

SAFETY COMPLIANCE TESTING FOR FMVSS No. 218 MOTORCYCLE HELMETS

Bell Helmets
Brand and Model – Bell, Qualifier DLX Blackout
Size – XL (61-62 cm)

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SECTION 1 PURPOSE OF COMPLIANCE TEST

1.1 PURPOSE OF COMPLIANCE TEST

This testing was conducted as part of the Department of Transportation (DOT), National Highway Traffic Safety Administration’s Federal Motor Vehicle Safety Standard (FMVSS) No. 218, “Motorcycle Helmets”¹ Compliance Program. The purpose of the test was to determine if the production helmets supplied by the Office of Vehicle Safety Compliance satisfy the requirements of TP-218-07², as governed by the contract.

1.2 TEST PROCEDURE

The Southwest Research Institute Test Procedure for FMVSS No. 218³ submitted to the Office of Vehicle Safety Compliance, National Highway Traffic Safety Administration (NHTSA), contains the specific procedures used to conduct this test. The Southwest Research Institute Test Procedure for FMVSS No. 218, as modified by project specific process travelers, is in accordance with TP-218-07.

The test procedure shall not conflict with any portion of FMVSS No. 218 nor amendments in effect as noted in the applicable contract.

¹ National Highway Traffic Safety Administration, FMVSS No. 218, “Motorcycle Helmets”, 49 CFR Chapter V Section 571.218, August 20, 1973, as last amended 77 FR 768, January 6, 2012.

² NHTSA, TP-218-07, Laboratory Test Procedure for FMVSS 218 Motorcycle Helmets, May 13, 2011.

³ SwRI Test Procedure, WI-100-16, Revision 2, FMVSS No. 218 Motorcycle Helmet Testing, January 29, 2021.

SECTION 2 COMPLIANCE TEST DATA SUMMARY

2.1 HELMET DATA

Helmet data given is based on information provided with the helmets, information provided by the manufacturer/distributor, and measured data. General helmet information and sample specific details are provided in Table 1 and Table 2, respectively.

Table 1: General Helmet Information

HELMET BRAND NAME:	Bell
HELMET MODEL DESIGNATION:	Qualifier DLX Blackout
HELMET MANUFACTURER:	Bell Helmets
HELMET SIZE DESIGNATION:	XL (61-62 cm)
COVERAGE:	Complete
HELMET POSITION INDEX (HPI) (mm):	50 mm (from NHTSA)
SHELL MATERIAL:	Acrylonitrile Butadiene Styrene & Polycarbonate Blend
LINER MATERIAL:	<Not Specified>
TYPE OF RETENTION SYSTEM:	D-Ring

Table 2: Helmet Details

DESCRIPTION	HELMET A	HELMET B	HELMET C	HELMET D	HELMET E
CONDITIONING	Ambient	Low Temp	High Temp	Water Immersed	Spare
SHELL COLOR/PATTERN	Black	Black	Black	Black	Black
WEIGHT (grams)	1537.0	1529.0	1521.5	1526.0	1532.5
MONTH/YEAR OF MANUFACTURER	08/2024	04/2024	04/2024	04/2024	04/2024

Comments:

- All helmets were received in undamaged condition and were appropriate for testing.
- The HPI is based on information supplied by NHTSA.
- Weight is determined with all auxiliary equipment removed, which includes face shield and support hardware; helmet is ready for testing.
- Photographs of the helmets are given in Appendix C.

2.2 SUMMARY OF TEST RESULTS

A summary of the test results for each helmet and each part as identified in FMVSS No. 218 is provided in Table 3.

Table 3: Summary of Test Results

TEST	HELMET A	HELMET B	HELMET C	HELMET D
IMPACT (S5.1, S7.1)	PASS	PASS	PASS	PASS
PENETRATION (S5.2, S7.2)	PASS	PASS	PASS	PASS
RETENTION (S5.3, S7.3)	PASS	PASS	PASS	PASS
CONFIGURATION (S5.4)	PASS	NA	NA	NA
PERIPHERAL VISION/BROW OPENING (S5.4)	PASS	NA	NA	NA
LABELING (S5.6)	FAIL	NA	NA	NA

Comments:

- Testing was performed on December 11, 2025.
- S5.6.1 Labeling: The instructions to the purchaser label is incomplete.
 - Liner constructed of information is missing.
- The helmet does not satisfy the testing requirements of FMVSS No. 218.

2.3 SELECTION OF APPROPRIATE HEADFORM (S6.1)

Selection of the headform used during testing was based on the helmet size designation, as identified in Table 4. If the size range is not specified by hat size, the selection is based on best fit of the helmet on the headform. As identified in FMVSS No. 218, if the helmet size designation falls into more than one of the size ranges, it shall be tested on each appropriate headform. When multiple headforms are appropriate, the selection shall be based on best fit and discussion with the supplier of the helmets.

Table 4: Headform Selection

HELMET SIZE DESIGNATION	HEADFORM SIZE	DROP ASSEMBLY WEIGHT
≤ European Size 54 ≤ 6 ¾	Small	3.5, +0.1, -0.1 kg 7.8, +0.2, -0.2 lbs
> European Size 54 but ≤ European Size 60 > 6 ¾ but ≤ 7 ½	Medium	5.0, +0.1, -0.1 kg 11.0, +0.2, -0.2 lbs
> European Size 60 > 7 ½	Large	6.1, +0.1, -0.1 kg 13.4, +0.2, -0.2 lbs

Comments:

- A large headform was used based on the discrete size and information provided by the manufacturer. The total weight of the drop assembly was 6.06 kg. The helmet was a good fit on the headform.

2.4 REFERENCE MARKING (S6.2) AND HELMET POSITIONING (S6.3)

The test line was drawn on the helmet, as identified by Figure 2 in FMVSS No. 218, following the procedures of S6.2 of FMVSS No. 218. The centers of impact sites were selected at points on the helmet on or above the test line. Before each test, the helmet was fixed on the test headform in the position that conformed to the helmet position index, in accordance with the requirements of S6.3 of FMVSS No. 218.

Comments:

- None.

2.5 CONDITIONING FOR TESTING (S6.4)

The helmets were conditioned for 4 to 24 hours in the specified environmental condition shown in Table 5, prior to testing. One helmet was conditioned in each environment. Each test was performed within 2 to 4 minutes after removal of the helmet from conditioning. The maximum time during which the helmets were out of the conditioning environment was less than 4 minutes. Records of the conditioning are given in Section 3.1 (Conditioning Environment Plots).

Table 5: Test Conditioning Summary

IDENTIFICATION	CONDITIONS	HELMET
Ambient Conditions	21°C ± 5°C, 30% to 70% RH, Site Pressure 61°F to 79°F	A
Low Temperature	-10°C ± 5°C 5°F to 23°F	B
High Temperature	50°C ± 5°C 113°F to 131°F	C
Water Immersion	21°C ± 5°C 61°F to 79°F	D

Comments:

- None.

2.6 IMPACT TESTING (S5.1 & S7.1)

The helmets were subjected to the impact attenuation test in accordance with S7.1 of FMVSS No. 218. The construction materials and resonant frequencies of the headforms satisfy the requirements of S7.1.5 of FMVSS No. 218. The testing was performed using a monorail drop test system, as required by S7.1.6 of FMVSS No. 218. The drop assembly satisfies the requirements of S7.1.7, S7.1.8, and S7.1.12 of FMVSS No. 218. The response accelerometer and instrumentation satisfy the requirements of S7.1.9 of FMVSS No. 218. The anvils and mounting satisfy the requirements of S7.1.10 and S7.1.11 of FMVSS No. 218.

The Impact Attenuation Instrument System was checked before and after testing by dropping the bare headform, for impact on the top, onto a MEP pad. The pre-test drop height was set to achieve a nominal peak acceleration of 400 g's \pm 10 g's. Post-test drops were made from the same drop height. Three drops were made for the pre-test and post-test conditions, and an average peak deceleration for both the pre-test and post-test were calculated. Summary data is provided in Table 6 and time histories for the system check impacts are given in Section 3.2 (Impact Time History Plots). The difference between pre-test average and the post-test averages shall not exceed \pm 15 g's, and these results are provided in Table 7.

Table 6: Impact Pre- and Post-Test Results

SYSTEM CHECK	DROP NO.	DROP HEIGHT (cm)	IMPACT VELOCITY (m/s)	PEAK ACCEL (g)	DWELL TIME AT \geq 150 G (ms)	DWELL TIME AT \geq 200 G (ms)
Pre-test	1A	103	4.44	395	2.3	2.0
Pre-test	2A	103	4.44	391	2.3	2.0
Pre-test	3A	103	4.45	389	2.3	2.0
Post-test	1B	103	4.45	388	2.3	2.0
Post-test	2B	103	4.44	380	2.3	2.0
Post-test	3B	103	4.44	381	2.3	2.0

Table 7: Impact Pre- and Post-test Summary Comparison

SYSTEM CHECK	AVERAGE PEAK ACCEL (g)
Pre-test	392
Post-test	383
Pre- & Post-test Difference	9

Each helmet (A, B, C, and D) was impacted at four locations with the center of impact points on or above the test line, and at least one-fifth of the maximum circumference of the helmet from any prior impact center. Two impact locations on each helmet were with the hemispherical anvil and two were with the flat anvil, with two impacts at each location. The two impacts at each location shall be within 1.9 cm (0.75 inches) of each other. Acceptable velocities were:

- a) Flat Anvil – 5.8 to 6.2 m/sec (19.0 to 20.3 ft/sec)
- b) Hemispherical Anvil – 5.0 to 5.4 m/sec (16.4 to 17.7 ft/sec)

Impact summary data is provided in Table 8 through Table 11, and time histories for the impacts are provided in Section 3.2 (Impact Time History Plots). The conditioning environment, impact location, anvil type, peak acceleration, dwells at 150 g's and 200 g's, and impact velocity information are also included on the impact plots.

