

REPORT NUMBER: 208-2360529-TEST

**DUMMY PERFORMANCE CALIBRATIONS
FMVSS 208**

**GENERAL MOTORS LLC
2024 CHEVROLET SILVERADO EV
NHTSA NO.: C20240101**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



TEST DATES: OCTOBER 24, 2024 – MAY 8, 2025

FINAL REPORT DATE: JULY 14, 2025

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, S.E., NVS-220
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TABLE OF CONTENTS

		<u>Page No.</u>
DUMMY S/N: 401	PRE-TEST CERTIFICATION DATA	1-1
	PASSED ALL CALIBRATION CHECKS	
DUMMY S/N: 401	POST-TEST CERTIFICATION DATA	2-1
	PASSED ALL CALIBRATION CHECKS	
DUMMY S/N: 403	PRE-TEST CERTIFICATION DATA	3-1
	PASSED ALL CALIBRATION CHECKS	
DUMMY S/N: 403	POST-TEST CERTIFICATION DATA	4-1
	PASSED ALL CALIBRATION CHECKS	

HYBRID III 50 th SN #401, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6-35.0	34.7
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.2
C	H-POINT HEIGHT	Reference	3.3-3.5	3.5
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.4
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.6
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.5
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.8
I	SHOULDER TO ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.5
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.1
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.5
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	18.5

HYBRID III 50 th SN #401, PART 572, SUBPART E EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.8
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.2
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.7
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	38.5
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.3
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

DATA SHEET A3
HEAD DROP TEST (572.32) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive head drops are necessary)

1. It has been at least 2 hours since the last head drop. (572.32(c)(5))
 N/A, ONLY one head drop performed
2. The head assembly consists of the complete head (78051-61X), the neck transducer structural replacement (78051-383X), and three (3) accelerometers. (572.32(b))
3. Torque the skull cap screws to 160 lbf-in.
4. Accelerometers and their respective mounts are smooth and clean.
5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.35(i))
6. The head assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
7. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No Damage
8. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.32(c)(2))

- X 9. Suspend and orient the head assembly as shown in Figure 6A. The lowest point on the forehead is 0.5 in. below the lowest point on the dummy's nose when the midsagittal plane is vertical. (572.32(c)(3))

Record the actual distance: 0.5 inches

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

- X 10. The 1.6 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 7A.

Record the right side distance: 501 mm

Record the left side distance: 501 mm

- X 11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.32(c)(4))

Record actual micro finish: 24.8 micro inches

- X 12. The impact surface is rigidly supported. (572.132(c)(4))

- X 13. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (Figure 6A)

Record thickness: 50.9 mm

Record width: 604 mm

Record length: 595 mm

- X 14. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches \pm 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.32(b) & (572.32(c)(4))

- X 16. Complete the following table using channel class 1000 data. (572.36(i)):

Parameter	Specification	Result
Peak resultant acceleration	$225 \text{ g} \leq x \leq 275 \text{ g}$	263 g
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration $\leq 15 \text{ g}$	-3.3 g

- X 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.


Signature

04/17/2025
Date

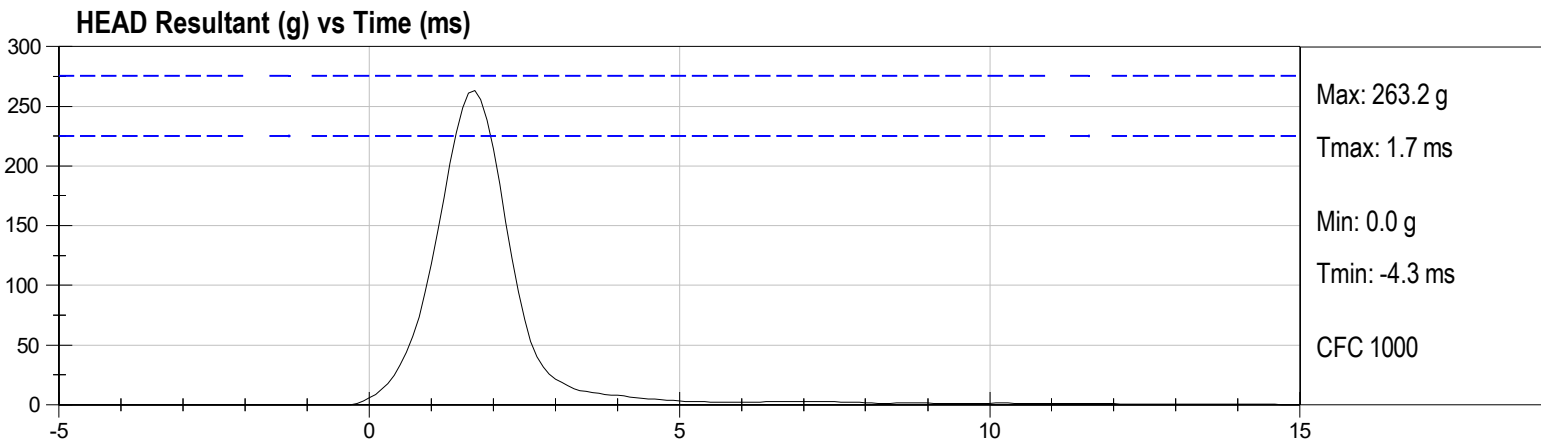
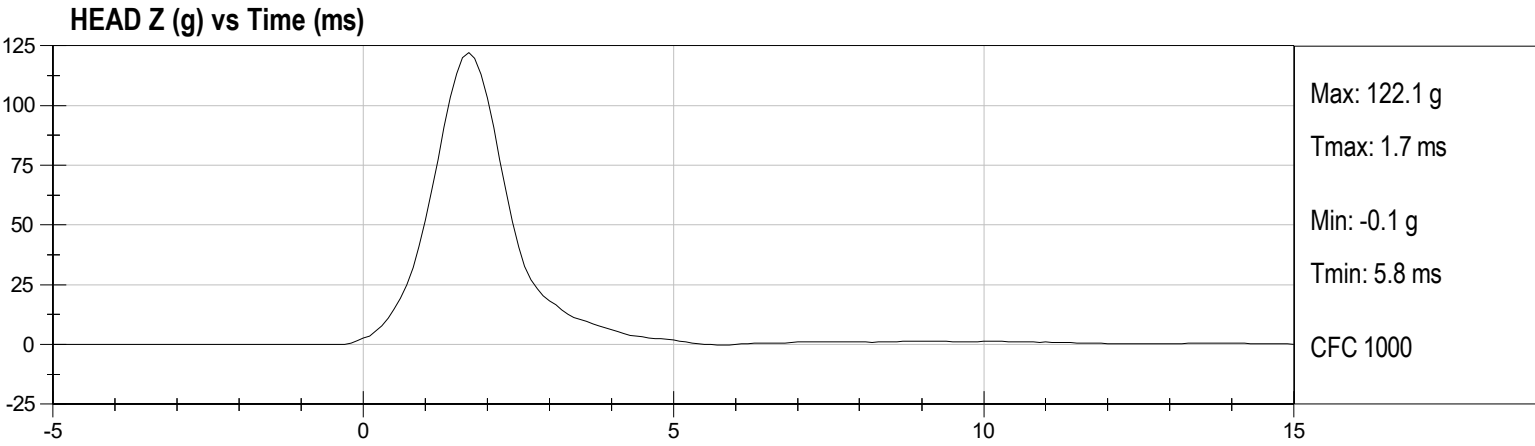
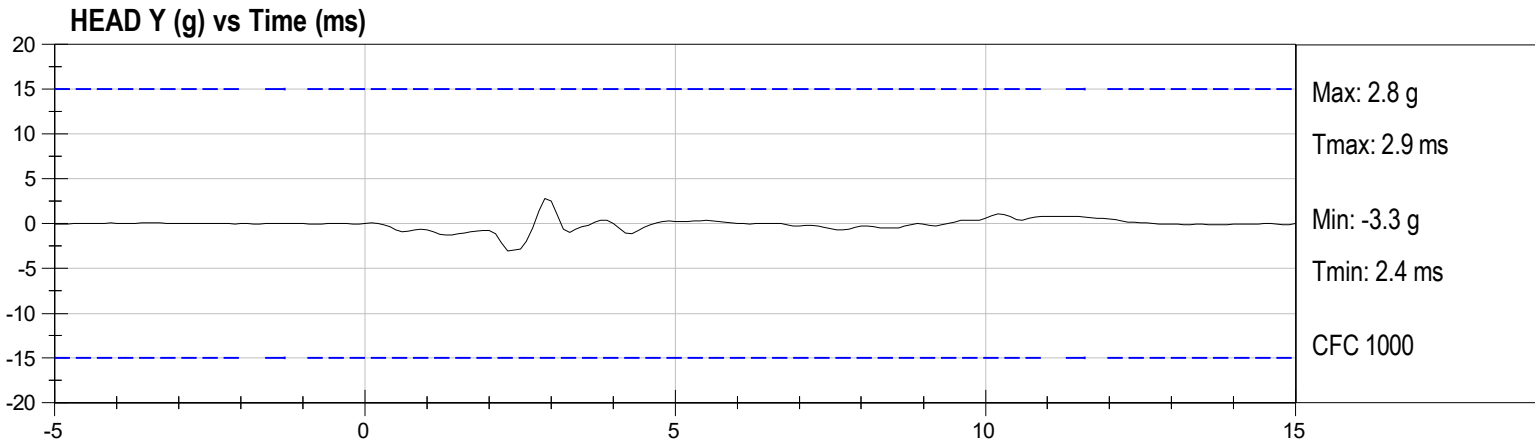
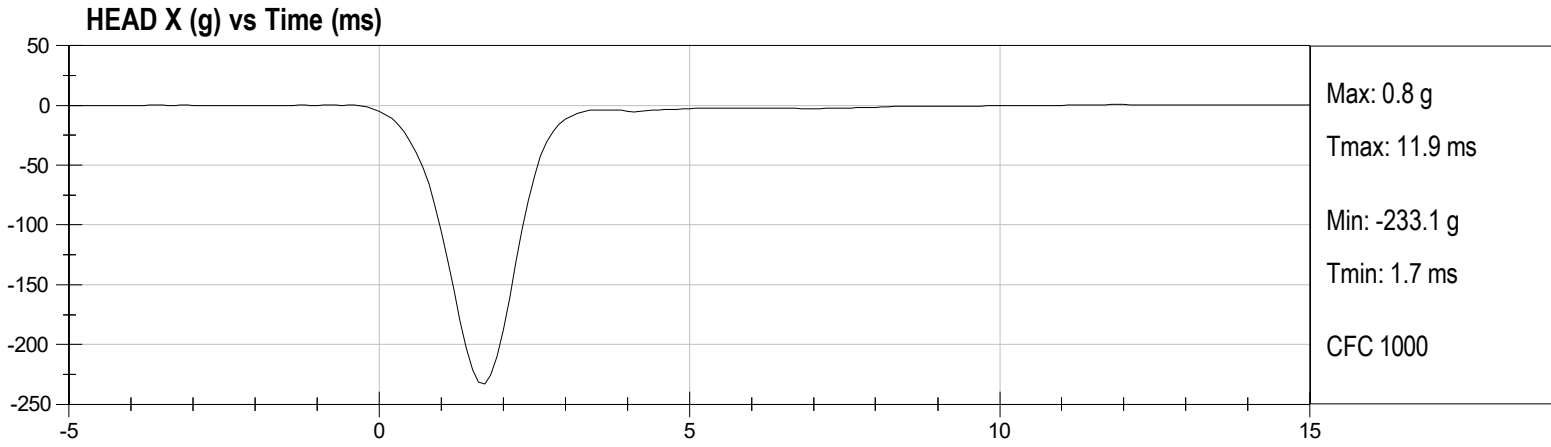


Head Drop Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 04/17/2025
Test ID: D251171
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	g	225 to 275	263	Pass
Peak Lateral Acceleration	g	-15.0 to 15.0	-3.3	Pass
Unimodal	%	within 10% of peak	1	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
HEAD X	Endevco	T30974	11/25/2024	5/27/2025
HEAD Y	Endevco	T30975	11/25/2024	5/27/2025
HEAD Z	Endevco	T30976	11/25/2024	5/27/2025



DATA SHEET A4
NECK FLEXION TEST (572.33) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive flexion tests are necessary)

1. It has been at least 30 minutes since the last flexion test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.6°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9A for the flexion test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 22.6 to 23.4 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:

Neck Flexion Test Results (572.33(b)(1) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	22.6 ft/s \leq speed \leq 23.4 ft/s	22.83 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	22.5 \leq g \leq 27.5
	@ 20 ms	17.6 \leq g \leq 22.6
	@ 30 ms	12.5 \leq g \leq 18.5
	Above 30 ms	29 g maximum
First Pendulum Decay to 5g	34 ms \leq time \leq 42 ms	37.5 ms
Plane D Rotation	64° \leq max. rotation \leq 78°	71.1 ms
	57 ms \leq time of max. rotation \leq 64 ms	59.4 ms
Time for Plane D Rotation to Cross 0° During First Rebound	113 ms \leq time \leq 128 ms	113.1 ms
Maximum Moment	65 lbf-ft \leq moment \leq 80 lbf-ft	97.1 lbf-ft
	47 ms \leq time of max. moment \leq 58 ms	50.1 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Flexion)	97 ms \leq time \leq 107 ms	97.5 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(1)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

- X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.


Signature

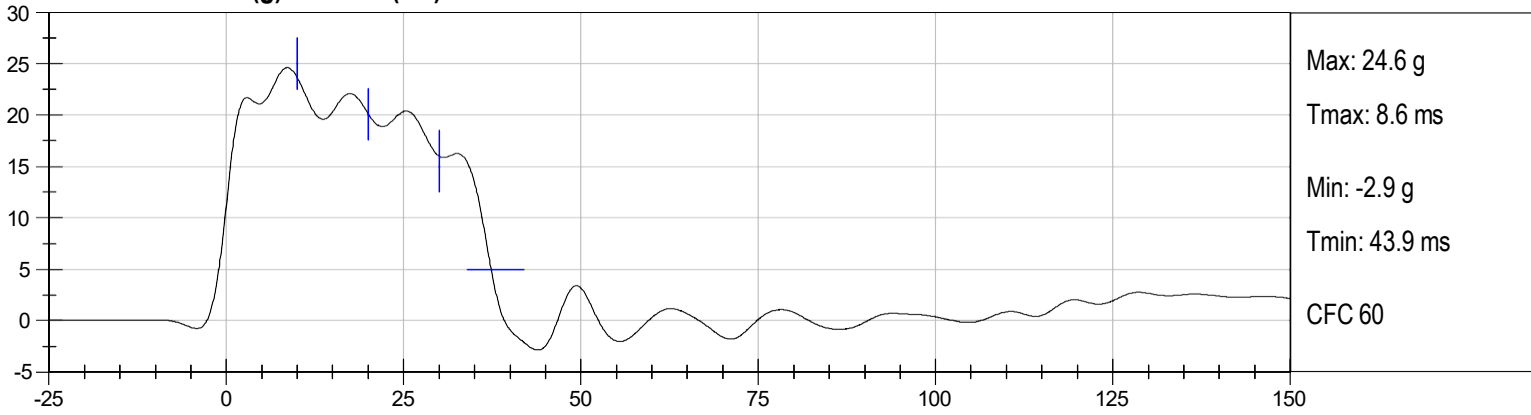
04/17/2025
Date



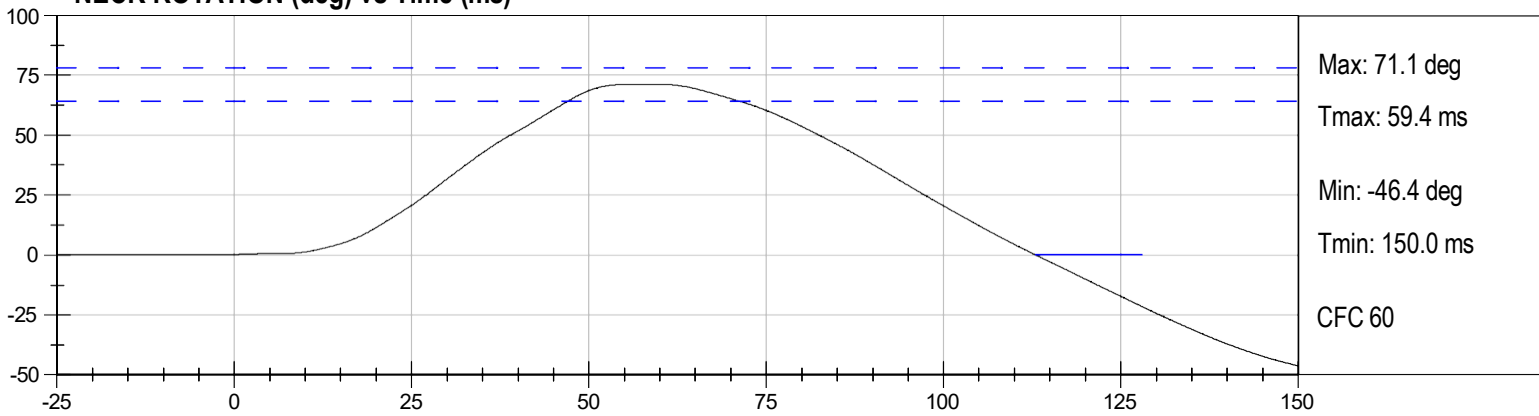
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration At 10 ms After T0	g	22.50 to 27.50	23.76	Pass
Pendulum Deceleration At 20 ms After T0	g	17.60 to 22.60	20.22	Pass
Pendulum Deceleration At 30 ms After T0	g	12.50 to 18.50	16.05	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 29.0	16.3	Pass
Deceleration Decay Time to Cross 5 g	ms	34.0 to 42.0	37.5	Pass
Maximum "D" Plane Rotation	deg	64.0 to 78.0	71.1	Pass
Time of Maximum "D" Plane Rotation	ms	57.0 to 64.0	59.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	113.0 to 128.0	113.1	Pass
Maximum Moment About Occipital Condyle	Nm	88.1 to 108.5	97.1	Pass
Time of Maximum Moment About Occipital Condyle	ms	47.0 to 58.0	50.1	Pass
Positive Moment Decay Time To Zero Crossing	ms	97.0 to 107.0	97.5	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N1561FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N1561MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025

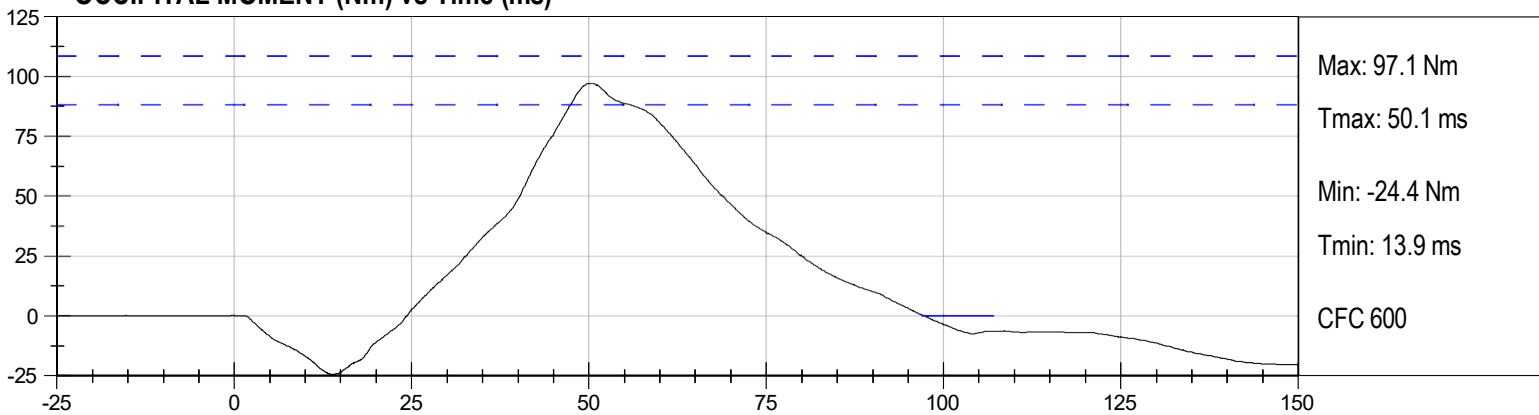
PEND. ACCEL. (g) vs Time (ms)



NECK ROTATION (deg) vs Time (ms)



OCCIPITAL MOMENT (Nm) vs Time (ms)



DATA SHEET A5
NECK EXTENSION TEST (572.33) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive extension tests are necessary)

1. It has been at least 30 minutes since the last extension test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 10A for the extension test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 19.5 ft/s to 20.3 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:
 Neck Extension Test Results (572.33(b)(2) & 572.133(c)(4))

Parameter	Specification	Results
Pendulum impact speed	19.5 ft/s \leq speed \leq 20.3 ft/s	19.62 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	17.2 \leq g \leq 21.2
	@ 20 ms	14 \leq g \leq 19
	@ 30 ms	11.0 \leq g \leq 16.0
	Above 30 ms	22 g maximum
First Pendulum Decay to 5g	38 ms \leq time \leq 46 ms	39.1 ms
Plane D Rotation	81° \leq max. rotation \leq 106°	99.1°
	72 ms \leq time of max. rotation \leq 82 ms	77.4 ms
Time for Plane D Rotation to Cross 0° During First Rebound	147 ms \leq time \leq 174 ms	154.6 ms
Maximum Moment	-59 lbf-ft \leq moment \leq -39 lbf-ft	-63.1 lbf-ft
	65 ms \leq time of max. moment \leq 79 ms	72.5 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Extension)	120 ms \leq time \leq 148 ms	138.6 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(2)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

- X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.


Signature

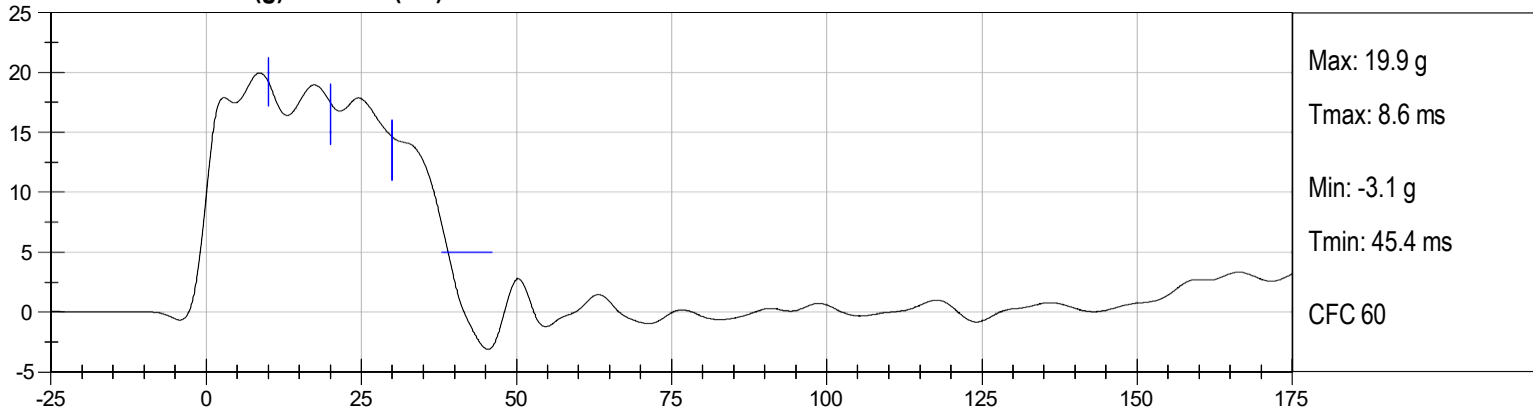
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Date



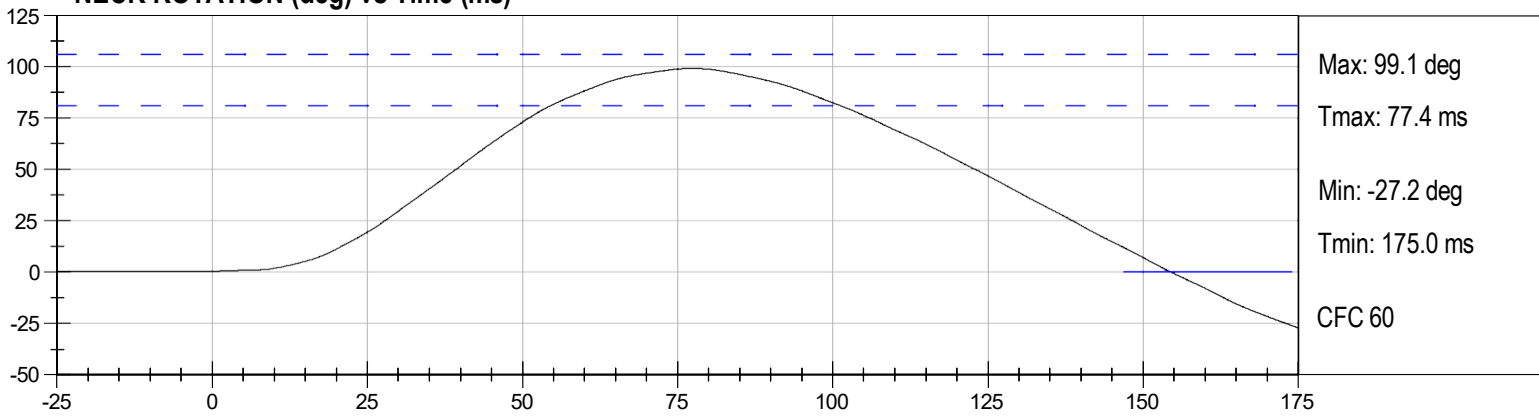
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration At 10 ms After T0	g	17.20 to 21.20	19.30	Pass
Pendulum Deceleration At 20 ms After T0	g	14.00 to 19.00	17.54	Pass
Pendulum Deceleration At 30 ms After T0	g	11.00 to 16.00	14.62	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 22.0	14.6	Pass
Deceleration Decay Time to Cross 5 G's	ms	38.0 to 46.0	39.1	Pass
Maximum "D" Plane Rotation	deg	81.0 to 106.0	99.1	Pass
Time of Maximum "D" Plane Rotation	ms	72.0 to 82.0	77.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	147.0 to 174.0	154.6	Pass
Minimum Moment About Occipital Condyle	Nm	-79.9 to -52.9	-63.1	Pass
Time of Minimum Moment About Occipital Condyle	ms	65.0 to 79.0	72.5	Pass
Negative Moment Decay Time To Zero Crossing	ms	120.0 to 148.0	138.6	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N1561FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N1561MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025

