Final Report Number: NCAP-TRC-19-008

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

FORD MOTOR CO.

2019 Ford Ranger Supercrew

NHTSA Number: M20190211

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

Report Date: October 24, 2019

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: October 24, 2019

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 _____

Technical Report Documentation Page

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15. Supplemental Notes

16. Abstract

A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2019 Ford Ranger Supercrew, 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 September 4, 2019.

The impact velocity was 55.71 km/h, and the ambient temperature at the barrier face at the time of impact was 22.1° C. The target vehicle post-test maximum crush was 630 millimeters at vehicle centerline. The test vehicle's performance is as follows:

	Driver ATD			Passenger ATD		
Measurement Description	Units	Threshold	Result	Units	Threshold	Result
Head Injury Criteria (HIC_{15})	NA	700	137	NA	700	344
Maximum Chest Compression	mm	63	-19.5	mm	52	-12.0
3ms Chest Clip	Gs	60	44.2	Gs	60	38.7
Nij	NA	1	0.35	NA	1	0.41
Neck Tension	Newtons	4170	1616.1	Newtons	2620	864.8
Neck Compression	Newtons	4000	-417.2	Newtons	2520	-488.1
Left Femur Force	Newtons	10000	-3134.8	Newtons	6800	-2266.1
Right Femur Force	Newtons	10000	-667.0	Newtons	6800	-1278.0

17. Key Words	18. Distribution Statement
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, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. Number of Pages	22. Price
Unclassified	Unclassified	177	

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1: PURPOSE AND SUMMARY OF THE TEST

PURPOSE

This 56 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-12-D-00257. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

This 56 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards 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 2019 Ford Ranger Supercrew at a velocity of 55.71 km/h. The test was performed at Transportation Research Center, Inc. on September 4, 2019. 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. EB7513) were qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 105 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 80.7 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 630 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)	137	0.35	1616.1	-417.2	44.2	-19.5	-3134.8	-667.0
Passenger (5^{th} Female)	344	0.41	864.8	-488.1	38.7	-12.0	-2266.1	-1278.0

TEST COMMENTS:

Passenger Head Y Accel Redundant: Data spikes throughout
No issues found during post test inspection. Accel to be replaced prior to next test.

2.2 REPORT AREA 2: DATA SHEETS

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

TEST VEHICLE INFORMATION

NHTSA No.	M20190211
Model Year	2019
Make	Ford
Model	Ranger
Body Style	Truck
VIN	1FTER4FH1KLA66428
Body Color	Hot Red Pepper Met. Tint CC
Odometer Reading (km/mi)	42 mi
Engine Displacement (L)	2.3
Type/No. Cylinders	Gas/4
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	10
Overdrive	Yes
Final Drive	4WD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	Yes
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? No

DATA FROM CERTIFICATION LABEL

Manufactured by	FORD MOTOR CO.
Date of Manufacture	06/19

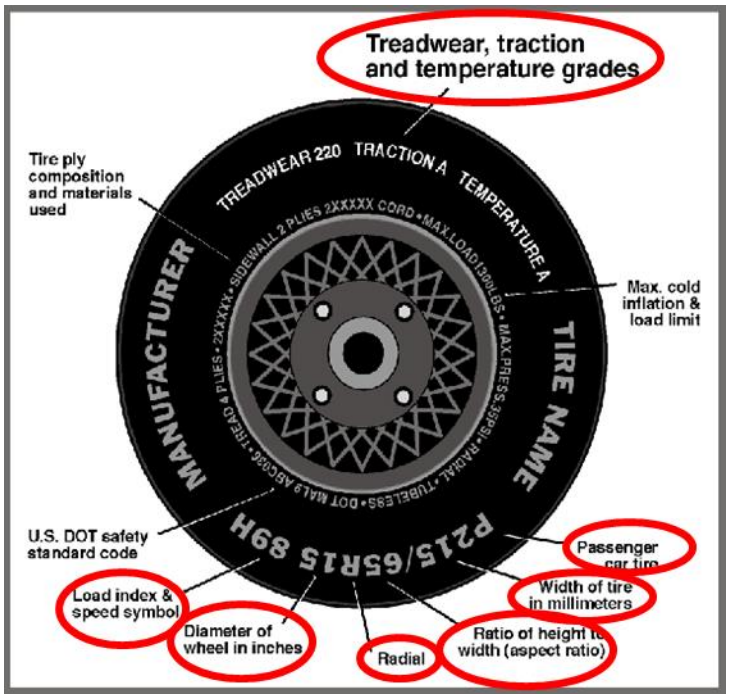
GVWR (kg)	2744 (6050 lb)
GAWR Front (kg)	1420 (3130 lb)
GAWR Rear (kg)	1529 (3370 lb)

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				675.0
Cargo Wt. (RCLW) (kg)				334.8

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold / Test Pressure (kPa)	210	210
Recommended Tire Size	255/65R17 110T	255/65R17 110T
Tire Size on Vehicle	255/65R17 110T	255/65R17 110T
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler	Dueler
Treadwear	520	520
Traction Grade	B	B
Temperature Grade	B	B
Tire Plies Sidewall	5	5
Tire Plies Body	2	2
Load Index/Speed Symbol	110T	110T
Tire Material	Polyester/Steel/Nylon	Polyester/Steel/Nylon
DOT Safety Code Right	9B22 RHD 1619	9B22 RHD 1619
DOT Safety Code Left	9B22 RHD 1619	9B22 RHD 1619

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	599.4	448.6		635.2	555.8	
Right	kg	570.4	412.6		590.0	517.6	
Ratio	%	57.6	42.4		53.3	46.7	
Totals	kg	1169.8	861.2	2031.0	1225.2	1073.4	2298.6

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2031.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.3
Rated Cargo/Luggage Weight (RCLW)[1]	kg	136.0
Vehicle Target Weight (TVTW)	kg	2306.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	885	900	968	978	1361
As Tested	mm	885	896	940	940	1499
Post Test	mm	912	919	950	940	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	3210
Total Vehicle Length at Left Side	mm	5185
Total Vehicle Length at Centerline	mm	5375
Total Vehicle Length at Right Side	mm	5185
Weight of Ballast in Cargo Area	kg	31.3
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	liters	66.2

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: None

[1] Rated cargo and luggage weight limited to 136.0 kg or 300.0 lbs.

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

TARGET VEHICLE STRUCTURAL MEASUREMENT

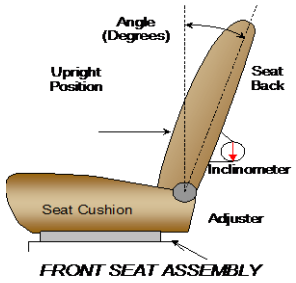
	Elements	Pre-Test (mm)
1	Total Length	5375
2	Total Width	1860
3	Bumper Top Height	658
4	Bumper Bottom Height	593
5	Longitudinal Member Top Height	536
6	Distance Between Longitudinal Members	1019
7	Longitudinal Member Width	60
8	Engine Top Height	1060
9	Engine Bottom Height	262
10	Engine and Gearbox Width	608
11	Front Bumper-Engine Distance	708
12	Front Shock Absorber Fixing Height	775
13	Bonnet Leading Edge Height	1035
14	Front Shock Absorber Fixing Width	219
15	Front Bumper – Front Axle Distance	900
16	Front Axle – A-Pillar Distance	655
17	A-Pillar – B-Pillar Distance	1020
18	B-Pillar – Rear Axle Distance	1575
19	B-Pillar – C-Pillar Distance	850
20	Roof Sill Bottom Height	1645
21	Roof Sill Top Height	1710
22	Floor Sill Bottom Height	505
23	Floor Sill Top Height	558

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

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:	2.9
Passenger Seat back angle:	2.8

SEAT FORE/AFT POSITIONS

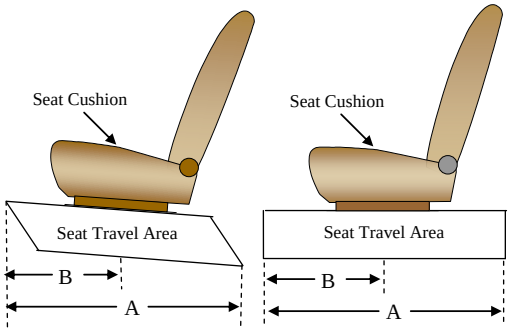
Describe the method of determining seat fore/aft positions.
Driver: Mid position, Positioned according to Form 1
Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	38 detents	15
Passenger Seat	38 detents	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	4	0, Uppermost
Passenger Seat	4	0, Uppermost



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

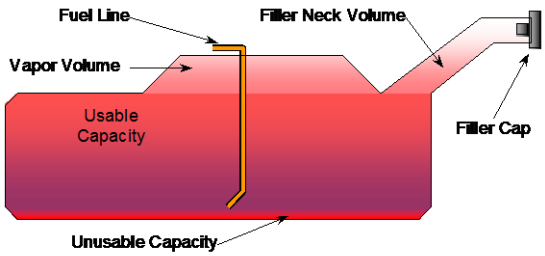
Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	71.2
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	66.2
Actual Amount of Solvent Used	66.2
1/3 of Usable Capacity	23.7

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

The electronic fuel pump operates for a prescribed amount of time to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within two seconds following ignition operation the fuel pump will shut-off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. A fuel system shut-off system is also equipped which is designed to stop the fuel flow to the engine if the vehicle sustains an impact above a certain magnitude.

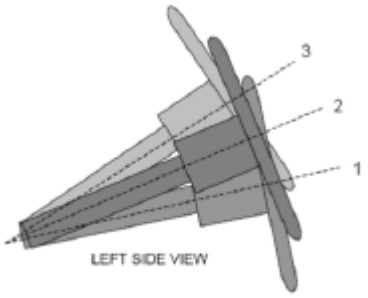


VEHICLE FUEL TANK ASSEMBLY

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.



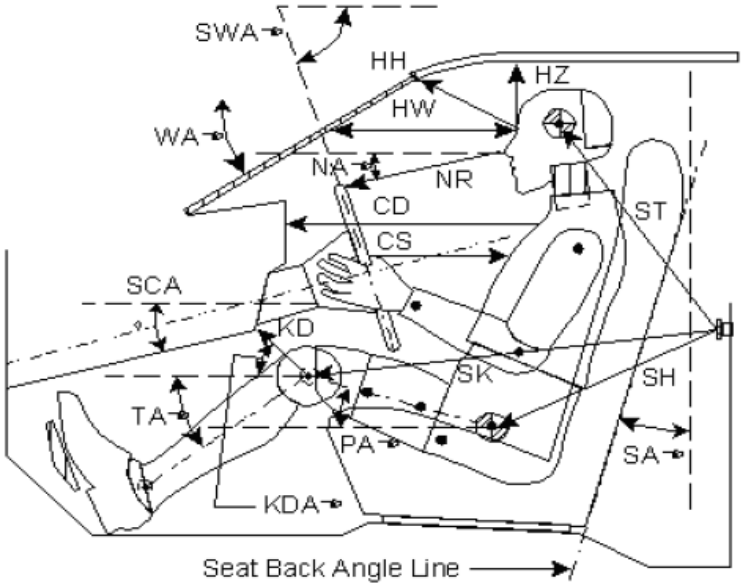
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	23.7	0
Geometric Center Position No. 2	25.1	22
Uppermost Position No. 3	26.6	43
Telescoping Steering Wheel Travel		43
Test Position	25.1	22

DATA SHEET NO. 3 - DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

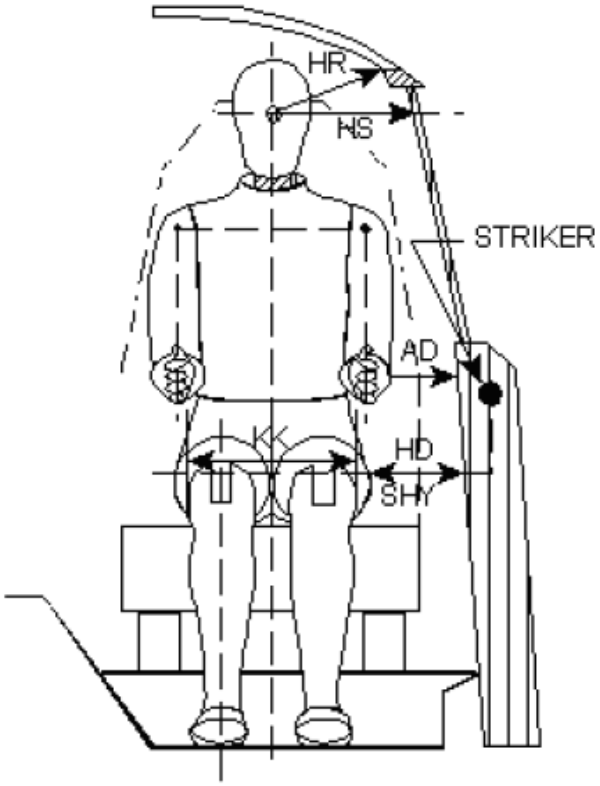
Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019



Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WAº	Windshield Angle		29.9		
SWAº	Steering Wheel Angle		25.1		
SCAº	Steering Column Angle		64.9		
SAº	Seat Back Angle (on head rest post)		2.9		2.9
HZ	Head to Roof (Z)	254		249	
HH	Head to Header	359		337	
HW	Head to Windshield	666		679	
NR	Nose to Rim	348	9.4		
CD	Chest to Dash	521		400	
CS	Chest to Steering Hub	277			
RA	Rim to Abdomen	169			
KDL	Left Knee to Dash	163	28.8	84	33.8
KDR	Right Knee to Dash	151	33.3	113	33.2
PAº	Pelvic Angle		21.6		19.2
TAº	Tibia Angle		48.2		52.7
SK	Striker to Knee	570	-6.0	666	9.1
ST	Striker to Head	498	-71.7	455	-60.6
SH	Striker to H-Point	304	39.2	394	22.0

DATA SHEET NO. 4 - DUMMY LATERAL CLEARANCE DIMENSIONS

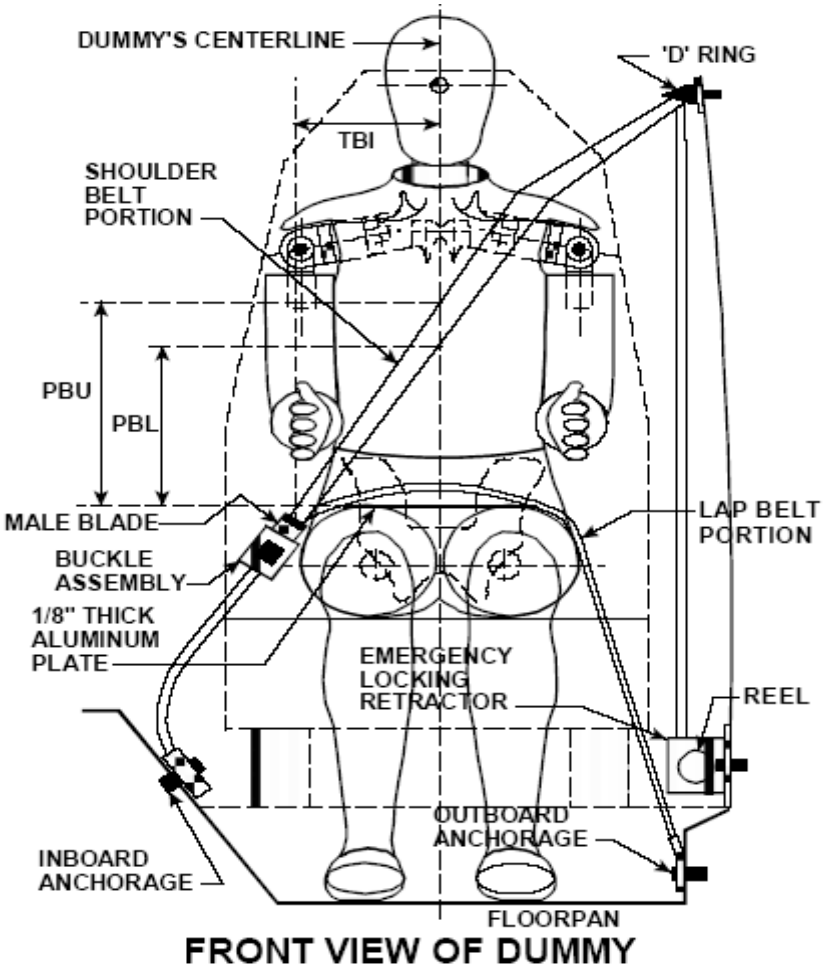
Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019



Code	Measurement Description	Driver	Passenger
AD	Arm to Door	113	87
HD	H-Point to Door	139	179
HR	Head to Side Header	263	268
HS	Head to Side Window	335	354
KK	Knee to Knee	220	170
SHY	Striker to H-Point (Y Direction)	240	265
AA	Ankle to Ankle	333	171

DATA SHEET NO. 5 - SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	352	288
PBL – Top surface of reference to belt lower edge	mm	265	198

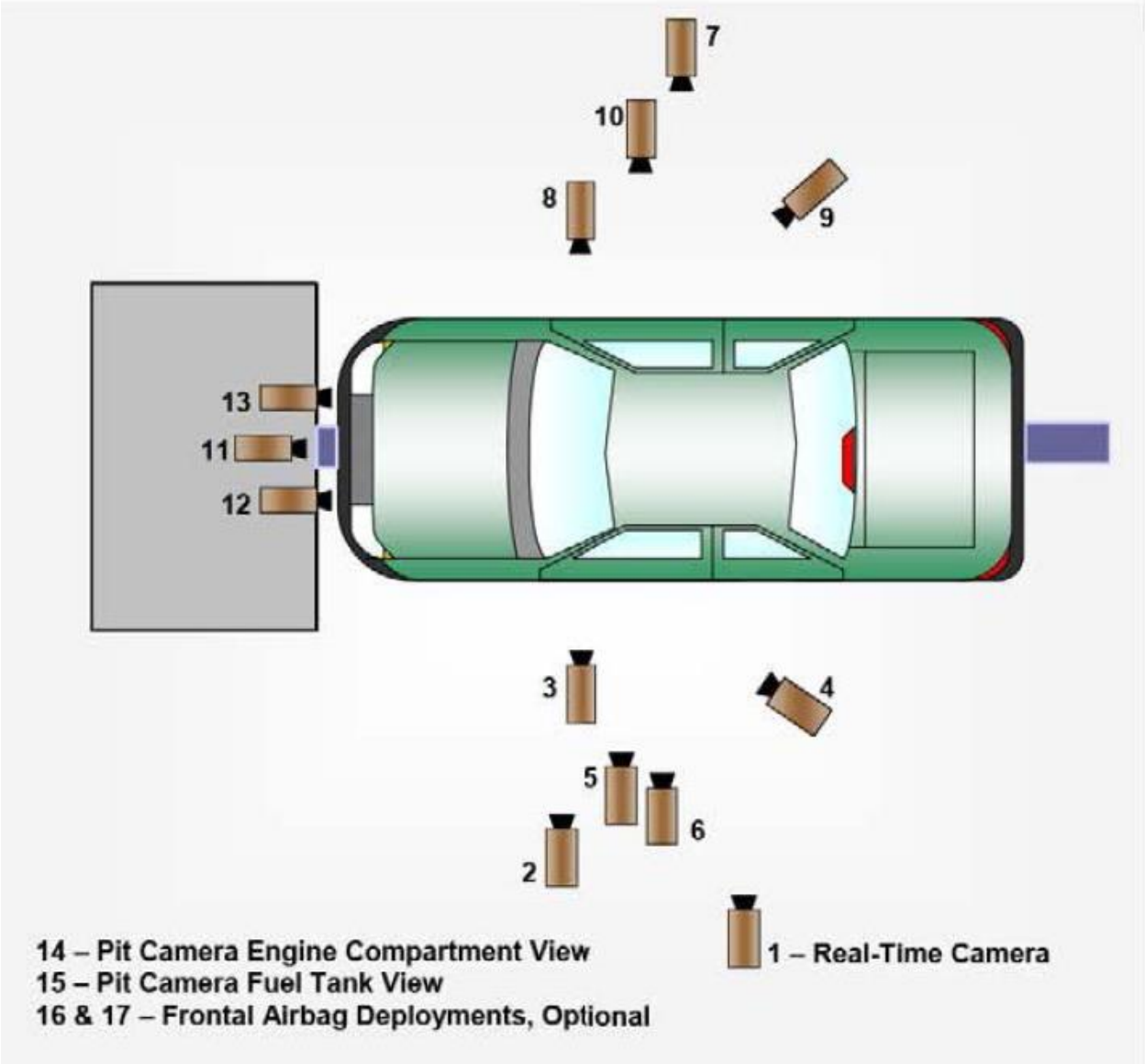
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	839	810
Lap belt length as measured on ATD	mm	752	835
Remainder of belt on reel	mm	760	805
Total belt length for continuous webbing systems	mm	2351	2450

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

Test Vehicle:	2019 Ford Ranger Supercrew	NHTSA No.:	M20190211
Test Program:	NCAP Frontal Impact	Test Date:	9/4/2019

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

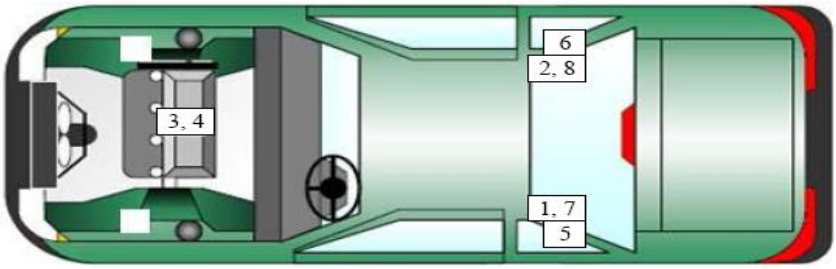
CAMERA LOCATIONS

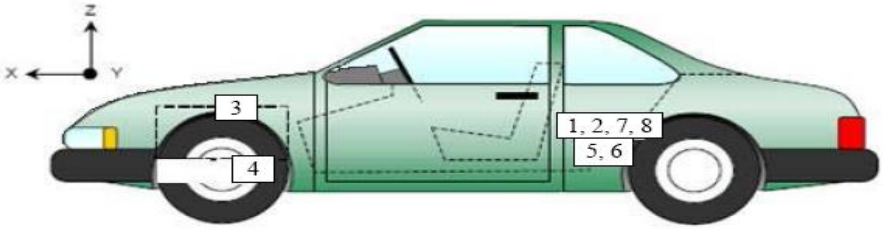
No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	REAL-TIME LEFT OVERALL	-3378	-6167	-1639	Zoom	30
2	LEFT OVERALL	-2290	-6209	-1507	20	1000
3	DRIVER CLOSE-UP	-1832	-5788	-1582	50	1000
4	LEFT FRONT HALF	-1410	-5695	-1721	25	1000
5	LEFT ANGLE	-3505	-2540	-1977	25	1000
6	STEERING COLUMN	-3378	-5555	-1532	50	1000
7	RIGHT OVERALL	-3330	5859	-1618	20	1000
8	PASSENGER CLOSE-UP	-1814	5532	-1670	50	1000
9	RIGHT FRONT HALF	-1174	5265	-1462	25	1000
10	RIGHT ANGLE	-3473	2165	-1970	25	1000
11	WINDSHIELD	0	0	-2588	8.5	1000
12	DRIVER WINDSHIELD	0	-443	-2588	20	1000
13	PASSENGER WINDSHIELD	0	411	-2588	20	1000
14	PIT FRONT	-703	0	3272	25	1000
15	PIT REAR	-2618	0	3272	12.5	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: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2350	-560	-715
2	Right Rear Accelerometer – X Direction	2350	560	-718
3	Engine Top X	4630	0	-1042
4	Engine Bottom X	4295	100	-428
5	Left Rear Accelerometer – Z Direction	2350	-560	-721
6	Right Rear Accelerometer – Z Direction	2350	560	-724
7	Left Rear Accelerometer – X Direction Redundant	2320	-560	-715
8	Right Rear Accelerometer- X Direction Redundant	2320	560	-718

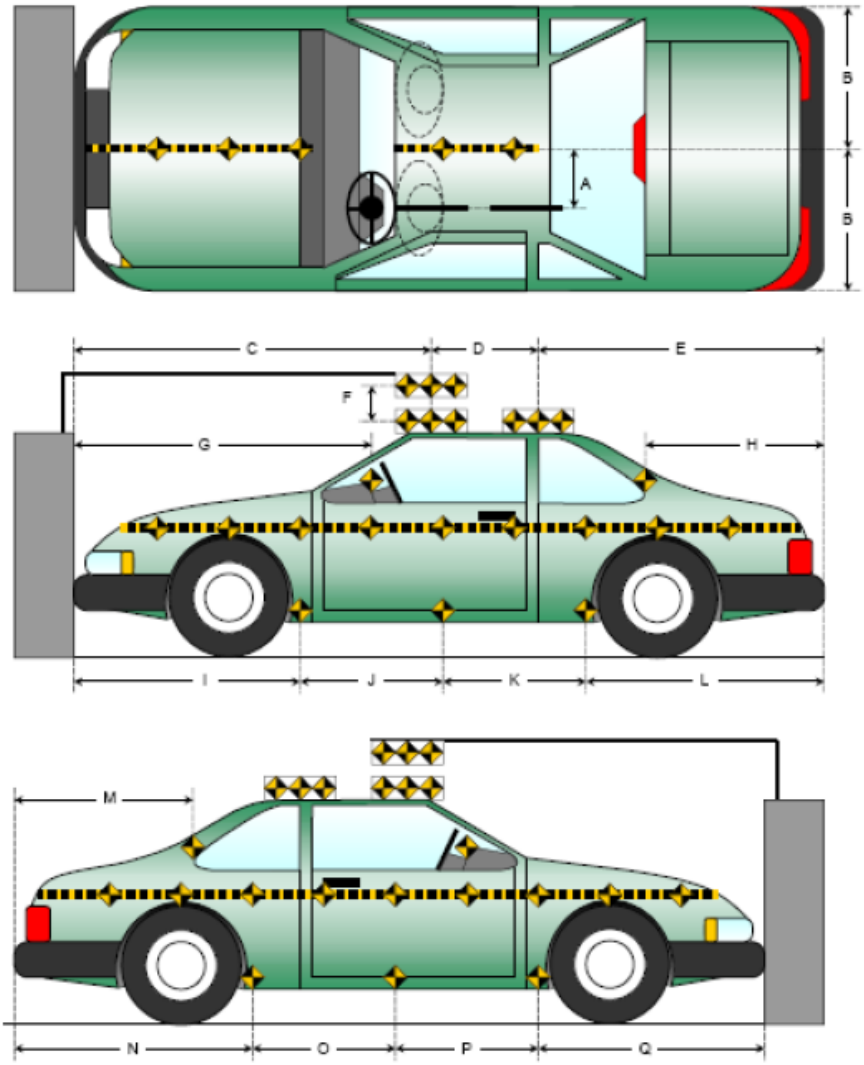
Reference Points: X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8 - PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

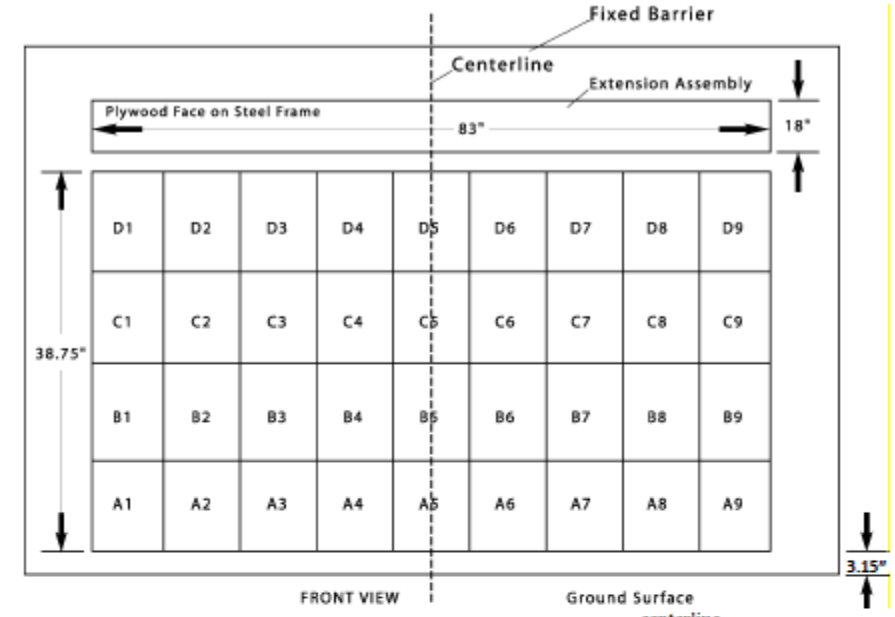
Item	Value
A	395
B	930
C	2311
D	595
E	2472
F	255
G	1786
H	1885
I	1505
J	1000
K	951
L	1920
M	1873
N	1920
O	940
P	1000
Q	1515

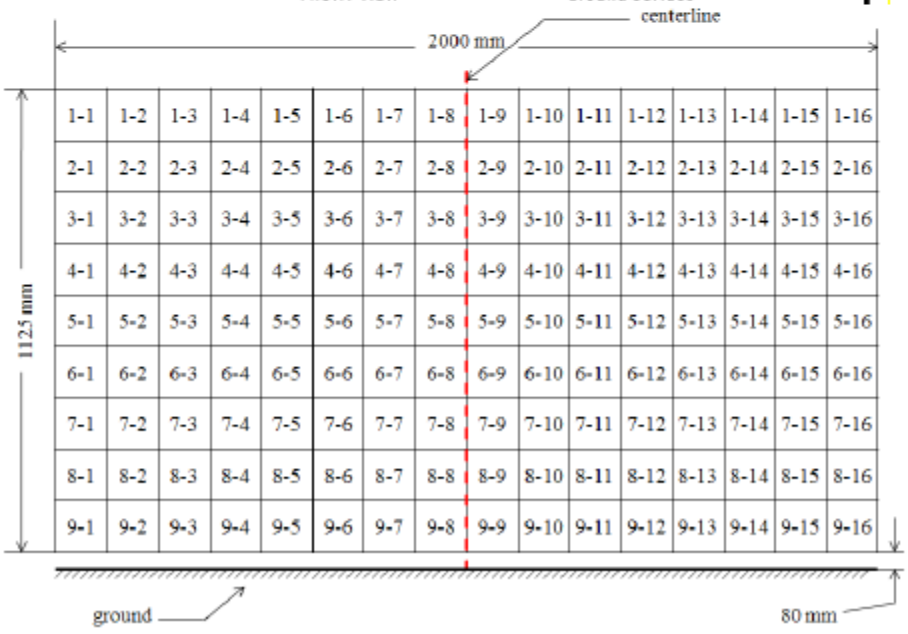
All units in millimeters



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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019





DATA SHEET NO. 10 - TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

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: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th / 037	Hybrid III 5th / EB7513
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**			No
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	Damage from PAB, across bottom & along left A pillar
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

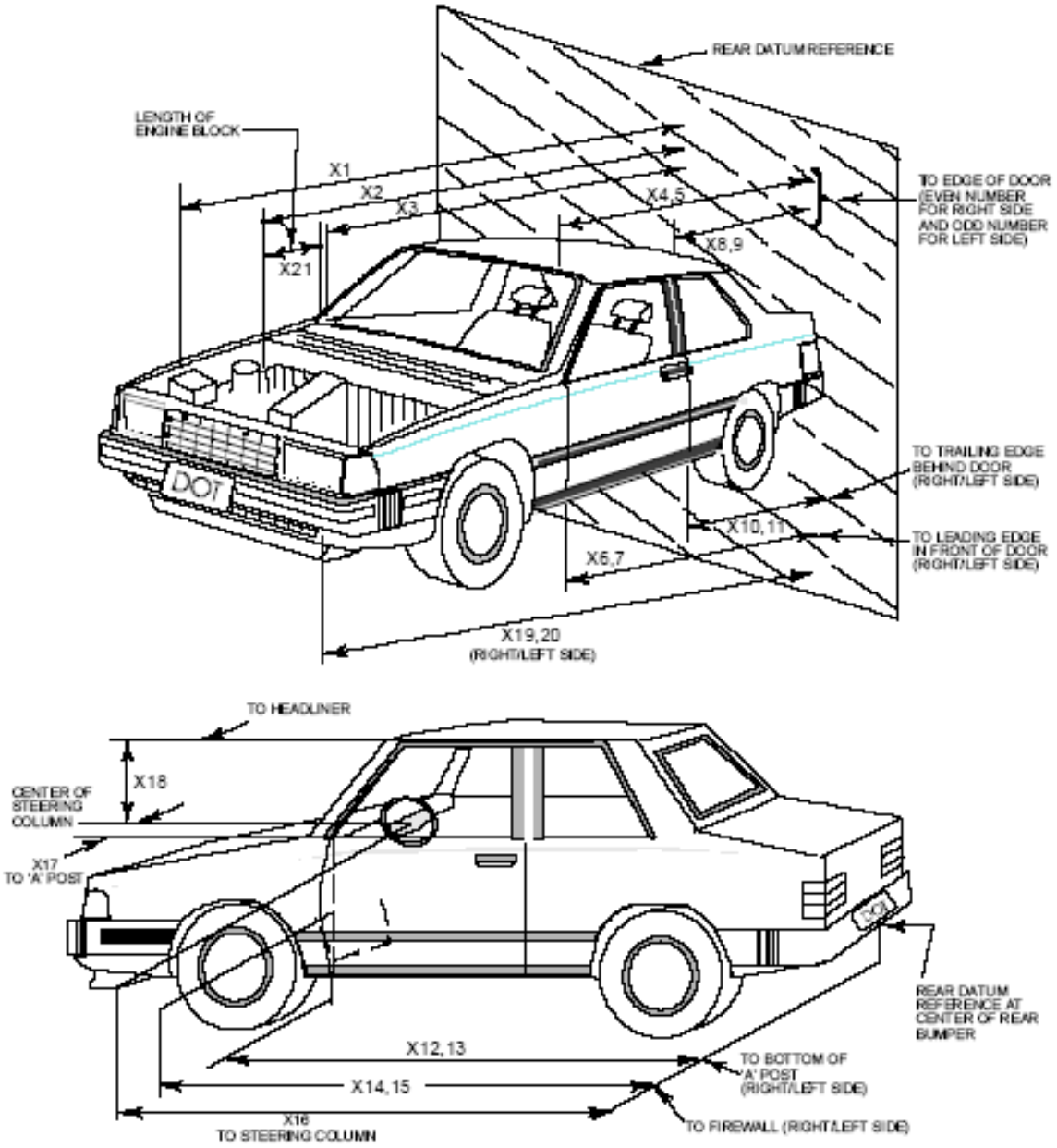
Measured Parameter	Units	Value
Left Side	mm	600
Center	mm	590
Right Side	mm	584
Average	mm	591

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: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019



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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	5375	4745	630
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4667	4428	239
3	RSOV to Firewall	4280	4115	165
4	RSOV to Upper Leading Edge of Right Door	3822	3820	2
5	RSOV to Upper Leading Edge of Left Door	3835	3824	11
6	RSOV to Lower Leading Edge of Right Door	3780	3790	-10
7	RSOV to Lower Leading Edge of Left Door	3788	3786	2
8	RSOV to Upper Trailing Edge of Right Door	2835	2833	2
9	RSOV to Upper Trailing Edge of Left Door	2841	2830	11
10	RSOV to Lower Trailing Edge of Right Door	2805	2814	-9
11	RSOV to Lower Trailing Edge of Left Door	2807	2805	2
12	RSOV to Bottom of "A" Post-of Right Side	3814	3815	-1
13	RSOV to Bottom of "A" Post-of Left Side	3820	3815	5
14	RSOV to Firewall, Right Side	4515	4300	215
15	RSOV to Firewall, Left Side	4518	4287	231
16	RSOV to Steering Column	3401	3470	-69
17	Center of Steering Column to "A" Post	280	290	-10
18	Center of Steering Column to Headliner	445	432	13
19	RSOV to Right Side of Front Bumper	5185	4762	423
20	RSOV to Left Side of Front Bumper	5185	4760	425
21	Length of Engine Block	550	550	0
RD	RSOV to Right Side of Dash Panel	3690	3682	8
CD	RSOV to Center of Dash Panel	3613	3585	28
LD	RSOV to Left Side of Dash Panel	3697	3666	31

All Dimensions in mm

DATA SHEET NO. 13 - ACCIDENT INVESTIGATION DIVISION DATA

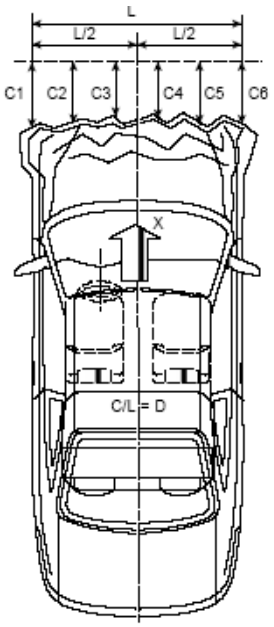
Test Vehicle: 2019 Ford Ranger Supercrew
NHTSA No.: M20190211
Test Program: NCAP Frontal Impact
Test Date: 9/4/2019

VEHICLE INFORMATION

VIN: 1FTER4FH1KLA66428
Wheelbase: 3210
Vehicle Size Category: Truck
Test Weight (kg): 2298.6

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): 55.71
Velocity Change (km/h): 64.46
Time of Separation (ms): 160



CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1676
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5185	4760	425
C2	Crush zone 2 at left side	mm	5325	4743	582
C3	Crush zone 3 at left side	mm	5375	4751	624
C4	Crush zone 4 at right side	mm	5378	4750	628
C5	Crush zone 5 at right side	mm	5329	4737	592
C6	Crush zone 6 at right side	mm	5185	4762	423
L	C1 to C6	mm	1676	1491	185

DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS

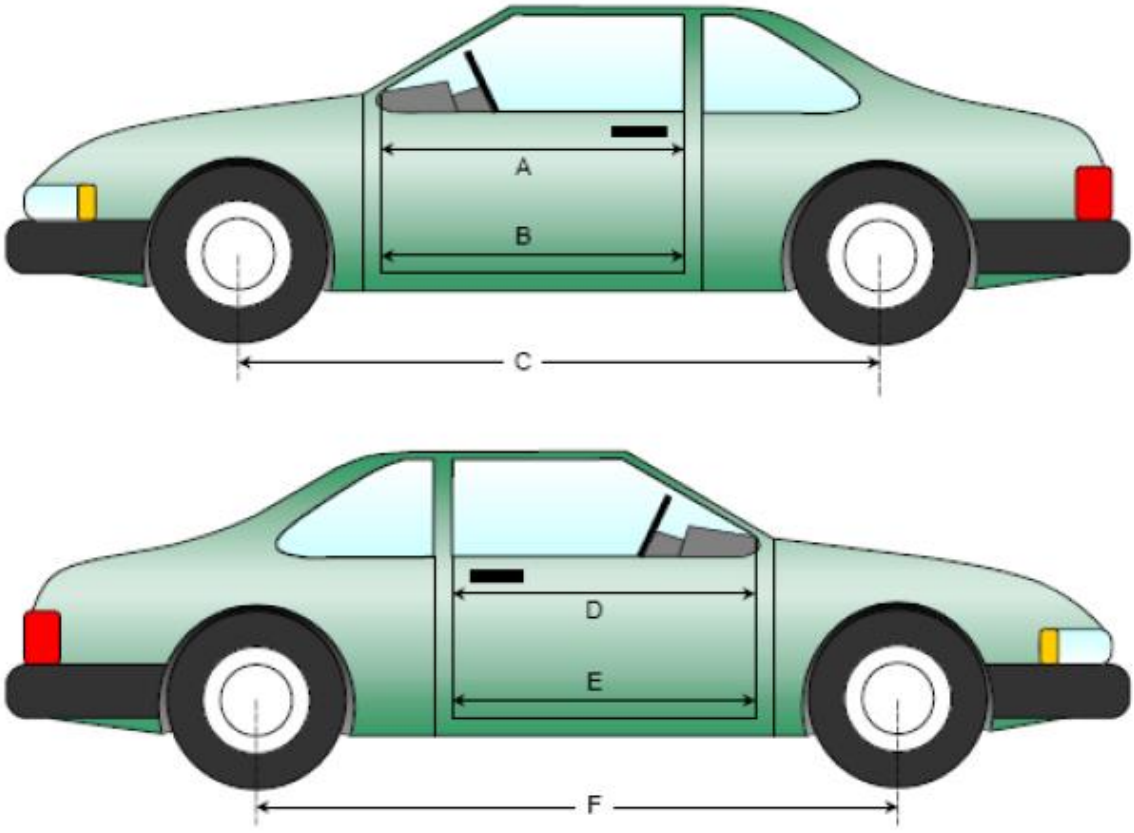
Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	962	960	2
B	Left Side Lower	mm	910	906	4
D	Right Side Upper	mm	963	963	0
E	Right Side Lower	mm	910	912	-2

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3210	3165	45
F	Right Side Wheelbase	mm	3210	3150	60



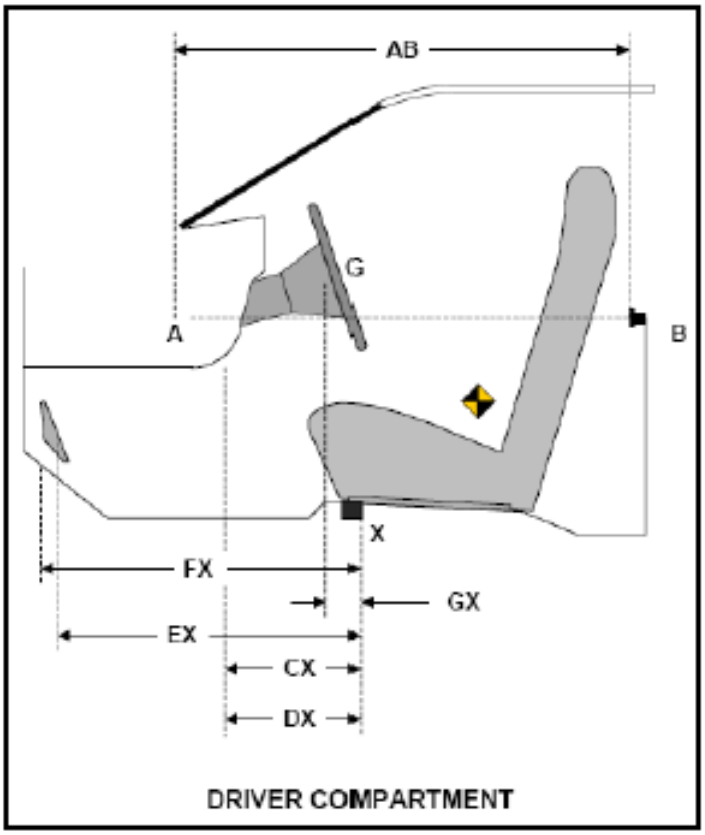
DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	747	745	2
CX	Left Knee Bolster to X	mm	330	291	39
DX	Right Knee Bolster to X	mm	362	320	42
EX	Brake Pedal to X	mm	578	612	-34
FX	Foot Rest to X	mm	618	610	8
GX	Center of Steering Column Wheel Hub to X	mm	110	155	-45

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

Please provide windshield mounting details.

