Vehicle Research and Test Center

FMVSS 213 Testing

Hybrid III 6 Year Old

Prepared By:

Transportation Research Center Inc.

10820 State Route 347

P. O. Box B-67

East Liberty, OH 43319

Summary Report

January 2021

Prepared For

Vehicle Research and Test Center

P. O. Box 37

East Liberty, OH 43319

SECTION 1
PURPOSE AND SUMMARY FOR HYBRID III 6 YEAR OLD

The purpose of the testing is: to determine if higher pulses within the FMVSS 213 corridor produce different results.

SUMMARY

A Hybrid III 6 year old dummy (serial number 027) was secured in the left rear occupant position (position 4 or P4) in a belt positioning booster and forward facing convertible child restraint system (CRS). The Hybrid III 6 year old was instrumented with head, chest, and pelvic triaxial accelerometers, upper neck, and lumbar force and moment load cells, a displacement potentiometer and a rate gyro in the chest. During this test series the dummy was restrained with a 3-point seatbelt (SB3PT) or Lower Anchors and Top Tether (LATCH).

Section 2 contains the testing performed using a belt positioning booster CRS in the right rear seating position. Section 3 contains the testing performed using a forward facing CRS in the right rear seating position. Section 4 contains the dummy certification information.

SECTION 2

BELT POSITIONING BOOSTER CRS TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position # 4 CRS
ATD Type/Serial No.	Hybrid III 6 Year Old/027
Restrain System	SB3PT
CRS Direction	Forward Facing
Foam Cushion	WB7, WB10, WB13

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N4 Driver Front	mm	1843.92	313.63	-505.41
N1 Driver Excursion	mm	814.06	-906.45	-447.50
Driver Side	mm	444.19	-880.48	-376.24

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210121-1 VRTC Test Number: FR_RR_PE_13

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.16	-0.36	0.43
Center of Seat Back Frame	mm	-118.64	350.76	-682.78
Top of Head	mm	99.96	348.86	-824.52
Bridge of Nose	mm	176.57	352.08	-715.49
Head CG Outboard	mm	103.76	283.70	-724.90
Neck Center	mm	109.92	348.66	-621.08
Shoulder Belt Up	mm	159.97	350.93	-558.00
Shoulder Belt Down	mm	200.62	350.03	-481.20
Lap Belt Up	mm	242.14	350.55	-366.14
Lap Belt Down	mm	280.55	350.24	-343.00
Base Center	mm	462.41	349.49	-242.83
Center of Seat Frame Bottom	mm	618.27	350.34	-105.08
Outboard Knee	mm	453.20	238.75	-332.71
Outboard Ankle	mm	657.68	254.50	-187.37
Target 2 - Seat Base H-Point	mm	186.01	141.40	-260.23
Target 3 - Seat Base Side	mm	424.75	183.36	-262.91

DUMMY INJURY

HIC (36 ms)	485
Chest Clip (3 ms)	53.05 g
Head Excursion (mm)	454
Knee Excursion (mm)	581

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210122-1 VRTC Test Number: FR_RR_PE_15

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.03	0.01	0.53
Center of Seat Back Frame	mm	-158.67	350.14	-814.85
Top of Head	mm	100.60	349.83	-825.82
Bridge of Nose	mm	180.87	353.69	-718.31
Head CG Outboard	mm	108.25	285.71	-726.95
Neck Center	mm	112.54	352.31	-618.47
Shoulder Belt Up	mm	160.42	350.86	-560.63
Shoulder Belt Down	mm	203.10	350.35	-480.87
Lap Belt Up	mm	243.64	350.48	-365.18
Lap Belt Down	mm	284.72	350.05	-344.66
Base Center	mm	459.62	351.08	-248.38
Center of Seat Frame Bottom	mm	618.27	350.60	-105.07
Outboard Knee	mm	454.19	240.66	-330.28
Outboard Ankle	mm	660.14	254.14	-184.37
Target 2 - Seat Base H-Point	mm	181.00	150.20	-257.76
Target 3 - Seat Base Side	mm	416.75	180.41	-263.34

DUMMY INJURY

HIC (36 ms)	457
Chest Clip (3 ms)	54.08 g
Head Excursion (mm)	481
Knee Excursion (mm)	588

DUMMY POSITIONING

CRS: Harmony Youth NB – Belt Positioning Booster – SB3PT

TRC Test Number: S210122-2 VRTC Test Number: FR_RR_PE_17

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.05	-0.27	0.38
Center of Seat Back Frame	mm	-162.49	350.01	-818.33
Top of Head	mm	105.21	349.16	-823.84
Bridge of Nose	mm	180.09	351.65	-715.64
Head CG Outboard	mm	108.34	284.59	-724.11
Neck Center	mm	110.68	350.80	-617.07
Shoulder Belt Up	mm	160.24	350.64	-556.84
Shoulder Belt Down	mm	201.76	350.45	-476.09
Lap Belt Up	mm	239.57	350.26	-367.64
Lap Belt Down	mm	278.22	350.67	-344.06
Base Center	mm	456.79	350.92	-244.52
Center of Seat Frame Bottom	mm	618.13	350.39	-105.18
Outboard Knee	mm	452.87	241.96	-335.21
Outboard Ankle	mm	660.24	255.62	-192.67
Target 2 - Seat Base H-Point	mm	182.64	141.54	-254.64
Target 3 - Seat Base Side	mm	420.61	175.43	-259.97

DUMMY INJURY

HIC (36 ms)	437
Chest Clip (3 ms)	52.13 g
Head Excursion (mm)	454
Knee Excursion (mm)	573

DUMMY POSITIONING

CRS: Graco TurboBooster HB – Belt Positioning Booster – SB3PT

TRC Test Number: S210129-1 VRTC Test Number: FR_RR_PE_25

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.09	-0.39	0.35
Center of Seat Back Frame	mm	-118.54	350.92	-682.93
Top of Headrest	mm	-73.37	349.56	-805.38
Top of Head	mm	153.38	350.50	-837.14
Bridge of Nose	mm	227.20	351.20	-730.76
Head CG Outboard	mm	157.06	283.42	-739.09
Neck Center	mm	161.01	349.24	-635.03
Shoulder Belt Up	mm	208.15	349.05	-570.81
Shoulder Belt Down	mm	250.17	350.73	-501.09
Lap Belt Up	mm	285.27	350.65	-380.66
Lap Belt Down	mm	318.29	349.84	-355.39
Base Center	mm	526.18	351.30	-271.75
Center of Seat Frame Bottom	mm	618.05	350.38	-105.36
Outboard Knee	mm	505.26	244.68	-369.44
Outboard Ankle	mm	651.54	254.25	-162.68
Target 1 - Seat Side Upper	mm	99.97	159.60	-690.45
Target 4 - Seat Side Lower	mm	154.23	160.44	-361.18
Target 2 - Seat Base H-Point	mm	210.66	156.71	-276.09
Target 3 - Seat Base Side	mm	369.01	147.17	-227.14

DUMMY INJURY

HIC (36 ms)	600
Chest Clip (3 ms)	49.82 g
Head Excursion(mm)	549
Knee Excursion (mm)	630

DUMMY POSITIONING

CRS: Graco TurboBooster HB – Belt Positioning Booster – SB3PT

TRC Test Number: S210202-1 VRTC Test Number: FR_RR_PE_27

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.20	-0.17	0.16
Center of Seat Back Frame	mm	-118.64	351.11	-683.07
Top of Headrest	mm	-69.60	352.49	-800.19
Top of Head	mm	150.84	349.34	-839.64
Bridge of Nose	mm	227.05	353.08	-732.15
Head CG Outboard	mm	154.78	284.70	-739.82
Neck Center	mm	158.76	350.24	-637.35
Shoulder Belt Up	mm	209.96	350.48	-574.36
Shoulder Belt Down	mm	251.18	350.39	-497.94
Lap Belt Up	mm	292.63	351.26	-382.90
Lap Belt Down	mm	327.25	350.57	-357.65
Base Center	mm	528.34	351.11	-263.87
Center of Seat Frame Bottom	mm	617.99	350.63	-105.67
Outboard Knee	mm	500.57	248.95	-366.59
Outboard Ankle	mm	650.48	251.25	-163.24
Target 1 - Seat Side Upper	mm	97.92	160.58	-682.38
Target 4 - Seat Side Lower	mm	146.23	165.94	-359.77
Target 2 - Seat Base H-Point	mm	209.51	156.56	-278.48
Target 3 - Seat Base Side	mm	370.88	148.41	-225.18

DUMMY INJURY

HIC (36 ms)	632
Chest Clip (3 ms)	54.78 g
Head Excursion (mm)	572
Knee Excursion (mm)	630

DUMMY POSITIONING

CRS: Graco TurboBooster HB – Belt Positioning Booster – SB3PT

TRC Test Number: S210202-2 VRTC Test Number: FR_RR_PE_29

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.06	-0.33	0.46
Center of Seat Back Frame	mm	-118.64	350.64	-682.92
Top of Headrest	mm	-69.44	351.93	-804.27
Top of Head	mm	151.50	350.11	-841.32
Bridge of Nose	mm	229.13	353.69	-734.80
Head CG Outboard	mm	157.11	286.85	-741.30
Neck Center	mm	163.43	352.69	-638.33
Shoulder Belt Up	mm	211.32	350.01	-576.24
Shoulder Belt Down	mm	252.45	350.30	-507.57
Lap Belt Up	mm	292.60	350.89	-384.71
Lap Belt Down	mm	327.02	349.13	-356.54
Base Center	mm	526.96	350.54	-265.84
Center of Seat Frame Bottom	mm	618.16	350.37	-105.24
Outboard Knee	mm	507.04	241.60	-364.26
Outboard Ankle	mm	651.98	256.80	-159.08
Target 1 - Seat Side Upper	mm	105.02	161.11	-685.50
Target 4 - Seat Side Lower	mm	145.40	161.93	-361.02
Target 2 - Seat Base H-Point	mm	208.92	157.63	-279.41
Target 3 - Seat Base Side	mm	365.86	147.00	-221.37

DUMMY INJURY

HIC (36 ms)	616
Chest Clip (3 ms)	55.95 g
Head Excursion (mm)	561
Knee Excursion (mm)	627

SECTION 3

FORWARD FACING CRS TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position # 4 CRS
ATD Type/Serial No.	Hybrid III 6 Year Old/027
Restrain System	LATCH
CRS Direction	Forward Facing
Foam Cushion	WB7, WB13

