

Final Report Number: NCAP-TRC-17-005

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

**DAIMLER AG STUTTGART
2017 Mercedes-Benz E-Class Sedan
NHTSA Number: M20174300**

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



Report Date: January 19, 2017

FINAL REPORT

**Prepared For:
U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
1200 New Jersey Ave, SE Room W43-410
Washington, DC 20590**

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Prepared By: ILO Project Operations Group

Approved By: John Shultz

Approval Date: January 19, 2017

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 _____

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16. Abstract A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2017 Mercedes-Benz E-Class Sedan, in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301 and foot well intrusion performance. This test was conducted at the Transportation Research Center Inc. in East Liberty, Ohio on December 05, 2016. The impact velocity was 56.43 km/h, and the ambient temperature at the barrier face at the time of impact was 20.3° C. The target vehicle post-test maximum crush was 445 millimeters at vehicle centerline. The test vehicle's performance is as follows: <table border="1"> <thead> <tr> <th></th> <th colspan="3">Driver ATD</th> <th colspan="3">Passenger ATD</th> </tr> <tr> <th>Measurement Description</th> <th>Units</th> <th>Threshold</th> <th>Result</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>NA</td> <td>700</td> <td>177</td> <td>NA</td> <td>700</td> <td>180</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-21.9</td> <td>mm</td> <td>52</td> <td>-18.5</td> </tr> <tr> <td>3ms Chest Clip</td> <td>Gs</td> <td>60</td> <td>44.7</td> <td>Gs</td> <td>60</td> <td>42.1</td> </tr> <tr> <td>Nij</td> <td>NA</td> <td>1</td> <td>0.32</td> <td>NA</td> <td>1</td> <td>0.35</td> </tr> <tr> <td>Neck Tension</td> <td>Newtons</td> <td>4170</td> <td>1182.9</td> <td>Newtons</td> <td>2620</td> <td>465.1</td> </tr> <tr> <td>Neck Compression</td> <td>Newtons</td> <td>4000</td> <td>-245.8</td> <td>Newtons</td> <td>2520</td> <td>-714.5</td> </tr> <tr> <td>Left Femur Force</td> <td>Newtons</td> <td>10000</td> <td>-1786.4</td> <td>Newtons</td> <td>6800</td> <td>-1033.4</td> </tr> <tr> <td>Right Femur Force</td> <td>Newtons</td> <td>10000</td> <td>-2572.7</td> <td>Newtons</td> <td>6800</td> <td>-561.1</td> </tr> </tbody> </table>								Driver ATD			Passenger ATD			Measurement Description	Units	Threshold	Result	Units	Threshold	Result	Head Injury Criteria (HIC ₁₅)	NA	700	177	NA	700	180	Maximum Chest Compression	mm	63	-21.9	mm	52	-18.5	3ms Chest Clip	Gs	60	44.7	Gs	60	42.1	Nij	NA	1	0.32	NA	1	0.35	Neck Tension	Newtons	4170	1182.9	Newtons	2620	465.1	Neck Compression	Newtons	4000	-245.8	Newtons	2520	-714.5	Left Femur Force	Newtons	10000	-1786.4	Newtons	6800	-1033.4	Right Femur Force	Newtons	10000	-2572.7	Newtons	6800	-561.1
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1: PURPOSE AND SUMMARY OF THE TEST

PURPOSE

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

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

SUMMARY

A 2017 Mercedes-Benz E-Class Sedan impacted the barrier wall at a velocity of 56.43 km/h. The test was performed at Transportation Research Center, Inc. on December 05, 2016. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck load cells, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and the passenger's lap belts to measure dummy pelvic section loading.

The driver (position 1) ATD (Serial No. 037), and the right-front passenger (position 2) ATD (Serial No. 426) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 100 channels of data were recorded on an on-board data acquisition system. The 288 barrier channels of data were recorded on an off-board high resolution barrier data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

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

The maximum static crush of the vehicle was 445 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below:

ATD Position	HIC₁₅	Nij	Neck Tension (N)	Neck Compression (N)	3 ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th Male)	177	0.32	1182.9	-245.8	44.7	-21.9	-1786.4	-2572.7
Passenger (5 th Female)	180	0.35	465.1	-714.5	42.1	-18.5	-1033.4	-561.1

2: OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

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

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

TEST VEHICLE INFORMATION

NHTSA No.	M20174300
Model Year	2017
Make	Mercedes-Benz
Model	E300 E-Class
Body Style	Sedan
VIN	WDDZF4KB5HA030179
Body Color	Selenite Grey Metallic
Odometer Reading (km/mi)	17 Mi.
Engine Displacement (L)	2.0
Type/No. Cylinders	Inline/4
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	9
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

TEST VEHICLE OPTIONS

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	No

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured by	DAIMLER AG STUTTGART	GVWR (kg)	2345 (5170 lbs)
Date of Manufacture	04/16	GAWR Front (kg)	1120 (2469 lbs)
		GAWR Rear (kg)	1225 (2701 lbs)

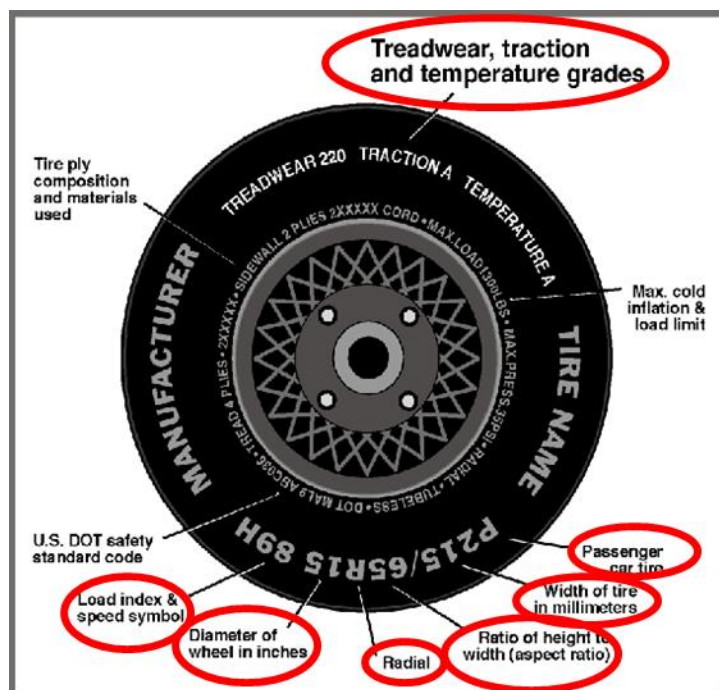
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				485
Cargo Wt. (RCLW) (kg)				144.8

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

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold / Test Pressure (kPa)	260	310
Recommended Tire Size	245/45R18	245/45R18
Tire Size on Vehicle	245/45R18	245/45R18
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle Sport	Eagle Sport
Treadwear	400	400
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index/Speed Symbol	100V	100V
Tire Material	Polyester/Steel/Polyamide	Polyester/Steel/Polyamide
DOT Safety Code Right	DM8U JAAR 1316	DMU8 JAAR 1616
DOT Safety Code Left	DM8U JAAR 1416	DMU8 JAAR 1616

DATA SHEET NO. 1 (CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2017 Mercedes-Benz E-Class SedanNHTSA No.: M20174300Test Program: NCAP Frontal ImpactTest Date: 12/5/16**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	480.8	415.4		509.0	528.0	
Right	kg	492.4	415		510.4	531.6	
Ratio	%	54	46		49.0	51.0	
Totals	kg	973.2	830.4	1803.6	1019.4	1059.6	2079.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1803.6
Weight of 1 P572E ATD & 1 P572O ATD	kg	139.3
Rated Cargo/Luggage Weight (RCLW)	kg	144.8
Vehicle Target Weight (TVTW)	kg	2087.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	725	718	743	743	1353
As Tested	mm	712	710	691	687	1498
Post Test	mm	786	800	687	693	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2940
Total Vehicle Length at Left Side	mm	4760
Total Vehicle Length at Centerline	mm	4930
Total Vehicle Length at Right Side	mm	4763
Weight of Ballast in Cargo Area	kg	33.8
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	liters	61.3

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: None

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

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4930
2	Total Width	1858
3	Bumper Top Height	495
4	Bumper Bottom Height	420
5	Longitudinal Member Top Height	530
6	Distance Between Longitudinal Members	720
7	Longitudinal Member Width	60
8	Engine Top Height	848
9	Engine Bottom Height	110
10	Engine and Gearbox Width	350
11	Front Bumper-Engine Distance	652
12	Front Shock Absorber Fixing Height	830
13	Bonnet Leading Edge Height	770
14	Front Shock Absorber Fixing Width	950
15	Front Bumper – Front Axle Distance	790
16	Front Axle – A-Pillar Distance	840
17	A-Pillar – B-Pillar Distance	980
18	B-Pillar – Rear Axle Distance	1120
19	B-Pillar – C-Pillar Distance	900
20	Roof Sill Bottom Height	1300
21	Roof Sill Top Height	1390
22	Floor Sill Bottom Height	342
23	Floor Sill Top Height	393

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan

NHTSA No.: M20174300

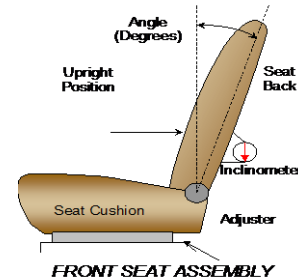
Test Program: NCAP Frontal Impact

Test Date: 12/5/16

NORMAL DESIGN RIDING POSITION

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

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



	Degree
Driver Seat back angle:	19.5
Passenger Seat back angle:	17.1

SEAT FORE/AFT POSITIONS

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

Driver: Mid position, Positioned according to Form 1

Passenger: Full forward, Positioned according to Form 1

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	323	162
Passenger Seat	257	0

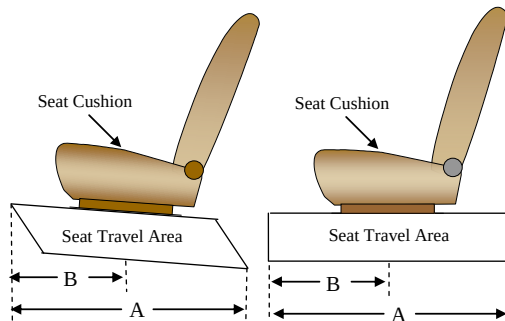
SEAT BELT UPPER ANCHORAGE

Describe the method of positioning seat belt upper anchorages.

Driver: Uppermost, Positioned according to Form 1

Passenger: Uppermost, Positioned according to Form 1.

	Total No. of Positions	Placed in Position No.
Driver Seat	5, numbered from 0 to 4	4, Uppermost
Passenger Seat	5, numbered from 0 to 4	4, Uppermost



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA

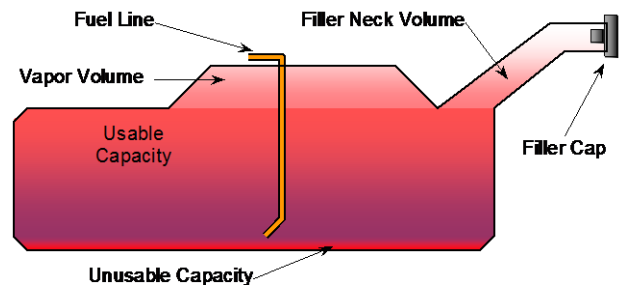
Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	65.9
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	61.3
Actual Amount of Solvent Used	61.3
1/3 of Usable Capacity	21.9

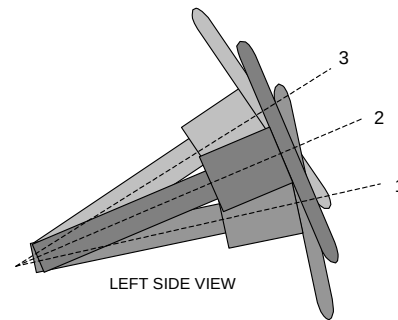
The fuel pump is in operation if the ignition is switched to the "ON" position. After about 15 seconds the pump switches back to standby mode, if the engine is not started.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. Steel square was placed across the rim of the steering wheel, an inclinometer was placed on the plate and the angle was measured. Telescope travel was measured full in and full out and set at the midpoint.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

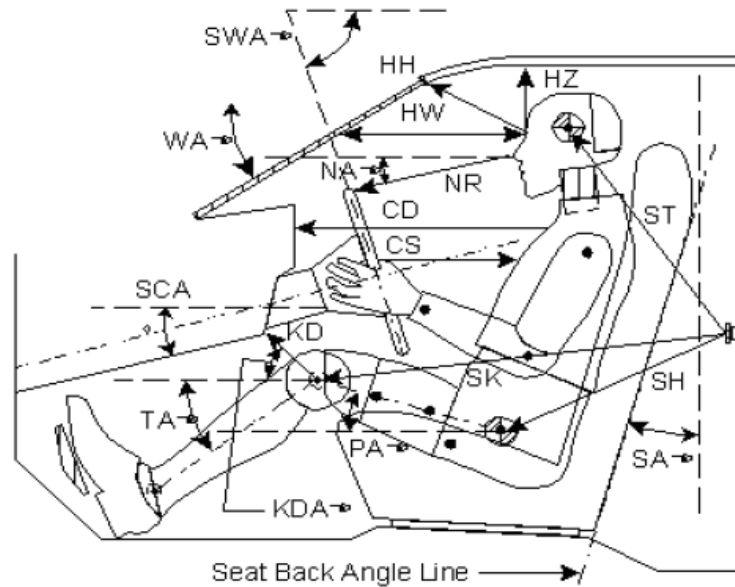
	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	18.9	
Geometric Center Position No. 2	21.1	
Uppermost Position No. 3	23.4	
Telescoping Steering Wheel Travel		55
Test Position	21.1	27

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16



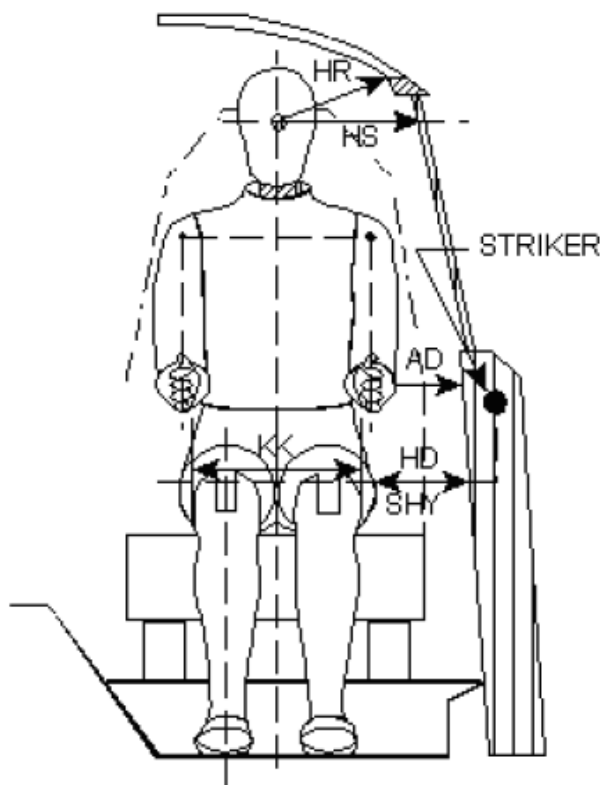
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		28.8		
SWA°	Steering Wheel Angle		21.1		
SCA°	Steering Column Angle		68.9		
SA°	Seat Back Angle (on headrest post)		19.5		17.1
HZ	Head to Roof (Z)	185		177	
HH	Head to Header	360		296	
HW	Head to Windshield	656		604	
NR	Nose to Rim	386	5.8		
CD	Chest to Dash	540		437	
CS	Chest to Steering Hub	326			
RA	Rim to Abdomen	217			
KDL	Left Knee to Dash	206	26.2	112	35.0
KDR	Right Knee to Dash	185	26.4	130	35.2
PA°	Pelvic Angle		23.9		20.2
TA°	Tibia Angle		35.3		43.2
SK	Striker to Knee	540	12.5	655	10.6
ST	Striker to Head	420	-85.8	404	-65.6
SH	Striker to H-Point	288	58.7	364	33.3

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16



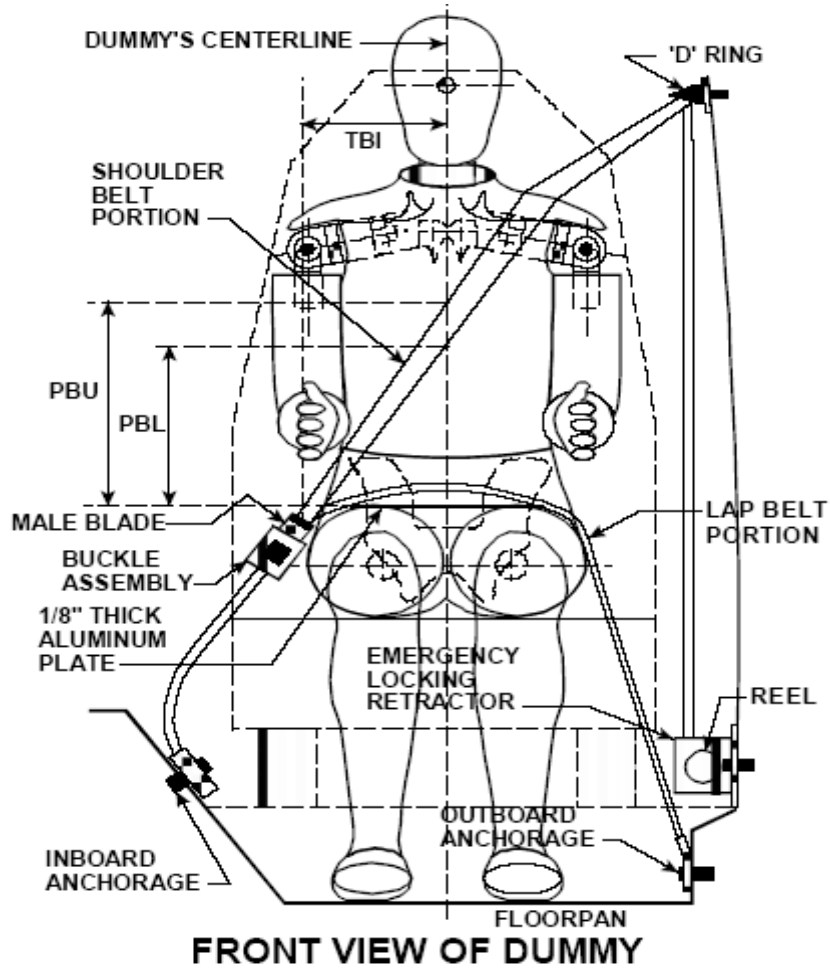
Code	Measurement Description	Driver	Passenger
AD	Arm to Door	123	100
HD	H-Point to Door	167	183
HR	Head to Side Header	219	235
HS	Head to Side Window	330	314
KK	Knee to Knee	350	160
SHY	Striker to H-Point (Y Direction)	252	162
AA	Ankle to Ankle	348	124

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	321	266
PBL – Top surface of reference to belt lower edge	mm	230	176

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	902	918
Lap belt length as measured on ATD	mm	606	565
Remainder of belt on reel	mm	1057	972
Total belt length for continuous webbing systems	mm	2565	2455

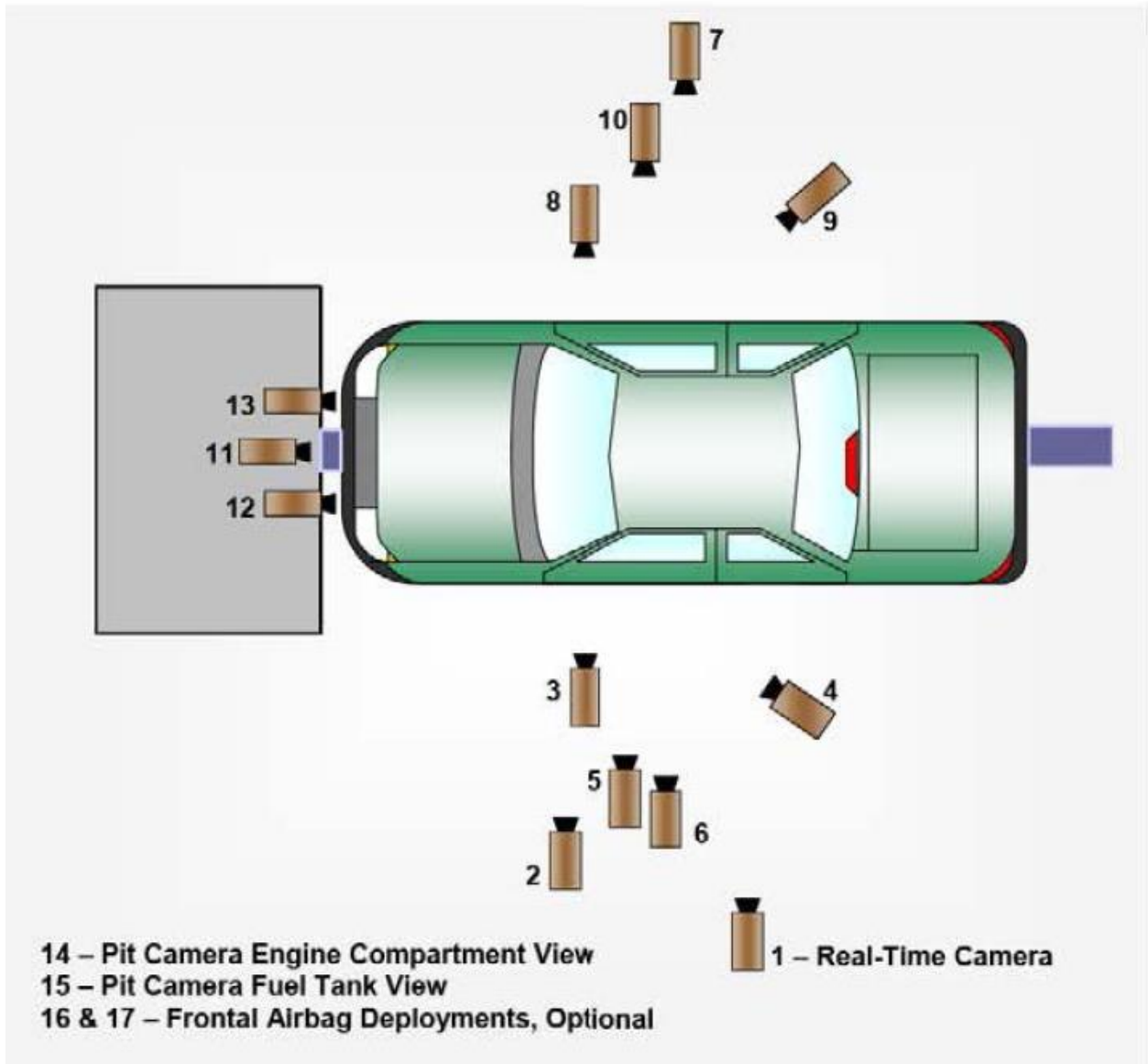
DATA SHEET NO. 6

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	322	-5560	1200	Zoom	30
2	Driver Close-Up	1881	-5272	1330	50	1000
3	Left Front Half	1265	-5000	1170	25	1000
4	Left Angle	3867	2218	1980	35	1000
5	Steering Column - Top	2289	5331	2350	50	1000
6	Steering Column – Bottom	2079	5027	1210	50	1000
7	Right Overall	2629	6104	1220	20	1000
8	Passenger Close-Up	2026	6045	1220	50	1000
9	Right Front Half	4268	2566	1960	35	1000
10	Right Angle	1388	4736	1090	25	1000
11	Windshield	0	0	2680	20	1000
12	Driver Windshield	0	-310	2680	25	1000
13	Passenger Windshield	0	470	2680	25	1000
14	Pit Front	1240	0	3077	25	1000
15	Pit Rear	3043	0	3228	25	1000
16	Onboard Driver Airbag (Optional)				25	1000
17	Onboard Passenger Airbag (Optional)				25	1000

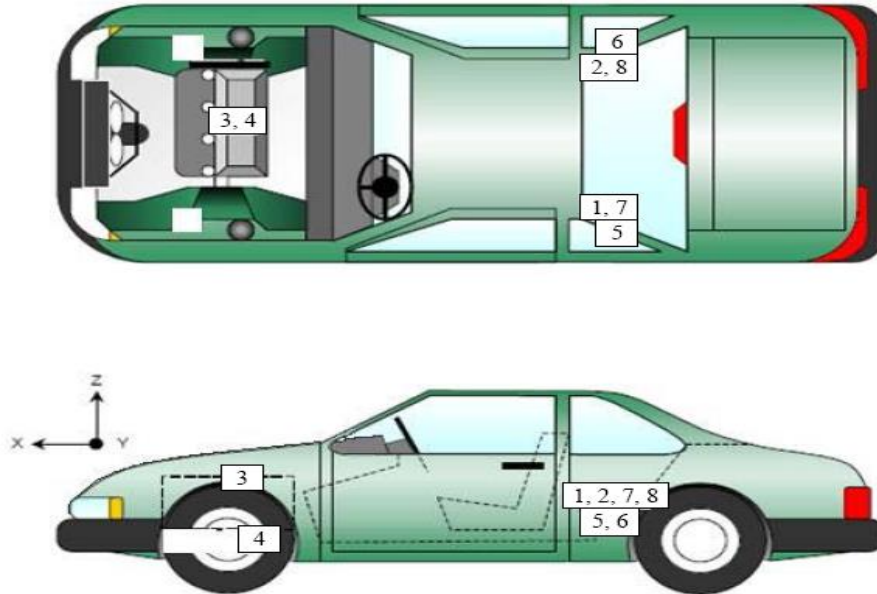
Reference Points: +X – forward of impact plane
+Y – right of monorail center
+Z – into ground

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Location (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1920	-468	-456
2	Right Rear Accelerometer – X Direction	1920	420	-456
3	Engine Top X	4210	-20	-856
4	Engine Bottom X	4090	0	-150
5	Left Rear Accelerometer – Z Direction	1920	-468	-456
6	Right Rear Accelerometer – Z Direction	1920	420	-456
7	Left Rear Accelerometer – X Direction Redundant	1910	-335	-456
8	Right Rear Accelerometer- X Direction Redundant	1910	285	-456

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

DATA SHEET NO. 8

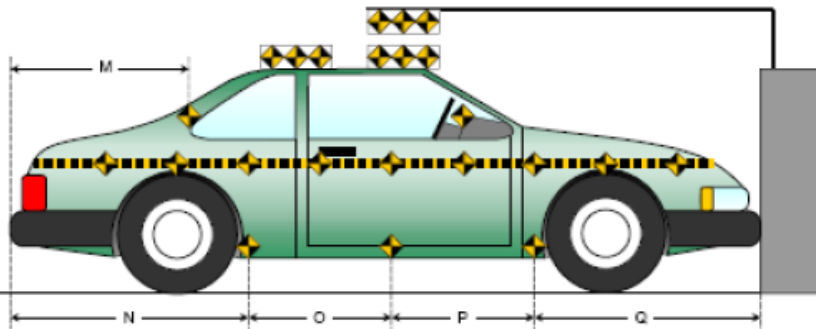
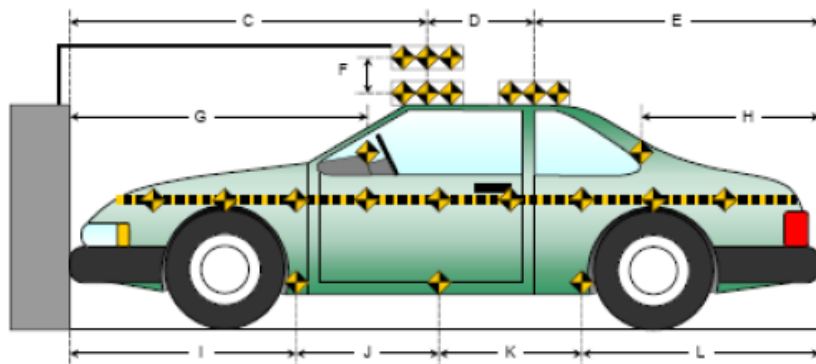
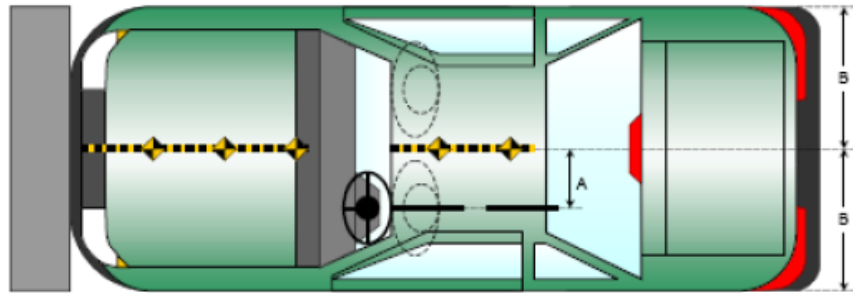
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

Item	Value
A	485
B	929
C	2484
D	609
E	1919
F	216
G	1931
H	1224
I	1299
J	1014
K	1020
L	1597
M	1205
N	1605
O	1025
P	1010
Q	1290

All units in millimeters



DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

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

DATA SHEET NO. 10

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	44
Passenger Dummy Accelerometers	44
Vehicle Structure Accelerometers	8
Total	96

CAMERA COVERAGE

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

DATA SHEET NO. 11

POST-TEST OBSERVATIONS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan

NHTSA No.: M20174300

Test Program: NCAP Frontal Impact

Test Date: 12/5/16

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th/ 037	Hybrid III 5th/ 426
Head Contact	Frontal Airbag, Head Restraint	Frontal Airbag, Sun Visor
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag, Center Tunnel	Glove Box
Right Knee Contact	Knee Airbag	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed & latched, operational	Remained closed & latched, operational
Rear Door Opening	Remained closed & latched, operational	Remained closed & latched, operational
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	840
Center	mm	867
Right Side	mm	812
Average	mm	840

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

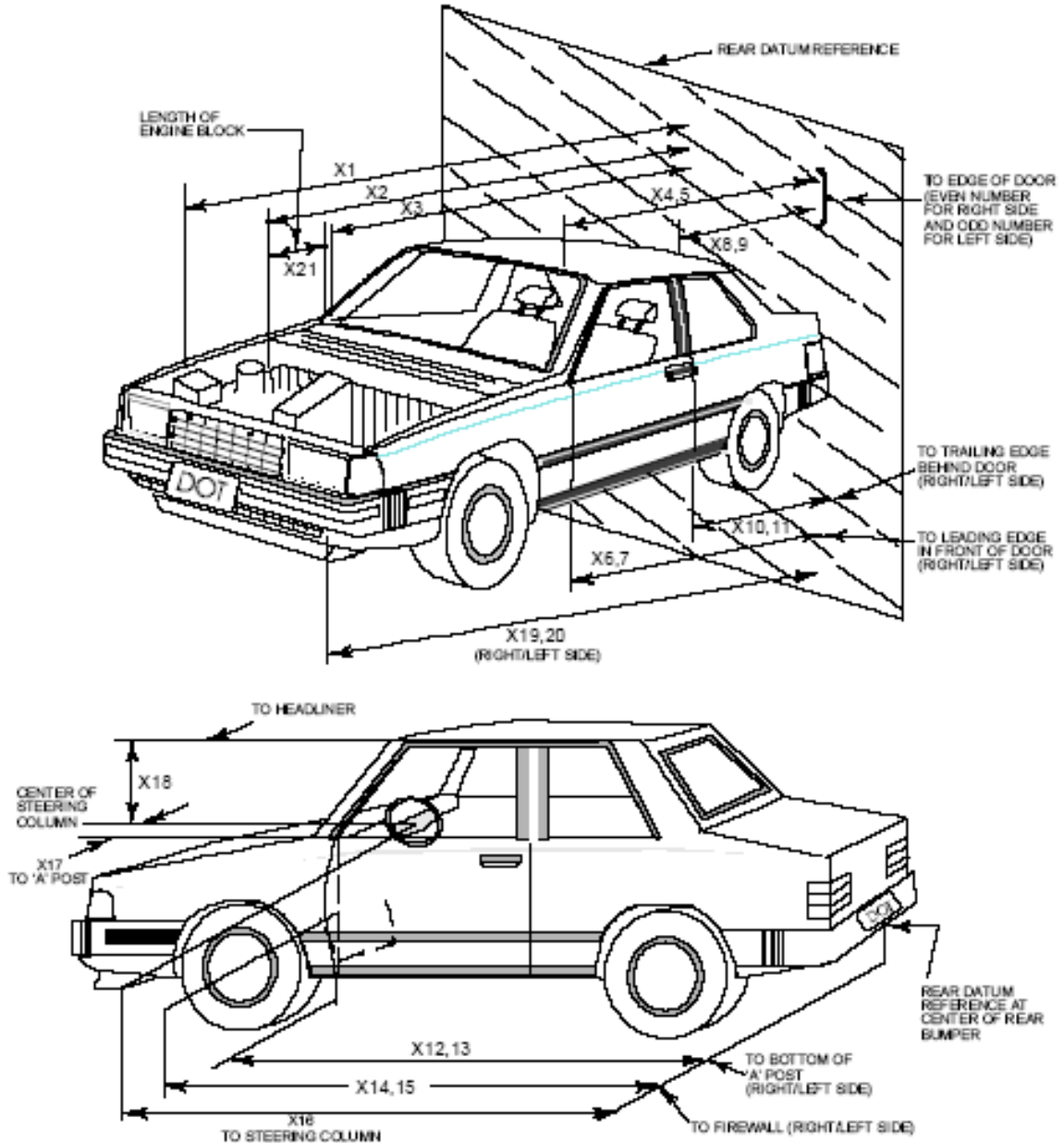
Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Side Curtain Airbag	Yes	No	Yes	No
Torso/Pelvis Airbag	Yes	No	Yes	No
Pelvis Airbag	No	N/A	No	N/A
Knee Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load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

DATA SHEET NO. 12

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16



DATA SHEET NO. 12 (CONTINUED)**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4930	4485	445
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4285	4216	69
3	RSOV to Firewall	3725	3721	4
4	RSOV to Upper Leading Edge of Right Door	3360	3360	0
5	RSOV to Upper Leading Edge of Left Door	3360	3360	0
6	RSOV to Lower Leading Edge of Right Door	3370	3366	4
7	RSOV to Lower Leading Edge of Left Door	3357	3365	-8
8	RSOV to Upper Trailing Edge of Right Door	2290	2297	-7
9	RSOV to Upper Trailing Edge of Left Door	2294	2295	-1
10	RSOV to Lower Trailing Edge of Right Door	2315	2310	5
11	RSOV to Lower Trailing Edge of Left Door	2312	2320	-8
12	RSOV to Bottom of "A" Post-of Right Side	3260	3260	0
13	RSOV to Bottom of "A" Post-of Left Side	3250	3250	0
14	RSOV to Firewall, Right Side	3453	3479	-26
15	RSOV to Firewall, Left Side	3535	3550	-15
16	RSOV to Steering Column	2919	2930	-11
17	Center of Steering Column to "A" Post	334	334	0
18	Center of Steering Column to Headliner	418	454	-36
19	RSOV to Right Side of Front Bumper	4763	4510	253
20	RSOV to Left Side of Front Bumper	4760	4483	277
21	Length of Engine Block	650	650	0
RD	RSOV to Right Side of Dash Panel	3142	3142	0
CD	RSOV to Center of Dash Panel	3072	3063	9
LD	RSOV to Left Side of Dash Panel	3153	3157	-4

All Dimensions in mm

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16

VEHICLE INFORMATION

VIN: WDDZF4KB5HA030179
Vehicle Size Category: Sedan

Wheelbase: 2940
Test Weight (kg): 2079.0

ACCELEROMETER DATA

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

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

Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.43

Velocity Change (km/h): 65.80

Time of Separation (ms): 136

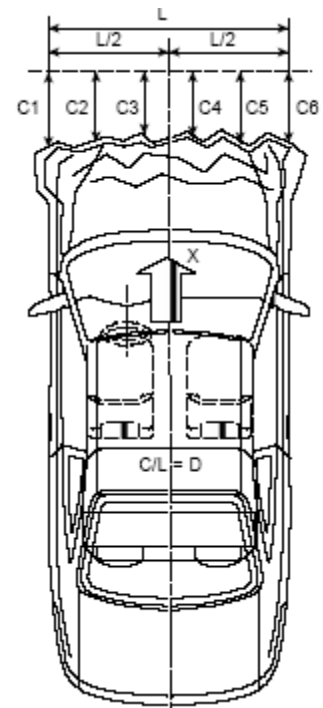
CRUSH PROFILE

Collision Deformation Classification: 12FDEW2

Midpoint of Damage: Centerline

Damage Region Length (mm): 1524

Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4760	4483	277
C2	Crush zone 2 at left side	mm	4857	4457	400
C3	Crush zone 3 at left side	mm	4910	4476	434
C4	Crush zone 4 at right side	mm	4905	4491	414
C5	Crush zone 5 at right side	mm	4860	4491	369
C6	Crush zone 6 at right side	mm	4763	4510	253
L	C1 to C6	mm	1524	1508	16