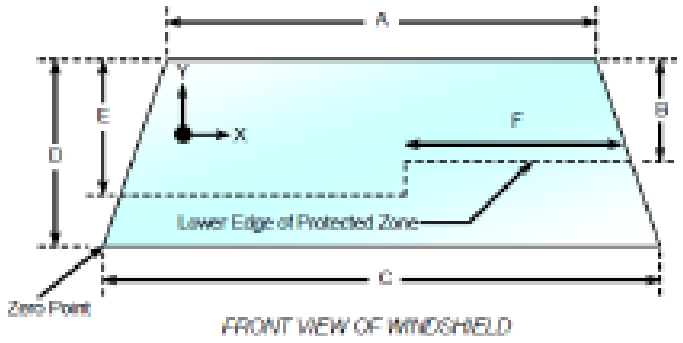
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.3°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2235	1433	64.1
Right Side	2235	2175	97.3
Total	4470	3608	80.7

Item	Units	Value
A	mm	1250
B	mm	464
C	mm	1500
D	mm	860
E	mm	526
F	mm	528



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: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 21.3°C Test Time: 13:50

Stoddard Solvent Spillage Measurements

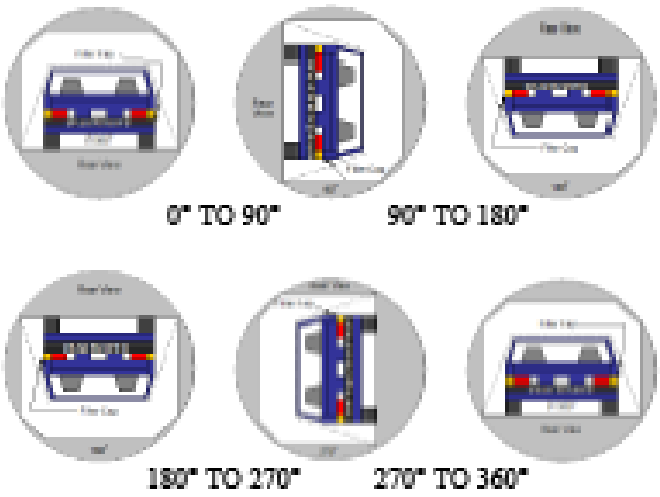
A	From impact until vehicle motion ceases: (maximum allowable – 1 oz.)	0 oz.
B	For the 5-minute period after motion ceases: (maximum allowable – 5 oz.)	0 oz.
C	For the following 25 minutes: (maximum allowable – 1 oz./minutes)	0 oz.
D	Spillage: None	

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

Test Vehicle: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

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

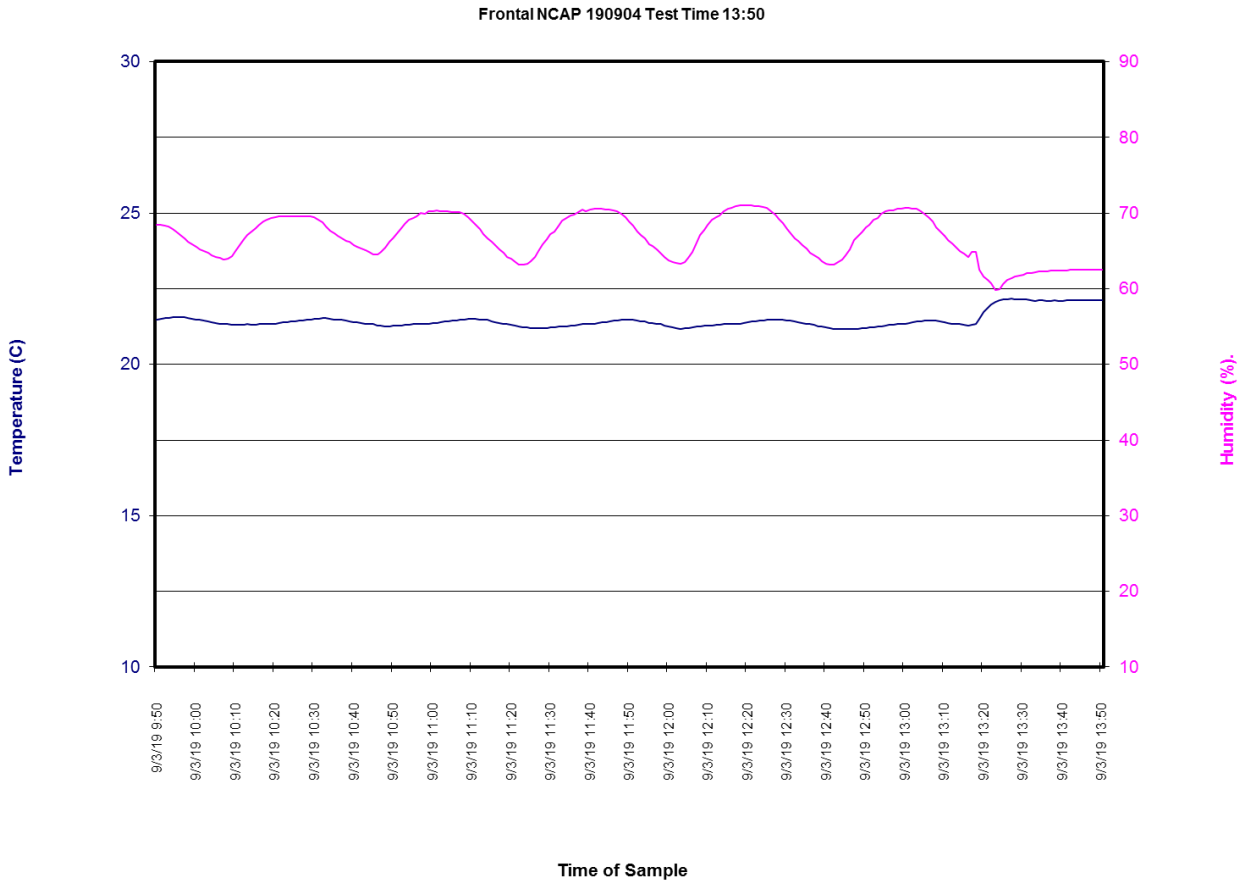
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0º to 90º	0	0	0	N/A
90º to 180º	0	0	0	N/A
180º to 270º	0	0	0	N/A
270º to 360º	0	0	0	N/A

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: 2019 Ford Ranger Supercrew NHTSA No.: M20190211
Test Program: NCAP Frontal Impact Test Date: 9/4/2019

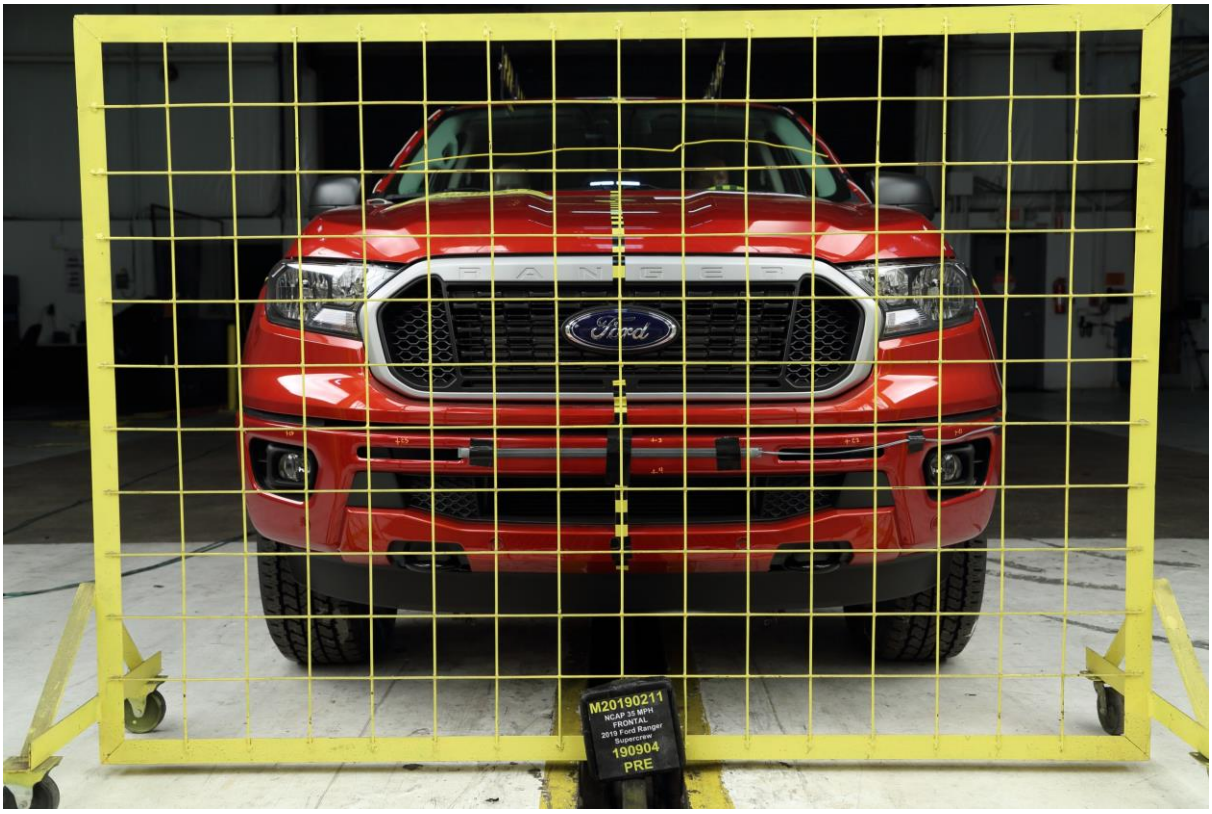


APPENDIX A
PHOTOGRAPHS

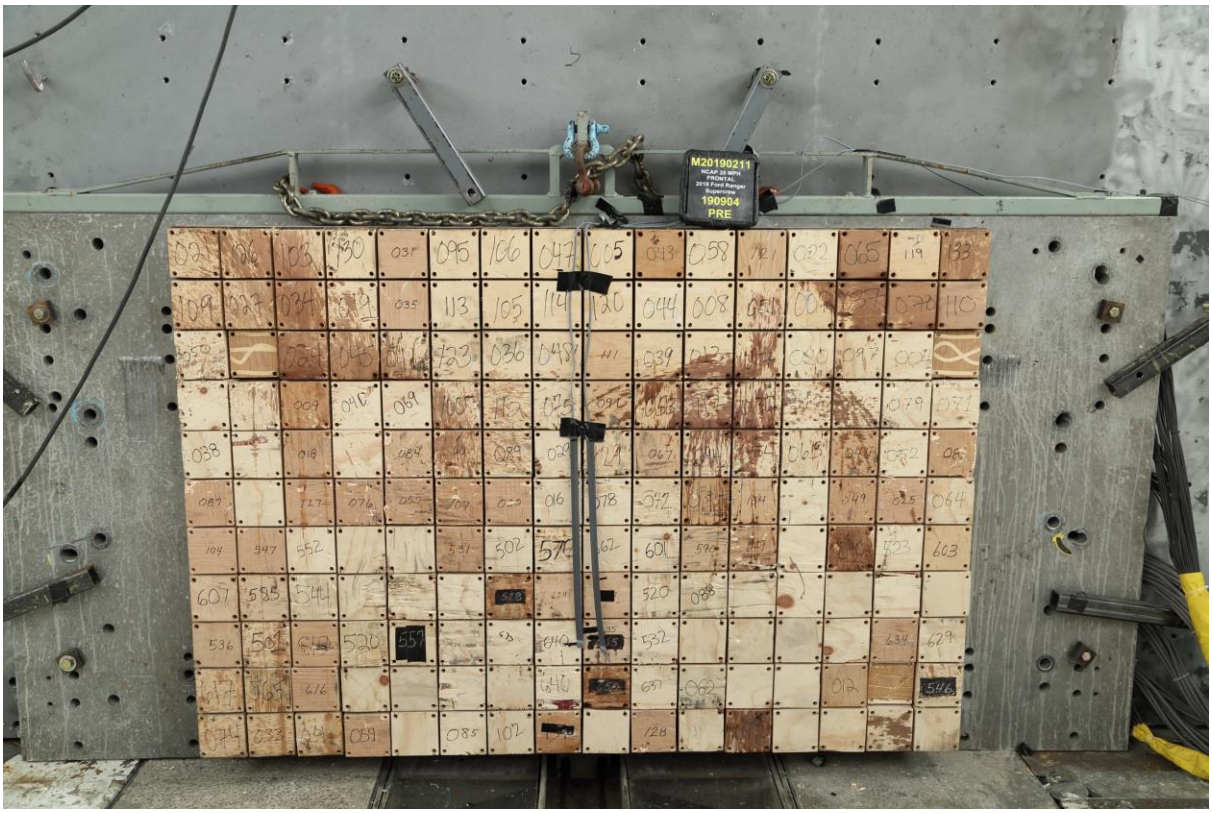
TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)

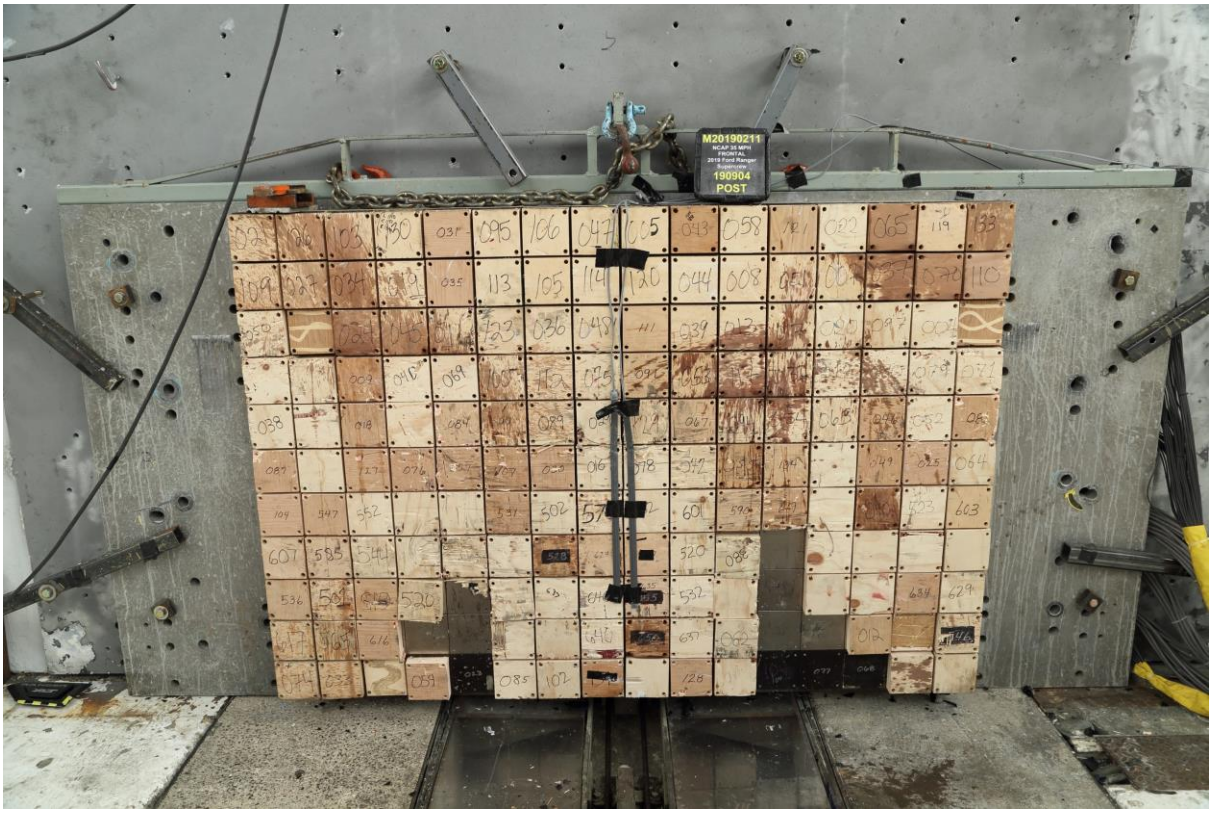
TABLE OF PHOTOGRAPHS (CONTINUED)



001 Load Cell Location



002 Pre-Test Load Cell Wall



003 Post-Test Load Cell Wall

004 Manufacturer's Label

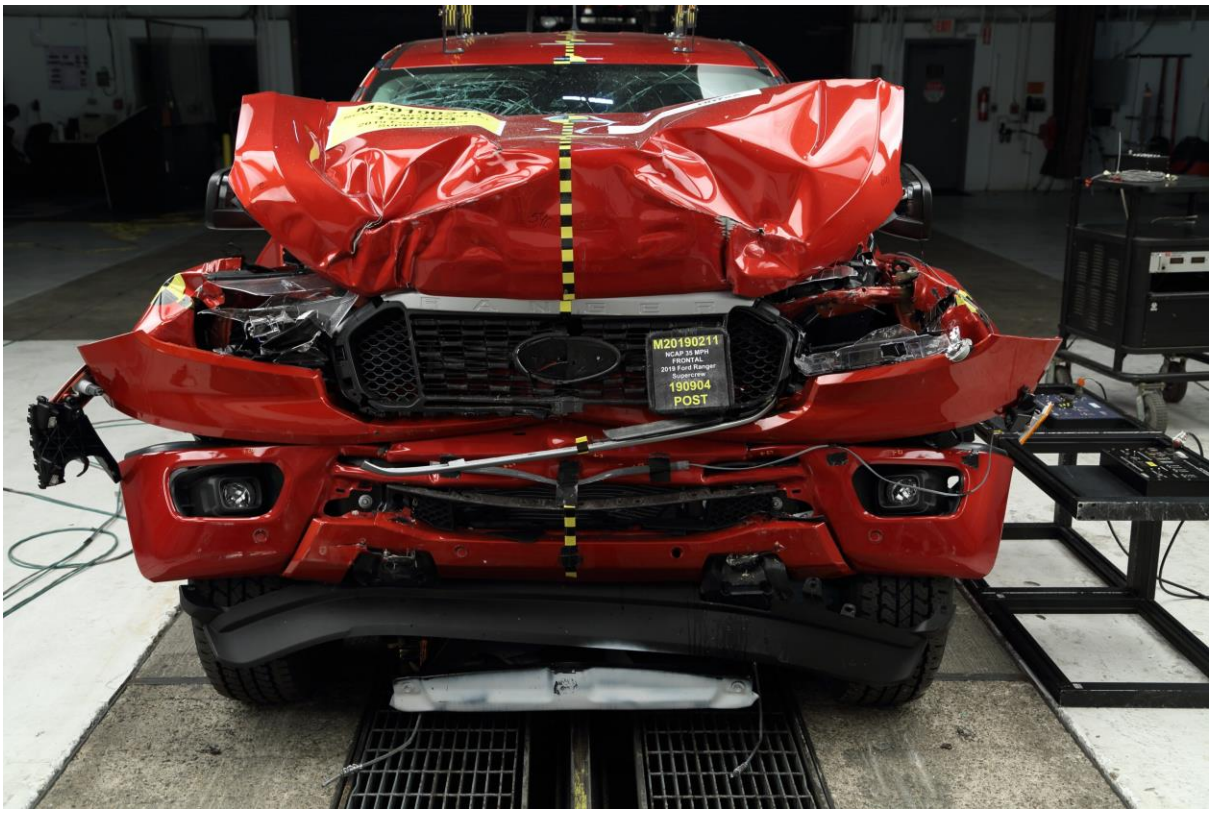
005 Tire Placard

Intentionally Left Blank

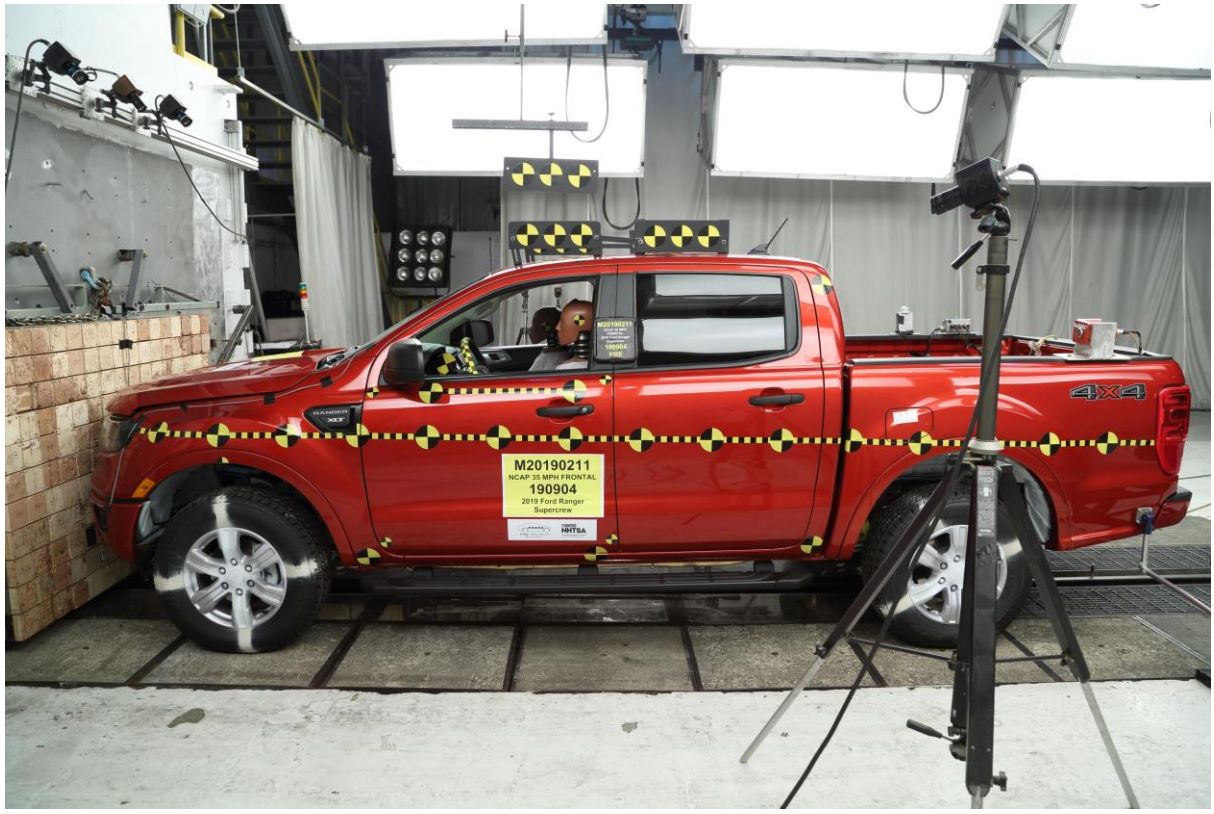
006 2019 Ford Ranger Supercrew Frontal As Delivered