CAMERA POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Origin	mm	0.00	0.00	0.00
N4 Driver Front	mm	1843.92	313.63	-505.41
N1 Driver Excursion	mm	721.19	-908.92	-449.62
Driver Side	mm	444.19	-880.48	-376.24

DUMMY POSITIONING

CRS: Evenflo SureRide – Forward Facing – LATCH

TRC Test Number: S210125-1 VRTC Test Number: FR_RR_PE_19

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.20	0.01	0.09
Center of Seat Back Frame	mm	-118.86	350.21	-683.97
Top of CRS	mm	-42.68	349.48	-741.60
Top of Head	mm	103.74	350.13	-802.66
Bridge of Nose	mm	207.22	351.94	-720.64
Head CG Outboard	mm	133.15	285.43	-707.41
Neck Center	mm	166.20	350.58	-608.62
Chest Clip	mm	254.41	351.18	-555.06
Buckle	mm	392.79	348.77	-381.68
Base Center	mm	597.17	351.93	-231.54
Center of Seat Frame Bottom	mm	617.99	350.68	-105.51
Outboard Knee	mm	569.52	233.87	-368.74
Outboard Ankle	mm	718.55	251.33	-166.80
Target 1 - Seat Side Upper	mm	29.15	215.65	-573.41
Target 4 - Seat Side Lower	mm	117.34	222.64	-317.95
Target 2 - Seat Base H-Point	mm	273.68	184.28	-275.90
Target 3 - Seat Base Side	mm	413.78	169.13	-323.09

DUMMY INJURY

HIC (36 ms)	450*
Chest Clip (3 ms)	47.35 g
Head Excursion (mm)	640
Knee Excursion (mm)	776

*Truncated to exclude rebound

DUMMY POSITIONING

CRS: Evenflo SureRide – Forward Facing – LATCH

TRC Test Number: S210127-1 VRTC Test Number: FR_RR_PE_21

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.18	-0.08	0.58
Center of Seat Back Frame	mm	-120.61	350.55	-683.11
Top of CRS	mm	-48.67	352.12	-743.83
Top of Head	mm	98.47	349.54	-799.35
Bridge of Nose	mm	203.90	352.96	-719.60
Head CG Outboard	mm	129.53	286.37	-704.08
Neck Center	mm	166.02	351.38	-606.69
Chest Clip	mm	251.90	350.82	-557.53
Buckle	mm	398.90	351.97	-383.04
Base Center	mm	601.02	349.96	-233.38
Center of Seat Frame Bottom	mm	617.98	350.67	-105.22
Outboard Knee	mm	575.17	236.26	-373.66
Outboard Ankle	mm	712.27	252.82	-162.78
Target 1 - Seat Side Upper	mm	35.17	218.23	-577.41
Target 4 - Seat Side Lower	mm	120.68	223.29	-322.19
Target 2 - Seat Base H-Point	mm	278.75	185.44	-278.19
Target 3 - Seat Base Side	mm	418.41	171.66	-327.64

DUMMY INJURY

*Truncated to exclude rebound

HIC (36 ms)	404*
Chest Clip (3 ms)	47.83 g
Head Excursion (mm)	643
Knee Excursion (mm)	782

DUMMY POSITIONING

CRS: Evenflo SureRide – Forward Facing – LATCH

TRC Test Number: S210128-1 VRTC Test Number: FR_RR_PE_23

DUMMY POSITIONING FARO MEASUREMENTS

Description	Units	X	Y	Z
Z-Point	mm	-0.02	0.28	0.80
Center of Seat Back Frame	mm	-121.38	350.27	-682.57
Top of CRS	mm	-48.91	349.54	-745.42
Top of Head	mm	101.20	348.42	-805.96
Bridge of Nose	mm	204.09	353.18	-722.70
Head CG Outboard	mm	128.82	286.78	-708.53
Neck Center	mm	163.37	352.08	-611.33
Chest Clip	mm	253.54	349.90	-553.76
Buckle	mm	390.18	351.73	-379.54
Base Center	mm	597.28	351.43	-233.47
Center of Seat Frame Bottom	mm	618.77	349.93	-104.60
Outboard Knee	mm	564.22	234.33	-370.08
Outboard Ankle	mm	722.04	245.79	-172.30
Target 1 - Seat Side Upper	mm	23.90	221.29	-575.72
Target 4 - Seat Side Lower	mm	117.96	220.92	-320.48
Target 2 - Seat Base H-Point	mm	275.67	181.91	-278.07
Target 3 - Seat Base Side	mm	417.14	168.42	-330.01

DUMMY INJURY

HIC (36 ms)	363*
Chest Clip (3 ms)	46.11 g
Head Excursion (mm)	635
Knee Excursion (mm)	770

*Truncated to exclude rebound

SECTION 4
DUMMY CALIBRATION DATA

Transportation Research Center Inc.
ATD Certification Report

Customer:

Vehicle Research and Test Center
10820 State Route 347
East Liberty, OH 43319

Anthropomorphic Device:

Hybrid III (6) Year Old
Serial No. 027
Certification No. 26

Transportation Research Center Inc.
P.O. Box B-67
10820 St. Rt. 347
East Liberty, OH 43319-0367

Table of Contents

Introduction

Customer Name:	VRTC
Customer Contact:	Bryan Crabtree
Email:	Bryan.Crabtree.CTR@dot.gov
Phone:	(937) 666-4511
Date Received:	December 8, 2020
Date Completed:	December 9, 2020

Special Instruction: N/A

This Certification Report meets the requirements set forth by the ANSI National Accreditation Board ISO/IEC 17025:2017 accreditation under the scope of Mechanical Testing for Crash Test Dummy Certification Testing (ANAB Certificate #L2187). This testing certification shall not be reproduced, except in full, without written approval of TRC Inc.

The evidence measurements of this Certification Report are traceable by the Serial Number and Certification Number located at the top of the first section for each certification.

Each certification test was conducted by an authorized Transportation Research Center Inc. (TRC Inc.) employee within the requirements of the ISO/IEC 17025:2017 standards and adheres to CFR Part 572 Subparts B, E, N, O, P, R, T, U, V, SAE J2860, J2856, J2862; depending on ATD type. Any statements of conformity in this report are made using the shared risk method.

Each component of the ATD to be tested was contained in a temperature controlled environment for a period of at least 4 hours before the test. The temperature in the ATD Certification Laboratory was between 20.6°C and 22.2°C (69.08°F – 71.96°F). The relative humidity in the ATD Certification Laboratory was between 10% and 70%.

Date Testing Requested: 12/08/2020

Testing Conducted by: _____ Date: 12/09/2020
Robert Benavides, Engineering Technician I

Testing Approved by: _____ Date: 12/10/2020
Sal LoPresti, Supervisor - Calibration Services

Appendix A – Incoming Inspection

TRC ATD Laboratory As Received Inspection Report

Name: Robert Benavides

Date: 12/9/2020

Customer: VRTC

ATD S/N: 027

HEAD / NECK

No.	Comments	Photo No.
1	None to report.	
2		
3		

THORAX / ABDOMEN

No.	Comments	Photo No.
4	None to report.	
5		
6		

SHOULDERS / ARMS

No.	Comments	Photo No.
7	None to report.	
8		
9		

PELVIS / LUMBAR

No.	Comments	Photo No.
10	None to report.	
11		
12		

FEMUR / KNEES

No.	Comments	Photo No.
13	None to report.	
14		
15		

LOWER LEGS / FEET

No.	Comments	Photo No.
16	None to report.	
17		
18		

TRC ATD Laboratory As Received Inspection Photos

Name: Robert Benavides

Date: 12/9/2020

Customer: VRTC

ATD S/N: 027

1	
2	
3	
4	
5	
6	

TRC ATD Laboratory Inspection Report Action Items

Name:	Robert Benavides	Date:	12/9/2020
Customer:	VRTC	ATD S/N:	027

Action #1	None to report.
Resolution #1	
Action #2	
Resolution #2	
Action #3	
Resolution #3	
Comments	

Appendix B – Test Results

Transportation Research Center Inc.

Front Head Drop
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.0 - 22.0 ºC	21.8 ºC	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Peak Head Resultant Acceleration	245 - 300 g	277.9 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-1.8 g	Yes
Is Acceleration Curve Unimodal	< 10 %	1.55 %	Yes

Test meets specifications.

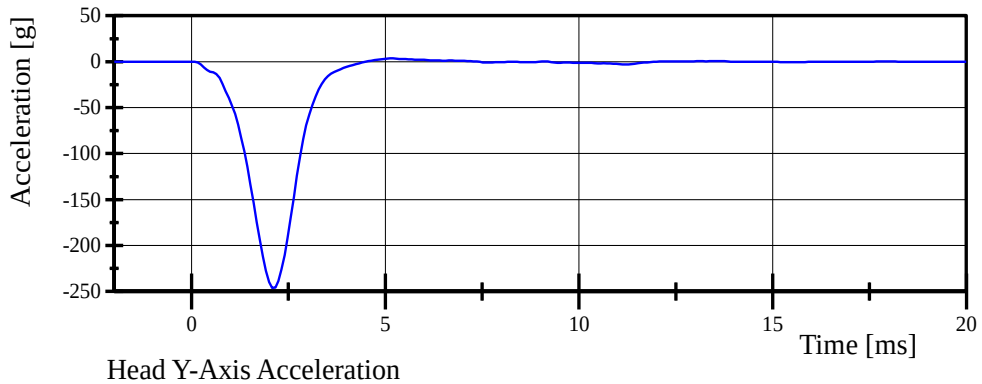
Condition: Used

Comments:
Head S/N: 916

Transportation Research Center Inc.