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

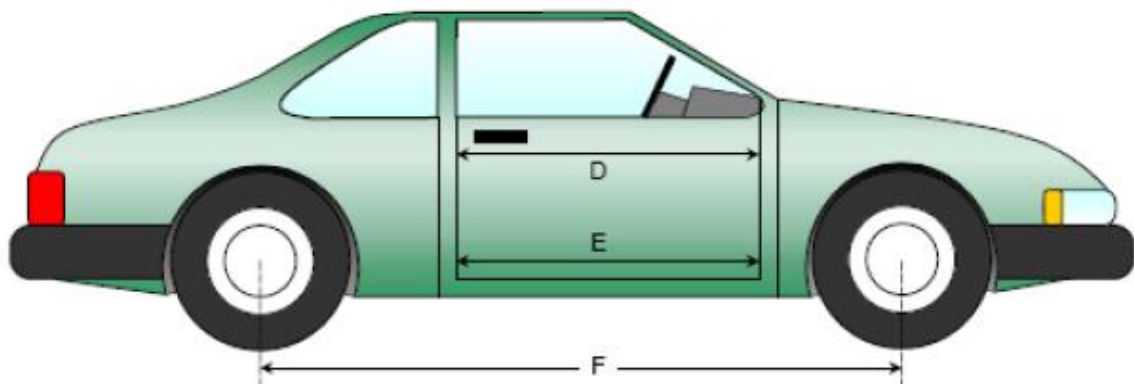
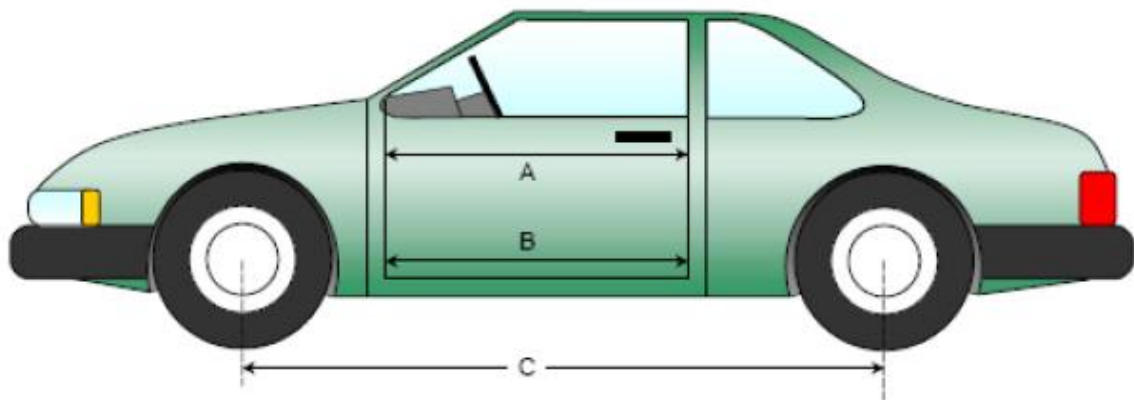
NHTSA No.: M20174300
Test Date: 12/5/16

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	925	930	-5
B	Left Side Lower	mm	825	825	0
C	Right Side Upper	mm	930	931	-1
D	Right Side Lower	mm	830	830	0

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2940	2820	120
F	Right Side Wheelbase	mm	2940	2820	120



DATA SHEET NO. 14 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

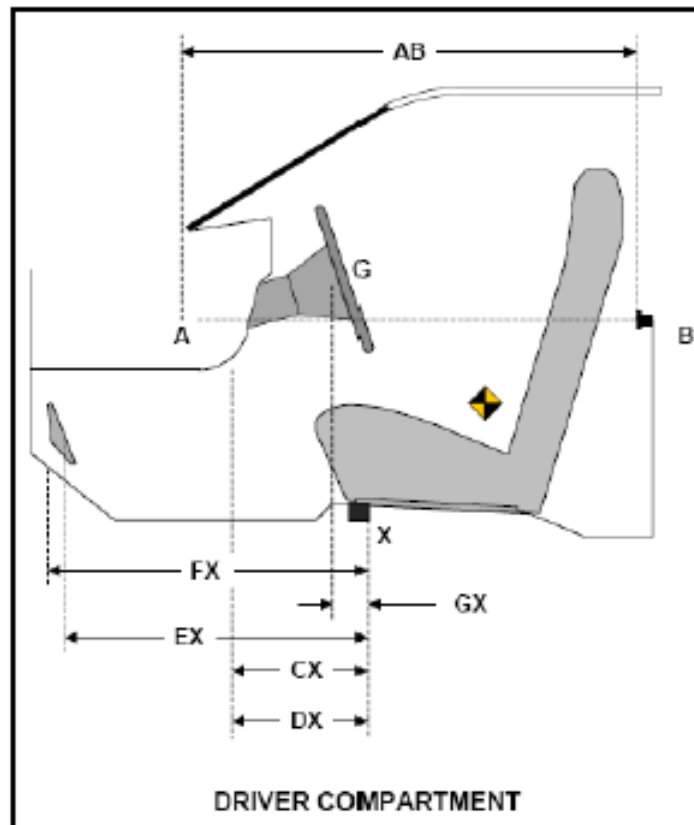
Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	930	930	0
CX	Left Knee Bolster to X	mm	310	305	5
DX	Right Knee Bolster to X	mm	270	285	-15
EX	Brake Pedal to X	mm	610	610	0
FX	Foot Rest to X	mm	640	655	-15
GX	Center of Steering Column Wheel Hub to X	mm	70	135	-65

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15

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

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

Please provide windshield mounting details.

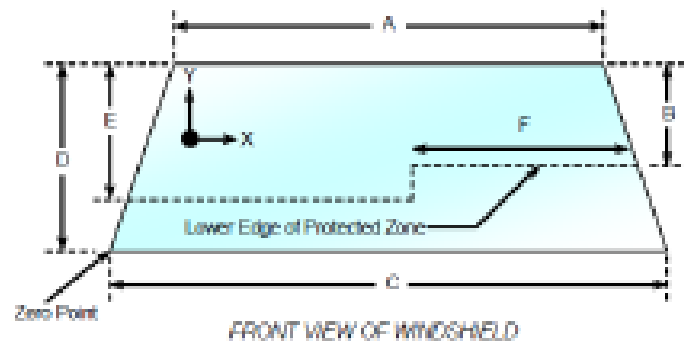
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 20.3° C

WINDSHIELD PERIPHERY MEASUREMENTS¹

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

Item	Units	Value
A	mm	1180
B	mm	430
C	mm	1370
D	mm	810
E	mm	420
F	mm	1015



AREAS OF PROTECTED ZONE FAILURES

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

DATA SHEET NO. 15 (CONTINUED)

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

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan

NHTSA No.: M20174300

Test Program: NCAP Frontal Impact

Test Date: 12/5/16

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.1°C

Test Time: 15:41

Stoddard Solvent Spillage Measurements

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

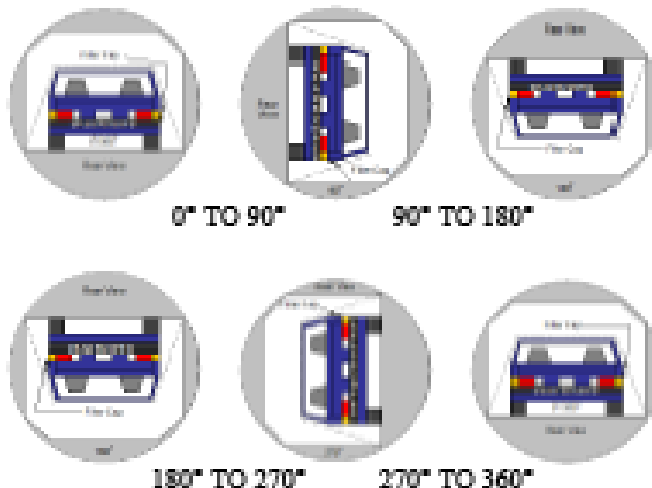
DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
 Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
 Test Date: 12/5/16

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage:
None



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	90	330	420
90° to 180°	90	330	840
180° to 270°	90	330	1260
270° to 360°	90	330	1480

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

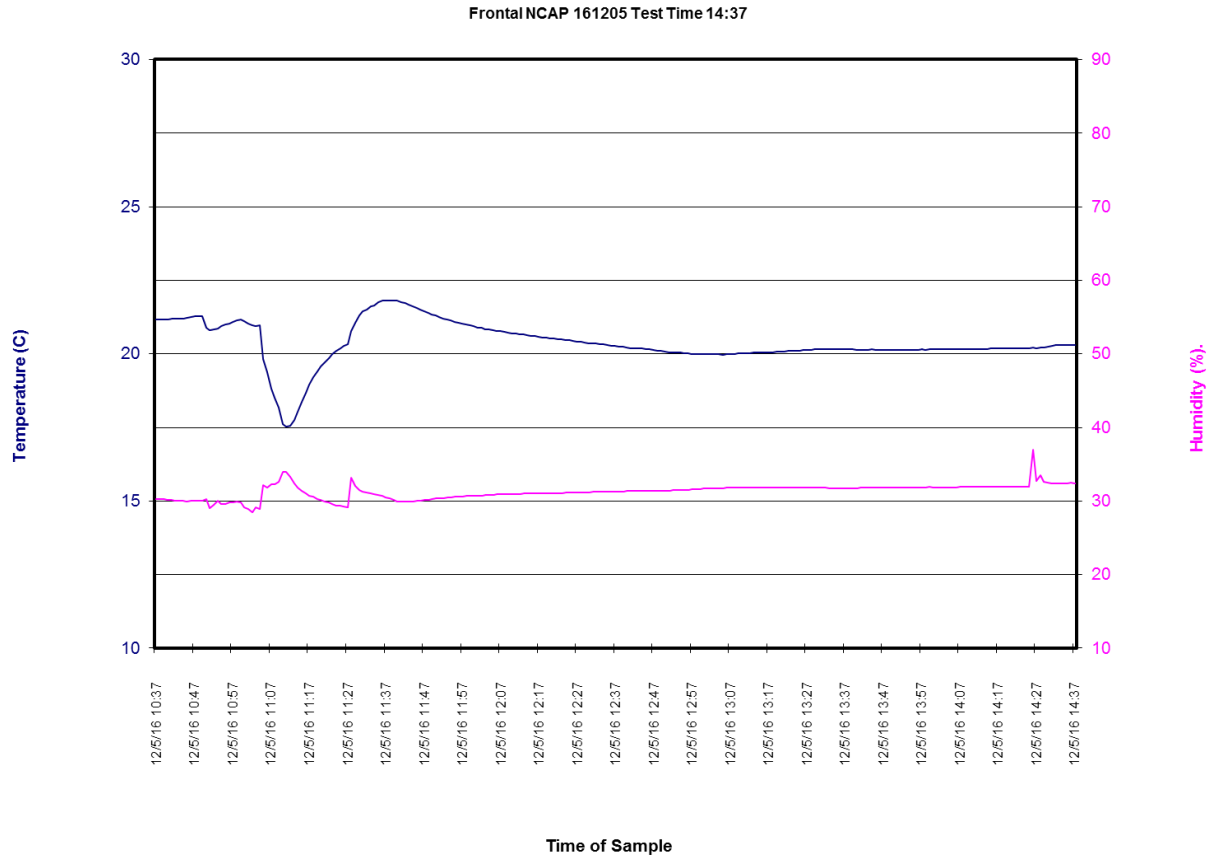
Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17

DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2017 Mercedes-Benz E-Class Sedan
Test Program: NCAP Frontal Impact

NHTSA No.: M20174300
Test Date: 12/5/16



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

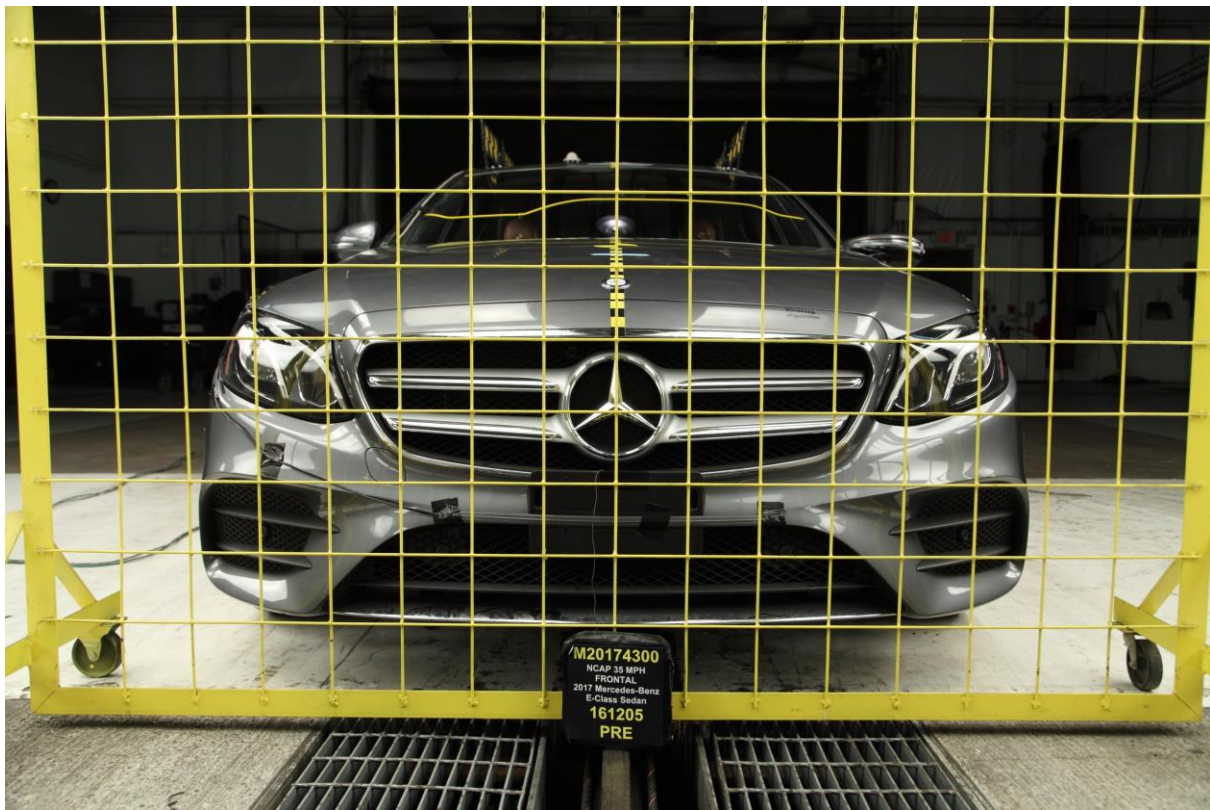
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4	Manufacturer's Label	A-6
5	Tire Placard	A-7
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7	Right Rear 3-4 View, as Received	A-8
8	Pre-Test Front View of Test Vehicle	A-9
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12	Pre-Test Right View of Test Vehicle	A-11
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79	Monroney Label Photograph	A-47



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 2017 Mercedes-Benz E-Class Sedan Frontal As Delivered



