

**Research FMVSS 208
Flat Frontal Barrier Test
Belted at 35 mph**

**TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
2019 Toyota Highlander**

**PREPARED BY:
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Report Date: March 5, 2025

FINAL REPORT

**Prepared For:
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16. Abstract A 56.32 km/h (35 mph), frontal rigid barrier impact test was conducted on a 2019 Toyota Highlander based on the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing (May 2018) and FMVSS 208 (September 2012) test procedures. This test was conducted to obtain data related to FMVSS Nos. 208, 212, 219 (partial), performance. The test was conducted at the Transportation Research Center Inc. in East Liberty, Ohio on October 10, 2024. The impact velocity was 56.33 km/h, and the ambient temperature at the barrier face at the time of impact was 21.6° C. The target vehicle post-test maximum crush was 324 millimeters at Crush zone 5 at right side. The test vehicle's performance is as follows:																																																			
<table border="1"> <thead> <tr> <th>Measurement Description</th><th>Units</th><th>Driver THOR-50M</th><th>Passenger THOR-50M</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC15)</td><td>N/A</td><td>225</td><td>238</td></tr> <tr> <td>Brain Injury Criteria (BrIC)</td><td>N/A</td><td>0.61</td><td>1.12</td></tr> <tr> <td>Abdomen Deflection</td><td>mm</td><td>64.66</td><td>57.87</td></tr> <tr> <td>Peak Resultant Acetabulum Force</td><td>N</td><td>2613.03</td><td>2666.01</td></tr> <tr> <td>Peak Chest Deflection</td><td>mm</td><td>64.85</td><td>54.75</td></tr> <tr> <td>Neck Injury Criteria (Nij)</td><td>N/A</td><td>0.68</td><td>0.80</td></tr> <tr> <td>Peak Neck Tension</td><td>N</td><td>2657.09</td><td>1901.28</td></tr> <tr> <td>Peak Neck Compression</td><td>mm</td><td>-294.93</td><td>-488.42</td></tr> <tr> <td>Peak Upper Tibia Index</td><td>N</td><td>0.82</td><td>0.80</td></tr> <tr> <td>Left Femur Force</td><td>N</td><td>-2584.22</td><td>-3892.34</td></tr> <tr> <td>Right Femur Force</td><td>N</td><td>-4125.26</td><td>-5676.37</td></tr> </tbody> </table>				Measurement Description	Units	Driver THOR-50M	Passenger THOR-50M	Head Injury Criteria (HIC15)	N/A	225	238	Brain Injury Criteria (BrIC)	N/A	0.61	1.12	Abdomen Deflection	mm	64.66	57.87	Peak Resultant Acetabulum Force	N	2613.03	2666.01	Peak Chest Deflection	mm	64.85	54.75	Neck Injury Criteria (Nij)	N/A	0.68	0.80	Peak Neck Tension	N	2657.09	1901.28	Peak Neck Compression	mm	-294.93	-488.42	Peak Upper Tibia Index	N	0.82	0.80	Left Femur Force	N	-2584.22	-3892.34	Right Femur Force	N	-4125.26	-5676.37
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SECTION 1 PURPOSE AND SUMMARY OF THE TEST

PURPOSE

This 56.32 km/h frontal barrier impact test is part of the frontal research crash test program. It was conducted for the National Highway Traffic Safety Administration's (NHTSA) under 693JJ923D000057 by Transportation Research Center Inc. The purpose of this test was to evaluate the repeatability, reproducibility, and durability of the THOR 50th percentile ATD.

The test was conducted using NHTSA's Procedure for NCAP Full Frontal Rigid Barrier Impact Testing (dated May 2018.) and NHTSA's FMVSS No.208, dated September 2012 as a guidelines. THOR-50M ATDs were used instead of the Hybrid III 50th and Hybrid III 5th percentile ATDs listed in the test procedures.

SUMMARY

A high-res load cell barrier; provided by NHTSA; consisting of 288 load cells that can collect force and moment was impacted by a 2019 Toyota Highlander at a velocity of 56.33 km/h. This test only collected 160 channels of force data in the X-direction. The top row of load cells were not collected during this test. The test was performed at Transportation Research Center, Inc. on October 10, 2024. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and 18 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two THOR-50M anthropomorphic test devices (ATDs) were placed in the driver seating and right-front passenger position. The ATDs were seated per a draft THOR-50M seating procedure Appendix E. The driver SN: EG2595 (IDDAS) was equipped with IR-TRACCs and HIS 4-position spine. The passenger SN: 9799 (cabled) was equipped with STRACK. Both ATDs were fully instrumented with head, chest, spine and pelvis tri-axial accelerometers, upper neck transducers, femur load cells, and lower leg instrumentation.

The driver (position 1) ATD (Serial No. EG2595), and the right-front passenger (position 2) ATD (Serial No. DO9799) were qualified prior to the test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

A total of 470 channels of data were recorded on an on-board data acquisition system at 20,000 samples per second and processed as specified in SAE J211/1MAR 95. Appendix B contains the vehicle and dummy response data traces.

There was 100.0 percent windshield retention and no intrusion into the protected zone of the windshield during the event.

The maximum static crush of the vehicle was 324 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

The occupant data is summarized below:

Measurement Description	Units	Driver	Passenger
Head Injury Criteria (HIC ₁₅)	N/A	225	238
Brain Injury Criterion (BrIC)	N/A	0.61	1.12
Neck Injury Criteria (NIJ)	N/A	0.68	0.80
Neck Tension	N	2657.09	1901.28
Neck Compression	N	-294.93	-488.42
Upper Left Resultant Chest Deflection	mm	31.40	54.75
Upper Right Resultant Chest Deflection	mm	64.85	30.03 ⁽¹⁾
Lower Left Resultant Chest Deflection	mm	14.93	32.80 ⁽²⁾
Lower Right Resultant Chest Deflection	mm	35.86	12.83
Maximum Chest Deflection	mm	64.85	54.75
T6 Chest Resultant Acceleration, 3ms Clip	g	47.51	39.55
Left Abdomen Deflection	mm	64.66	56.34
Right Abdomen Deflection	mm	54.13	57.87
Maximum Abdomen Deflection	mm	64.66	57.87
Left Acetabulum Force	N	1845.95	1731.31
Right Acetabulum Force	N	2613.03	2666.01
Left Femur Force	N	-2584.22	-3892.34
Right Femur Force	N	-4125.26	-5676.37
Left Upper Tibia Index	N/A	0.76	0.80
Right Upper Tibia Index	N/A	0.82	0.38

Left Lower Tibia Index	N/A	0.34	0.77
Right Lower Tibia Index	N/A	DAE	0.29

¹Was calculated up to 100 ms; recorded questionable data after ~100 ms

² Was calculated up to 53 ms; recorded questionable data after ~53 ms

DATA ACQUISITION EXPLANATIONS

Driver Right lower Tibia Load Cell Force Z: QD throughout

Passenger Upper Neck Load Cell Moment Y: Spikes throughout

Passenger Upper Neck Load Cell Moment Z: CF 82.0 ms (plug ripped off)

Passenger Right Upper Thorax Y Rotary Potentiometer: No Valid Data

Passenger T6 Z Accelerometer: Spikes throughout

Passenger Left Lower Thorax Y Rotary Potentiometer: CF 52.0 ms

Passenger Right Lower Thorax Z Rotary Potentiometer: CF 169.0 ms

Passenger Right Femur Load Cell Force X: Spikes 64.0-68.0 ms

Passenger Right Tibia Y Accelerometer: CF 70.0 ms

Passenger Right Ankle Y Rotary Potentiometer: QD throughout

Left Rear Seat Crossmember X Accelerometer: CF 37.0 ms

Left Rear Seat Crossmember Z Accelerometer: CF 37.0 ms

Top of Engine X Accelerometer: CF 25.0 ms

Bottom of Engine X Accelerometer: CF 60.0 ms

Left Rear Seat Crossmember X Redundant Accelerometer: QD after 74.0 ms

Left Rear Seat Crossmember Z Redundant Accelerometer: QD after 74.0 ms

Passenger Lap Belt: CF 56.0 ms

TABLE 1 THOR-50M INSTRUMENTATION DATA
Driver Dummy Serial Number: EG2595

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	14.33	274.85	-52.74	112.90
	Y	9.50	70.50	-17.20	201.25
	Z	49.68	70.00	-8.42	128.45
	R	64.04	70.05		
Head Angular Rate (deg/sec)	X	278.37	64.10	-325.33	203.65
	Y	1127.27	235.90	-1899.16	71.20
	Z	366.28	144.00	-298.07	54.85
Upper Neck Force (N)	X	243.81	268.75	-800.24	153.60
	Y	130.22	113.05	-147.48	58.40
	Z	2657.09	72.35	-294.93	150.10
Upper Neck Moment (Nm)	X	15.94	204.75	-10.41	67.60
	Y	20.68	151.35	-14.54	126.40
	Z	5.01	106.40	-6.84	47.15
Left Upper Thorax IR-TRACC (V)		0.08	79.00	0.03	113.70
Left Upper Thorax Rotary Potentiometer (deg)	Y	18.37	142.65	2.24	72.95
	Z	17.81	81.60	10.66	287.10
Right Upper Thorax IR-TRACC (V)		0.25	75.55	0.04	117.60
Right Upper Thorax Rotary Potentiometer(deg)	Y	21.99	133.60	-3.26	71.45
	Z	-10.80	15.65	-17.99	74.30
T6 Acceleration (g)	X	5.80	16.35	-47.50	66.35
	Y	18.15	95.35	-12.04	68.30
	Z	7.25	104.50	-12.49	75.70
	R	48.90	66.40		
T6 Angular Rate (deg/sec)	X	124.47	191.40	-167.33	135.25
	Y	224.20	98.65	-265.20	68.95
	Z	1301.56	69.80	-344.46	129.15
Thoracic Spine Force (N)	X	158.64	118.25	-2019.75	92.10
	Y	230.19	149.50	-1197.87	105.65
	Z	3561.32	68.90	-513.69	32.15
Thoracic Spine Moment (Nm)	X	72.40	100.95	-45.04	66.15
	Y	266.62	109.60	-29.30	64.05
Left Lower Thorax IR-TRACC (V)		0.06	192.95	0.05	80.70
Left Lower Thorax Rotary Potentiometer (deg)	Y	-0.10	85.80	-5.73	20.65
	Z	7.48	24.30	2.62	69.90
Right Lower Thorax IR-TRACC (V)		0.12	69.65	0.06	293.35
Right Lower Thorax Rotary Potentiometer (deg)	Y	-4.30	17.25	-15.38	71.40
	Z	3.79	80.85	-5.22	29.90

TABLE 1 THOR-50M INSTRUMENTATION DATA (CONT'D)
Driver Dummy Serial Number: EG2595

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Abdominal IR-TRACC (V)		0.21	117.55	0.04	16.20
Left Abdominal Rotary Potentiometer (deg)	Y	4.70	300.00	-1.85	121.95
	Z	4.28	23.65	1.05	84.20
Right Abdominal IR-TRACC (V)		0.18	58.95	0.05	16.20
Right Abdominal Rotary Potentiometer (deg)	Y	6.36	24.95	-1.77	118.70
	Z	-0.25	190.00	-4.95	80.85
Left A.S.I.S. Load Cell Force (N)	X	61.91	19.05	-4994.21	68.45
Left A.S.I.S. Load Cell Moment (Nm)	Y	13.43	59.90	-7.83	73.90
Right A.S.I.S. Load Cell Force (N)	X	29.31	16.55	-4819.27	67.55
Right A.S.I.S. Load Cell Moment (Nm)	Y	15.18	62.40	-2.87	74.15
Left Acetabulum Force (N)	X	1305.63	88.15	-1280.11	74.70
	Y	236.77	74.95	-776.89	21.20
	Z	339.52	112.55	-1291.55	85.90
	R	1857.44	86.15		
Right Acetabulum Force (N)	X	336.01	21.90	-2311.02	89.55
	Y	136.03	52.85	-1037.14	68.80
	Z	1203.06	88.60	-680.57	66.40
	R	2620.91	89.65		
Pelvis Accelerometer (g)	X	10.80	88.40	-68.84	67.80
	Y	14.25	76.65	-9.32	20.05
	Z	11.30	21.15	-27.17	94.55
	R	70.30	67.80		
Pelvis Angular Rate (deg/sec)	X	214.67	91.90	-122.68	121.80
	Y	922.63	77.50	-415.81	104.35
	Z	283.35	40.60	-148.95	104.70
Left Femur Force (N)	X	658.95	81.70	-344.97	118.30
	Y	143.25	123.45	-512.74	21.65
	Z	263.67	112.85	-2584.22	63.95
Left Femur Moment (Nm)	X	58.88	21.55	-54.18	56.10
	Y	63.21	87.70	-106.59	64.20
	Z	28.75	95.95	-28.13	72.40
Left Knee Slider Potentiometer (mm)	X	0.80	300.00	-6.49	44.20
5-Channel Left Upper Tibia Force (N)	X	89.25	16.60	-862.45	22.15
	Y	130.61	16.60	-879.46	19.50
	Z	442.28	28.55	-1337.99	82.55
5-Channel Left Upper Tibia Moment (Nm)	X	68.84	16.95	-81.13	20.45
	Y	151.24	29.25	-31.88	16.85

TABLE 1 THOR-50M INSTRUMENTATION DATA (CONT'D)

Driver Dummy Serial Number: EG2595

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Lower Tibia Force (N)	X	776.34	29.90	-86.60	16.50
	Y	814.11	17.10	-227.82	16.60
	Z	173.01	17.20	-2688.82	84.70
Left Lower Tibia Moment (Nm)	X	20.72	16.75	-58.12	18.80
	Y	69.00	30.40	-19.77	52.80
Left Ankle Rotary Potentiometer (deg)	X	-0.98	0.75	-27.55	106.00
	Y	20.72	89.10	-9.42	-16.70
	Z	4.20	30.45	-4.86	108.75
Right Femur Force (N)	X	638.03	78.15	-419.06	29.00
	Y	580.36	21.15	-273.70	91.55
	Z	89.79	184.00	-4125.26	67.90
Right Femur Moment (Nm)	X	87.83	42.75	-63.79	20.65
	Y	65.94	89.90	-120.85	66.55
	Z	32.78	40.05	-39.05	60.85
Right Knee Slider Potentiometer (mm)	X	0.52	272.25	-6.59	26.90
5-Channel Right Upper Tibia Force (N)	X	487.49	51.35	-687.87	27.75
	Y	1007.68	19.60	-47.07	155.55
	Z	230.39	24.60	-1781.64	89.10
5-Channel Right Upper Tibia Moment (Nm)	X	95.22	19.95	-42.09	92.45
	Y	177.28	27.30	-21.57	16.60
Right Lower Tibia Force (N)	X	919.54	27.50	-478.93	51.50
	Y	340.90	55.15	-718.50	19.60
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Right Lower Tibia Moment (Nm)	X	64.38	19.75	-23.28	16.70
	Y	75.85	27.85	-70.13	51.45
Right Ankle Rotary Potentiometer (deg)	X	34.23	95.15	-1.86	18.80
	Y	24.42	72.80	-14.96	19.80
	Z	5.17	15.10	-1.37	118.60

¹See data acquisition explanation

Positive Direction

Longitudinal Forward
Lateral Rightward
Vertical Downward

Negative Direction

Longitudinal Rearward
Lateral Leftward
Vertical Upward

TABLE 2 THOR-50M INSTRUMENTATION DATA
Passenger Dummy Serial Number: DO9799

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	4.63	284.30	-32.50	72.80
	Y	20.61	129.80	-4.26	30.00
	Z	57.27	65.25	-8.05	22.05
	R	59.42	65.25		
Head Angular Rate (deg/sec)	X	383.20	147.95	-838.35	86.70
	Y	11.51	-38.65	-2951.11	86.55
	Z	1175.53	96.35	-1515.20	138.90
Upper Neck Force (N)	X	227.97	298.95	-504.16	178.35
	Y	340.56	84.95	-64.34	29.80
	Z	1901.28	64.70	-488.42	133.30
Upper Neck Moment (Nm)	X	26.47	93.10	-20.86	115.80
	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Lower Neck Force (N)	X	130.89	286.40	-530.92	71.45
	Y	210.66	116.90	-821.92	92.70
	Z	2348.34	65.30	-496.52	133.30
Lower Neck Moment (Nm)	X	38.88	63.30	-20.91	211.30
	Y	66.54	176.75	-45.05	300.00
	Z	20.83	159.15	-10.98	111.45
T1 Acceleration (g)	X	2.86	18.45	-36.55	71.50
	Y	31.36	77.90	-18.80	72.05
	Z	53.36	71.45	-11.28	22.55
	R	65.51	71.55		
T1 Angular Rate (deg/sec)	X	153.44	162.40	-883.96	108.55
	Y	364.70	218.55	-1359.24	68.35
	Z	1453.79	85.95	-464.50	131.55
Left Upper Thorax S Track (mm)		39.63	195.80	-6.68	76.60
Left Upper Thorax Rotary Potentiometer (deg)	Y	18.64	137.20	-6.87	69.25
	Z	19.94	72.15	12.23	104.70
Right Upper Thorax S Track (mm)		40.46	6.95	24.00	79.50
Right Upper Thorax Rotary Potentiometer (deg)	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	-11.48	130.00	-22.03	77.90
Sternum Acceleration (g)	X	28.37	24.75	-70.51	20.80

¹See data acquisition explanation

TABLE 2 THOR-50M INSTRUMENTATION DATA (CONT'D)

Passenger Dummy Serial Number: DO9799

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
T6 Acceleration (g)	X	3.49	16.55	-38.02	66.25
	Y	13.83	95.05	-6.83	69.05
	Z	25.25	74.45	-11.88	21.65
	R	41.59	66.85		
T6 Angular Rate (deg/sec)	X	198.30	140.30	-496.49	100.50
	Y	215.77	198.80	-1444.82	59.90
	Z	1161.74	86.95	-295.73	118.85
Thoracic Spine Force (N)	X	265.10	36.20	-853.59	99.35
	Y	1517.66	91.25	-63.80	273.40
	Z	2644.50	73.55	-1816.74	38.55
Thoracic Spine Moment (Nm)	X	138.29	118.70	-103.92	84.55
	Y	217.65	123.05	-7.71	18.80
Left Lower Thorax S Track (mm)		43.20	-25.65	0.72	71.55
Left Lower Thorax Rotary Potentiometer (deg)	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Right Lower Thorax S Track (mm)		45.39	65.45	35.52	37.50
Right Lower Thorax Rotary Potentiometer (deg)	Y	-3.69	151.95	-9.63	41.35
	Z	0.06	127.95	-7.49	97.35
T12 Acceleration (g)	X	5.26	26.25	-43.59	61.00
	Y	15.84	97.10	-16.39	72.90
	Z	9.87	75.65	-21.69	57.90
	R	48.25	57.90		
T12 Angular Rate (deg/sec)	X	185.24	138.25	-558.16	82.15
	Y	211.78	211.10	-1371.30	72.35
	Z	1054.99	87.00	-287.76	115.50
Left Abdominal S Track (mm)		59.56	-48.65	4.13	72.40
Left Abdominal Rotary Potentiometer (deg)	Y	2.74	20.60	-1.04	300.00
	Z	6.66	104.90	1.28	23.45
Right Abdominal S Track (mm)		62.92	8.10	6.49	79.95
Right Abdominal Rotary Potentiometer (deg)	Y	3.02	18.90	-2.96	115.15
	Z	-1.78	107.35	-5.35	35.20
Left A.S.I.S. Load Cell Force (N)	X	16.68	19.50	-2112.23	67.15
Left A.S.I.S. Load Cell Moment (Nm)	Y	2.75	50.80	-29.15	65.50
Right A.S.I.S. Load Cell Force (N)	X	67.47	36.85	-1355.38	67.30
Right A.S.I.S. Load Cell Moment (Nm)	Y	2.16	94.50	-19.04	66.75

¹See data acquisition explanation

TABLE 2 THOR-50M INSTRUMENTATION DATA (CONT'D)

Passenger Dummy Serial Number: DO9799

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Acetabulum Force (N)	X	1504.22	92.30	-490.28	25.80
	Y	398.12	21.35	-640.21	74.10
	Z	723.57	57.80	-1080.84	78.05
	R	1736.20	90.20		
Right Acetabulum Force (N)	X	608.42	25.75	-2637.85	56.90
	Y	511.12	113.25	-198.62	46.55
	Z	1157.36	76.20	-599.48	37.00
	R	2671.33	56.85		
Pelvis Accelerometer (g)	X	8.47	20.65	-70.26	62.70
	Y	10.09	63.50	-12.07	88.60
	Z	2.09	158.80	-17.27	61.10
	R	72.06	62.70		
Pelvis Angular Rate (deg/sec)	X	137.02	119.80	-513.20	75.75
	Y	416.68	21.75	-1411.28	74.45
	Z	442.11	101.70	-159.03	34.35
Left Femur Force (N)	X	545.57	76.90	-554.91	19.15
	Y	287.24	39.45	-220.07	74.40
	Z	398.68	110.40	-3892.34	60.50
Left Femur Moment (Nm)	X	86.79	73.55	-28.84	38.95
	Y	107.79	77.00	-44.15	57.20
	Z	41.72	80.20	-13.32	58.60
Left Knee Slider Potentiometer (mm)	X	1.62	77.00	-4.02	94.65
Left Upper Tibia Load Cell Force (N)	X	736.41	49.70	-404.90	40.25
	Y	221.70	47.35	-130.08	62.70
	Z	396.80	19.60	-2653.84	69.75
Left Upper Tibia Load Cell Moment (Nm)	X	67.95	76.75	-17.44	62.10
	Y	59.56	94.05	-163.59	50.95
Left Lower Tibia Load Cell Force (N)	X	258.86	94.20	-1049.44	50.70
	Y	123.81	62.70	-292.86	77.50
	Z	131.71	20.60	-3981.32	69.25
Left Lower Tibia Load Cell Moment (Nm)	X	32.26	49.65	-15.54	62.55
	Y	29.70	78.20	-153.87	49.15
Left Tibia Accelerometer (g)	X	16.10	94.55	-157.19	48.75
	Y	9.39	62.75	-22.07	49.75
Left Ankle Rotary Potentiometer (deg)	X	0.15	259.10	-16.79	80.10
	Y	39.92	69.95	-6.95	-21.00
	Z	5.25	108.65	-4.77	165.15

TABLE 2 THOR-50M INSTRUMENTATION DATA (CONT'D)

Passenger Dummy Serial Number: DO9799

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Foot Accelerometer (g)	X	40.72	61.45	-191.15	48.10
	Y	17.89	50.00	-24.37	45.85
	Z	22.44	40.50	-65.64	46.00
	R	198.80	48.10		
Right Femur Force (N)	X	--- ¹	--- ¹	--- ¹	--- ¹
	Y	109.15	35.10	-597.37	57.25
	Z	457.98	26.50	-5676.37	61.50
Right Femur Moment (Nm)	X	54.10	102.60	-23.48	189.95
	Y	113.85	76.95	-41.52	18.85
	Z	36.35	117.55	-14.03	189.40
Right Knee Slider Potentiometer (mm)	X	0.70	90.90	-3.99	66.50
Right Upper Tibia Force (N)	X	163.49	116.15	-556.42	66.85
	Y	65.30	186.70	-295.39	66.15
	Z	429.62	104.60	-2359.96	66.35
Right Upper Tibia Moment (Nm)	X	38.11	117.50	-20.26	62.35
	Y	77.05	77.75	-13.43	188.40
Right Lower Tibia Force (N)	X	364.92	37.50	-45.10	136.55
	Y	208.34	66.25	-132.94	105.95
	Z	207.57	26.60	-2835.24	67.25
Right Lower Tibia Moment (Nm)	X	11.83	124.85	-16.74	66.50
	Y	49.03	76.30	-18.42	56.60
Right Tibia Accelerometer (g)	X	18.94	76.90	-83.26	52.45
	Y	--- ¹	--- ¹	--- ¹	--- ¹
Right Ankle Rotary Potentiometer (deg)	X	11.85	137.45	-7.74	102.30
	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	0.47	200.95	-7.43	113.65
Right Foot Accelerometer (g)	X	38.03	71.25	-100.42	51.80
	Y	12.43	106.45	-30.46	48.00
	Z	7.68	48.00	-49.63	53.85
	R	107.82	53.90		

¹See data acquisition explanation

Positive Direction

Longitudinal Forward
Lateral Rightward
Vertical Downward

Negative Direction

Longitudinal Rearward
Lateral Leftward
Vertical Upward

SECTION 2 OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

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

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

TEST VEHICLE INFORMATION

NHTSA No.	
Model Year	2019
Make	Toyota
Model	Highlander
Body Style	MPV
VIN	5TDDZRFH5K5993312
Body Color	Gray
Odometer Reading (km/mi)	42,796
Engine Displacement (L)	3.5
Type/No. Cylinders	Gas/6
Engine Placement	Front
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

TEST VEHICLE OPTIONS

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured by	TOYOTA MOTOR MANUFACTURING, INDIANA, INC.	GVWR (kg)	2720 (6000 LB)
Date of Manufacture		GAWR Front (kg)	1345 (2955 LB)
		GAWR Rear (kg)	1590 (3505 LB)

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Split Bench	
Number of Occupants	2	2	3	7
Capacity Wt. (VCW) (kg)				580.0
Cargo Wt. (RCLW) (kg)				96.0

Test Date: 10/10/2024



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	250	250
Recommended Tire Size	245/55R19	245/55R19
Tire Size on Vehicle	245/55R19	245/55R19
Tire Manufacturer	Toyo	Toyo
Tire Model	Open Country	Open Country
Treadwear	300	300
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	103T	103T
Tire Material	Steel, Polyester, Nylon	Steel, Polyester, Nylon
DOT Safety Code Right	73HH KL21419	173HH567
DOT Safety Code Left	73HH KL21419	173HH567

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

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	567.4	493.8		617.6	580.8	
Right	kg	585.0	450.2		613.4	577.6	
Ratio	%	55.0	45.0		51.6	48.4	
Totals	kg	1152.4	944.0	2096.4	1231.0	1158.4	2389.4 ¹

¹Weight is 5.5kg over max; max calculated without considering reduced weight label.

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2096.4
Weight of 1 THOR-50 ATD (98.0 kg)	kg	196.0
Rated Cargo/Luggage Weight (RCLW)	kg	96.0
Vehicle Target Weight (TVTW)	kg	2388.4

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front)
As Delivered	mm	824	828	825	838	1261
As Tested	mm	815	819	791	798	1357
Post Test	mm	798	816	818	820	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2800
Total Vehicle Length at Left Side	mm	4795
Total Vehicle Length at Centerline	mm	4882
Total Vehicle Length at Right Side	mm	4790
Weight of Ballast in Cargo Area	kg	174.0
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	liters	0.0

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

None

DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)Test Vehicle: 2019 Toyota HighlanderTest Program: THOR-50 Durability EvaluationTest Date: 10/10/2024**TARGET VEHICLE STRUCTURAL MEASUREMENT**

	Elements	Descriptions	Pre-Test (mm)
1	Total Length	Total length of the vehicle bumper to bumper	4882
2	Total Width	Widest part of the vehicle excluding mirrors	100
3	Bumper Top Height	Height from ground	595
4	Bumper Bottom Height	Height from ground	495
5	Longitudinal Member Top Height	Bumper beam top to ground	595
6	Distance Between Longitudinal Members	Distance between bumper beam mounts	964
7	Longitudinal Member Width	Bumper beam width	108
8	Engine Top Height	Top of engine to ground	935
9	Engine Bottom Height	Bottom of engine to ground	210
10	Engine and Gearbox Width	Engine width	860
11	Front Bumper-Engine Distance	Front of front bumper to leading edge of engine	520
12	Front Shock Absorber Fixing Height	Shock mount (Under hood) to ground	983
13	Bonnet Leading Edge Height	Height of the leading edge of hood to ground	985
14	Front Shock Absorber Fixing Width	Width between shock mounts	1325
15	Front Bumper – Front Axle Distance	leading edge of bumper to front axle	980
16	Front Axle – A-Pillar Distance	Front axle to A pillar	492
17	A-Pillar – B-Pillar Distance	Distance between A and B pillars	1090
18	B-Pillar – Rear Axle Distance	B Pillar to rear axle	1210
19	B-Pillar – C-Pillar Distance	Distance between B and C pillars	982
20	Roof Sill Bottom Height	Bottom of roof Sill to ground (door frame top)	1540
21	Roof Sill Top Height	Top of roof Sill to ground (edge of the roof where it rolls into roof)	1645
22	Floor Sill Bottom Height	Sill bottom to ground	480
23	Floor Sill Top Height	Sill top to ground	460

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

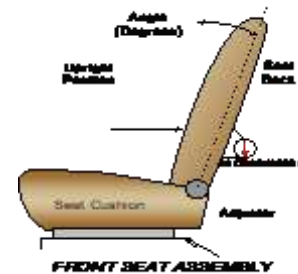
Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

NORMAL DESIGN RIDING POSITION

Measure at the head rest post

	Degree
Driver Seat back angle:	5.5
Passenger Seat back angle:	5.5



SEAT FORE/AFT POSITIONS

Mid per the Thor 50th Seating procedure

	Total Fore/Aft Travel	Placed in Position No.
Driver Seat	312	156
Passenger Seat	260	130

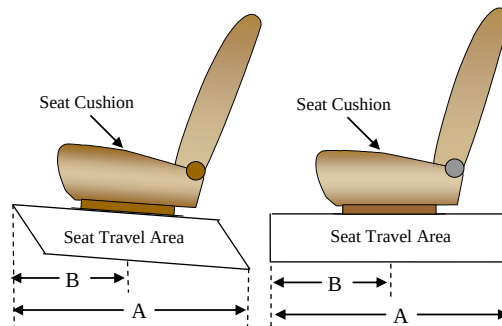
SEAT BELT UPPER ANCHORAGE

Describe the method of positioning seat belt upper anchorages.

Driver: Uppermost, Positioned according to Form 1

Passenger: Uppermost, Positioned according to Form 1

	Total No. of Positions	Placed in Position No.
Driver Seat	4	0, Full Up
Passenger Seat	4	0, Full Up



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

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

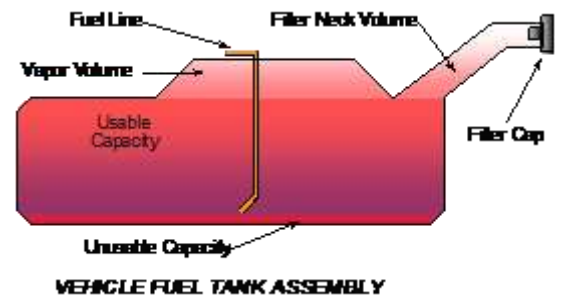
Test Date: 10/10/2024

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	72.3
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	67.2
Actual Amount of Solvent Used	67.2
1/3 of Usable Capacity	24.1

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

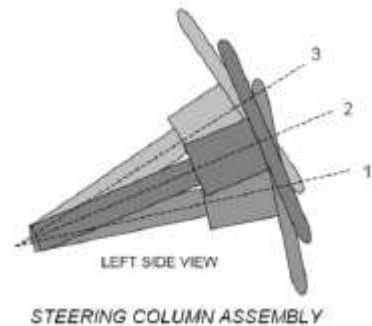
Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



STEERING COLUMN ADJUSTMENT

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

The steering wheel was adjusted to the midpoint of tilt angle range and the midpoint of the telescoping travel (if applicable)



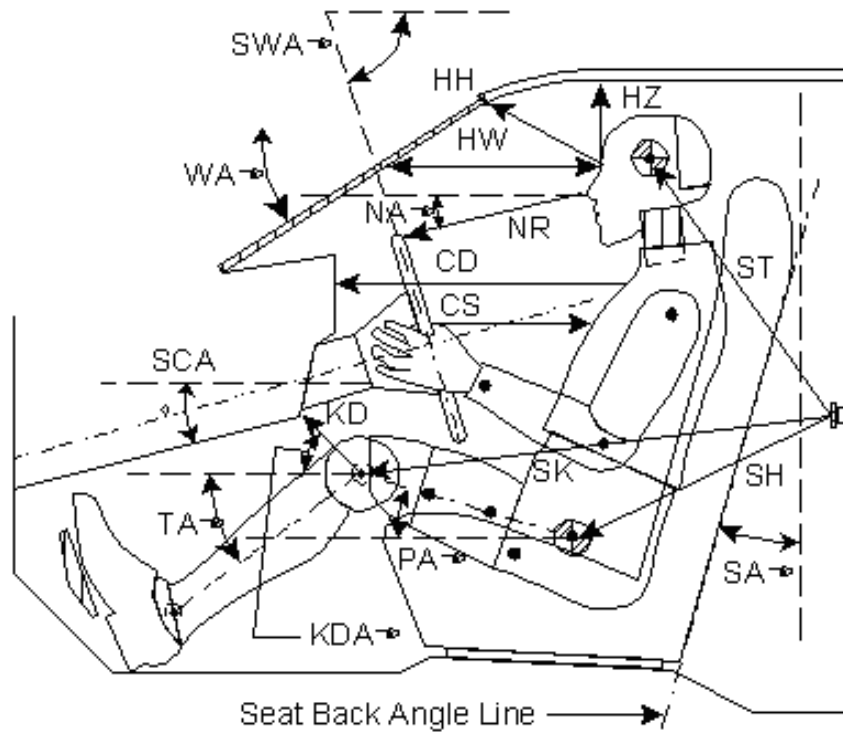
STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost Position No. 1	23.6	0
Geometric Center Position No. 2	25.4	20
Uppermost Position No. 3	27.2	40
Telescoping Steering Wheel Travel		40
Test Position	25.4	20

DATA SHEET NO. 3 - DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		58.0		58.1
SWA°	Steering Wheel Angle		25.4		
SCA°	Steering Column Angle		64.6		
SA°	Seat Back Angle (on head rest post)		5.5		5.5
HZ	Head to Roof (Z)	191		164	
HH	Head to Header	454		436	
HW	Head to Windshield	719		666	
NR	Nose to Rim	496			
CD	Chest to Dash	946		915	
CS	Chest to Steering Hub	356			
RA	Rim to Abdomen	186			
KDL	Left Knee to Dash	108	20.2	81	44.9
KDR	Right Knee to Dash	114	45.3	98	48.8
PA°	Pelvic Angle		34.3		32.8
TA°	Tibia Angle		49.6		44.5
SK	Striker to Knee	654	4.7	690	6.6
ST	Striker to Head	507	83.2	481	84.0
SH	Striker to H-Point	304	39.0	294.0	36.1

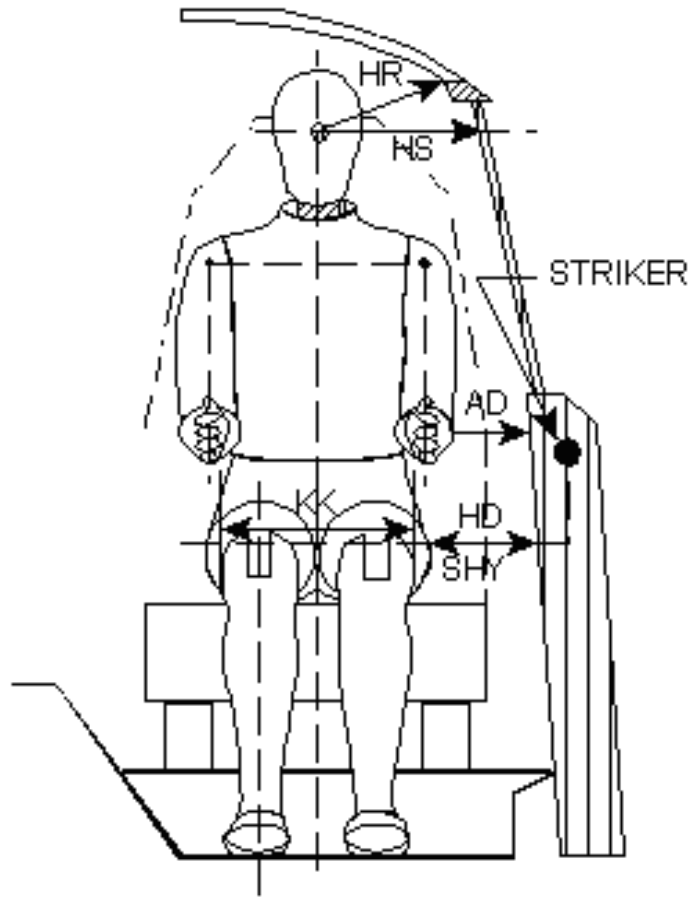
Measurements taken with CMM

DATA SHEET NO. 4 - DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



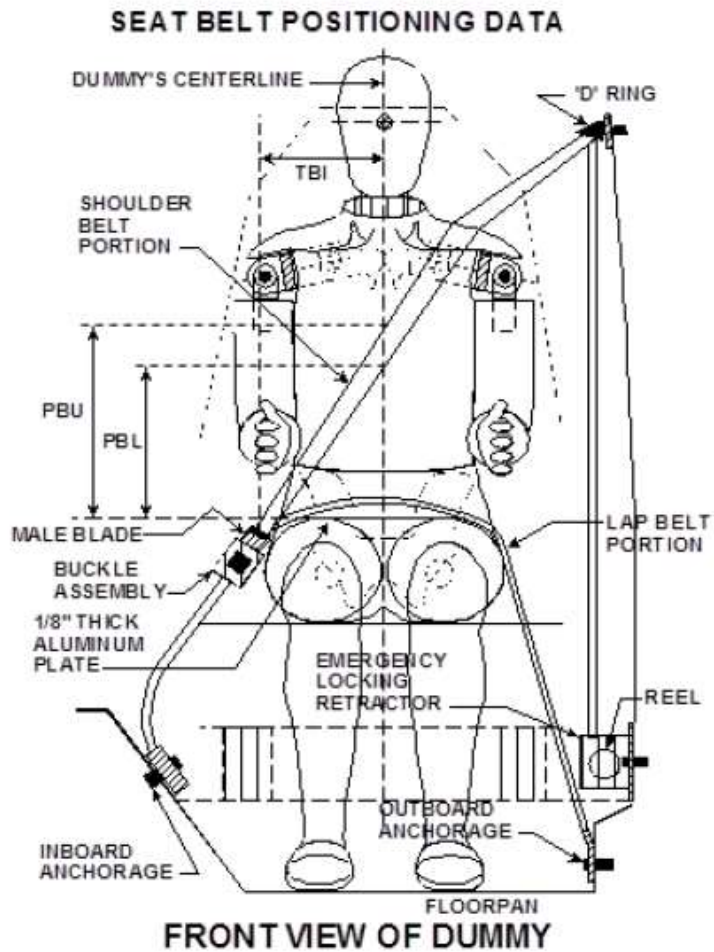
Code	Description	Axis	Units	Driver		Passenger	
AD	Arm to Door		mm	178		102	
HD	H-Point to Door		mm	98		47	
HR	Head to Side Header		mm	257		244	
HS	Head to Side Window		mm	346		337	
KK	Knee to Knee		mm	295		231	
SHY	Striker to H-Point (Y Direction)		mm	246		242	
HLHL	Heel to Heel		mm	366		262	
Tilt Sensor	Head	X, Y	Deg	-0.3	-2.0	0.0	-3.0
	Upper Thorax	X, Y	Deg	-0.4	0.8	-0.7	1.8
	Mid Thorax	X, Y	Deg	0.0	22.7	-0.3	22.8
	Lower Thorax	X, Y	Deg	0.4	32.1	-0.1	31.4
	Pelvis	X, Y	Deg	-0.6	34.3	0.0	32.7

Measurements taken with CMM

DATA SHEET NO. 5 - SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU – Top surface of reference to belt upper edge	mm	288	333
PBL – Top surface of reference to belt lower edge	mm	220	266

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	865	905
Lap belt length as measured on ATD	mm	960	905
Remainder of belt on reel	mm	795	830
Total belt length for continuous webbing systems	mm	2620	2640

TABLE 3 SEATING TABLE

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Driver THOR 50M Seating Worksheet

Vehicle	2019 TOYOTA HIGHLANDER		Technician	J BELZYT	
VIN #	STD0ZRFH5K5993312		Position	DRIVER	
ATD	EG2595		Date	10/10/2024	
Test #	241010				

SCRL Angle	Max	_____	THOR Tilt Sensors	X	Y	TEMP
	Min	-	Head	0°±1°	-0.3	-2
	Difference	0	T1	record for ref	-0.4	0.8
	/2	0	T6	record for ref	0	22.7
	Min	+	T12	record for ref	0.4	32.1
	Mid Angle	0	Pelvis	0°±1°/33°±2.5°	-0.6	34.3

Seat Back Angle	W/Level *	_____	HEAD REST POST ANGLE	5.5	REST POST ANGLE	_____
Seat Pan Angle	W/Level *	_____	Seat Fore/Aft Mid Position	MID	Seat Fore/Aft Set Position	_____
			CENTER OF KNEE TO KNEE	300 MM		_____
					mm rearward of mid position	_____

Pelvis Angle	THOR 33° ±/2.5°	Manual Inclinometer	Tilt Sensor	34.3
--------------	-----------------	---------------------	-------------	------

FARO Measurements On Vehicle Before Seating and Instrumentation								
Name	Measurements From Striker			X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
	Meas X	Meas Y	Meas Z					
SBU -	-32.628	2.639	-18.971					
SBL -	-31.778	1.859	21.061					
STRIKER (Center) -	0.000	0.000	0.000					
FOSB	479.341	243.344	471.796					
FISB	478.151	646.617	469.531					
ROSB	-34.071	206.822	481.237					
RISB	-34.752	660.130	478.770					
S0	541.000	444.000	-182.000					
TS -	627.000	443.000	-340.000					
BS -	465.000	443.000	-18.000					
SC1-	746.000	352.000	-29.900					
CLAP (Bottom center of accel pedal)	1063.817	624.470	385.841					
Floor Pan Point	1051.723	624.027	478.670					
Brake Pedal - Center (from J.S. E.15)	1064.152	476.616	327.309					
Left Lower IP(from J.S. E.15)	757.919	293.964	-55.018					
Right Lower IP(from J.S. E.15)	753.577	595.066	-54.332					
Upper IP(from J.S. E.15)	785.482	295.162	-276.662					
Parking Brake(from J.S. E.15)	914.016	203.473	268.589					
Footrest(from J.S. E.15)	1116.545	230.778	328.798					
TP Outboard(from J.S. E.15)	1243.453	425.130	328.394					
TP Center(from J.S. E.15)	1243.924	477.550	326.517					
TP Inboard(from J.S. E.15)	1232.136	625.459	327.050					
PEDAL REFERENCE POINT (PRP)	1091.037	624.363	348.108					
RHP - (Right Heel Point)	963.135	624.023	504.034					
LHP - (Left Heel Point)	963.527	269.730	476.553					
Gas Pedal Right Upper	1122.864	644.422	325.963					
Gas Pedal Right Lower	1069.357	644.274	374.260					
Gas Pedal Left Upper	1124.609	606.375	325.713					
Gas Pedal Left Lower	1069.703	605.797	374.360					
Brake Pedal Right Upper	1082.675	534.185	306.914					
Brake Pedal Right Lower	1053.141	518.246	355.084					
Brake Pedal Left Upper	1086.538	423.295	301.159					
Brake Pedal Left Lower	1054.947	432.230	351.343					
Seat Centerline Point	966.764	446.566	502.100					
SCR- Full Forward (Per Seating Procedure)								
SCR- Full Rearward (Per Seating Procedure)								
SCR- Mid Track (Per Seating Procedure)								
SAE J826 Manikin H-POINT - (Seating Procedure)	235.940	245.600	191.154					
DR PROJECTED THOR H-POINT AT MID-POSITION - (Seating Procedure)								
DRIVER STP 15.27 MID-POSITION - (Seating Procedure)	538.334	166.747	282.511					

NOTES:

TABLE 3 SEATING TABLE (CONT'D)

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

FARO Measurements Taken Once Seating is Complete								
Measurements From Striker								
Name	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
DRIVER STP STEP 18.6 TRIAL 1 -	538.300		282.500					
DR PROJECTED THOR H-POINT STEP 18.6.2 TRIAL 1 -	256.000		170.000					
DRIVER STP STEP 18.6 TRIAL 2 -	N/A	N/A	N/A					
DR PROJECTED THOR H-POINT STEP 18.6.2 TRIAL 2 -	N/A	N/A	N/A					
DRIVER STP STEP 18.6 TRIAL 3 -	N/A	N/A	N/A					
DR PROJECTED THOR H-POINT STEP 18.6.2 TRIAL 3 -	N/A	N/A	N/A					
RHCG	41.934	517.733	-480.206					
LHCG	50.199	360.495	-477.934					
RIGHT EAM	50.677	513.389	-450.751					
LEFT EAM	55.214	364.096	-449.728					
NS	143.426	436.597	-485.804					
RIGHT IOF	140.403	469.449	-448.125					
LEFT IOF	138.647	403.983	-448.743					
TN	143.066	434.985	-448.462					
TC	131.226	435.289	-344.812					
C1	166.033	427.525	-220.246					
C2	184.835	444.795	-182.269					
C3	278.683	446.302	-17.294					
SHT R	10.307	635.518	-253.179					
SHT L	15.803	255.195	-251.992					
E1	261.123	221.444	-24.312					
LEFT WRIST	485.006	250.324	-136.997					
RIGHT WRIST	466.521	639.672	-132.339					
P1	179.673	169.468	143.435					
H-POINT	254.202	210.419	174.428					
H-POINT (2)	255.934	245.868	173.803					
OK	651.611	247.108	53.254					
K	667.937	539.619	87.538					
OA	921.221	234.576	370.400					
IA	970.613	588.343	373.387					
OH	919.491	259.261	500.780					
IH	968.813	621.926	501.194					
OUTBOARD TOE	1096.663	262.570	296.081					
INBOARD TOE	N/A	N/A	N/A					
OF	-142.565	353.431	-347.117					
TOP CENTER SHOULDER BELT	157.841	446.681	-234.493					
BOTTOM CENTER SHOULDER BELT	190.401	446.950	-167.054					
TOP CENTER LAP BELT	302.793	447.213	21.772					
BOTTOM CENTER LAP BELT	322.394	446.578	64.474					
CENTER OF BELT AT D-RING	-111.676	185.564	-446.183					
DRIVER SCRP - FINAL TEST POSITION	488.467	445.844	214.832					
Measurements to be taken once Dummy is seated and measured								
Name	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
R	142.677	438.972	-676.415					
H	571.528	434.533	-638.281					
W1	862.402	434.590	-487.051					
W1 OUTSIDE	878.486	438.790	-484.742					
W2 OUTSIDE	1121.978	435.532	-332.460					
D1	754.152	429.179	-302.280					
D2	752.863	247.976	15.901					
D3	744.391	574.685	10.169					
HRP	141.484	215.974	-618.259					
HSP	141.493	91.030	-484.550					
ADP	259.009	43.308	-25.536					
HDP	252.928	112.895	172.455					
Measurements calculated using points collected from the FARO arm								
Name	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
HZ						191	454	
HH				719				
HW							496	
NR							946	
CD				356				
CS				455				
CBS								
IKD							114	
OKD							108	
HR							257	
HS					346			
AD					178			
HD					98			
HLHL							366	
KK							295	
SH							373	
HRA - (Inclinometer measurement deg)								5.5
H-POINT TOOL ANGLE								22.6
TORSO ANGLE								17.4
WINDSHIELD ANGLE								58.0
Distance A (From Point 1 to 7)				Missing Point 1				
Distance B (From Point 4 to 8)				Missing Point 4				
Wheelbase (From center of front tire to rear tire) Driver Side				Missing Front Wheel				

NOTES:

TABLE 3 SEATING TABLE (CONT'D)

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Passenger THOR 50M Seating Worksheet

Vehicle	2019 TOYOTA HIGHLANDER		Technician	J BELZYT	
VIN #	5TDDZRFH5KS993312		Position	DRIVER	
ATD	D09799		Date	10/10/2024	
SEATING #	3				

SCRL Angle	Max	_____	THOR 50th Tilt Sensors		
	Min	-	Head	0°±2	
	Difference	0	T1	0°±2	
	/2	0	T6	0°±2	
	Min	+	T12	0°±2	
	Mid Angle	0	Pelvis	0°±2	

	W/Level °	_____	HEAD REST		
Seat Back Angle	W/Level °	_____	POST ANGLE	5.5	
Seat Pan Angle					

Pelvis Angle	32.8	Manual Inclinometer			
---------------------	------	------------------------	--	--	--

			FINAL HEAD REST		
			POST ANGLE		

Name	Measurements From Striker						
	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance
SBU -	-32.211	-3.293	-19.988				
SBL -	-31.708	-1.170	20.207				
STRIKER CENTER -	0.000	0.000	0.000				
FOSB -	479.139	-237.220	472.857				
FISB -	479.273	-640.947	474.242				
ROSB -	-35.387	-202.463	483.228				
RISB -	-34.802	-656.166	482.752				
Left Lower IP(from J.S. E.15)	732.968	-590.140	33.394				
Right Lower IP(from J.S. E.15)	767.848	-289.990	31.182				
Upper IP(from J.S. E.15)	749.323	-290.085	-40.447				
TP Outboard(from J.S. E.15)	1134.441	-290.378	334.152				
TP Center(from J.S. E.15)	1239.898	-440.901	332.969				
TP Inboard(from J.S. E.15)	1226.743	-590.447	332.832				
Footrest (from J.S. E.15)							
Seat Centerline Point	967.180	-1235.359	507.918				
SCR- Full Forward (Per Seating Procedure)							
SCR- Full Rearward (Per Seating Procedure)							
SCR- Mid Track (Per Seating Procedure)							
SAE J826 Manikin H-POINT -	237.693	-242.238	173.046				
PASS PROJECTED THOR H-POINT AT MID-POSITION -	264.700	-160.598	152.150				
PASS STP 11.27 MID-POSITION -	555.103	-164.233	289.960				
NOTES:							

TABLE 3 SEATING TABLE (CONT'D)

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Name	Measurements From Striker							
	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
ATD Measurements to be taken once Dummy is placed in vehicle								
PASS STP STEP 14.6 TRIAL 1 -	555.000		288.000					
PASS PROJECTED THOR H-POINT STEP 14.6.2 TRIAL 1 -	258.000		153.000					
PASS STP STEP 14.6 TRIAL 2 -	N/A	N/A	N/A					
PASS PROJECTED THOR H-POINT STEP 14.6.2 TRIAL 2 -	N/A	N/A	N/A					
PASS STP STEP 14.6 TRIAL 3 -	N/A	N/A	N/A					
PASS PROJECTED THOR H-POINT STEP 14.6.2 TRIAL 3 -	N/A	N/A	N/A					
RHDCG	59.669	-367.572	-503.158					
LHDCG	68.677	-522.118	-499.938					
RIGHT EAM -	66.241	-370.735	-475.287					
LEFT EAM -	76.171	-517.876	-472.994					
NS	155.601	-440.605	-507.673					
RIGHT IOF -	149.438	-409.178	-468.137					
LEFT IOF -	153.322	-472.143	-469.453					
TN	154.472	-441.774	-469.377					
TC	141.085	-440.098	-365.980					
C1	184.828	-441.750	-247.114					
SHT L	47.036	-636.784	-274.656					
SHT R	17.154	-250.407	-277.437					
E1	177.265	-188.159	4.968					
LEFT WRIST	441.102	-670.586	81.583					
RIGHT WRIST	421.948	-225.856	67.556					
P1	191.118	-165.095	120.177					
H-POINT	264.700	-160.598	152.150					
H-POINT (2)	266.491	-241.710	151.304					
OK	685.799	-298.332	79.785					
IK	694.547	-528.473	94.687					
OA	982.633	-303.170	371.440					
IA	1005.250	-551.114	371.088					
OH	971.612	-334.218	509.523					
IH	993.541	-595.022	508.270					
OUTBOARD TOE	1152.687	-376.650	310.840					
INBOARD TOE	N/A	N/A	N/A					
OP	-133.216	-353.835	-364.165					
TOP CENTER OF SHOULDER BELT	192.052	-444.951	-237.817					
BOTTOM CENTER OF SHOULDER BELT	221.158	-444.924	-171.130					
TOP CENTER LAP BELT	322.272	-445.059	0.858					
BOTTOM CENTER OF LAP BELT	344.426	-444.853	40.374					
CENTER OF BELT AT D-RING	-105.184	-184.311	-445.221					
PASSENGER SCRP - FINAL TEST POSITION	508.662	-444.289	192.313					
Name	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
Measurements to be taken on Dummy is seated and measured								
R	154.115	-442.934	-671.830					
H	573.190	-438.517	-632.680					
W1	821.980	-437.929	-505.659					
W1 OUTSIDE	830.086	-442.411	-509.879					
W2 OUTSIDE	1140.014	-442.272	-316.951					
D1	736.623	-440.796	-22.721					
D2	755.266	-299.926	10.475					
D3	747.575	-531.408	34.143					
HRP	157.388	-219.947	-612.429					
HSP	154.741	-103.443	-509.410					
ADP	179.278	-86.145	4.872					
HDP	266.615	-114.072	150.609					
Name	Meas X	Meas Y	Meas Z	X-DISTANCE	Y-DISTANCE	Z-DISTANCE	3D Distance	Deg
Measurements calculated using points collected from the FARO arm								
HZ						164		
HH							436	
HW				666				
CD							915	
IKD							81	
OKD							98	
HR							244	
HS					337			
AD					102			
HD					47			
HLHL							262	
KK							231	
SH							345	
HRA - (Inclinometer measurement deg)								5.5
H-POINT TOOL ANGLE								23.5
TORSO ANGLE								16.7
WINDSHIELD ANGLE								58.1
Distance D (From Point 1 to 7)				Missing Point 1				
Distance E (From Point 4 to 8)				Missing Point 4				
Wheelbase (From center of front tire to rear tire) - Passenger Side								

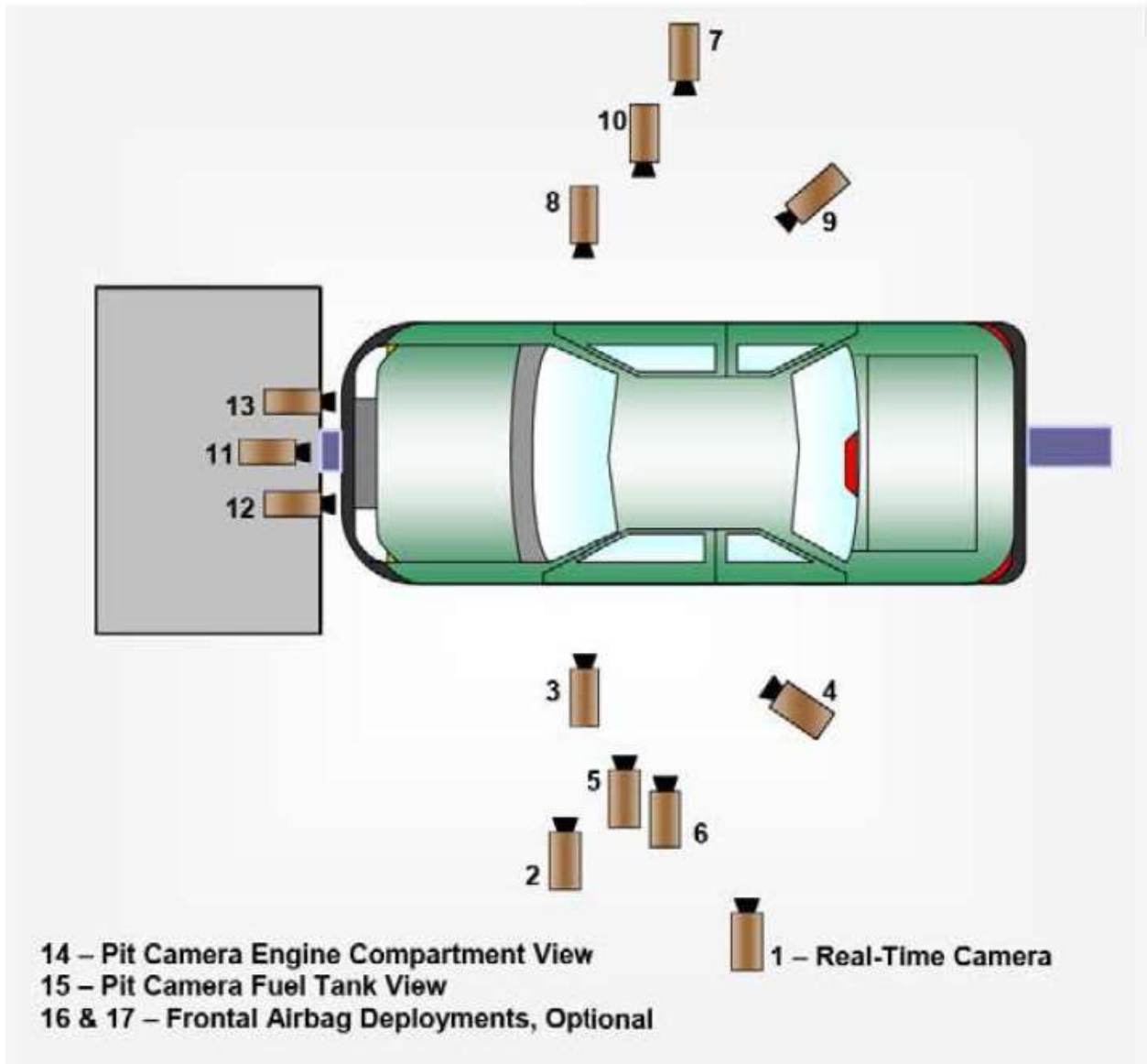
NOTES:

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

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Frame Speed (fps)
		X	Y	Z		
1	Real Time Left Side	--- ¹	--- ¹	--- ¹	Zoom	30
2	Left Overall	-2580	-4329	-1443	8.5	1000
3	Driver Close-up	-2066	-4361	-1431	50	1000
4	Left Angle	-3479	-1870	-1669	20	1000
5	Left Front Half	-1286	-4777	-1187	25	1000
6	Onboard Occupant Compartment Center				8.5	1000
7	Right Overall	-2813	3992	-1596	8.5	1000
8	Passenger Close-up	-1963	4711	-1557	20	1000
9	Right Angle	-3746	688	-1561	50	1000
10	Right Front Half	-1365	-4290	-1261	25	1000
11	Windshield	0	0	-2642	20	1000
12	Driver Windshield	0	-311	-2653	20	1000
13	Passenger Windshield	0	190	-2676	20	1000
14	Pit Engine (Front)	-900	0	2240	20	1000
15	Pit Fuel Tank (Rear)	-3123	0	2240	20	1000
16	Driver Airbag				8.5	1000
17	Passenger Airbag				8.5	1000
18	Driver Onboard (Footwell)				1.8	500
19	Passenger Onboard (Footwell)				1.8	500

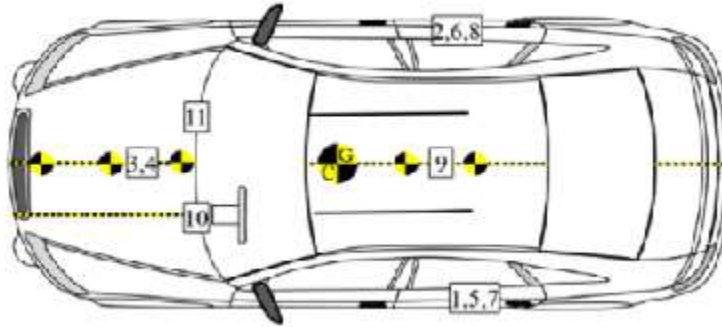
¹ Measurements not taken

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

DATA SHEET NO. 7 - VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
1	Left Rear Seat Cross Member	1,953	-419	-483				
	Longitudinal (g)				--- ¹	--- ¹	--- ¹	--- ¹
	Vertical (g)				--- ¹	--- ¹	--- ¹	--- ¹
2	Right Rear Seat Cross Member	1,953	424	-479				
	Longitudinal (g)				7.73	106.05	-54.35	44.10
	Vertical (g)				6.88	25.40	-13.45	77.30
3	Top of Engine	4,184	-41	-169				
	Longitudinal (g)				--- ¹	--- ¹	--- ¹	--- ¹
4	Bottom of Engine	4,160	207	-213				
	Longitudinal (g)				--- ¹	--- ¹	--- ¹	--- ¹
5	Left Sill	2,107	-705	-465				
	Longitudinal (g)				1.06	184.10	-54.83	53.15
	Vertical (g)				4.64	35.40	-9.51	31.70
6	Right Sill	2,108	702	-467				
	Longitudinal (g)				1.82	90.50	-58.78	43.40
	Vertical (g)				6.55	35.20	-13.42	43.20
7	Left Rear Seat Cross Member Redundant	1,954	-708	-466				
	Longitudinal (g)				--- ¹	--- ¹	--- ¹	--- ¹
	Vertical (g)				--- ¹	--- ¹	--- ¹	--- ¹
8	Right Rear Seat Cross Member Redundant	1,954	704	-469				
	Longitudinal (g)				1.23	147.75	-59.55	43.40
	Vertical (g)				7.58	51.90	-10.54	72.40
9	Vehicle CG	2,135	-1	-460				
	Longitudinal (g)				3.06	103.65	-66.74	47.00
	Lateral (g)				6.04	50.10	-9.64	42.75
	Vertical (g)				36.52	34.40	-36.85	31.00
	Resultant (g)				71.92	46.90		

¹See data acquisition explanation

DATA SHEET NO. 7 - VEHICLE ACCELEROMETER DATA (CONT'D)

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
9a	Vehicle CG	2,190	-1	-460				
	Longitudinal (°/s)				226.70	37.85	-112.88	65.60
	Lateral (°/s)				413.37	64.50	-242.08	54.70
	Vertical (°/s)				81.20	39.25	-75.52	32.15
10	Driver Toe Pan	3,619	-376	-477				
	Longitudinal (g)				25.45	28.75	-58.21	53.40
	Lateral (g)				17.37	46.80	-16.32	36.00
	Vertical (g)				46.35	40.65	-14.53	73.00
	Resultant (g)				62.94	45.90		
11	Front Passenger Toe Pan	3,612	376	-480				
	Longitudinal (g)				22.90	39.25	-51.20	31.30
	Lateral (g)				11.47	49.05	-24.21	38.05
	Vertical (g)				72.47	41.60	-10.67	72.25
	Resultant (g)				72.60	41.50	0.07	-0.20

Reference point:

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

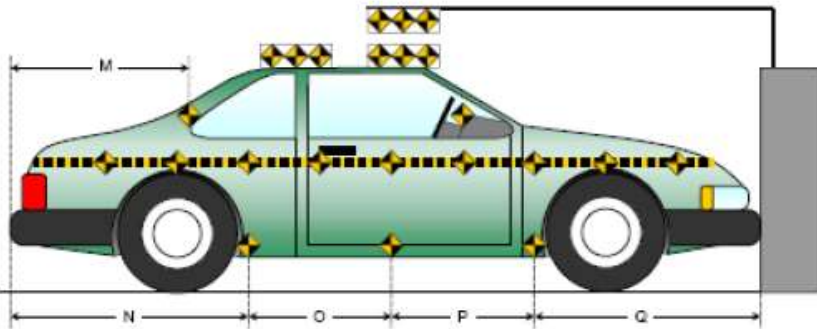
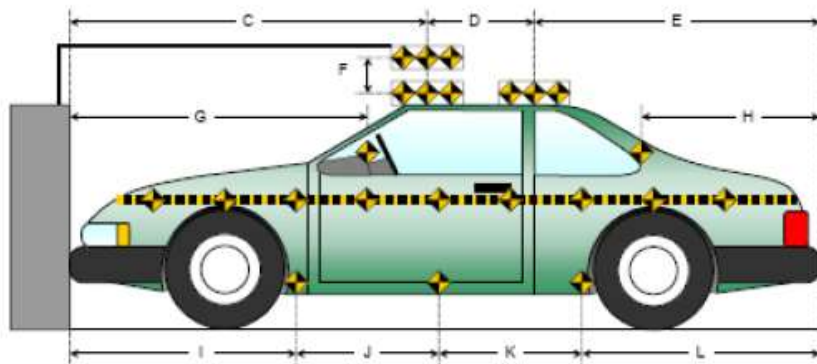
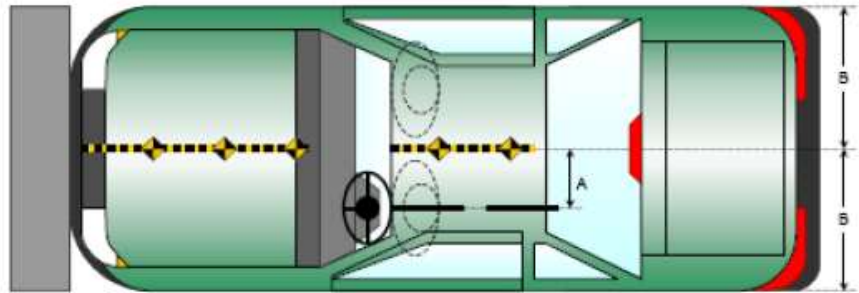
DATA SHEET NO. 8 - PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Item	Value
A	N/A
B	962
C	N/A
D	N/A
E	N/A
F	N/A
G	1792
H	823
I	1537
J	843
K	842
L	1660
M	830
N	1667
O	836
P	838
Q	1541

All units in millimeters



DATA SHEET NO. 9 - TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

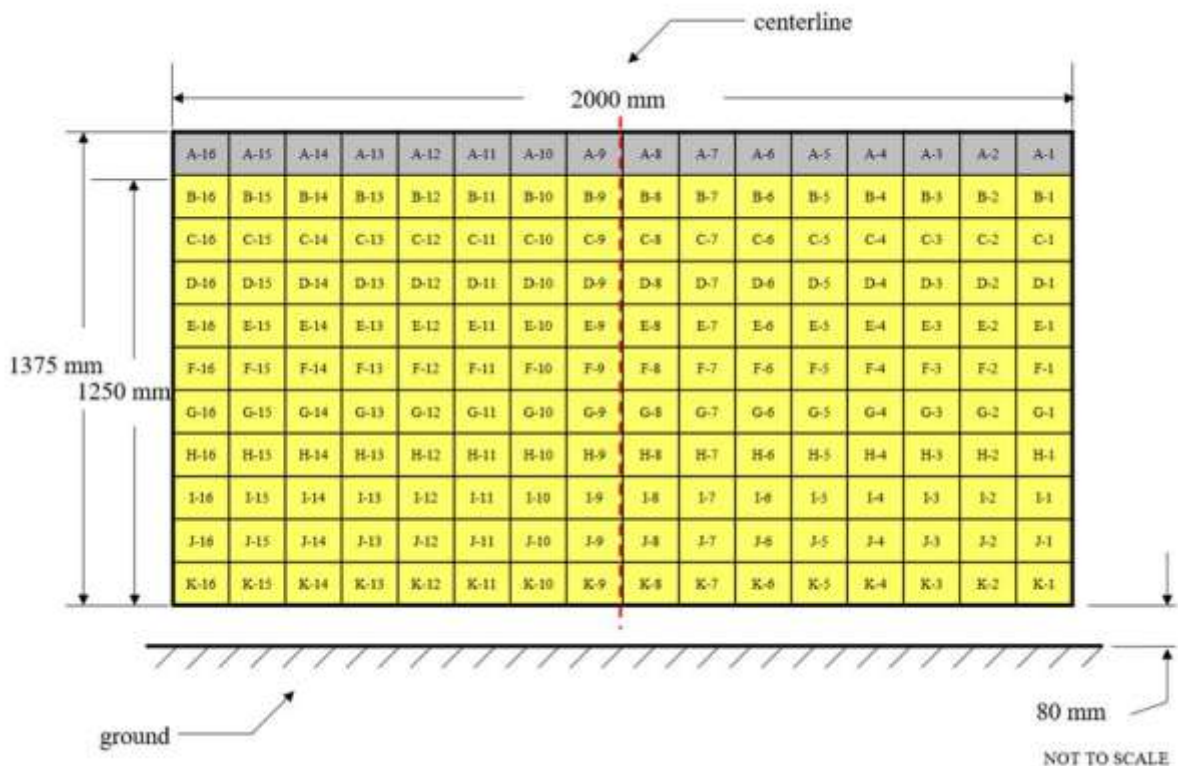
INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy	121
Passenger Dummy	150
Vehicle Structure	39
High Res Load Cell Barrier	160
Total	470

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	4
High-Speed Offboard	14
Real-Time Panning	1
Total	19

LOAD CELL LOCATIONS ON FIXED BARRIER



Row A is grayed out because it was not collected

DATA SHEET NO. 10 - POST-TEST OBSERVATIONSTest Vehicle: 2019 Toyota HighlanderTest Program: THOR-50 Durability EvaluationTest Date: 10/10/2024**TEST DUMMY INFORMATION AND CONTACT LOCATIONS**

Description	Driver	Passenger
Dummy Type / Serial No.	THOR-50M/EG2595	THOR-50M/DO9799
Head Contact	Front Airbag/Overhead IP	Front Airbag
Upper Torso Contact	Seat belt/Airbag	Seat belt/Airbag
Lower Torso Contact	Seatbelt	Seatbelt
Left Knee Contact	Knee airbag	Glove Box
Right Knee Contact	Knee airbag	Glove Box

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

Description	Driver	Passenger	Other
Locked/Unlocked Doors**	Unlocked	Unlocked	
Front Door Opening**	No	No	
Rear Door Opening**	No	No	
Trunk/Hatch/Tailgate Opening**			No
Seat Track Shift (mm) **	No	No	
Seat Back Movement from Initial Position**	No	No	

**NOTE: Indicate "No", "N/A", or "Yes", and if "Yes", describe

POST- OTHER VEHICLE POST-TEST OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	286
Center	mm	200
Right Side	mm	282
Average	mm	256

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

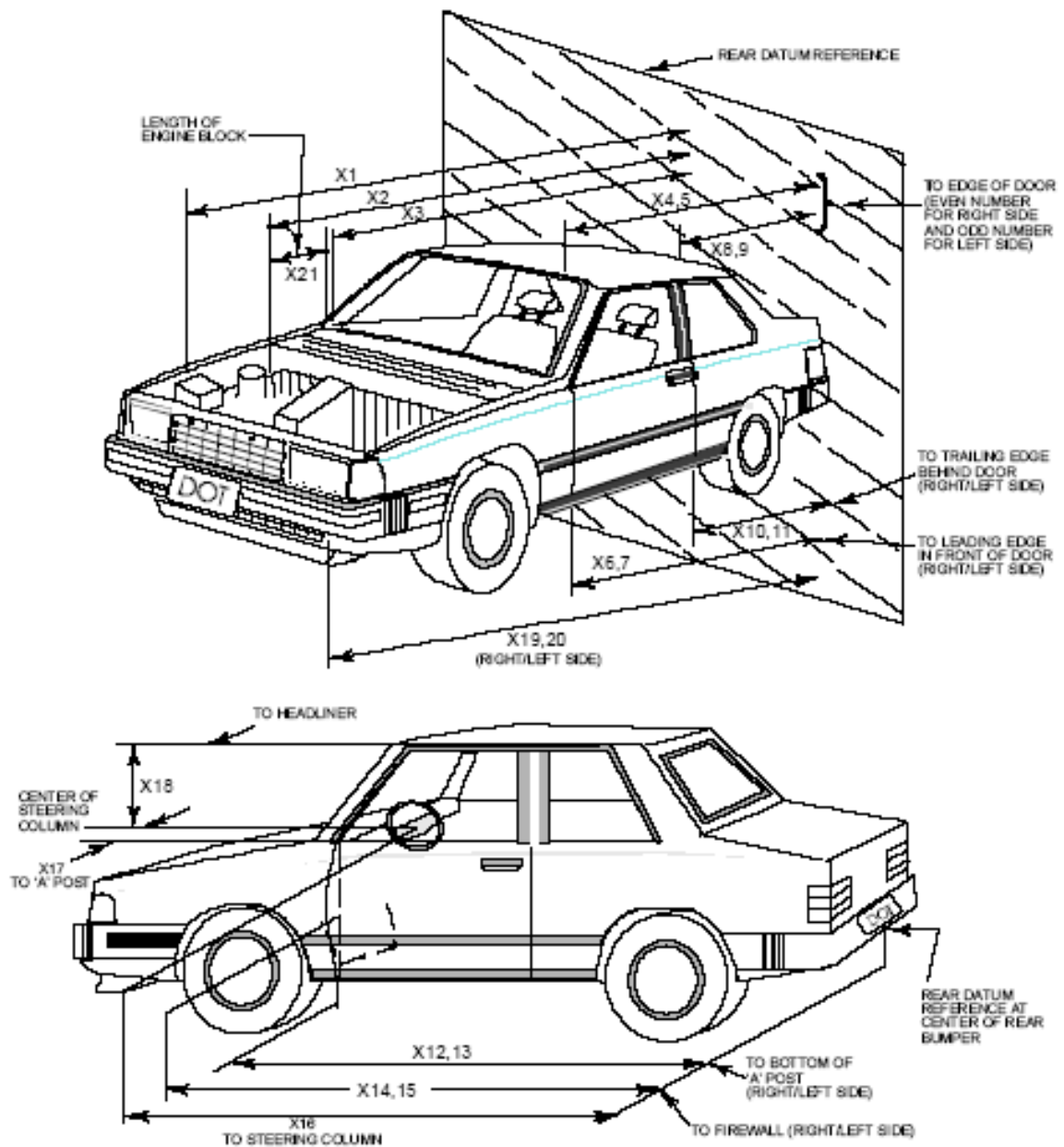
Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Torso/Pelvis Side Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	Yes	Yes	Yes
Knee Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	No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

DATA SHEET NO. 11 - VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



DATA SHEET NO. 11 - VEHICLE PROFILE MEASUREMENTS (CONT'D)Test Vehicle: 2019 Toyota HighlanderTest Program: THOR-50 Durability EvaluationTest Date: 10/10/2024

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4882	4554	-328
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4357	4019	-338
3	RSOV to Firewall	3657	3609	-48
4	RSOV to Upper Leading Edge of Right Door	3365	3375	10
5	RSOV to Upper Leading Edge of Left Door	3368	3378	10
6	RSOV to Lower Leading Edge of Right Door	3336	3337	1
7	RSOV to Lower Leading Edge of Left Door	3337	3334	-3
8	RSOV to Upper Trailing Edge of Right Door	2309	2318	9
9	RSOV to Upper Trailing Edge of Left Door	2316	2323	7
10	RSOV to Lower Trailing Edge of Right Door	2337	2332	-5
11	RSOV to Lower Trailing Edge of Left Door	2342	2333	-9
12	RSOV to Bottom of "A" Post-of Right Side	3349	3360	11
13	RSOV to Bottom of "A" Post-of Left Side	3349	3364	15
14	RSOV to Firewall, Right Side	3947	3937	-10
15	RSOV to Firewall, Left Side	3950	3849	-101
16	RSOV to Steering Column	2915	2982	67
17	Center of Steering Column to "A" Post	320	350	30
18	Center of Steering Column to Headliner	430	428	-2
19	RSOV to Right Side of Front Bumper	4790	4500	-290
20	RSOV to Left Side of Front Bumper	4795	4502	-293
21	Length of Engine Block	520	520	0
RD	RSOV to Right Side of Dash Panel	3160	3177	17
CD	RSOV to Center of Dash Panel	3185	3195	10
LD	RSOV to Left Side of Dash Panel	3162	3183	21

All Dimensions in mm

DATA SHEET NO. 12 - ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

VEHICLE INFORMATION

VIN: 5TDDZRFH5K5993312
Vehicle Size Category: MPV

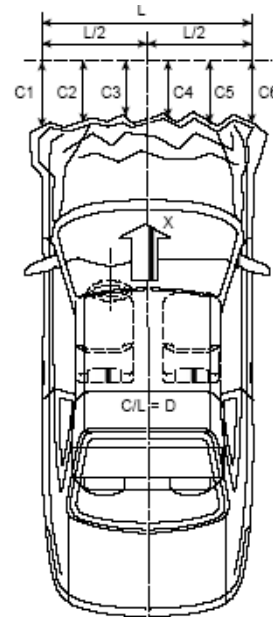
Wheelbase: 2800
Test Weight (kg): 2389.4

ACCELEROMETER DATA

Accelerometer Locations: As listed on Page 15 of this report.
Cal. Procedure/Interval: TRC procedure / 6 month interval
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.33
Velocity Change (km/h): --¹
Time of Separation (ms): 156

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1220
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	77	370	293
C2	Crush zone 2 at left side	mm	17	314	297
C3	Crush zone 3 at left side	mm	4	310	306
C4	Crush zone 4 at right side	mm	0	303	303
C5	Crush zone 5 at right side	mm	12	336	324
C6	Crush zone 6 at right side	mm	82	372	290
L	C1 to C6	mm	1220	1271	51

¹ Not Available, Cross member channels bad

DATA SHEET NO. 13 - VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50 Durability Evaluation

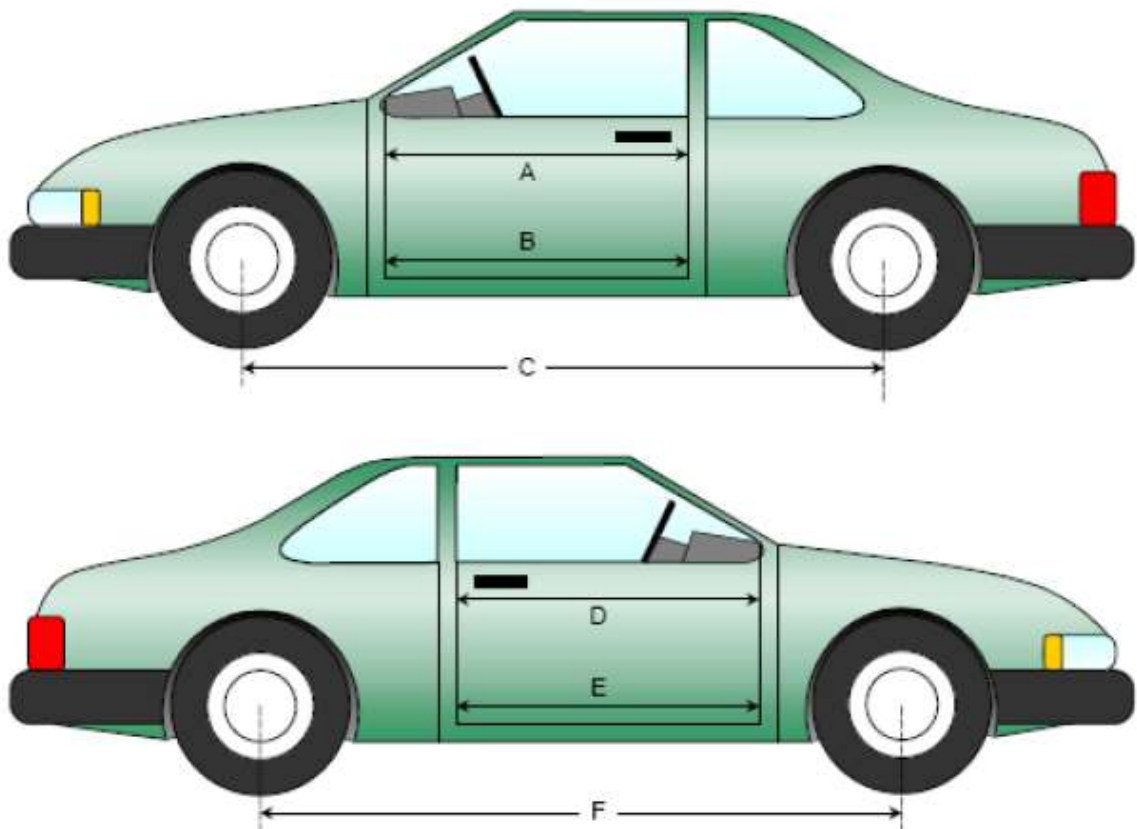
Test Date: 10/10/2024

DOOR OPENING WIDTH

No.	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	935	946	-11
B	Left Side Lower	mm	850	850	0
D	Right Side Upper	mm	935	940	-5
E	Right Side Lower	mm	850	860	-10

WHEELBASE MEASUREMENTS

No.	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2590	2520	70
F	Right Side Wheelbase	mm	2590	2520	70

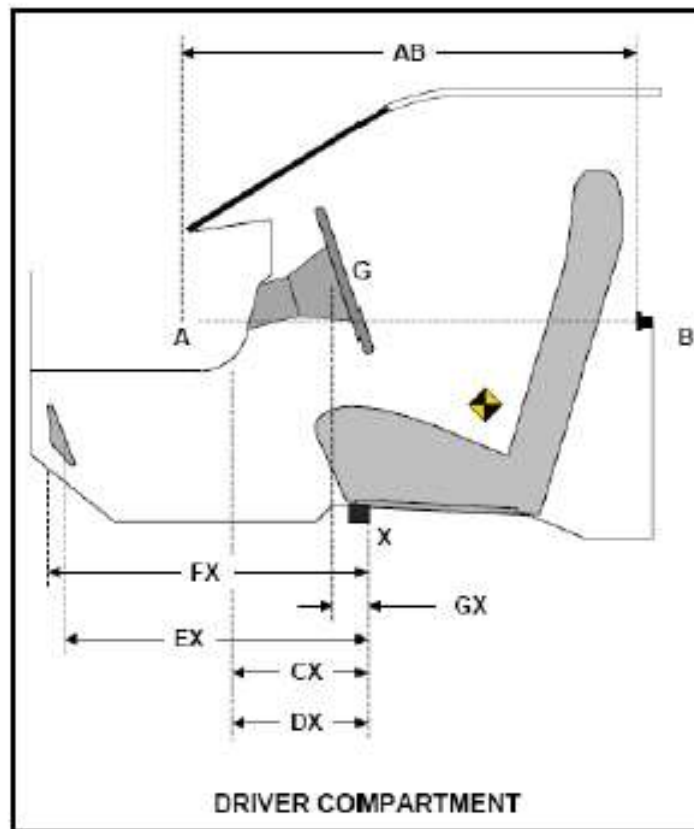


¹ Front suspension damaged and wheels fell off measurements not available

DATA SHEET NO. 13 - VEHICLE INTRUSION MEASUREMENTS (CONT'D)Test Vehicle: 2019 Toyota HighlanderTest Program: THOR-50 Durability EvaluationTest Date: 10/10/2024**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	935	935	0
CX	Left Knee Bolster to X	mm	335	340	-5
DX	Right Knee Bolster to X	mm	335	390	-55
EX	Brake Pedal to X	mm	560	537	23
FX	Foot Rest to X	mm	580	566	14
GX	Center of Steering Column Wheel Hub to X	mm	65	156	-91

X = Front of Seat Track (Stationary)



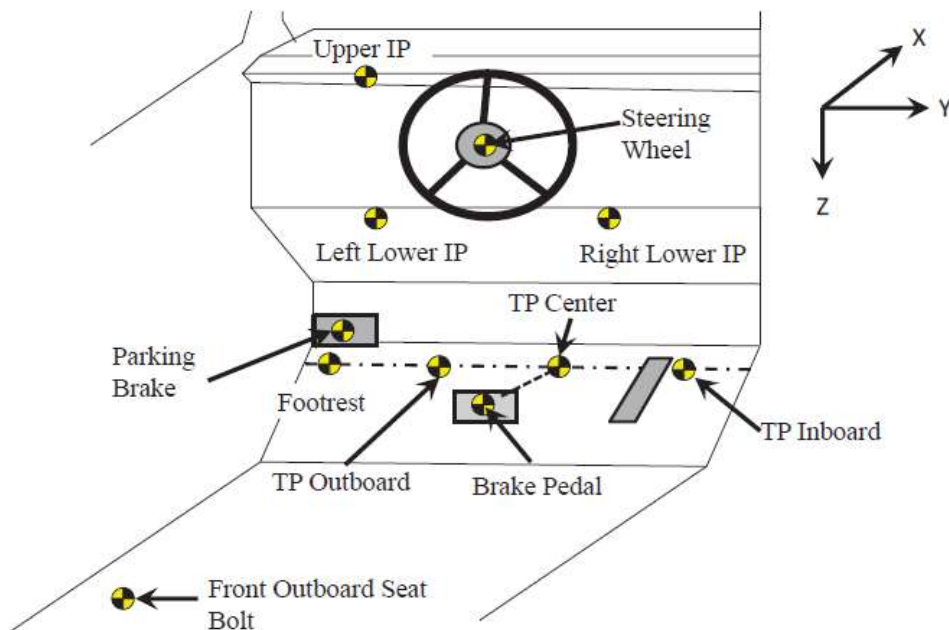
DATA SHEET NO. 13 VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

DRIVER FLOOR PAN MEASUREMENTS



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
Steering Wheel	2,924	-397	-620	2,924	-397	-620	0	0	0
Left Lower IP	3140	-548	-492	3156	-543	-496	-16	-5	4
Right Lower IP	3136	-247	-492	3156	-247	-494	-20	0	2
Upper IP	3168	-547	-714	3174	-548	-719	-6	1	5
Parking Brake Pedal Point	3296	-638	-169	3296	-638	-169	0	0	0
TP Footrest	3499	-611	-108	3499	-611	-108	0	0	0
TP Outboard	3626	-417	-109	3574	-406	-136	52	-11	27
TP Center	3626	-364	-111	3566	-356	-140	60	-8	29
TP Inboard	3615	-216	-110	3538	-219	-141	77	3	31

Reference point:

+X – From the rear of the vehicle to the front of the vehicle

+Y – From the left side of the vehicle to the right side of the vehicle

+Z – From the top of the vehicle to the bottom of the vehicle

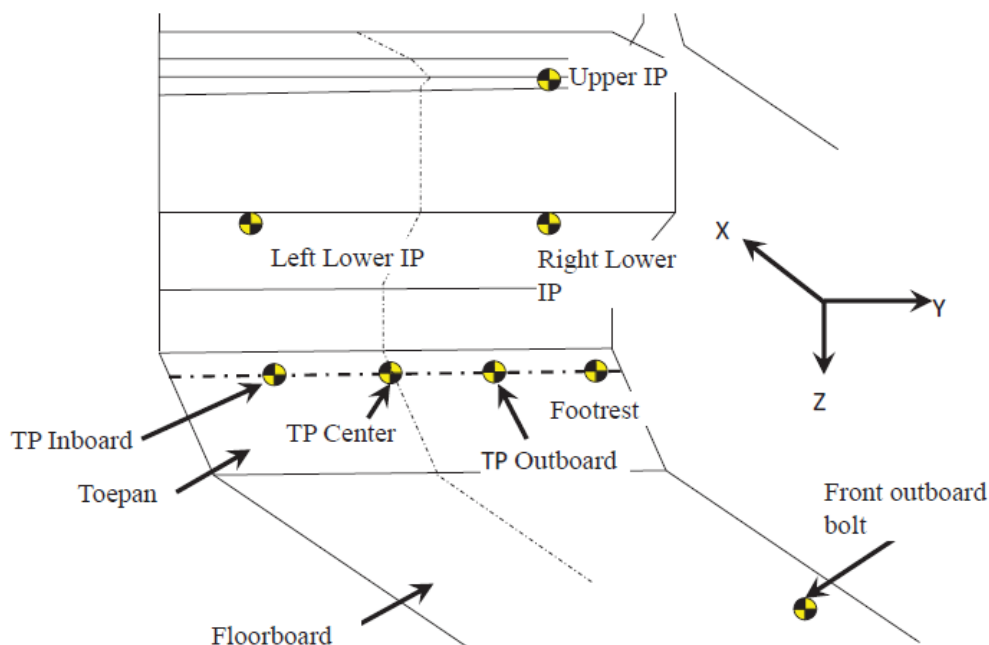
DATA SHEET NO. 13 VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

PASSENGER FLOOR PAN MEASUREMENTS



Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
Left Lower IP	3115	250	-410	3128	252	-428	-13	-2	18
Right Lower IP	3150	550	-412	3148	555	-440	2	-5	28
Upper IP	3131	550	-484	3140	552	-490	-9	-2	6
TP Footrest	--- ¹	--- ¹	--- ¹	--- ¹	--- ¹	--- ¹	--- ¹	--- ¹	--- ¹
TP Outboard	3516	550	-109	3490	545	-121	26	5	12
TP Center	3622	399	-110	3536	396	-139	86	3	29
TP Inboard	3609	250	-110	3524	253	-138	85	-3	28

Reference point:

+X – From the rear of the vehicle to the front of the vehicle

+Y – From the left side of the vehicle to the right side of the vehicle

+Z – From the top of the vehicle to the bottom of the vehicle

¹ Vehicle does not have passenger foot rest

DATA SHEET NO. 13 - VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2019 Toyota Highlander
 Test Program: THOR-50M Durability Evaluation

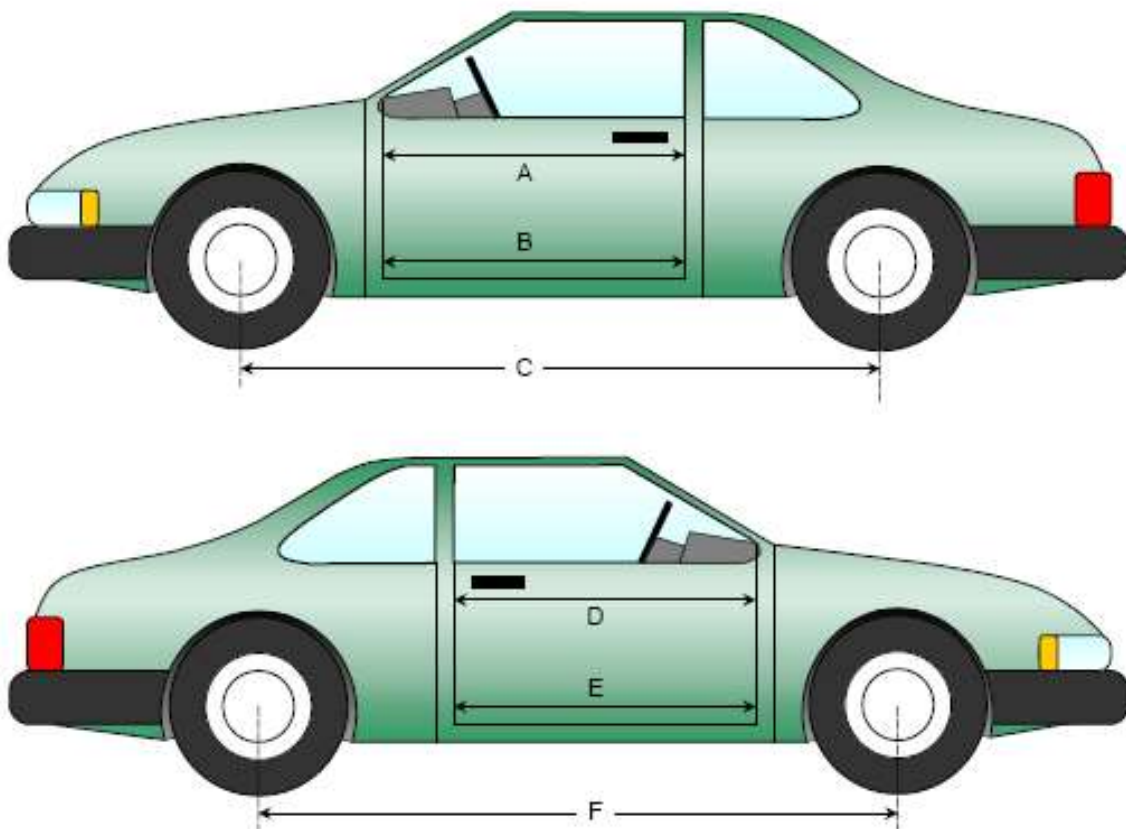
NHTSA No. _____
 Test Date: 9/18/2024

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1008	1004	4
B	Left Side Lower	mm	840	837	3
D	Right Side Upper	mm	1005	1007	-2
E	Right Side Lower	mm	829	830	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2800	2720	80
F	Right Side Wheelbase	mm	2800	2780	20



DATA SHEET NO. 13 VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Toyota Highlander

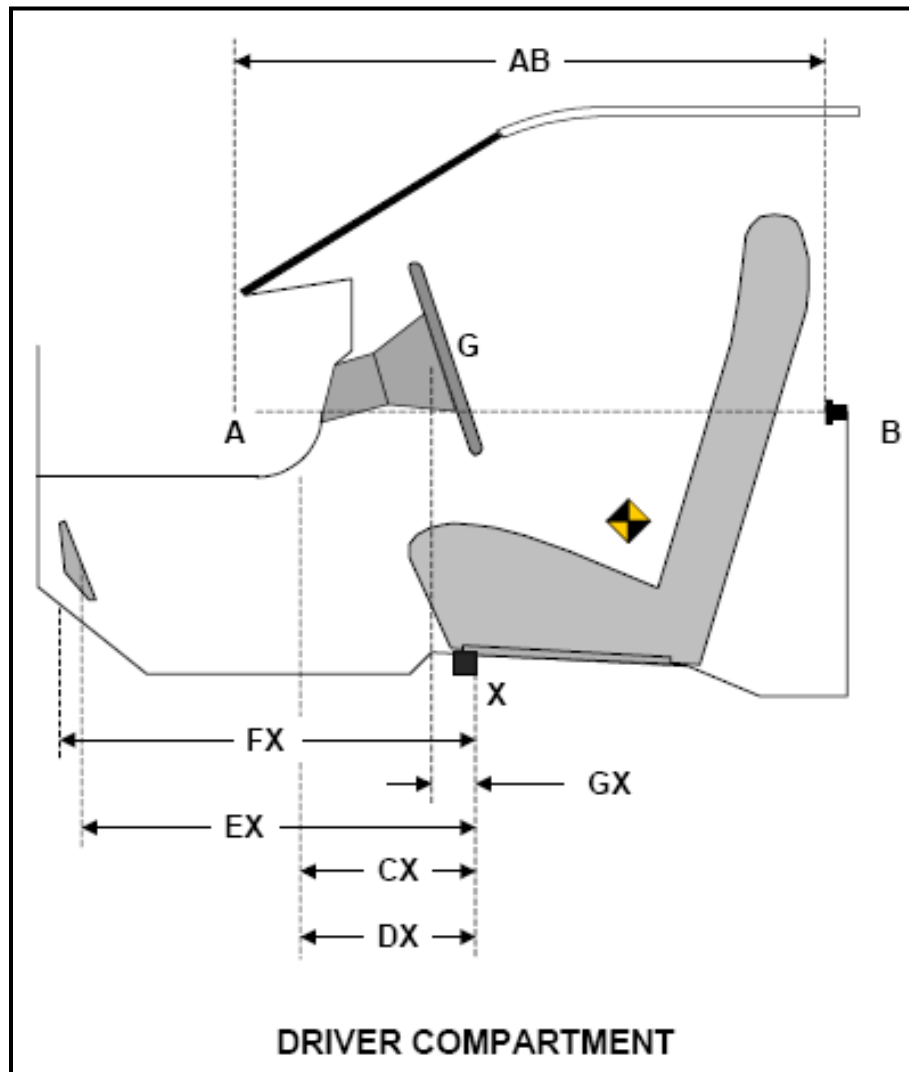
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1000	1000	0
CX	Left Knee Bolster to X	mm	275	280	-5
DX	Right Knee Bolster to X	mm	266	283	-17
EX	Brake Pedal to X	mm	588	595	-7
FX	Foot Rest to X	mm	532	520	12
GX	Center of Steering Column Wheel Hub to X	mm	91	56	35

X = Front of Seat Track (Stationary)



**DATA SHEET NO. 14 - SUMMARY OF INDICANT FMVSS 212 AND FMVSS 219
(PARTIAL) DATA**

Test Vehicle: 2019 Toyota Highlander
Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024

Please provide windshield mounting details.

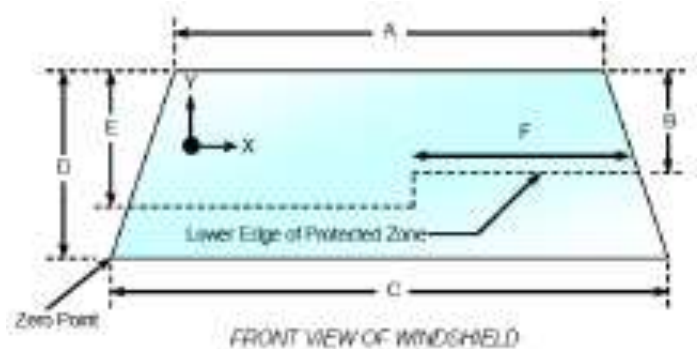
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.6°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2255	2108	100.0
Right Side	2255	2108	100.0
Total	4510	4216	100.0

Item	Units	Value
A	mm	1270
B	mm	479
C	mm	1588
D	mm	826
E	mm	499
F	mm	343



AREAS OF PROTECTED ZONE FAILURES

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

X	Y
NA	NA
NA	NA
NA	NA
NA	NA

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

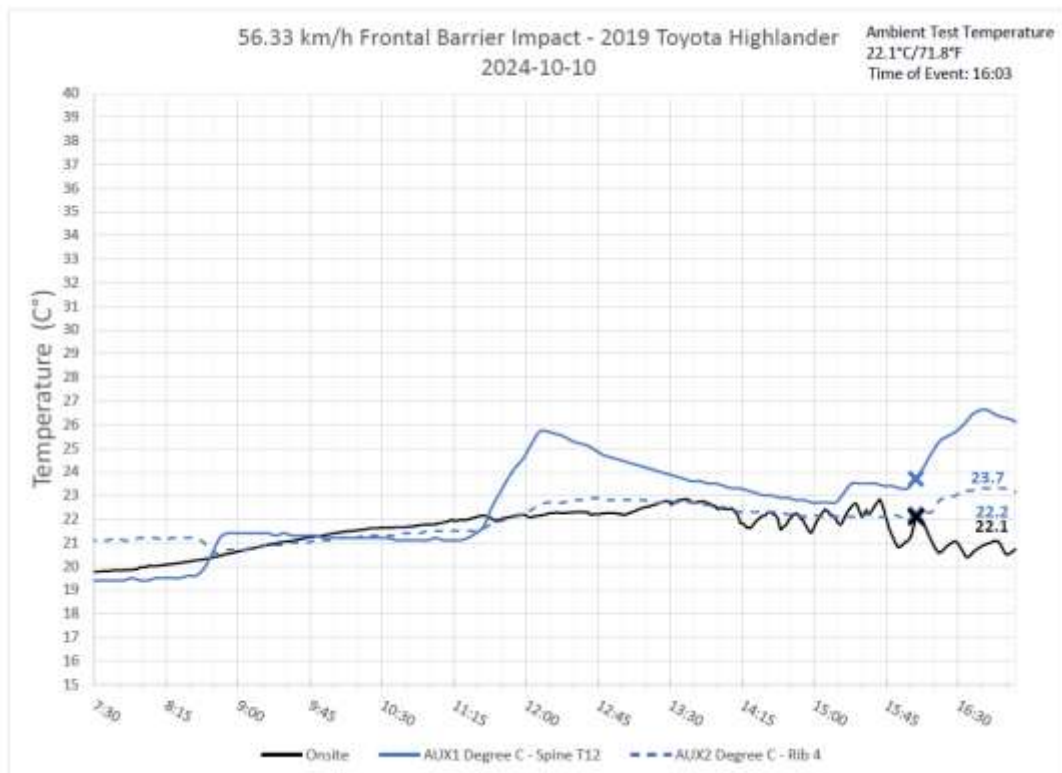
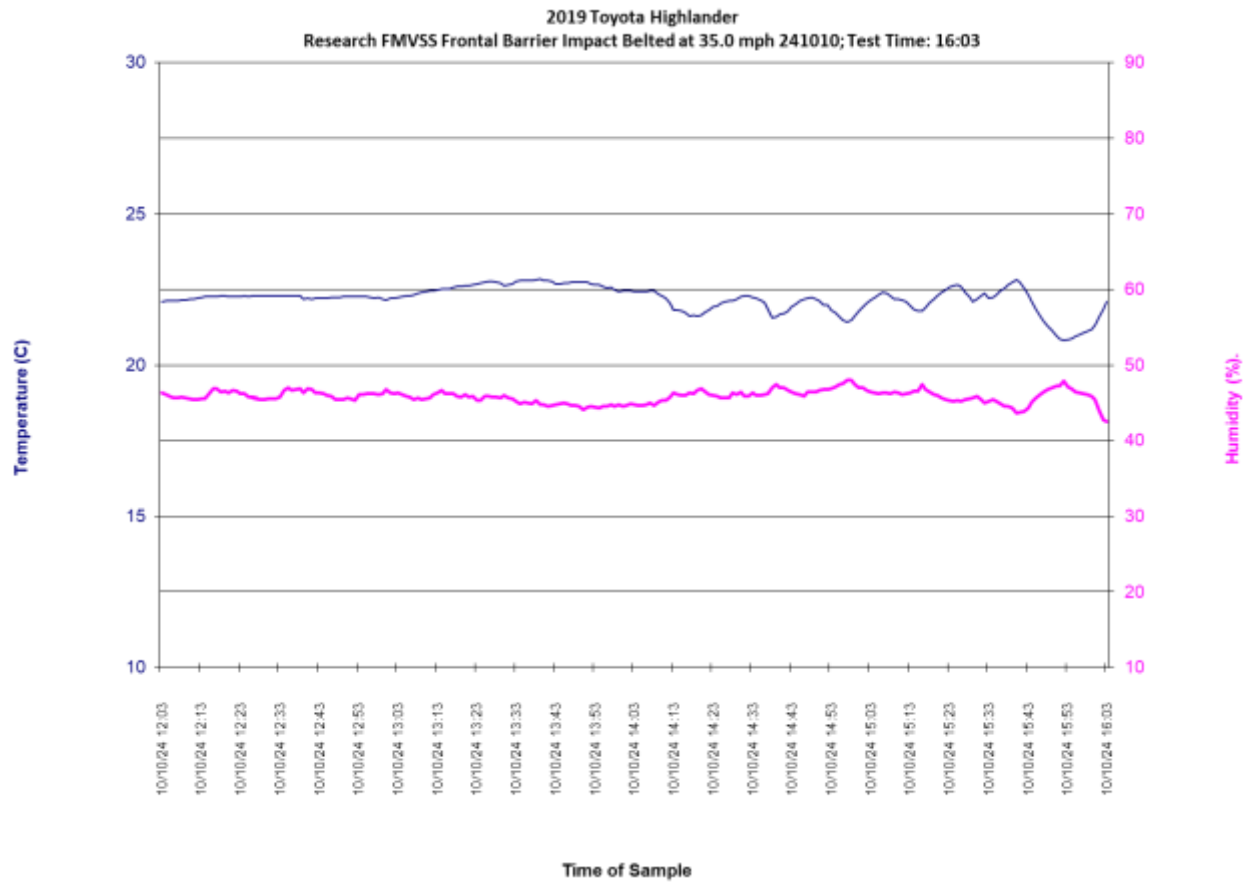
X	Y
NA	NA
NA	NA
NA	NA
NA	NA

DATA SHEET NO. 15 - DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2019 Toyota Highlander

Test Program: THOR-50 Durability Evaluation

Test Date: 10/10/2024



APPENDIX A
PHOTOGRAPHS

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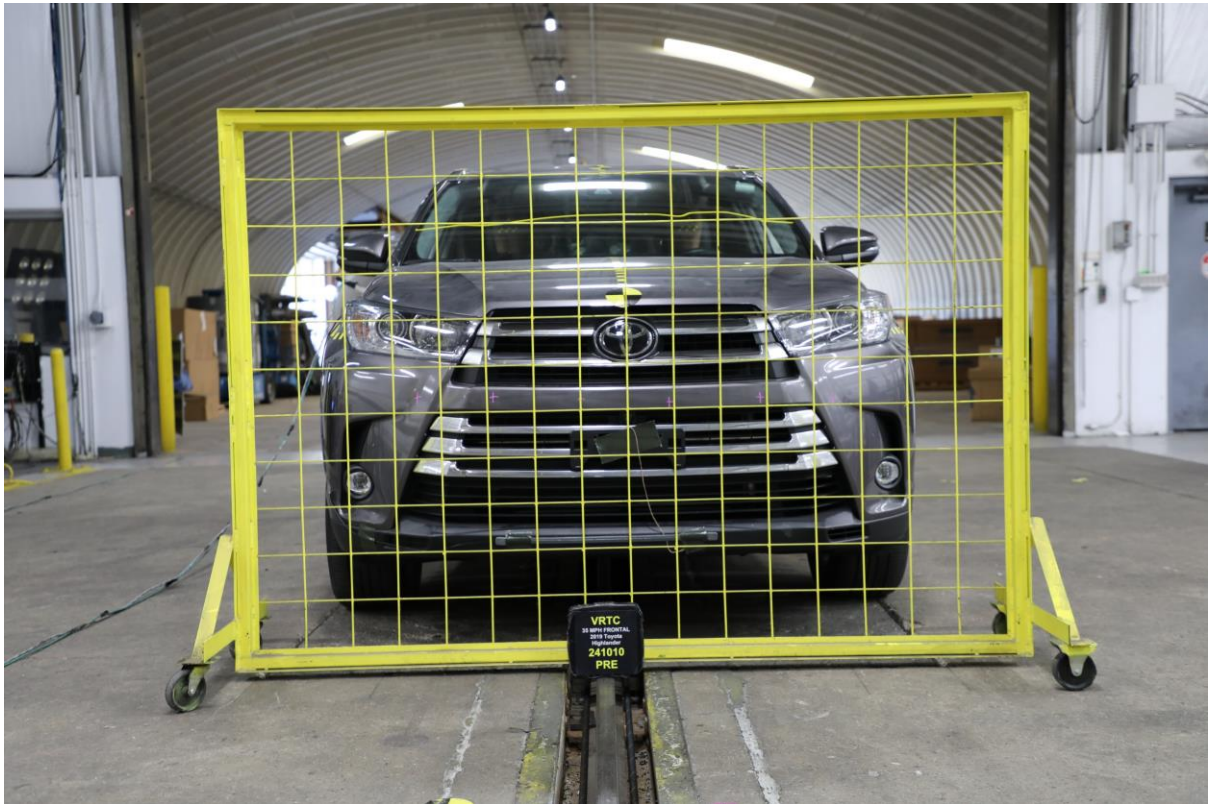
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3	Manufacturer's Label	A-6
4	Tire Placard	A-6
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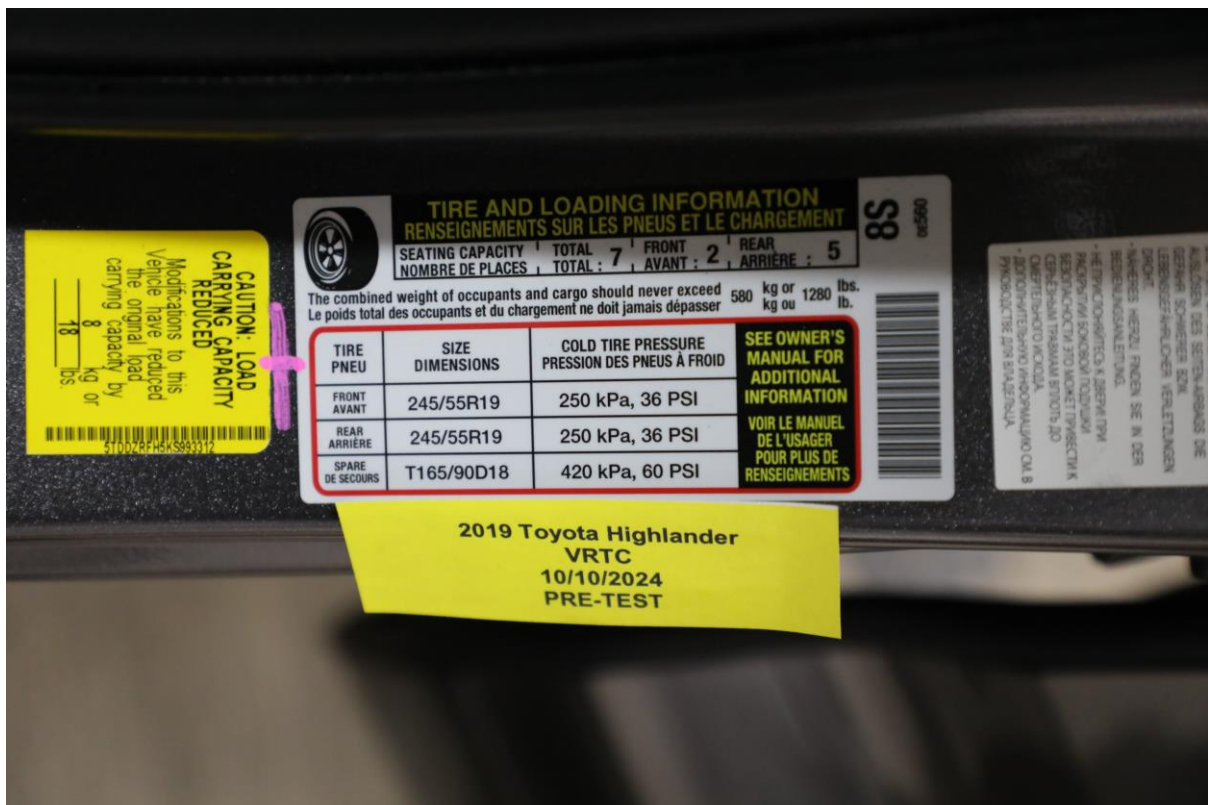
001 Load Cell Location



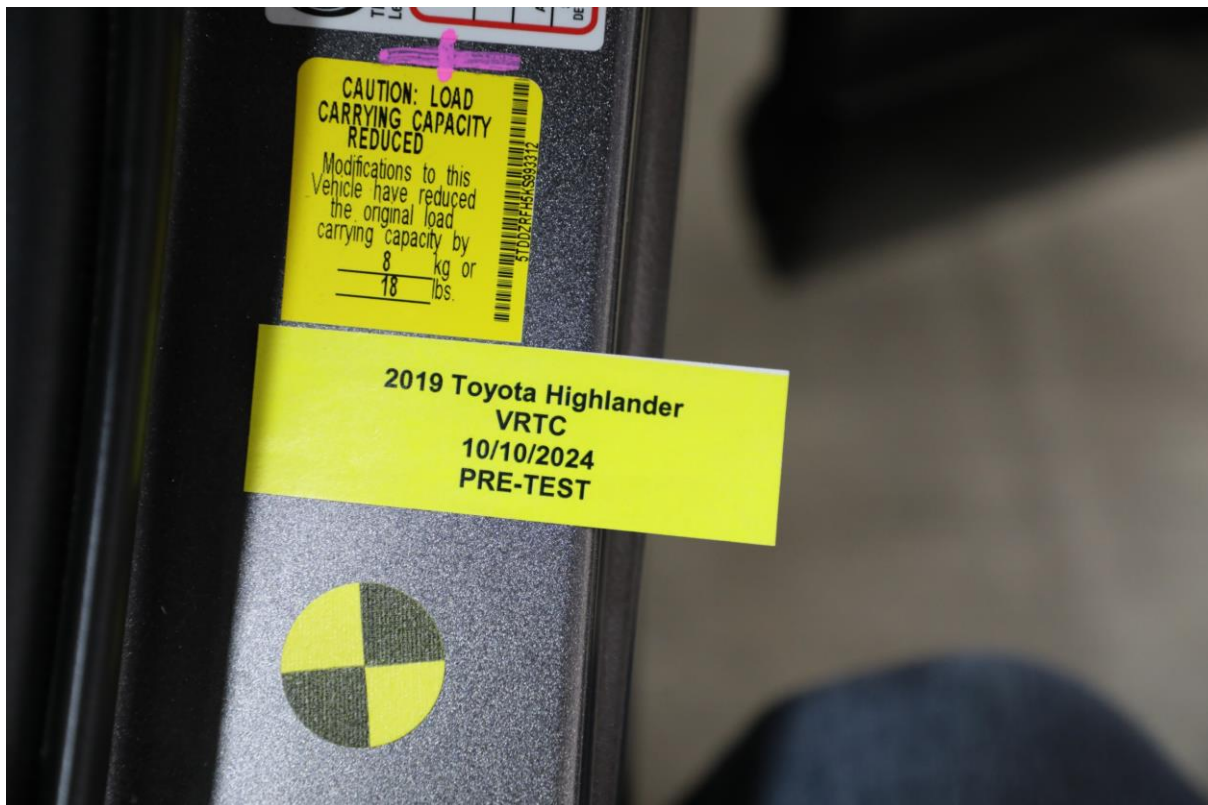
002 Pre-Test Load Cell Wall



003 Manufacturer's Label



004 Tire Placard



004a Reduced Load Carrying Capacity Label

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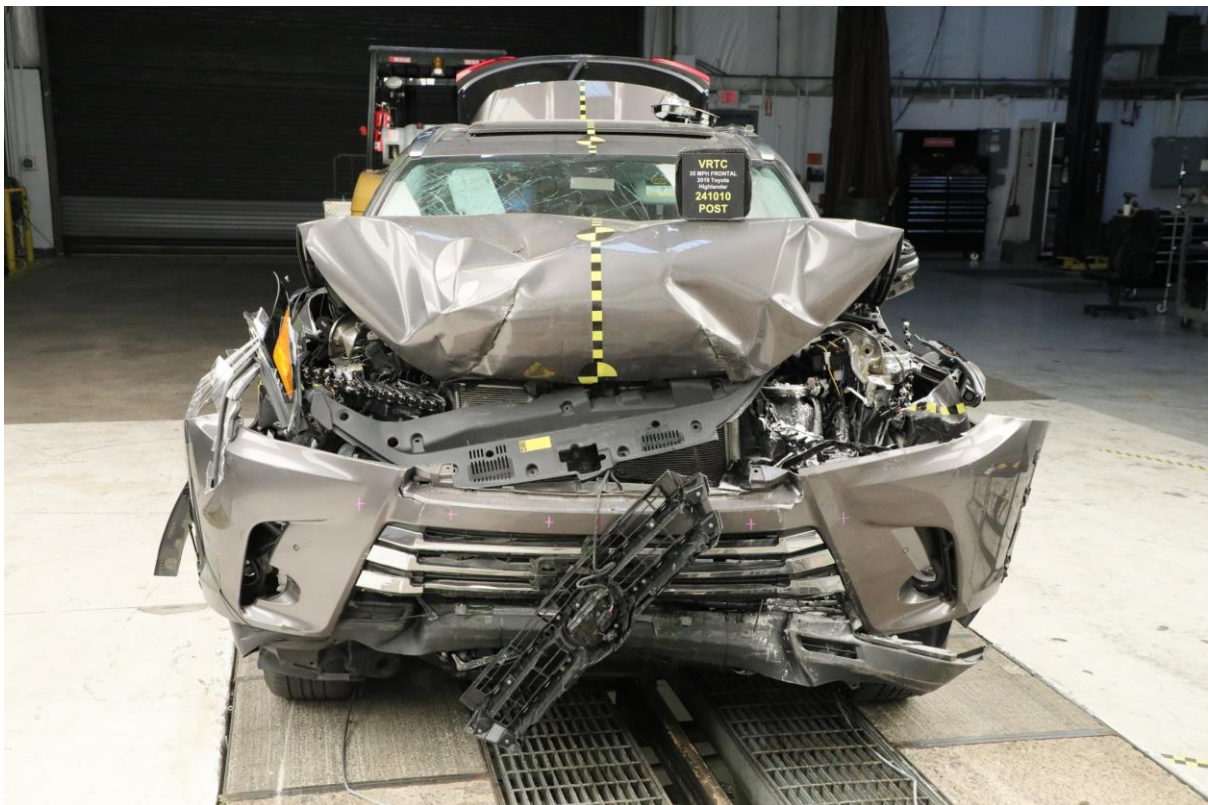
005 2019 Toyota Highlander Frontal As Delivered



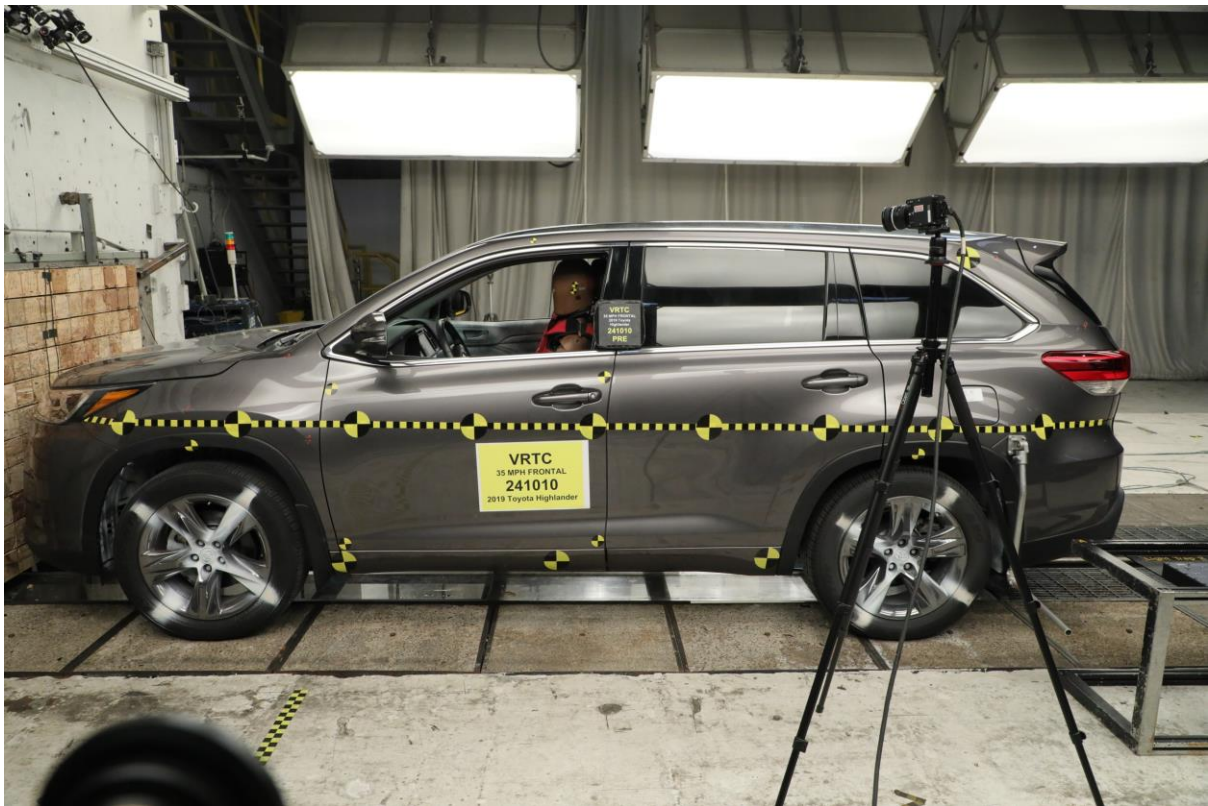
006 Left Rear 3-4 View, as Received



007 Pre-Test Front View of Test Vehicle



008 Post-Test Front View of Test Vehicle



009 Pre-Test Left View of Test Vehicle



010 Post-Test Left View of Test Vehicle



011 Pre-Test Right View of Test Vehicle



012 Post-Test Right View of Test Vehicle



013 Pre-Test Right Front 3-4 View



014 Post-Test Right Front 3-4 View



015 Pre-Test Left Rear 3-4 View



016 Post-Test Left Rear 3-4 View



017 Pre-Test Windshield View



018 Post-Test Windshield View



019 Pre-Test Engine Compartment View



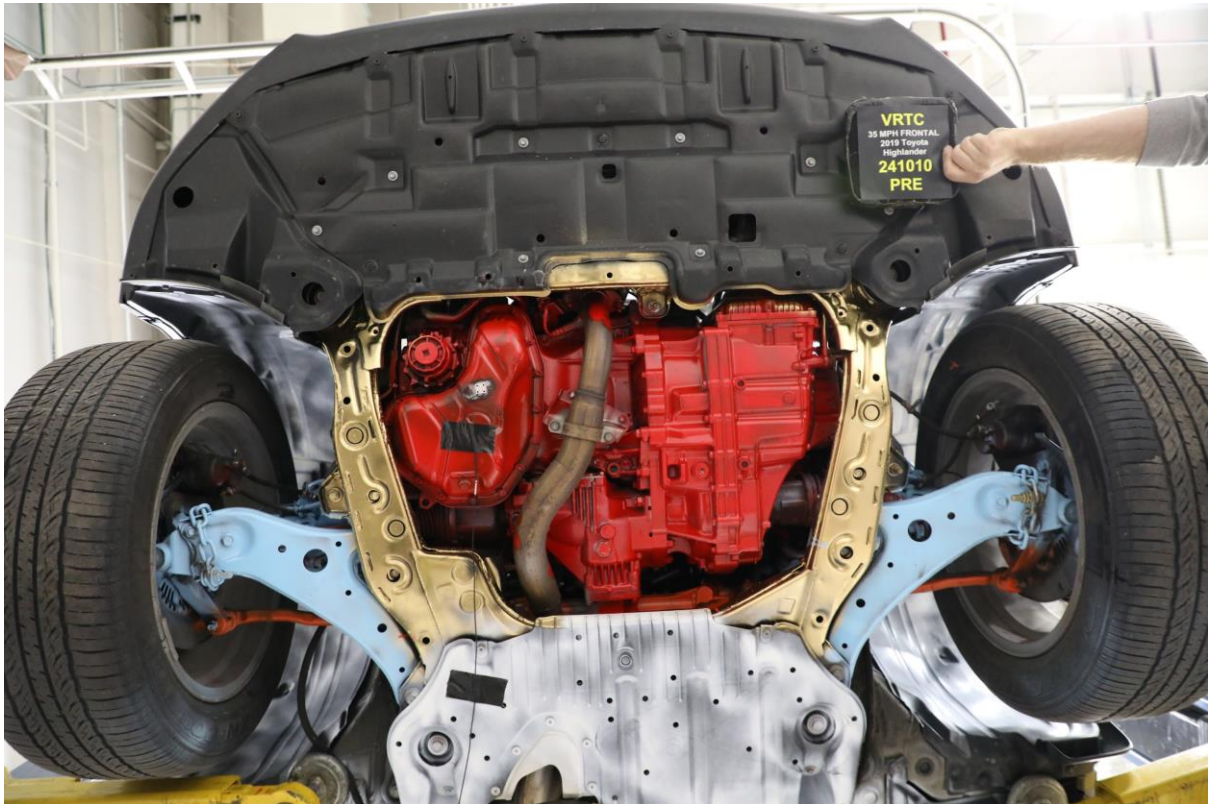
020 Post-Test Engine Compartment View



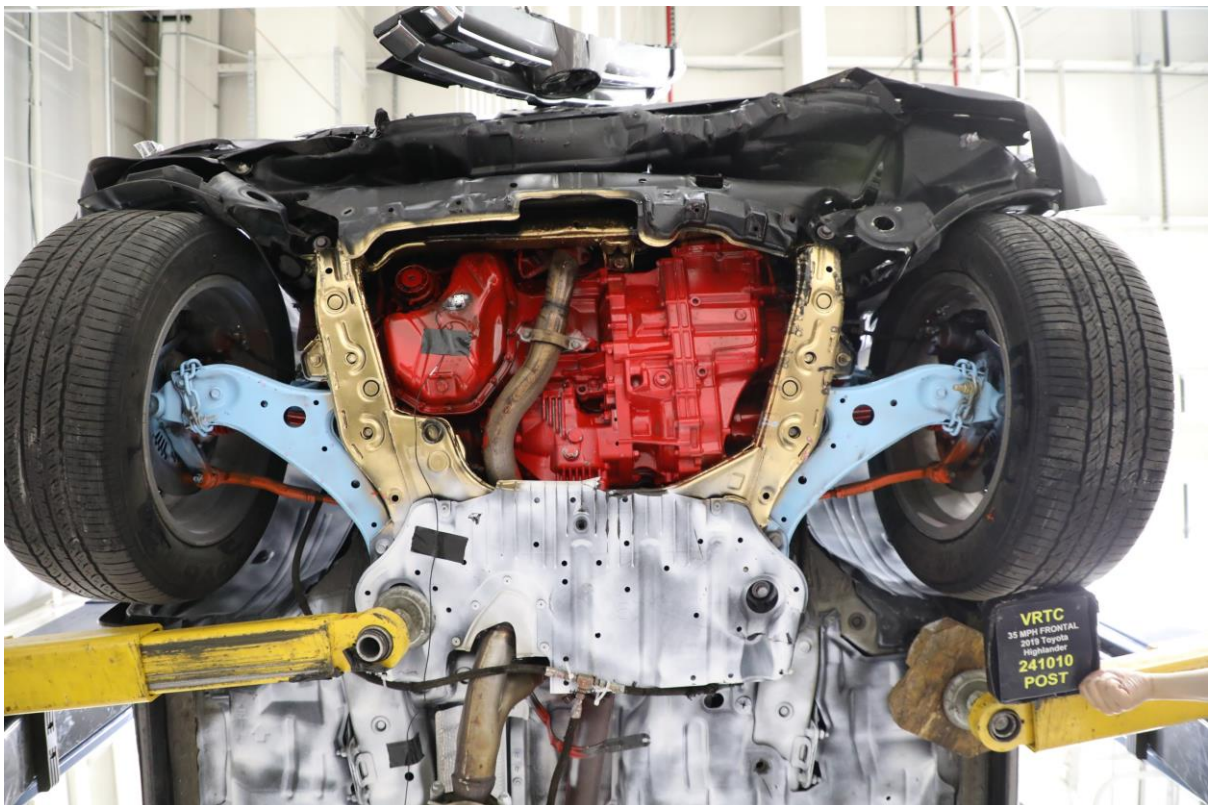
021 Pre-Test Fuel Filler Cap View



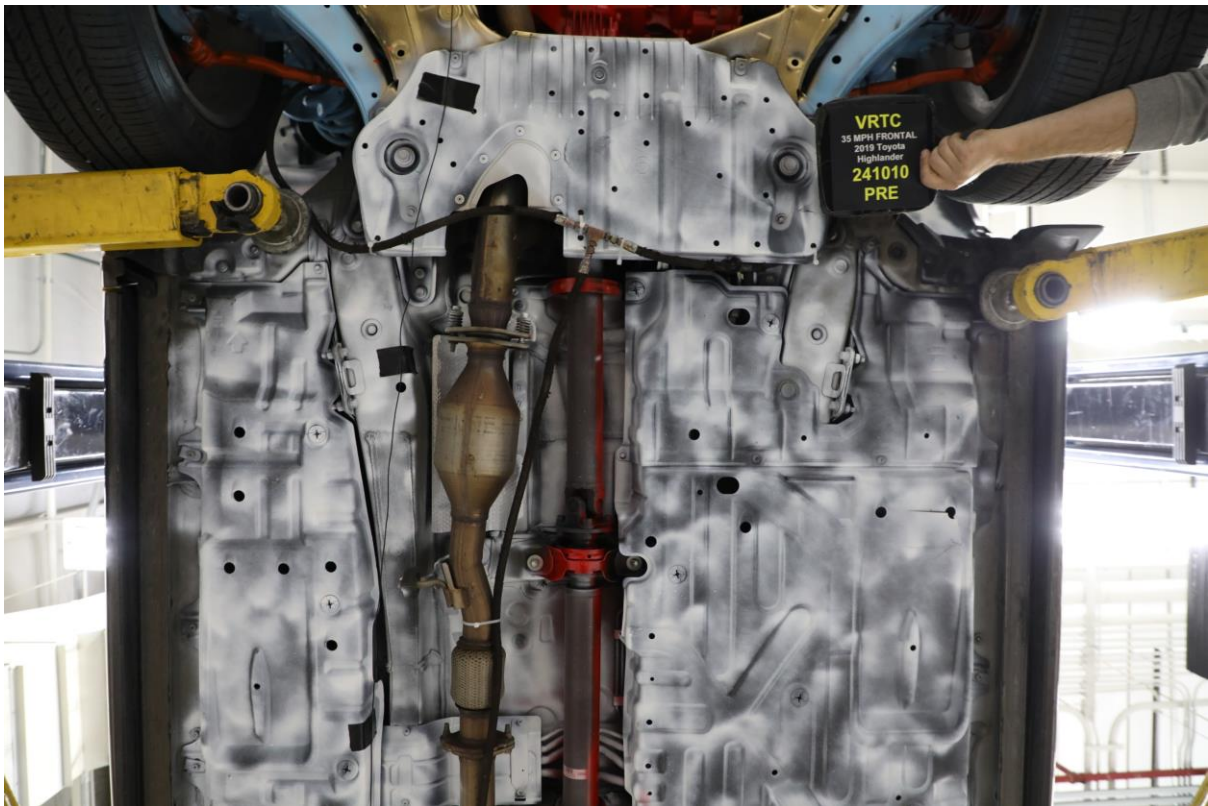
022 Post-Test Fuel Filler Cap View



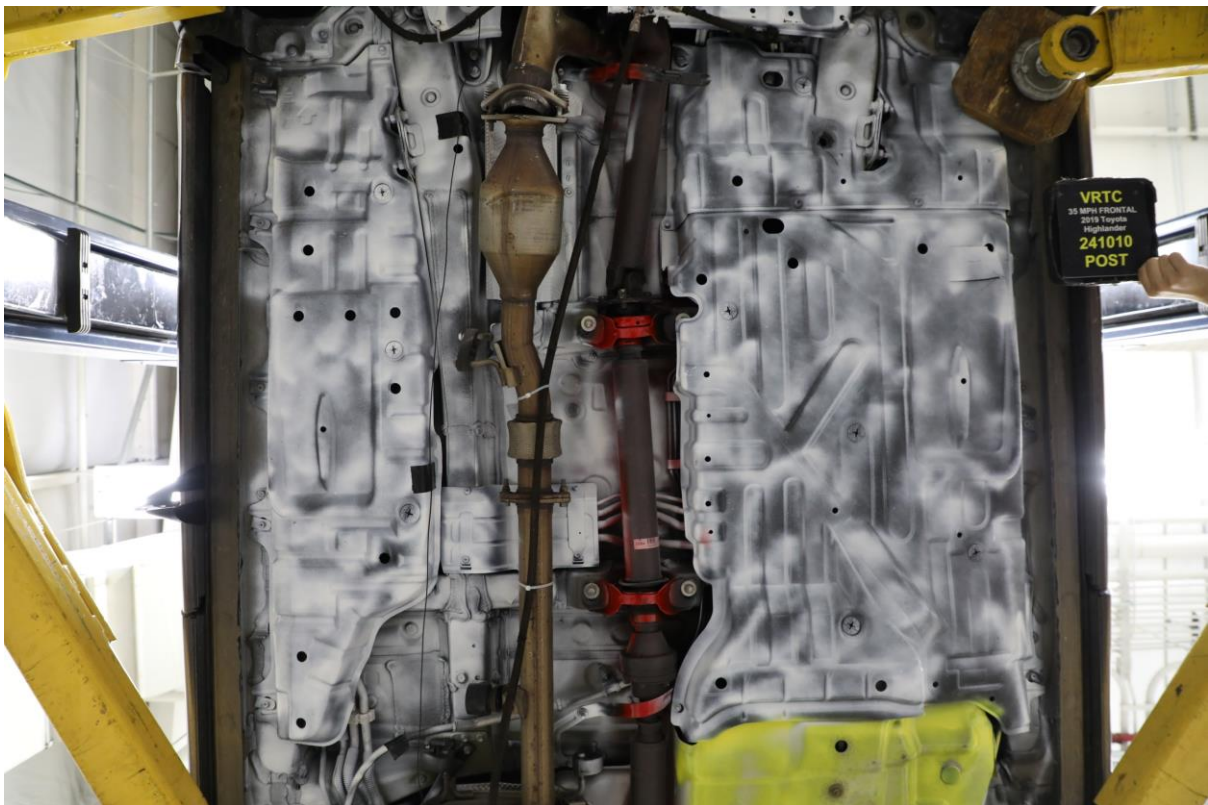
023 Pre-Test Front Underbody View



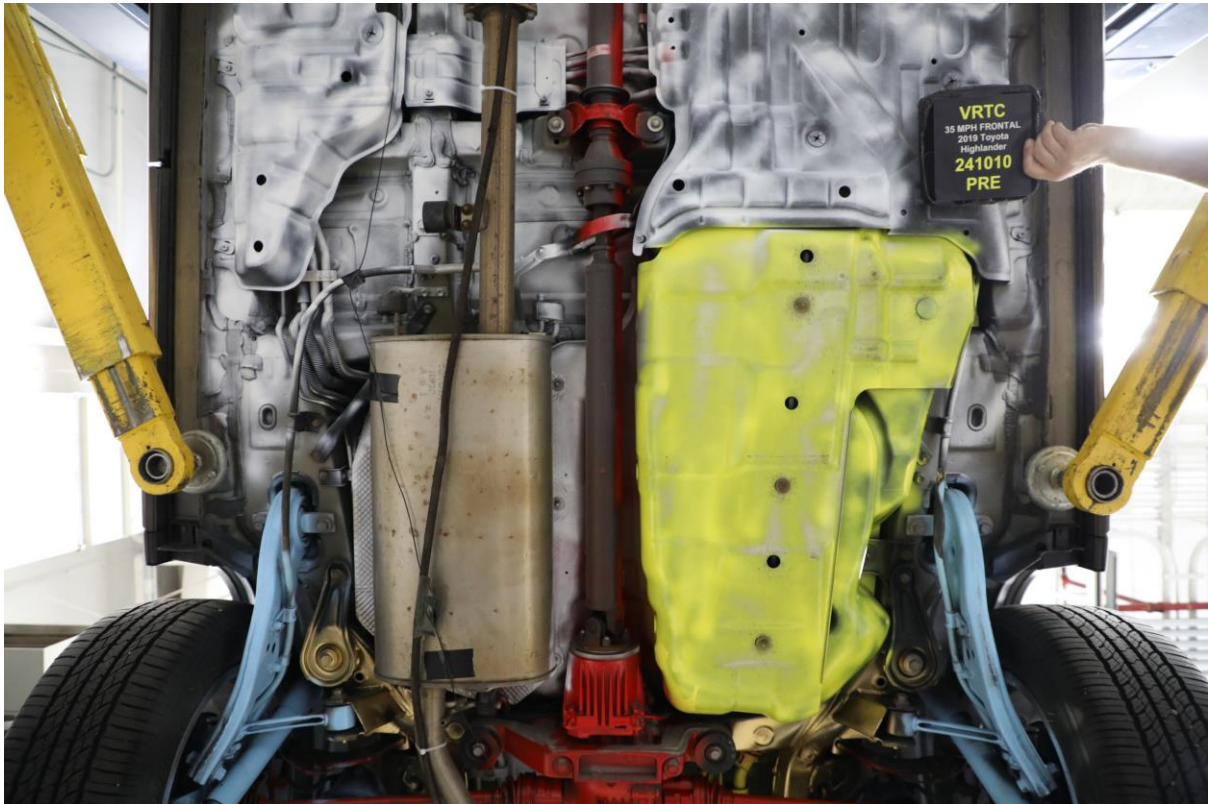
024 Post-Test Front Underbody View



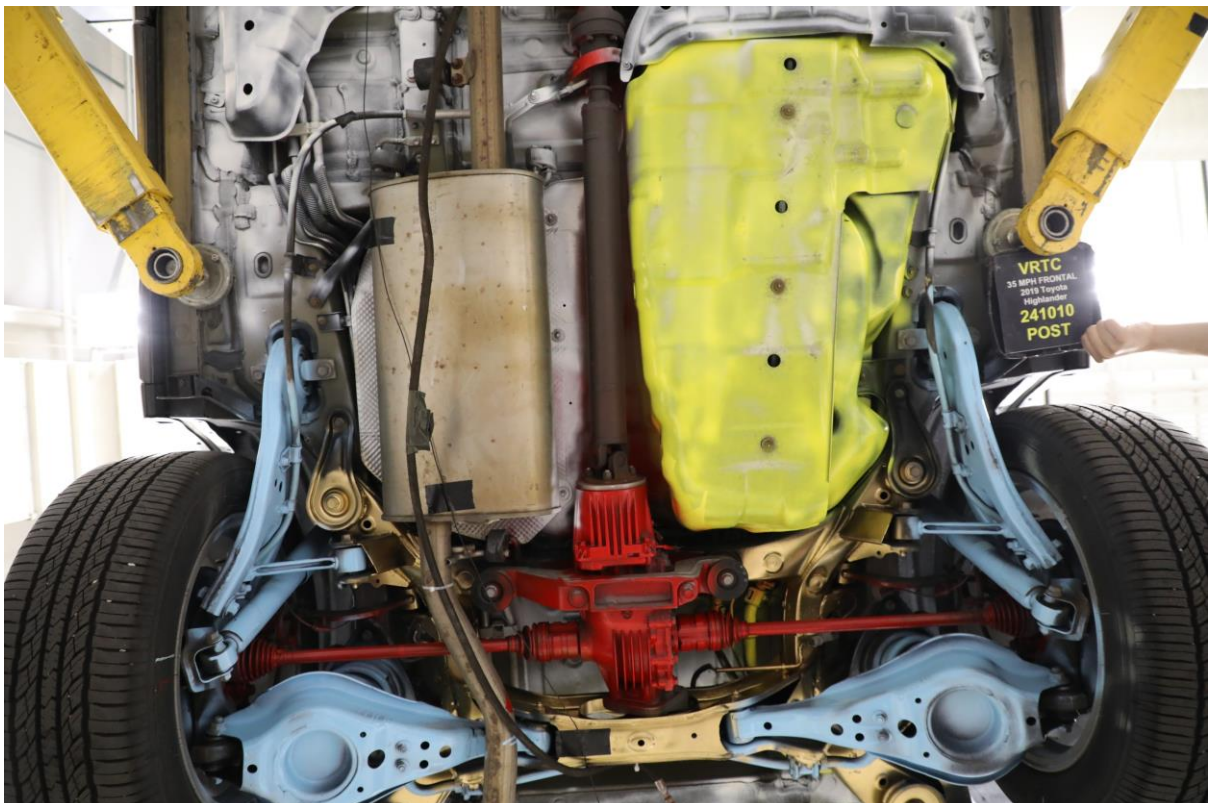
024a Pre-Test Mid Front Underbody View



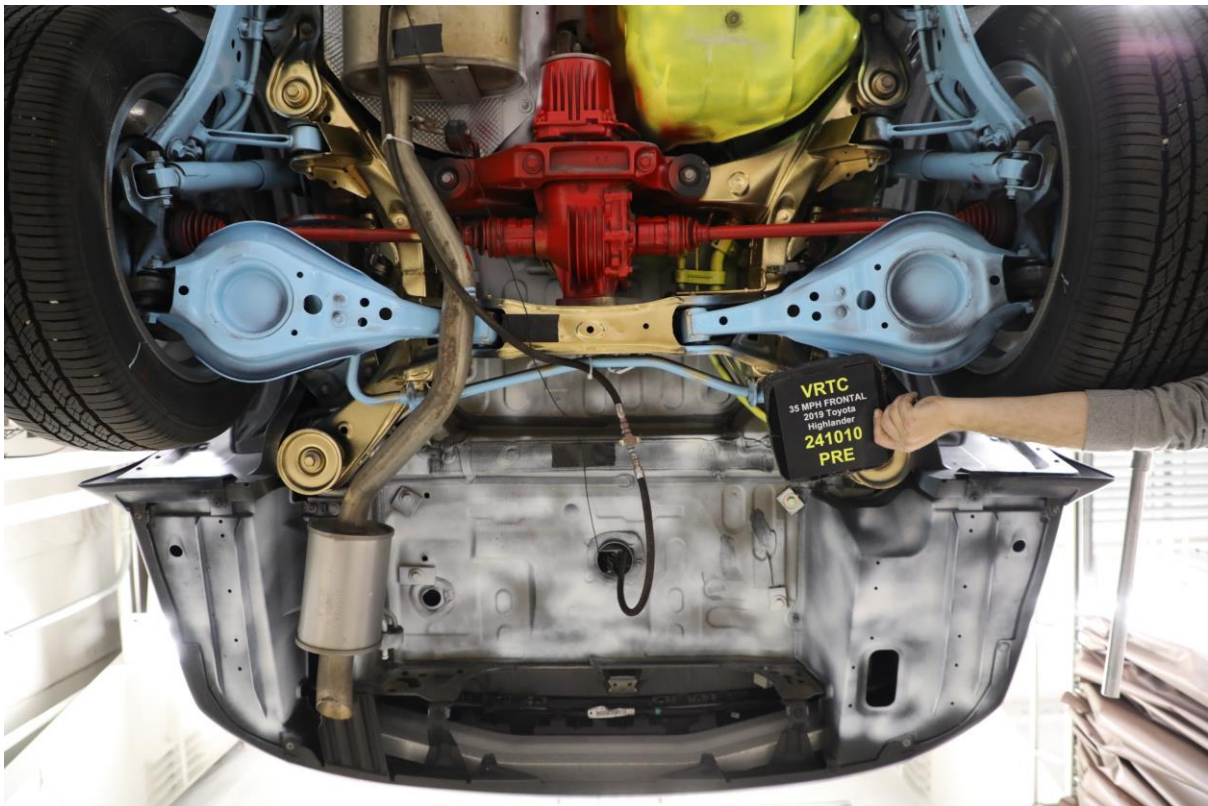
024b Post-Test Mid Front Underbody View



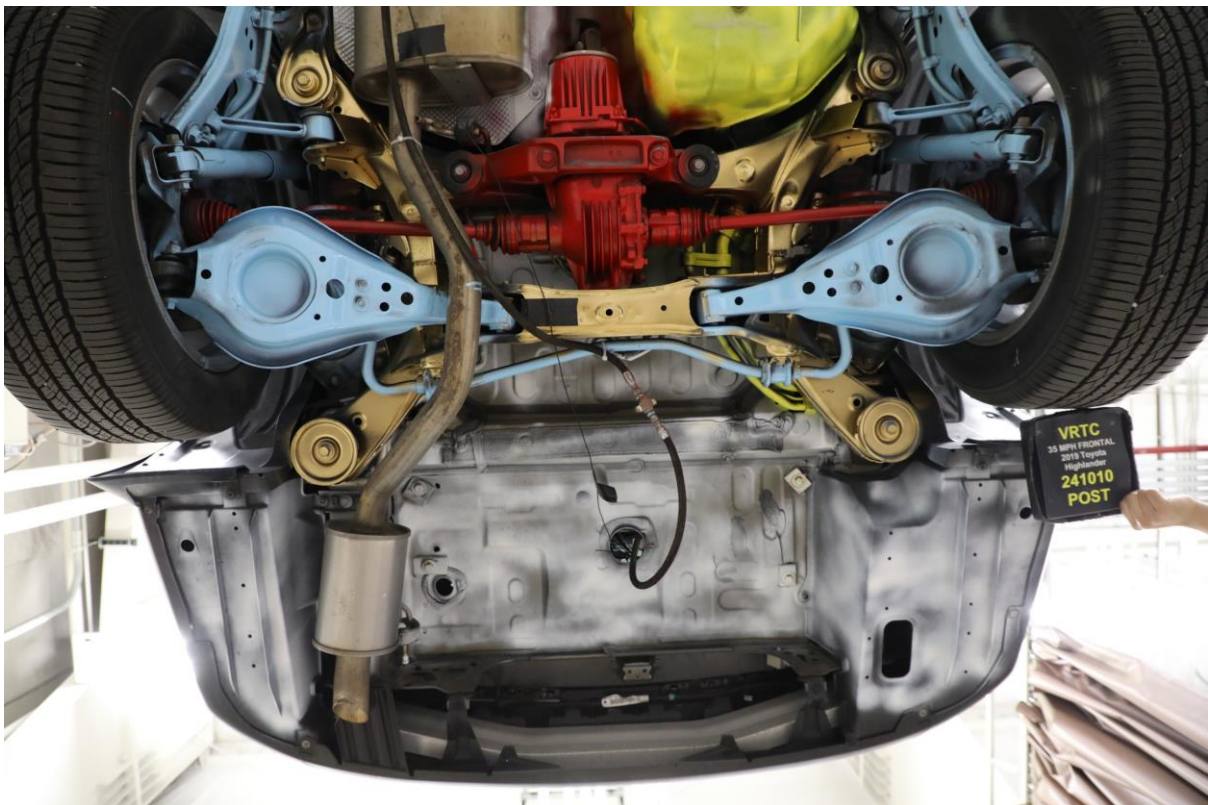
024c Pre-Test Mid Rear Underbody View



024d Post-Test Mid Rear Underbody View



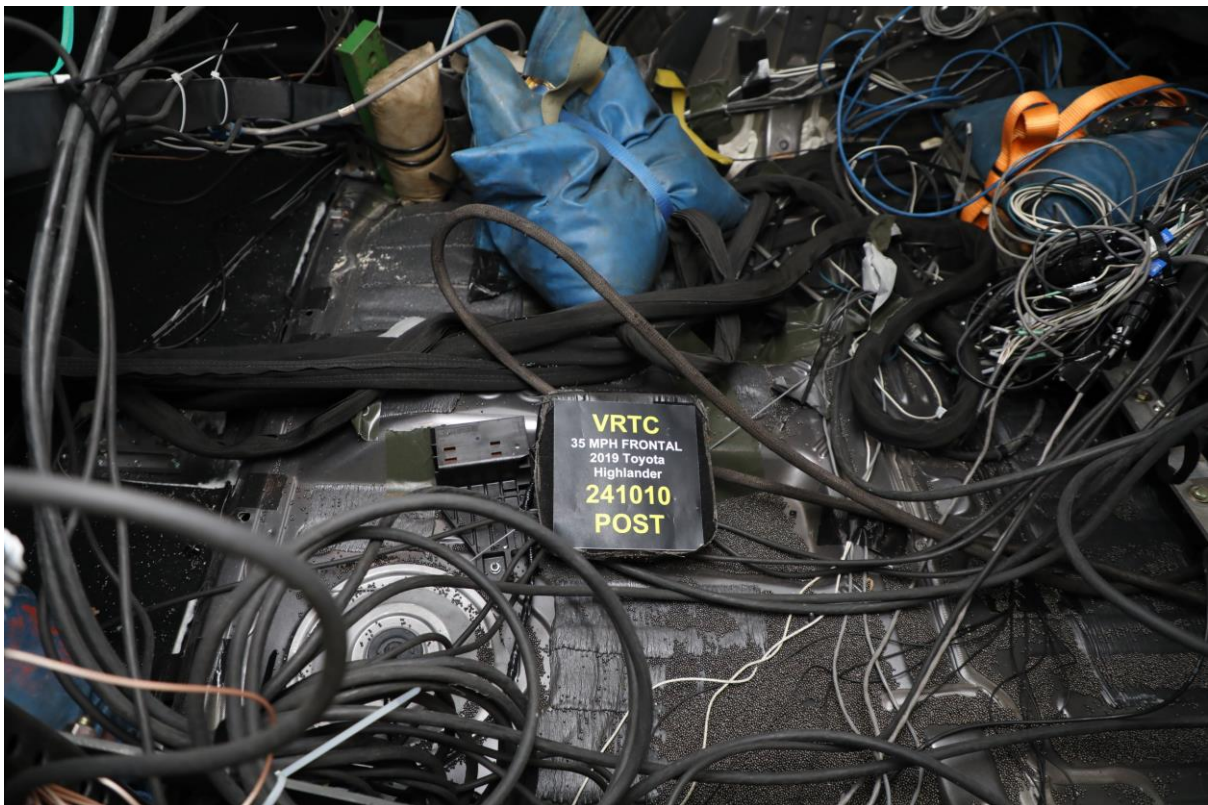
025 Pre-Test Rear Underbody View



026 Post-Test Rear Underbody View



027 Pre-Test Dummy Cable Routing



028 Post-Test Dummy Cable Routing



029 Pre-Test Driver Dummy Front View



030 Post-Test Driver Dummy Front View



031 Pre-Test Driver Dummy Window View



032 Post-Test Driver Dummy Window View



033 Pre-Test Driver Dummy and Vehicle Interior View



034 Post-Test Driver Dummy and Vehicle Interior View



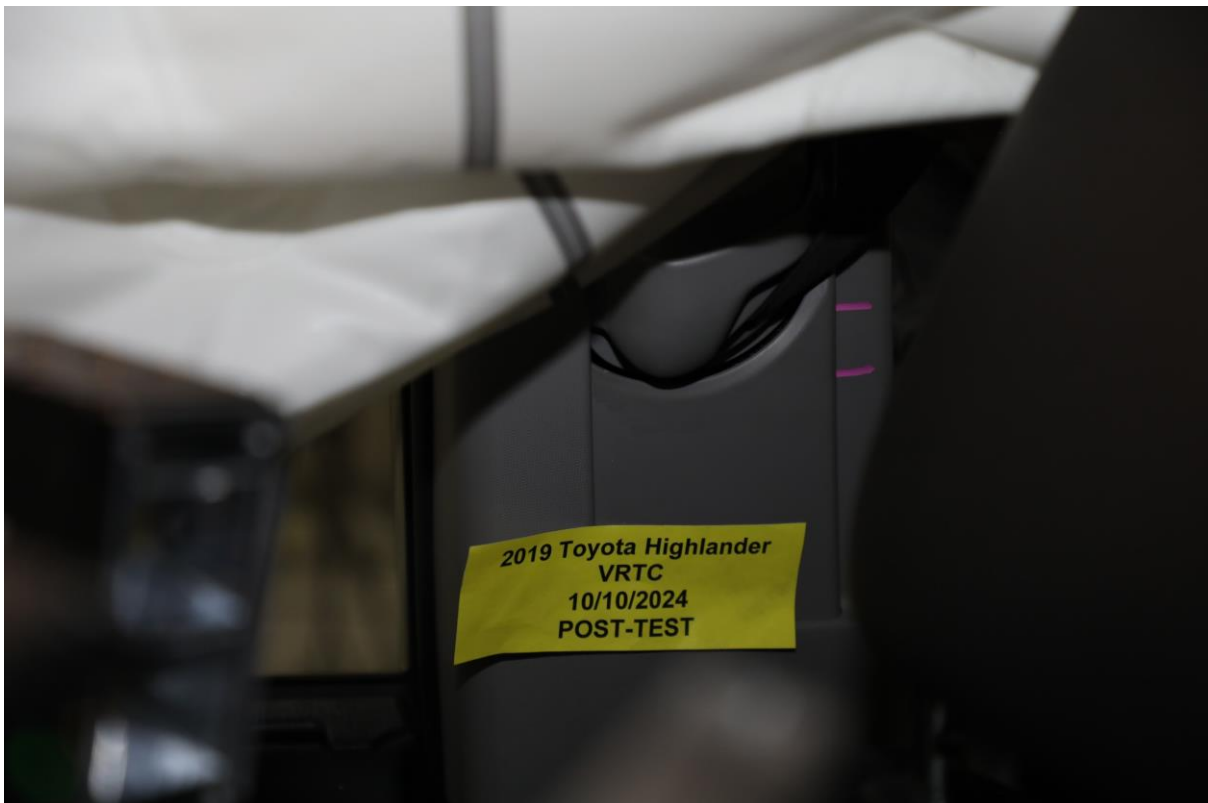
035 Pre-Test Driver's Seat Fore-Aft Markings



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



037 Pre-Test View of Belt Anchorage for Driver Dummy



038 Post-Test View of Belt Anchorage for Driver Dummy



039 Pre-Test Driver Dummy Feet



040 Post-Test Driver Dummy Feet



041 Pre-Test Driver's Side Knee Bolster



042 Post-Test Driver's Side Knee Bolster



043 Pre-Test Driver's Side Floorpan



044 Post-Test Driver's Side Floorpan



045 Post-Test Driver Dummy Face



046 Post-Test Driver Dummy Contact with Airbag



047 Post-Test Driver Dummy Contact with Headrest

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048 Pre-Test View of the Steering Wheel



049 Post-Test View of the Steering Wheel



050 Pre-Test Passenger Dummy Front View



051 Post-Test Passenger Dummy Front View



052 Pre-Test Passenger Dummy Window View



053 Post-Test Passenger Dummy Window View



054 Pre-Test Passenger Dummy and Vehicle Interior View



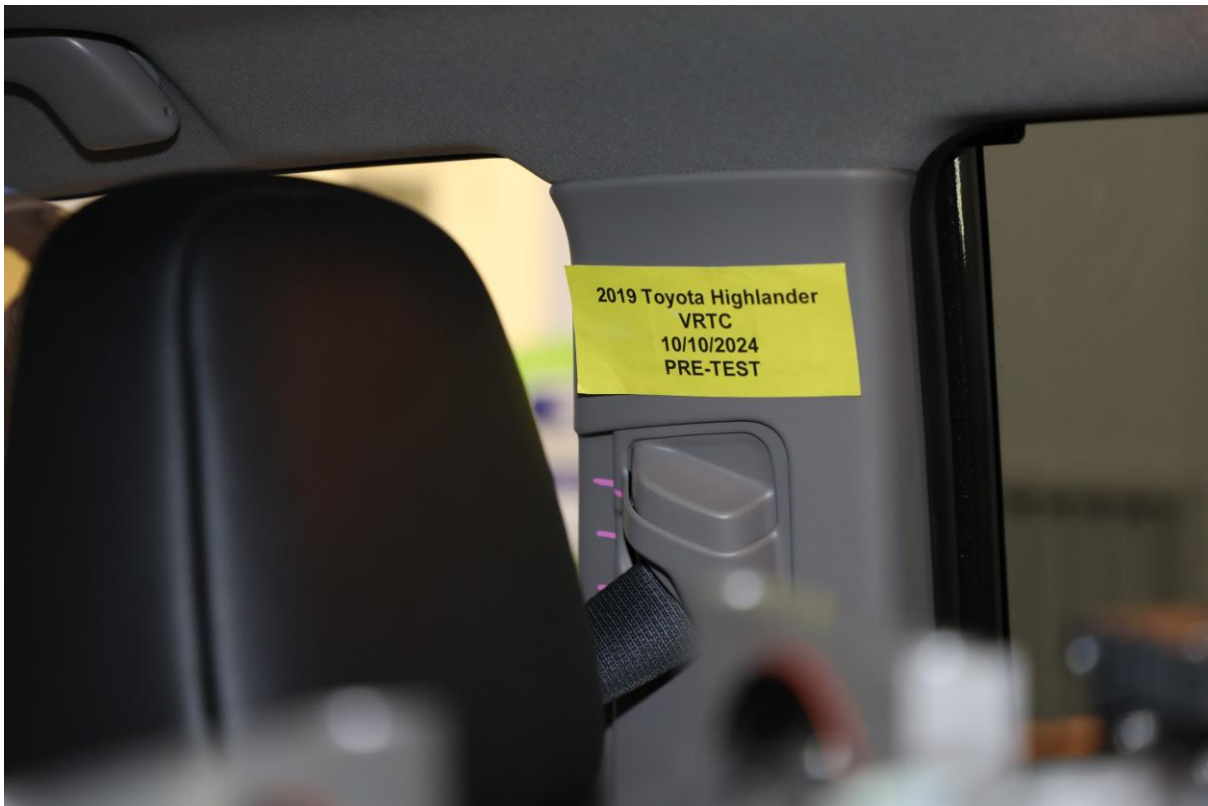
055 Post-Test Passenger Dummy and Vehicle Interior View



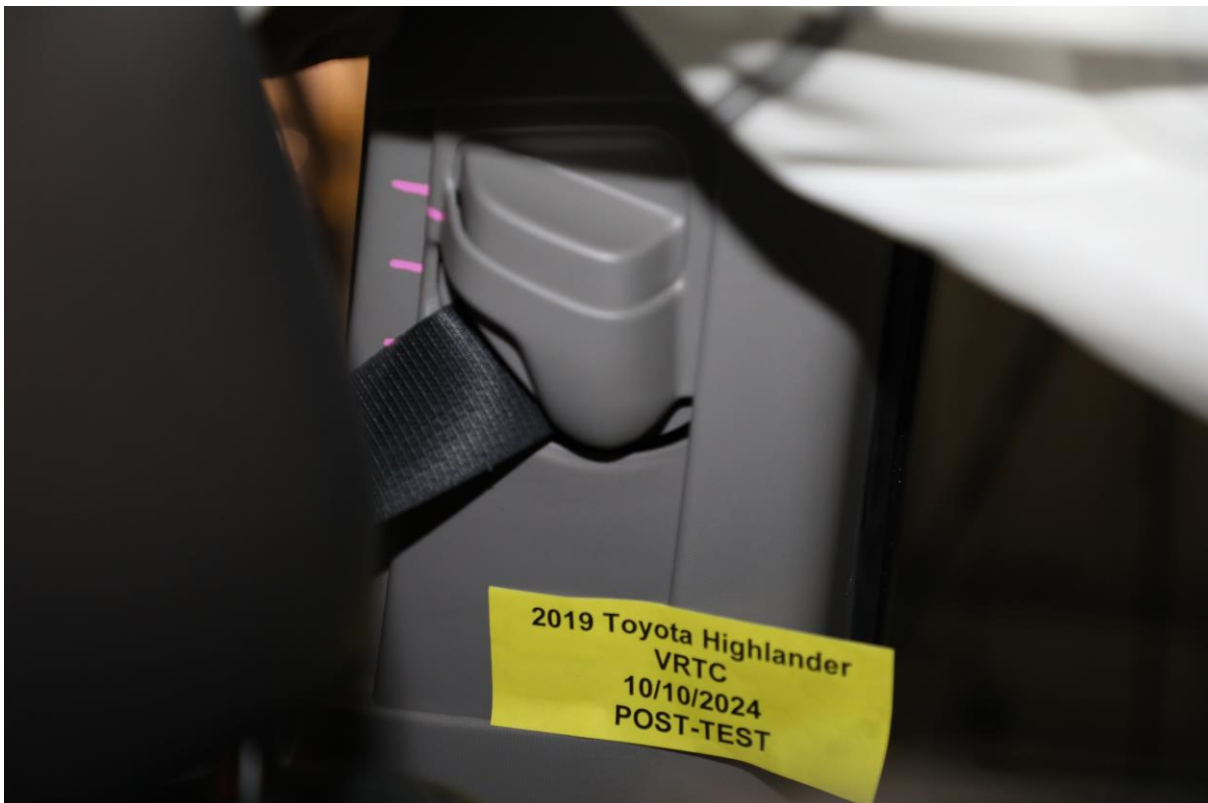
056 Pre-Test Passenger's Seat Fore-Aft Markings



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



058 Pre-Test View of Belt Anchorage for Passenger Dummy



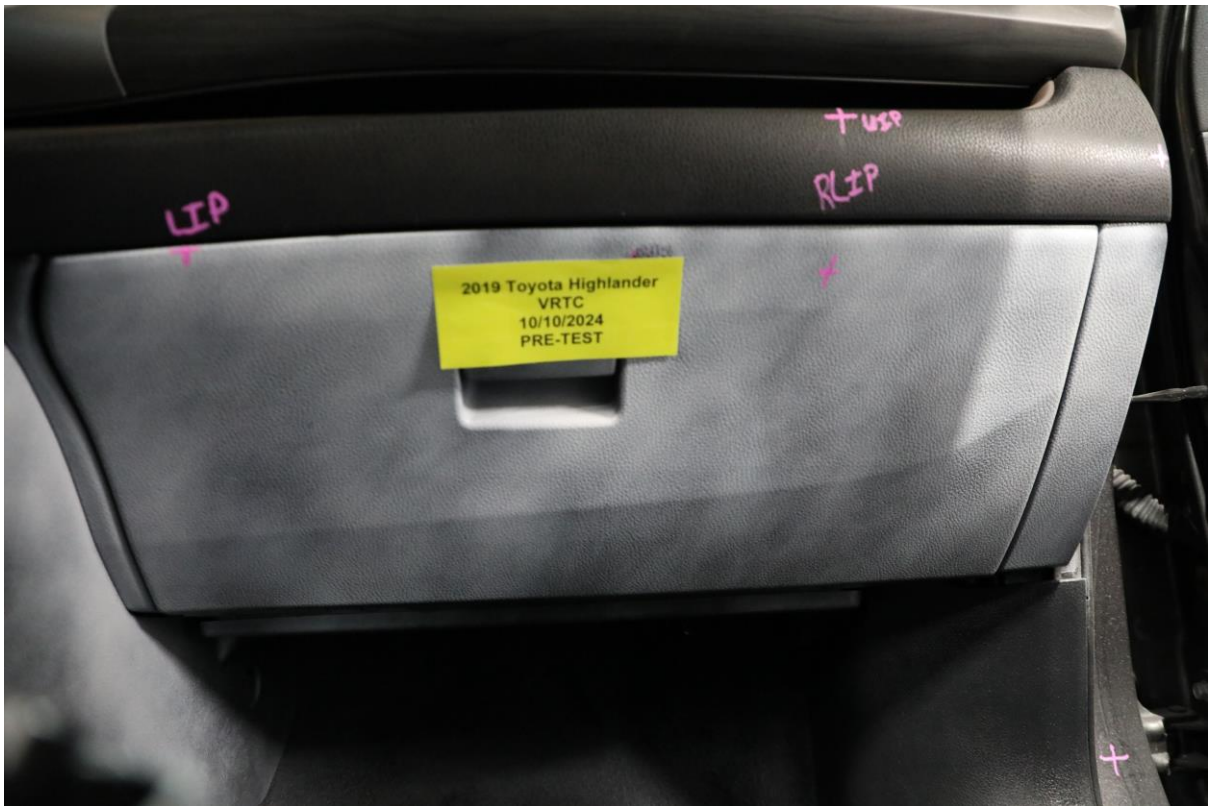
059 Post-Test View of Belt Anchorage for Passenger Dummy



060 Pre-Test Passenger Dummy Feet



061 Post-Test Passenger Dummy Feet



062 Pre-Test Passenger's Side Knee Bolster



063 Post-Test Passenger's Side Knee Bolster



064 Pre-Test Passenger's Side Floorpan



065 Post-Test Passenger's Side Floorpan



066 Post-Test Passenger Dummy Face



067 Post-Test Passenger Dummy Contact with Airbag

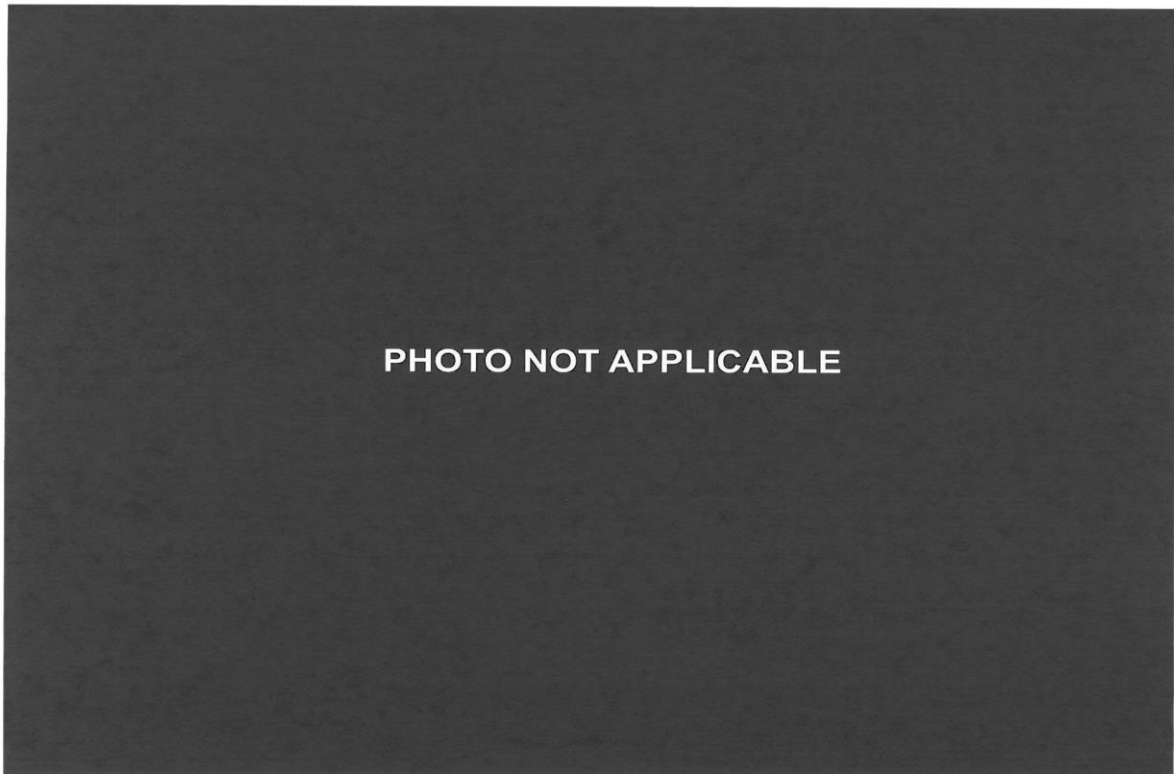


068 Post-Test Passenger Dummy Contact with Headrest

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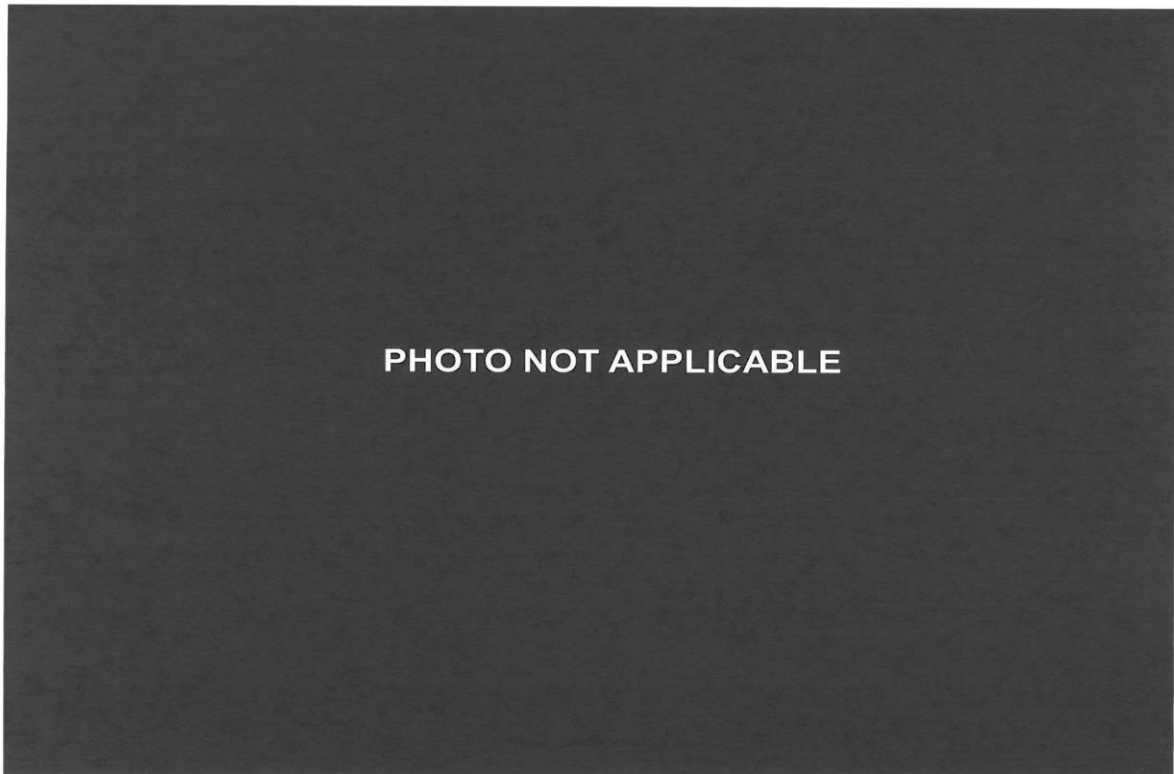
069 Photograph of Ballast Installed in Vehicle



070 Post-Test Stoddard Spillage Location View



071 Post-Test Speed Trap Read out



072 Vehicle at 0° on Static Rollover Device

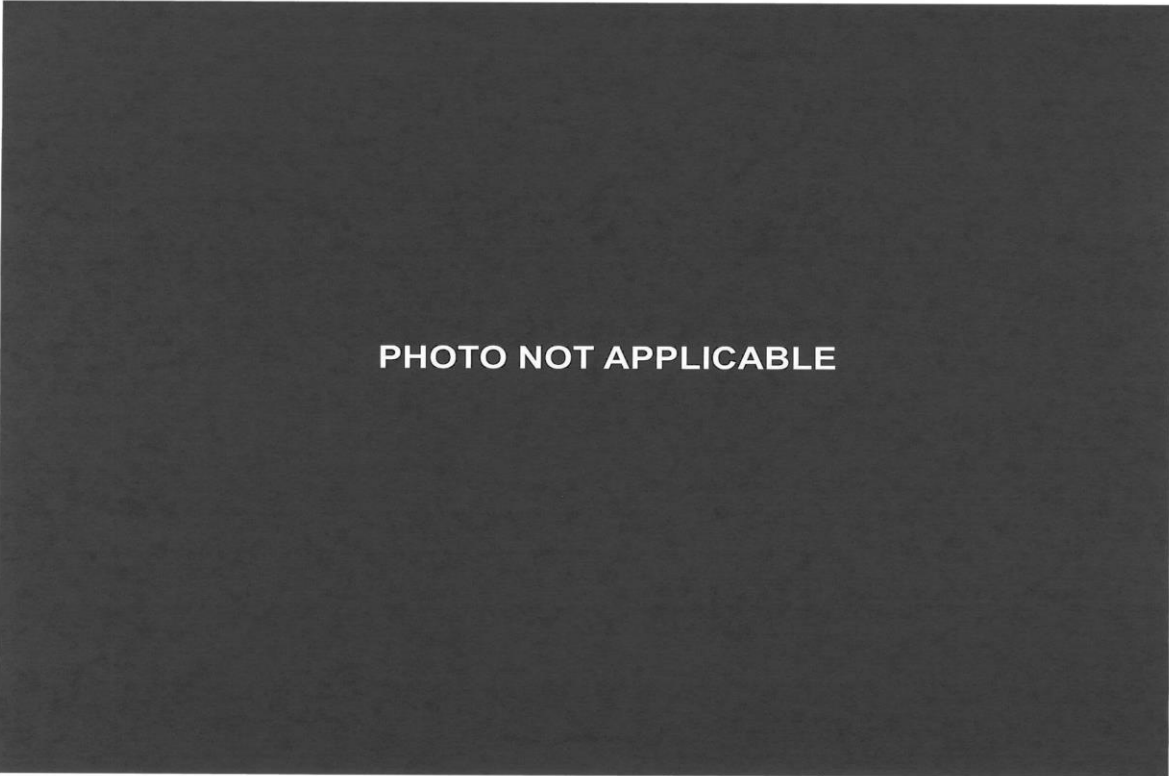


PHOTO NOT APPLICABLE

073 Vehicle at 90° on Static Rollover Device

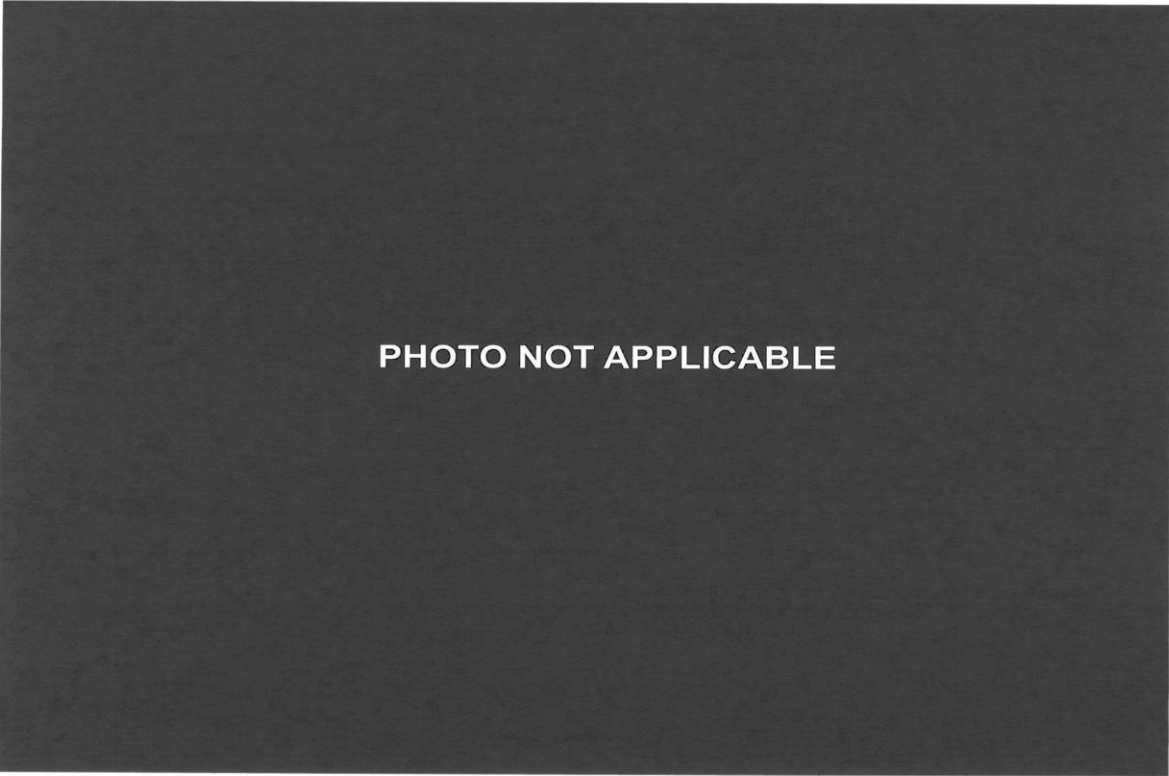


PHOTO NOT APPLICABLE

074 Vehicle at 180° on Static Rollover Device

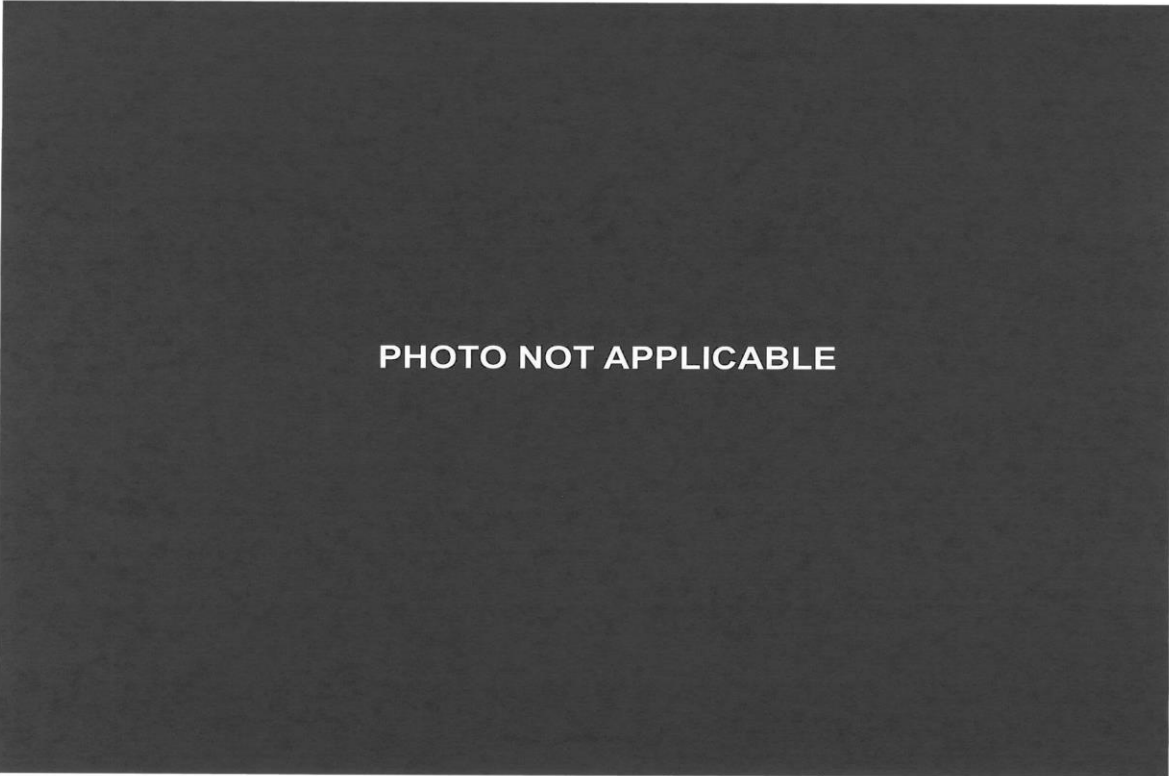


PHOTO NOT APPLICABLE

075 Vehicle at 270° on Static Rollover Device

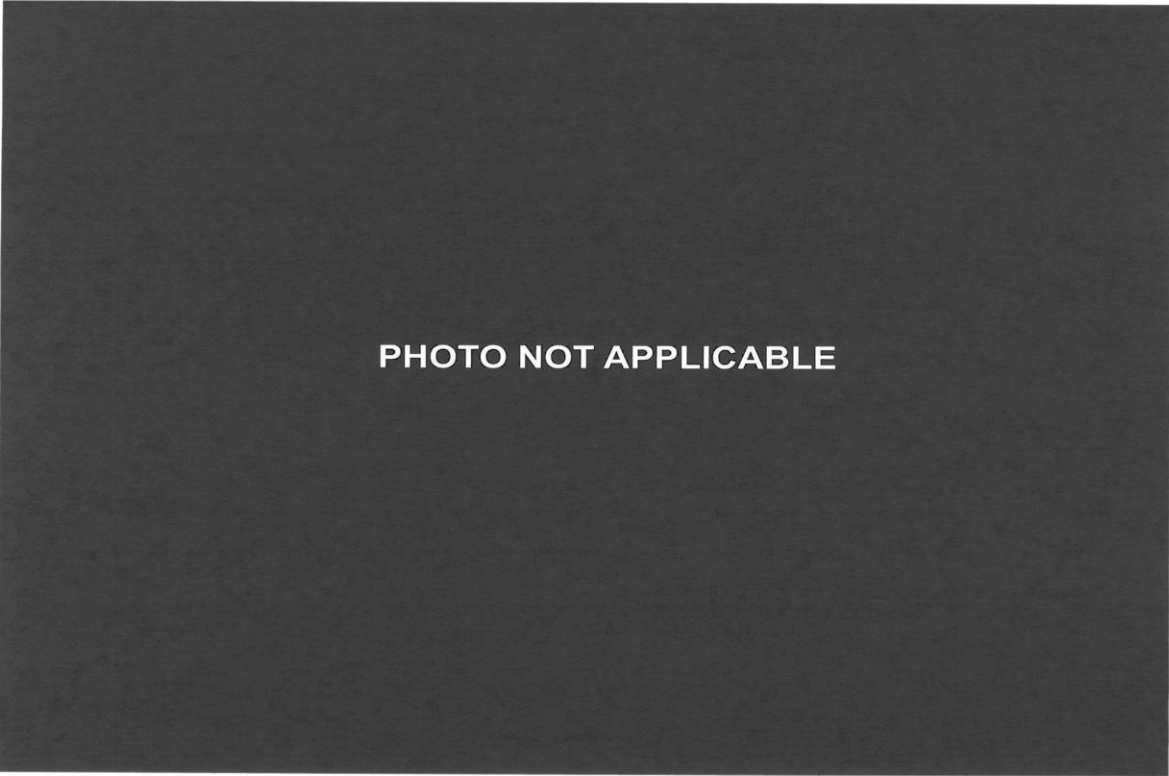


PHOTO NOT APPLICABLE

076 Vehicle at 360° on Static Rollover Device

PHOTO NOT AVAILABLE

077 2019 Toyota Highlander Frontal Impact Event

PHOTO NOT AVAILABLE

078 Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

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18	Driver Chest Left Upper Dy	B-19
19	Driver Chest Left Upper Dz	B-19
20	Driver Chest Left Upper Resultant	B-19
21	Driver Right Upper Thorax IR-TRACC	B-20
22	Driver Right Upper Thorax Y Rotary Potentiometer	B-20
23	Driver Right Upper Thorax Z Rotary Potentiometer	B-20
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25	Driver Chest Right Upper Dy	B-21
26	Driver Chest Right Upper Dz	B-21
27	Driver Chest Right Upper Resultant	B-21
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34	Driver T6 Z Angular Rate Sensor	B-23
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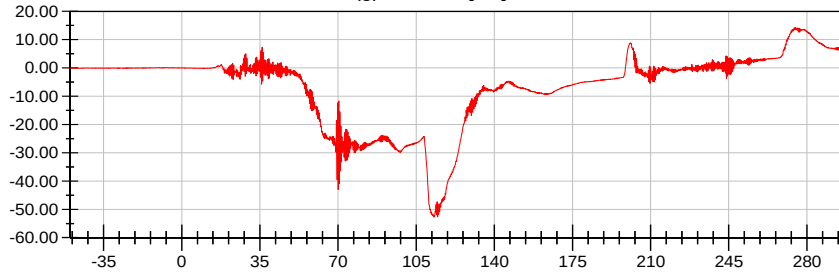
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

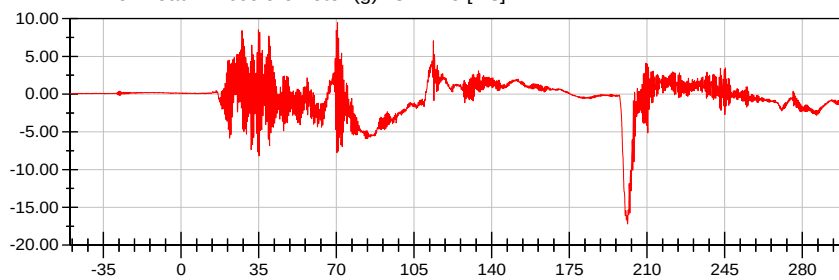
14.33 g at 274.85 ms

<Min>

-52.74 g at 112.90 ms

CFC_1000

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



<Max>

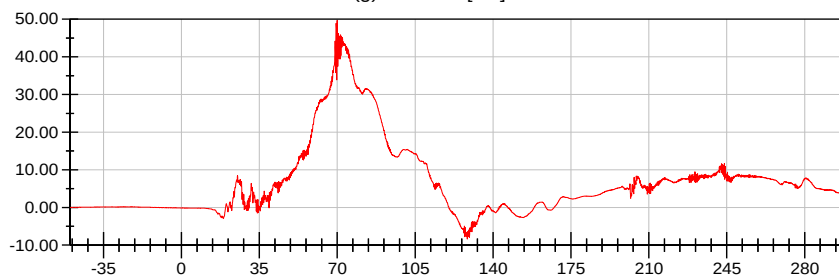
9.50 g at 70.50 ms

<Min>

-17.20 g at 201.25 ms

CFC_1000

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



<Max>

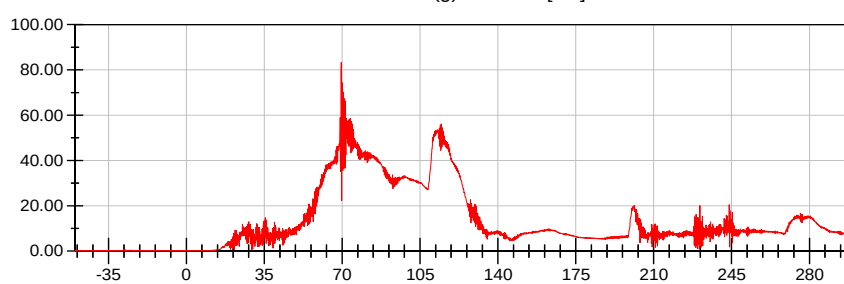
49.68 g at 70.00 ms

<Min>

-8.42 g at 128.45 ms

CFC_1000

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



<Max>

83.26 g at 69.60 ms

<Min>

0.07 g at -47.45 ms

CFC 1000



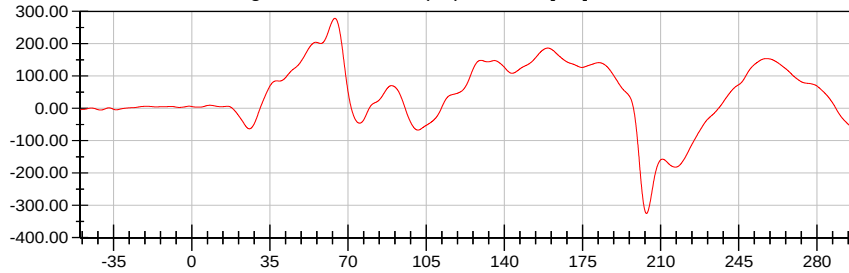
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Head X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

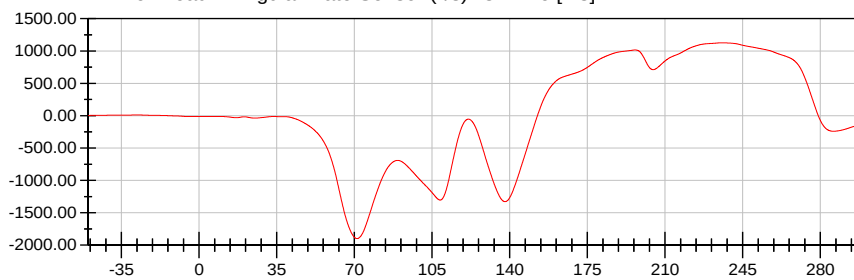
278.37 °/s at 64.10 ms

<Min>

-325.33 °/s at 203.65 ms

CFC_60

Driver Head Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

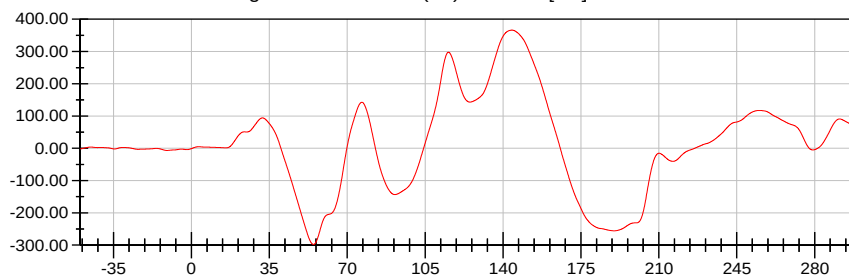
1,127.27 °/s at 235.90 ms

<Min>

-1,899.16 °/s at 71.20 ms

CFC_60

Driver Head Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

366.28 °/s at 144.00 ms

<Min>

-298.07 °/s at 54.85 ms

CFC_60

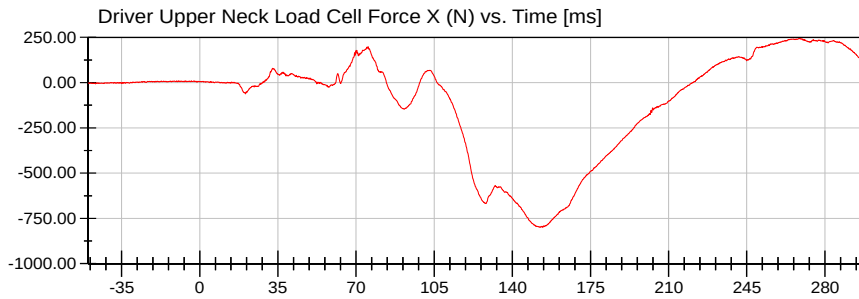


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



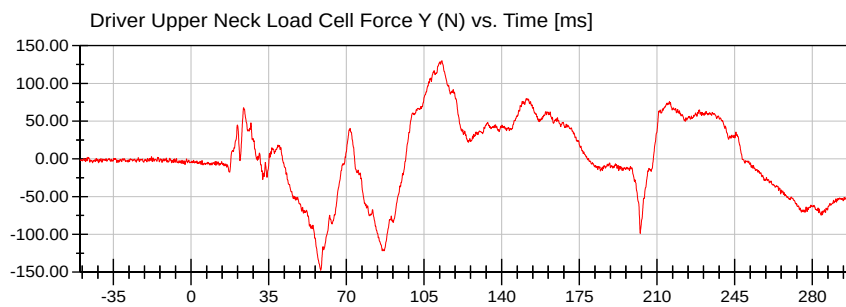
<Max>

243.81 N at 268.75 ms

<Min>

-800.24 N at 153.60 ms

CFC_1000



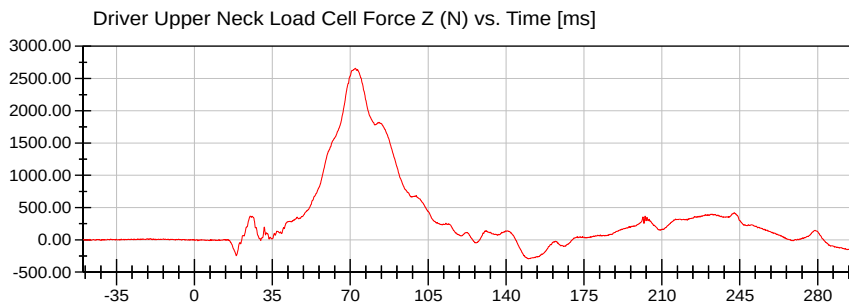
<Max>

130.22 N at 113.05 ms

<Min>

-147.48 N at 58.40 ms

CFC_1000



<Max>

2,657.09 N at 72.35 ms

<Min>

-294.93 N at 150.10 ms

CFC_1000



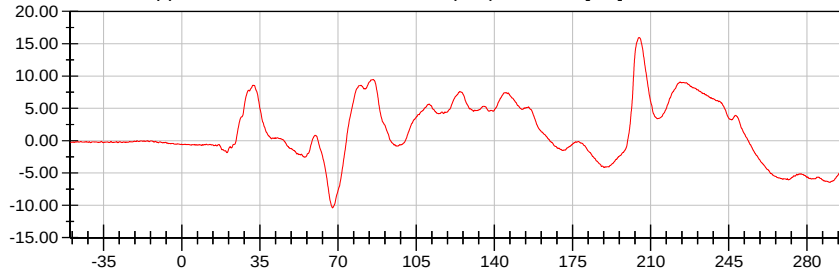
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Upper Neck Load Cell Moment X (Nm) vs. Time [ms]



<Max>

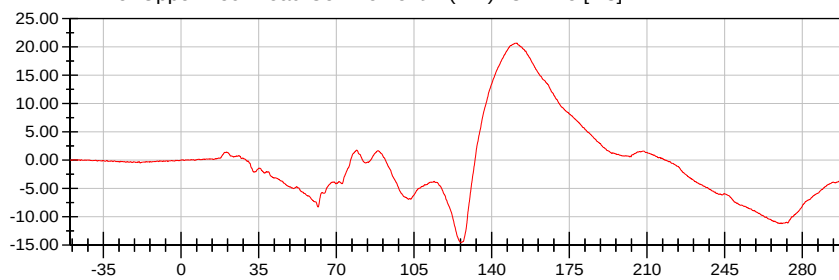
15.93 Nm at 204.75 ms

<Min>

-10.40 Nm at 67.60 ms

CFC_600

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



<Max>

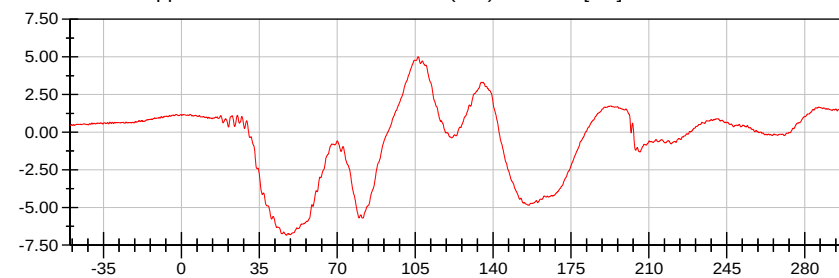
20.68 Nm at 151.35 ms

<Min>

-14.54 Nm at 126.40 ms

CFC_600

Driver Upper Neck Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

5.01 Nm at 106.40 ms

<Min>

-6.84 Nm at 47.15 ms

CFC_600



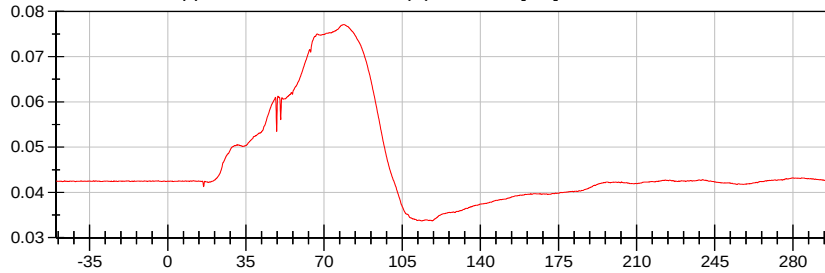
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Left Upper Thorax IR-TRACC (V) vs. Time [ms]



<Max>

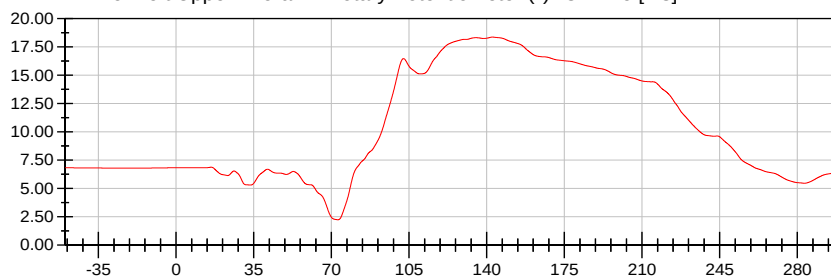
0.08 V at 79.00 ms

<Min>

0.03 V at 113.70 ms

CFC_600

Driver Left Upper Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

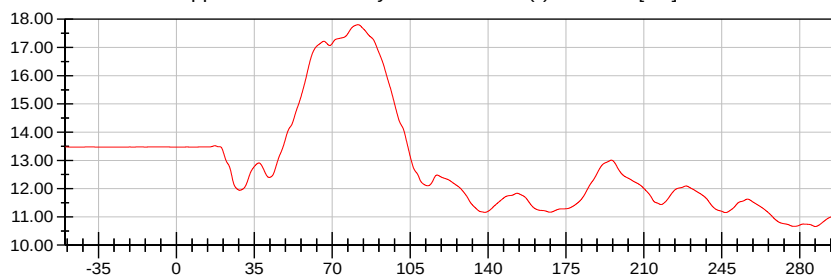
18.37 ° at 142.65 ms

<Min>

2.24 ° at 72.95 ms

CFC_180

Driver Left Upper Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

17.81 ° at 81.60 ms

<Min>

10.66 ° at 287.10 ms

CFC_180



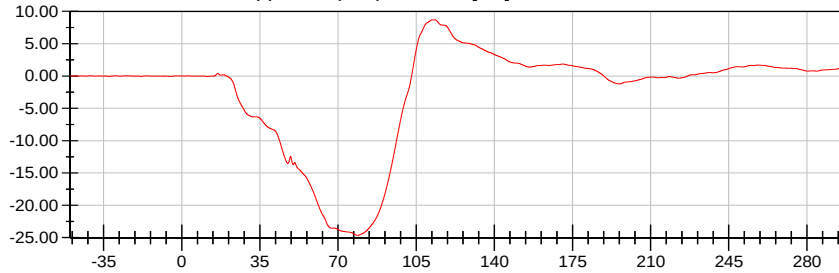
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Chest Left Upper Dx (mm) vs. Time [ms]



<Max>

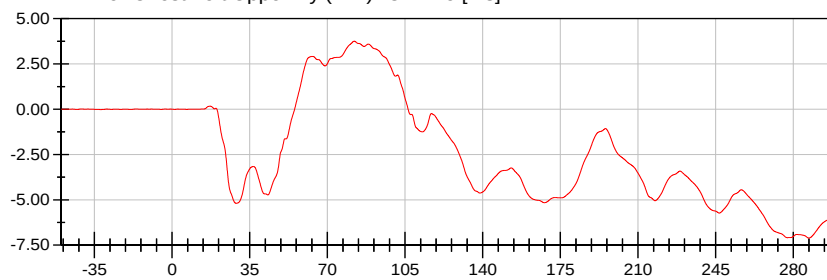
8.70 mm at 113.20 ms

<Min>

-24.63 mm at 78.70 ms

CFC_1000

Driver Chest Left Upper Dy (mm) vs. Time [ms]



<Max>

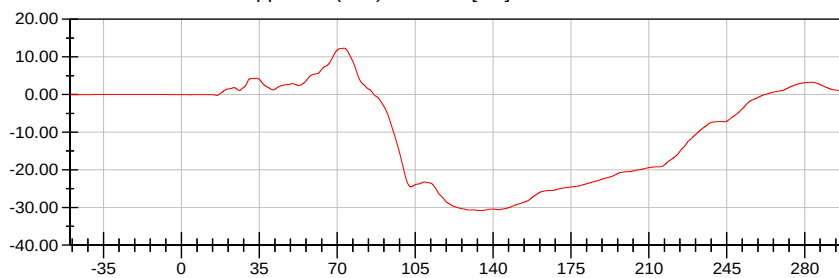
3.76 mm at 82.15 ms

<Min>

-7.11 mm at 287.00 ms

CFC_1000

Driver Chest Left Upper Dz (mm) vs. Time [ms]



<Max>

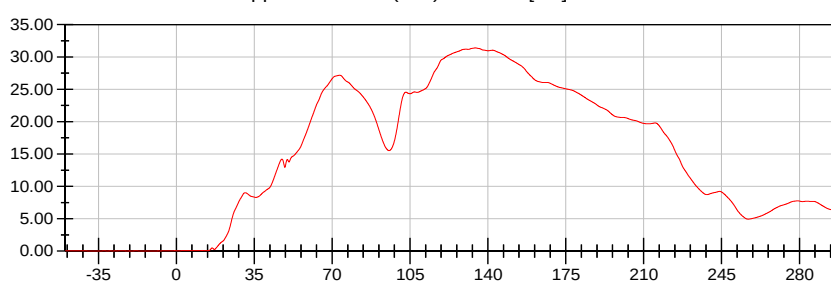
12.30 mm at 73.10 ms

<Min>

-30.85 mm at 134.25 ms

CFC_1000

Driver Chest Left Upper Resultant (mm) vs. Time [ms]



<Max>

31.40 mm at 134.30 ms

<Min>

0.01 mm at -34.50 ms

CFC_1000



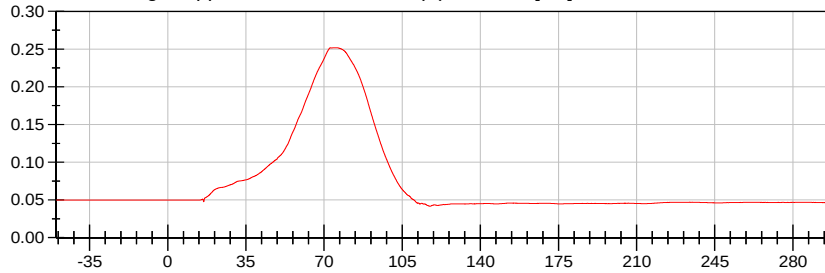
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Right Upper Thorax IR-TRACC (V) vs. Time [ms]



<Max>

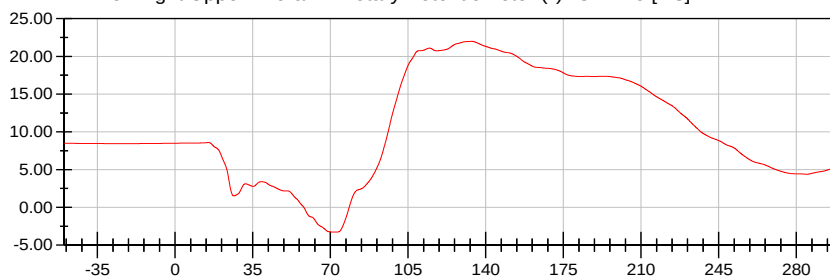
0.25 V at 75.55 ms

<Min>

0.04 V at 117.60 ms

CFC_600

Driver Right Upper Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

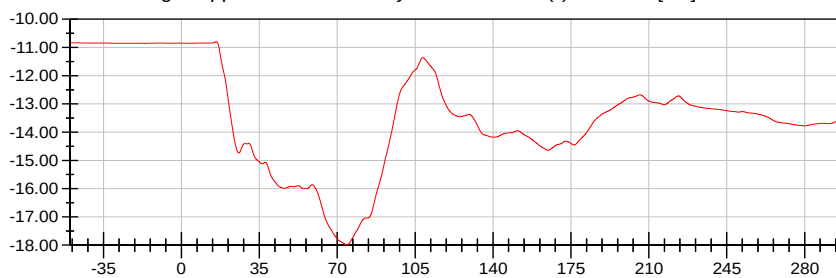
21.99 ° at 133.60 ms

<Min>

-3.26 ° at 71.45 ms

CFC_180

Driver Right Upper Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

-10.79 ° at 15.65 ms

<Min>

-17.99 ° at 74.30 ms

CFC_180



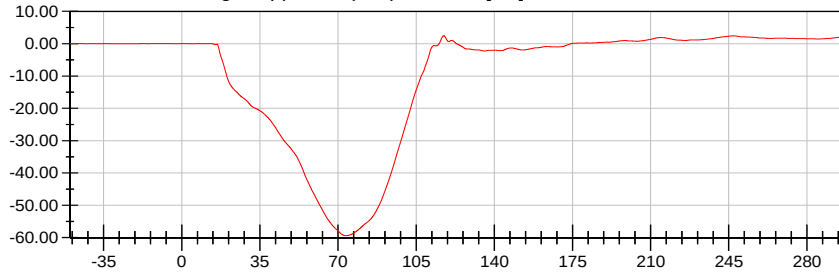
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Chest Right Upper Dx (mm) vs. Time [ms]



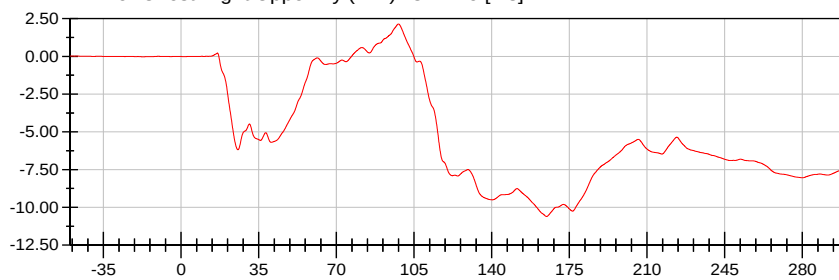
<Max>

2.48 mm at 117.35 ms

<Min>

-59.39 mm at 73.80 ms

Driver Chest Right Upper Dy (mm) vs. Time [ms]



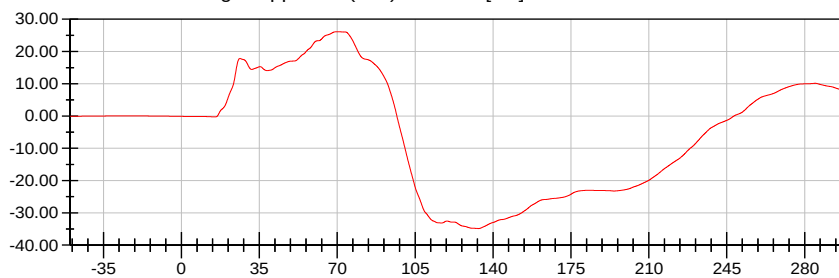
<Max>

2.14 mm at 98.00 ms

<Min>

-10.60 mm at 164.70 ms

Driver Chest Right Upper Dz (mm) vs. Time [ms]



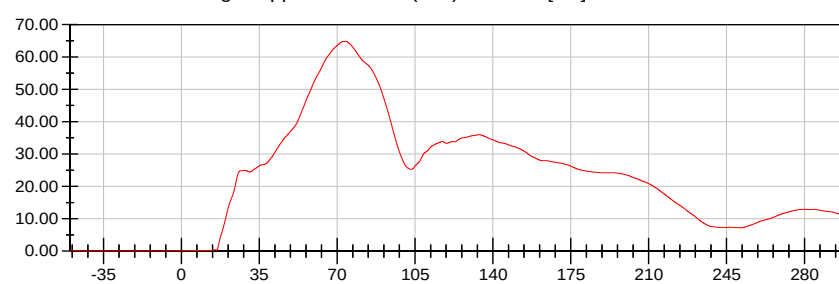
<Max>

26.11 mm at 69.65 ms

<Min>

-34.85 mm at 133.40 ms

Driver Chest Right Upper Resultant (mm) vs. Time [ms]



<Max>

64.85 mm at 73.65 ms

<Min>

0.00 mm at -35.25 ms



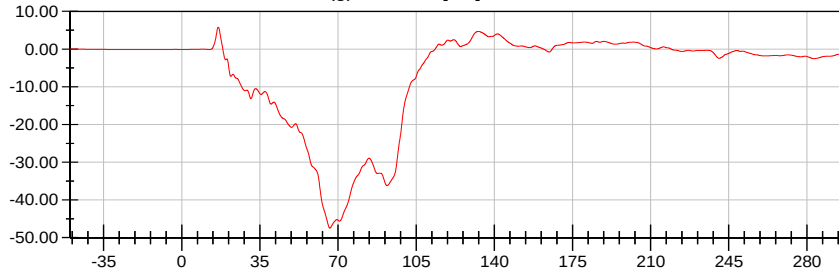
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver T6 X Accelerometer (g) vs. Time [ms]



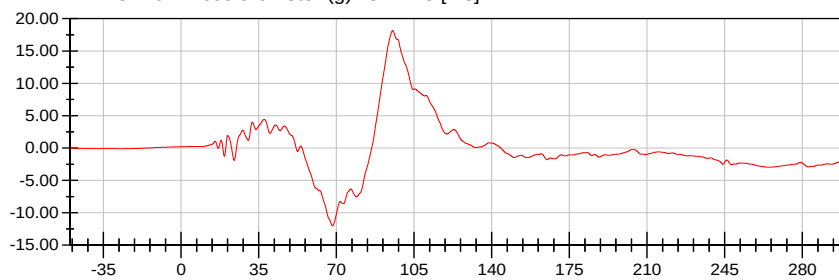
<Max>

5.80 g at 16.35 ms

<Min>

-47.50 g at 66.35 ms

Driver T6 Y Accelerometer (g) vs. Time [ms]



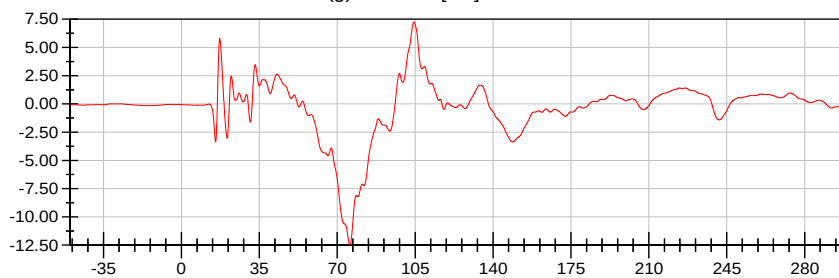
<Max>

18.15 g at 95.35 ms

<Min>

-12.04 g at 68.30 ms

Driver T6 Z Accelerometer (g) vs. Time [ms]



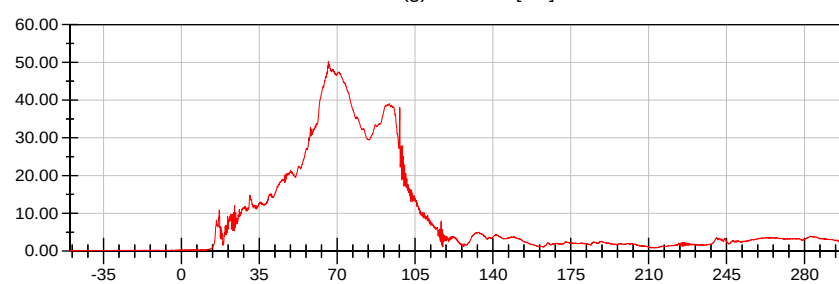
<Max>

7.25 g at 104.50 ms

<Min>

-12.49 g at 75.70 ms

Driver T6 Accelerometer Resultant (g) vs. Time [ms]



<Max>

50.20 g at 66.05 ms

<Min>

0.02 g at -47.35 ms



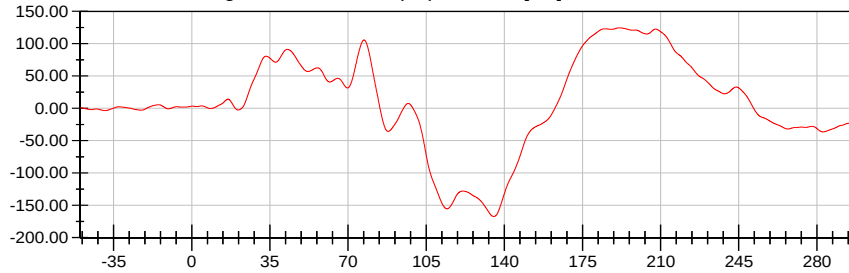
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver T6 X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

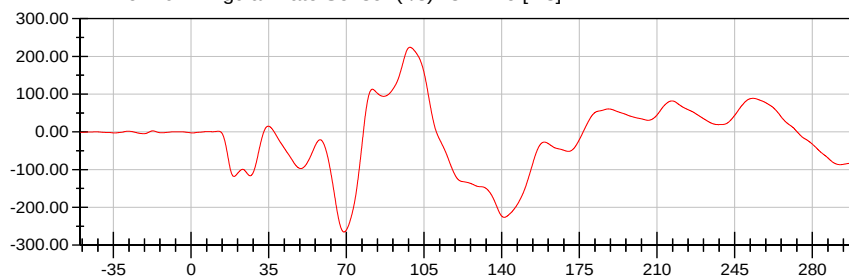
124.47 °/s at 191.40 ms

<Min>

-167.33 °/s at 135.25 ms

CFC_60

Driver T6 Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

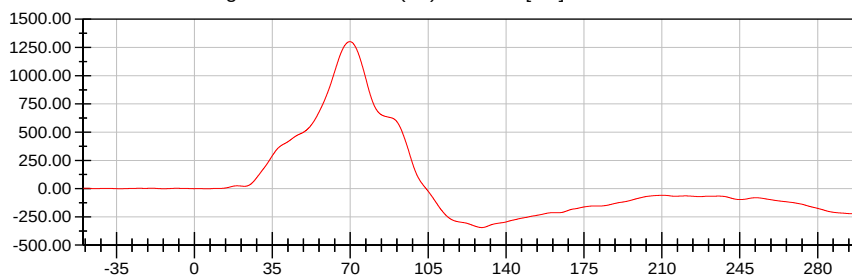
224.20 °/s at 98.65 ms

<Min>

-265.20 °/s at 68.95 ms

CFC_60

Driver T6 Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

1,301.56 °/s at 69.80 ms

<Min>

-344.46 °/s at 129.15 ms

CFC_60



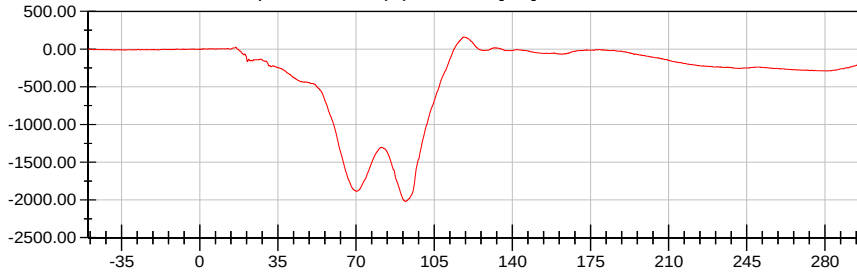
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Thoracic Spine X Force (N) vs. Time [ms]



<Max>

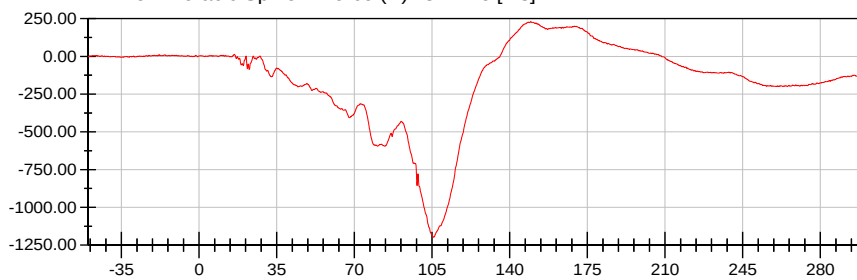
158.64 N at 118.25 ms

<Min>

-2,019.75 N at 92.10 ms

CFC_600

Driver Thoracic Spine Y Force (N) vs. Time [ms]



<Max>

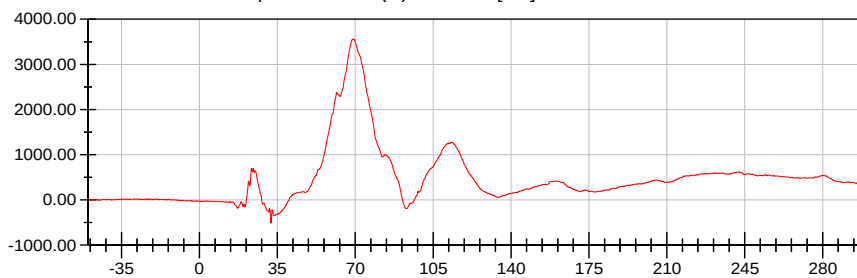
230.19 N at 149.50 ms

<Min>

-1,197.87 N at 105.65 ms

CFC_600

Driver Thoracic Spine Z Force (N) vs. Time [ms]



<Max>

3,561.32 N at 68.90 ms

<Min>

-513.69 N at 32.15 ms

CFC_600



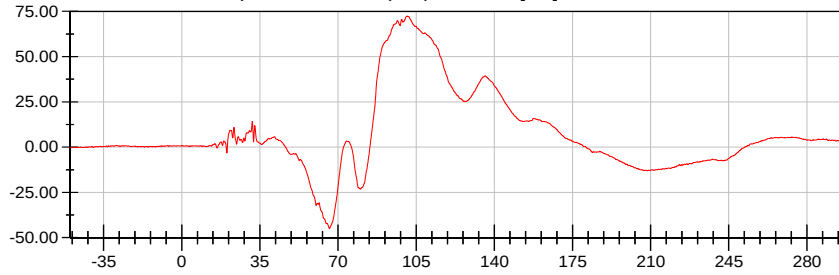
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Thoracic Spine X Moment (Nm) vs. Time [ms]



<Max>

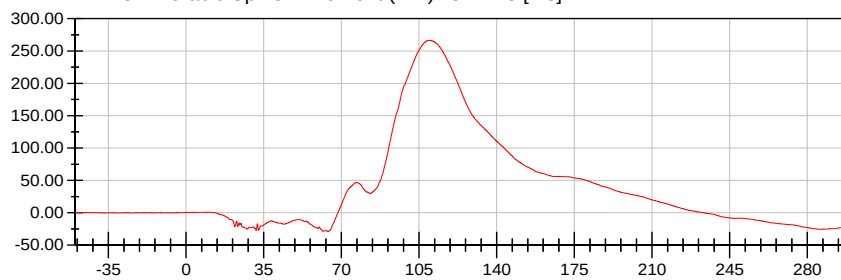
72.40 Nm at 100.95 ms

<Min>

-45.04 Nm at 66.15 ms

CFC_600

Driver Thoracic Spine Y Moment (Nm) vs. Time [ms]



<Max>

266.62 Nm at 109.60 ms

<Min>

-29.30 Nm at 64.05 ms

CFC_600



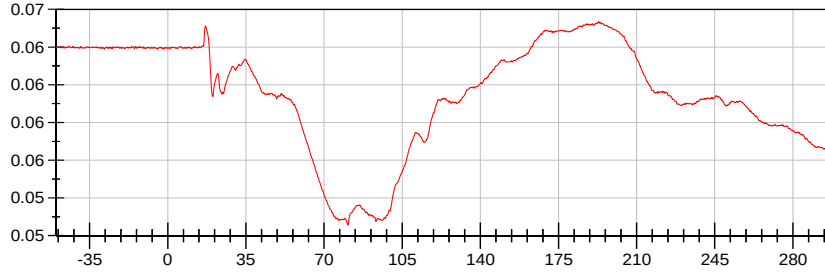
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Left Lower Thorax IR-TRACC (V) vs. Time [ms]



<Max>

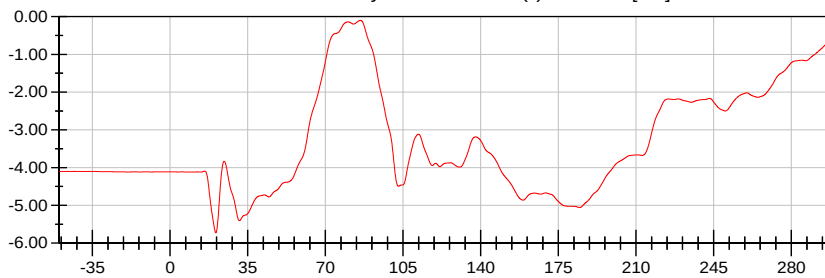
0.06 V at 192.95 ms

<Min>

0.05 V at 80.70 ms

CFC_600

Driver Left Lower Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

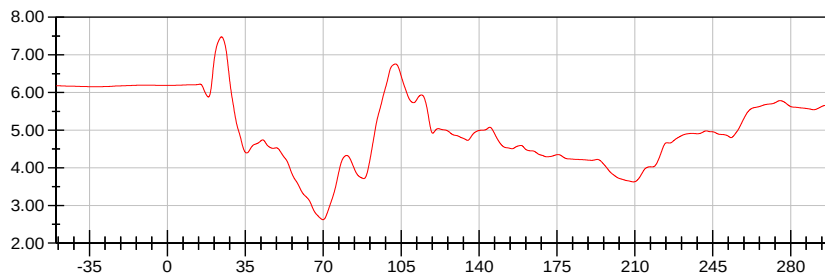
-0.10 ° at 85.80 ms

<Min>

-5.73 ° at 20.65 ms

CFC_180

Driver Left Lower Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

7.48 ° at 24.30 ms

<Min>

2.62 ° at 69.90 ms

CFC_180



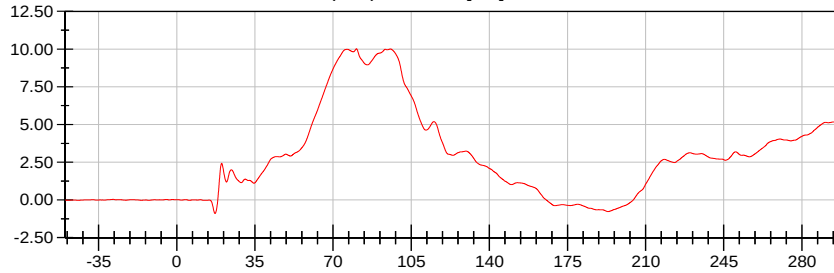
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Chest Left Lower Dx (mm) vs. Time [ms]



<Max>

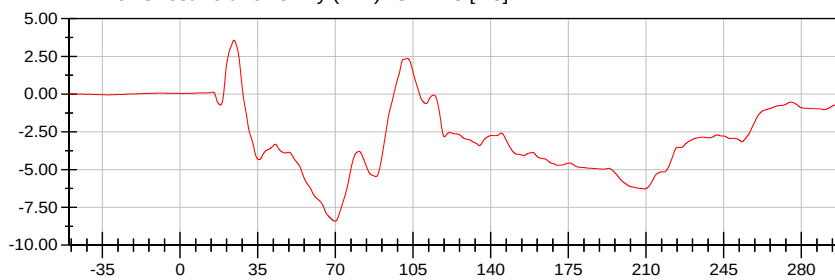
10.02 mm at 80.50 ms

<Min>

-0.90 mm at 17.15 ms

CFC_1000

Driver Chest Left Lower Dy (mm) vs. Time [ms]



<Max>

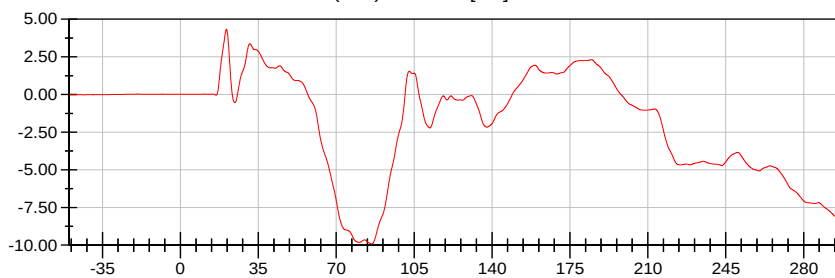
3.57 mm at 24.30 ms

<Min>

-8.41 mm at 69.95 ms

CFC_1000

Driver Chest Left Lower Dz (mm) vs. Time [ms]



<Max>

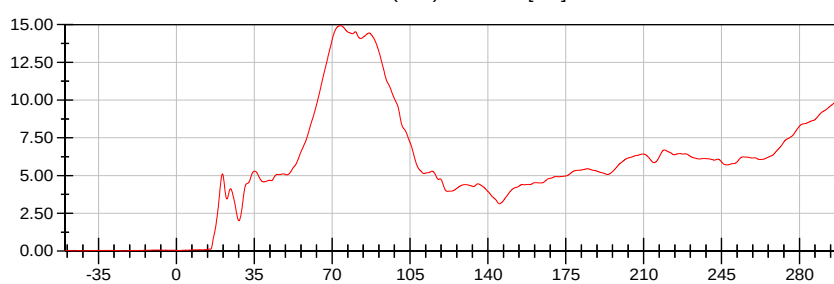
4.34 mm at 20.65 ms

<Min>

-9.93 mm at 85.95 ms

CFC_1000

Driver Chest Left Lower Resultant (mm) vs. Time [ms]



<Max>

14.93 mm at 73.75 ms

<Min>

0.01 mm at -24.15 ms

CFC_1000



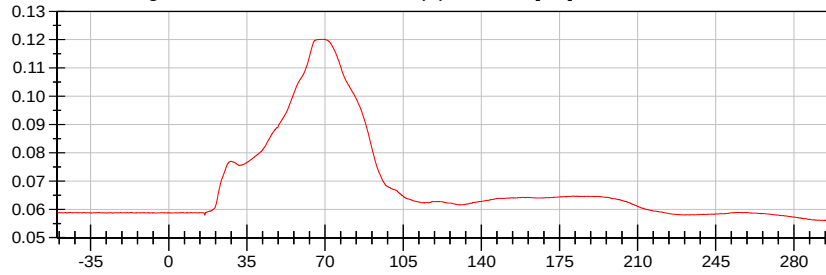
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Right Lower Thorax IR-TRACC (V) vs. Time [ms]