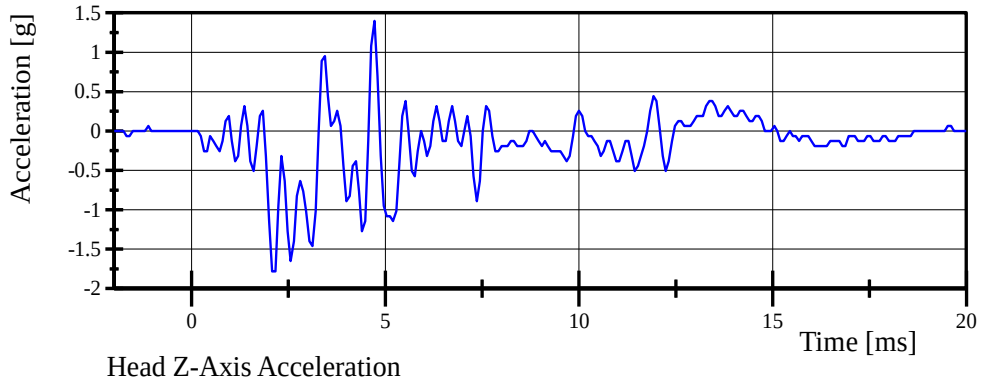
Front Head Drop
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Head X-Axis Acceleration



Filter Class: CFC_1000
Max: 3.5 g at 5.1 ms
Min: -246.0 g at 2.1 ms

Head Y-Axis Acceleration



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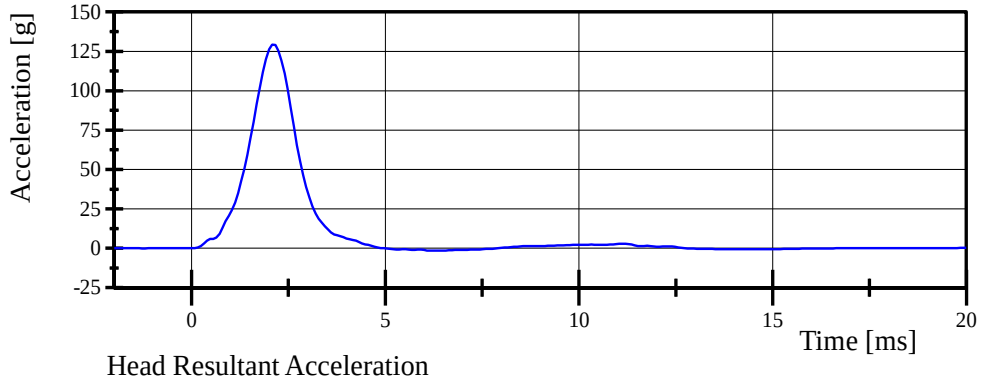
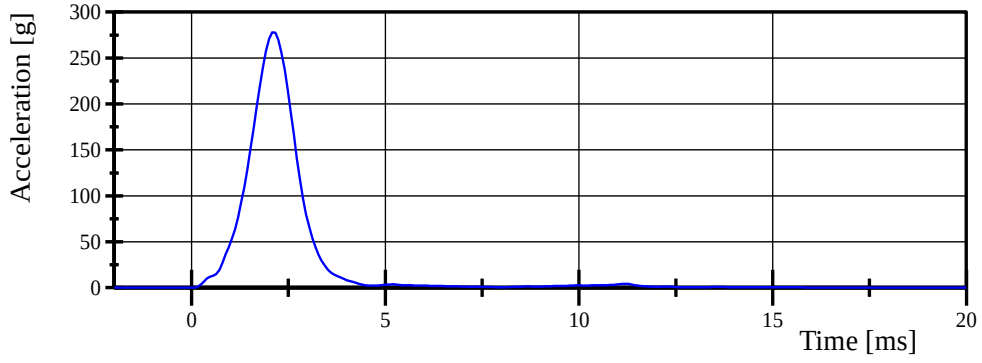
Max: 1.4 g at 4.7 ms
Min: -1.8 g at 2.1 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 129.4 g at 2.1 ms
Min: -1.5 g at 6.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 277.9 g at 2.1 ms
Min: 0.0 g at -1.8 ms

Transportation Research Center Inc.

Neck Flexion
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 ºC	21.4 ºC	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Impact Velocity	4.83 - 5.07 m/s	4.899 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.2) - (-1.6) m/s	-1.50 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-2.4) - (-3.4) m/s	-2.87 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-3.8) - (-5.0) m/s	-4.14 m/s	Yes
Total Head D-Plane Rotation	(-74) - (-92) º	-77.4 º	Yes
Peak Neck Occipital Condyles Moment Between -74º and -92º Rotation	27 - 33 Nm	29.6 Nm	Yes
Neck Occipital Condyles Moment Decay to 5 Nm	103 - 123 ms	109.7 ms	Yes

Test meets specifications.

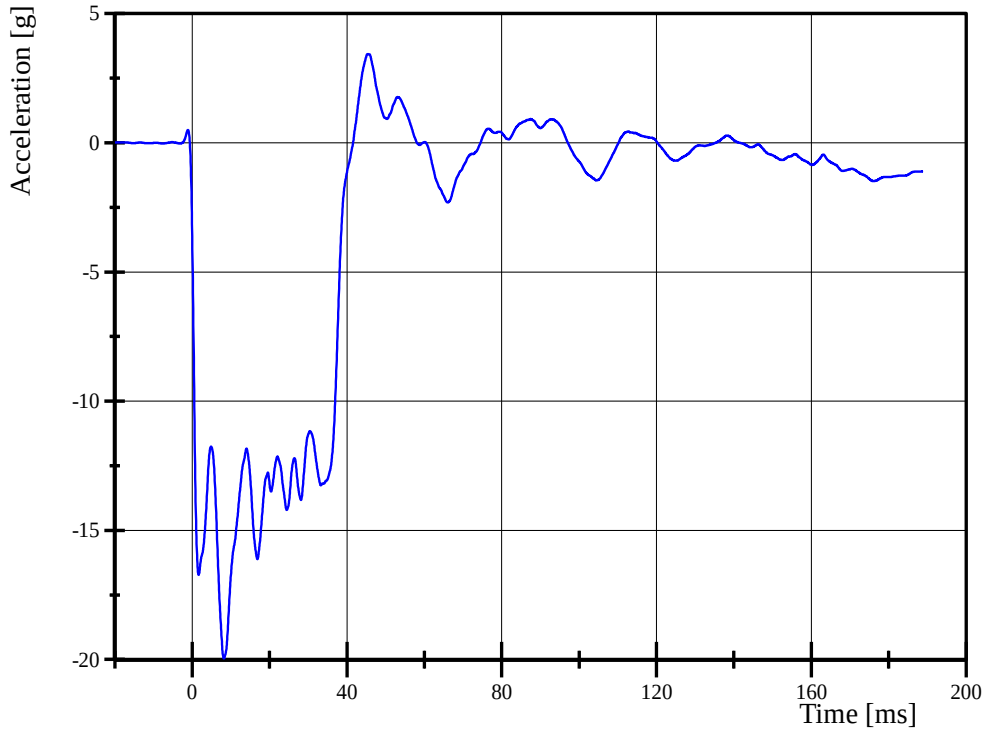
Condition: Used

Comments:
Neck S/N: EK3898

Transportation Research Center Inc.

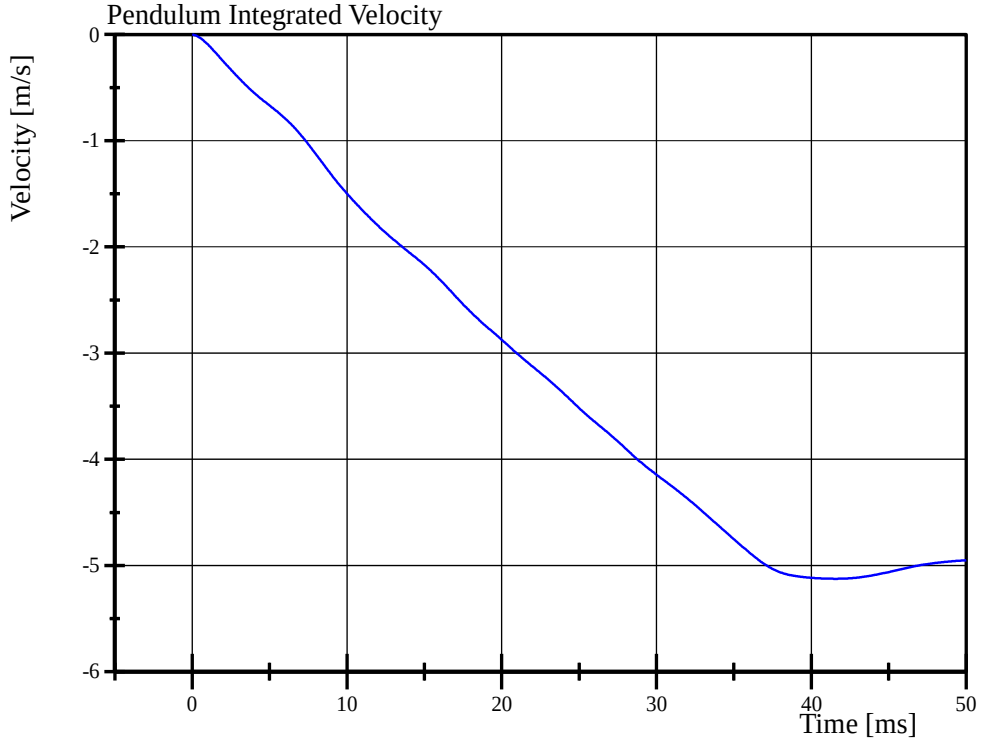
Neck Flexion
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.4 g at 45.4 ms
Min: -20.0 g at 8.2 ms

Pendulum Integrated Velocity



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -5.1 m/s at 41.6 ms

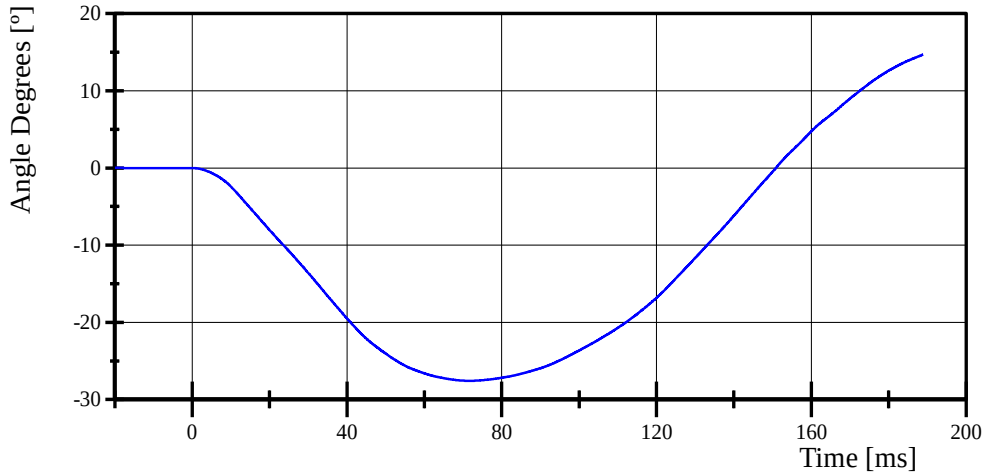
Transportation Research Center Inc.