Table 8: Helmet A (Ambient) Impact Test Results

TEST RECORD NO.	IMPACT LOCATION	LOCATION IMPACT NO.	ANVIL	IMPACT VELOCITY (m/s)	PEAK ACCEL (g)	DWELL TIME AT ≥150 G (ms)	DWELL TIME AT ≥200 G (ms)
3	Left Front Quadrant	1	Hemi	5.20	92	0.0	0.0
4	Left Front Quadrant	2	Hemi	5.20	112	0.0	0.0
11	Right Rear Quadrant	1	Hemi	5.28	81	0.0	0.0
12	Right Rear Quadrant	2	Hemi	5.20	110	0.0	0.0
19	Right Front Quadrant	1	Flat	6.04	140	0.0	0.0
20	Right Front Quadrant	2	Flat	5.94	199	2.5	0.0
27	Left Rear Quadrant	1	Flat	6.05	128	0.0	0.0
28	Left Rear Quadrant	2	Flat	6.04	144	0.0	0.0

Table 9: Helmet B (Low Temperature) Impact Test Results

TEST RECORD NO.	IMPACT LOCATION	LOCATION IMPACT NO.	ANVIL	IMPACT VELOCITY (m/s)	PEAK ACCEL (g)	DWELL TIME AT ≥150 G (ms)	DWELL TIME AT ≥200 G (ms)
5	Left Front Quadrant	1	Hemi	5.20	89	0.0	0.0
6	Left Front Quadrant	2	Hemi	5.20	104	0.0	0.0
13	Right Rear Quadrant	1	Hemi	5.20	83	0.0	0.0
14	Right Rear Quadrant	2	Hemi	5.19	96	0.0	0.0
21	Right Front Quadrant	1	Flat	6.04	135	0.0	0.0
22	Right Front Quadrant	2	Flat	6.04	169	2.2	0.0
29	Left Rear Quadrant	1	Flat	6.05	135	0.0	0.0
30	Left Rear Quadrant	2	Flat	6.04	148	0.0	0.0

Table 10: Helmet C (High Temperature) Impact Test Results

TEST RECORD NO.	IMPACT LOCATION	LOCATION IMPACT NO.	ANVIL	IMPACT VELOCITY (m/s)	PEAK ACCEL (g)	DWELL TIME AT ≥150 G (ms)	DWELL TIME AT ≥200 G (ms)
7	Left Front Quadrant	1	Hemi	5.19	79	0.0	0.0
8	Left Front Quadrant	2	Hemi	5.20	99	0.0	0.0
15	Right Rear Quadrant	1	Hemi	5.20	79	0.0	0.0
16	Right Rear Quadrant	2	Hemi	5.20	102	0.0	0.0
23	Right Front Quadrant	1	Flat	6.04	126	0.0	0.0
24	Right Front Quadrant	2	Flat	6.04	150	0.0	0.0
31	Left Rear Quadrant	1	Flat	6.05	122	0.0	0.0
32	Left Rear Quadrant	2	Flat	6.05	146	0.0	0.0

Table 11: Helmet D (Water Immersed) Impact Test Results

TEST RECORD NO.	IMPACT LOCATION	LOCATION IMPACT NO.	ANVIL	IMPACT VELOCITY (m/s)	PEAK ACCEL (g)	DWELL TIME AT ≥150 G (ms)	DWELL TIME AT ≥200 G (ms)
9	Left Front Quadrant	1	Hemi	5.20	87	0.0	0.0
10	Left Front Quadrant	2	Hemi	5.20	119	0.0	0.0
17	Right Rear Quadrant	1	Hemi	5.20	82	0.0	0.0
18	Right Rear Quadrant	2	Hemi	5.20	101	0.0	0.0
25	Right Front Quadrant	1	Flat	5.93	122	0.0	0.0
26	Right Front Quadrant	2	Flat	5.93	146	0.0	0.0
33	Left Rear Quadrant	1	Flat	6.05	120	0.0	0.0
34	Left Rear Quadrant	2	Flat	6.05	143	0.0	0.0

Comments:

- This helmet satisfies the impact testing requirements of S5.1 of FMVSS No. 218.

2.7 PENETRATION (S5.2 & S7.2)

One sample of each of the helmets was subjected to the penetration test in accordance with S7.2 of FMVSS No. 218. The penetration striker satisfies the requirements of S7.2.6 and S7.2.7 of FMVSS No. 218. The height of the free-fall drop of 300 ± 1.5 cm (118.1 ± 0.6 inches), as measured from the striker point to the impact point on the outer surface of the test helmet. Two penetration blows were applied to each helmet at least 7.6 cm (3 inches) apart, and at least 7.6 cm (3 inches) from the centers of any impacts applied during the impact attenuation test. A summary of the penetration test results is provided in Table 12.

Table 12: Penetration Test Results Summary

TEST	HELMET	CONDITION	PASS	FAIL
1	A	Ambient	PASS	
2	A	Ambient	PASS	
3	B	Low Temperature	PASS	
4	B	Low Temperature	PASS	
5	C	High Temperature	PASS	
6	C	High Temperature	PASS	
7	D	Water Immersed	PASS	
8	D	Water Immersed	PASS	

Comments:

- This helmet satisfies the penetration requirements of S5.2 of FMVSS No. 218.

2.8 RETENTION SYSTEM TESTING (S5.3 & S7.3)

The helmets were subjected to the retention system testing in accordance with the procedures given in S7.3 of FMVSS No. 218. The helmet was placed on the headform, which was mounted on a stationary support. Load was applied to the retention system through a simulated jaw structure that satisfies the requirements of S7.3.2. The elongation of the retention system was measured between the extremity of the adjustable portion of the retention system and the apex of the helmet. Elongation was defined as the difference between the position with an initial 22.7 kg +4.5 kg -0.0 kg (50-lb.) load and the final position with a 136 kg +0.0 kg -4.5 kg (300-lb.) load. The load rate shall be 1.0 to 3.0 cm/minute as measured between the rolls assembly and the headform. The acceptance criteria were that the retention system remained intact without elongating more than 2.54 cm (1 inch). A summary of the retention test results is provided in Table 13.

Table 13: Retention Test Results Summary

HELMET	CONDITIONS	INITIAL READING (cm)	FINAL READING (cm)	ELONGATION (cm)
A	Ambient	2.48	3.79	1.31
B	Low Temperature	2.29	3.72	1.43
C	High Temperature	2.71	4.10	1.39
D	Water Immersed	2.40	3.83	1.43

Time histories for the retention system testing are given in Section 3.3 (Retention Time History Plots). Given on these plots are the conditioning environment, load, and elongation.

Comments:

- This helmet satisfies the retention testing requirements of S5.3 of FMVSS No. 218.

2.9 CONFIGURATION (S5.4)

The configuration of this helmet is such that it has a protective surface of continuous contour at all points above the test line.

Comments:

- The helmet satisfies the configuration requirements of S5.4 of FMVSS No. 218. See helmet photographs in Appendix C.

2.10 PERIPHERAL VISION AND BROW OPENING (S5.4)

The peripheral vision shall be at least 105° each side of the mid-sagittal plane through the basic plane. The brow opening shall be at least 2.54 cm (1 inch) above all points in the basic plane that is within the angles of peripheral vision. The peripheral vision and brow opening were measured with the helmet positioned on the headform in accordance with S6.2.1 and S6.2.2 of FMVSS No. 218. The peripheral vision and brow opening results are summarized in Table 14.

Table 14: *Peripheral Vision and Brow Opening Conformance Summary*

	REQUIREMENTS	TEST RESULTS
PERIPHERAL VISION	>105°	>105°
BROW OPENING	>2.54 cm	>2.54 cm

Comments:

- This helmet satisfies the peripheral vision and brow opening requirements of S5.4 of FMVSS No. 218.

2.11 LABELING (S5.6)

Each helmet shall be labeled permanently and legibly in a manner such that the label(s) can be easily read without removing padding or any other permanent part. The information in Table 15 shall be included:

Table 15: Labeling Conformance Summary

REQUIRED INFORMATION	CONTENT/ FORMAT	PERMANENCE
(1) Manufacturer’s name or identification.	PASS	PASS
(2) Discrete Size.	PASS	PASS
(3) Month and year of manufacture.	PASS	PASS
(4) Instruction to the Purchaser as follows:	PASS	PASS
Shell and liner constructed of (identify type(s) of materials)	FAIL	PASS
The helmet can be seriously damaged by some common substances without the damage being visible to the user.	PASS	PASS
Apply only the following: (Recommended cleaning agents, paints, adhesives, etc. as appropriate).	PASS	PASS
Make no modifications.	PASS	PASS
Fasten helmet securely.	PASS	PASS
If the helmet experiences a severe blow, return it to the manufacturer for inspection or destroy and replace it.	PASS	PASS
(5) The Certification Label shall be on the outer surface of the helmet, centered laterally, and with letters in a color that contrast to the label background. This constitutes the manufacturer's certification that the helmet conforms to the applicable Federal Motor Vehicle Safety Standards. The certification label shall contain the following:	PASS	PASS
Manufactures name and/or brand. This must be above the model designation, centered, and in letters at least 0.23 cm (0.09 inch) high.	PASS	PASS
Precise model designation. This must be above the symbol “DOT”, centered, and in letters at least 0.23 cm (0.09 inch) high.	PASS	PASS
Symbol “DOT”. This symbol should be centered with letters at least 1 cm (0.375 inch) high. The horizontal centerline on the symbol shall be located a minimum of 2.5 cm (1.0 inches) and a maximum of 7.6 cm (3.0 inches) from the bottom edge of the posterior portion of the helmet	PASS	PASS
“FMVSS No. 218”. This must be below the symbol “DOT”, centered, and in letters at least 0.23 cm (0.09 inch) high.	PASS	PASS
“Certified”. This must be below the “FMVSS No. 218”, centered, and in letters at least 0.23 cm (0.09 inch) high.	PASS	PASS

Comments:

- S5.6.1 Labeling: The instructions to the purchaser label is incomplete.
 - Liner constructed of information is missing.
- This helmet does not satisfy all the labeling requirements of S5.6 of FMVSS No. 218 Section 12.5.4. See labeling photographs (Appendix C). The DOT symbol is 1.06 cm in height and is 4.34 cm above the rear of the helmet based on the edge of the molding. The specified height is between 2.5 and 7.6 cm.

