SAFETY COMPLIANCE TESTING FOR FMVSS No. 218 MOTORCYCLE HELMETS

Brand: SIMPSON
Model: SHORTY OTW
Size: M (56-57 cm)

Prepared By

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6 August 2020

Final Report 218-ACT-20-022

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

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Approved By: _____
John Bogler

Approval Date: 6 August 2020

FINAL REPORT ACCEPTANCE BY OVSC

Accepted By: _____

Acceptance Date: 11/13/2020

HS# 646691

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 218-ACT-20-022	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Sub-Title FINAL REPORT OF FMVSS NO. 218 COMPLIANCE TESTING OF SIMPSON, MODEL SHORTY OTW, SIZE M (56-57 cm) MOTORCYCLE HELMET		**5. Report Date** 6 August 2020 **6. Performing Organization Code** ACT
7. Author(s) Scott Huber, Program Manager		**8. Performing Organization Report No.** 52.1122.001
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: S5.3 Retention System. The retention system on the ambient sample separated. S5.6.1 Labeling. The manufacturer's name, month and year of manufacture and the instructions to the purchaser labels do not appear to be permanent. S5.6.1 Labeling. The instructions to the purchaser labels are not visible to the user without moving any part of the helmet. S5.6.4 Labeling. The manufacturer's name label is 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		
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Form DOT F1700.7 (8-69)

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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-218-07[2], as governed by the contract.

2. TEST PROCEDURE

The ACT Lab Helmet Testing Manual, Part I – Motorcycle Helmets[3] 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.

HELMET DATA

HELMET BRAND NAME: SIMPSON

HELMET MODEL DESIGNATION: SHORTY OTW

HELMET MANUFACTURER: SIMPSON HELMETS INC

HELMET SIZE: M (56-57 cm)

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

HELMET POSITIONING INDEX: 57 cm

SHELL MATERIAL: Fiberglass and Polyester Resin

LINER MATERIAL: Expanded Polystyrene

BUCKLE DESCRIPTION: ITW Nexus/A

HELMET	A Ambient	B Low Temp	C High Temp	D Water Immersed	E Spare
SHELL COLOR/PATTERN	White	White	White	White	White
WEIGHT (grams)	932	928	912	936	956
MONTH & YEAR OF MANUFACTURE	10/2018	01/2019	01/2019	01/2019	01/2019

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 visor 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 IMMERSED
IMPACT	Pass	Pass	Pass	Pass
PENETRATION	Pass	Pass	Pass	Pass
RETENTION	Fail	Pass	Pass	Pass

INDICATE Pass or Fail

TEST	PASS/FAIL
PERIPHERAL VISION	Pass
LABELING	Fail

COMMENTS:

1. S5.3.1 Retention System. (a) The retention system on the ambient sample separated while loaded.

2. S5.6.1 Labeling. The manufacturer's name, month and year of manufacture and the instructions to the purchaser labels do not appear to be permanent.

3. S5.6.1 Labeling. The instructions to the purchaser labels are not visible to the user without moving any part of the helmet.

4. S5.6.1 Labeling. As of the date of this report, the entity listed on the interior label, "SIMPSON HELMETS INC", has not filed in accordance with Part 566, Manufacturer Identification, and therefore cannot be verified as a recognized manufacturer.

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: M (56-57 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 (61ºF to 79ºF); 30% to 70% Relative Humidity
Low Temperature	-15°C to -5°C (5ºF to 23ºF)
High Temperature	45°C to 55°C (113ºF to 131ºF)
Water Immersion	16°C to 26°C (61ºF to 79ºF)

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 : 23.2 ºC ; AVERAGE LAB HUMIDITY : 52.5 %

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	1.26	4.74	397.1	2.4	2.0	Pre 1	Crown
	2	1.26	4.72	397.8	2.4	2.0	Pre 2	Crown
	3	1.26	4.72	392.2	2.4	2.0	Pre 3	Crown
PRETEST AVERAGE		XXXX	XXXX	395.7	XXX	XXX	XXXX	XXXX
POSTTEST	1	1.26	4.79	411.1	2.4	2.0	Post 1	Crown
	2	1.26	4.73	397.5	2.4	2.0	Post 2	Crown
	3	1.26	4.76	399.6	2.4	2.0	Post 3	Crown
POSTTEST AVERAGE		XXXX	XXXX	402.7	XXX	XXX	XXXX	XXXX
DIFFERENCE BETWEEN PRE-TEST AND POST-TEST AVERAGES				7.0	DIFFERENCE NOT TO EXCEED 15 g			