Neck Flexion

HIII 6YO Serial No. 027 Certification No. 26-1

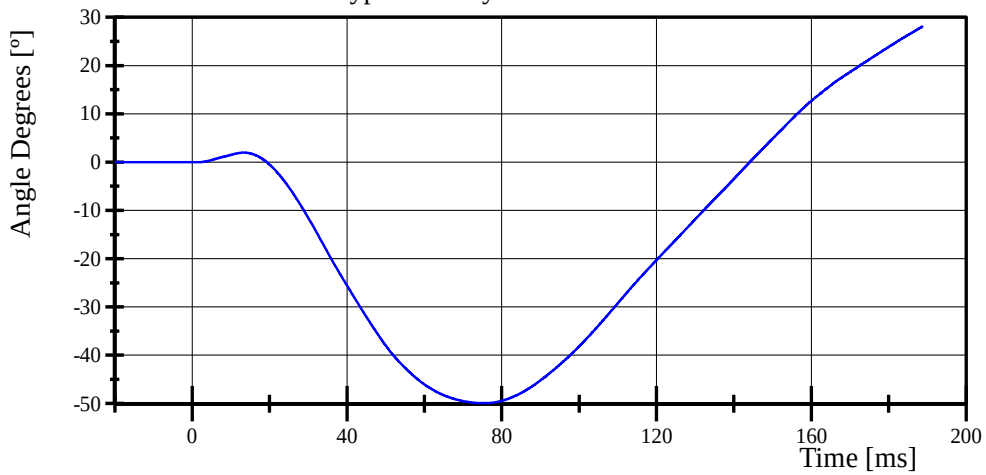
Test Date: 12/9/2020

Pot Rotation at the Base of Neck



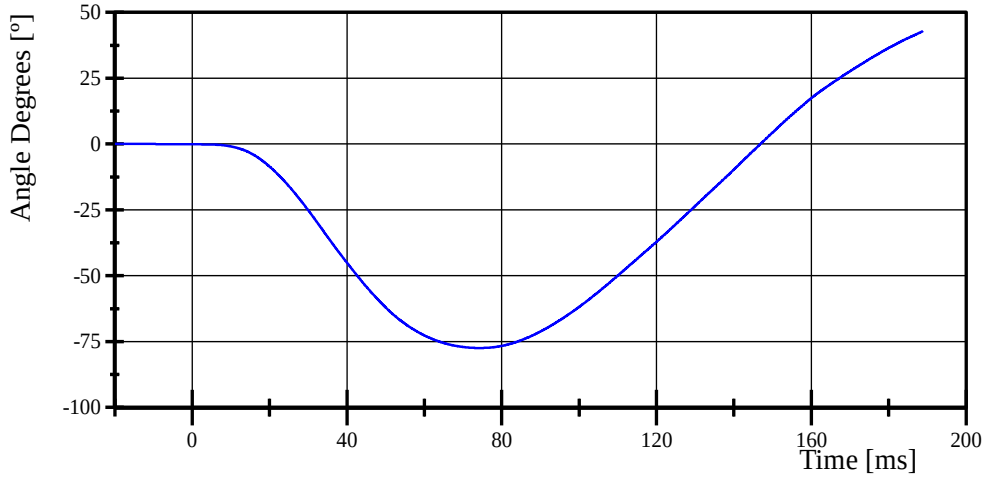
Filter Class: CFC_60
Max: 14.7 º at 188.9 ms
Min: -27.6 º at 71.8 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 28.2 º at 188.9 ms
Min: -49.9 º at 75.4 ms

Total Head D-Plane Rotation

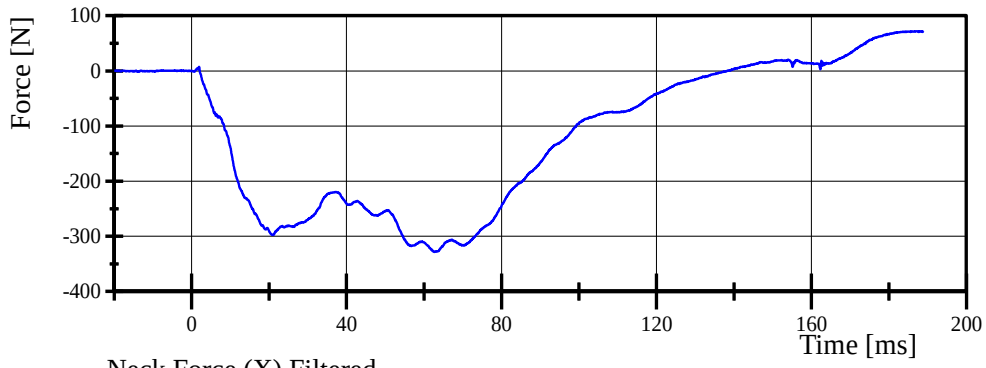


Filter Class: CFC_60
Max: 42.9 º at 188.9 ms
Min: -77.4 º at 74.2 ms

Transportation Research Center Inc.

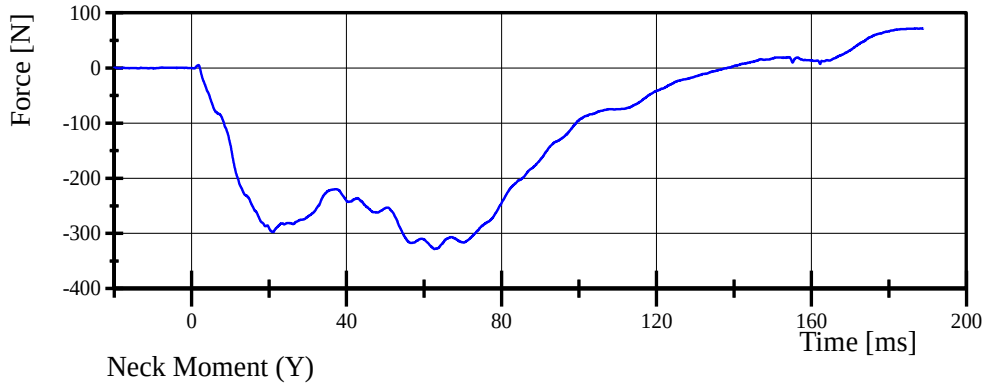
Neck Flexion
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Neck Force (X)



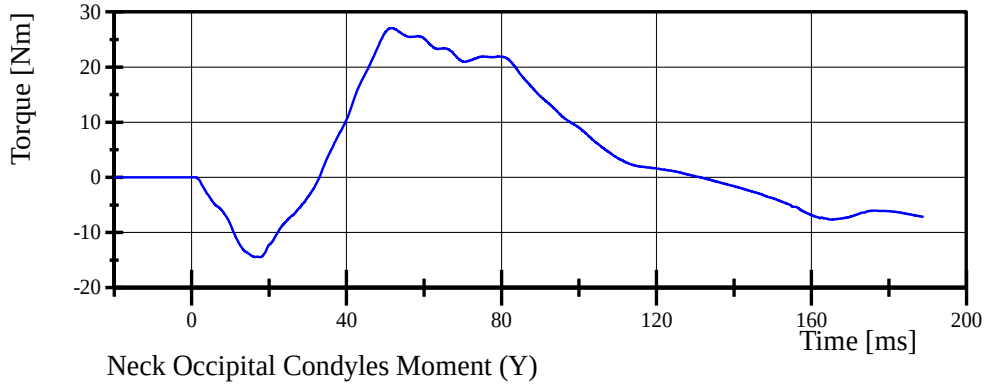
Filter Class: CFC_1000
Max: 72.0 N at 186.9 ms
Min: -328.5 N at 62.6 ms

Neck Force (X) Filtered



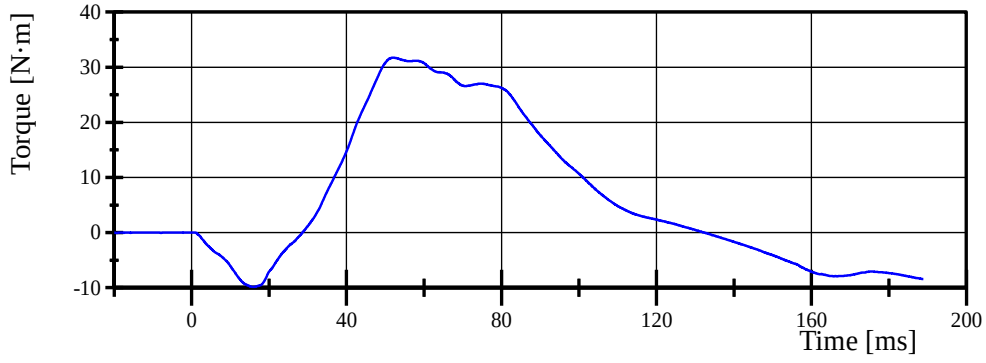
Filter Class: CFC_600
Max: 72.0 N at 188.2 ms
Min: -328.2 N at 62.7 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 27.1 Nm at 51.8 ms
Min: -14.5 Nm at 17.8 ms

Neck Occipital Condyles Moment (Y)



Filter Class: Without_(Constar
Max: 31.7 N·m at 52.1 ms
Min: -9.9 N·m at 16.0 ms

Transportation Research Center Inc.

Neck Extension
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 ºC	21.5 ºC	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Impact Velocity	4.18 - 4.42 m/s	4.386 m/s	Yes
Pendulum Integrated Velocity at 10ms	(-1.0) - (-1.4) m/s	-1.14 m/s	Yes
Pendulum Integrated Velocity at 20ms	(-2.2) - (-3.0) m/s	-2.24 m/s	Yes
Pendulum Integrated Velocity at 30ms	(-3.2) - (-4.2) m/s	-3.31 m/s	Yes
Total Head D-Plane Rotation	85 - 103 º	96.4 º	Yes
Peak Neck Occipital Condyles Moment Between 85º and 103º Rotation	(-19) - (-24) Nm	-20.8 Nm	Yes
Neck Occipital Condyles Moment Decay to 5 Nm	123 - 147 ms	140.0 ms	Yes

Test meets specifications.