SECTION 3 TEST DATA

3.1 CONDITIONING ENVIRONMENT PLOTS

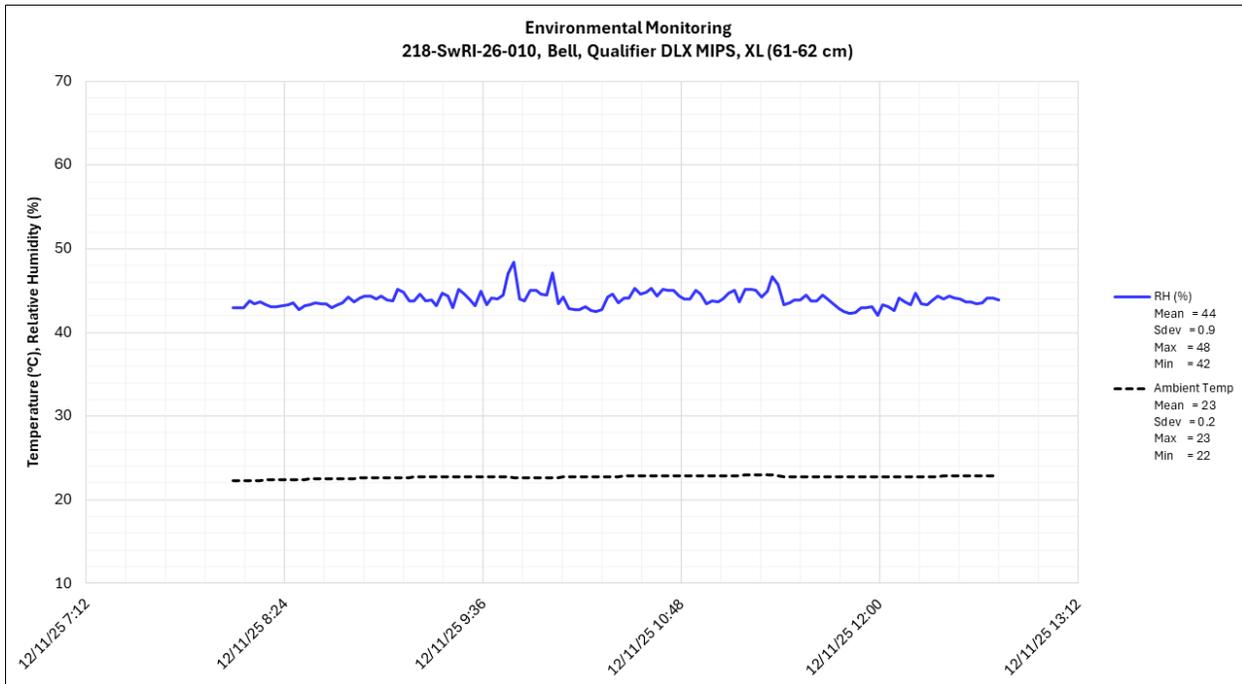


Figure 1: Relative Humidity and Ambient Temperature, Bell, Qualifier DLX Blackout, XL (61-62 cm)

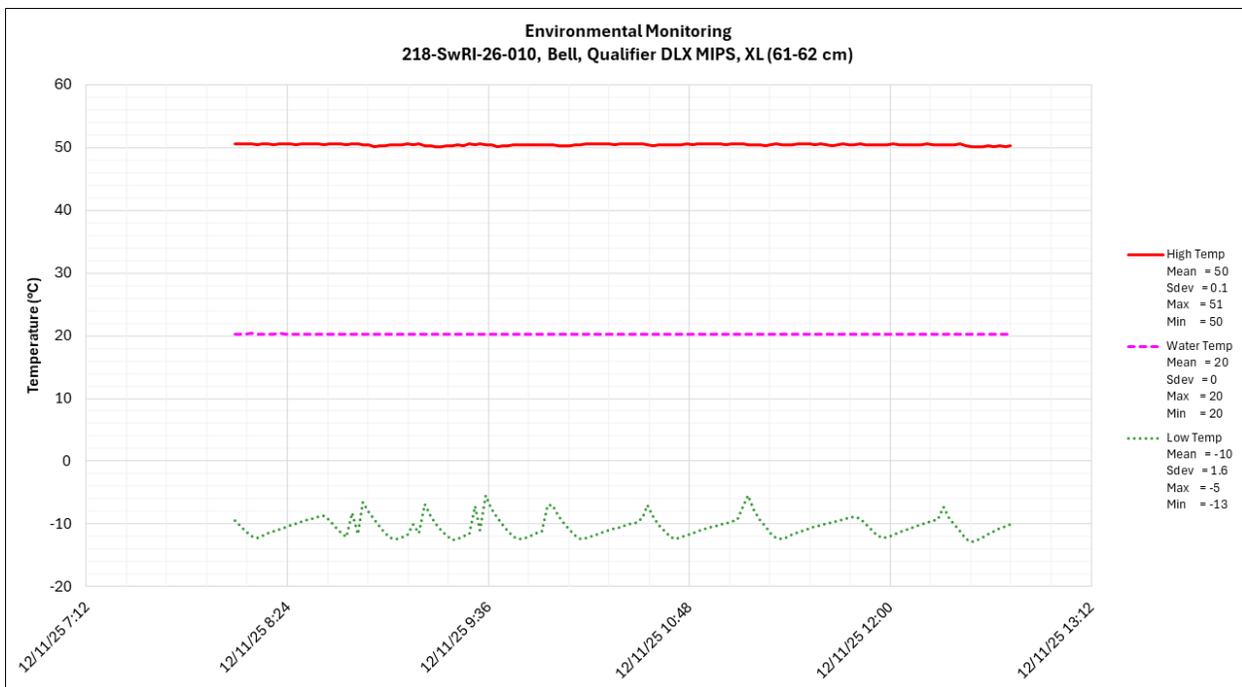


Figure 2: High, Low, and Water Temperatures, Bell, Qualifier DLX Blackout, XL (61-62 cm)

3.2 IMPACT TIME HISTORY PLOTS

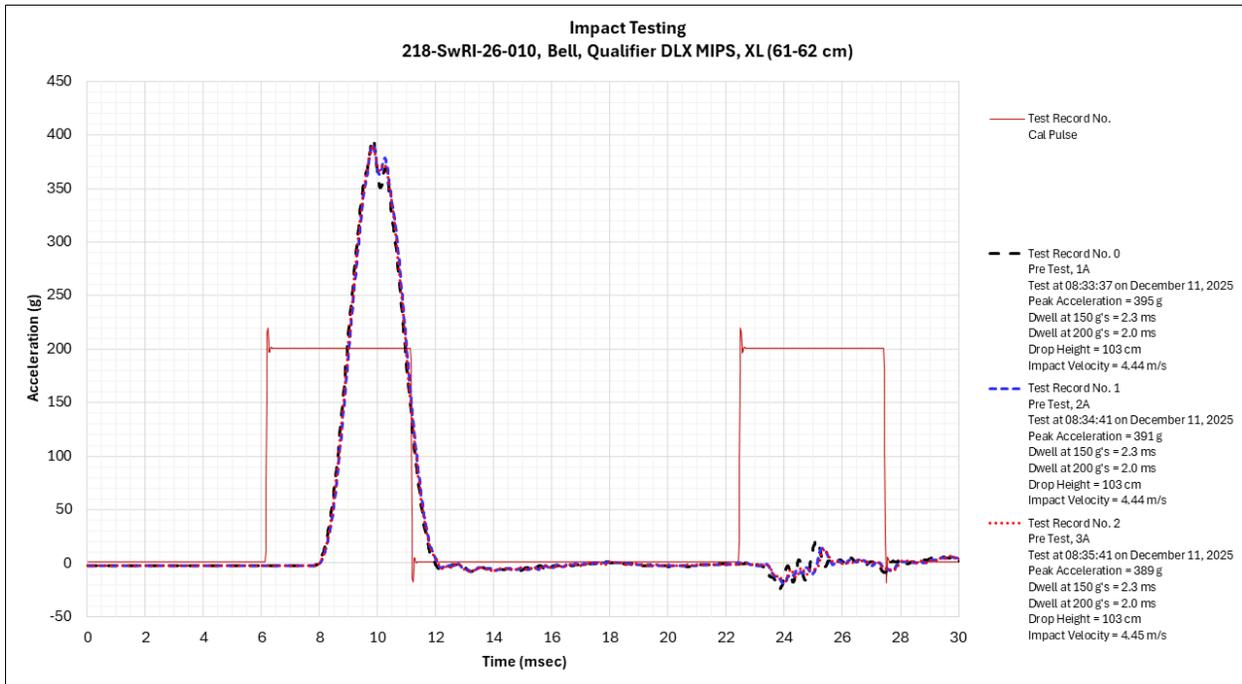


Figure 3: Pre-Impact Test Checks, Bell, Qualifier DLX Blackout, XL (61-62 cm)

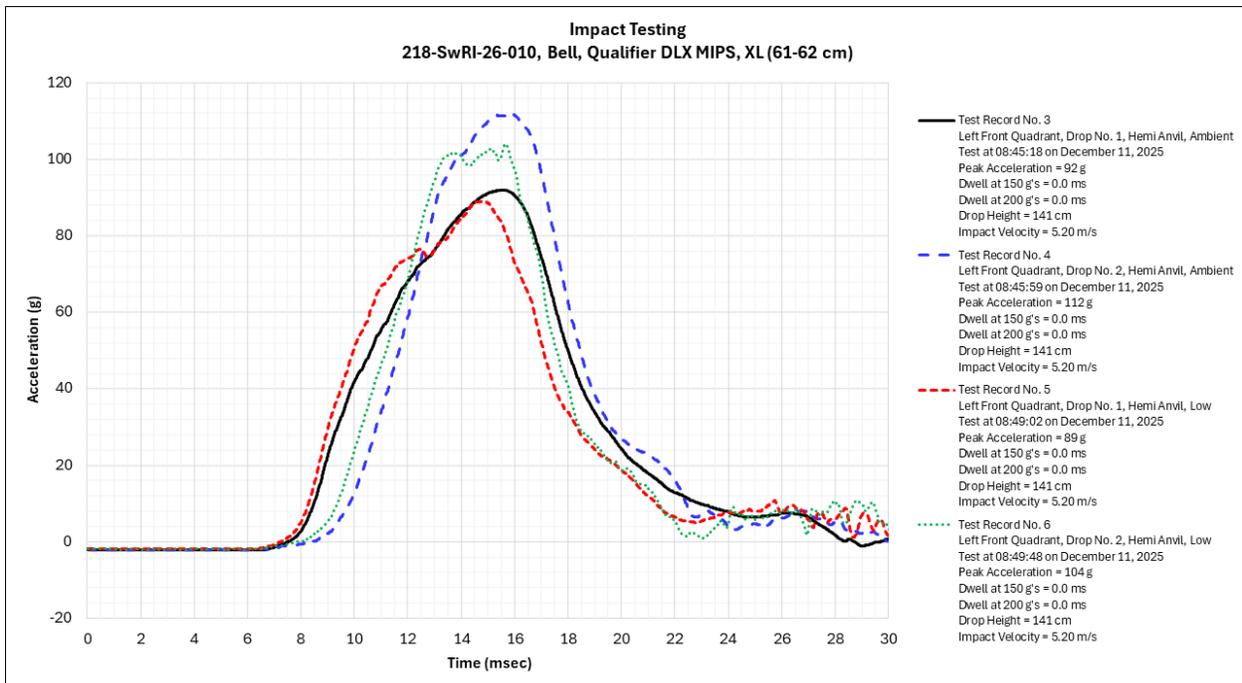


Figure 4: Impact Loc. #1, Helmets A and B, Bell, Qualifier DLX Blackout, XL (61-62 cm)

