

SAFETY COMPLIANCE TESTING FOR FMVSS No. 218 MOTORCYCLE HELMETS

Brand: Biltwell
Model: LANE SPLITTER
Size: L (59-60 cm)

Prepared By

ACT Lab LLC
3280 East 59th Street,
Long Beach CA 90805
www.act-lab.com




12 May 2020

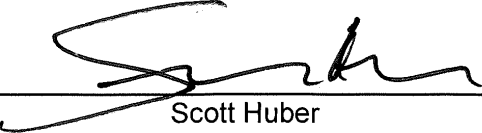
Final Report 218-ACT-20-005


Prepared For

U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance (NEF-220)
1200 New Jersey Ave., S.E.
Washington, DC 20590

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

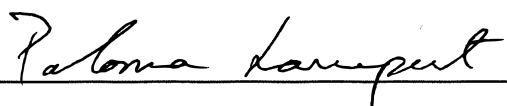
Technician: 
Devon Dahm

Project Manager: 
Scott Huber

Approved By: 
John Bogler

Approval Date: 12 May 2020

FINAL REPORT ACCEPTANCE BY OVSC

Accepted By: 

Acceptance Date: 06/11/2020

HS# 646684

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 218-ACT-20-005	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Sub-Title FINAL REPORT OF FMVSS NO. 218 COMPLIANCE TESTING OF BILTWELL, MODEL LANE SPLITTER, SIZE L (59-60 cm) MOTORCYCLE HELMET		5. Report Date 12 May 2020	
		6. Performing Organization Code ACT	
7. Author(s) Scott Huber, Program Manager		8. Performing Organization Report No. 52.1105.001	
9. Performing Organization Name and Address ACT Lab LLC 3280 East 59th Street, Long Beach CA 90805		10. Work Unit No.	
		11. Contract or Grant No. 693JJ918D000022	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NEF-220) 1200 New Jersey Avenue, S.E. Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report	
		14. Sponsoring Agency Code NEF-220	
16. Abstract Compliance tests were conducted on the subject model motorcycle helmet in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-218-07. Test failures identified were as follows: S5.6.1 Labeling. The discrete size and month & year of manufacture labels do not appear to be permanent. The instructions to the purchaser labels are incomplete.			
17. Key Words Helmet Compliance Testing Safety Engineering FMVSS No. 218		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division (NPO-120) 1200 New Jersey Avenue, S.E. Washington, D.C. 20590	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 35	22. Price

Form DOT F1700.7 (8-69)

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

Control Document; Official ACT NHTSA FMVSS No.218/Report Template TP-07/USA 14 May 2020/Rev.22

SharePoint/GlobalResourceLibrary/Reporting/ReportTemplates/Helmets/FMVSS No.218

TABLE OF CONTENTS

Section I	Purpose of Compliance Test
Section II	Compliance Test Data Summary
Section III	Test Data
Section IV	Test Failure Details
Appendix A	Interpretations or Deviations from FMVSS No. 218
Appendix B	Test Equipment and Calibration
Appendix C	Photographs

PURPOSE OF COMPLIANCE TEST

1. PURPOSE OF COMPLIANCE TEST

This testing was conducted as part of the Department of Transportation, 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.

2. TEST PROCEDURE

The ACT Lab Helmet Testing Manual, Part I – Motorcycle Helmets³ submitted to the Office of Vehicle Safety Compliance, National Highway Traffic Safety Administration, contains the specific procedures used to conduct this test. The ACT Lab Helmet Testing Manual, Part I – Motorcycle Helmets as modified by Project-Specific notations is in accordance with TP-218-07.

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

¹ NHTSA, FMVSS No. 218, Motorcycle Helmets, 49 CFR Chapter V Section 571.218, August 20, 1973 as last amended FR 28132 Vol. 76, No. 93, May 13, 2011.

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

³ ACT Lab Helmet Test Manual, Version 4.2 – Motorcycle Helmets in accordance with FMVSS No. 218, 22 July 2013.

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

HELMET DATA

HELMET BRAND NAME: Biltwell

HELMET MODEL DESIGNATION: LANE SPLITTER

HELMET MANUFACTURER: Biltwell Custom Motorcycle Corp.

HELMET SIZE: L (59-60 cm)

HELMET COVERAGE: Partial: _____ Full: _____ Complete: X

HELMET POSITIONING INDEX: 49 mm

SHELL MATERIAL: Acrylonitrile Butadiene Styrene (ABS) Polymer

LINER MATERIAL: Expanded Polystyrene (EPS)

BUCKLE DESCRIPTION: Double D-Rings

HELMET	A Ambient	B Low Temp	C High Temp	D Water Immersed	E Spare
SHELL COLOR/PATTERN	Black	Black	Black	Black	Black
WEIGHT (grams)	1462	1438	1451	1450	1565
MONTH & YEAR OF MANUFACTURE	Aug 2019	Aug 2019	Aug 2019	Aug 2019	Aug 2019

COMMENTS:

1. All helmets were received in undamaged condition and were appropriate for testing.
2. Weights listed above for helmets A-D are as tested with face shield removed.
3. Weight for helmet E is complete with all components in place.
4. NHTSA provided the HPI based on information obtained from the manufacturer.

SUMMARY OF TEST RESULTS

INDICATE Pass or Fail

HELMET	A	B	C	D
TEST	AMBIENT	LOW TEMP	HIGH TEMP	WATER IMMERSSED
IMPACT	Pass	Pass	Pass	Pass
PENETRATION	Pass	Pass	Pass	Pass
RETENTION	Pass	Pass	Pass	Pass

INDICATE Pass or Fail

TEST	PASS/FAIL
PERIPHERAL VISION	Pass
LABELING	Fail

COMMENTS:

1. S5.6.1 Labeling. The discrete size and month & year of manufacture labels do not appear to be permanent. S5.6.1 Labeling. The instructions to the purchaser labels are incomplete.

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

SELECTION OF APPROPRIATE HEADFORM

Paragraph S6.1 - If the helmet size designation falls into more than one of three size ranges, it shall be tested on each appropriate headform.

HELMET SIZE DESIGNATION	HEADFORM SIZE
Less than or equal to 6-3/4 (European Size 54)	SMALL
Greater than 6-3/4, but less than or equal to 7-1/2 (European Size 60)	MEDIUM
Greater than 7-1/2 (European 60)	LARGE

COMMENTS:

The manufacturer marked the helmet with its corresponding discrete size: L (59-60 cm),
Headform Size: DOT Medium.

CONDITIONING FOR TESTING — Paragraph S6.4 — The protective headgear shall be conditioned for not less than 4 hours and no more than 24 hours, in the specified environmental condition shown below, prior to test.

Ambient Conditions	16°C to 26°C (61°F to 79°F); 30% to 70% Relative Humidity
Low Temperature	-15°C to -5°C (5°F to 23°F)
High Temperature	45°C to 55°C (113°F to 131°F)
Water Immersion	16°C to 26°C (61°F to 79°F)

The maximum time during which the protective headgear may be out of the conditioning environment shall not exceed 4 minutes. It must then be returned to the conditioned environment for a minimum of 3 minutes for each minute or portion of a minute in excess of 4 minutes out of the conditioning environment or 12 hours, whichever is less, prior to resumption of testing.

AVERAGE LAB TEMPERATURE : 22.5 °C ; AVERAGE LAB HUMIDITY : 50.3 %

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

IMPACT ATTENUATION

SYSTEMS CHECK	TRIAL DROP	DROP (meters)	VEL. (m/s)	PEAK (g)	DWELL TIME (ms)		TEST RECORD	HEADFORM POSITION
					150 g	200 g		
PRETEST	1	1.30	4.89	403.3	2.42	2.06	Pre 1	Crown
	2	1.30	4.85	408.9	2.42	2.06	Pre 2	Crown
	3	1.30	4.88	407.5	2.39	2.06	Pre 3	Crown
PRETEST AVERAGE		XXXX	XXXX	408.6	XXX	XXX	XXXX	XXXX
POSTTEST	1	1.30	4.83	404.0	2.39	2.00	Post 1	Crown
	2	1.30	4.87	401.0	2.47	2.03	Post 2	Crown
	3	1.30	4.91	413.1	2.42	2.00	Post 3	Crown
POSTTEST AVERAGE		XXXX	XXXX	406.0	XXX	XXX	XXXX	XXXX
DIFFERENCE BETWEEN PRE-TEST AND POST-TEST AVERAGES				2.6	DIFFERENCE NOT TO EXCEED 15 g			

