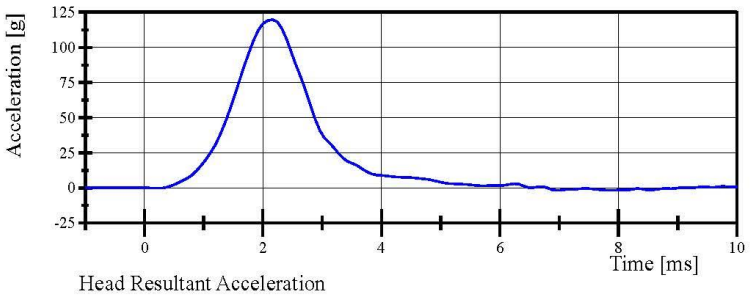
Filter Class: CFC_1000
Max: 0.5 g at 6.2 ms
Min: -222.8 g at 2.1 ms

Head Y-Axis Acceleration



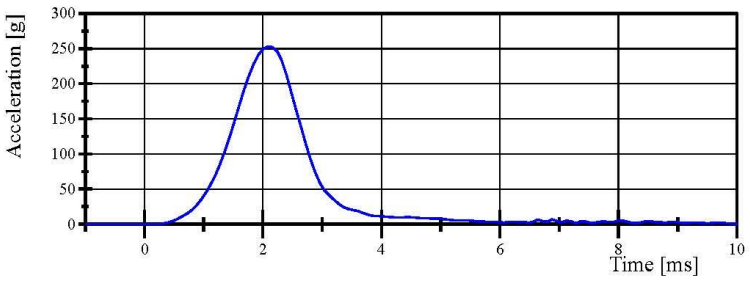
Filter Class: CFC_1000
Max: 6.4 g at 6.6 ms
Min: -6.0 g at 6.9 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 119.8 g at 2.2 ms
Min: -1.7 g at 7.8 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 252.7 g at 2.1 ms
Min: 0.0 g at -1.0 ms

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

12.13.2019 09:01:01 576

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.905 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.1 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.72 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.52 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-14.91 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-14.91 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-68.3 °	Yes
Time of Peak	57 - 64 ms	61.0 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	120.6 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	107.41 N·m	Yes
Time of Peak	47 - 58 ms	51.6 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	97.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

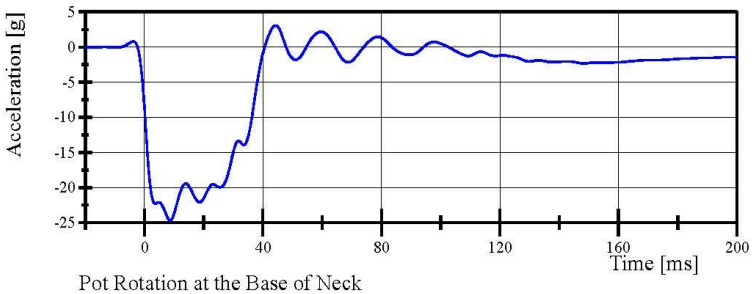
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

12.16.2019 14:48:27 1838

Transportation Research Center Inc.

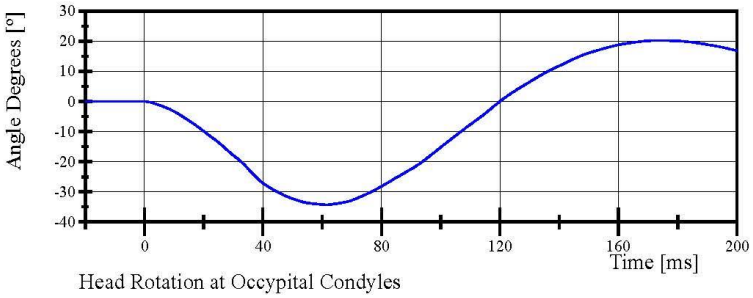
Neck Flexion
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Pendulum Acceleration



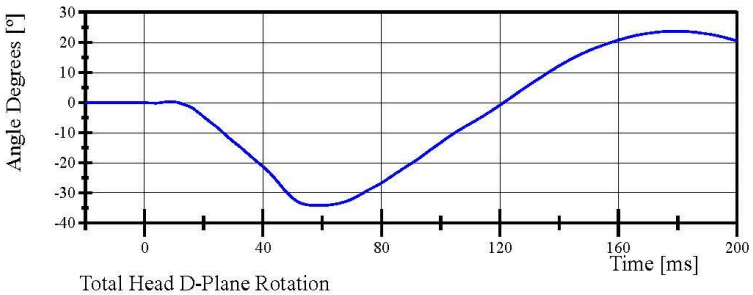
Filter Class: CFC_60
Max: 3.1 g at 44.3 ms
Min: -24.7 g at 8.7 ms

Pot Rotation at the Base of Neck



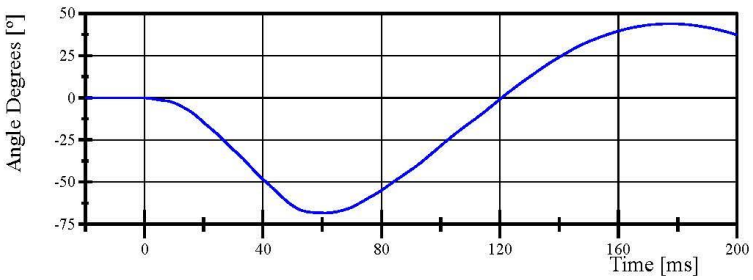
Filter Class: CFC_60
Max: 20.3 ° at 173.7 ms
Min: -34.3 ° at 61.6 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 23.7 ° at 179.5 ms
Min: -34.1 ° at 60.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 43.9 ° at 177.6 ms
Min: -68.3 ° at 61.0 ms

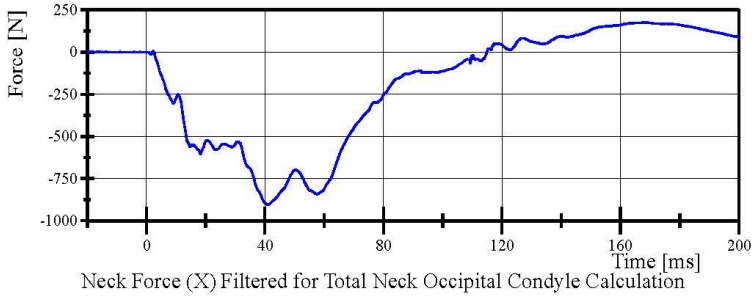
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.16.2019 14:49:55 1838

Transportation Research Center Inc.

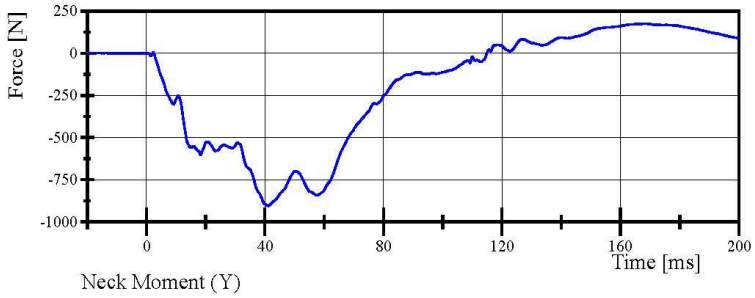
Neck Flexion
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Neck Force (X)



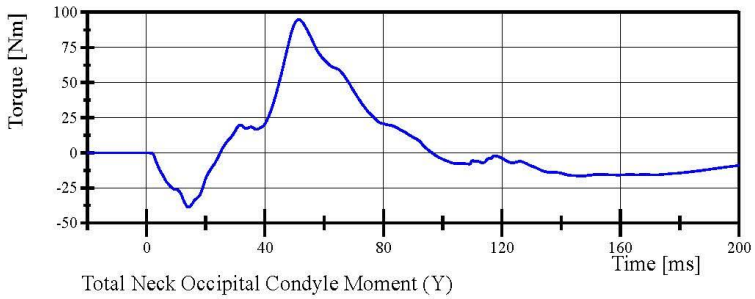
Filter Class: CFC_1000
Max: 175.0 N at 168.2 ms
Min: -904.1 N at 41.2 ms

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



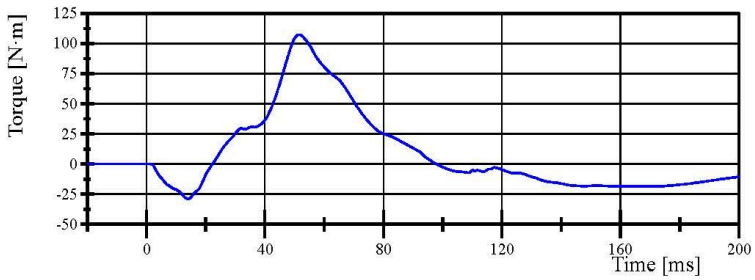
Filter Class: CFC_600
Max: 174.9 N at 168.4 ms
Min: -904.1 N at 41.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 94.8 Nm at 51.5 ms
Min: -38.6 Nm at 14.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 107.4 N·m at 51.6 ms
Min: -29.1 N·m at 14.0 ms

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

12.16.2019 14:49:56 1838

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.966 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	40.2 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	19.70 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.75 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.98 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.98 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	92.8 °	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	(-52.9) - (-80) N·m	-68.05 N·m	Yes
Time of Peak	65 - 79 ms	71.4 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	144.7 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

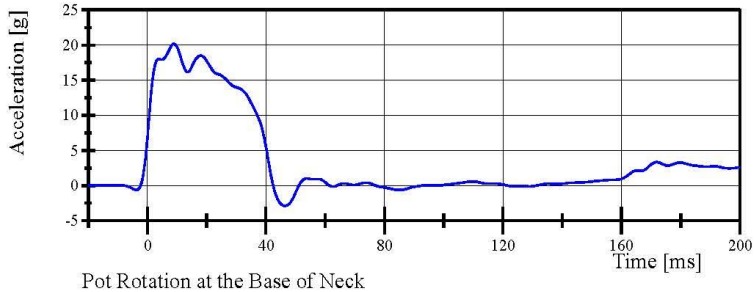
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

12.16.2019 15:22:01 1983

Transportation Research Center Inc.

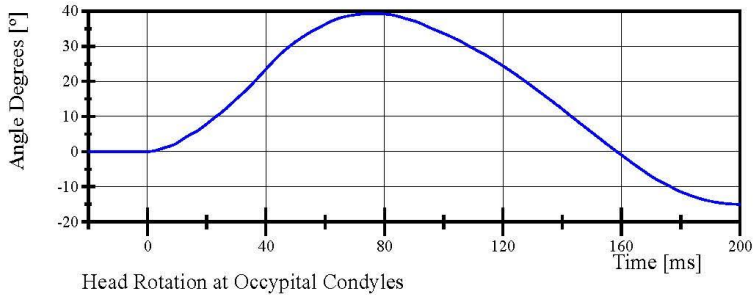
Neck Extension
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Pendulum Acceleration



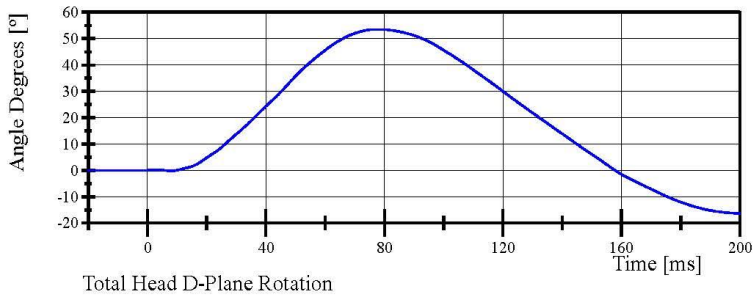
Filter Class: CFC_60
Max: 20.2 g at 9.0 ms
Min: -2.9 g at 46.4 ms

Pot Rotation at the Base of Neck



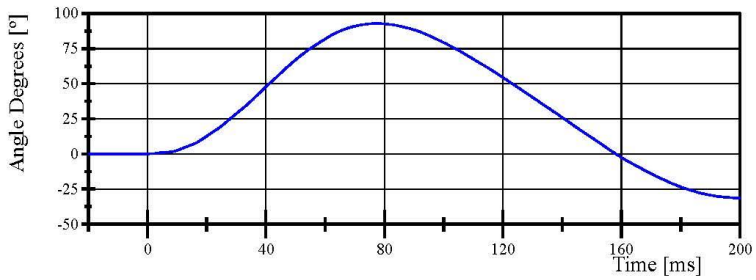
Filter Class: CFC_60
Max: 39.3 ° at 76.5 ms
Min: -15.0 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 53.5 ° at 77.6 ms
Min: -16.2 ° at 198.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 92.8 ° at 77.2 ms
Min: -31.3 ° at 200.0 ms

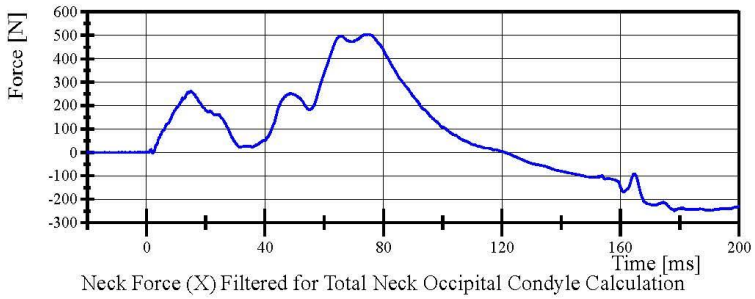
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.16.2019 15:22:29 1983

Transportation Research Center Inc.

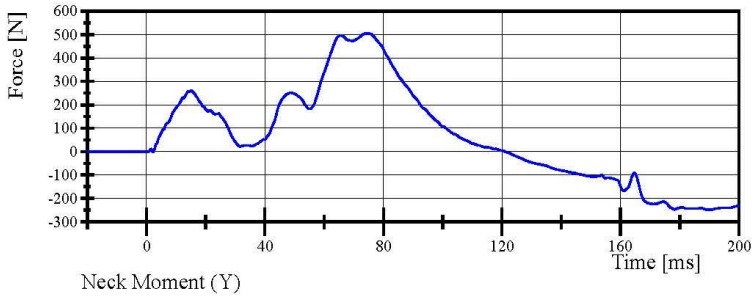
Neck Extension
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/16/2019

Neck Force (X)



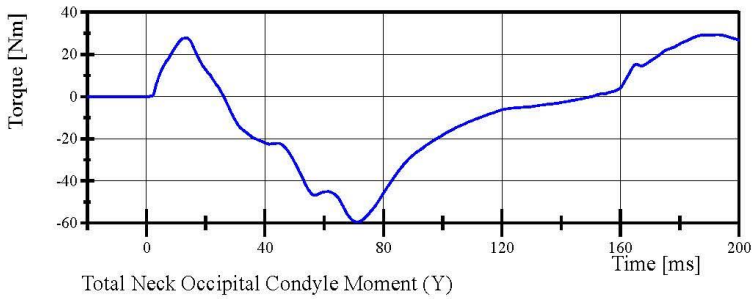
Filter Class: CFC_1000
Max: 504.7 N at 75.1 ms
Min: -249.2 N at 178.2 ms

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



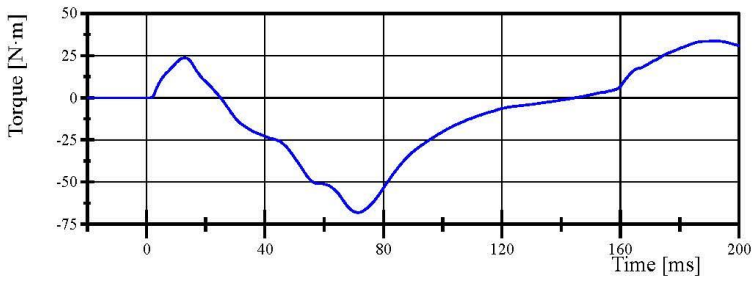
Filter Class: CFC_600
Max: 504.5 N at 75.0 ms
Min: -247.5 N at 190.9 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 29.3 Nm at 192.3 ms
Min: -59.5 Nm at 71.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.7 N·m at 192.2 ms
Min: -68.0 N·m at 71.4 ms

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

12.16.2019 15:22:29 1983

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.777 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,637.4 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-68.03 mm	Yes
Internal Hysteresis	69 - 85 %	71.9 %	Yes

Test meets specifications.

Condition: Used

Comments:
Jacket S/N: 2565
Rib Set S/N: 02033121A

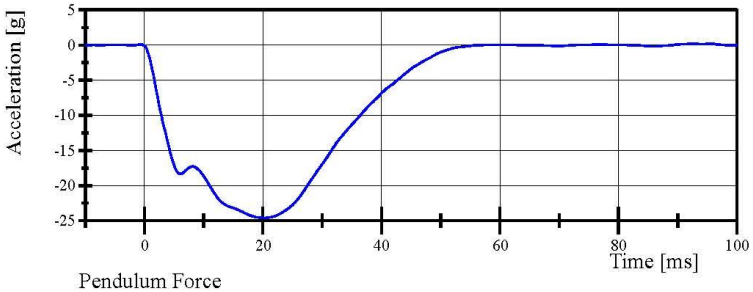
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.13.2019 08:10:21 412

Transportation Research Center Inc.