Helmet Designation	Helmet Condition	Impact Location	Front		Left		Right		Rear	
		Impact Number	1	2	1	2	1	2	1	2
A	Ambient	Anvil	Hemi		Hemi		Flat		Flat	
		Test Record No.	1	2	3	4	5	6	7	8
		Peak g	115	135	107	145	161	204	180	210
		ms @ 150	0.0	0.0	0.0	0.0	1.6	3.0	2.8	3.0
		ms @ 200	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1
		Velocity m/s	5.32	5.29	5.28	5.28	5.98	6.01	6.02	5.97
B	Low Temperature	Anvil	Hemi		Hemi		Flat		Flat	
		Test Record No.	9	10	11	12	13	14	15	16
		Peak g	117	131	108	147	164	210	185	217
		ms @ 150	0.0	0.0	0.0	0.0	1.6	2.9	3.0	3.3
		ms @ 200	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1
		Velocity m/s	5.31	5.27	5.31	5.27	5.99	5.98	5.98	5.99
C	High Temperature	Anvil	Hemi		Hemi		Flat		Flat	
		Test Record No.	17	18	19	20	21	22	23	24
		Peak g	106	129	96	148	133	179	172	189
		ms @ 150	0.0	0.0	0.0	0.0	0.0	2.0	1.8	2.8
		ms @ 200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Velocity m/s	5.25	5.24	5.30	5.27	6.01	5.96	5.96	5.95
D	Water Immersed	Anvil	Hemi		Hemi		Flat		Flat	
		Test Record No.	25	26	27	28	29	30	31	32
		Peak g	96	136	83	120	139	150	157	172
		ms @ 150	0.0	0.0	0.0	0.0	0.0	0.1	1.0	2.3
		ms @ 200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Velocity m/s	5.29	5.26	5.26	5.28	5.96	5.94	5.97	5.92

COMMENTS: 1. The actual drop heights were: flat anvil 200 cm, hemi anvil 151 cm.
2. Values reported in the above tables are rounded.

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 60º ± 0.5°, 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 cm ± 1.5 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	Front Right	X		AMBIENT
3	B	Crown	X		LOW TEMPERATURE
4	B	Front Right	X		LOW TEMPERATURE
5	C	Crown	X		HIGH TEMPERATURE
6	C	Front Right	X		HIGH TEMPERATURE
7	D	Crown	X		WATER IMMERSED
8	D	Front Right	X		WATER IMMERSED

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

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	1.08	---	---
B	LOW TEMPERATURE	0.45	2.56	2.11
C	HIGH TEMPERATURE	0.67	2.97	2.30
D	WATER IMMERSED	0.35	2.74	2.39

CONFIGURATION - Paragraph S5.4 - Helmet shall provide a minimum peripheral vision of 105º 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	> 105º	Pass
BROW OPENING	> 2.5 cm (1 inch)	Pass

COMMENT: Values in the above tables are rounded.

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

COMMENTS:

1. The manufacturer's name, month and year of manufacture and the instructions to the purchaser labels do not appear to be permanent.

2. The instructions to the purchaser labels are not visible to the user without moving any part of the helmet.

3. As of the date of this report, the entity listed on the interior label, "SIMPSON HELMETS INC", has not filed in accordance with Part 566, Manufacturer Identification, and therefore cannot be verified as a recognized manufacturer.

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	

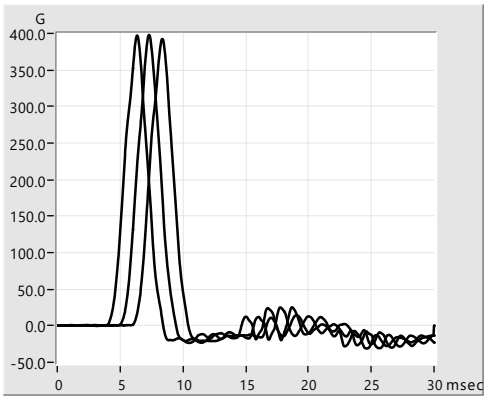
COMMENT:

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

TEST DATA

Uni-Axial System-Check

Helmet Manufacturer : SHOEI CO., LTD.
Address : JUN OHTSU PMO AKIHABARA NORTH, 8TH FLOOR 1-31-7 TAITO TOKYO 110-0016 JP



Testing Laboratory : ACT LAB LLC
Address : 3280 East 59th Street
Long Beach, CA
90805

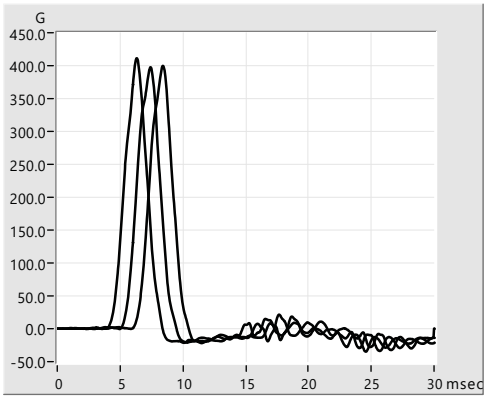
Laboratory Technician name : Michael Valdez
M.E.P. Pad Model : H0171
Laboratory Temperature : 23 deg C
Laboratory Humidity : 51 %
Selected Filter Frequency : CFC1000 # 1650 Hz
Acc. sensitivity (axis Z) : 10.47 mV/G
Acc. sensitivity (axis X) : 10.00 mV/G
Acc. sensitivity (axis Y) : 10.00 mV/G
Drop Device : D.O.T Size C (Uni-Axial) 23
Drop mass assembly : 5.012 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	126.0	56.1	4.8	5.37	4.7334	395.3	2.36	2.01	2861	3977	09:51:28	2020-08-06	Pass
2	126.0	56.4	4.6	5.35	4.7444	396.1	2.38	1.99	2841	3964	09:51:51	2020-08-06	Pass
3	126.0	57.2	3.9	5.32	4.7756	407.2	2.39	2.03	2864	4026	09:52:09	2020-08-06	Pass
4	126.0	56.2	4.7	5.36	4.7367	397.1	2.38	2.02	2851	3945	09:52:45	2020-08-06	Pass
5	126.0	55.9	5.0	5.38	4.7211	397.8	2.37	2.01	2856	3970	09:53:06	2020-08-06	Pass
6	126.0	55.9	5.0	5.38	4.7235	392.2	2.38	2.00	2810	3910	09:53:46	2020-08-06	Pass
Last 3#	126.00	56.00	4.90	5.37	4.73	395.70	2.38	2.01	2839.00	3941.67	9.00	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
USA