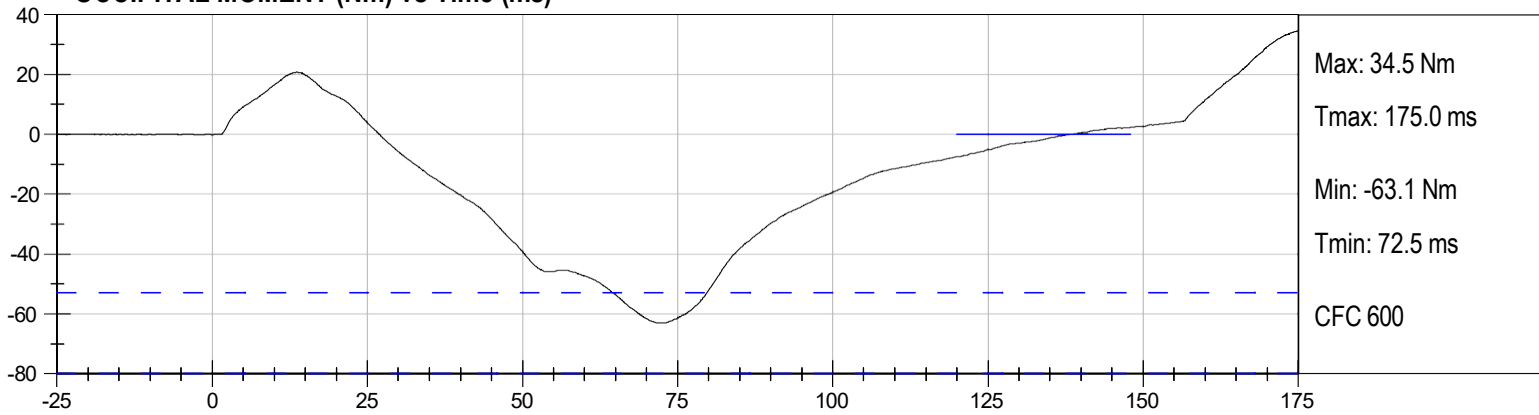
PEND. ACCEL. (g) vs Time (ms)



NECK ROTATION (deg) vs Time (ms)



OCCIPITAL MOMENT (Nm) vs Time (ms)



DATA SHEET A6
THORAX IMPACT TEST (572.34) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive thorax impact tests are necessary)

1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
 N/A, ONLY one thorax impact test performed
2. The test fixture conforms to the specifications in Figure 12A.
3. The complete assembled dummy (78051-218) is used (572.34(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. No shoes are worn. (572.34(b))
4. The dummy assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.34(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.6°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>26%</u> |
| Record the minimum humidity: | <u>16%</u> |
5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material (78051-17 thru 78051-22), chest displacement transducer assembly (78051-317) and the rear rib supports (78051-304). Inspect for rib deformation using the chest depth gage (83-5006-007). If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
- No Damage
 - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage

 - The following repairs or replacement was performed. Record:

- X 6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 12A. The surface must be long enough to support the pelvis and outstretched legs. (572.34(c)(2))
- X 7. Level the ribs both longitudinally and laterally $\pm 0.5^\circ$ and adjust the pelvis angle to $13^\circ \pm 2^\circ$. The angle may be measured using the special H-point tool (78051-532) that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block. (572.34(c)(2))
- X 8. The midsagittal plane of the dummy is vertical within $\pm 1^\circ$. (572.134(c)(3))
- X 9. The longitudinal centerline of the test probe is centered within ± 2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1 mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5° of a horizontal line in the dummy's midsagittal plane. (572.34(c)(4))
- X 10. Align the adjustable neck bracket index marks to the "zero" position. (Figure 12A)
- X 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to locations such as the rear surfaces of the thoracic spine and the lower neck bracket. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.
- X 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.
- X 13. Place the arm assemblies horizontal $\pm 2^\circ$ and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.
- X 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 Class 180.
- X 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2° of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.34(c)(5)) The velocity of the test probe at the time of impact is 22 f/s ± 0.4 f/s. (572.34(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.34(c)(6))

X 16. Complete the following table:

Thorax Impact Results (572.34(b))

Parameter*	Specification	Result
Test Probe Speed	21.6 ft/s ≤ speed ≤ 22.4 ft/s	21.92 ft/s
Chest Compression	2.5 in. ≤ compression ≤ 2.86 in.	2.57 in.
Peak resistance force**	1160 lb ≤ peak force ≤ 1325 lb	1245 lb
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	73 %

*Time zero is defined as the time of initial contact between the test probe and the chest skin.

**Force = impactor mass x acceleration (572.34(b))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve.

X 17. Plots of chest compression, pendulum acceleration, pendulum speed, and force, follow this sheet.


Signature

04/17/2025
Date

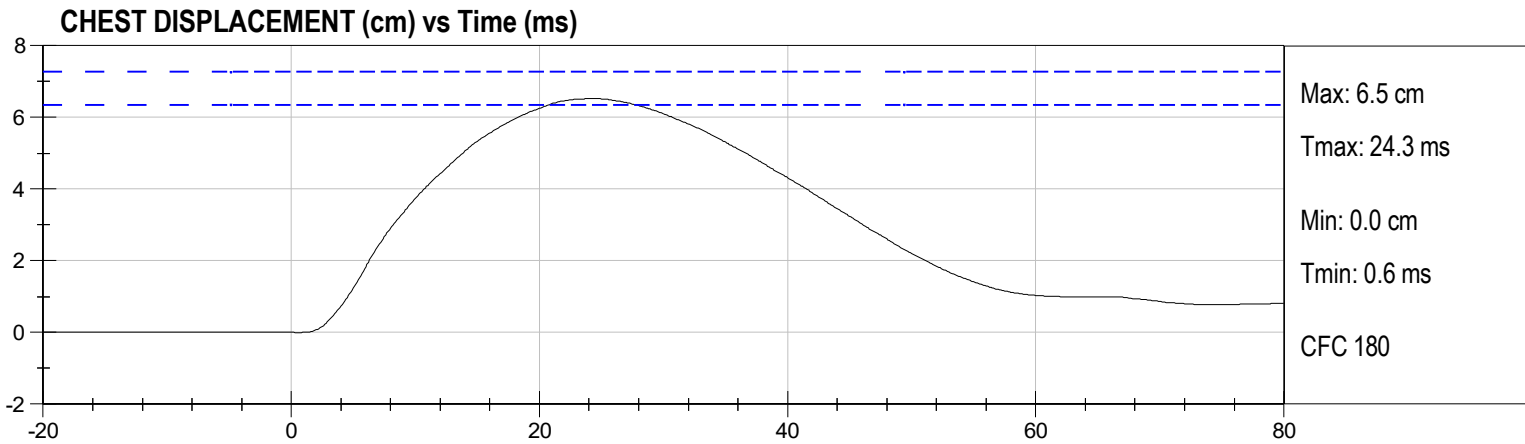
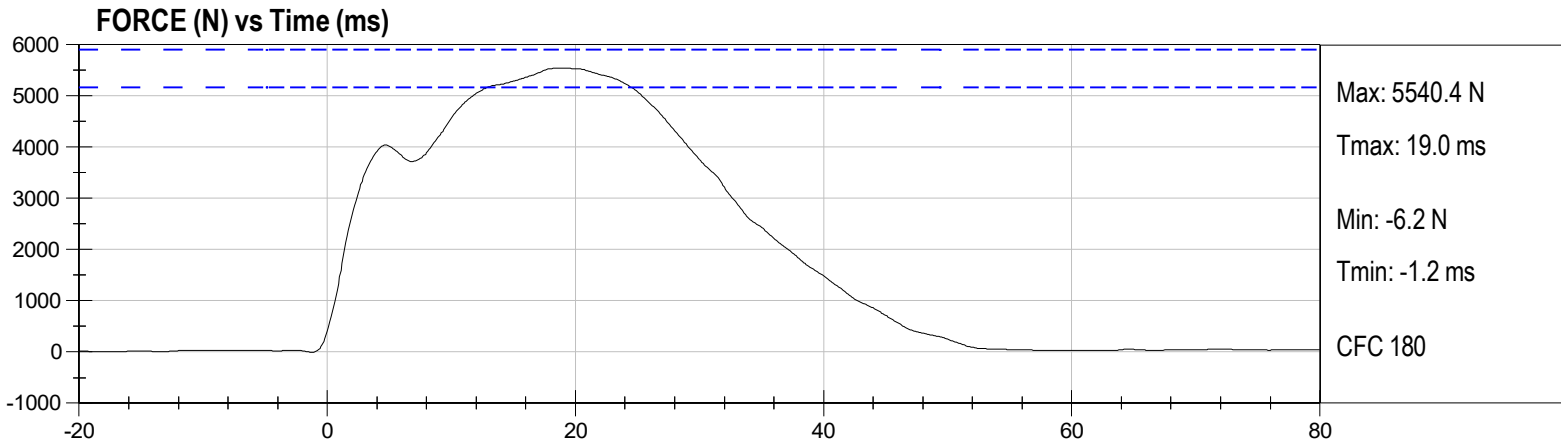
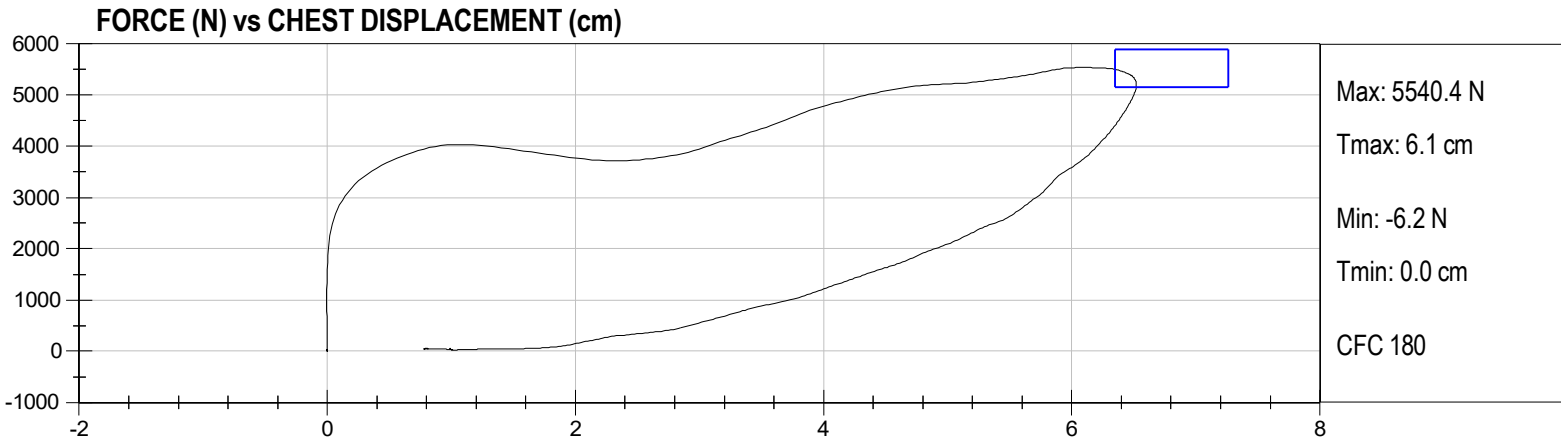


Thorax Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 04/17/2025
Test ID: D251174
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5540	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.52	Pass
Internal Hysteresis	%	69 to 85	73	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	03/21/2025	9/20/2025
CHEST DISPLACEMENT	Humanetics	401	04/14/2025	10/14/2025



DATA SHEET A7
LEFT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-001) with the upper leg assembly (78051-46) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.5°C</u> |
| Record the minimum temperature: | <u>20.2°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	6.8 ft/s \leq speed \leq 7.0 ft/s	6.96 ft/s
Peak resistance force*	1060 lb \leq force \leq 1300 lb	1264 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

04/17/2025
Date

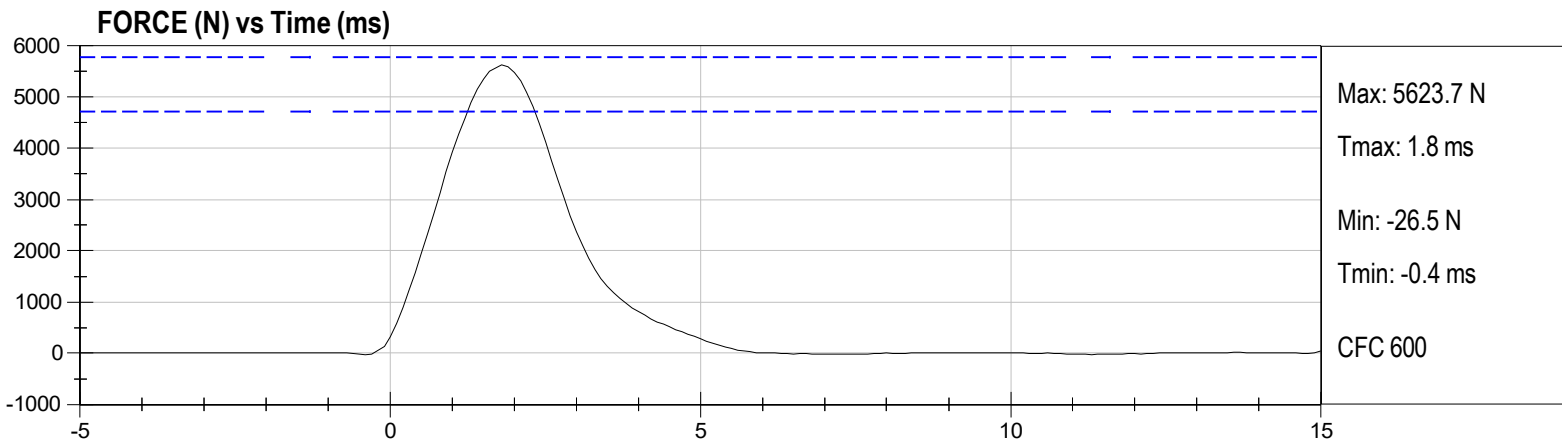


Left Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 04/17/2025
Test ID: D251176
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5624	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A8
RIGHT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-002) with the upper leg assembly (78051-47) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.5°C</u> |
| Record the minimum temperature: | <u>20.2°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))


X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	6.8 ft/s \leq speed \leq 7.0 ft/s	6.92 ft/s
Peak resistance force*	1060 lb \leq force \leq 1300 lb	1238 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

04/17/2025
Date

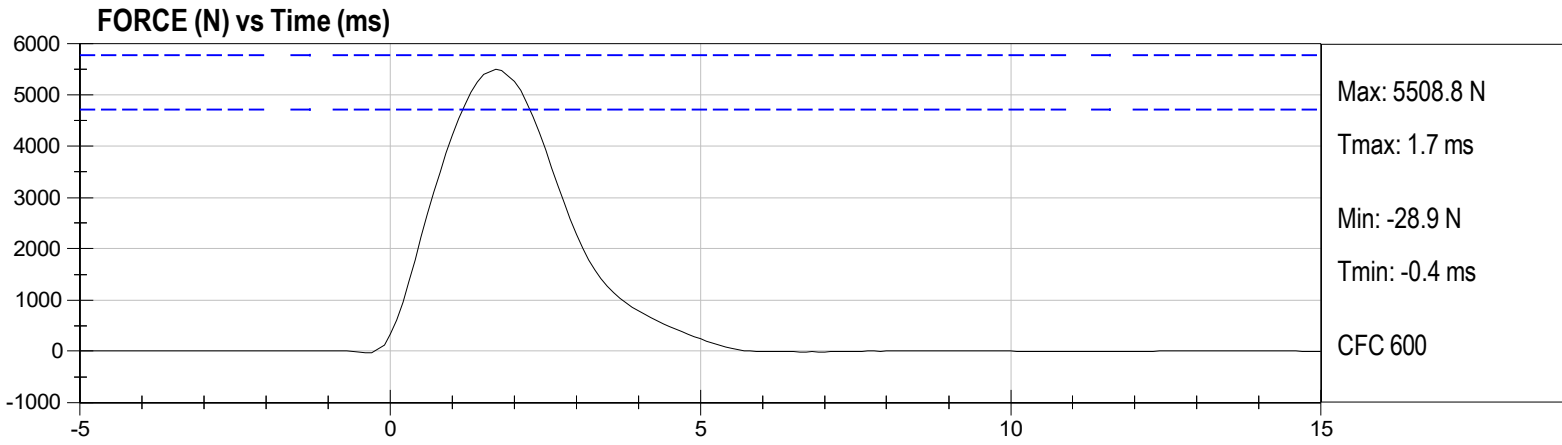


Right Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 04/17/2025
Test ID: D251175
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5509	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A9

HIP JOINT-FEMUR FLEXION (572.35(c)) (50th Male)

Dummy Serial Number: 401

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
- Post test calibration verification

Test attempt no. 1 (when successive hip joint-femur flexion tests are necessary)

- 1. It has been at least 30 minutes since the last hip joint-femur flexion test. (572.36(m))
 - N/A, ONLY one hip joint-femur flexion test performed

- 2. The test fixture conforms to the specifications in Figure 17A.

- 3. Use the assembled dummy (78051-218) except (572.35(c)(2)):
 - 3.1 remove the leg assemblies (86-5001-001 & 002) by removing 3/8-16 Socket Head Cap Screw and retaining the structural assembly of the upper legs (78051-43 & 44)
 - 3.2 remove the abdominal insert (78051-52)
 - 3.3 replace the instrument cover plate (78051-13) in the pelvic bone with a rigid pelvic bone stabilizer insert (Figure 15A) and attach the pelvis upper support device (Figure 16A).

- 4. The assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(c)(v))

Record the maximum temperature:	<u>21.8°C</u>
Record the minimum temperature:	<u>20.5°C</u>
Record the maximum humidity:	<u>29%</u>
Record the minimum humidity:	<u>19%</u>

- 5. Seat the dummy on the rigid seat fixture. (572.35(c)(2)(ii))
- 6. Secure the dummy by bolting the stabilizer insert and the pelvis upper support device to the seat back of the test fixture as shown in Figures 17A, 18A, and 19A. (572.35(c)(2)(ii))
- 7. Adjust the threaded rods until plane B is horizontal.
- 8. Secure the lever arm into the left femur shaft opening of the upper leg structure assembly (78051-43) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))
- 9. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline

horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:

Left Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.4°/s
Femur Torque at 30°	Torque ≤ 70 ft-lbf	3.01 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	42.9°


- X 11. Secure the lever arm into the right femur shaft opening of the upper leg structure assembly (78051-44) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))

- X 12. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:

Right Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.4°/s
Femur Torque at 30°	torque ≤ 70 ft-lbf	3.01 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	42.5°


Signature

04/17/2025
Date

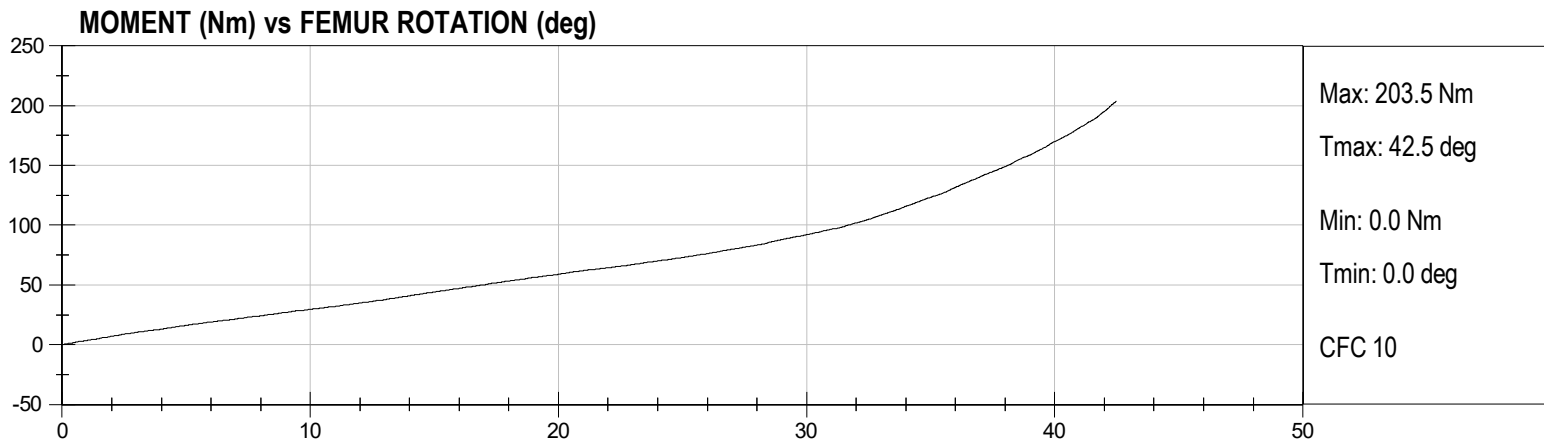


Right Hip-Femur Flexion Test
 Hybrid III 50th Percentile Male
 ATD Serial No: 401

Test Date: 04/17/2025
 Test ID: D251179
 Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	Pass
Moment at 30 Degrees	Nm	<= 94.9	91.9	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	42.5	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025





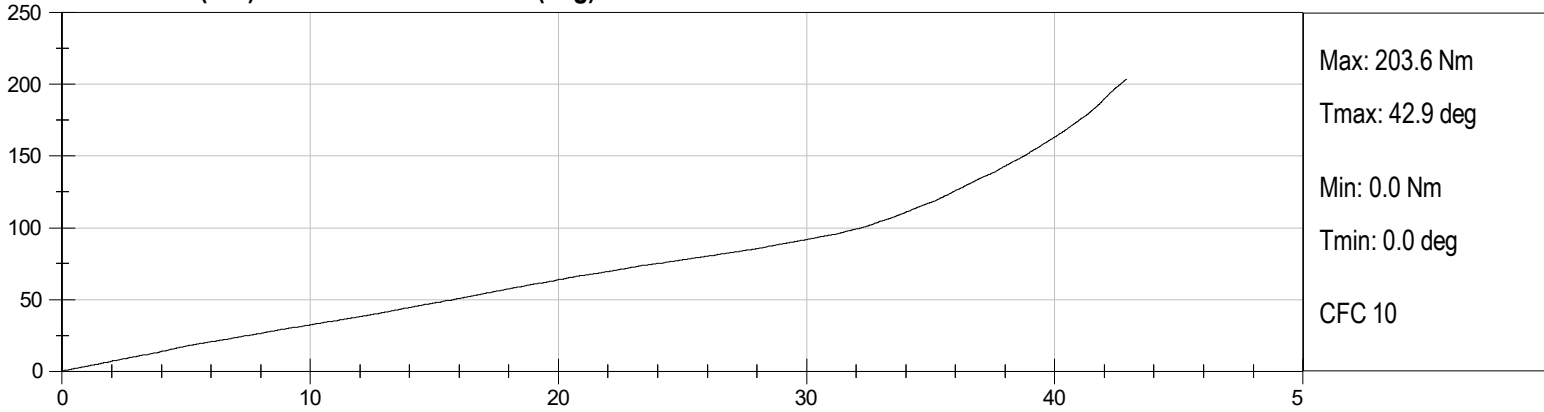
Left Hip-Femur Flexion Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 04/17/2025
Test ID: D251170
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	Pass
Moment at 30 Degrees	Nm	<= 94.9	91.8	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	42.9	Pass


Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025

MOMENT (Nm) vs FEMUR ROTATION (deg)



DATA SHEET A10
PART 572 INSTRUMENTATION CALIBRATION INFORMATION

I.D. NO.	MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF LAST CALIBRATION	DATE OF NEXT CALIBRATION
DUMMY INSTRUMENTATION					
HEAD ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AL6Y2	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	C19386	05/07/2025	11/06/2025
(3) VERTICAL	Endevco	7231C-750	C12811	04/14/2025	10/14/2025
NECK TRANSDUCER	Denton	1716A	N252FX	02/05/2025	08/07/2025
CHEST ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AGH70	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	AGH55	04/14/2025	10/14/2025
(3) VERTICAL	Endevco	7231C-750	AGH72	04/14/2025	10/14/2025
CHEST POTENTIOMETER	Humanetics	78051-317	401	04/14/2025	10/14/2025
FEMUR LOAD CELLS					
(1) RIGHT FEMUR	Denton	2121AJTF	F2026FZ	04/14/2025	10/14/2025
(2) LEFT FEMUR	Denton	2121AJTF	F2027FZ	04/14/2025	10/14/2025
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER	Endevco	7231C-750	AH5P1	01/13/2025	07/15/2025
THORAX PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-360M17	P79577	03/21/2025	09/20/2025
KNEE PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-360M17	P82128	12/03/2024	06/04/2025
NECK ROTATION TRANSDUCER 1 (OPTIONAL)	Servo	14CBI-2897	4707	02/25/2025	08/27/2025
NECK ROTATION TRANSDUCER 2 (OPTIONAL)	Servo	14CBI-2897	7297	02/25/2025	08/27/2025

LABORATORY TECHNICIAN: 

DATA SHEET A3
HEAD DROP TEST (572.32) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive head drops are necessary)

1. It has been at least 2 hours since the last head drop. (572.32(c)(5))
 N/A, ONLY one head drop performed
2. The head assembly consists of the complete head (78051-61X), the neck transducer structural replacement (78051-383X), and three (3) accelerometers. (572.32(b))
3. Torque the skull cap screws to 160 lbf-in.
4. Accelerometers and their respective mounts are smooth and clean.
5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J2111/1 MAR95. (572.35(i))
6. The head assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.1°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
7. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No Damage
8. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.32(c)(2))

X 9. Suspend and orient the head assembly as shown in Figure 6A. The lowest point on the forehead is 0.5 in. below the lowest point on the dummy's nose when the midsagittal plane is vertical. (572.32(c)(3))

Record the actual distance: 0.5 inches

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

X 10. The 1.6 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 7A.

Record the right side distance: 501 mm

Record the left side distance: 501 mm

X 11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.32(c)(4))

Record actual micro finish: 24.8 micro inches

X 12. The impact surface is rigidly supported. (572.132(c)(4))

X 13. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (Figure 6A)

Record thickness: 50.9 mm

Record width: 604 mm

Record length: 595 mm

X 14. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches \pm 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.32(b) & (572.32(c)(4))

X 16. Complete the following table using channel class 1000 data. (572.36(i)):

Parameter	Specification	Result
Peak resultant acceleration	$225 \text{ g} \leq x \leq 275 \text{ g}$	265 g
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration $\leq 15 \text{ g}$	-3.3 g

X 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.