Helmet Designation	Helmet Condition	Impact Location	Front		Left		Right		Rear	
			1	2	1	2	1	2	1	2
A	Ambient	Impact Number	Hemi		Hemi		Flat		Flat	
		Test Record No.	1	2	3	4	5	6	7	8
		Peak g	88.2	108.7	106.6	121.4	185.6	217.0	181.1	216.8
		ms @ 150	0.00	0.00	0.00	0.00	3.52	3.53	3.15	3.69
		ms @ 200	0.00	0.00	0.00	0.00	0.00	1.93	0.00	0.88
		Velocity m/s	5.21	5.21	5.22	5.19	6.03	6.01	6.09	6.09
B	Low Temperature	Impact Number	Hemi		Hemi		Flat		Flat	
		Test Record No.	9	10	11	12	13	14	15	16
		Peak g	96.6	105.1	111.9	115.9	195.3	223.8	180.2	211.5
		ms @ 150	0.00	0.00	0.00	0.00	3.37	3.49	3.46	3.64
		ms @ 200	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.70
		Velocity m/s	5.22	5.21	5.19	5.20	6.01	6.03	6.08	6.07
C	High Temperature	Impact Number	Hemi		Hemi		Flat		Flat	
		Test Record No.	17	18	19	20	21	22	23	24
		Peak g	81.0	102.7	96.9	103.5	176.3	182.5	162.9	191.2
		ms @ 150	0.00	0.00	0.00	0.00	3.35	3.09	1.39	2.11
		ms @ 200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Velocity m/s	5.19	5.19	5.20	5.21	6.04	6.00	6.09	6.08
D	Water Immersed	Impact Number	Hemi		Hemi		Flat		Flat	
		Test Record No.	25	26	27	28	29	30	31	32
		Peak g	80.6	91.7	96.7	104.0	178.1	201.3	170.6	191.3
		ms @ 150	0.00	0.00	0.00	0.00	3.51	3.50	1.94	3.45
		ms @ 200	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00
		Velocity m/s	5.22	5.22	5.21	5.21	6.03	6.04	6.09	6.09

COMMENTS: 1. The actual drop heights were: flat anvil 201 cm, hemi anvil 148 cm.
2. Values reported in the above tables are rounded.

Contract File No.: 52.1105
Test File: 001

Technician: Devon Dahm
Test Date: 12 May 2020

PENETRATION

Paragraph S5.2 and S7.2

WEIGHT OF STRIKER: 2.95 to 3.06 kg (6 pounds, 8 ounces to 6 pounds, 12 ounces)

POINT OF STRIKER: Radius = 0.5 ± 0.1 mm (0.02 ± 0.004 in.), included angle of $60^\circ \pm 0.5^\circ$, hardness minimum of 60 Rockwell "C" Scale and a cone height of not less than 3.8 ± 0.038 cm (1.5 ± 0.015 in.).

HEIGHT OF FALL: $300 \text{ cm} \pm 1.5 \text{ cm}$, measured from the tip of the striker point to the outer surface of the mounted protective headgear.

FAILURE CRITERION: When tested, the protective headgear shall be failed if the penetrator has made an indentation in the headform.

TEST	HELMET	TEST LOCATION	PASS	FAIL	CONDITIONS
1	A	Crown	X		AMBIENT
2	A	Rear Right	X		AMBIENT
3	B	Crown	X		LOW TEMPERATURE
4	B	Rear Right	X		LOW TEMPERATURE
5	C	Crown	X		HIGH TEMPERATURE
6	C	Rear Right	X		HIGH TEMPERATURE
7	D	Crown	X		WATER IMMERSED
8	D	Rear Right	X		WATER IMMERSED

COMMENT: Photographs of penetration test locations are found in Appendix C.

Contract File No.: 52.1105

Test File: 001

Control Document; Official ACT NHTSA FMVSS No.218/Report Template TP-07/USA 14 May 2020/Rev.22
 SharePoint/GlobalResourceLibrary/Reporting/ReportTemplates/Helmets/FMVSS No.218

Technician: Devon Dahm

Test Date: 12 May 2020

RETENTION SYSTEM

Paragraph S5.3 and S7.3

REQUIREMENTS:

READING	APPLIED LOAD
INITIAL	22.68 kg, + 4.54 kg, - 0 kg (50.0 Lbs, + 10 Lbs, - 0 Lbs)
FINAL	136 kg, + 0 kg, - 2.3 kg (300.0 Lbs, + 0 Lbs, - 5 Lbs)

ELONGATION NOT TO EXCEED 2.5 cm (1.0 INCH) AFTER LOAD INCREASE

HELMET	CONDITIONS	INITIAL READING (cm)	FINAL READING (cm)	ELONGATION (cm)
A	AMBIENT	0.68	1.76	1.08
B	LOW TEMPERATURE	0.81	1.87	1.06
C	HIGH TEMPERATURE	0.99	2.22	1.23
D	WATER IMMERSED	0.66	1.79	1.13

CONFIGURATION - Paragraph S5.4 - Helmet shall provide a minimum peripheral vision of 105° to each side of the midsagittal plane. The brow opening shall be at least 2.54 cm (1 inch) above all points in the basic plane that are within the angles of peripheral vision.

	REQUIREMENTS	TEST RESULTS
PERIPHERAL VISION	> 105°	Pass
BROW OPENING	> 2.5 cm (1 inch)	Pass

COMMENT: Values in the above tables are rounded.

Contract File No.: 52.1105

Test File: 001

Control Document; Official ACT NHTSA FMVSS No.218/Report Template TP-07/USA 14 May 2020/Rev.22
SharePoint/GlobalResourceLibrary/Reporting/ReportTemplates/Helmets/FMVSS No.218

Technician: Devon Dahm

Test Date: 12 May 2020

LABELING

S5.6.1 *Labeling* - Each helmet shall be permanently and legibly labeled, in a manner such that the label(s) can be easily read without removing padding or any other permanent part, with the following:

Required Information	Content/Format	Permanent
Manufacturer's name	Pass	Pass
Discrete size	Pass	Fail
Month and year of manufacture	Pass	Fail
Instructions to the purchaser as follows:	-----	-----
“Shell and liner constructed of (identify type(s) of materials).”	Fail	Pass
“Helmet can be seriously damaged by some common substances without damage being visible to the user.”	Fail	Pass
“Apply only the following: (Recommended cleaning agents, paints, adhesives, etc., as appropriate.”	Pass	Pass
“Make no modifications.”	Pass	Pass
“Fasten helmet securely.”	Fail	Pass
“If helmet experiences a severe blow, return it to the manufacturer for inspection, or destroy it and replace it.”	Fail	Pass

COMMENTS:

1. The discrete size and month and year of manufacture do not appear to be permanent since they can be removed intact from the helmet leaving little or no trace on the helmet.
2. The instructions to the purchaser labels are incomplete.

LABELING

S5.6.2 Certification. Each helmet shall be labeled permanently and legibly with a label, constituting the manufacturer’s certification that the helmet conforms to the applicable Federal motor vehicle safety standards, that is separate from the label(s) used to comply with S5.6.1, and complies with paragraphs (a) through (c) of this section.(a) Content, format, and appearance. The label required by paragraph S5.6.2 shall have the following content, format, and appearance:

Required Certification Information	Content/ Format	Permanent
The symbol “DOT,” horizontally centered on the label, in letters not less than 0.38 inch (1.0 cm) high.	Pass	Pass
The term “FMVSS No. 218,” horizontally centered beneath the symbol DOT, in letters not less than 0.09 inches (0.23 cm) high.	Pass	
The word “CERTIFIED,” horizontally centered beneath the term “FMVSS No. 218,” in letters not less than 0.09 inches (0.23 cm) high.	Pass	
The precise model designation horizontally centered above the symbol DOT, in letters and/or numerals not less than 0.09 inch (0.23 cm) high.	Pass	
The manufacturer’s name and/or brand, horizontally centered above the model designation, in letters and/or numerals not less than 0.09 inch (0.23 cm) high.	Pass	
All symbols, letters and numerals shall be in a color that contrasts with the background of the label.	Pass	
No information, other than the information specified in subparagraph (a), shall appear on the label.	Pass	
The label shall appear on the outer surface of the helmet and be placed so that it is centered laterally with the horizontal centerline of the DOT symbol located a minimum of 1 inch (2.5 cm) and a maximum of 3 inches (7.6 cm) from the bottom edge of the posterior portion of the helmet.	Pass	

COMMENT:

1. Labels were determined to be both easily read and permanent based on the TP-218-07, Section 12.5.4.

TEST DATA

Contract File No.: 52.1105

Test File: 001

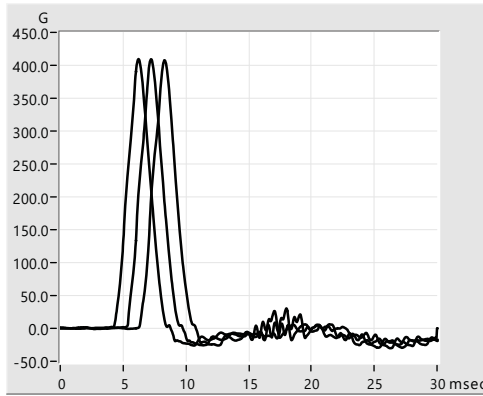
Technician: Devon Dahm

Test Date: 12 May 2020

Control Document; Official ACT NHTSA FMVSS No.218/Report Template TP-07/USA 14 May 2020/Rev.22
SharePoint/GlobalResourceLibrary/Reporting/ReportTemplates/Helmets/FMVSS No.218

Uni-Axial System-Check

Helmet Manufacturer : NHTSA
 Address : 1200 New Jersey Ave, S.E. Washington,
 DC 20590



Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
 Long Beach, CA
 90805

Laboratory Technician name : Devon Dahm

M.E.P. Pad Model : H0171

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 %

Selected Filter Frequency : CFC1000 # 1650 Hz

Acc. sensitivity (axis Z) : 10.47 mV/G

Acc. sensitivity (axis X) : 10.00 mV/G

Acc. sensitivity (axis Y) : 10.00 mV/G

Drop Device : D.O.T Size C (Uni-Axial) 23

Drop mass assembly : 5.036 kg Time gate flag height : 25.40 mm

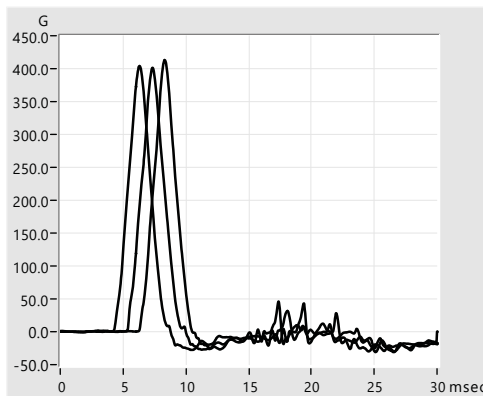
Calibration peak : 400.0 G +/- 20.00 G

Impact #	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	130.5	59.2	4.2	5.24	4.8488	401.5	2.39	2.07	3050	4201	10:47:52	2020-05-12	Pass
2	130.5	59.7	3.8	5.22	4.8675	407.7	2.43	2.06	3092	4258	10:49:09	2020-05-12	Pass
3	130.5	60.5	3.1	5.18	4.9033	406.1	2.42	2.07	3019	4217	10:50:13	2020-05-12	Pass
4	130.5	60.1	3.4	5.20	4.8864	409.3	2.42	2.06	3036	4256	10:51:17	2020-05-12	Pass
5	130.5	59.2	4.1	5.24	4.8500	408.9	2.42	2.06	3040	4234	10:52:21	2020-05-12	Pass
6	130.5	59.9	3.6	5.21	4.8792	407.5	2.39	2.05	2987	4237	10:53:25	2020-05-12	Pass
Last 3#	130.50	59.73	3.70	5.22	4.87	408.57	2.41	2.06	3021.00	4242.33	10.00	2020.00	0.00

Curve impact #2 : shift of 1msec ; Curve impact #3 : shift of 2msec

Uni-Axial System-Check

Helmet Manufacturer : NHTSA
 Address : 1200 New Jersey Ave, S.E. Washington,
 DC 20590



Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
 Long Beach, CA
 90805

Laboratory Technician name : Devon Dahm

M.E.P. Pad Model : H0171

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 %

Selected Filter Frequency : CFC1000 # 1650 Hz

Acc. sensitivity (axis Z) : 10.47 mV/G

Acc. sensitivity (axis X) : 10.00 mV/G

Acc. sensitivity (axis Y) : 10.00 mV/G

Drop Device : D.O.T Size C (Uni-Axial) 23

Drop mass assembly : 5.036 kg Time gate flag height : 25.40 mm

Calibration peak : 400.0 G +/- 20.00 G

Impact #	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	130.0	60.1	3.2	5.20	4.8874	408.0	2.39	2.03	3018	4265	14:46:50	2020-05-12	Pass
2	130.0	60.2	3.1	5.19	4.8914	411.3	2.39	2.01	3063	4295	14:47:55	2020-05-12	Pass
3	130.0	60.1	3.3	5.20	4.8849	405.1	2.37	2.02	2906	4146	14:50:03	2020-05-12	Pass
4	130.0	58.6	4.4	5.26	4.8259	404.0	2.39	2.00	2909	4132	14:51:18	2020-05-12	Pass
5	130.0	59.8	3.5	5.21	4.8729	401.0	2.47	2.03	2871	4028	14:53:05	2020-05-12	Pass
6	130.0	60.8	2.7	5.17	4.9125	413.1	2.42	2.00	2925	4215	14:54:15	2020-05-12	Pass
Last 3#	130.00	59.73	3.53	5.21	4.87	406.03	2.43	2.01	2901.67	4125.00	14.00	2020.00	0.00

Curve impact #2 : shift of 1msec ; Curve impact #3 : shift of 2msec

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
Long Beach, CA
90805

Helmet Manufacturer : NHTSA

Address : 1200 New Jersey Ave, S.E.
Washington, DC 20590

SystemCheckFile#: N/A

Laboratory Technician name : Devon Dahm

Batch Number :

Ref. P.O. Number : 2020

Model : LANE SPLITTER

Color : Black

Size : L 59-60 cm

Weight : 1462.00 g

Manufacturing Date : Aug 2019

Standard Request : FMVSS No.218

Identification Code : 521105001-A

Headform Model : D.O.T.

Headform Size : C D.O.T

Conditioning : Ambient

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 % (moto)

Selected Filter Frequency : CFC1000 # 1650402

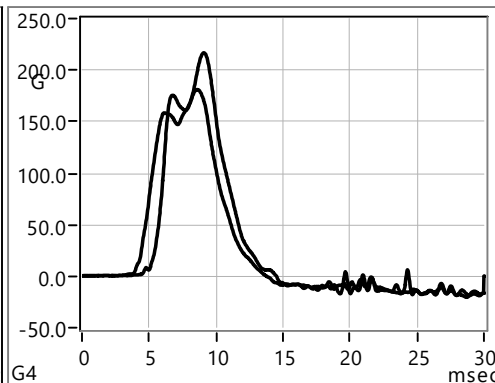
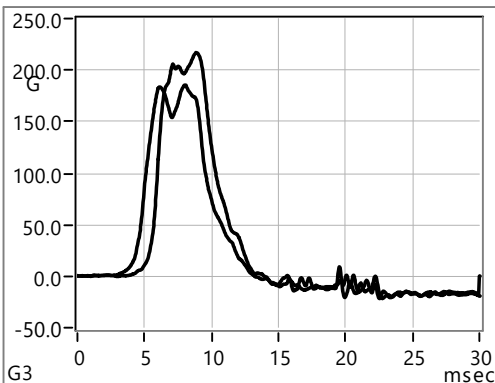
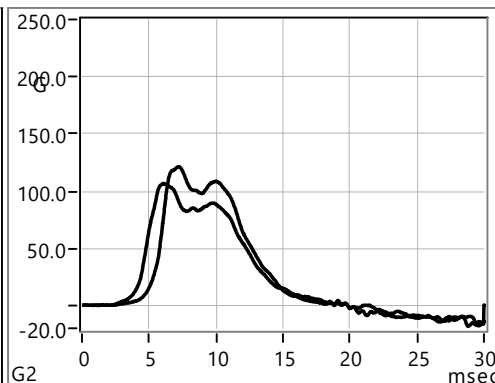
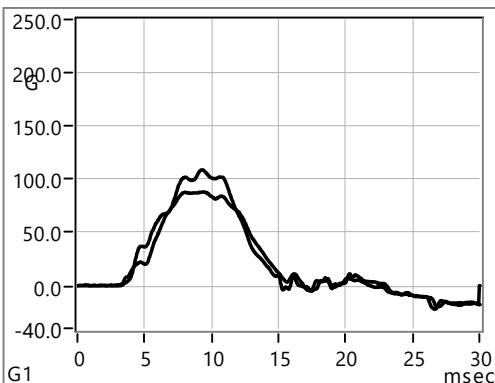
Maximum Peak G's authorized : 400 G

Maximum Peak m/s² authorized : 3923 m/s²

Drop mass assembly : 5.036 kg

Time gate flag height : 25.40 mm

Acc. sensibility (axis Z) : 10.47



Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	Front	Hemi	147.5	68.4	3.1	4.87	5.2120	88.2	0.00	0.00	364	410	12:40:54	2020-05-12	Pass
2	Front	Hemi	147.5	68.3	3.2	4.88	5.2088	108.7	0.00	0.00	458	528	12:42:00	2020-05-12	Pass
3	Left	Hemi	147.5	68.6	3.0	4.87	5.2181	106.6	0.00	0.00	472	526	13:04:55	2020-05-12	Pass
4	Left	Hemi	147.5	67.9	3.4	4.89	5.1938	121.4	0.00	0.00	604	686	13:06:02	2020-05-12	Pass
5	Right	Flat	200.5	91.4	3.9	4.22	6.0253	185.6	3.52	0.00	1341	1621	13:47:43	2020-05-12	Pass
6	Right	Flat	200.5	91.0	4.1	4.23	6.0114	217.0	3.53	1.93	1790	2162	13:48:48	2020-05-12	Pass
7	Rear	Flat	200.5	93.5	2.8	4.17	6.0924	181.1	3.15	0.00	1297	1513	14:02:23	2020-05-12	Pass
8	Rear	Flat	200.5	93.3	2.9	4.17	6.0884	216.8	3.69	0.88	1582	1911	14:03:28	2020-05-12	Pass

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
Long Beach, CA
90805

Helmet Manufacturer : NHTSA

Address : 1200 New Jersey Ave, S.E.
Washington, DC 20590

SystemCheckFile#: N/A

Laboratory Technician name : Devon Dahm

Batch Number :

Ref. P.O. Number : 2020

Model : LANE SPLITTER

Color : Black

Size : L 59-60 cm

Weight : 1438.00 g

Manufacturing Date : Aug 2019

Standard Request : FMVSS No.218

Identification Code : 521105001-B

Headform Model : D.O.T.