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 : 23 deg C
Laboratory Humidity : 52 %
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 : 5.012 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	126.0	58.3	2.9	5.26	4.8247	413.2	2.38	2.04	3171	4405	16:00:54	2020-08-06	Pass
2	126.0	57.3	3.8	5.31	4.7816	399.6	2.38	2.02	3093	4257	16:01:35	2020-08-06	Pass
3	126.0	56.8	4.2	5.33	4.7620	406.3	2.39	2.02	3086	4293	16:02:45	2020-08-06	Pass
4	126.0	57.5	3.6	5.30	4.7912	411.1	2.36	2.02	3083	4280	16:03:35	2020-08-06	Pass
5	126.0	56.0	4.9	5.37	4.7283	397.5	2.37	2.01	3026	4200	16:04:23	2020-08-06	Pass
6	126.0	56.8	4.2	5.34	4.7607	399.6	2.37	2.00	3019	4186	16:05:19	2020-08-06	Pass
Last 3#	126.00	56.77	4.23	5.34	4.76	402.73	2.37	2.01	3042.67	4222.00	16.00	2020.00	0.00

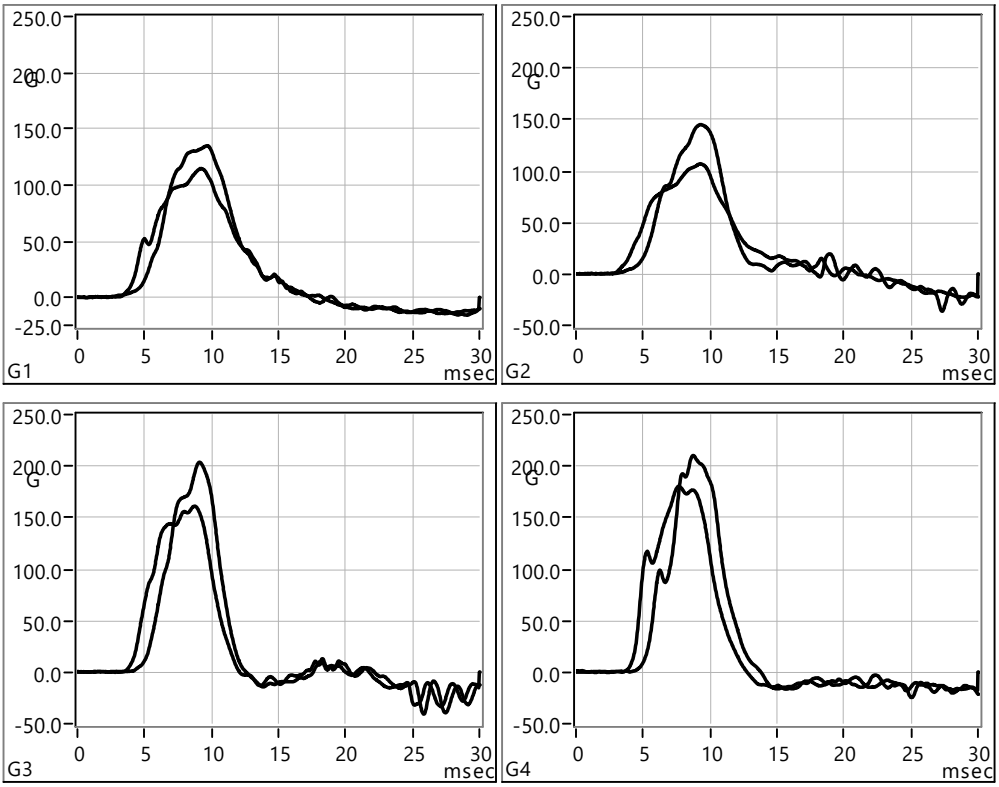
Curve impact #2 : shift of 1msec ; Curve impact #3 : shift of 2msec

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC
Address : 3280 East 59th Street
Long Beach, CA
90805

Helmet Manufacturer : G-Force
Address : 4231 Southside Dr.
Suite 300 Acworth GA
30101 USA

