Final Report Number: NCAP-TRC-19-006

New Car Assessment Program (NCAP)

Frontal Barrier Impact Test

FCA US LLC

2019 Ram 1500 Crew Cab

NHTSA Number: M20190310

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

Report Date: July 23, 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

Notice

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

Prepared By: ILO Project Operations Group

Approved By: John Shultz

Approval Date: July 23, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date _____

_____

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

Date _____

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NCAP-TRC-19-006		

4. Title and Subtitle	5. Report Date
Final Report of NEW CAR ASSESSMENT PROGRAM Frontal Impact Testing of a 2019 Ram 1500 Crew Cab NHTSA No. M20190310	July 23, 2019
	6. Performing Organization Code TRC Inc.
7. Author(s) John Shultz, Project Manager	8. Performing Organization Report No. 190508
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319-0367	10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTNH22-12-D-00257
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave SE Room W43-410, Washington, DC 20590	13. Type of Report and Period Covered Final Report May 8, 2019 – July 23, 2019 14. Sponsoring Agency Code NRM-110

15. Supplemental Notes

16. Abstract

A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2019 Ram 1500 Crew Cab, 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 May 8, 2019.

The impact velocity was 55.91 km/h, and the ambient temperature at the barrier face at the time of impact was 21.9° C. The target vehicle post-test maximum crush was 610 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	226	NA	700	293
Maximum Chest Compression	mm	63	-19.3	mm	52	-15.0
3ms Chest Clip	Gs	60	39.6	Gs	60	42.8
Nij	NA	1	0.37	NA	1	0.36
Neck Tension	Newtons	4170	1691.2	Newtons	2620	970.6
Neck Compression	Newtons	4000	-154.7	Newtons	2520	-317.7
Left Femur Force	Newtons	10000	-1908.7	Newtons	6800	-1758.7
Right Femur Force	Newtons	10000	-1887.4	Newtons	6800	-195.2

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	

Form DOT F 1700.7 Reproduction of completed page authorized

Table of Contents

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 Ram 1500 Crew Cab at a velocity of 55.91 km/h. The test was performed at Transportation Research Center, Inc. on May 8, 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. 426) were qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 106 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

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

The maximum static crush of the vehicle was 610 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, sun visor 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)	226	0.37	1691.2	-154.7	39.6	-19.3	-1908.7	-1887.4
Passenger (5^{th} Female)	293	0.36	970.6	-317.7	42.8	-15.0	-1758.7	-195.2

TEST COMMENTS:

NHTSA numbers were changed between receipt of the vehicles and testing therefore some incoming photos have the original number in them as prep work had already began

Redundant speed trap malfunctioned

Driver Chest X Accel Redundant data channel failed at 57.0 ms

2.2 REPORT AREA 2: DATA SHEETS

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

TEST VEHICLE INFORMATION

NHTSA No.	M20190310
Model Year	2019
Make	Ram
Model	1500 Crew Cab
Body Style	Truck
VIN	1C6SRFNT6KN804871
Body Color	Maximum Steel Met.
Odometer Reading (km/mi)	16 mi.
Engine Displacement (L)	5.7
Type/No. Cylinders	Gas/8
Engine Placement	Front/Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	4WD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

TEST VEHICLE OPTIONS

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	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	FCA US LLC
Date of Manufacture	3-19

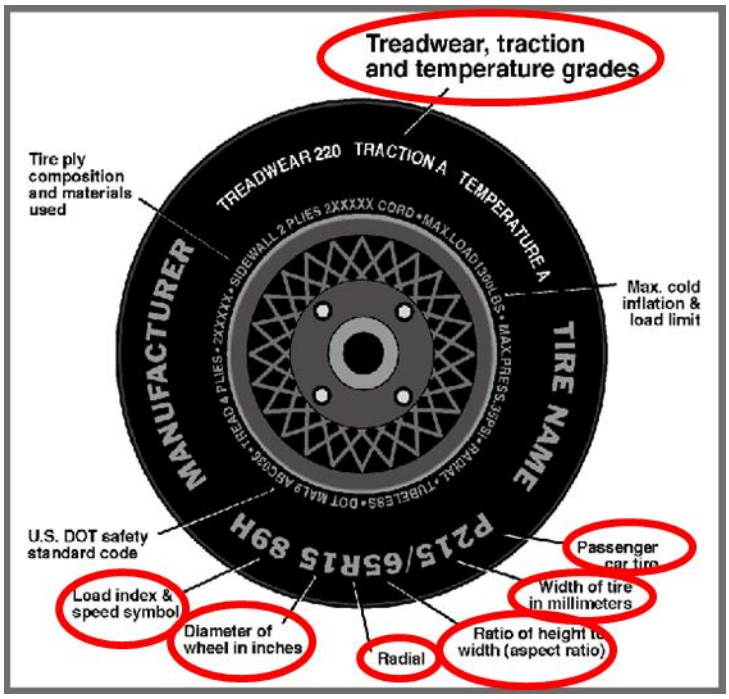
GVWR (kg)	3221 (7100 lbs)
GAWR Front (kg)	1770 (3900 lbs)
GAWR Rear (kg)	1860 (4100 lbs)

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Split Bench	Bench	N/A	
Number of Occupants	3	3	N/A	6
Capacity Wt. (VCW) (kg)				778.0
Cargo Wt. (RCLW) (kg)				370.0

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	250	250
Recommended Tire Size	275/65R18 116T	275/65R18 116T
Tire Size on Vehicle	275/65R18	275/65R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/T	Dueler H/T
Treadwear	520	520
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	2	2
Load Index/Speed Symbol	116T	116T
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Right	9BYJ DHT 0219	9BYJ DHT 0119
DOT Safety Code Left	9BYJ DHT 0219	9BYJ DHT 0219

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	744.4	506.2		787.2	599.4	
Right	kg	705.4	497.4		741.4	593.2	
Ratio	%	59.1	40.9		56.2	43.8	
Totals	kg	1449.8	1003.6	2453.4	1528.6	1192.6	2721.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2453.4
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	2728.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	921	933	983	994	1599
As Tested	mm	924	927	965	965	1714
Post Test	mm	926	902	970	964	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	3910
Total Vehicle Length at Left Side	mm	5910
Total Vehicle Length at Centerline	mm	6140
Total Vehicle Length at Right Side	mm	5914
Weight of Ballast in Cargo Area	kg	44.4
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	liters	116.2

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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

TARGET VEHICLE STRUCTURAL MEASUREMENT

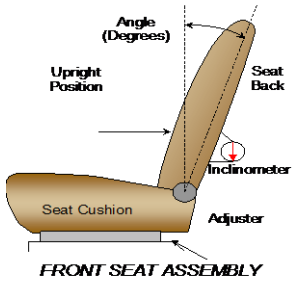
	Elements	Pre-Test (mm)
1	Total Length	6140
2	Total Width	2028
3	Bumper Top Height	705
4	Bumper Bottom Height	365
5	Longitudinal Member Top Height	590
6	Distance Between Longitudinal Members	780
7	Longitudinal Member Width	120
8	Engine Top Height	1150
9	Engine Bottom Height	340
10	Engine and Gearbox Width	660
11	Front Bumper-Engine Distance	745
12	Front Shock Absorber Fixing Height	740
13	Bonnet Leading Edge Height	1140
14	Front Shock Absorber Fixing Width	885
15	Front Bumper – Front Axle Distance	1000
16	Front Axle – A-Pillar Distance	580
17	A-Pillar – B-Pillar Distance	1055
18	B-Pillar – Rear Axle Distance	2210
19	B-Pillar – C-Pillar Distance	1020
20	Roof Sill Bottom Height	1745
21	Roof Sill Top Height	1816
22	Floor Sill Bottom Height	520
23	Floor Sill Top Height	580

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

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:	1.2
Passenger Seat back angle:	0.0

SEAT FORE/AFT POSITIONS

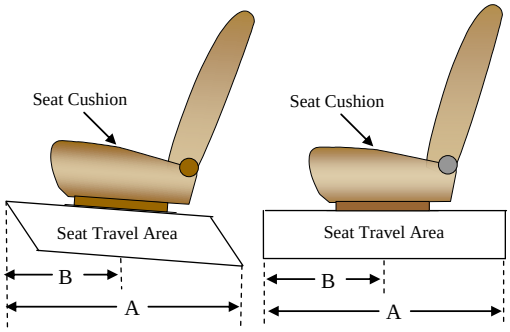
Describe the method of determining seat fore/aft positions.
Driver: Mid position, Positioned according to Form 1
Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	220 mm ; 33 notches	110 mm ; 17th notch
Passenger Seat	220 mm ; 33 notches	0 mm ; 1st notch

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	5	0
Passenger Seat	5	0



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

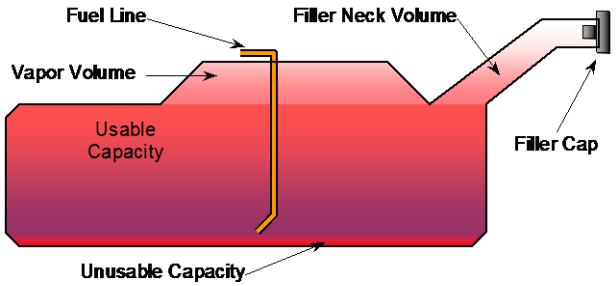
Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	87.0
Usable Capacity of "Optional Tank"	124.9
92%-94% of Usable Capacity	116.2
Actual Amount of Solvent Used	116.2
1/3 of Usable Capacity	41.6

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

Ignition key in and turned to the run position. For keyless system use start/stop button to set it run position.

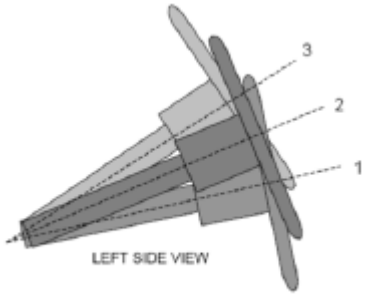


VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. Describe how this measurement was taken.

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



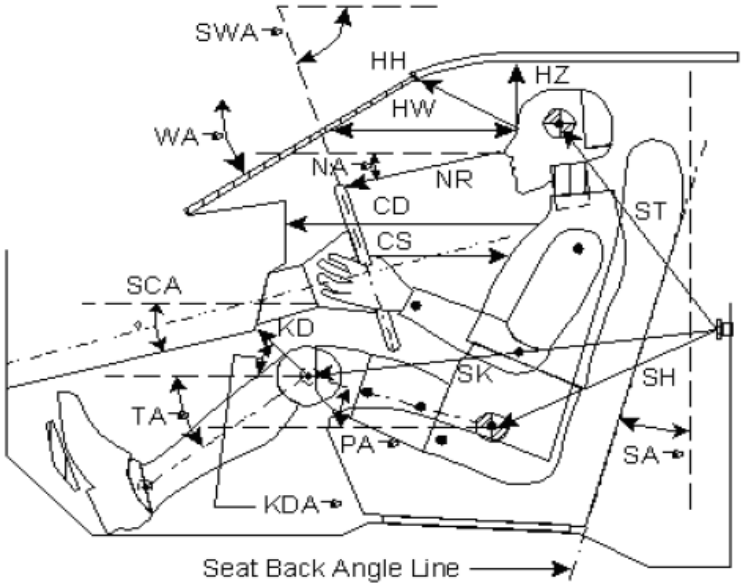
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	25.0	0
Geometric Center Position No. 2	22.7	28
Uppermost Position No. 3	20.5	57
Telescoping Steering Wheel Travel		57
Test Position	22.7	28

DATA SHEET NO. 3 - DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

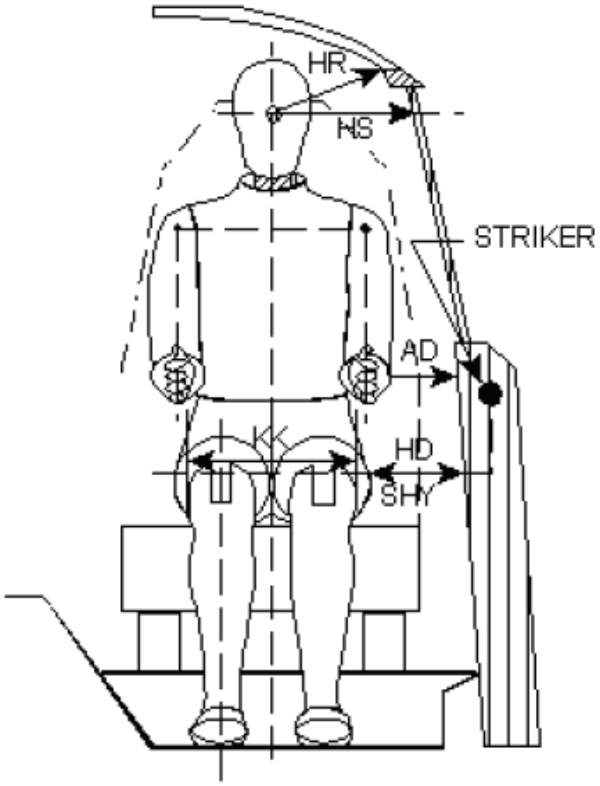
Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WAº	Windshield Angle		29.9		
SWAº	Steering Wheel Angle		66.0		
SCAº	Steering Column Angle		24.0		
SAº	Seat Back Angle (on head rest post)		1.2		0.0
HZ	Head to Roof (Z)	224		279	
HH	Head to Header	460		421	
HW	Head to Windshield	741		751	
NR	Nose to Rim	415	11.2		
CD	Chest to Dash	575		427	
CS	Chest to Steering Hub	351			
RA	Rim to Abdomen	208			
KDL	Left Knee to Dash	159	26.8	79	31.6
KDR	Right Knee to Dash	122	25.4	98	31.4
PAº	Pelvic Angle		22.2		20.4
TAº	Tibia Angle		56.3		60.2
SK	Striker to Knee	574	-7.6	641	-2.1
ST	Striker to Head	653	-79.2	574	-71.8
SH	Striker to H-Point	195	13.3	315	5.2

DATA SHEET NO. 4 - DUMMY LATERAL CLEARANCE DIMENSIONS

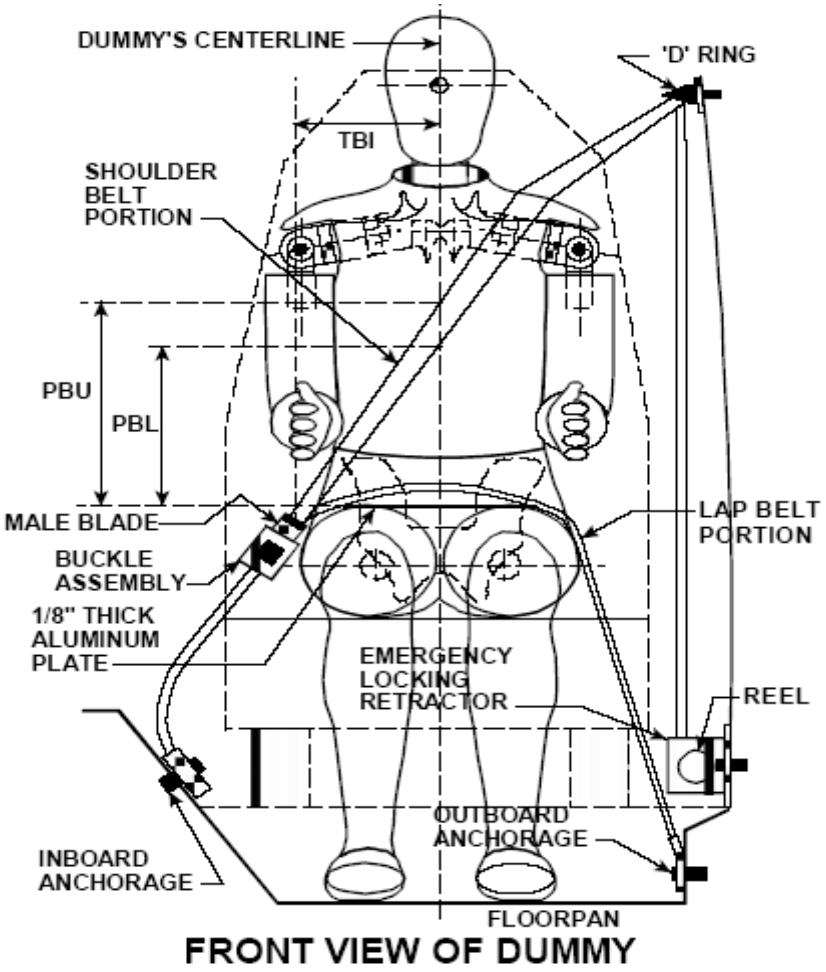
Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



Code	Measurement Description	Driver	Passenger
AD	Arm to Door	109	100
HD	H-Point to Door	145	173
HR	Head to Side Header	259	329
HS	Head to Side Window	257	359
KK	Knee to Knee	337	170
SHY	Striker to H-Point (Y Direction)	246	153
AA	Ankle to Ankle	315	170

DATA SHEET NO. 5 - SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	364	273
PBL – Top surface of reference to belt lower edge	mm	279	186

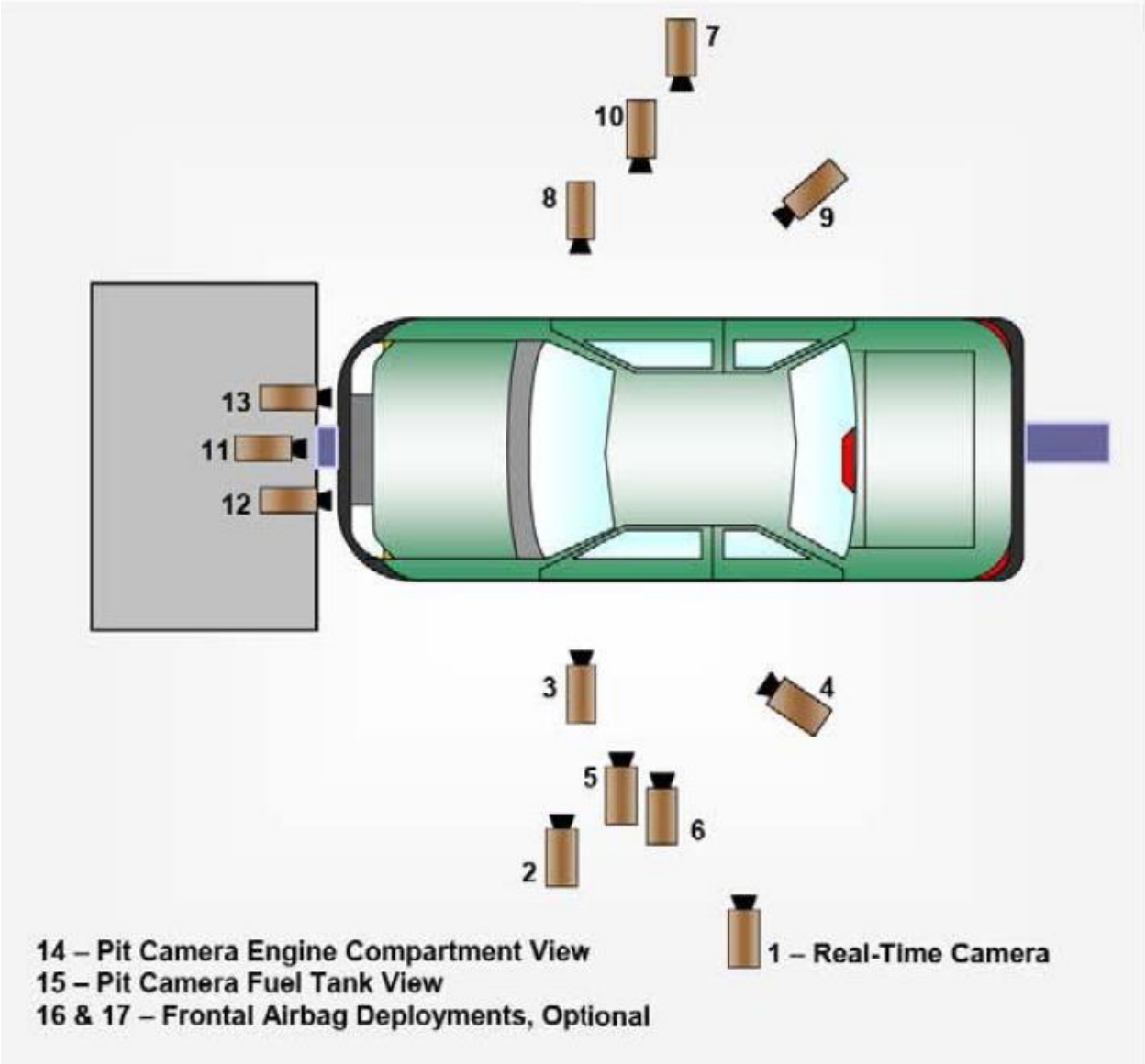
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	826	895
Lap belt length as measured on ATD	mm	788	779
Remainder of belt on reel	mm	1614	1674
Total belt length for continuous webbing systems	mm	2555	2795

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

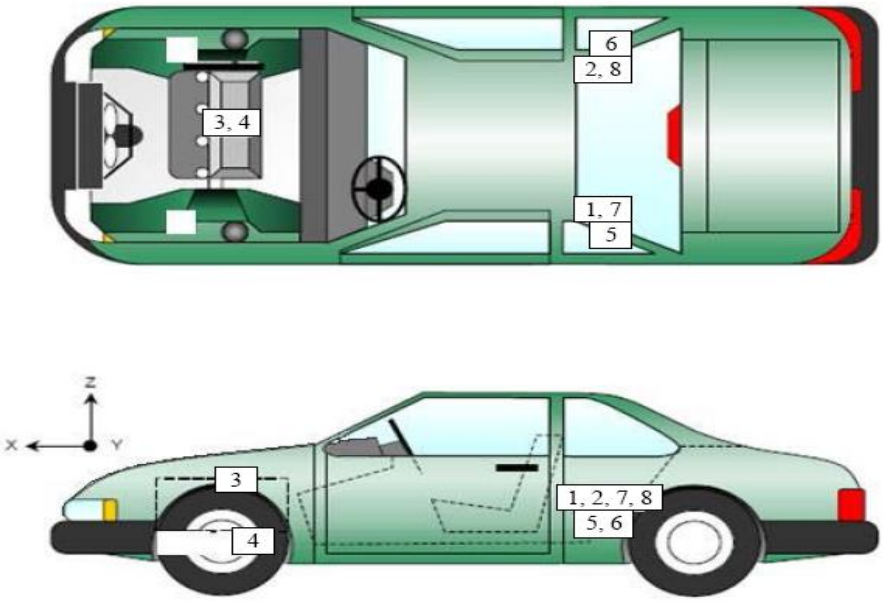
CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	REAL-TIME LEFT OVERALL	439	-6295	-1587	Zoom	30
2	LEFT OVERALL	2428	-5927	-1345	20	1000
3	DRIVER CLOSE-UP	1641	-5321	-1583	50	1000
4	LEFT FRONT HALF	1234	-5275	-1387	25	1000
5	LEFT ANGLE	3662	-2836	-1990	25	1000
6	STEERING COLUMN	1949	-5909	-2119	50	1000
7	RIGHT OVERALL	2435	6880	-1379	20	1000
8	PASSENGER CLOSE-UP	1513	6086	-1369	50	1000
9	RIGHT FRONT HALF	1192	6009	-1327	25	1000
10	RIGHT ANGLE	3631	2776	-1907	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				25	1000
17	PASSENGER ONBOARD				25	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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2860	-702	-584
2	Right Rear Accelerometer – X Direction	2860	695	-590
3	Engine Top X	5105	50	-1066
4	Engine Bottom X	6020	15	-326
5	Left Rear Accelerometer – Z Direction	2860	-702	-584
6	Right Rear Accelerometer – Z Direction	2860	695	-590
7	Left Rear Accelerometer – X Direction Redundant	2860	-672	-584
8	Right Rear Accelerometer- X Direction Redundant	2860	665	-590

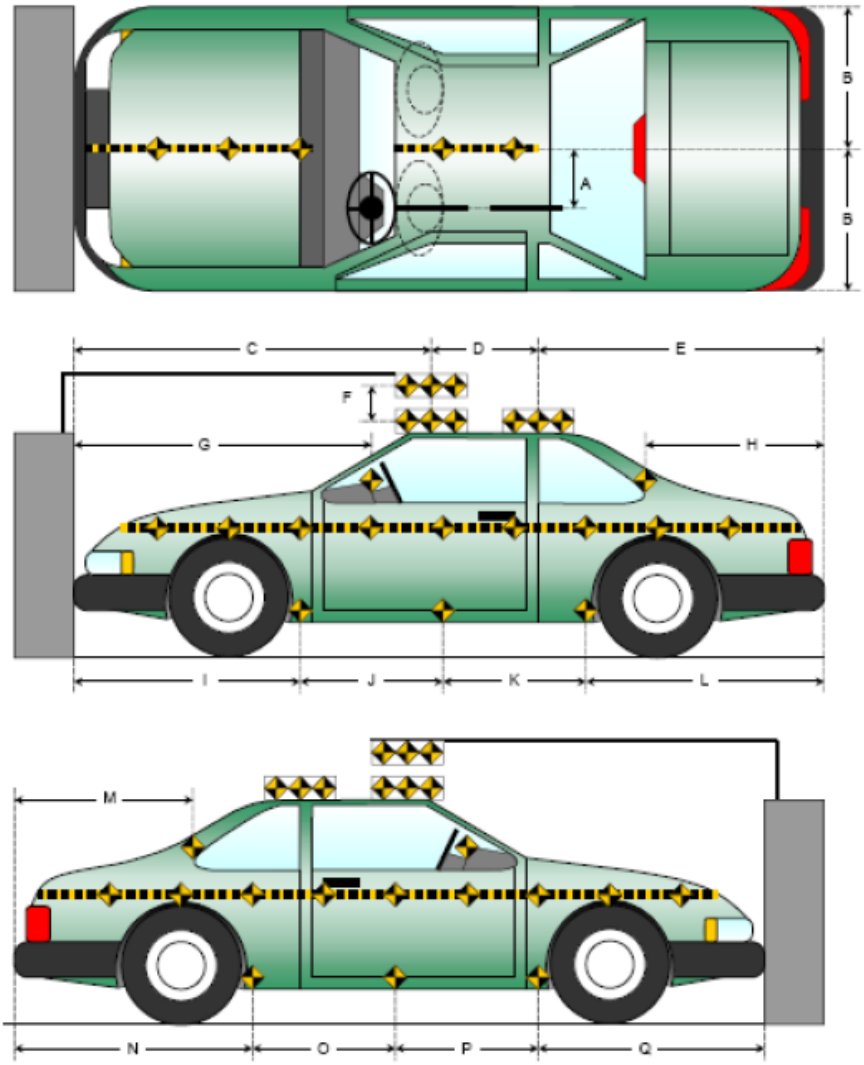
Reference Points: X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8 - PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

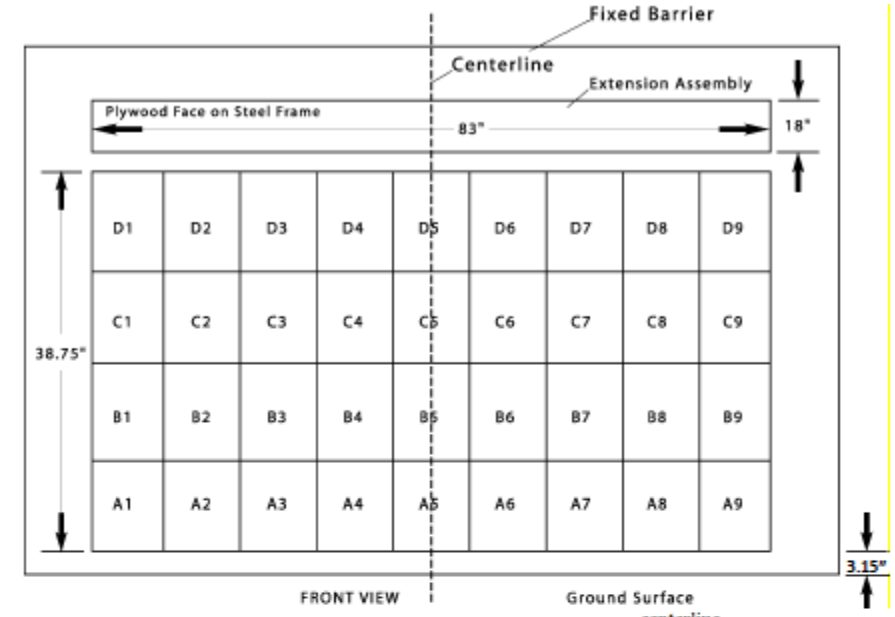
Item	Value
A	485
B	1014
C	2390
D	600
E	3146
F	232
G	1860
H	2377
I	1575
J	1367
K	833
L	2365
M	2398
N	2362
O	830
P	1380
Q	1568

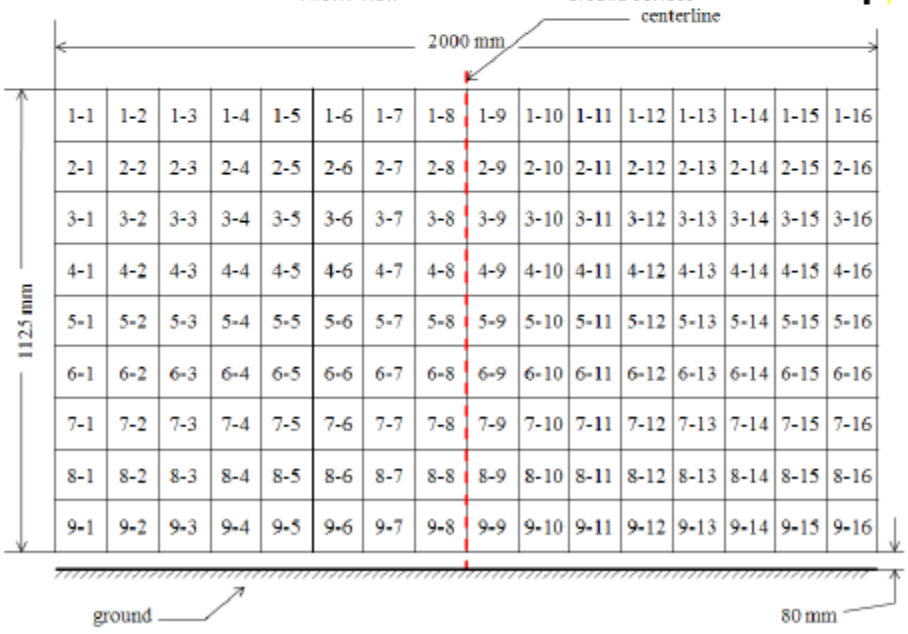
All units in millimeters



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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019





DATA SHEET NO. 10 - TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th / 037	Hybrid III 5th / 426
Head Contact	Frontal Airbag and Sun Visor 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**	Locked	Locked	
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	Small crack lower left A pillar
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

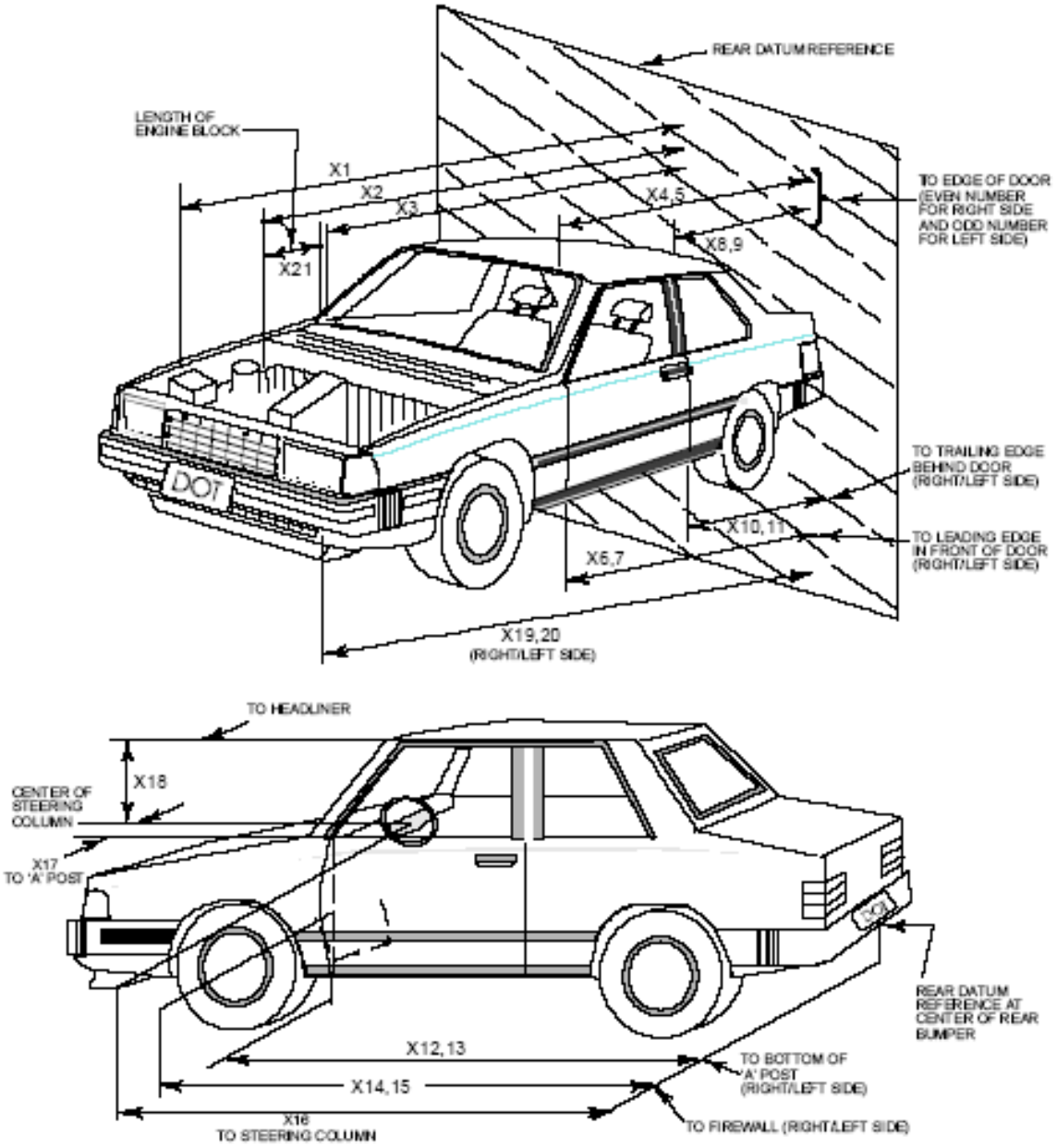
Measured Parameter	Units	Value
Left Side	mm	431
Center	mm	427
Right Side	mm	425
Average	mm	428

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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	6140	5530	610
2	Rear Surface of Vehicle (RSOV) to Front of Engine	5395	5340	55
3	RSOV to Firewall	5020	5000	20
4	RSOV to Upper Leading Edge of Right Door	4555	4556	-1
5	RSOV to Upper Leading Edge of Left Door	4556	4548	8
6	RSOV to Lower Leading Edge of Right Door	4492	4511	-19
7	RSOV to Lower Leading Edge of Left Door	4495	4505	-10
8	RSOV to Upper Trailing Edge of Right Door	4467	4463	4
9	RSOV to Upper Trailing Edge of Left Door	3468	3460	8
10	RSOV to Lower Trailing Edge of Right Door	3462	3463	-1
11	RSOV to Lower Trailing Edge of Left Door	3463	3475	-12
12	RSOV to Bottom of "A" Post-of Right Side	4510	4507	3
13	RSOV to Bottom of "A" Post-of Left Side	4514	4505	9
14	RSOV to Firewall, Right Side	5210	4975	235
15	RSOV to Firewall, Left Side	5210	4975	235
16	RSOV to Steering Column	4070	4102	-32
17	Center of Steering Column to "A" Post	292	306	-14
18	Center of Steering Column to Headliner	460	490	-30
19	RSOV to Right Side of Front Bumper	5914	5545	369
20	RSOV to Left Side of Front Bumper	5910	5540	370
21	Length of Engine Block	660	660	0
RD	RSOV to Right Side of Dash Panel	4350	4348	2
CD	RSOV to Center of Dash Panel	4260	4253	7
LD	RSOV to Left Side of Dash Panel	4364	4360	4

All Dimensions in mm

DATA SHEET NO. 13 - ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

VEHICLE INFORMATION

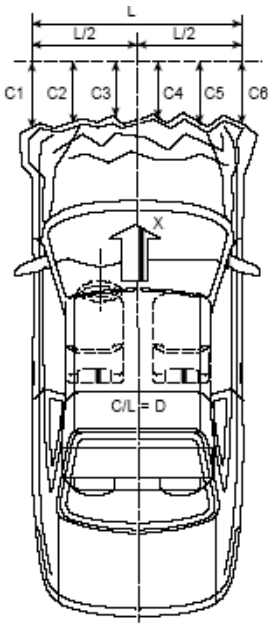
VIN: 1C6SRFNT6KN804871 Wheelbase: 3910
Vehicle Size Category: Truck Test Weight (kg): 2721.2

ACCELEROMETER DATA

Accelerometer Locations: As listed on Page 15 of this report.
Cal. Procedure/Interval: TRC procedure / 6 month interval
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 55.91
Velocity Change (km/h): 61.82
Time of Separation (ms): 195

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1828
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5910	5540	370
C2	Crush zone 2 at left side	mm	6085	5555	530
C3	Crush zone 3 at left side	mm	6140	5530	610
C4	Crush zone 4 at right side	mm	6140	5530	610
C5	Crush zone 5 at right side	mm	6084	5552	532
C6	Crush zone 6 at right side	mm	5914	5545	369
L	C1 to C6	mm	1828	1805	23

DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS

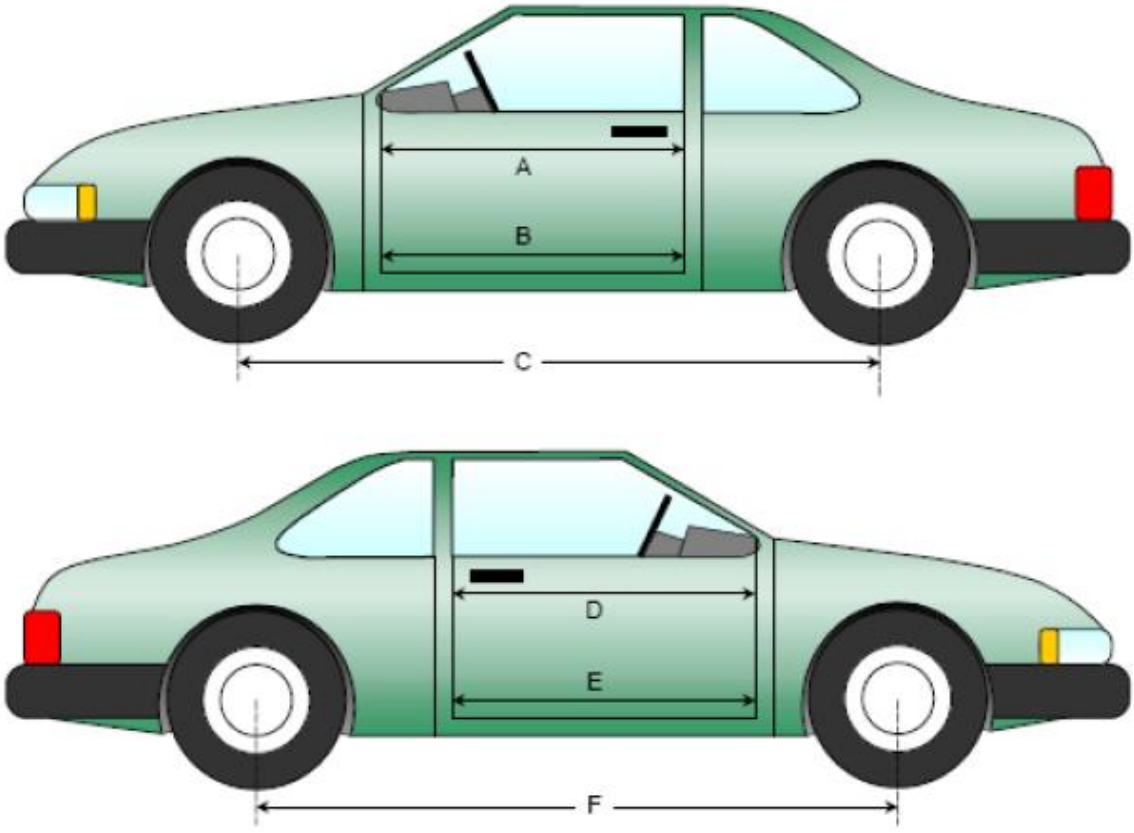
Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	990	990	0
B	Left Side Lower	mm	920	920	0
D	Right Side Upper	mm	990	990	0
E	Right Side Lower	mm	920	920	0

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3910	3855	55
F	Right Side Wheelbase	mm	3910	3860	50



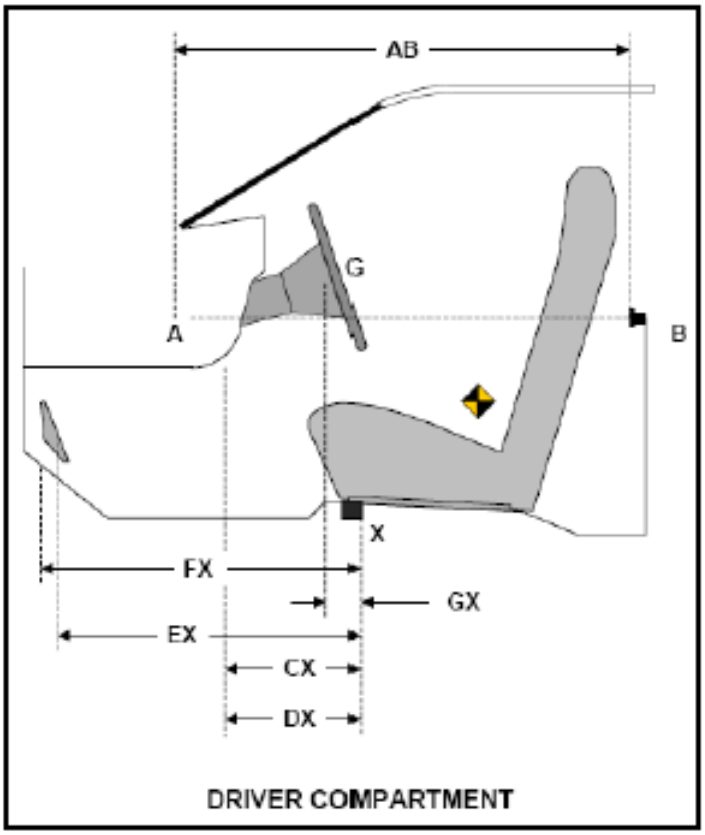
DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1010	1010	0
CX	Left Knee Bolster to X	mm	290	305	-15
DX	Right Knee Bolster to X	mm	278	264	14
EX	Brake Pedal to X	mm	530	520	10
FX	Foot Rest to X	mm	650	645	5
GX	Center of Steering Column Wheel Hub to X	mm	54	98	-44

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

Please provide windshield mounting details.