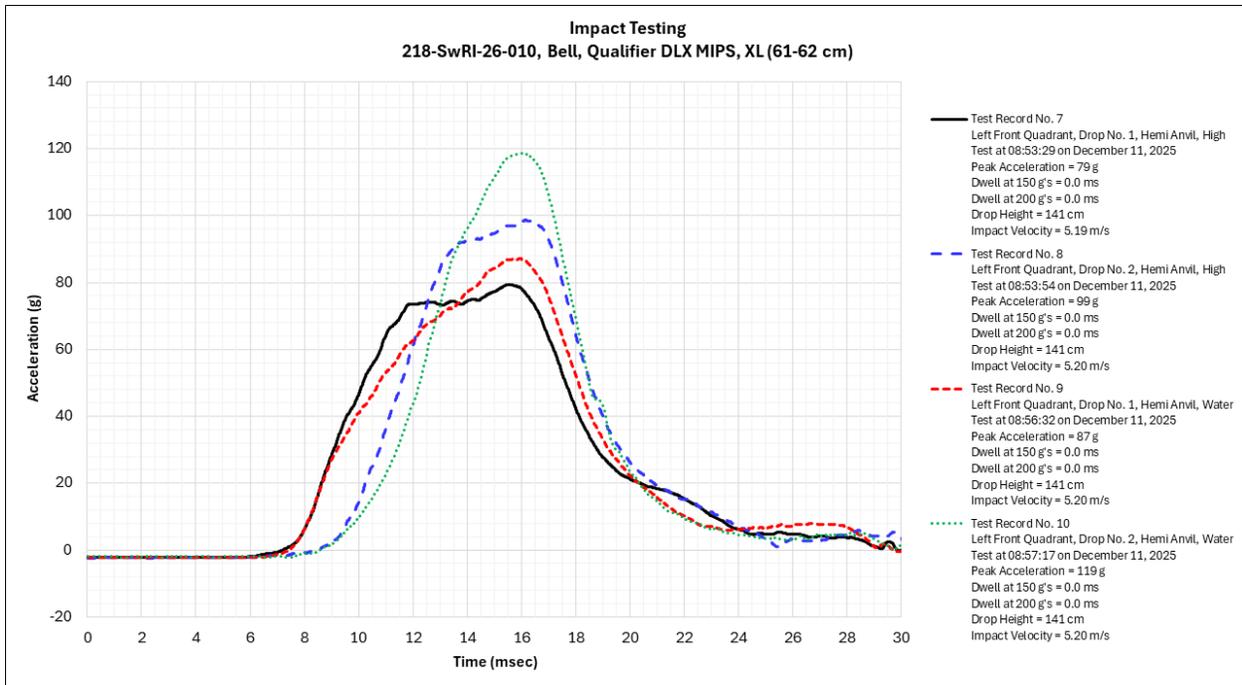


Figure 5: Impact Loc. #1, Helmets C and D, Bell, Qualifier DLX Blackout, XL (61-62 cm)

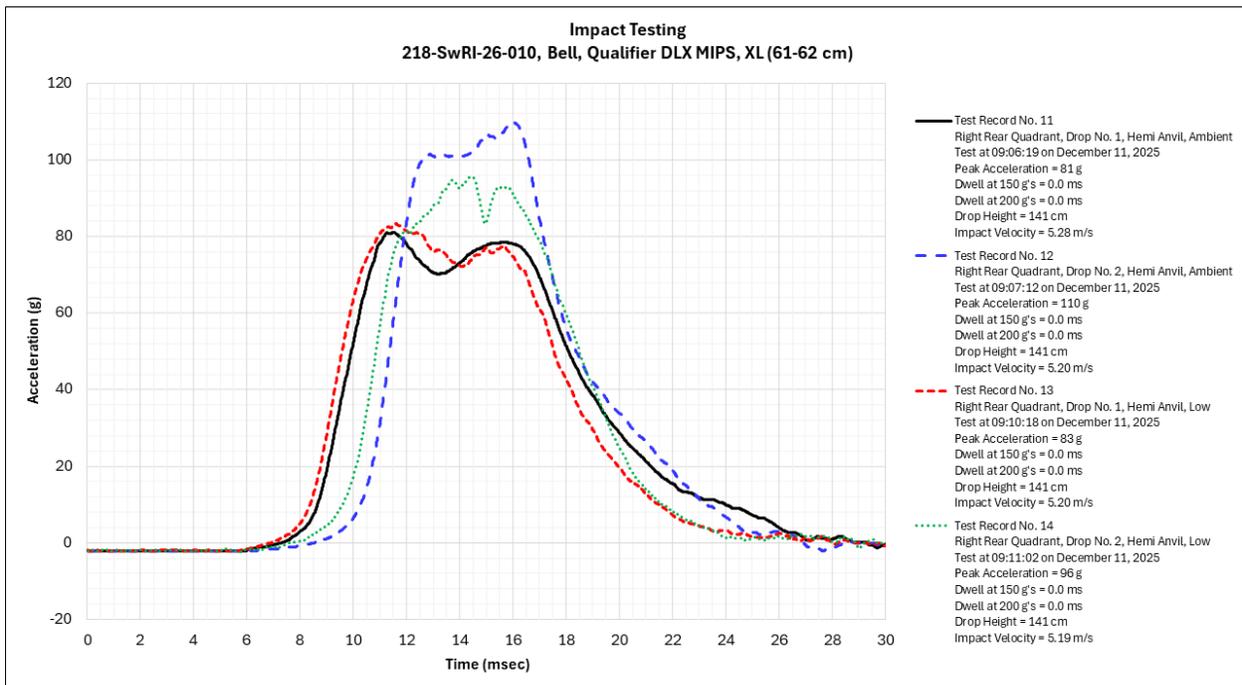


Figure 6: Impact Loc. #2, Helmets A and B, Bell, Qualifier DLX Blackout, XL (61-62 cm)

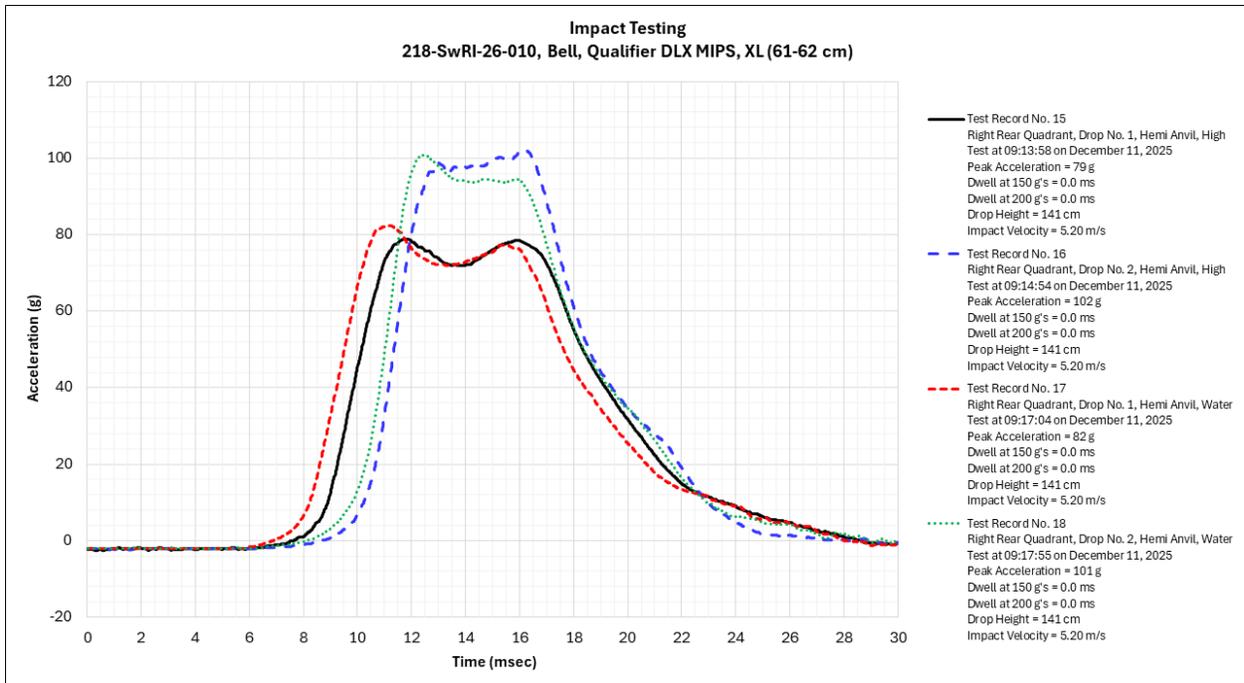


Figure 7: Impact Loc. #2, Helmets C and D, Bell, Qualifier DLX Blackout, XL (61-62 cm)