SystemCheckFile#: N/A
Laboratory Technician name : Michael Valdez
Batch Number :
Ref. P.O. Number : 2020
Model : SIMPSON SHORTY
Color : White
Size : M (56-57 cm)
Weight : 932.00 g
Manufacturing Date : 10/2018
Standard Request : FMVSS No.218
Identification Code : 521122001-A
Headform Model : D.O.T.
Headform Size : C D.O.T
Conditioning : Ambient
Laboratory Temperature : 22 deg C
Laboratory Humidity : 47 %
Selected Filter Frequency : CFC1000 # 1650 Hz
Maximum Peak G's authorized : 400 G
Maximum Peak m/s2 authorized : 3923 m/s2
Drop mass assembly : 5.012 kg
Time gate flag height : 25.40 mm
Acc. sensibility (axis Z) : 10.47



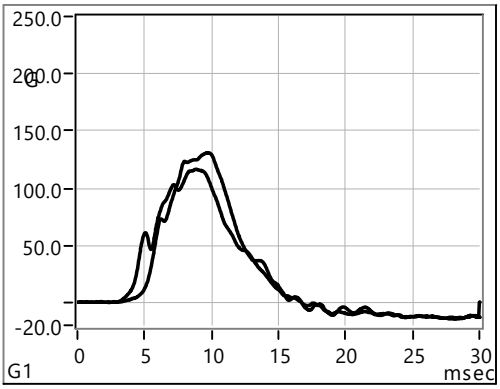
Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL	
1	Front	Hemi	151.0	70.8	2.3	4.78	5.3161	114.5	0.00	0.00	486	562	14:39:23	2020-08-06	Pass	
2	Front	Hemi	151.0	70.1	2.8	4.80	5.2875	134.8	0.00	0.00	688	0	14:40:43	2020-08-06	Pass	
3	Left	Hemi	151.0	70.0	2.9	4.81	5.2839	107.1	0.00	0.00	417	480	14:56:03	2020-08-06	Pass	
4	Left	Hemi	151.0	69.9	2.9	4.81	5.2821	145.1	0.00	0.00	678	796	14:57:12	2020-08-06	Pass	
5	Right	Flat	200.0	89.6	4.5	4.25	5.9801	161.2	1.57	0.00	1004	1148	15:11:37	2020-08-06	Pass	
6	Right	Flat	200.0	90.6	4.0	4.23	6.0112	203.9	2.98	0.45	1306	1587	15:12:41	2020-08-06	Pass	
7	Rear	Flat	200.0	90.9	3.8	4.22	6.0221	180.2	2.77	0.00	1319	1523	15:33:09	2020-08-06	Pass	
8	Rear	Flat	200.0	89.8	4.4	4.24	5.9861	210.2	3.02	1.05	1563	1850	15:34:39	2020-08-06	Pass	

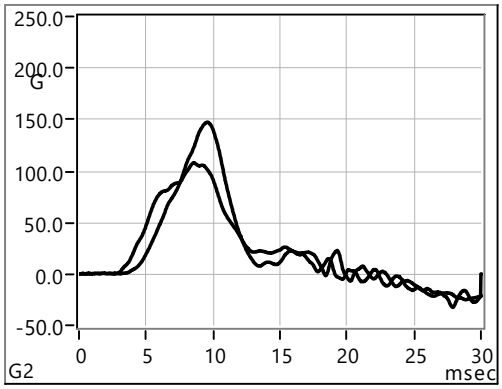
Impact Uni-Axial

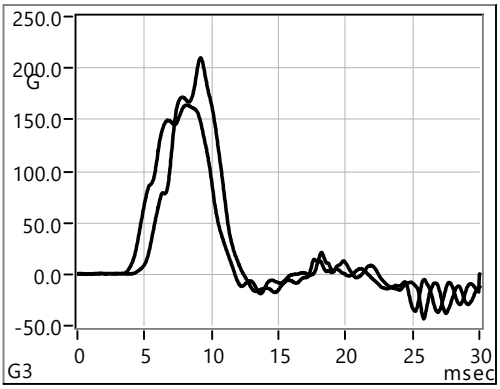
Testing Laboratory : ACT LAB LLC
Address : 3280 East 59th Street
Long Beach, CA
90805

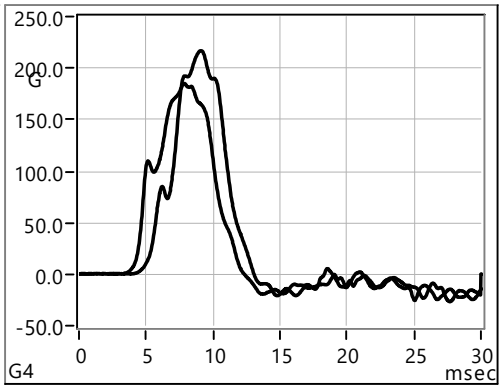
Helmet Manufacturer : G-Force
Address : 4231 Southside Dr.
Suite 300 Acworth GA
30101 USA