<Max>

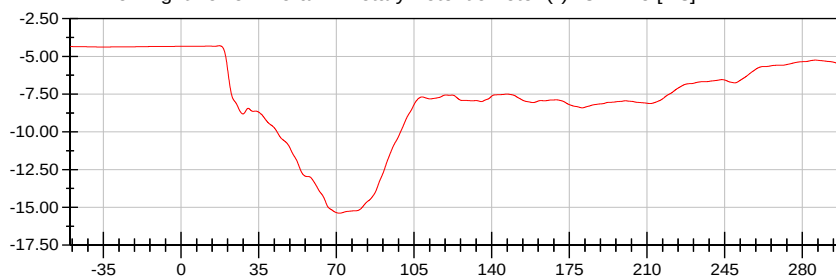
0.12 V at 69.65 ms

<Min>

0.06 V at 293.35 ms

CFC_600

Driver Right Lower Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

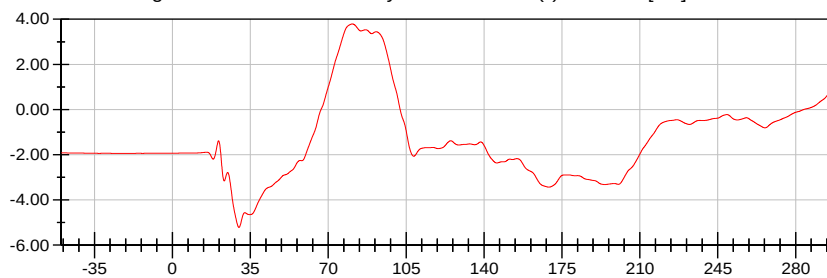
-4.30 ° at 17.25 ms

<Min>

-15.38 ° at 71.40 ms

CFC_180

Driver Right Lower Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

3.79 ° at 80.85 ms

<Min>

-5.22 ° at 29.90 ms

CFC_180



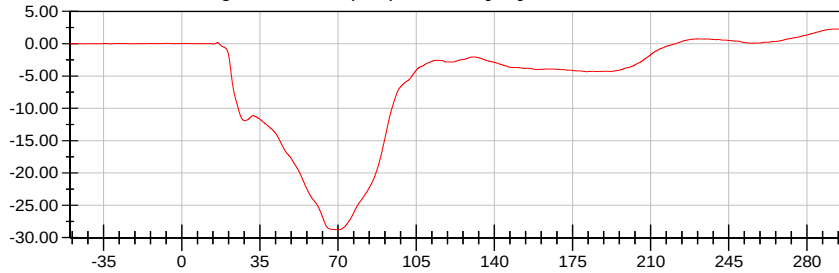
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Chest Right Lower Dx (mm) vs. Time [ms]



<Max>

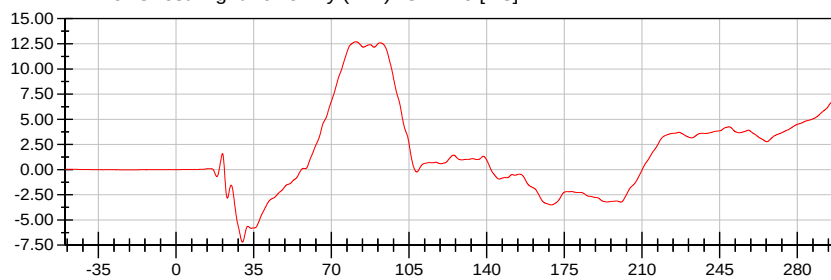
2.28 mm at 294.85 ms

<Min>

-28.78 mm at 69.65 ms

CFC_1000

Driver Chest Right Lower Dy (mm) vs. Time [ms]



<Max>

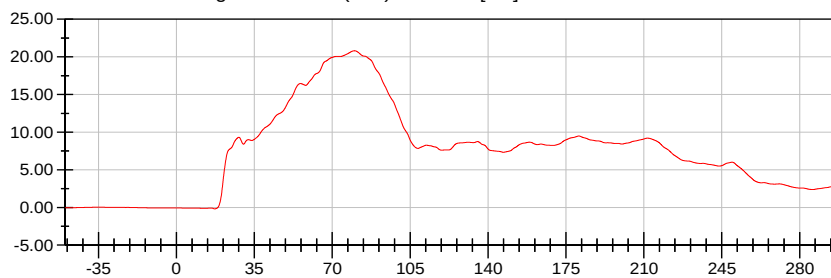
12.71 mm at 81.05 ms

<Min>

-7.21 mm at 29.90 ms

CFC_1000

Driver Chest Right Lower Dz (mm) vs. Time [ms]



<Max>

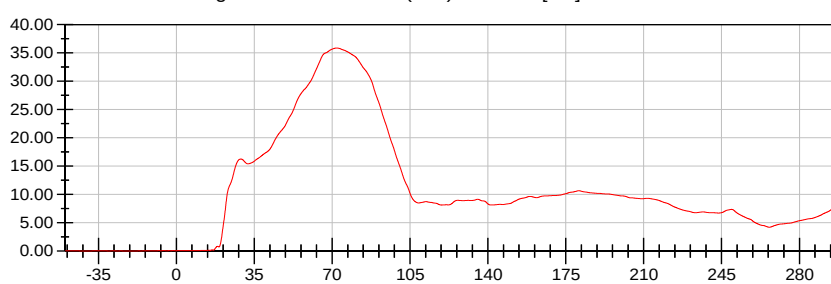
20.81 mm at 80.05 ms

<Min>

-0.19 mm at 17.20 ms

CFC_1000

Driver Chest Right Lower Resultant (mm) vs. Time [ms]



<Max>

35.86 mm at 72.05 ms

<Min>

0.02 mm at -20.25 ms

CFC_1000



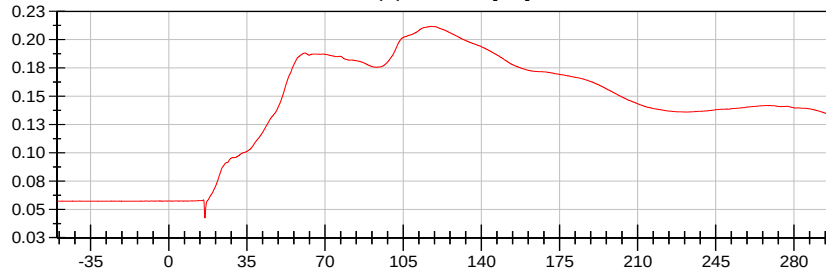
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Abdominal Left IR-TRACC (V) vs. Time [ms]



<Max>

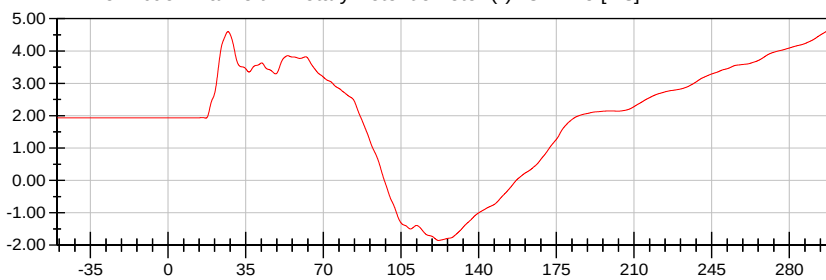
0.21 V at 117.55 ms

<Min>

0.04 V at 16.20 ms

CFC_600

Driver Abdominal Left Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

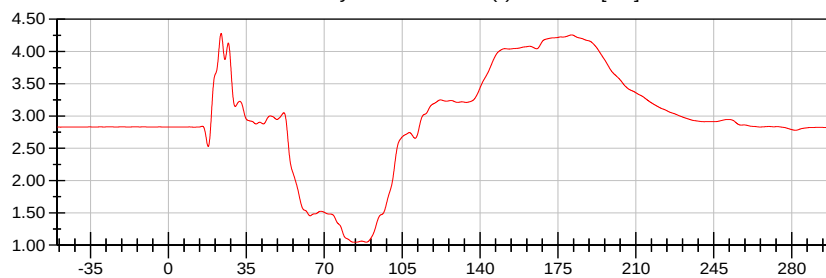
4.70 ° at 300.00 ms

<Min>

-1.85 ° at 121.95 ms

CFC_180

Driver Abdominal Left Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

4.28 ° at 23.65 ms

<Min>

1.05 ° at 84.20 ms

CFC_180



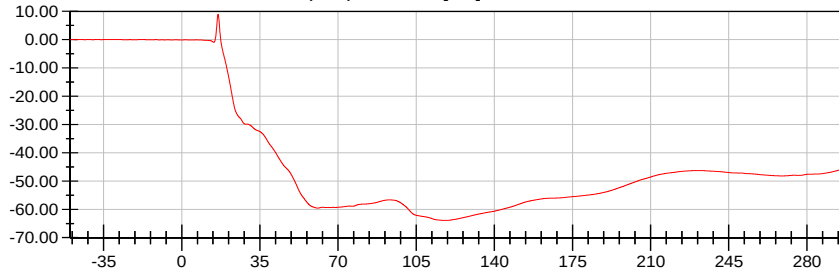
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Abdomen Left Dx (mm) vs. Time [ms]



<Max>

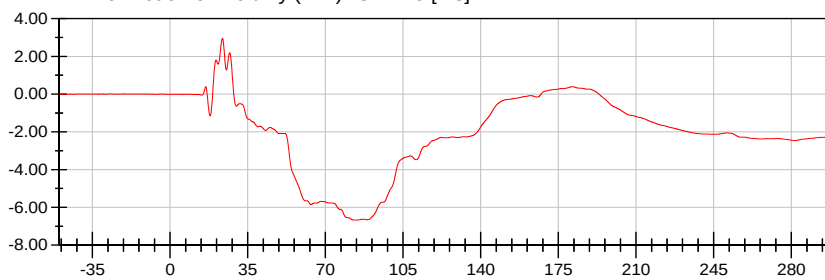
8.94 mm at 16.25 ms

<Min>

-63.91 mm at 117.80 ms

CFC_1000

Driver Abdomen Left Dy (mm) vs. Time [ms]



<Max>

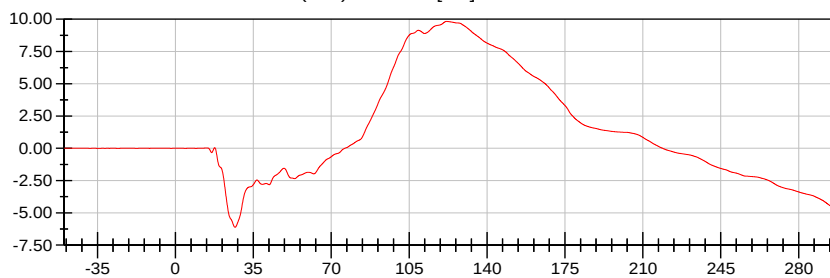
2.96 mm at 23.60 ms

<Min>

-6.67 mm at 82.70 ms

CFC_1000

Driver Abdomen Left Dz (mm) vs. Time [ms]



<Max>

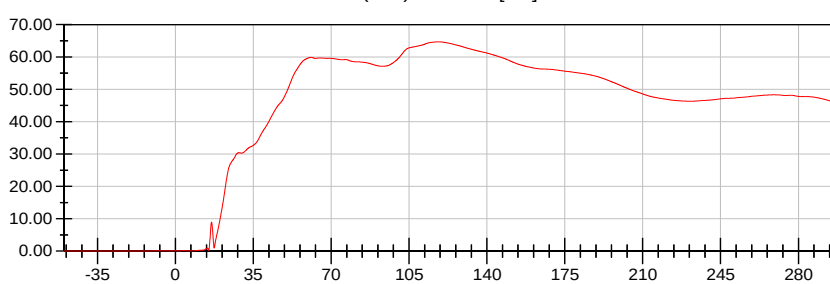
9.83 mm at 121.85 ms

<Min>

-6.12 mm at 26.80 ms

CFC_1000

Driver Abdomen Left Resultant (mm) vs. Time [ms]



<Max>

64.66 mm at 117.80 ms

<Min>

0.00 mm at -19.25 ms

CFC_1000



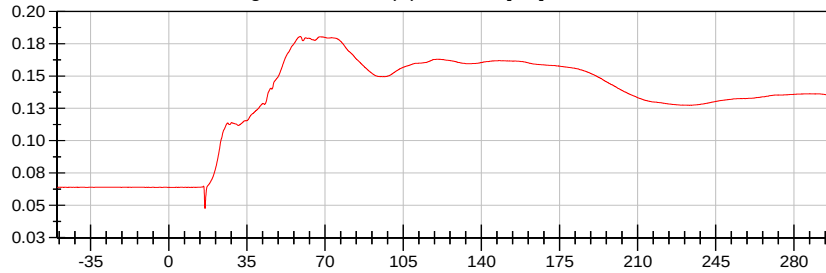
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Abdominal Right IR-TRACC (V) vs. Time [ms]



<Max>

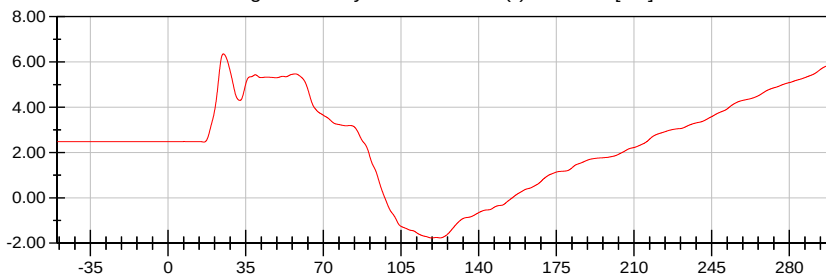
0.18 V at 58.95 ms

<Min>

0.05 V at 16.20 ms

CFC_600

Driver Abdominal Right Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

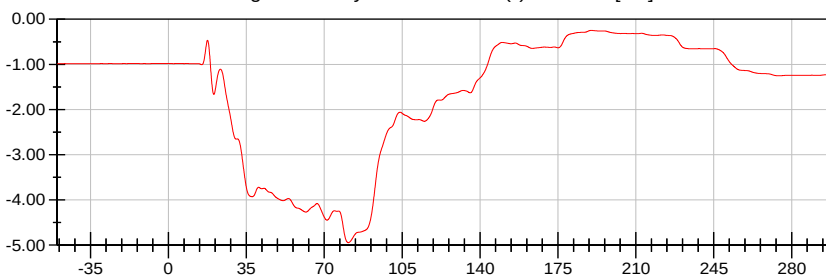
6.36 ° at 24.95 ms

<Min>

-1.77 ° at 118.70 ms

CFC_180

Driver Abdominal Right Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

-0.25 ° at 190.00 ms

<Min>

-4.95 ° at 80.85 ms

CFC_180



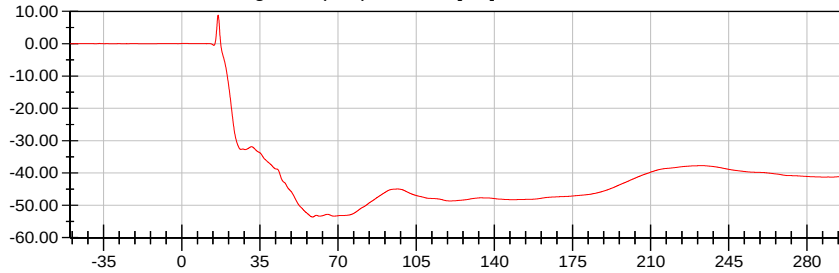
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Abdomen Right Dx (mm) vs. Time [ms]



<Max>

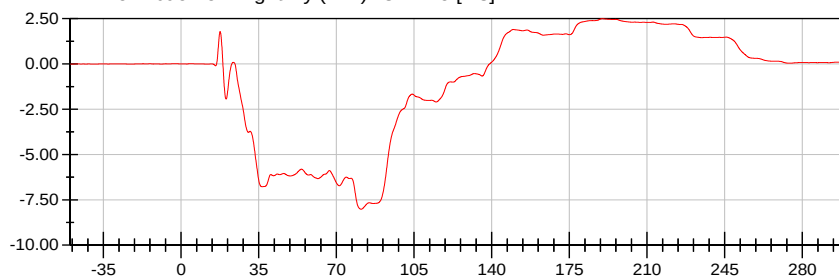
8.87 mm at 16.25 ms

<Min>

-53.62 mm at 58.60 ms

CFC_1000

Driver Abdomen Right Dy (mm) vs. Time [ms]



<Max>

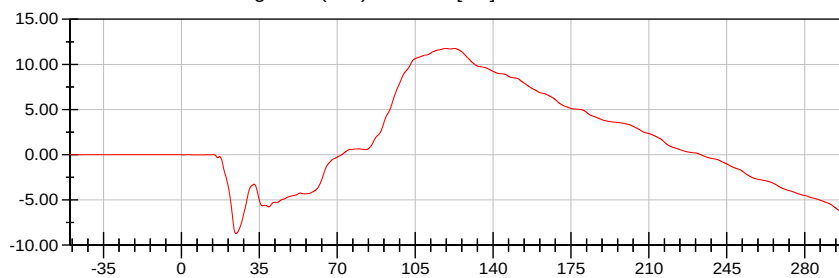
2.50 mm at 189.80 ms

<Min>

-8.02 mm at 81.15 ms

CFC_1000

Driver Abdomen Right Dz (mm) vs. Time [ms]



<Max>

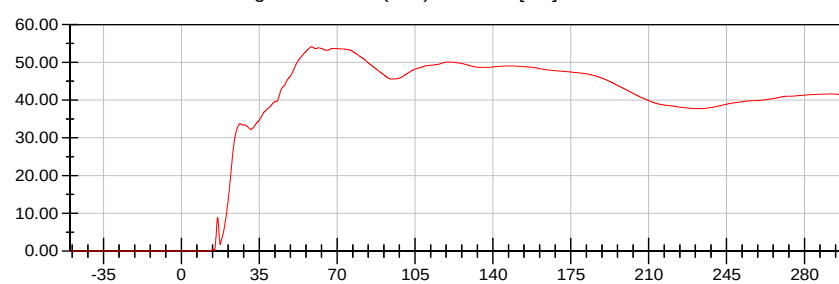
11.76 mm at 118.55 ms

<Min>

-8.72 mm at 24.50 ms

CFC_1000

Driver Abdomen Right Resultant (mm) vs. Time [ms]



<Max>

54.13 mm at 58.60 ms

<Min>

0.00 mm at -24.80 ms

CFC_1000



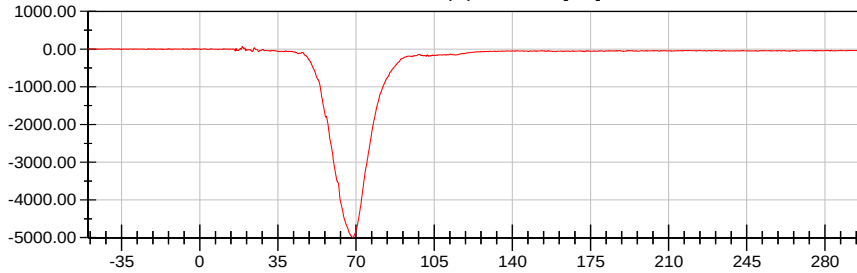
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left A.S.I.S. Load Cell Force X (N) vs. Time [ms]



<Max>

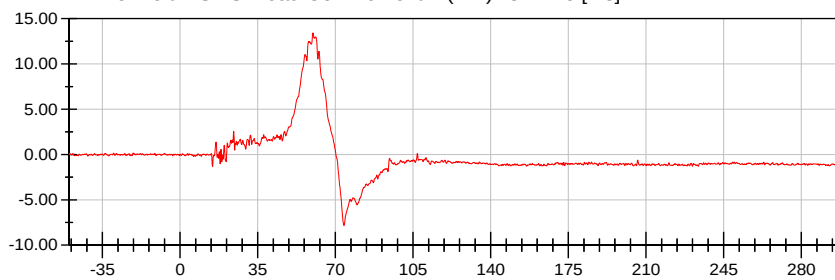
61.91 N at 19.05 ms

<Min>

-4,994.21 N at 68.45 ms

CFC_600

Driver Left A.S.I.S. Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

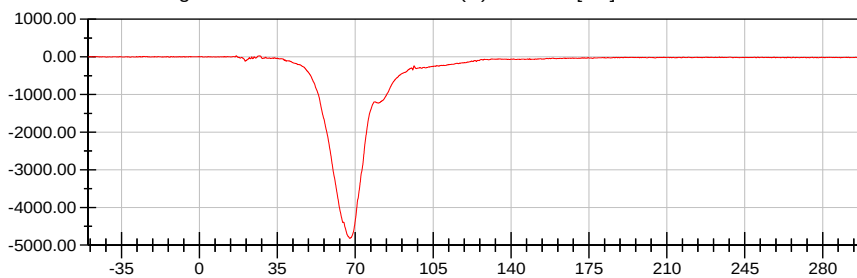
13.43 Nm at 59.90 ms

<Min>

-7.83 Nm at 73.90 ms

CFC_600

Driver Right A.S.I.S. Load Cell Force X (N) vs. Time [ms]



<Max>

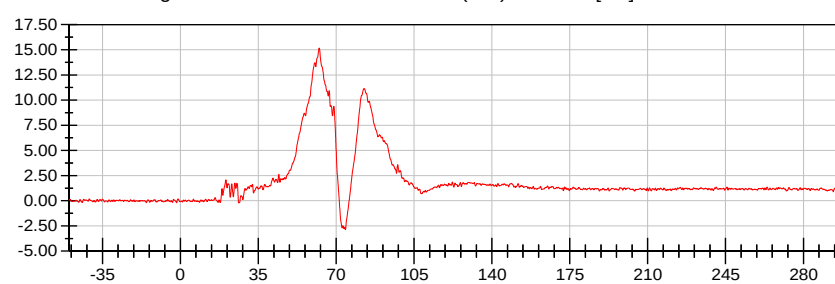
29.31 N at 16.55 ms

<Min>

-4,819.27 N at 67.55 ms

CFC_600

Driver Right A.S.I.S. Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

15.18 Nm at 62.40 ms

<Min>

-2.87 Nm at 74.15 ms

CFC_600



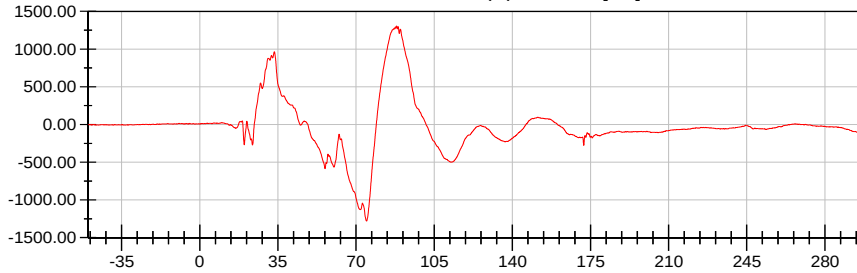
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Acetabulum Load Cell Force X (N) vs. Time [ms]



<Max>

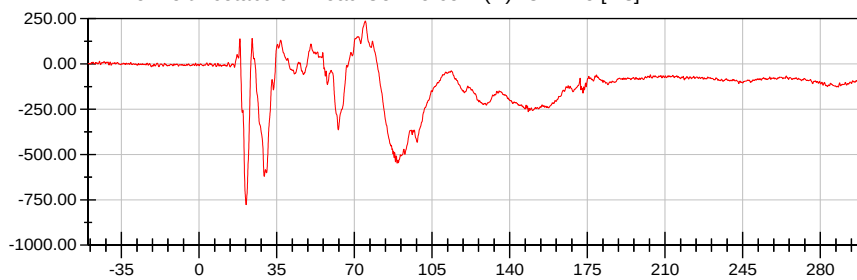
1,305.63 N at 88.15 ms

<Min>

-1,280.11 N at 74.70 ms

CFC_600

Driver Left Acetabulum Load Cell Force Y (N) vs. Time [ms]



<Max>

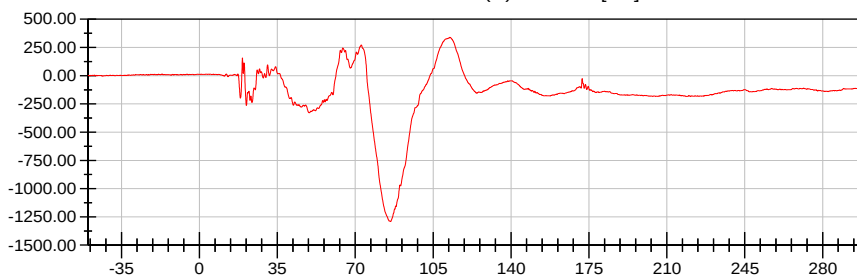
236.77 N at 74.95 ms

<Min>

-776.89 N at 21.20 ms

CFC_600

Driver Left Acetabulum Load Cell Force Z (N) vs. Time [ms]



<Max>

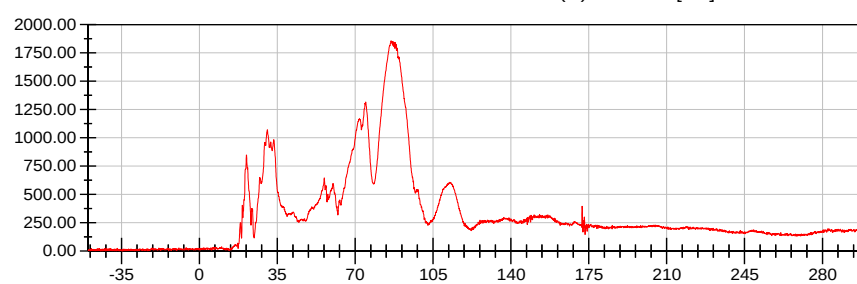
339.52 N at 112.55 ms

<Min>

-1,291.55 N at 85.90 ms

CFC_600

Driver Left Acetabulum Load Cell Force Resultant (N) vs. Time [ms]



<Max>

1,857.44 N at 86.15 ms

<Min>

0.77 N at -44.35 ms

Prefiltered_> CFC 1000



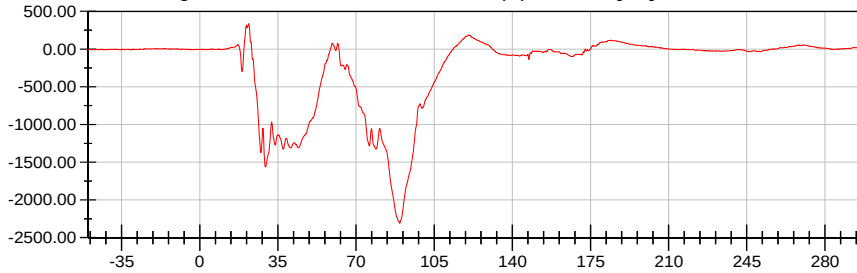
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Right Acetabulum Load Cell Force X (N) vs. Time [ms]



<Max>

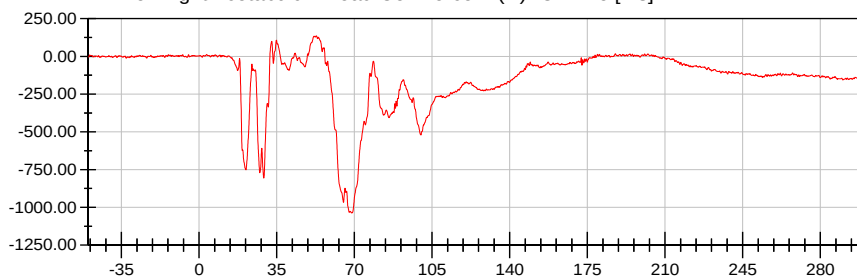
336.01 N at 21.90 ms

<Min>

-2,311.02 N at 89.55 ms

CFC_600

Driver Right Acetabulum Load Cell Force Y (N) vs. Time [ms]



<Max>

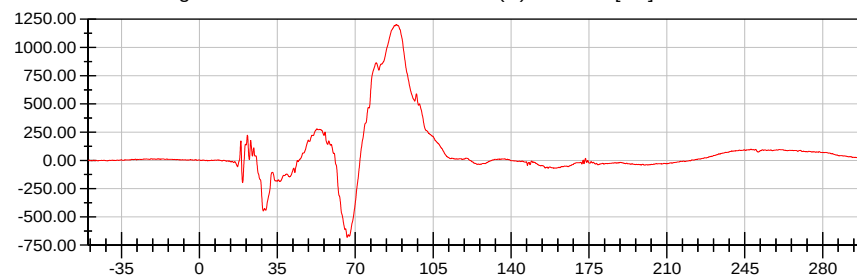
136.03 N at 52.85 ms

<Min>

-1,037.13 N at 68.80 ms

CFC_600

Driver Right Acetabulum Load Cell Force Z (N) vs. Time [ms]



<Max>

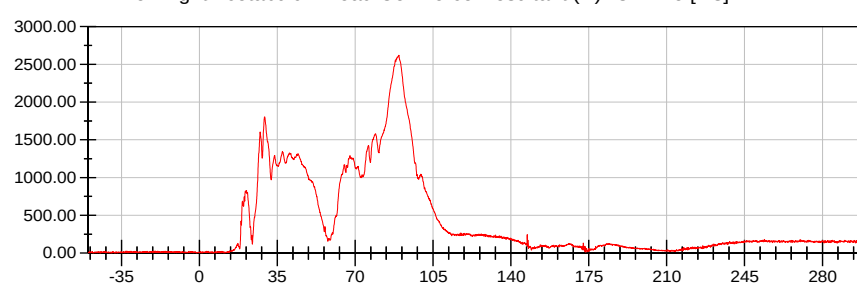
1,203.06 N at 88.60 ms

<Min>

-680.57 N at 66.40 ms

CFC_600

Driver Right Acetabulum Load Cell Force Resultant (N) vs. Time [ms]



<Max>

2,620.91 N at 89.65 ms

<Min>

1.21 N at 7.70 ms

CFC 600



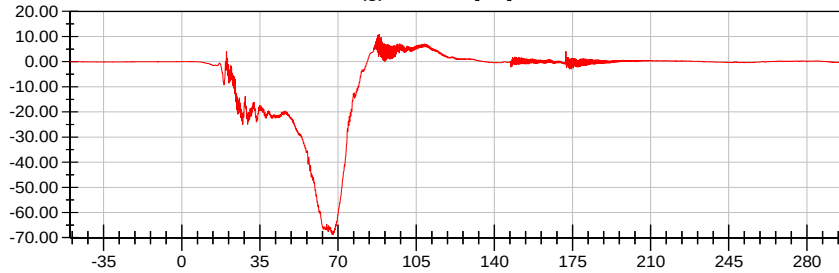
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Pelvis X Accelerometer (g) vs. Time [ms]



<Max>

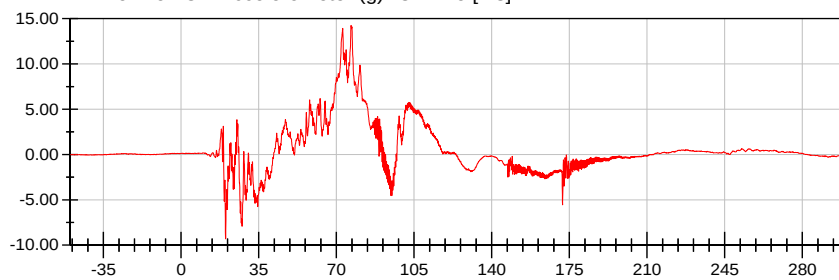
10.80 g at 88.40 ms

<Min>

-68.83 g at 67.80 ms

CFC_1000

Driver Pelvis Y Accelerometer (g) vs. Time [ms]



<Max>

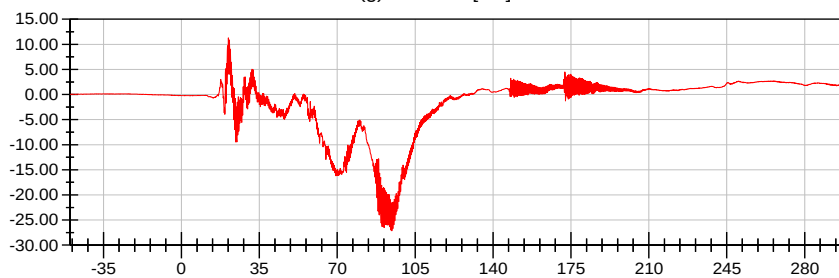
14.24 g at 76.65 ms

<Min>

-9.32 g at 20.05 ms

CFC_1000

Driver Pelvis Z Accelerometer (g) vs. Time [ms]



<Max>

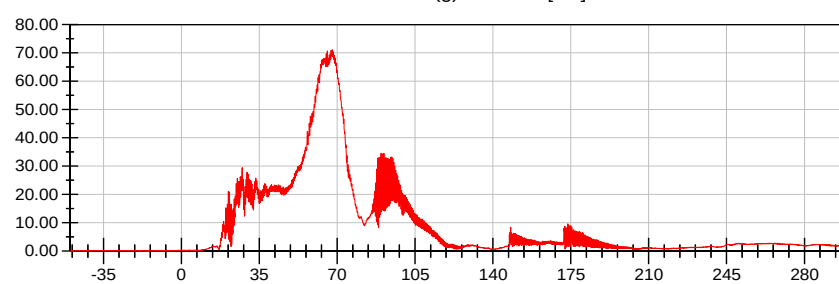
11.30 g at 21.15 ms

<Min>

-27.16 g at 94.55 ms

CFC_1000

Driver Pelvis Accelerometer Resultant (g) vs. Time [ms]



<Max>

71.14 g at 67.80 ms

<Min>

0.01 g at -15.15 ms

CFC 1000



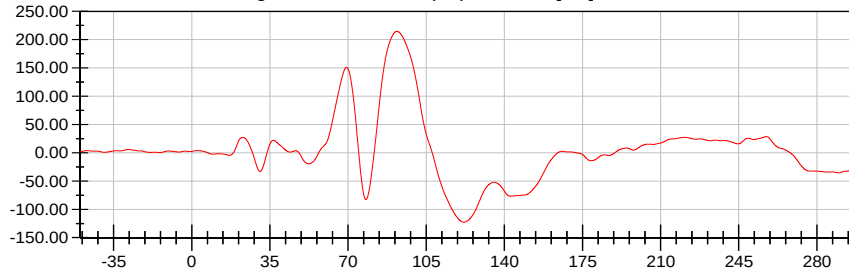
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Pelvis X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

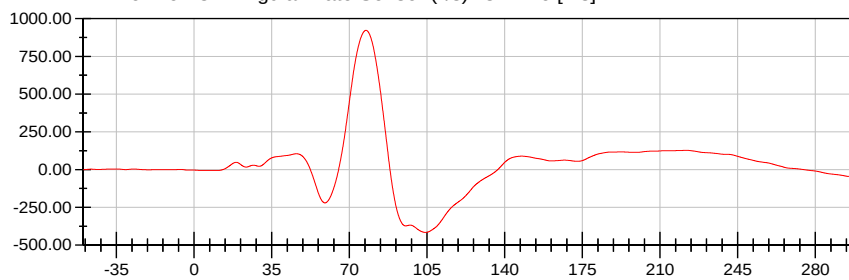
214.67 °/s at 91.90 ms

<Min>

-122.68 °/s at 121.80 ms

CFC_60

Driver Pelvis Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

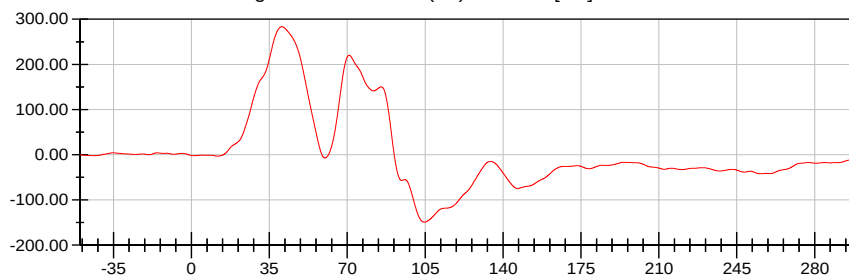
922.63 °/s at 77.50 ms

<Min>

-415.81 °/s at 104.35 ms

CFC_60

Driver Pelvis Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

283.35 °/s at 40.60 ms

<Min>

-148.95 °/s at 104.70 ms

CFC_60



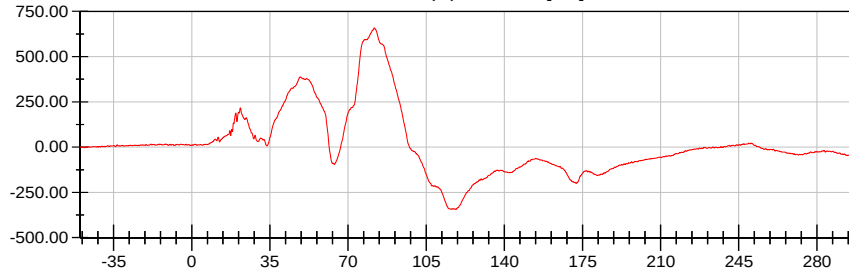
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

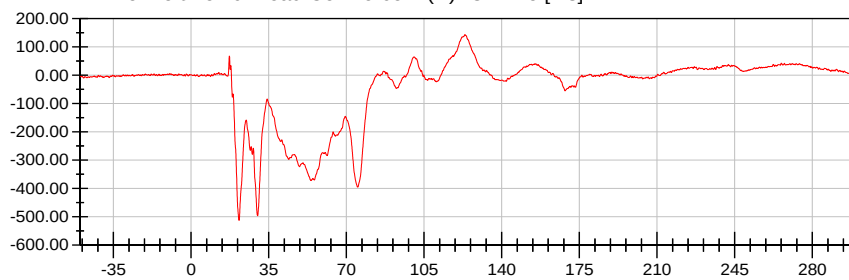
658.95 N at 81.70 ms

<Min>

-344.97 N at 118.30 ms

CFC_600

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



<Max>

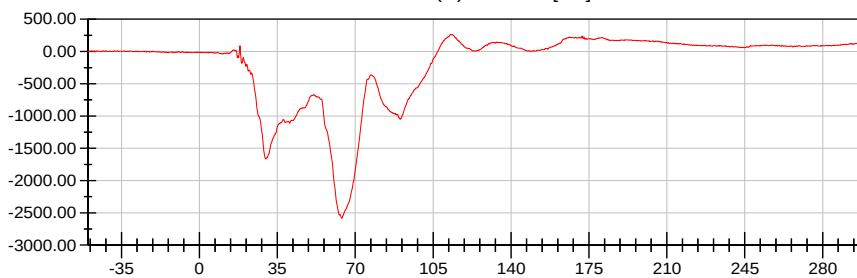
143.25 N at 123.45 ms

<Min>

-512.74 N at 21.65 ms

CFC_600

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



<Max>

263.67 N at 112.85 ms

<Min>

-2,584.21 N at 63.95 ms

CFC_600



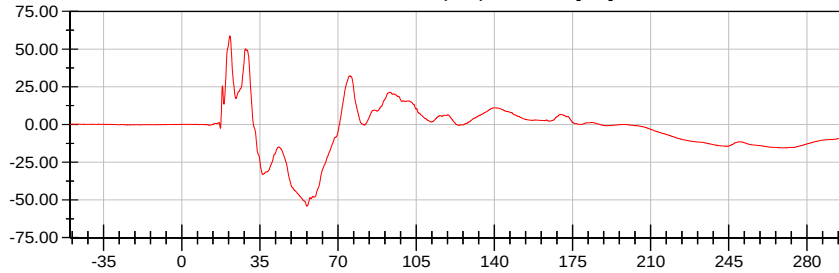
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Femur Load Cell Moment X (Nm) vs. Time [ms]



<Max>

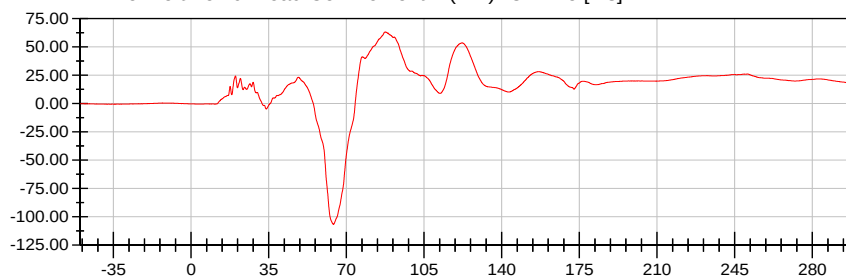
58.88 Nm at 21.55 ms

<Min>

-54.18 Nm at 56.10 ms

CFC_600

Driver Left Femur Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

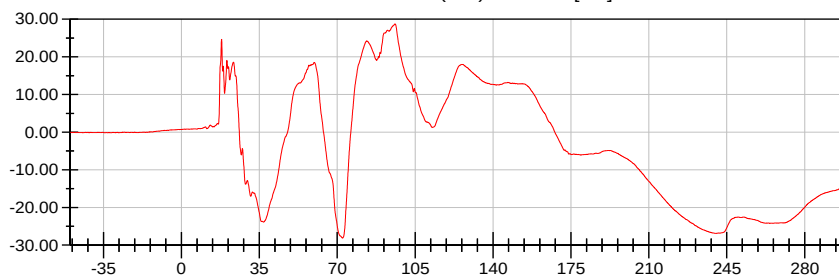
63.21 Nm at 87.70 ms

<Min>

-106.59 Nm at 64.20 ms

CFC_600

Driver Left Femur Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

28.75 Nm at 95.95 ms

<Min>

-28.13 Nm at 72.40 ms

CFC_600

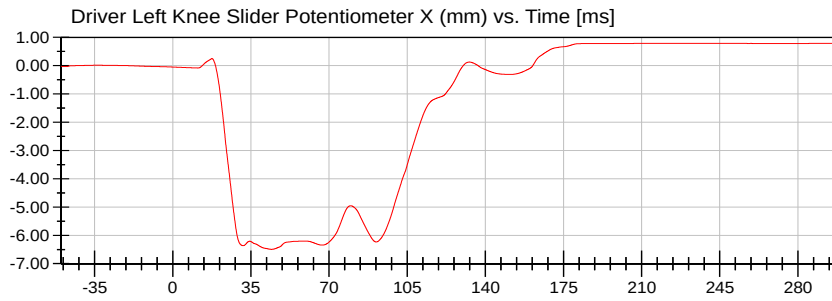


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



<Max>

0.80 mm at 300.00 ms

<Min>

-6.49 mm at 44.20 ms

CFC_180

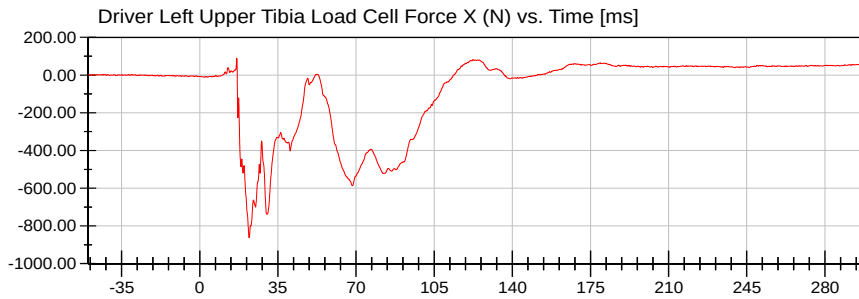


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



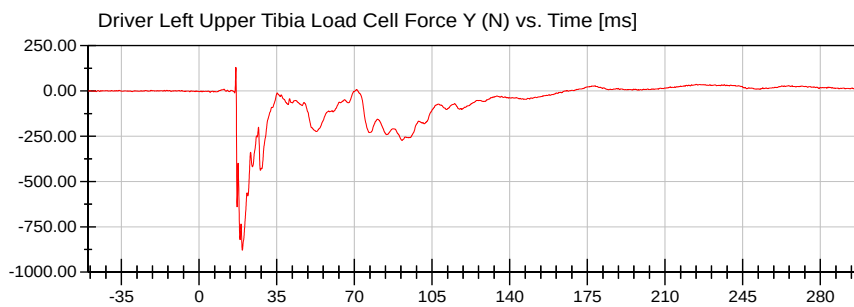
<Max>

89.25 N at 16.60 ms

<Min>

-862.45 N at 22.15 ms

CFC_600



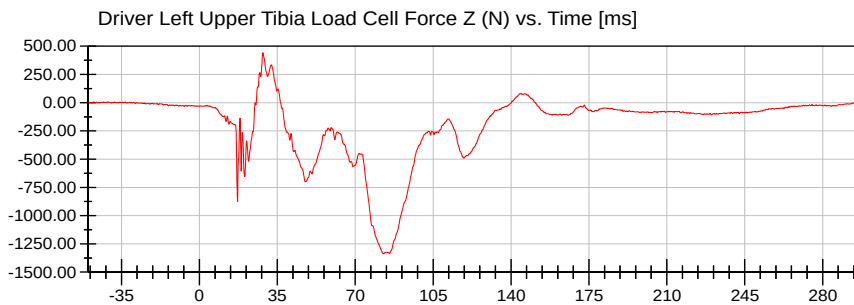
<Max>

130.61 N at 16.60 ms

<Min>

-879.46 N at 19.50 ms

CFC_600



<Max>

442.28 N at 28.55 ms

<Min>

-1,337.99 N at 82.55 ms

CFC_600



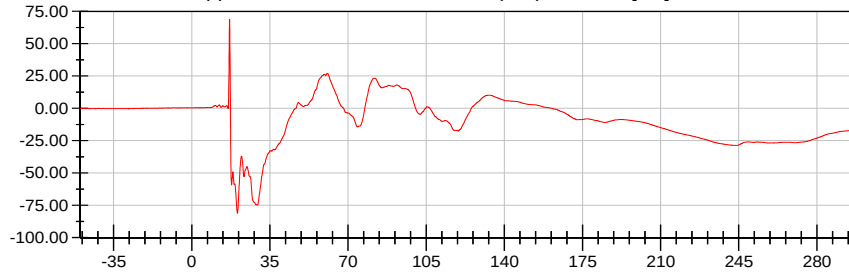
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Upper Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

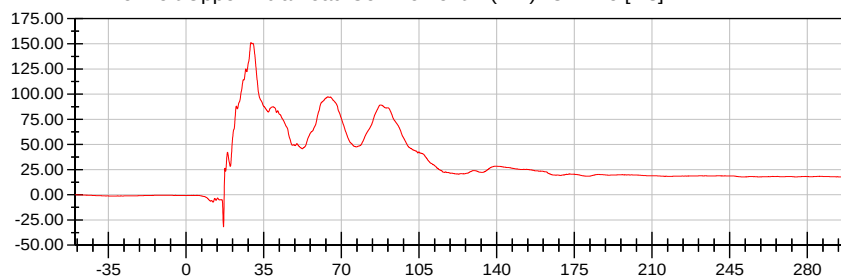
68.84 Nm at 16.95 ms

<Min>

-81.13 Nm at 20.45 ms

CFC_600

Driver Left Upper Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

151.24 Nm at 29.25 ms

<Min>

-31.88 Nm at 16.85 ms

CFC_600



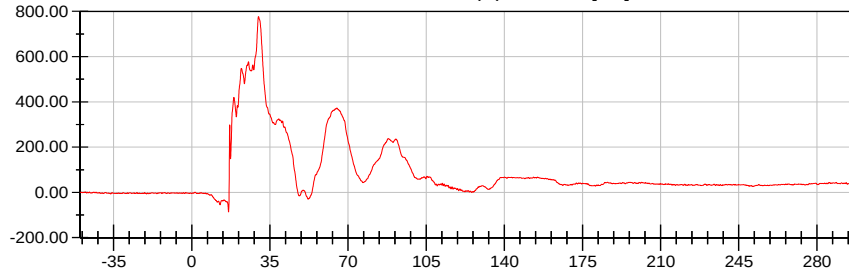
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Lower Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

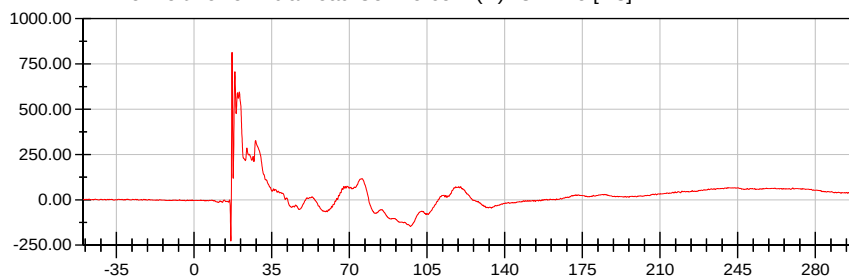
776.34 N at 29.90 ms

<Min>

-86.60 N at 16.50 ms

CFC_600

Driver Left Lower Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

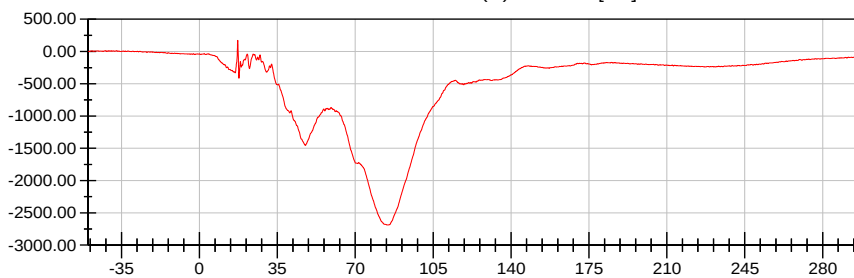
814.11 N at 17.10 ms

<Min>

-227.82 N at 16.60 ms

CFC_600

Driver Left Lower Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

173.01 N at 17.20 ms

<Min>

-2,688.81 N at 84.70 ms

CFC_600



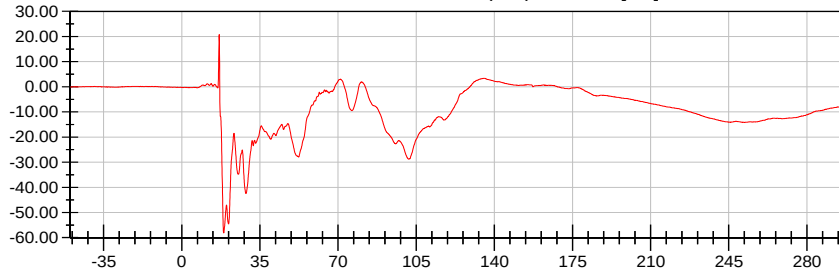
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Lower Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

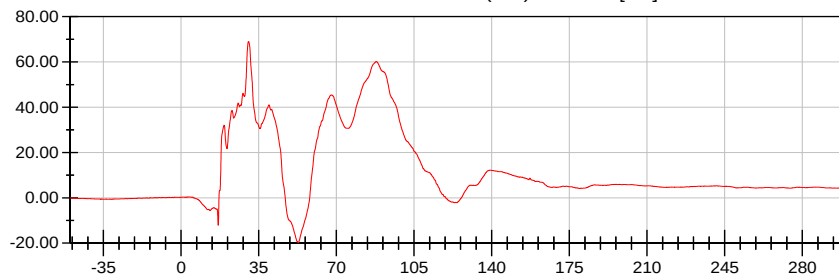
20.72 Nm at 16.75 ms

<Min>

-58.12 Nm at 18.80 ms

CFC_600

Driver Left Lower Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

69.00 Nm at 30.40 ms

<Min>

-19.77 Nm at 52.80 ms

CFC_600



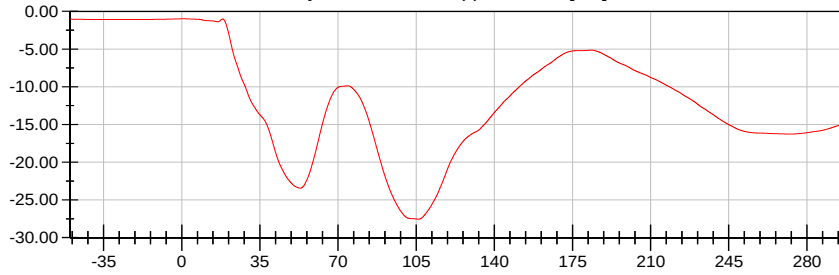
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Left Ankle X Rotary Potentiometer (°) vs. Time [ms]



<Max>

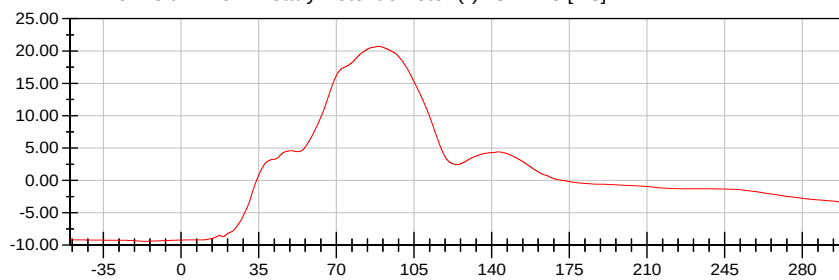
-0.98 ° at 0.75 ms

<Min>

-27.55 ° at 106.00 ms

CFC_180

Driver Left Ankle Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

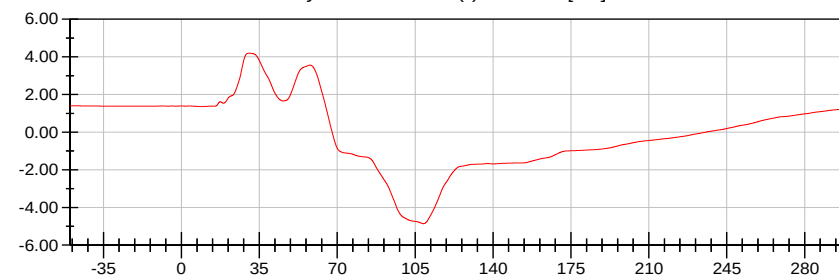
20.72 ° at 89.10 ms

<Min>

-9.41 ° at -16.70 ms

CFC_180

Driver Left Ankle Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

4.20 ° at 30.45 ms

<Min>

-4.86 ° at 108.75 ms

CFC_180



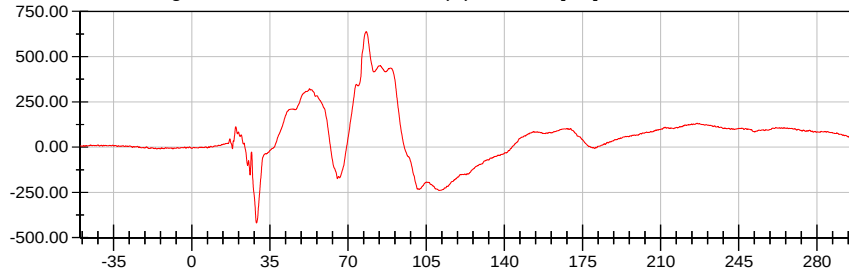
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

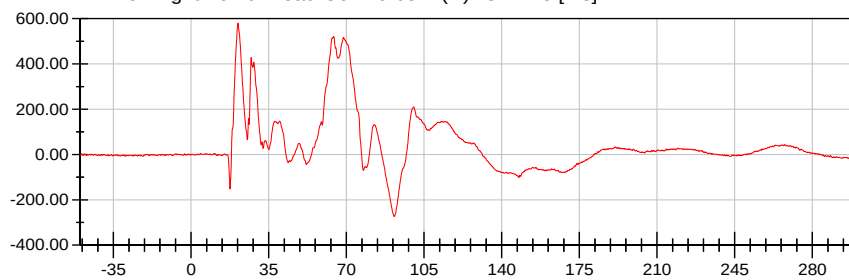
638.03 N at 78.15 ms

<Min>

-419.06 N at 29.00 ms

CFC_600

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



<Max>

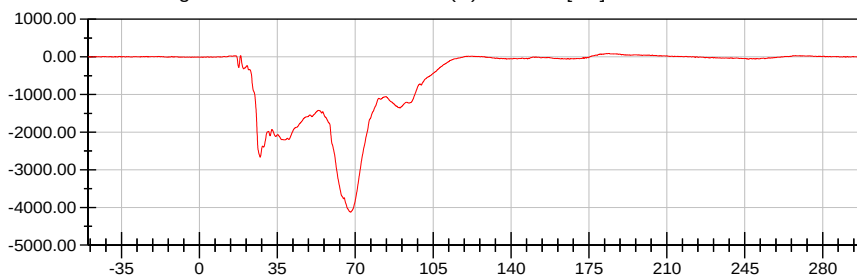
580.36 N at 21.15 ms

<Min>

-273.70 N at 91.55 ms

CFC_600

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



<Max>

89.79 N at 184.00 ms

<Min>

-4,125.26 N at 67.90 ms

CFC_600



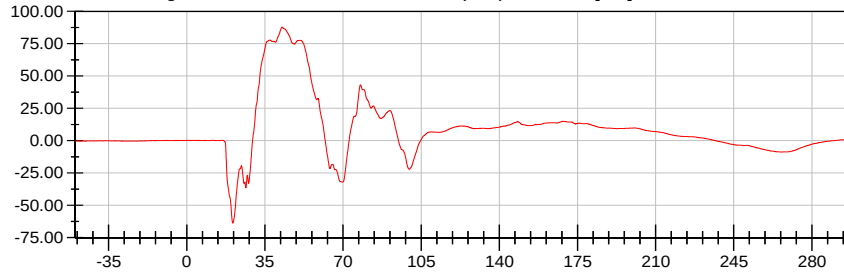
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Right Femur Load Cell Moment X (Nm) vs. Time [ms]



<Max>

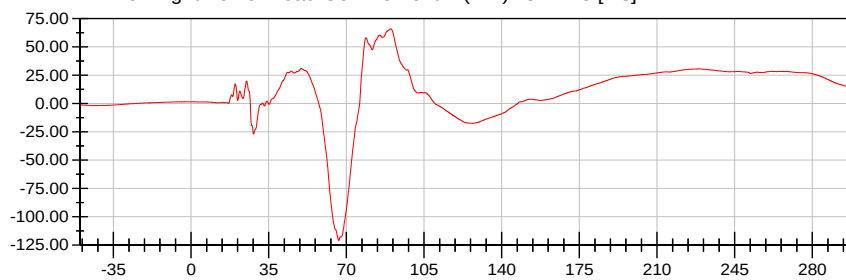
87.83 Nm at 42.75 ms

<Min>

-63.79 Nm at 20.65 ms

CFC_600

Driver Right Femur Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

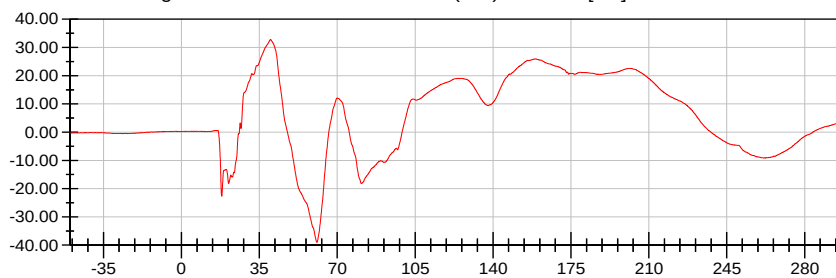
65.94 Nm at 89.90 ms

<Min>

-120.85 Nm at 66.55 ms

CFC_600

Driver Right Femur Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

32.78 Nm at 40.05 ms

<Min>

-39.05 Nm at 60.85 ms

CFC_600

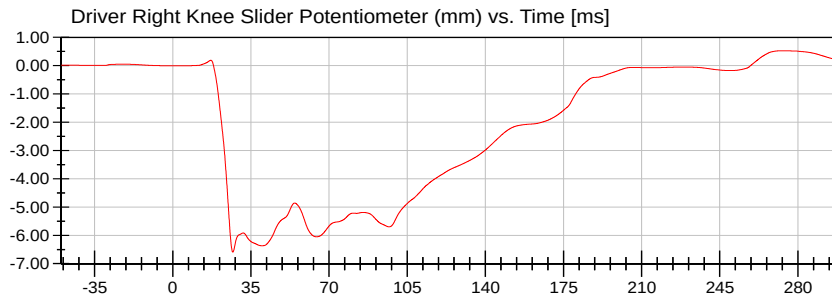


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



<Max>

0.52 mm at 272.25 ms

<Min>

-6.59 mm at 26.90 ms

CFC_180



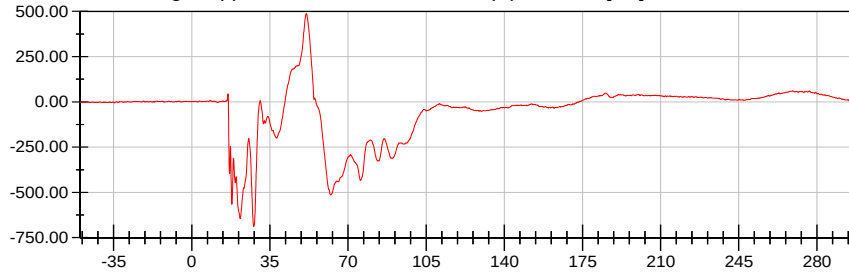
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Right Upper Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

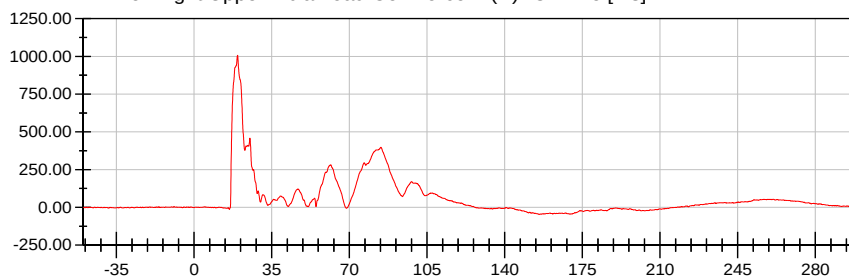
487.49 N at 51.35 ms

<Min>

-687.87 N at 27.75 ms

CFC_600

Driver Right Upper Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

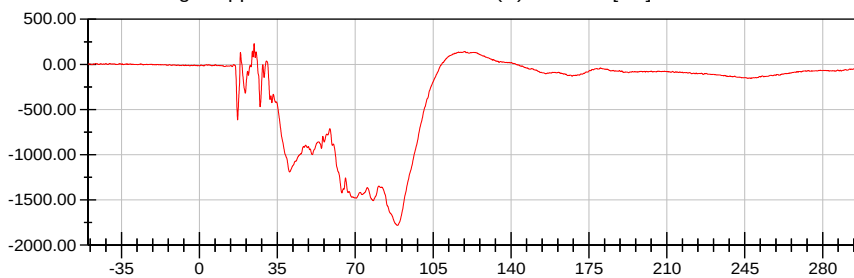
1,007.68 N at 19.60 ms

<Min>

-47.07 N at 155.55 ms

CFC_600

Driver Right Upper Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

230.39 N at 24.60 ms

<Min>

-1,781.64 N at 89.10 ms

CFC_600



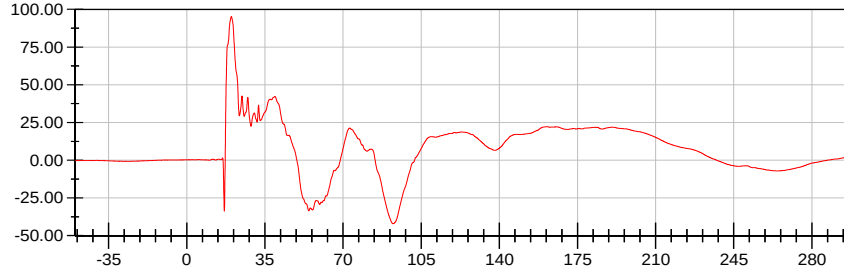
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Right Upper Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

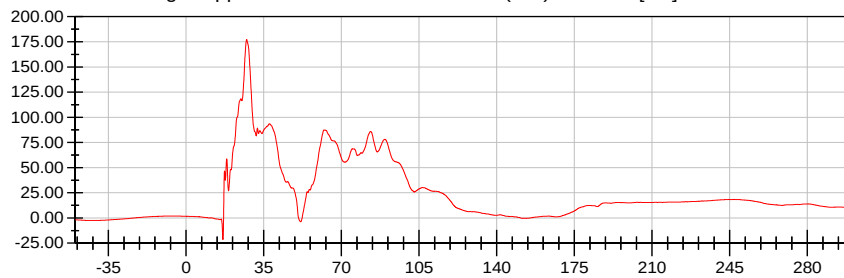
95.22 Nm at 19.95 ms

<Min>

-42.09 Nm at 92.45 ms

CFC_600

Driver Right Upper Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

177.28 Nm at 27.30 ms

<Min>

-21.57 Nm at 16.60 ms

CFC_600



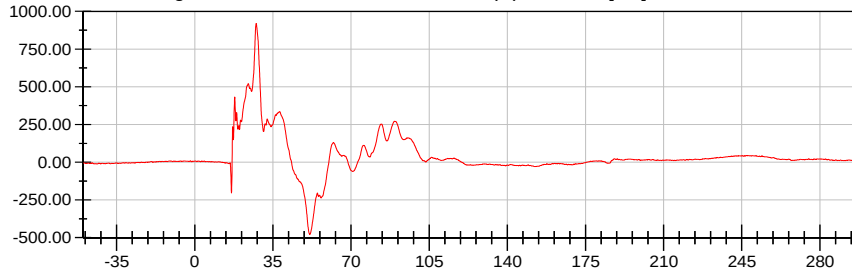
VRTC

Test Lab: CTF

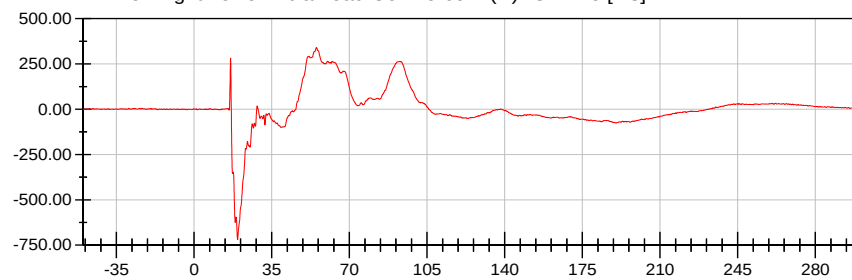
Test Number: 241010 ()

Test Date: 10/10/2024

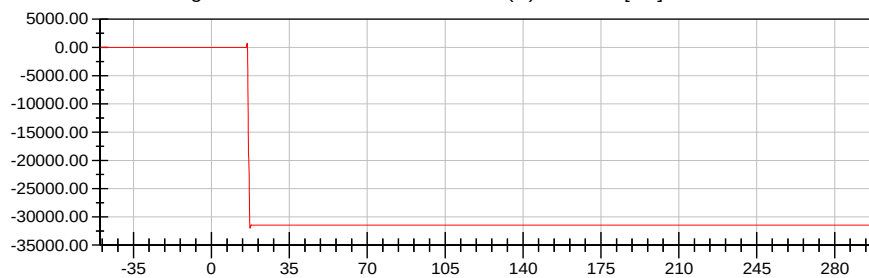
Driver Right Lower Tibia Load Cell Force X (N) vs. Time [ms]



Driver Right Lower Tibia Load Cell Force Y (N) vs. Time [ms]



Driver Right Lower Tibia Load Cell Force Z (N) vs. Time [ms]



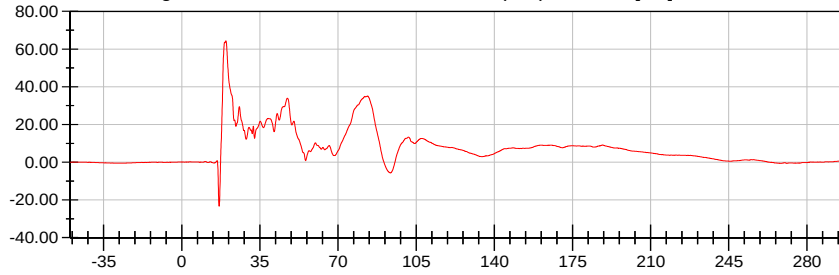
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Right Lower Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

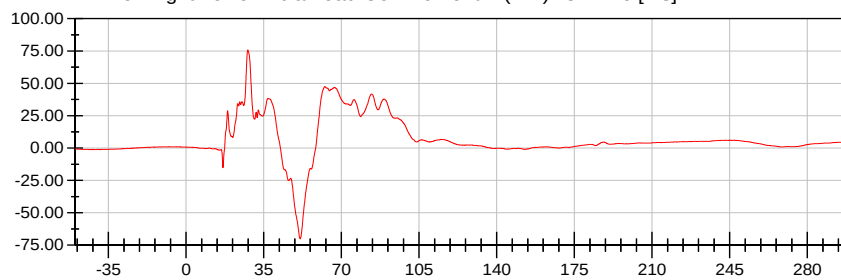
64.38 Nm at 19.75 ms

<Min>

-23.28 Nm at 16.70 ms

CFC_600

Driver Right Lower Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

75.85 Nm at 27.85 ms

<Min>

-70.13 Nm at 51.45 ms

CFC_600



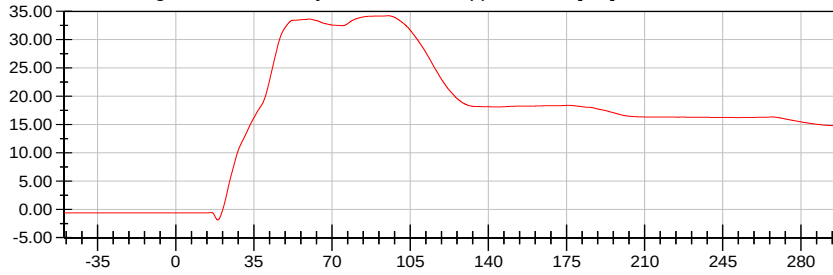
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Right Ankle X Rotary Potentiometer (°) vs. Time [ms]



<Max>

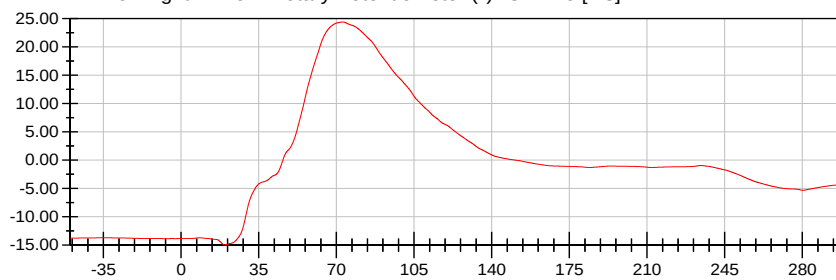
34.23 ° at 95.15 ms

<Min>

-1.86 ° at 18.80 ms

CFC_180

Driver Right Ankle Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

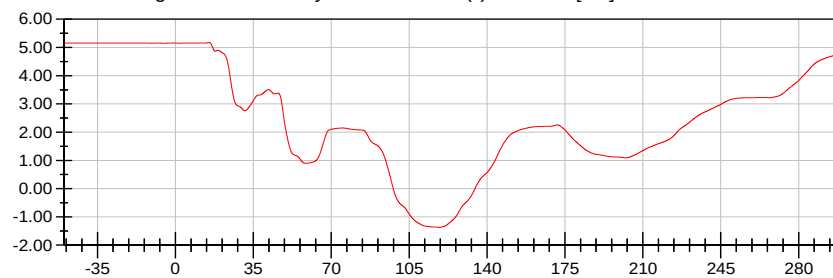
24.42 ° at 72.80 ms

<Min>

-14.95 ° at 19.80 ms

CFC_180

Driver Right Ankle Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

5.17 ° at 15.10 ms

<Min>

-1.37 ° at 118.60 ms

CFC_180



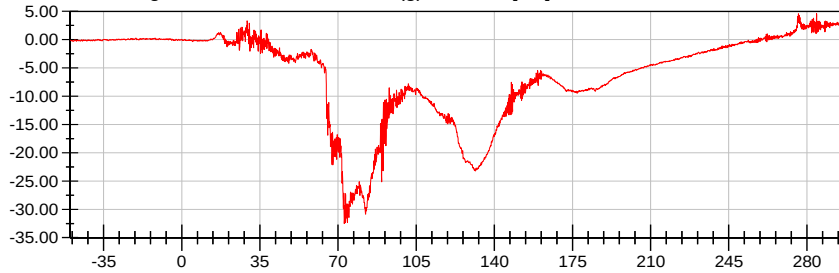
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



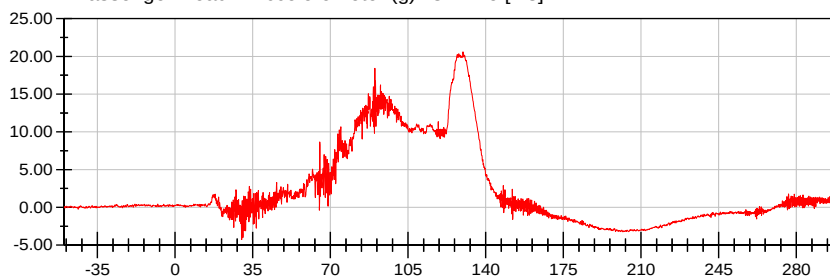
<Max>

4.63 g at 284.30 ms

<Min>

-32.50 g at 72.80 ms

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



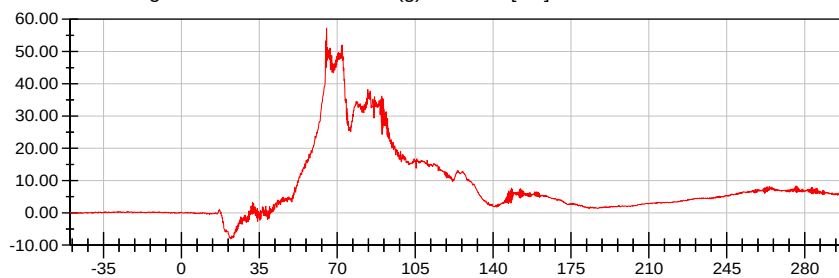
<Max>

20.61 g at 129.80 ms

<Min>

-4.26 g at 30.00 ms

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



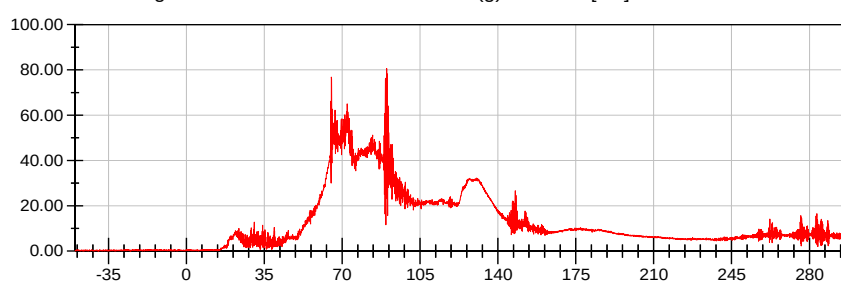
<Max>

57.27 g at 65.25 ms

<Min>

-8.05 g at 22.05 ms

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



<Max>

80.59 g at 90.00 ms

<Min>

0.05 g at -41.90 ms



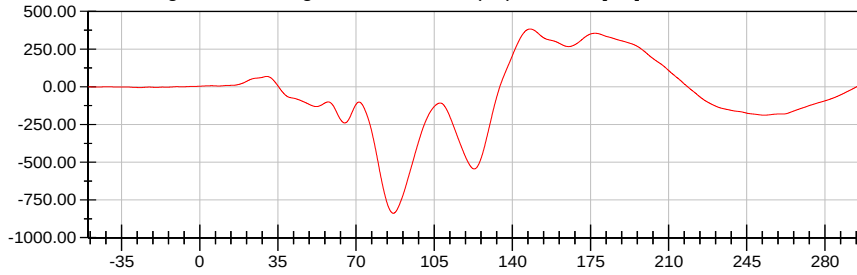
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Head X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

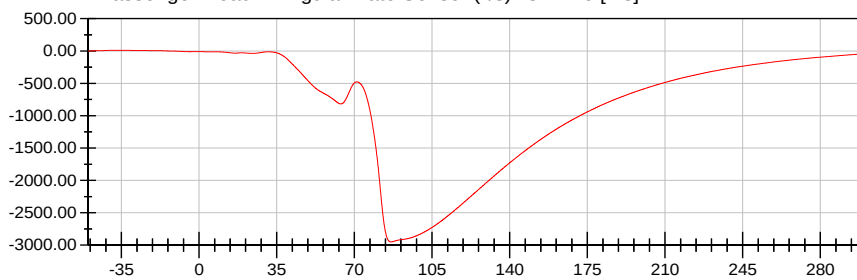
383.20 °/s at 147.95 ms

<Min>

-838.35 °/s at 86.70 ms

CFC_60

Passenger Head Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

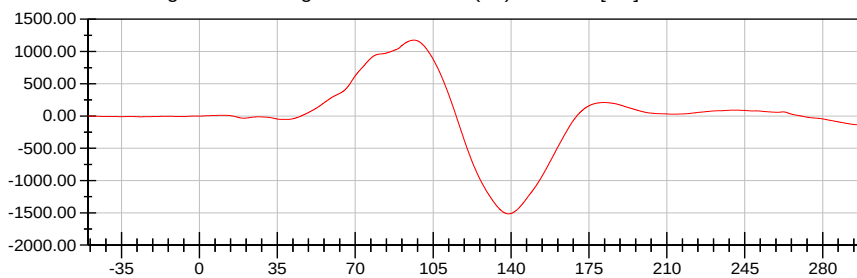
11.51 °/s at -38.65 ms

<Min>

-2,951.11 °/s at 86.55 ms

CFC_60

Passenger Head Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

1,175.53 °/s at 96.35 ms

<Min>

-1,515.20 °/s at 138.90 ms

CFC_60



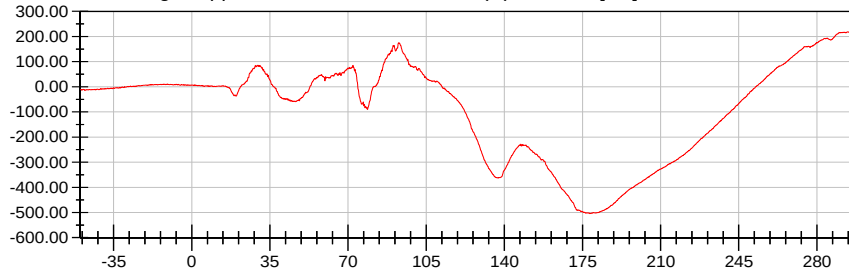
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

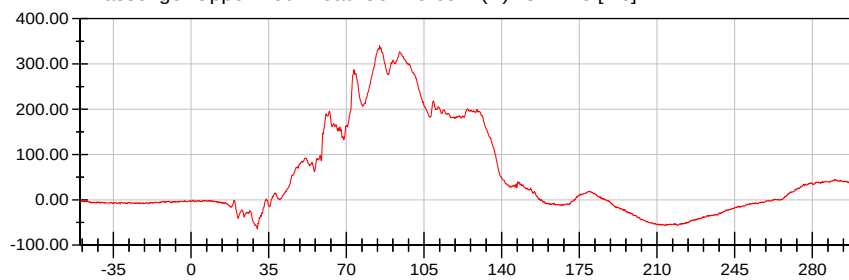
227.97 N at 298.95 ms

<Min>

-504.16 N at 178.35 ms

CFC_1000

Passenger Upper Neck Load Cell Force Y (N) vs. Time [ms]



<Max>

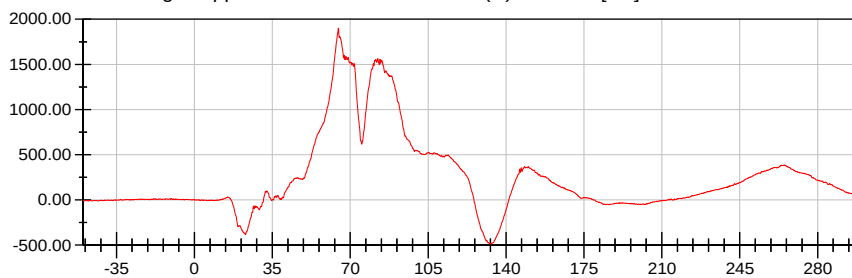
340.56 N at 84.95 ms

<Min>

-64.34 N at 29.80 ms

CFC_1000

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



<Max>

1,901.28 N at 64.70 ms

<Min>

-488.42 N at 133.30 ms

CFC_1000



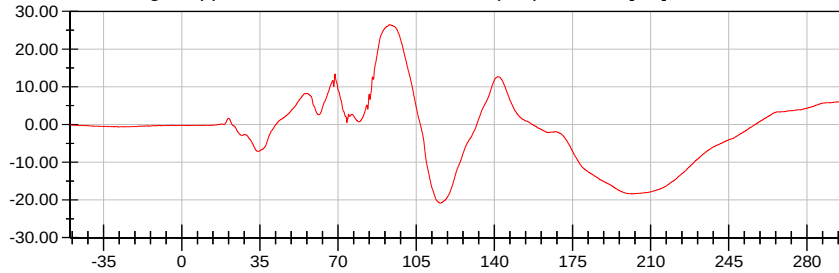
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Upper Neck Load Cell Moment X (Nm) vs. Time [ms]



<Max>

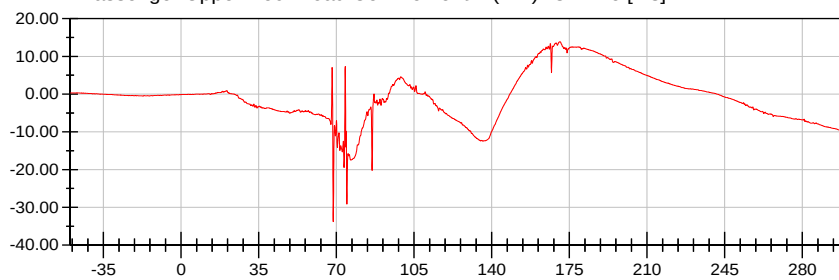
26.47 Nm at 93.10 ms

<Min>

-20.86 Nm at 115.80 ms

CFC_600

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



<Max>

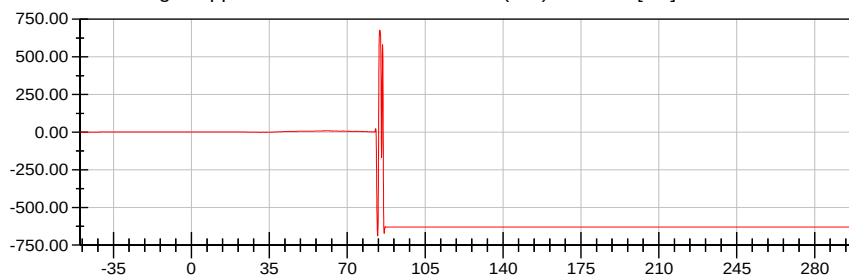
13.89 Nm at 170.85 ms

<Min>

-33.79 Nm at 68.60 ms

CFC_600

Passenger Upper Neck Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

676.39 Nm at 84.60 ms

<Min>

-688.86 Nm at 83.65 ms

CFC_600



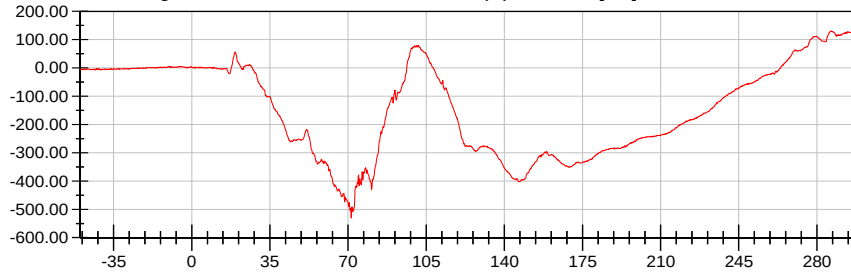
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Lower Neck Load Cell Force X (N) vs. Time [ms]



<Max>

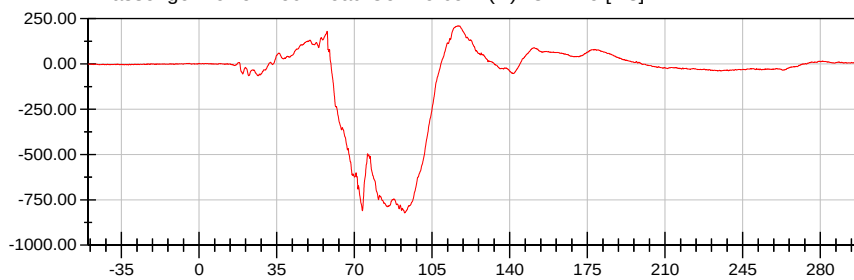
130.89 N at 286.40 ms

<Min>

-530.92 N at 71.45 ms

CFC_1000

Passenger Lower Neck Load Cell Force Y (N) vs. Time [ms]



<Max>

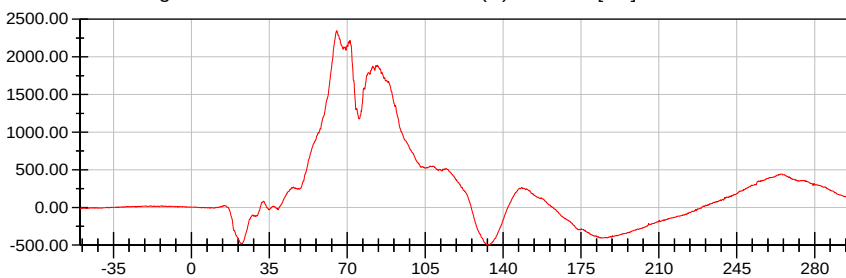
210.66 N at 116.90 ms

<Min>

-821.92 N at 92.70 ms

CFC_1000

Passenger Lower Neck Load Cell Force Z (N) vs. Time [ms]



<Max>

2,348.34 N at 65.30 ms

<Min>

-496.52 N at 133.30 ms

CFC_1000



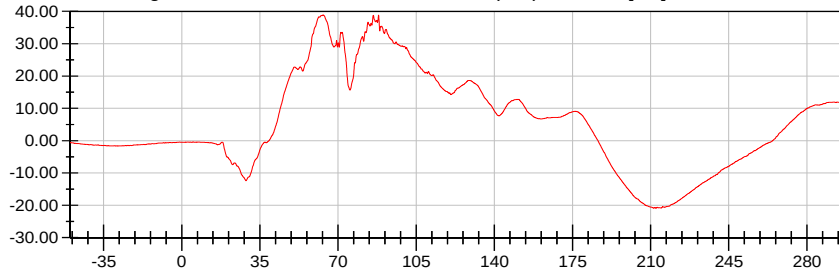
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Lower Neck Load Cell Moment X (Nm) vs. Time [ms]



<Max>

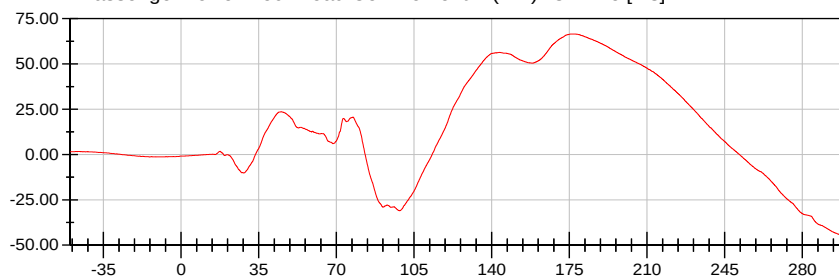
38.88 Nm at 63.30 ms

<Min>

-20.91 Nm at 211.30 ms

CFC_600

Passenger Lower Neck Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

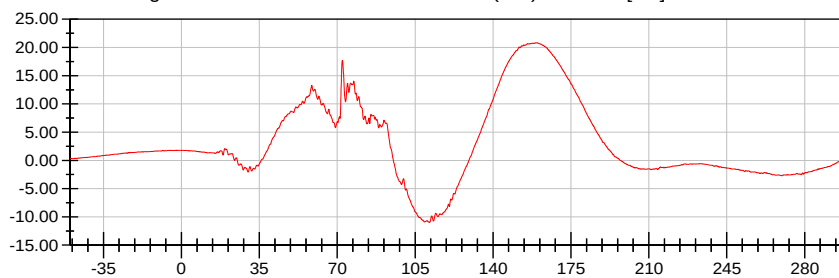
66.54 Nm at 176.75 ms

<Min>

-45.05 Nm at 300.00 ms

CFC_600

Passenger Lower Neck Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

20.83 Nm at 159.15 ms

<Min>

-10.97 Nm at 111.45 ms

CFC_600



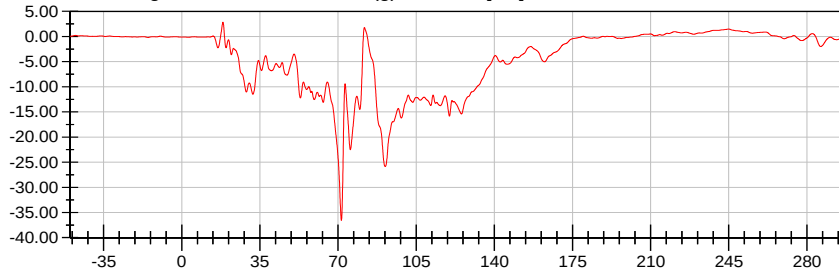
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger T1 X Accelerometer (g) vs. Time [ms]



<Max>

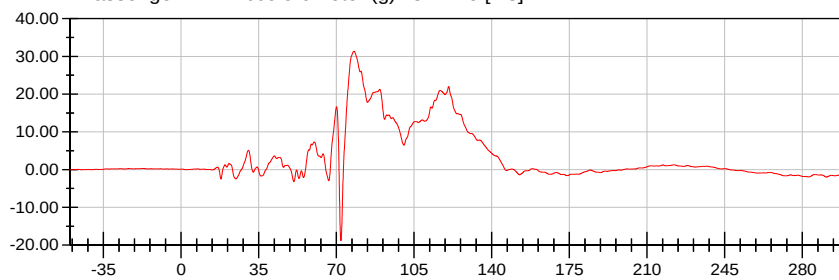
2.86 g at 18.45 ms

<Min>

-36.55 g at 71.50 ms

CFC_180

Passenger T1 Y Accelerometer (g) vs. Time [ms]



<Max>

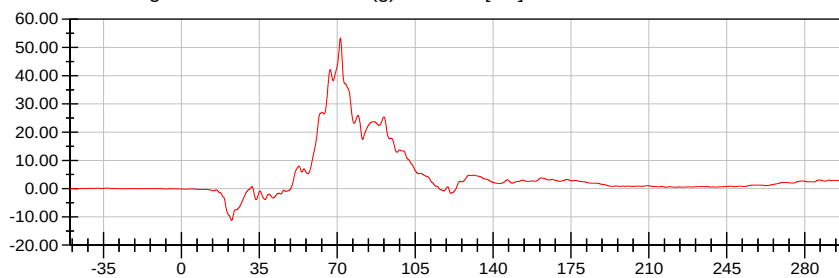
31.36 g at 77.90 ms

<Min>

-18.80 g at 72.05 ms

CFC_180

Passenger T1 Z Accelerometer (g) vs. Time [ms]



<Max>

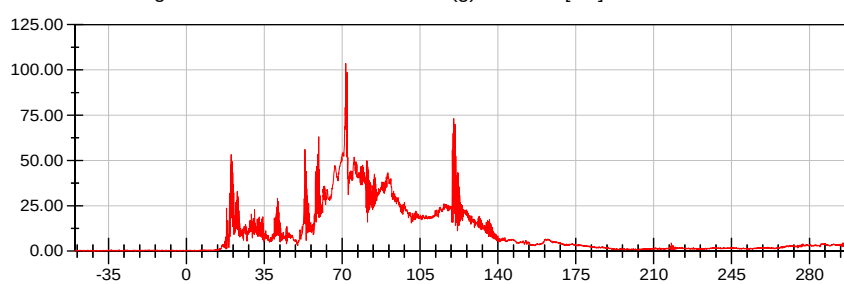
53.36 g at 71.45 ms

<Min>

-11.28 g at 22.55 ms

CFC_180

Passenger T1 Accelerometer Resultant (g) vs. Time [ms]



<Max>

103.52 g at 71.65 ms

<Min>

0.06 g at -49.50 ms

CFC 1000

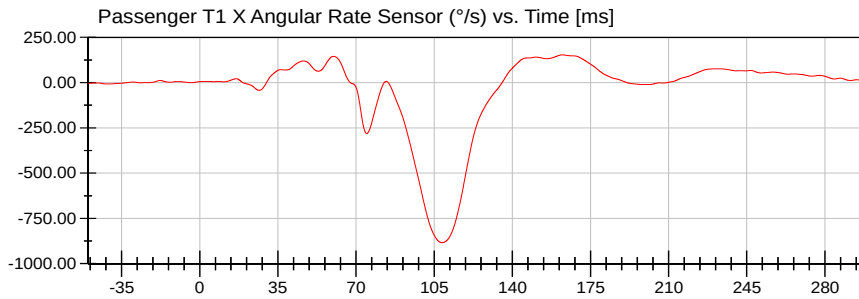


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



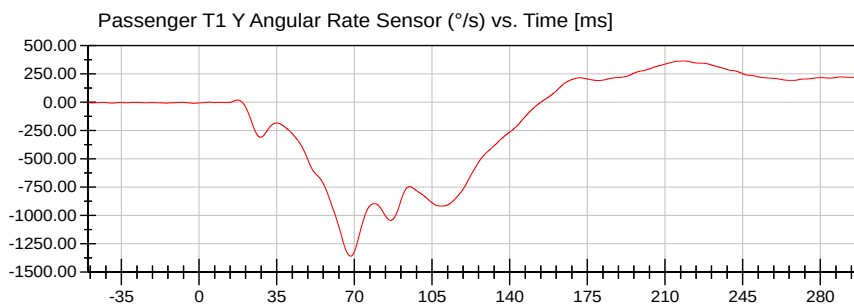
<Max>

153.44 °/s at 162.40 ms

<Min>

-883.96 °/s at 108.55 ms

CFC_60



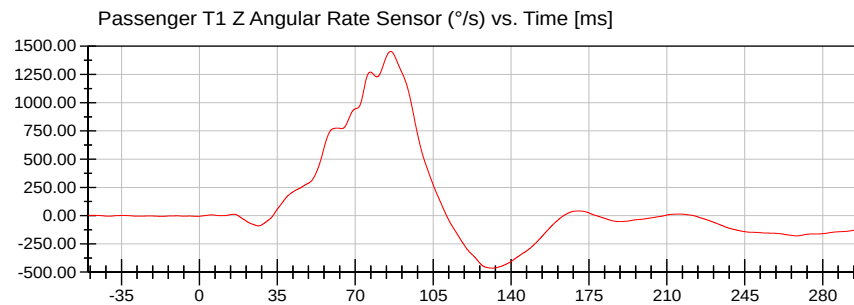
<Max>

364.70 °/s at 218.55 ms

<Min>

-1,359.24 °/s at 68.35 ms

CFC_60



<Max>

1,453.78 °/s at 85.95 ms

<Min>

-464.50 °/s at 131.55 ms

CFC_60



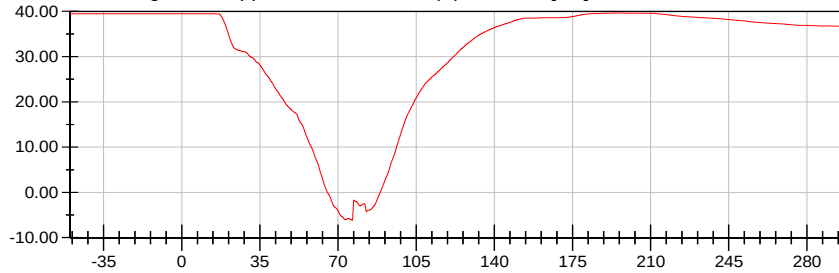
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Left Upper Thorax S Track (V) vs. Time [ms]



<Max>

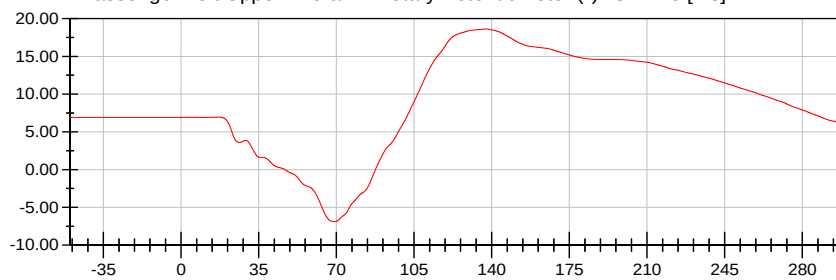
39.63 mV at 195.80 ms

<Min>

-6.18 mV at 76.35 ms

CFC_600

Passenger Left Upper Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

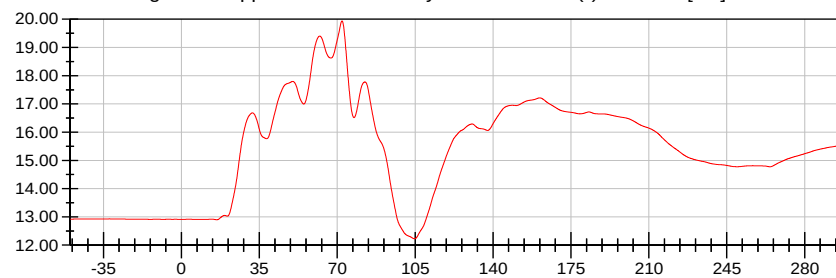
18.64 ° at 137.20 ms

<Min>

-6.87 ° at 69.25 ms

CFC_180

Passenger Left Upper Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

19.94 ° at 72.15 ms

<Min>

12.23 ° at 104.70 ms

CFC_180



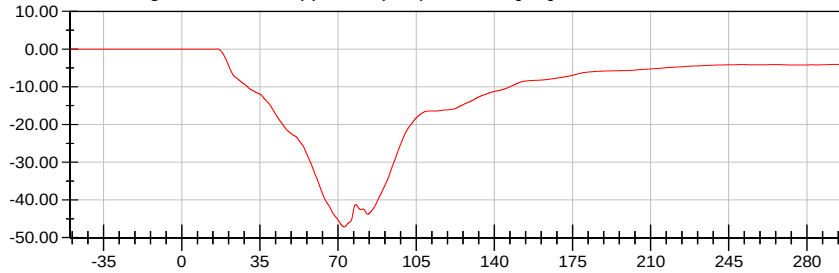
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Chest Left Upper Dx (mm) vs. Time [ms]



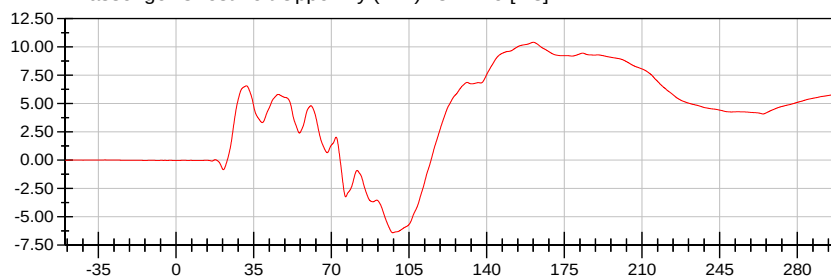
<Max>

0.01 mm at 15.65 ms

<Min>

-47.16 mm at 72.70 ms

Passenger Chest Left Upper Dy (mm) vs. Time [ms]



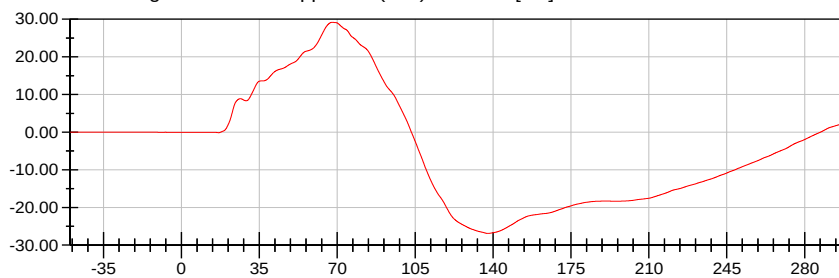
<Max>

10.42 mm at 161.05 ms

<Min>

-6.40 mm at 97.70 ms

Passenger Chest Left Upper Dz (mm) vs. Time [ms]



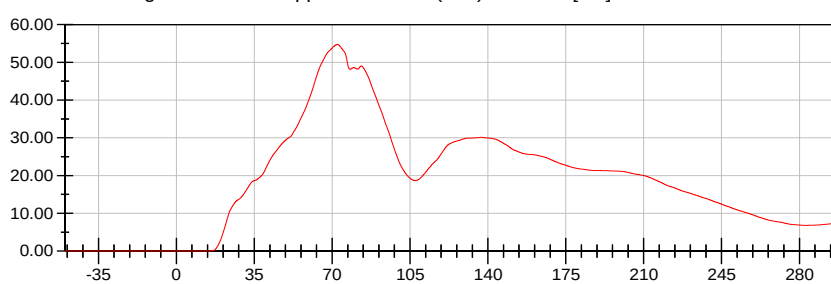
<Max>

29.17 mm at 67.75 ms

<Min>

-26.89 mm at 137.65 ms

Passenger Chest Left Upper Resultant (mm) vs. Time [ms]



<Max>

54.75 mm at 72.35 ms

<Min>

0.00 mm at -25.20 ms



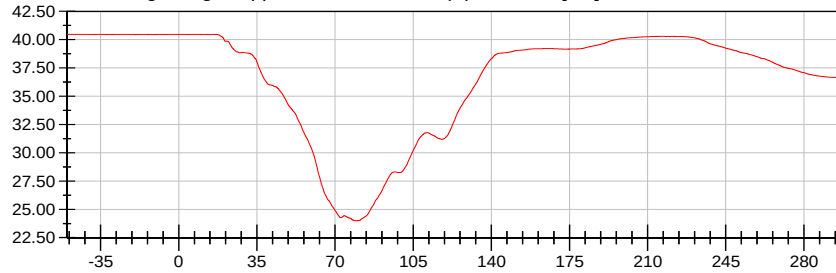
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Upper Thorax S Track (V) vs. Time [ms]



<Max>

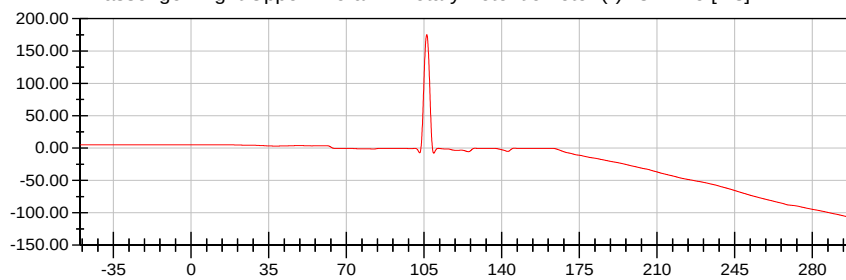
40.46 mV at 6.95 ms

<Min>

24.00 mV at 79.50 ms

CFC_600

Passenger Right Upper Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

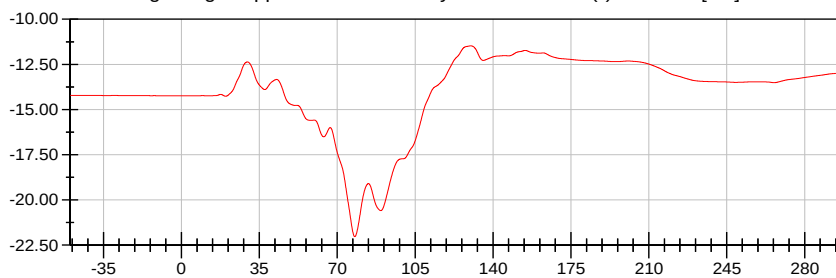
175.45 ° at 106.25 ms

<Min>

-109.13 ° at 300.00 ms

CFC_180

Passenger Right Upper Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

-11.48 ° at 130.00 ms

<Min>

-22.03 ° at 77.90 ms

CFC_180



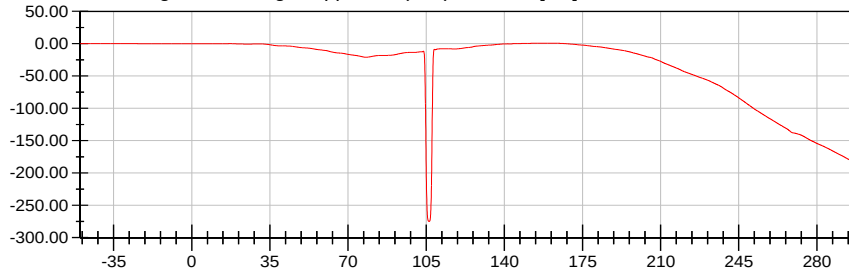
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Chest Right Upper Dx (mm) vs. Time [ms]



<Max>

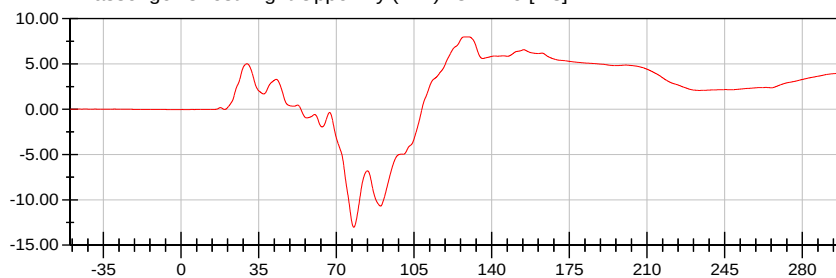
0.70 mm at 162.75 ms

<Min>

-274.90 mm at 106.30 ms

CFC_1000

Passenger Chest Right Upper Dy (mm) vs. Time [ms]



<Max>

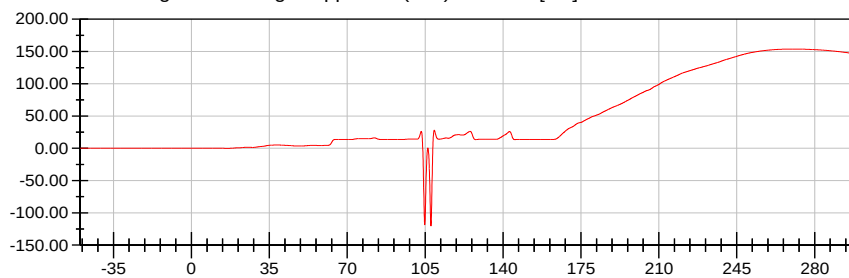
7.99 mm at 129.70 ms

<Min>

-13.03 mm at 77.85 ms

CFC_1000

Passenger Chest Right Upper Dz (mm) vs. Time [ms]



<Max>

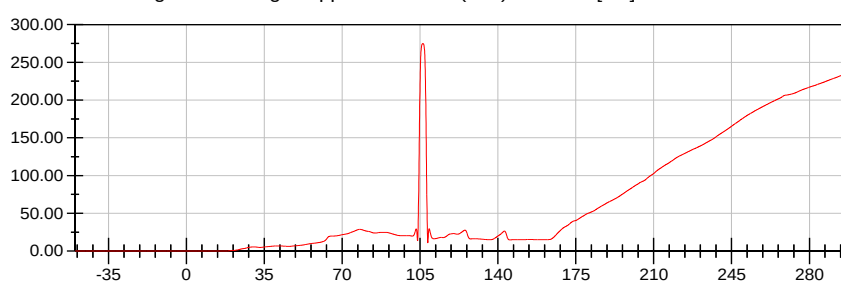
153.74 mm at 268.75 ms

<Min>

-120.26 mm at 107.65 ms

CFC_1000

Passenger Chest Right Upper Resultant (mm) vs. Time [ms]



<Max>

274.90 mm at 106.30 ms

<Min>

0.00 mm at -23.85 ms

CFC_1000

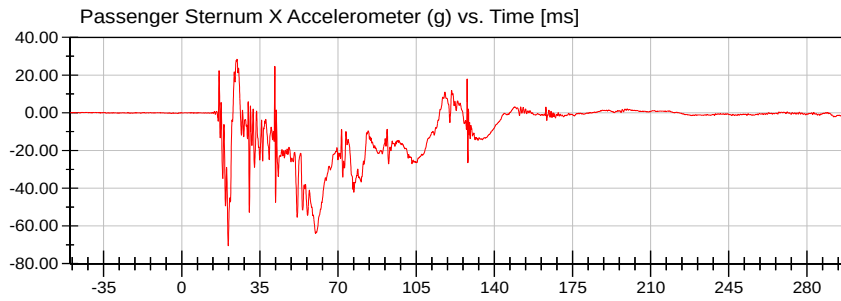


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



<Max>

28.37 g at 24.75 ms

<Min>

-70.51 g at 20.80 ms

CFC_1000



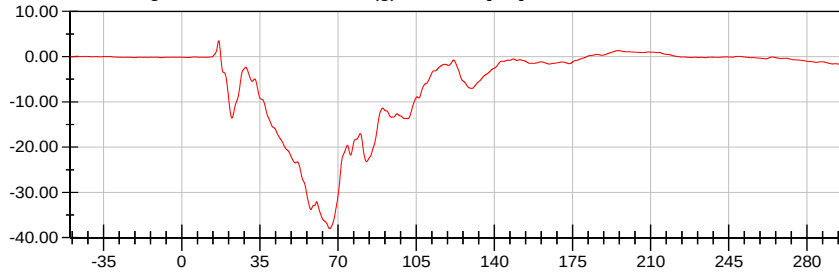
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger T6 X Accelerometer (g) vs. Time [ms]



<Max>

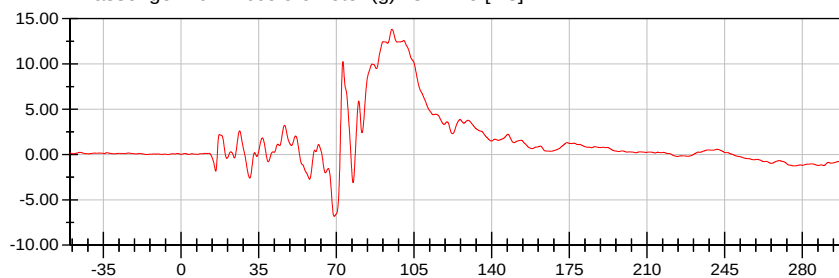
3.49 g at 16.55 ms

<Min>

-38.02 g at 66.25 ms

CFC_180

Passenger T6 Y Accelerometer (g) vs. Time [ms]



<Max>

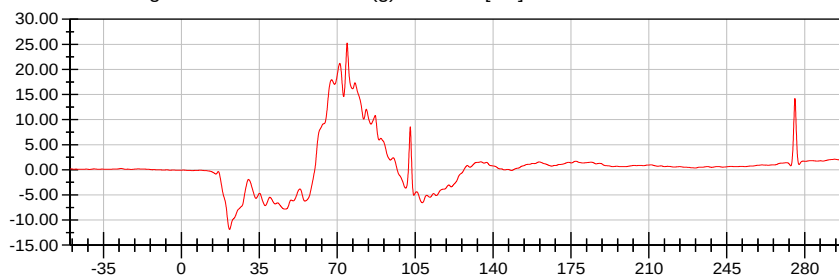
13.82 g at 95.05 ms

<Min>

-6.83 g at 69.05 ms

CFC_180

Passenger T6 Z Accelerometer (g) vs. Time [ms]



<Max>

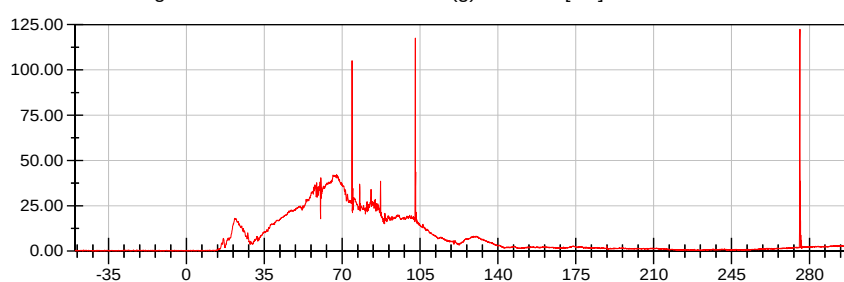
25.25 g at 74.45 ms

<Min>

-11.88 g at 21.65 ms

CFC_180

Passenger T6 Accelerometer Resultant (g) vs. Time [ms]



<Max>

122.38 g at 275.70 ms

<Min>

0.02 g at -46.65 ms

CFC 180

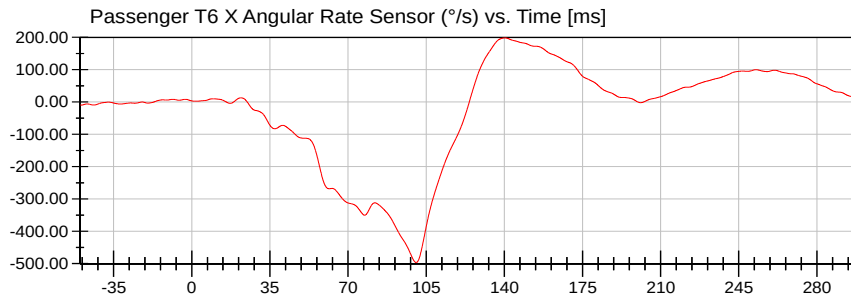


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



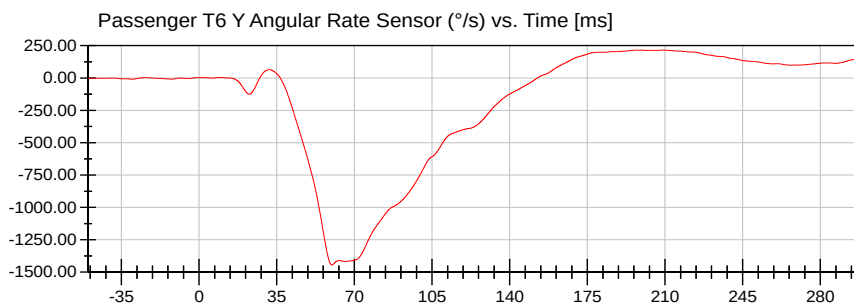
<Max>

198.30 °/s at 140.30 ms

<Min>

-496.49 °/s at 100.50 ms

CFC_60



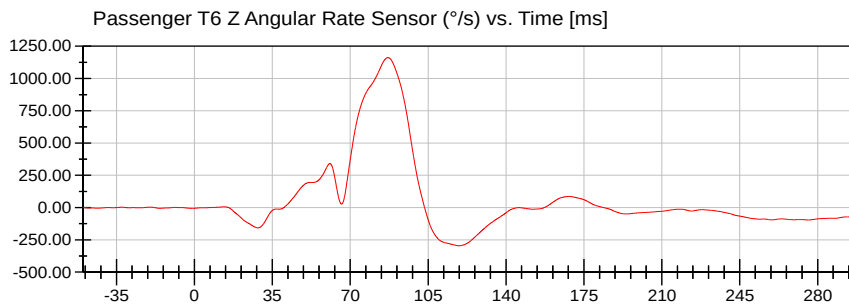
<Max>

215.77 °/s at 198.80 ms

<Min>

-1,444.82 °/s at 59.90 ms

CFC_60



<Max>

1,161.74 °/s at 86.95 ms

<Min>

-295.73 °/s at 118.85 ms

CFC_60



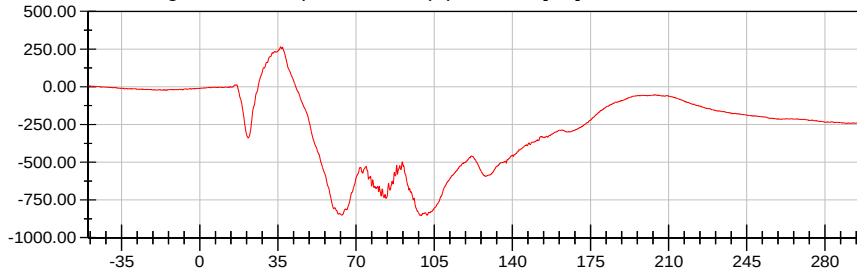
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Thoracic Spine X Force (N) vs. Time [ms]



<Max>

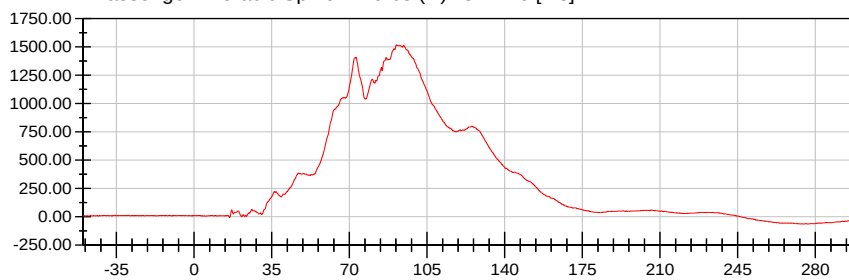
265.10 N at 36.20 ms

<Min>

-853.59 N at 99.35 ms

CFC_600

Passenger Thoracic Spine Y Force (N) vs. Time [ms]



<Max>

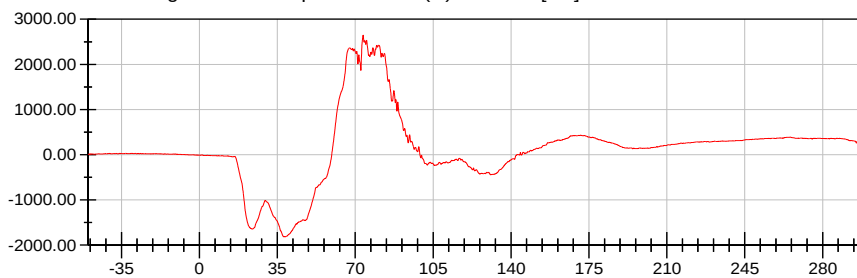
1,517.66 N at 91.25 ms

<Min>

-63.80 N at 273.40 ms

CFC_600

Passenger Thoracic Spine Z Force (N) vs. Time [ms]



<Max>

2,644.50 N at 73.55 ms

<Min>

-1,816.74 N at 38.55 ms

CFC_600



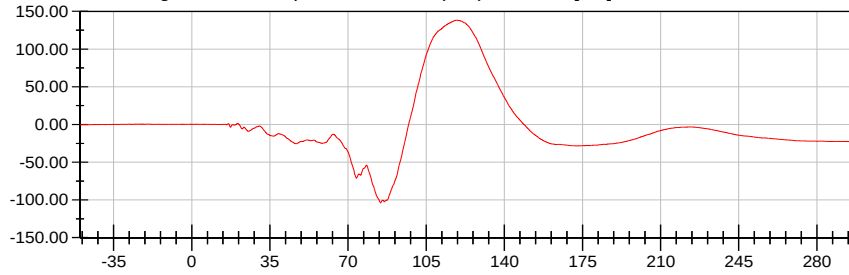
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Thoracic Spine X Moment (Nm) vs. Time [ms]



<Max>

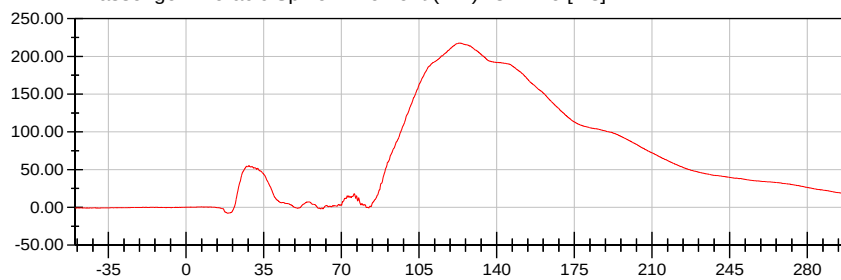
138.29 Nm at 118.70 ms

<Min>

-103.92 Nm at 84.55 ms

CFC_600

Passenger Thoracic Spine Y Moment (Nm) vs. Time [ms]



<Max>

217.64 Nm at 123.05 ms

<Min>

-7.71 Nm at 18.80 ms

CFC_600



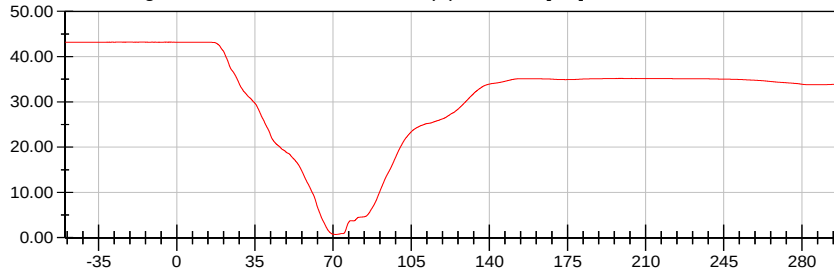
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Left Lower Thorax S Track (V) vs. Time [ms]



<Max>

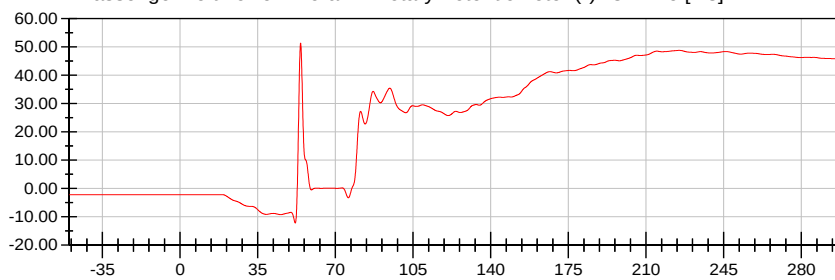
43.20 mV at -25.65 ms

<Min>

0.72 mV at 71.55 ms

CFC_600

Passenger Left Lower Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

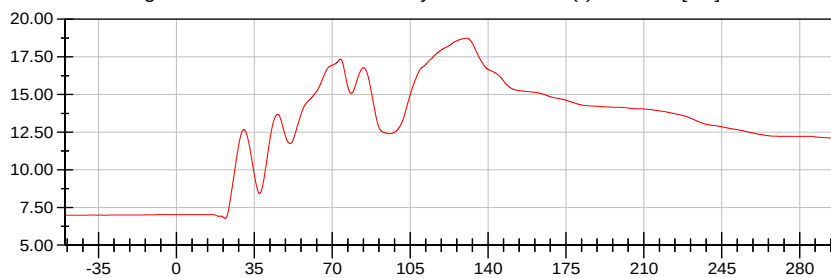
51.36 ° at 54.35 ms

<Min>

-12.21 ° at 51.90 ms

CFC_180

Passenger Left Lower Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

18.74 ° at 130.50 ms

<Min>

6.77 ° at 22.00 ms

CFC_180



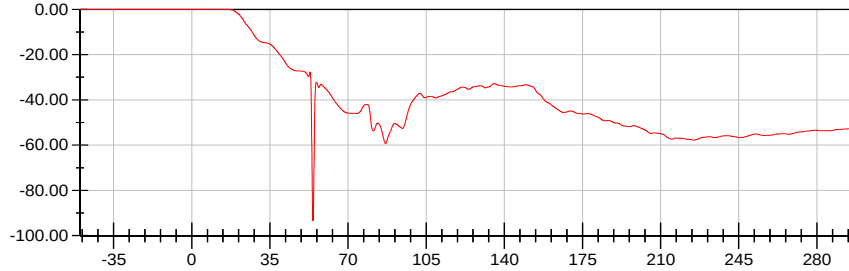
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Chest Left Lower Dx (mm) vs. Time [ms]



<Max>

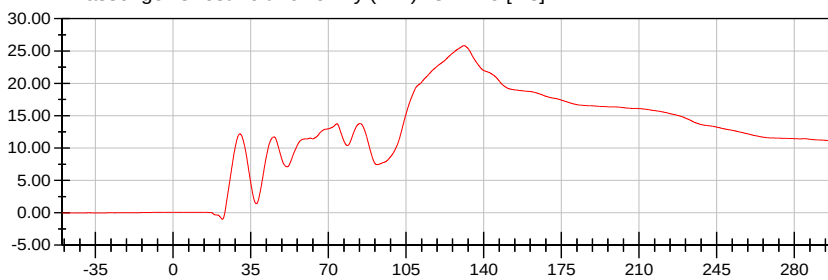
0.01 mm at -26.10 ms

<Min>

-93.41 mm at 54.30 ms

CFC_1000

Passenger Chest Left Lower Dy (mm) vs. Time [ms]



<Max>

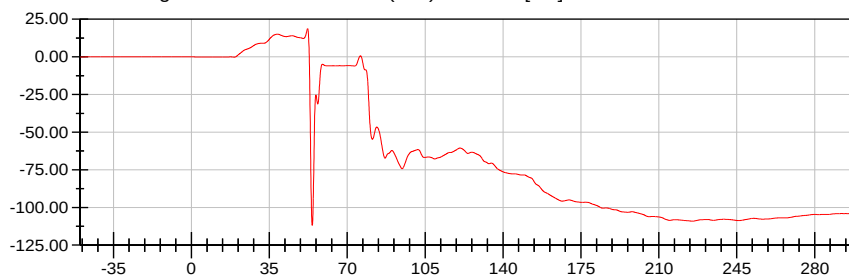
25.83 mm at 131.10 ms

<Min>

-1.01 mm at 22.25 ms

CFC_1000

Passenger Chest Left Lower Dz (mm) vs. Time [ms]



<Max>

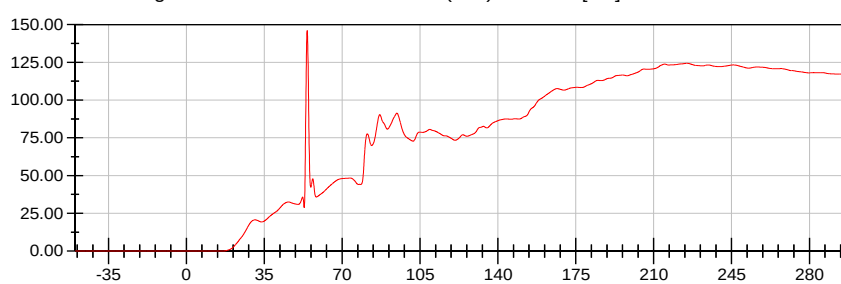
18.72 mm at 52.20 ms

<Min>

-111.91 mm at 54.30 ms

CFC_1000

Passenger Chest Left Lower Resultant (mm) vs. Time [ms]



<Max>

146.04 mm at 54.30 ms

<Min>

0.00 mm at -38.50 ms

CFC_1000



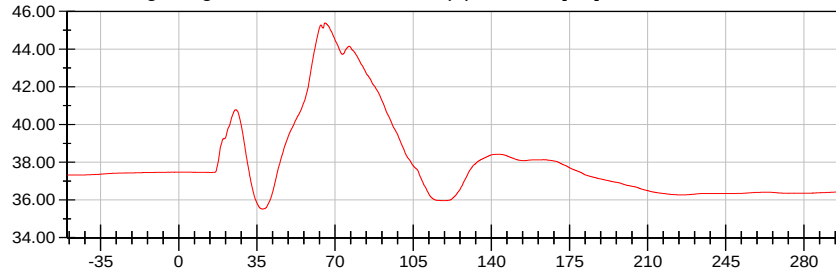
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Lower Thorax S Track (V) vs. Time [ms]



<Max>

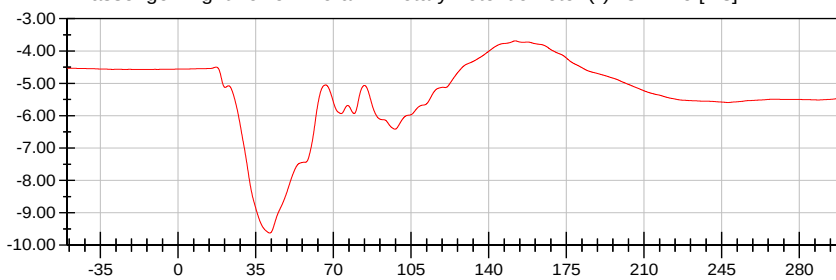
45.38 mV at 65.45 ms

<Min>

35.52 mV at 37.50 ms

CFC_600

Passenger Right Lower Thorax Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

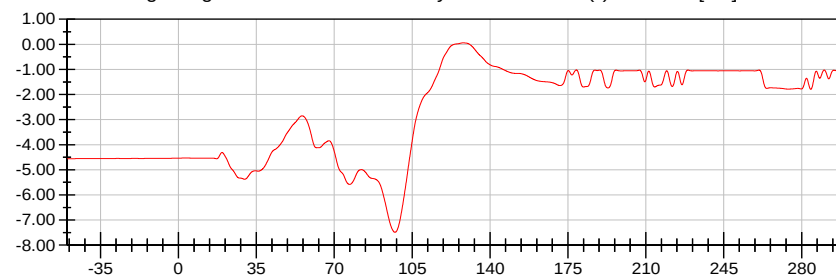
-3.69 ° at 151.95 ms

<Min>

-9.63 ° at 41.35 ms

CFC_180

Passenger Right Lower Thorax Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

0.06 ° at 127.95 ms

<Min>

-7.49 ° at 97.35 ms

CFC_180



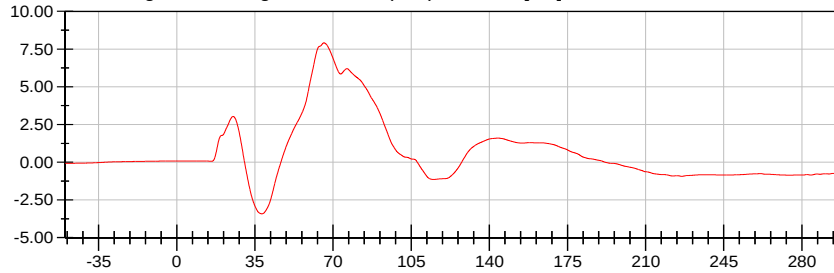
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Chest Right Lower Dx (mm) vs. Time [ms]



<Max>

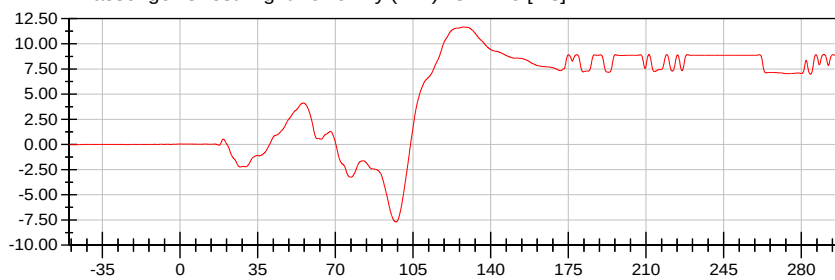
7.91 mm at 65.95 ms

<Min>

-3.42 mm at 38.10 ms

CFC_1000

Passenger Chest Right Lower Dy (mm) vs. Time [ms]



<Max>

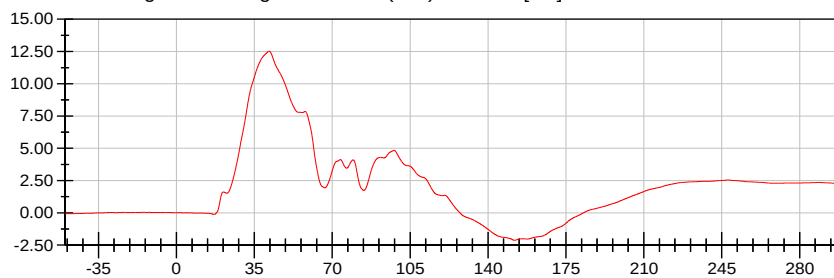
11.67 mm at 127.75 ms

<Min>

-7.69 mm at 97.35 ms

CFC_1000

Passenger Chest Right Lower Dz (mm) vs. Time [ms]



<Max>

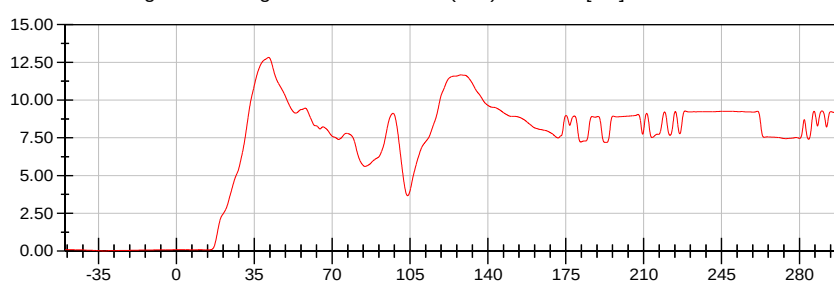
12.52 mm at 41.60 ms

<Min>

-2.13 mm at 151.95 ms

CFC_1000

Passenger Chest Right Lower Resultant (mm) vs. Time [ms]



<Max>

12.83 mm at 41.45 ms

<Min>

0.01 mm at -32.50 ms

CFC_1000



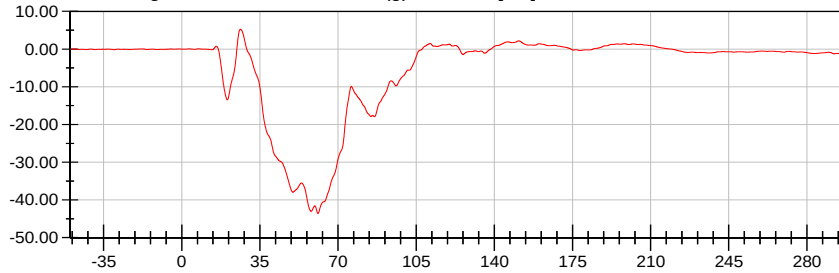
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger T12 X Accelerometer (g) vs. Time [ms]



<Max>

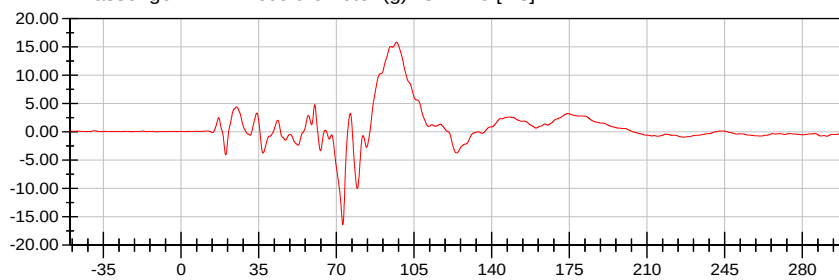
5.26 g at 26.25 ms

<Min>

-43.58 g at 61.00 ms

CFC_180

Passenger T12 Y Accelerometer (g) vs. Time [ms]



<Max>

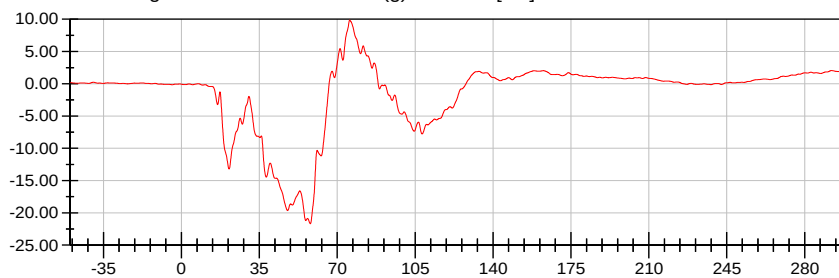
15.84 g at 97.10 ms

<Min>

-16.39 g at 72.90 ms

CFC_180

Passenger T12 Z Accelerometer (g) vs. Time [ms]



<Max>

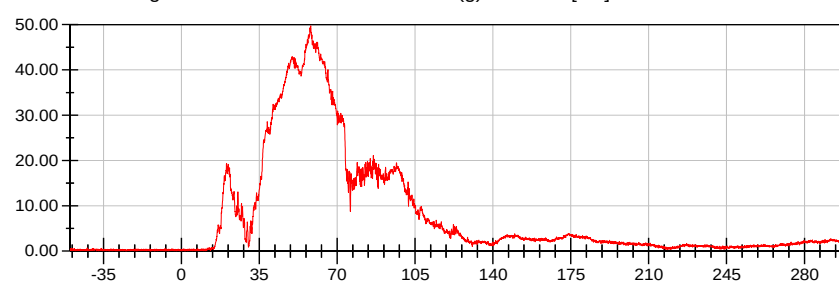
9.87 g at 75.65 ms

<Min>

-21.69 g at 57.90 ms

CFC_180

Passenger T12 Accelerometer Resultant (g) vs. Time [ms]



<Max>

49.74 g at 58.10 ms

<Min>

0.05 g at -42.85 ms

CFC 1000



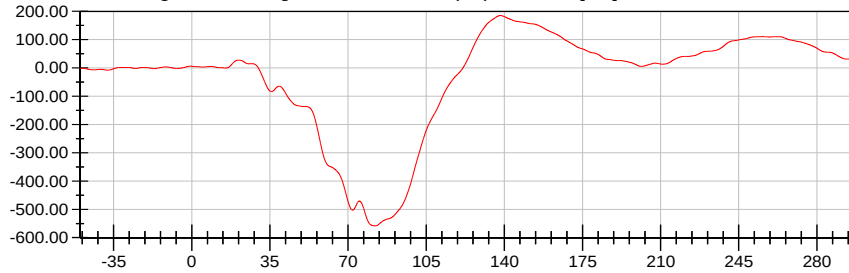
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger T12 X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

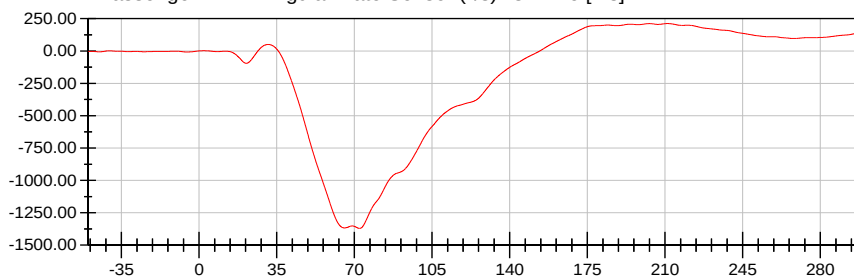
185.24 °/s at 138.25 ms

<Min>

-558.16 °/s at 82.15 ms

CFC_60

Passenger T12 Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

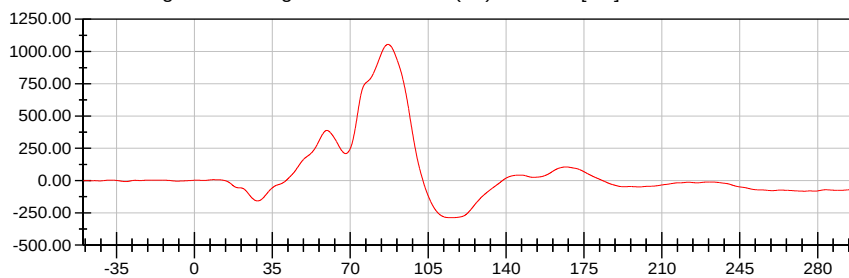
211.78 °/s at 211.10 ms

<Min>

-1,371.30 °/s at 72.35 ms

CFC_60

Passenger T12 Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

1,054.99 °/s at 87.00 ms

<Min>

-287.76 °/s at 115.50 ms

CFC_60



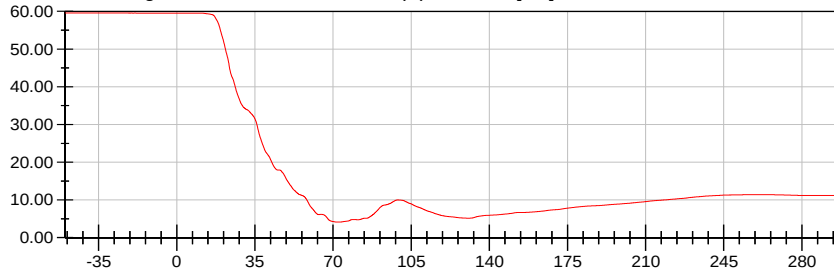
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Abdominal Left S Track (V) vs. Time [ms]



<Max>

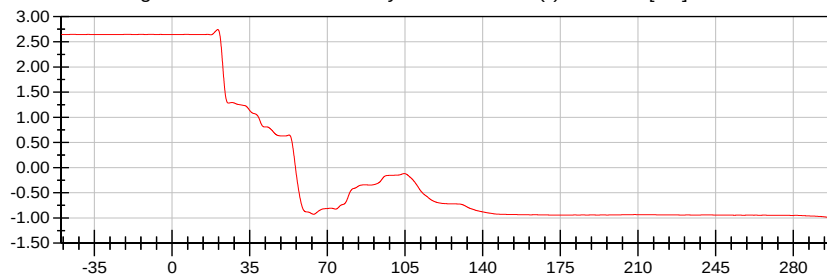
59.56 mV at -48.65 ms

<Min>

4.13 mV at 72.40 ms

CFC_600

Passenger Abdominal Left Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

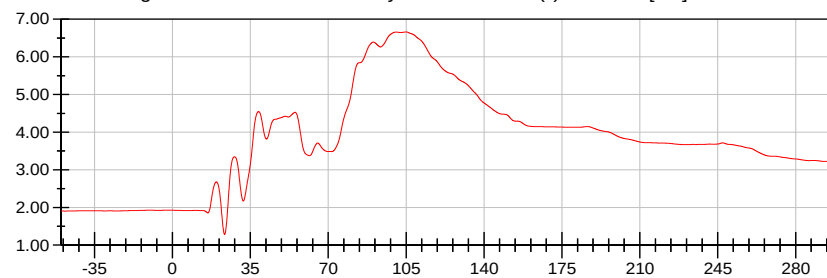
2.74 ° at 20.60 ms

<Min>

-1.04 ° at 300.00 ms

CFC_180

Passenger Abdominal Left Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

6.66 ° at 104.90 ms

<Min>

1.28 ° at 23.45 ms

CFC_180



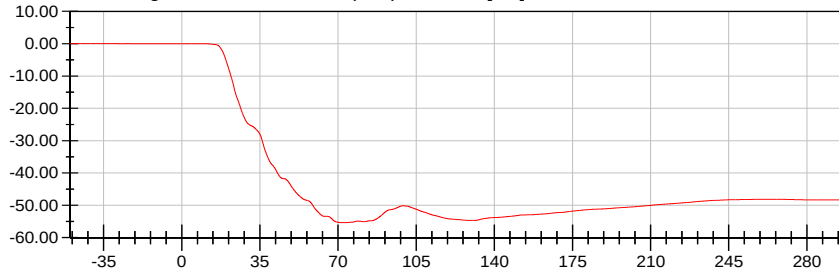
VRTC

Test Lab: CTF

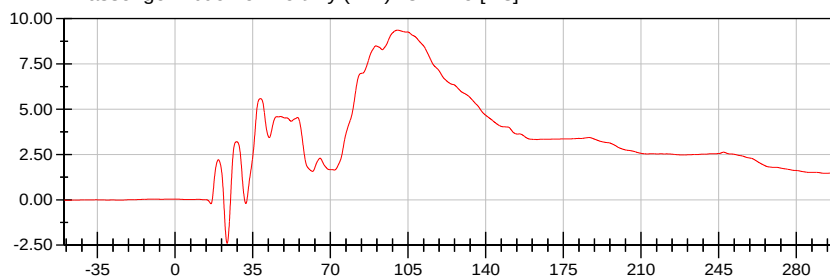
Test Number: 241010 ()

Test Date: 10/10/2024

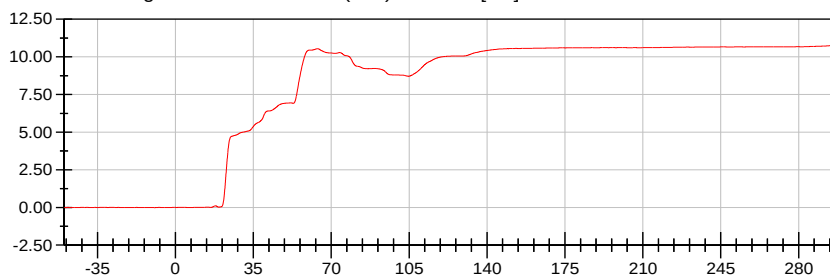
Passenger Abdomen Left Dx (mm) vs. Time [ms]



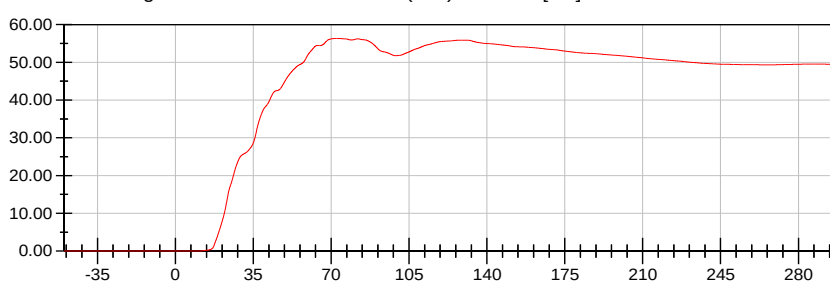
Passenger Abdomen Left Dy (mm) vs. Time [ms]



Passenger Abdomen Left Dz (mm) vs. Time [ms]



Passenger Abdomen Left Resultant (mm) vs. Time [ms]



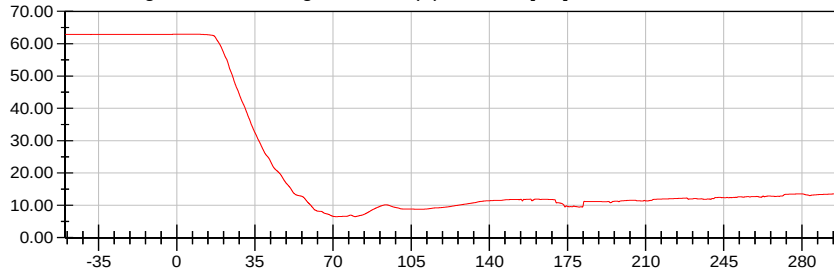
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Abdominal Right S Track (V) vs. Time [ms]



<Max>

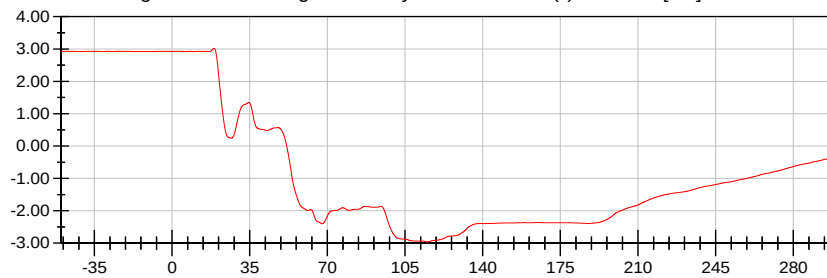
62.92 mV at 8.10 ms

<Min>

6.49 mV at 79.95 ms

CFC_600

Passenger Abdominal Right Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

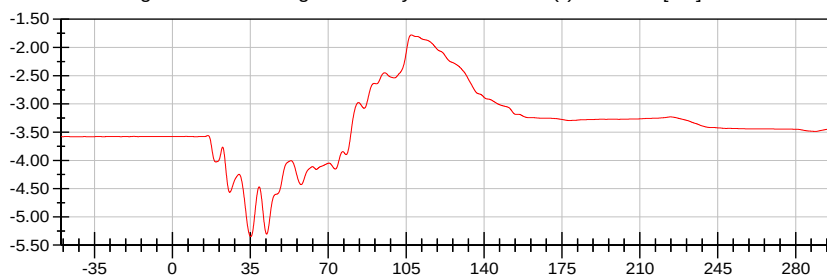
3.02 ° at 18.90 ms

<Min>

-2.96 ° at 115.15 ms

CFC_180

Passenger Abdominal Right Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

-1.78 ° at 107.35 ms

<Min>

-5.35 ° at 35.20 ms

CFC_180



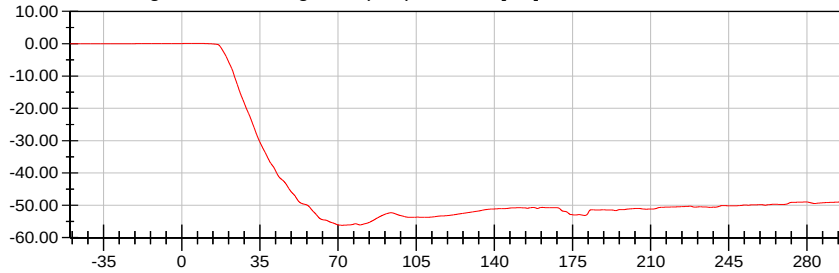
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Abdomen Right Dx (mm) vs. Time [ms]



<Max>

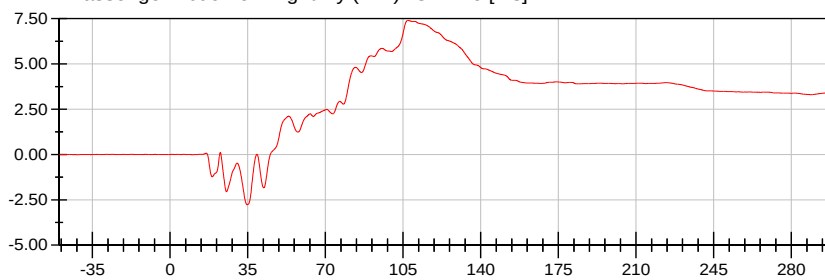
0.07 mm at 7.50 ms

<Min>

-56.16 mm at 71.70 ms

CFC_1000

Passenger Abdomen Right Dy (mm) vs. Time [ms]



<Max>

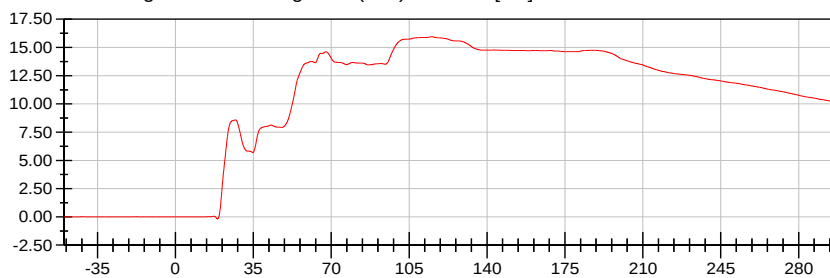
7.40 mm at 107.25 ms

<Min>

-2.77 mm at 34.90 ms

CFC_1000

Passenger Abdomen Right Dz (mm) vs. Time [ms]



<Max>

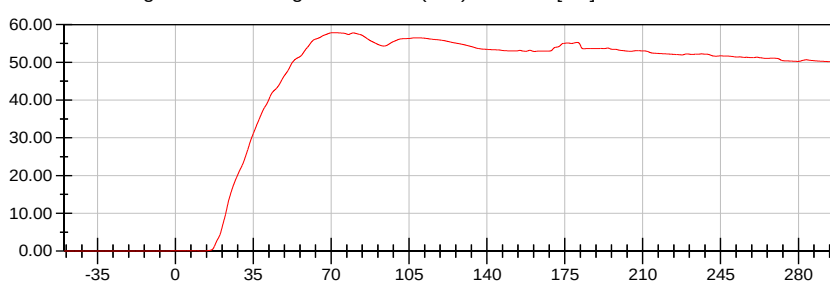
15.95 mm at 115.20 ms

<Min>

-0.18 mm at 18.95 ms

CFC_1000

Passenger Abdomen Right Resultant (mm) vs. Time [ms]



<Max>

57.86 mm at 70.80 ms

<Min>

0.00 mm at -18.75 ms

CFC_1000



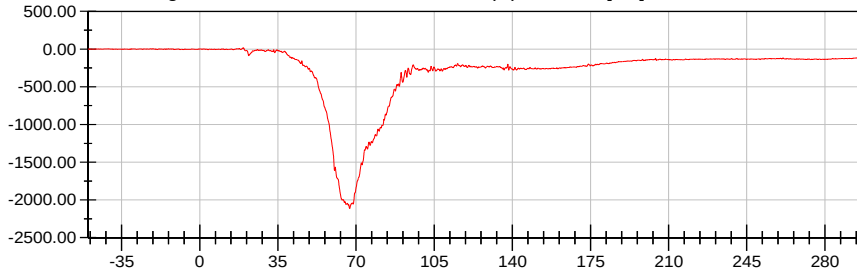
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left A.S.I.S. Load Cell Force X (N) vs. Time [ms]



<Max>

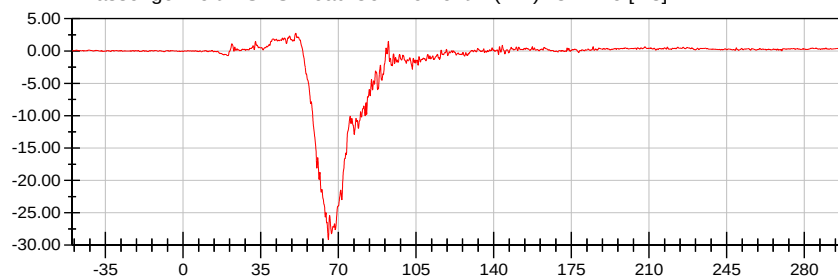
16.68 N at 19.50 ms

<Min>

-2,112.23 N at 67.15 ms

CFC_600

Passenger Left A.S.I.S. Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

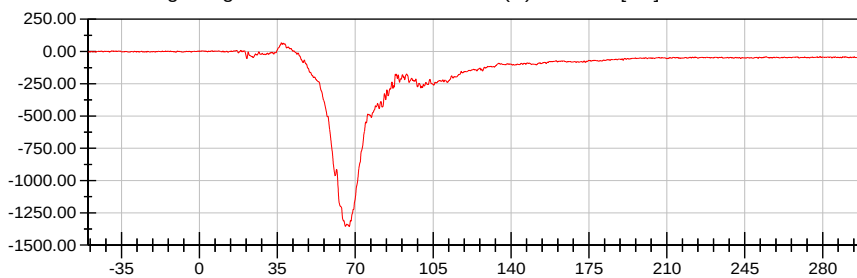
2.75 Nm at 50.80 ms

<Min>

-29.15 Nm at 65.50 ms

CFC_600

Passenger Right A.S.I.S. Load Cell Force X (N) vs. Time [ms]



<Max>

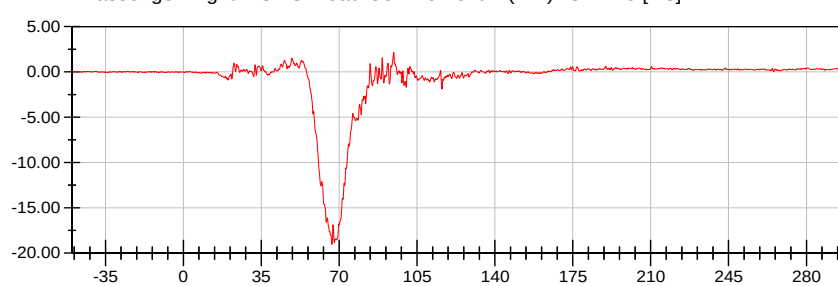
67.47 N at 36.85 ms

<Min>

-1,355.38 N at 67.30 ms

CFC_600

Passenger Right A.S.I.S. Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

2.16 Nm at 94.50 ms

<Min>

-19.04 Nm at 66.75 ms

CFC_600



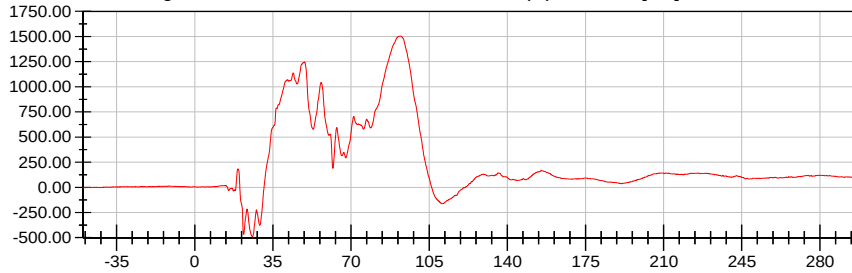
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Acetabulum Load Cell Force X (N) vs. Time [ms]



<Max>

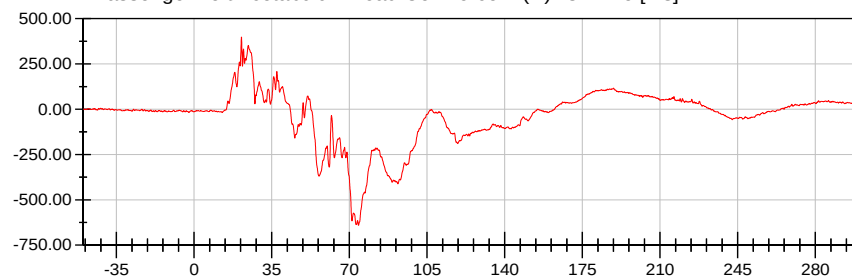
1,504.22 N at 92.30 ms

<Min>

-490.28 N at 25.80 ms

CFC_600

Passenger Left Acetabulum Load Cell Force Y (N) vs. Time [ms]



<Max>

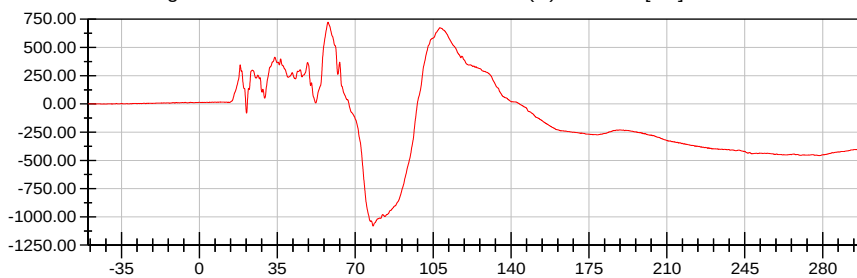
398.12 N at 21.35 ms

<Min>

-640.21 N at 74.10 ms

CFC_600

Passenger Left Acetabulum Load Cell Force Z (N) vs. Time [ms]



<Max>

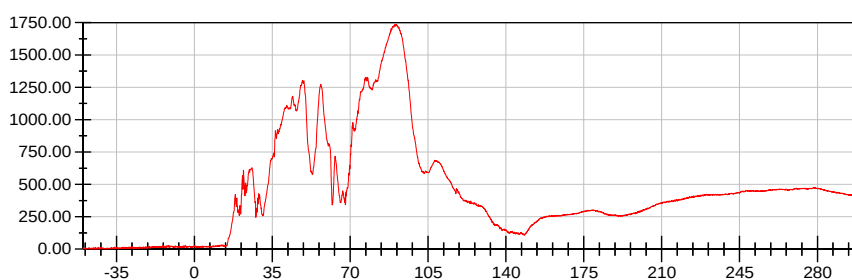
723.57 N at 57.80 ms

<Min>

-1,080.84 N at 78.05 ms

CFC_600

Passenger Left Acetabulum Load Cell Force Resultant (N) vs. Time [ms]



<Max>

1,736.20 N at 90.20 ms

<Min>

0.31 N at -49.00 ms

CFC 600



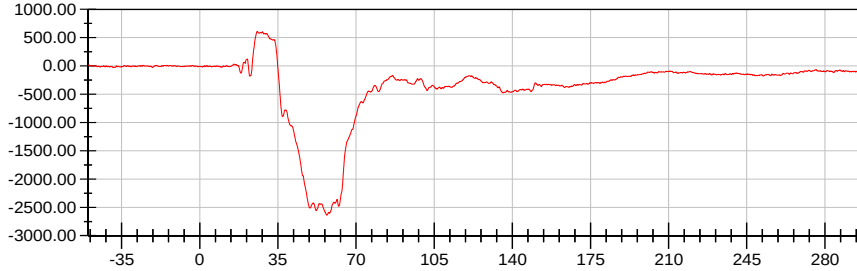
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Acetabulum Load Cell Force X (N) vs. Time [ms]



<Max>

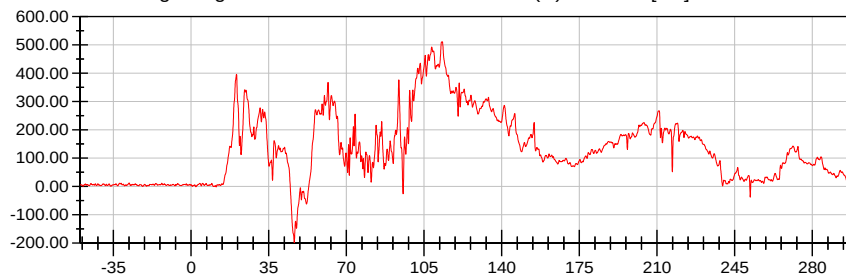
608.42 N at 25.75 ms

<Min>

-2,637.85 N at 56.90 ms

CFC_600

Passenger Right Acetabulum Load Cell Force Y (N) vs. Time [ms]



<Max>

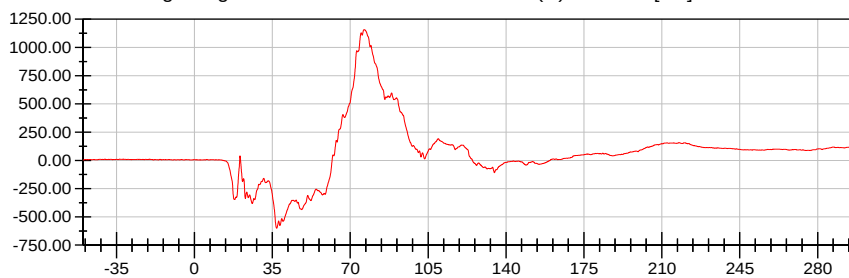
511.12 N at 113.25 ms

<Min>

-198.62 N at 46.55 ms

CFC_600

Passenger Right Acetabulum Load Cell Force Z (N) vs. Time [ms]



<Max>

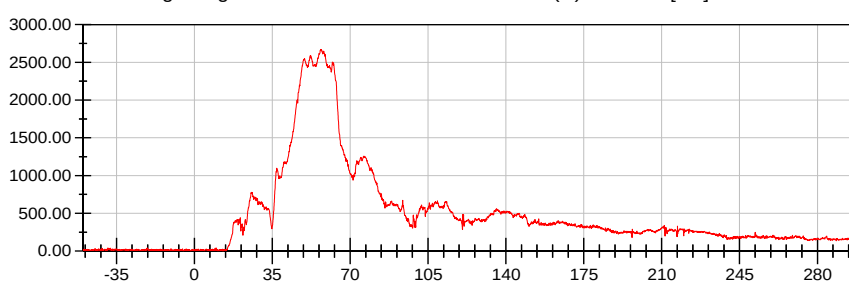
1,157.35 N at 76.20 ms

<Min>

-599.48 N at 37.00 ms

CFC_600

Passenger Right Acetabulum Load Cell Resultant (N) vs. Time [ms]



<Max>

2,671.33 N at 56.85 ms

<Min>

2.58 N at 12.50 ms

CFC 600



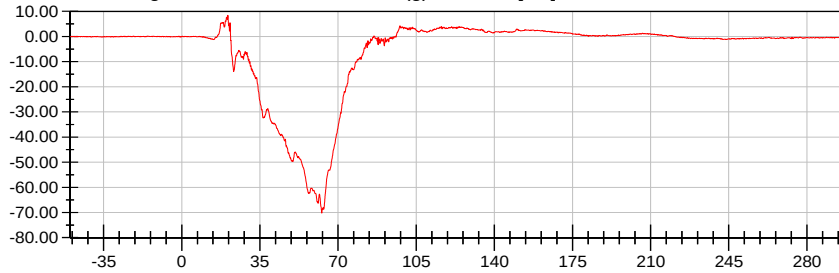
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Pelvis X Accelerometer (g) vs. Time [ms]



<Max>

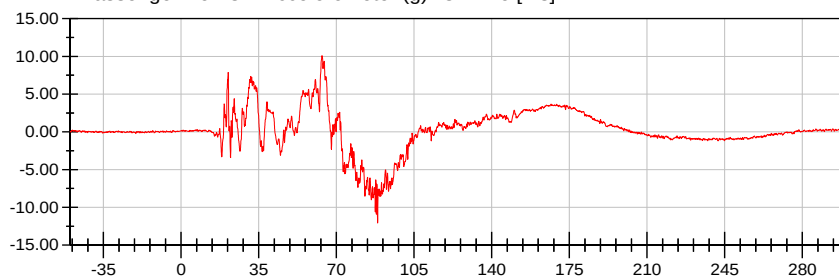
8.47 g at 20.65 ms

<Min>

-70.26 g at 62.70 ms

CFC_1000

Passenger Pelvis Y Accelerometer (g) vs. Time [ms]



<Max>

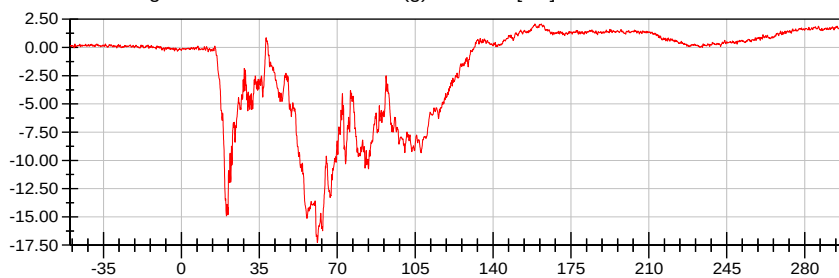
10.09 g at 63.50 ms

<Min>

-12.07 g at 88.60 ms

CFC_1000

Passenger Pelvis Z Accelerometer (g) vs. Time [ms]



<Max>

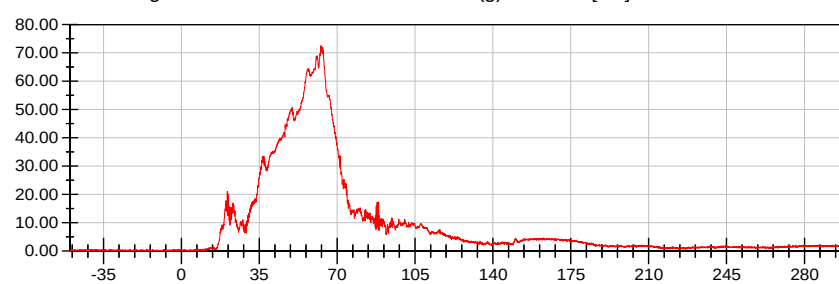
2.09 g at 158.80 ms

<Min>

-17.27 g at 61.10 ms

CFC_1000

Passenger Pelvis Accelerometer Resultant (g) vs. Time [ms]



<Max>

72.61 g at 62.75 ms

<Min>

0.05 g at -38.95 ms

CFC 1000



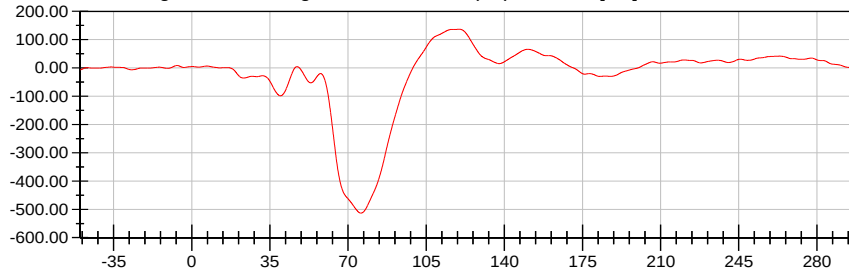
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Pelvis X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

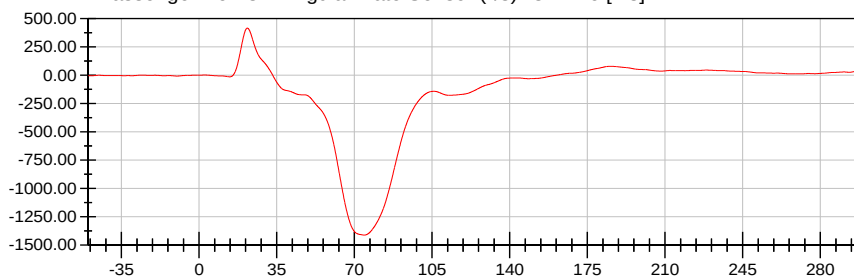
137.02 °/s at 119.80 ms

<Min>

-513.20 °/s at 75.75 ms

CFC_60

Passenger Pelvis Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

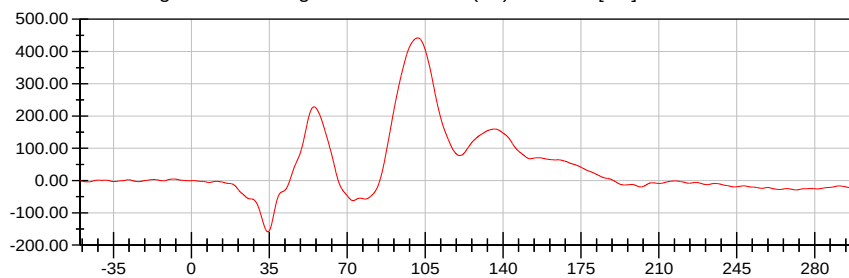
416.68 °/s at 21.75 ms

<Min>

-1,411.28 °/s at 74.45 ms

CFC_60

Passenger Pelvis Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

442.11 °/s at 101.70 ms

<Min>

-159.03 °/s at 34.35 ms

CFC_60



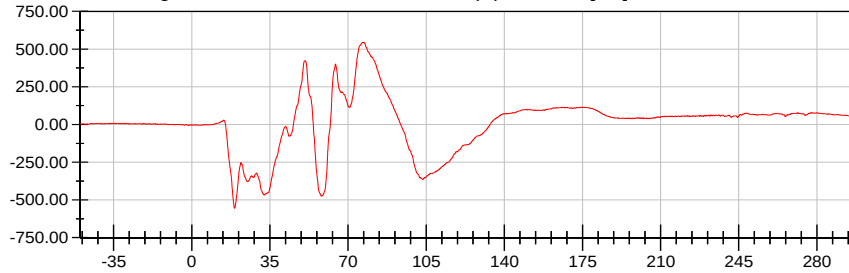
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

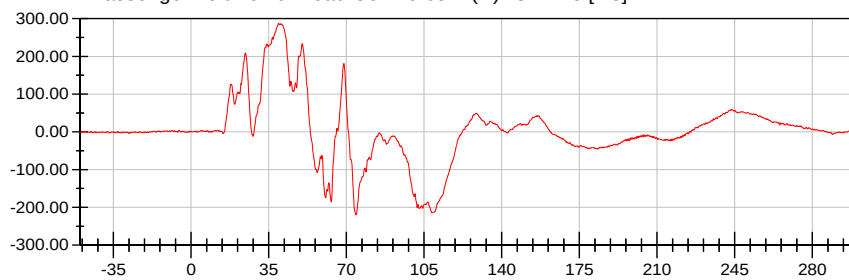
545.57 N at 76.90 ms

<Min>

-554.91 N at 19.15 ms

CFC_600

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



<Max>

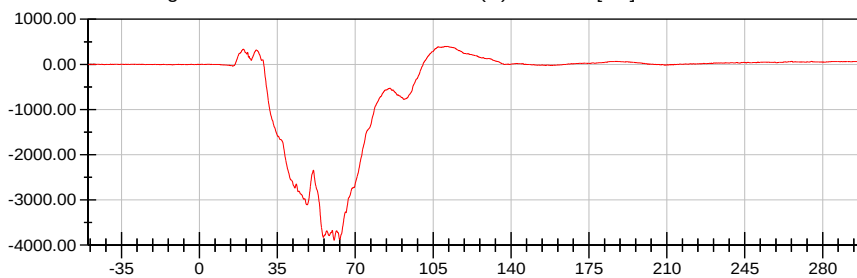
287.24 N at 39.45 ms

<Min>

-220.07 N at 74.40 ms

CFC_600

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



<Max>

398.68 N at 110.40 ms

<Min>

-3,892.33 N at 60.50 ms

CFC_600



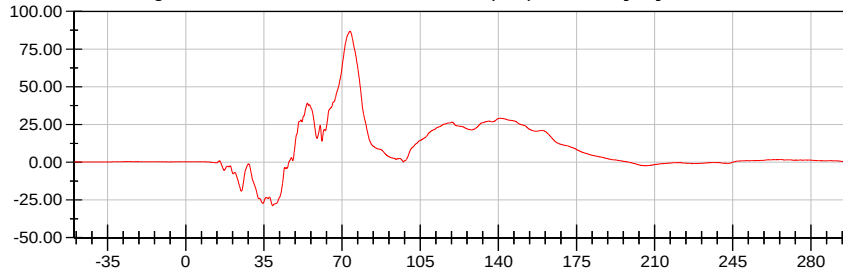
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Femur Load Cell Moment X (Nm) vs. Time [ms]



<Max>

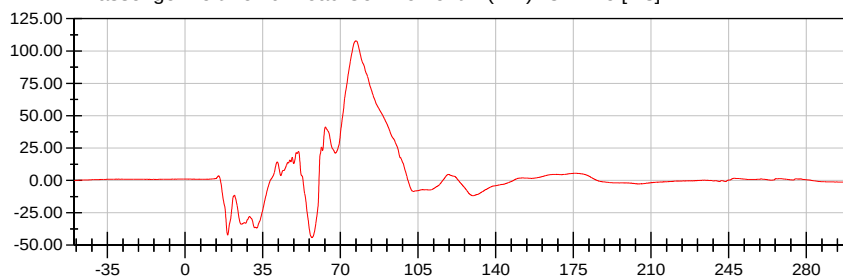
86.79 Nm at 73.55 ms

<Min>

-28.84 Nm at 38.95 ms

CFC_600

Passenger Left Femur Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

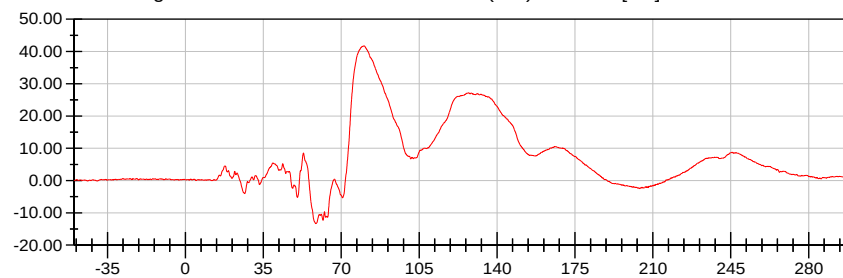
107.79 Nm at 77.00 ms

<Min>

-44.15 Nm at 57.20 ms

CFC_600

Passenger Left Femur Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

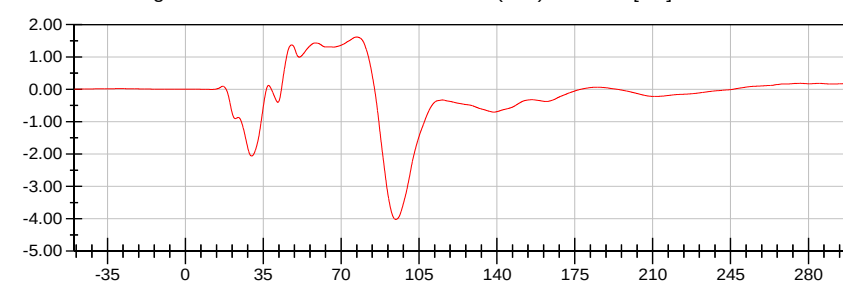
41.72 Nm at 80.20 ms

<Min>

-13.32 Nm at 58.60 ms

CFC_600

Passenger Left Knee Slider Potentiometer X (mm) vs. Time [ms]



<Max>

1.62 mm at 77.00 ms

<Min>

-4.02 mm at 94.65 ms

CFC_180



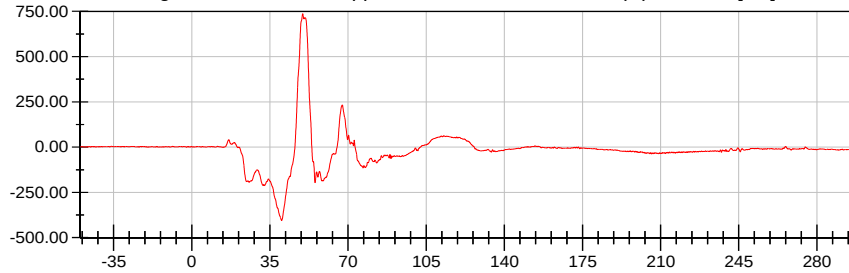
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger 5-Channel Left Upper Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

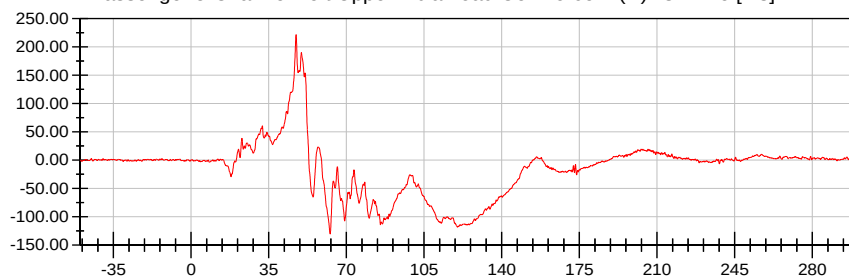
736.41 N at 49.70 ms

<Min>

-404.90 N at 40.25 ms

CFC_600

Passenger 5-Channel Left Upper Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

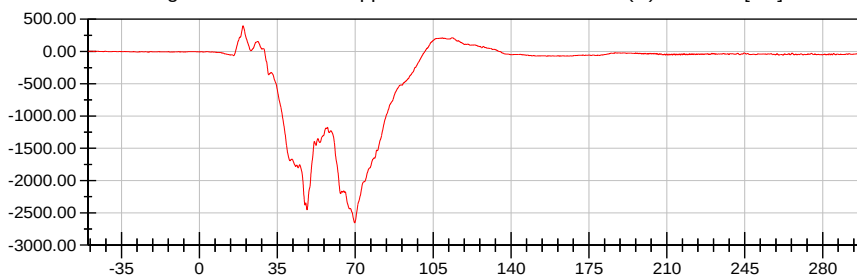
221.69 N at 47.35 ms

<Min>

-130.08 N at 62.70 ms

CFC_600

Passenger 5-Channel Left Upper Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

396.80 N at 19.60 ms

<Min>

-2,653.84 N at 69.75 ms

CFC_600



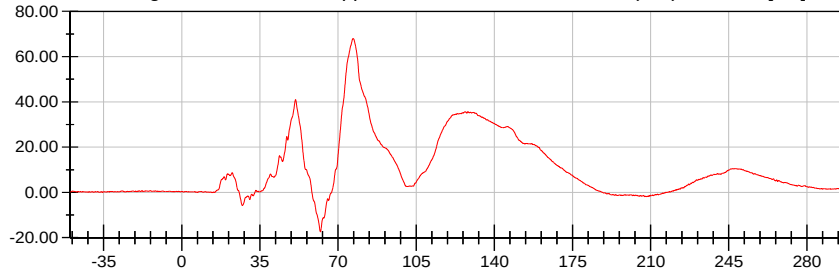
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger 5-Channel Left Upper Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

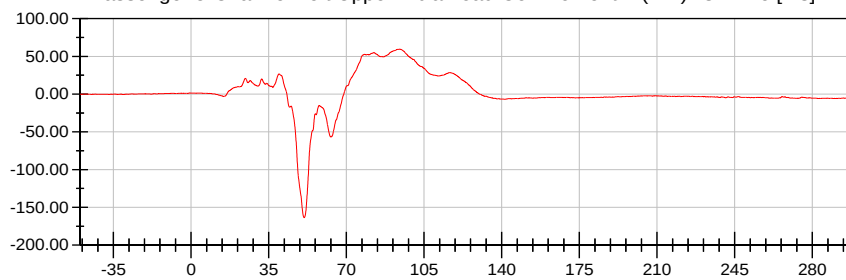
67.95 Nm at 76.75 ms

<Min>

-17.44 Nm at 62.10 ms

CFC_600

Passenger 5-Channel Left Upper Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

59.56 Nm at 94.05 ms

<Min>

-163.59 Nm at 50.95 ms

CFC_600



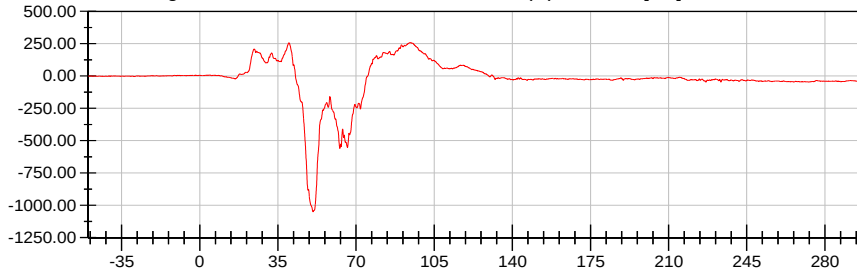
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Lower Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

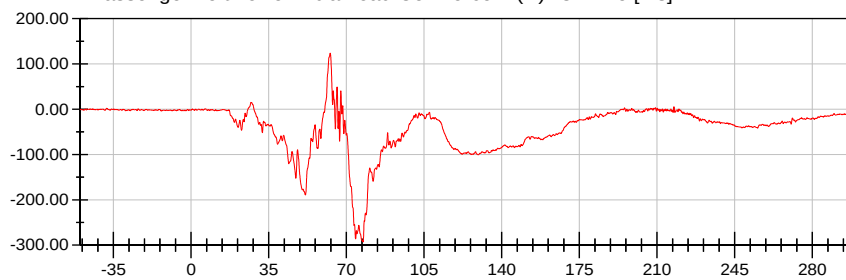
258.86 N at 94.20 ms

<Min>

-1,049.44 N at 50.70 ms

CFC_600

Passenger Left Lower Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

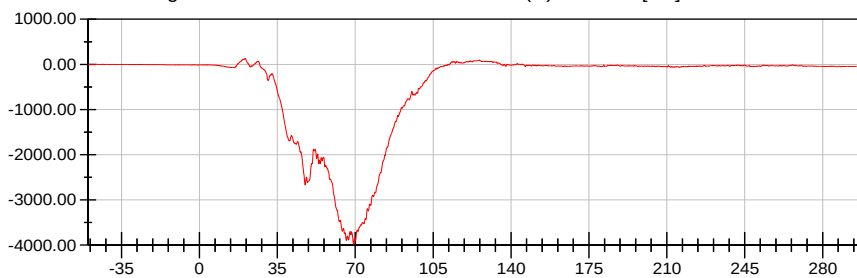
123.80 N at 62.70 ms

<Min>

-292.86 N at 77.50 ms

CFC_600

Passenger Left Lower Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

131.71 N at 20.60 ms

<Min>

-3,981.32 N at 69.25 ms

CFC_600



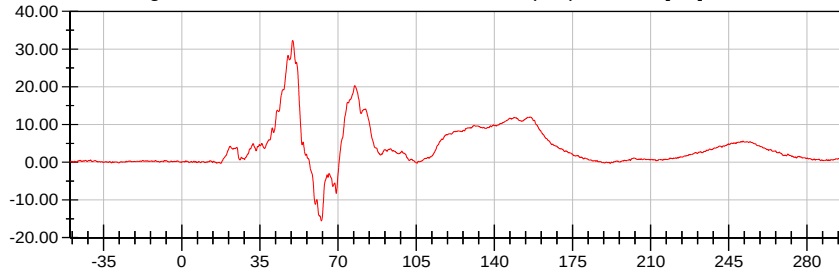
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Lower Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

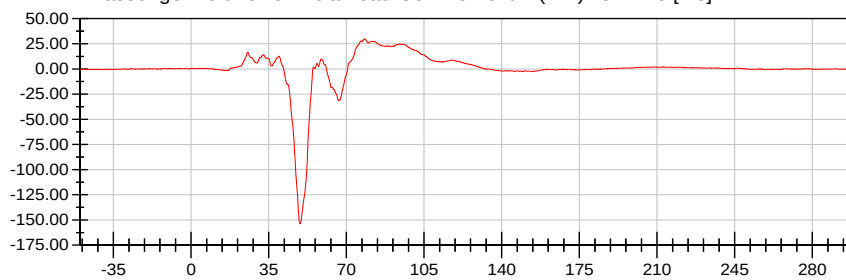
32.26 Nm at 49.65 ms

<Min>

-15.54 Nm at 62.55 ms

CFC_600

Passenger Left Lower Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

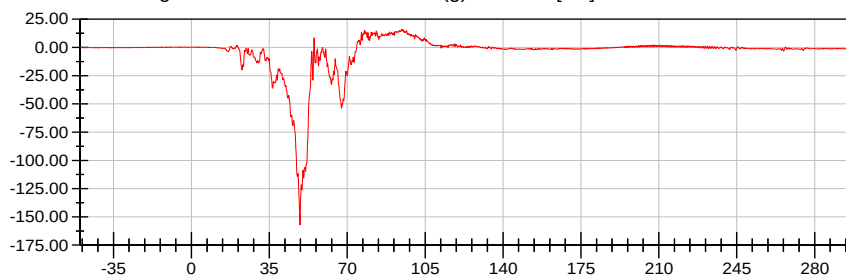
29.69 Nm at 78.20 ms

<Min>

-153.86 Nm at 49.15 ms

CFC_600

Passenger Left Tibia X Accelerometer (g) vs. Time [ms]



<Max>

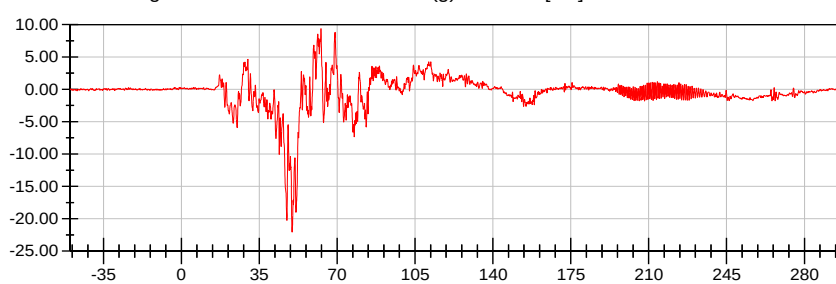
16.10 g at 94.55 ms

<Min>

-157.19 g at 48.75 ms

CFC_1000

Passenger Left Tibia Y Accelerometer (g) vs. Time [ms]



<Max>

9.39 g at 62.75 ms

<Min>

-22.07 g at 49.75 ms

CFC_1000



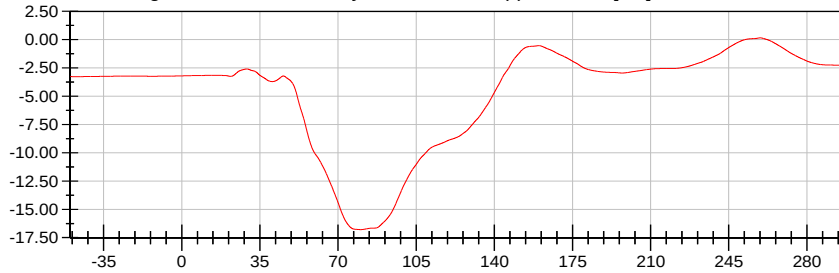
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Ankle X Rotary Potentiometer (°) vs. Time [ms]



<Max>

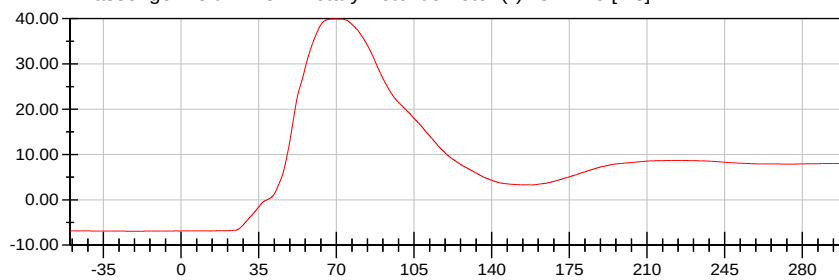
0.15 ° at 259.10 ms

<Min>

-16.79 ° at 80.10 ms

CFC_180

Passenger Left Ankle Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

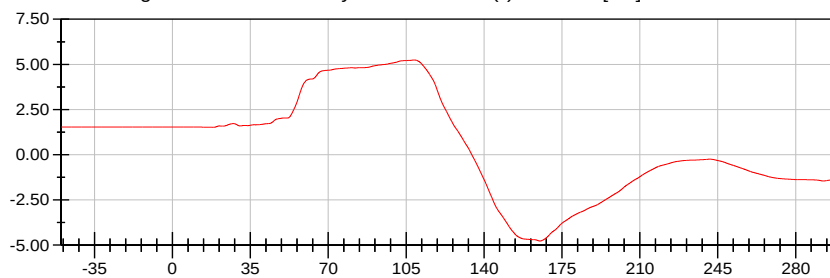
39.92 ° at 69.95 ms

<Min>

-6.95 ° at -21.00 ms

CFC_180

Passenger Left Ankle Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

5.24 ° at 108.65 ms

<Min>

-4.77 ° at 165.15 ms

CFC_180



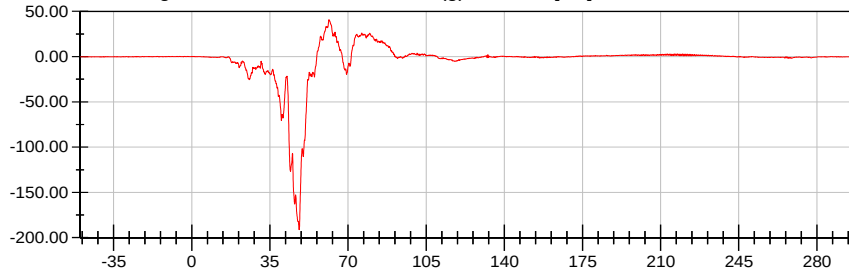
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Left Foot X Accelerometer (g) vs. Time [ms]



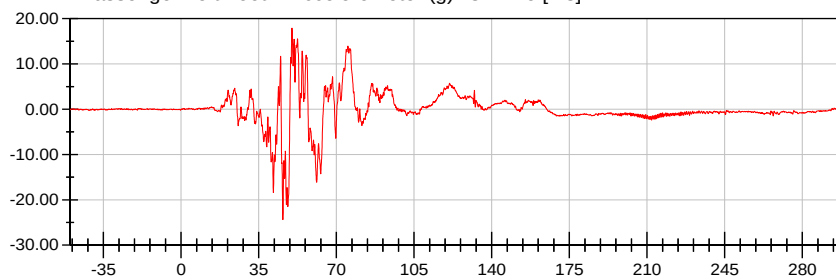
<Max>

40.72 g at 61.45 ms

<Min>

-191.15 g at 48.10 ms

Passenger Left Foot Y Accelerometer (g) vs. Time [ms]



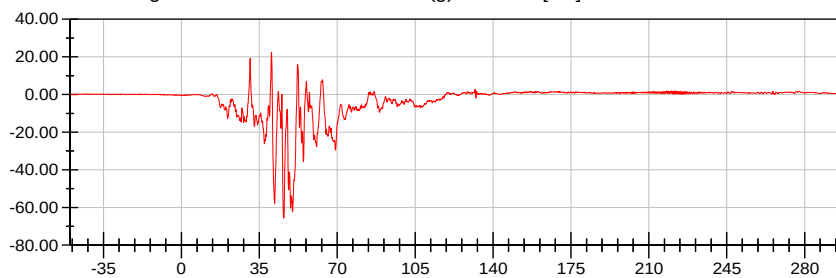
<Max>

17.89 g at 50.00 ms

<Min>

-24.37 g at 45.85 ms

Passenger Left Foot Z Accelerometer (g) vs. Time [ms]



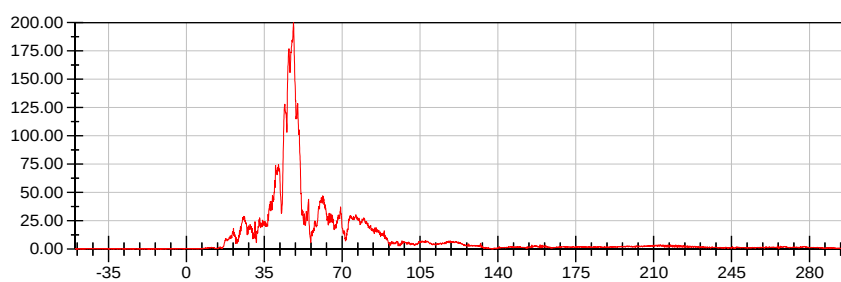
<Max>

22.44 g at 40.50 ms

<Min>

-65.64 g at 46.00 ms

Passenger Left Foot Accelerometer Resultant (g) vs. Time [ms]



<Max>

199.83 g at 48.15 ms

<Min>

0.03 g at -39.70 ms



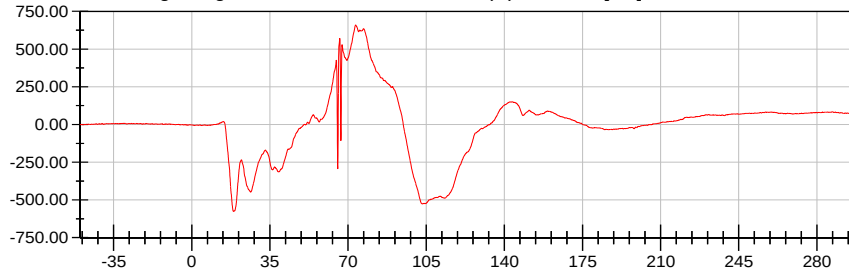
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

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



<Max>

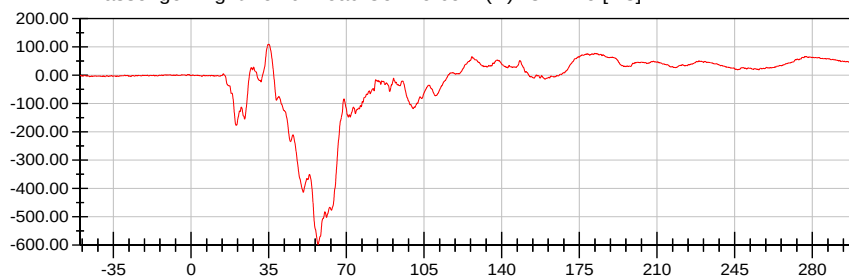
659.84 N at 73.40 ms

<Min>

-575.36 N at 18.70 ms

CFC_600

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



<Max>

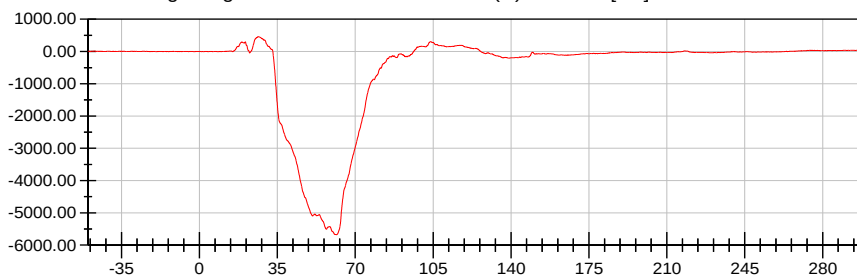
109.15 N at 35.10 ms

<Min>

-597.37 N at 57.25 ms

CFC_600

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



<Max>

457.98 N at 26.50 ms

<Min>

-5,676.37 N at 61.50 ms

CFC_600



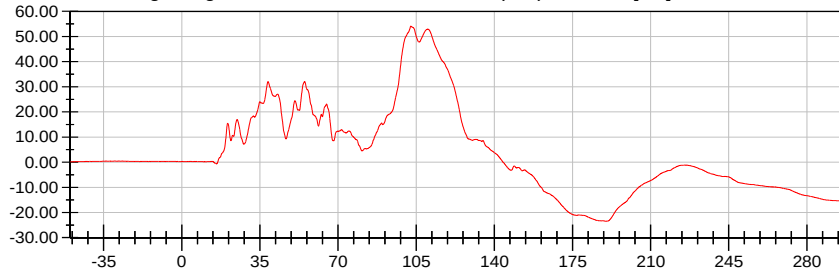
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Femur Load Cell Moment X (Nm) vs. Time [ms]



<Max>

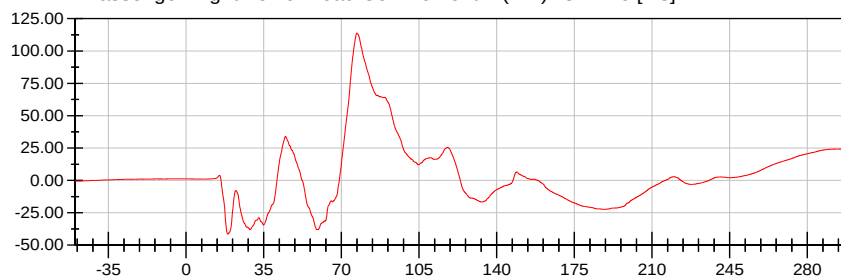
54.10 Nm at 102.60 ms

<Min>

-23.48 Nm at 189.95 ms

CFC_600

Passenger Right Femur Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

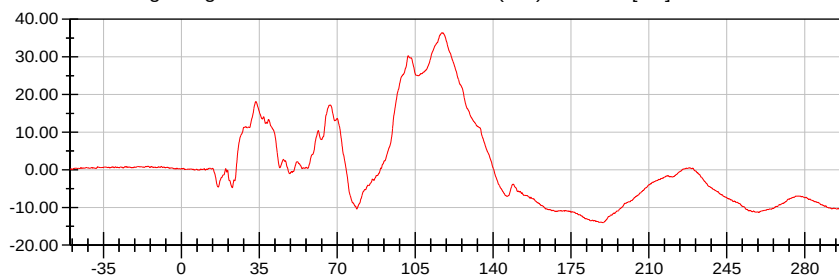
113.85 Nm at 76.95 ms

<Min>

-41.51 Nm at 18.85 ms

CFC_600

Passenger Right Femur Load Cell Moment Z (Nm) vs. Time [ms]



<Max>

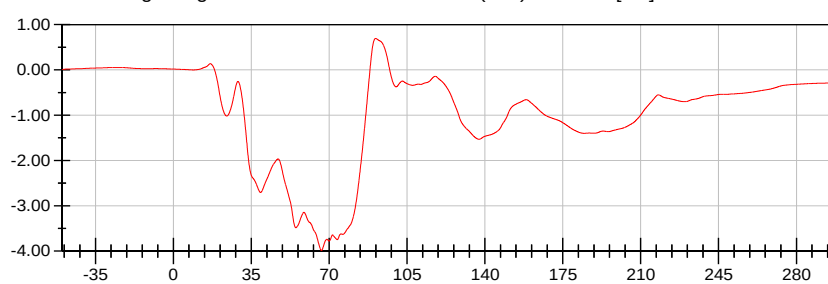
36.35 Nm at 117.55 ms

<Min>

-14.03 Nm at 189.40 ms

CFC_600

Passenger Right Knee Slider Potentiometer (mm) vs. Time [ms]



<Max>

0.69 mm at 90.90 ms

<Min>

-3.99 mm at 66.50 ms

CFC_180



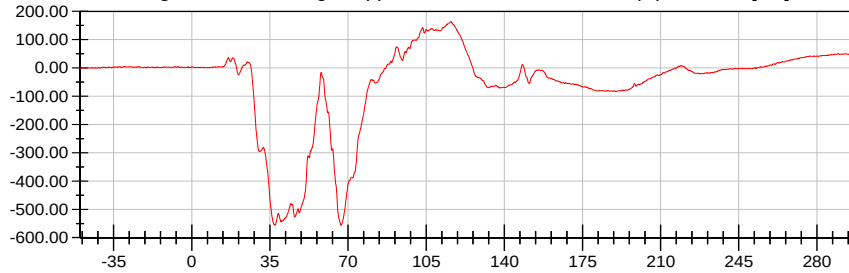
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger 5-Channel Right Upper Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

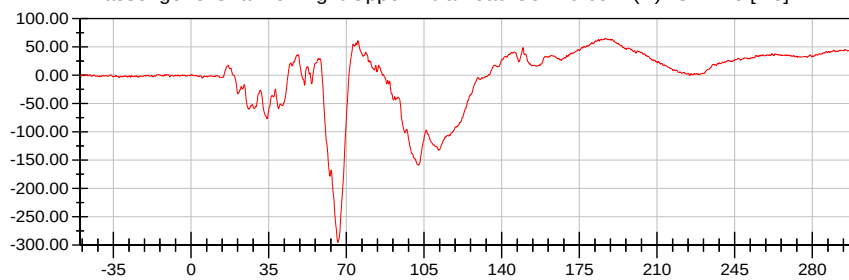
163.49 N at 116.15 ms

<Min>

-556.42 N at 66.85 ms

CFC_600

Passenger 5-Channel Right Upper Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

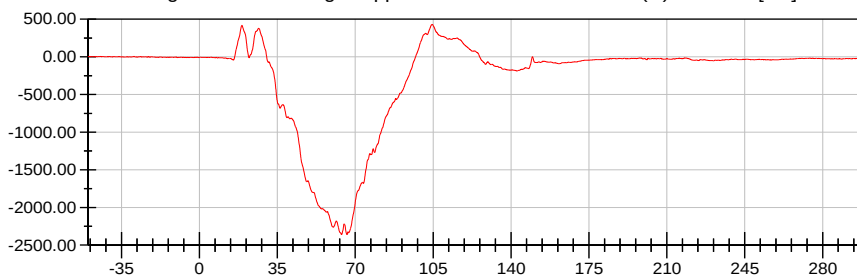
65.30 N at 186.70 ms

<Min>

-295.39 N at 66.15 ms

CFC_600

Passenger 5-Channel Right Upper Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

429.62 N at 104.60 ms

<Min>

-2,359.96 N at 66.35 ms

CFC_600



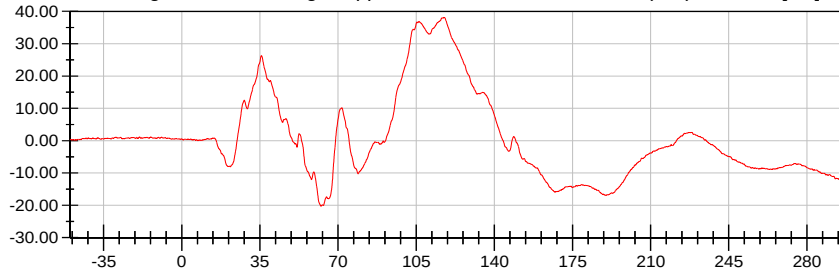
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger 5-Channel Right Upper Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

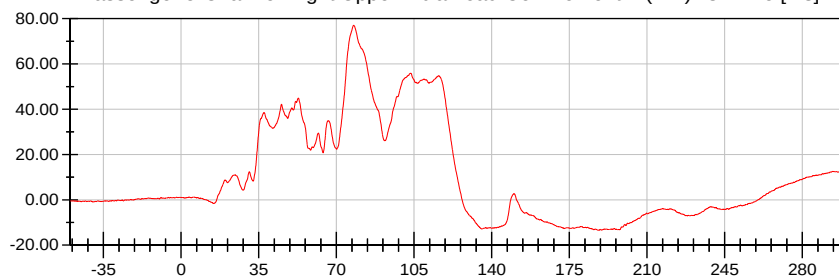
38.11 Nm at 117.50 ms

<Min>

-20.26 Nm at 62.35 ms

CFC_600

Passenger 5-Channel Right Upper Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

77.05 Nm at 77.75 ms

<Min>

-13.43 Nm at 188.40 ms

CFC_600



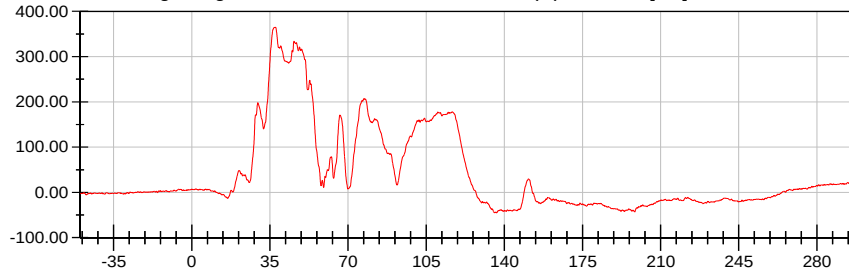
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Lower Tibia Load Cell Force X (N) vs. Time [ms]



<Max>

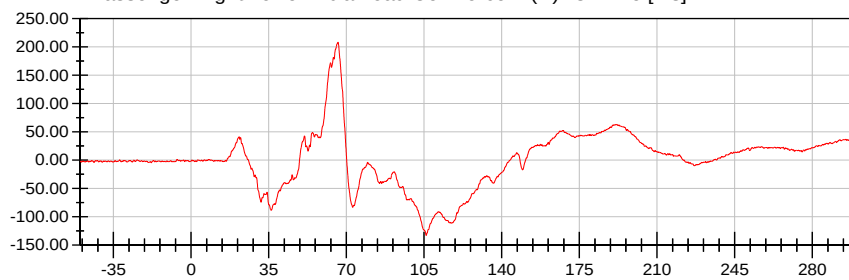
364.92 N at 37.50 ms

<Min>

-45.10 N at 136.55 ms

CFC_600

Passenger Right Lower Tibia Load Cell Force Y (N) vs. Time [ms]



<Max>

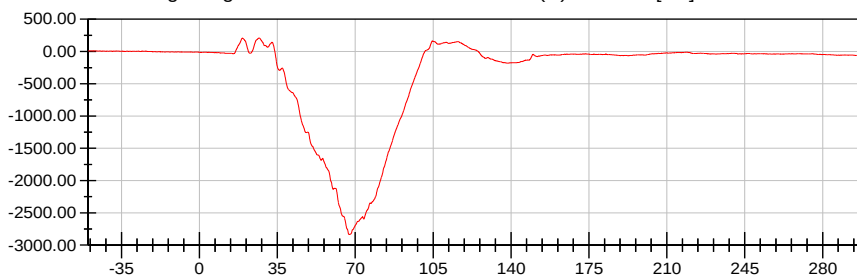
208.34 N at 66.25 ms

<Min>

-132.93 N at 105.95 ms

CFC_600

Passenger Right Lower Tibia Load Cell Force Z (N) vs. Time [ms]



<Max>

207.57 N at 26.60 ms

<Min>

-2,835.24 N at 67.25 ms

CFC_600



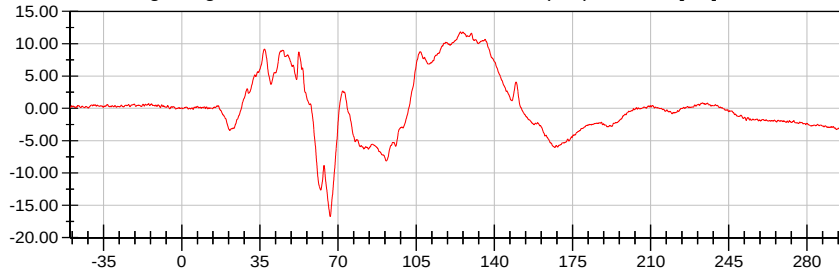
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Lower Tibia Load Cell Moment X (Nm) vs. Time [ms]



<Max>

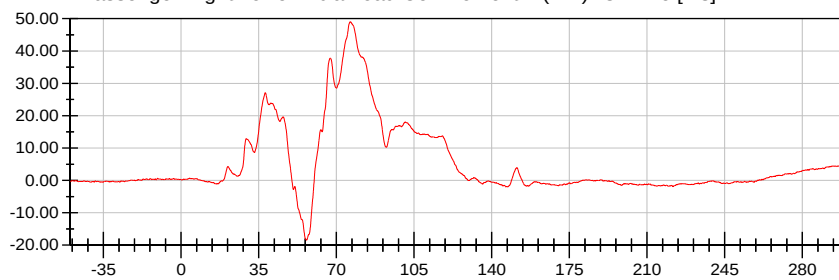
11.83 Nm at 124.85 ms

<Min>

-16.74 Nm at 66.50 ms

CFC_600

Passenger Right Lower Tibia Load Cell Moment Y (Nm) vs. Time [ms]



<Max>

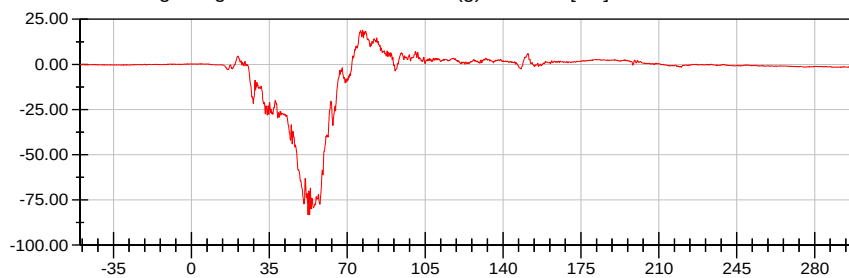
49.03 Nm at 76.30 ms

<Min>

-18.42 Nm at 56.60 ms

CFC_600

Passenger Right Tibia X Accelerometer (g) vs. Time [ms]



<Max>

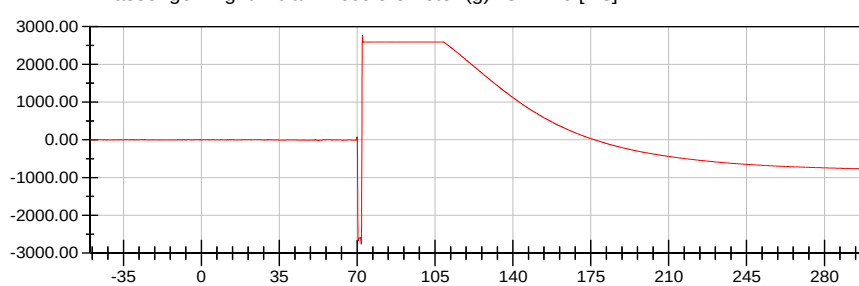
18.94 g at 76.90 ms

<Min>

-83.26 g at 52.45 ms

CFC_1000

Passenger Right Tibia Y Accelerometer (g) vs. Time [ms]



<Max>

2,763.70 g at 72.40 ms

<Min>

-2,766.79 g at 71.85 ms

CFC_1000



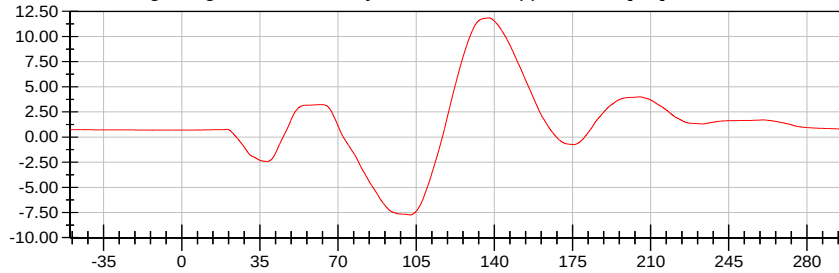
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Right Ankle X Rotary Potentiometer (°) vs. Time [ms]



<Max>

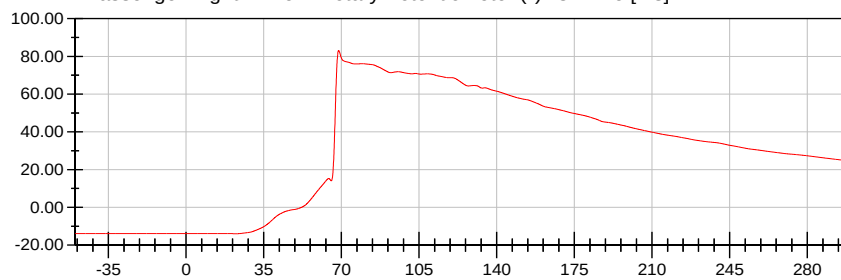
11.85 ° at 137.45 ms

<Min>

-7.74 ° at 102.30 ms

CFC_180

Passenger Right Ankle Y Rotary Potentiometer (°) vs. Time [ms]



<Max>

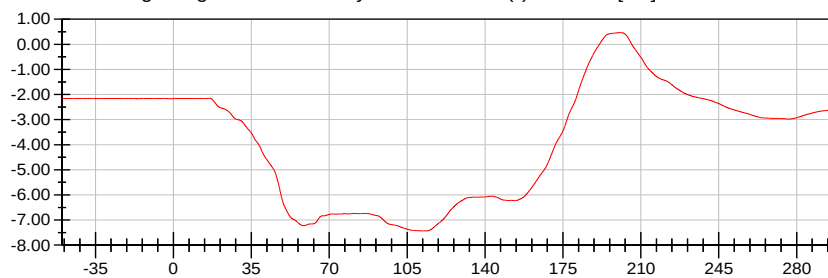
83.12 ° at 68.80 ms

<Min>

-13.96 ° at 22.65 ms

CFC_180

Passenger Right Ankle Z Rotary Potentiometer (°) vs. Time [ms]



<Max>

0.47 ° at 200.95 ms

<Min>

-7.43 ° at 113.65 ms

CFC_180



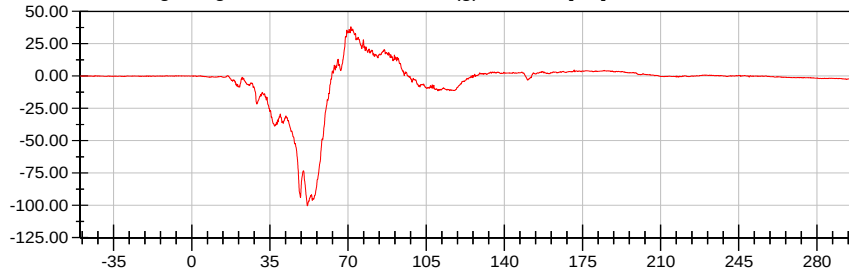
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Right Foot X Accelerometer (g) vs. Time [ms]



<Max>

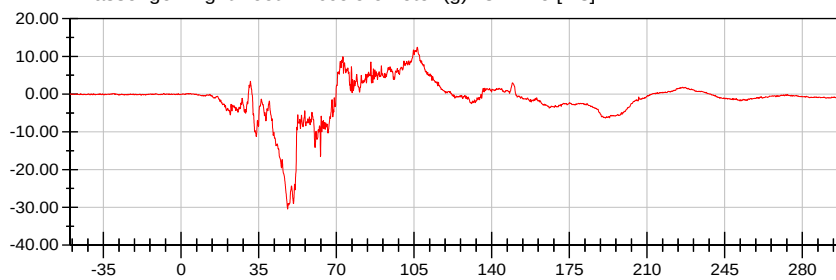
38.03 g at 71.25 ms

<Min>

-100.42 g at 51.80 ms

CFC_1000

Passenger Right Foot Y Accelerometer (g) vs. Time [ms]



<Max>

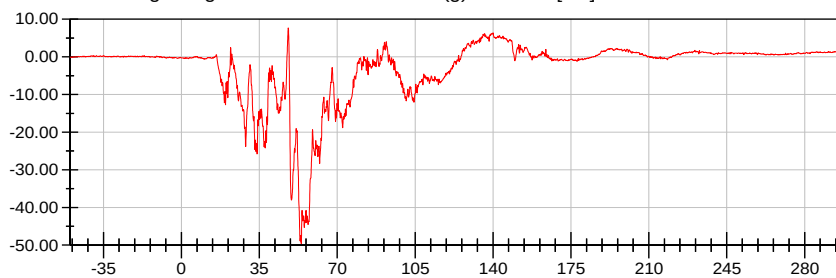
12.43 g at 106.45 ms

<Min>

-30.46 g at 48.00 ms

CFC_1000

Passenger Right Foot Z Accelerometer (g) vs. Time [ms]



<Max>

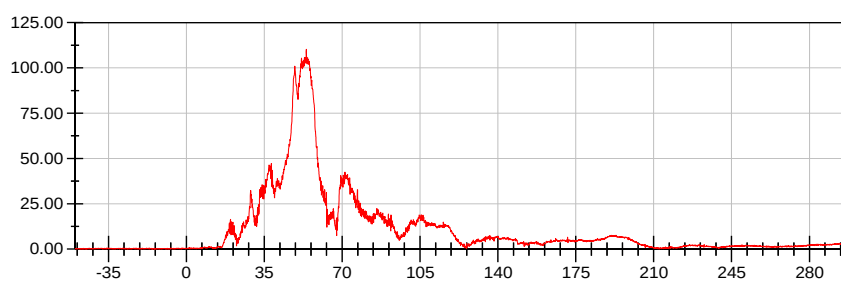
7.68 g at 48.00 ms

<Min>

-49.63 g at 53.85 ms

CFC_1000

Passenger Right Foot Accelerometer Resultant (g) vs. Time [ms]



<Max>

110.26 g at 53.90 ms

<Min>

0.06 g at -47.90 ms

CFC 1000



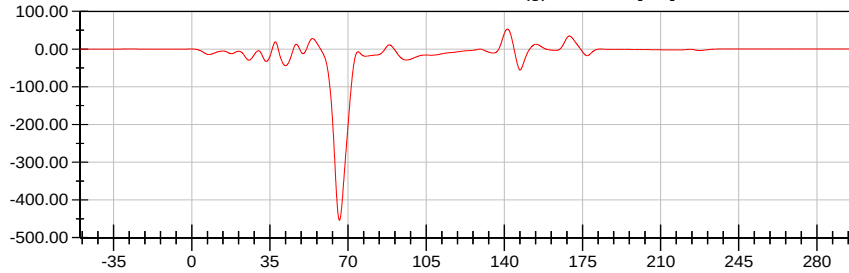
VRTC

Test Lab: CTF

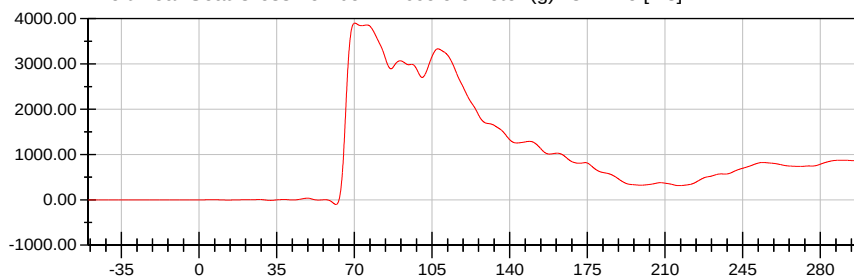
Test Number: 241010 ()

Test Date: 10/10/2024

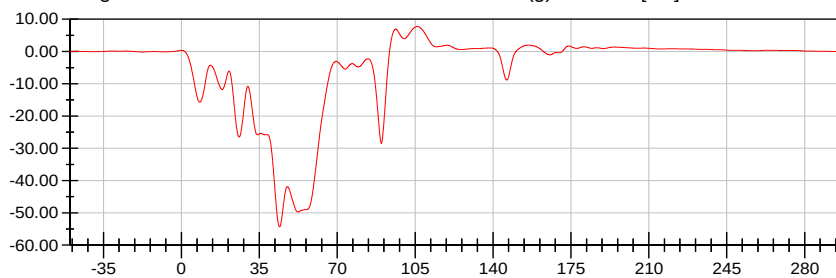
Left Rear Seat Crossmember X Accelerometer (g) vs. Time [ms]



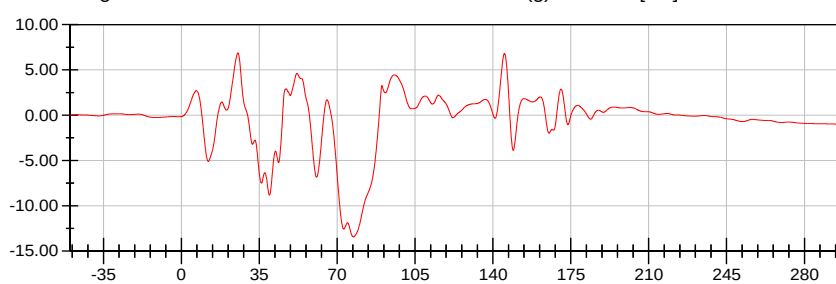
Left Rear Seat Crossmember Z Accelerometer (g) vs. Time [ms]



Right Rear Seat Crossmember X Accelerometer (g) vs. Time [ms]



Right Rear Seat Crossmember Z Accelerometer (g) vs. Time [ms]

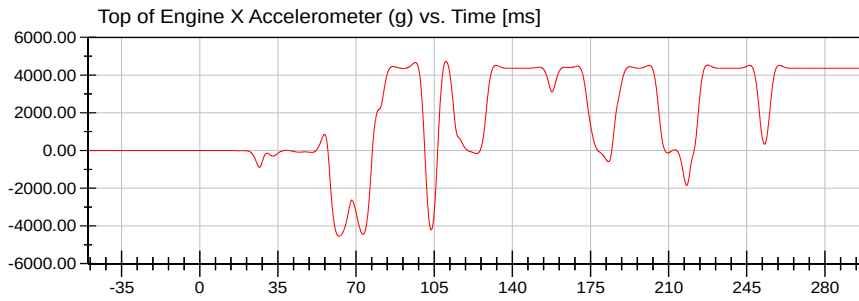


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



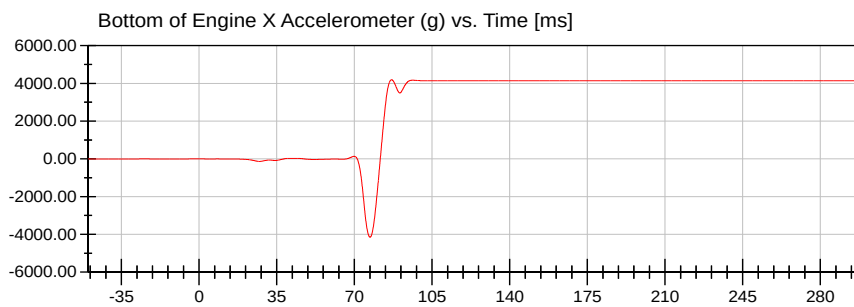
<Max>

4,736.61 g at 110.30 ms

<Min>

-4,541.90 g at 62.45 ms

CFC_60



<Max>

4,192.50 g at 86.75 ms

<Min>

-4,154.49 g at 77.05 ms

CFC_60



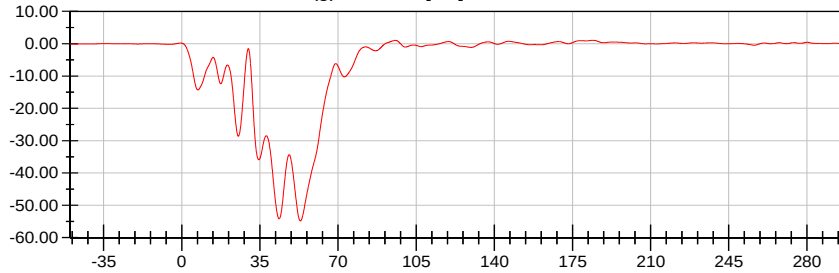
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Left Sill X Accelerometer (g) vs. Time [ms]