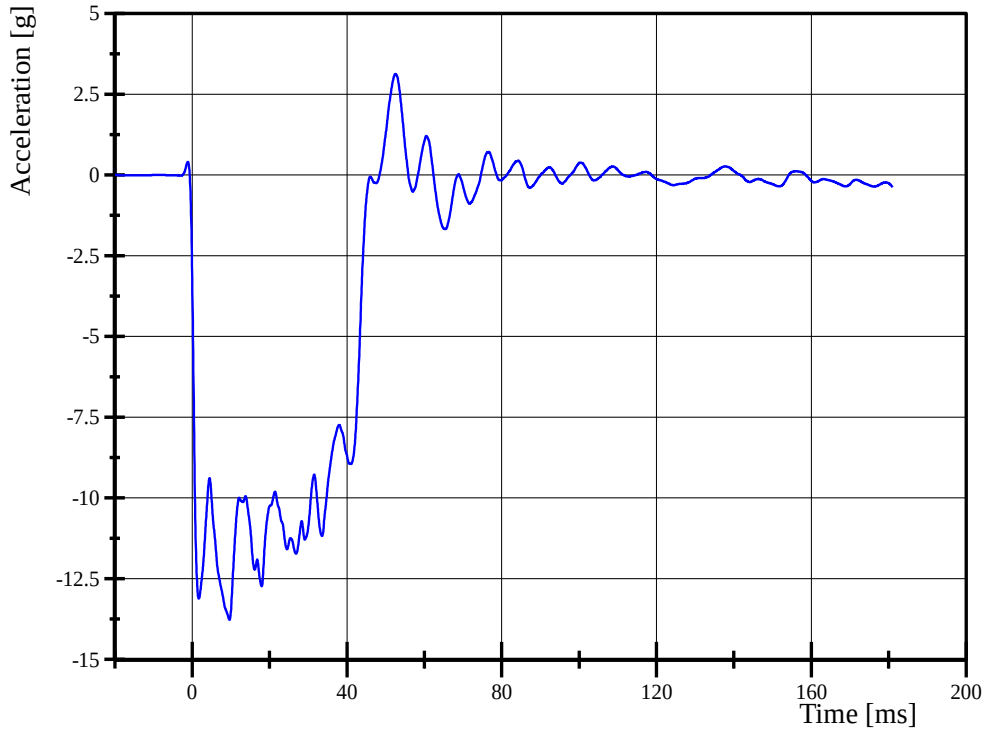
Condition: Used

Comments:
Neck S/N: EK3898

Transportation Research Center Inc.

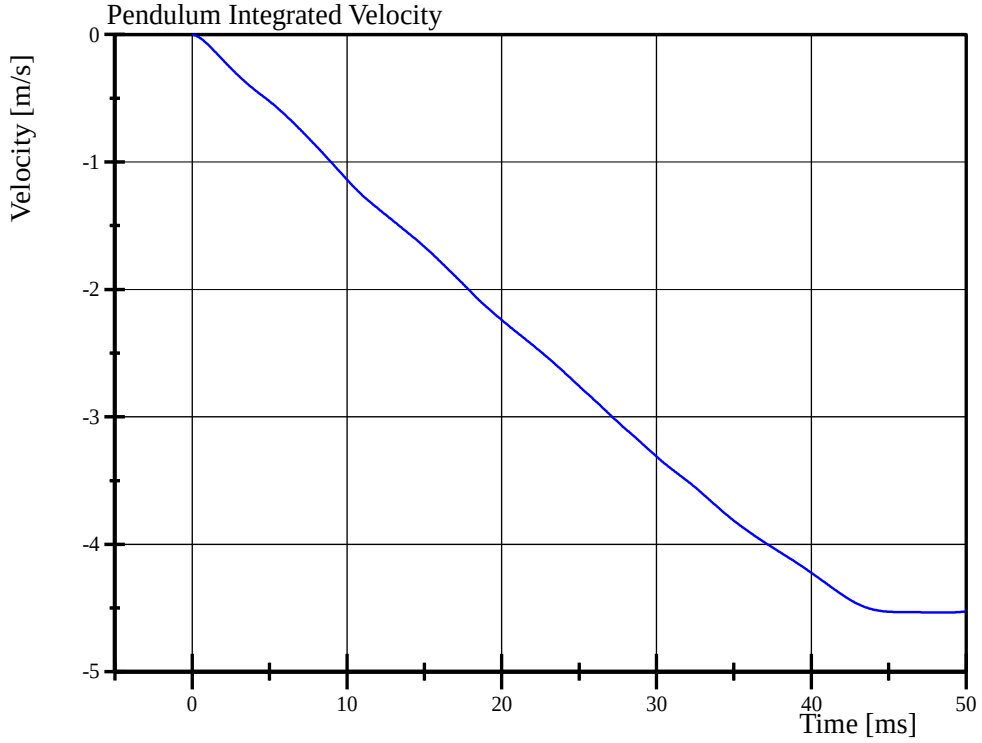
Neck Extension
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Pendulum Acceleration



Filter Class: CFC_180
Max: 3.1 g at 52.5 ms
Min: -13.8 g at 9.6 ms

Pendulum Integrated Velocity



Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -4.5 m/s at 48.4 ms

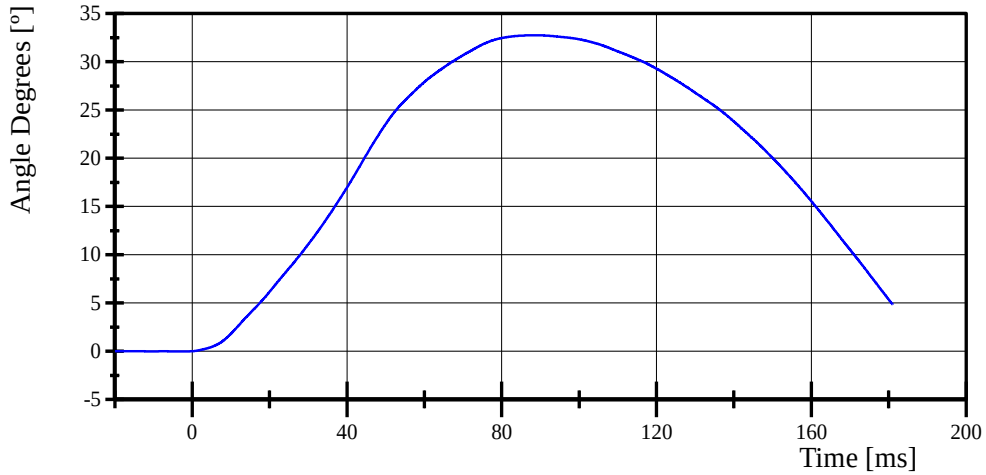
Transportation Research Center Inc.

Neck Extension

HIII 6YO Serial No. 027 Certification No. 26-1

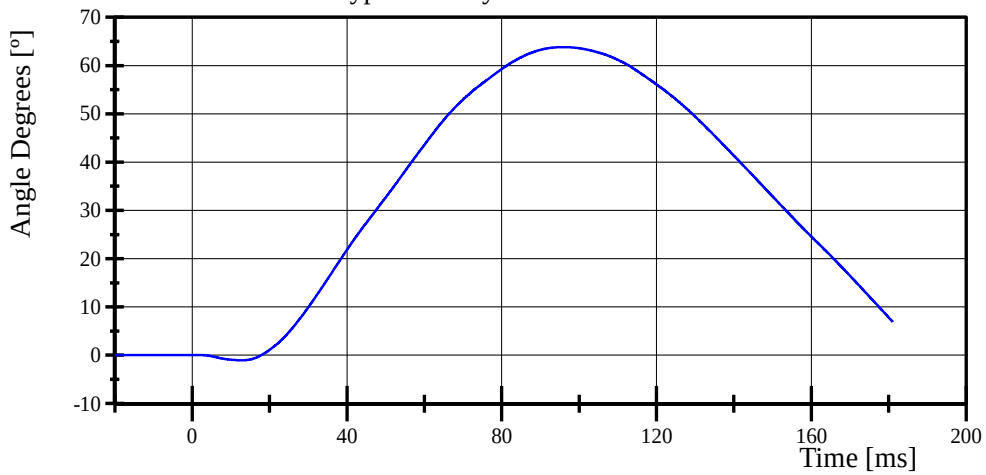
Test Date: 12/9/2020

Pot Rotation at the Base of Neck



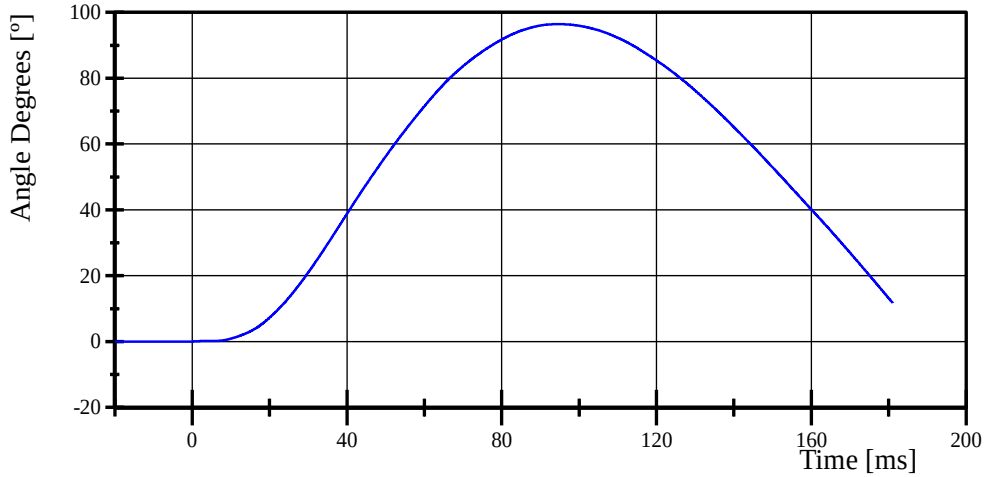
Filter Class: CFC_60
Max: 32.7 º at 88.6 ms
Min: -0.0 º at -2.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 63.8 º at 96.0 ms
Min: -1.0 º at 12.8 ms

Total Head D-Plane Rotation

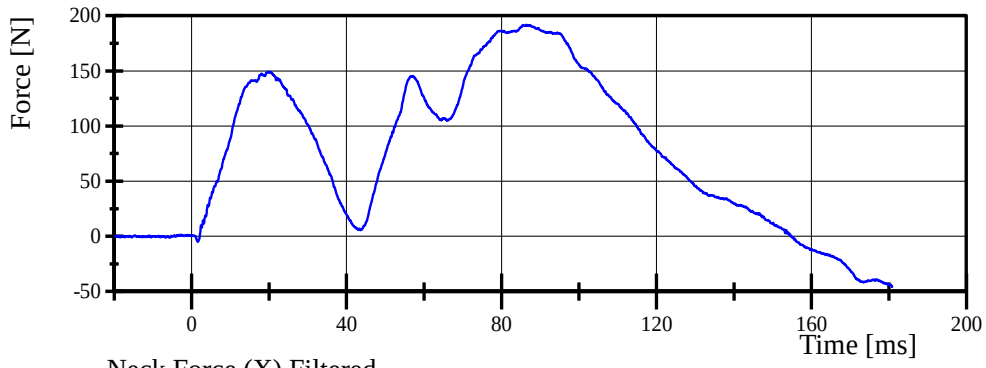


Filter Class: CFC_60
Max: 96.4 º at 94.6 ms
Min: -0.0 º at -3.3 ms

Transportation Research Center Inc.