SystemCheckFile#: N/A
Laboratory Technician name : Michael Valdez
Batch Number :
Ref. P.O. Number : 2020
Model : SIMPSON SHORTY
Color : White
Size : M (56-57 cm)
Weight : 928.00 g
Manufacturing Date : 01/2019
Standard Request : FMVSS No.218
Identification Code : 521122001-B
Headform Model : D.O.T.
Headform Size : C D.O.T
Conditioning : Cold
Laboratory Temperature : 22 deg C
Laboratory Humidity : 47 %
Selected Filter Frequency : CFC1000 # 1650 Hz
Maximum Peak G's authorized : 400 G
Maximum Peak m/s2 authorized : 3923 m/s2
Drop mass assembly : 5.012 kg
Time gate flag height : 25.40 mm
Acc. sensibility (axis Z) : 10.47









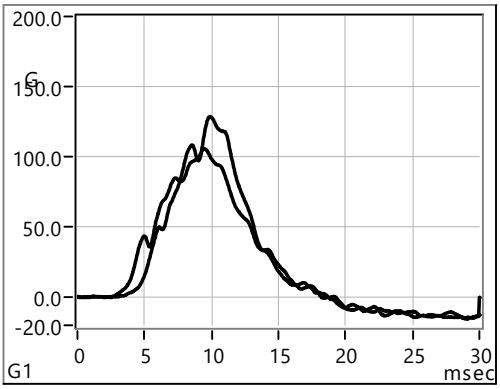
Impact #	Position	Anvil type	Drop Height (cm)	Energy (Joules)	Friction (%)	Time Gate (msec)	Velocity IN (m/sec)	Peak Acc.(G)	Delta T 150G (msec)	Delta T 200G (msec)	HIC	SI	Test Time	Test Date	PASS or FAIL	
1	Front	Hemi	151.0	70.5	2.5	4.79	5.3050	116.6	0.00	0.00	506	598	14:42:06	2020-08-06	Pass	
2	Front	Hemi	151.0	69.5	3.2	4.82	5.2676	130.6	0.00	0.00	639	762	14:43:21	2020-08-06	Pass	
3	Left	Hemi	151.0	70.7	2.4	4.78	5.3097	108.0	0.00	0.00	397	471	14:58:32	2020-08-06	Pass	
4	Left	Hemi	151.0	69.7	3.1	4.82	5.2741	147.4	0.00	0.00	606	717	14:59:50	2020-08-06	Pass	
5	Right	Flat	200.0	90.0	4.3	4.24	5.9935	164.0	1.63	0.00	1012	1164	15:13:47	2020-08-06	Pass	
6	Right	Flat	200.0	89.5	4.6	4.25	5.9751	209.7	2.94	0.47	1266	1516	15:15:02	2020-08-06	Pass	
7	Rear	Flat	200.0	89.5	4.6	4.25	5.9777	185.1	3.03	0.00	1333	1553	15:35:54	2020-08-06	Pass	
8	Rear	Flat	200.0	90.1	4.3	4.24	5.9945	217.0	3.29	1.13	1745	1997	15:36:57	2020-08-06	Pass	

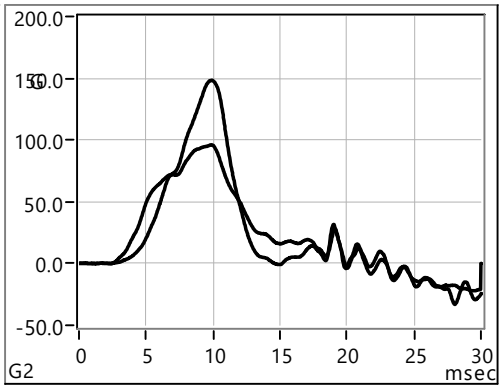
Impact Uni-Axial

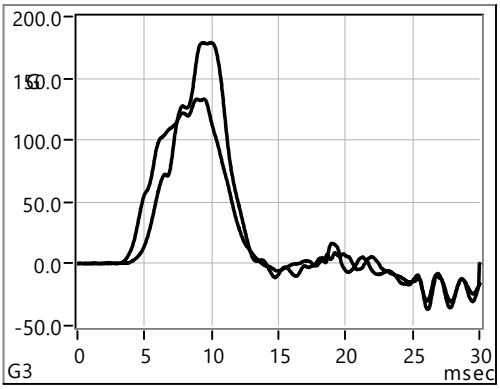
Testing Laboratory : ACT LAB LLC
Address : 3280 East 59th Street
Long Beach, CA
90805

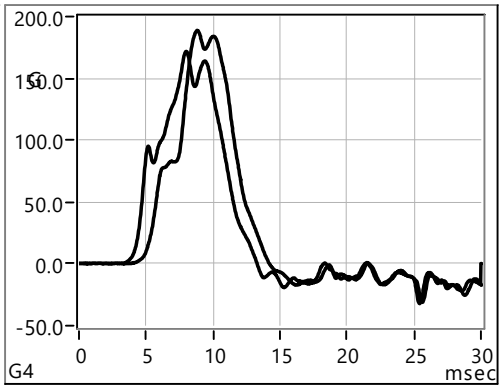
Helmet Manufacturer : G-Force
Address : 4231 Southside Dr.
Suite 300 Acworth GA
30101 USA