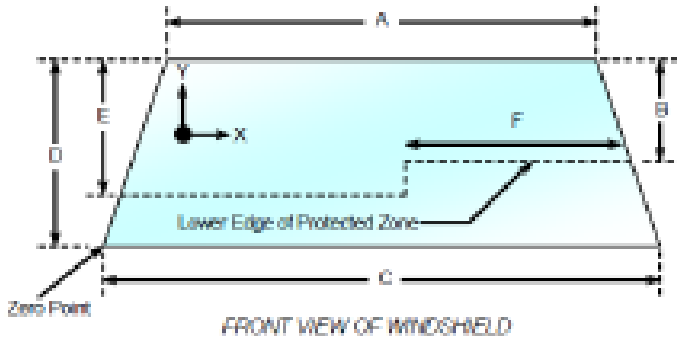
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.9°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2353	2353	100.0
Right Side	2353	2353	100.0
Total	4706	4706	100.0

Item	Units	Value
A	mm	1420
B	mm	450
C	mm	1545
D	mm	870
E	mm	510
F	mm	490



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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 21.3°C Test Time: 14:44

Stoddard Solvent Spillage Measurements

A From impact until vehicle motion ceases: 0 oz.
(maximum allowable – 1 oz.)

B For the 5-minute period after motion ceases: 0 oz.
(maximum allowable – 5 oz.)

C For the following 25 minutes: 0 oz.
(maximum allowable – 1 oz./minutes)

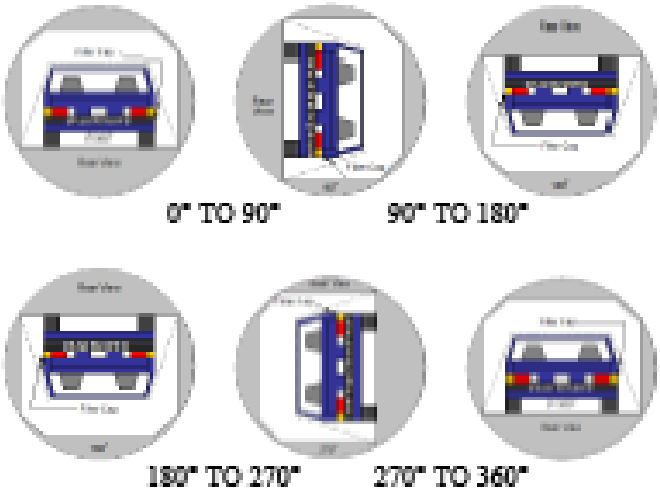
D Spillage: None

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

Test Vehicle: 2019 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019

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

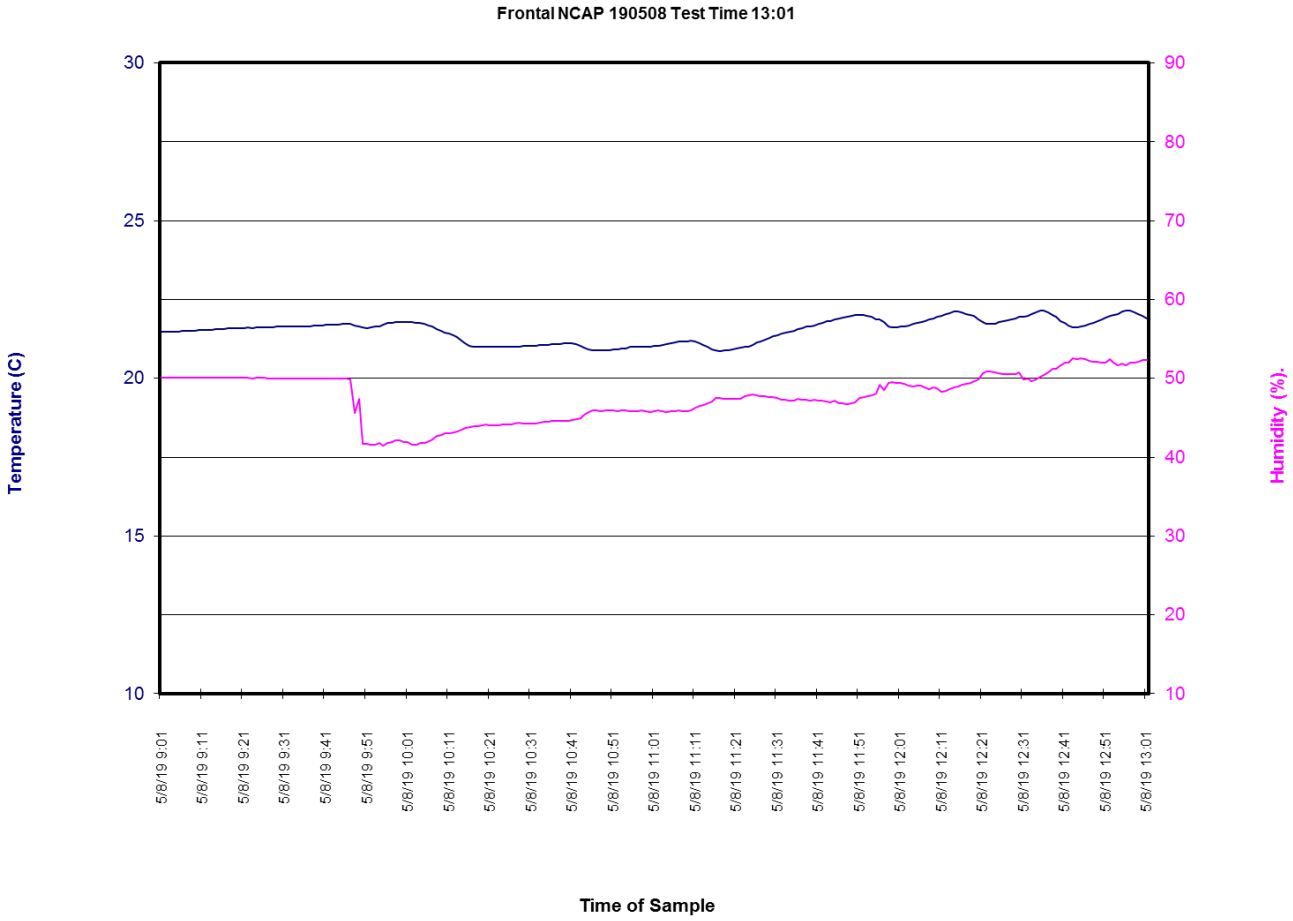
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0º to 90º	0	0	0	N/A
90º to 180º	0	0	0	N/A
180º to 270º	0	0	0	N/A
270º to 360º	0	0	0	N/A

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 Ram 1500 Crew Cab NHTSA No.: M20190310
Test Program: NCAP Frontal Impact Test Date: 5/8/2019



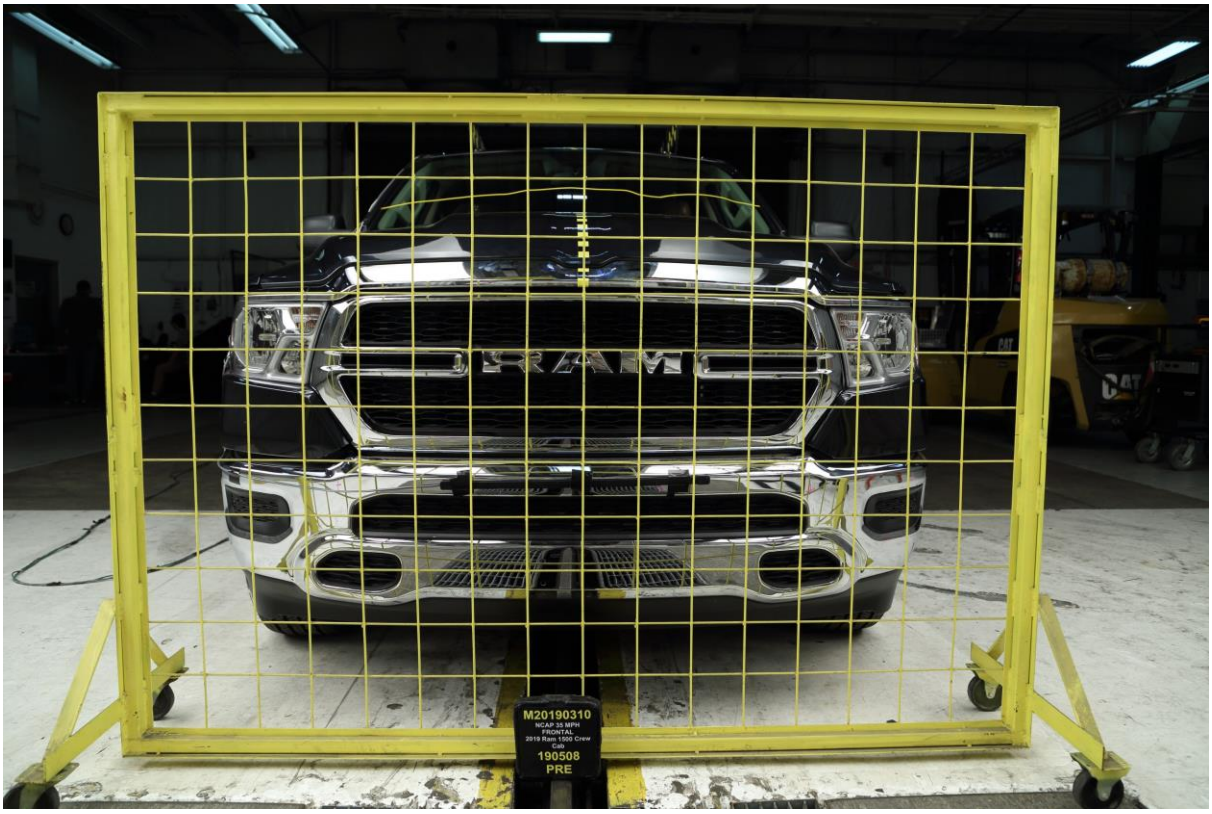
APPENDIX A

PHOTOGRAPHS

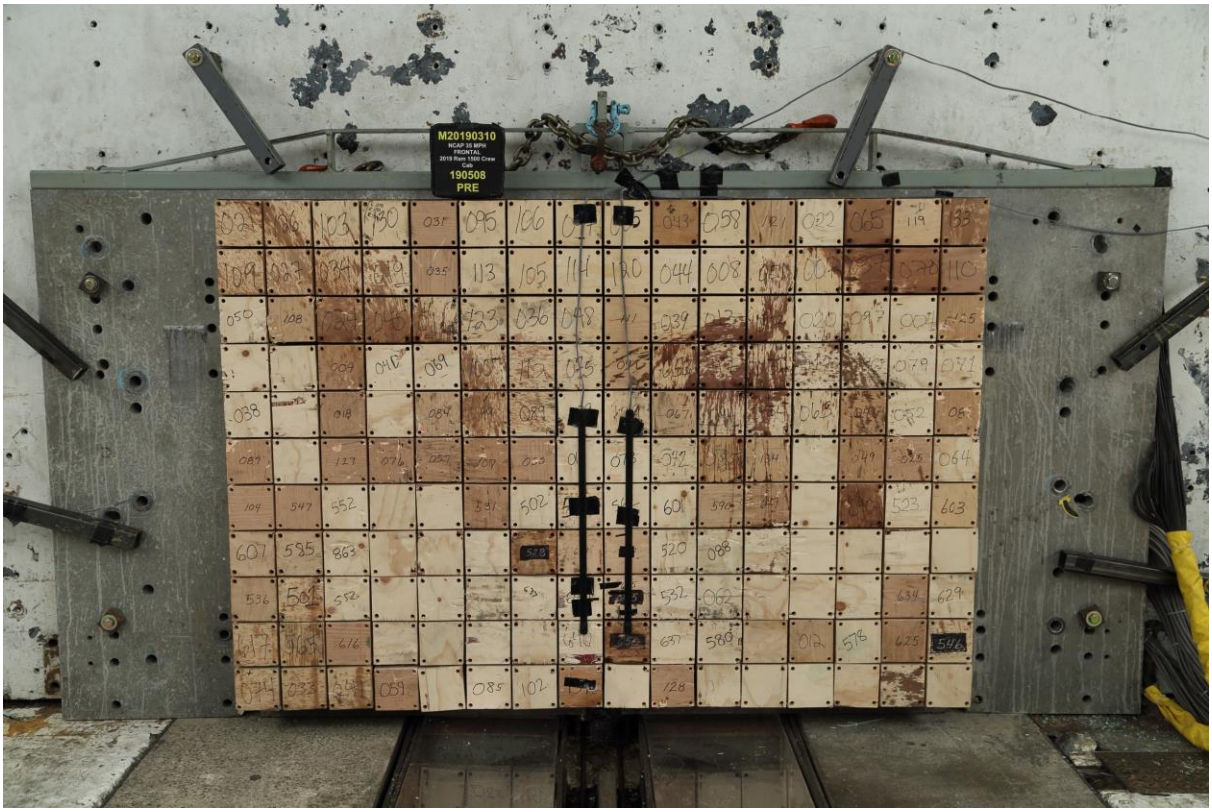
TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)

TABLE OF PHOTOGRAPHS (CONTINUED)