007 Left Rear 3-4 View, as Received



008 Pre-Test Front View of Test Vehicle



009 Post-Test Front View of Test Vehicle



010 Pre-Test Left View of Test Vehicle



011 Post-Test Left View of Test Vehicle



012 Pre-Test Right View of Test Vehicle



013 Post-Test Right View of Test Vehicle



014 Pre-Test Right Front 3-4 View



015 Post-Test Right Front 3-4 View



016 Pre-Test Left Rear 3-4 View



017 Post-Test Left Rear 3-4 View



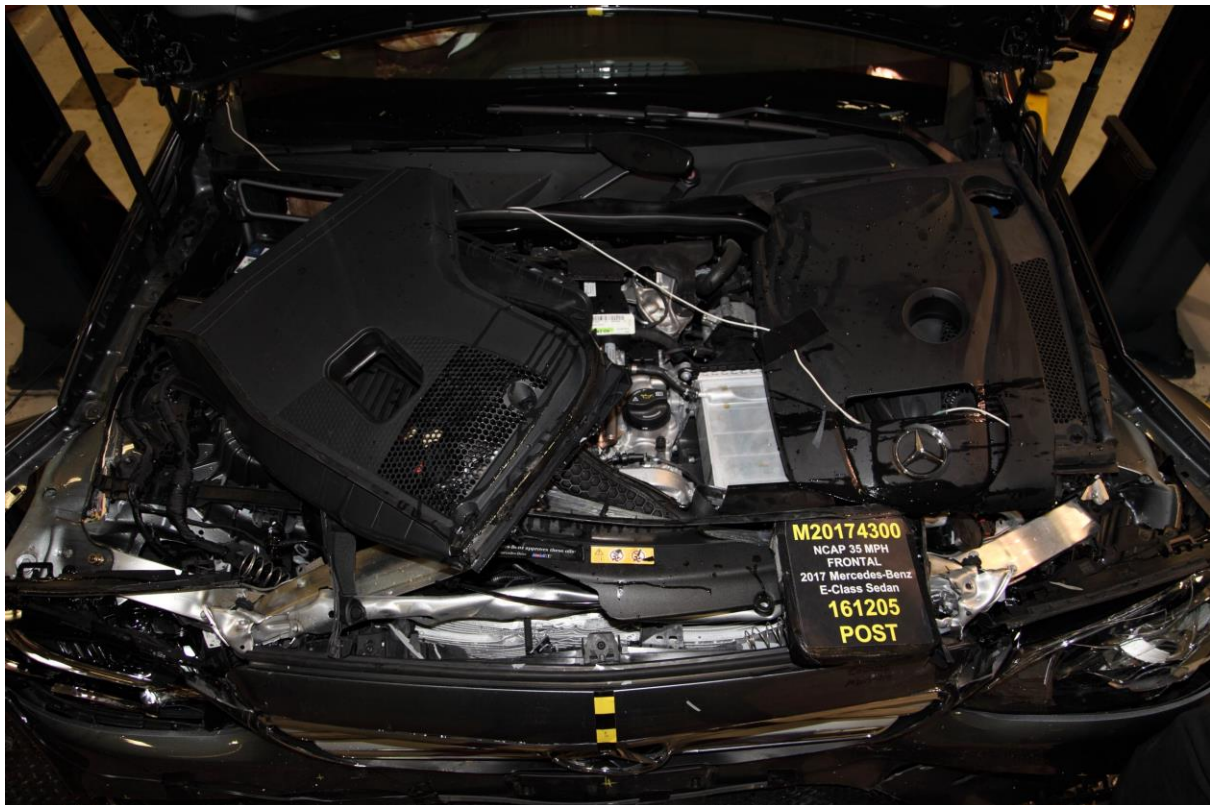
018 Pre-Test Windshield View



019 Post-Test Windshield View



020 Pre-Test Engine Compartment View



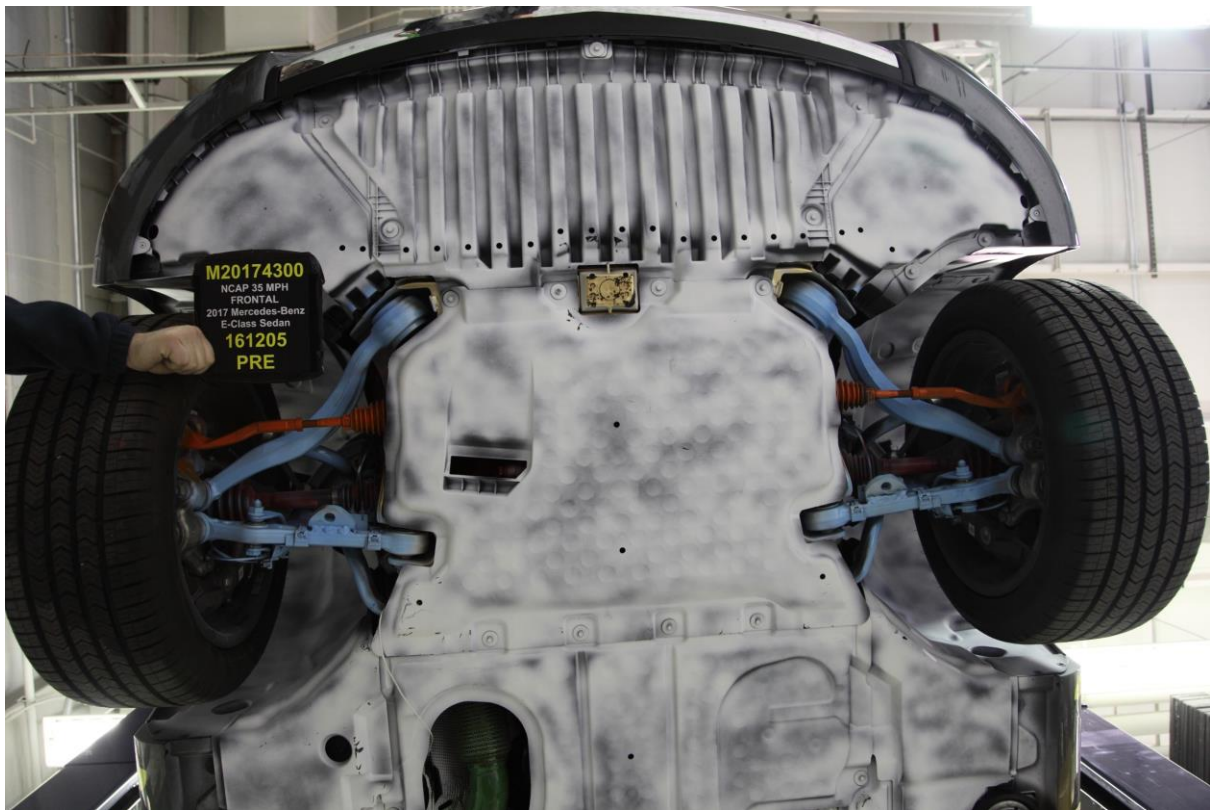
021 Post-Test Engine Compartment View



022 Pre-Test Fuel Filler Cap View



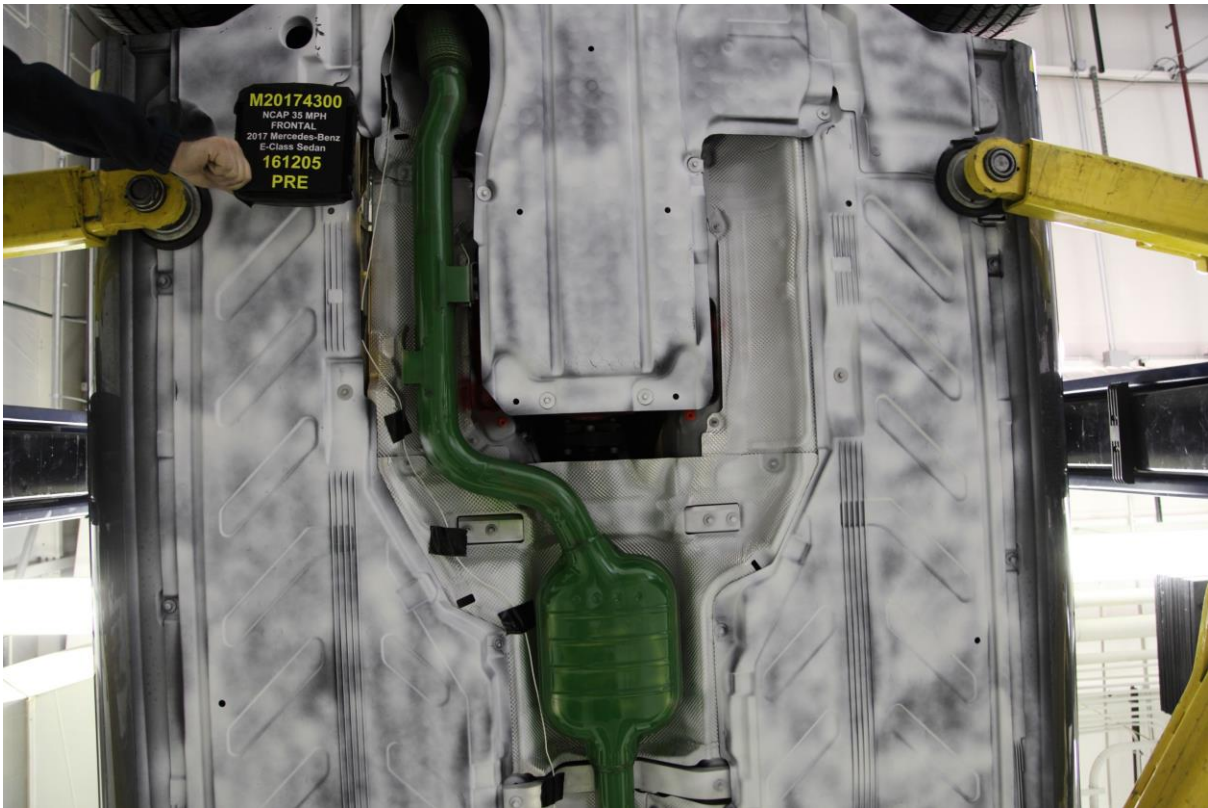
023 Post-Test Fuel Filler Cap View



024 Pre-Test Front Underbody View



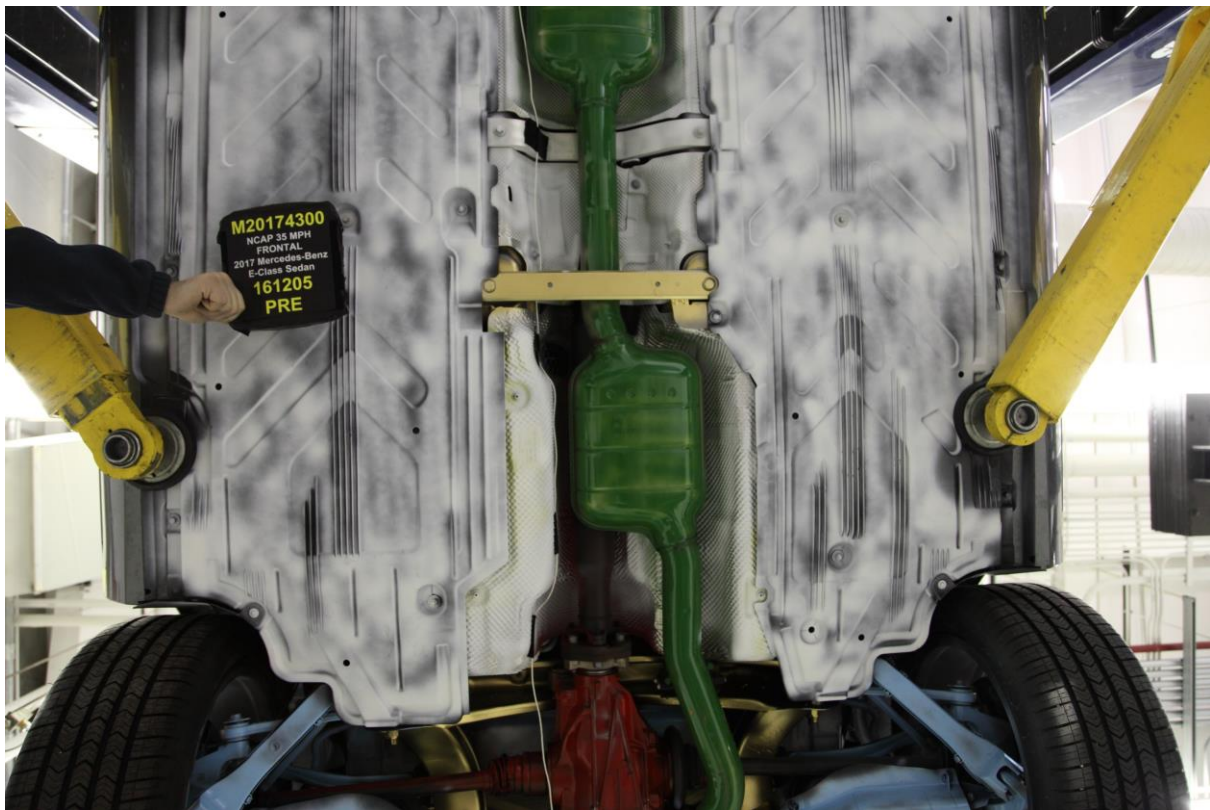
025 Post-Test Front Underbody View



025a Pre-Test Mid Front Underbody View



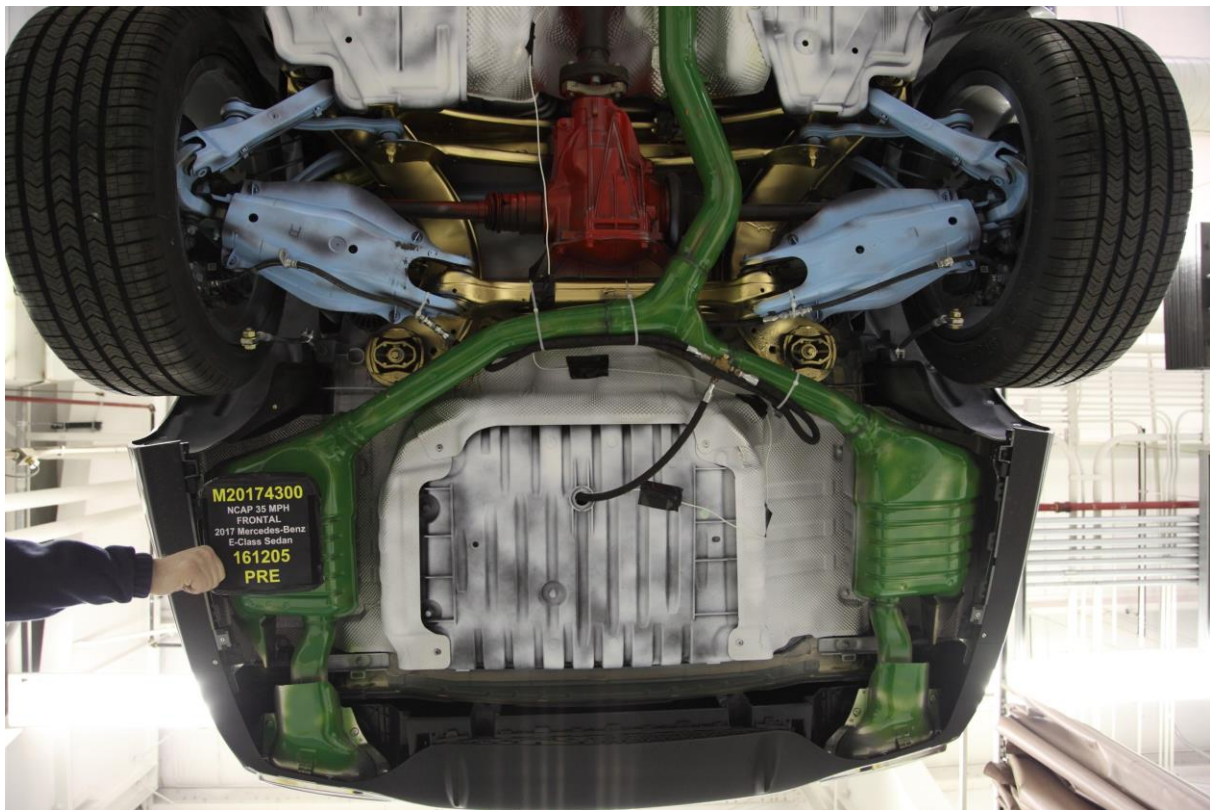
025b Post-Test Mid Front Underbody View



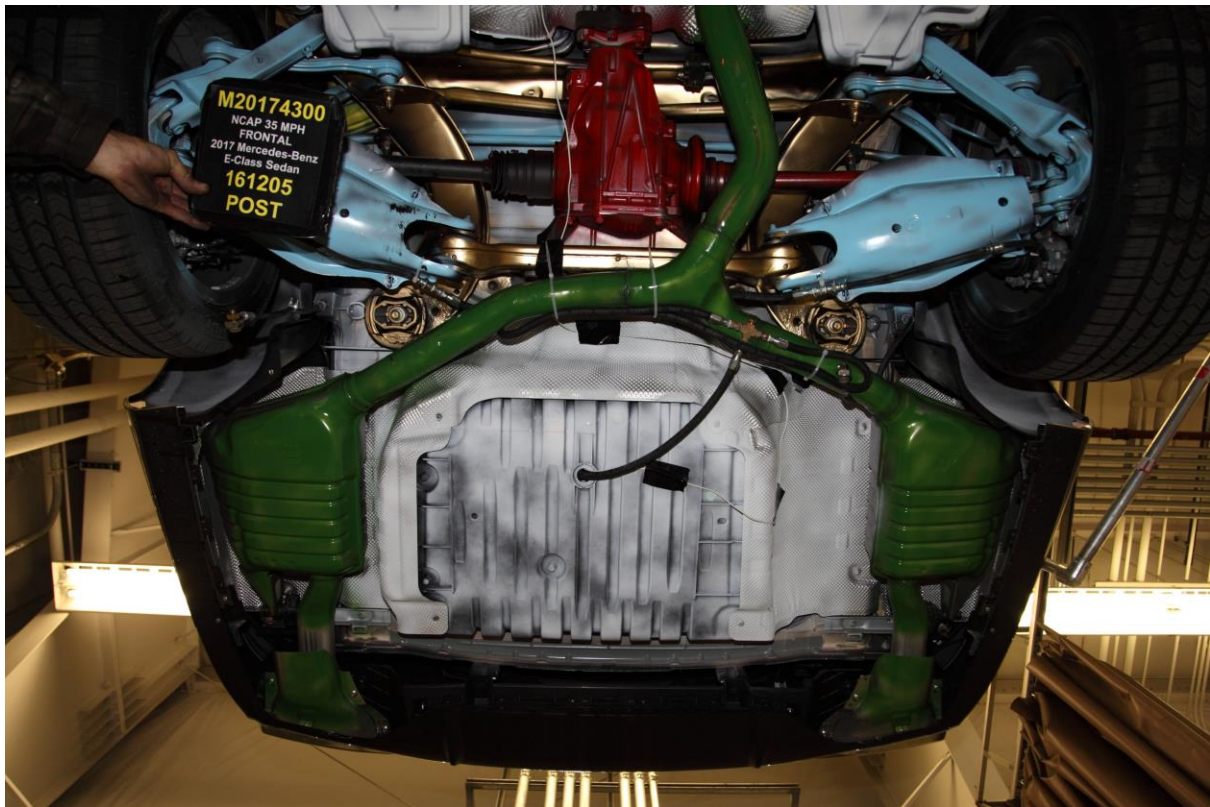
025c Pre-Test Mid Rear Underbody View



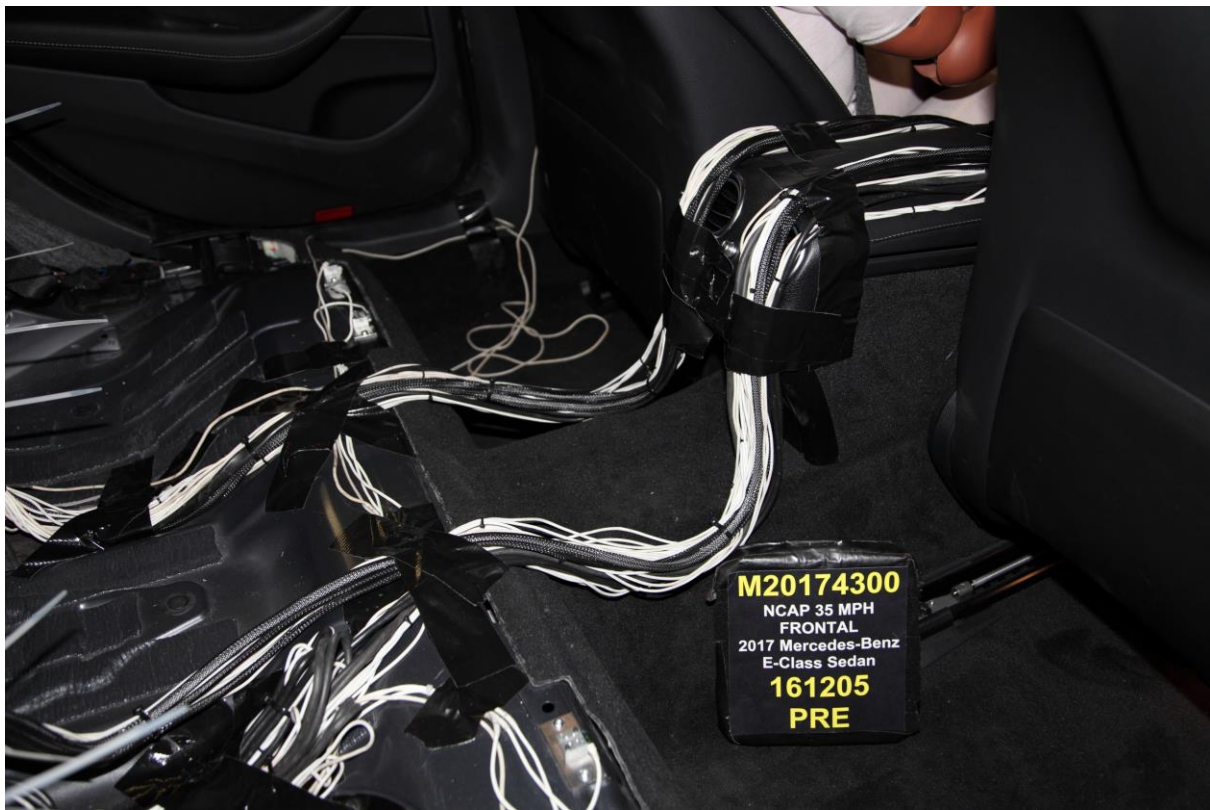
025d Post-Test Mid Rear Underbody View



026 Pre-Test Rear Underbody View



027 Post-Test Rear Underbody View



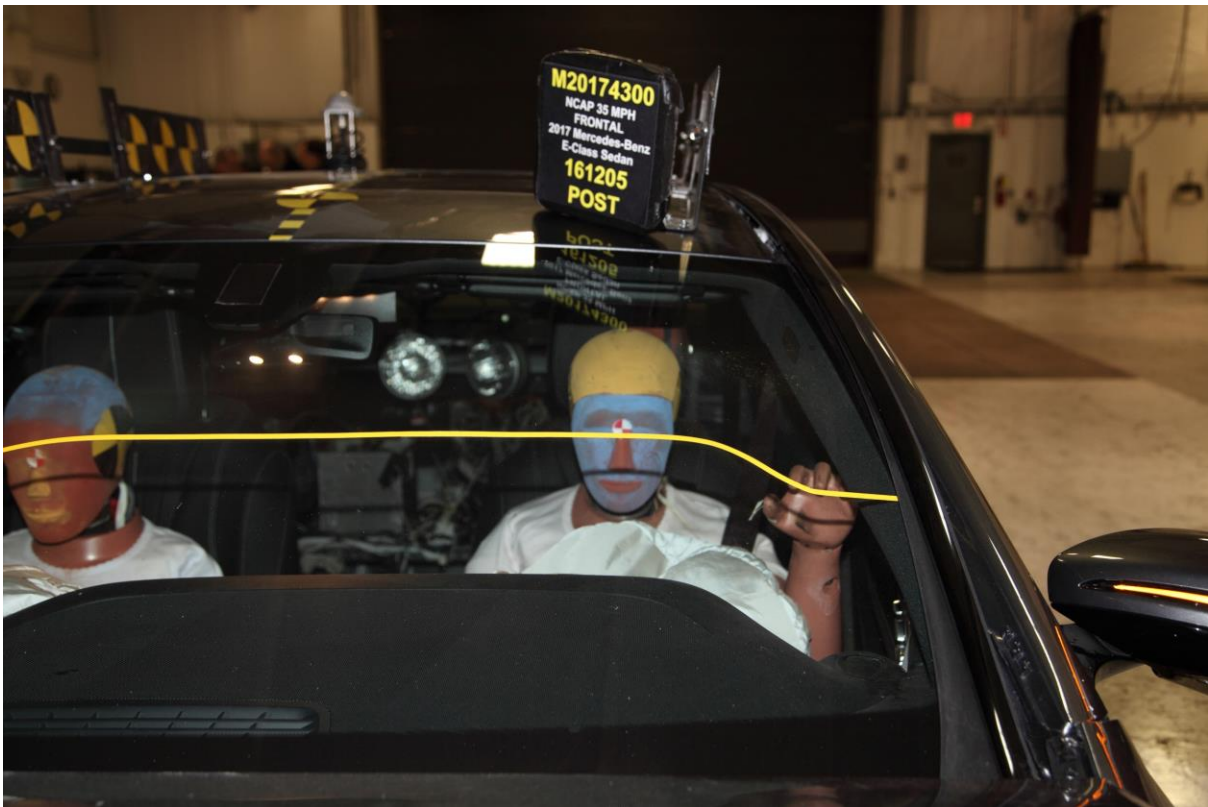
028 Pre-Test Dummy Cable Routing



029 Post-Test Dummy Cable Routing



030 Pre-Test Driver Dummy Front View



031 Post-Test Driver Dummy Front View



032 Pre-Test Driver Dummy Window View



033 Post-Test Driver Dummy Window View



034 Pre-Test Driver Dummy and Vehicle Interior View



035 Post-Test Driver Dummy and Vehicle Interior View



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



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



038 Pre-Test View of Belt Anchorage for Driver Dummy



039 Post-Test View of Belt Anchorage for Driver Dummy



040 Pre-Test Driver Dummy Feet



041 Post-Test Driver Dummy Feet



042 Pre-Test Driver's Side Knee Bolster



043 Post-Test Driver's Side Knee Bolster



044 Pre-Test Driver's Side Floorpan



045 Post-Test Driver's Side Floorpan



046 Post-Test Driver Dummy Face



047 Post-Test Driver Dummy Contact with Airbag



048 Post-Test Driver Dummy Contact with Headrest

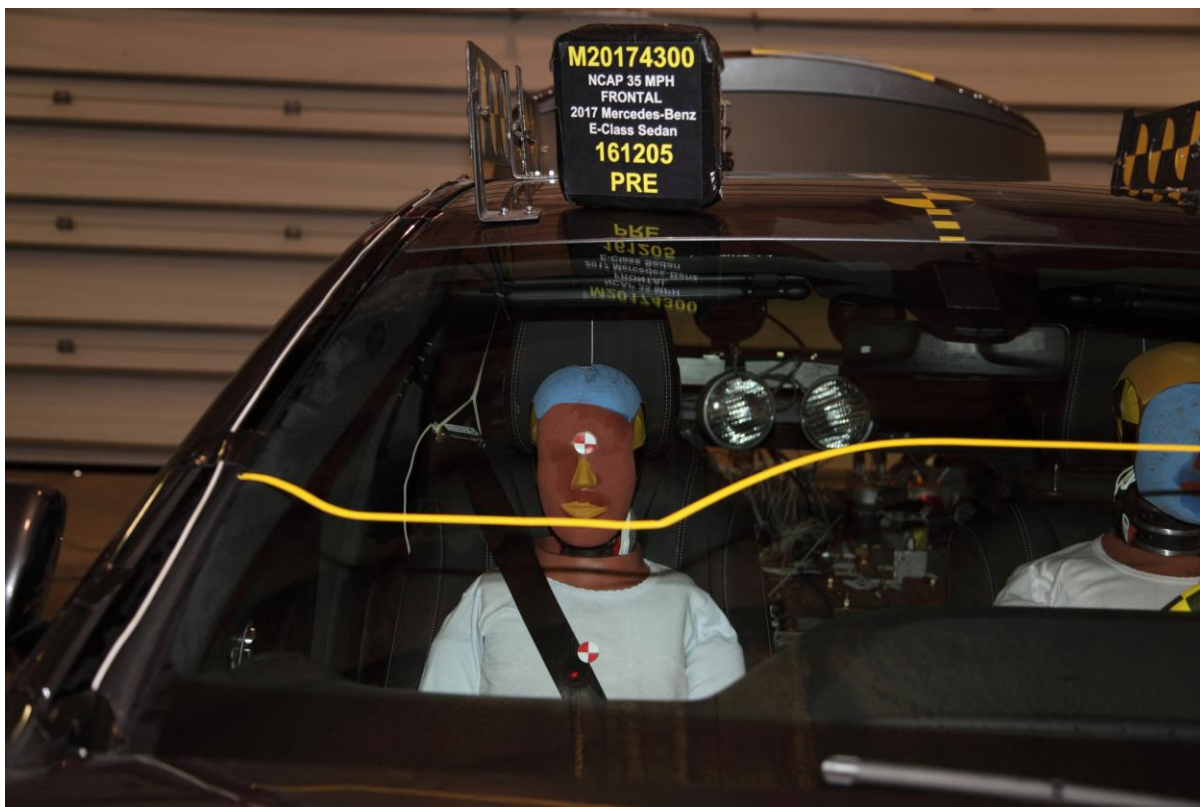
Intentionally Left Blank



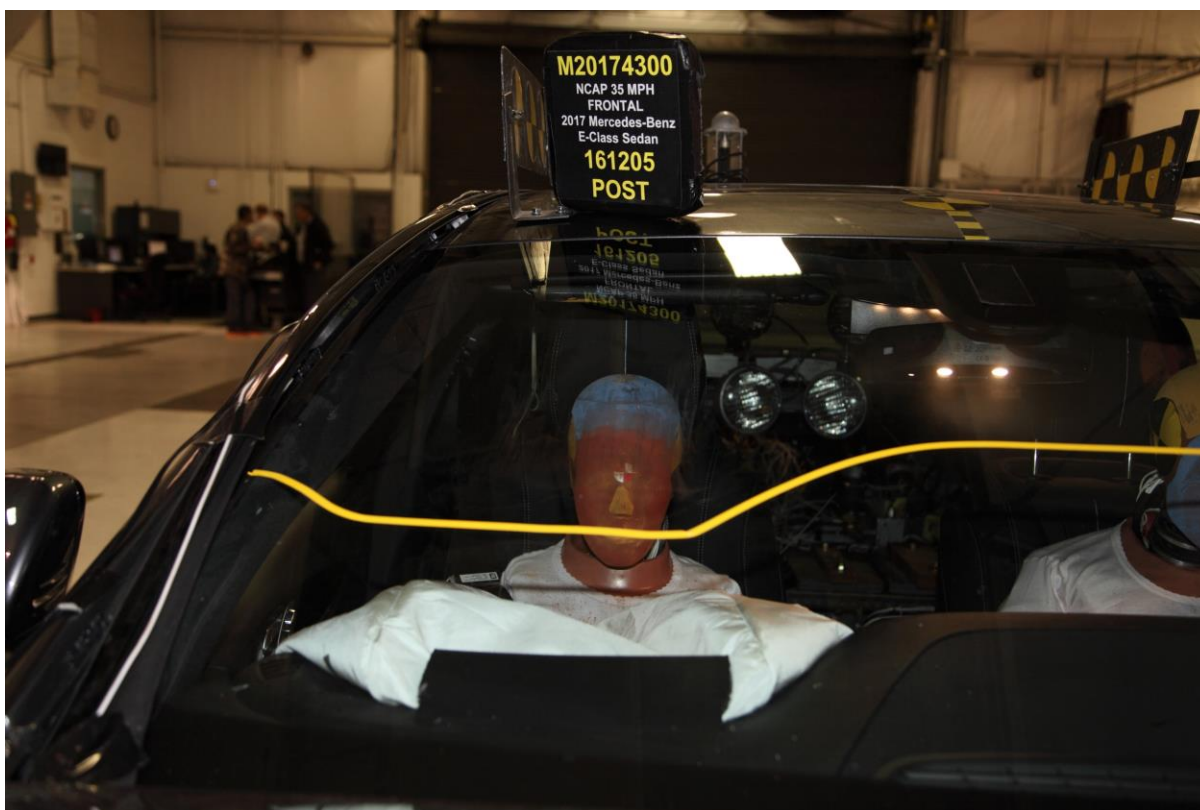
049 Pre-Test View of the Steering Wheel



050 Post-Test View of the Steering Wheel



051 Pre-Test Passenger Dummy Front View



052 Post-Test Passenger Dummy Front View



053 Pre-Test Passenger Dummy Window View



054 Post-Test Passenger Dummy Window View



055 Pre-Test Passenger Dummy and Vehicle Interior View



056 Post-Test Passenger Dummy and Vehicle Interior View



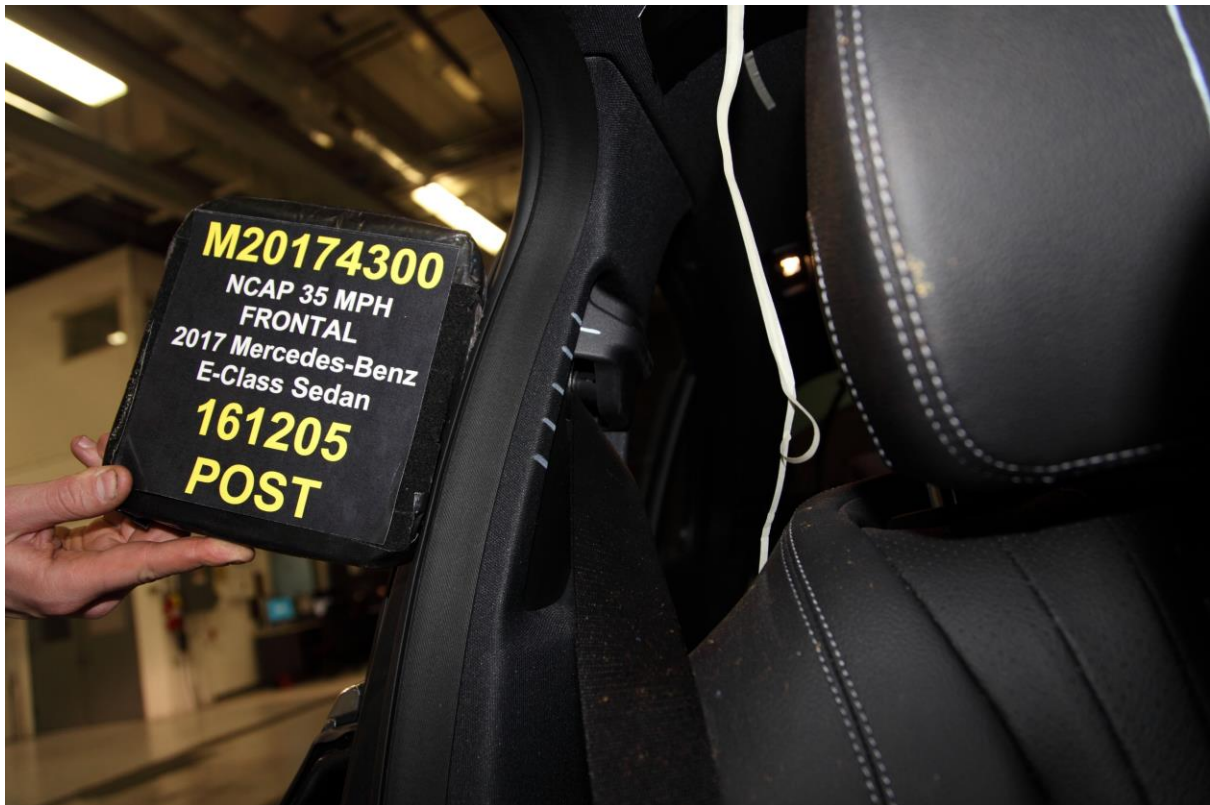
057 Pre-Test Passenger's Seat Fore-Aft Markings



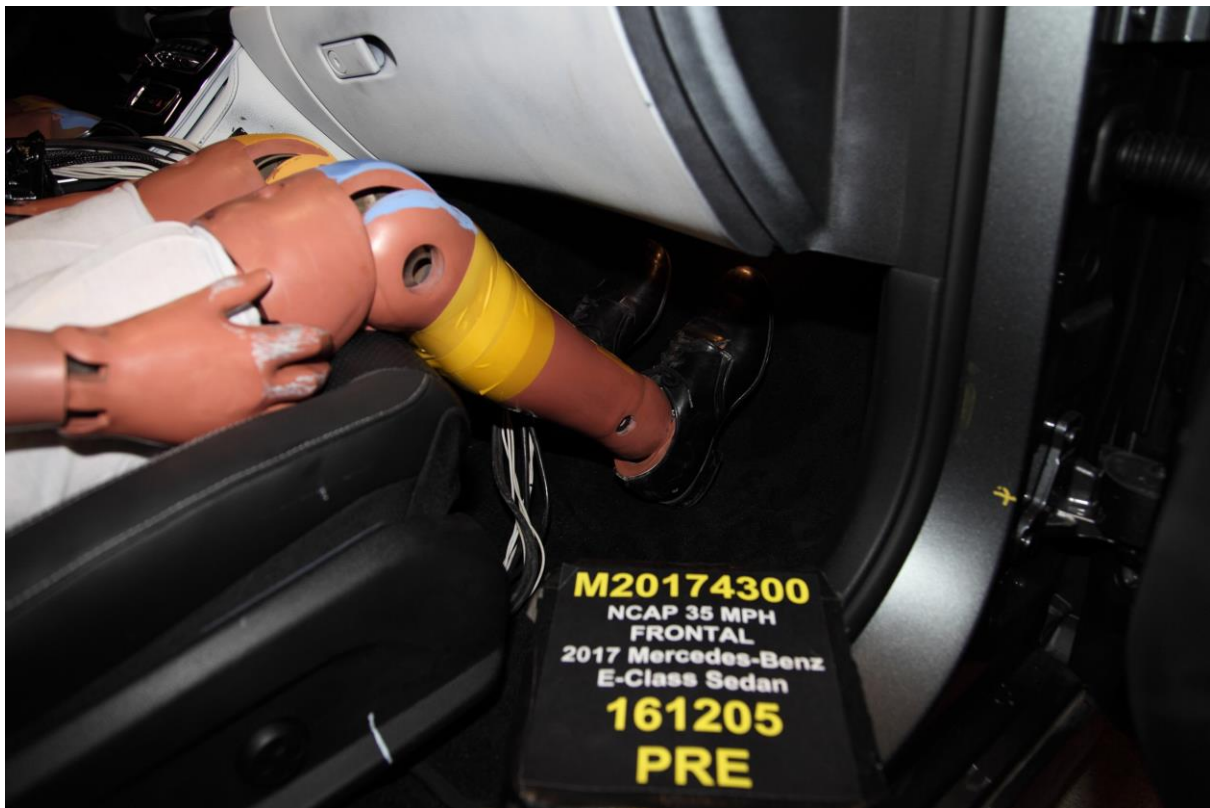
058 Post-Test Passenger's Seat Fore-Aft Markings



059 Pre-Test View of Belt Anchorage for Passenger Dummy



060 Post-Test View of Belt Anchorage for Passenger Dummy



061 Pre-Test Passenger Dummy Feet



062 Post-Test Passenger Dummy Feet



063 Pre-Test Passenger's Side Knee Bolster



064 Post-Test Passenger's Side Knee Bolster



065 Pre-Test Passenger's Side Floorpan



066 Post-Test Passenger's Side Floorpan



067 Post-Test Passenger Dummy Face



068 Post-Test Passenger Dummy Contact with Airbag

PHOTO NOT APPLICABLE

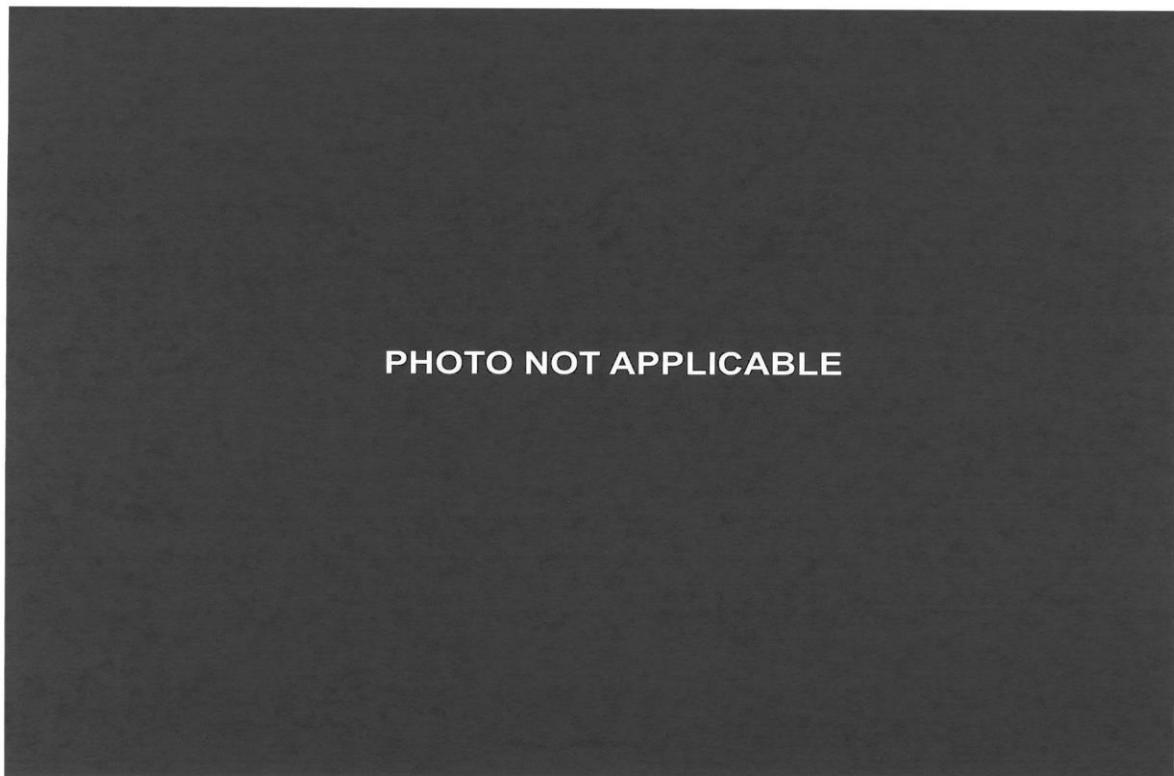
069 Post Test Passenger Dummy Contact with Headrest



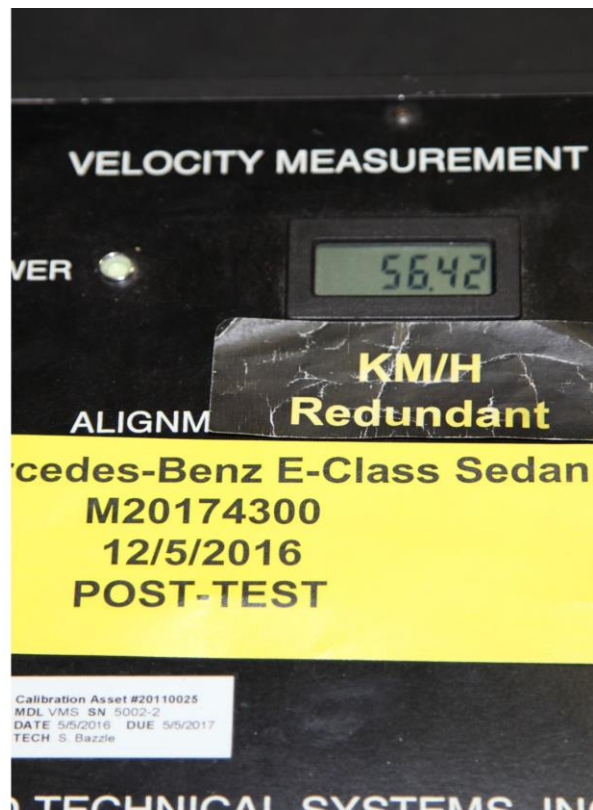
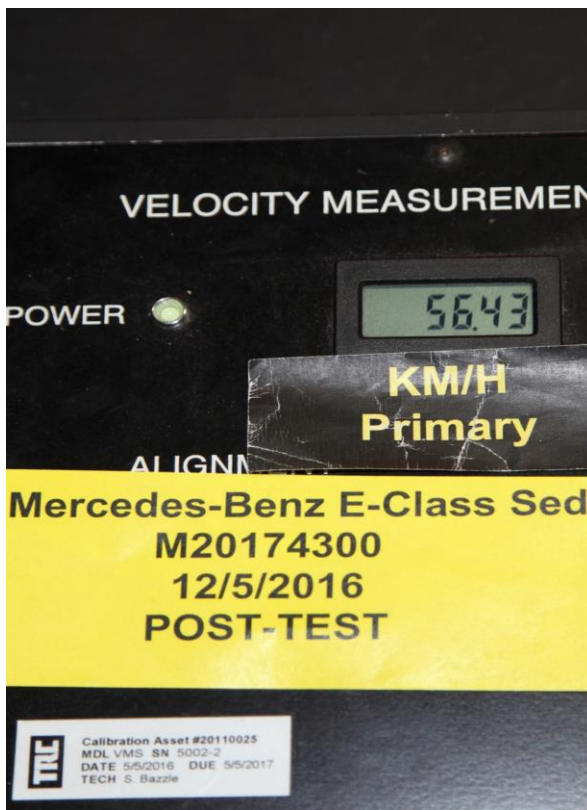
069a Post Test Passenger Dummy Contact with Sun Visor



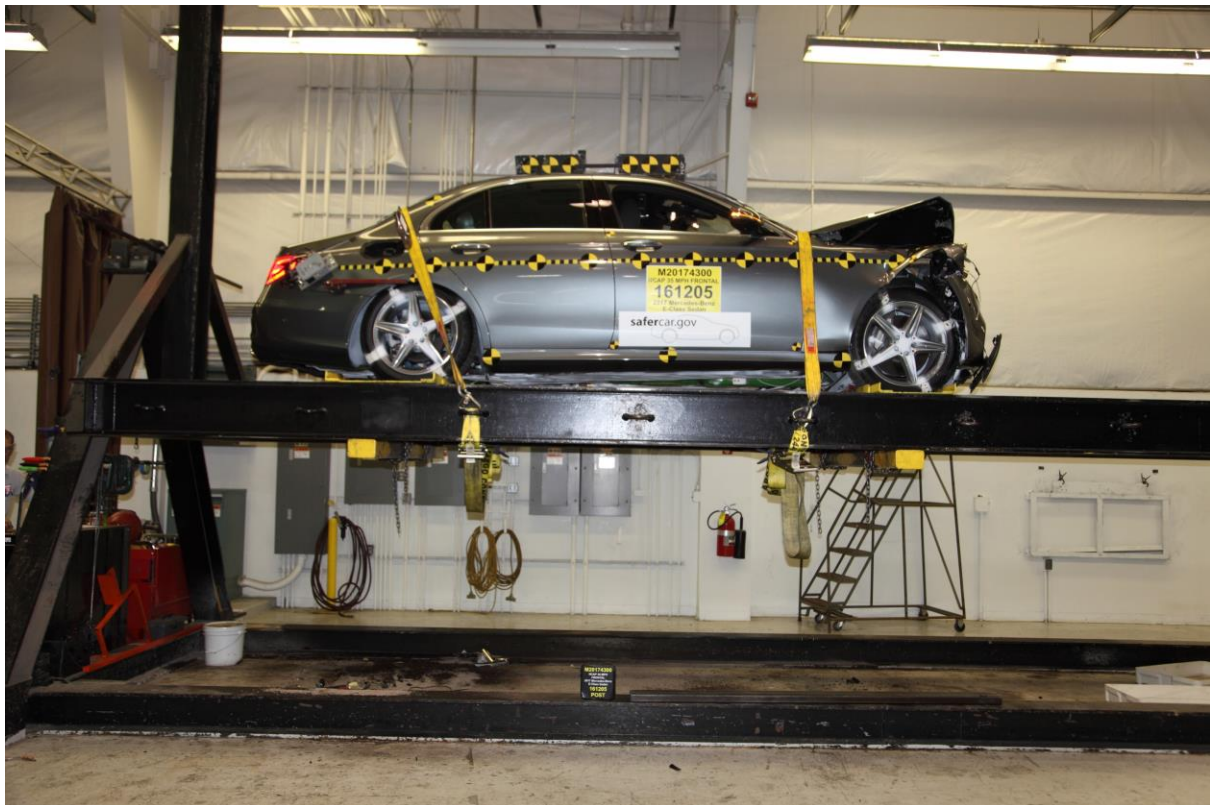
070 Photograph of Ballast Installed in Vehicle



071 Post-Test Stoddard Spillage Location View



072 Post-Test Speed Trap Readout



073 Vehicle at 0° on Static Rollover Device



074 Vehicle at 90° on Static Rollover Device



075 Vehicle at 180° on Static Rollover Device



076 Vehicle at 270° on Static Rollover Device



077 Vehicle at 360° on Static Rollover Device



078 2017 Mercedes-Benz E-Class Sedan Frontal Impact Event

2017 E300 4MATIC Sedan

PO#: 0770617193
VIN: WDDZF4K85HA030179

www.MBUSA.com

Standard Features	Suggested Retail Price	\$54,650
PERFORMANCE/HANDLING	PAINT/UPHOLSTERY & TRIM	720.00
2.0L Inline-4 Turbo Engine	992 Satellite Grey Metallic	N/C
241 Horsepower	121 Black MB Tex	N/C
273 hp 4MATIC	736 Natural Grain Black Ash Wood	N/C
4MATIC 4x4 Wheel Drive		N/C
9C 7DIN 9-Speed Automatic Transmission		N/C
DYNAMIC SELECT		N/C
KEYLESS-START		N/C
ECO Start/Stop System		N/C
COMFORT/CONVENIENCE	OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES	N/C
Power Tilting Steered	13C 3-Spoke Multifunction Steering Wheel	N/C
Bluetooth® Connectivity	808 18" AMG 5-Spoke Wheels	N/C
Ambient Lighting	511C Black Headliner	N/C
Power Front Seats with Memory & Lumbar Support	677 Sport-tuned suspension for Sport	650.00
Dual-Zone Automatic Climate Control	810 Burmester Surround Sound System	150.00
Rain-Sensing Intermittent Windshield Wipers	608 Wheel Locking bells	350.00
Multifunction Steering Wheel w/Touch Control Buttons	104 Rear Deck Spoiler	300.00
Power Folding Mirrors	137 Comfort Box	3,100.00
Split Folding Rear Seats	P01 Premium 1 Package Rearview Camera, Parking Pilot, NFC Wireless	N/C
Stepped w/ Control Controller	Charging, KEYLESS-GO with HANDS-FREE ACCESS, Electronic Trunk Closure,	N/C
12.3-inch High-Resolution COMAND® Display	Blind Spot Assist, SiriusXM® Radio with Free Trial Period, Heated	N/C
Driver's Side and Interior Auto-Dimming Mirrors	Front Seats	N/C
COMAND Navigation w/ Map Updates incl. for 3 years	322 Sport Wheel Package Sport Body Styling, Mercedes-Benz Star in	650.00
Live Traffic provided for 3 years	Cruise, Perforated Front Brake Discs, Front Brake Calipers with	N/C
mbux® - w/ Trial Period by Verizon Telematics	"Mercedes-Benz" Lettering, Sport Wheels	N/C
(subscriptions required thereafter)	Destination and Delivery	212.00
Apple CarPlay™ & Android Auto	Total Retail Price	\$61,695.00

EPA DOT Fuel Economy and Environment

Fuel Economy

24 MPG combined city/hwy

22 MPG city

29 MPG highway

Midsize cars range from 13 to 114 MPG. The best vehicle rates 119 MPG.

4.2 gallons per 100 miles

Annual fuel cost

\$1,750

Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score **Not Rated**

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		
Side Crash	Front seat Rear seat	Not Rated
Based on the risk of injury in a side impact.		
Rollover	Not Rated	
Based on the risk of rollover in a single-vehicle crash.		