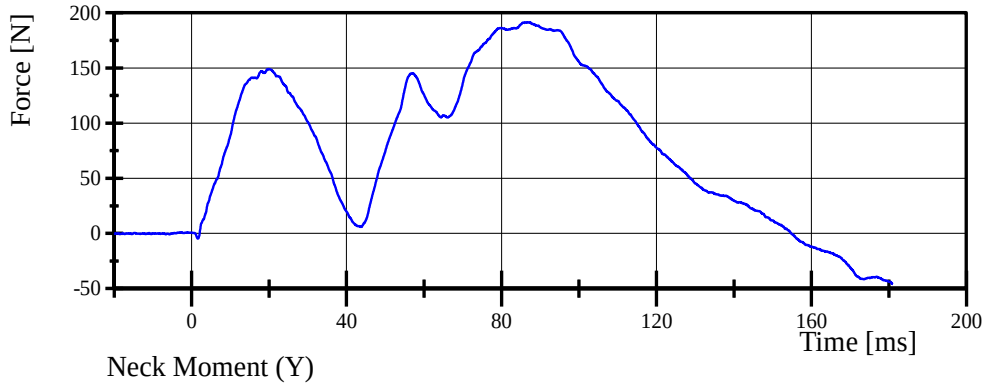
Neck Extension
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Neck Force (X)



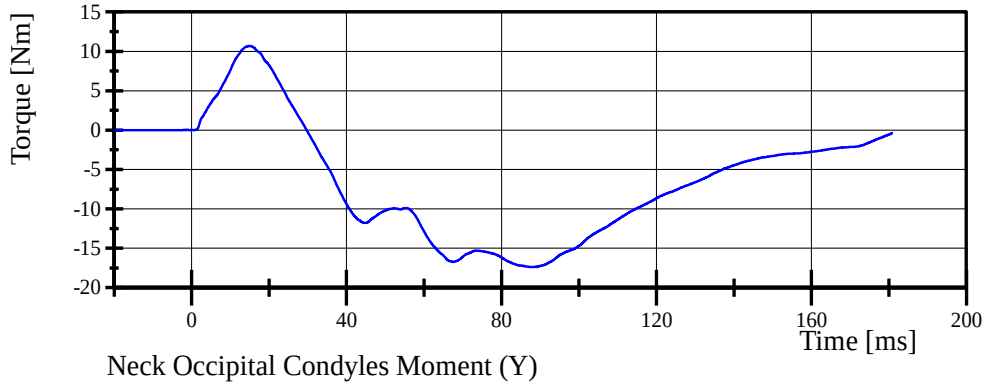
Filter Class: CFC_1000
Max: 191.8 N at 86.4 ms
Min: -45.9 N at 180.9 ms

Neck Force (X) Filtered



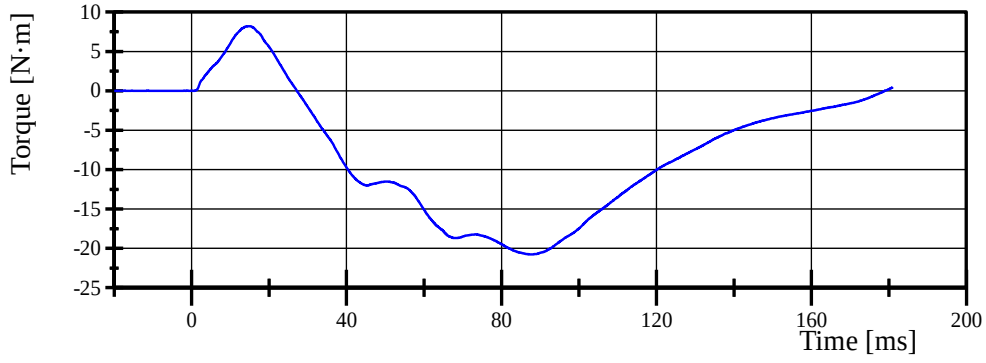
Filter Class: CFC_600
Max: 191.5 N at 86.4 ms
Min: -45.9 N at 181.1 ms

Neck Moment (Y)



Filter Class: CFC_600
Max: 10.7 Nm at 15.2 ms
Min: -17.4 Nm at 88.1 ms

Neck Occipital Condyles Moment (Y)



Filter Class: Without_(Constar
Max: 8.2 N·m at 14.9 ms
Min: -20.8 N·m at 87.5 ms

Transportation Research Center Inc.

Front Thorax
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 ºC	21.7 ºC	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Probe Velocity	6.59 - 6.83 m/s	6.770 m/s	Yes
Probe Force Peak Between 38.0 mm and 46.0 mm Chest Deflection	(-1,150) - (-1,380) N	-1,271.9 N	Yes
Probe Force Peak Between 12.5 mm and 38.0 mm Chest Deflection	>= (-1,500) N	-1,335.3 N	Yes
Maximum Chest Compression	(-38) - (-46) mm	-40.0 mm	Yes
Internal Hysteresis	65 - 85 %	74.5 %	Yes

Test meets specifications.

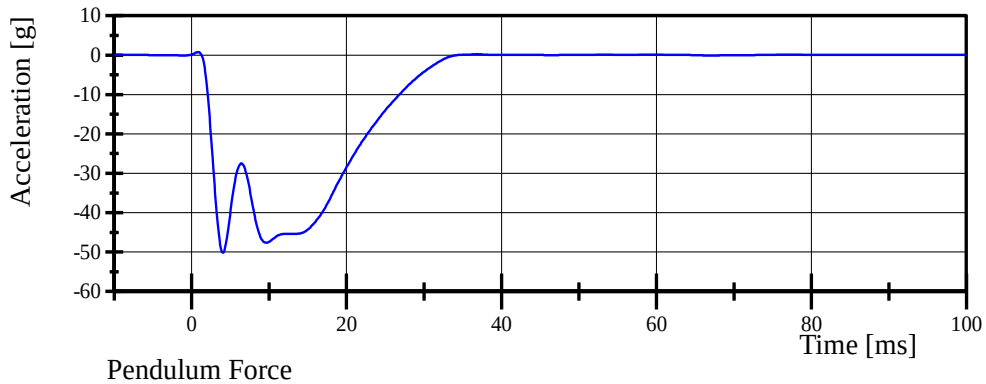
Condition: Used

Comments:
Jacket S/N: DL6916
Rib Set S/N: 18031815A

Transportation Research Center Inc.

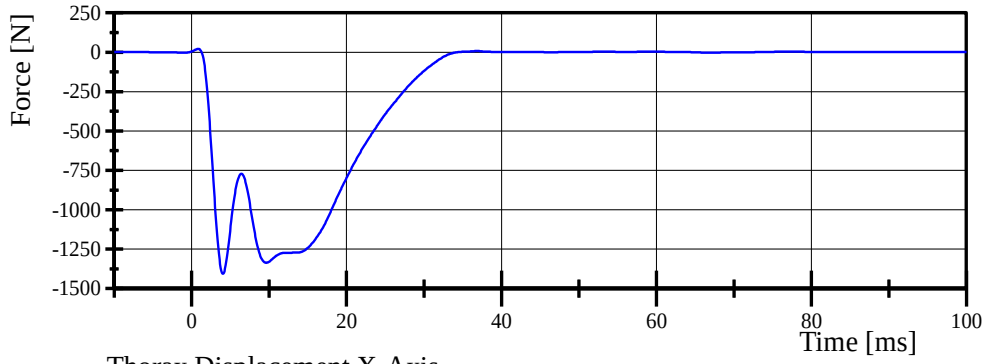
Front Thorax
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Pendulum Acceleration



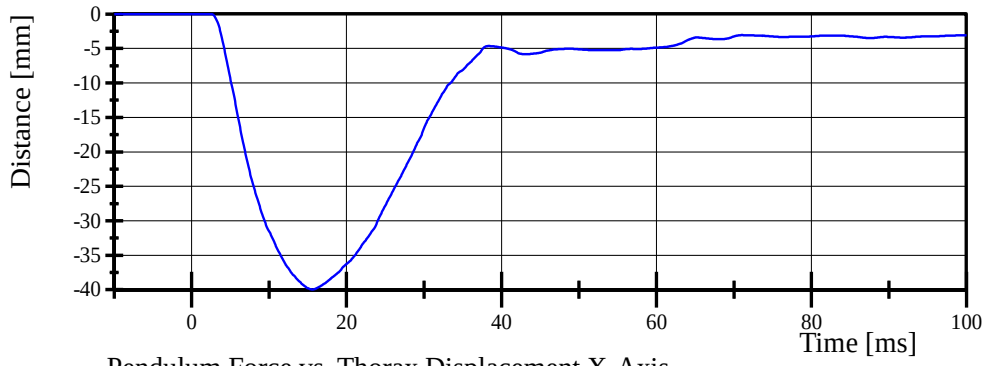
Filter Class: CFC_180
Max: 0.8 g at 0.9 ms
Min: -50.2 g at 4.1 ms