<Max>

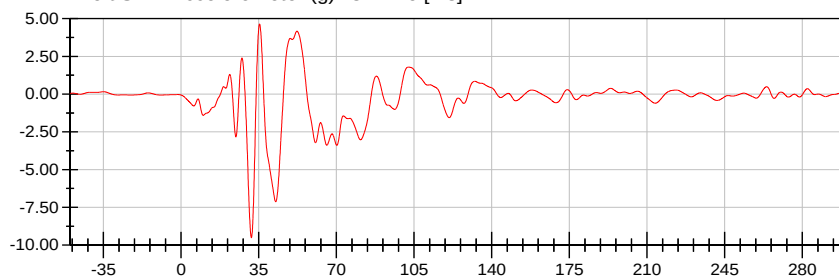
1.06 g at 184.10 ms

<Min>

-54.83 g at 53.15 ms

CFC_60

Left Sill Y Accelerometer (g) vs. Time [ms]



<Max>

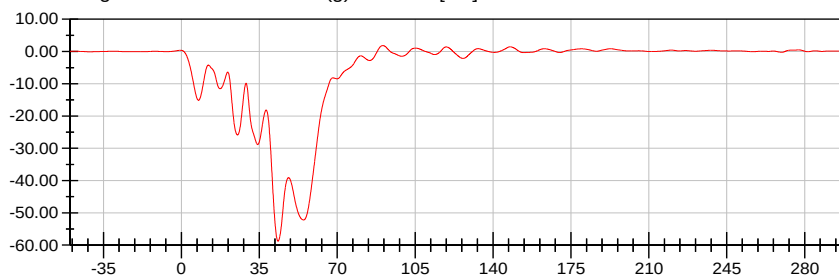
4.64 g at 35.40 ms

<Min>

-9.51 g at 31.70 ms

CFC_60

Right Sill X Accelerometer (g) vs. Time [ms]



<Max>

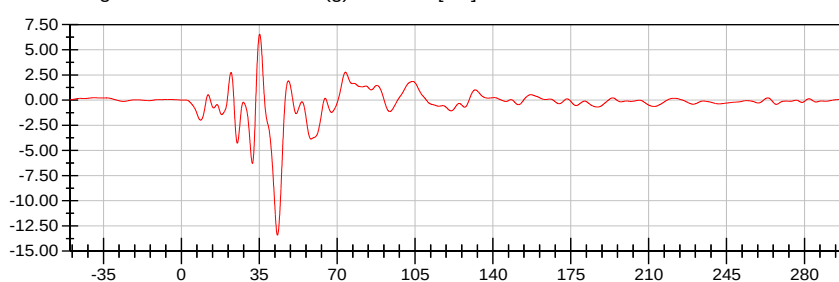
1.82 g at 90.50 ms

<Min>

-58.78 g at 43.40 ms

CFC_60

Right Sill Y Accelerometer (g) vs. Time [ms]



<Max>

6.54 g at 35.20 ms

<Min>

-13.42 g at 43.20 ms

CFC_60



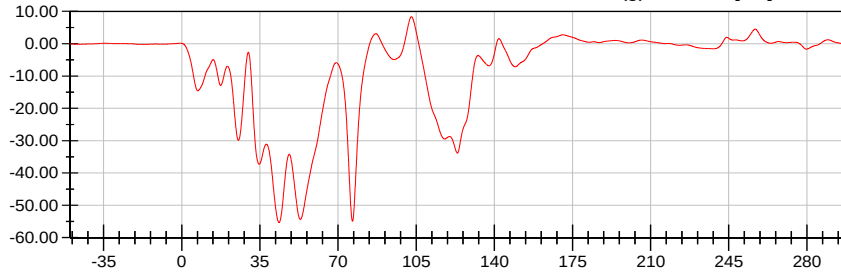
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Left Rear Seat Crossmember X Redundant Accelerometer (g) vs. Time [ms]



<Max>

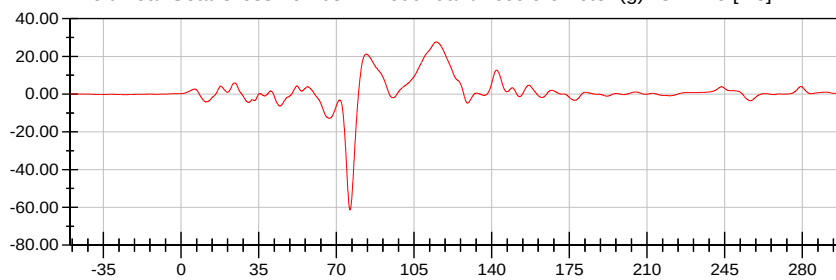
8.33 g at 102.85 ms

<Min>

-55.33 g at 43.55 ms

CFC_60

Left Rear Seat Crossmember Z Redundant Accelerometer (g) vs. Time [ms]



<Max>

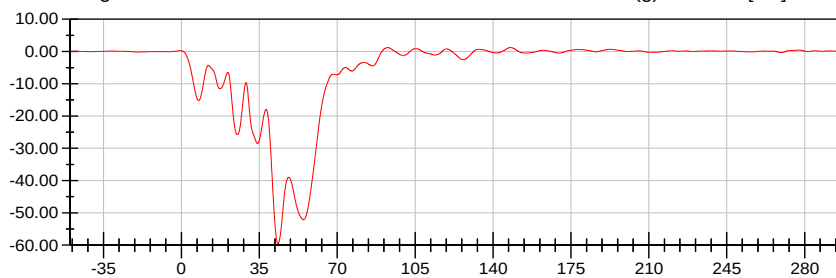
27.67 g at 115.05 ms

<Min>

-61.43 g at 76.15 ms

CFC_60

Right Rear Seat Crossmember X Redundant Accelerometer (g) vs. Time [ms]



<Max>

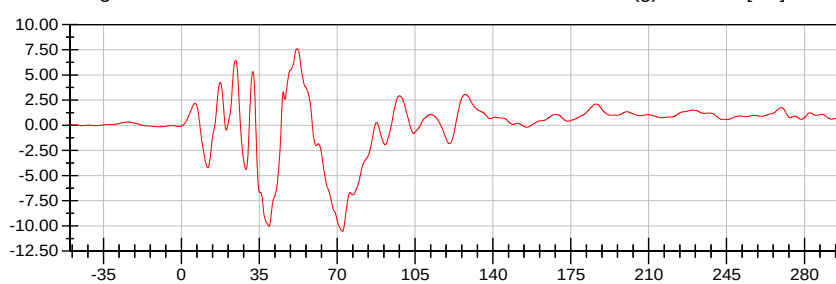
1.23 g at 147.75 ms

<Min>

-59.55 g at 43.40 ms

CFC_60

Right Rear Seat Crossmember Z Redundant Accelerometer (g) vs. Time [ms]



<Max>

7.58 g at 51.90 ms

<Min>

-10.54 g at 72.40 ms

CFC_60



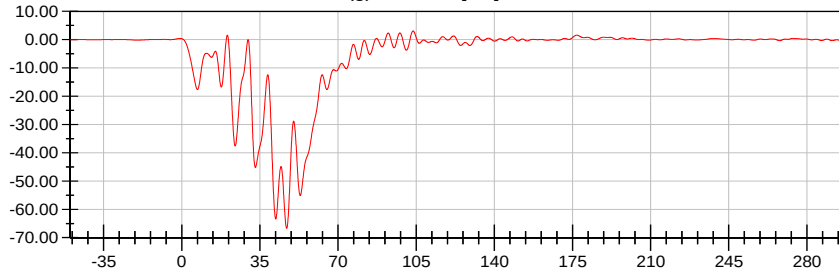
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Vehicle CG X Accelerometer (g) vs. Time [ms]



<Max>

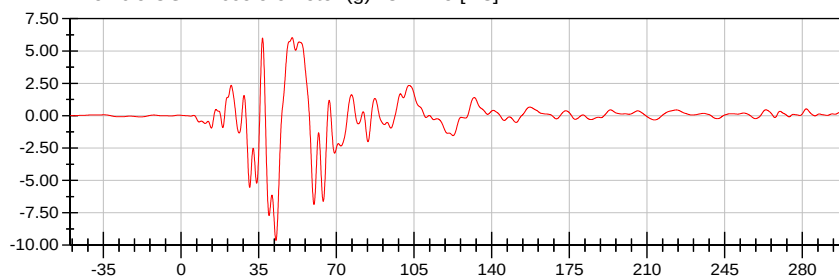
3.06 g at 103.65 ms

<Min>

-66.74 g at 47.00 ms

CFC_60

Vehicle CG Y Accelerometer (g) vs. Time [ms]



<Max>

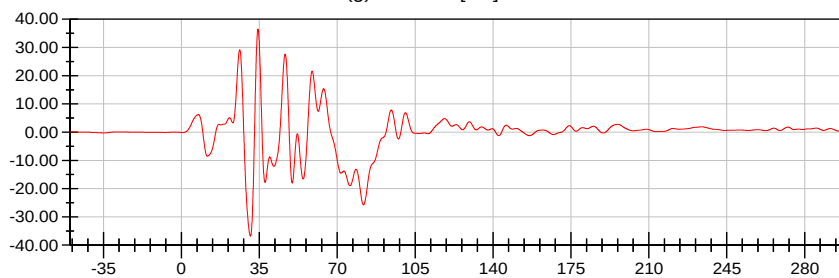
6.04 g at 50.10 ms

<Min>

-9.64 g at 42.75 ms

CFC_60

Vehicle CG Z Accelerometer (g) vs. Time [ms]



<Max>

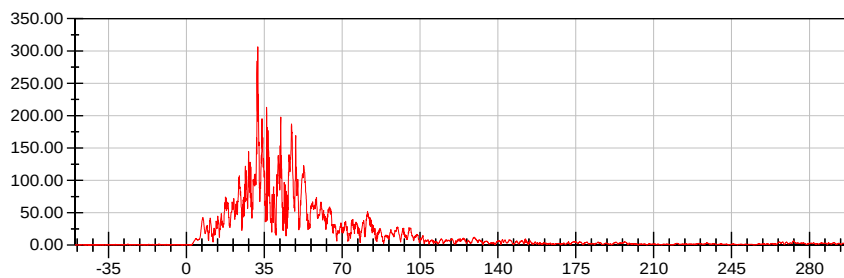
36.52 g at 34.40 ms

<Min>

-36.85 g at 31.00 ms

CFC_60

Vehicle CG Accelerometer Resultant (g) vs. Time [ms]



<Max>

306.35 g at 32.05 ms

<Min>

0.06 g at -44.80 ms

CFC 1000



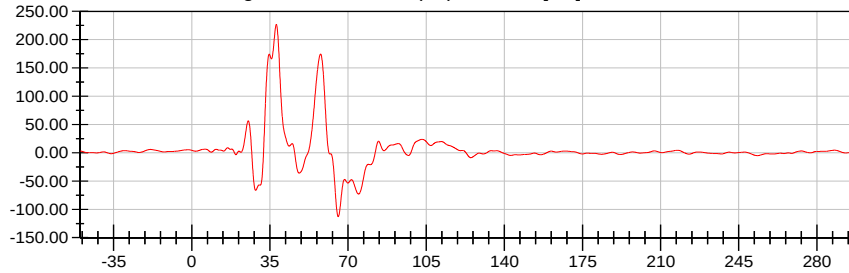
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Vehicle CG X Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

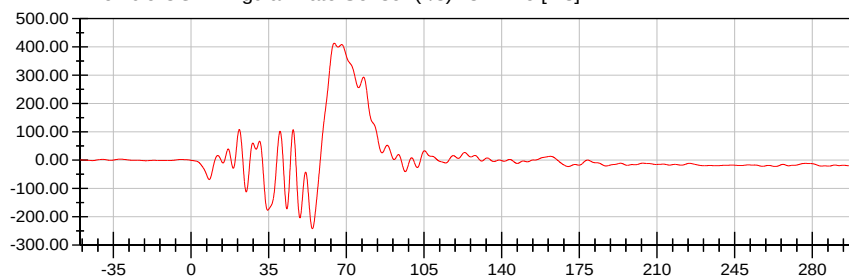
226.70 °/s at 37.85 ms

<Min>

-112.88 °/s at 65.60 ms

CFC_60

Vehicle CG Y Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

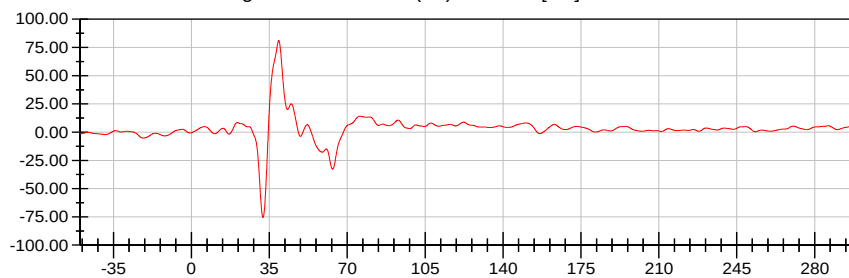
413.37 °/s at 64.50 ms

<Min>

-242.08 °/s at 54.70 ms

CFC_60

Vehicle CG Z Angular Rate Sensor (°/s) vs. Time [ms]



<Max>

81.20 °/s at 39.25 ms

<Min>

-75.52 °/s at 32.15 ms

CFC_60



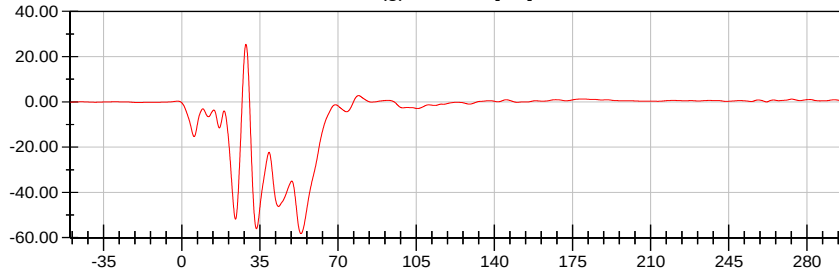
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Toe Pan X Accelerometer (g) vs. Time [ms]



<Max>

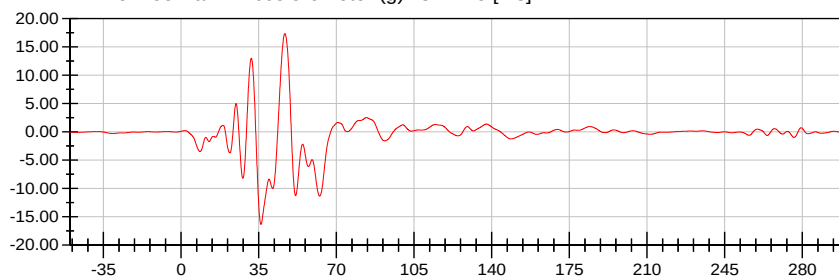
25.44 g at 28.75 ms

<Min>

-58.21 g at 53.40 ms

CFC_60

Driver Toe Pan Y Accelerometer (g) vs. Time [ms]



<Max>

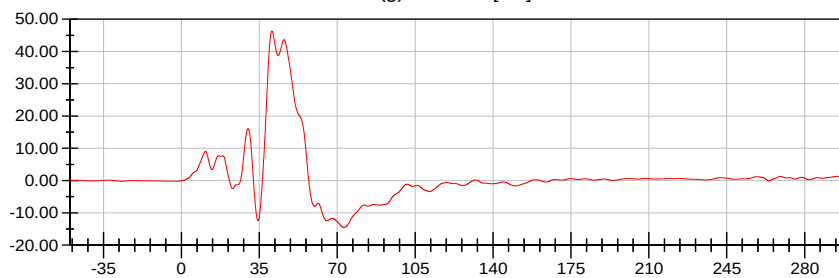
17.36 g at 46.80 ms

<Min>

-16.32 g at 36.00 ms

CFC_60

Driver Toe Pan Z Accelerometer (g) vs. Time [ms]



<Max>

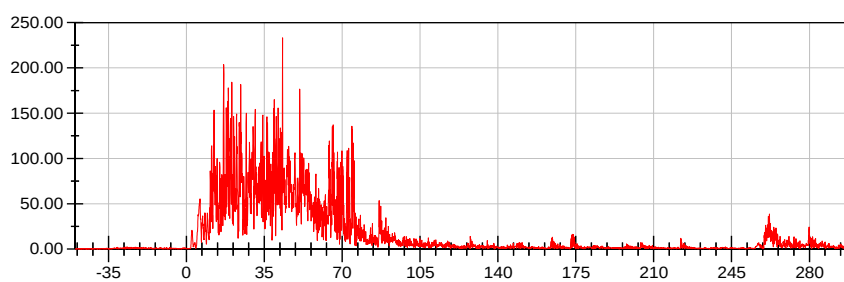
46.35 g at 40.65 ms

<Min>

-14.53 g at 73.00 ms

CFC_60

Driver Toe Pan Accelerometer Resultant (g) vs. Time [ms]



<Max>

233.25 g at 43.20 ms

<Min>

0.05 g at -46.25 ms

CFC 60



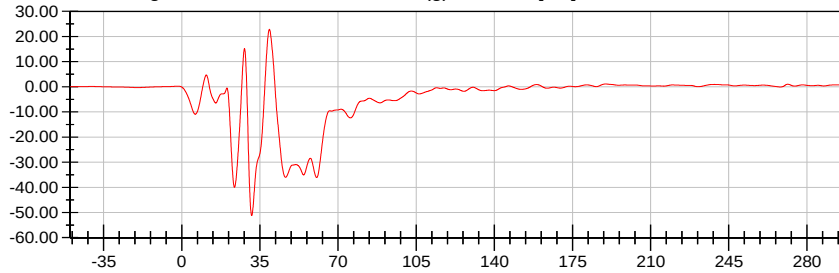
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Passenger Toe Pan X Accelerometer (g) vs. Time [ms]



<Max>

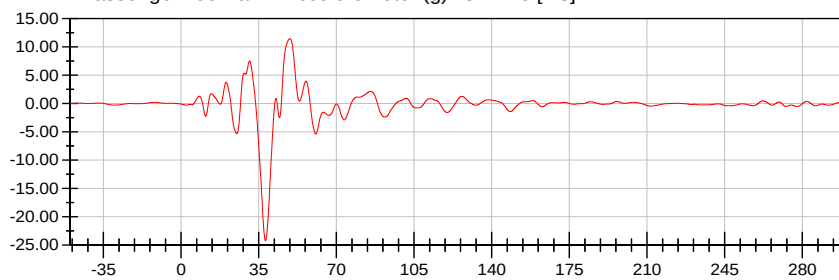
22.90 g at 39.25 ms

<Min>

-51.20 g at 31.30 ms

CFC_60

Passenger Toe Pan Y Accelerometer (g) vs. Time [ms]



<Max>

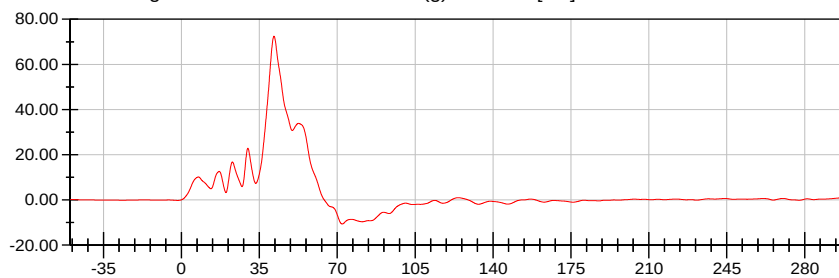
11.47 g at 49.05 ms

<Min>

-24.21 g at 38.05 ms

CFC_60

Passenger Toe Pan Z Accelerometer (g) vs. Time [ms]



<Max>

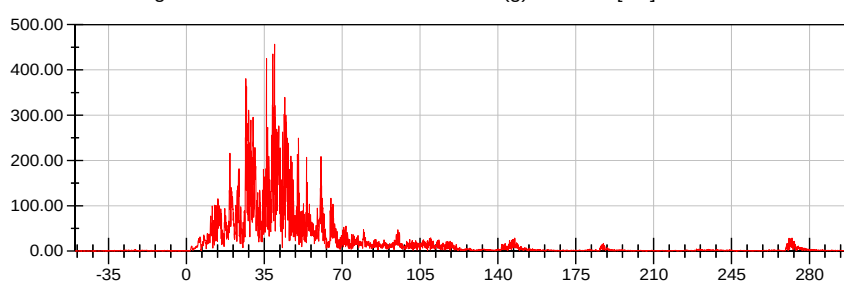
72.47 g at 41.60 ms

<Min>

-10.67 g at 72.25 ms

CFC_60

Passenger Toe Pan Accelerometer Resultant (g) vs. Time [ms]



<Max>

456.87 g at 39.65 ms

<Min>

0.04 g at -49.70 ms

CFC 60



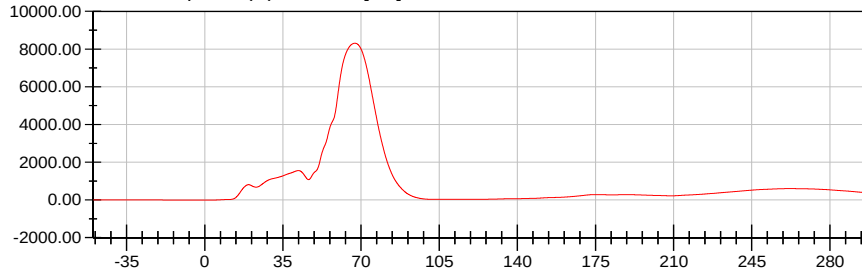
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Lap Belt (N) vs. Time [ms]



<Max>

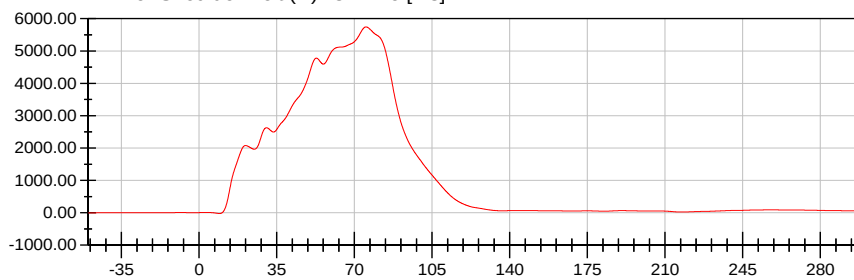
8,312.74 N at 67.25 ms

<Min>

-6.88 N at 1.95 ms

CFC_60

Driver Shoulder Belt (N) vs. Time [ms]



<Max>

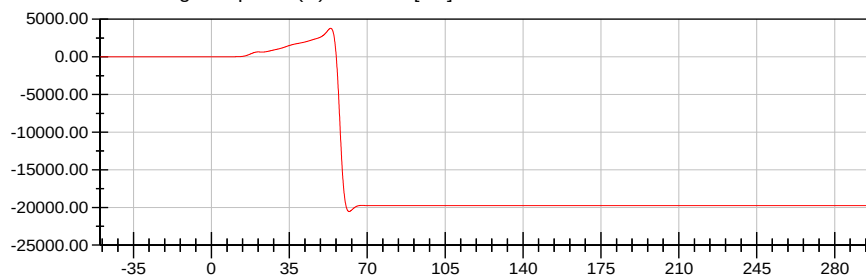
5,745.27 N at 75.25 ms

<Min>

-22.02 N at 9.15 ms

CFC_60

Passenger Lap Belt (N) vs. Time [ms]



<Max>

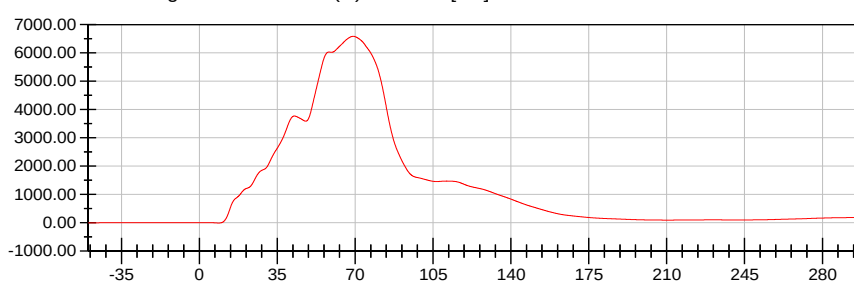
3,790.56 N at 53.60 ms

<Min>

-20,542.85 N at 61.85 ms

CFC_60

Passenger Shoulder Belt (N) vs. Time [ms]



<Max>

6,585.91 N at 69.15 ms

<Min>

-8.25 N at 8.70 ms

CFC_60



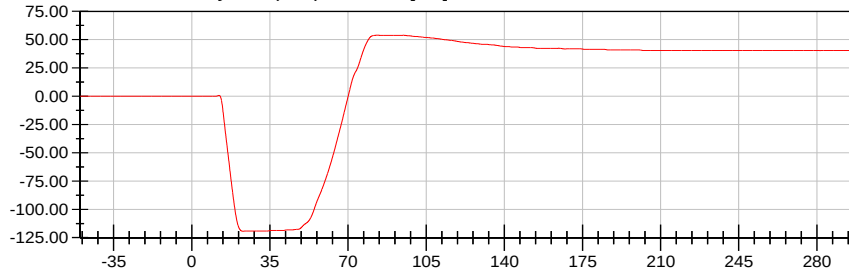
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

Driver Belt Pay Out (mm) vs. Time [ms]



<Max>

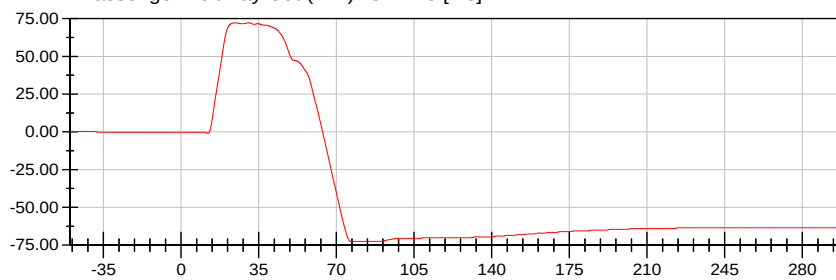
53.88 mm at 82.85 ms

<Min>

-119.29 mm at 22.90 ms

CFC_180

Passenger Belt Pay Out (mm) vs. Time [ms]



<Max>

72.22 mm at 24.35 ms

<Min>

-72.65 mm at 76.80 ms

CFC_180



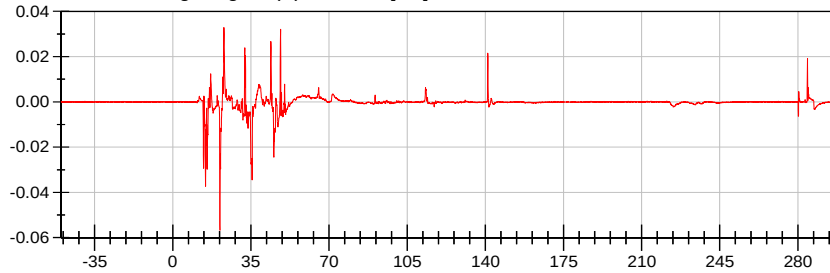
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Driver Airbag Stage 1 (V) vs. Time [ms]



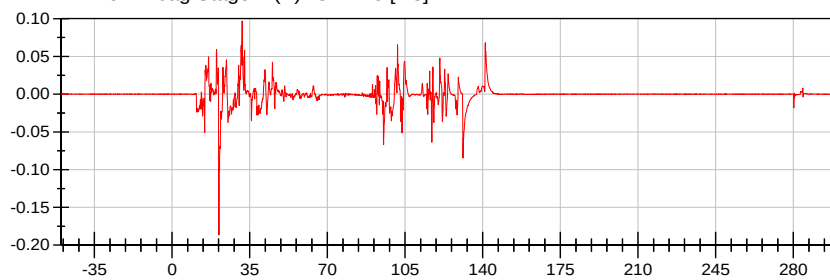
<Max>

0.03 V at 22.90 ms

<Min>

-0.06 V at 21.15 ms

Driver Airbag Stage 2 (V) vs. Time [ms]



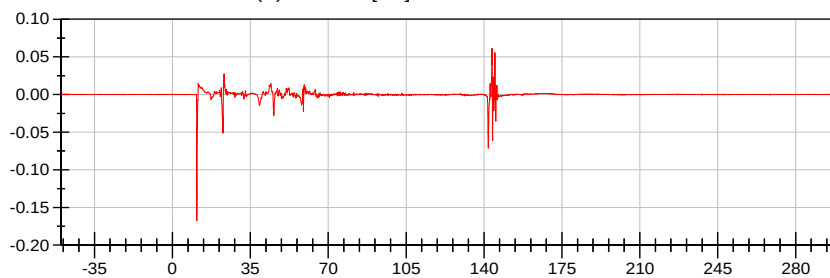
<Max>

0.10 V at 31.60 ms

<Min>

-0.19 V at 21.10 ms

Driver Pretensioner (V) vs. Time [ms]



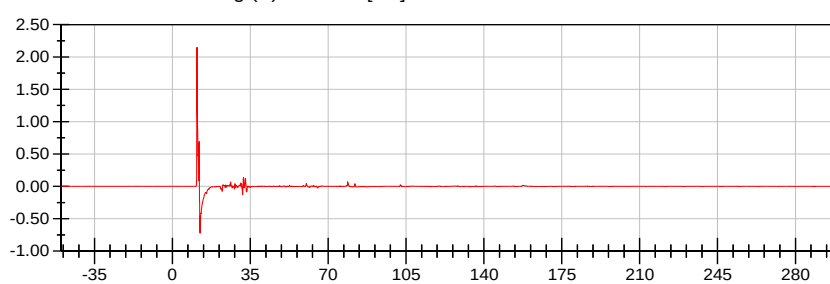
<Max>

0.06 V at 143.55 ms

<Min>

-0.17 V at 11.00 ms

Driver Knee Airbag (V) vs. Time [ms]



<Max>

2.15 V at 11.05 ms

<Min>

-0.72 V at 12.40 ms



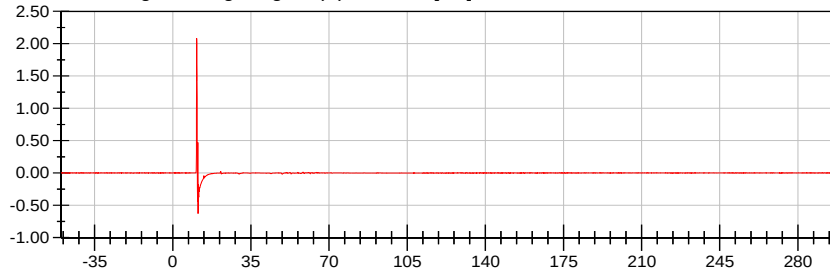
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

Passenger Airbag Stage 1 (V) vs. Time [ms]



<Max>

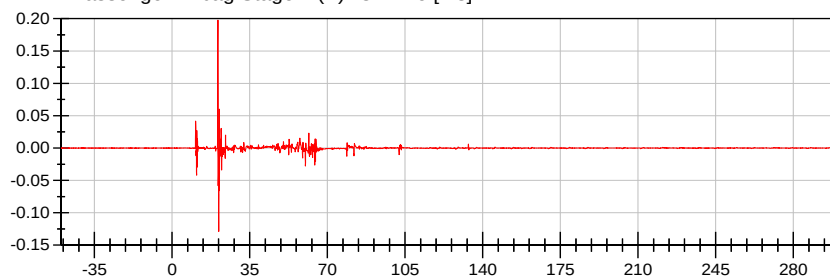
2.08 V at 10.70 ms

<Min>

-0.63 V at 11.35 ms

Unfiltered

Passenger Airbag Stage 2 (V) vs. Time [ms]



<Max>

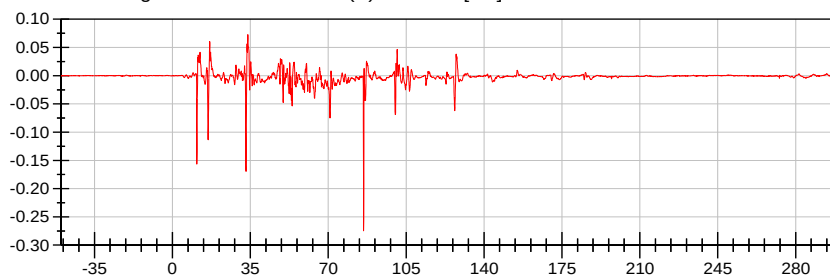
0.20 V at 20.65 ms

<Min>

-0.13 V at 21.05 ms

Unfiltered

Passenger Seat Pretensioner (V) vs. Time [ms]



<Max>

0.07 V at 33.90 ms

<Min>

-0.27 V at 85.90 ms

Unfiltered



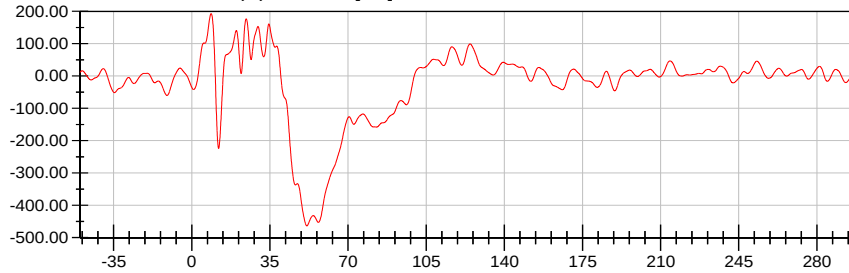
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER K-01 (N) vs. Time [ms]



<Max>

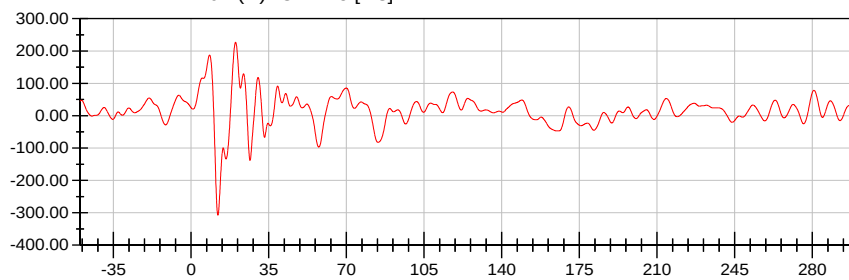
193.16 N at 8.70 ms

<Min>

-463.78 N at 51.55 ms

CFC_60

BARRIER K-02 (N) vs. Time [ms]



<Max>

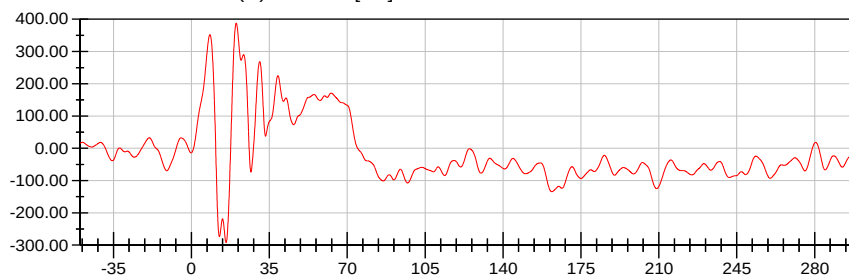
226.93 N at 20.05 ms

<Min>

-307.49 N at 12.10 ms

CFC_60

BARRIER K-03 (N) vs. Time [ms]



<Max>

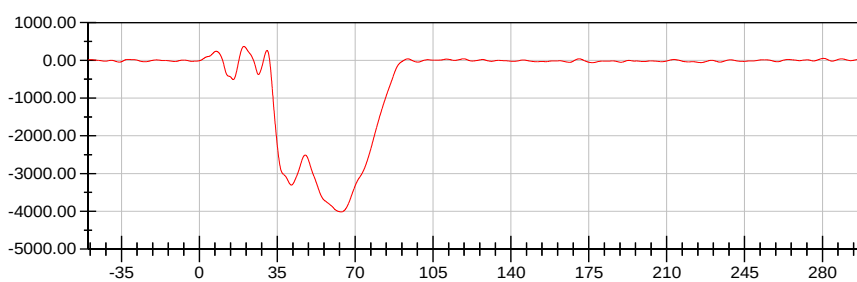
387.71 N at 20.15 ms

<Min>

-292.23 N at 15.60 ms

CFC_60

BARRIER K-04 (N) vs. Time [ms]



<Max>

368.34 N at 20.00 ms

<Min>

-4,014.88 N at 63.70 ms

CFC_60

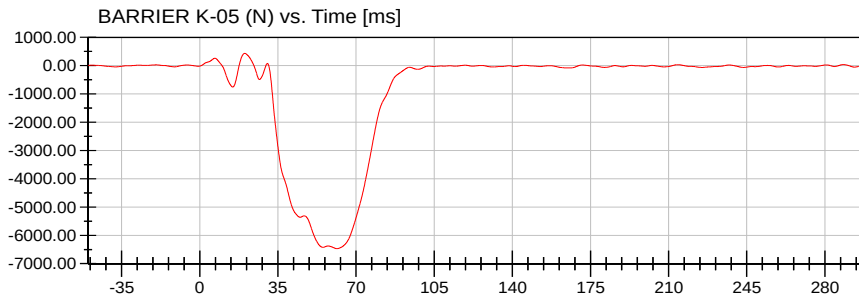


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



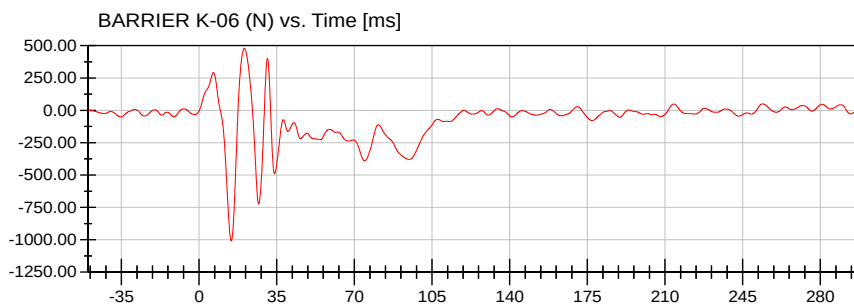
<Max>

432.98 N at 20.15 ms

<Min>

-6,471.00 N at 61.45 ms

CFC_60



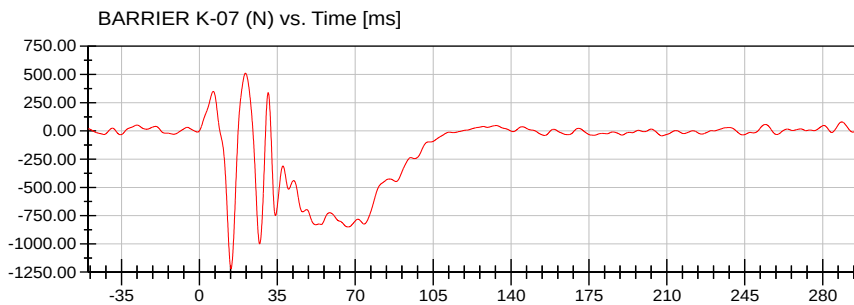
<Max>

479.68 N at 20.40 ms

<Min>

-1,009.12 N at 14.50 ms

CFC_60



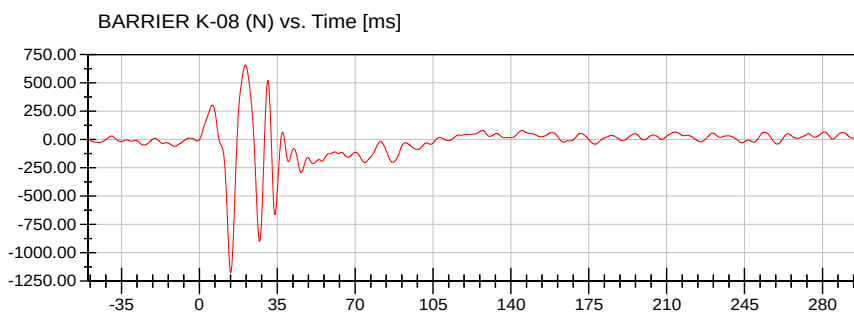
<Max>

511.02 N at 20.70 ms

<Min>

-1,219.57 N at 14.20 ms

CFC_60



<Max>

657.91 N at 20.70 ms

<Min>

-1,176.91 N at 14.10 ms

CFC_60



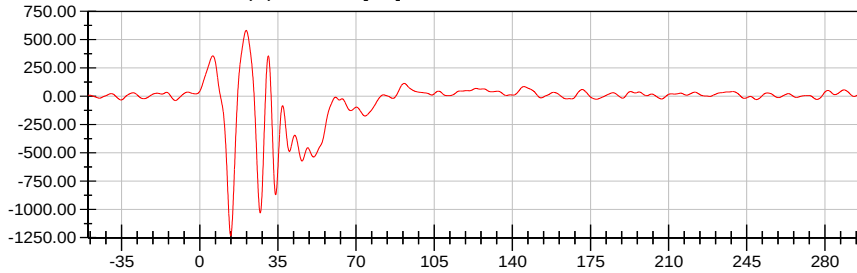
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER K-09 (N) vs. Time [ms]



<Max>

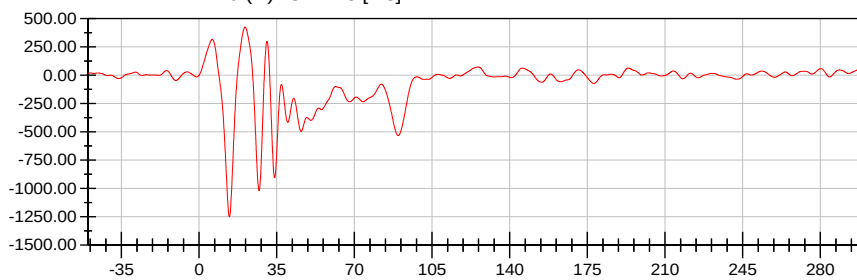
581.44 N at 20.80 ms

<Min>

-1,236.10 N at 13.85 ms

CFC_60

BARRIER K-10 (N) vs. Time [ms]



<Max>

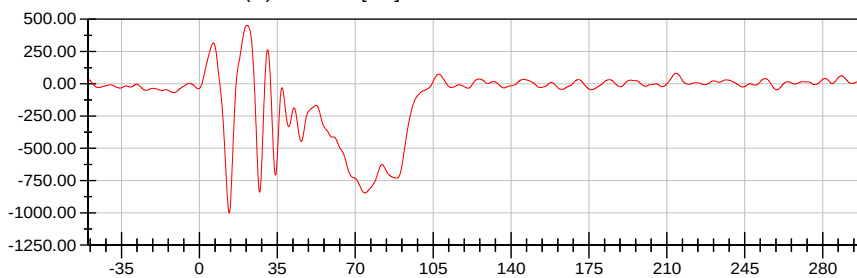
425.74 N at 20.70 ms

<Min>

-1,250.40 N at 13.65 ms

CFC_60

BARRIER K-11 (N) vs. Time [ms]



<Max>

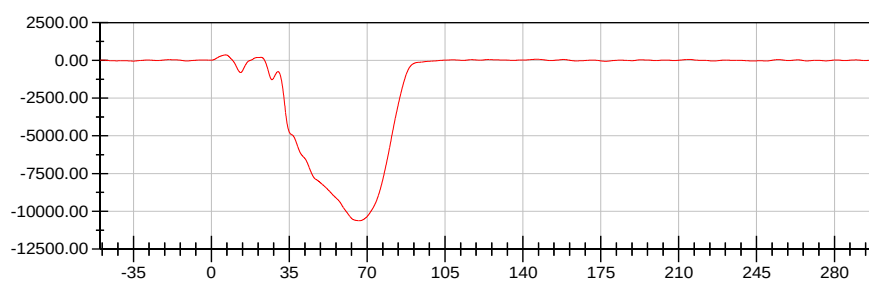
451.53 N at 21.40 ms

<Min>

-1,001.60 N at 13.40 ms

CFC_60

BARRIER K-12 (N) vs. Time [ms]



<Max>

359.44 N at 6.40 ms

<Min>

-10,621.92 N at 66.45 ms

CFC_60



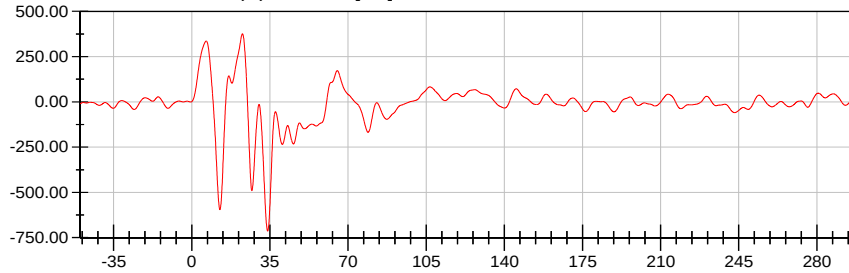
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

BARRIER K-13 (N) vs. Time [ms]



<Max>

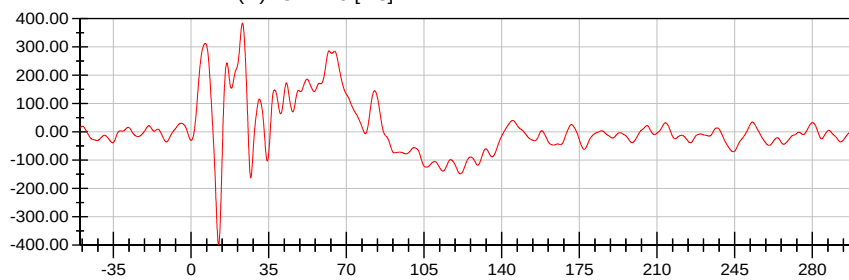
375.90 N at 22.70 ms

<Min>

-714.07 N at 34.00 ms

CFC_60

BARRIER K-14 (N) vs. Time [ms]



<Max>

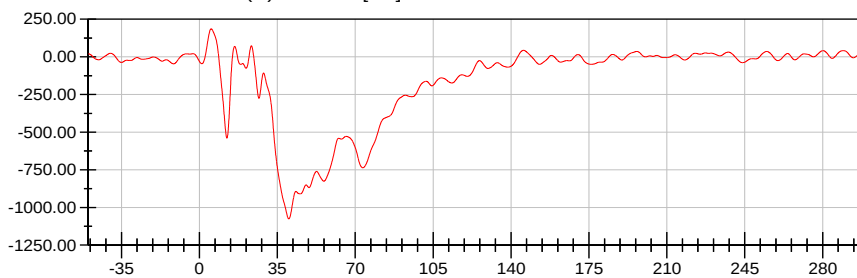
383.90 N at 23.15 ms

<Min>

-398.64 N at 12.40 ms

CFC_60

BARRIER K-15 (N) vs. Time [ms]



<Max>

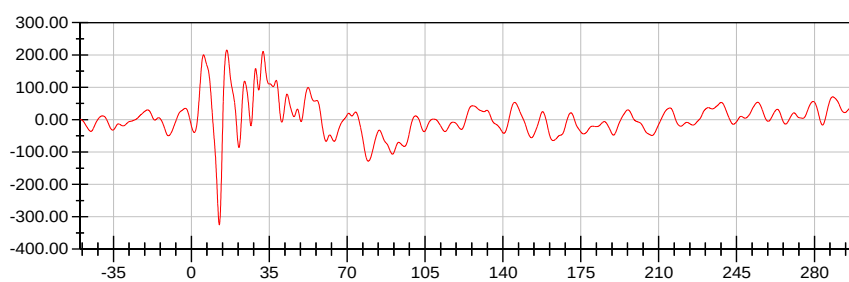
186.33 N at 5.30 ms

<Min>

-1,075.98 N at 40.15 ms

CFC_60

BARRIER K-16 (N) vs. Time [ms]



<Max>

215.37 N at 15.90 ms

<Min>

-325.22 N at 12.55 ms

CFC_60



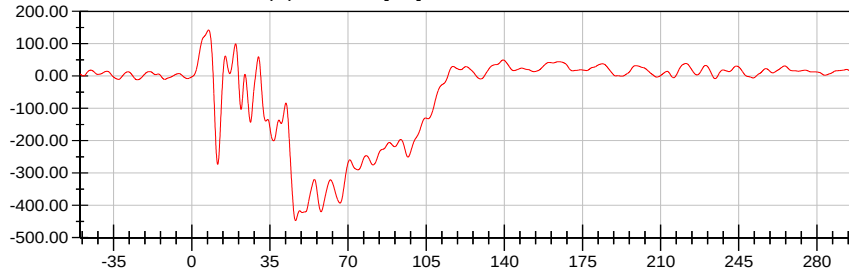
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER J-01 FX (N) vs. Time [ms]



<Max>

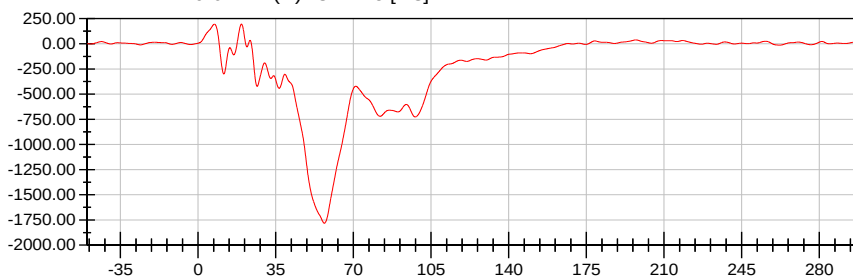
142.37 N at 7.50 ms

<Min>

-447.18 N at 46.50 ms

CFC_60

BARRIER J-02 FX (N) vs. Time [ms]



<Max>

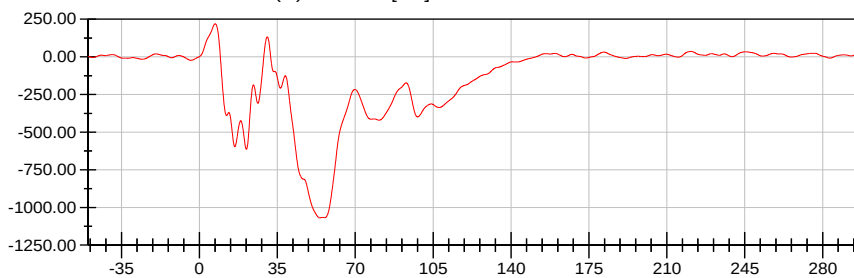
195.55 N at 19.55 ms

<Min>

-1,782.20 N at 56.90 ms

CFC_60

BARRIER J-03 FX (N) vs. Time [ms]



<Max>

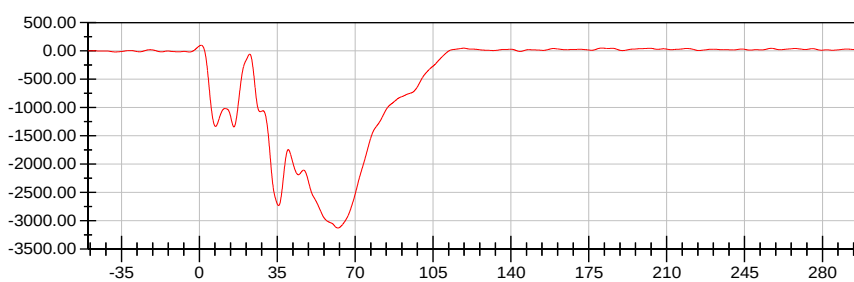
219.74 N at 7.10 ms

<Min>

-1,069.14 N at 54.10 ms

CFC_60

BARRIER J-04 FX (N) vs. Time [ms]



<Max>

99.82 N at 0.80 ms

<Min>

-3,127.01 N at 62.25 ms

CFC_60



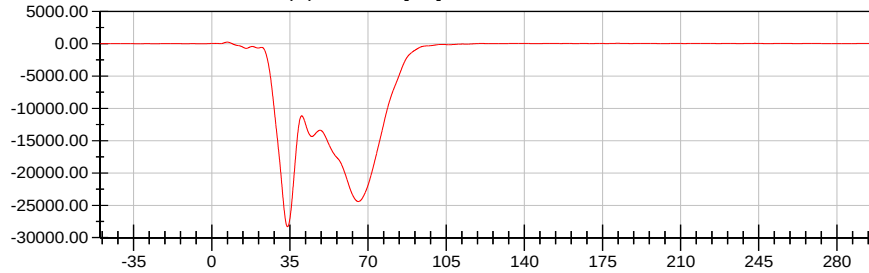
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER J-05 FX (N) vs. Time [ms]



<Max>

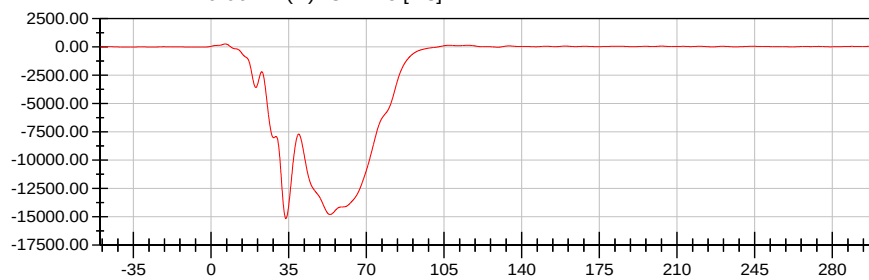
242.61 N at 6.95 ms

<Min>

-28,310.42 N at 33.95 ms

CFC_60

BARRIER J-06 FX (N) vs. Time [ms]



<Max>

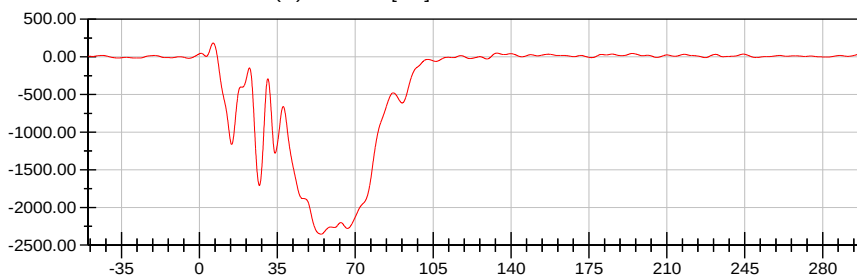
262.78 N at 6.40 ms

<Min>

-15,155.72 N at 33.75 ms

CFC_60

BARRIER J-07 FX (N) vs. Time [ms]



<Max>

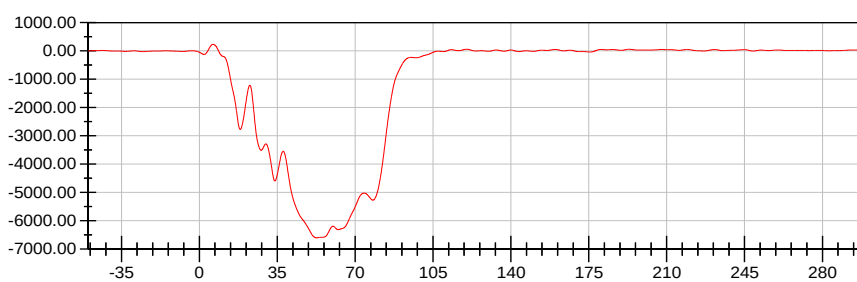
184.52 N at 6.20 ms

<Min>

-2,354.14 N at 54.70 ms

CFC_60

BARRIER J-08 FX (N) vs. Time [ms]



<Max>

231.36 N at 6.15 ms

<Min>

-6,603.06 N at 52.70 ms

CFC_60

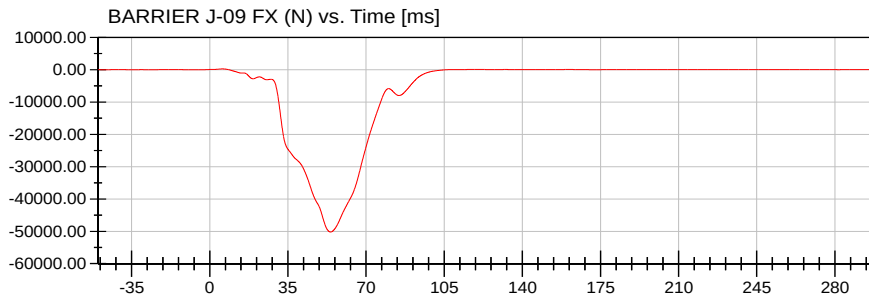


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



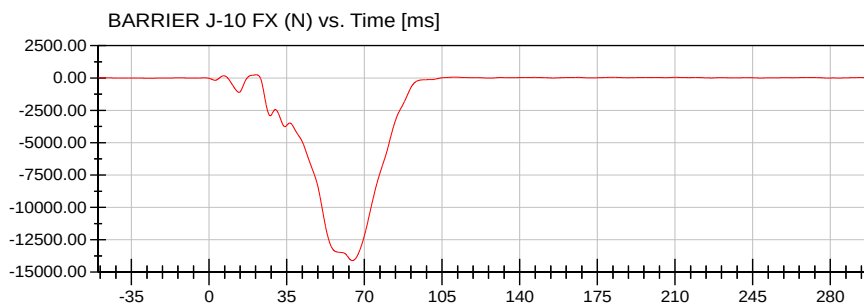
<Max>

245.31 N at 5.65 ms

<Min>

-50,208.92 N at 54.10 ms

CFC_60



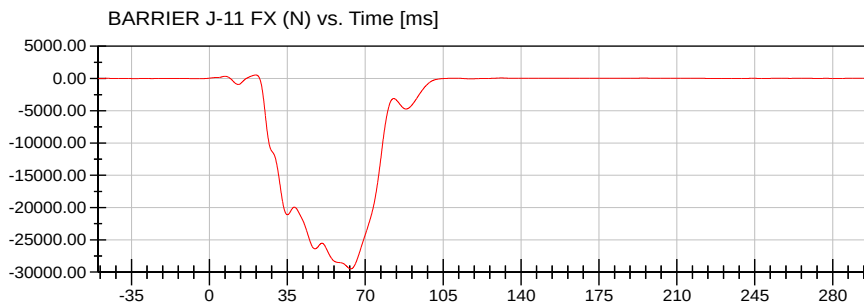
<Max>

251.33 N at 21.25 ms

<Min>

-14,105.69 N at 64.60 ms

CFC_60



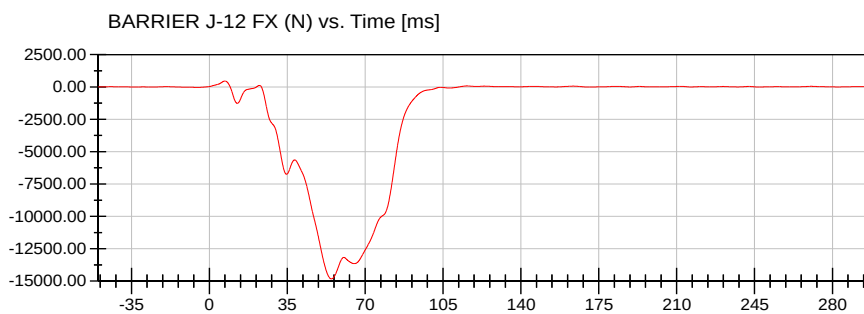
<Max>

545.80 N at 20.85 ms

<Min>

-29,490.49 N at 63.55 ms

CFC_60



<Max>

457.21 N at 7.00 ms

<Min>

-14,832.99 N at 54.85 ms

CFC_60



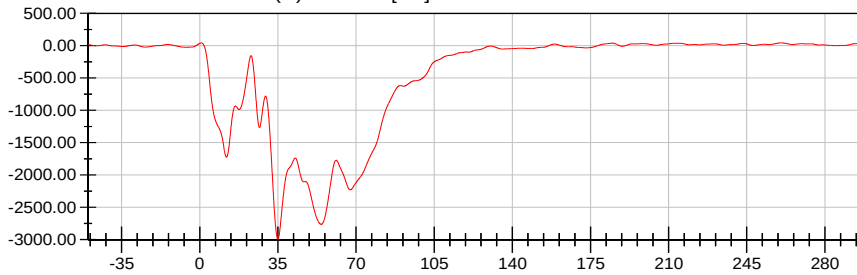
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER J-13 FX (N) vs. Time [ms]



<Max>

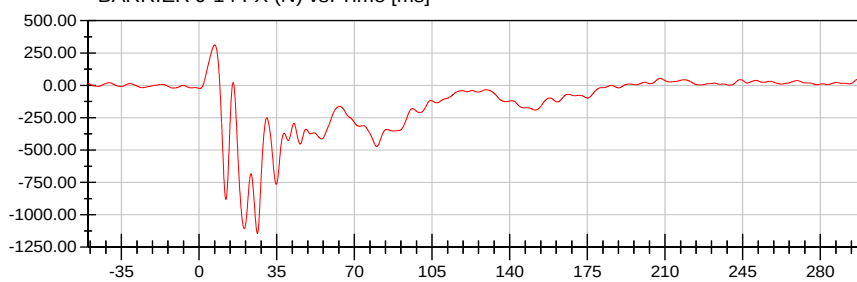
43.61 N at 260.50 ms

<Min>

-2,993.06 N at 34.95 ms

CFC_60

BARRIER J-14 FX (N) vs. Time [ms]



<Max>

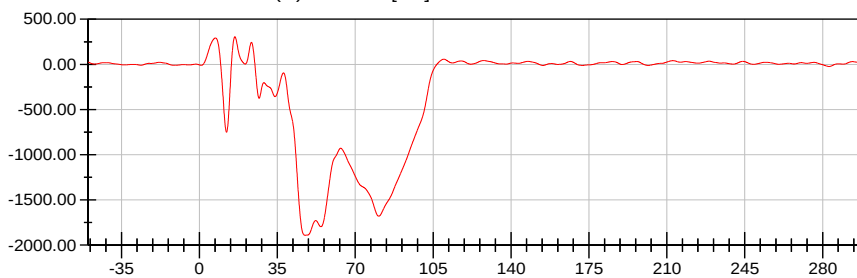
313.25 N at 7.00 ms

<Min>

-1,144.94 N at 26.30 ms

CFC_60

BARRIER J-15 FX (N) vs. Time [ms]



<Max>

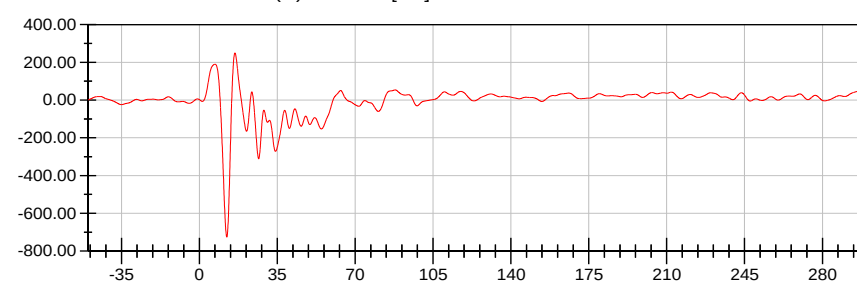
305.37 N at 15.95 ms

<Min>

-1,890.22 N at 47.50 ms

CFC_60

BARRIER J-16 FX (N) vs. Time [ms]



<Max>

249.80 N at 16.00 ms

<Min>

-725.50 N at 12.30 ms

CFC_60

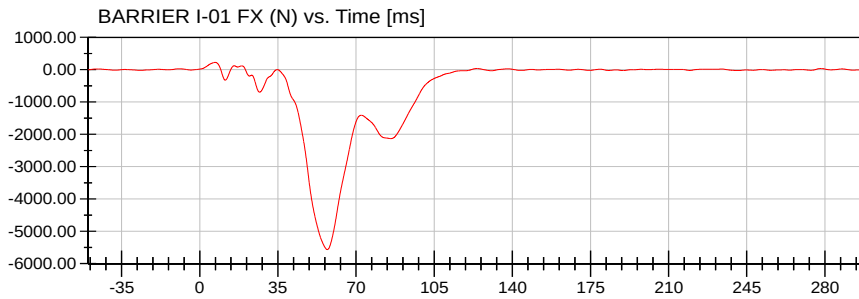


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



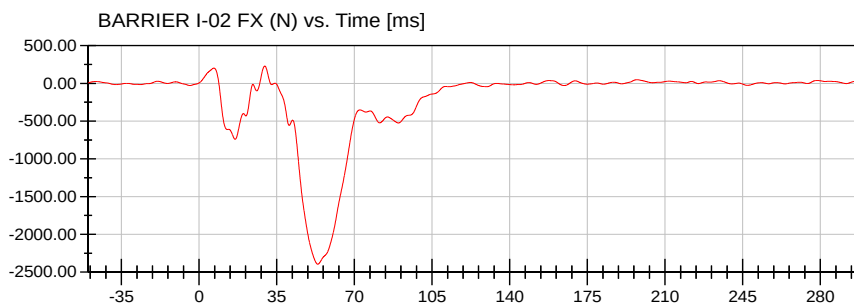
<Max>

226.02 N at 6.85 ms

<Min>

-5,563.93 N at 57.15 ms

CFC_60



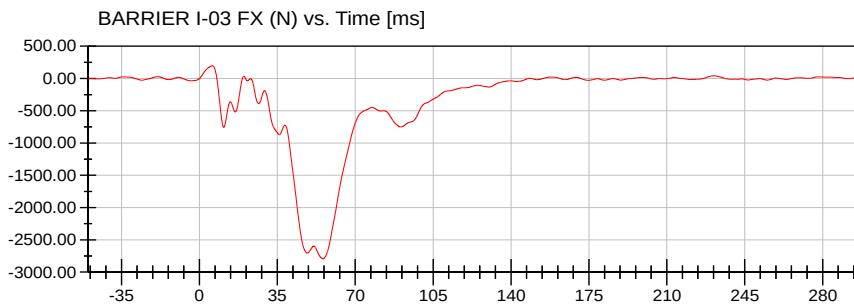
<Max>

229.66 N at 29.60 ms

<Min>

-2,395.01 N at 53.55 ms

CFC_60



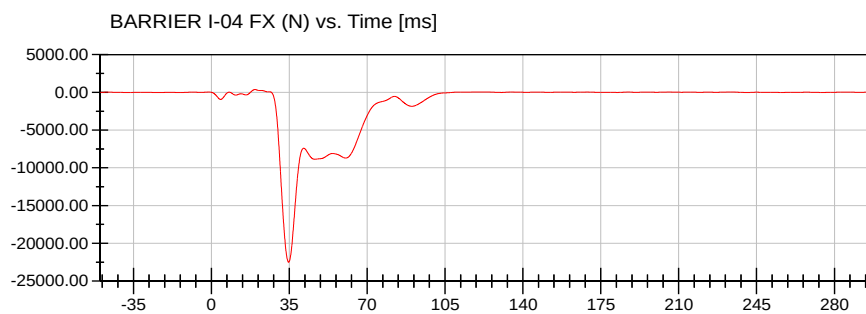
<Max>

197.02 N at 5.75 ms

<Min>

-2,792.74 N at 55.45 ms

CFC_60



<Max>

370.66 N at 19.60 ms

<Min>

-22,496.08 N at 34.70 ms

CFC_60

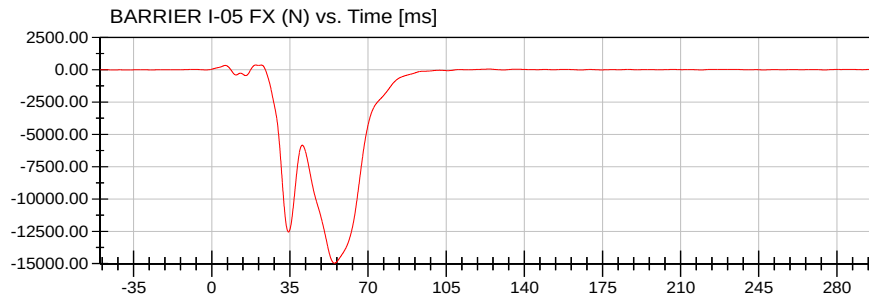


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



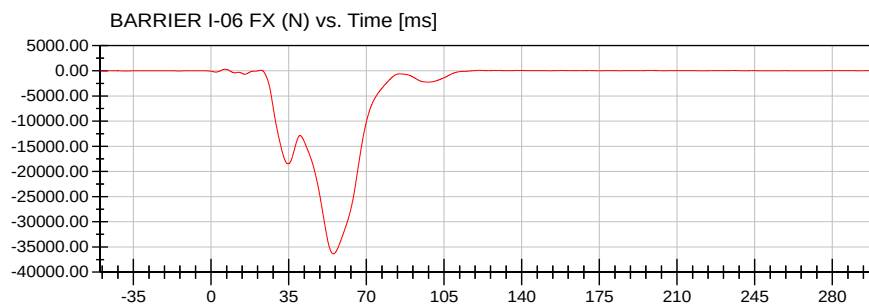
<Max>

360.90 N at 19.65 ms

<Min>

-14,966.46 N at 55.00 ms

CFC_60



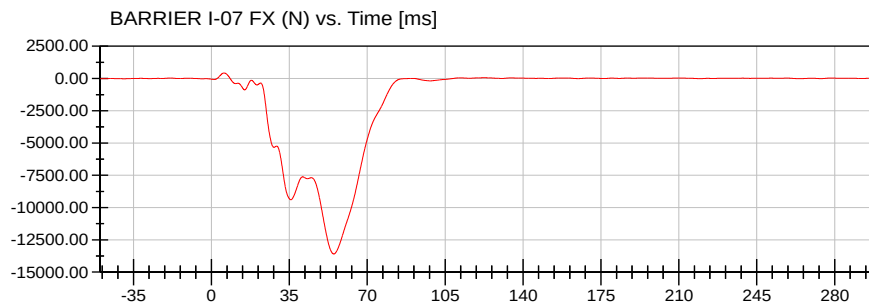
<Max>

307.93 N at 6.30 ms

<Min>

-36,358.76 N at 55.15 ms

CFC_60



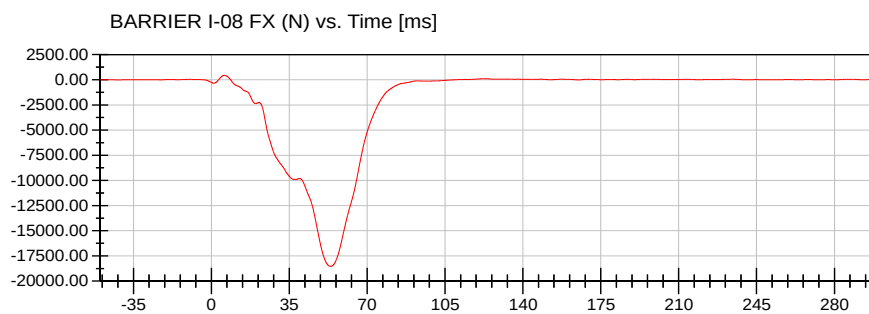
<Max>

423.78 N at 5.70 ms

<Min>

-13,594.03 N at 55.00 ms

CFC_60



<Max>

437.27 N at 5.80 ms

<Min>

-18,531.48 N at 53.60 ms

CFC_60

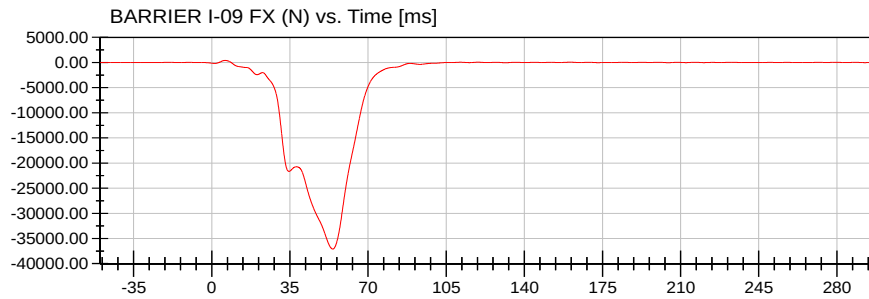


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



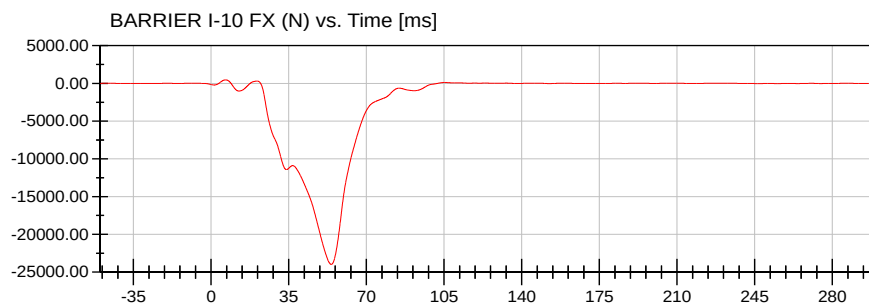
<Max>

403.33 N at 5.95 ms

<Min>

-37,104.26 N at 54.20 ms

CFC_60



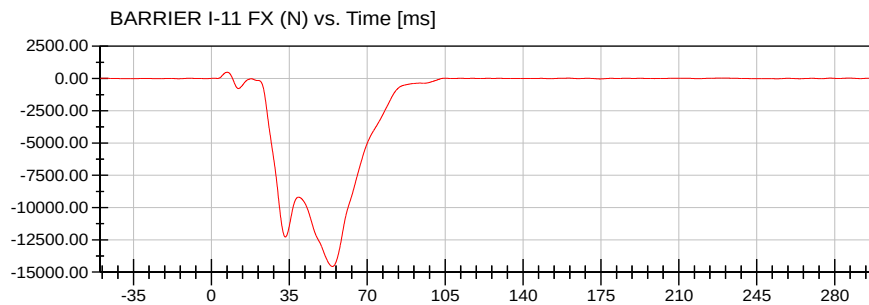
<Max>

462.16 N at 6.55 ms

<Min>

-23,975.90 N at 54.15 ms

CFC_60



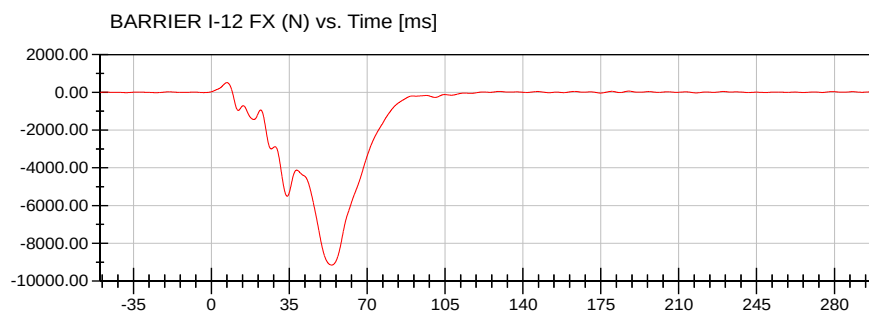
<Max>

485.83 N at 7.10 ms

<Min>

-14,563.12 N at 54.35 ms

CFC_60



<Max>

514.51 N at 7.00 ms

<Min>

-9,151.63 N at 54.05 ms

CFC_60



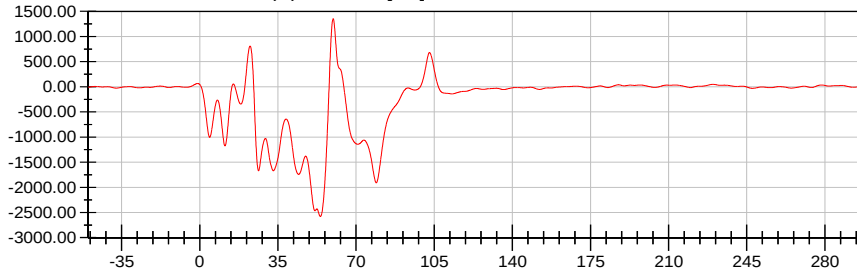
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER I-13 FX (N) vs. Time [ms]



<Max>

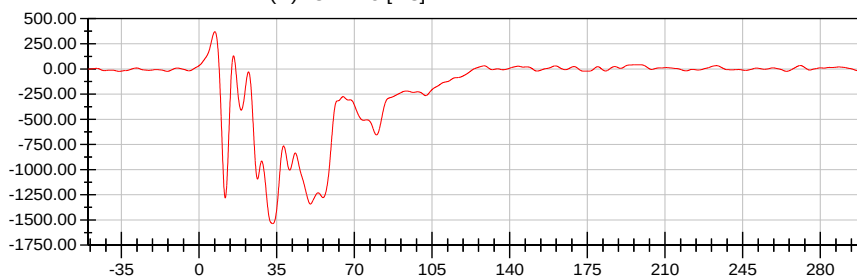
1,353.38 N at 59.75 ms

<Min>

-2,579.86 N at 54.00 ms

CFC_60

BARRIER I-14 FX (N) vs. Time [ms]



<Max>

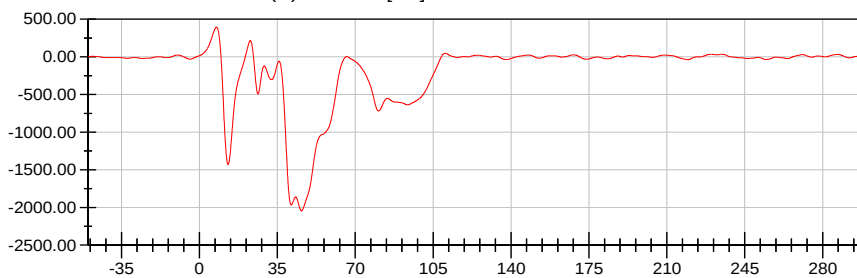
369.84 N at 7.10 ms

<Min>

-1,536.70 N at 33.25 ms

CFC_60

BARRIER I-15 FX (N) vs. Time [ms]



<Max>

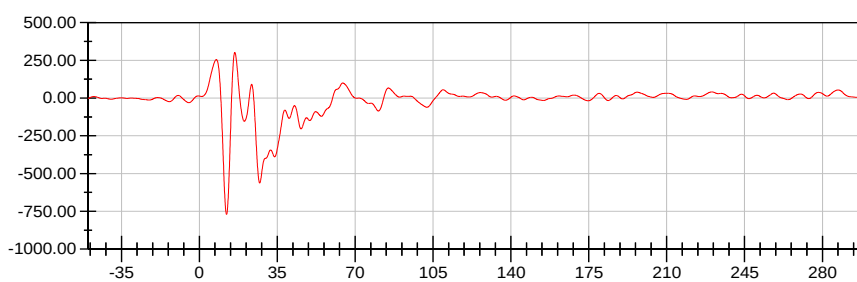
394.37 N at 7.70 ms

<Min>

-2,045.68 N at 45.85 ms

CFC_60

BARRIER I-16 FX (N) vs. Time [ms]



<Max>

302.50 N at 15.90 ms

<Min>

-770.43 N at 12.20 ms

CFC_60

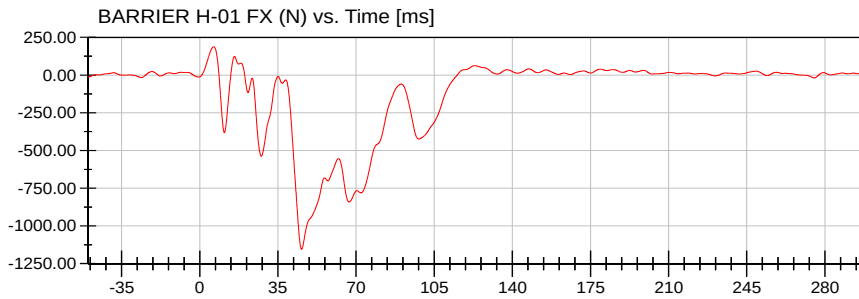


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



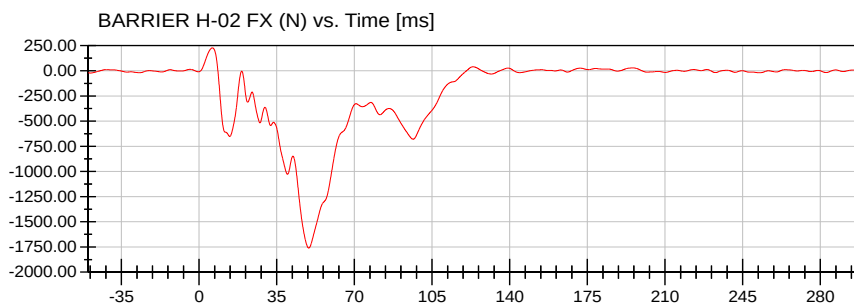
<Max>

187.63 N at 6.30 ms

<Min>

-1,155.34 N at 45.60 ms

CFC_60



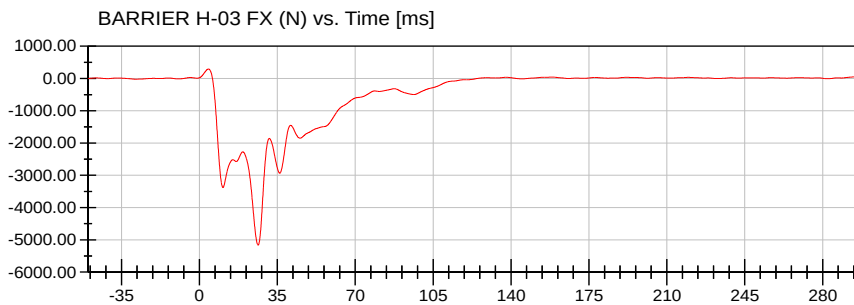
<Max>

228.34 N at 6.05 ms

<Min>

-1,760.89 N at 49.45 ms

CFC_60



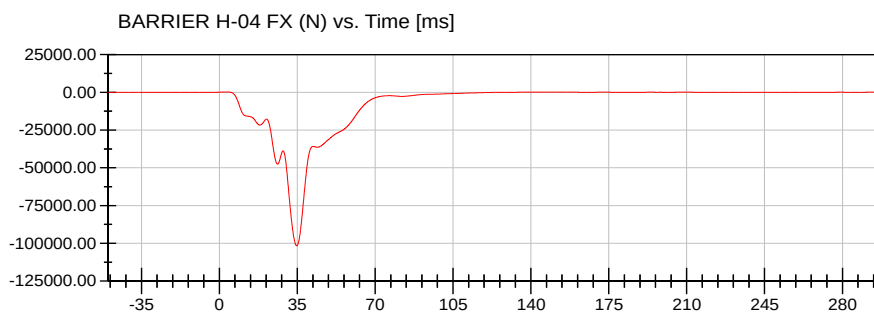
<Max>

293.38 N at 4.05 ms

<Min>

-5,163.18 N at 26.35 ms

CFC_60



<Max>

293.19 N at 3.30 ms

<Min>

-101,639.31 N at 34.75 ms

CFC_60

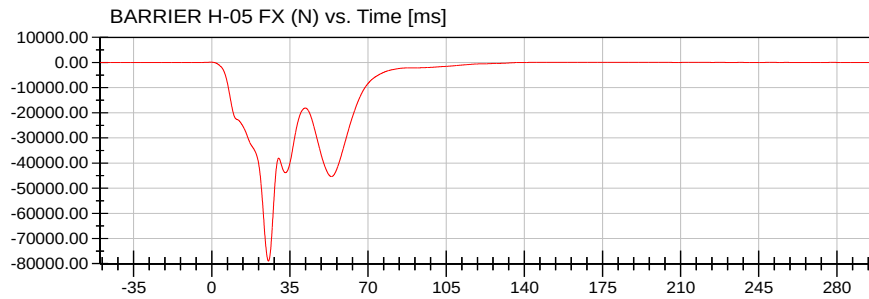


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



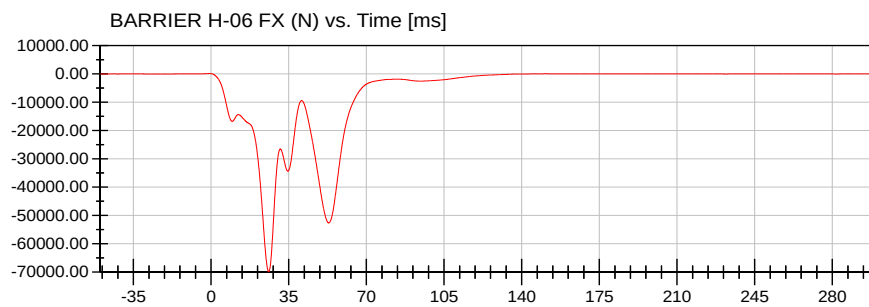
<Max>

130.79 N at -0.35 ms

<Min>

-78,960.76 N at 25.40 ms

CFC_60



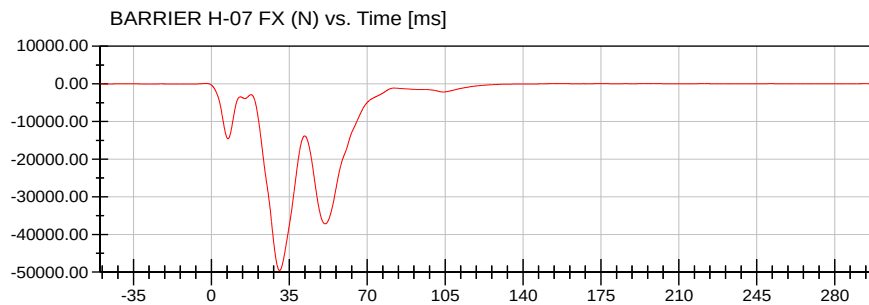
<Max>

142.20 N at -0.75 ms

<Min>

-69,868.30 N at 26.00 ms

CFC_60



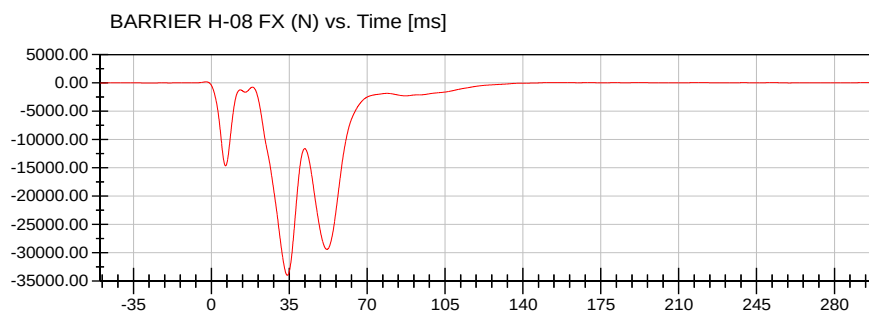
<Max>

106.54 N at -2.35 ms

<Min>

-49,564.67 N at 30.65 ms

CFC_60



<Max>

183.06 N at -2.35 ms

<Min>

-33,977.93 N at 34.15 ms

CFC_60

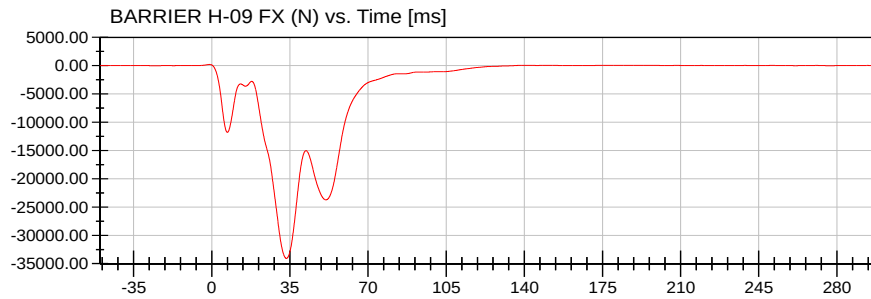


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



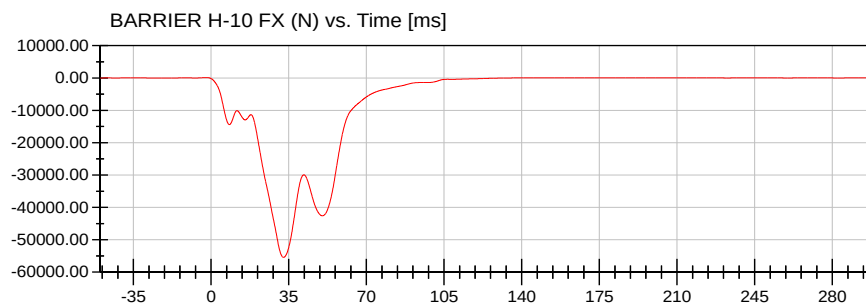
<Max>

201.15 N at -1.05 ms

<Min>

-34,081.92 N at 33.45 ms

CFC_60



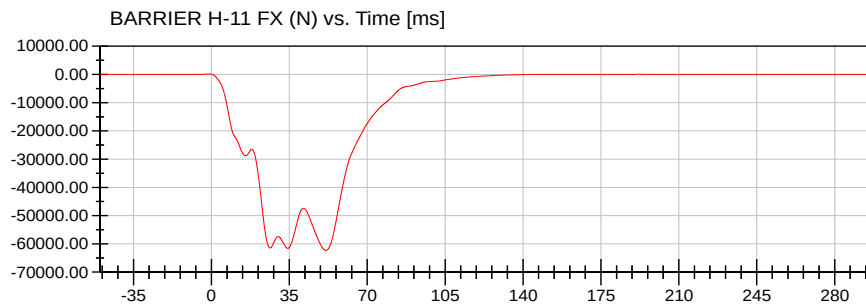
<Max>

125.38 N at -2.20 ms

<Min>

-55,445.98 N at 32.70 ms

CFC_60



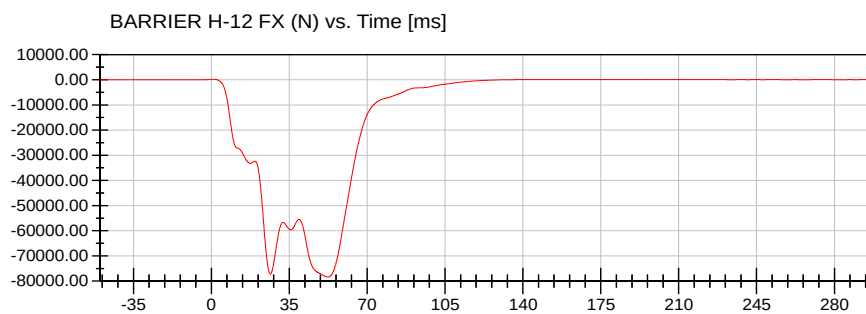
<Max>

145.00 N at -1.00 ms

<Min>

-62,307.25 N at 51.45 ms

CFC_60



<Max>

166.42 N at 1.05 ms

<Min>

-78,386.49 N at 52.35 ms

CFC_60

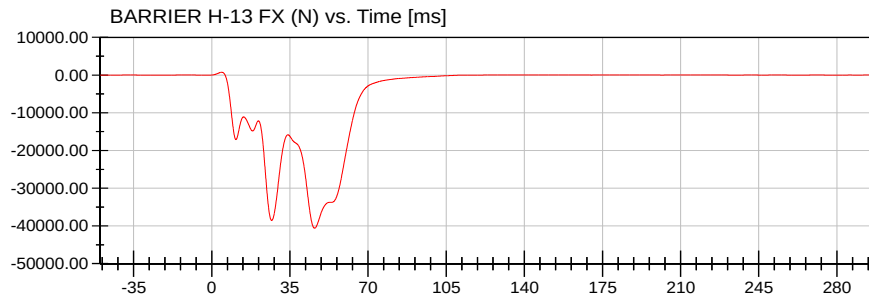


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



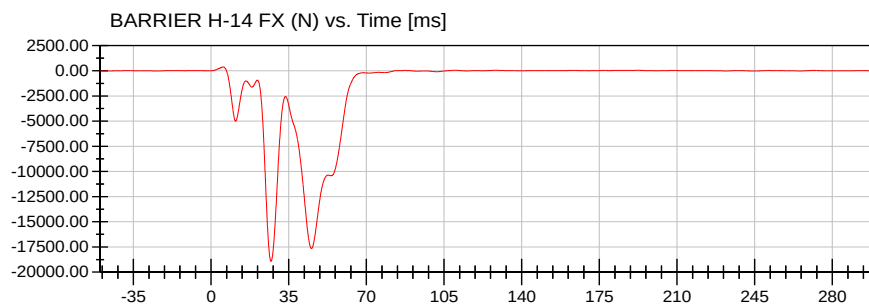
<Max>

740.62 N at 4.45 ms

<Min>

-40,600.86 N at 46.05 ms

CFC_60



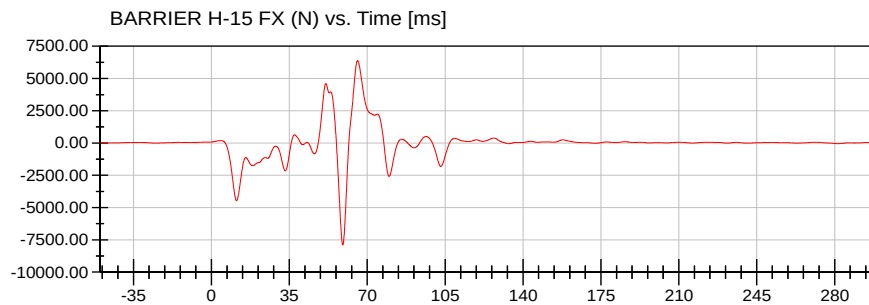
<Max>

378.92 N at 5.40 ms

<Min>

-18,923.29 N at 27.05 ms

CFC_60



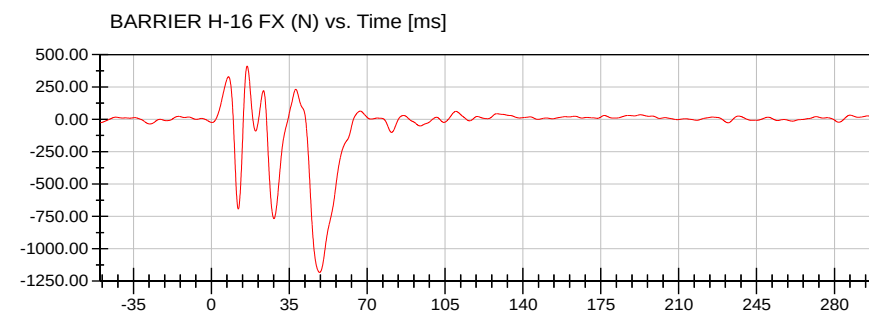
<Max>

6,387.05 N at 65.70 ms

<Min>

-7,905.14 N at 59.05 ms

CFC_60



<Max>

411.01 N at 16.05 ms

<Min>

-1,183.00 N at 48.65 ms

CFC_60



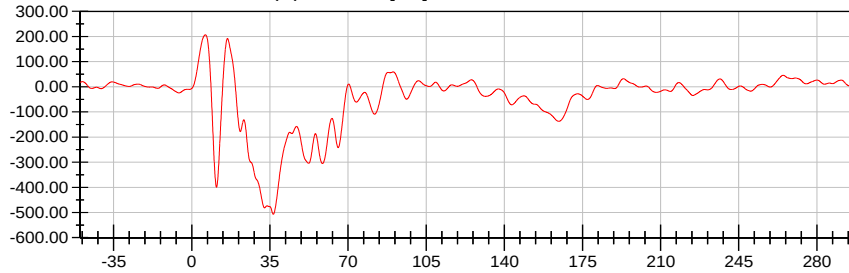
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER G-01 FX (N) vs. Time [ms]



<Max>

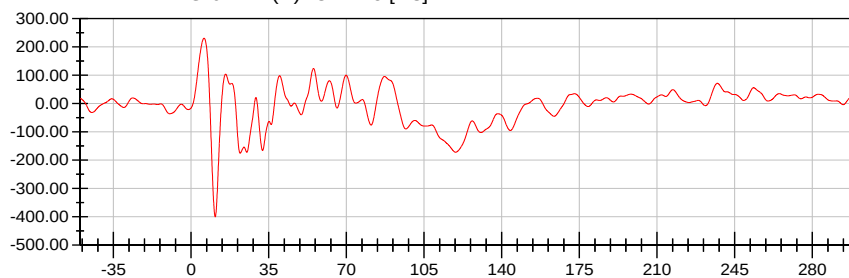
207.01 N at 6.10 ms

<Min>

-507.07 N at 36.55 ms

CFC_60

BARRIER G-02 FX (N) vs. Time [ms]



<Max>

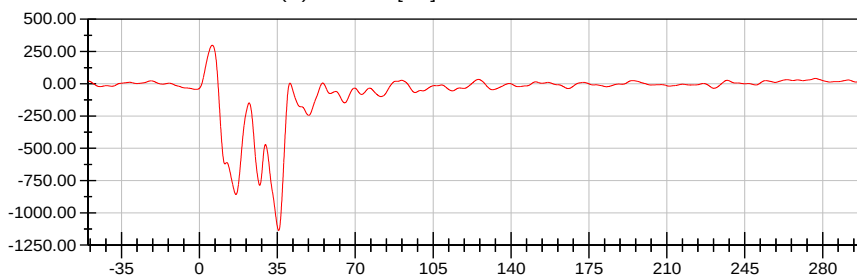
230.95 N at 5.85 ms

<Min>

-400.25 N at 10.90 ms

CFC_60

BARRIER G-03 FX (N) vs. Time [ms]



<Max>

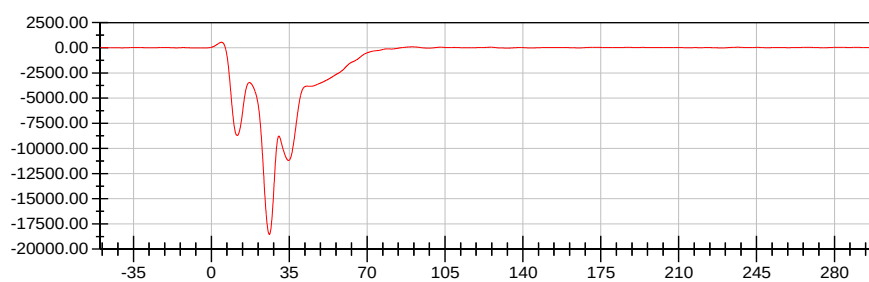
298.61 N at 5.80 ms

<Min>

-1,136.64 N at 35.60 ms

CFC_60

BARRIER G-04 FX (N) vs. Time [ms]



<Max>

548.56 N at 4.55 ms

<Min>

-18,538.31 N at 26.05 ms

CFC_60

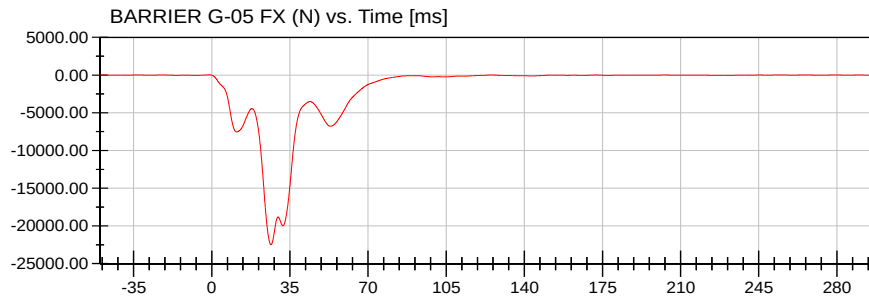


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



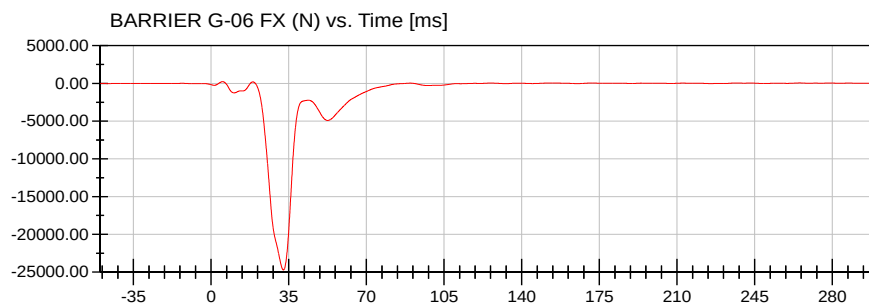
<Max>

32.87 N at -1.25 ms

<Min>

-22,495.35 N at 26.55 ms

CFC_60



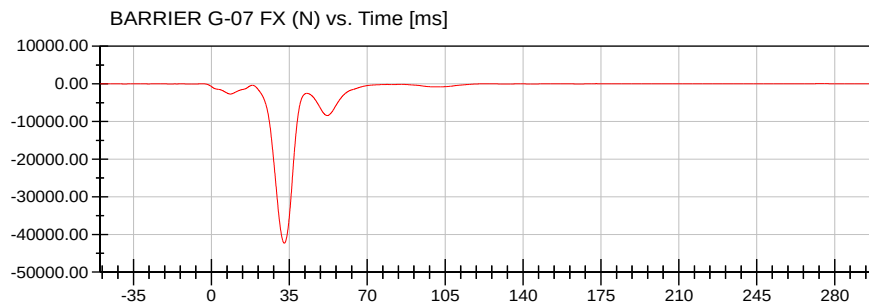
<Max>

230.04 N at 5.20 ms

<Min>

-24,721.67 N at 32.60 ms

CFC_60



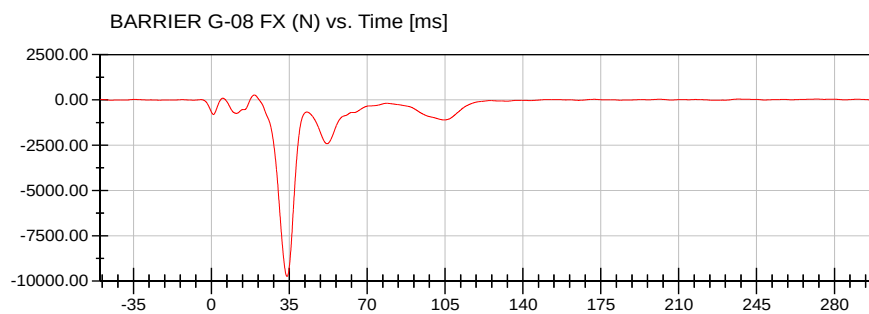
<Max>

51.57 N at 272.90 ms

<Min>

-42,321.43 N at 32.75 ms

CFC_60



<Max>

271.42 N at 19.30 ms

<Min>

-9,744.74 N at 34.00 ms

CFC_60

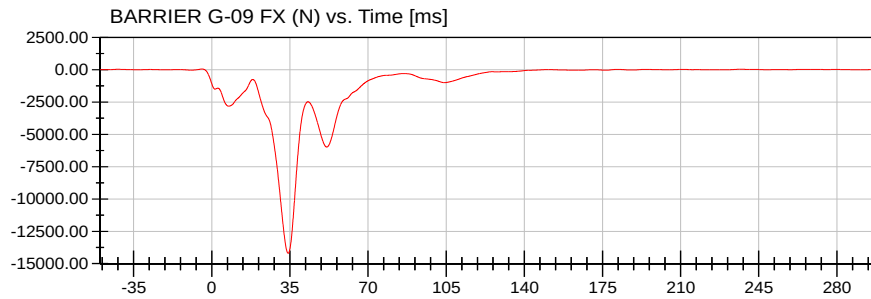


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



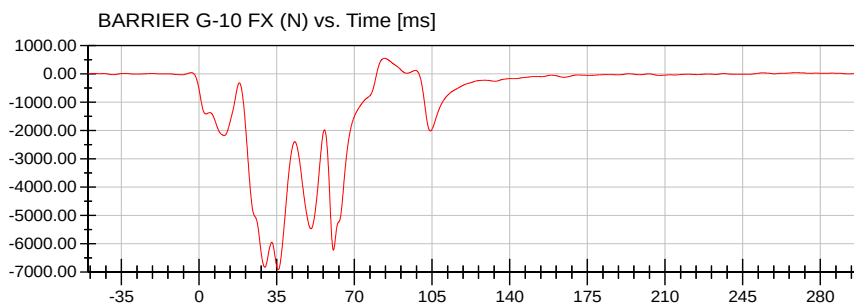
<Max>

52.35 N at -4.35 ms

<Min>

-14,197.16 N at 34.20 ms

CFC_60



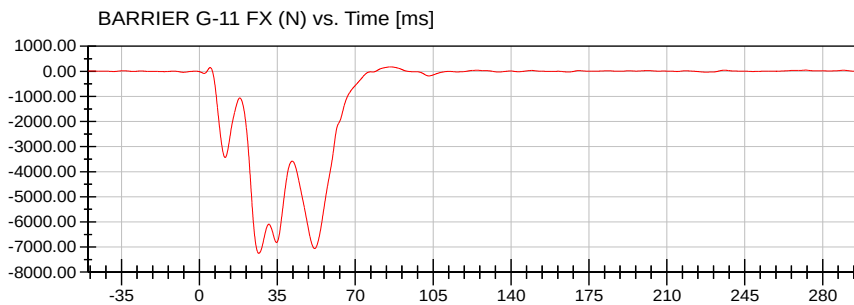
<Max>

548.75 N at 83.60 ms

<Min>

-6,914.94 N at 35.70 ms

CFC_60



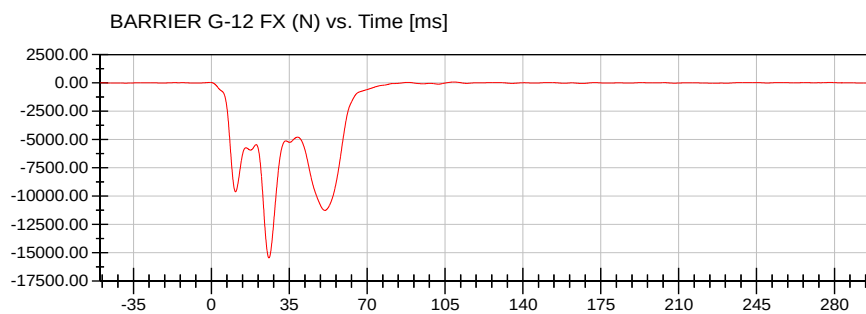
<Max>

173.93 N at 85.90 ms

<Min>

-7,252.30 N at 26.70 ms

CFC_60



<Max>

81.09 N at 108.90 ms

<Min>

-15,453.68 N at 25.85 ms

CFC_60

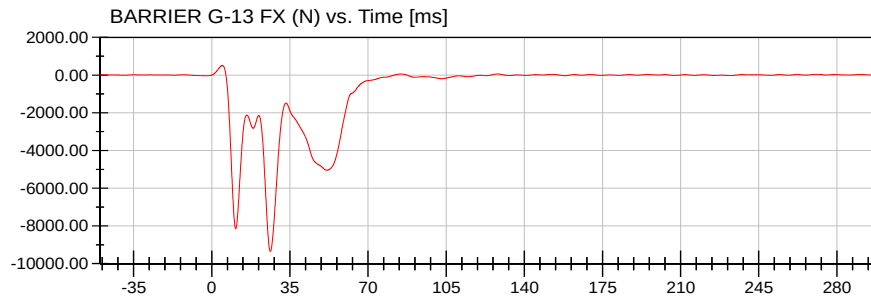


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



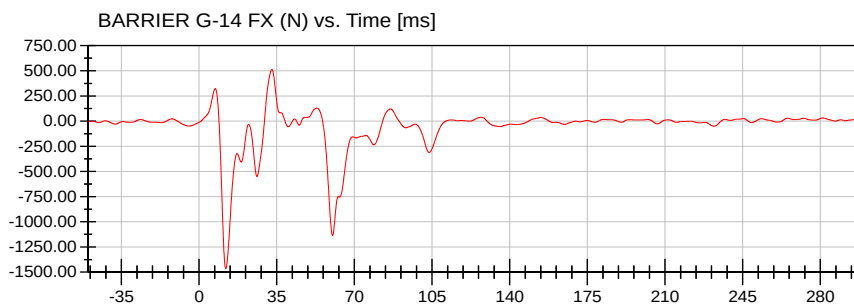
<Max>

512.41 N at 4.75 ms

<Min>

-9,359.42 N at 26.25 ms

CFC_60



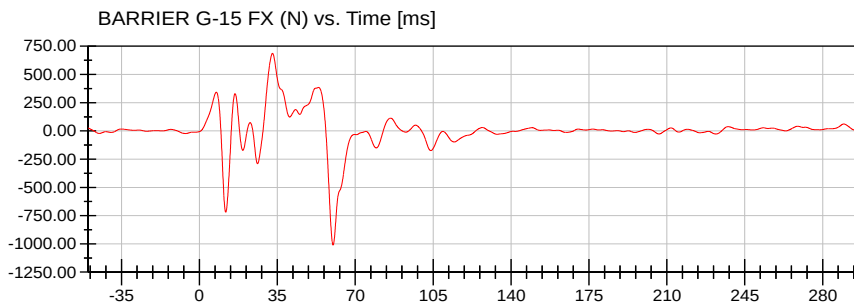
<Max>

513.70 N at 32.80 ms

<Min>

-1,466.03 N at 12.05 ms

CFC_60



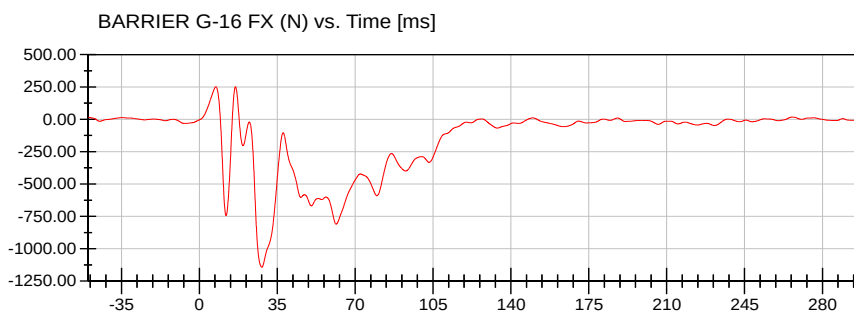
<Max>

686.51 N at 32.85 ms

<Min>

-1,010.31 N at 60.05 ms

CFC_60



<Max>

251.23 N at 16.20 ms

<Min>

-1,142.99 N at 28.05 ms

CFC_60

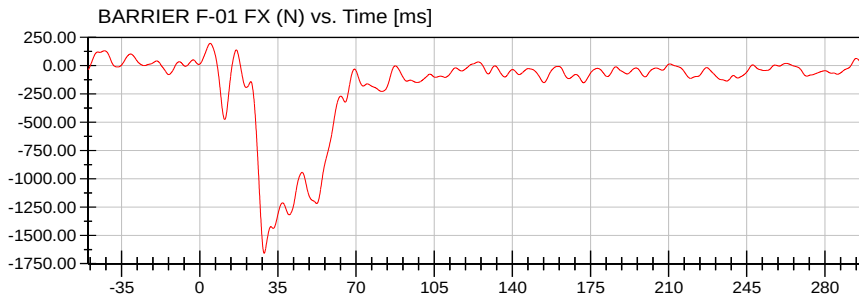


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



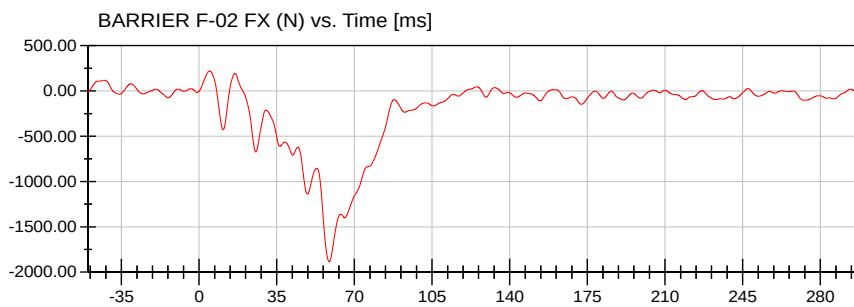
<Max>

196.52 N at 4.70 ms

<Min>

-1,657.65 N at 28.85 ms

CFC_60



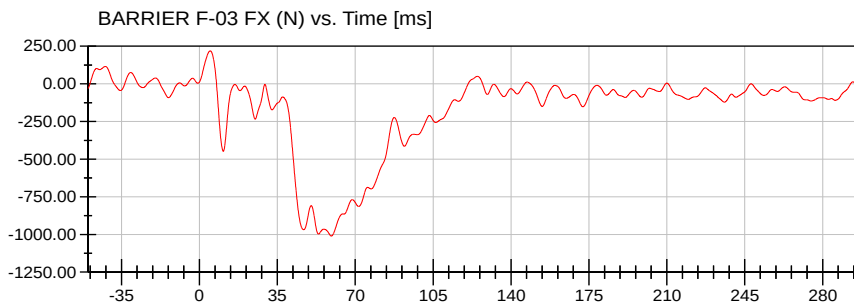
<Max>

220.55 N at 4.75 ms

<Min>

-1,886.27 N at 58.65 ms

CFC_60



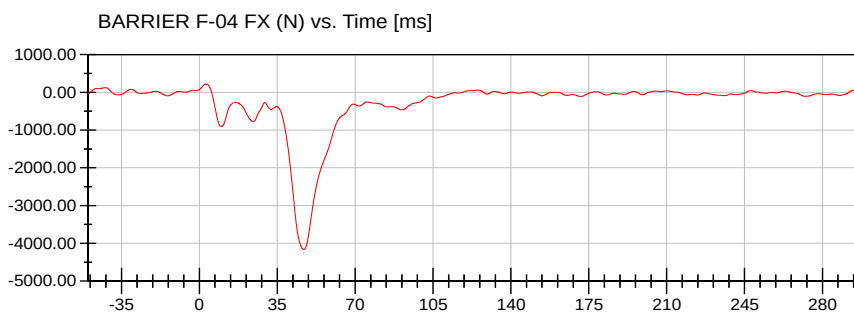
<Max>

219.50 N at 4.85 ms

<Min>

-1,010.09 N at 59.30 ms

CFC_60



<Max>

219.10 N at 3.10 ms

<Min>

-4,161.62 N at 47.00 ms

CFC_60

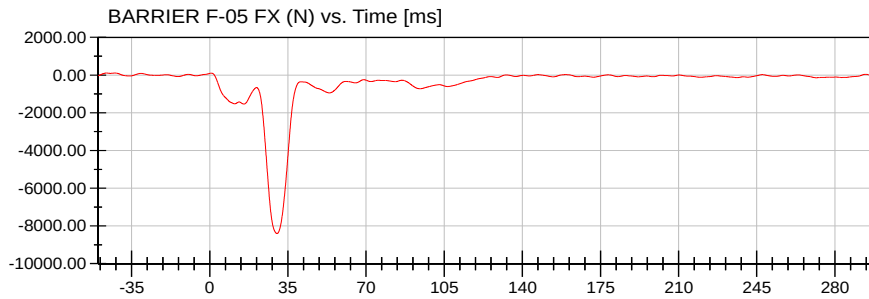


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



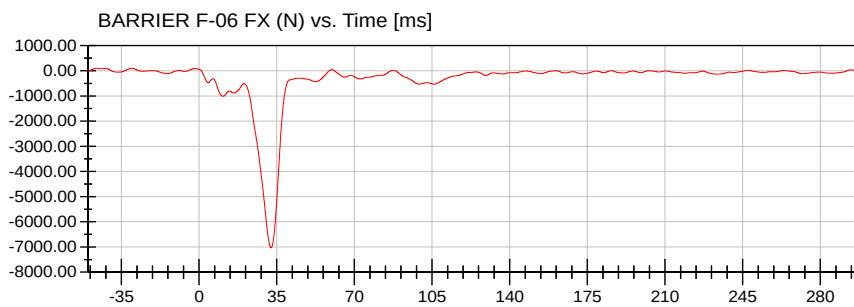
<Max>

106.52 N at -46.25 ms

<Min>

-8,401.82 N at 30.15 ms

CFC_60



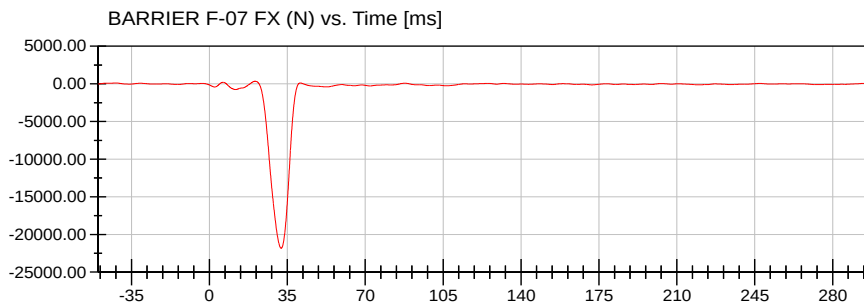
<Max>

99.84 N at -46.20 ms

<Min>

-7,027.88 N at 32.45 ms

CFC_60



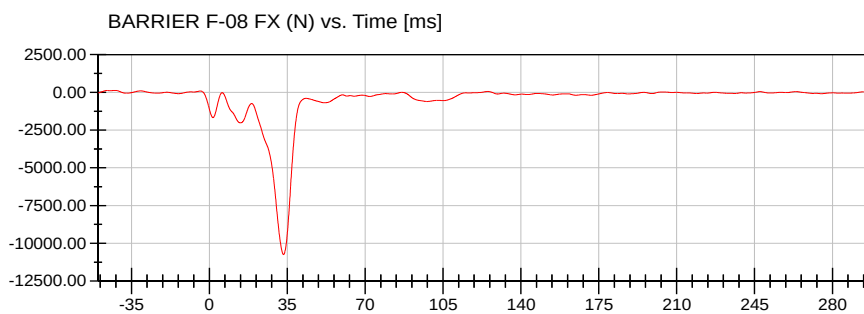
<Max>

351.56 N at 20.55 ms

<Min>

-21,830.27 N at 32.25 ms

CFC_60



<Max>

130.90 N at -42.35 ms

<Min>

-10,741.44 N at 33.35 ms

CFC_60

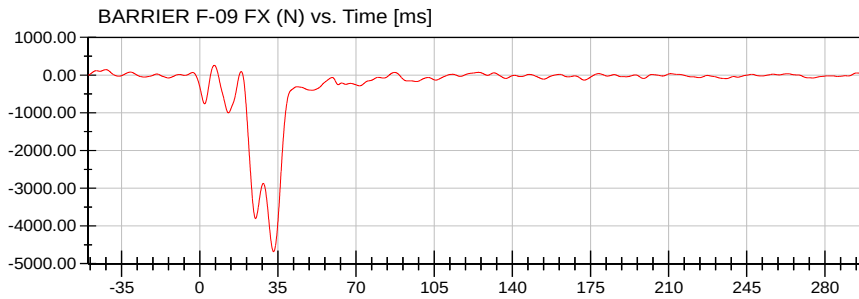


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



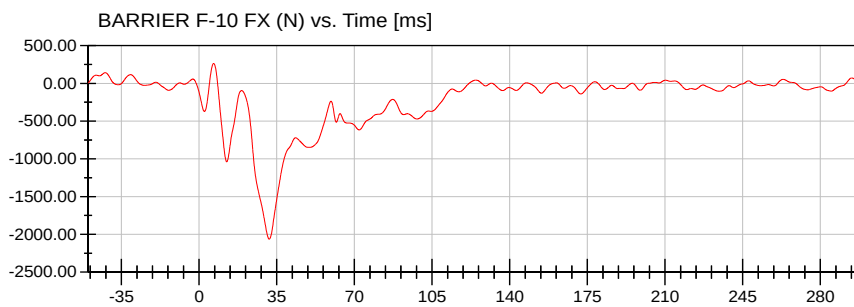
<Max>

257.66 N at 6.50 ms

<Min>

-4,682.21 N at 33.05 ms

CFC_60



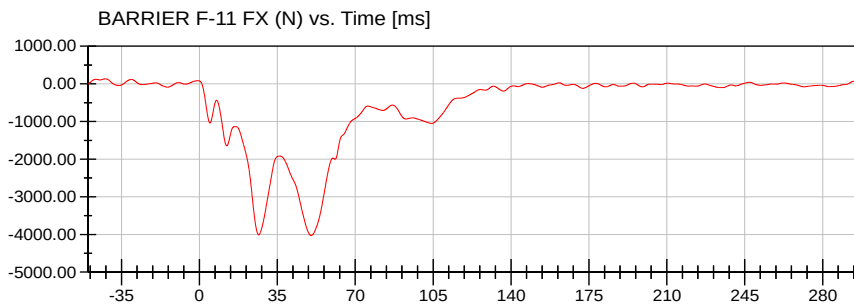
<Max>

264.33 N at 6.55 ms

<Min>

-2,064.02 N at 31.60 ms

CFC_60



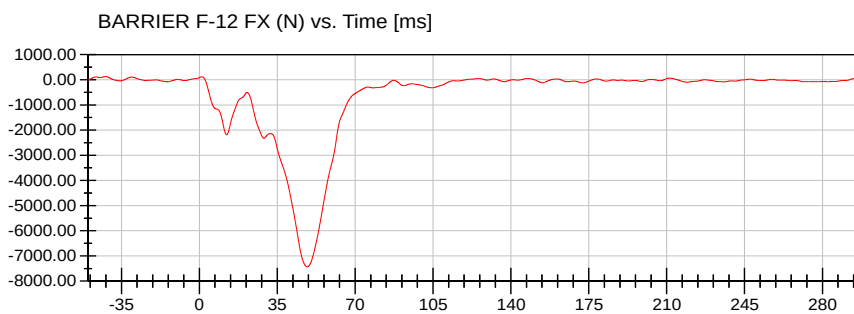
<Max>

133.08 N at -42.30 ms

<Min>

-4,026.10 N at 50.25 ms

CFC_60



<Max>

126.88 N at -42.10 ms

<Min>

-7,432.91 N at 48.45 ms

CFC_60



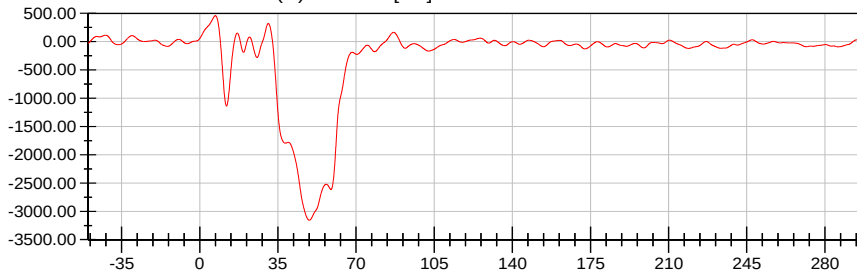
VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()

BARRIER F-13 FX (N) vs. Time [ms]



<Max>

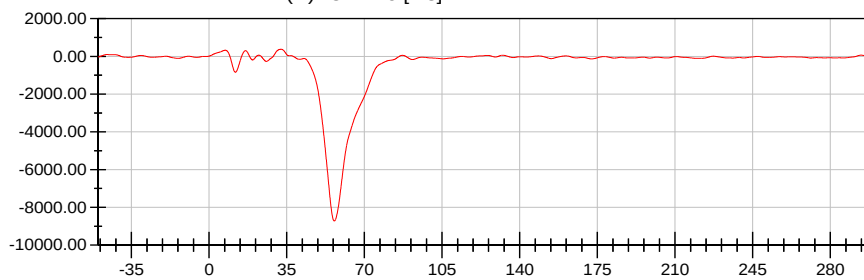
459.75 N at 7.00 ms

<Min>

-3,155.79 N at 49.05 ms

CFC_60

BARRIER F-14 FX (N) vs. Time [ms]



<Max>

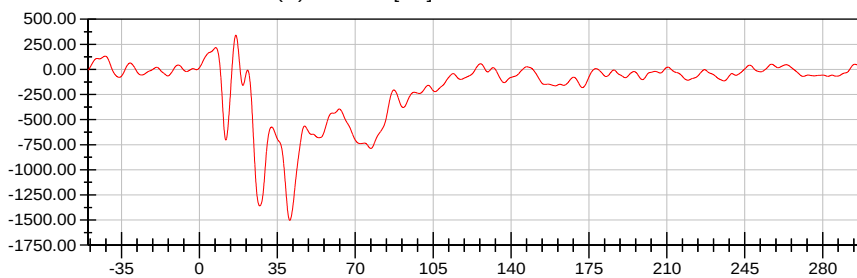
378.99 N at 32.40 ms

<Min>

-8,722.19 N at 56.45 ms

CFC_60

BARRIER F-15 FX (N) vs. Time [ms]



<Max>

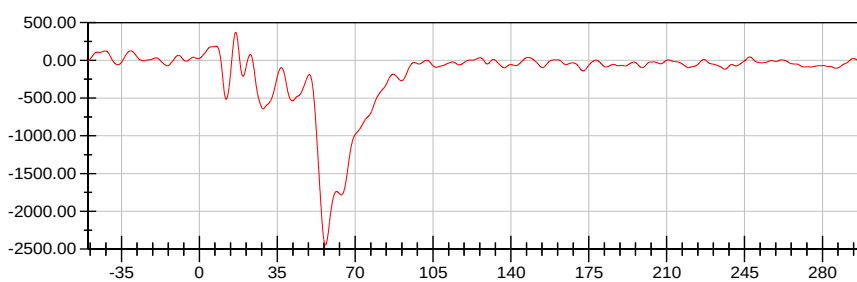
340.77 N at 16.35 ms

<Min>

-1,502.64 N at 40.60 ms

CFC_60

BARRIER F-16 FX (N) vs. Time [ms]



<Max>

370.78 N at 16.30 ms

<Min>

-2,444.96 N at 56.65 ms

CFC_60



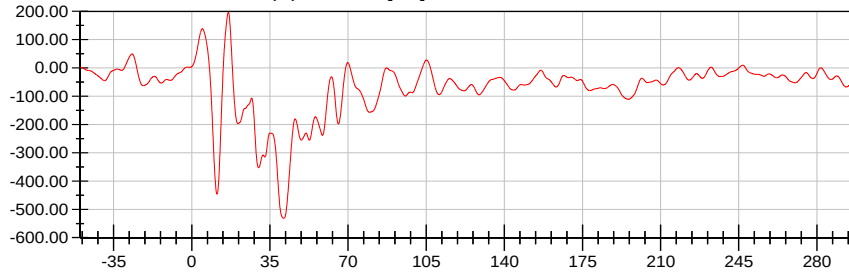
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER E-01 FX (N) vs. Time [ms]



<Max>

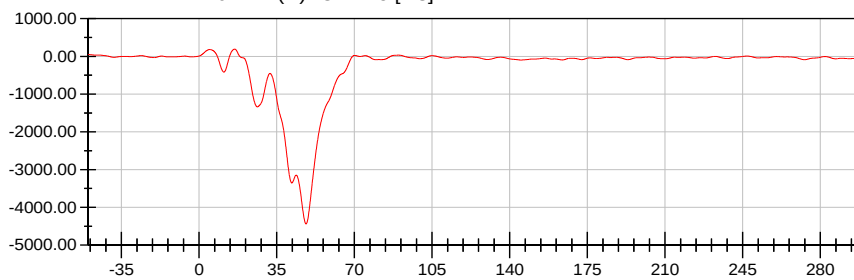
196.62 N at 16.40 ms

<Min>

-531.43 N at 41.25 ms

CFC_60

BARRIER E-02 FX (N) vs. Time [ms]



<Max>

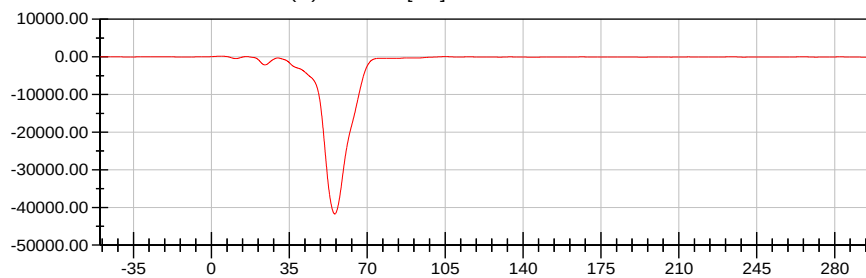
193.16 N at 16.05 ms

<Min>

-4,437.79 N at 48.20 ms

CFC_60

BARRIER E-03 FX (N) vs. Time [ms]



<Max>

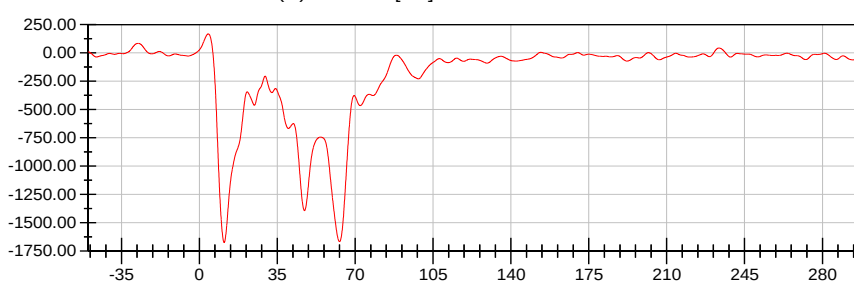
185.61 N at 4.15 ms

<Min>

-41,730.95 N at 55.45 ms

CFC_60

BARRIER E-04 FX (N) vs. Time [ms]



<Max>

168.39 N at 4.00 ms

<Min>

-1,674.45 N at 11.15 ms

CFC_60

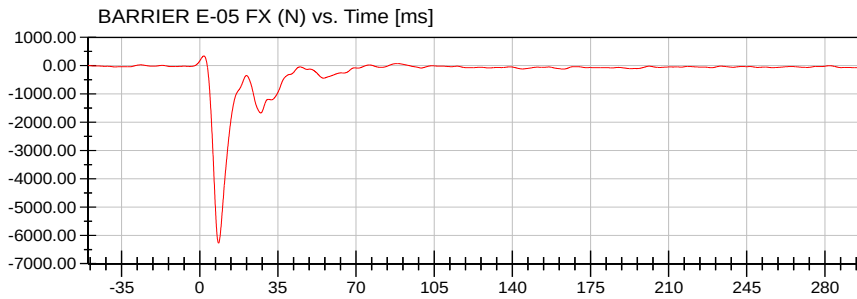


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



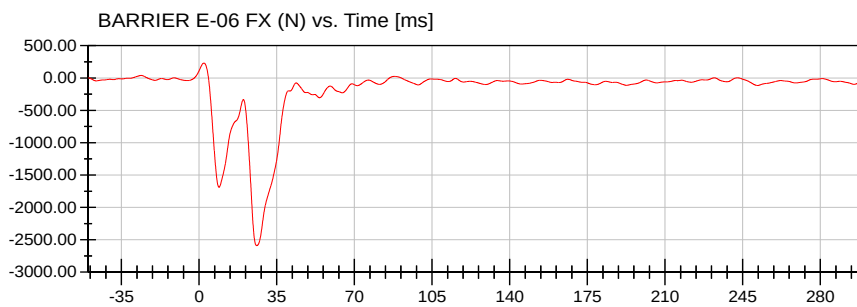
<Max>

342.39 N at 1.85 ms

<Min>

-6,273.85 N at 8.40 ms

CFC_60



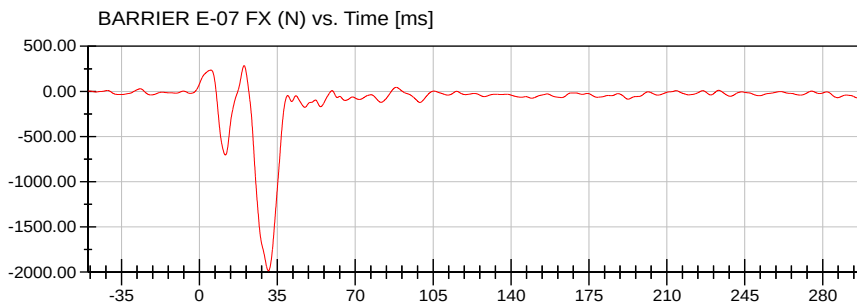
<Max>

230.96 N at 2.20 ms

<Min>

-2,589.84 N at 26.00 ms

CFC_60



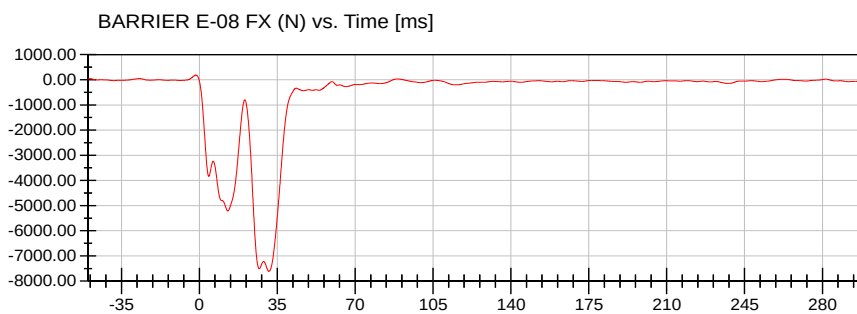
<Max>

285.25 N at 20.10 ms

<Min>

-1,986.10 N at 31.00 ms

CFC_60



<Max>

186.73 N at -1.55 ms

<Min>

-7,614.00 N at 31.30 ms

CFC_60

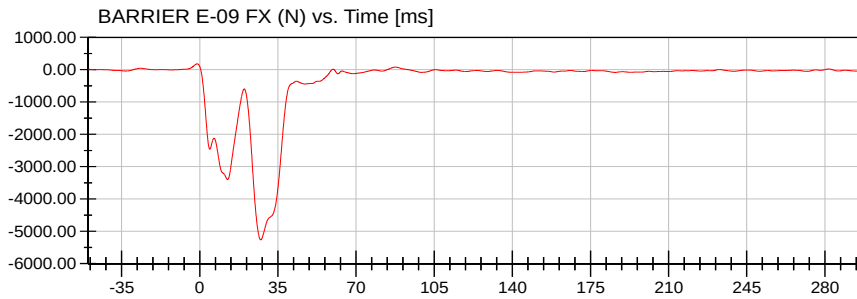


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



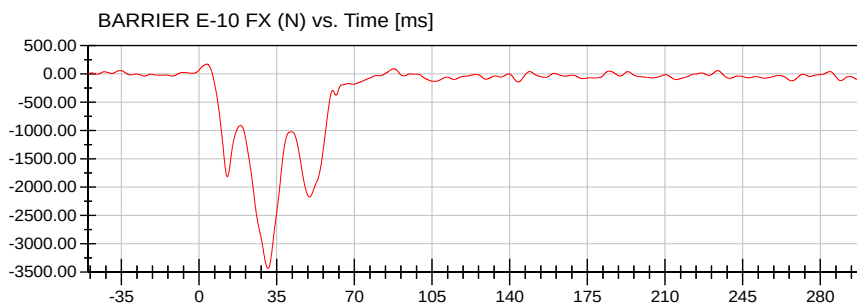
<Max>

179.20 N at -1.15 ms

<Min>

-5,261.95 N at 27.30 ms

CFC_60



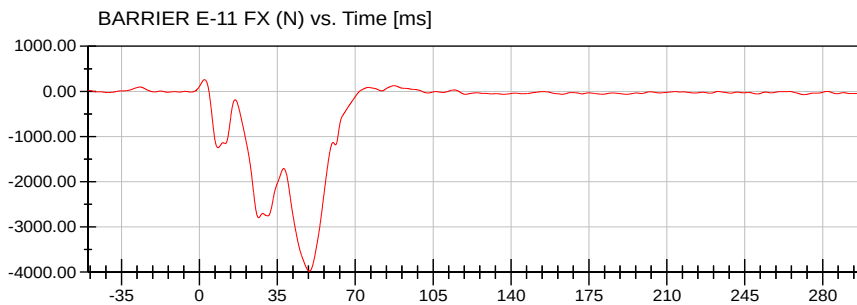
<Max>

173.46 N at 3.50 ms

<Min>

-3,435.02 N at 31.10 ms

CFC_60



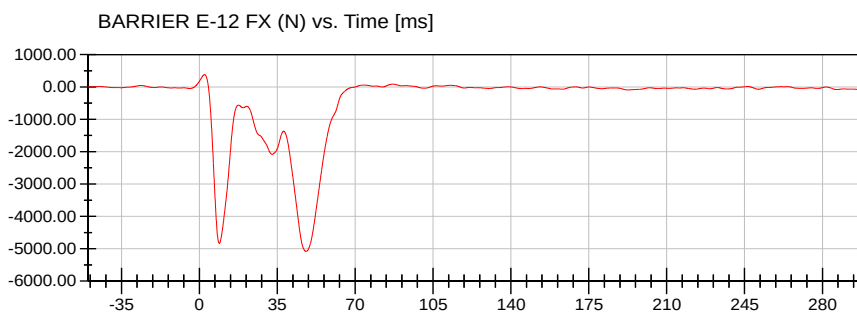
<Max>

259.07 N at 2.30 ms

<Min>

-3,978.95 N at 49.40 ms

CFC_60



<Max>

382.03 N at 2.30 ms

<Min>

-5,082.97 N at 47.95 ms

CFC_60

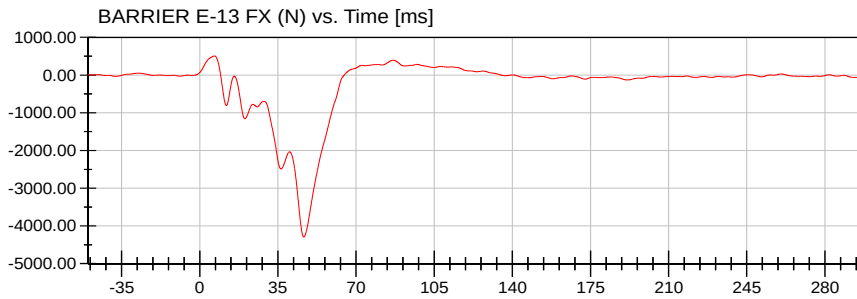


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



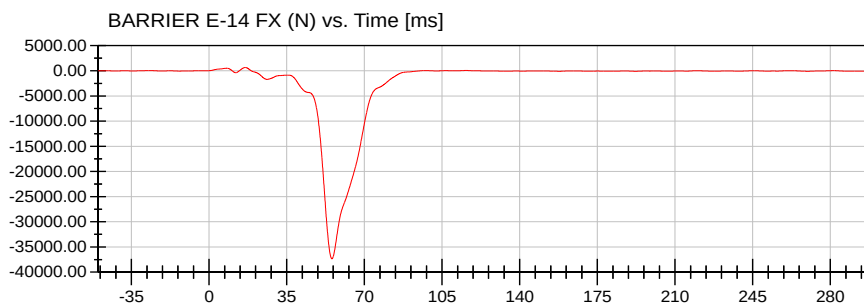
<Max>

507.76 N at 6.55 ms

<Min>

-4,293.27 N at 46.65 ms

CFC_60



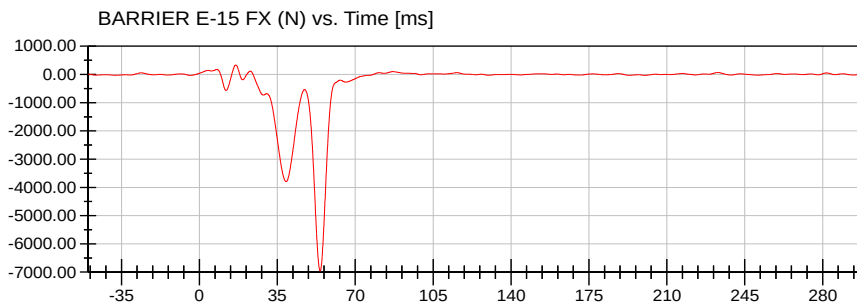
<Max>

652.22 N at 16.30 ms

<Min>

-37,359.02 N at 55.40 ms

CFC_60



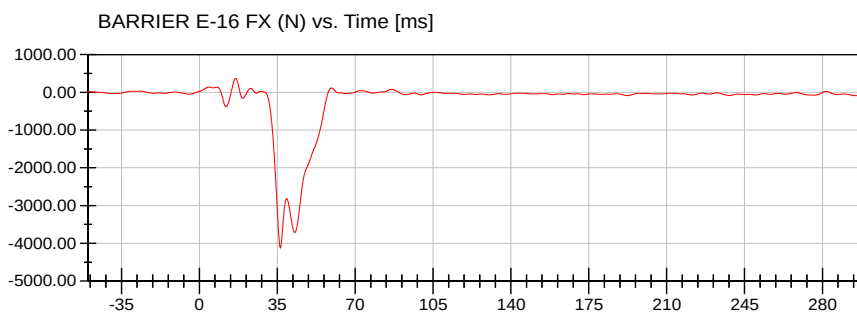
<Max>

333.39 N at 16.30 ms

<Min>

-6,961.21 N at 54.25 ms

CFC_60



<Max>

365.38 N at 16.30 ms

<Min>

-4,123.43 N at 36.40 ms

CFC_60

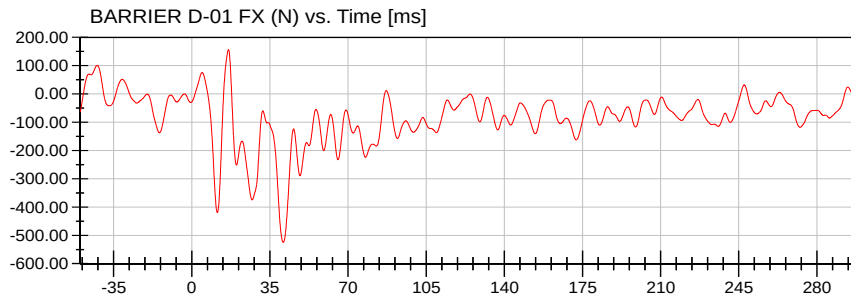


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



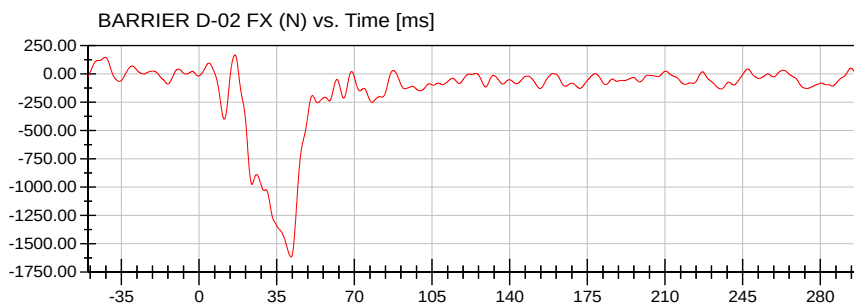
<Max>

156.63 N at 16.45 ms

<Min>

-524.91 N at 40.95 ms

CFC_60



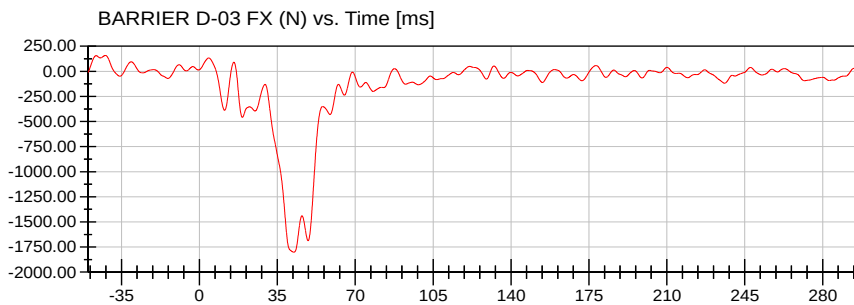
<Max>

168.26 N at 16.20 ms

<Min>

-1,617.89 N at 41.50 ms

CFC_60



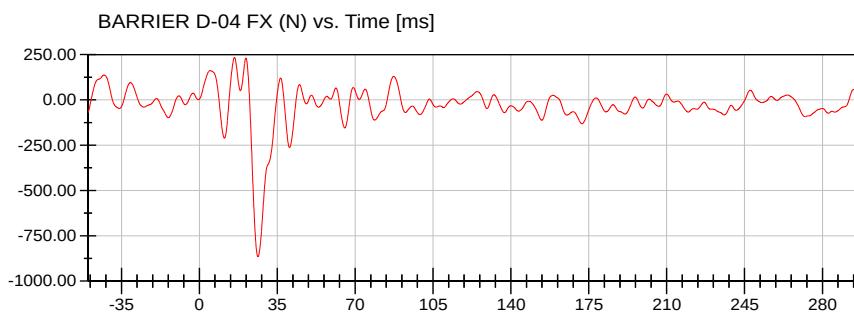
<Max>

157.33 N at 42.25 ms

<Min>

-1,800.60 N at 42.45 ms

CFC_60



<Max>

234.81 N at 15.75 ms

<Min>

-865.71 N at 26.35 ms

CFC_60

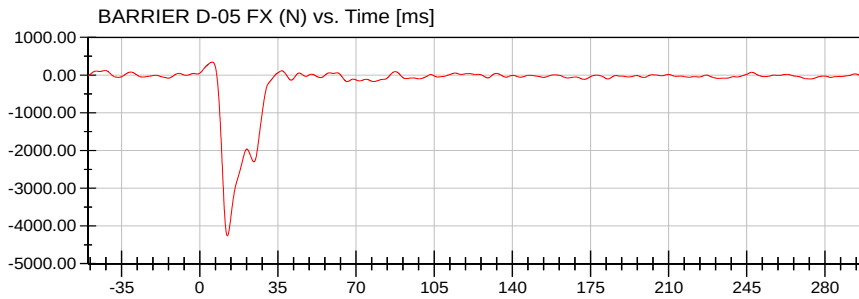


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



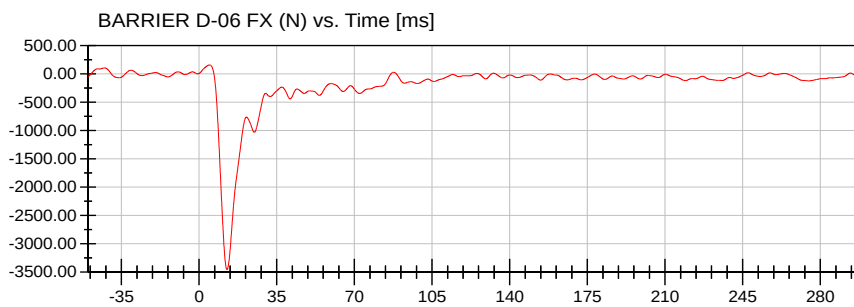
<Max>

344.48 N at 5.60 ms

<Min>

-4,264.33 N at 12.35 ms

CFC_60



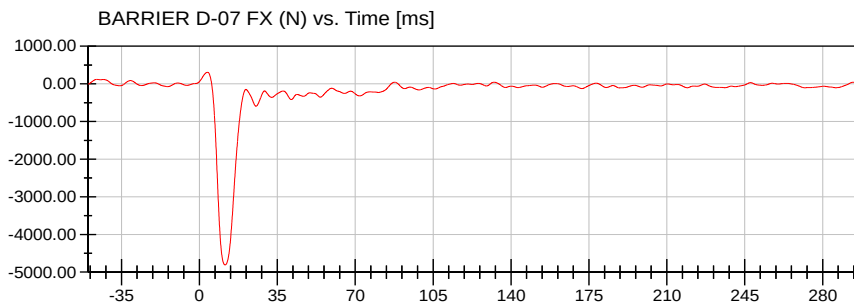
<Max>

158.79 N at 4.65 ms

<Min>

-3,455.57 N at 12.60 ms

CFC_60



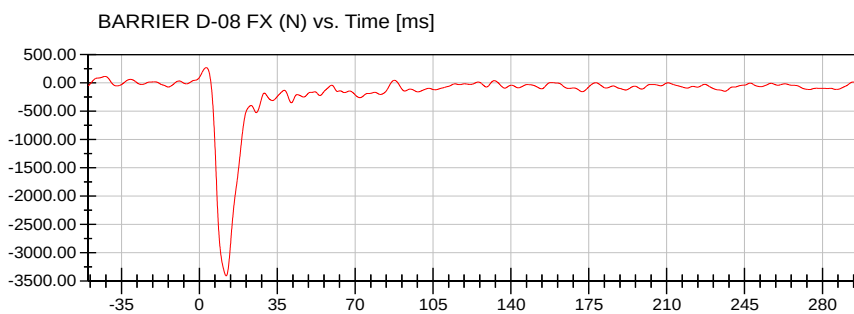
<Max>

308.30 N at 3.60 ms

<Min>

-4,808.57 N at 11.55 ms

CFC_60



<Max>

269.37 N at 3.10 ms

<Min>

-3,407.63 N at 12.05 ms

CFC_60

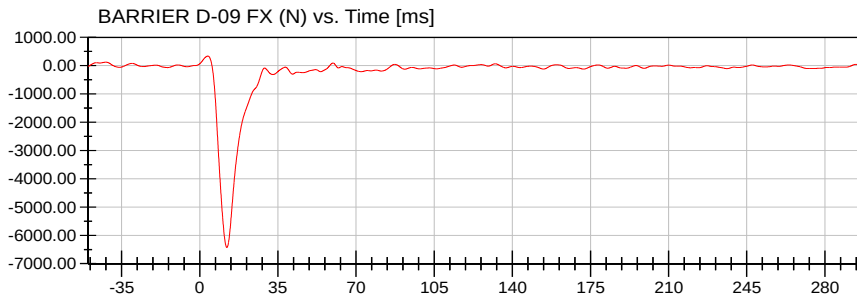


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



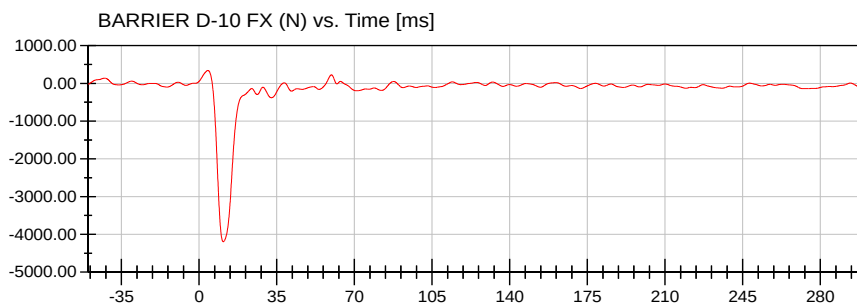
<Max>

338.29 N at 3.60 ms

<Min>

-6,429.41 N at 12.15 ms

CFC_60



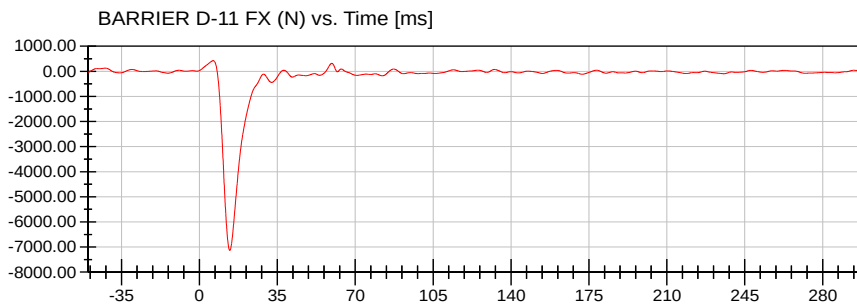
<Max>

341.56 N at 4.00 ms

<Min>

-4,195.45 N at 10.90 ms

CFC_60



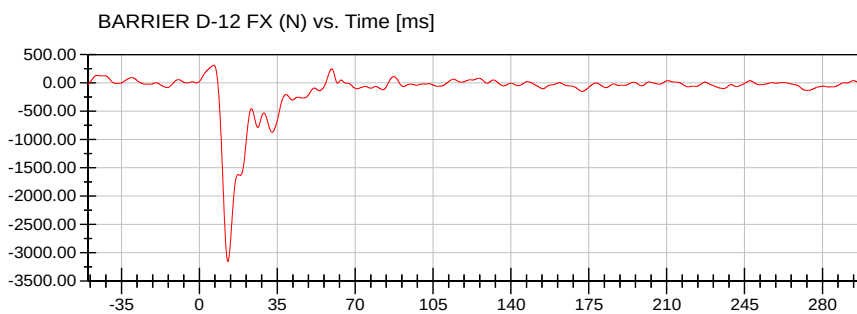
<Max>

422.29 N at 6.20 ms

<Min>

-7,137.19 N at 13.65 ms

CFC_60



<Max>

312.11 N at 6.45 ms

<Min>

-3,153.30 N at 12.80 ms

CFC_60



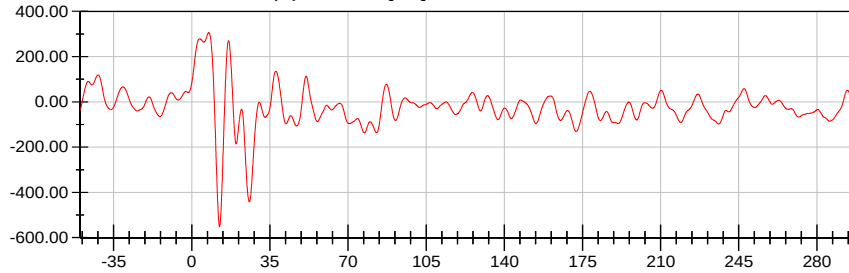
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER D-13 FX (N) vs. Time [ms]



<Max>

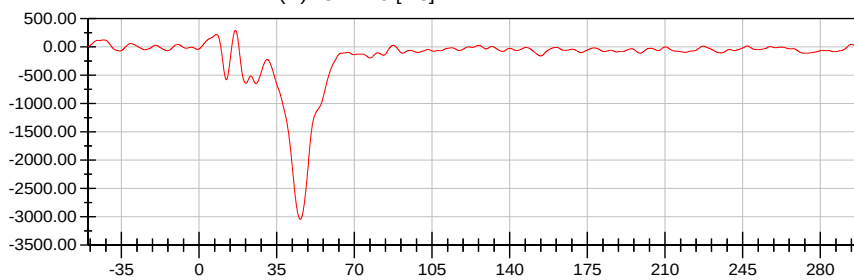
306.27 N at 7.60 ms

<Min>

-551.20 N at 12.45 ms

CFC_60

BARRIER D-14 FX (N) vs. Time [ms]



<Max>

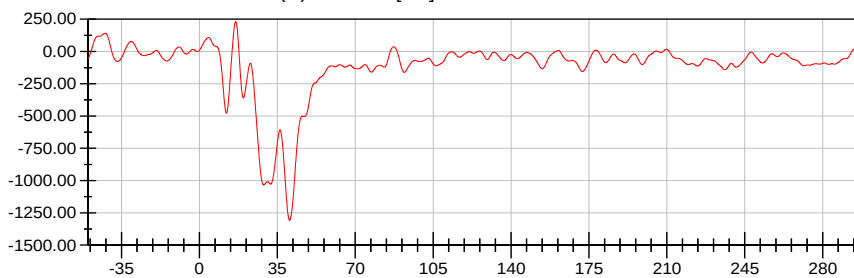
293.46 N at 16.35 ms

<Min>

-3,042.89 N at 45.65 ms

CFC_60

BARRIER D-15 FX (N) vs. Time [ms]



<Max>

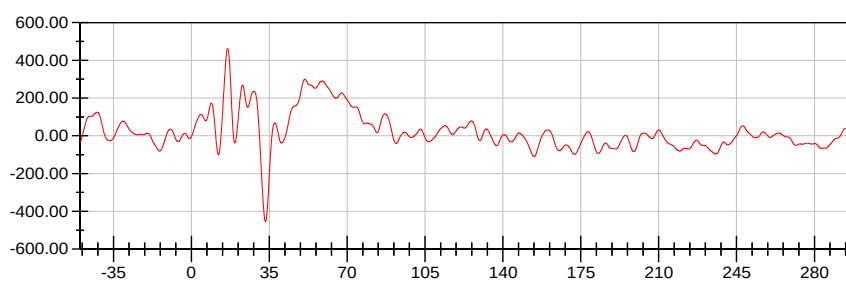
231.69 N at 16.25 ms

<Min>

-1,307.50 N at 40.50 ms

CFC_60

BARRIER D-16 FX (N) vs. Time [ms]



<Max>

463.09 N at 16.30 ms

<Min>

-455.31 N at 33.30 ms

CFC_60

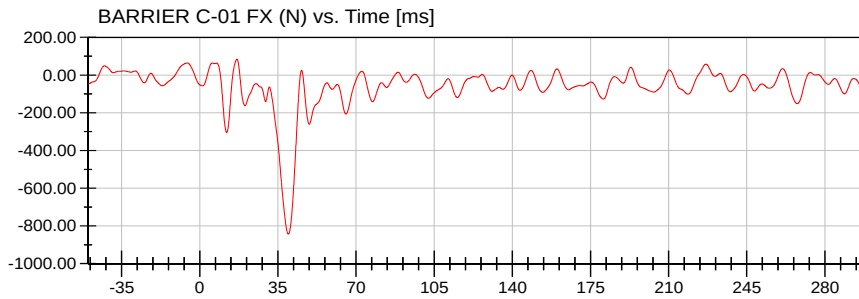


VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()



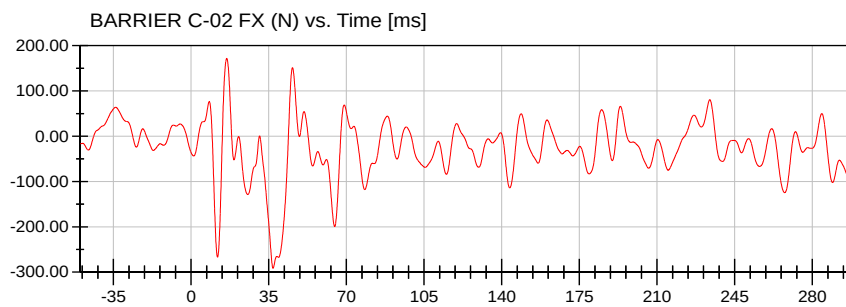
<Max>

84.22 N at 16.65 ms

<Min>

-843.58 N at 39.70 ms

CFC_60



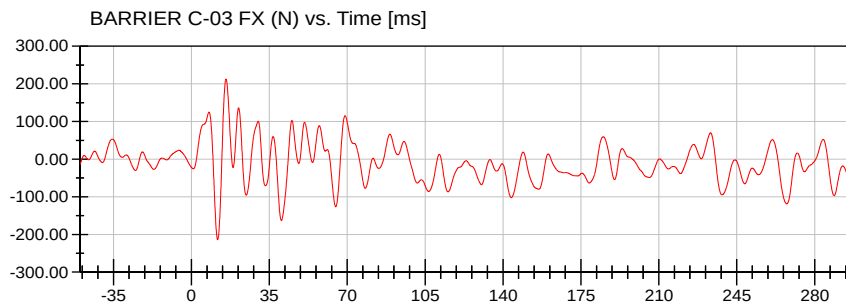
<Max>

171.86 N at 16.10 ms

<Min>

-291.54 N at 36.95 ms

CFC_60



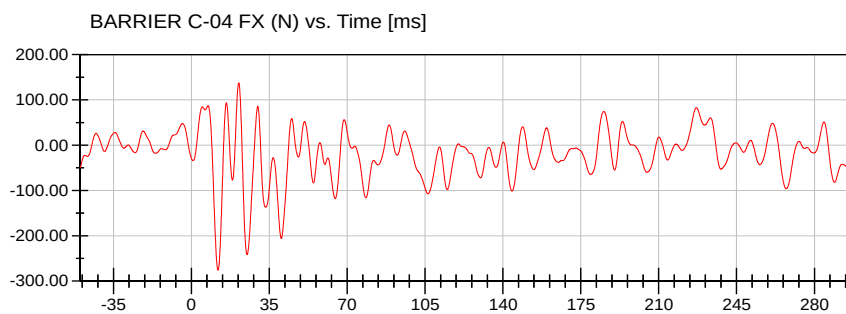
<Max>

212.79 N at 15.55 ms

<Min>

-213.83 N at 11.80 ms

CFC_60



<Max>

137.75 N at 21.30 ms

<Min>

-276.08 N at 12.00 ms

CFC_60

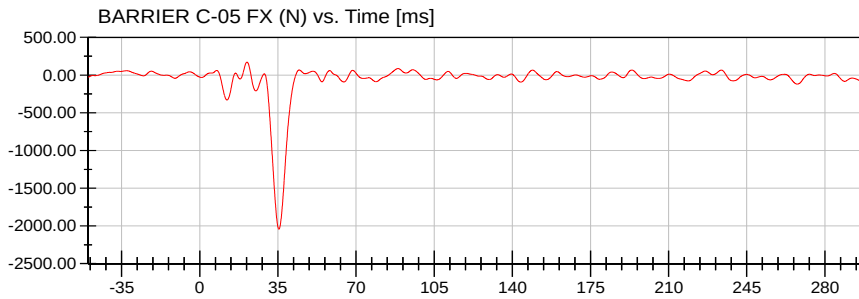


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



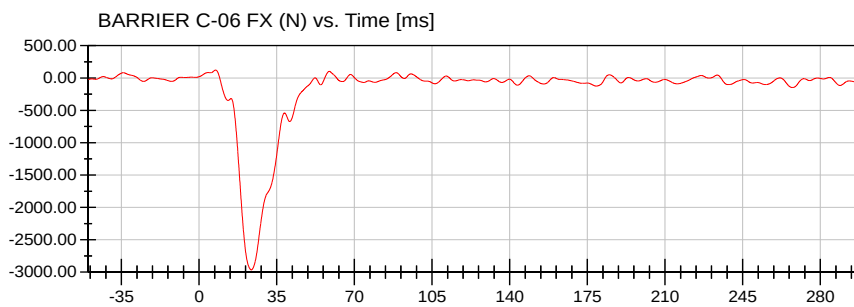
<Max>

171.52 N at 21.15 ms

<Min>

-2,043.43 N at 35.45 ms

CFC_60



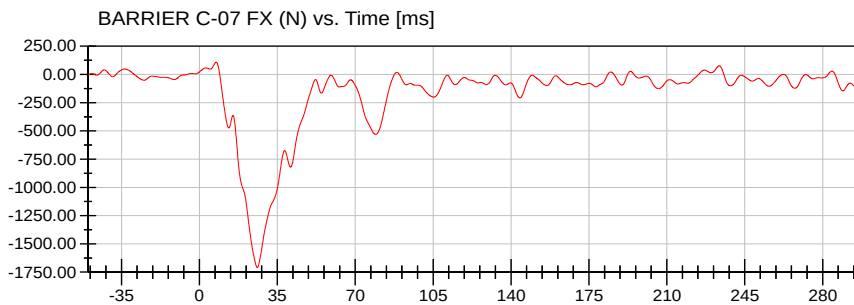
<Max>

122.79 N at 7.45 ms

<Min>

-2,965.66 N at 23.55 ms

CFC_60



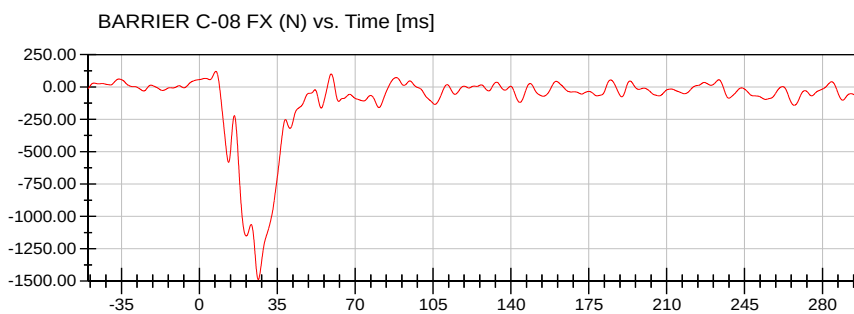
<Max>

107.80 N at 7.50 ms

<Min>

-1,709.14 N at 26.00 ms

CFC_60



<Max>

120.40 N at 7.40 ms

<Min>

-1,488.73 N at 26.50 ms

CFC_60

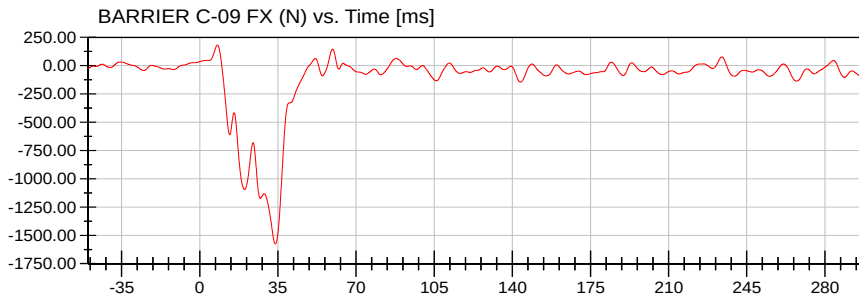


VRTC

Test Date: 10/10/2024

Test Lab: CTF

Test Number: 241010 ()



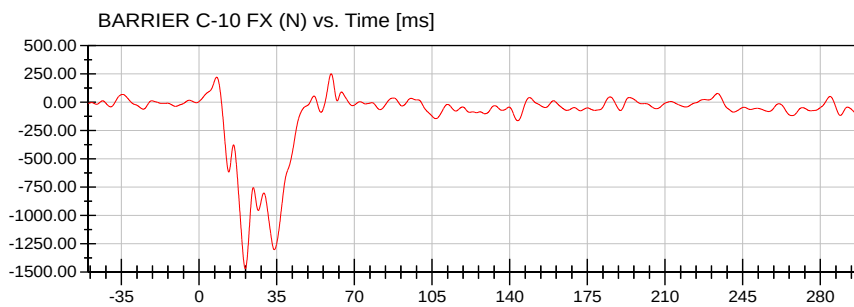
<Max>

181.92 N at 7.90 ms

<Min>

-1,575.79 N at 33.85 ms

CFC_60



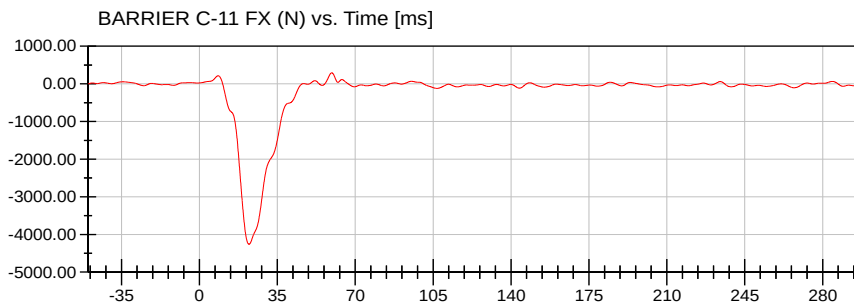
<Max>

250.80 N at 59.55 ms

<Min>

-1,470.42 N at 20.85 ms

CFC_60



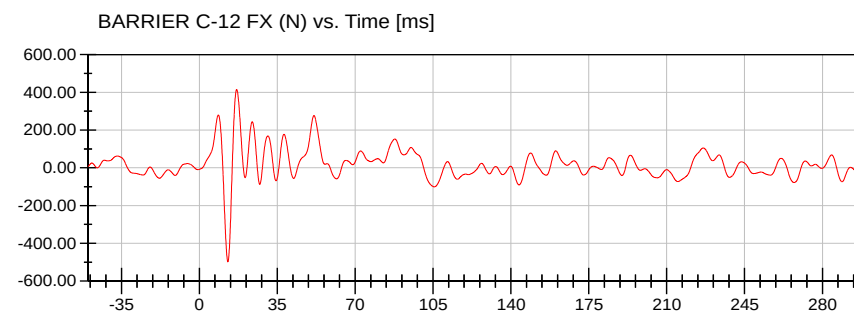
<Max>

292.39 N at 59.50 ms

<Min>

-4,262.08 N at 22.30 ms

CFC_60



<Max>

415.22 N at 16.75 ms

<Min>

-498.03 N at 12.80 ms

CFC_60



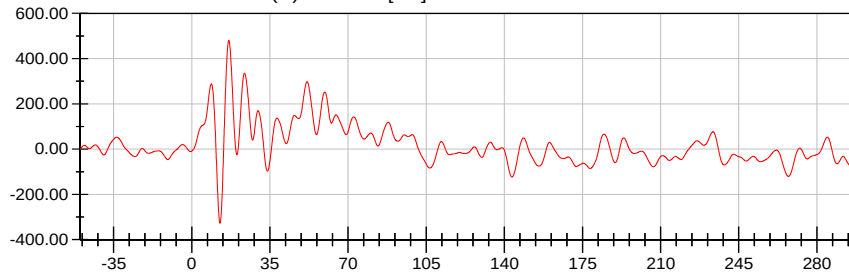
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER C-13 FX (N) vs. Time [ms]



<Max>

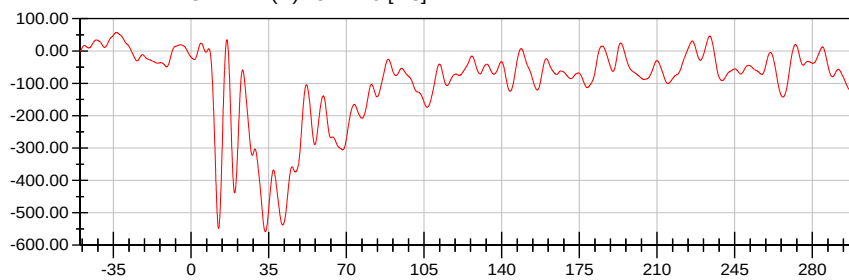
480.24 N at 16.60 ms

<Min>

-327.35 N at 12.65 ms

CFC_60

BARRIER C-14 FX (N) vs. Time [ms]



<Max>

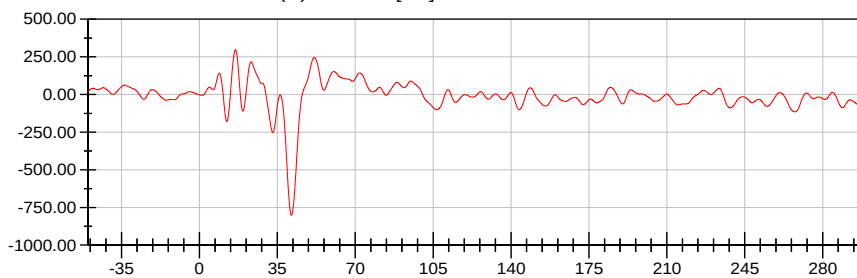
57.41 N at -33.65 ms

<Min>

-558.53 N at 33.50 ms

CFC_60

BARRIER C-15 FX (N) vs. Time [ms]



<Max>

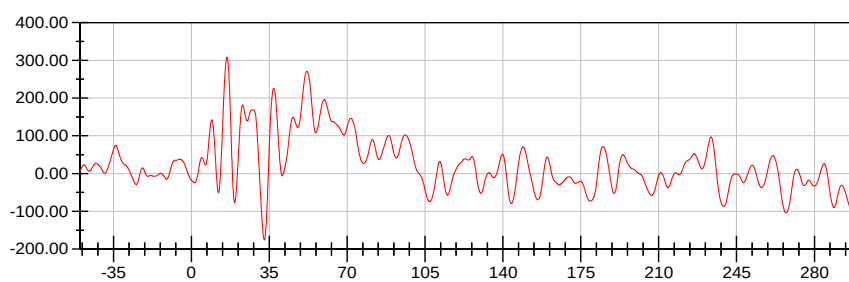
297.41 N at 16.20 ms

<Min>

-801.71 N at 41.30 ms

CFC_60

BARRIER C-16 FX (N) vs. Time [ms]



<Max>

308.76 N at 16.00 ms

<Min>

-176.07 N at 32.80 ms

CFC_60



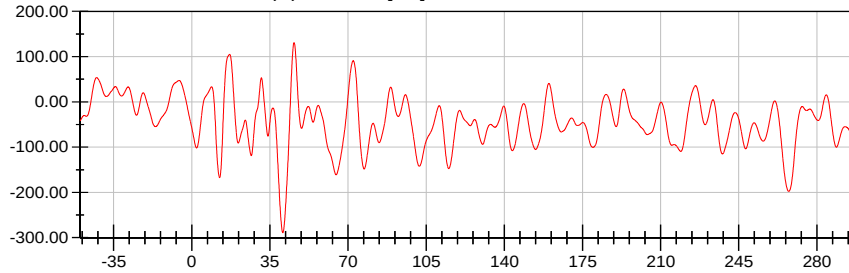
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER B-01 FX (N) vs. Time [ms]



<Max>

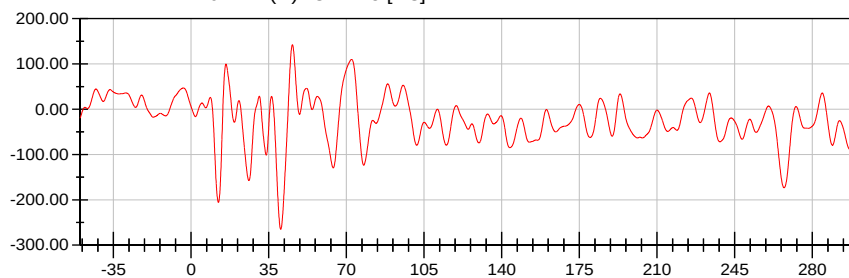
130.97 N at 45.85 ms

<Min>

-289.07 N at 40.80 ms

CFC_60

BARRIER B-02 FX (N) vs. Time [ms]



<Max>

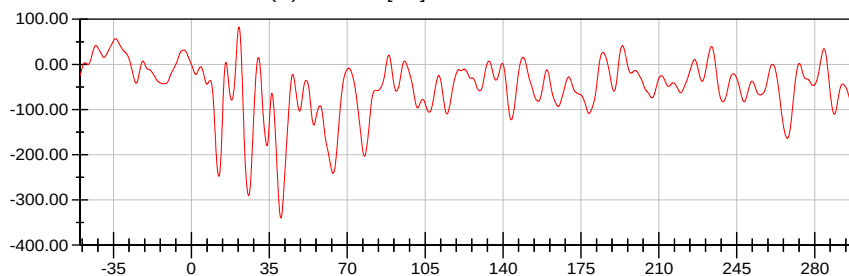
142.21 N at 45.65 ms

<Min>

-265.07 N at 40.40 ms

CFC_60

BARRIER B-03 FX (N) vs. Time [ms]



<Max>

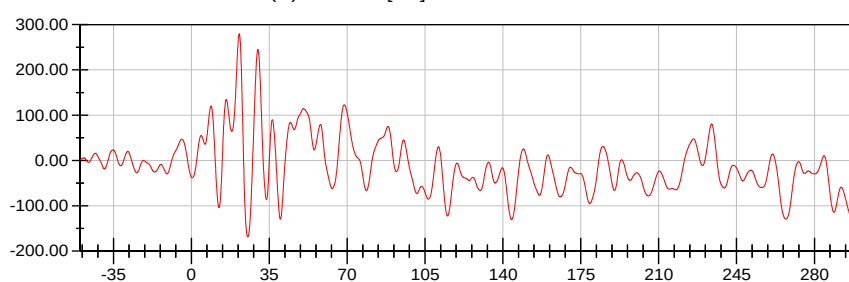
82.94 N at 21.35 ms

<Min>

-339.98 N at 40.20 ms

CFC_60

BARRIER B-04 FX (N) vs. Time [ms]



<Max>

280.03 N at 21.55 ms

<Min>

-168.68 N at 25.35 ms

CFC_60



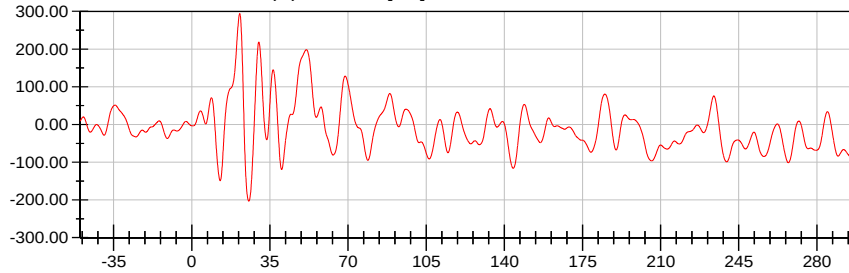
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER B-05 FX (N) vs. Time [ms]



<Max>

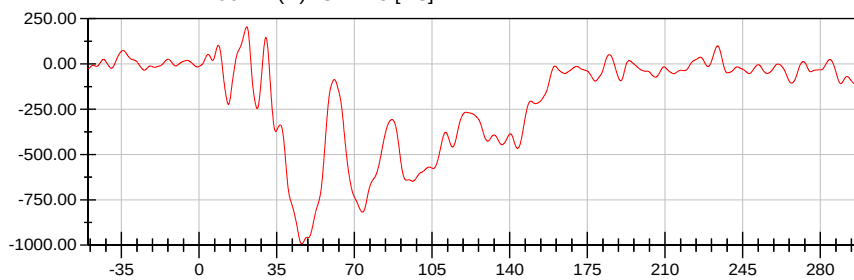
294.23 N at 21.50 ms

<Min>

-203.13 N at 25.55 ms

CFC_60

BARRIER B-06 FX (N) vs. Time [ms]



<Max>

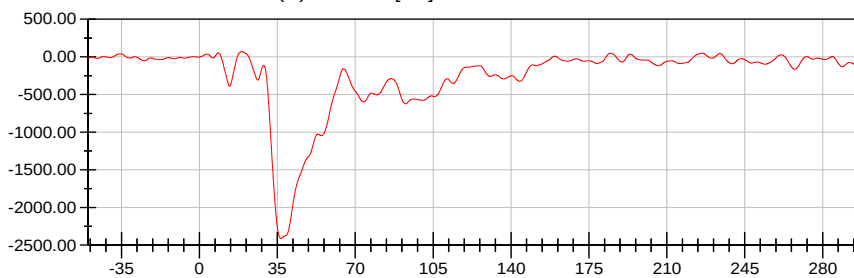
204.71 N at 21.50 ms

<Min>

-993.75 N at 46.30 ms

CFC_60

BARRIER B-07 FX (N) vs. Time [ms]



<Max>

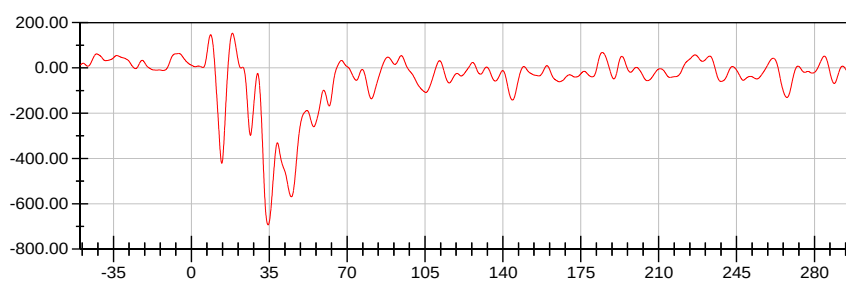
68.78 N at 18.95 ms

<Min>

-2,413.43 N at 36.60 ms

CFC_60

BARRIER B-08 FX (N) vs. Time [ms]



<Max>

152.85 N at 18.45 ms

<Min>

-693.01 N at 34.50 ms

CFC_60



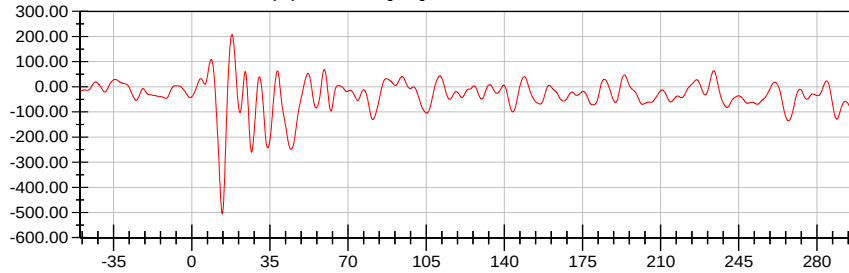
VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024

BARRIER B-09 FX (N) vs. Time [ms]



<Max>

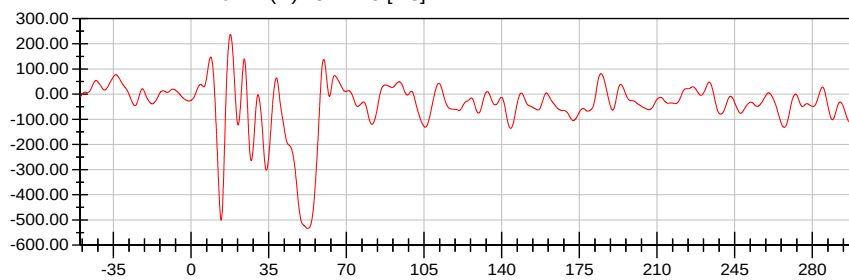
208.67 N at 18.00 ms

<Min>

-505.57 N at 13.65 ms

CFC_60

BARRIER B-10 FX (N) vs. Time [ms]



<Max>

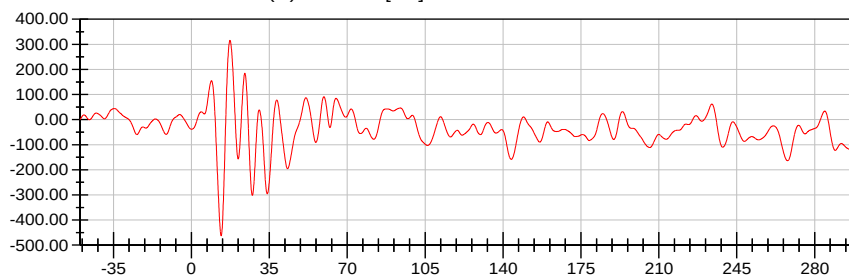
237.49 N at 17.75 ms

<Min>

-533.58 N at 52.55 ms

CFC_60

BARRIER B-11 FX (N) vs. Time [ms]



<Max>

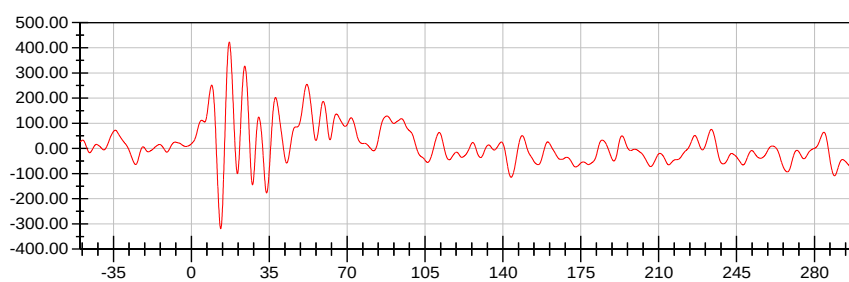
315.79 N at 17.35 ms

<Min>

-462.69 N at 13.35 ms

CFC_60

BARRIER B-12 FX (N) vs. Time [ms]



<Max>

422.57 N at 17.05 ms

<Min>

-319.36 N at 13.20 ms

CFC_60

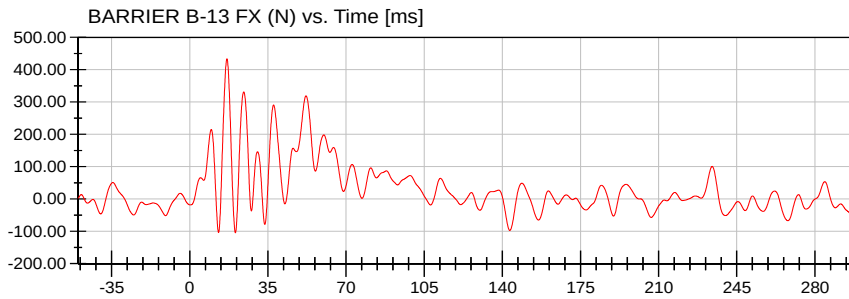


VRTC

Test Lab: CTF

Test Number: 241010 ()

Test Date: 10/10/2024



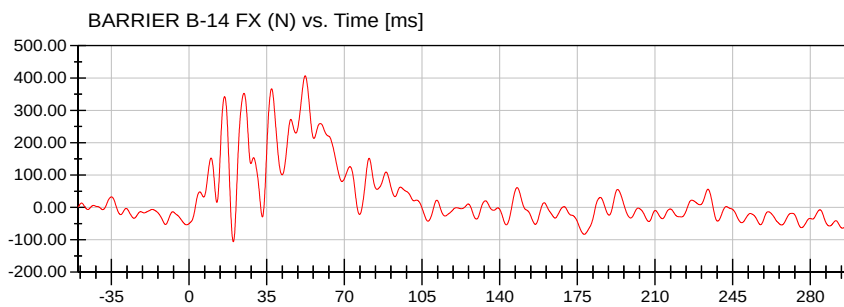
<Max>

433.60 N at 16.65 ms

<Min>

-104.67 N at 20.45 ms

CFC_60



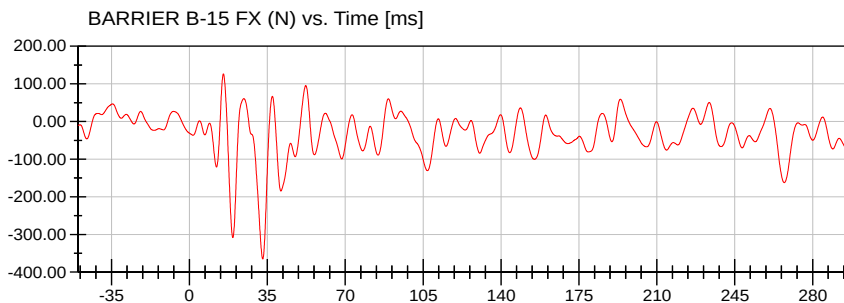
<Max>

407.06 N at 52.35 ms

<Min>

-106.14 N at 19.95 ms

CFC_60



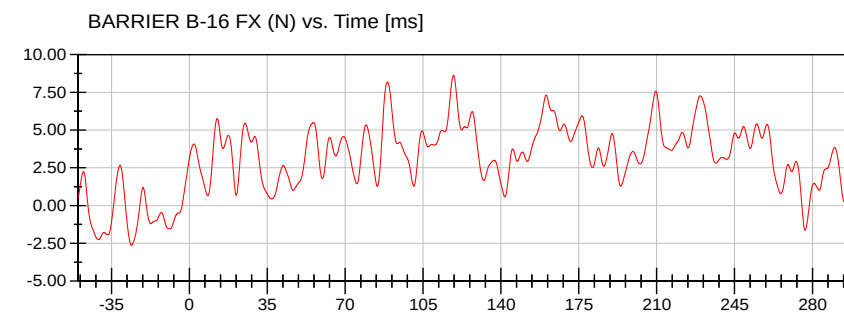
<Max>

126.58 N at 15.25 ms

<Min>

-365.41 N at 32.95 ms

CFC_60



<Max>

8.63 N at 118.70 ms

<Min>

-2.63 N at -26.00 ms

CFC_60



Barrier A01-A16 were not recorded

APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION

THOR-50M Head Impact Qualification
Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Head Skin: EI9570

Test ID: 240919-1

Test Date: 9/19/2024

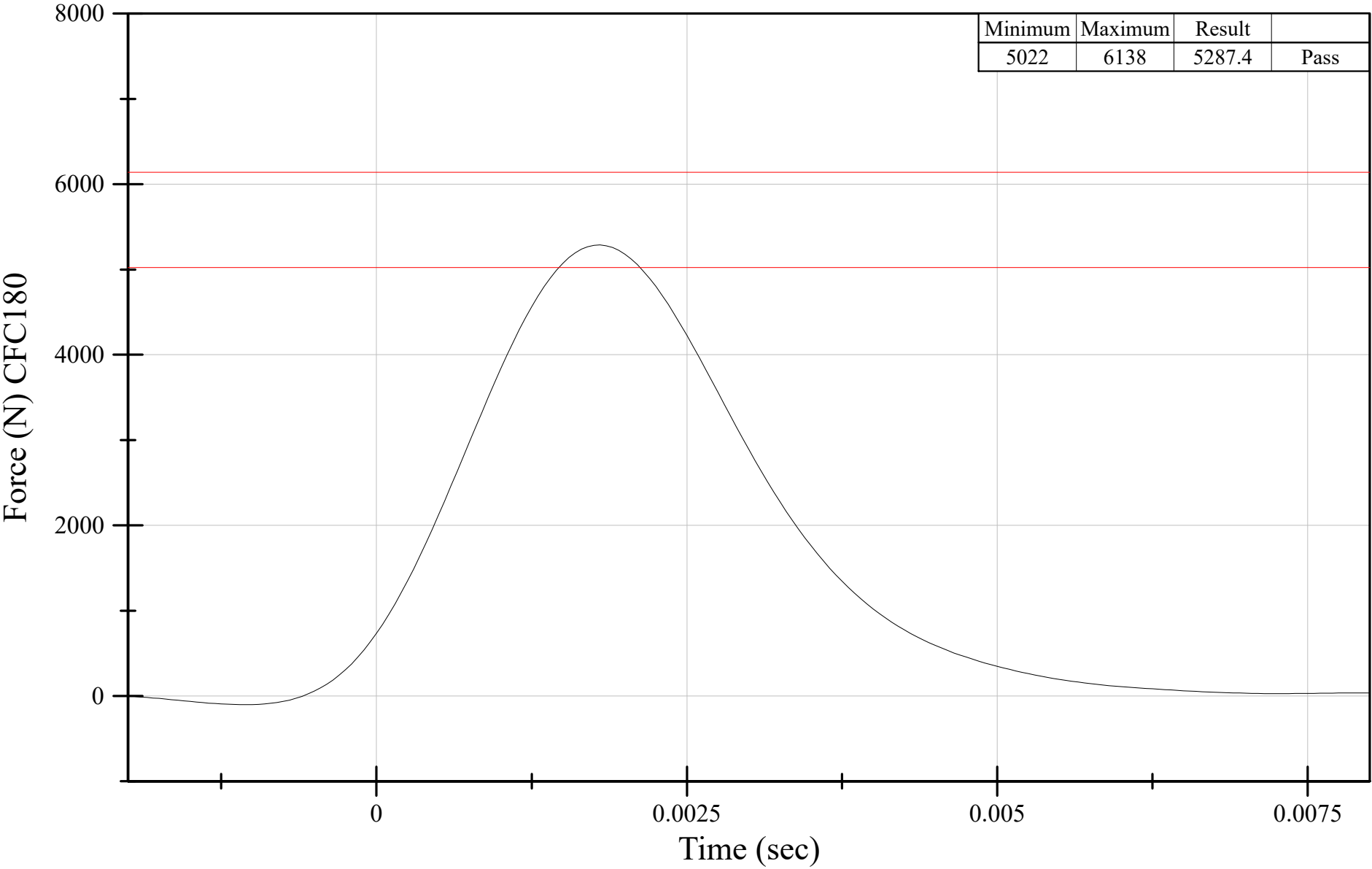
Test Time: 6:37 AM

Test Results

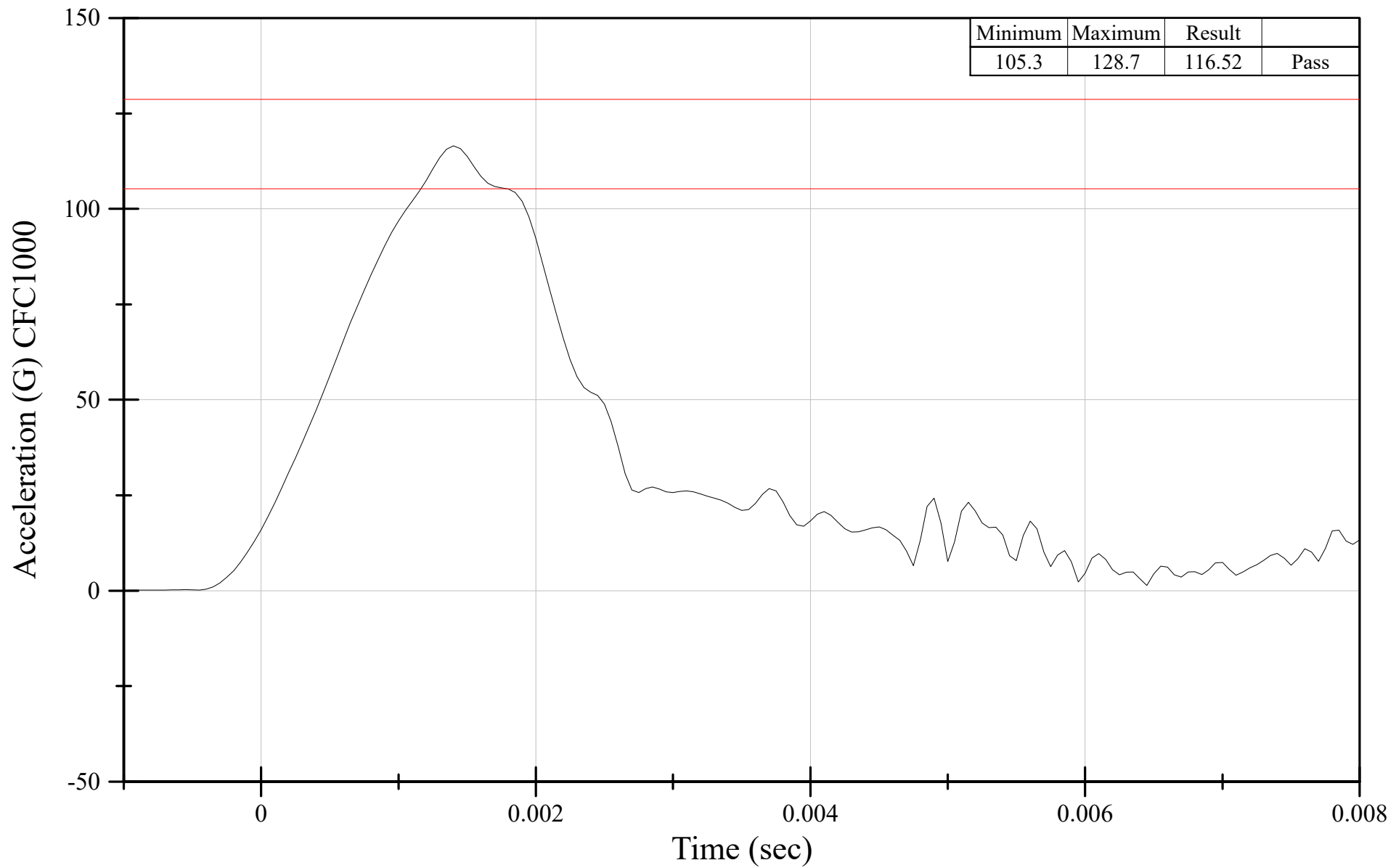
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	54	Pass
Test Velocity (m/s)	1.95 - 2.05	1.950	Pass
Peak Probe Force (N)	5022 - 6138	5287.4	Pass
Peak Head CG Resultant Acceleration (g)	105.3 - 128.7	116.52	Pass

* THOR-50M Qualification Manual - April 2023

THOR-50M Head Impact Qualification
Probe Force
Serial Number: EG2595



THOR-50M Head Impact Qualification
Head CG Resultant Acceleration
Serial Number: EG2595



THOR-50M Neck Left Torsion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 240912-19

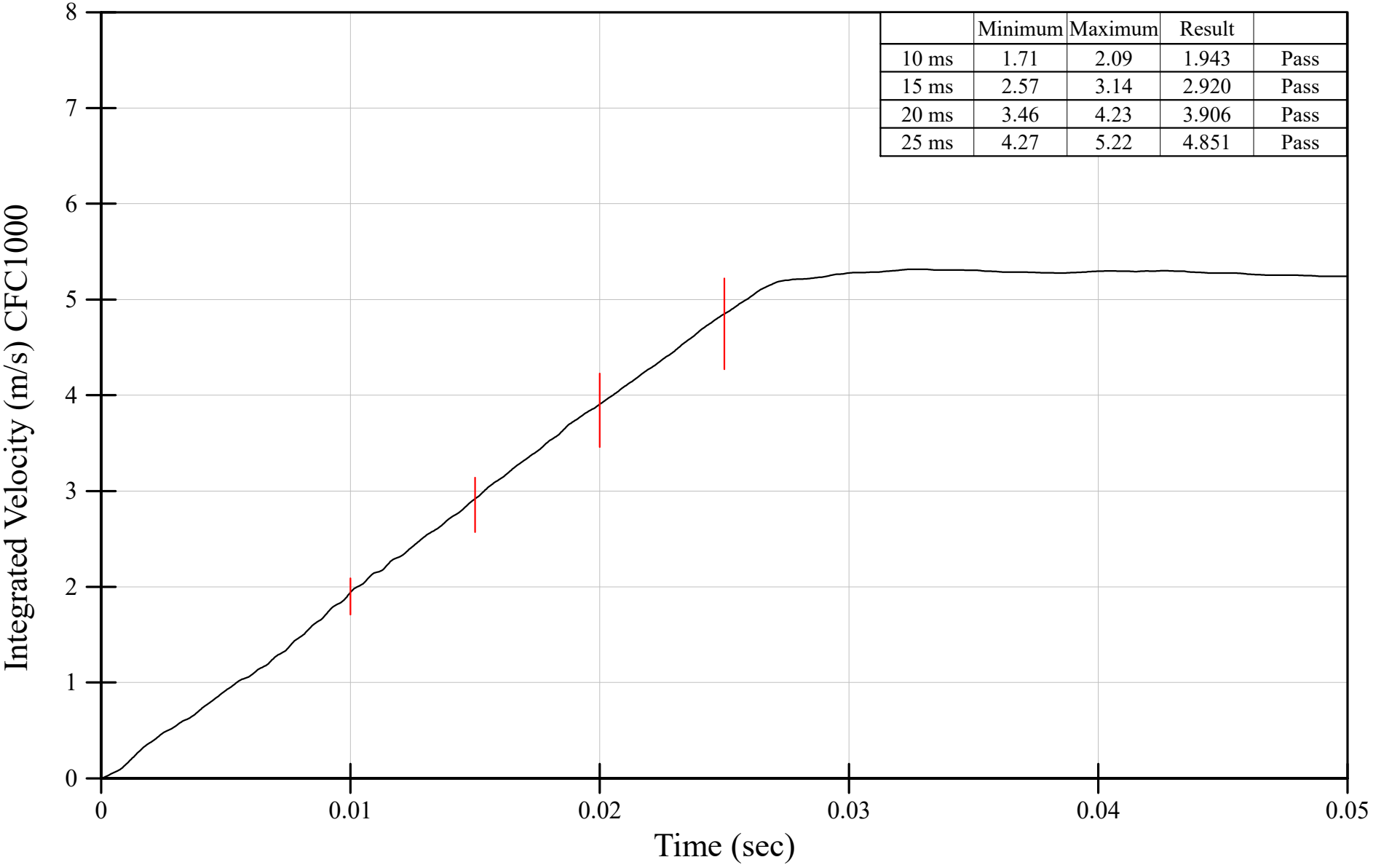
Test Date: 9/12/2024

Test Time: 12:30 PM

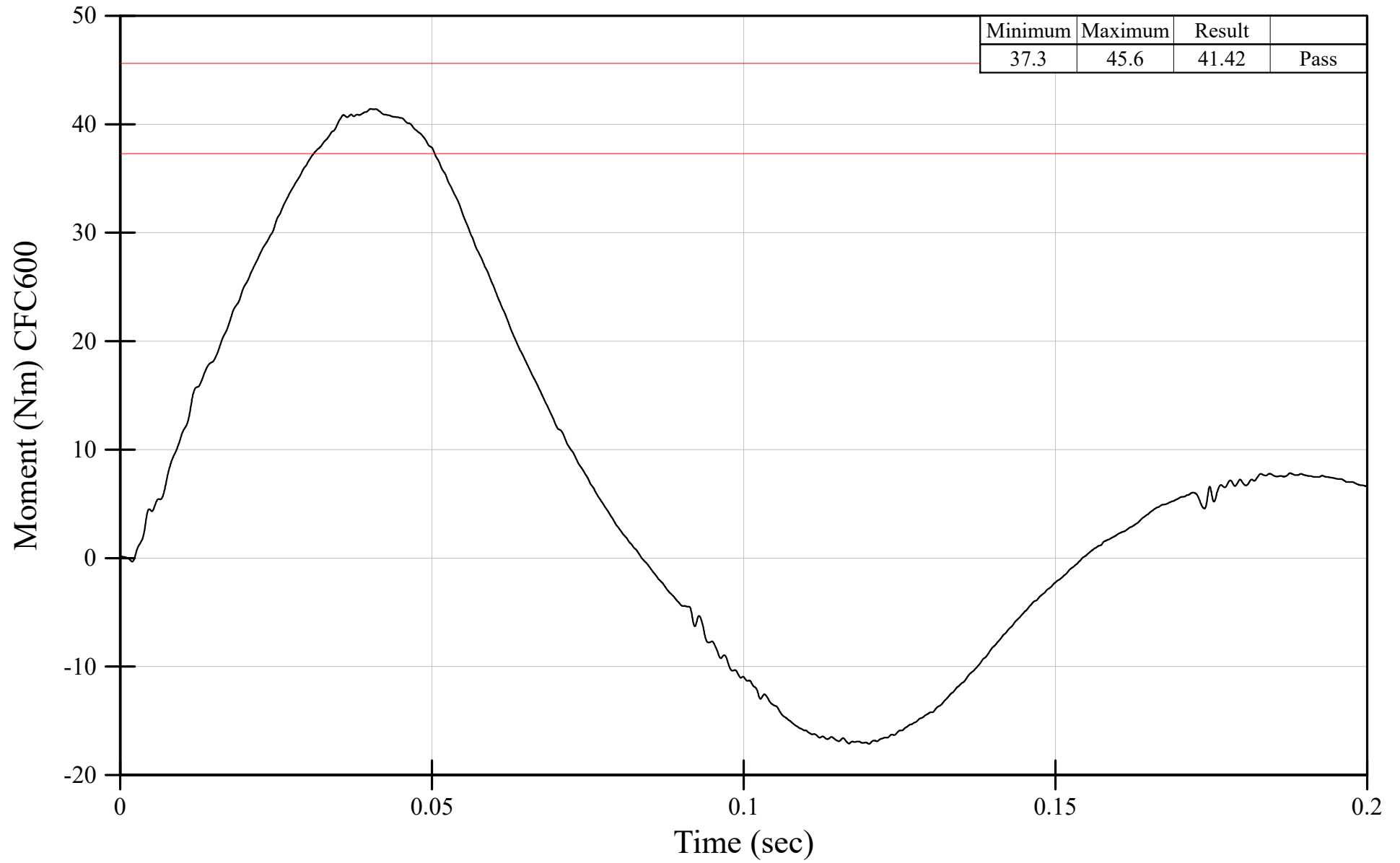
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	4.987	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.943	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.920	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.906	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.851	Pass
Peak Upper Neck Mz (Nm)	37.3 - 45.6	41.42	Pass
Peak Neck Fixture Rotation (deg)	-52.7 - (-43.1)	-44.47	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	-1529 - (-1251)	-1346.1	Pass

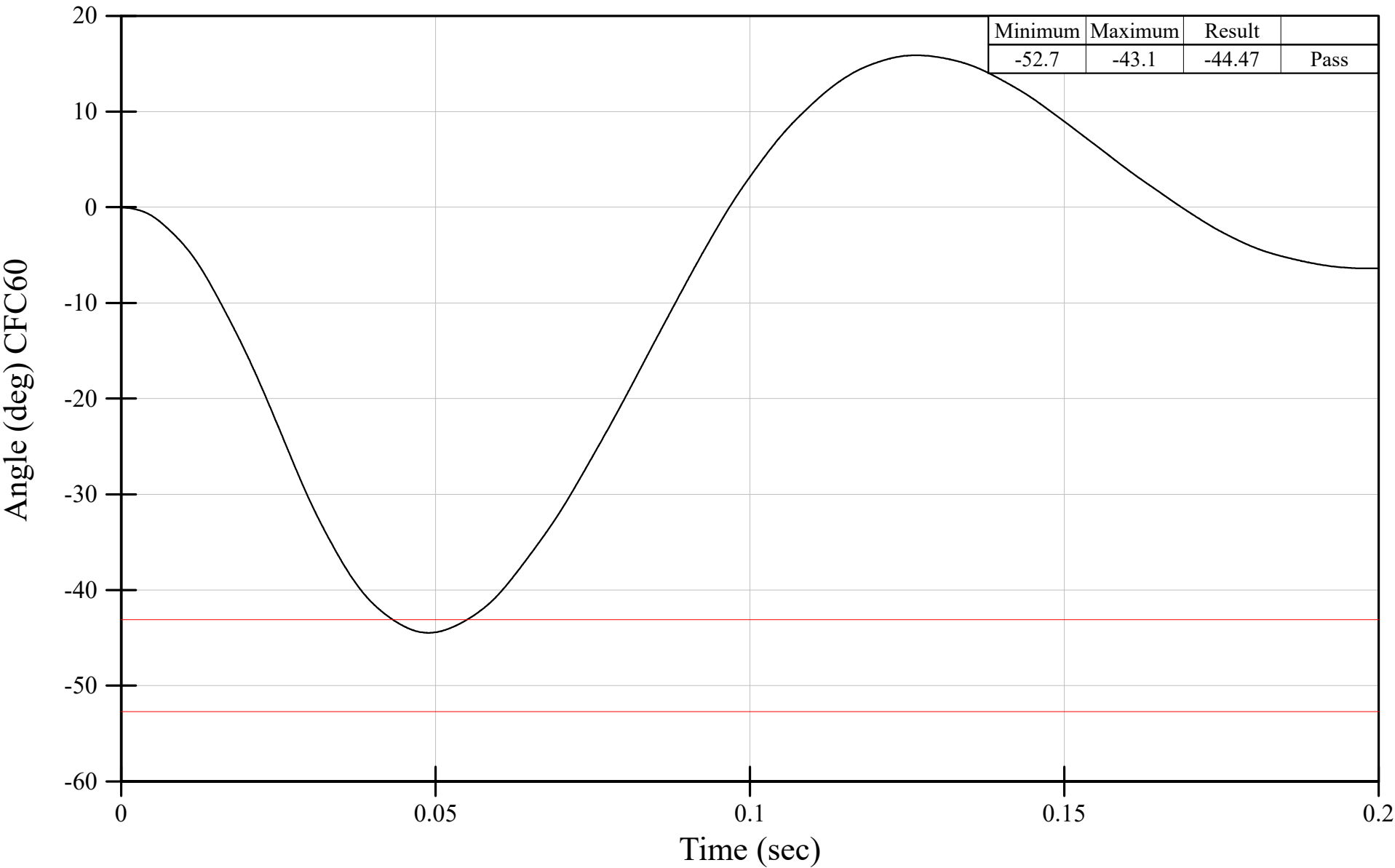
THOR-50M Neck Left Torsion Qualification
Pendulum Velocity
Neck Serial Number: EG3956



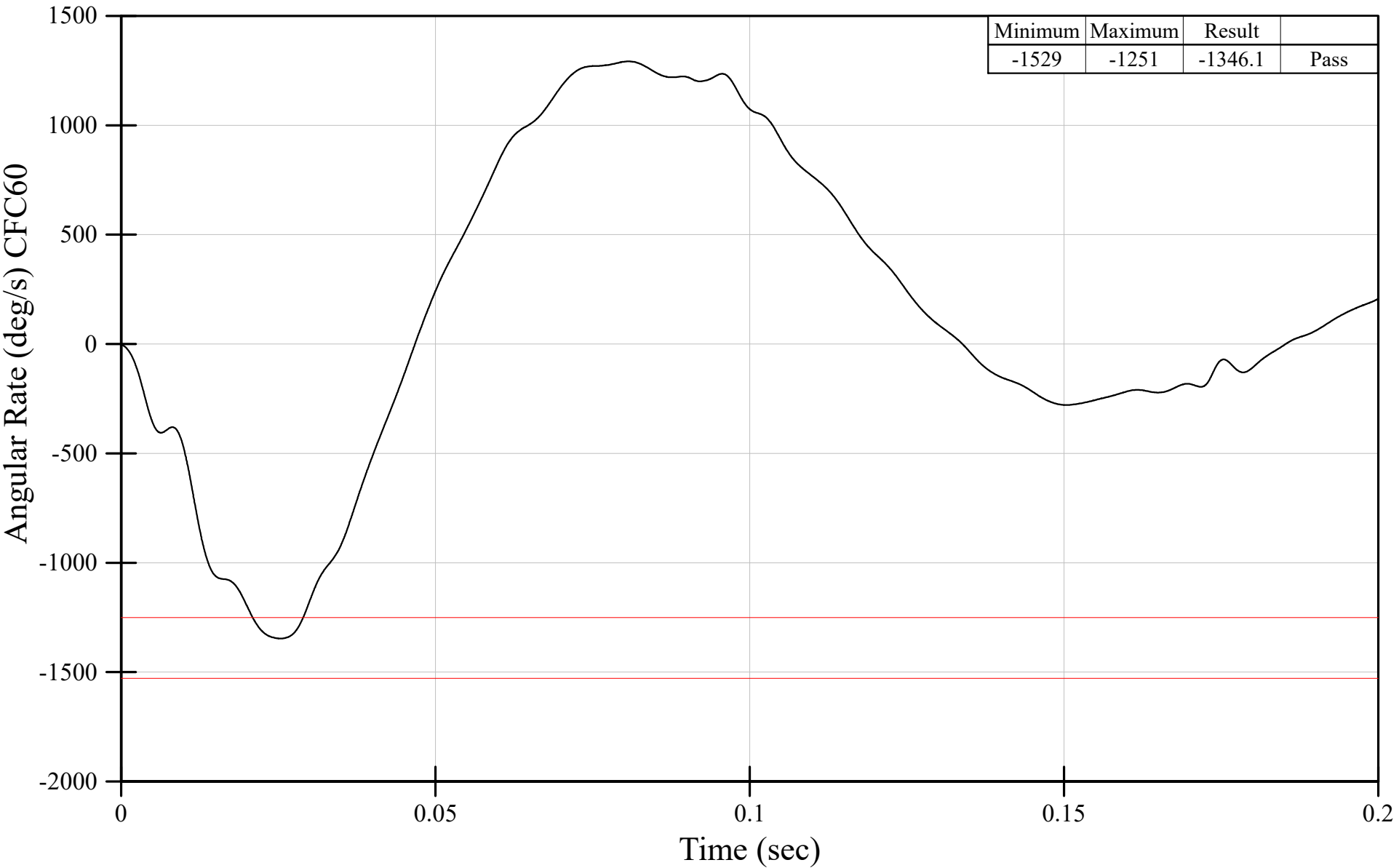
THOR-50M Neck Left Torsion Qualification
Peak Upper Neck Moment Z
Neck Serial Number: EG3956



THOR-50M Neck Left Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: EG3956



THOR-50M Neck Left Torsion Qualification
Peak Angular Rate
Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 240912-20

Test Date: 9/12/2024

Test Time: 1:39 PM

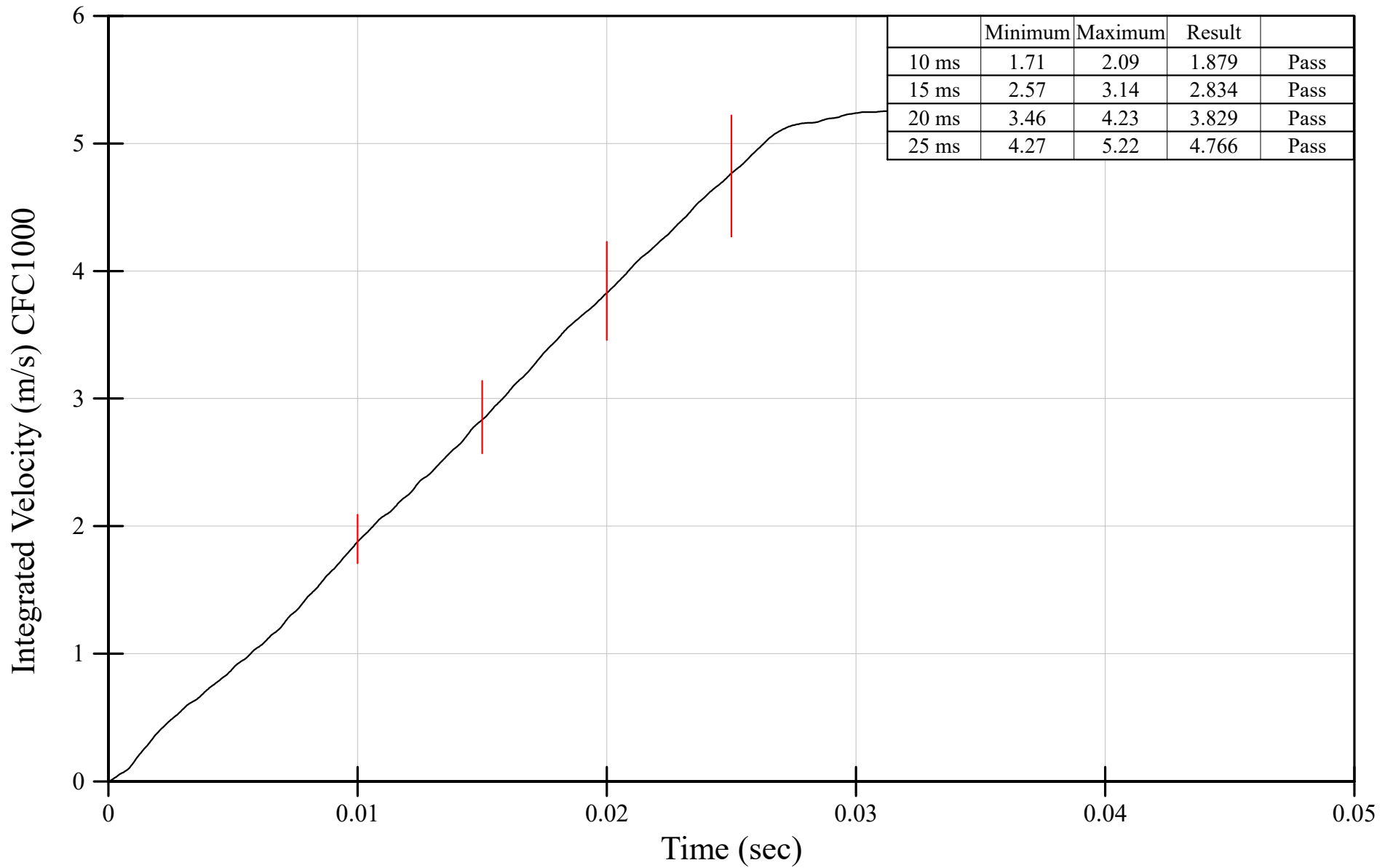
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	5.003	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.879	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.834	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.829	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.766	Pass
Peak Upper Neck Mz (Nm)	-45.6 - (-37.3)	-41.83	Pass
Peak Neck Fixture Rotation (deg)	43.1 - 52.7	44.82	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	1251 - 1529	1375.1	Pass

THOR-50M Neck Right Torsion Qualification

Pendulum Velocity

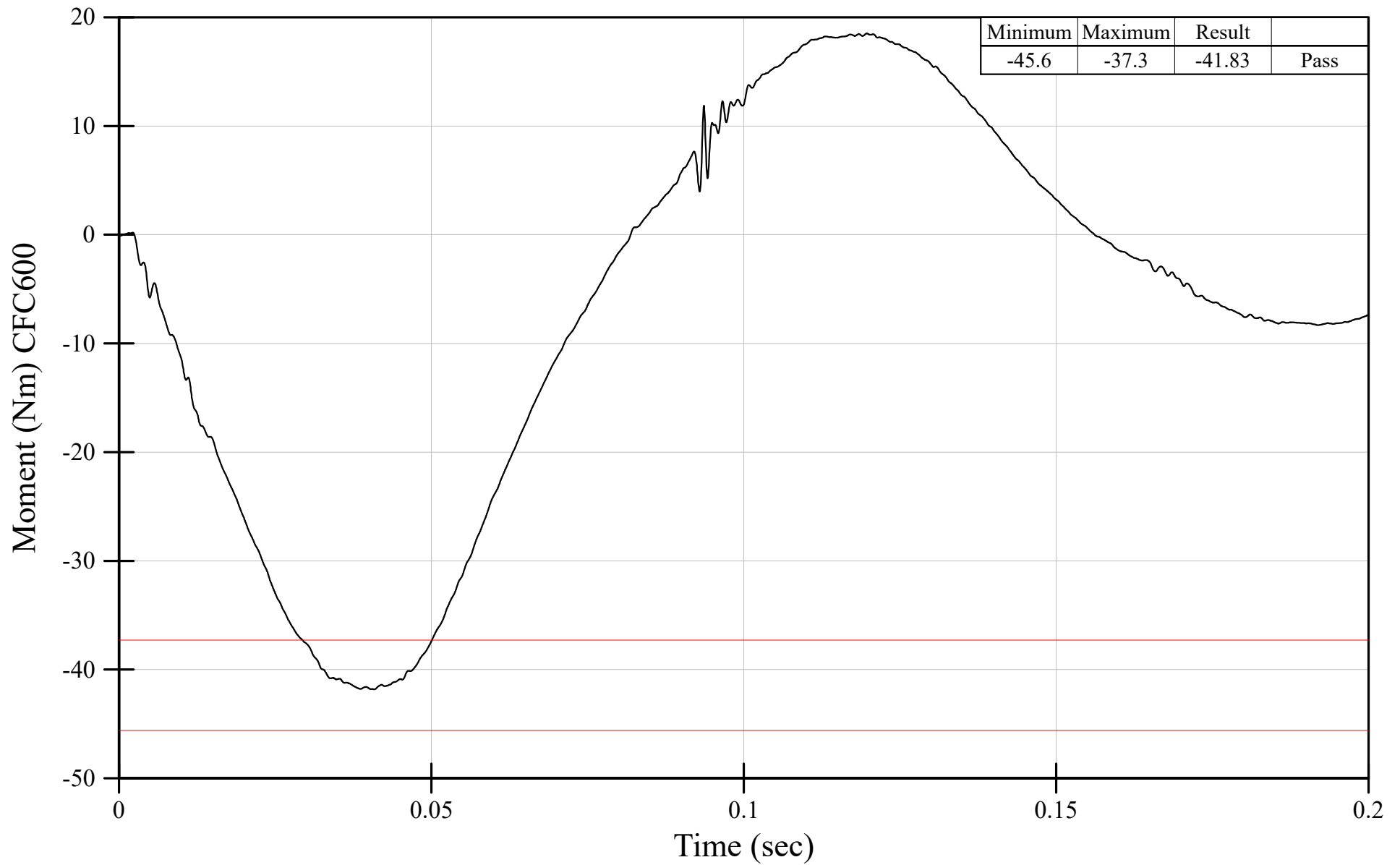
Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification

Peak Upper Neck Moment Z

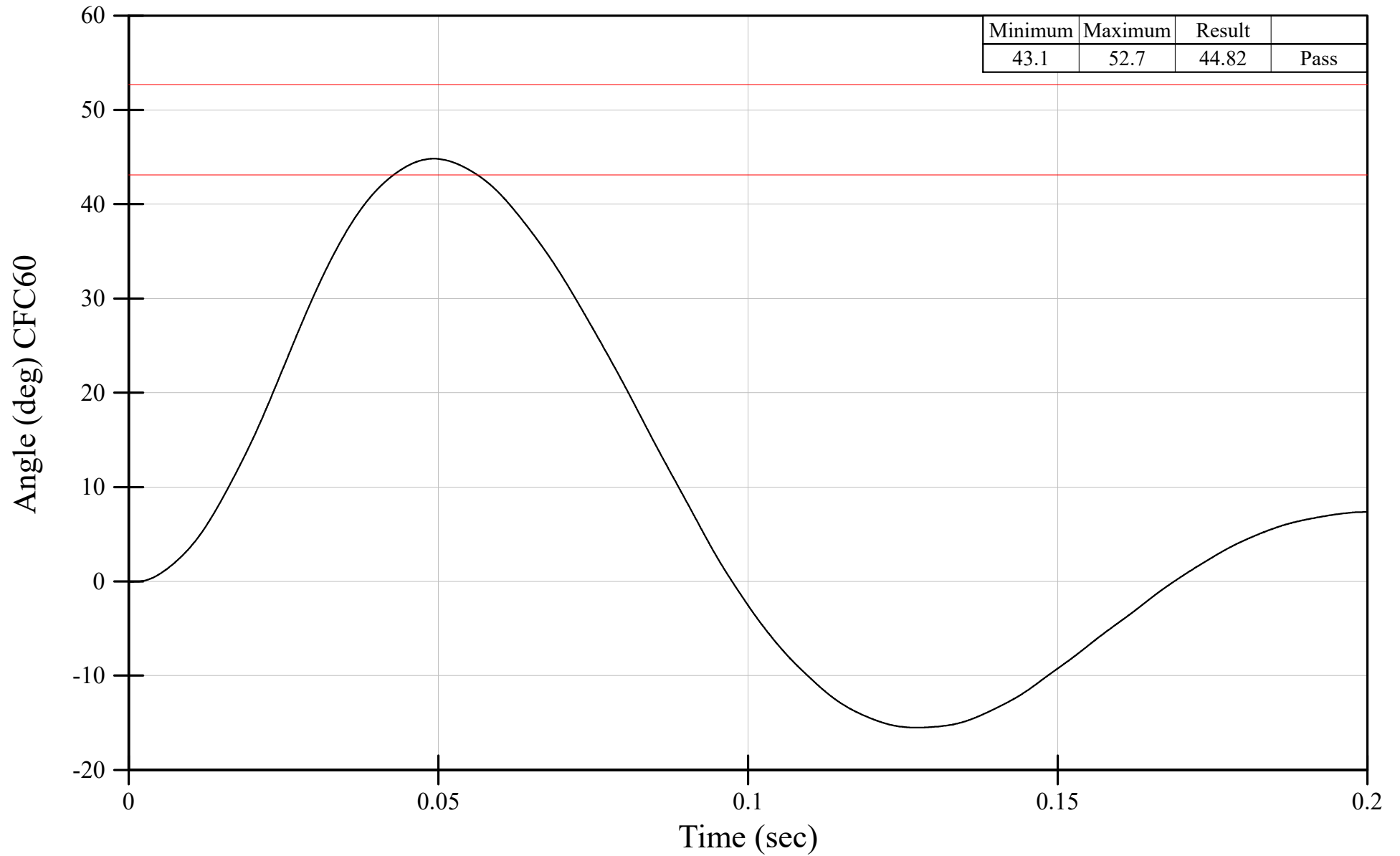
Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification

Neck Fixture Rotation

Neck Serial Number: EG3956



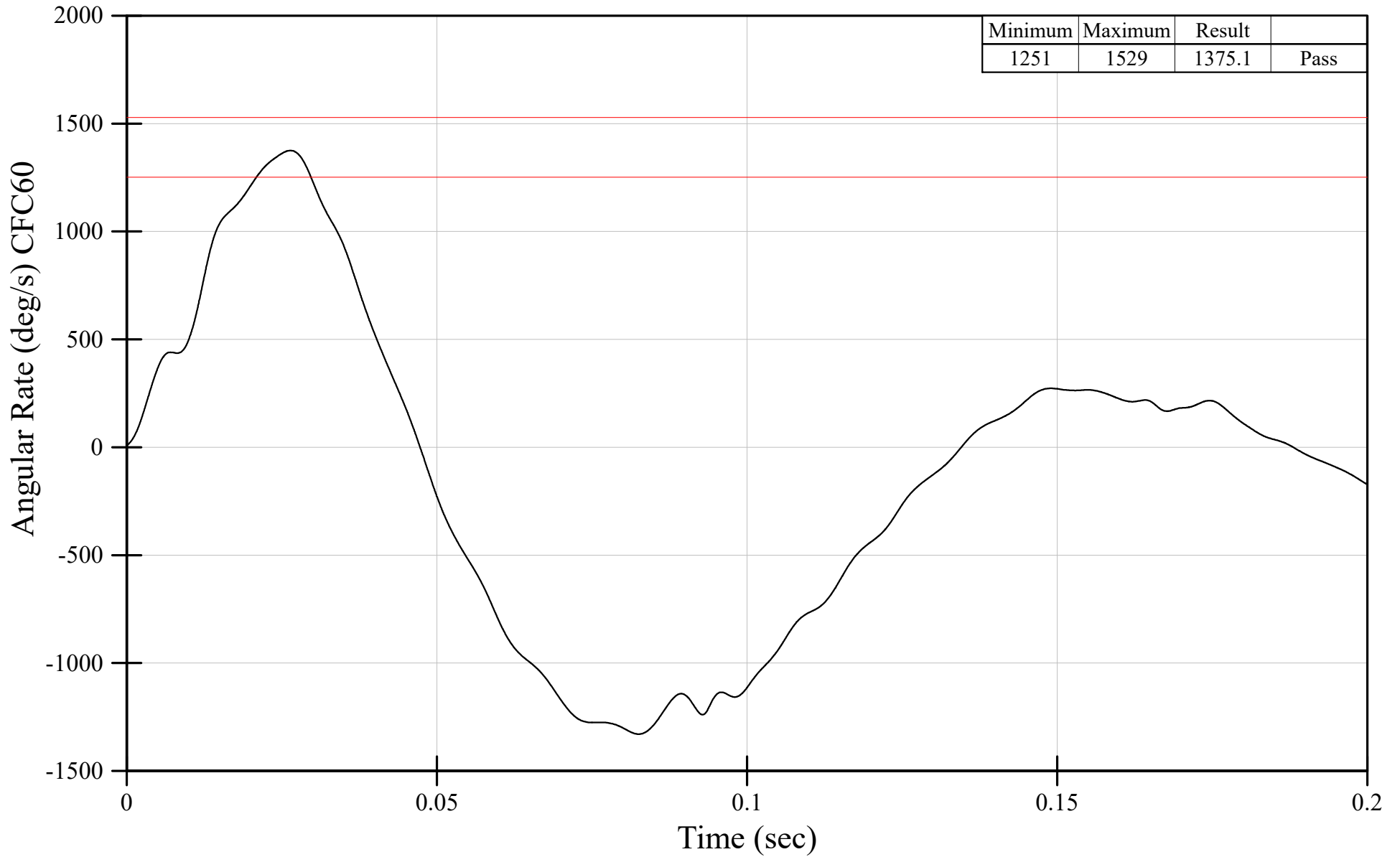
File Name: 240912-20 processed

9/12/2024 1:39 PM

THOR-50M Neck Right Torsion Qualification

Peak Angular Rate

Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240912-27

Test Date: 9/12/2024

Test Time: 3:55 PM

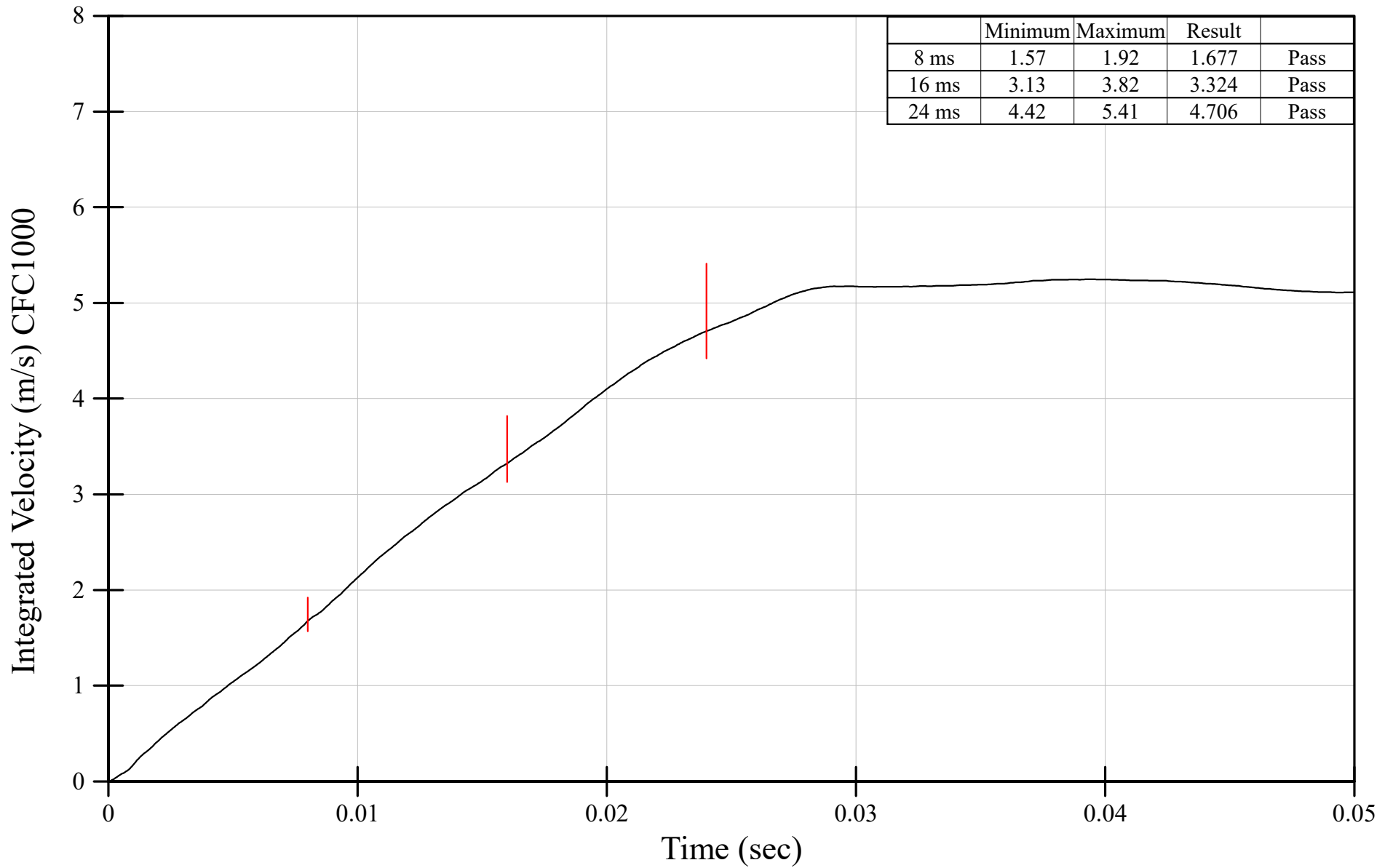
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.95 - 5.05	5.002	Pass
Pendulum Velocity at 8 ms (m/s)	1.57 - 1.92	1.677	Pass
Pendulum Velocity at 16 ms (m/s)	3.13 - 3.82	3.324	Pass
Pendulum Velocity at 24 ms (m/s)	4.42 - 5.41	4.706	Pass
Peak Upper Neck My (Nm)	27.9 - 34.1	33.57	Pass
Peak Upper Neck Fz prior to 40 ms (N)	774 - 946	841.6	Pass
Peak Head Angular Velocity Y (deg/sec)	-2172 - (-1777)	-1886.3	Pass
Peak Head Rotation (deg)	-71.0 - (-58.1)	-61.25	Pass

THOR-50M Neck Front Flexion Qualification

Pendulum Velocity

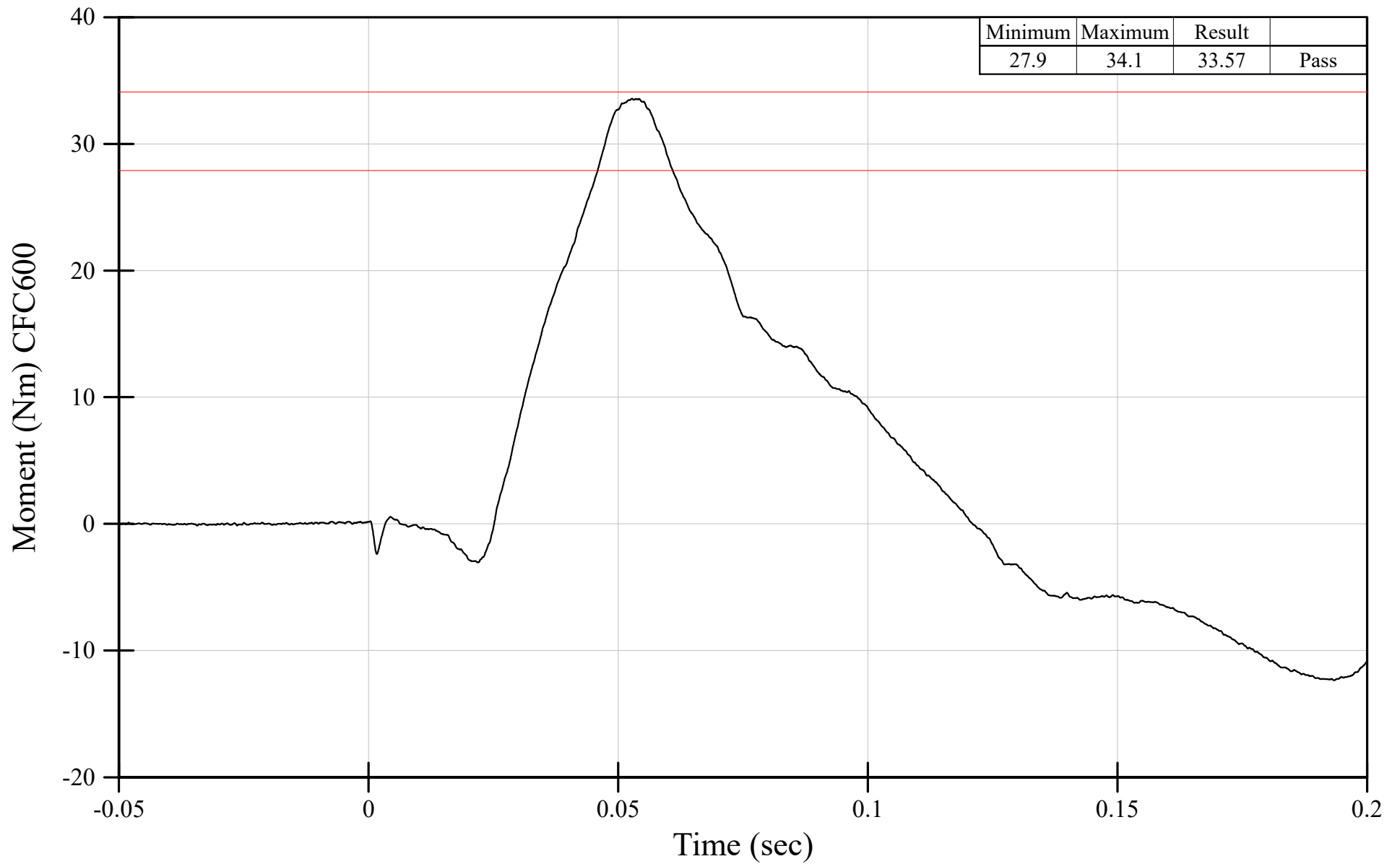
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Upper Neck My

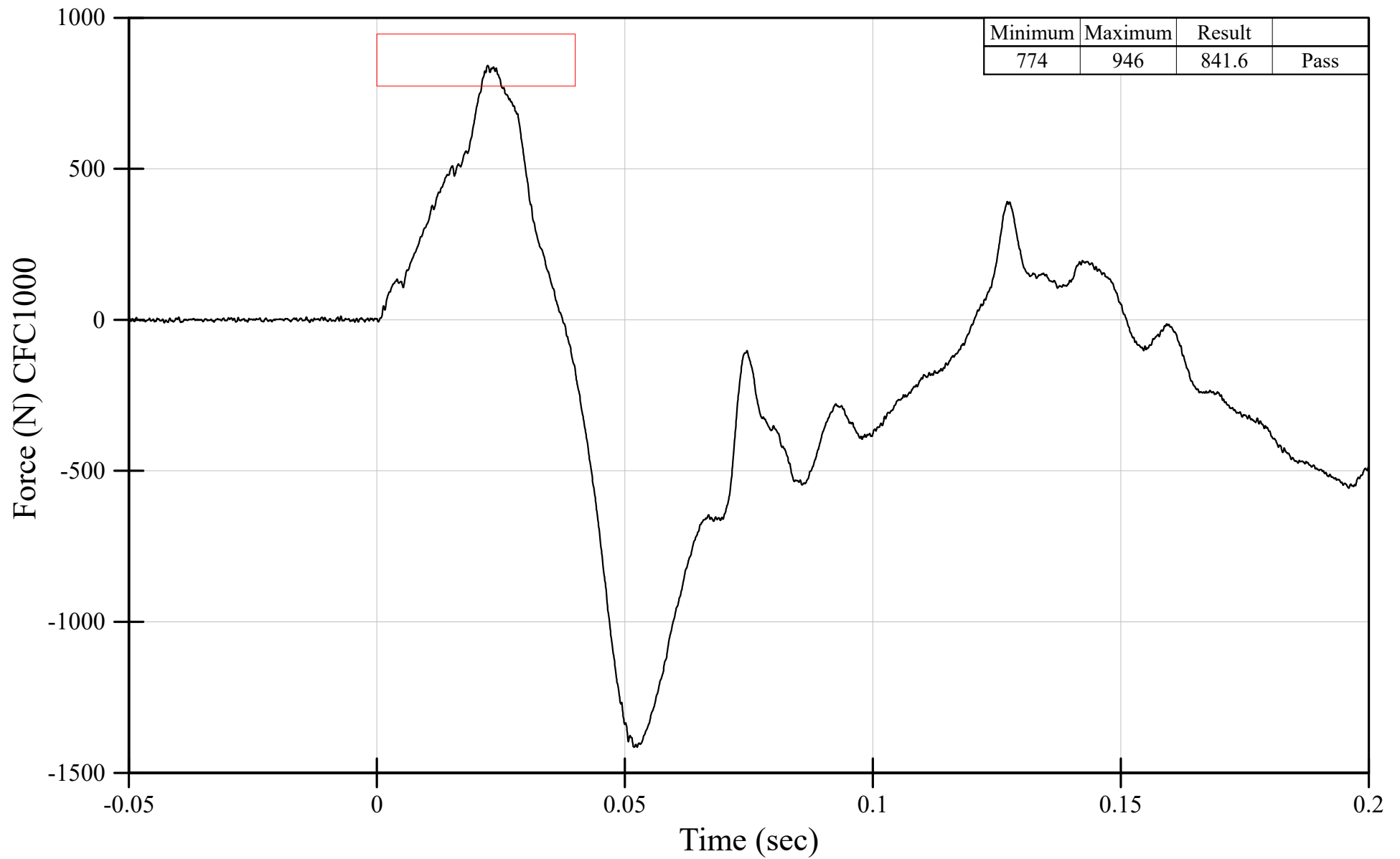
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Upper Neck Fz

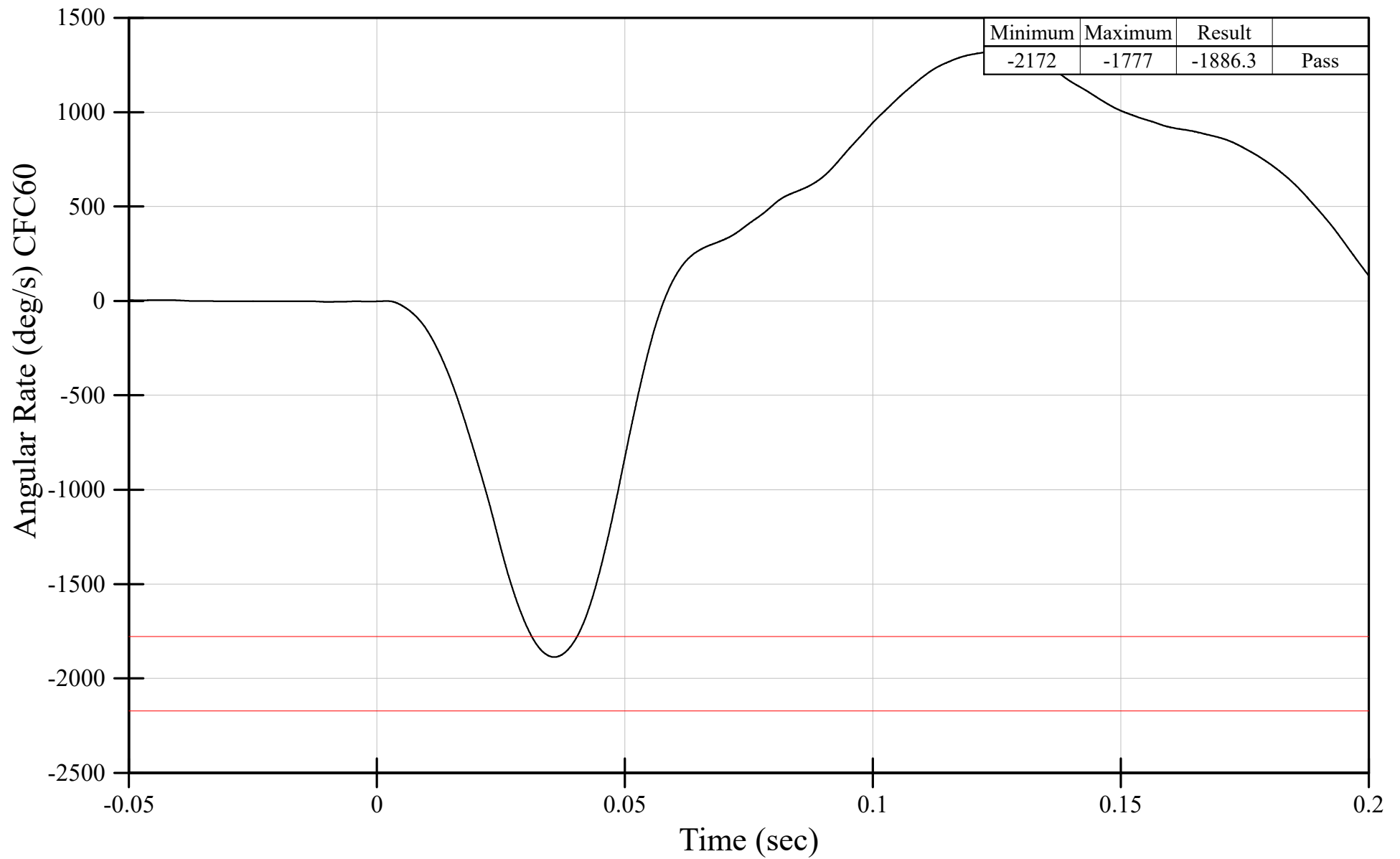
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Peak Head Angular Rate

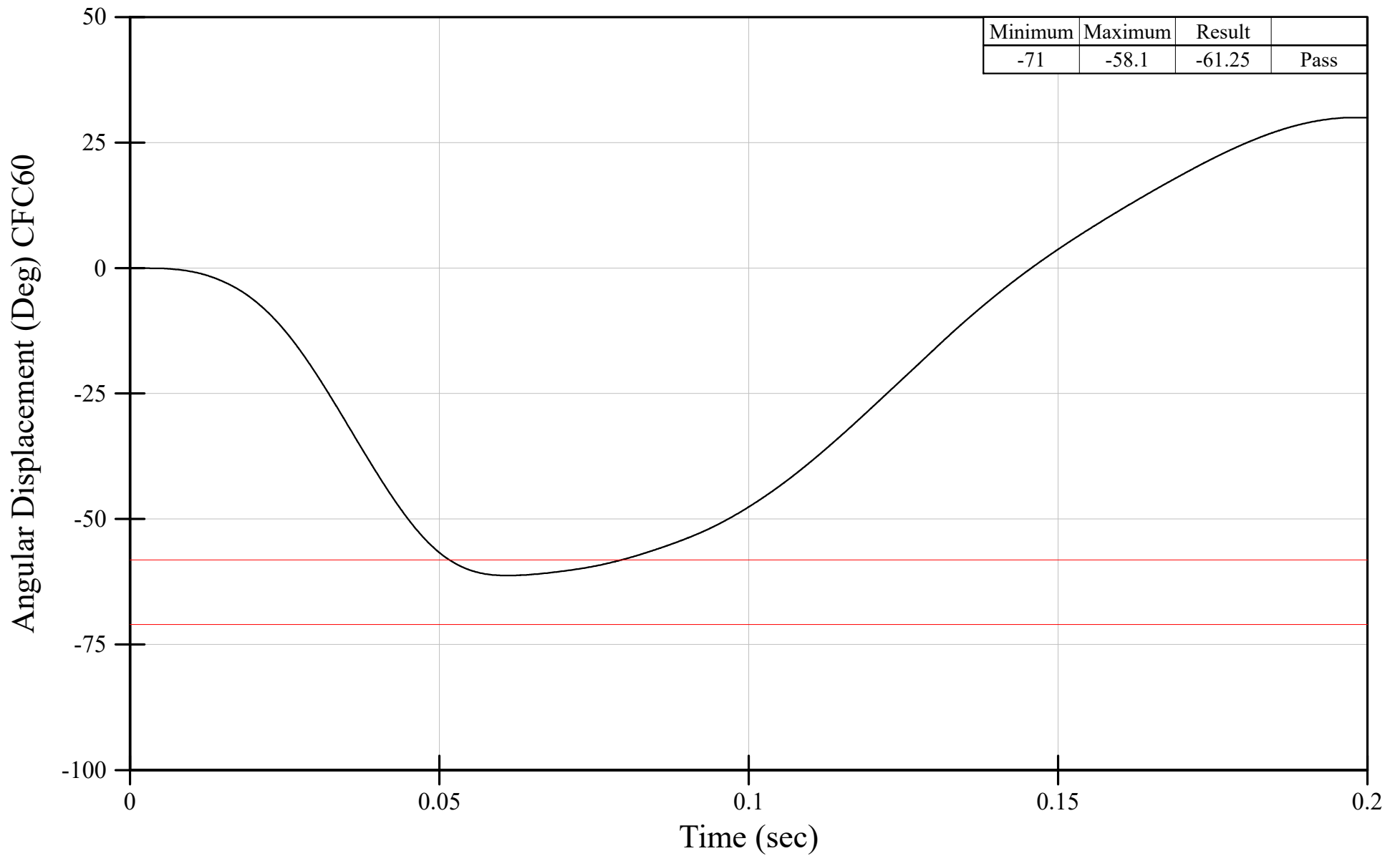
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Head Rotation

Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240913-4

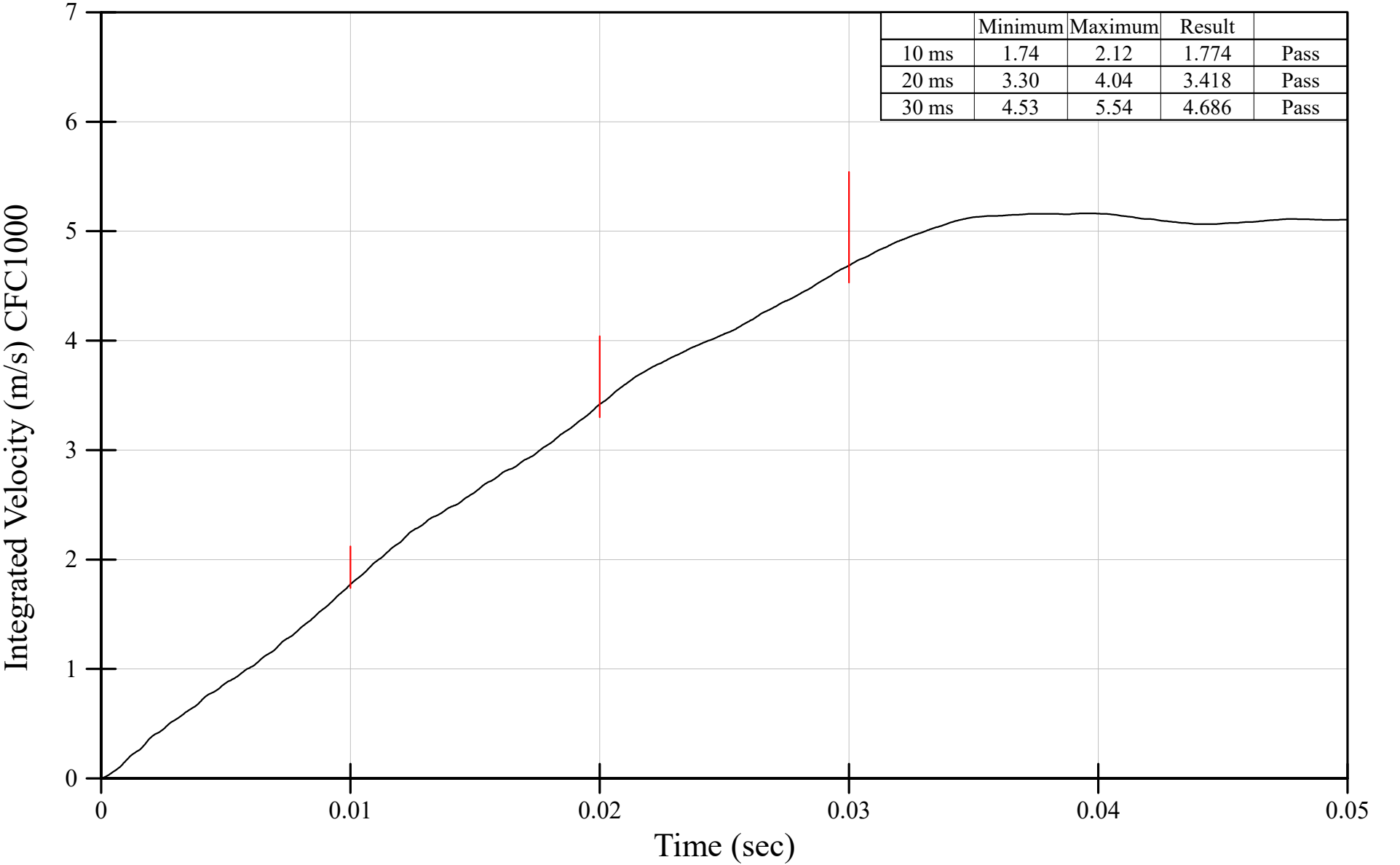
Test Date: 9/13/2024

Test Time: 8:53 AM

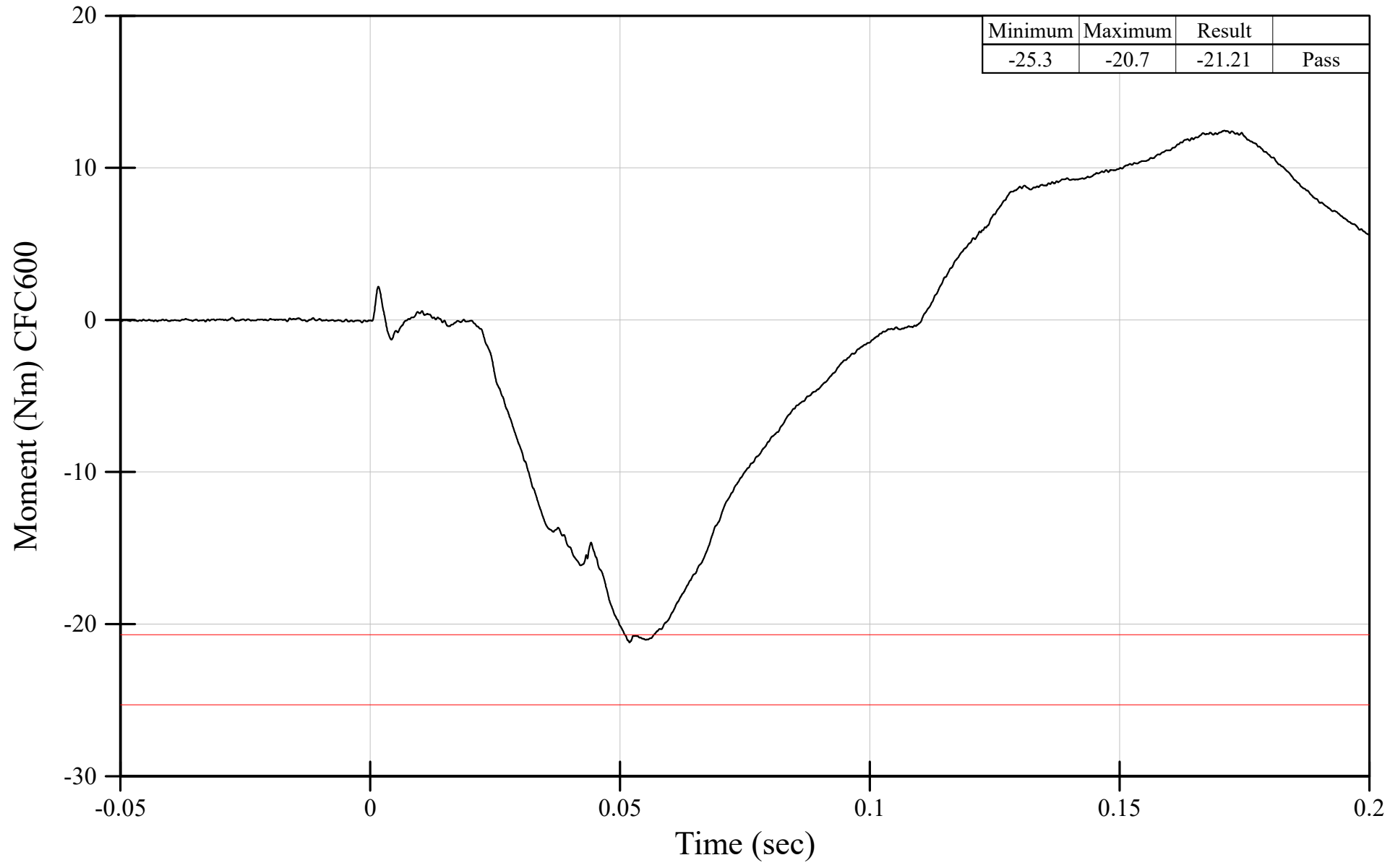
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	5.004	Pass
Pendulum Velocity at 10 ms (m/s)	1.74 - 2.12	1.774	Pass
Pendulum Velocity at 20 ms (m/s)	3.30 - 4.04	3.418	Pass
Pendulum Velocity at 30 ms (m/s)	4.53 - 5.54	4.686	Pass
Peak Upper Neck My (Nm)	-25.3 - (-20.7)	-21.21	Pass
Peak Upper Neck Fz (N)	-3210 - (-2626)	-3191.7	Pass
Peak Head Angular Velocity Y (deg/sec)	1855 - 2261	2052.6	Pass
Peak Head Rotation (deg)	58.5 - 71.5	61.95	Pass

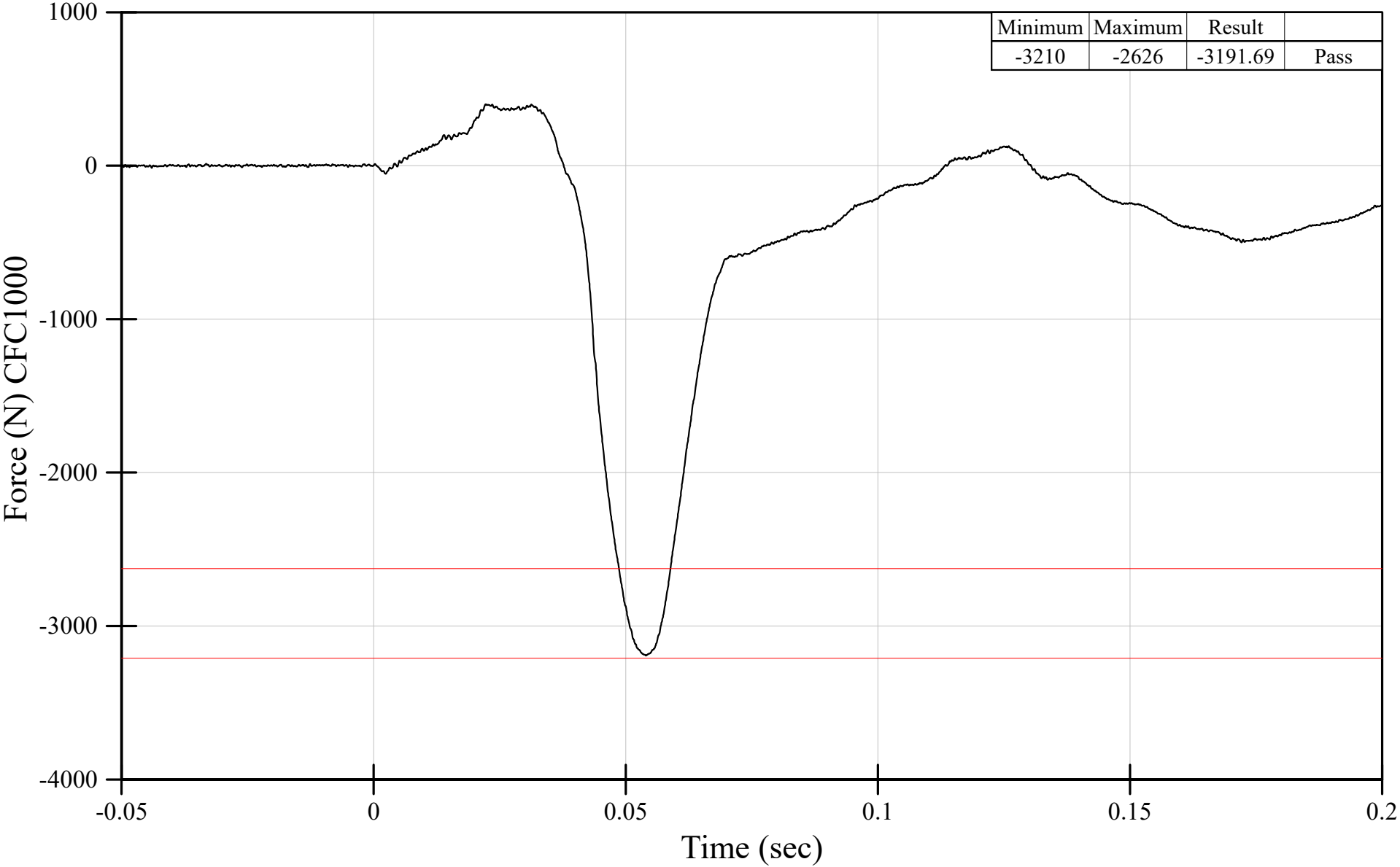
THOR-50M Neck Extension Qualification
Pendulum Velocity
Neck Serial Number: EG3956



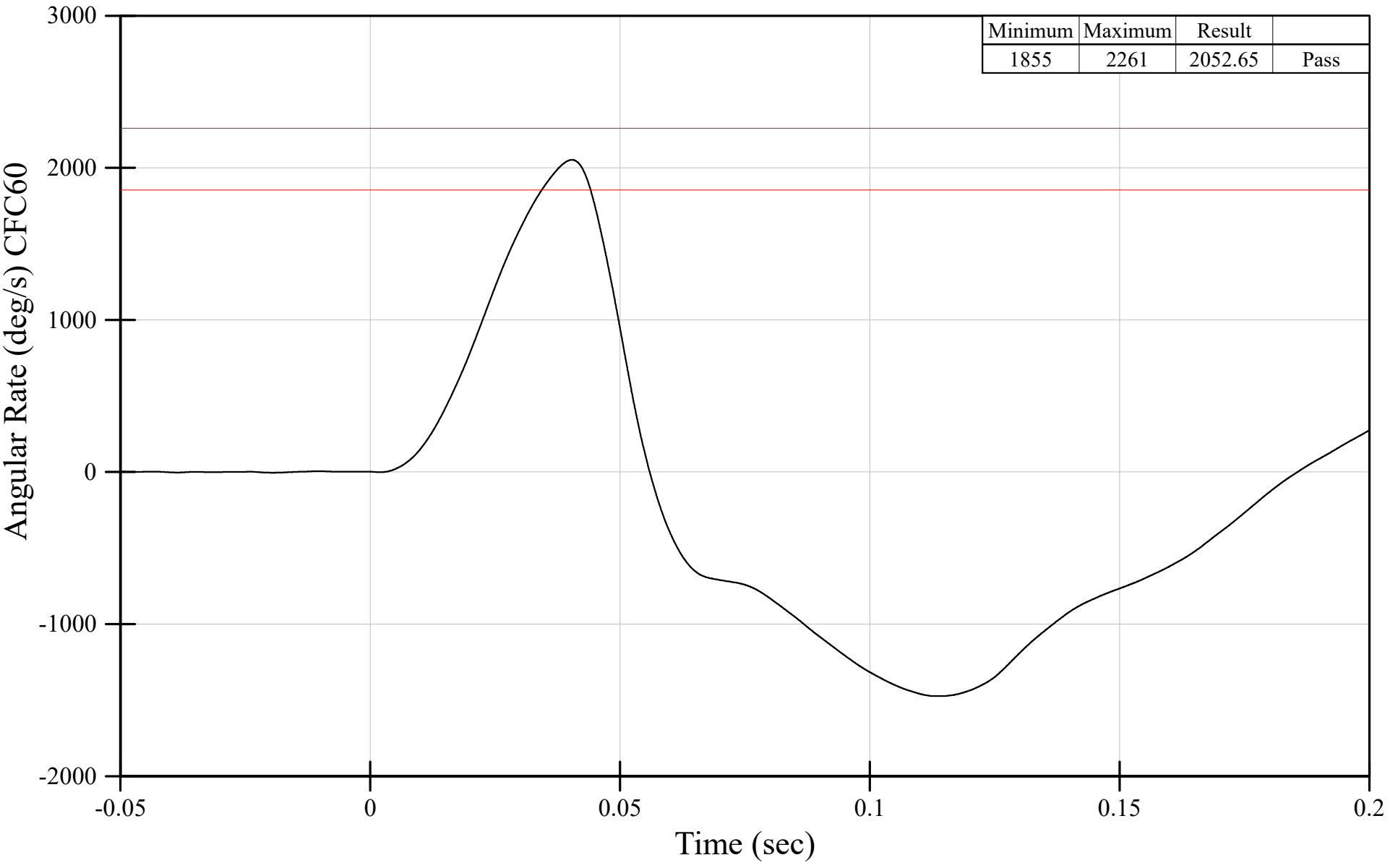
THOR-50M Neck Extension Qualification
Upper Neck My
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification
Upper Neck Fz
Neck Serial Number: EG3956



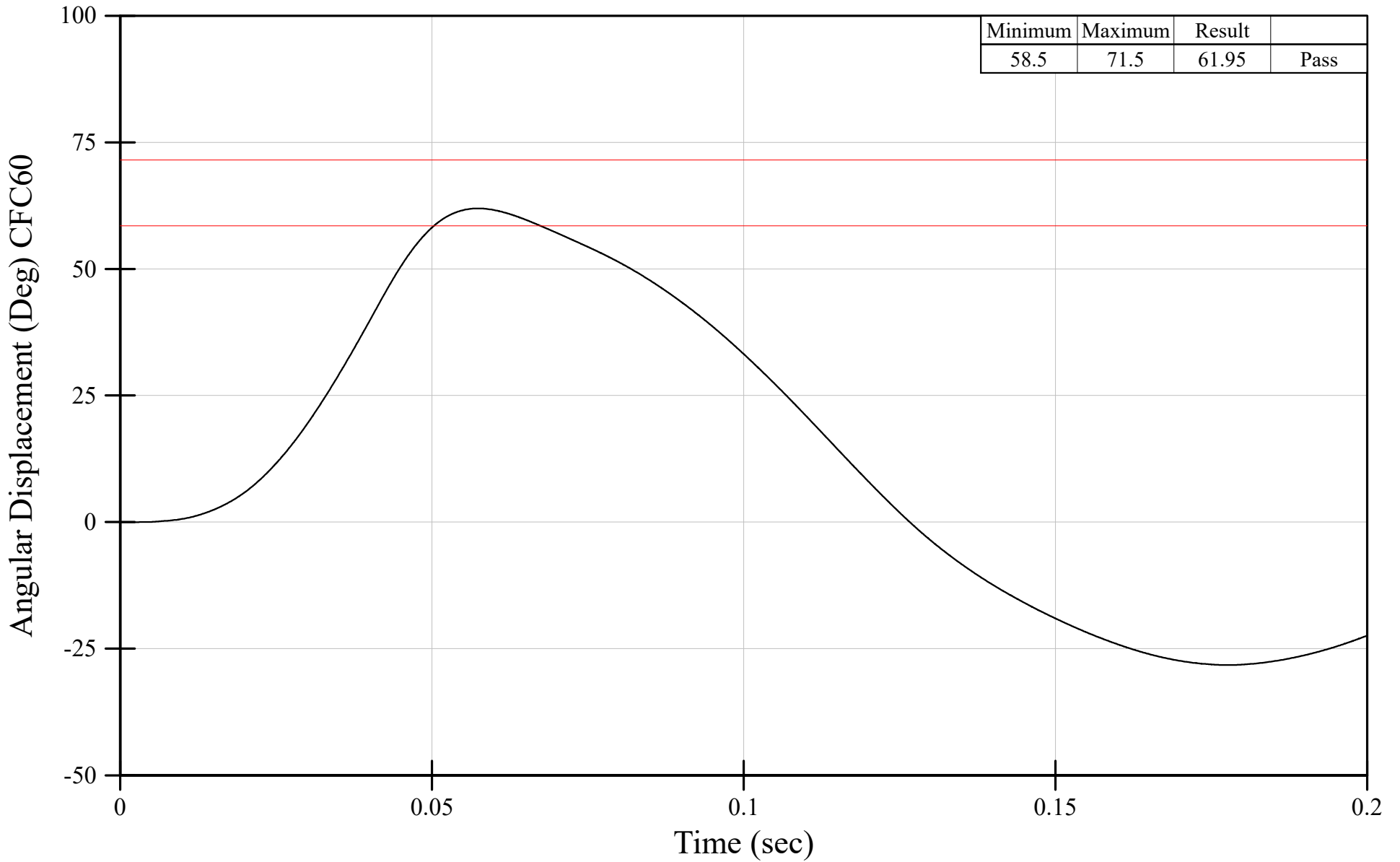
THOR-50M Neck Extension Qualification
Peak Head Angular Rate
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification

Neck Rotation

Neck Serial Number: EG3956



THOR-50M Neck Left Lateral Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240916-3

Test Date: 9/16/2024

Test Time: 7:49 AM

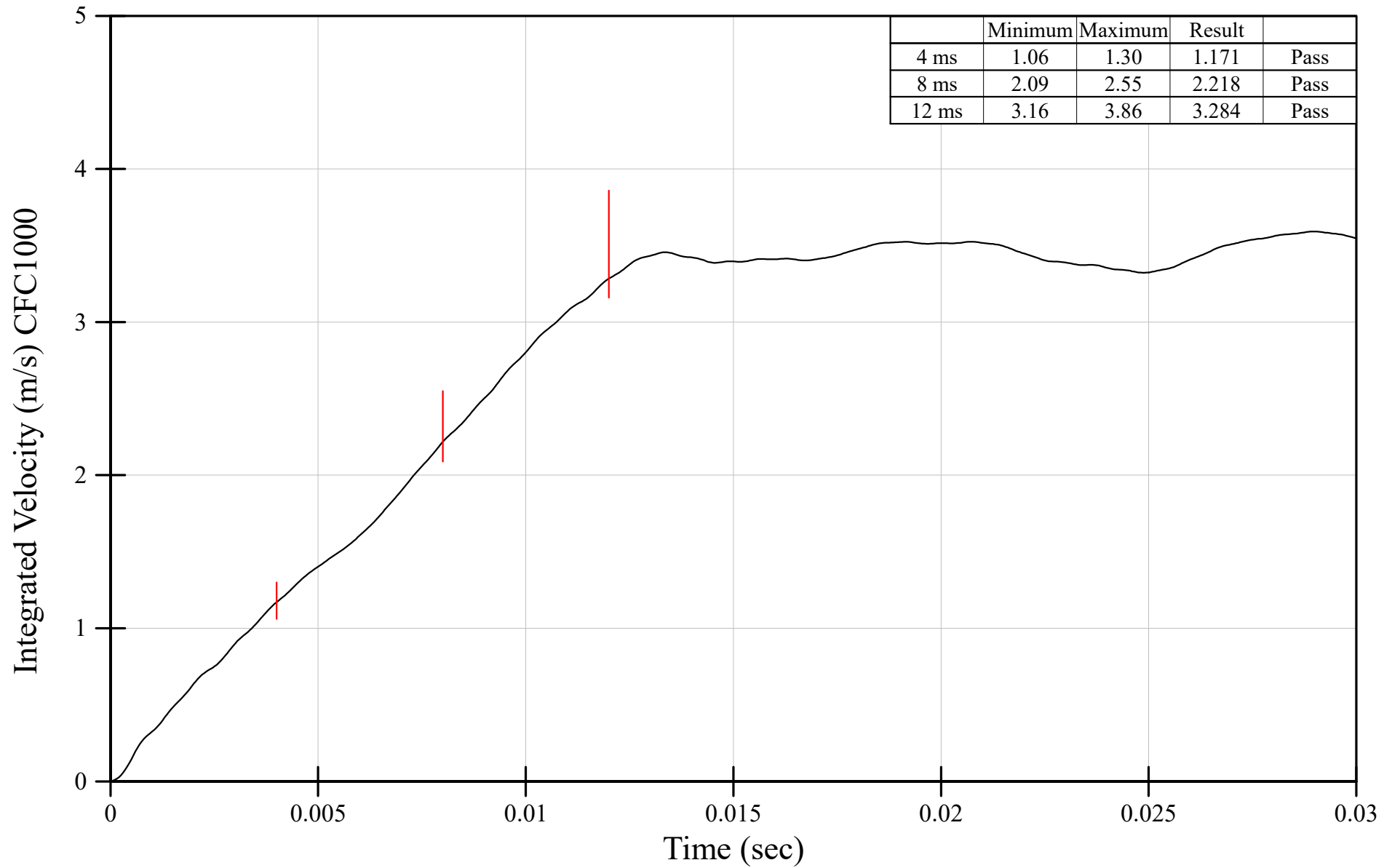
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	3.35 - 3.45	3.397	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.171	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.218	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.284	Pass
Peak Upper Neck Mx after 40 ms (N)	44.8 - 54.7	50.79	Pass
Peak Head Angular Velocity X (deg/sec)	-1498 - (-1226)	-1263.4	Pass
Peak Head Rotation (deg)	-45.9 - (-37.6)	-37.86	Pass

THOR-50M Neck Left Lateral Qualification

Pendulum Velocity

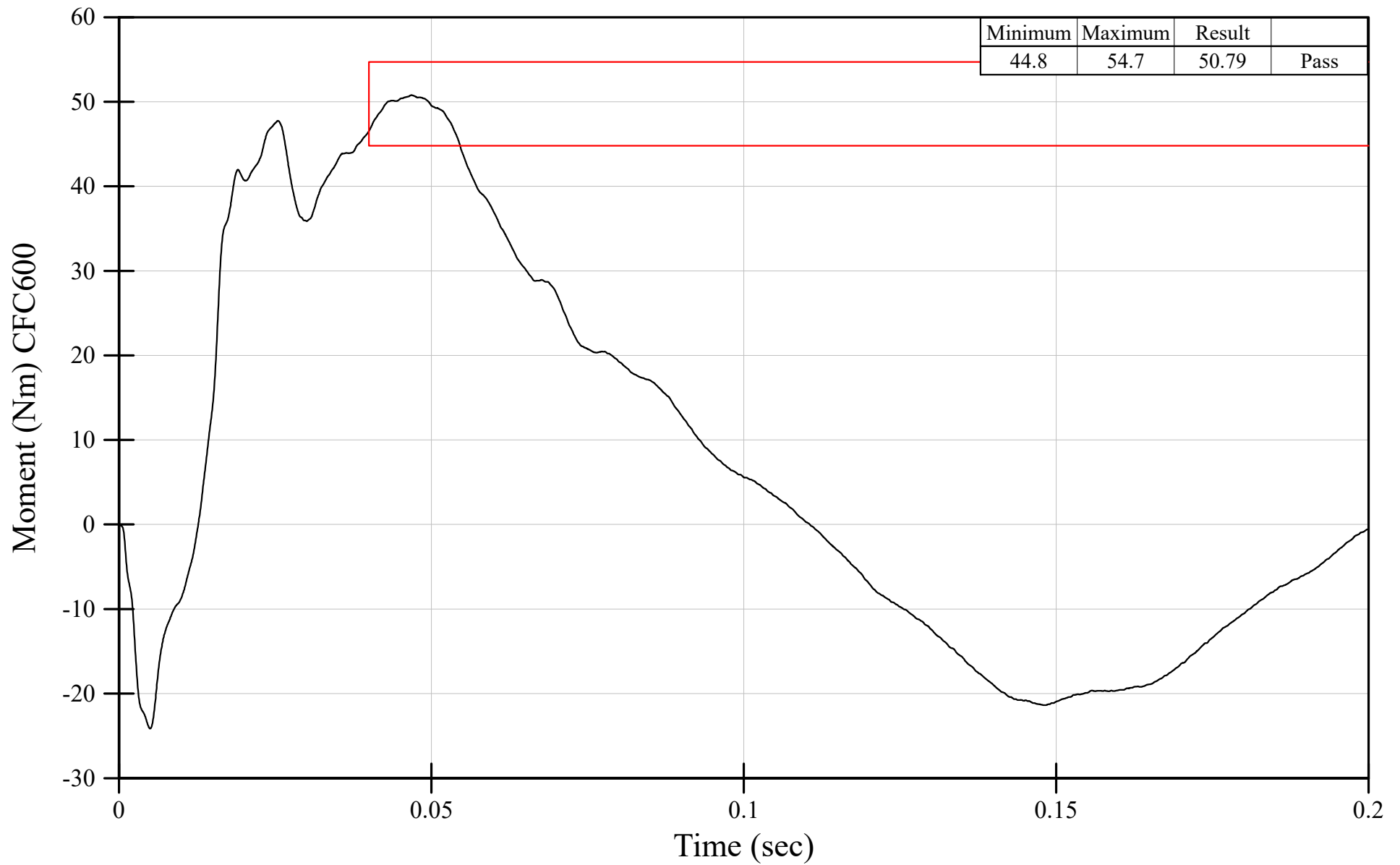
Serial Number: EG3956



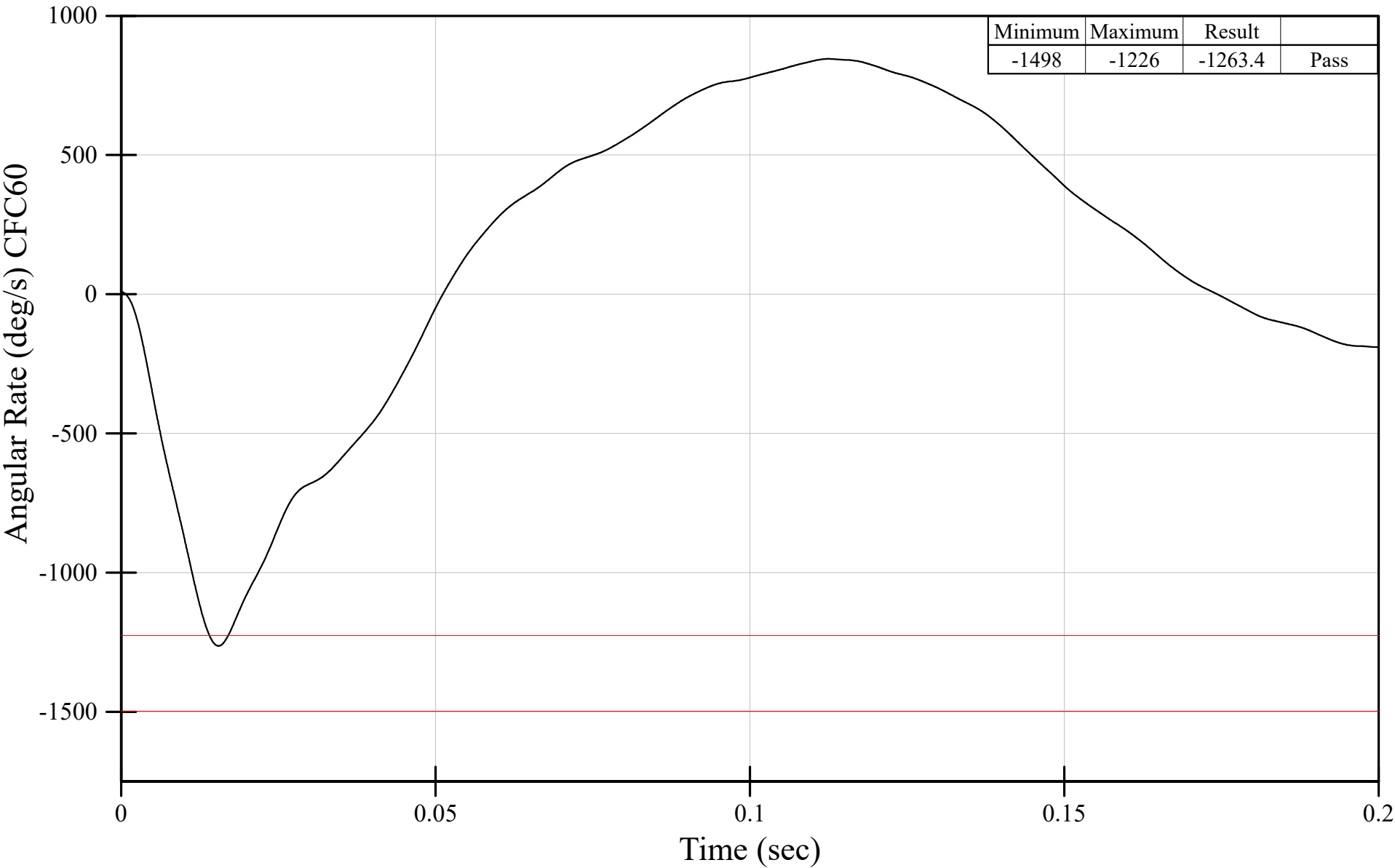
THOR-50M Neck Left Lateral Qualification

Upper Neck Mx

Serial Number: EG3956



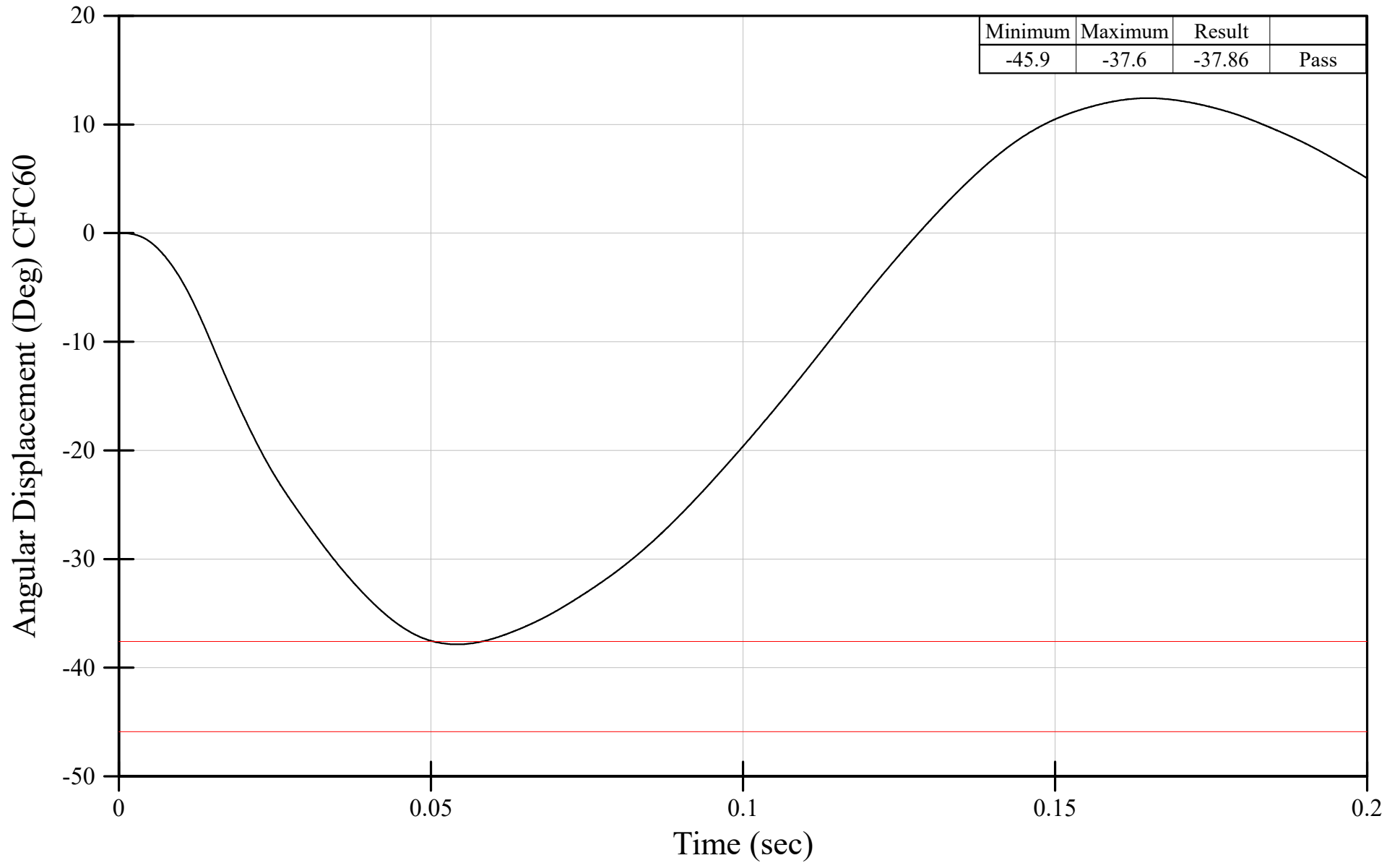
THOR-50M Neck Left Lateral Qualification
Peak Angular Rate
Serial Number: EG3956



THOR-50M Neck Left Lateral Qualification

Neck Rotation

Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240916-1

Test Date: 9/16/2024

Test Time: 6:22 AM

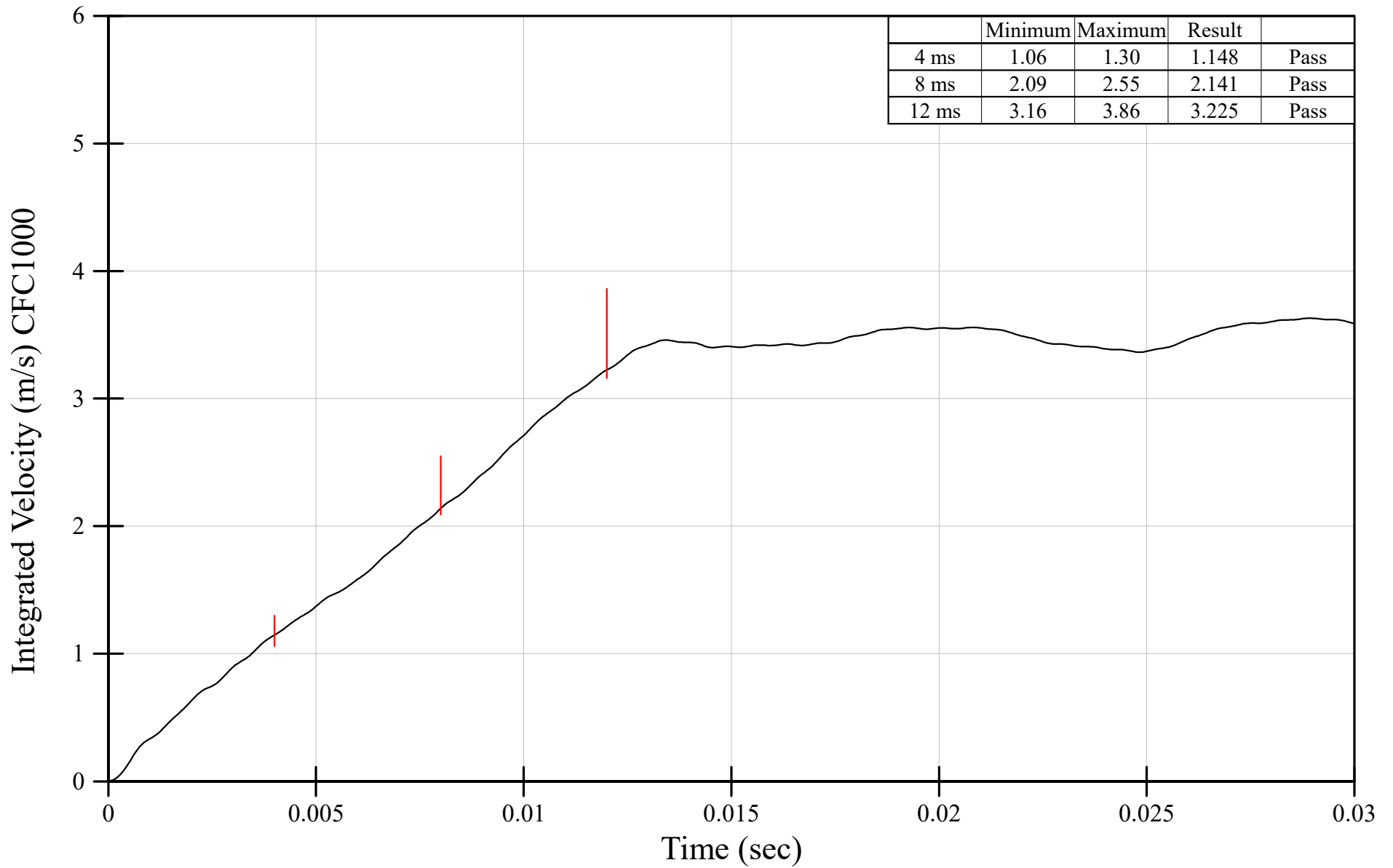
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	3.35 - 3.45	3.404	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.148	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.141	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.225	Pass
Peak Upper Neck Mx after 40 ms (N)	-54.7 - (-44.8)	-50.51	Pass
Peak Head Angular Velocity X (deg/sec)	1226 - 1498	1230.5	Pass
Peak Head Rotation (deg)	37.6 - 45.9	37.85	Pass

THOR-50M Neck Right Lateral Qualification

Pendulum Velocity

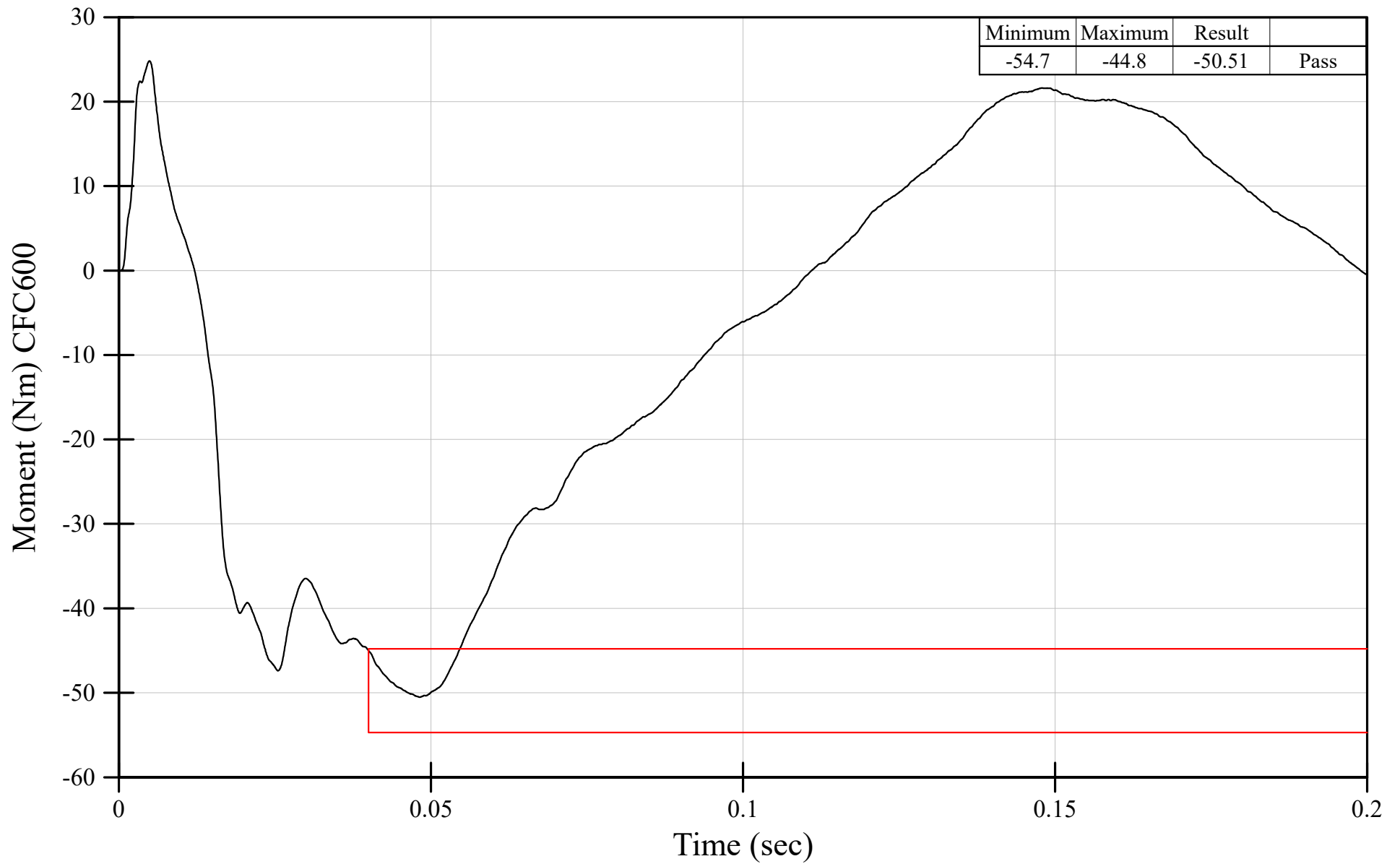
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Upper Neck Mx

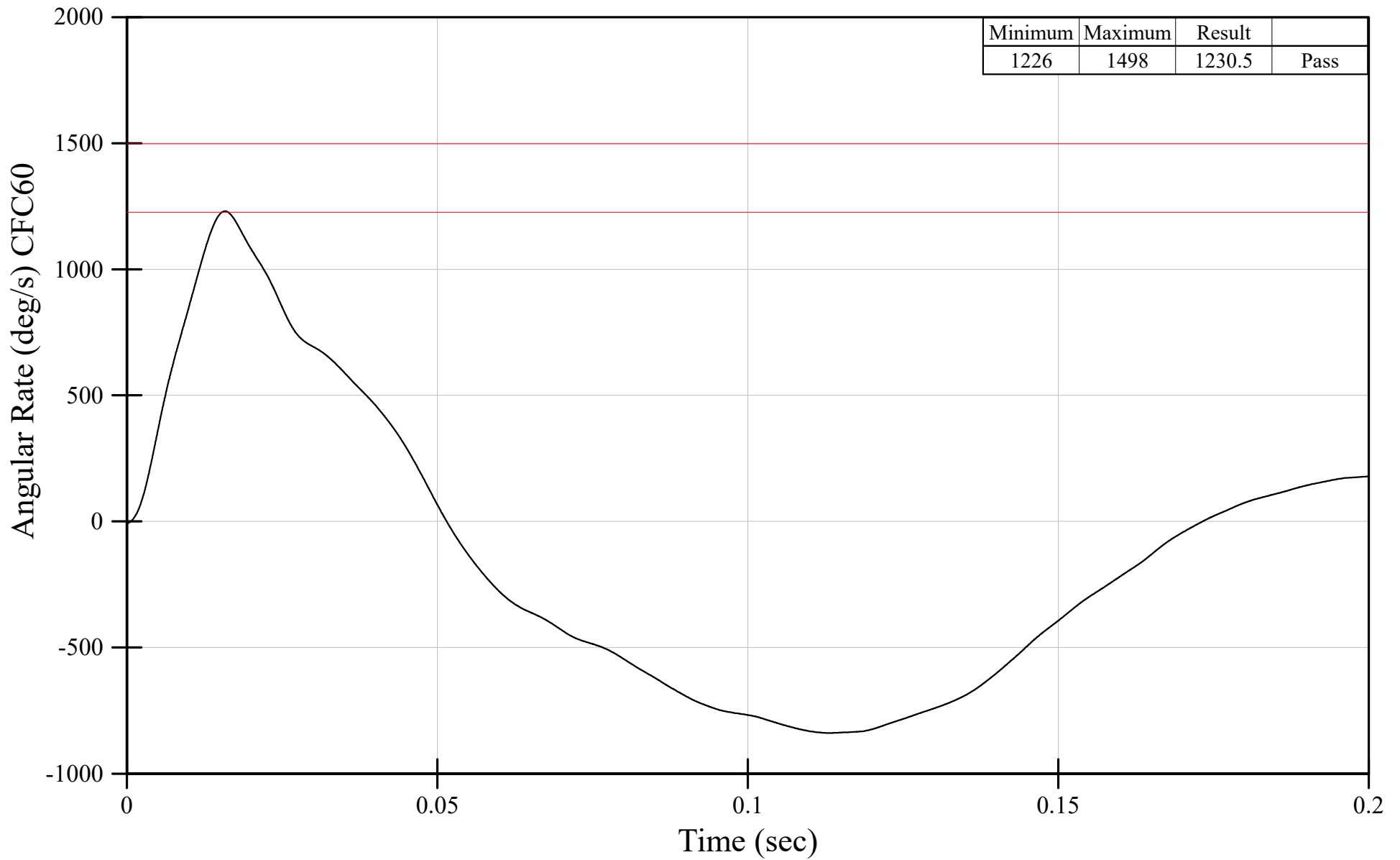
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Peak Angular Rate

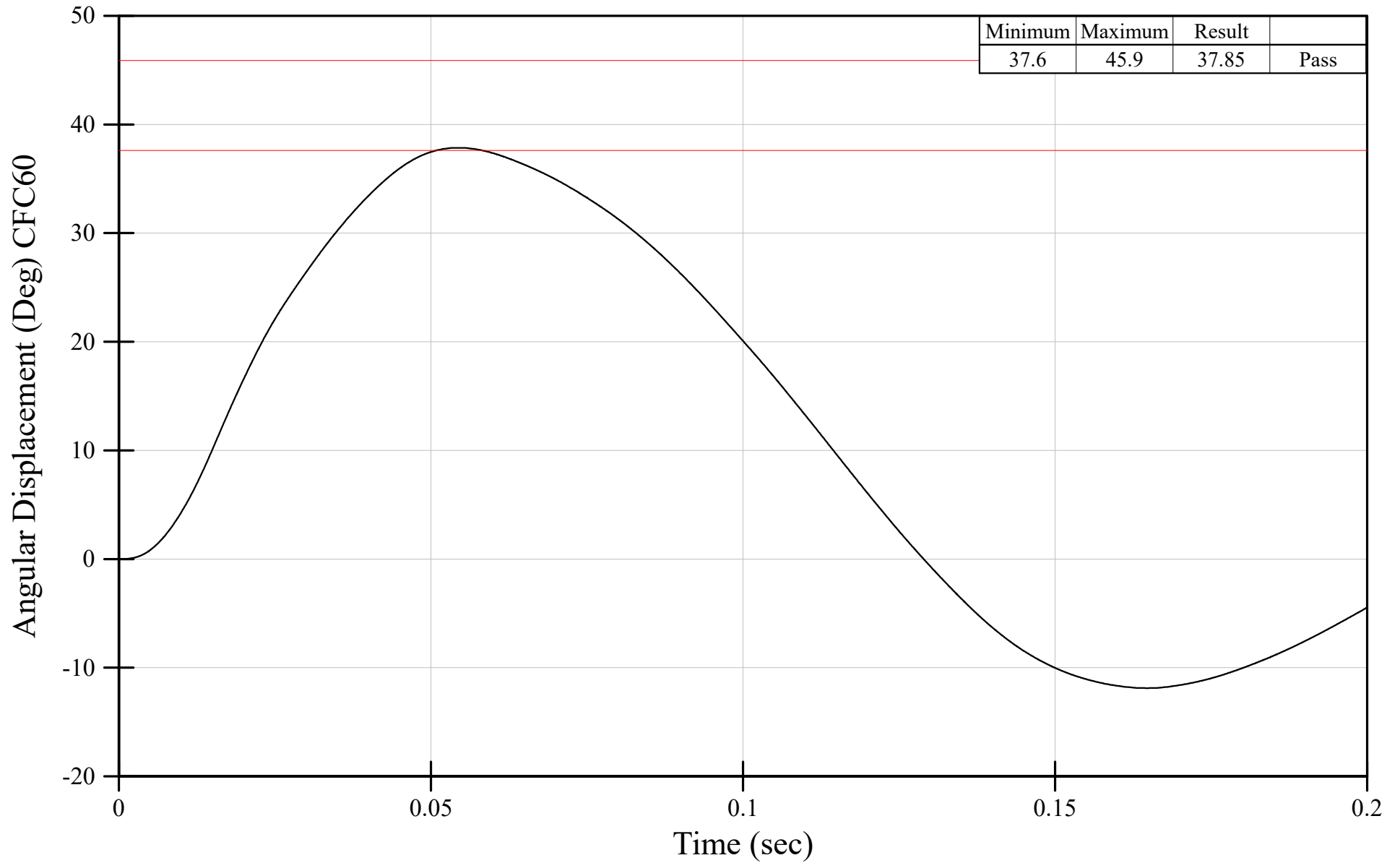
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Neck Rotation

Serial Number: EG3956



THOR-50M Upper Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898
Rib 2 Serial Number: EF8143
Rib 3 Serial Number: EF8418
Rib 4 Serial Number: EF9464

Rib 5 Serial Number: EF9496
Rib 6 Serial Number: EF9497
Rib 7 Serial Number: EF8423

Test ID: 240926-12
Test Date: 9/26/2024
Test Time: 2:45 PM

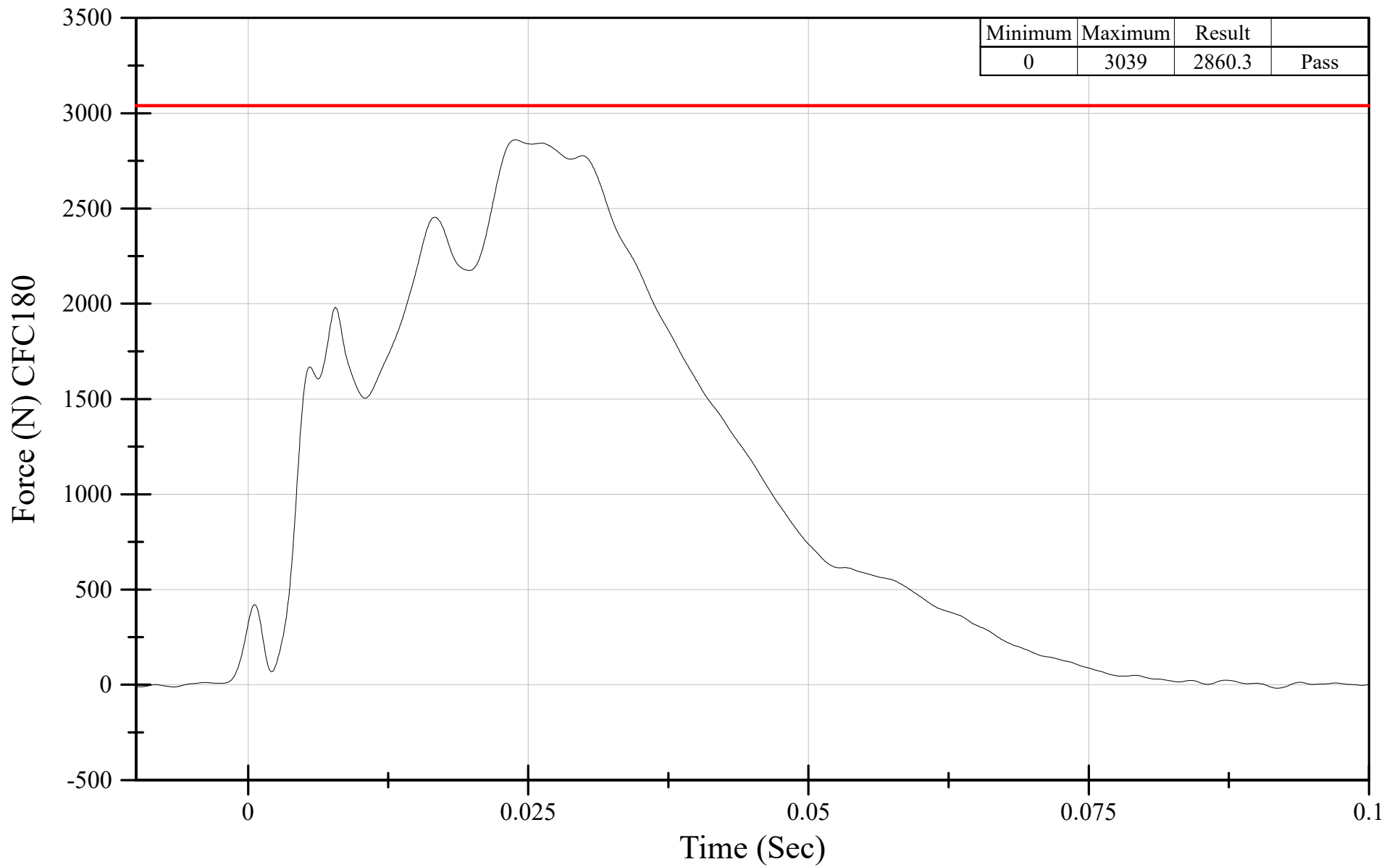
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.25 - 4.35	4.287	Pass
Peak Probe Force (N)	less than 3039	2860.3	Pass
Peak Upper Left Resultant Deflection (mm)	48.3 - 59.0	52.29	Pass
Peak Upper Right Resultant Deflection (mm)	48.3 - 59.0	51.17	Pass
Difference Between Peak Left & Right Resultant Deflections (mm)	less than 5.0	1.12	Pass
Force at Left Peak Resultant Deflection (N)	2409 - 2944	2842.0	Pass
Force at Right Peak Resultant Deflection (N)	2409 - 2944	2758.8	Pass

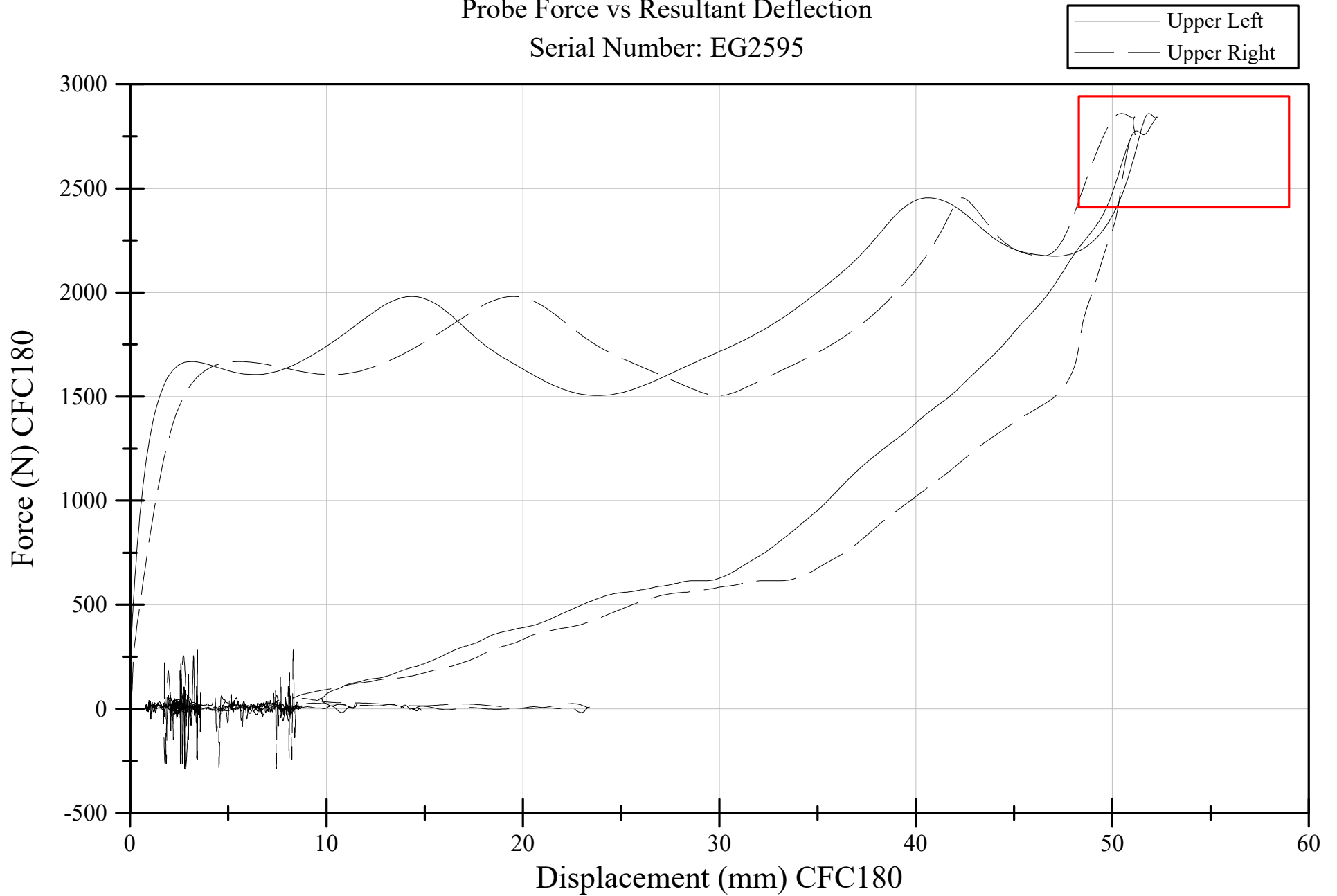
THOR-50M Upper Thorax Qualification

Probe Force

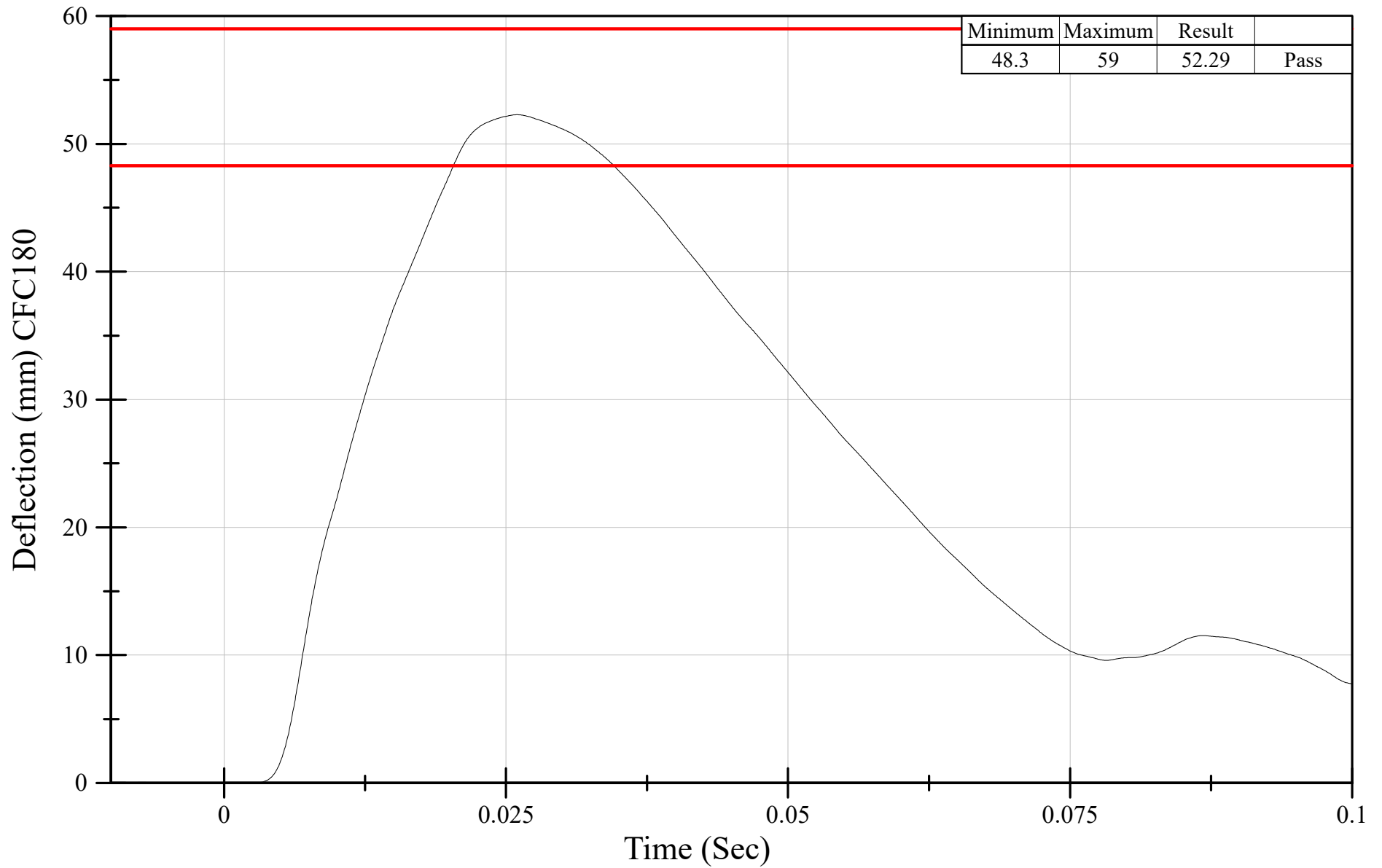
Serial Number: EG2595



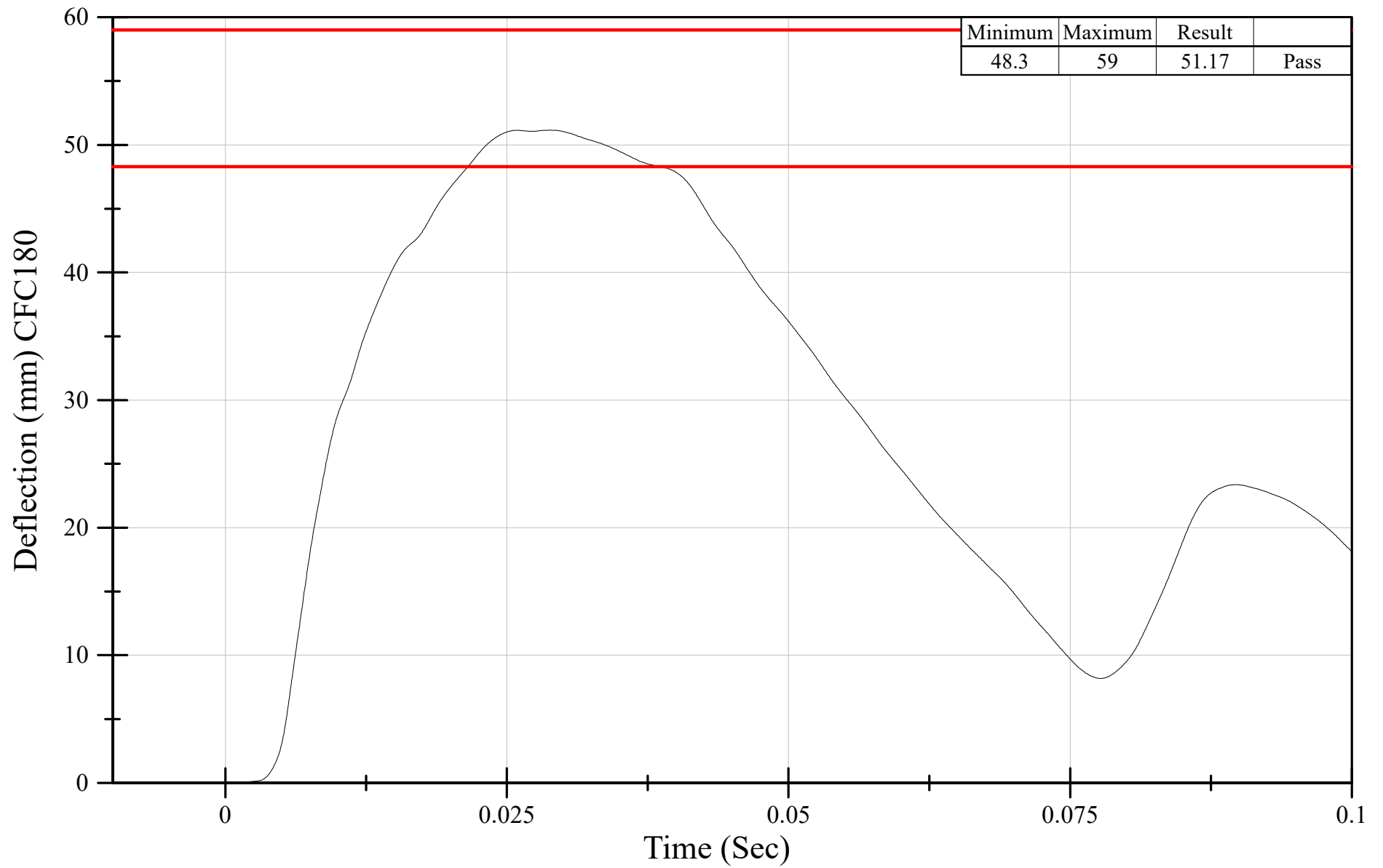
THOR-50M Upper Thorax Qualification
Probe Force vs Resultant Deflection
Serial Number: EG2595



THOR-50M Upper Thorax Qualification
Left Resultant Deflection
Serial Number: EG2595



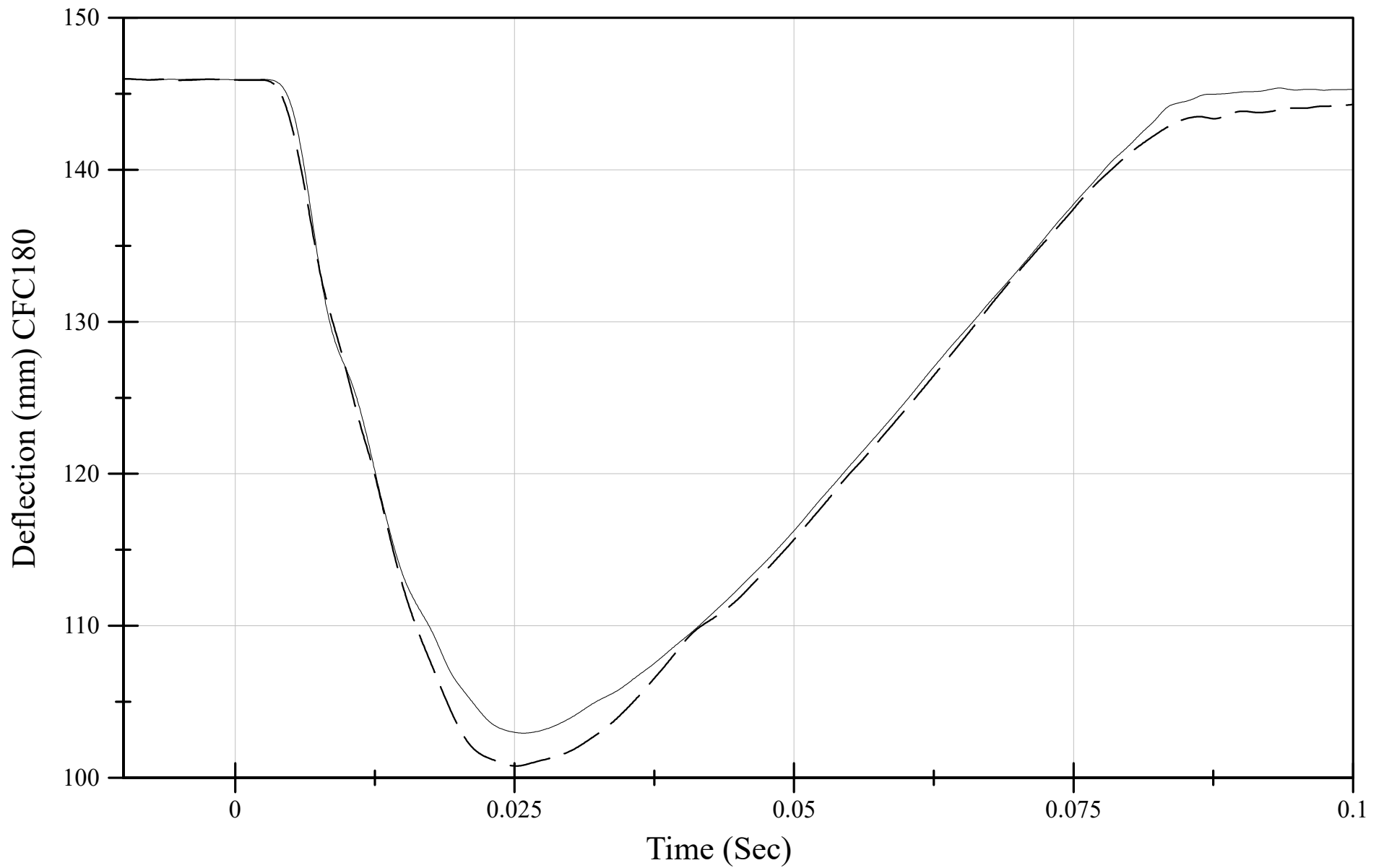
THOR-50M Upper Thorax Qualification
Right Resultant Deflection
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

X-Deflection

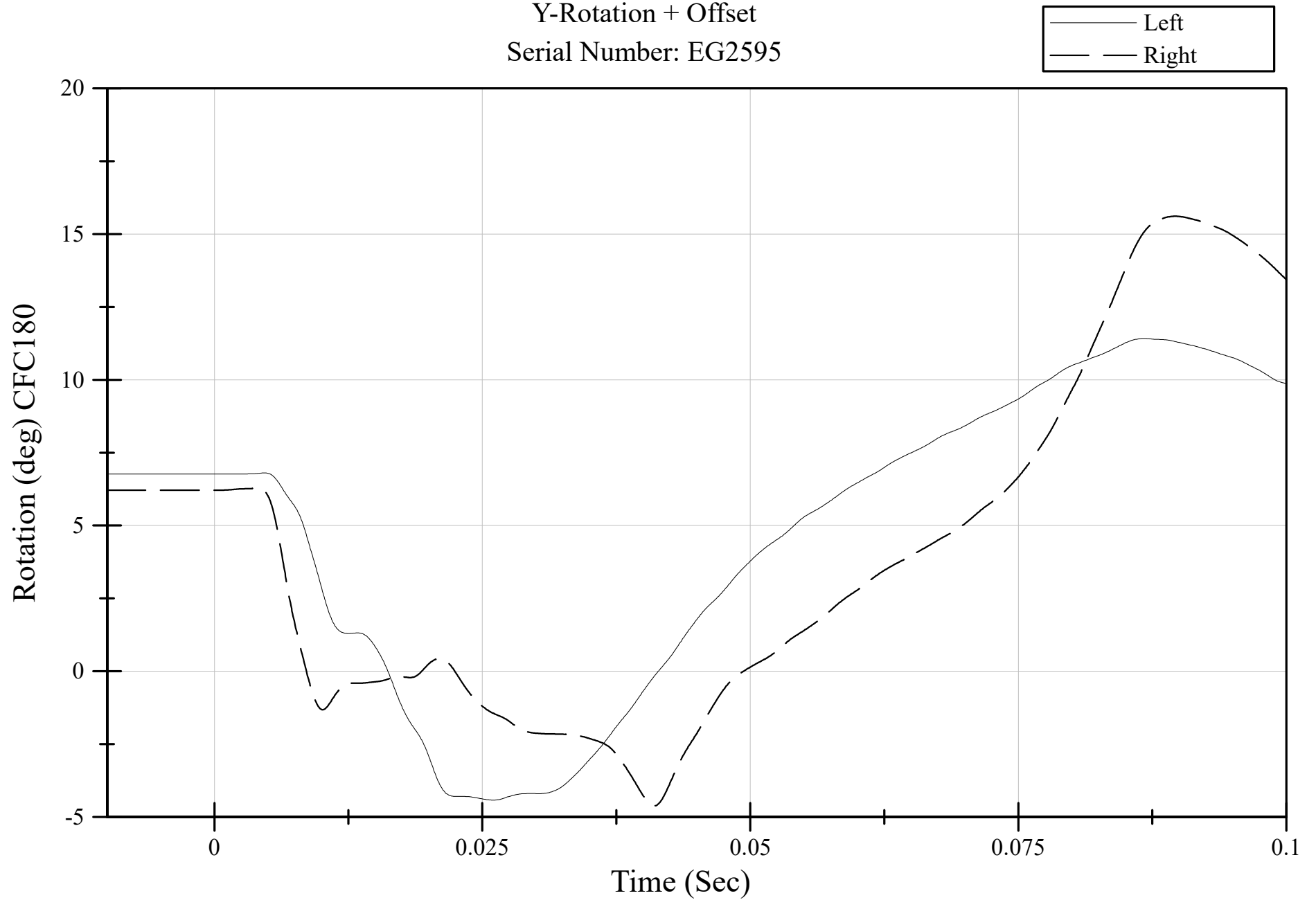
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

Y-Rotation + Offset

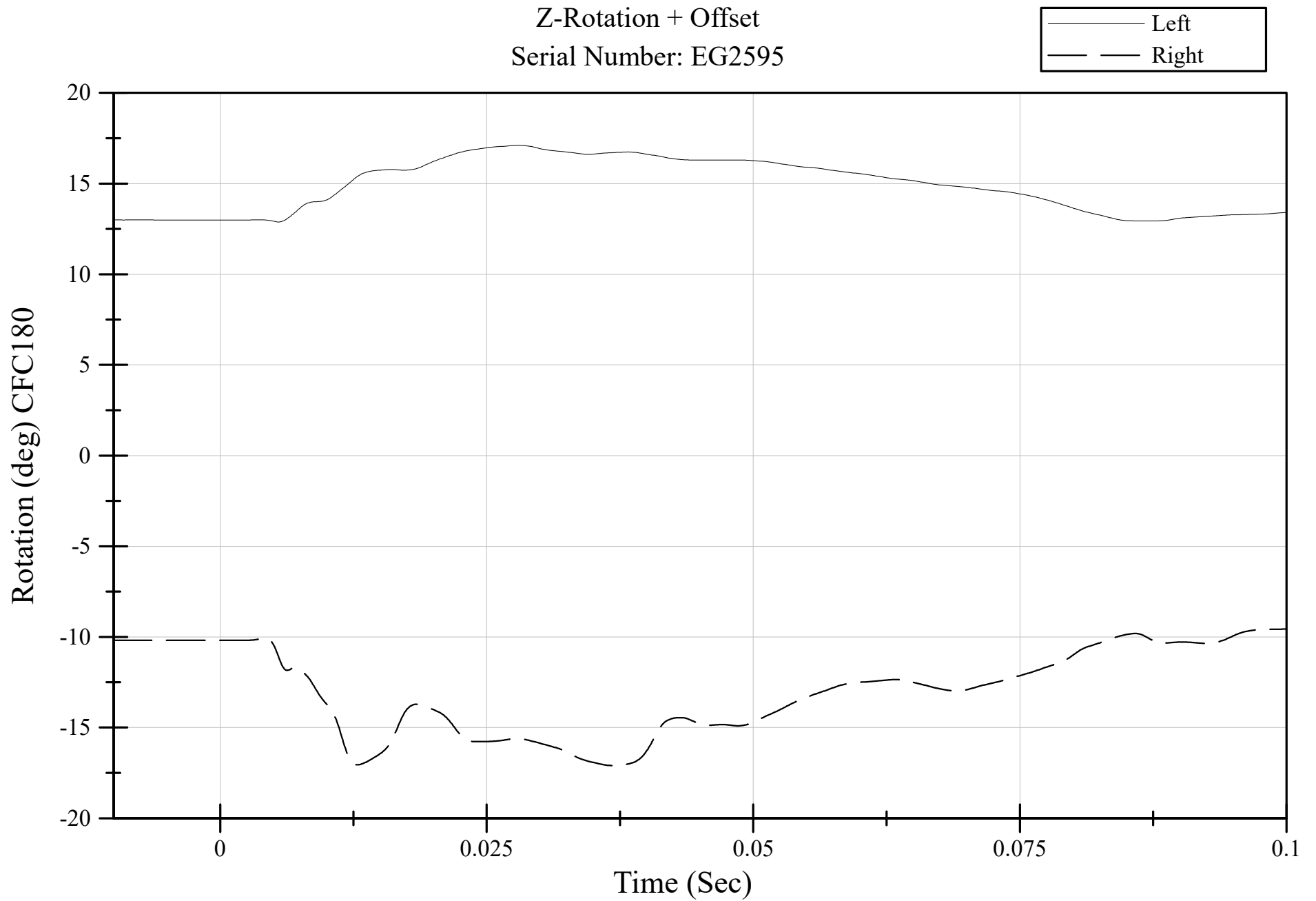
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898 Rib 5 Serial Number: EF9496
Rib 2 Serial Number: EF8143 Rib 6 Serial Number: EF9497
Rib 3 Serial Number: EF8418 Rib 7 Serial Number: EF8423
Rib 4 Serial Number: EF9464

Test ID: 240926-13
Test Date: 9/26/2024
Test Time: 4:19 PM

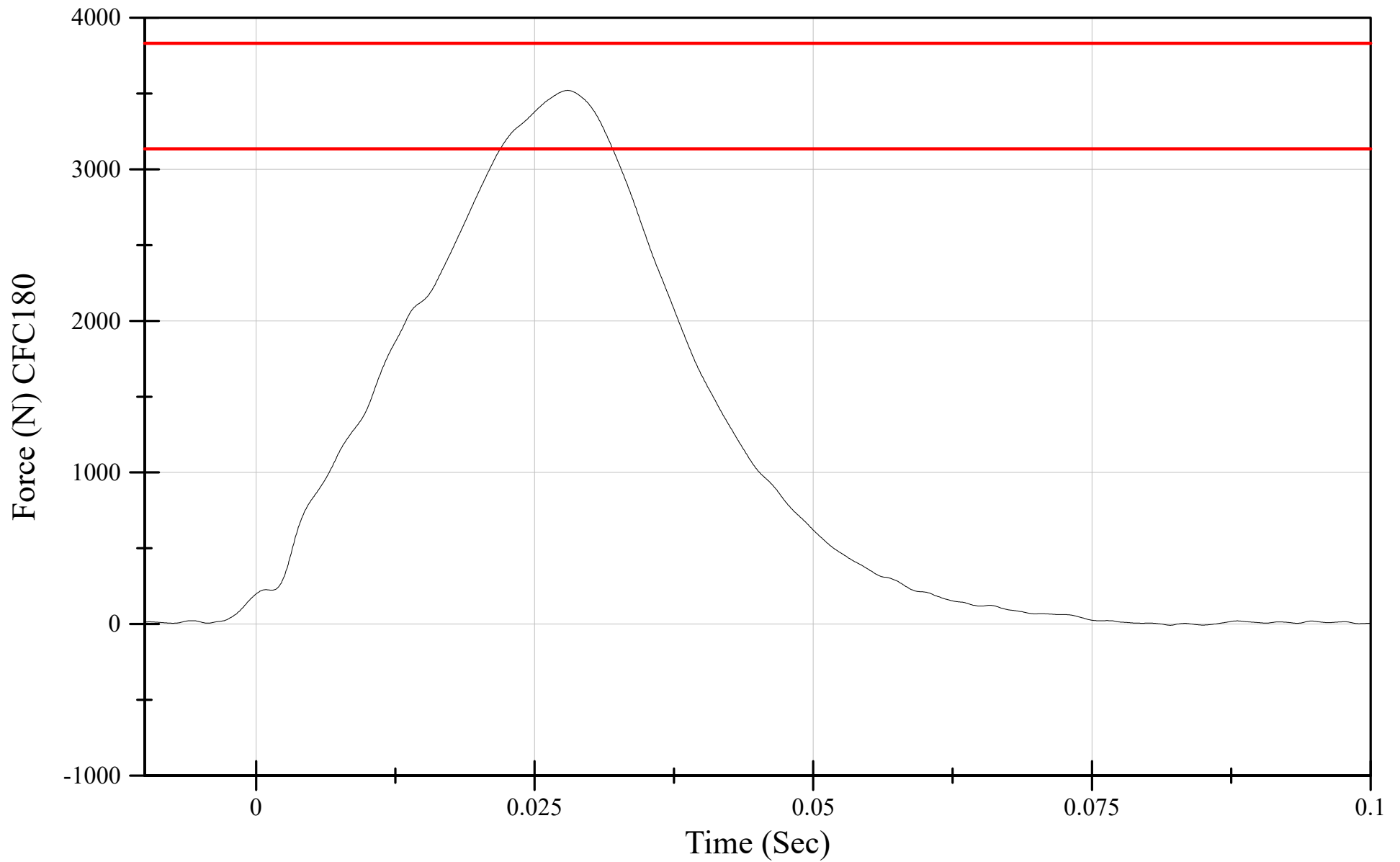
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.25 - 4.35	4.293	Pass
Peak Probe Force (N)	3136 - 3832	3521.4	Pass
Left Resultant Deflection at Peak Force (mm)	45.8 - 56.0	52.36	Pass

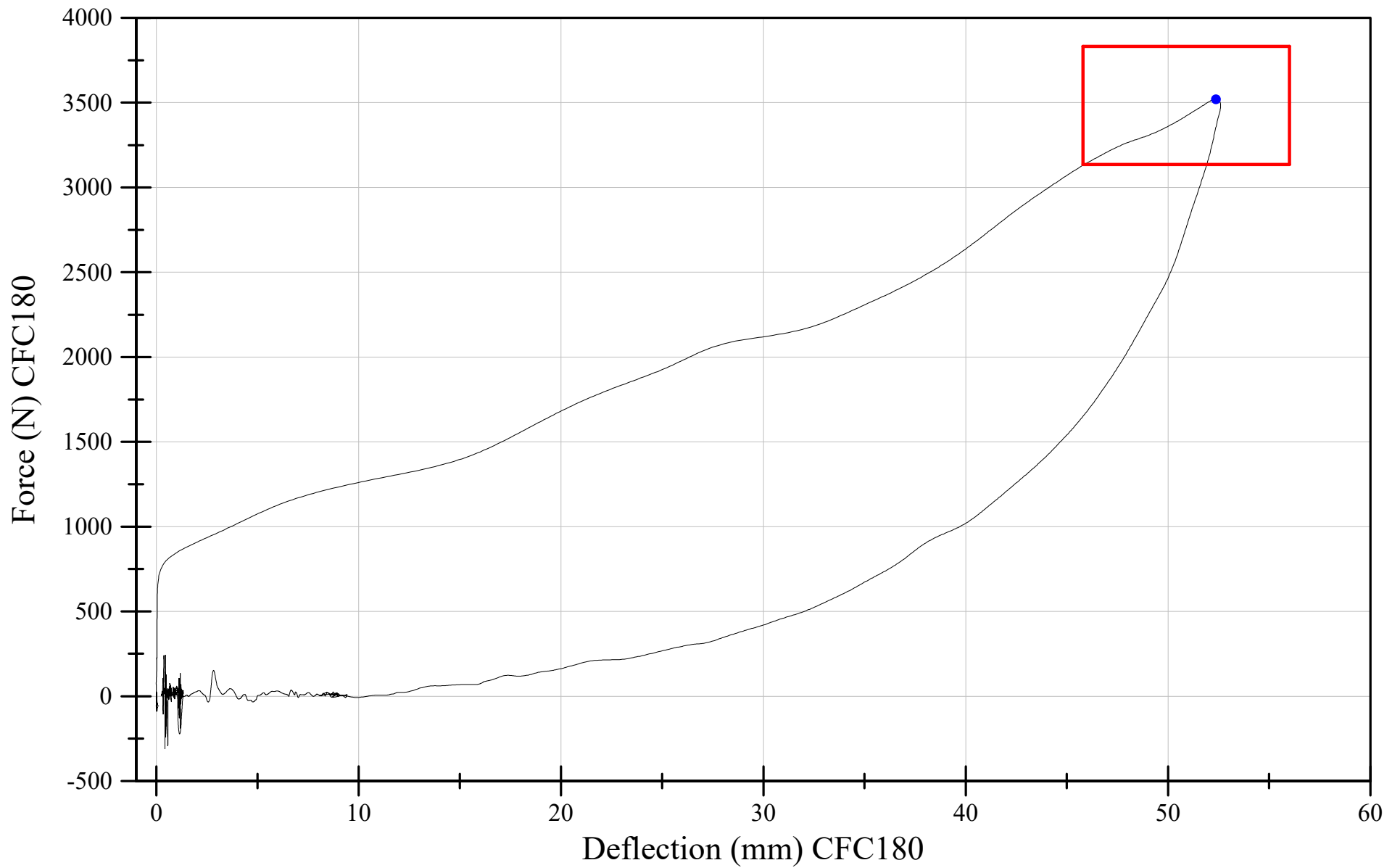
THOR-50M Left Lower Thorax Qualification

Probe Force

Serial Number: EG2595



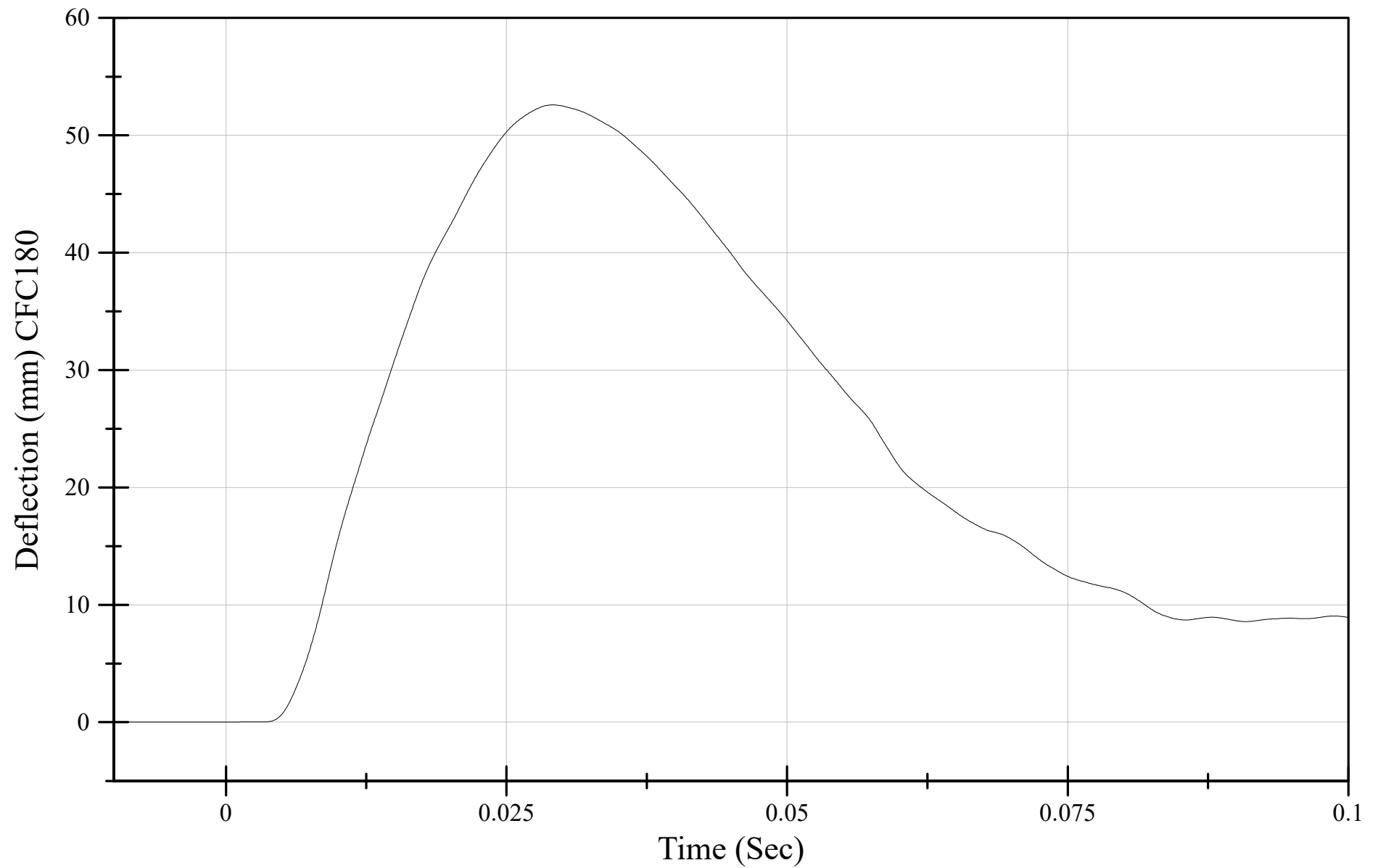
THOR-50M Left Lower Thorax Qualification
Probe Force vs Left Resultant Deflection
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Left Resultant Deflection

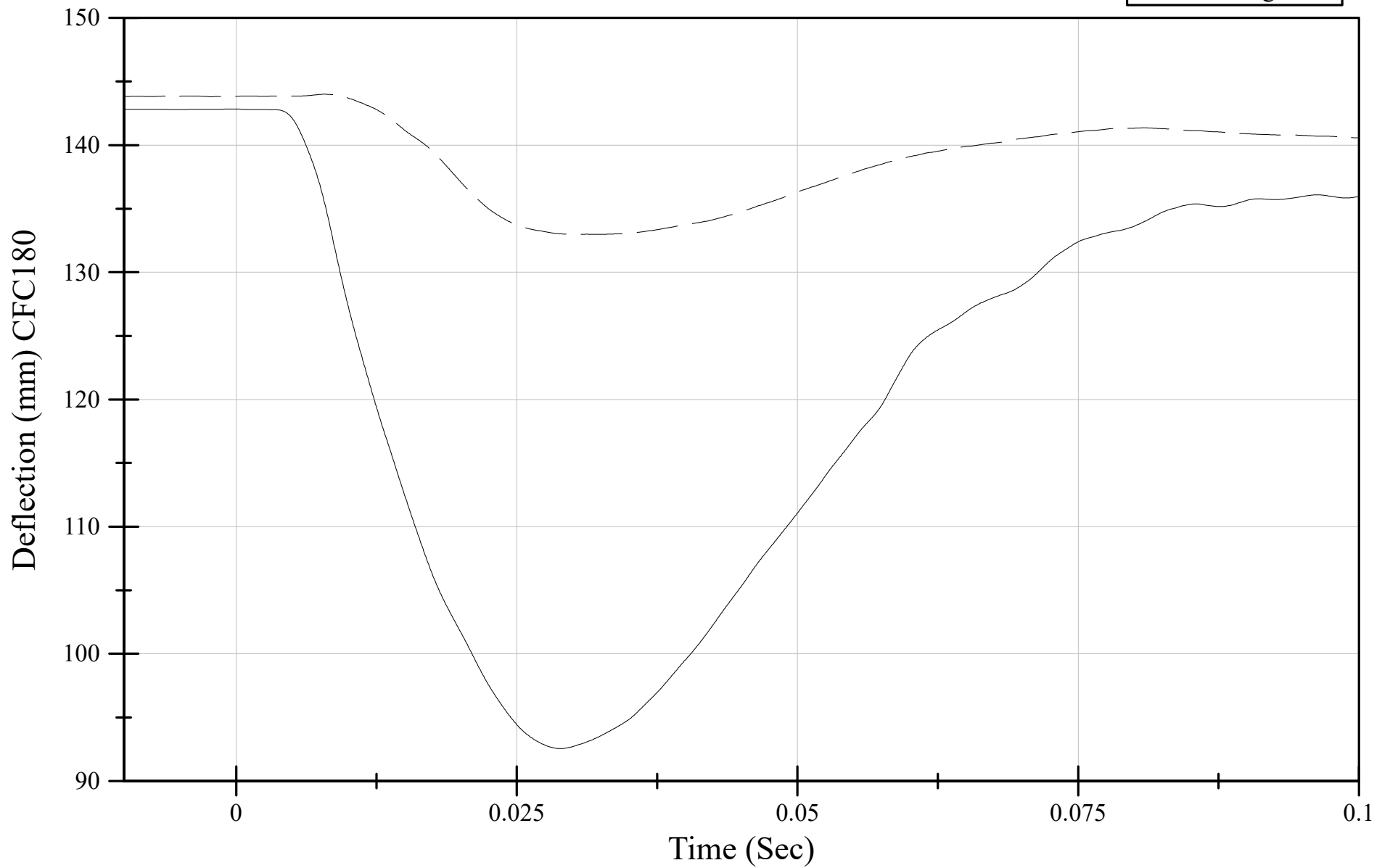
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

X-Deflection

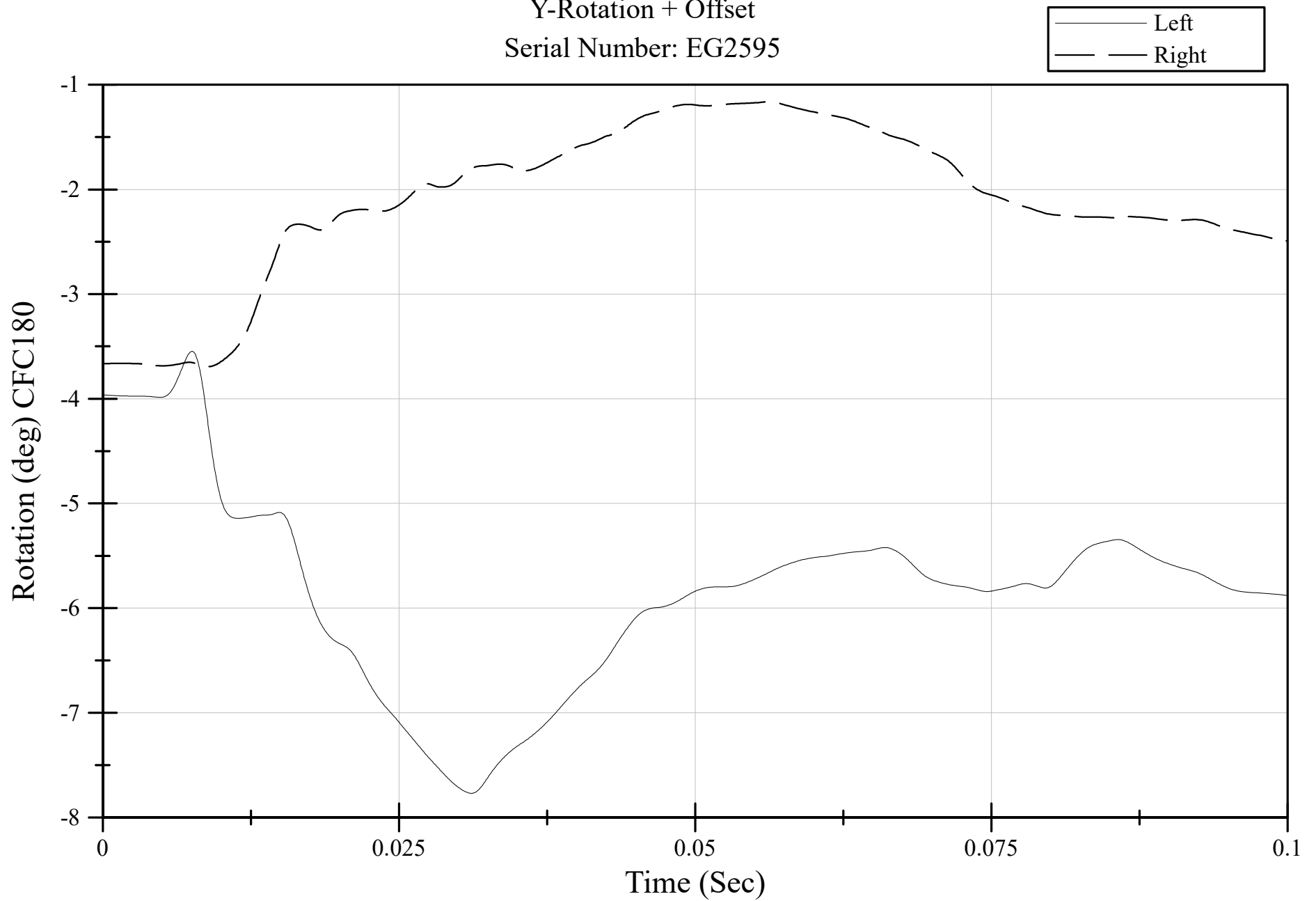
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Y-Rotation + Offset

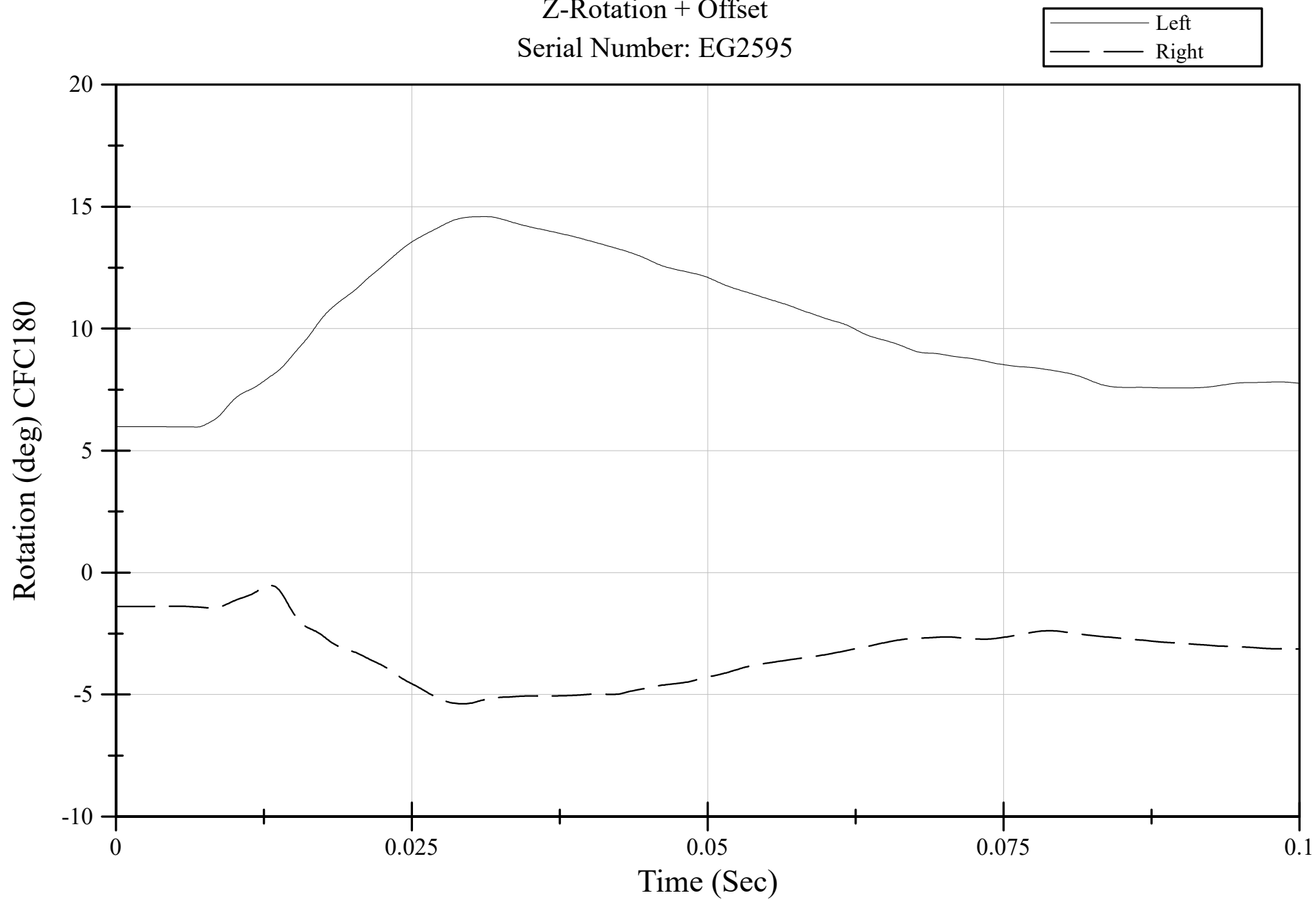
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898
Rib 2 Serial Number: EF8143
Rib 3 Serial Number: EF8418
Rib 4 Serial Number: EF9464

Rib 5 Serial Number: EF9496
Rib 6 Serial Number: EF9497
Rib 7 Serial Number: EF8423

Test ID: 240930-1
Test Date: 9/30/2024
Test Time: 7:32 AM

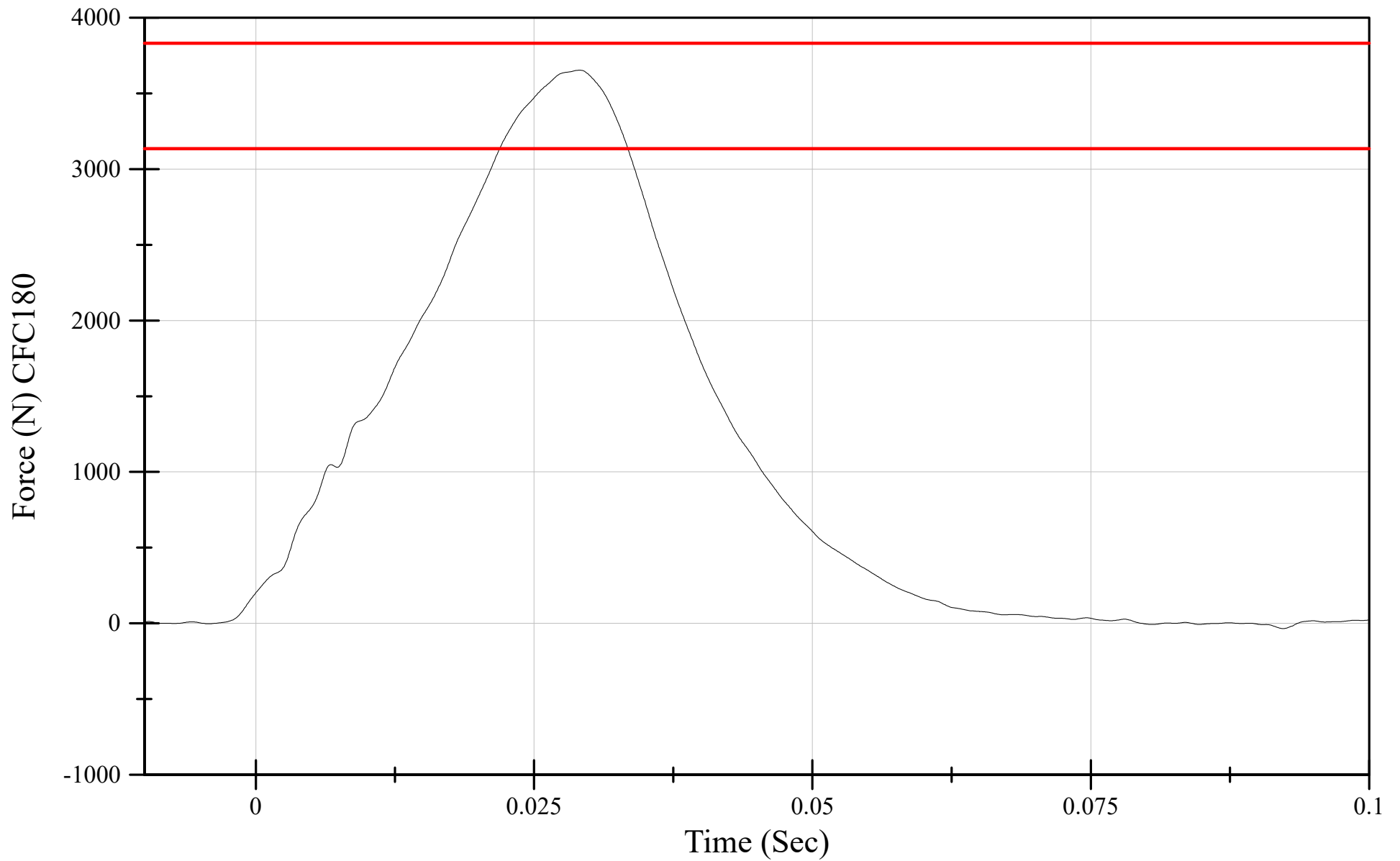
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	58	Pass
Test Velocity (m/s)	4.25 - 4.35	4.286	Pass
Peak Probe Force (N)	3136 - 3832	3655.3	Pass
Right Resultant Deflection at Peak Force (mm)	45.8 - 56.0	48.49	Pass

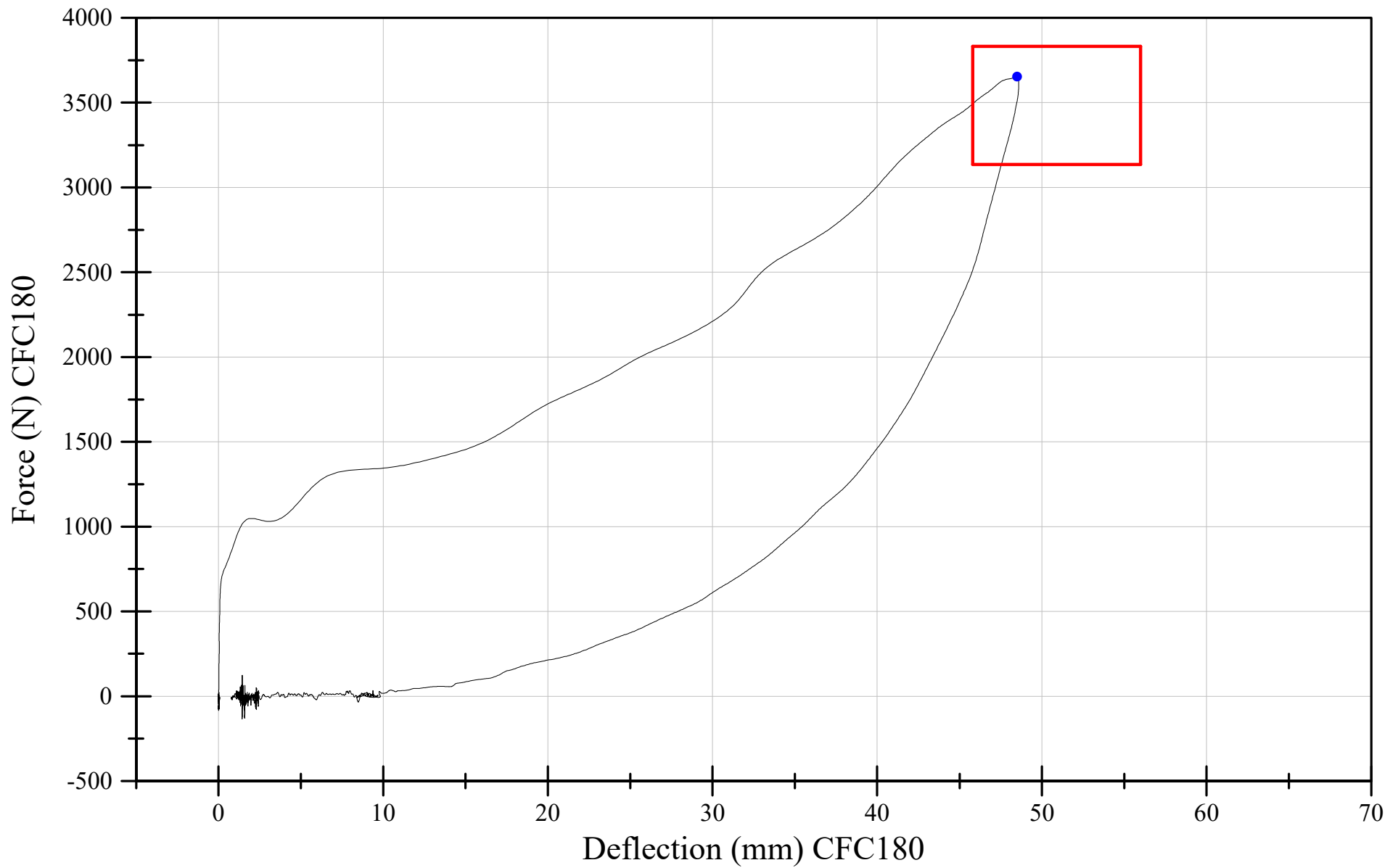
THOR-50M Right Lower Thorax Qualification

Probe Force

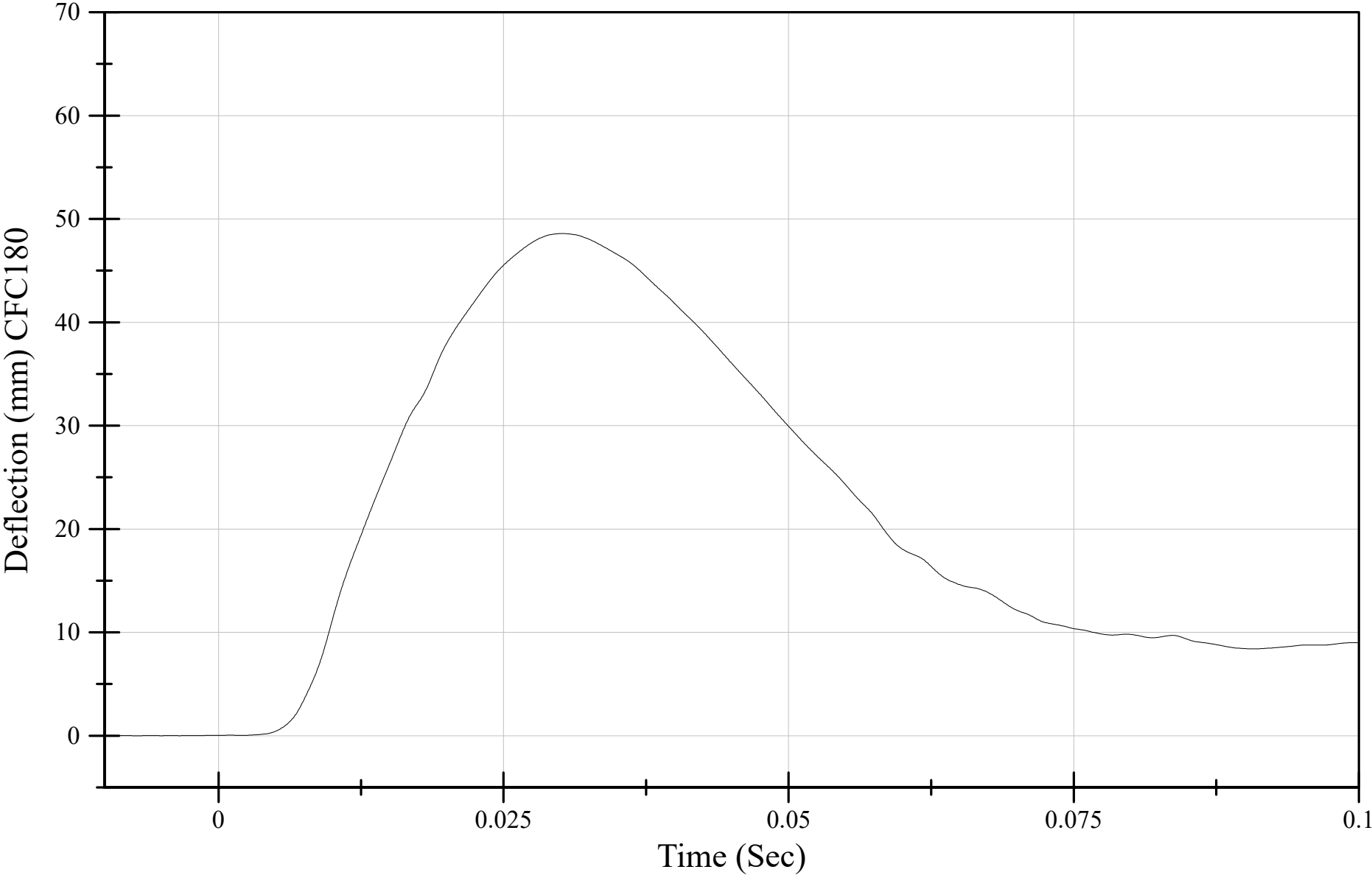
Serial Number: EG2595



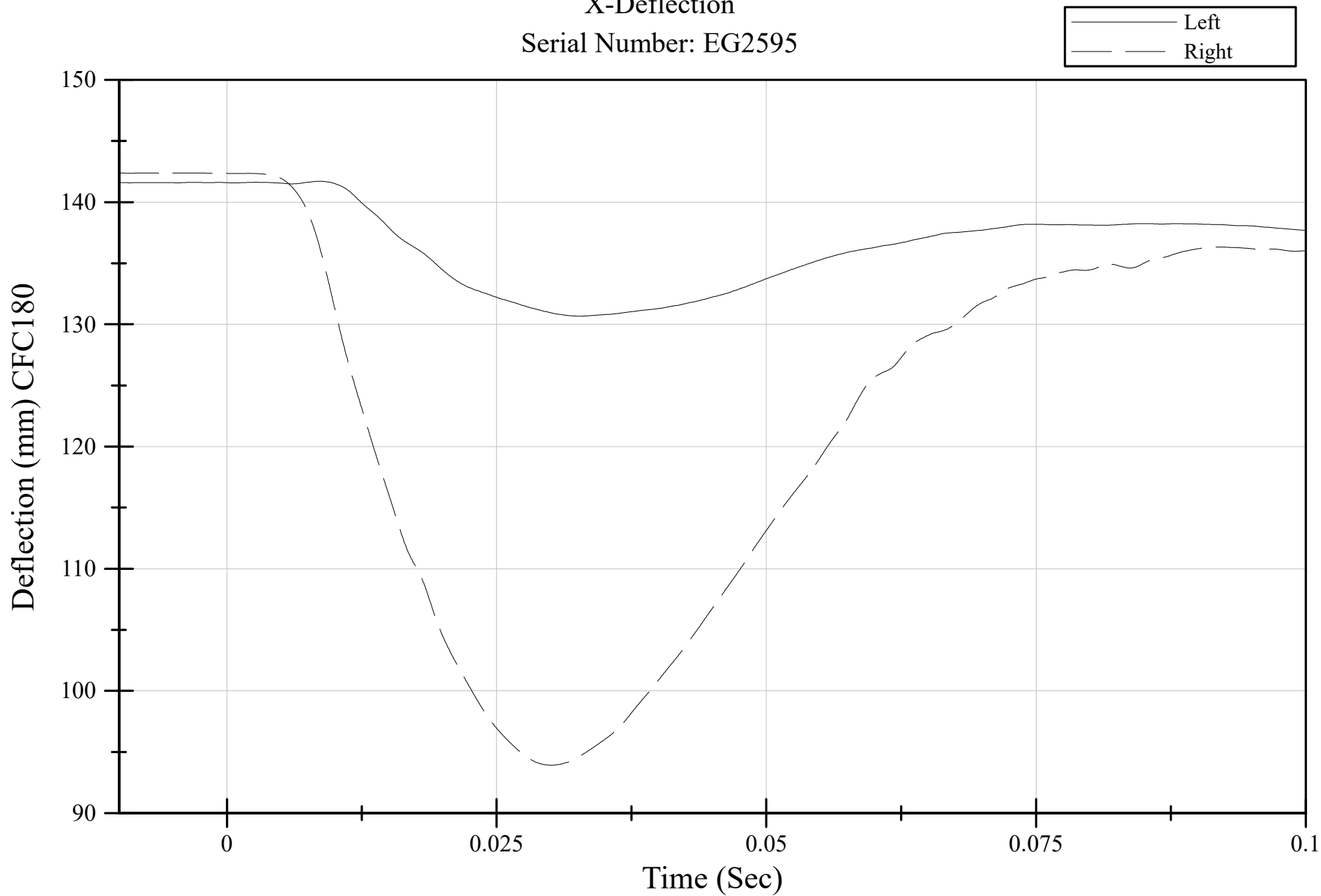
THOR-50M Right Lower Thorax Qualification
Probe Force vs Right Resultant Deflection
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification
Right Resultant Deflection
Serial Number: EG2595



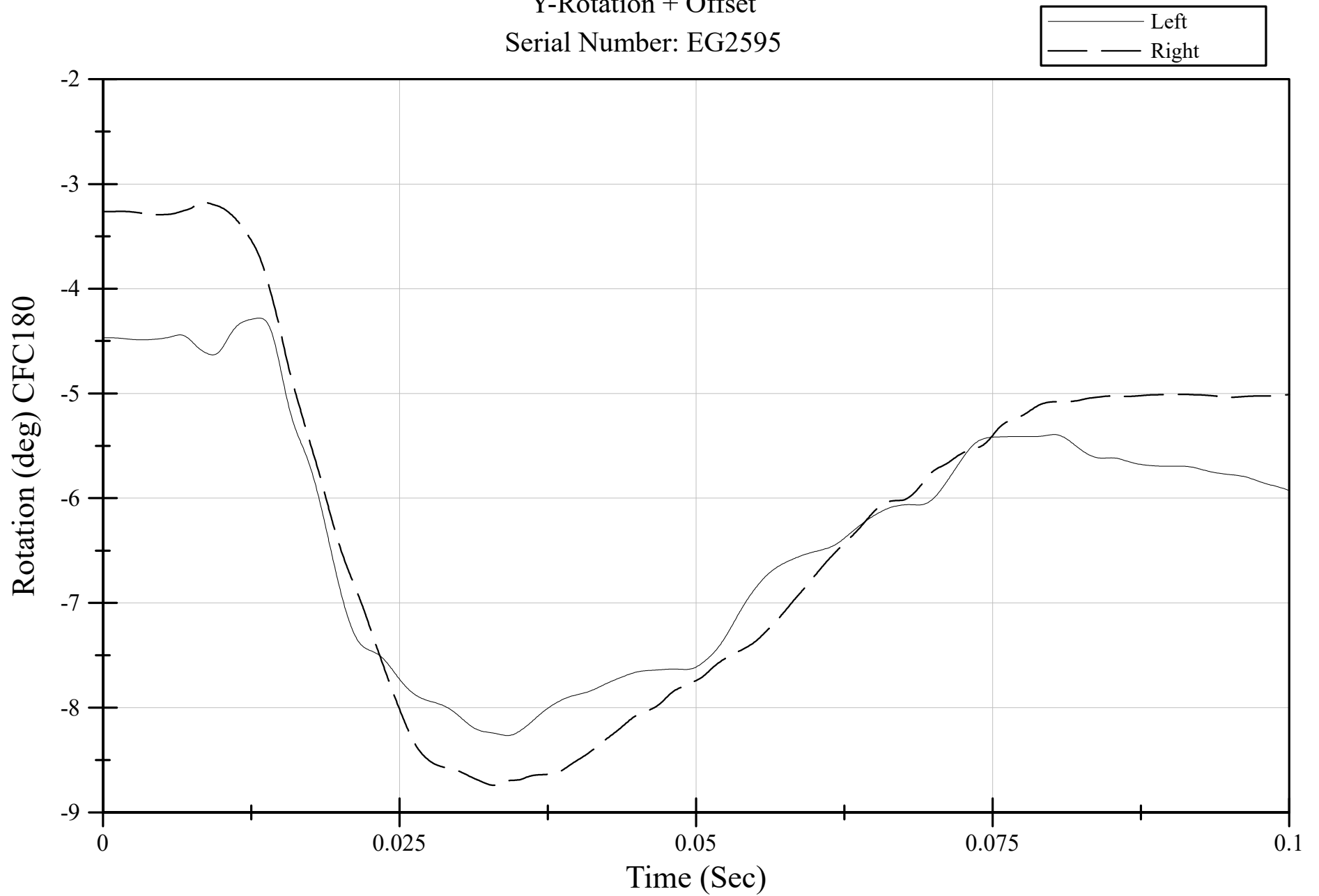
THOR-50M Right Lower Thorax Qualification
X-Deflection
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Y-Rotation + Offset

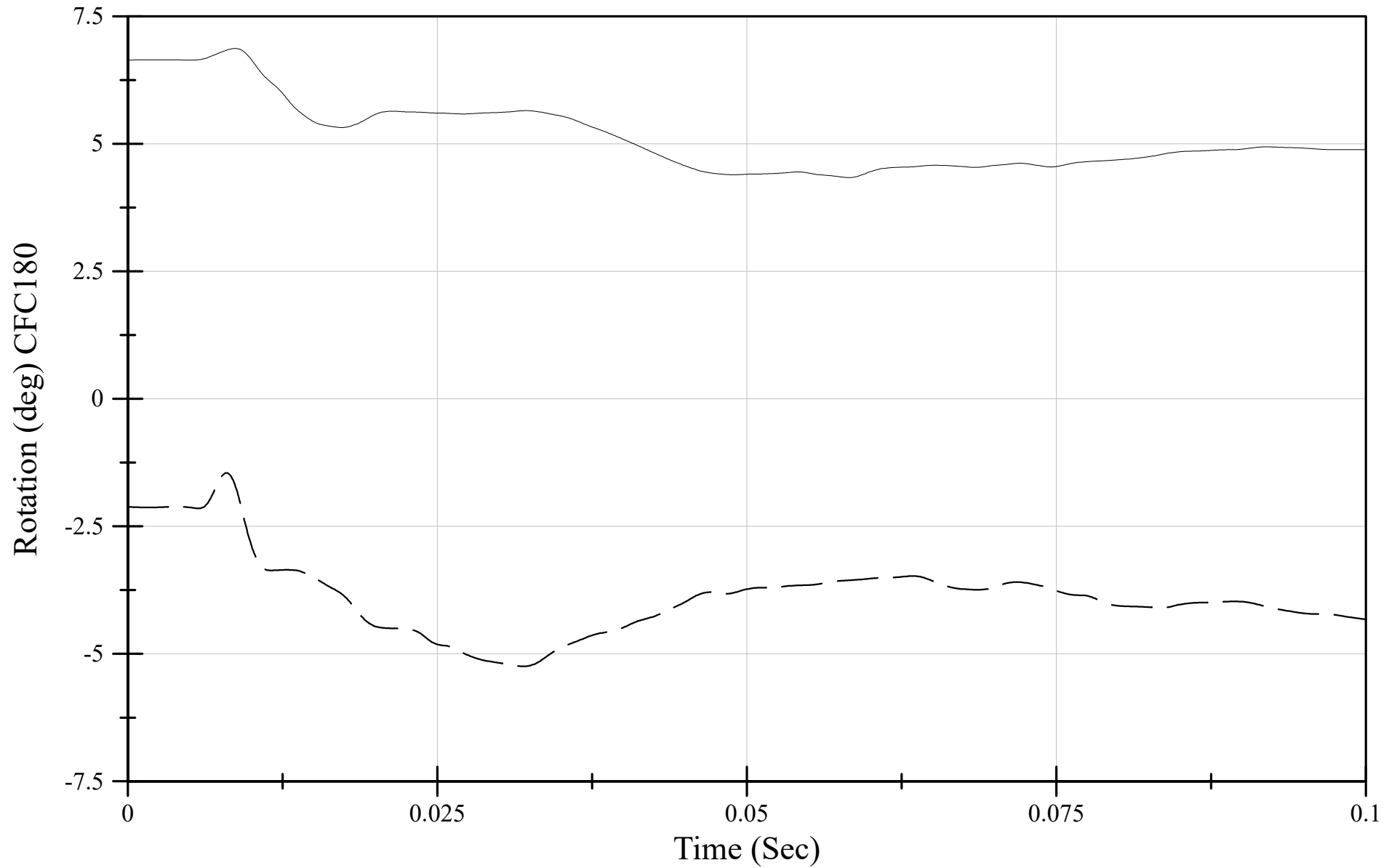
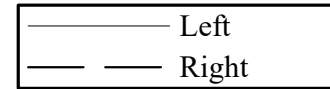
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Front Lower Abdomen Foam: 023

Rear Lower Abdomen Foam: 007

Lower Abdomen Bag: EG3240

Test ID: 240930-2

Test Date: 9/30/2024

Test Time: 10:00 AM

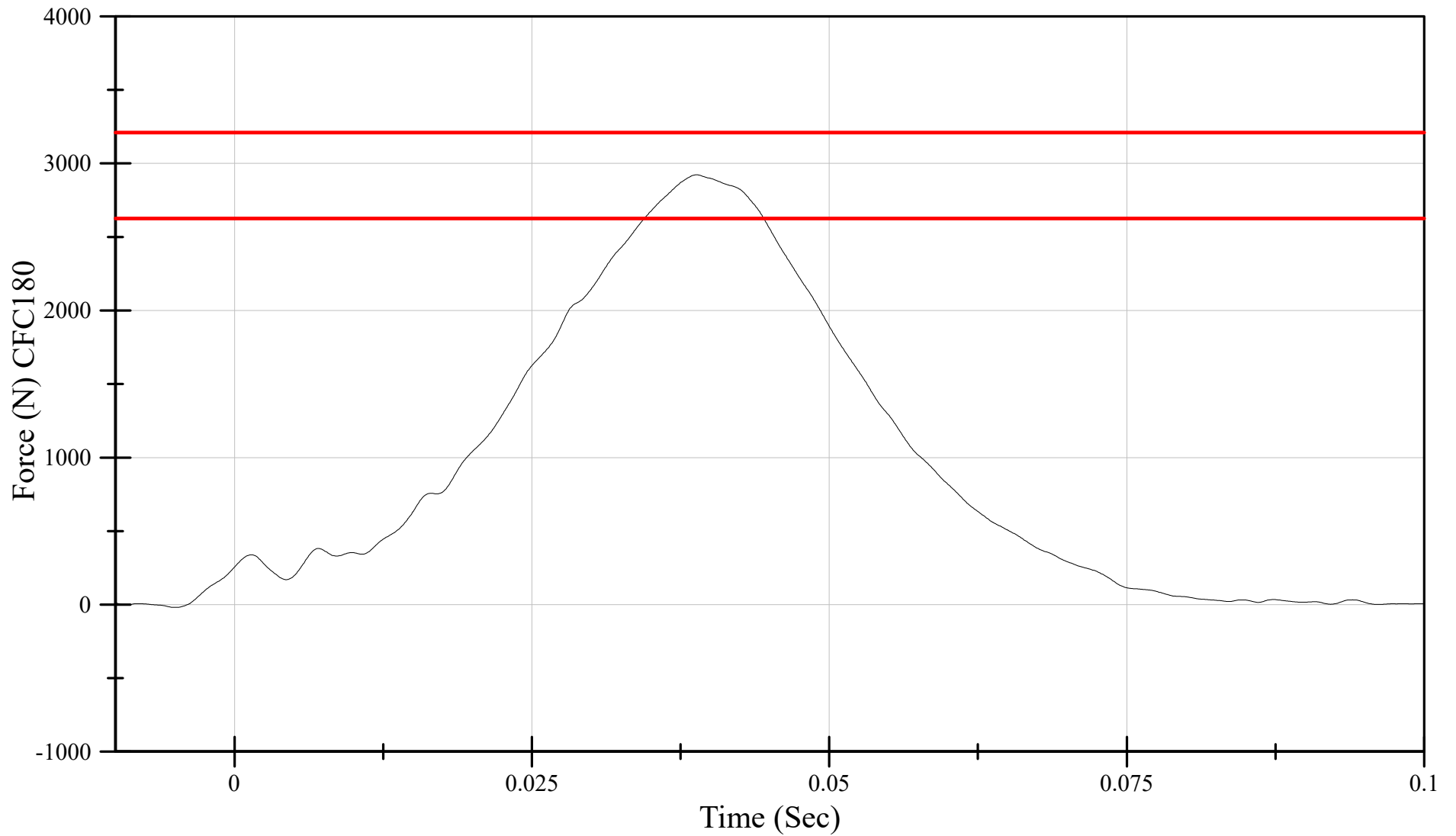
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	58	Pass
Test Velocity (m/s)	3.25 - 3.35	3.289	Pass
Peak Probe Force (N)	2626 - 3210	2922.5	Pass
Lower Left Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-88.99	Pass
Lower Right Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-89.82	Pass
Difference Between Peak Left & Right X-axis Deflections (mm)	less than 8.0	0.72	Pass

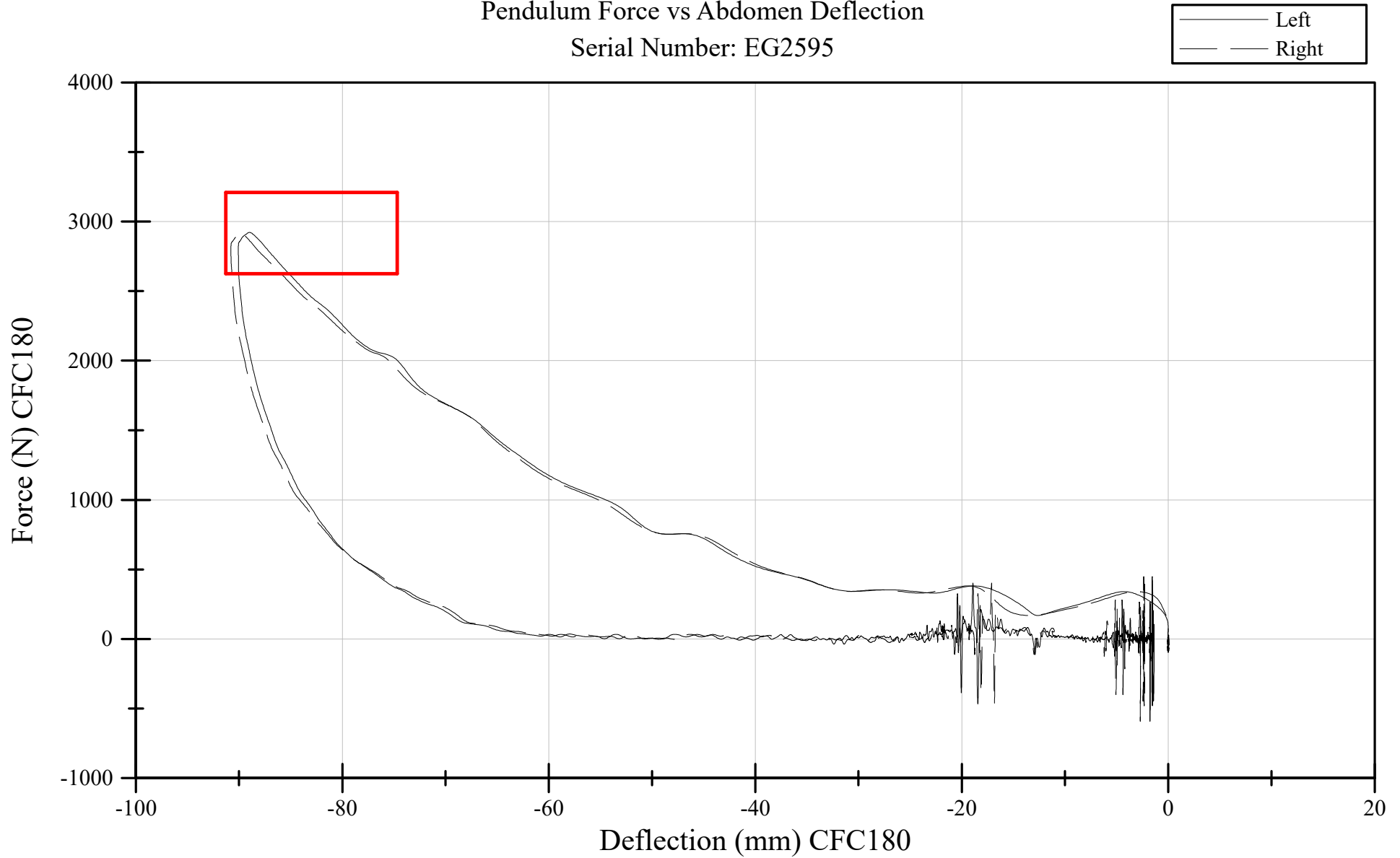
THOR-50M Lower Abdomen Qualification

Probe Force

Serial Number: EG2595



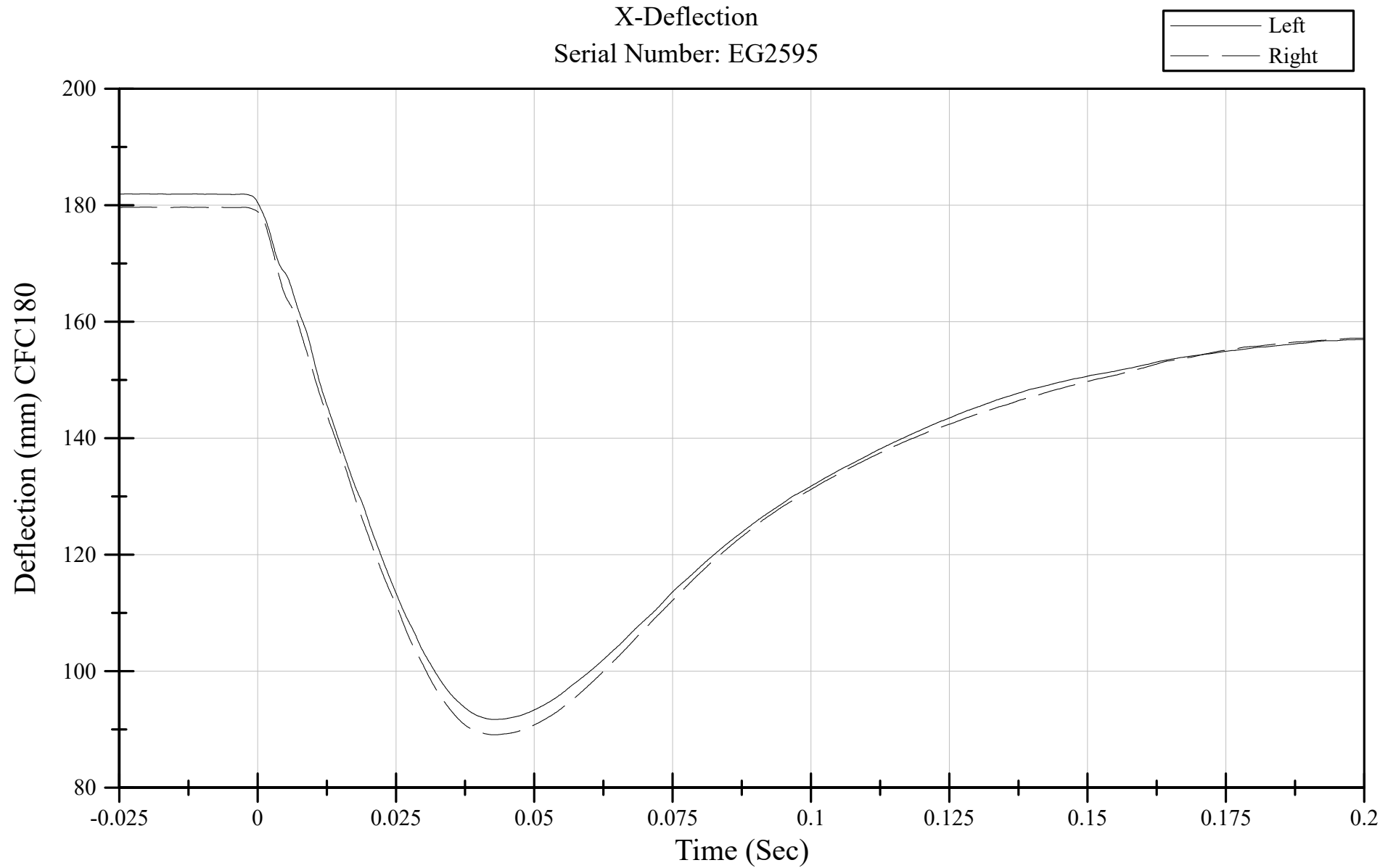
THOR-50M Lower Abdomen Qualification
Pendulum Force vs Abdomen Deflection
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

X-Deflection

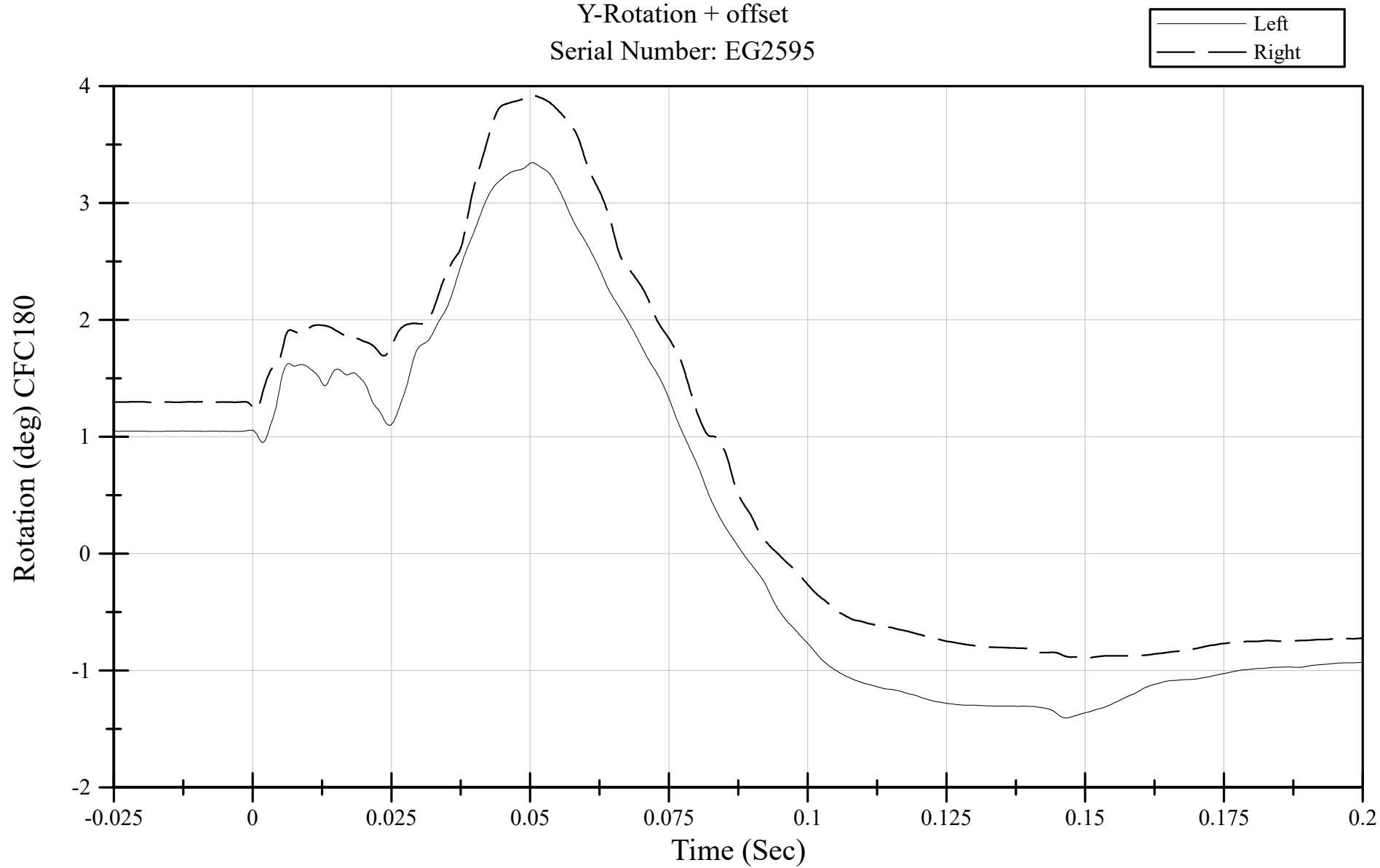
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Y-Rotation + offset

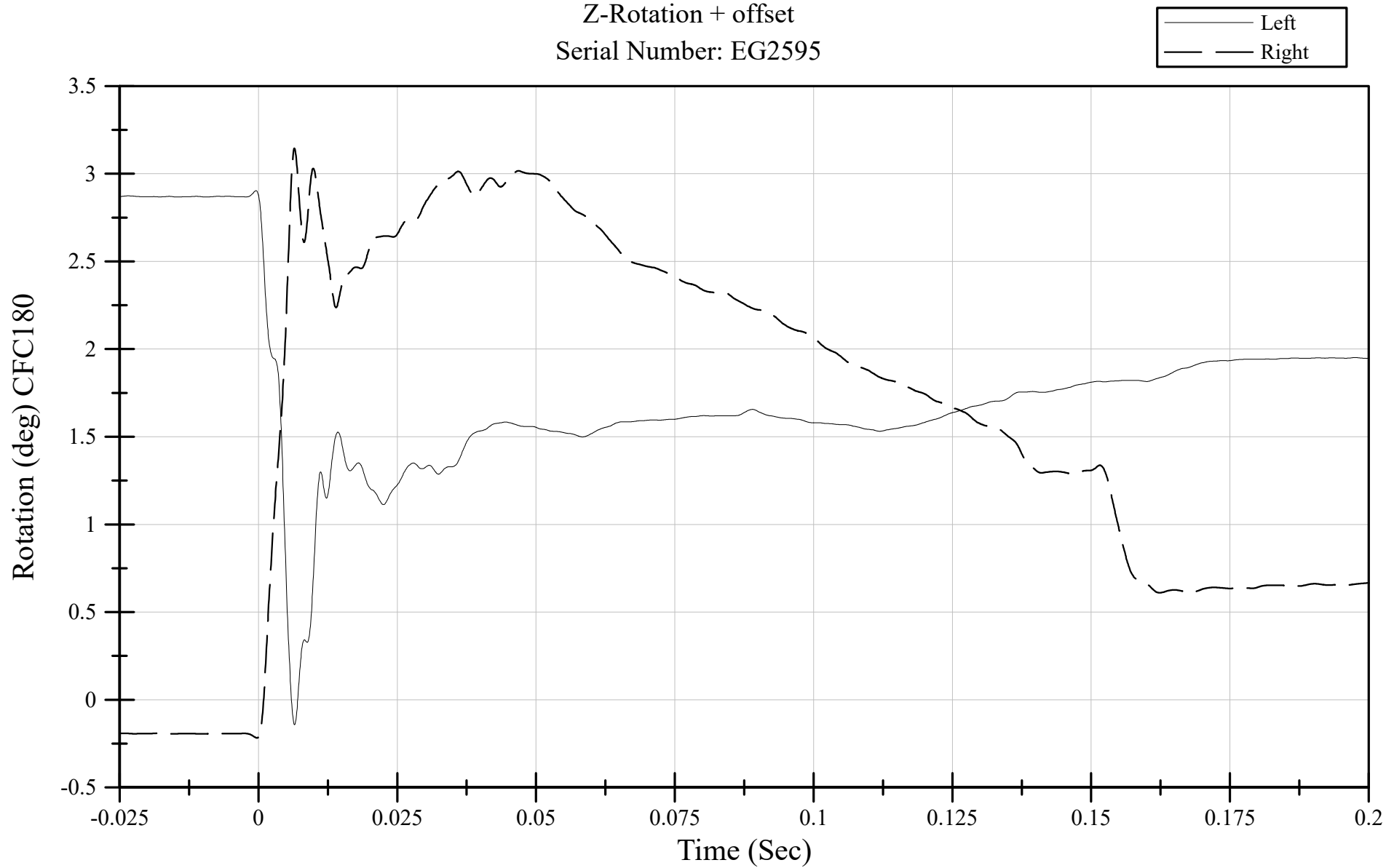
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Z-Rotation + offset

Serial Number: EG2595



THOR-50M Left Upper Leg Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Compression Element:
Left Thigh Flesh: EF9984

Test ID: 241003-2

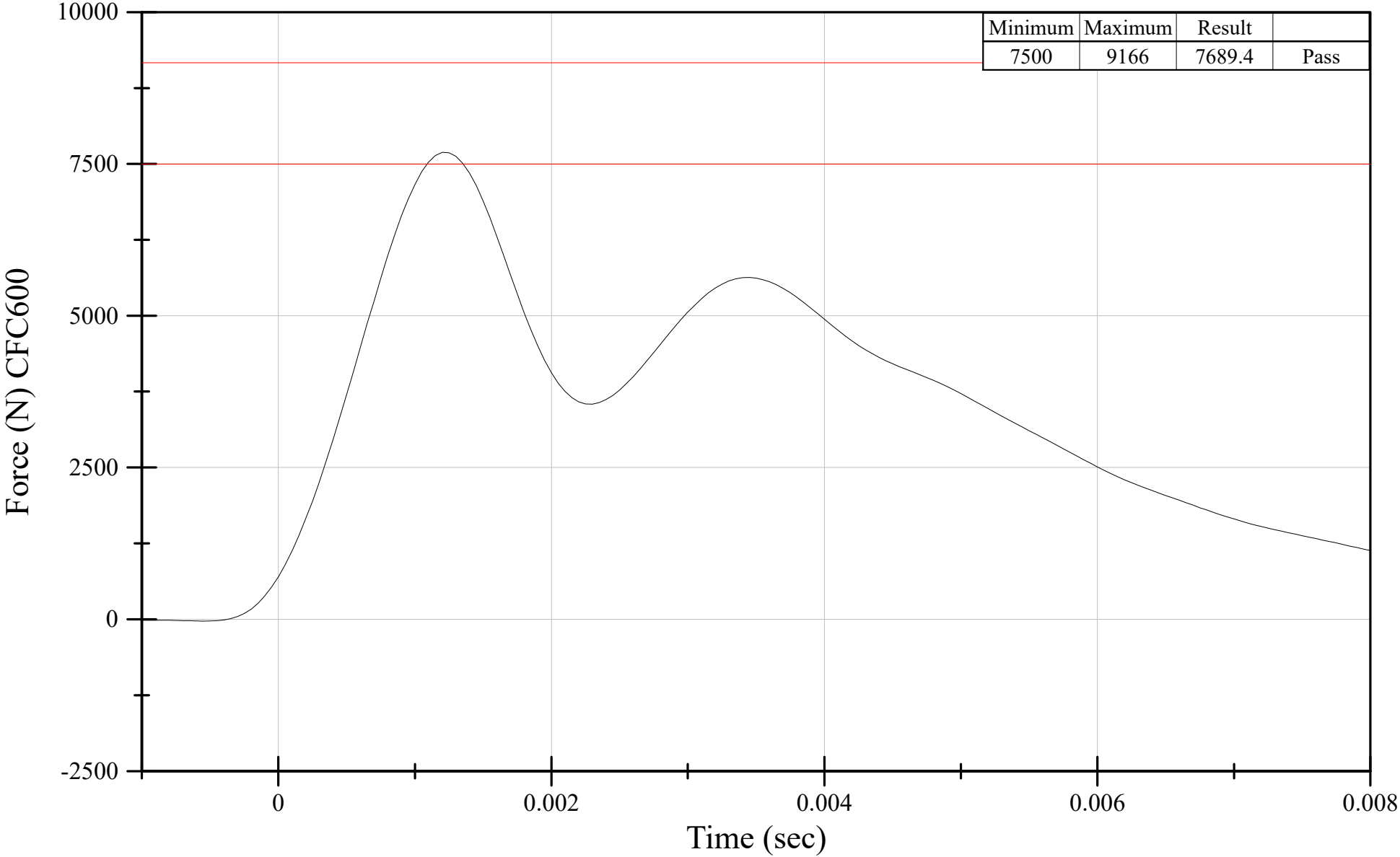
Test Date: 10/3/2024

Test Time: 9:18 AM

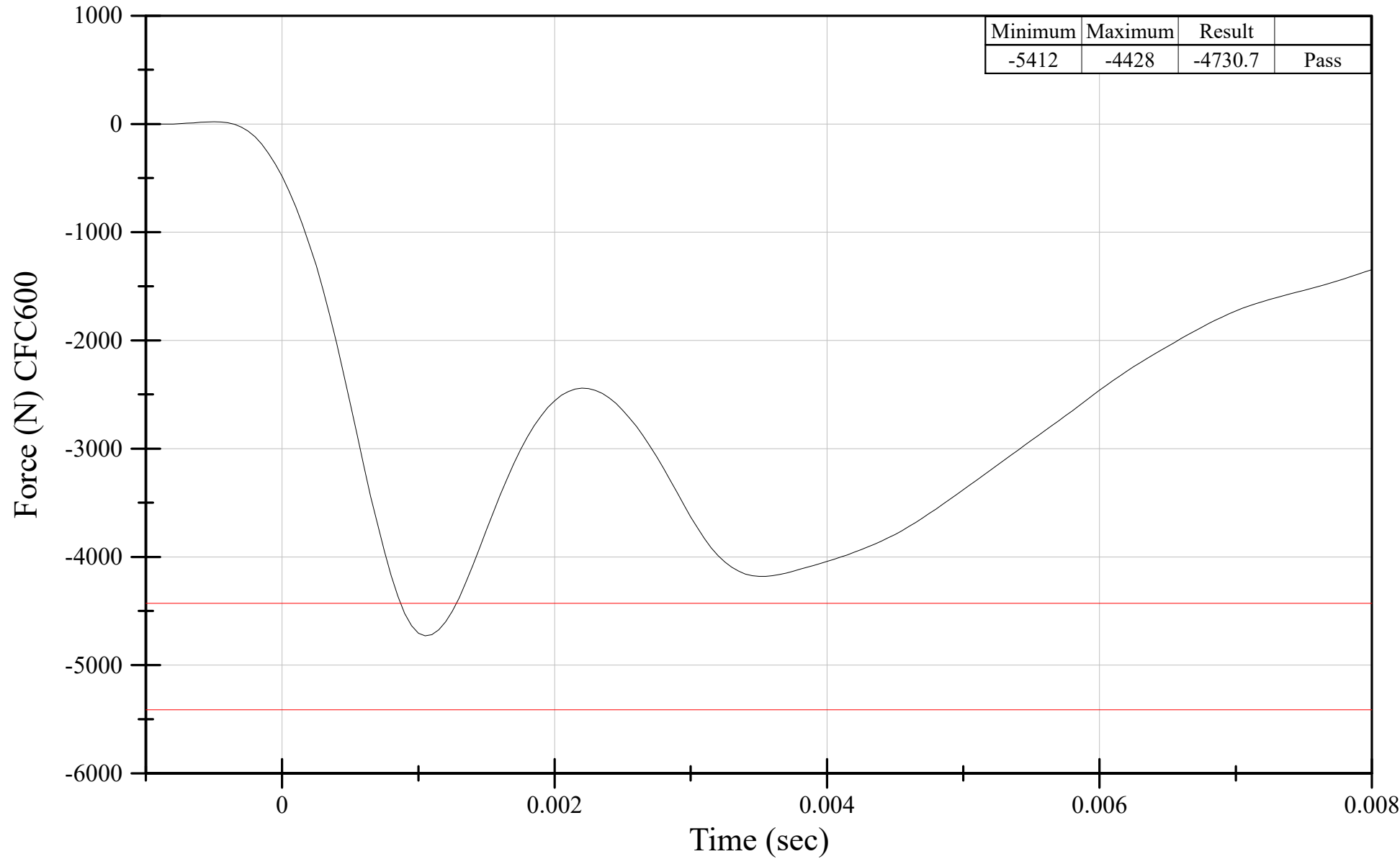
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	3.25 - 3.35	3.286	Pass
Peak Probe Force (N)	7500 - 9166	7689.4	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4730.7	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2937.5	Pass

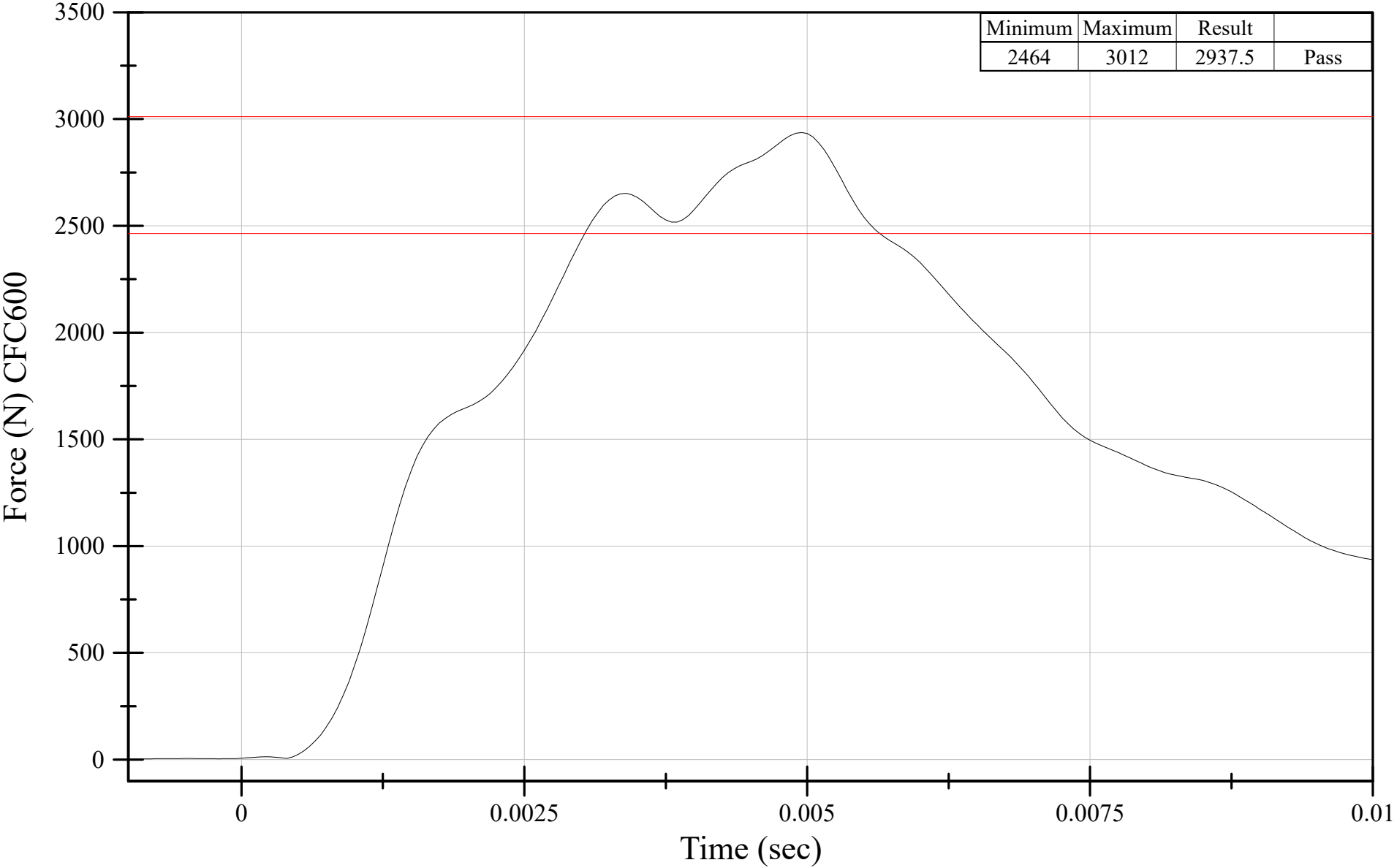
THOR-50M Left Upper Leg Qualification
Probe Force
Serial Number: EG2595



THOR-50M Left Upper Leg Qualification
Femur Z-Force
Serial Number: EG2595



THOR-50M Left Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: EG2595



THOR-50M Right Upper Leg Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Compression Element:
Right Thigh Flesh: EG0935

Test ID: 241003-1

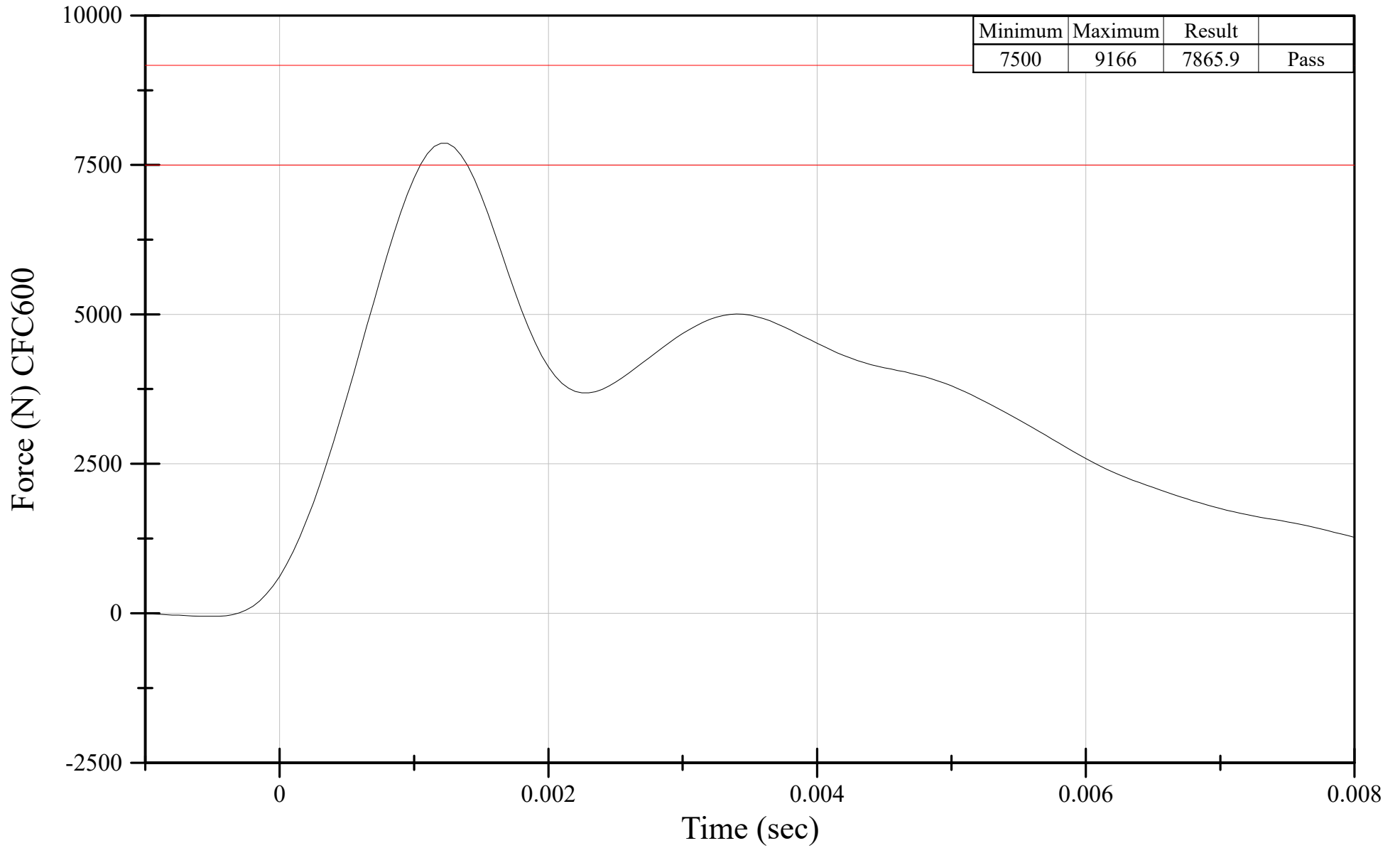
Test Date: 10/3/2024

Test Time: 8:31 AM

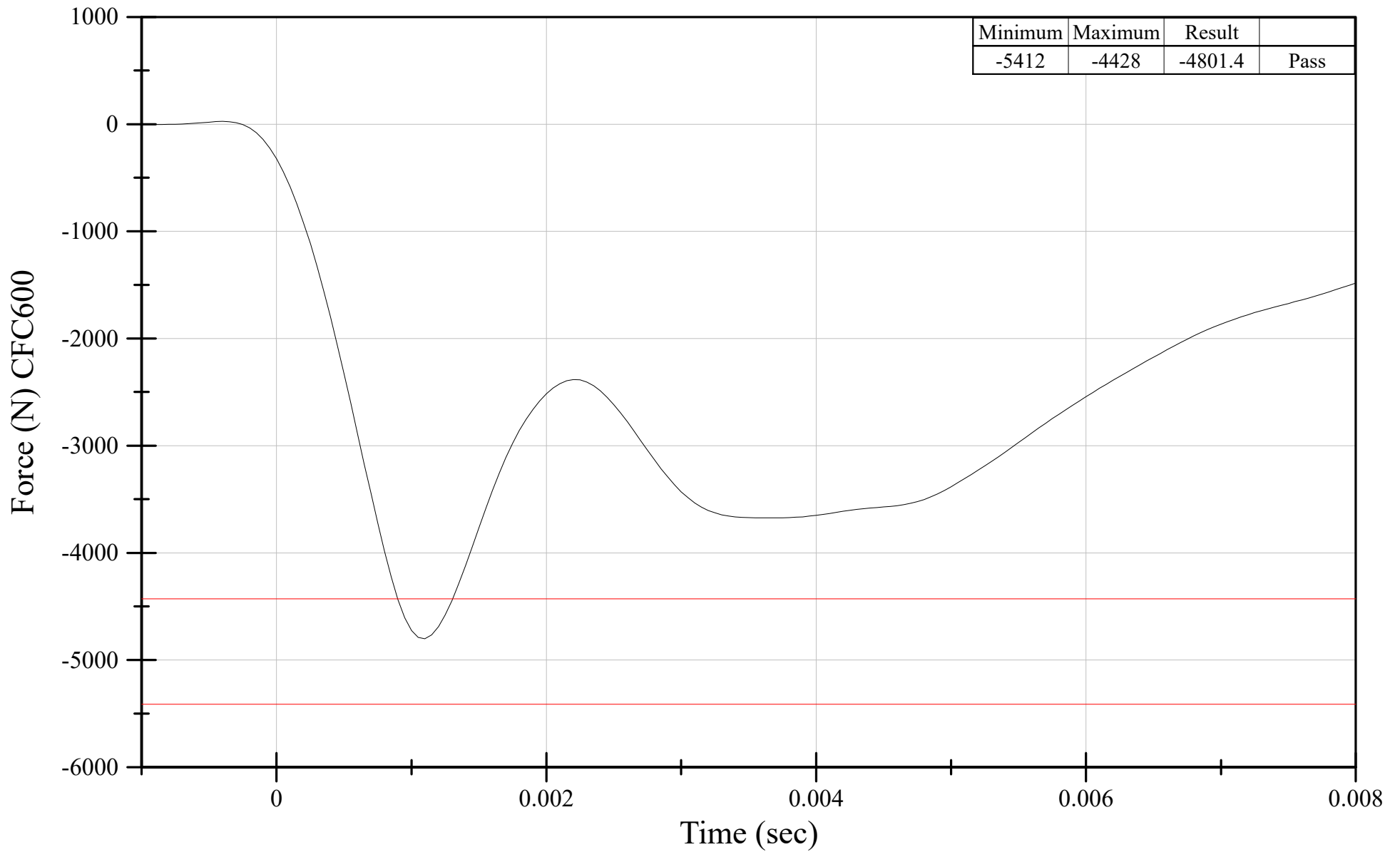
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	3.25 - 3.35	3.291	Pass
Peak Probe Force (N)	7500 - 9166	7865.9	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4801.4	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2963.8	Pass

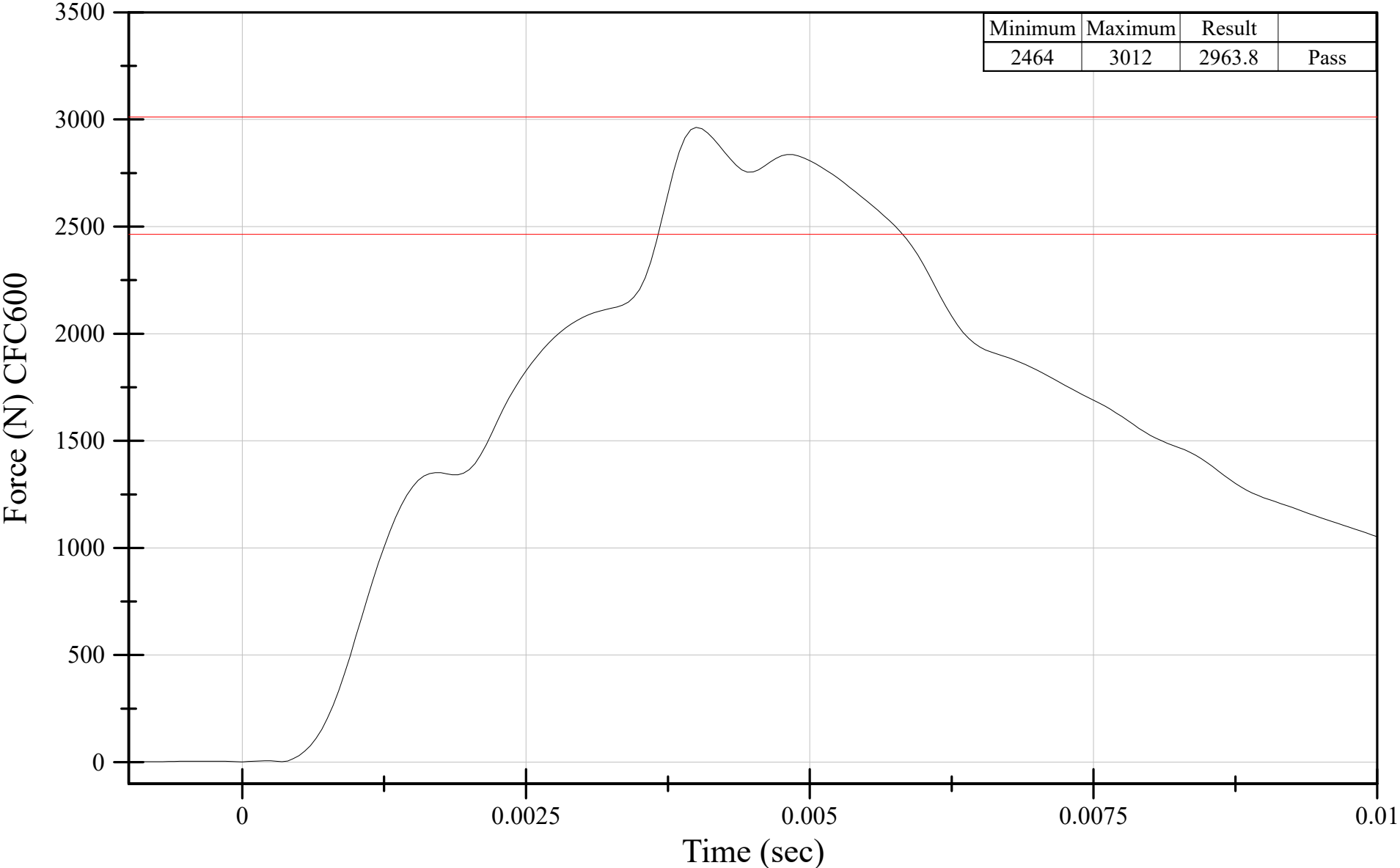
THOR-50M Right Upper Leg Qualification
Probe Force
Serial Number: EG2595



THOR-50M Right Upper Leg Qualification
Femur Z-Force
Serial Number: EG2595

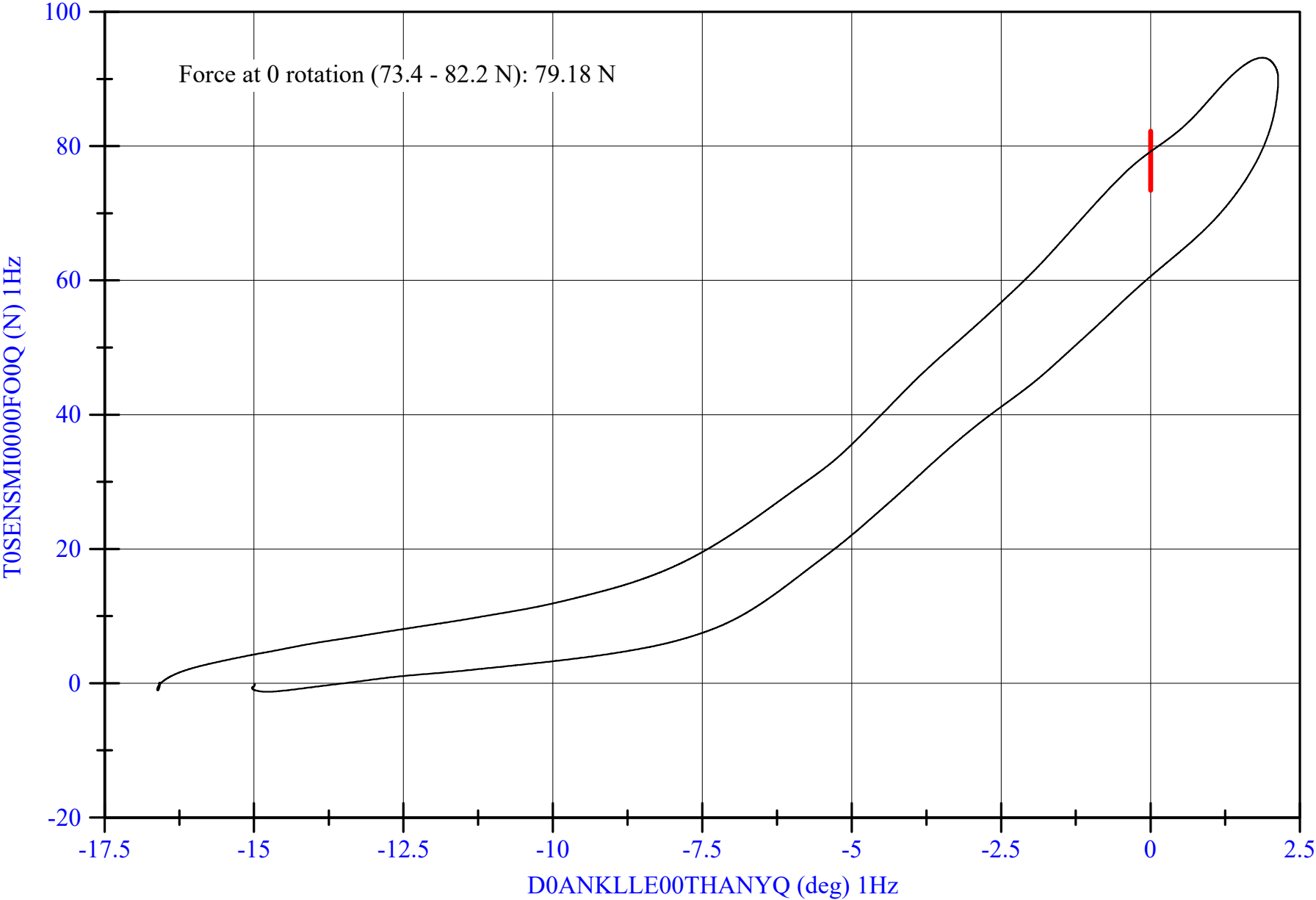


THOR-50M Right Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: EG2595



Test Temperature: 21.6° C
Test Humidity: 56%

Left Achilles Force
LX Leg SN:



THOR-50M Left Ball of Foot Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Left Dorsiflexion Stop: ER8522

Test ID: 240925-2

Test Date: 9/25/2024

Test Time: 7:01 AM

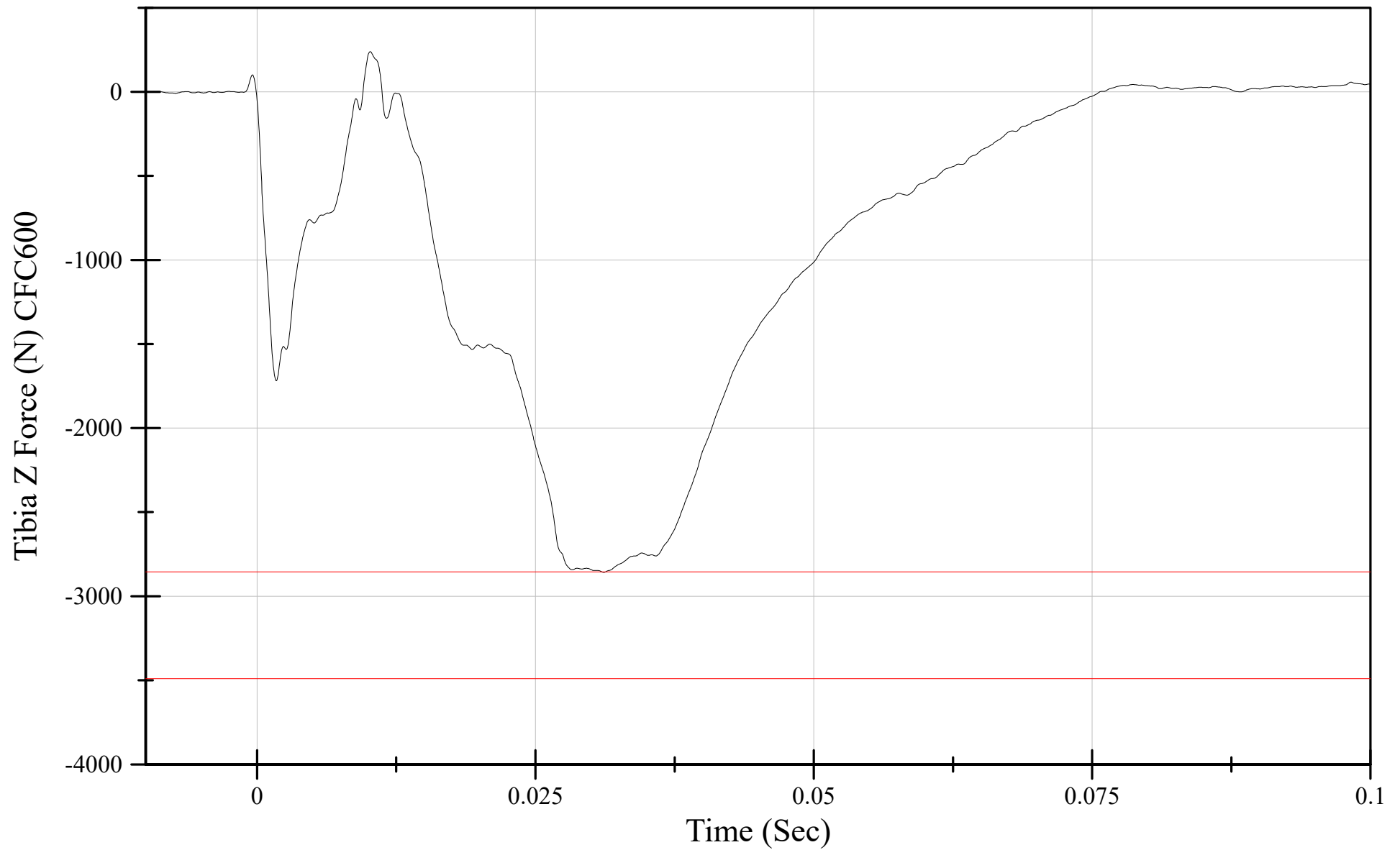
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	57	Pass
Test Velocity (m/s)	4.95 - 5.05	4.980	Pass
Peak Lower Tibia Fz (N)	-3487 - (-2853)	-2857.9	Pass
Peak Ankle Resistive Moment (Nm)	49.8 - 60.8	58.70	Pass
Peak Ankle Y-axis Rotation (deg)	30.4 - 37.2	32.69	Pass

THOR-50M Left Ball of Foot Qualification

Tibia Load

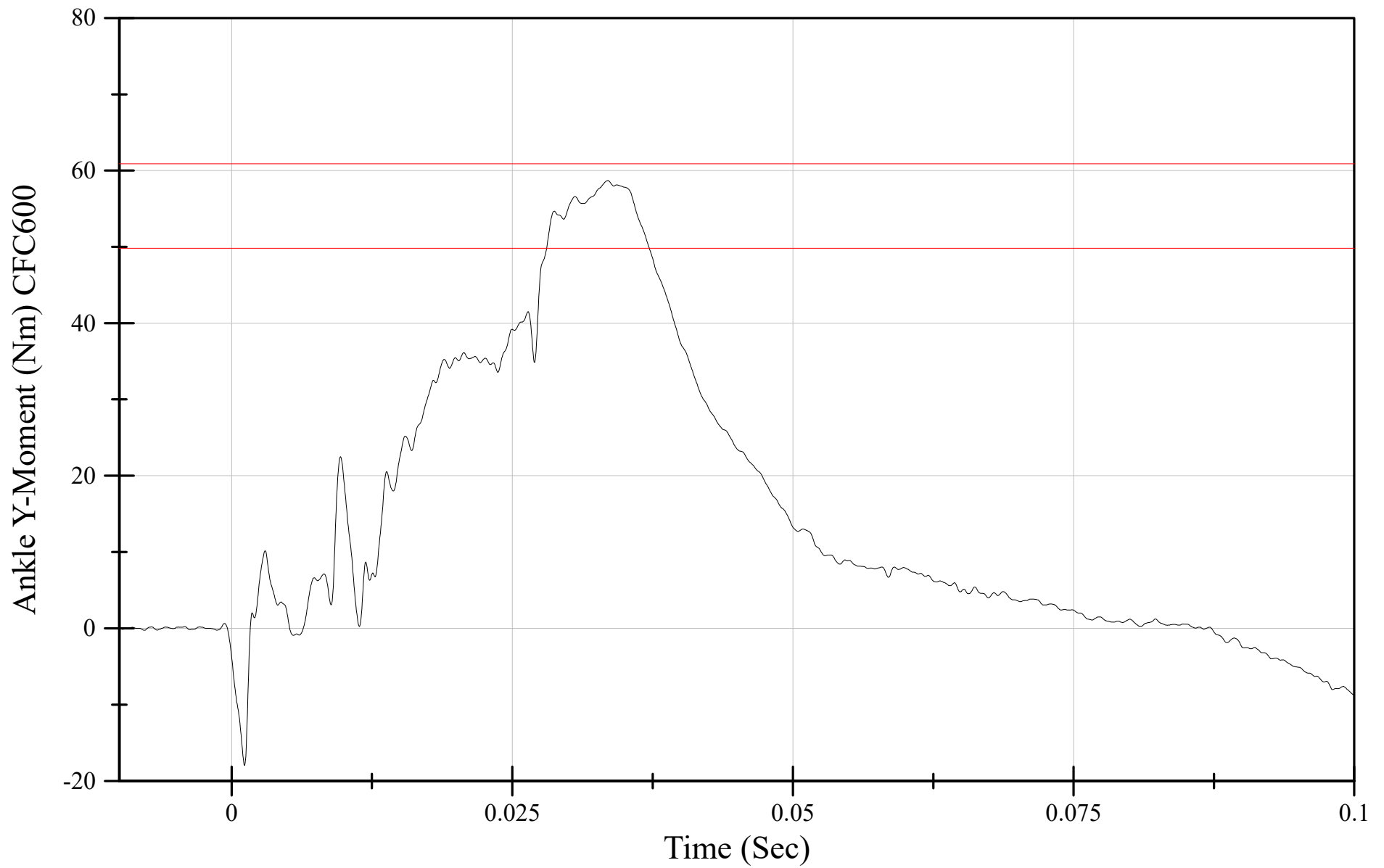
Serial Number: EG2595



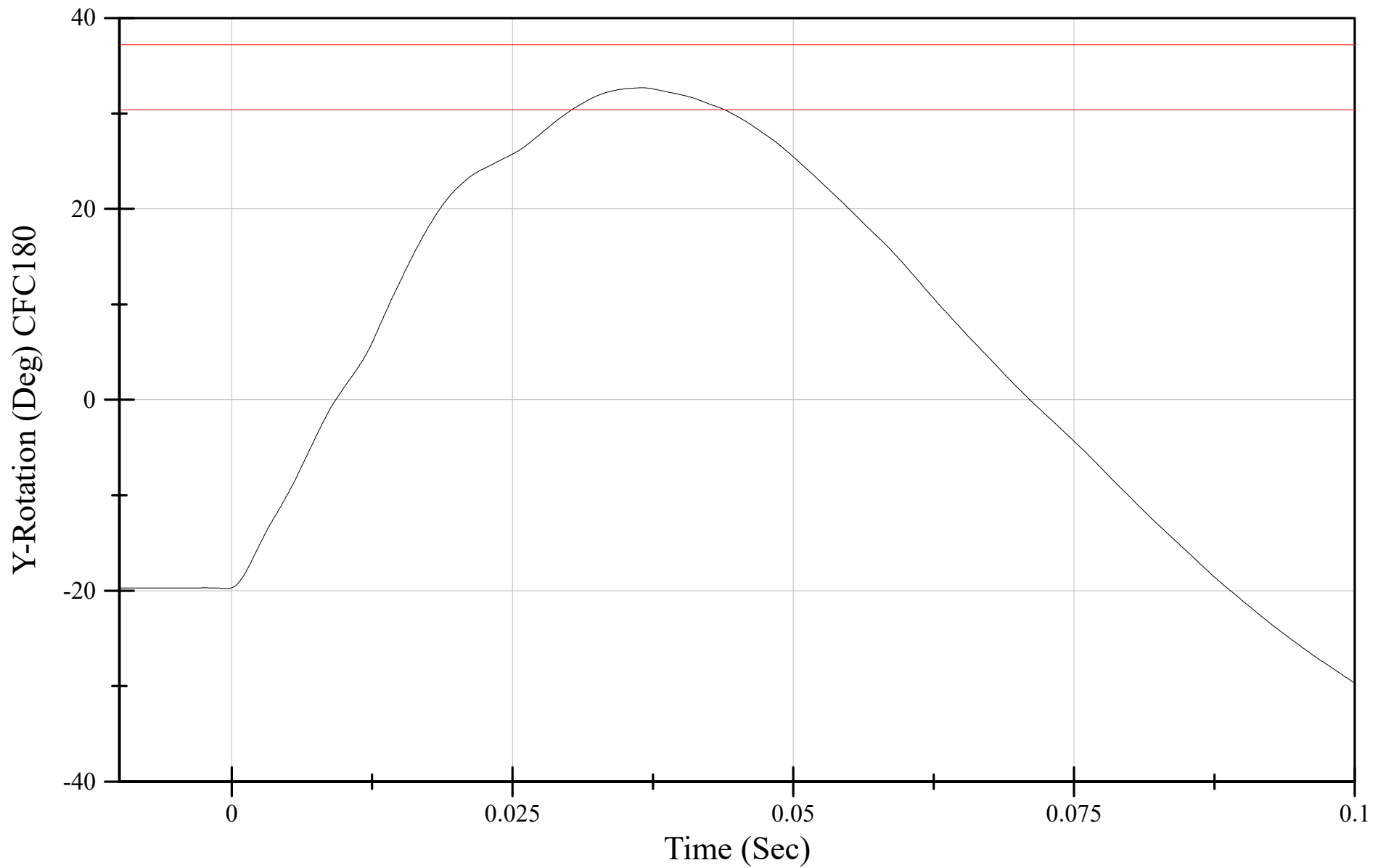
THOR-50M Left Ball of Foot Qualification

Ankle Y-Moment

Serial Number: EG2595



THOR-50M Left Ball of Foot Qualification
Ankle Y-Rotation
Serial Number: EG2595



THOR-50M Left Heel Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Test ID: 240925-7

Test Date: 9/25/2024

Test Time: 12:47 PM

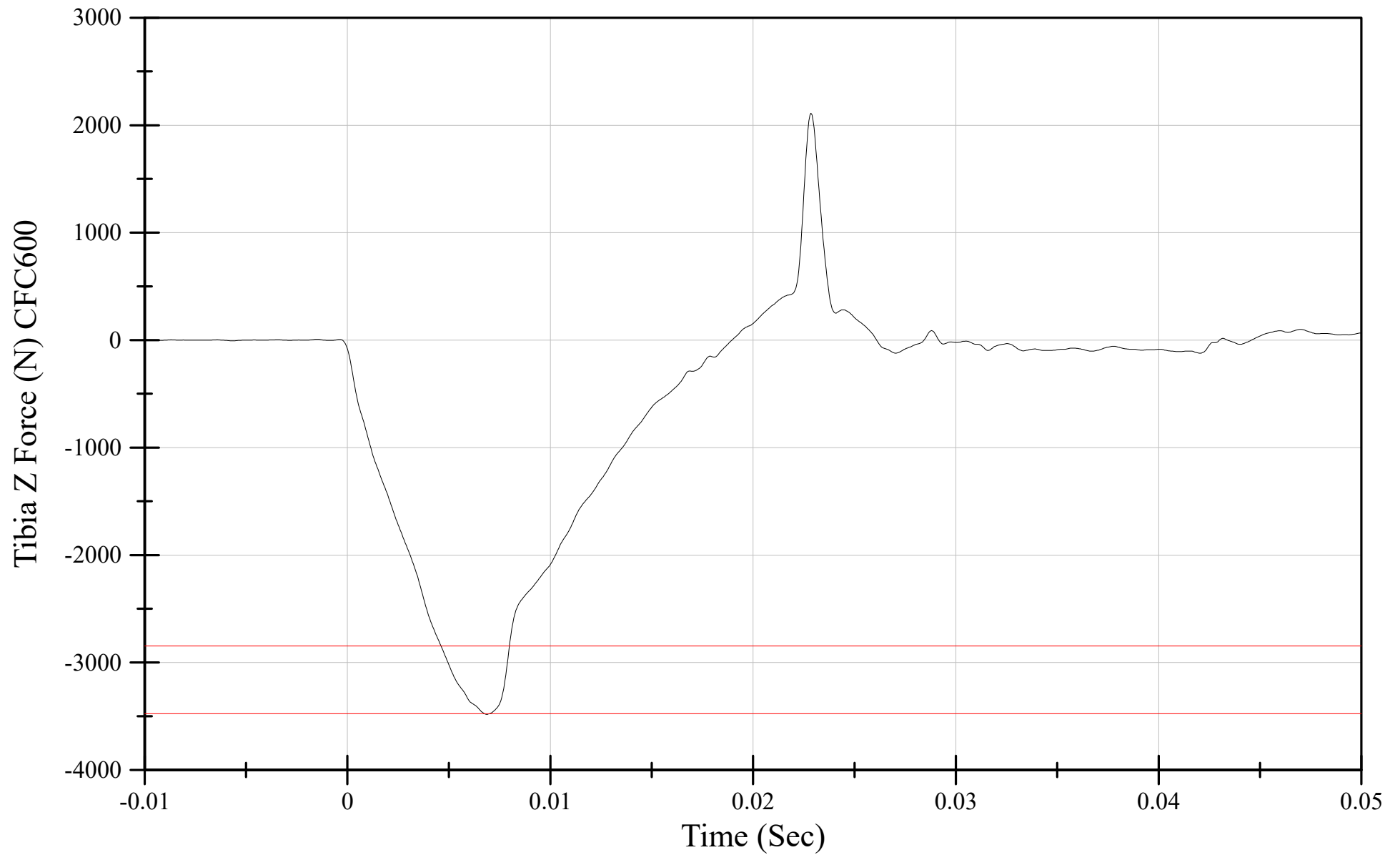
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.8	Pass
Test Humidity (%)	10 - 70	58	Pass
Test Velocity (m/s)	3.95 - 4.05	3.959	Pass
Peak Lower Tibia Fz (N)	-3478 - (-2846)	-3482.3	Fail

THOR-50M Left Heel Qualification

Tibia Load

Left Ankle Serial Number:



THOR-50M Left Inversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:
Left Inversion Stop: EQ2410

Test ID: 240923-8

Test Date: 9/23/2024

Test Time: 3:05 PM

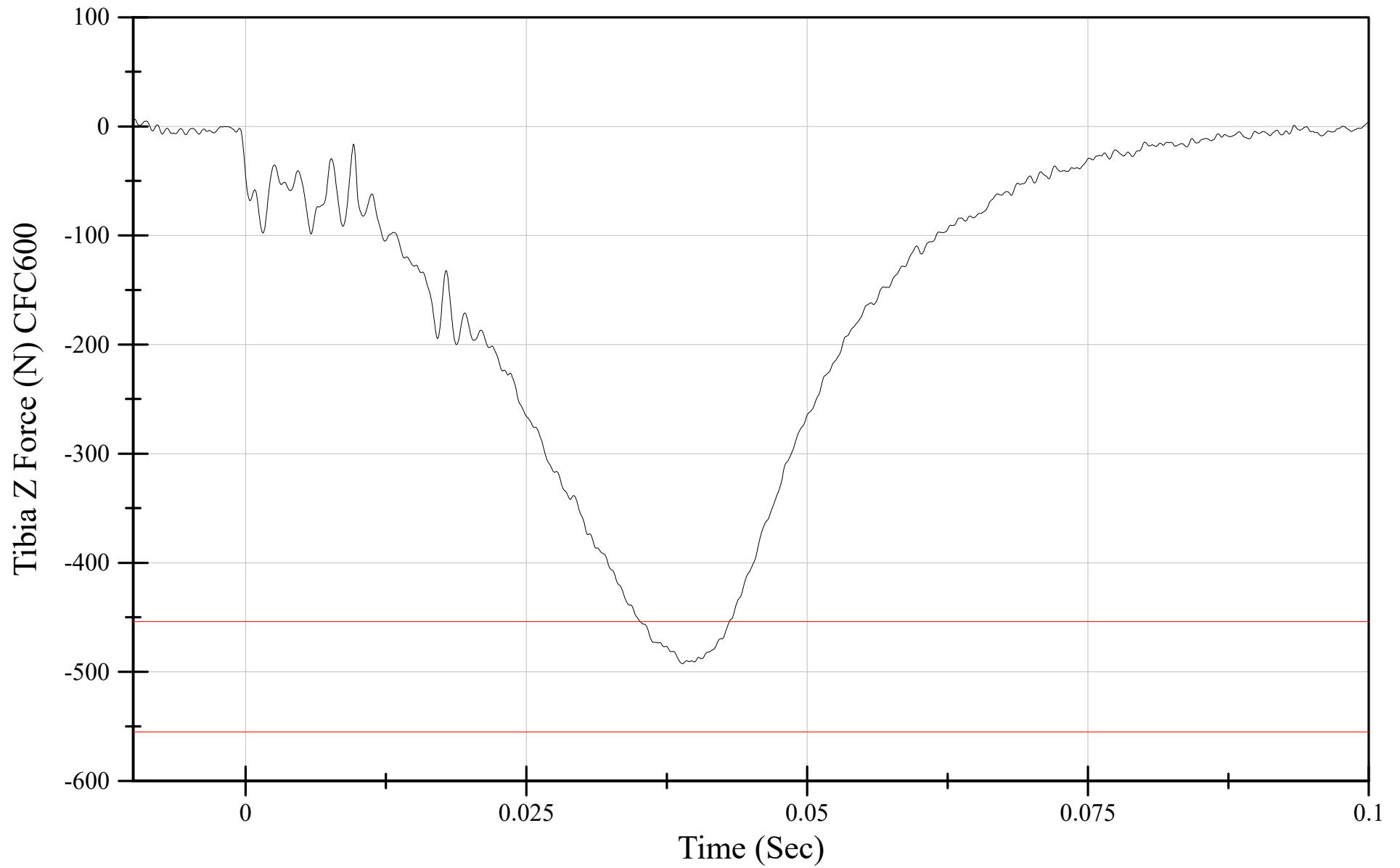
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	55	Pass
Test Velocity (m/s)	1.95 - 2.05	2.00	Pass
Peak Lower Tibia Fz (N)	-555 - (-454)	-492	Pass
Peak Ankle Resistive Moment (Nm)	-43.0 - (-35.2)	-37.6	Pass
Peak Ankle X-axis Rotation (deg)	-37.9 - (-31.0)	-34.3	Pass

THOR-50M Left Inversion Qualification

Tibia Load

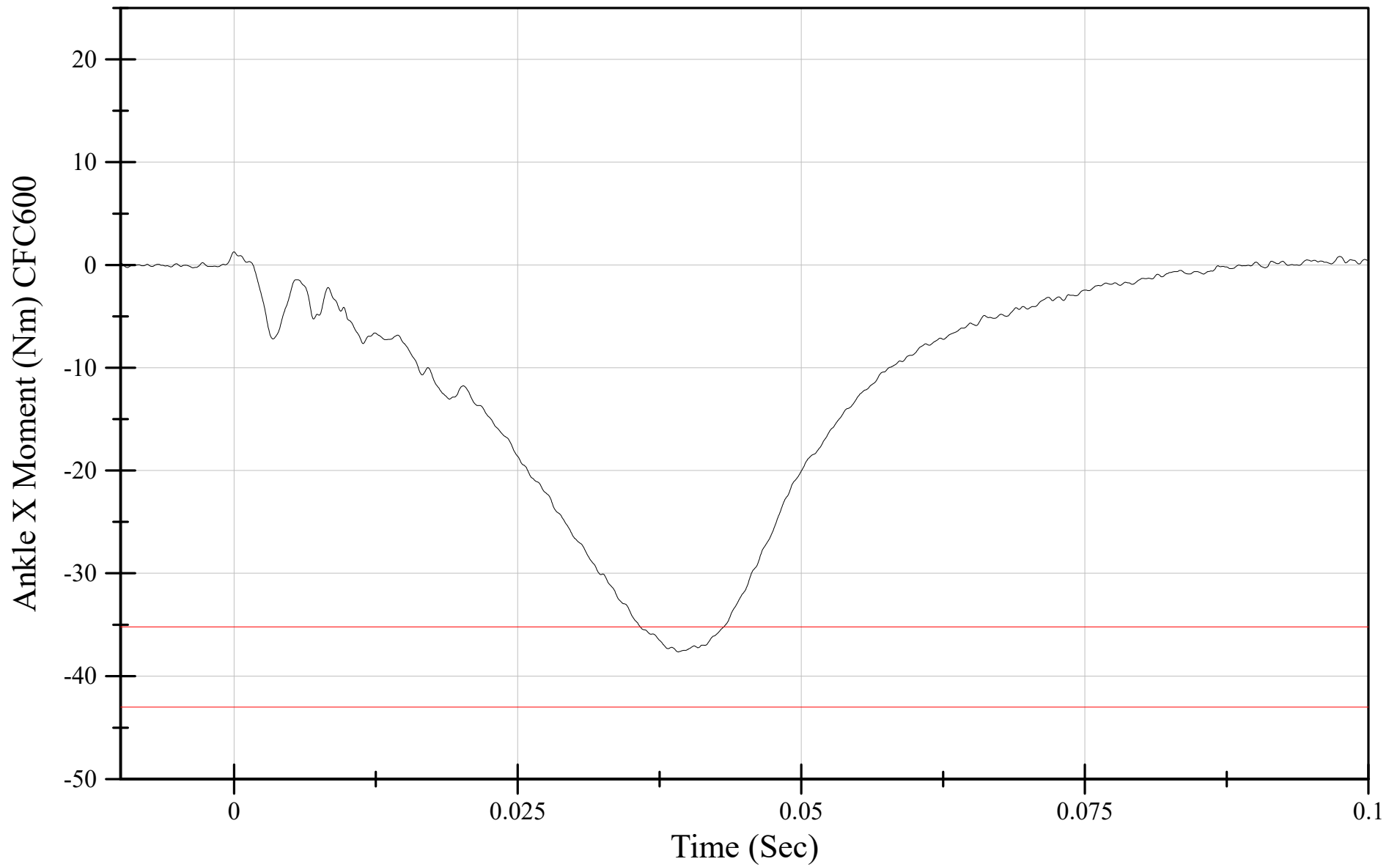
Left Ankle Serial Number:



THOR-50M Left Inversion Qualification

Ankle Moment

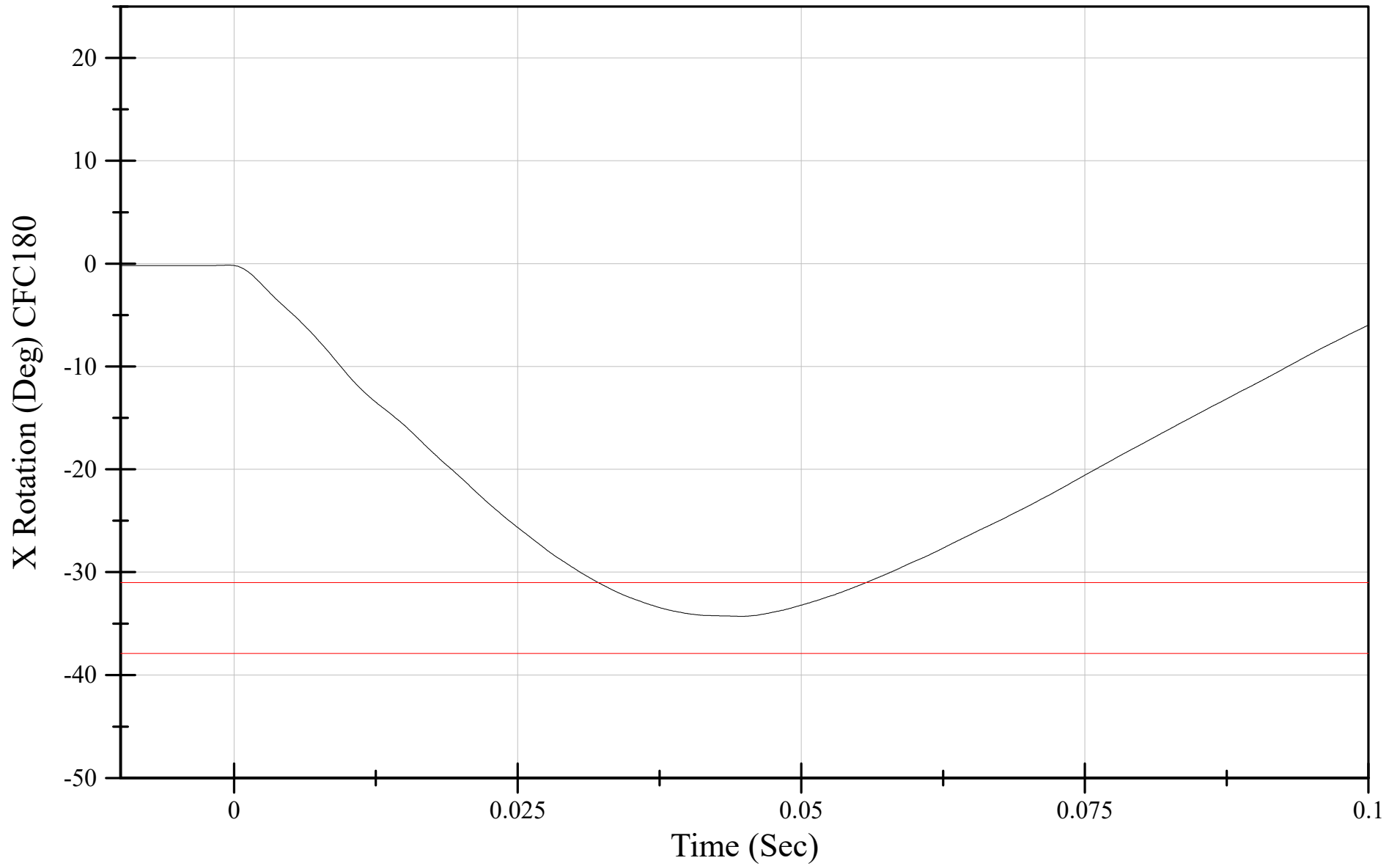
Left Ankle Serial Number:



THOR-50M Left Inversion Qualification

Ankle X Rotation

Left Ankle Serial Number:



THOR-50M Left Eversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Left Eversion Stop: EQ2410

Test ID: 240923-14

Test Date: 9/23/2024

Test Time: 3:45 PM

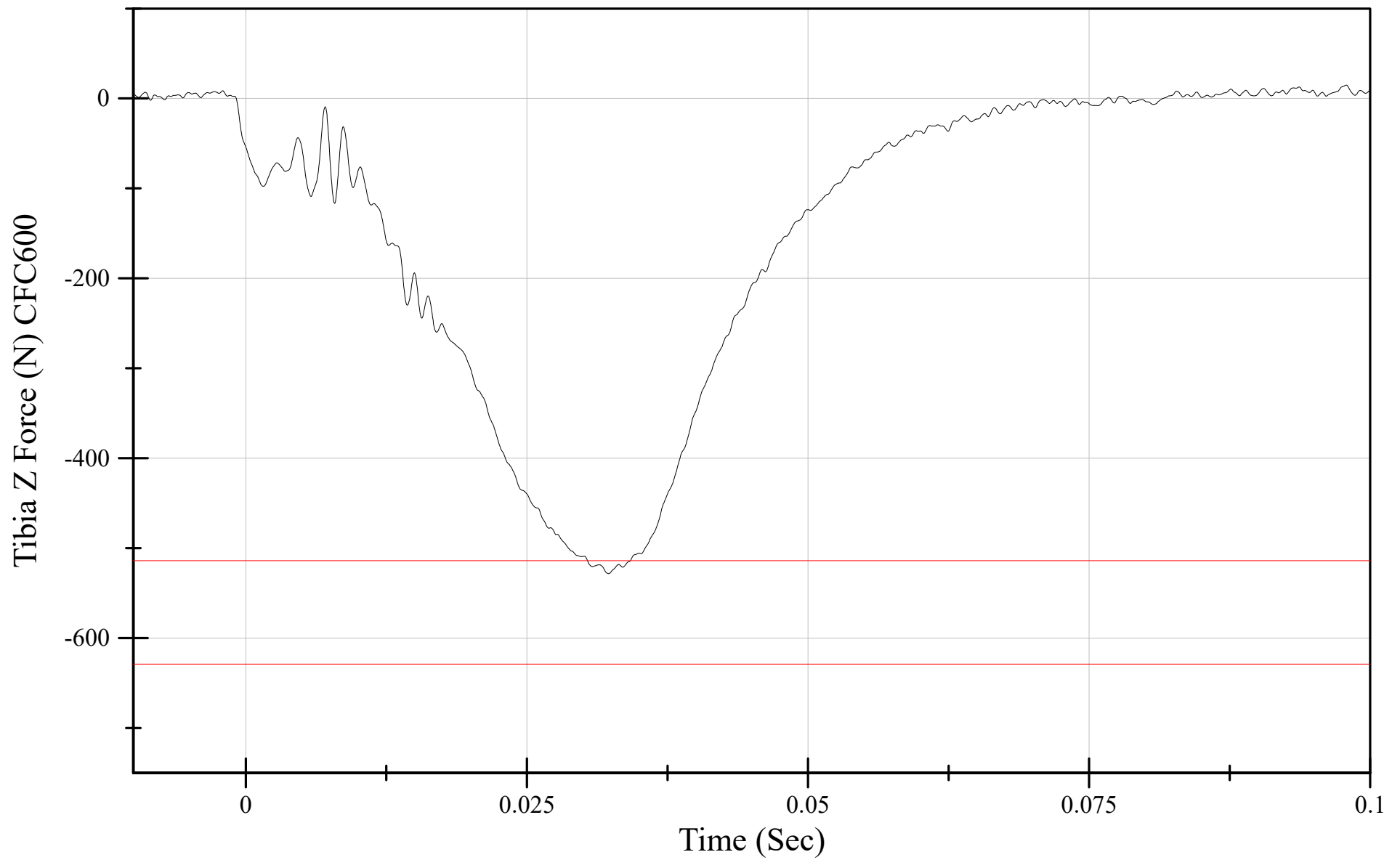
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	55	Pass
Test Velocity (m/s)	1.95 - 2.05	2.00	Pass
Peak Lower Tibia Fz (N)	-629 - (-514)	-528	Pass
Peak Ankle Resistive Moment (Nm)	38.7 - 47.3	38.7	Pass
Peak Ankle X-axis Rotation (deg)	26.6 - 32.5	28.2	Pass

THOR-50M Left Eversion Qualification

Tibia Load

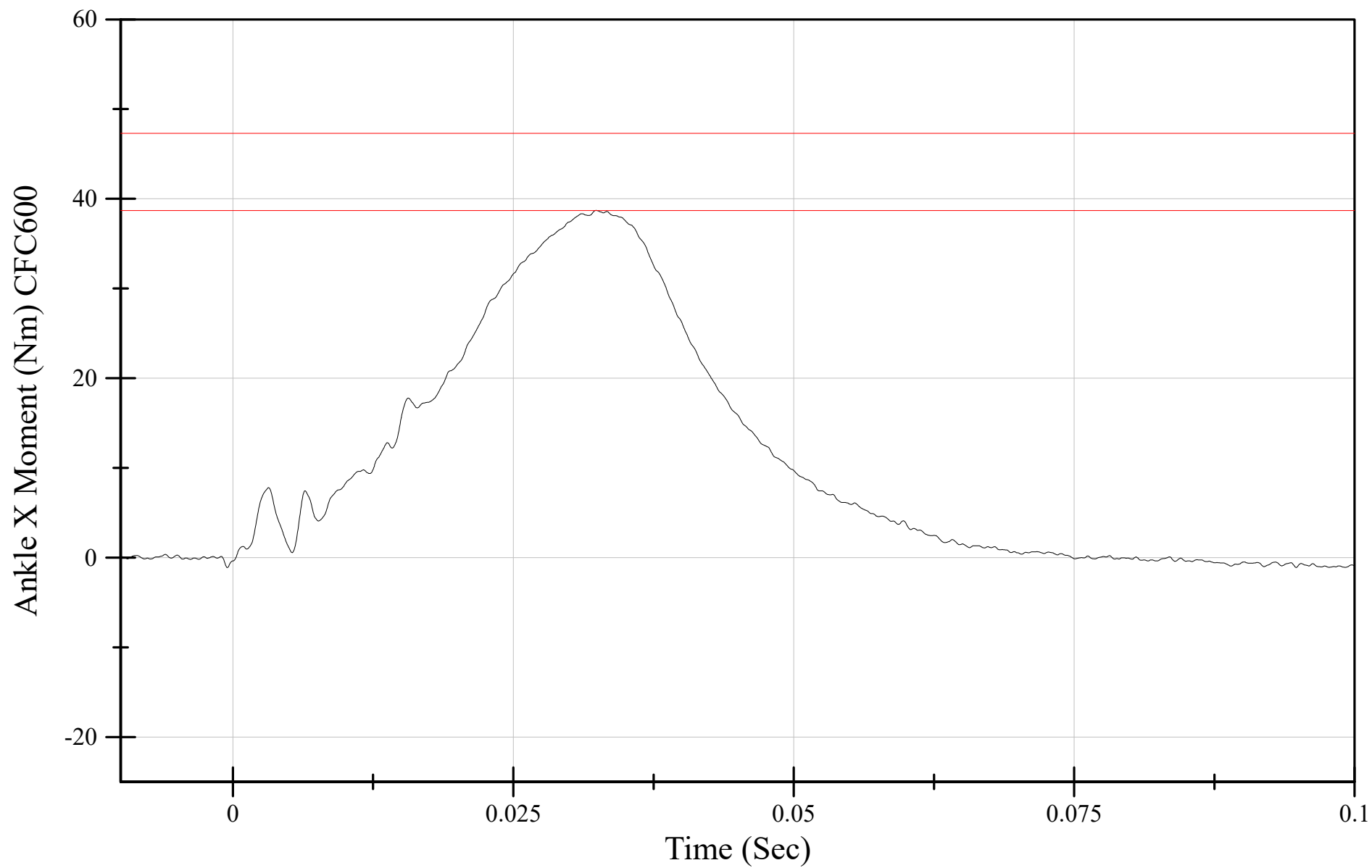
Serial Number: EG2595



THOR-50M Left Eversion Qualification

Ankle Moment

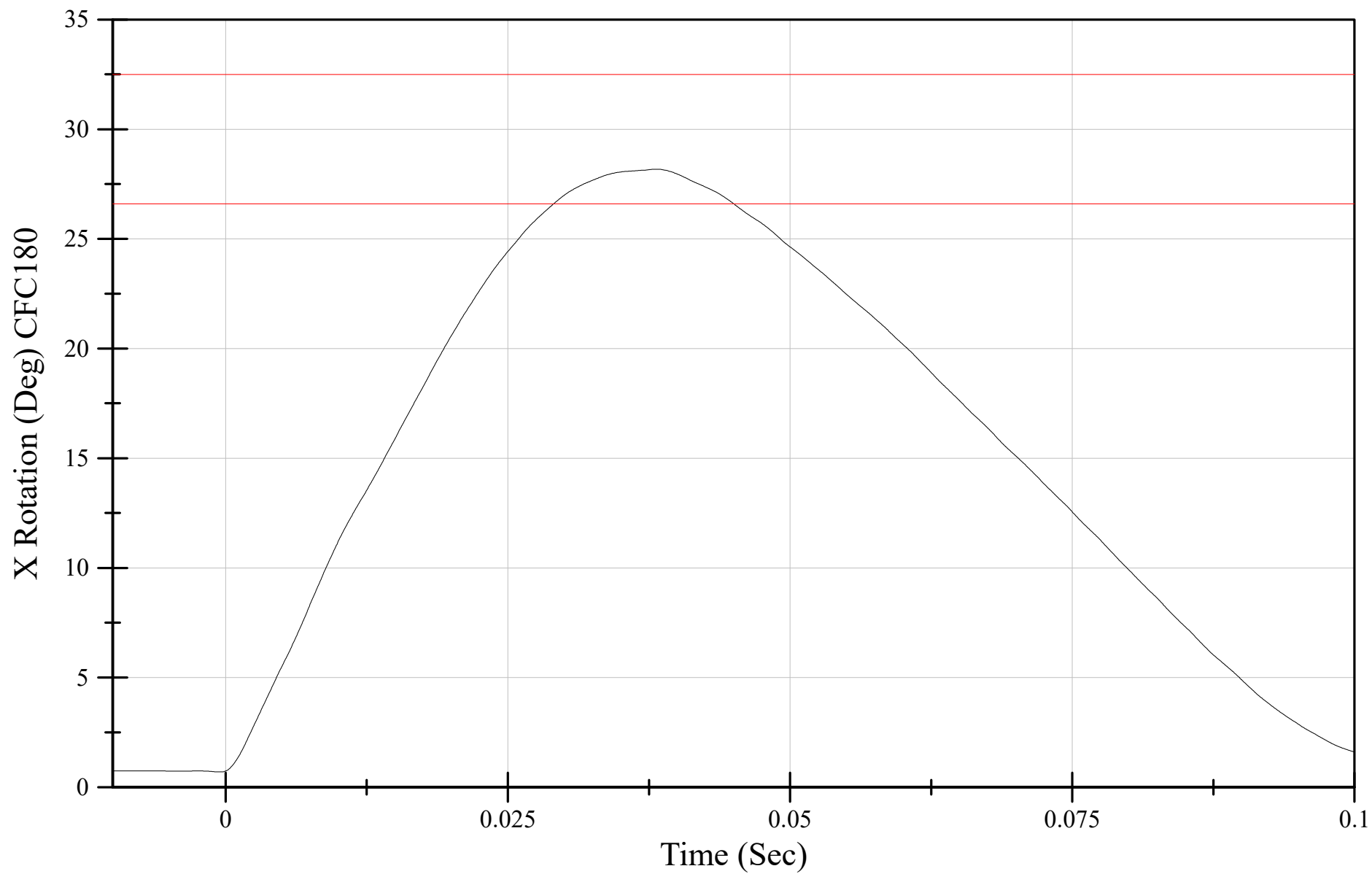
Serial Number: EG2595



THOR-50M Left Eversion Qualification

Ankle X Rotation

Serial Number: EG2595



THOR-50M Head Impact Qualification
Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Head Skin: EI9570

Test ID: 241024-1

Test Date: 10/24/2024

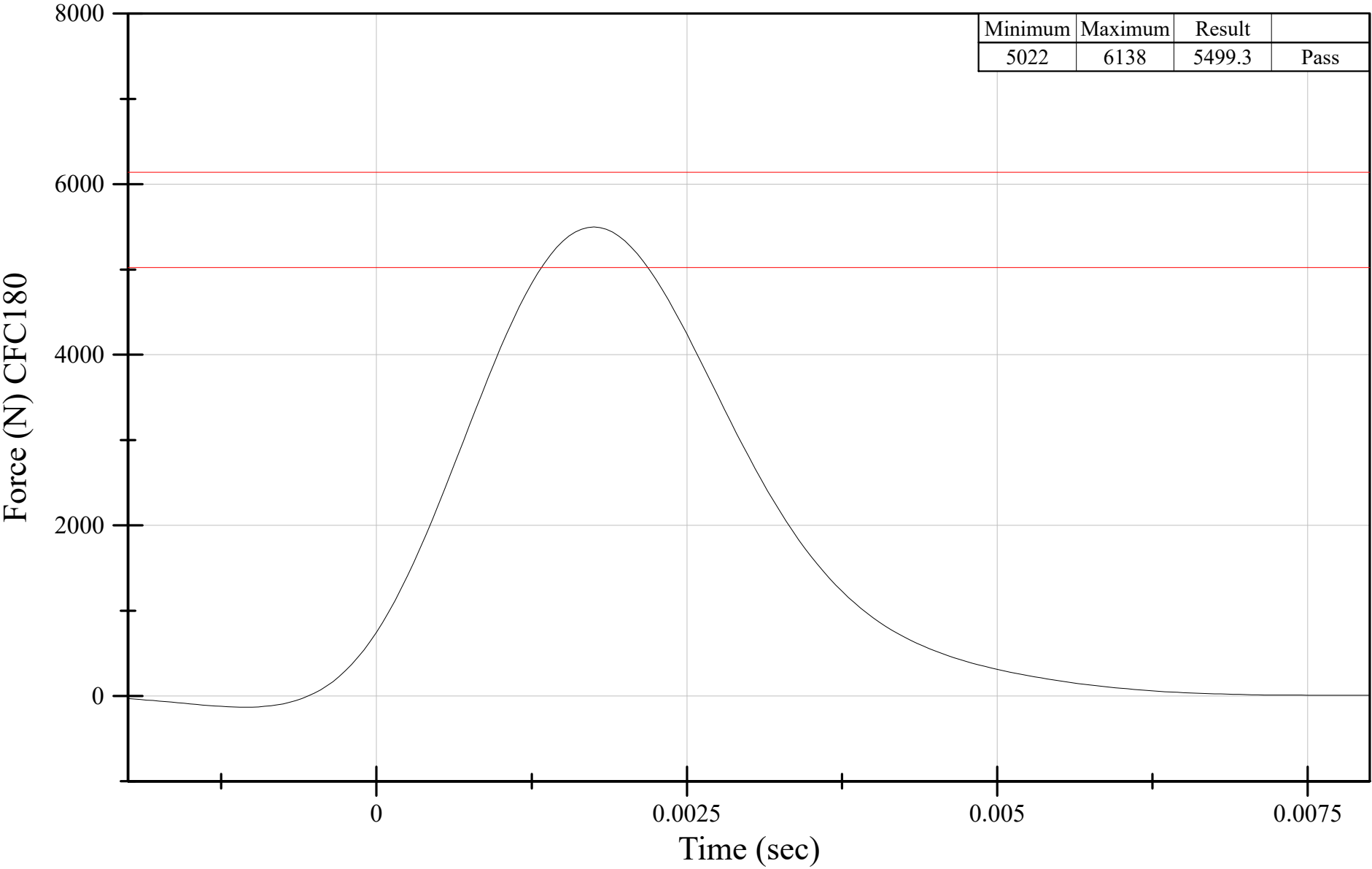
Test Time: 8:11 AM

Test Results

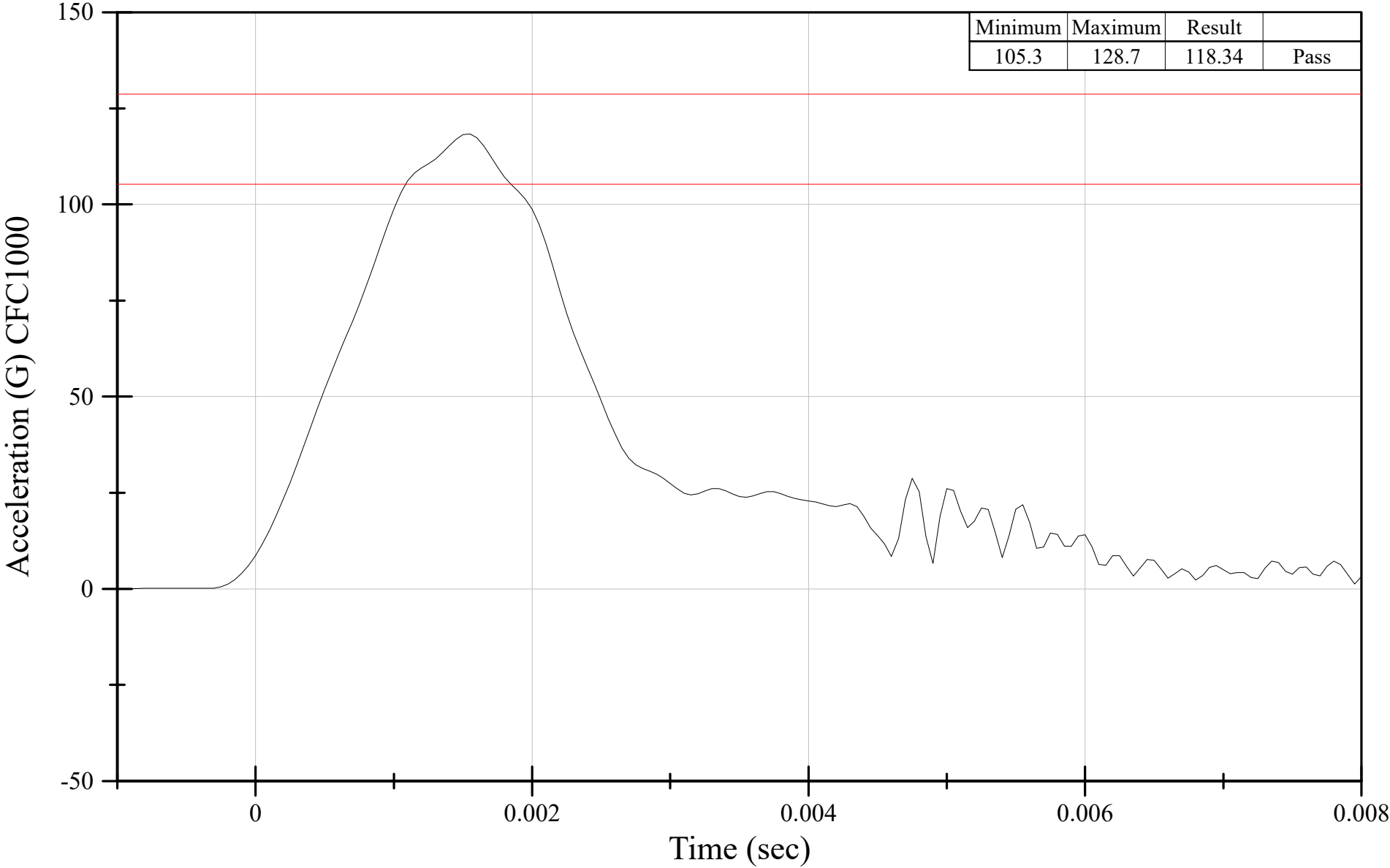
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	48	Pass
Test Velocity (m/s)	1.95 - 2.05	1.989	Pass
Peak Probe Force (N)	5022 - 6138	5499.3	Pass
Peak Head CG Resultant Acceleration (g)	105.3 - 128.7	118.34	Pass

* THOR-50M Qualification Manual - April 2023

THOR-50M Head Impact Qualification
Probe Force
Serial Number: EG2595



THOR-50M Head Impact Qualification
Head CG Resultant Acceleration
Serial Number: EG2595



THOR-50M Neck Left Torsion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 241023-16

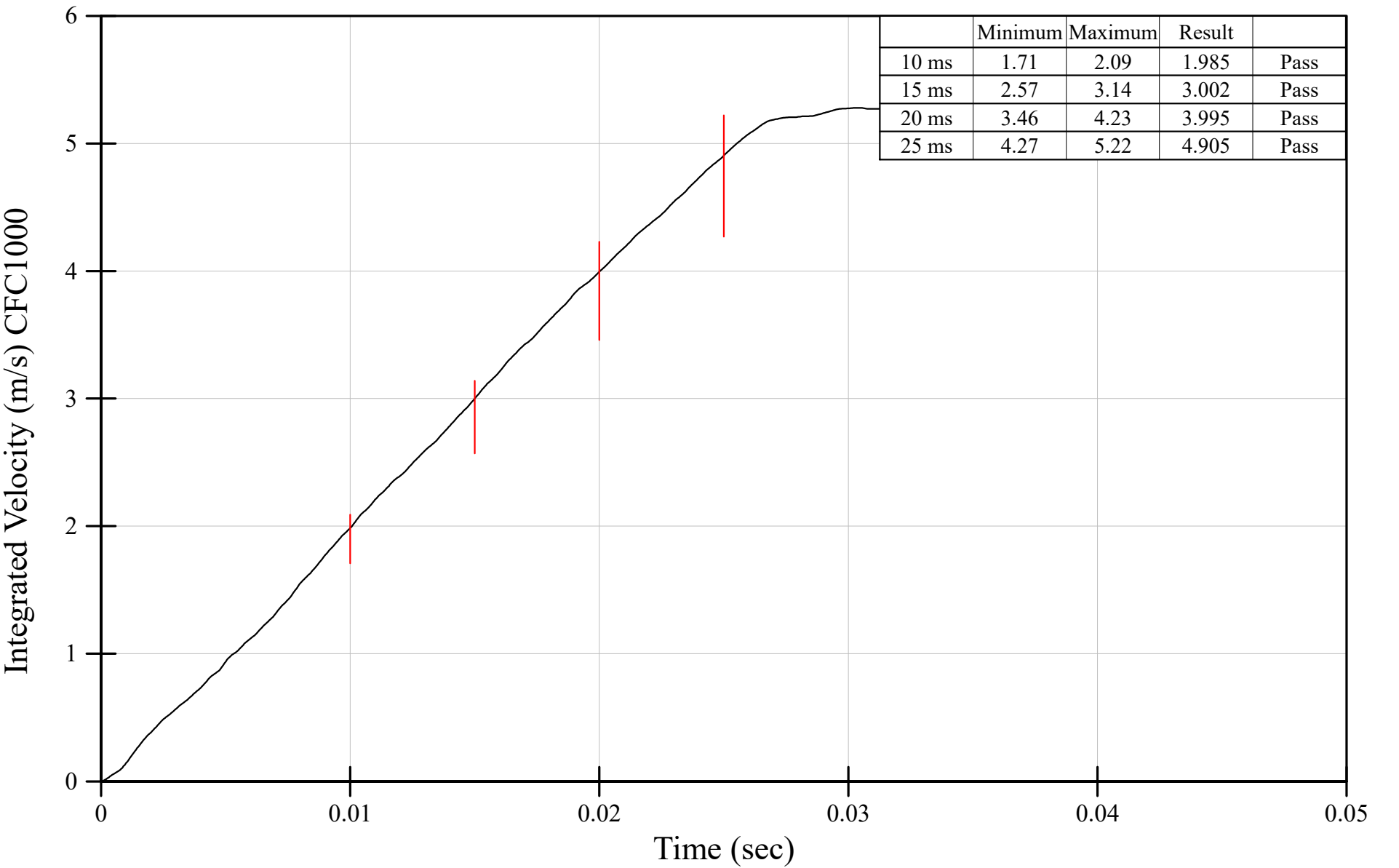
Test Date: 10/23/2024

Test Time: 10:16 AM

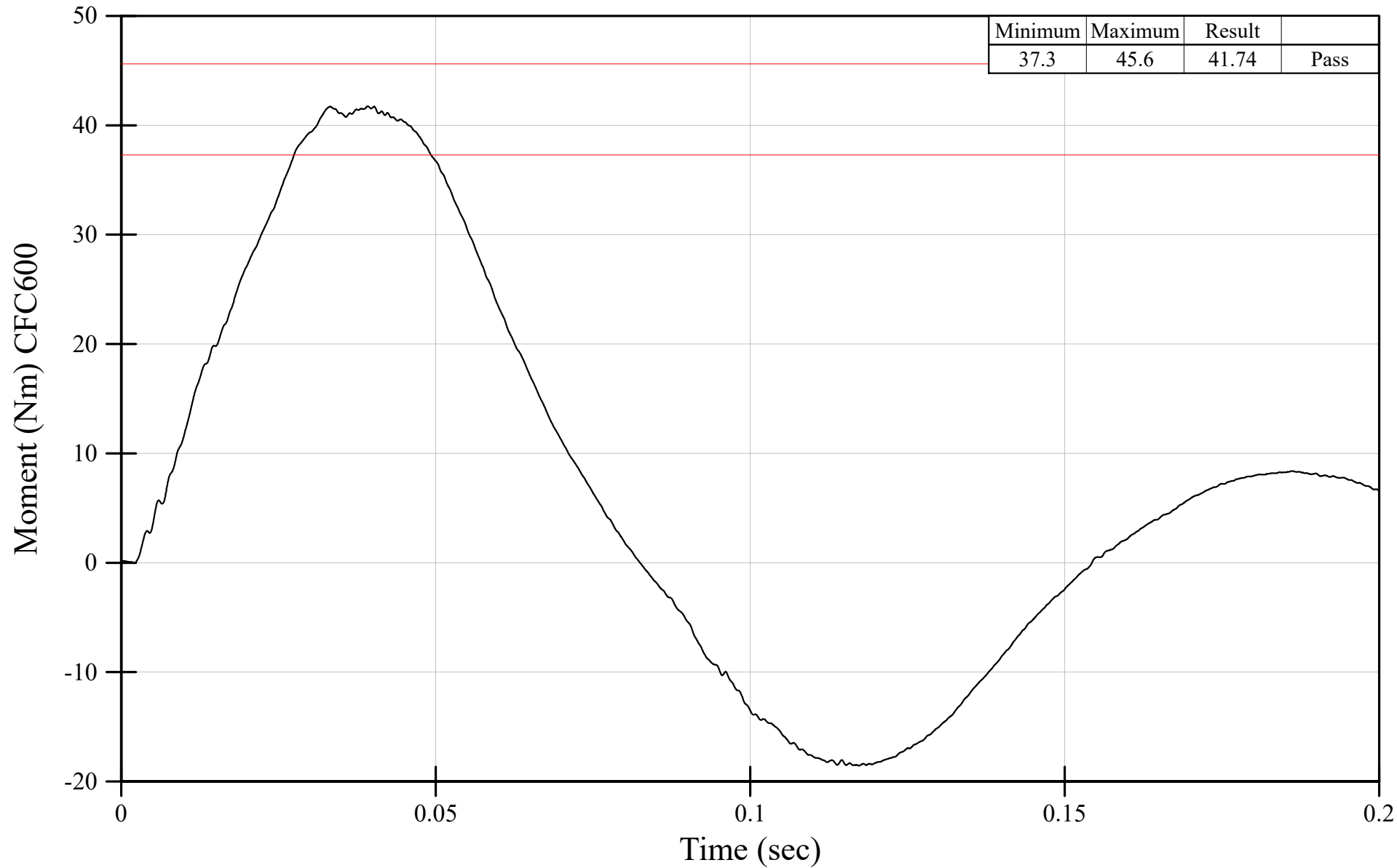
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.95 - 5.05	5.001	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.985	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	3.002	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.995	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.905	Pass
Peak Upper Neck Mz (Nm)	37.3 - 45.6	41.74	Pass
Peak Neck Fixture Rotation (deg)	-52.7 - (-43.1)	-44.88	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	-1529 - (-1251)	-1348.1	Pass

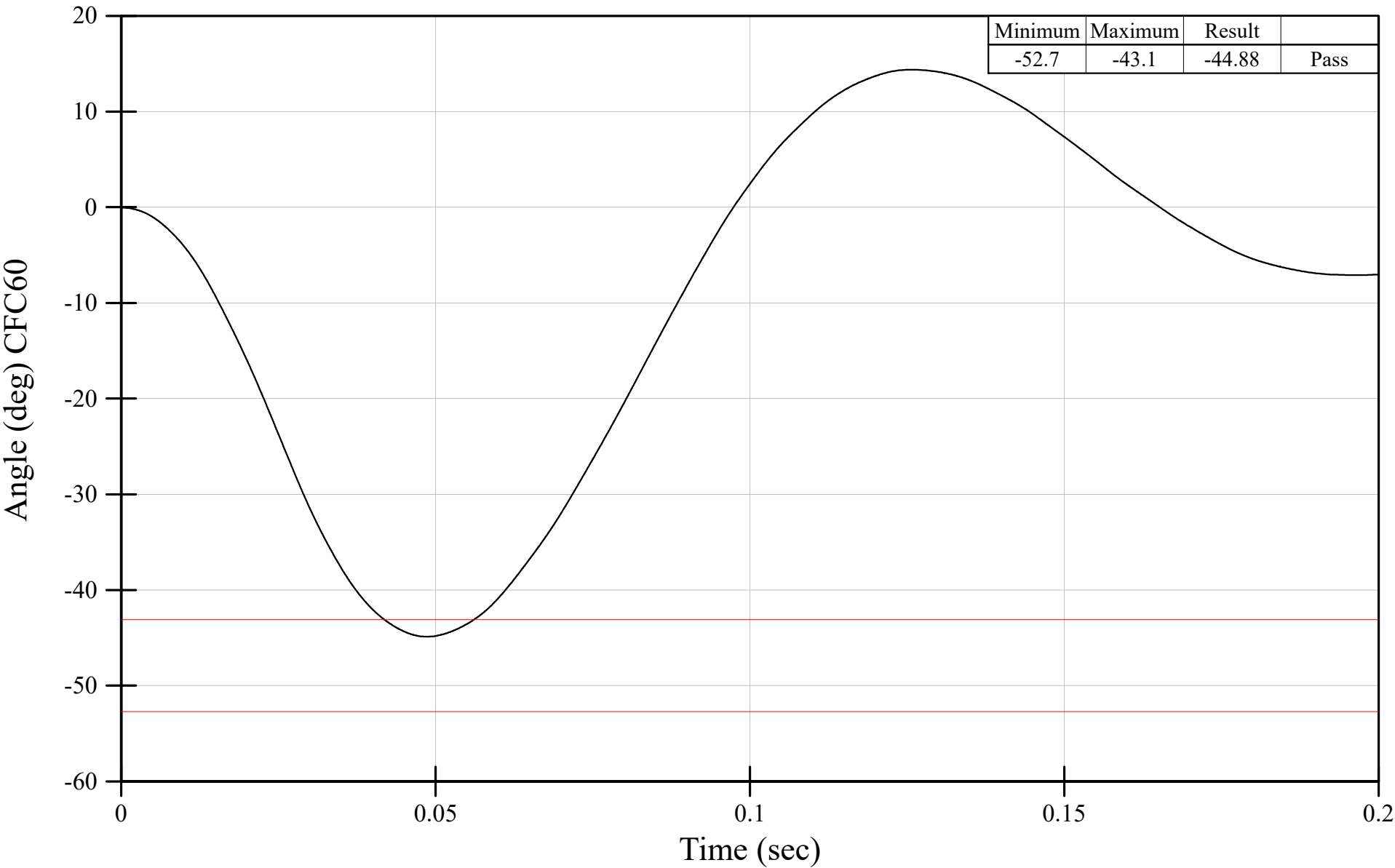
THOR-50M Neck Left Torsion Qualification
Pendulum Velocity
Neck Serial Number: EG3956



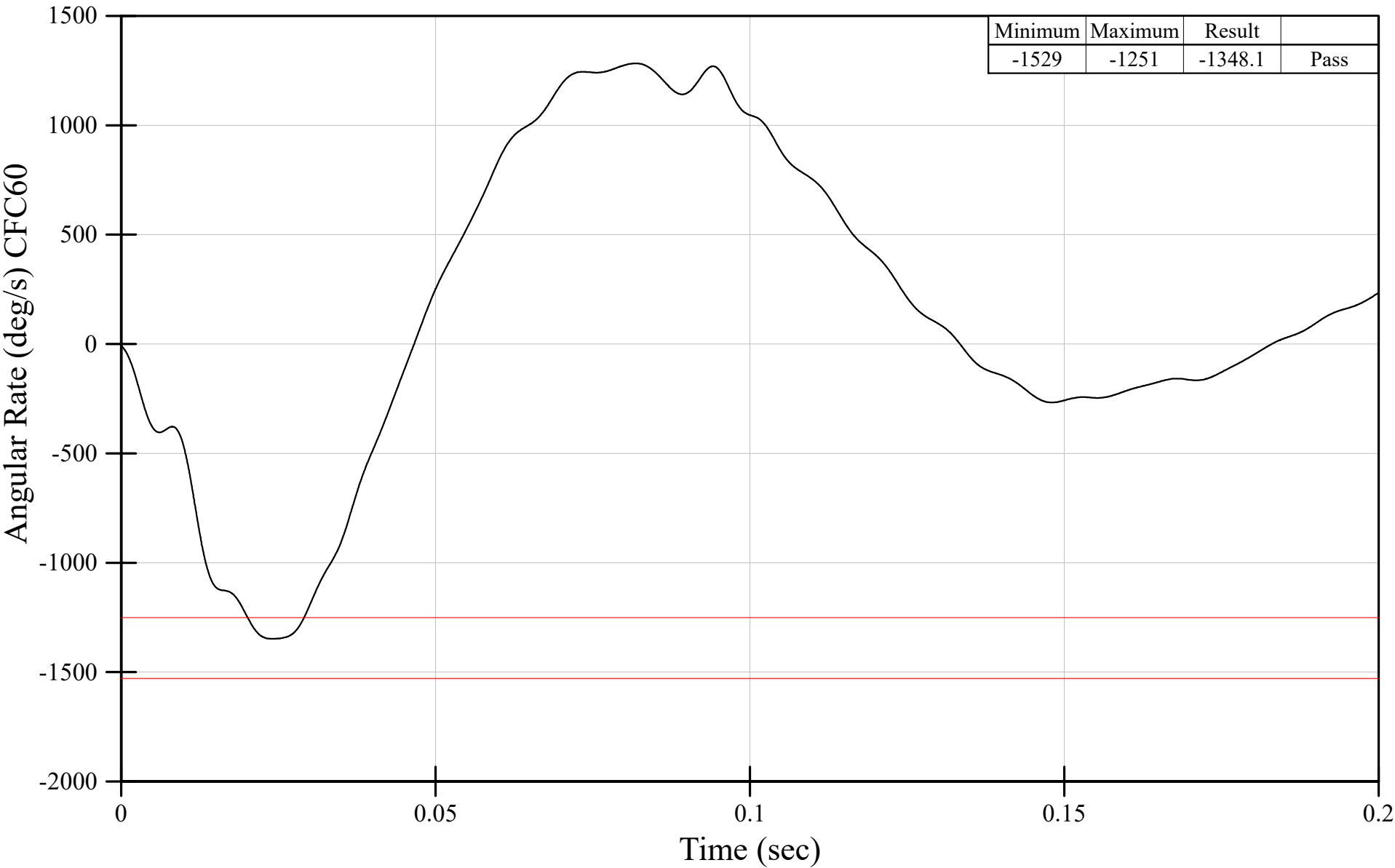
THOR-50M Neck Left Torsion Qualification
Peak Upper Neck Moment Z
Neck Serial Number: EG3956



THOR-50M Neck Left Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: EG3956



THOR-50M Neck Left Torsion Qualification
Peak Angular Rate
Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 241023-24

Test Date: 10/23/2024

Test Time: 10:58 AM

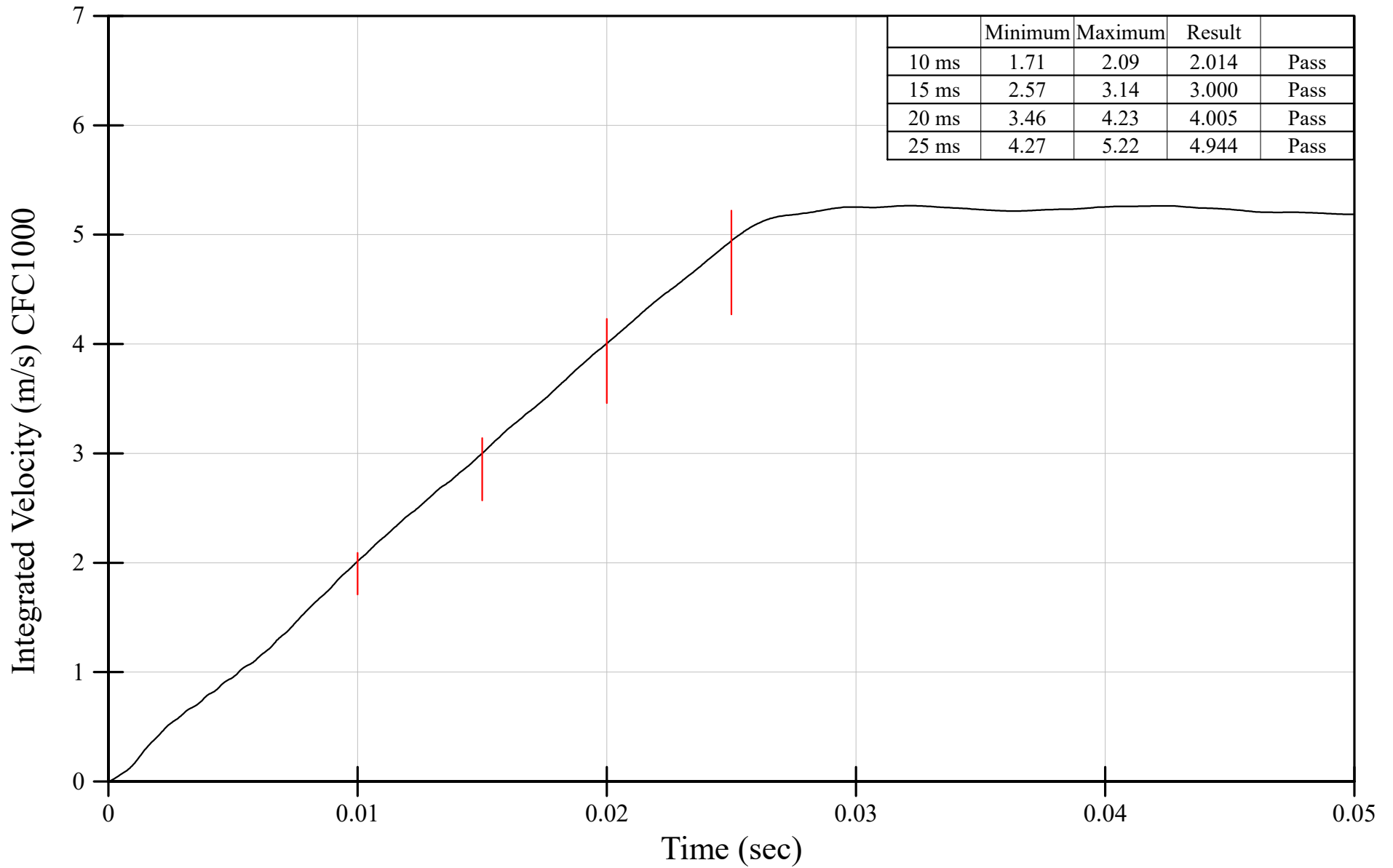
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.95 - 5.05	4.987	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	2.014	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	3.000	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	4.005	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.944	Pass
Peak Upper Neck Mz (Nm)	-45.6 - (-37.3)	-42.08	Pass
Peak Neck Fixture Rotation (deg)	43.1 - 52.7	44.76	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	1251 - 1529	1378.0	Pass

THOR-50M Neck Right Torsion Qualification

Pendulum Velocity

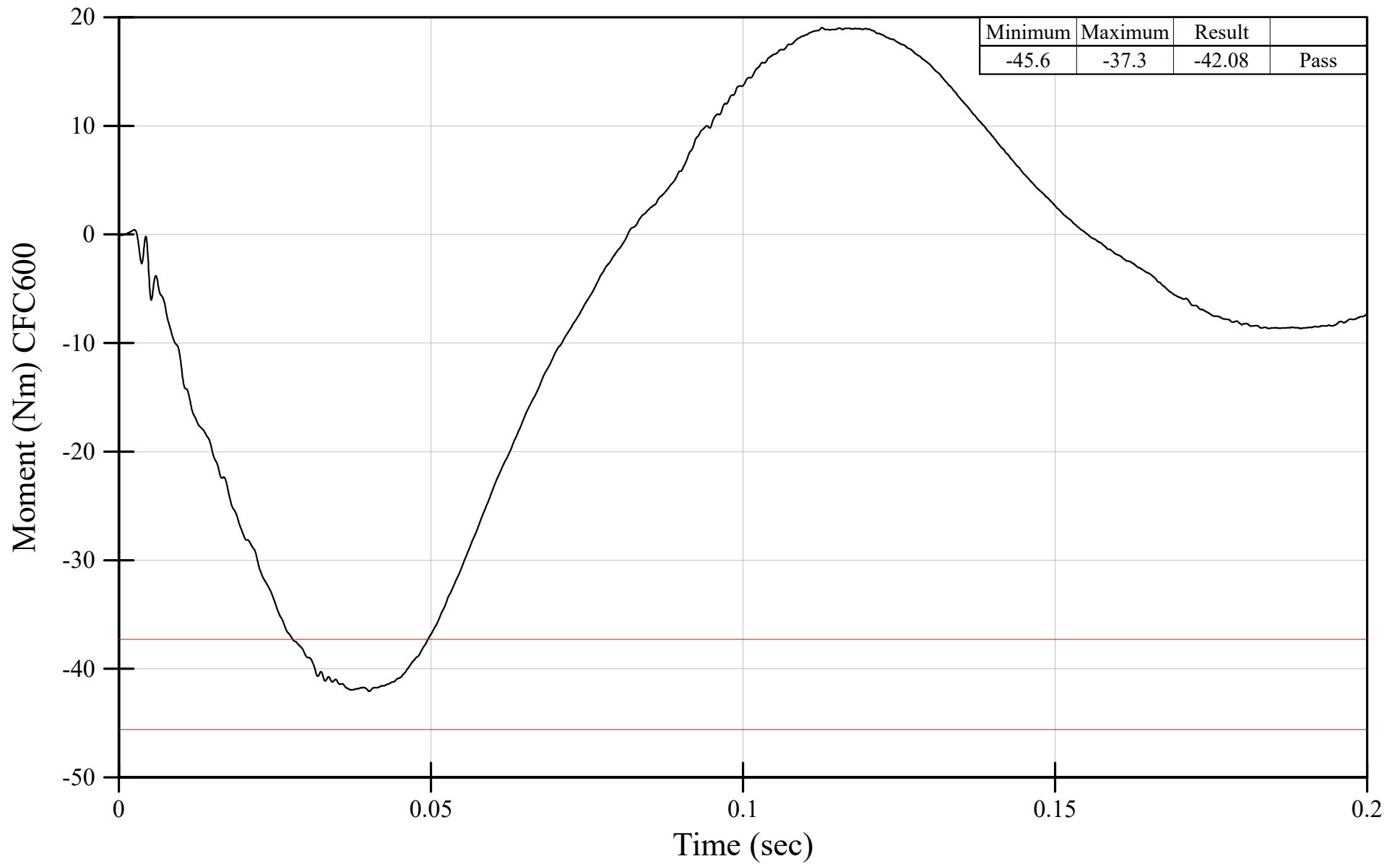
Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification

Peak Upper Neck Moment Z

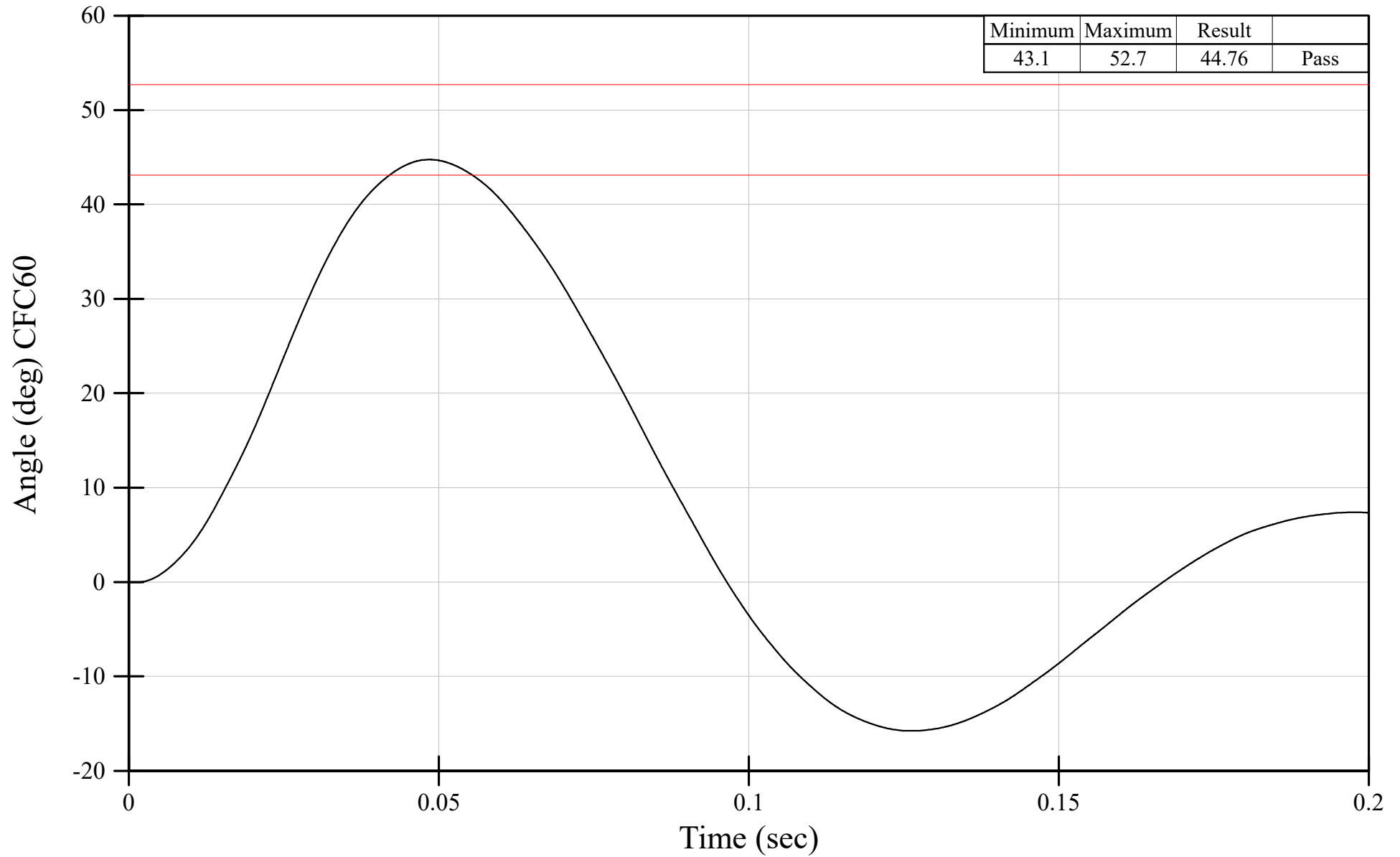
Neck Serial Number: EG3956



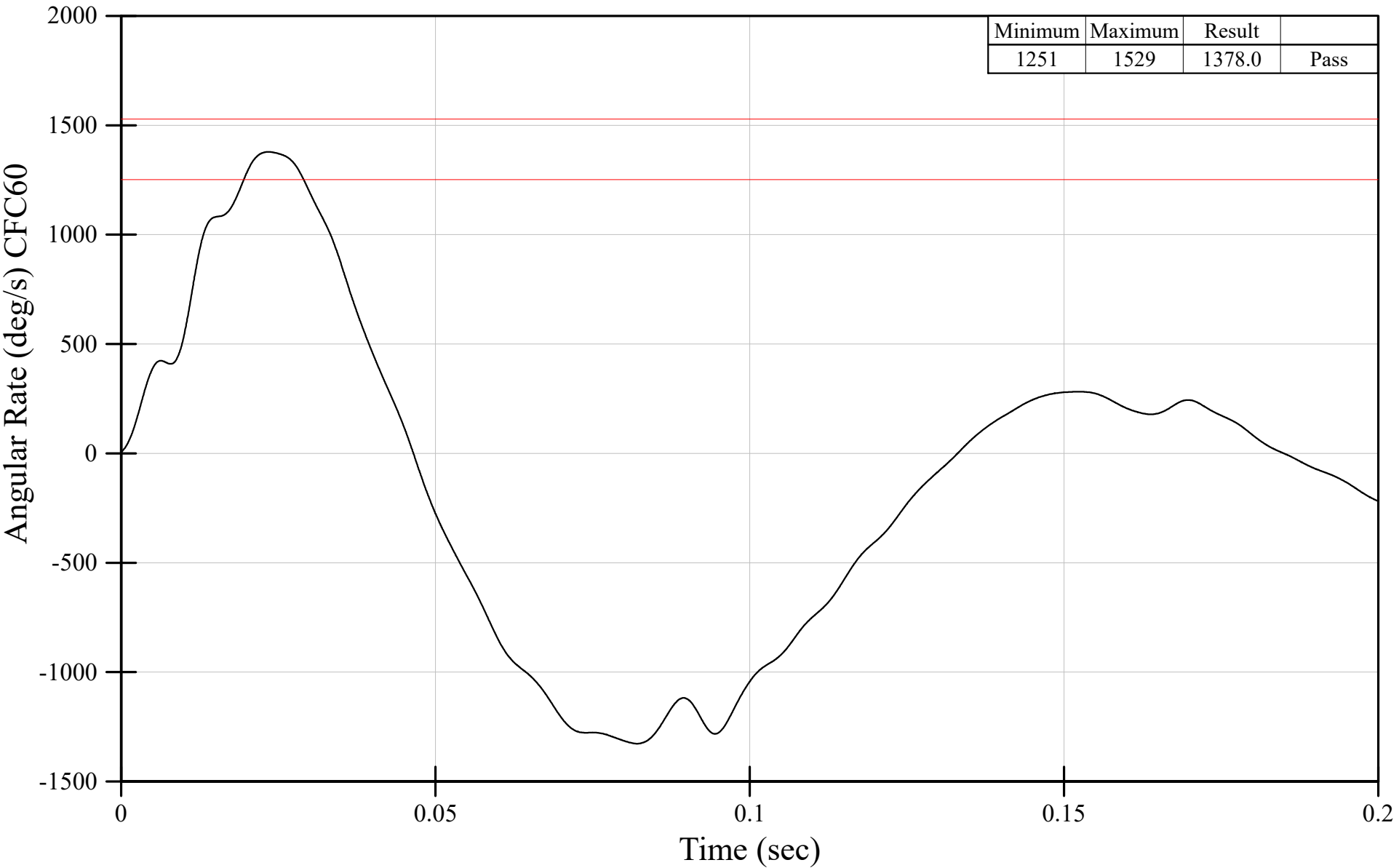
THOR-50M Neck Right Torsion Qualification

Neck Fixture Rotation

Neck Serial Number: EG3956



THOR-50M Neck Right Torsion Qualification
Peak Angular Rate
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241022-18

Test Date: 10/22/2024

Test Time: 4:17 PM

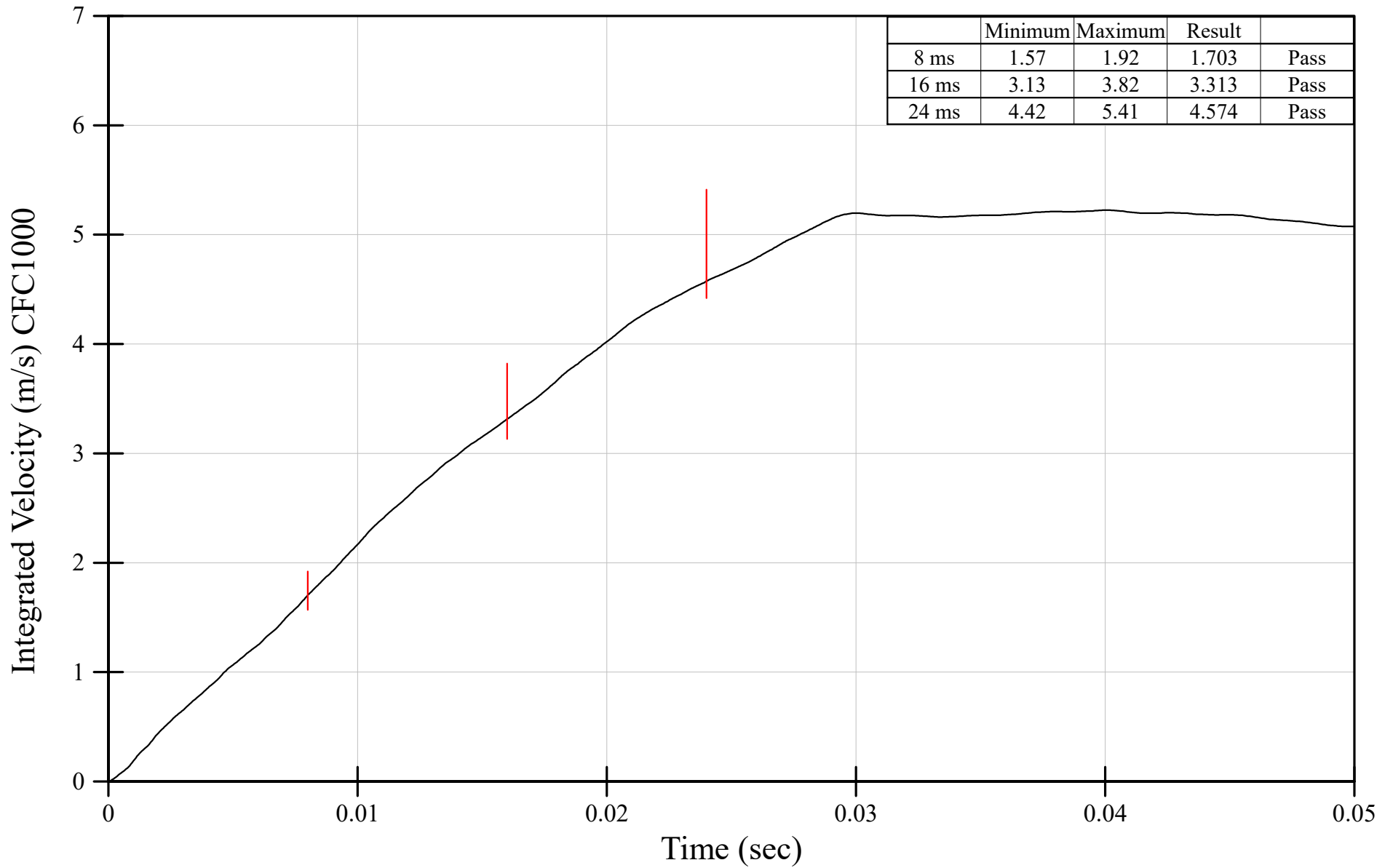
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	48	Pass
Test Velocity (m/s)	4.95 - 5.05	5.000	Pass
Pendulum Velocity at 8 ms (m/s)	1.57 - 1.92	1.703	Pass
Pendulum Velocity at 16 ms (m/s)	3.13 - 3.82	3.313	Pass
Pendulum Velocity at 24 ms (m/s)	4.42 - 5.41	4.574	Pass
Peak Upper Neck My (Nm)	27.9 - 34.1	34.06	Pass
Peak Upper Neck Fz prior to 40 ms (N)	774 - 946	808.3	Pass
Peak Head Angular Velocity Y (deg/sec)	-2172 - (-1777)	-1841.7	Pass
Peak Head Rotation (deg)	-71.0 - (-58.1)	-59.93	Pass

THOR-50M Neck Front Flexion Qualification

Pendulum Velocity

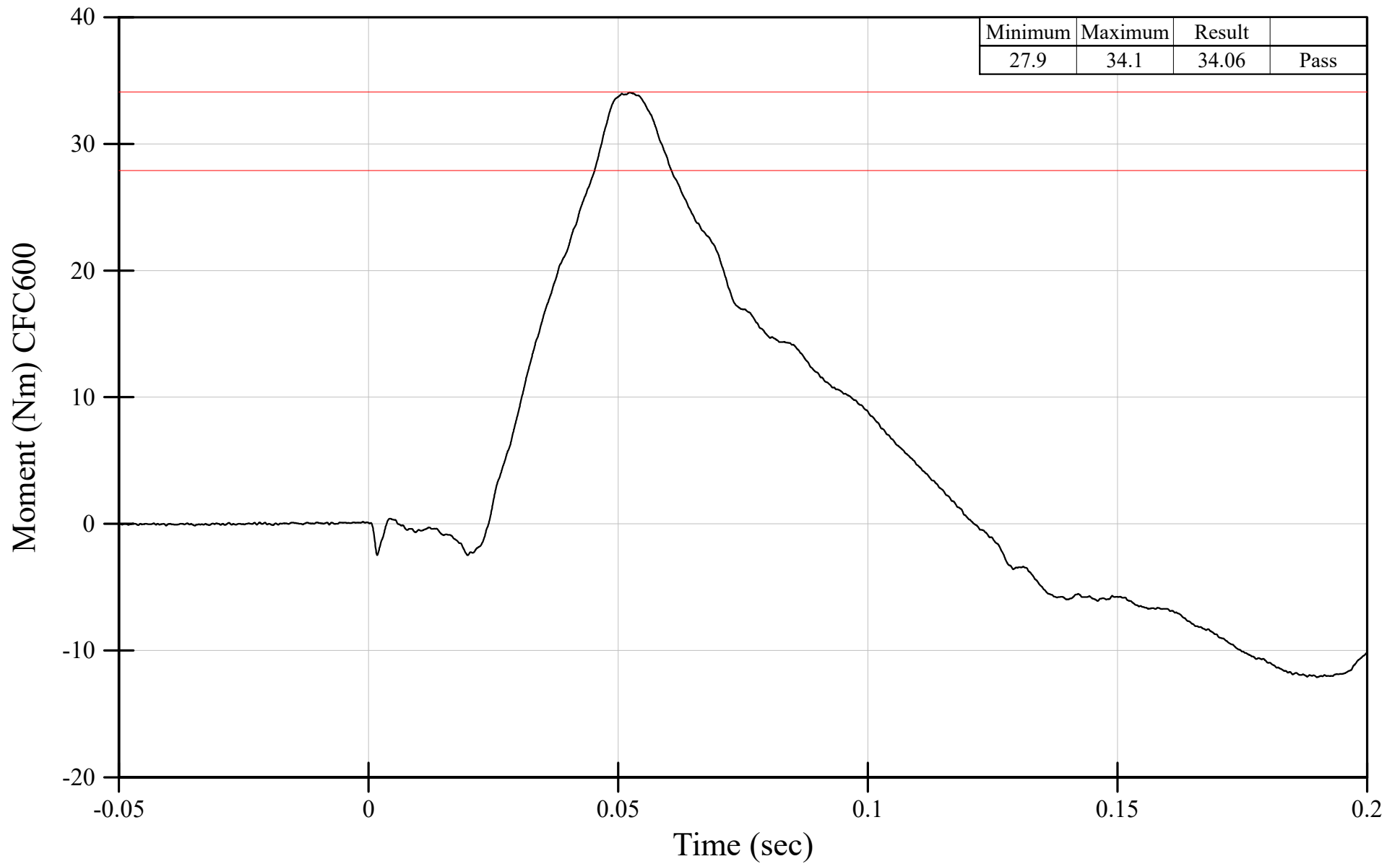
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Upper Neck My

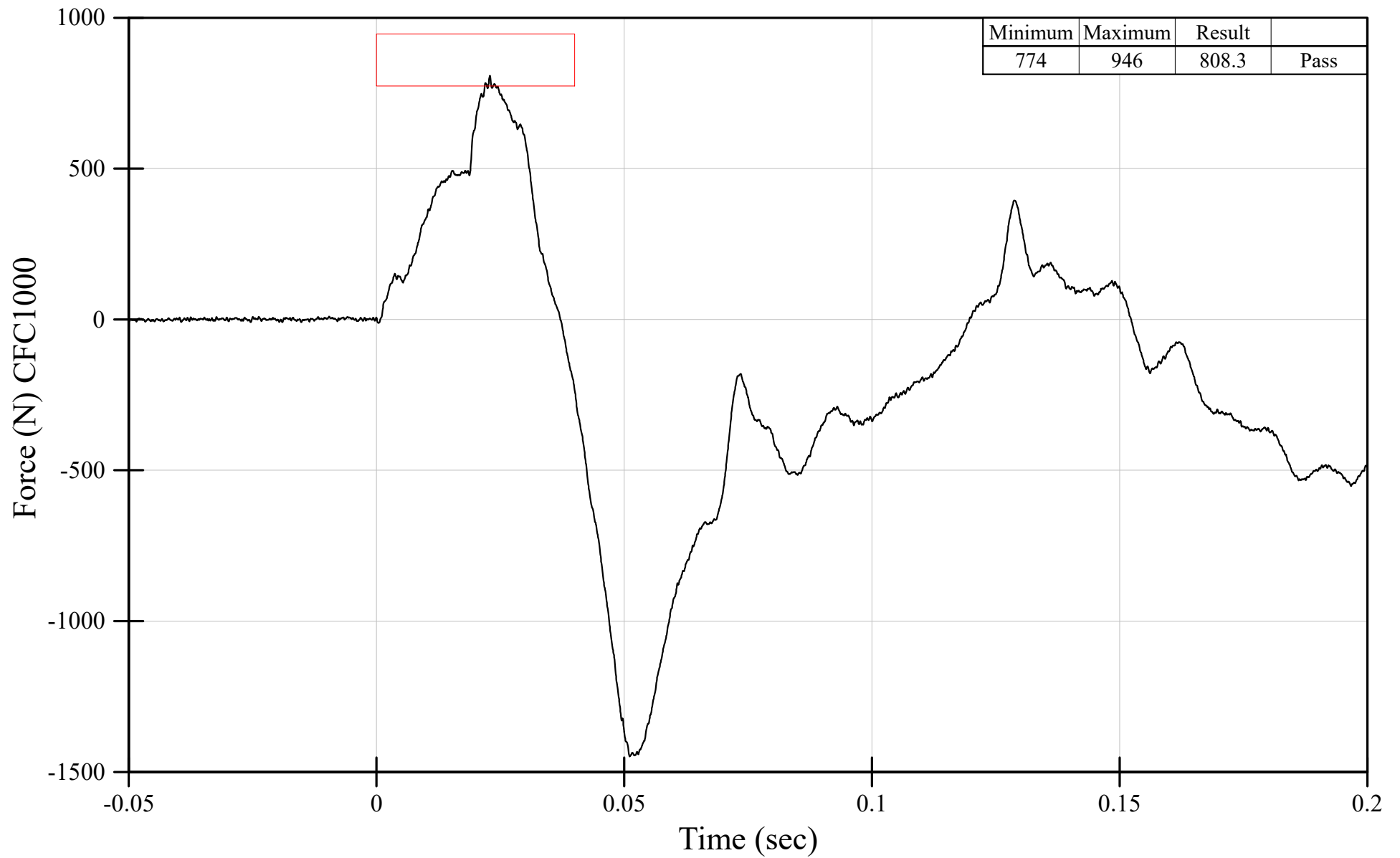
Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification

Upper Neck Fz

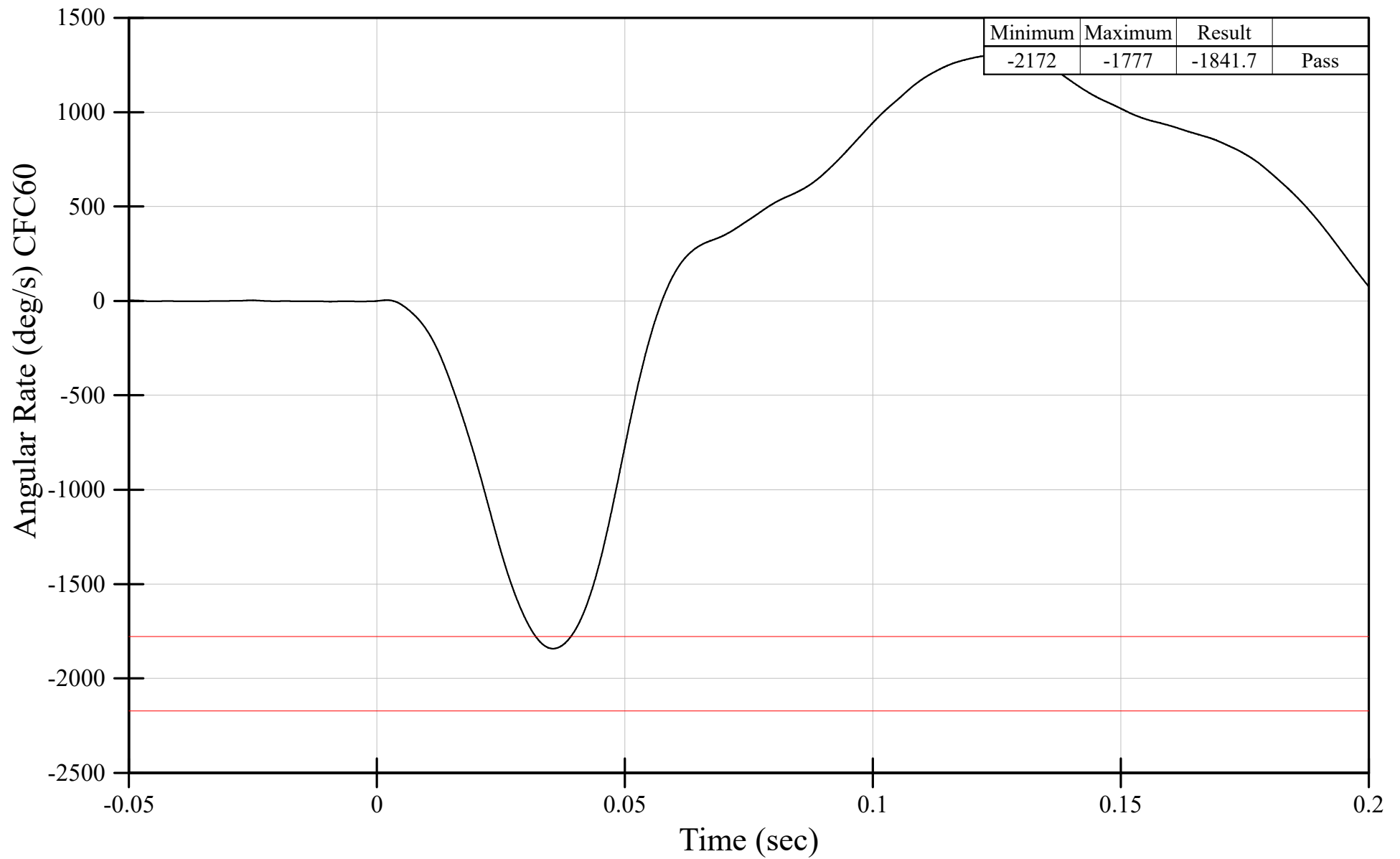
Neck Serial Number: EG3956



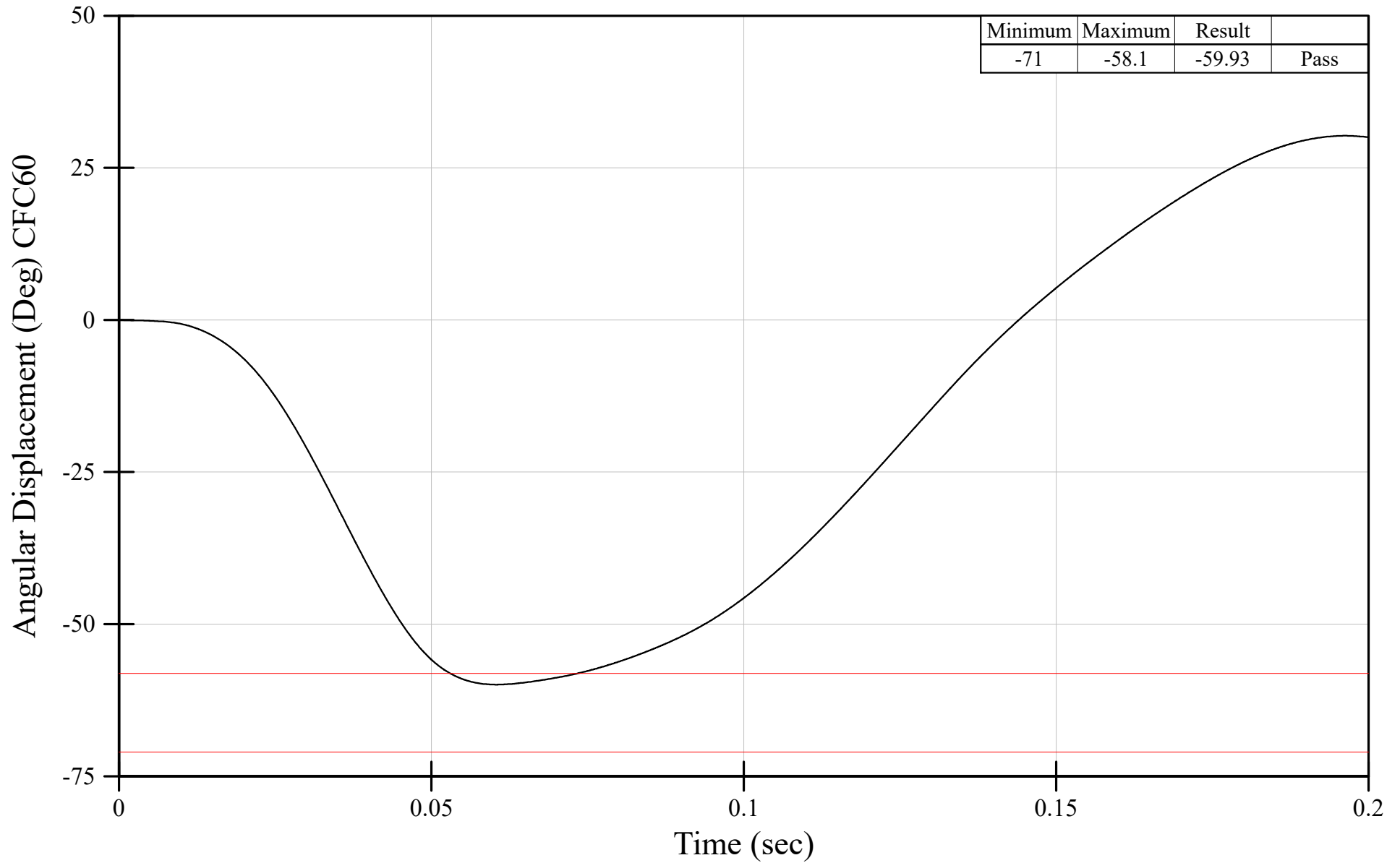
THOR-50M Neck Front Flexion Qualification

Peak Head Angular Rate

Neck Serial Number: EG3956



THOR-50M Neck Front Flexion Qualification
Head Rotation
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241023-1

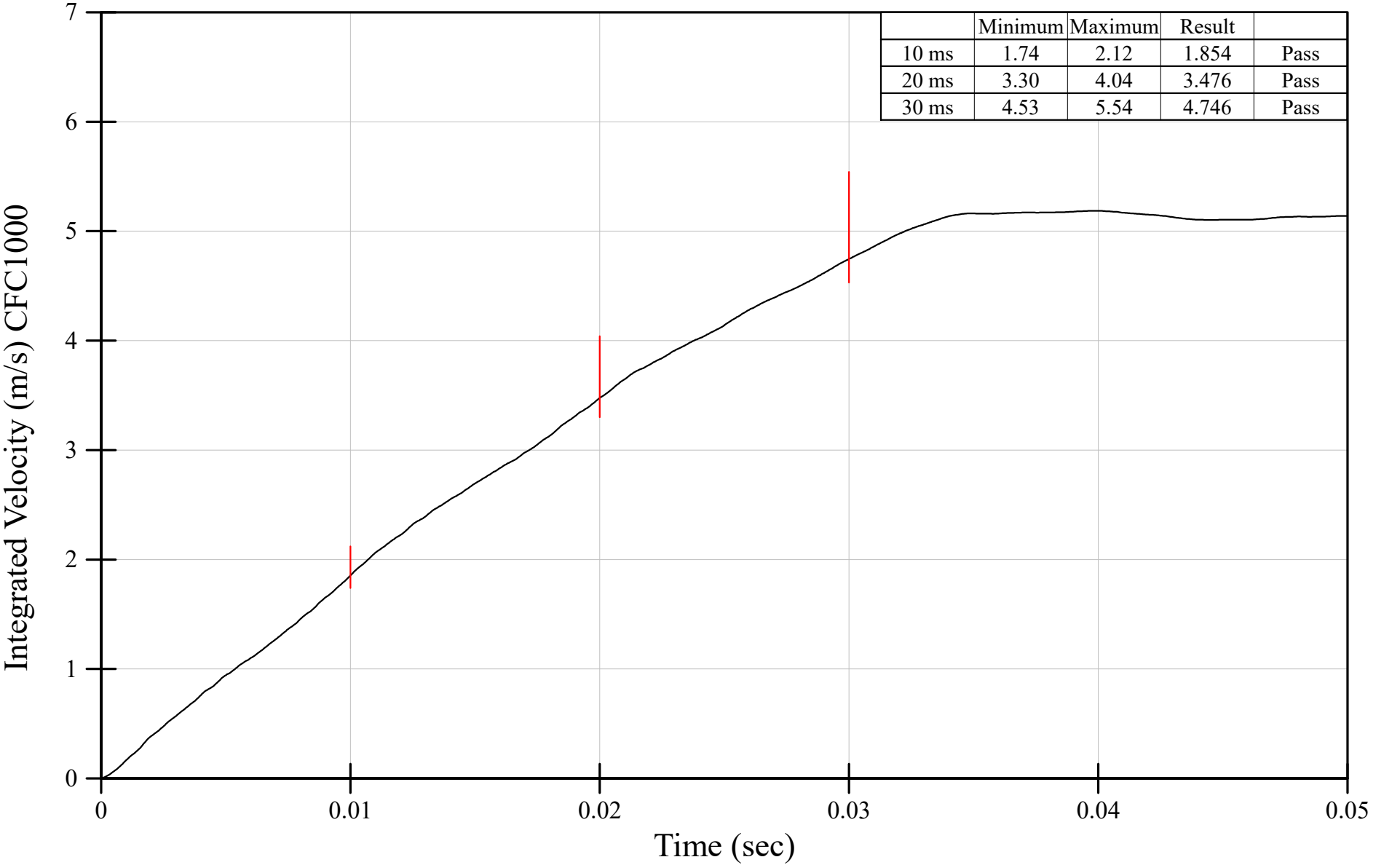
Test Date: 10/23/2024

Test Time: 6:48 AM

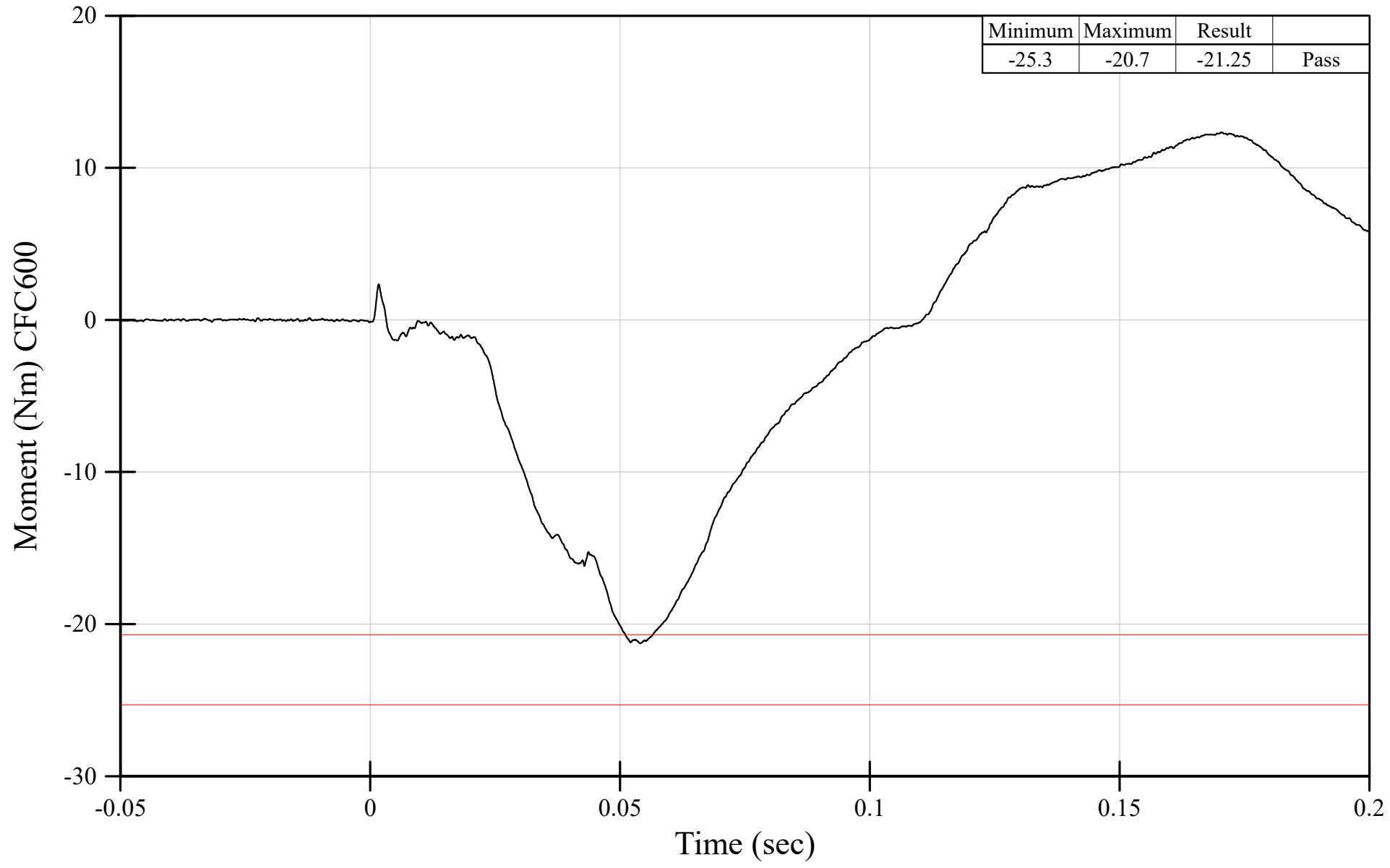
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.95 - 5.05	5.004	Pass
Pendulum Velocity at 10 ms (m/s)	1.74 - 2.12	1.854	Pass
Pendulum Velocity at 20 ms (m/s)	3.30 - 4.04	3.476	Pass
Pendulum Velocity at 30 ms (m/s)	4.53 - 5.54	4.746	Pass
Peak Upper Neck My (Nm)	-25.3 - (-20.7)	-21.25	Pass
Peak Upper Neck Fz (N)	-3210 - (-2626)	-3140.1	Pass
Peak Head Angular Velocity Y (deg/sec)	1855 - 2261	2052.3	Pass
Peak Head Rotation (deg)	58.5 - 71.5	61.91	Pass

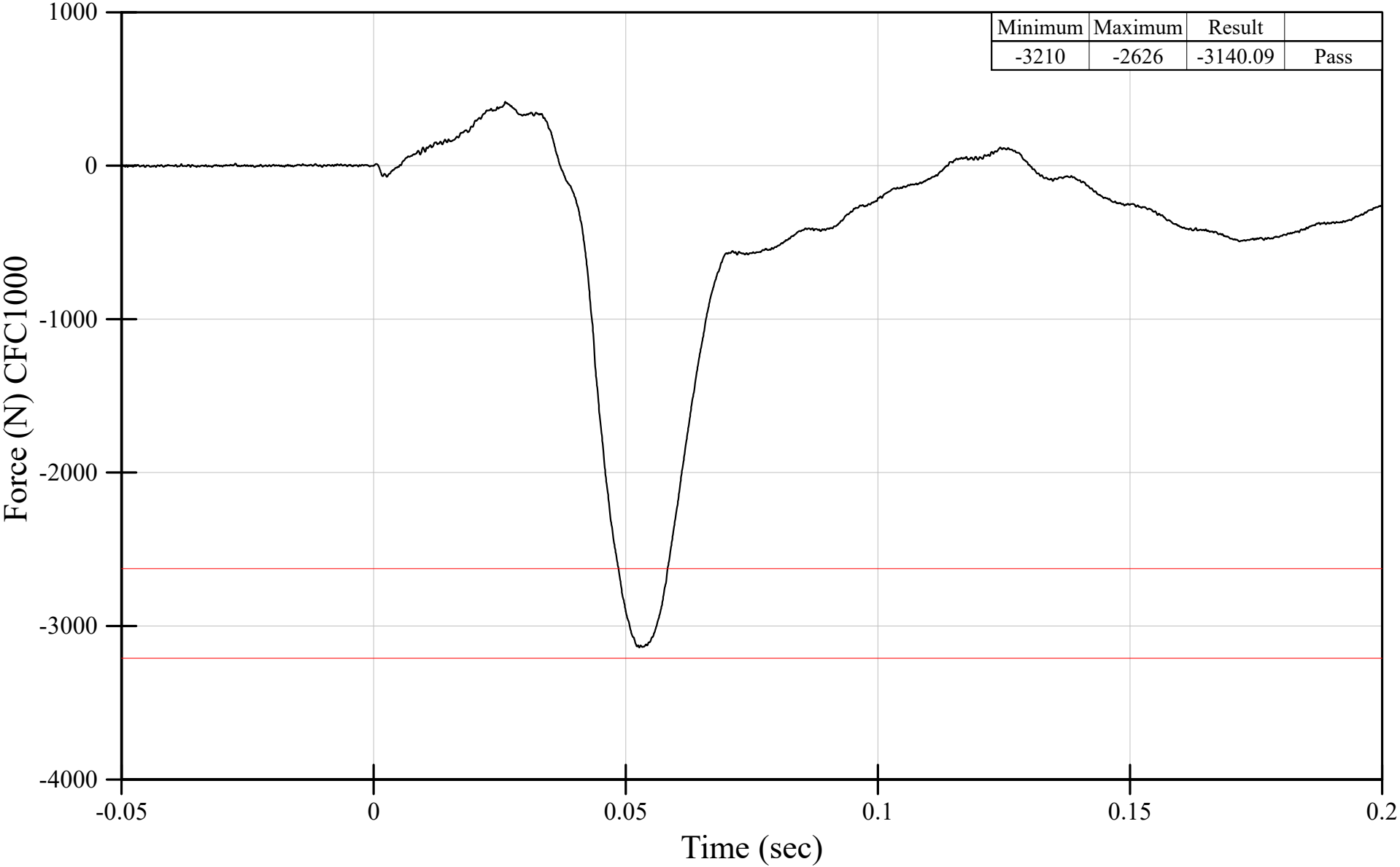
THOR-50M Neck Extension Qualification
Pendulum Velocity
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification
Upper Neck My
Neck Serial Number: EG3956



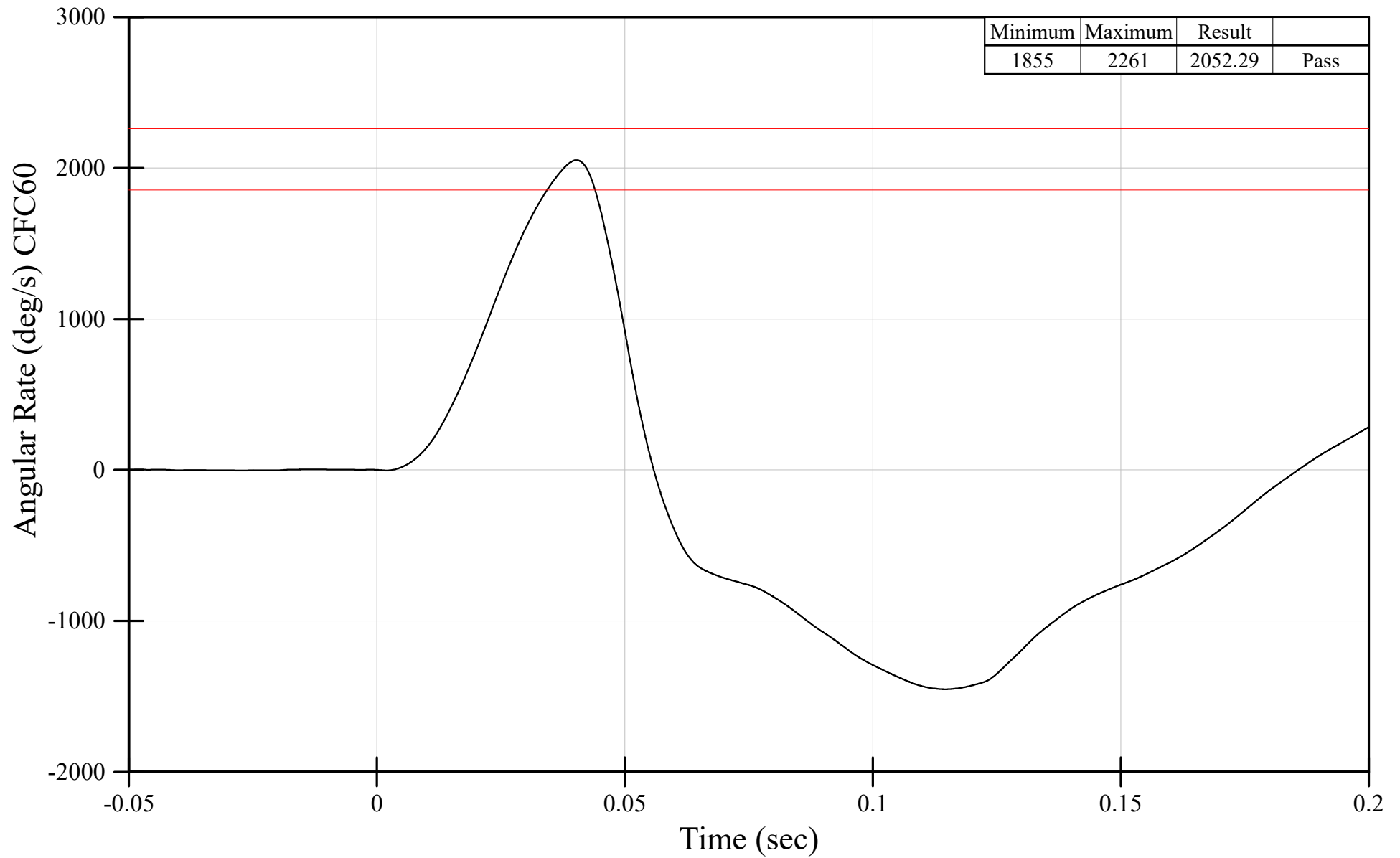
THOR-50M Neck Extension Qualification
Upper Neck Fz
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification

Peak Head Angular Rate

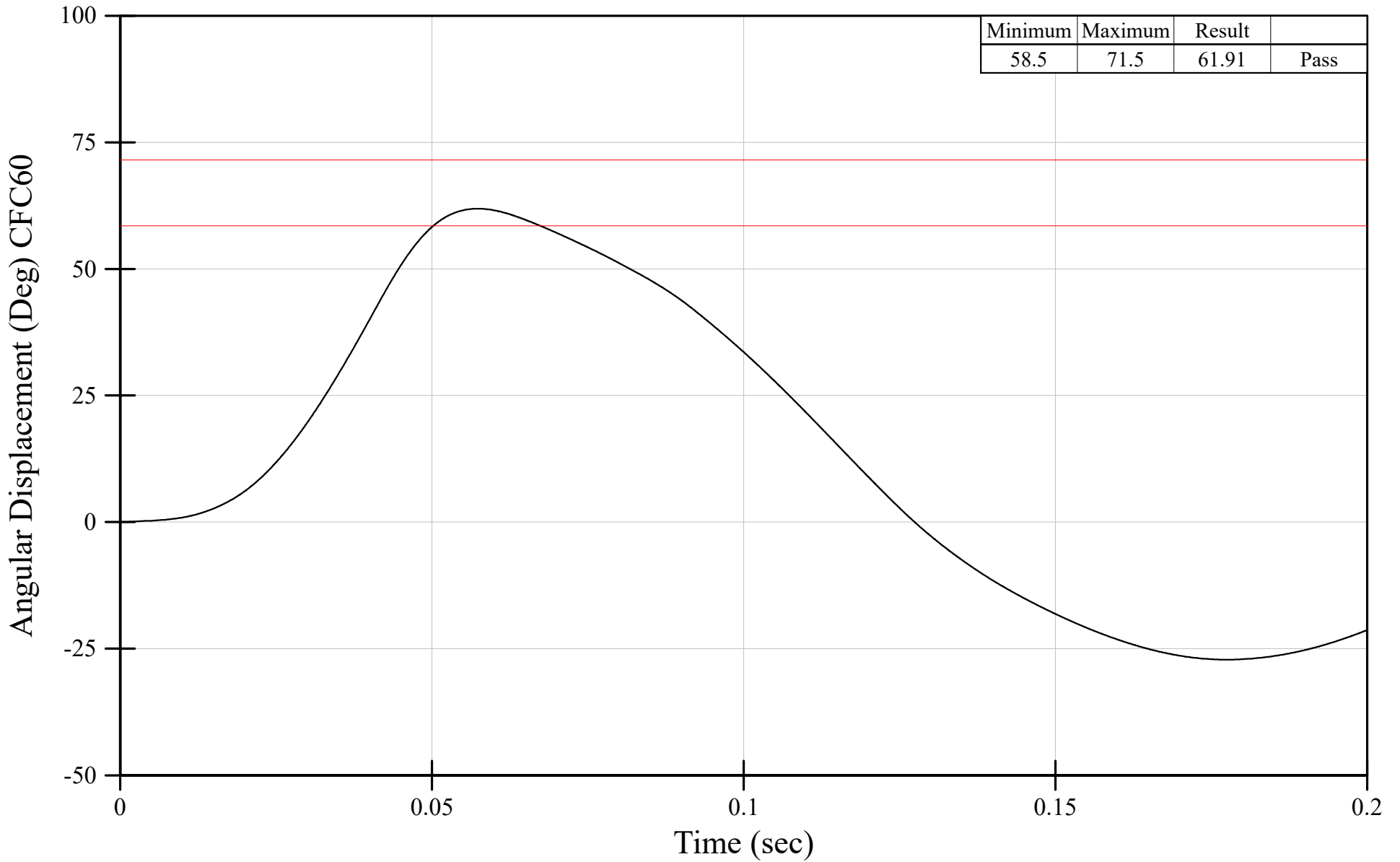
Neck Serial Number: EG3956



THOR-50M Neck Extension Qualification

Neck Rotation

Neck Serial Number: EG3956



THOR-50M Neck Left Lateral Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241023-8

Test Date: 10/23/2024

Test Time: 8:51 AM

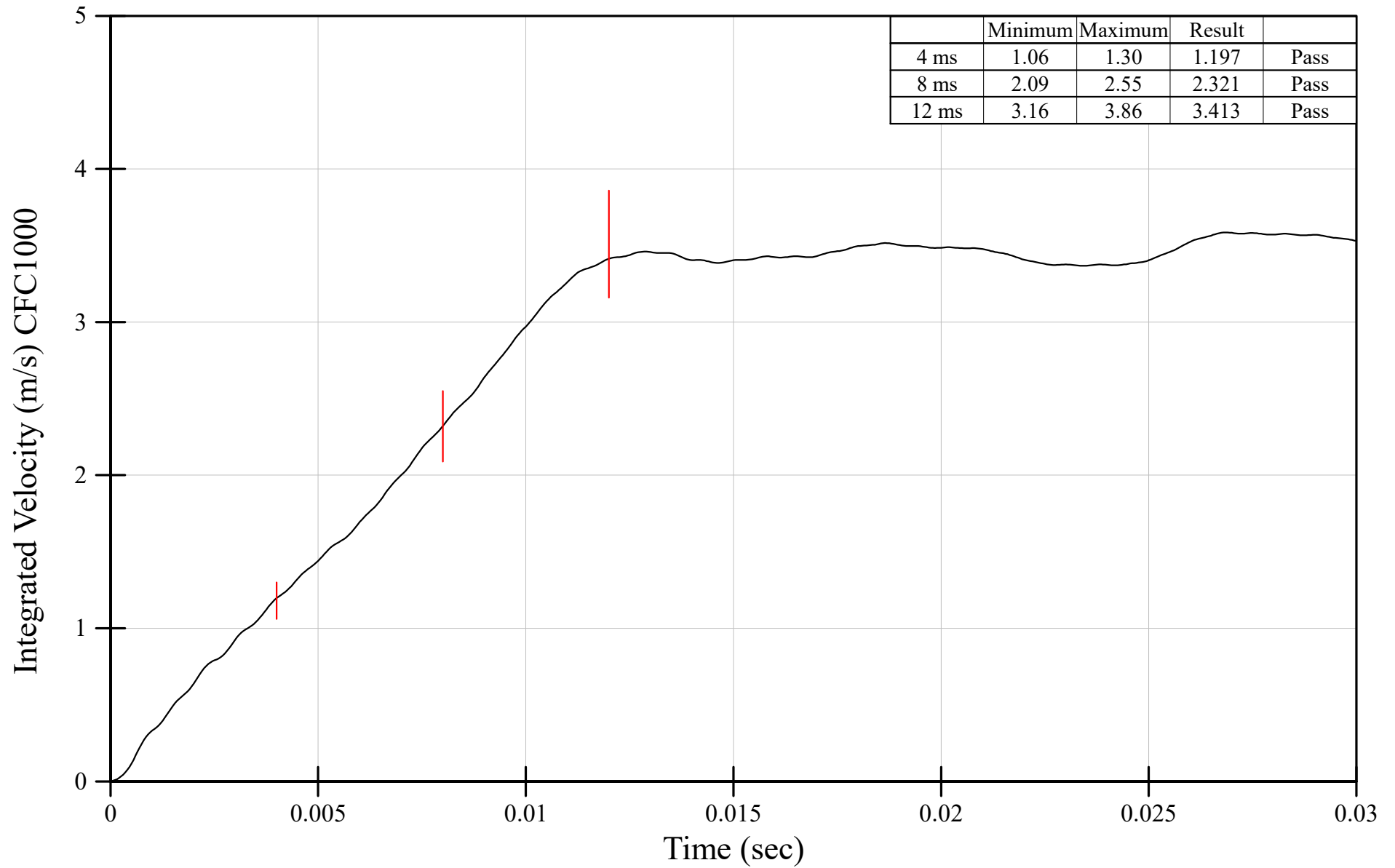
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	52	Pass
Test Velocity (m/s)	3.35 - 3.45	3.393	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.197	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.321	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.413	Pass
Peak Upper Neck Mx after 40 ms (N)	44.8 - 54.7	49.81	Pass
Peak Head Angular Velocity X (deg/sec)	-1498 - (-1226)	-1284.9	Pass
Peak Head Rotation (deg)	-45.9 - (-37.6)	-37.85	Pass

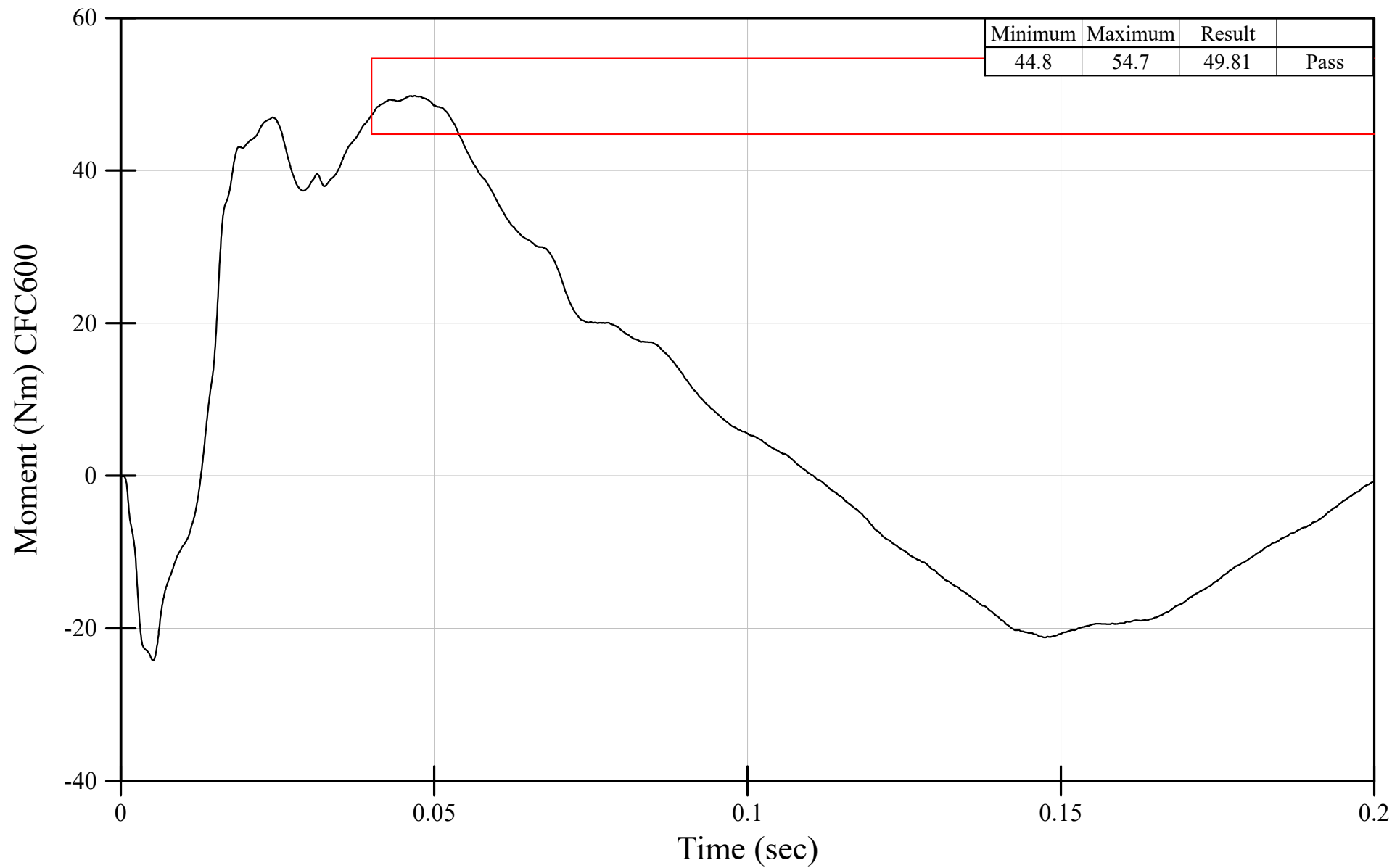
THOR-50M Neck Left Lateral Qualification

Pendulum Velocity

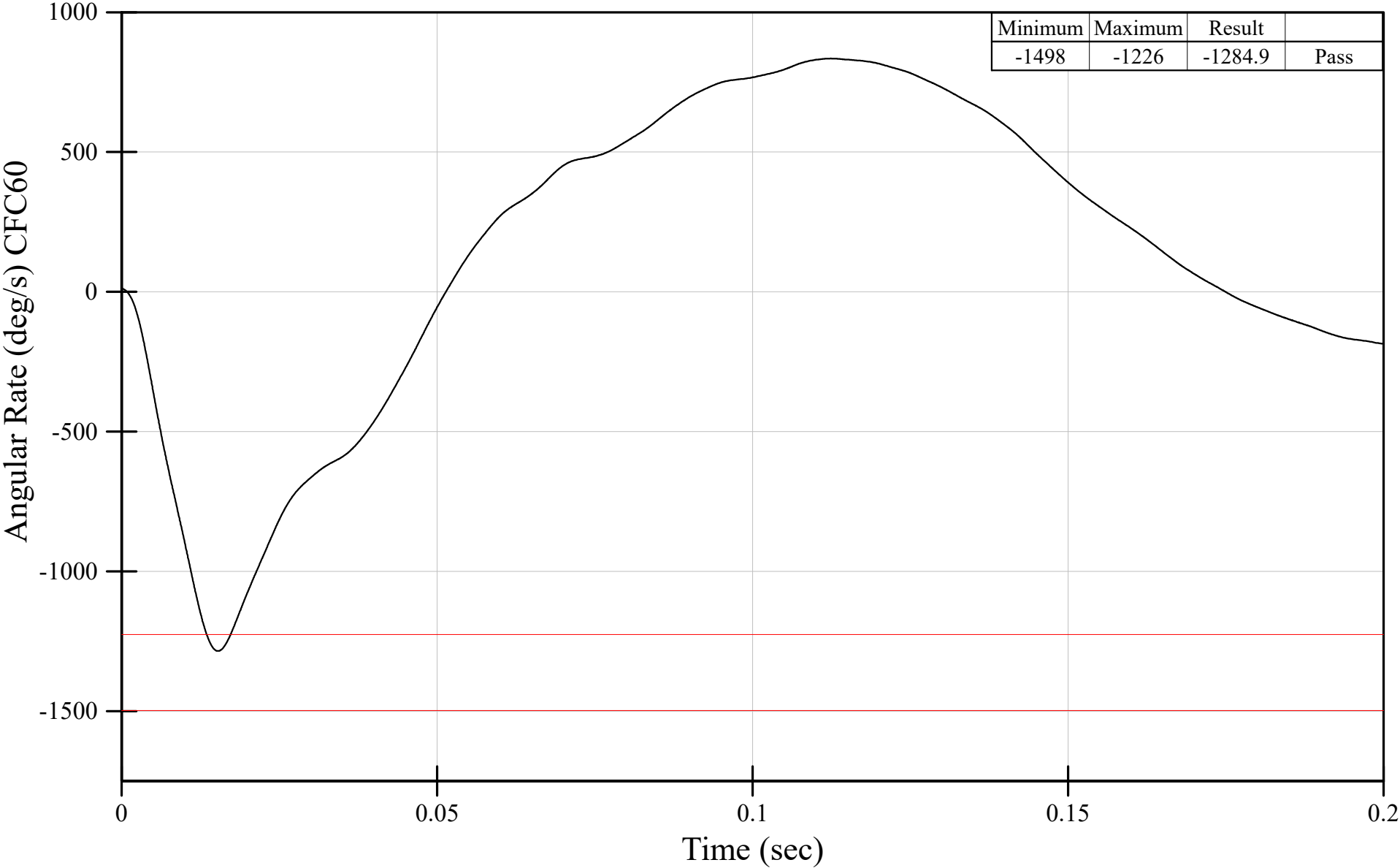
Serial Number: EG3956



THOR-50M Neck Left Lateral Qualification
Upper Neck Mx
Serial Number: EG3956



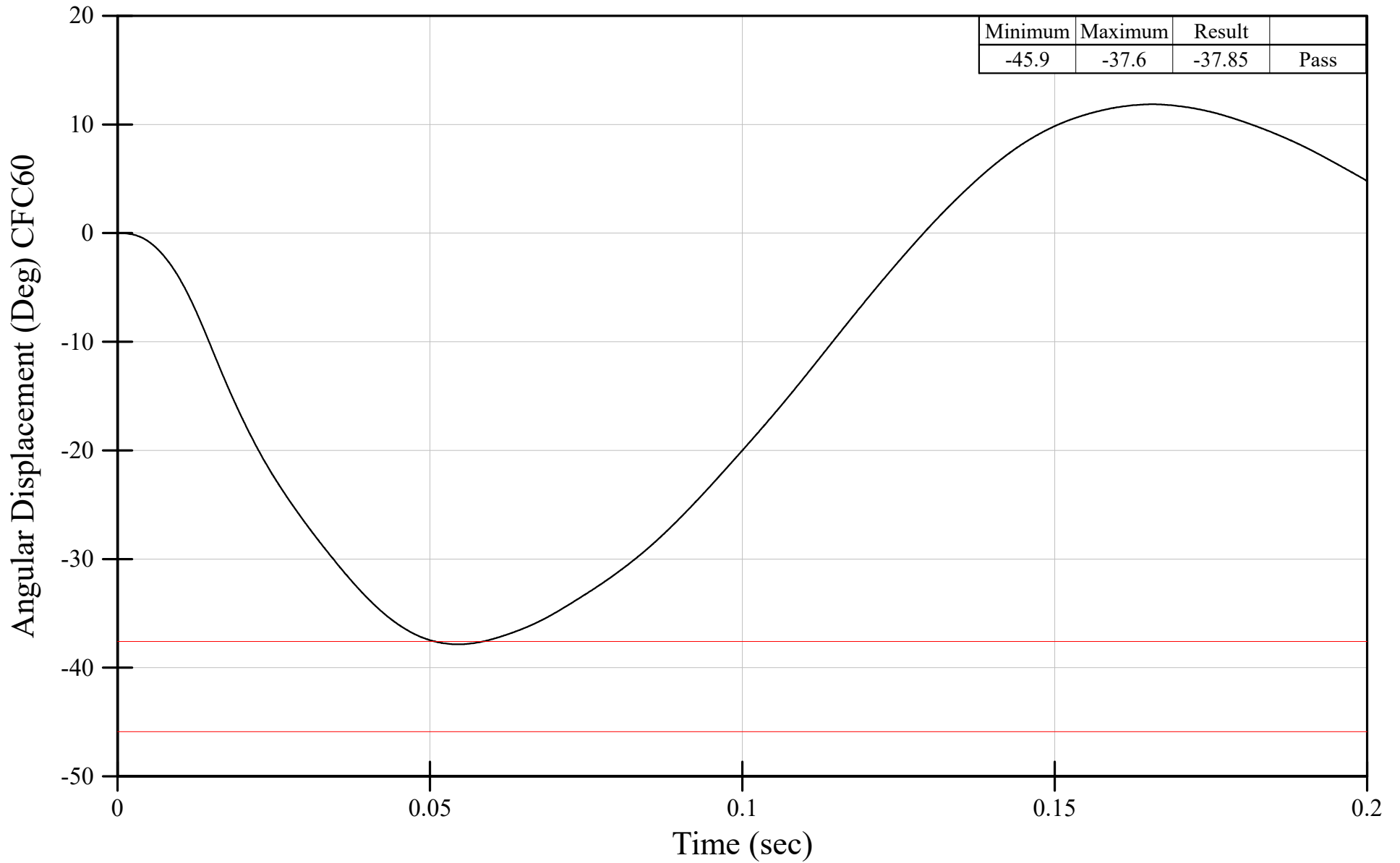
THOR-50M Neck Left Lateral Qualification
Peak Angular Rate
Serial Number: EG3956



THOR-50M Neck Left Lateral Qualification

Neck Rotation

Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Neck Serial Number: EG3956

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241023-7

Test Date: 10/23/2024

Test Time: 8:01 AM

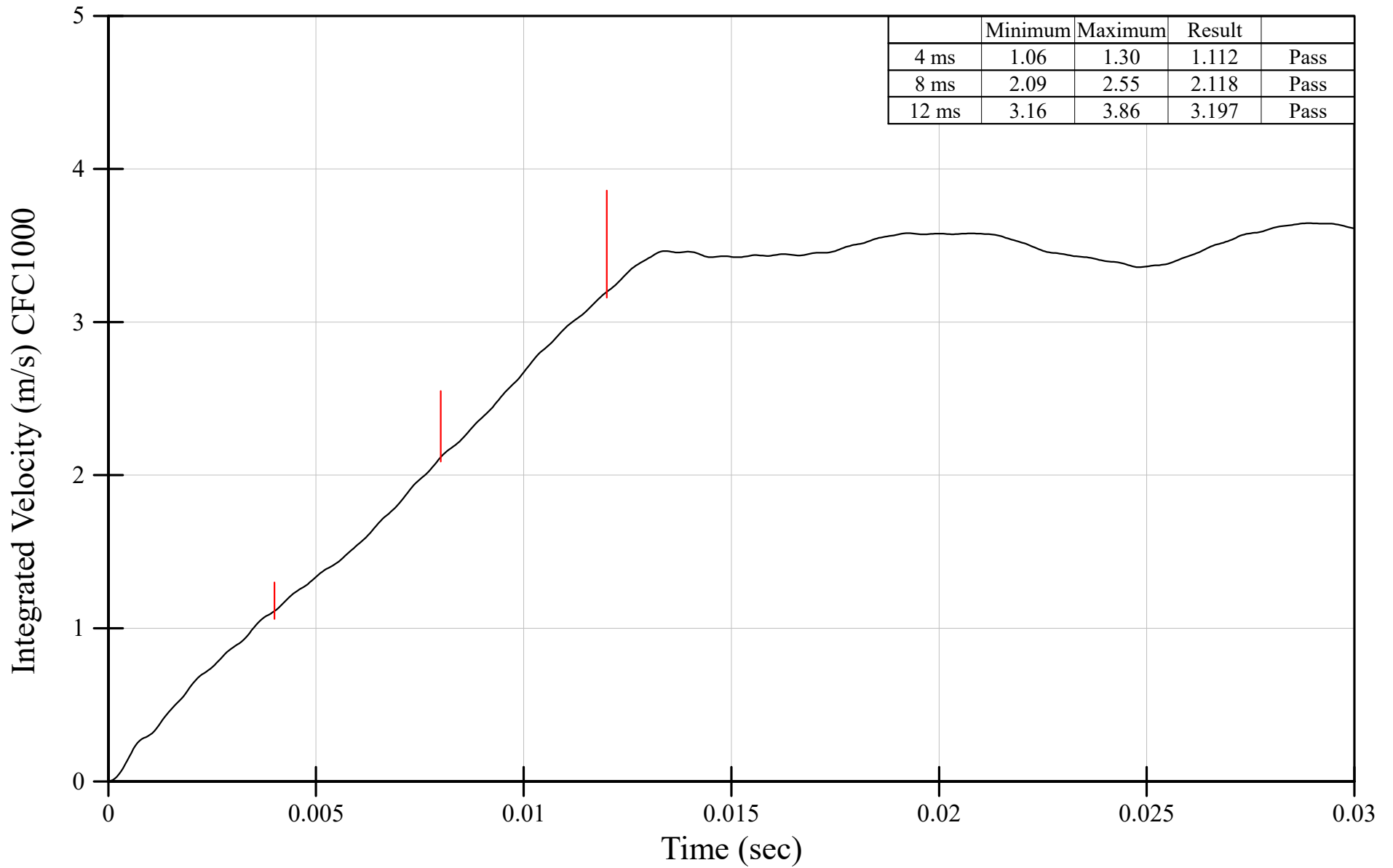
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	48	Pass
Test Velocity (m/s)	3.35 - 3.45	3.412	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.112	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.118	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.197	Pass
Peak Upper Neck Mx after 40 ms (N)	-54.7 - (-44.8)	-50.40	Pass
Peak Head Angular Velocity X (deg/sec)	1226 - 1498	1236.2	Pass
Peak Head Rotation (deg)	37.6 - 45.9	38.07	Pass

THOR-50M Neck Right Lateral Qualification

Pendulum Velocity

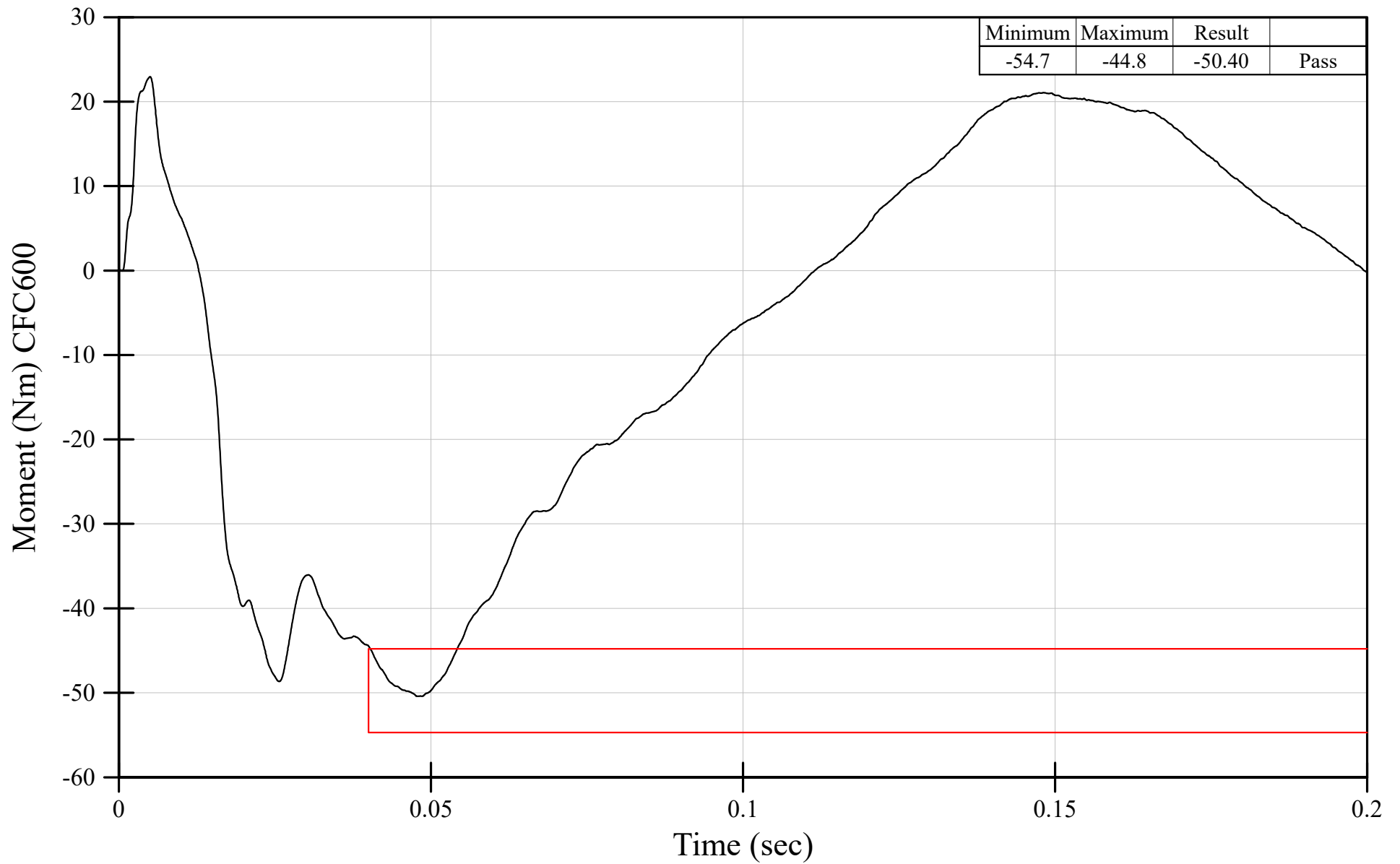
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Upper Neck Mx

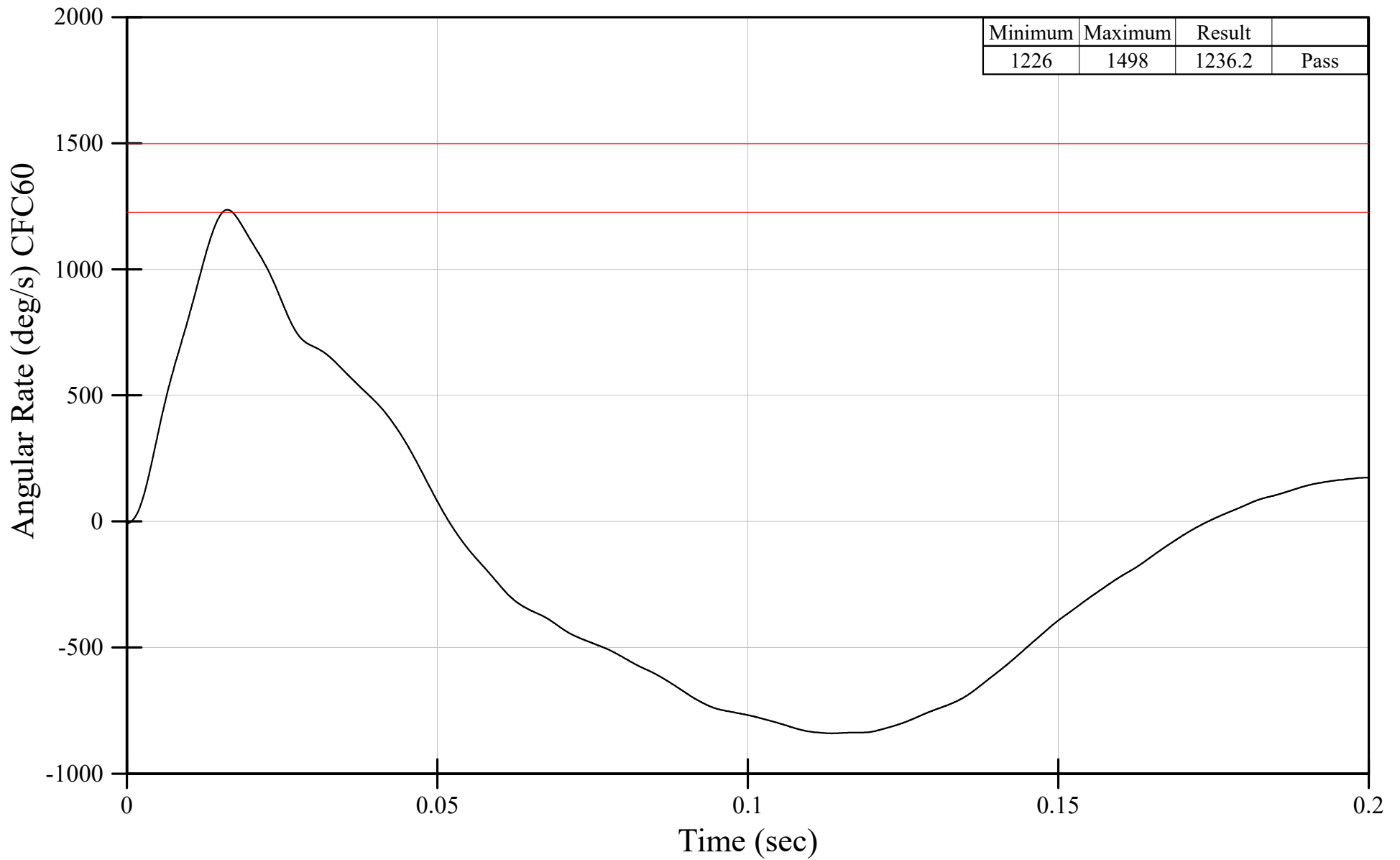
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Peak Angular Rate

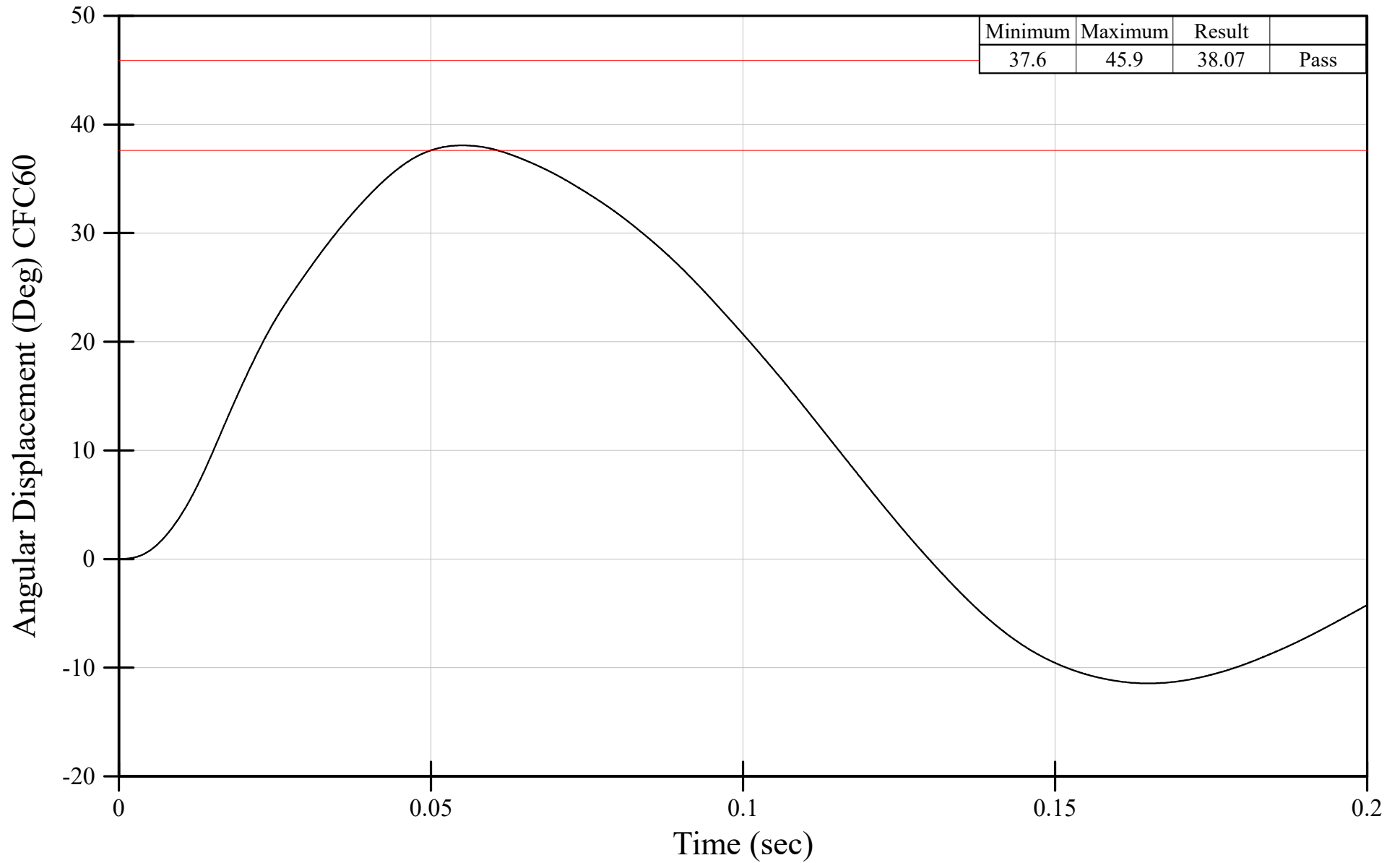
Serial Number: EG3956



THOR-50M Neck Right Lateral Qualification

Neck Rotation

Serial Number: EG3956



THOR-50M Upper Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898
Rib 2 Serial Number: EF8143
Rib 3 Serial Number: EF8418
Rib 4 Serial Number: EF9464

Rib 5 Serial Number: EF9496
Rib 6 Serial Number: EF9497
Rib 7 Serial Number: EF8423

Test ID: 241024-2
Test Date: 10/24/2024
Test Time: 10:34 AM

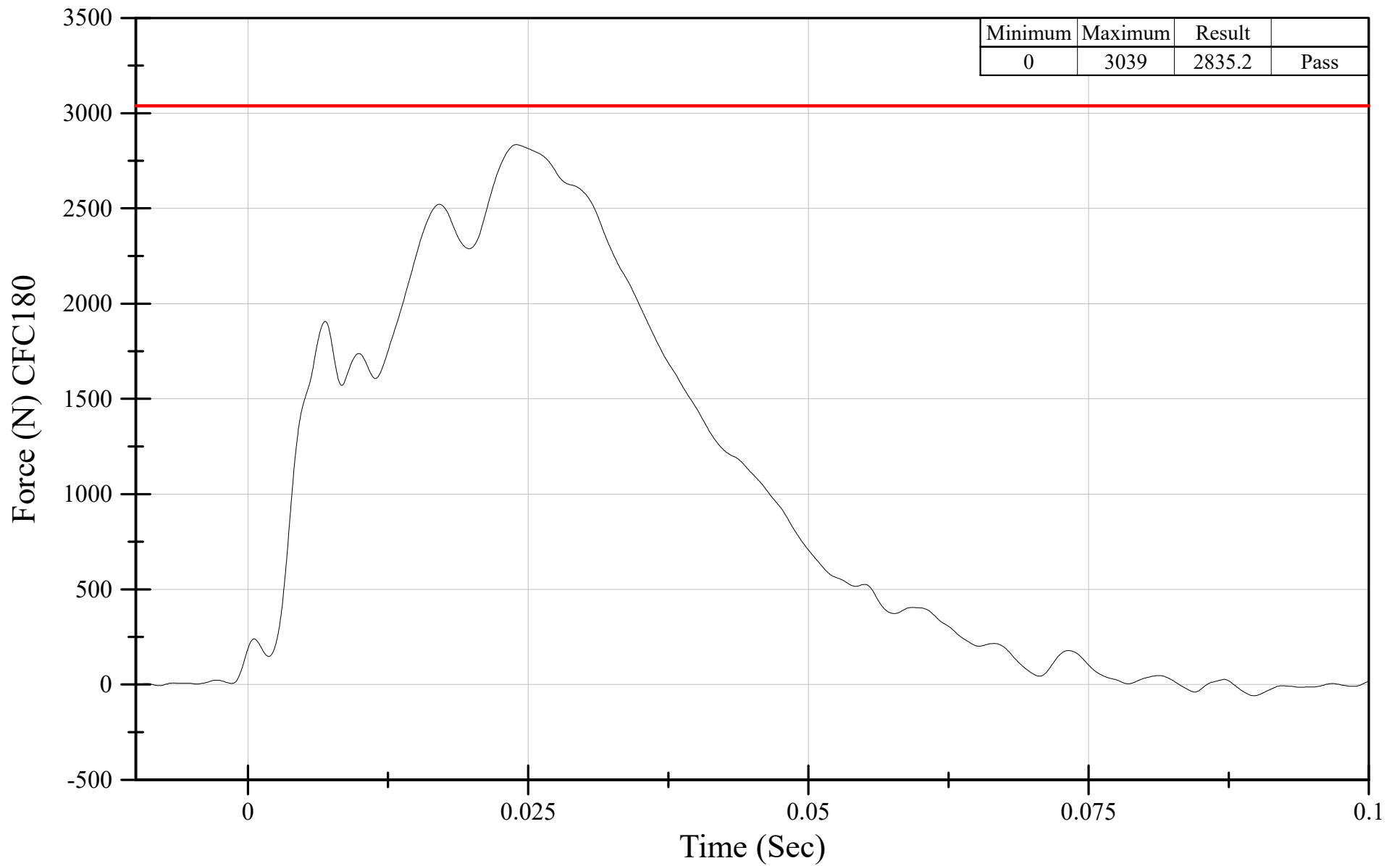
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	52	Pass
Test Velocity (m/s)	4.25 - 4.35	4.305	Pass
Peak Probe Force (N)	less than 3039	2835.2	Pass
Peak Upper Left Resultant Deflection (mm)	48.3 - 59.0	52.86	Pass
Peak Upper Right Resultant Deflection (mm)	48.3 - 59.0	52.28	Pass
Difference Between Peak Left & Right Resultant Deflections (mm)	less than 5.0	0.58	Pass
Force at Left Peak Resultant Deflection (N)	2409 - 2944	2783.0	Pass
Force at Right Peak Resultant Deflection (N)	2409 - 2944	2800.4	Pass

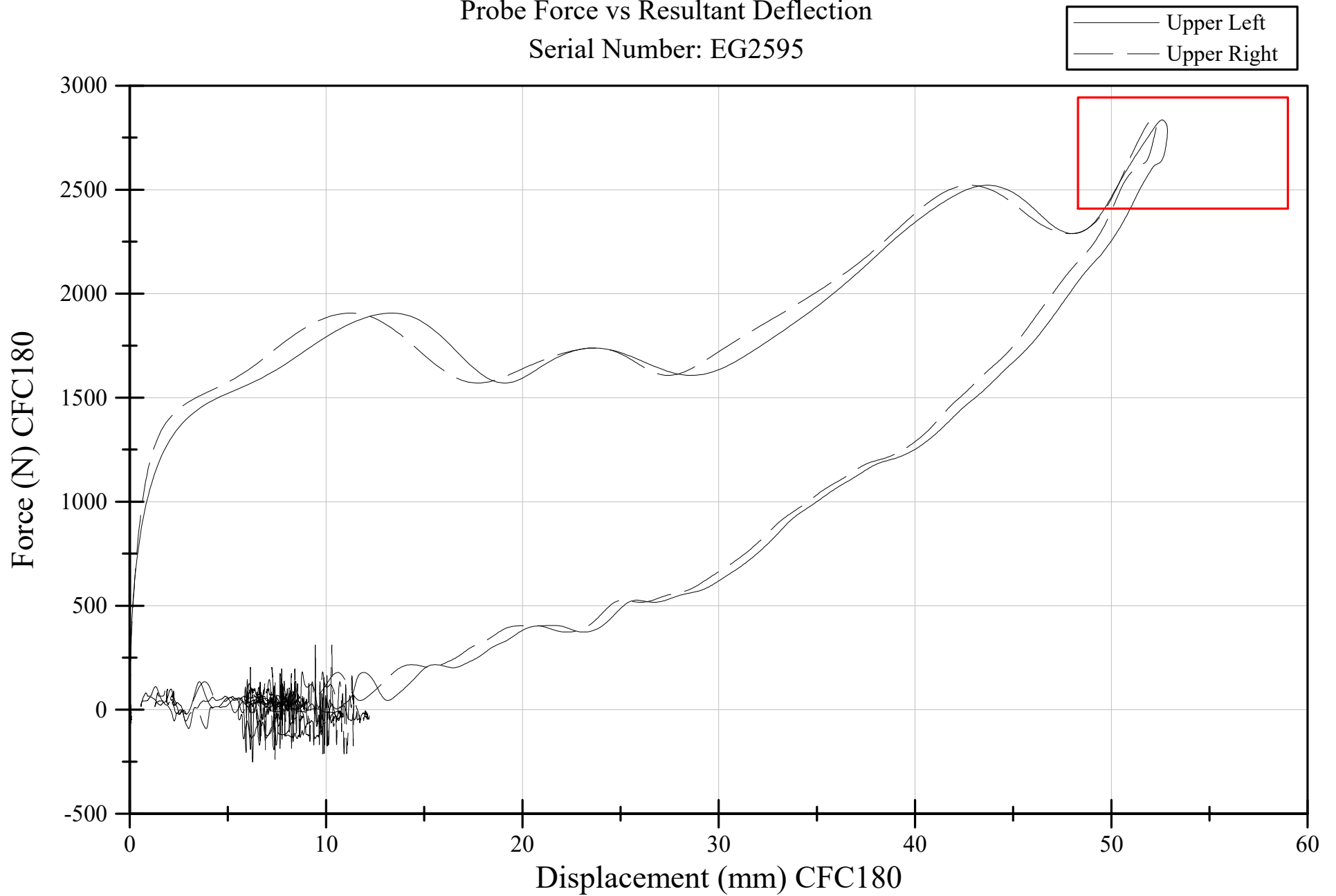
THOR-50M Upper Thorax Qualification

Probe Force

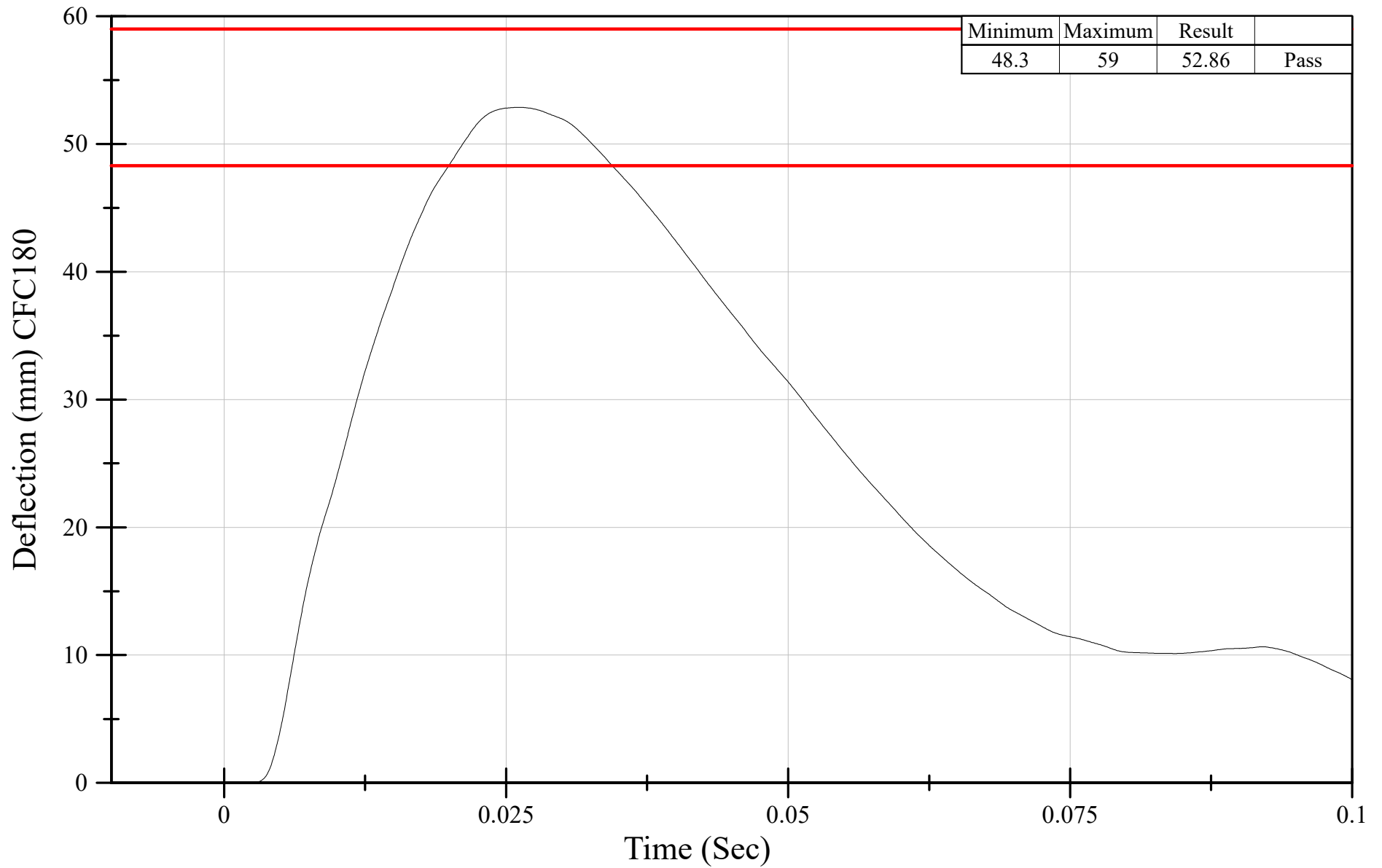
Serial Number: EG2595



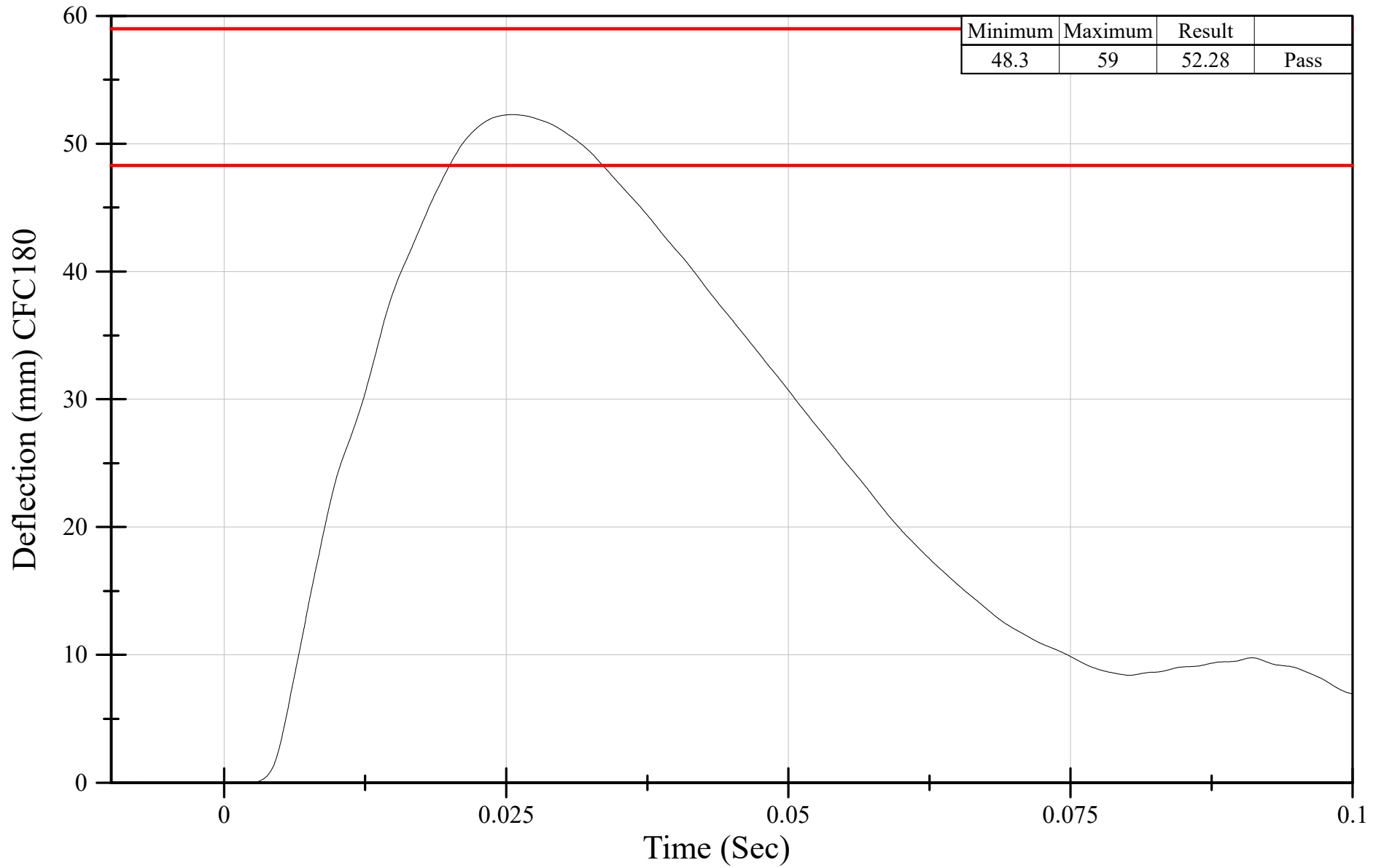
THOR-50M Upper Thorax Qualification
Probe Force vs Resultant Deflection
Serial Number: EG2595



THOR-50M Upper Thorax Qualification
Left Resultant Deflection
Serial Number: EG2595



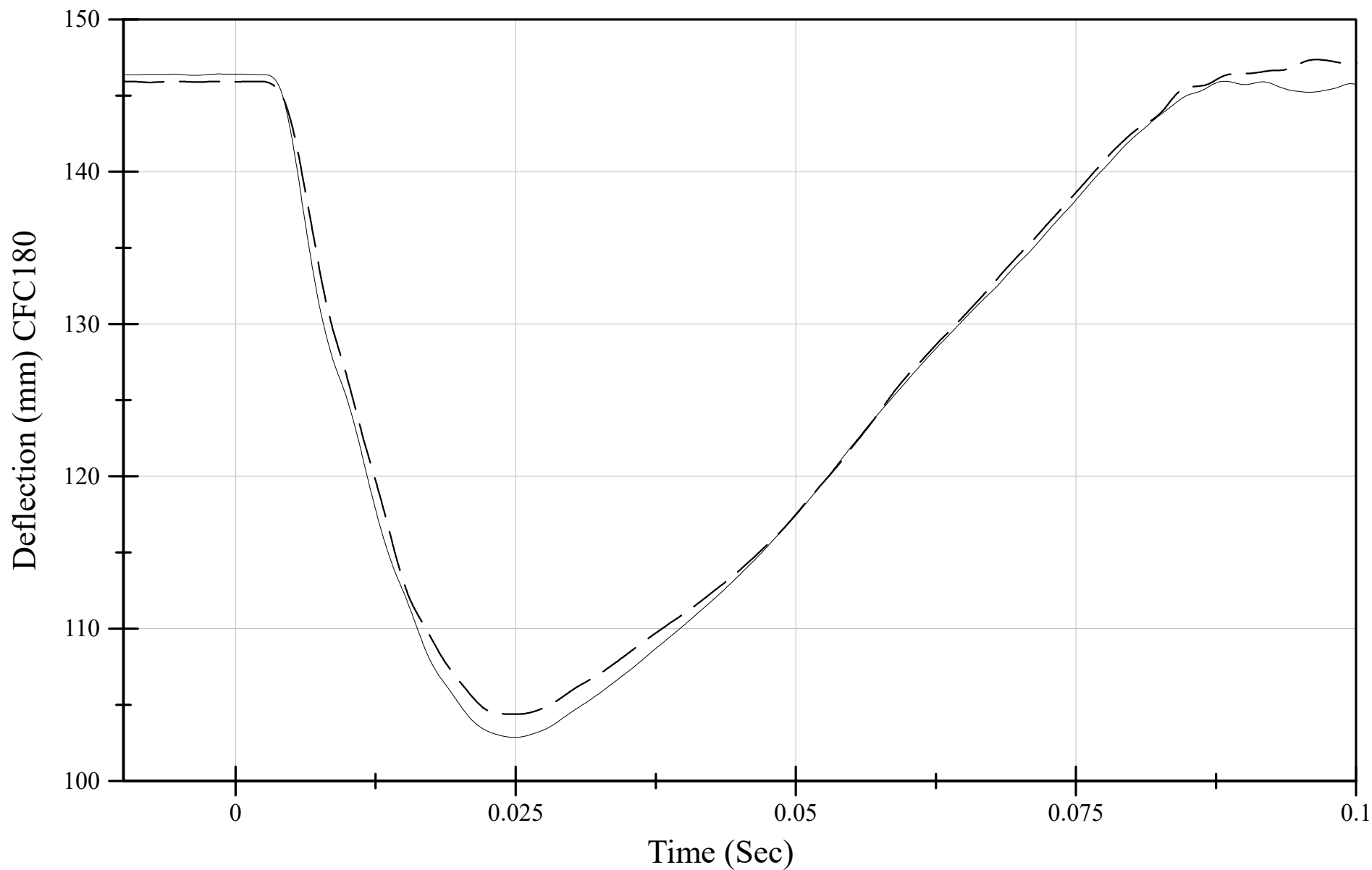
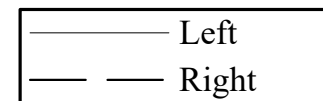
THOR-50M Upper Thorax Qualification
Right Resultant Deflection
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

X-Deflection

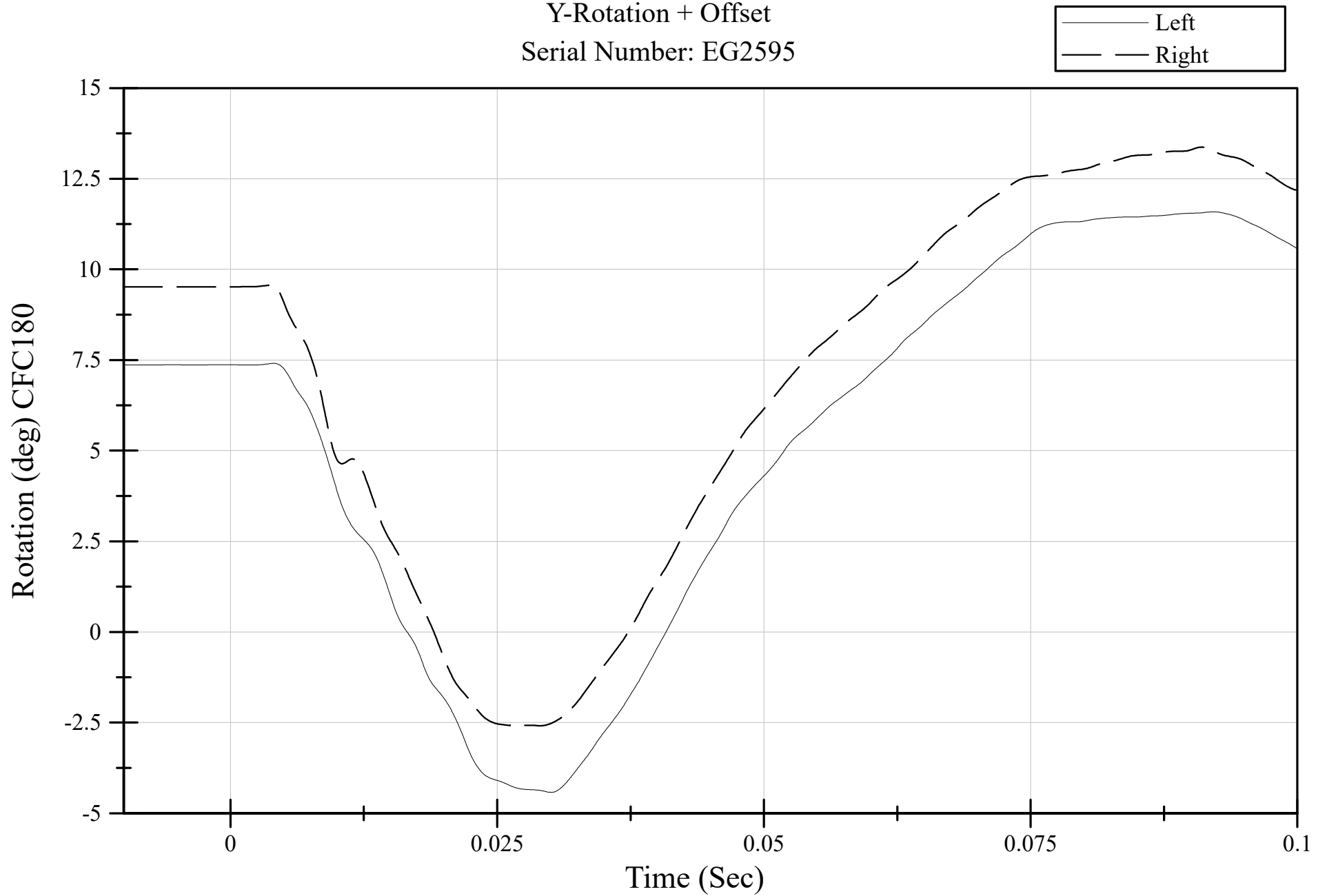
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

Y-Rotation + Offset

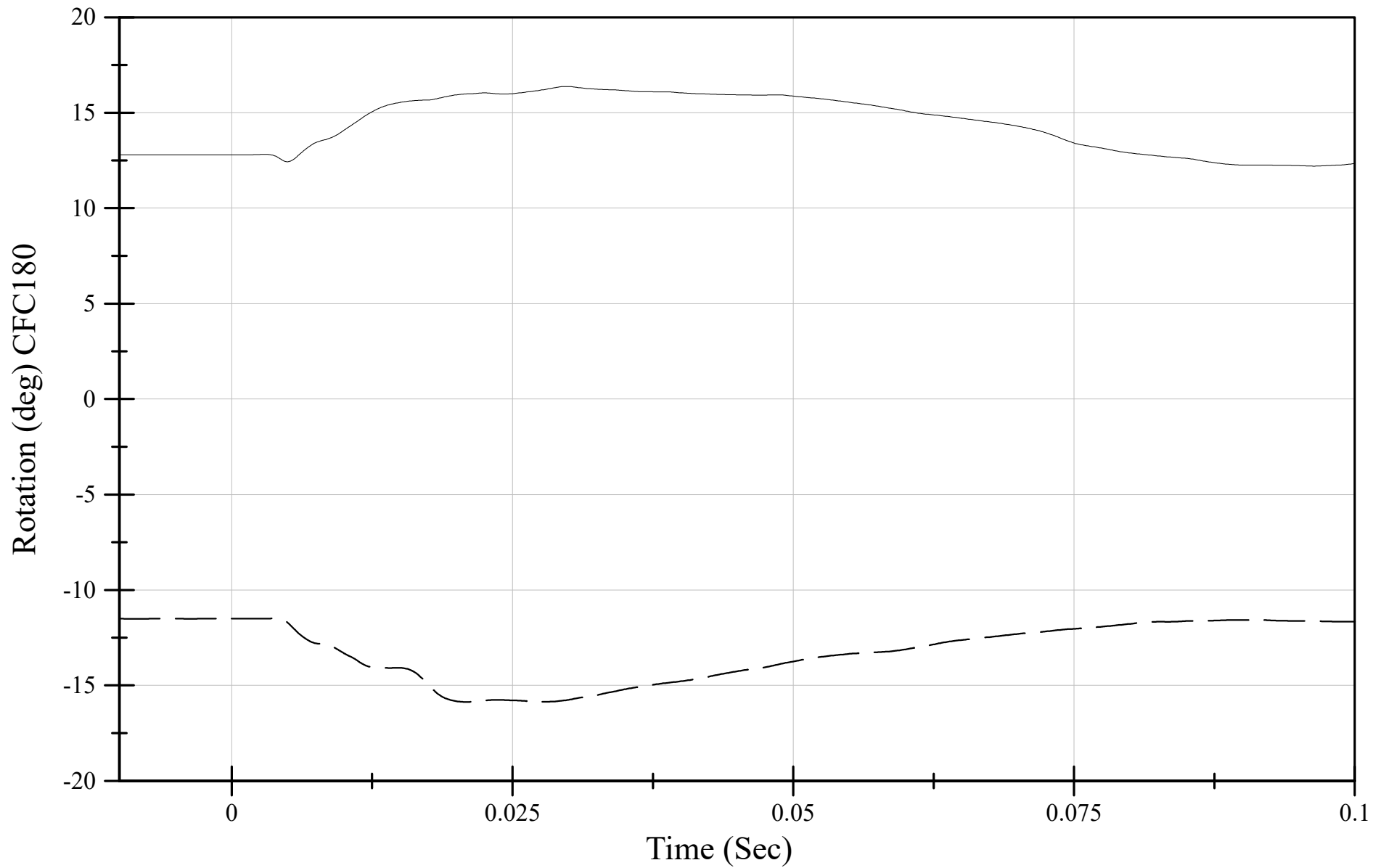
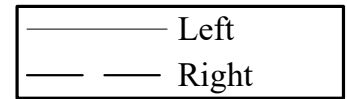
Serial Number: EG2595



THOR-50M Upper Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898
Rib 2 Serial Number: EF8143
Rib 3 Serial Number: EF8418
Rib 4 Serial Number: EF9464

Rib 5 Serial Number: EF9496
Rib 6 Serial Number: EF9497
Rib 7 Serial Number: EF8423

Test ID: 241024-3
Test Date: 10/24/2024
Test Time: 11:17 AM

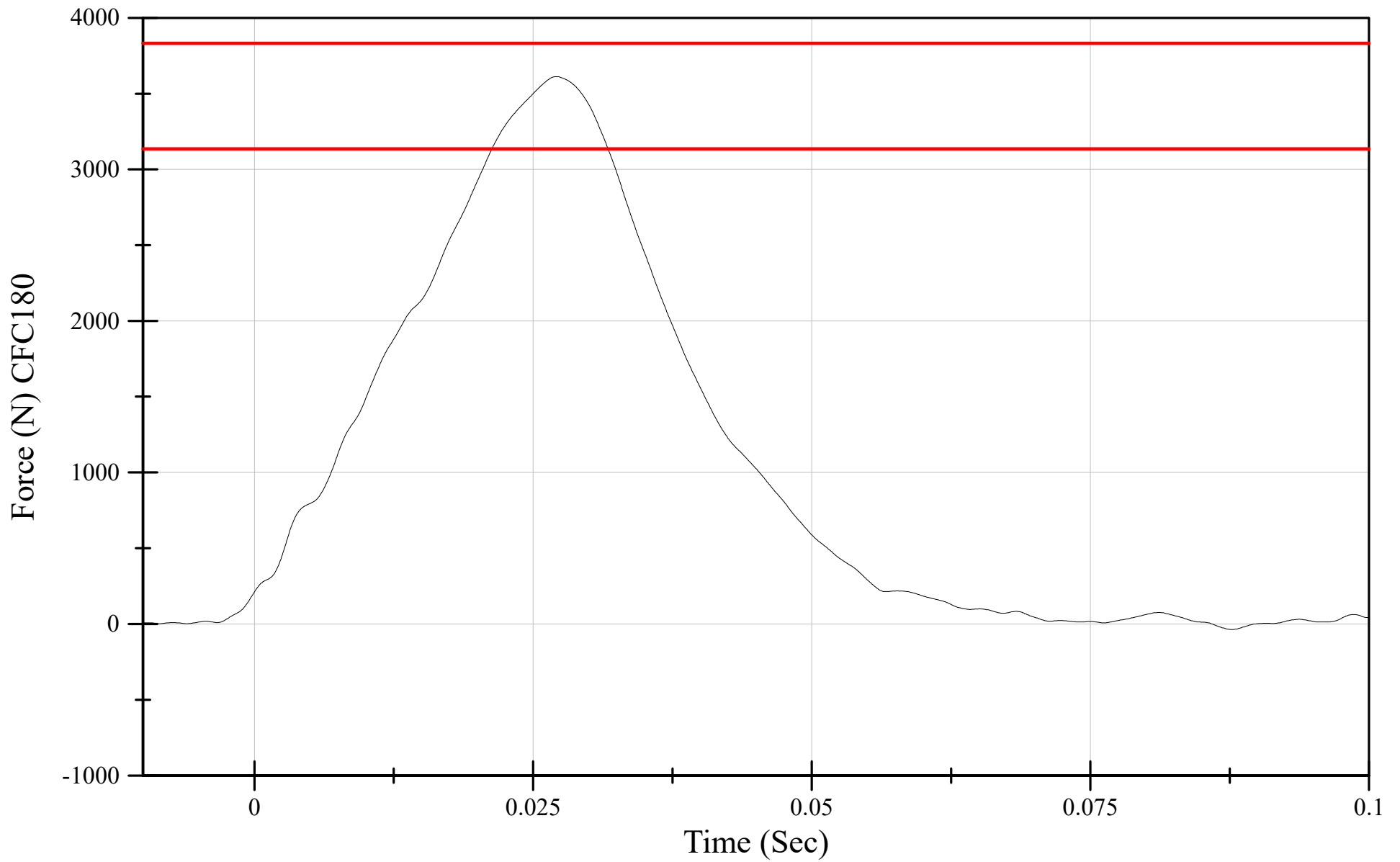
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.25 - 4.35	4.310	Pass
Peak Probe Force (N)	3136 - 3832	3612.7	Pass
Left Resultant Deflection at Peak Force (mm)	45.8 - 56.0	51.45	Pass

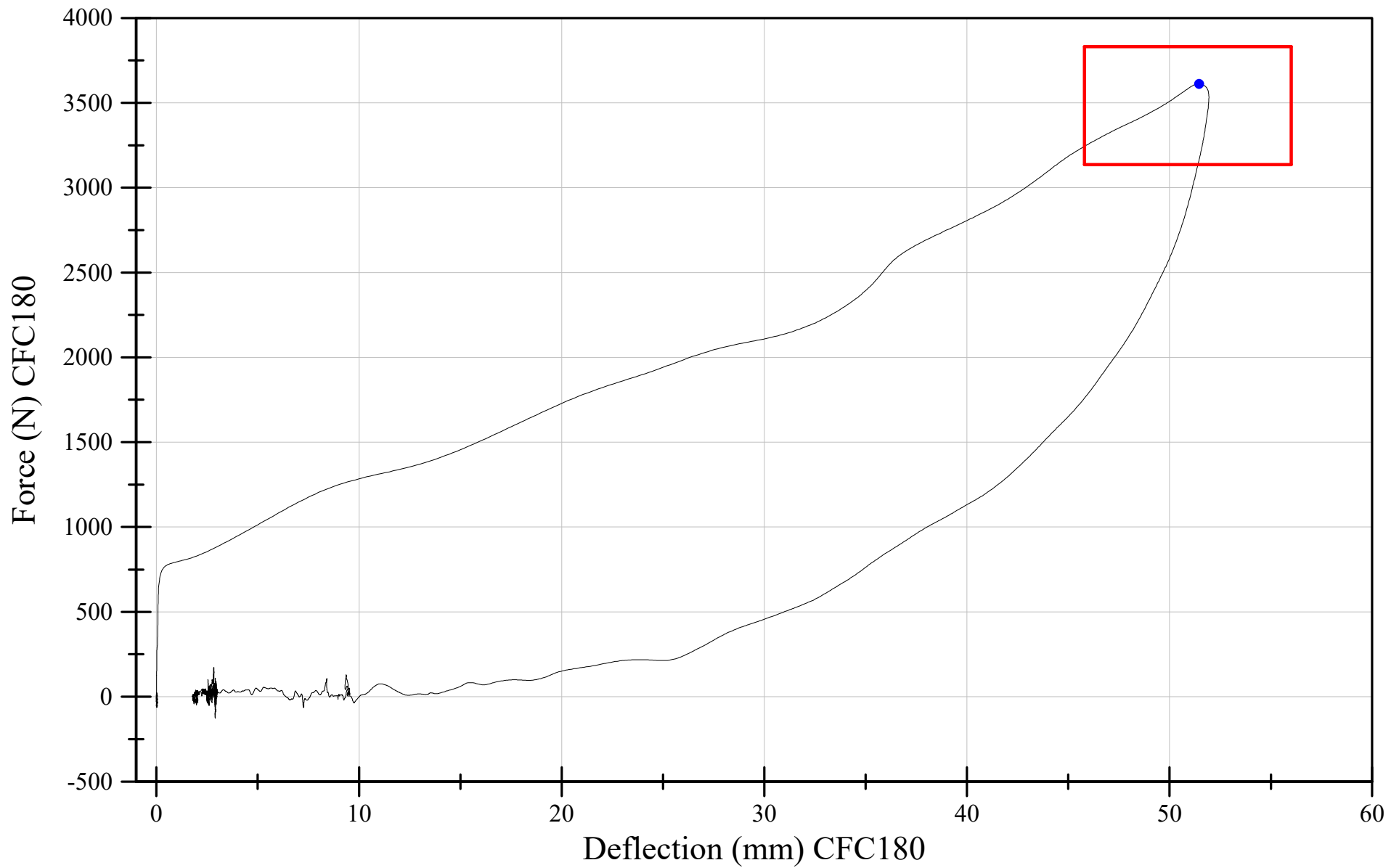
THOR-50M Left Lower Thorax Qualification

Probe Force

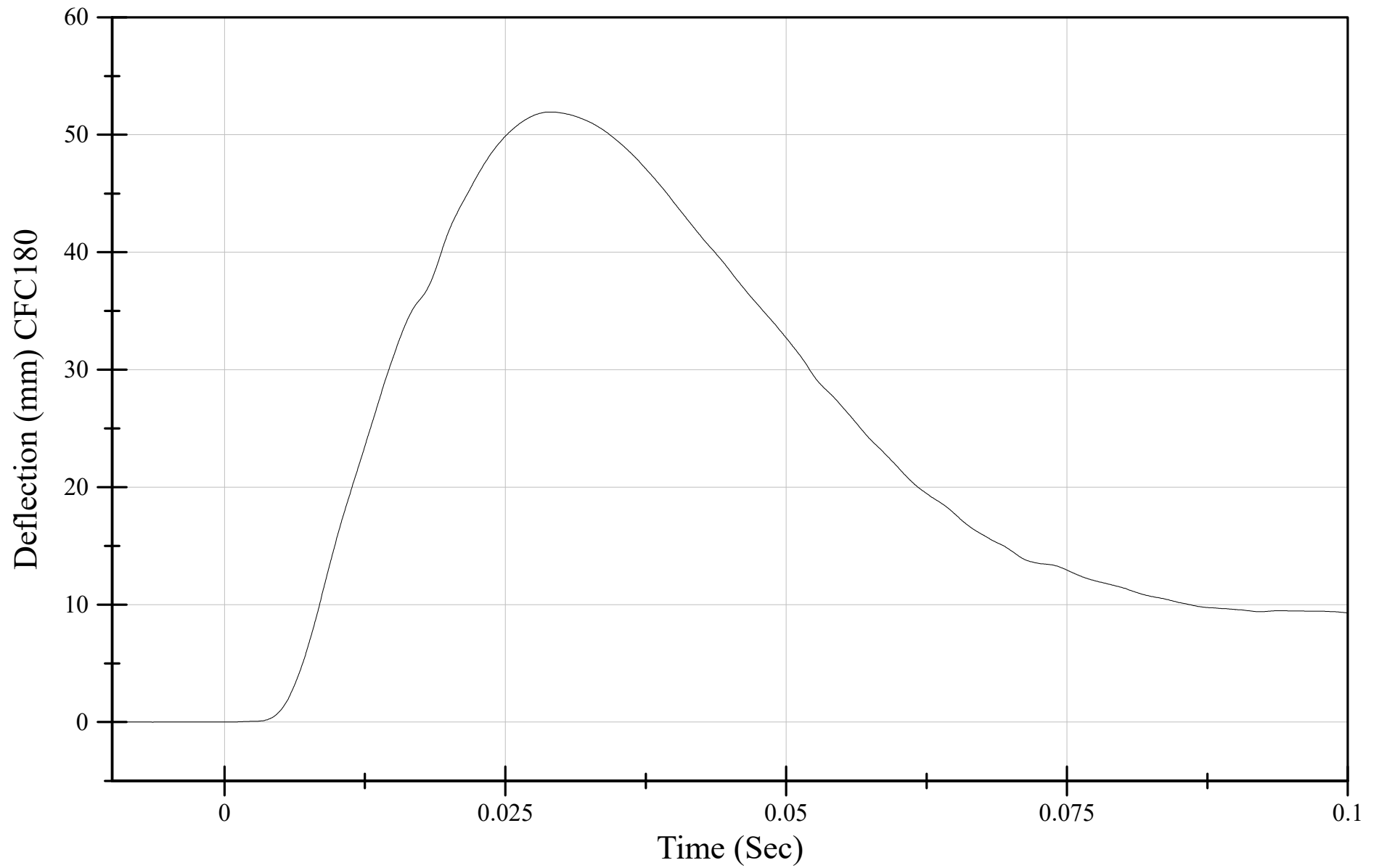
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification
Probe Force vs Left Resultant Deflection
Serial Number: EG2595



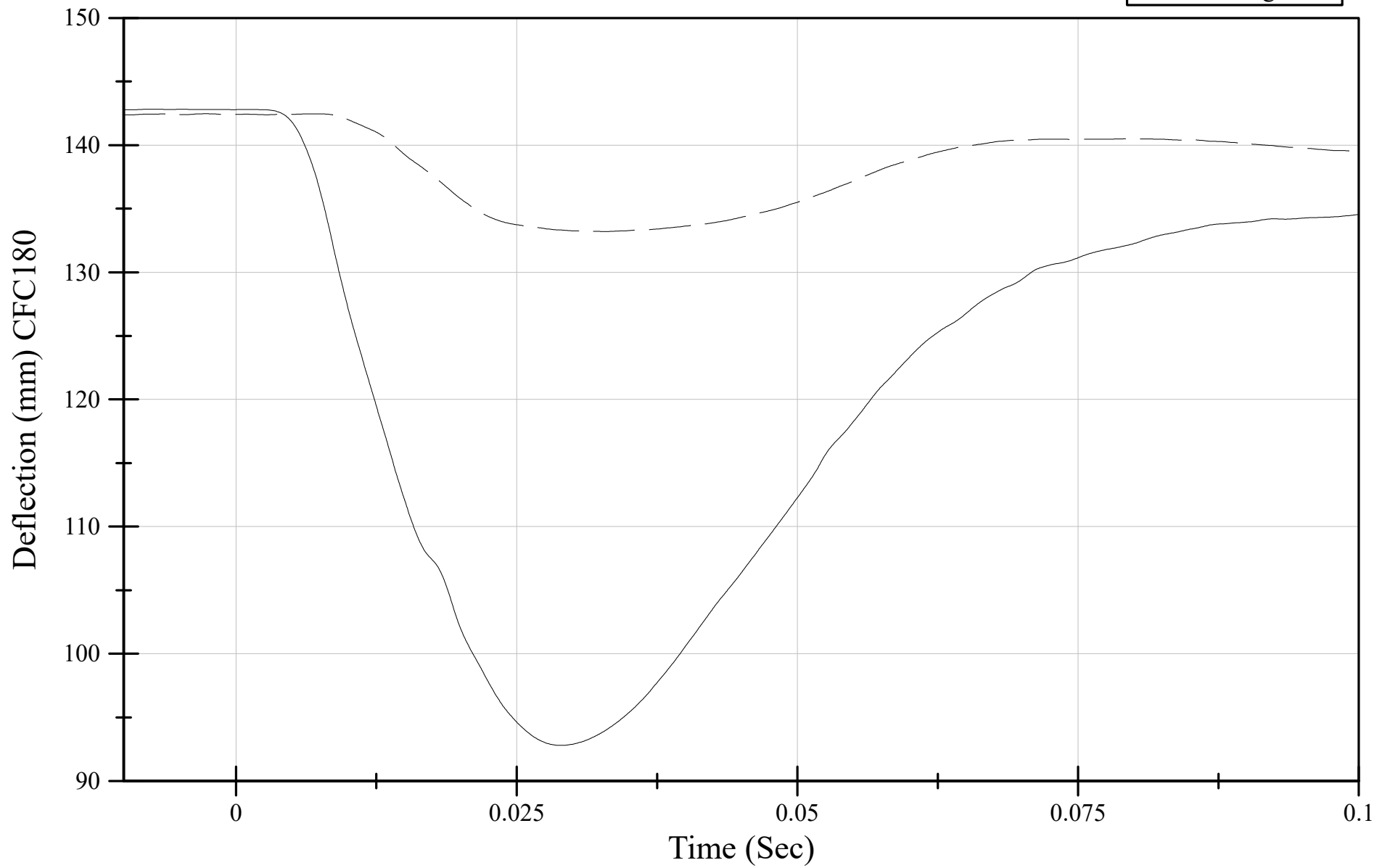
THOR-50M Left Lower Thorax Qualification
Left Resultant Deflection
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

X-Deflection

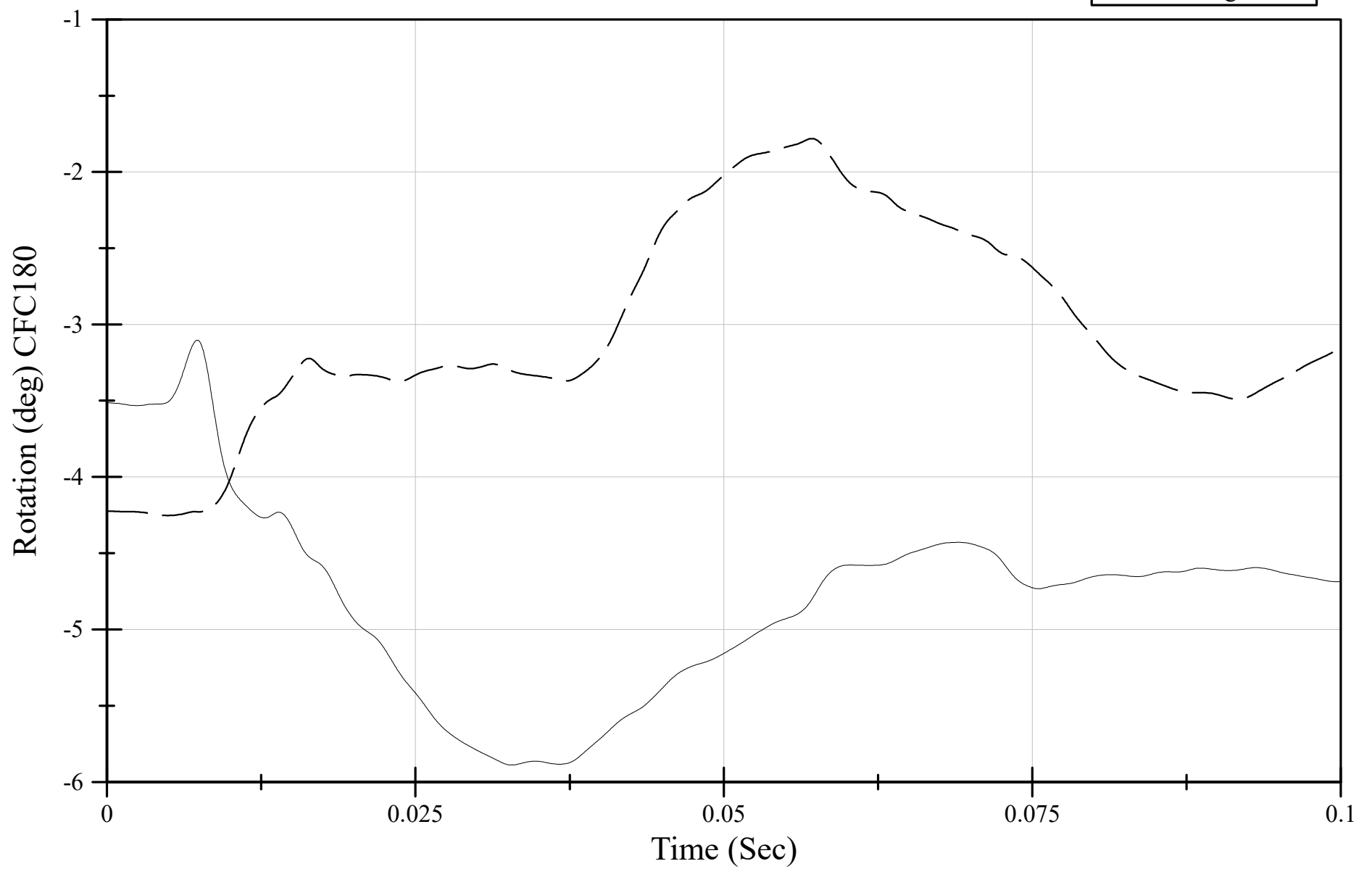
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Y-Rotation + Offset

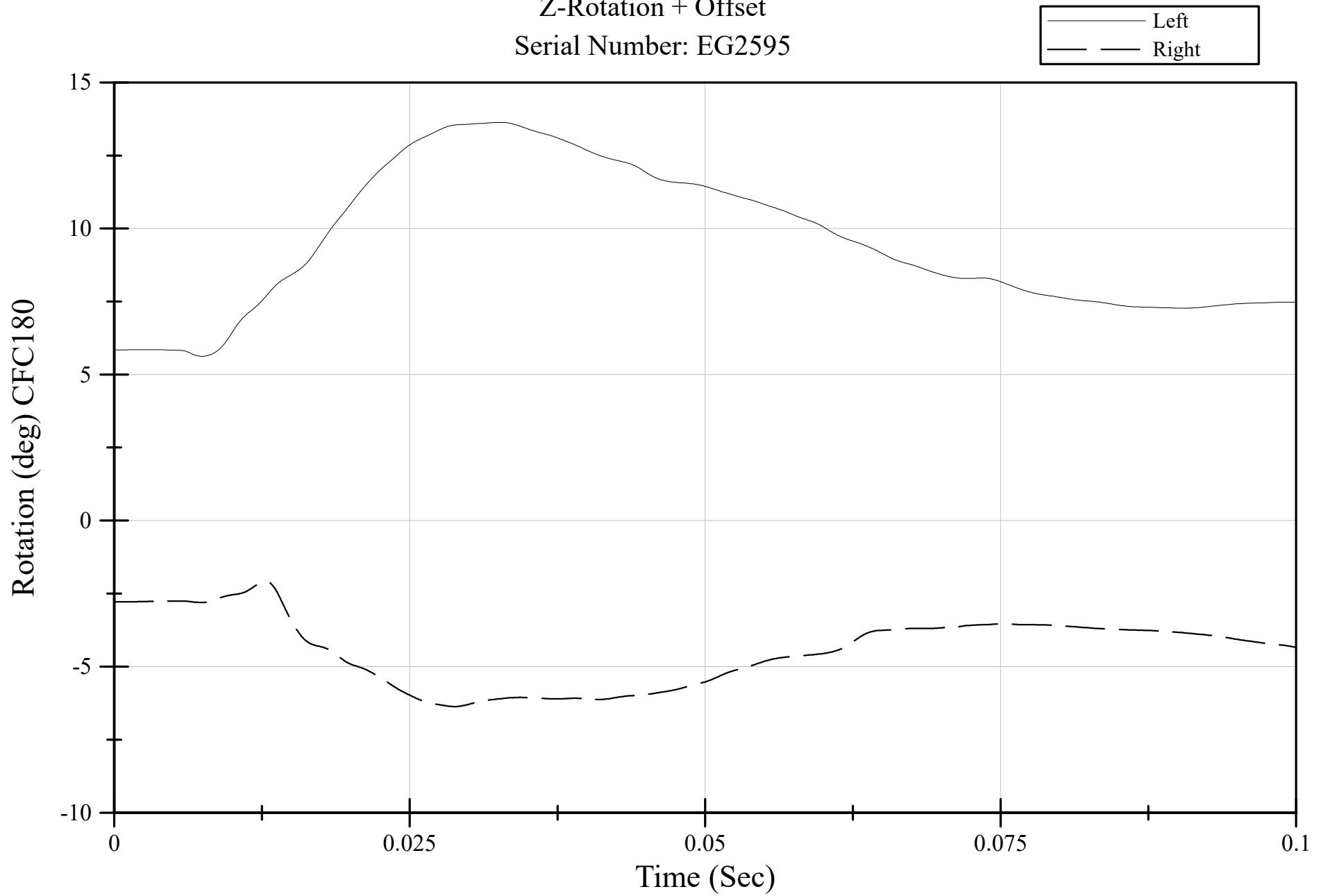
Serial Number: EG2595



THOR-50M Left Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Rib 1 Serial Number: EF9898
Rib 2 Serial Number: EF8143
Rib 3 Serial Number: EF8418
Rib 4 Serial Number: EF9464

Rib 5 Serial Number: EF9496
Rib 6 Serial Number: EF9497
Rib 7 Serial Number: EF8423

Test ID: 241024-4
Test Date: 10/24/2024
Test Time: 12:21 PM

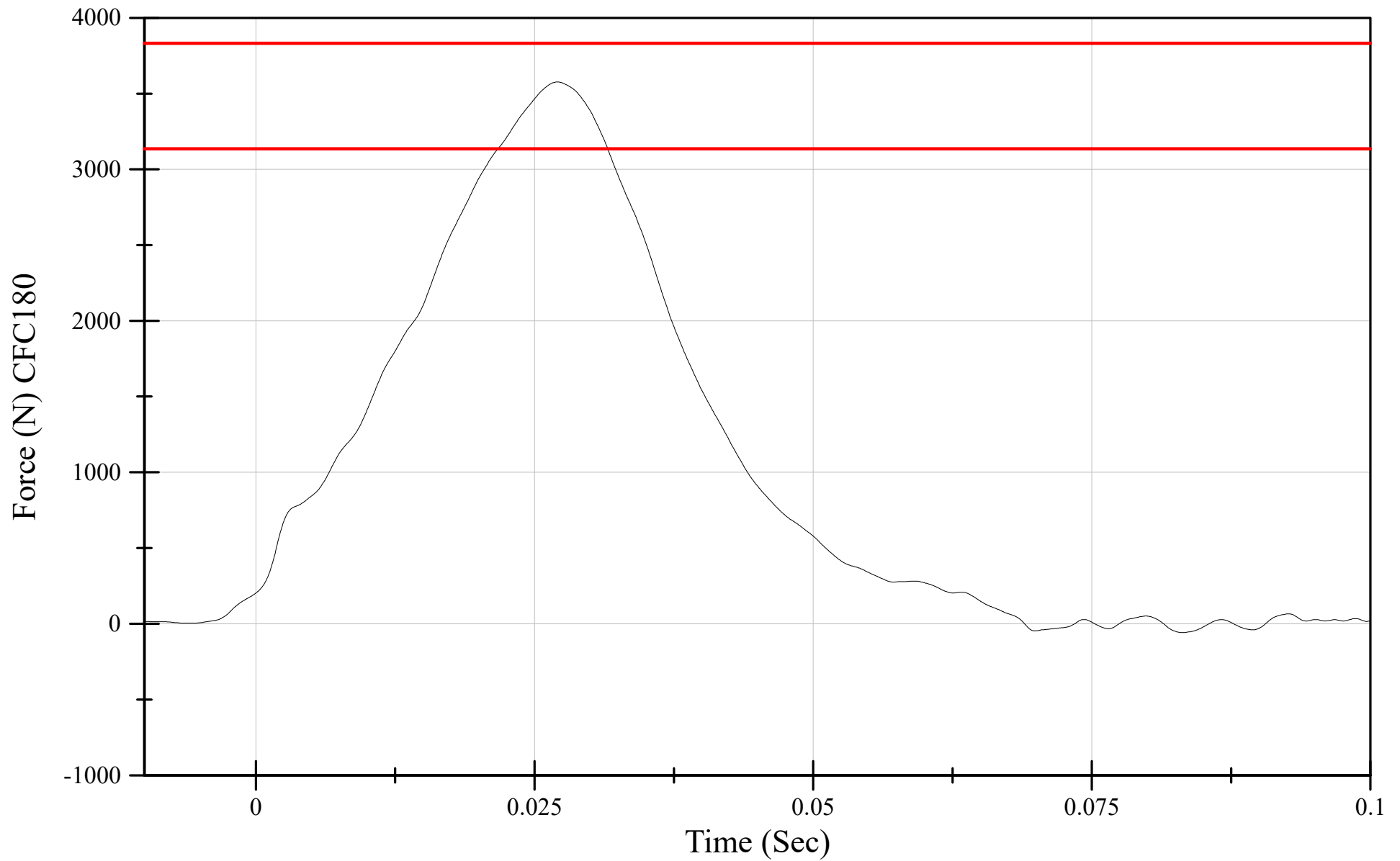
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	4.25 - 4.35	4.291	Pass
Peak Probe Force (N)	3136 - 3832	3576.9	Pass
Right Resultant Deflection at Peak Force (mm)	45.8 - 56.0	50.04	Pass

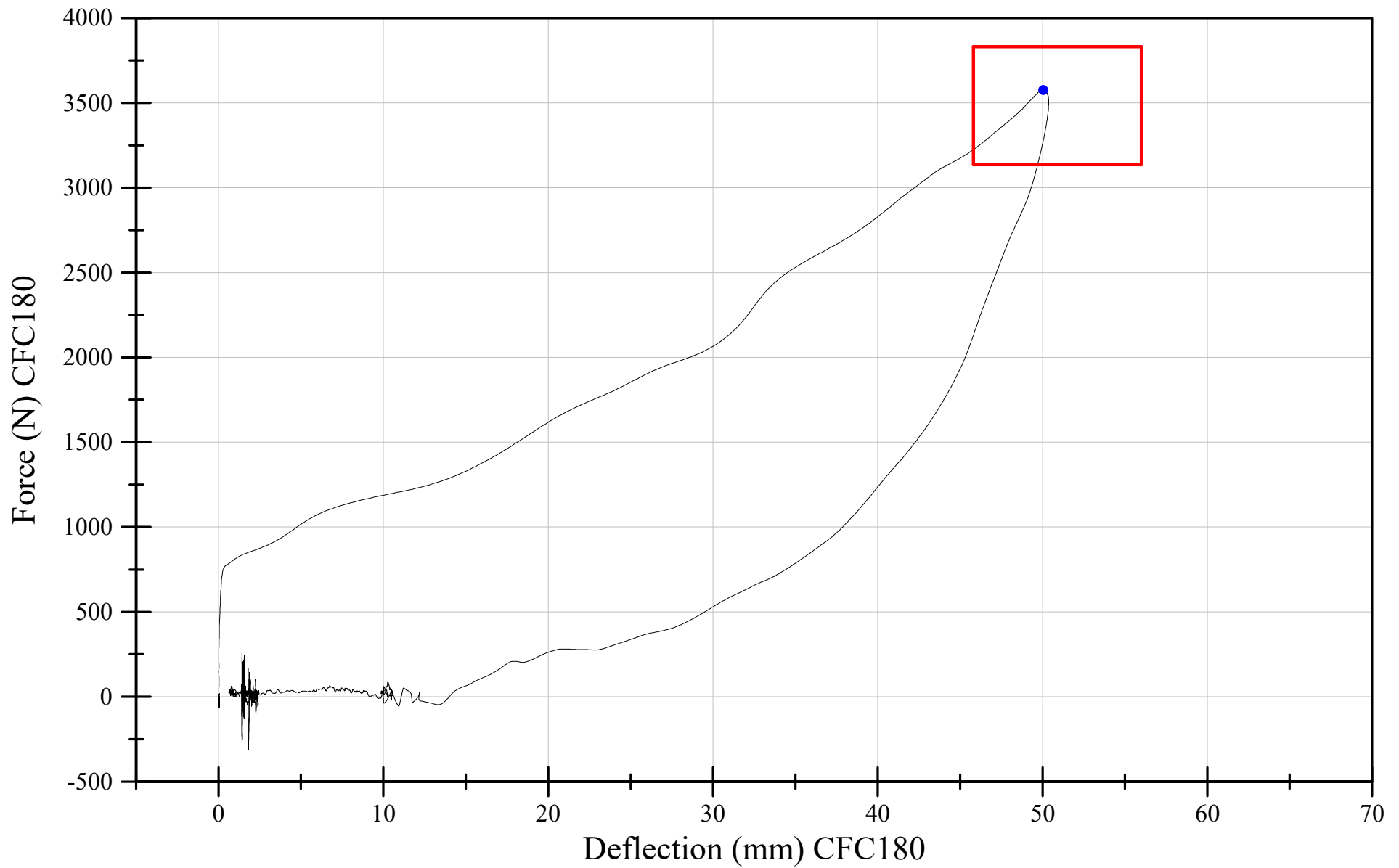
THOR-50M Right Lower Thorax Qualification

Probe Force

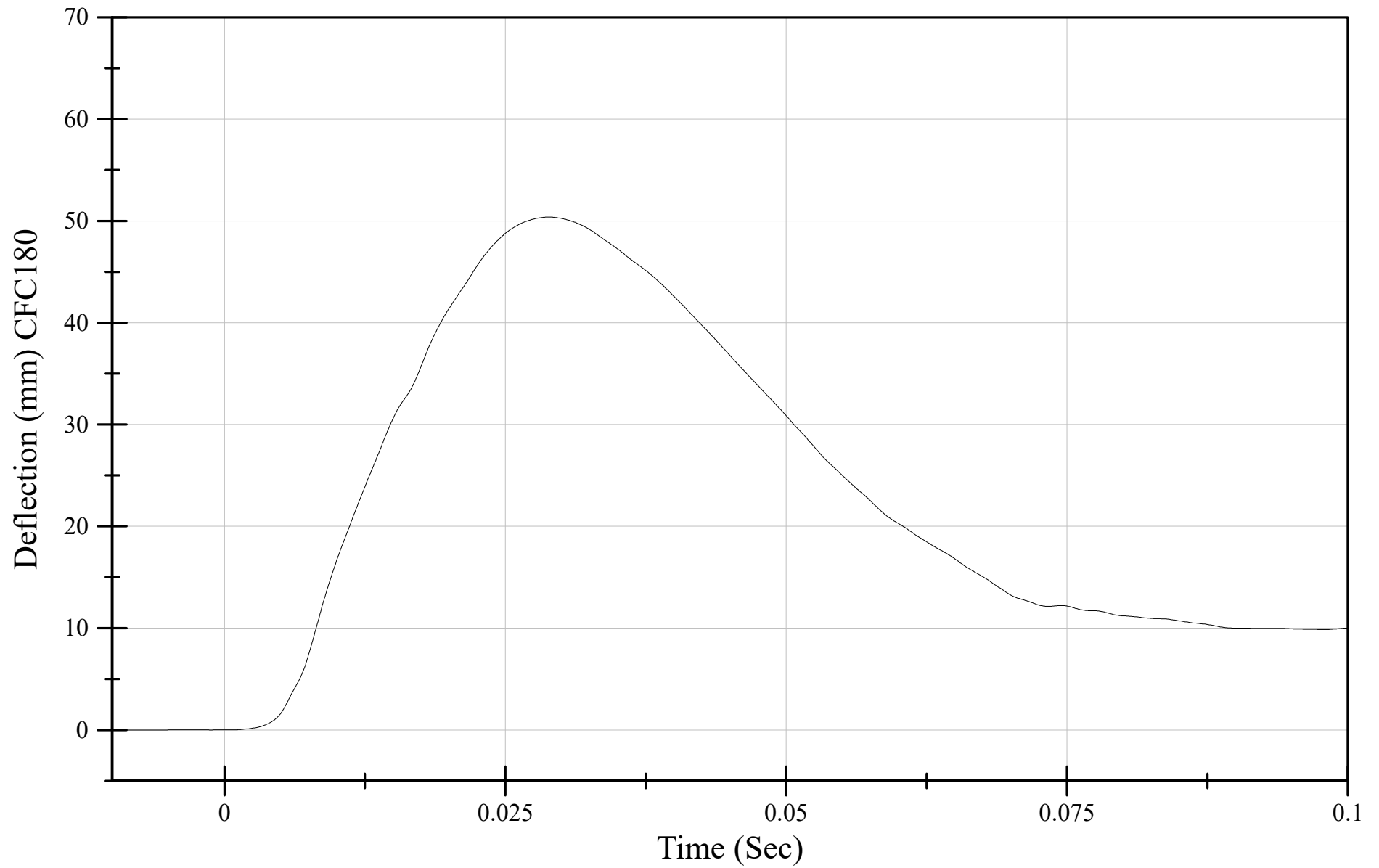
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification
Probe Force vs Right Resultant Deflection
Serial Number: EG2595



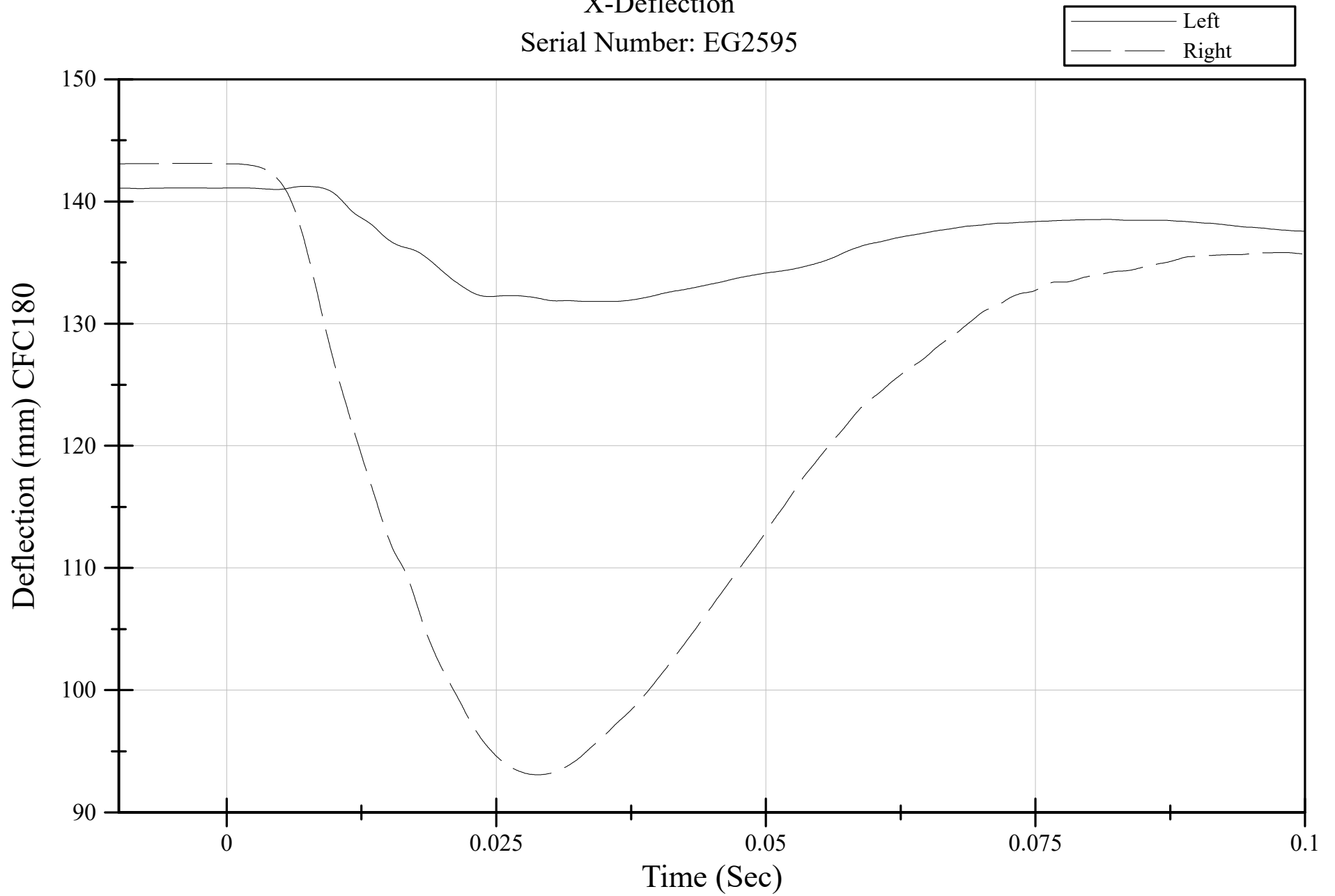
THOR-50M Right Lower Thorax Qualification
Right Resultant Deflection
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

X-Deflection

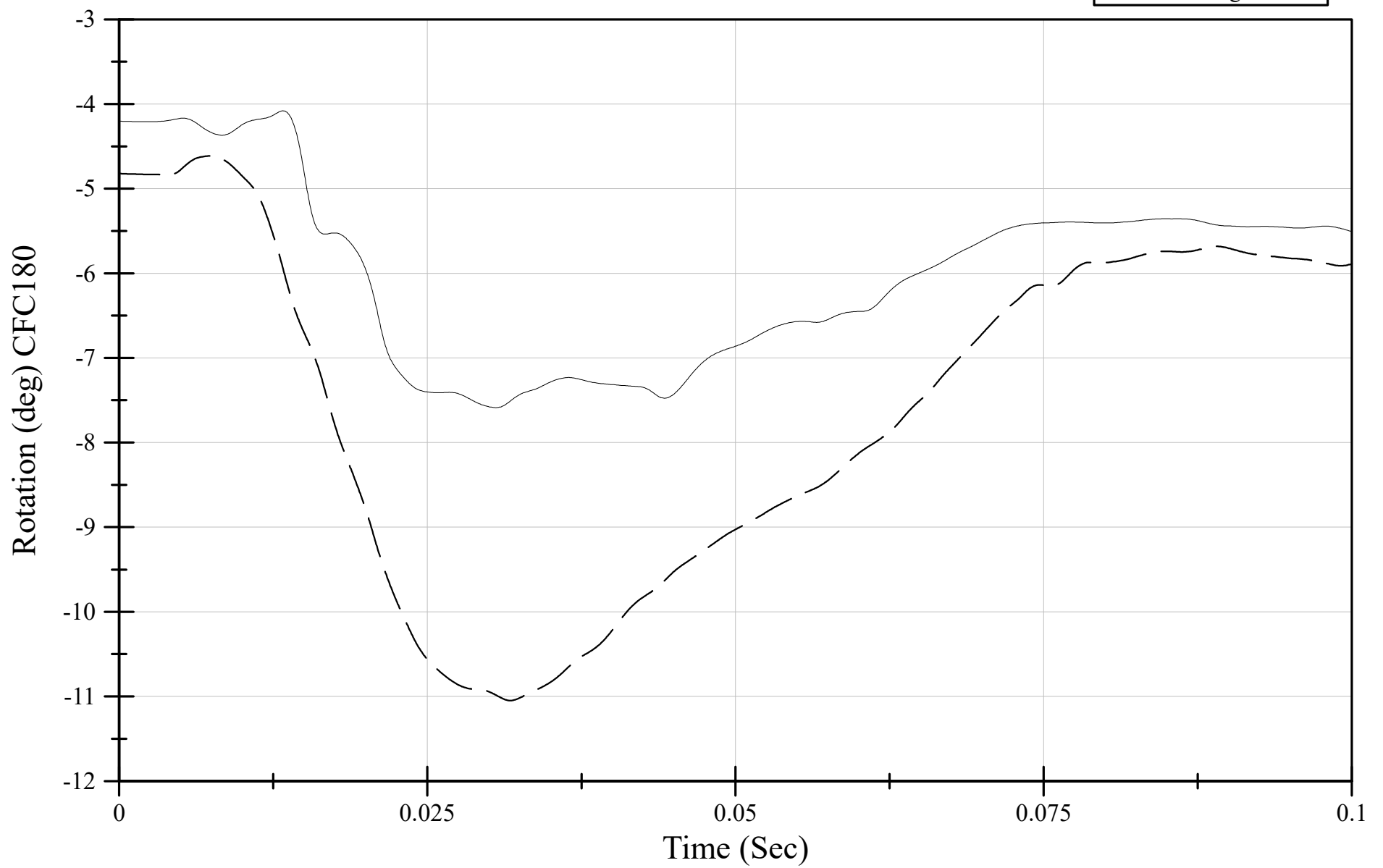
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Y-Rotation + Offset

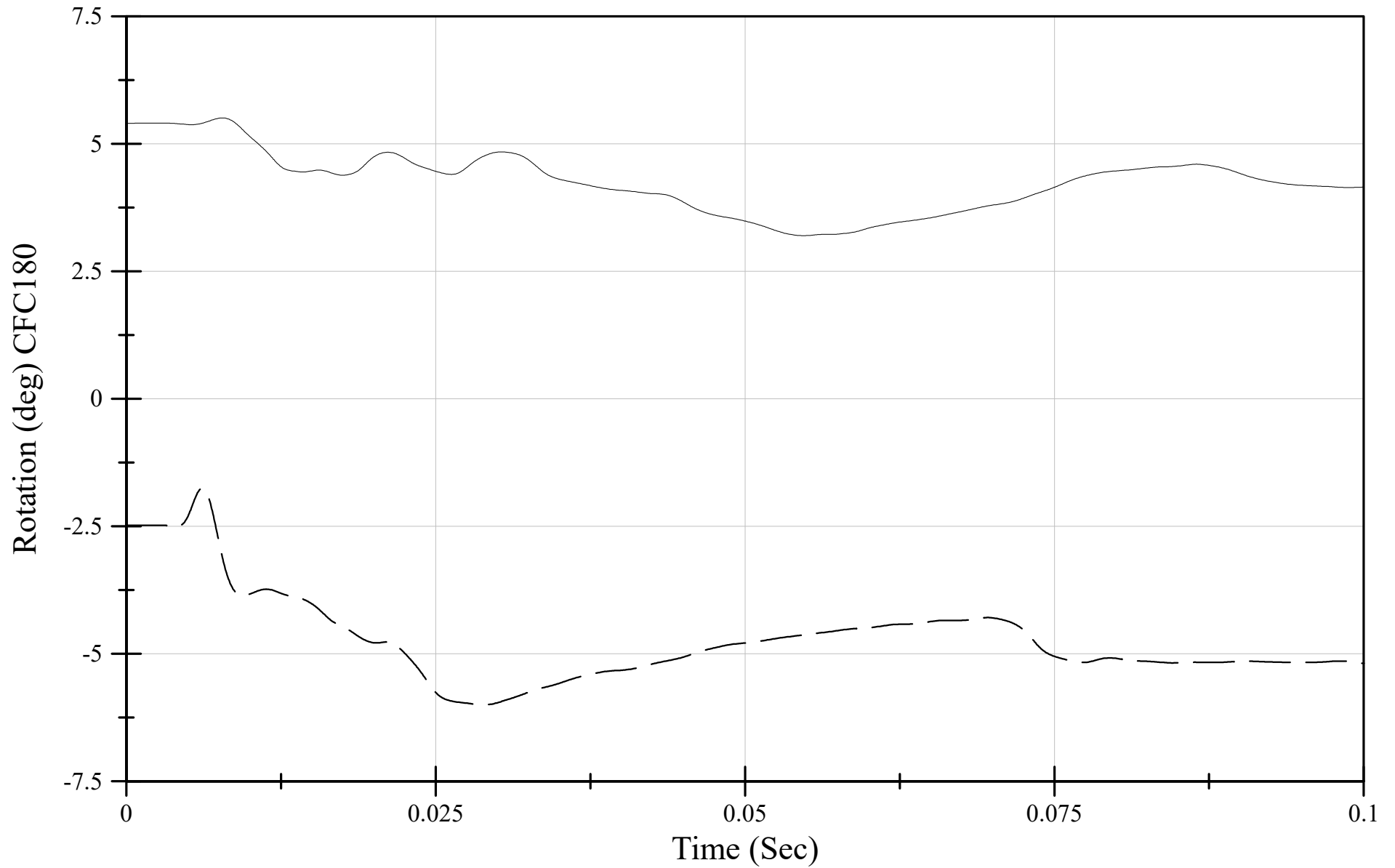
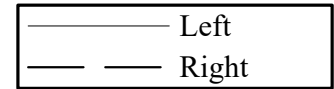
Serial Number: EG2595



THOR-50M Right Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Front Lower Abdomen Foam: EF9898

Rear Lower Abdomen Foam: EF8143

Lower Abdomen Bag: EF8418

Test ID: 241024-5

Test Date: 10/24/2024

Test Time: 1:41 PM

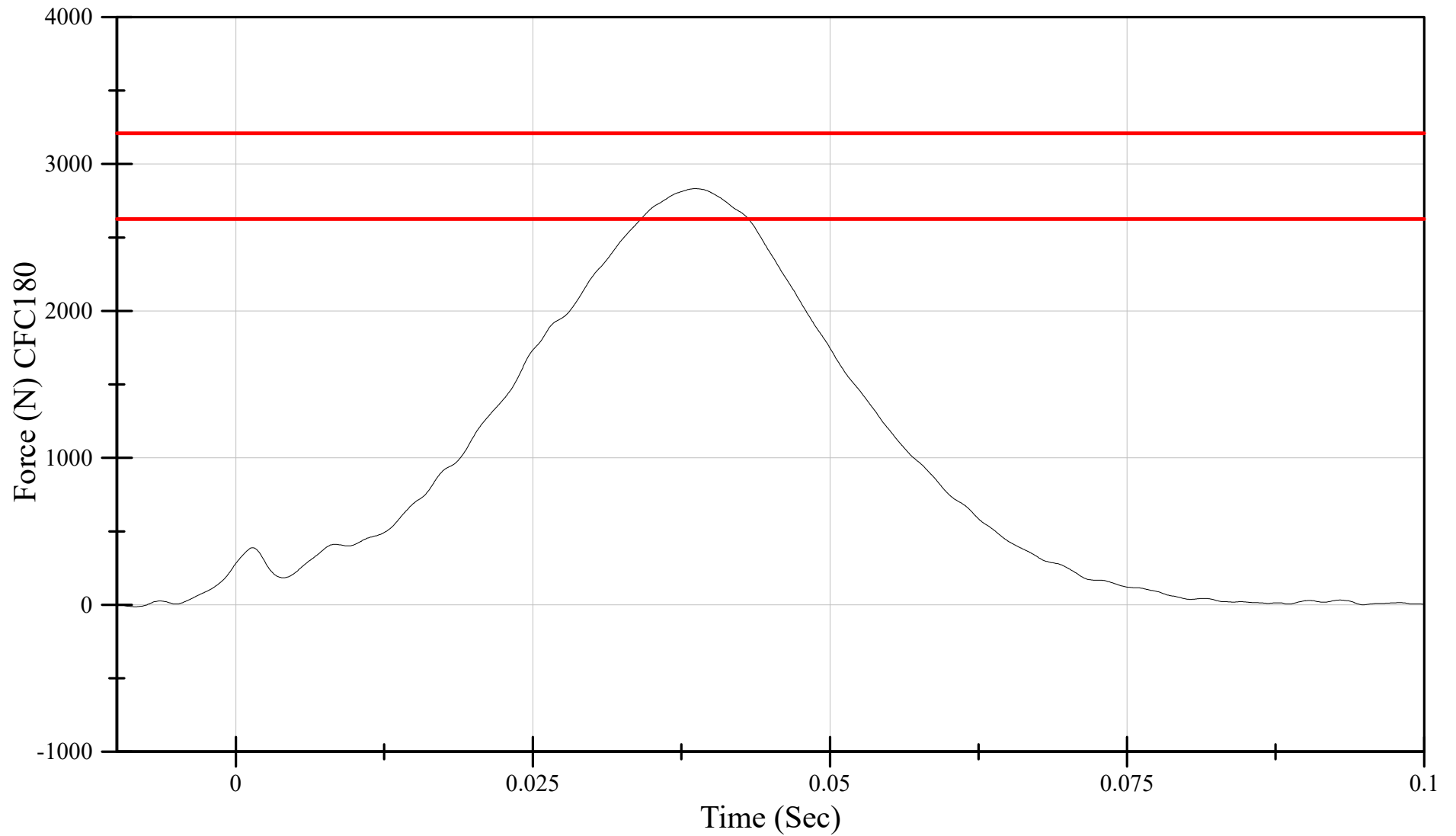
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	47	Pass
Test Velocity (m/s)	3.25 - 3.35	3.302	Pass
Peak Probe Force (N)	2626 - 3210	2832.6	Pass
Lower Left Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-88.40	Pass
Lower Right Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-88.40	Pass
Difference Between Peak Left & Right X-axis Deflections (mm)	less than 8.0	0.02	Pass

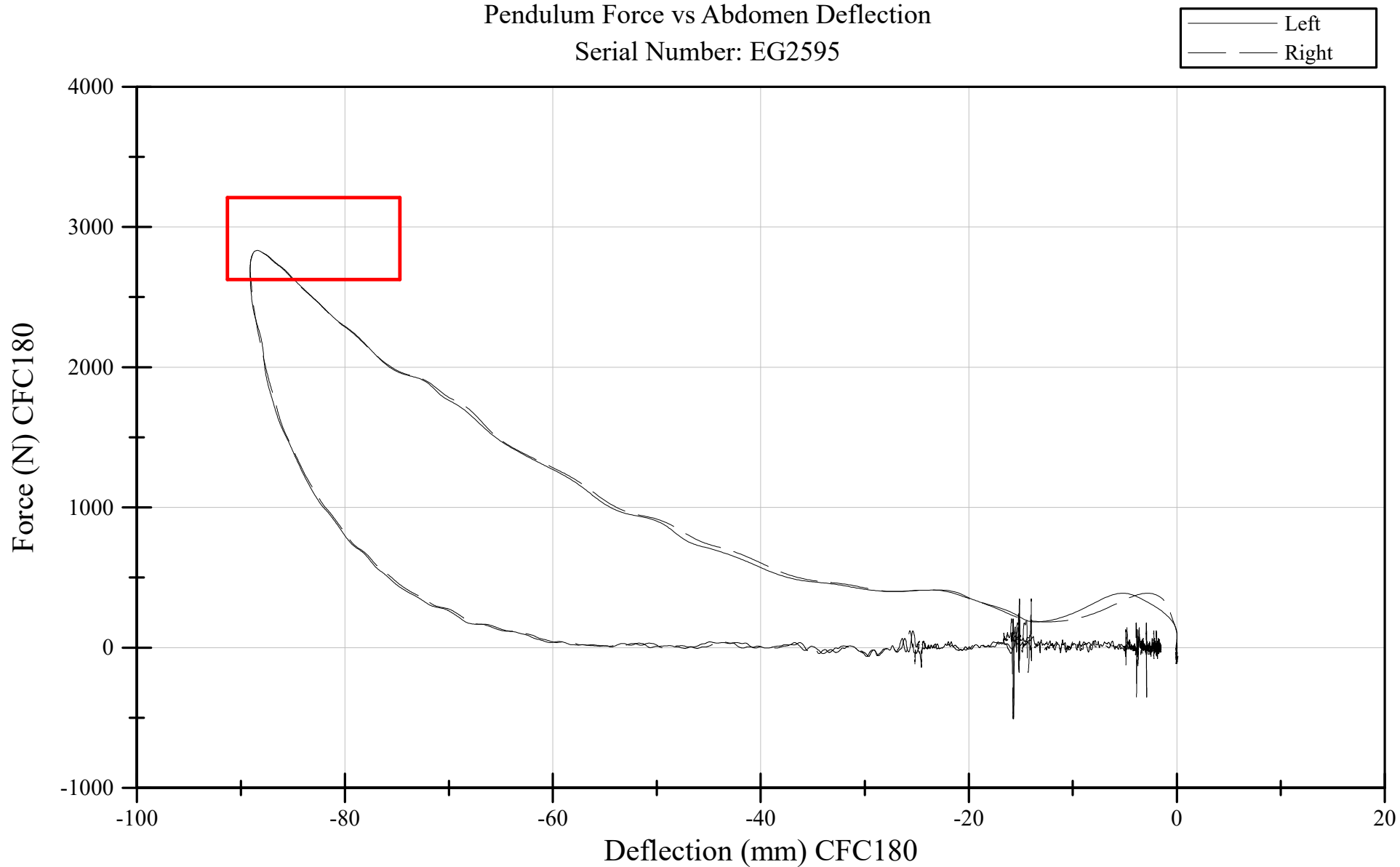
THOR-50M Lower Abdomen Qualification

Probe Force

Serial Number: EG2595



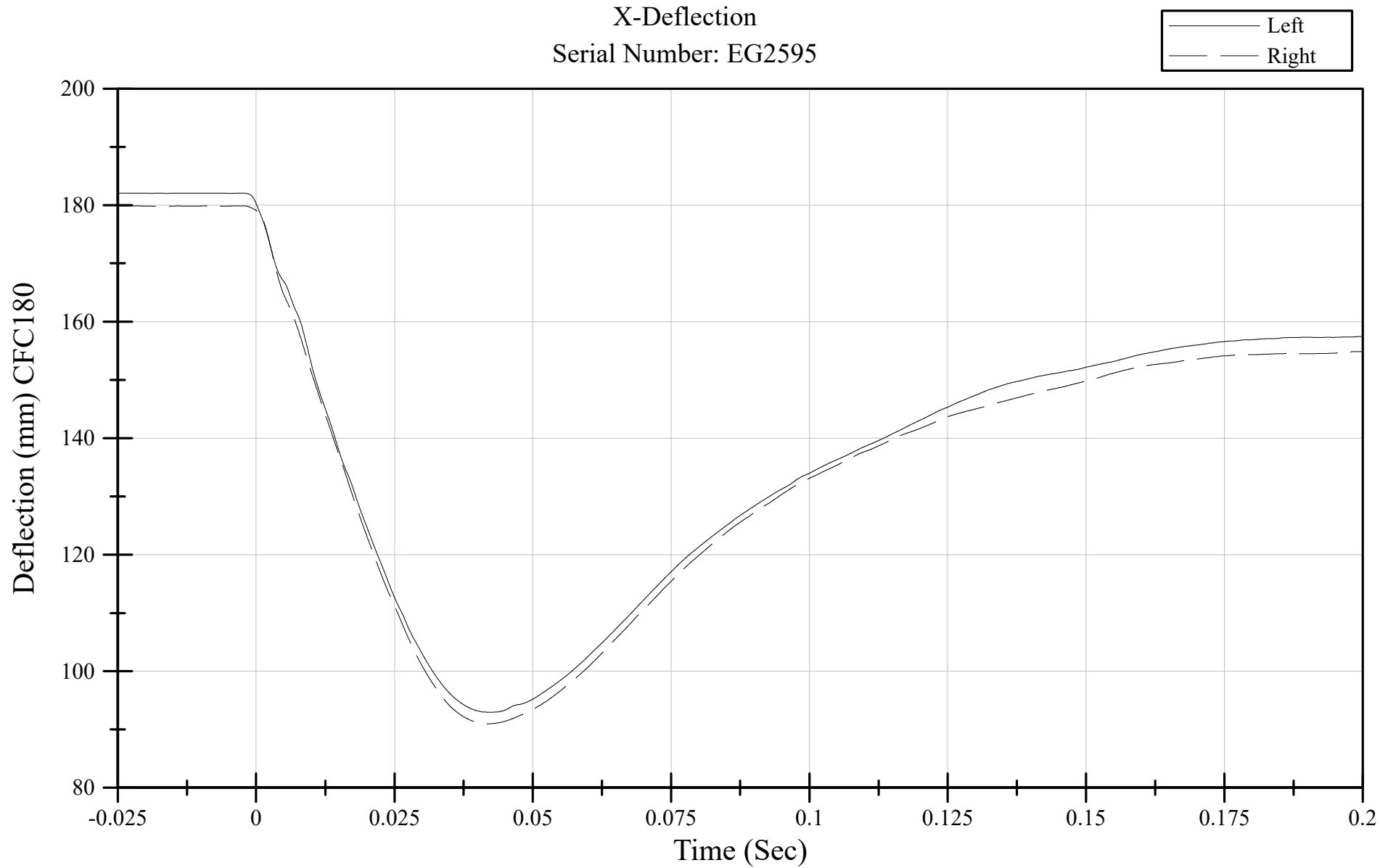
THOR-50M Lower Abdomen Qualification
Pendulum Force vs Abdomen Deflection
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

X-Deflection

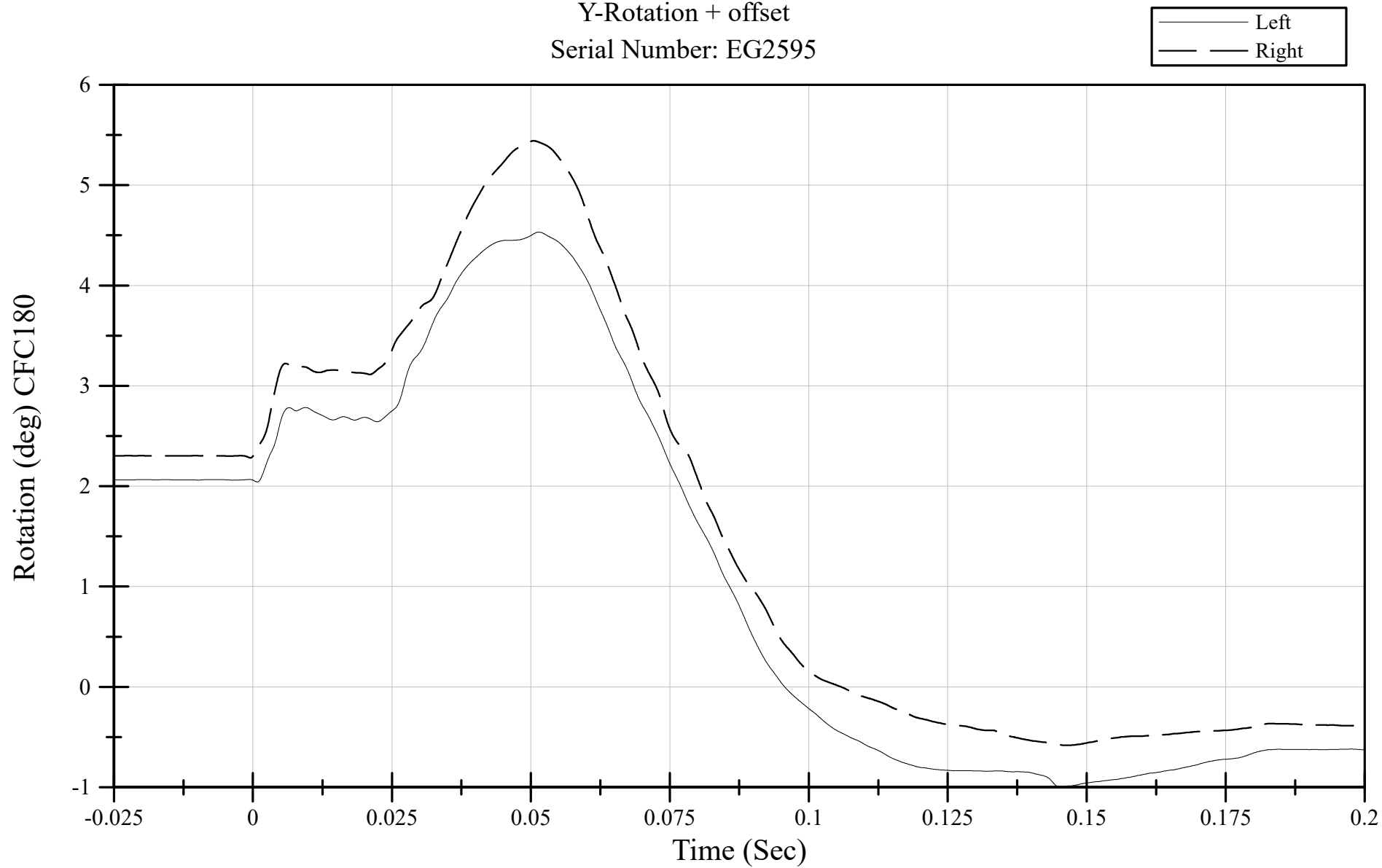
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Y-Rotation + offset

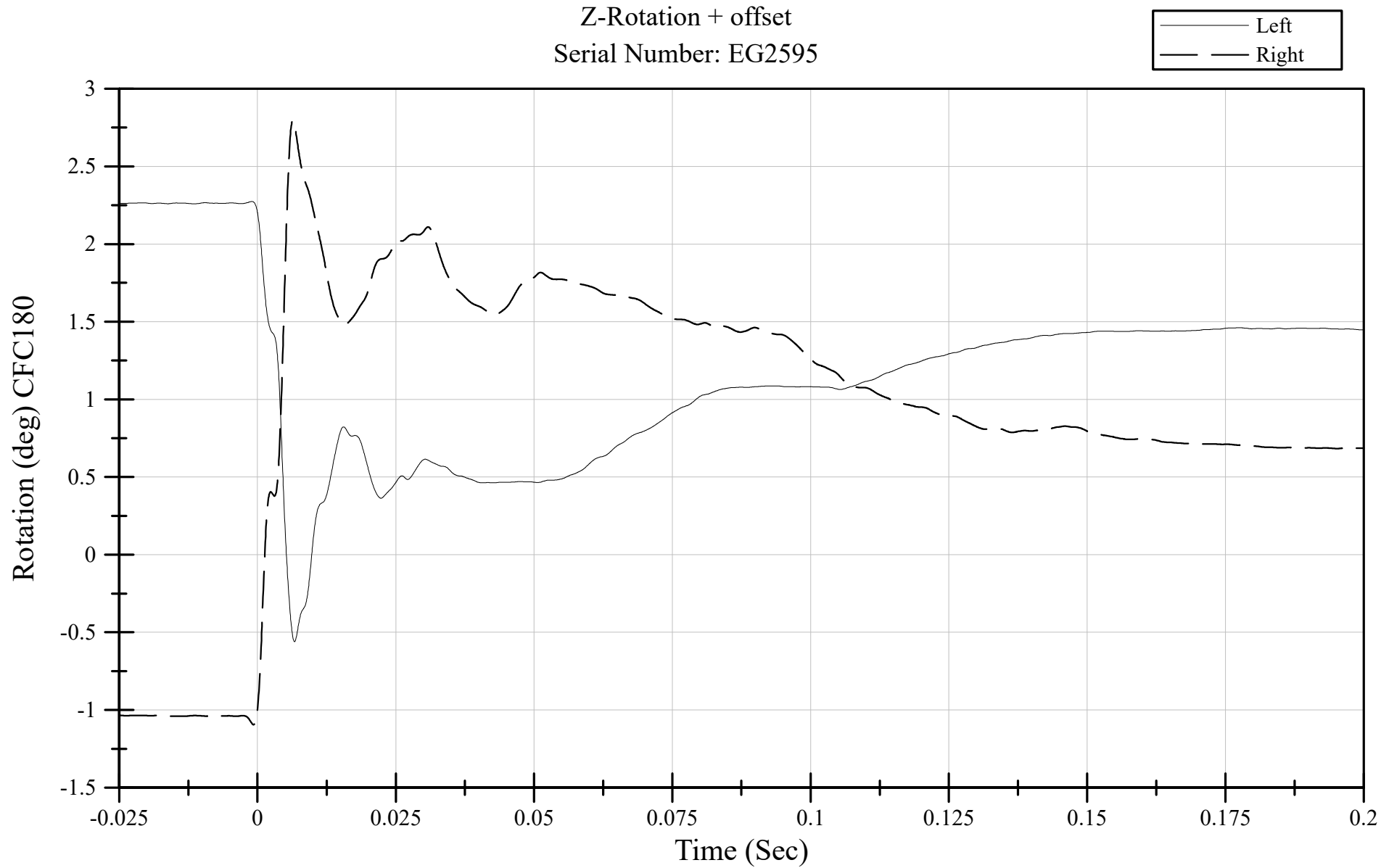
Serial Number: EG2595



THOR-50M Lower Abdomen Qualification

Z-Rotation + offset

Serial Number: EG2595



THOR-50M Left Upper Leg Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Compression Element:
Left Thigh Flesh: EF9984

Test ID: 241028-1

Test Date: 10/28/2024

Test Time: 1:26 PM

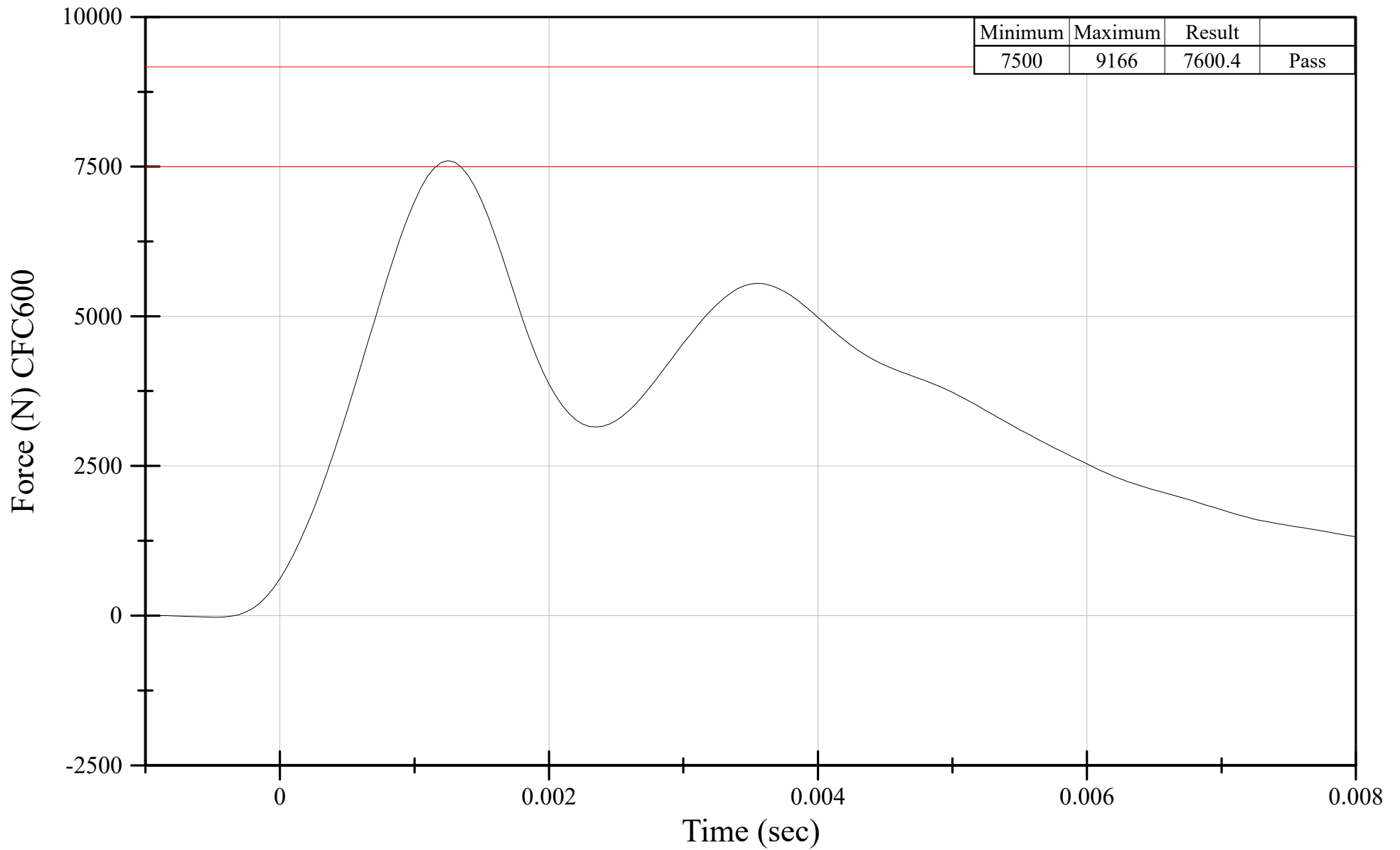
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	3.25 - 3.35	3.289	Pass
Peak Probe Force (N)	7500 - 9166	7600.4	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4563.9	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2790.8	Pass