Headform Size : C D.O.T

Conditioning : Cold

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 % (moto)

Selected Filter Frequency : CFC1000 # 1650402

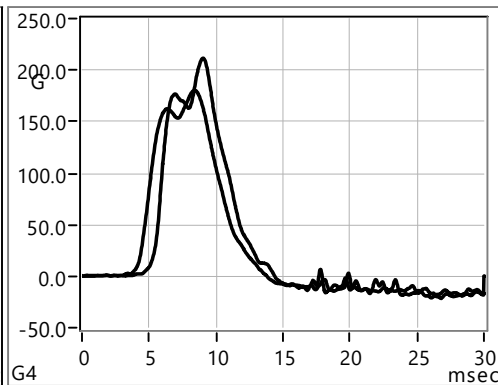
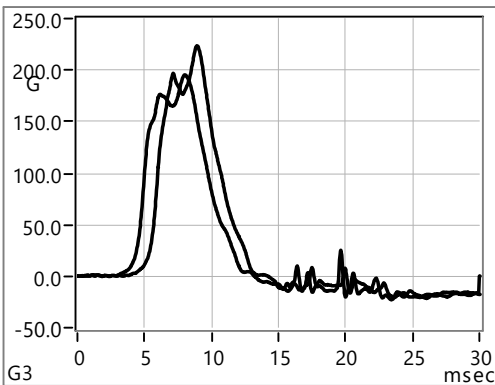
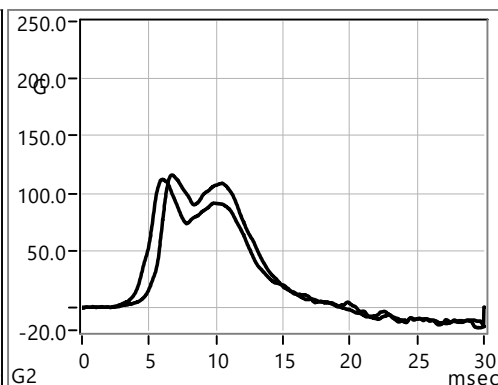
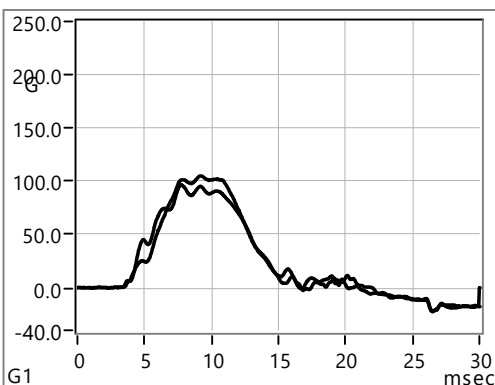
Maximum Peak G's authorized : 400 G

Maximum Peak m/s² authorized : 3923 m/s²

Drop mass assembly : 5.036 kg

Time gate flag height : 25.40 mm

Acc. sensibility (axis Z) : 10.47



Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	Front	Hemi	147.5	68.6	3.0	4.87	5.2180	96.6	0.00	0.00	416	470	12:43:29	2020-05-12	Pass
2	Front	Hemi	147.5	68.4	3.1	4.87	5.2113	105.1	0.00	0.00	493	556	12:44:38	2020-05-12	Pass
3	Left	Hemi	147.5	67.8	3.5	4.89	5.1905	111.9	0.00	0.00	478	546	13:07:25	2020-05-12	Pass
4	Left	Hemi	147.5	68.0	3.4	4.89	5.1966	115.9	0.00	0.00	610	677	13:08:33	2020-05-12	Pass
5	Right	Flat	200.5	90.9	4.2	4.23	6.0079	195.3	3.37	0.00	1437	1697	13:49:56	2020-05-12	Pass
6	Right	Flat	200.5	91.4	3.9	4.21	6.0264	223.8	3.49	0.87	1664	2031	13:51:04	2020-05-12	Pass
7	Rear	Flat	200.5	93.2	3.0	4.17	6.0844	180.2	3.46	0.00	1352	1560	14:04:39	2020-05-12	Pass
8	Rear	Flat	200.5	92.9	3.1	4.18	6.0735	211.5	3.64	0.70	1616	1896	14:05:43	2020-05-12	Pass

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
Long Beach, CA
90805

Helmet Manufacturer : NHTSA

Address : 1200 New Jersey Ave, S.E.
Washington, DC 20590

SystemCheckFile#: N/A

Laboratory Technician name : Devon Dahm

Batch Number :

Ref. P.O. Number : 2020

Model : LANE SPLITTER

Color : Black

Size : L 59-60 cm

Weight : 1451.00 g

Manufacturing Date : Aug 2019

Standard Request : FMVSS No.218

Identification Code : 521105001-C

Headform Model : D.O.T.

Headform Size : C D.O.T

Conditioning : Hot

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 % (moto)

Selected Filter Frequency : CFC1000 # 1650402

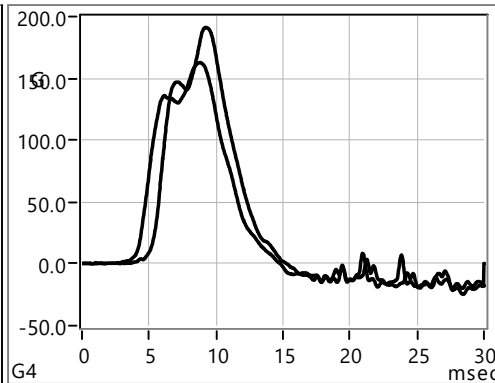
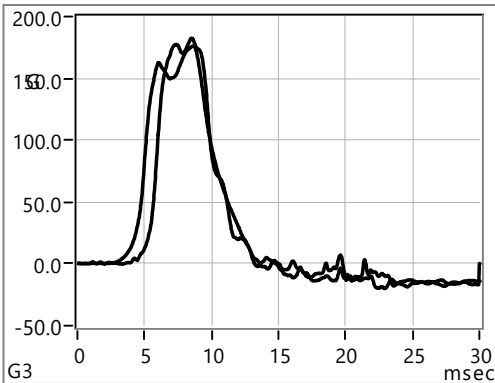
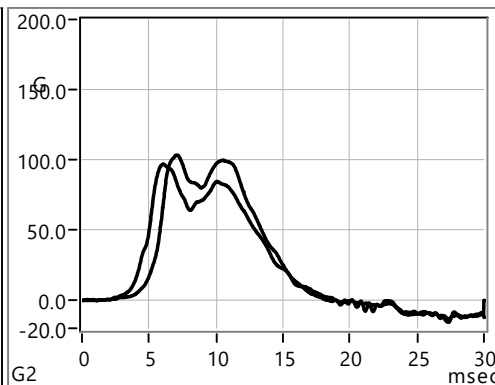
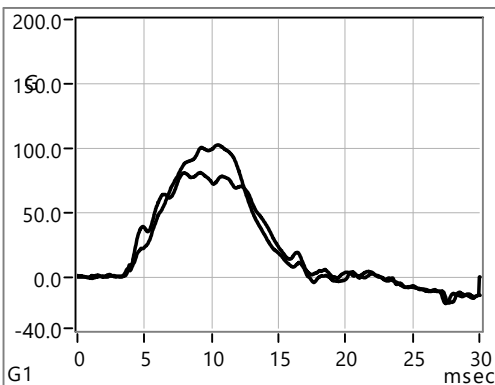
Maximum Peak G's authorized : 400 G

Maximum Peak m/s² authorized : 3923 m/s²

Drop mass assembly : 5.036 kg

Time gate flag height : 25.40 mm

Acc. sensibility (axis Z) : 10.47



Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	Front	Hemi	147.5	67.9	3.4	4.89	5.1932	81.0	0.00	0.00	321	362	12:46:01	2020-05-12	Pass
2	Front	Hemi	147.5	67.9	3.5	4.89	5.1929	102.7	0.00	0.00	445	0	12:47:07	2020-05-12	Pass
3	Left	Hemi	147.5	68.1	3.3	4.88	5.2003	96.9	0.00	0.00	394	439	13:09:58	2020-05-12	Pass
4	Left	Hemi	147.5	68.3	3.2	4.88	5.2079	103.5	0.00	0.00	498	558	13:11:11	2020-05-12	Pass
5	Right	Flat	200.5	91.8	3.7	4.21	6.0396	176.3	3.35	0.00	1283	1497	13:52:31	2020-05-12	Pass
6	Right	Flat	200.5	90.7	4.3	4.23	6.0027	182.5	3.09	0.00	1221	1433	13:53:37	2020-05-12	Pass
7	Rear	Flat	200.5	93.3	2.9	4.17	6.0884	162.9	1.39	0.00	1077	1269	14:06:59	2020-05-12	Pass
8	Rear	Flat	200.5	93.1	3.0	4.18	6.0813	191.2	2.11	0.00	1345	1582	14:08:14	2020-05-12	Pass

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC

Address : 3280 East 59th Street
Long Beach, CA
90805

Helmet Manufacturer : NHTSA

Address : 1200 New Jersey Ave, S.E.
Washington, DC 20590

SystemCheckFile#: N/A

Laboratory Technician name : Devon Dahm

Batch Number :

Ref. P.O. Number : 2020

Model : LANE SPLITTER

Color : Black

Size : L 59-60 cm

Weight : 1450.00 g

Manufacturing Date : Aug 2019

Standard Request : FMVSS No.218

Identification Code : 521105001-D

Headform Model : D.O.T.