Signature

05/09/2025
Date

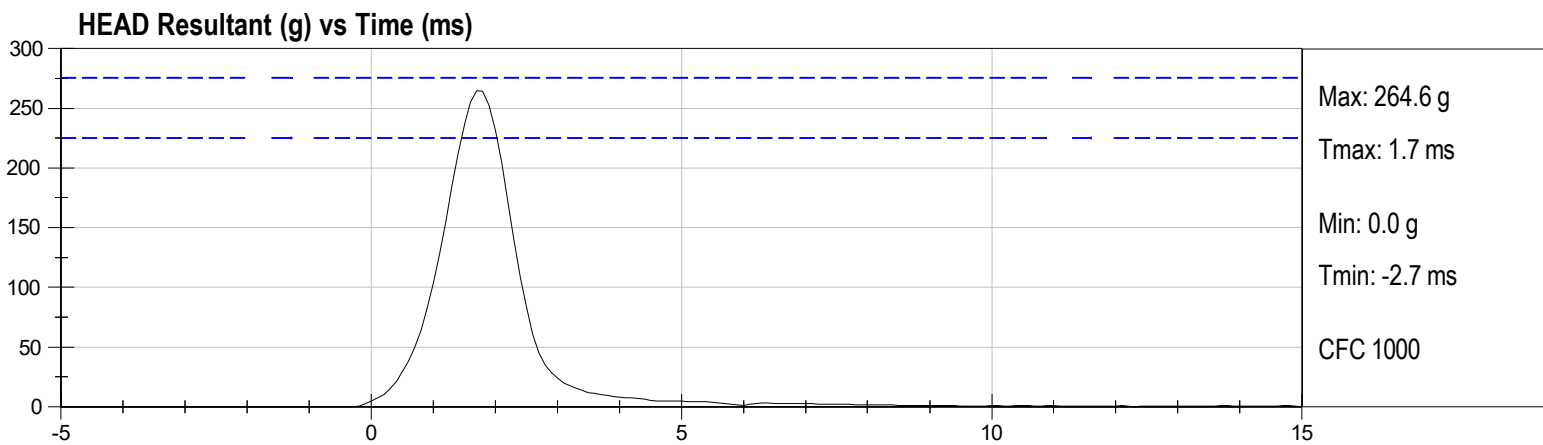
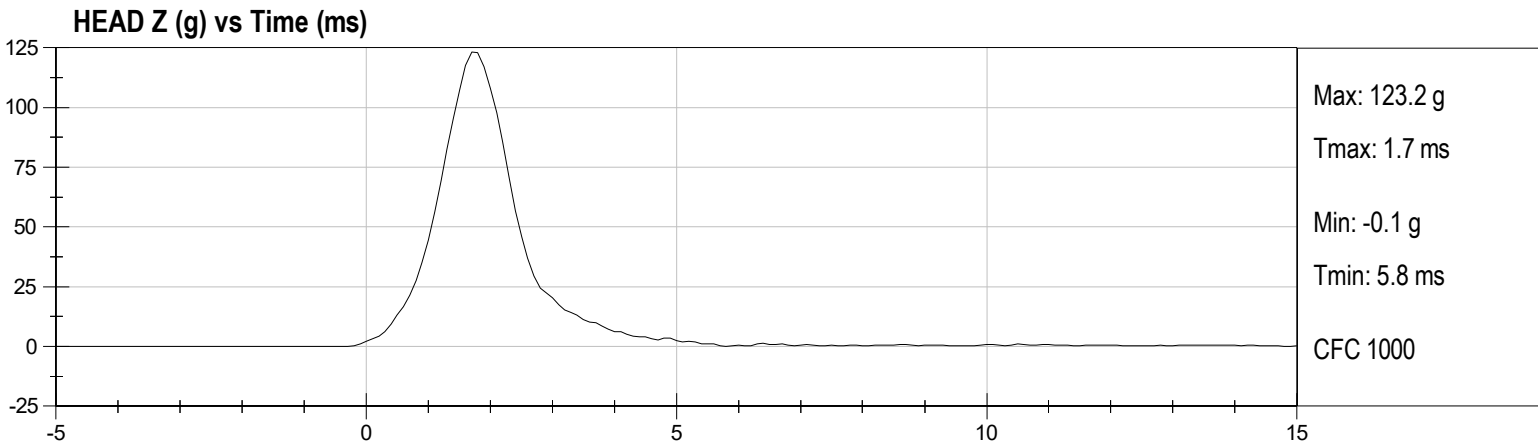
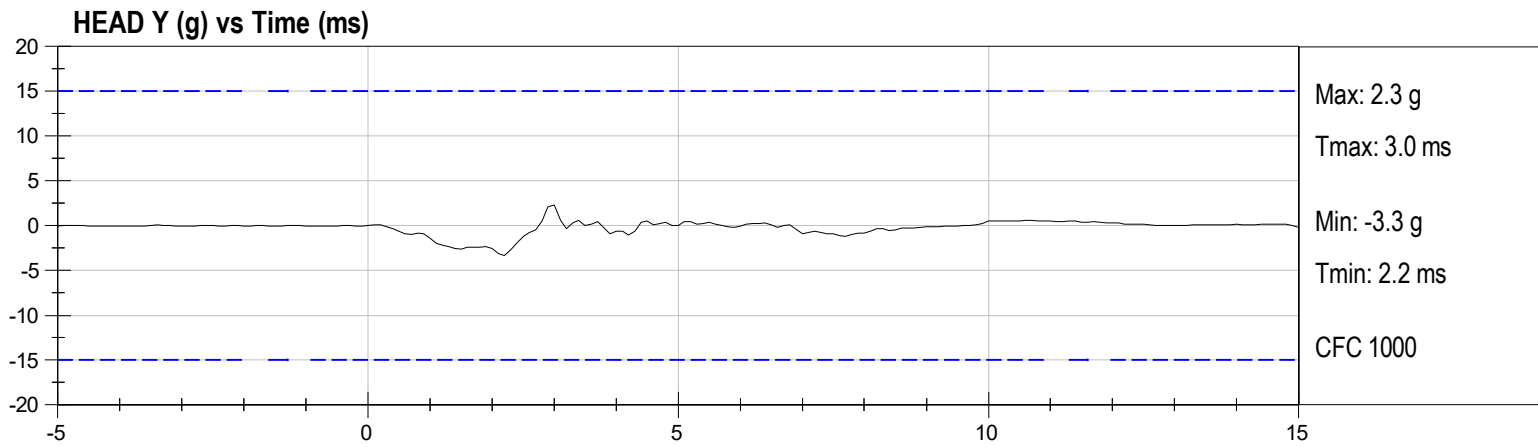
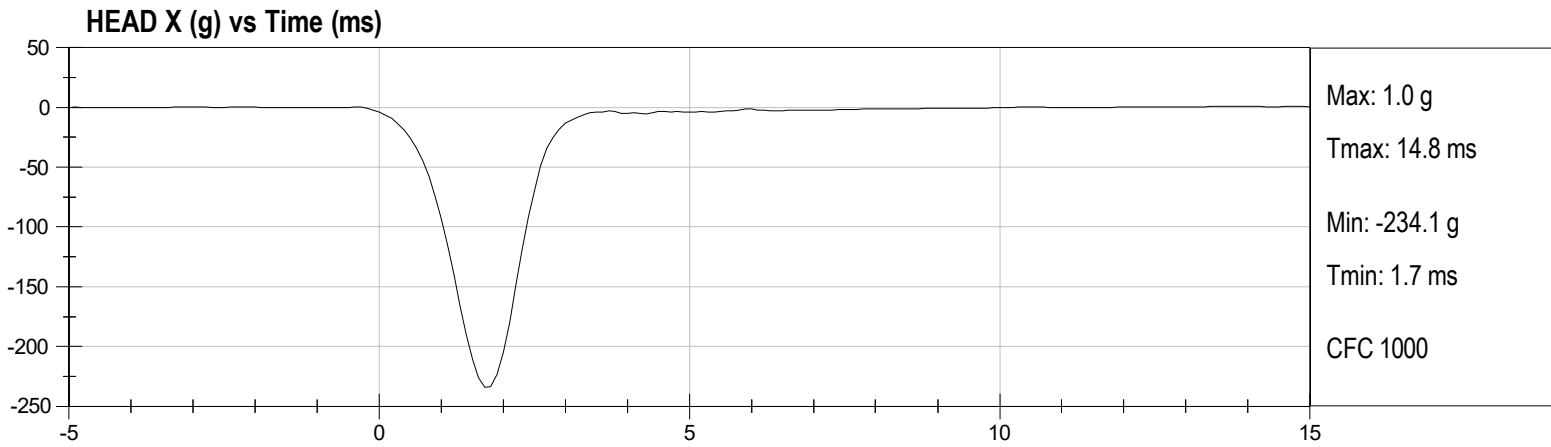


Head Drop Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 05/09/2025
Test ID: D251381
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	g	225 to 275	265	Pass
Peak Lateral Acceleration	g	-15.0 to 15.0	-3.3	Pass
Unimodal	%	within 10% of peak	2	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
HEAD X	Endevco	T30974	11/25/2024	5/27/2025
HEAD Y	Endevco	T30975	11/25/2024	5/27/2025
HEAD Z	Endevco	T30976	11/25/2024	5/27/2025



DATA SHEET A4
NECK FLEXION TEST (572.33) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive flexion tests are necessary)

1. It has been at least 30 minutes since the last flexion test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>21.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9A for the flexion test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 22.6 to 23.4 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:

Neck Flexion Test Results (572.33(b)(1) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	22.6 ft/s \leq speed \leq 23.4 ft/s	22.74 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	22.5 \leq g \leq 27.5
	@ 20 ms	17.6 \leq g \leq 22.6
	@ 30 ms	12.5 \leq g \leq 18.5
	Above 30 ms	29 g maximum
First Pendulum Decay to 5g	34 ms \leq time \leq 42 ms	41.1 ms
Plane D Rotation	64° \leq max. rotation \leq 78°	68.3°
	57 ms \leq time of max. rotation \leq 64 ms	57.3 ms
Time for Plane D Rotation to Cross 0° During First Rebound	113 ms \leq time \leq 128 ms	113.4 ms
Maximum Moment	65 lbf-ft \leq moment \leq 80 lbf-ft	2.97 lbf-ft
	47 ms \leq time of max. moment \leq 58 ms	52.9 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Flexion)	97 ms \leq time \leq 107 ms	98.8 ms


*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(1)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.


Signature

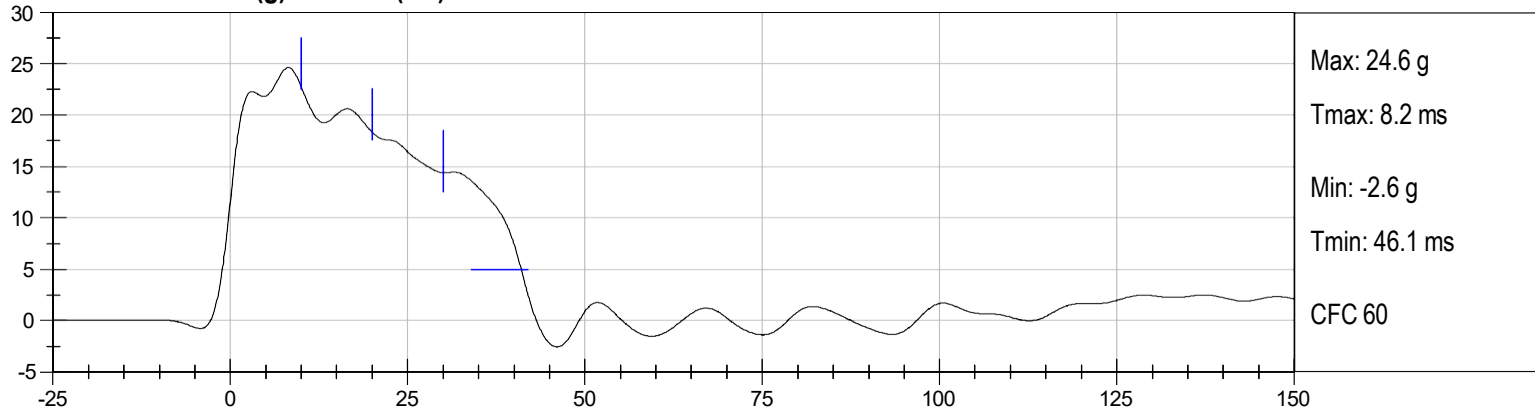
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Date



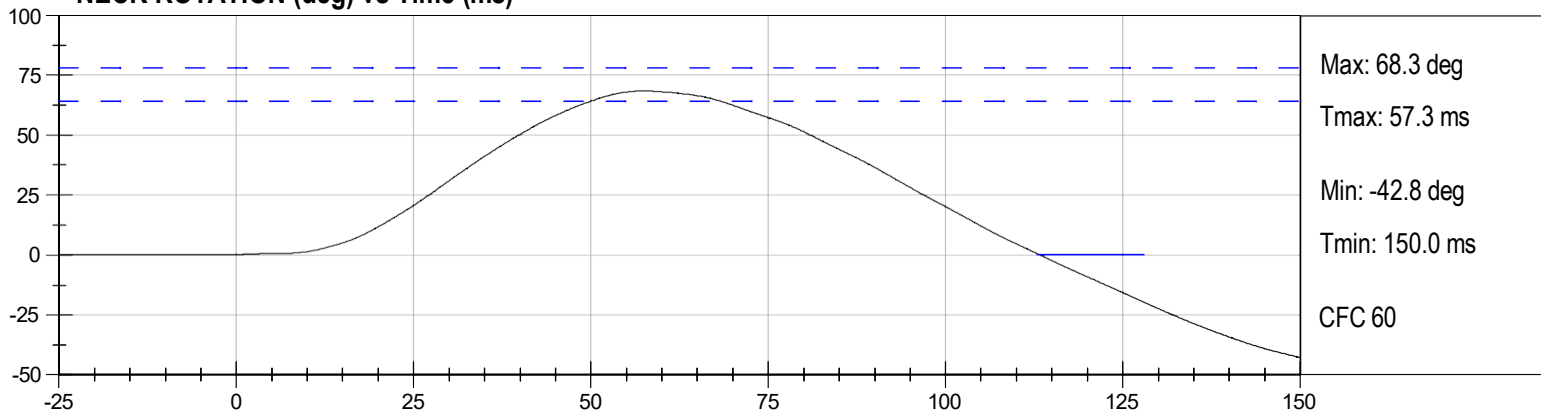
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.93	Pass
Pendulum Deceleration At 10 ms After T0	g	22.50 to 27.50	22.90	Pass
Pendulum Deceleration At 20 ms After T0	g	17.60 to 22.60	18.40	Pass
Pendulum Deceleration At 30 ms After T0	g	12.50 to 18.50	14.39	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 29.0	14.5	Pass
Deceleration Decay Time to Cross 5 g	ms	34.0 to 42.0	41.1	Pass
Maximum "D" Plane Rotation	deg	64.0 to 78.0	68.3	Pass
Time of Maximum "D" Plane Rotation	ms	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	113.0 to 128.0	113.4	Pass
Maximum Moment About Occipital Condyle	Nm	88.1 to 108.5	90.6	Pass
Time of Maximum Moment About Occipital Condyle	ms	47.0 to 58.0	52.9	Pass
Positive Moment Decay Time To Zero Crossing	ms	97.0 to 107.0	98.8	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N252FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N252MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025

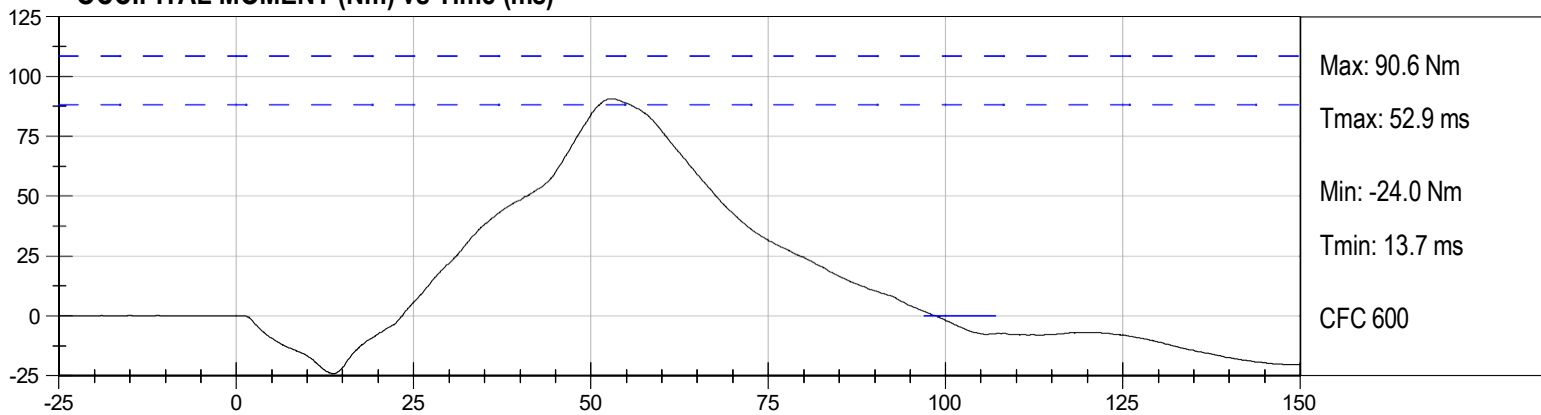
PEND. ACCEL. (g) vs Time (ms)



NECK ROTATION (deg) vs Time (ms)



OCCIPITAL MOMENT (Nm) vs Time (ms)



DATA SHEET A5
NECK EXTENSION TEST (572.33) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive extension tests are necessary)

1. It has been at least 30 minutes since the last extension test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 10A for the extension test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 19.5 ft/s to 20.3 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:

Neck Extension Test Results (572.33(b)(2) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	19.5 ft/s \leq speed \leq 20.3 ft/s	19.62 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	17.2 \leq g \leq 21.2
	@ 20 ms	14 \leq g \leq 19
	@ 30 ms	11.0 \leq g \leq 16.0
	Above 30 ms	22 g maximum
First Pendulum Decay to 5g	38 ms \leq time \leq 46 ms	44.5 ms
Plane D Rotation	81° \leq max. rotation \leq 106°	95.9°
	72 ms \leq time of max. rotation \leq 82 ms	78.7 ms
Time for Plane D Rotation to Cross 0° During First Rebound	147 ms \leq time \leq 174 ms	156.1 ms
Maximum Moment	-59 lbf-ft \leq moment \leq -39 lbf-ft	-1.90 lbf-ft
	65 ms \leq time of max. moment \leq 79 ms	75.3 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Extension)	120 ms \leq time \leq 148 ms	139.8 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(2)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

- X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.


Signature

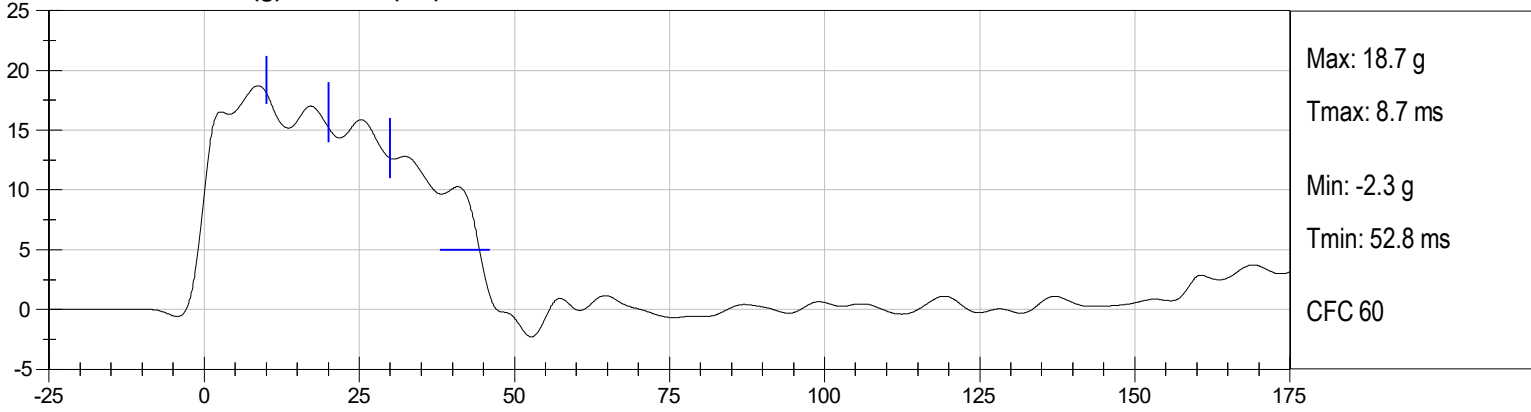
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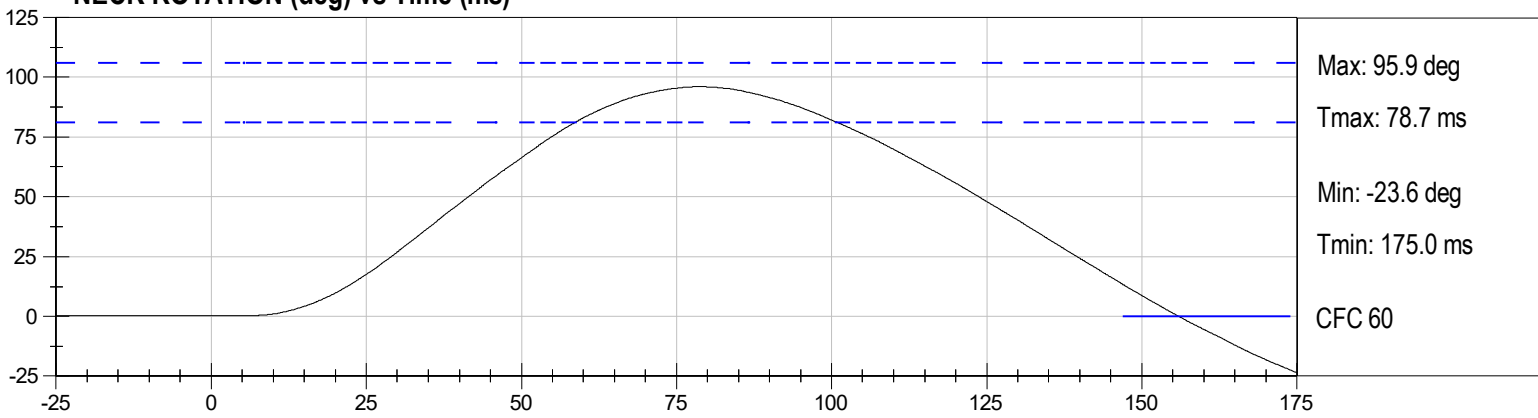
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration At 10 ms After T0	g	17.20 to 21.20	18.19	Pass
Pendulum Deceleration At 20 ms After T0	g	14.00 to 19.00	15.30	Pass
Pendulum Deceleration At 30 ms After T0	g	11.00 to 16.00	12.66	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 22.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's	ms	38.0 to 46.0	44.5	Pass
Maximum "D" Plane Rotation	deg	81.0 to 106.0	95.9	Pass
Time of Maximum "D" Plane Rotation	ms	72.0 to 82.0	78.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	147.0 to 174.0	156.1	Pass
Minimum Moment About Occipital Condyle	Nm	-79.9 to -52.9	-58.0	Pass
Time of Minimum Moment About Occipital Condyle	ms	65.0 to 79.0	75.3	Pass
Negative Moment Decay Time To Zero Crossing	ms	120.0 to 148.0	139.8	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N252FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N252MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025

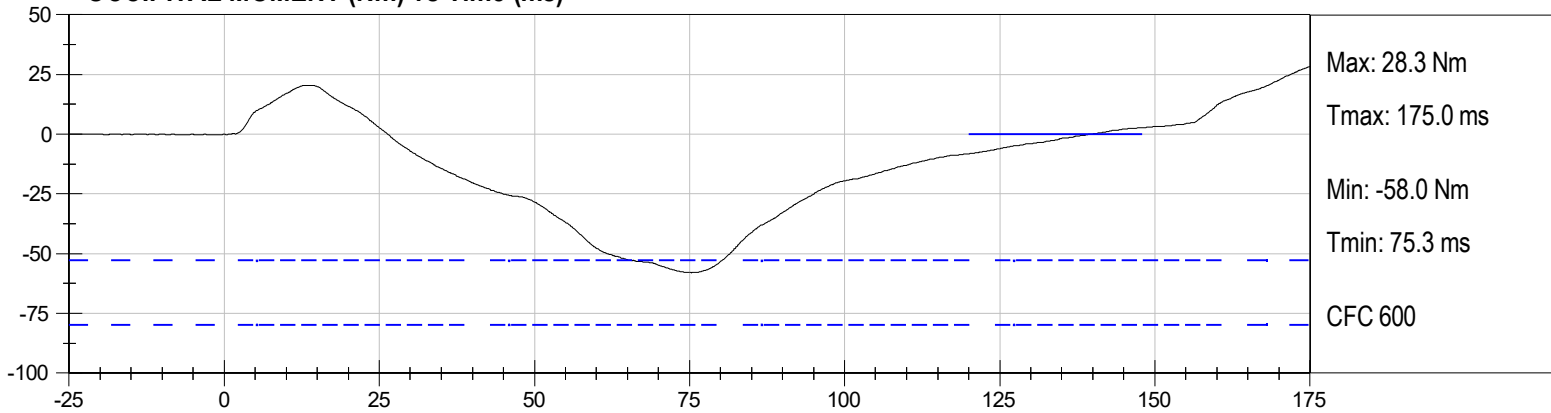
PEND. ACCEL. (g) vs Time (ms)



NECK ROTATION (deg) vs Time (ms)



OCCIPITAL MOMENT (Nm) vs Time (ms)



DATA SHEET A6
THORAX IMPACT TEST (572.34) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive thorax impact tests are necessary)

1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
 N/A, ONLY one thorax impact test performed
2. The test fixture conforms to the specifications in Figure 12A.
3. The complete assembled dummy (78051-218) is used (572.34(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. No shoes are worn. (572.34(b))
4. The dummy assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.34(c)(1))

Record the maximum temperature:	<u>21.7°C</u>
Record the minimum temperature:	<u>20.6°C</u>
Record the maximum humidity:	<u>27%</u>
Record the minimum humidity:	<u>17%</u>

5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material (78051-17 thru 78051-22), chest displacement transducer assembly (78051-317) and the rear rib supports (78051-304). Inspect for rib deformation using the chest depth gage (83-5006-007). If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.