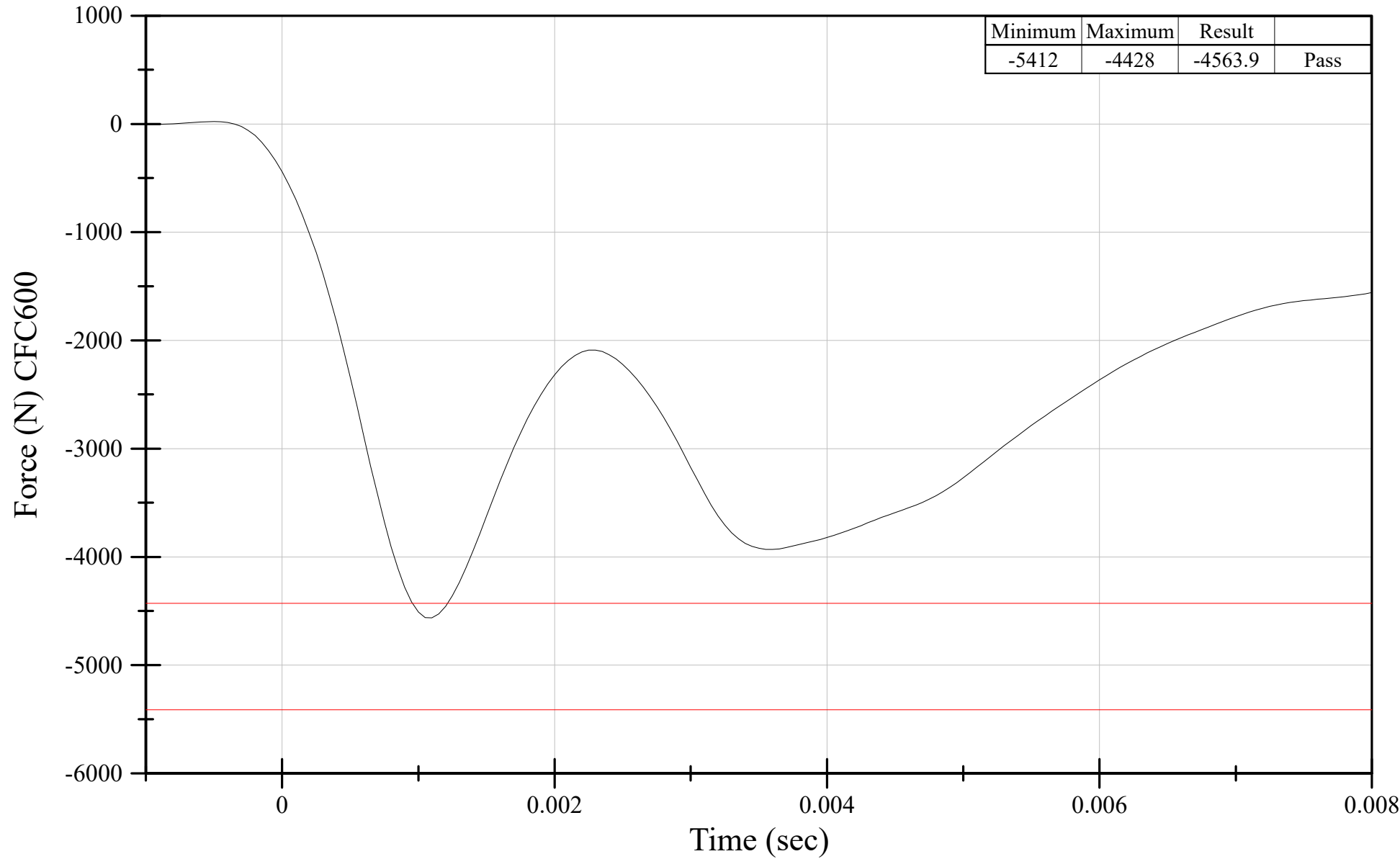
THOR-50M Left Upper Leg Qualification

Probe Force

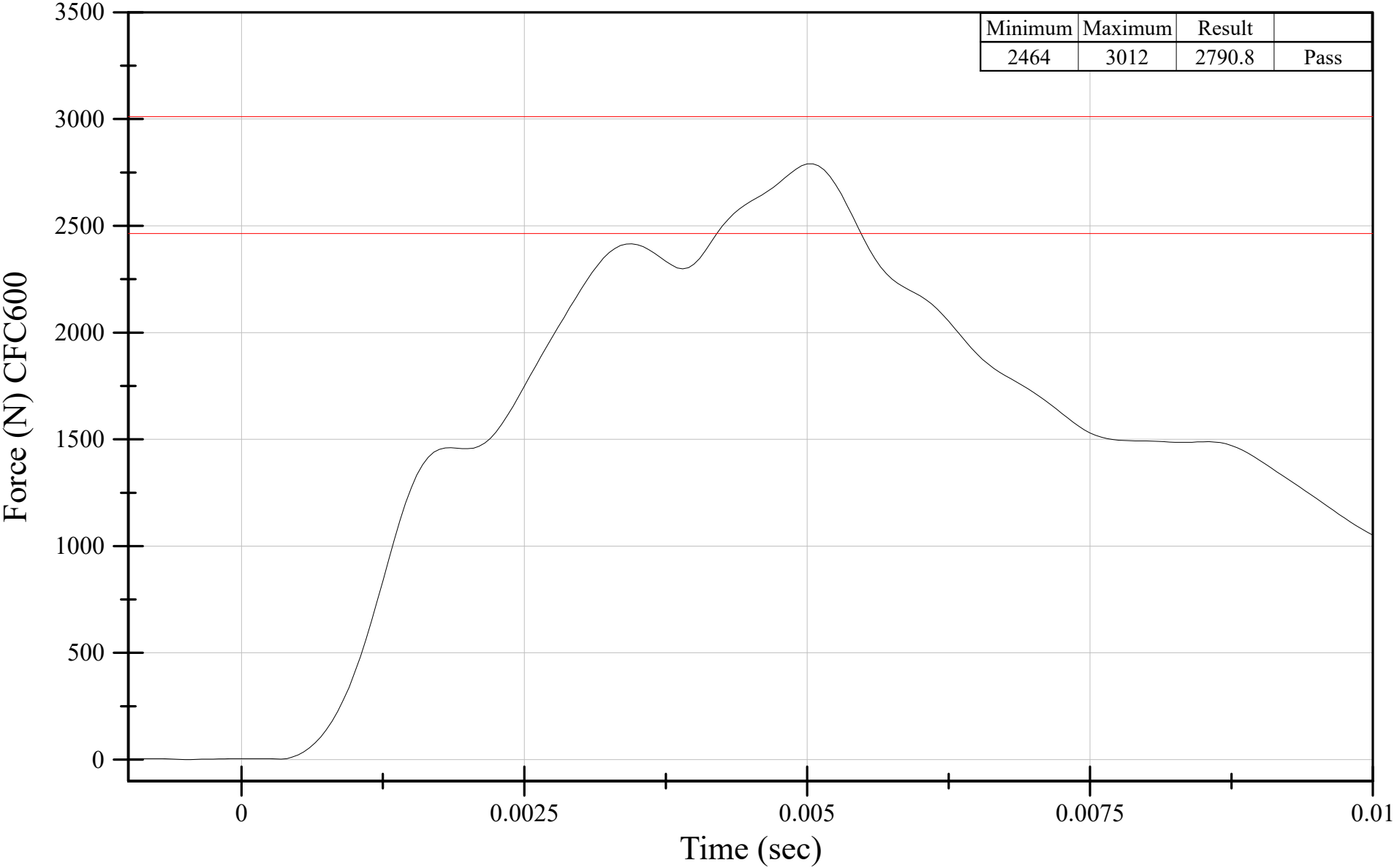
Serial Number: EG2595



THOR-50M Left Upper Leg Qualification
Femur Z-Force
Serial Number: EG2595



THOR-50M Left Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: EG2595



THOR-50M Right Upper Leg Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Compression Element:
Right Thigh Flesh: EG0935

Test ID: 241028-2

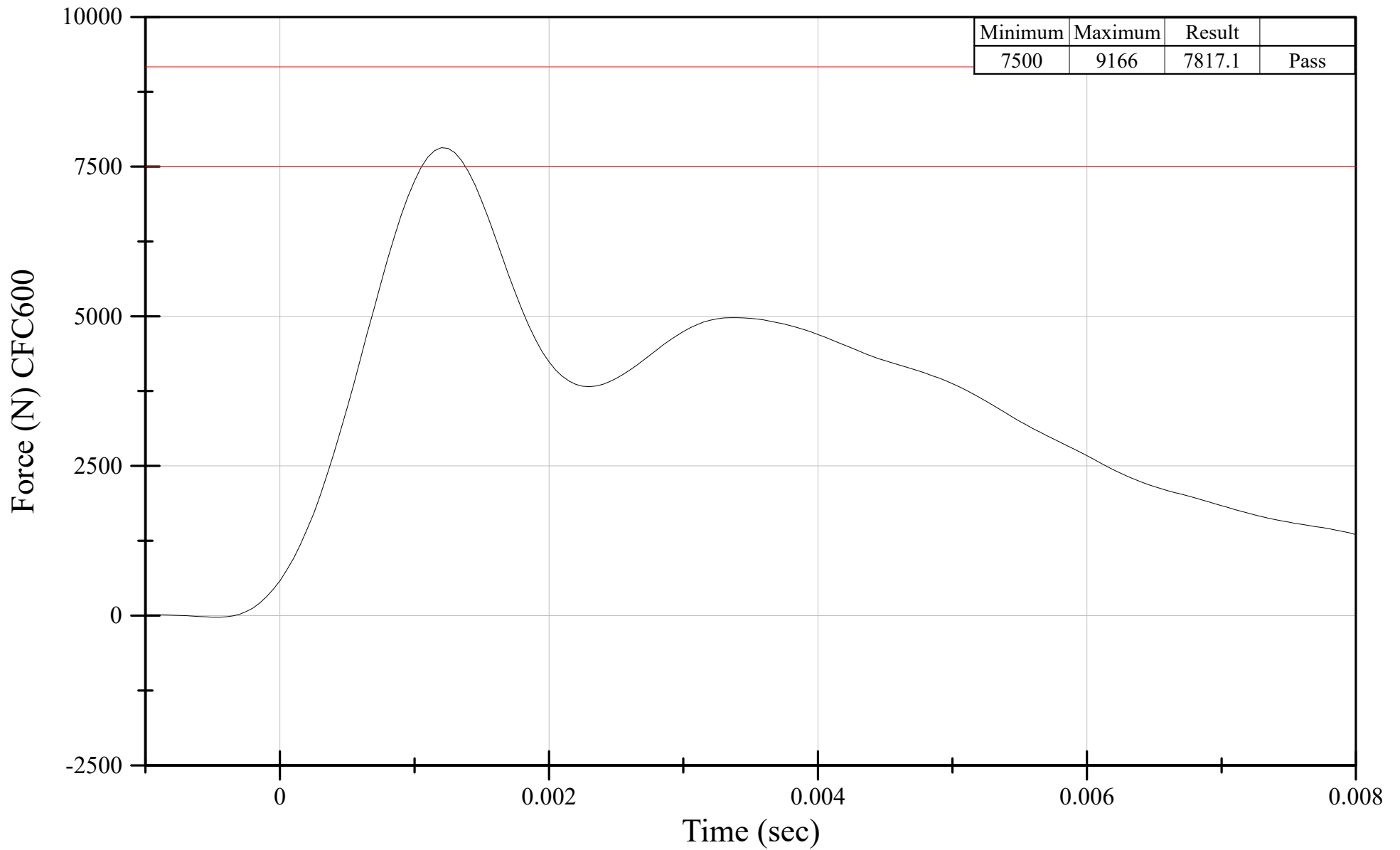
Test Date: 10/28/2024

Test Time: 4:10 PM

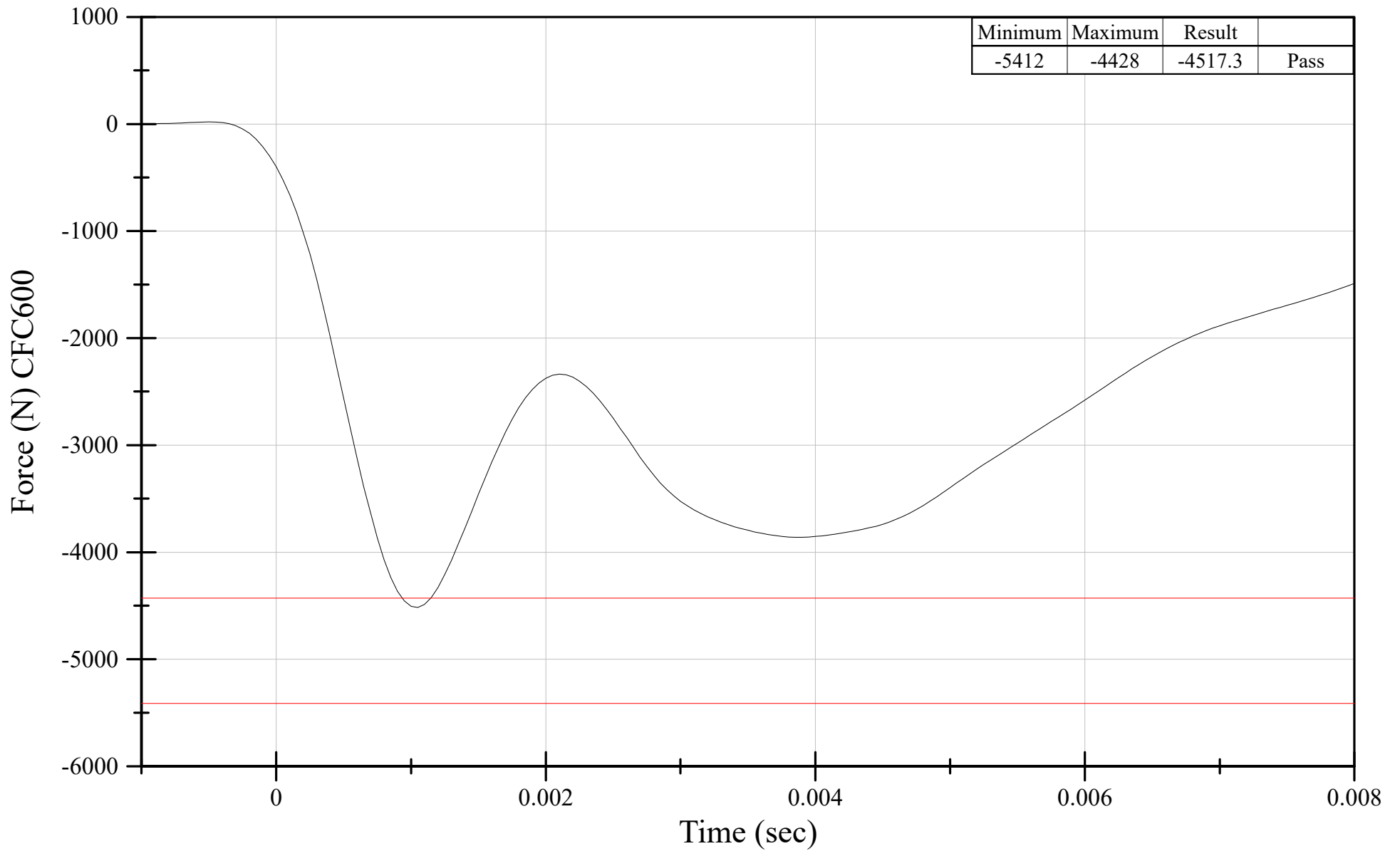
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	3.25 - 3.35	3.296	Pass
Peak Probe Force (N)	7500 - 9166	7817.1	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4517.3	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2906.8	Pass

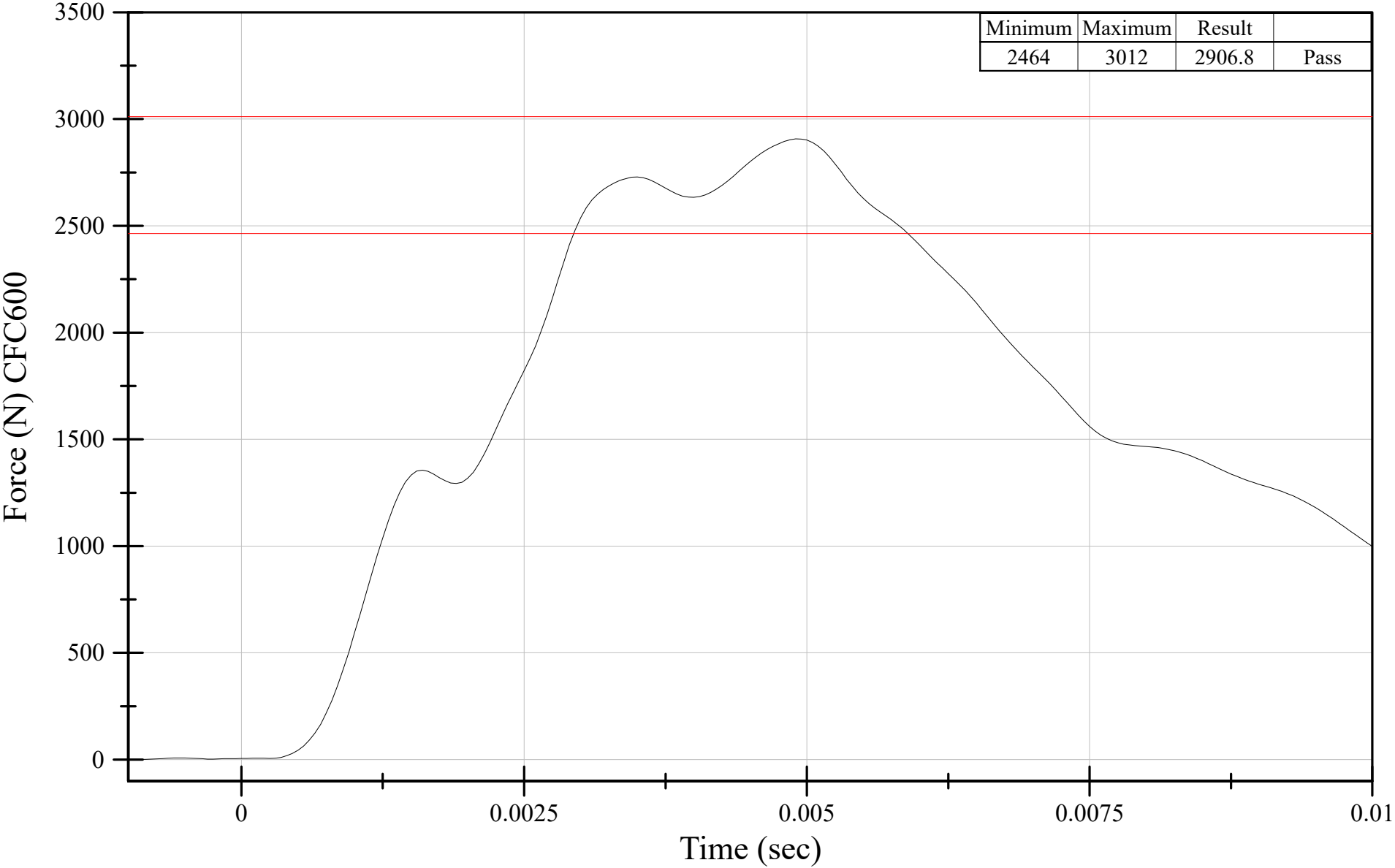
THOR-50M Right Upper Leg Qualification
Probe Force
Serial Number: EG2595



THOR-50M Right Upper Leg Qualification
Femur Z-Force
Serial Number: EG2595



THOR-50M Right Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: EG2595



THOR-50M Left Knee Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

String Pot:

Inboard Slider: EG0606

Outboard Slider: EG0606

Test ID: 241030-10

Test Date: 10/30/2024

Test Time: 2:16 PM

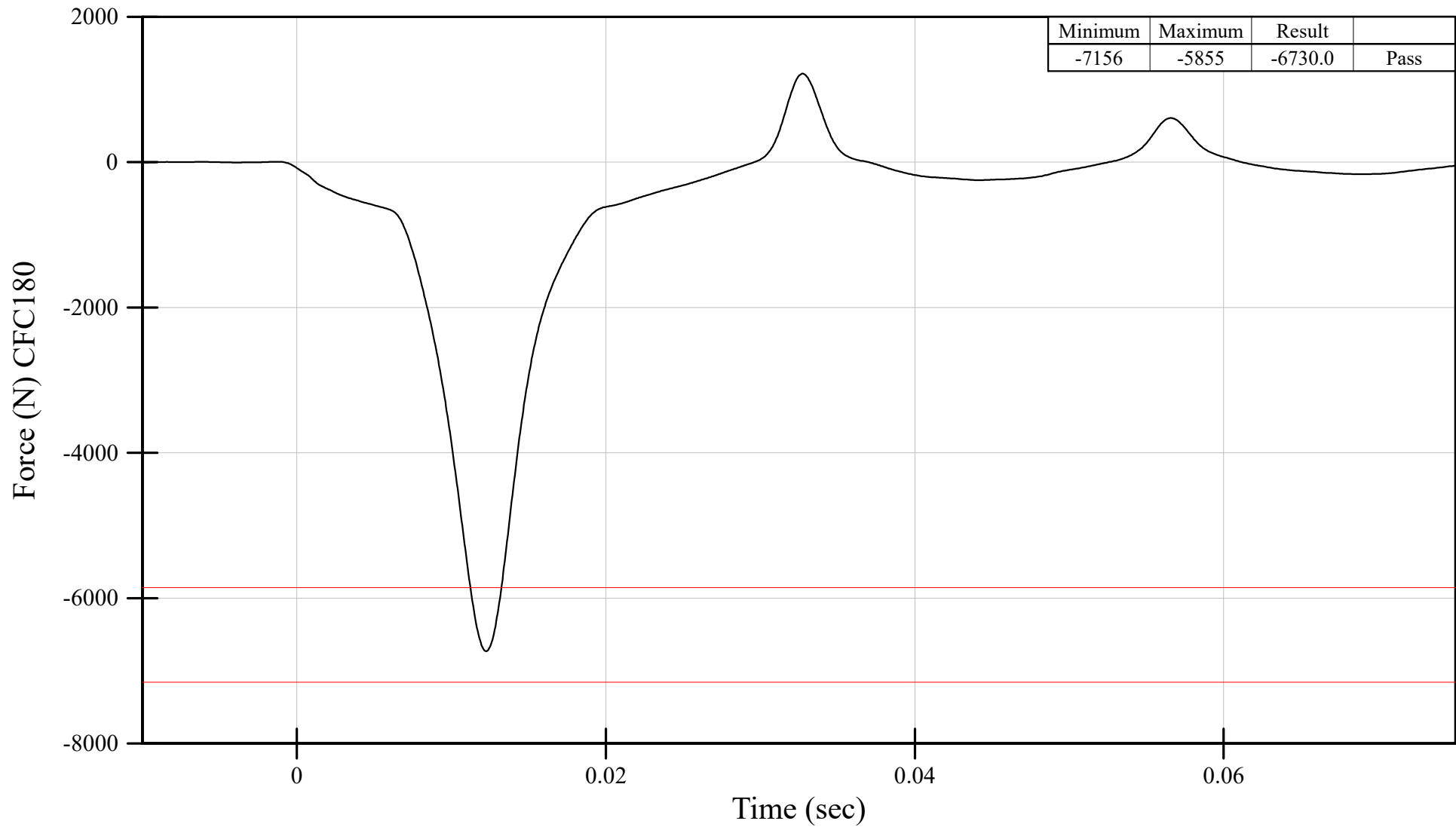
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	55	Pass
Test Velocity (m/s)	2.15 - 2.25	2.195	Pass
Peak Femur Fz (N)	-7156 - (-5855)	-6730.0	Pass
Knee Deflection at Peak Femur Force (N)	-22.2 - (-18.2)	-20.06	Pass

THOR-50M Left Knee Qualification

Peak Femur Fz

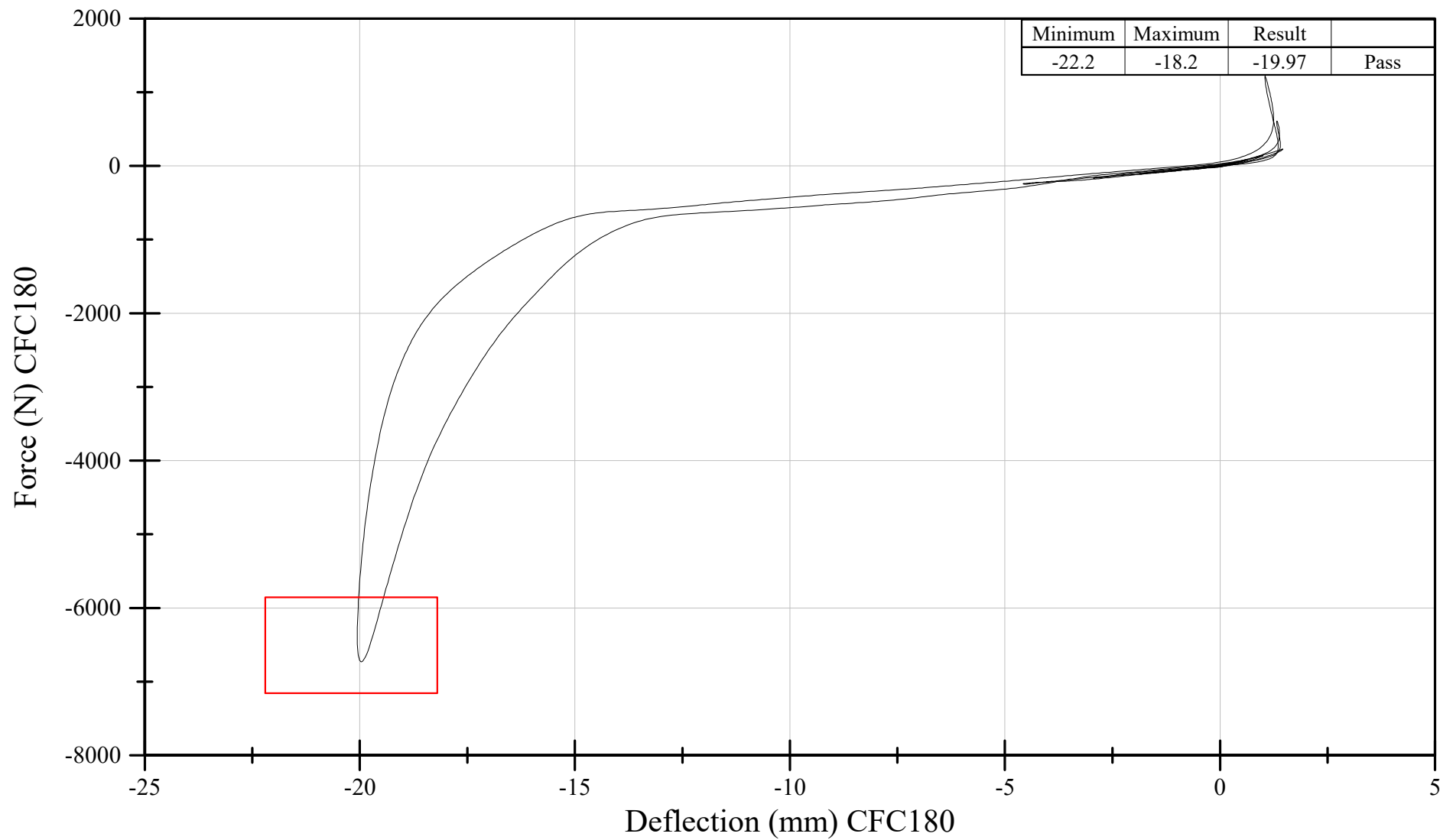
Dummy Serial Number: EG2595



File Name: 241030-10 processed

10/30/2024 2:16 PM

THOR-50M Left Knee Qualification
Peak Deflection at Peak Force
Dummy Serial Number: EG2595



THOR-50M Right Knee Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

String Pot:

Inboard Slider: EF6003

Outboard Slider: EF6003

Test ID: 241030-11

Test Date: 10/30/2024

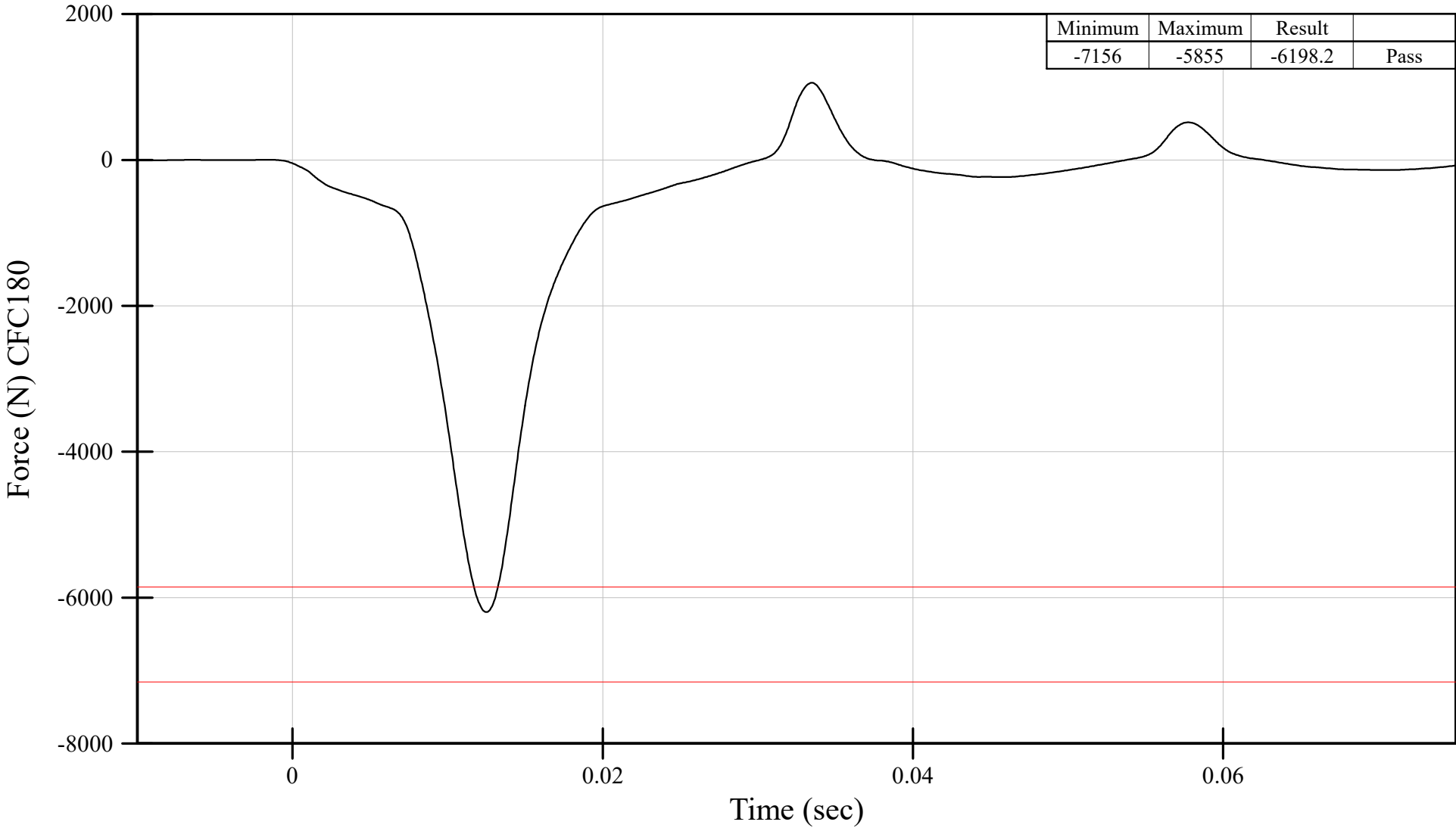
Test Time: 3:13 PM

Test Results

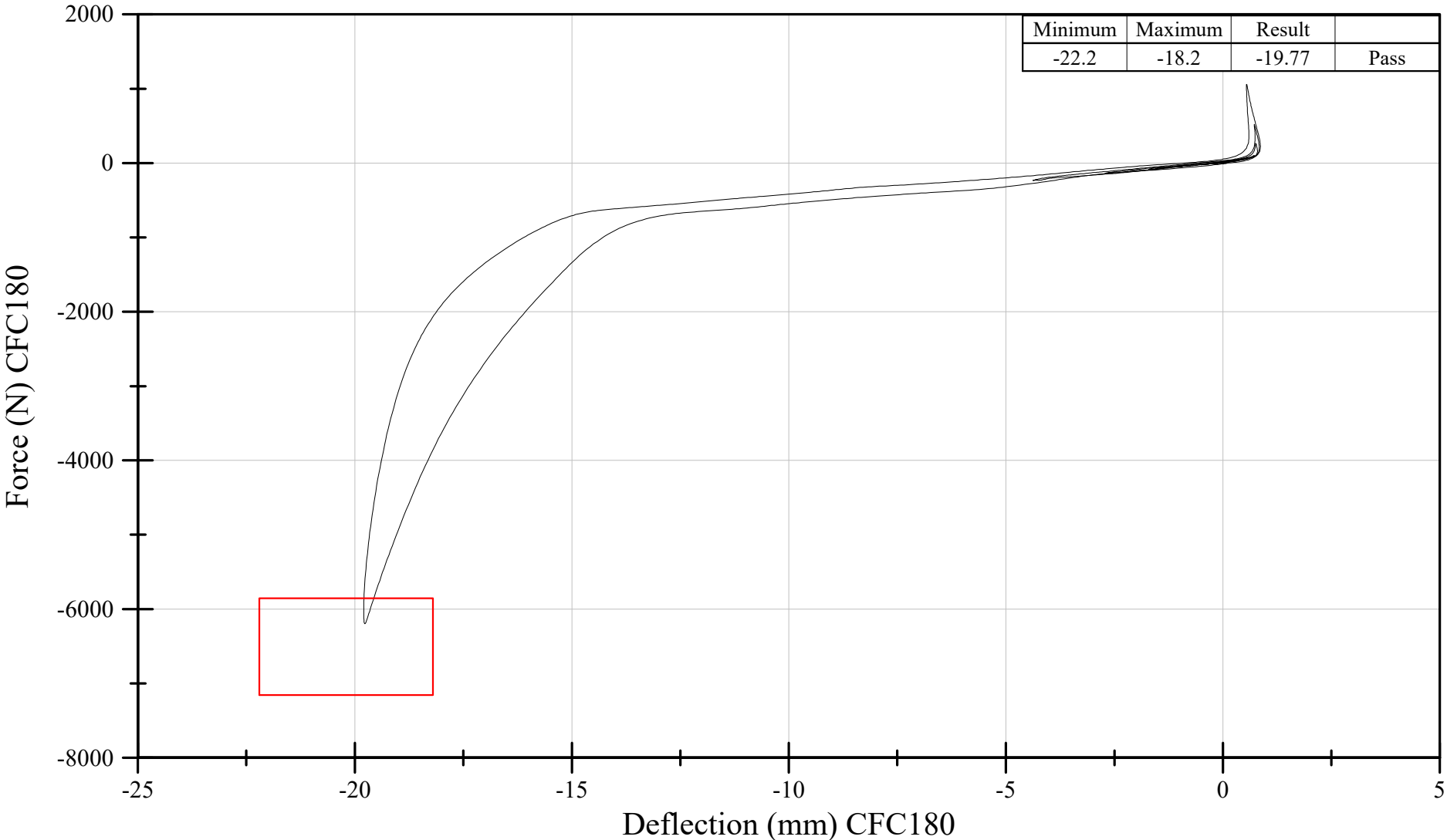
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	55	Pass
Test Velocity (m/s)	2.15 - 2.25	2.201	Pass
Peak Femur Fz (N)	-7156 - (-5855)	-6198.2	Pass
Knee Deflection at Peak Femur Force (N)	-22.2 - (-18.2)	-19.77	Pass

* THOR-50M Qualification Manual - April 2023

THOR-50M Right Knee Qualification
Peak Femur Fz
Dummy Serial Number: EG2595



THOR-50M Right Knee Qualification
Peak Deflection at Peak Force
Dummy Serial Number: EG2595



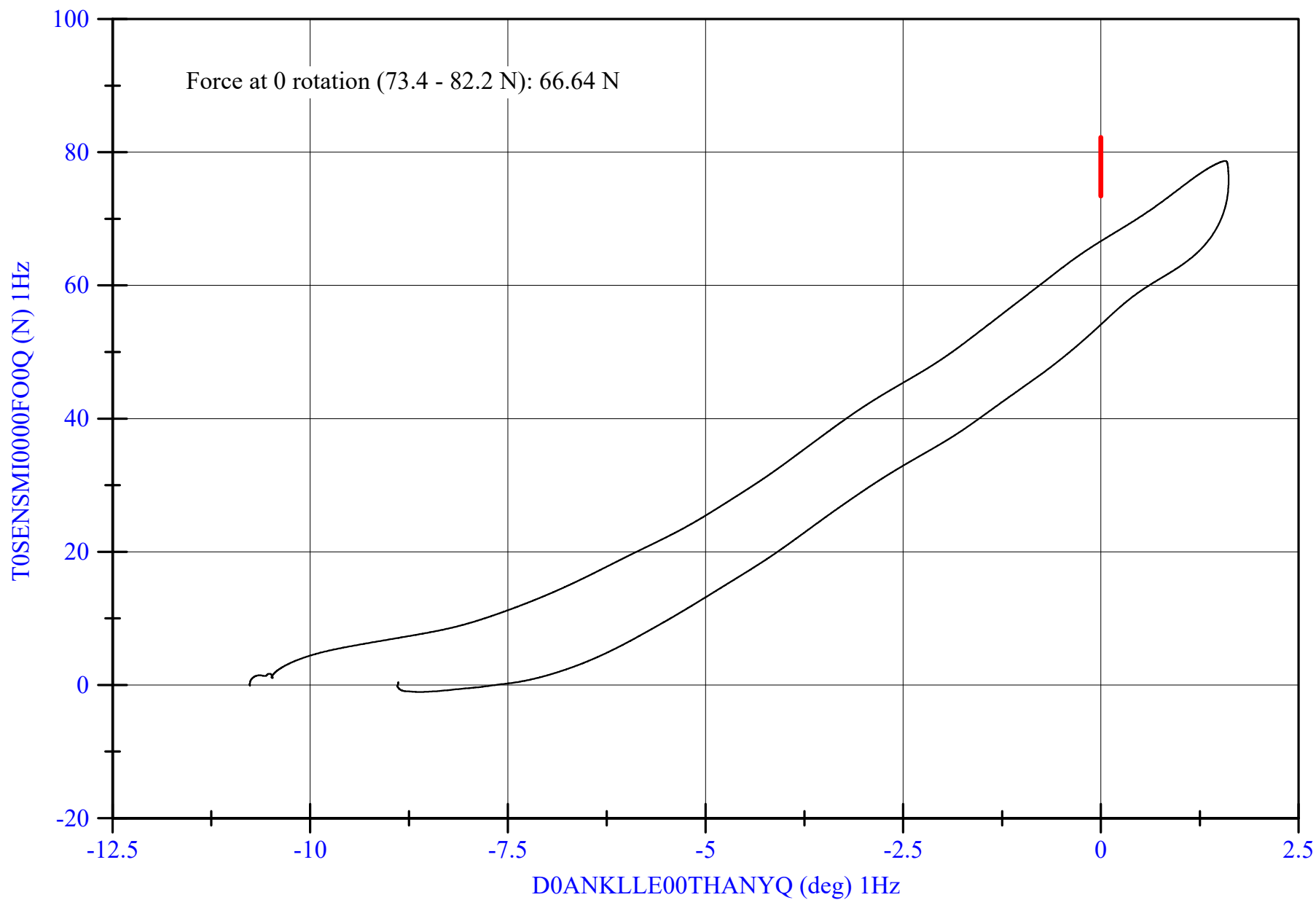
Test Temperature: 21.2° C

Test Humidity: 56%

Left Achilles Force

LX Leg SN:

— Pass Through Line
— Applied Force



Data file: 241031-1 processed

THOR-50M Left Ball of Foot Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Left Dorsiflexion Stop: ER8522

Test ID: 241031-2

Test Date: 10/31/2024

Test Time: 8:21 AM

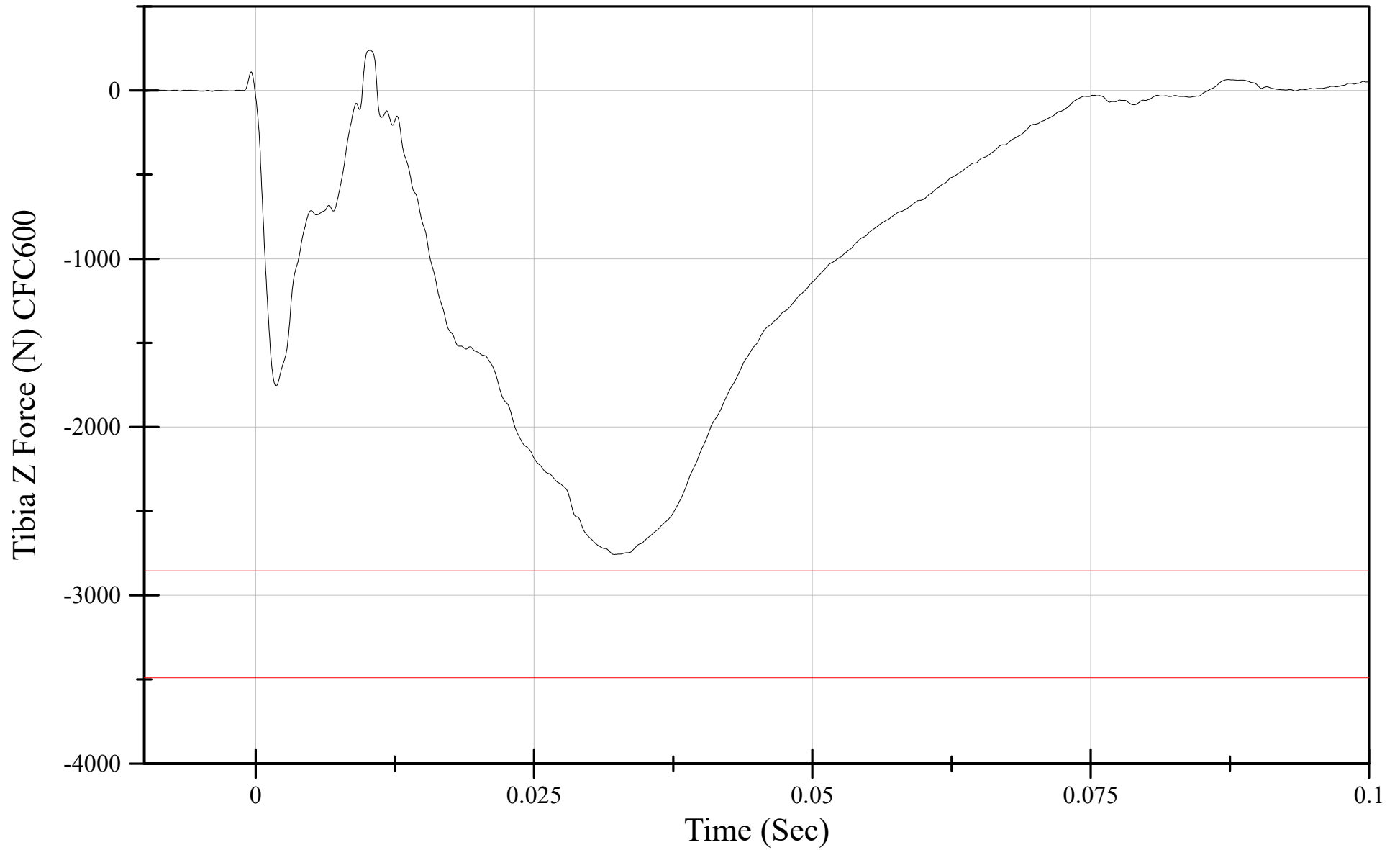
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.95 - 5.05	4.984	Pass
Peak Lower Tibia Fz (N)	-3487 - (-2853)	-2757.6	Fail
Peak Ankle Resistive Moment (Nm)	49.8 - 60.8	57.42	Pass
Peak Ankle Y-axis Rotation (deg)	30.4 - 37.2	32.59	Pass

THOR-50M Left Ball of Foot Qualification

Tibia Load

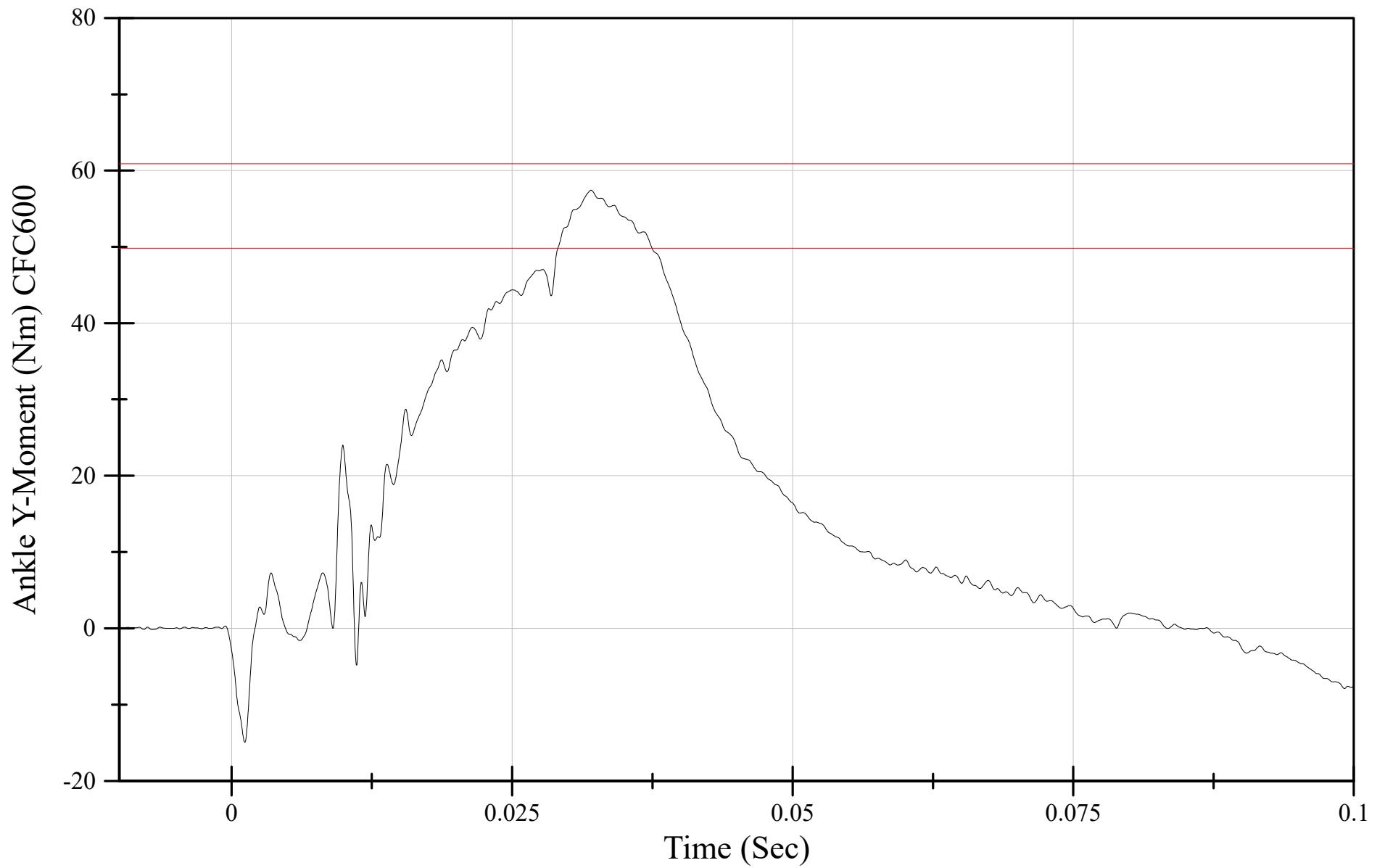
Serial Number: EG2595



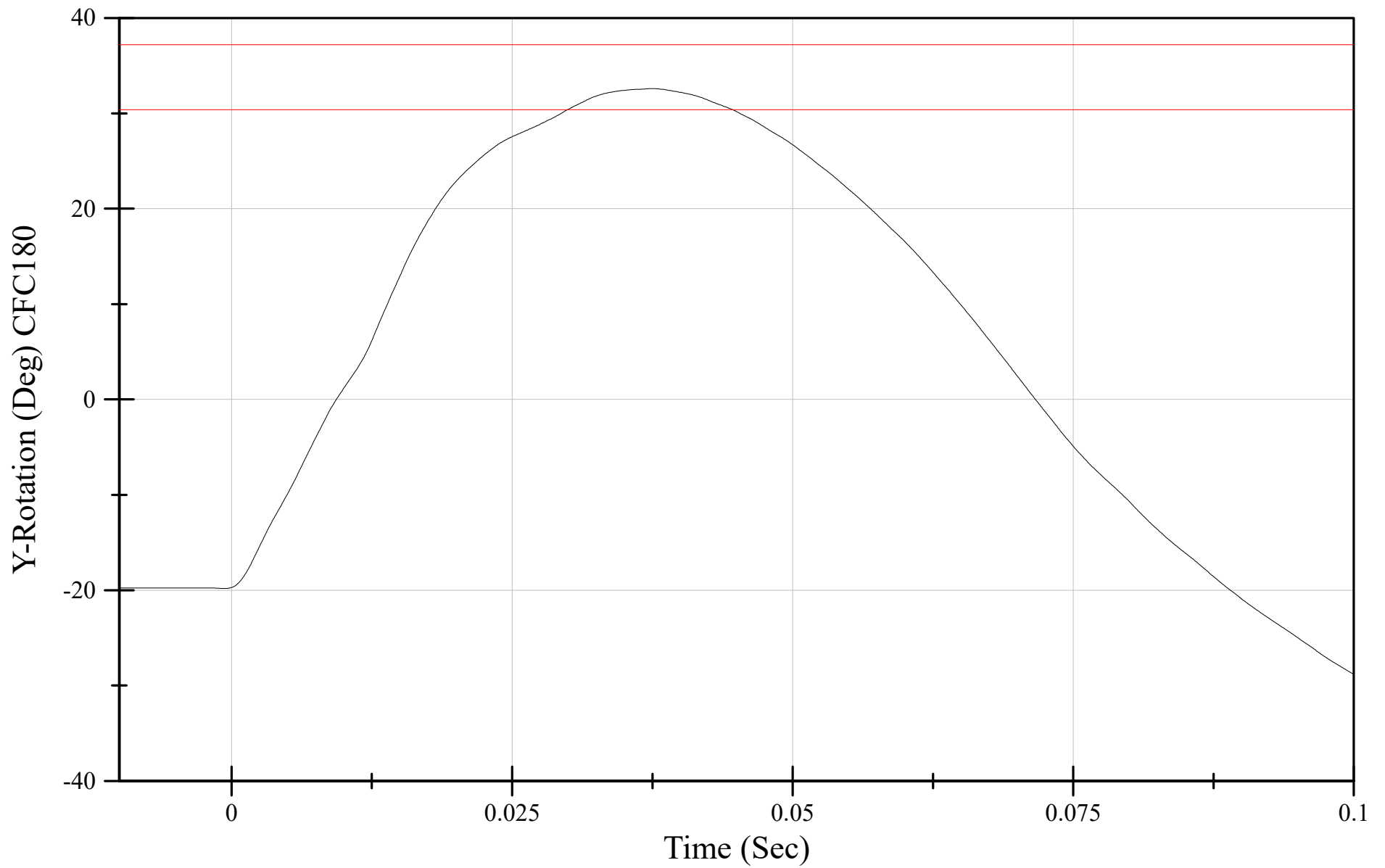
THOR-50M Left Ball of Foot Qualification

Ankle Y-Moment

Serial Number: EG2595



THOR-50M Left Ball of Foot Qualification
Ankle Y-Rotation
Serial Number: EG2595



THOR-50M Left Heel Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Test ID: 241030-13

Test Date: 10/30/2024

Test Time: 4:16 PM

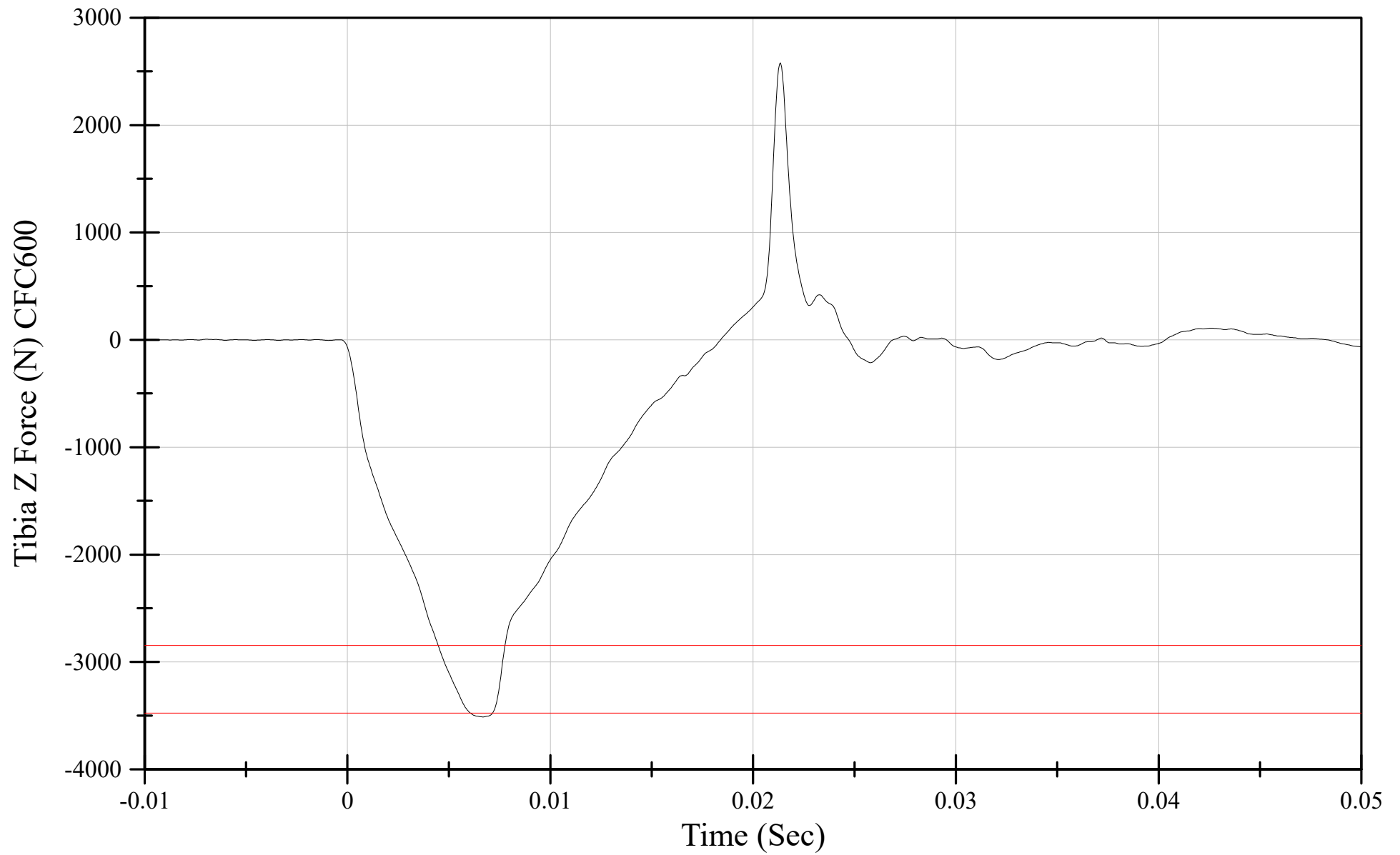
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	54	Pass
Test Velocity (m/s)	3.95 - 4.05	3.968	Pass
Peak Lower Tibia Fz (N)	-3478 - (-2846)	-3511.8	Fail

THOR-50M Left Heel Qualification

Tibia Load

Left Ankle Serial Number:



THOR-50M Left Eversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:

Left Eversion Stop: EQ2410

Test ID: 241031-4

Test Date: 10/31/2024

Test Time: 10:03 AM

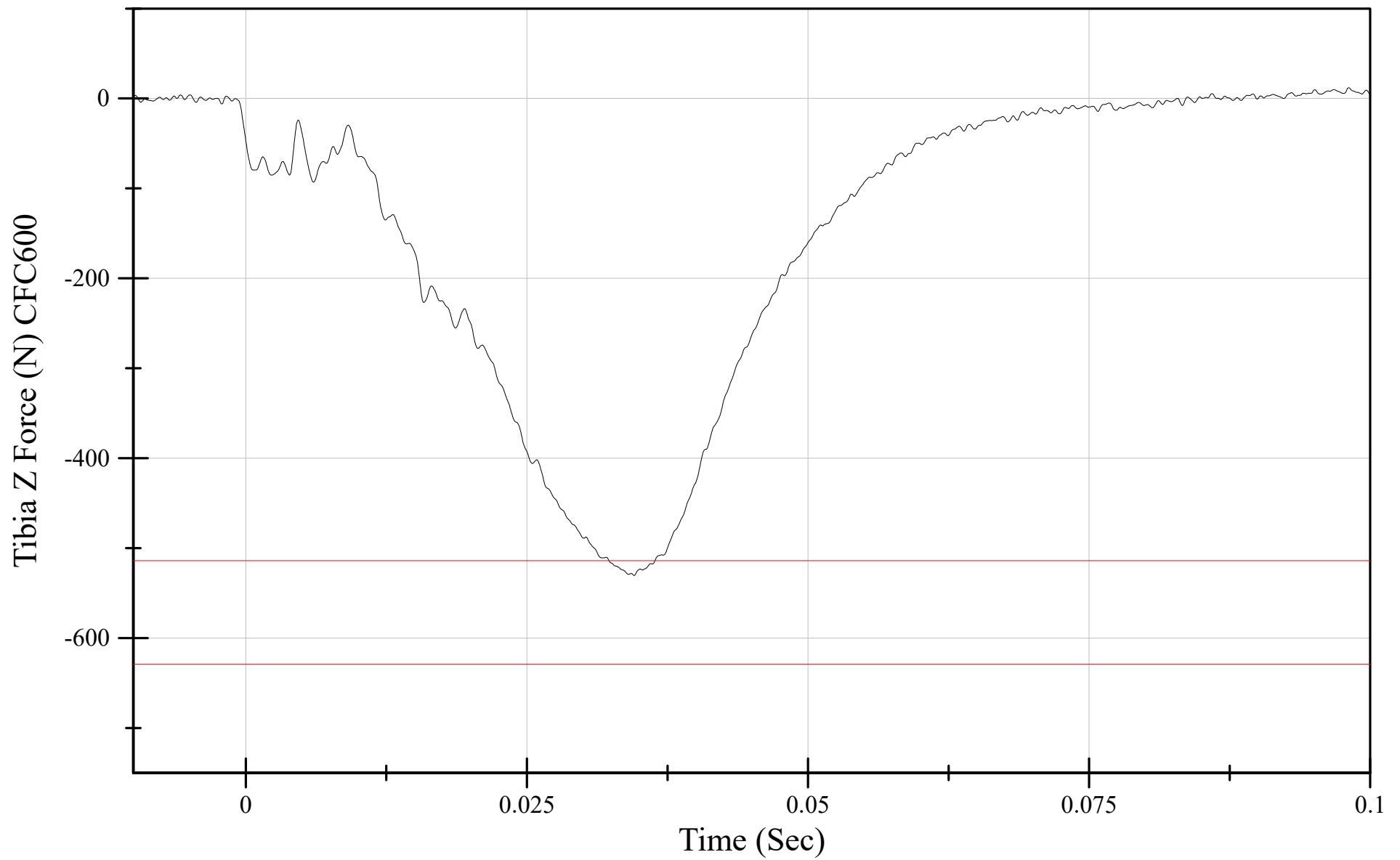
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	1.95 - 2.05	1.99	Pass
Peak Lower Tibia Fz (N)	-629 - (-514)	-531	Pass
Peak Ankle Resistive Moment (Nm)	38.7 - 47.3	40.0	Pass
Peak Ankle X-axis Rotation (deg)	26.6 - 32.5	27.6	Pass

THOR-50M Left Eversion Qualification

Tibia Load

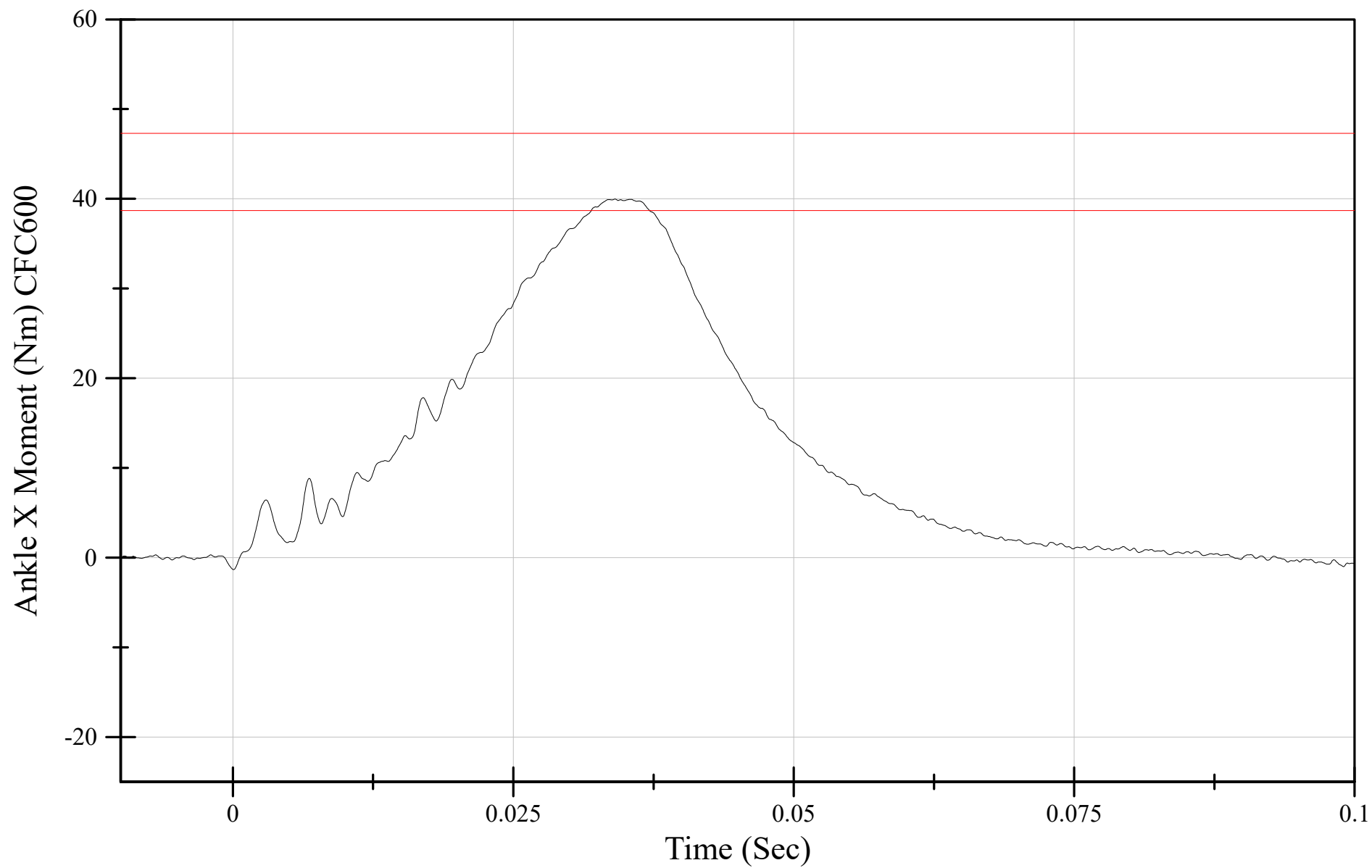
Serial Number: EG2595



THOR-50M Left Eversion Qualification

Ankle Moment

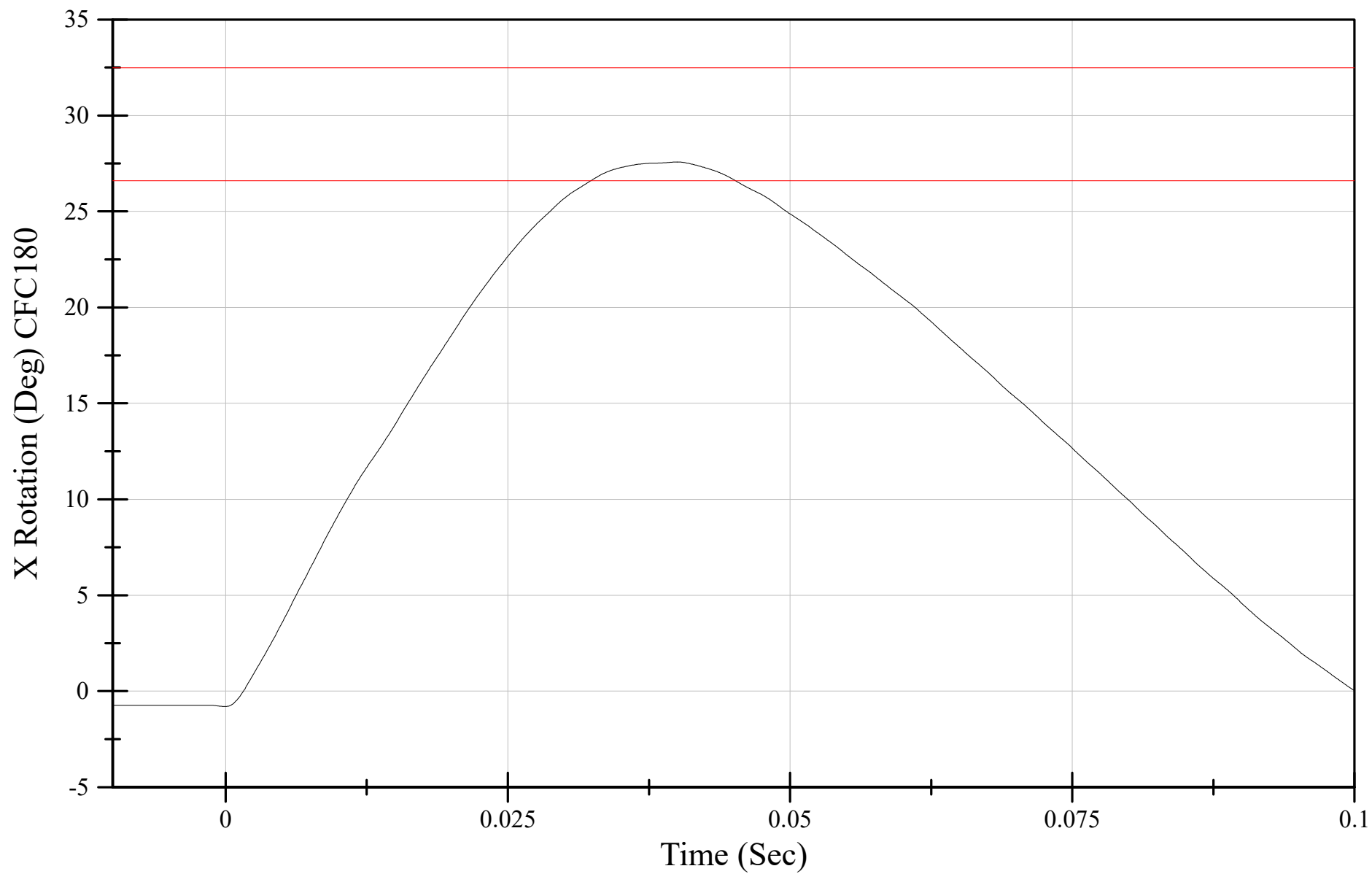
Serial Number: EG2595



THOR-50M Left Eversion Qualification

Ankle X Rotation

Serial Number: EG2595



THOR-50M Left Inversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Left Ankle:
Left Inversion Stop: EQ2410

Test ID: 241031-3

Test Date: 10/31/2024

Test Time: 9:00 AM

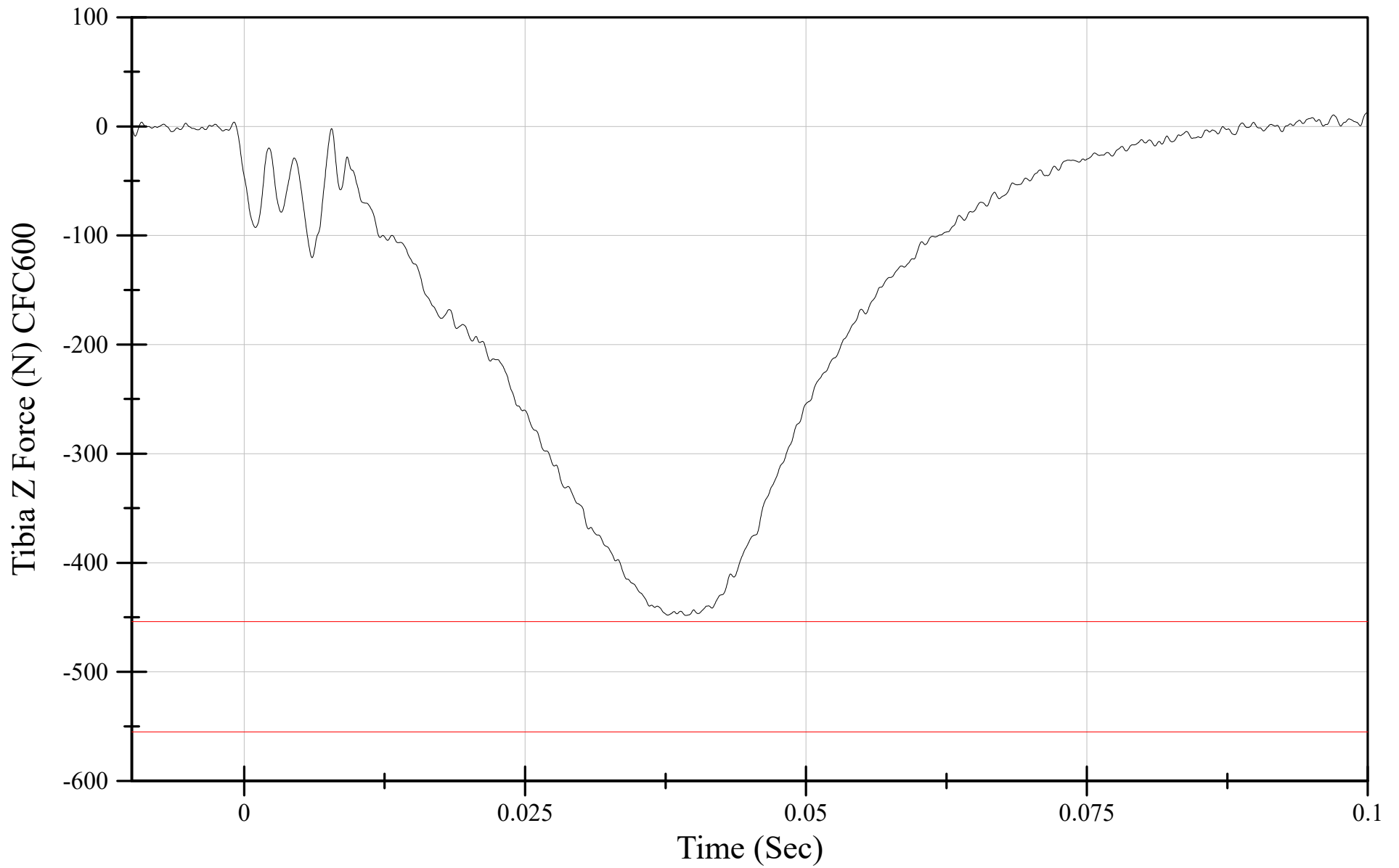
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	1.95 - 2.05	1.99	Pass
Peak Lower Tibia Fz (N)	-555 - (-454)	-448	Fail
Peak Ankle Resistive Moment (Nm)	-43.0 - (-35.2)	-35.9	Pass
Peak Ankle X-axis Rotation (deg)	-37.9 - (-31.0)	-33.7	Pass

THOR-50M Left Inversion Qualification

Tibia Load

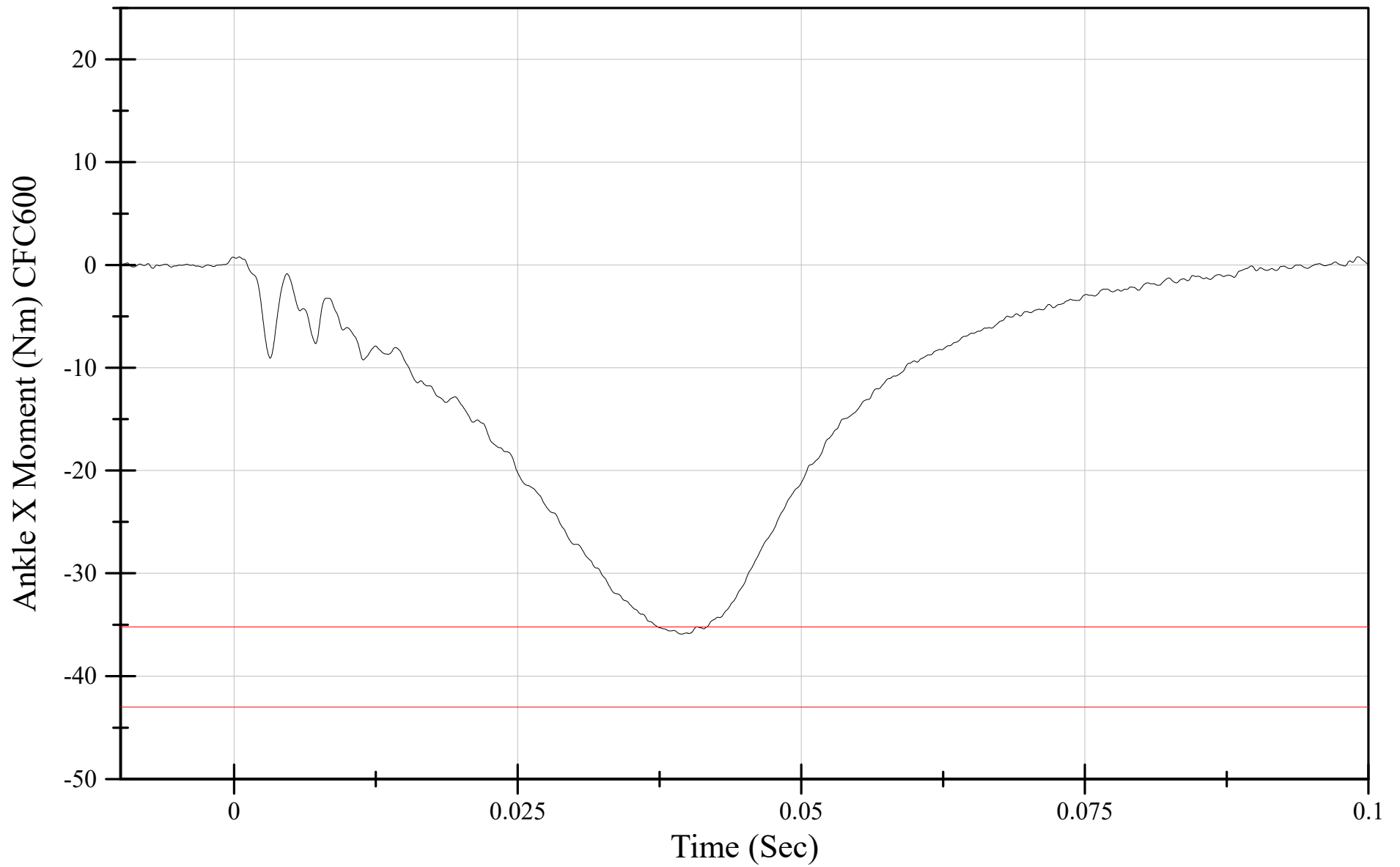
Left Ankle Serial Number:



THOR-50M Left Inversion Qualification

Ankle Moment

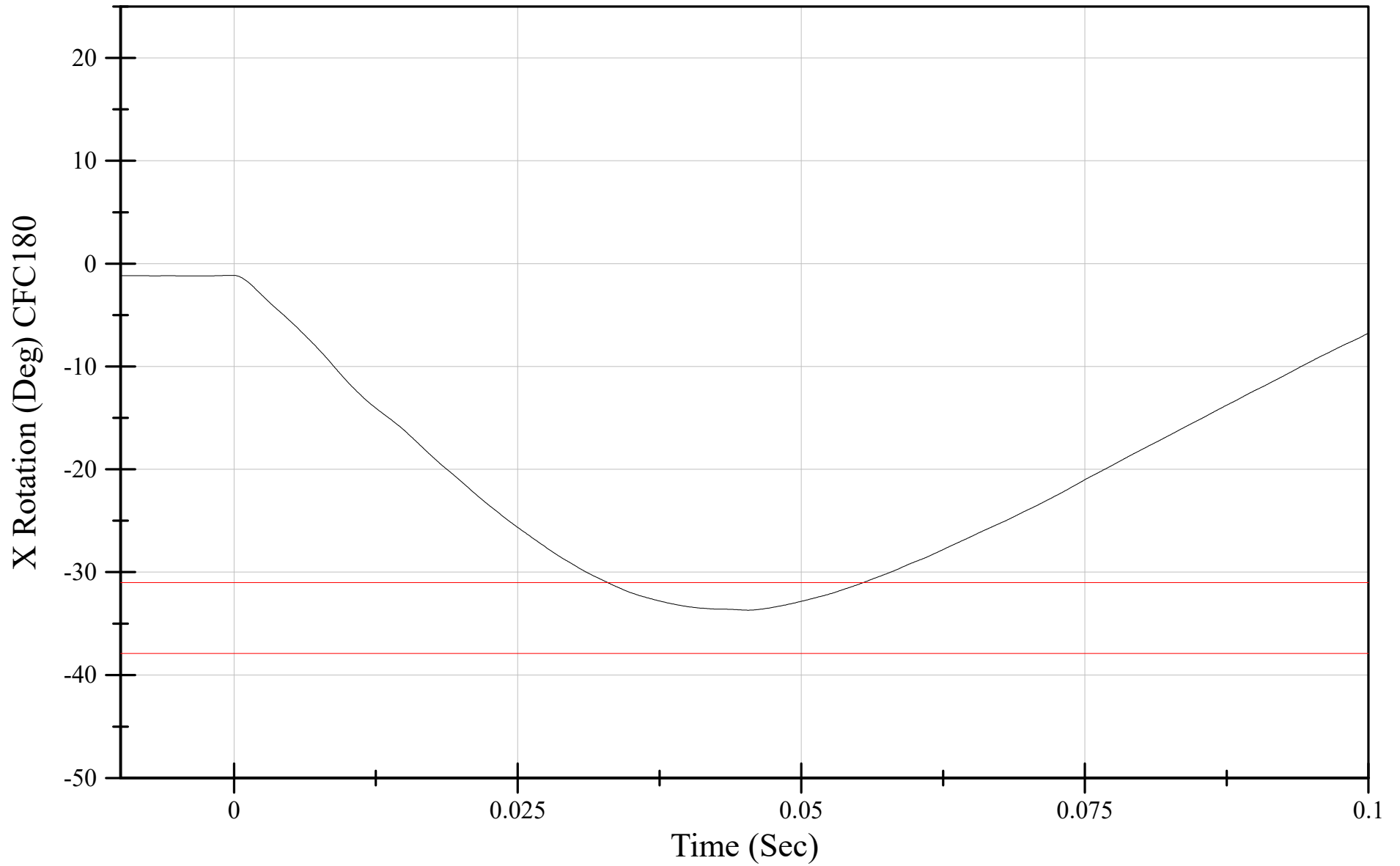
Left Ankle Serial Number:



THOR-50M Left Inversion Qualification

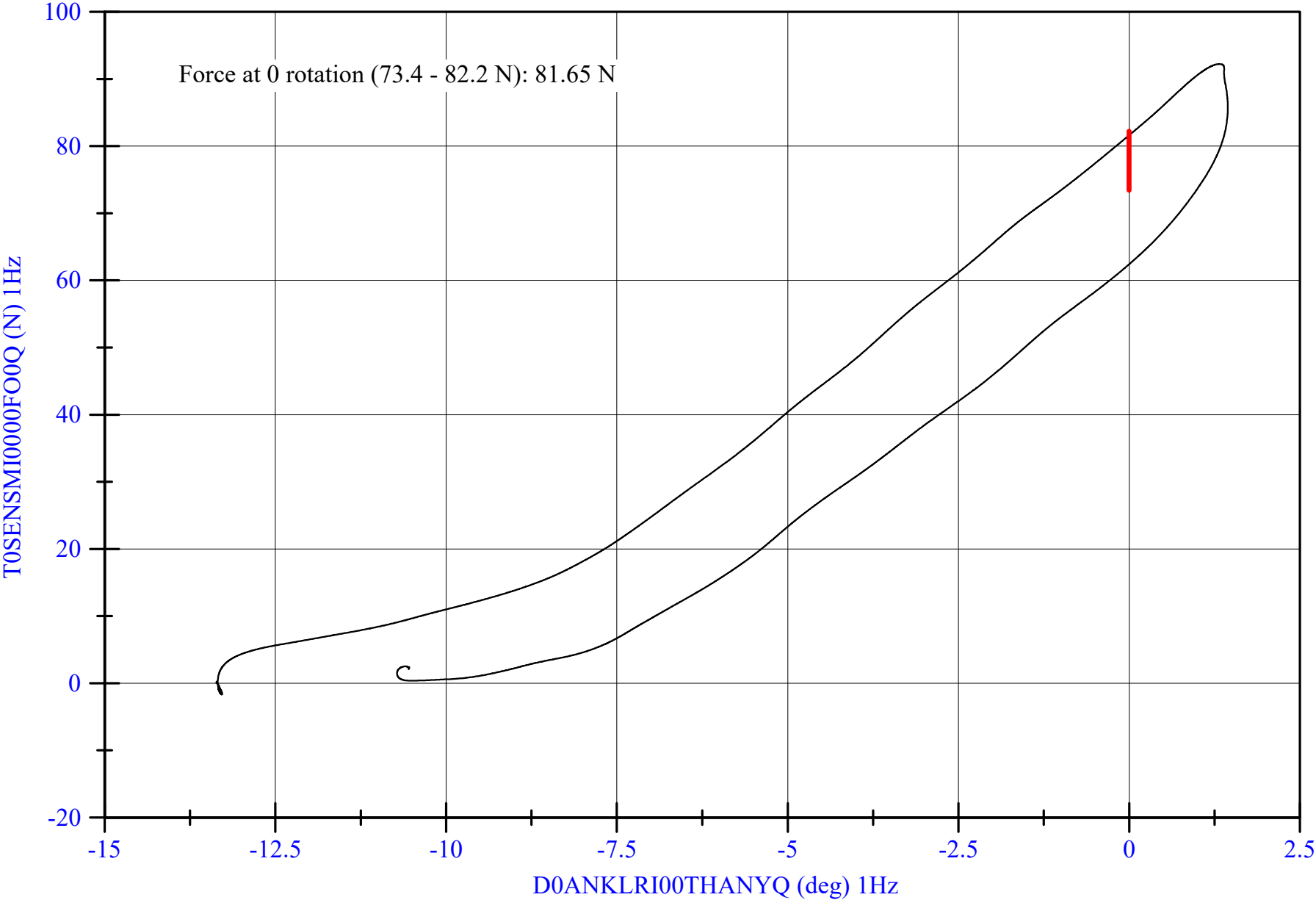
Ankle X Rotation

Left Ankle Serial Number:



Test Temperature: 21.2° C
Test Humidity: 57%

Right Achilles Force
LX Leg SN:



THOR-50M Right Ball of Foot Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Right Ankle:

Right Dorsiflexion Stop: ER8521

Test ID: 241031-13

Test Date: 10/31/2024

Test Time: 2:40 PM

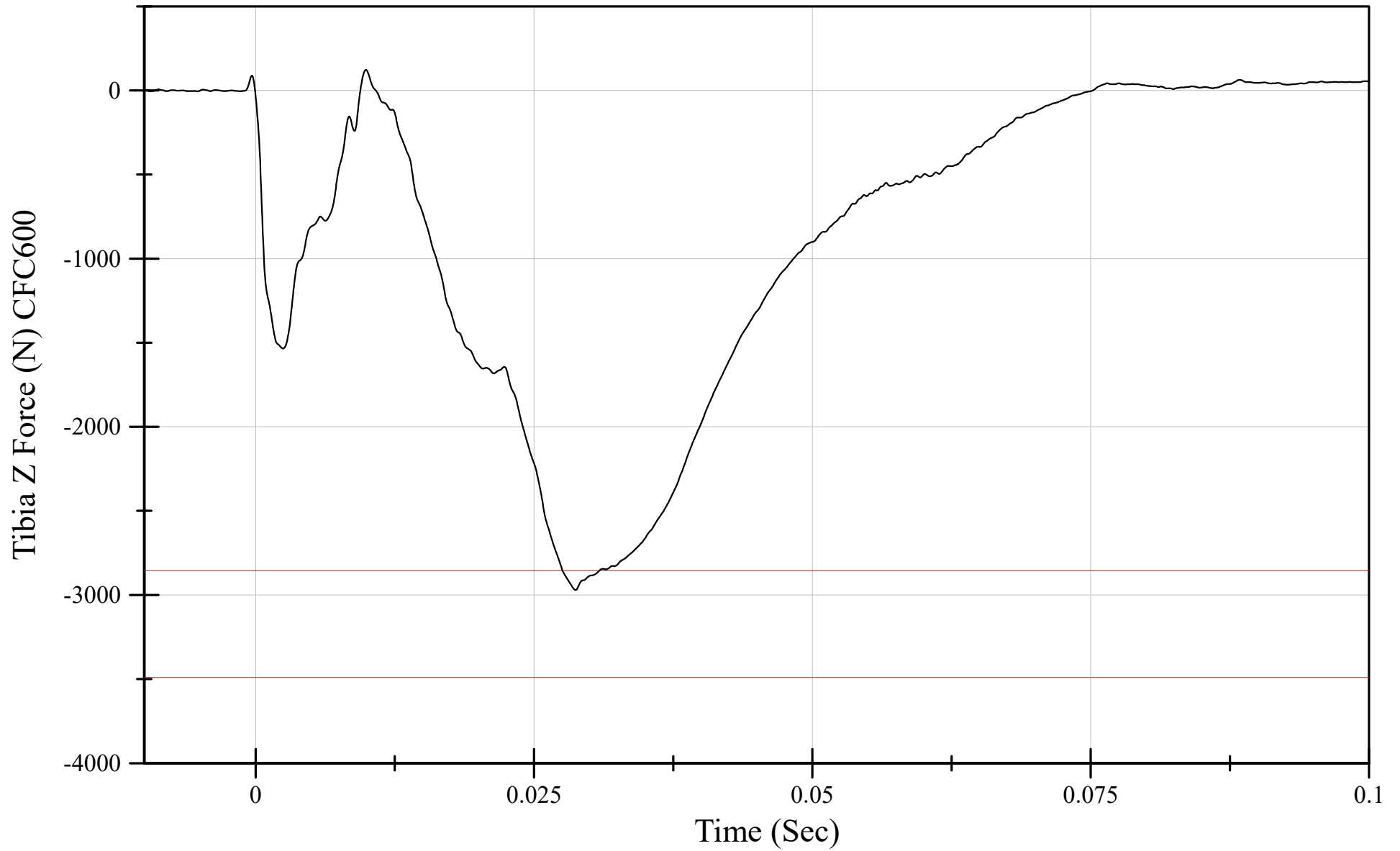
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.95 - 5.05	4.966	Pass
Peak Lower Tibia Fz (N)	-3487 - (-2853)	-2970.3	Pass
Peak Ankle Resistive Moment (Nm)	49.8 - 60.8	56.37	Pass
Peak Ankle Y-axis Rotation (deg)	30.4 - 37.2	31.75	Pass

THOR-50M Right Ball of Foot Qualification

Tibia Load

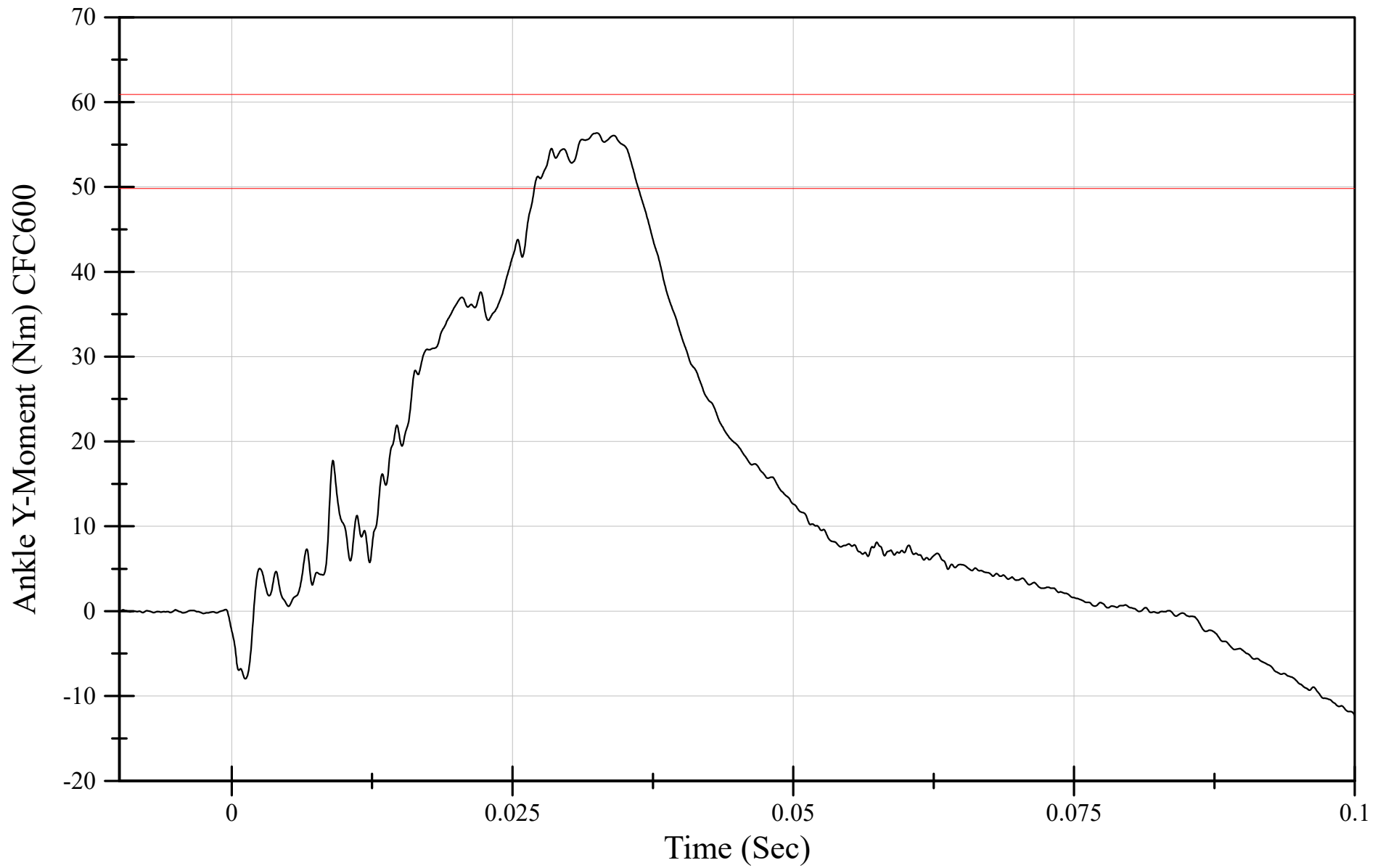
Serial Number:



THOR-50M Right Ball of Foot Qualification

Ankle Y-Moment

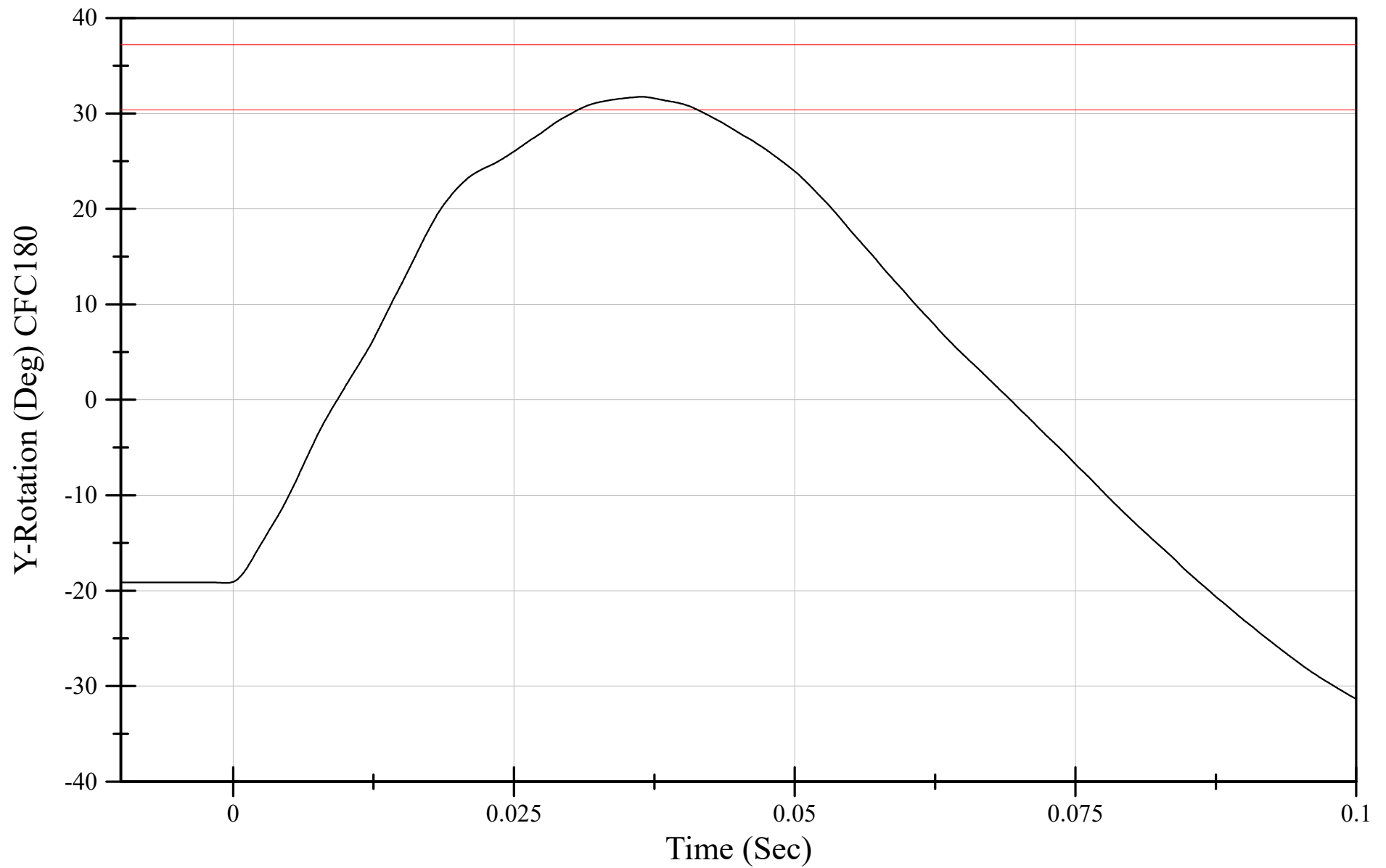
Serial Number:



THOR-50M Right Ball of Foot Qualification

Ankle Y-Rotation

Serial Number:



THOR-50M Right Eversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Right Ankle:

Right Eversion Stop: ER4910

Test ID: 241031-9

Test Date: 10/31/2024

Test Time: 12:50 PM

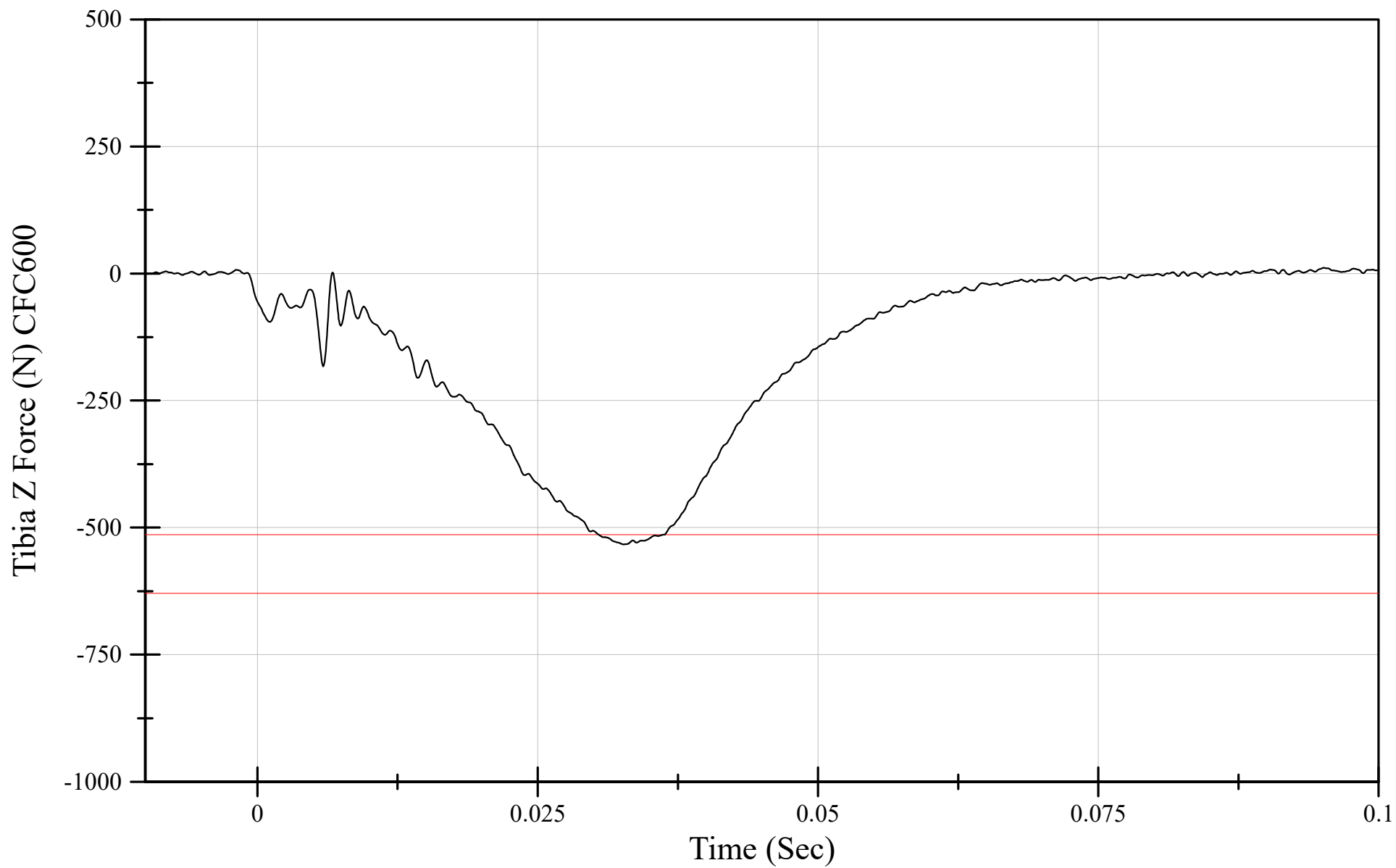
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	57	Pass
Test Velocity (m/s)	1.95 - 2.05	2.01	Pass
Peak Lower Tibia Fz (N)	-629 - (-514)	-533	Pass
Peak Ankle Resistive Moment (Nm)	-47.3 - (-38.7)	-40.9	Pass
Peak Ankle X-axis Rotation (deg)	-32.5 - (-26.6)	-29.1	Pass

THOR-50M Right Eversion Qualification

Tibia Load

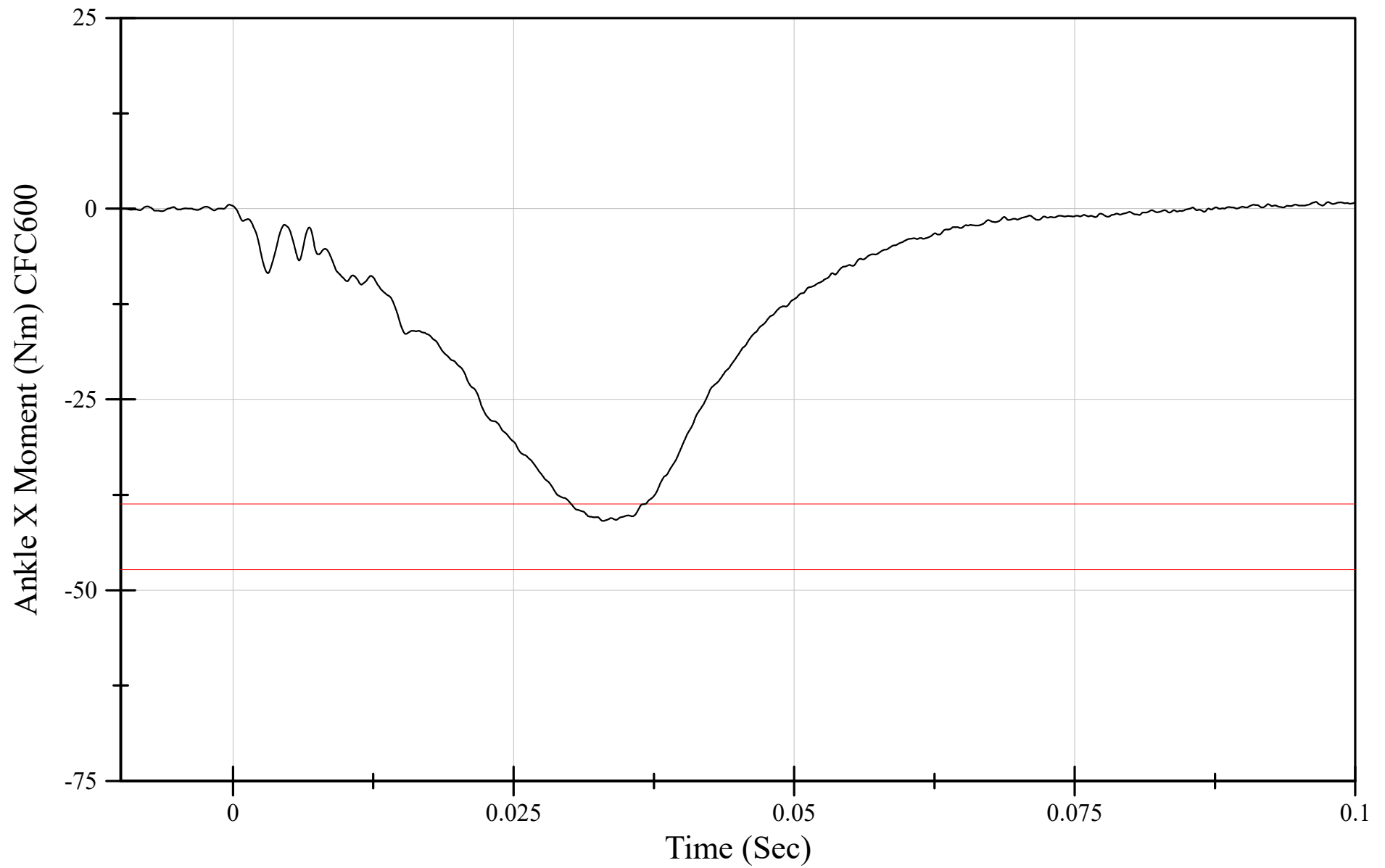
Serial Number: EG2595



THOR-50M Right Eversion Qualification

Ankle Moment

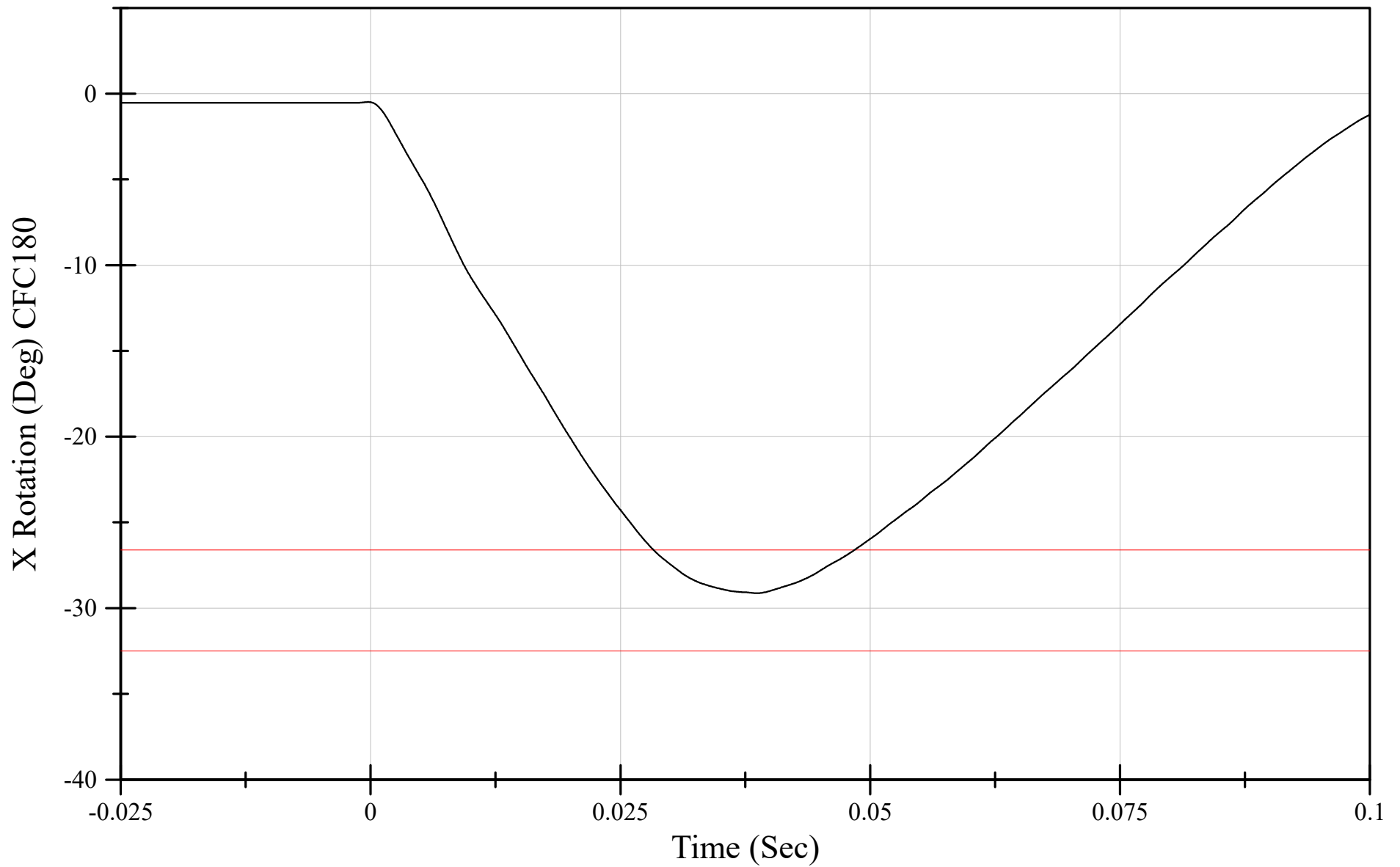
Serial Number: EG2595



THOR-50M Right Eversion Qualification

Ankle X Rotation

Serial Number: EG2595



THOR-50M Right Heel Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Right Ankle:

Test ID: 241104-1

Test Date: 11/4/2024

Test Time: 6:42 AM

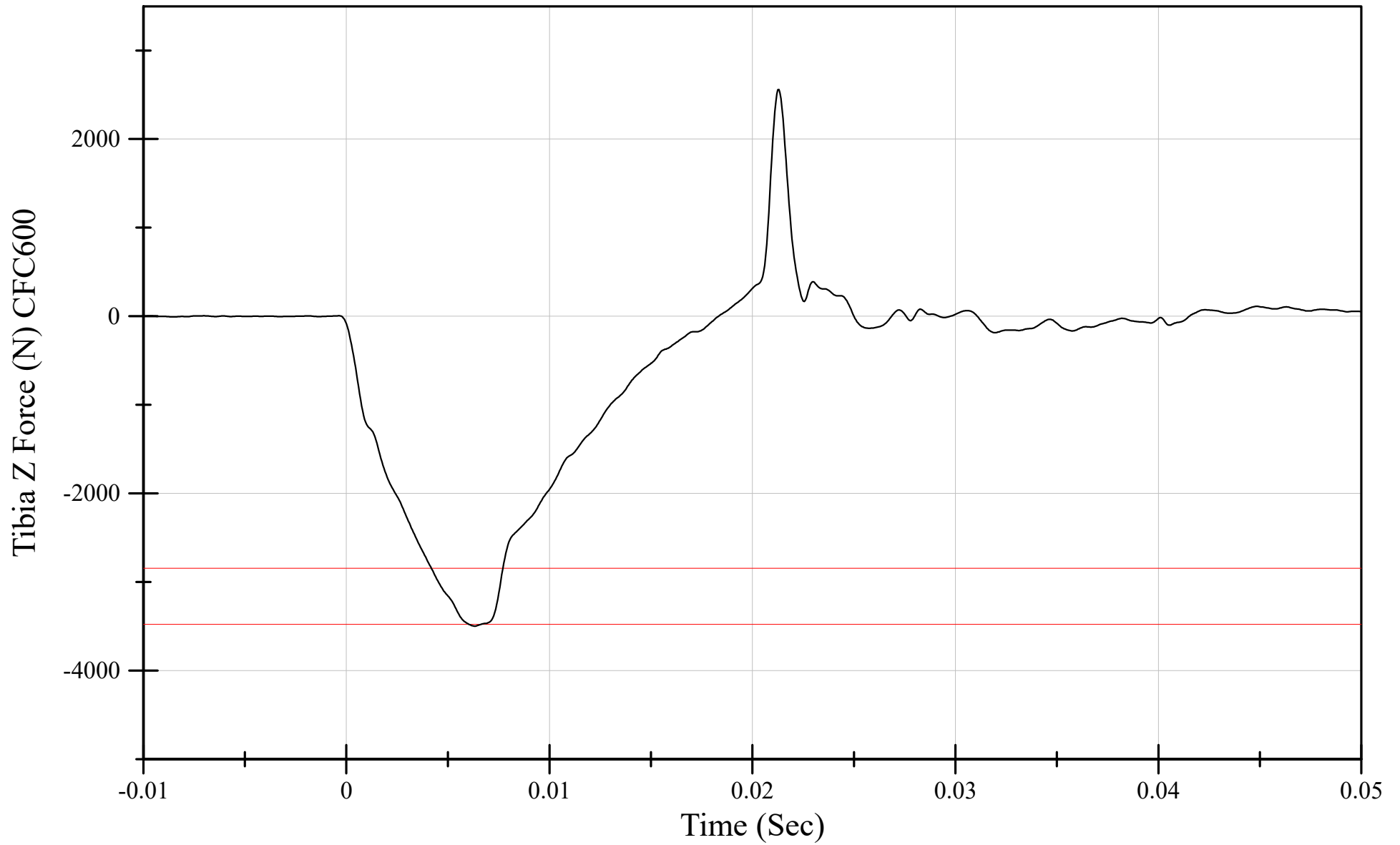
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	99.0	Fail
Test Humidity (%)	10 - 70	1	Fail
Test Velocity (m/s)	3.95 - 4.05	3.96	Pass
Peak Lower Tibia Fz (N)	-3478 - (-2846)	-3498	Fail

THOR-50M Right Heel Qualification

Tibia Load

Serial Number:



THOR-50M Right Inversion Qualification

Test Results Summary

Dummy Serial Number: EG2595

Tested Components

Right Ankle:
Right Inversion Stop: EQ2398

Test ID: 241031-8
Test Date: 10/31/2024
Test Time: 12:17 PM

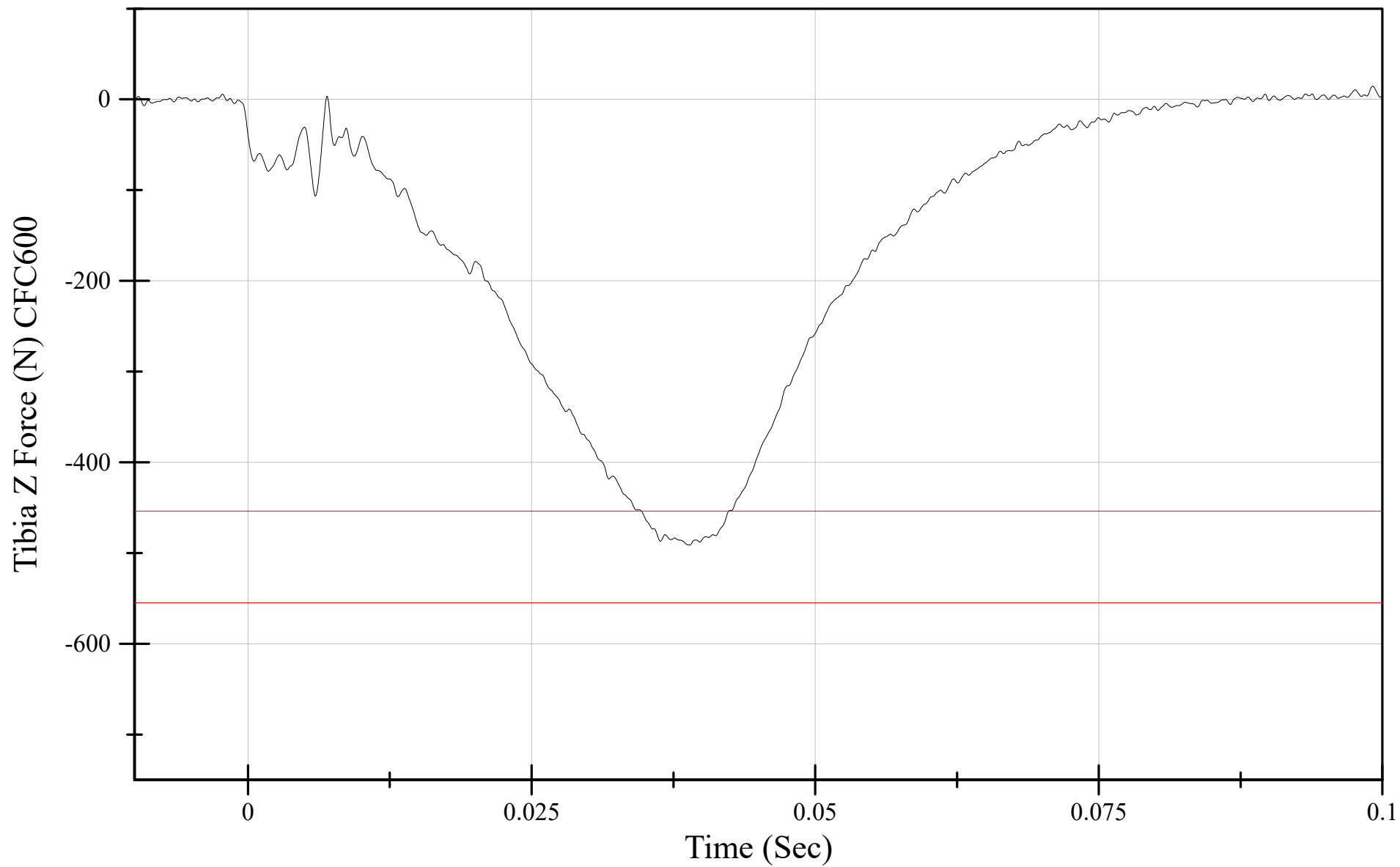
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	57	Pass
Test Velocity (m/s)	1.95 - 2.05	2.01	Pass
Peak Lower Tibia Fz (N)	-555 - (-454)	-491	Pass
Peak Ankle Resistive Moment (Nm)	35.2 - 43.0	38.6	Pass
Peak Ankle X-axis Rotation (deg)	31.0 - 37.9	33.3	Pass

THOR-50M Right Inversion Qualification

Tibia Load

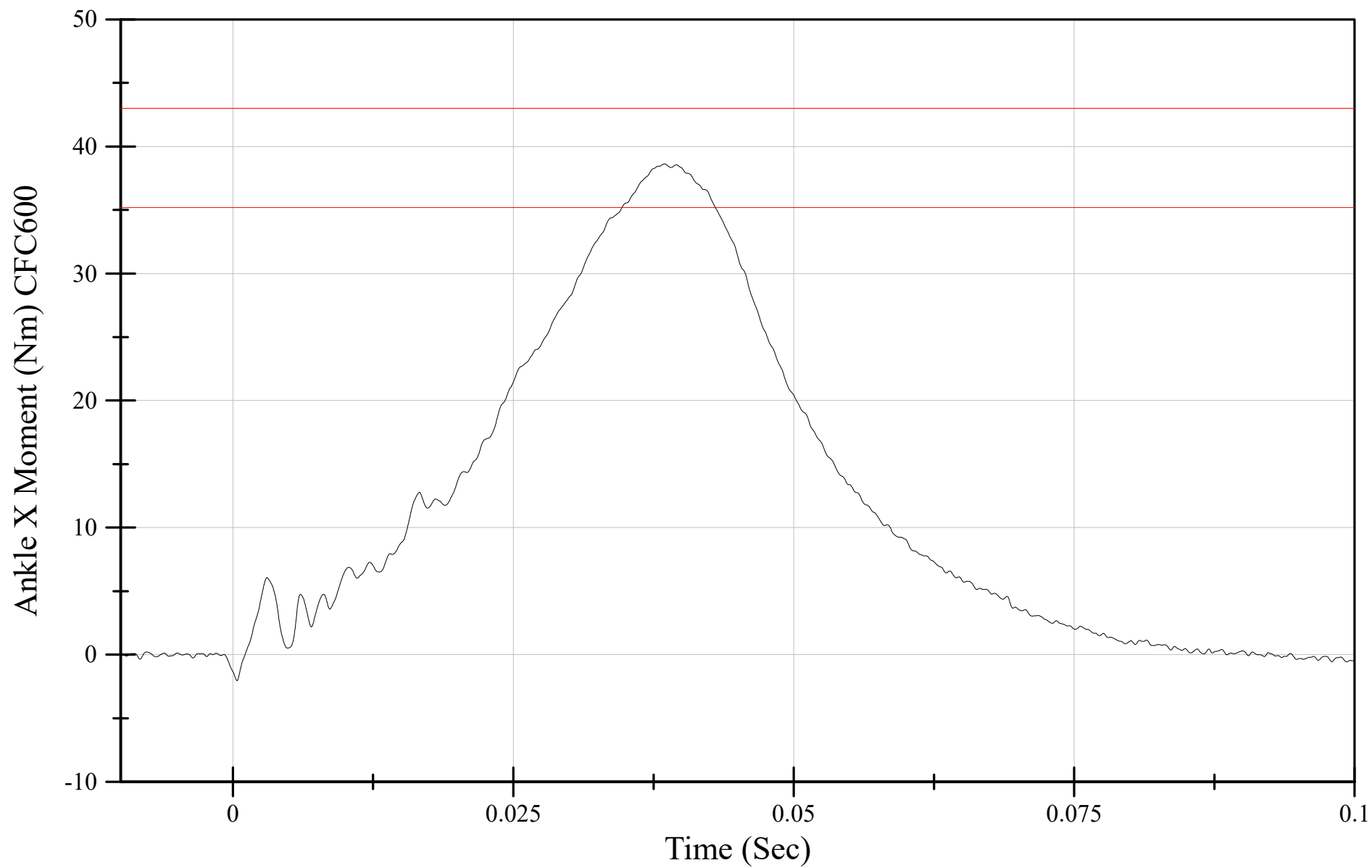
Right Ankle Serial Number:



THOR-50M Right Inversion Qualification

Ankle Moment

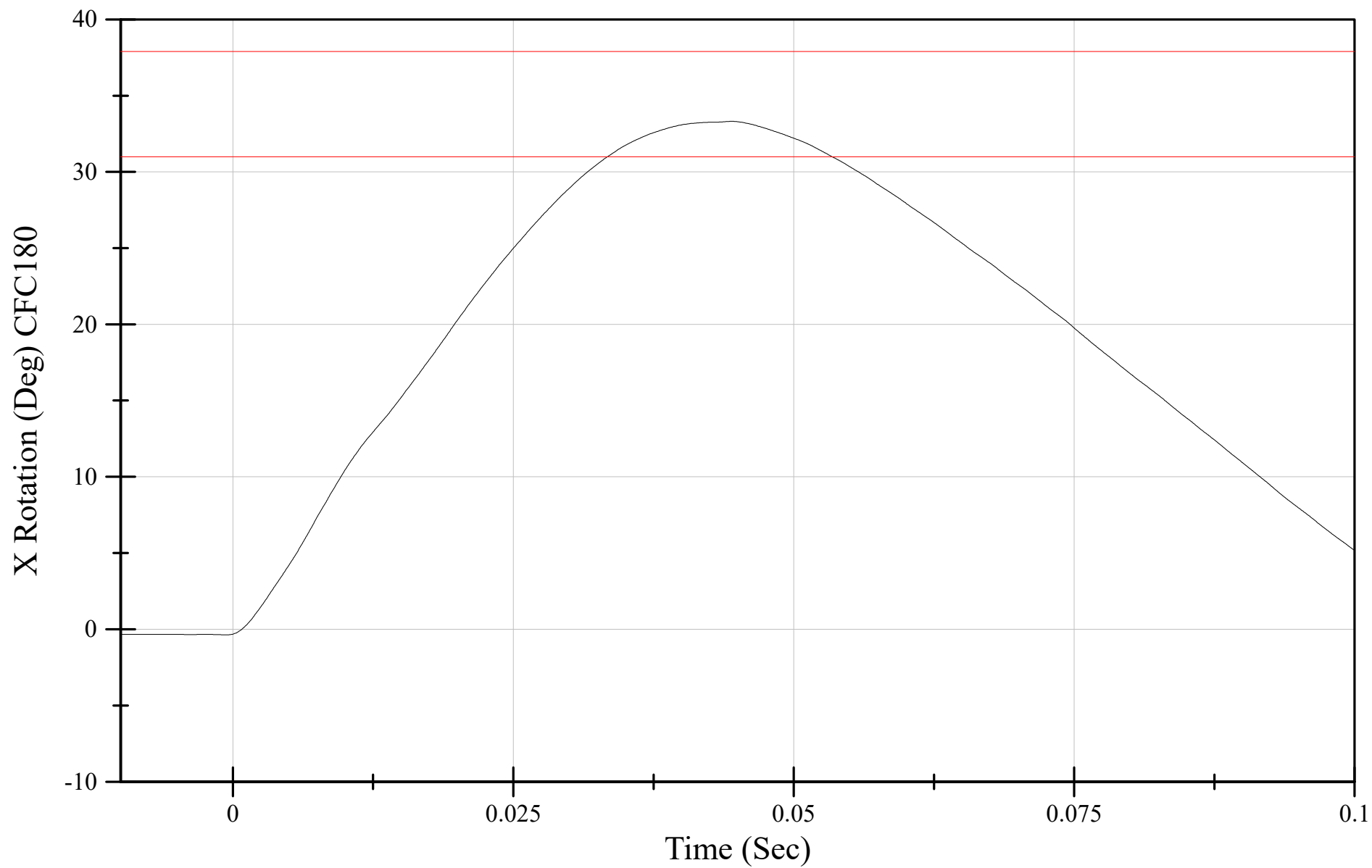
Right Ankle Serial Number:



THOR-50M Right Inversion Qualification

Ankle X Rotation

Right Ankle Serial Number:



THOR-50M Head Impact Qualification
Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Head Skin: EW9412

Test ID: 240925-8

Test Date: 9/25/2024

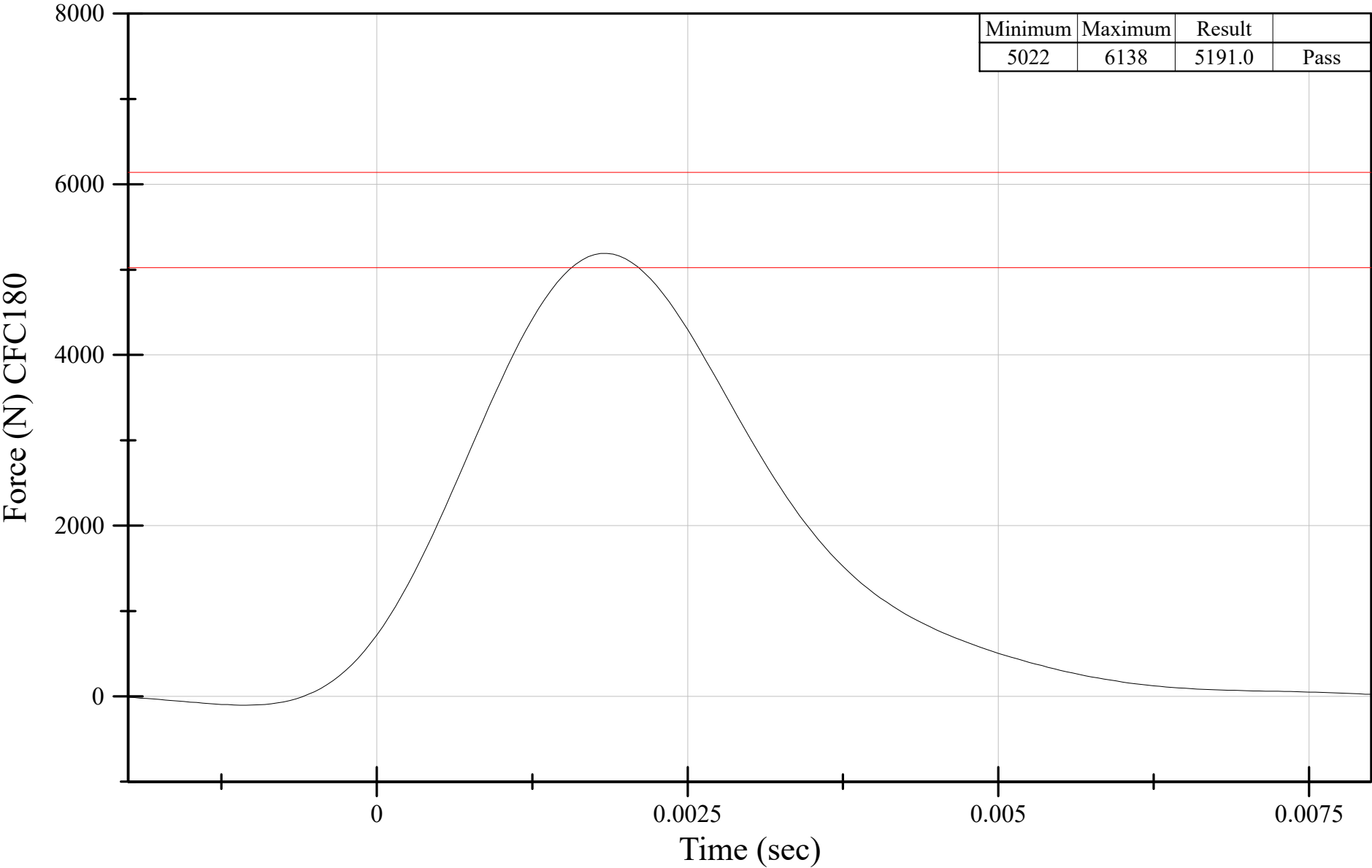
Test Time: 4:22 PM

Test Results

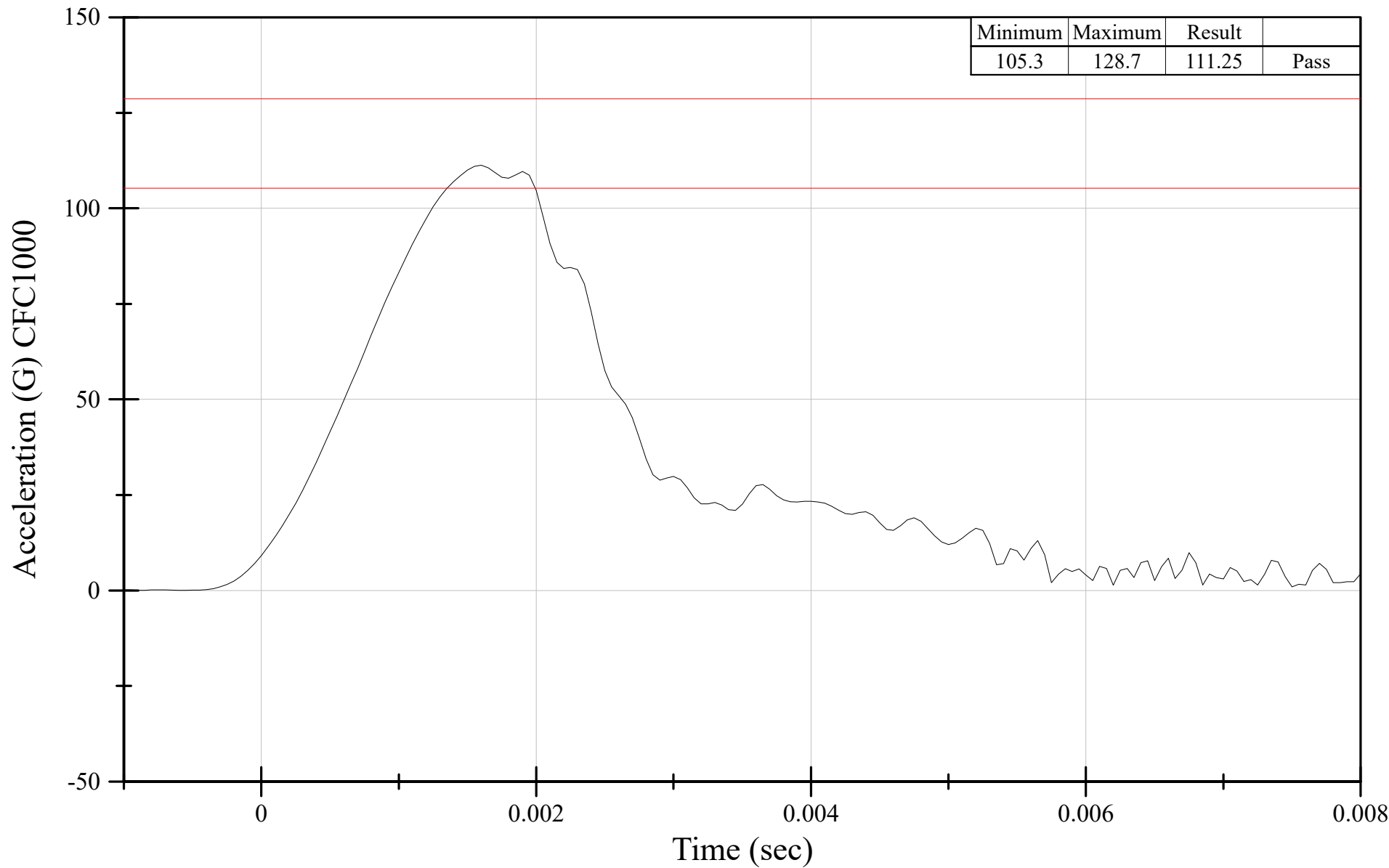
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.9	Pass
Test Humidity (%)	10 - 70	54	Pass
Test Velocity (m/s)	1.95 - 2.05	1.966	Pass
Peak Probe Force (N)	5022 - 6138	5191.0	Pass
Peak Head CG Resultant Acceleration (g)	105.3 - 128.7	111.25	Pass

* THOR-50M Qualification Manual - April 2023

THOR-50M Head Impact Qualification
Probe Force
Serial Number: DO9799



THOR-50M Head Impact Qualification
Head CG Resultant Acceleration
Serial Number: DO9799



THOR-50M Neck Left Torsion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 240911-3

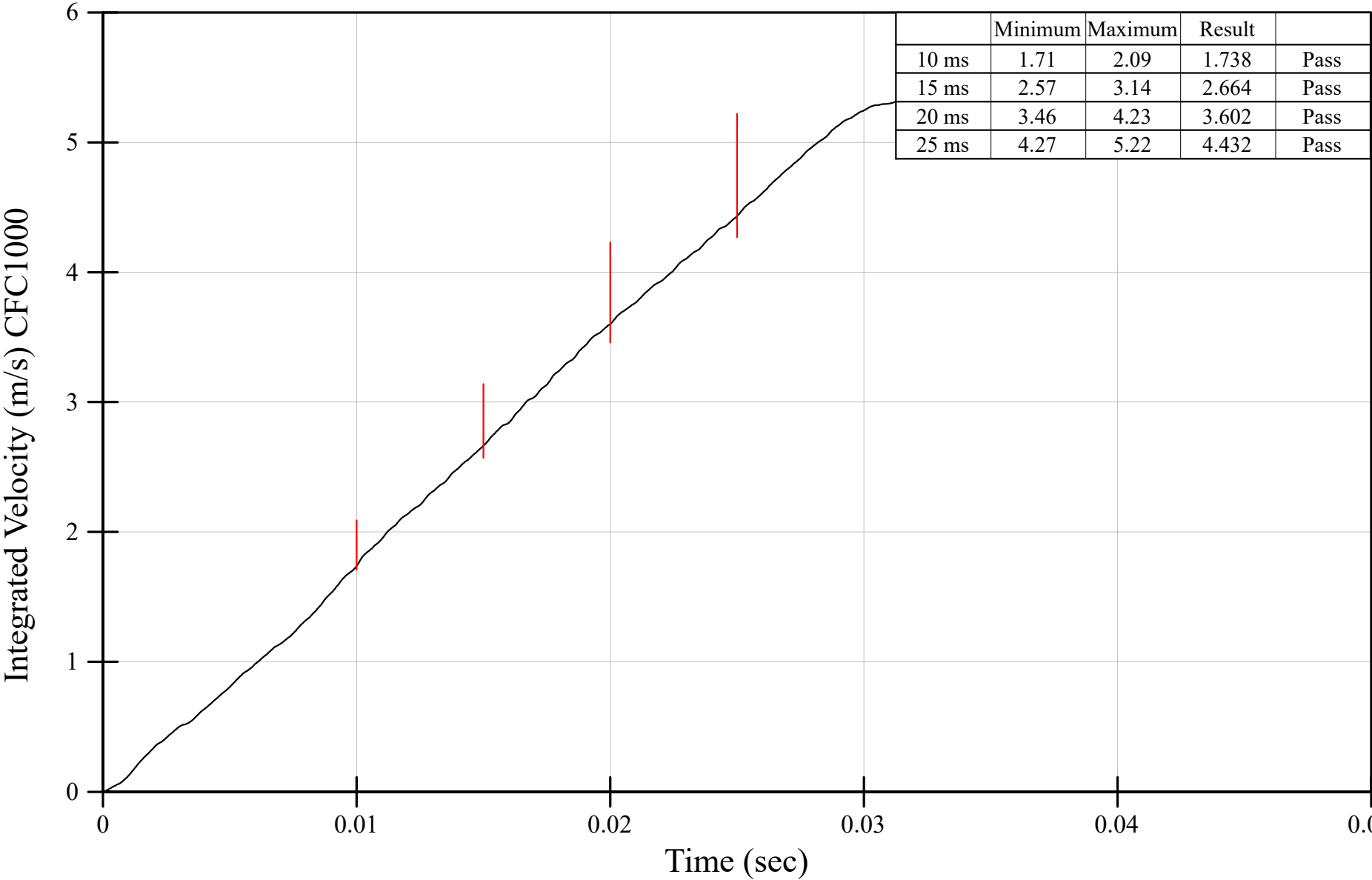
Test Date: 9/11/2024

Test Time: 8:24 AM

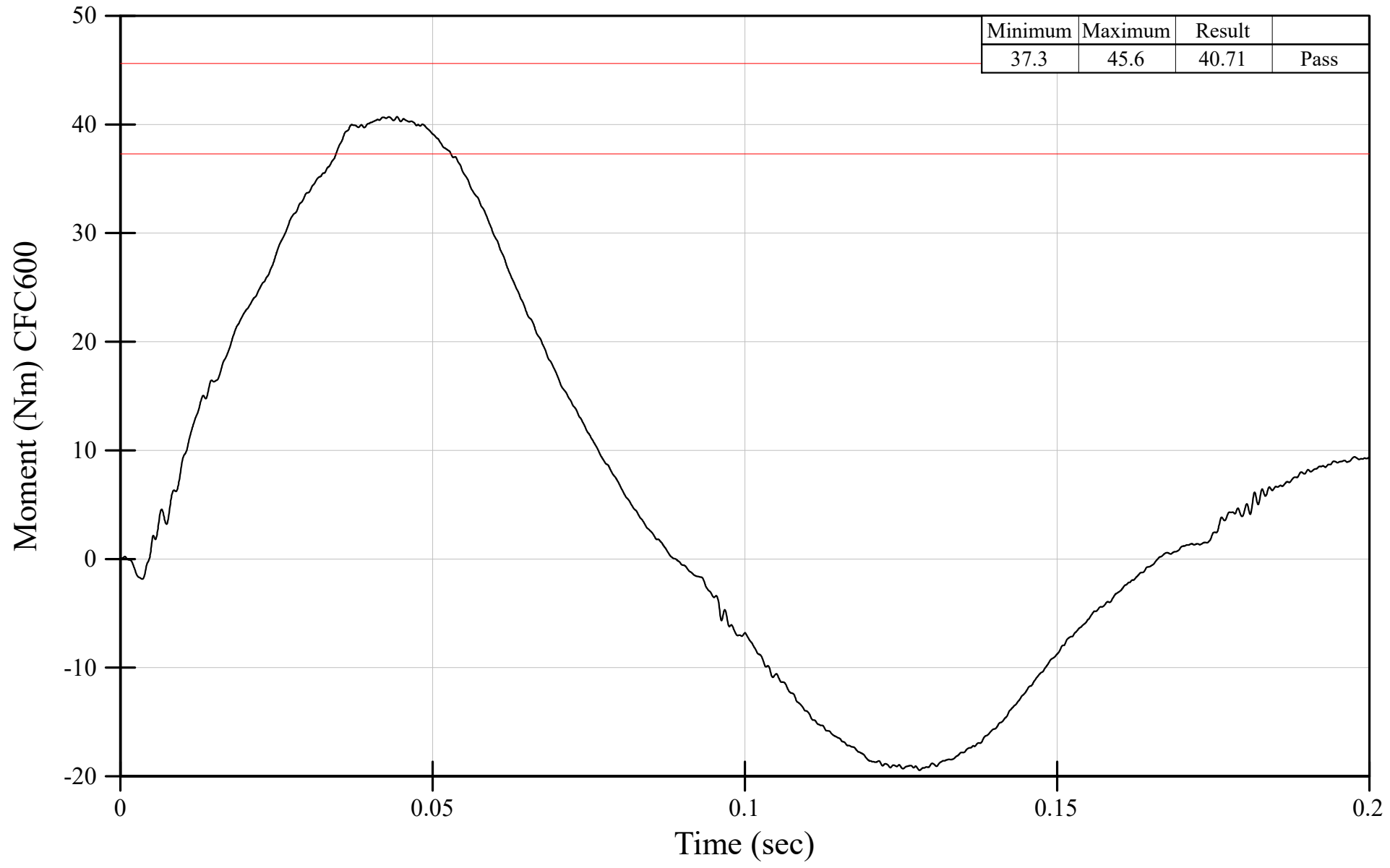
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	4.999	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.738	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.664	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.602	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.432	Pass
Peak Upper Neck Mz (Nm)	37.3 - 45.6	40.71	Pass
Peak Neck Fixture Rotation (deg)	-52.7 - (-43.1)	-49.84	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	-1529 - (-1251)	-1416.7	Pass

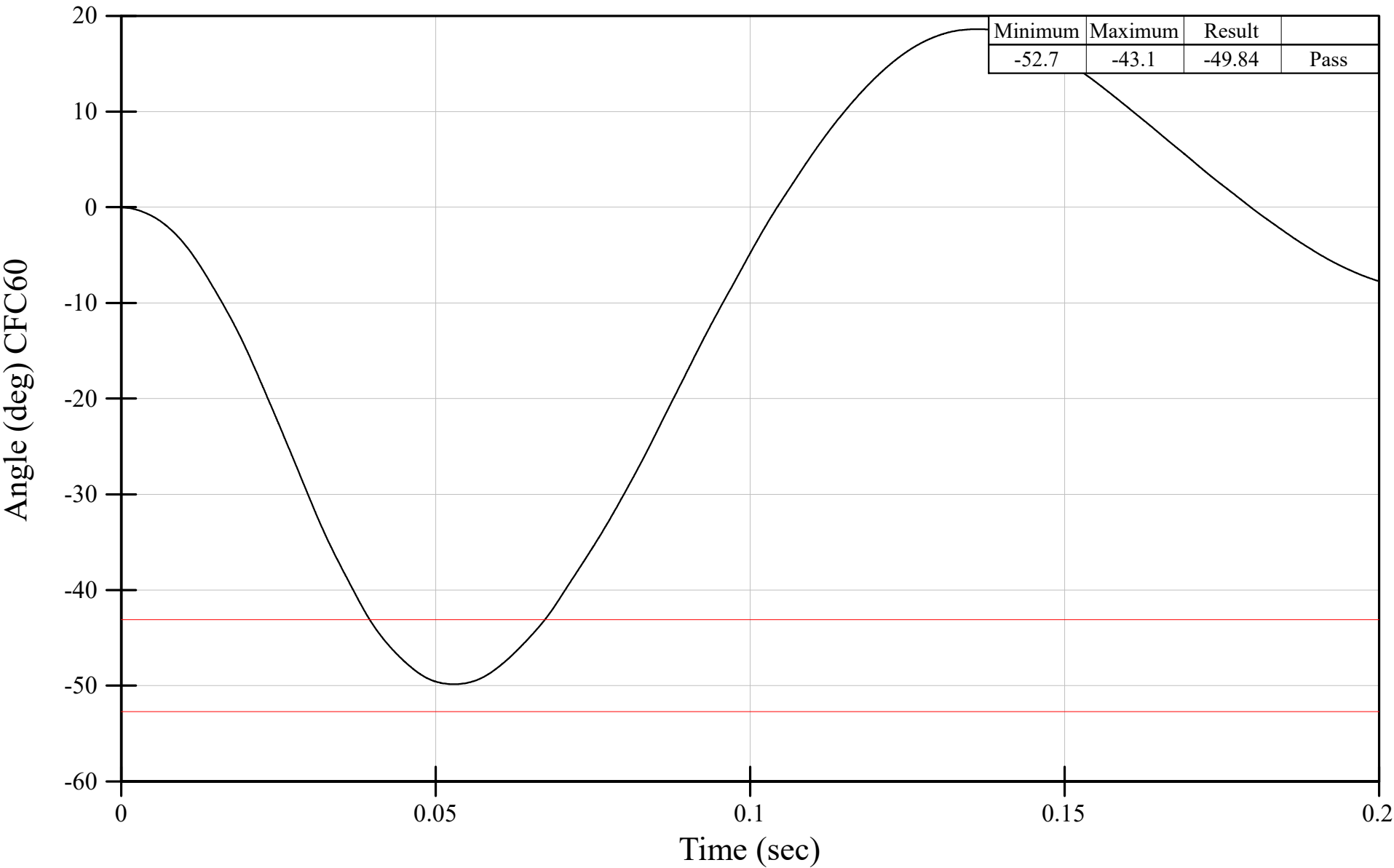
THOR-50M Neck Left Torsion Qualification
Pendulum Velocity
Neck Serial Number: FA8045



THOR-50M Neck Left Torsion Qualification
Peak Upper Neck Moment Z
Neck Serial Number: FA8045



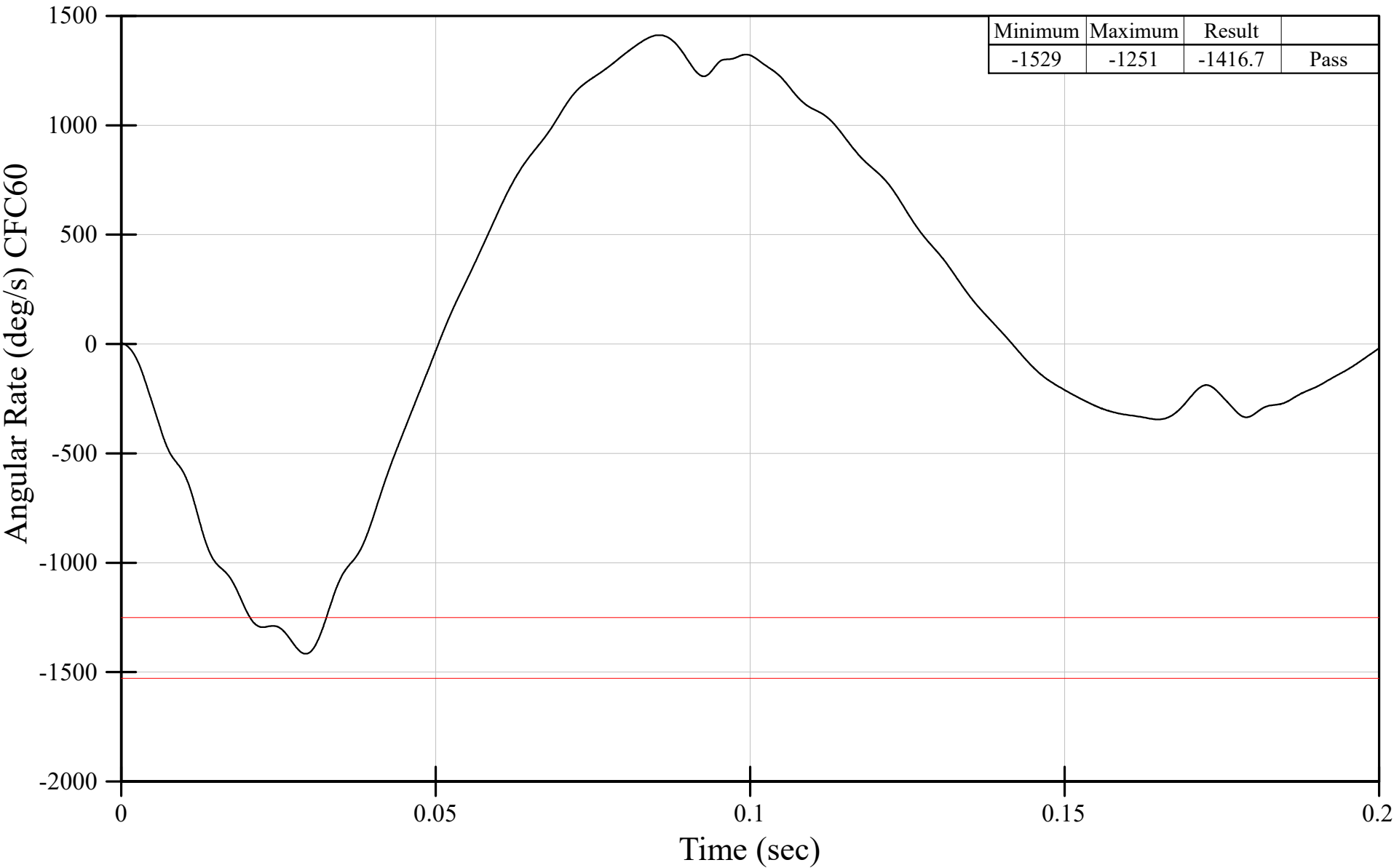
THOR-50M Neck Left Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: FA8045



THOR-50M Neck Left Torsion Qualification

Peak Angular Rate

Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 240911-6

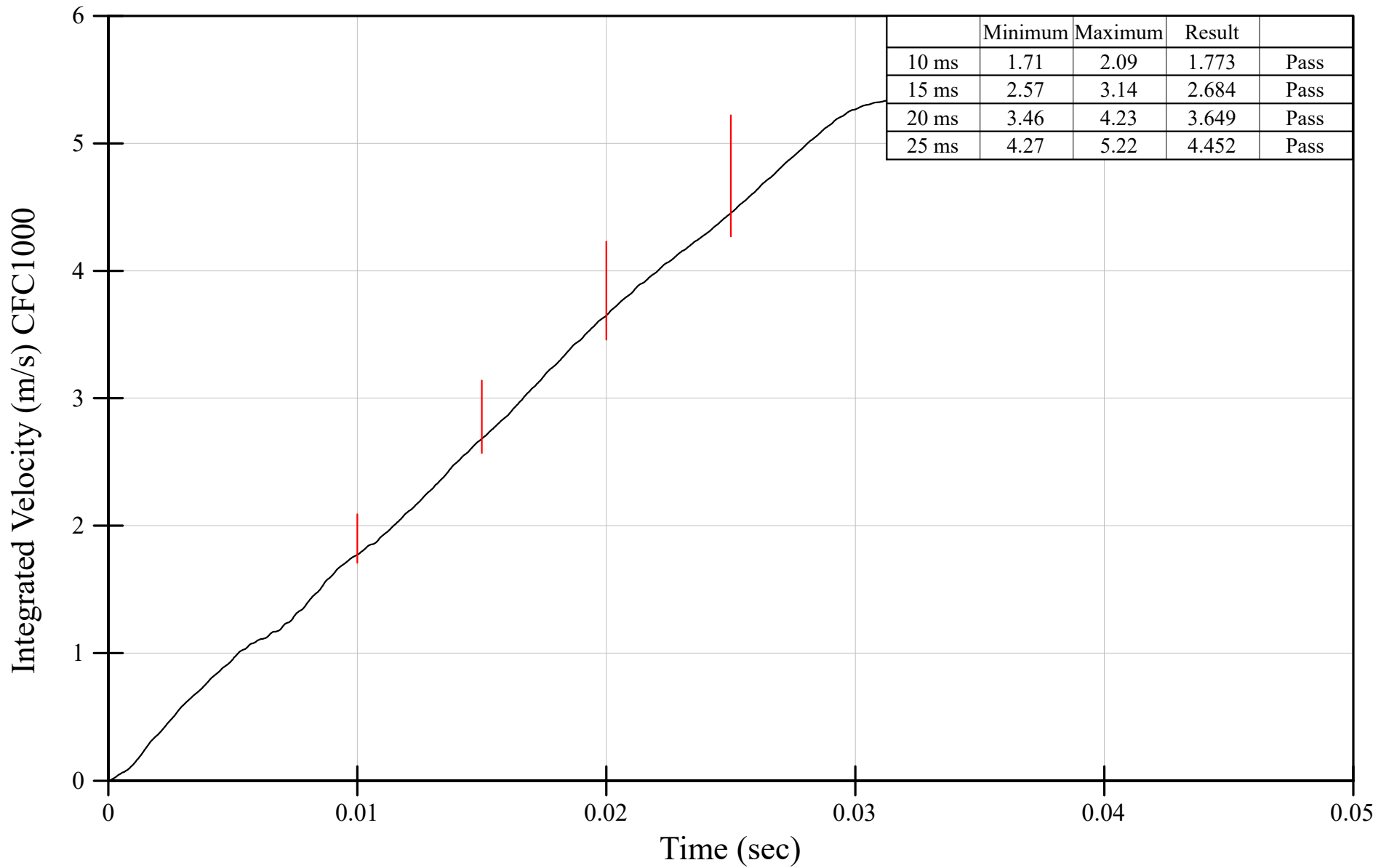
Test Date: 9/11/2024

Test Time: 9:06 AM

Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	52	Pass
Test Velocity (m/s)	4.95 - 5.05	5.008	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.773	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.684	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.649	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.452	Pass
Peak Upper Neck Mz (Nm)	-45.6 - (-37.3)	-40.45	Pass
Peak Neck Fixture Rotation (deg)	43.1 - 52.7	50.04	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	1251 - 1529	1417.8	Pass

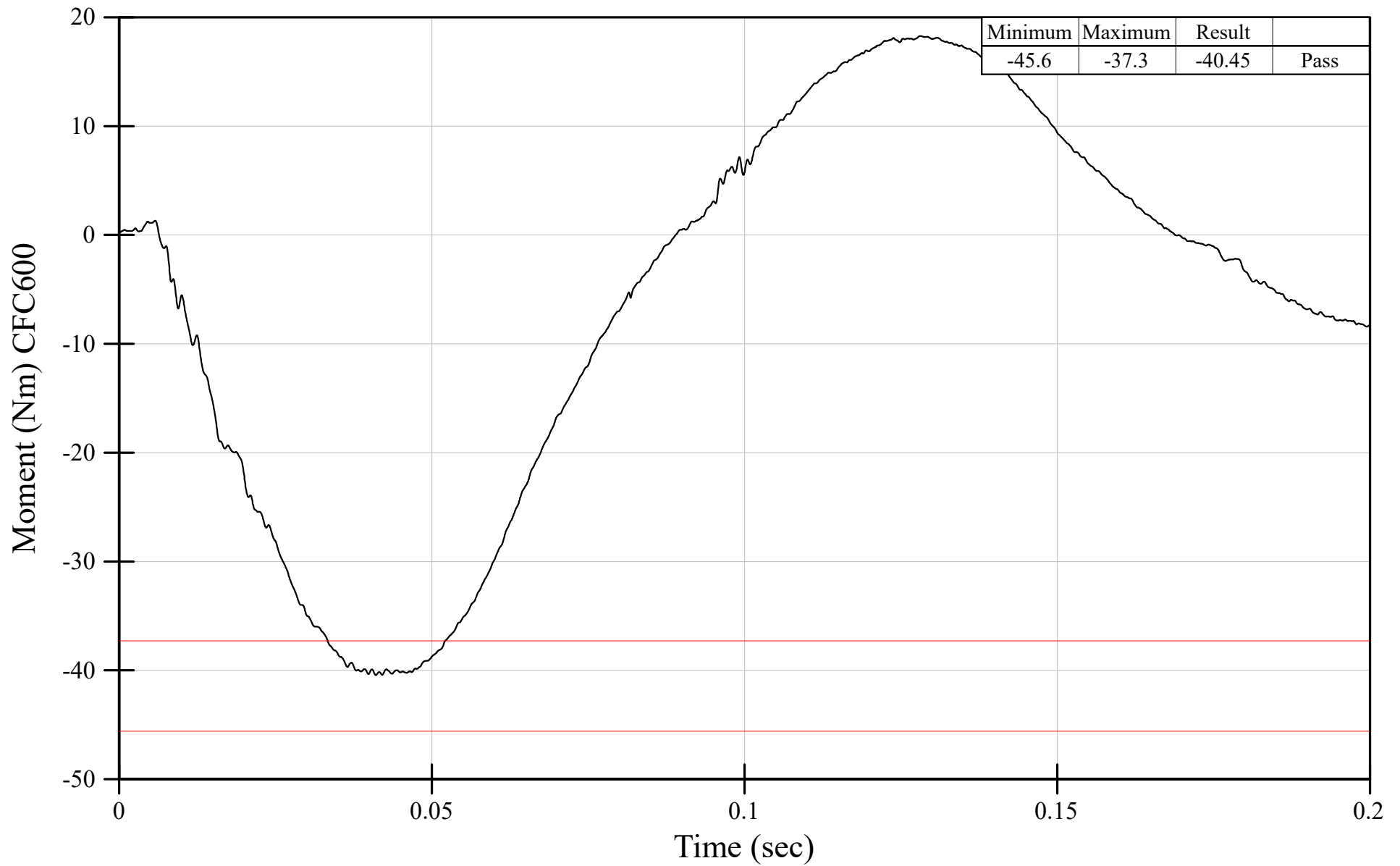
THOR-50M Neck Right Torsion Qualification
Pendulum Velocity
Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Peak Upper Neck Moment Z

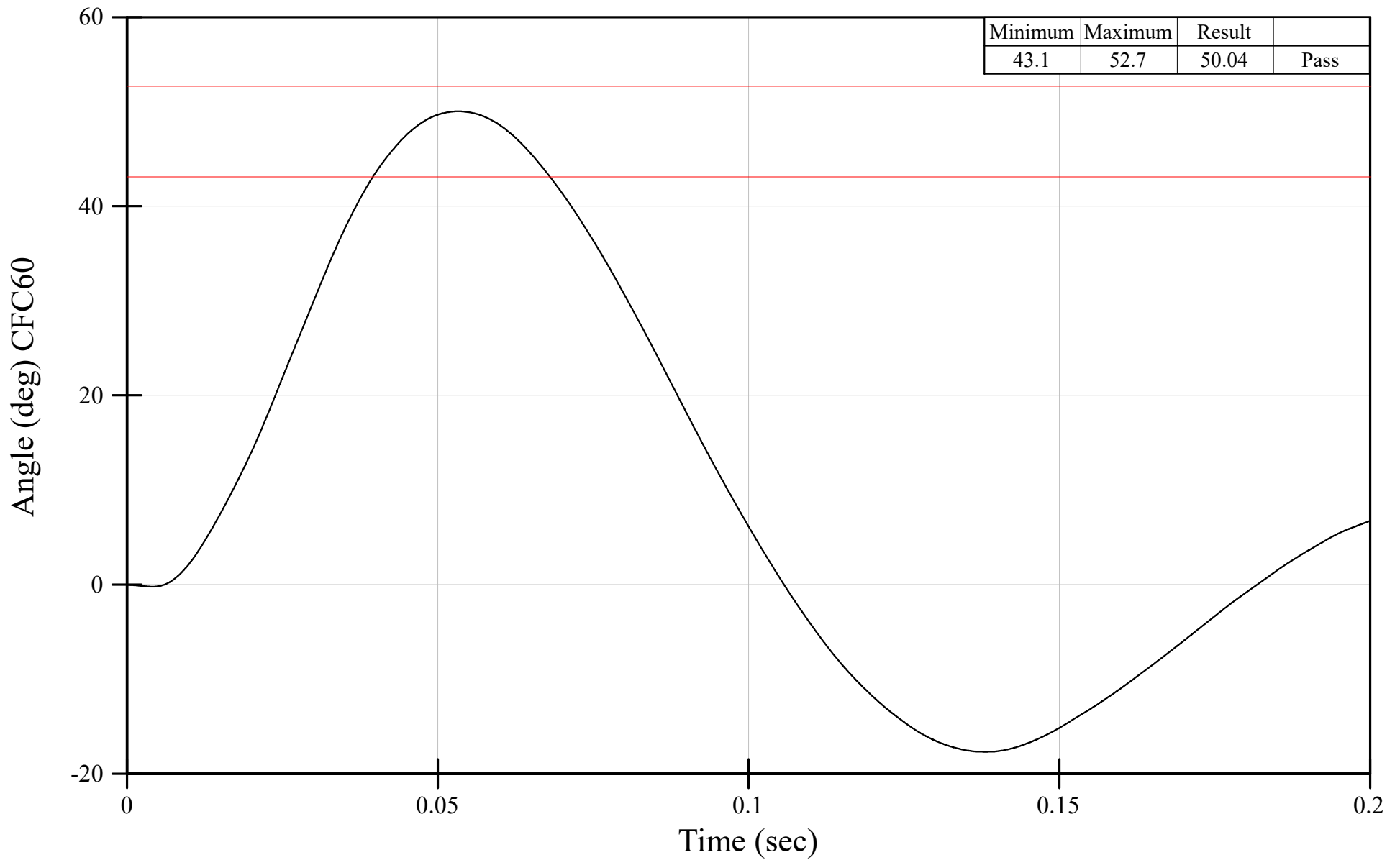
Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Neck Fixture Rotation

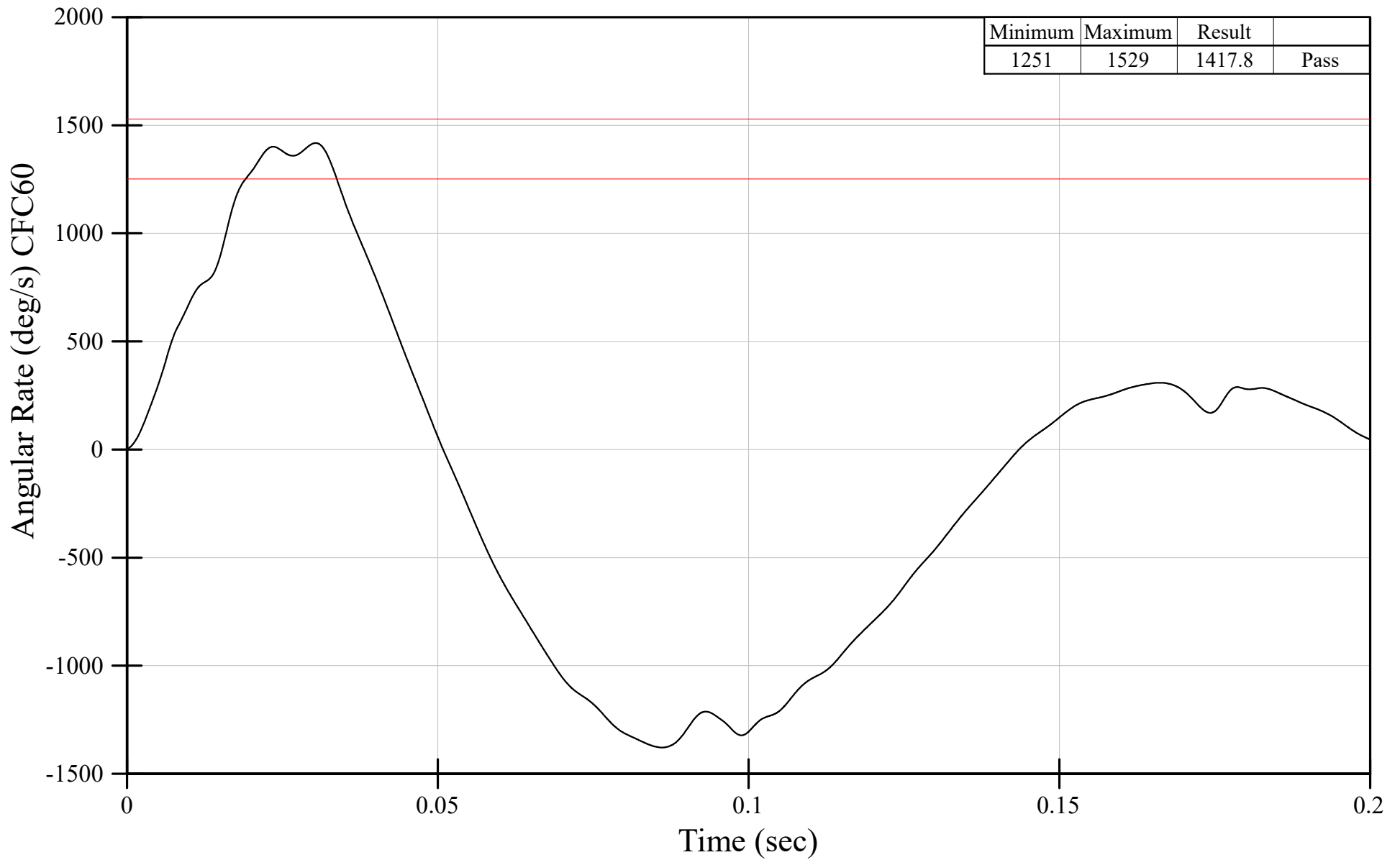
Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Peak Angular Rate

Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240911-18

Test Date: 9/11/2024

Test Time: 2:50 PM

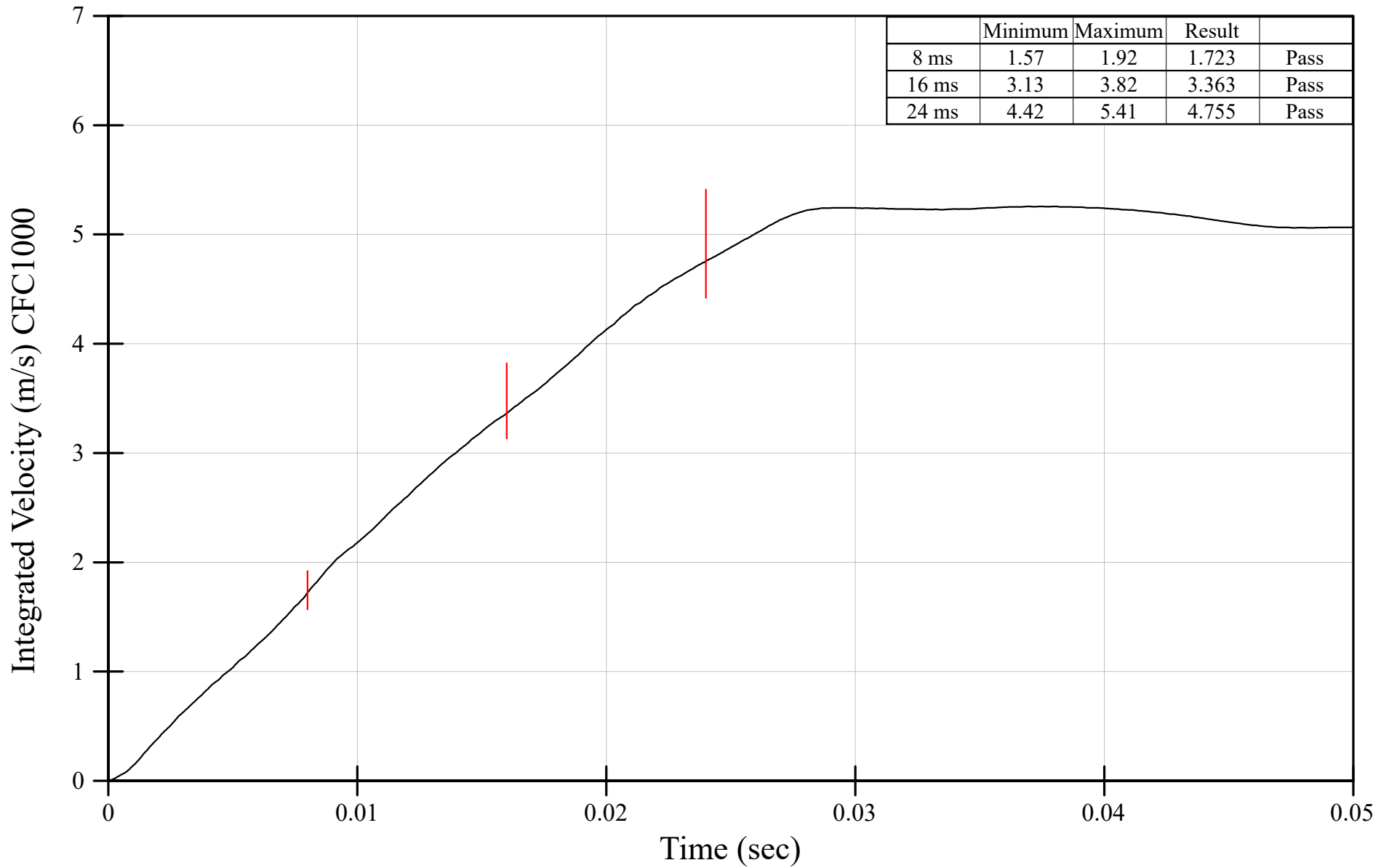
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	5.003	Pass
Pendulum Velocity at 8 ms (m/s)	1.57 - 1.92	1.723	Pass
Pendulum Velocity at 16 ms (m/s)	3.13 - 3.82	3.363	Pass
Pendulum Velocity at 24 ms (m/s)	4.42 - 5.41	4.755	Pass
Peak Upper Neck My (Nm)	27.9 - 34.1	29.53	Pass
Peak Upper Neck Fz prior to 40 ms (N)	774 - 946	877.7	Pass
Peak Head Angular Velocity Y (deg/sec)	-2172 - (-1777)	-1890.2	Pass
Peak Head Rotation (deg)	-71.0 - (-58.1)	-66.48	Pass

THOR-50M Neck Front Flexion Qualification

Pendulum Velocity

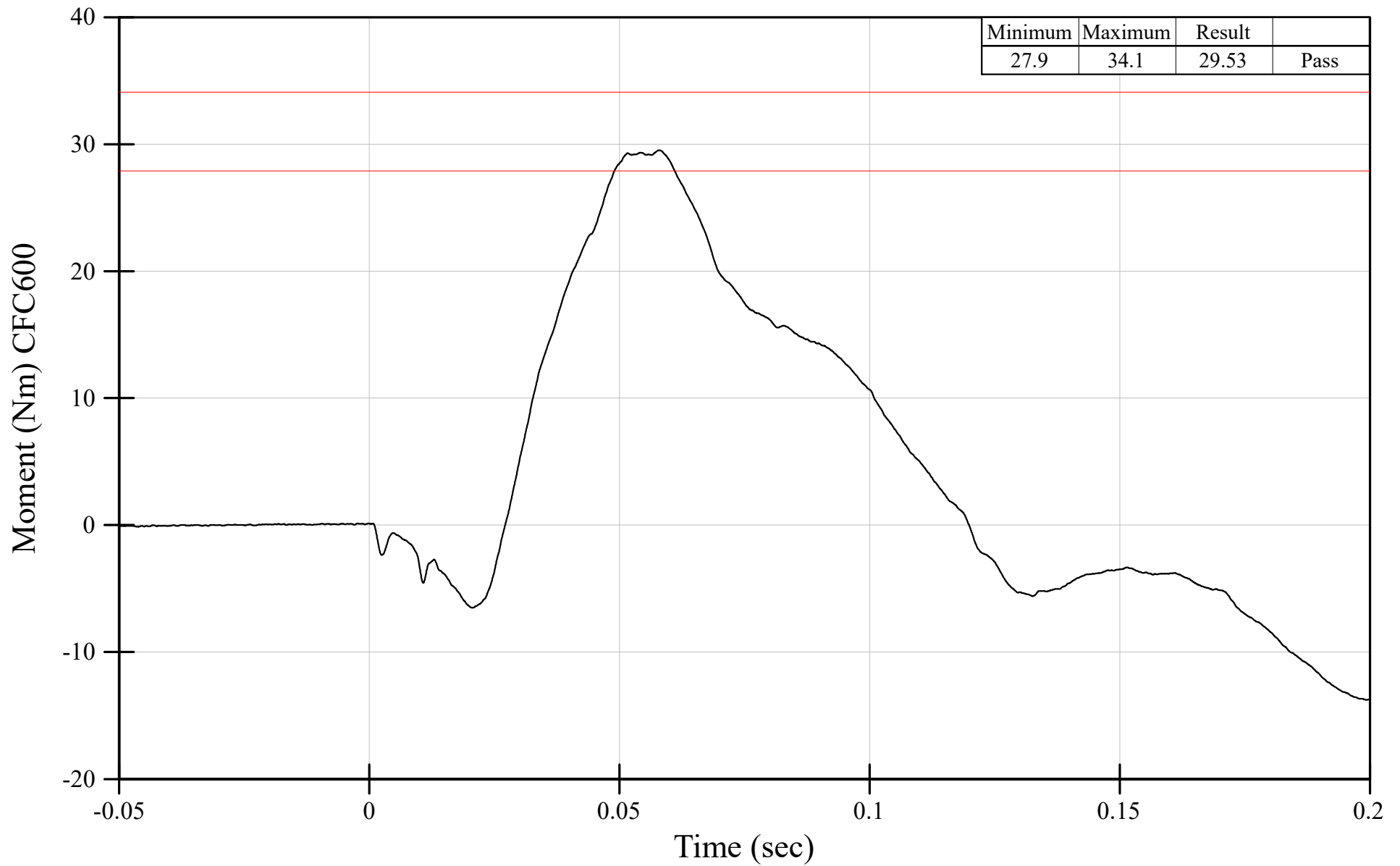
Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Upper Neck My

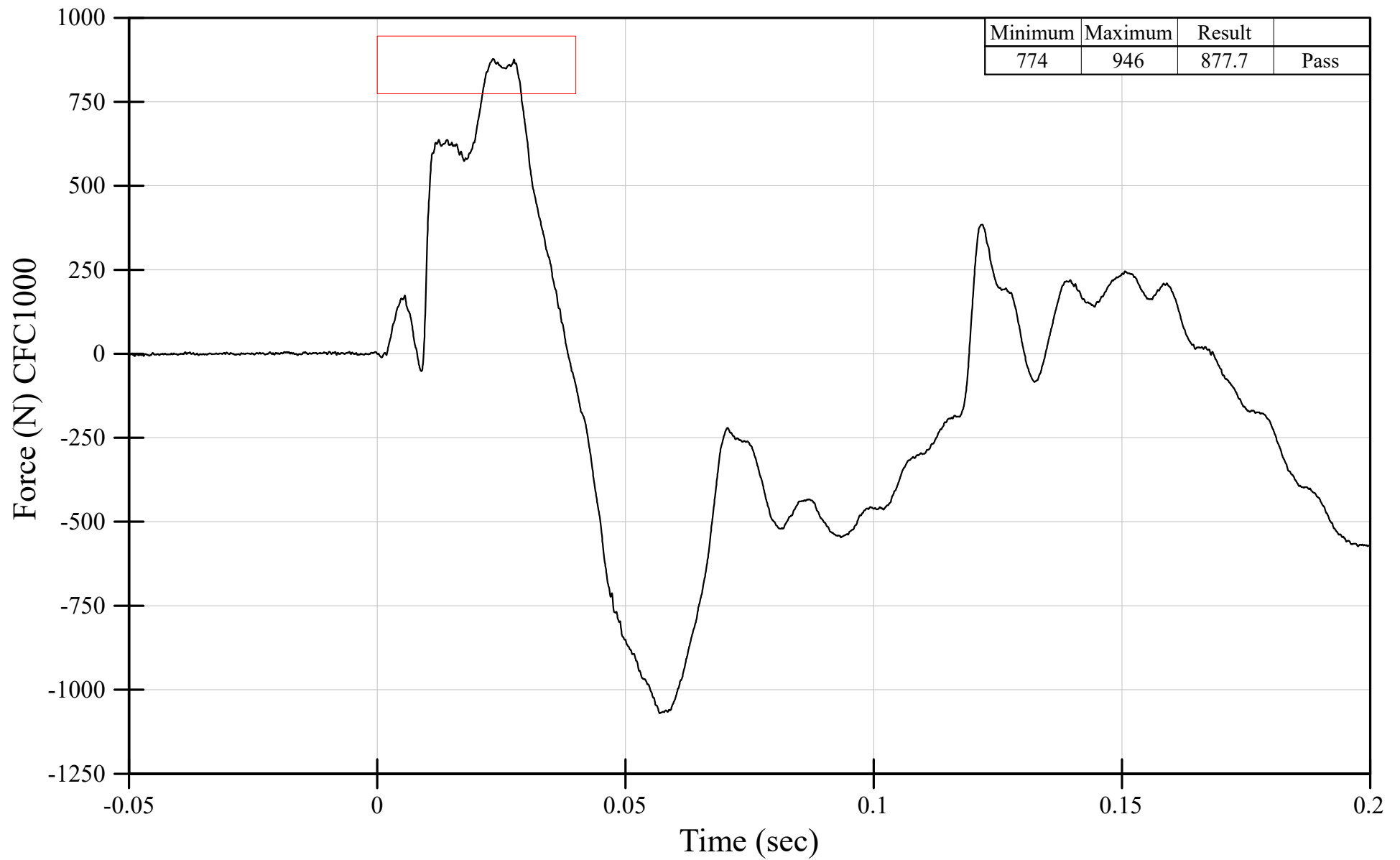
Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Upper Neck Fz

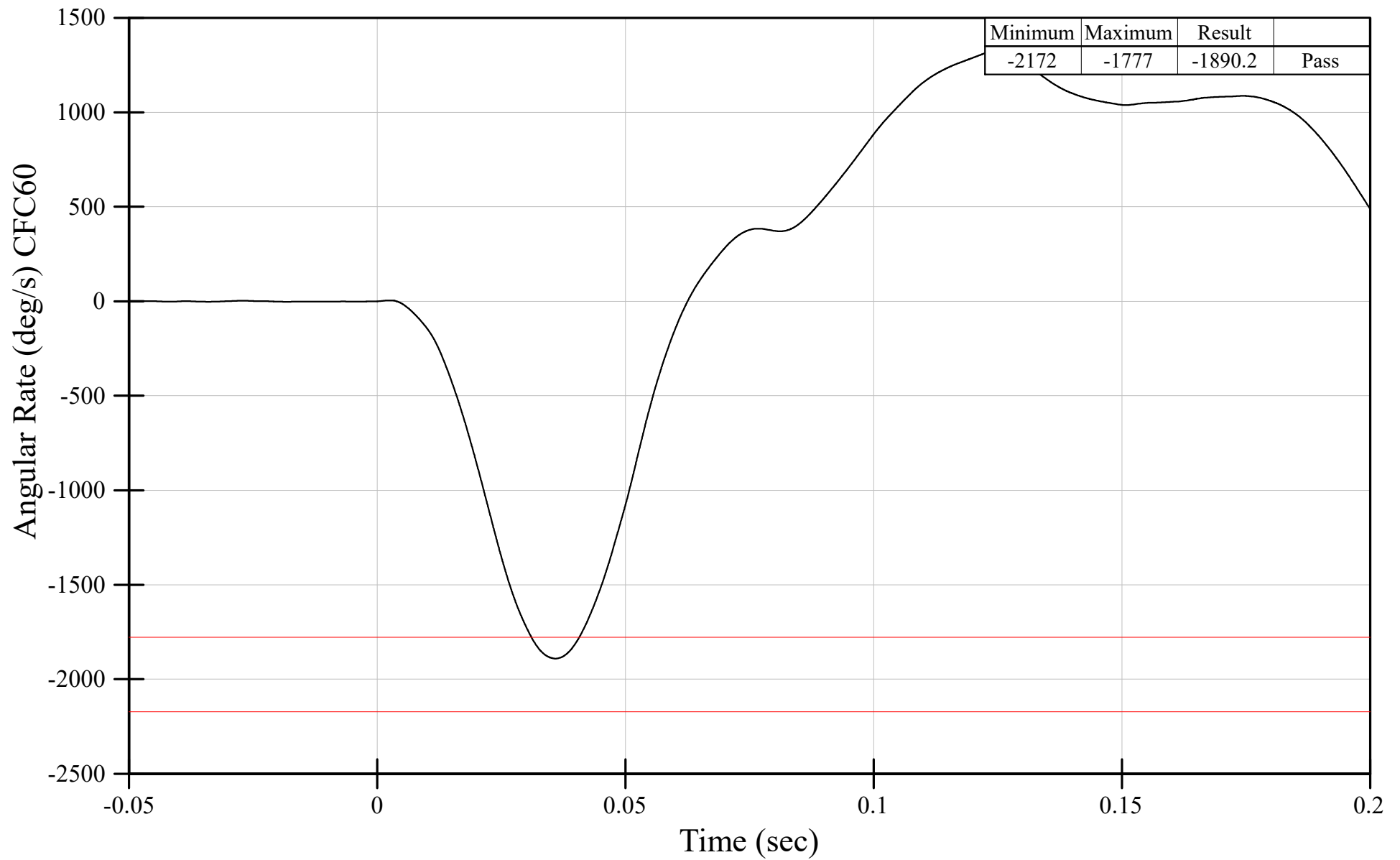
Neck Serial Number: FA8045



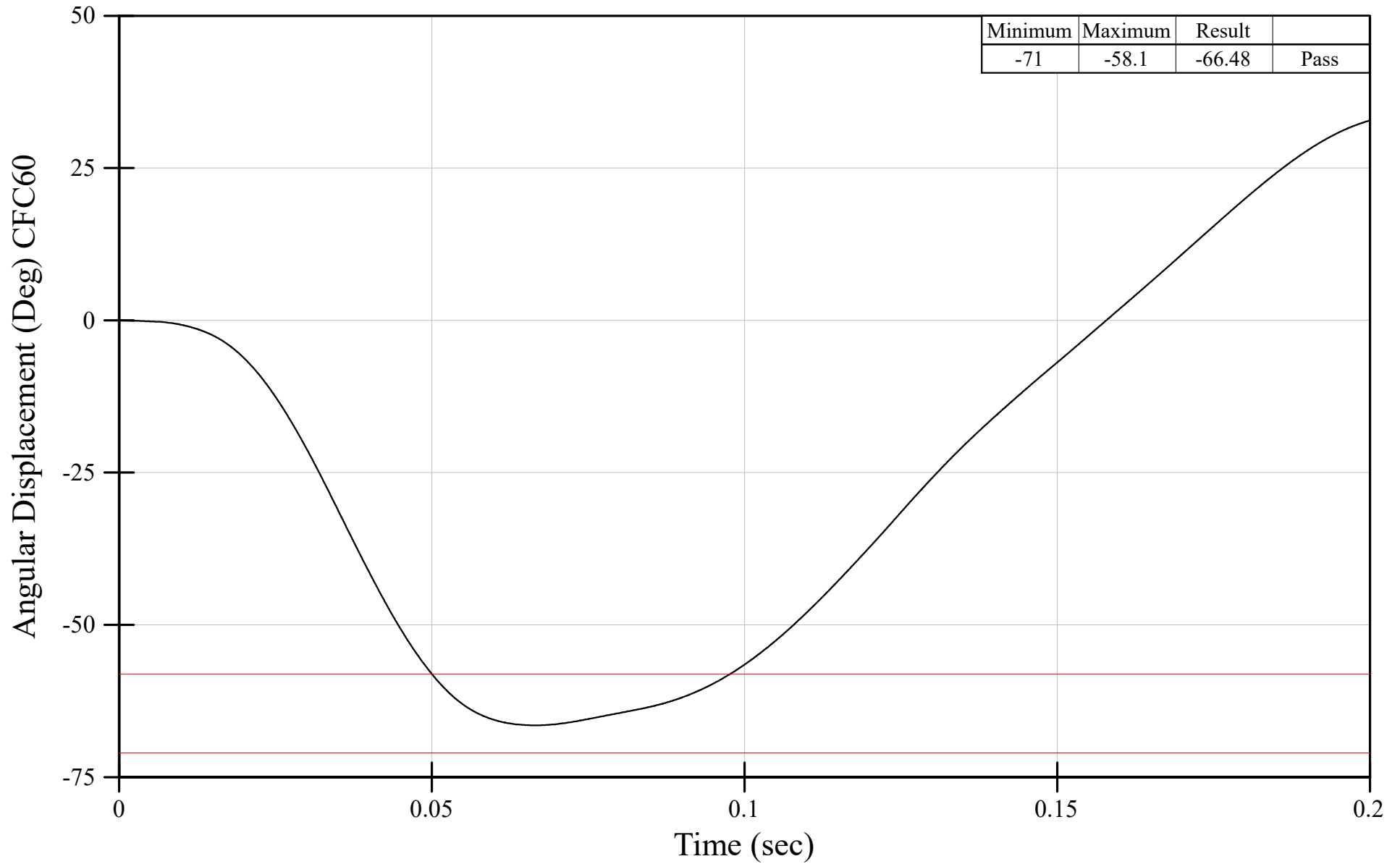
THOR-50M Neck Front Flexion Qualification

Peak Head Angular Rate

Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification
Head Rotation
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240912-1

Test Date: 9/12/2024

Test Time: 7:03 AM

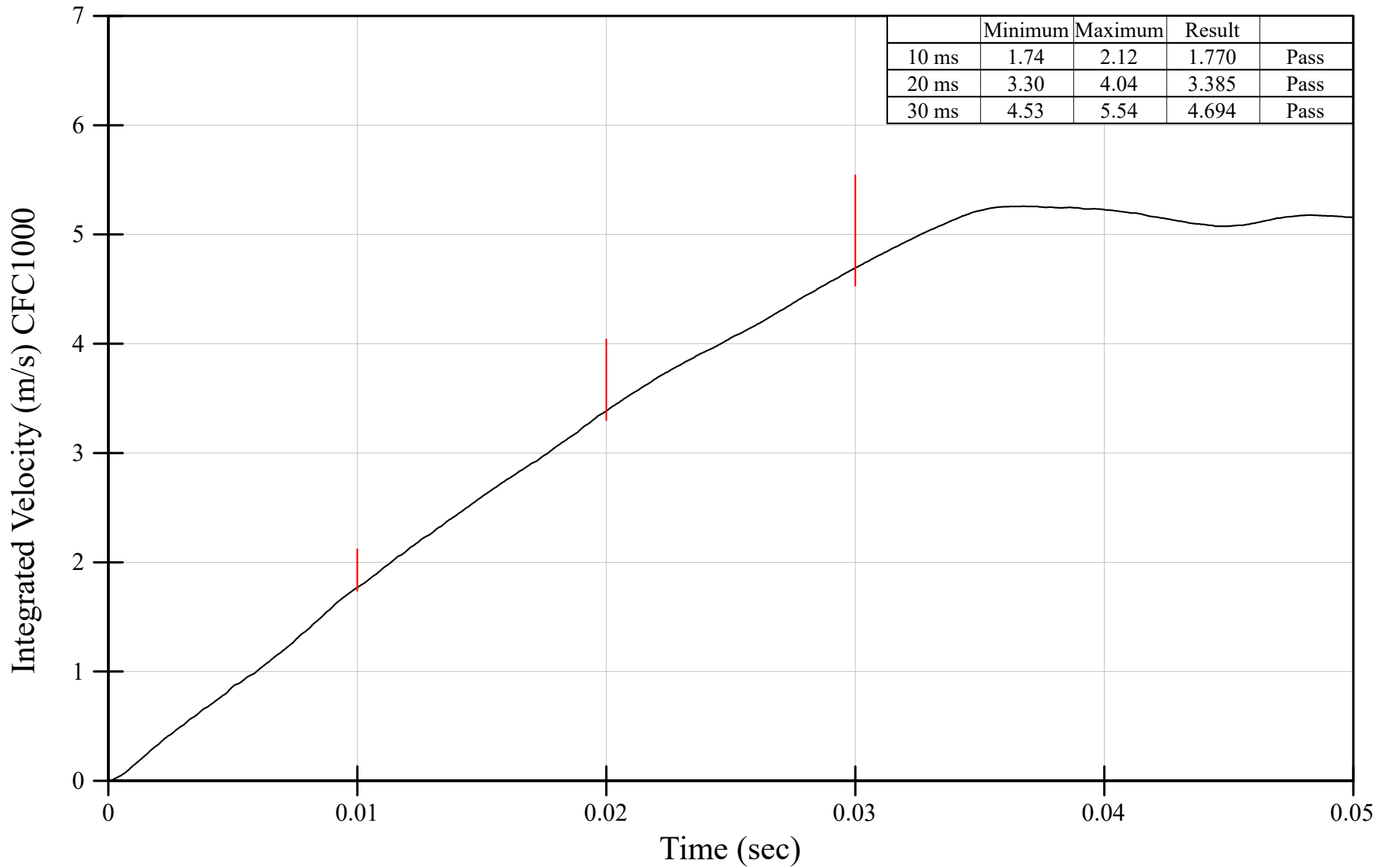
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.95 - 5.05	5.019	Pass
Pendulum Velocity at 10 ms (m/s)	1.74 - 2.12	1.770	Pass
Pendulum Velocity at 20 ms (m/s)	3.30 - 4.04	3.385	Pass
Pendulum Velocity at 30 ms (m/s)	4.53 - 5.54	4.694	Pass
Peak Upper Neck My (Nm)	-25.3 - (-20.7)	-25.04	Pass
Peak Upper Neck Fz (N)	-3210 - (-2626)	-2920.9	Pass
Peak Head Angular Velocity Y (deg/sec)	1855 - 2261	2016.2	Pass
Peak Head Rotation (deg)	58.5 - 71.5	64.41	Pass

THOR-50M Neck Extension Qualification

Pendulum Velocity

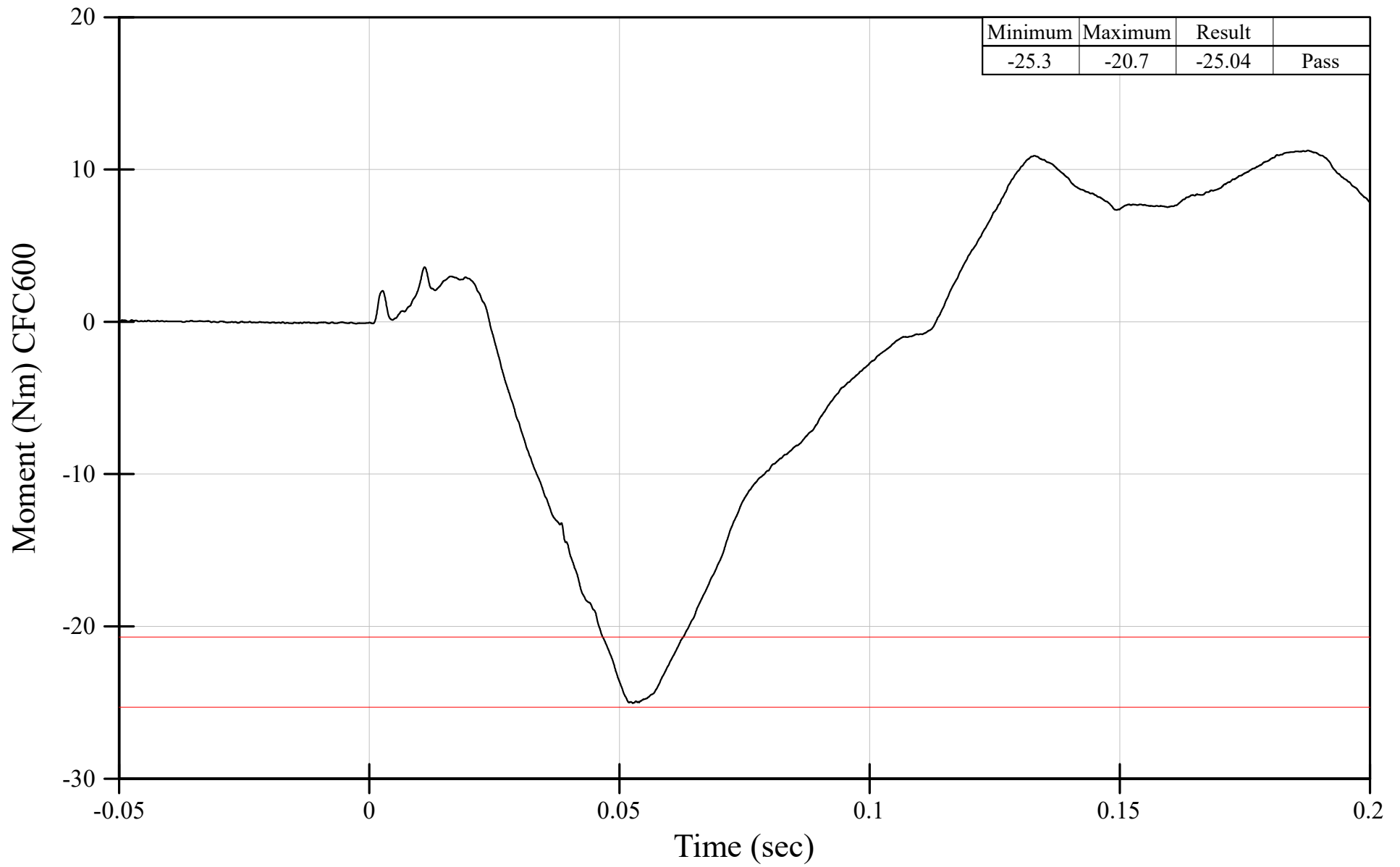
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Upper Neck My

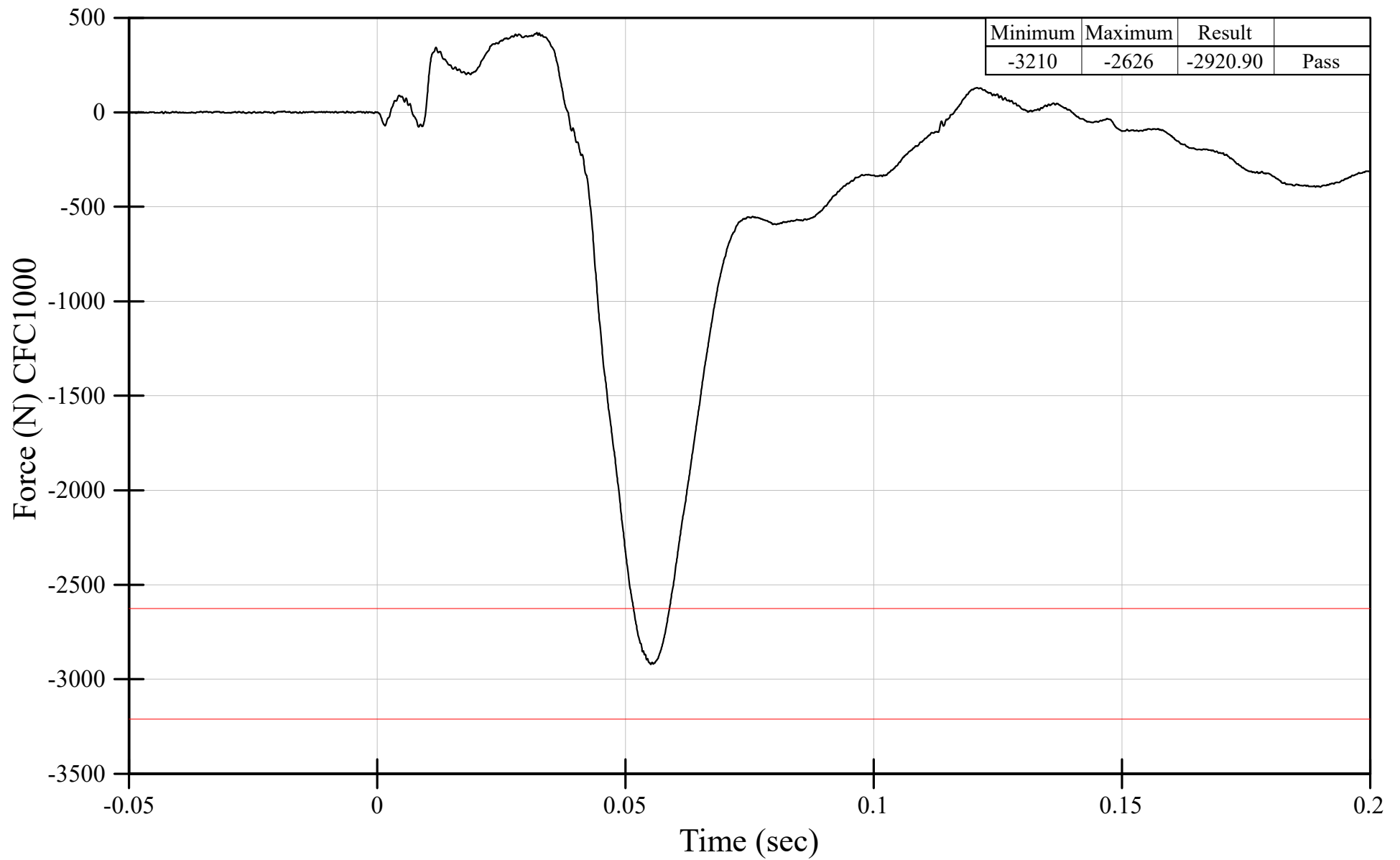
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Upper Neck Fz

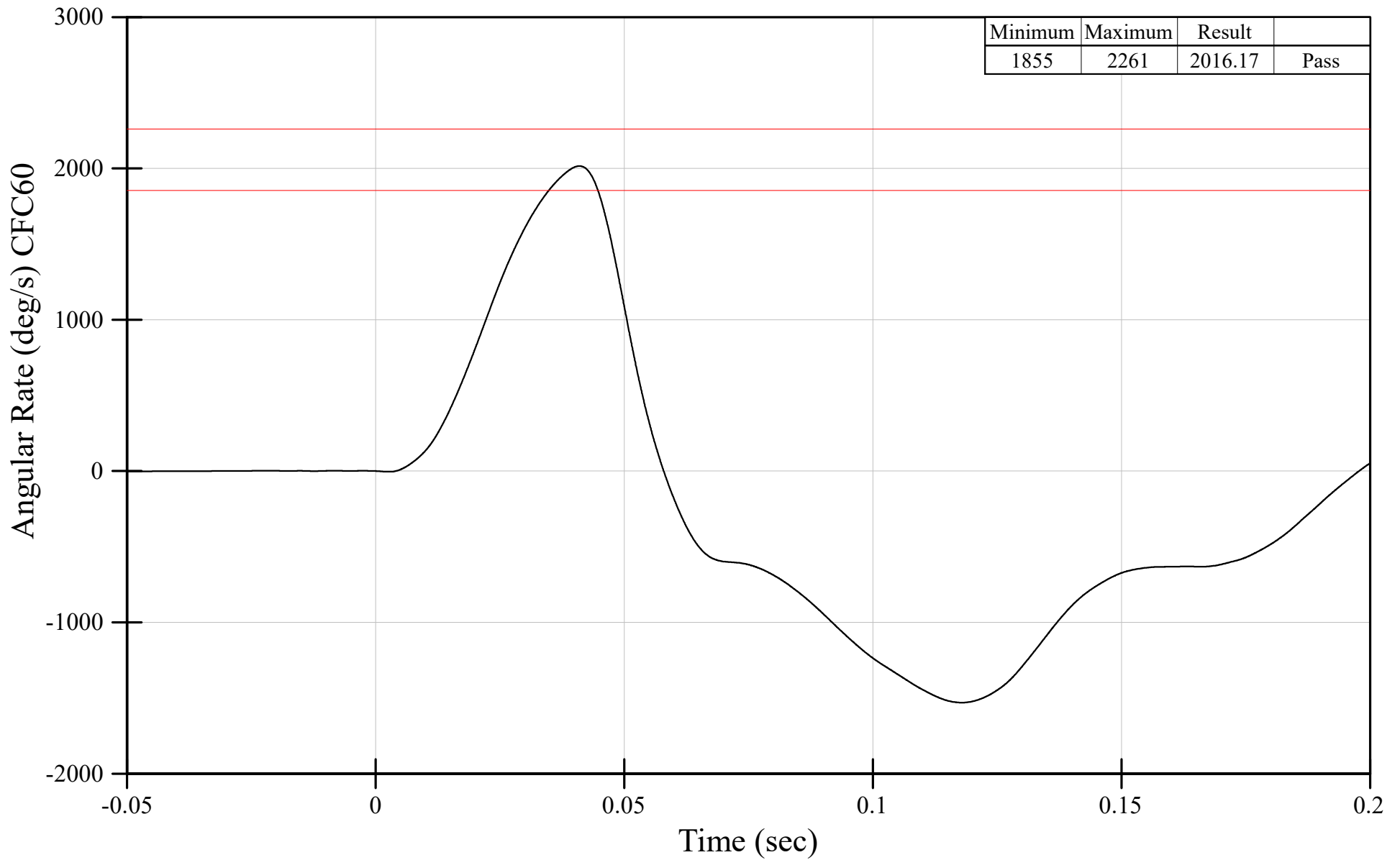
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Peak Head Angular Rate

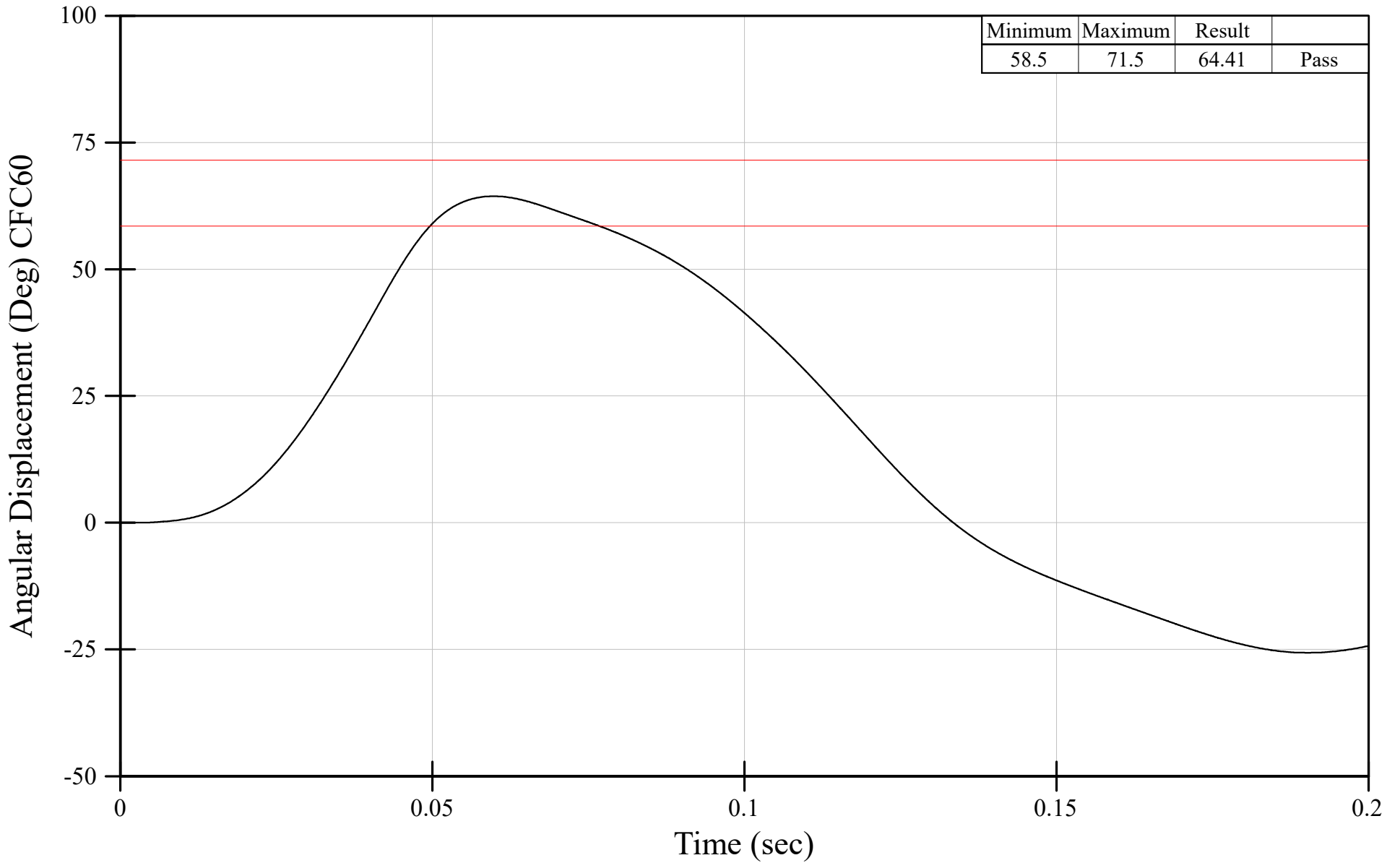
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Neck Rotation

Neck Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240912-2

Test Date: 9/12/2024

Test Time: 8:17 AM

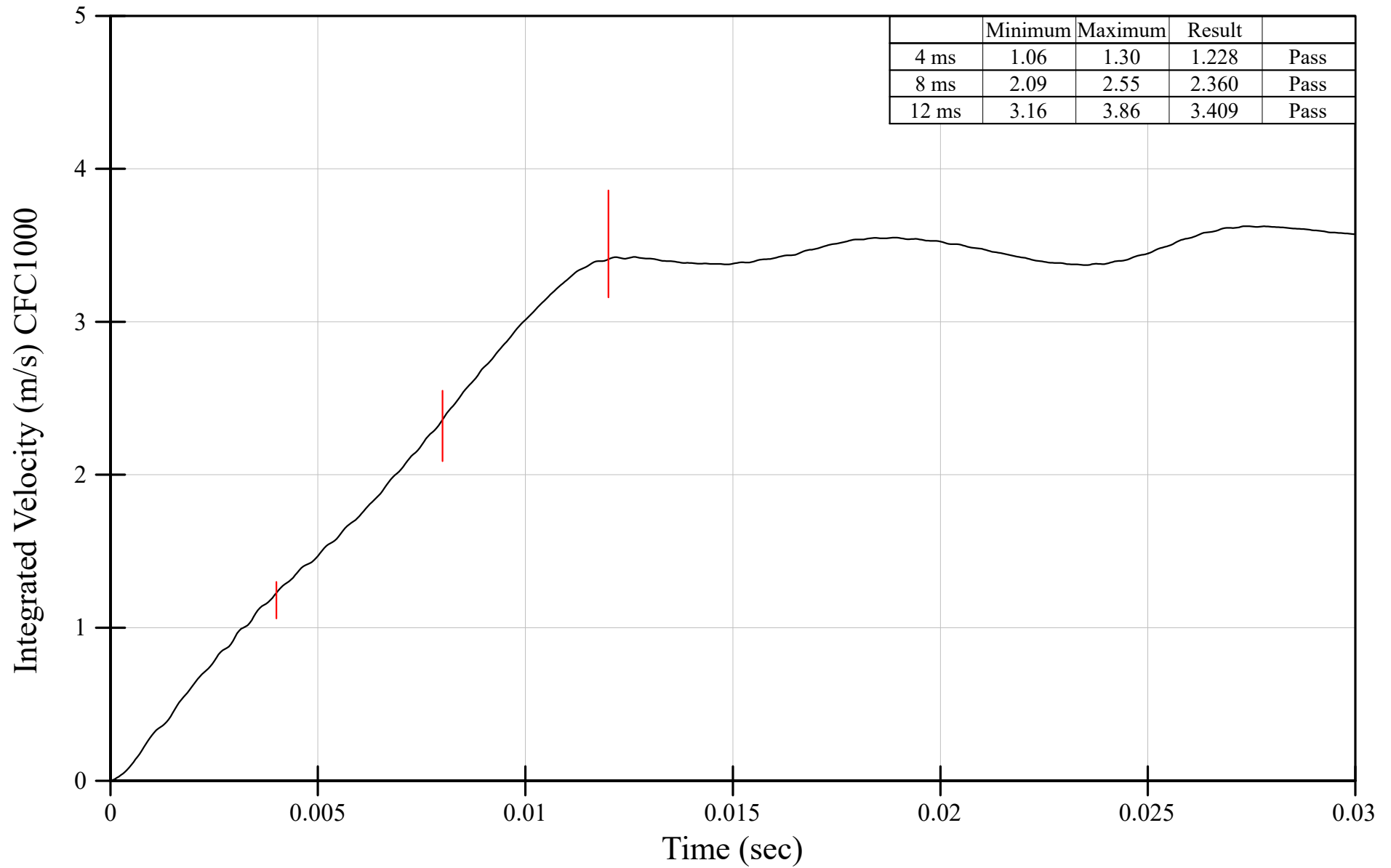
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	3.35 - 3.45	3.381	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.228	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.360	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.409	Pass
Peak Upper Neck Mx after 40 ms (N)	44.8 - 54.7	49.86	Pass
Peak Head Angular Velocity X (deg/sec)	-1498 - (-1226)	-1364.6	Pass
Peak Head Rotation (deg)	-45.9 - (-37.6)	-40.62	Pass

THOR-50M Neck Left Lateral Qualification

Pendulum Velocity

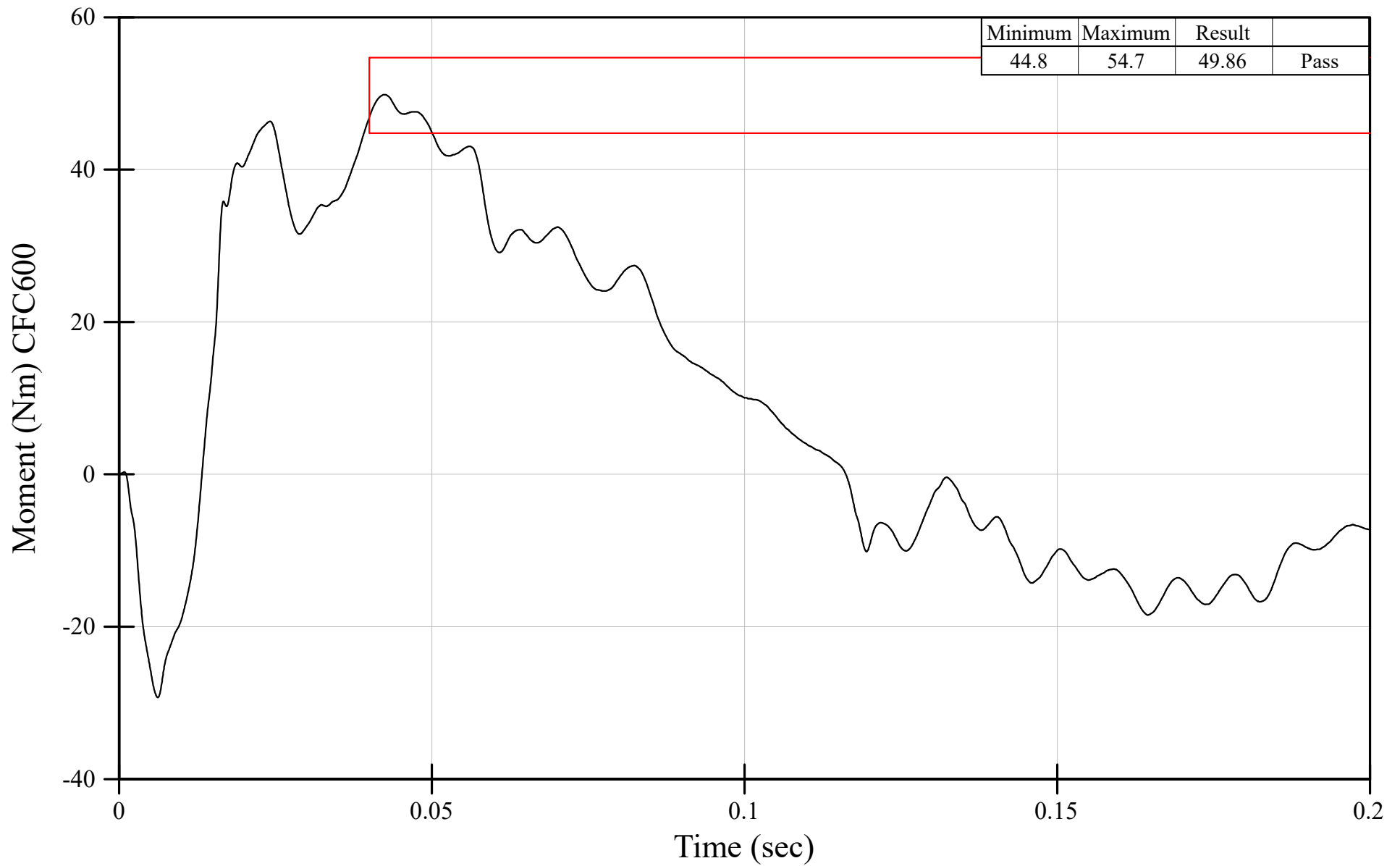
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Upper Neck Mx

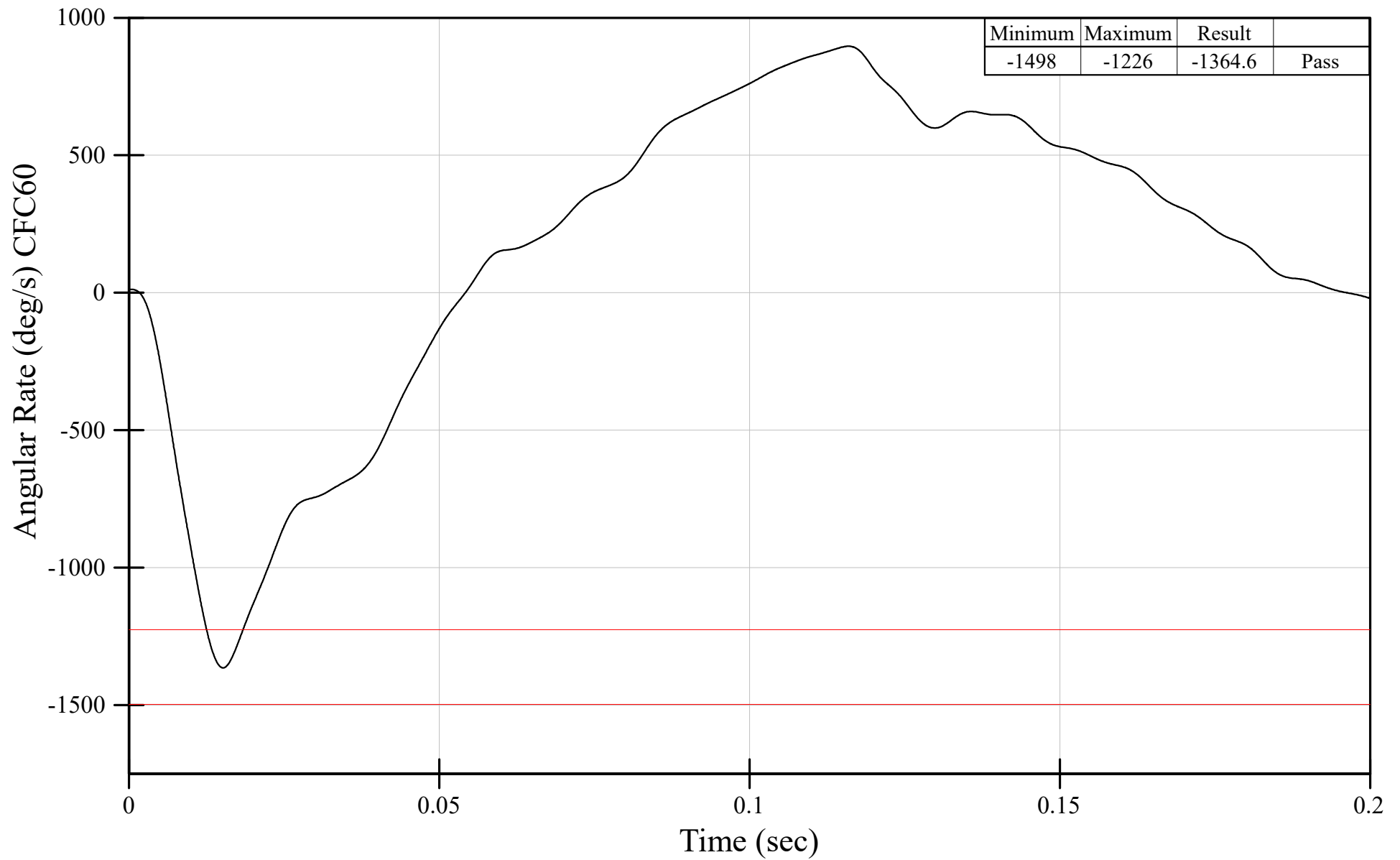
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Peak Angular Rate

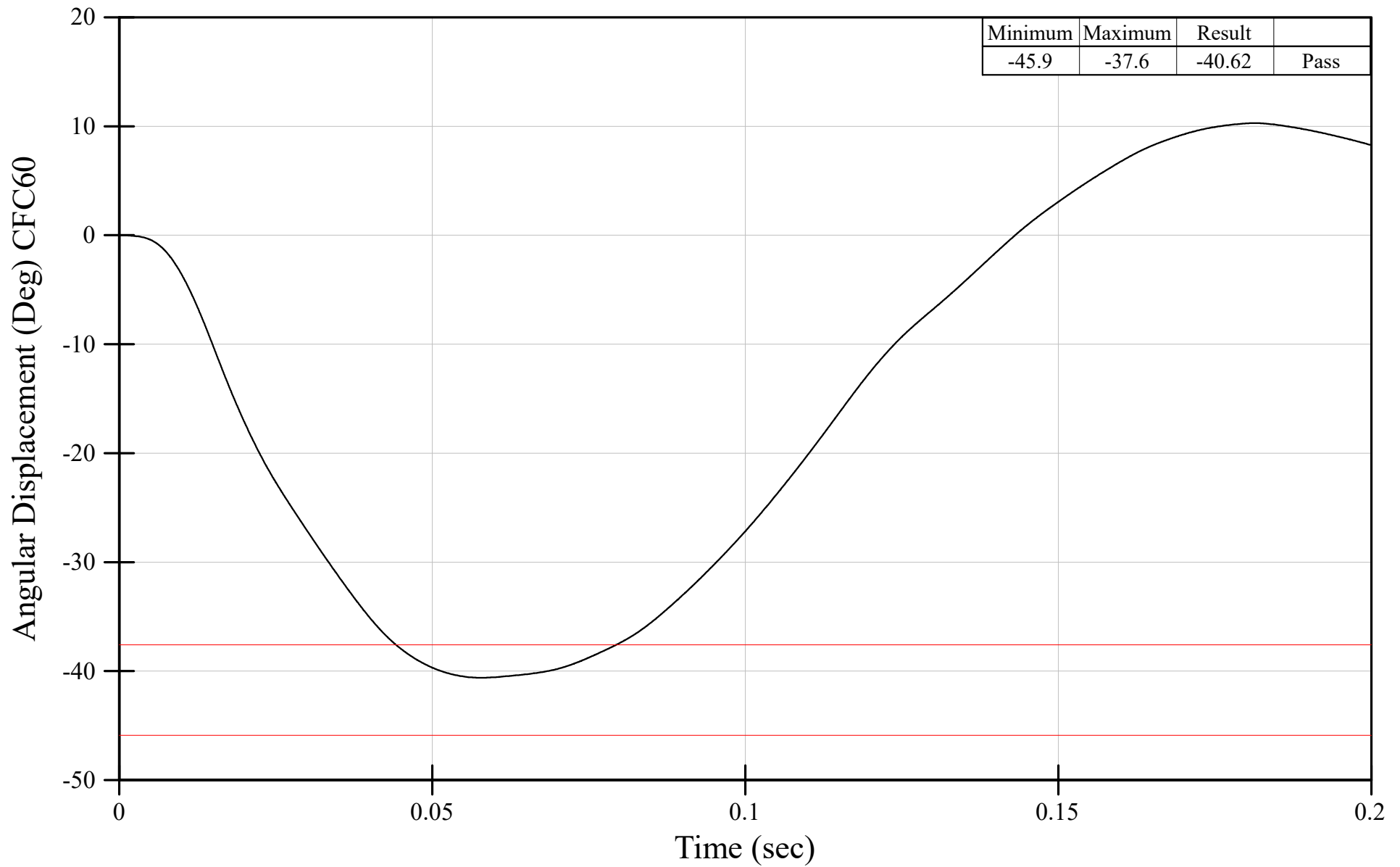
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Neck Rotation

Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 240912-8

Test Date: 9/12/2024

Test Time: 8:52 AM

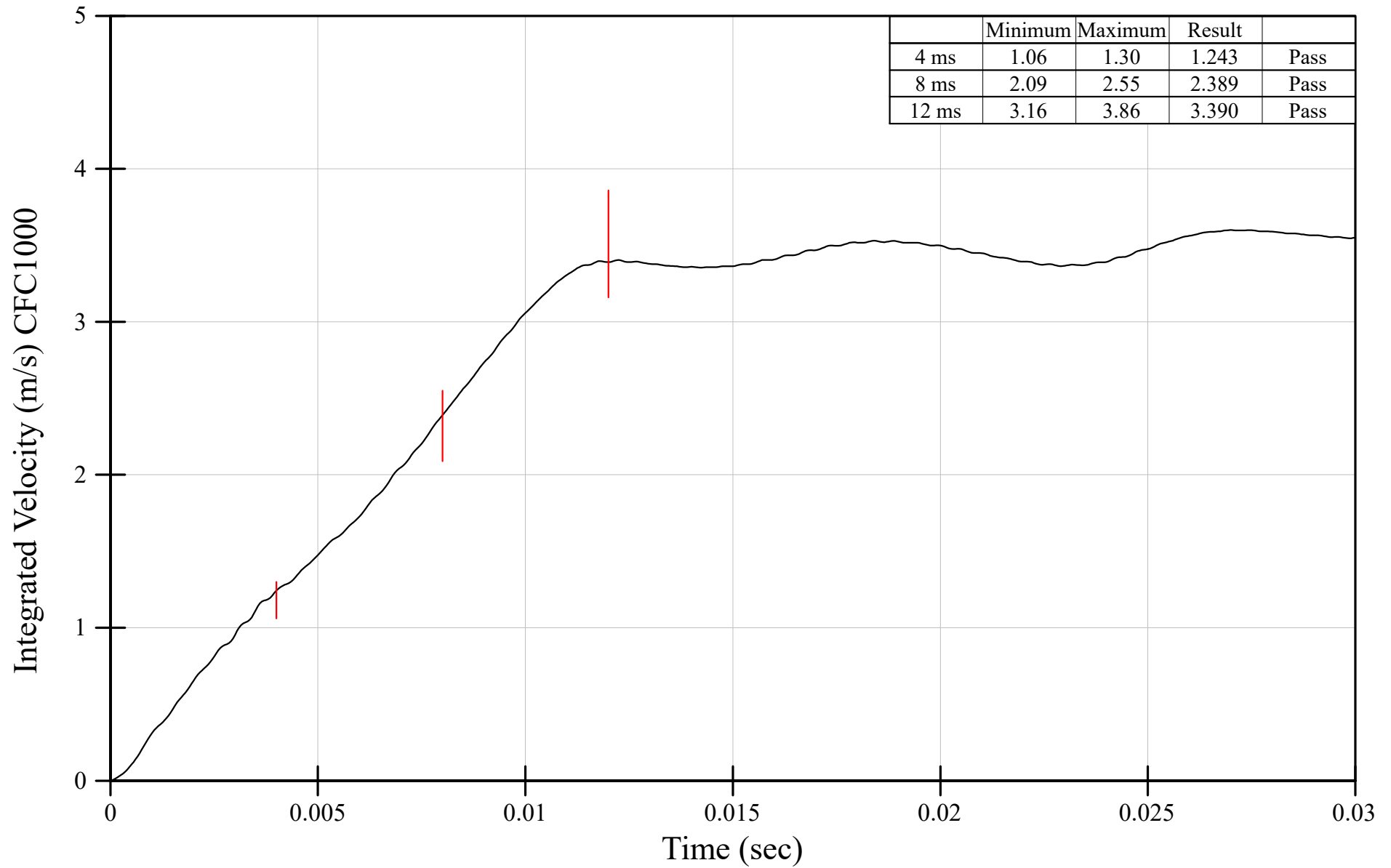
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	3.35 - 3.45	3.383	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.243	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.389	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.390	Pass
Peak Upper Neck Mx after 40 ms (N)	-54.7 - (-44.8)	-47.83	Pass
Peak Head Angular Velocity X (deg/sec)	1226 - 1498	1370.3	Pass
Peak Head Rotation (deg)	37.6 - 45.9	41.65	Pass