SystemCheckFile#: N/A
Laboratory Technician name : Michael Valdez
Batch Number :
Ref. P.O. Number : 2020
Model : SIMPSON SHORTY
Color : White
Size : M (56-57 cm)
Weight : 912.00 g
Manufacturing Date : 01/2019
Standard Request : FMVSS No.218
Identification Code : 521122001-C
Headform Model : D.O.T.
Headform Size : C D.O.T
Conditioning : Hot
Laboratory Temperature : 22 deg C
Laboratory Humidity : 47 %
Selected Filter Frequency : CFC1000 # 1650 Hz
Maximum Peak G's authorized : 400 G
Maximum Peak m/s2 authorized : 3923 m/s2
Drop mass assembly : 5.012 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	151.0	69.1	3.5	4.84	5.2508	105.8	0.00	0.00	423	489	14:44:42	2020-08-06	Pass	
2	Front	Hemi	151.0	68.8	3.7	4.85	5.2391	128.5	0.00	0.00	574	666	14:45:55	2020-08-06	Pass	
3	Left	Hemi	151.0	70.4	2.6	4.79	5.2985	96.1	0.00	0.00	342	398	15:01:01	2020-08-06	Pass	
4	Left	Hemi	151.0	69.6	3.2	4.82	5.2685	148.4	0.00	0.00	630	747	15:01:42	2020-08-06	Pass	
5	Right	Flat	200.0	90.4	4.1	4.23	6.0052	133.2	0.00	0.00	674	795	15:16:06	2020-08-06	Pass	
6	Right	Flat	200.0	89.1	4.8	4.26	5.9638	179.0	1.99	0.00	1082	1246	15:17:26	2020-08-06	Pass	
7	Rear	Flat	200.0	89.1	4.8	4.26	5.9622	171.8	1.83	0.00	1048	1264	15:38:07	2020-08-06	Pass	
8	Rear	Flat	200.0	88.6	5.1	4.27	5.9465	188.7	2.83	0.00	1271	1529	15:39:17	2020-08-06	Pass	

Impact Uni-Axial

Testing Laboratory : ACT LAB LLC
Address : 3280 East 59th Street
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90805

Helmet Manufacturer : G-Force
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Suite 300 Acworth GA
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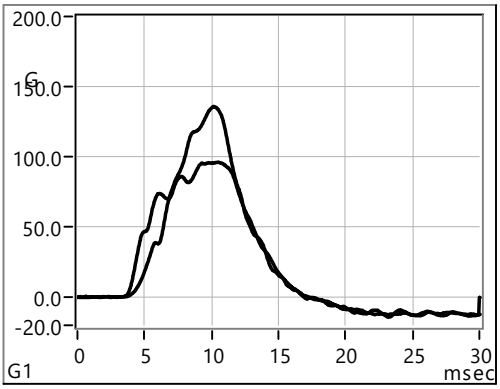
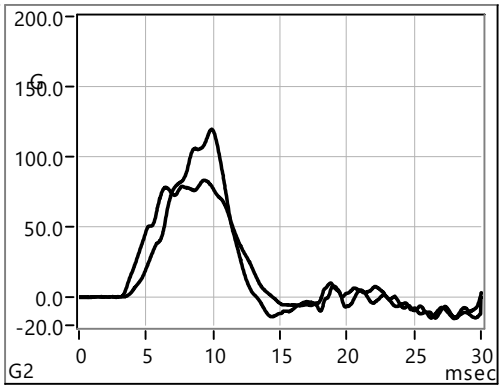
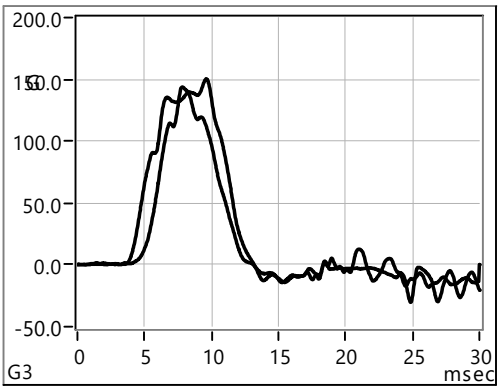
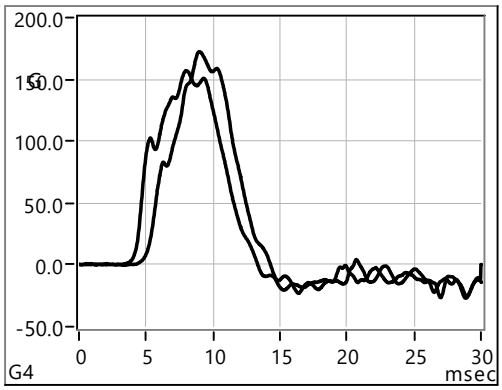
SystemCheckFile#: N/A
Laboratory Technician name : Michael Valdez
Batch Number :
Ref. P.O. Number : 2020
Model : SIMPSON SHORTY
Color : White
Size : M (56-57 cm)
Weight : 936.00 g
Manufacturing Date : 01/2019
Standard Request : FMVSS No.218
Identification Code : 521122001-D
Headform Model : D.O.T.
Headform Size : C D.O.T
Conditioning : Wet
Laboratory Temperature : 22 deg C
Laboratory Humidity : 47 %
Selected Filter Frequency : CFC1000 # 1650 Hz
Maximum Peak G's authorized : 400 G
Maximum Peak m/s2 authorized : 3923 m/s2
Drop mass assembly : 5.012 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	151.0	70.2	2.7	4.80	5.2929	96.3	0.00	0.00	451	504	14:48:42	2020-08-06	Pass	
2	Front	Hemi	151.0	69.4	3.3	4.83	5.2642	135.8	0.00	0.00	652	763	14:49:36	2020-08-06	Pass	
3	Left	Hemi	151.0	69.4	3.3	4.83	5.2611	83.4	0.00	0.00	280	309	15:03:18	2020-08-06	Pass	
4	Left	Hemi	151.0	69.9	3.0	4.81	5.2815	119.7	0.00	0.00	391	452	15:04:21	2020-08-06	Pass	
5	Right	Flat	200.0	89.0	4.8	4.26	5.9606	139.1	0.00	0.00	730	844	15:18:48	2020-08-06	Pass	
6	Right	Flat	200.0	88.3	5.2	4.28	5.9372	150.4	0.11	0.00	810	932	15:24:23	2020-08-06	Pass	
7	Rear	Flat	200.0	89.4	4.6	4.25	5.9720	156.9	0.96	0.00	1012	1186	15:40:41	2020-08-06	Pass	
8	Rear	Flat	200.0	87.8	5.5	4.29	5.9207	172.4	2.27	0.00	1112	1295	15:41:47	2020-08-06	Pass	