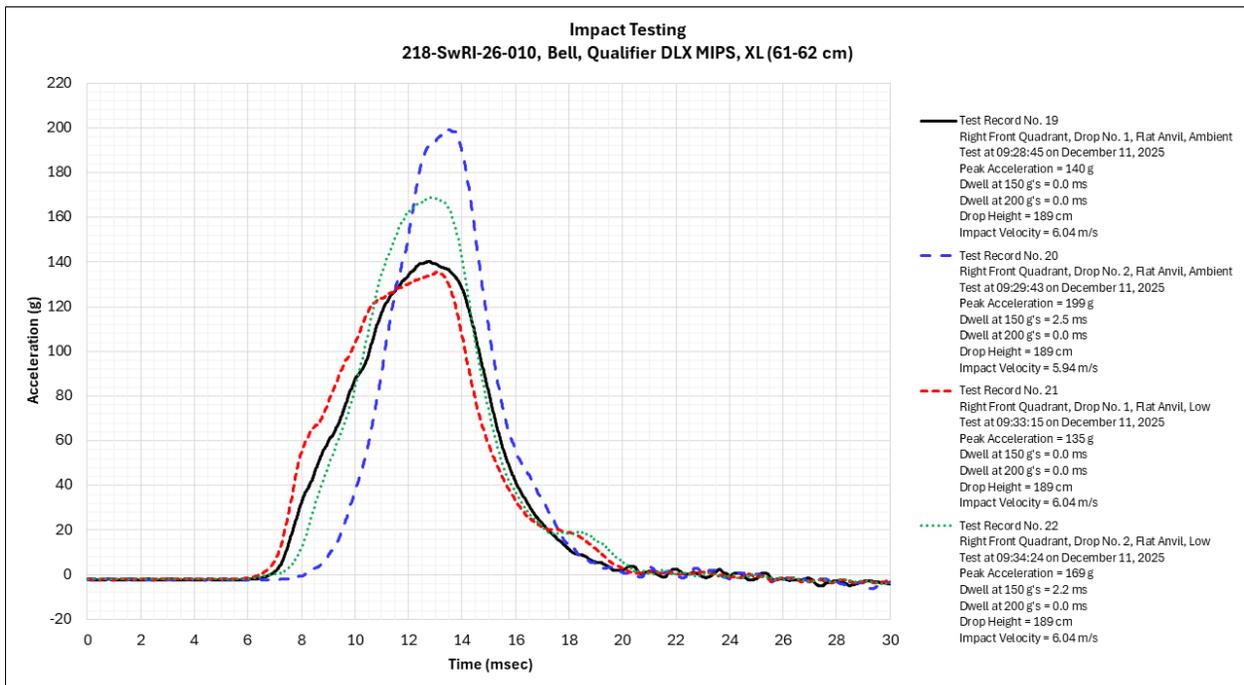


Figure 8: Impact Loc. #3, Helmets A and B, Bell, Qualifier DLX Blackout, XL (61-62 cm)

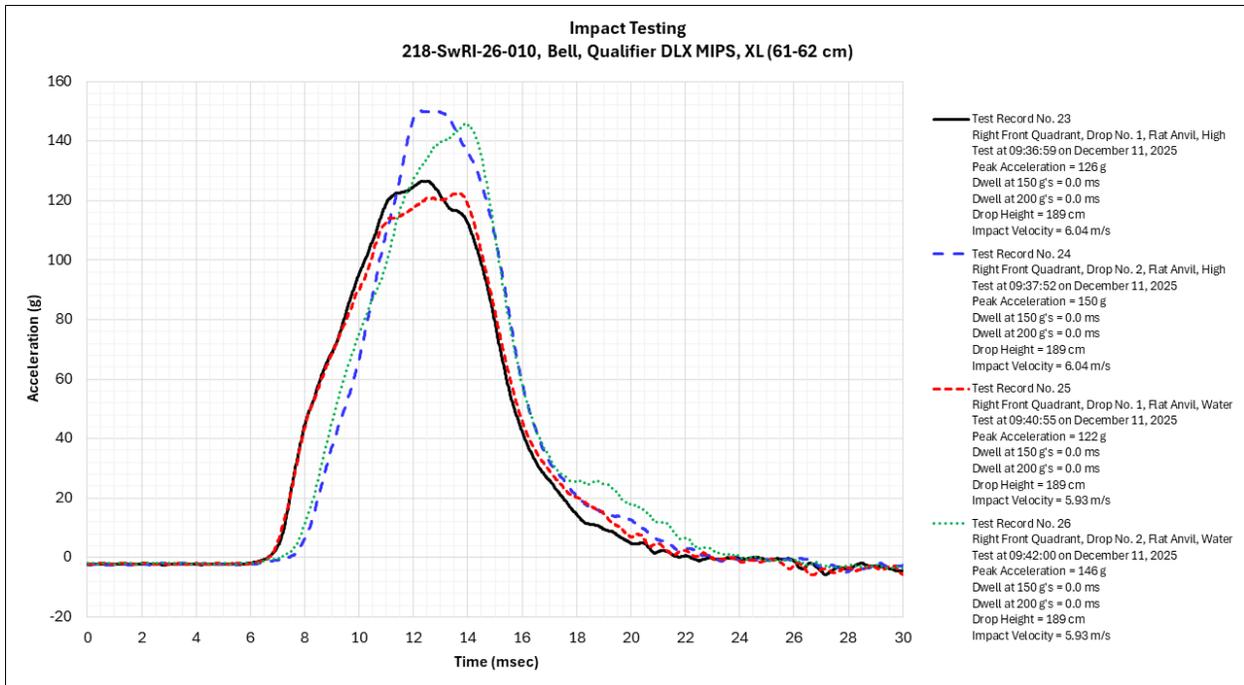


Figure 9: Impact Loc. #3, Helmets C and D, Bell, Qualifier DLX Blackout, XL (61-62 cm)

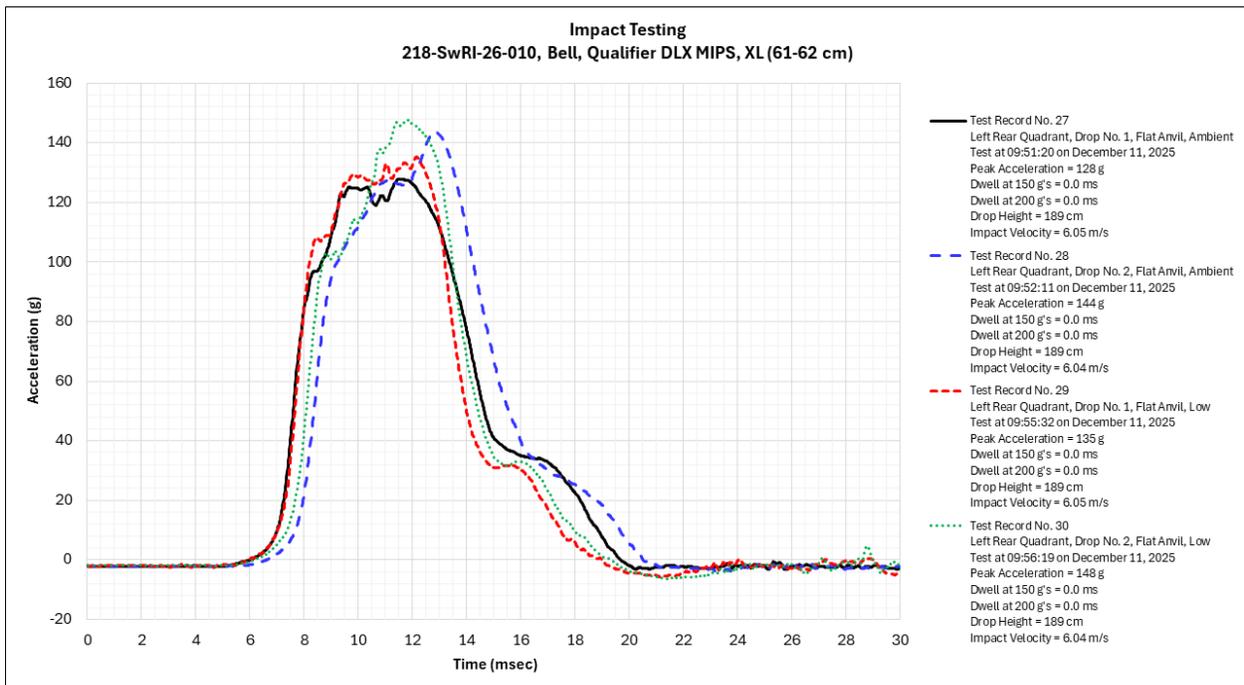


Figure 10: Impact Loc. #4, Helmets A and B, Bell, Qualifier DLX Blackout, XL (61-62 cm)

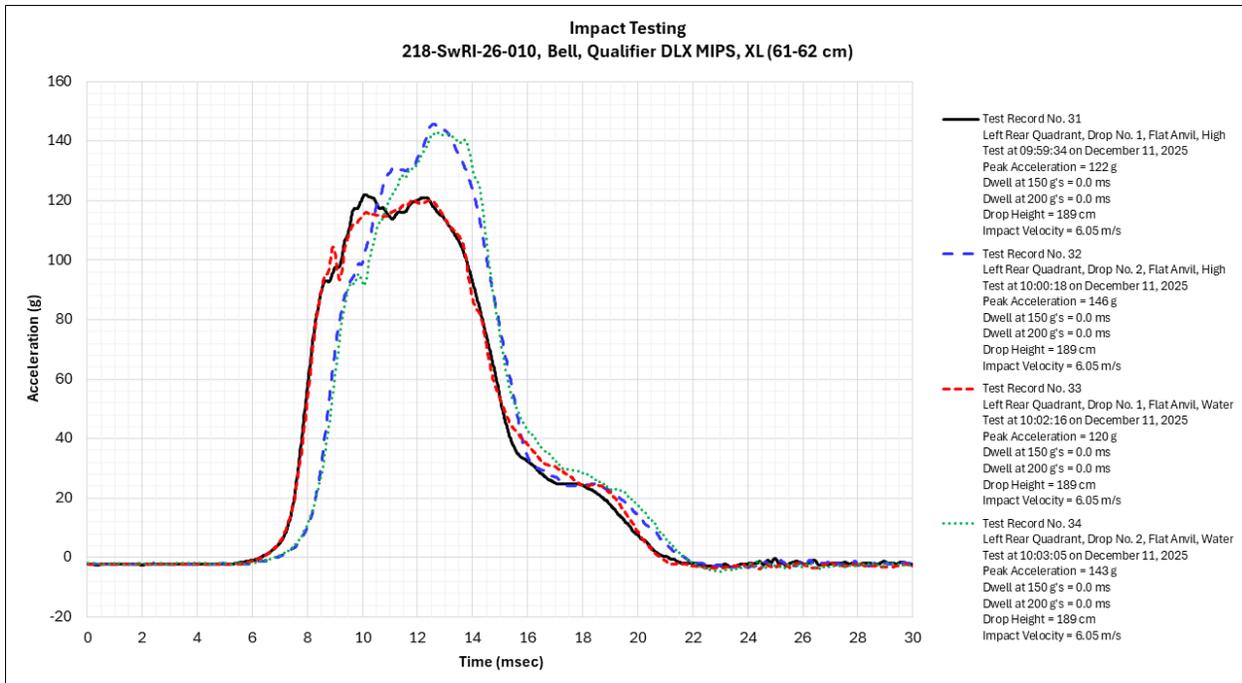


Figure 11: Impact Loc. #4 Helmets C and D, Bell, Qualifier DLX Blackout, XL (61-62 cm)