Headform Size : C D.O.T

Conditioning : Wet

Laboratory Temperature : 22 deg C

Laboratory Humidity : 50 % (moto)

Selected Filter Frequency : CFC1000 # 1650402

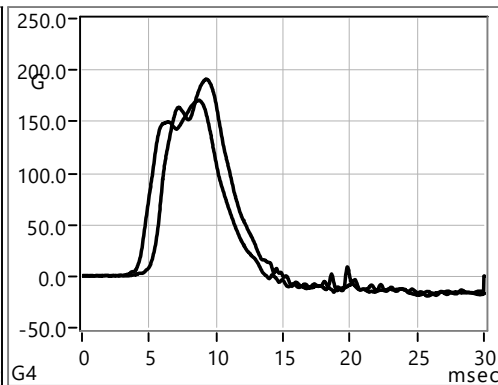
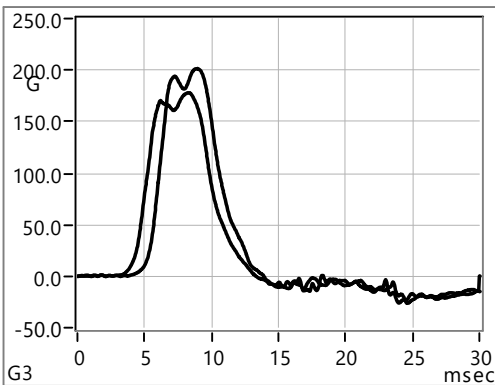
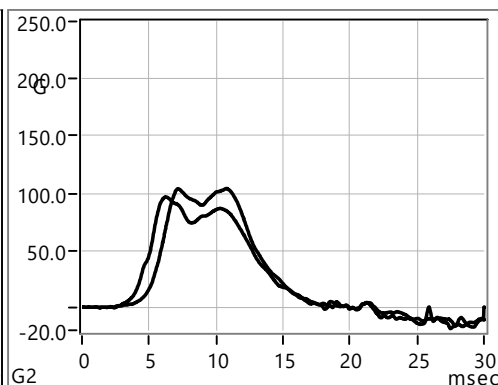
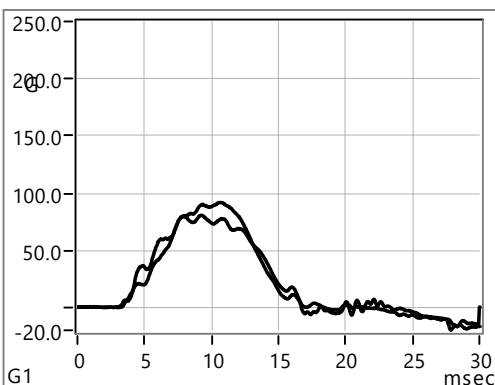
Maximum Peak G's authorized : 400 G

Maximum Peak m/s² authorized : 3923 m/s²

Drop mass assembly : 5.036 kg

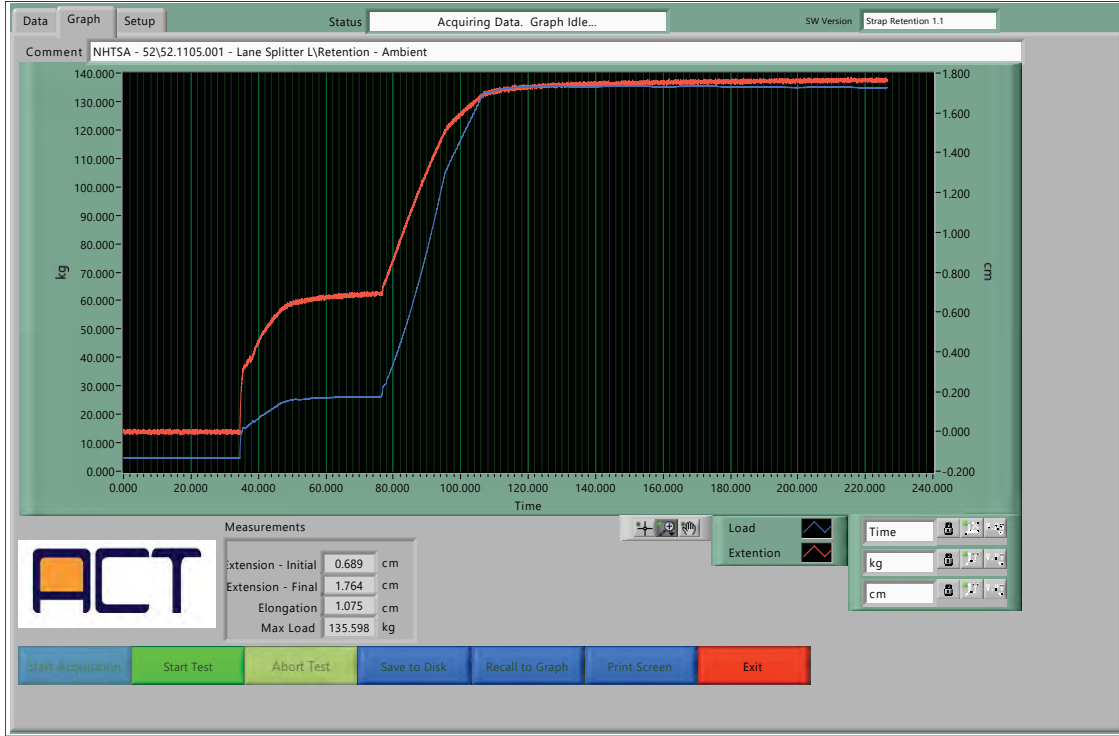
Time gate flag height : 25.40 mm

Acc. sensibility (axis Z) : 10.47

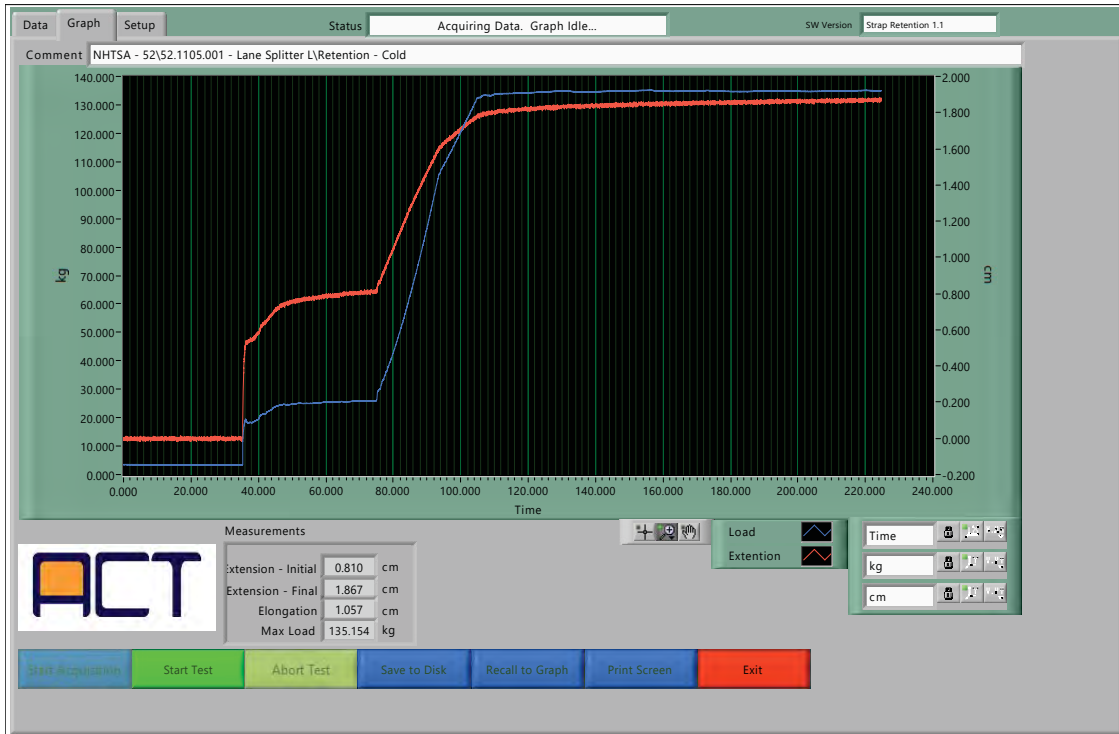


Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL
1	Front	Hemi	147.5	68.6	2.9	4.87	5.2207	80.6	0.00	0.00	305	345	12:56:59	2020-05-12	Pass
2	Front	Hemi	147.5	68.5	3.0	4.87	5.2165	91.7	0.00	0.00	359	412	12:58:04	2020-05-12	Pass
3	Left	Hemi	147.5	68.3	3.2	4.88	5.2084	96.7	0.00	0.00	418	466	13:12:31	2020-05-12	Pass
4	Left	Hemi	147.5	68.3	3.2	4.88	5.2082	104.0	0.00	0.00	523	583	13:13:40	2020-05-12	Pass
5	Right	Flat	200.5	91.5	3.9	4.21	6.0279	178.1	3.51	0.00	1330	1565	13:55:19	2020-05-12	Pass
6	Right	Flat	200.5	91.9	3.6	4.20	6.0424	201.3	3.50	0.46	1580	1941	13:56:29	2020-05-12	Pass
7	Rear	Flat	200.5	93.2	3.0	4.17	6.0851	170.6	1.94	0.00	1228	1424	14:09:39	2020-05-12	Pass
8	Rear	Flat	200.5	93.3	2.9	4.17	6.0877	191.3	3.45	0.00	1425	1661	14:10:45	2020-05-12	Pass