ACT DOT Strap Retention Acquistion
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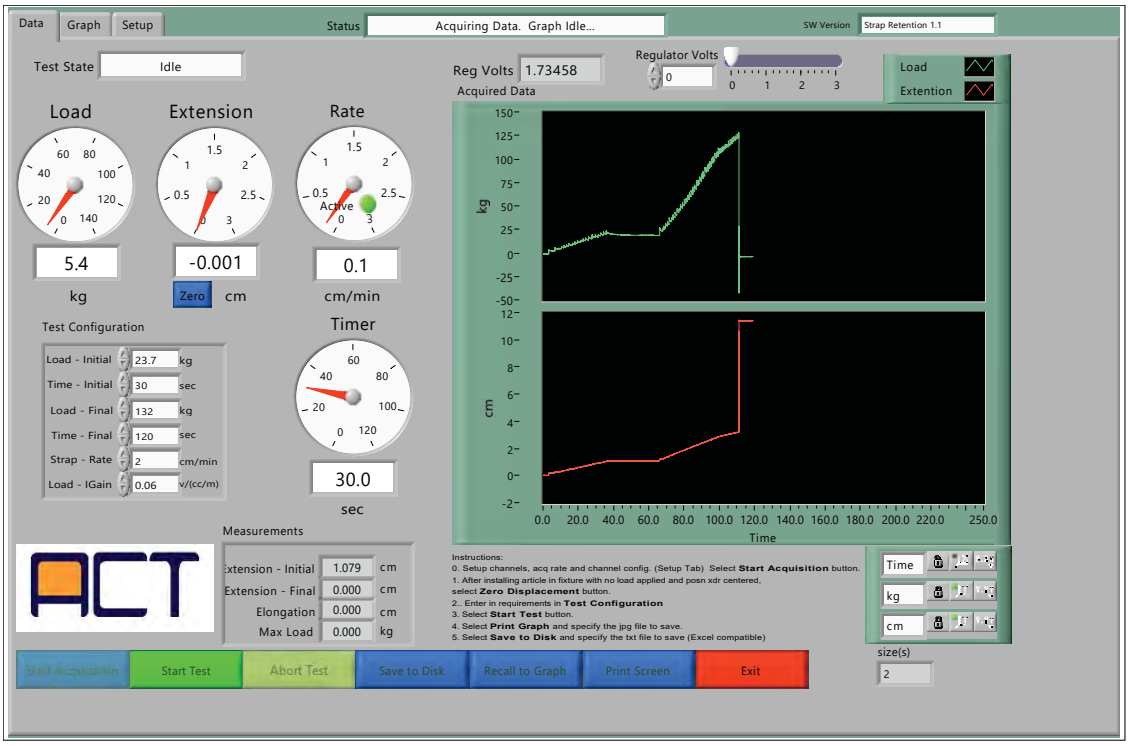
Printed on 2020-08-06 at 4:22 PM