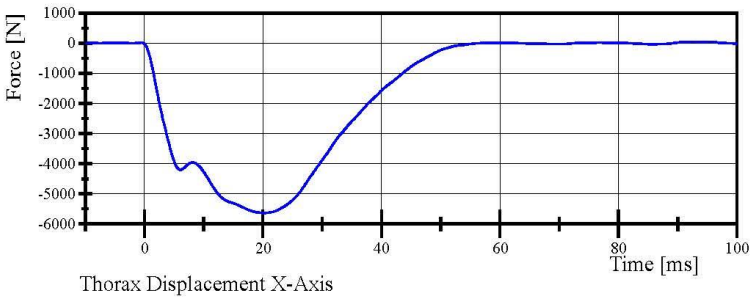
Front Thorax
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Pendulum Acceleration



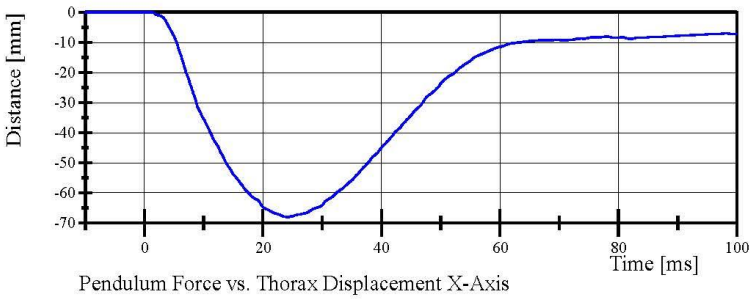
Filter Class: CFC_180
Max: 0.2 g at 92.6 ms
Min: -24.6 g at 20.1 ms

Pendulum Force



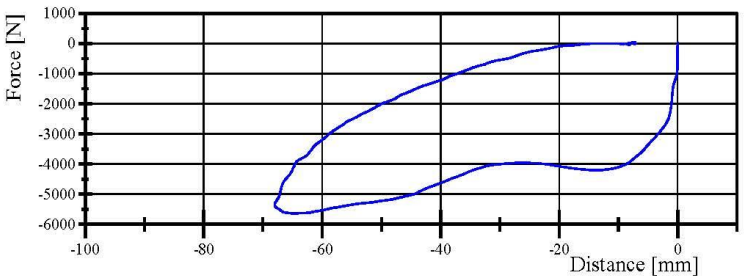
Filter Class: CFC_180
Max: 48.0 N at 92.6 ms
Min: -5,637.4 N at 20.1 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -10.0 ms
Min: -68.0 mm at 24.2 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 48.0 N at -7.5 mm
Min: -5,637.4 N at -64.8 mm

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

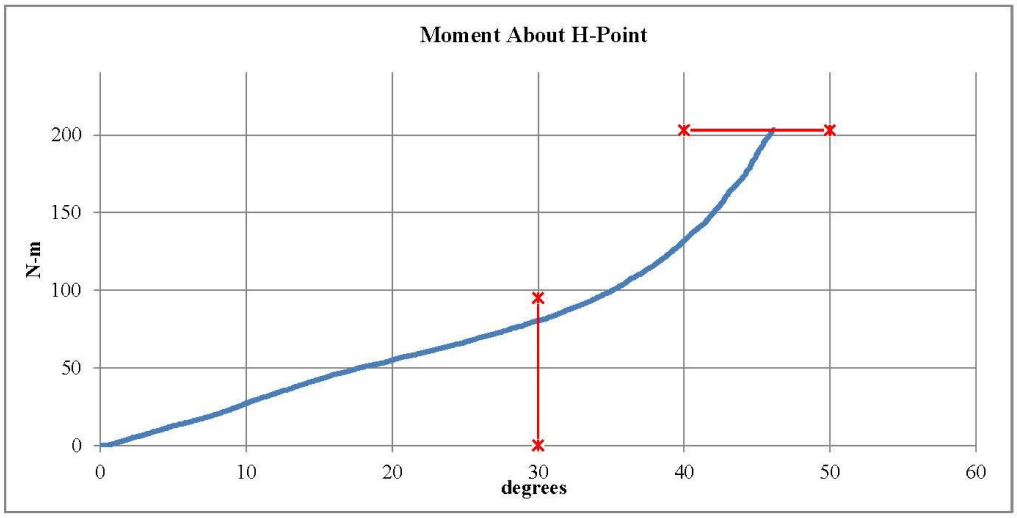
12.13.2019 08:10:53 412

Transportation Research Center Inc.

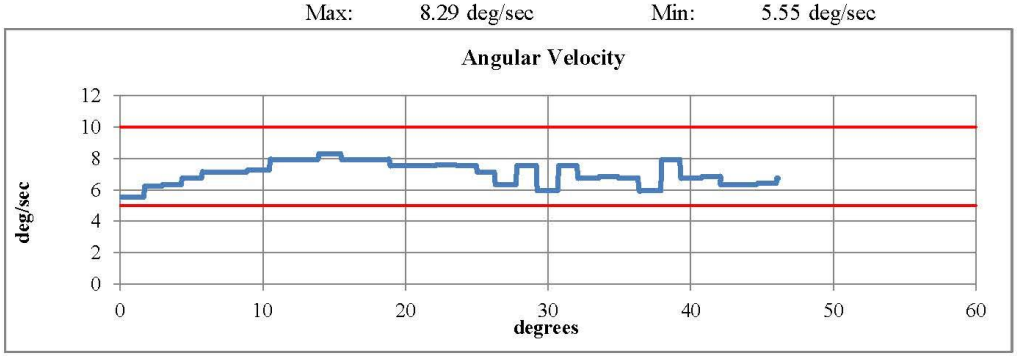
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	13-Dec-2019
Side Tested:	Left Hip	Time:	10:43
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.3	°C	Pass
Humidity	10	-	70	39	%	Pass
Moment at 30°	0	≤	94.9	80.33	N-m	Pass
Angle at 203 Nm	40	-	50	46.13	deg	Pass
Average Velocity	5	-	10	7.02	deg/sec	Pass



Max: 8.29 deg/sec Min: 5.55 deg/sec



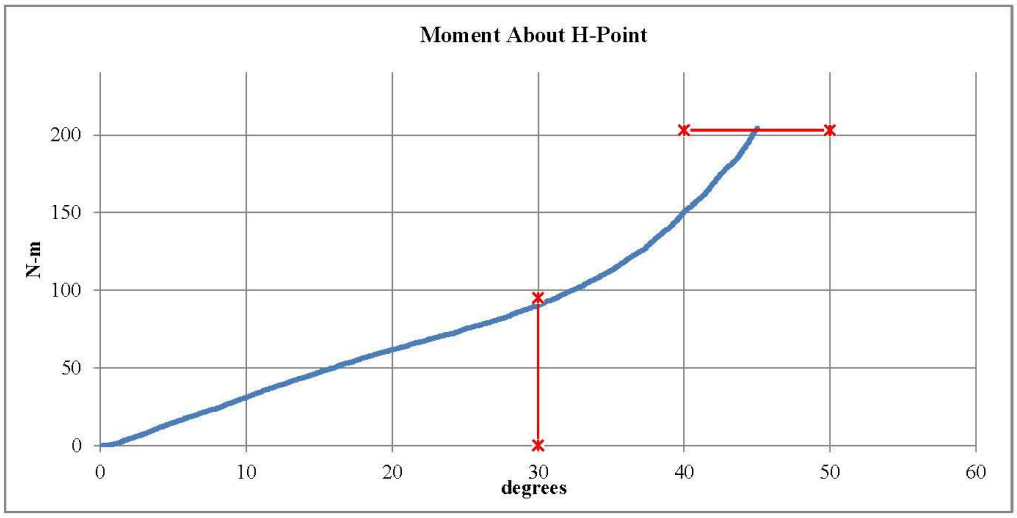
Comments:
Pelvis Skin S/N: EK3565

Transportation Research Center Inc.

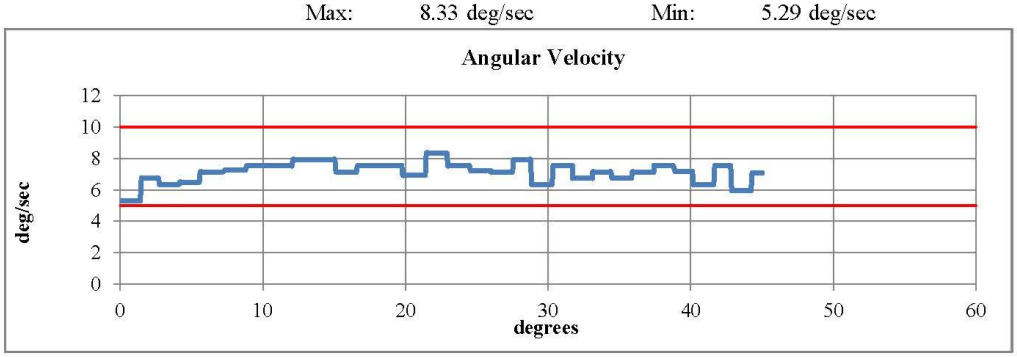
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	13-Dec-2019
Side Tested:	Right Hip	Time:	12:37
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.3	°C	Pass
Humidity	10	-	70	39	%	Pass
Moment at 30°	0	≤	94.9	90.45	N-m	Pass
Angle at 203 Nm	40	-	50	45.02	deg	Pass
Average Velocity	5	-	10	7.12	deg/sec	Pass



Max: 8.33 deg/sec Min: 5.29 deg/sec



Comments:
Pelvis Skin S/N: EK3565

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.080 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,455.28 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 2672

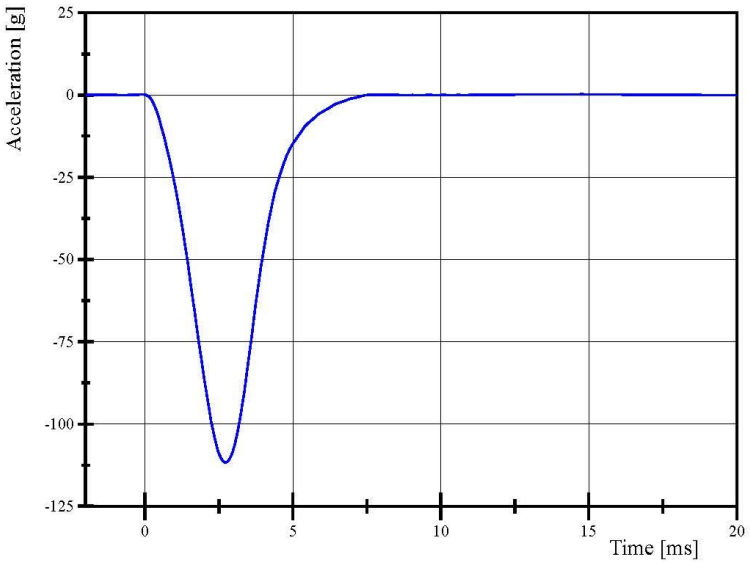
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.13.2019 07:36:46 1800

Transportation Research Center Inc.

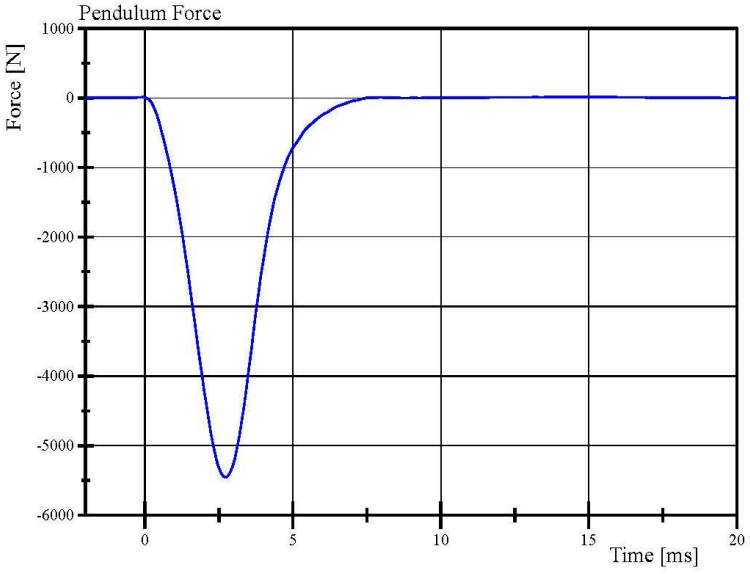
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 14.7 ms
Min: -111.7 g at 2.7 ms

Pendulum Force



Filter Class: CFC_600
Max: 10.7 N at 14.7 ms
Min: -5,455.3 N at 2.7 ms

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

12.13.2019 07:37:18 1800

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.086 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-4,942.57 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 1248

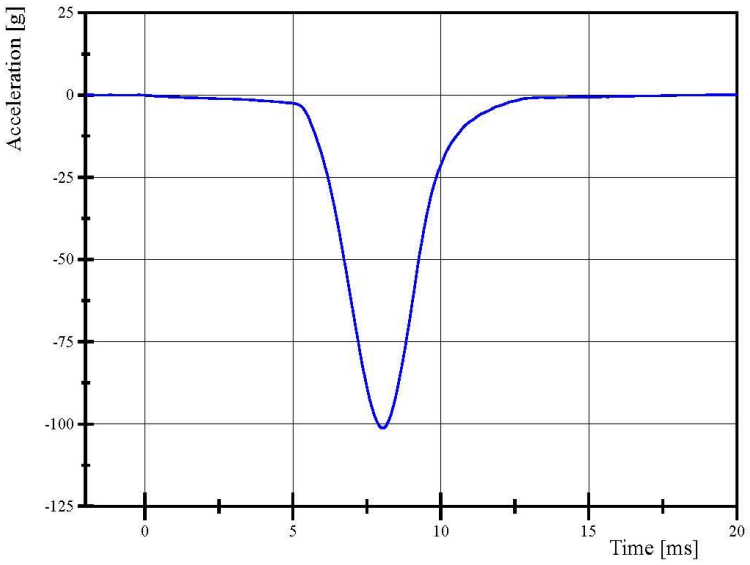
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.13.2019 07:39:39 1728

Transportation Research Center Inc.

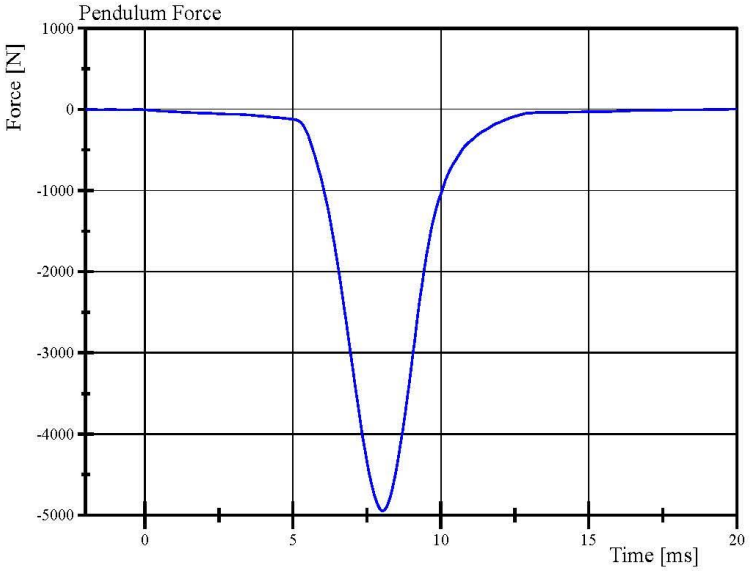
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 65-1
Test Date: 12/13/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.1 g at 20.0 ms
Min: -101.2 g at 8.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 3.7 N at 20.0 ms
Min: -4,942.6 N at 8.0 ms

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

12.13.2019 07:40:09 1728

Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 66

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	510	Yes
C	H-Point Height	83.8 - 88.9	85	Yes
D	H-Point From Seatback	134.6 - 139.7	137	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	91	Yes
F	Thigh Clearance	139.7 - 154.9	147	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	337	Yes
J	Elbow Rest Height	190.5 - 210.8	199	Yes
K	Buttock Knee Length	579.1 - 604.5	601	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	494	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	223	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	425	Yes
W	Foot Breadth	91.4 - 106.7	96	Yes
Y	Chest Circumference	970.3 - 1000.8	991	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	432	Yes
BB	Location For Waist Circumference	226.1 - 231.1	229	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	256.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	9.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	3.15 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: N/A

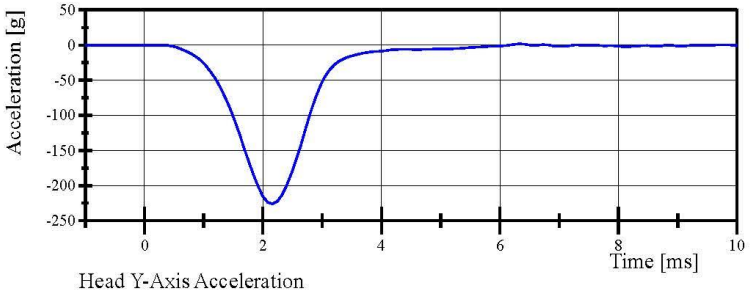
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

01.22.2020 09:21:58 610

Transportation Research Center Inc.