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4235

PARTS CONTENT INFORMATION

For vehicles in this cartline:
U.S./Canadian Parts Content: 0 %
Major Sources of Foreign Parts Content: GERMANY: 68 %

NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle:
Final Assembly Point: SINDELFINGEN, GERMANY
Country of Origin: GERMANY
Engine: GERMANY
Transmission: GERMANY

Special Messages:

* Bluetooth is a registered trademark of Bluetooth SIG, Inc. * Prepaid Maintenance Plan available for this vehicle, see dealer for details. * This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

079 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

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

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

Driver Head Acceleration X Redundant
Driver Head Acceleration Y Redundant
Driver Head Acceleration Z Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X Acceleration
Driver Pelvis Y Acceleration
Driver Pelvis Z Acceleration
Driver Left Femur Force Redundant
Driver Right Femur Force Redundant
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Shoulder Belt Force
Driver Lap Belt Force
Passenger Head Acceleration X Redundant
Passenger Head Acceleration Y Redundant
Passenger Head Acceleration Z Redundant
Passenger Upper Neck Force Y

Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Redundant
Passenger Right Femur Force Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
Load Cell Barrier Forces and Moments

NHTSA

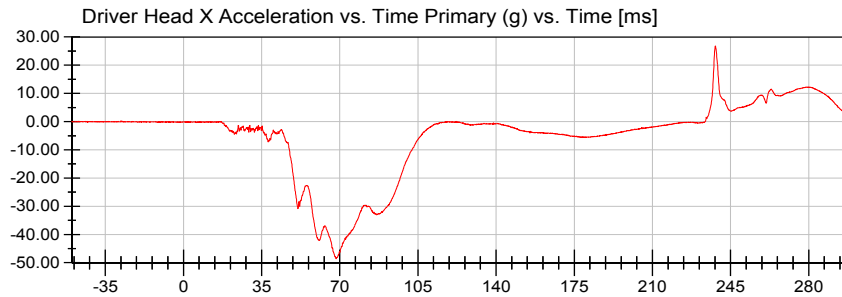
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



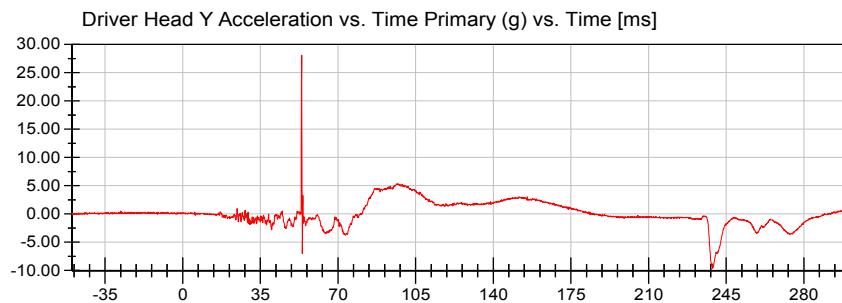
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26.76 g at 238.16 ms

<Min>

-48.63 g at 68.32 ms

CFC_1000



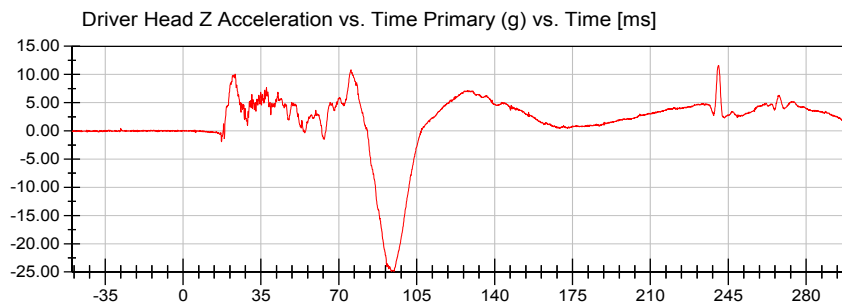
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28.10 g at 53.60 ms

<Min>

-9.61 g at 238.88 ms

CFC_1000



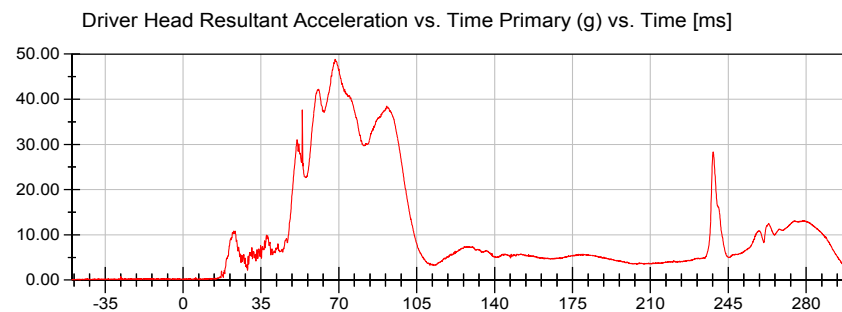
<Max>

11.58 g at 240.56 ms

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-24.87 g at 93.60 ms

CFC_1000



<Max>

48.83 g at 68.32 ms

<Min>

0.03 g at -48.48 ms

CFC_1000



NHTSA

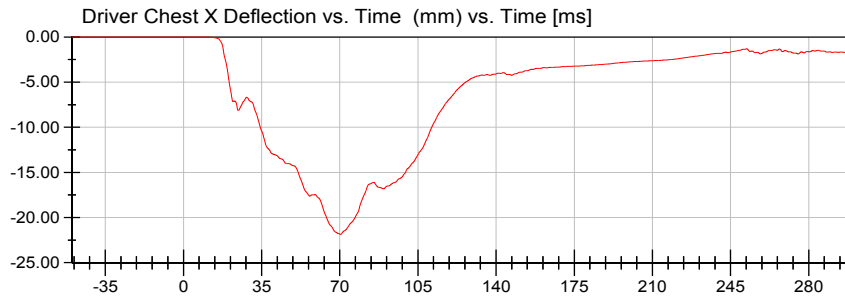
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



<Max>

0.00 mm at -42.96 ms

<Min>

-21.86 mm at 70.32 ms

CFC_600



NHTSA

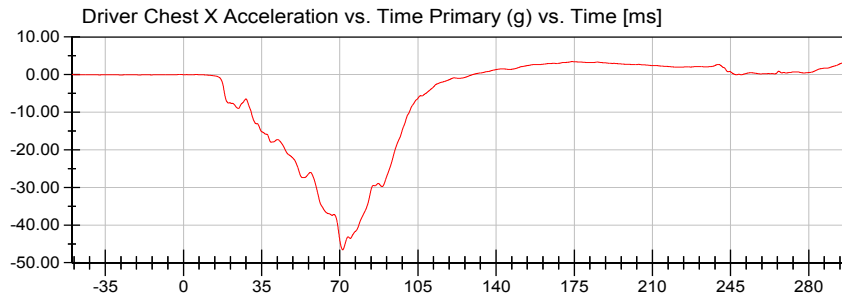
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Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



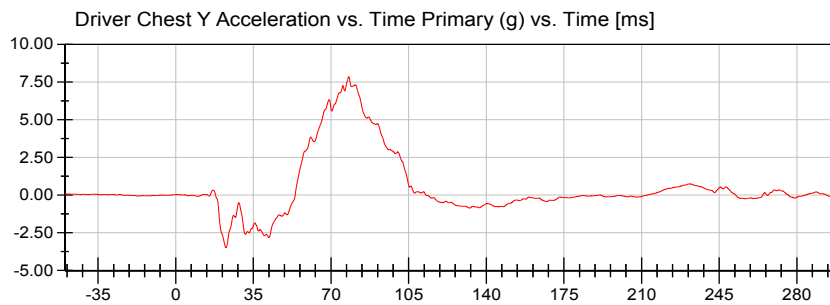
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3.44 g at 174.00 ms

<Min>

-46.60 g at 71.36 ms

CFC_180



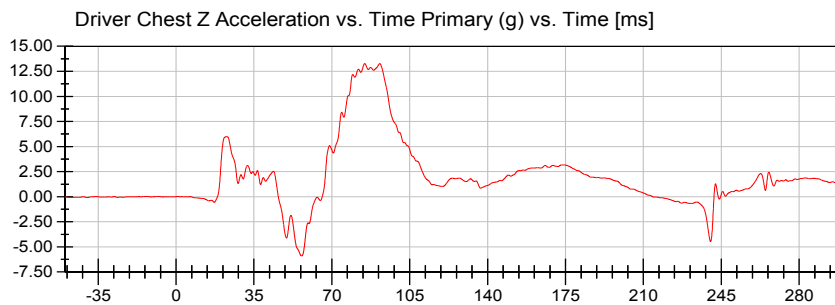
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7.86 g at 78.00 ms

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-3.49 g at 22.64 ms

CFC_180



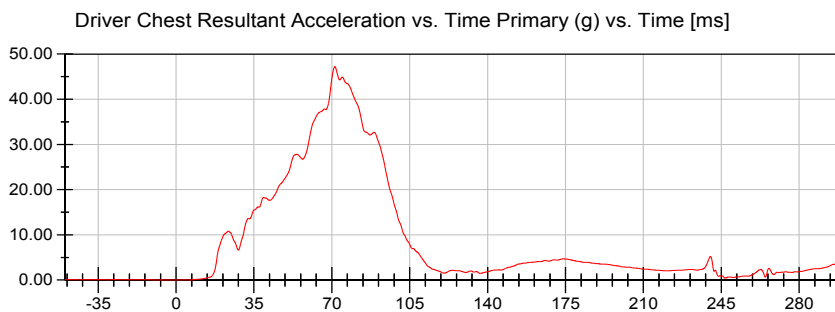
<Max>

13.27 g at 84.80 ms

<Min>

-5.90 g at 56.48 ms

CFC_180



<Max>

47.22 g at 71.36 ms

<Min>

0.01 g at -2.40 ms

CFC_180



NHTSA

Test Lab: CTF

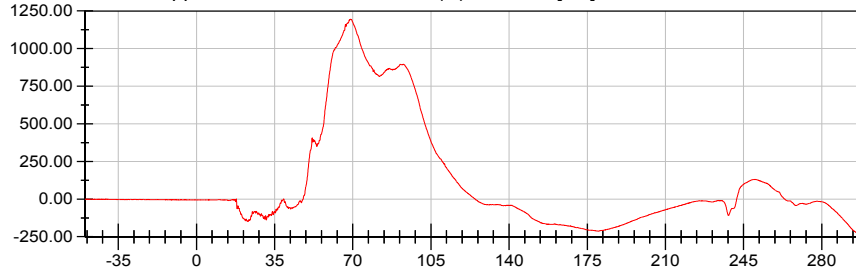
Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)

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



<Max>

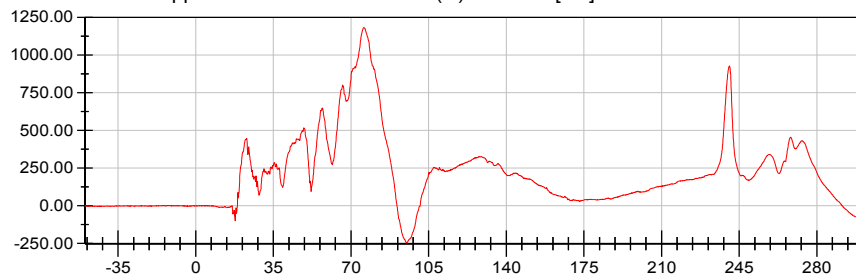
1,194.85 N at 69.04 ms

<Min>

-230.53 N at 297.92 ms

CFC_1000

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



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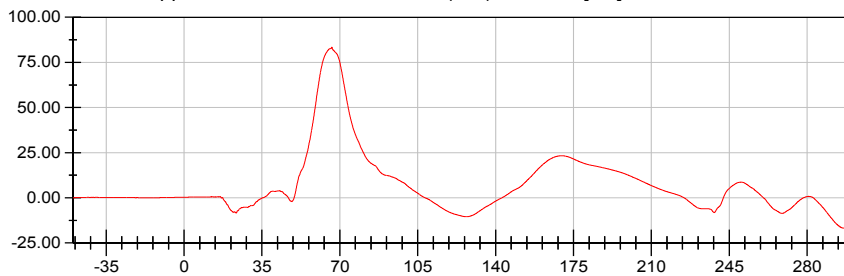
1,182.90 N at 75.68 ms

<Min>

-245.83 N at 95.12 ms

CFC_1000

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



<Max>

83.38 Nm at 66.40 ms

<Min>

-16.81 Nm at 296.64 ms

CFC_600





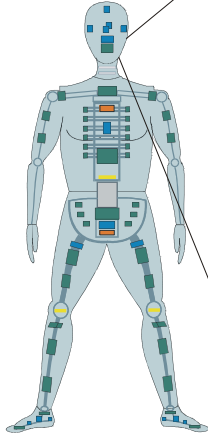
2017 Mercedes-Benz E-Class Sedan NCAP 35 mph Frontal Impact Neck Injury Predictor (NIJ)

Date: 12/05/2016
Time: 14:37

Customer: NHTSA

Test Number: M20174300

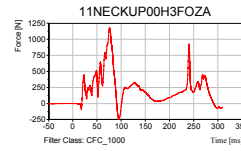
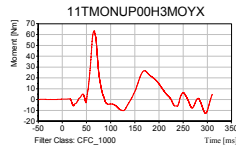
Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310



Dummy: HIII 50th Male
Seating Position:

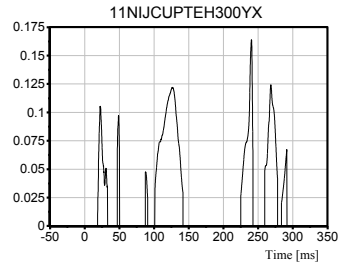
Driver

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

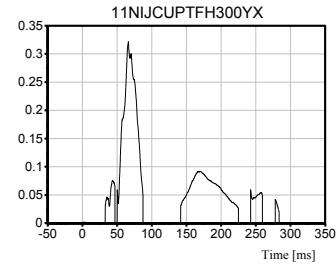


TRC Inc. Test Lab: CTF

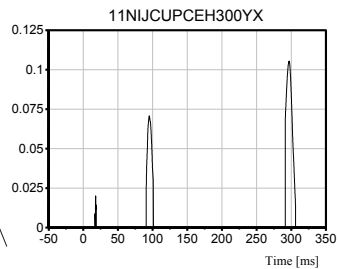
Test Number: 161205



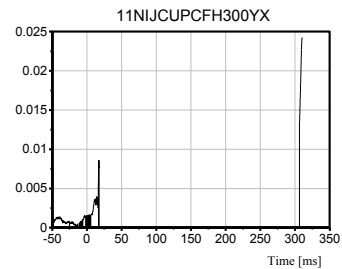
Max [NTE] 0.1640 at 240.40 ms



Max [NTF] 0.3215 at 66.32 ms



Max [NCE] 0.1055 at 297.12 ms



Max [NCF] 0.0242 at 310.00 ms

NHTSA

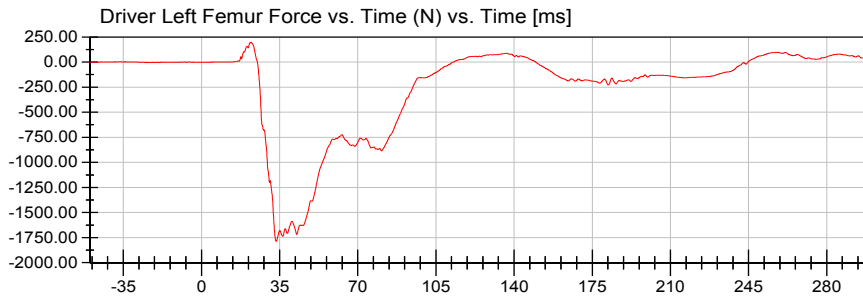
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Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



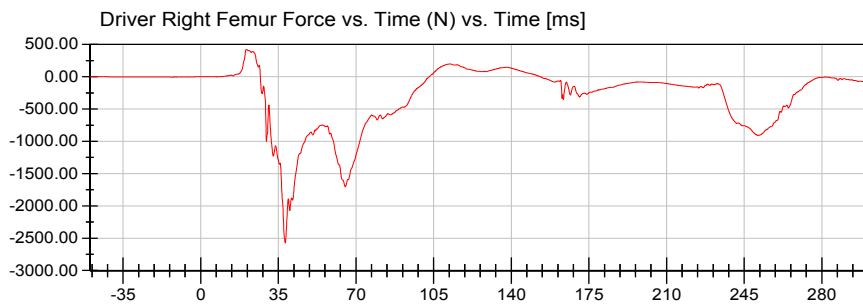
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198.59 N at 22.24 ms

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-1,786.44 N at 33.52 ms

CFC_600



<Max>

425.28 N at 20.56 ms

<Min>

-2,572.65 N at 38.08 ms

CFC_600



NHTSA

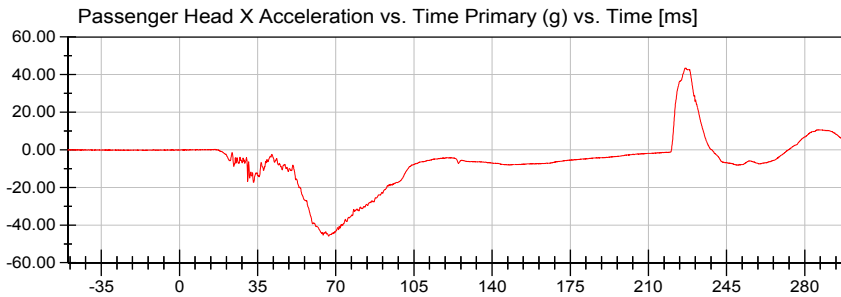
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)

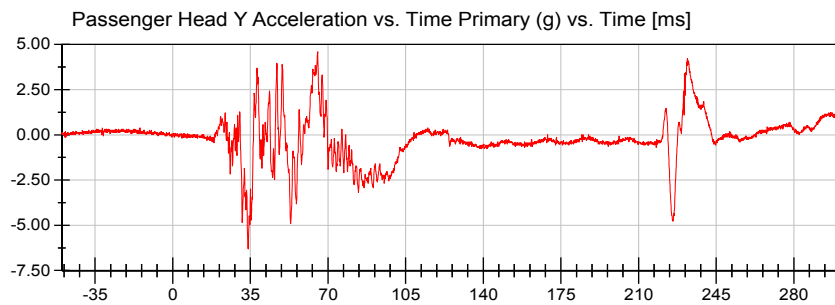


<Max>

43.37 g at 226.40 ms

<Min>

-45.86 g at 66.80 ms

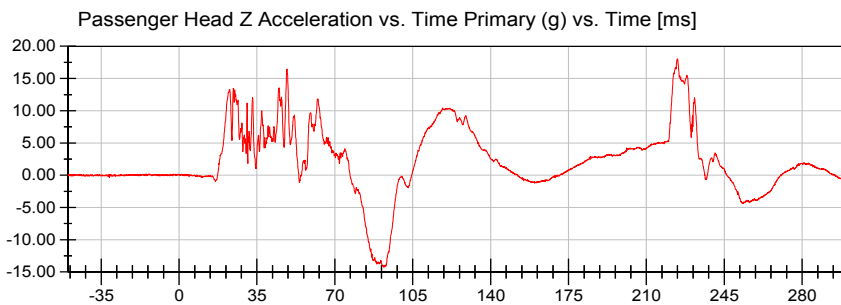


<Max>

4.60 g at 65.36 ms

<Min>

-6.31 g at 34.00 ms

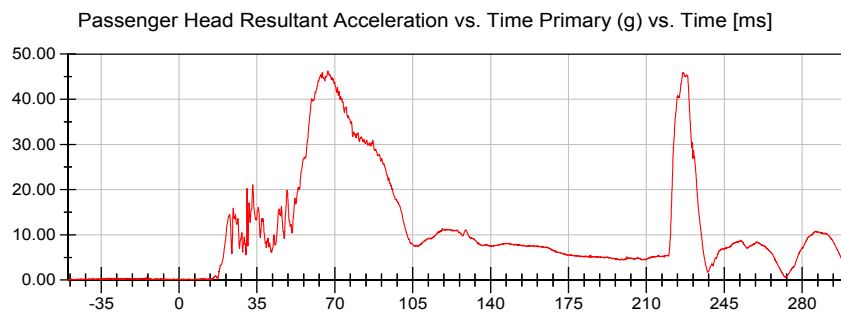


<Max>

18.06 g at 223.92 ms

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-14.27 g at 92.00 ms



<Max>

46.25 g at 66.88 ms

<Min>

0.03 g at -49.44 ms



NHTSA

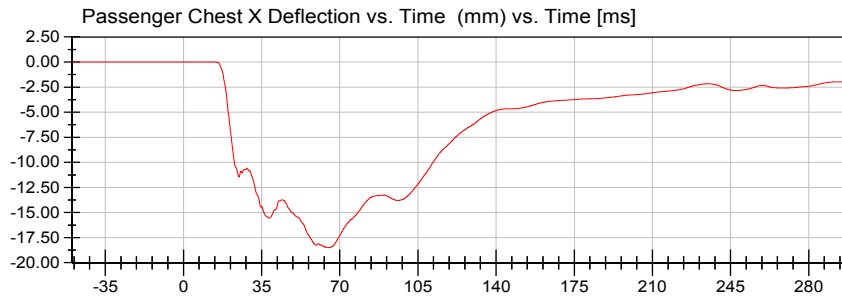
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



<Max>

0.01 mm at -15.52 ms

<Min>

-18.50 mm at 64.96 ms

CFC_600



NHTSA

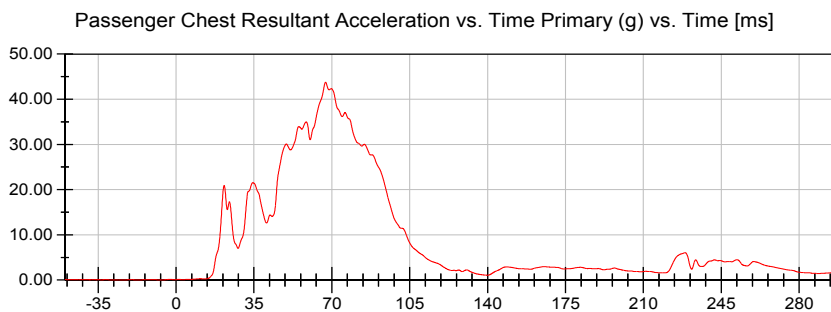
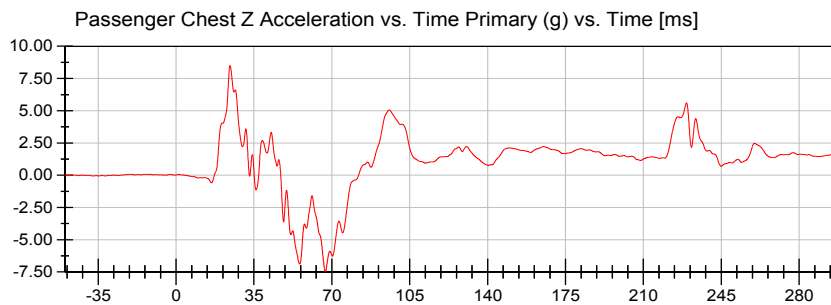
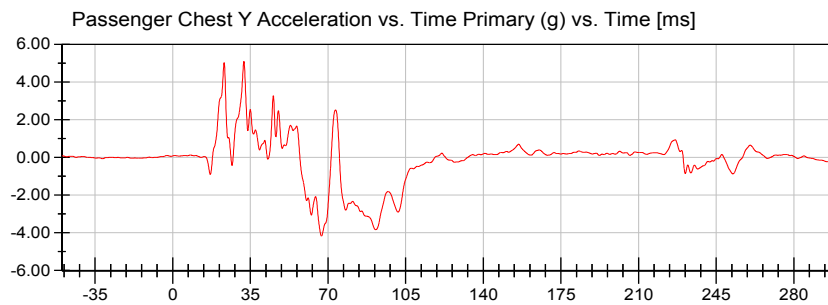
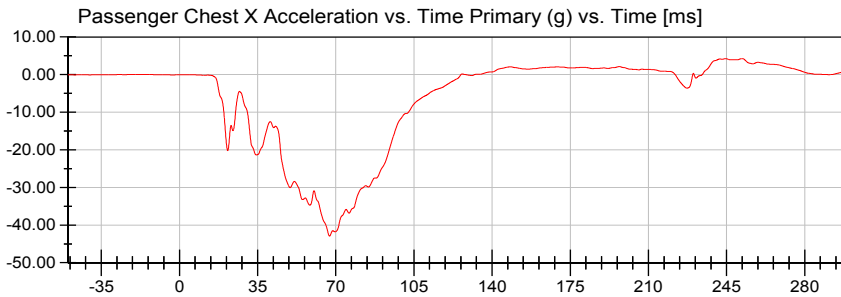
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



NHTSA

Test Lab: CTF

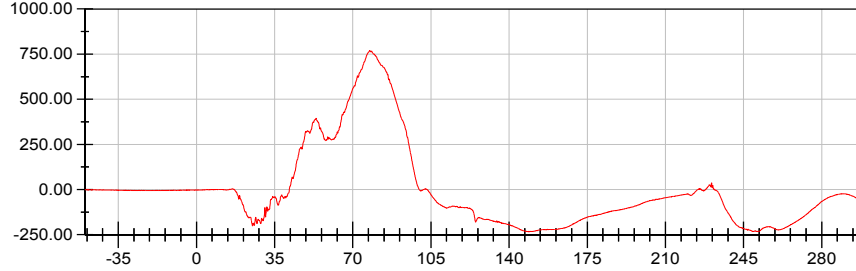
Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)

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



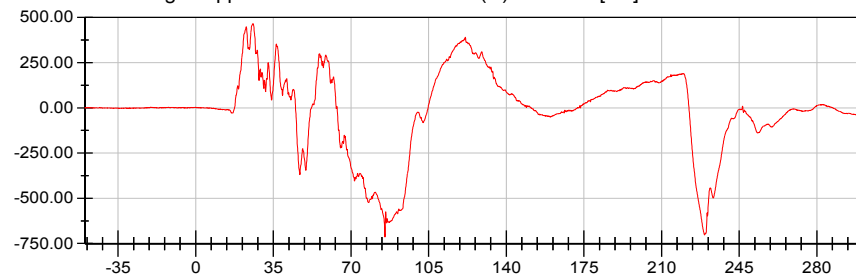
<Max>

770.22 N at 77.60 ms

<Min>

-233.69 N at 148.72 ms

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



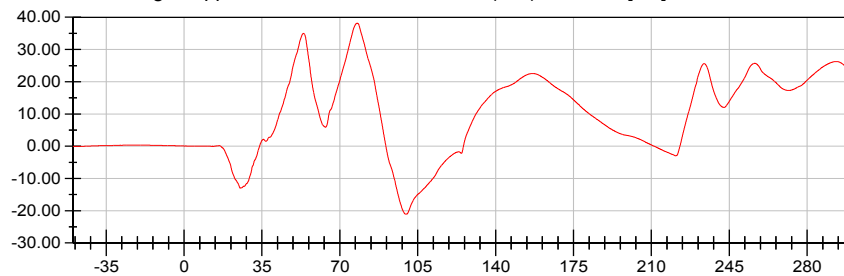
<Max>

465.09 N at 25.68 ms

<Min>

-714.45 N at 85.28 ms

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



<Max>

38.18 Nm at 77.76 ms

<Min>

-21.08 Nm at 99.76 ms





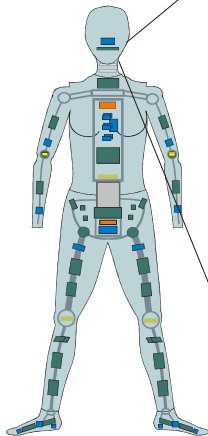
2017 Mercedes-Benz E-Class Sedan NCAP 35 mph Frontal Impact Neck Injury Predictor (NIJ)

Date: 12/05/2016
Time: 14:37

Customer: NHTSA

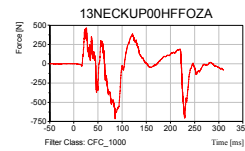
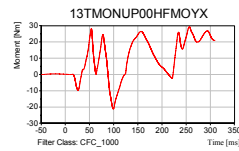
Test Number: M20174300

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



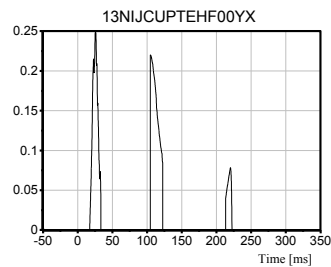
Dummy: HIII 5th Female
Seating Position:
Right Front Passenger

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

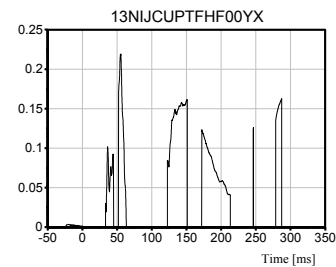


TRC Inc. Test Lab: CTF

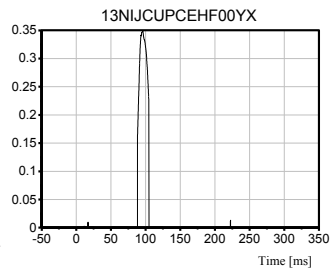
Test Number: 161205



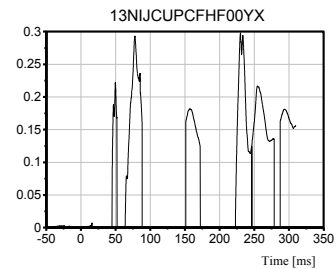
Max [NTE] 0.2499 at 25.52 ms



Max [NTF] 0.2191 at 55.44 ms



Max [NCE] 0.3493 at 95.92 ms



Max [NCF] 0.2983 at 230.00 ms

NHTSA

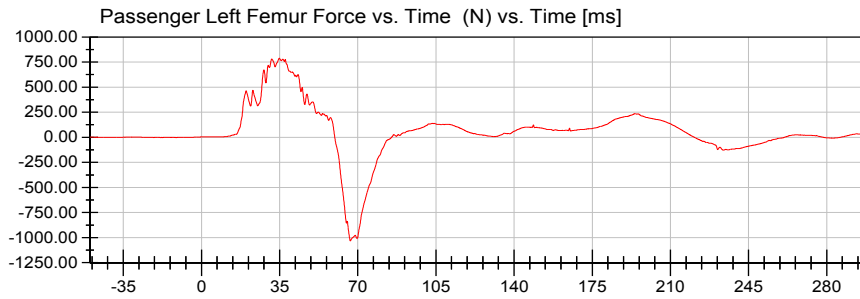
Test Lab: CTF

Test Number: 161205 ()

Test Date: 12/05/2016

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

Position #2 Hybrid III Small Adult Female (426)



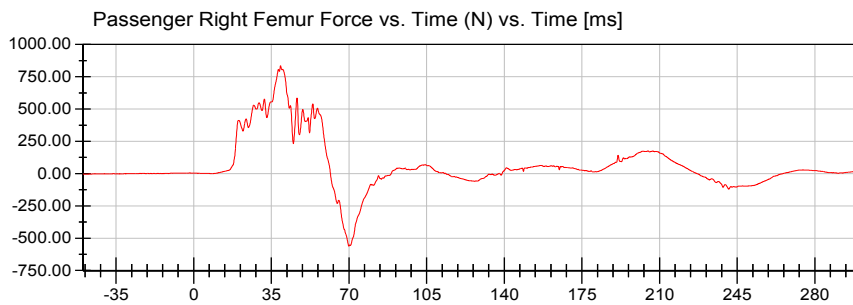
<Max>

787.22 N at 34.80 ms

<Min>

-1,033.41 N at 66.64 ms

CFC_600



<Max>

835.22 N at 39.12 ms

<Min>

-561.10 N at 69.92 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. 42

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	882	Yes
B	Shoulder Pivot Height	505.5 - 520.7	515	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	93	Yes
F	Thigh Clearance	139.7 - 154.9	151	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	Yes
H	Skull Cap To Backline	40.6 - 45.7	45	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	340	Yes
J	Elbow Rest Height	190.5 - 210.8	199	Yes
K	Buttock Knee Length	579.1 - 604.5	599	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	495	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	226	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	429	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	990	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	430	Yes
BB	Location For Waist Circumference	226.1 - 231.1	230	Yes

Comments:



Revised 8/10/12

Page 19 of 19

Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 42-1

Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	17 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	261.1 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	9.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

11.22.2016 08:44:11 615

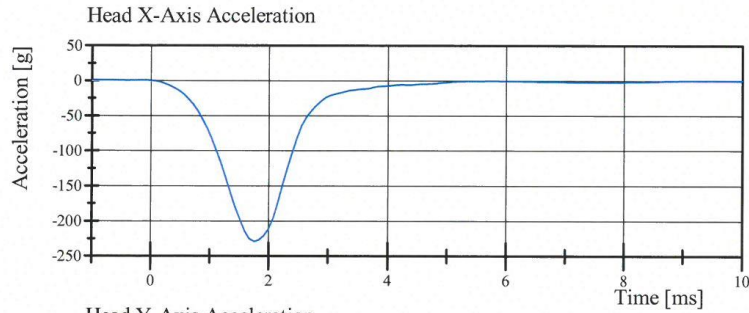


Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 42-1

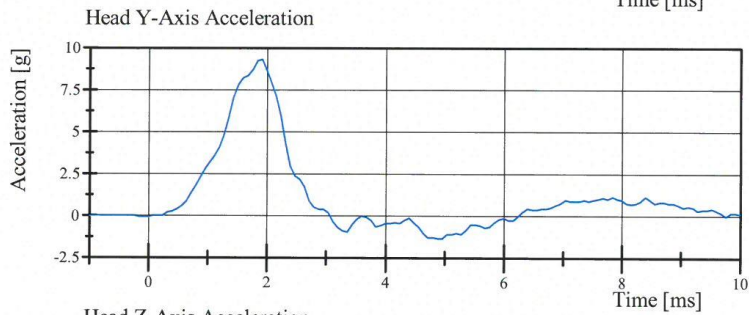
Test Date: 11/22/2016



Filter Class: CFC_1000

Max: 0.2 g at 9.7 ms

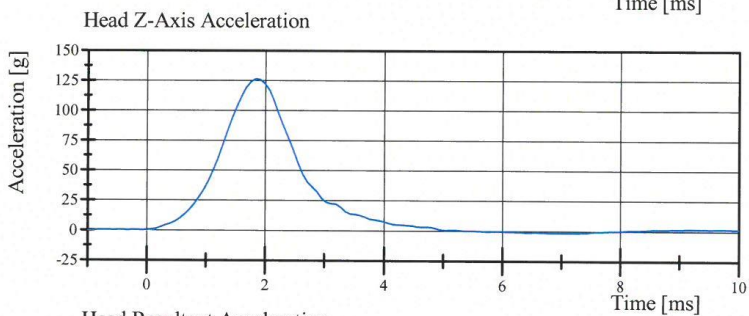
Min: -229.5 g at 1.8 ms



Filter Class: CFC_1000

Max: 9.3 g at 1.9 ms

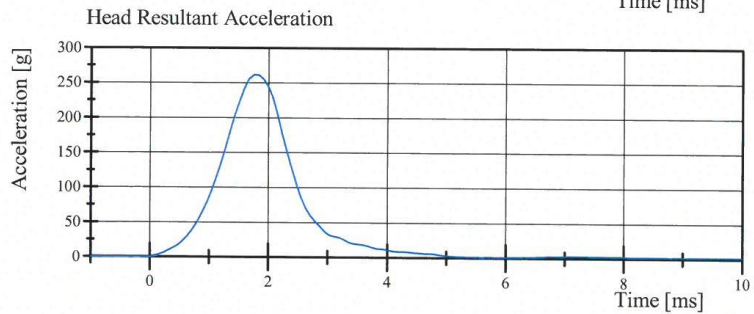
Min: -1.4 g at 4.9 ms



Filter Class: CFC_1000

Max: 126.4 g at 1.8 ms

Min: -1.5 g at 7.0 ms



Filter Class: CFC_1000

Max: 261.1 g at 1.8 ms

Min: 0.0 g at -0.3 ms

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

11.22.2016 08:44:24 615



Transportation Research Center Inc.

Neck Flexion

HIII 50th Serial No. 037 Certification No. 42-1

Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.941 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	38.0 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-24.40 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.24 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-15.01 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-15.01 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-65.5 °	Yes
Time of Peak	57 - 64 ms	59.1 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	113 - 128 ms	118.2 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	104.6 N·m	Yes
Time of Peak	47 - 58 ms	50.8 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	97 - 107 ms	100.4 ms	Yes

Test meets specifications.

Comments:

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

11.22.2016 12:56:33 3035

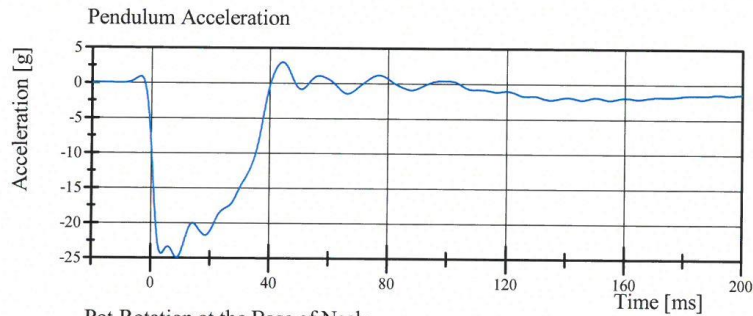


Transportation Research Center Inc.

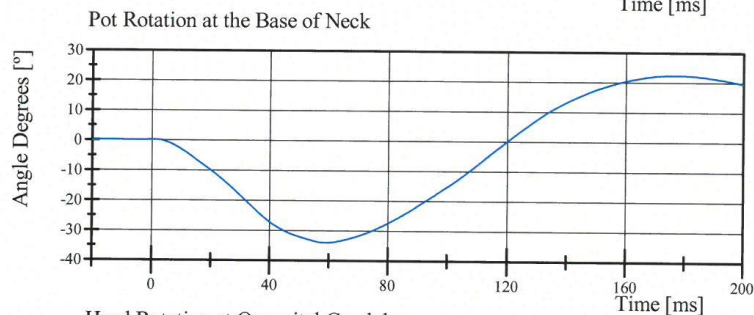
Neck Flexion

HIII 50th Serial No. 037 Certification No. 42-1

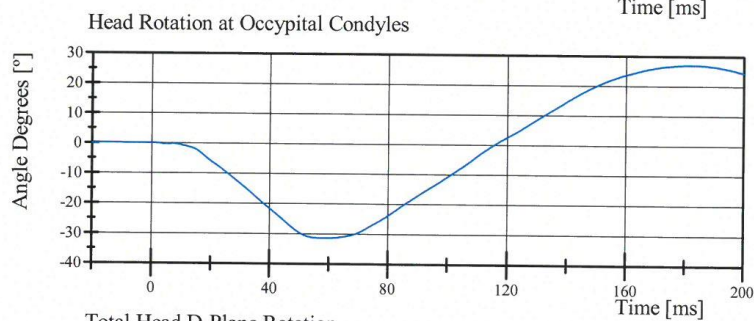
Test Date: 11/22/2016



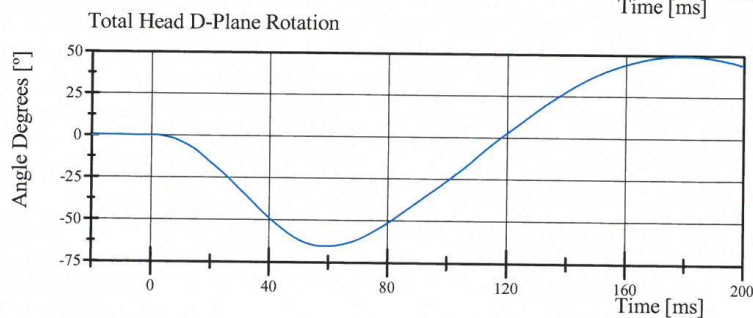
Filter Class: CFC_60
Max: 2.9 g at 44.3 ms
Min: -25.0 g at 8.9 ms



Filter Class: CFC_60
Max: 22.5 ° at 177.0 ms
Min: -34.1 ° at 59.1 ms



Filter Class: CFC_60
Max: 27.1 ° at 182.4 ms
Min: -31.5 ° at 59.3 ms



Filter Class: CFC_60
Max: 49.5 ° at 179.7 ms
Min: -65.5 ° at 59.1 ms

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

11.22.2016 12:56:43 3035

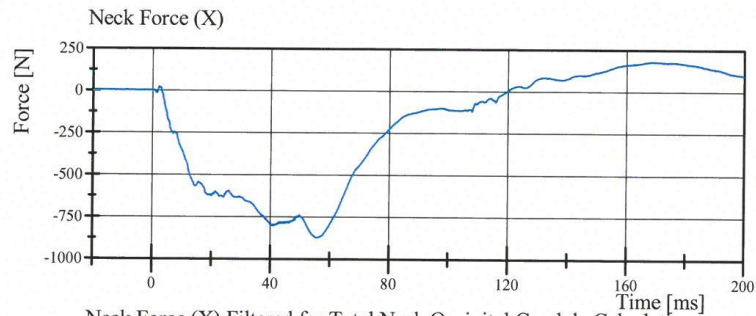


Transportation Research Center Inc.