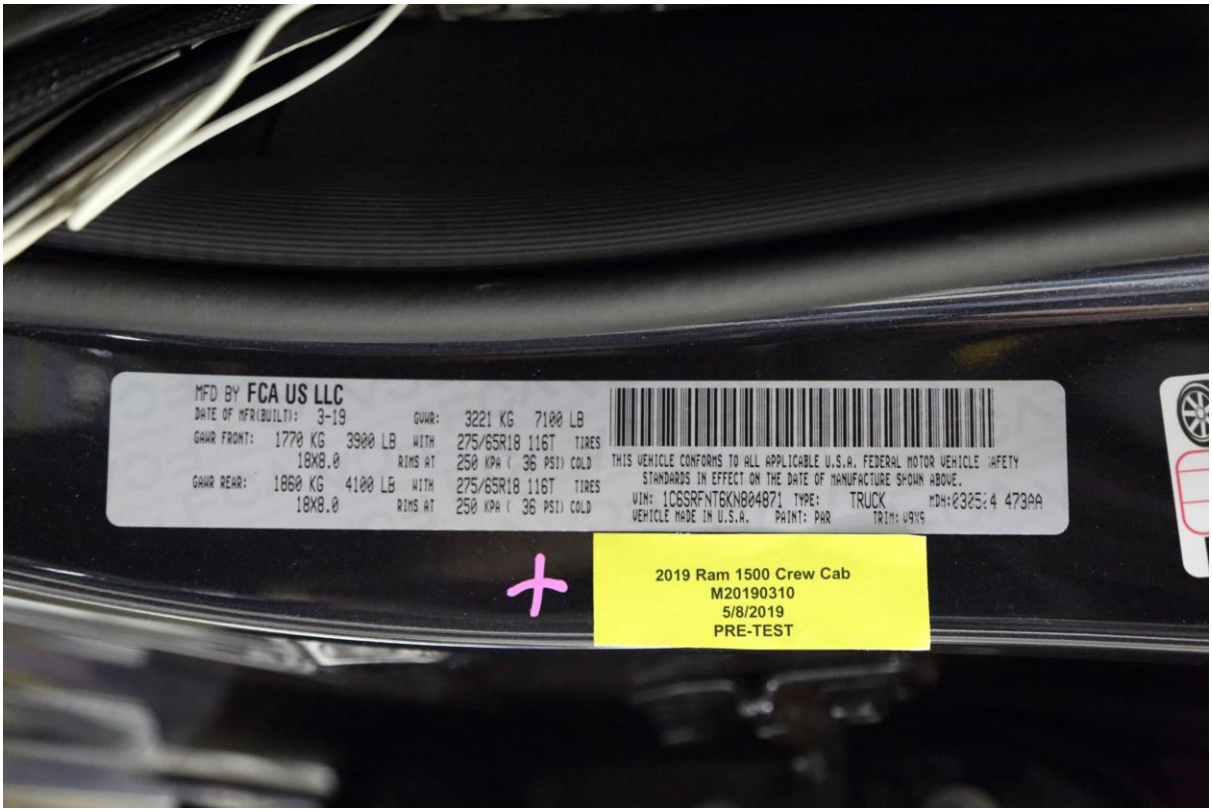


001 Load Cell Location



002 Pre-Test Load Cell Wall

003 Post-Test Load Cell Wall



004 Manufacturer's Label

005 Tire Placard

Intentionally Left Blank

006 2019 Ram 1500 Crew Cab Frontal As Delivered

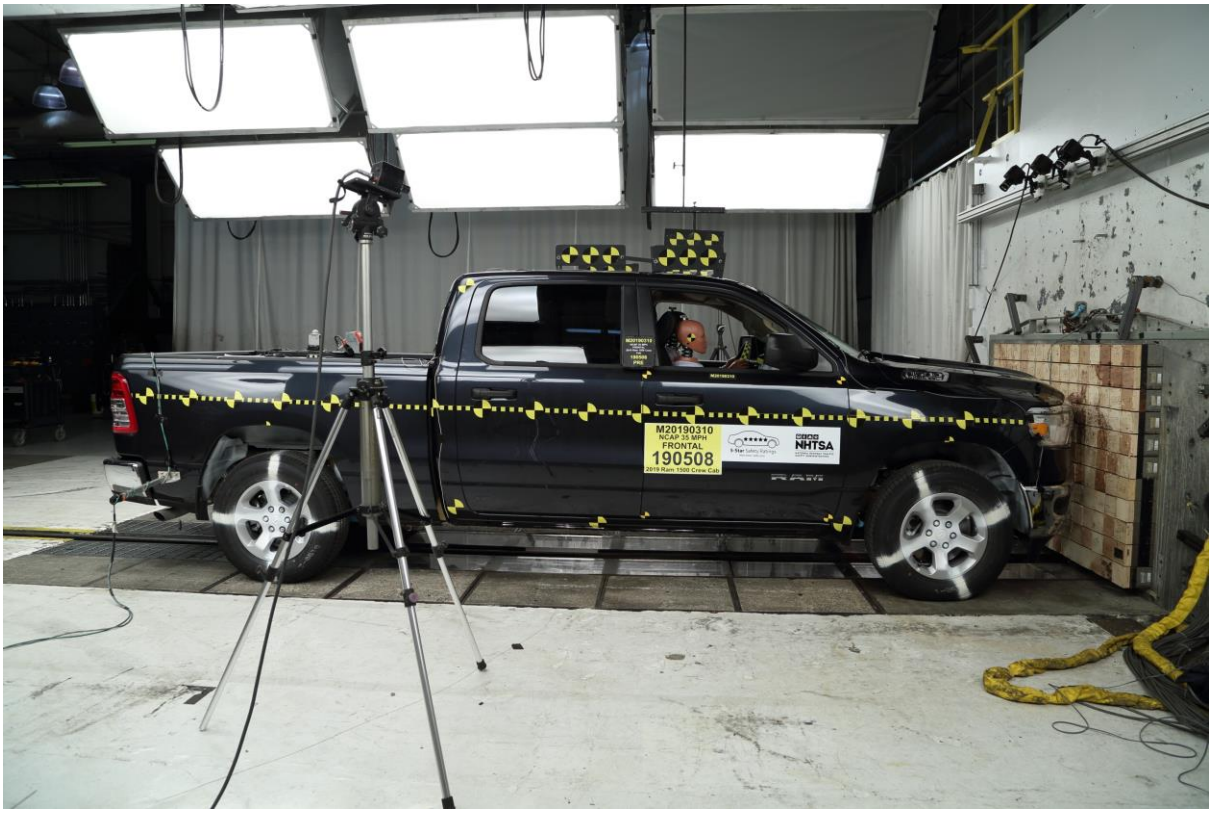
007 Left Rear 3-4 View, as Received

008 Pre-Test Front View of Test Vehicle

009 Post-Test Front View of Test Vehicle

010 Pre-Test Left View of Test Vehicle

011 Post-Test Left View of Test Vehicle



012 Pre-Test Right View of Test Vehicle

013 Post-Test Right View of Test Vehicle

014 Pre-Test Right Front 3-4 View

015 Post-Test Right Front 3-4 View

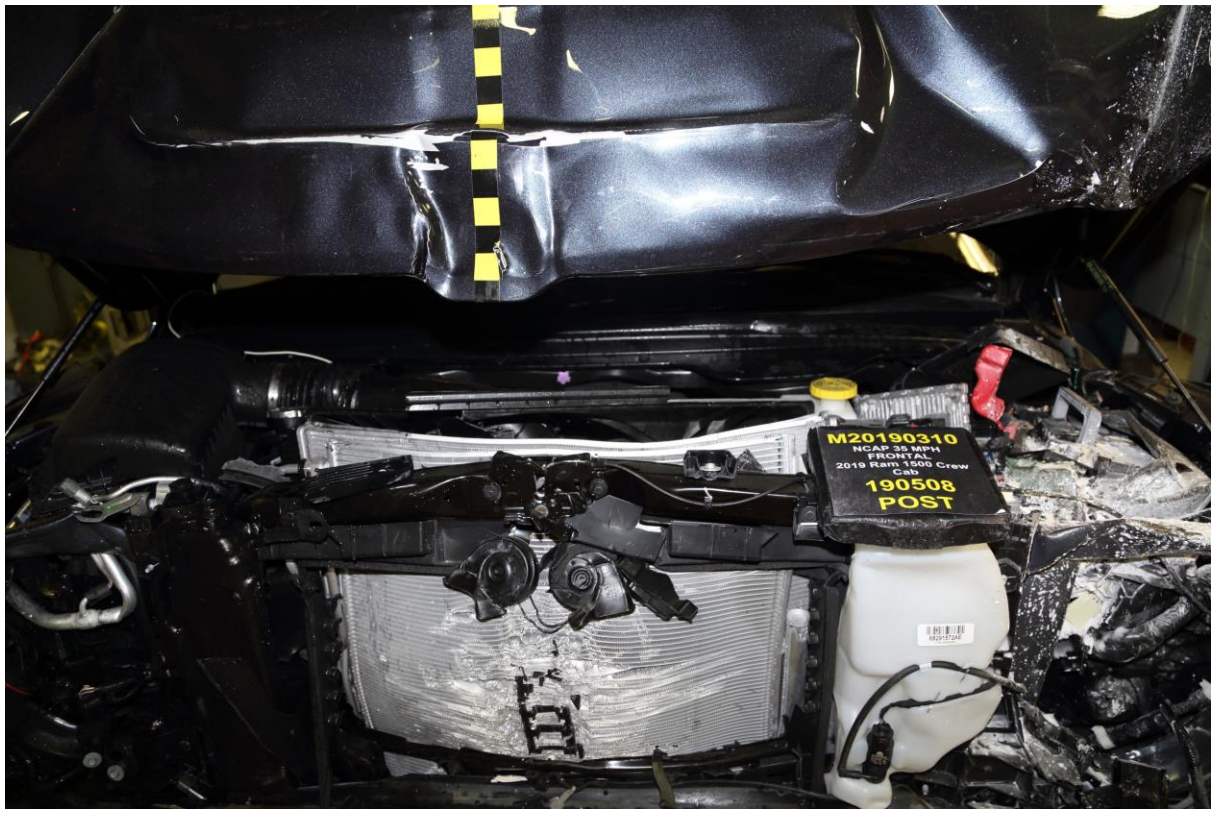
016 Pre-Test Left Rear 3-4 View

017 Post-Test Left Rear 3-4 View

018 Pre-Test Windshield View

019 Post-Test Windshield View

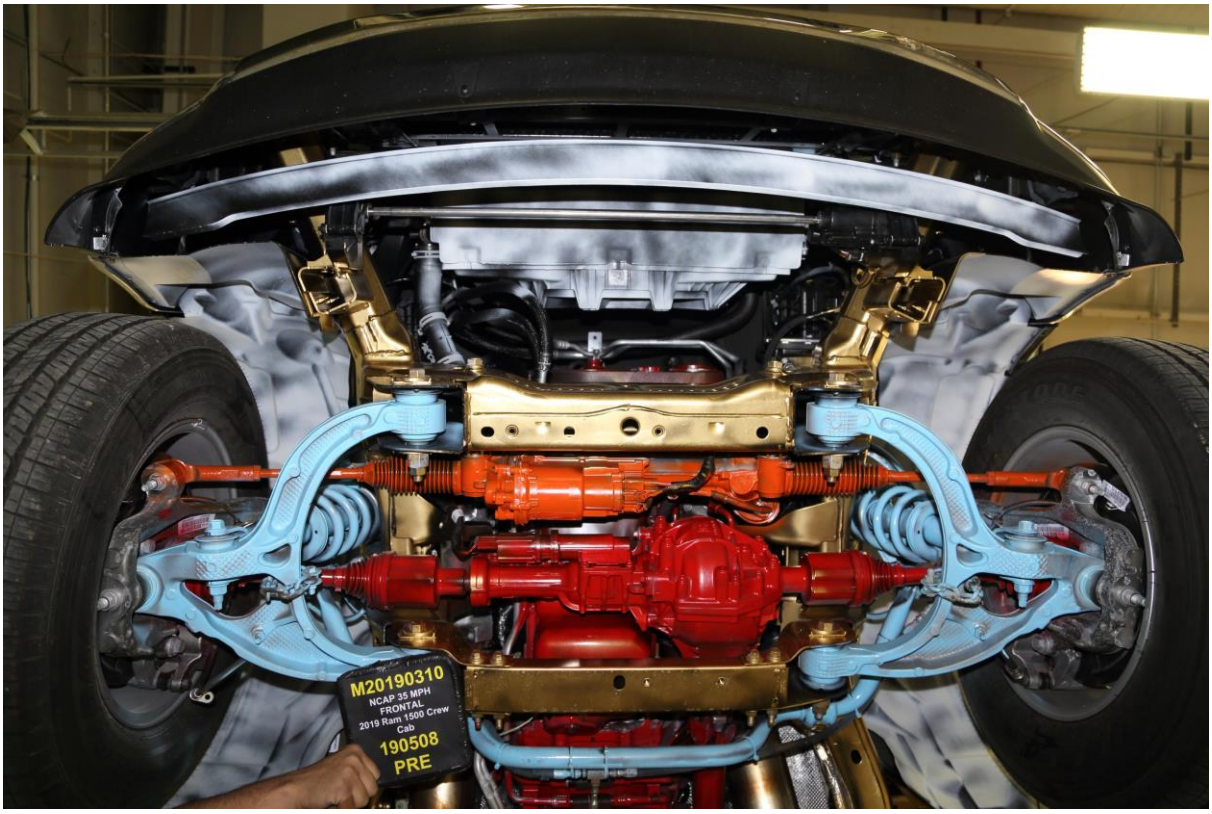
020 Pre-Test Engine Compartment View



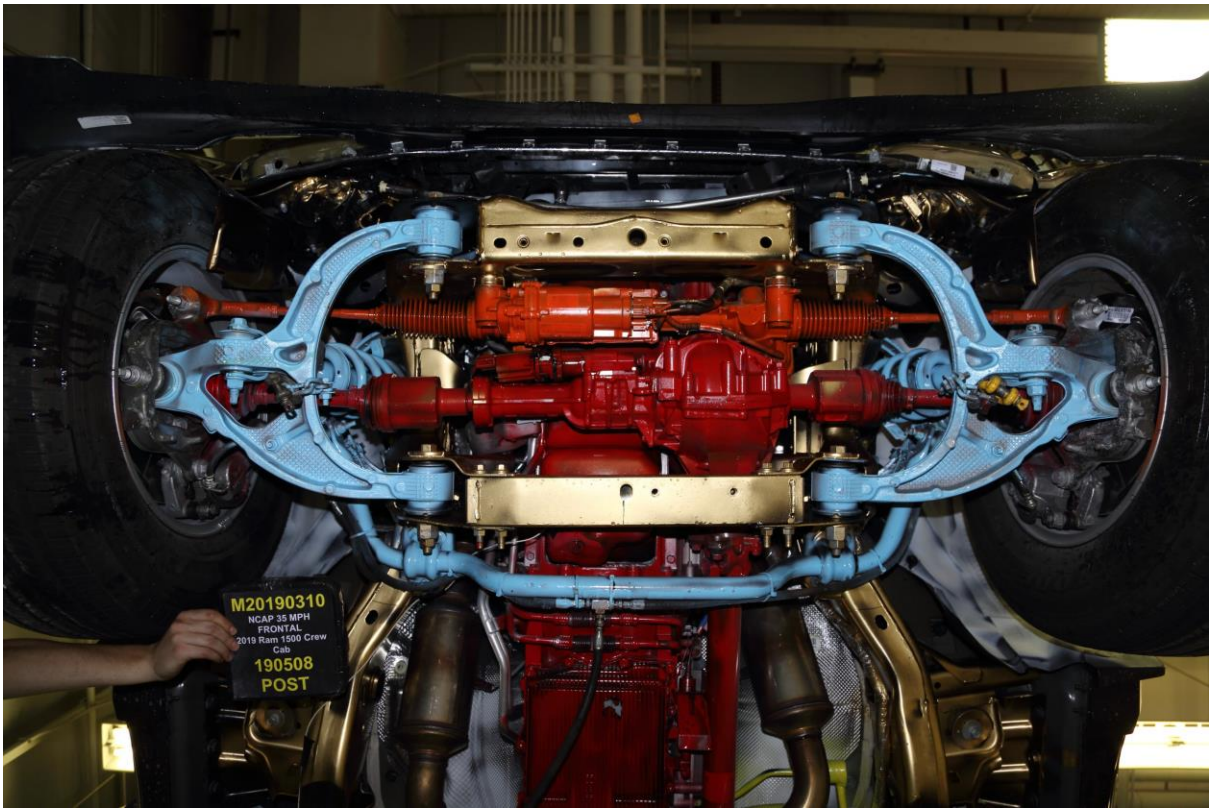
021 Post-Test Engine Compartment View

022 Pre-Test Fuel Filler Cap View

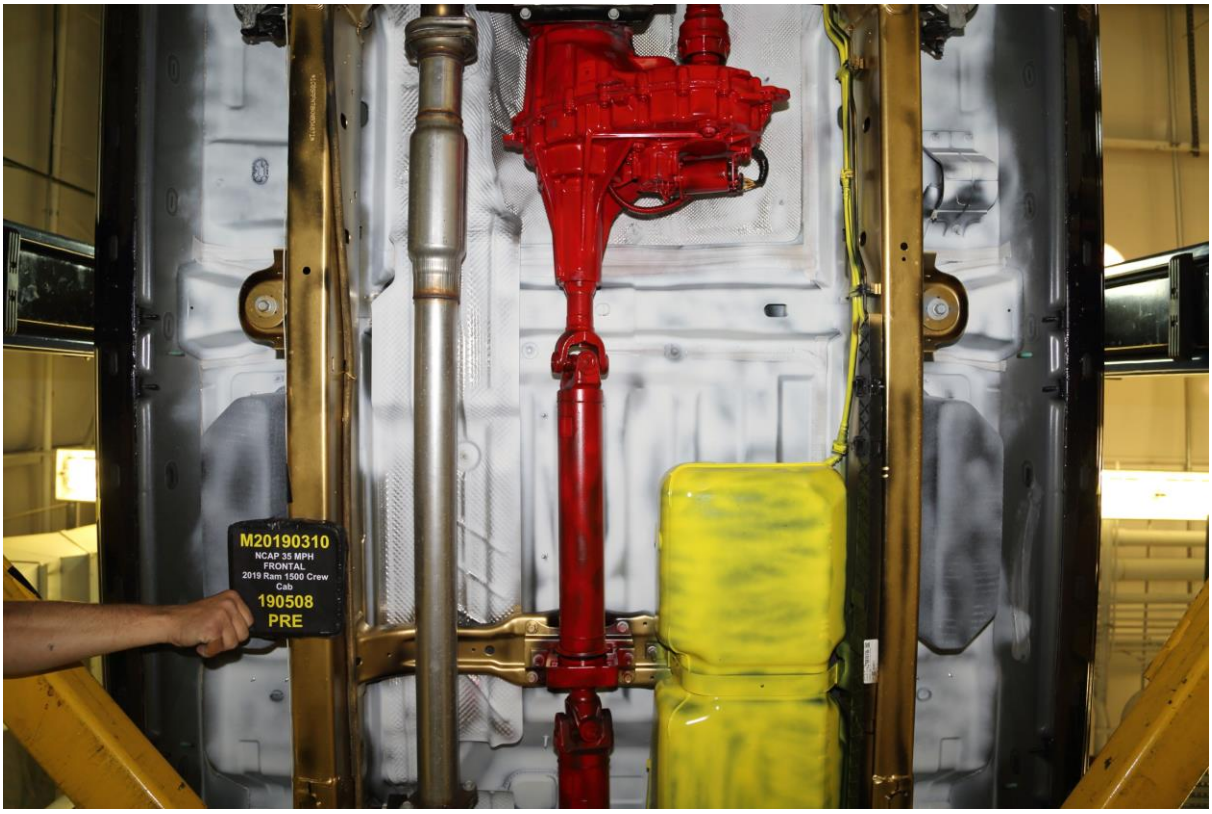
023 Post-Test Fuel Filler Cap View



024 Pre-Test Front Underbody View

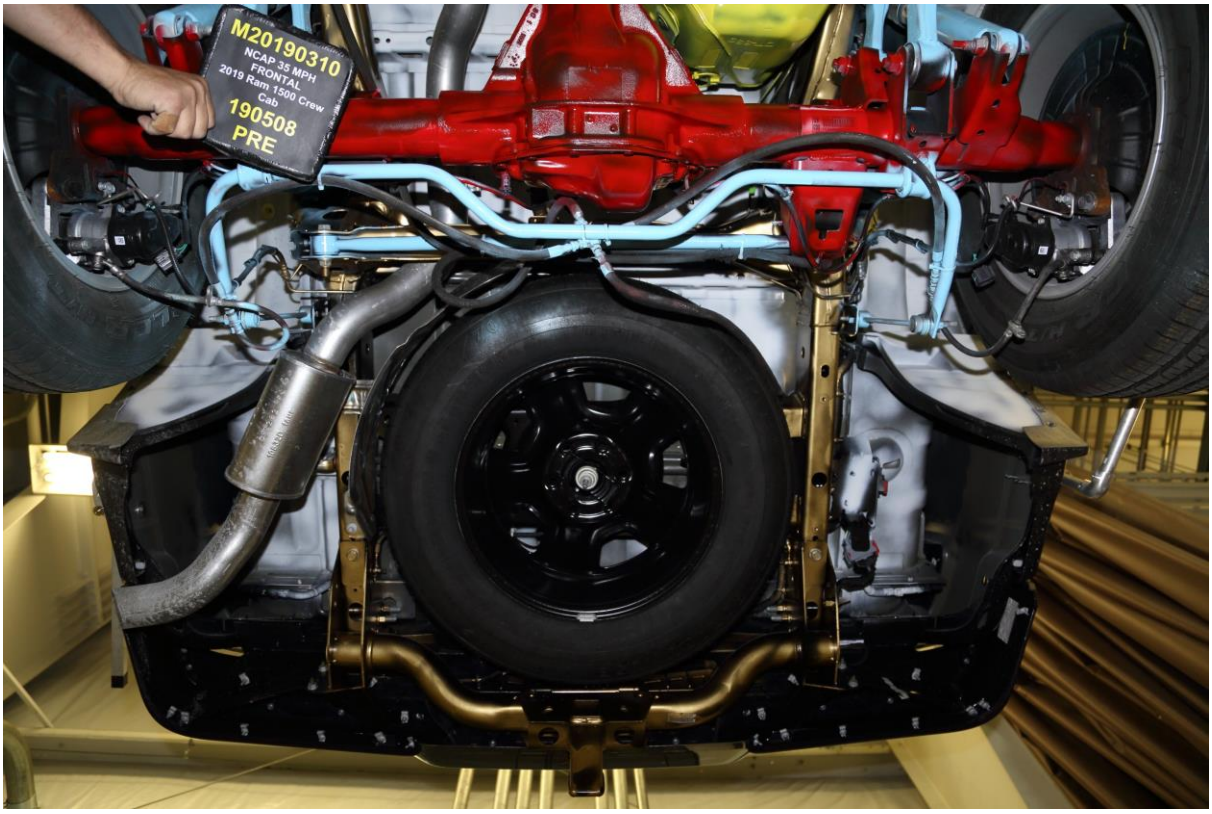


025 Post-Test Front Underbody View

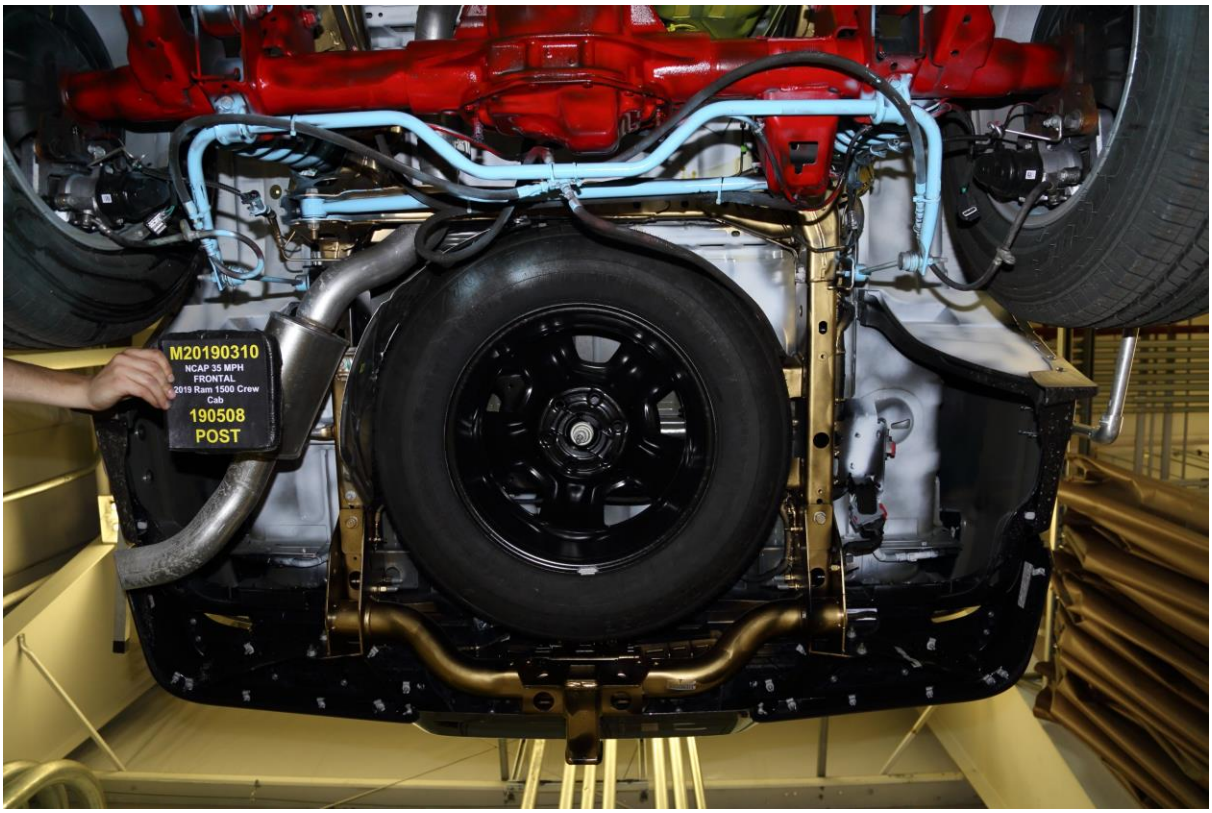


025a Pre-Test Mid Underbody View

025b Post-Test Mid Underbody View



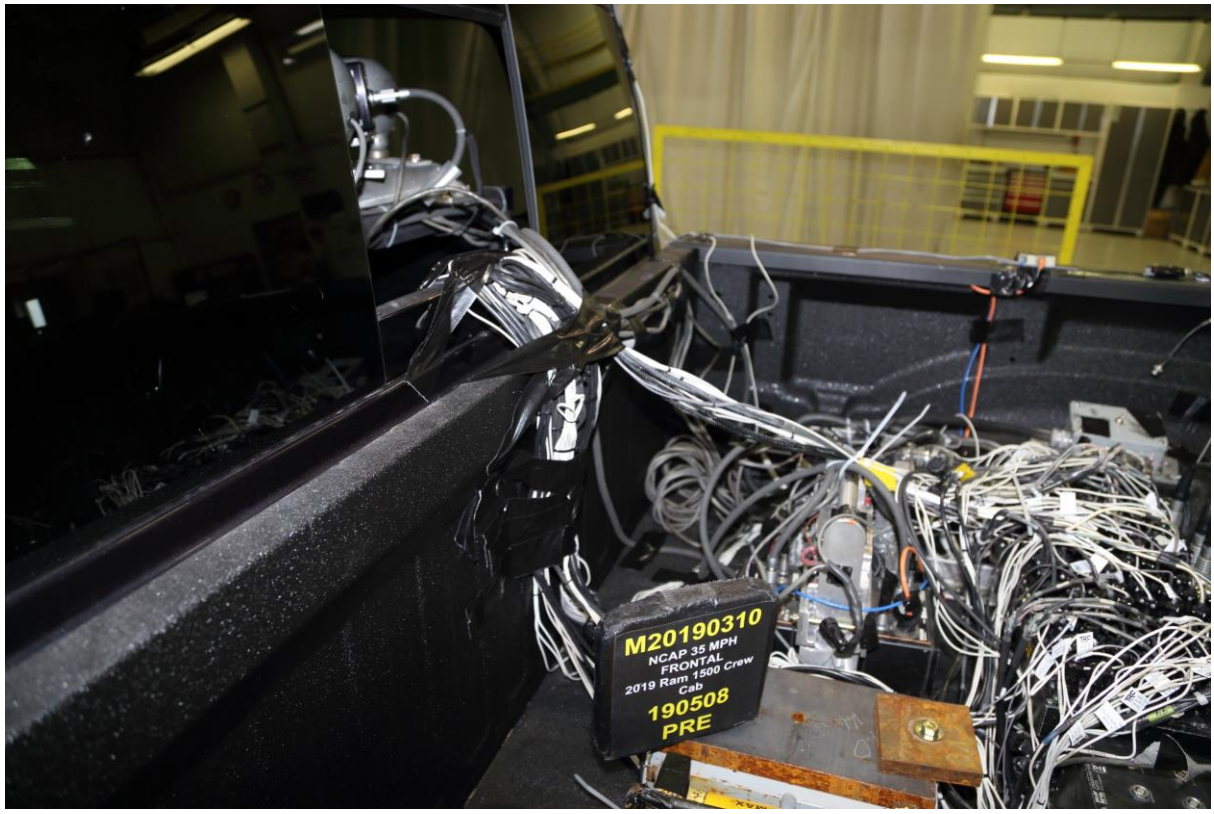
026 Pre-Test Rear Underbody View



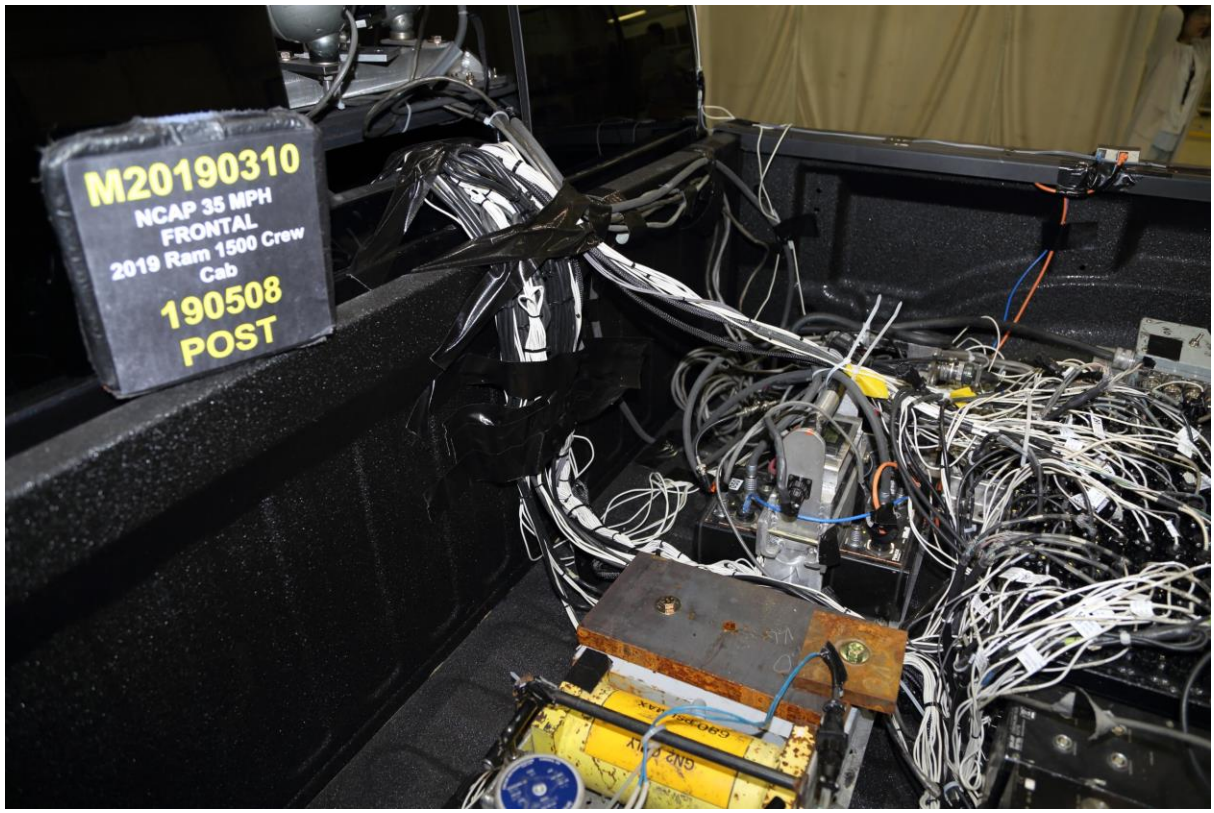
027 Post-Test Rear Underbody View

028 Pre-Test Dummy Cable Routing

029 Post-Test Dummy Cable Routing



029a Pre-Test Dummy Cable Routing



029b 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

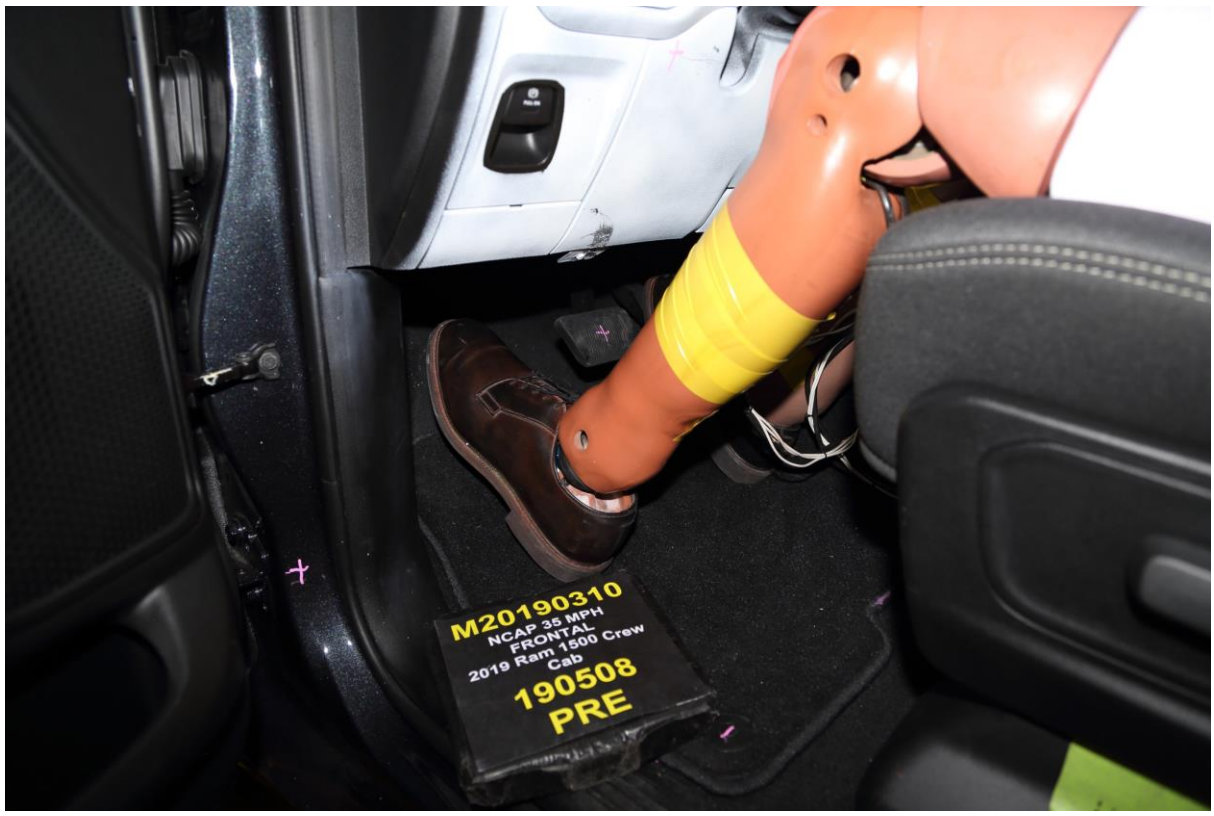
037 Post-Test Driver's Seat Fore-Aft Markings

038 Pre-Test View of Belt Anchorage for Driver Dummy

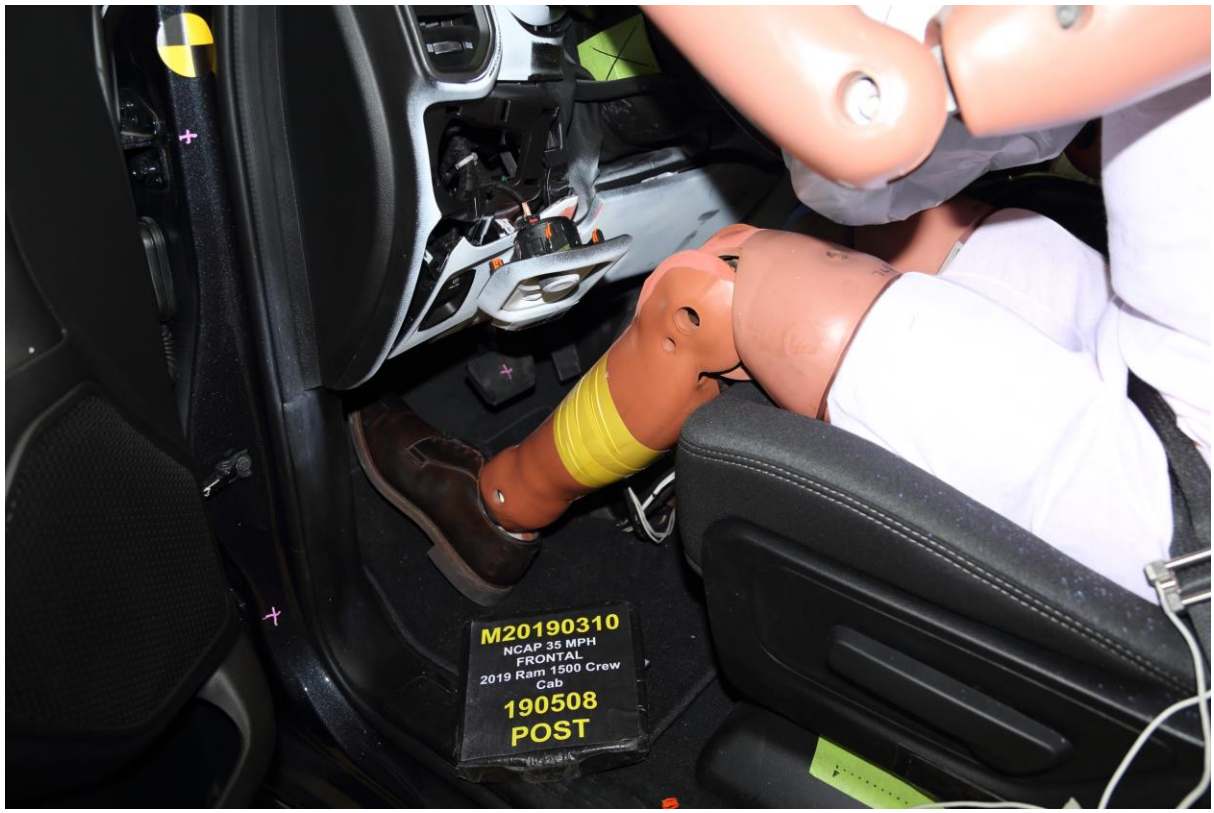
039 Post-Test View of Belt Anchorage for Driver Dummy

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

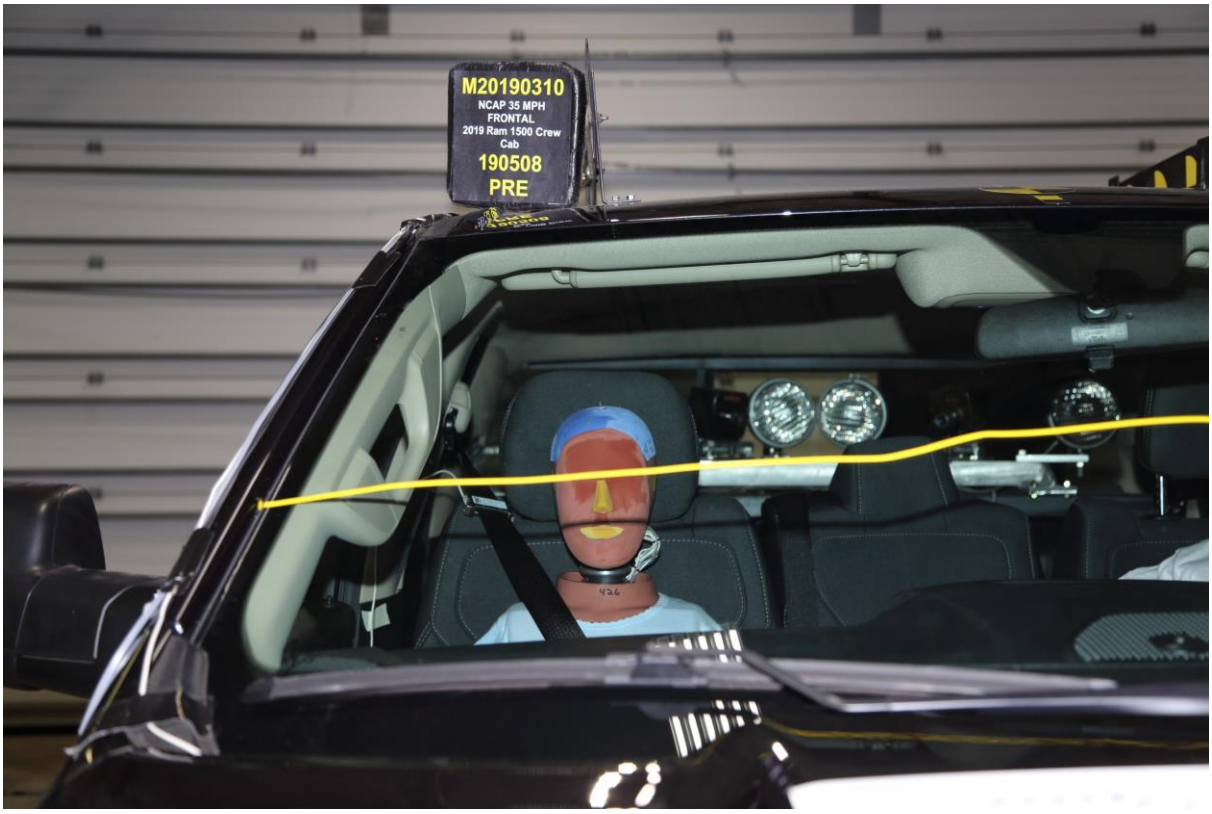
049 Post-Test Driver Dummy Contact with Airbag

050 Post-Test Driver Dummy Contact with Headrest

Intentionally Left Blank

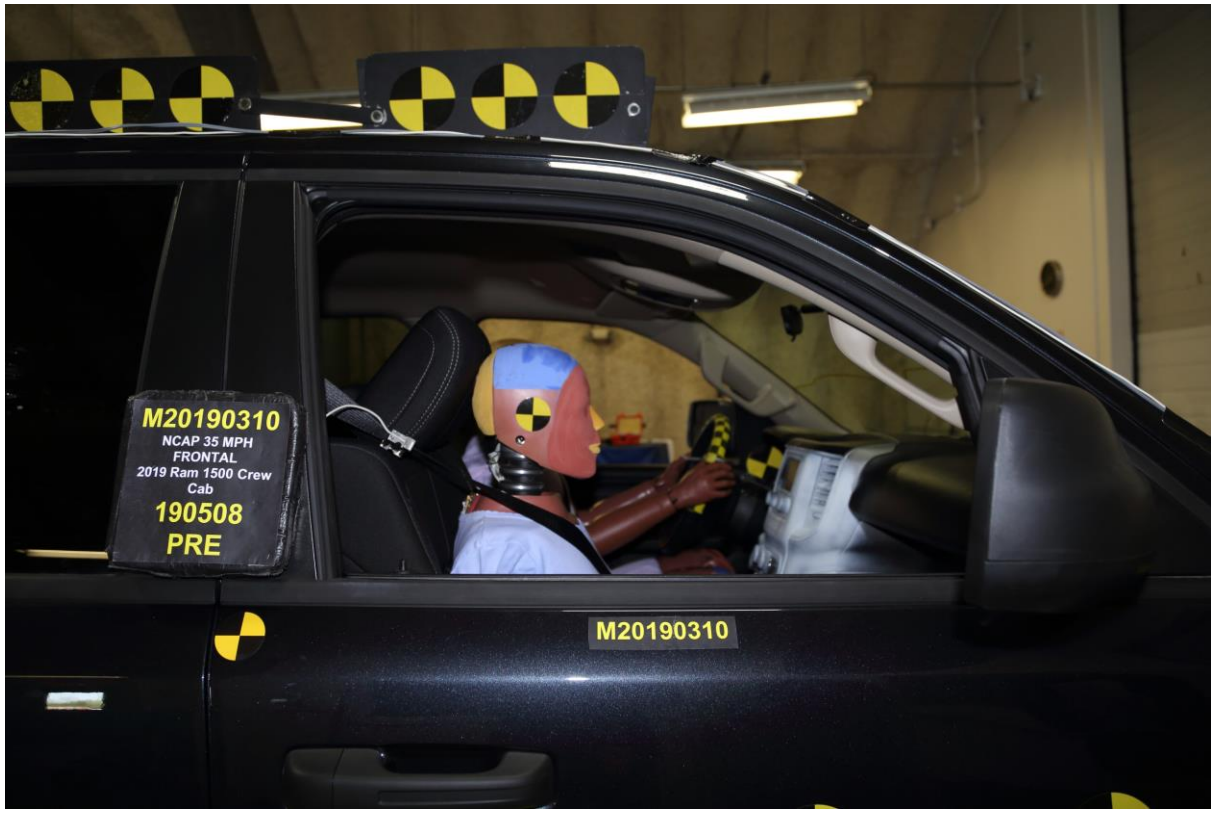
051 Pre-Test View of the Steering Wheel

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

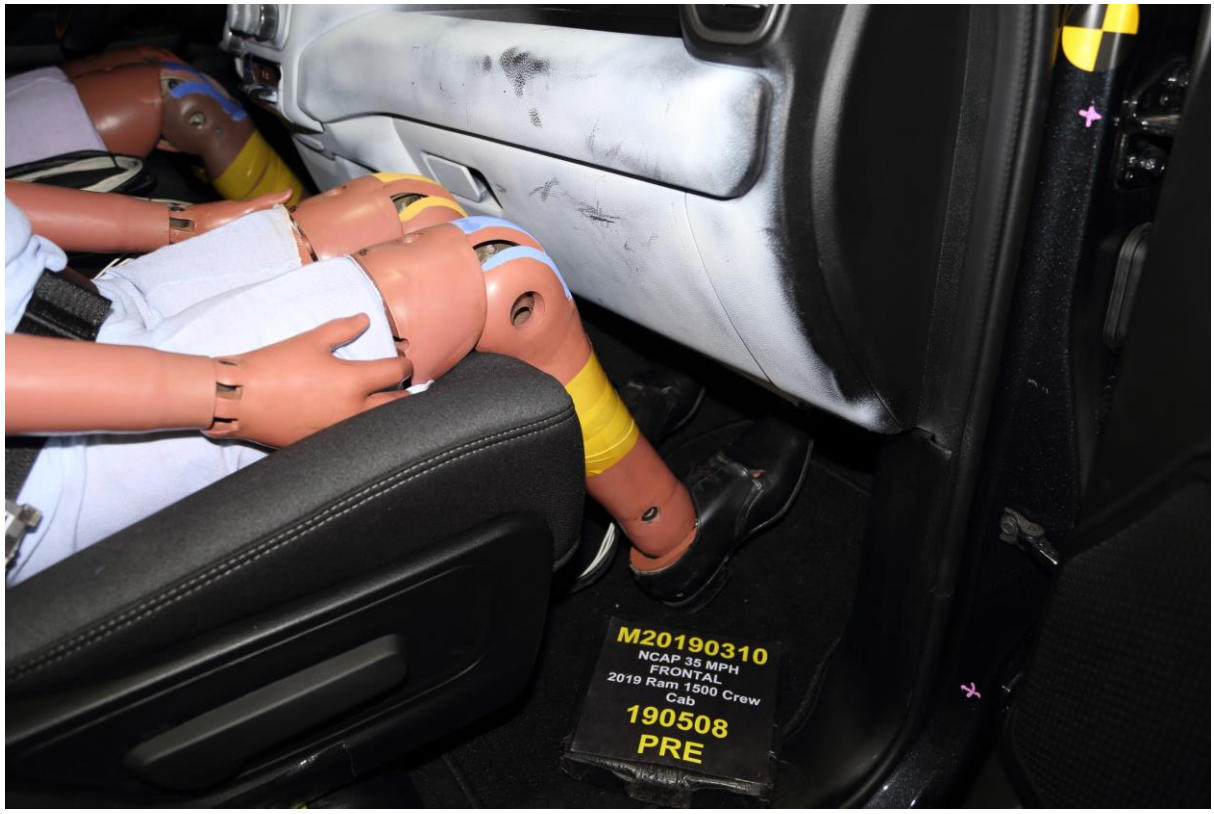
060 Post-Test Passenger's Seat Fore-Aft Markings

061 Pre-Test View of Belt Anchorage for Passenger Dummy

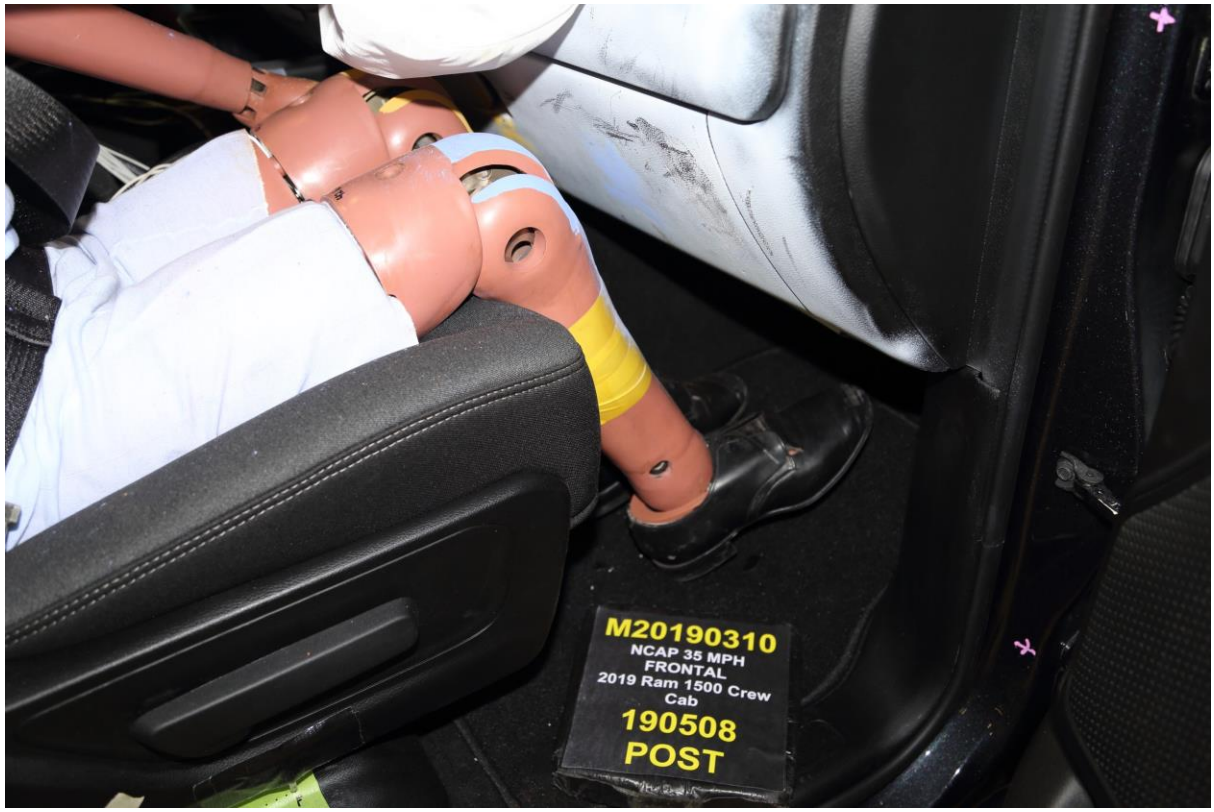
062 Post-Test View of Belt Anchorage for Passenger Dummy

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

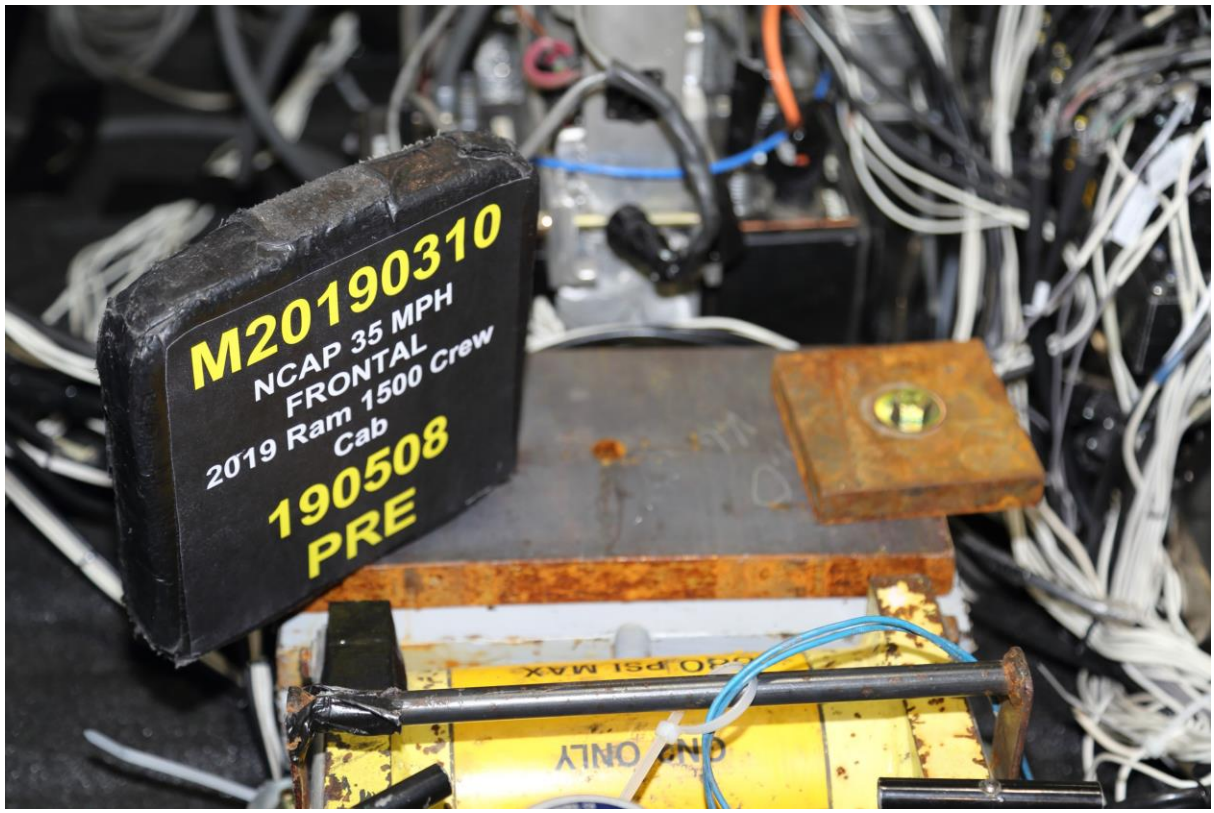
069 Pre-Test Passenger's Side Floorpan

070 Post-Test Passenger's Side Floorpan

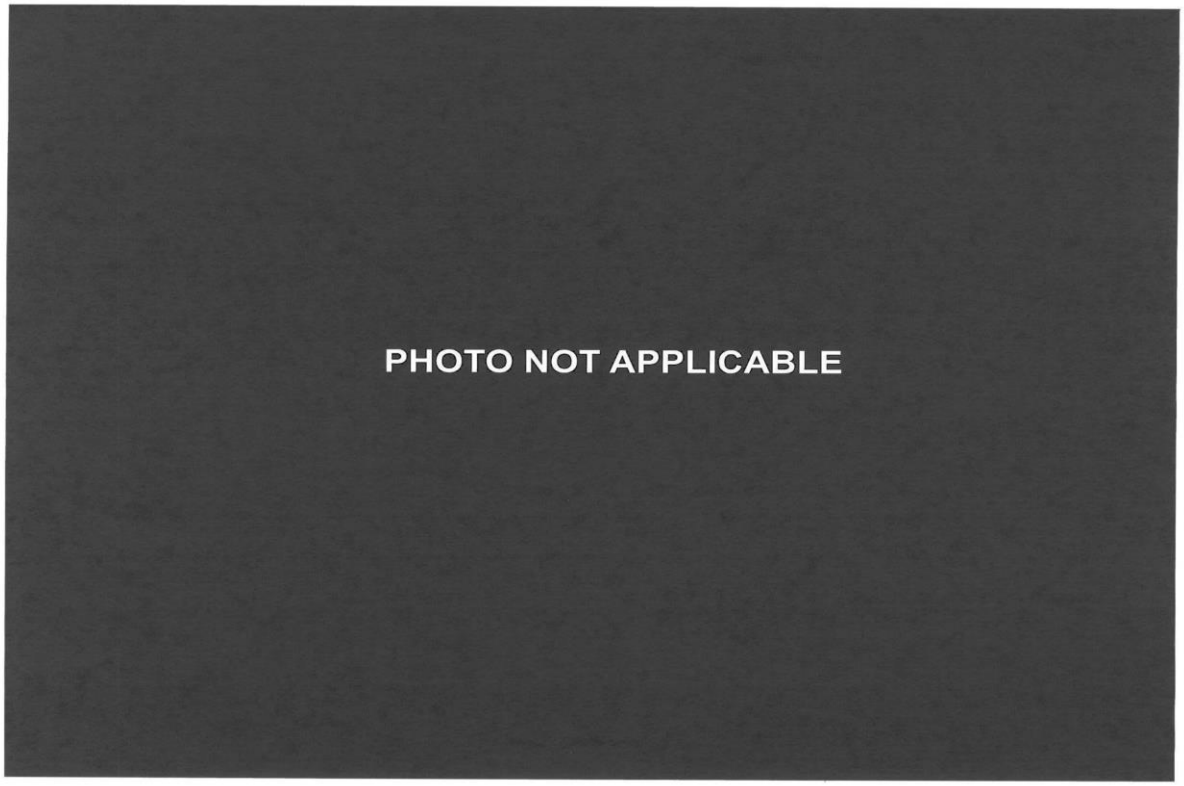
071 Post-Test Passenger Dummy Face

072 Post-Test Passenger Dummy Contact with Airbag

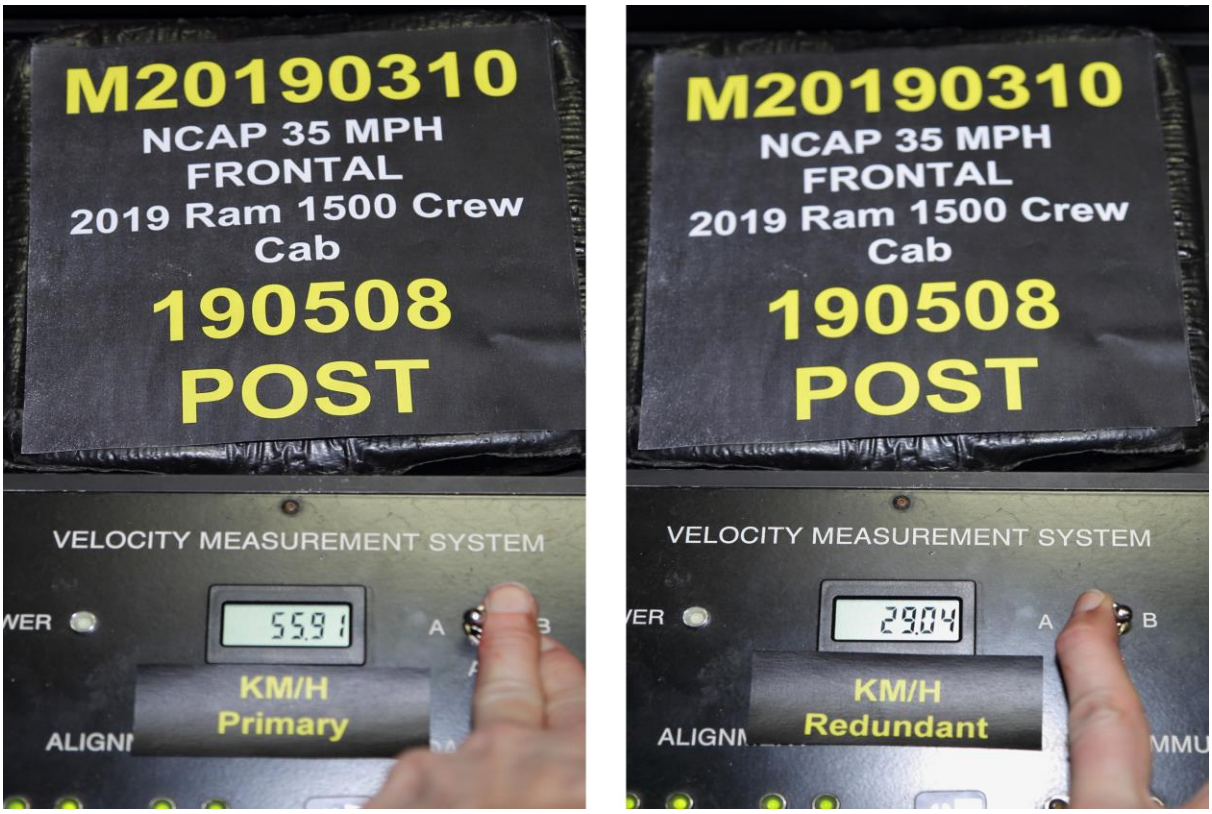
073 Post-Test Passenger Dummy Contact with Headrest