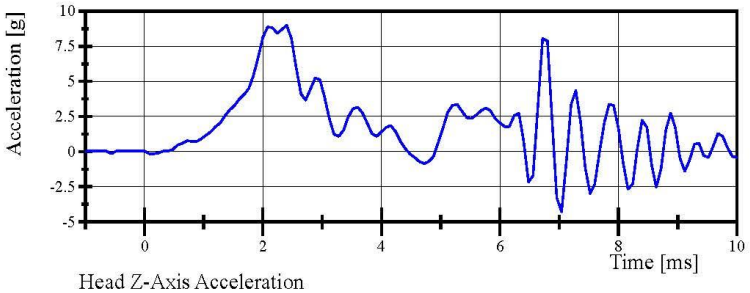
Front Head Drop
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Head X-Axis Acceleration



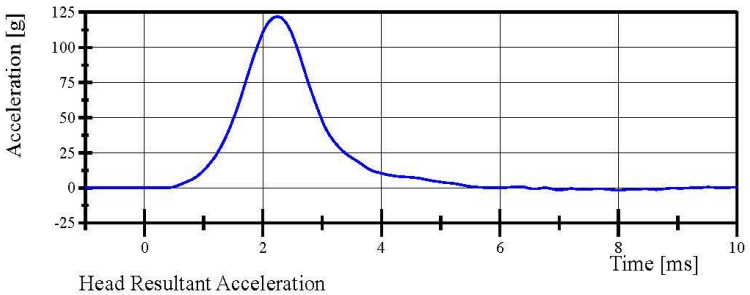
Filter Class: CFC_1000
Max: 1.8 g at 6.3 ms
Min: -226.2 g at 2.2 ms

Head Y-Axis Acceleration



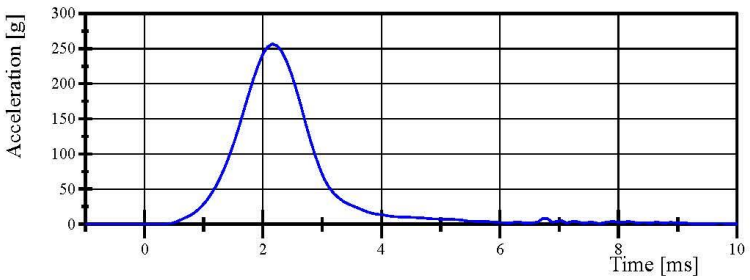
Filter Class: CFC_1000
Max: 9.0 g at 2.4 ms
Min: -4.3 g at 7.0 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 122.0 g at 2.2 ms
Min: -1.6 g at 8.0 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 256.5 g at 2.2 ms
Min: 0.0 g at -1.0 ms

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

01.22.2020 09:22:42 610

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.916 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.8 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.76 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-20.42 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-14.77 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-14.77 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-65.9 °	Yes
Time of Peak	57 - 64 ms	60.9 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	118.7 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	106.03 N·m	Yes
Time of Peak	47 - 58 ms	51.8 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	97.6 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

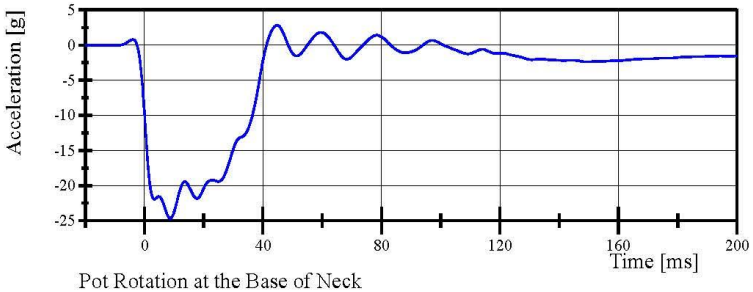
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

01.22.2020 10:52:28 1872

Transportation Research Center Inc.

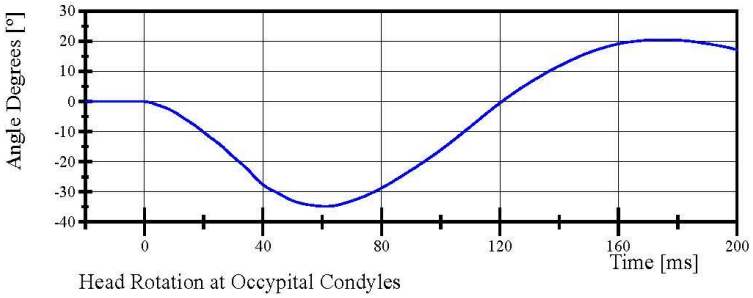
Neck Flexion
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Pendulum Acceleration



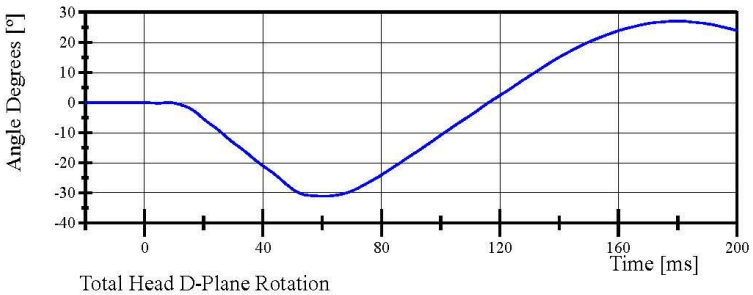
Filter Class: CFC_60
Max: 2.8 g at 44.8 ms
Min: -24.7 g at 8.7 ms

Pot Rotation at the Base of Neck



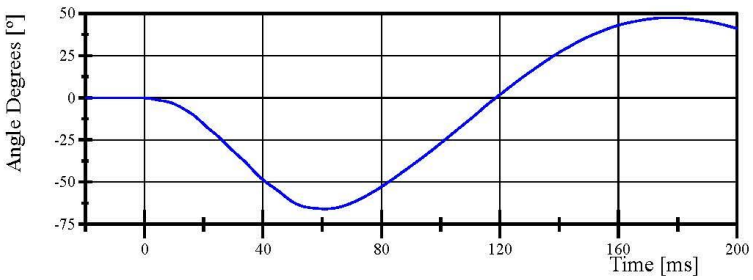
Filter Class: CFC_60
Max: 20.5 ° at 174.1 ms
Min: -34.8 ° at 61.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 27.1 ° at 180.2 ms
Min: -31.1 ° at 60.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 47.5 ° at 178.2 ms
Min: -65.9 ° at 60.9 ms

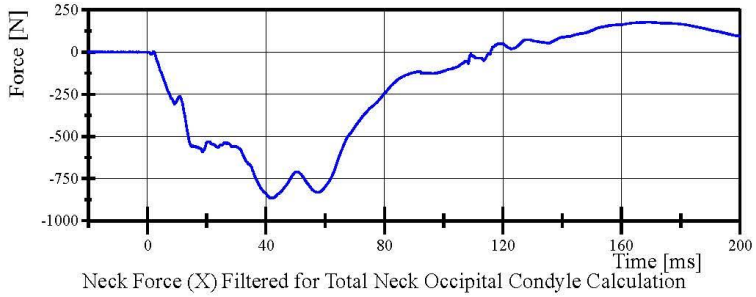
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

01.22.2020 10:54:52 1872

Transportation Research Center Inc.

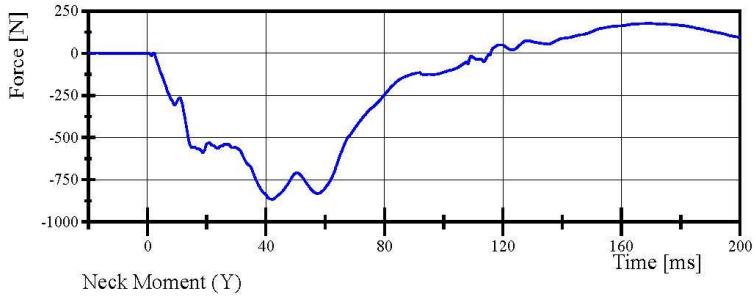
Neck Flexion
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Neck Force (X)



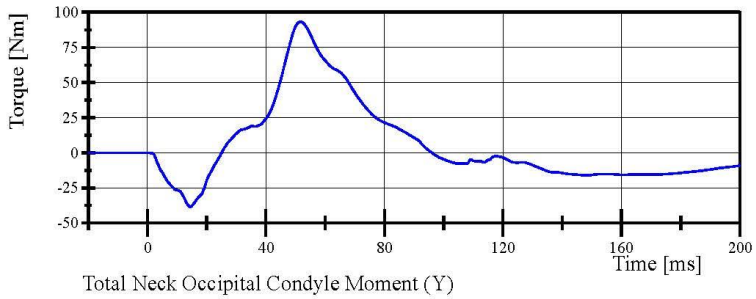
Filter Class: CFC_1000
Max: 178.0 N at 169.2 ms
Min: -867.4 N at 42.0 ms

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



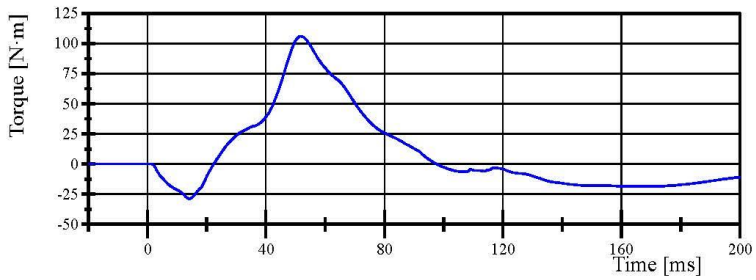
Filter Class: CFC_600
Max: 177.8 N at 169.2 ms
Min: -866.9 N at 42.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 93.3 Nm at 51.7 ms
Min: -38.3 Nm at 14.4 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 106.0 N·m at 51.8 ms
Min: -28.8 N·m at 14.2 ms

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

01.22.2020 10:54:52 1872

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.963 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	38.9 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.60 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.16 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	15.19 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	15.79 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.9 °	Yes
Time of Peak	72 - 82 ms	77.1 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	158.3 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-52.9) - (-80) N·m	-69.13 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	144.6 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

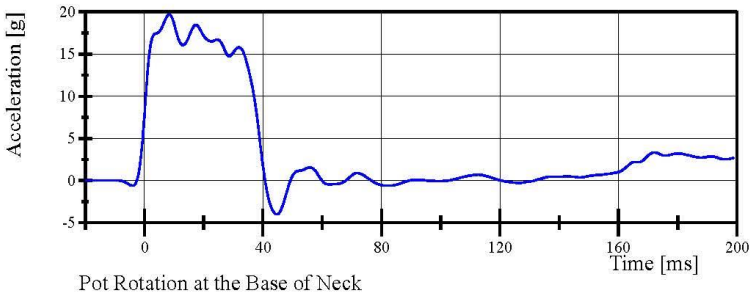
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

01.22.2020 11:22:48 2021

Transportation Research Center Inc.

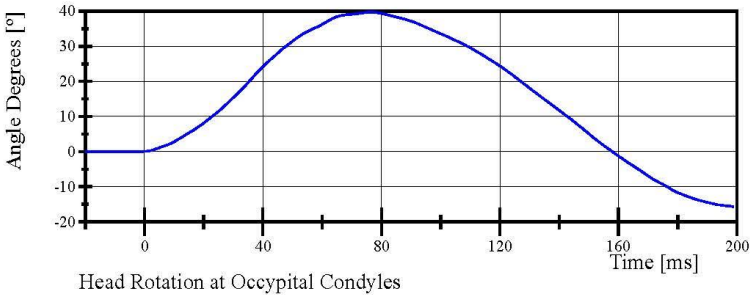
Neck Extension
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Pendulum Acceleration



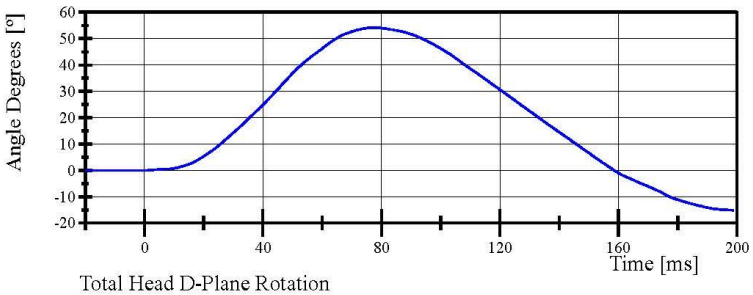
Filter Class: CFC_60
Max: 19.7 g at 8.4 ms
Min: -4.0 g at 44.7 ms

Pot Rotation at the Base of Neck



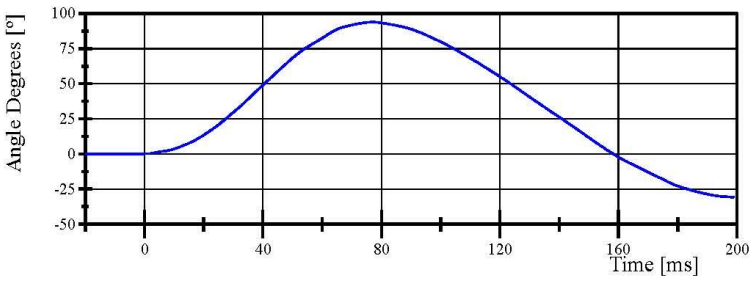
Filter Class: CFC_60
Max: 39.7 ° at 76.4 ms
Min: -15.7 ° at 199.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 54.2 ° at 77.6 ms
Min: -15.2 ° at 199.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 93.9 ° at 77.1 ms
Min: -30.8 ° at 199.0 ms

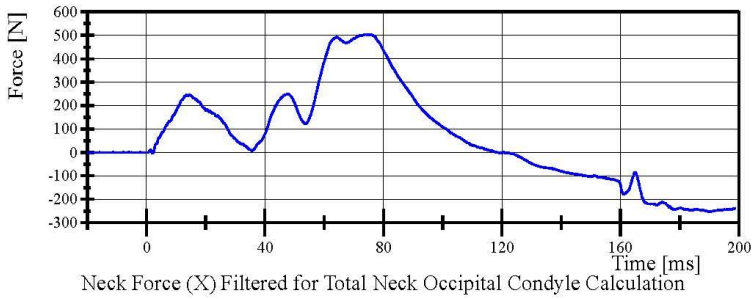
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

01.22.2020 11:25:00 2021

Transportation Research Center Inc.

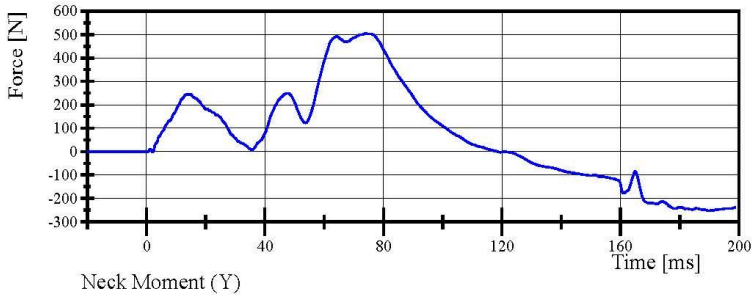
Neck Extension
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Neck Force (X)



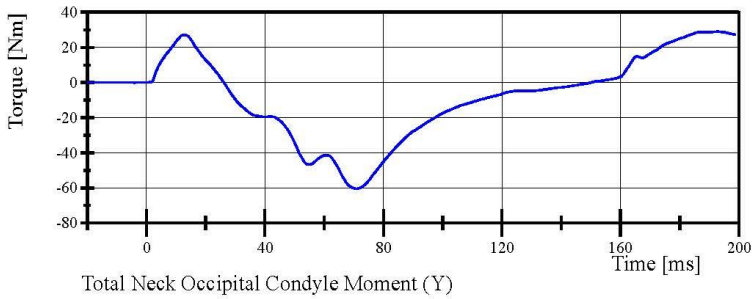
Filter Class: CFC_1000
Max: 504.6 N at 73.8 ms
Min: -253.1 N at 189.6 ms

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



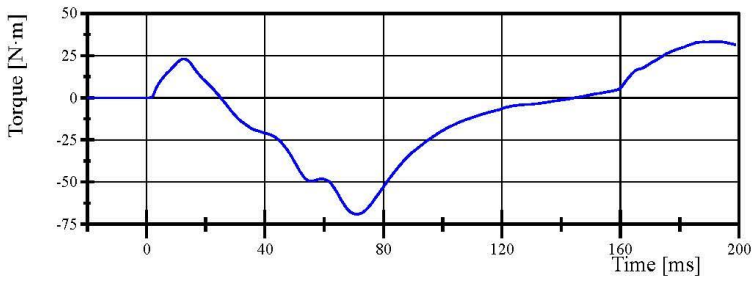
Filter Class: CFC_600
Max: 504.1 N at 73.9 ms
Min: -252.4 N at 189.8 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 29.0 Nm at 193.0 ms
Min: -60.4 Nm at 70.8 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.4 N·m at 192.6 ms
Min: -69.1 N·m at 71.0 ms

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

01.22.2020 11:25:01 2021

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.776 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,561.2 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-67.84 mm	Yes
Internal Hysteresis	69 - 85 %	71.7 %	Yes

Test meets specifications.

Condition: Used

Comments:
Jacket S/N: 2565
Rib Set S/N: 02033121A

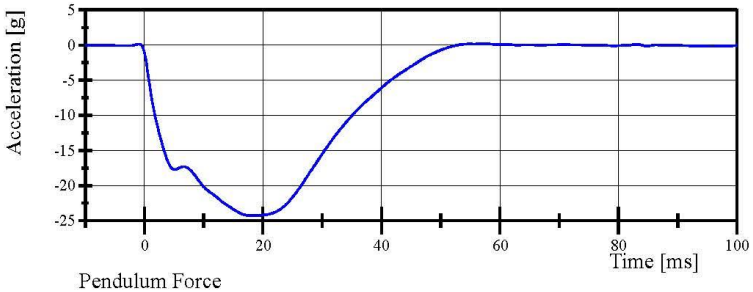
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

01.22.2020 07:30:48 383

Transportation Research Center Inc.