THOR-50M Neck Right Lateral Qualification

Pendulum Velocity

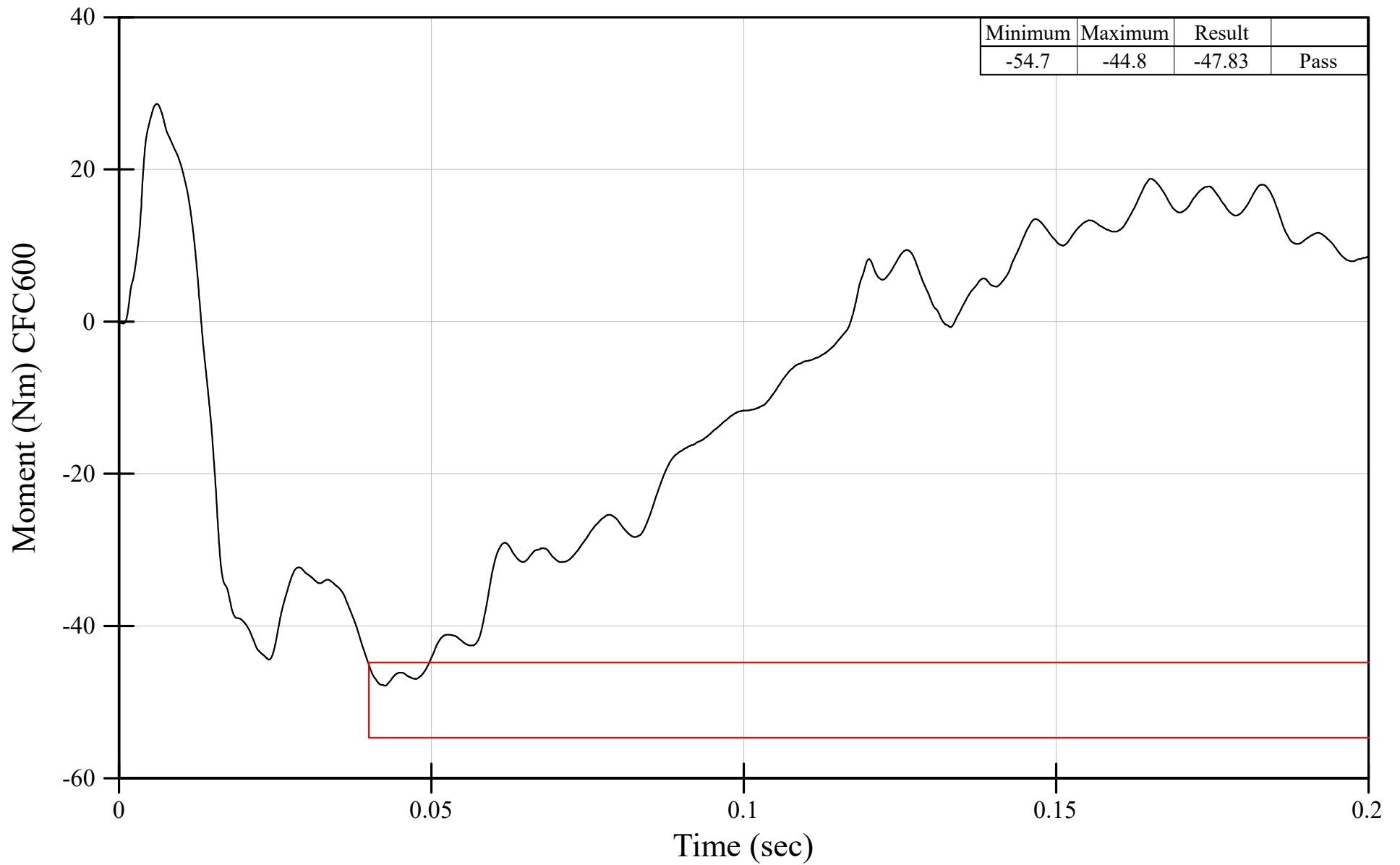
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Upper Neck Mx

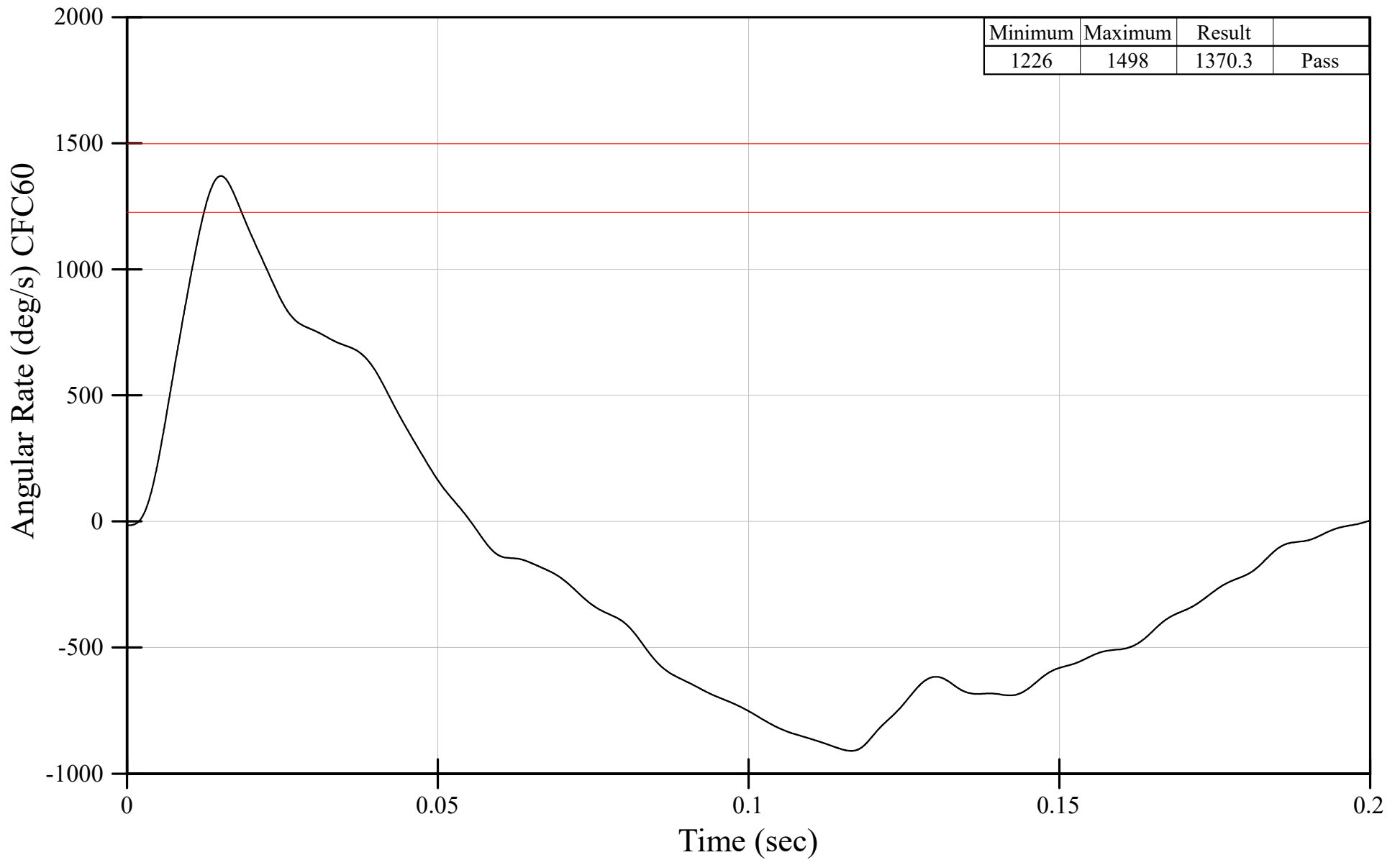
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Peak Angular Rate

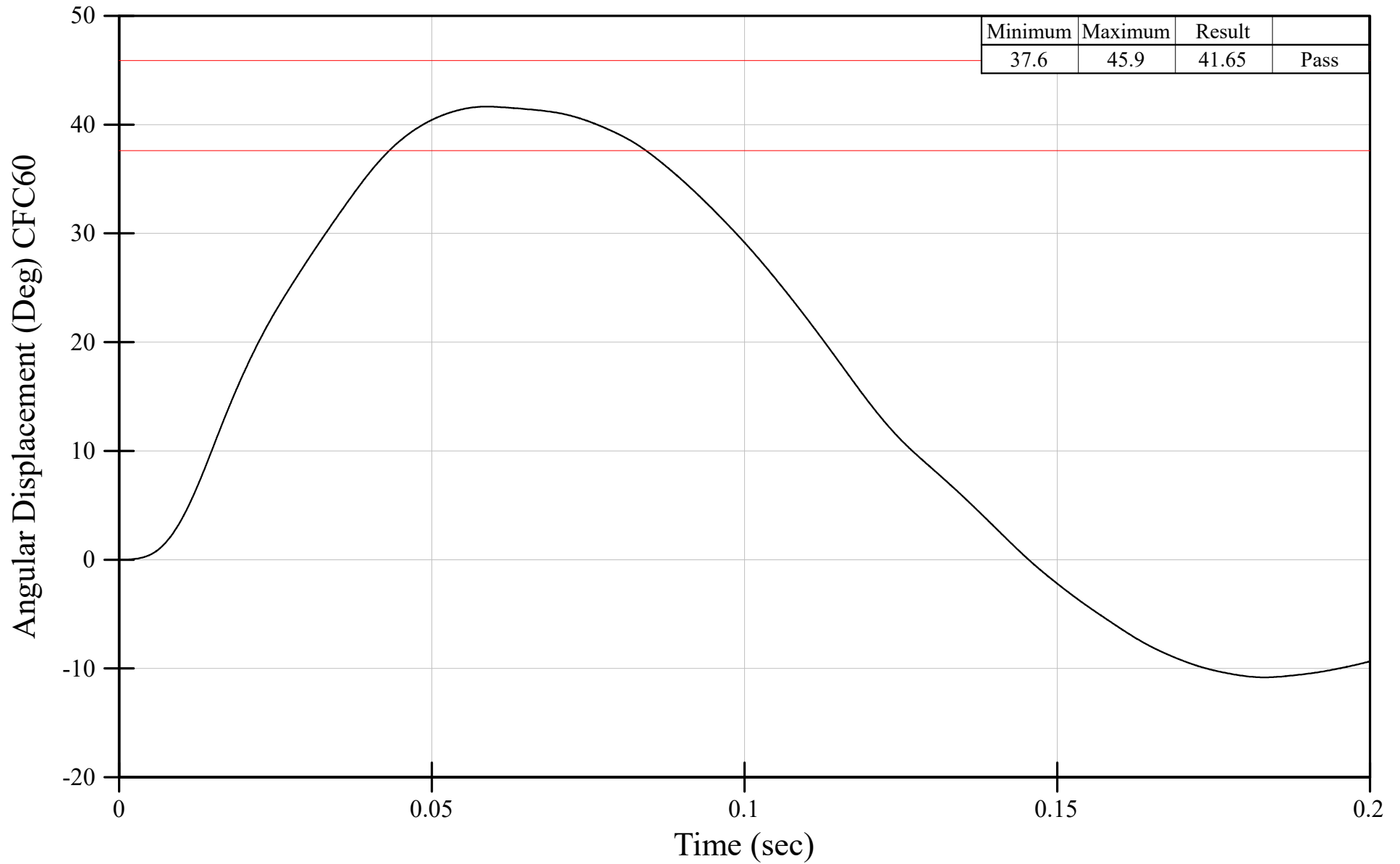
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Neck Rotation

Serial Number: FA8045



THOR-50M Upper Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Rib 1 Serial Number: 12073 Rib 5 Serial Number: 12079
Rib 2 Serial Number: 12113 Rib 6 Serial Number: 12123
Rib 3 Serial Number: 12235 Rib 7 Serial Number: 12146
Rib 4 Serial Number: 12202

Test ID: 240930-12
Test Date: 9/30/2024
Test Time: 3:42 PM

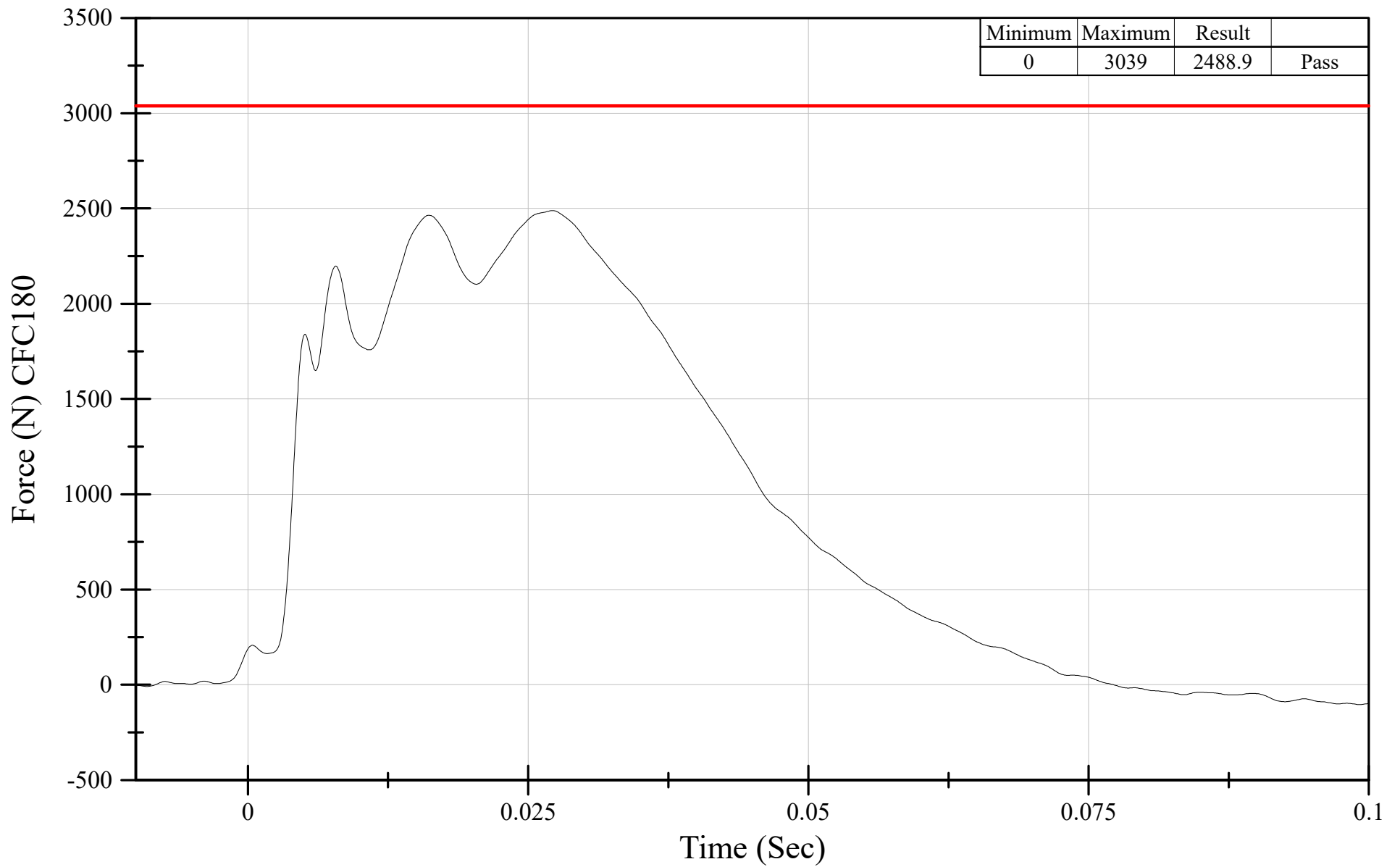
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.25 - 4.35	4.335	Pass
Peak Probe Force (N)	less than 3039	2488.9	Pass
Peak Upper Left Resultant Deflection (mm)	48.3 - 59.0	56.09	Pass
Peak Upper Right Resultant Deflection (mm)	48.3 - 59.0	55.60	Pass
Difference Between Peak Left & Right Resultant Deflections (mm)	less than 5.0	0.49	Pass
Force at Left Peak Resultant Deflection (N)	2409 - 2944	2412.1	Pass
Force at Right Peak Resultant Deflection (N)	2409 - 2944	2483.4	Pass

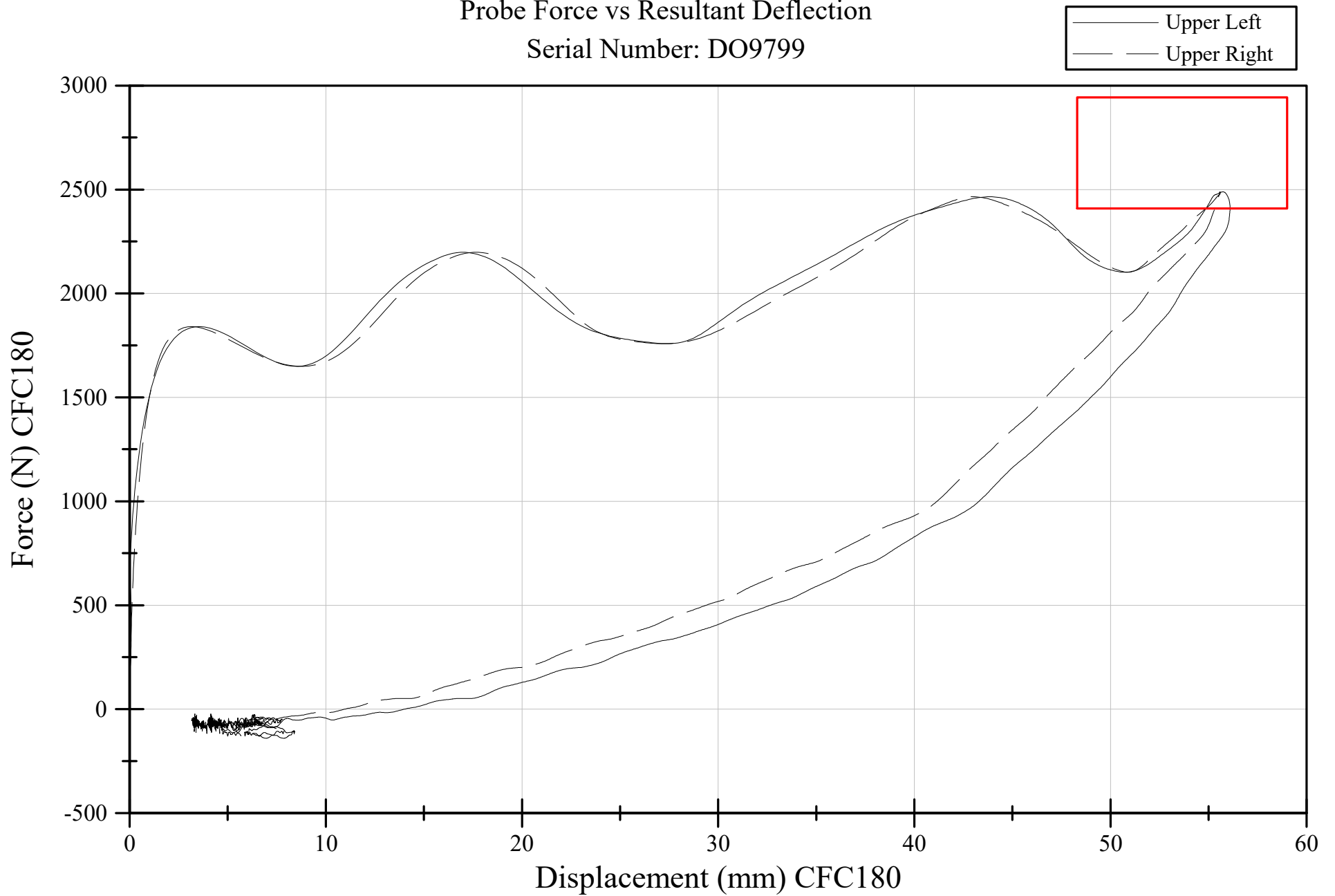
THOR-50M Upper Thorax Qualification

Probe Force

Serial Number: DO9799



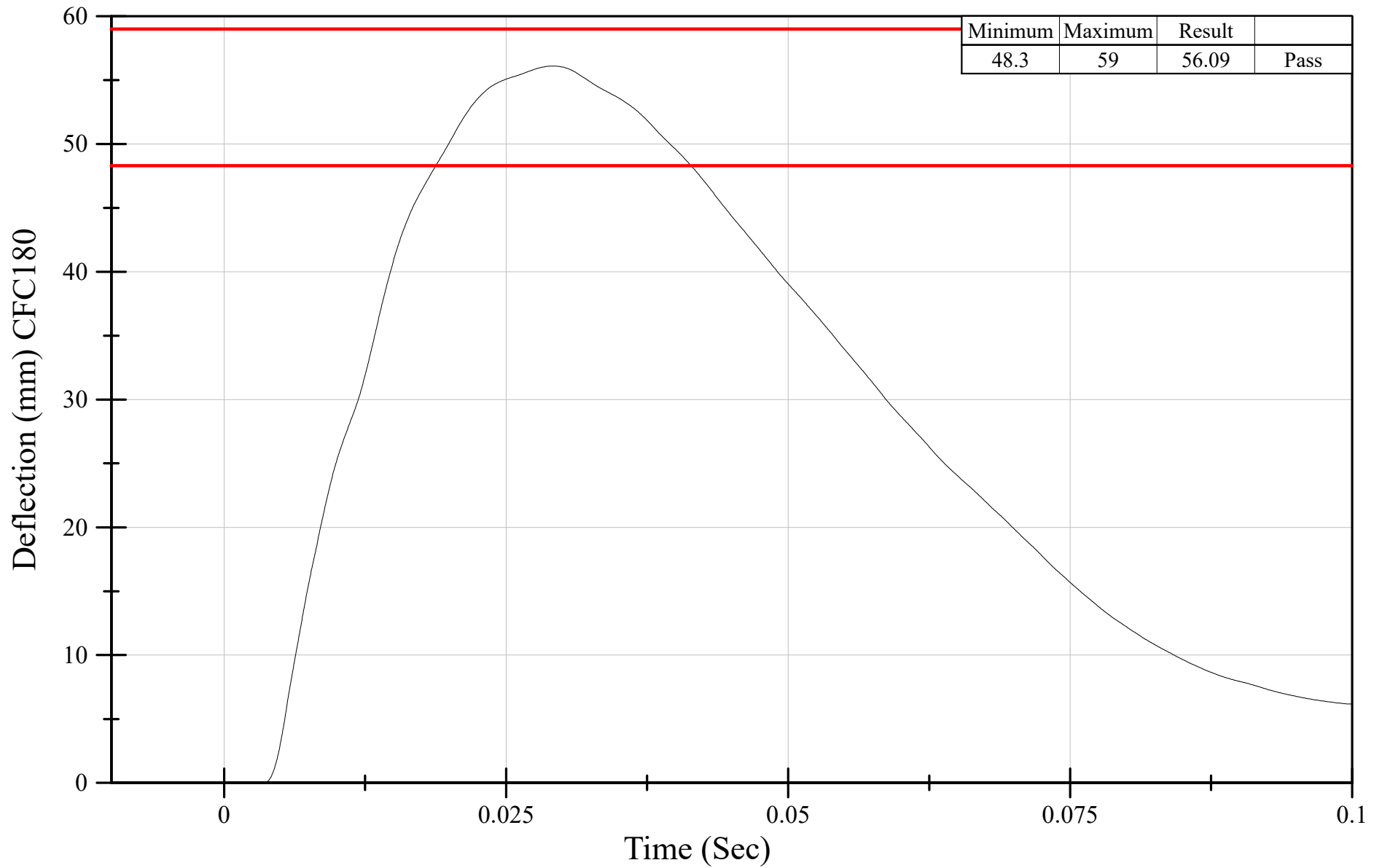
THOR-50M Upper Thorax Qualification
Probe Force vs Resultant Deflection
Serial Number: DO9799



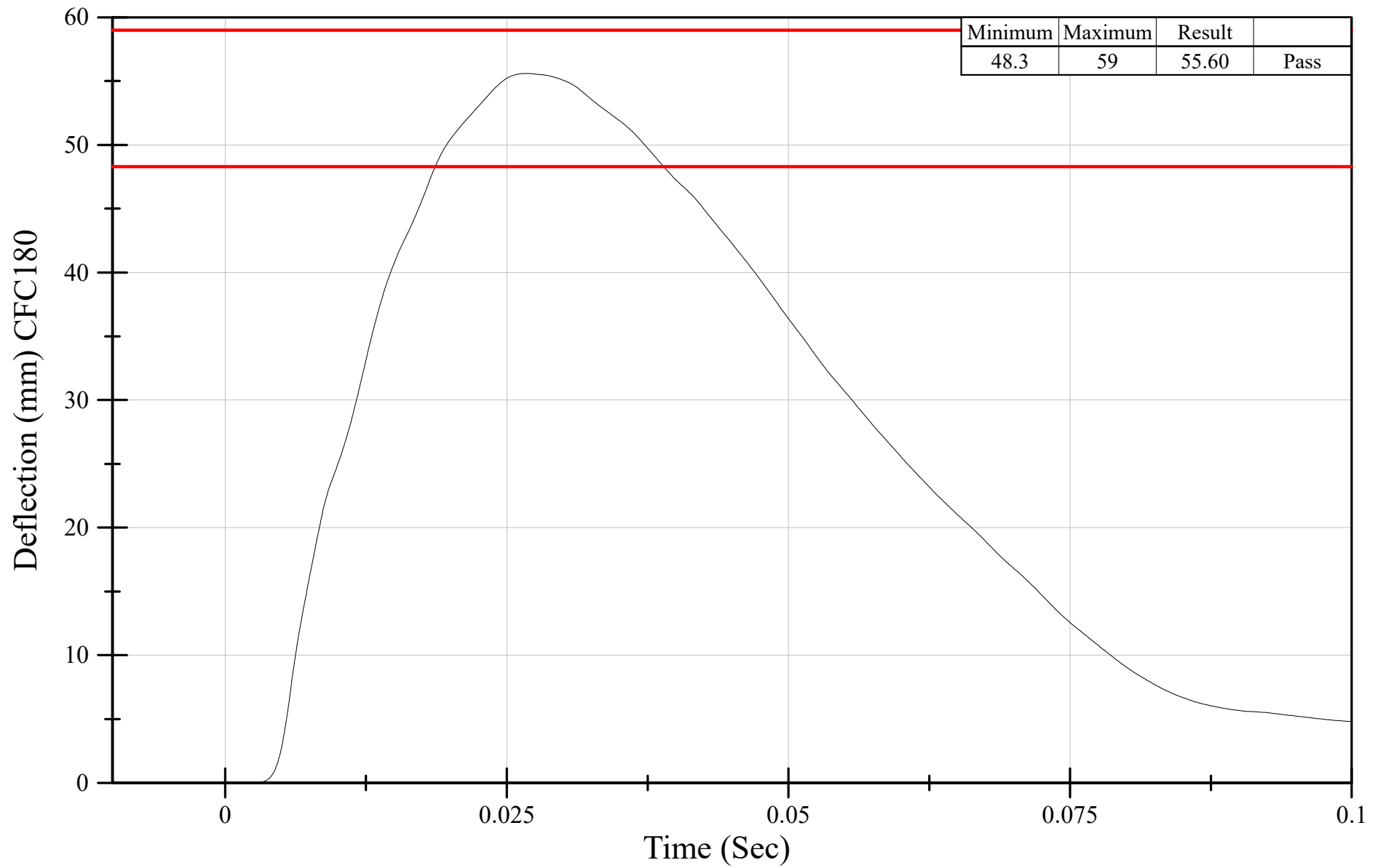
THOR-50M Upper Thorax Qualification

Left Resultant Deflection

Serial Number: DO9799



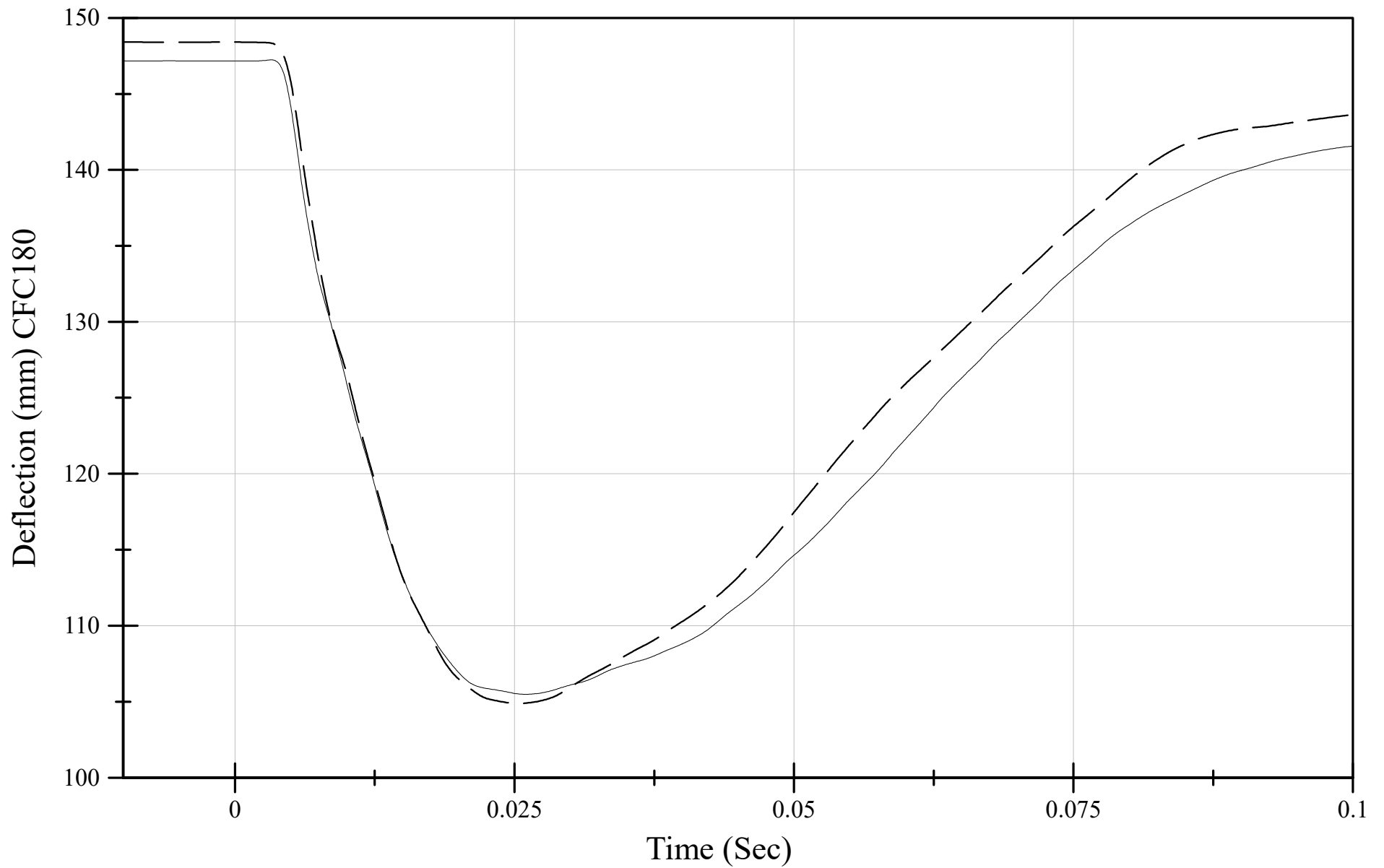
THOR-50M Upper Thorax Qualification
Right Resultant Deflection
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

X-Deflection

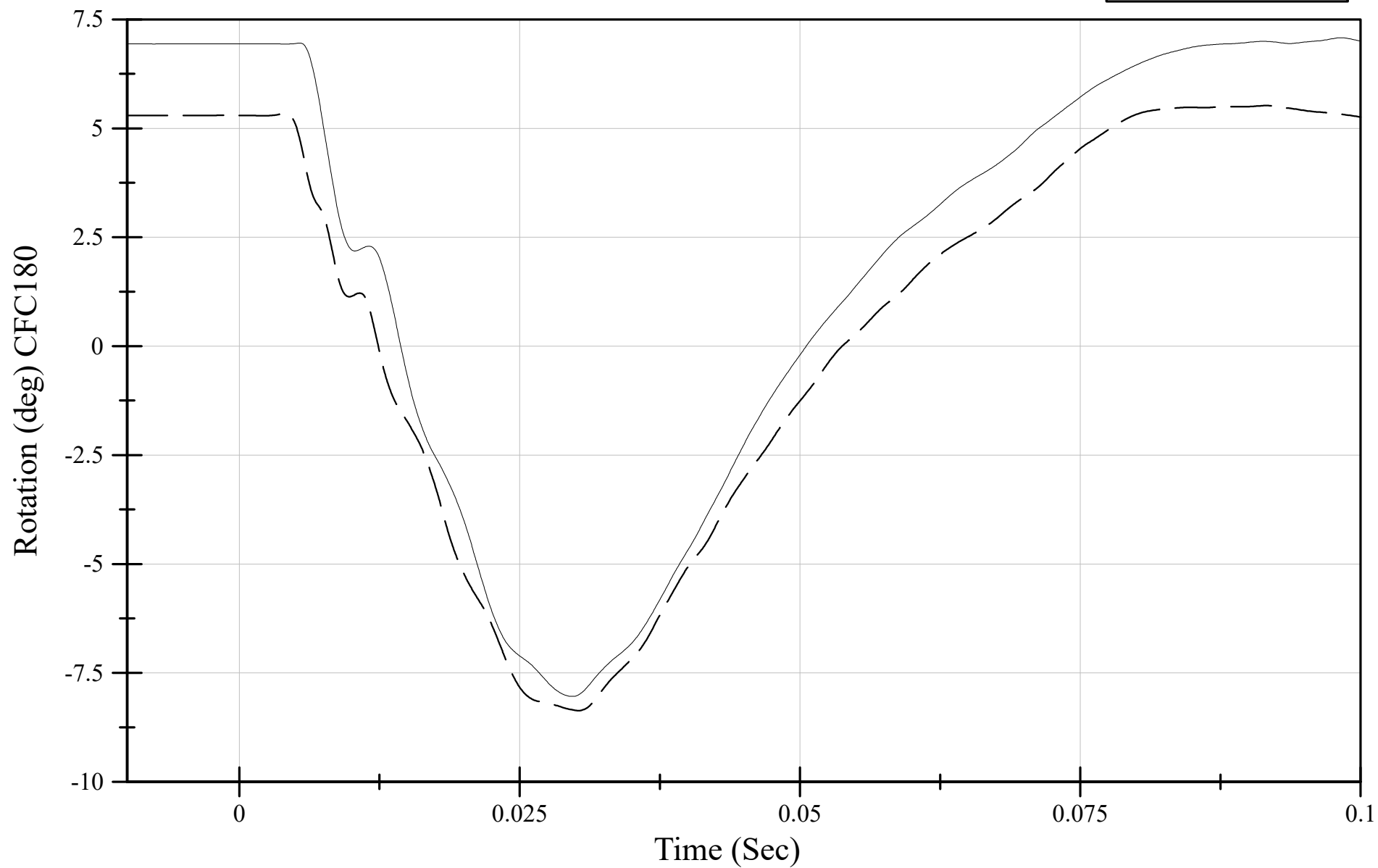
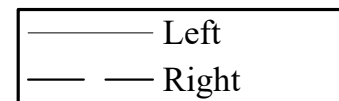
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Y-Rotation + Offset

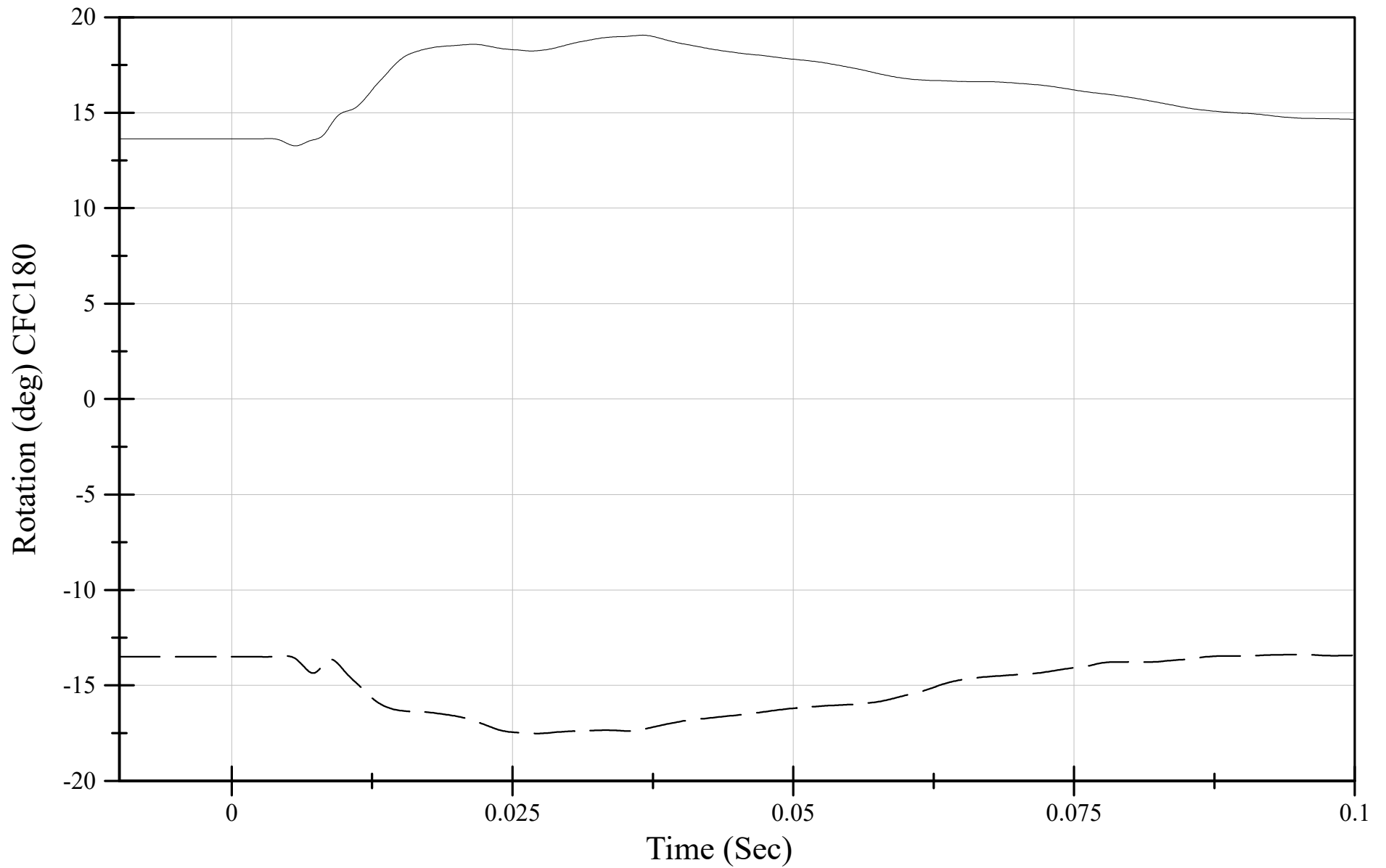
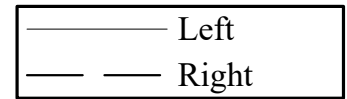
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Rib 1 Serial Number: 12073
Rib 2 Serial Number: 12113
Rib 3 Serial Number: 12235
Rib 4 Serial Number: 12202

Rib 5 Serial Number: 12079
Rib 6 Serial Number: 12123
Rib 7 Serial Number: 12146

Test ID: 240930-13
Test Date: 9/30/2024
Test Time: 4:04 PM

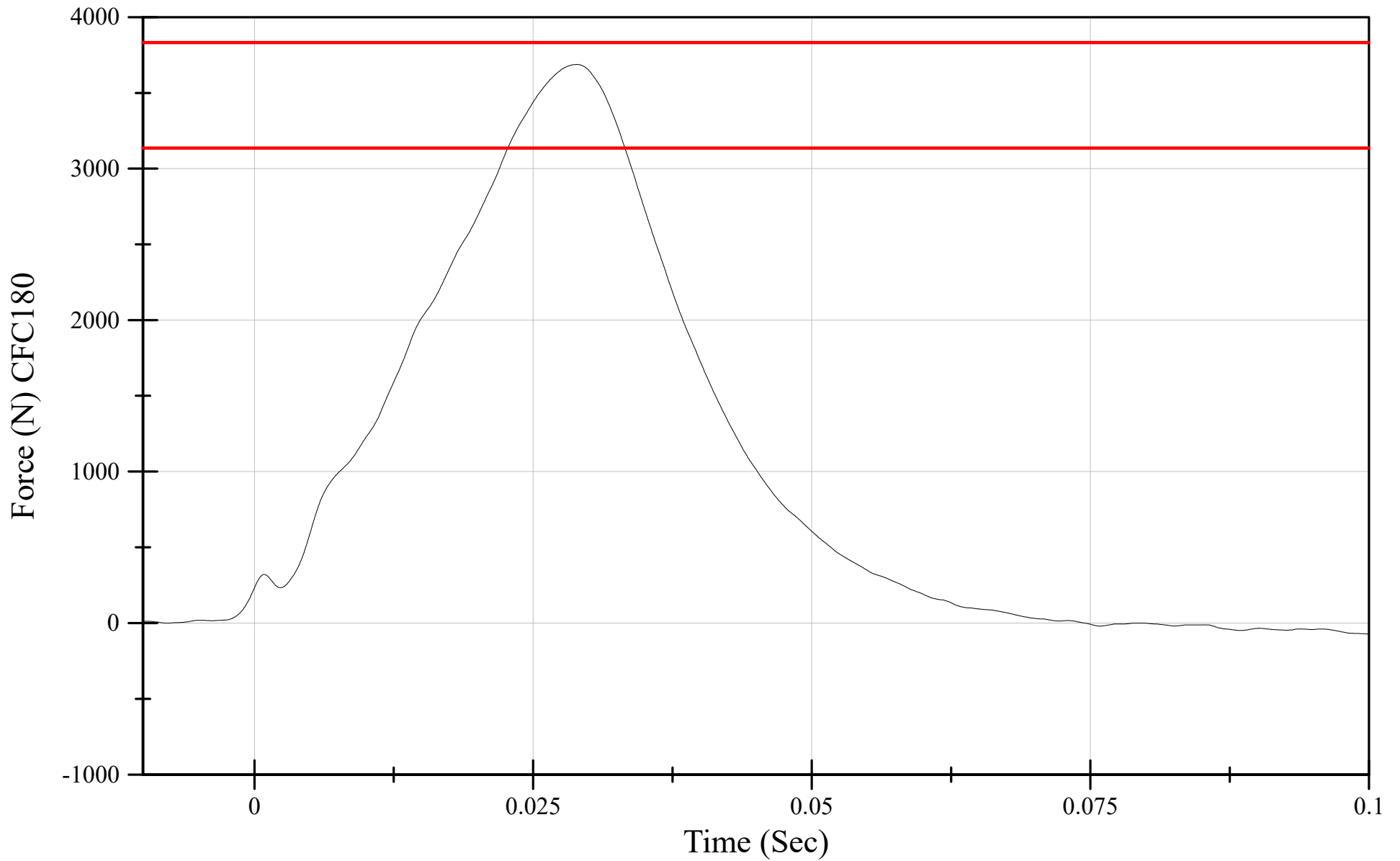
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.25 - 4.35	4.309	Pass
Peak Probe Force (N)	3136 - 3832	3688.0	Pass
Left Resultant Deflection at Peak Force (mm)	45.8 - 56.0	50.94	Pass

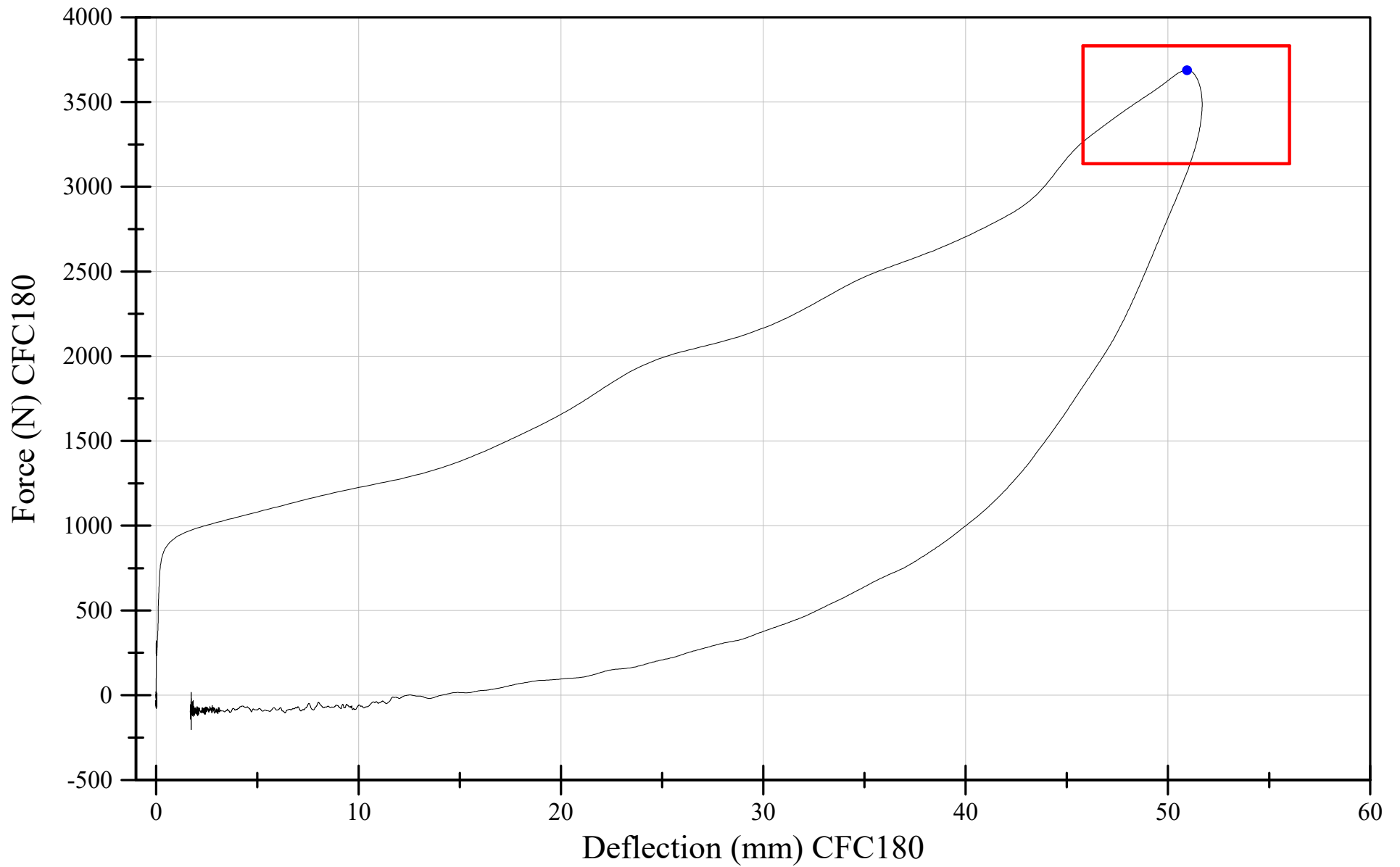
THOR-50M Left Lower Thorax Qualification

Probe Force

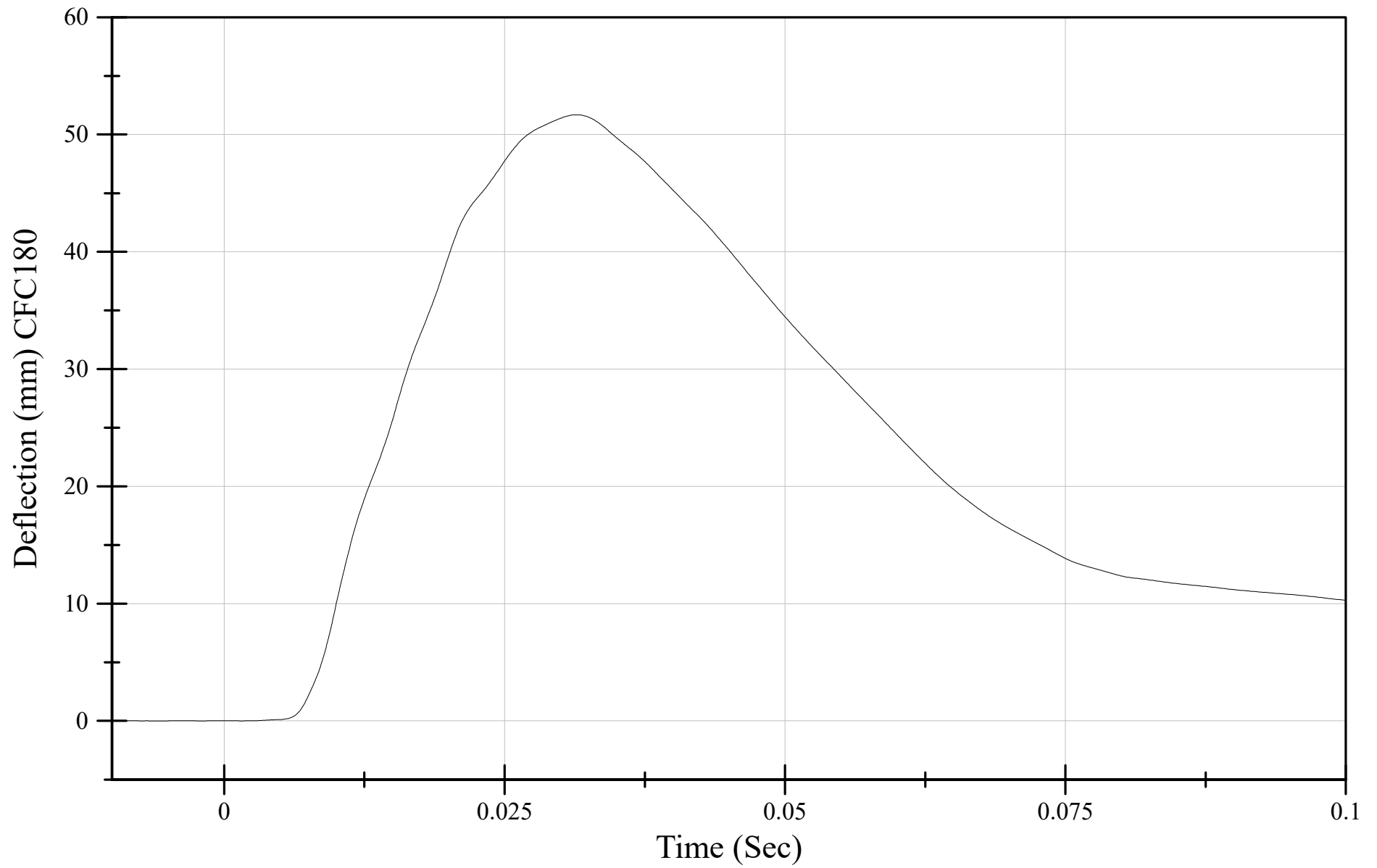
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification
Probe Force vs Left Resultant Deflection
Serial Number: DO9799



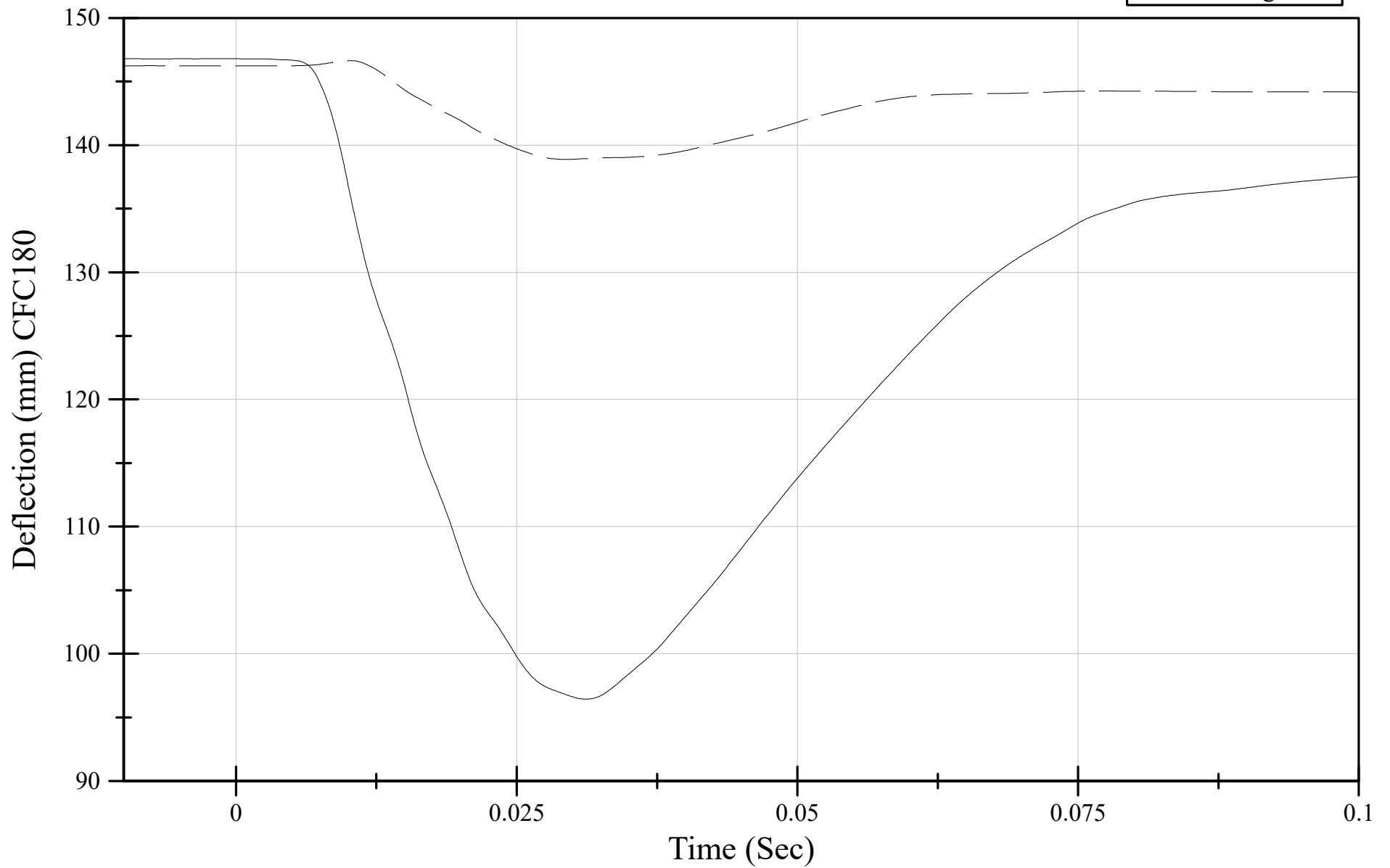
THOR-50M Left Lower Thorax Qualification
Left Resultant Deflection
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

X-Deflection

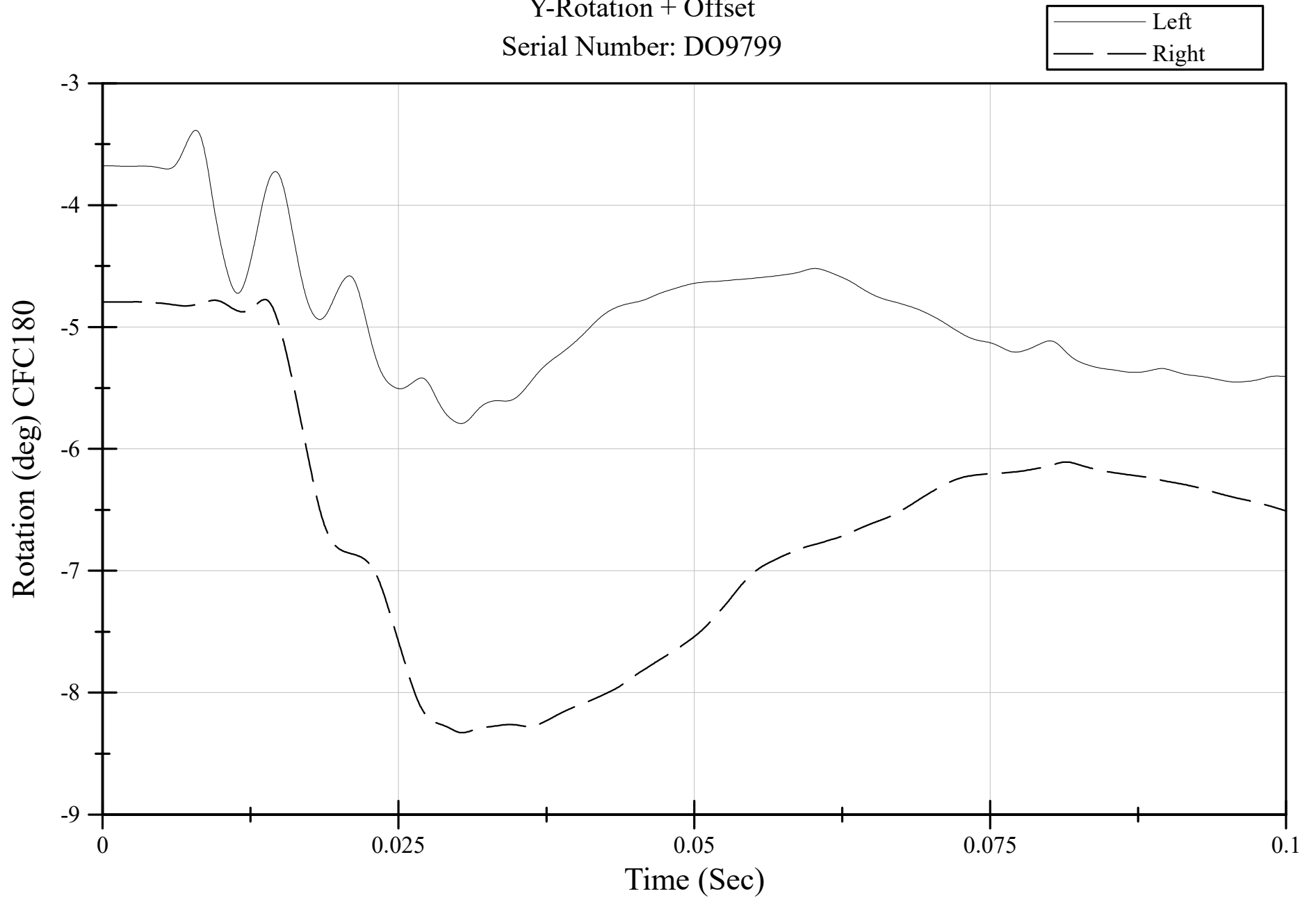
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Y-Rotation + Offset

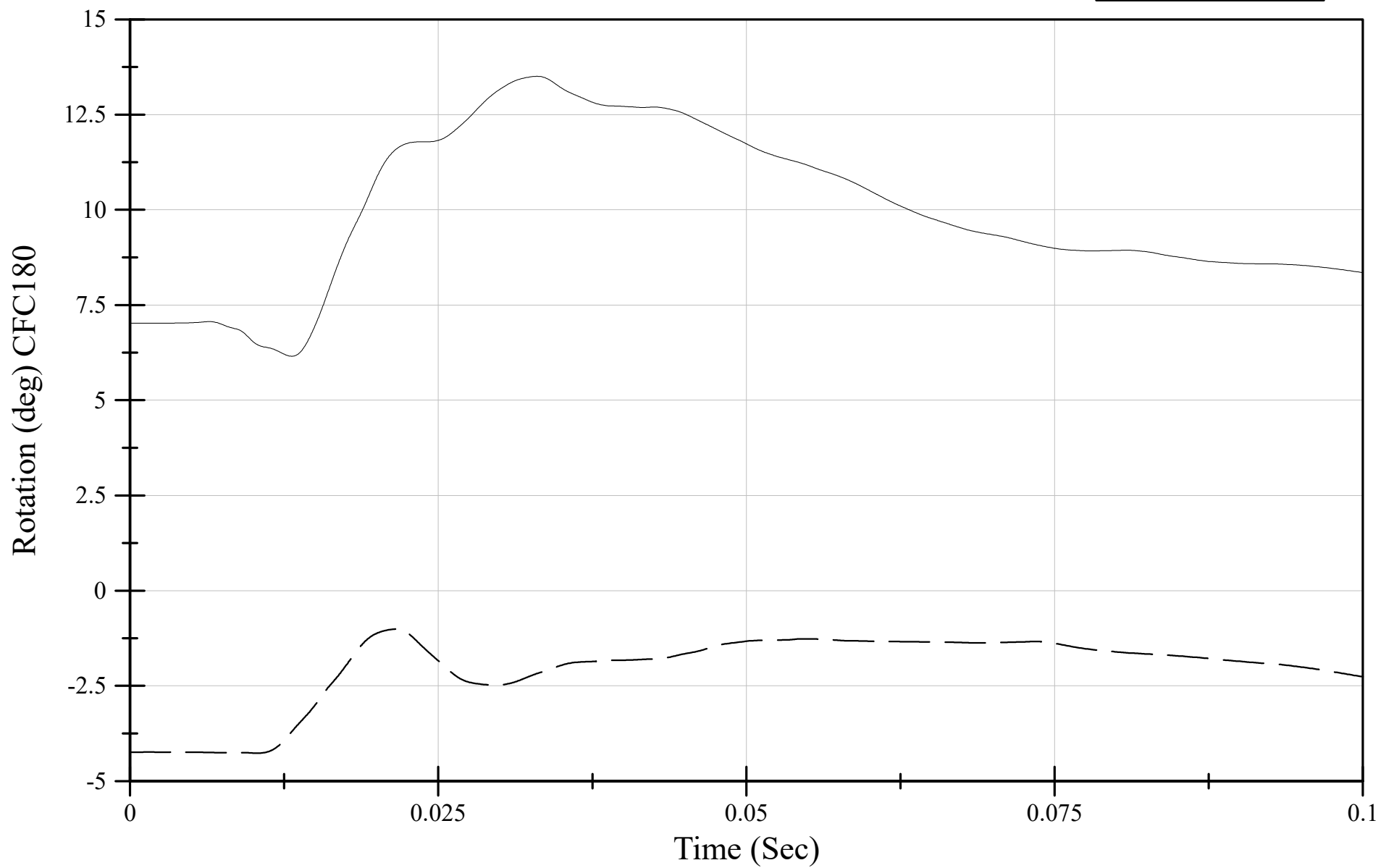
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Rib 1 Serial Number: 12073
Rib 2 Serial Number: 12113
Rib 3 Serial Number: 12235
Rib 4 Serial Number: 12202

Rib 5 Serial Number: 12079
Rib 6 Serial Number: 12123
Rib 7 Serial Number: 12146

Test ID: 240930-14
Test Date: 9/30/2024
Test Time: 5:12 PM

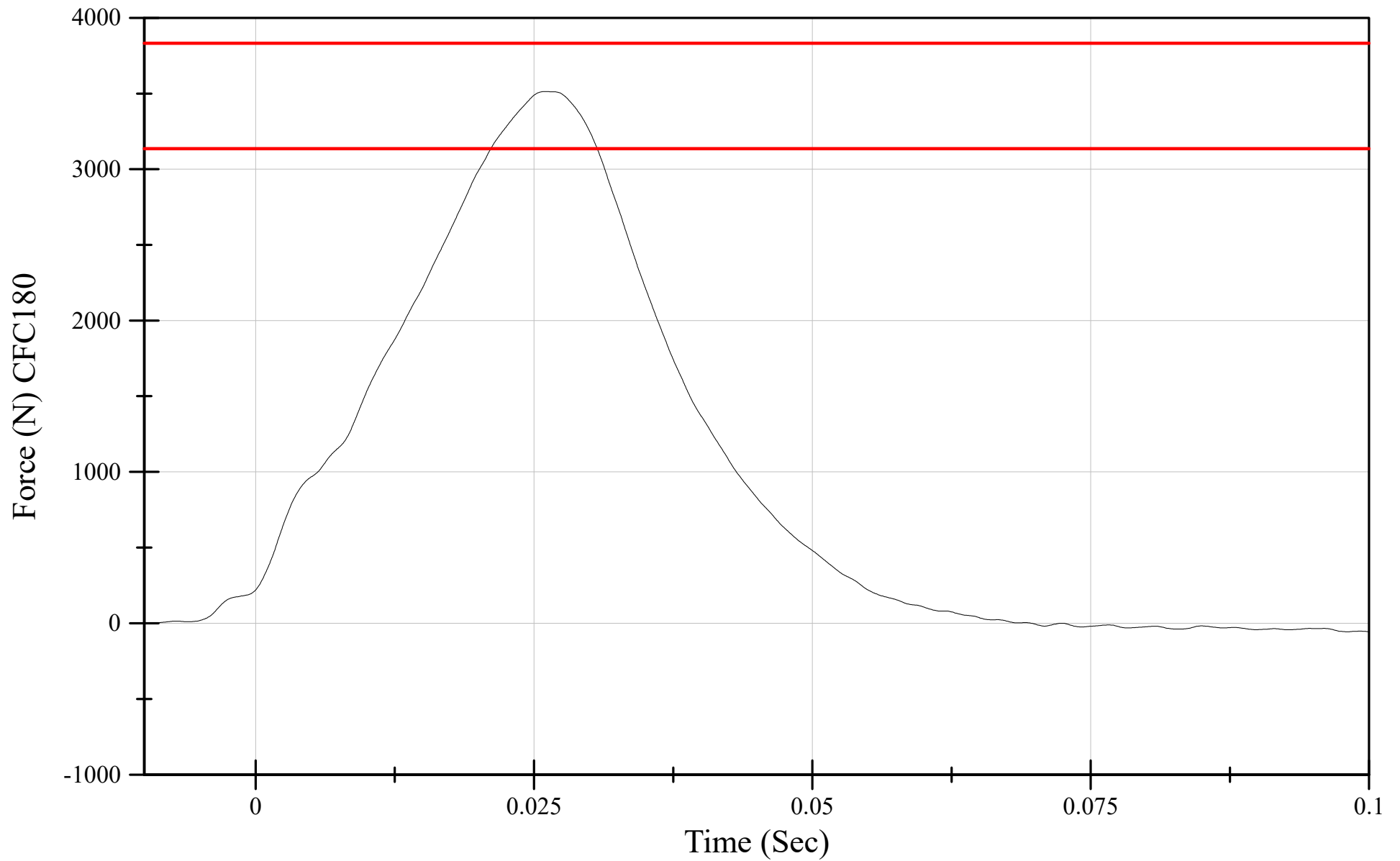
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	4.25 - 4.35	4.306	Pass
Peak Probe Force (N)	3136 - 3832	3512.8	Pass
Right Resultant Deflection at Peak Force (mm)	45.8 - 56.0	49.90	Pass

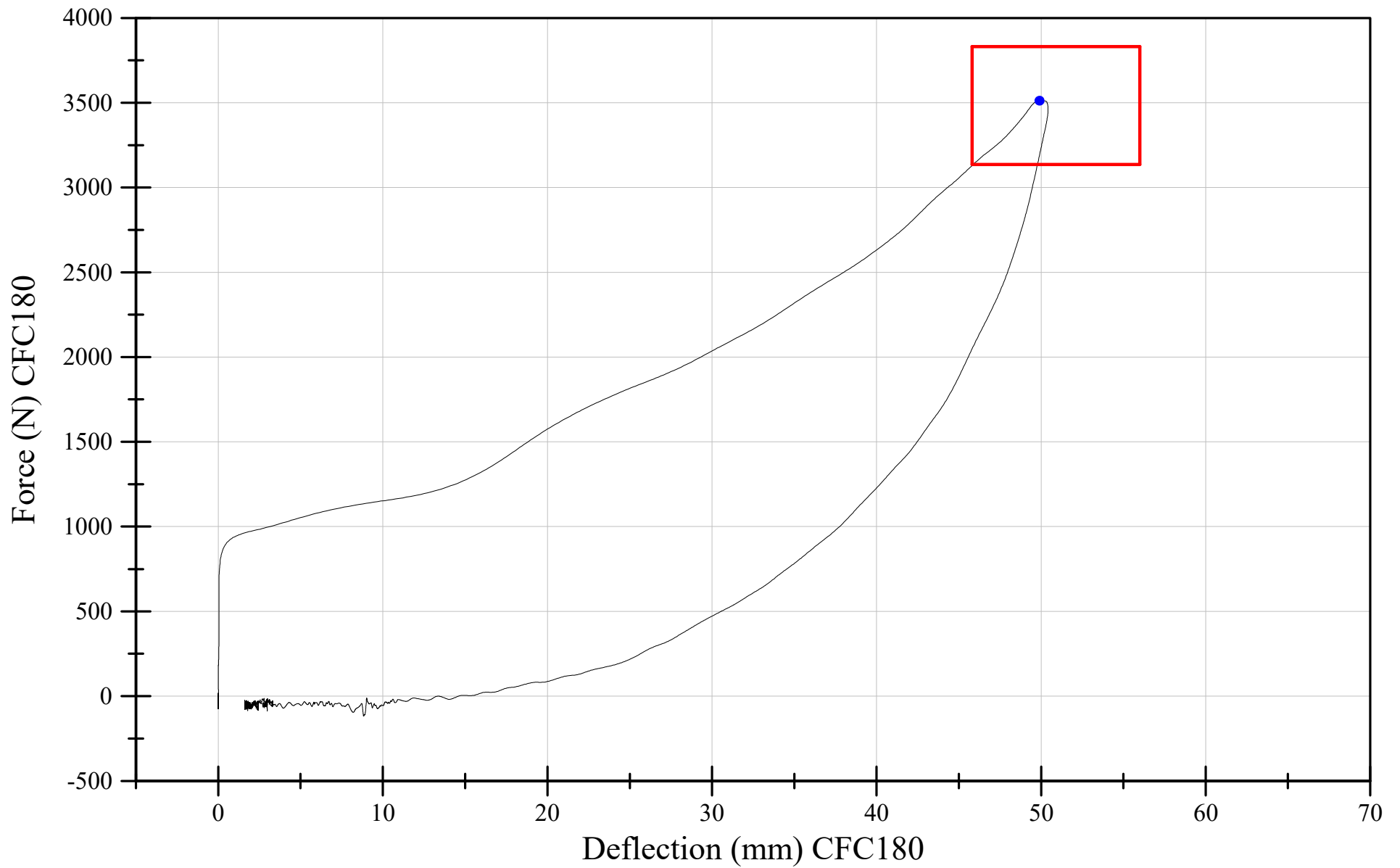
THOR-50M Right Lower Thorax Qualification

Probe Force

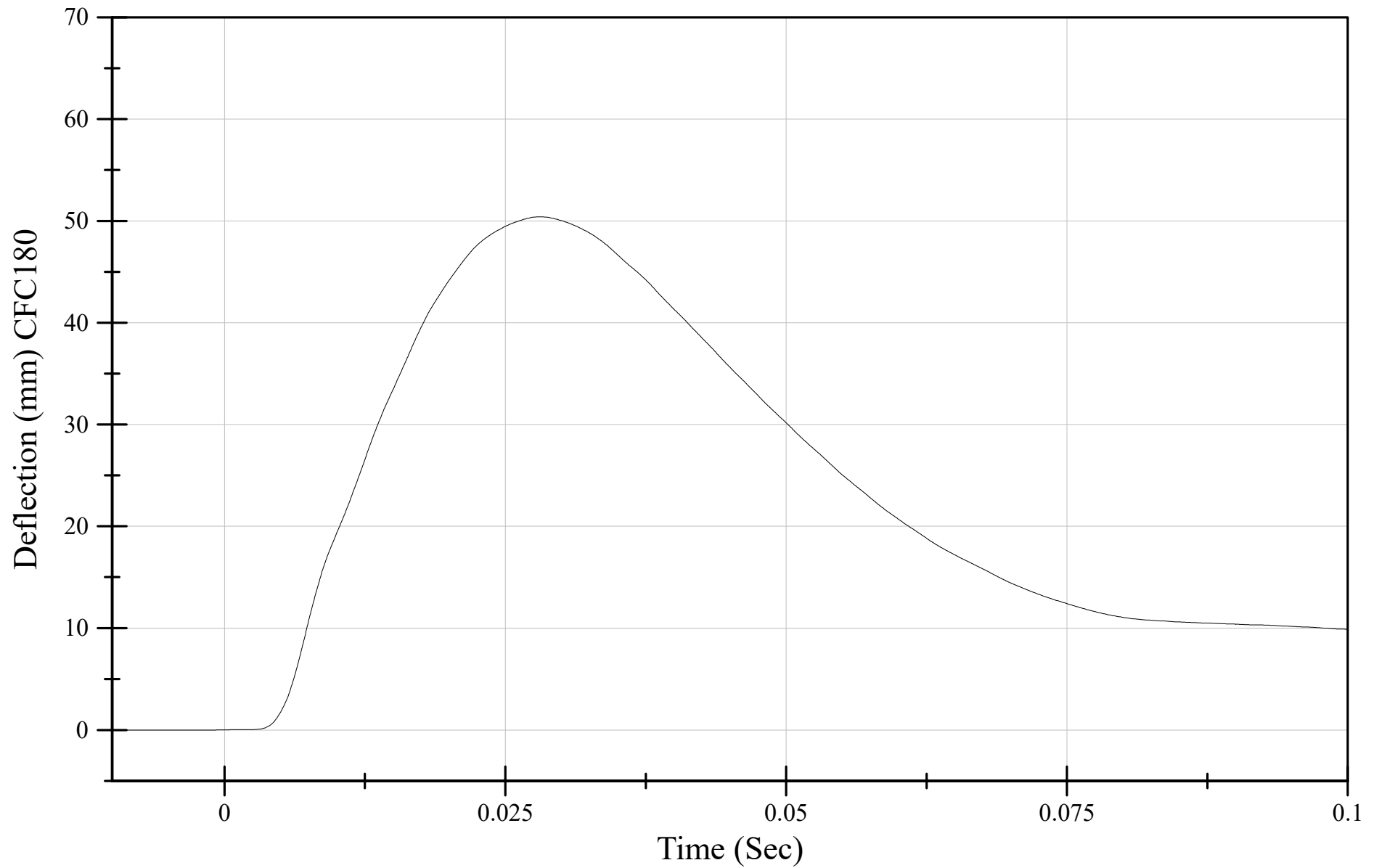
Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification
Probe Force vs Right Resultant Deflection
Serial Number: DO9799



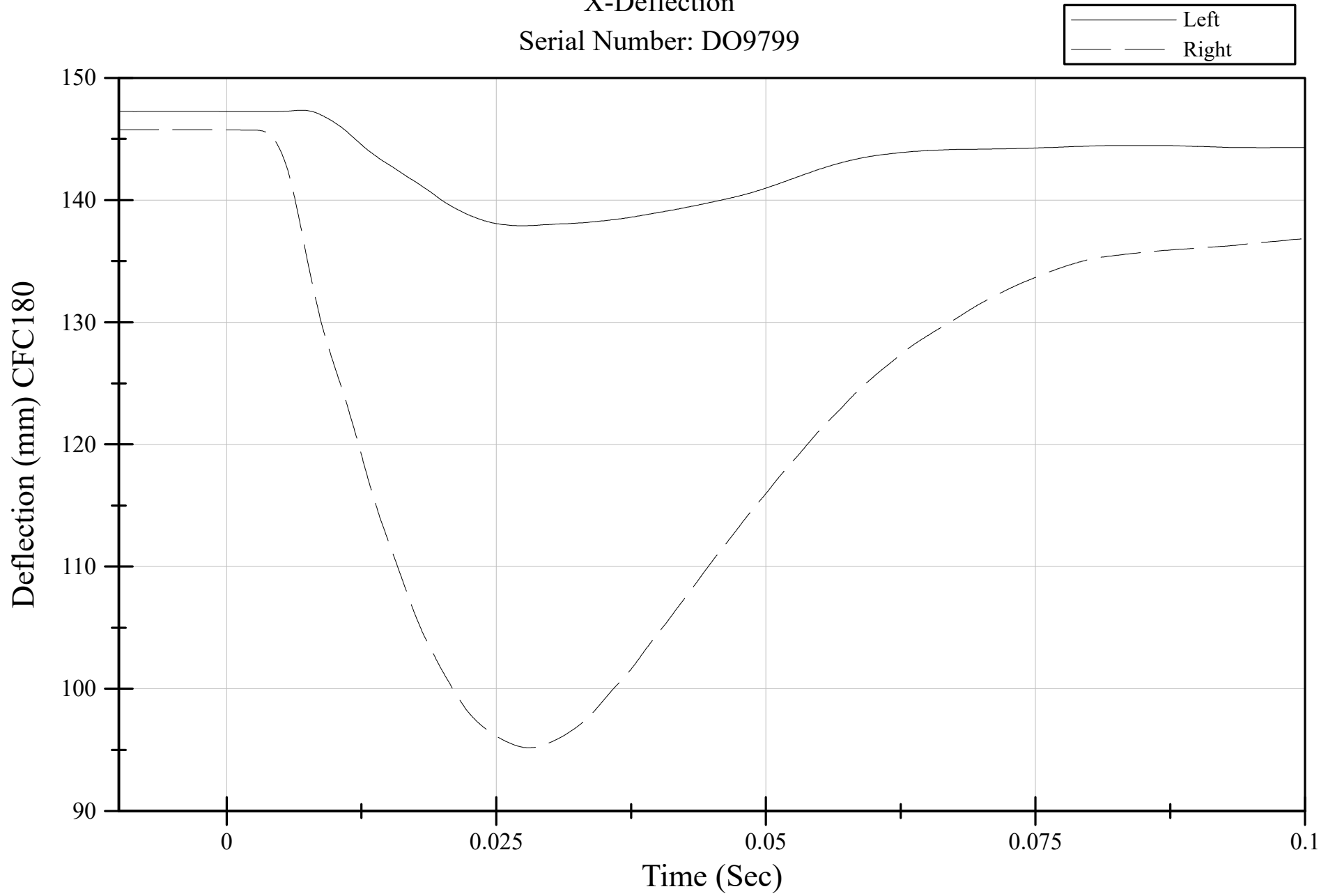
THOR-50M Right Lower Thorax Qualification
Right Resultant Deflection
Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification

X-Deflection

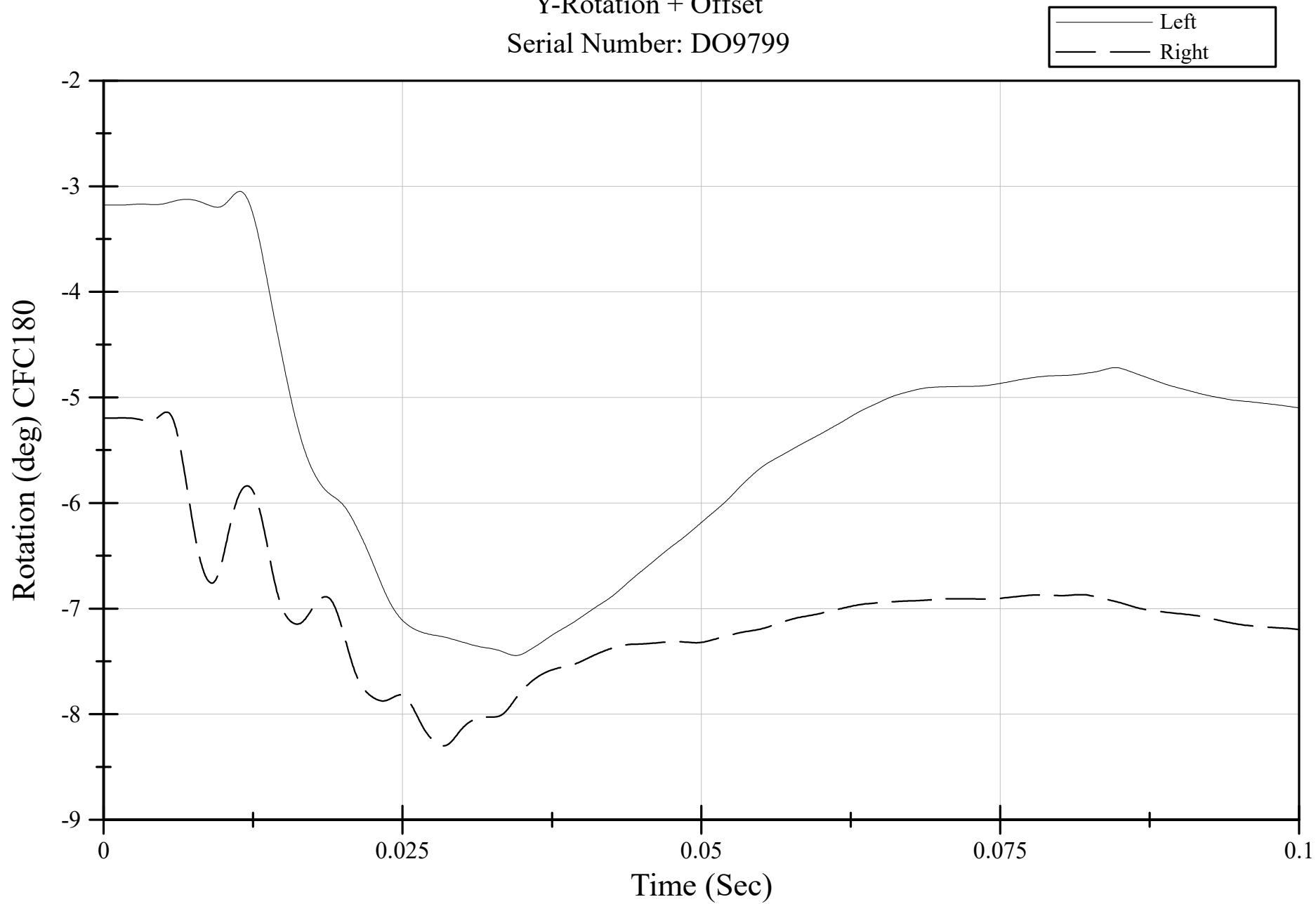
Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification

Y-Rotation + Offset

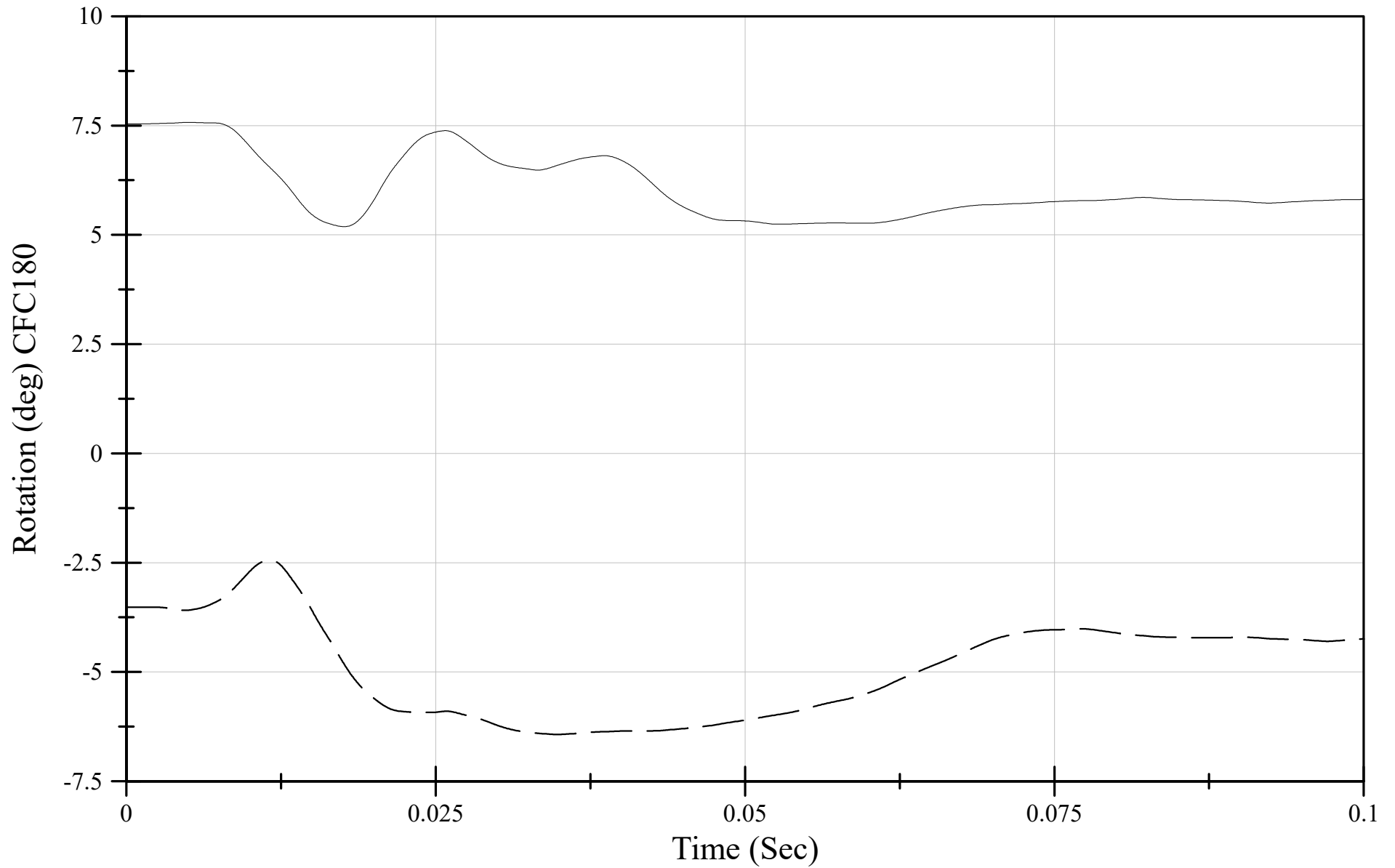
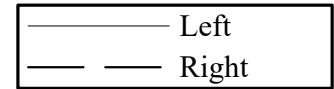
Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Front Lower Abdomen Foam: 010

Rear Lower Abdomen Foam: 014

Lower Abdomen Bag: 11315

Test ID: 241001-8

Test Date: 10/1/2024

Test Time: 11:32 AM

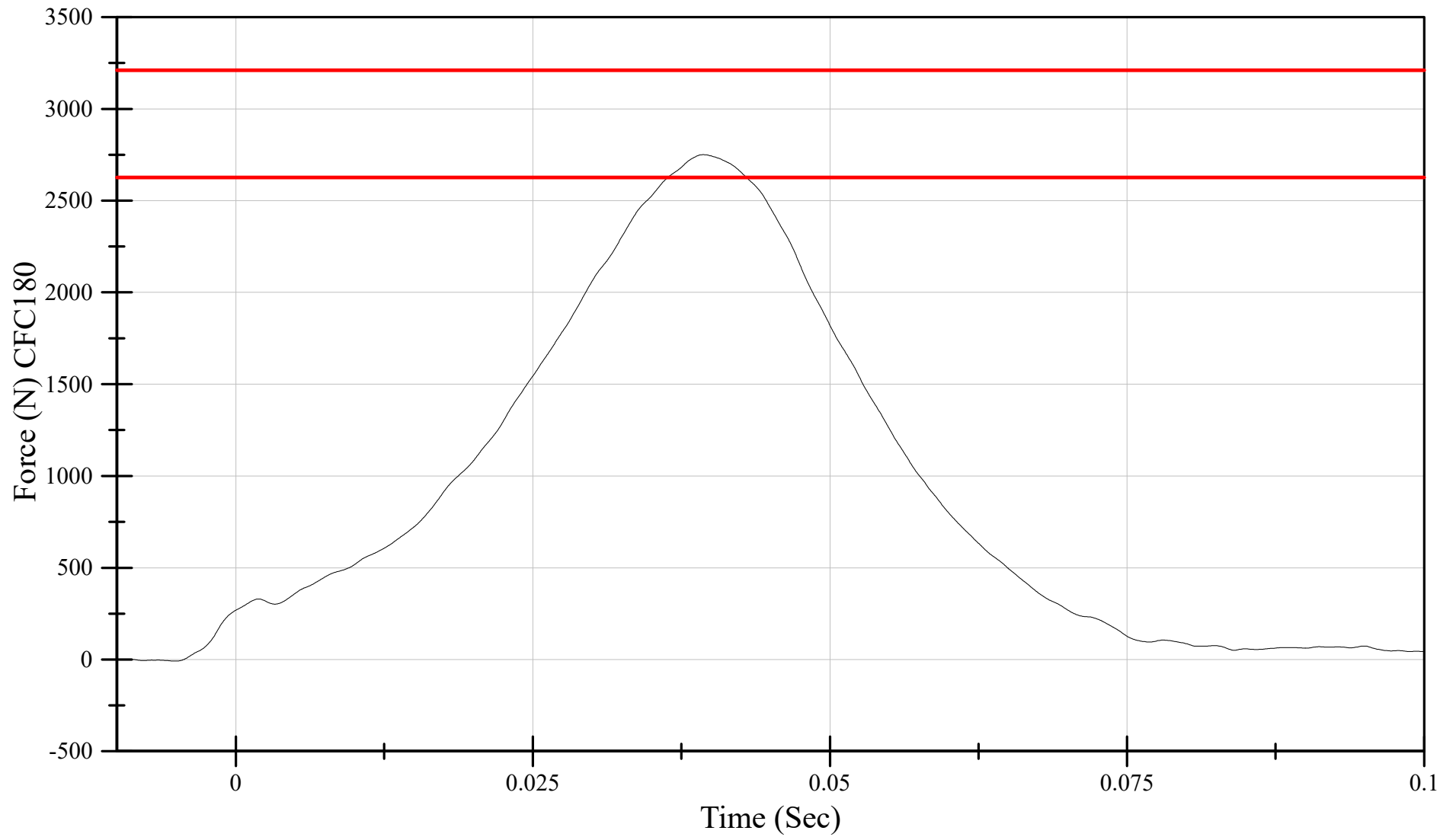
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.5	Pass
Test Humidity (%)	10 - 70	57	Pass
Test Velocity (m/s)	3.25 - 3.35	3.260	Pass
Peak Probe Force (N)	2626 - 3210	2751.3	Pass
Lower Left Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-90.82	Pass
Lower Right Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-88.52	Pass
Difference Between Peak Left & Right X-axis Deflections (mm)	less than 8.0	1.96	Pass

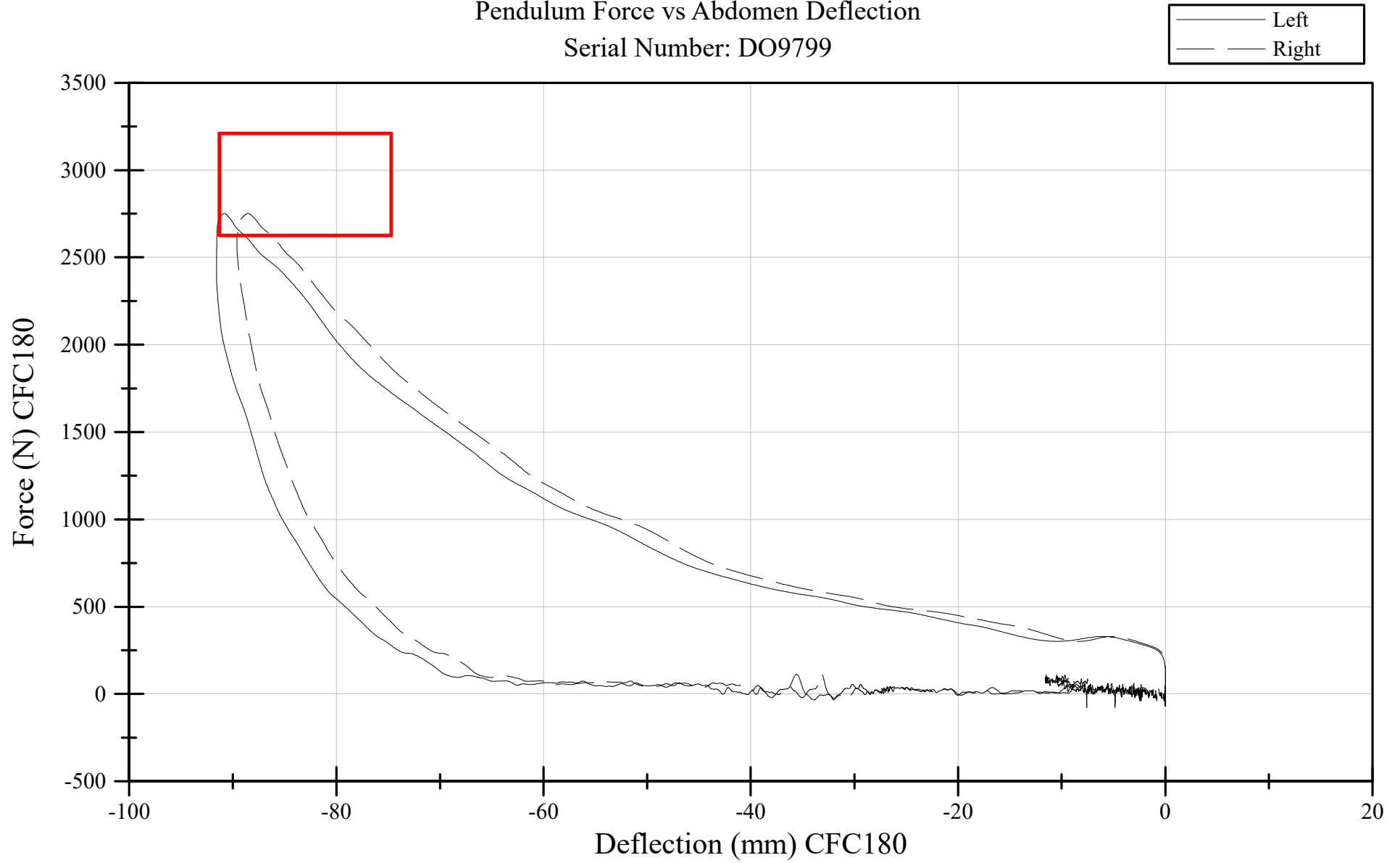
THOR-50M Lower Abdomen Qualification

Probe Force

Serial Number: DO9799



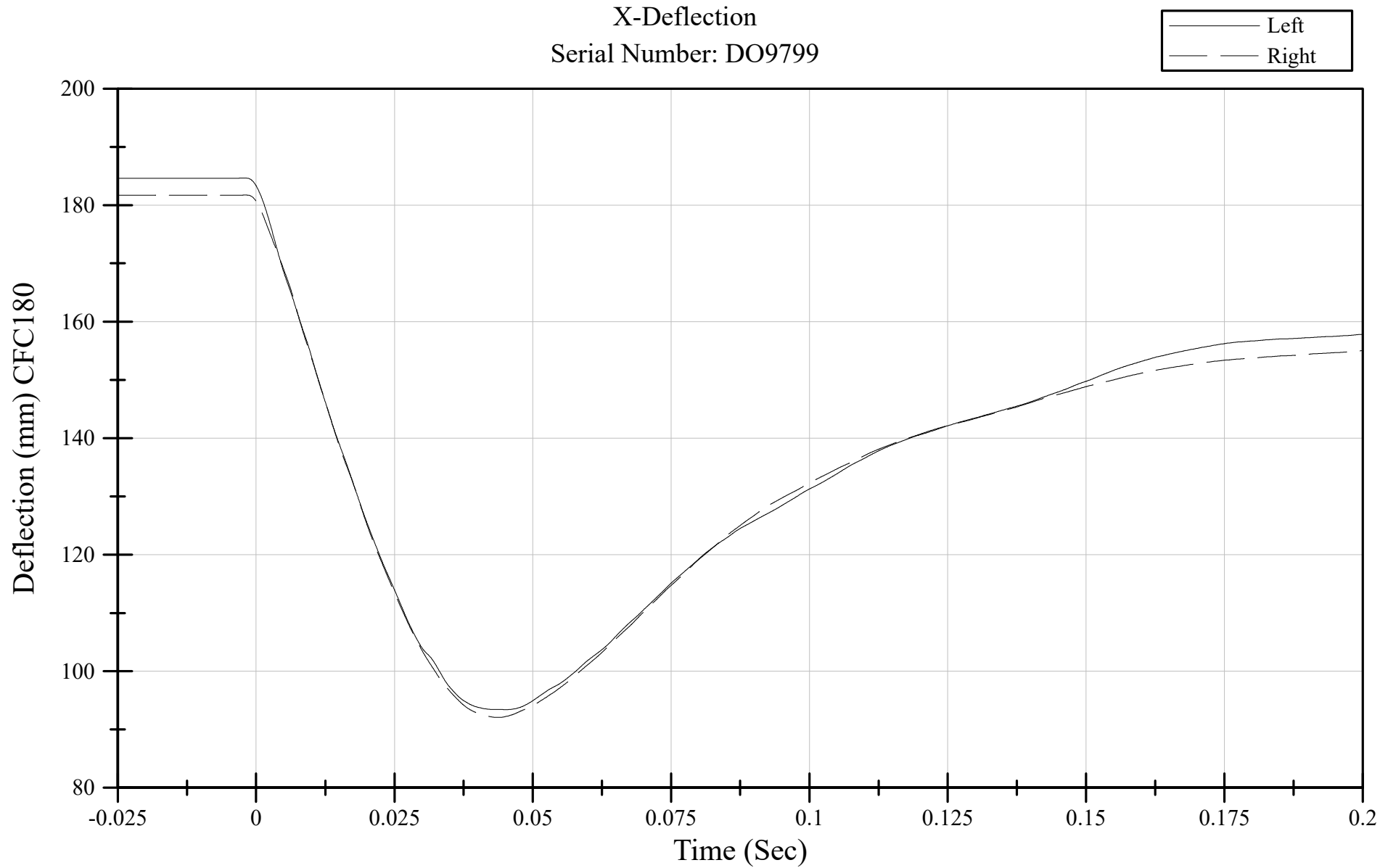
THOR-50M Lower Abdomen Qualification
Pendulum Force vs Abdomen Deflection
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

X-Deflection

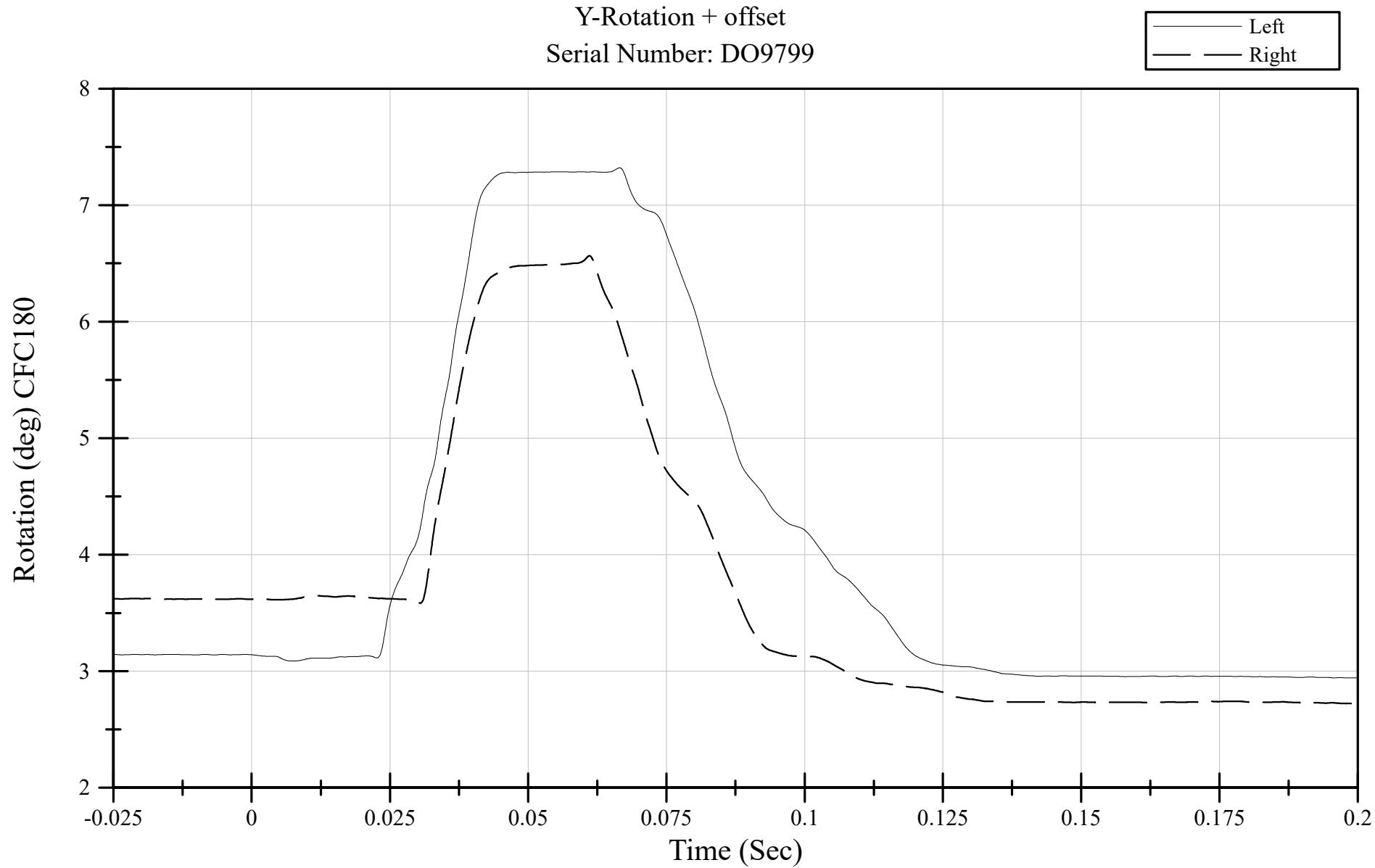
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

Y-Rotation + offset

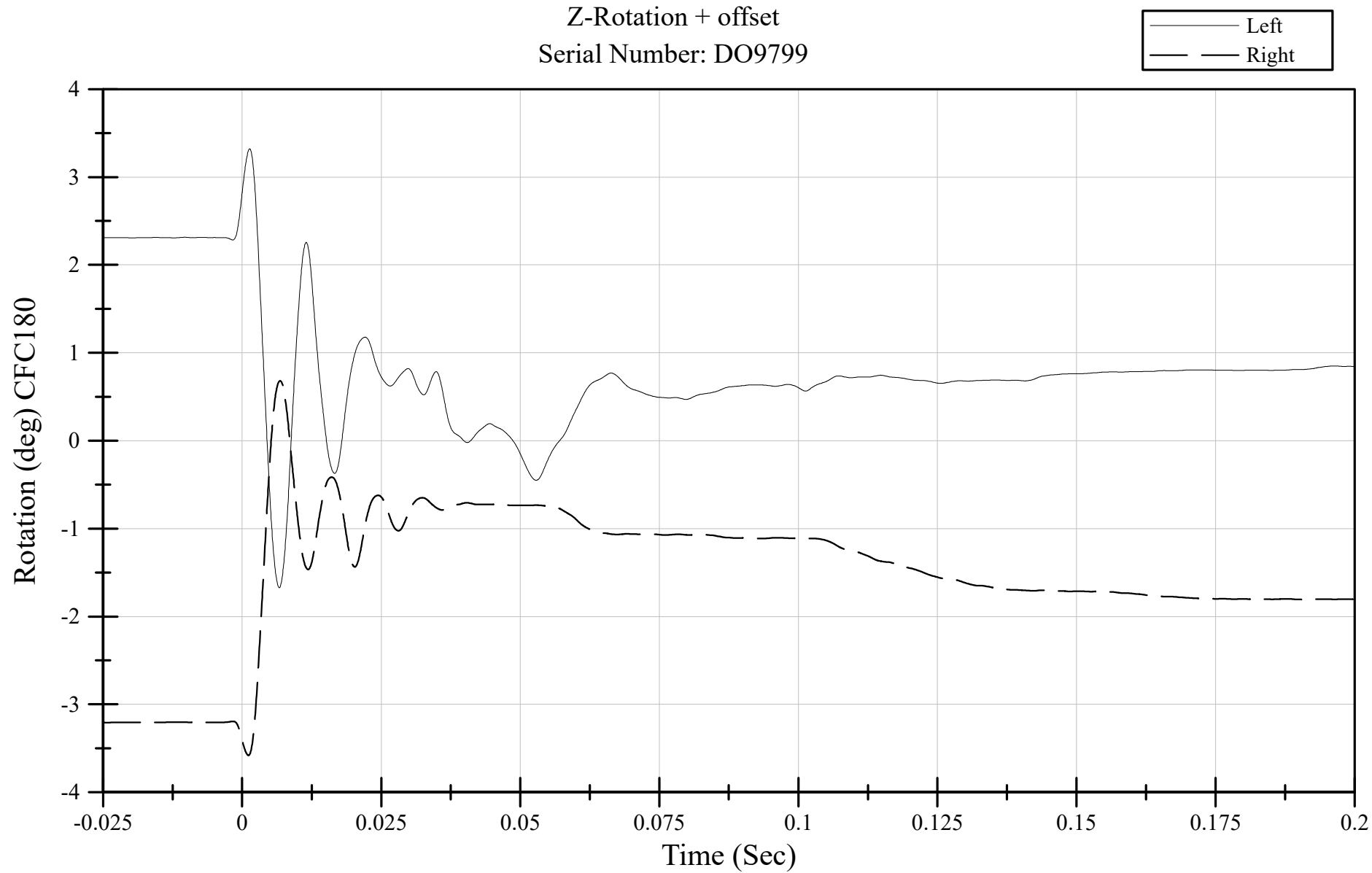
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

Z-Rotation + offset

Serial Number: DO9799



THOR-50M Left Upper Leg Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Compression Element:
Left Thigh Flesh: EH2766

Test ID: 241002-10

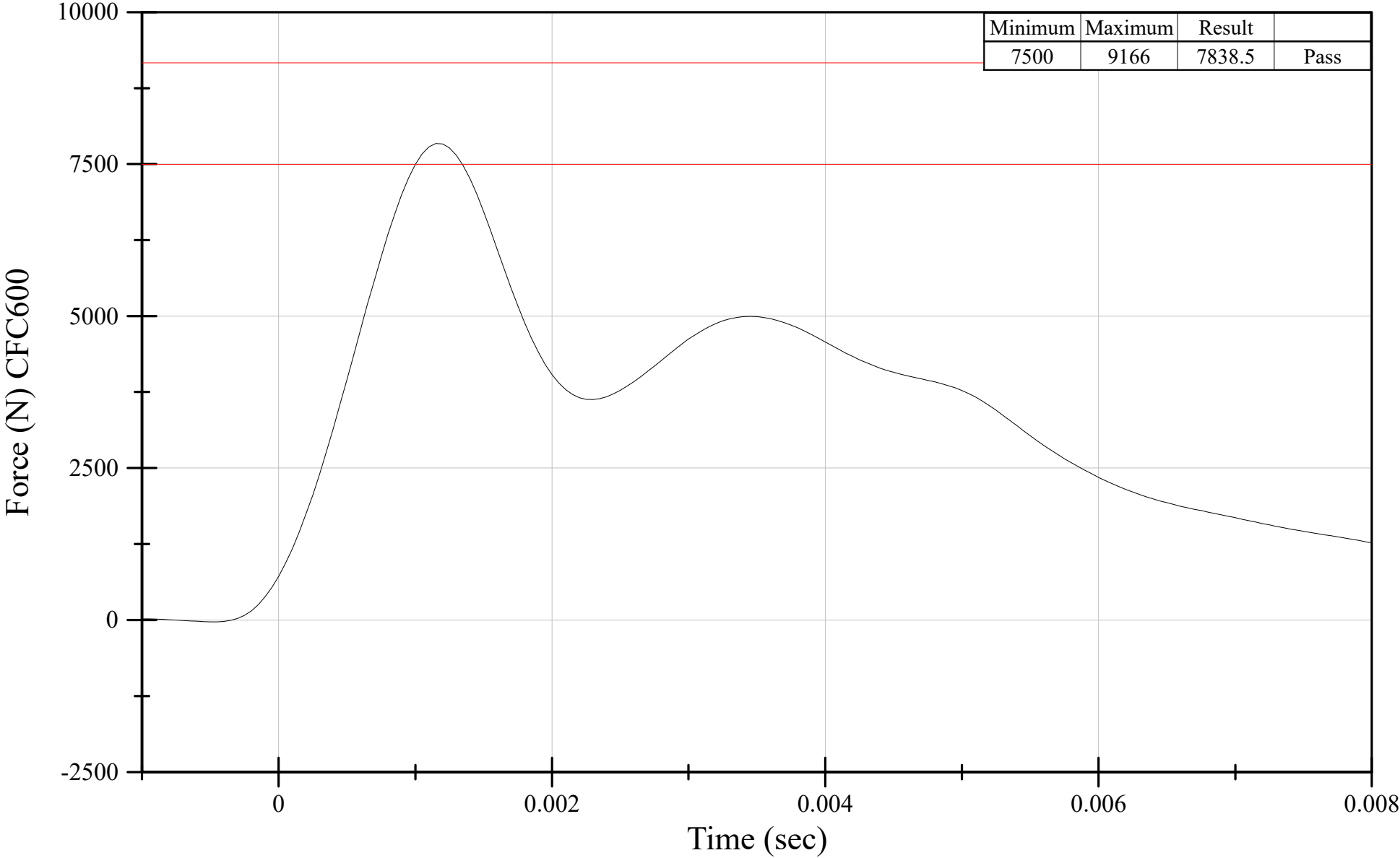
Test Date: 10/2/2024

Test Time: 3:35 PM

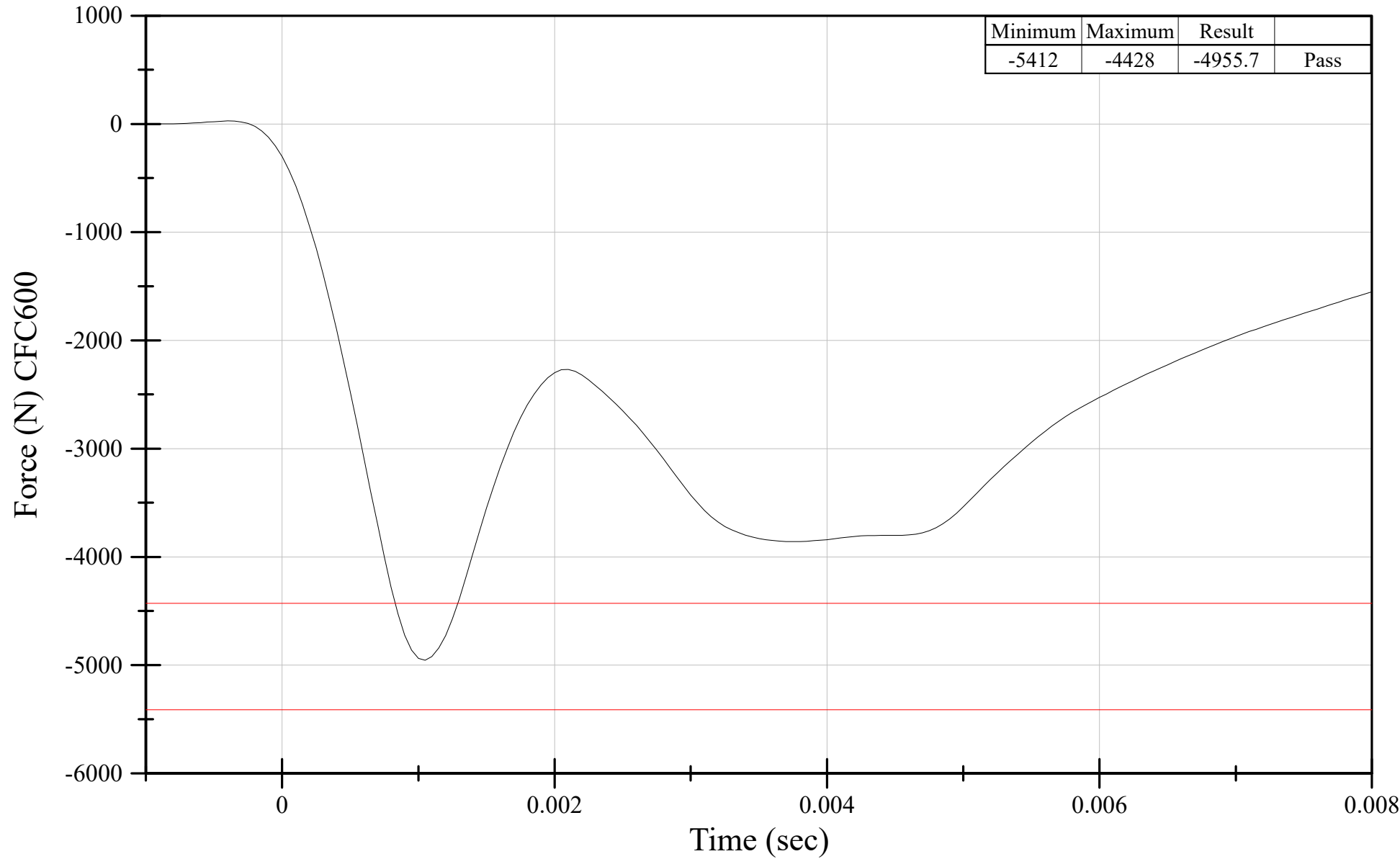
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	54	Pass
Test Velocity (m/s)	3.25 - 3.35	3.293	Pass
Peak Probe Force (N)	7500 - 9166	7838.5	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4955.7	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2876.7	Pass

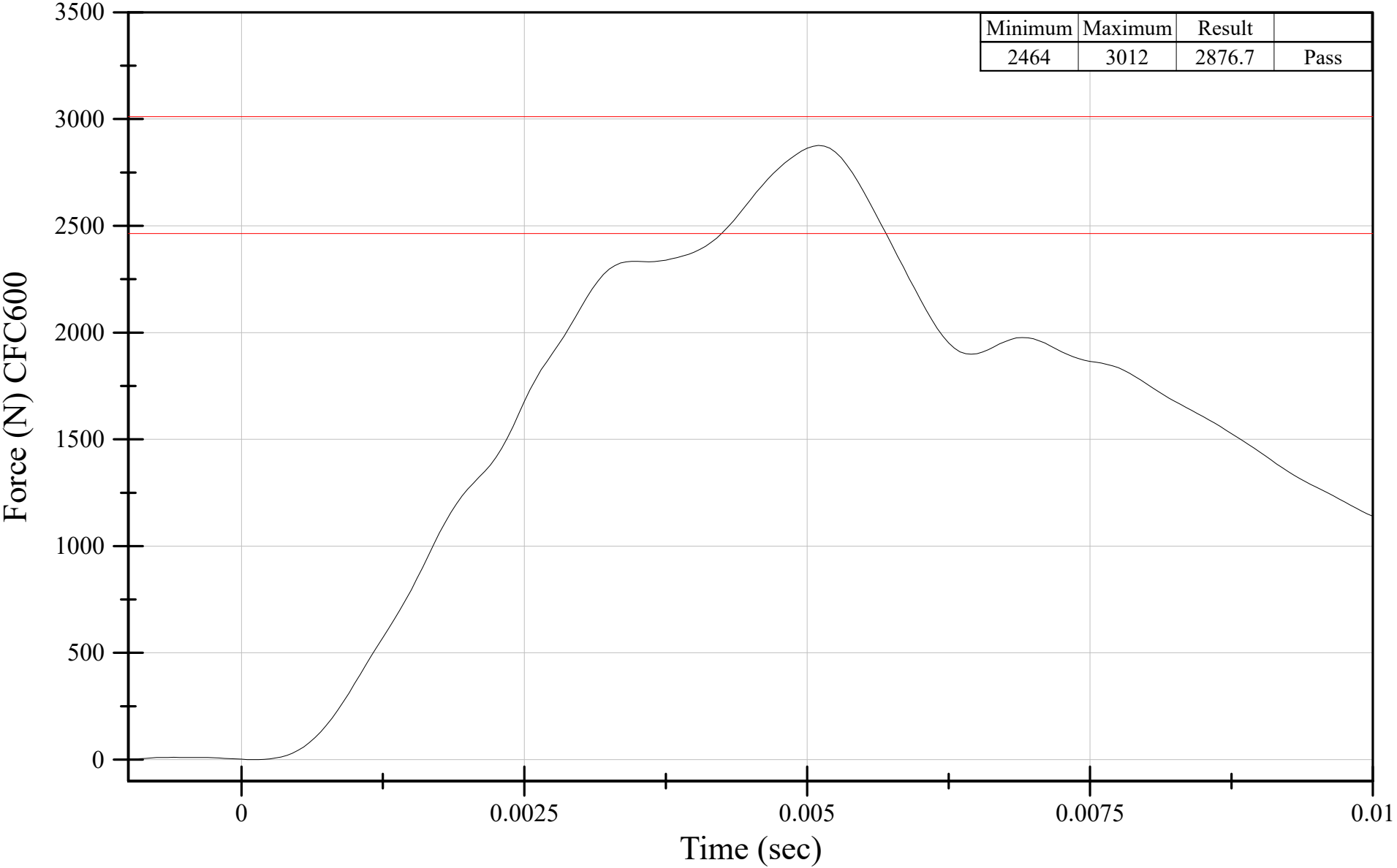
THOR-50M Left Upper Leg Qualification
Probe Force
Serial Number: DO9799



THOR-50M Left Upper Leg Qualification
Femur Z-Force
Serial Number: DO9799



THOR-50M Left Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Compression Element:
Right Thigh Flesh: EH2766

Test ID: 241002-13

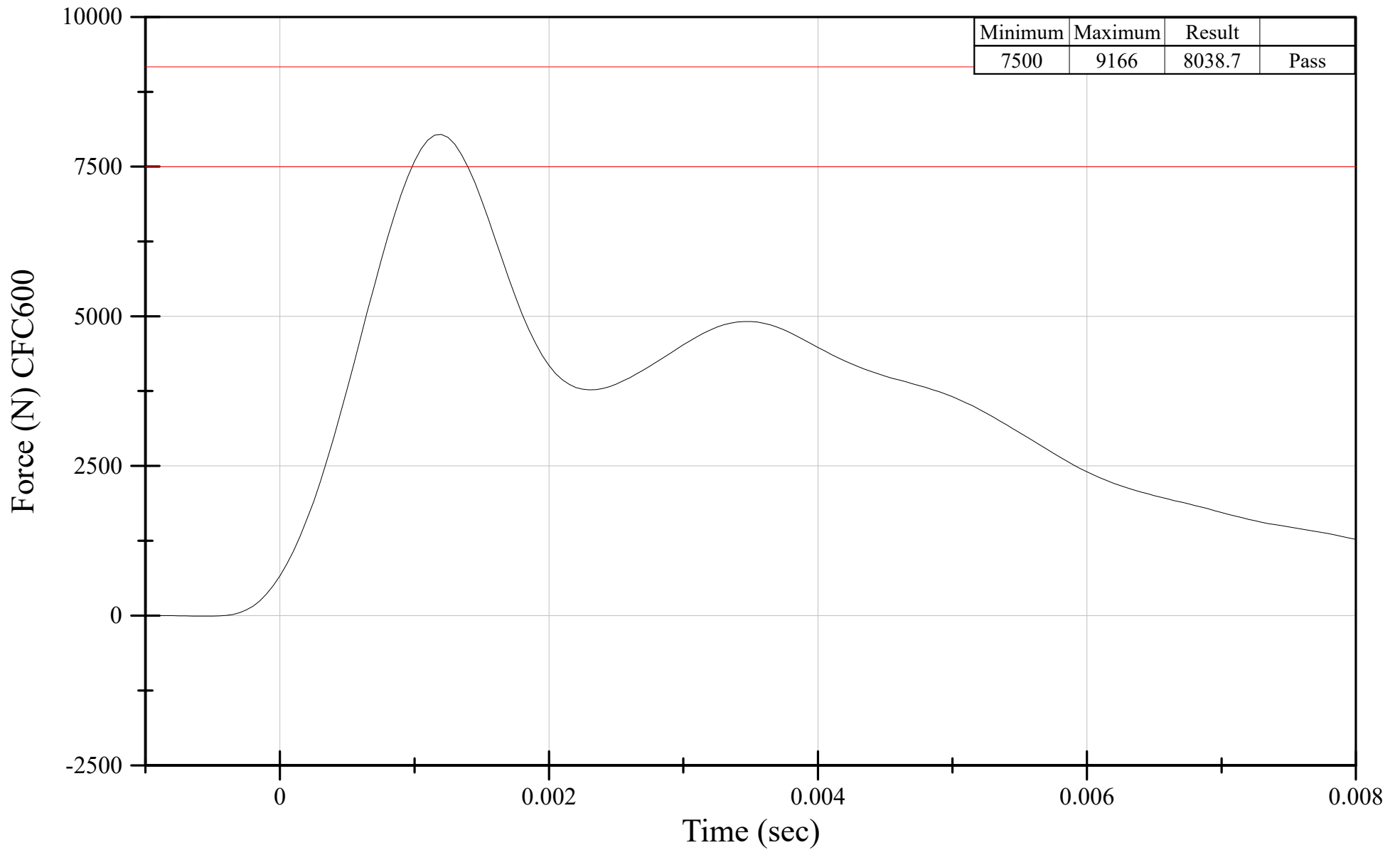
Test Date: 10/2/2024

Test Time: 4:29 PM

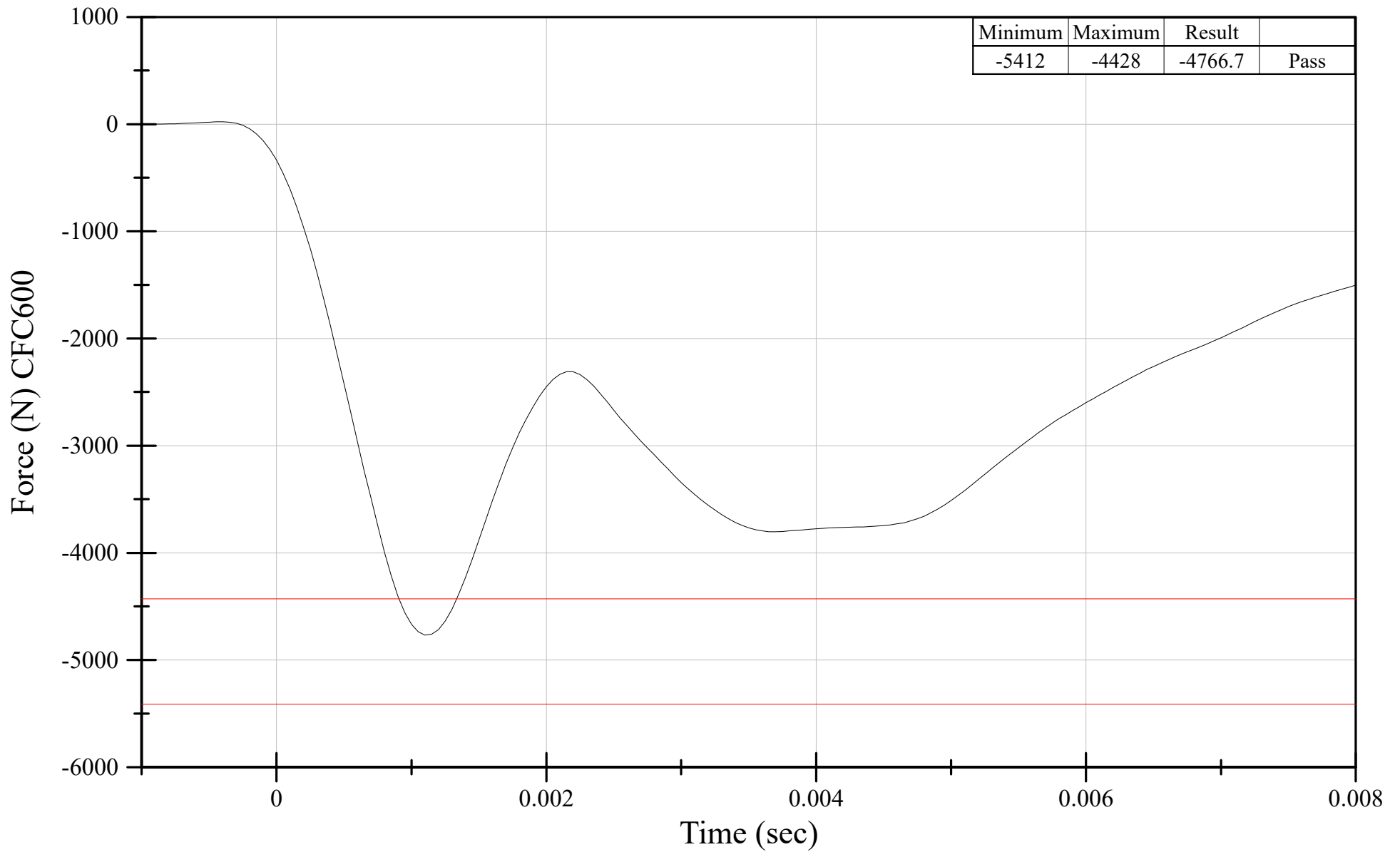
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	53	Pass
Test Velocity (m/s)	3.25 - 3.35	3.294	Pass
Peak Probe Force (N)	7500 - 9166	8038.7	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4766.7	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2767.9	Pass

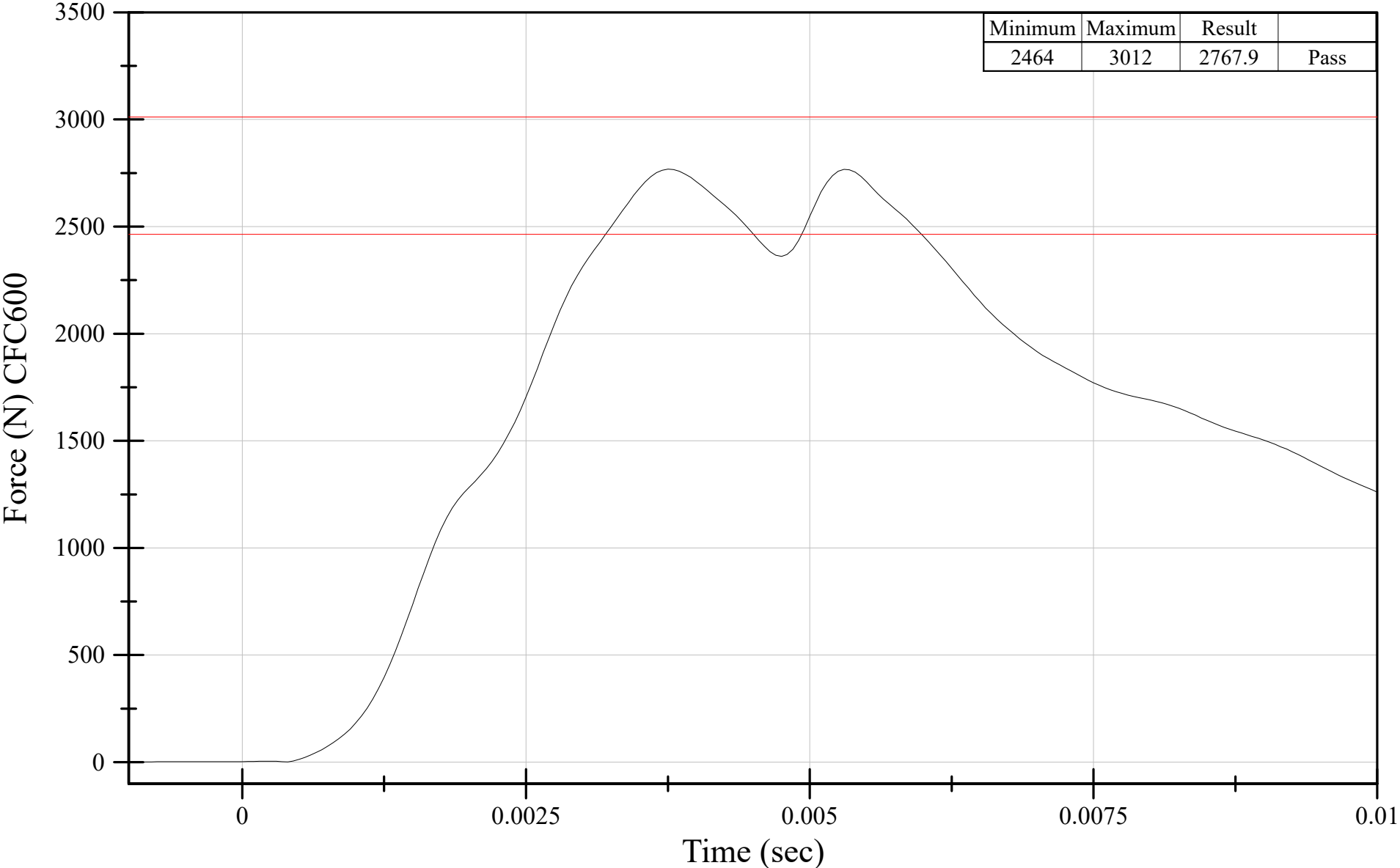
THOR-50M Right Upper Leg Qualification
Probe Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification
Femur Z-Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: DO9799



THOR-50M Head Impact Qualification
Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Head Skin: EW9412

Test ID: 241113-3

Test Date: 11/13/2024

Test Time: 8:07 AM

Test Results

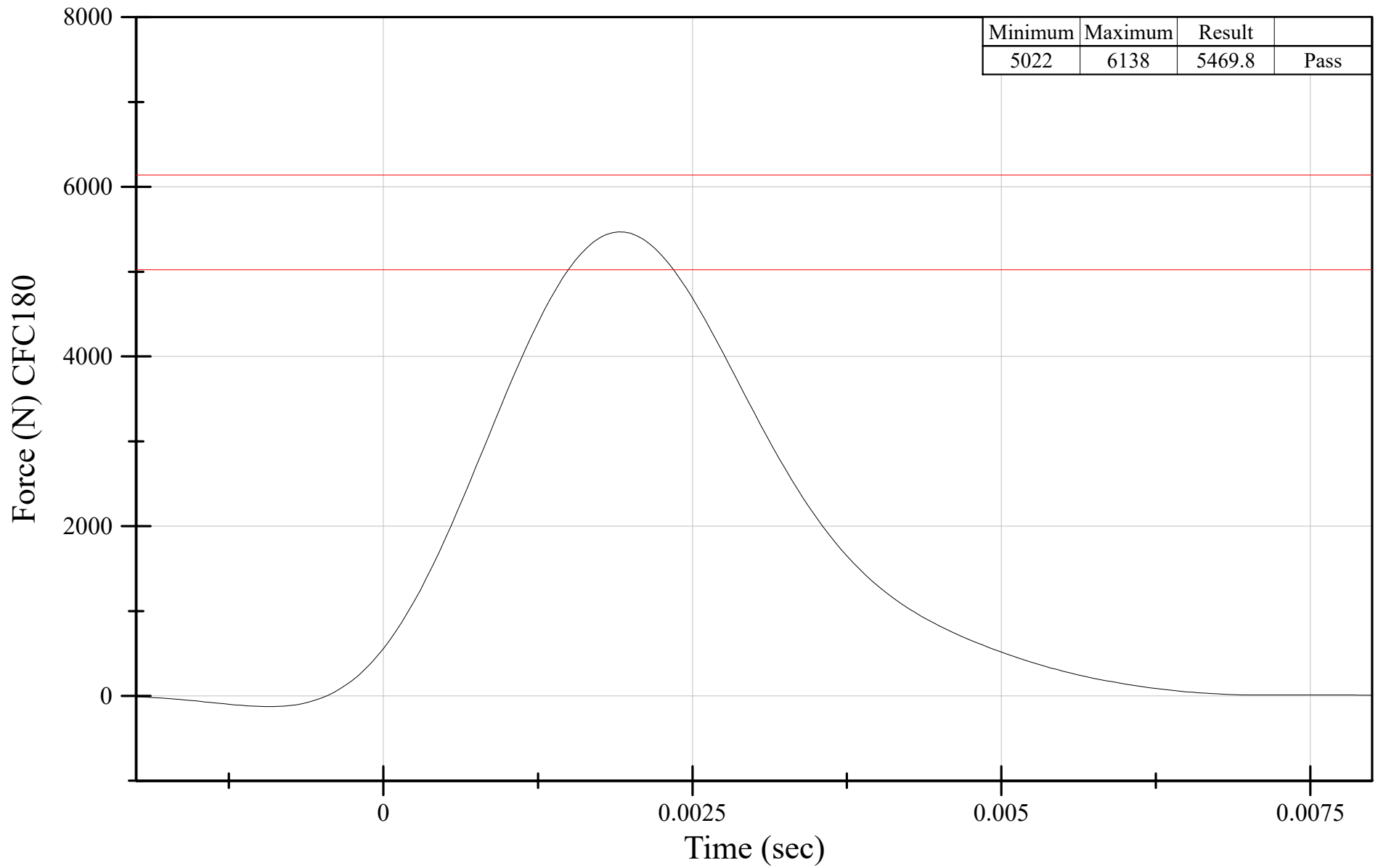
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	1.95 - 2.05	2.040	Pass
Peak Probe Force (N)	5022 - 6138	5469.8	Pass
Peak Head CG Resultant Acceleration (g)	105.3 - 128.7	116.93	Pass

* THOR-50M Qualification Manual - April 2023

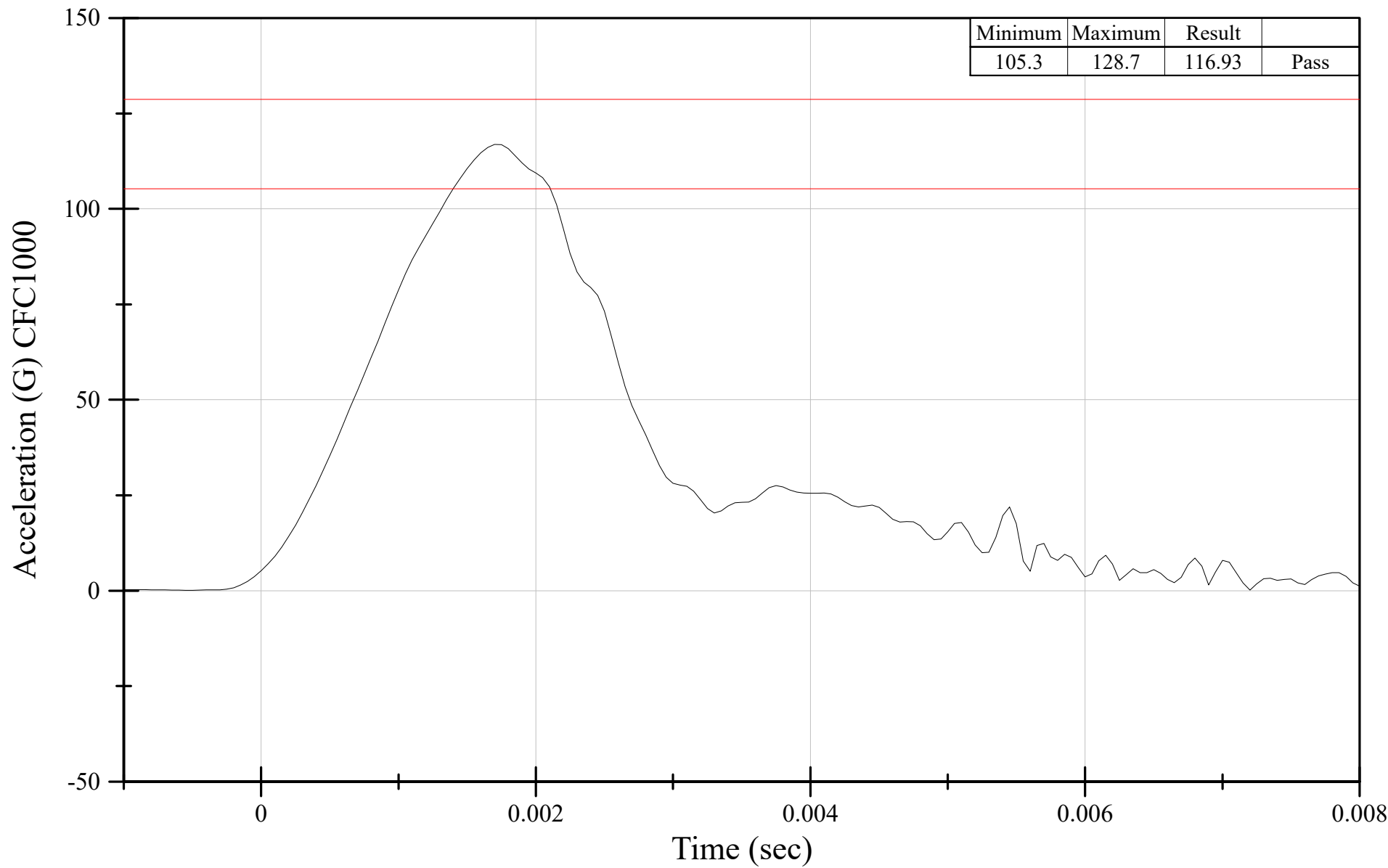
THOR-50M Head Impact Qualification

Probe Force

Serial Number: DO9799



THOR-50M Head Impact Qualification
Head CG Resultant Acceleration
Serial Number: DO9799



THOR-50M Neck Left Torsion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 241203-1

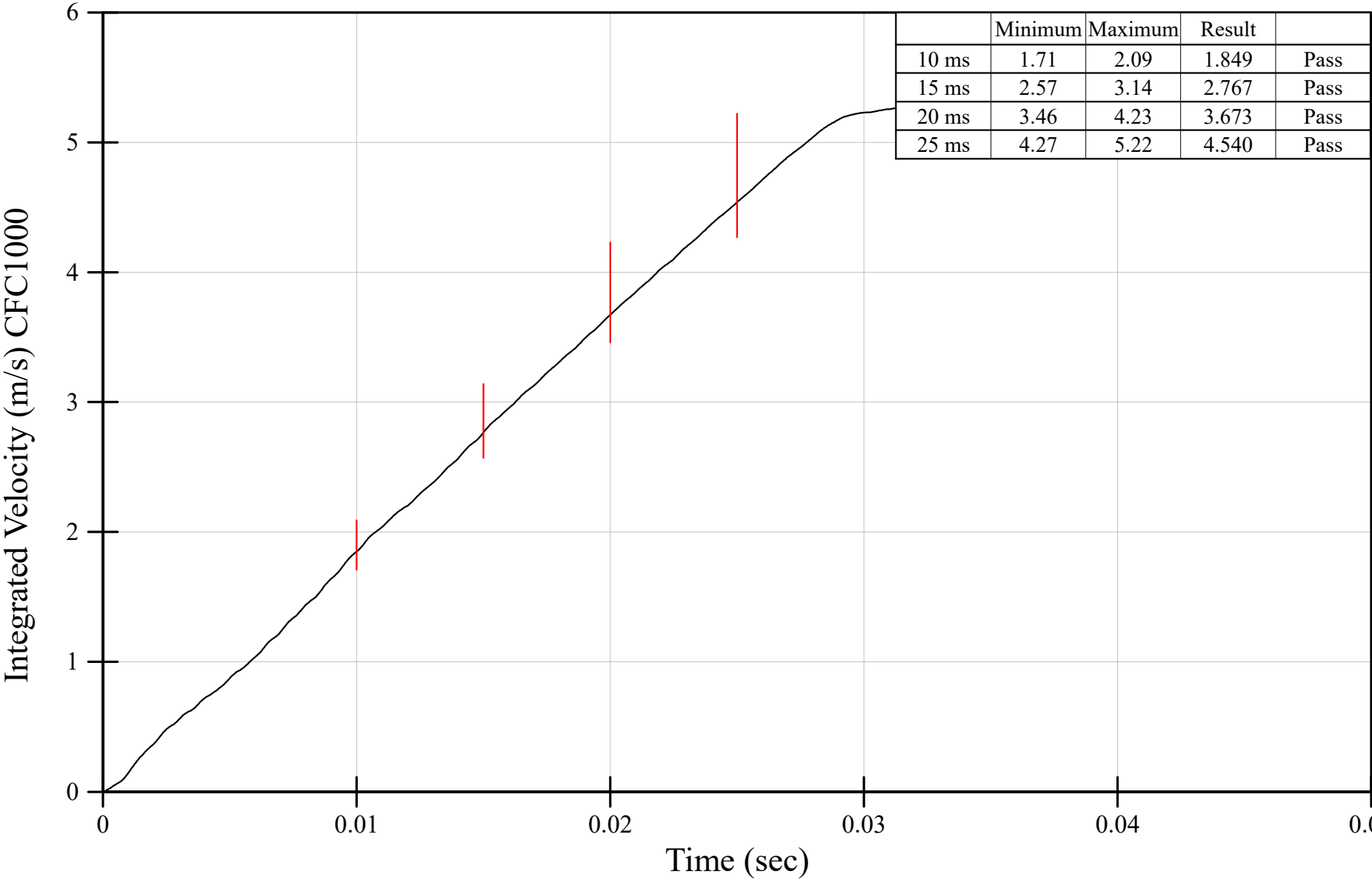
Test Date: 12/3/2024

Test Time: 7:41 AM

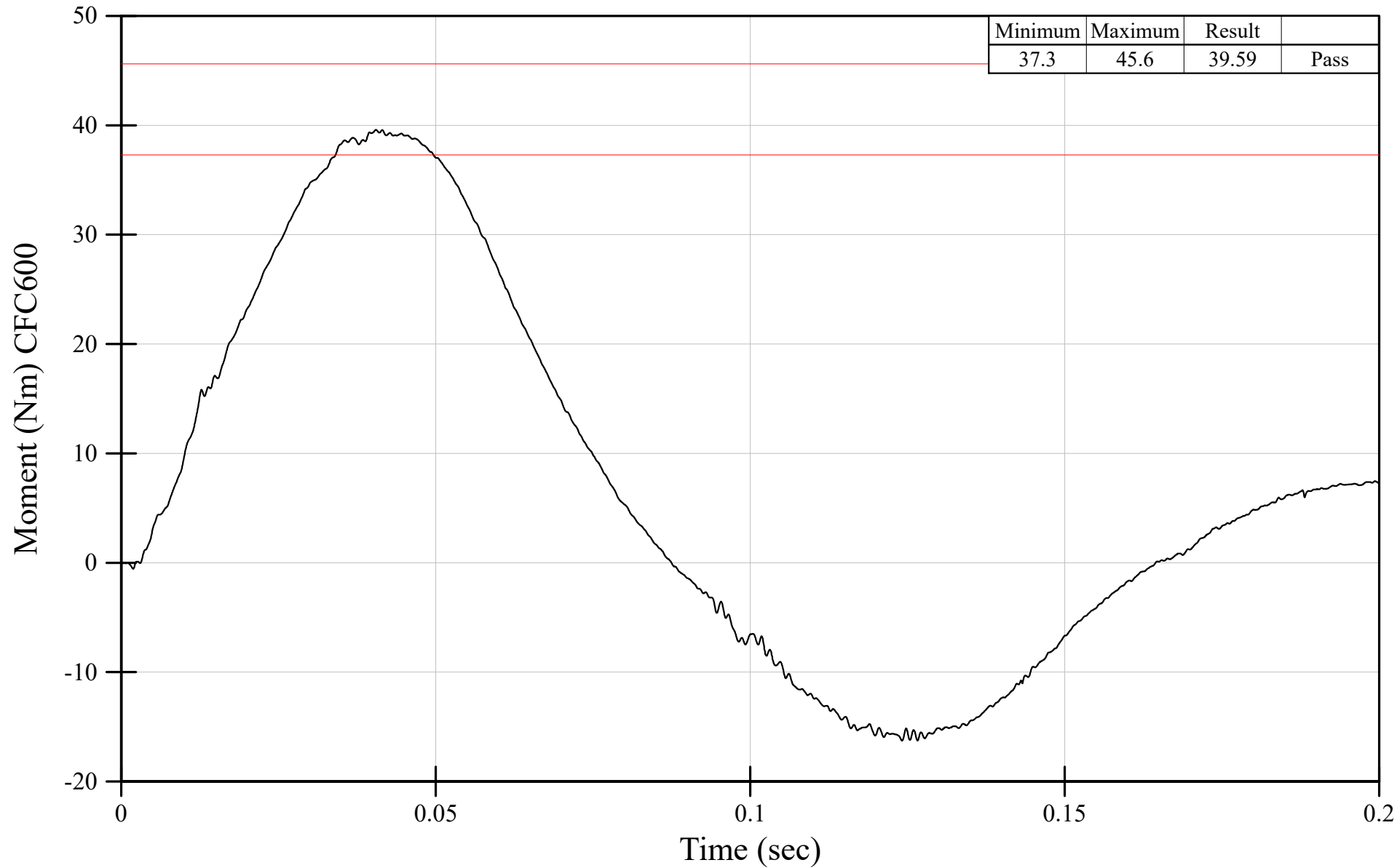
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	52	Pass
Test Velocity (m/s)	4.95 - 5.05	5.022	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.849	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.767	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.673	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.540	Pass
Peak Upper Neck Mz (Nm)	37.3 - 45.6	39.59	Pass
Peak Neck Fixture Rotation (deg)	-52.7 - (-43.1)	-46.86	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	-1529 - (-1251)	-1336.2	Pass

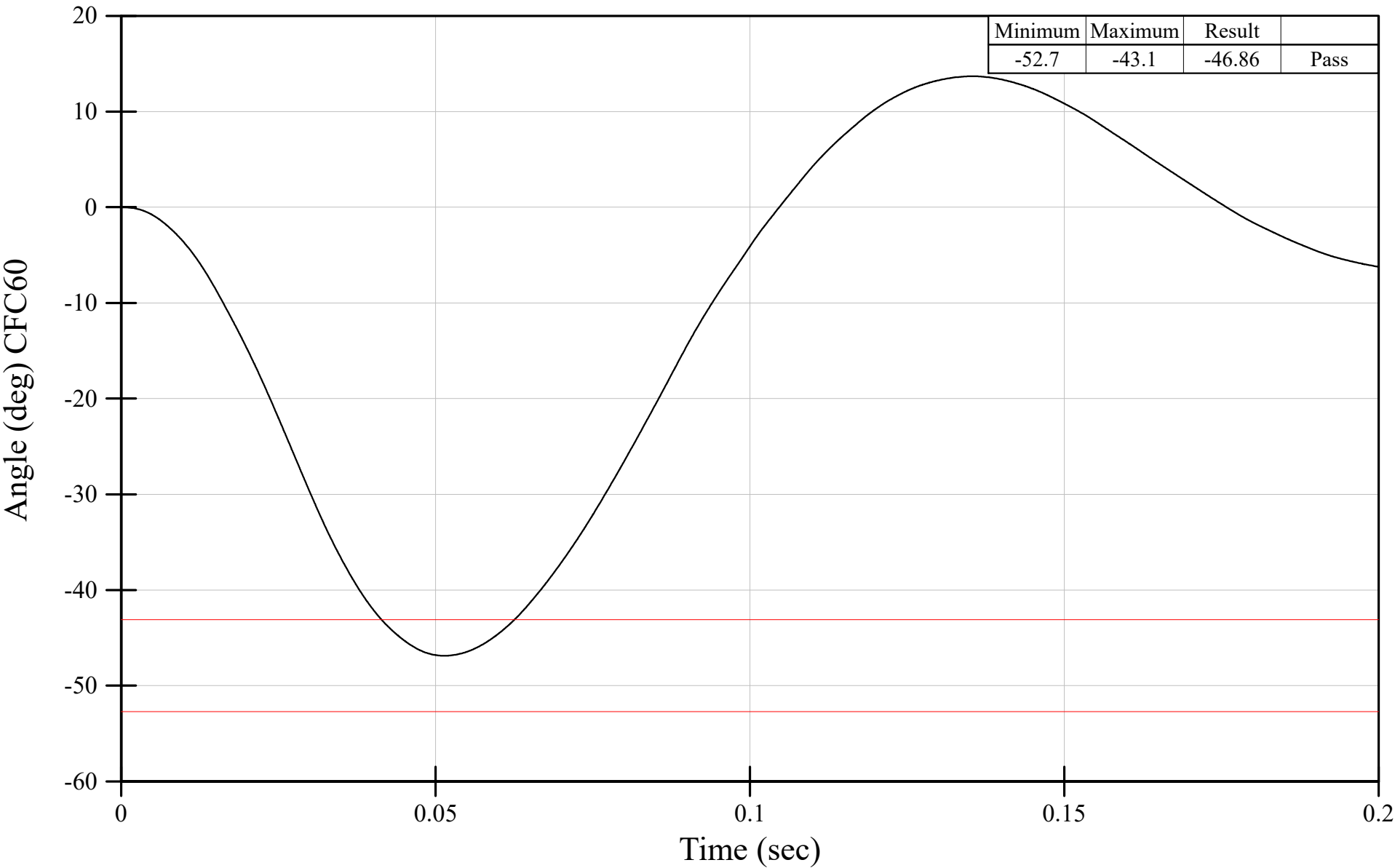
THOR-50M Neck Left Torsion Qualification
Pendulum Velocity
Neck Serial Number: FA8045



THOR-50M Neck Left Torsion Qualification
Peak Upper Neck Moment Z
Neck Serial Number: FA8045



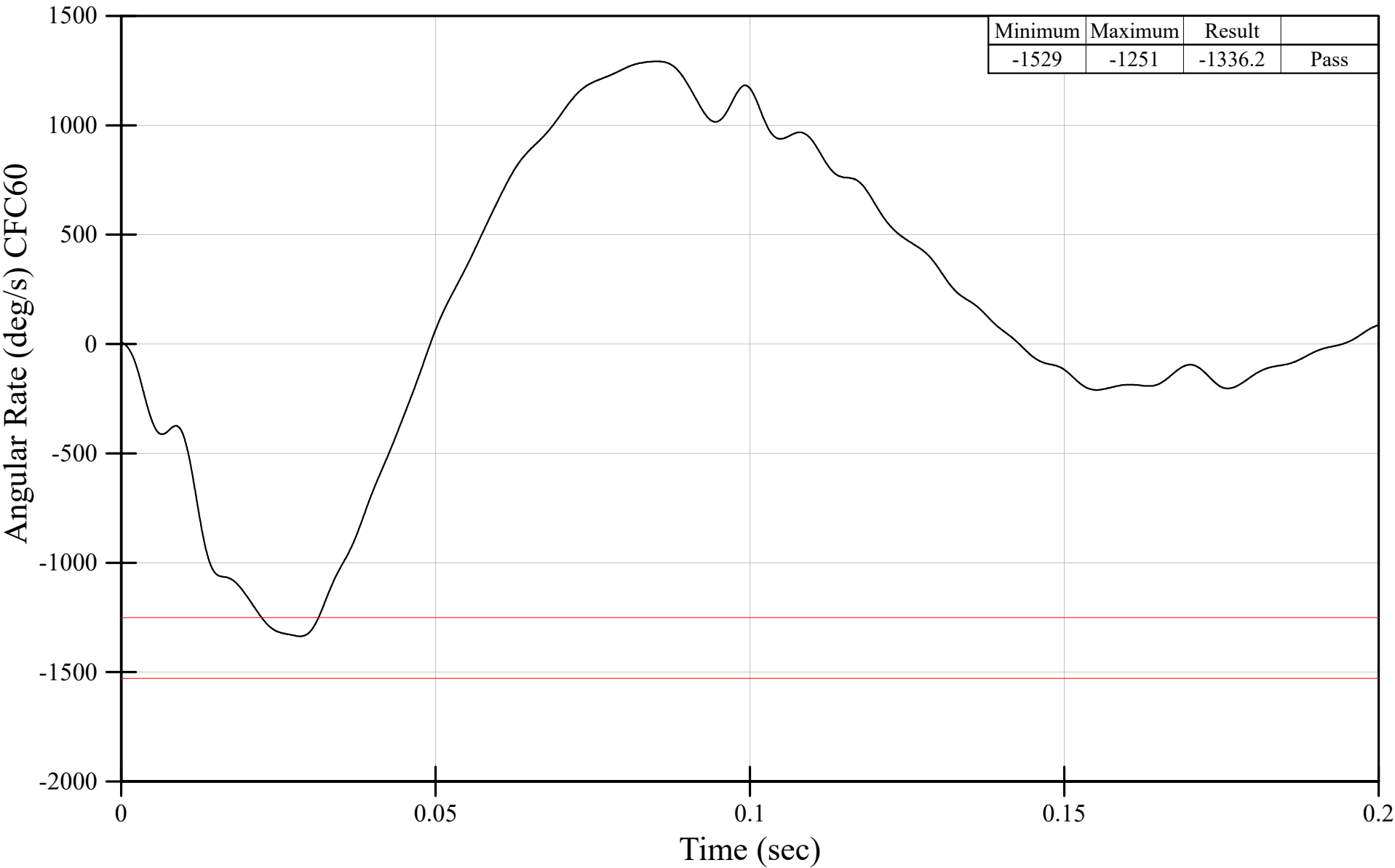
THOR-50M Neck Left Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: FA8045



THOR-50M Neck Left Torsion Qualification

Peak Angular Rate

Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly Serial Number:

O.C. Cam Serial Number:

Test ID: 241203-3

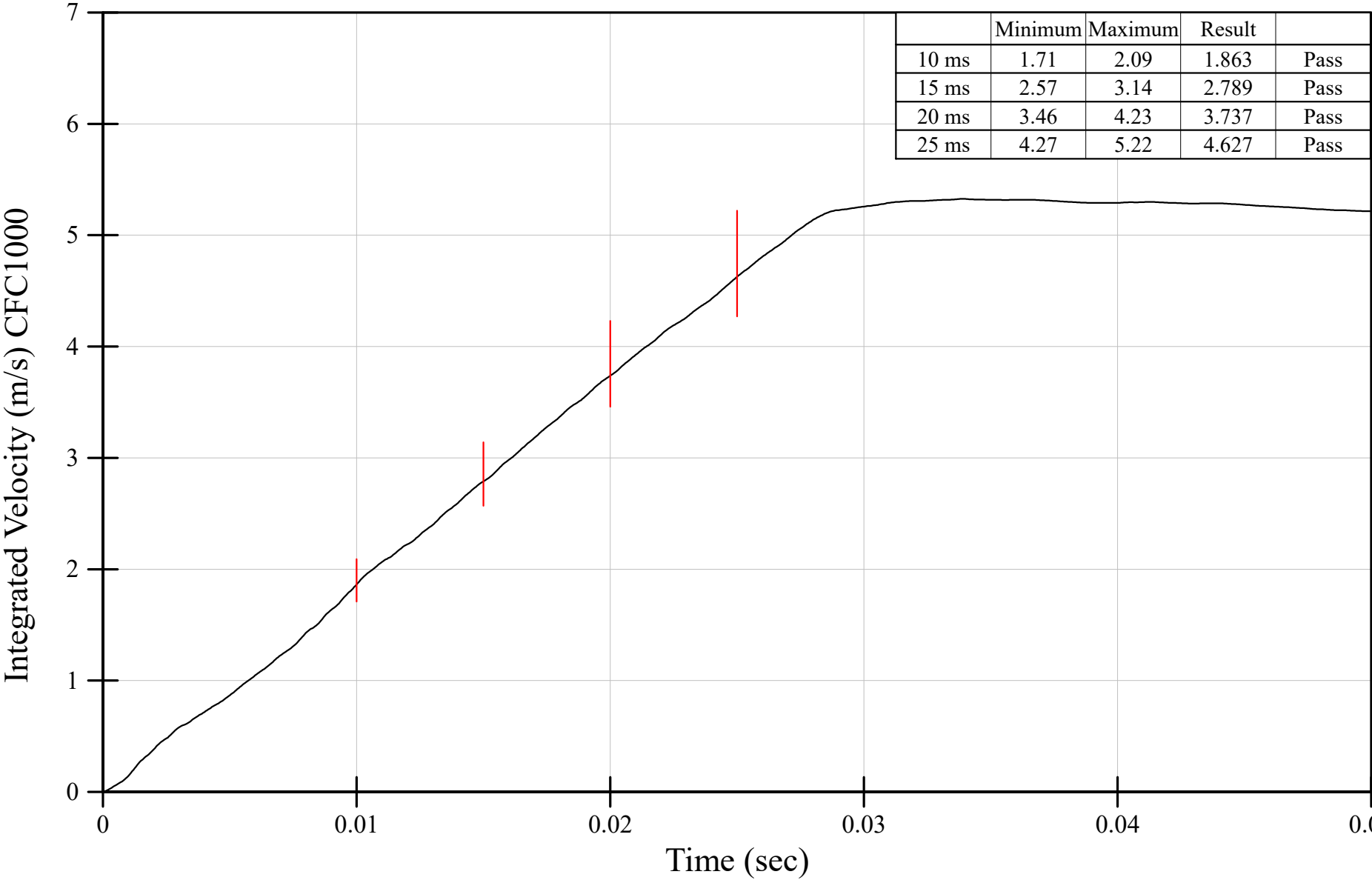
Test Date: 12/3/2024

Test Time: 8:20 AM

Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	4.95 - 5.05	5.014	Pass
Pendulum Velocity at 10 ms (m/s)	1.71 - 2.09	1.863	Pass
Pendulum Velocity at 15 ms (m/s)	2.57 - 3.14	2.789	Pass
Pendulum Velocity at 20 ms (m/s)	3.46 - 4.23	3.737	Pass
Pendulum Velocity at 25 ms (m/s)	4.27 - 5.22	4.627	Pass
Peak Upper Neck Mz (Nm)	-45.6 - (-37.3)	-39.53	Pass
Peak Neck Fixture Rotation (deg)	43.1 - 52.7	47.54	Pass
Peak Upper Neck Angular Velocity Z (deg/sec)	1251 - 1529	1382.1	Pass

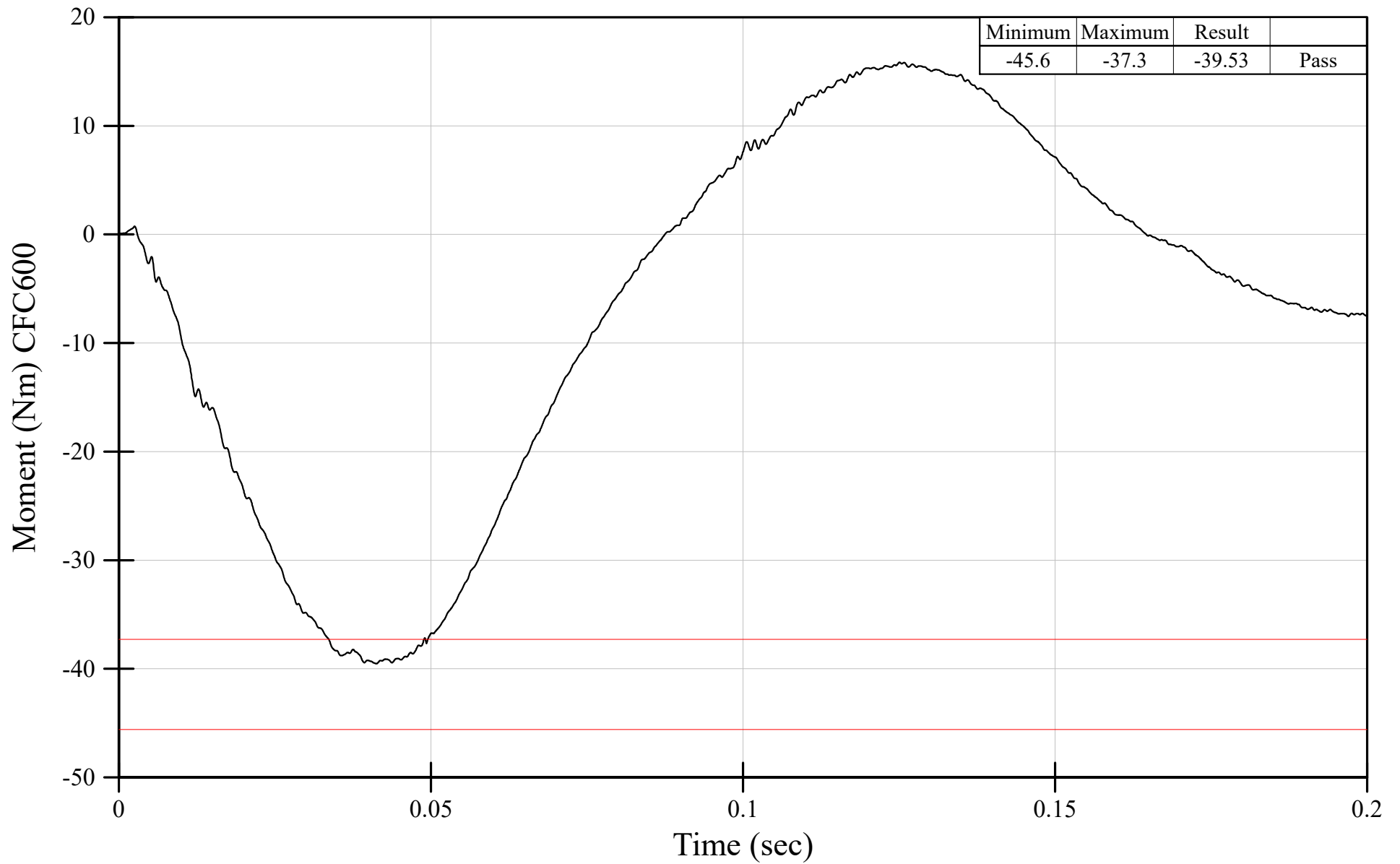
THOR-50M Neck Right Torsion Qualification
Pendulum Velocity
Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification

Peak Upper Neck Moment Z

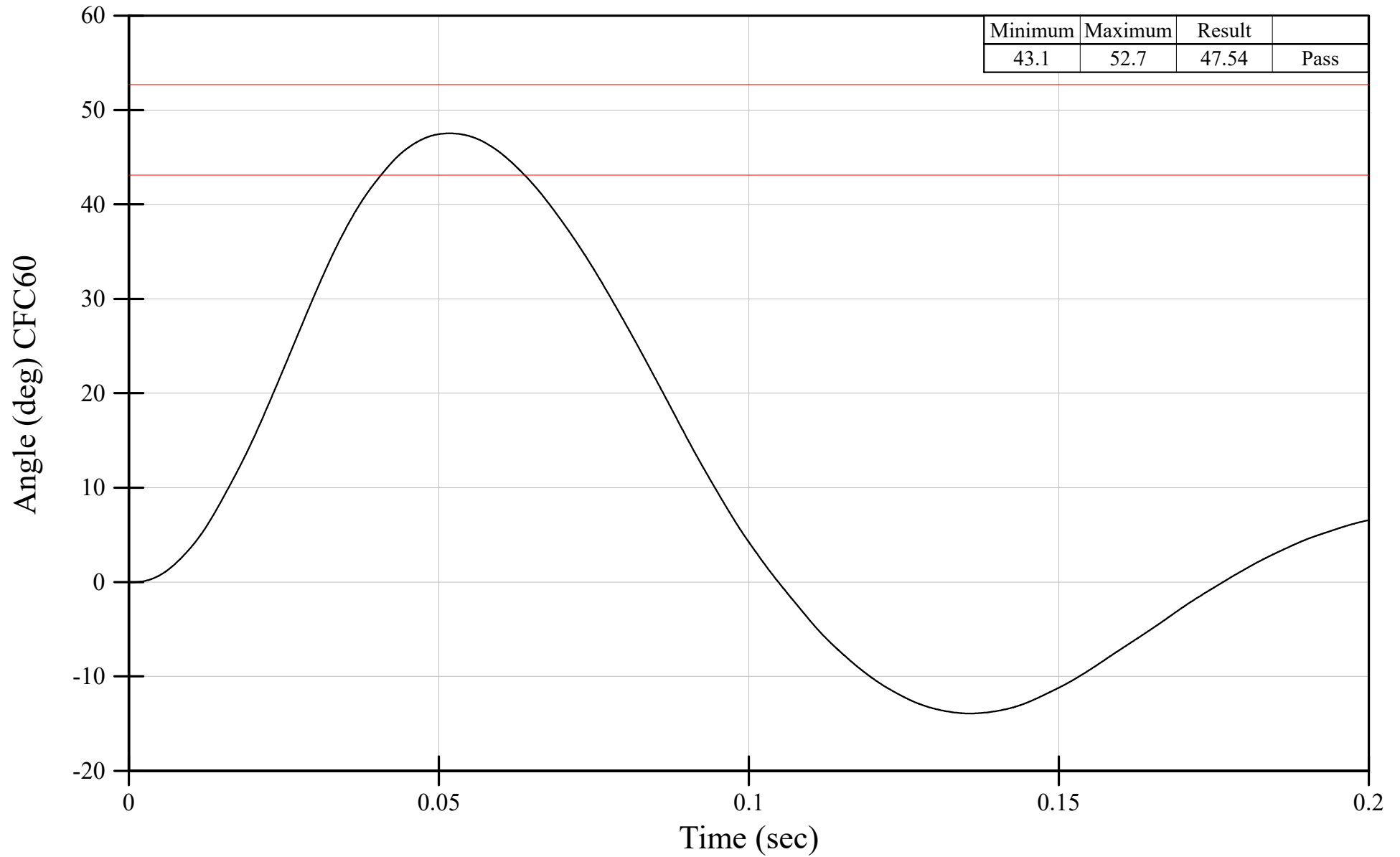
Neck Serial Number: FA8045



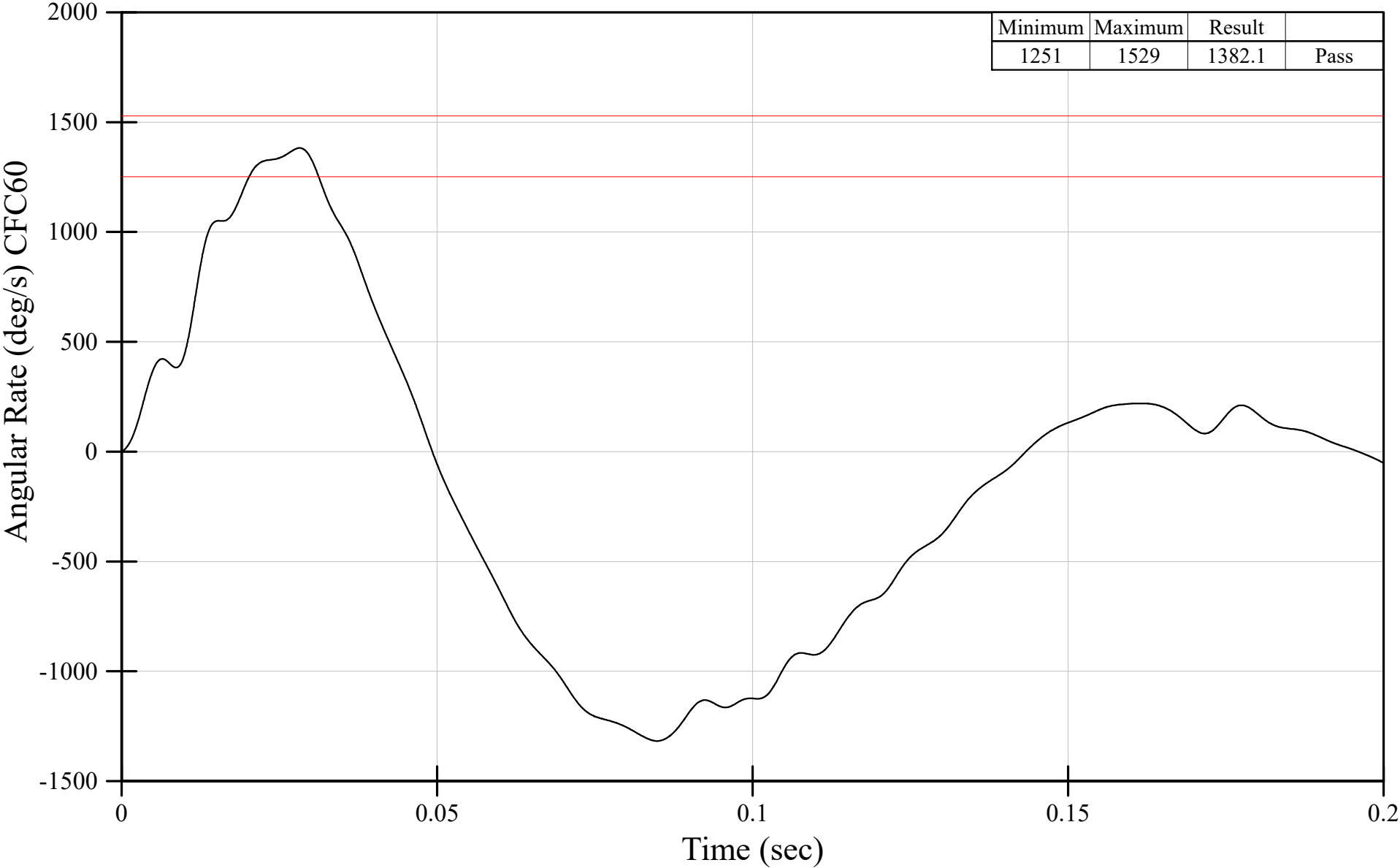
THOR-50M Neck Right Torsion Qualification

Neck Fixture Rotation

Neck Serial Number: FA8045



THOR-50M Neck Right Torsion Qualification
Peak Angular Rate
Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241202-5

Test Date: 12/2/2024

Test Time: 1:26 PM

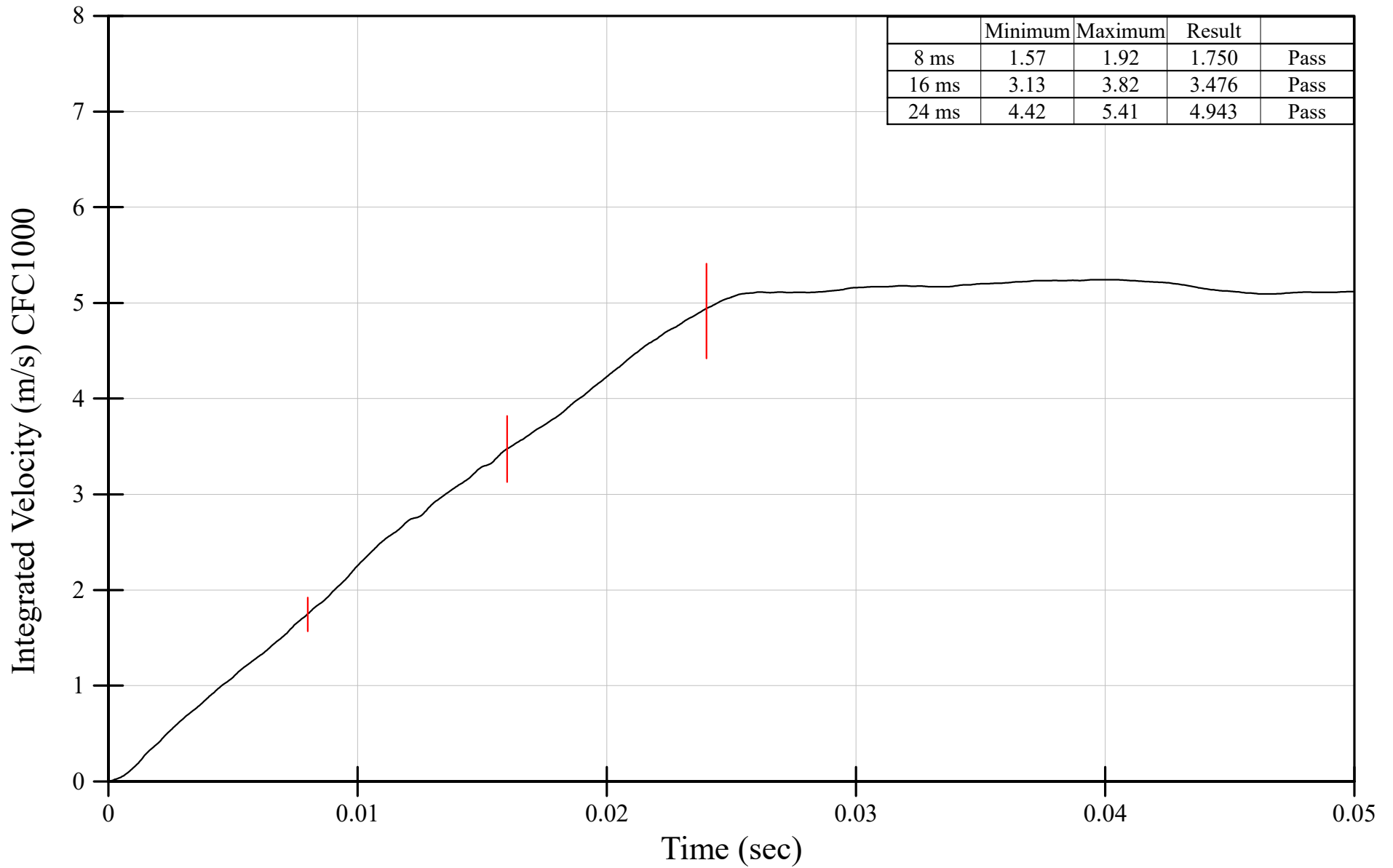
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.1	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	4.95 - 5.05	5.005	Pass
Pendulum Velocity at 8 ms (m/s)	1.57 - 1.92	1.750	Pass
Pendulum Velocity at 16 ms (m/s)	3.13 - 3.82	3.476	Pass
Pendulum Velocity at 24 ms (m/s)	4.42 - 5.41	4.943	Pass
Peak Upper Neck My (Nm)	27.9 - 34.1	31.10	Pass
Peak Upper Neck Fz prior to 40 ms (N)	774 - 946	980.9	Fail
Peak Head Angular Velocity Y (deg/sec)	-2172 - (-1777)	-1926.8	Pass
Peak Head Rotation (deg)	-71.0 - (-58.1)	-66.07	Pass

THOR-50M Neck Front Flexion Qualification

Pendulum Velocity

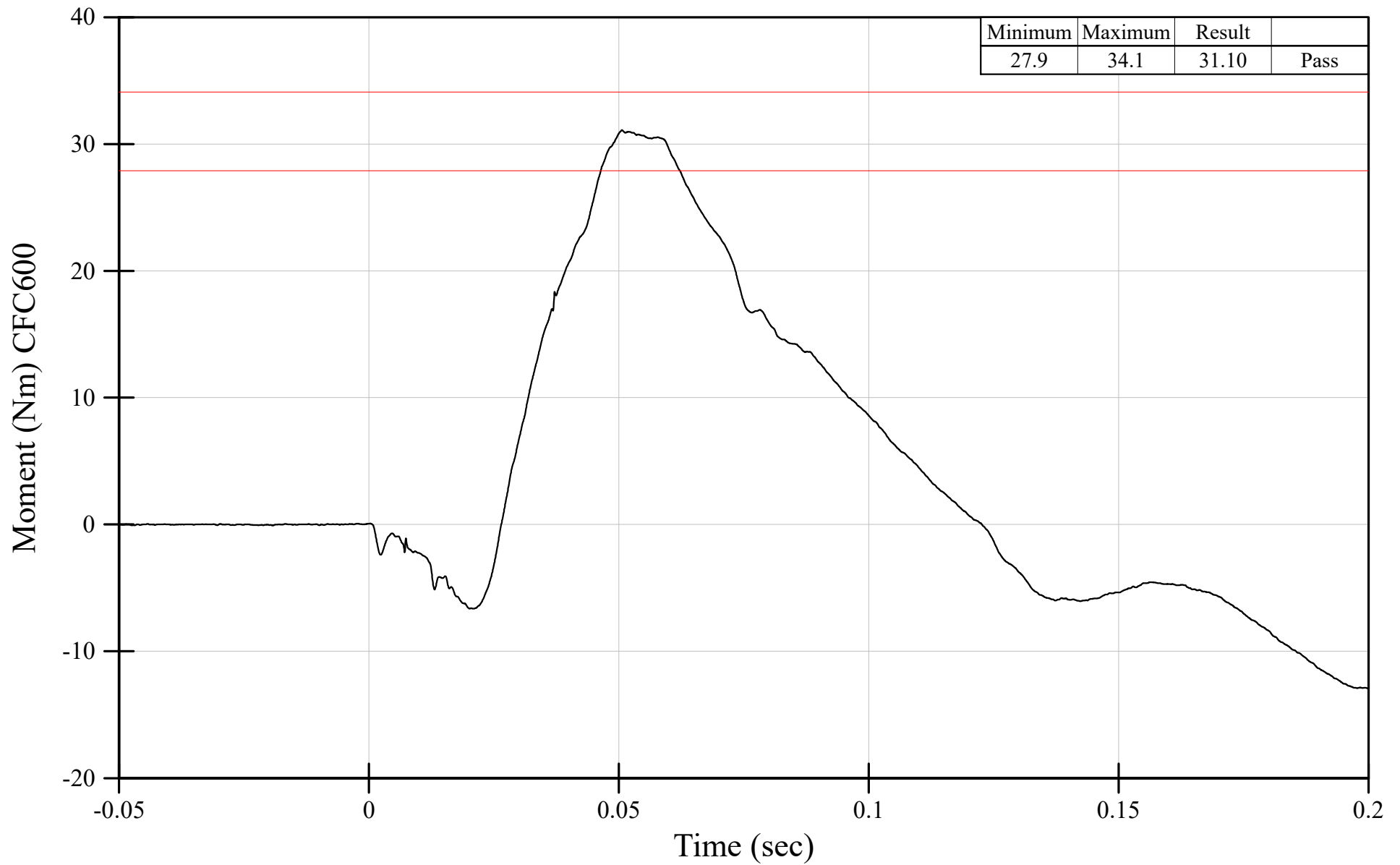
Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Upper Neck My

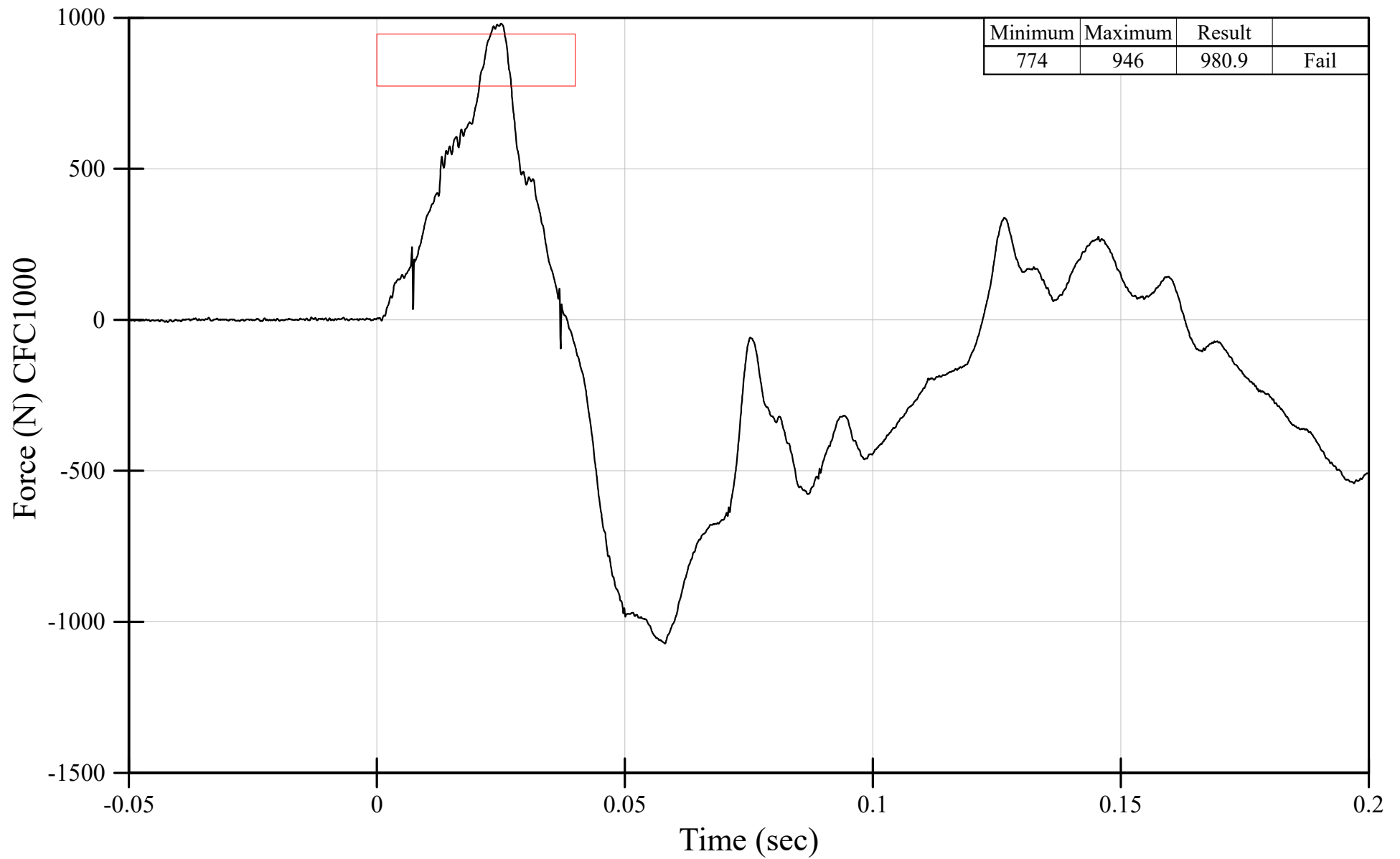
Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification

Upper Neck Fz

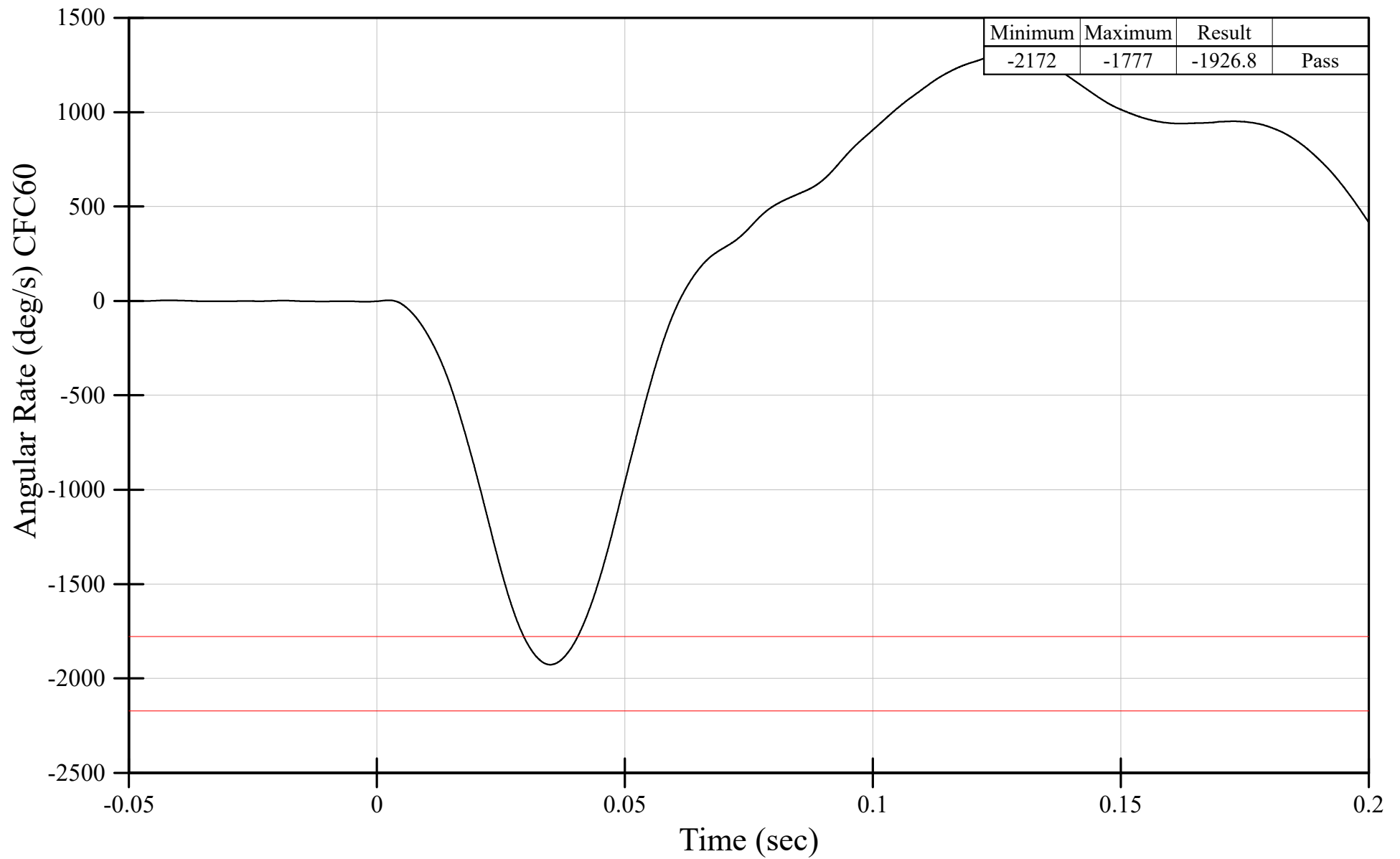
Neck Serial Number: FA8045



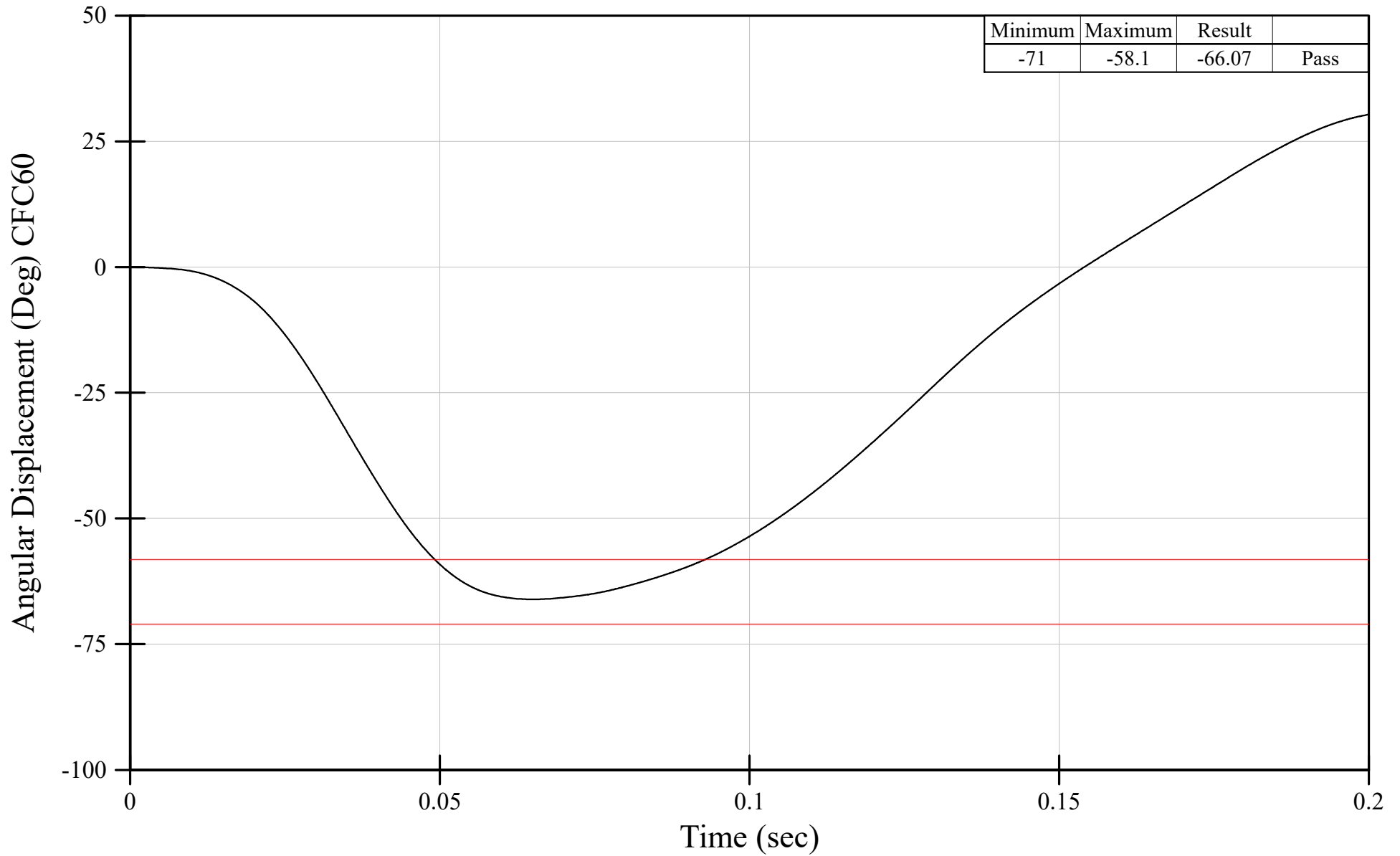
THOR-50M Neck Front Flexion Qualification

Peak Head Angular Rate

Neck Serial Number: FA8045



THOR-50M Neck Front Flexion Qualification
Head Rotation
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241202-3

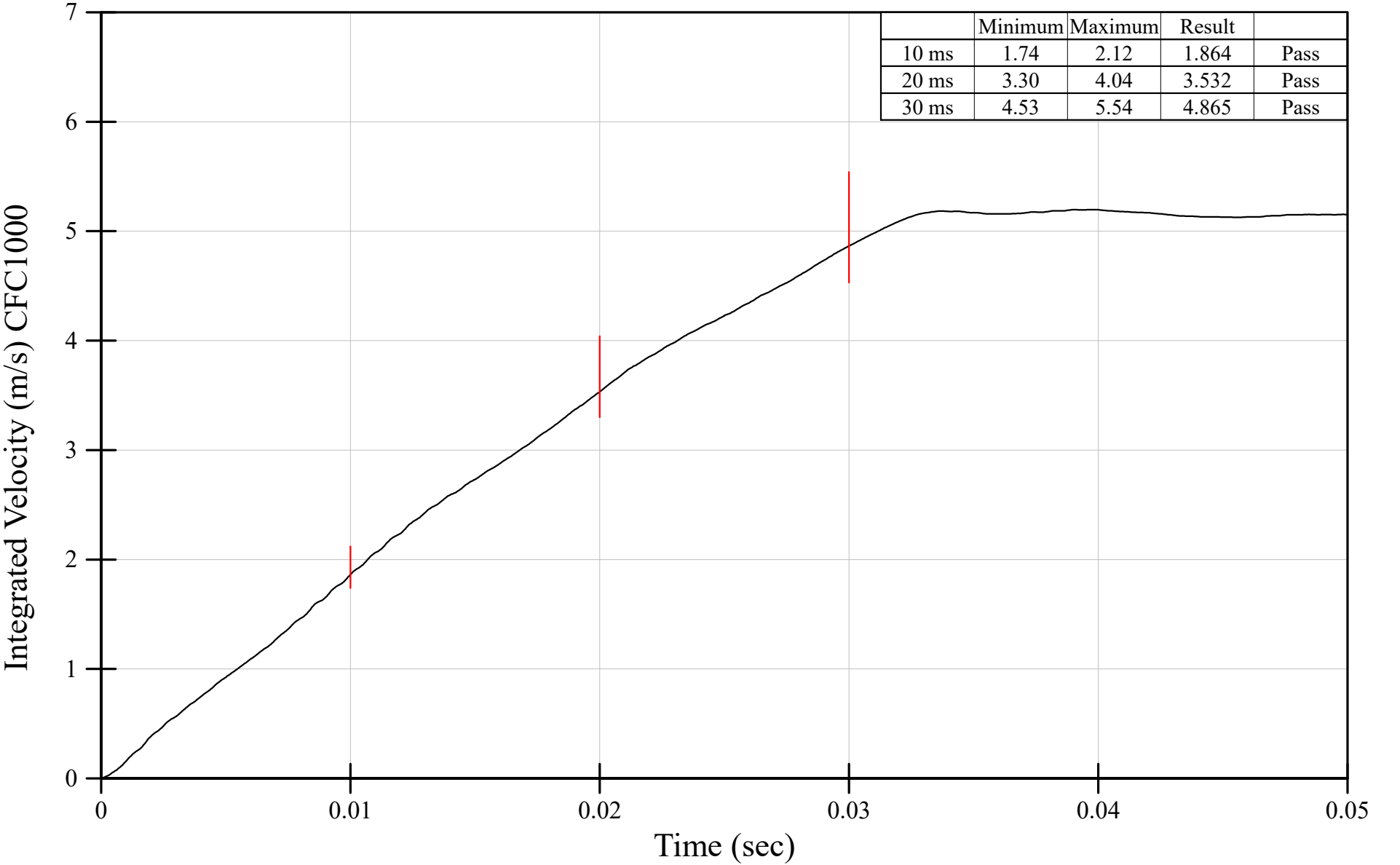
Test Date: 12/2/2024

Test Time: 12:40 PM

Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	4.95 - 5.05	4.992	Pass
Pendulum Velocity at 10 ms (m/s)	1.74 - 2.12	1.864	Pass
Pendulum Velocity at 20 ms (m/s)	3.30 - 4.04	3.532	Pass
Pendulum Velocity at 30 ms (m/s)	4.53 - 5.54	4.865	Pass
Peak Upper Neck My (Nm)	-25.3 - (-20.7)	-27.45	Fail
Peak Upper Neck Fz (N)	-3210 - (-2626)	-2922.0	Pass
Peak Head Angular Velocity Y (deg/sec)	1855 - 2261	2074.6	Pass
Peak Head Rotation (deg)	58.5 - 71.5	63.66	Pass

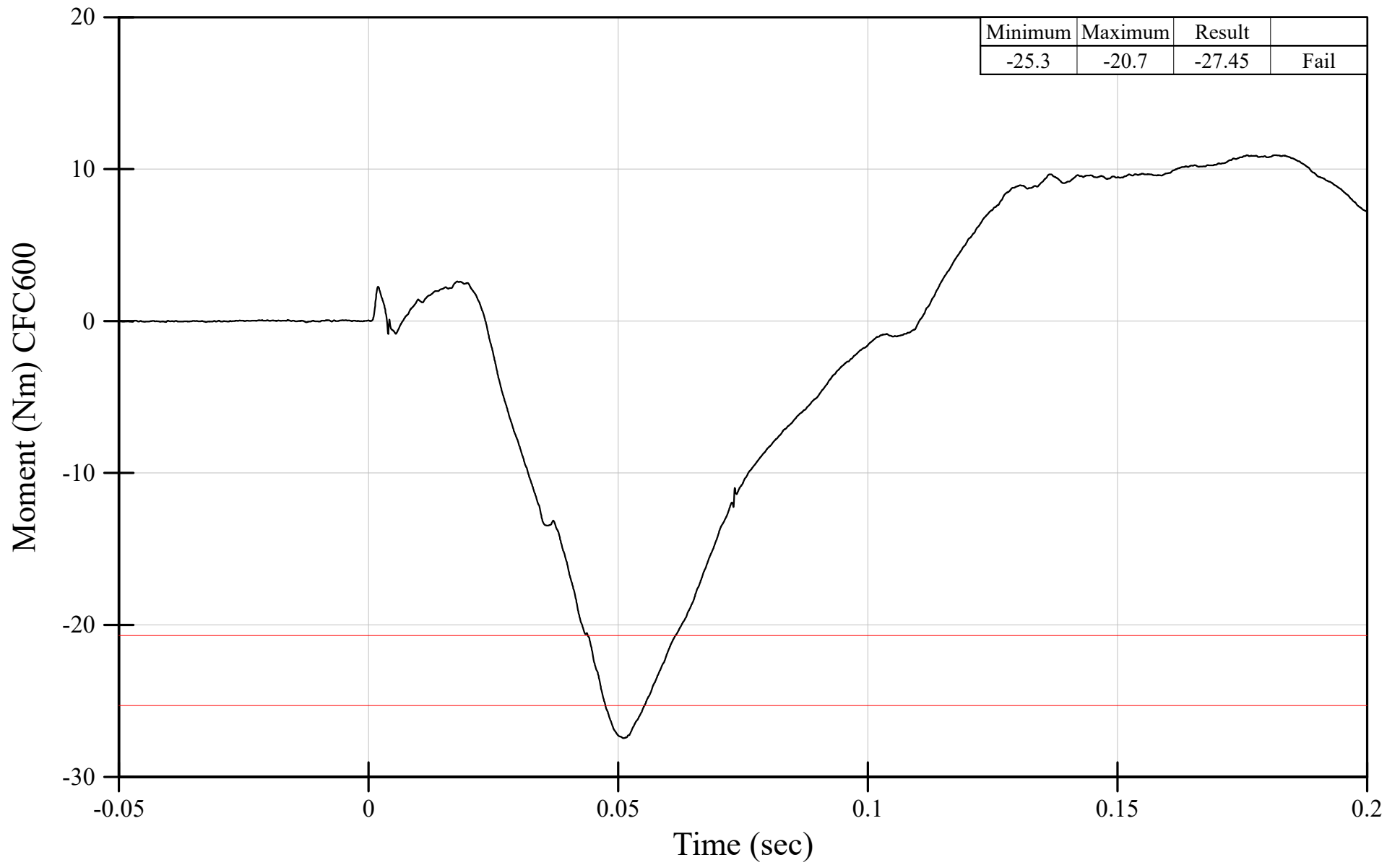
THOR-50M Neck Extension Qualification
Pendulum Velocity
Neck Serial Number: FA8045



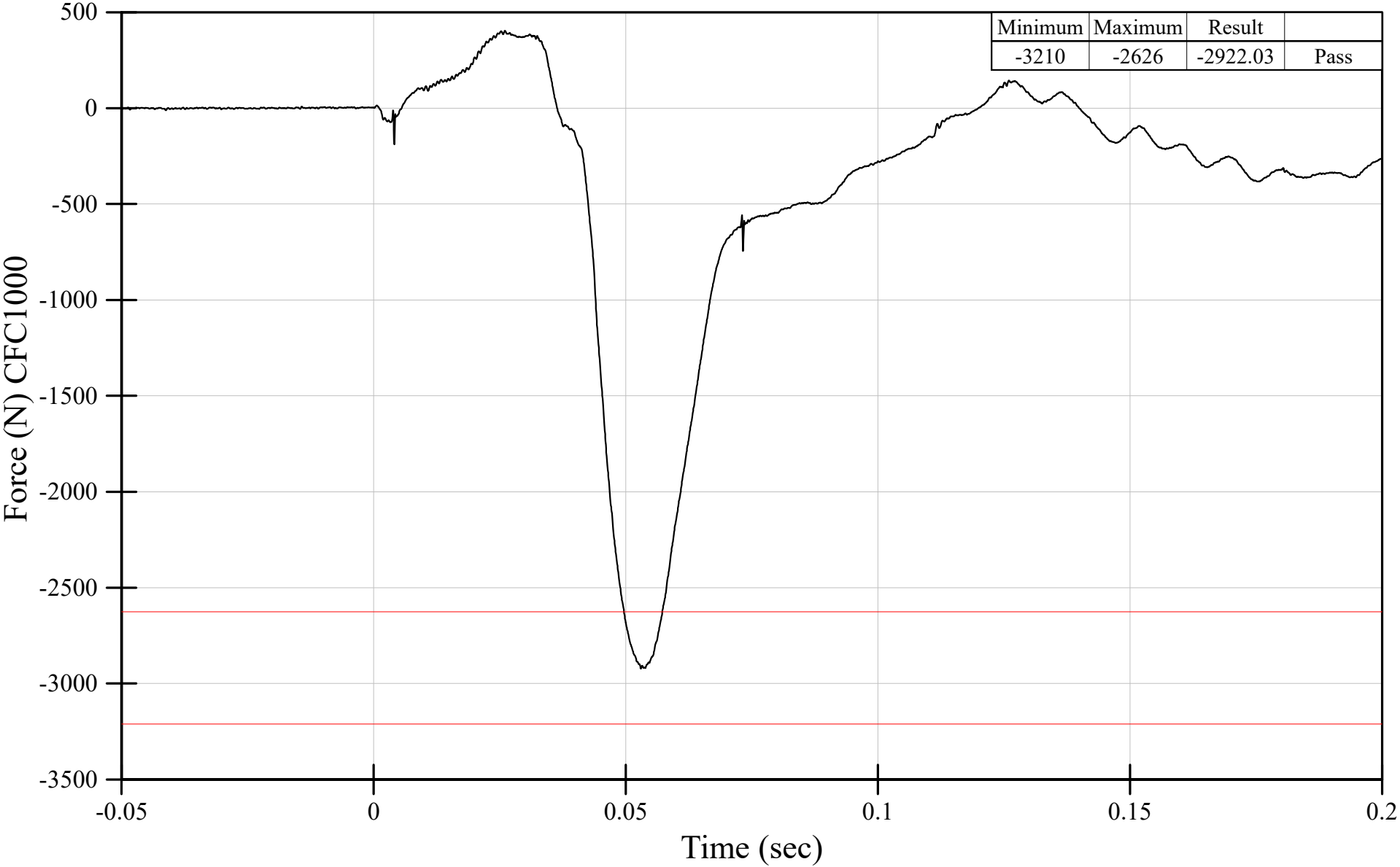
THOR-50M Neck Extension Qualification

Upper Neck My

Neck Serial Number: FA8045



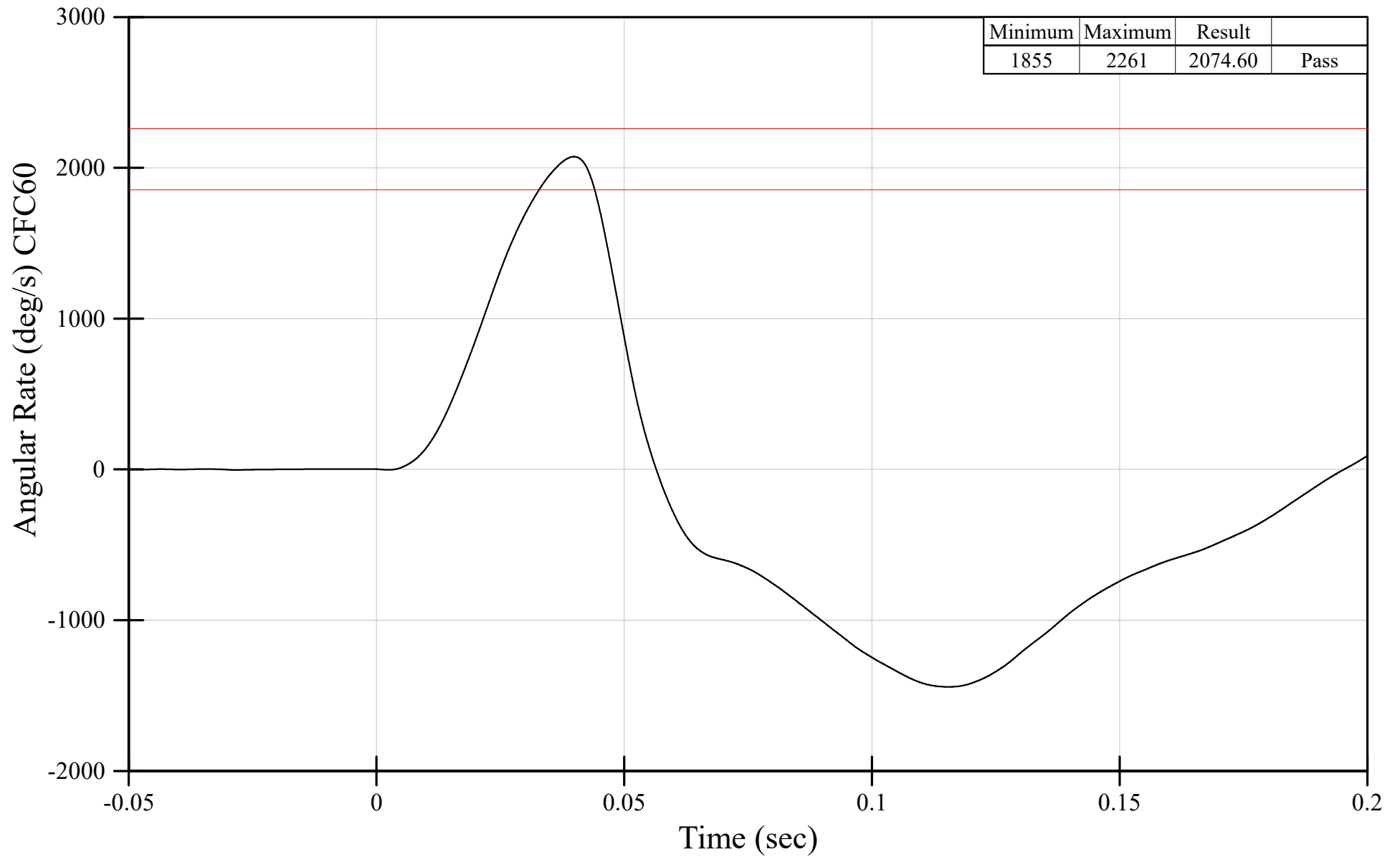
THOR-50M Neck Extension Qualification
Upper Neck Fz
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Peak Head Angular Rate

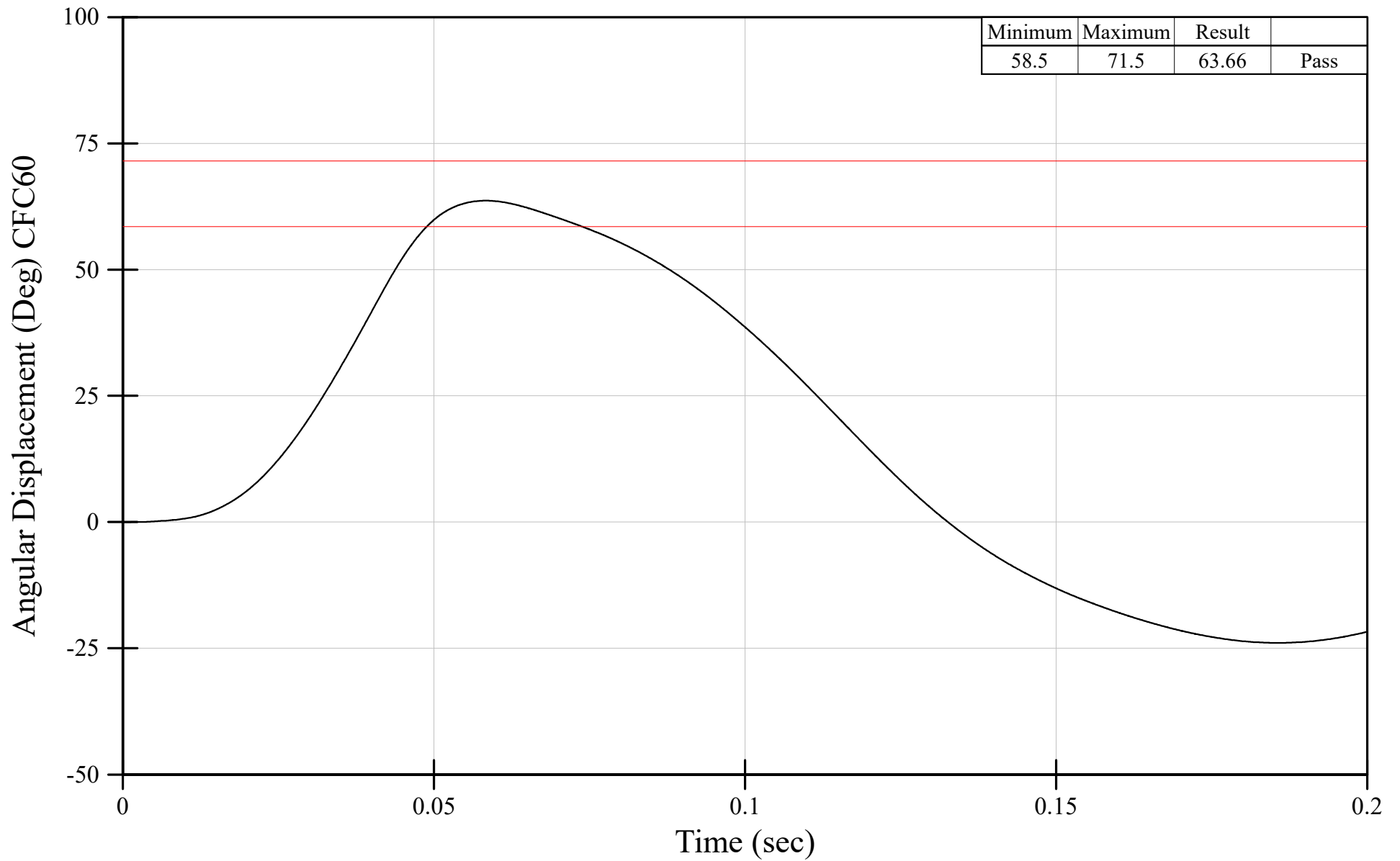
Neck Serial Number: FA8045



THOR-50M Neck Extension Qualification

Neck Rotation

Neck Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241202-9

Test Date: 12/2/2024

Test Time: 4:03 PM

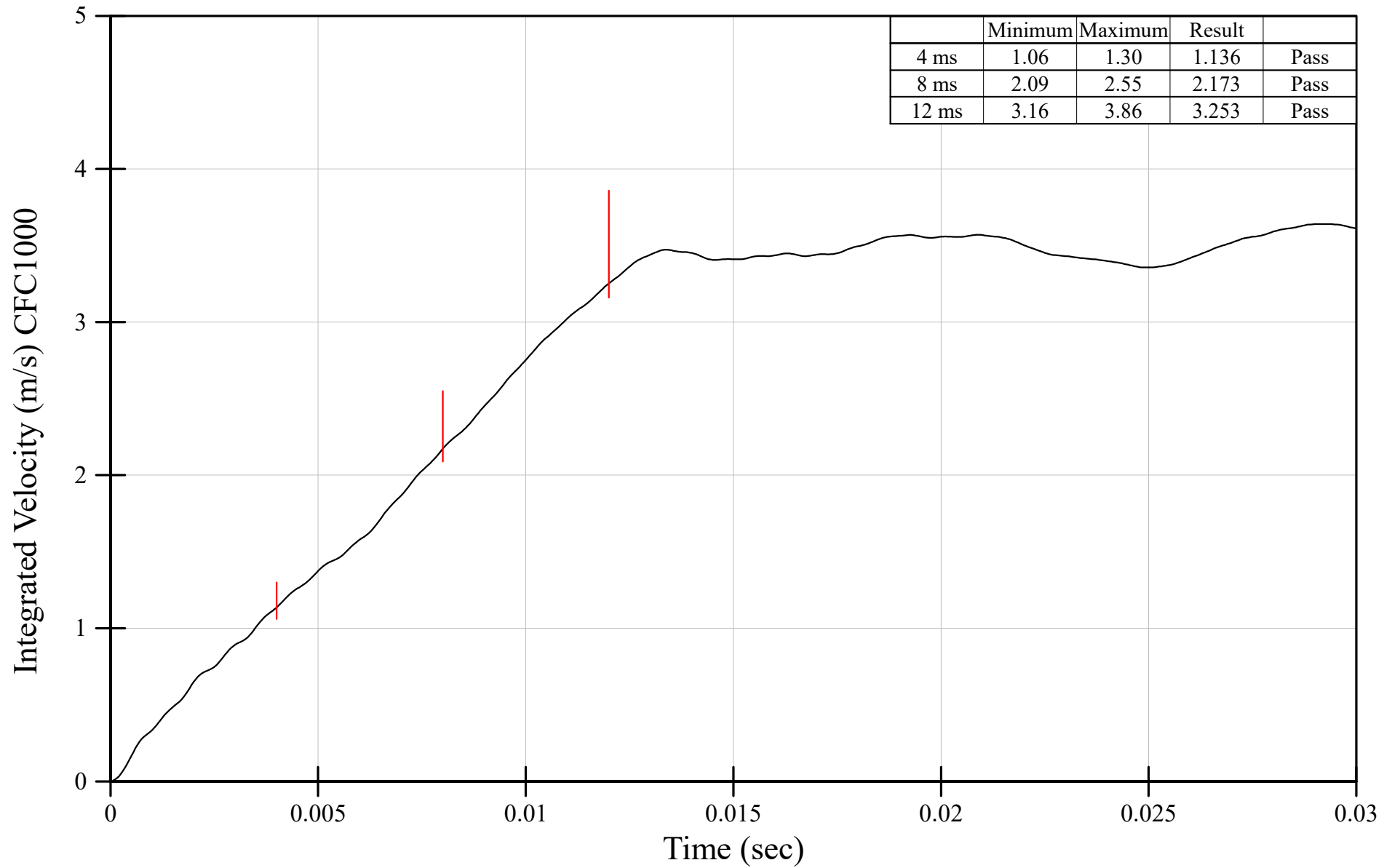
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	3.35 - 3.45	3.388	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.136	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.173	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.253	Pass
Peak Upper Neck Mx after 40 ms (N)	44.8 - 54.7	48.24	Pass
Peak Head Angular Velocity X (deg/sec)	-1498 - (-1226)	-1286.5	Pass
Peak Head Rotation (deg)	-45.9 - (-37.6)	-40.52	Pass

THOR-50M Neck Left Lateral Qualification

Pendulum Velocity

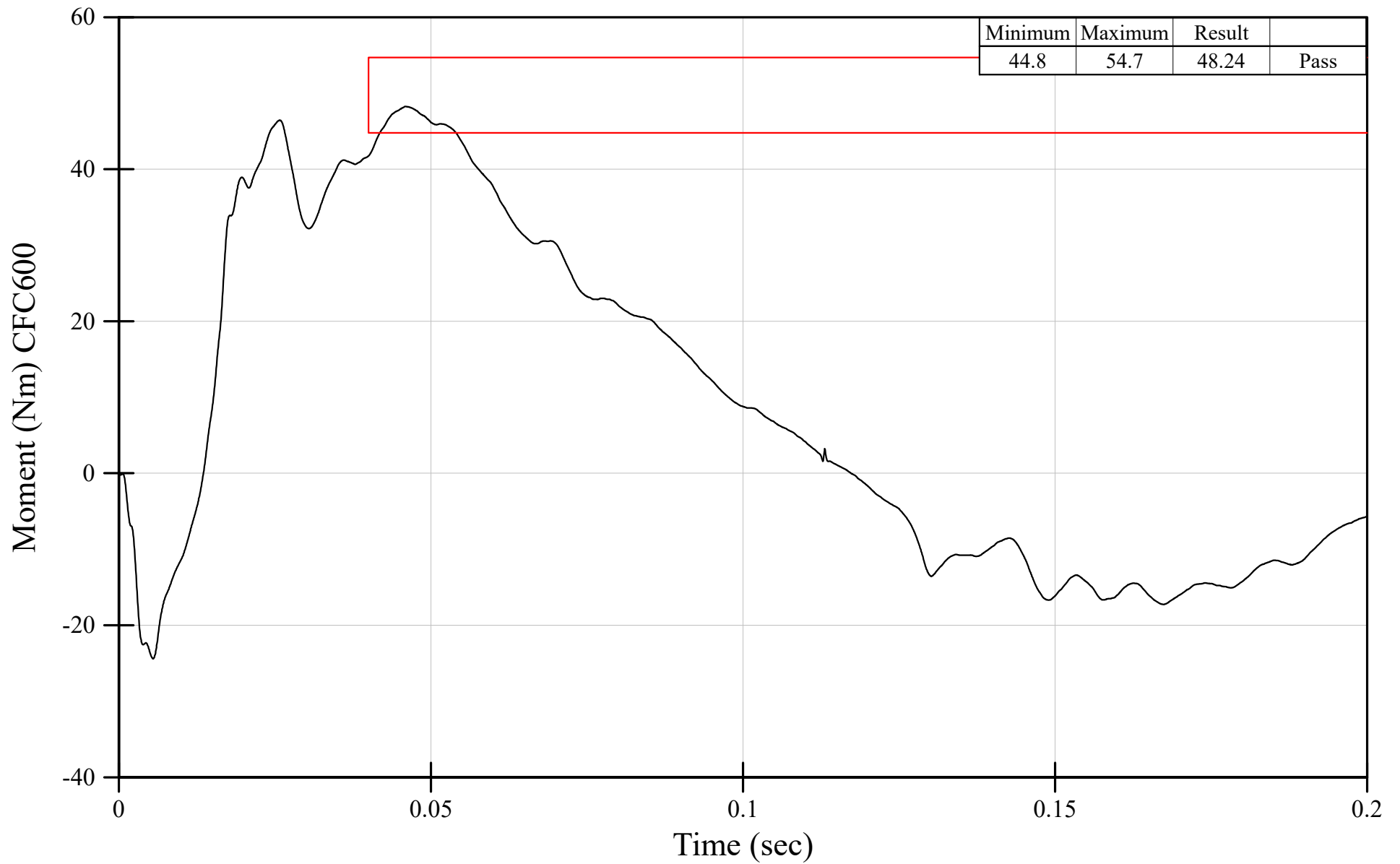
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Upper Neck Mx

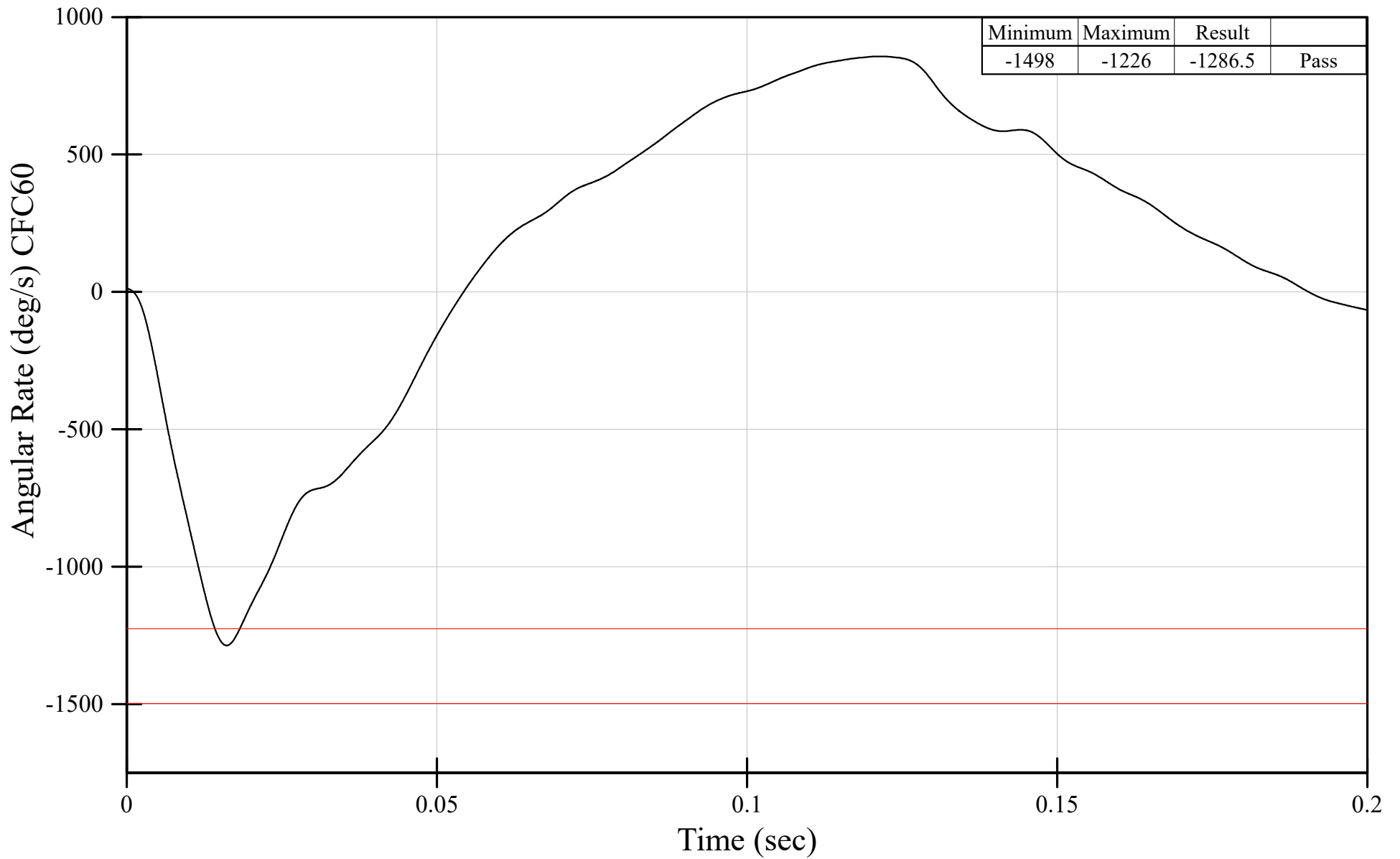
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Peak Angular Rate