074 Photograph of Ballast Installed in Vehicle



075 Post-Test Stoddard Spillage Location View

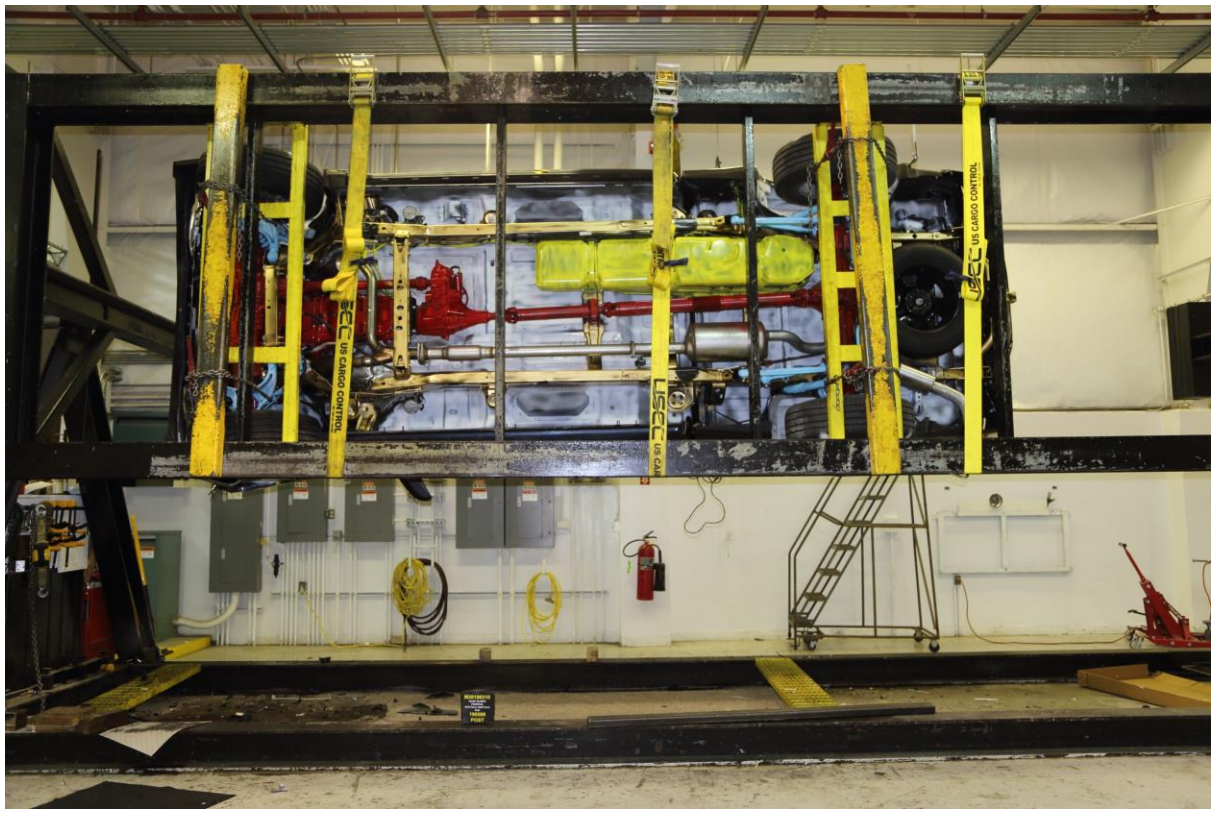


076 Post-Test Speed Trap Read out

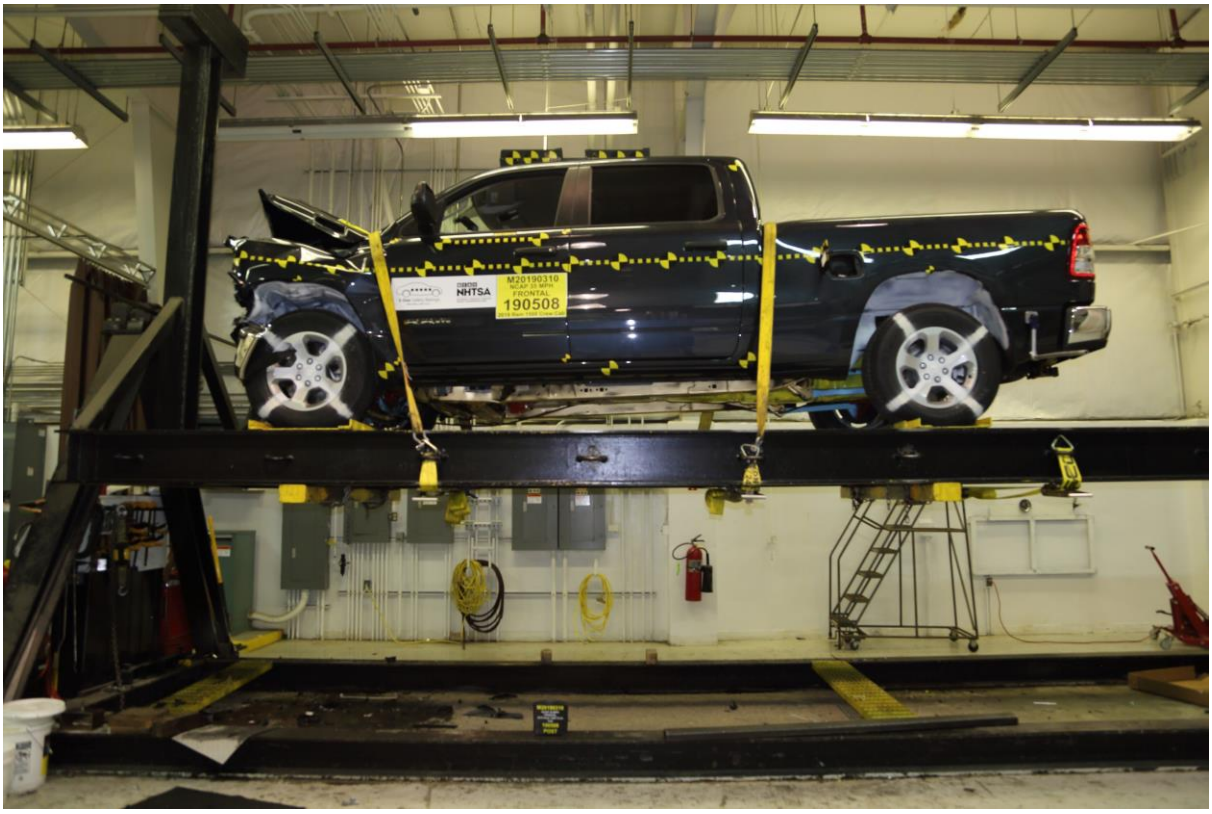
077 Vehicle at 0º on Static Rollover Device

078 Vehicle at 90º on Static Rollover Device

079 Vehicle at 180º on Static Rollover Device

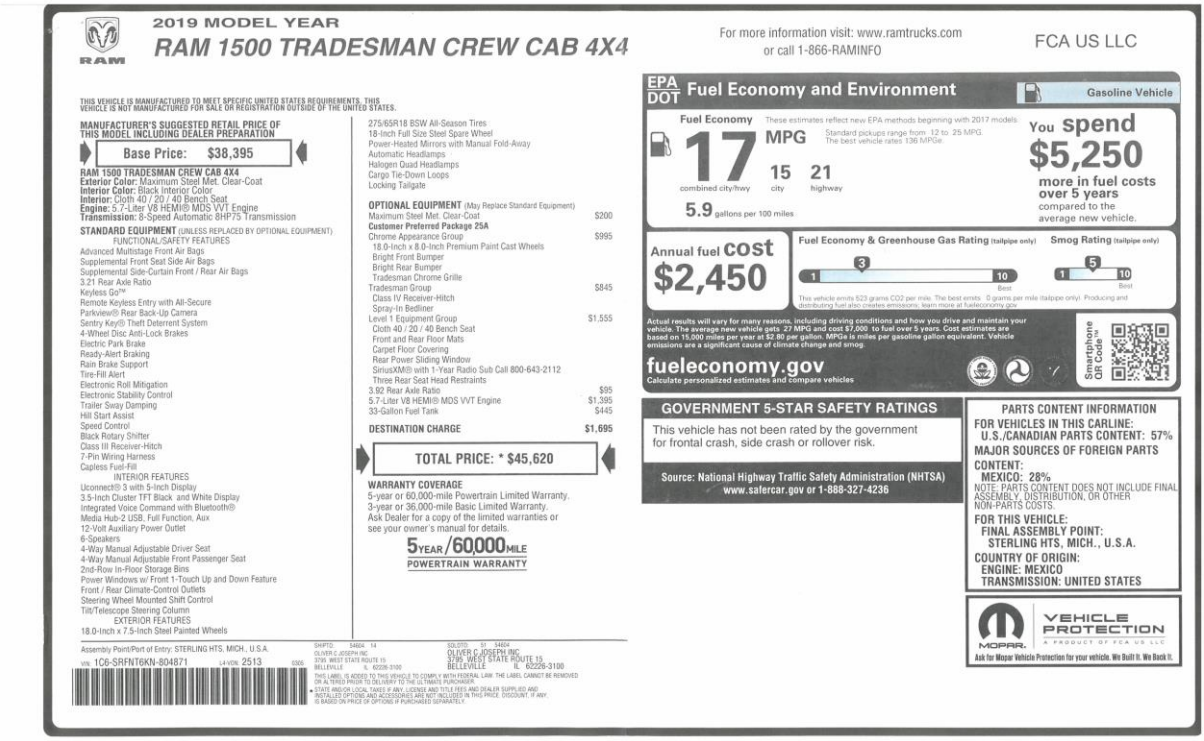


080 Vehicle at 270º on Static Rollover Device



081 Vehicle at 360º on Static Rollover Device

082 2019 Ram 1500 Crew Cab Frontal Impact Event



2019 MODEL YEAR

RAM 1500 TRADESMAN CREW CAB 4X4

For more information visit: www.ramtrucks.com or call 1-866-RAMINFO

FCA US LLC

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: $38,395

RAM 1500 TRADESMAN CREW CAB 4X4
Exterior Color: Maximum Steel Met. Clear-Coat
Interior Color: Black Interior Color
Interior: Cloth 40 / 20 / 40 Bench Seat
Engine: 5.7-Liter V8 HEMI® MDS VVT Engine
Transmission: 8-Speed Automatic 8HP75 Transmission

STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)

FUNCTIONAL/SAFETY FEATURES
Advanced Multistage Front Air Bags
Supplemental Front Seat Side Air Bags
Supplemental Side-Curtain Front / Rear Air Bags
3.21 Rear Axle Ratio
Keyless Go™
Remote Keyless Entry with All-Secure
ParkView® Rear Back-Up Camera
Sentry Key® Theft Deterrent System
4-Wheel Disc Anti-Lock Brakes
Electric Park Brake
Ready-Alert Braking
Rain Brake Support
Tire-Fill Alert
Electronic Roll Mitigation
Electronic Stability Control
Trailer Sway Damping
Hill Start Assist
Speed Control
Black Rotary Shifter
Class III Receiver-Hitch
7-Pin Wiring Harness
Capless Fuel-Fill

INTERIOR FEATURES
Uconnect® 3 with 5-Inch Display
3.5-Inch Cluster TFT Black and White Display
Integrated Voice Command with Bluetooth®
Media Hub-2 USB, Full Function, Aux
12-Volt Auxiliary Power Outlet
6-Speakers
4-Way Manual Adjustable Driver Seat
4-Way Manual Adjustable Front Passenger Seat
2nd-Row In-Floor Storage Bins
Power Windows w/ Front 1-Touch Up and Down Feature
Front / Rear Climate-Control Outlets
Steering Wheel Mounted Shift Control
Tilt/Telescope Steering Column

EXTERIOR FEATURES
18.0-Inch x 7.5-Inch Steel Painted Wheels
275/65R18 BSW All-Season Tires
18-Inch Full Size Steel Spare Wheel
Power-Heated Mirrors with Manual Fold-Away
Automatic Headlamps
Halogen Quad Headlamps
Cargo Tie-Down Loops
Locking Tailgate

OPTIONAL EQUIPMENT (May Replace Standard Equipment)

Maximum Steel Met. Clear-Coat	$200
Customer Preferred Package 25A	
Chrome Appearance Group	$995
18.0-Inch x 8.0-Inch Premium Paint Cast Wheels	
Bright Front Bumper	
Bright Rear Bumper	
Tradesman Chrome Grille	
Tradesman Group	$845
Class IV Receiver-Hitch	
Spray-In Bedliner	
Level 1 Equipment Group	$1,555
Cloth 40 / 20 / 40 Bench Seat	
Front and Rear Floor Mats	
Carpet Floor Covering	
Rear Power Sliding Window	
SiriusXM® with 1-Year Radio Sub Call 800-643-2112	
Three Rear Seat Head Restraints	
3.92 Rear Axle Ratio	$95
5.7-Liter V8 HEMI® MDS VVT Engine	$1,395
33-Gallon Fuel Tank	$445
DESTINATION CHARGE	$1,695

TOTAL PRICE: * $45,620

WARRANTY COVERAGE
5-year or 60,000-mile Powertrain Limited Warranty.
3-year or 36,000-mile Basic Limited Warranty.
Ask Dealer for a copy of the limited warranties or see your owner's manual for details.

5 YEAR / 60,000 MILE
POWERTRAIN WARRANTY

Assembly Point/Port of Entry: STERLING HTS, MICH., U.S.A.

VIN: 1C6-SRFNT6KN-804871 L4 VDS: 2513

SHIPTO: 54604 14
OLIVER C JOSEPH INC
3795 WEST STATE ROUTE 15
BELLEVILLE IL 62226-3100

SOLDTO: 01 54604
OLIVER C JOSEPH INC
3795 WEST STATE ROUTE 15
BELLEVILLE IL 62226-3100

THIS LABEL IS ADDED TO THIS VEHICLE TO COMPLY WITH FEDERAL LAW. THE LABEL CANNOT BE REMOVED OR ALTERED PRIOR TO DELIVERY TO THE ULTIMATE PURCHASER.

* STATE AND/OR LOCAL TAXES IF ANY, LICENSE AND TITLE FEES AND DEALER SUPPLIED AND INSTALLED OPTIONS AND ACCESSORIES ARE NOT INCLUDED IN THIS PRICE. DISCOUNT, IF any, IS BASED ON PRICE OF OPTIONS IF PURCHASED SEPARATELY.

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: 17 MPG combined city/hwy (15 city, 21 highway)
These estimates reflect new EPA methods beginning with 2017 models. Standard pickups range from 12 to 25 MPG. The best vehicle rates 136 MPGe.
5.9 gallons per 100 miles

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

Annual fuel cost $2,450

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 3 (1 – 10, Best)
Smog Rating (tailpipe only): 5 (1 – 10, Best)
This vehicle emits 523 grams CO2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fueleconomy.gov

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and cost $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.80 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone Decoder

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 57%
MAJOR SOURCES OF FOREIGN PARTS CONTENT:
MEXICO: 28%
NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.
FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
STERLING HTS, MICH., U.S.A.
COUNTRY OF ORIGIN:
ENGINE: MEXICO
TRANSMISSION: UNITED STATES

MOPAR. VEHICLE PROTECTION
A PRODUCT OF FCA US LLC
Ask for Mopar Vehicle Protection for your vehicle. We Built It. We Back It.

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 Shoulder Belt Force
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: 05/08/2019

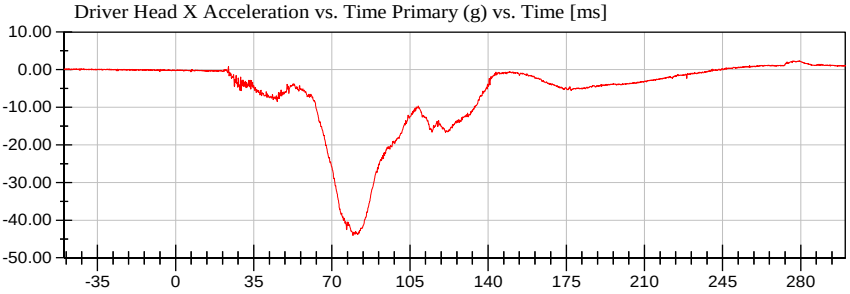
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

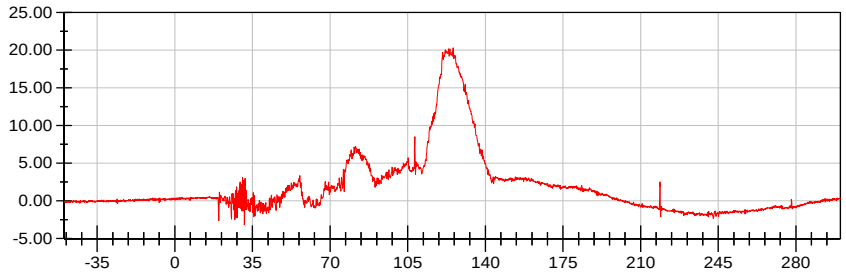
2.40 g at 279.52 ms

<Min>

-44.10 g at 79.44 ms

CFC_1000

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



<Max>

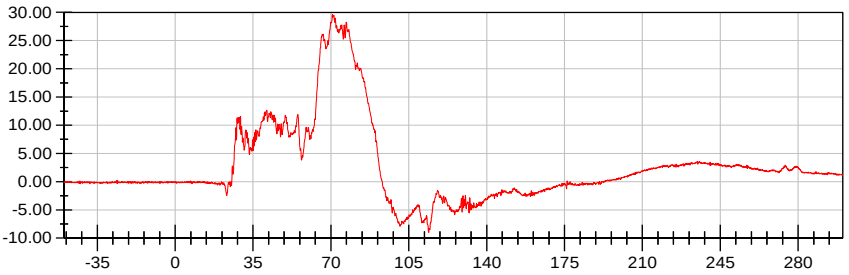
20.31 g at 125.44 ms

<Min>

-3.14 g at 31.36 ms

CFC_1000

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



<Max>

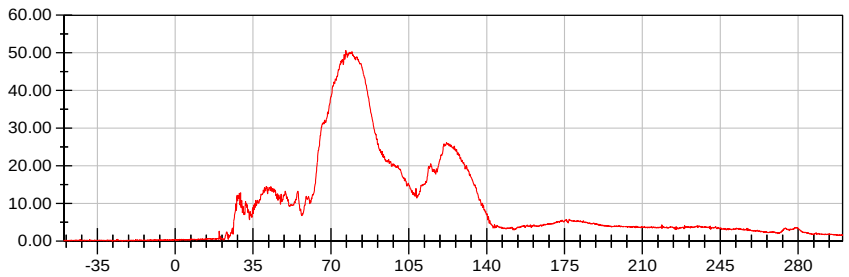
29.62 g at 70.72 ms

<Min>

-8.98 g at 113.92 ms

CFC_1000

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



<Max>

50.62 g at 76.72 ms

<Min>

0.05 g at -28.40 ms

CFC_1000

NHTSA

Test Date: 05/08/2019

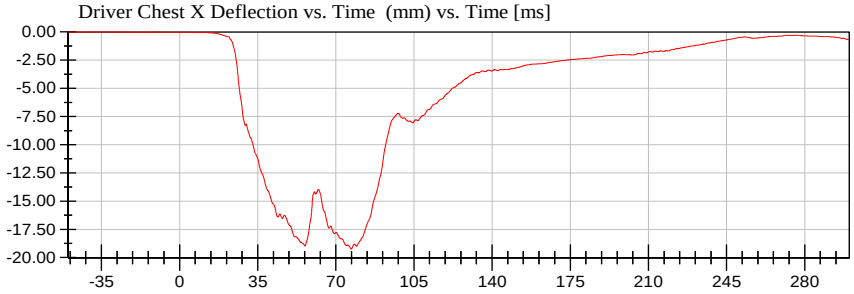
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

-0.01 mm at -48.40 ms

<Min>

-19.25 mm at 76.96 ms

CFC_600

NHTSA

Test Date: 05/08/2019

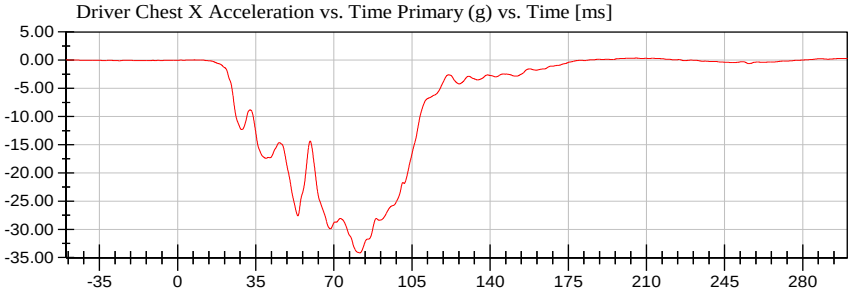
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

0.37 g at 205.44 ms

<Min>

-34.16 g at 81.68 ms

CFC_180

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

<Max>

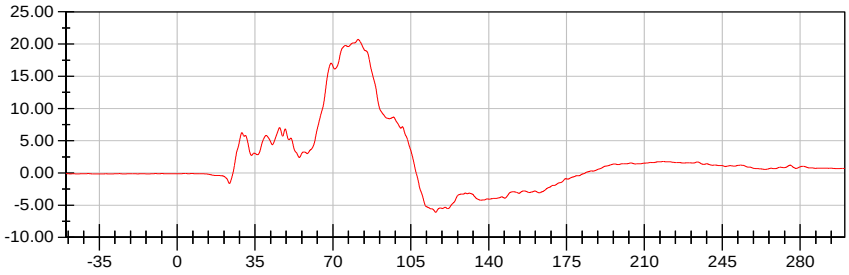
9.06 g at 95.28 ms

<Min>

-3.68 g at 35.60 ms

CFC_180

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



<Max>

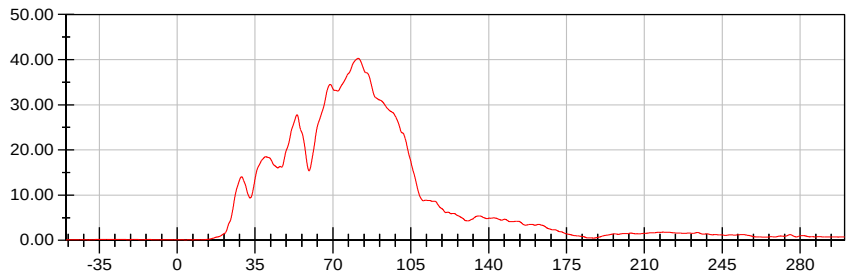
20.73 g at 81.28 ms

<Min>

-6.09 g at 116.16 ms

CFC_180

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



<Max>

40.28 g at 81.36 ms

<Min>

0.09 g at -50.00 ms

CFC_180

NHTSA

Test Date: 05/08/2019

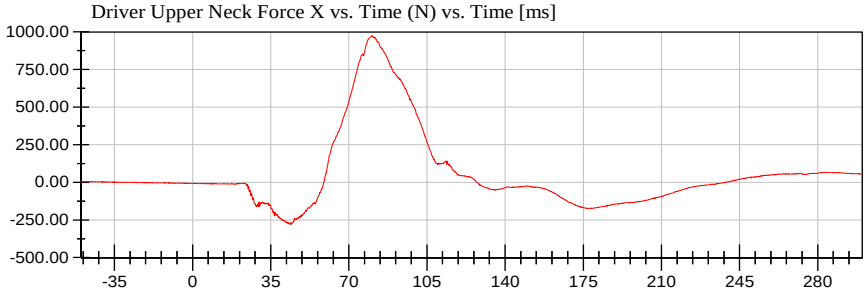
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

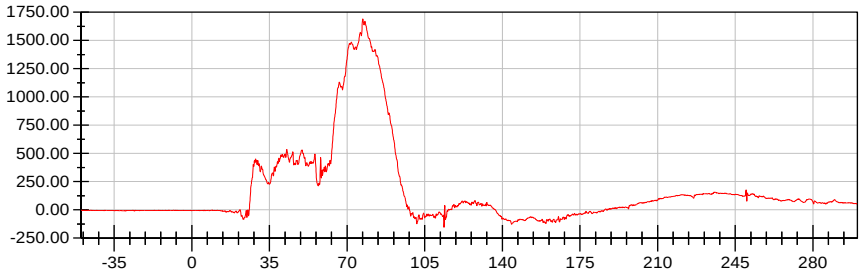
974.21 N at 80.16 ms

<Min>

-279.62 N at 44.24 ms

CFC_1000

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



<Max>

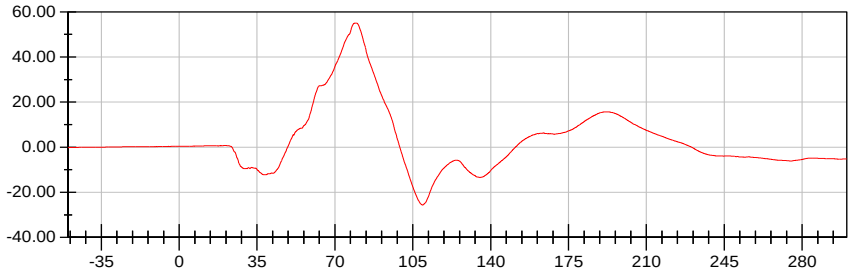
1,691.15 N at 77.04 ms

<Min>

-154.67 N at 113.76 ms

CFC_1000

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



<Max>

55.04 Nm at 79.52 ms

<Min>

-25.61 Nm at 109.44 ms

CFC_600

2019 Ram 1500 Crew Cab NCAP 35 mph Frontal Impact

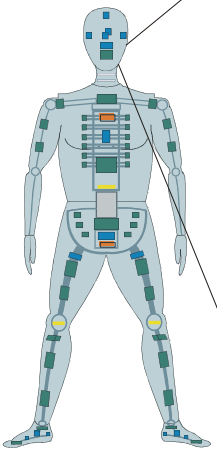
Neck Injury Predictor (NIJ)

Date: 05/08/2019
Time: 13:01

Customer: NHTSA
Test Number: M20190310

TRC Inc. Test Lab: CTF
Test Number: 190508

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



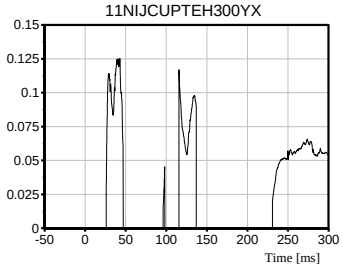
Dummy:HIII 50th Male
Seating Position:
Driver

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

11TMONUP00H3MOYX

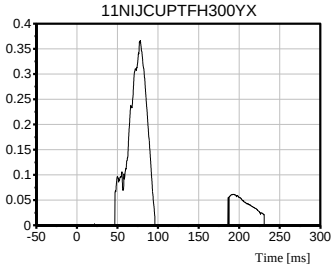
11NECKUP00H3FOZA

11NIJCUPTEH300YX



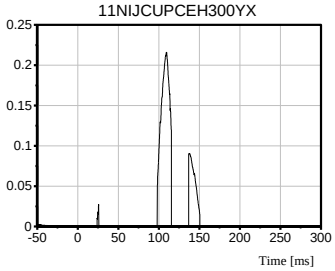
Max [NTE] 0.1253 at 42.80 ms

11NIJCUPTFH300YX



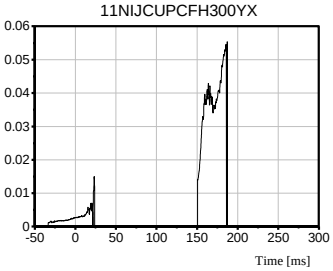
Max [NTF] 0.3665 at 78.08 ms

11NIJCUPCEH300YX



Max [NCE] 0.2161 at 109.60 ms

11NIJCUPCFH300YX



Max [NCF] 0.0554 at 187.28 ms

NHTSA

Test Date: 05/08/2019

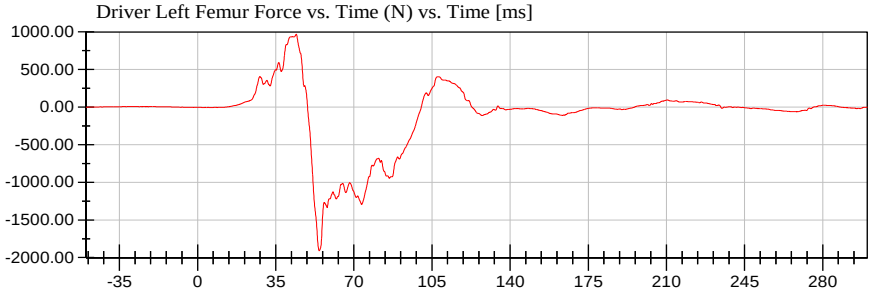
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

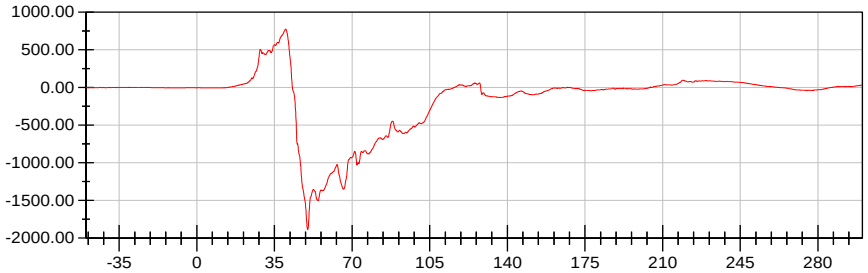
969.20 N at 44.24 ms

<Min>

-1,908.71 N at 54.48 ms

CFC_600

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



<Max>

775.78 N at 40.08 ms

<Min>

-1,887.42 N at 50.00 ms

CFC_600

NHTSA

Test Date: 05/08/2019

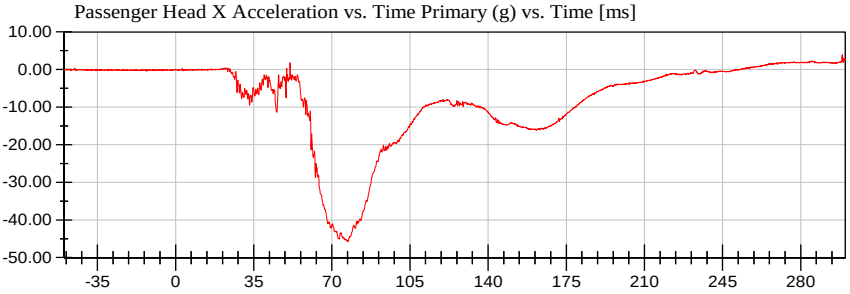
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

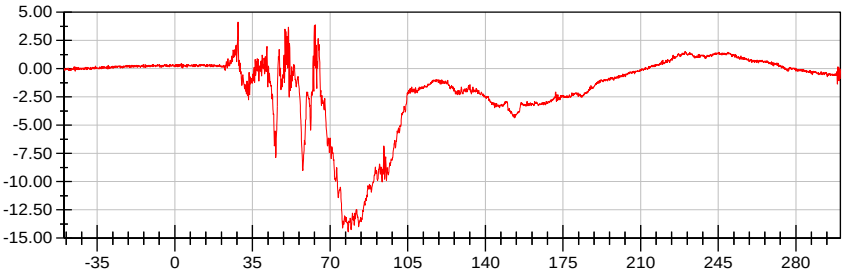
3.92 g at 298.56 ms

<Min>

-45.76 g at 77.28 ms

CFC_1000

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



<Max>

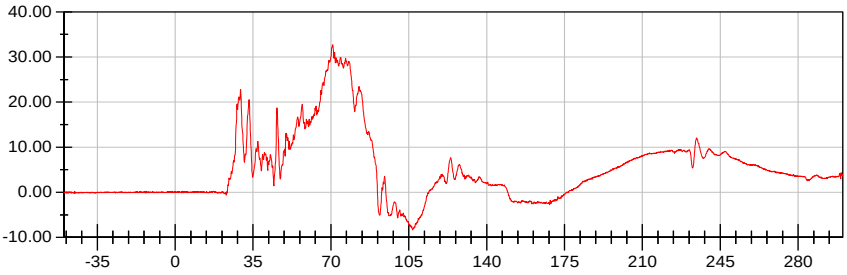
4.14 g at 28.48 ms

<Min>

-14.44 g at 78.16 ms

CFC_1000

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



<Max>

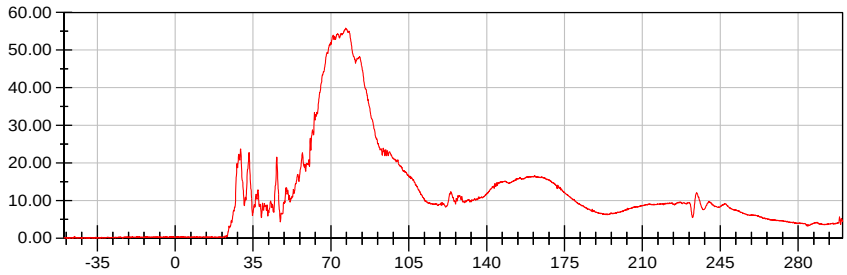
32.69 g at 70.80 ms

<Min>

-8.36 g at 106.72 ms

CFC_1000

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



<Max>

55.82 g at 76.64 ms

<Min>

0.03 g at -33.76 ms

CFC_1000

NHTSA

Test Date: 05/08/2019

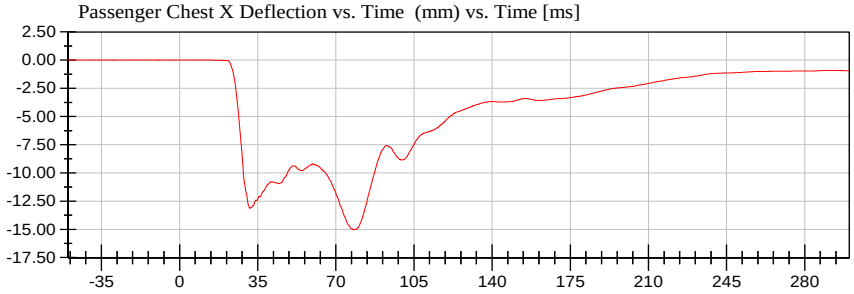
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

0.00 mm at -37.12 ms

<Min>

-15.04 mm at 78.08 ms

CFC_600

NHTSA

Test Date: 05/08/2019

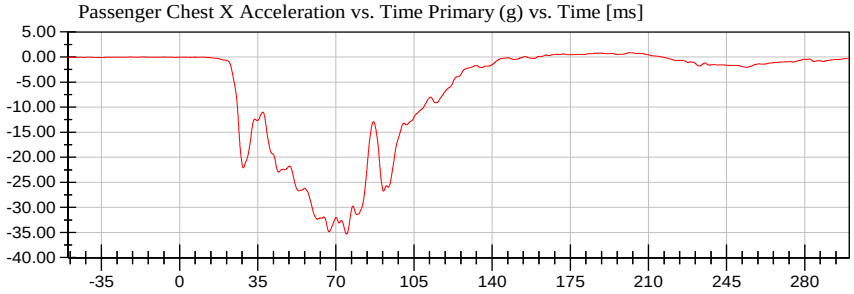
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

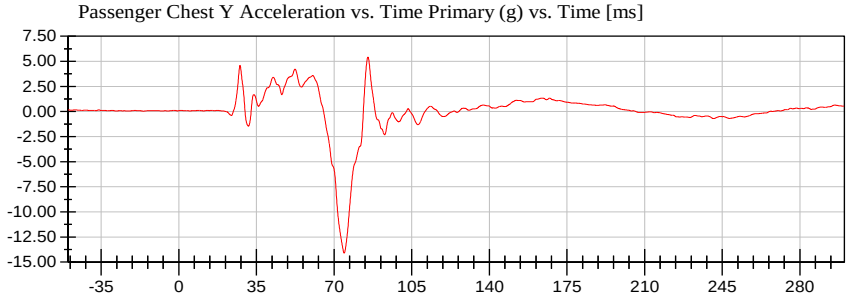
0.86 g at 201.60 ms

<Min>

-35.32 g at 74.80 ms

CFC_180

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



<Max>

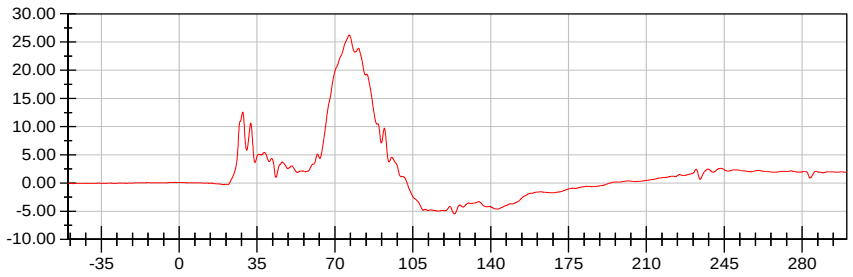
5.42 g at 85.28 ms

<Min>

-14.09 g at 74.56 ms

CFC_180

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



<Max>

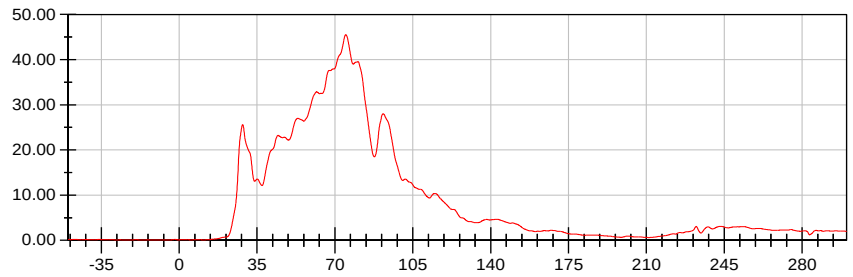
26.22 g at 76.40 ms

<Min>

-5.46 g at 123.68 ms

CFC_180

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



<Max>

45.51 g at 74.88 ms

<Min>

0.07 g at -22.32 ms

CFC_180

NHTSA

Test Date: 05/08/2019

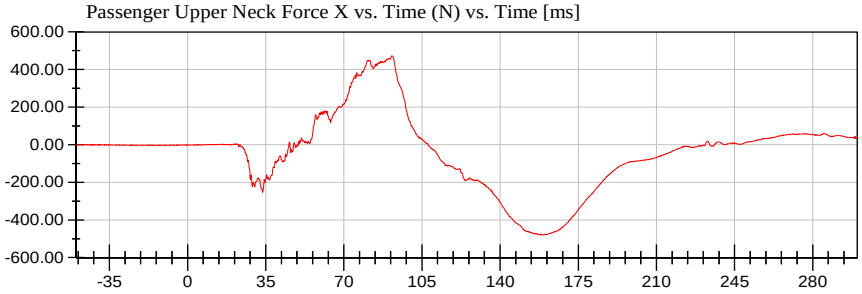
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