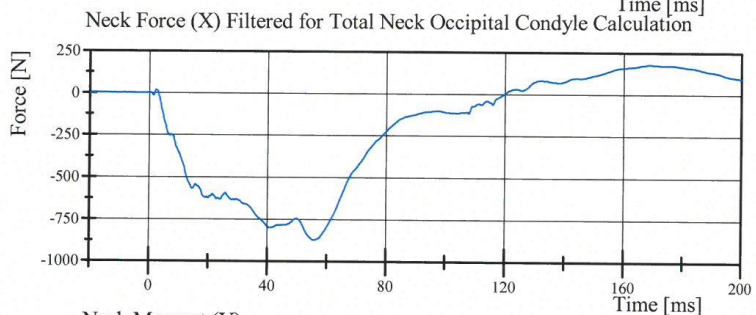
Neck Flexion

HIII 50th Serial No. 037 Certification No. 42-1

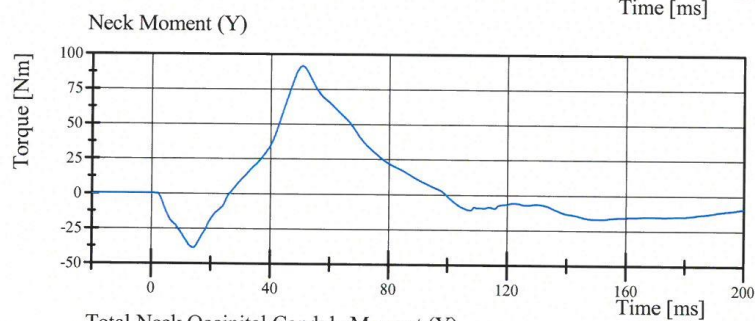
Test Date: 11/22/2016



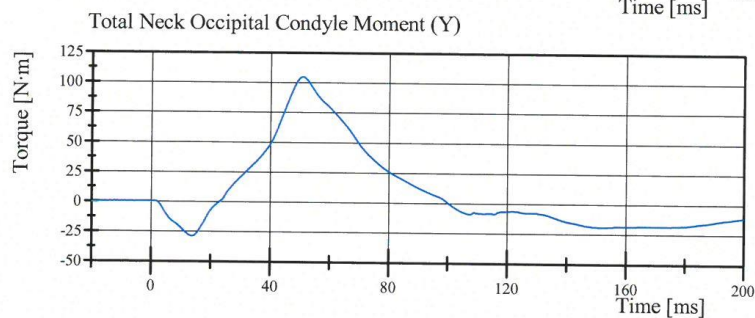
Filter Class: CFC_1000
Max: 179.9 N at 168.9 ms
Min: -872.2 N at 55.4 ms



Filter Class: CFC_600
Max: 179.4 N at 168.9 ms
Min: -872.1 N at 56.0 ms



Filter Class: CFC_600
Max: 91.3 Nm at 50.7 ms
Min: -38.9 Nm at 14.2 ms



Filter Class: Without_(Consta
Max: 104.6 N·m at 50.8 ms
Min: -29.1 N·m at 13.8 ms

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

11.22.2016 12:56:44 3035



Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 42-2

Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-5.995 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	41.7 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.47 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	15.90 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	12.57 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	13.05 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	93.2 °	Yes
Time of Peak	72 - 82 ms	77.9 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	147 - 174 ms	159.4 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-69.6 N·m	Yes
Time of Peak	65 - 79 ms	72.1 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	120 - 148 ms	144.5 ms	Yes

Test meets specifications.

Comments:

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

11.22.2016 13:59:26 3129

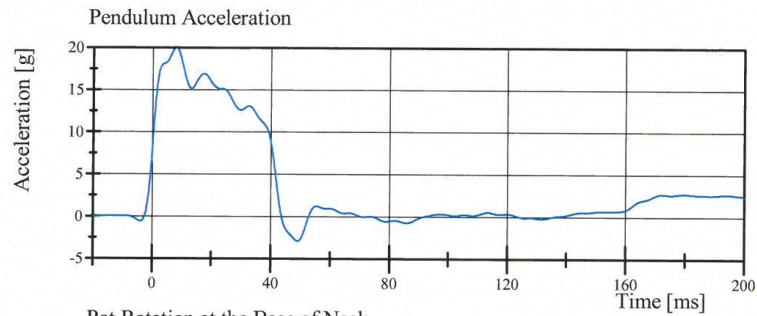


Transportation Research Center Inc.

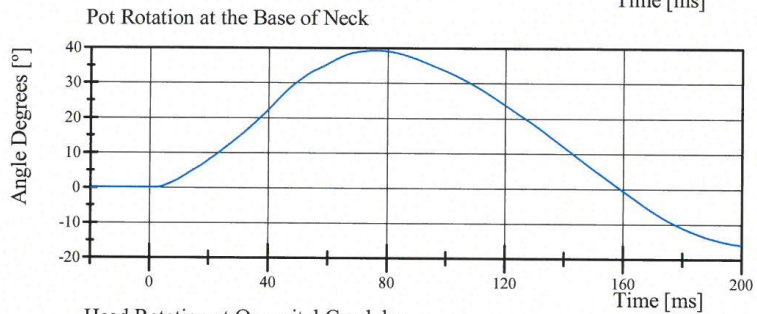
Neck Extension

HIII 50th Serial No. 037 Certification No. 42-2

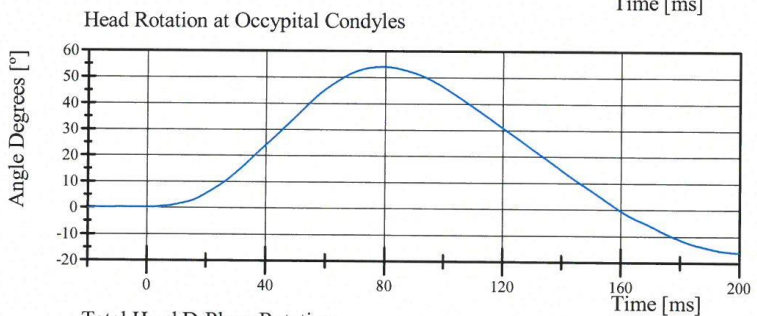
Test Date: 11/22/2016



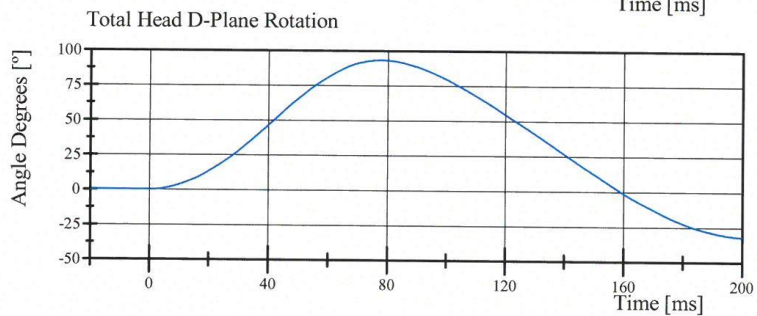
Filter Class: CFC_60
Max: 19.9 g at 8.0 ms
Min: -2.9 g at 49.2 ms



Filter Class: CFC_60
Max: 39.3 ° at 76.0 ms
Min: -15.8 ° at 200.0 ms



Filter Class: CFC_60
Max: 54.0 ° at 79.4 ms
Min: -16.1 ° at 200.0 ms



Filter Class: CFC_60
Max: 93.2 ° at 77.9 ms
Min: -31.9 ° at 200.0 ms

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

11.22.2016 13:59:36 3129

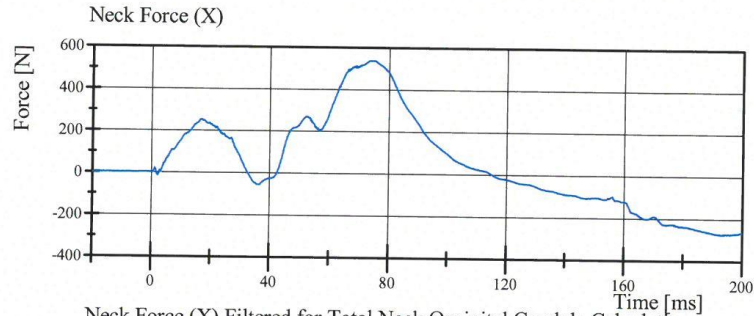


Transportation Research Center Inc.

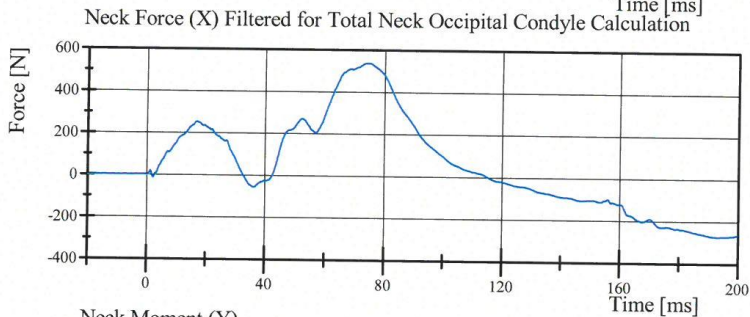
Neck Extension

HIII 50th Serial No. 037 Certification No. 42-2

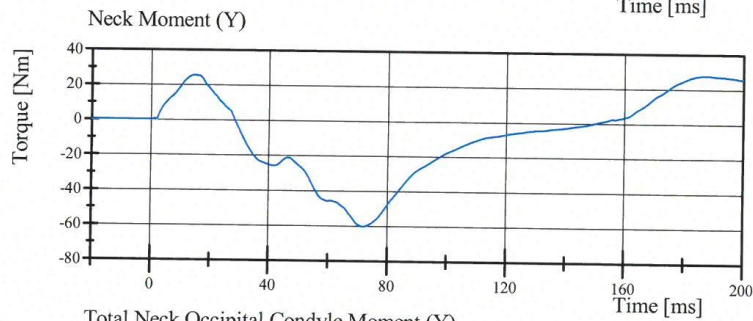
Test Date: 11/22/2016



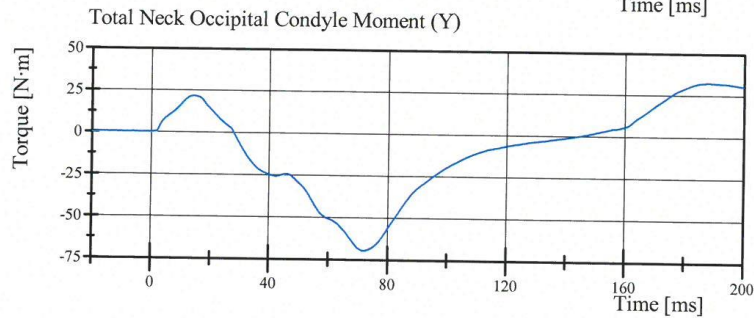
Filter Class: CFC_1000
Max: 536.8 N at 74.8 ms
Min: -272.7 N at 193.1 ms



Filter Class: CFC_600
Max: 536.5 N at 74.8 ms
Min: -272.4 N at 193.1 ms



Filter Class: CFC_600
Max: 28.0 Nm at 187.7 ms
Min: -60.4 Nm at 71.9 ms



Filter Class: Without_(Consta
Max: 32.6 N·m at 187.8 ms
Min: -69.6 N·m at 72.1 ms

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

11.22.2016 13:59:37 3129



Transportation Research Center Inc.

Front Thorax

HIH 50th Serial No. 037 Certification No. 42-1

Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.666 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,656.8 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-69.40 mm	Yes
Internal Hysteresis	65 - 85 %	72.4 %	Yes

Test meets specifications.

Comments:

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

11.22.2016 15:06:20 439

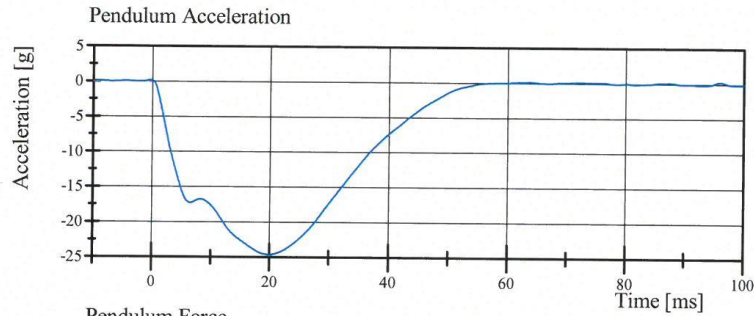


Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 42-1

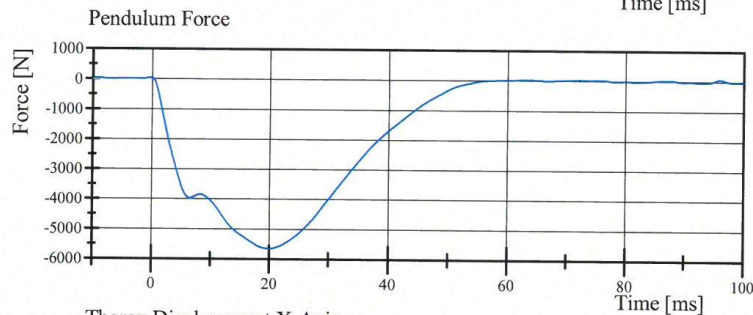
Test Date: 11/22/2016



Filter Class: CFC_180

Max: 0.3 g at 96.0 ms

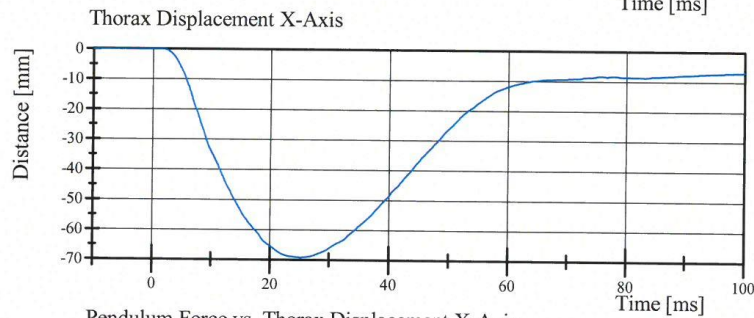
Min: -24.7 g at 20.1 ms



Filter Class: CFC_180

Max: 63.6 N at 96.0 ms

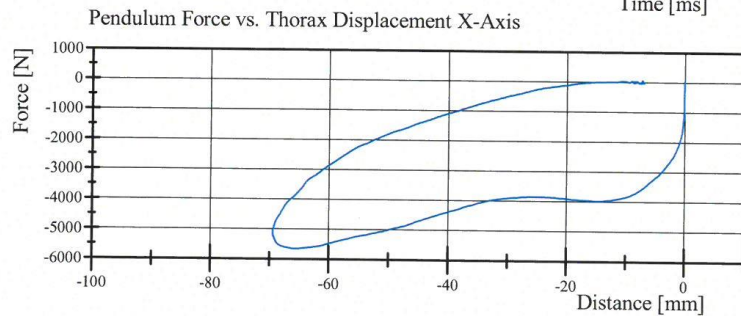
Min: -5,656.8 N at 20.1 ms



Filter Class: CFC_600

Max: 0.0 mm at -7.0 ms

Min: -69.4 mm at 25.2 ms



Filter Class: CFC_180

Max: 63.6 N at -7.2 mm

Min: -5,656.8 N at -65.6 mm

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

11.22.2016 15:06:33 439



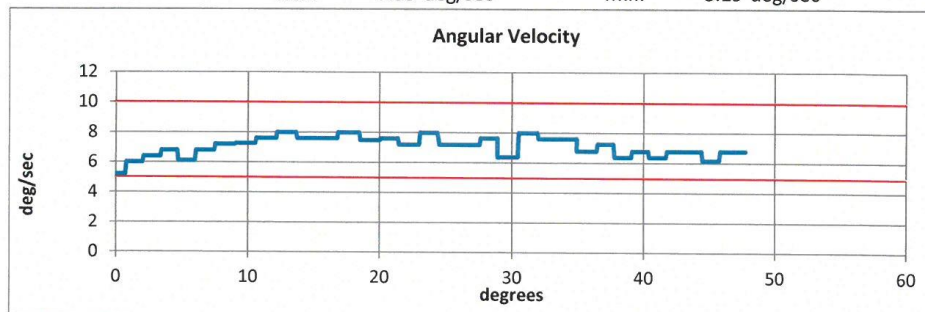
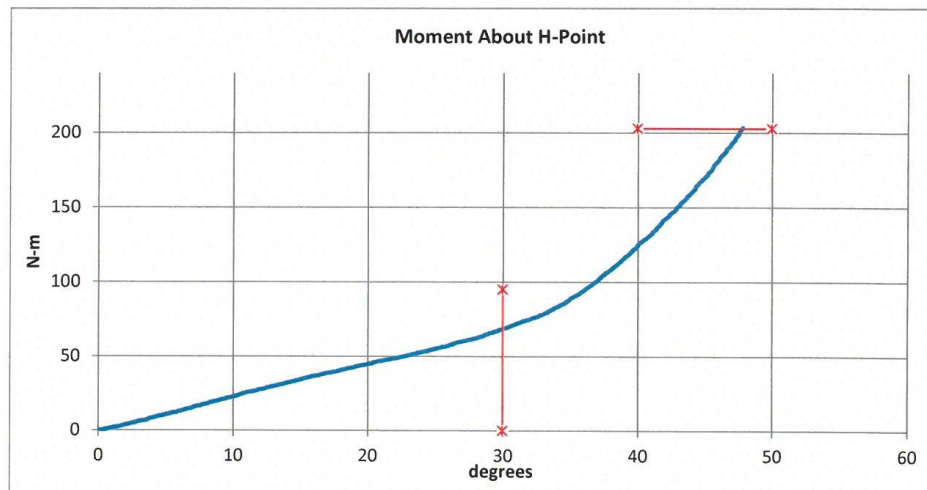
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion



Serial Number: 037 Date: 22-Nov-2016
Side Tested: Left Hip Time: 8:18
Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION		TEST RESULTS		
Temperature	18.9	- 25.6	21.3	°C	Pass
Humidity	10	- 70	17	%	Pass
Moment at 30°	0	≤ 94.9	68.75	N-m	Pass
Angle at 203 Nm	40	- 50	47.8	deg	Pass
Average Velocity	5	- 10	7.06	deg/sec	Pass



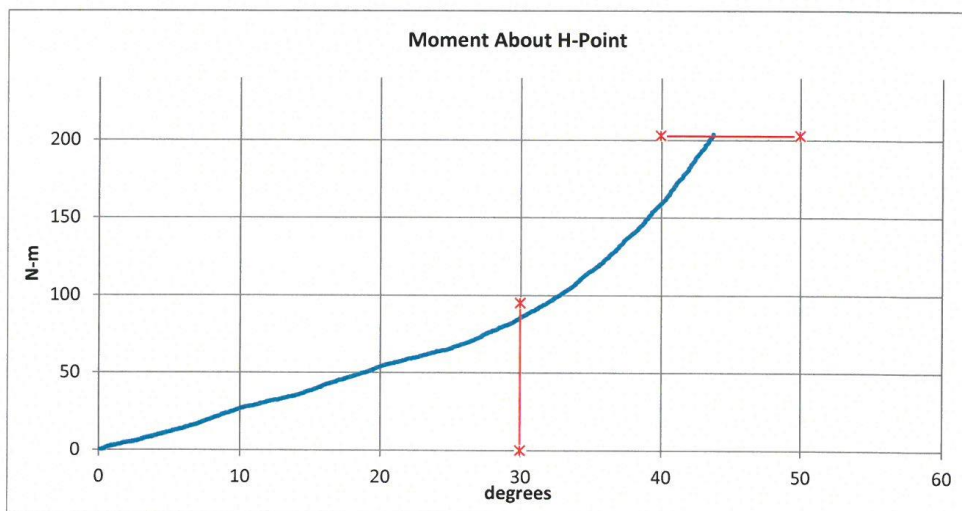
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

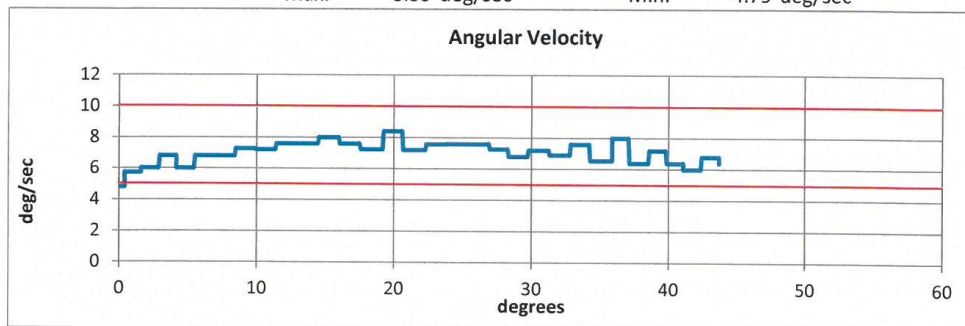


Serial Number: 037 Date: 22-Nov-2016
Side Tested: Right Hip Time: 9:38
Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.3	°C	Pass
Humidity	10	-	70	18	%	Pass
Moment at 30°	0	≤	94.9	85.93	N-m	Pass
Angle at 203 Nm	40	-	50	43.72	deg	Pass
Average Velocity	5	-	10	7.03	deg/sec	Pass



Max: 8.39 deg/sec Min: 4.79 deg/sec



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 42-1
Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	17 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.103 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,609.18 N	Yes

Test meets specifications.

Comments:

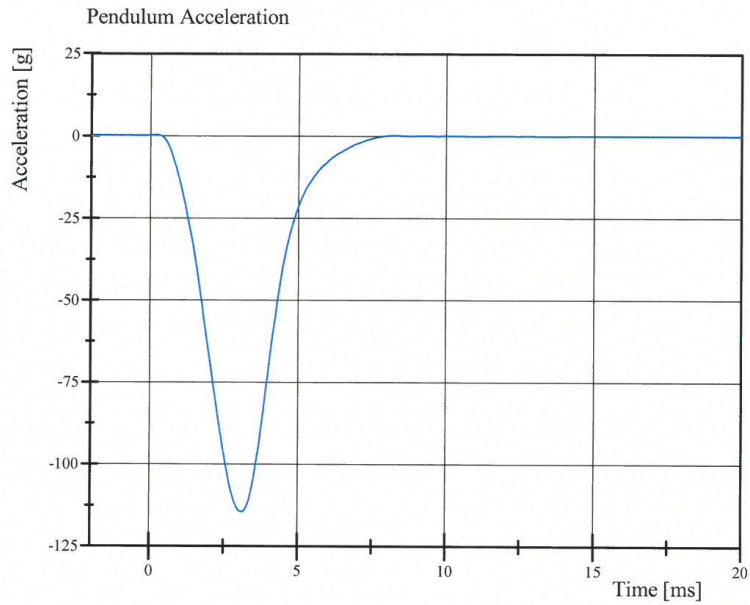
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

11.22.2016 07:57:56 1900

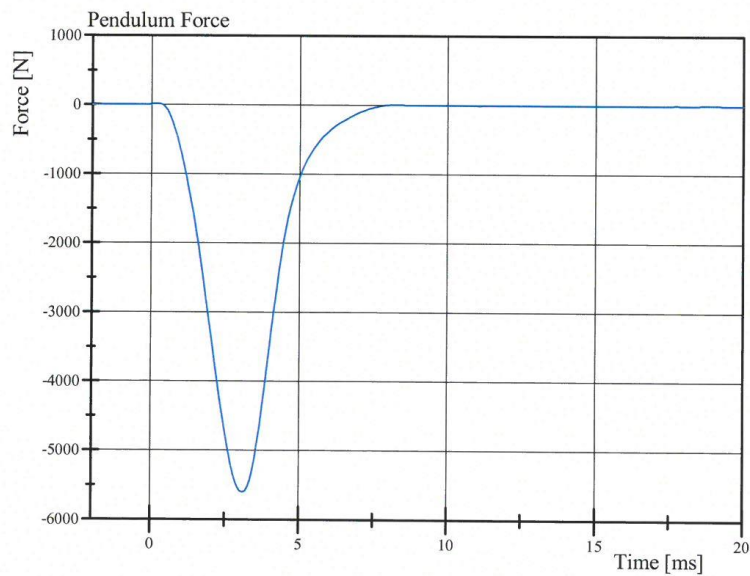


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 42-1
Test Date: 11/22/2016



Filter Class: CFC_600
Max: 0.2 g at 0.2 ms
Min: -114.6 g at 3.1 ms



Filter Class: CFC_600
Max: 8.1 N at 0.2 ms
Min: -5,609.2 N at 3.1 ms

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

11.22.2016 07:58:08 1900



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 42-1
Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	17 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.096 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,597.97 N	Yes

Test meets specifications.

Comments:

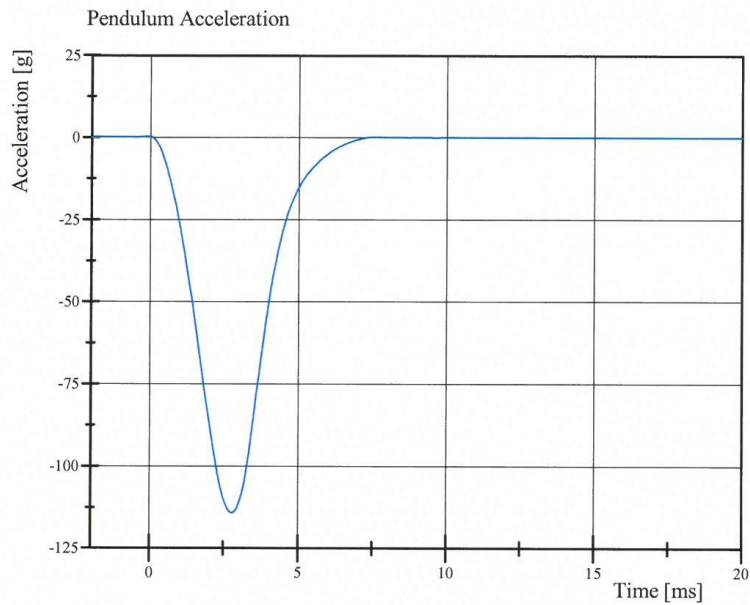
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

11.22.2016 08:02:30 1906

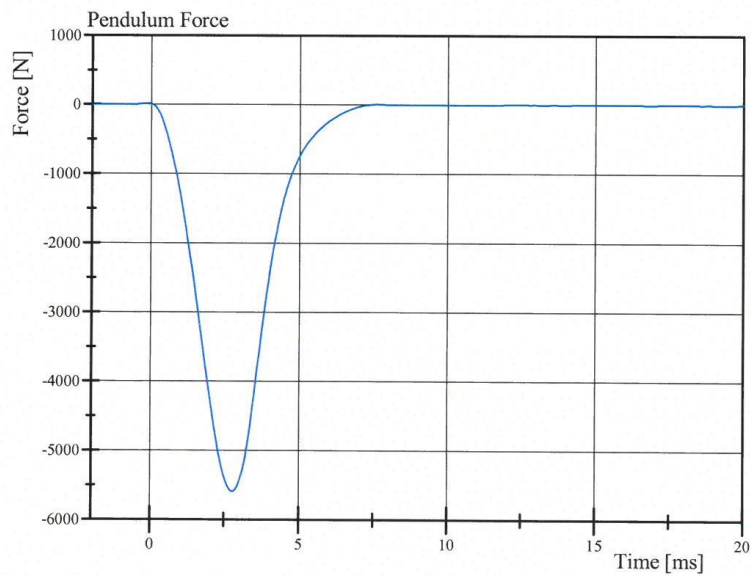


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 42-1
Test Date: 11/22/2016



Filter Class: CFC_600
Max: 0.2 g at -0.1 ms
Min: -114.4 g at 2.8 ms



Filter Class: CFC_600
Max: 9.3 N at -0.1 ms
Min: -5,598.0 N at 2.8 ms

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

11.22.2016 08:02:40 1906



Post-Test Calibration Sheets

Driver S/N 037

Transportation Research Center Inc.
572E HIII 50th Male Dummy
External Dimensions
Serial No. 037
Calibration No. 43

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	878.8 - 889.0	881	Yes
B	Shoulder Pivot Height	505.5 - 520.7	514	Yes
C	H-Point Height	83.8 - 88.9	87	Yes
D	H-Point From Seatback	134.6 - 139.7	138	Yes
E	Shoulder Pivot From Backline	83.8 - 94.0	91	Yes
F	Thigh Clearance	139.7 - 154.9	150	Yes
G	Back Of Elbow To Wrist Pivot	289.6 - 304.8	295	Yes
H	Skull Cap To Backline	40.6 - 45.7	45	Yes
I	Shoulder-Elbow Length	330.2 - 345.4	340	Yes
J	Elbow Rest Height	190.5 - 210.8	200	Yes
K	Buttock Knee Length	579.1 - 604.5	599	Yes
L	Popliteal Height	429.3 - 454.7	440	Yes
M	Knee Pivot Height	485.1 - 500.4	495	Yes
N	Buttock Popliteal Length	452.1 - 477.5	470	Yes
O	Chest Depth	213.4 - 228.6	225	Yes
P	Foot Length	251.5 - 266.7	264	Yes
V	Shoulder Breadth	421.6 - 436.9	430	Yes
W	Foot Breadth	91.4 - 106.7	97	Yes
Y	Chest Circumference	970.3 - 1000.8	990	Yes
Z	Waist Circumference	835.7 - 866.1	865	Yes
AA	Location For Chest Circumference	429.3 - 434.3	430	Yes
BB	Location For Waist Circumference	226.1 - 231.1	230	Yes

Comments:

Revised 8/10/12

Page 19 of 19



Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 43-1

Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Peak Head Resultant Acceleration	225 - 275 g	270.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	8.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

12.06.2016 13:59:31 614

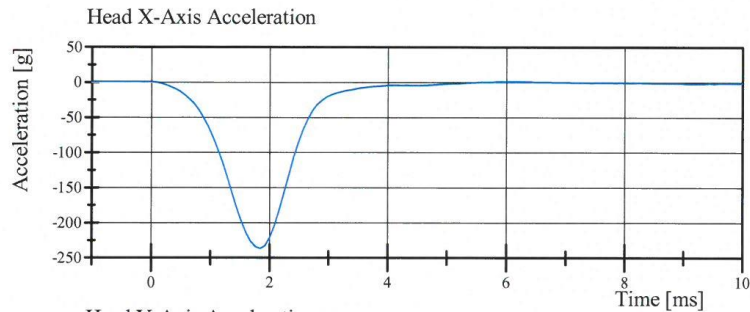


Transportation Research Center Inc.

Front Head Drop

HIII 50th Serial No. 037 Certification No. 43-1

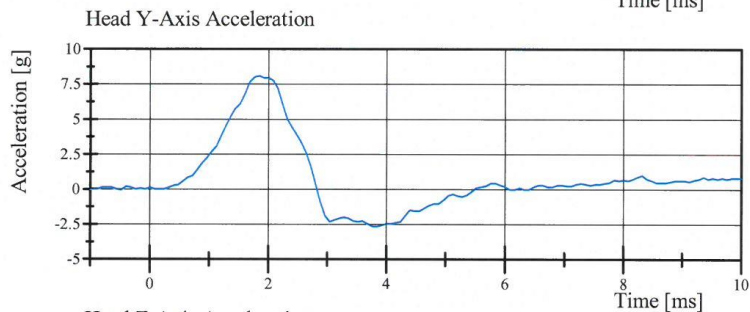
Test Date: 12/6/2016



Filter Class: CFC_1000

Max: 0.6 g at 6.1 ms

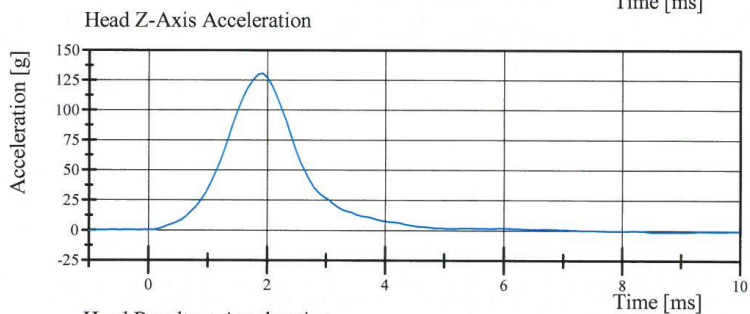
Min: -237.5 g at 1.8 ms



Filter Class: CFC_1000

Max: 8.0 g at 1.8 ms

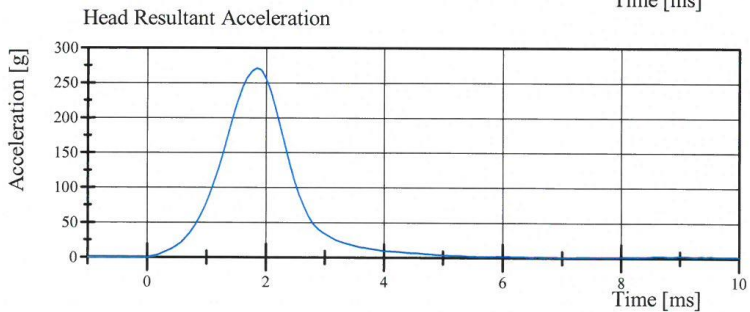
Min: -2.7 g at 3.8 ms



Filter Class: CFC_1000

Max: 130.4 g at 1.9 ms

Min: -1.2 g at 8.6 ms



Filter Class: CFC_1000

Max: 270.7 g at 1.8 ms

Min: 0.0 g at -1.0 ms

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

12.06.2016 13:59:41 614



Transportation Research Center Inc.

Neck Flexion

HIH 50th Serial No. 037 Certification No. 43-1

Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	32 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	6.948 m/s	Yes
Pendulum Acceleration Decay Crossing -5g	34 - 42 ms	37.0 ms	Yes
Pendulum Acceleration at 10ms	(-22.5) - (-27.5) g	-25.06 g	Yes
Pendulum Acceleration at 20ms	(-17.6) - (-22.6) g	-21.32 g	Yes
Pendulum Acceleration at 30ms	(-12.5) - (-18.5) g	-14.94 g	Yes
Pendulum Acceleration > 30ms	>= (-29.0) g	-14.94 g	Yes
Total Head D-Plane Rotation			
Peak	(-64) - (-78) °	-64.1 °	Yes
Time of Peak	57 - 64 ms	58.4 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	113 - 128 ms	116.8 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	88 - 108 N·m	107.3 N·m	Yes
Time of Peak	47 - 58 ms	49.8 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	97 - 107 ms	98.8 ms	Yes

Test meets specifications.

Comments:

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

12.06.2016 15:00:09 3037

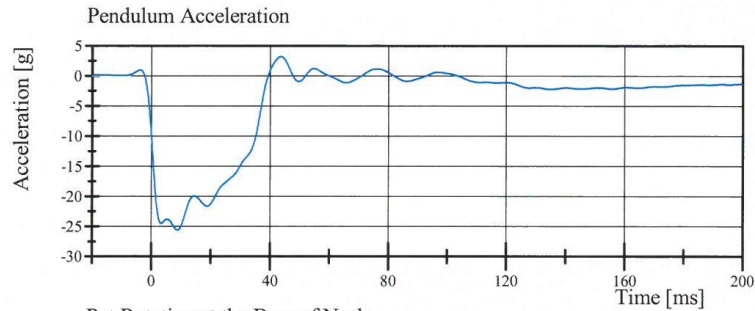


Transportation Research Center Inc.