- No Damage
 - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage:

 - The following repairs or replacement was performed. Record:

6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture

- _____ surface as shown in Figure 12A. The surface must be long enough to support the pelvis and outstretched legs. (572.34(c)(2))
- X 7. Level the ribs both longitudinally and laterally $\pm 0.5^\circ$ and adjust the pelvis angle to $13^\circ \pm 2^\circ$. The angle may be measured using the special H-point tool (78051-532) that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block. (572.34(c)(2))
- X 8. The midsagittal plane of the dummy is vertical within $\pm 1^\circ$. (572.134(c)(3))
- X 9. The longitudinal centerline of the test probe is centered within ± 2.5 mm of the midsagittal plane of the dummy and is $12.7 \text{ mm} \pm 1 \text{ mm}$ below the horizontal peripheral centerline of the No. 3 rib and is within 0.5° of a horizontal line in the dummy's midsagittal plane. (572.34(c)(4))
- X 10. Align the adjustable neck bracket index marks to the "zero" position. (Figure 12A)
- X 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to locations such as the rear surfaces of the thoracic spine and the lower neck bracket. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.
- X 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.
- X 13. Place the arm assemblies horizontal $\pm 2^\circ$ and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.
- X 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 Class 180.
- X 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2° of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.34(c)(5)) The velocity of the test probe at the time of impact is $22 \text{ f/s} \pm 0.4 \text{ f/s}$. (572.34(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.34(c)(6))
- X 16. Complete the following table:

Thorax Impact Results (572.34(b))

Parameter*	Specification	Result
Test Probe Speed	21.6 ft/s ≤ speed ≤ 22.4 ft/s	259.84 ft/s
Chest Compression	2.5 in. ≤ compression ≤ 2.86 in.	2.56 in.
Peak resistance force**	1160 lb ≤ peak force ≤ 1325 lb	1249 lb
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	73 %

*Time zero is defined as the time of initial contact between the test probe and the chest skin.

**Force = impactor mass x acceleration (572.34(b))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve.

- X 17. Plots of chest compression, pendulum acceleration, pendulum speed, and force, follow this sheet.


Signature

05/09/2025
Date

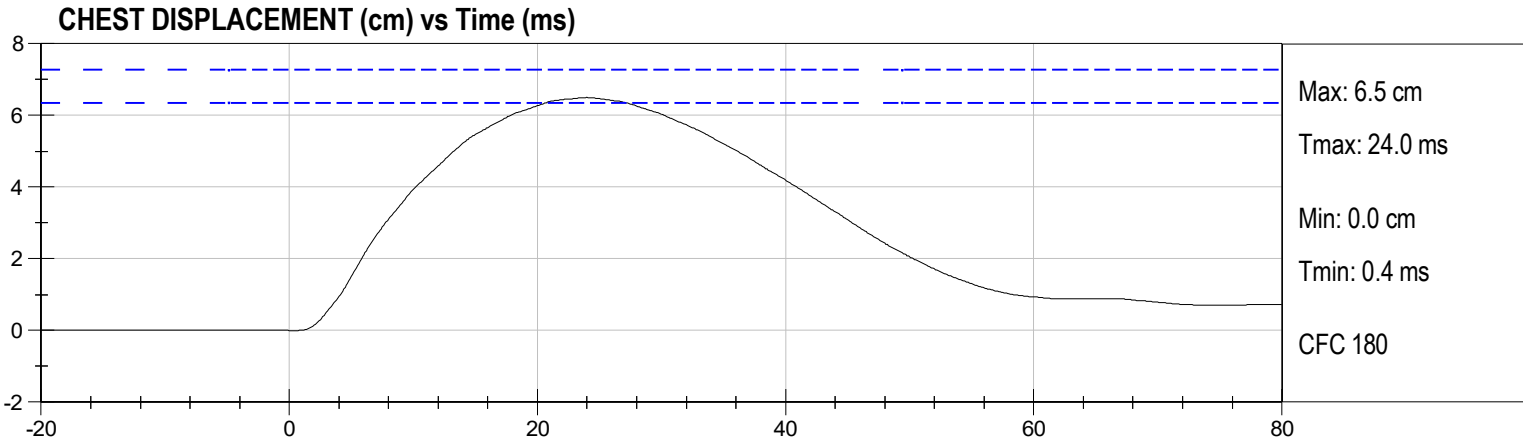
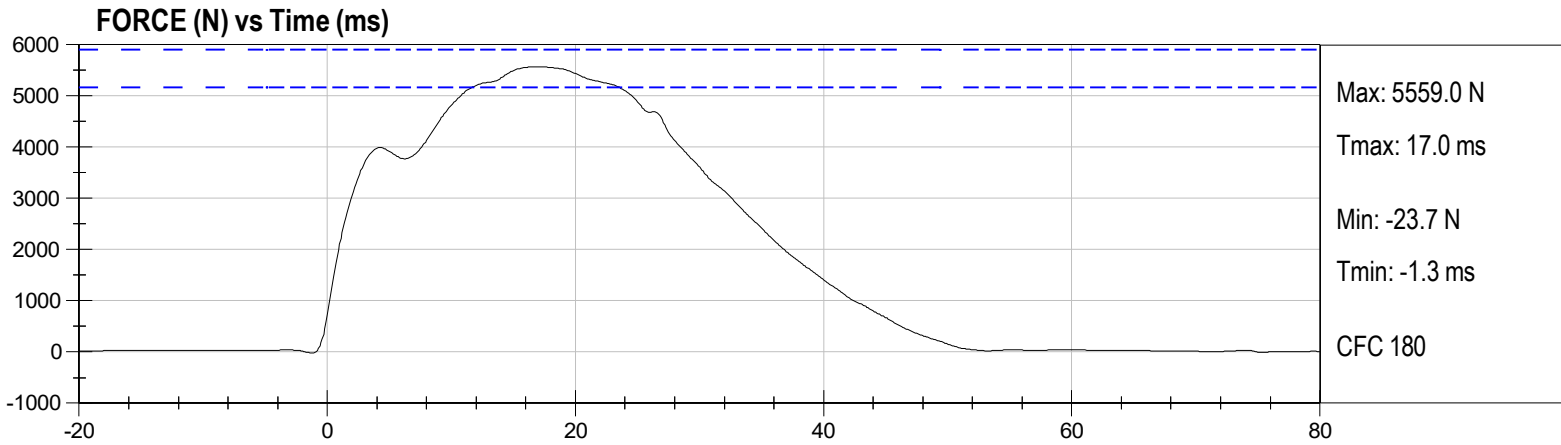
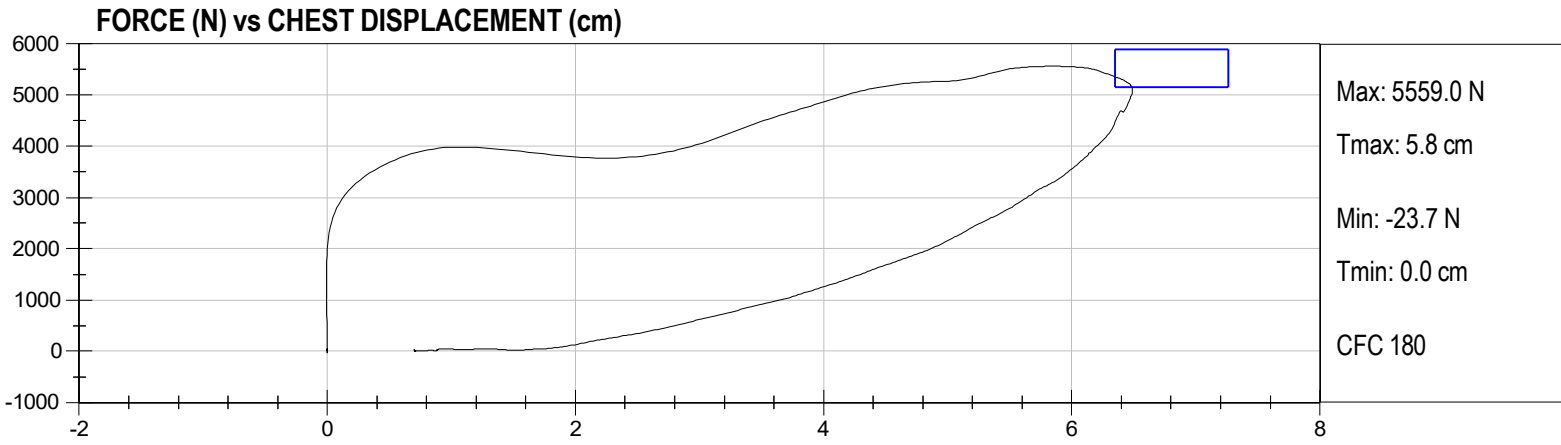


Thorax Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 05/09/2025
Test ID: D251384
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5559	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.49	Pass
Internal Hysteresis	%	69 to 85	73	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	03/21/2025	9/20/2025
CHEST DISPLACEMENT	Humanetics	401	04/14/2025	10/14/2025



DATA SHEET A7
LEFT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-001) with the upper leg assembly (78051-46) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	6.8 ft/s \leq speed \leq 7.0 ft/s	6.92 ft/s
Peak resistance force*	1060 lb \leq force \leq 1300 lb	1266 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

05/09/2025
Date

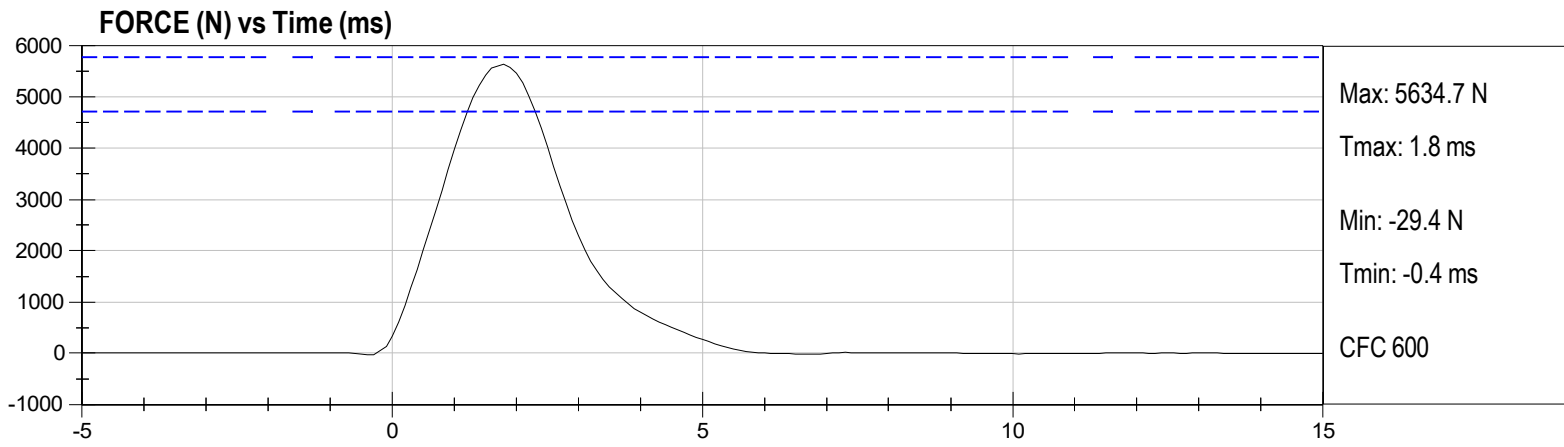


Left Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 05/09/2025
Test ID: D251386
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5635	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A8
RIGHT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-002) with the upper leg assembly (78051-47) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	6.8 ft/s \leq speed \leq 7.0 ft/s	6.99 ft/s
Peak resistance force*	1060 lb \leq force \leq 1300 lb	1253 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

05/09/2025
Date

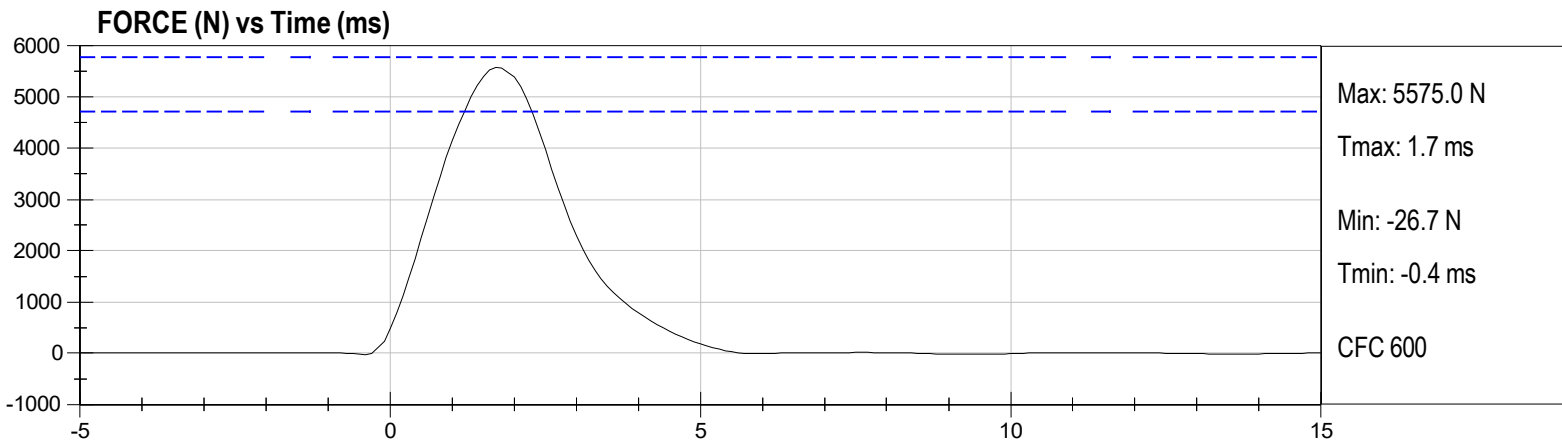


Right Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 401

Test Date: 05/09/2025
Test ID: D251385
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5575	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A9
HIP JOINT-FEMUR FLEXION (572.35(c)) (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive hip joint-femur flexion tests are necessary)

1. It has been at least 30 minutes since the last hip joint-femur flexion test. (572.36(m))
 N/A, ONLY one hip joint-femur flexion test performed
2. The test fixture conforms to the specifications in Figure 17A.
3. Use the assembled dummy (78051-218) except (572.35(c)(2)):
 3.1 remove the leg assemblies (86-5001-001 & 002) by removing 3/8-16 Socket Head Cap Screw and retaining the structural assembly of the upper legs (78051-43 & 44)
 3.2 remove the abdominal insert (78051-52)
 3.3 replace the instrument cover plate (78051-13) in the pelvic bone with a rigid pelvic bone stabilizer insert (Figure 15A) and attach the pelvis upper support device (Figure 16A).
4. The assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(c)(v))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.1°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Seat the dummy on the rigid seat fixture. (572.35(c)(2)(ii))
6. Secure the dummy by bolting the stabilizer insert and the pelvis upper support device to the seat back of the test fixture as shown in Figures 17A, 18A, and 19A. (572.35(c)(2)(ii))
7. Adjust the threaded rods until plane B is horizontal.
8. Secure the lever arm into the left femur shaft opening of the upper leg structure assembly (78051-43) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))
9. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline

horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Left Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	5°/s ≤ rotation rate ≤ 10°/s	6.4°/s
Femur Torque at 30°	Torque ≤ 70 ft-lbf	2.57 ft-lbf
Rotation at 150 lbf-ft	40° ≤ rotation ≤ 50°	46.8°

- X 11. Secure the lever arm into the right femur shaft opening of the upper leg structure assembly (78051-44) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))

- X 12. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Right Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	5°/s ≤ rotation rate ≤ 10°/s	6.4°/s
Femur Torque at 30°	torque ≤ 70 ft-lbf	2.72 ft-lbf
Rotation at 150 lbf-ft	40° ≤ rotation ≤ 50°	44.1°


Signature

05/09/2025
Date



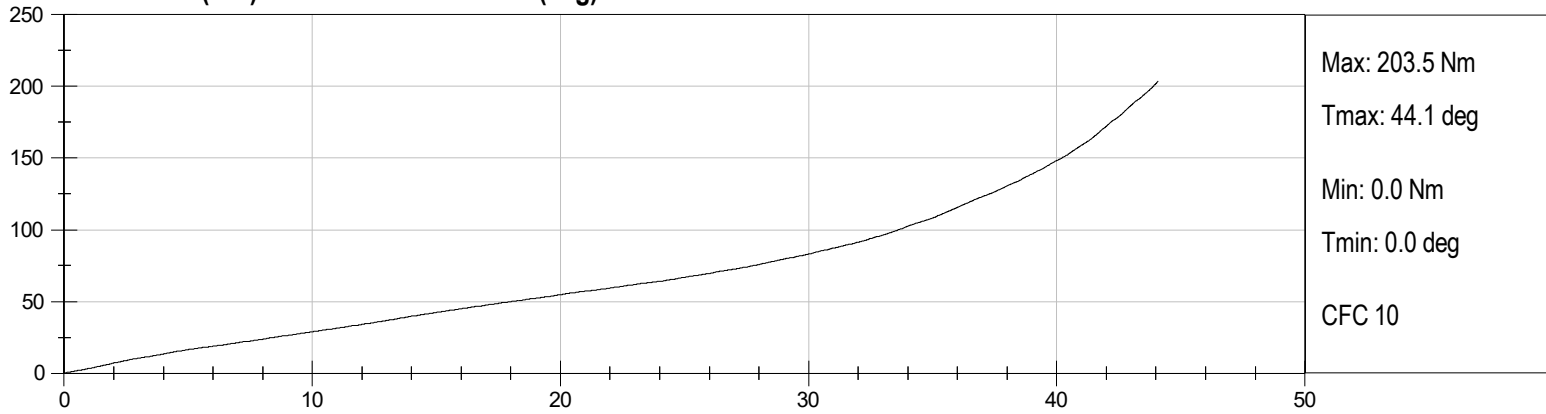
Right Hip-Femur Flexion Test
 Hybrid III 50th Percentile Male
 ATD Serial No: 401

Test Date: 05/09/2025
 Test ID: D251389
 Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	Pass
Moment at 30 Degrees	Nm	<= 94.9	83.0	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	44.1	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025

MOMENT (Nm) vs FEMUR ROTATION (deg)



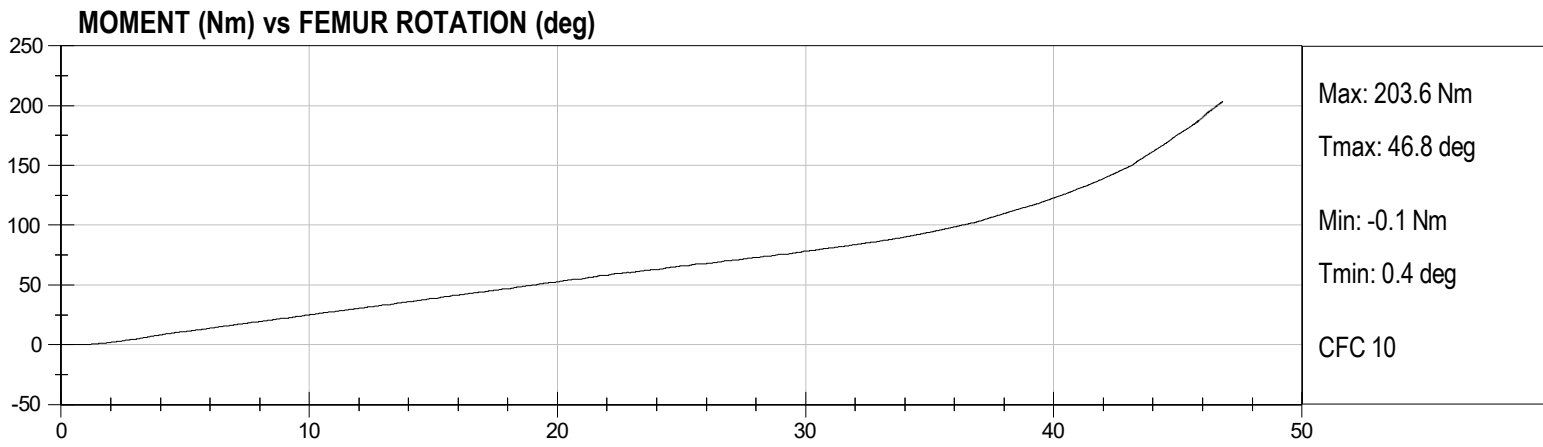


Left Hip-Femur Flexion Test
 Hybrid III 50th Percentile Male
 ATD Serial No: 401

Test Date: 05/09/2025
 Test ID: D251380
 Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.4	Pass
Moment at 30 Degrees	Nm	<= 94.9	78.2	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	46.8	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025



DATA SHEET A1
DUMMY DAMAGE CHECKLIST (50th Male)

Dummy Serial Number: 401

Test Date: 05/09/2025

Technician: Brian Lucas

This check sheet is completed as part of the post test calibration verification.

X Perform general cleaning.

Dummy Item	Inspect for	Comments	Damage	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement approved by:


Signature

05/09/2025
Date

Describe the repair or replacement of parts:

Checked by:


Signature

05/09/2025
Date

DATA SHEET A10
PART 572 INSTRUMENTATION CALIBRATION INFORMATION

I.D. NO.	MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF LAST CALIBRATION	DATE OF NEXT CALIBRATION
DUMMY INSTRUMENTATION					
HEAD ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AL6Y2	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	C19386	05/07/2025	11/06/2025
(3) VERTICAL	Endevco	7231C-750	C18384	05/07/2025	11/06/2025
NECK TRANSDUCER	Denton	1716A	N252FX	02/05/2025	08/07/2025
CHEST ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AGH70	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	AGH55	04/14/2025	10/14/2025
(3) VERTICAL	Endevco	7231C-750	AGH72	04/14/2025	10/14/2025
CHEST POTENTIOMETER	Humanetics	78051-317	401	04/14/2025	10/14/2025
FEMUR LOAD CELLS					
(1) RIGHT FEMUR	Denton	2121AJTF	F2026FZ	04/14/2025	10/14/2025
(2) LEFT FEMUR	Denton	2121AJTF	F2027FZ	04/14/2025	10/14/2025
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER	Endevco	7231C-750	AH5P1	01/13/2025	07/15/2025
THORAX PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-2-360M17	P79577	03/21/2025	09/20/2025
KNEE PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-360M17	P82128	12/03/2024	06/04/2025
NECK ROTATION TRANSDUCER 1 (OPTIONAL)	Servo	14CBI-2897	4707	02/25/2025	08/27/2025
NECK ROTATION TRANSDUCER 2 (OPTIONAL)	Servo	14CBI-2897	7297	02/25/2025	08/27/2025

LABORATORY TECHNICIAN: 

HYBRID III 50 th SN #403, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.9
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.5
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.6
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	5.9
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.4
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.6
I	SHOULDER TO ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.5
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	8.3
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.5
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.5
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.6
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	18.5

HYBRID III 50 th SN #403, PART 572, SUBPART E EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.8
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.2
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.8
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	3.9
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	38.8
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.2
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

DATA SHEET A3
HEAD DROP TEST (572.32) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive head drops are necessary)

1. It has been at least 2 hours since the last head drop. (572.32(c)(5))
 N/A, ONLY one head drop performed
2. The head assembly consists of the complete head (78051-61X), the neck transducer structural replacement (78051-383X), and three (3) accelerometers. (572.32(b))
3. Torque the skull cap screws to 160 lbf-in.
4. Accelerometers and their respective mounts are smooth and clean.
5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.35(i))
6. The head assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.1°C</u> |
| Record the maximum humidity: | <u>28%</u> |
| Record the minimum humidity: | <u>18%</u> |
7. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No Damage
8. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.32(c)(2))

X 9. Suspend and orient the head assembly as shown in Figure 6A. The lowest point on the forehead is 0.5 in. below the lowest point on the dummy's nose when the midsagittal plane is vertical. (572.32(c)(3))

Record the actual distance: 0.5 inches

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

X 10. The 1.6 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 7A.

Record the right side distance: 501 mm

Record the left side distance: 501 mm

X 11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.32(c)(4))

Record actual micro finish: 24.8 micro inches

X 12. The impact surface is rigidly supported. (572.132(c)(4))

X 13. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (Figure 6A)

Record thickness: 50.9 mm

Record width: 604 mm

Record length: 595 mm

X 14. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches \pm 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.32(b) & (572.32(c)(4))

X 16. Complete the following table using channel class 1000 data. (572.36(i)):

Parameter	Specification	Result
Peak resultant acceleration	$225 \text{ g} \leq x \leq 275 \text{ g}$	273 g
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration $\leq 15 \text{ g}$	-1.7 g

X 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.