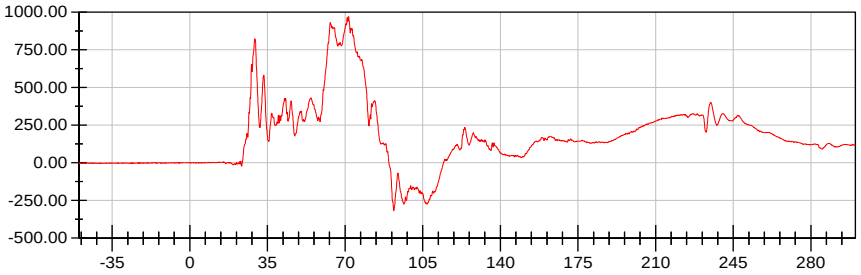
472.52 N at 91.36 ms

<Min>

-479.96 N at 158.16 ms

CFC_1000

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



<Max>

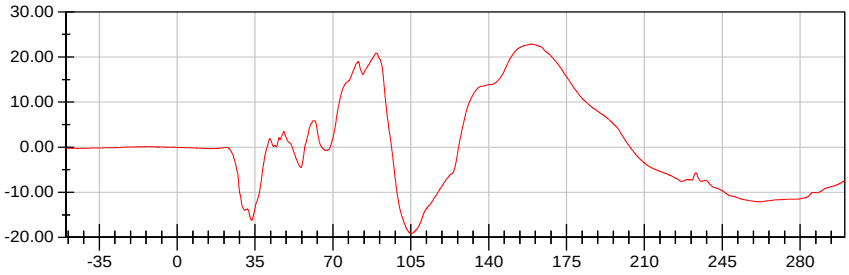
970.62 N at 71.52 ms

<Min>

-317.66 N at 91.92 ms

CFC_1000

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



<Max>

22.84 Nm at 159.12 ms

<Min>

-19.05 Nm at 105.20 ms

CFC_600

2019 Ram 1500 Crew Cab NCAP 35 mph Frontal Impact

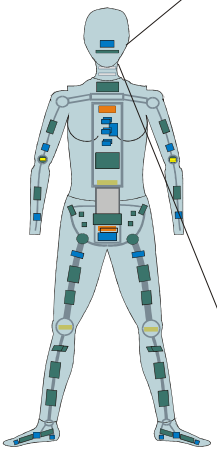
Neck Injury Predictor (NIJ)

Date: 05/08/2019
Time: 13:01

Customer: NHTSA
Test Number: M20190310

TRC Inc. Test Lab: CTF
Test Number: 190508

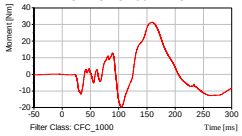
Test Orientation = Frontal
Fzc(Tension) = 4287
Fzc(Compression) = 3880
Myc(Extension) = 67
Myc(Flexion) = 155



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

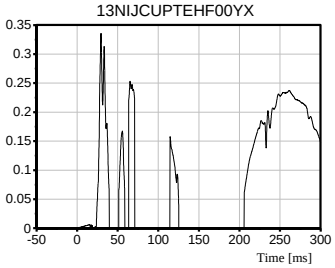
NIJ Source Code: (Fz/Fzc)+(My/Myc)

13TMONUP00HFMOYX



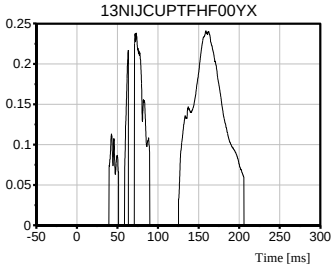
13NECKUP00HFFOZA

13NIJCUPTEHF00YX



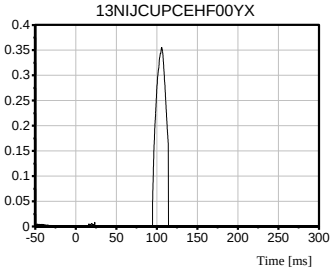
Max [NTE] 0.3353 at 29.44 ms

13NIJCUPTFHF00YX



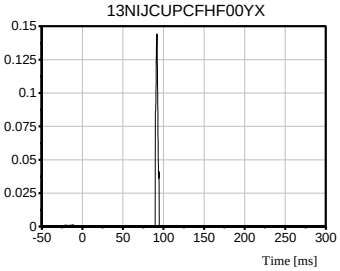
Max [NTF] 0.2410 at 158.88 ms

13NIJCUPCEHF00YX



Max [NCE] 0.3553 at 106.08 ms

13NIJCUPCFHF00YX



Max [NCF] 0.1443 at 91.92 ms

NHTSA

Test Date: 05/08/2019

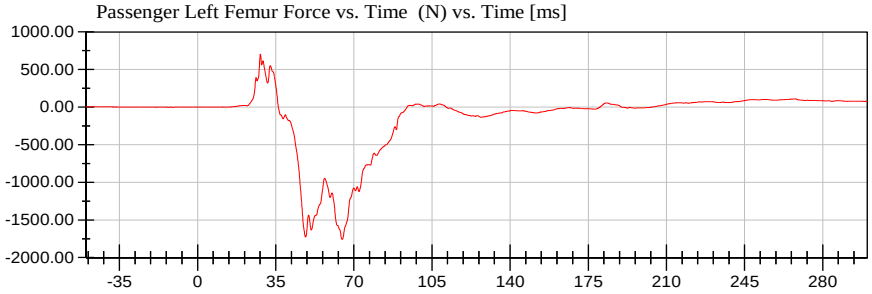
Test Lab: CTF

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

Test Number: 190508 (M20190310)

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

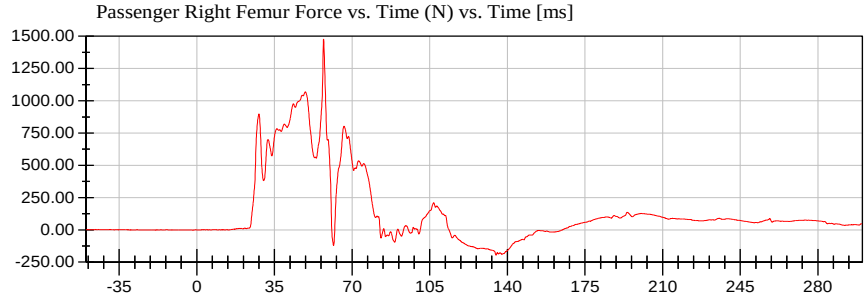
704.39 N at 28.08 ms

<Min>

-1,758.66 N at 64.80 ms

CFC_600

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



<Max>

1,477.52 N at 57.20 ms

<Min>

-195.19 N at 134.88 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. 57

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. 57-1
Test Date: 3/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	271.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	9.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

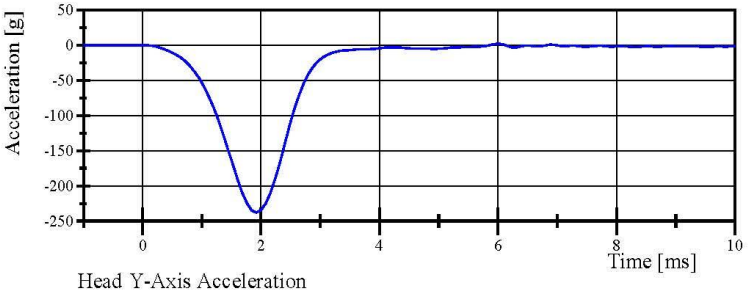
Condition: Used

Comments:
Head Skin S/N: N/A

Transportation Research Center Inc.

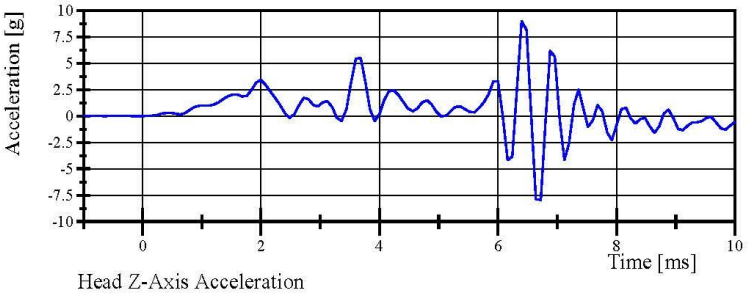
Front Head Drop
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Head X-Axis Acceleration



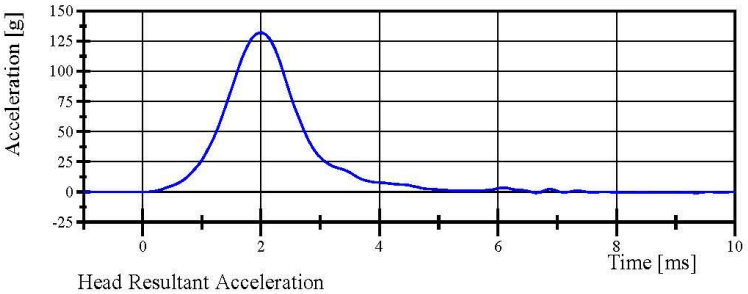
Filter Class: CFC_1000
Max: 2.1 g at 6.0 ms
Min: -237.9 g at 1.9 ms

Head Y-Axis Acceleration



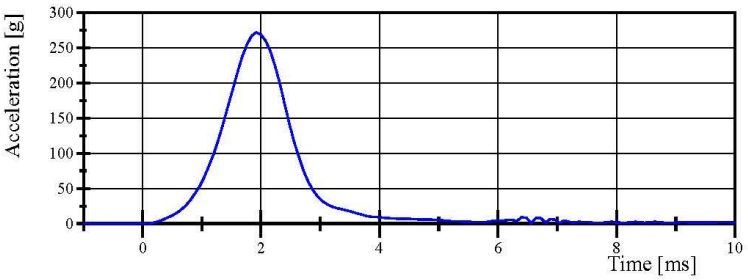
Filter Class: CFC_1000
Max: 9.0 g at 6.4 ms
Min: -7.9 g at 6.7 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 132.3 g at 2.0 ms
Min: -0.8 g at 6.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 271.7 g at 1.9 ms
Min: 0.0 g at -0.6 ms

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

03.20.2019 10:22:18 578

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.914 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.9 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-23.92 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-20.45 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-16.73 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-16.73 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-67.3 °	Yes
Time of Peak	57 - 64 ms	59.8 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	120.7 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	100.08 N·m	Yes
Time of Peak	47 - 58 ms	52.9 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	102.1 ms	Yes

Test meets specifications.

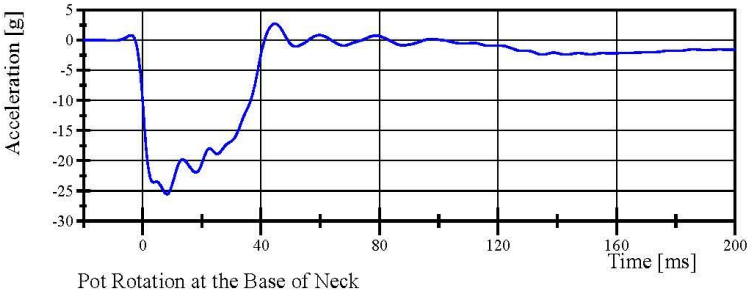
Condition: Used

Comments:
Neck S/N: 4728

Transportation Research Center Inc.

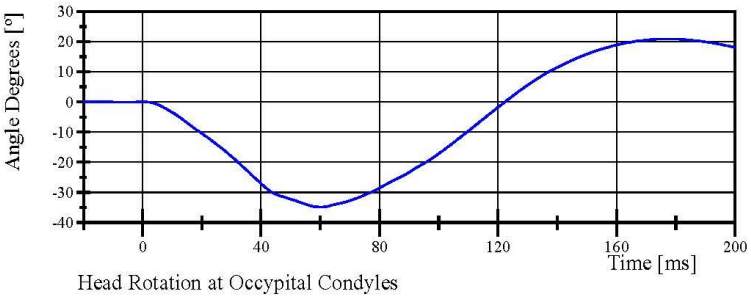
Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration



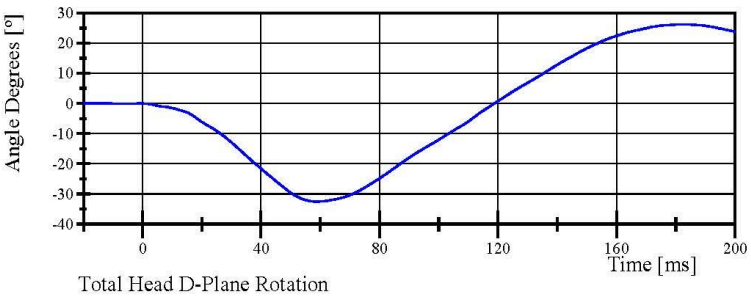
Filter Class: CFC_60
Max: 2.7 g at 44.7 ms
Min: -25.5 g at 8.3 ms

Pot Rotation at the Base of Neck



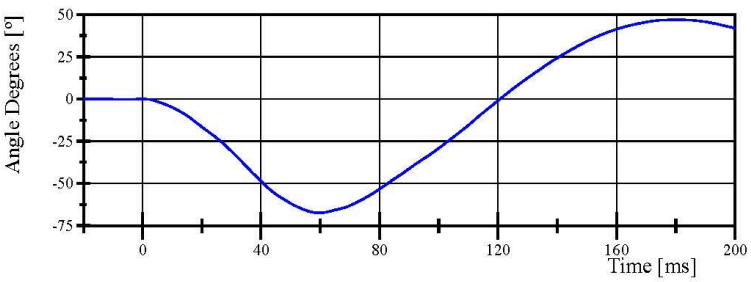
Filter Class: CFC_60
Max: 20.9 ° at 177.2 ms
Min: -34.8 ° at 60.3 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 26.3 ° at 182.6 ms
Min: -32.5 ° at 58.7 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 47.1 ° at 180.4 ms
Min: -67.3 ° at 59.8 ms

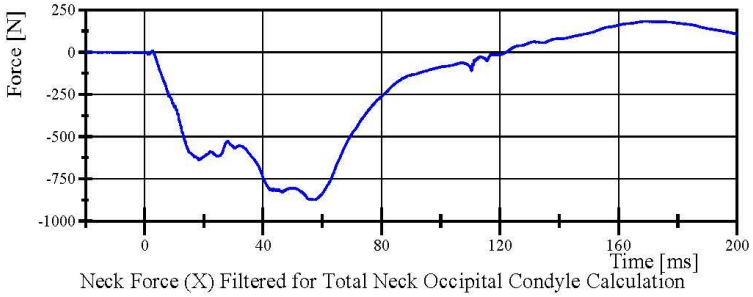
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.20.2019 10:47:25 1838

Transportation Research Center Inc.

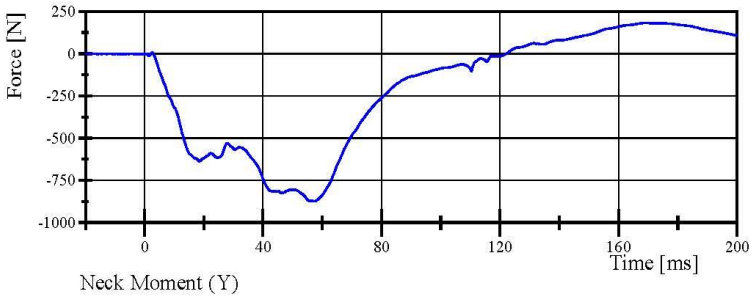
Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Neck Force (X)



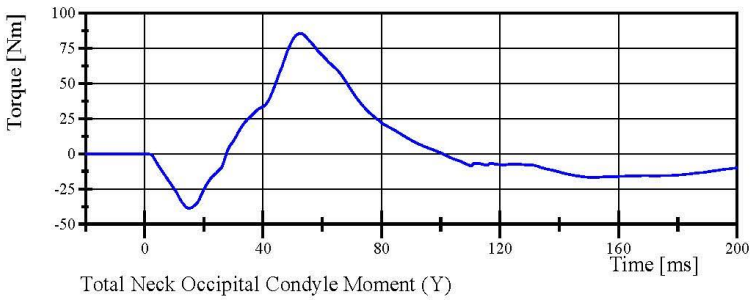
Filter Class: CFC_1000
Max: 183.2 N at 168.6 ms
Min: -873.1 N at 57.2 ms

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



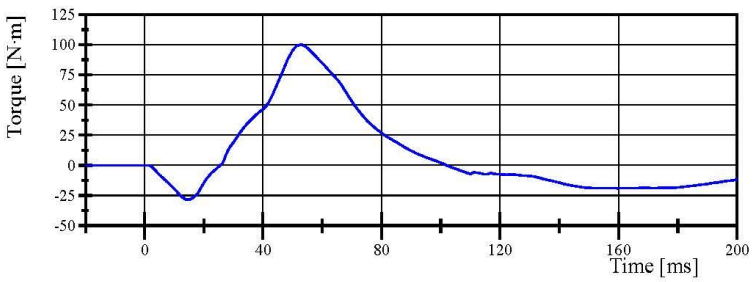
Filter Class: CFC_600
Max: 183.1 N at 169.0 ms
Min: -872.8 N at 57.3 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 85.5 Nm at 52.5 ms
Min: -38.8 Nm at 15.1 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 100.1 N·m at 52.9 ms
Min: -28.5 N·m at 14.7 ms

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

03.20.2019 10:47:26 1838

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.966 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	38.3 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	20.80 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.95 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	13.66 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	14.52 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.6 °	Yes
Time of Peak	72 - 82 ms	76.5 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	158.1 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-52.9) - (-80) N·m	-73.84 N·m	Yes
Time of Peak	65 - 79 ms	72.2 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	147.9 ms	Yes

Test meets specifications.

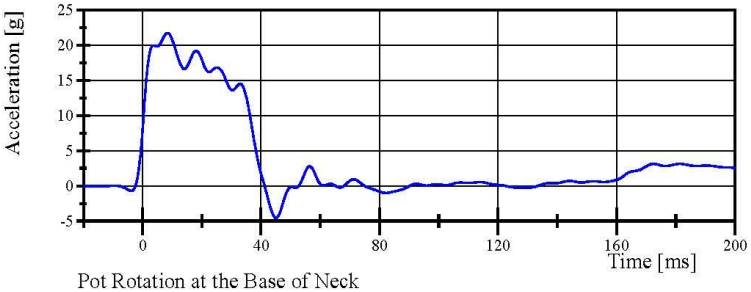
Condition: Used

Comments:
Neck S/N: 4278

Transportation Research Center Inc.

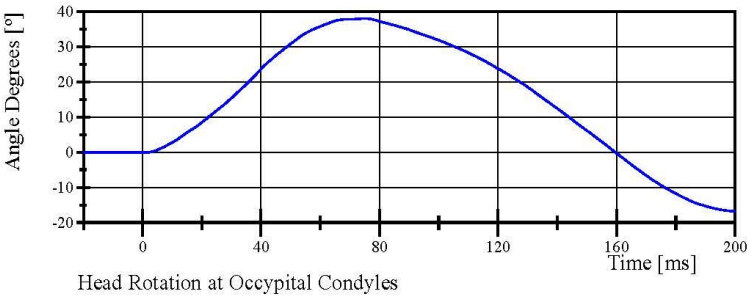
Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

Pendulum Acceleration



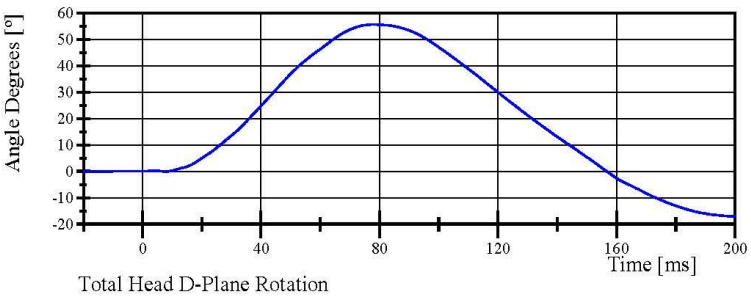
Filter Class: CFC_60
Max: 21.7 g at 8.5 ms
Min: -4.6 g at 45.1 ms

Pot Rotation at the Base of Neck



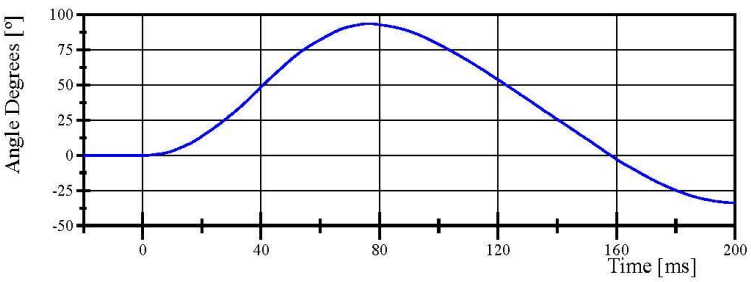
Filter Class: CFC_60
Max: 38.0 ° at 75.2 ms
Min: -16.8 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 55.7 ° at 78.1 ms
Min: -17.0 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 93.6 ° at 76.5 ms
Min: -33.8 ° at 200.0 ms

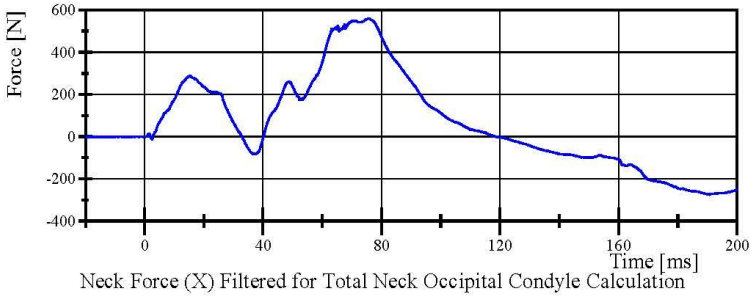
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.20.2019 12:42:10 1985

Transportation Research Center Inc.

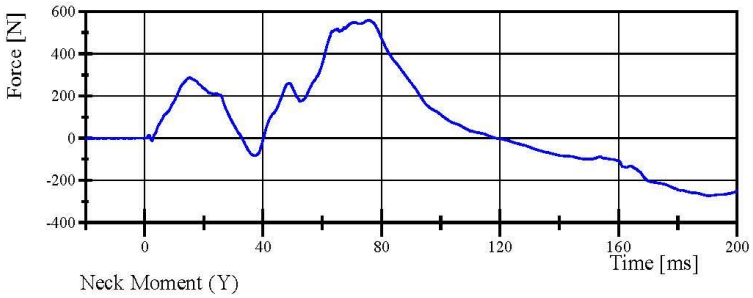
Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

Neck Force (X)



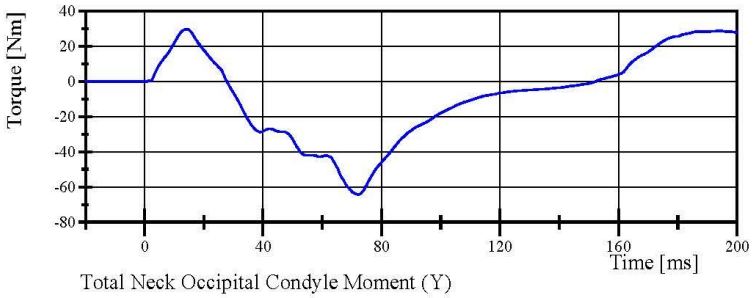
Filter Class: CFC_1000
Max: 559.1 N at 75.9 ms
Min: -274.4 N at 190.7 ms

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



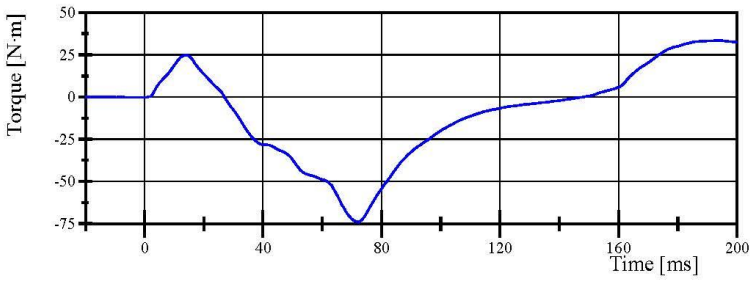
Filter Class: CFC_600
Max: 558.9 N at 75.8 ms
Min: -273.9 N at 190.7 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 29.7 Nm at 14.3 ms
Min: -64.3 Nm at 72.2 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.5 N·m at 193.5 ms
Min: -73.8 N·m at 72.2 ms

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

03.20.2019 12:42:10 1985

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 57-5
Test Date: 3/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.794 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,808.0 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-65.39 mm	Yes
Internal Hysteresis	69 - 85 %	73.2 %	Yes

Test meets specifications.

Condition: Used

Comments:
Jacket S/N: 2565
Rib Set S/N: 02033121A
New Bib S/N: 1190

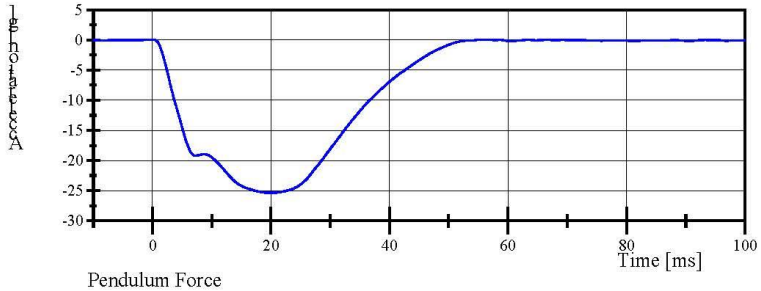
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.25.2019 14:10:30 370

Transportation Research Center Inc.

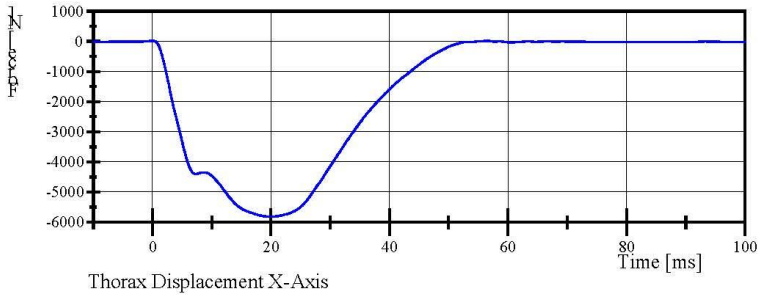
Front Thorax
HIII 50th Serial No. 037 Certification No. 57-5
Test Date: 3/25/2019

Pendulum Acceleration



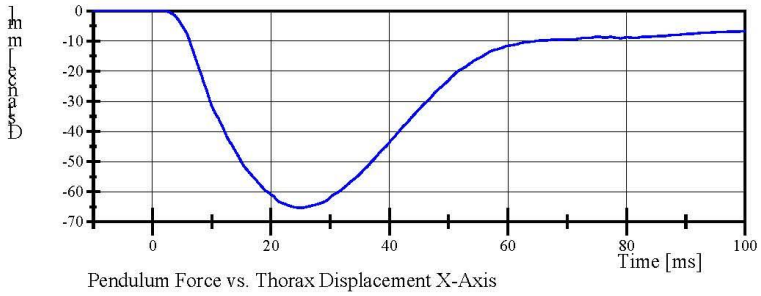
Filter Class: CFC_180
Max: 0.1 g at 0.0 ms
Min: -25.3 g at 19.8 ms

Pendulum Force



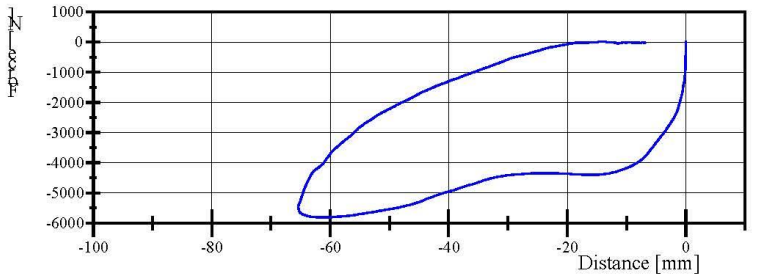
Filter Class: CFC_180
Max: 19.6 N at 0.0 ms
Min: -5,808.0 N at 19.8 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -6.5 ms
Min: -65.4 mm at 25.1 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 19.6 N at -0.0 mm
Min: -5,808.0 N at -60.7 mm

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

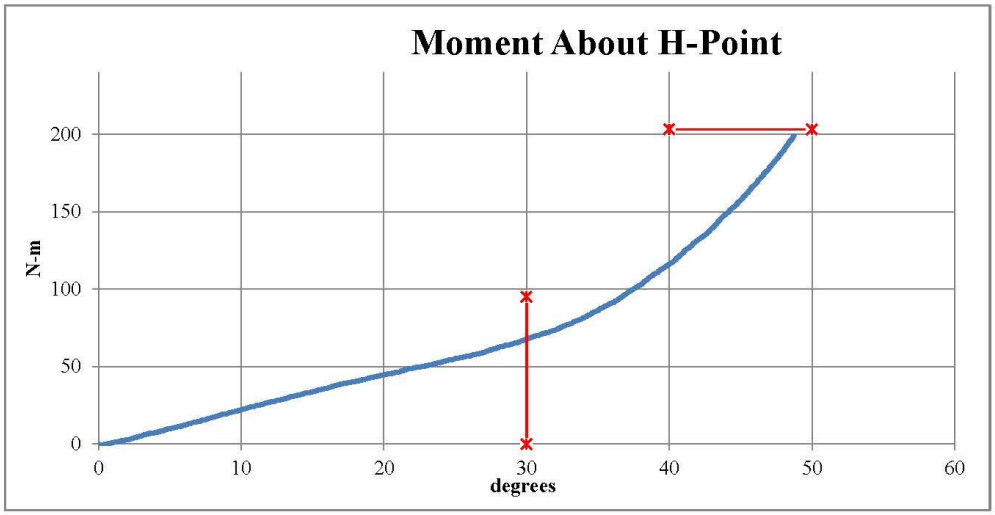
03.25.2019 14:11:31 370

Transportation Research Center Inc.

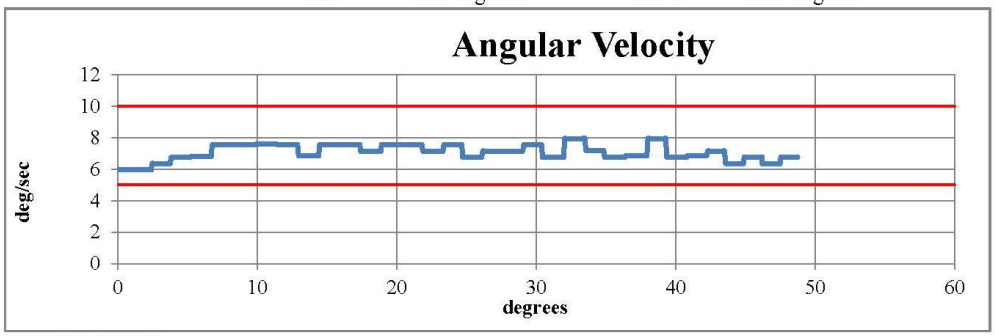
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	20-Mar-2019
Side Tested:	Left Hip	Time:	10:42
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.5	°C	Pass
Humidity	10	-	70	37	%	Pass
Moment at 30°	0	≤	94.9	67.82	N-m	Pass
Angle at 203 Nm	40	-	50	49.13	deg	Pass
Average Velocity	5	-	10	7.05	deg/sec	Pass



Max: 7.95 deg/sec Min: 5.96 deg/sec



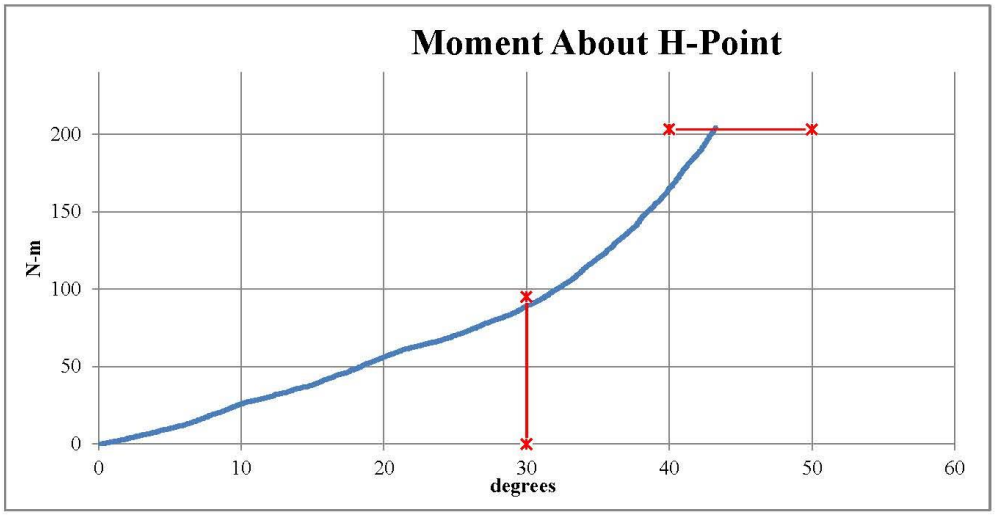
Pelvis Skin S/N: N/A
Lumbar Spine S/N: 0551
Lumbar Cable S/N: N/A

Transportation Research Center Inc.

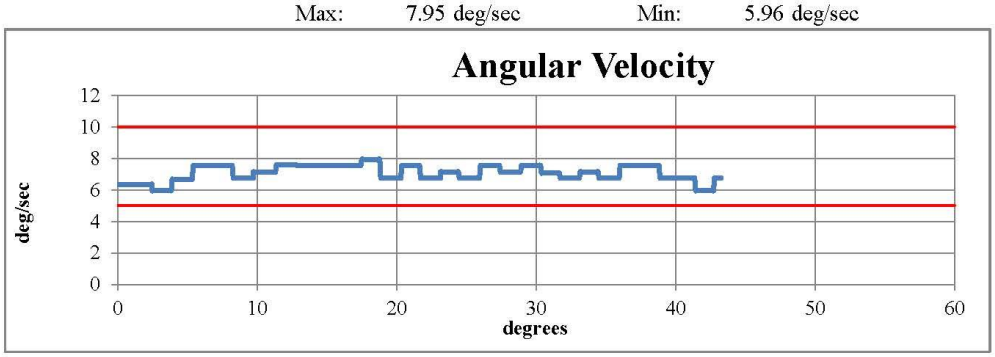
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	20-Mar-2019
Side Tested:	Right Hip	Time:	12:01
Test Number:	1	Comments:	

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.7	°C	Pass
Humidity	10	-	70	40	%	Pass
Moment at 30°	0	≤	94.9	89.44	N-m	Pass
Angle at 203 Nm	40	-	50	43.25	deg	Pass
Average Velocity	5	-	10	7.06	deg/sec	Pass



Max: 7.95 deg/sec Min: 5.96 deg/sec



Pelvis Skin S/N: N/A
Lumbar Spine S/N: 0551
Lumbar Cable S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.122 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,729.57 N	Yes

Test meets specifications.

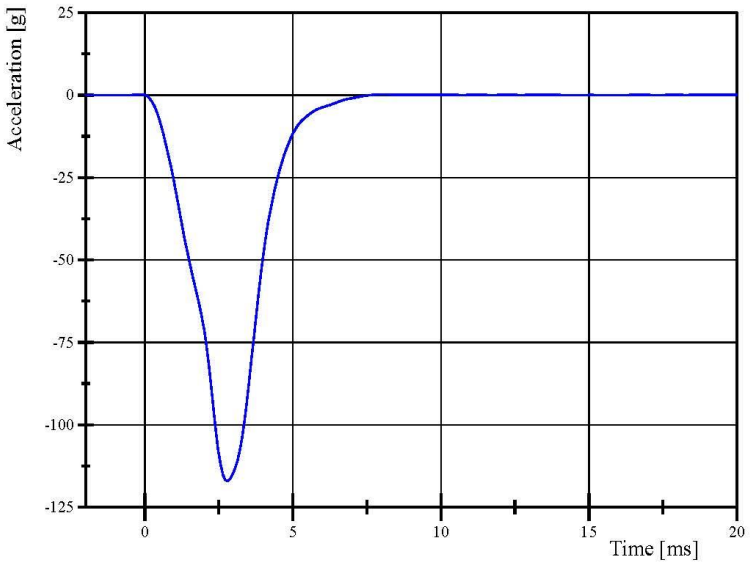
Condition: Used

Comments:
Knee Skin S/N: 2672

Transportation Research Center Inc.

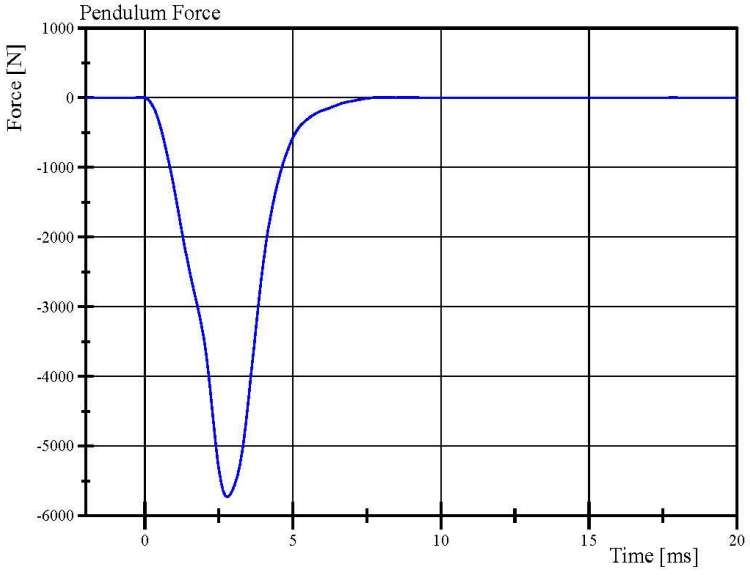
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.2 g at -0.2 ms
Min: -117.1 g at 2.8 ms

Pendulum Force



Filter Class: CFC_600
Max: 8.5 N at -0.2 ms
Min: -5,729.6 N at 2.8 ms

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

03.20.2019 08:45:23 1741

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-2
Test Date: 3/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.124 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,240.89 N	Yes

Test meets specifications.