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

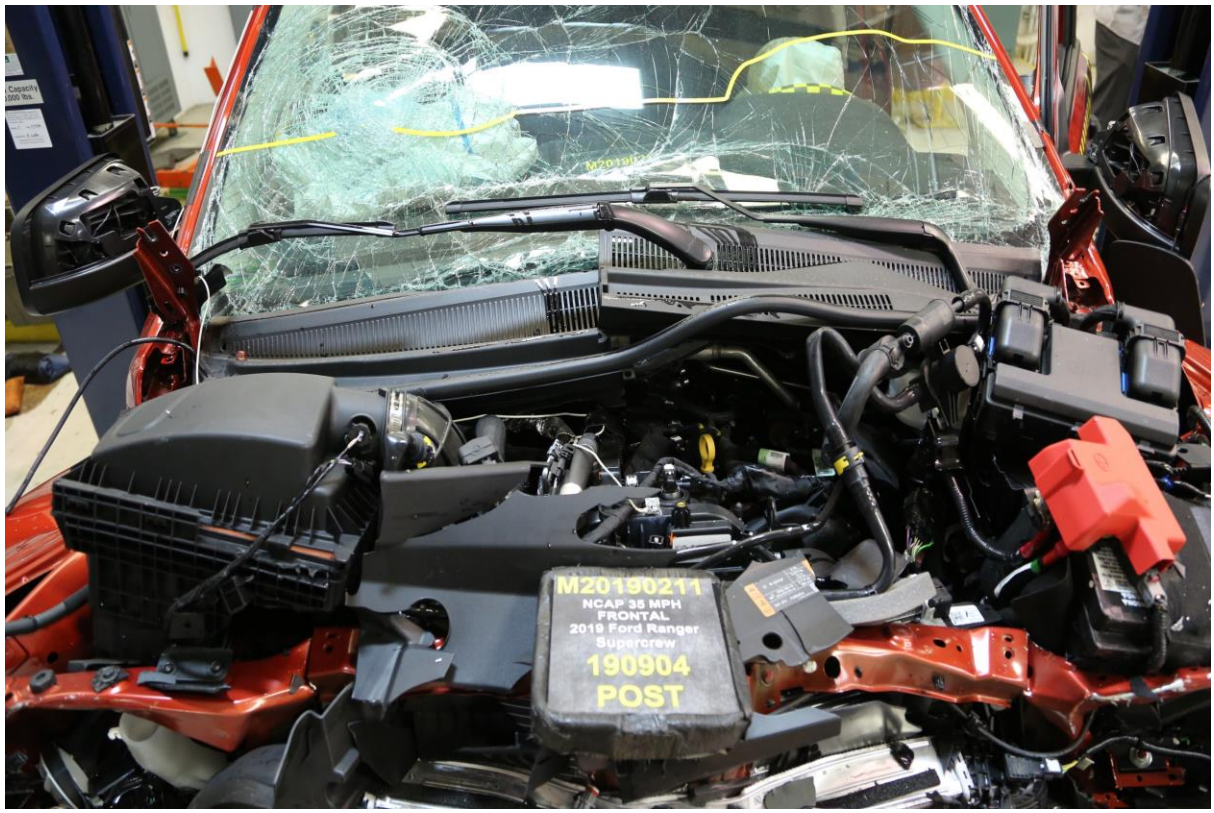
016 Pre-Test Left Rear 3-4 View

017 Post-Test Left Rear 3-4 View

018 Pre-Test Windshield View

019 Post-Test Windshield View

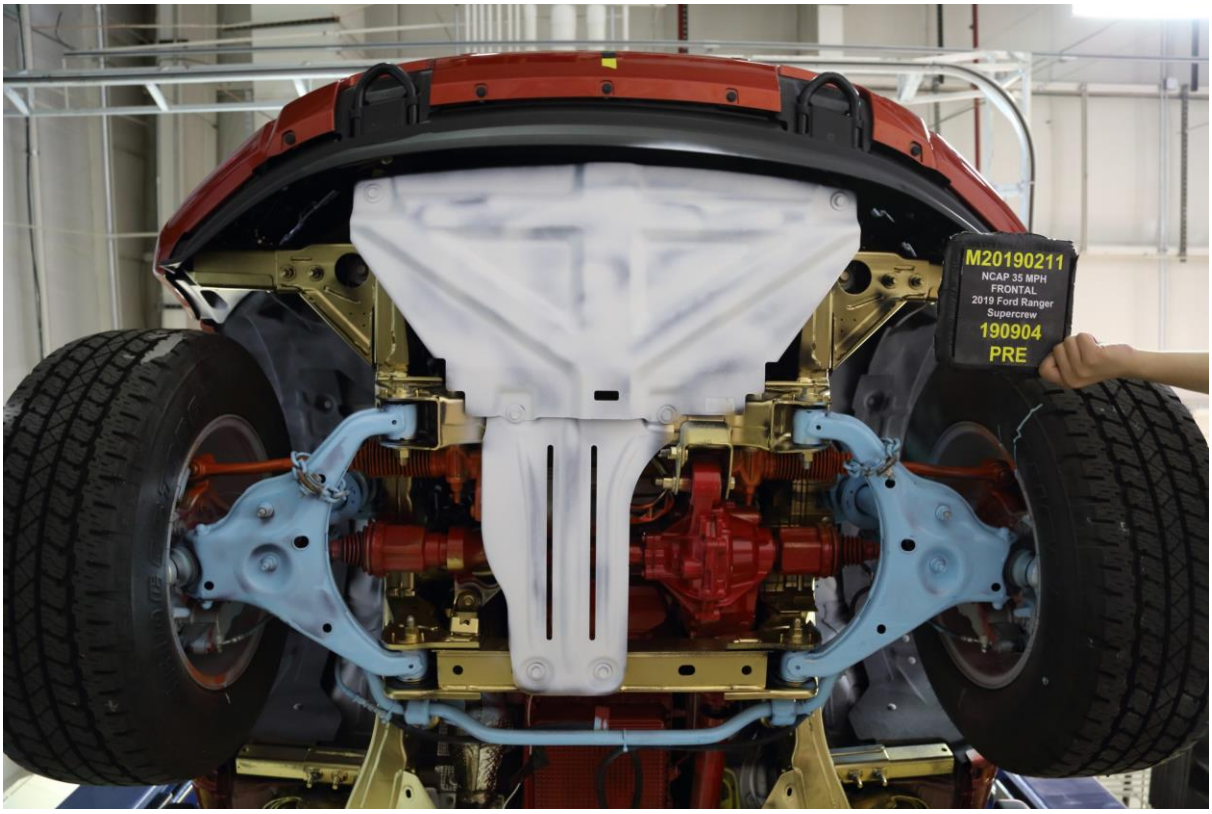
020 Pre-Test Engine Compartment View



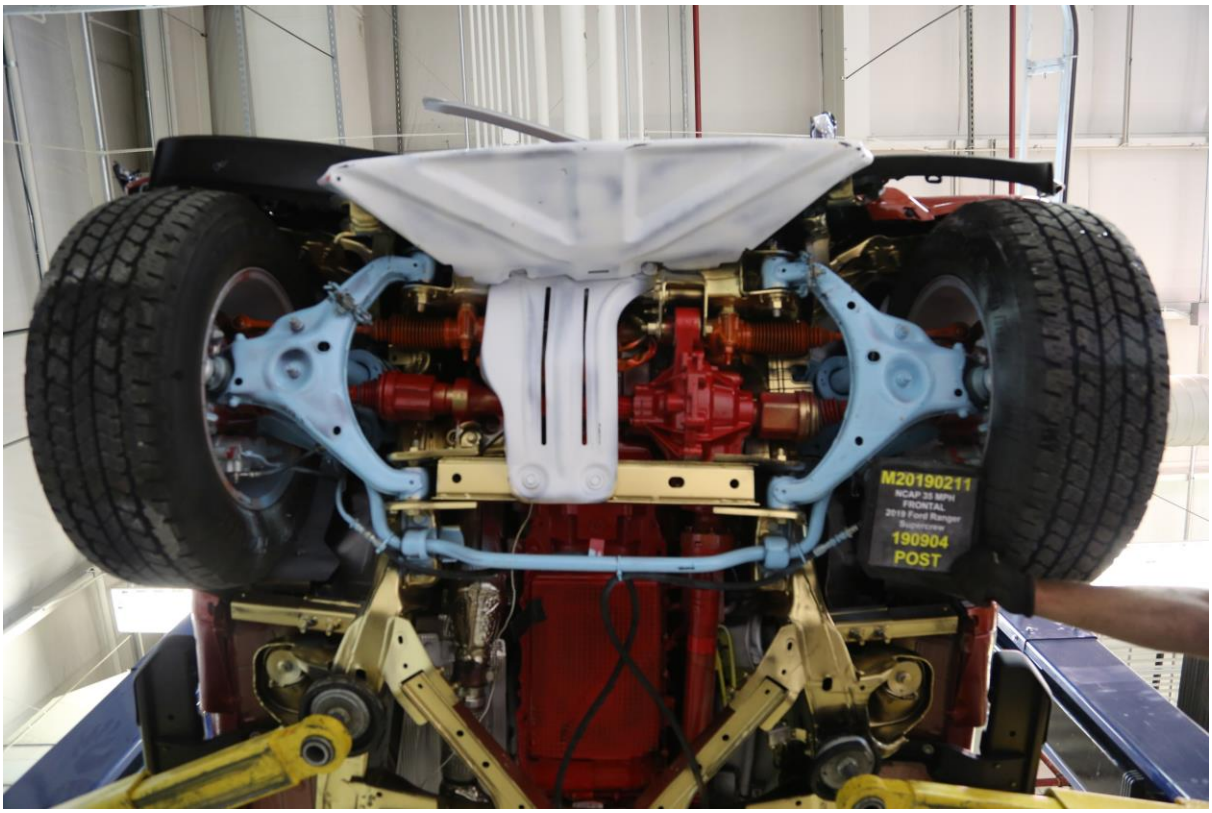
021 Post-Test Engine Compartment View

022 Pre-Test Fuel Filler Cap View

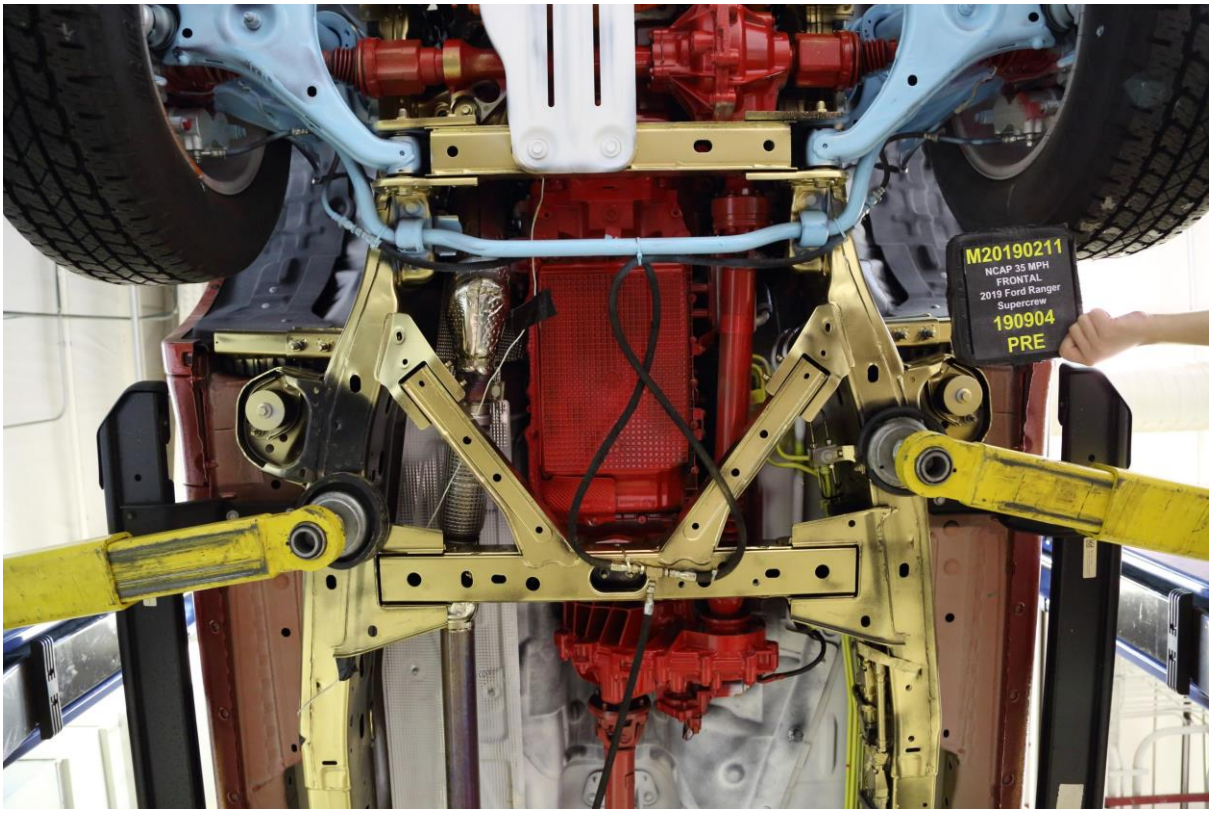
023 Post-Test Fuel Filler Cap View



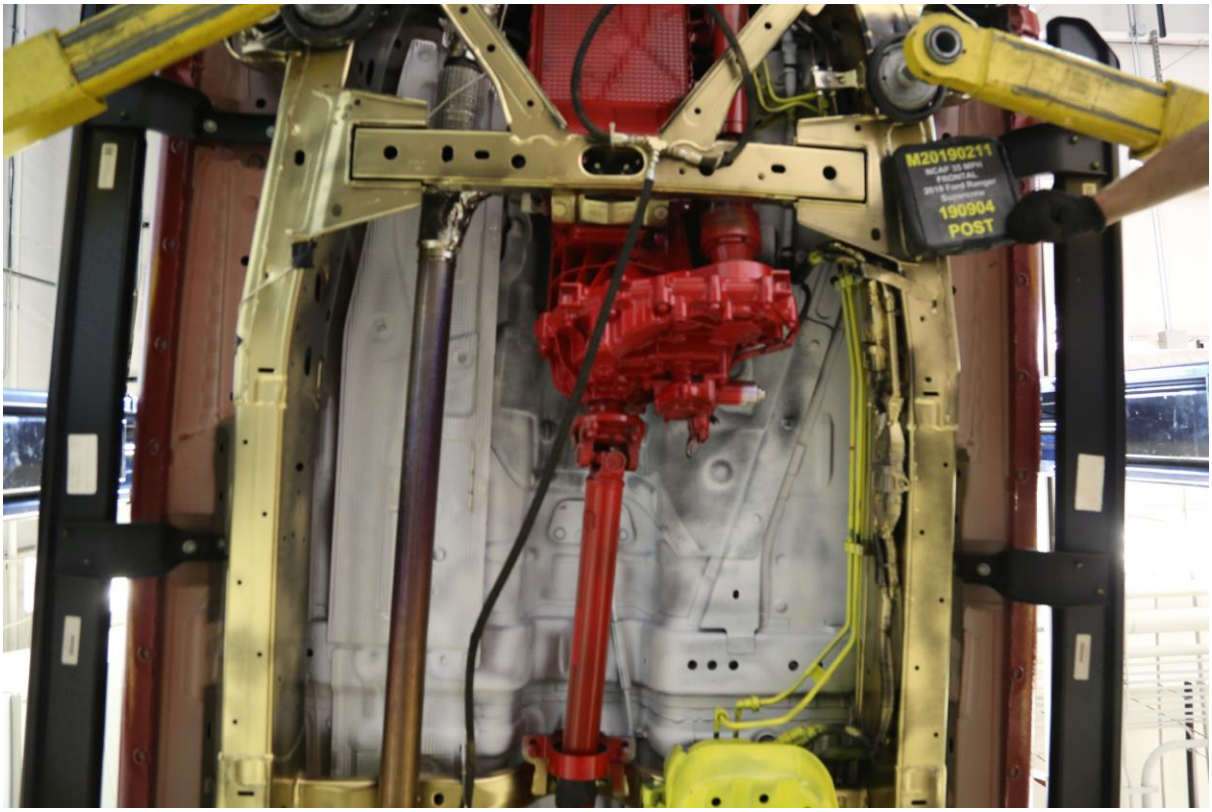
024 Pre-Test Front Underbody View



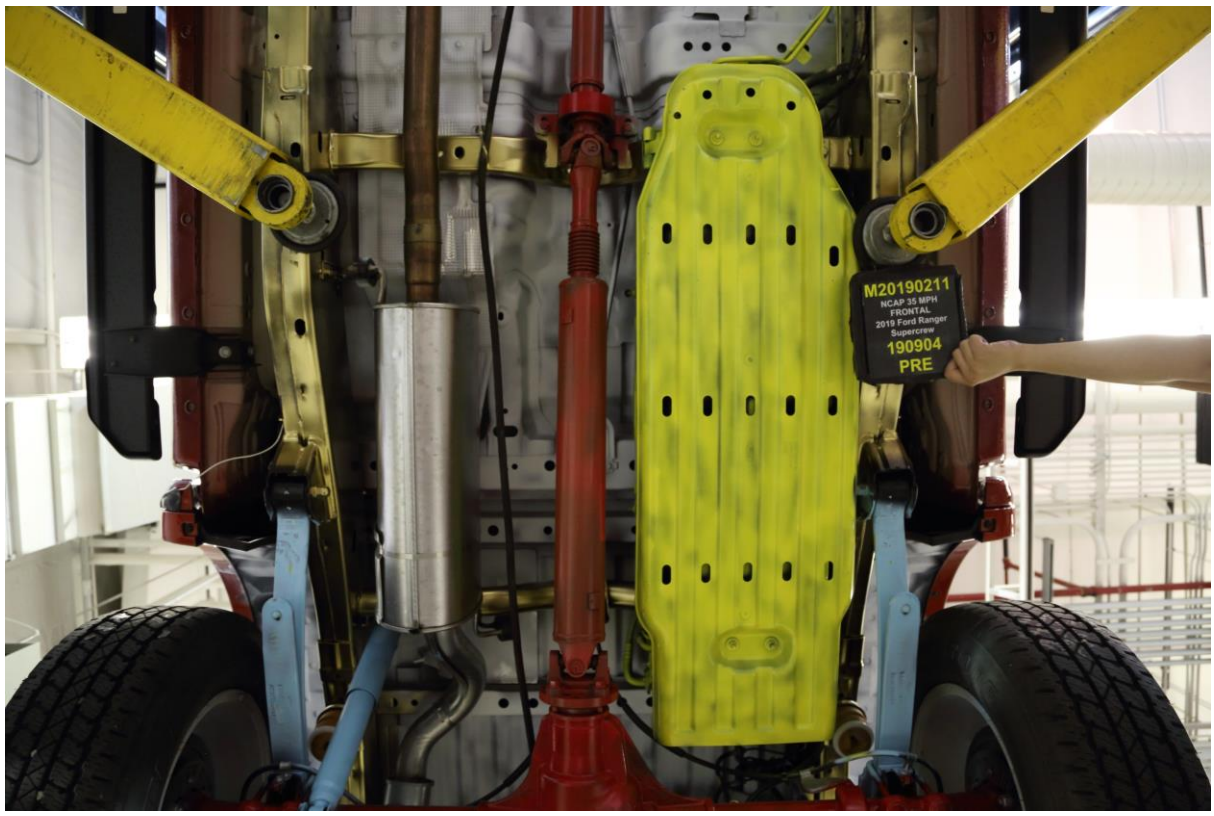
025 Post-Test Front Underbody View



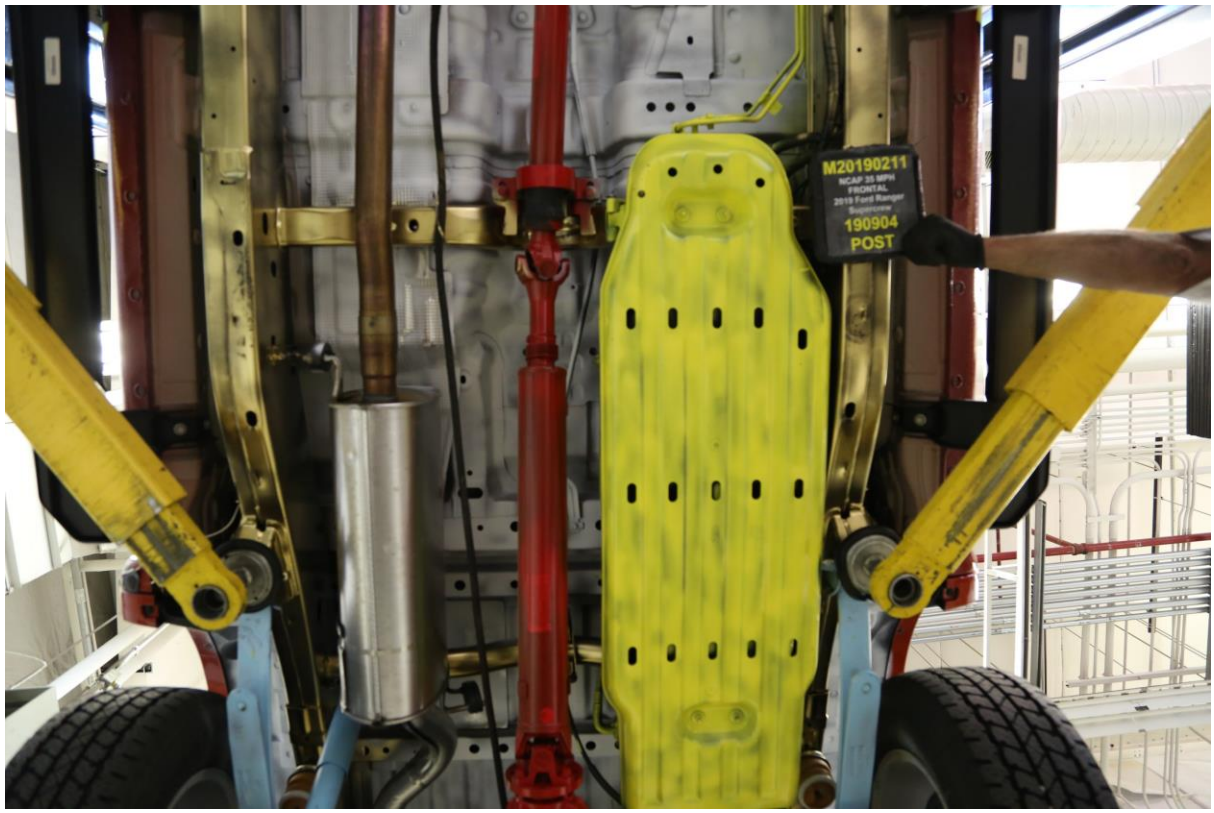
025a Pre-Test Mid Front Underbody View



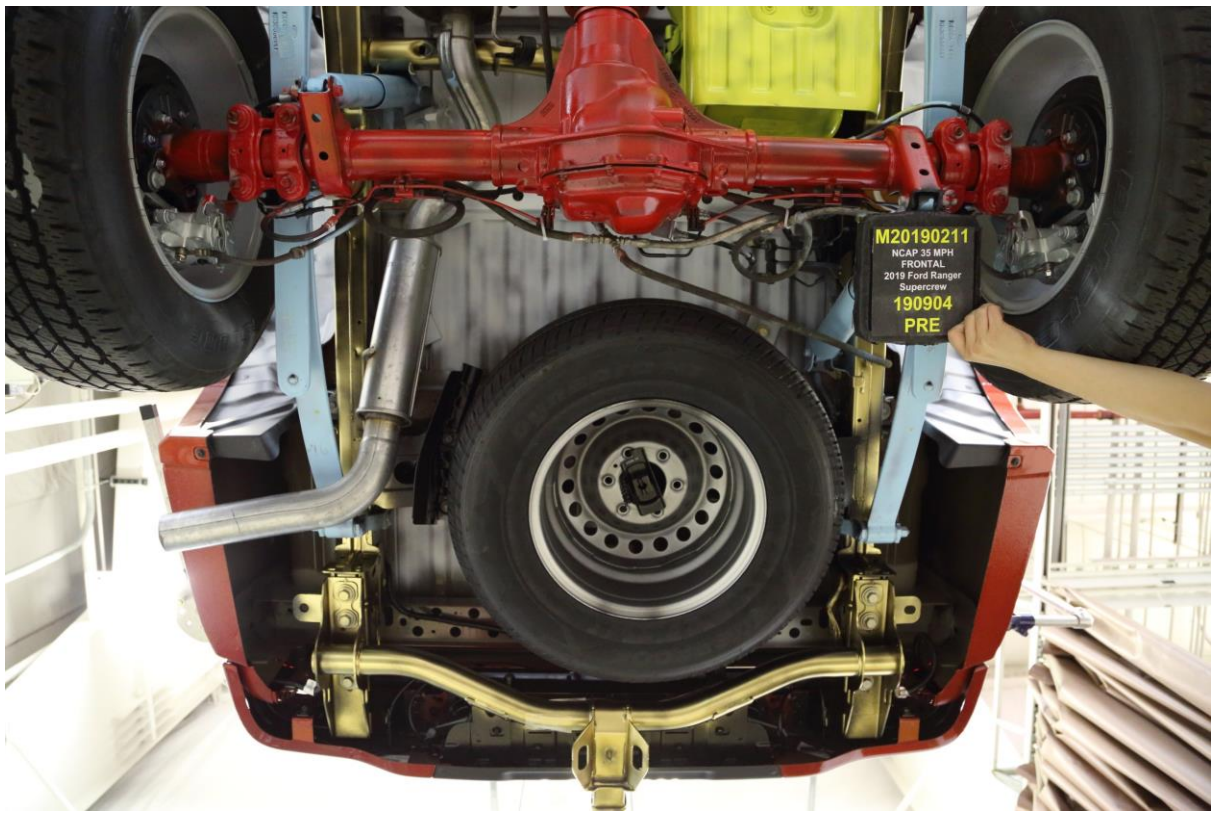
025b Post-Test Mid Front Underbody View



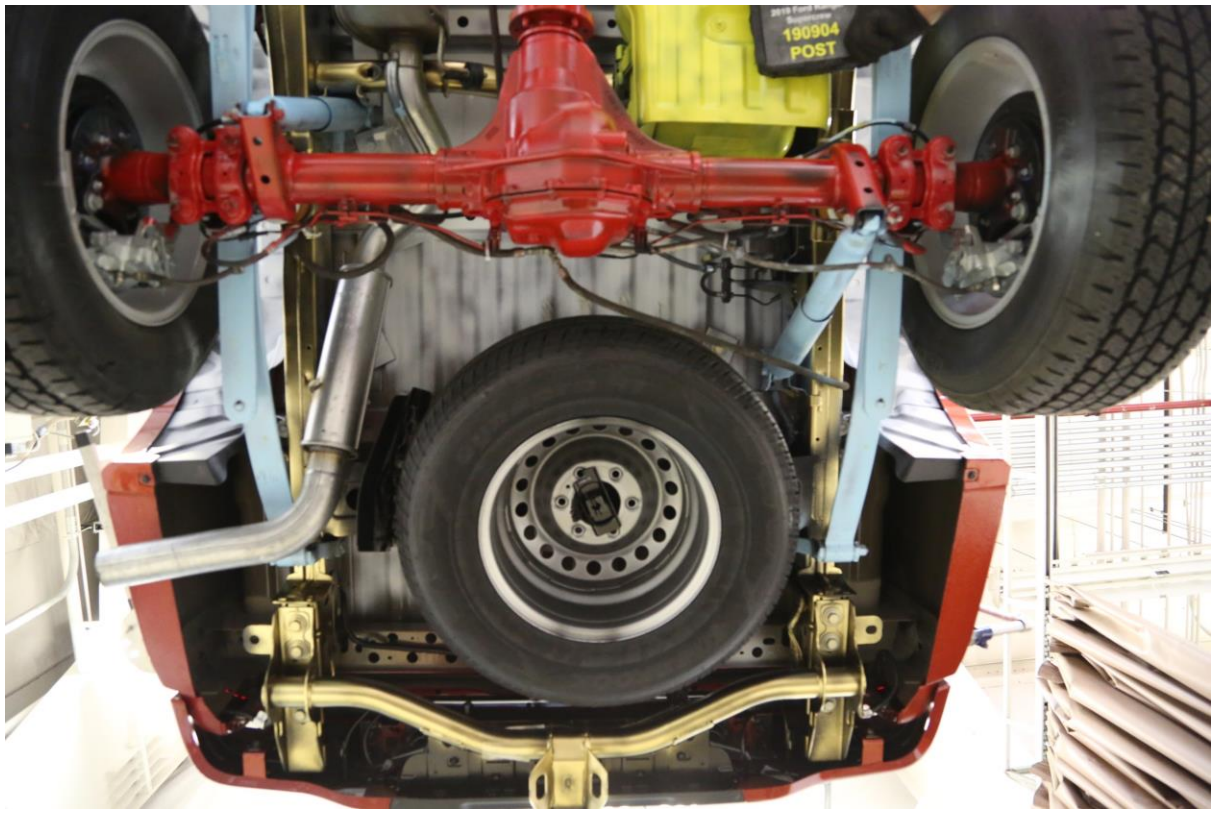
025c Pre-Test Mid Rear Underbody View



025d Post-Test Mid Rear Underbody View



026 Pre-Test Rear Underbody View



027 Post-Test Rear Underbody View

028 Pre-Test Dummy Cable Routing

029 Post-Test Dummy Cable Routing

030 Pre-Test Driver Dummy Front View

031 Post-Test Driver Dummy Front View

032 Pre-Test Driver Dummy Window View

033 Post-Test Driver Dummy Window View

034 Pre-Test Driver Dummy and Vehicle Interior View

035 Post-Test Driver Dummy and Vehicle Interior View

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

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

038 Pre-Test View of Belt Anchorage for Driver Dummy

039 Post-Test View of Belt Anchorage for Driver Dummy

040 Pre-Test 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

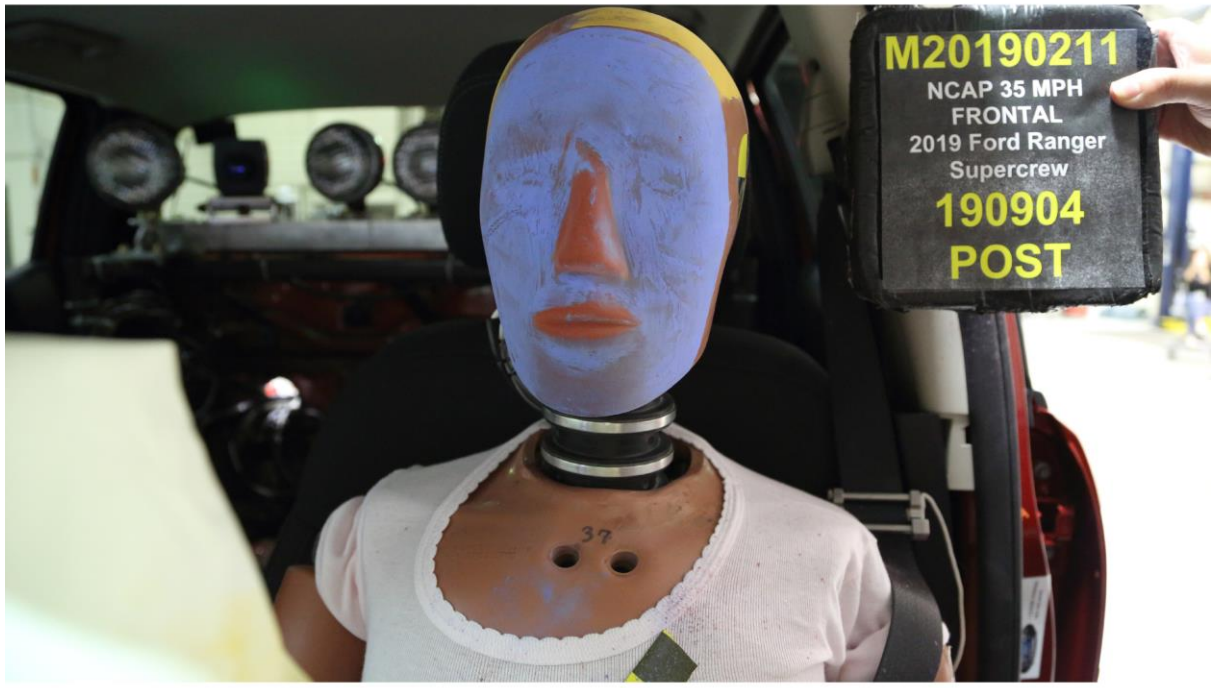
043 Post-Test Driver Dummy Feet

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

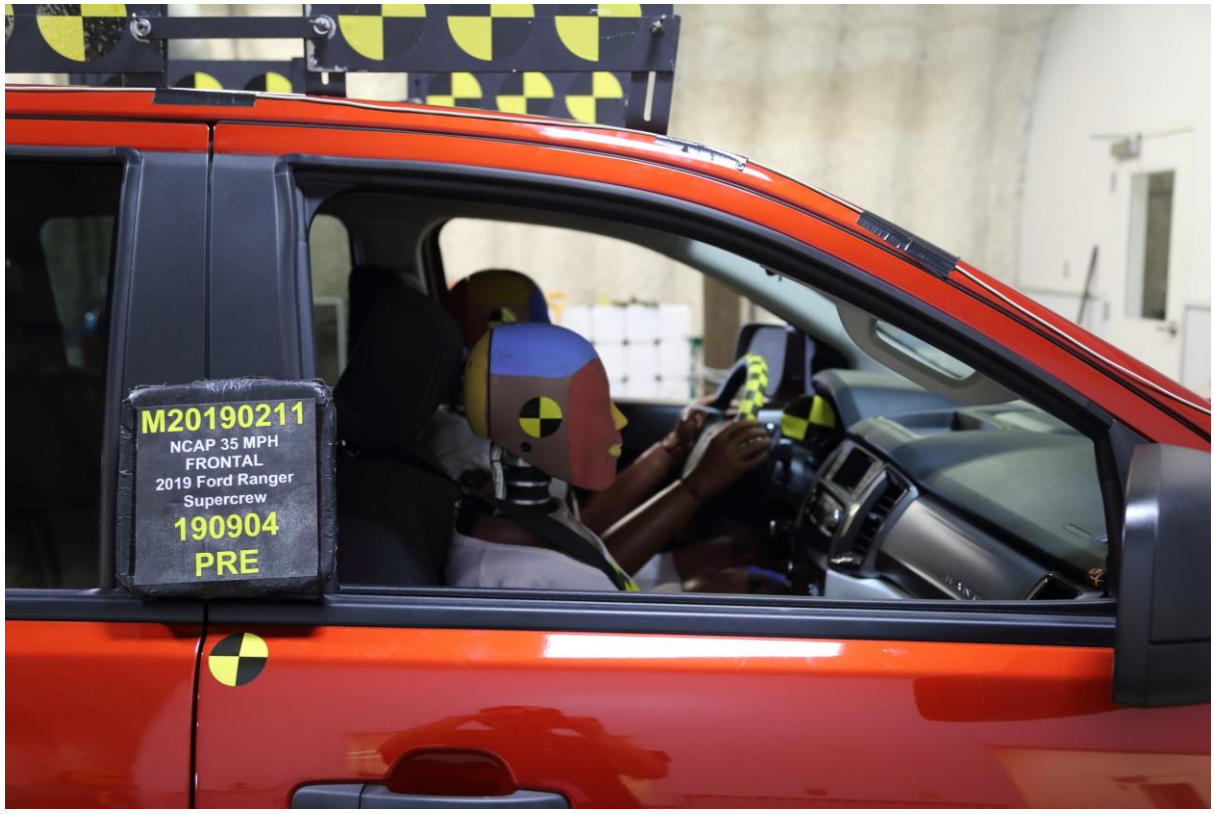
Intentionally Left Blank

051 Pre-Test View of the Steering Wheel

052 Post-Test View of the Steering Wheel

053 Pre-Test Passenger Dummy Front View

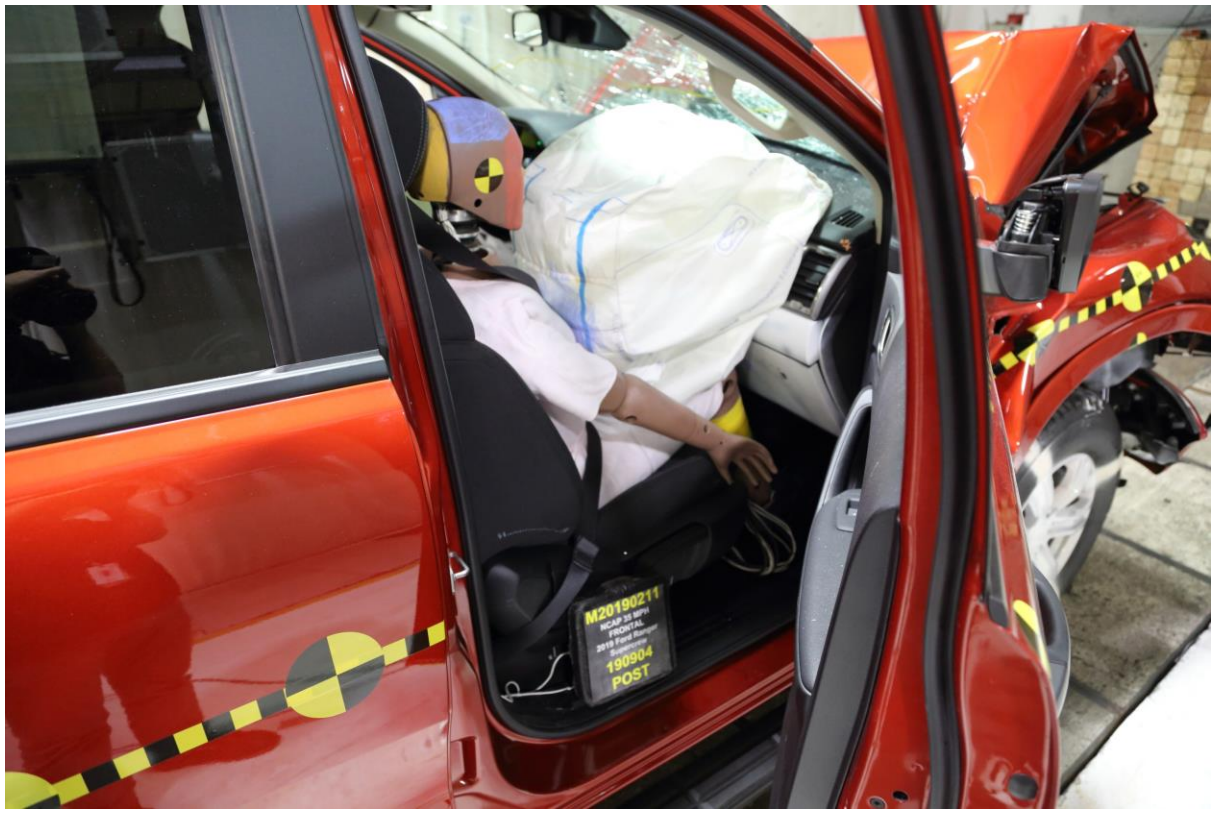
054 Post-Test Passenger Dummy Front View



055 Pre-Test Passenger Dummy Window View

056 Post-Test Passenger Dummy Window View

057 Pre-Test Passenger Dummy and Vehicle Interior View



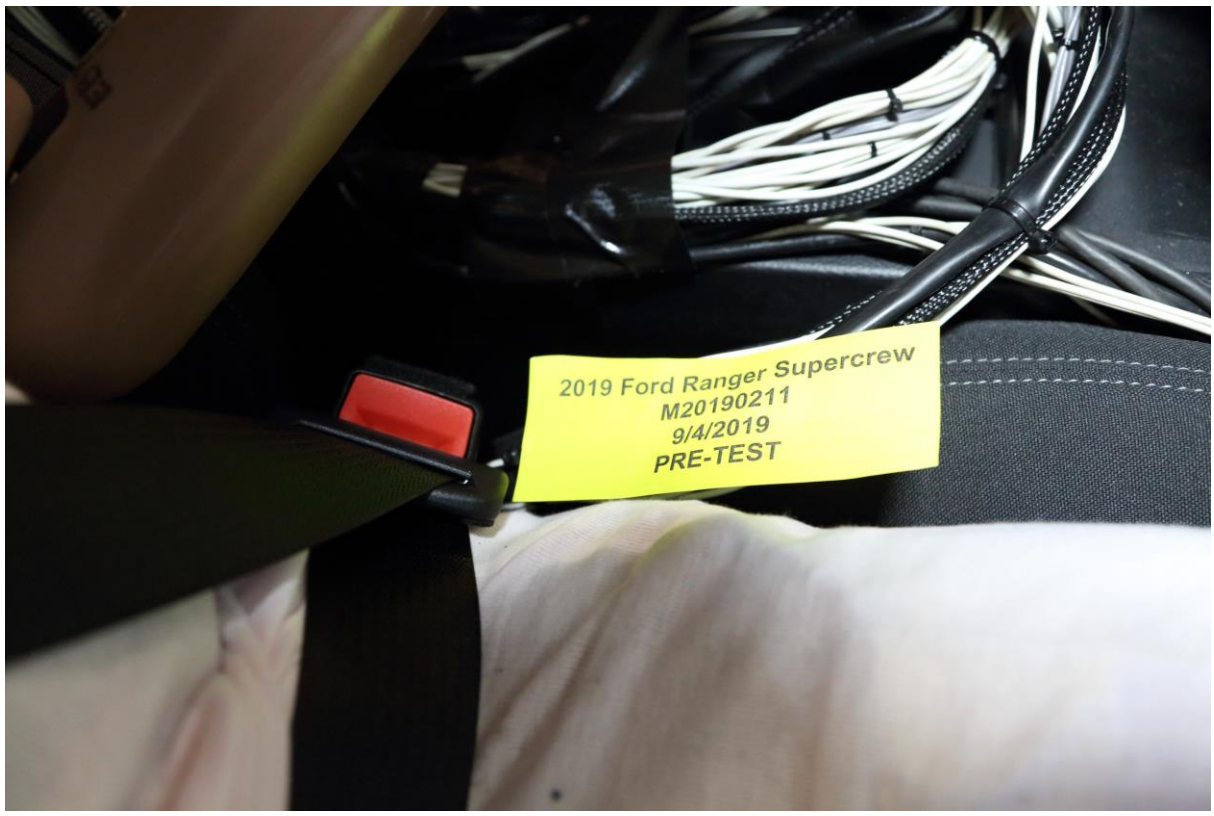
058 Post-Test Passenger Dummy and Vehicle Interior View

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

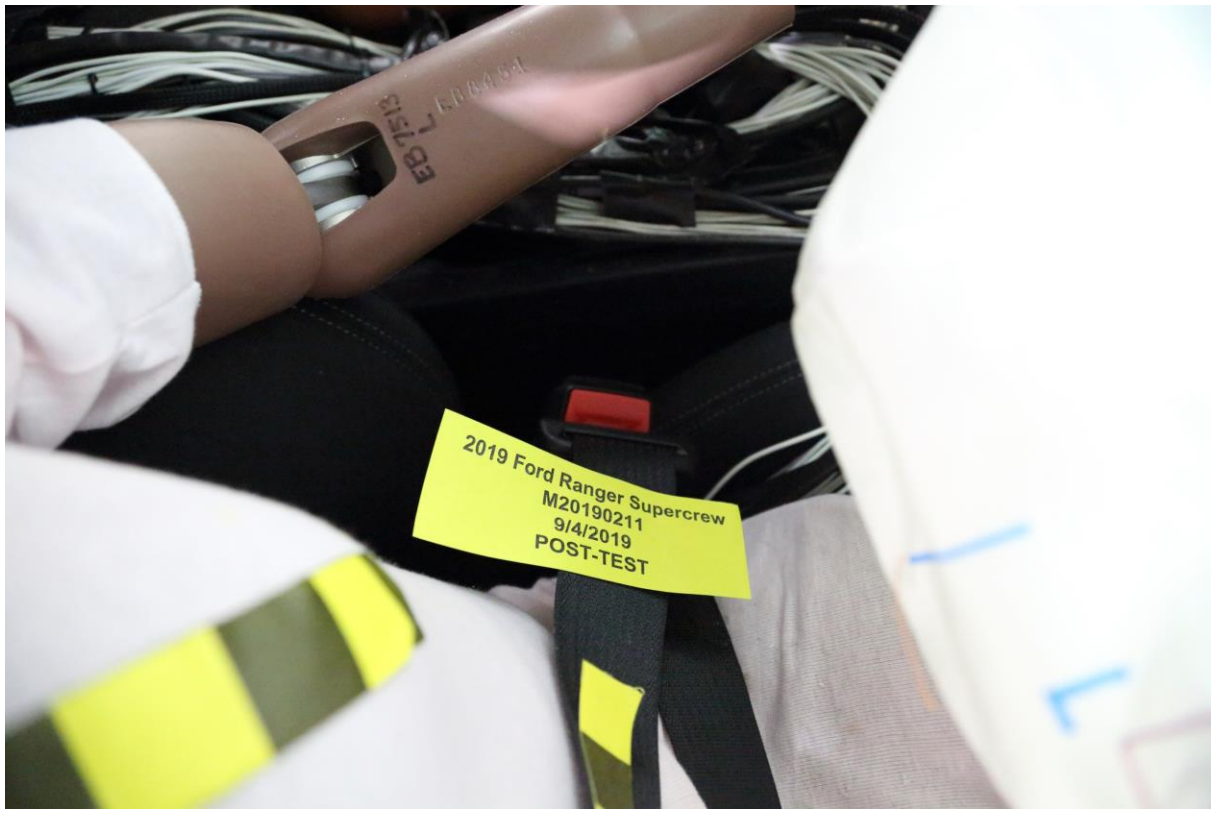
060 Post-Test Passenger's Seat Fore-Aft Markings

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

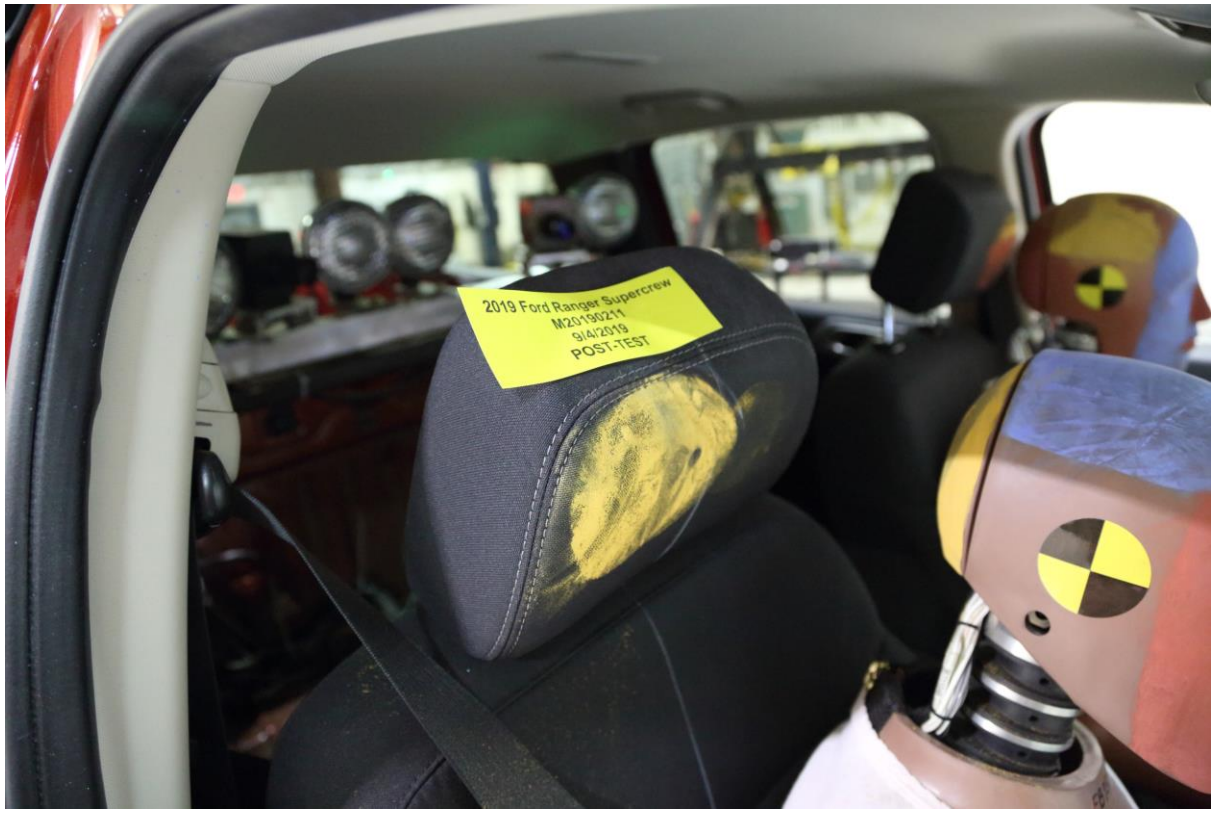
068 Post-Test Passenger's Side Knee Bolster