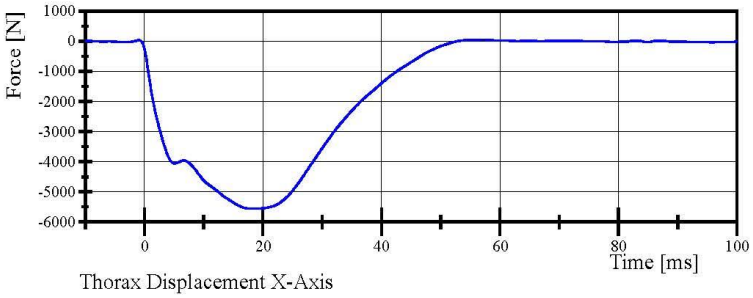
Front Thorax
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Pendulum Acceleration



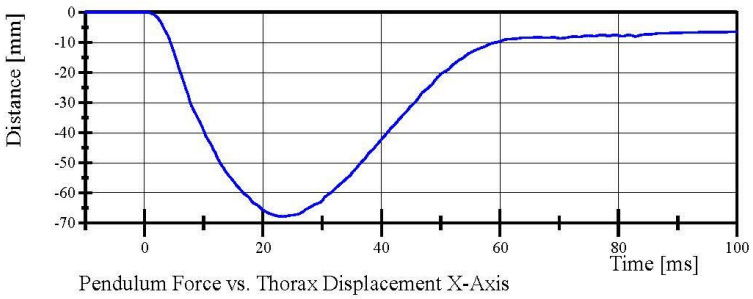
Filter Class: CFC_180
Max: 0.2 g at 57.0 ms
Min: -24.3 g at 18.8 ms

Pendulum Force



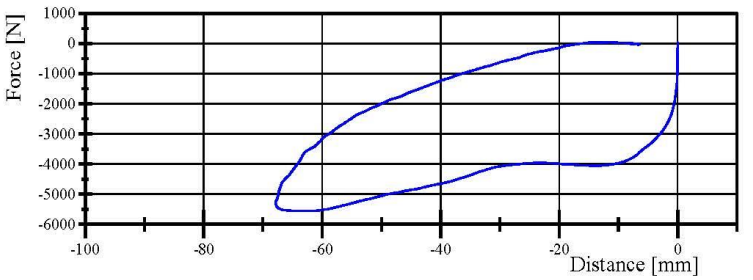
Filter Class: CFC_180
Max: 45.4 N at 57.0 ms
Min: -5,561.2 N at 18.8 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -10.0 ms
Min: -67.8 mm at 23.4 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 45.4 N at -11.7 mm
Min: -5,561.2 N at -63.8 mm

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

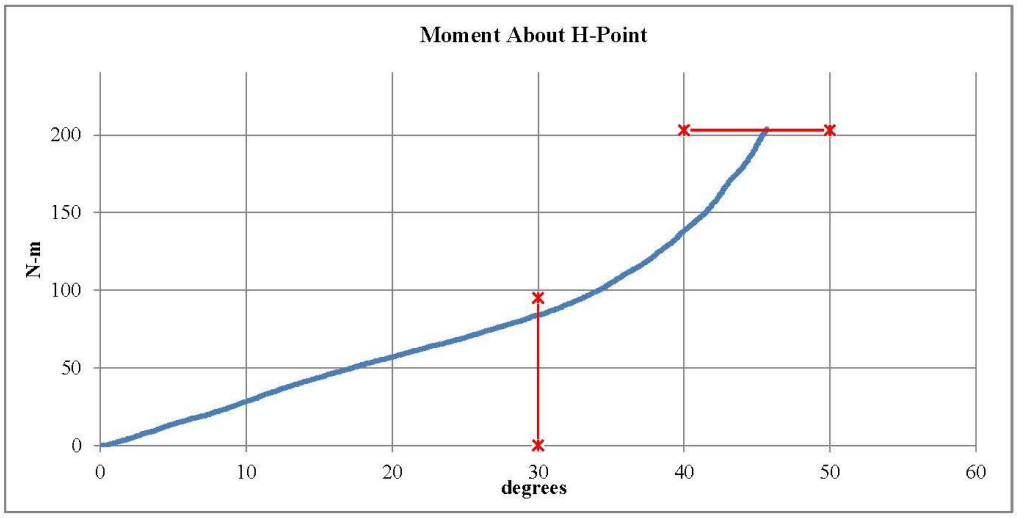
01.22.2020 07:31:22 383

Transportation Research Center Inc.

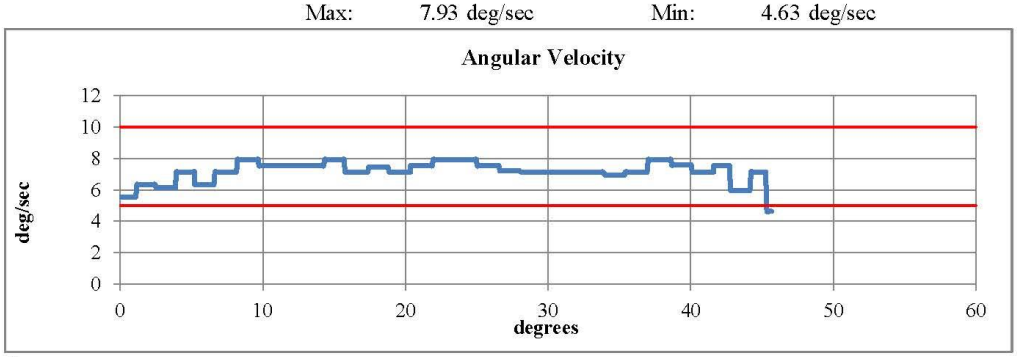
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	22-Jan-2020
Side Tested:	Left Hip	Time:	8:31
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.8	°C	Pass
Humidity	10	-	70	40	%	Pass
Moment at 30°	0	≤	94.9	84.2	N-m	Pass
Angle at 203 Nm	40	-	50	45.66	deg	Pass
Average Velocity	5	-	10	7.18	deg/sec	Pass



Max: 7.93 deg/sec Min: 4.63 deg/sec



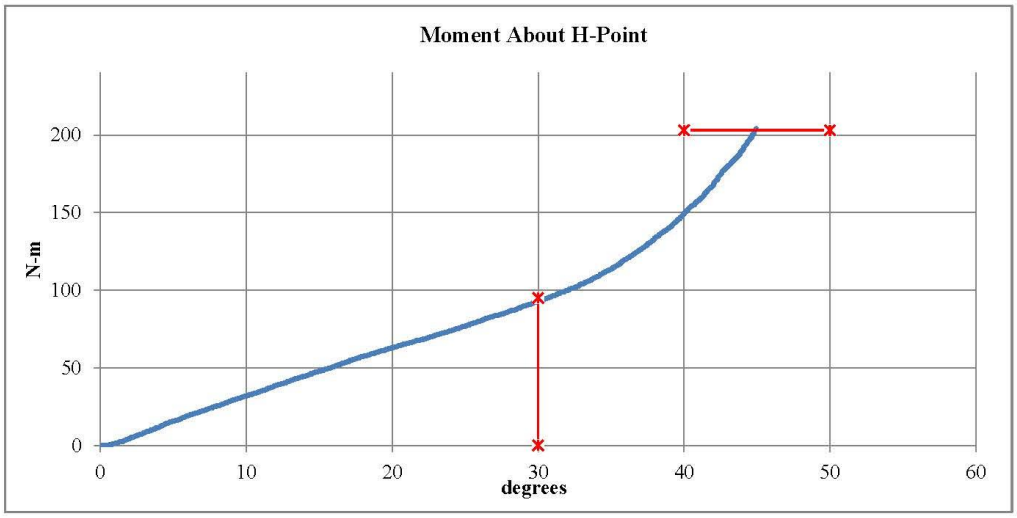
Comments:
Pelvis Skin S/N: EK3565

Transportation Research Center Inc.

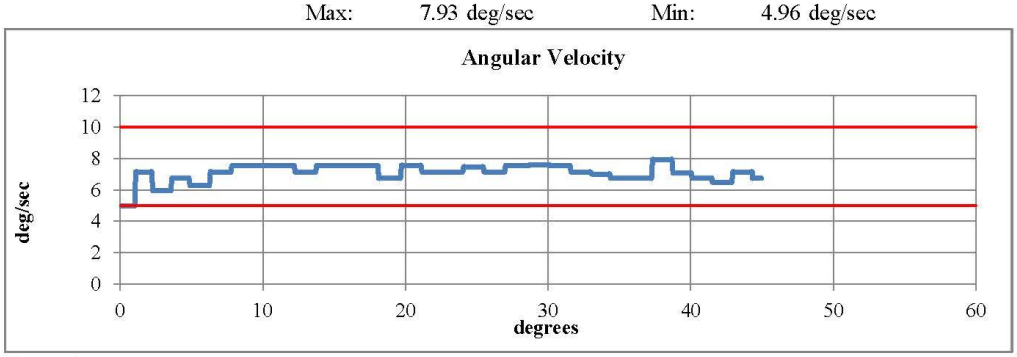
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	22-Jan-2020
Side Tested:	Right Hip	Time:	9:51
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.7	°C	Pass
Humidity	10	-	70	39	%	Pass
Moment at 30°	0	≤	94.9	92.83	N-m	Pass
Angle at 203 Nm	40	-	50	44.94	deg	Pass
Average Velocity	5	-	10	7.08	deg/sec	Pass



Max: 7.93 deg/sec Min: 4.96 deg/sec



Comments:
Pelvis Skin S/N: EK3565

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,675.00 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 2672

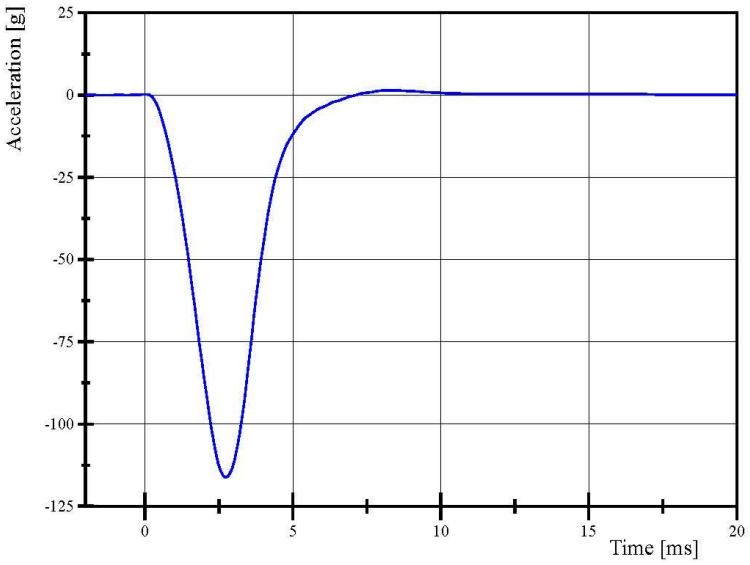
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

01.22.2020 07:47:49 1744

Transportation Research Center Inc.

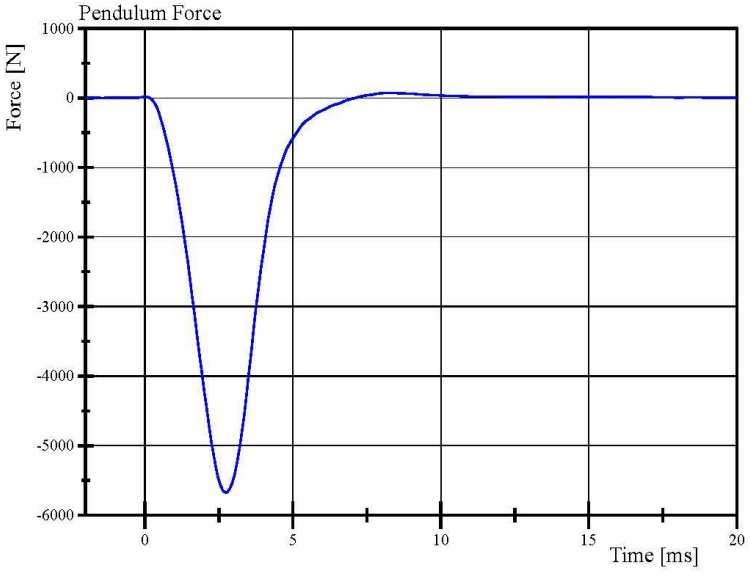
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 1.5 g at 8.3 ms
Min: -116.2 g at 2.7 ms

Pendulum Force



Filter Class: CFC_600
Max: 71.2 N at 8.3 ms
Min: -5,675.0 N at 2.7 ms

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

01.22.2020 07:48:17 1744

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.116 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,465.01 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 1248

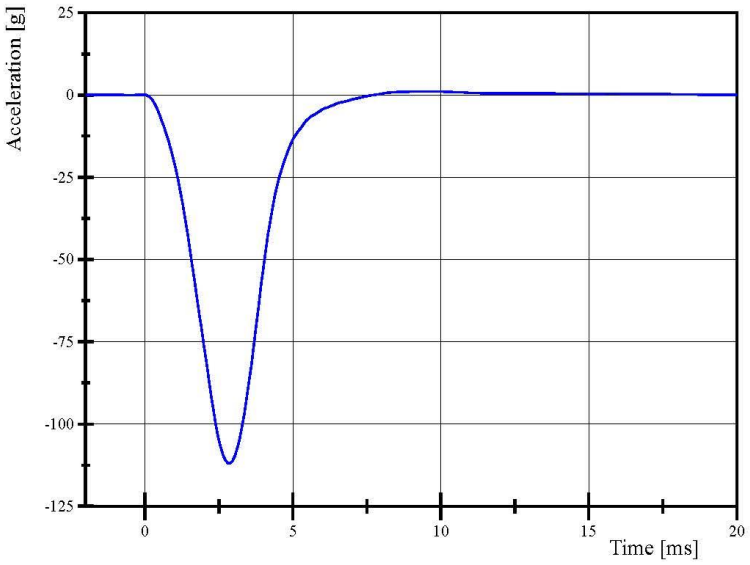
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

01.22.2020 07:59:25 1738

Transportation Research Center Inc.

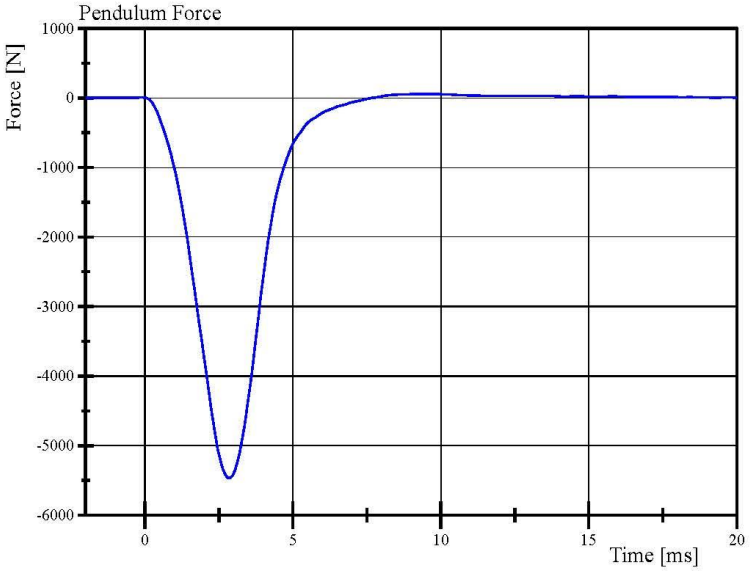
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 66-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 1.2 g at 9.7 ms
Min: -111.9 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 56.7 N at 9.7 ms
Min: -5,465.0 N at 2.9 ms

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

01.22.2020 07:59:53 1738

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. 38

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	778	Yes
B	Shoulder Pivot Height	431.8 - 457.2	444	Yes
C	Hip Pivot Height	81.3 - 86.3	82	Yes
D	Hip Pivot from Backline	144.8 - 149.8	145	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	81	Yes
F	Thigh Clearance	119.4 - 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	281	Yes
J	Elbow Rest Height	182.8 - 203.2	184	Yes
K	Buttock Knee Length	520.7 - 546.1	537	Yes
L	Popliteal Height	355.6 - 376.0	364	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	225	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	138	Yes
T	Head Depth	177.8 - 188.0	180	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	360	Yes
W	Foot Breadth	78.8 - 94.0	88	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	777	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	355	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	163	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 38-5
Test Date: 1/16/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	257.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	6.4 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	0.00 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: 05628

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

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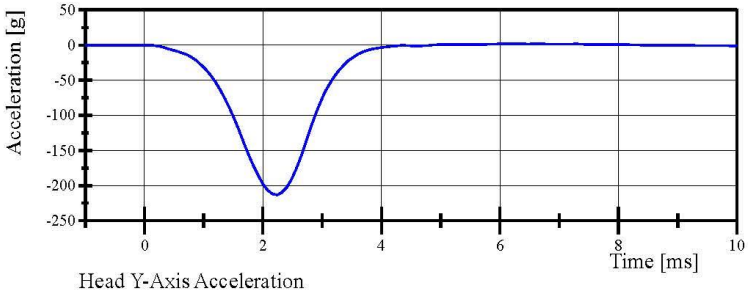
Transportation Research Center Inc.

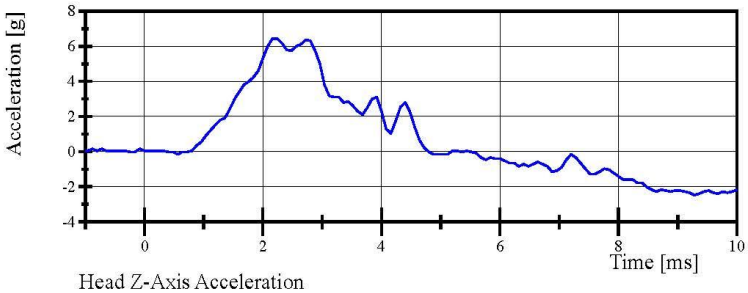
Front Head Drop
HIII 5th Serial No. 070 Certification No. 38-5
Test Date: 1/16/2020

Head X-Axis Acceleration



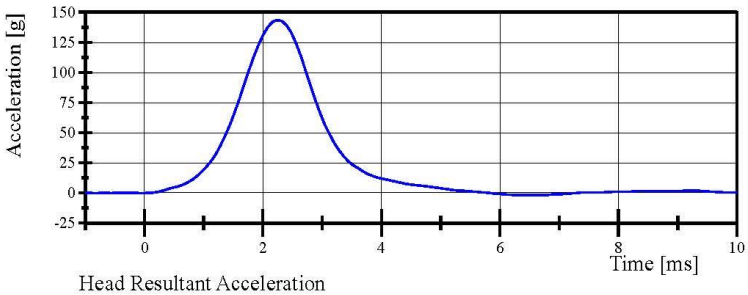
Filter Class: CFC_1000
Max: 2.0 g at 6.2 ms
Min: -213.2 g at 2.2 ms

Head Y-Axis Acceleration



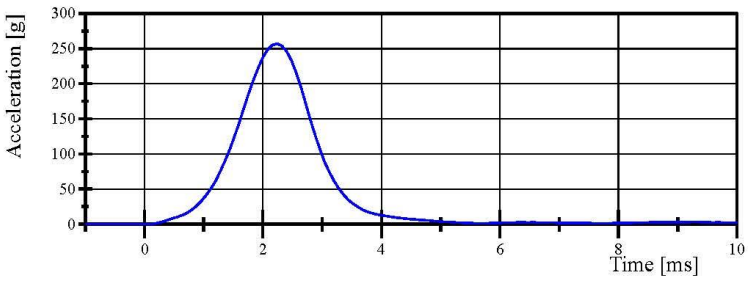
Filter Class: CFC_1000
Max: 6.4 g at 2.2 ms
Min: -2.5 g at 9.3 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 143.7 g at 2.2 ms
Min: -1.9 g at 6.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 257.2 g at 2.2 ms
Min: 0.0 g at -1.0 ms

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

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Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.065 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.16 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.24 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.02 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-77.4 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	69.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	84.7 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: DJ2788

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

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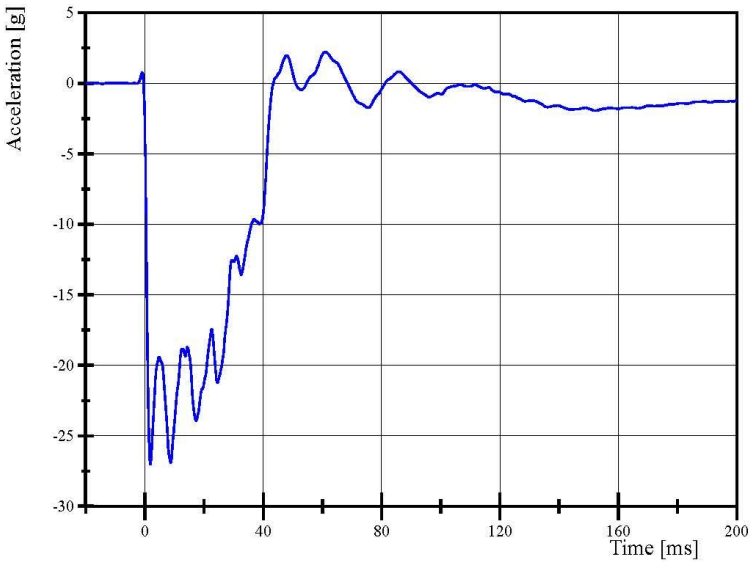
Transportation Research Center Inc.