Condition: New

Comments:
Knee Skin S/N: 176

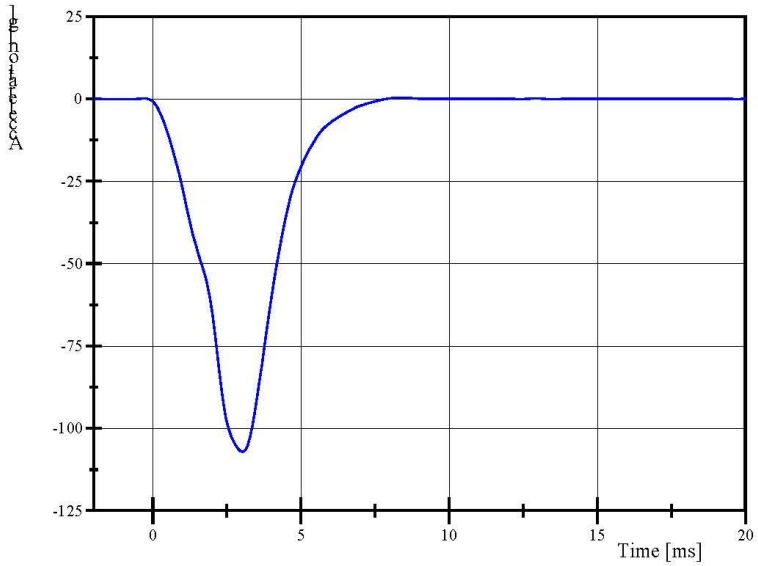
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.25.2019 14:01:45 1758

Transportation Research Center Inc.

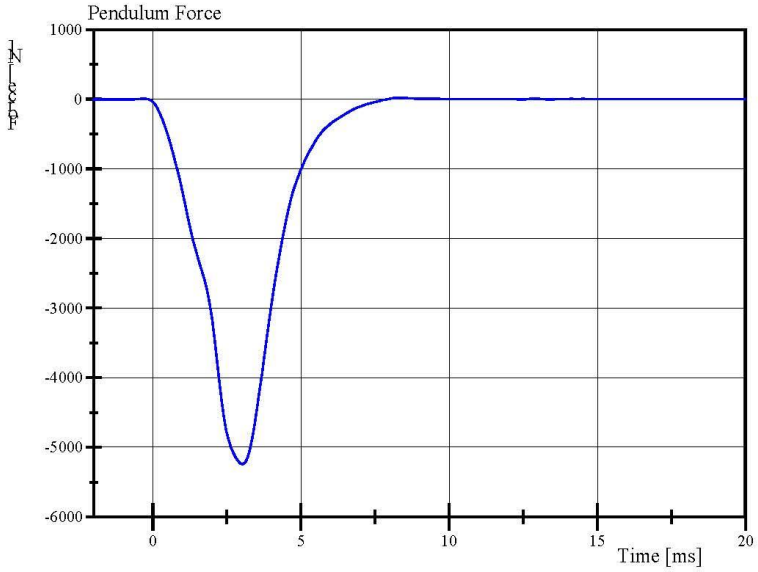
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-2
Test Date: 3/25/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.5 g at 8.3 ms
Min: -107.1 g at 3.0 ms

Pendulum Force



Filter Class: CFC_600
Max: 22.4 N at 8.3 ms
Min: -5,240.9 N at 3.0 ms

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

03.25.2019 14:02:26 1758

Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 58

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. 58-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	263.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	3.2 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

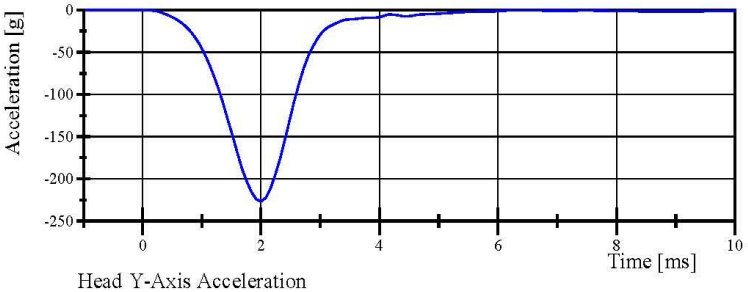
Condition: Used

Comments:
Head Skin S/N: N/A

Transportation Research Center Inc.

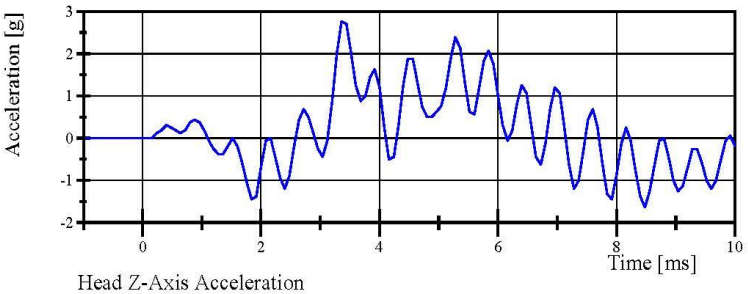
Front Head Drop
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/12/2019

Head X-Axis Acceleration



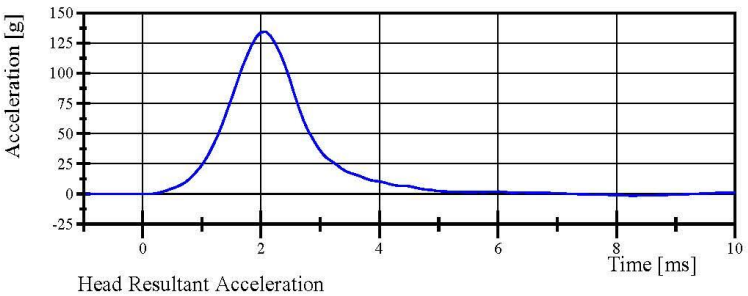
Filter Class: CFC_1000
Max: 0.0 g at -1.0 ms
Min: -226.7 g at 2.0 ms

Head Y-Axis Acceleration



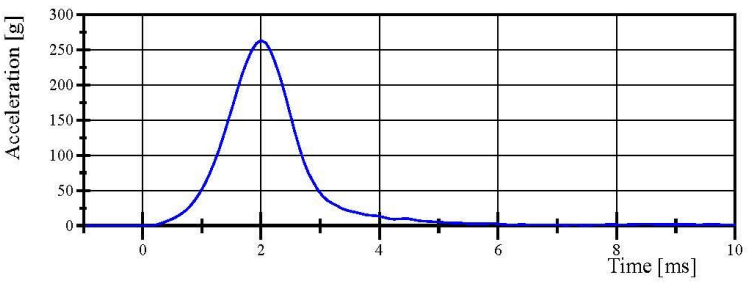
Filter Class: CFC_1000
Max: 2.8 g at 3.4 ms
Min: -1.6 g at 8.5 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 134.7 g at 2.1 ms
Min: -1.3 g at 8.2 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 263.5 g at 2.0 ms
Min: 0.0 g at -1.0 ms

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

05.12.2019 07:58:59 577

Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.910 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.5 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-25.22 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-20.07 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.23 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.23 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-70.7 °	Yes
Time of Peak	57 - 64 ms	58.4 ms	Yes
Total Head D-Plane Rotation Decay to 0°	113 - 128 ms	116.4 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88.1 - 108.4 N·m	100.87 N·m	Yes
Time of Peak	47 - 58 ms	51.4 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	97 - 107 ms	99.3 ms	Yes

Test meets specifications.

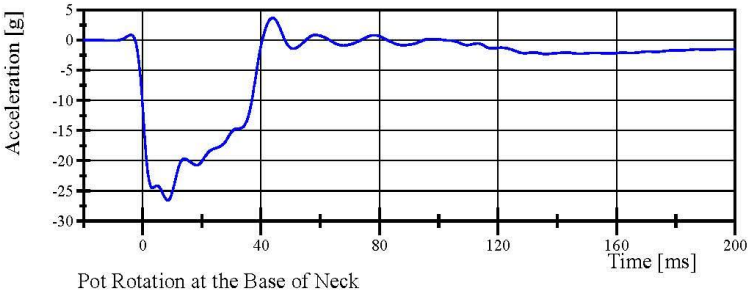
Condition: Used

Comments:
Neck S/N: 4728

Transportation Research Center Inc.

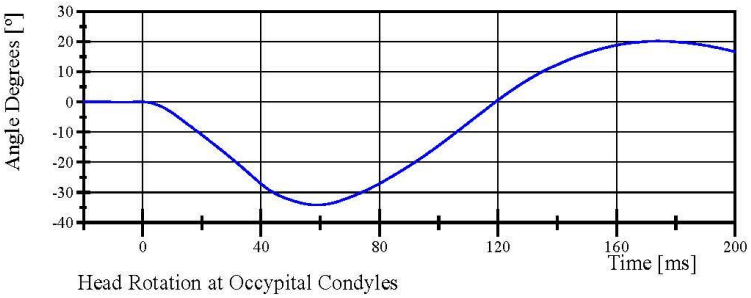
Neck Flexion
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Pendulum Acceleration



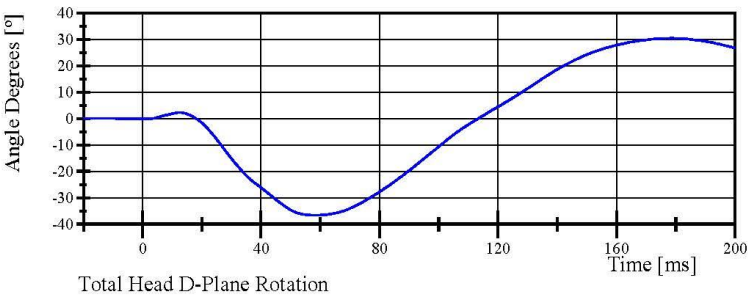
Filter Class: CFC_60
Max: 3.7 g at 43.9 ms
Min: -26.6 g at 8.6 ms

Pot Rotation at the Base of Neck



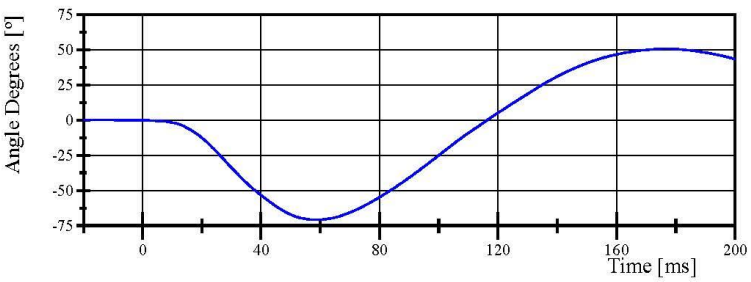
Filter Class: CFC_60
Max: 20.2 ° at 173.9 ms
Min: -34.1 ° at 58.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 30.5 ° at 178.7 ms
Min: -36.6 ° at 58.3 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 50.6 ° at 177.0 ms
Min: -70.7 ° at 58.4 ms

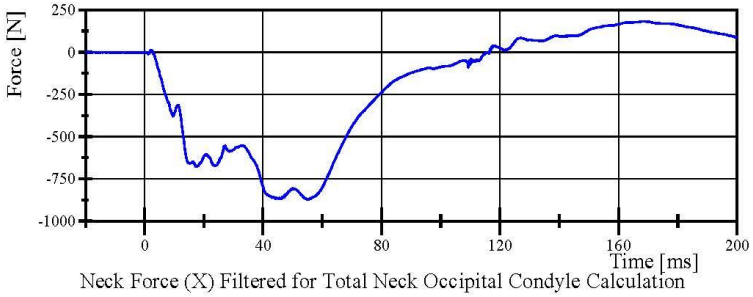
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.10.2019 14:03:21 1841

Transportation Research Center Inc.

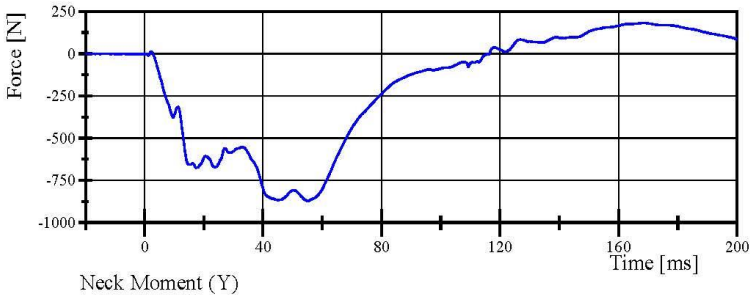
Neck Flexion
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Neck Force (X)



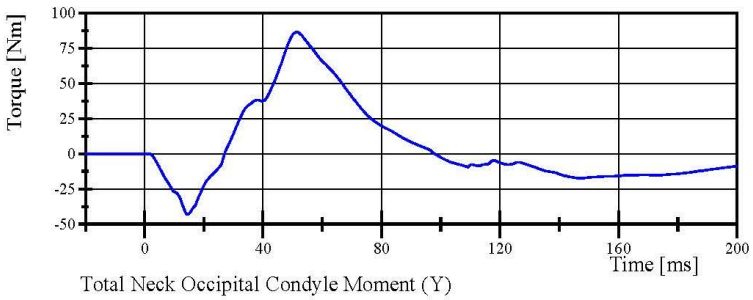
Filter Class: CFC_1000
Max: 183.4 N at 167.9 ms
Min: -871.0 N at 55.2 ms

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



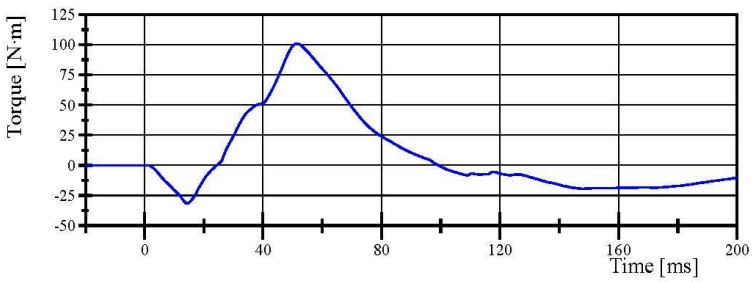
Filter Class: CFC_600
Max: 183.0 N at 168.8 ms
Min: -871.1 N at 55.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 86.5 Nm at 51.3 ms
Min: -43.0 Nm at 14.6 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 100.9 N·m at 51.4 ms
Min: -31.5 N·m at 14.4 ms

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

05.10.2019 14:03:22 1841

Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.970 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	38.4 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	20.48 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	17.05 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	14.05 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	14.60 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	100.0 °	Yes
Time of Peak	72 - 82 ms	75.7 ms	Yes
Total Head D-Plane Rotation Decay to 0°	147 - 174 ms	157.9 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-52.9) - (-80) N·m	-71.81 N·m	Yes
Time of Peak	65 - 79 ms	71.5 ms	Yes
Total Neck Occipital Condyles Moment Decay to 0 N·m	120 - 148 ms	146.0 ms	Yes

Test meets specifications.

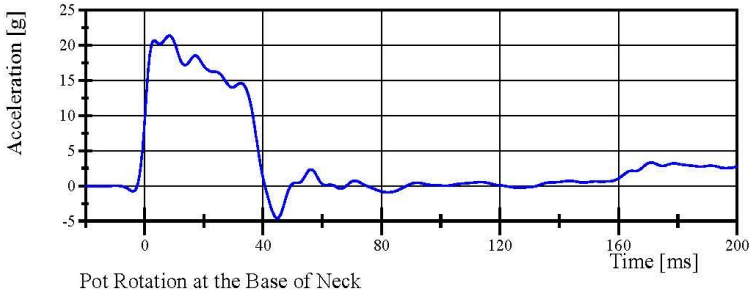
Condition: Used

Comments:
Neck S/N: 4728

Transportation Research Center Inc.

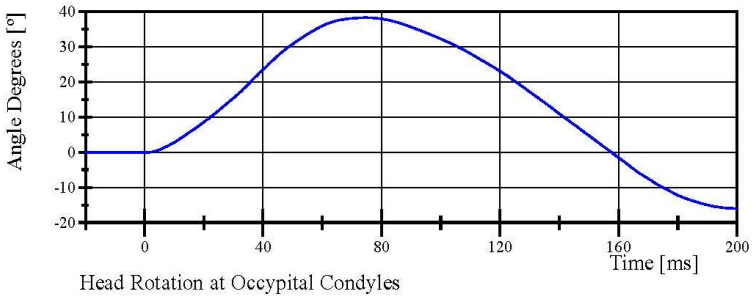
Neck Extension
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Pendulum Acceleration



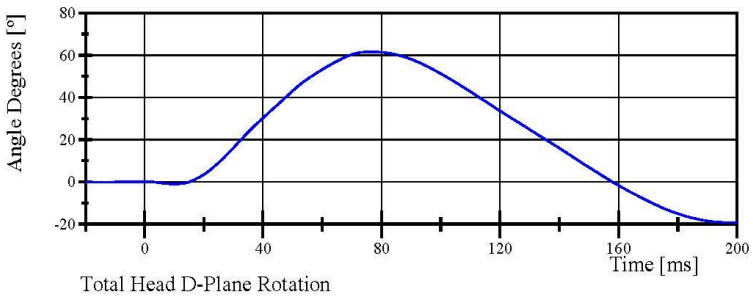
Filter Class: CFC_60
Max: 21.4 g at 8.4 ms
Min: -4.6 g at 44.8 ms

Pot Rotation at the Base of Neck



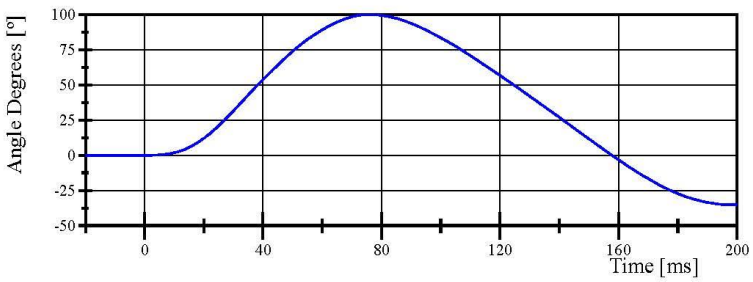
Filter Class: CFC_60
Max: 38.3 ° at 74.6 ms
Min: -15.9 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 61.7 ° at 76.4 ms
Min: -19.3 ° at 197.6 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 100.0 ° at 75.7 ms
Min: -35.2 ° at 198.2 ms

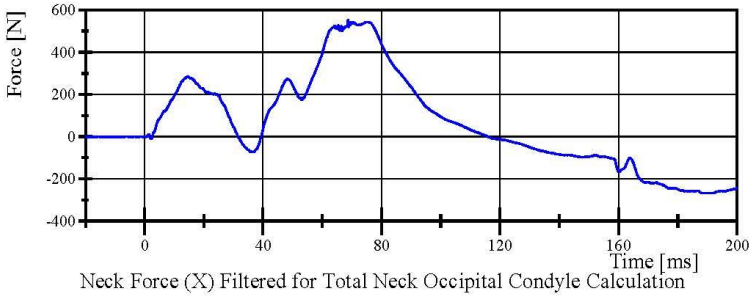
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

05.10.2019 14:48:12 1986

Transportation Research Center Inc.

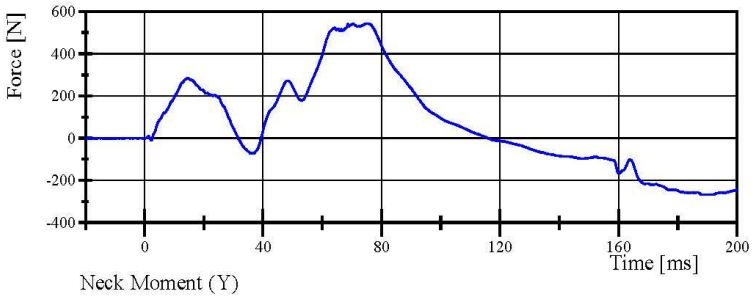
Neck Extension
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/10/2019

Neck Force (X)



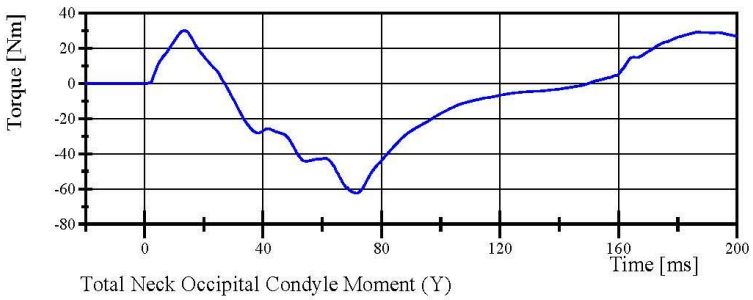
Filter Class: CFC_1000
Max: 553.4 N at 68.7 ms
Min: -267.1 N at 188.5 ms

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



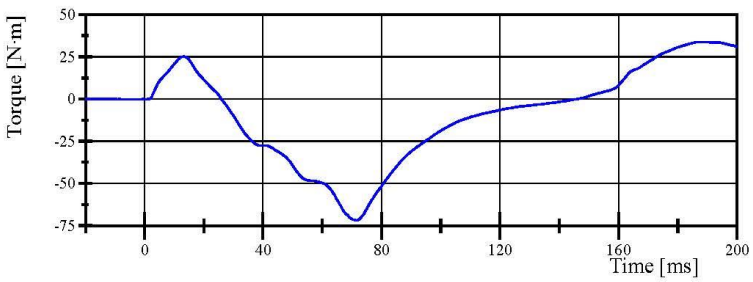
Filter Class: CFC_600
Max: 544.1 N at 75.2 ms
Min: -266.9 N at 191.2 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 30.0 Nm at 13.4 ms
Min: -62.4 Nm at 71.6 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 33.7 N·m at 186.9 ms
Min: -71.8 N·m at 71.5 ms

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

05.10.2019 14:48:12 1986

Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.783 m/s	Yes
Probe Force Peak	(-5,160) - (-5,894) N	-5,725.8 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-65.25 mm	Yes
Internal Hysteresis	69 - 85 %	73.7 %	Yes

Test meets specifications.

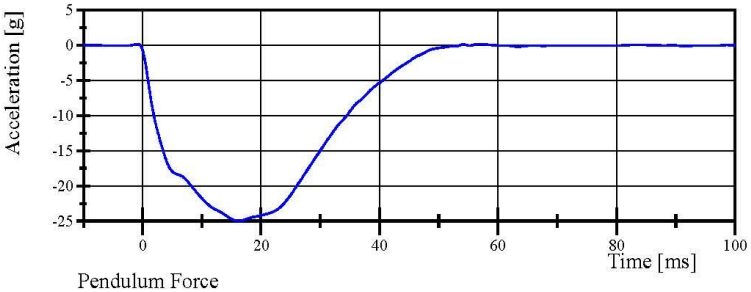
Condition: Used

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

Transportation Research Center Inc.

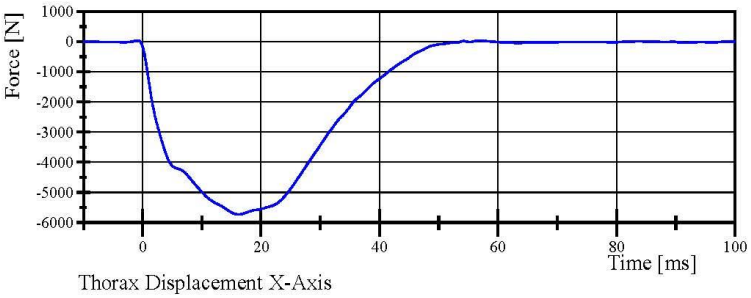
Front Thorax
HIII 50th Serial No. 037 Certification No. 58-1
Test Date: 5/13/2019

Pendulum Acceleration



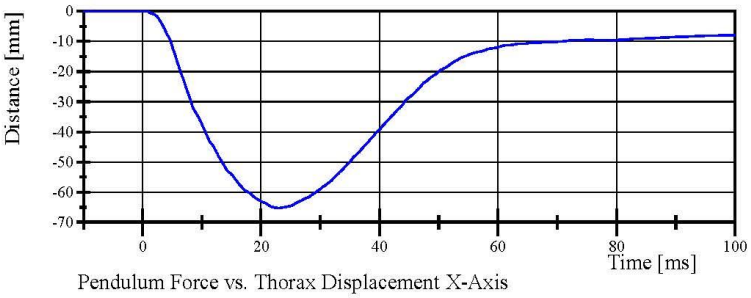
Filter Class: CFC_180
Max: 0.2 g at -0.8 ms
Min: -25.0 g at 16.2 ms

Pendulum Force



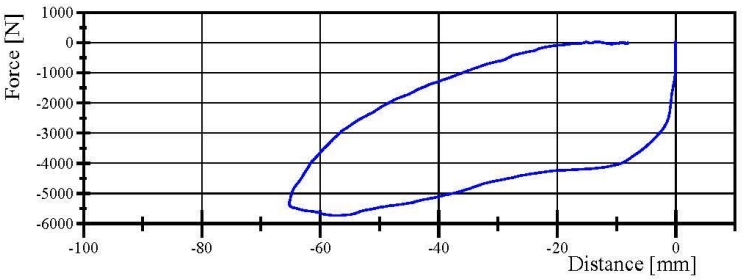
Filter Class: CFC_180
Max: 38.5 N at -0.8 ms
Min: -5,725.8 N at 16.2 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -8.7 ms
Min: -65.2 mm at 23.0 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 38.5 N at -0.0 mm
Min: -5,725.8 N at -57.2 mm

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

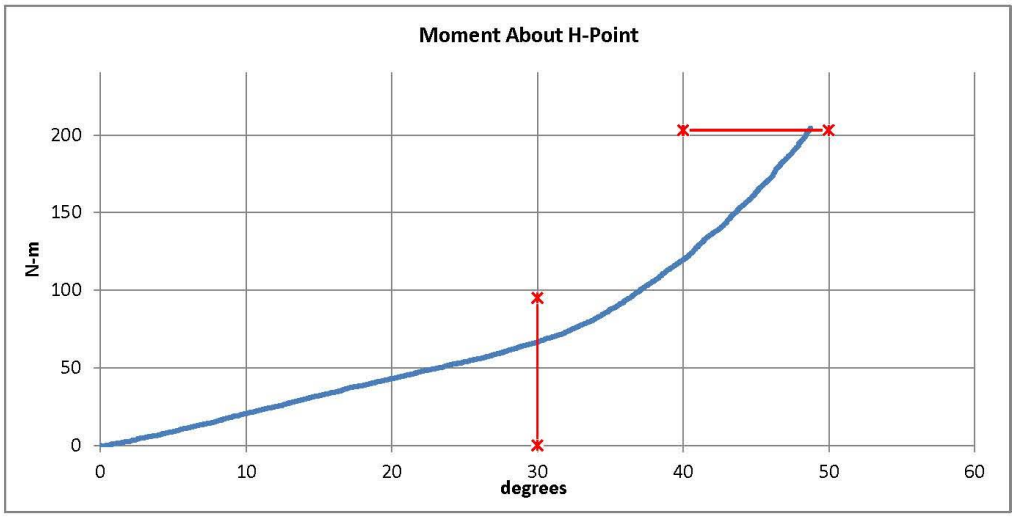
05.13.2019 07:37:46 367

Transportation Research Center Inc.

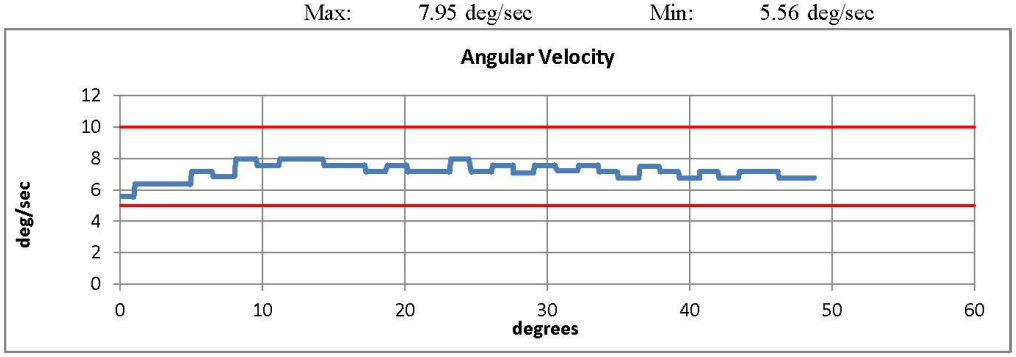
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	10-May-2019
Side Tested:	Left Hip	Time:	13:32
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21	°C	Pass
Humidity	10	-	70	50	%	Pass
Moment at 30°	0	≤	94.9	66.63	N-m	Pass
Angle at 203 Nm	40	-	50	48.74	deg	Pass
Average Velocity	5	-	10	7.16	deg/sec	Pass



Max: 7.95 deg/sec Min: 5.56 deg/sec



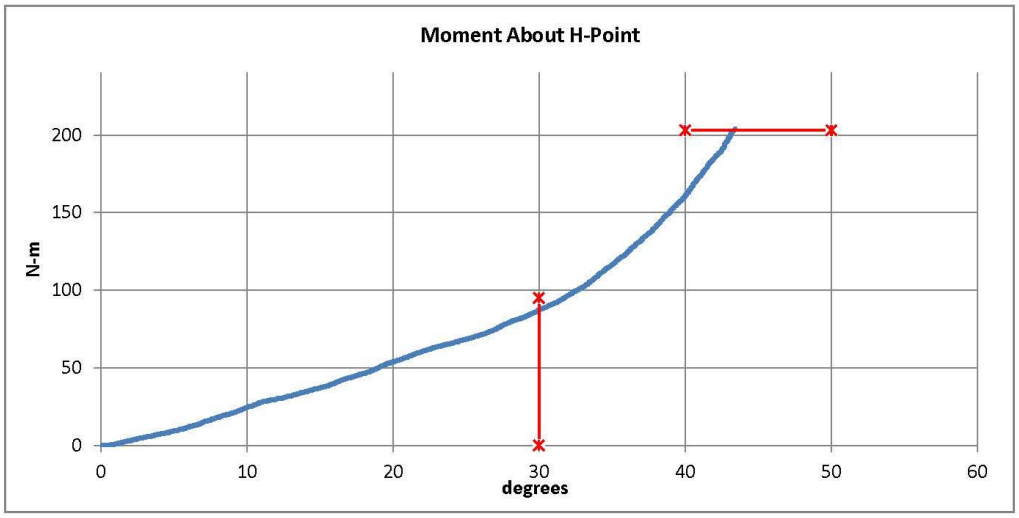
Comments:
Pelvis Skin S/N: N/A
Lumbar S/N: 0550

Transportation Research Center Inc.

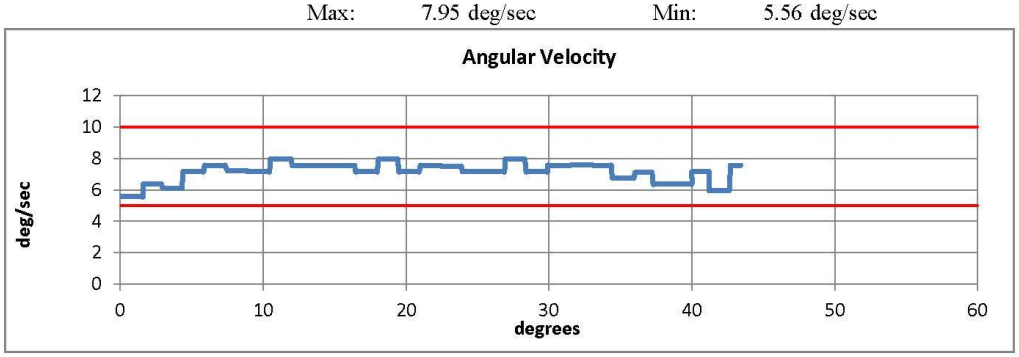
Hybrid III 50th Male Hip Range of Motion

Serial Number:	037	Date:	12-May-2019
Side Tested:	Right Hip	Time:	6:13
Test Number:	1		

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	20.9	°C	Pass
Humidity	10	-	70	39	%	Pass
Moment at 30°	0	≤	94.9	87.66	N-m	Pass
Angle at 203 Nm	40	-	50	43.41	deg	Pass
Average Velocity	5	-	10	7.13	deg/sec	Pass



Max: 7.95 deg/sec Min: 5.56 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. 58-4
Test Date: 5/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.086 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,397.67 N	Yes

Test meets specifications.

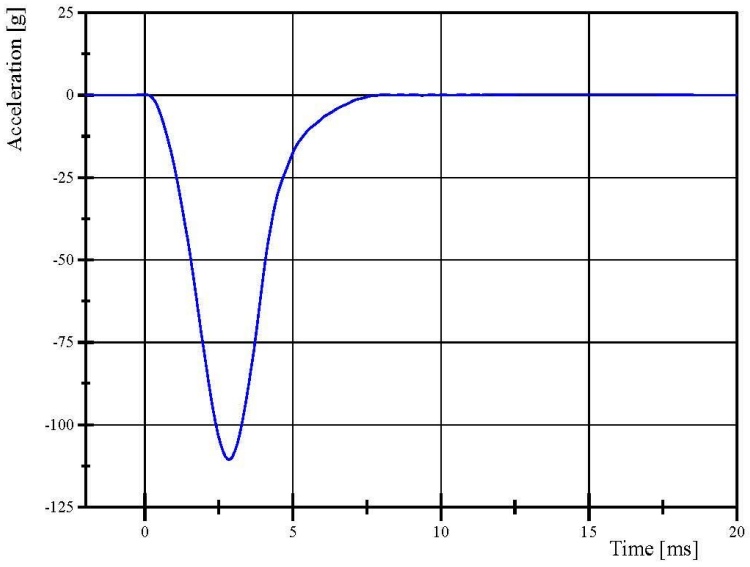
Condition: Used

Comments:
Knee Skin S/N: 2672

Transportation Research Center Inc.

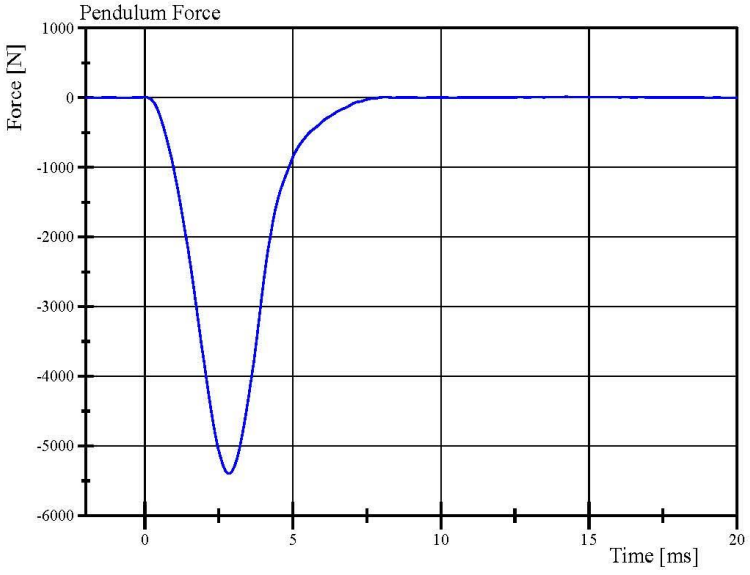
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 58-4
Test Date: 5/10/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.3 g at 14.2 ms
Min: -110.5 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 13.3 N at 14.2 ms
Min: -5,397.7 N at 2.9 ms

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

05.10.2019 11:54:19 1759

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 58-2
Test Date: 5/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.8 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.083 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,178.84 N	Yes

Test meets specifications.

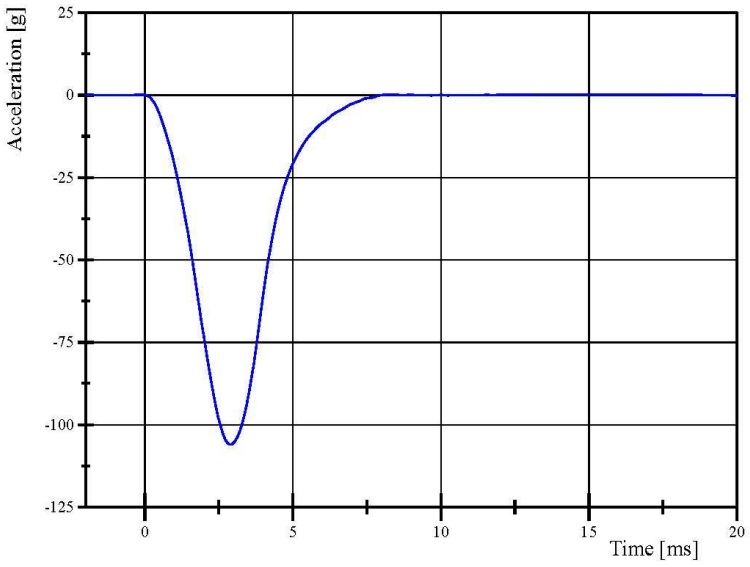
Condition: Used

Comments:
Knee Skin S/N: 176

Transportation Research Center Inc.