069 Pre-Test Passenger's Side Floorpan

070 Post-Test Passenger's Side Floorpan

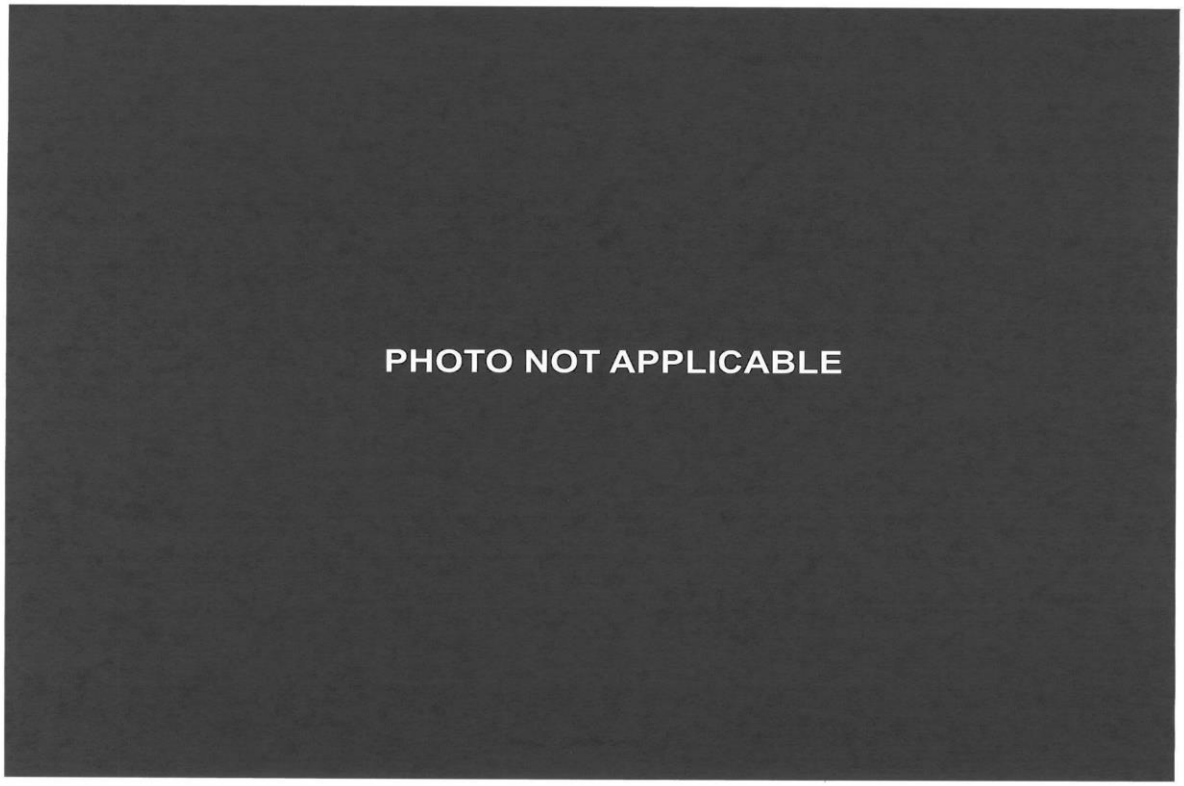
071 Post-Test Passenger Dummy Face

072 Post-Test Passenger Dummy Contact with Airbag



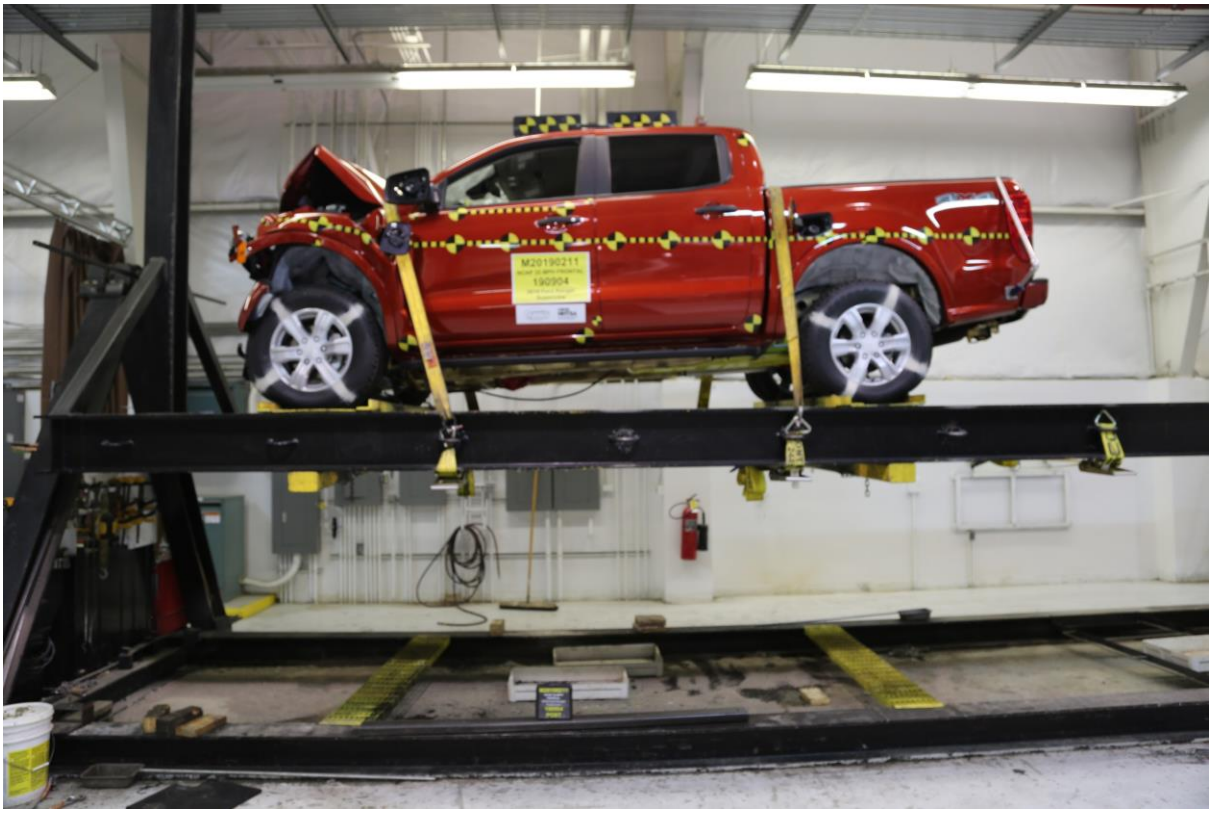
073 Post-Test Passenger Dummy Contact with Headrest

074 Photograph of Ballast Installed in Vehicle

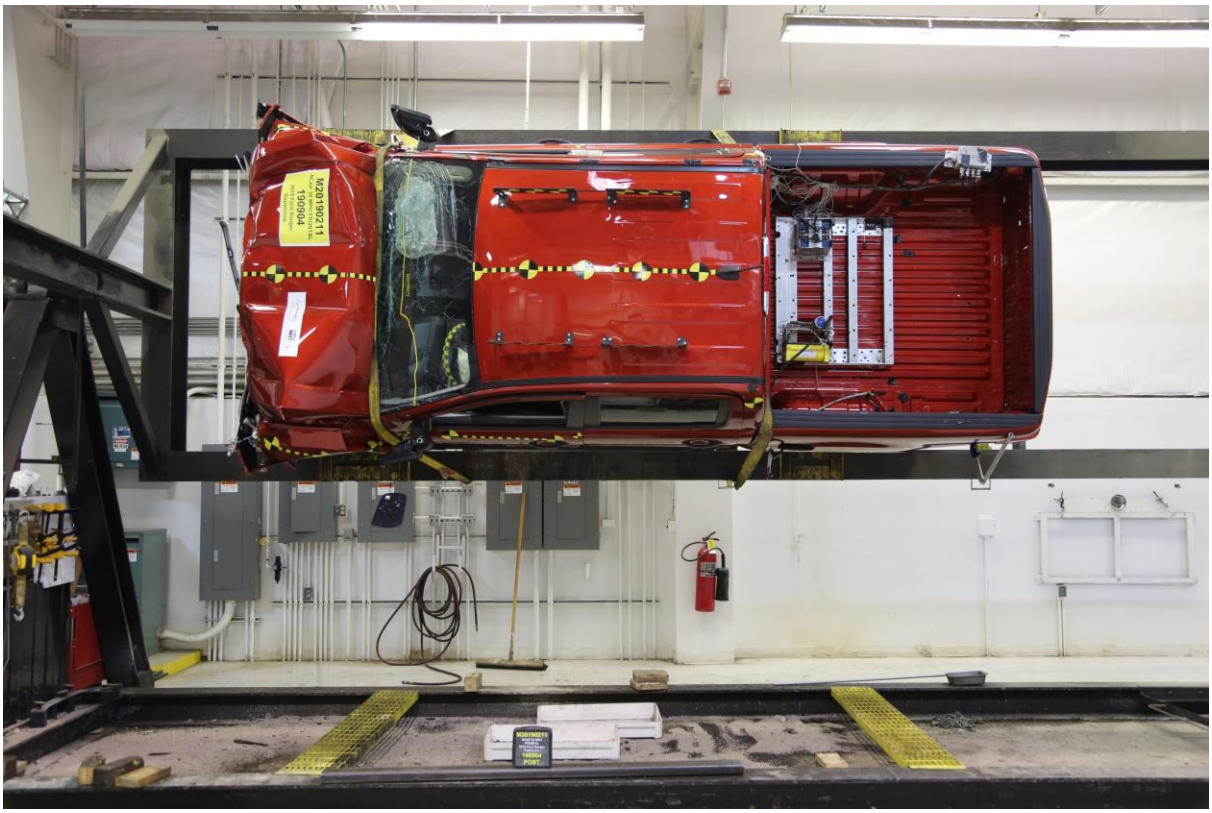


075 Post-Test Stoddard Spillage Location View

076 Post-Test Speed Trap Read out

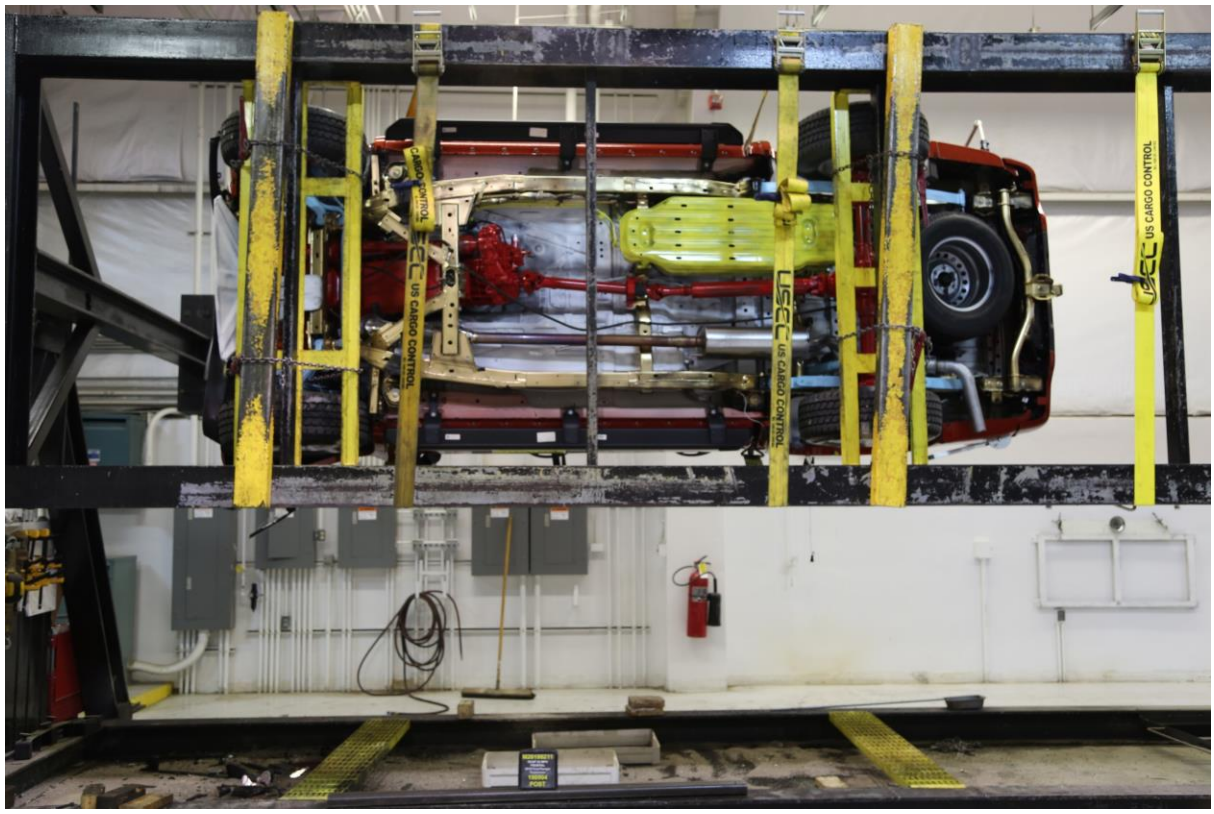


077 Vehicle at 0º on Static Rollover Device

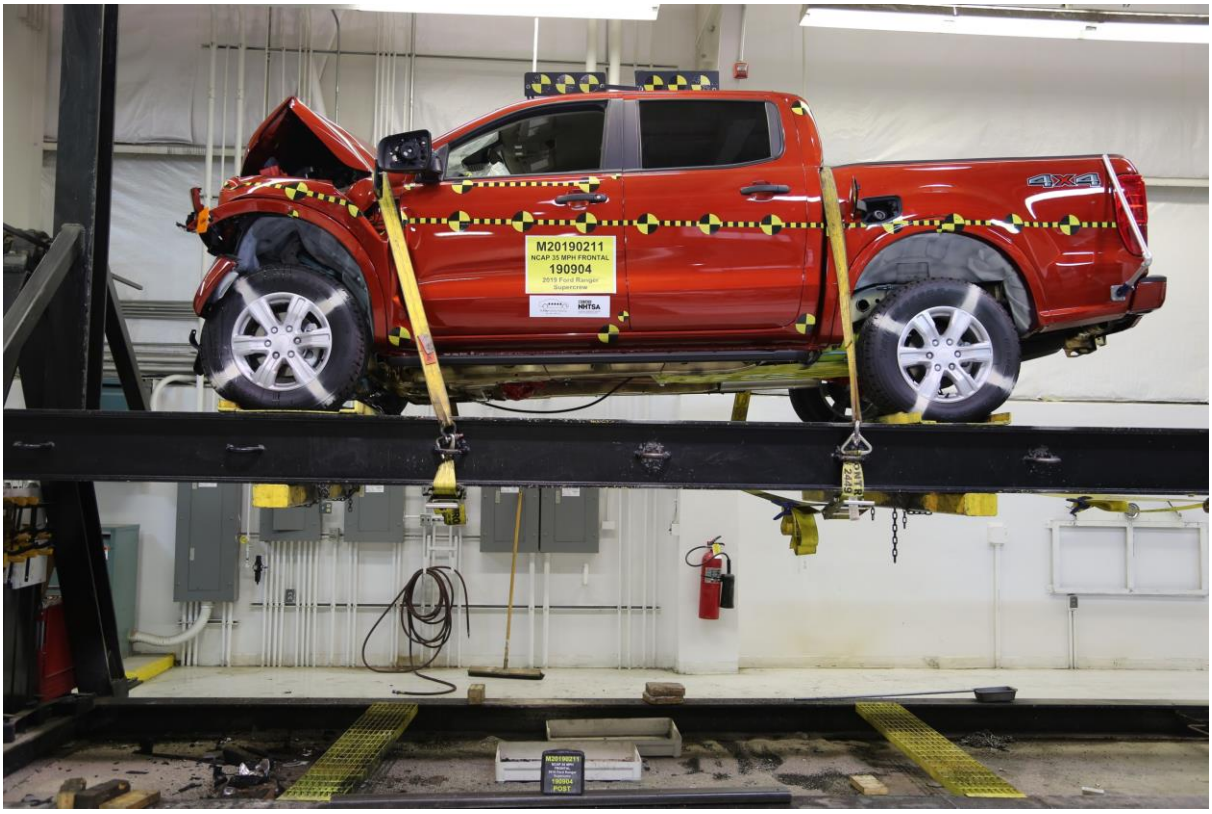


078 Vehicle at 90º on Static Rollover Device

079 Vehicle at 180º on Static Rollover Device

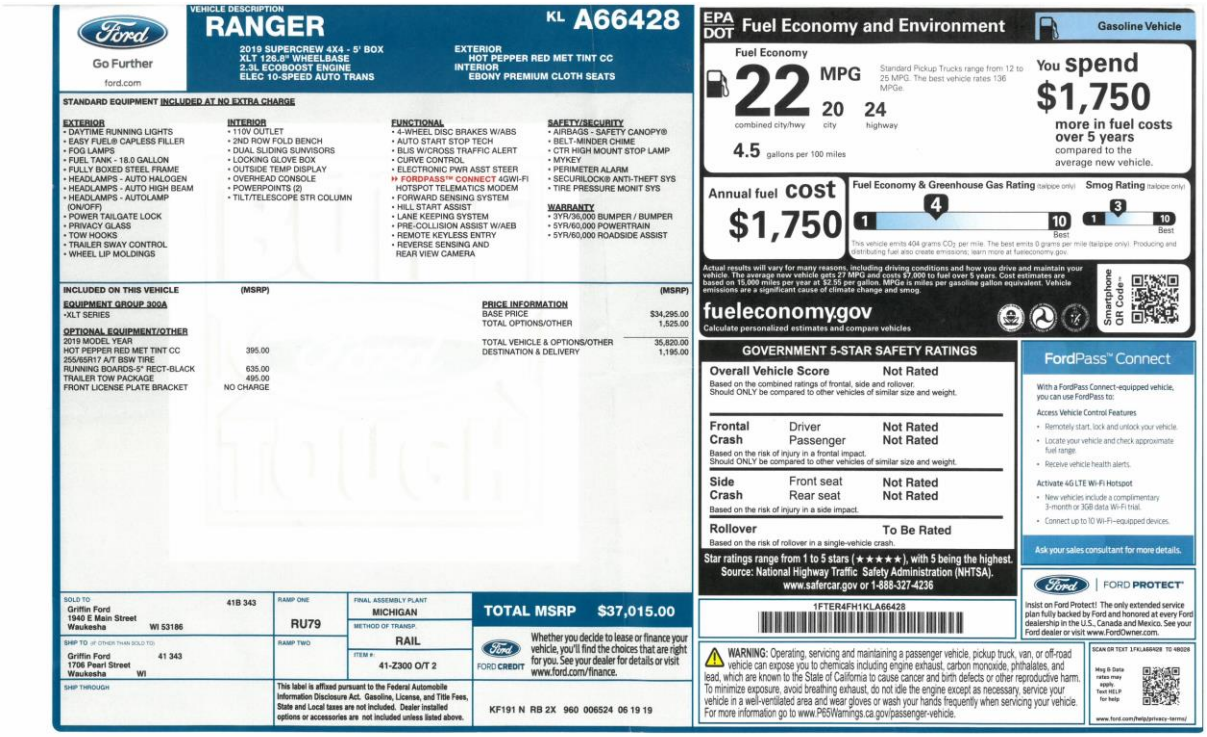


080 Vehicle at 270º on Static Rollover Device



081 Vehicle at 360º on Static Rollover Device

082 2019 Ford Ranger Supercrew Frontal Impact Event



083 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

The following additional dummy and vehicle response data can be found in the R & D section of the NHTSA website at: www.nhtsa.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 Lap 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 Lap 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: 09/04/2019

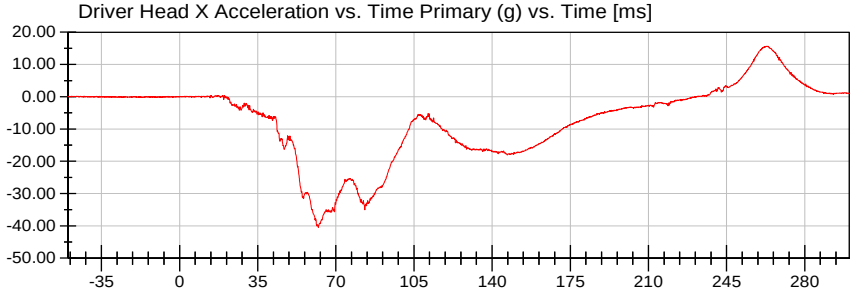
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

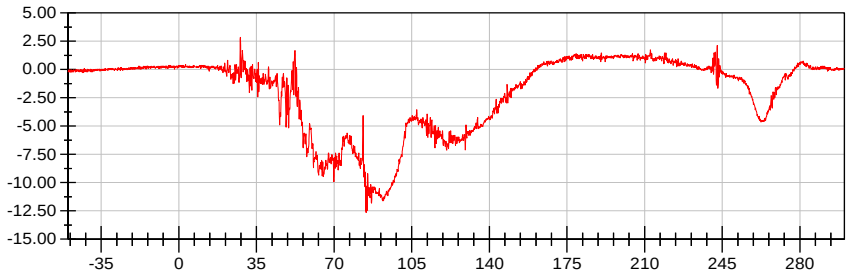
15.64 g at 262.96 ms

<Min>

-40.49 g at 62.16 ms

CFC_1000

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



<Max>

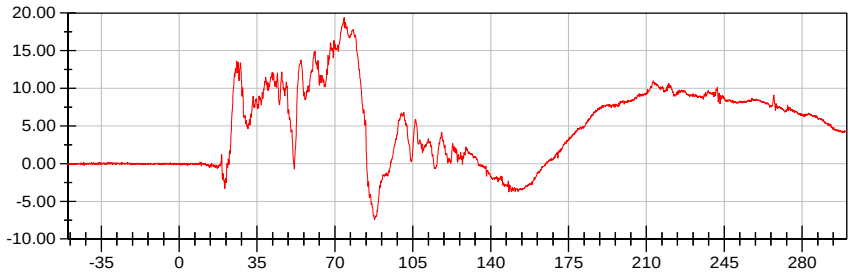
2.84 g at 27.76 ms

<Min>

-12.65 g at 84.40 ms

CFC_1000

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



<Max>

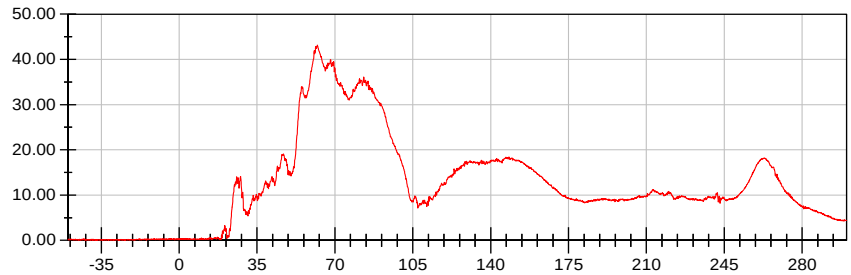
19.41 g at 74.16 ms

<Min>

-7.43 g at 87.76 ms

CFC_1000

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



<Max>

43.14 g at 62.16 ms

<Min>

0.02 g at -45.36 ms

CFC_1000

NHTSA

Test Date: 09/04/2019

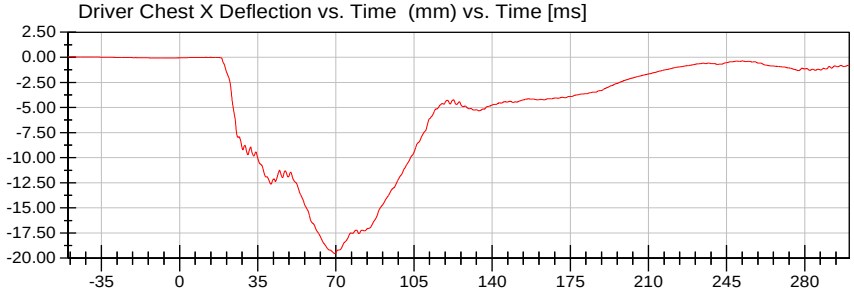
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

0.04 mm at -48.24 ms

<Min>

-19.54 mm at 69.60 ms

CFC_600

NHTSA

Test Date: 09/04/2019

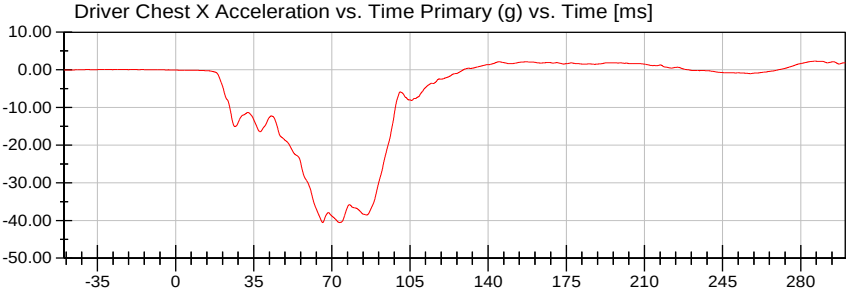
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

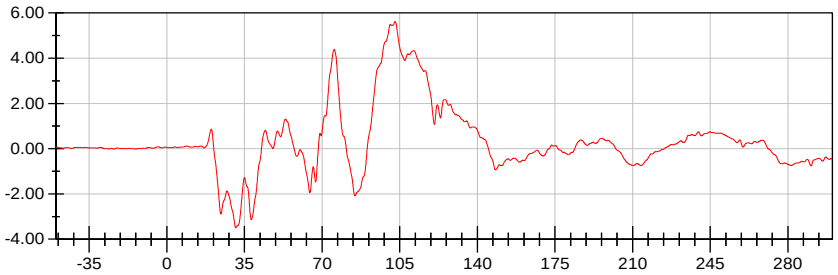
2.30 g at 286.48 ms

<Min>

-40.56 g at 73.36 ms

CFC_180

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



<Max>

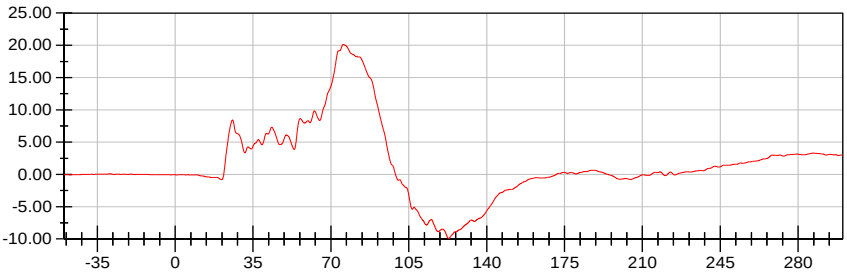
5.62 g at 102.88 ms

<Min>

-3.50 g at 31.04 ms

CFC_180

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



<Max>

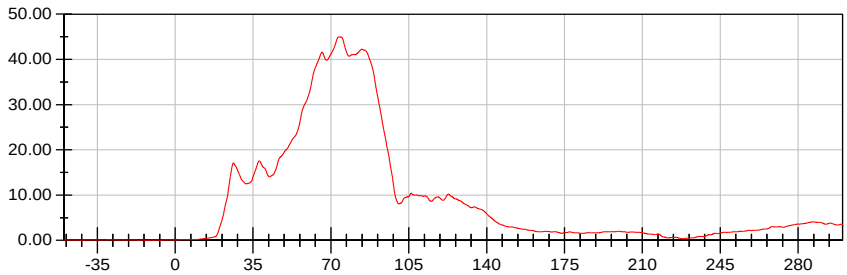
20.14 g at 75.52 ms

<Min>

-9.95 g at 122.88 ms

CFC_180

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



<Max>

44.97 g at 73.44 ms

<Min>

0.04 g at -11.76 ms

CFC_180

NHTSA

Test Date: 09/04/2019

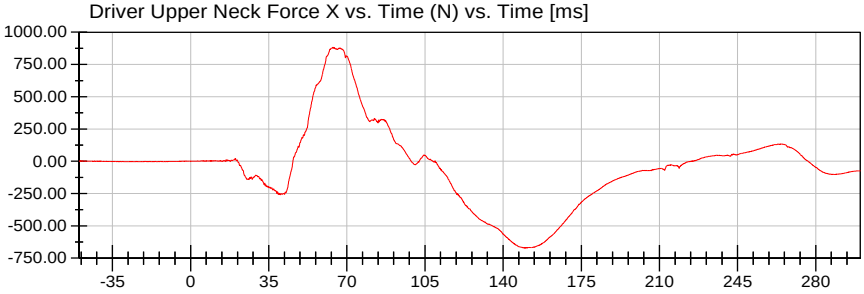
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

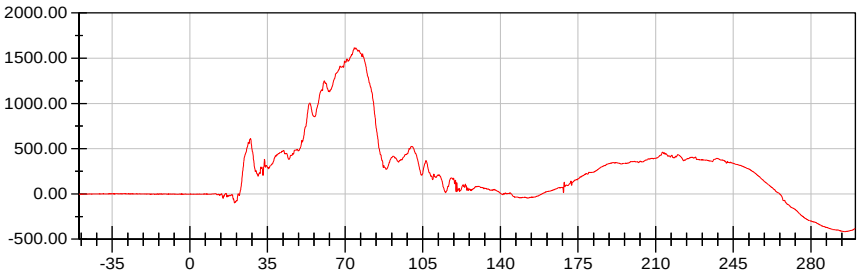
883.15 N at 63.76 ms

<Min>

-673.62 N at 149.60 ms

CFC_1000

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



<Max>

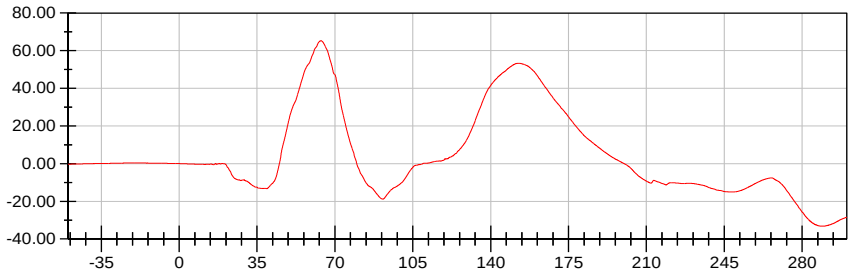
1,616.10 N at 74.16 ms

<Min>

-417.20 N at 294.88 ms

CFC_1000

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



<Max>

65.31 Nm at 63.76 ms

<Min>

-33.24 Nm at 288.88 ms

CFC_600

2019 Ford Ranger Supercrew NCAP 35 mph Frontal Impact

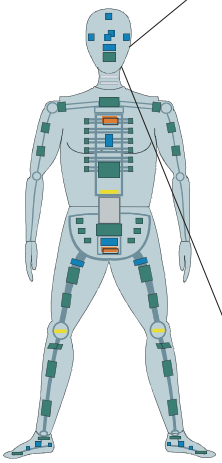
Neck Injury Predictor (NIJ)

Date: 09/04/2019
Time: 13:50

Customer: NHTSA
Test Number: M20190211

TRC Inc. Test Lab: CTF
Test Number: 190904

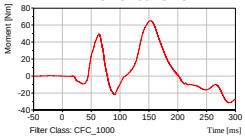
Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310



Dummy:HIII 50th Male
Seating Position:
Driver

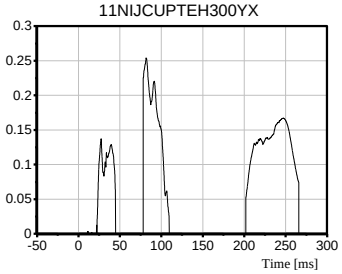
NIJ Source Code: (Fz/Fzc)+(My/Myc)

11TMONUP00H3MOYX



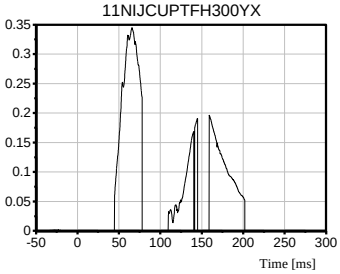
11NECKUP00H3FOZA

11NIJCUPTEH300YX



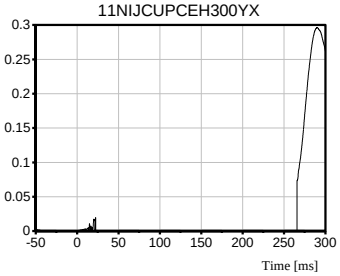
Max [NTE] 0.2543 at 81.60 ms

11NIJCUPTFH300YX



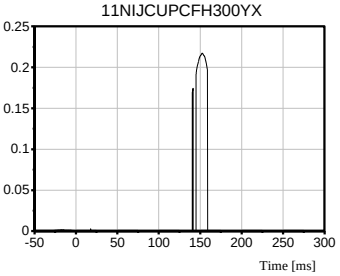
Max [NTF] 0.3447 at 65.84 ms

11NIJCUPCEH300YX



Max [NCE] 0.2965 at 289.92 ms

11NIJCUPCFH300YX



Max [NCF] 0.2174 at 152.64 ms

NHTSA

Test Date: 09/04/2019

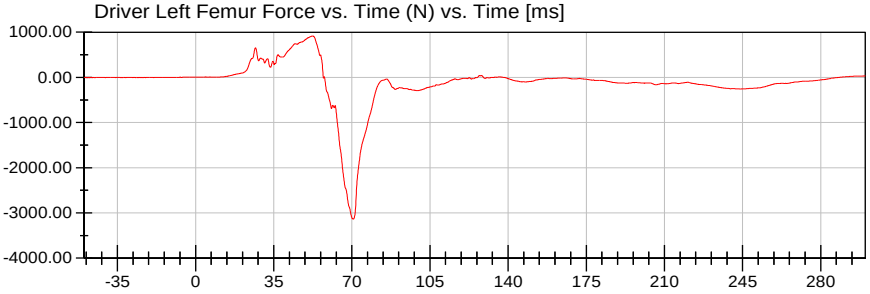
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

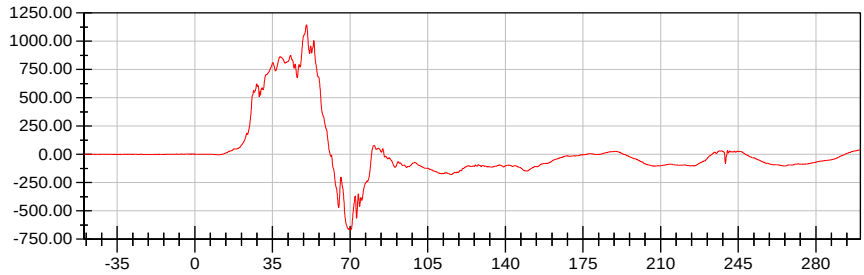
914.22 N at 52.48 ms

<Min>

-3,134.78 N at 70.72 ms

CFC_600

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



<Max>

1,144.60 N at 50.40 ms

<Min>

-667.01 N at 70.32 ms

CFC_600

NHTSA

Test Date: 09/04/2019

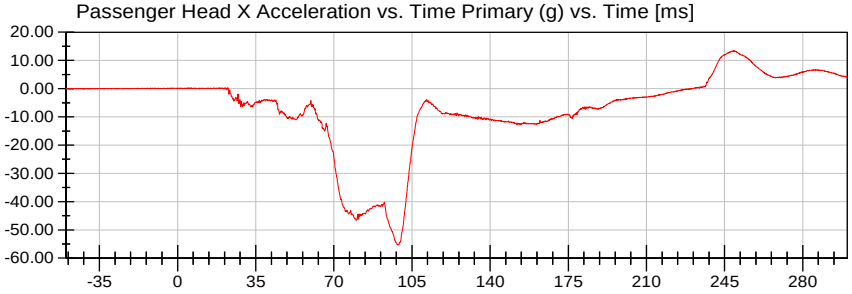
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

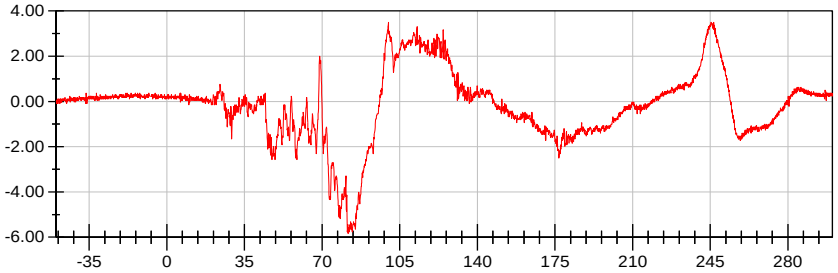
13.41 g at 248.88 ms

<Min>

-55.37 g at 98.56 ms

CFC_1000

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



<Max>

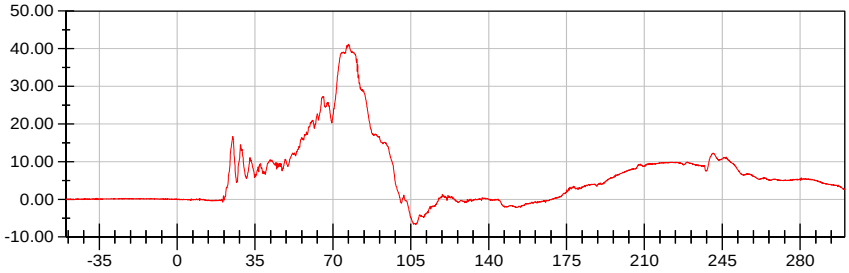
3.50 g at 99.92 ms

<Min>

-5.84 g at 81.76 ms

CFC_1000

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



<Max>

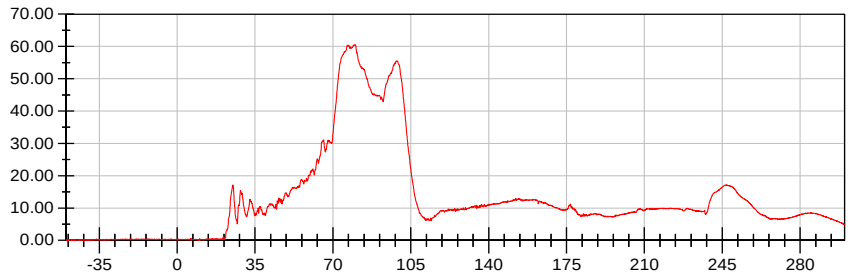
41.15 g at 76.88 ms

<Min>

-6.71 g at 107.20 ms

CFC_1000

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



<Max>

60.58 g at 79.92 ms

<Min>

0.03 g at -49.76 ms

CFC_1000

NHTSA

Test Date: 09/04/2019

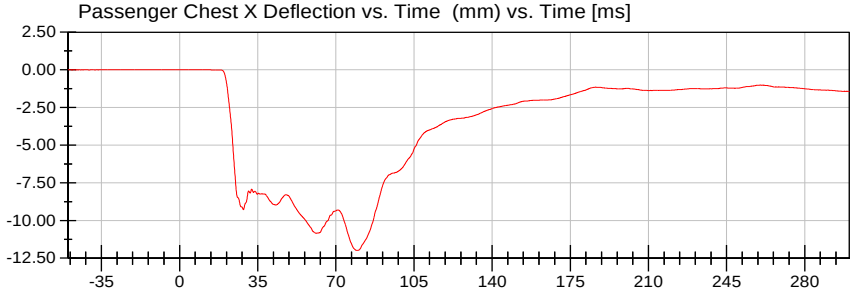
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

0.01 mm at 2.16 ms

<Min>

-11.99 mm at 79.44 ms

CFC_600

NHTSA

Test Date: 09/04/2019

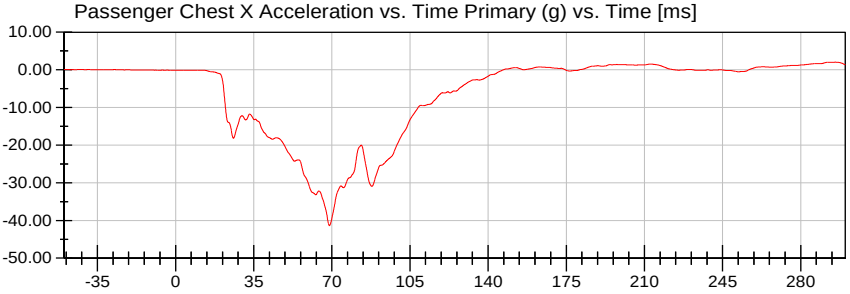
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