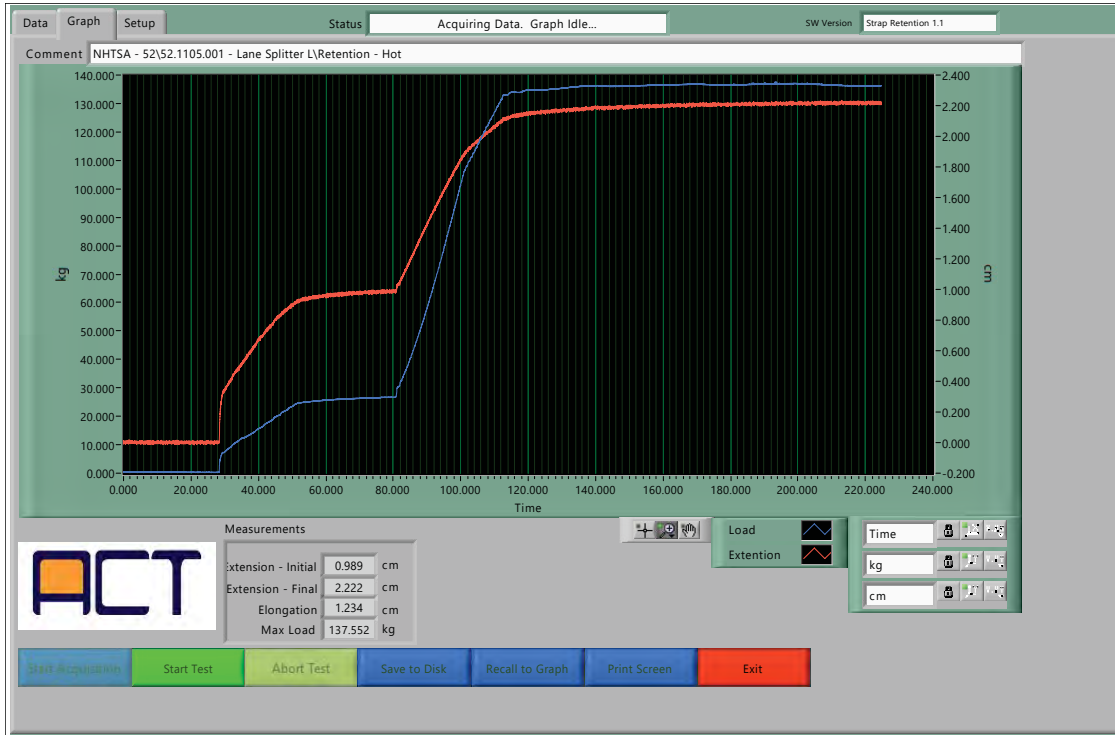
ACT DOT Strap Retention Acquisition
 C:\DAQ\DAQ_ADMIN\Strap Retention\Strap_Retention.exe\Strap Retention - Main.vi
 Last modified on 2017-10-01 at 4:36 PM
 Printed on 2020-05-12 at 3:16 PM



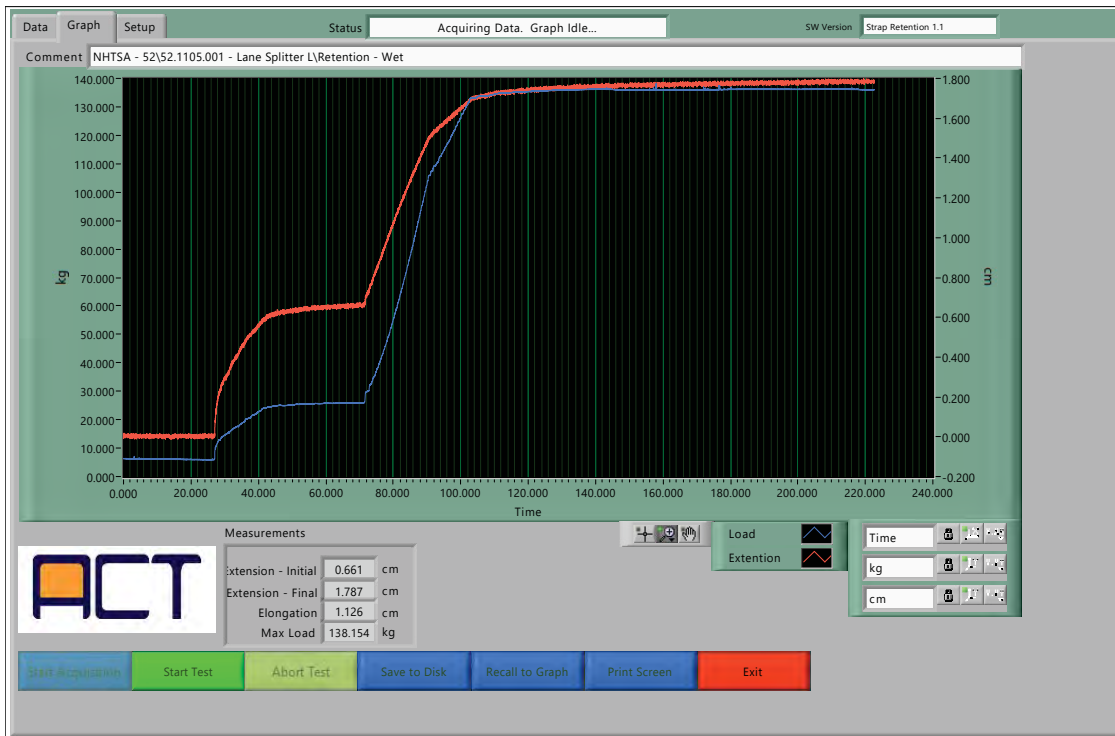
ACT DOT Strap Retention Acquisition
 C:\DAQ\DAQ_ADMIN\Strap Retention\Strap_Retention.exe\Strap Retention - Main.vi
 Last modified on 2017-10-01 at 4:36 PM
 Printed on 2020-05-12 at 3:22 PM