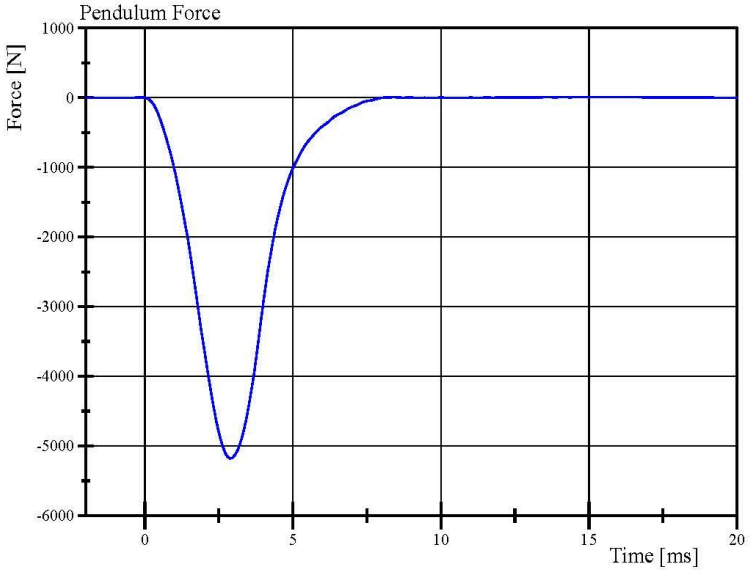
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 58-2
Test Date: 5/10/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.3 g at 15.1 ms
Min: -106.0 g at 2.9 ms

Pendulum Force



Filter Class: CFC_600
Max: 12.3 N at 15.1 ms
Min: -5,178.8 N at 2.9 ms

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

05.10.2019 11:39:58 1756

Pre-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 50

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	443	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	129	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	534	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	429	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	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	164	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	50 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	289.9 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	8.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

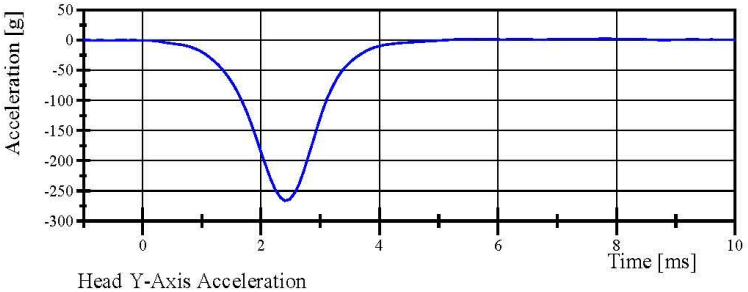
Condition: Used

Comments:
Head Skin S/N: 1348

Transportation Research Center Inc.

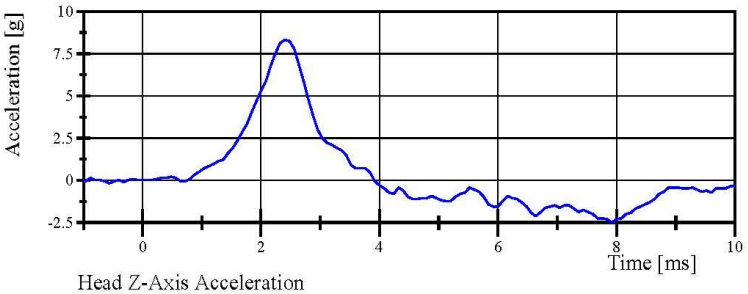
Front Head Drop
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Head X-Axis Acceleration



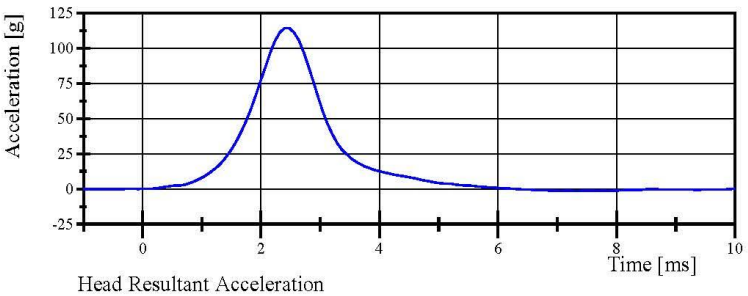
Filter Class: CFC_1000
Max: 2.6 g at 7.8 ms
Min: -266.3 g at 2.4 ms

Head Y-Axis Acceleration



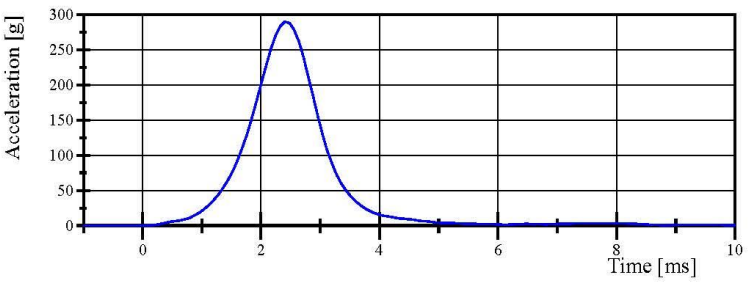
Filter Class: CFC_1000
Max: 8.3 g at 2.4 ms
Min: -2.5 g at 7.9 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 114.3 g at 2.4 ms
Min: -1.4 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 289.9 g at 2.4 ms
Min: 0.0 g at -0.8 ms

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

04.25.2019 14:17:46 609

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 426 Certification No. 50-2
Test Date: 4/30/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.046 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.33 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.41 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.19 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-79.5 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	79.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	88.8 ms	Yes

Test meets specifications.

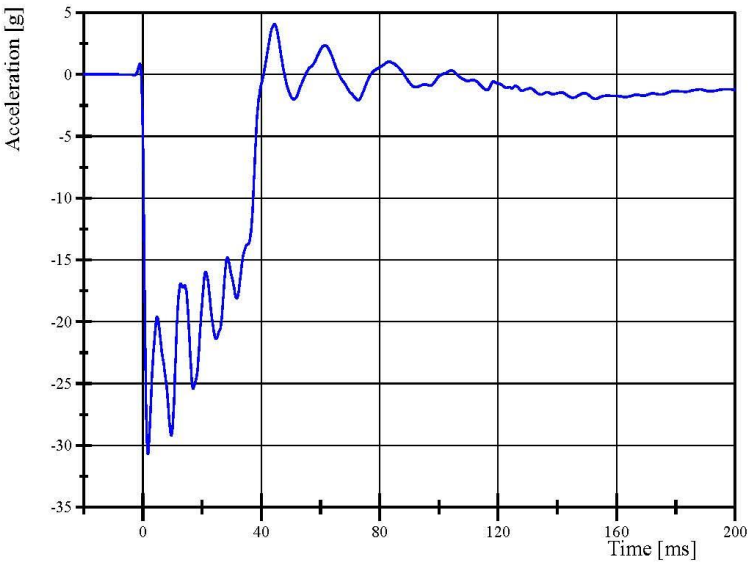
Condition: Used

Comments:
Neck S/N: DM2392

Transportation Research Center Inc.

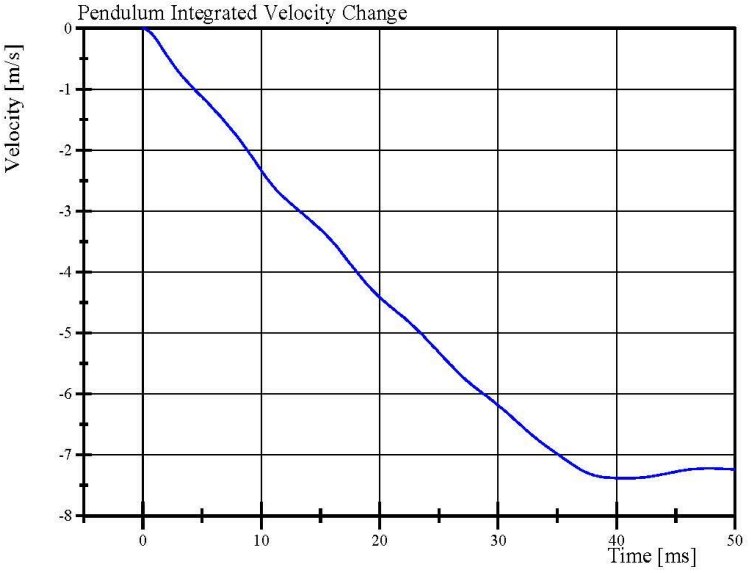
Neck Flexion
HIII 5th Serial No. 426 Certification No. 50-2
Test Date: 4/30/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 4.1 g at 44.5 ms
Min: -30.7 g at 1.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.4 m/s at 40.8 ms

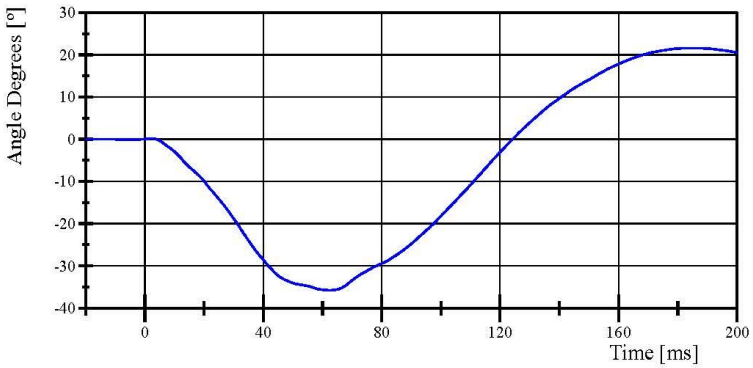
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

04.30.2019 13:37:56 1855

Transportation Research Center Inc.

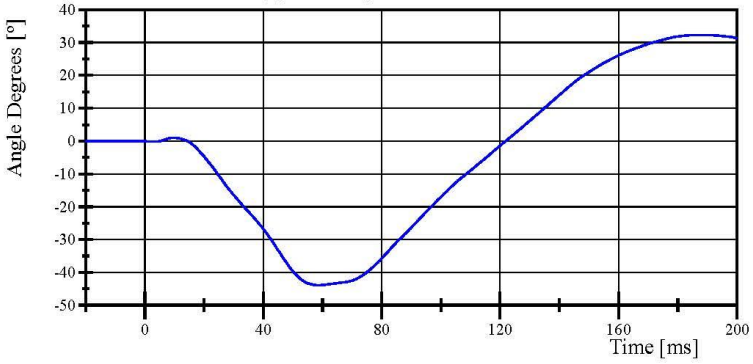
Neck Flexion
HIII 5th Serial No. 426 Certification No. 50-2
Test Date: 4/30/2019

Pot Rotation at the Base of Neck



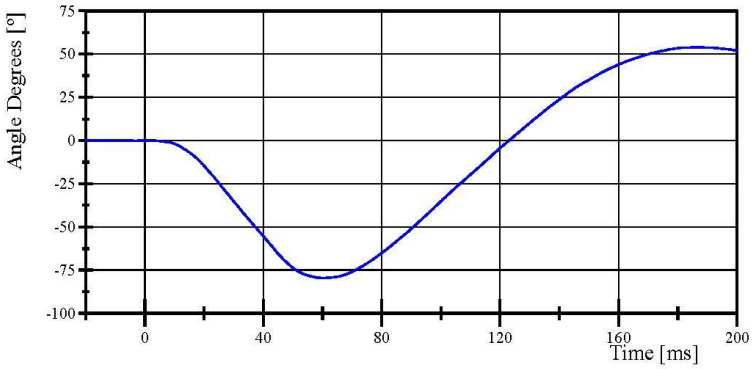
Filter Class: CFC_60
Max: 21.6 ° at 184.2 ms
Min: -35.7 ° at 62.6 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 32.3 ° at 187.9 ms
Min: -43.9 ° at 58.6 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 53.9 ° at 186.9 ms
Min: -79.5 ° at 60.1 ms

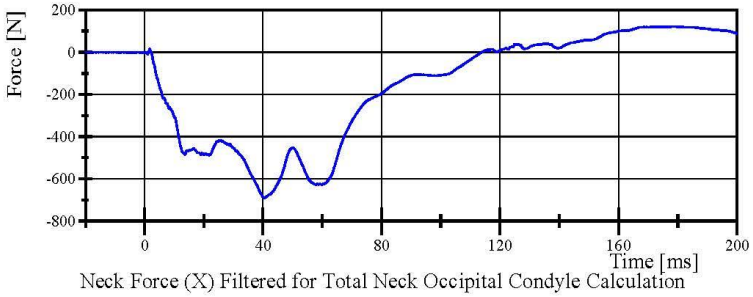
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

04.30.2019 13:37:57 1855

Transportation Research Center Inc.

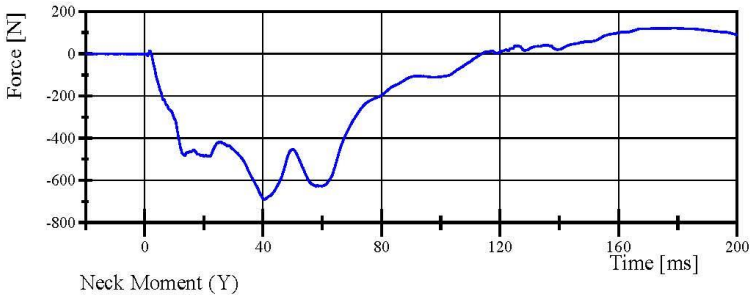
Neck Flexion
HIII 5th Serial No. 426 Certification No. 50-2
Test Date: 4/30/2019

Neck Force (X)



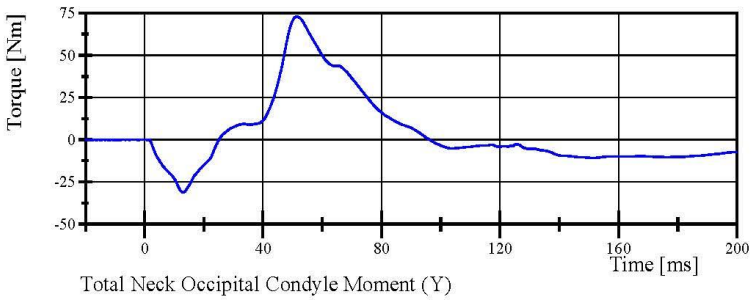
Filter Class: CFC_1000
Max: 122.3 N at 178.0 ms
Min: -689.1 N at 40.5 ms

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



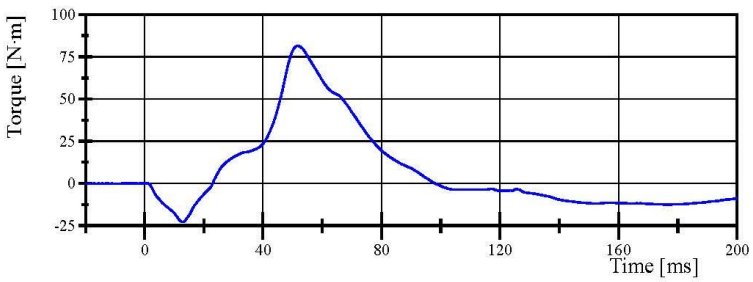
Filter Class: CFC_600
Max: 122.2 N at 178.4 ms
Min: -688.9 N at 40.5 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 73.0 Nm at 51.4 ms
Min: -31.2 Nm at 13.0 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 81.5 N·m at 51.6 ms
Min: -22.7 N·m at 12.8 ms

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

04.30.2019 13:37:58 1855

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/30/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.084 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.87 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.63 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.21 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	99.6 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-54.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	105.4 ms	Yes

Test meets specifications.

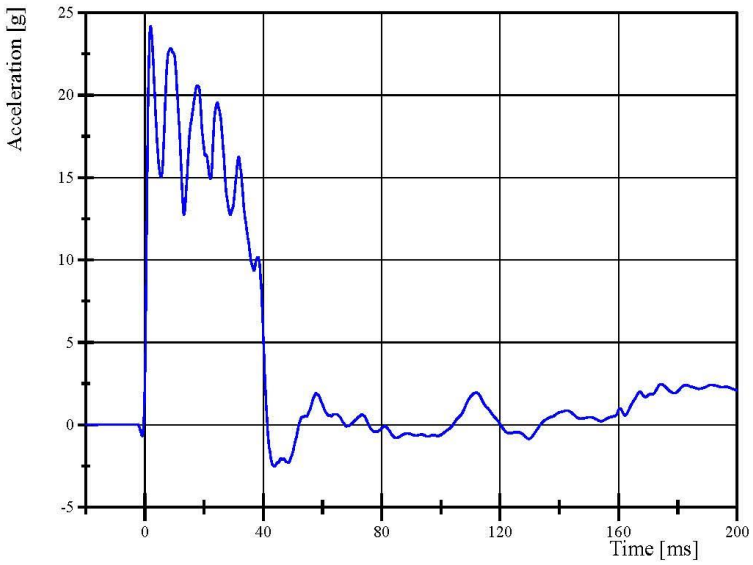
Condition: Used

Comments:
Neck S/N: DM2392

Transportation Research Center Inc.

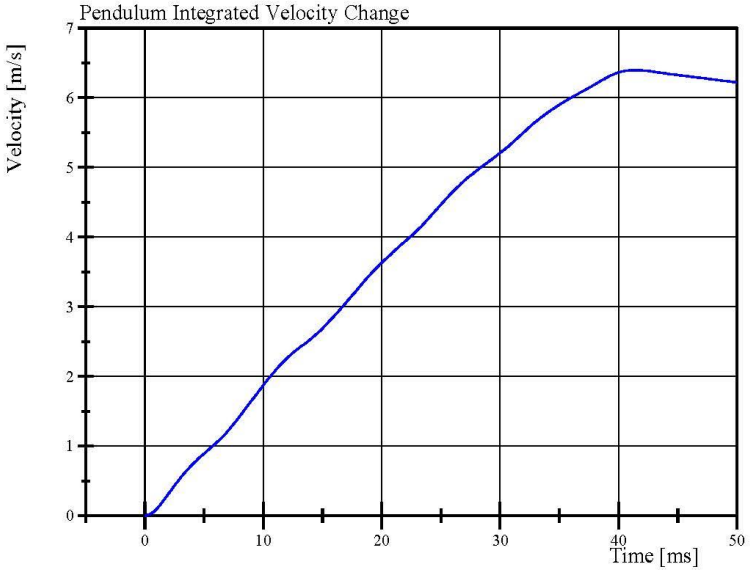
Neck Extension
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/30/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 24.2 g at 1.9 ms
Min: -2.5 g at 43.8 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.4 m/s at 41.4 ms
Min: 0.0 m/s at 0.0 ms

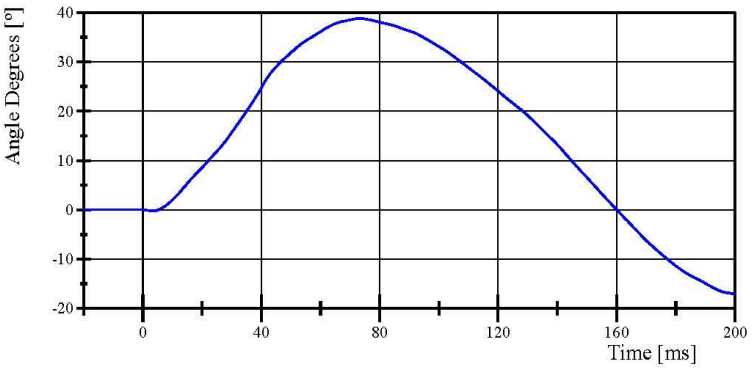
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

04.30.2019 14:30:04 1996

Transportation Research Center Inc.

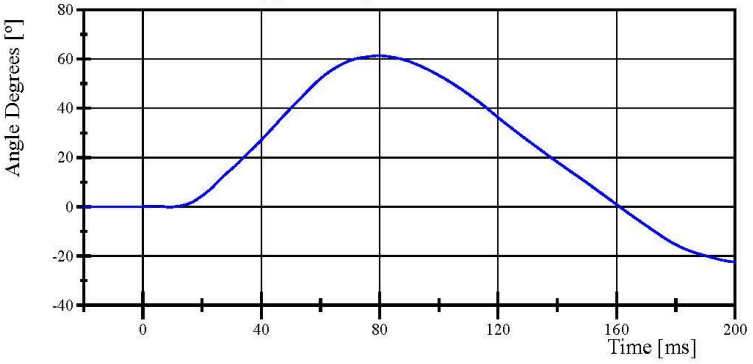
Neck Extension
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/30/2019

Pot Rotation at the Base of Neck



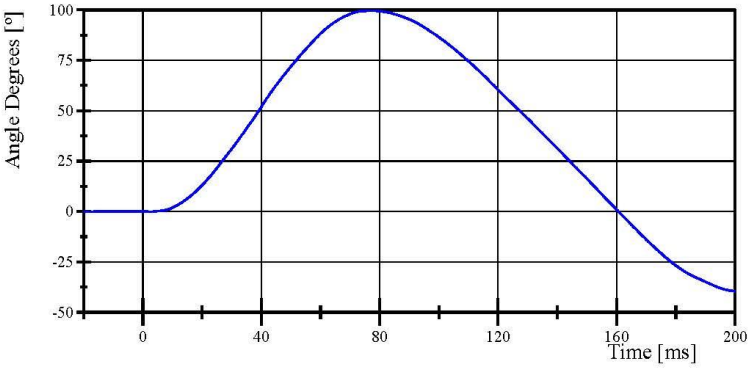
Filter Class: CFC_60
Max: 38.8 ° at 73.3 ms
Min: -17.1 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 61.3 ° at 79.7 ms
Min: -22.5 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 99.6 ° at 77.4 ms
Min: -39.6 ° at 200.0 ms

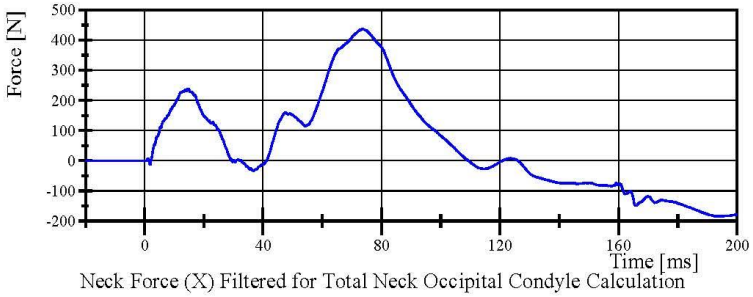
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

04.30.2019 14:30:04 1996

Transportation Research Center Inc.

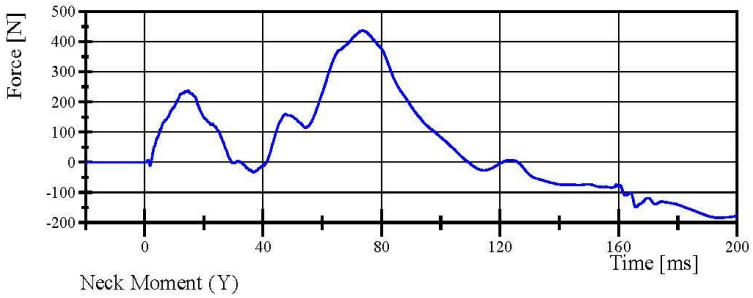
Neck Extension
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/30/2019

Neck Force (X)



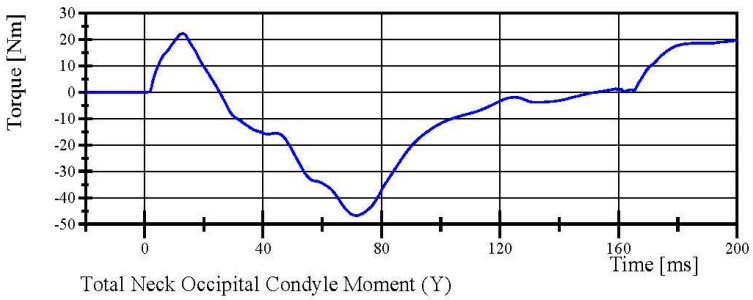
Filter Class: CFC_1000
Max: 436.6 N at 73.4 ms
Min: -184.5 N at 194.4 ms

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



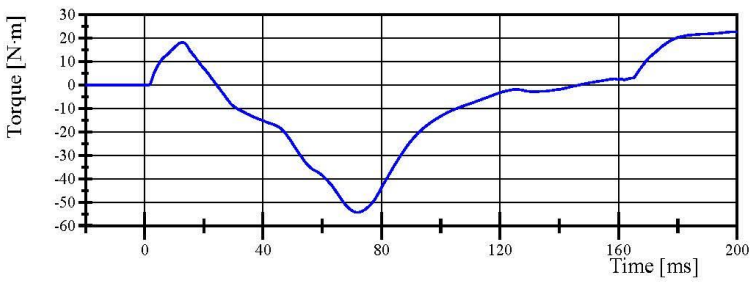
Filter Class: CFC_600
Max: 436.5 N at 73.6 ms
Min: -183.8 N at 194.4 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 22.2 Nm at 13.0 ms
Min: -46.7 Nm at 71.5 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 22.8 N·m at 200.0 ms
Min: -54.3 N·m at 72.0 ms

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

04.30.2019 14:30:05 1996

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.747 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,313.1 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,383.8 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-50.6 mm	Yes
Internal Hysteresis	69 - 85 %	74.3 %	Yes

Test meets specifications.

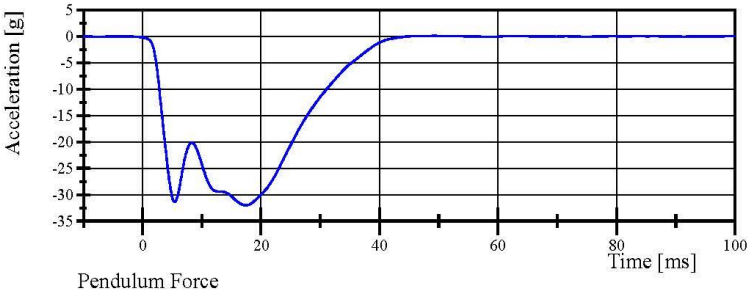
Condition: Used

Comments:
Jacket S/N: DG9935
Rib Set S/N: DJ1164

Transportation Research Center Inc.

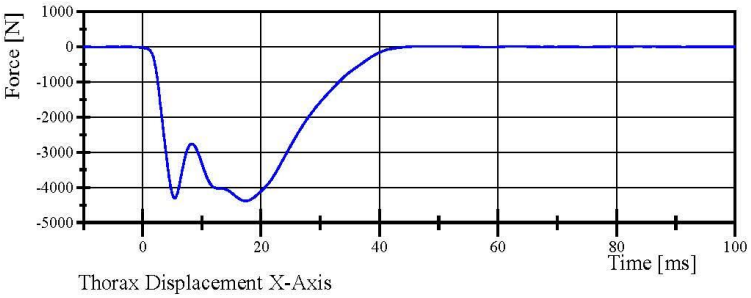
Front Thorax
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Pendulum Acceleration



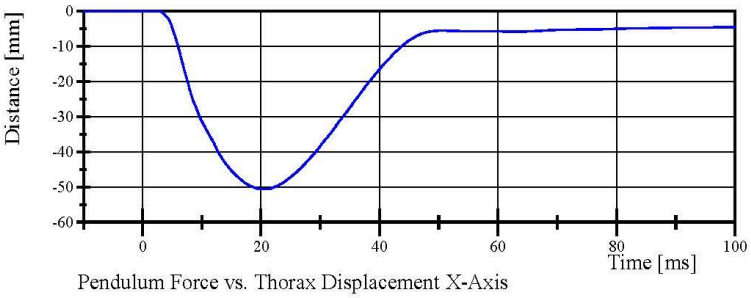
Filter Class: CFC_180
Max: 0.1 g at 49.3 ms
Min: -32.0 g at 17.4 ms

Pendulum Force



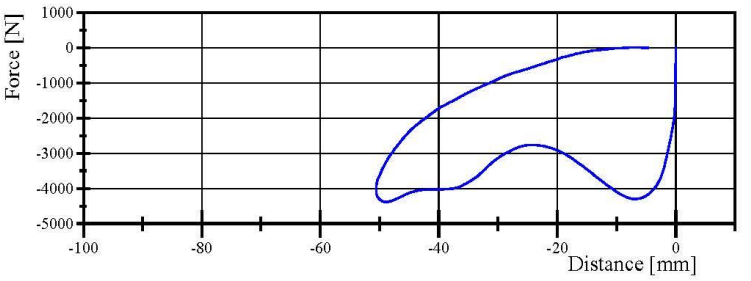
Filter Class: CFC_180
Max: 12.6 N at 49.3 ms
Min: -4,383.8 N at 17.4 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -4.4 ms
Min: -50.6 mm at 20.3 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 12.6 N at -5.6 mm
Min: -4,383.8 N at -49.0 mm

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

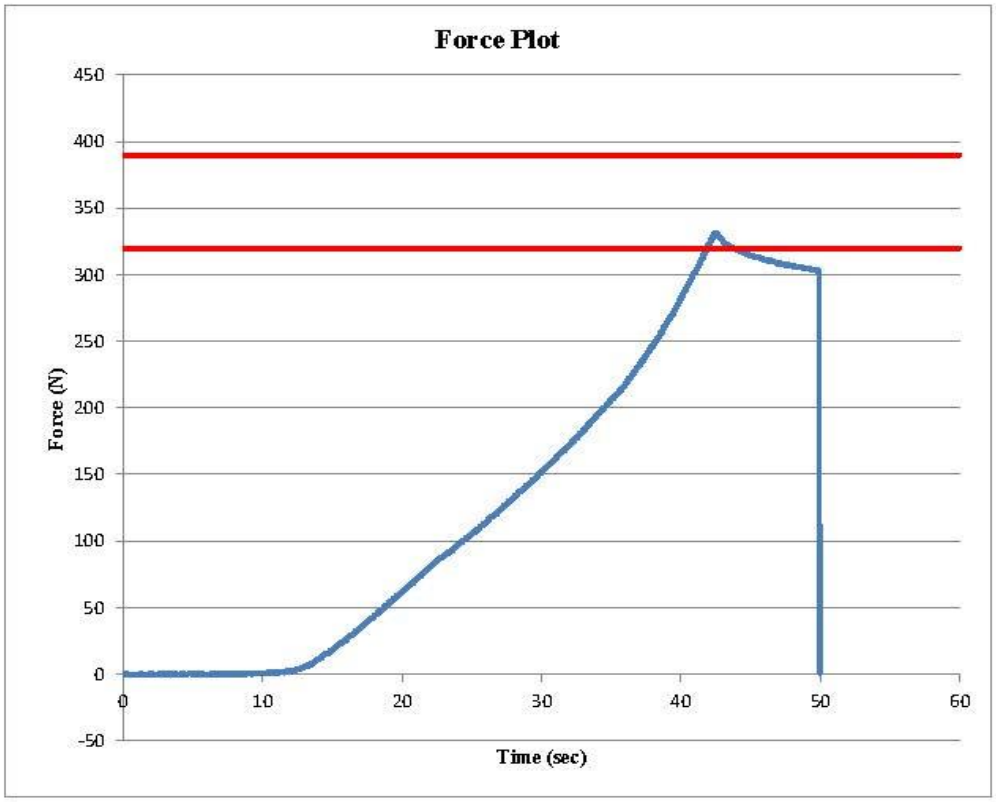
04.25.2019 14:58:04 408

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	426	Date:	4/26/2019
Test Number:	1	Time:	6:15

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.1	°C	Pass
Humidity	10	-	70	48	%	Pass
Average Angular Velocity	0.5	-	1.5	0.91	deg/sec	Pass
Initial Angle	0	-	20	17.49	deg	Pass
Peak Force at 45.05°	320	-	390	331.62	N	Pass
Final Angle	-8	-	8	4.3	deg	Pass



Comments:
Abdomen S/N: 1047
Pelvis S/N: 885
Lumbar S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.098 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,938.2 N	Yes

Test meets specifications.

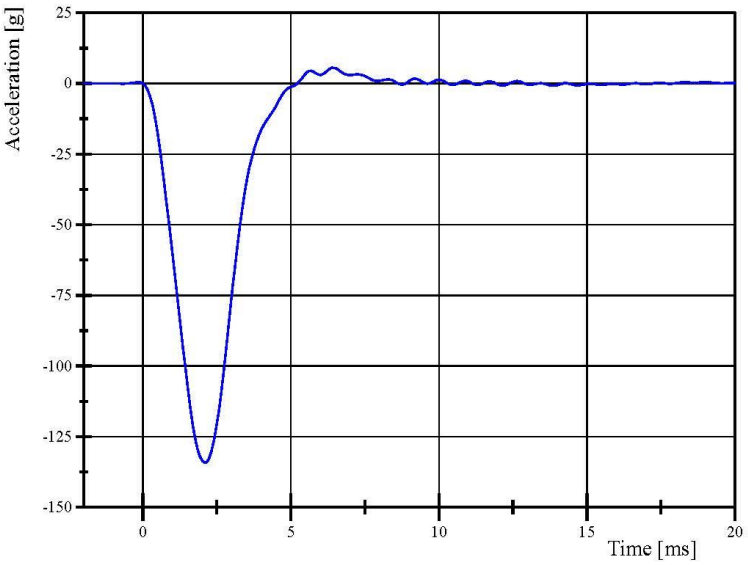
Condition: Used

Comments:
Knee Skin S/N: 1366

Transportation Research Center Inc.

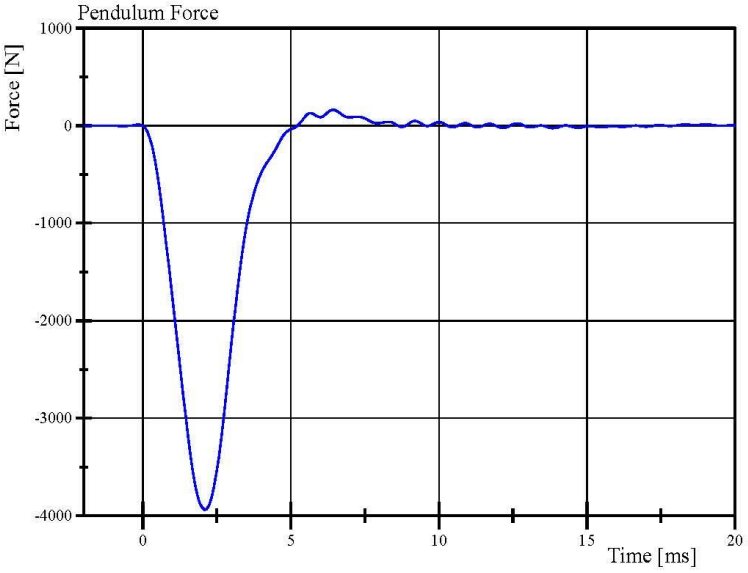
Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 5.5 g at 6.4 ms
Min: -134.3 g at 2.1 ms

Pendulum Force



Filter Class: CFC_600
Max: 162.3 N at 6.4 ms
Min: -3,938.2 N at 2.1 ms

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

04.25.2019 15:31:43 1864

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.109 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,842.7 N	Yes

Test meets specifications.

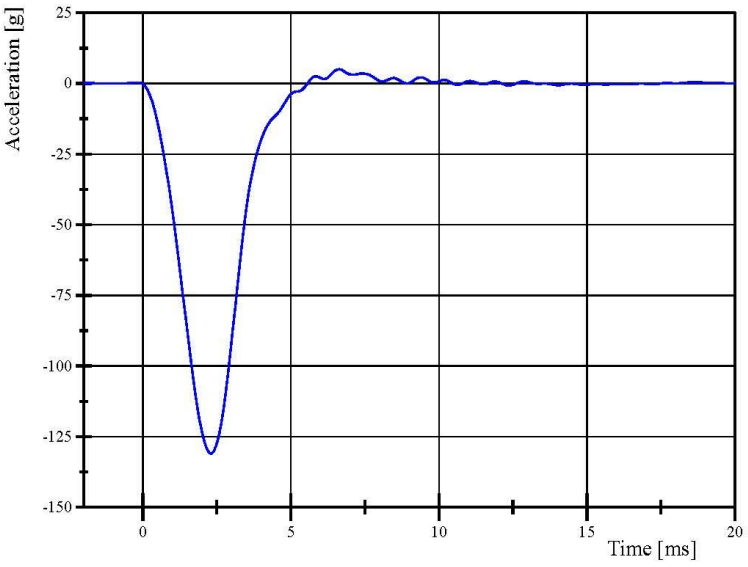
Condition: Used

Comments:
Knee Skin S/N: 1402

Transportation Research Center Inc.

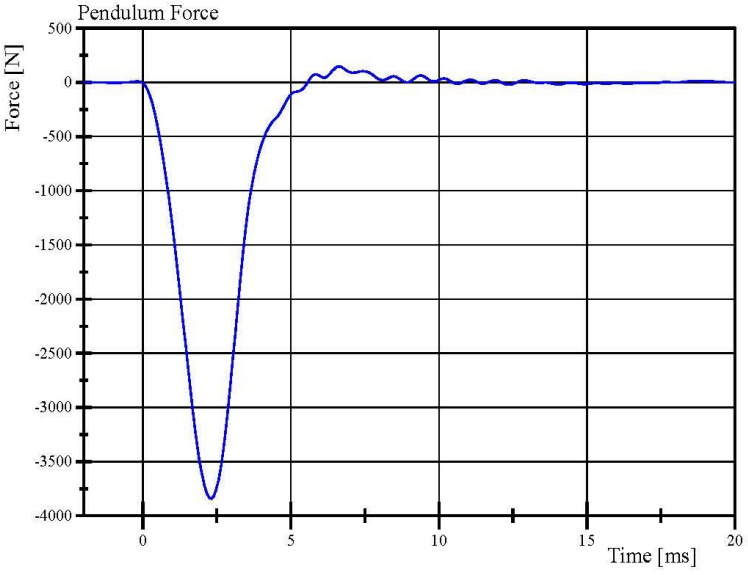
Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 50-1
Test Date: 4/25/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 5.0 g at 6.6 ms
Min: -131.1 g at 2.3 ms

Pendulum Force



Filter Class: CFC_600
Max: 147.6 N at 6.6 ms
Min: -3,842.7 N at 2.3 ms

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

04.25.2019 15:40:35 1859

Post-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
572O HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 51

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	780	Yes
B	Shoulder Pivot Height	431.8 - 457.2	443	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	79	Yes
F	Thigh Clearance	119.4 - 134.6	129	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	534	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	429	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	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	164	Yes

Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	278.6 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-2.6 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

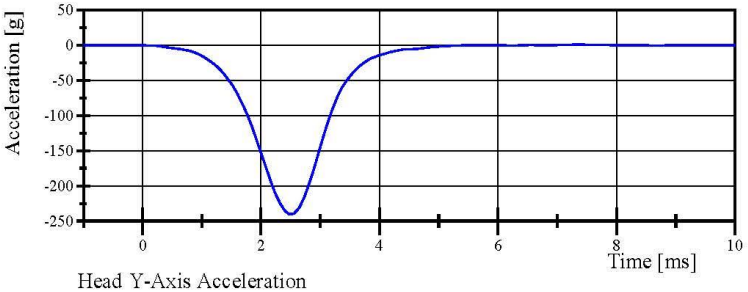
Condition: Used

Comments:
Head Skin S/N: 1348

Transportation Research Center Inc.