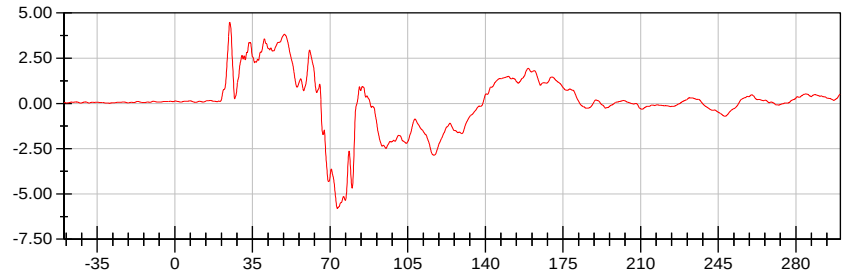
2.02 g at 295.44 ms

<Min>

-41.34 g at 68.96 ms

CFC_180

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



<Max>

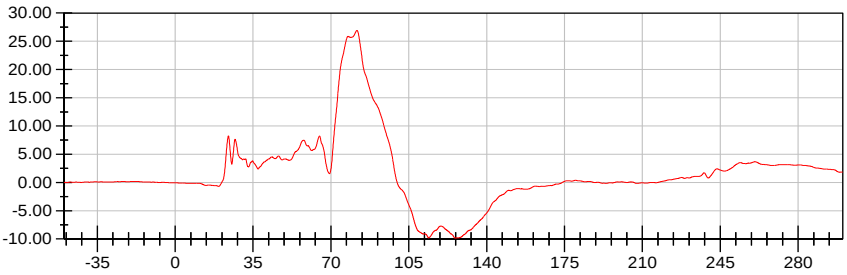
4.48 g at 24.80 ms

<Min>

-5.80 g at 73.28 ms

CFC_180

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



<Max>

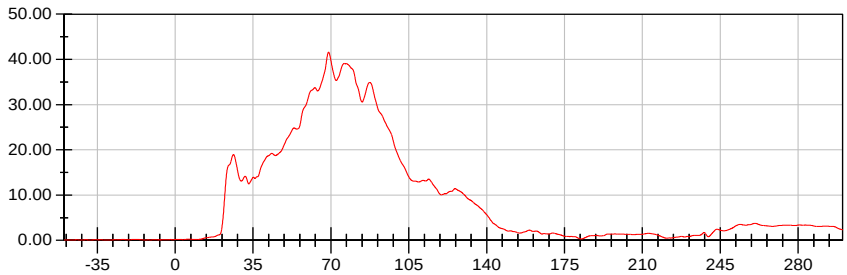
26.93 g at 81.76 ms

<Min>

-9.84 g at 125.92 ms

CFC_180

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



<Max>

41.59 g at 68.96 ms

<Min>

0.07 g at -29.12 ms

CFC_180

NHTSA

Test Date: 09/04/2019

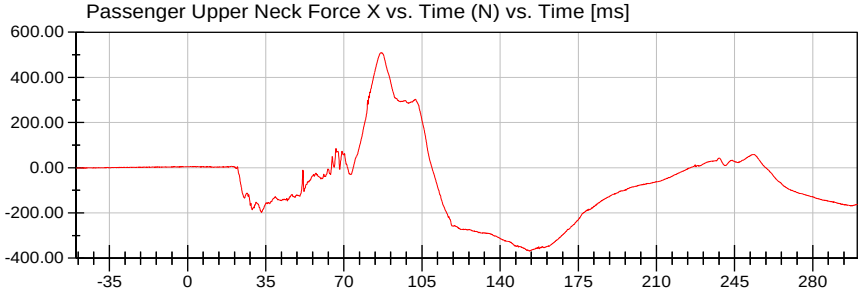
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

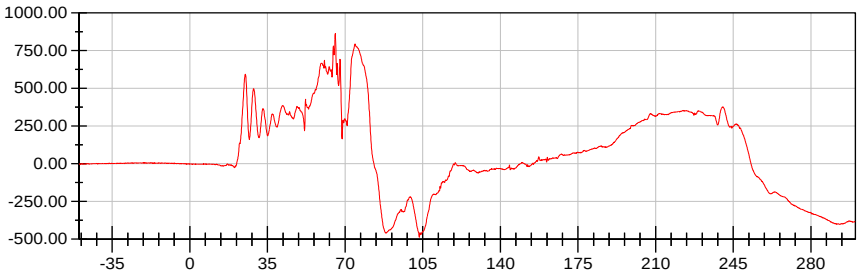
509.16 N at 86.56 ms

<Min>

-369.10 N at 152.88 ms

CFC_1000

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



<Max>

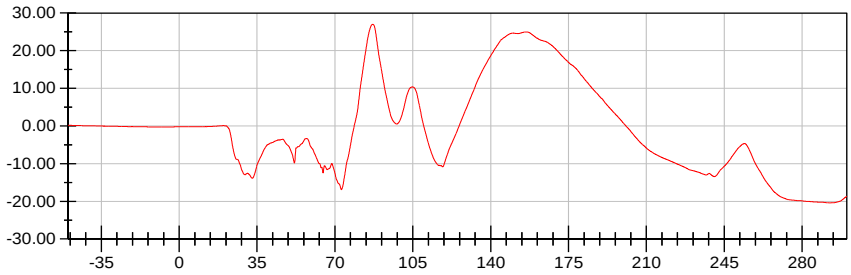
864.77 N at 65.60 ms

<Min>

-488.13 N at 103.44 ms

CFC_1000

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



<Max>

26.99 Nm at 87.04 ms

<Min>

-20.41 Nm at 292.72 ms

CFC_600

2019 Ford Ranger Supercrew NCAP 35 mph Frontal Impact

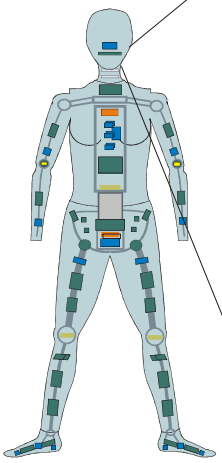
Neck Injury Predictor (NIJ)

Date: 09/04/2019
Time: 13:50

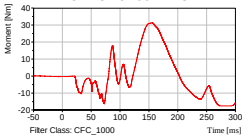
Customer: NHTSA
Test Number: M20190211

TRC Inc. Test Lab: CTF
Test Number: 190904

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

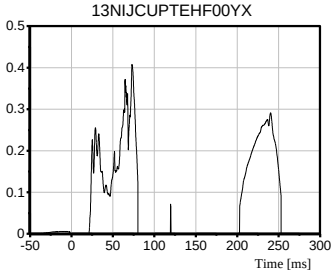


13TMONUP00HFMOYX



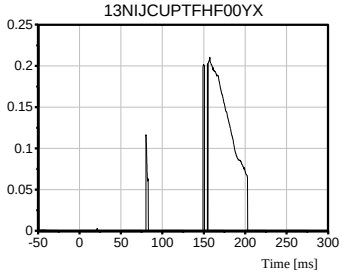
13NECKUP00HFFOZA

13NIJCUPTEHF00YX



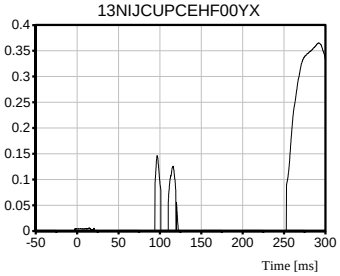
Max [NTE] 0.4079 at 73.12 ms

13NIJCUPTFHF00YX



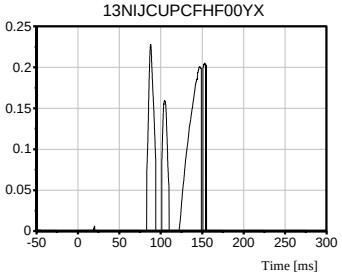
Max [NTF] 0.2106 at 157.28 ms

13NIJCUPCEHF00YX



Max [NCE] 0.3655 at 291.76 ms

13NIJCUPCFHF00YX



Max [NCF] 0.2279 at 87.84 ms

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

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

NHTSA

Test Date: 09/04/2019

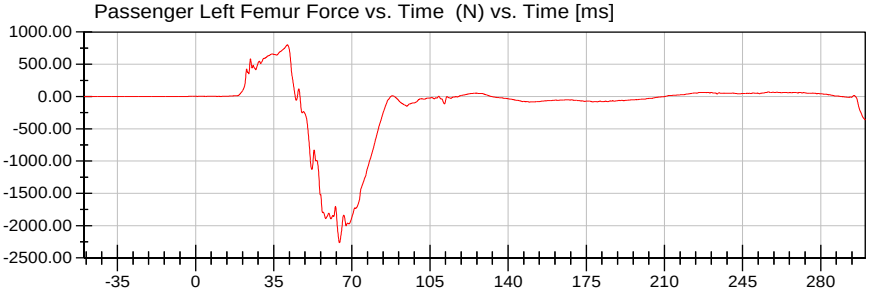
Test Lab: CTF

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

Test Number: 190904 (M20190211)

Position #2 Hybrid III Small Adult Female (EB7513)

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



<Max>

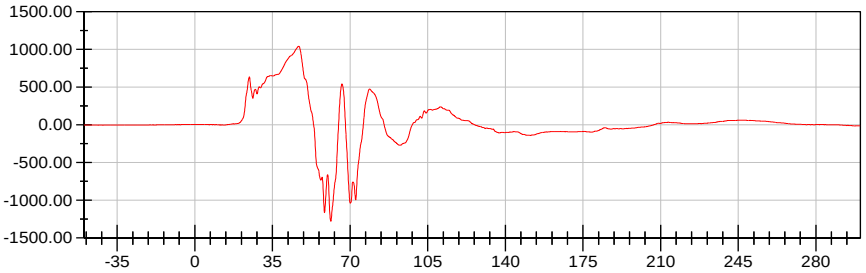
799.47 N at 41.12 ms

<Min>

-2,266.07 N at 64.48 ms

CFC_600

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



<Max>

1,043.02 N at 46.88 ms

<Min>

-1,277.96 N at 61.36 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. 60

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	511	Yes
C	H-Point Height	83.8 - 88.9	86	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	145	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	222	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. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	257.8 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	5.1 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.99 %	Yes

Test meets specifications.

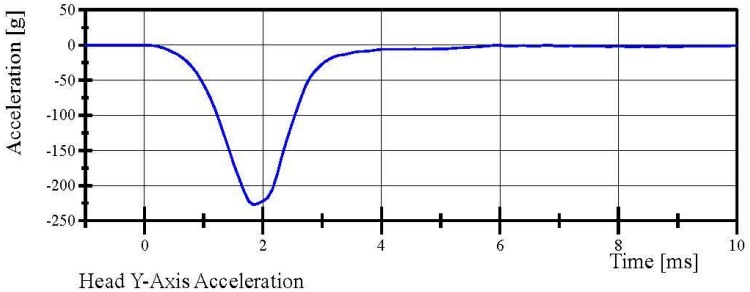
Condition: Used

Comments:
Head Skin S/N: N/A

Transportation Research Center Inc.

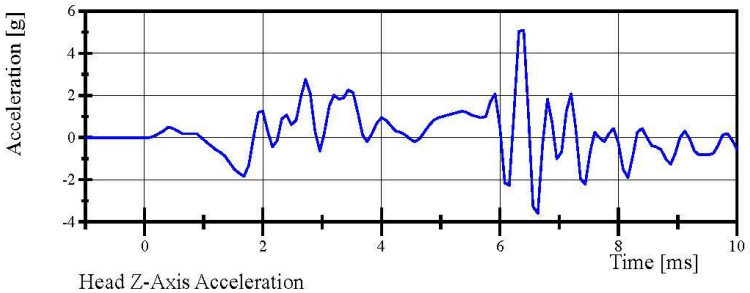
Front Head Drop
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Head X-Axis Acceleration



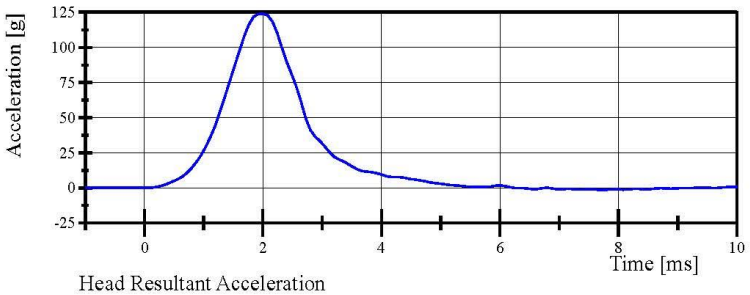
Filter Class: CFC_1000
Max: 0.1 g at 6.8 ms
Min: -227.3 g at 1.8 ms

Head Y-Axis Acceleration



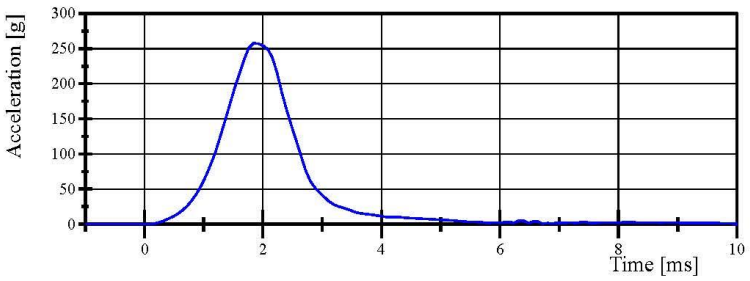
Filter Class: CFC_1000
Max: 5.1 g at 6.4 ms
Min: -3.6 g at 6.6 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 124.0 g at 2.0 ms
Min: -1.4 g at 7.7 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 257.8 g at 1.8 ms
Min: 0.0 g at -1.0 ms

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

08.19.2019 09:29:13 578

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.914 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	37.5 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-25.68 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-19.58 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-17.31 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-17.31 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-68.3 °	Yes
Time of Peak	57 - 64 ms	58.5 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	119.0 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	100.41 N·m	Yes
Time of Peak	47 - 58 ms	50.6 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	102.2 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

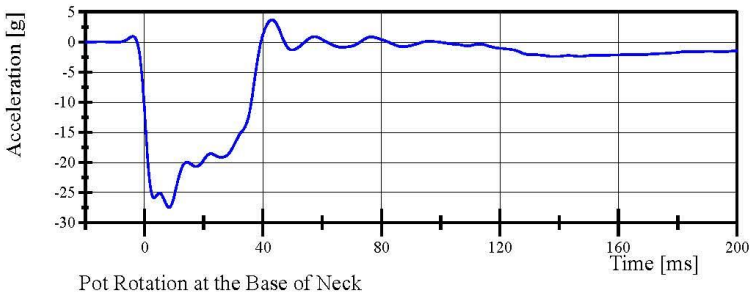
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

08.19.2019 10:31:56 1840

Transportation Research Center Inc.

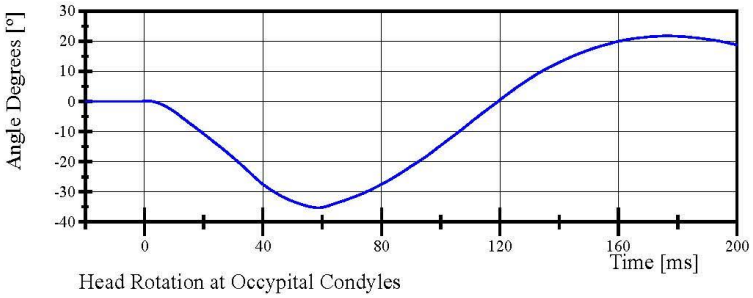
Neck Flexion
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Pendulum Acceleration



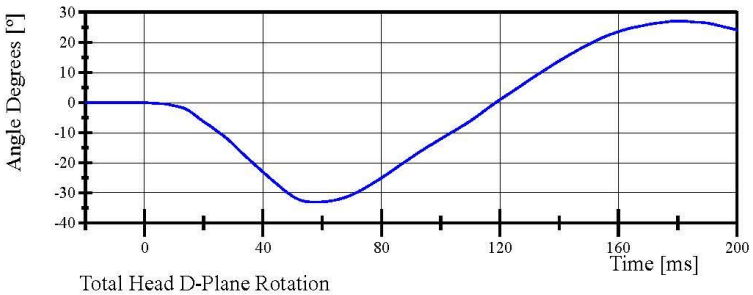
Filter Class: CFC_60
Max: 3.7 g at 43.1 ms
Min: -27.5 g at 8.3 ms

Pot Rotation at the Base of Neck



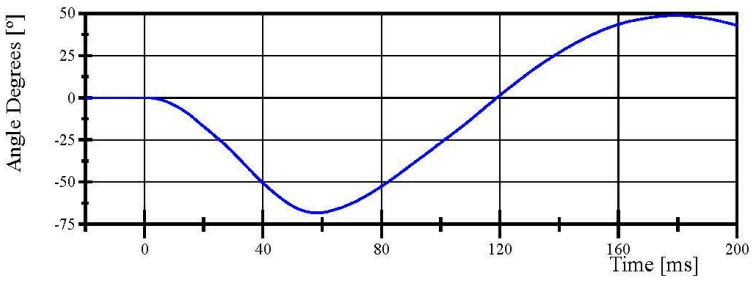
Filter Class: CFC_60
Max: 21.8 ° at 176.6 ms
Min: -35.3 ° at 58.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 27.1 ° at 180.7 ms
Min: -33.0 ° at 57.2 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 48.8 ° at 179.5 ms
Min: -68.3 ° at 58.5 ms

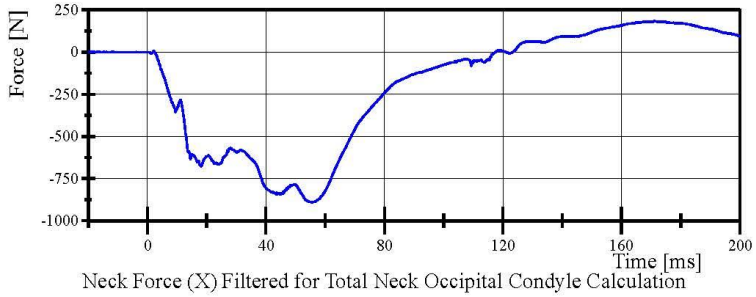
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

08.19.2019 10:32:30 1840

Transportation Research Center Inc.

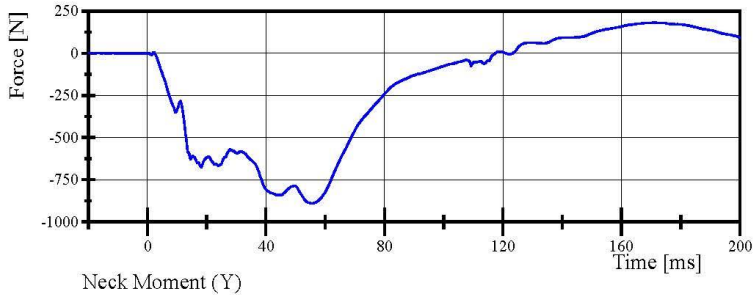
Neck Flexion
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Neck Force (X)



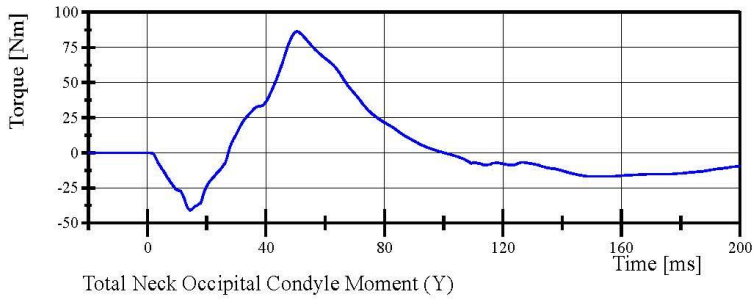
Filter Class: CFC_1000
Max: 184.2 N at 171.2 ms
Min: -890.3 N at 55.4 ms

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



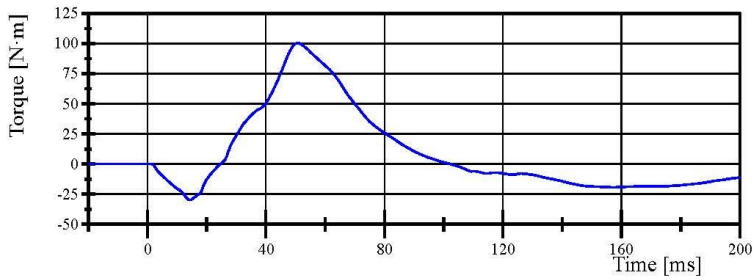
Filter Class: CFC_600
Max: 183.2 N at 171.3 ms
Min: -890.4 N at 55.5 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 86.3 Nm at 50.4 ms
Min: -41.0 Nm at 14.5 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 100.4 N·m at 50.6 ms
Min: -29.9 N·m at 14.4 ms

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

08.19.2019 10:32:30 1840

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.961 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	42.2 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	19.56 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.82 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	12.77 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	12.77 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	94.1 °	Yes
Time of Peak	72 - 82 ms	78.8 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	161.4 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-52.9) - (-80) N·m	-69.12 N·m	Yes
Time of Peak	65 - 79 ms	73.6 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	147.7 ms	Yes

Test meets specifications.

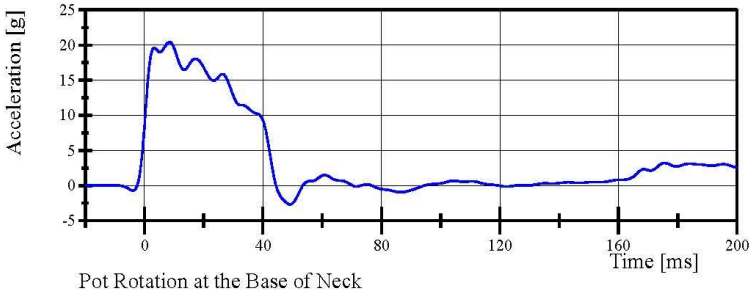
Condition: Used

Comments:
Neck S/N: 4728

Transportation Research Center Inc.

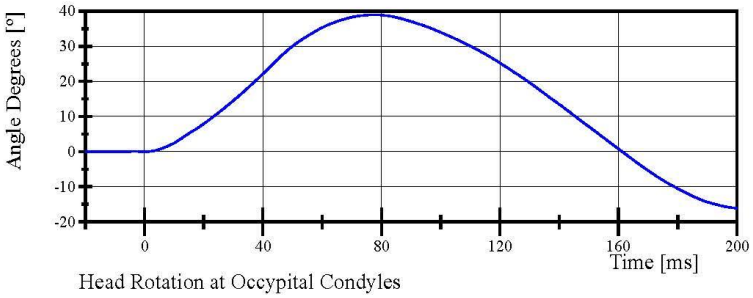
Neck Extension
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Pendulum Acceleration



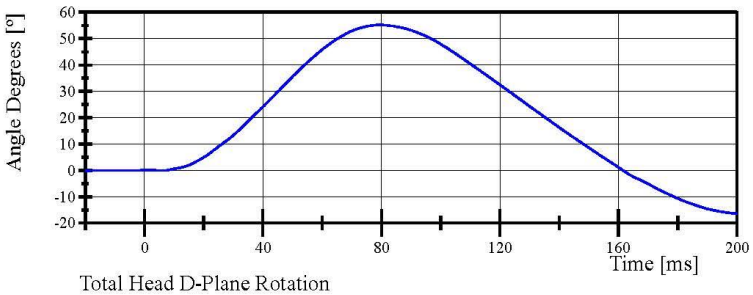
Filter Class: CFC_60
Max: 20.4 g at 8.5 ms
Min: -2.7 g at 49.2 ms

Pot Rotation at the Base of Neck



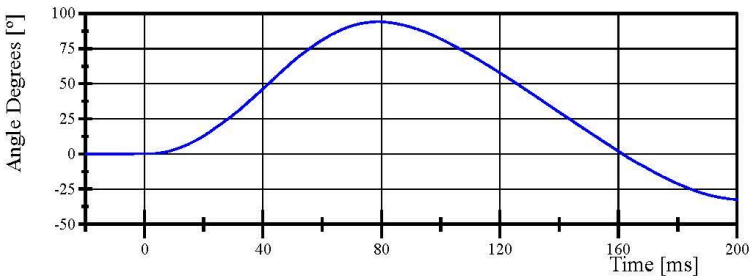
Filter Class: CFC_60
Max: 38.9 ° at 77.5 ms
Min: -16.1 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 55.2 ° at 79.5 ms
Min: -16.4 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 94.1 ° at 78.8 ms
Min: -32.6 ° at 200.0 ms

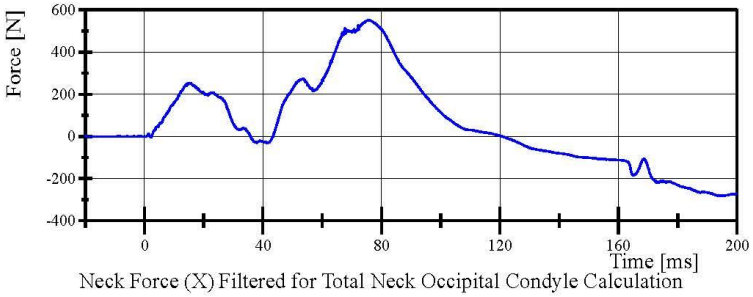
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

08.19.2019 11:34:19 1989

Transportation Research Center Inc.

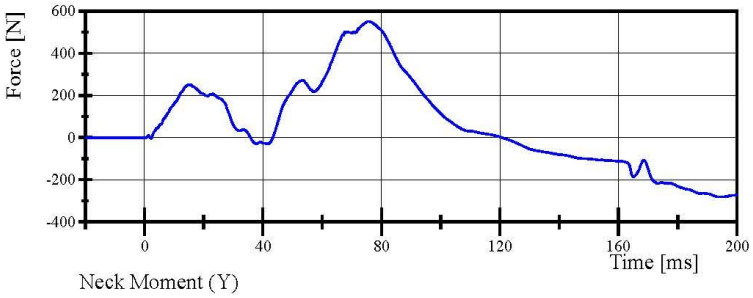
Neck Extension
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Neck Force (X)



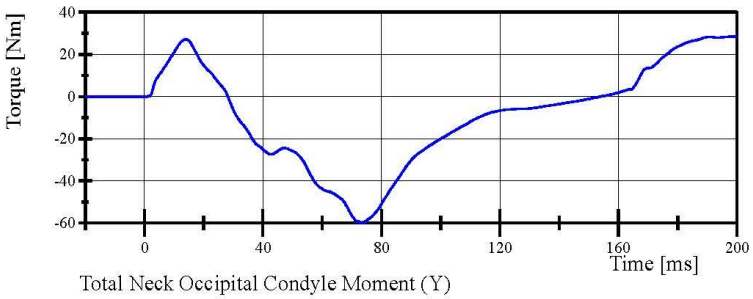
Filter Class: CFC_1000
Max: 551.5 N at 75.5 ms
Min: -281.5 N at 194.3 ms

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



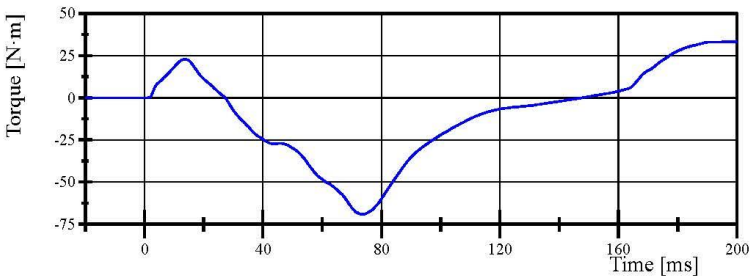
Filter Class: CFC_600
Max: 551.4 N at 75.6 ms
Min: -281.3 N at 194.4 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 28.6 Nm at 198.6 ms
Min: -59.7 Nm at 73.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.4 N·m at 198.1 ms
Min: -69.1 N·m at 73.6 ms

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

08.19.2019 11:34:20 1989

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.797 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,605.5 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-67.26 mm	Yes
Internal Hysteresis	69 - 85 %	73.5 %	Yes

Test meets specifications.

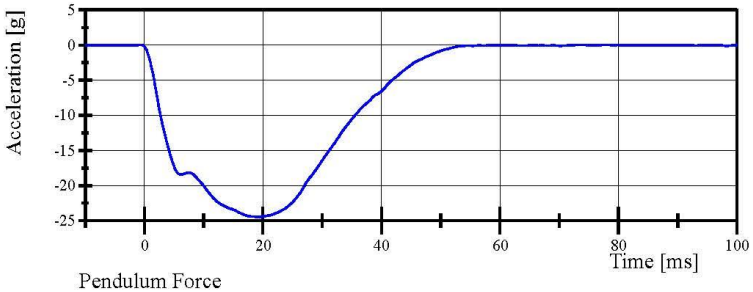
Condition: Used

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

Transportation Research Center Inc.

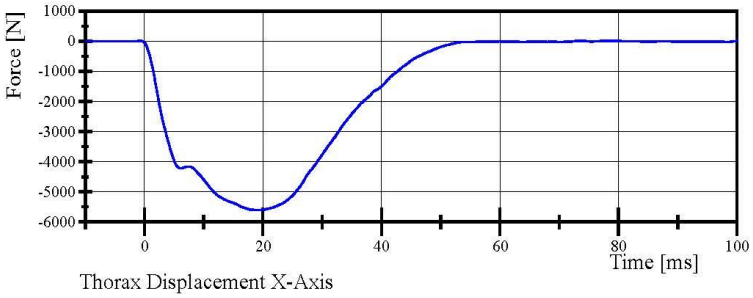
Front Thorax
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Pendulum Acceleration



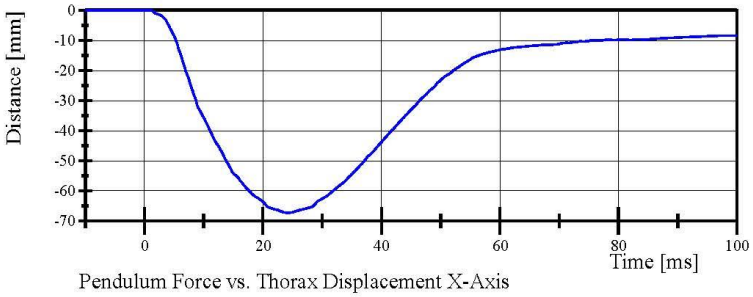
Filter Class: CFC_180
Max: 0.0 g at -0.6 ms
Min: -24.5 g at 19.4 ms

Pendulum Force



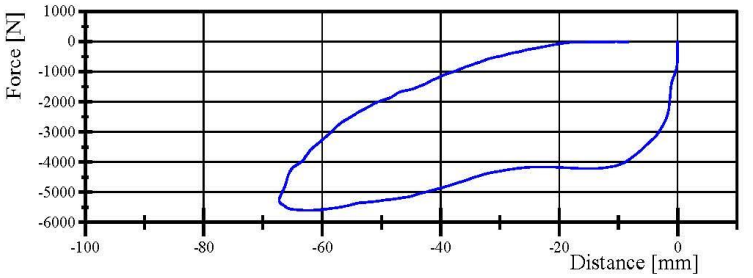
Filter Class: CFC_180
Max: 8.4 N at -0.6 ms
Min: -5,605.5 N at 19.4 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.8 ms
Min: -67.3 mm at 24.2 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 8.4 N at -0.0 mm
Min: -5,605.5 N at -62.7 mm

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

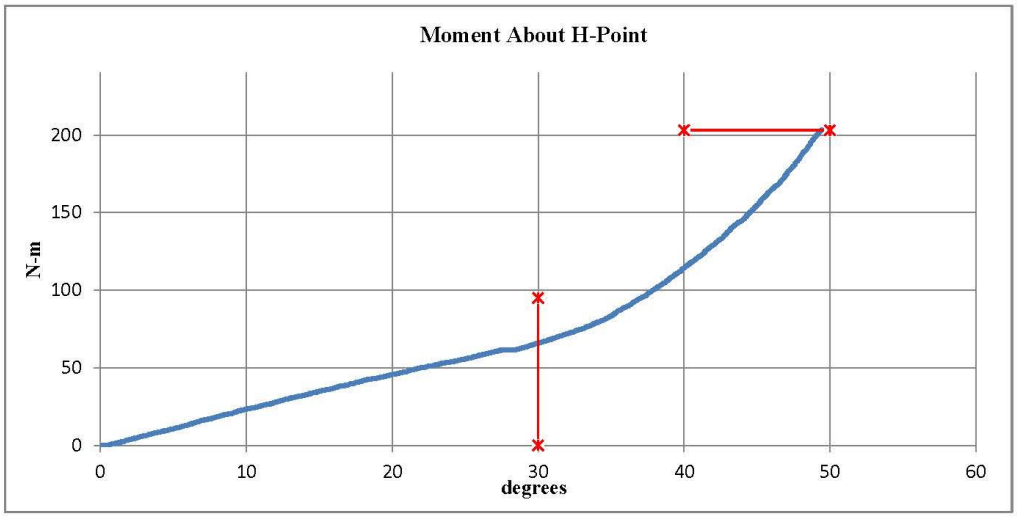
08.19.2019 13:43:07 388

Transportation Research Center Inc.

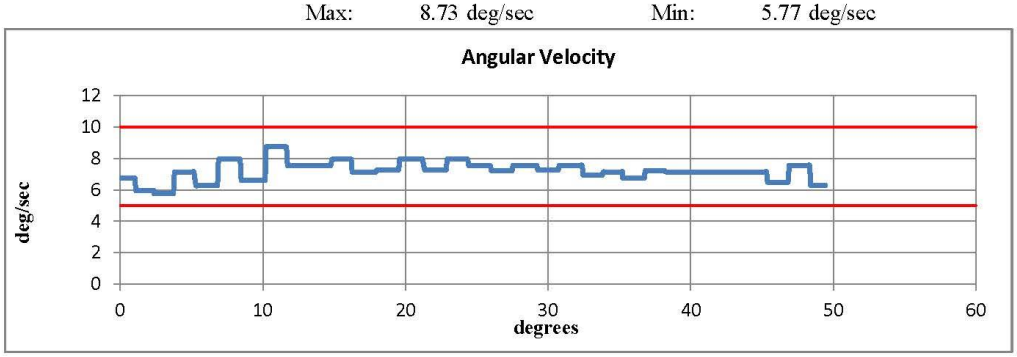
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	19-Aug-2019
Side Tested:	Left Hip	Time:	9:33
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.8	°C	Pass
Humidity	10	-	70	60	%	Pass
Moment at 30°	0	≤	94.9	66.23	N-m	Pass
Angle at 203 Nm	40	-	50	49.44	deg	Pass
Average Velocity	5	-	10	7.19	deg/sec	Pass



Max: 8.73 deg/sec Min: 5.77 deg/sec



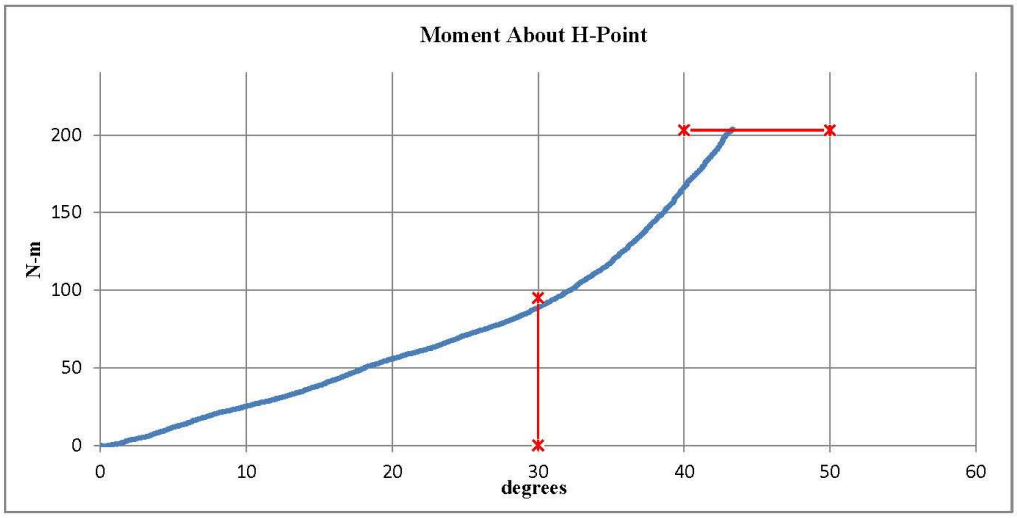
Comments:
Pelvis Skin S/N: N/A
Lumbar S/N: 0550

Transportation Research Center Inc.

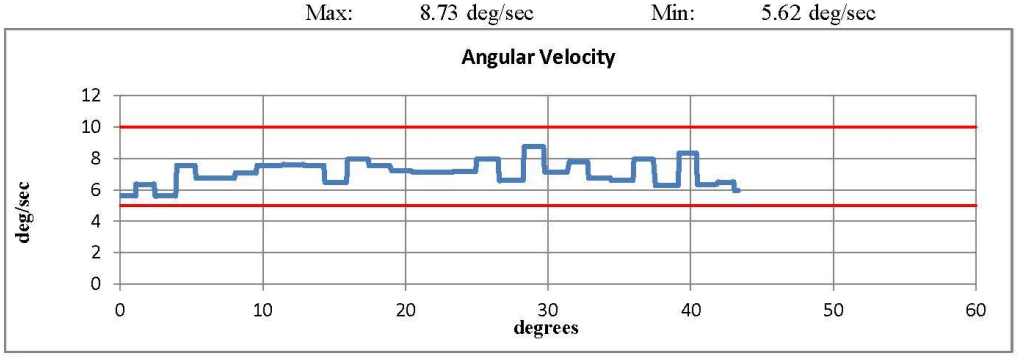
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	19-Aug-2019
Side Tested:	Right Hip	Time:	10:38
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.9	°C	Pass
Humidity	10	-	70	59	%	Pass
Moment at 30°	0	≤	94.9	89.39	N-m	Pass
Angle at 203 Nm	40	-	50	43.33	deg	Pass
Average Velocity	5	-	10	7.1	deg/sec	Pass



Max: 8.73 deg/sec Min: 5.62 deg/sec



Comments:
Pelvis Skin S/N: N/A
Lumbar S/N: 0550

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.089 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,572.50 N	Yes

Test meets specifications.