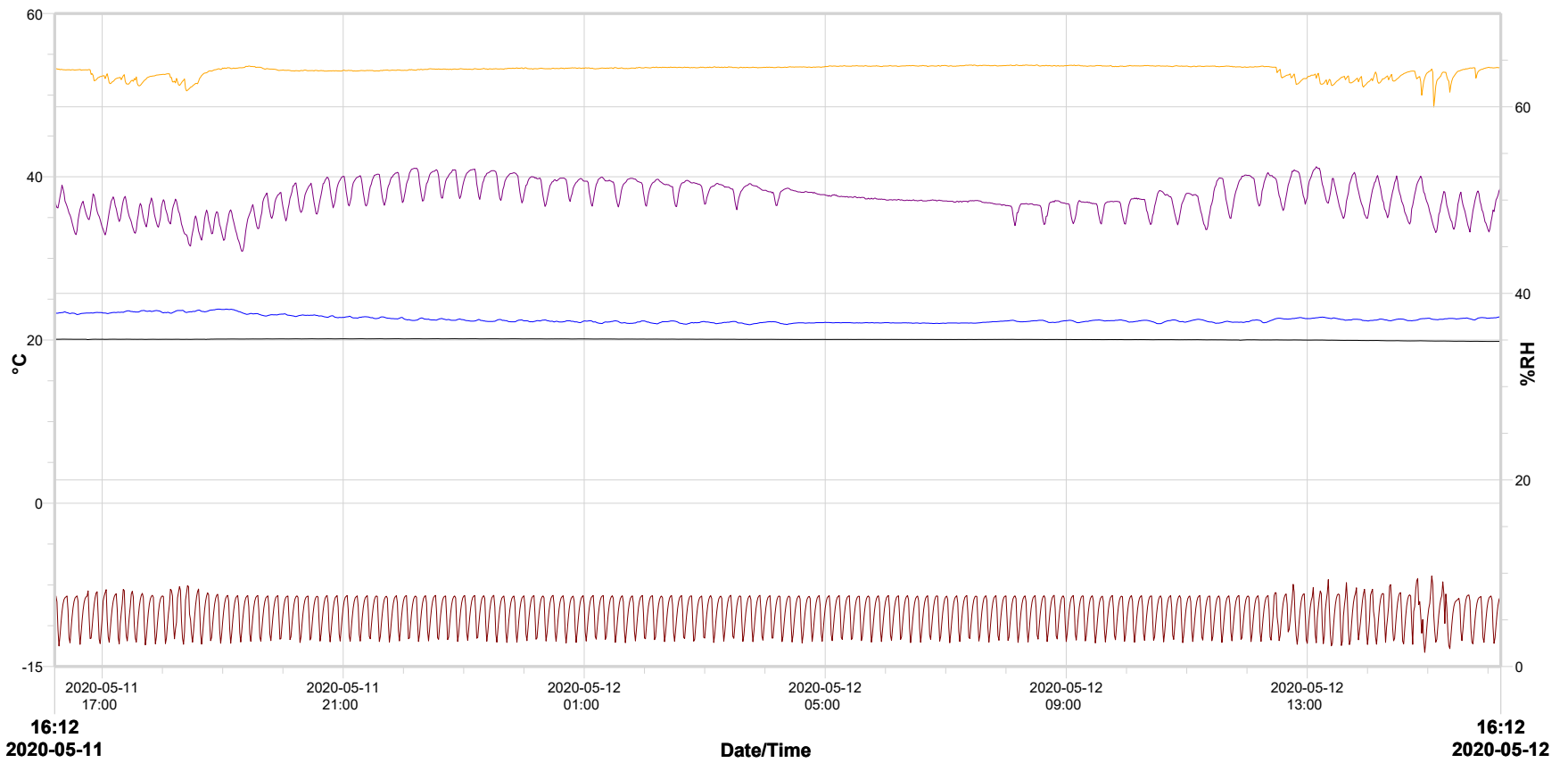


ACT DOT Strap Retention Acquisition
C:\DAQ\DAQ_ADMIN\Strap Retention\Strap_Retention.exe\Strap Retention - Main.vi
Last modified on 2017-10-01 at 4:36 PM
Printed on 2020-05-12 at 3:27 PM



ACT DOT Strap Retention Acquisition
C:\DAQ\DAQ_ADMIN\Strap Retention\Strap_Retention.exe\Strap Retention - Main.vi
Last modified on 2017-10-01 at 4:36 PM
Printed on 2020-05-12 at 3:33 PM





Report Summary Statistics										
#	Location	Zone	Color	Units	Avg	Min	Max	STD	MKT	Samples
1	H0177 - Humidity (1044)	viewLinc/ACT-Helmet Lab (1041)	Yellow	%RH	50.25	44.51	53.58	1.69	0.00	1440
2	H0177 - Lab Temp. (1042)	viewLinc/ACT-Helmet Lab (1041)	Purple	°C	22.52	21.88	23.78	0.45	22.53	1440
3	H0178 - Oven (1046)	viewLinc/ACT-Helmet Lab (1041)	Yellow	°C	53.09	48.53	53.70	0.64	53.10	1440
4	H0178 - Water (1048)	viewLinc/ACT-Helmet Lab (1041)	Blue	°C	20.07	19.82	20.16	0.08	20.07	1440
5	H0179 - Freezer (1050)	viewLinc/ACT-Helmet Lab (1041)	Red	°C	-11.45	-14.27	-8.91	2.04	-11.45	1440

APPENDIX A

INTERPRETATIONS OR DEVIATIONS FROM FMVSS No. 218

Excess water on the water immersed sample was allowed to drip off before testing to prevent water damage to test equipment.

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

APPENDIX B EQUIPMENT LIST AND CALIBRATION SCHEDULES

ACT ID	Description	Make/Model	S/N	Last Check	Next Check
H0028	Anvil Hemispherical	Cadex	C070911-01	12/5/2019	12/5/2020
H0029	Anvil Flat	Cadex	C310811-02	12/5/2019	12/5/2020
H0171	Anvil MEP	Cadex	2141901	4/18/2019	4/18/2020
H0040	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0146	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0055	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0144	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0047	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0145	Clamp	Cadex	NA	12/3/2019	12/3/2020
H0194	Drop Carriage	Cadex	NA	5/11/2020	12/3/2020
H0064	Penetration Striker #1	Cadex	NA	12/5/2019	12/5/2020
H0065	Penetration Striker #2	Cadex	NA	12/5/2019	12/5/2020
H0173	Drop Carriage	Cadex	NA	12/3/2019	12/3/2020
H0195	Magnesium Ball Arm	Cadex	NA	5/11/2020	12/3/2020
H0115	Steel Ball Arm	Cadex	NA	12/3/2019	12/3/2020
H0172	Aluminum Ball Arm	Cadex	NA	12/3/2019	12/3/2020
H0092	Environmental Chamber	Immersion Bucket	NA	NA	NA
H0174	Environmental Chamber	Heratherm OSG 750		NA	NA
H0186	Environmental Chamber	69K-035	9123314	NA	NA
H0187	Environmental Chamber	69K-031HC	9129337	NA	NA
H0079	Fixture	Mono Rail Tower	NA	12/5/2019	12/5/2020
H0080	Fixture	Penetration Tube	NA	12/5/2019	12/5/2020
H0081	Fixture	Positional Stability Stand	NA	12/5/2019	12/5/2020
H0082	Fixture	Retention	NA	12/5/2019	12/5/2020
H0087	Fixture	Penetration Heaform Mount	NA	NA	NA
H0088	Fixture	Penetration Height Stick	NA	NA	NA
H0089	Fixture	Peripheral Vision Stand	NA	NA	NA
H0096	Fixture	Positional Stability Ap.	NA	12/5/2019	12/5/2020
H0111	Fixture	Precision Brow Block	NA	12/5/2019	12/5/2020
H0114	Fixture	Peripheral Vision Protractor	NA	NA	NA
H0120	Fixture	Penetration Base	NA	NA	NA
H0148	Fixture	Headform Stand	NA	NA	NA
H0166	Fixture	Peripheral Vision Go-No-Go	NA	12/5/2019	12/5/2020
H0117	Headform Penetration: S	Cadex	7293	12/5/2019	12/5/2020
H0118	Headform Penetration: M	Cadex	7294	12/5/2019	12/5/2020
H0119	Headform Penetration: L	Cadex	7296	12/5/2019	12/5/2020
H0138	Headform Impact: S	Cadex	C04574 - 7567	12/5/2019	12/5/2020
H0139	Headform Impact: M	Cadex	C04575 - 7571	12/5/2019	12/5/2020
H0140	Headform Impact: L	Cadex	C04576 - 7573	12/5/2019	12/5/2020
H0093	Ballast Weight	NA	NA	12/3/2019	12/5/2020
H0188	Lab Computer	ASUS		NA	NA

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

Calibrated Measurement Equipment								
ACT ID	Description	Make/Model	S/N	Range	Accuracy from Cal. Certs	Last Calibration	Next Calibration	Calibration By:
H0193	Velocity Gate	Velocimeter HVTG Short	HVTG120200 129-1	--	5.77E-02	1/29/2020	1/29/2021	CADEX
H0192	Accelerometer	PBC	LW226129	2000 g	±2.5%	8/23/2019	8/23/2020	PCB Piezotronics
H1089	Data Acquisition Box	353B18	CC120200129 -1		±2.84 mV	1/29/2020	1/29/2021	CADEX
H1089	Data Acquisition Box	PC--4400	CC120200129 -1		±2.84 mV	1/29/2020	1/29/2021	CADEX
H0098	LVDT - Retention	Schaevitz	16071	2 in	±0.5%	11/26/2019	11/26/2020	Micro Quality Calibration
H0180	Ohaus Scale	2000-HR	90921684	0-6000 gm	±1 g	10/28/2019	10/28/2020	Micro Quality Calibration
H0099	Load Cell - Retention	Futek	490706	0-500 lbs	±0.2%	11/25/2019	11/26/2020	Micro Quality Calibration
H0105	Height Gage	LSB350	3121016	0-12 in	±0.001 in	11/26/2019	11/26/2020	Micro Quality Calibration
H0180	Ohaus Scale	V11P6	90921684	0-6000 gm	±1 g	10/28/2019	10/28/2020	Micro Quality Calibration
H0124	Digital Measuring Tape	ADIR PRO	-	16.5 ft/192 in	±0.03125 in	11/26/2019	11/26/2020	Micro Quality Calibration
H0179	Environmental Data Logger	Etape	19381045	-90 To +95 °C	±0.05 °C	9/17/2019	9/17/2020	Vaisala
H0105	Height Gage	Mitutoyo	3121016	0-12 in	±0.001 in	11/26/2019	11/26/2020	Micro Quality Calibration
H0177	Environmental Data Logger	Veriteq	19382001	-25 To +70°C,	0.80%RH	9/16/2019	9/16/2020	Vaisala
H0181	Digital Caliper	SP-2000-20R	B19221219	0-100% RH	±0.06 °C	11/13/2019	11/13/2020	Micro Quality Calibration
H0178	Environmental Data Logger	Veriteq	19381048	-90 To +95 °C	±0.07 °C	9/17/2019	9/17/2020	Vaisala