Pendulum Force



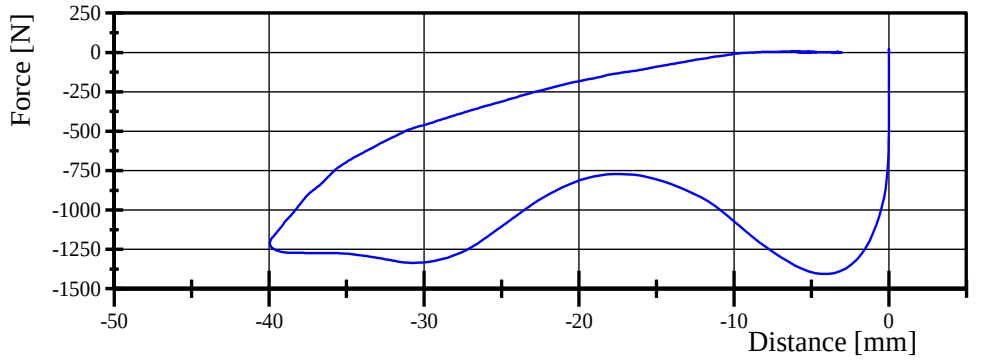
Filter Class: CFC_180
Max: 21.6 N at 0.9 ms
Min: -1,406.6 N at 4.1 ms

Thorax Displacement X-Axis



Filter Class: CFC_600
Max: 0.0 mm at -9.1 ms
Min: -40.0 mm at 15.6 ms

Pendulum Force vs. Thorax Displacement X-Axis



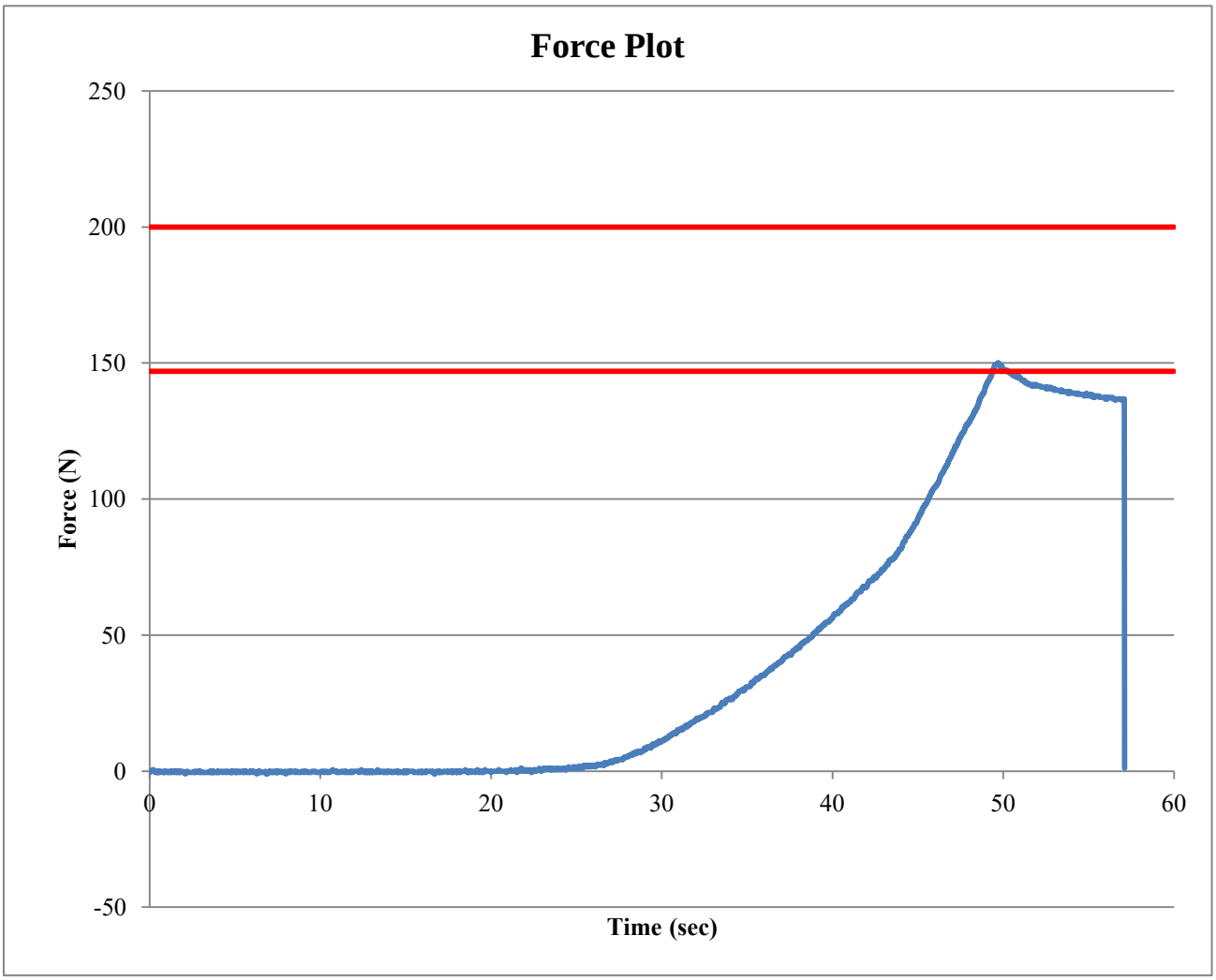
Filter Class: CFC_180
Max: 21.6 N at -0.0 mm
Min: -1,406.6 N at -4.3 mm

Transportation Research Center Inc.

Hybrid III Six-Year-Old Child Torso Flexion

Customer:	VRTC		
Serial Number:	027	Date:	12/9/2020
Test Number:	1	Time:	8:17

TEST PARAMETER	SPECIFICATION			TEST RESULTS		
Temperature	18.9	-	25.6	21.3	°C	Pass
Humidity	10	-	70	40	%	Pass
Average Angular Velocity	0.5	-	1.5	0.99	deg/sec	Pass
Initial Angle	0	-	22	21.92	deg	Pass
Peak Force at 45.13°	147	-	200	150.01	N	Pass
Final Angle	-8	-	8	6.63	deg	Pass



Comments:
Pelvis S/N: DM9378
Lumbar S/N: 904
Abdomen S/N: DV2472

Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	21.2 ºC	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.102 m/s	Yes
Peak Femur Force	(-2,000) - (-3,000) N	-2,385.6 N	Yes

Test meets specifications.

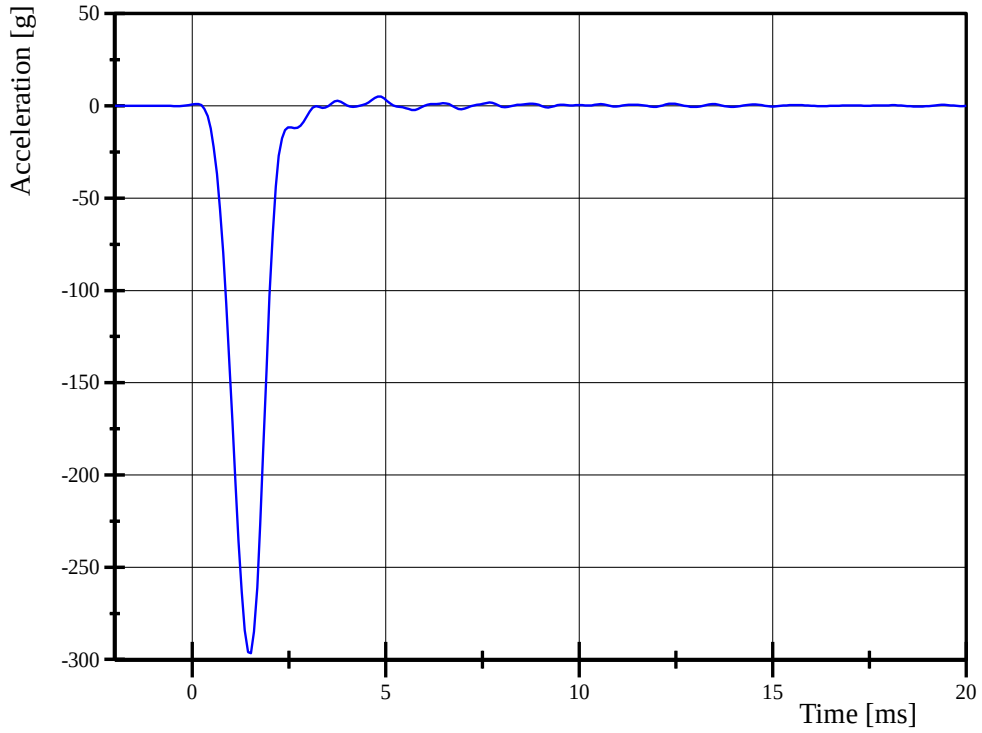
Condition: Used

Comments:
Knee Skin S/N: 640

Transportation Research Center Inc.

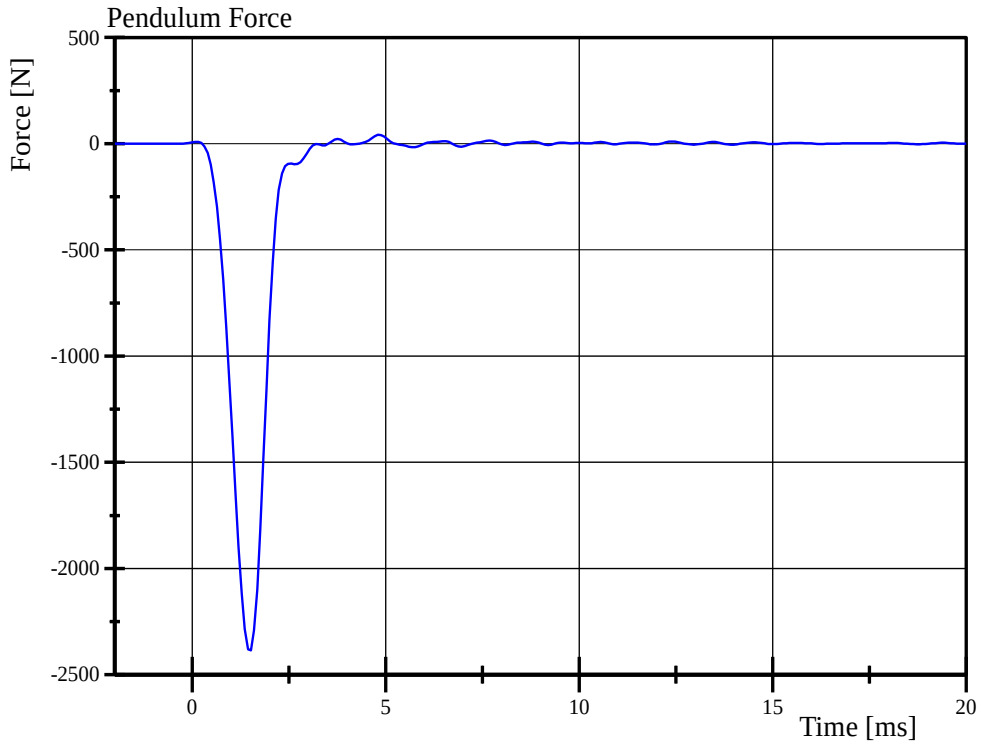
Left Knee Femur Response Test
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 5.1 g at 4.8 ms
Min: -296.7 g at 1.5 ms

Pendulum Force



Filter Class: CFC_600
Max: 41.3 N at 4.8 ms
Min: -2,385.6 N at 1.5 ms

Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 ºC	21.1 ºC	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Probe Velocity	2.07 - 2.13 m/s	2.102 m/s	Yes
Peak Femur Force	(-2,000) - (-3,000) N	-2,405.4 N	Yes

Test meets specifications.