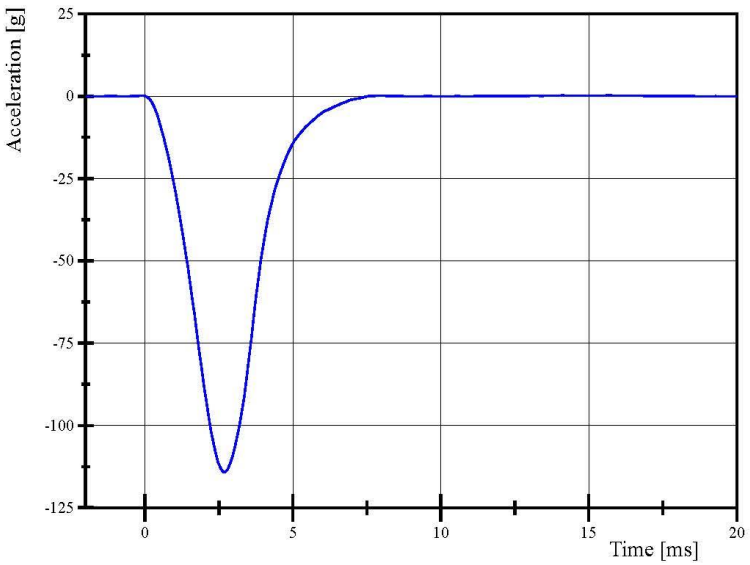
Condition: Used

Comments:
Knee Skin S/N: 2672

Transportation Research Center Inc.

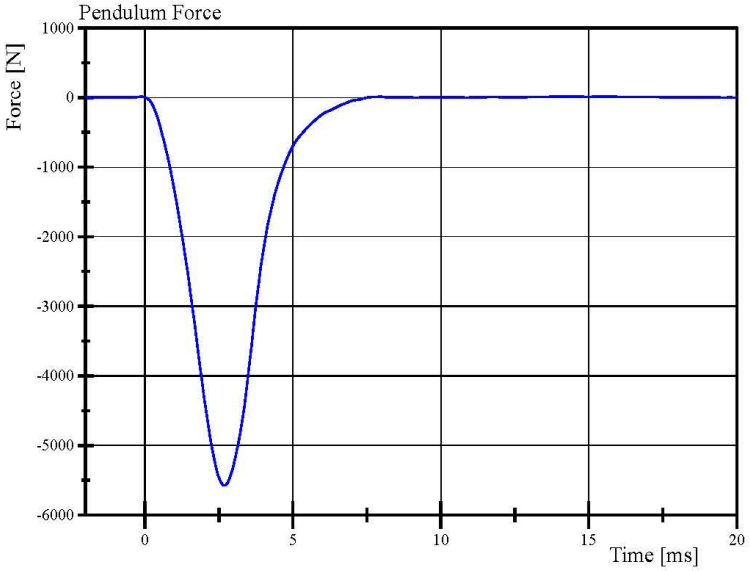
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 15.7 ms
Min: -114.1 g at 2.7 ms

Pendulum Force



Filter Class: CFC_600
Max: 11.3 N at 15.7 ms
Min: -5,572.5 N at 2.7 ms

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

08.19.2019 10:18:31 1825

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.088 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,234.08 N	Yes

Test meets specifications.

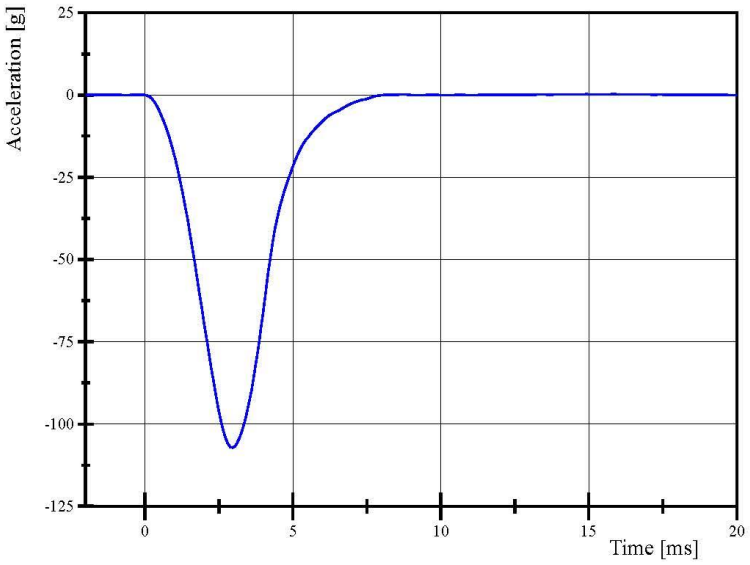
Condition: Used

Comments:
Knee Skin S/N: 176

Transportation Research Center Inc.

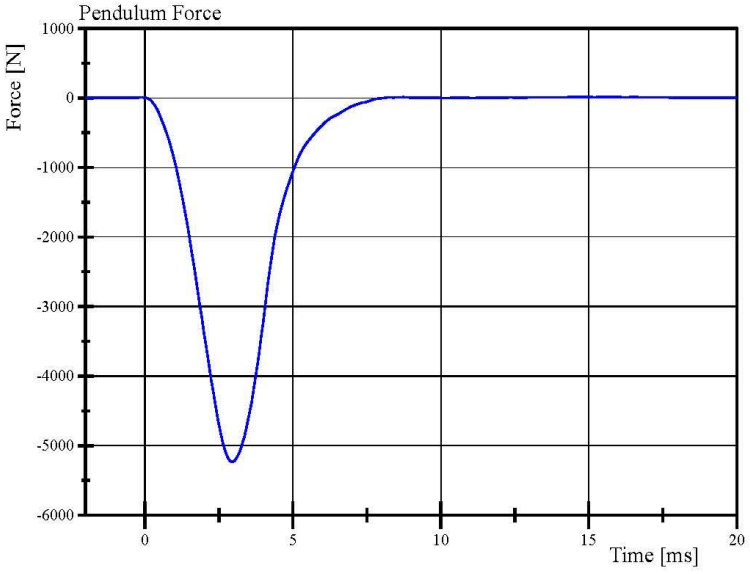
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 60-1
Test Date: 8/19/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 14.9 ms
Min: -107.2 g at 3.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 11.1 N at 14.9 ms
Min: -5,234.1 N at 3.0 ms

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

08.19.2019 10:22:14 1818

Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 61

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	881	Yes
B	Shoulder Pivot Height	505.5 - 520.7	511	Yes
C	H-Point Height	83.8 - 88.9	86	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	145	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	222	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. 61-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	57 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	264.1 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	10.1 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	2.17 %	Yes

Test meets specifications.

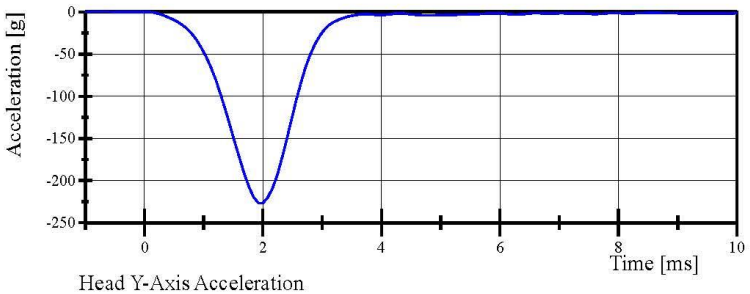
Condition: Used

Comments:
Head Skin S/N: N/A

Transportation Research Center Inc.

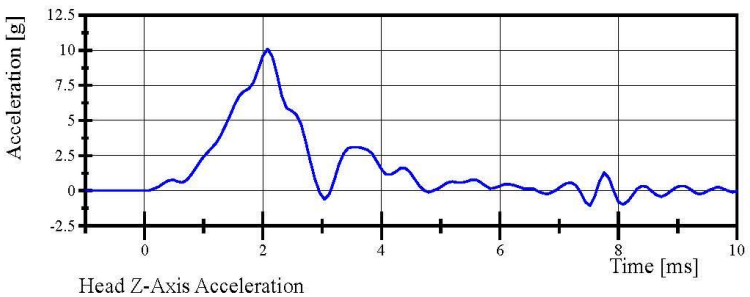
Front Head Drop
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/5/2019

Head X-Axis Acceleration



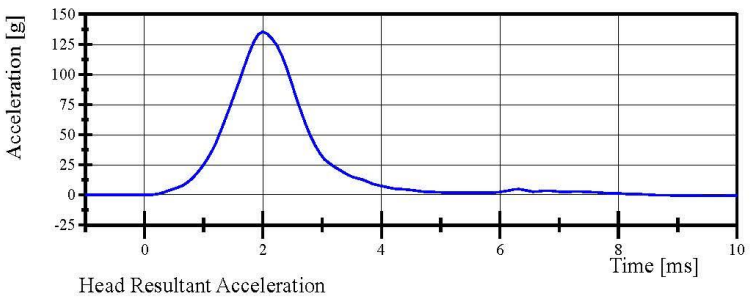
Filter Class: CFC_1000
Max: 0.0 g at -1.0 ms
Min: -226.5 g at 1.9 ms

Head Y-Axis Acceleration



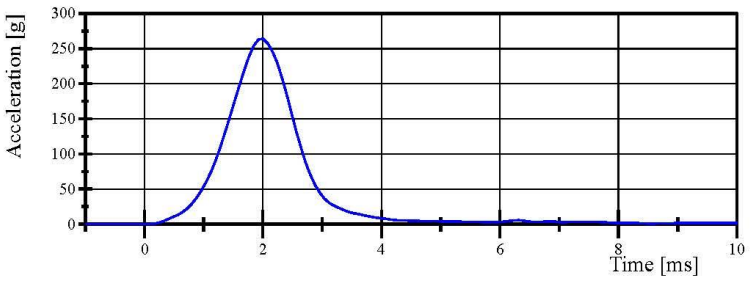
Filter Class: CFC_1000
Max: 10.1 g at 2.1 ms
Min: -1.0 g at 7.5 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 135.5 g at 2.0 ms
Min: -0.7 g at 9.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 264.1 g at 2.0 ms
Min: 0.0 g at -0.4 ms

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

09.05.2019 16:21:08 578

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 61-2
Test Date: 9/6/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	52 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.909 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	37.2 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-26.73 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.37 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-17.13 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-17.13 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-67.0 °	Yes
Time of Peak	57 - 64 ms	58.2 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	117.0 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	103.70 N·m	Yes
Time of Peak	47 - 58 ms	50.1 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	98.9 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 4728

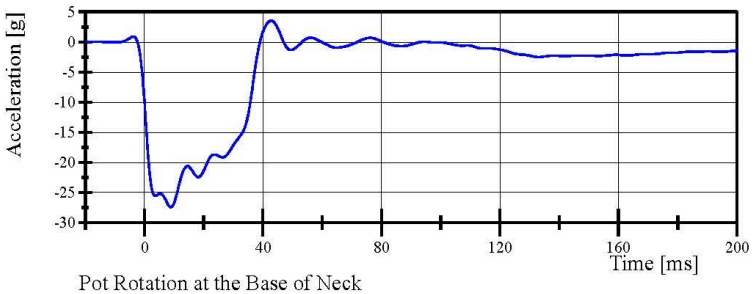
Specification Source: CFR49 Part 572 Subpart E with Polarity in accordance with J211

09.06.2019 08:09:26 1837

Transportation Research Center Inc.

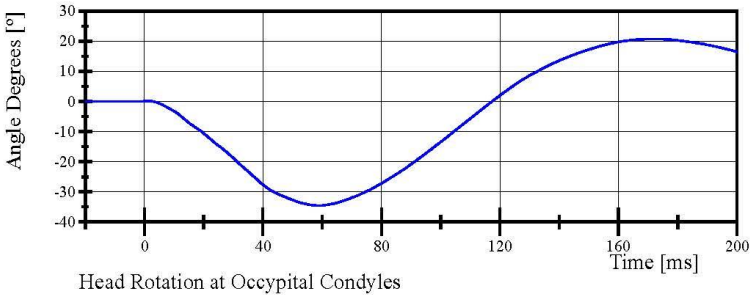
Neck Flexion
HIII 50th Serial No. 037 Certification No. 61-2
Test Date: 9/6/2019

Pendulum Acceleration



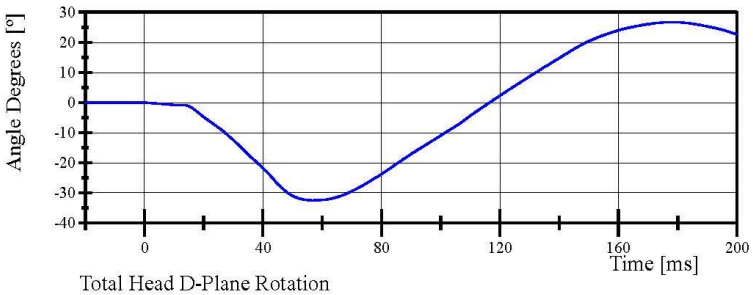
Filter Class: CFC_60
Max: 3.6 g at 42.8 ms
Min: -27.4 g at 8.9 ms

Pot Rotation at the Base of Neck



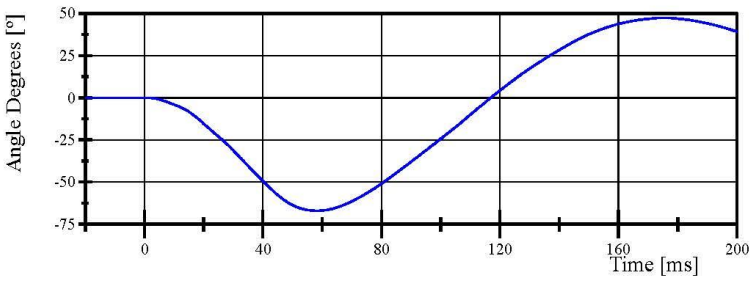
Filter Class: CFC_60
Max: 20.8 ° at 172.1 ms
Min: -34.6 ° at 59.1 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 26.7 ° at 178.0 ms
Min: -32.5 ° at 56.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 47.3 ° at 175.6 ms
Min: -67.0 ° at 58.2 ms

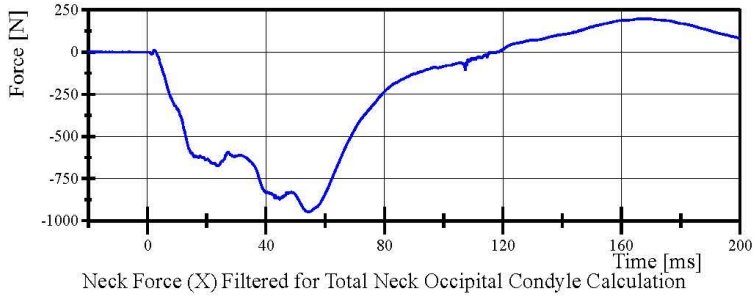
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

09.06.2019 08:09:50 1837

Transportation Research Center Inc.

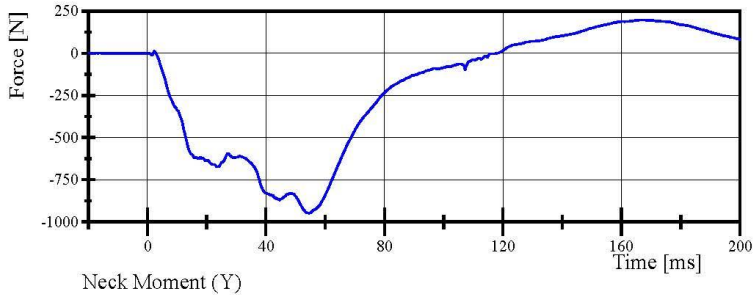
Neck Flexion
HIII 50th Serial No. 037 Certification No. 61-2
Test Date: 9/6/2019

Neck Force (X)



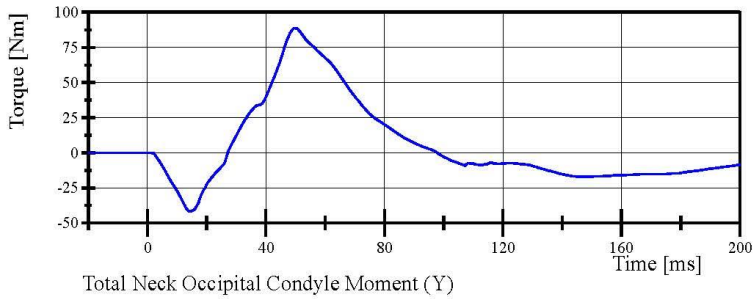
Filter Class: CFC_1000
Max: 198.5 N at 167.1 ms
Min: -947.7 N at 54.5 ms

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



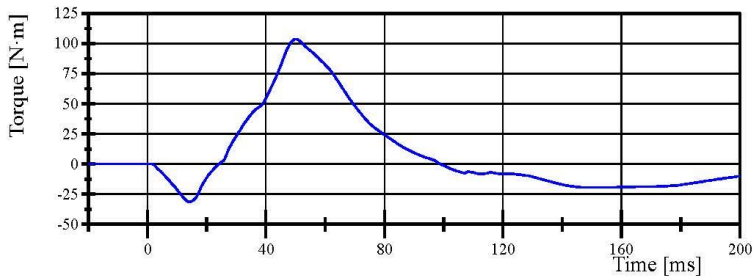
Filter Class: CFC_600
Max: 198.3 N at 167.2 ms
Min: -947.6 N at 54.5 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 88.7 Nm at 49.9 ms
Min: -41.7 Nm at 14.6 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 103.7 N·m at 50.1 ms
Min: -31.4 N·m at 14.2 ms

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

09.06.2019 08:09:50 1837

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/6/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	53 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.964 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	43.9 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.26 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.45 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.88 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.88 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.8 °	Yes
Time of Peak	72 - 82 ms	79.5 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	162.6 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-52.9) - (-80) N·m	-65.40 N·m	Yes
Time of Peak	65 - 79 ms	74.0 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	147.9 ms	Yes

Test meets specifications.

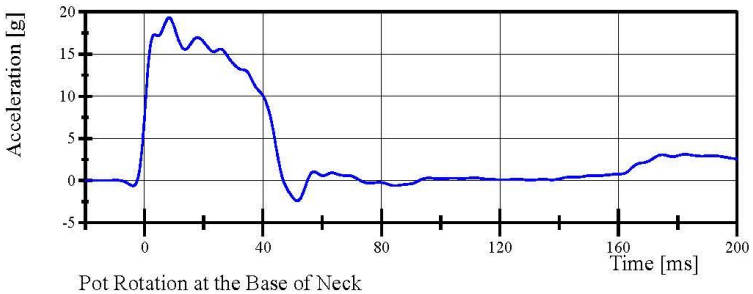
Condition: Used

Comments:
Neck S/N: 4728

Transportation Research Center Inc.

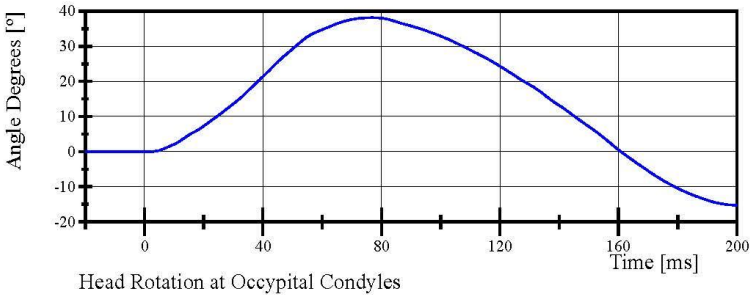
Neck Extension
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/6/2019

Pendulum Acceleration



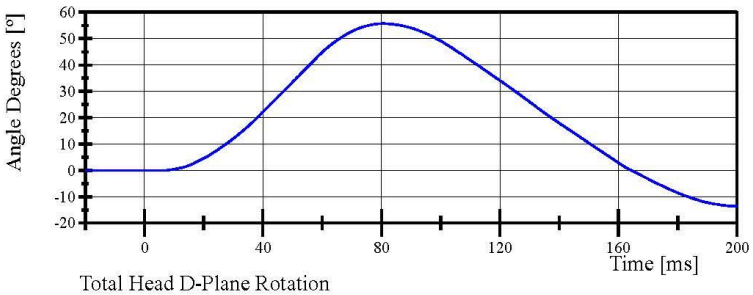
Filter Class: CFC_60
Max: 19.3 g at 8.3 ms
Min: -2.4 g at 51.6 ms

Pot Rotation at the Base of Neck



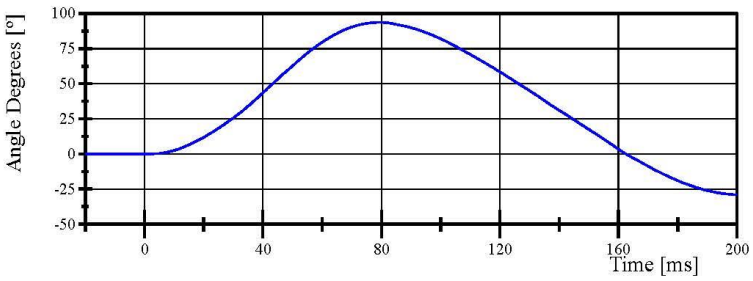
Filter Class: CFC_60
Max: 38.1 ° at 76.8 ms
Min: -15.3 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 55.7 ° at 80.6 ms
Min: -13.7 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 93.8 ° at 79.5 ms
Min: -29.0 ° at 200.0 ms

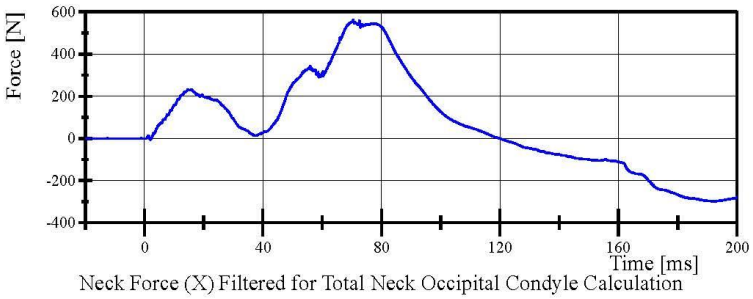
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

09.06.2019 08:45:24 1988

Transportation Research Center Inc.

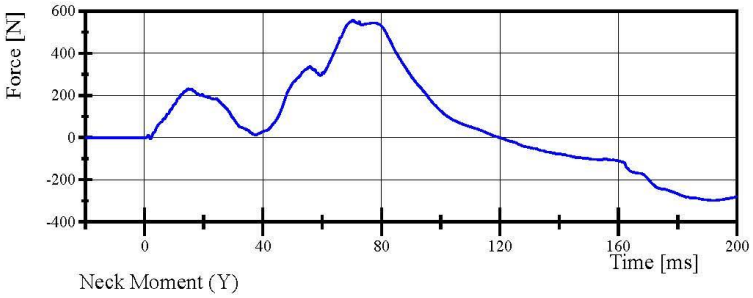
Neck Extension
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/6/2019

Neck Force (X)



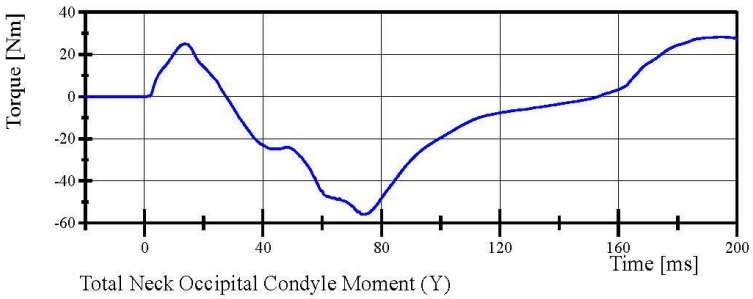
Filter Class: CFC_1000
Max: 561.9 N at 70.5 ms
Min: -298.8 N at 192.0 ms

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



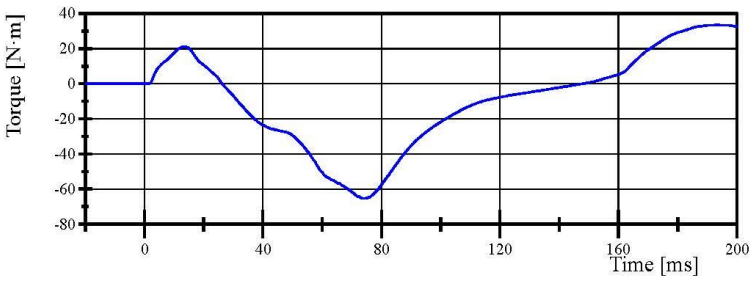
Filter Class: CFC_600
Max: 557.6 N at 70.5 ms
Min: -298.6 N at 192.0 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 28.2 Nm at 193.8 ms
Min: -55.9 Nm at 74.0 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.5 N·m at 193.7 ms
Min: -65.4 N·m at 74.0 ms

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

09.06.2019 08:45:25 1988

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.793 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,558.4 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-68.17 mm	Yes
Internal Hysteresis	69 - 85 %	72.2 %	Yes

Test meets specifications.

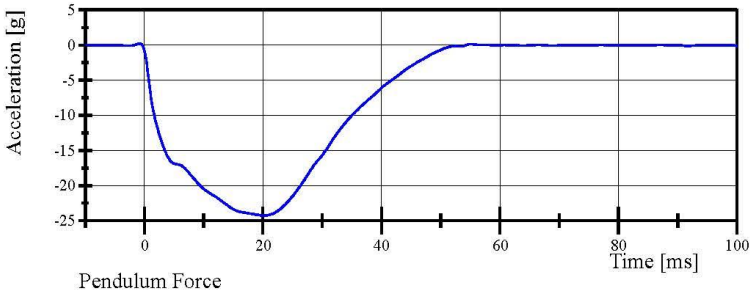
Condition: Used

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

Transportation Research Center Inc.

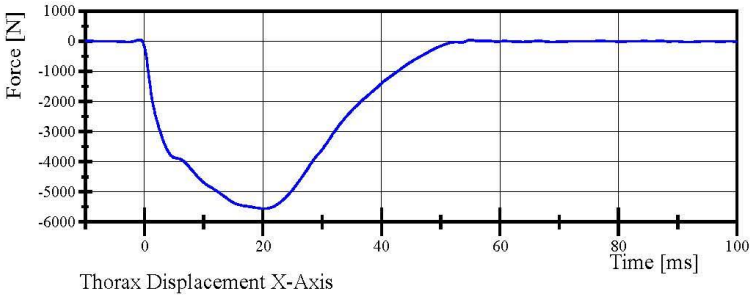
Front Thorax
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/5/2019

Pendulum Acceleration



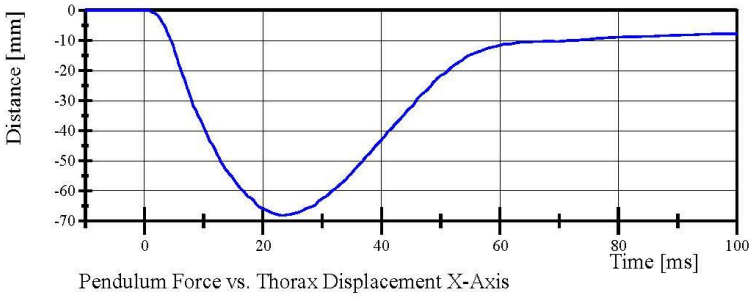
Filter Class: CFC_180
Max: 0.2 g at -0.8 ms
Min: -24.3 g at 20.2 ms

Pendulum Force



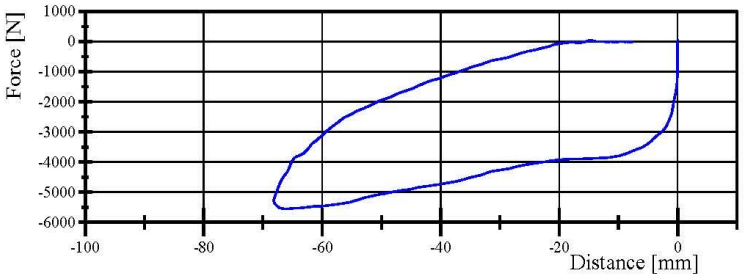
Filter Class: CFC_180
Max: 50.4 N at -0.8 ms
Min: -5,558.4 N at 20.2 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.2 ms
Min: -68.2 mm at 23.4 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 50.4 N at -0.0 mm
Min: -5,558.4 N at -66.0 mm

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

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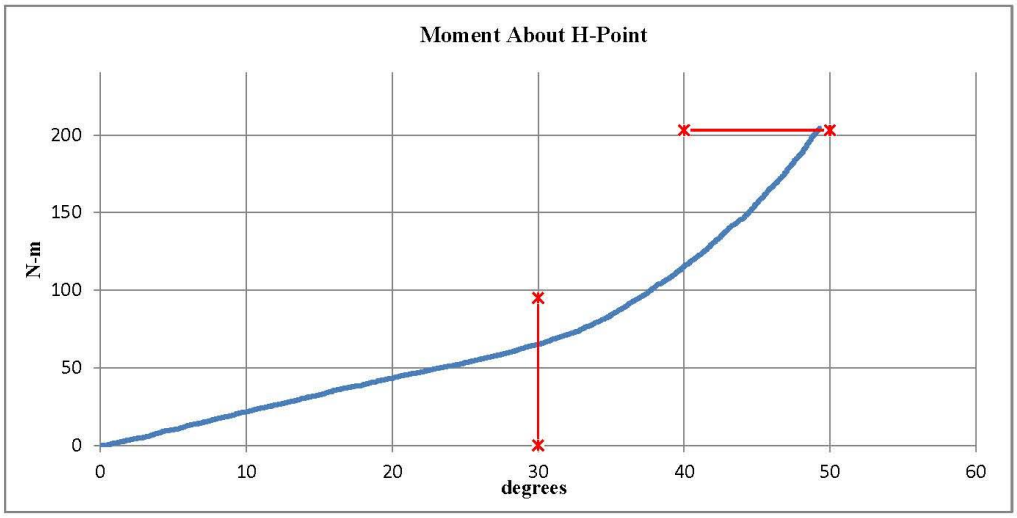
Transportation Research Center Inc.

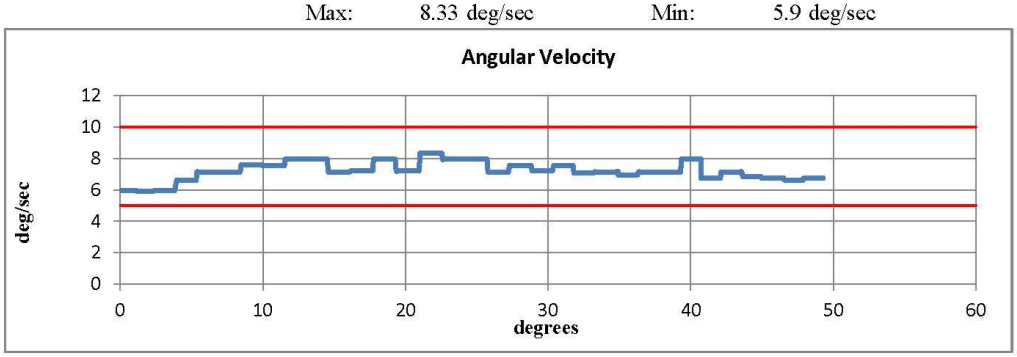
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	06-Sep-2019
Side Tested:	Left Hip	Time:	7:39
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21	°C	Pass
Humidity	10	-	70	49	%	Pass
Moment at 30°	0	≤	94.9	65.34	N-m	Pass
Angle at 203 Nm	40	-	50	49.28	deg	Pass
Average Velocity	5	-	10	7.2	deg/sec	Pass



Max: 8.33 deg/sec Min: 5.9 deg/sec



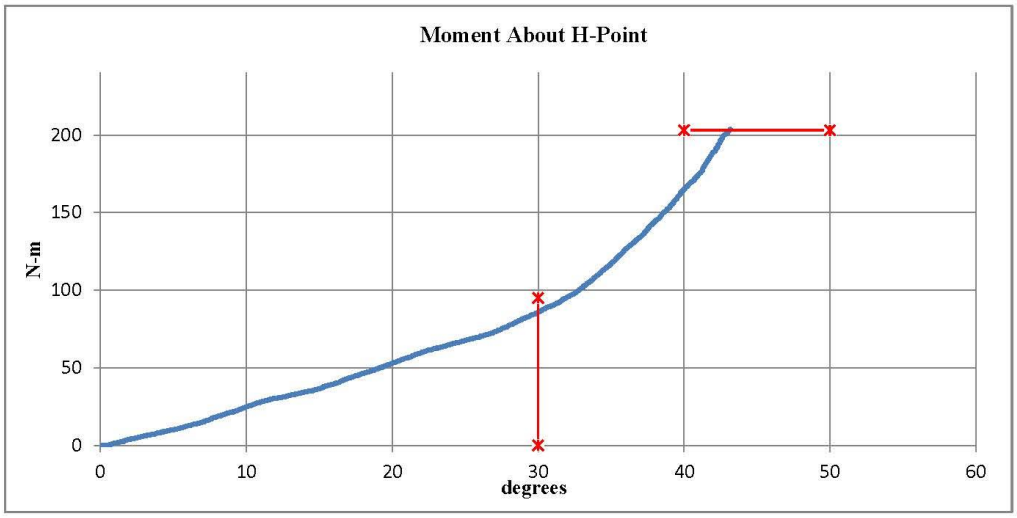
Pelvis Skin S/N: N/A

Transportation Research Center Inc.

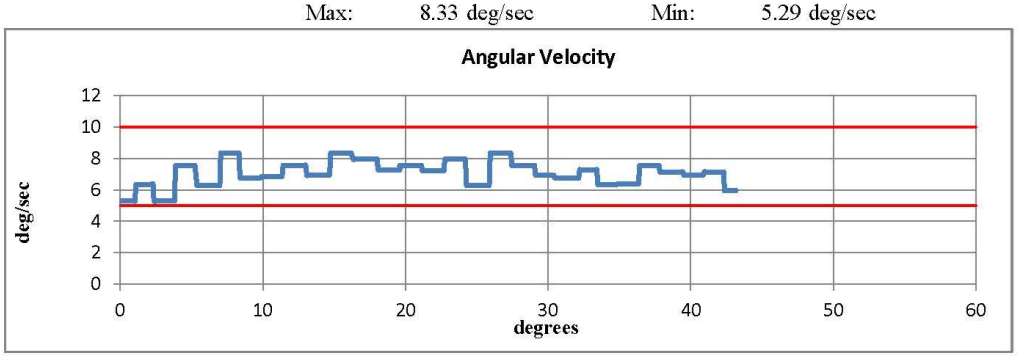
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	06-Sep-2019
Side Tested:	Right Hip	Time:	8:59
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.2	°C	Pass
Humidity	10	-	70	54	%	Pass
Moment at 30°	0	≤	94.9	86.12	N-m	Pass
Angle at 203 Nm	40	-	50	43.17	deg	Pass
Average Velocity	5	-	10	7.06	deg/sec	Pass



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



Pelvis Skin S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 61-2
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	56 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.080 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,605.89 N	Yes

Test meets specifications.

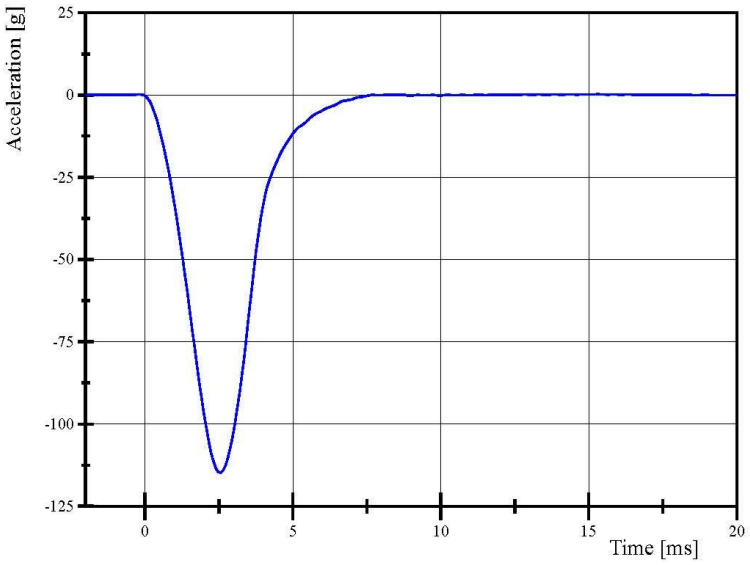
Condition: Used

Comments:
Knee Skin S/N: 2672

Transportation Research Center Inc.

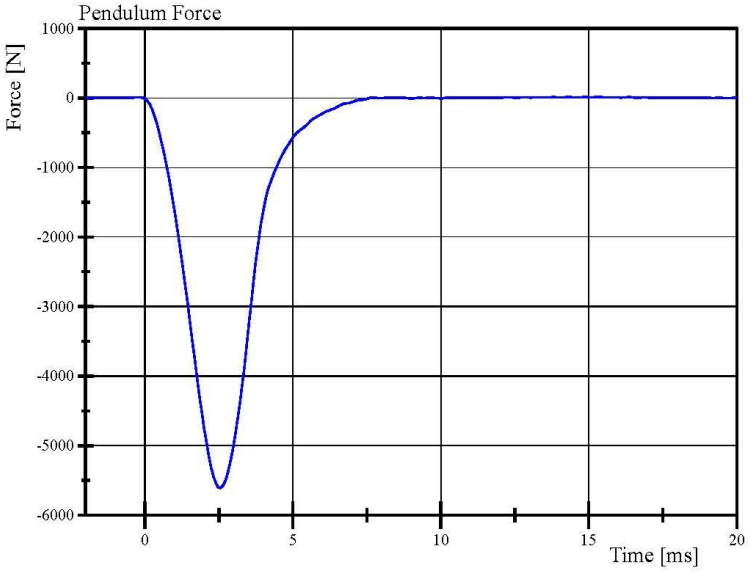
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 61-2
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 15.4 ms
Min: -114.8 g at 2.6 ms

Pendulum Force



Filter Class: CFC_600
Max: 11.0 N at 15.4 ms
Min: -5,605.9 N at 2.6 ms

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

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Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	54 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.077 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,482.92 N	Yes

Test meets specifications.

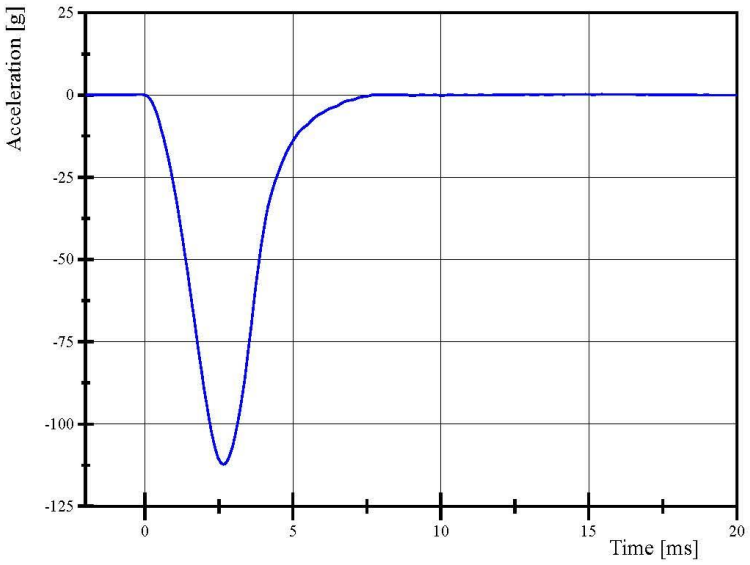
Condition: Used

Comments:
Knee Skin S/N: 176

Transportation Research Center Inc.