Contract File No.: 52.1105

Test File: 001

Technician: Devon Dahm

Test Date: 12 May 2020

Control Document: Official ACT NHTSA FMVSS No.218/Report Template TP-07/USA 14 May 2020/Rev.22
SharePoint/GlobalResourceLibrary/Reporting/ReportTemplates/Helmets/FMVSS No.218

APPENDIX C
PHOTOGRAPHS

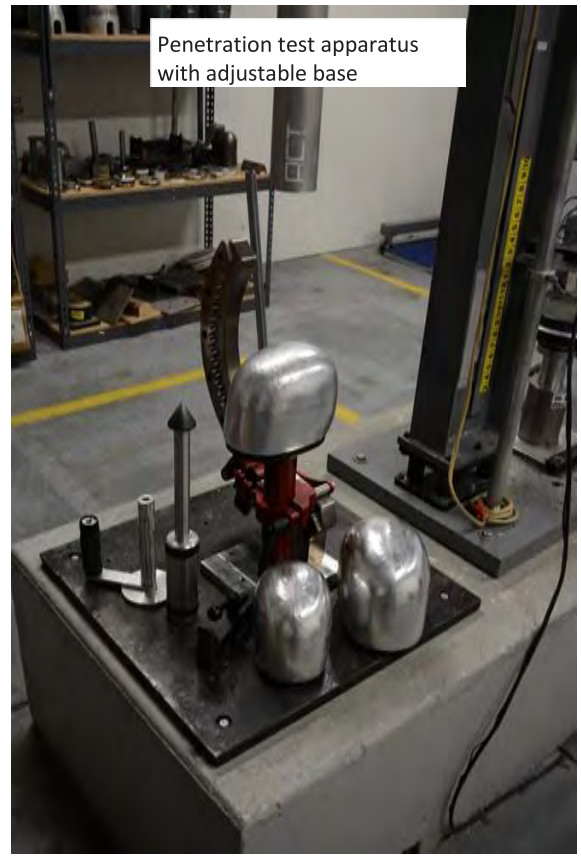
Contract File No.: 52.1105
Test File: 001

Technician: Devon Dahm
Test Date: 12 May 2020

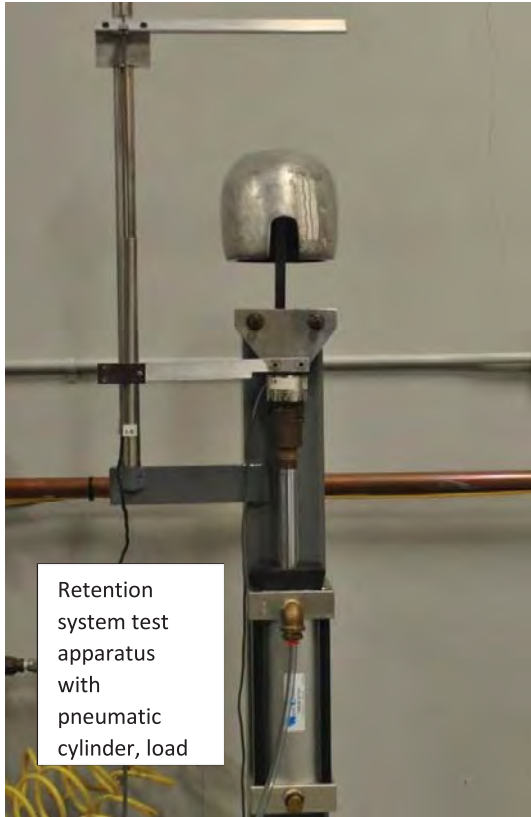
Impact attenuation test apparatus with three headforms (S, M, L), flat, hemi and MEP anvils



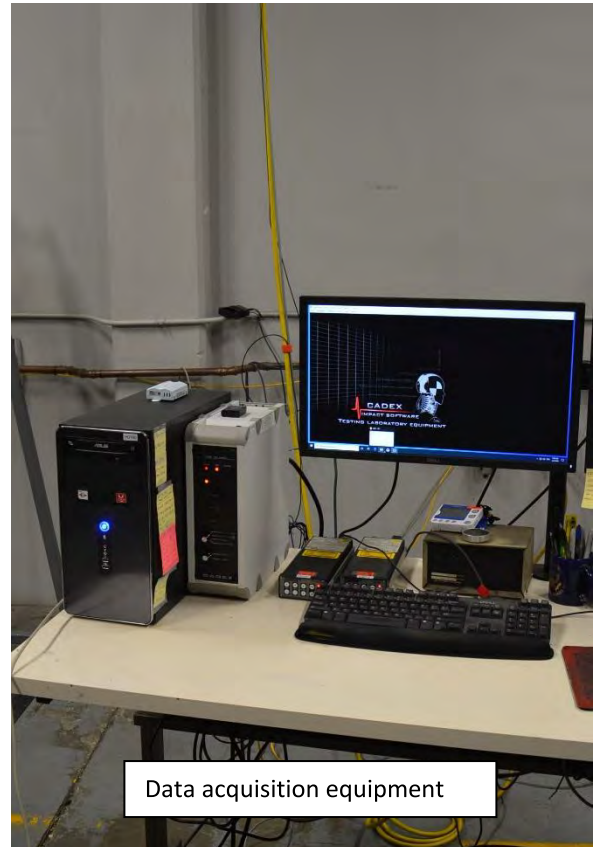
Penetration test apparatus with adjustable base



Retention system test apparatus with pneumatic cylinder, load



Data acquisition equipment





Biltwell LANE SPLITTER helmet and box showing model designation



Biltwell LANE SPLITTER helmet with test line, front left view



Biltwell LANE SPLITTER helmet with test line, rear left view



Biltwell LANE SPLITTER helmet interior view



Biltwell LANE SPLITTER
helmet front and left side
hemispherical anvil impact
locations



Biltwell LANE SPLITTER
helmet right side and
rear flat anvil impact
locations



Biltwell LANE SPLITTER
helmet crown penetration
test location



Biltwell LANE SPLITTER
helmet rear right penetration
test location



Biltwell LANE SPLITTER helmet
S5.6.1 Labeling



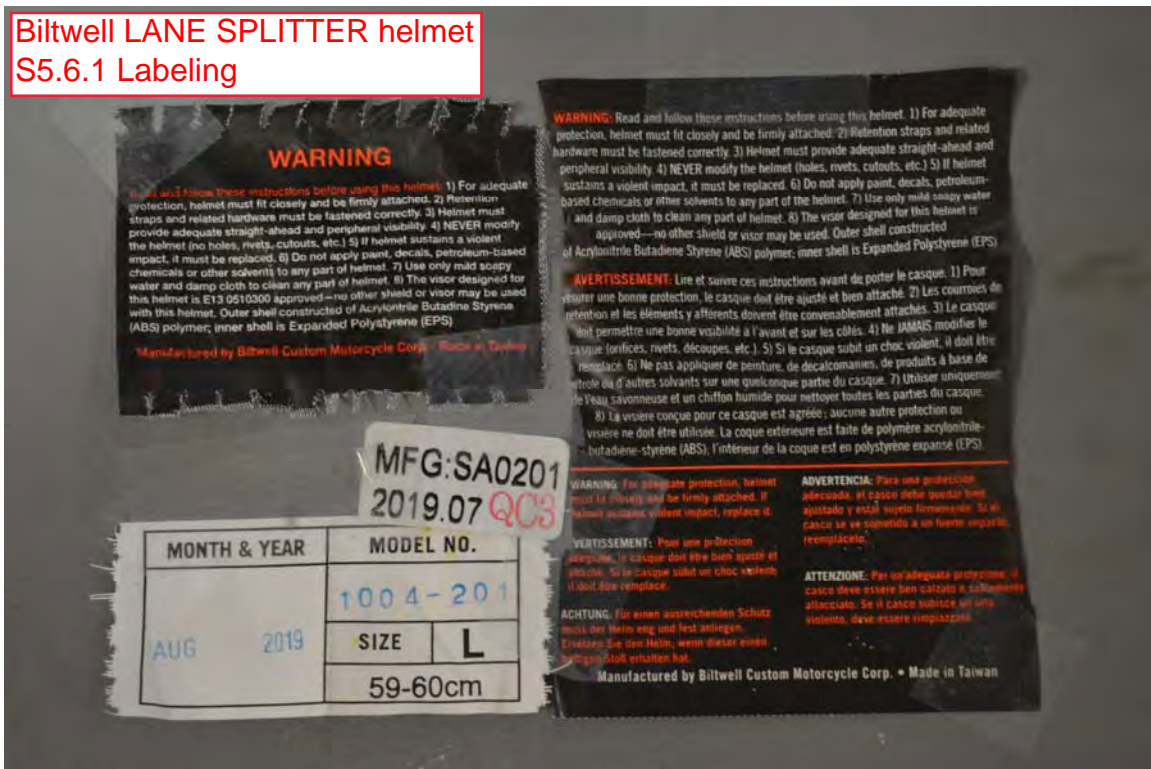
Biltwell LANE SPLITTER helmet
S5.6.1 Labeling



**Biltwell LANE SPLITTER helmet
S5.6.1 Labeling**



**Biltwell LANE SPLITTER helmet
S5.6.1 Labeling**



Biltwell LANE SPLITTER helmet
S5.6.2 Certification Label