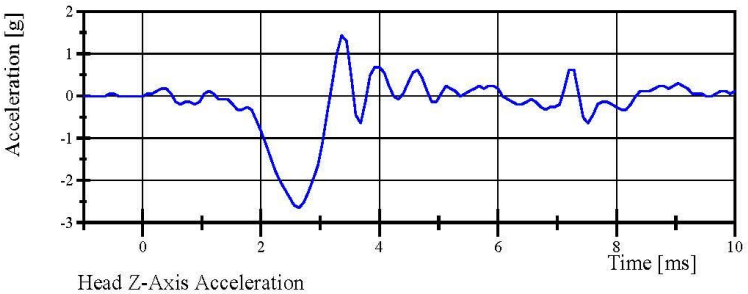
Front Head Drop
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Head X-Axis Acceleration



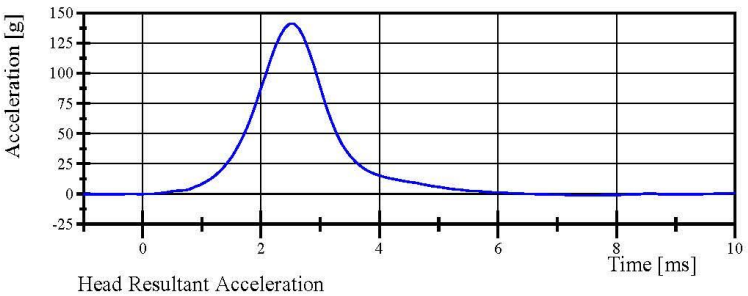
Filter Class: CFC_1000
Max: 0.8 g at 7.4 ms
Min: -240.3 g at 2.5 ms

Head Y-Axis Acceleration



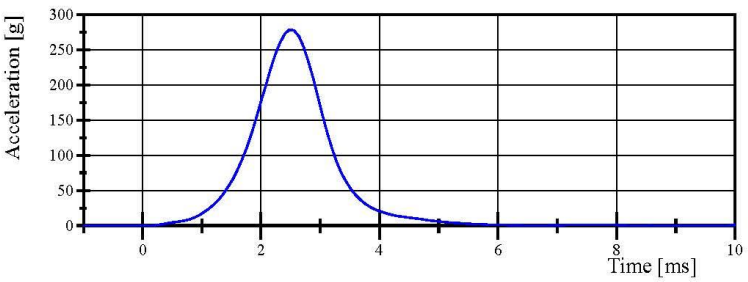
Filter Class: CFC_1000
Max: 1.4 g at 3.4 ms
Min: -2.6 g at 2.6 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 141.0 g at 2.5 ms
Min: -1.2 g at 7.6 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 278.6 g at 2.5 ms
Min: 0.0 g at -1.0 ms

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

05.12.2019 10:43:11 574

Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.040 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.34 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.41 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.30 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-79.5 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	79.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	89.2 ms	Yes

Test meets specifications.

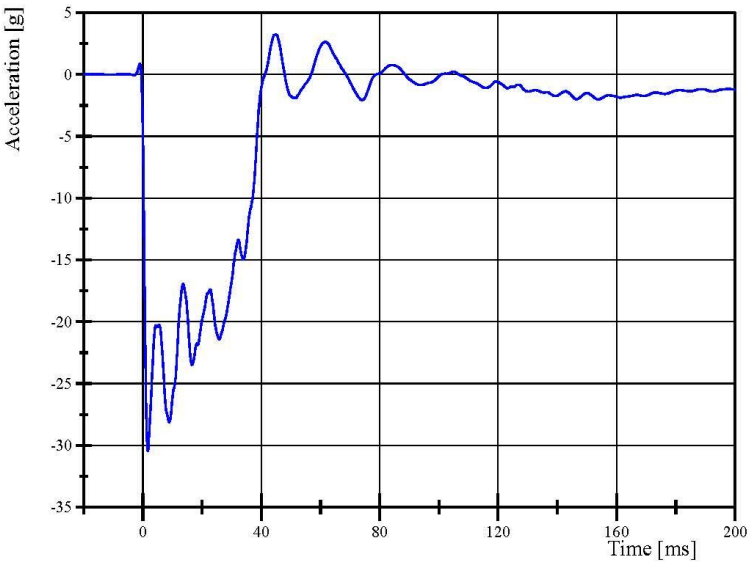
Condition: Used

Comments:
Neck S/N: DM2392

Transportation Research Center Inc.

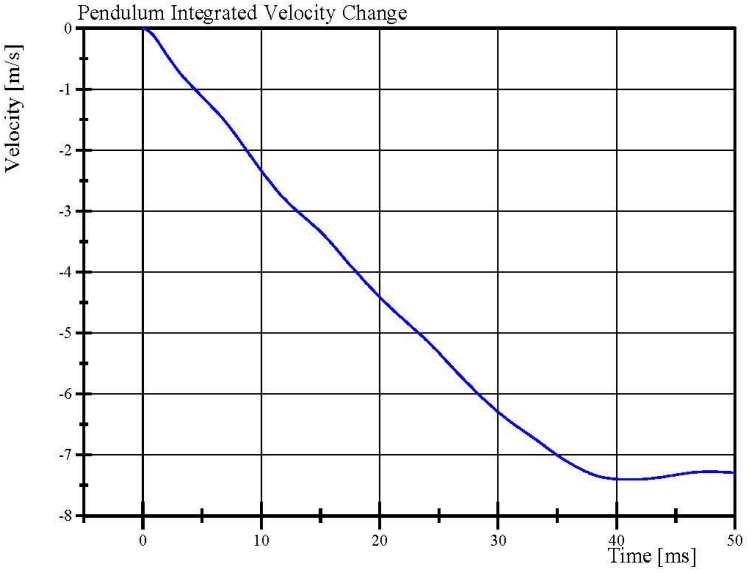
Neck Flexion
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.2 g at 44.9 ms
Min: -30.4 g at 1.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.4 m/s at 41.3 ms

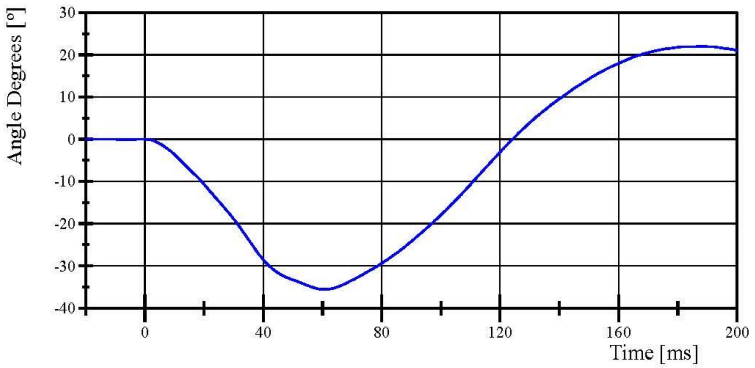
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.12.2019 11:11:31 1824

Transportation Research Center Inc.

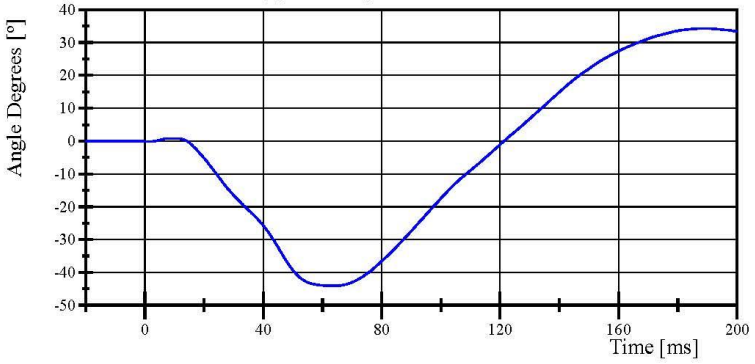
Neck Flexion
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pot Rotation at the Base of Neck



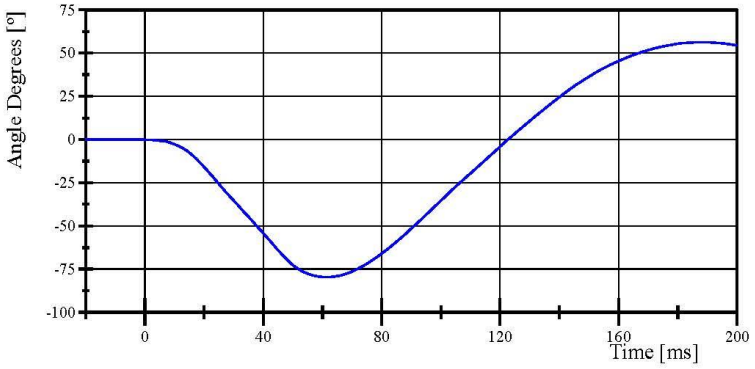
Filter Class: CFC_60
Max: 22.0 ° at 188.3 ms
Min: -35.5 ° at 60.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 34.3 ° at 189.1 ms
Min: -44.1 ° at 63.9 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 56.3 ° at 188.7 ms
Min: -79.5 ° at 61.5 ms

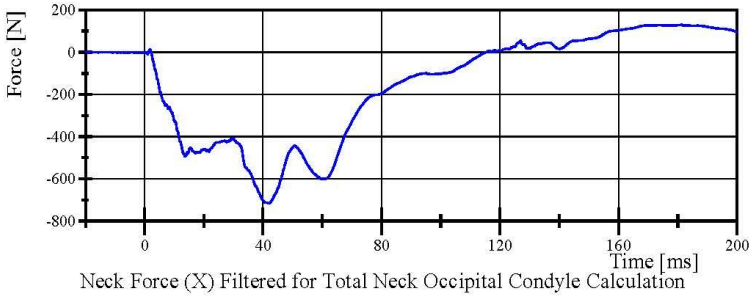
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.12.2019 11:11:32 1824

Transportation Research Center Inc.

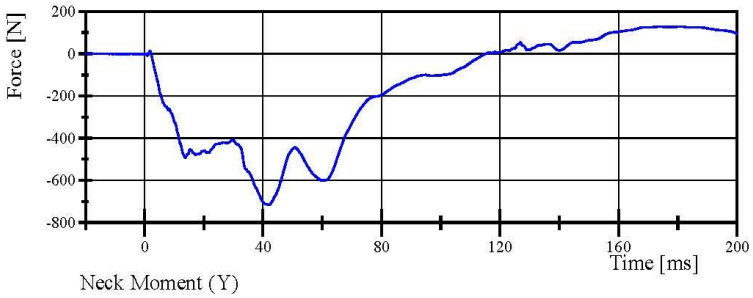
Neck Flexion
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Neck Force (X)



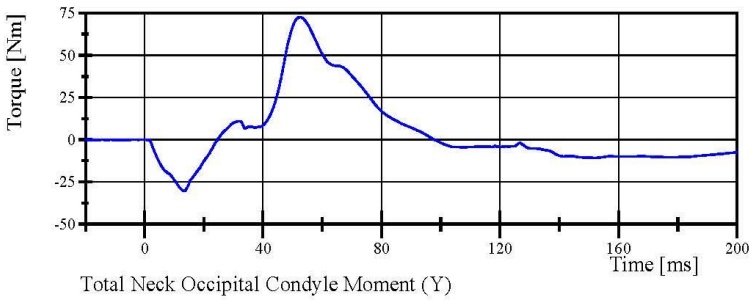
Filter Class: CFC_1000
Max: 130.2 N at 181.2 ms
Min: -716.4 N at 41.8 ms

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



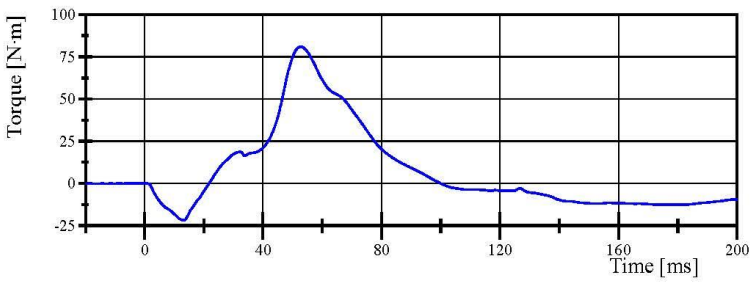
Filter Class: CFC_600
Max: 129.8 N at 180.5 ms
Min: -716.2 N at 42.0 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 72.6 Nm at 52.5 ms
Min: -30.3 Nm at 13.4 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 81.0 N·m at 52.8 ms
Min: -21.8 N·m at 13.1 ms

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

05.12.2019 11:11:33 1824

Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.083 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.77 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.40 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	4.96 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	109.2 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-55.3 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	107.2 ms	Yes

Test meets specifications.

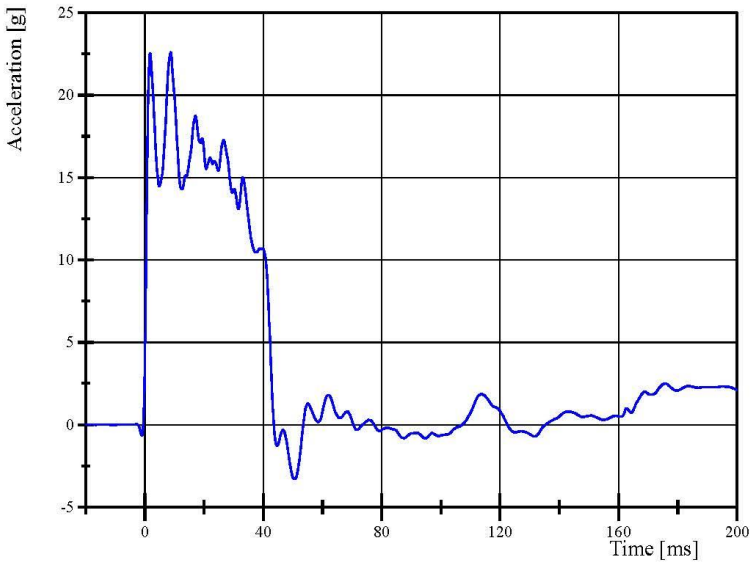
Condition: Used

Comments:
Neck S/N: DM2392

Transportation Research Center Inc.

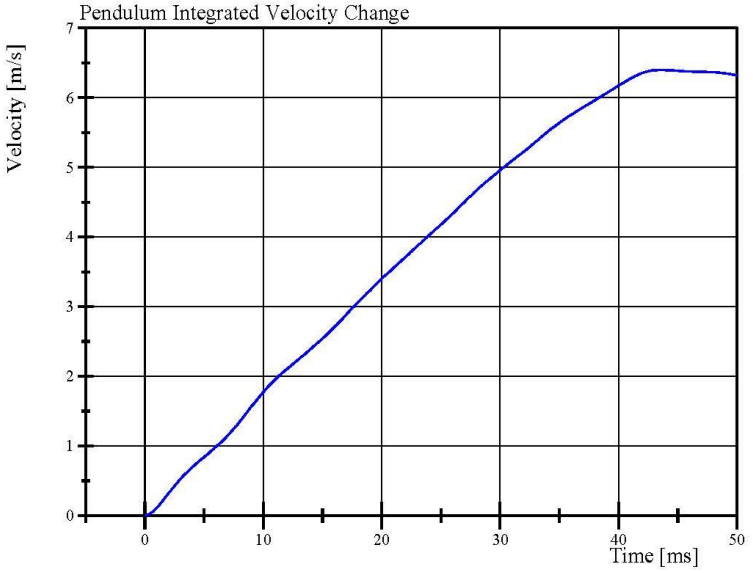
Neck Extension
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 22.6 g at 8.7 ms
Min: -3.3 g at 50.7 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.4 m/s at 43.6 ms
Min: 0.0 m/s at 0.0 ms

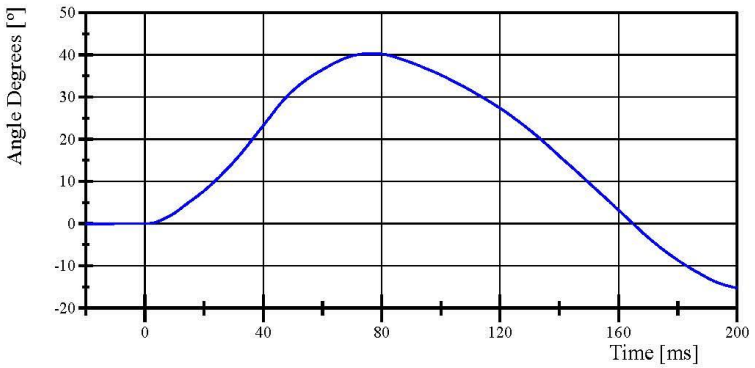
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.12.2019 12:23:42 1968

Transportation Research Center Inc.

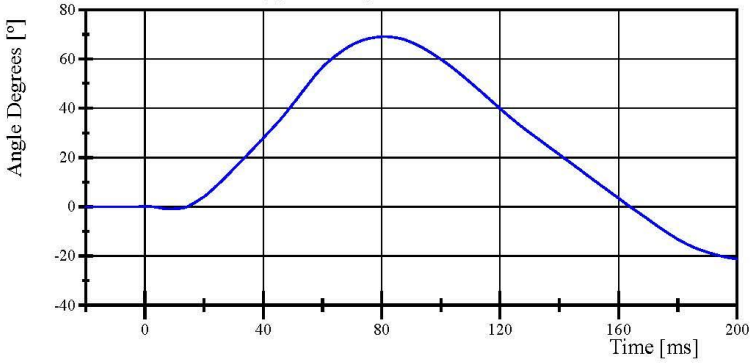
Neck Extension
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pot Rotation at the Base of Neck



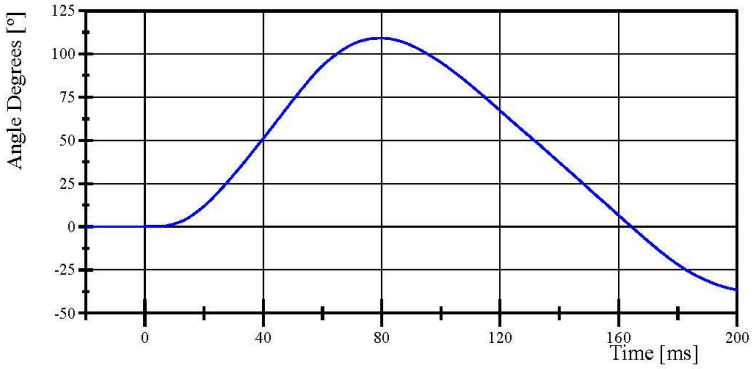
Filter Class: CFC_60
Max: 40.3 ° at 76.5 ms
Min: -15.2 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 69.0 ° at 81.1 ms
Min: -21.3 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 109.2 ° at 79.8 ms
Min: -36.5 ° at 200.0 ms

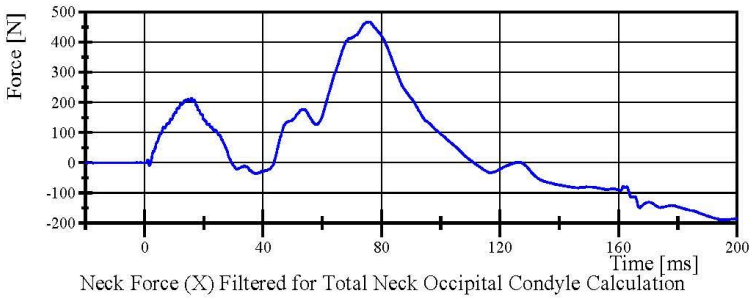
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

05.12.2019 12:23:43 1968

Transportation Research Center Inc.

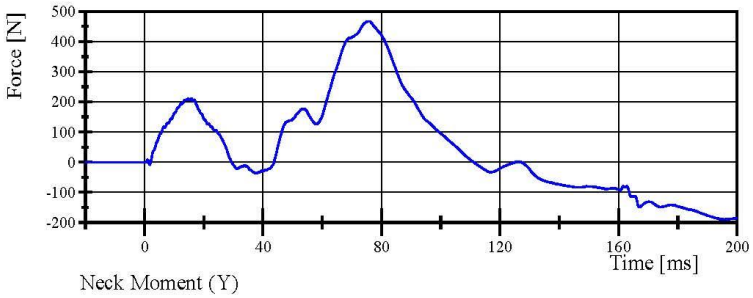
Neck Extension
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Neck Force (X)



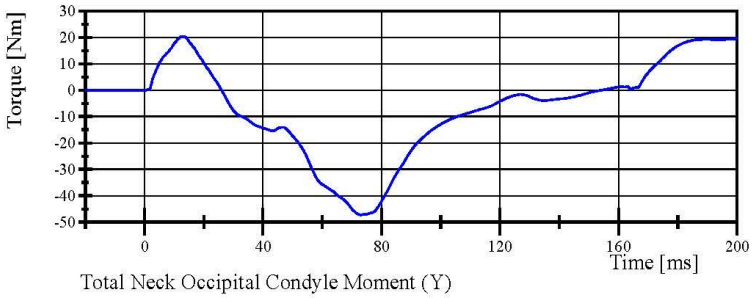
Filter Class: CFC_1000
Max: 467.6 N at 76.0 ms
Min: -189.5 N at 195.5 ms

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



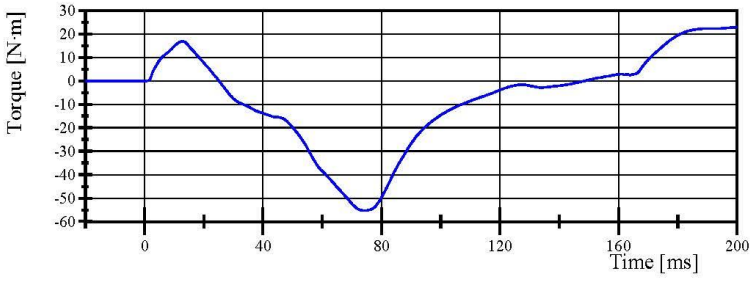
Filter Class: CFC_600
Max: 467.4 N at 76.0 ms
Min: -189.3 N at 195.6 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 20.3 Nm at 13.3 ms
Min: -47.3 Nm at 72.9 ms

Total Neck Occipital Condyle Moment (Y)



Filter Class: Without_(Constar
Max: 22.8 N·m at 199.6 ms
Min: -55.3 N·m at 74.7 ms

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

05.12.2019 12:23:43 1968

Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/13/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	43 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.741 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,280.6 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	>= (-4,600) N	-4,393.8 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-50.7 mm	Yes
Internal Hysteresis	69 - 85 %	75.0 %	Yes

Test meets specifications.

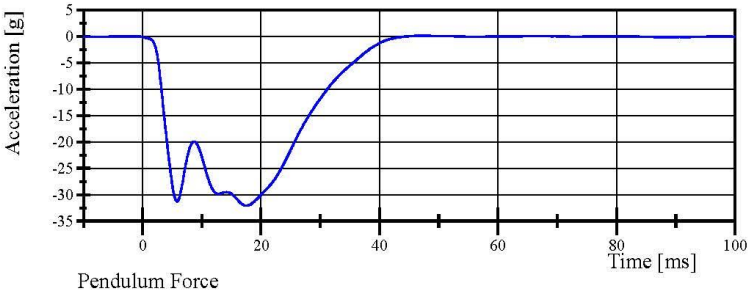
Condition: Used

Comments:
Jacket S/N: DG9935
Rib Set S/N: DJ1164

Transportation Research Center Inc.

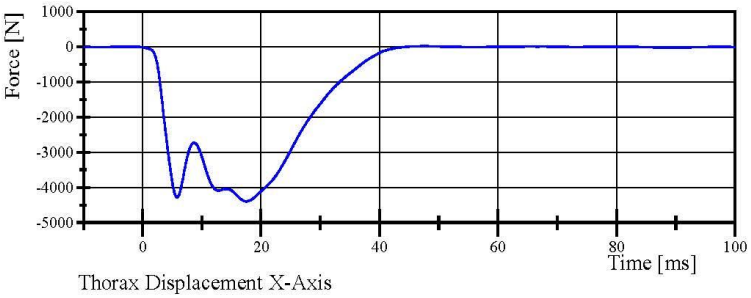
Front Thorax
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/13/2019

Pendulum Acceleration



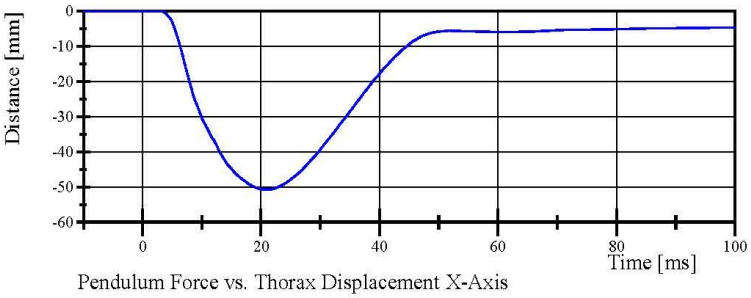
Filter Class: CFC_180
Max: 0.1 g at 47.8 ms
Min: -32.1 g at 17.5 ms

Pendulum Force



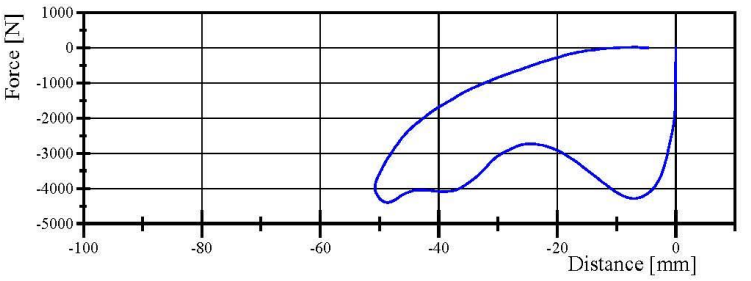
Filter Class: CFC_180
Max: 15.6 N at 47.8 ms
Min: -4,393.8 N at 17.5 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -8.6 ms
Min: -50.7 mm at 20.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



Filter Class: CFC_180
Max: 15.6 N at -6.7 mm
Min: -4,393.8 N at -48.6 mm

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

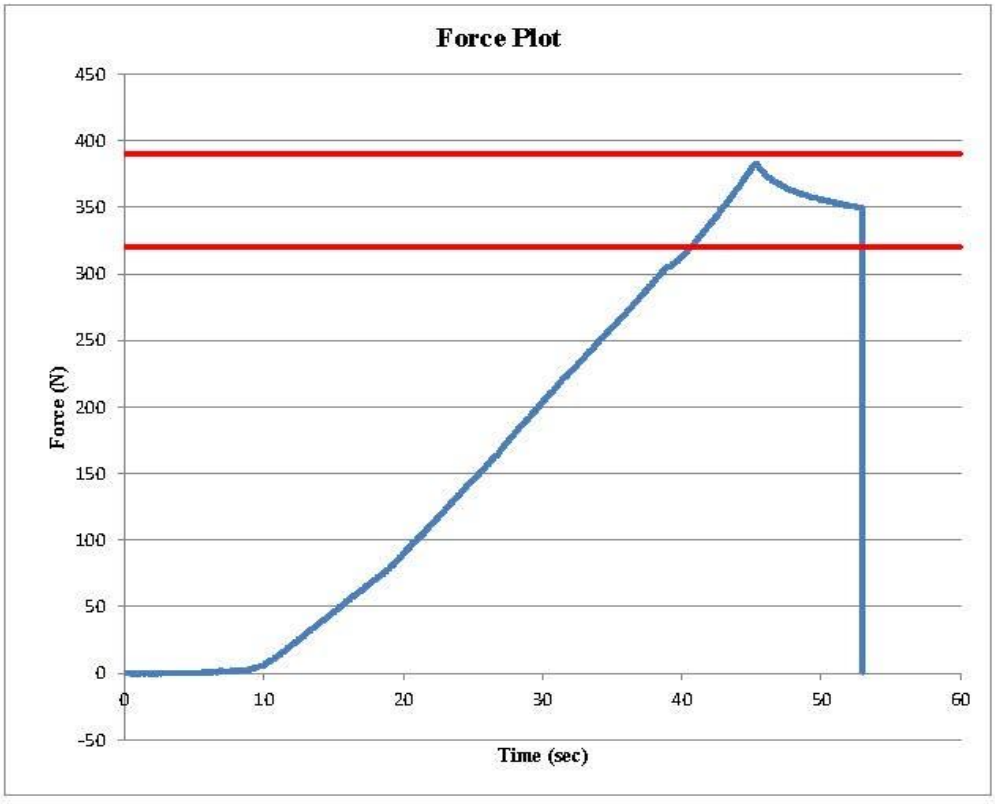
05.13.2019 11:01:21 379

Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

Customer:	NHTSA		
Serial Number:	426	Date:	5/12/2019
Test Number:	1	Time:	12:53

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.4	°C	Pass
Humidity	10	-	70	40	%	Pass
Average Angular Velocity	0.5	-	1.5	0.89	deg/sec	Pass
Initial Angle	0	-	20	13.2	deg	Pass
Peak Force at 45.15°	320	-	390	382.51	N	Pass
Final Angle	-8	-	8	7.12	deg	Pass



Comments:
Abdomen S/N: 1047
Pelvis S/N: 885
Lumbar S/N: N/A

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.100 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,989.9 N	Yes

Test meets specifications.

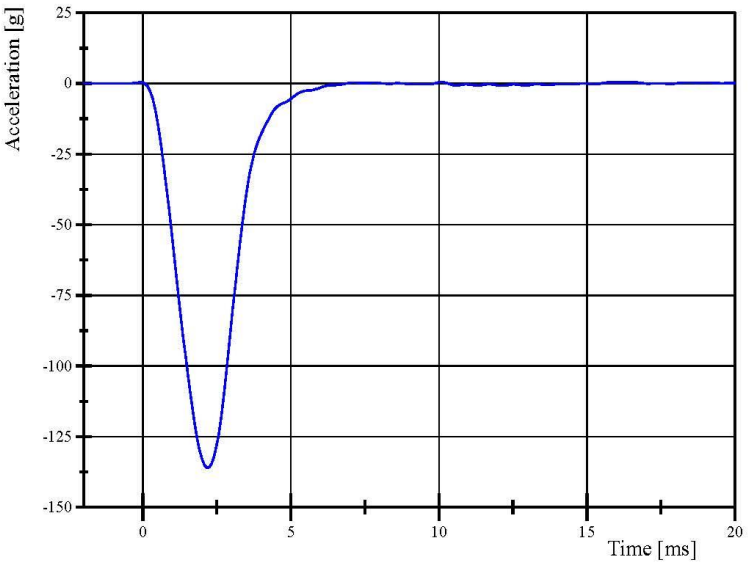
Condition: Used

Comments:
Knee Skin S/N: 1366

Transportation Research Center Inc.

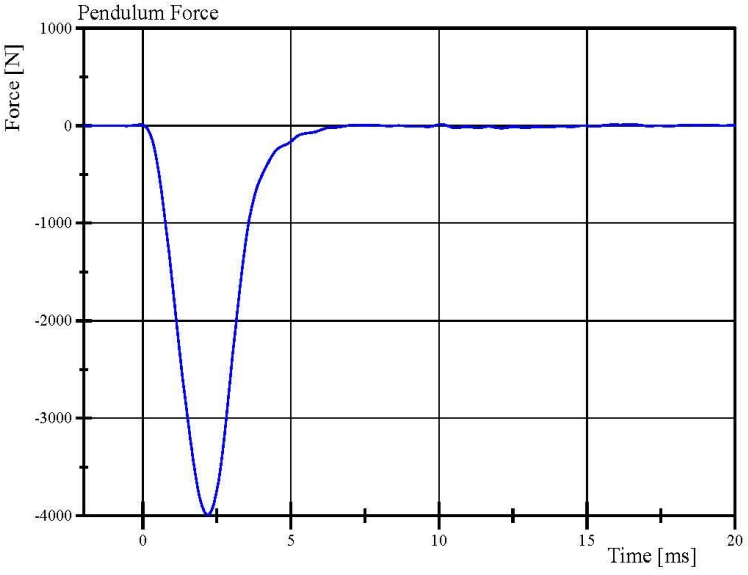
Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 0.5 g at 10.1 ms
Min: -136.1 g at 2.2 ms

Pendulum Force



Filter Class: CFC_600
Max: 13.7 N at 10.1 ms
Min: -3,989.9 N at 2.2 ms

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

05.12.2019 10:15:49 2091

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	21.4 ºC	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.106 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,897.8 N	Yes

Test meets specifications.

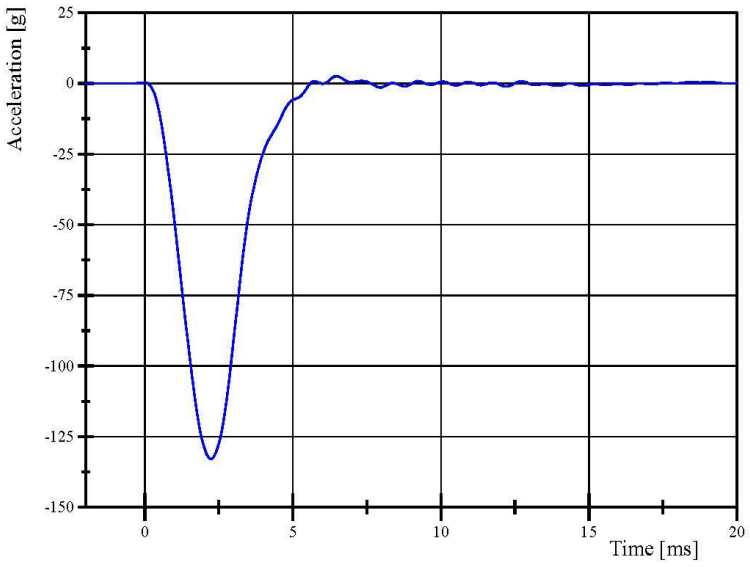
Condition: Used

Comments:
Knee Skin S/N: 1402

Transportation Research Center Inc.

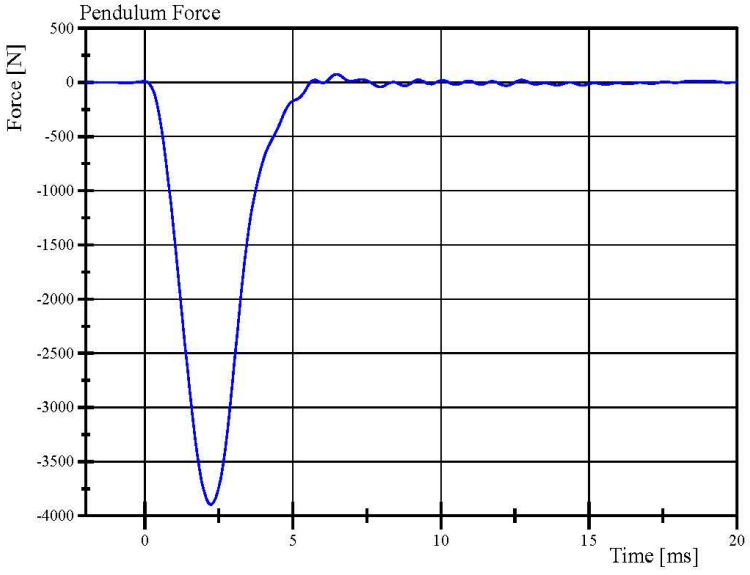
Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 51-1
Test Date: 5/12/2019

Pendulum Acceleration



Filter Class: CFC_600
Max: 2.6 g at 6.5 ms
Min: -132.9 g at 2.2 ms

Pendulum Force



Filter Class: CFC_600
Max: 75.0 N at 6.5 ms
Min: -3,897.8 N at 2.2 ms

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

05.12.2019 10:24:42 2084

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	5-Mar-2019
			Y	P94650	Endevco	4-Mar-2019
			Z	P94622	Endevco	4-Mar-2019
		Redundant	X	P94431	Endevco	4-Mar-2019
			Y	P94487	Endevco	4-Mar-2019
			Z	P94645	Endevco	4-Mar-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	4-Mar-2019
			Y	P61255	Endevco	4-Mar-2019
			Z	P45008	Endevco	4-Mar-2019
		Redundant	X	P91177	Endevco	4-Mar-2019
			Y	P94570	Endevco	4-Mar-2019
			Z	P91172	Endevco	4-Mar-2019
Chest Potentiometer			X	CST037	Servo	5-Mar-2019
Pelvis Accelerometers			X	P91185	Endevco	4-Mar-2019
			Y	P91876	Endevco	4-Mar-2019
			Z	T10338	Endevco	4-Mar-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	4-Mar-2019
			Z	P91498	Endevco	4-Mar-2019
		Front	Z	P90841	Endevco	4-Mar-2019
	Right	Rear	X	P93467	Endevco	4-Mar-2019
			Z	P97619	Endevco	4-Mar-2019
		Front	Z	P94523	Endevco	4-Mar-2019
Seat Belt Load Cells		Lap	N/A	S1402Q	Measurement Spec.	9-Jul-2018
		Shoulder	N/A	R141C8	Measurement Spec.	10-Dec-2018

TABLE 2 – Front Passenger Dummy Instrumentation

Instrumentation			Axis/Location	Hybrid III 5th S/N 426		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	P90285	Endevco	4-Mar-19
			Y	P90302	Endevco	4-Mar-19
			Z	P94534	Endevco	4-Mar-19
		Redundant	X	P89014	Endevco	4-Mar-19
			Y	P90855	Endevco	4-Mar-19
			Z	P94525	Endevco	4-Mar-19
Head Angular Rate Sensors			X	ARS14948	DTS	15-Oct-2018
			Y	ARS14949	DTS	15-Oct-2018
			Z	ARS14952	DTS	15-Oct-2018
Upper Neck Load Cell			FX, FY, FZ, MX, MY, MZ	2207	Denton	1-Oct-2018
Chest Accelerometers		Primary	X	P93543	Endevco	5-Mar-19
			Y	P93533	Endevco	5-Mar-19
			Z	P93402	Endevco	5-Mar-19
		Redundant	X	P91664	Endevco	5-Mar-19
			Y	P93546	Endevco	5-Mar-19
			Z	P93547	Endevco	5-Mar-19
Chest Potentiometer			X	CST426	Servo	1-Oct-2018
Pelvis Accelerometers			X	P93514	Endevco	5-Mar-19
			Y	P87467	Endevco	5-Mar-19
			Z	P93766	Endevco	5-Mar-19
Femur Load Cells	Left	Primary	Z	DI4214-FZ1	Denton	1-Oct-18
		Redundant	Z	DI4214-FZ2	Denton	1-Oct-18
	Right	Primary	Z	DI4217-FZ1	Denton	1-Oct-18
		Redundant	Z	DI4217-FZ2	Denton	1-Oct-18
Tibia Load Cells	Left	Upper	MX, MY, FZ	3643-92	Denton	1-Oct-18
		Lower	MX, MY, FZ	3644-92	Denton	1-Oct-18
	Right	Upper	MX, MY, FZ	3643-484	Denton	1-Oct-18
		Lower	MX, MY, FZ	3644-369	Denton	1-Oct-18
Foot Accelerometers	Left	Rear	X	P90866	Endevco	4-Mar-19
			Z	T11451	Endevco	4-Mar-19
		Front	Z	P97890	Endevco	4-Mar-19
	Right	Rear	X	P97640	Endevco	4-Mar-19
			Z	P91471	Endevco	4-Mar-19
		Front	Z	P91907	Endevco	4-Mar-19
Seat Belt Load Cells		Lap	N/A	R141CC	Measurement Spec.	10-Jul-2018
		Shoulder	N/A	R141C5	Measurement Spec.	10-Jul-2018

TABLE 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	T11837	Endevco	8-Jan-2019
			Z	T11864	Endevco	7-Jan-2019
		Redundant	X	T11819	Endevco	11-Apr-2019
	Right	Primary	X	P73570	Endevco	15-Apr-2019
			Z	T11833	Endevco	8-Jan-2019
		Redundant	X	T11452	Endevco	7-Jan-2019
Engine Accelerometers	Top		X	T11825	Endevco	8-Jan-2019
	Bottom		X	T11820	Endevco	7-Jan-2019