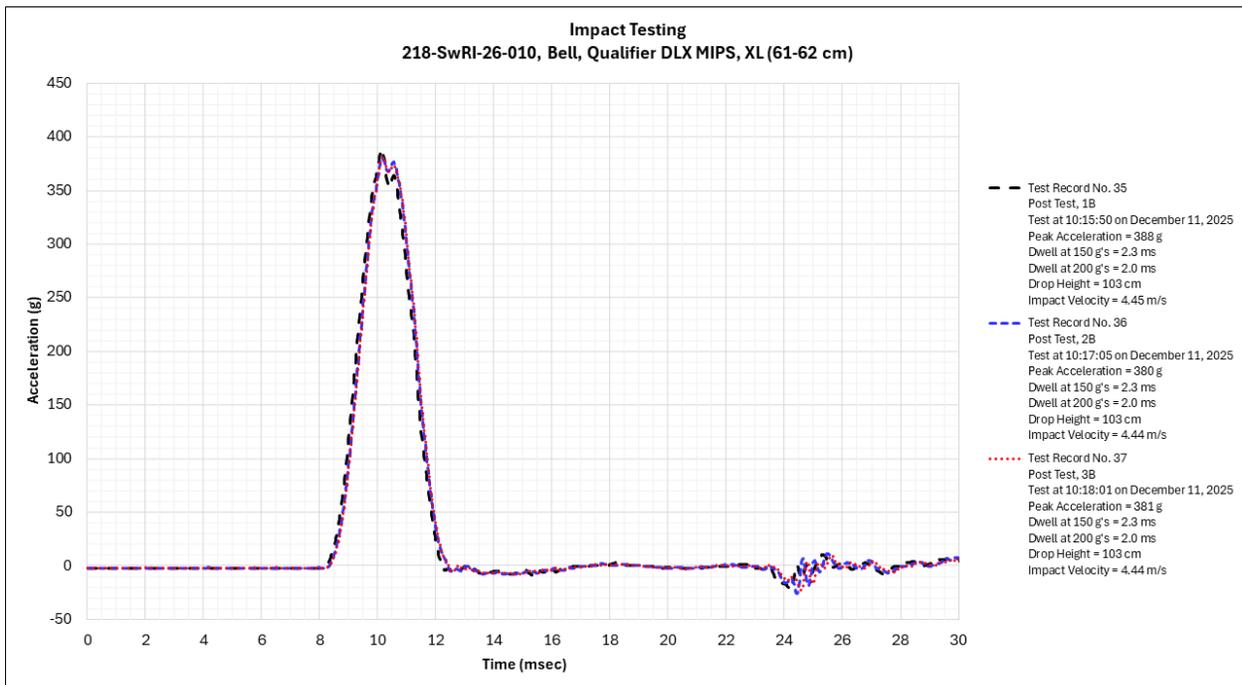


Figure 12: Post-Impact Test Checks, Bell, Qualifier DLX Blackout, XL (61-62 cm)

3.3 RETENTION TIME HISTORY PLOTS

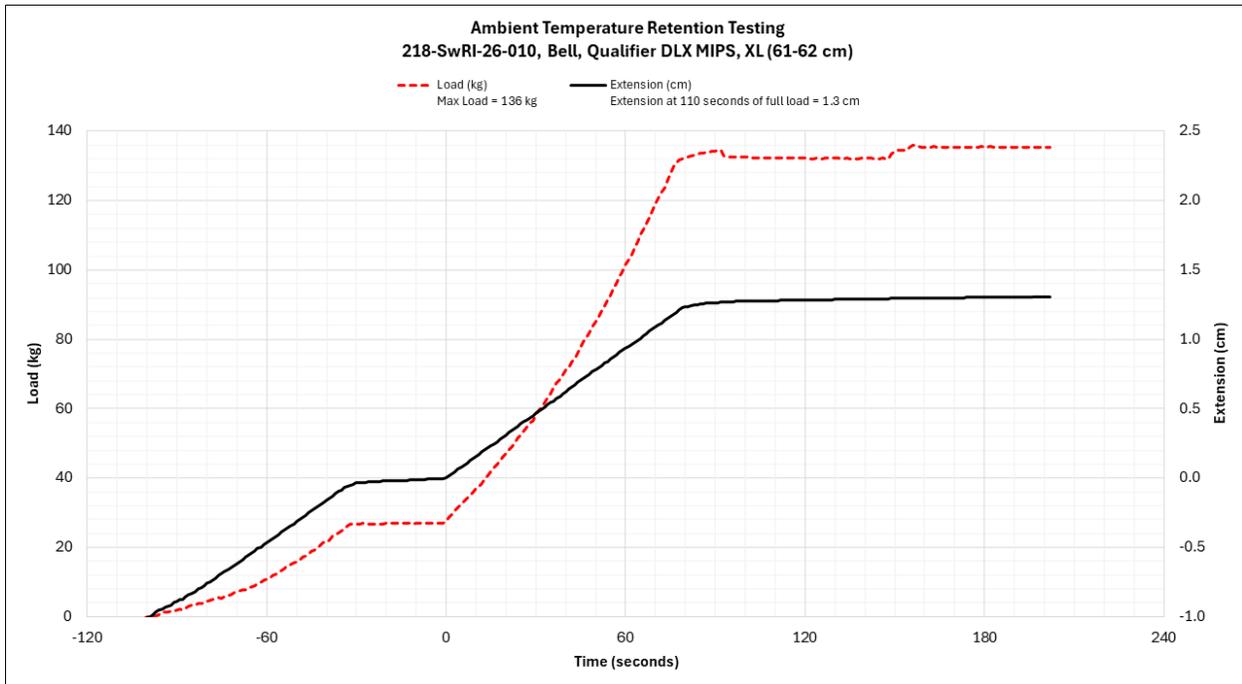


Figure 13: Ambient Temperature Retention Testing, Bell, Qualifier DLX Blackout, XL (61-62 cm)

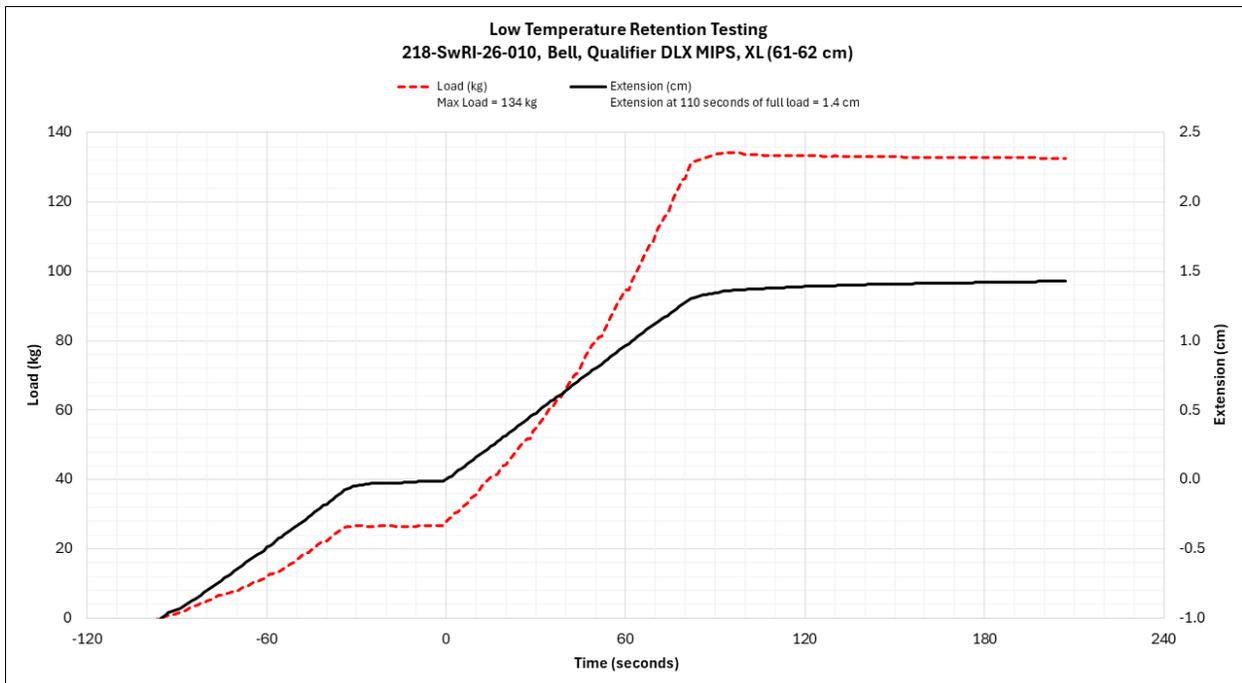


Figure 14: Low Temperature Retention Testing, Bell, Qualifier DLX Blackout, XL (61-62 cm)