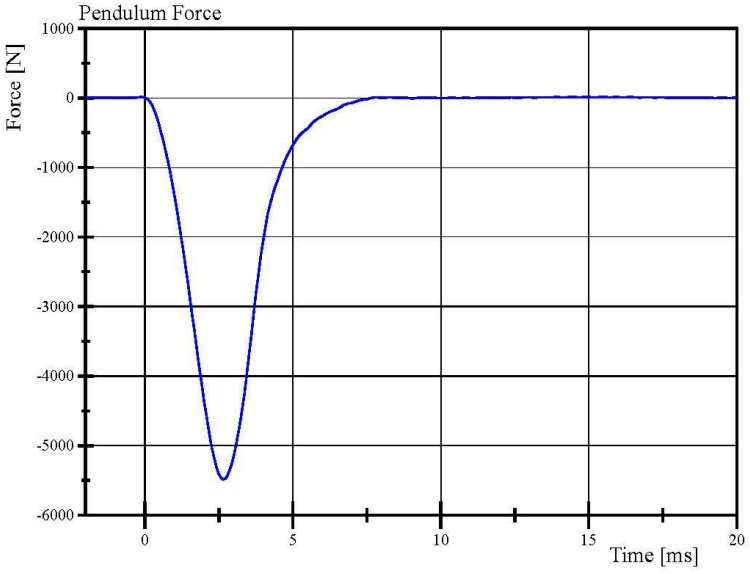
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 61-1
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at 15.4 ms
Min: -112.3 g at 2.6 ms

Pendulum Force



Filter Class: CFC_600
Max: 10.8 N at 15.4 ms
Min: -5,482.9 N at 2.6 ms

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

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Pre-Test Calibration Sheets

Front Passenger S/N EB7513

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. EB7513 Calibration No. 05

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	779	Yes
B	Shoulder Pivot Height	431.8 - 457.2	443	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	148	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	130	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	197	Yes
K	Buttock Knee Length	520.7 - 546.1	533	Yes
L	Popliteal Height	355.6 - 376.0	359	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	430	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	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	141	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	356	Yes
W	Foot Breadth	78.8 - 94.0	85	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	867	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	164	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	267.3 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-3.2 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.74 %	Yes

Test meets specifications.

Condition: Used

Comments:
Head Skin S/N: EA8751

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

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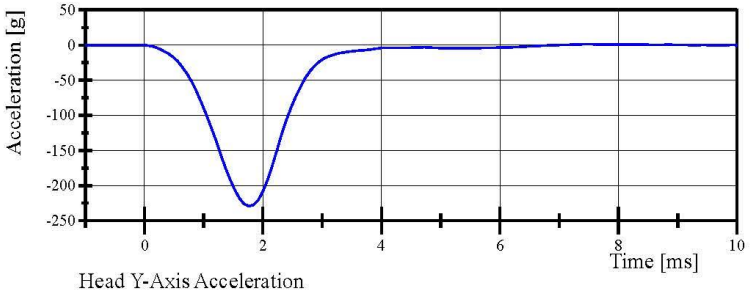
Transportation Research Center Inc.

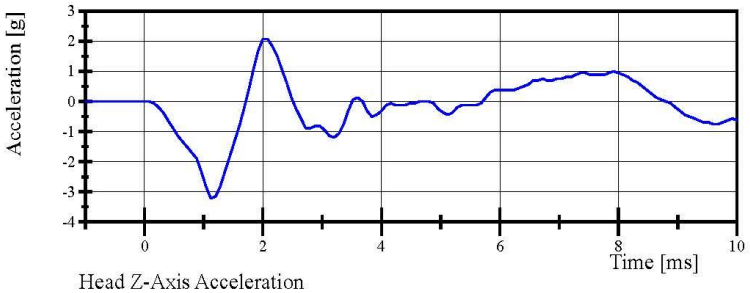
Front Head Drop
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/20/2019

Head X-Axis Acceleration



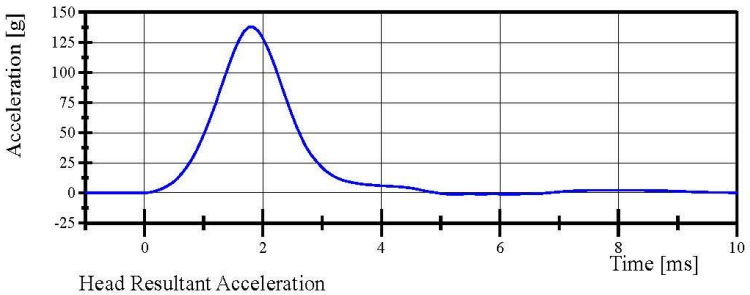
Filter Class: CFC_1000
Max: 1.4 g at 7.4 ms
Min: -229.2 g at 1.8 ms

Head Y-Axis Acceleration



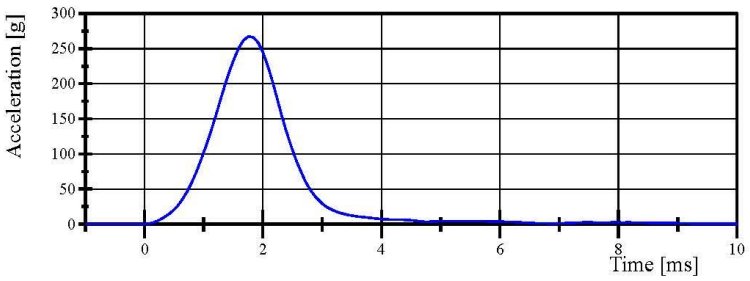
Filter Class: CFC_1000
Max: 2.1 g at 2.0 ms
Min: -3.2 g at 1.1 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 137.8 g at 1.8 ms
Min: -1.1 g at 5.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 267.3 g at 1.8 ms
Min: 0.0 g at -1.0 ms

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

08.20.2019 15:22:17 580

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.076 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.49 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.78 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.66 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-82.0 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	76.0 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	89.5 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: EB6930

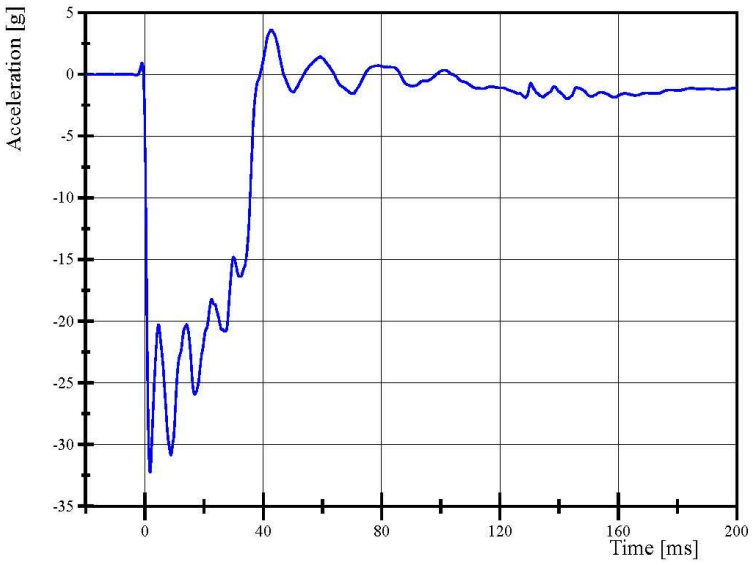
Specification Source: CFR49 Part 572 Subpart O with Polarity in accordance with J211

08.21.2019 14:39:21 1819

Transportation Research Center Inc.

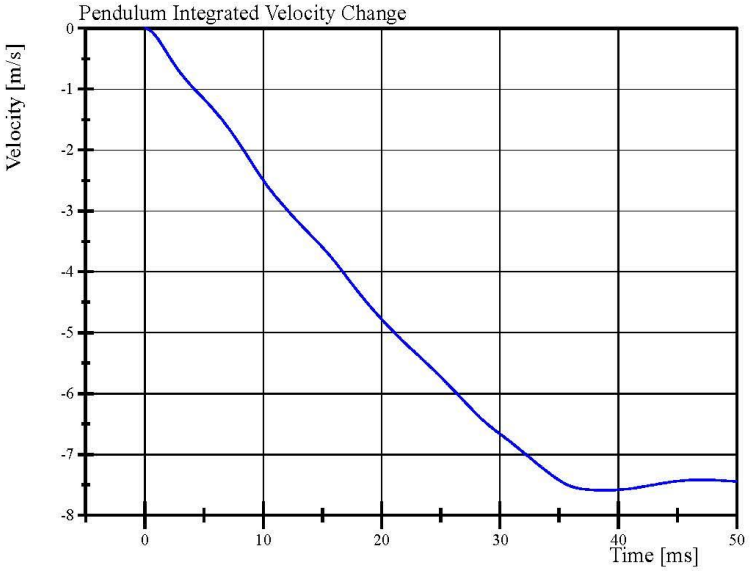
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.6 g at 42.8 ms
Min: -32.2 g at 1.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.6 m/s at 39.0 ms

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

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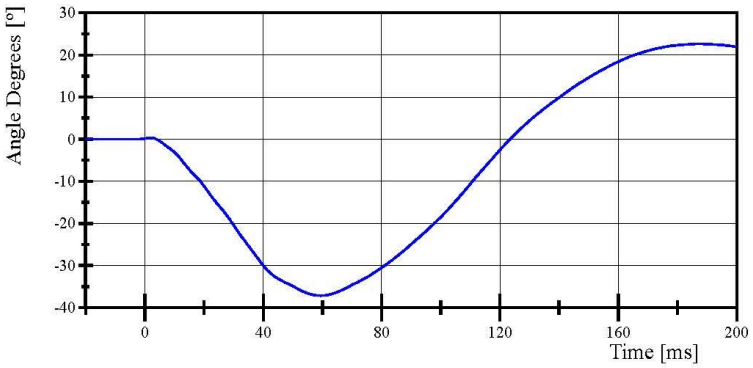
Transportation Research Center Inc.

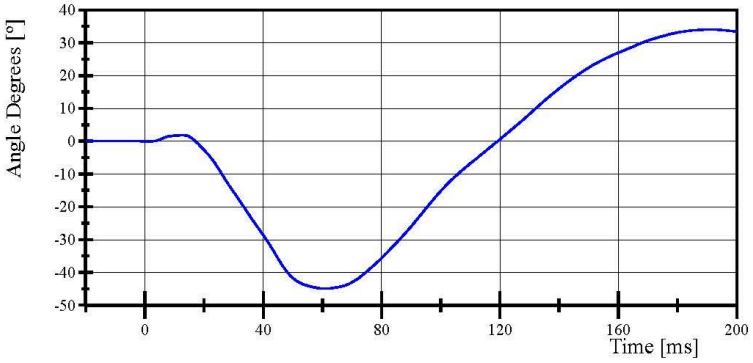
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Pot Rotation at the Base of Neck



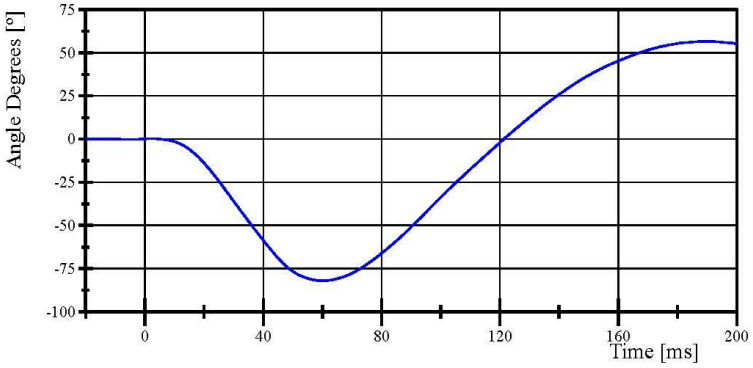
Filter Class: CFC_60
Max: 22.6 ° at 187.4 ms
Min: -37.1 ° at 59.5 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 34.1 ° at 191.2 ms
Min: -44.9 ° at 60.8 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 56.6 ° at 189.8 ms
Min: -82.0 ° at 60.1 ms

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

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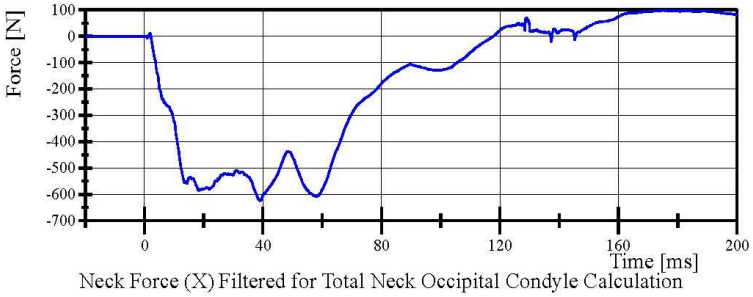
Transportation Research Center Inc.

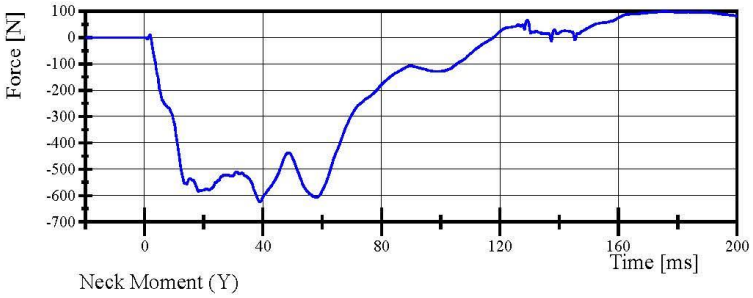
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Neck Force (X)



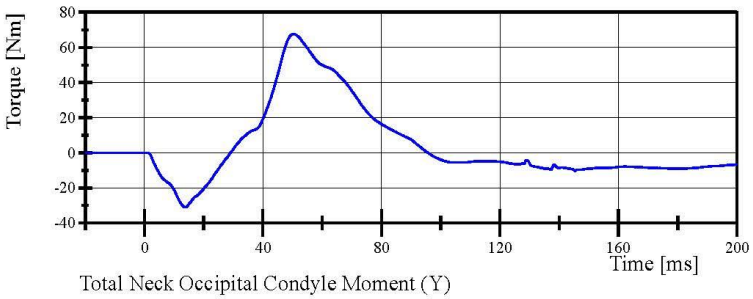
Filter Class: CFC_1000
Max: 99.1 N at 176.4 ms
Min: -623.8 N at 39.0 ms

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



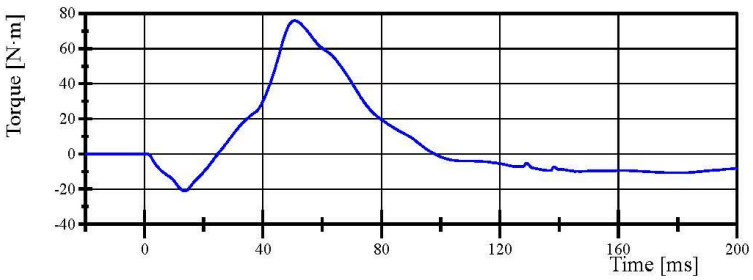
Filter Class: CFC_600
Max: 98.7 N at 176.4 ms
Min: -623.5 N at 39.0 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 67.6 Nm at 50.5 ms
Min: -30.9 Nm at 13.6 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 76.0 N·m at 50.8 ms
Min: -21.1 N·m at 13.6 ms

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

08.21.2019 14:40:19 1819

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.048 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.90 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.61 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.24 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	110.7 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-56.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	105.9 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: EB6930

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

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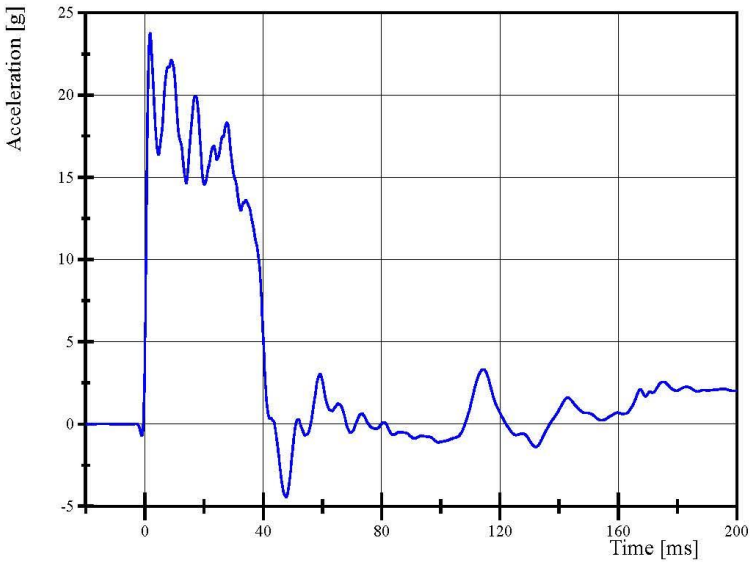
Transportation Research Center Inc.

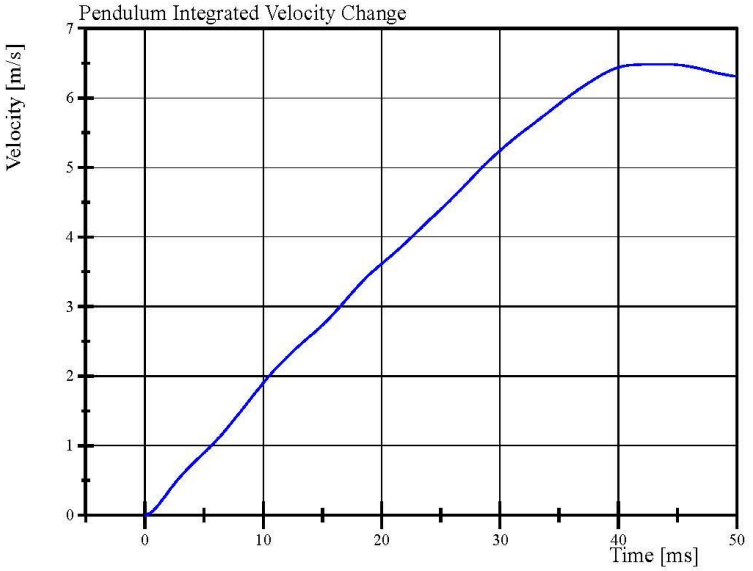
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 23.8 g at 1.8 ms
Min: -4.4 g at 47.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.5 m/s at 43.8 ms
Min: 0.0 m/s at 0.0 ms

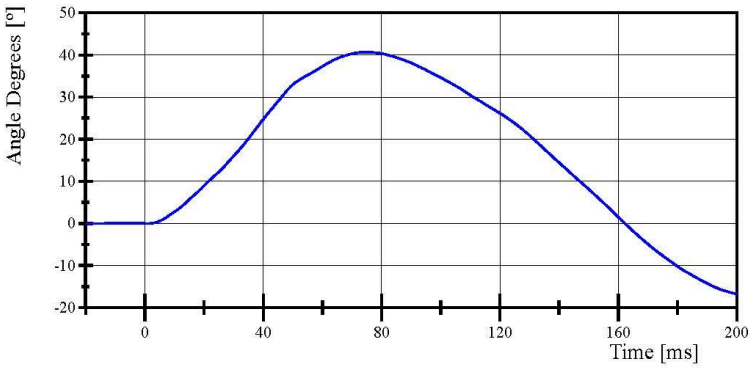
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.21.2019 16:15:44 1973

Transportation Research Center Inc.

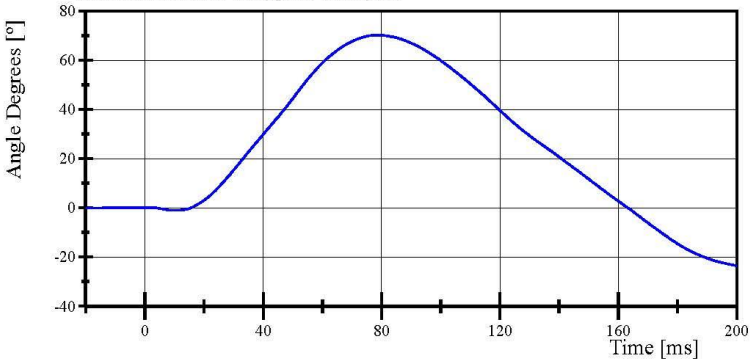
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Pot Rotation at the Base of Neck



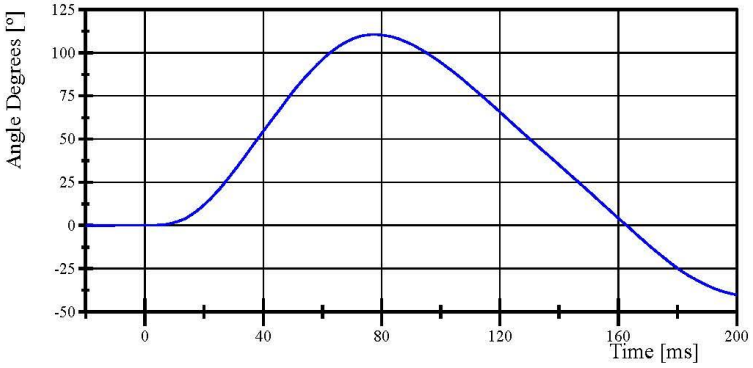
Filter Class: CFC_60
Max: 40.6 ° at 74.7 ms
Min: -16.7 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 70.2 ° at 78.4 ms
Min: -23.5 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 110.7 ° at 77.4 ms
Min: -40.2 ° at 200.0 ms

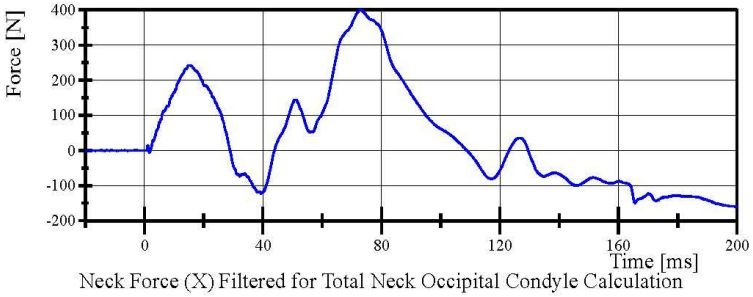
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.21.2019 16:15:44 1973

Transportation Research Center Inc.

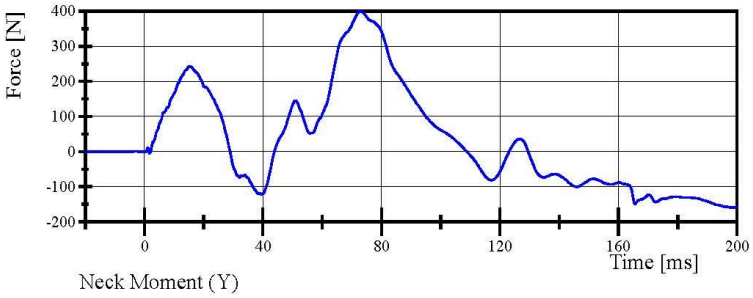
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Neck Force (X)



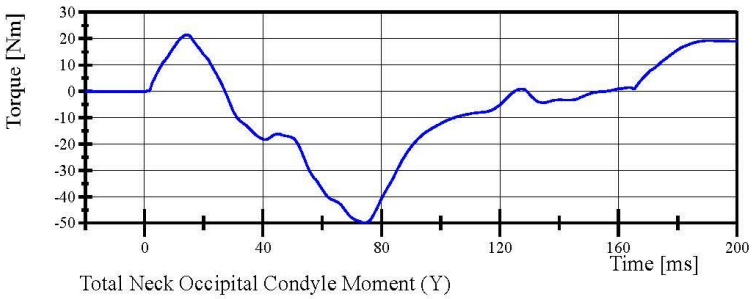
Filter Class: CFC_1000
Max: 399.7 N at 72.7 ms
Min: -159.7 N at 199.9 ms

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



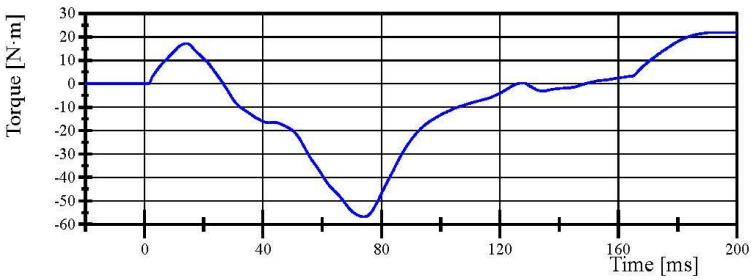
Filter Class: CFC_600
Max: 399.6 N at 72.8 ms
Min: -159.5 N at 200.0 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 21.4 Nm at 14.6 ms
Min: -49.9 Nm at 74.5 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 21.9 N·m at 196.0 ms
Min: -56.8 N·m at 74.1 ms

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

08.21.2019 16:15:44 1973

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/22/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.786 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,215.2 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,278.8 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-52.0 mm	Yes
Internal Hysteresis	69 - 85 %	77.0 %	Yes

Test meets specifications.

Condition: Used

Comments:
Jacket S/N: DZ8735
Rib Set S/N: EB7630

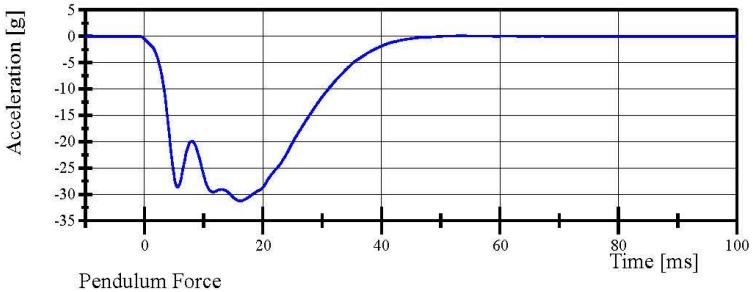
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.22.2019 09:34:46 407

Transportation Research Center Inc.

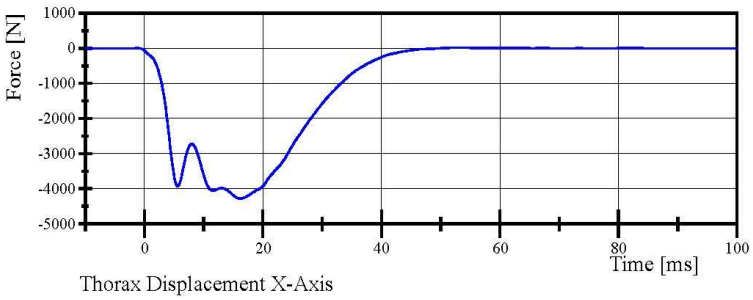
Front Thorax
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/22/2019

Pendulum Acceleration



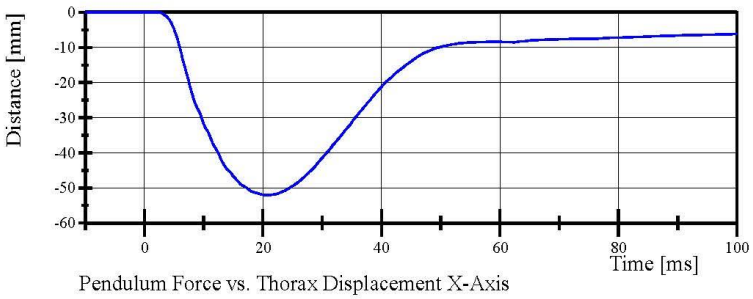
Filter Class: CFC_180
Max: 0.1 g at 53.4 ms
Min: -31.2 g at 16.2 ms

Pendulum Force



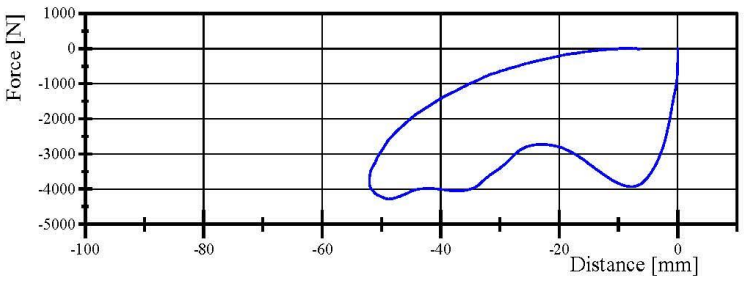
Filter Class: CFC_180
Max: 13.0 N at 53.4 ms
Min: -4,278.8 N at 16.2 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -8.6 ms
Min: -52.0 mm at 20.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 13.0 N at -8.8 mm
Min: -4,278.8 N at -48.8 mm

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

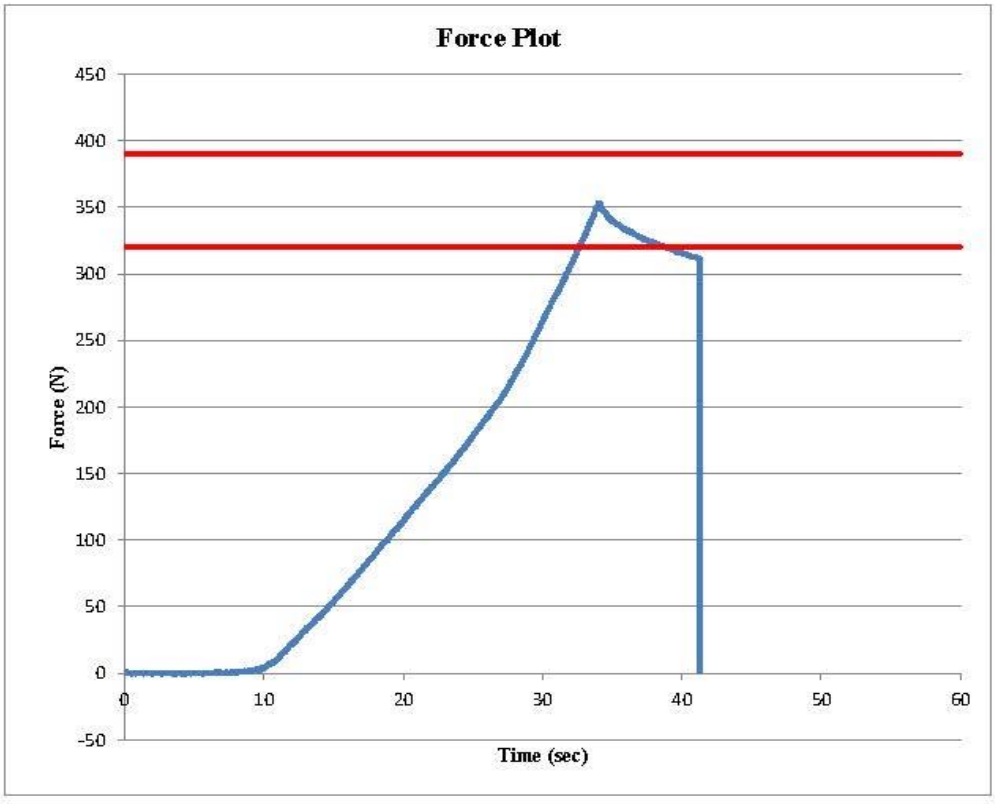
08.22.2019 09:35:46 407

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	EB7513	Date:	8/22/2019
Test Number:	1	Time:	8:03

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.8	°C	Pass
Humidity	10	-	70	60	%	Pass
Average Angular Velocity	0.5	-	1.5	1.1	deg/sec	Pass
Initial Angle	0	-	20	18.02	deg	Pass
Peak Force at 45.36°	320	-	390	353.05	N	Pass
Final Angle	-8	-	8	3.56	deg	Pass



Comments:
Abdomen S/N: EB8206
Lumbar S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.100 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,793.8 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: EB7773

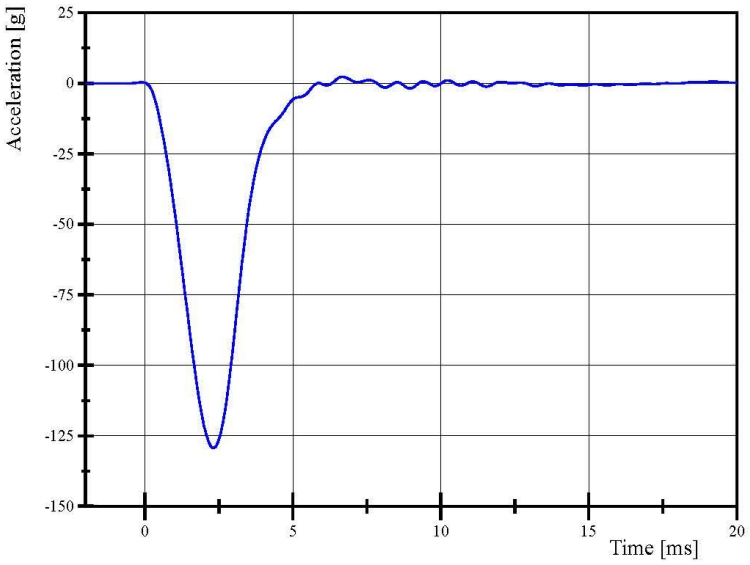
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.21.2019 07:58:25 1866

Transportation Research Center Inc.

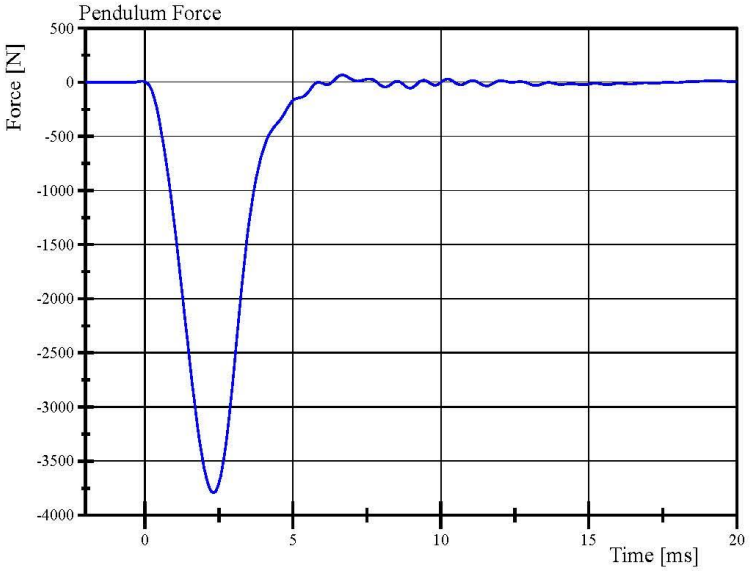
Left Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 5-2
Test Date: 8/21/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.3 g at 6.6 ms
Min: -129.4 g at 2.3 ms

Pendulum Force



Filter Class: CFC_600
Max: 67.5 N at 6.6 ms
Min: -3,793.8 N at 2.3 ms

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

08.21.2019 07:59:39 1866

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	60 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.105 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,842.9 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: EB7550

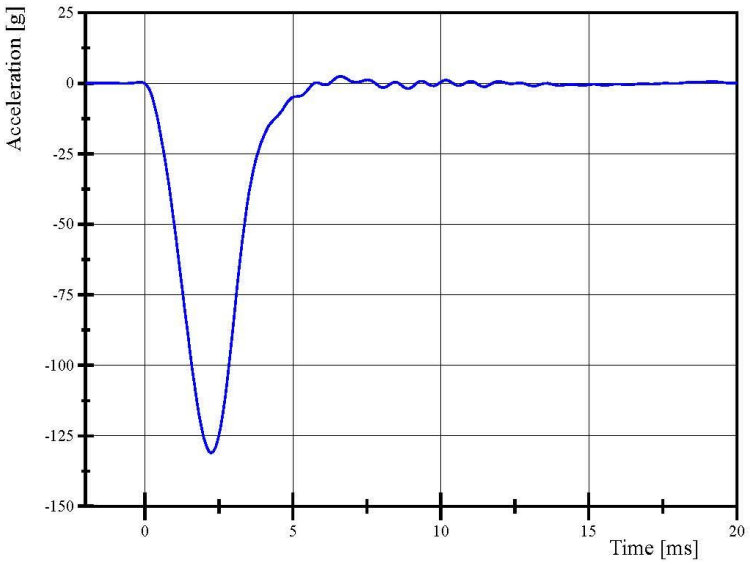
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

08.21.2019 08:02:41 1864

Transportation Research Center Inc.

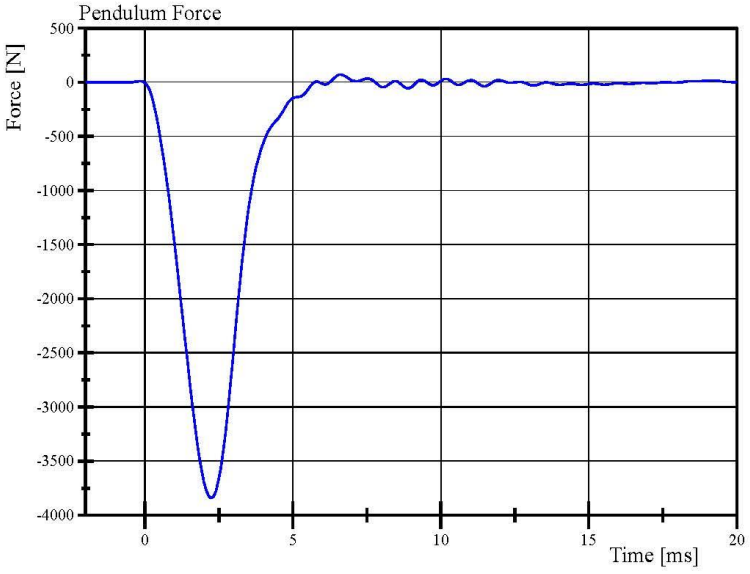
Right Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 5-1
Test Date: 8/21/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.4 g at 6.6 ms
Min: -131.1 g at 2.2 ms

Pendulum Force



Filter Class: CFC_600
Max: 71.2 N at 6.6 ms
Min: -3,842.9 N at 2.2 ms

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

08.21.2019 08:03:07 1864

Post-Test Calibration Sheets

Front Passenger S/N EB7513

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. EB7513 Calibration No. 06

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	779	Yes
B	Shoulder Pivot Height	431.8 - 457.2	443	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	148	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	130	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	197	Yes
K	Buttock Knee Length	520.7 - 546.1	533	Yes
L	Popliteal Height	355.6 - 376.0	359	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	430	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	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	141	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	356	Yes
W	Foot Breadth	78.8 - 94.0	85	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	867	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	164	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. EB7515 Certification No. 6-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	270.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-4.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.28 %	Yes

Test meets specifications.