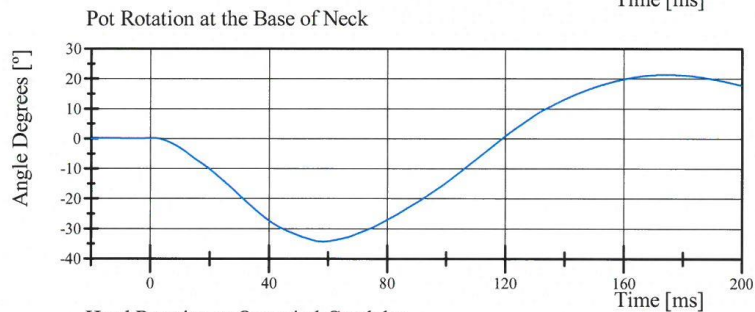
Neck Flexion

HIII 50th Serial No. 037 Certification No. 43-1

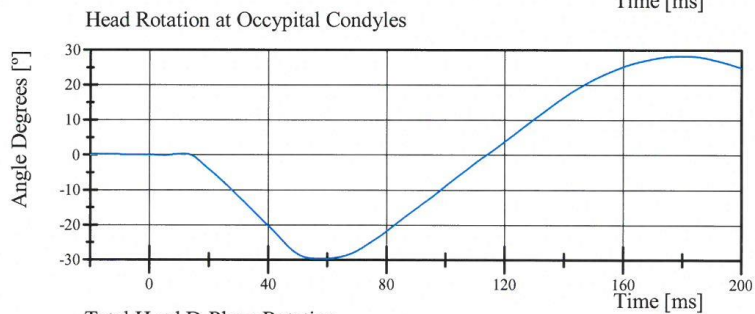
Test Date: 12/6/2016



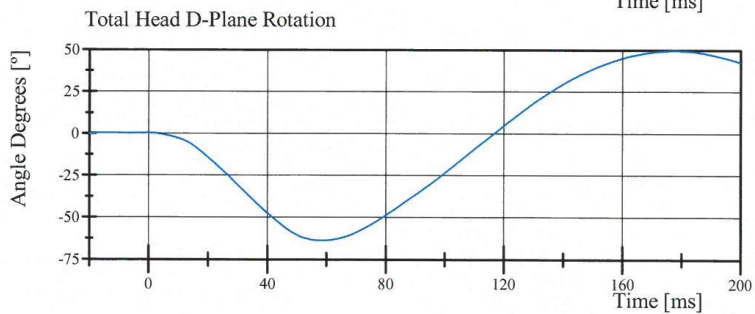
Filter Class: CFC_60
Max: 3.1 g at 43.6 ms
Min: -25.7 g at 8.9 ms



Filter Class: CFC_60
Max: 21.4 ° at 174.7 ms
Min: -34.4 ° at 58.3 ms



Filter Class: CFC_60
Max: 28.3 ° at 180.6 ms
Min: -29.7 ° at 59.3 ms



Filter Class: CFC_60
Max: 49.5 ° at 177.5 ms
Min: -64.1 ° at 58.4 ms

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

12.06.2016 15:00:20 3037

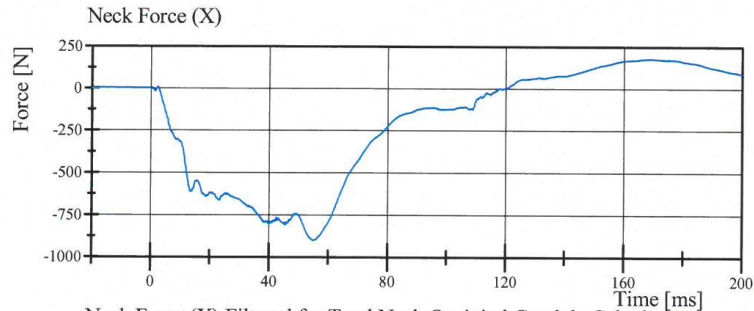


Transportation Research Center Inc.

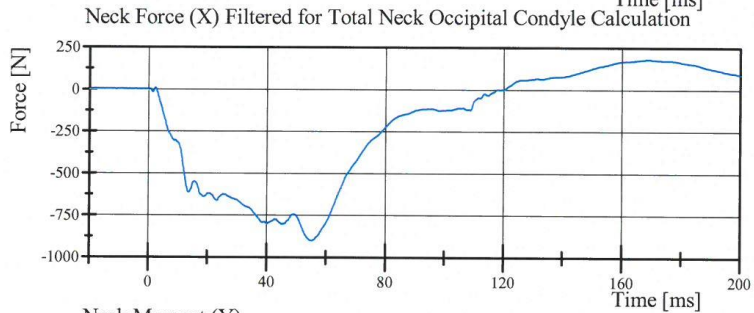
Neck Flexion

HIII 50th Serial No. 037 Certification No. 43-1

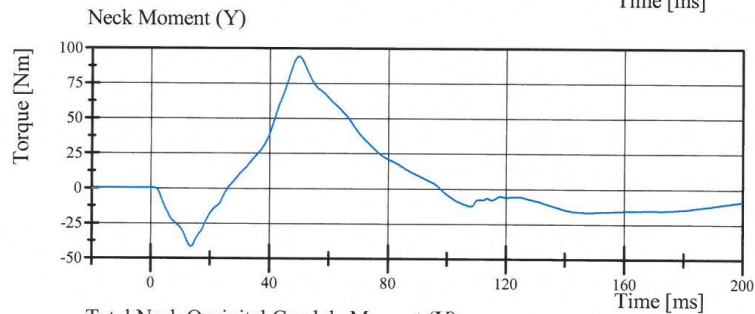
Test Date: 12/6/2016



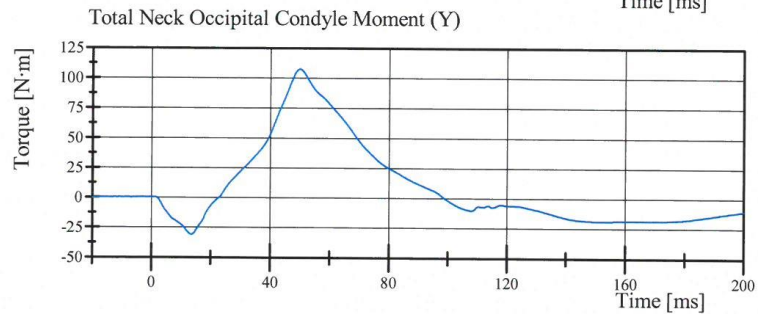
Filter Class: CFC_1000
Max: 179.1 N at 167.9 ms
Min: -902.4 N at 55.1 ms



Filter Class: CFC_600
Max: 179.0 N at 168.5 ms
Min: -902.0 N at 55.0 ms



Filter Class: CFC_600
Max: 94.1 Nm at 49.7 ms
Min: -41.9 Nm at 13.5 ms



Filter Class: Without_(Consta
Max: 107.3 N·m at 49.8 ms
Min: -31.0 N·m at 13.4 ms

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

12.06.2016 15:00:21 3037



Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 43-1

Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	(-5.95) - (-6.18) m/s	-6.000 m/s	Yes
Pendulum Acceleration Decay Crossing 5g	38 - 46 ms	41.9 ms	Yes
Pendulum Acceleration at 10ms	17.2 - 21.2 g	18.82 g	Yes
Pendulum Acceleration at 20ms	14.0 - 19.0 g	16.10 g	Yes
Pendulum Acceleration at 30ms	11.0 - 16.0 g	12.20 g	Yes
Pendulum Acceleration > 30ms	<= 22.0 g	12.44 g	Yes
Total Head D-Plane Rotation			
Peak	81 - 106 °	94.0 °	Yes
Time of Peak	72 - 82 ms	76.8 ms	Yes
Total Head D-Plane Rotation			
Decay to 0°	147 - 174 ms	159.1 ms	Yes
Total Neck Occipital Condyles Moment			
Peak	(-53) - (-80) N·m	-70.5 N·m	Yes
Time of Peak	65 - 79 ms	71.4 ms	Yes
Total Neck Occipital Condyles Moment			
Decay to 0 N·m	120 - 148 ms	143.6 ms	Yes

Test meets specifications.

Comments:

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

12.06.2016 15:31:27 3128

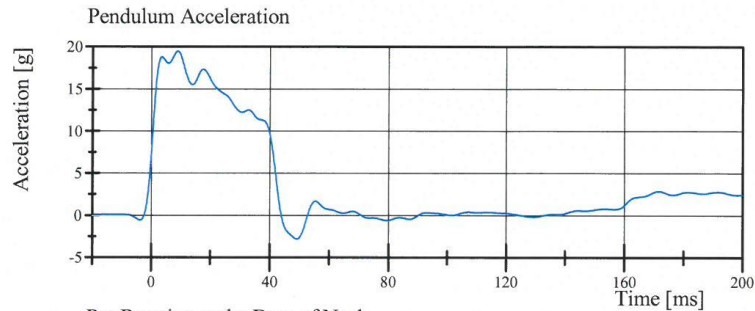


Transportation Research Center Inc.

Neck Extension

HIII 50th Serial No. 037 Certification No. 43-1

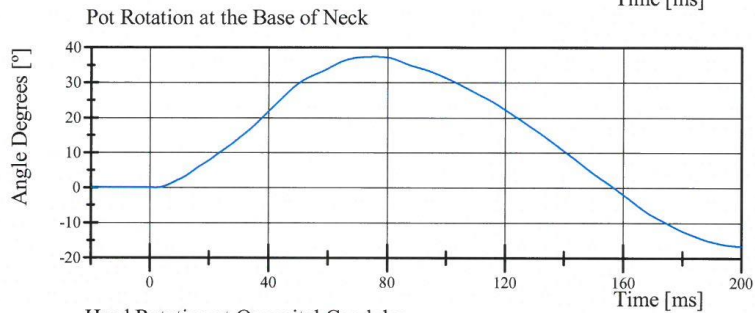
Test Date: 12/6/2016



Filter Class: CFC_60

Max: 19.4 g at 8.8 ms

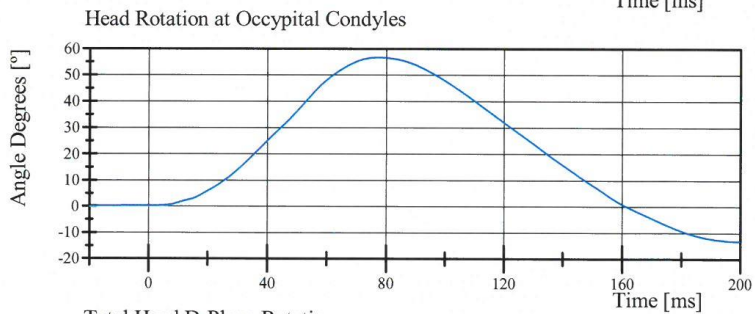
Min: -2.9 g at 49.2 ms



Filter Class: CFC_60

Max: 37.4 ° at 76.0 ms

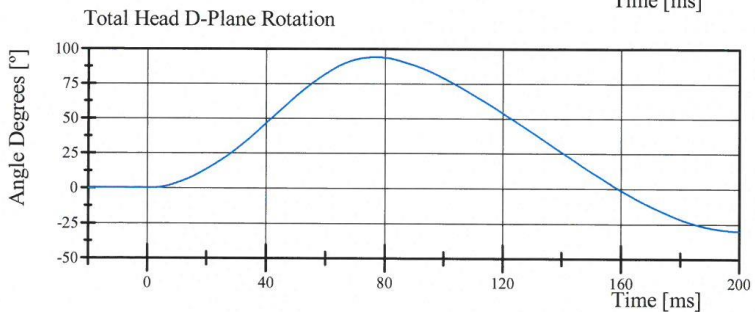
Min: -16.6 ° at 200.0 ms



Filter Class: CFC_60

Max: 56.6 ° at 77.3 ms

Min: -13.2 ° at 199.7 ms



Filter Class: CFC_60

Max: 94.0 ° at 76.8 ms

Min: -29.8 ° at 200.0 ms

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

12.06.2016 15:31:37 3128

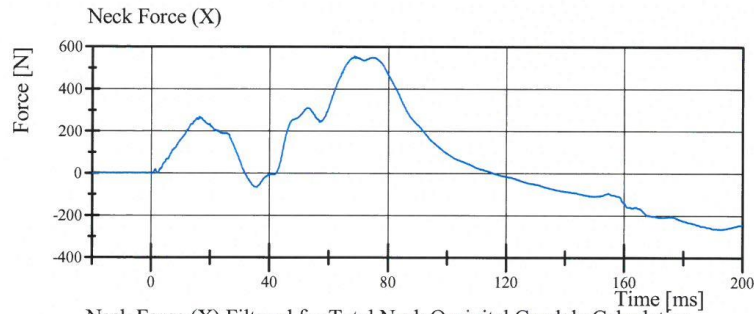


Transportation Research Center Inc.

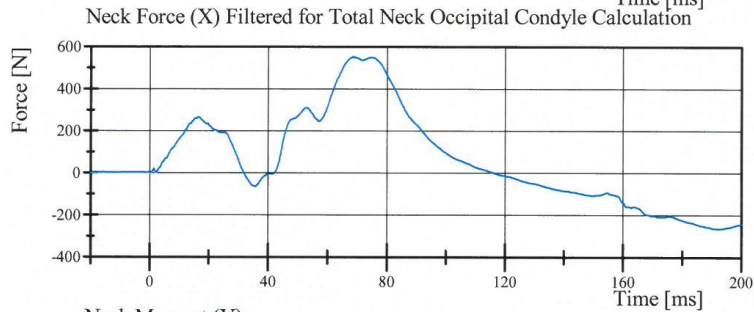
Neck Extension

HIII 50th Serial No. 037 Certification No. 43-1

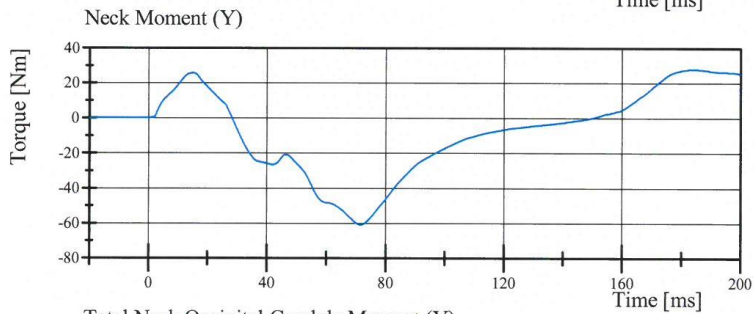
Test Date: 12/6/2016



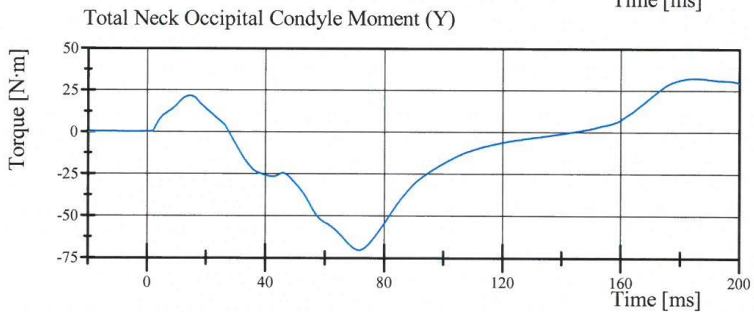
Filter Class: CFC_1000
Max: 554.9 N at 68.6 ms
Min: -263.9 N at 192.4 ms



Filter Class: CFC_600
Max: 551.7 N at 68.5 ms
Min: -263.6 N at 192.9 ms



Filter Class: CFC_600
Max: 28.0 Nm at 183.5 ms
Min: -61.1 Nm at 71.5 ms



Filter Class: Without_(Consta
Max: 32.2 N·m at 185.2 ms
Min: -70.5 N·m at 71.4 ms

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

12.06.2016 15:31:38 3128



Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 43-1

Test Date: 12/7/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	27 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.693 m/s	Yes
Probe Force Peak	(-5,160) - (-5,893) N	-5,536.3 N	Yes
Maximum Chest Compression	(-63.5) - (-72.6) mm	-71.32 mm	Yes
Internal Hysteresis	65 - 85 %	72.9 %	Yes

Test meets specifications.

Comments:

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

12.07.2016 13:15:29 393

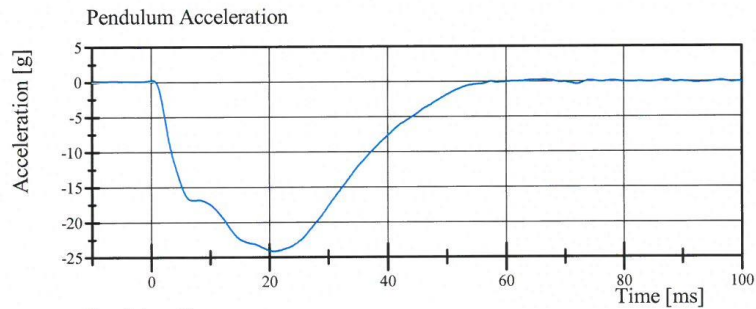


Transportation Research Center Inc.

Front Thorax

HIII 50th Serial No. 037 Certification No. 43-1

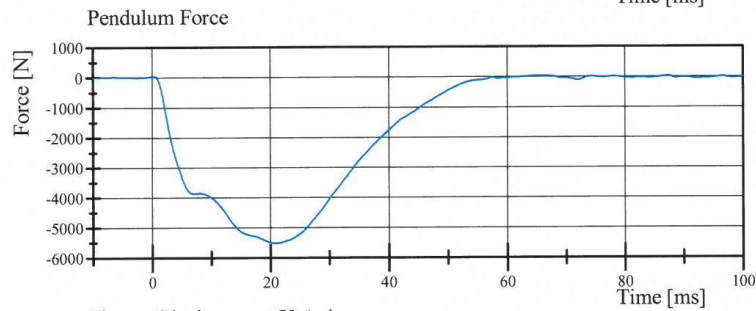
Test Date: 12/7/2016



Filter Class: CFC_180

Max: 0.2 g at 66.5 ms

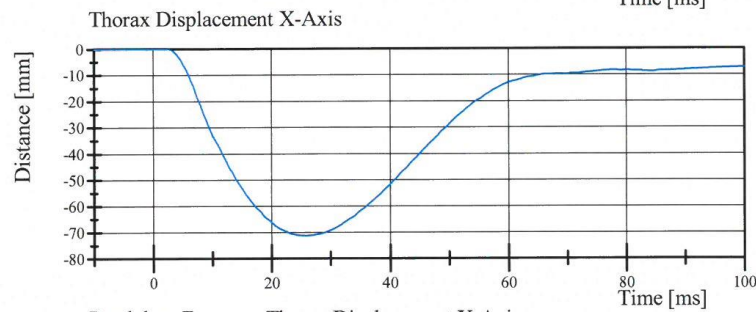
Min: -24.2 g at 20.8 ms



Filter Class: CFC_180

Max: 39.2 N at 66.5 ms

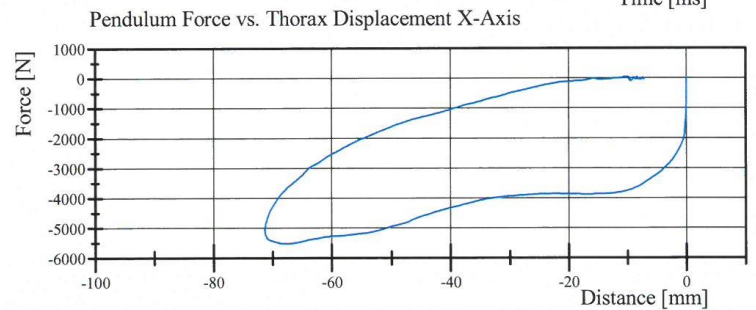
Min: -5,536.3 N at 20.8 ms



Filter Class: CFC_600

Max: 0.0 mm at -6.5 ms

Min: -71.3 mm at 25.8 ms



Filter Class: CFC_180

Max: 39.2 N at -9.9 mm

Min: -5,536.3 N at -67.9 mm

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

12.07.2016 13:15:45 393



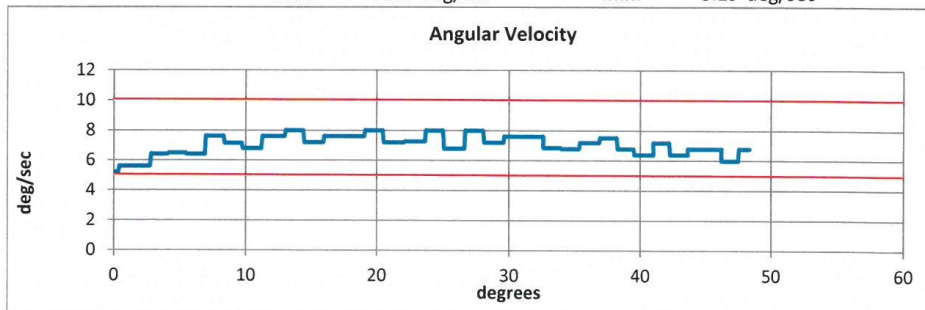
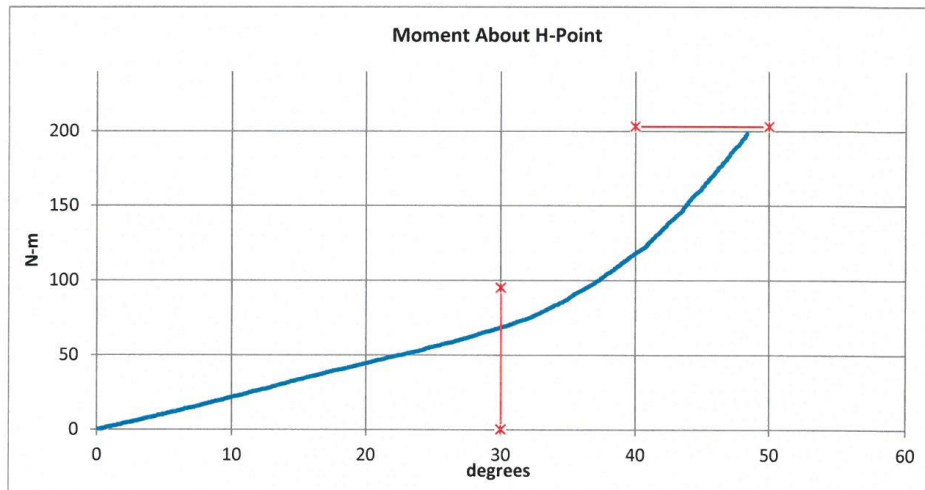
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion



Serial Number: 037 Date: 06-Dec-2016
Side Tested: Left Hip Time: 14:30
Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION		TEST RESULTS		
Temperature	18.9	- 25.6	21.6	°C	Pass
Humidity	10	- 70	37	%	Pass
Moment at 30°	0	≤ 94.9	68.75	N-m	Pass
Angle at 203 Nm	40	- 50	48.76	deg	Pass
Average Velocity	5	- 10	7.01	deg/sec	Pass



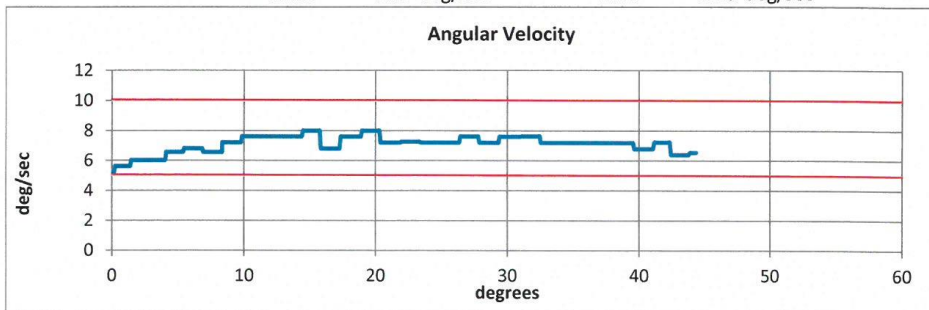
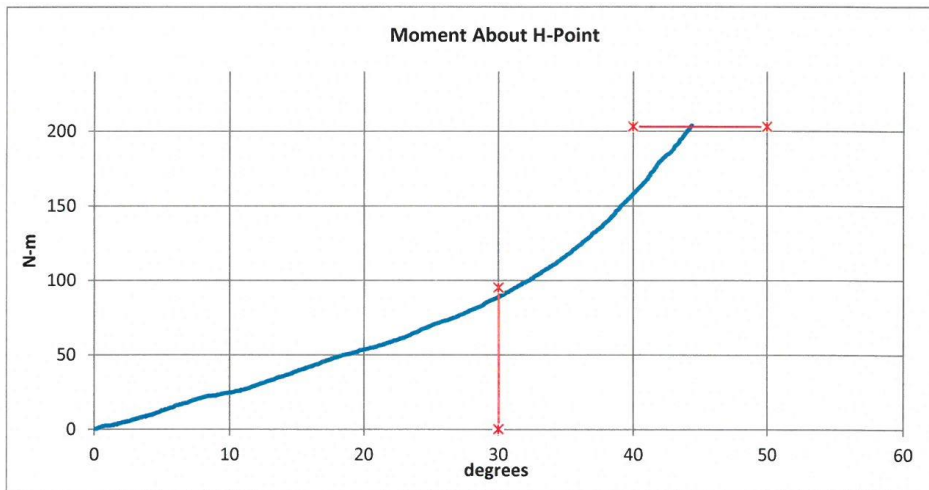
Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion



Serial Number: 037 Date: 06-Dec-2016
Side Tested: Right Hip Time: 15:43
Test Number: 1 Comments:

TEST PARAMETER	SPECIFICATION		TEST RESULTS	
Temperature	18.9	- 25.6	21.6 °C	Pass
Humidity	10	- 70	39 %	Pass
Moment at 30°	0	≤ 94.9	88.9 N-m	Pass
Angle at 203 Nm	40	- 50	44.36 deg	Pass
Average Velocity	5	- 10	7.08 deg/sec	Pass



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 43-1
Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.110 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,215.33 N	Yes

Test meets specifications.

Comments:

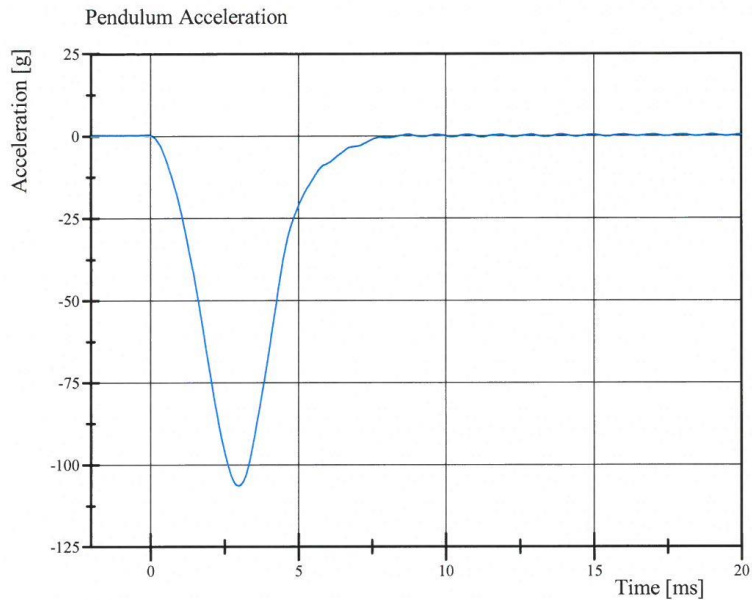
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.06.2016 14:36:23 1757

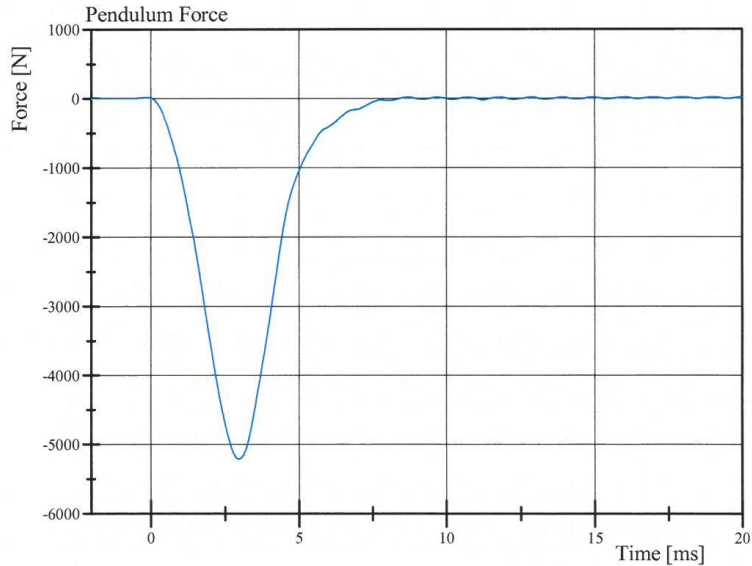


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 43-1
Test Date: 12/6/2016



Filter Class: CFC_600
Max: 0.4 g at 18.0 ms
Min: -106.6 g at 3.0 ms



Filter Class: CFC_600
Max: 17.2 N at 18.0 ms
Min: -5,215.3 N at 3.0 ms

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

12.06.2016 14:36:48 1757



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 43-1
Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.117 m/s	Yes
Peak Femur Force	(-4,715.2) - (-5,782.6) N	-5,369.01 N	Yes

Test meets specifications.

Comments:

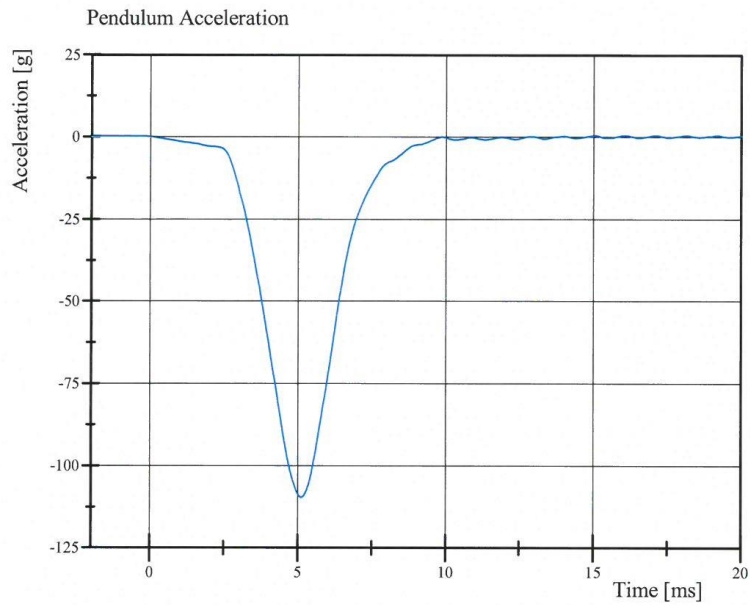
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

12.06.2016 14:41:40 1725

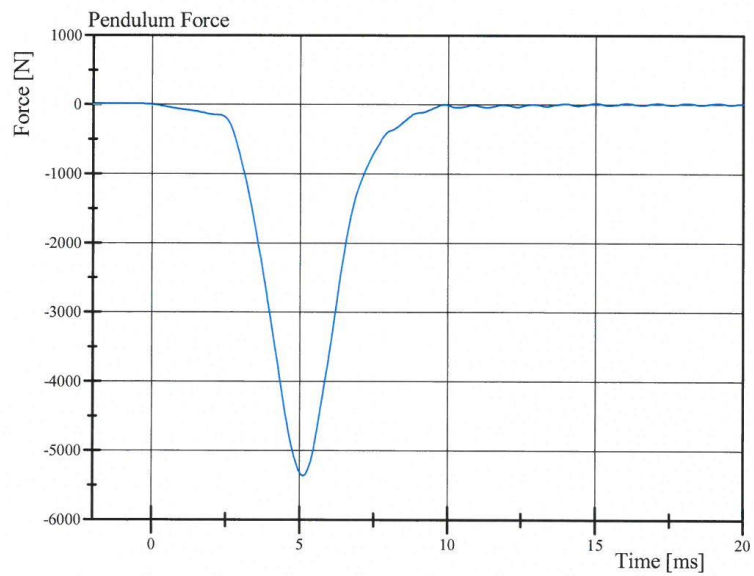


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 43-1
Test Date: 12/6/2016



Filter Class: CFC_600
Max: 0.3 g at 16.0 ms
Min: -109.7 g at 5.1 ms



Filter Class: CFC_600
Max: 17.0 N at 16.0 ms
Min: -5,369.0 N at 5.1 ms

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

12.06.2016 14:41:49 1725



Pre-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
5720 HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 40

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	444	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	78	Yes
F	Thigh Clearance	119.4 - 134.6	130	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	250	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	196	Yes
K	Buttock Knee Length	520.7 - 546.1	535	Yes
L	Popliteal Height	355.6 - 376.0	367	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	431	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	224	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	141	Yes
T	Head Depth	177.8 - 188.0	182	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	357	Yes
W	Foot Breadth	78.8 - 94.0	83	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 40-1

Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	276.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	6.4 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

11.22.2016 09:29:04 608

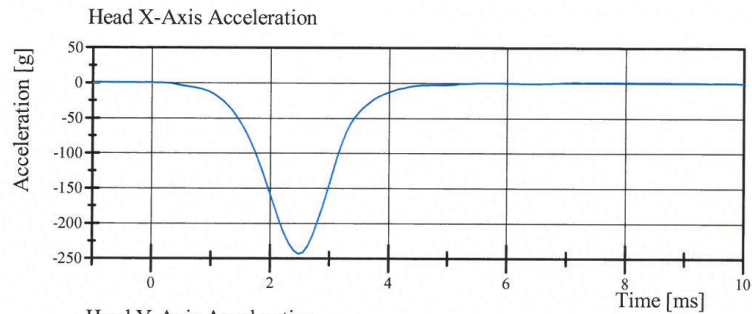


Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 40-1

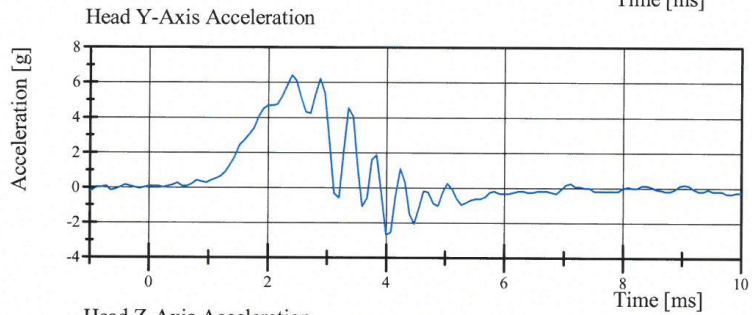
Test Date: 11/22/2016



Filter Class: CFC_1000

Max: 1.1 g at 7.6 ms

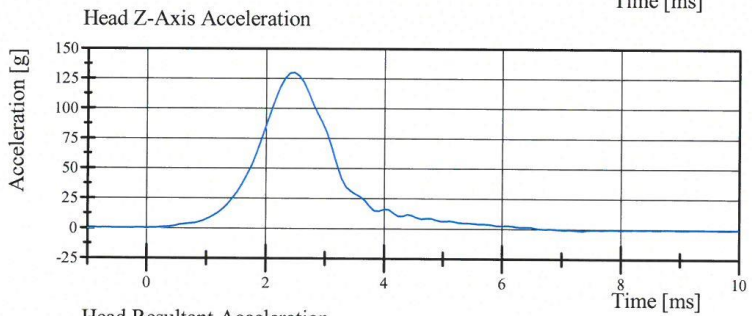
Min: -243.7 g at 2.5 ms



Filter Class: CFC_1000

Max: 6.4 g at 2.4 ms

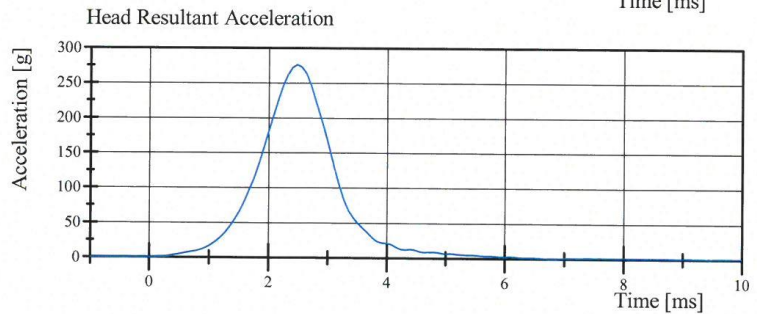
Min: -2.7 g at 4.0 ms



Filter Class: CFC_1000

Max: 129.9 g at 2.5 ms

Min: -1.3 g at 7.4 ms



Filter Class: CFC_1000

Max: 276.2 g at 2.5 ms

Min: 0.0 g at -0.8 ms

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

11.22.2016 09:29:22 608



Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 40-7

Test Date: 11/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.045 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.45 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.90 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.95 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-78.2 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	71.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	86.9 ms	Yes

Test meets specifications.