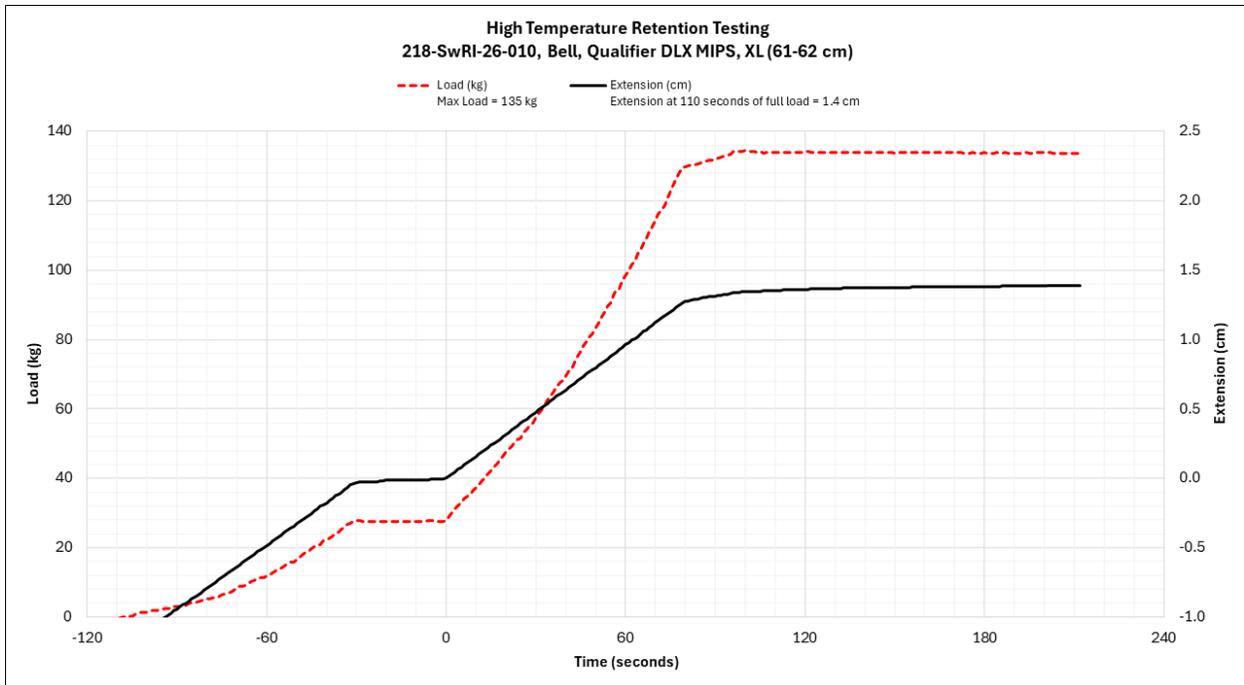


Figure 15: High Temperature Retention Testing, Bell, Qualifier DLX Blackout, XL (61-62 cm)

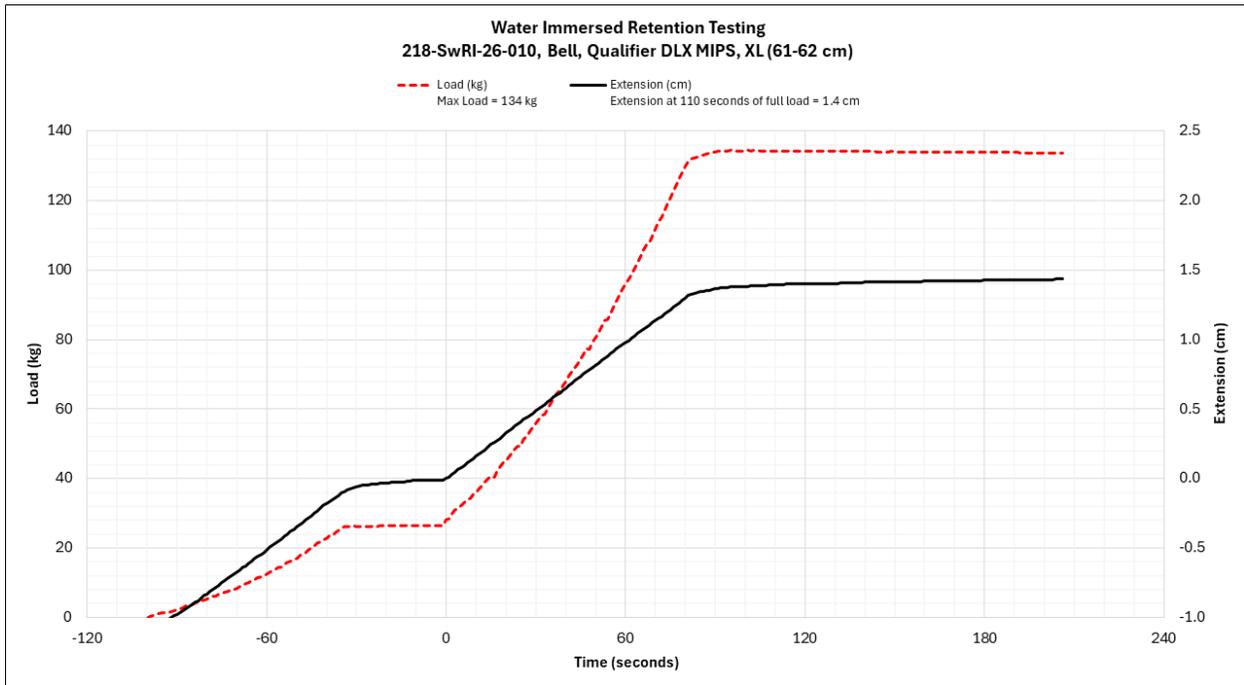


Figure 16: Water Immersed Retention Testing, Bell, Qualifier DLX Blackout, XL (61-62 cm)

SECTION 4 TEST FAILURE DETAILS

- S5.6.1 Labeling: The instructions to the purchaser label is incomplete.
 - Liner constructed of information is missing.

APPENDIX A INTERPRETATION OF DEVIATIONS FROM FMVSS No. 218

All testing was performed in accordance with the requirements of FMVSS No. 218.

APPENDIX B TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

Table 16: Test Apparatus List for SwRI Protective Headgear Testing Requiring One-Time Dimension Checks or No Calibration

ITEM NO.	DESCRIPTION	MANUFACTURER	MODEL	ASSET/SN	ACCURACY	DATE OF DIMENSIONAL CHECK
1a	DOT Headforms	Controlled Casting	Small, Medium, and Large	None	+0.31 inches	6/89
1b	DOT Headforms	CADEX	Large	4914	+0.31 inches	2/08
2	ISO Impact Headforms	None	A, E, J, M, and O	None	N/A	N/A
3	ISO Full Headforms	None	A, E, J, M, and O	None	N/A	N/A
4	Drop Assembly	SwRI	Small, Medium, and Large	None	TP-218-06	6/89
5	Modular Elastomeric Programmer (MEP)	MTS Systems Corp.	None	None	N/A	N/A
6	Spherical Impactor with MEP	None	None	None	N/A	N/A
7	Static Retention Test System	SwRI	None	None	N/A	N/A
8	Chin Strap Fixture	SwRI	1	1	TP-218-06	1/80
9	Static Weights (Steel)	SwRI	1	1	±0.1 lbs.	2/94
10	Hydraulic Cylinder	Enerpac	RD46	1	N/A	N/A
11	Hydraulic Pump	Enerpac	P-18	CC 4511	N/A	N/A
12	Dynamic Retention Test System	None	None	None	N/A	N/A
13	Chin Strap Fixture	SwRI	1	1	TP-218-06	1/80
14	Dynamic Weights (Steel)	SwRI	1	1	±0.1 lbs.	2/94
15	Roll-off Test System	None	None	None	N/A	N/A
16	Penetration Striker	SwRI	1	1	TP-218-06	1/80
17	Environmental Conditioner	EDPAC	Mini Tech 90	None	N/A	N/A
18	Oven with Digitronic Control	Despatch Industries Inc.	LDB1-69	128710	N/A	N/A
19	Freezer with Omega Temperature Controller	Sears	9105010 CN100TC	S102041026 4011302	N/A	N/A
20	Peripheral Vision Template	SwRI	1	1	±15 min	1/80

Table 17: Instrumentation List for SwRI Protective Headgear Testing

ITEM NO.	DESCRIPTION	MANUFACTURER AND MODEL	ASSET/SN	ACCURACY	DATE OF LAST CAL.	DATE OF NEXT CAL.
1a	Data Acquisition System (DAS)	National Instruments CDAQ-9178, NI-9402, NI-9239	None	DAS Validation Procedure	11/13/2025	11/13/2026
1b	Data Acquisition Software	National Instruments / LabVIEW for Windows	Version 12	DAS Validation Procedure	11/13/2025	11/13/2026
1c	Data Acquisition Computer	HP Z220 Workstation	NA	DAS Validation Procedure	11/13/2025	11/13/2026
2a	Humidity and Temperature Transmitter	Omega / HX41	010751 / 0599-6004	Manufacturer's Specification and DAS Validation Procedure	01/08/2025	01/08/2026
2b	Isolated Voltage Output	Omega / OM5-II-4-20	9213-15 9149-08	Manufacturer's Specification and DAS Validation Procedure	01/08/2025	01/08/2026
3	Thermocouple Wire and Thermocouple Input Module	Omega / OM5-LTC-J2-C	21266 21261 21253	DAS Validation Procedure	11/13/2025	11/13/2026
4	Optical Velocity Transducer	Biokinetic and Associates Velocity Gate / 048-004-9411	9505-007	DAS Validation Procedure	11/13/2025	11/13/2026
5a	Test Accelerometer	Endevco / 2262-1000	NL05	DAS Validation Procedure	11/13/2025	11/13/2026
5b	Strain Gage Conditioner	Measurement Group Inc. / 2120A	102130	DAS Validation Procedure	11/13/2025	11/13/2026
5c	Strain Gage Power Supply	Measurements Group Inc. / 2110A	102034	DAS Validation Procedure	11/13/2025	11/13/2026
5d	Filter	Frequency Devices, Inc. / 5BAF-LPBU4 4-Pole Butterworth 1.75 kHz	None	DAS Validation Procedure	11/13/2025	11/13/2026
6a	Load Cell	Futek LSB353	286580	DAS Validation Procedure	11/13/2025	11/13/2026
6b	Strain Gage Conditioner	Measurement Group Inc. / 2120A	102130	DAS Validation Procedure	11/13/2025	11/13/2026
6c	Strain Gage Power Supply	Measurements Group Inc. / 2110A	102034	DAS Validation Procedure	11/13/2025	11/13/2026
6d	Isolated Voltage Output	Intelligent Measurement / PCI-5B41-02	None	DAS Validation Procedure	11/13/2025	11/13/2026
7a	Potentiometer	Humphrey / RP14-0601-1	87	DAS Validation Procedure	11/13/2025	11/13/2026
7b	Isolated Voltage Output	Intelligent Measurement / PCI-5B41-02	None	DAS Validation Procedure	11/13/2025	11/13/2026
8	Scale	Ohaus Scale Corp / EB-15	015480	Manufacturer's Specification	01/03/2025	01/03/2026
9	Function Generator	Agilent / 33220A	013902	Manufacturer's Specification	05/19/2025	05/19/2026