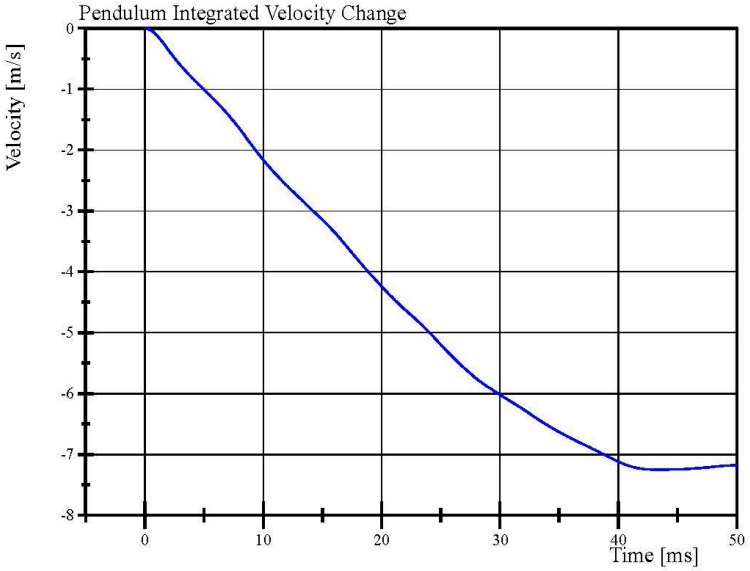
Neck Flexion
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 2.2 g at 61.1 ms
Min: -27.0 g at 1.9 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.3 m/s at 43.4 ms

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

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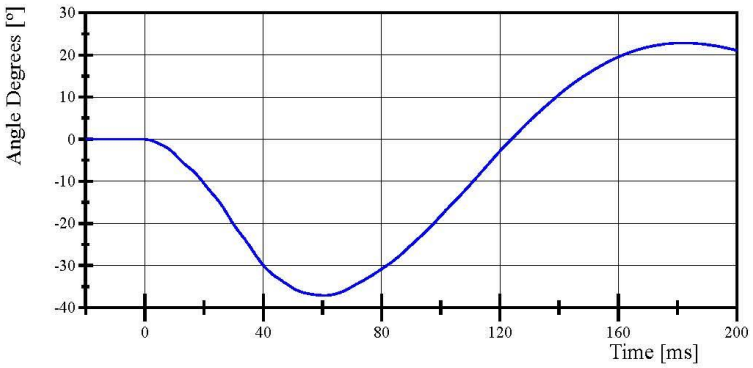
Transportation Research Center Inc.

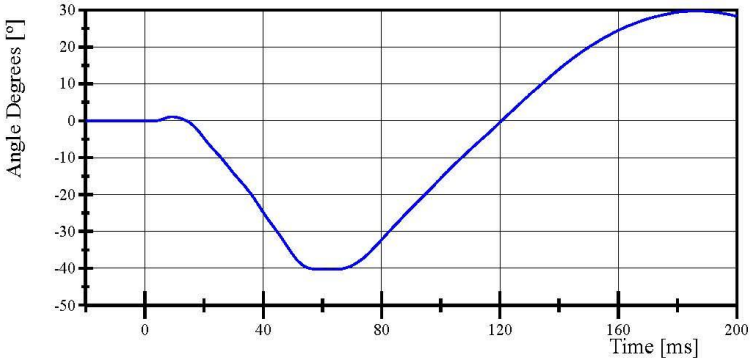
Neck Flexion
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Pot Rotation at the Base of Neck



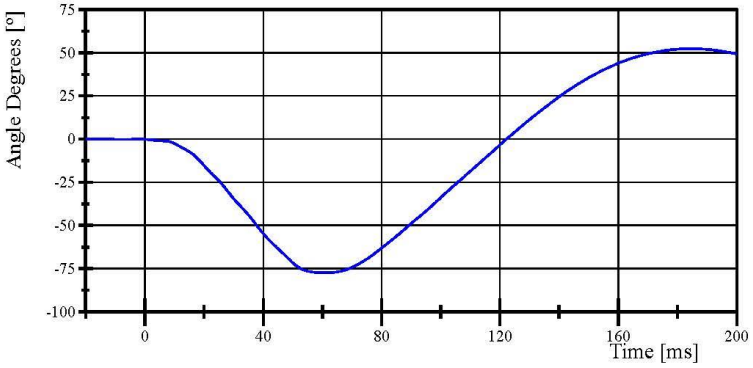
Filter Class: CFC_60
Max: 22.8 ° at 182.0 ms
Min: -37.1 ° at 60.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 29.7 ° at 186.6 ms
Min: -40.3 ° at 63.1 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 52.5 ° at 184.2 ms
Min: -77.4 ° at 61.1 ms

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

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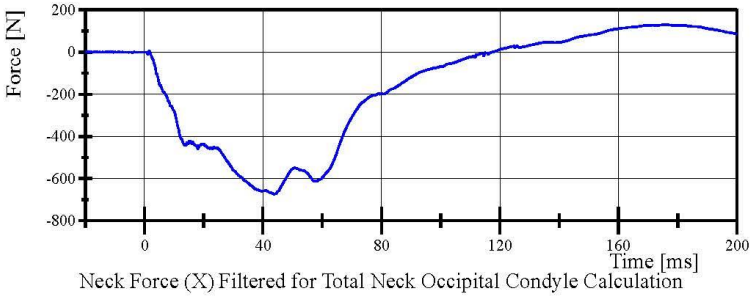
Transportation Research Center Inc.

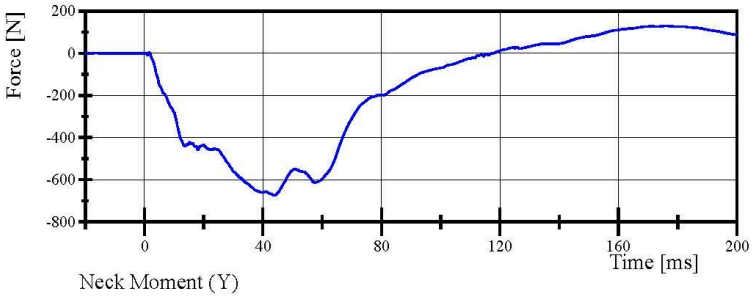
Neck Flexion
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Neck Force (X)



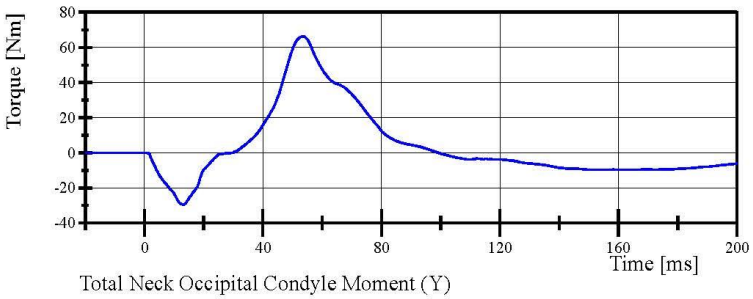
Filter Class: CFC_1000
Max: 130.2 N at 176.5 ms
Min: -674.4 N at 43.7 ms

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



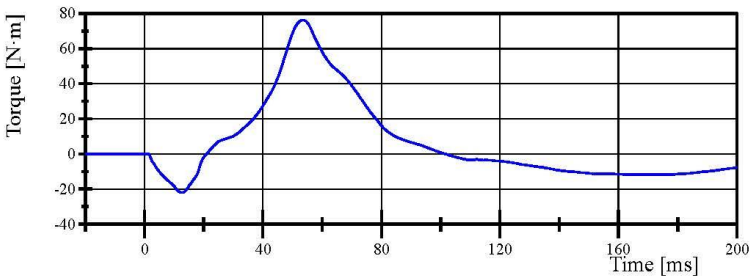
Filter Class: CFC_600
Max: 129.9 N at 176.5 ms
Min: -673.8 N at 43.8 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 66.3 Nm at 53.5 ms
Min: -29.5 Nm at 13.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 76.3 N·m at 53.5 ms
Min: -21.9 N·m at 12.9 ms

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

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Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.086 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.77 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.55 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.07 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	107.4 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-54.2 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	102.0 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: DJ2788

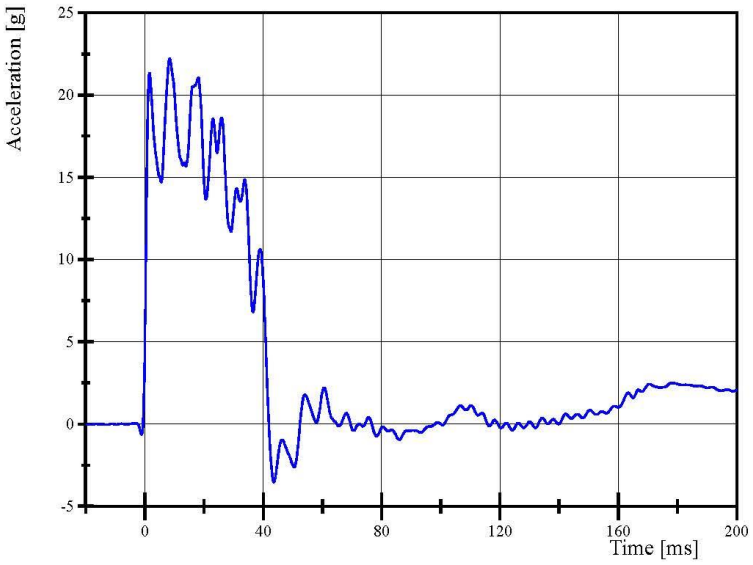
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.15.2020 08:27:52 2000

Transportation Research Center Inc.

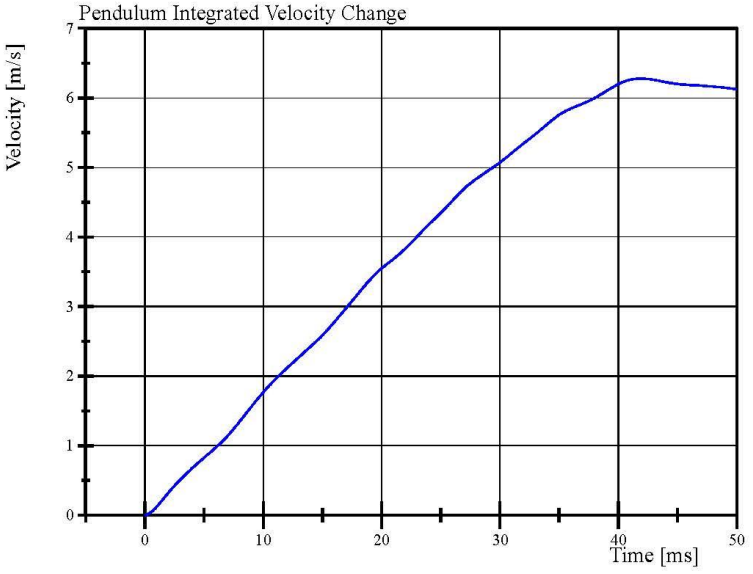
Neck Extension
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 22.2 g at 8.4 ms
Min: -3.5 g at 43.6 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.3 m/s at 41.9 ms
Min: 0.0 m/s at 0.0 ms

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

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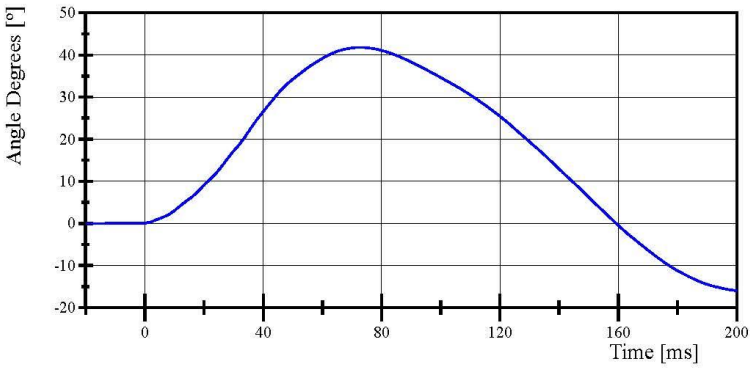
Transportation Research Center Inc.

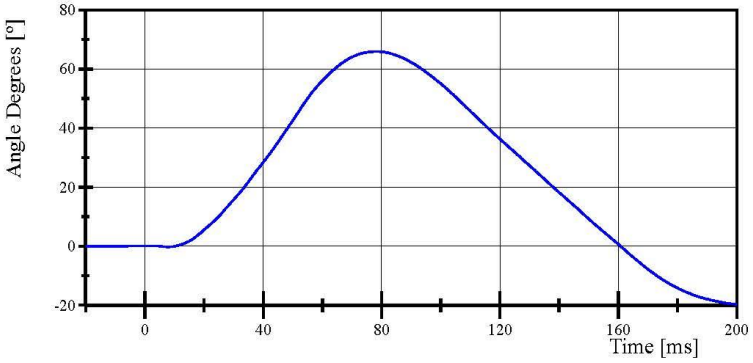
Neck Extension
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Pot Rotation at the Base of Neck



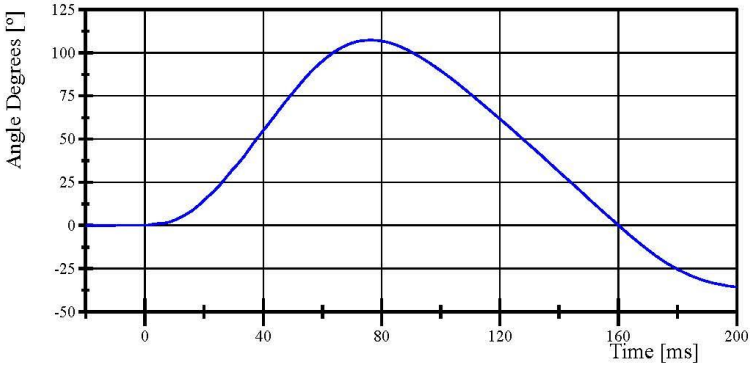
Filter Class: CFC_60
Max: 41.8 ° at 72.8 ms
Min: -16.0 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 66.0 ° at 78.3 ms
Min: -19.7 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 107.4 ° at 76.3 ms
Min: -35.7 ° at 200.0 ms

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

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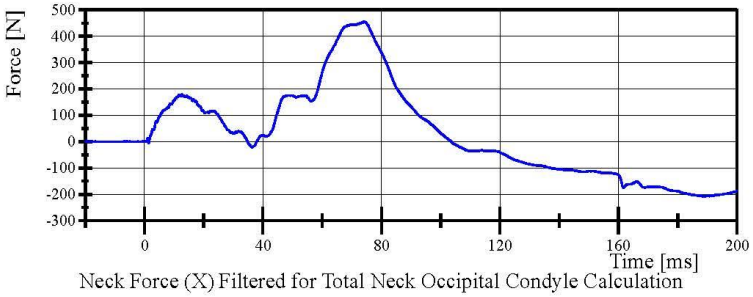
Transportation Research Center Inc.