Signature

04/17/2025
Date

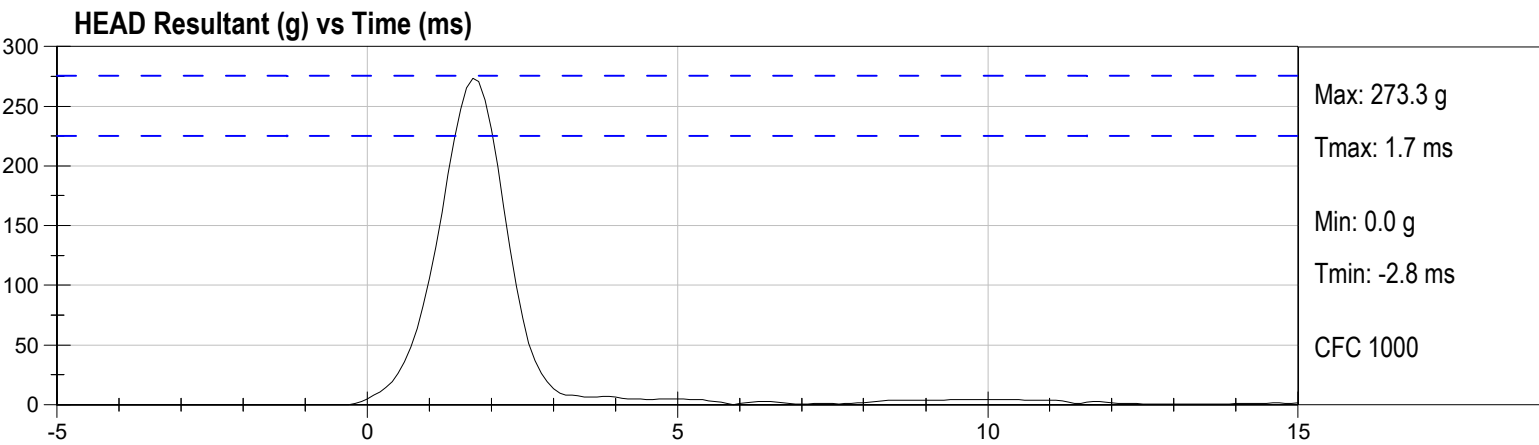
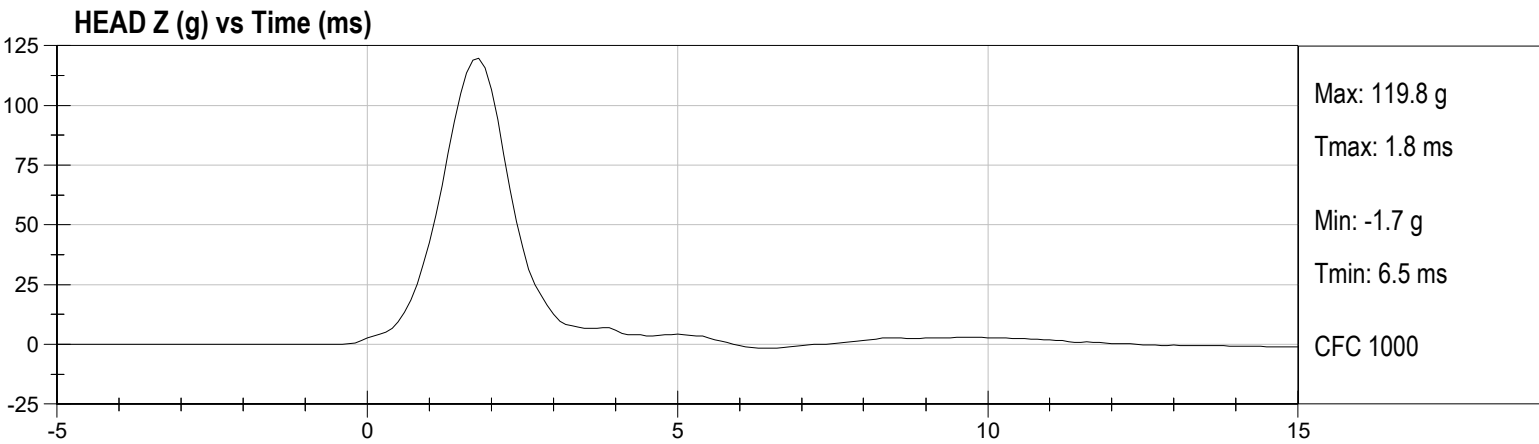
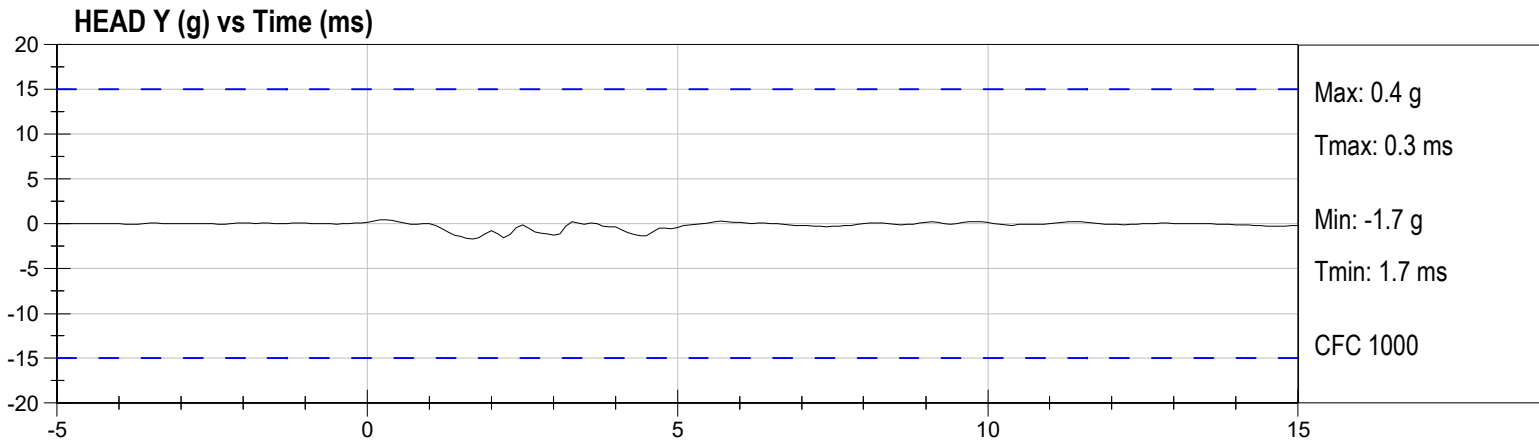
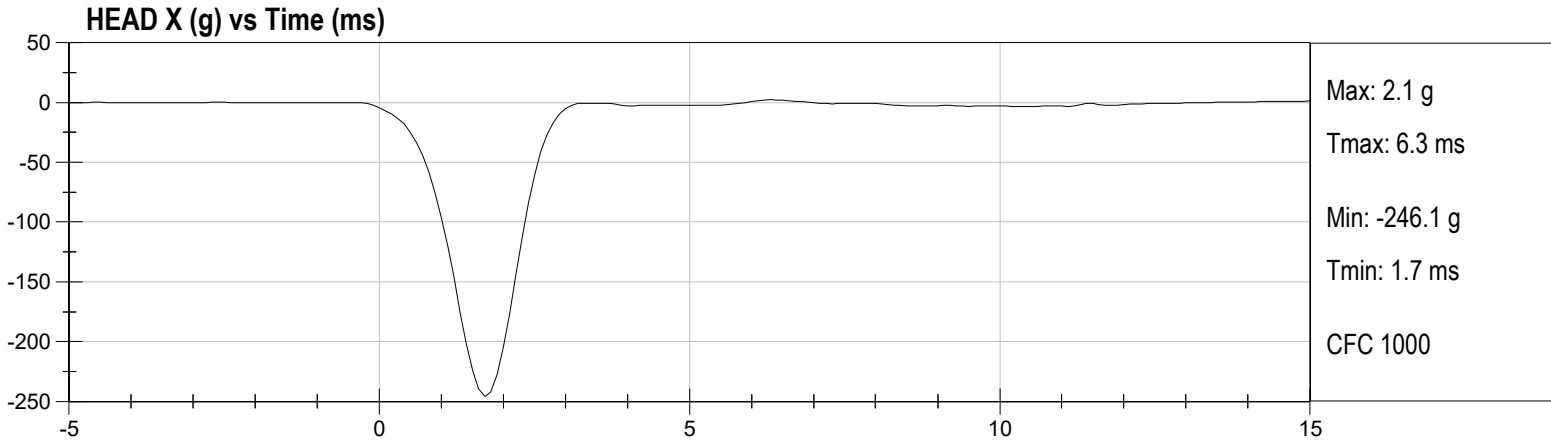


Head Drop Test
 Hybrid III 50th Percentile Male
 ATD Serial No: 403

Test Date: 04/17/2025
 Test ID: D251181
 Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	g	225 to 275	273	Pass
Peak Lateral Acceleration	g	-15.0 to 15.0	-1.7	Pass
Unimodal	%	within 10% of peak	3	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
HEAD X	Endevco	T30974	11/25/2024	5/27/2025
HEAD Y	Endevco	T30975	11/25/2024	5/27/2025
HEAD Z	Endevco	T30976	11/25/2024	5/27/2025



DATA SHEET A4
NECK FLEXION TEST (572.33) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive flexion tests are necessary)

1. It has been at least 30 minutes since the last flexion test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.8°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9A for the flexion test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 22.6 to 23.4 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:

Neck Flexion Test Results (572.33(b)(1) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	22.6 ft/s \leq speed \leq 23.4 ft/s	22.83 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	22.5 \leq g \leq 27.5
	@ 20 ms	17.6 \leq g \leq 22.6
	@ 30 ms	12.5 \leq g \leq 18.5
	Above 30 ms	29 g maximum
First Pendulum Decay to 5g	34 ms \leq time \leq 42 ms	37.1 ms
Plane D Rotation	64° \leq max. rotation \leq 78°	72.9 °
	57 ms \leq time of max. rotation \leq 64 ms	60.7 ms
Time for Plane D Rotation to Cross 0° During First Rebound	113 ms \leq time \leq 128 ms	117.1 ms
Maximum Moment	65 lbf-ft \leq moment \leq 80 lbf-ft	3.01 lbf-ft
	47 ms \leq time of max. moment \leq 58 ms	50.2 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Flexion)	97 ms \leq time \leq 107 ms	99.0 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(1)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.

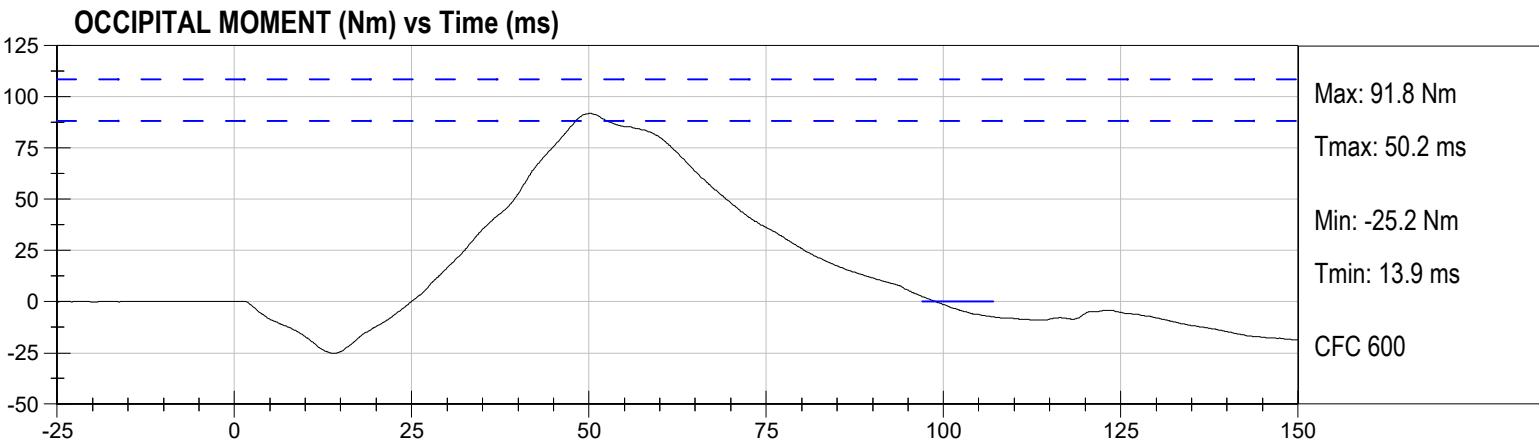
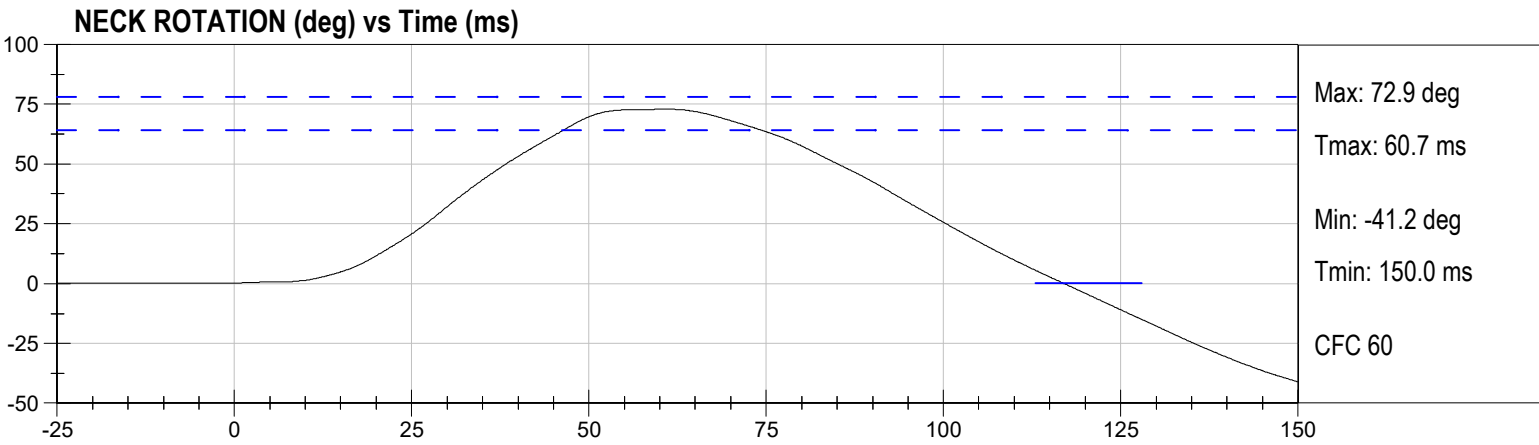
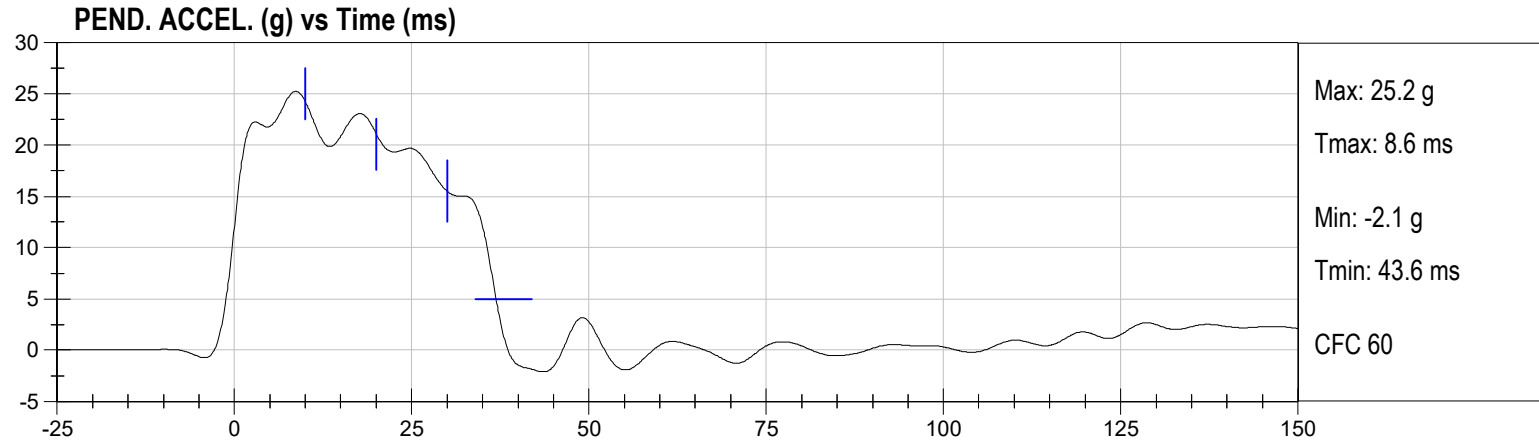

Signature

04/17/2025
Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration At 10 ms After T0	g	22.50 to 27.50	24.38	Pass
Pendulum Deceleration At 20 ms After T0	g	17.60 to 22.60	21.23	Pass
Pendulum Deceleration At 30 ms After T0	g	12.50 to 18.50	15.56	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 29.0	15.5	Pass
Deceleration Decay Time to Cross 5 g	ms	34.0 to 42.0	37.1	Pass
Maximum "D" Plane Rotation	deg	64.0 to 78.0	72.9	Pass
Time of Maximum "D" Plane Rotation	ms	57.0 to 64.0	60.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	113.0 to 128.0	117.1	Pass
Maximum Moment About Occipital Condyle	Nm	88.1 to 108.5	91.8	Pass
Time of Maximum Moment About Occipital Condyle	ms	47.0 to 58.0	50.2	Pass
Positive Moment Decay Time To Zero Crossing	ms	97.0 to 107.0	99.0	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N1561FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N1561MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025



DATA SHEET A5
NECK EXTENSION TEST (572.33) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive extension tests are necessary)

1. It has been at least 30 minutes since the last extension test. (572.36(m))
 N/A, ONLY one neck test performed
2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No damage
5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
- Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 10A for the extension test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 19.5 ft/s to 20.3 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:
Neck Extension Test Results (572.33(b)(2) & 572.133(c)(4))

Parameter	Specification	Results
Pendulum impact speed	19.5 ft/s \leq speed \leq 20.3 ft/s	19.62 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	17.2 \leq g \leq 21.2
	@ 20 ms	14 \leq g \leq 19
	@ 30 ms	11.0 \leq g \leq 16.0
	Above 30 ms	22 g maximum
First Pendulum Decay to 5g	38 ms \leq time \leq 46 ms	40.9 ms
Plane D Rotation	81° \leq max. rotation \leq 106°	102.0°
	72 ms \leq time of max. rotation \leq 82 ms	78.2 ms
Time for Plane D Rotation to Cross 0° During First Rebound	147 ms \leq time \leq 174 ms	161.6 ms
Maximum Moment	-59 lbf-ft \leq moment \leq -39 lbf-ft	-2.15 lbf-ft
	65 ms \leq time of max. moment \leq 79 ms	73.4 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Extension)	120 ms \leq time \leq 148 ms	143.0 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(2)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.

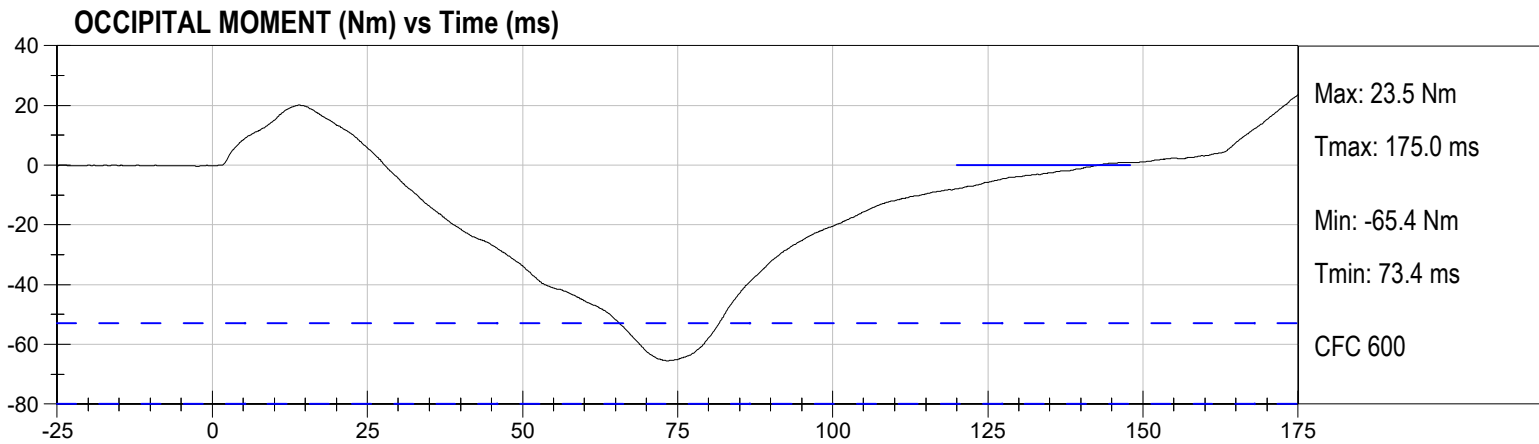
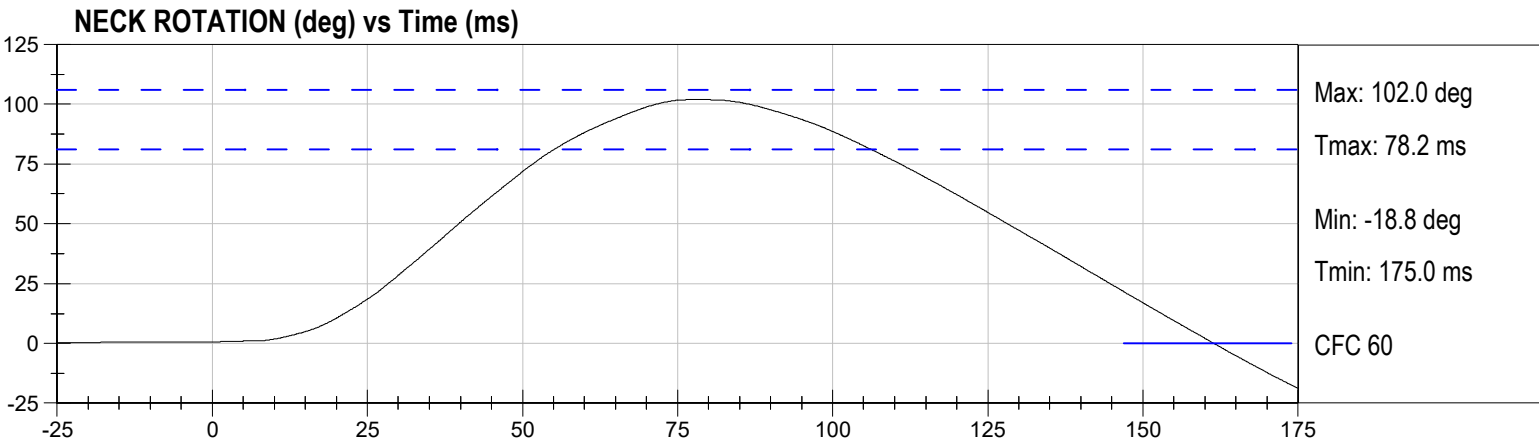
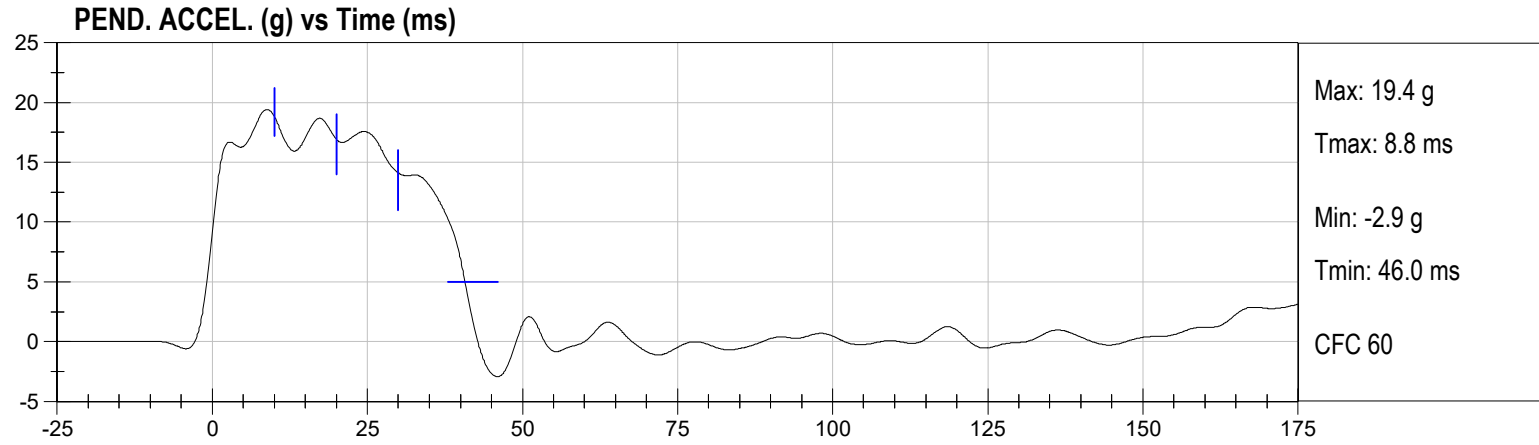

Signature

04/17/2025
Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration At 10 ms After T0	g	17.20 to 21.20	18.90	Pass
Pendulum Deceleration At 20 ms After T0	g	14.00 to 19.00	16.97	Pass
Pendulum Deceleration At 30 ms After T0	g	11.00 to 16.00	14.13	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 22.0	14.1	Pass
Deceleration Decay Time to Cross 5 G's	ms	38.0 to 46.0	40.9	Pass
Maximum "D" Plane Rotation	deg	81.0 to 106.0	102.0	Pass
Time of Maximum "D" Plane Rotation	ms	72.0 to 82.0	78.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	147.0 to 174.0	161.6	Pass
Minimum Moment About Occipital Condyle	Nm	-79.9 to -52.9	-65.4	Pass
Time of Minimum Moment About Occipital Condyle	ms	65.0 to 79.0	73.4	Pass
Negative Moment Decay Time To Zero Crossing	ms	120.0 to 148.0	143.0	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N1561FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N1561MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025



DATA SHEET A6
THORAX IMPACT TEST (572.34) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive thorax impact tests are necessary)

1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
 N/A, ONLY one thorax impact test performed
2. The test fixture conforms to the specifications in Figure 12A.
3. The complete assembled dummy (78051-218) is used (572.34(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. No shoes are worn. (572.34(b))
4. The dummy assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.34(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material (78051-17 thru 78051-22), chest displacement transducer assembly (78051-317) and the rear rib supports (78051-304). Inspect for rib deformation using the chest depth gage (83-5006-007). If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
- No Damage
 - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage
 - The following repairs or replacement was performed. Record:
-

- X 6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 12A. The surface must be long enough to support the pelvis and outstretched legs. (572.34(c)(2))
- X 7. Level the ribs both longitudinally and laterally $\pm 0.5^\circ$ and adjust the pelvis angle to $13^\circ \pm 2^\circ$. The angle may be measured using the special H-point tool (78051-532) that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block. (572.34(c)(2))
- X 8. The midsagittal plane of the dummy is vertical within $\pm 1^\circ$. (572.134(c)(3))
- X 9. The longitudinal centerline of the test probe is centered within ± 2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1 mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5° of a horizontal line in the dummy's midsagittal plane. (572.34(c)(4))
- X 10. Align the adjustable neck bracket index marks to the "zero" position. (Figure 12A)
- X 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to locations such as the rear surfaces of the thoracic spine and the lower neck bracket. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.
- X 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.
- X 13. Place the arm assemblies horizontal $\pm 2^\circ$ and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.
- X 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 Class 180.
- X 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2° of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.34(c)(5)) The velocity of the test probe at the time of impact is 22 f/s ± 0.4 f/s. (572.34(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.34(c)(6))

X 16. Complete the following table:

Thorax Impact Results (572.34(b))

Parameter*	Specification	Result
Test Probe Speed	21.6 ft/s ≤ speed ≤ 22.4 ft/s	22.21 ft/s
Chest Compression	2.5 in. ≤ compression ≤ 2.86 in.	2.52 in.
Peak resistance force**	1160 lb ≤ peak force ≤ 1325 lb	1269 lb
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	71 %

*Time zero is defined as the time of initial contact between the test probe and the chest skin.