Comments:

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

11.23.2016 08:20:47 1840

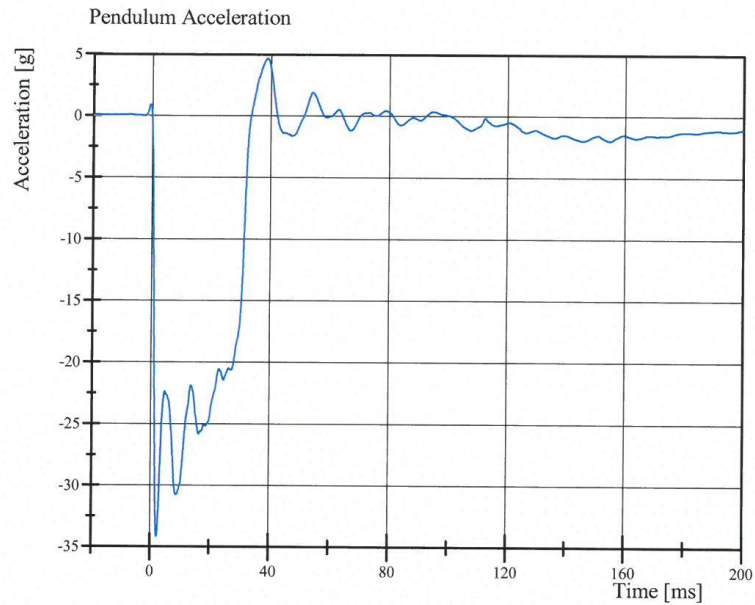


Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 40-7

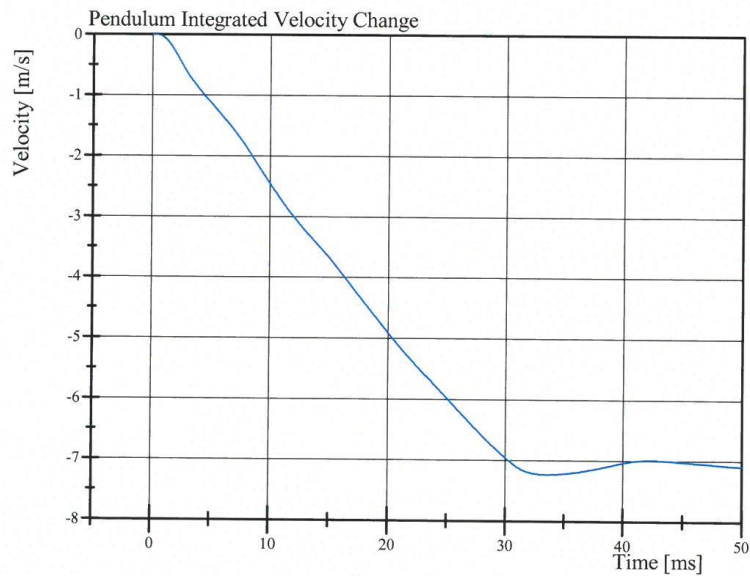
Test Date: 11/23/2016



Filter Class: CFC_180

Max: 4.6 g at 38.9 ms

Min: -34.2 g at 2.4 ms



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -7.2 m/s at 33.6 ms

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

11.23.2016 08:21:26 1840

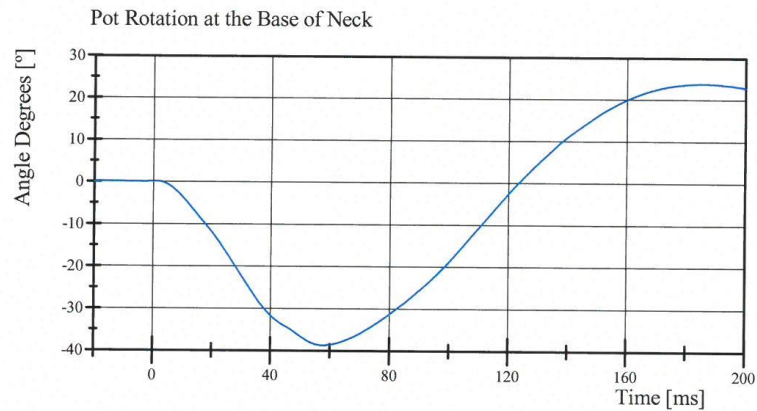


Transportation Research Center Inc.

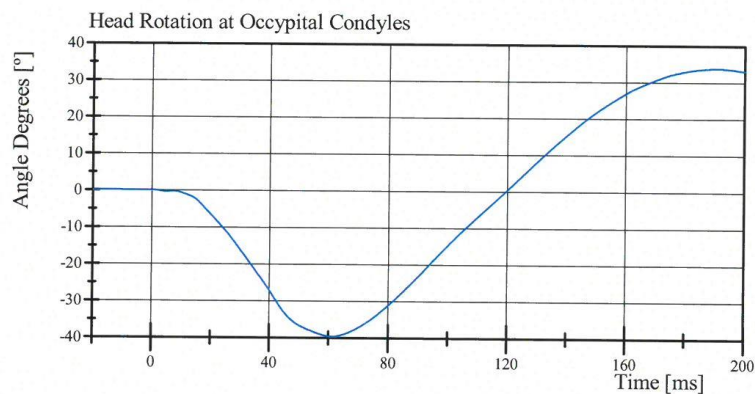
Neck Flexion

HIH 5th Serial No. 426 Certification No. 40-7

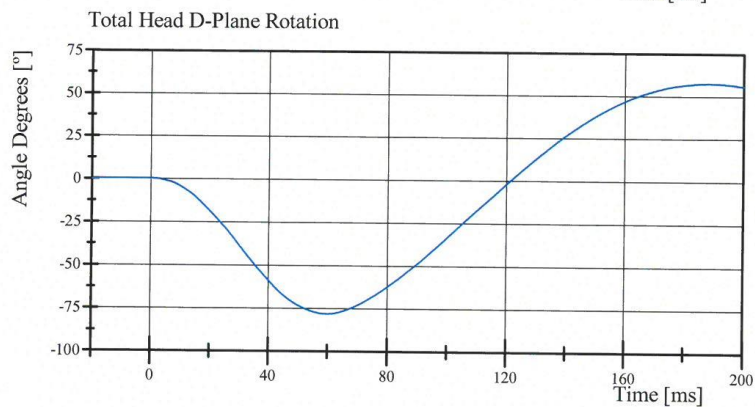
Test Date: 11/23/2016



Filter Class: CFC_60
Max: 23.8 ° at 185.7 ms
Min: -38.8 ° at 57.8 ms



Filter Class: CFC_60
Max: 33.8 ° at 190.6 ms
Min: -39.7 ° at 61.3 ms



Filter Class: CFC_60
Max: 57.6 ° at 188.1 ms
Min: -78.2 ° at 60.1 ms

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

11.23.2016 08:21:27 1840

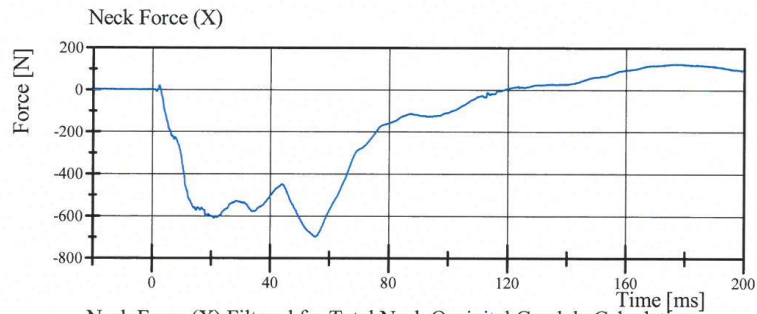


Transportation Research Center Inc.

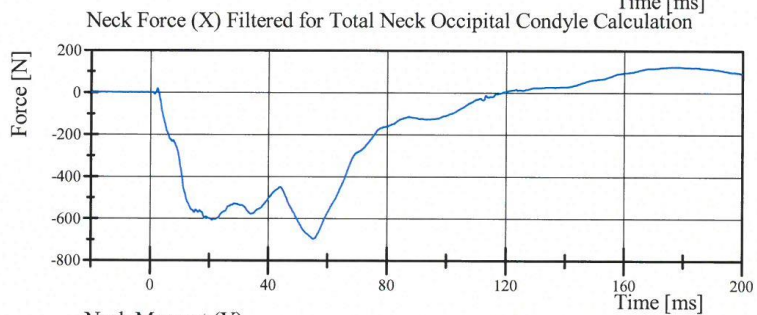
Neck Flexion

HIII 5th Serial No. 426 Certification No. 40-7

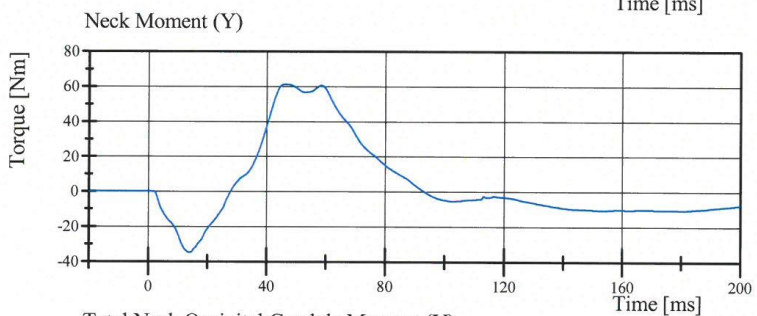
Test Date: 11/23/2016



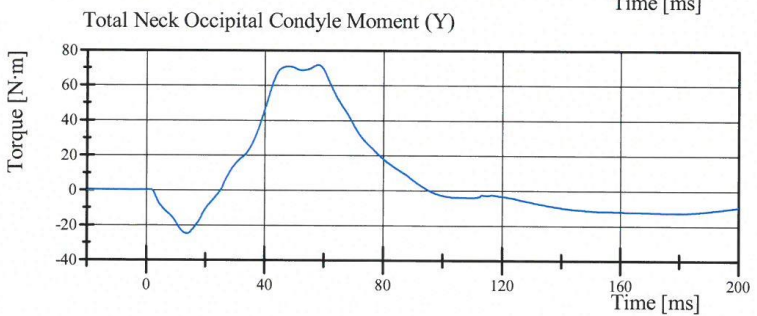
Filter Class: CFC_1000
Max: 124.6 N at 176.7 ms
Min: -697.8 N at 55.2 ms



Filter Class: CFC_600
Max: 124.3 N at 177.4 ms
Min: -697.6 N at 55.3 ms



Filter Class: CFC_600
Max: 61.1 Nm at 46.3 ms
Min: -35.0 Nm at 14.0 ms



Filter Class: Without (Constai
Max: 71.6 N·m at 58.1 ms
Min: -25.1 N·m at 13.9 ms

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

11.23.2016 08:21:27 1840



Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 40-1

Test Date: 11/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	19 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.129 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.84 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.76 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.45 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	103.1 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-58.6 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	103.7 ms	Yes

Test meets specifications.

Comments:

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

11.23.2016 09:05:07 3107

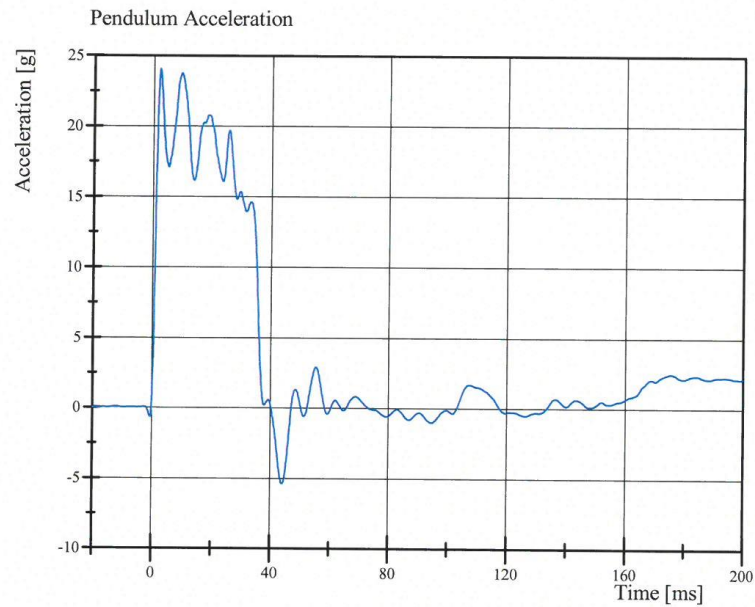


Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 40-1

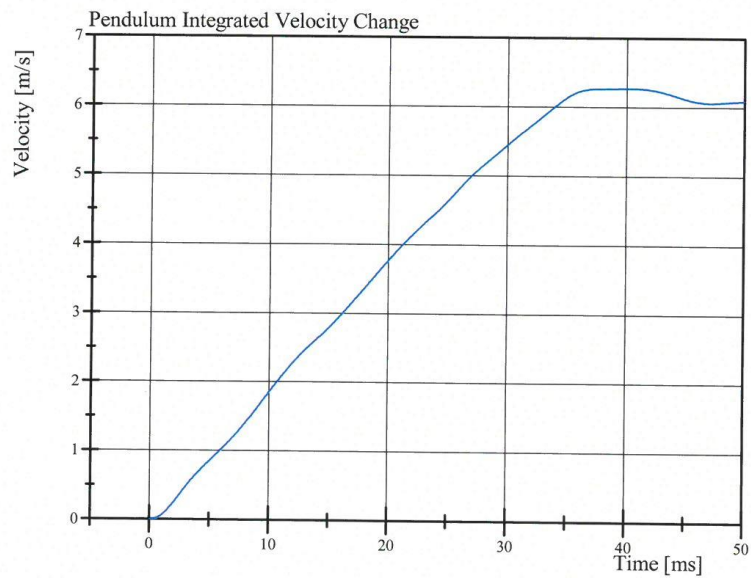
Test Date: 11/23/2016



Filter Class: CFC_180

Max: 24.0 g at 2.4 ms

Min: -5.4 g at 44.2 ms



Filter Class: CFC_180

Max: 6.3 m/s at 40.3 ms

Min: 0.0 m/s at 0.0 ms

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

11.23.2016 09:05:34 3107



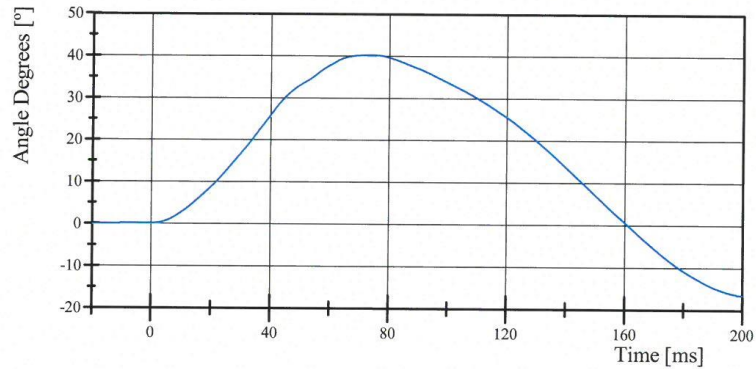
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 40-1

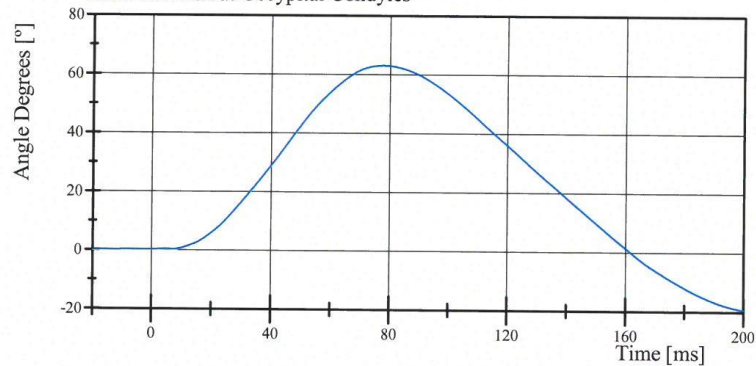
Test Date: 11/23/2016

Pot Rotation at the Base of Neck



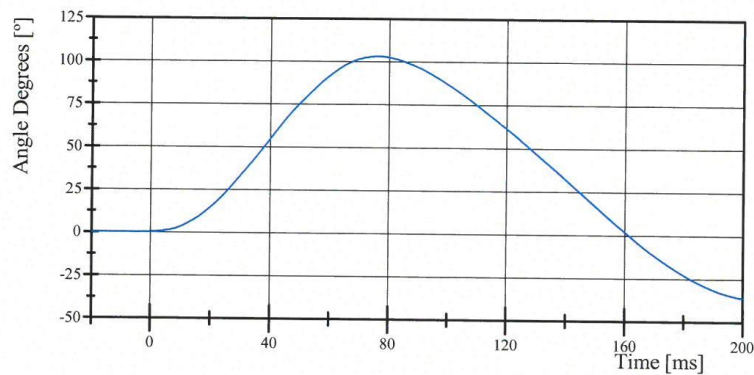
Filter Class: CFC_60
Max: 40.2 ° at 74.1 ms
Min: -16.5 ° at 200.0 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 63.1 ° at 77.8 ms
Min: -19.4 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 103.1 ° at 76.5 ms
Min: -36.0 ° at 200.0 ms

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

11.23.2016 09:05:35 3107

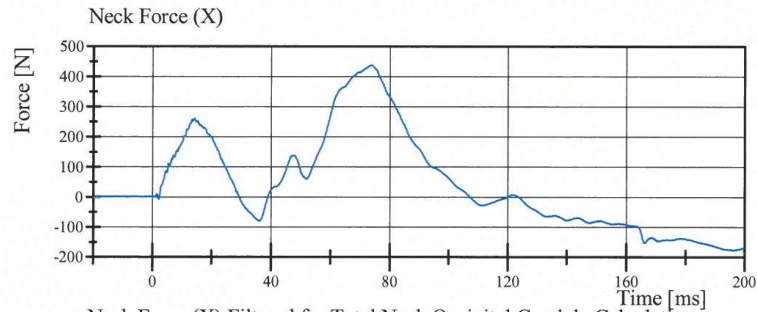


Transportation Research Center Inc.

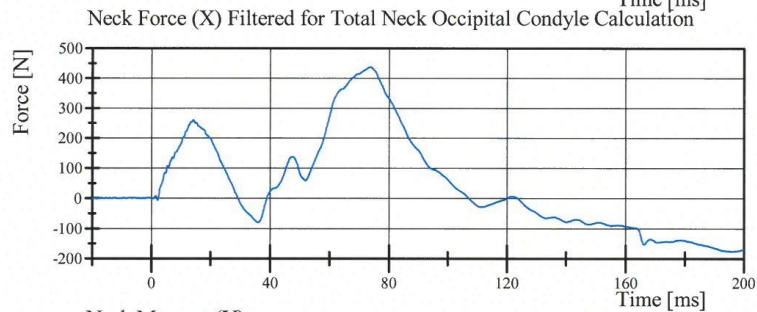
Neck Extension

HIII 5th Serial No. 426 Certification No. 40-1

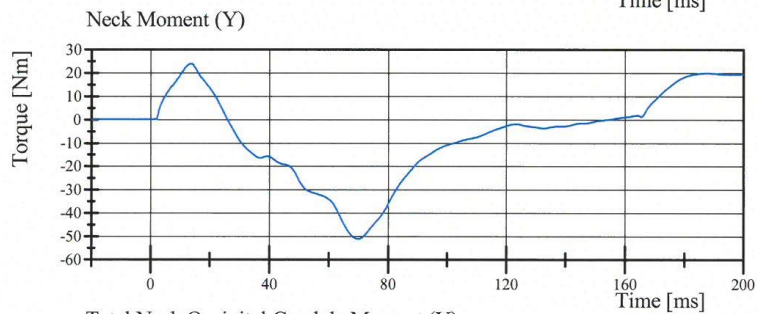
Test Date: 11/23/2016



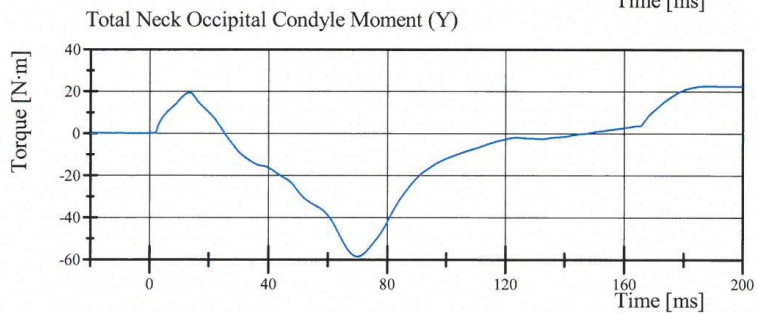
Filter Class: CFC_1000
Max: 437.1 N at 73.7 ms
Min: -176.3 N at 196.2 ms



Filter Class: CFC_600
Max: 437.1 N at 73.8 ms
Min: -175.8 N at 196.2 ms



Filter Class: CFC_600
Max: 23.8 Nm at 13.6 ms
Min: -51.2 Nm at 70.1 ms



Filter Class: Without_(Consta
Max: 22.8 N·m at 188.8 ms
Min: -58.6 N·m at 70.1 ms

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

11.23.2016 09:05:37 3107



Transportation Research Center Inc.

Front Thorax

HIII 5th Serial No. 426 Certification No. 40-1

Test Date: 11/23/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	20 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.685 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,049.0 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	$\geq (-4,600)$ N	-4,396.8 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-50.0 mm	Yes
Internal Hysteresis	69 - 85 %	75.6 %	Yes

Test meets specifications.

Comments:

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

11.23.2016 10:07:05 420

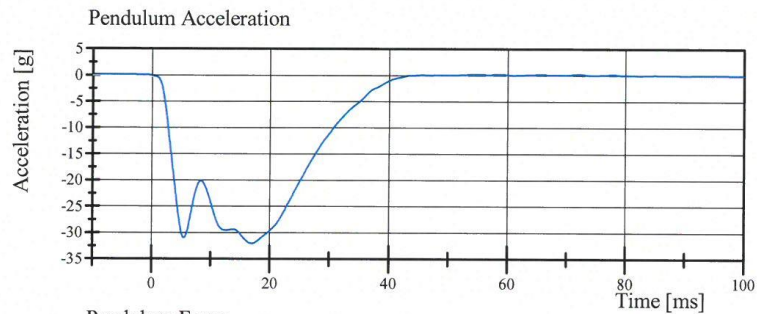


Transportation Research Center Inc.

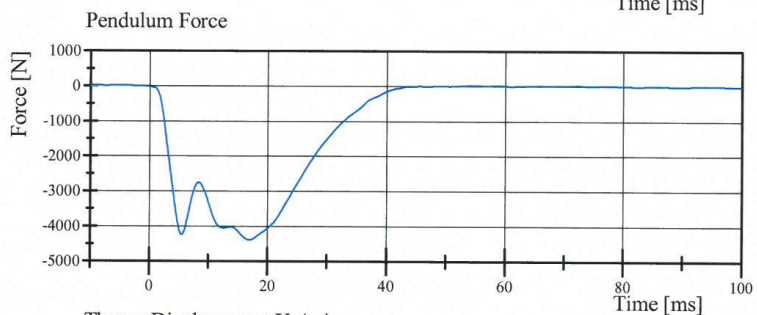
Front Thorax

HIII 5th Serial No. 426 Certification No. 40-1

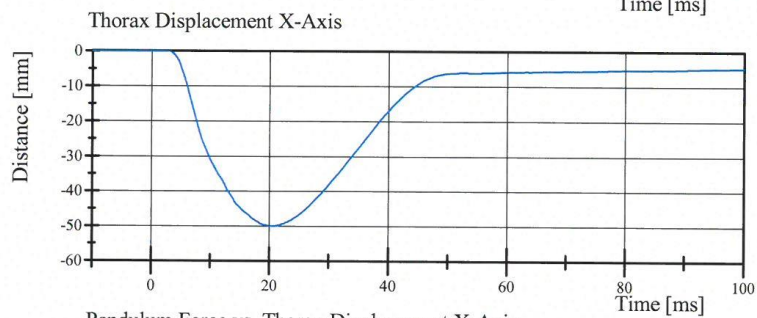
Test Date: 11/23/2016



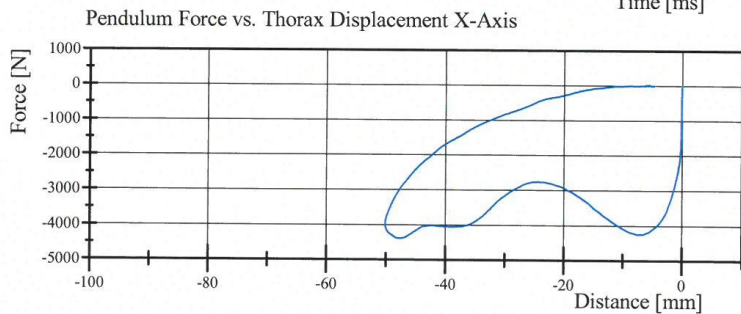
Filter Class: CFC_180
Max: 0.2 g at 72.2 ms
Min: -32.1 g at 17.0 ms



Filter Class: CFC_180
Max: 23.8 N at 72.2 ms
Min: -4,396.8 N at 17.0 ms



Filter Class: CFC_600
Max: 0.0 mm at -5.5 ms
Min: -50.0 mm at 20.6 ms



Filter Class: CFC_180
Max: 23.8 N at -5.5 mm
Min: -4,396.8 N at -47.8 mm

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

11.23.2016 10:07:15 420



Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

NHTSA

Serial Number: 426

Date: 11/23/2016

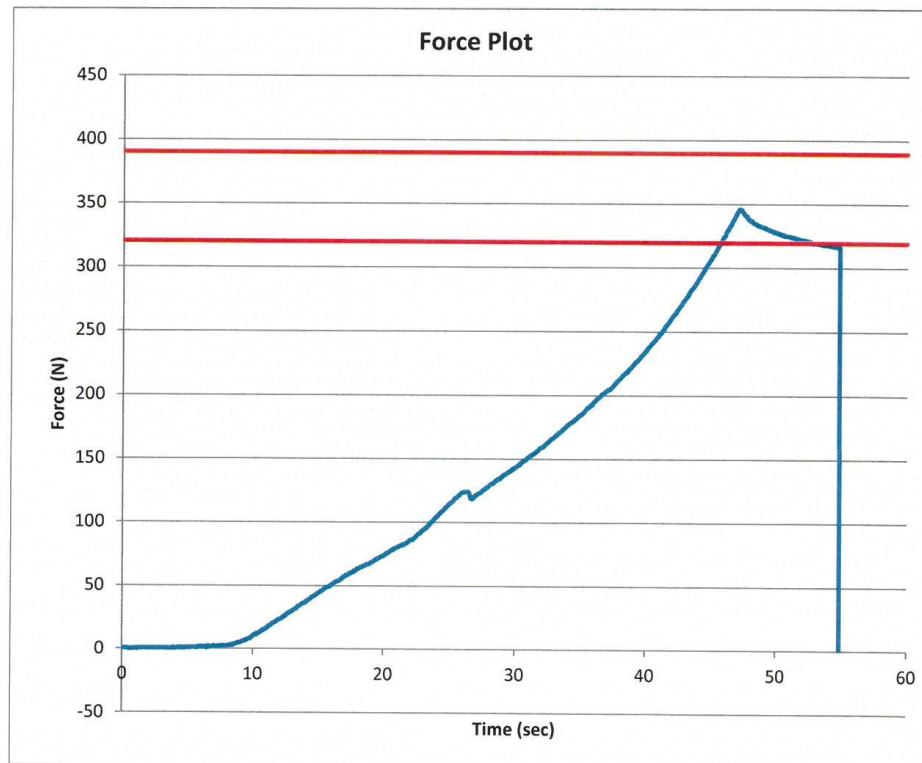
Test Number: 1

Time: 8:34

Comments:



TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.4 °C Pass
Humidity	10 - 70	18 % Pass
Average Angular Velocity	0.5 - 1.5	0.82 deg/sec Pass
Initial Angle	0 - 20	13.19 deg Pass
Peak Force at 45.12°	320 - 390	346.19 N Pass
Final Angle	-8 - 8	6.49 deg Pass



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 40-1
Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	18 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.093 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-4,048.4 N	Yes

Test meets specifications.

Comments:

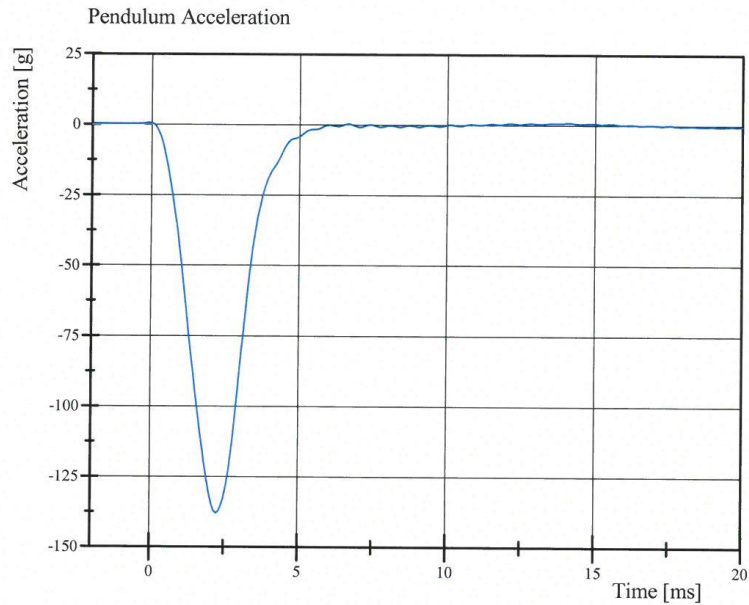
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

11.22.2016 08:40:46 1719

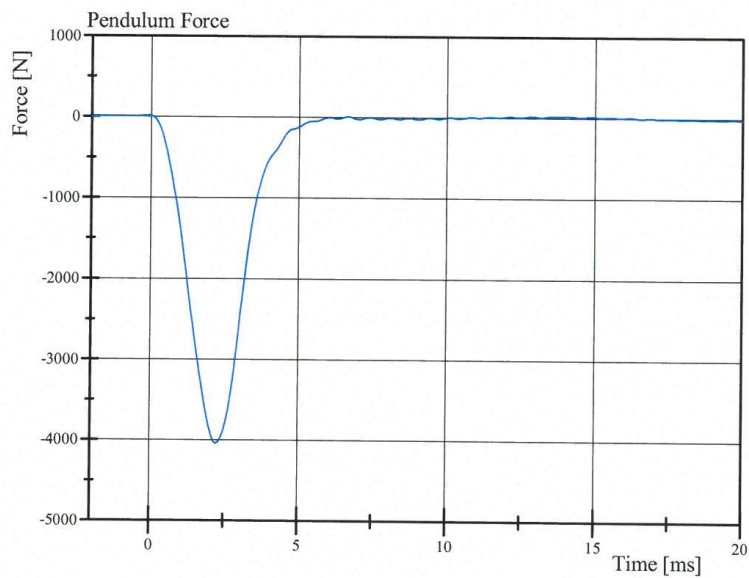


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 40-1
Test Date: 11/22/2016



Filter Class: CFC_600
Max: 0.7 g at 14.1 ms
Min: -138.1 g at 2.2 ms



Filter Class: CFC_600
Max: 21.2 N at 14.1 ms
Min: -4,048.4 N at 2.2 ms

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

11.22.2016 08:41:05 1719



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 40-1
Test Date: 11/22/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	17 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.102 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-4,024.1 N	Yes

Test meets specifications.

Comments:

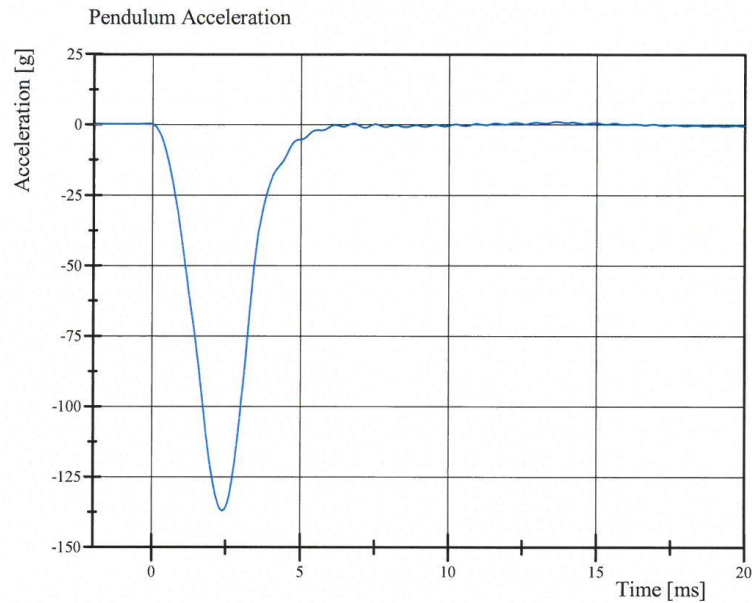
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

11.22.2016 08:48:25 1714

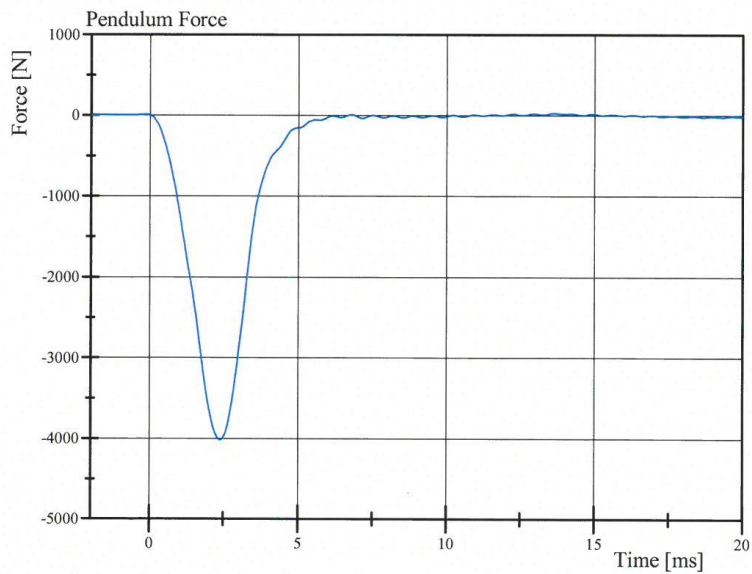


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 40-1
Test Date: 11/22/2016



Filter Class: CFC_600
Max: 1.0 g at 13.7 ms
Min: -137.2 g at 2.4 ms



Filter Class: CFC_600
Max: 28.8 N at 13.7 ms
Min: -4,024.1 N at 2.4 ms

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

11.22.2016 08:48:37 1714



Post-Test Calibration Sheets

Front Passenger S/N 426

Transportation Research Center Inc.
5720 HIII 5th Dummy
External Dimensions
Serial No. 426 Calibration No. 41

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	444	Yes
C	Hip Pivot Height	81.3 - 86.3	85	Yes
D	Hip Pivot from Backline	144.8 - 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	78	Yes
F	Thigh Clearance	119.4 - 134.6	130	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	250	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	286	Yes
J	Elbow Rest Height	182.8 - 203.2	196	Yes
K	Buttock Knee Length	520.7 - 546.1	535	Yes
L	Popliteal Height	355.6 - 376.0	367	Yes
M	Knee Pivot Height	393.7 - 419.1	409	Yes
N	Buttock Popliteal Length	414.0 - 439.4	431	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	224	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	473	Yes
S	Head Breadth	137.1 - 147.3	141	Yes
T	Head Depth	177.8 - 188.0	182	Yes
U	Hip Breadth	299.7 - 314.9	306	Yes
V	Shoulder Breadth	350.5 - 365.7	357	Yes
W	Foot Breadth	78.8 - 94.0	83	Yes
X	Head Circumference	528.3 - 548.7	539	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	870	Yes
Z	Waist Circumference	759.5 - 789.9	775	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	345	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 41-1

Test Date: 12/5/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	277.2 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	3.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

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

12.05.2016 17:01:34 608

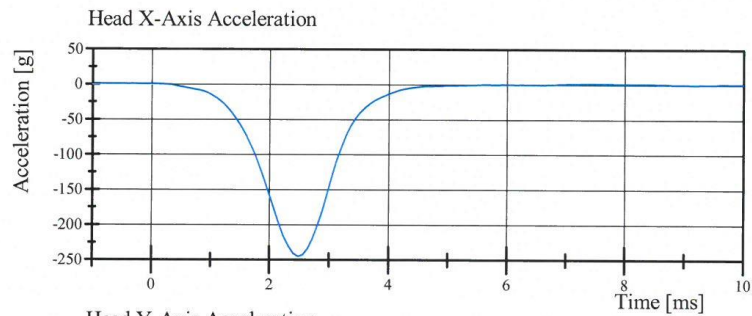


Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 426 Certification No. 41-1

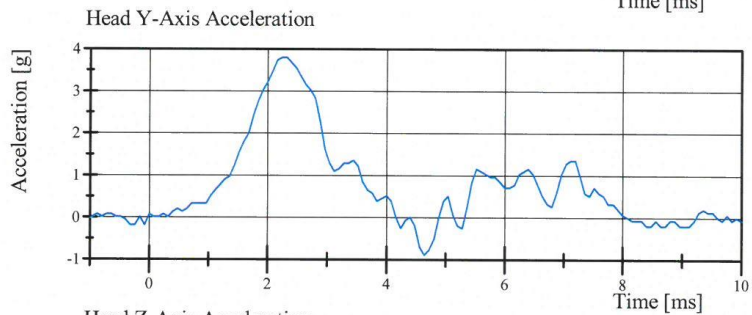
Test Date: 12/5/2016



Filter Class: CFC_1000

Max: 1.5 g at 7.7 ms

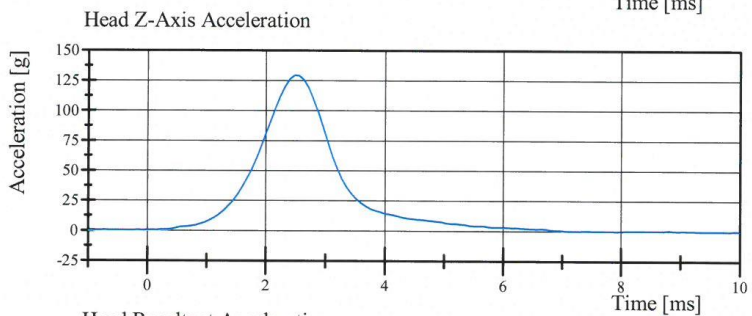
Min: -245.3 g at 2.5 ms



Filter Class: CFC_1000

Max: 3.8 g at 2.2 ms

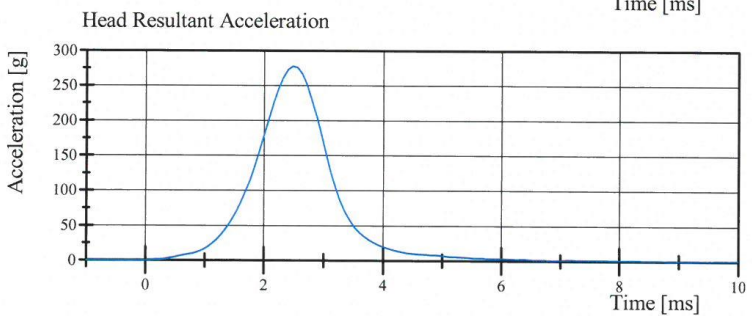
Min: -0.9 g at 4.6 ms



Filter Class: CFC_1000

Max: 129.0 g at 2.5 ms

Min: -0.5 g at 9.6 ms



Filter Class: CFC_1000

Max: 277.2 g at 2.5 ms

Min: 0.0 g at -0.5 ms

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

12.05.2016 17:01:44 608



Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 41-3

Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	26 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.060 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	-4.64 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.64 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	70.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	87.6 ms	Yes

Test meets specifications.