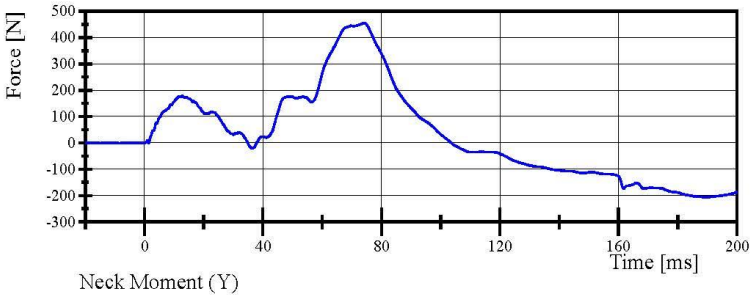
Neck Extension
HIII 5th Serial No. 070 Certification No. 38-2
Test Date: 1/15/2020

Neck Force (X)



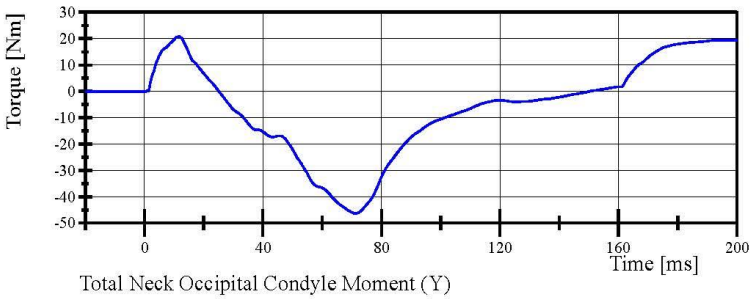
Filter Class: CFC_1000
Max: 455.6 N at 74.2 ms
Min: -207.1 N at 189.0 ms

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



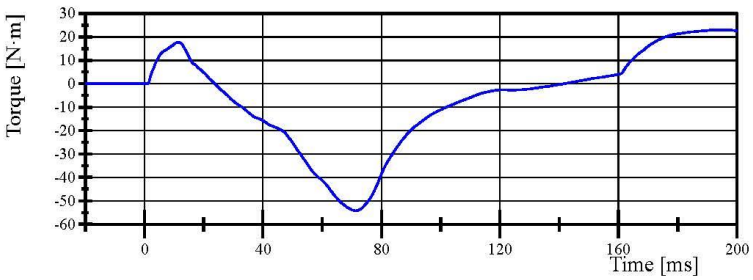
Filter Class: CFC_600
Max: 455.1 N at 74.2 ms
Min: -206.7 N at 189.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 20.8 Nm at 11.6 ms
Min: -46.3 Nm at 71.3 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 23.0 N·m at 193.5 ms
Min: -54.2 N·m at 71.3 ms

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

01.15.2020 08:28:21 2000

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/15/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	41 %	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	-3,957.3 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-3,957.0 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-53.6 mm	Yes
Internal Hysteresis	69 - 85 %	71.8 %	Yes

Test meets specifications.

Condition: Used

Comments:
Rib Set S/N: 050302468
Jacket S/N: N/A

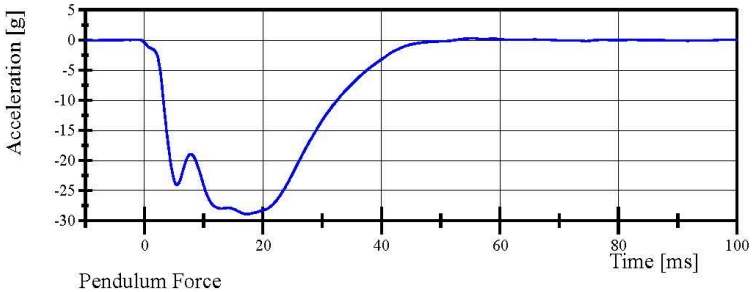
Specification Source: CFR49 Part 572 Subpart O with Polarity in accordance with J211

01.15.2020 09:48:42 414

Transportation Research Center Inc.

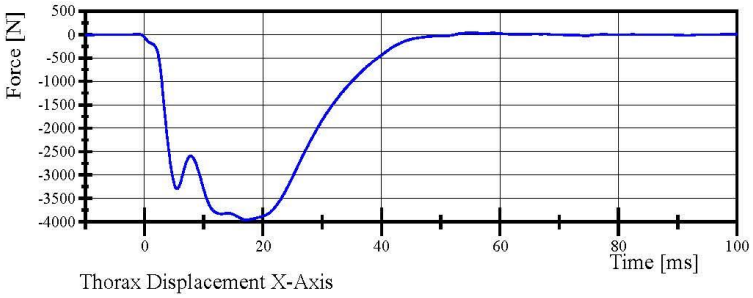
Front Thorax
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/15/2020

Pendulum Acceleration



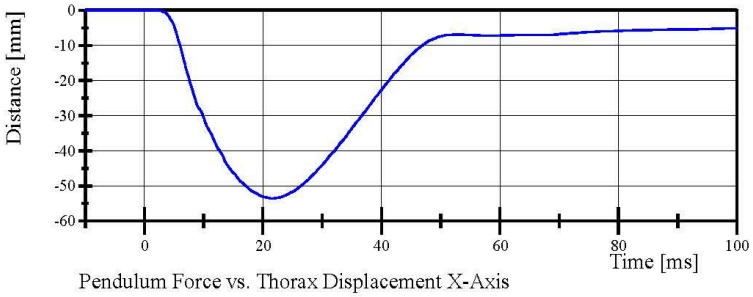
Filter Class: CFC_180
Max: 0.3 g at 55.4 ms
Min: -28.9 g at 17.2 ms

Pendulum Force



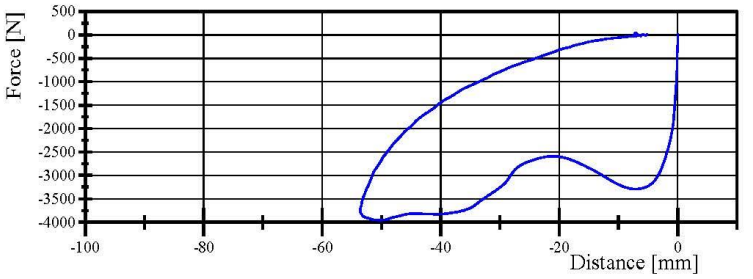
Filter Class: CFC_180
Max: 41.7 N at 55.4 ms
Min: -3,957.3 N at 17.2 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -6.6 ms
Min: -53.6 mm at 21.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 41.7 N at -7.1 mm
Min: -3,957.3 N at -50.1 mm

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

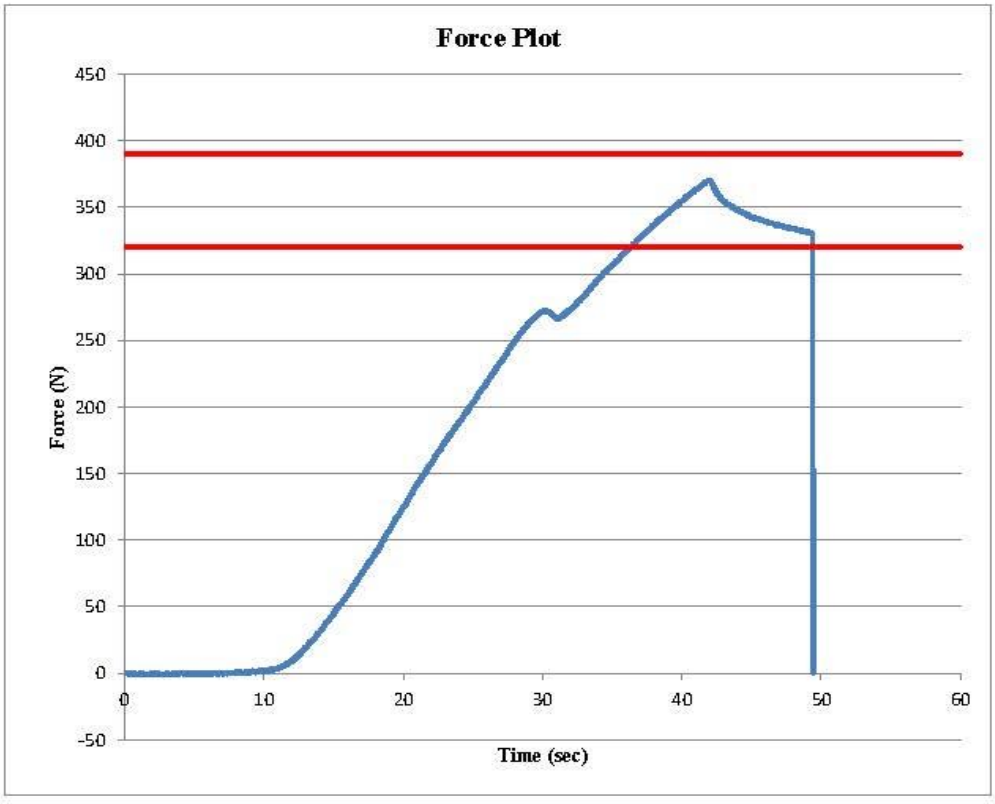
01.15.2020 09:52:00 414

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	070	Date:	1/15/2020
Test Number:	1	Time:	10:03

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.1	°C	Pass
Humidity	10	-	70	41	%	Pass
Average Angular Velocity	0.5	-	1.5	0.96	deg/sec	Pass
Initial Angle	0	-	20	15.48	deg	Pass
Peak Force at 45.29°	320	-	390	370.1	N	Pass
Final Angle	-8	-	8	5.33	deg	Pass



Lumbar S/N: 05060

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/14/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.094 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,810.5 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 05856

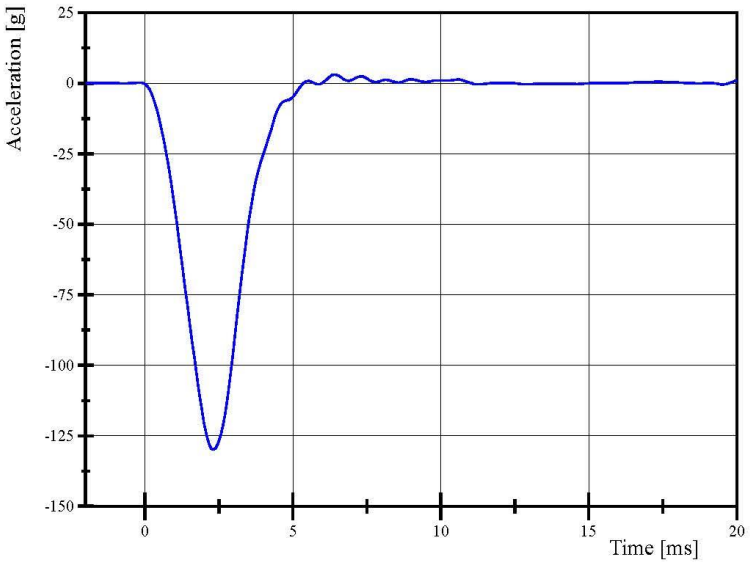
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.14.2020 08:44:52 1805

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/14/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 3.1 g at 6.4 ms
Min: -130.0 g at 2.3 ms

Pendulum Force

Filter Class: CFC_600
Max: 90.4 N at 6.4 ms
Min: -3,810.5 N at 2.3 ms

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

01.14.2020 08:45:30 1805

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/14/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.092 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,846.9 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 05269

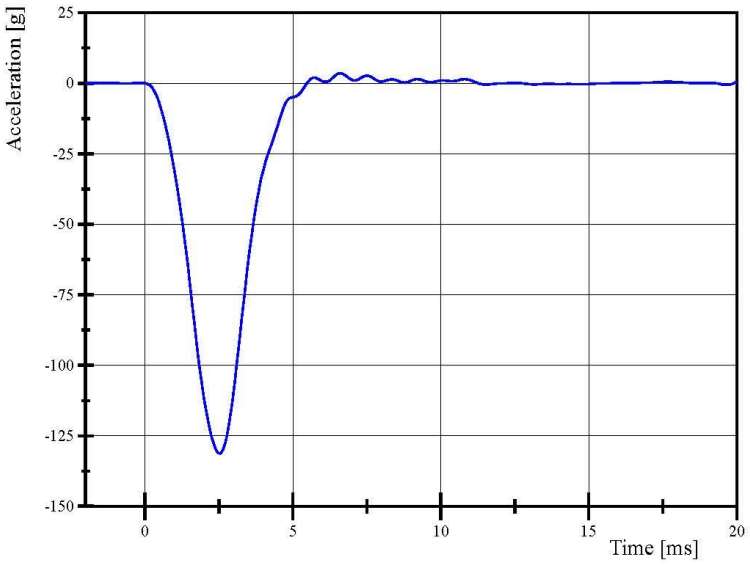
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.14.2020 08:49:16 1803

Transportation Research Center Inc.

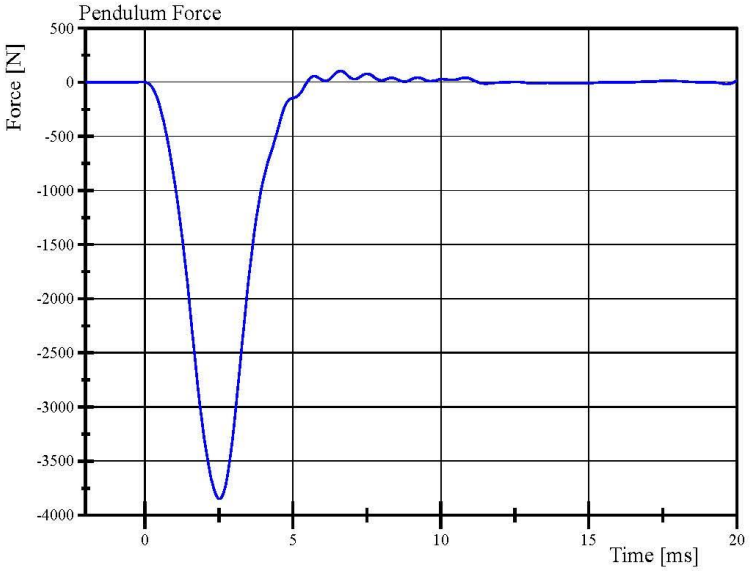
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 38-1
Test Date: 1/14/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 3.5 g at 6.6 ms
Min: -131.2 g at 2.6 ms

Pendulum Force



Filter Class: CFC_600
Max: 104.0 N at 6.6 ms
Min: -3,846.9 N at 2.6 ms

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

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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. 39

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	778	Yes
B	Shoulder Pivot Height	431.8 - 457.2	444	Yes
C	Hip Pivot Height	81.3 - 86.3	82	Yes
D	Hip Pivot from Backline	144.8 - 149.8	145	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	81	Yes
F	Thigh Clearance	119.4 - 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	281	Yes
J	Elbow Rest Height	182.8 - 203.2	184	Yes
K	Buttock Knee Length	520.7 - 546.1	537	Yes
L	Popliteal Height	355.6 - 376.0	364	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	225	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	138	Yes
T	Head Depth	177.8 - 188.0	180	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	360	Yes
W	Foot Breadth	78.8 - 94.0	88	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	777	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	355	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	163	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	261.9 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	3.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	0.00 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: 05628

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

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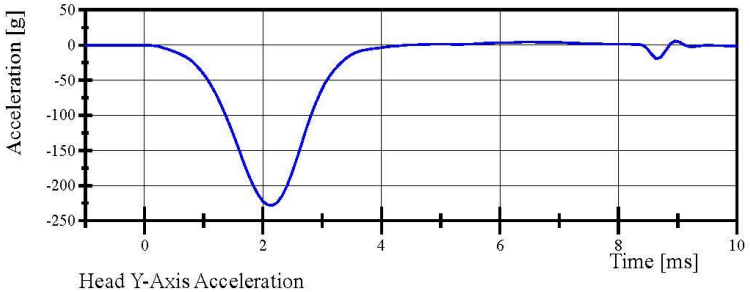
Transportation Research Center Inc.

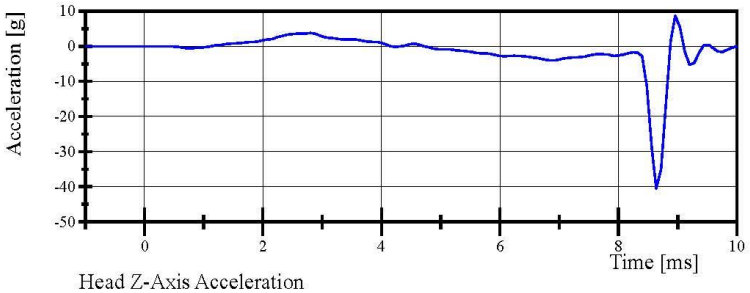
Front Head Drop
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Head X-Axis Acceleration



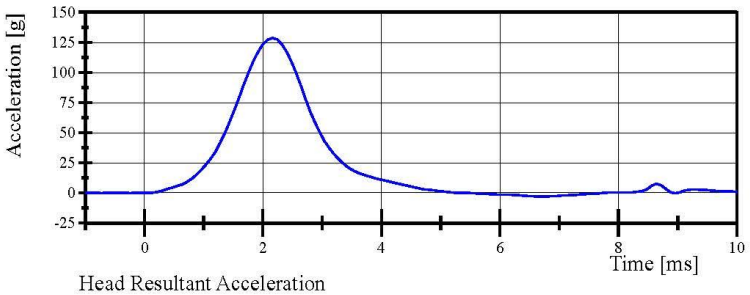
Filter Class: CFC_1000
Max: 5.8 g at 9.0 ms
Min: -228.1 g at 2.2 ms

Head Y-Axis Acceleration



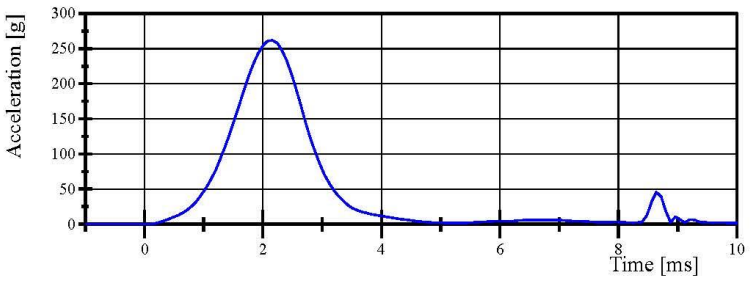
Filter Class: CFC_1000
Max: 8.7 g at 9.0 ms
Min: -40.5 g at 8.6 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 128.7 g at 2.2 ms
Min: -3.0 g at 6.7 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 261.9 g at 2.2 ms
Min: 0.0 g at -0.6 ms

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

01.22.2020 07:26:34 613

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.063 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.12 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.21 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.00 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-78.9 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	75.2 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	87.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: DJ2788

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

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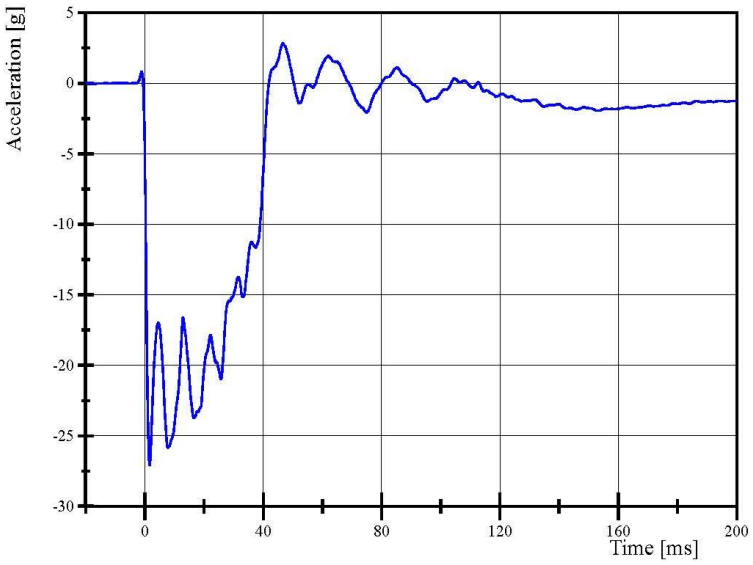
Transportation Research Center Inc.