**Force = impactor mass x acceleration (572.34(b))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve.

 X 17. Plots of chest compression, pendulum acceleration, pendulum speed, and force, follow this sheet.


Signature

04/17/2025
Date

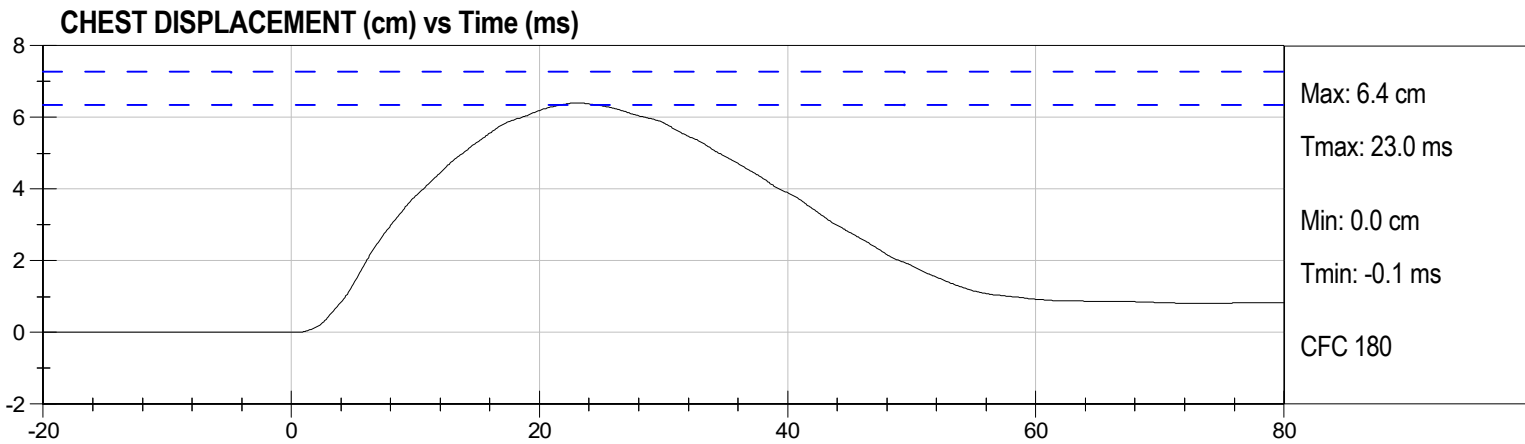
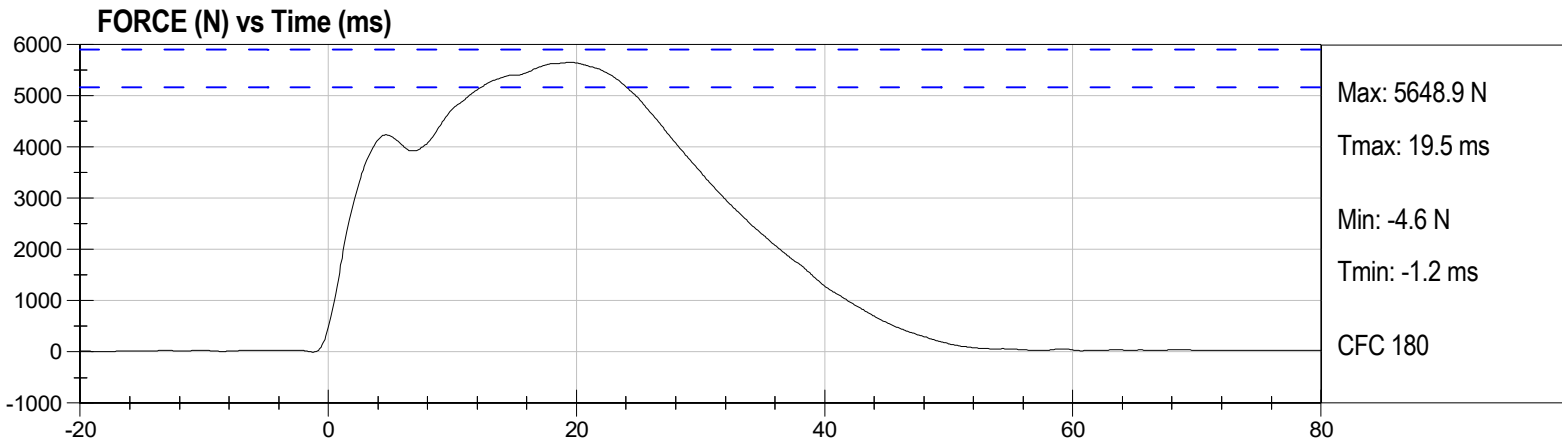
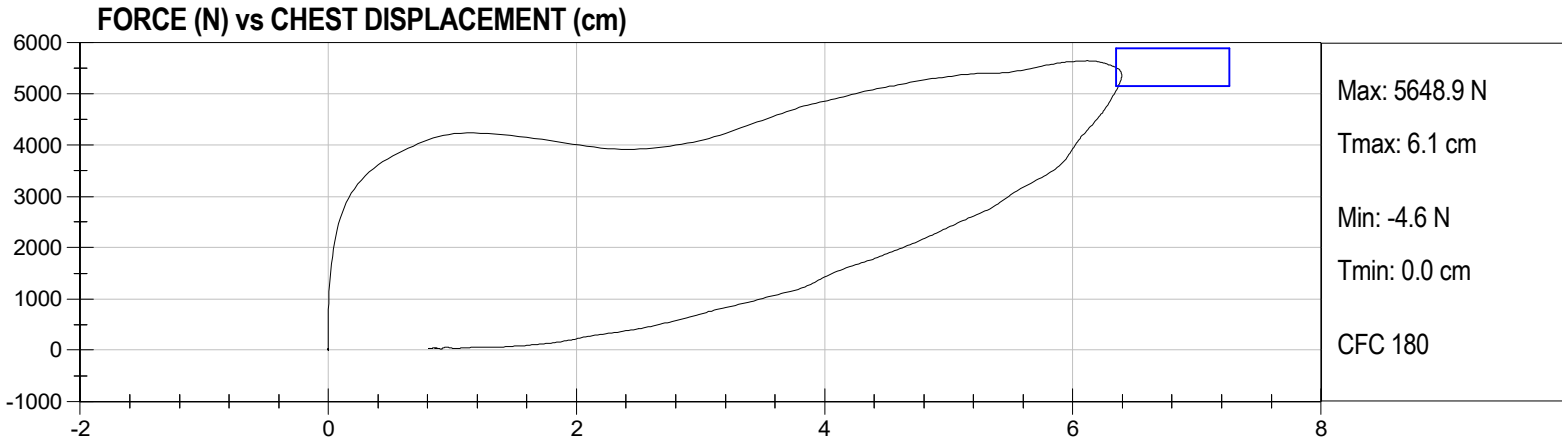


Thorax Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 04/17/2025
Test ID: D251184
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5649	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.39	Pass
Internal Hysteresis	%	69 to 85	71	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	03/21/2025	9/20/2025
CHEST DISPLACEMENT	Humanetics	403	04/14/2025	10/14/2025



DATA SHEET A7
LEFT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-001) with the upper leg assembly (78051-46) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	$6.8 \text{ ft/s} \leq \text{speed} \leq 7.0 \text{ ft/s}$	6.92 ft/s
Peak resistance force*	$1060 \text{ lb} \leq \text{force} \leq 1300 \text{ lb}$	1064 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

04/17/2025
Date

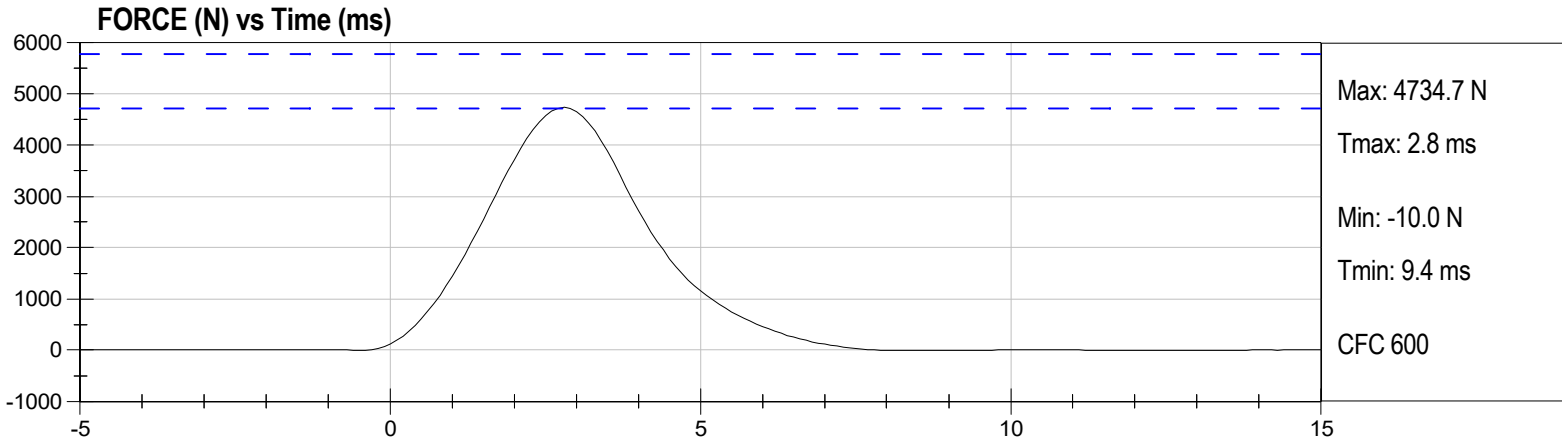


Left Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 04/17/2025
Test ID: D251186
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	4735	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A8
RIGHT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 N/A, ONLY one knee impact test performed
2. The test fixture conforms to the specifications in Figure 14A.
3. The leg assembly (86-5001-002) with the upper leg assembly (78051-47) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.6°C</u> |
| Record the minimum temperature: | <u>20.3°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	$6.8 \text{ ft/s} \leq \text{speed} \leq 7.0 \text{ ft/s}$	6.92 ft/s
Peak resistance force*	$1060 \text{ lb} \leq \text{force} \leq 1300 \text{ lb}$	1065 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

04/17/2025
Date

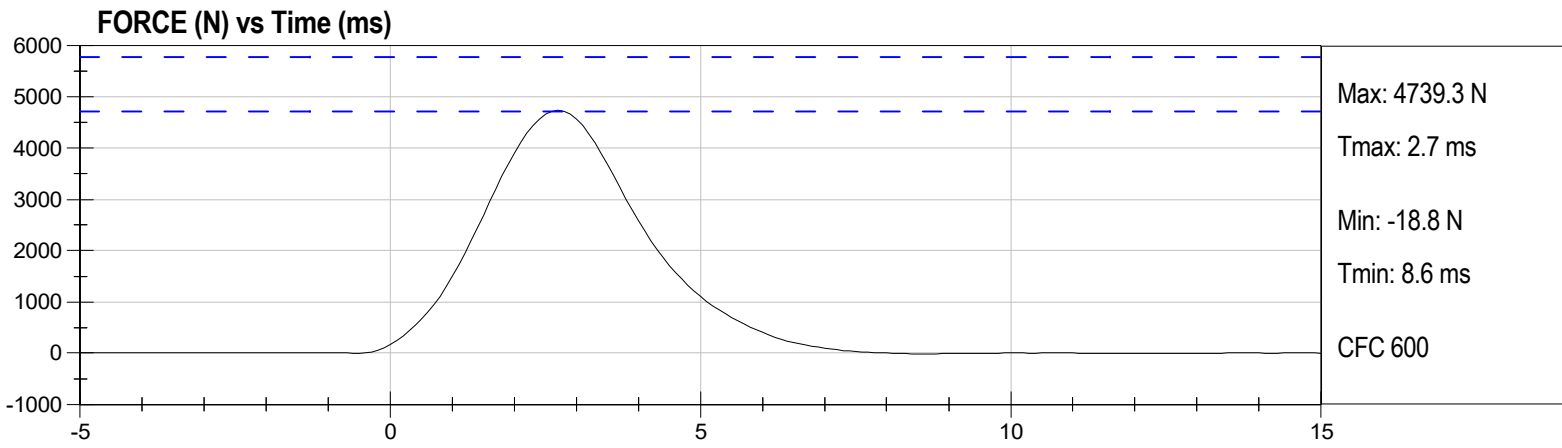


Right Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 04/17/2025
Test ID: D251185
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	4739	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A9
HIP JOINT-FEMUR FLEXION (572.35(c)) (50th Male)

Dummy Serial Number: 403

Test Date: 04/17/2025

Technician: Jonah Pulokas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive hip joint-femur flexion tests are necessary)

1. It has been at least 30 minutes since the last hip joint-femur flexion test. (572.36(m))
 N/A, ONLY one hip joint-femur flexion test performed
2. The test fixture conforms to the specifications in Figure 17A.
3. Use the assembled dummy (78051-218) except (572.35(c)(2)):
 3.1 remove the leg assemblies (86-5001-001 & 002) by removing 3/8-16 Socket Head Cap Screw and retaining the structural assembly of the upper legs (78051-43 & 44)
 3.2 remove the abdominal insert (78051-52)
 3.3 replace the instrument cover plate (78051-13) in the pelvic bone with a rigid pelvic bone stabilizer insert (Figure 15A) and attach the pelvis upper support device (Figure 16A).
4. The assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(c)(v))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.1°C</u> |
| Record the maximum humidity: | <u>31%</u> |
| Record the minimum humidity: | <u>21%</u> |
5. Seat the dummy on the rigid seat fixture. (572.35(c)(2)(ii))
6. Secure the dummy by bolting the stabilizer insert and the pelvis upper support device to the seat back of the test fixture as shown in Figures 17A, 18A, and 19A. (572.35(c)(2)(ii))
7. Adjust the threaded rods until plane B is horizontal.
8. Secure the lever arm into the left femur shaft opening of the upper leg structure assembly (78051-43) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))
9. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline

horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Left Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.5°/s
Femur Torque at 30°	Torque ≤ 70 ft-lbf	2.63 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	47°

- X 11. Secure the lever arm into the right femur shaft opening of the upper leg structure assembly (78051-44) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))

- X 12. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Right Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.5°/s
Femur Torque at 30°	torque ≤ 70 ft-lbf	2.63 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	46°


Signature

04/17/2025
Date

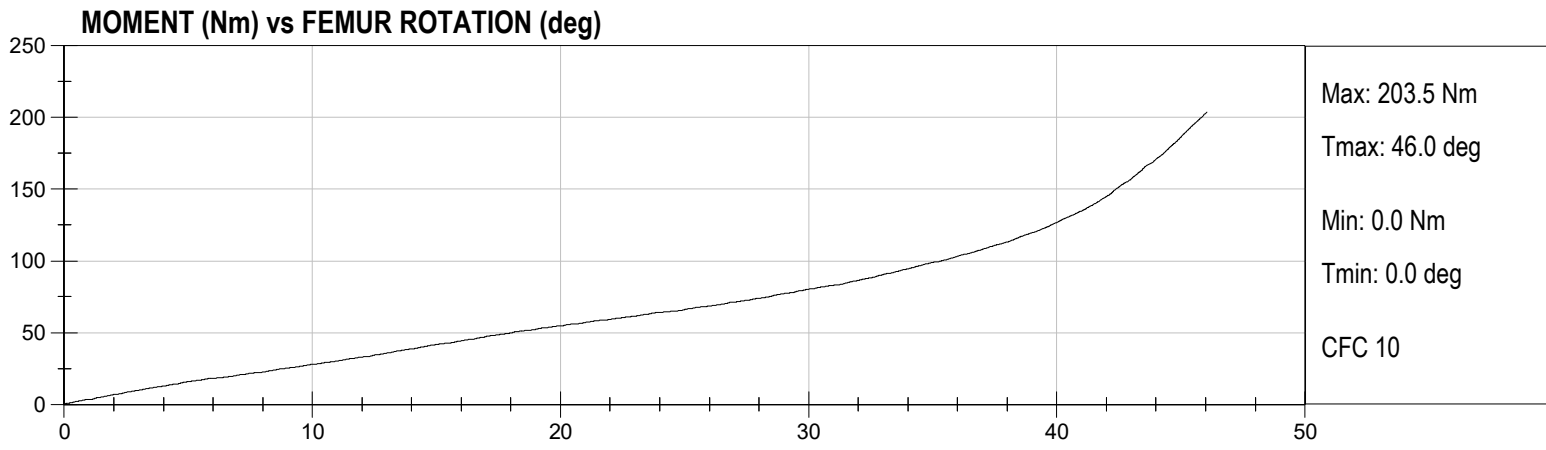


Right Hip-Femur Flexion Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 04/17/2025
Test ID: D251189
Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	Pass
Moment at 30 Degrees	Nm	<= 94.9	80.2	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	46.0	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025



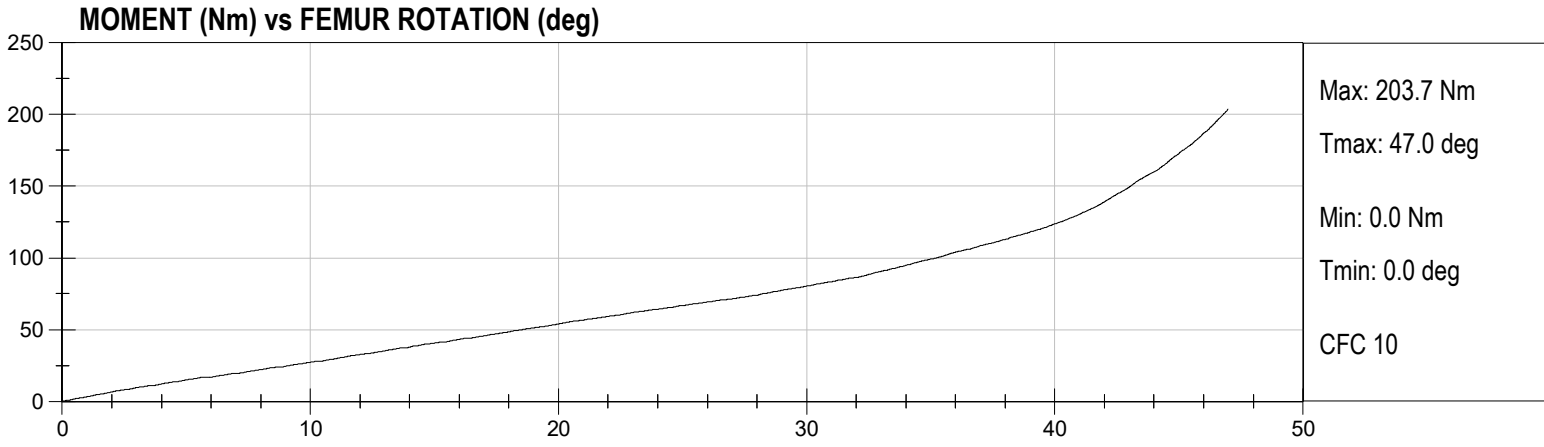


Left Hip-Femur Flexion Test
 Hybrid III 50th Percentile Male
 ATD Serial No: 403

Test Date: 04/17/2025
 Test ID: D251180
 Test Technician: Jonah Pulokas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	Pass
Moment at 30 Degrees	Nm	<= 94.9	80.3	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	47.0	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025



DATA SHEET A10
PART 572 INSTRUMENTATION CALIBRATION INFORMATION

I.D. NO.	MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF LAST CALIBRATION	DATE OF NEXT CALIBRATION
DUMMY INSTRUMENTATION					
HEAD ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AH5D9	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	AGH74	04/14/2025	10/14/2025
(3) VERTICAL	Endevco	7231C-750	C19307	04/14/2025	10/14/2025
NECK TRANSDUCER	Denton	1716A	N1206FX	11/18/2024	05/20/2025
CHEST ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AH5J3	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	C16675	05/07/2025	11/06/2025
(3) VERTICAL	Endevco	7231C-750	C12885	04/14/2025	10/14/2025
CHEST POTENTIOMETER	Humanetics	78051-317	403	04/14/2025	10/14/2025
FEMUR LOAD CELLS					
(1) RIGHT FEMUR	Humanetics	2121AJLN2	F3137FZ	04/14/2025	10/14/2025
(2) LEFT FEMUR	Humanetics	2121AJLN2	F3138FZ	04/14/2025	10/14/2025
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER	Endevco	7231C-750	AH5P1	01/13/2025	07/15/2025
THORAX PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-360M17	P79577	03/21/2025	09/20/2025
KNEE PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-360M17	P82128	12/03/2024	06/04/2025
NECK ROTATION TRANSDUCER 1 (OPTIONAL)	Servo	14CBI-2897	4707	02/25/2025	08/27/2025
NECK ROTATION TRANSDUCER 2 (OPTIONAL)	Servo	14CBI-2897	7297	02/25/2025	08/27/2025

LABORATORY TECHNICIAN: 

DATA SHEET A3
HEAD DROP TEST (572.32) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive head drops are necessary)

1. It has been at least 2 hours since the last head drop. (572.32(c)(5))
 N/A, ONLY one head drop performed
2. The head assembly consists of the complete head (78051-61X), the neck transducer structural replacement (78051-383X), and three (3) accelerometers. (572.32(b))
3. Torque the skull cap screws to 160 lbf-in.
4. Accelerometers and their respective mounts are smooth and clean.
5. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.35(i))
6. The head assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
7. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
- Record findings and actions: No Damage
8. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.32(c)(2))

X 9. Suspend and orient the head assembly as shown in Figure 6A. The lowest point on the forehead is 0.5 in. below the lowest point on the dummy's nose when the midsagittal plane is vertical. (572.32(c)(3))

Record the actual distance: 0.5 inches

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

X 10. The 1.6 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 7A.