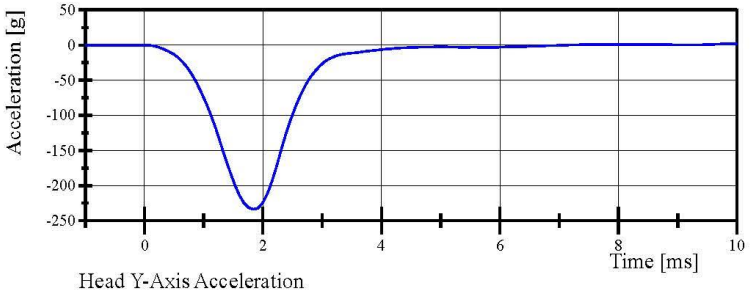
Condition: Used

Comments:
Head Skin S/N: EA8751

Transportation Research Center Inc.

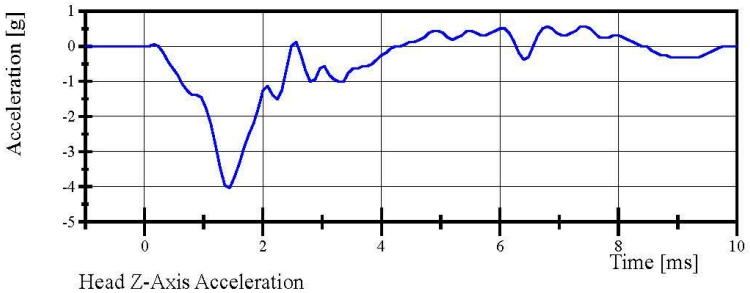
Front Head Drop
HIII 5th Serial No. EB7515 Certification No. 6-1
Test Date: 9/5/2019

Head X-Axis Acceleration



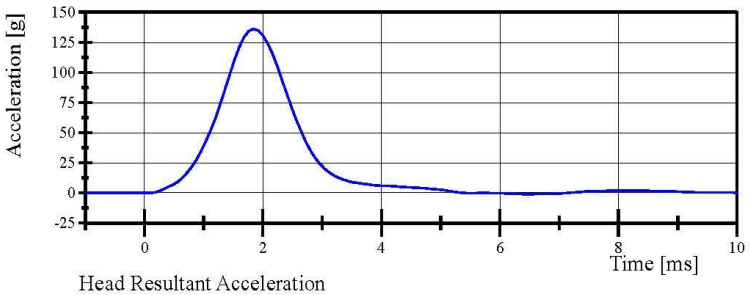
Filter Class: CFC_1000
Max: 2.4 g at 10.0 ms
Min: -234.0 g at 1.8 ms

Head Y-Axis Acceleration



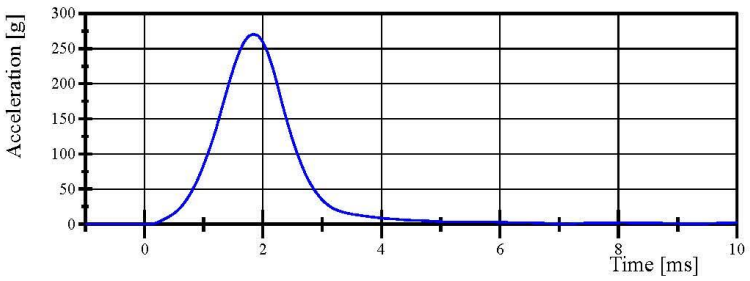
Filter Class: CFC_1000
Max: 0.6 g at 6.8 ms
Min: -4.0 g at 1.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 136.2 g at 1.8 ms
Min: -1.0 g at 6.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 270.7 g at 1.8 ms
Min: 0.0 g at -0.8 ms

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

09.05.2019 08:02:27 580

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.068 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.38 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.53 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.35 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-83.2 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	81.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	89.3 ms	Yes

Test meets specifications.

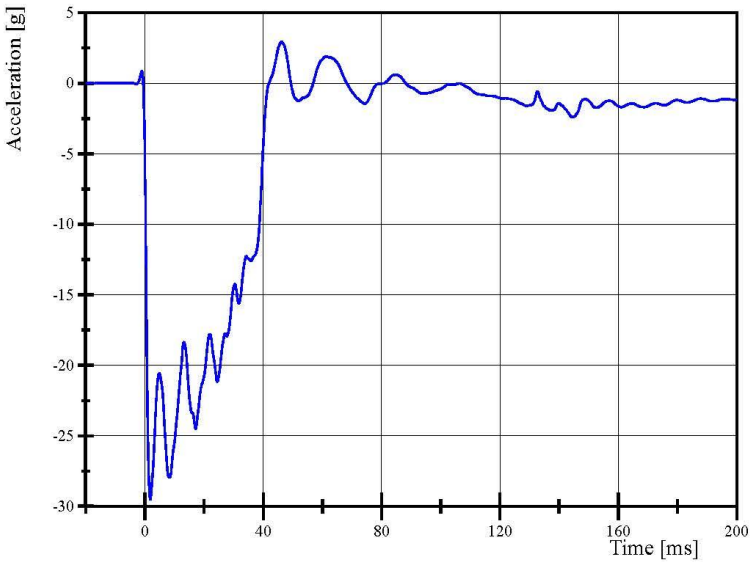
Condition: Used

Comments:
Neck S/N: EB6930

Transportation Research Center Inc.

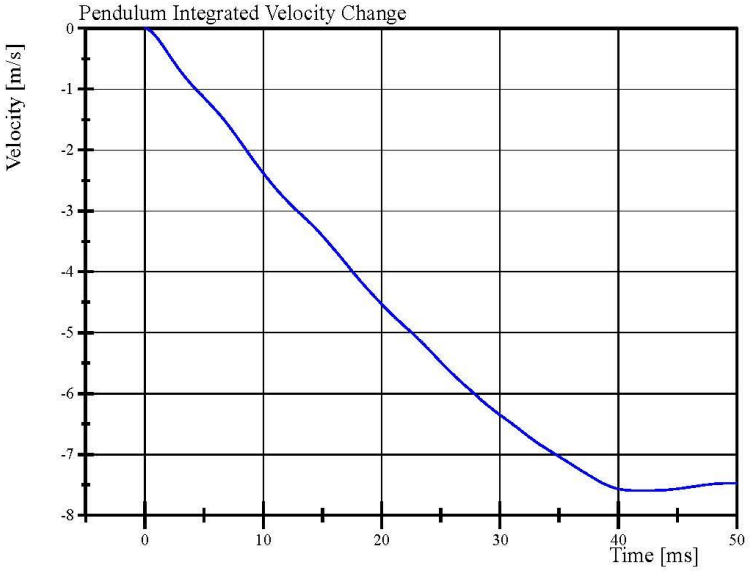
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 2.9 g at 46.2 ms
Min: -29.5 g at 1.9 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.6 m/s at 41.9 ms

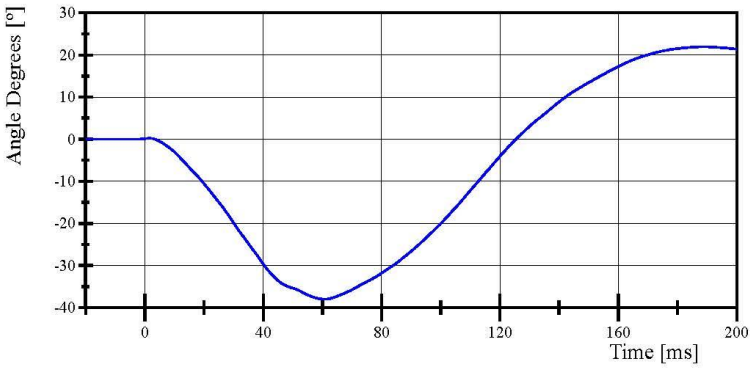
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

09.05.2019 10:56:33 1819

Transportation Research Center Inc.

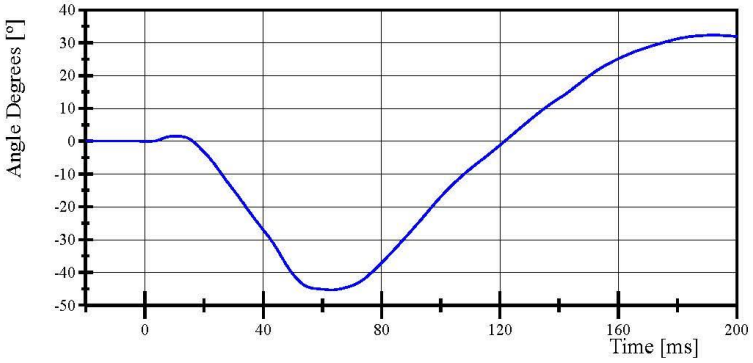
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Pot Rotation at the Base of Neck



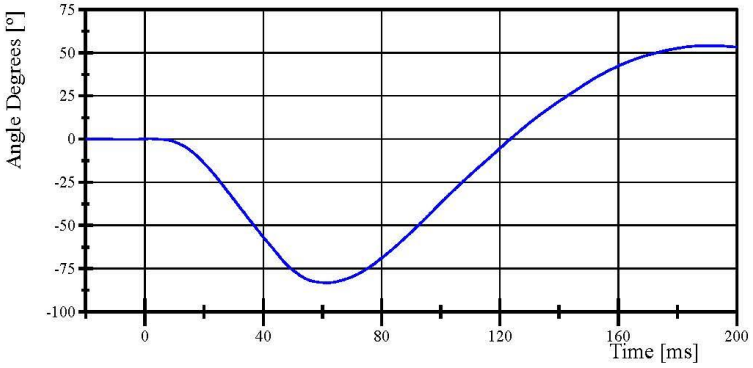
Filter Class: CFC_60
Max: 21.9 ° at 188.8 ms
Min: -38.0 ° at 60.9 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 32.4 ° at 192.2 ms
Min: -45.3 ° at 63.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 54.2 ° at 191.3 ms
Min: -83.2 ° at 61.6 ms

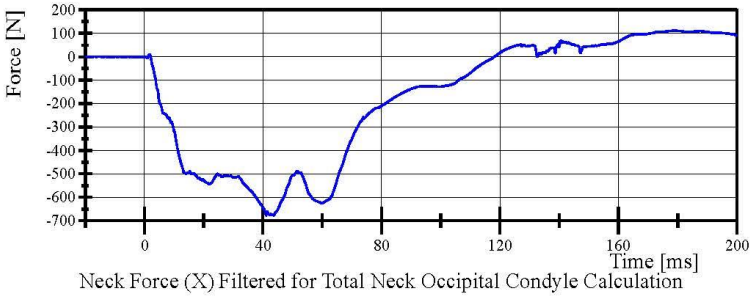
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

09.05.2019 10:56:33 1819

Transportation Research Center Inc.

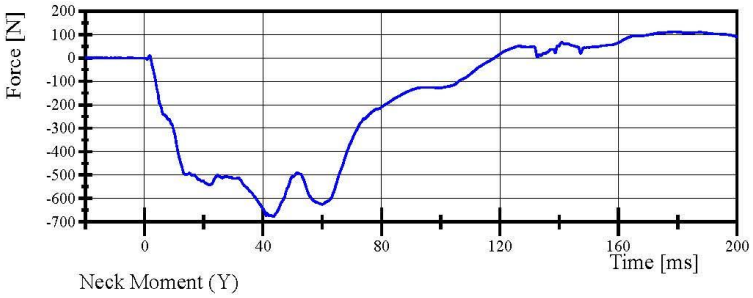
Neck Flexion
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Neck Force (X)



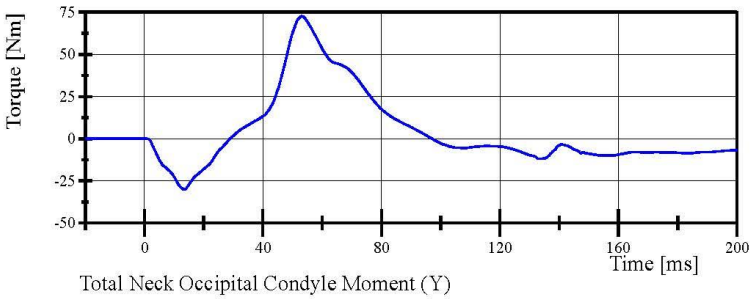
Filter Class: CFC_1000
Max: 112.7 N at 178.8 ms
Min: -677.6 N at 43.6 ms

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



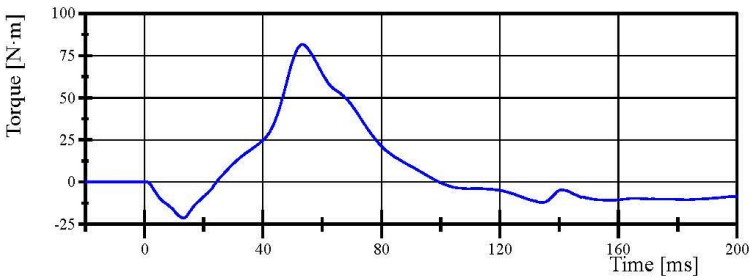
Filter Class: CFC_600
Max: 112.7 N at 179.0 ms
Min: -676.8 N at 43.6 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 72.7 Nm at 53.1 ms
Min: -30.1 Nm at 13.3 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 81.7 N·m at 53.5 ms
Min: -21.3 N·m at 13.2 ms

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

09.05.2019 10:56:34 1819

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.042 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.79 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.45 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.00 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	109.4 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-55.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	105.7 ms	Yes

Test meets specifications.

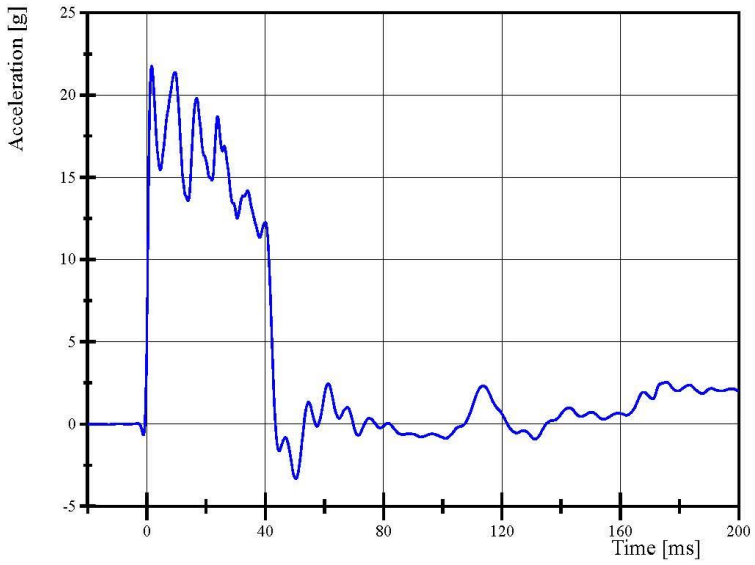
Condition: Used

Comments:
Neck S/N: EB6930

Transportation Research Center Inc.

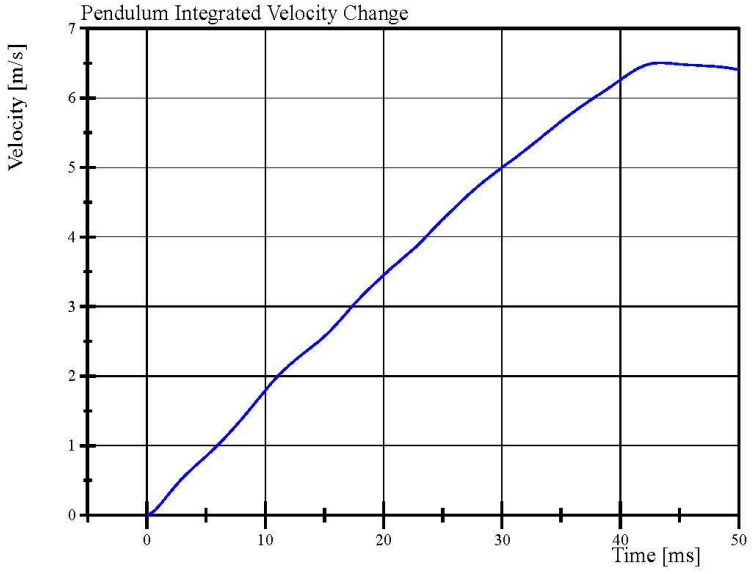
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 21.8 g at 1.6 ms
Min: -3.3 g at 50.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.5 m/s at 43.4 ms
Min: 0.0 m/s at 0.0 ms

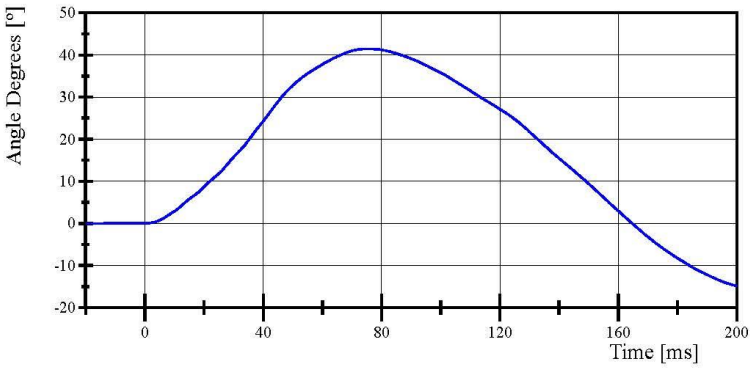
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

09.05.2019 11:42:22 1975

Transportation Research Center Inc.

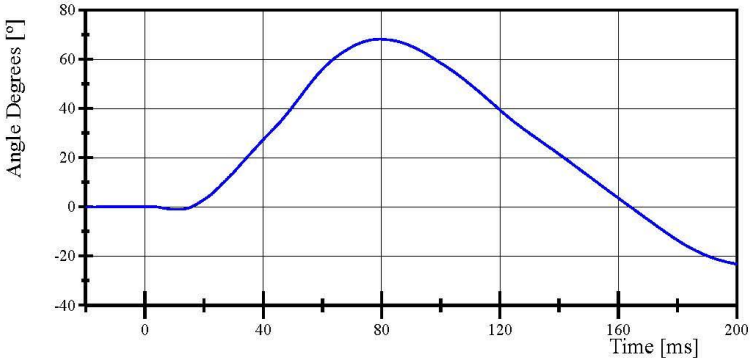
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Pot Rotation at the Base of Neck



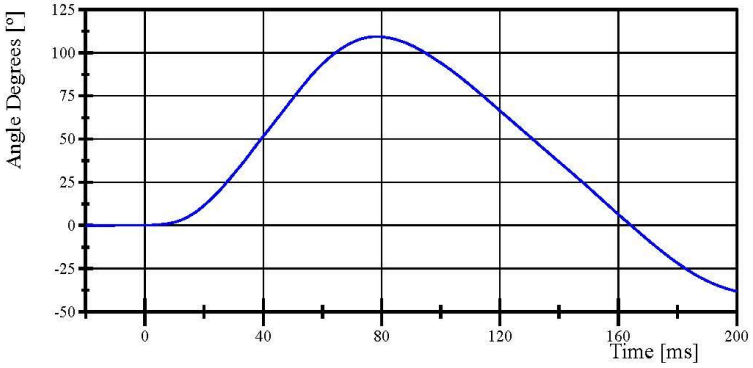
Filter Class: CFC_60
Max: 41.4 ° at 75.5 ms
Min: -14.9 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 68.1 ° at 79.4 ms
Min: -23.2 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 109.4 ° at 78.3 ms
Min: -38.1 ° at 200.0 ms

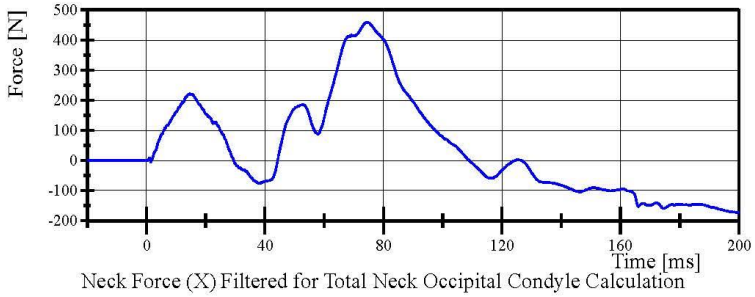
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

09.05.2019 11:42:22 1975

Transportation Research Center Inc.

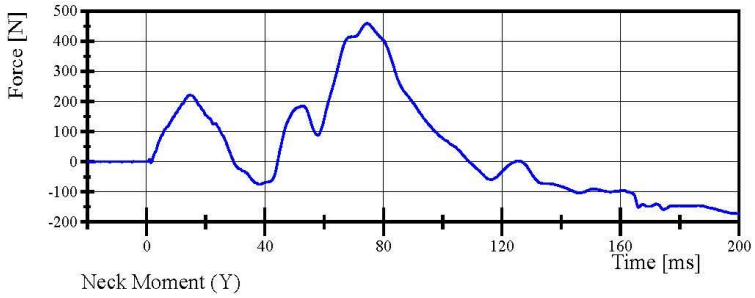
Neck Extension
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Neck Force (X)



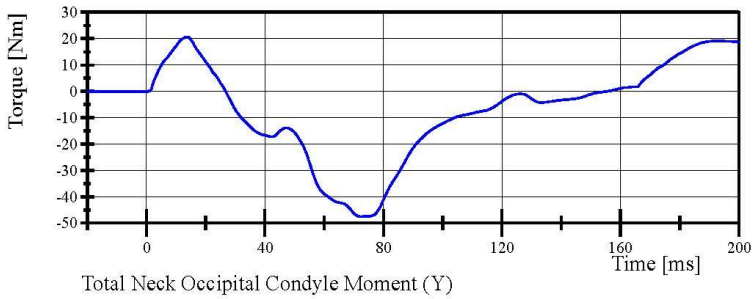
Filter Class: CFC_1000
Max: 459.5 N at 74.4 ms
Min: -173.3 N at 200.0 ms

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



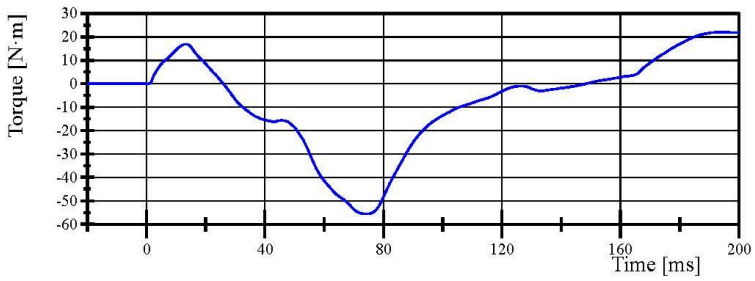
Filter Class: CFC_600
Max: 459.3 N at 74.4 ms
Min: -173.2 N at 200.0 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 20.7 Nm at 13.7 ms
Min: -47.6 Nm at 72.4 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 22.0 N·m at 194.1 ms
Min: -55.6 N·m at 74.4 ms

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

09.05.2019 11:42:23 1975

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.784 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,325.3 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,326.1 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-52.6 mm	Yes
Internal Hysteresis	69 - 85 %	75.9 %	Yes

Test meets specifications.

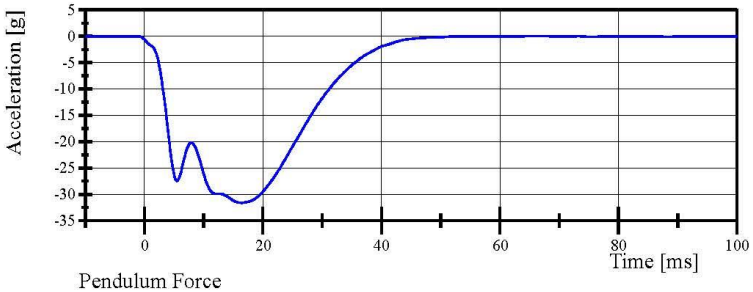
Condition: Used

Comments:
Jacket S/N: DZ8735
Rib Set S/N: EB7630

Transportation Research Center Inc.

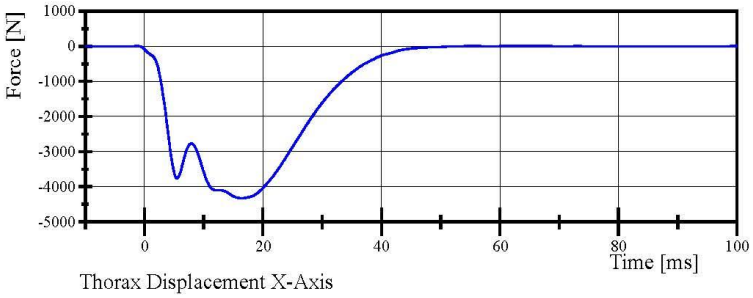
Front Thorax
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Pendulum Acceleration



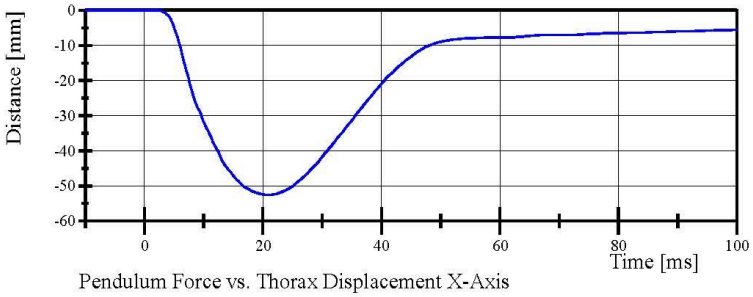
Filter Class: CFC_180
Max: 0.0 g at 73.2 ms
Min: -31.6 g at 16.4 ms

Pendulum Force



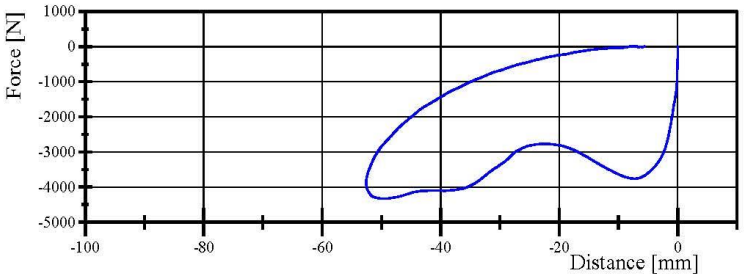
Filter Class: CFC_180
Max: 6.4 N at 73.2 ms
Min: -4,326.1 N at 16.4 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -7.0 ms
Min: -52.6 mm at 20.9 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 6.4 N at -6.9 mm
Min: -4,326.1 N at -49.6 mm

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

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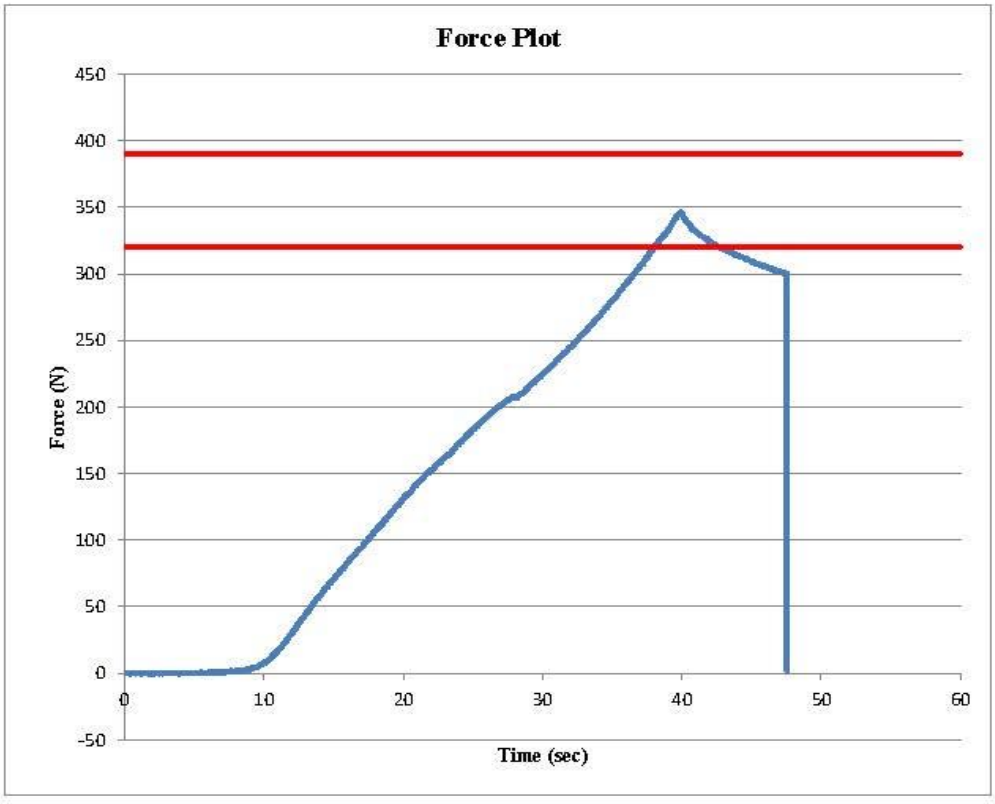
Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	EB7513	Date:	9/5/2019
Test Number:	1	Time:	13:15

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.8	°C	Pass
Humidity	10	-	70	59	%	Pass
Average Angular Velocity	0.5	-	1.5	1.02	deg/sec	Pass
Initial Angle	0	-	20	14.46	deg	Pass
Peak Force at 45.26°	320	-	390	346.08	N	Pass
Final Angle	-8	-	8	5.03	deg	Pass



Comments:
Abdomen S/N: EB8206
Lumbar S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.125 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-4,051.6 N	Yes

Test meets specifications.

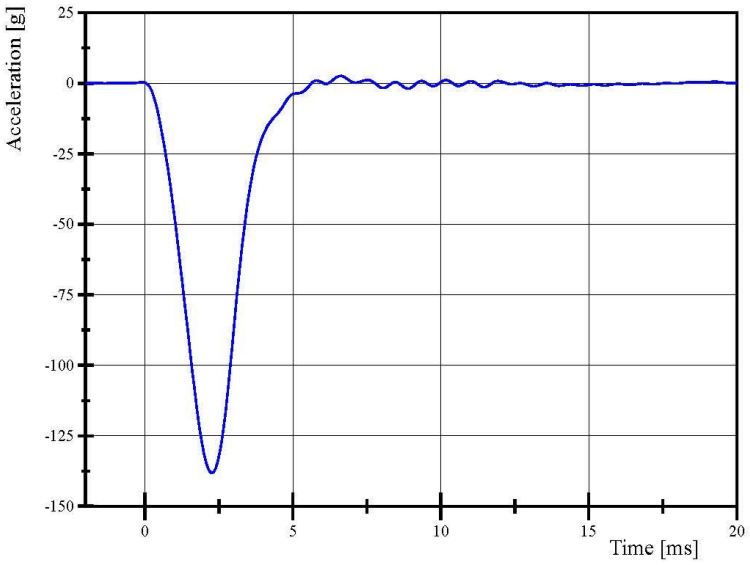
Condition: Used

Comments:
Knee Skin S/N: EB7773

Transportation Research Center Inc.

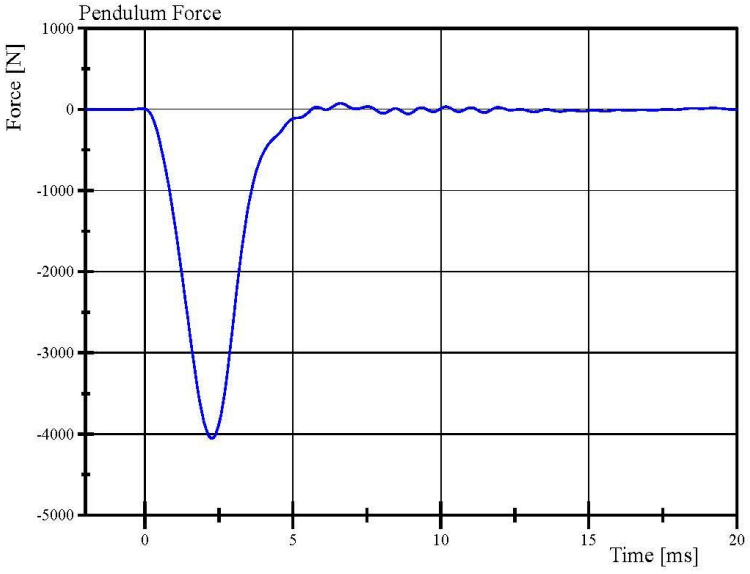
Left Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 6-2
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.6 g at 6.6 ms
Min: -138.2 g at 2.2 ms

Pendulum Force



Filter Class: CFC_600
Max: 75.7 N at 6.6 ms
Min: -4,051.6 N at 2.2 ms

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

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Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	59 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.129 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,690.0 N	Yes

Test meets specifications.

Condition: Used

Comments:
Knee Skin S/N: EB7550

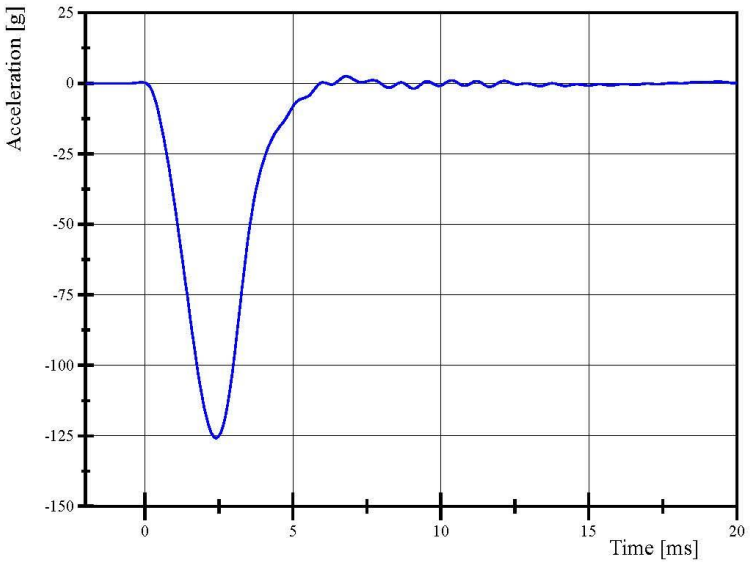
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

09.05.2019 09:52:19 1852

Transportation Research Center Inc.

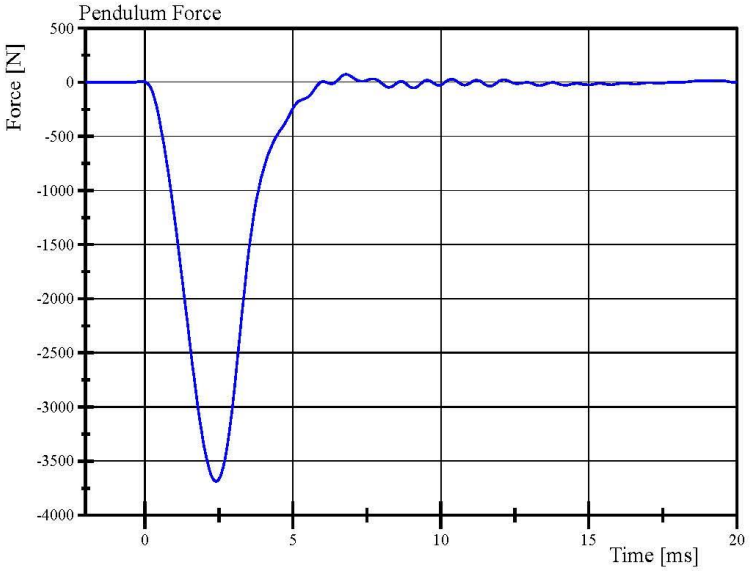
Right Knee Femur Response Test
HIII 5th Serial No. EB7513 Certification No. 6-1
Test Date: 9/5/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.5 g at 6.8 ms
Min: -125.8 g at 2.4 ms

Pendulum Force



Filter Class: CFC_600
Max: 73.1 N at 6.8 ms
Min: -3,690.0 N at 2.4 ms

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

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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	R141C5	Measurement Spec.	27-Aug-2019
		Shoulder	N/A	S1402Q	Measurement Spec.	27-Aug-2019

TABLE 2 – Front Passenger Dummy Instrumentation

Instrumentation			Axis/Location	Hybrid III 5th S/N EB7513		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	P44972	Endevco	22-Aug-2019
			Y	P80217	Endevco	12-Jun-2019
			Z	P69062	Endevco	21-Aug-2019
		Redundant	X	T11046	Endevco	22-Aug-2019
			Y	P97525	Endevco	22-Aug-2019
			Z	P73228	Endevco	22-Aug-2019
Head Angular Rate Sensors			X	ARS14944	DTS	15-Oct-2018
			Y	ARS14937	DTS	15-Oct-2018
			Z	ARS14938	DTS	15-Oct-2018
Upper Neck Load Cell			FX, FY, FZ, MX, MY, MZ	1634	Humanetics	27-Feb-2019
Chest Accelerometers		Primary	X	P80855	Endevco	21-Aug-2019
			Y	P97544	Endevco	22-Aug-2019
			Z	P57791	Endevco	12-Jun-2019
		Redundant	X	P73221	Endevco	21-Aug-2019
			Y	P69097	Endevco	21-Aug-2019
			Z	P69074	Endevco	21-Aug-2019
Chest Potentiometer			X	4223	Servo	21-Aug-2019
Pelvis Accelerometers			X	P91969	Endevco	22-Aug-2019
			Y	P91958	Endevco	22-Aug-2019
			Z	P80721	Endevco	22-Aug-2019
Femur Load Cells	Left	Primary	Z	DT0997-FZ1	Humanetics	27-Feb-2019
		Redundant	Z	DT0997-FZ2	Humanetics	27-Feb-2019
	Right	Primary	Z	DS4140-FZ1	Humanetics	27-Feb-2019
		Redundant	Z	DS4140-FZ2	Humanetics	27-Feb-2019
Tibia Load Cells	Left	Upper	MX, MY, FZ	3643-92	Denton	1-Oct-2018
		Lower	MX, MY, FZ	3644-92	Denton	1-Oct-2018
	Right	Upper	MX, MY, FZ	3643-484	Denton	1-Oct-2018
		Lower	MX, MY, FZ	3644-369	Denton	1-Oct-2018
Foot Accelerometers	Left	Rear	X	P90866	Endevco	21-Aug-2019
			Z	T11451	Endevco	21-Aug-2019
		Front	Z	P97890	Endevco	21-Aug-2019
	Right	Rear	X	P97640	Endevco	21-Aug-2019
			Z	P91471	Endevco	21-Aug-2019
		Front	Z	P91907	Endevco	21-Aug-2019
Seat Belt Load Cells		Lap	N/A	T1210A	Measurement Spec.	10-Dec-2018
		Shoulder	N/A	N/A	N/A	N/A

TABLE 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	P61501	Endevco	8-May-2019
			Z	P94561	Endevco	15-Apr-2019
		Redundant	X	P57917	Endevco	8-May-2019
	Right	Primary	X	P57192	Endevco	16-Jul-2019
			Z	T11835	Endevco	18-Jun-2019
		Redundant	X	P88453	Endevco	17-Jun-2019
Engine Accelerometers	Top		X	P94485	Endevco	17-Jun-2019
	Bottom		X	P81013	Endevco	10-May-2019