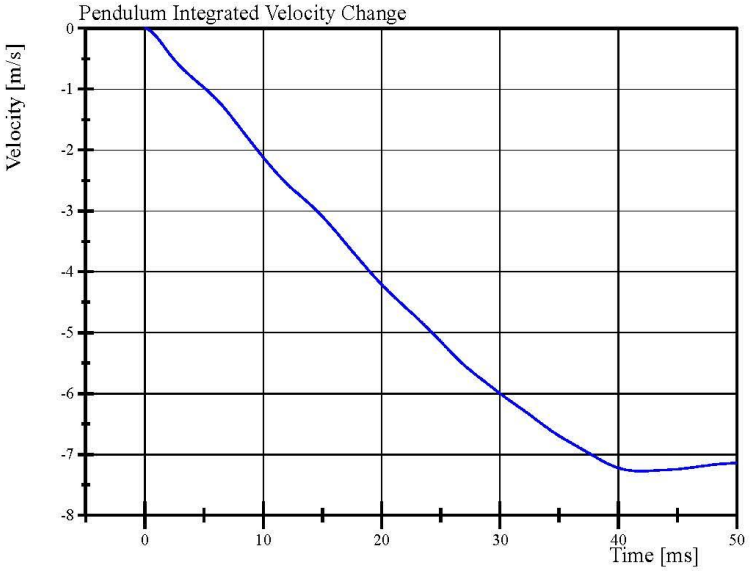
Neck Flexion
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 2.8 g at 46.7 ms
Min: -27.1 g at 1.6 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.3 m/s at 41.9 ms

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

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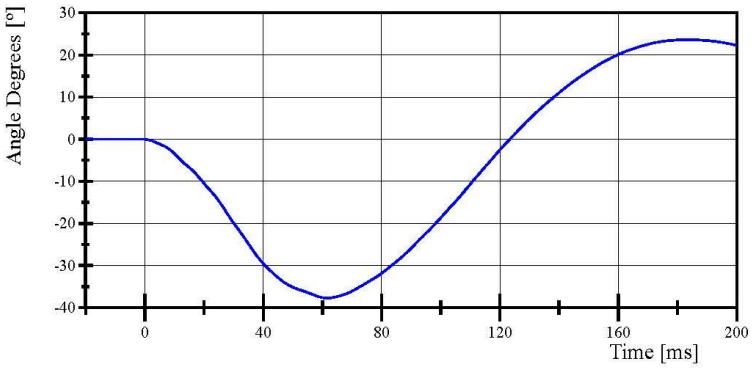
Transportation Research Center Inc.

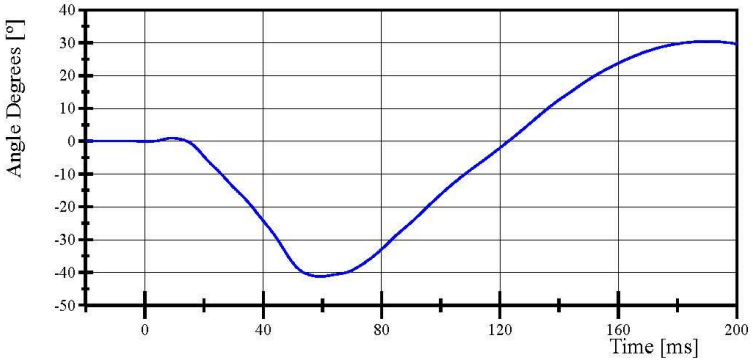
Neck Flexion
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pot Rotation at the Base of Neck



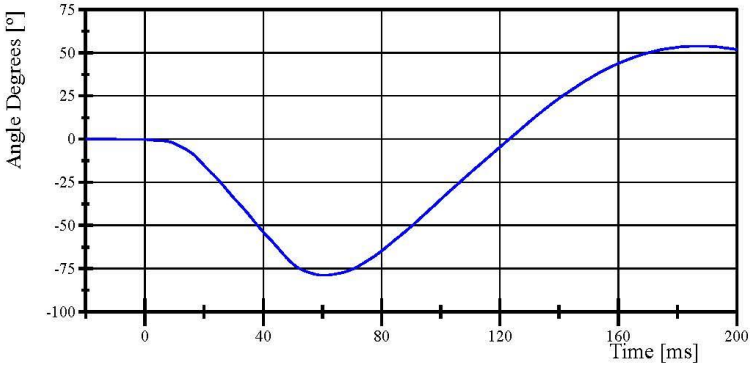
Filter Class: CFC_60
Max: 23.6 ° at 183.4 ms
Min: -37.7 ° at 61.6 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 30.4 ° at 190.2 ms
Min: -41.3 ° at 59.1 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 53.9 ° at 187.7 ms
Min: -78.9 ° at 60.4 ms

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

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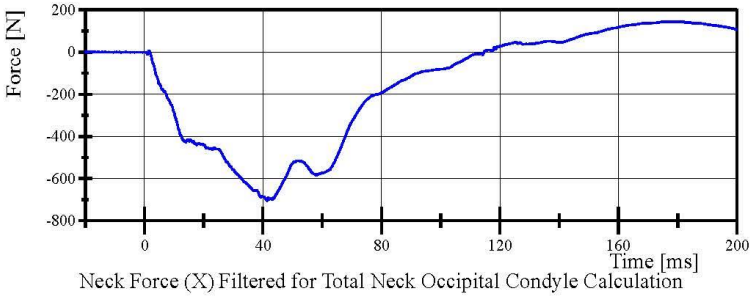
Transportation Research Center Inc.

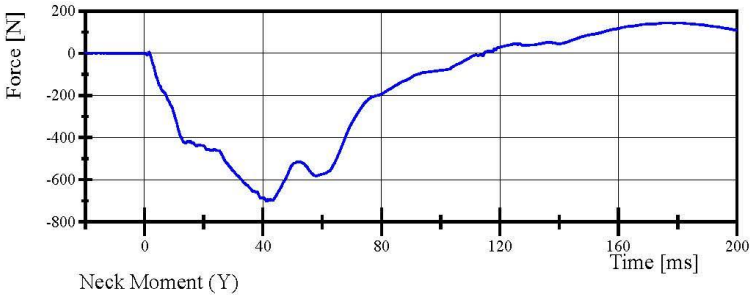
Neck Flexion
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Neck Force (X)



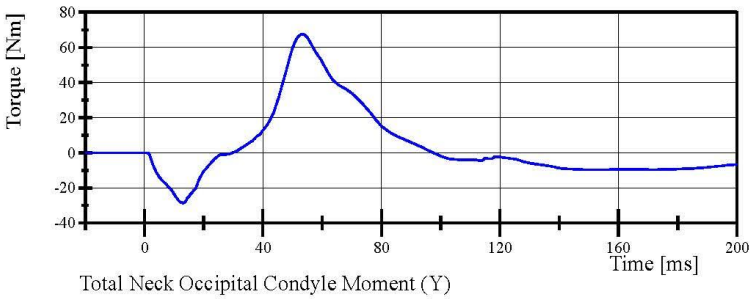
Filter Class: CFC_1000
Max: 144.6 N at 180.5 ms
Min: -705.6 N at 41.4 ms

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



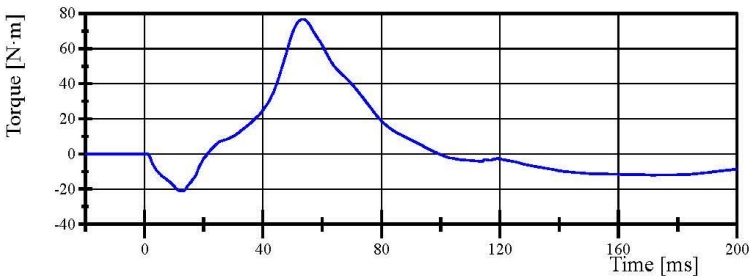
Filter Class: CFC_600
Max: 144.1 N at 180.4 ms
Min: -703.1 N at 41.3 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 67.4 Nm at 53.2 ms
Min: -28.6 Nm at 13.0 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 76.6 N·m at 53.6 ms
Min: -21.2 N·m at 12.8 ms

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

01.22.2020 07:55:50 1855

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.085 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.82 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.68 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.34 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	107.6 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-57.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	98.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: DJ2788

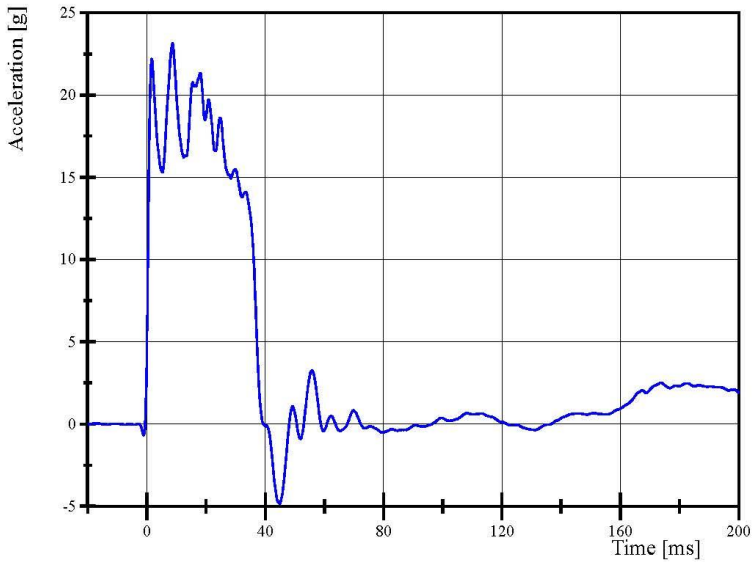
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.22.2020 08:49:00 1998

Transportation Research Center Inc.

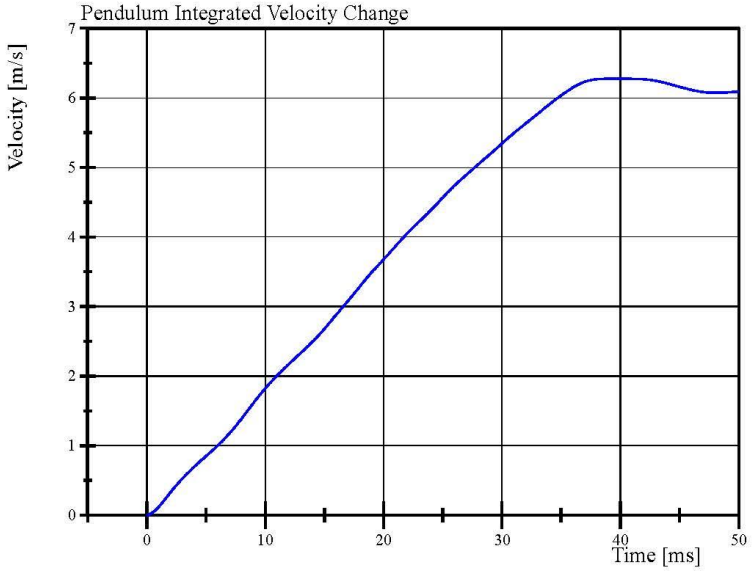
Neck Extension
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 23.1 g at 8.7 ms
Min: -4.8 g at 44.9 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.3 m/s at 39.5 ms
Min: 0.0 m/s at 0.0 ms

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

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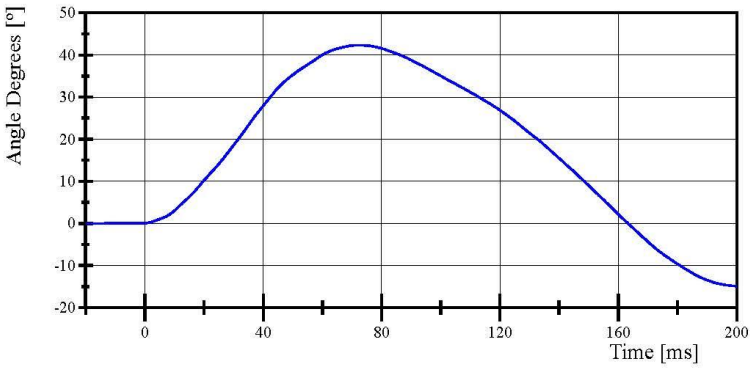
Transportation Research Center Inc.

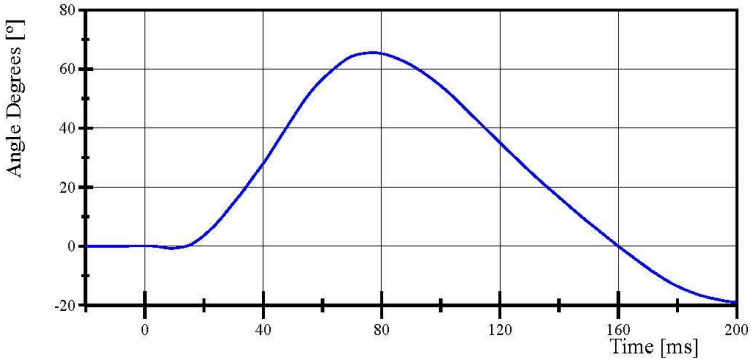
Neck Extension
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pot Rotation at the Base of Neck



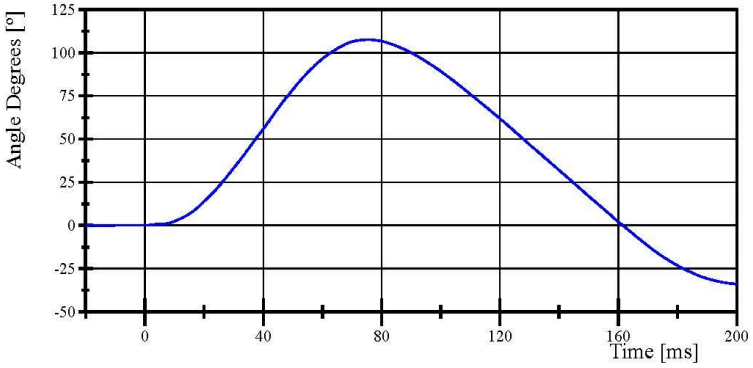
Filter Class: CFC_60
Max: 42.3 ° at 72.2 ms
Min: -14.9 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 65.5 ° at 77.2 ms
Min: -19.1 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 107.6 ° at 75.6 ms
Min: -34.0 ° at 200.0 ms

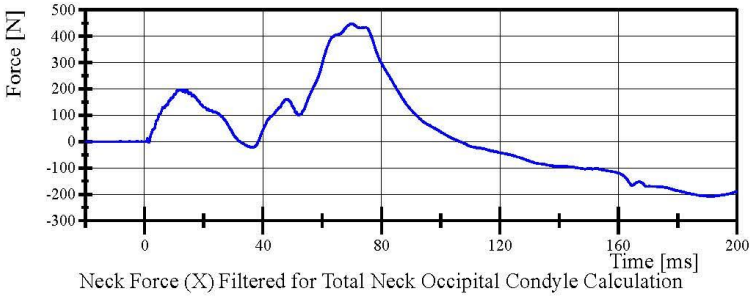
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.22.2020 08:49:40 1998

Transportation Research Center Inc.

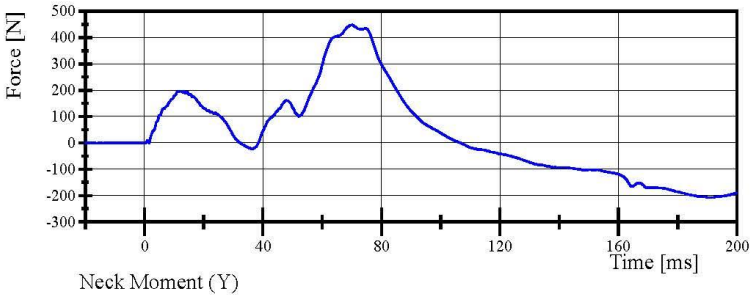
Neck Extension
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Neck Force (X)



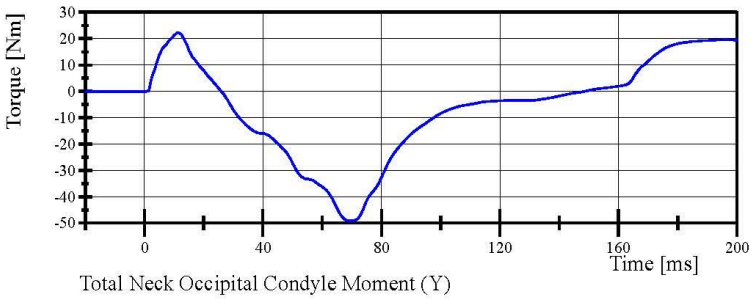
Filter Class: CFC_1000
Max: 447.7 N at 70.2 ms
Min: -207.7 N at 190.7 ms

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



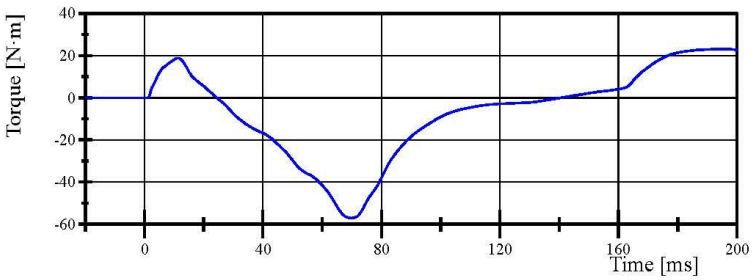
Filter Class: CFC_600
Max: 447.6 N at 70.2 ms
Min: -207.3 N at 190.7 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 22.3 Nm at 11.3 ms
Min: -49.1 Nm at 69.8 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 23.2 N·m at 194.3 ms
Min: -57.1 N·m at 69.9 ms

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

01.22.2020 08:49:40 1998

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.732 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,084.6 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,084.6 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-53.1 mm	Yes
Internal Hysteresis	69 - 85 %	72.2 %	Yes

Test meets specifications.