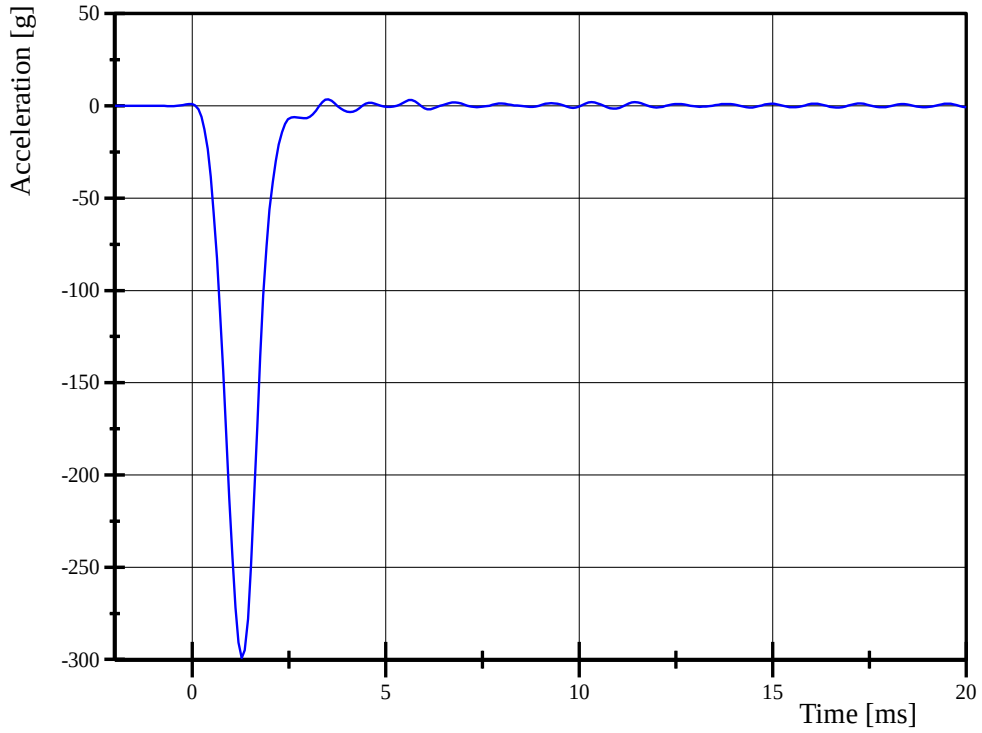
Condition: Used

Comments:
Knee Skin S/N: 643

Transportation Research Center Inc.

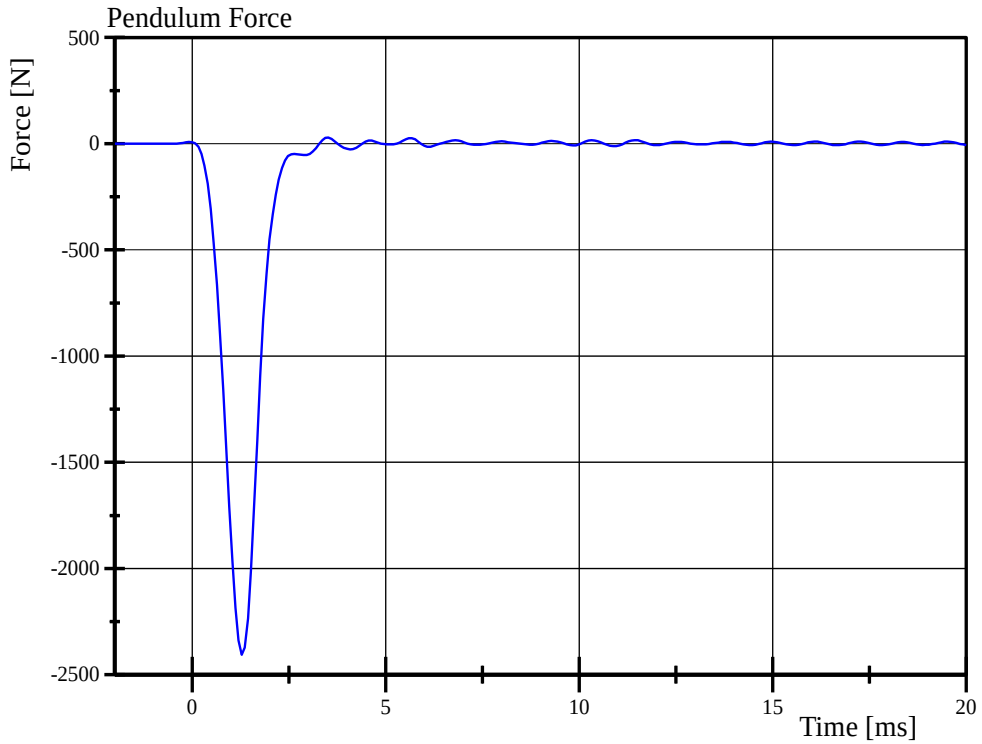
Right Knee Femur Response Test
HIII 6YO Serial No. 027 Certification No. 26-1
Test Date: 12/9/2020

Pendulum Acceleration



Filter Class: CFC_600
Max: 3.6 g at 3.5 ms
Min: -299.1 g at 1.3 ms

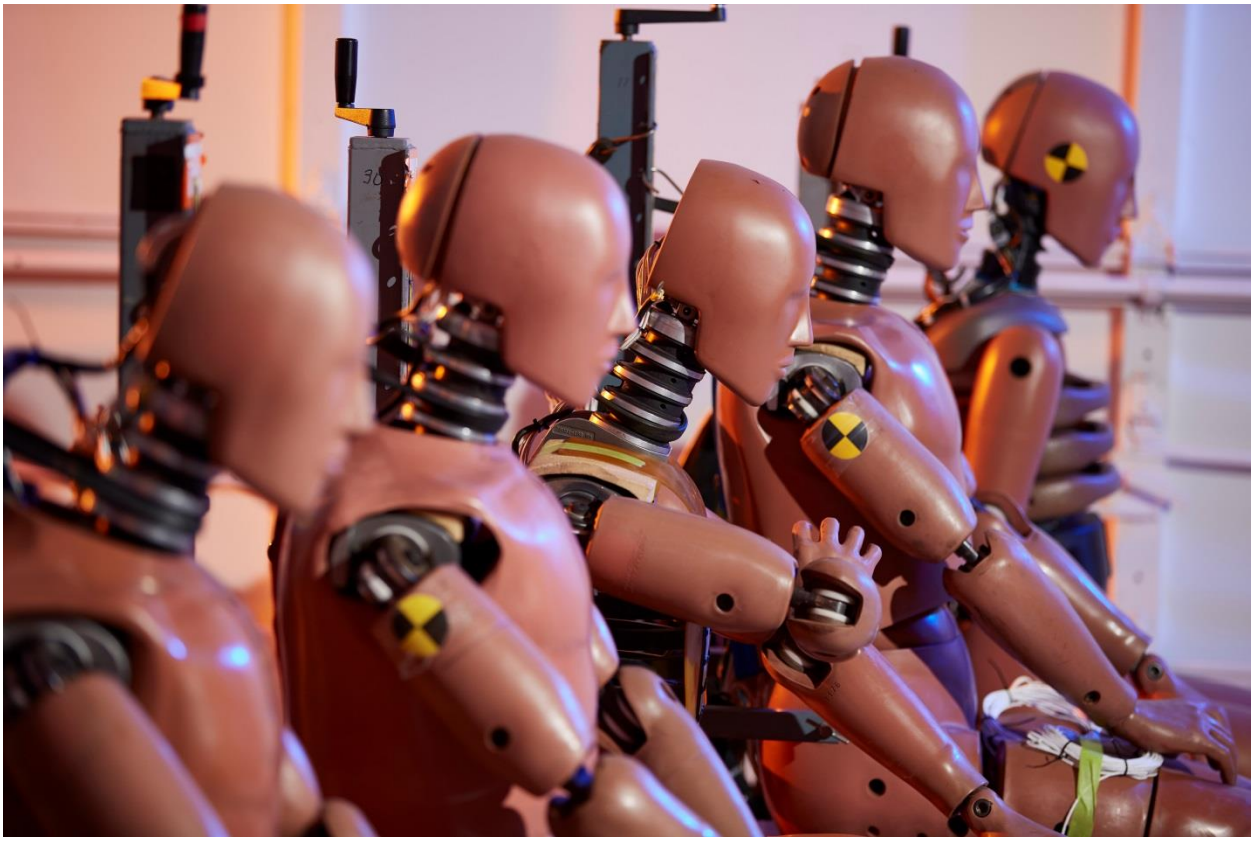
Pendulum Force



Filter Class: CFC_600
Max: 29.0 N at 3.5 ms
Min: -2,405.4 N at 1.3 ms

Appendix C – Quality Assurance

Quality Assurance



ATD Assembly & Final Inspection

ATD Type:	Hybrid III (6) Year Old
ATD Serial Number:	027
Assembled by:	
Inspected by:	
Date Inspected:	12/09/2020