APPENDIX C PHOTOGRAPHS

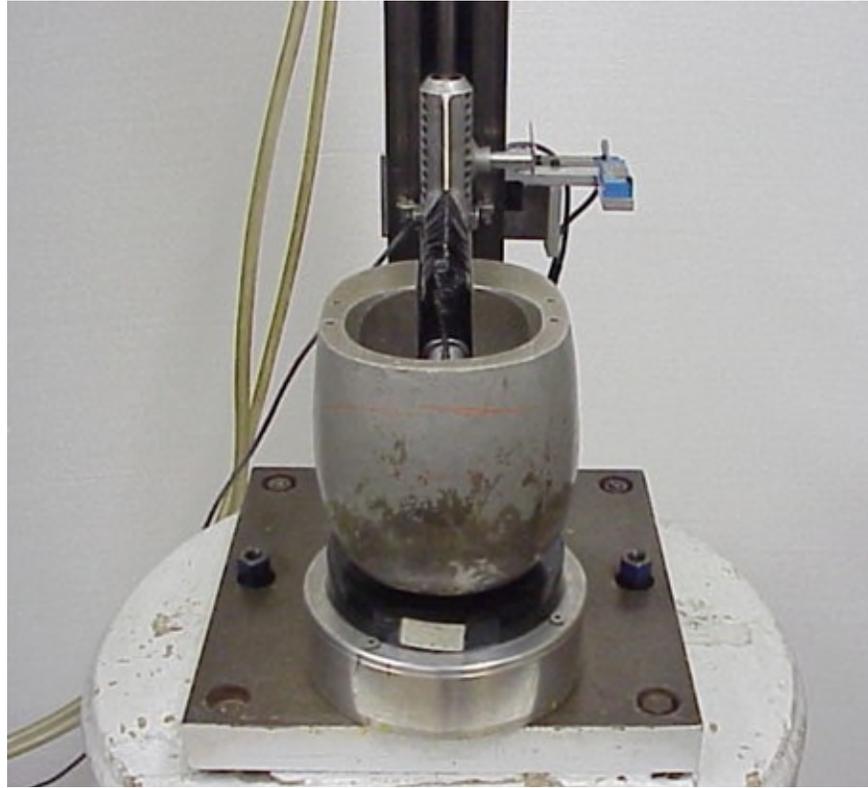
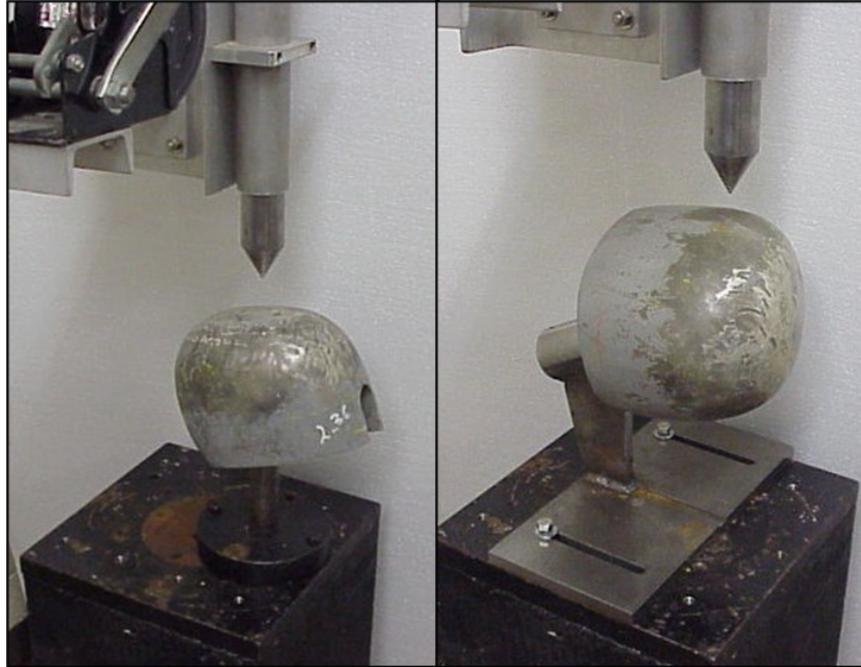


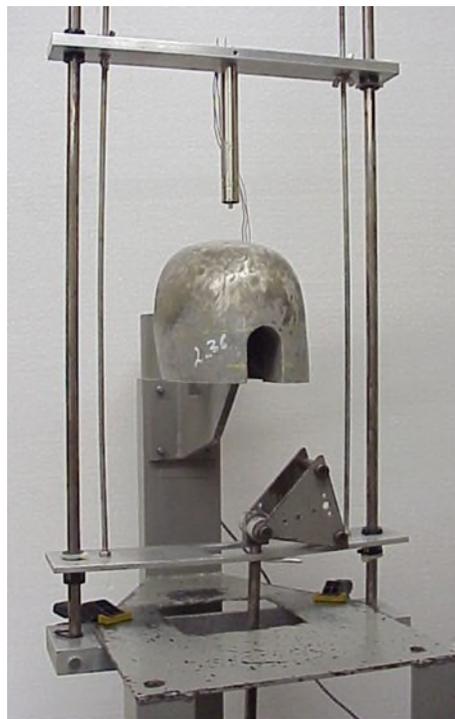
Figure 17: SwRI Helmet Impact Test Equipment: MEP Pad, DOT Headform, Drop Assembly, and Velocity Gate



Figure 18: SwRI Helmet Impact Test Equipment: Flat (left) and Hemisphere (right) Anvil Impact Configurations



*Figure 19: SwRI Helmet Test Equipment:
Penetration Resistance Test Apparatus Configured for
Crown (left) and Side, Front, and Rear (right) Locations*



*Figure 20: SwRI Helmet Test Equipment:
Retention System Test Apparatus with DOT Headform, Simulated Jaw, and LVDT*



Figure 21: Front View, Bell, Qualifier DLX Blackout, XL (61-62 cm)



Figure 22: Side View, Bell, Qualifier DLX Blackout, XL (61-62 cm)



Figure 23: Rear View, Bell, Qualifier DLX Blackout, XL (61-62 cm)



Figure 24: Top View, Bell, Qualifier DLX Blackout, XL (61-62 cm)



Figure 25: Interior View, Bell, Qualifier DLX Blackout, XL (61-62 cm)

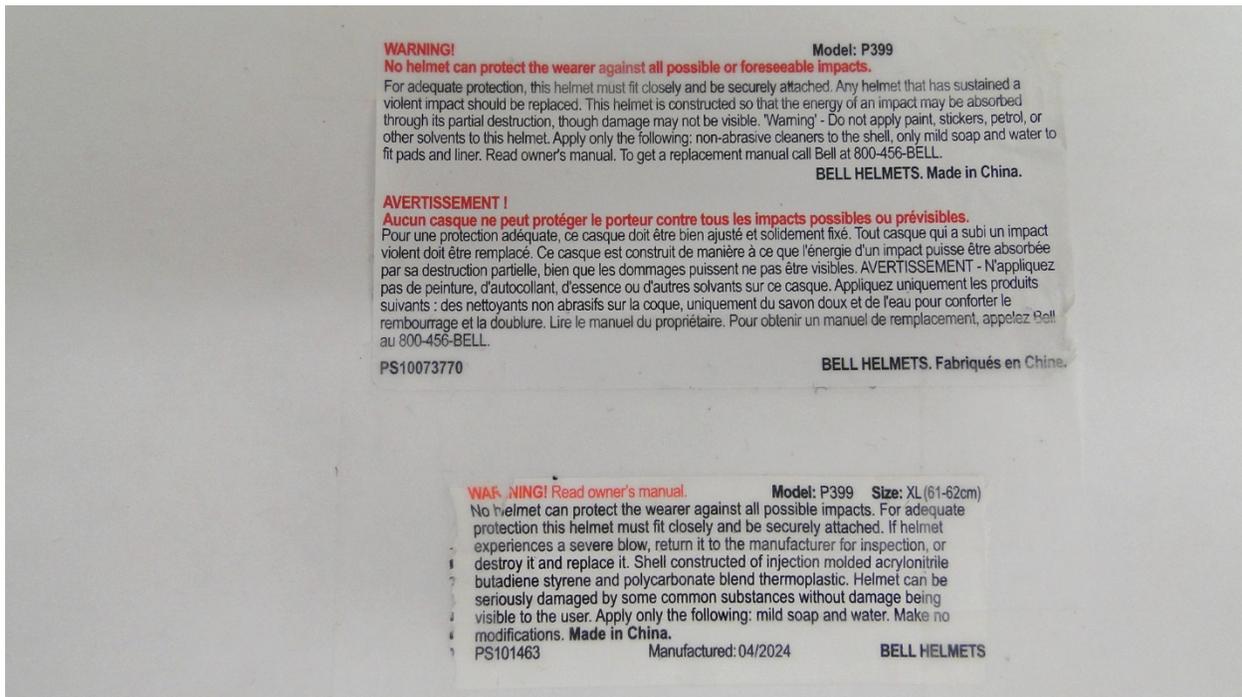


Figure 26: Labeling, Bell, Qualifier DLX Blackout, XL (61-62 cm)