Record the right side distance: 501 mm

Record the left side distance: 501 mm

X 11. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.32(c)(4))

Record actual micro finish: 24.8 micro inches

X 12. The impact surface is rigidly supported. (572.132(c)(4))

X 13. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (Figure 6A)

Record thickness: 50.9 mm

Record width: 604 mm

Record length: 595 mm

X 14. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches \pm 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.32(b) & (572.32(c)(4))

X 16. Complete the following table using channel class 1000 data. (572.36(i)):

Parameter	Specification	Result
Peak resultant acceleration	$225 \text{ g} \leq x \leq 275 \text{ g}$	256 g
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration $\leq 15 \text{ g}$	-3.1 g

X 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

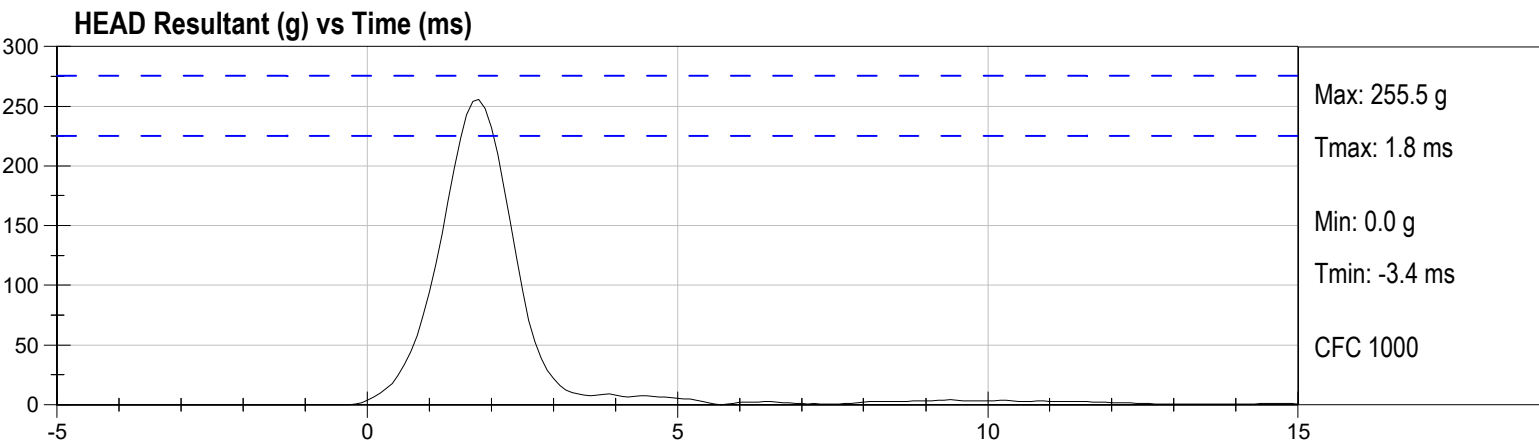
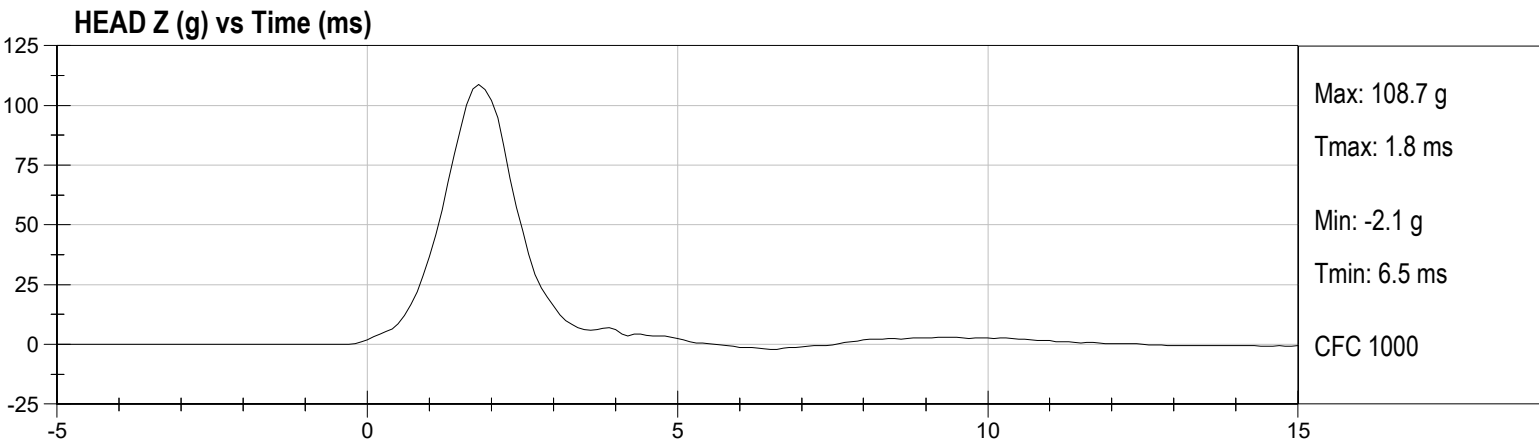
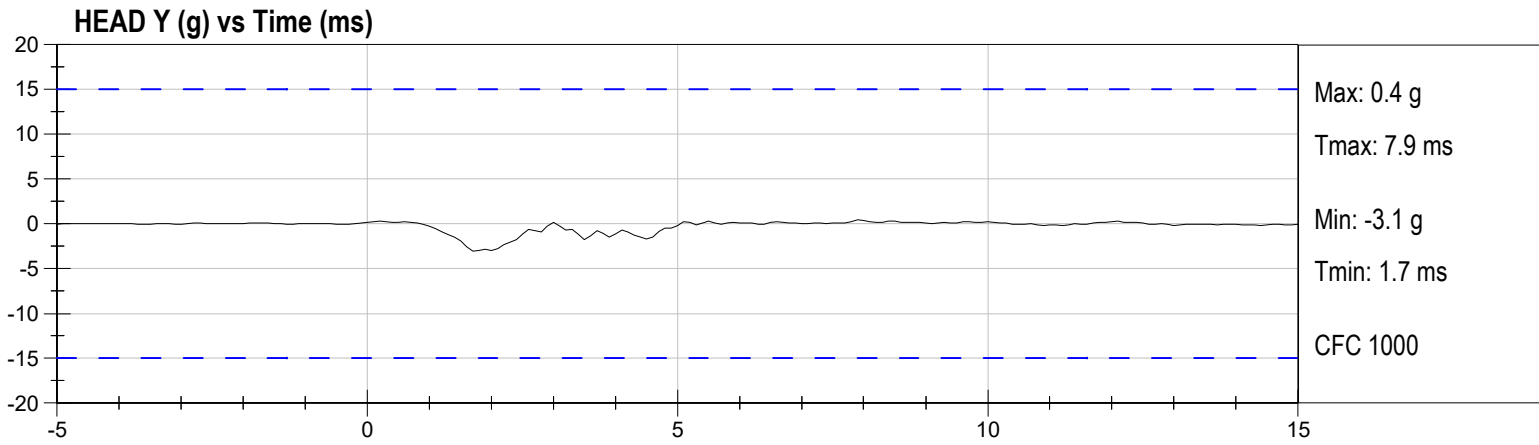
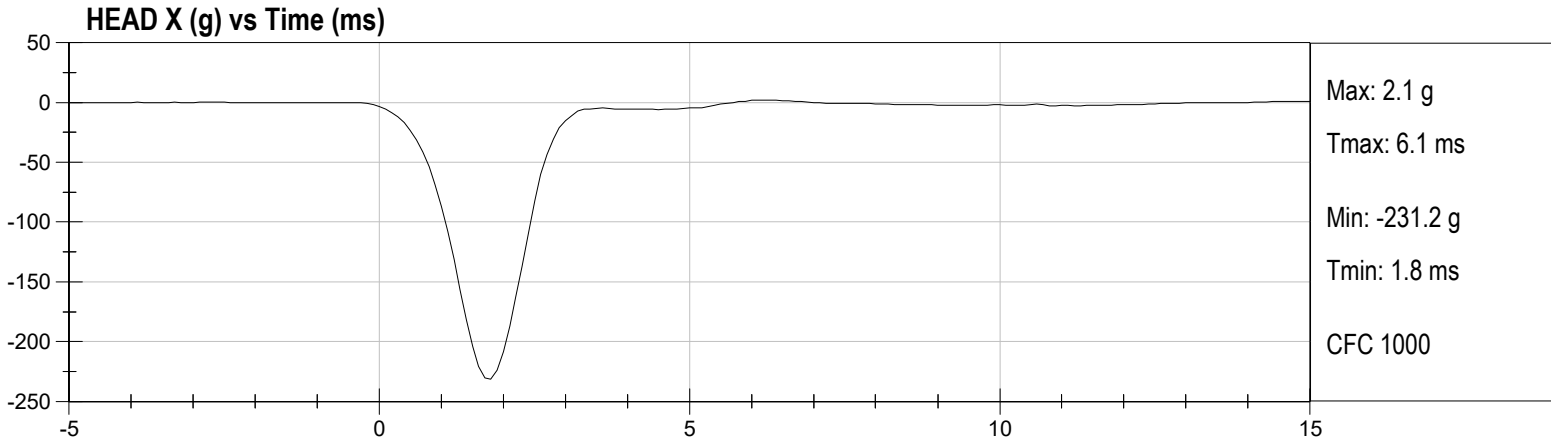

Signature

05/09/2025
Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	g	225 to 275	256	Pass
Peak Lateral Acceleration	g	-15.0 to 15.0	-3.1	Pass
Unimodal	%	within 10% of peak	3	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
HEAD X	Endevco	T30974	11/25/2024	5/27/2025
HEAD Y	Endevco	T30975	11/25/2024	5/27/2025
HEAD Z	Endevco	T30976	11/25/2024	5/27/2025



DATA SHEET A4
NECK FLEXION TEST (572.33) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 X Post test calibration verification

Test attempt no. 1 (when successive flexion tests are necessary)

- X 1. It has been at least 30 minutes since the last flexion test. (572.36(m))
 X N/A, ONLY one neck test performed
- X 2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))
- X 3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.6°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
- X 4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: No damage
- X 5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore "A" type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.
- X 6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9A for the flexion test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 22.6 to 23.4 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:

Neck Flexion Test Results (572.33(b)(1) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	22.6 ft/s \leq speed \leq 23.4 ft/s	22.87 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	22.5 \leq g \leq 27.5
	@ 20 ms	17.6 \leq g \leq 22.6
	@ 30 ms	12.5 \leq g \leq 18.5
	Above 30 ms	29 g maximum
First Pendulum Decay to 5g	34 ms \leq time \leq 42 ms	38.0 ms
Plane D Rotation	64° \leq max. rotation \leq 78°	71.1°
	57 ms \leq time of max. rotation \leq 64 ms	57.8 ms
Time for Plane D Rotation to Cross 0° During First Rebound	113 ms \leq time \leq 128 ms	114.9 ms
Maximum Moment	65 lbf-ft \leq moment \leq 80 lbf-ft	3.07 lbf-ft
	47 ms \leq time of max. moment \leq 58 ms	50.8 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Flexion)	97 ms \leq time \leq 107 ms	98.4 ms

*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(1)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.



Signature

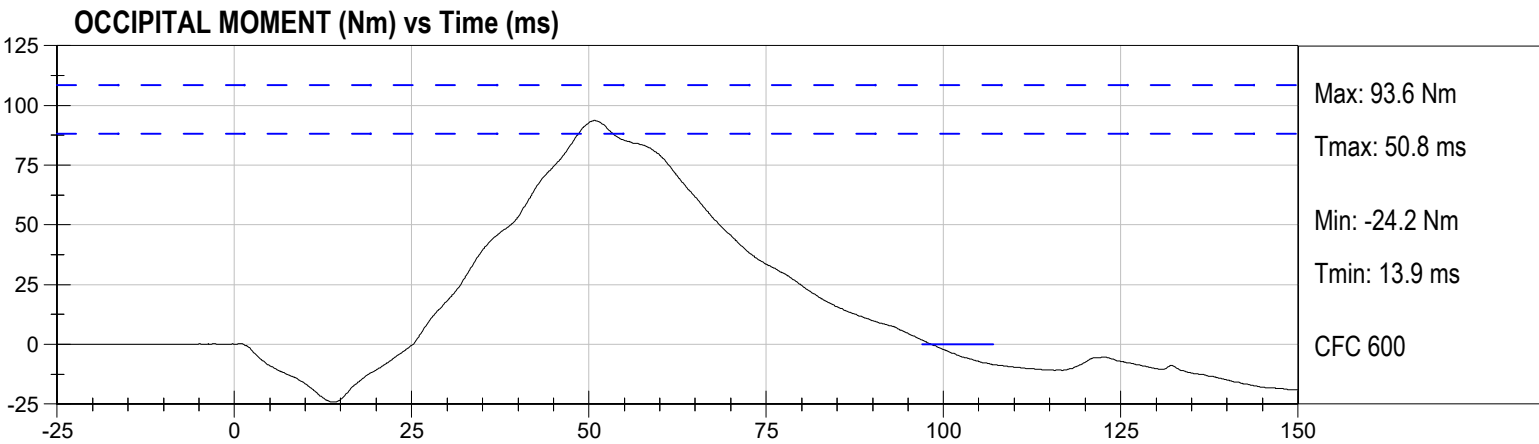
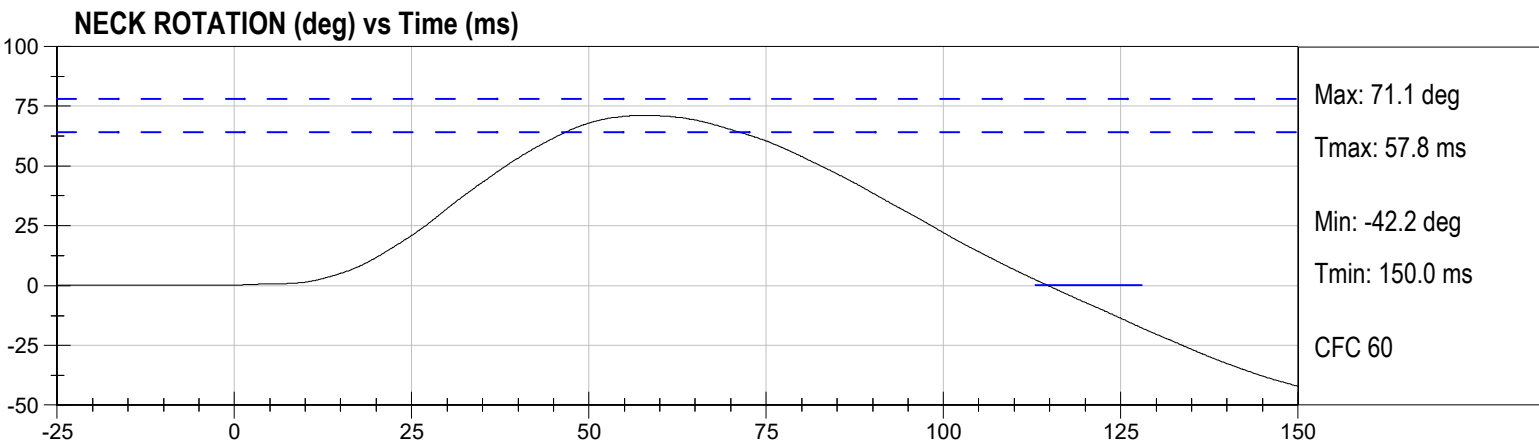
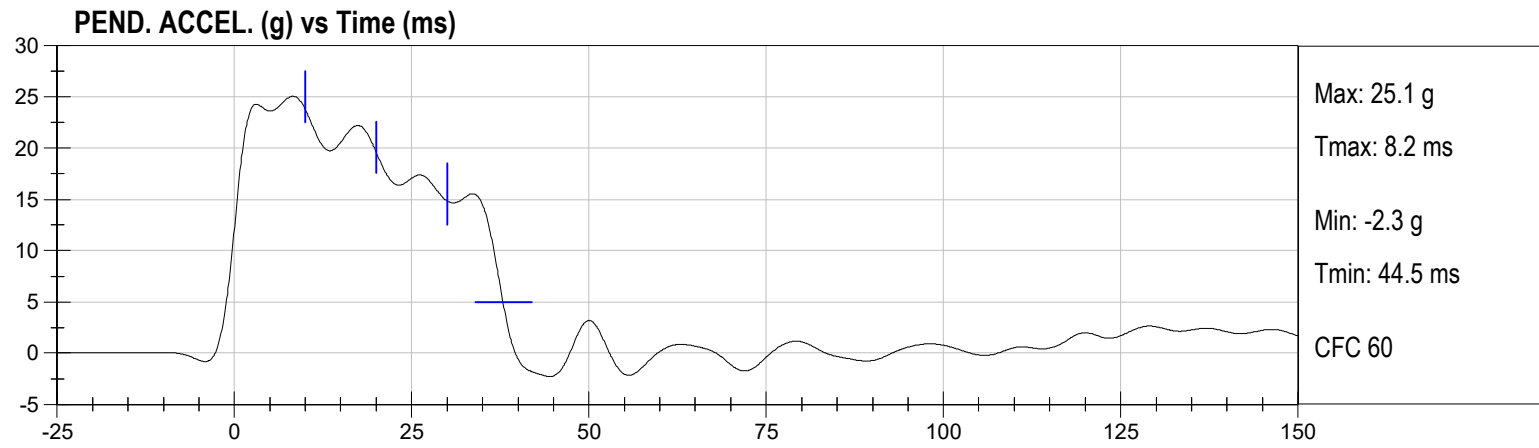
05/09/2025

Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	6.89 to 7.13	6.97	Pass
Pendulum Deceleration At 10 ms After T0	g	22.50 to 27.50	23.91	Pass
Pendulum Deceleration At 20 ms After T0	g	17.60 to 22.60	19.74	Pass
Pendulum Deceleration At 30 ms After T0	g	12.50 to 18.50	14.89	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 29.0	15.5	Pass
Deceleration Decay Time to Cross 5 g	ms	34.0 to 42.0	38.0	Pass
Maximum "D" Plane Rotation	deg	64.0 to 78.0	71.1	Pass
Time of Maximum "D" Plane Rotation	ms	57.0 to 64.0	57.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	113.0 to 128.0	114.9	Pass
Maximum Moment About Occipital Condyle	Nm	88.1 to 108.5	93.6	Pass
Time of Maximum Moment About Occipital Condyle	ms	47.0 to 58.0	50.8	Pass
Positive Moment Decay Time To Zero Crossing	ms	97.0 to 107.0	98.4	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N252FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N252MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025



DATA SHEET A5
NECK EXTENSION TEST (572.33) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
- X Post test calibration verification

Test attempt no. 1 (when successive extension tests are necessary)

- X 1. It has been at least 30 minutes since the last extension test. (572.36(m))
 X N/A, ONLY one neck test performed

- X 2. The components required for the neck tests include the head assembly (78051-61X), neck assembly (78051-90), bib simulator (78051-84), upper neck adjusting bracket (78051-307), lower neck adjusting bracket (78051-303), six axis neck transducer (C-1709) and either three accelerometers or their mass equivalent installed in the head assembly. Data from the accelerometers are not required. (572.33(b))

- X 3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.33(c)(1))
 Record the maximum temperature: 21.4°C
 Record the minimum temperature: 20.6°C
 Record the maximum humidity: 27%
 Record the minimum humidity: 17%

- X 4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
 Record findings and actions: No damage

- X 5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (78051-90).
 Record findings and actions: No Deterioration; Hardness: Front 89; Back 90.

- X 6. Pre-test calibration Neck cable torque: Torque the jam nut (78051-64) on the neck cable (78051-301) to 1.0 ± 0.2 lb-ft by loosening the jam nut and relaxing the neck cable before torquing. (572.33(c)(2))

- X 7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.36(i))
- X 8. The test fixture pendulum conforms to the specifications in Figure 8A. (572.33(c)(3))
- X 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 10A for the extension test. (572.33(c)(3))
- X 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 11A.
- X 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.
- X 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 19.5 ft/s to 20.3 ft/sec as measured at the center of the pendulum accelerometer. (572.33(c)(4))
- X 13. Complete the following table:
 Neck Extension Test Results (572.33(b)(2) & 572.33(c)(4))

Parameter	Specification	Results
Pendulum impact speed	19.5 ft/s \leq speed \leq 20.3 ft/s	19.62 ft/s
Pendulum Deceleration Versus Time Pulse	@ 10 ms	17.2 \leq g \leq 21.2
	@ 20 ms	14 \leq g \leq 19
	@ 30 ms	11.0 \leq g \leq 16.0
	Above 30 ms	22 g maximum
First Pendulum Decay to 5g	38 ms \leq time \leq 46 ms	42.3 ms
Plane D Rotation	81° \leq max. rotation \leq 106°	100°
	72 ms \leq time of max. rotation \leq 82 ms	78.5 ms
Time for Plane D Rotation to Cross 0° During First Rebound	147 ms \leq time \leq 174 ms	159.5 ms
Maximum Moment	-59 lbf-ft \leq moment \leq -39 lbf-ft	-2.12 lbf-ft
	65 ms \leq time of max. moment \leq 79 ms	72.7 ms
Time of first decay to 0 lbf-ft Positive Moment Decay** (Extension)	120 ms \leq time \leq 148 ms	142.9 ms


*Moment about the occipital condyle = $M_y - (0.058 \text{ ft} \times F_x)$ (572.33(b)(2)(ii))

M_y = Moment in lbf-ft measured by the transducer

F_x = Force, in lbf measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.33(b)(3))

X 14. Plots of pendulum acceleration, y-axis moment, x-axis force, y-axis moment about the occipital condyle, and D plane rotation follows this sheet.

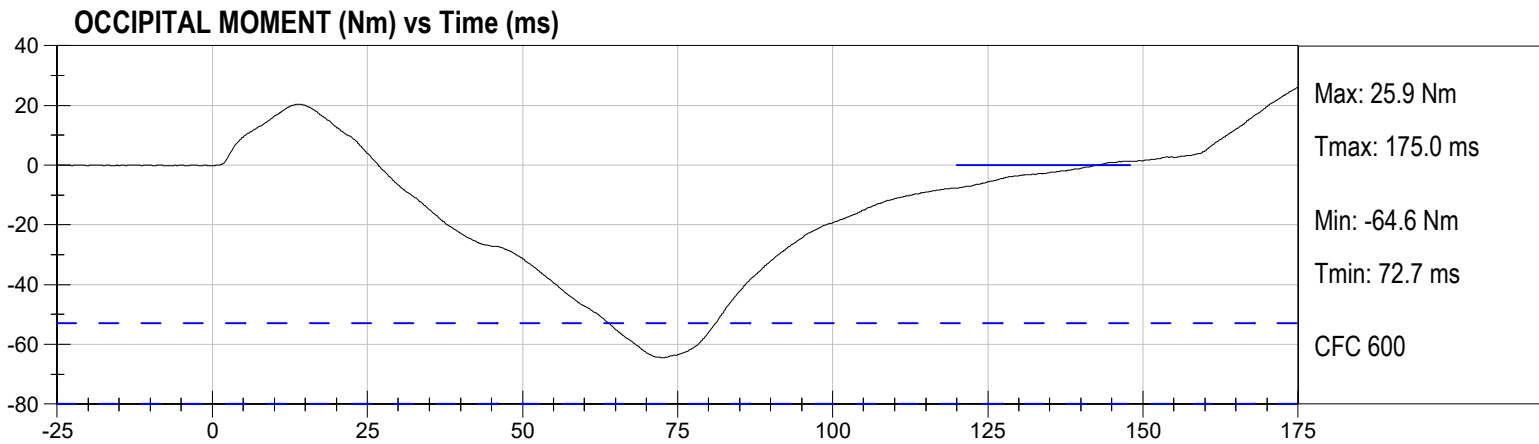
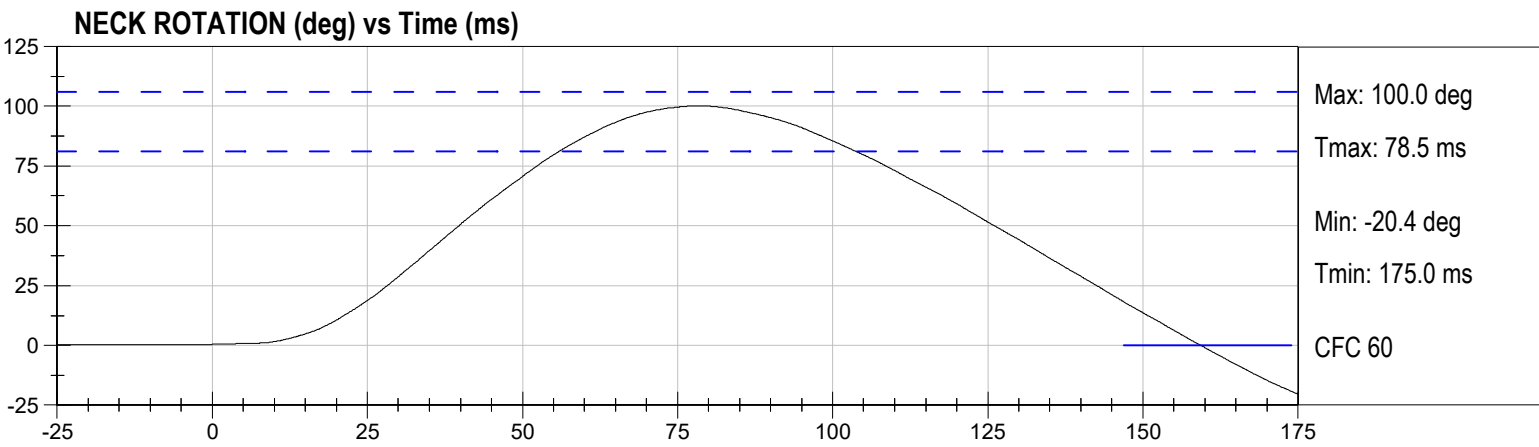
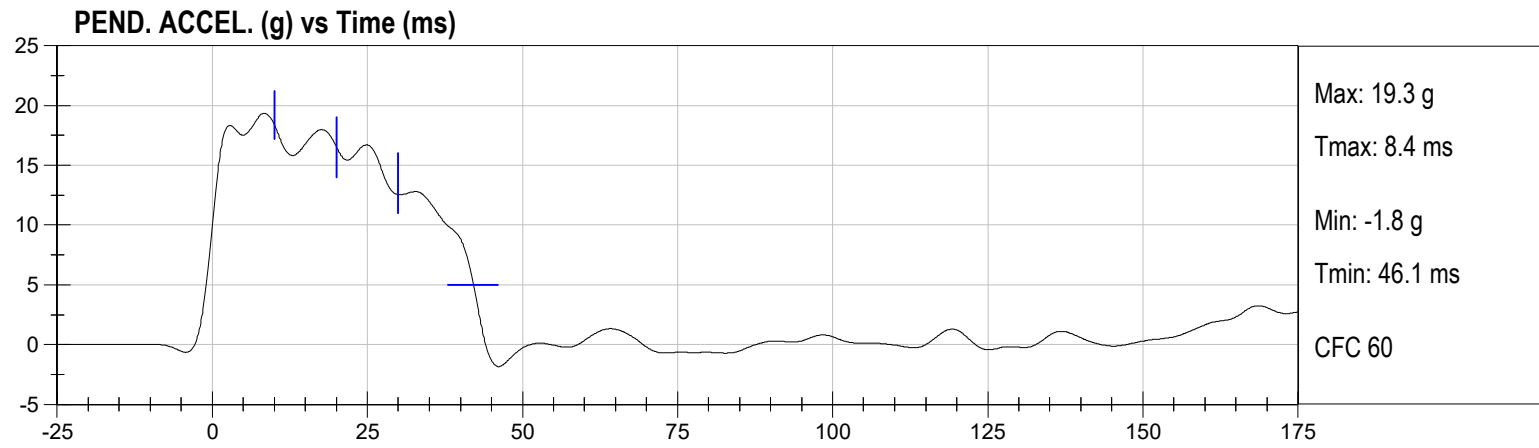

Signature

05/09/2025
Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Pendulum Velocity	m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration At 10 ms After T0	g	17.20 to 21.20	18.47	Pass
Pendulum Deceleration At 20 ms After T0	g	14.00 to 19.00	16.63	Pass
Pendulum Deceleration At 30 ms After T0	g	11.00 to 16.00	12.54	Pass
Peak Pendulum Deceleration After 30 ms	g	<= 22.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's	ms	38.0 to 46.0	42.3	Pass
Maximum "D" Plane Rotation	deg	81.0 to 106.0	100.0	Pass
Time of Maximum "D" Plane Rotation	ms	72.0 to 82.0	78.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing	ms	147.0 to 174.0	159.5	Pass
Minimum Moment About Occipital Condyle	Nm	-79.9 to -52.9	-64.6	Pass
Time of Minimum Moment About Occipital Condyle	ms	65.0 to 79.0	72.7	Pass
Negative Moment Decay Time To Zero Crossing	ms	120.0 to 148.0	142.9	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PEND. ACCEL.	Endevco	AH5P1	01/13/2025	7/15/2025
NECK FORCE X	Denton	N252FX	02/05/2025	8/7/2025
NECK MOMENT Y	Denton	N252MY	02/05/2025	8/7/2025
PEND. POT	Servo	4707	02/25/2025	8/27/2025
HEAD POT	Servo	7297	02/25/2025	8/27/2025



DATA SHEET A6
THORAX IMPACT TEST (572.34) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive thorax impact tests are necessary)

1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
 N/A, ONLY one thorax impact test performed
2. The test fixture conforms to the specifications in Figure 12A.
3. The complete assembled dummy (78051-218) is used (572.34(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. No shoes are worn. (572.34(b))
4. The dummy assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.34(c)(1))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.4°C</u> |
| Record the minimum temperature: | <u>20.6°C</u> |
| Record the maximum humidity: | <u>28%</u> |
| Record the minimum humidity: | <u>18%</u> |
5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material (78051-17 thru 78051-22), chest displacement transducer assembly (78051-317) and the rear rib supports (78051-304). Inspect for rib deformation using the chest depth gage (83-5006-007). If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
- No Damage
- Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage:
-
- The following repairs or replacement was performed. Record:
-

- X 6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 12A. The surface must be long enough to support the pelvis and outstretched legs. (572.34(c)(2))
- X 7. Level the ribs both longitudinally and laterally $\pm 0.5^\circ$ and adjust the pelvis angle to $13^\circ \pm 2^\circ$. The angle may be measured using the special H-point tool (78051-532) that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block. (572.34(c)(2))
- X 8. The midsagittal plane of the dummy is vertical within $\pm 1^\circ$. (572.134(c)(3))
- X 9. The longitudinal centerline of the test probe is centered within ± 2.5 mm of the midsagittal plane of the dummy and is $12.7 \text{ mm} \pm 1 \text{ mm}$ below the horizontal peripheral centerline of the No. 3 rib and is within 0.5° of a horizontal line in the dummy's midsagittal plane. (572.34(c)(4))
- X 10. Align the adjustable neck bracket index marks to the "zero" position. (Figure 12A)
- X 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to locations such as the rear surfaces of the thoracic spine and the lower neck bracket. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.
- X 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.
- X 13. Place the arm assemblies horizontal $\pm 2^\circ$ and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.
- X 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 Class 180.
- X 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2° of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.34(c)(5)) The velocity of the test probe at the time of impact is $22 \text{ f/s} \pm 0.4 \text{ f/s}$. (572.34(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.34(c)(6))

X 16. Complete the following table:

Thorax Impact Results (572.34(b))

Parameter*	Specification	Result
Test Probe Speed	$21.6 \text{ ft/s} \leq \text{speed} \leq 22.4 \text{ ft/s}$	22.21 ft/s
Chest Compression	$2.5 \text{ in.} \leq \text{compression} \leq 2.86 \text{ in.}$	2.53 in.
Peak resistance force**	$1160 \text{ lb} \leq \text{peak force} \leq 1325 \text{ lb}$	1282 lb
Internal Hysteresis***	$69\% \leq \text{hysteresis} \leq 85\%$	69 %

*Time zero is defined as the time of initial contact between the test probe and the chest skin.