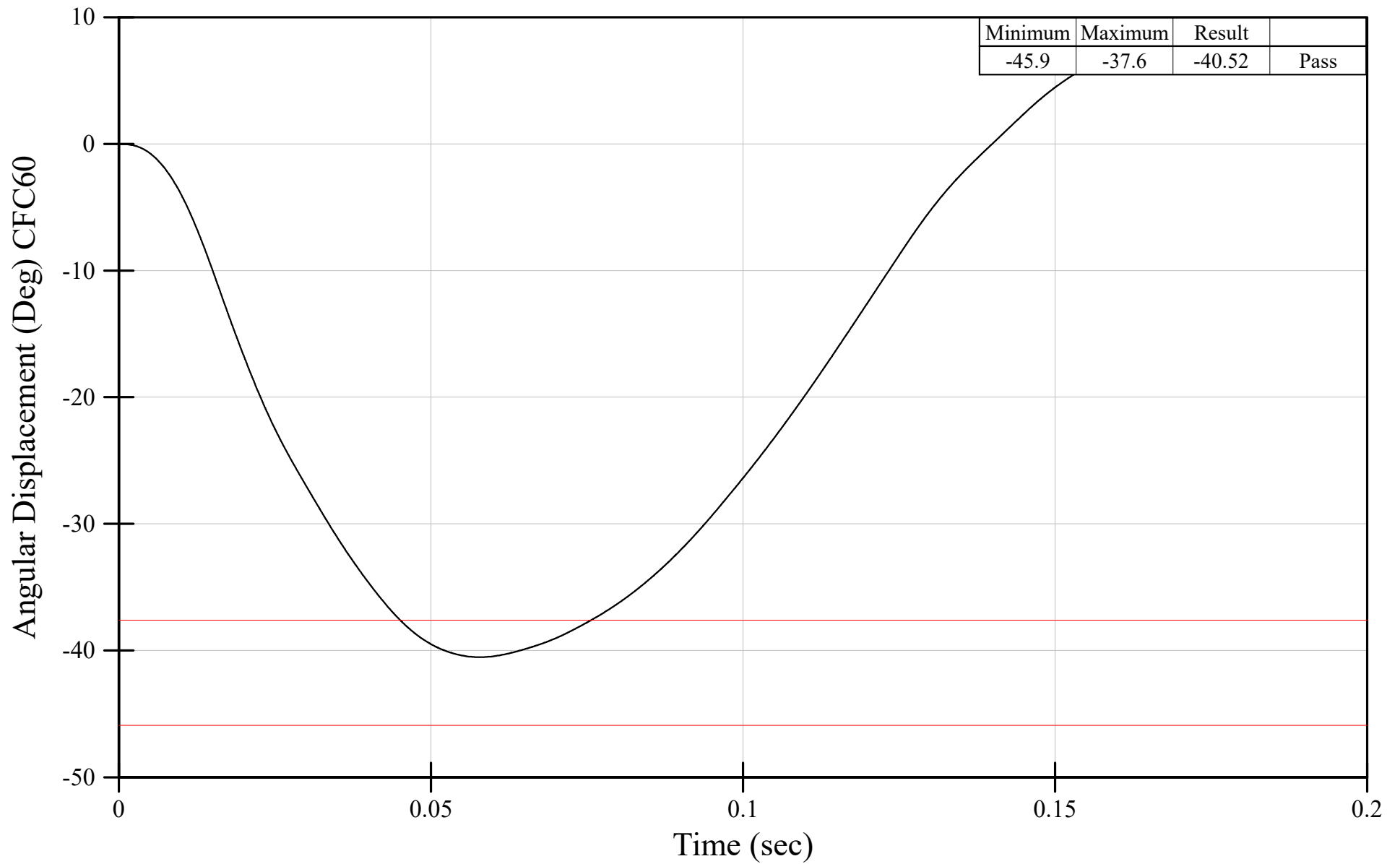
Serial Number: FA8045



THOR-50M Neck Left Lateral Qualification

Neck Rotation

Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Neck Serial Number: FA8045

O.C. Stop Assembly:

O.C. Cam:

Test ID: 241202-8

Test Date: 12/2/2024

Test Time: 3:10 PM

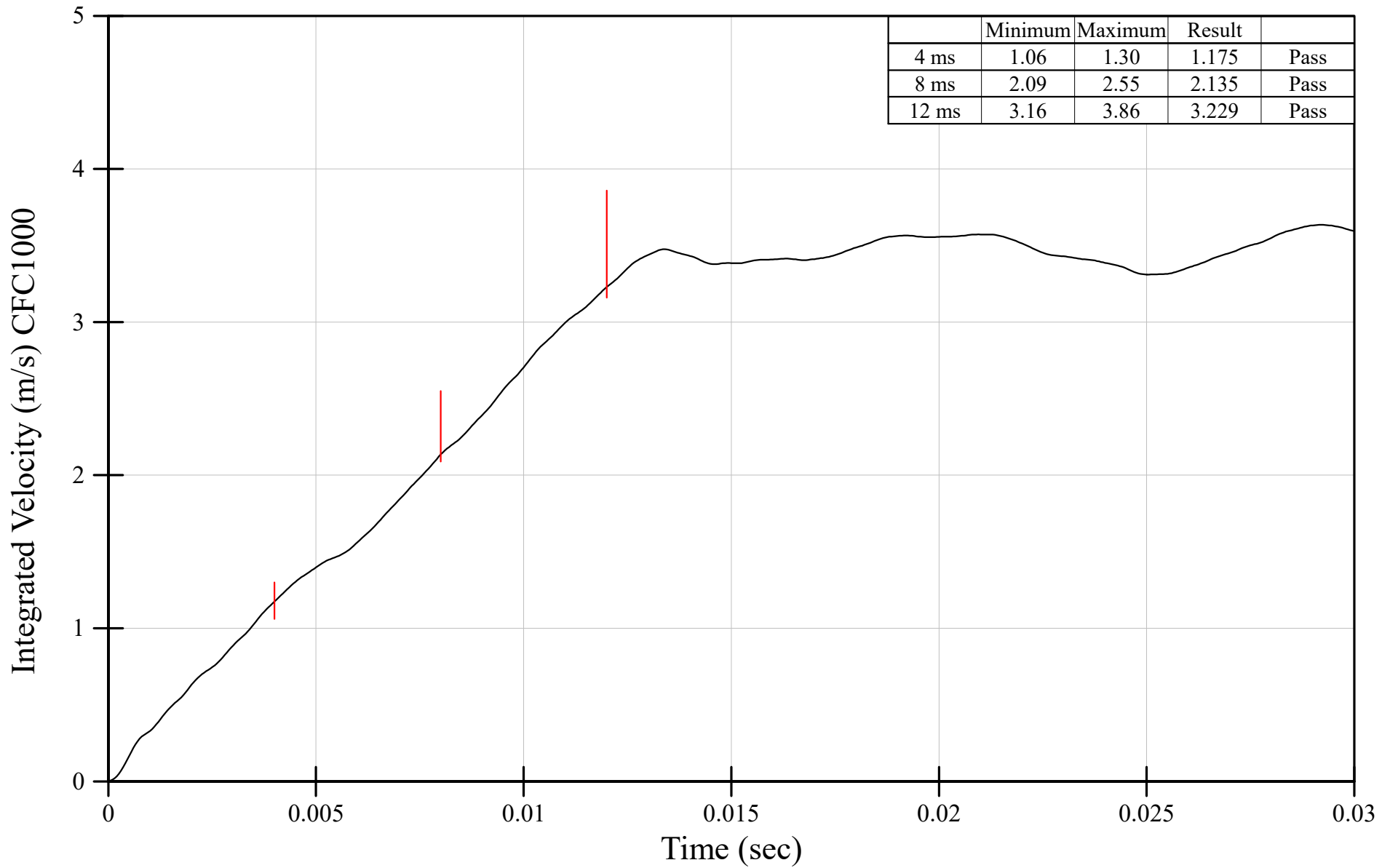
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	52	Pass
Test Velocity (m/s)	3.35 - 3.45	3.396	Pass
Pendulum Velocity at 4 ms (m/s)	1.06 - 1.30	1.175	Pass
Pendulum Velocity at 8 ms (m/s)	2.09 - 2.55	2.135	Pass
Pendulum Velocity at 12 ms (m/s)	3.16 - 3.86	3.229	Pass
Peak Upper Neck Mx after 40 ms (N)	-54.7 - (-44.8)	-47.06	Pass
Peak Head Angular Velocity X (deg/sec)	1226 - 1498	1284.3	Pass
Peak Head Rotation (deg)	37.6 - 45.9	41.10	Pass

THOR-50M Neck Right Lateral Qualification

Pendulum Velocity

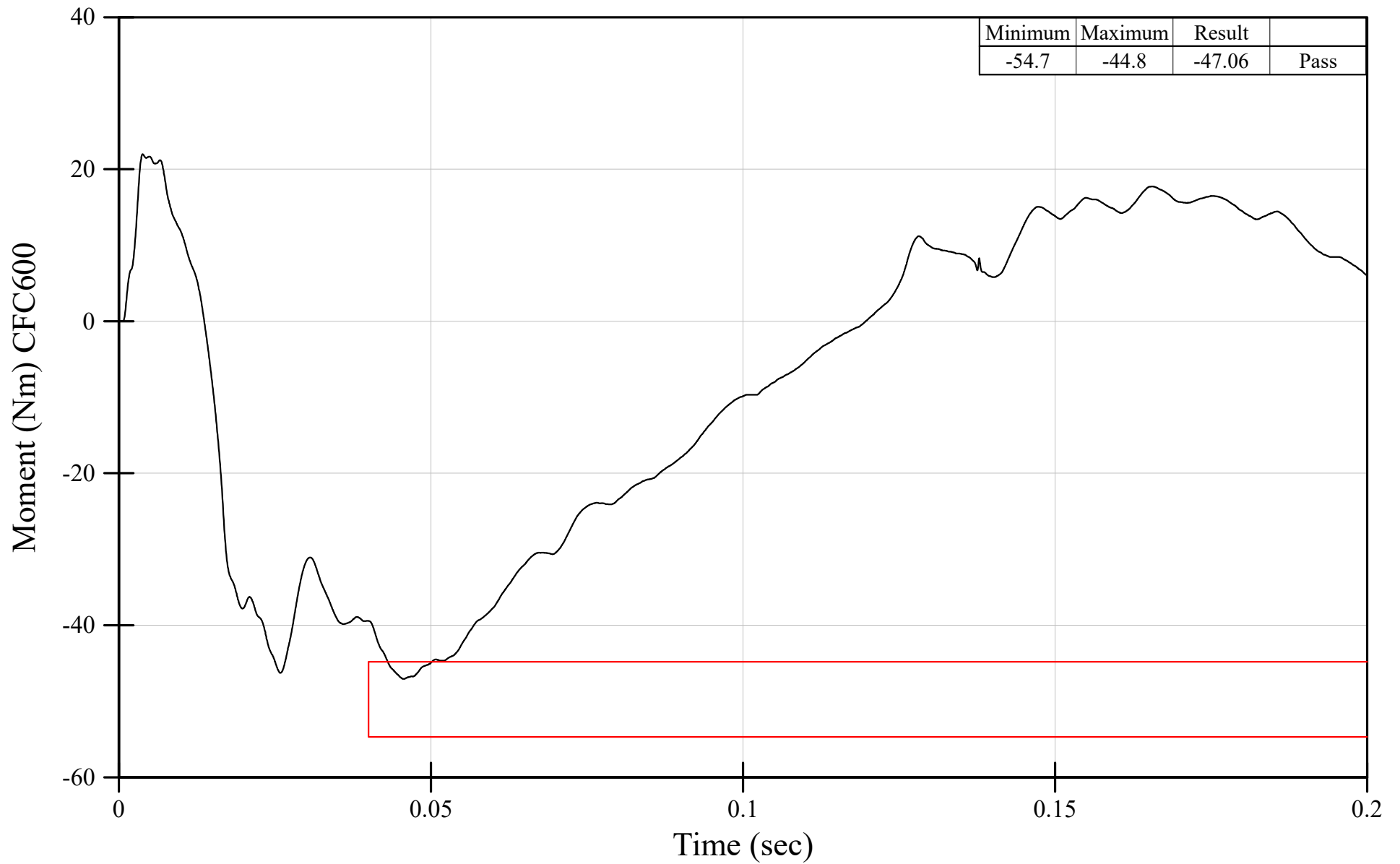
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Upper Neck Mx

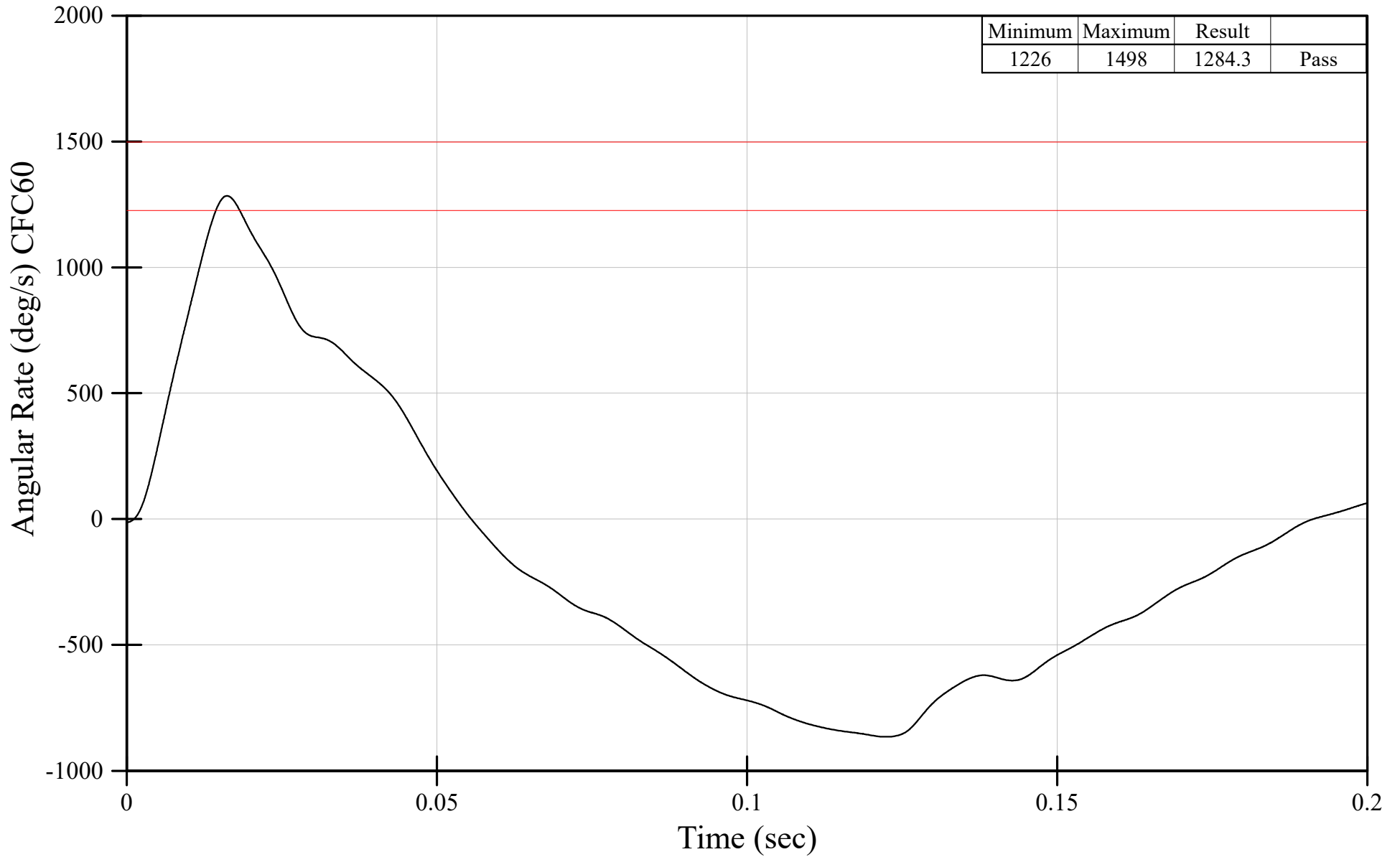
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Peak Angular Rate

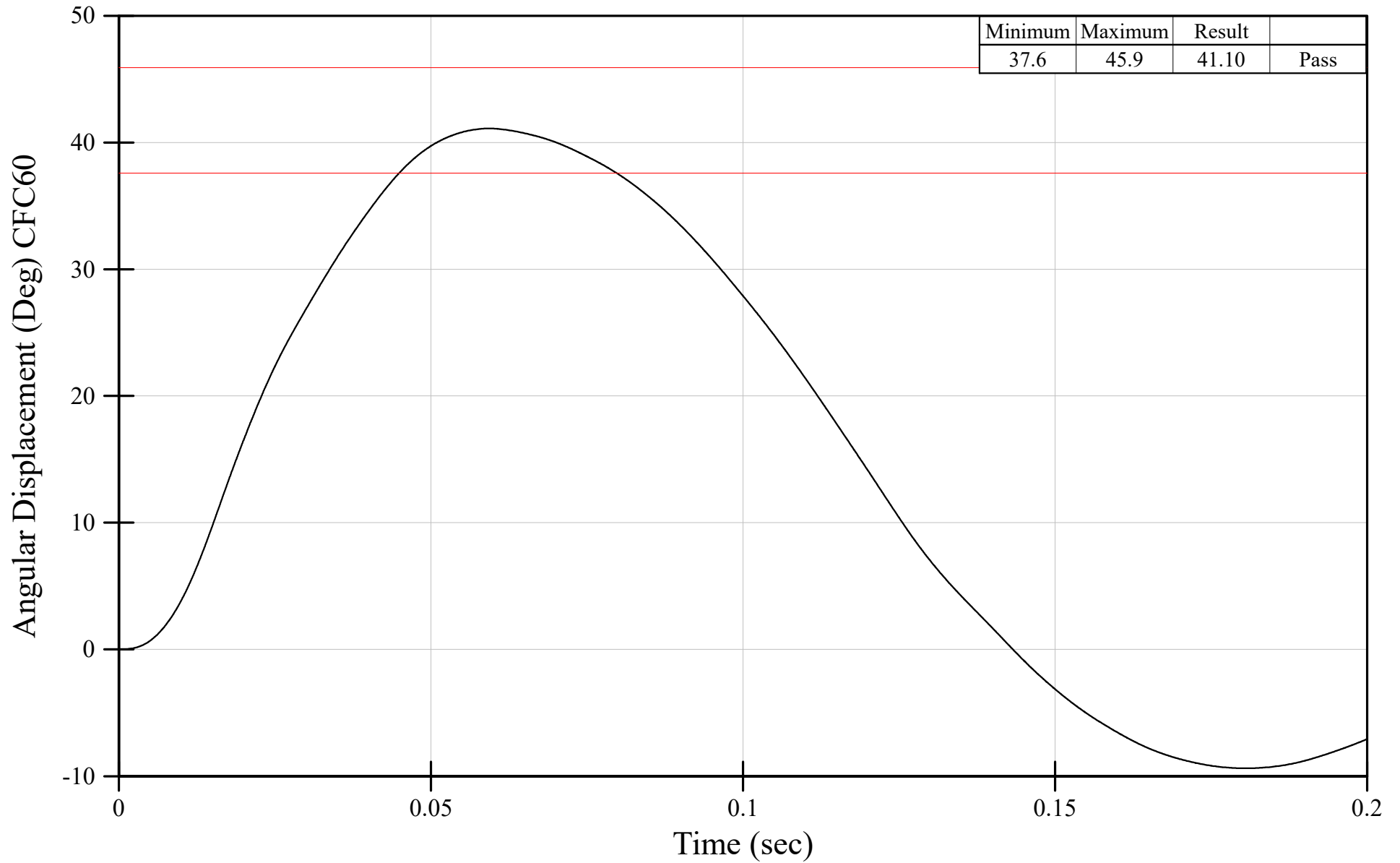
Serial Number: FA8045



THOR-50M Neck Right Lateral Qualification

Neck Rotation

Serial Number: FA8045



THOR-50M Upper Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Rib 1 Serial Number: 12073 Rib 5 Serial Number: 12079
Rib 2 Serial Number: 12113 Rib 6 Serial Number: 12123
Rib 3 Serial Number: 12235 Rib 7 Serial Number: 12146
Rib 4 Serial Number: 12202

Test ID: 241120-10
Test Date: 11/20/2024
Test Time: 10:25 AM

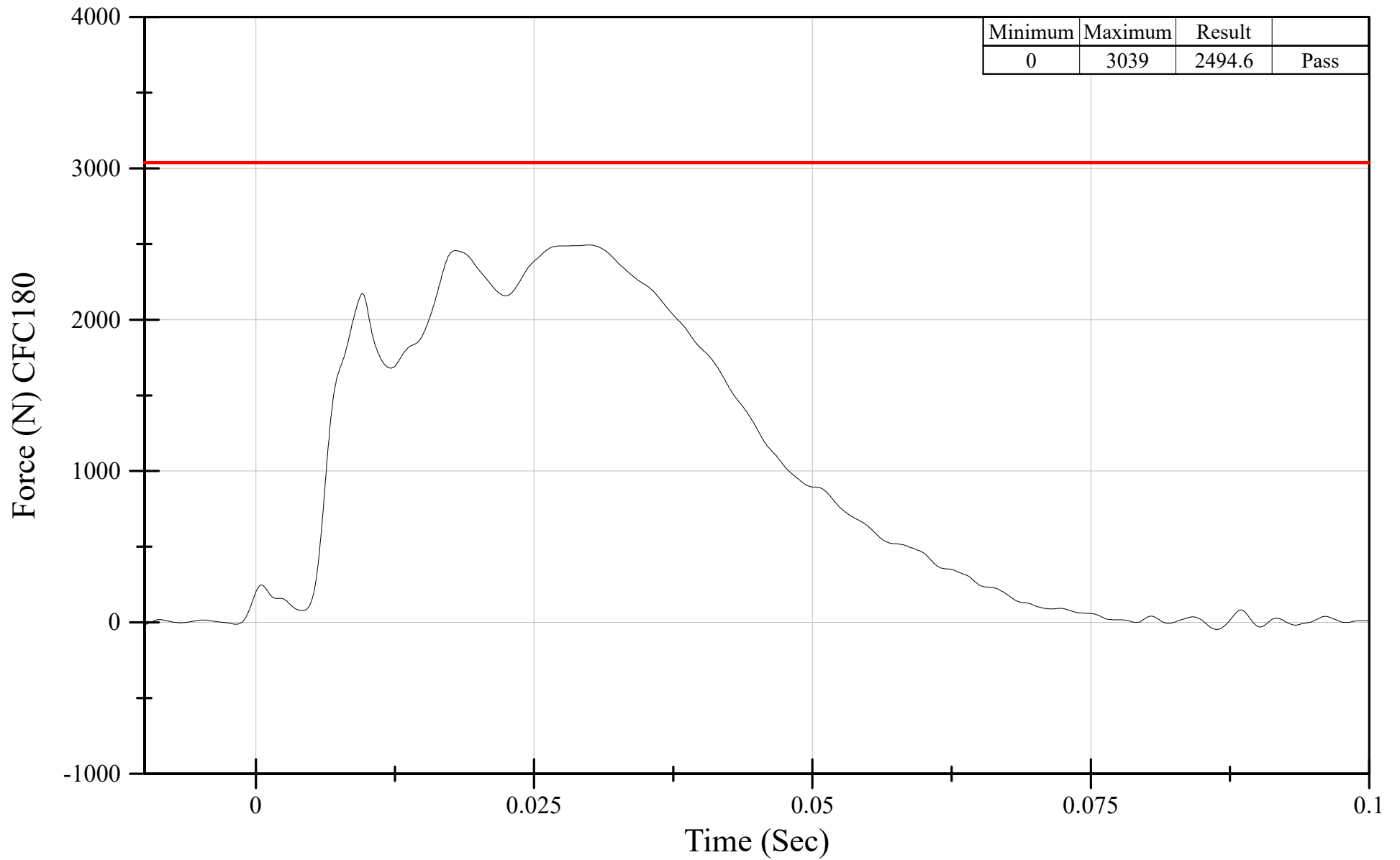
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	53	Pass
Test Velocity (m/s)	4.25 - 4.35	4.325	Pass
Peak Probe Force (N)	less than 3039	2494.6	Pass
Peak Upper Left Resultant Deflection (mm)	48.3 - 59.0	53.62	Pass
Peak Upper Right Resultant Deflection (mm)	48.3 - 59.0	53.70	Pass
Difference Between Peak Left & Right Resultant Deflections (mm)	less than 5.0	0.08	Pass
Force at Left Peak Resultant Deflection (N)	2409 - 2944	2490.3	Pass
Force at Right Peak Resultant Deflection (N)	2409 - 2944	2490.5	Pass

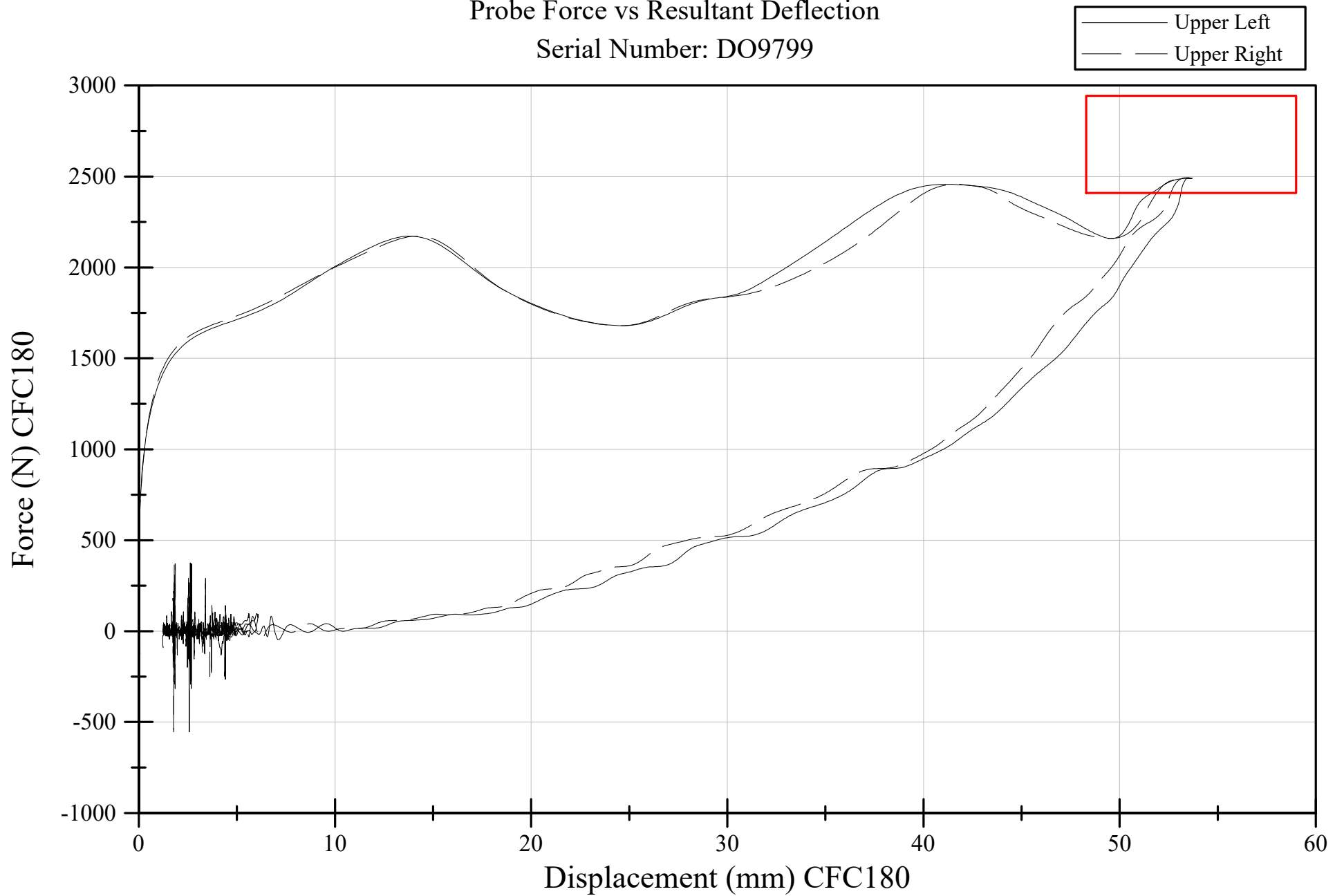
THOR-50M Upper Thorax Qualification

Probe Force

Serial Number: DO9799



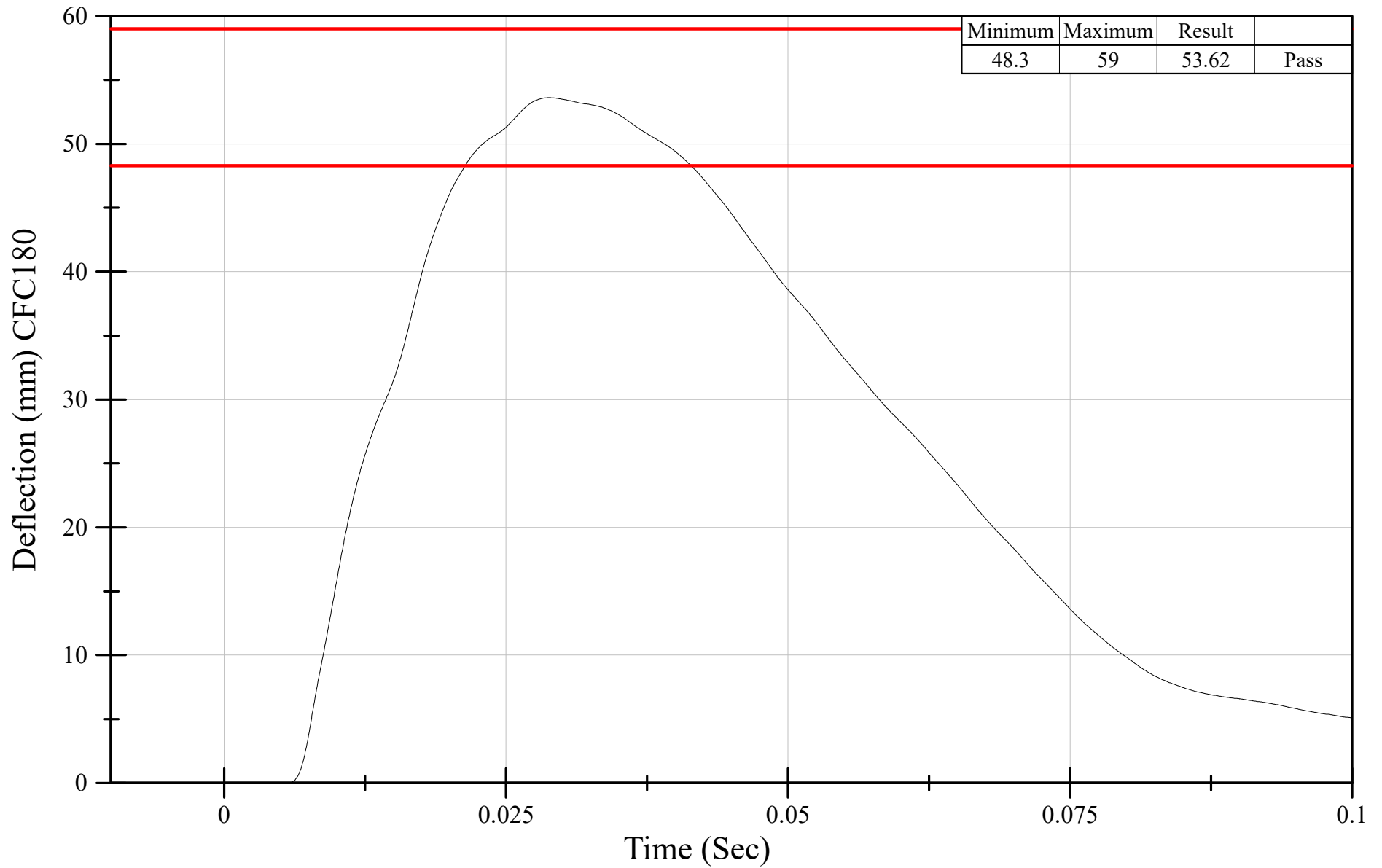
THOR-50M Upper Thorax Qualification
Probe Force vs Resultant Deflection
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Left Resultant Deflection

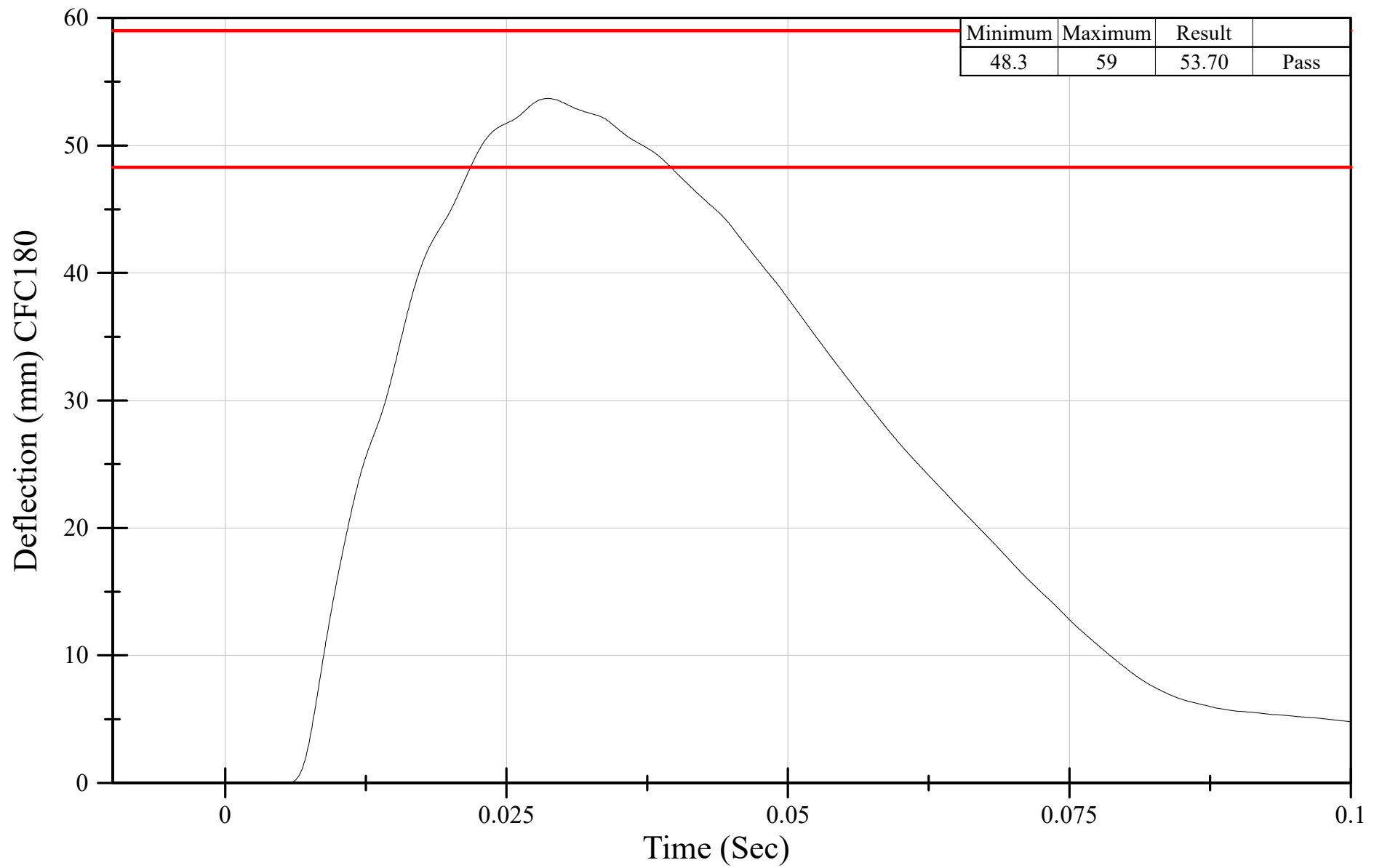
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Right Resultant Deflection

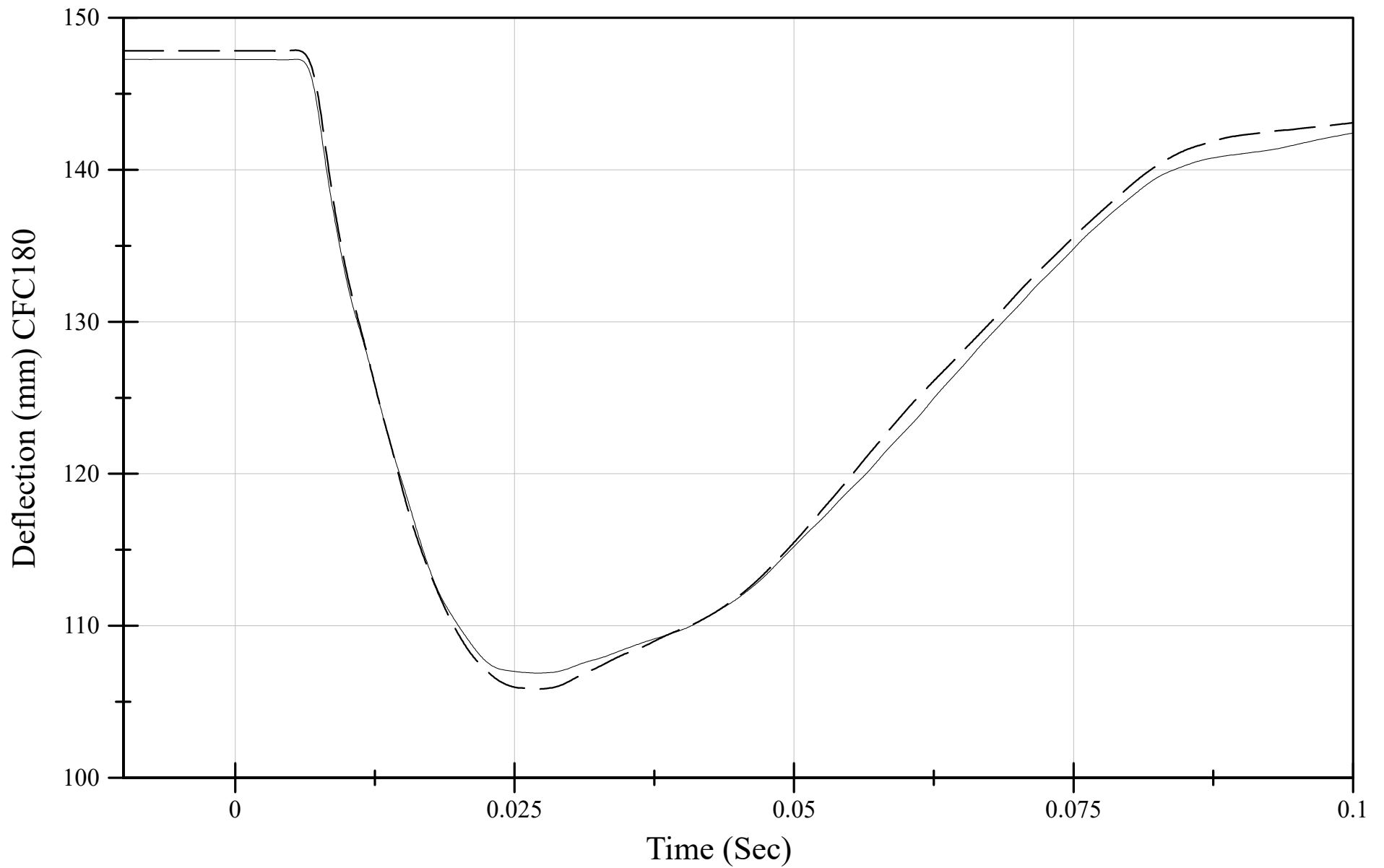
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

X-Deflection

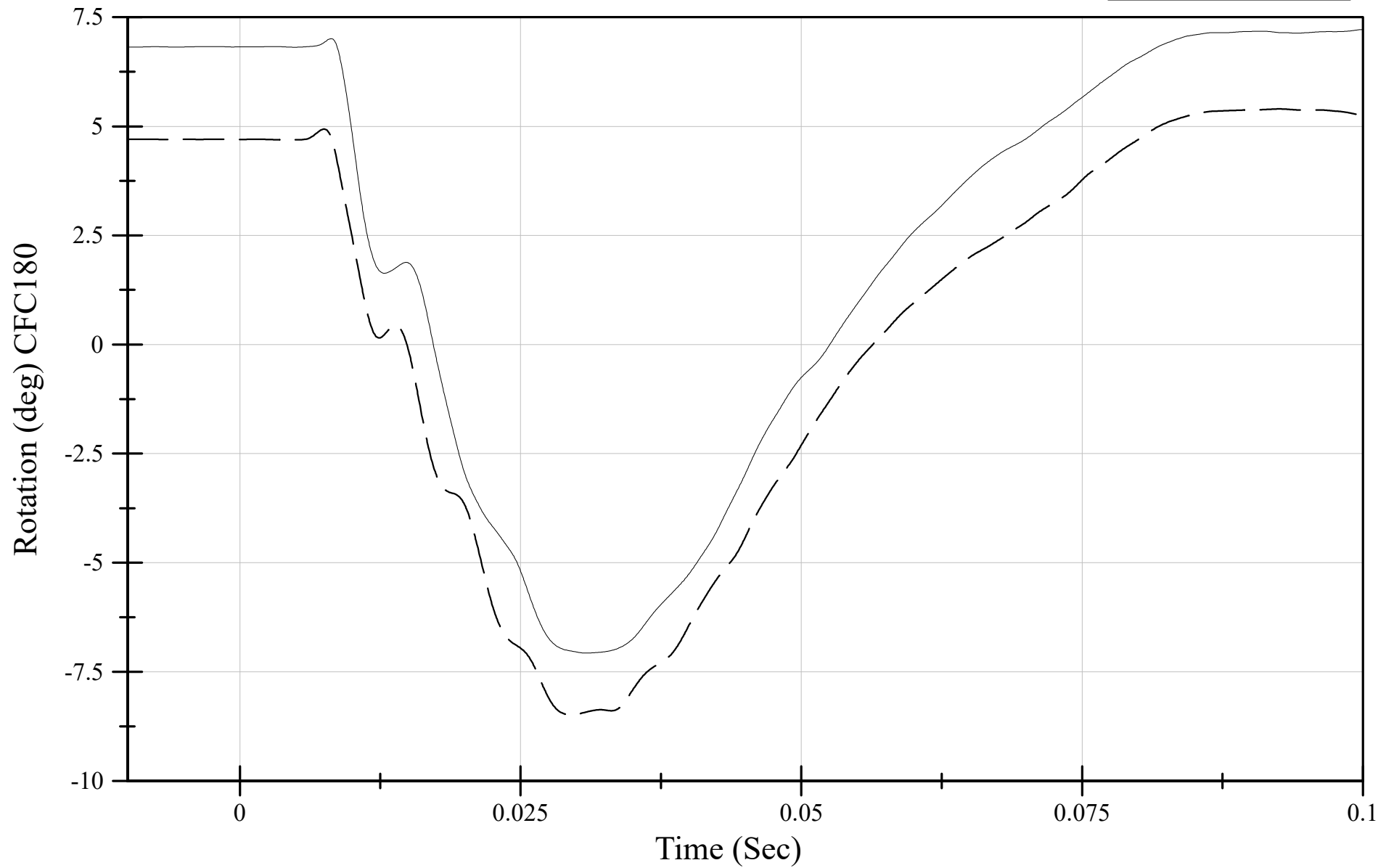
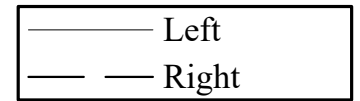
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Y-Rotation + Offset

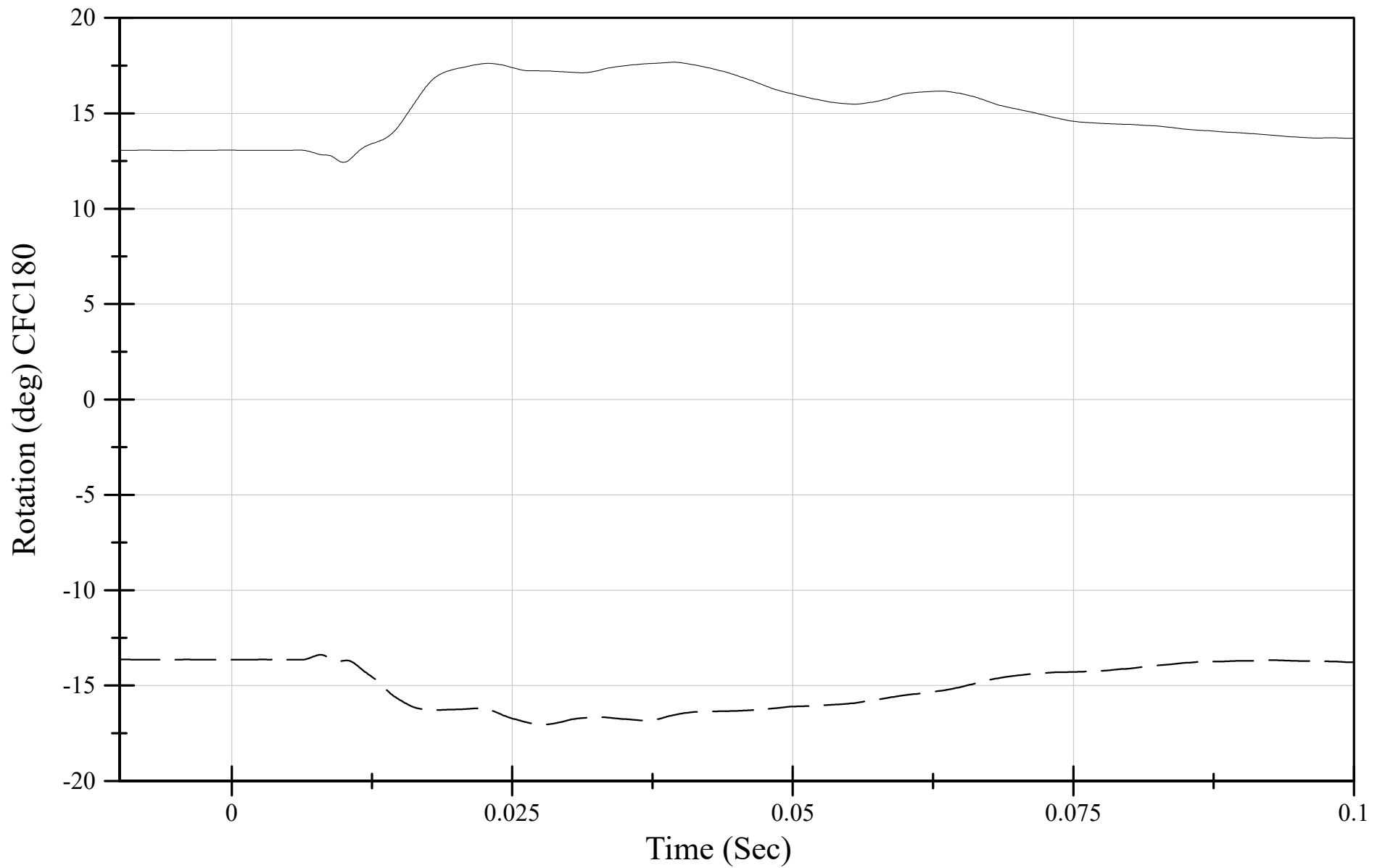
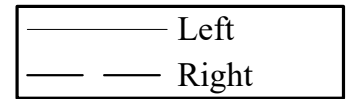
Serial Number: DO9799



THOR-50M Upper Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Rib 1 Serial Number: 12073
Rib 2 Serial Number: 12113
Rib 3 Serial Number: 12235
Rib 4 Serial Number: 12202

Rib 5 Serial Number: 12079
Rib 6 Serial Number: 12123
Rib 7 Serial Number: 12146

Test ID: 241127-11
Test Date: 11/27/2024
Test Time: 3:40 PM

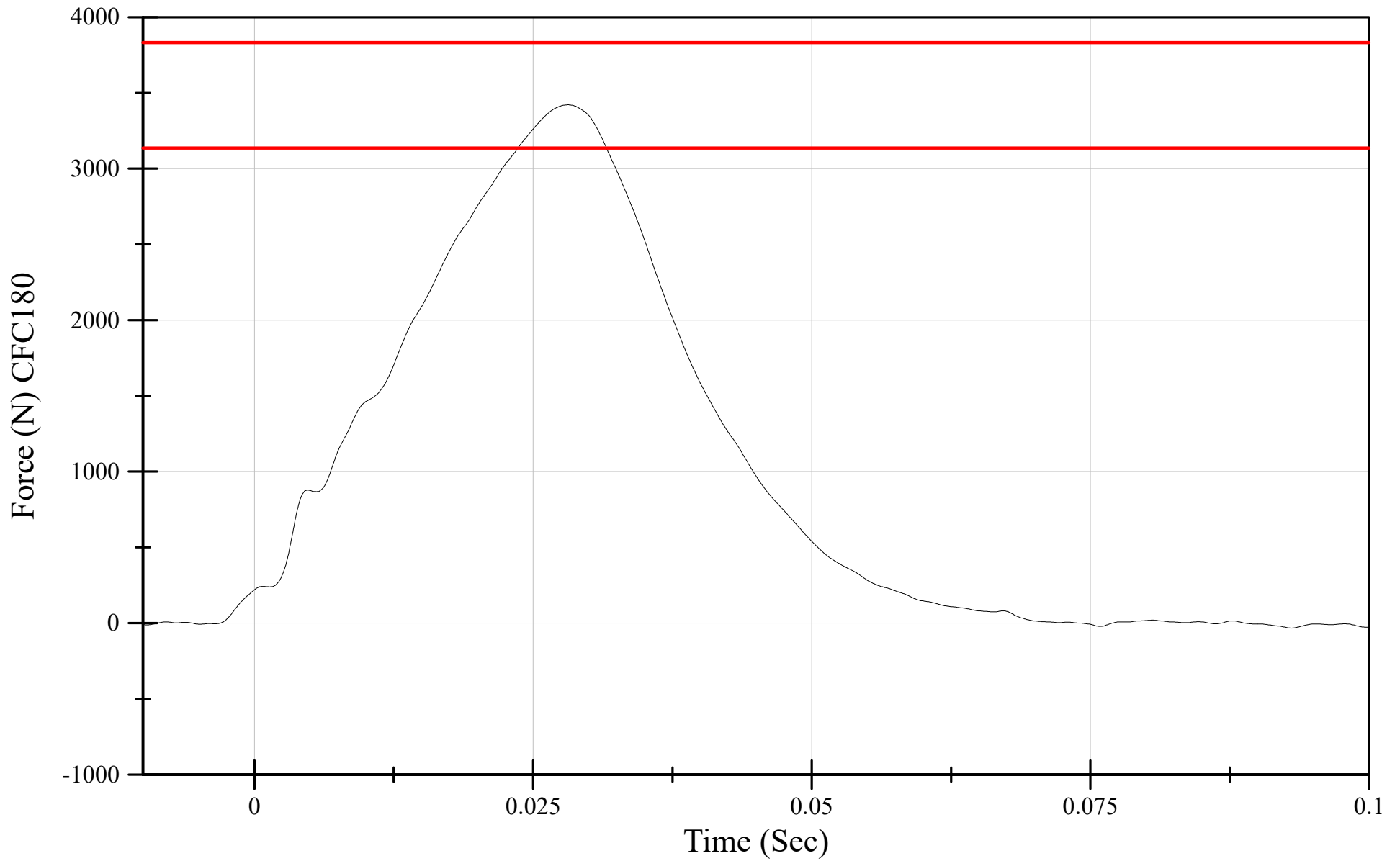
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.4	Pass
Test Humidity (%)	10 - 70	51	Pass
Test Velocity (m/s)	4.25 - 4.35	4.289	Pass
Peak Probe Force (N)	3136 - 3832	3421.5	Pass
Left Resultant Deflection at Peak Force (mm)	45.8 - 56.0	48.28	Pass

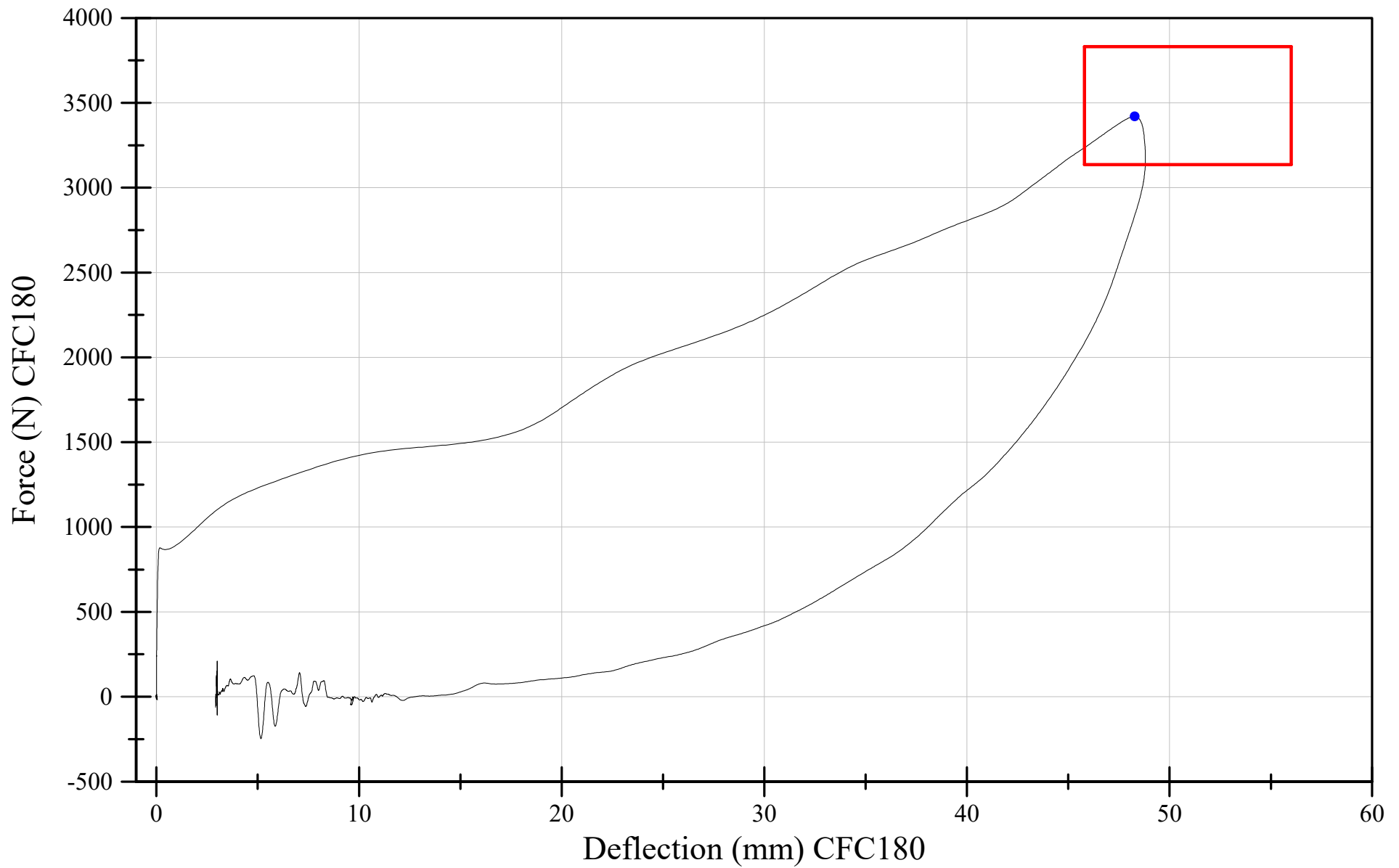
THOR-50M Left Lower Thorax Qualification

Probe Force

Serial Number: DO9799



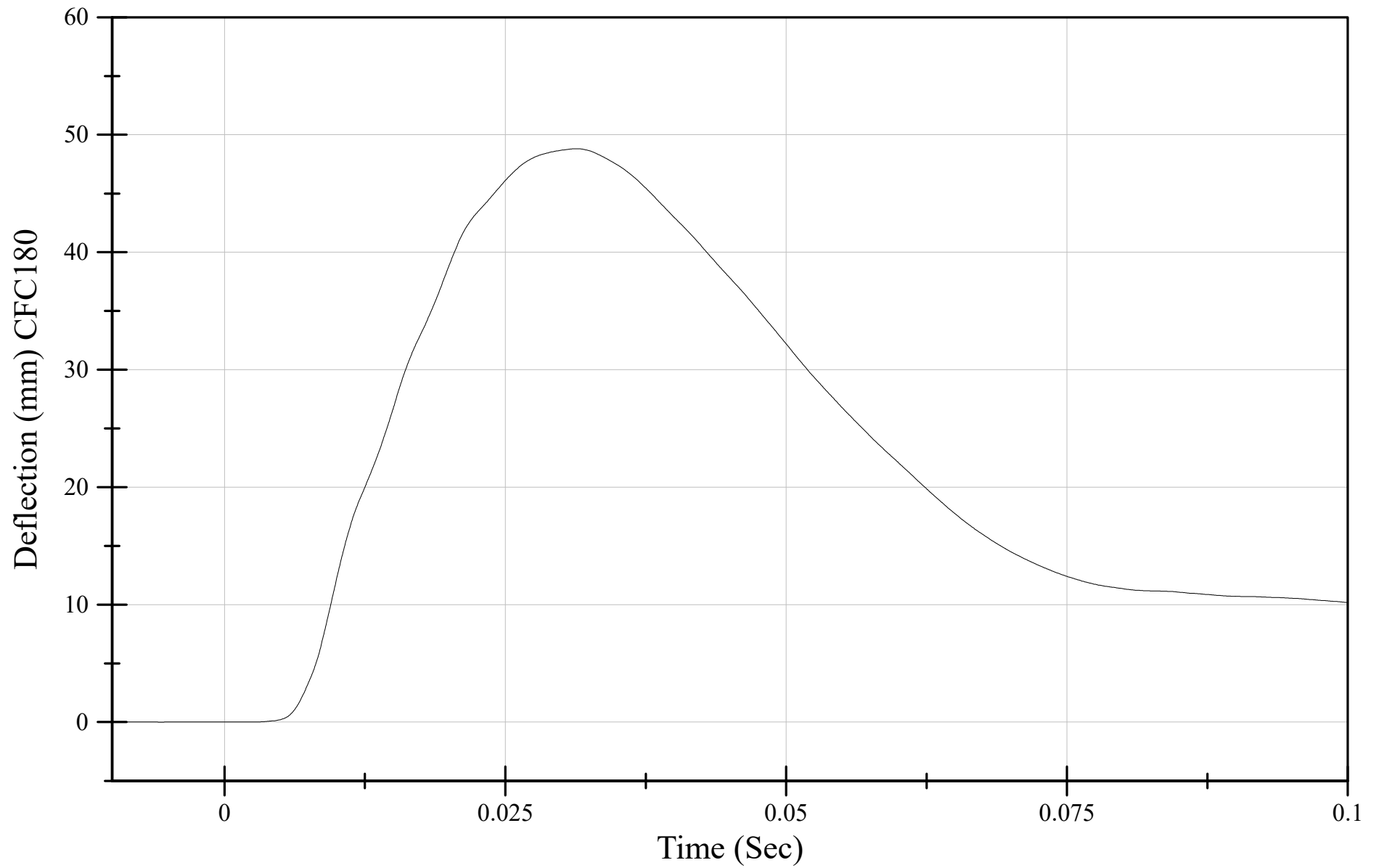
THOR-50M Left Lower Thorax Qualification
Probe Force vs Left Resultant Deflection
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Left Resultant Deflection

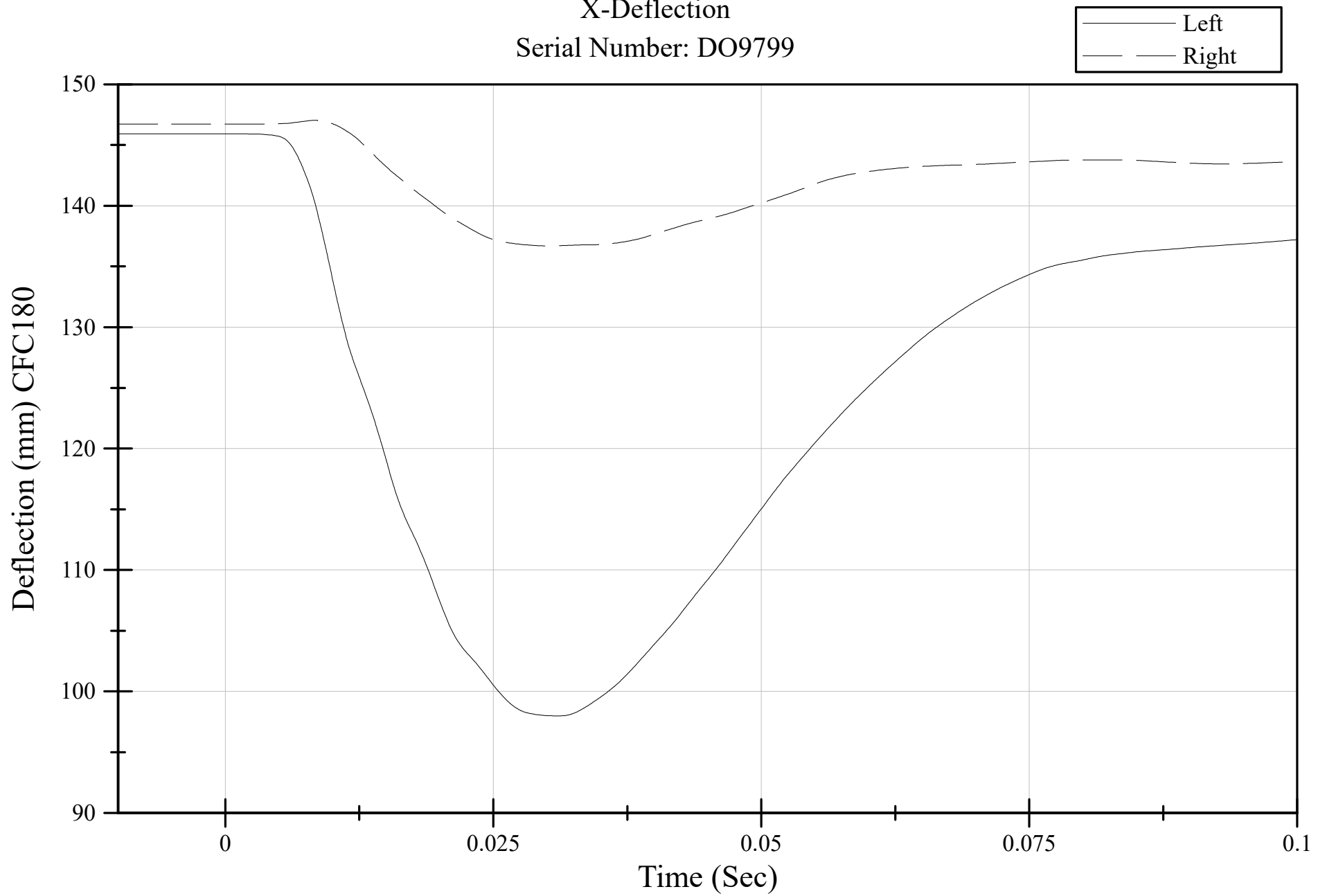
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

X-Deflection

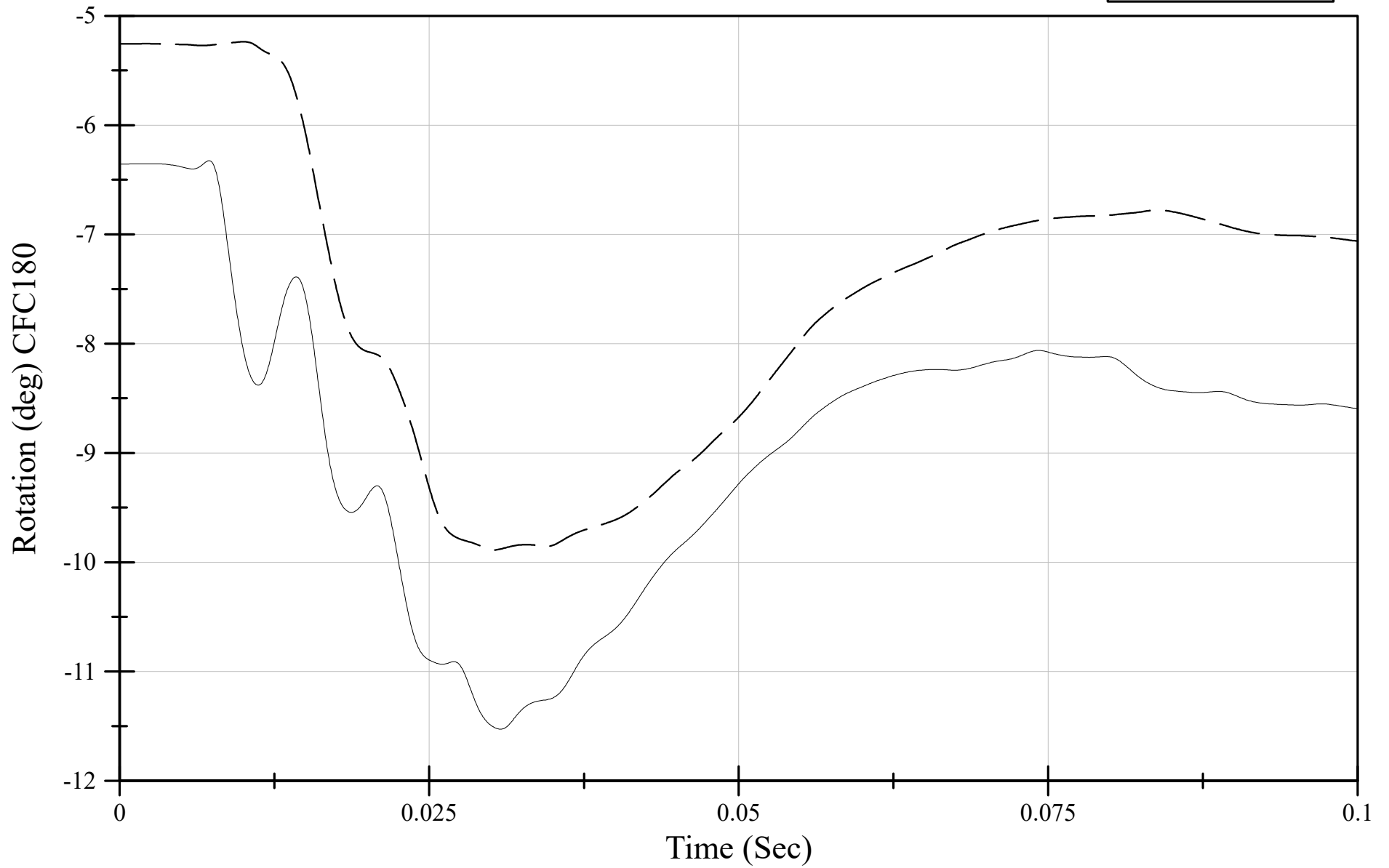
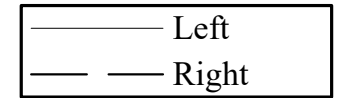
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Y-Rotation + Offset

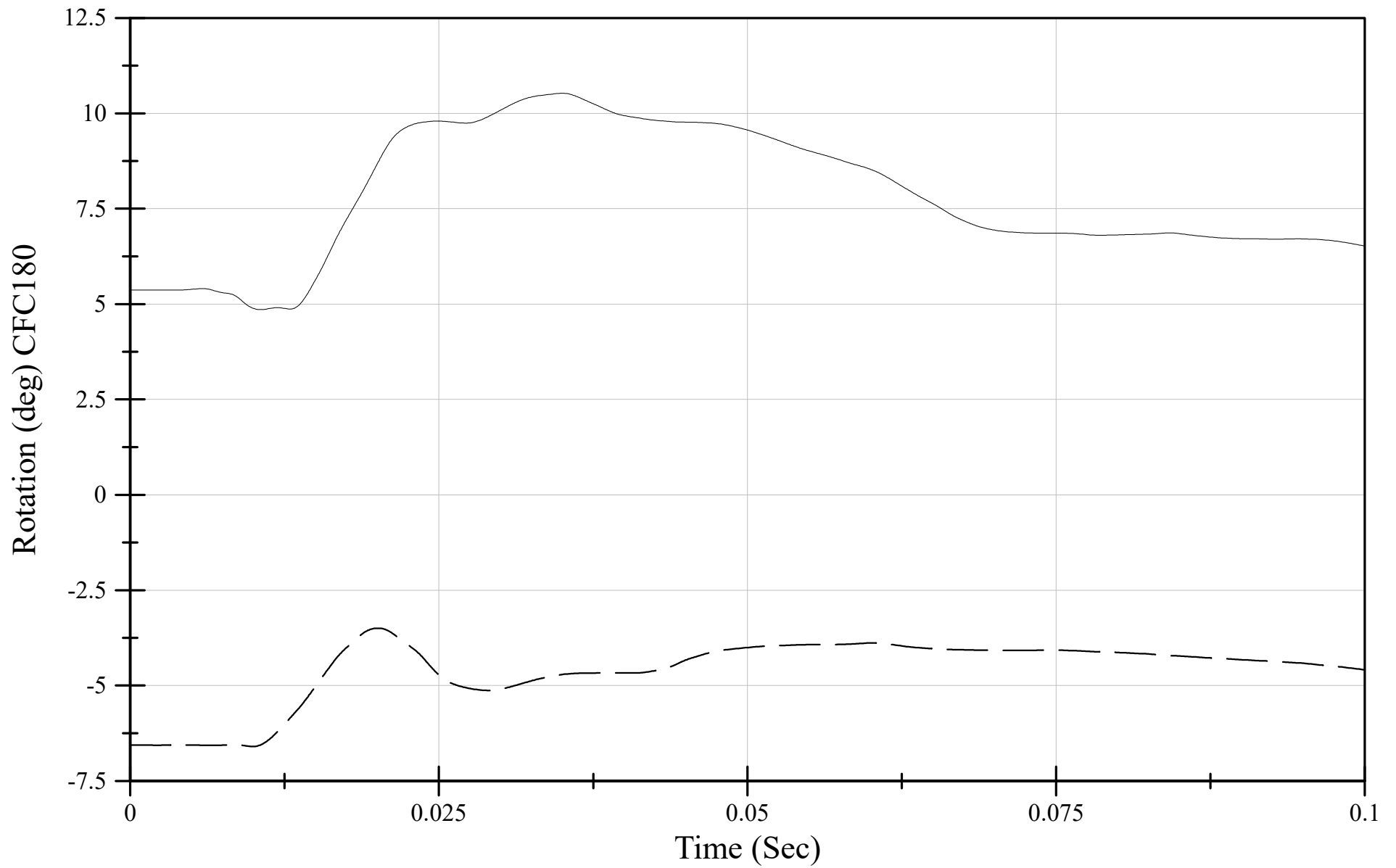
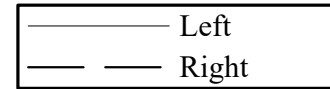
Serial Number: DO9799



THOR-50M Left Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9799



THOR-50M Right Lower Thorax Qualification

Test Results Summary

Dummy Serial Number: DO9899

Tested Components

Rib 1 Serial Number: 12073 Rib 5 Serial Number: 12079
Rib 2 Serial Number: 12113 Rib 6 Serial Number: 12123
Rib 3 Serial Number: 12235 Rib 7 Serial Number: 12146
Rib 4 Serial Number: 12202

Test ID: 241120-20
Test Date: 11/20/2024
Test Time: 3:35 PM

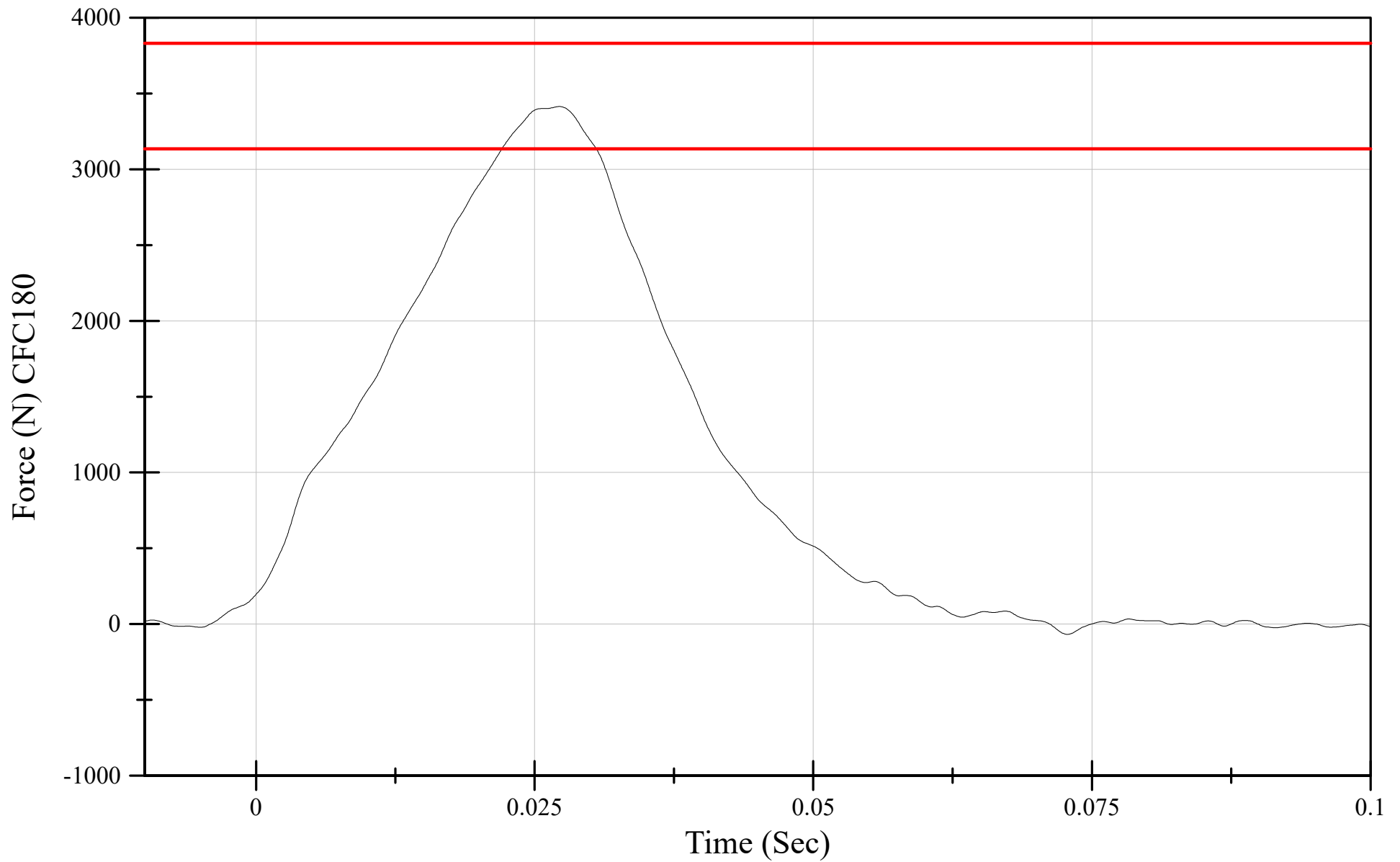
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	48	Pass
Test Velocity (m/s)	4.25 - 4.35	4.306	Pass
Peak Probe Force (N)	3136 - 3832	3415.4	Pass
Right Resultant Deflection at Peak Force (mm)	45.8 - 56.0	48.66	Pass

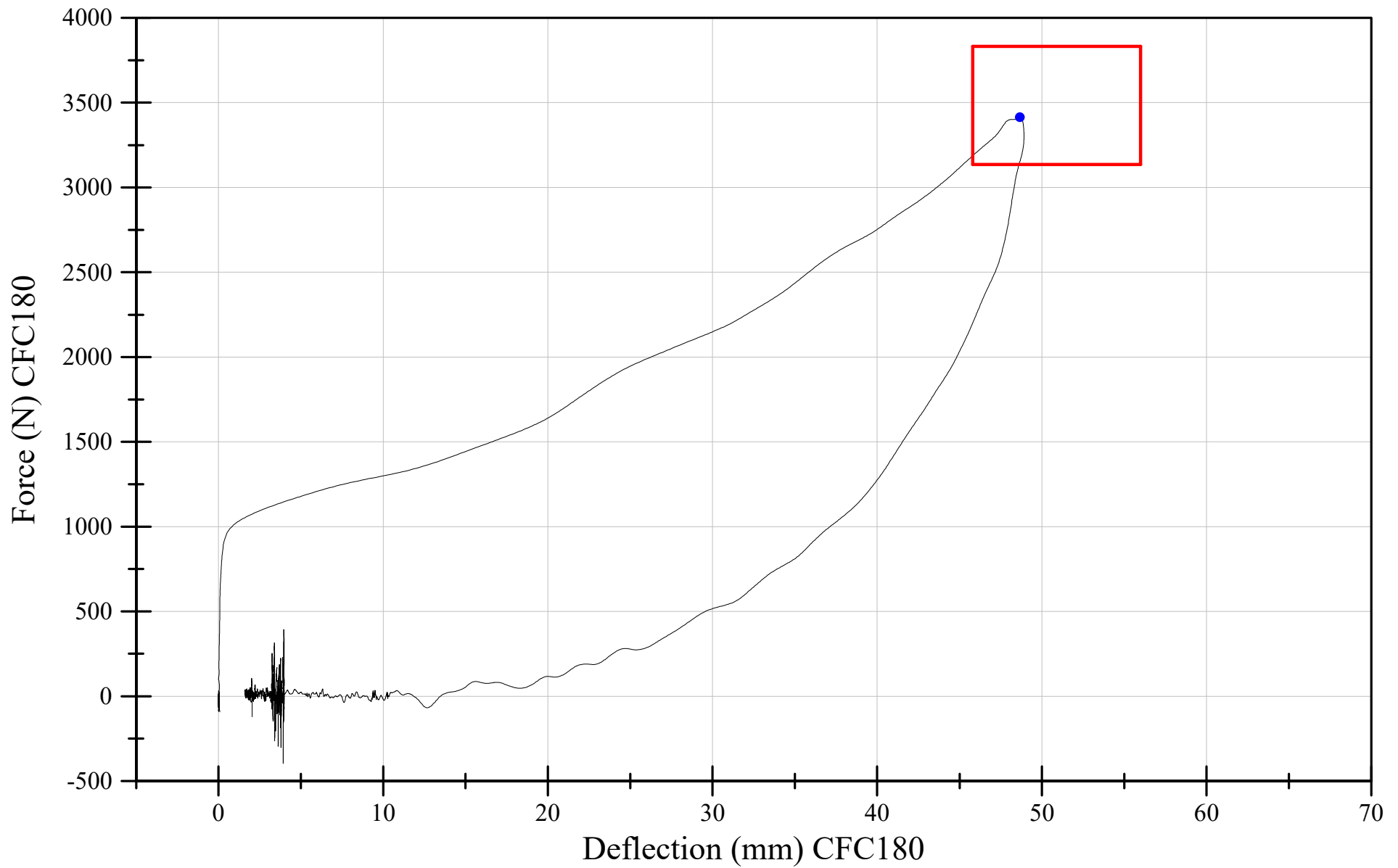
THOR-50M Right Lower Thorax Qualification

Probe Force

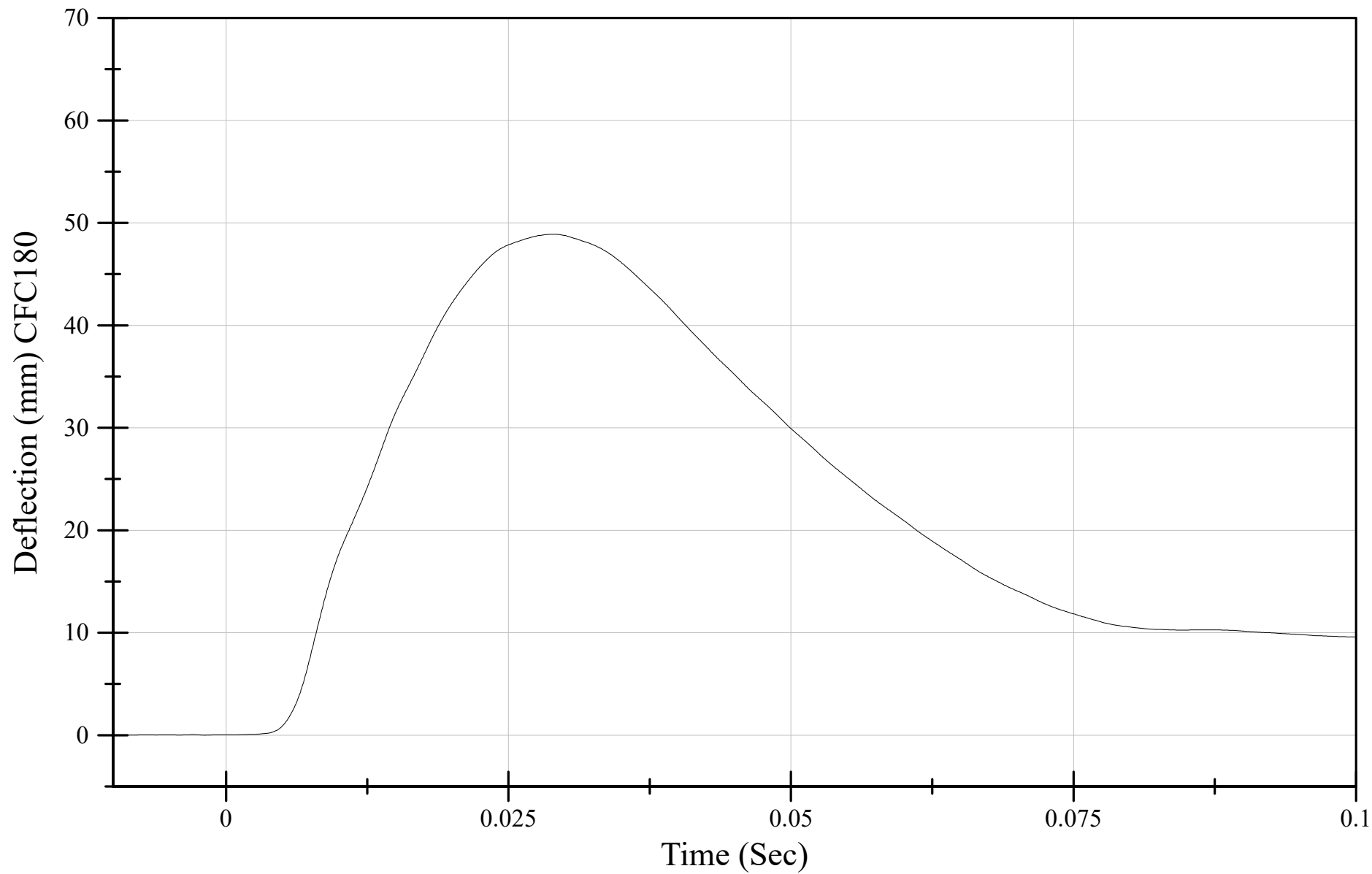
Serial Number: DO9899



THOR-50M Right Lower Thorax Qualification
Probe Force vs Right Resultant Deflection
Serial Number: DO9899



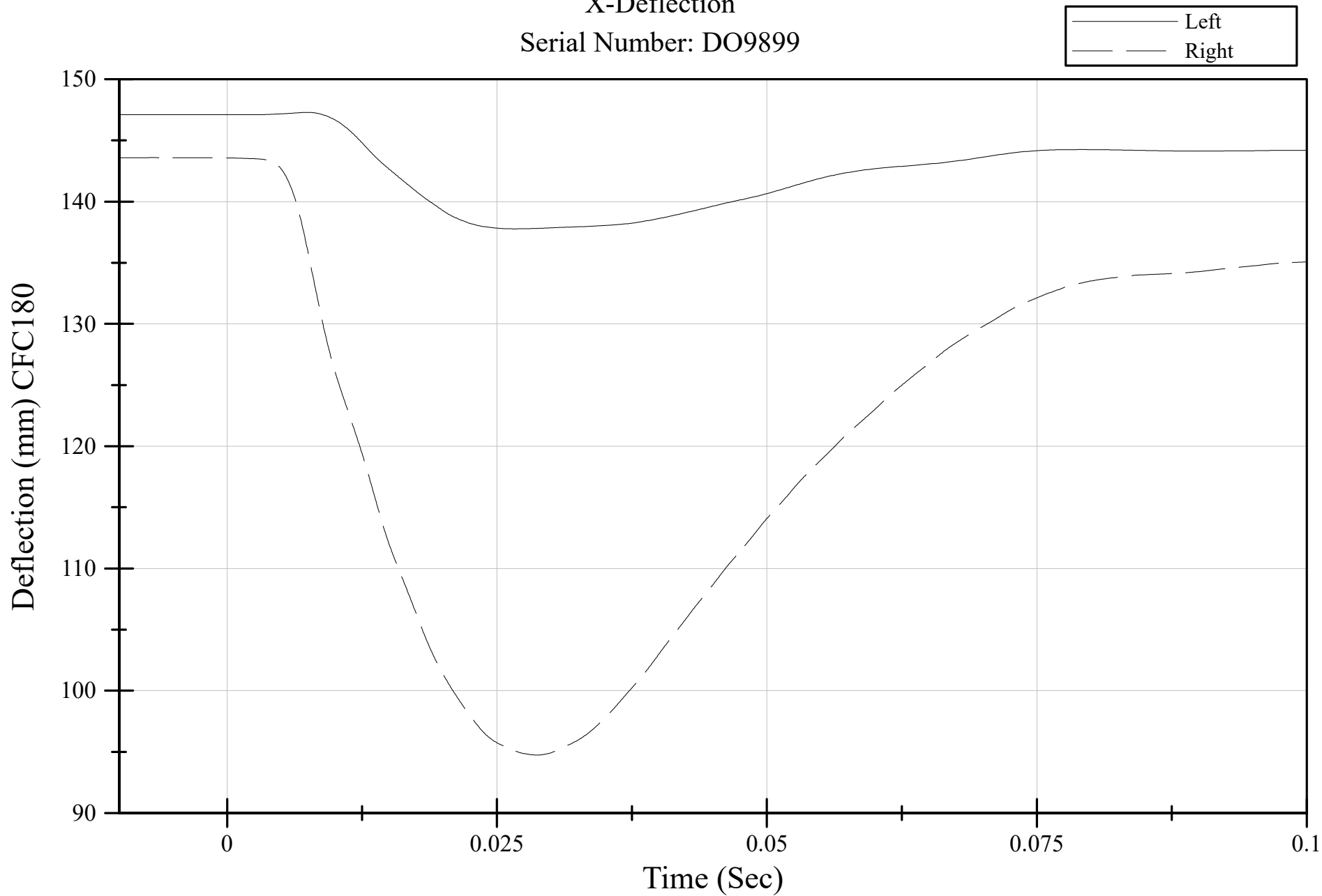
THOR-50M Right Lower Thorax Qualification
Right Resultant Deflection
Serial Number: DO9899



THOR-50M Right Lower Thorax Qualification

X-Deflection

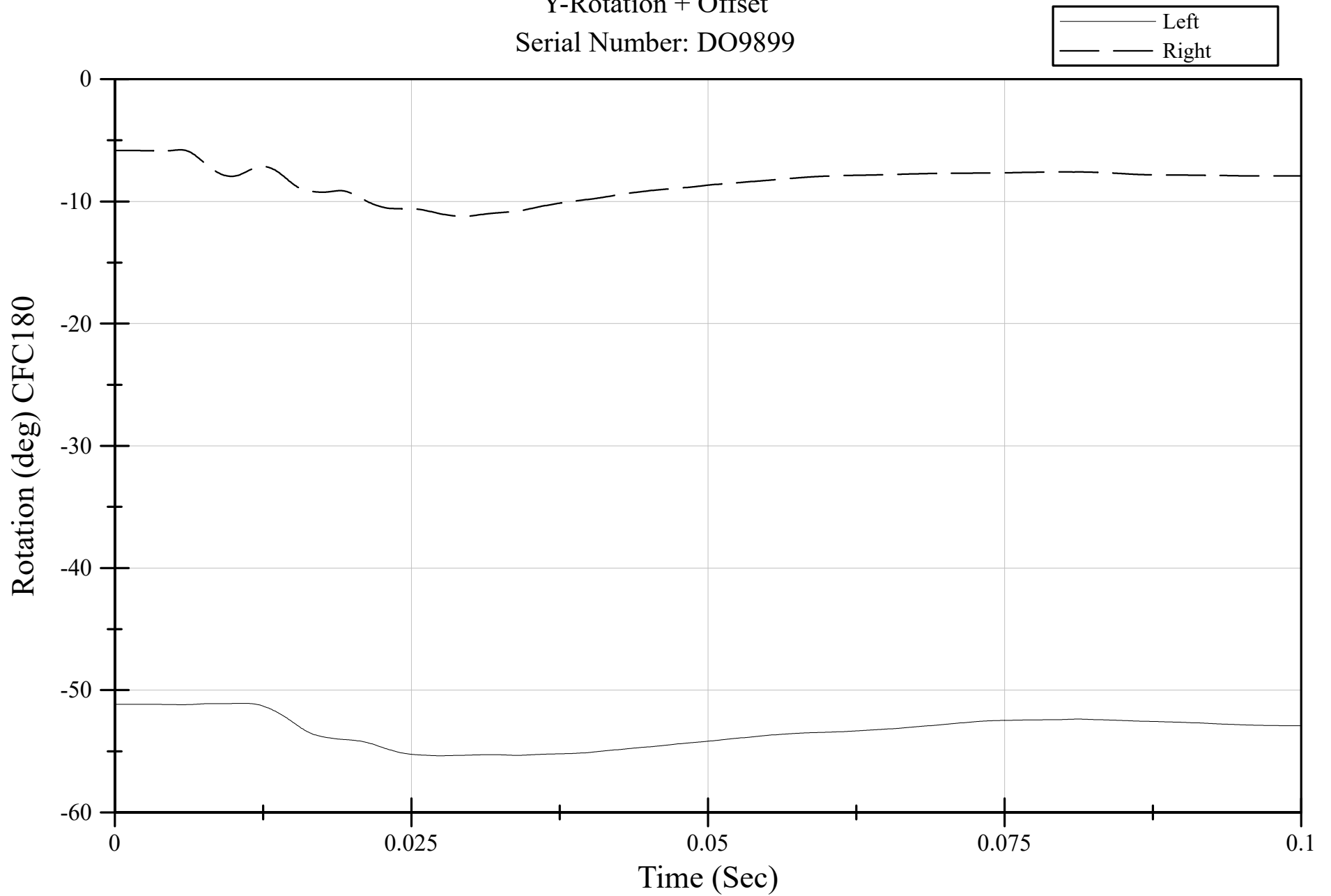
Serial Number: DO9899



THOR-50M Right Lower Thorax Qualification

Y-Rotation + Offset

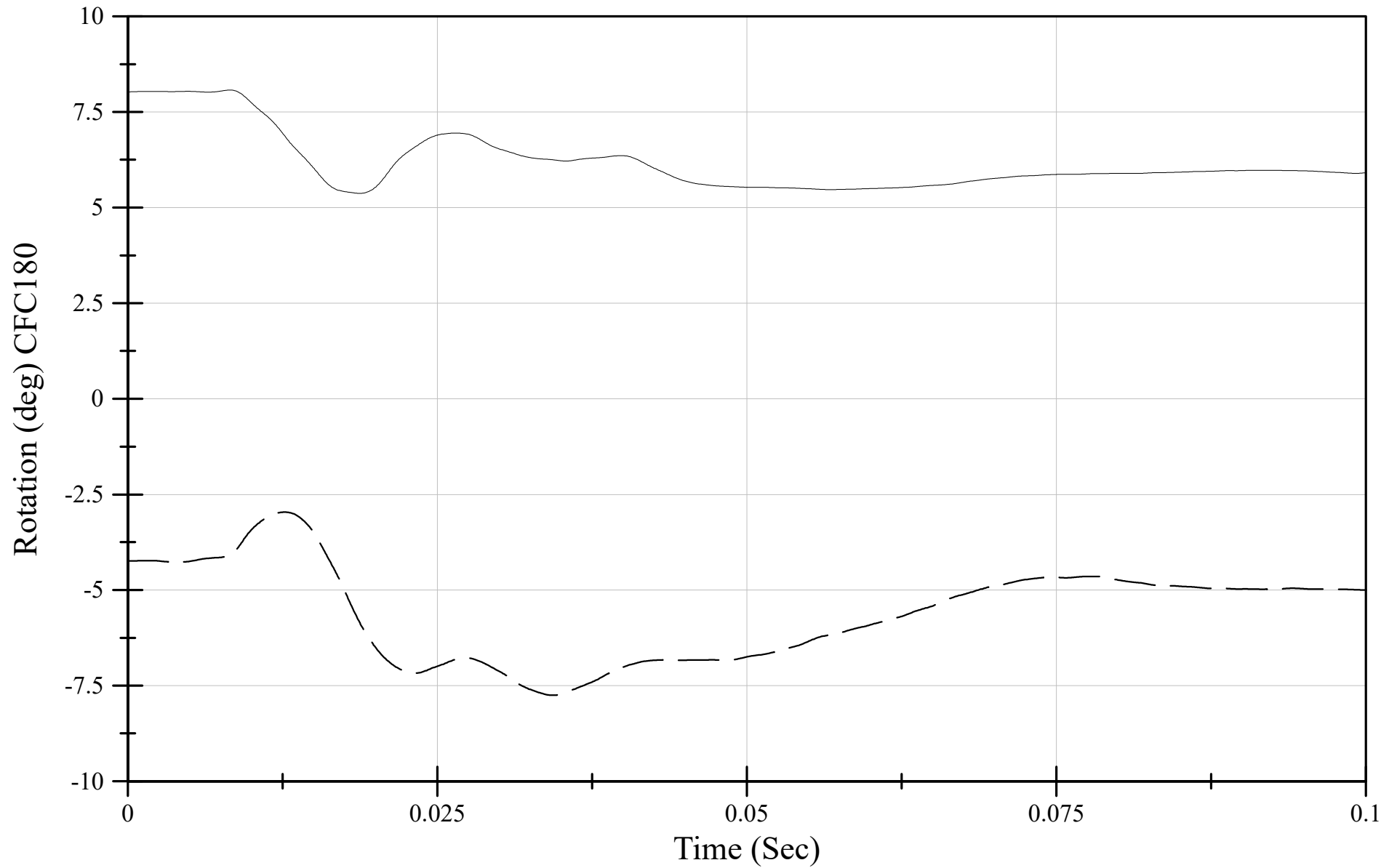
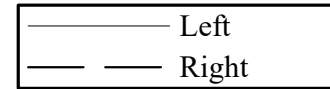
Serial Number: DO9899



THOR-50M Right Lower Thorax Qualification

Z-Rotation + Offset

Serial Number: DO9899



THOR-50M Lower Abdomen Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Front Lower Abdomen Foam: 010
Rear Lower Abdomen Foam: 014
Lower Abdomen Bag: 11315

Test ID: 241106-6
Test Date: 11/7/2024
Test Time: 6:55 AM

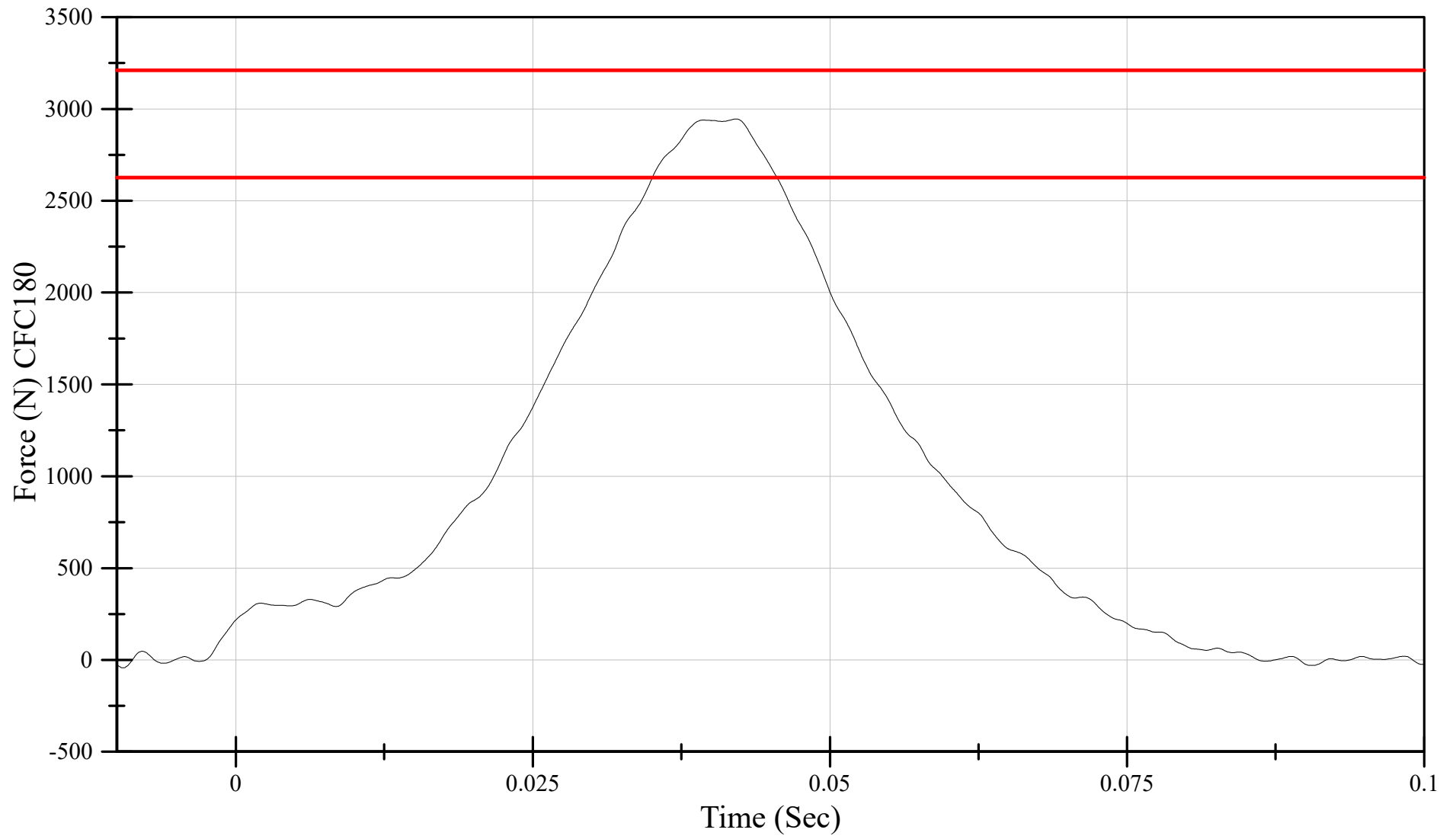
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.7	Pass
Test Humidity (%)	10 - 70	56	Pass
Test Velocity (m/s)	3.25 - 3.35	3.300	Pass
Peak Probe Force (N)	2626 - 3210	2945.4	Pass
Lower Left Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-92.65	Fail
Lower Right Abdomen X-axis Deflection at Time of Peak Force (mm)	-91.3 - (-74.7)	-92.21	Fail
Difference Between Peak Left & Right X-axis Deflections (mm)	less than 8.0	0.32	Pass

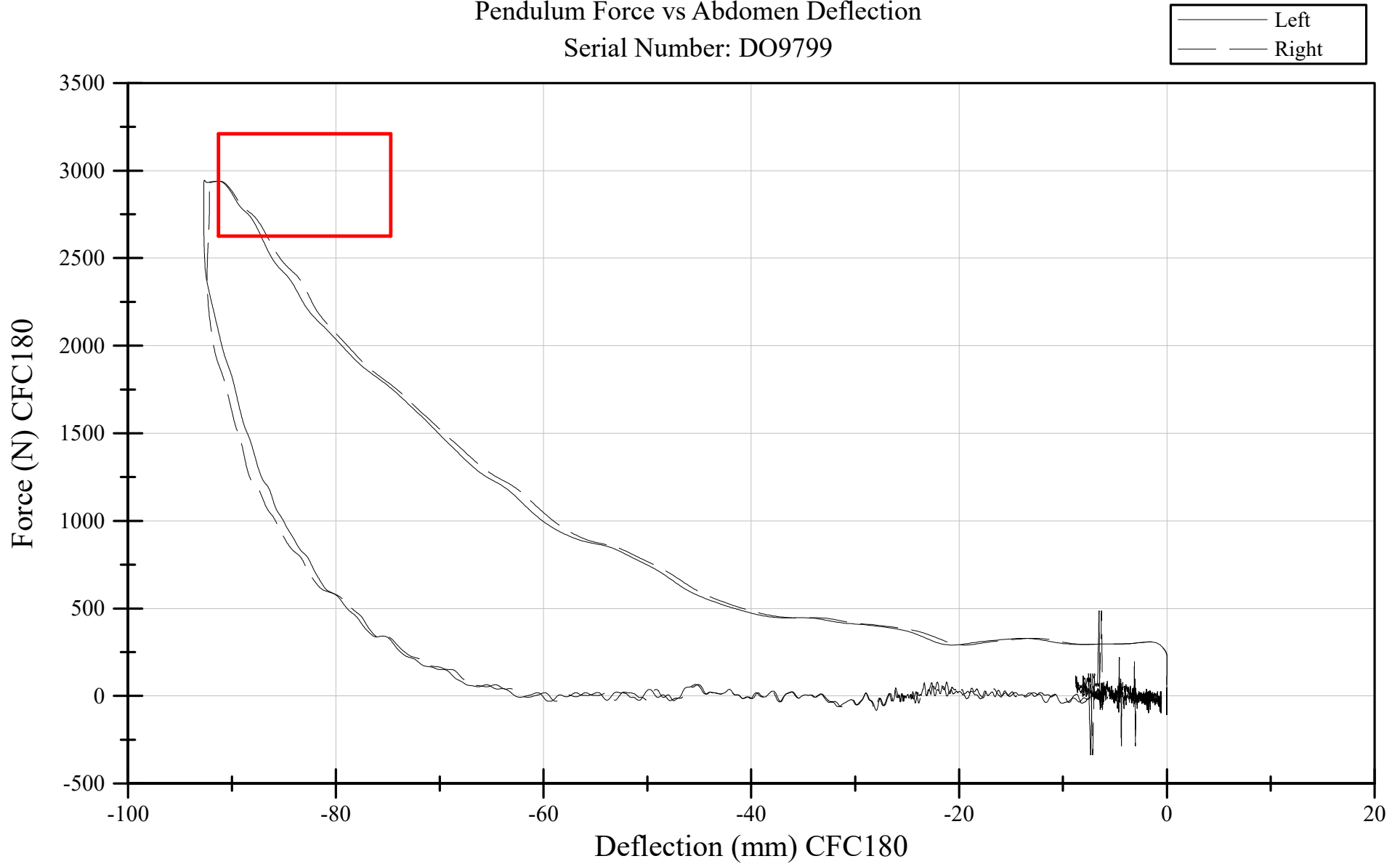
THOR-50M Lower Abdomen Qualification

Probe Force

Serial Number: DO9799



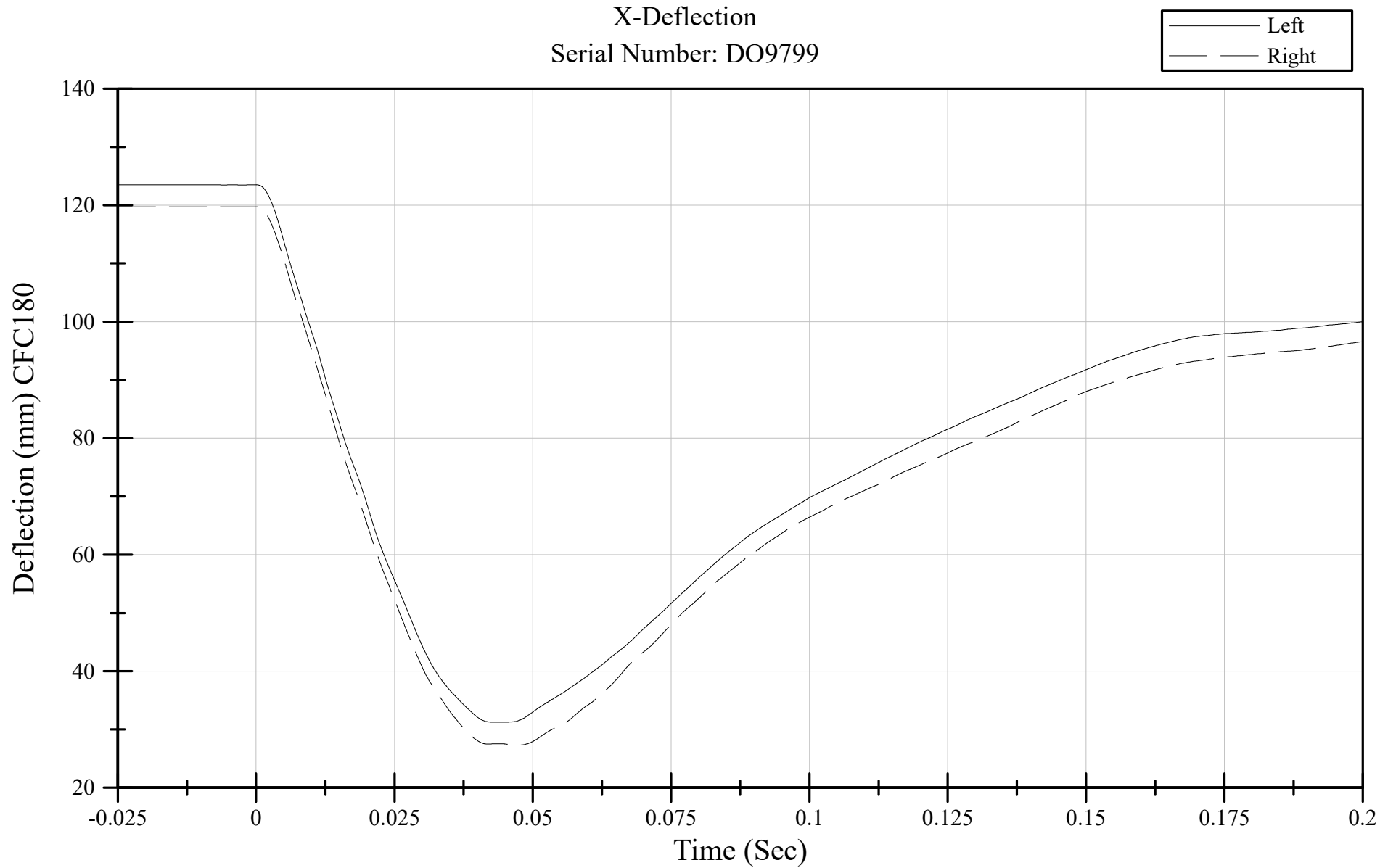
THOR-50M Lower Abdomen Qualification
Pendulum Force vs Abdomen Deflection
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

X-Deflection

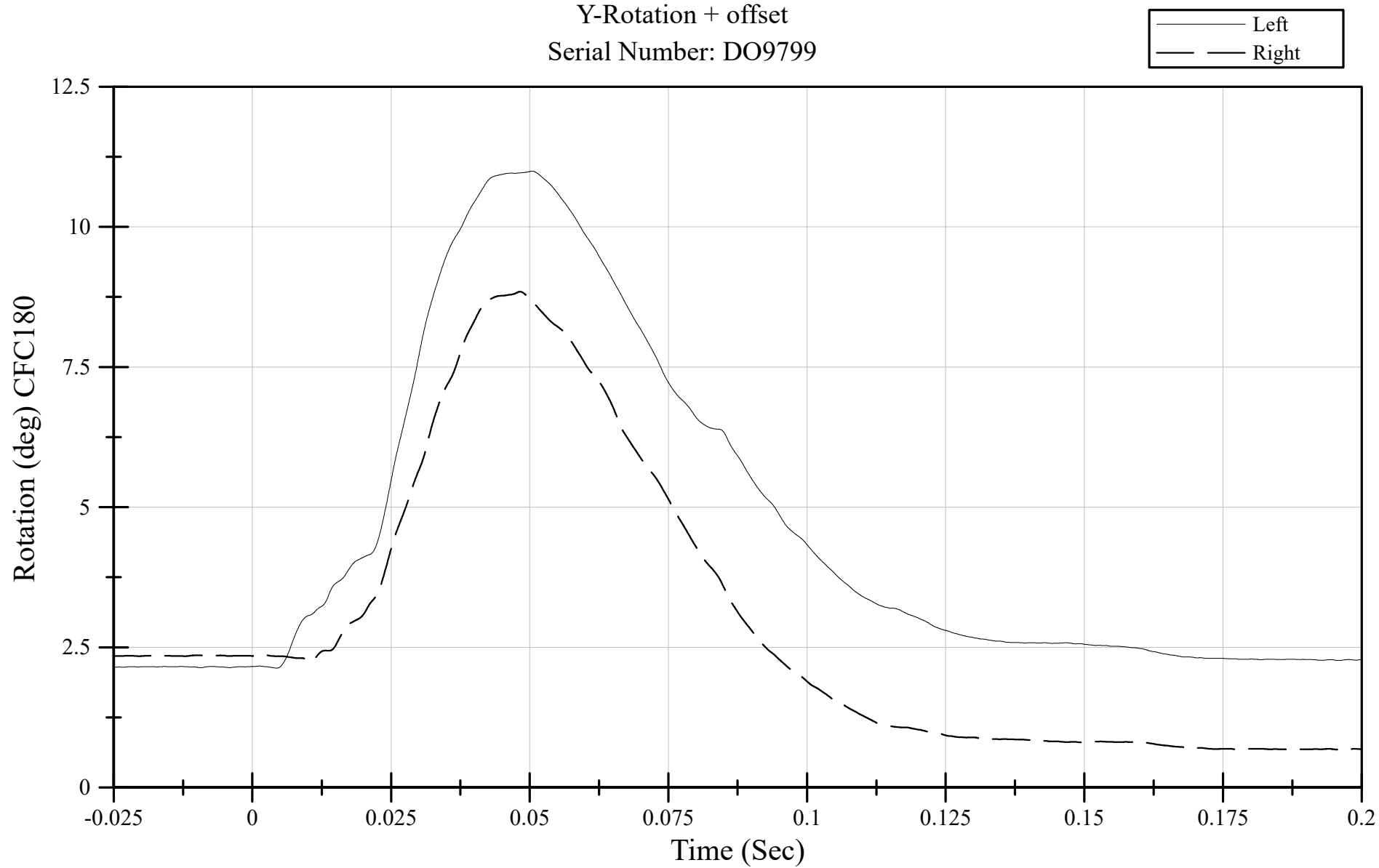
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

Y-Rotation + offset

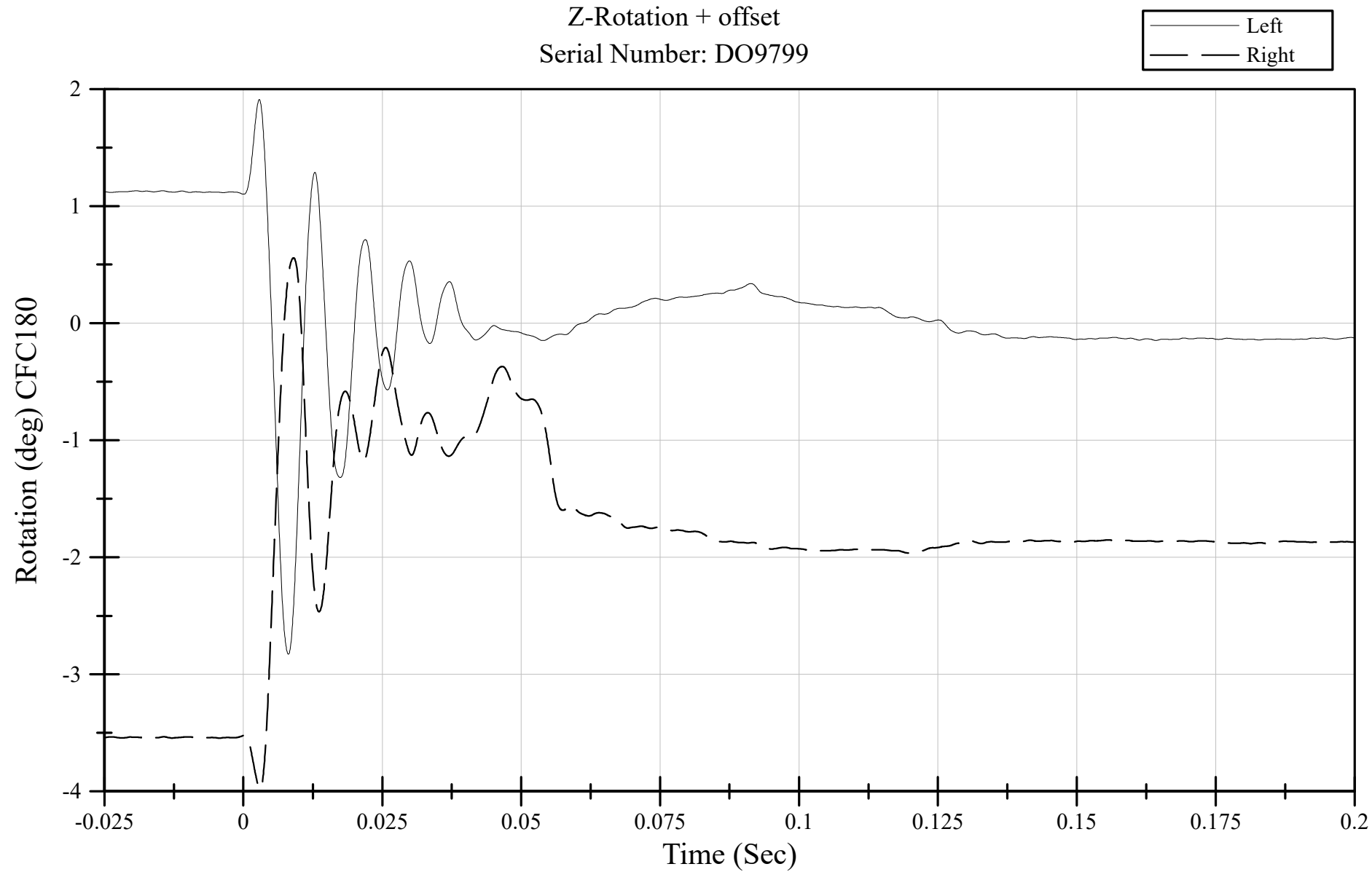
Serial Number: DO9799



THOR-50M Lower Abdomen Qualification

Z-Rotation + offset

Serial Number: DO9799



THOR-50M Left Upper Leg Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Compression Element:
Left Thigh Flesh: EH2766

Test ID: 241203-5

Test Date: 12/3/2024

Test Time: 1:08 PM

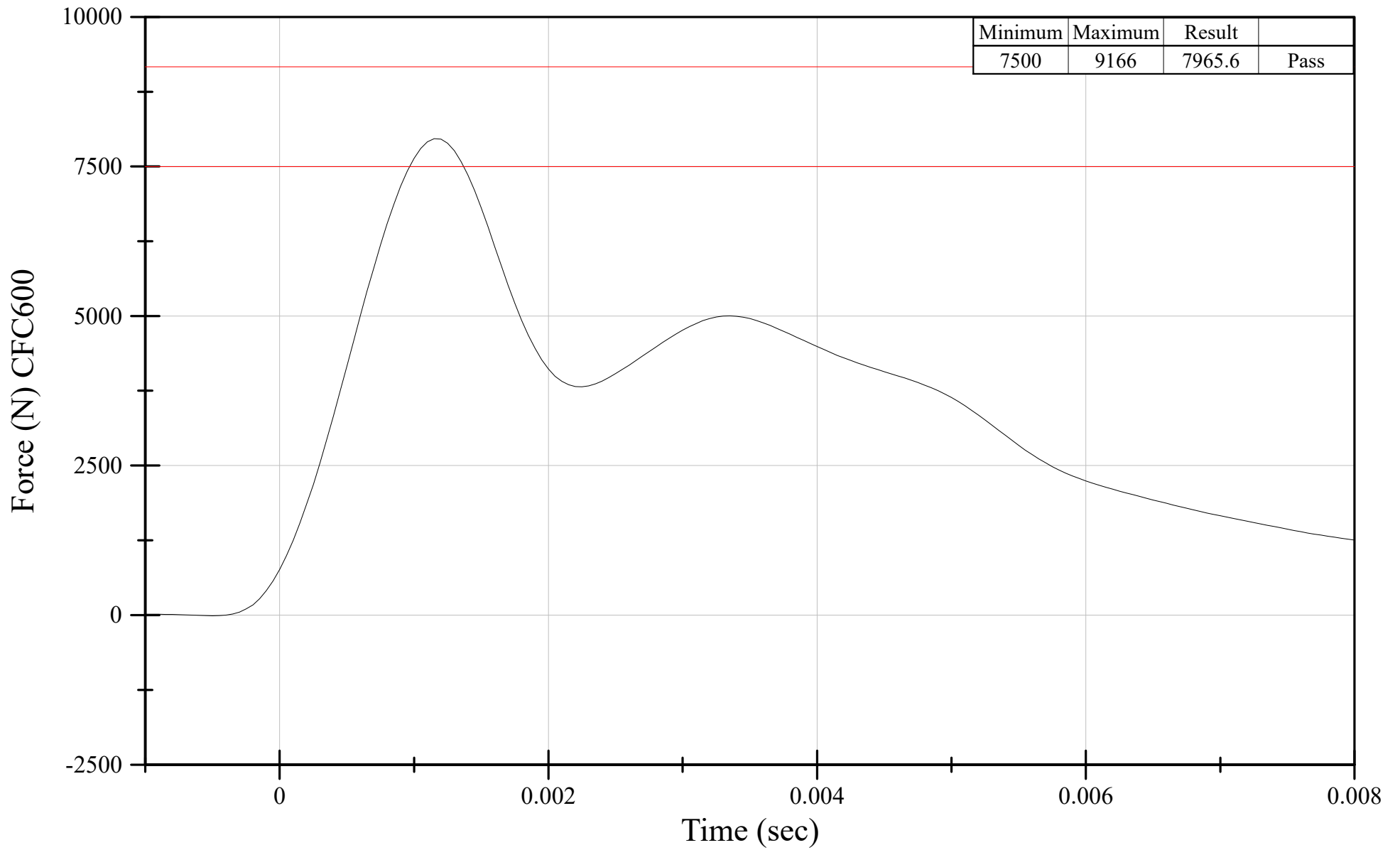
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	49	Pass
Test Velocity (m/s)	3.25 - 3.35	3.301	Pass
Peak Probe Force (N)	7500 - 9166	7965.6	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4989.3	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2767.2	Pass

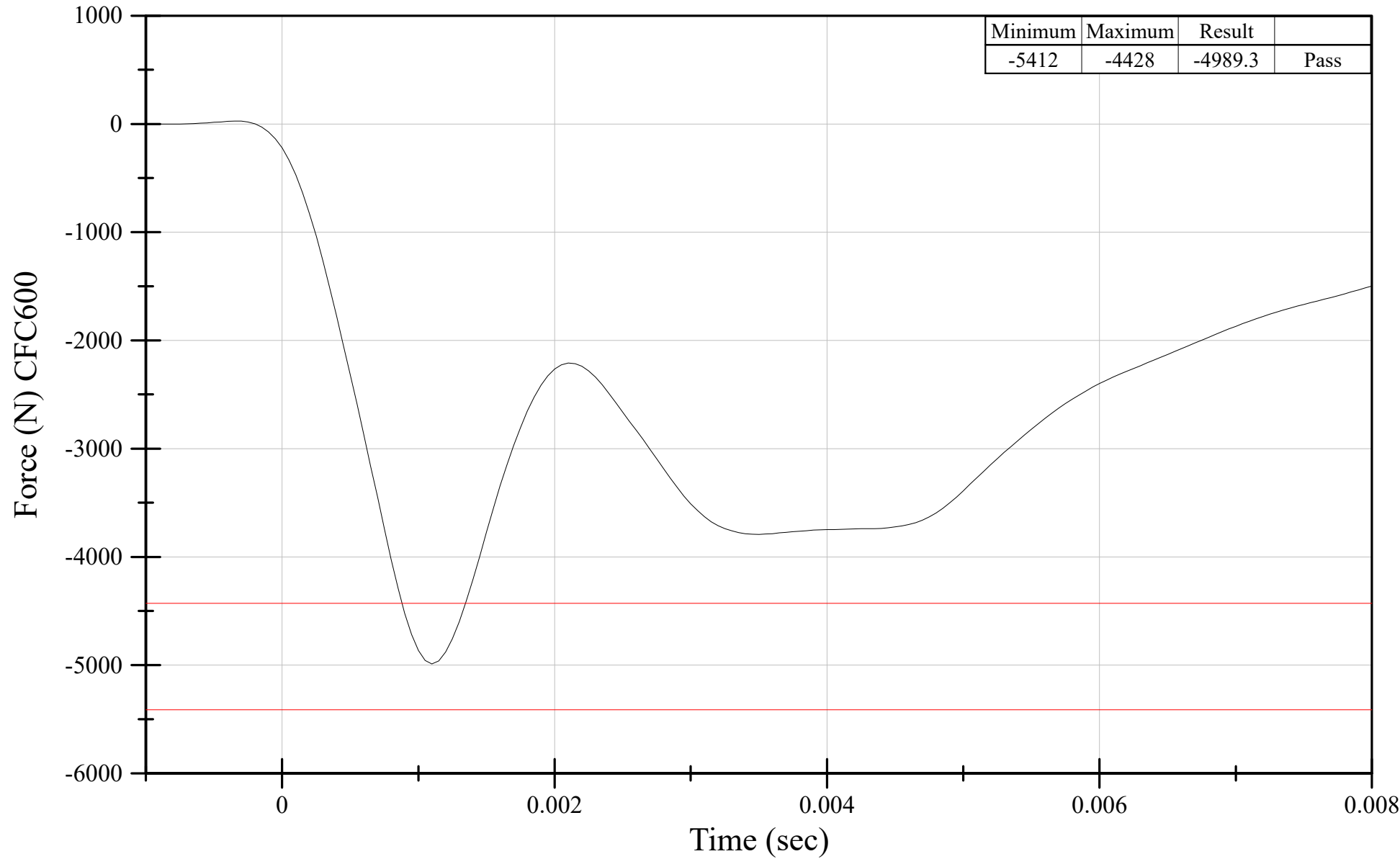
THOR-50M Left Upper Leg Qualification

Probe Force

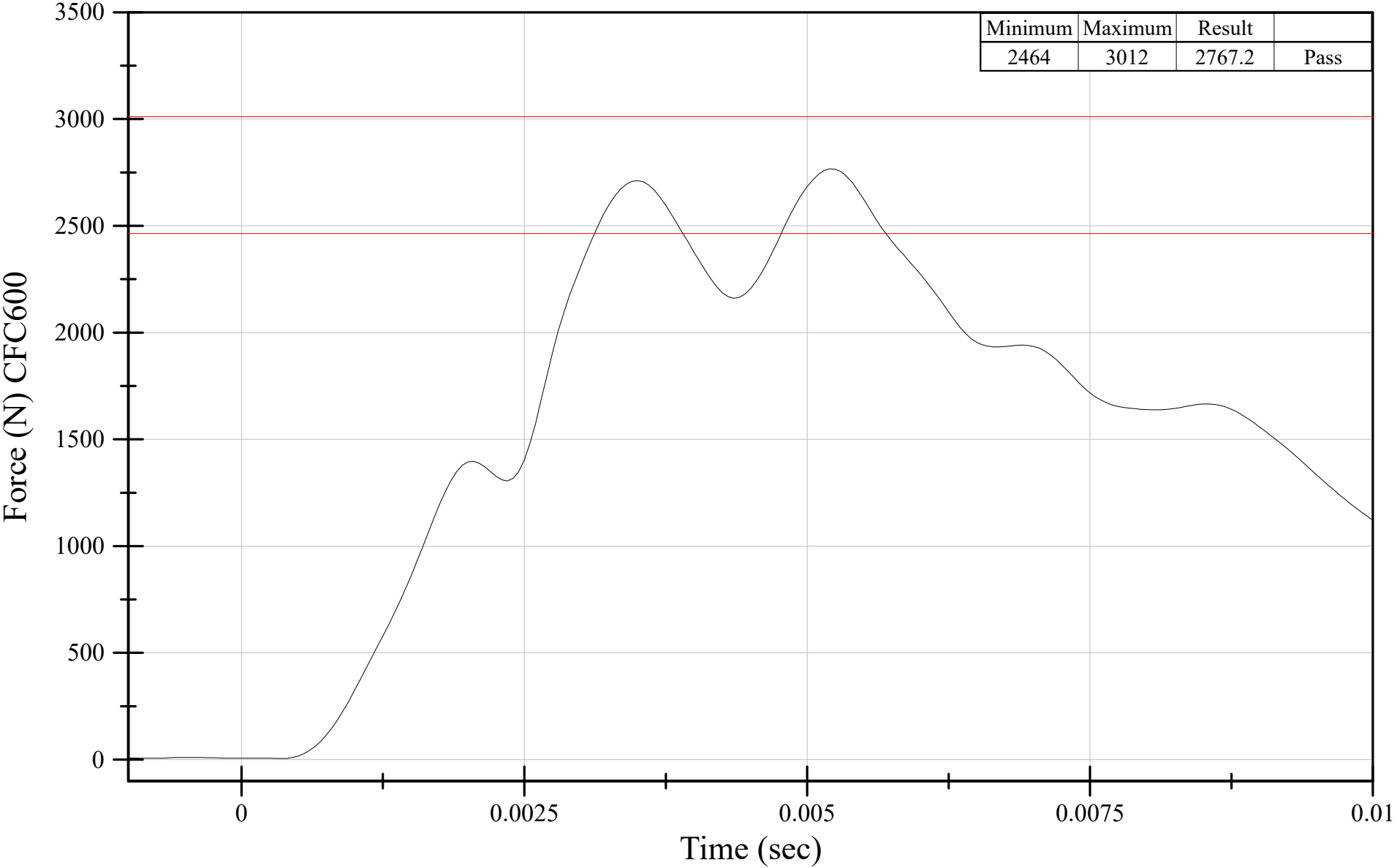
Serial Number: DO9799



THOR-50M Left Upper Leg Qualification
Femur Z-Force
Serial Number: DO9799



THOR-50M Left Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification

Test Results Summary

Dummy Serial Number: DO9799

Tested Components

Compression Element:
Right Thigh Flesh: EE8430

Test ID: 241203-6

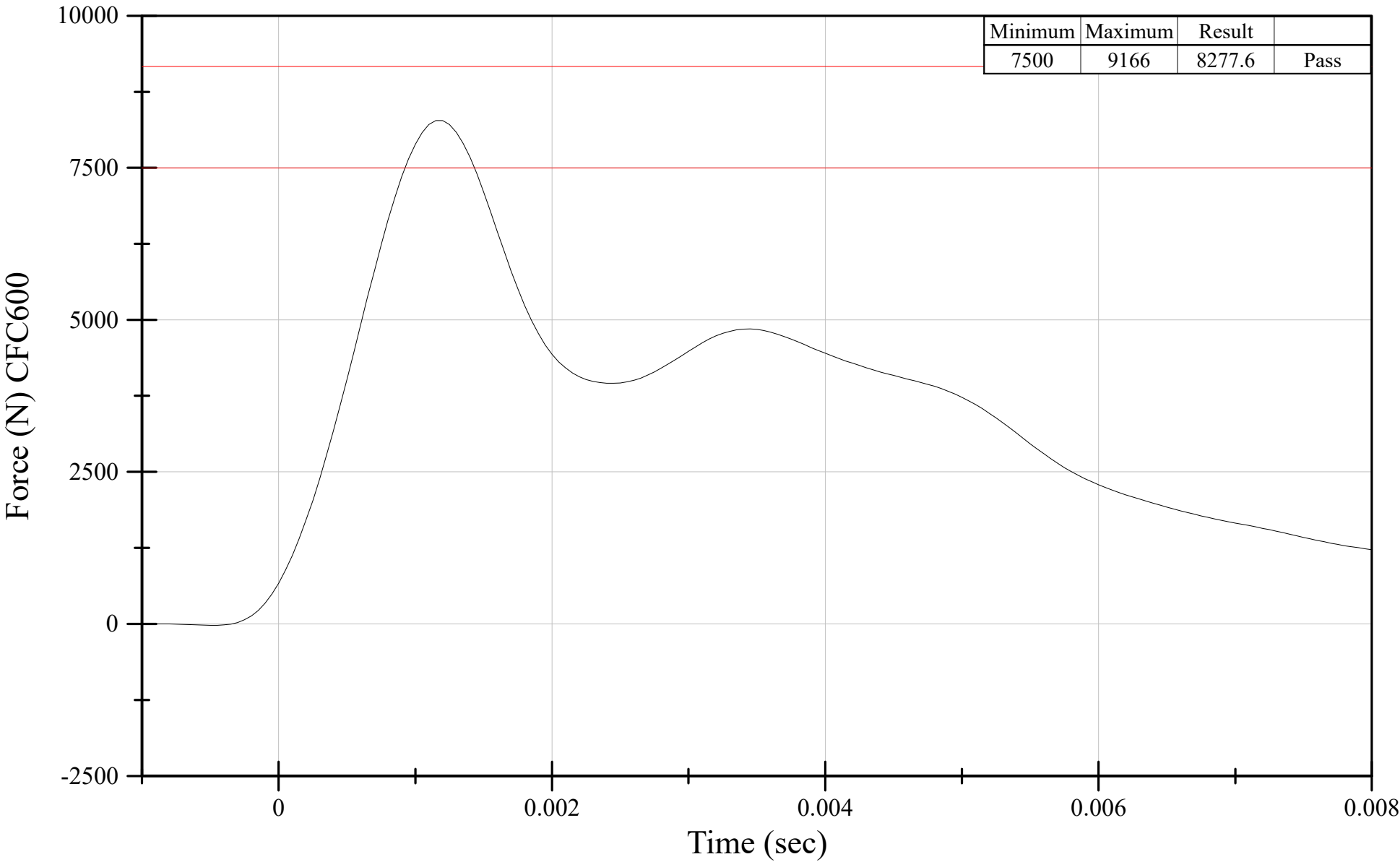
Test Date: 12/3/2024

Test Time: 2:01 PM

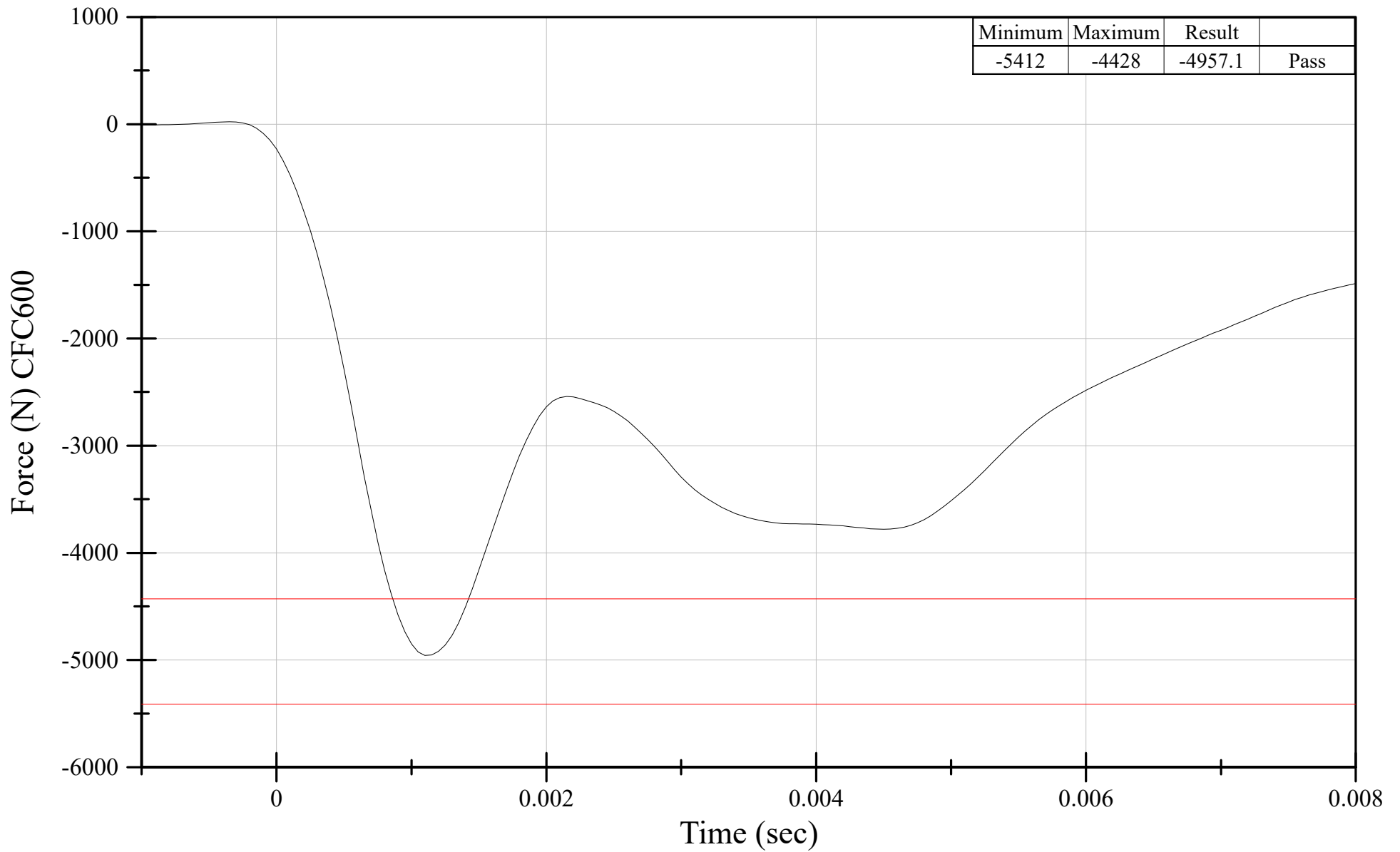
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.2	Pass
Test Humidity (%)	10 - 70	50	Pass
Test Velocity (m/s)	3.25 - 3.35	3.292	Pass
Peak Probe Force (N)	7500 - 9166	8277.6	Pass
Peak Femur Force (N)	-5412 - (-4428)	-4957.1	Pass
Peak Resultant Acetabulum Force (N)	2464 - 3012	2941.4	Pass

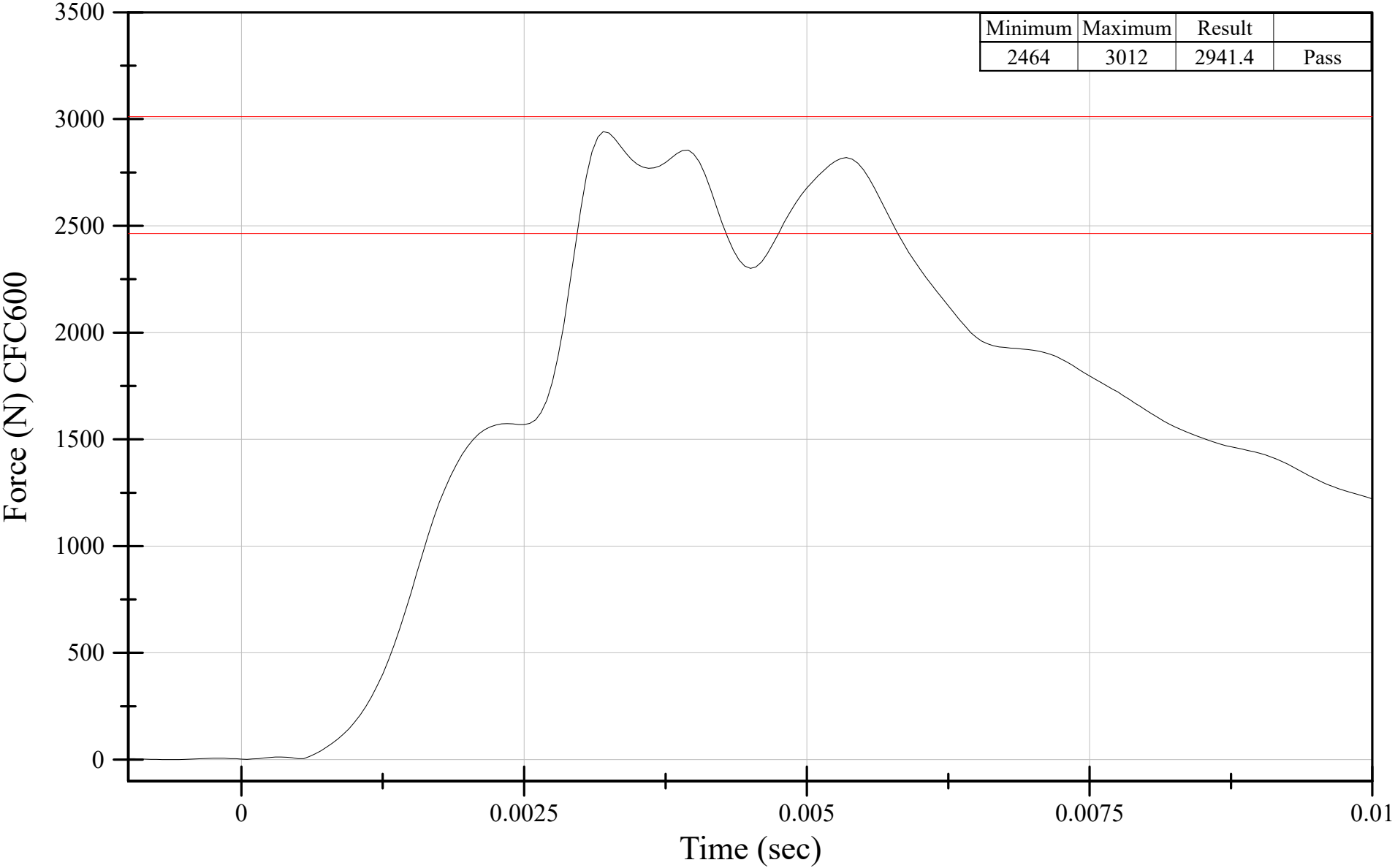
THOR-50M Right Upper Leg Qualification
Probe Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification
Femur Z-Force
Serial Number: DO9799



THOR-50M Right Upper Leg Qualification
Peak Acetabulum Resultant Force
Serial Number: DO9799



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrumentation			Axis/Location	THOR-50M S/N EG2595		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers			X	A20123-AC1	DTS	27-Feb-2024
			Y	A20123-AC2	DTS	27-Feb-2024
			Z	A20123-AC3	DTS	27-Feb-2024
Head Angular Rate Sensors			X	A20123-AV1	DTS	27-Feb-2024
			Y	A20123-AV2	DTS	27-Feb-2024
			Z	A20123-AV3	DTS	27-Feb-2024
Neck Load Cells		Upper	FX, FY, FZ, MX, MY, MZ	DS9758	HUMANETICS	29-Jul-2024
Thorax IR-TRACCs	Left	Upper	N/A	DI4718	HUMANETICS	7-Aug-2024
	Right		N/A	DJ2613	HUMANETICS	12-Aug-2024
	Left	Lower	N/A	DS6353	HUMANETICS	14-Aug-2024
	Right		N/A	DS6354	HUMANETICS	12-Aug-2024
Thorax Rotary Potentiometers	Left	Upper	Y	DI2383	SFERNICE	7-Aug-2024
			Z	DI2382	SFERNICE	7-Aug-2024
	Right	Upper	Y	DI7752	SFERNICE	7-Aug-2024
			Z	DI7753	SFERNICE	7-Aug-2024
	Left	Lower	Y	68	SFERNICE	13-Aug-2024
			Z	DS4092	SFERNICE	7-Aug-2024
	Right	Lower	Y	DM4776	SFERNICE	7-Aug-2024
			Z	DM4777	SFERNICE	7-Aug-2024
T6 Accelerometers			X	A20124-AC1	DTS	27-Feb-2024
			Y	A20124-AC3	DTS	27-Feb-2024
			Z	A20124-AC2	DTS	27-Feb-2024
T6 Angular Rate Sensors			X	A20124-AV1	DTS	27-Feb-2024
			Y	A20124-AV3	DTS	27-Feb-2024
			Z	A20124-AV2	DTS	27-Feb-2024
Thoracic Spine Load Cells			FX, FY, FZ, MX, MY, MZ	ED3057T	HUMANETICS	29-Jul-2024
Abdominal IR-TRACCs		Left	N/A	EA3851	HUMANETICS	8-Aug-2024
		Right	N/A	EC4123	HUMANETICS	4-Sep-2024
Abdominal Rotary Potentiometers		Left	Y	DJ5443	SFERNICE	7-Aug-2024
			Z	DJ5444	SFERNICE	7-Aug-2024
		Right	Y	DJ5445	SFERNICE	7-Aug-2024
			Z	DJ5446	SFERNICE	7-Aug-2024

TABLE 1 – DRIVER DUMMY INSTRUMENTATION (CONT'D)

Instrumentation		Axis/Location	THOR-50M S/N EG2595			
			Serial Number	Manufacturer	Calibration Date	
A.S.I.S. Load Cells	Left	FX, MY	DP5091	Humanetics	30-Jul-2024	
	Right	FX, MY	DP5092	Humanetics	30-Jul-2024	
Acetabulum Load Cells	Left	FX, FY, FZ	DP1100	Humanetics	30-Jul-2024	
	Right	FX, FY, FZ	DL9552	Humanetics	30-Jul-2024	
Pelvis Accelerometers		X	A20125-AC2	DTS	27-Feb-2024	
		Y	A20125-AC1	DTS	27-Feb-2024	
		Z	A20125-AC3	DTS	27-Feb-2024	
Pelvis Angular Rate Sensors		X	A20125-AV2	DTS	27-Feb-2024	
		Y	A20125-AV1	DTS	27-Feb-2024	
		Z	A20125-AV3	DTS	27-Feb-2024	
Femur Load Cells	Left	FX, FY, FZ, MX, MY, MZ	EF6258	Humanetics	29-Jul-2024	
	Right	FX, FY, FZ, MX, MY, MZ	EF6262	Humanetics	30-Jul-2024	
Knee Slider Potentiometers		Left	FX	18084185	Firstmark	8-Aug-2024
		Right	FX	18105187	Firstmark	8-Aug-2024
Tibia Load Cells	Left	Upper	FX, FY, FZ, MX, MY	I1070	MG Sensor	30-Jul-2024
		Lower	FX, FY, FZ, MX, MY	I1067	MG Sensor	30-Jul-2024
	Right	Upper	FX, FY, FZ, MX, MY	I1071	MG Sensor	30-Jul-2024
		Lower	FX, FY, FZ, MX, MY	I1068	MG Sensor	30-Jul-2024
Ankle Rotary Potentiometers		Left	X	DZ7175	Sfernice	6-Aug-2024
			Y	DW5076	Sfernice	6-Aug-2024
			Z	DZ7176	Sfernice	6-Aug-2024
		Right	X	EA2105	Sfernice	6-Aug-2024
			Y	DS8362	Sfernice	6-Aug-2024
			Z	DW3676	Sfernice	6-Aug-2024
Seat Belt Load Cells		Lap	N/A	N100ED	Measurement Spec.	25-Jan-2024
		Shoulder	N/A	X08013	Measurement Spec.	24-Jan-2024
Driver Belt Pay Out		X	PH09	IES	23-Oct-2015	

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

Instrumentation			Axis/Location	THOR-50M S/N DO9799		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers			X	T31854	Endevco	22-Jul-2024
			Y	T34807	Endevco	23-Jul-2024
			Z	T12030	Endevco	23-Jul-2024
Head Angular Rate Sensors			X	ARS20907	DTS	22-Feb-2024
			Y	ARS20949	DTS	22-Feb-2024
			Z	ARS21136	DTS	22-Feb-2024
Neck Load Cells		Upper	FX, FY, FZ, MX, MY, MZ	DP3956	Humanetics	6-Feb-2024
		Lower	FX, FY, FZ, MX, MY, MZ	EM4656	Humanetics	26-Feb-2024
T1 Accelerometers			X	T34238	Endevco	23-Jul-2024
			Y	T34810	Endevco	23-Jul-2024
			Z	T34176	Endevco	23-Jul-2024
T1 Angular Rate Sensors			X	ARS11816	DTS	3-May-2024
			Y	ARS6635	DTS	6-May-2024
			Z	ARS21116	DTS	3-May-2024
Thorax S Track	Left	Upper	N/A	38	Labtech	29-Jul-2024
	Right		N/A	39	Labtech	29-Jul-2024
	Left	Lower	N/A	40	Labtech	5-Aug-2024
	Right		N/A	41	Labtech	5-Aug-2024
Thorax Rotary Potentiometers	Left	Upper	Y	57	Sfernice	24-Jul-2024
			Z	58	Sfernice	24-Jul-2024
	Right	Upper	Y	59	Sfernice	24-Jul-2024
			Z	60	Sfernice	24-Jul-2024
	Left	Lower	Y	61	Sfernice	24-Jul-2024
			Z	62	Sfernice	25-Jul-2024
	Right	Lower	Y	63	Sfernice	25-Jul-2024
			Z	64	Sfernice	25-Jul-2024
Sternum Accelerometer			X	P52062	Endevco	23-Jul-2024
T6 Accelerometers			X	T34220	Endevco	23-Jul-2024
			Y	T34387	Endevco	23-Jul-2024
			Z	P58889	Endevco	23-May-2024
T6 Angular Rate Sensors			X	ARS14256	DTS	3-May-2024
			Y	ARS14199	DTS	6-May-2024
			Z	ARS14964	DTS	3-May-2024
Thoracic Spine Load Cells			FX, FY, FZ, MX, MY, MZ	ER7738	Humanetics	24-Jul-2024

TABLE 1 – FRONT PASSENGER DUMMY INSTRUMENTATION (CONT'D)

Instrumentation		Axis/Location	THOR-50M S/N DO9799			
			Serial Number	Manufacturer	Calibration Date	
T12 Accelerometers		X	T29394	Endevco	23-Jul-2024	
		Y	T34179	Endevco	23-Jul-2024	
		Z	T31730	Endevco	22-Jul-2024	
T12 Angular Rate Sensors		X	ARS14236	DTS	3-May-2024	
		Y	ARS21139	DTS	3-May-2024	
		Z	ARS20707	DTS	3-May-2024	
Abdominal S Track	Left	N/A	37	Labtech	25-Jul-2024	
	Right	N/A	36	Labtech	25-Jul-2024	
Abdominal Rotary Potentiometers	Left	Y	EA2114	Sfernice	25-Jul-2024	
		Z	EA2115	Sfernice	25-Jul-2024	
	Right	Y	DS3069	Sfernice	25-Jul-2024	
		Z	DS4126	Sfernice	25-Jul-2024	
A.S.I.S. Load Cells	Left	FX, MY	EK3361	Humanetics	25-Jul-2024	
	Right	FX, MY	EK0307	Humanetics	25-Jul-2024	
Acetabulum Load Cells	Left	FX, FY, FZ	EK1681	Humanetics	24-Jul-2024	
	Right	FX, FY, FZ	DP4631	Humanetics	27-Jul-2024	
Pelvis Accelerometers		X	T31130	Endevco	22-Jul-2024	
		Y	P51670	Endevco	23-Jul-2024	
		Z	T31707	Endevco	22-Jul-2024	
Pelvis Angular Rate Sensors		X	ARS4714	DTS	6-May-2024	
		Y	ARS13605	DTS	3-May-2024	
		Z	ARS13107	DTS	3-May-2024	
Femur Load Cells		Left	FX, FY, FZ, MX, MY, MZ	EF6261	Denton	5-Oct-2022
		Right	FX, FY, FZ, MX, MY, MZ	DP4630	Denton	26-Sep-2022
Knee Slider Potentiometers		Left	FX	38967	Firstmark	10-Sep-2024
		Right	FX	7090459	Firstmark	20-Oct-2022
Tibia Load Cells	Left	Upper	FX, FY, FZ, MX, MY	DT1795	Humanetics	10-Sep-2024
		Lower	FX, FY, FZ, MX, MY	80	Denton	10-Sep-2024
	Right	Upper	FX, FY, FZ, MX, MY	DQ5734	Humanetics	15-Feb-2023
		Lower	FX, FY, FZ, MX, MY	DQ9685	Denton	15-Feb-2023
Tibia Accelerometers		Left	X	P64094	Endevco	23-Jul-2024
			Y	T31852	Endevco	22-Jul-2024
		Right	X	T29436	Endevco	8-Feb-2023
			Y	T29264	Endevco	8-Feb-2023

TABLE 1 – FRONT PASSENGER DUMMY INSTRUMENTATION (CONT'D)

Instrumentation		Axis/Location	THOR-50M S/N DO9799		
			Serial Number	Manufacturer	Calibration Date
Ankle Rotary Potentiometers	Left	X	DQ3798	Sfernice	9-Sep-2024
		Y	DQ3799	Sfernice	9-Sep-2024
		Z	DQ3807	Sfernice	9-Sep-2024
	Right	X	EJ3860	Sfernice	15-Feb-2023
		Y	EJ3760	Sfernice	15-Feb-2023
		Z	DM4774	Sfernice	14-Feb-2023
Foot Accelerometers	Left	X	T34960	Endevco	23-Jul-2024
		Y	T34239	Endevco	23-Jul-2024
		Z	T31281	Endevco	22-Jul-2024
	Right	X	T29426	Endevco	8-Feb-2023
		Y	T29393	Endevco	8-Feb-2023
		Z	T29427	Endevco	8-Feb-2023
Seat Belt Load Cells	Lap	N/A	T1210C	Measurement Spec.	1-Feb-2024
	Shoulder	N/A	R141CA	Measurement Spec.	1-Feb-2024
Passenger Belt Pay Out		X	PH10	IES	26-Oct-2015

TABLE 3 – VEHICLE INSTRUMENTATION

Instrumentation		Axis	Serial Number	Manufacturer	Calibration Date
Seat Crossmember Accelerometers	Left Rear	X	A385749	Measurement Spec.	23-May-2024
		Z	A386417	Measurement Spec.	23-May-2024
	Right Rear	X	A385708	Measurement Spec.	18-Jun-2024
		Z	A377515	Measurement Spec.	18-Jun-2024
Engine Accelerometers	Top	X	A400072	Measurement Spec.	18-Jun-2024
	Bottom	X	A349801	Measurement Spec.	10-Jun-2024
Sill Accelerometers	Left	X	A377503	Measurement Spec.	18-Jun-2024
		Y	A385699	Measurement Spec.	18-Jun-2024
	Right	X	A386356	Measurement Spec.	18-Jun-2024
		Y	A400111	Measurement Spec.	10-Jun-2024

TABLE 3 – VEHICLE INSTRUMENTATION (CONT'D)

Instrumentation		Axis	Serial Number	Manufacturer	Calibration Date
Seat Crossmember Redundant Accelerometers	Left Rear	X	A377498	Measurement Spec.	18-Jun-2024
		Z	A349879	Measurement Spec.	6-Jun-2024
	Right Rear	X	A377499	Measurement Spec.	18-Jun-2024
		Z	A386292	Measurement Spec.	23-May-2024
Linear Acceleration Accelerometers		X	A385705	Measurement Spec.	18-Jun-2024
		Y	A378307	Measurement Spec.	23-May-2024
		Z	A377514	Measurement Spec.	18-Jun-2024
Linear Angular Rate Sensors		X	ARS9194	DTS	2-Apr-2024
		Y	ARS6461	DTS	2-Apr-2024
		Z	ARS12511	DTS	2-Apr-2024
Toe Pan Accelerometers	Driver	X	A400091	Measurement Spec.	23-May-2024
		Y	A385755	Measurement Spec.	23-May-2024
		Z	A385698	Measurement Spec.	18-Jun-2024
	Passenger	X	A386339	Measurement Spec.	23-May-2024
		Y	A386353	Measurement Spec.	18-Jun-2024
		Z	A385702	Measurement Spec.	5-Jun-2024

APPENDIX E
SEATING PROCEDURE

Appendix E

THOR 50TH PERCENTILE MALE DUMMY SEATING & POSITIONING PROCEDURES: DRIVER POSITION

Seating and Positioning Procedures for the THOR 50th Percentile Male Dummy (THOR-50M) – Driver Position

1 Determine the seat type

Visually inspect the seats to determine type (i.e., bucket or bench).

___Bench

___Bucket

2 Position lumbar supports

Position the seat's adjustable lumbar supports to the lowest, retracted, or deflated adjustment positions.

___N/A No lumbar adjustment

3 Position additional supports

Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position.

___N/A No additional support adjustment

4 Position leg supports

Position an adjustable leg support system in its rearmost position.

___N/A No adjustable leg support system

5 Mark the centerline of the seat using a vehicle longitudinal, vertical (XZ) plane (complete ONLY the one that is applicable to seat being marked)

5.1 Bucket Seat: For future reference, locate and mark the line on the seat cushion that is the intersection of the XZ plane which passes through the centerline of the seat and the seat cushion upper surface.

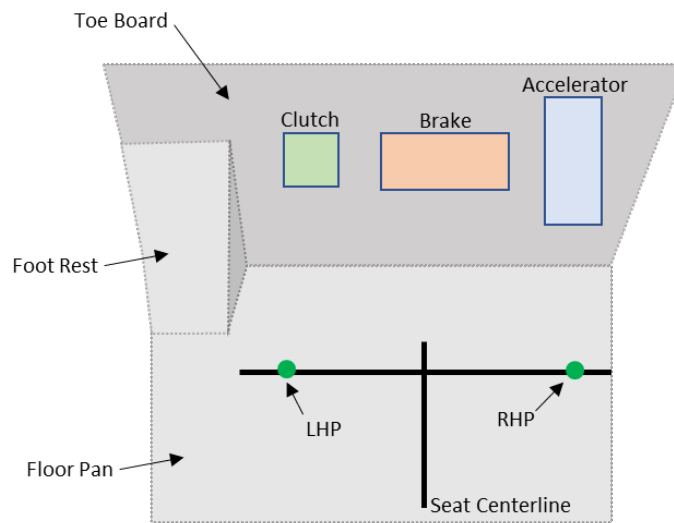
5.2 Bench Seat: For future reference, locate and mark the line on the seat cushion that is the intersection of the XZ plane which passes through the centerline of the steering wheel and the seat cushion upper surface.

6 Determine the type of accelerator pedal in the vehicle in order to mark the Right Heel Point (RHP). It is suggested to do the measurements using a Coordinate-Measuring Machine (CMM).

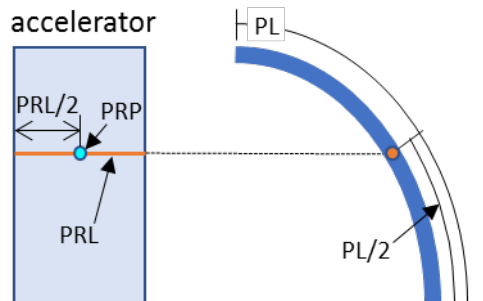
6.1 Is it a suspended accelerator pedal? If so, use the procedures detailed in step 7, and then go to step 9.

6.2 Is it a floor-mounted accelerator pedal? If so, skip step 7 and use the procedures detailed in step 8, and then go to step 9.

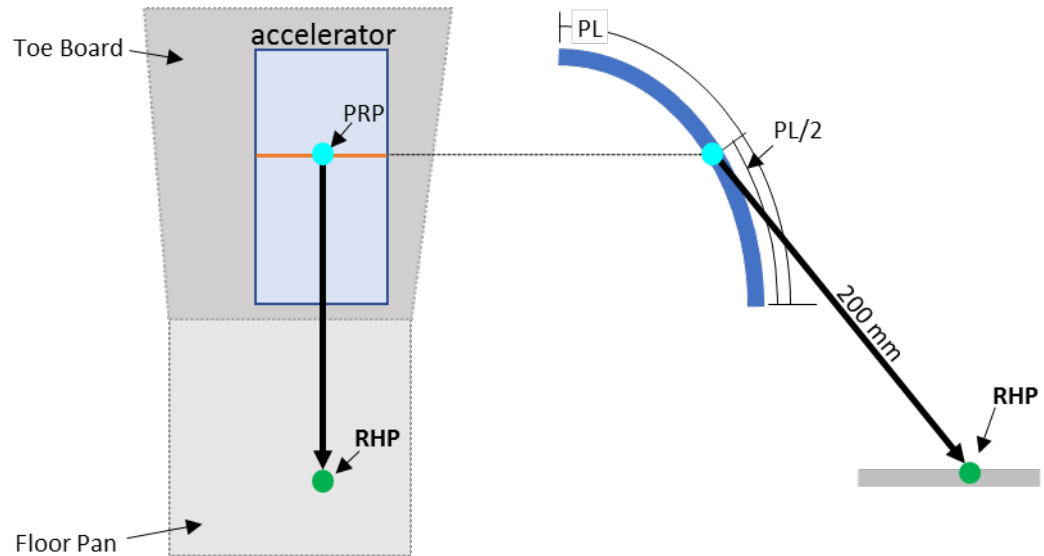
- 7 **Locate and mark the Heel Points (RHP and LHP) on the floor pan with a suspended accelerator pedal.** (For a floor-mounted pedal, proceed to step 8.)



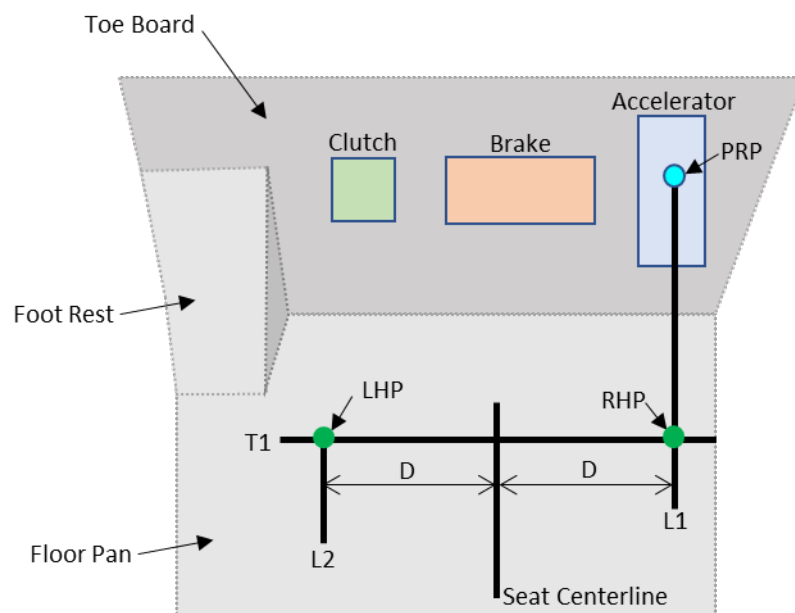
- 7.1 Place adjustable pedals in the full forward position (towards the front of the vehicle).
___N/A the pedals are not adjustable.
- 7.2 Using the diagram and steps below, locate the Pedal Reference Point (PRP) on the accelerator pedal (using a measurement device such as a flexible tape measure, CMM, and/or calipers).



- 7.2.1 Measure the accelerator pedal length (PL) along the surface of the pedal from the top edge to the bottom edge. Establish the pedal reference line (PRL) by marking a line in the y-direction on the pedal surface at the midpoint of the PL.
- 7.2.2 Measure the accelerator pedal width along the PRL. Establish the pedal reference point (PRP) by marking the midpoint of the PRL.
- 7.3 Using a measurement device (CMM, 200 mm bar, calipers), locate a point on the floor pan that is 200 mm from PRP and is in the vehicle's longitudinal, vertical (XZ) plane which passes through PRP. This is the right heel point (RHP).



- 7.4 Mark a line on the pedal and the floor pan that passes through PRP and RHP. This line shall be referred to as L1 and should be in the same vehicle XZ plane as PRP and RHP.
- 7.5 Translate and mark the seat centerline on the floor pan. The lines on the seat and floor pan should be in the same vehicle XZ plane.
- 7.6 Measure the distance in the y-direction (D) from the seat centerline to L1. Record the value:_____.



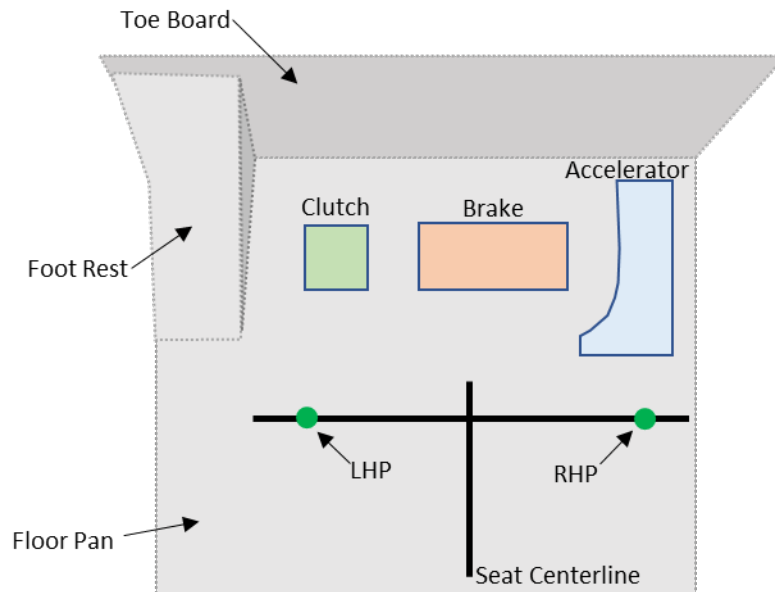
- 7.6.1 Measure and mark a point on the floor pan to the left of the seat centerline that is the same distance from the seat centerline as RHP and in the same vehicle lateral, vertical (YZ) plane, and label that the left heel point (LHP).

7.6.2 Construct a line on the floor pan through RHP and LHP; call it T1.

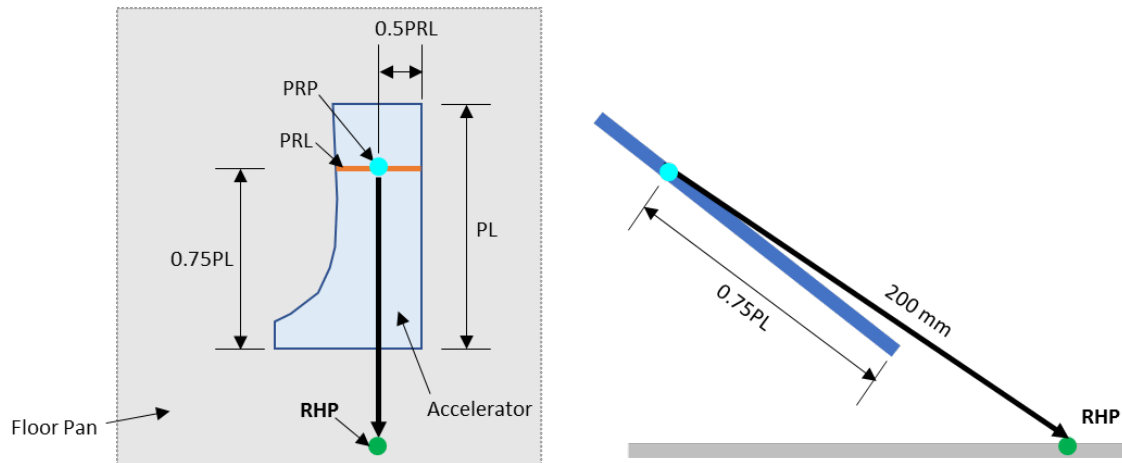
7.6.3 Construct a line on the floor pan that is in a vehicle XZ plane and that passes through LHP. This line shall be referred to as L2.

7.7 Mark two lines on the floor pan parallel to line T1; the first 10 mm forward and the second 10 mm rearward of T1. This zone between these two lines will be used for placement of both the left and right heels and will be referred to as the heel point zone.

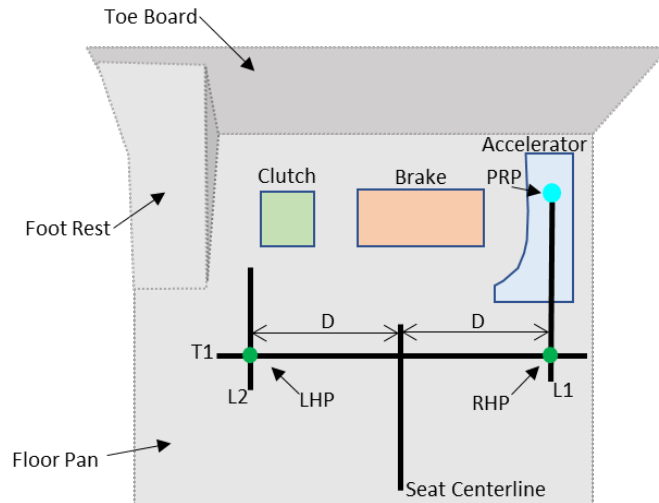
8 Locate and mark the Heel Points (RHP and LHP) on the floor pan with a floor-mounted accelerator pedal. (Use step 7 for a suspended pedal.)



8.1 Using the diagram below, locate the Pedal Reference Point (PRP) and the Right Heel Point (RHP) using a measurement device such as a tape measure, CMM, 200 mm bar, and/or calipers. Use the active part of the pedal, which is defined as the moveable part of the floor-mounted pedal.



- 8.1.1 Determine the overall pedal length (PL) on the active pedal, as measured along the surface of the moveable pedal. Record the length:_____. Calculate 75% of this length (0.75PL). Establish the pedal reference line (PRL) by marking a line in the y-direction on the pedal surface at 0.75PL from the bottom edge of the pedal.
- 8.1.2 Measure the length of the PRL in the y-direction and mark the center point of the PRL. This is the PRP.
- 8.1.3 Using a measurement device (CMM, 200mm bar, calipers), locate a point on the floor pan that is 200 mm from PRP and in the vehicle's longitudinal, vertical (XZ) plane which passes through PRP. This is the right heel point (RHP).
- 8.2 Mark a line on the pedal and the floor pan that passes through PRP and RHP. This line shall be referred to as L1 and should be in the same vehicle XZ plane as PRP and RHP.
- 8.3 Translate and mark the seat centerline on the floor pan. The lines on the seat and floor pan should be in the same vehicle XZ plane.
- 8.4 Measure the distance in the y-direction (D) from the seat centerline to L1. Record the value:_____.



8.4.1 Measure and mark a point on the floor pan to the left of the seat centerline that is the same distance from the seat centerline as RHP and in the same vehicle lateral, vertical (YZ) plane, and label that the left heel point (LHP).

8.4.2 Construct a line on the floor pan through RHP and LHP; call it T1.

8.4.3 Construct a line on the floor pan that is in a vehicle XZ plane and that passes through LHP. This line shall be referred to as L2.

8.6 Mark two lines on the floor pan parallel to line T1; the first 10 mm forward and the second 10 mm rearward of T1. This zone between these two lines will be used for placement of both the left and right heels and will be referred to as the heel point zone.

9 Mark the range of seat travel

Prior to marking the seat for fore/aft travel, move the seat through its full range of motion using all available controls. Separately, operate each control to determine whether it moves the seat and/or seat cushion primarily in the fore-aft or up-down directions.

9.1 Mark a point (seat cushion reference point - SCRP) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion. For seat cushions that move up and down independently from the seat housing, mark the point on the side of the cushion in an area that will not be obscured by the seat housing when the seat cushion is at its lowest height position.

9.2 Draw a horizontal line (seat cushion reference line - SCRL) through the SCRP.

- 9.3 Using only the controls that primarily move the seat in the fore-aft direction, move the SCRP to the lowest rearmost position.
- 9.4 If the seat cushion adjusts fore-aft, independent of the seat back, using only the controls that primarily move the seat cushion in the fore-aft direction, move the SCRP to the rearmost position.

___ N/A No independent fore-aft seat cushion adjustment

- 9.5 Using any part of any control, other than the parts just used for fore-aft positioning, determine the range of angles of the SCRL and set the SCRL at mid-angle. Record the maximum, minimum, and mid-angles in the table below.

SCRL (deg)	Max	Min	Mid
Driver			

- 9.6 If the seat and/or seat cushion height is adjustable, using any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, put the SCRP in its lowest position with the SCRL angle at the mid-angle found in 9.5.

___ N/A No seat height adjustment

- 9.7 Using only the controls that primarily move the seat in the fore-aft direction, verify the seat is in the rearmost position.
- 9.8 Using only the controls that primarily move the seat in the fore-aft direction, mark the fore-aft seat positions. Mark each position so that there is a visual indication when the seat is at a particular position.

For manual seats, move the seat forward one detent at a time and mark each detent.

For power seats, mark only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-track (if there is no mid-track, label the closest adjustment position to the rear of mid-track), and R for rearmost.

Measure the SCRP fore-aft location for each seat position on the table below.

	SCRL Mid-Angle (deg)							SCRP Height (mm) Spacing measurement between detents (if applicable)
		Rearmost		Mid-track		Foremost		
		X	Z	X	Z	X	Z	
Driver								

9.8.1 While at mid-track, also mark a position that is 25 mm rearward of mid-track.

10 Position the head restraint

- 10.1 Using any adjustment of the head restraint, position it to its highest setting.
- 10.2 Using any adjustment of the head restraint, position it to the full rearward setting. If it rotates, rotate it such that the head restraint extends as far rearward as possible.

___N/A The test vehicle is equipped with automatically adjusting head restraints or there is no head restraint adjustment.

11 Set the seat for a test dummy

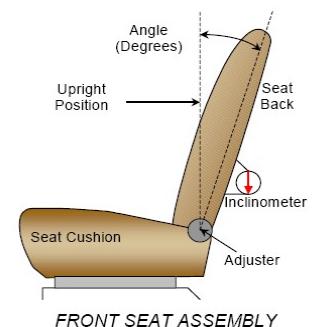
Using the reference marks on the seat, set the seat in the mid-track, lowest height, and mid seat cushion angle positions as follows:

- 11.1 If the seat or seat cushion height is adjustable, using other than the controls that primarily move the seat or seat cushion fore and aft, set the height of the SCRP to the minimum height, with the SCRL set as closely as possible to the mid-angle determined in previous steps.
- 11.2 Using the control that primarily moves the seat fore and aft, move the SCRP to the mid-track position.
- 11.3 Set the seat back angle at the manufacturer's nominal design riding position for a 50th percentile male adult occupant.

If the position is not specified, set the seat back in the position that produces a torso (back) angle of 25° from vertical when measured with the SAE J826 H-point machine. For seat backs with discrete positions, if a torso (back) angle of 25° from vertical cannot be achieved, set the seat back in the detent that yields a torso (back) angle as close as possible to 25° from vertical. Describe the method used to achieve the nominal design riding position and record the seat back angle.

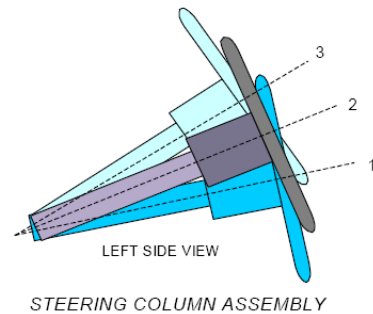
Seat Back Angle ___°

___N/A The seat back does not adjust.



12 Set the steering wheel to the mid-position

Use the markings to position the steering wheel hub at the geometric center of full range of driving positions including any telescoping positions. For steering columns with discrete positions and no detent at the mid-angle, position the column in the next lowest detent from the mid-angle.



Complete the following table:

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1		
Geometric Center – Position 2		
Uppermost – Position 3		
Telescoping Steering Wheel Travel		
Test Position		

__N/A The steering wheel does not adjust.

13 Set adjustable seat belt upper anchorages

Use the markings to position an adjustable seat belt upper anchorage at the manufacturer's nominal design position for a 50th percentile male adult occupant or highest position if not provided. Fill in the following table:

Seat	Total # of Positions	Placed in Position #
Driver		

__N/A The seat belt upper anchorage does not adjust.

14 Retract the armrest

Retract any folding armrest

___N/A No armrest or armrest is fixed, not retractable.

15 Determine the H-point location with the H-Point machine;

Position the three-dimensional H-point manikin (i.e., H-point machine) specified in Society of Automotive Engineers (SAE) Surface Vehicle Standard J826, revised July 1995, Devices for Use in Defining and Measuring Vehicle Seating Accommodation in the seat as follows:

- 15.1 Place a 910 mm² piece of muslin cotton cloth over the seat area (the muslin cloth shall be comparable to 48 threads/in² and density of 2.85 lb/yd). Tuck the muslin cloth a sufficient amount to prevent hammocking of the material.
- 15.2 Place the seat and back assembly of the H-Point machine such that its plane of symmetry is coincident with the centerline marking on the seat.
- 15.3 Install the lower leg and foot segments.
- 15.4 Set the length of the lower leg segments at 414 mm (16.3 in) and the length of the thigh bar at 401 mm (15.8 in).
- 15.5 Leg and foot placement
 - 15.5.1 Insert the pin so that the right foot angle is not less than 87°.
 - 15.5.2 Place the right foot on the un-depressed accelerator pedal with the sole of the foot on the pedal and the heel as far forward as allowable. Do not place the heel on the toe board.
 - 15.5.3 Adjust the left leg to be the same distance from H-point machine centerline as the right leg.
 - 15.5.4 With the T-bar level, place the left foot on the toe board with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.
 - ___Foot on toe board
 - ___Foot on floor pan
- 15.6 Apply the lower leg weights.
- 15.7 Apply the thigh weights.
- 15.8 Tilt the back pan forward against the forward stop and draw the H-point machine

away from the seatback using the T-bar.

15.9 Re-positioning the H-point machine.

15.9.1 Allow the H-point machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required due to the seat pan contacting the seat back.

___The seat pan does not slide rearward. Go to step 15.9.2.

15.9.2 Slide the H-point machine rearward by a horizontal rearward load applied at the T-bar until the seat pan contacts the seat back.

15.10 Apply a 10 kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.

15.11 Again apply a 10 kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.

15.12 Carefully return the back pan to the seat back.

15.13 Install the right and left buttock weights.

15.14 Install the eight torso weights, alternating the installation between right and left.

15.15 Tilt the back pan forward until the stop is contacted.

15.16 Rock the H-point machine from side to side over a 10° arc (5° to each side of the vertical centerline) for three complete cycles. Restrain the T-bar during rocking so that the seat pan does not change position. Minimize any inadvertent exterior loads applied in a vertical or fore-aft direction. The feet are free to move during this rocking motion.

15.17 Without applying a forward or lateral load, lift the right foot off the floor the minimum amount necessary until no additional forward foot movement is obtained.

15.18 Lower the right foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor, toe board, or undepressed accelerator pedal.

15.19 Without applying a forward or lateral load, lift the left foot off the floor the minimum amount necessary until no additional forward foot movement is obtained.

15.20 Lower the left foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor or toe board.

15.21 Is the seat pan level?

___Yes. Go to step 15.23.

___No. Go to step 15.22.

- 15.22 Apply a sufficient lateral load to the top of the seatback pan to level the H-point machine seat pan on the seat.
- 15.23 Holding the T-bar to prevent the H-point machine from sliding forward on the seat cushion, return the seatback pan to the seatback.
- 15.24 Holding the T-bar to prevent the H-point machine from sliding forward on the seat cushion, apply a rearward force perpendicular to the back angle bar just above the torso weights until either 66 N (15 lb) of force is reached or the hip angle is increased by 3°, whichever occurs first. Minimize the exterior downward or side forces applied to the H-point machine. Release the force. Repeat this step until the resulting hip angle is identical. Complete as many force applications as necessary and record the results in the following table:

Force App.	Hip Angle
1	
2	
3	
4	
5	

- 15.25 Is the H-point machine level?
___Yes. Go to step 15.26.
___No. Go back to step 15.15 and repeat steps to re-level H-point machine.

- 15.26 Record the H-point location in the table below:

H-point Machine H-point Location and Torso Angle	
Torso Angle	°
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

Reference: X-axis is positive forward of striker
Y-axis is positive right of striker
Z-axis is positive below striker



- 15.27 Create a Seat Tracking Point (STP): Place a target point 20 mm forward of the H-point machine H-point on a rigid part of the seat and record its location in the table below. This reference point will be used to locate the dummy H-point relative to the seat if the seat cannot be set to the mid-track position.

Seat Tracking Point (STP) Location at Mid-track	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

- 15.28 Remove the H-point machine.

16 Calculate the THOR-50M H-point target at seat mid-track

- 16.1 The THOR-50M H-point is offset 20 mm forward and 20 mm above the H-point machine H-point as determined in the table below:

THOR-50M Target H-point at Mid-track		
H-point machine H-point (from step 15.26) +/- 20 mm = THOR-50M H-point at mid-track		
X (positive (+) forward of striker)	() + 20 mm	mm
Z (positive (+) below striker)	() - 20 mm	mm

If steps 1-16 were completed prior to seating, verify that measurements have been recorded prior to placing dummy in seat.

17 Once the H-point has been determined and the following things are verified, position a THOR-50M in the driver seat of the test vehicle.

- 17.1 Follow the procedures in the THOR-50M Qualification Manual for setting the

joint torques. Also, make sure the neck is placed in the neutral position setting and the spine box is placed in the slouched position before placing the dummy in the vehicle.

- 17.2 Verify the head and pelvis tilt sensors installed in the dummy are reading correctly about the X and Y axes.
- 17.3 Record the lumbar spine pitch change joint and neck pitch change joint settings below:

Lumbar spine pitch change joint: _____

Neck pitch change joint: _____

- 17.4 Verify the seat back and base angles, the steering wheel location, and the seat belt height adjustment are in the correct locations.

18 Positioning the test dummy in the seat

- 18.1 Move the seat to the full rearward position and place the test dummy in the seat with the thighs resting on the seat cushion.
- 18.2 Position the test dummy in the seat such that its plane of symmetry (i.e., mid-sagittal plane) is coincident with the centerline marking on the seat cushion, seat back, and head restraint and its H-point is approximately above the STP.
- 18.3 Bend the upper torso forward and then lay it back against the seat back. Push the shoulders of the dummy fully rearward. Using the installed tilt sensors, position the dummy so that it sits squarely and level in both the X- and Y-axes in the seat.
- 18.4 To the extent practicable keep the left and right thighs and legs in vertical planes and align the centerline of the right foot with the centerline of the accelerator pedal. Initially set the feet perpendicular to the legs and then place the right foot as far forward as possible in the direction of the pedal centerline.

18.4.1 Does this vehicle have a footrest?

___Yes. Starting with the left foot and leg inboard of the footrest, rotate the leg about the hip the minimal amount needed to maximize coverage of the sole of the shoe over the footrest (when viewed longitudinally), while keeping the centerline of the foot in a vertical plane and the leg as vertical as practicable. Ignore the LHP.

___No. Adjust the left leg so the knees are an equal distance from the seat centerline, as measured from the centerline of the knee, while keeping the leg as vertical as practical. Align the foot with the LHP (± 10 mm).

- 18.5 Lift the feet and slide the seat forward to 25 mm rearward of mid-track or the detent closest to this position that is not greater than 25 mm rearward of mid-

track. Adjust the feet if necessary. If there is knee/leg contact with the steering wheel, steering column, or instrument panel, adjust the knee/leg making contact inboard or outboard the minimal amount required to create clearance (not more than 10 mm).

Is there still interference between the dummy's knees/legs and the knee bolster/instrument panel?

___No. Go to step 18.6.

___Yes. Lift the feet and slide the seat to 50 mm rearward of mid-track or the detent closest to this position that is not greater than 50 mm rearward of mid-track. If there is still interference (within 5 mm), continue to move the seat rearward in 25 mm increments until there is no longer interference.

- 18.6 Verify the SCRP position, then measure location of the STP and record it under Trial 1 in the table below (subsequent trials may be needed, depending on the outcome of step 18.13):

Seat Tracking Point Location Trial 1	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)
Seat Tracking Point Location Trial 2 (if applicable)	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)
Seat Tracking Point Location Trial 3 (if applicable)	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

18.6.1 Calculate and record the Seat Tracking Point Difference (STPD)

STPD = Location of STP from step 18.6 – location of STP from step 15.27

Record in table below:

Trial 1			
	Results from 18.6 - Results from 15.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

Trial 2 (if applicable)			
	Results from 18.6 - Results from 15.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

Trial 3 (if applicable)			
	Results from 18.6 - Results from 15.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

18.6.2 Calculate and record the THOR-50M target H-point for each seat position as the seat is moved forward (per step 18.5), following the corresponding steps.

X: THOR-50M Target H-point for 18.6.2 = (THOR-50M Target H-point from 16.1) + (STPD from 18.6.1)

Z: THOR-50M Target H-point for 18.6.2 = (THOR-50M Target H-point from 16.1) + (STPD from 18.6.1)

Trial 1			
	Results from 16.1 - Results from 18.6.1 = Current Target H-point		
X (positive (+) forward of striker)	()	+	() mm
Z (positive (+) below striker)	()	+	() mm

Trial 2 (if applicable)			
	Results from 16.1 - Results from 18.6.1 = Current Target H-point		
X (positive (+) forward of striker)	()		() mm
Z (positive (+) below striker)	()	+	() mm

Trial 3(if applicable)			
	Results from 16.1 - Results from 18.6.1 = Current Target H-point		
X (positive (+) forward of striker)	()	+	() mm
Z (positive (+) below striker)	()	+	() mm

- 18.7 Confirm, using the tilt sensors, that the dummy is positioned such that a horizontal, lateral line passing through the dummy's hip pivot center is perpendicular to the center XZ plane of the seat – adjust the dummy if necessary.
- 18.8 Verify/Measure the pelvis angles using the tilt angle sensors installed in the test dummy. Verify that the pelvis angles are $0^{\circ} \pm 1^{\circ}$ (about the X-axis) and $33^{\circ} \pm 2.5^{\circ}$ (about the Y-axis).
- 18.9 Confirm that the H-point is within ± 10 mm of the target location in the horizontal (X) and the vertical (Z) directions – adjust the dummy if necessary.

18.10 Are the pelvis angles within specification (described in step 18.8)?

___ Yes. Go to step 18.11.

___ No. Go back to step 18.7 and repeat steps to re-adjust pelvis angles while maintaining the H-point position within specification.

18.11 Verify/Measure the head angles using the tilt angle sensors installed in the test dummy. Verify that the head angles are $0^\circ \pm 1^\circ$ (about the X axis) and $0^\circ \pm 1^\circ$ (about the Y-axis).

18.11.1 Are the head angles within specification?

___ Yes. Go to step 18.12 (foot placement).

___ No and head is not touching head rest. Go back to step 18.7; adjust the pelvis while maintaining the H-point target position within specification.

___ No and head is not touching head rest, but the pelvis has already been re-adjusted. Go to step 18.11.2.

___ No and head is touching head rest. Go to step 18.11.2.

___ No and seat back has been adjusted already.

Record final head angles X: _____°

Y: _____°

18.11.2 Has seatback angle been adjusted?

___ No. Adjust seatback a maximum of 1 detent for manual seats and not more than 2° from the manufacturer's recommended angle found in step 11.3, to bring the head angles within/or as close as possible to specification. Return to step 18.7.

Record original seatback angle before adjustment: _____°

Record the new seatback angle: _____°

___ Yes. Make no further adjustment.

Record final head angles X: _____°

Y: _____°

Go to step 18.12.

18.12 Foot Placement

18.12.1 Right Foot Placement

Without inducing pelvis or torso movement, position the right foot in contact with the accelerator pedal such that the midline of the foot is in the same vertical plane as L1 (longitudinal line parallel with vehicle centerline

which passes through PRP) and the heel is resting on RHP or within the heel point zone (as determined in step 7).

To the extent practicable, keep the right thigh and the leg in a vertical plane. Rotate the toe towards the shin of the dummy to minimize the compression of the accelerator pedal while maintaining contact with the pedal.

The heel shall remain as close as practicable to RHP but always within the heel point zone ($RHP \pm 10$ mm fore-aft).

18.12.2 Left Foot Placement – Does the vehicle have a footrest?

☐ Yes. The LHP created in step 7 is not used. Place the foot on the footrest. Go to steps 18.12.3 and 18.12.4.

☐ No. Go to step 18.12.5.

18.12.3 Place the heel on the floor pan at the intersection of the foot rest and the floor pan. To the extent practicable, keep the left thigh and leg in a vertical plane, rotate the leg about the hip the minimal amount needed to maximize contact with the sole of the shoe and the footrest while keeping the midline of the foot in a vertical plane.

If the foot sole of the foot cannot rest on the footrest due to the footrest angle, rotate the ankle as far forward as possible, while maintaining the heel location at the intersection of the floor pan and the footrest.

18.12.4 When the foot is placed on the footrest, does the footrest elevate the left heel more than 20 mm above (vertical axis) the right heel?

☐ No. Go to step 18.13.

☐ Yes. Position the foot off the footrest using step 18.12.5.

18.12.5 If there is not a footrest or the foot cannot be placed due to Step 18.12.4;

To the extent practicable keep the left thigh and the leg in a vertical plane throughout the procedure. With the midline of the foot in the same vertical plane as L2, place the heel on LHP or as close as possible within the heel point zone. If the left heel cannot be placed within the heel point zone, place the heel as near to LHP as practicable while keeping the midline of the foot in the same vertical plane as L2. Rotate the foot towards the toe board (plantar flexion) to the maximum extent practicable while maintaining the heel position. Check which of the following that applies (ONLY check one):

☐ The left foot reaches the toe board without adjusting the foot or leg. Record final knee spacing below and go to step 18.13.

___The foot does not reach the toe board and does not contact the brake or clutch pedal with foot rotated forward as far as possible (plantar flexion). Record final knee spacing below and go to step 18.13.

___The left foot contacts the brake or clutch pedal.

___Rotate the foot about the leg (abduction) the minimal amount needed to avoid pedal contact. If the heel is not in the heel point zone, move the heel forward to the middle of the heel point zone and LHP to the extent practicable. Rotate the foot towards the toe board (plantar flexion) to the maximum extent practicable while maintaining the heel position. If the foot still contacts the brake or clutch pedal, continue to the next step; otherwise, record final knee spacing below and go to step 18.13.

___Rotate the leg outboard about the hip the minimum distance necessary to avoid pedal contact. If the heel is not in the heel point zone, move the heel forward to the middle of the heel point zone to the extent practicable. Rotate the foot towards the toe board (plantar flexion) to the maximum extent practicable while maintain the heel position. Record final knee spacing below and go to step 18.13.

Final Knee Spacing: _____mm

18.13 Verify that the head and pelvis angles and the H-point location are within the specifications (steps 18.8, 18.9, and 18.11). For a seat that is not in mid-track, if the dummy leg/knee to knee bolster/instrument panel clearance is greater than 5 mm, the seat should be moved forward. If there is leg/knee contact with the steering wheel, steering column, knee bolster, or instrument panel, adjust the leg/knee making contact inboard or outboard the minimal amount required to create clearance (not to exceed 10 mm).

___Seat is already at mid-track and dummy is within specified head/pelvis angles and H-point location. Go to step 18.14.

___Dummy leg/knee to knee bolster/instrument panel clearance is greater than 5 mm. Adjust the seat forward, without going forward of mid-track, until a clearance of 5 mm or less is achieved.

Record seat position: _____mm rearward of mid-track.

Return to step 18.6 and repeat the steps to go through the trials.

___Dummy leg/knee to knee bolster/instrument panel clearance is not greater than 5 mm. No adjustments required.

Record seat position: _____mm rearward of mid-track.

Go to step 18.14.

18.14 Arm and belt placement. Verify the shoulders of the dummy are rotated fully rearward.

18.14.1 Place the right upper arm adjacent to the torso with the centerline as close to a vertical plane as possible.

Is the seat belt used for this test?

___Yes. Go to step 18.14.2.

___No. Go to step 18.14.8.

18.14.2 Fasten the seat belt around the dummy.

18.14.3 Remove all slack from the lap belt portion.

18.14.4 Pull the upper torso webbing out of the retractor and allow it to retract; repeat this four times.

18.14.5 Apply a 2 to 4-pound tension load to the lap belt.
___pounds of load applied

18.14.6 Is the belt system equipped with a tension-relieving device?

___Yes. Go to step 18.14.7.

___No. Go to step 18.14.8

18.14.7 Introduce the maximum amount of slack into the upper torso belt that is recommended by the vehicle manufacturer in the vehicle owner's manual.

18.14.8 Place the left upper arm adjacent to the torso with the centerline as close to a vertical plane as possible.

18.14.9 Place the right hand with the palm in contact with the steering wheel at the rim's horizontal centerline and with the thumb over the steering wheel.

18.14.10 Place the left hand with the palm in contact with the steering wheel at the rim's horizontal centerline and with the thumb over the steering wheel.

18.14.11 Tape the thumb of each hand to the steering wheel using masking tape with a width of 6 mm. The length of the tape shall only be enough to go around the thumb and steering wheel one time.

Appendix B

THOR 50TH PERCENTILE MALE DUMMY SEATING & POSITIONING PROCEDURES: RIGHT FRONT PASSENGER POSITION

Seating and Positioning Procedures for the THOR 50th Percentile Male Dummy (THOR-50M) – Right Front Passenger Position

1 Determine the seat type

Visually inspect the seats to determine type (i.e., bucket or bench).

☐ Bench

☐ Bucket

2 Position lumbar supports

Position the seat's adjustable lumbar supports to the lowest, retracted, or deflated adjustment positions.

☐ N/A No lumbar adjustment

3 Position additional supports

Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position.

☐ N/A No additional support adjustment

4 Position leg supports

Position an adjustable leg support system in its rearmost position.

☐ N/A No adjustable leg support system

5 Position the head restraint

5.1 Using any adjustment of the head restraint, position it to its highest position.

5.2 Using any adjustment of the head restraint, position it to the full rearward position. If it rotates, rotate it such that the head restraint extends as far rearward as possible.

☐ N/A The test vehicle is equipped with automatically adjusting head restraints or there is no head restraint adjustment,

6 Mark the centerline of the seat using a vehicle longitudinal, vertical (XZ) plane (complete ONLY the one that is applicable to seat being marked)

6.1 Bucket Seat: For future reference, locate and mark the line on the seat cushion that is the intersection of the XZ plane which passes through the centerline of the seat and the seat cushion upper surface.

6.2 Bench Seat: For future reference, locate and mark the line on the seat cushion that is the intersection of the XZ plane which passes through the seat cushion upper surface and is the same lateral distance from the vehicle centerline as the steering wheel center.

7 Mark the range of seat travel

Prior to marking the seat for fore/aft travel, move the seat through its full range of motion using all available controls. Separately, operate each control to determine whether it moves the seat and/or seat cushion primarily in the fore-aft or up-down directions.

- 7.1 Mark a point (seat cushion reference point - SCRP) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion. For seat cushions that move up and down independently from the seat housing, mark the point on the side of the cushion in an area that will not be obscured by the seat housing when the seat cushion is at its lowest height position.
- 7.2 Draw a horizontal line (seat cushion reference line - SCRL) through the SCRP.
- 7.3 Using only the controls that primarily move the seat in the fore-aft direction, move the SCRP to the lowest rearmost position.
- 7.4 If the seat cushion adjusts fore-aft, independent of the seat back, using only the controls that primarily move the seat cushion in the fore-aft direction, move the SCRP to the rearmost position.

___ N/A No independent fore-aft seat cushion adjustment

- 7.5 Using any part of any control, other than the parts just used for fore-aft positioning, determine the range of angles of the SCRL and set the SCRL at mid-angle. Record the maximum, minimum, and mid-angles in the table below.

SCRL (deg)	Max	Min	Mid
Passenger			

- 7.6 If the seat and/or seat cushion height is adjustable, using any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, put the SCRP in its lowest position with the SCRL angle at the mid-angle found in 7.5.

___N/A No seat height adjustment

- 7.7 Using only the controls that primarily move the seat in the fore-aft direction, verify the seat is in the rearmost position
- 7.8 Using only the controls that primarily move the seat in the fore-aft direction, mark the fore-aft seat positions. Mark each position so that there is a visual indication when the seat is at a particular position.

For manual seats, move the seat forward one detent at a time and mark each detent.

For power seats, mark only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-track (if there is no mid-track, label the closest adjustment position to the rear of mid-track), and R for rearmost.

Measure and record the SCRP fore-aft location for each seat position on the table below.

	SCRL Mid-Angle (deg)							SCRP Height (mm) Spacing measurement between detents (if applicable)
		Rearmost		Mid-track		Full forward		
		X	Z	X	Z	X	Z	X
Passenger								

7.8.1 While at mid-track, also mark a position that is 25 mm rearward of mid-track.

8 Set the seat for a test dummy

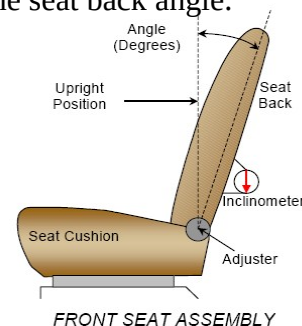
Using the reference marks on the seat, set the seat in the mid-track, lowest height, and mid seat cushion angle position as follows:

- 8.1 If the seat or seat cushion height is adjustable, using other than the controls that primarily move the seat or seat cushion fore and aft, set the height of the SCRP to the minimum height, with the SCRL set as closely as possible to the mid-angle determined in previous steps.
- 8.2 Using the control that primarily moves the seat fore and aft, move the SCRP to the mid-track position.
- 8.3 Set the seat back angle at the manufacturer's nominal design riding position for a 50th percentile male adult occupant.

If the position is not specified, set the seat back in the position that produces a torso (back) angle of 25° from vertical when measured with the SAE J826 H-point machine. For seat backs with discrete positions, if a torso (back) angle of 25° from vertical cannot be achieved, set the seat back in the detent that yields a torso (back) angle as close as possible to 25° from vertical. Describe the method used to achieve the nominal design riding position and record the seat back angle.

Seat Back Angle ____°

__N/A The seat back does not adjust.



9 Set adjustable seat belt upper anchorages

Use the markings to position an adjustable seat belt upper anchorage at the manufacturer's nominal design position for a 50th percentile male adult occupant or highest position if not provided. Fill in the following table:

Seat	Total # of Positions	Placed in Position #
Front Passenger		

___N/A The seat belt upper anchorage does not adjust.

10 Retract the armrest

Retract any folding armrest

___N/A No armrest or armrest is fixed, not retractable.

11 Determine the H-point location with the H-Point machine

Position the three-dimensional H-point manikin (i.e., H-point machine) specified in Society of Automotive Engineers (SAE) Surface Vehicle Standard J826, revised July 1995, Devices for Use in Defining and Measuring Vehicle Seating Accommodation in the seat as follows:

11.1 Place a 910 mm² piece of muslin cotton cloth over the seat area (the muslin cloth shall be comparable to 48 threads/in² and density of 2.85 lb/yd). Tuck the muslin cloth a sufficient amount to prevent hammocking of the material.

11.2 Place the seat and back assembly of the H-Point machine such that its plane of symmetry is coincident with the centerline marking on the seat.

11.3 Install the lower leg and foot segments.

11.4 Set the length of the lower leg segment at 414 mm (16.3 in) and the length of the thigh bar at 401 mm (15.8 in).

11.5 Leg and foot placement

11.5.1 Tighten the pins so that the foot angle is not more than 130°.

11.5.2 With the T-bar level, place the left foot on the toe board with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.

___Foot on toe board

___Foot on floor pan

- 11.5.3 With the T-bar level, place the right foot on the toe board with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.
- ___Foot on toe board
 - ___Foot on floor pan
- 11.5.4 Space the lower legs 270 mm (10.6 in) apart, equally spaced about the centerline of the H-point machine.
- 11.6 Apply the lower leg weights.
- 11.7 Apply the thigh weights.
- 11.8 Tilt the back pan forward against the forward stop and draw the H-point machine away from the seatback using the T-bar.
- 11.9 Re-positioning the H-point machine.
- 11.9.1 Allow the H-point machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required due to the seat pan contacting the seat back.
- ___The seat pan does not slide rearward. Go to step 11.9.2.
- 11.9.2 Slide the H-point machine rearward by a horizontal rearward load applied at the T-bar until the seat pan contacts the seat back.
- 11.10 Apply a 10-kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.
- 11.11 Again apply a 10-kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.
- 11.12 Carefully return the back pan to the seat back.
- 11.13 Install the right and left buttock weights.
- 11.14 Install the eight torso weights, alternating the installation between right and left.
- 11.15 Tilt the back pan forward until the stop is contacted.
- 11.16 Rock the H-point machine from side to side over a 10° arc (5° to each side of the vertical centerline) for three complete cycles. Restrained the T-bar during rocking so that the seat pan does not change position. Minimize any inadvertent exterior loads applied in a vertical or fore-aft direction. The feet are free to move during this rocking motion.
- 11.17 Without applying a forward or lateral load, lift the right foot off the floor the

minimum amount necessary until no additional forward foot movement is obtained.

- 11.18 Lower the right foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor or toe board.
- 11.19 Without applying a forward or lateral load, lift the left foot off the floor the minimum amount necessary until no additional forward foot movement is obtained.
- 11.20 Lower the left foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor or toe board.
- 11.21 Is the seat pan level?
 ___Yes. Go to step 11.23.
 ___No. Go to step 11.22.
- 11.22 Apply a sufficient lateral load to the top of the seatback pan to level the H-point machine seat pan on the seat.
- 11.23 Holding the T-bar to prevent the H-point from sliding forward on the seat cushion, return the seatback pan to the seatback.
- 11.24 Holding the T-bar to prevent the H-point machine from sliding forward on the seat cushion, apply a rearward force perpendicular to the back angle bar just above the torso weights until either 66 N (15 lb) of force is reached or the hip angle is increased by 3°, whichever occurs first. Minimize the exterior downward or side forces applied to the H-point machine. Release the force. Repeat this step until the resulting hip angle is identical. Complete as many force applications as necessary and record the results in the following table:

Force App.	Hip Angle
1	
2	
3	
4	
5	

- 11.25 Is the H-point machine level?
 ___Yes. Go to step 11.26.
 ___No. Go back to step 11.15 and repeat steps to re-level H-point machine.
- 11.26 Record the H-point location and torso angle in the table below:

H-point Machine H-point Location and Torso Angle	
Torso Angle	°
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

Reference: X-axis is positive forward of striker
Y-axis is positive right of striker
Z-axis is positive below striker



- 11.27 Create a Seat Tracking Point (STP): Place a target point 20 mm forward of the H-point machine H-point on a rigid part of the seat and record its location in the table below. This reference point will be used to locate the dummy H-point relative to the seat if the seat cannot be set to the mid-track position.

Seat Tracking Point (STP) Location at Mid-track	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

- 11.28 Remove the H-point machine.

12 Calculate the THOR-50M H-point Target at Mid-track

- 12.1 The THOR-50M H-point is offset 20 mm forward and 20 mm above the H-point machine H-point as determined in the table below:

THOR-50M Target H-point at Mid-track		
H-point machine H-point (11.26) +/- 20 mm = THOR-50M H-point at mid-track		
X (positive (+) forward of striker)	() + 20 mm	mm
Z (positive (+) below striker)	() - 20 mm	mm

If steps 1-12 were completed prior to seating, verify that measurements have been recorded prior to placing dummy in seat.

13 Once the H-point has been determined and the following things are verified, position a qualified THOR-50M in the right front seat of the test vehicle.

- 13.1 Follow the procedures in the THOR-50M Qualification Manual for setting the joint torques. Also, make sure the neck is placed in the neutral position setting and the spine box is placed in the slouched position before placing the dummy in the vehicle.
- 13.2 Verify the head and pelvis tilt sensors installed in the dummy are reading correctly about the X and Y axes.
- 13.3 Record the lumbar spine pitch change joint and neck pitch change joint settings below:

Lumbar spine pitch change joint: _____

Neck pitch change joint: _____

- 13.4 Verify the seat back and base angles and the seat belt height adjustment are in the correct locations.

14 Positioning the test dummy in the seat

- 14.1 Move the seat to the full rearward position and place the test dummy in the seat with the thighs resting on the seat.
- 14.2 Position the test dummy in the seat such that its plane of symmetry (i.e. mid-sagittal plane) is coincident with the centerline marking on the seat cushion, seat back, and head restraint and such that it's H-point is approximately above the STP.
- 14.3 Bend the upper torso forward and then lay it back against the seat back. Push the shoulders of the dummy fully rearward. Using the installed tilt sensors, position the dummy so that it sits squarely and level in the both the X and Y axes in the seat.
- 14.4 Foot and leg alignment:

Align the legs such that the following occurs:

To the extent practicable keep the left and right thigh and the leg in a vertical plane; adjust the knees such that they are 225 mm apart (centerline to centerline) and equidistant from the seat centerline. Initially set the feet perpendicular to the legs and equidistant from the seat centerline.

- 14.5 Lift the feet and slide the seat forward to 25 mm rearward of mid-track or the detent closest to this position that is not greater than 25 mm rearward of mid-track. Adjust the feet as necessary. If there is knee/leg contact with the knee bolster or instrument panel, adjust only the knee/leg that is interacting with the knee bolster/instrument panel inboard or outboard the minimum amount required to create clearance (not to exceed 10 mm), without the inner thigh crossing the centerline of the seat.

Is there still interference between the dummy's knees/legs and the knee bolster/instrument panel?

___No. Go to step 14.6.

___Yes. Lift the feet and slide the seat to 50 mm rearward of mid-track or the detent closest to this position that is not greater than 50 mm rearward of mid-track. If there is still interference (within 5 mm), continue to move the seat rearward in 25 mm increments until there is no longer interference.

- 14.6 Verify the SCRП position, then measure the location of the STP and record it under Trial 1 in table below (subsequent trials may be needed, depending on the outcome of step 14.13):

Seat Tracking Point Location Trial 1	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)
Seat Tracking Point Location Trial 2 (if applicable)	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)
Seat Tracking Point Location Trial 3 (if applicable)	
X (positive (+) forward of striker)	(mm)
Z (positive (+) below striker)	(mm)

14.6.1 Calculate and record the Seat Tracking Point Difference (STPD)

STPD = Location of STP from step 14.6 – location of STP from step 11.27

Record in table below:

Trial 1			
	Results from 14.6 - Results from 11.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

Trial 2 (if applicable)			
	Results from 14.6 - Results from 11.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

Trial 3 (if applicable)			
	Results from 14.6 - Results from 11.27 = STPD		
X (positive (+) forward of striker)	()	-	() mm
Z (positive (+) below striker)	()	-	() mm

14.6.2 Calculate and record the THOR-50M target H-point for each seat position as the seat is moved forward (per step 14.5), following the corresponding steps.

X: THOR-50M Target H-point for 14.6.2 = (THOR-50M Target H-point from 12.1) + (STPD from 14.6.1)

Z: THOR-50M Target H-point for 14.6.2 = (THOR-50M Target H-point from 12.1) + (STPD from 14.6.1)

Trial 1			
	Results from 12.1 - Results from 14.6.1 = Current Target H-point		
X (positive (+) forward of	()	+	() mm
Z (positive (+) below striker)	()	+	() mm

Trial 2 (if applicable)			
	Results from 12.1 - Results from 14.6.1 = Current Target H-point		
X (positive (+) forward of	()		() mm
Z (positive (+) below striker)	()	+	() mm

Trial 3 (if applicable)			
	Results from 12.1 - Results from 14.6.1 = Current Target H-point		
X (positive (+) forward of	()	+	() mm
Z (positive (+) below striker)	()	+	() mm

14.7 Confirm, using the tilt sensors, that the dummy is positioned such that a horizontal, lateral line passing through the dummy's hip pivot center is perpendicular to the center XZ plane of the seat – adjust the dummy if necessary.

14.8 Verify/measure the pelvis angles using the tilt angle sensors installed in the test dummy. Verify that the pelvis angles are $0^\circ \pm 1^\circ$ (about the X-axis) and $33^\circ \pm 2.5^\circ$ (about the Y-axis).

14.9 Confirm that the H-point is within ± 10 mm of the target location in the horizontal (X) and the vertical (Z) directions – adjust the dummy if necessary.

14.10 Are the pelvis angles within specification (described in step 14.8)?

___Yes. Go to step 14.11.

___No. Go back to step 14.7 and repeat steps to re-adjust the pelvis angles while maintaining the H-point position within specification.

- 14.11 Verify/Measure the head angles using the tilt angle sensors installed in the test dummy. Verify that the head angles are $0^\circ \pm 1^\circ$ (about the X axis) and $0^\circ \pm 1^\circ$ (about the Y-axis).

- 14.11.1 Are the head angles within specification?

___Yes. Go to step 14.12 (foot placement).

___No and head is not touching head rest. Go back to step 14.7; adjust the pelvis while maintaining the H-point target position within specification.

___No and head is not touching the head rest, but the pelvis has already been re-adjusted. Go to step 14.11.2.

___No and head is touching head rest. Go to step 14.11.2.

___No and seatback has been adjusted already.

Record final head angles X: _____[°]
Y: _____[°]

- 14.11.2 Has the seatback angle been adjusted?

___No. Adjust seatback a maximum of 1 detent for manual seats and not more than 2° from the manufacturer's recommended angle found in step 8.3, to bring the head angles within/or as close as possible to specification. Return to step 14.7.

Record original seatback angle before adjustment: _____[°]
Record the new seatback angle: _____[°]

___Yes. Make no further adjustment.

Record final head angles X: _____[°]
Y: _____[°]

Go to step 14.12.

- 14.12 Foot Placement

- 14.12.1 To the extent practicable without inducing pelvis or torso movement, keep the thighs and the legs in vertical planes throughout the procedure. If possible, maintain a knee spacing of 225 mm, as measured between the centerline of the knees, with the knees being equidistant from the seat centerline. Also, if possible, position and maintain the feet equidistant from the centerline of the seat.

14.12.2 For each foot, check which of the following that applies (ONLY check one):

___The foot can be placed flat on the toe board with the heel resting on the floor pan as close as possible to the intersection of the floor pan and toe board.

___The foot cannot be placed flat on the toe board. Set the foot perpendicular to the leg and place it as far forward as possible with the heel resting on the floor pan and the foot perpendicular to leg.

___The vehicle has a wheelhouse projection and the foot cannot be placed on the toe board. Do not set the foot on the wheelhouse projection. Set the foot perpendicular to the leg and move the leg laterally the minimum amount needed to avoid the wheelhouse projection, while maintaining the dummy's head and pelvis angle and H-point location specifications. Make sure the foot and leg are still in same vertical plane. Place the foot as far forward as possible with the heel resting on the floor pan.

14.12.3 If either of the dummy's legs contact the vehicle's interior, shift only the knee with clearance issues inboard or outboard the minimum required to avoid contact (not to exceed 10 mm), without the inner thigh crossing the centerline of the seat. Maintain the dummy's head and pelvis angle and H-point location specifications, and try to maintain the leg and foot in the same vertical plane.

___N/A- there was no leg contact.

___Knees were shifted for clearance.

Final Knee Spacing:_____ mm

14.13 Verify that the head and pelvis angles and the H-point location are within the specifications (steps 14.8, 14.9, and 14.11). For a seat that is not in mid-track, if the dummy leg/knee to knee bolster/instrument panel clearance is greater than 5 mm, the seat should be moved forward. If there is leg/knee contact with the knee bolster/instrument panel, adjust the leg/knee making contact inboard or outboard the minimal amount required to create clearance (not to exceed 10 mm).

___Seat is already at mid-track and dummy is within specified head/pelvis angles and H-point location. Go to step 14.14.

___ Dummy leg/knee to knee bolster/instrument panel clearance is greater than 5 mm. Adjust the seat forward, without going forward of mid-track, until a clearance of 5 mm or less is achieved.

Record seat position: _____ mm rearward of mid-track.

Return to step 14.6 and repeat the steps to go through the trials.

___Dummy leg/knee to knee bolster/instrument panel clearance is not greater than 5 mm. No adjustments required.

Record seat position: _____mm rearward of mid-track.

Go to step 14.14.

14.14 Arm and belt placement. Verify the shoulders of the dummy are rotated fully rearward.

14.14.1 Place the left upper arm adjacent to the torso with the centerline as close to a vertical plane as possible; Place the left-hand palm in contact with the outside of the left thigh and the little finger in contact with the seat cushion.

Is the seat belt used for this test?

___Yes. Go to step 14.14.2.

___No. Go to step 14.14.8.

14.14.2 Fasten the seat belt around the dummy.

14.14.3 Remove all slack from the lap belt portion.

14.14.4 Pull the upper torso webbing out of the retractor and allow it to retract; repeat this four times.

14.14.5 Apply a 2 to 4-pound tension load to the lap belt.

___pounds of load applied

14.14.6 Is the belt system equipped with a tension-relieving device?

___Yes. Go to step 14.14.7.

___No. Go to step 14.14.8.

14.14.7 Introduce the maximum amount of slack into the upper torso bet that is recommended by the vehicle manufacturer in the vehicle owner's manual.

14.14.8 Place the right upper arm adjacent to the torso with the centerline as close to a vertical plane as possible; Place the right-hand palm in contact with the outside of the right thigh and the little finger in contact with the seat cushion.

Appendix F High Res Barrier Instrumentation Data

Appendix F High Res Barrier Instrumentation Data

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
BARRIER K-01	N	-3125.017	26.6	2715.611	34.4
BARRIER K-02	N	-3416.914	26.5	2189.418	27.4
BARRIER K-03	N	-4714.694	26.45	1927.206	25.3
BARRIER K-04	N	-6215.395	26.4	1933.994	31.05
BARRIER K-05	N	-7019.215	26.45	1758.696	30.95
BARRIER K-06	N	-6399.366	26.5	2919.535	30.95
BARRIER K-07	N	-5893.238	33.55	2399.194	30.95
BARRIER K-08	N	-5186.319	33.45	2515.368	30.75
BARRIER K-09	N	-4677.392	27.75	2549.887	31.2
BARRIER K-10	N	-5144.805	13.6	2162.026	31.3
BARRIER K-11	N	-4794.978	13.55	1826.565	25.55
BARRIER K-12	N	-11207.143	62.7	2027.983	25.65
BARRIER K-13	N	-3389.226	26.85	1889.495	25.65
BARRIER K-14	N	-2643.082	26.5	2124.086	36.65
BARRIER K-15	N	-2782.763	12.5	2155.514	14.45
BARRIER K-16	N	-4009.141	12.6	2613.514	11.45
BARRIER J-01 FX	N	-2057.724	22.15	2097.895	28
BARRIER J-02 FX	N	-2094.776	56.9	1489.494	23.3
BARRIER J-03 FX	N	-2111.954	15.55	1840.05	31.3
BARRIER J-04 FX	N	-4565.266	32.95	847.102	3.6
BARRIER J-05 FX	N	-31798.954	33.0	843.234	3.2
BARRIER J-06 FX	N	-20050.119	33.3	861.525	6.4
BARRIER J-07 FX	N	-4889.788	33.4	1397.161	30.35
BARRIER J-08 FX	N	-7680.028	33.65	995.263	1.35
BARRIER J-09 FX	N	-50760.995	54.2	1110.175	1.35
BARRIER J-10 FX	N	-15865.905	63.35	1313.977	23.4
BARRIER J-11 FX	N	-30564.593	63.55	1045.539	23.1
BARRIER J-12 FX	N	-16237.766	61.6	2954.609	24.15
BARRIER J-13 FX	N	-4621.161	34.85	1702.918	32.1
BARRIER J-14 FX	N	-3501.547	26.45	1348.351	14.3
BARRIER J-15 FX	N	-2555.267	12.25	3119.542	32.1
BARRIER J-16 FX	N	-3182.17	12.65	1658.865	28.65
BARRIER I-01 FX	N	-6128.326	57.8	1396.111	30.05
BARRIER I-02 FX	N	-3935.373	12.55	1626.96	28.5

Appendix F High Res Barrier Instrumentation Data; Continued

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
BARRIER I-03 FX	N	-3160.535	46.45	1574.694	28.55
BARRIER I-04 FX	N	-24920.387	35.3	1657.509	19.35
BARRIER I-05 FX	N	-15393.168	53.5	1433.795	19.45
BARRIER I-06 FX	N	-36711.984	54.95	1376.01	23.1
BARRIER I-07 FX	N	-13911.546	54.65	2364.179	23.3
BARRIER I-08 FX	N	-18772.127	54.25	995.426	5.5
BARRIER I-09 FX	N	-37726.272	54.2	2504.363	1.25
BARRIER I-10 FX	N	-24582.551	53.15	3275.508	24.1
BARRIER I-11 FX	N	-15276.692	32.5	2183.919	24.1
BARRIER I-12 FX	N	-9371.352	54.65	1653.953	9.95
BARRIER I-13 FX	N	-16846.059	24.7	22481.984	24.15
BARRIER I-14 FX	N	-3782.602	11.35	1569.6	61.6
BARRIER I-15 FX	N	-3806.263	13.1	2179.361	32.1
BARRIER I-16 FX	N	-2857.281	27.45	1662.197	15.55
BARRIER H-01 FX	N	-2961.112	42.25	1571.12	24.05
BARRIER H-02 FX	N	-3272.22	27.65	1709.415	24.1
BARRIER H-03 FX	N	-8891.601	27.5	837.949	6.05
BARRIER H-04 FX	N	-107759.32	35.25	1120.659	6
BARRIER H-05 FX	N	-94354.045	26.35	550.584	1.95
BARRIER H-06 FX	N	-85221.654	26.75	645.361	1.35
BARRIER H-07 FX	N	-53945.504	31.3	328.908	157.3
BARRIER H-08 FX	N	-35892.522	34.1	307.197	-30.75
BARRIER H-09 FX	N	-34800.137	34.5	826.92	1.05
BARRIER H-10 FX	N	-57483.429	32.0	481.237	0.65
BARRIER H-11 FX	N	-67662.783	32.1	854.118	1.2
BARRIER H-12 FX	N	-82551.332	25.75	673.246	1.7
BARRIER H-13 FX	N	-43902.385	25.85	906.501	7.2
BARRIER H-14 FX	N	-24370.932	25.9	2735.292	61.6
BARRIER H-15 FX	N	-76062.717	58.9	29004.439	64.2
BARRIER H-16 FX	N	-2669.892	28.0	2210.806	24.1
BARRIER G-01 FX	N	-2124.296	11.45	1564.627	15.85
BARRIER G-02 FX	N	-1644.323	11.4	1532.217	29.05
BARRIER G-03 FX	N	-3496.957	32.45	1728.355	28.95
BARRIER G-04 FX	N	-25055.016	27.35	916.784	5.45

Appendix F High Res Barrier Instrumentation Data; Continued

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
BARRIER G-05 FX	N	-29250.02	27.35	401.585	1.9
BARRIER G-06 FX	N	-27317.756	33.8	1442.049	12.85
BARRIER G-07 FX	N	-43994.631	32.15	683.793	19.55
BARRIER G-08 FX	N	-11649.524	34.4	1248.879	23.9
BARRIER G-09 FX	N	-15730.204	34.4	226.622	277.2
BARRIER G-10 FX	N	-28024.594	60.1	10105.396	61.65
BARRIER G-11 FX	N	-18676.418	32.05	5869.964	61.6
BARRIER G-12 FX	N	-19024.667	25.9	1519.535	61.6
BARRIER G-13 FX	N	-15161.499	10.65	3033.124	61.55
BARRIER G-14 FX	N	-6706.094	60.1	4622.34	61.6
BARRIER G-15 FX	N	-6355.275	60.1	4641.975	32.45
BARRIER G-16 FX	N	-2470.128	10.75	1954.867	24.35
BARRIER F-01 FX	N	-3890.997	28.75	1290.893	23.25
BARRIER F-02 FX	N	-2351.2	58.9	1267.716	29.2
BARRIER F-03 FX	N	-2051.795	9.0	1783.245	29.55
BARRIER F-04 FX	N	-5084.499	47.9	1639.426	29.45
BARRIER F-05 FX	N	-10736.763	28.05	897.557	2
BARRIER F-06 FX	N	-8310.774	32.5	1227.168	1.4
BARRIER F-07 FX	N	-22751.24	32.55	1133.423	7.35
BARRIER F-08 FX	N	-12344.004	34.4	1831.186	60.1
BARRIER F-09 FX	N	-8023.454	24.7	2432.105	60.15
BARRIER F-10 FX	N	-6455.979	32.55	5399.648	63.4
BARRIER F-11 FX	N	-7992.049	61.65	5081.713	63.4
BARRIER F-12 FX	N	-8380.029	47.9	1657.873	62.55
BARRIER F-13 FX	N	-5817.09	60.2	2794.343	61.7
BARRIER F-14 FX	N	-12130.087	58.9	1819.049	31.7
BARRIER F-15 FX	N	-3372.285	28.4	1592.785	10.15
BARRIER F-16 FX	N	-3025.71	55.7	1529.854	10.15
BARRIER E-01 FX	N	-2732.194	28.75	1751.227	16.5
BARRIER E-02 FX	N	-6609.965	42.05	1528.509	16.5
BARRIER E-03 FX	N	-44504.325	55.8	1466.502	29.6
BARRIER E-04 FX	N	-2967.206	11.35	1052.81	29.5
BARRIER E-05 FX	N	-11712.036	8.0	919.218	20.9
BARRIER E-06 FX	N	-4876.978	24.65	1173.963	6.5

Appendix F High Res Barrier Instrumentation Data; Continued

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
BARRIER E-07 FX	N	-2907.297	32.6	1831.984	20.4
BARRIER E-08 FX	N	-10597.263	3.9	2107.412	60.1
BARRIER E-09 FX	N	-10105.661	3.65	2937.628	63.35
BARRIER E-10 FX	N	-6045.369	31.6	3868.423	63.35
BARRIER E-11 FX	N	-6795.416	31.5	5645.553	63.35
BARRIER E-12 FX	N	-8247.64	8.85	2731.587	63.4
BARRIER E-13 FX	N	-5339.31	45.7	4140.802	63.35
BARRIER E-14 FX	N	-41432.606	55.1	1541.775	16.55
BARRIER E-15 FX	N	-9273.492	54.3	1999.361	63.35
BARRIER E-16 FX	N	-24001.941	36.4	1867.946	15.7
BARRIER D-01 FX	N	-3496.486	27.15	1453.574	16.75
BARRIER D-02 FX	N	-4243.109	42.25	1083.283	16.9
BARRIER D-03 FX	N	-3793.739	43.5	1404.455	30.55
BARRIER D-04 FX	N	-3392.199	26.6	1419.636	15.85
BARRIER D-05 FX	N	-7020.338	11.55	1377.99	29.65
BARRIER D-06 FX	N	-5010.361	12.4	967.606	29.25
BARRIER D-07 FX	N	-6807.811	9.5	1338.518	28.9
BARRIER D-08 FX	N	-6016.687	8.3	1193.745	2.0
BARRIER D-09 FX	N	-7906.319	11.6	1913.461	60.15
BARRIER D-10 FX	N	-7461.672	9.5	3139.429	60.15
BARRIER D-11 FX	N	-8519.087	13.45	4613.286	32.15
BARRIER D-12 FX	N	-5708.933	12.6	3230.237	60.15
BARRIER D-13 FX	N	-3089.383	12.4	1670.085	32.25
BARRIER D-14 FX	N	-3767.012	46.55	1860.072	62.55
BARRIER D-15 FX	N	-3174.027	29.9	1492.975	15.8
BARRIER D-16 FX	N	-1725.878	33.25	1686.508	15.95
BARRIER C-01 FX	N	-1954.798	29.65	1503.61	28.25
BARRIER C-02 FX	N	-2340.981	36.7	1566.614	30.7
BARRIER C-03 FX	N	-1513.353	32.15	1939.308	30.65
BARRIER C-04 FX	N	-1093.79	13.5	1312.758	29.8
BARRIER C-05 FX	N	-3107.921	34.7	1278.95	20.4
BARRIER C-06 FX	N	-3971.363	25.9	988.694	52.65
BARRIER C-07 FX	N	-2727.187	25.9	1000.246	15.0
BARRIER C-08 FX	N	-2759.52	25.8	1502.882	58.9

Appendix F High Res Barrier Instrumentation Data; Continued

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
BARRIER C-09 FX	N	-2619.232	26.05	1696.74	15.65
BARRIER C-10 FX	N	-2693.105	26.05	2035.705	60.15
BARRIER C-11 FX	N	-5052.89	22.6	2444.64	63.4
BARRIER C-12 FX	N	-2035.831	12.5	1600.657	15.65
BARRIER C-13 FX	N	-2113.503	12.2	1749.604	32.15
BARRIER C-14 FX	N	-2596.782	12.1	1142.484	60.15
BARRIER C-15 FX	N	-1572.969	40.6	1234.43	28.75
BARRIER C-16 FX	N	-1150.4	12.45	1196.933	22.8
BARRIER B-01 FX	N	-1681.455	29.75	1787.134	31.3
BARRIER B-02 FX	N	-1569.969	34.3	1433.843	31.15
BARRIER B-03 FX	N	-1730.524	32.2	1074.97	14.55
BARRIER B-04 FX	N	-1616.987	32.05	1669.965	29.6
BARRIER B-05 FX	N	-1185.859	32.15	1717.51	21.8
BARRIER B-06 FX	N	-1446.418	34.15	1328.497	22.25
BARRIER B-07 FX	N	-3216.317	34.75	793.584	28.2
BARRIER B-08 FX	N	-1988.533	32.95	1265.504	58.9
BARRIER B-09 FX	N	-1782.672	14.15	2028.328	32.1
BARRIER B-10 FX	N	-1865.526	13.55	2749.684	32.15
BARRIER B-11 FX	N	-1871.536	13.25	1751.995	32.2
BARRIER B-12 FX	N	-1857.848	13.35	1368.645	29.45
BARRIER B-13 FX	N	-1577.487	27.25	1538.907	10.15
BARRIER B-14 FX	N	-1368.926	27.25	1308.03	17.15
BARRIER B-15 FX	N	-1257.534	27.4	995.801	14.6
BARRIER B-16 FX	N	-221.891	276.35	116.201	-47.0