Comments:

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

12.06.2016 08:04:08 1847

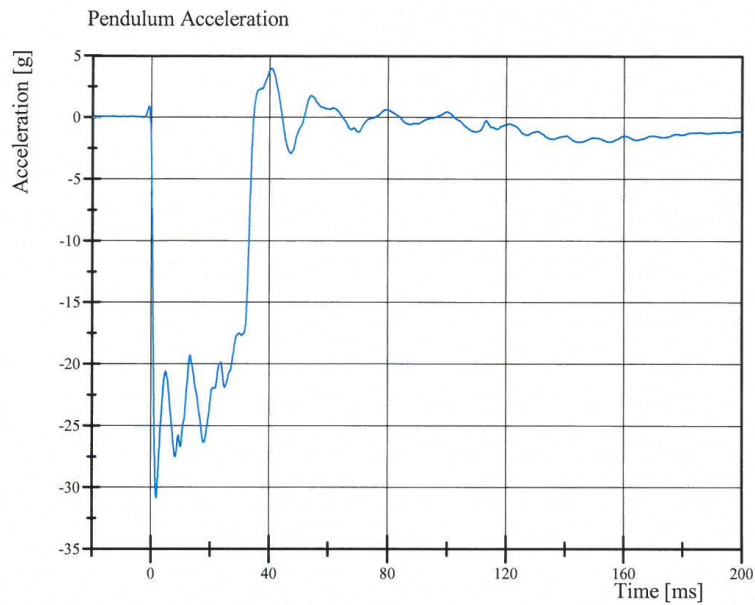


Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 41-3

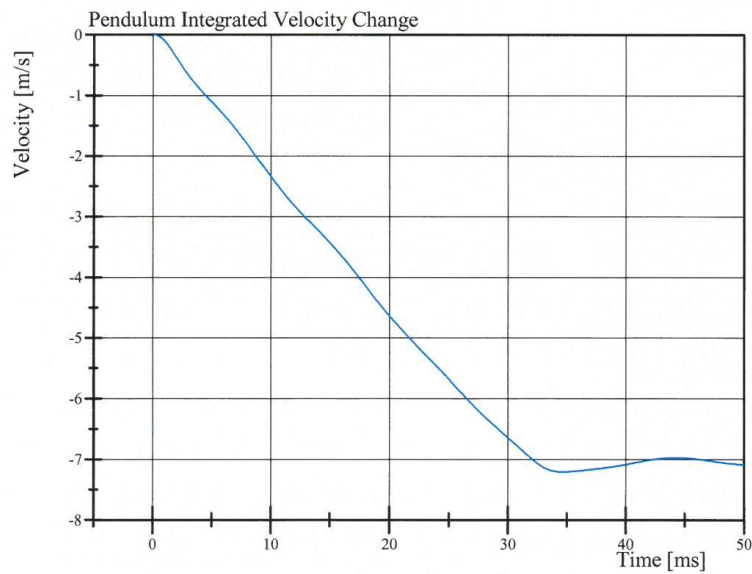
Test Date: 12/6/2016



Filter Class: CFC_180

Max: 3.9 g at 40.7 ms

Min: -30.9 g at 2.0 ms



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -7.2 m/s at 34.7 ms

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

12.06.2016 08:04:19 1847



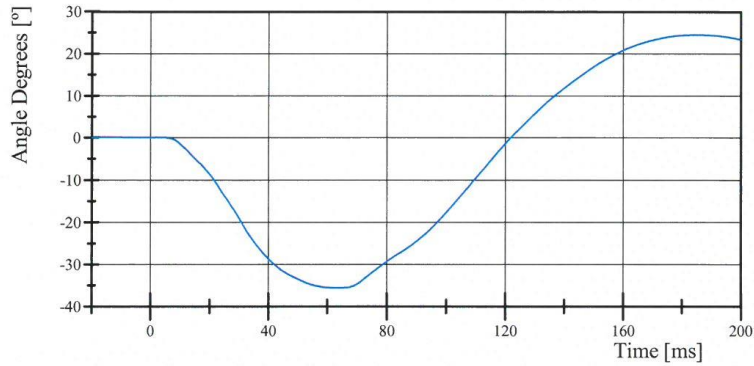
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 426 Certification No. 41-3

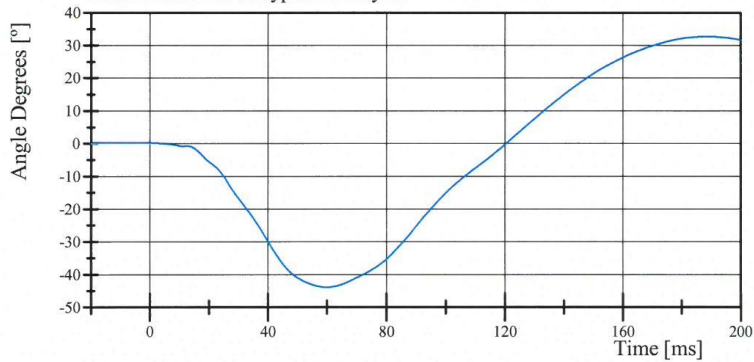
Test Date: 12/6/2016

Pot Rotation at the Base of Neck



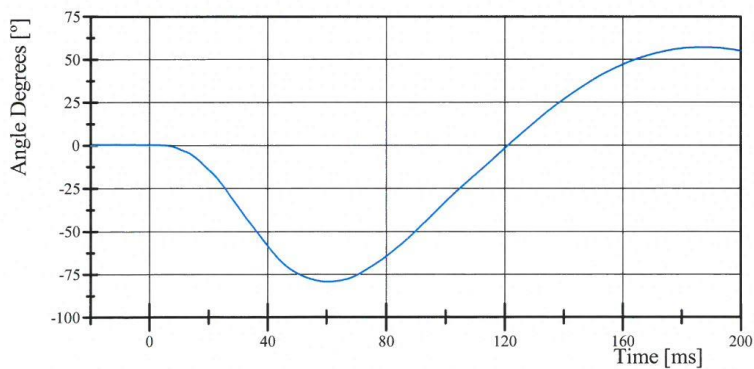
Filter Class: CFC_60
Max: 24.5 ° at 184.9 ms
Min: -35.6 ° at 61.9 ms

Head Rotation at Occipital Condyles



Filter Class: CFC_60
Max: 32.7 ° at 188.6 ms
Min: -44.0 ° at 60.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 57.2 ° at 187.2 ms
Min: -79.5 ° at 60.5 ms

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

12.06.2016 08:04:20 1847

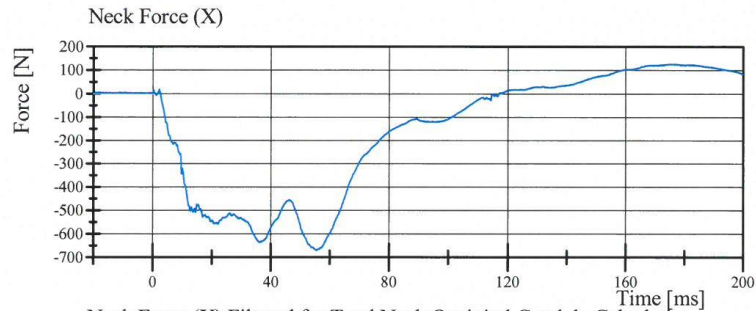


Transportation Research Center Inc.

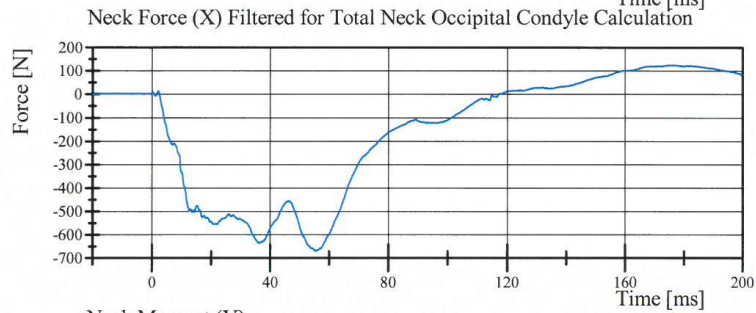
Neck Flexion

HIII 5th Serial No. 426 Certification No. 41-3

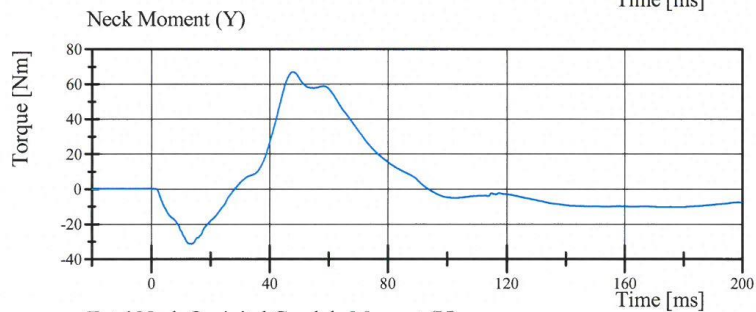
Test Date: 12/6/2016



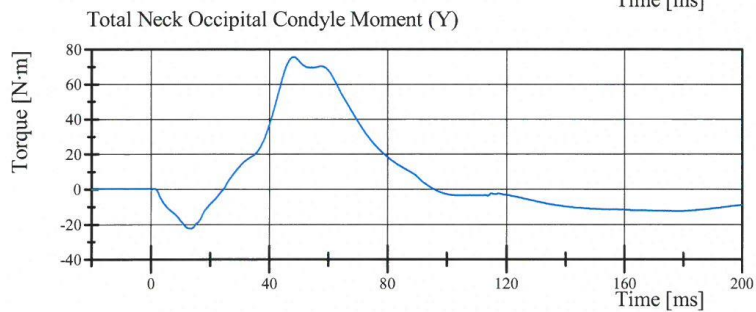
Filter Class: CFC_1000
Max: 125.4 N at 175.8 ms
Min: -671.4 N at 55.5 ms



Filter Class: CFC_600
Max: 125.1 N at 175.8 ms
Min: -670.7 N at 55.5 ms



Filter Class: CFC_600
Max: 66.7 Nm at 47.6 ms
Min: -31.7 Nm at 13.6 ms



Filter Class: Without_(Consta
Max: 75.4 N·m at 48.2 ms
Min: -22.7 N·m at 13.5 ms

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

12.06.2016 08:04:21 1847



Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 41-1

Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	30 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.134 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.84 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.76 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.51 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	108.9 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-64.0 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	102.0 ms	Yes

Test meets specifications.

Comments:

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

12.06.2016 08:45:55 3105

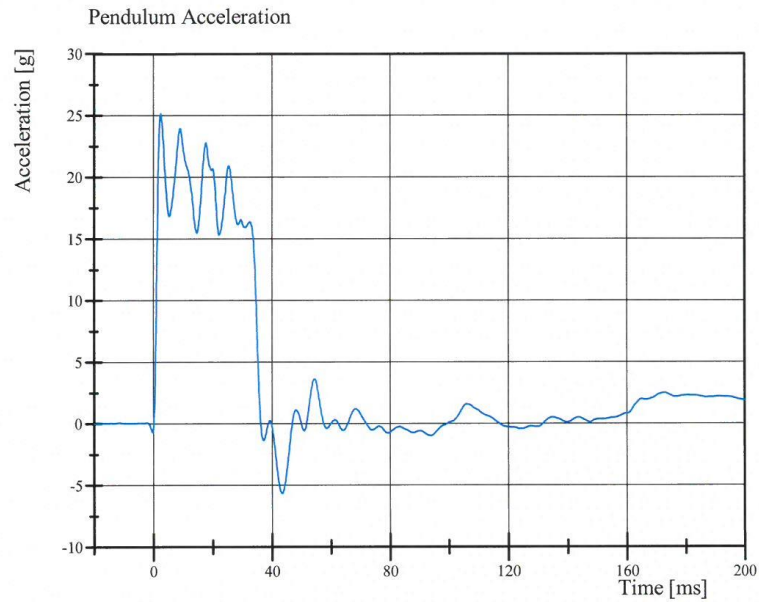


Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 426 Certification No. 41-1

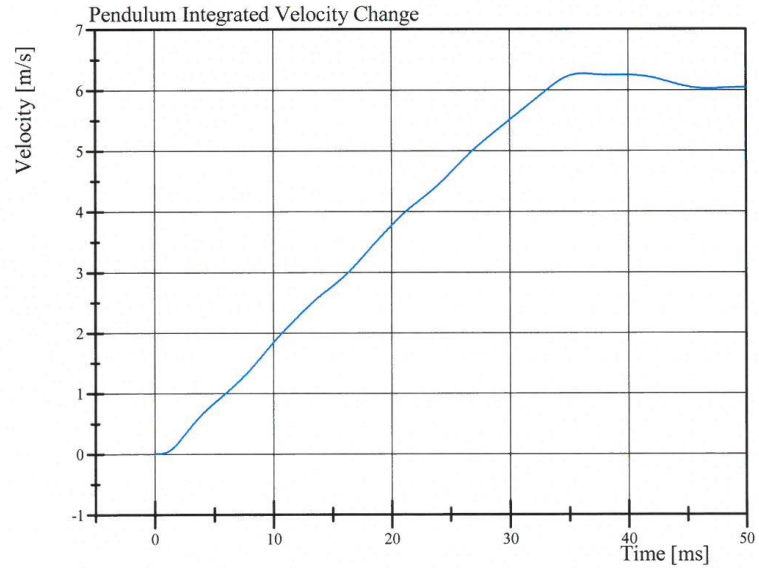
Test Date: 12/6/2016



Filter Class: CFC_180

Max: 25.1 g at 2.6 ms

Min: -5.7 g at 43.4 ms



Filter Class: CFC_180

Max: 6.3 m/s at 36.2 ms

Min: -0.0 m/s at 0.2 ms

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

12.06.2016 08:46:11 3105

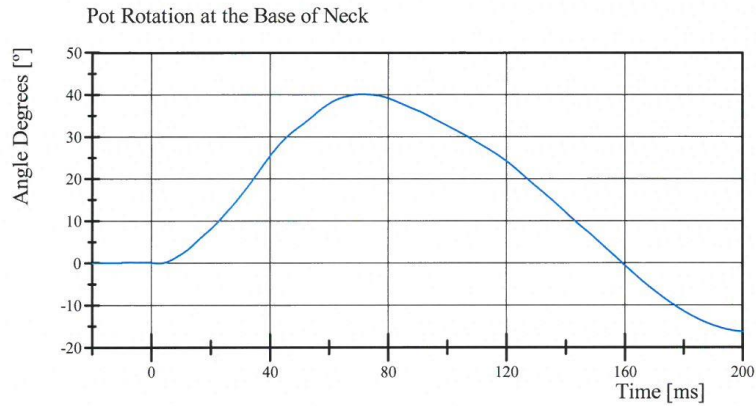


Transportation Research Center Inc.

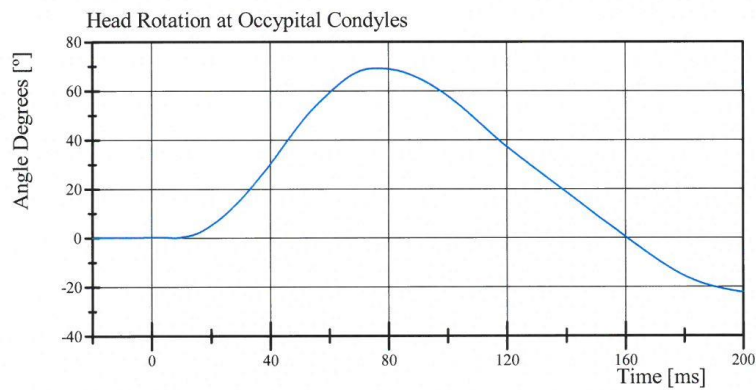
Neck Extension

HIII 5th Serial No. 426 Certification No. 41-1

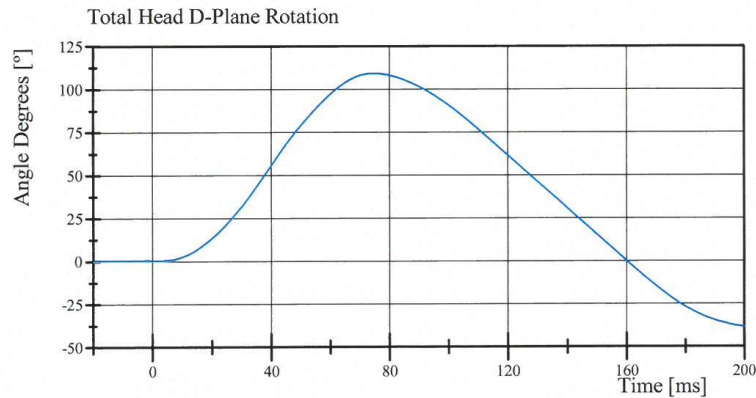
Test Date: 12/6/2016



Filter Class: CFC_60
Max: 40.0 ° at 71.0 ms
Min: -16.3 ° at 200.0 ms



Filter Class: CFC_60
Max: 69.1 ° at 76.2 ms
Min: -22.2 ° at 200.0 ms



Filter Class: CFC_60
Max: 108.9 ° at 74.8 ms
Min: -38.5 ° at 200.0 ms

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

12.06.2016 08:46:12 3105

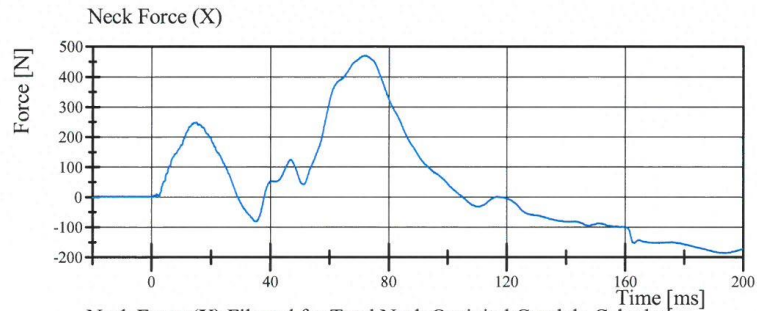


Transportation Research Center Inc.

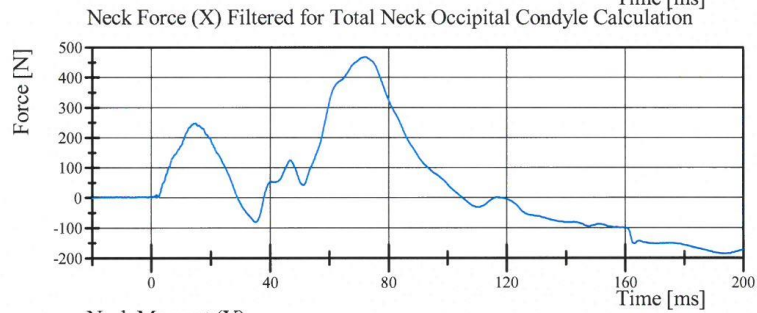
Neck Extension

HIII 5th Serial No. 426 Certification No. 41-1

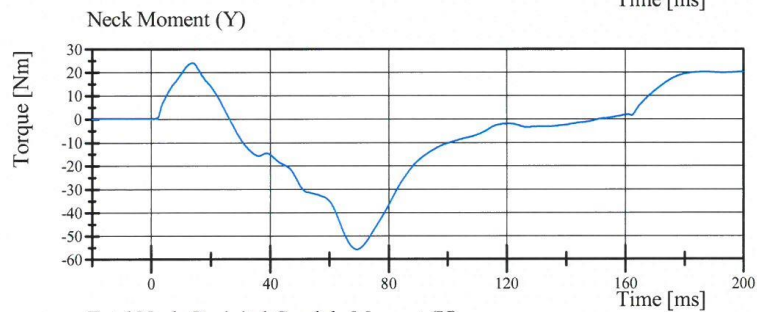
Test Date: 12/6/2016



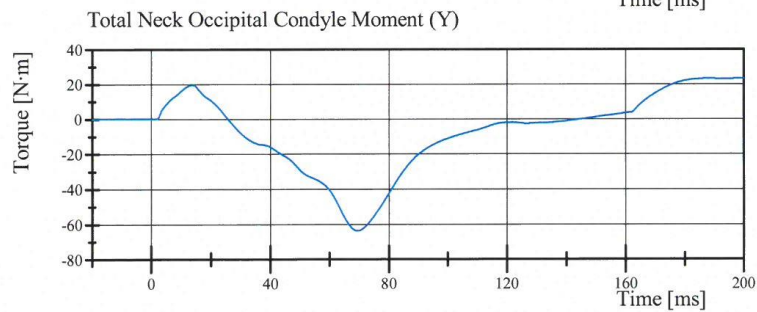
Filter Class: CFC_1000
Max: 468.4 N at 71.8 ms
Min: -186.1 N at 193.8 ms



Filter Class: CFC_600
Max: 468.1 N at 72.3 ms
Min: -185.8 N at 193.9 ms



Filter Class: CFC_600
Max: 23.8 Nm at 14.1 ms
Min: -56.0 Nm at 69.3 ms



Filter Class: Without_(Consta
Max: 23.3 N·m at 187.6 ms
Min: -64.0 N·m at 69.4 ms

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

12.06.2016 08:46:13 3105



Transportation Research Center Inc.

Front Thorax

HIII 5th Serial No. 426 Certification No. 41-1

Test Date: 12/7/2016

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	22 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.688 m/s	Yes
Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection	(-3,900) - (-4,400) N	-4,286.7 N	Yes
Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection	$\geq$ (-4,600) N	-4,399.7 N	Yes
Maximum Chest Compression	(-50) - (-58) mm	-50.7 mm	Yes
Internal Hysteresis	69 - 85 %	74.9 %	Yes

Test meets specifications.

Comments:

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

12.07.2016 14:33:21 411

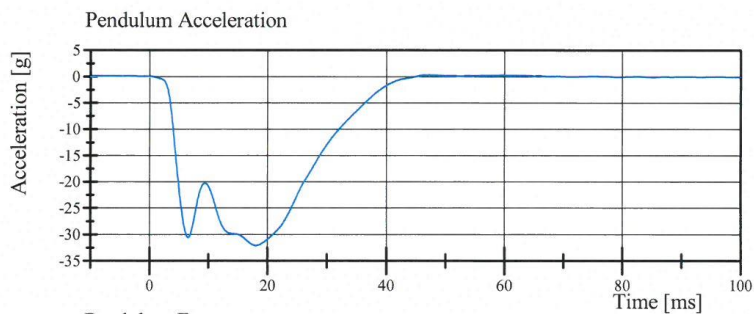


Transportation Research Center Inc.

Front Thorax

HIII 5th Serial No. 426 Certification No. 41-1

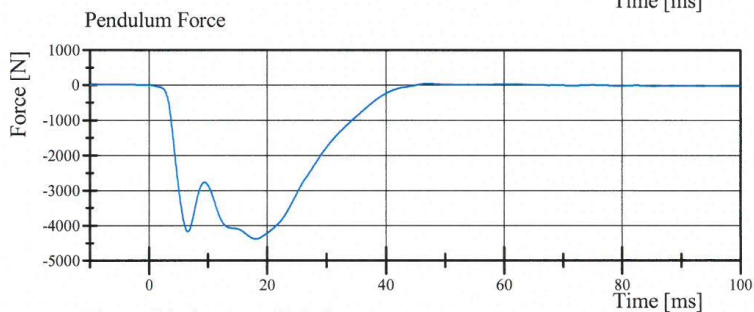
Test Date: 12/7/2016



Filter Class: CFC_180

Max: 0.3 g at 47.2 ms

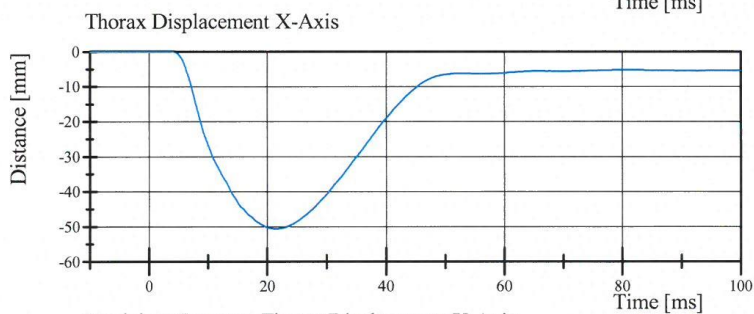
Min: -32.1 g at 18.1 ms



Filter Class: CFC_180

Max: 35.3 N at 47.2 ms

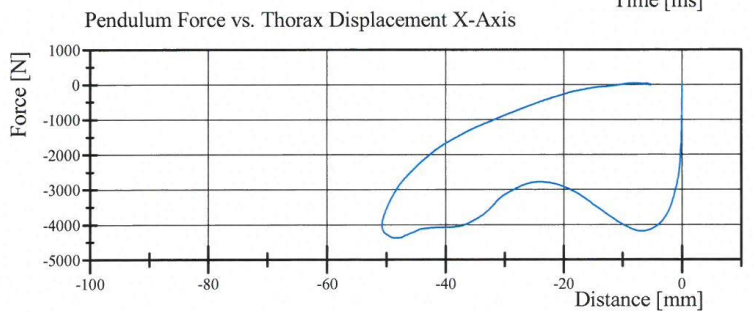
Min: -4,399.7 N at 18.1 ms



Filter Class: CFC_600

Max: 0.0 mm at -4.8 ms

Min: -50.7 mm at 21.4 ms



Filter Class: CFC_180

Max: 35.3 N at -8.0 mm

Min: -4,399.7 N at -48.4 mm

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

12.07.2016 14:33:31 411



Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

NCAP

Serial Number: 426

Date: 12/6/2016

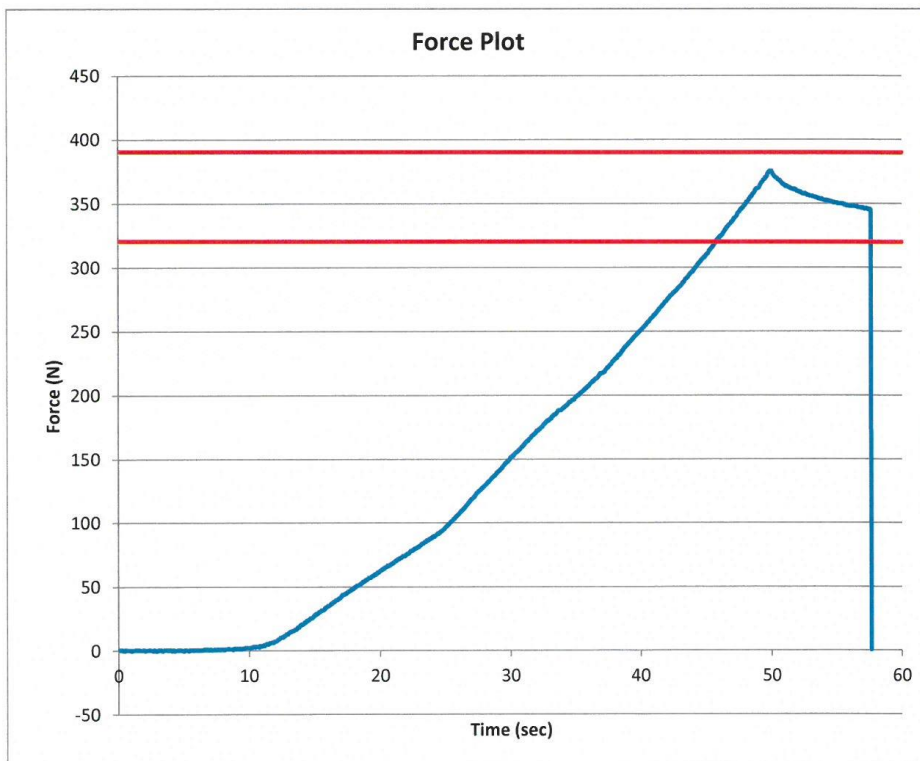
Test Number: 3

Time: 17:24

Comments:



TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	21.9 °C Pass
Humidity	10 - 70	36 % Pass
Average Angular Velocity	0.5 - 1.5	0.78 deg/sec Pass
Initial Angle	0 - 20	14.63 deg Pass
Peak Force at 45.12°	320 - 390	375.13 N Pass
Final Angle	-8 - 8	6.49 deg Pass



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 41-6
Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.104 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,693.9 N	Yes

Test meets specifications.

Comments:

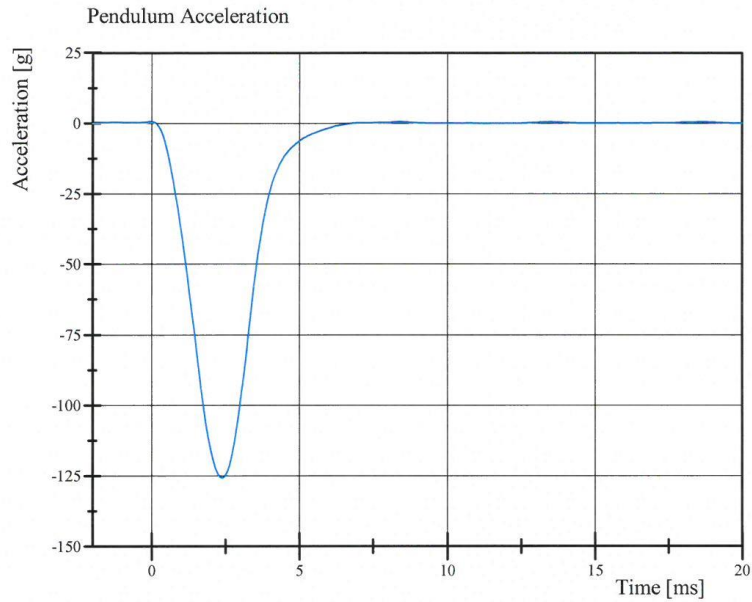
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.06.2016 12:33:31 1770

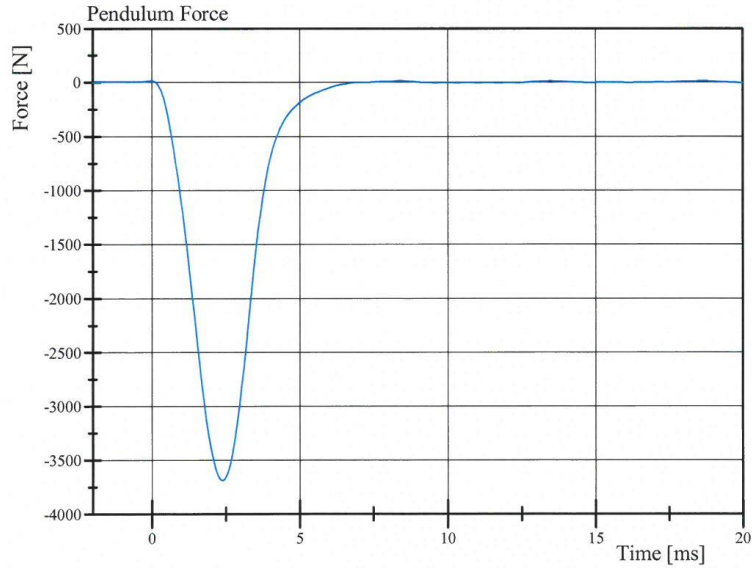


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 41-6
Test Date: 12/6/2016



Filter Class: CFC_600
Max: 0.4 g at 8.4 ms
Min: -126.0 g at 2.4 ms



Filter Class: CFC_600
Max: 10.9 N at 8.4 ms
Min: -3,693.9 N at 2.4 ms

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

12.06.2016 12:33:43 1770



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 41-2
Test Date: 12/6/2016

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.115 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,910.1 N	Yes

Test meets specifications.

Comments:

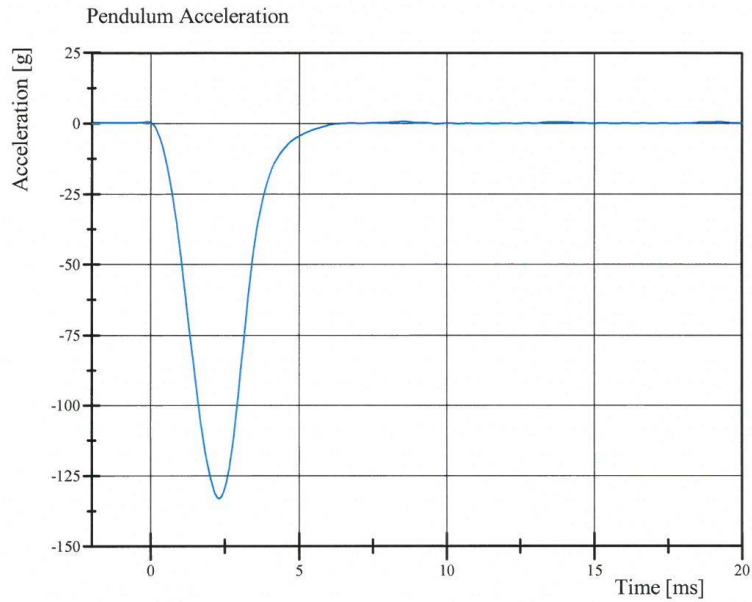
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.06.2016 11:54:15 1766

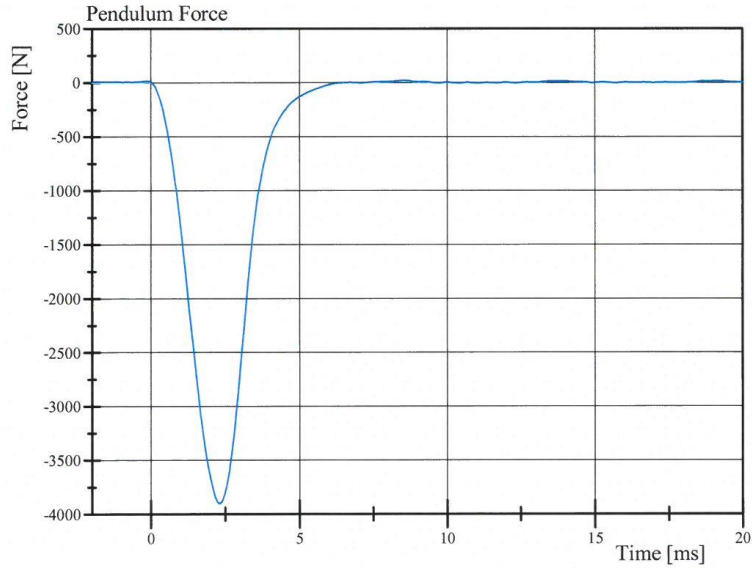


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 426 Certification No. 41-2
Test Date: 12/6/2016



Filter Class: CFC_600
Max: 0.6 g at 8.6 ms
Min: -133.3 g at 2.3 ms



Filter Class: CFC_600
Max: 16.9 N at 8.6 ms
Min: -3,910.1 N at 2.3 ms

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

12.06.2016 11:54:25 1766