**Force = impactor mass x acceleration (572.34(b))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve.

 X 17. Plots of chest compression, pendulum acceleration, pendulum speed, and force, follow this sheet.



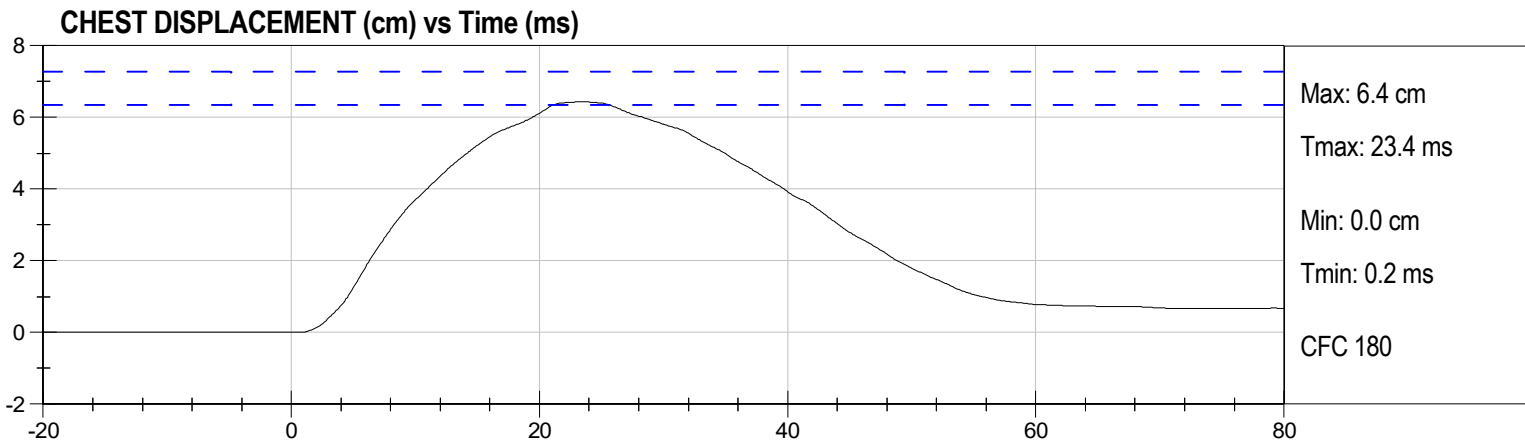
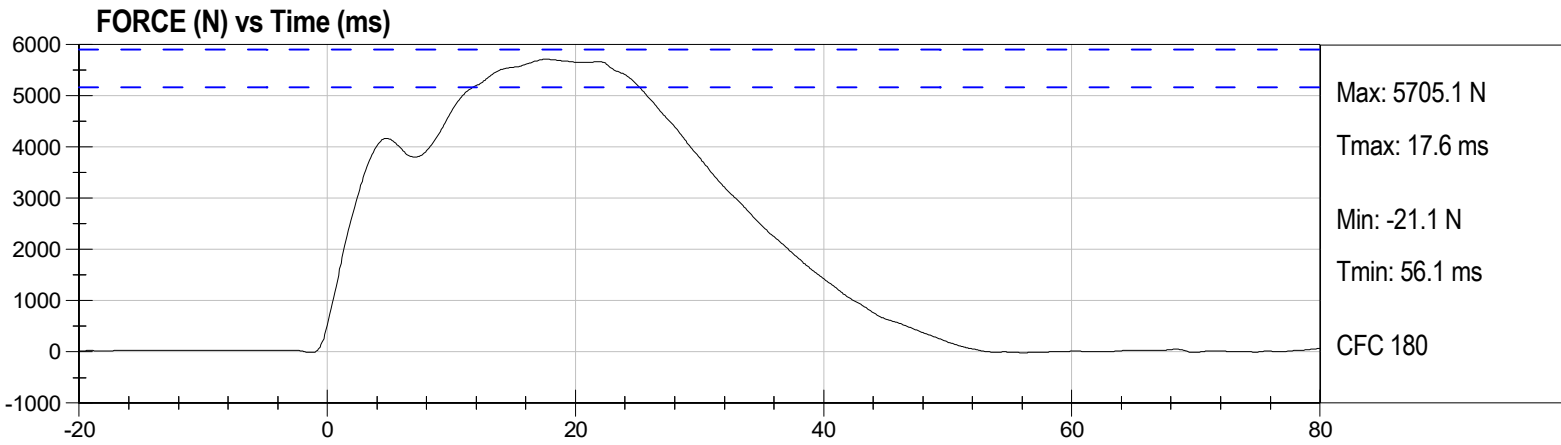
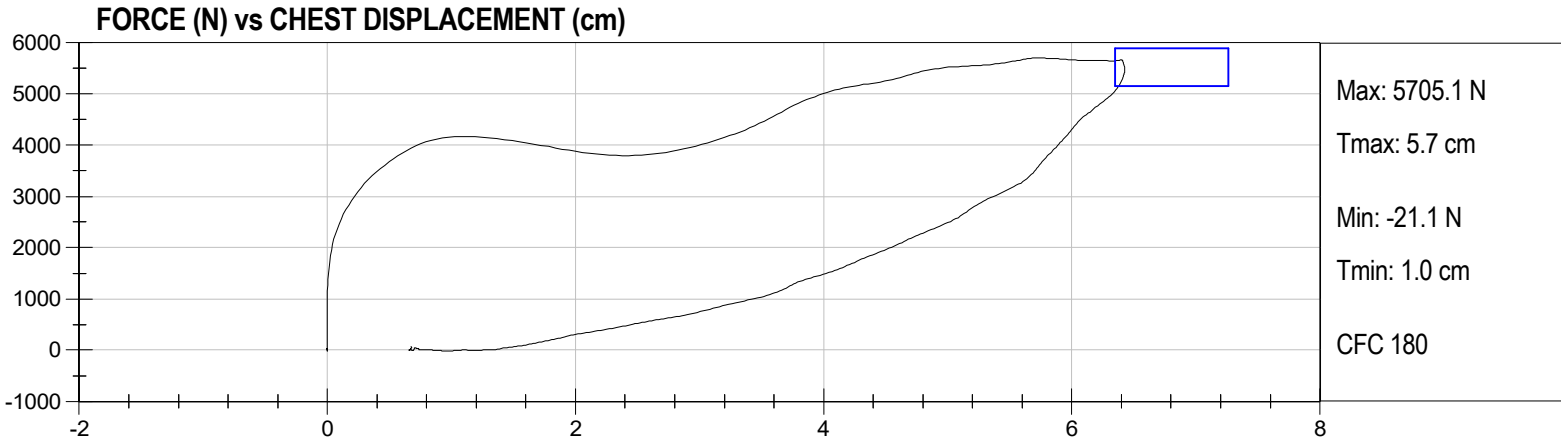
Signature

 05/09/2025
Date



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5705	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.43	Pass
Internal Hysteresis	%	69 to 85	69	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
PROBE	Endevco	P79577	03/21/2025	9/20/2025
CHEST DISPLACEMENT	Humanetics	403	04/14/2025	10/14/2025



DATA SHEET A7
LEFT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 X Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

- X 1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 X N/A, ONLY one knee impact test performed
- X 2. The test fixture conforms to the specifications in Figure 14A.
- X 3. The leg assembly (86-5001-001) with the upper leg assembly (78051-46) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
- X 4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
- X 5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
- X 6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
- X 7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
- X 8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
- X 9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
- X 10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	$6.8 \text{ ft/s} \leq \text{speed} \leq 7.0 \text{ ft/s}$	6.96 ft/s
Peak resistance force*	$1060 \text{ lb} \leq \text{force} \leq 1300 \text{ lb}$	1139 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

05/09/2025
Date

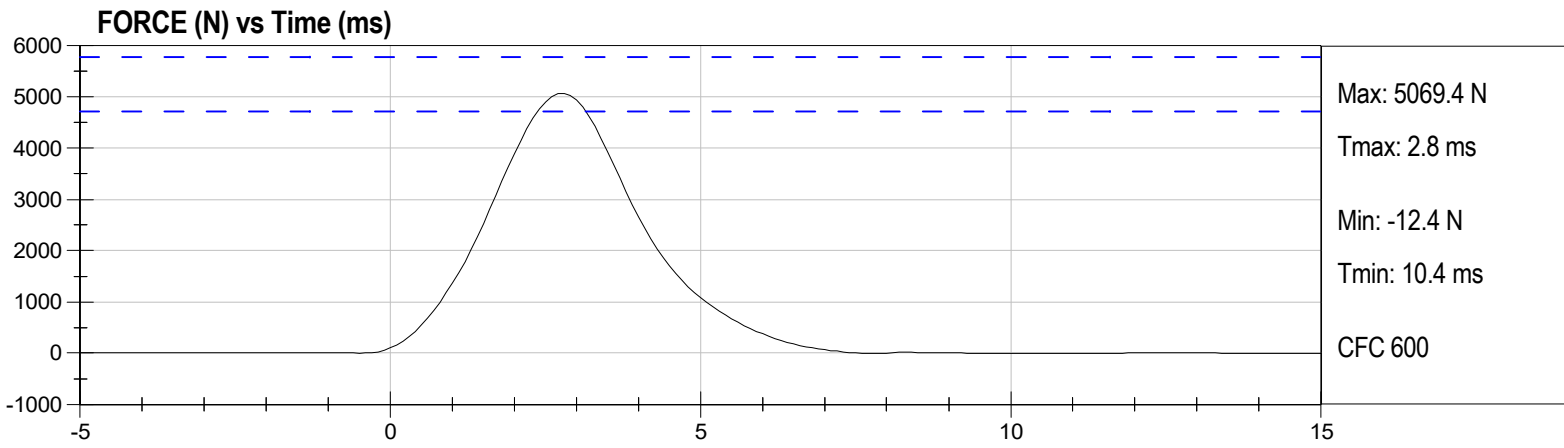


Left Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 05/09/2025
Test ID: D251396
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5069	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A8
RIGHT KNEE IMPACT TEST (572.35) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
X Post test calibration verification

Test attempt no. 1 (when successive knee impact tests are necessary)

- X 1. It has been at least 30 minutes since the last knee impact test. (572.36(m))
 X N/A, ONLY one knee impact test performed
- X 2. The test fixture conforms to the specifications in Figure 14A.
- X 3. The leg assembly (86-5001-002) with the upper leg assembly (78051-47) removed, and the load cell simulator (78051-319) is used. (572.35(b)(2))
- X 4. The knee assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(b)(2)(ii))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.7°C</u> |
| Record the minimum temperature: | <u>20.4°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
- X 5. Mount the test specimen and secure it to the rigid test fixture. (572.35(b)(2)(iii)) (Figure 14A)
- X 6. No parts of the foot or tibia contact any exterior surface. (572.35(b)(2)(iii))
- X 7. Align the test probe so that at contact the longitudinal centerline of the probe is collinear within 2 degrees with the longitudinal centerline of the femur load cell simulator except it is within 0.5 degrees horizontally. (572.35(b)(2)(iv)&(vi))
- X 8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.35(b)(2)(v))
- X 9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
- X 10. Contact the knee with the test probe at a speed between 6.8 ft/s and 7.0 ft/s. (572.35(b))

X 11. Complete the following table:

Knee Impact Results (572.35(b)(1))

Parameter	Specification	Result
Probe speed	$6.8 \text{ ft/s} \leq \text{speed} \leq 7.0 \text{ ft/s}$	6.86 ft/s
Peak resistance force*	$1060 \text{ lb} \leq \text{force} \leq 1300 \text{ lb}$	1080 lb

*Force = impactor mass x deceleration (572.35(b)(1))

X 12. Plots of pendulum acceleration, pendulum speed, and force, follow this sheet. Time zero is defined as the time of contact between the test probe and the knee. (572.3(b)(2)(vii))


Signature

05/09/2025
Date

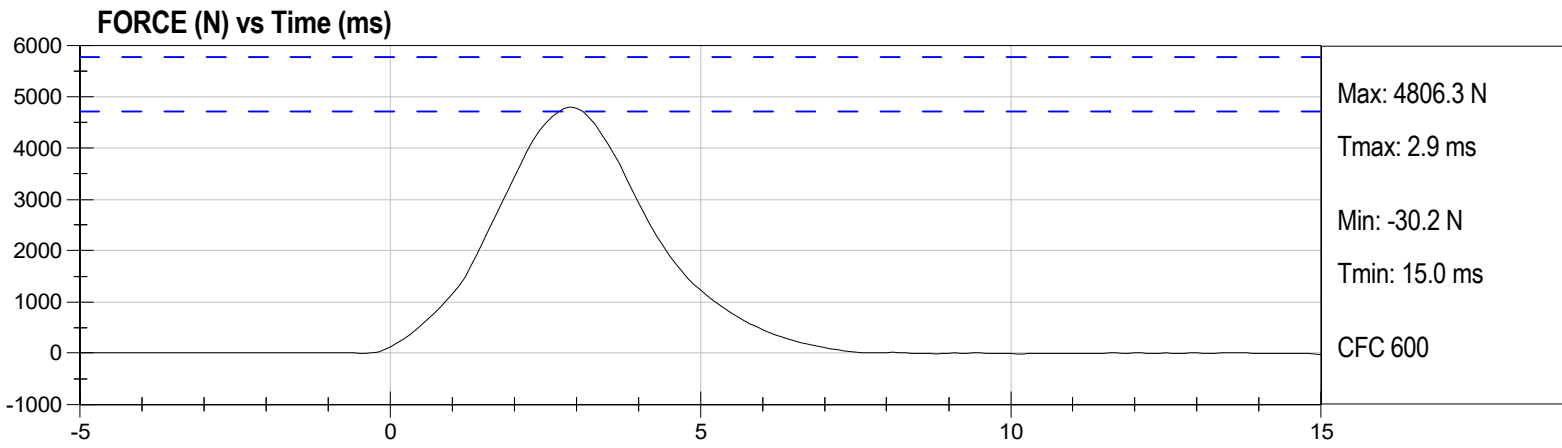


Right Knee Impact Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 05/09/2025
Test ID: D251395
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4806	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
KNEE PROBE	Endevco	P82128	12/03/2024	6/4/2025



DATA SHEET A9
HIP JOINT-FEMUR FLEXION (572.35(c)) (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

- Pre test calibration
 Post test calibration verification

Test attempt no. 1 (when successive hip joint-femur flexion tests are necessary)

1. It has been at least 30 minutes since the last hip joint-femur flexion test. (572.36(m))
 N/A, ONLY one hip joint-femur flexion test performed
2. The test fixture conforms to the specifications in Figure 17A.
3. Use the assembled dummy (78051-218) except (572.35(c)(2)):
 3.1 remove the leg assemblies (86-5001-001 & 002) by removing 3/8-16 Socket Head Cap Screw and retaining the structural assembly of the upper legs (78051-43 & 44)
 3.2 remove the abdominal insert (78051-52)
 3.3 replace the instrument cover plate (78051-13) in the pelvic bone with a rigid pelvic bone stabilizer insert (Figure 15A) and attach the pelvis upper support device (Figure 16A).
4. The assembly soaked at a temperature between 18.9°C (66°F) and 25.6°C (78°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.35(c)(v))
- | | |
|---------------------------------|---------------|
| Record the maximum temperature: | <u>21.5°C</u> |
| Record the minimum temperature: | <u>20.0°C</u> |
| Record the maximum humidity: | <u>27%</u> |
| Record the minimum humidity: | <u>17%</u> |
5. Seat the dummy on the rigid seat fixture. (572.35(c)(2)(ii))
6. Secure the dummy by bolting the stabilizer insert and the pelvis upper support device to the seat back of the test fixture as shown in Figures 17A, 18A, and 19A. (572.35(c)(2)(ii))
7. Adjust the threaded rods until plane B is horizontal.
8. Secure the lever arm into the left femur shaft opening of the upper leg structure assembly (78051-43) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))
9. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline

horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Left Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.5°/s
Femur Torque at 30°	Torque ≤ 70 ft-lbf	2.56 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	48.6°

- X 11. Secure the lever arm into the right femur shaft opening of the upper leg structure assembly (78051-44) and firmly secure it using the 3/8-16 socket head cap screws (Figure 19A). (572.35(c)(2)(iii))

- X 12. Lift the lever arm parallel to the midsagittal plane at a rotation rate between 5 and 10 degrees per second while maintaining the ½ in. shoulder bolt longitudinal centerline horizontal throughout the range of motion until the 150 ft-lbf torque level is reached (Figures 18A and 19A). (572.35(c)(2)(iv))

- X 10. Complete the following table:
Right Hip Joint-Femur Flexion Results (572.35(c)(1) & (c)(2)(iv))

Parameter	Specification	Result
Rotation Rate	$5^{\circ}/s \leq \text{rotation rate} \leq 10^{\circ}/s$	6.5°/s
Femur Torque at 30°	torque ≤ 70 ft-lbf	2.71 ft-lbf
Rotation at 150 lbf-ft	$40^{\circ} \leq \text{rotation} \leq 50^{\circ}$	46.5°


Signature

05/09/2025
Date

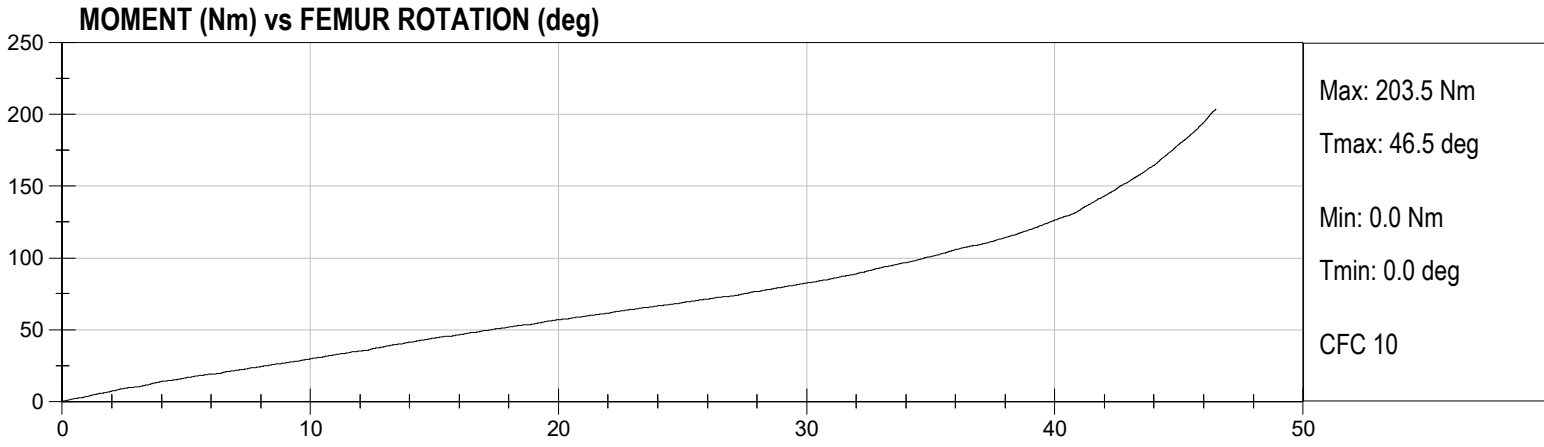


Right Hip-Femur Flexion Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 05/09/2025
Test ID: D251399
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	Pass
Moment at 30 Degrees	Nm	<= 94.9	82.5	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	46.5	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025



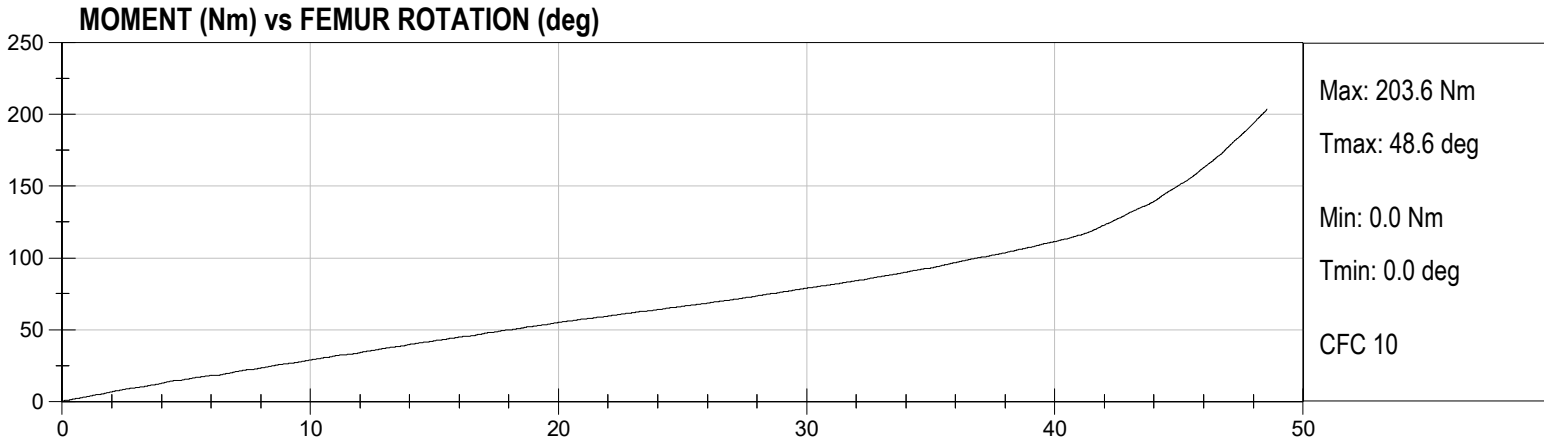


Left Hip-Femur Flexion Test
Hybrid III 50th Percentile Male
ATD Serial No: 403

Test Date: 05/09/2025
Test ID: D251390
Test Technician: Brian Lucas

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.5	Pass
Moment at 30 Degrees	Nm	<= 94.9	78.8	Pass
Rotation Angle at 203.4 Nm	deg	40.0 to 50.0	48.6	Pass

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
LOAD CELL	FTSS	DS8350MY	03/11/2025	3/11/2026
FRAME ANGLE	Servo	3966	03/27/2025	9/26/2025
FEMUR ANGLE	Servo	4714	03/27/2025	9/26/2025



DATA SHEET A1
DUMMY DAMAGE CHECKLIST (50th Male)

Dummy Serial Number: 403

Test Date: 05/09/2025

Technician: Brian Lucas

This check sheet is completed as part of the post test calibration verification.

X Perform general cleaning.

Dummy Item	Inspect for	Comments	Damage	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.

Repair or Replacement approved by:

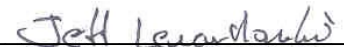


Signature

05/09/2025
Date

Describe the repair or replacement of parts:

Checked by:



Signature

05/09/2025
Date

DATA SHEET A10
PART 572 INSTRUMENTATION CALIBRATION INFORMATION

I.D. NO.	MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF LAST CALIBRATION	DATE OF NEXT CALIBRATION
DUMMY INSTRUMENTATION					
HEAD ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AH5D9	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	AGH74	04/14/2025	10/14/2025
(3) VERTICAL	Endevco	7231C-750	C19307	04/14/2025	10/14/2025
NECK TRANSDUCER	N/A	N/A	N/A	N/A	N/A
CHEST ACCELEROMETERS					
(1) LONGITUDINAL	Endevco	7231C-750	AH5J3	04/14/2025	10/14/2025
(2) LATERAL	Endevco	7231C-750	C16675	05/07/2025	11/06/2025
(3) VERTICAL	Endevco	7231C-750	C12885	04/14/2025	10/14/2025
CHEST POTENTIOMETER	Humanetics	78051-317	403	04/14/2025	10/14/2025
FEMUR LOAD CELLS					
(1) RIGHT FEMUR	Humanetics	2121AJLN2	F3137FZ	04/14/2025	10/14/2025
(2) LEFT FEMUR	Humanetics	2121AJLN2	F3138FZ	04/14/2025	10/14/2025
LABORATORY INSTRUMENTATION					
NECK PENDULUM ACCELEROMETER	Endevco	7231C-750	AH5P1	01/13/2025	07/15/2025
THORAX PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-2-360M17	P79577	03/21/2025	09/20/2025
KNEE PENDULUM ACCELEROMETER	Endevco	7264C-2KTZ-2-360M17	P82128	12/03/2024	06/04/2025
NECK ROTATION TRANSDUCER 1 (OPTIONAL)	Servo	14CBI-2897	4707	02/25/2025	08/27/2025
NECK ROTATION TRANSDUCER 2 (OPTIONAL)	Servo	14CBI-2897	7297	02/25/2025	08/27/2025

LABORATORY TECHNICIAN: 