Condition: Used

Comments:
Rib Set S/N: 050302468
Jacket S/N: N/A

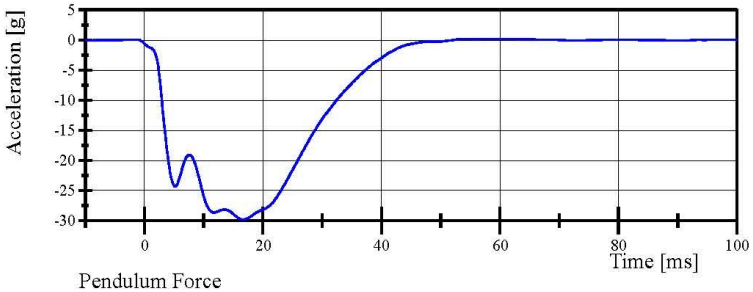
Specification Source: CFR49 Part 572 Subpart O with Polarity in accordance with J211

01.22.2020 11:02:32 400

Transportation Research Center Inc.

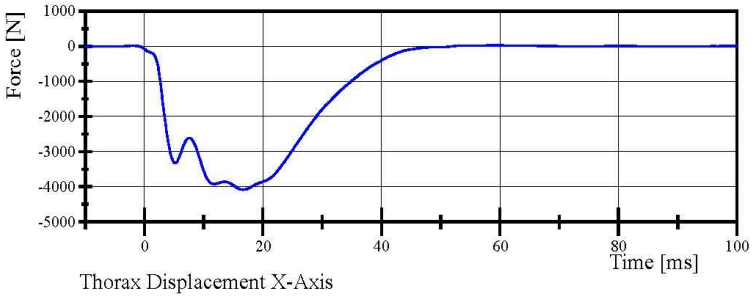
Front Thorax
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pendulum Acceleration



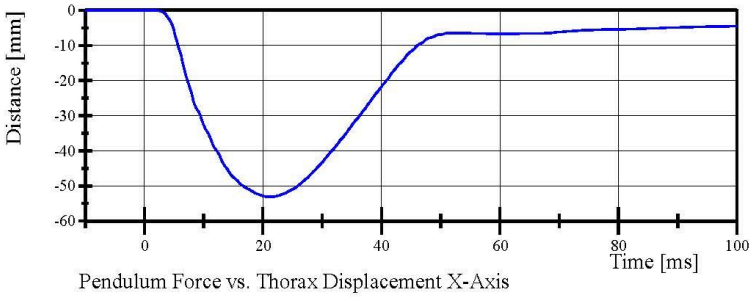
Filter Class: CFC_180
Max: 0.2 g at 58.7 ms
Min: -29.8 g at 16.6 ms

Pendulum Force



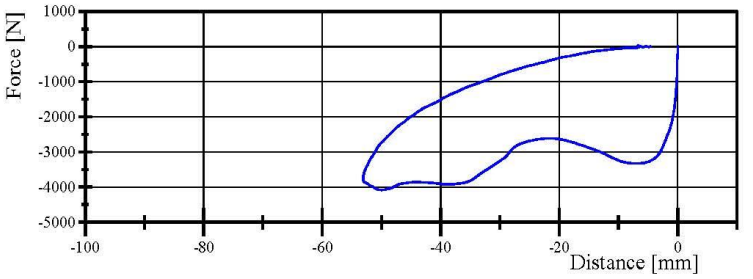
Filter Class: CFC_180
Max: 25.9 N at 58.7 ms
Min: -4,084.6 N at 16.6 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -4.1 ms
Min: -53.1 mm at 20.9 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 25.9 N at -6.7 mm
Min: -4,084.6 N at -50.0 mm

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

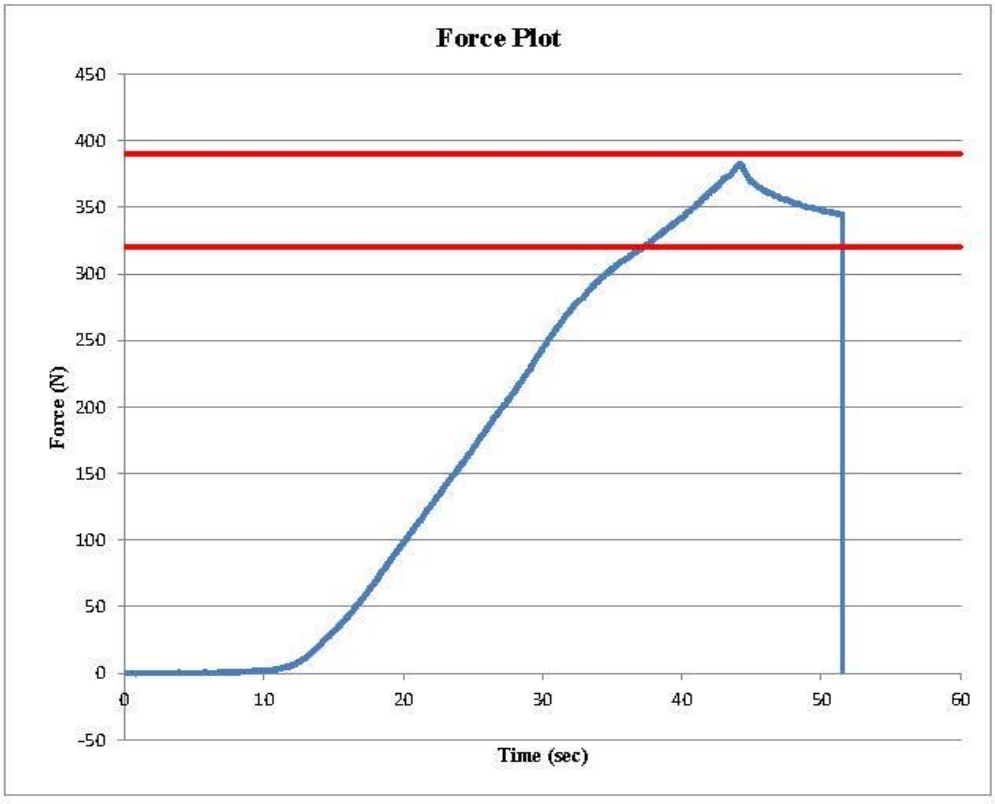
01.22.2020 11:03:16 400

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	070	Date:	01/22/2020
Test Number:	1	Time:	10:33

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.2	°C	Pass
Humidity	10	-	70	40	%	Pass
Average Angular Velocity	0.5	-	1.5	0.92	deg/sec	Pass
Initial Angle	0	-	20	14.85	deg	Pass
Peak Force at 45.39°	320	-	390	382.28	N	Pass
Final Angle	-8	-	8	3.87	deg	Pass



Lumbar S/N: 05060

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.075 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,669.7 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 05856

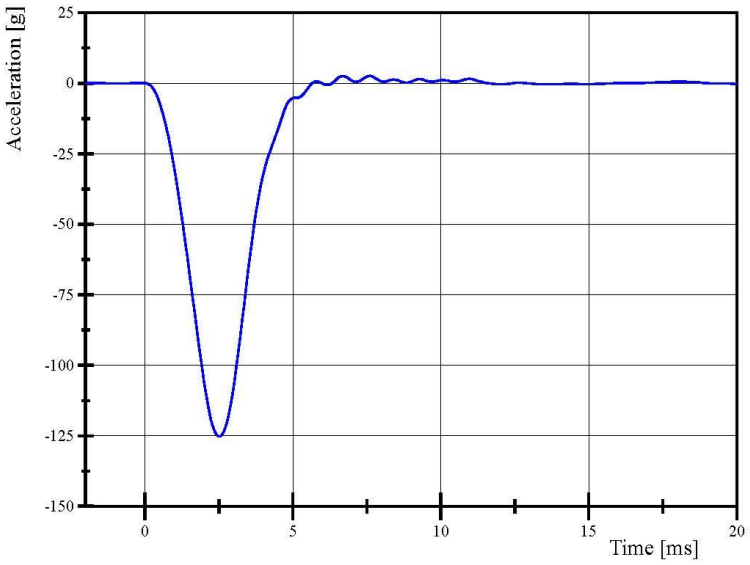
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.22.2020 08:19:59 1844

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.6 g at 7.6 ms
Min: -125.2 g at 2.5 ms

Pendulum Force

Filter Class: CFC_600
Max: 75.4 N at 7.6 ms
Min: -3,669.7 N at 2.5 ms

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

01.22.2020 08:20:40 1844

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.074 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,785.8 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: 05856

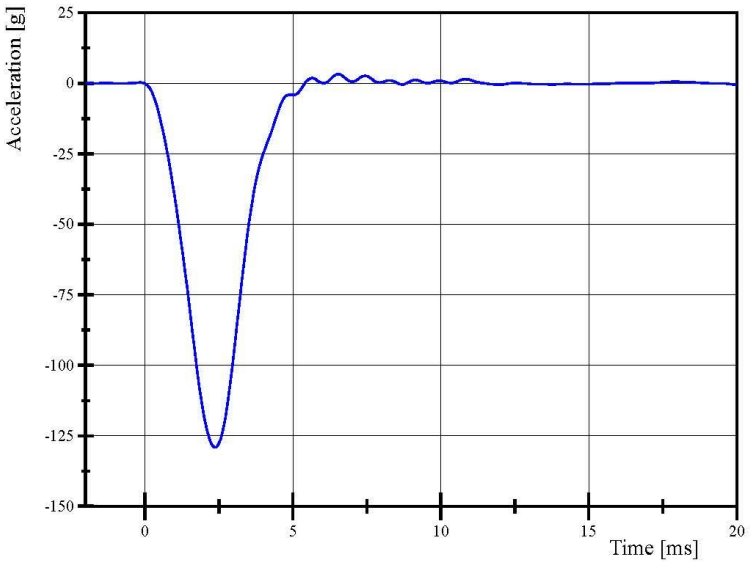
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

01.22.2020 08:26:57 1851

Transportation Research Center Inc.

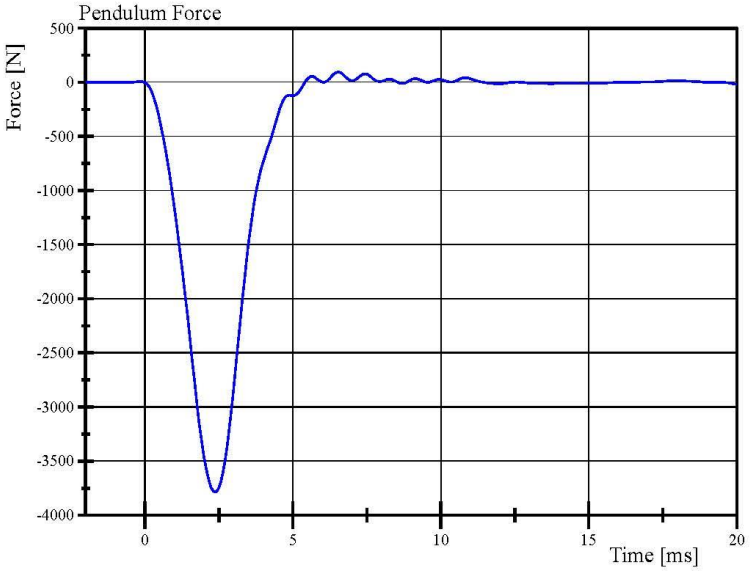
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 39-1
Test Date: 1/22/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 3.2 g at 6.6 ms
Min: -129.1 g at 2.4 ms

Pendulum Force



Filter Class: CFC_600
Max: 94.9 N at 6.6 ms
Min: -3,785.8 N at 2.4 ms

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

01.22.2020 08:27:30 1851

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

TABLE 1 – Driver Dummy Instrumentation

Instrumentation			Axis/Location	Hybrid III 50th S/N 037		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	T10650	Endevco	20-Aug-2019
			Y	P94650	Endevco	20-Aug-2019
			Z	P94622	Endevco	20-Aug-2019
		Redundant	X	P94431	Endevco	20-Aug-2019
			Y	P94487	Endevco	20-Aug-2019
			Z	P94645	Endevco	20-Aug-2019
Head Angular Rate Sensors			X	ARS14945	DTS	15-Oct-2018
			Y	ARS14946	DTS	15-Oct-2018
			Z	ARS14947	DTS	15-Oct-2018
Upper Neck Load Cell			FX, FY, FZ, MX, MY, MZ	2021	Humanetics	1-Mar-2019
Chest Accelerometers		Primary	X	P87834	Endevco	20-Aug-2019
			Y	P61255	Endevco	20-Aug-2019
			Z	P45008	Endevco	20-Aug-2019
		Redundant	X	P91177	Endevco	20-Aug-2019
			Y	P94570	Endevco	20-Aug-2019
			Z	P91172	Endevco	20-Aug-2019
Chest Potentiometer			X	CST037	Servo	5-Mar-2019
Pelvis Accelerometers			X	P91185	Endevco	19-Aug-2019
			Y	P91876	Endevco	19-Aug-2019
			Z	T11390	Endevco	19-Aug-2019
Femur Load Cells	Left	Primary	Z	DI4215-FZ1	Denton	1-Mar-2019
		Redundant	Z	DI4215-FZ2	Denton	1-Mar-2019
	Right	Primary	Z	DI4216-FZ1	Denton	1-Mar-2019
		Redundant	Z	DI4216-FZ2	Denton	1-Mar-2019
Tibia Load Cells	Left	Upper	MX, MY, FZ	3643-94	Denton	1-Mar-2019
		Lower	MX, MY, FZ	3644-370	Denton	1-Mar-2019
	Right	Upper	MX, MY, FZ	3643-413	Denton	1-Mar-2019
		Lower	MX, MY, FZ	3644-401	Denton	1-Mar-2019
Foot Accelerometers	Left	Rear	X	P90848	Endevco	20-Aug-2019
			Z	P91498	Endevco	20-Aug-2019
		Front	Z	P90841	Endevco	20-Aug-2019
	Right	Rear	X	P93467	Endevco	20-Aug-2019
			Z	P97619	Endevco	20-Aug-2019
		Front	Z	P94523	Endevco	20-Aug-2019
Seat Belt Load Cells		Lap	N/A	N/A	N/A	N/A
		Shoulder	N/A	X08011	Measurement Specialties	7-May-2019

TABLE 2 – Front Passenger Dummy Instrumentation

Instrumentation			Axis/Location	Hybrid III 5th S/N 070		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	P67021	Endevco	15-Jan-2020
			Y	T11826	Endevco	15-Jan-2020
			Z	P91114	Endevco	15-Jan-2020
		Redundant	X	P88042	Endevco	15-Jan-2020
			Y	P87135	Endevco	15-Jan-2020
			Z	P91198	Endevco	15-Jan-2020
Head Angular Rate Sensors			X	ARS13597	DTS	23-Aug-2019
			Y	ARS14300	DTS	23-Aug-2019
			Z	ARS13120	DTS	23-Aug-2019
Upper Neck Load Cell			FX, FY, FZ, MX, MY, MZ	1647	Humanetics	11-Mar-2019
Chest Accelerometers		Primary	X	P69070	Endevco	15-Jan-2020
			Y	P97725	Endevco	15-Jan-2020
			Z	P87117	Endevco	15-Jan-2020
		Redundant	X	P90851	Endevco	15-Jan-2020
			Y	P87091	Endevco	15-Jan-2020
			Z	P87126	Endevco	15-Jan-2020
Chest Potentiometer			X	2573	Servo	5-Mar-2019
Pelvis Accelerometers			X	T10325	Endevco	15-Jan-2020
			Y	P50387	Endevco	15-Jan-2020
			Z	P50394	Endevco	15-Jan-2020
Femur Load Cells	Left	Primary	Z	DS9755-FZ1	Humanetics	5-Mar-2019
		Redundant	Z	DS9755-FZ2	Humanetics	5-Mar-2019
	Right	Primary	Z	103-FZ1	Humanetics	5-Mar-2019
		Redundant	Z	103-FZ2	Humanetics	5-Mar-2019
Tibia Load Cells	Left	Upper	MX, MY, FZ	3643-654	Denton	5-Mar-2019
		Lower	MX, MY, FZ	3644-400	Denton	6-Mar-2019
	Right	Upper	MX, MY, FZ	3643-114	Denton	6-Mar-2019
		Lower	MX, MY, FZ	3644-675	Denton	6-Mar-2019
Foot Accelerometers	Left	Rear	X	P83387	Endevco	15-Jan-2020
			Z	P91953	Endevco	15-Jan-2020
		Front	Z	P77595	Endevco	14-Jan-2020
	Right	Rear	X	T11448	Endevco	15-Jan-2020
			Z	P94569	Endevco	15-Jan-2020
		Front	Z	P87455	Endevco	16-Jan-2020
Seat Belt Load Cells		Lap	N/A	N/A	N/A	N/A
		Shoulder	N/A	N100E7	Measurement Specialties	19-Nov-2019

TABLE 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	T11846	Endevco	4-Sep-2019
			Z	T11841	Endevco	5-Sep-2019
		Redundant	X	T11816	Endevco	5-Sep-2019
	Right	Primary	X	P58586	Endevco	26-Nov-2019
			Z	T11861	Endevco	4-Sep-2019
		Redundant	X	T11815	Endevco	5-Sep-2019
Engine Accelerometers	Top		X	T11453	Endevco	4-Sep-2019
	Bottom		X	T11813	Endevco	5-Sep-2019