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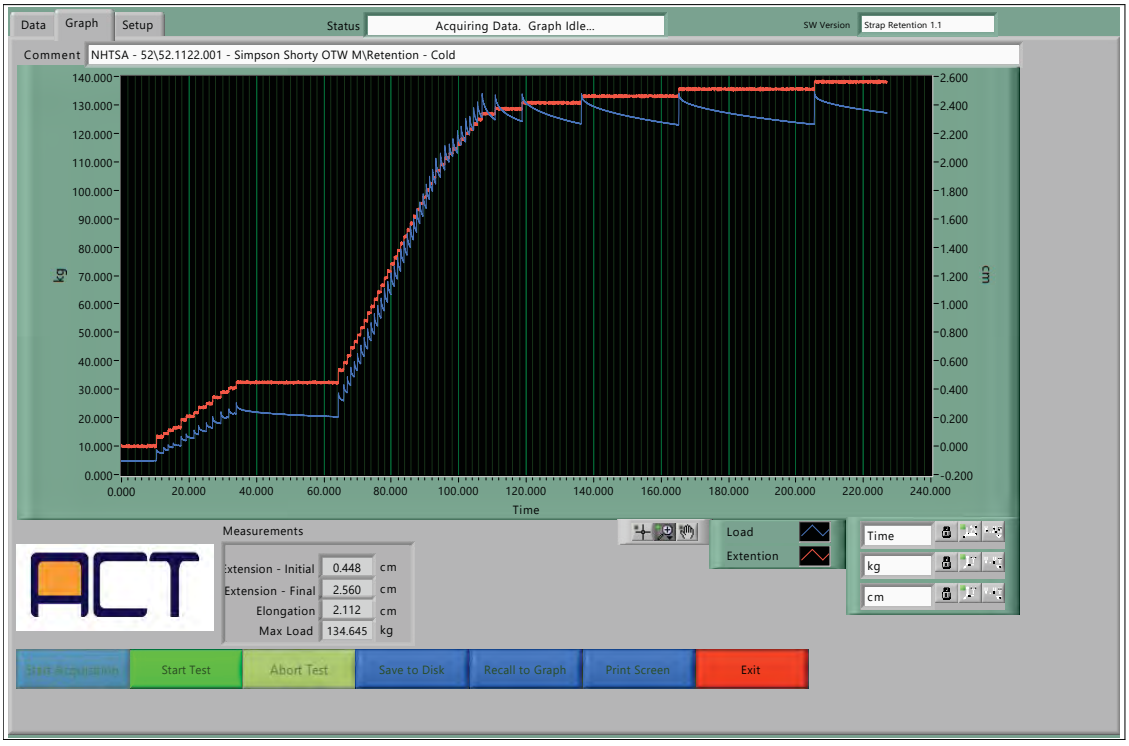

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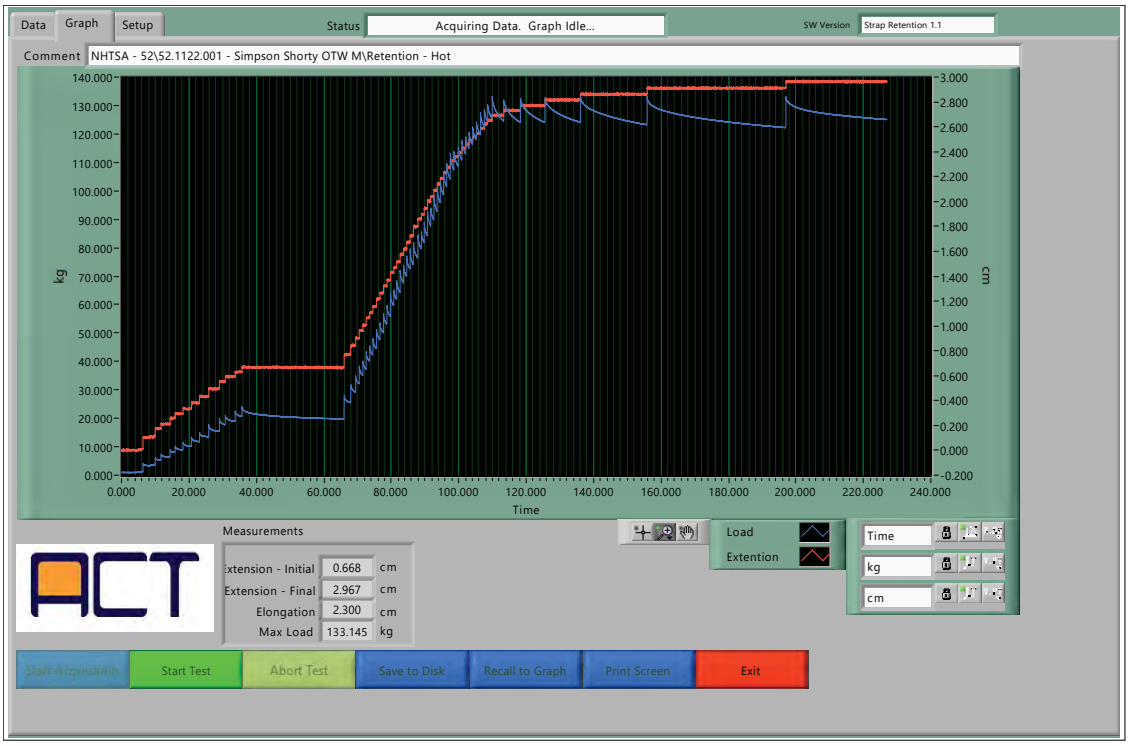

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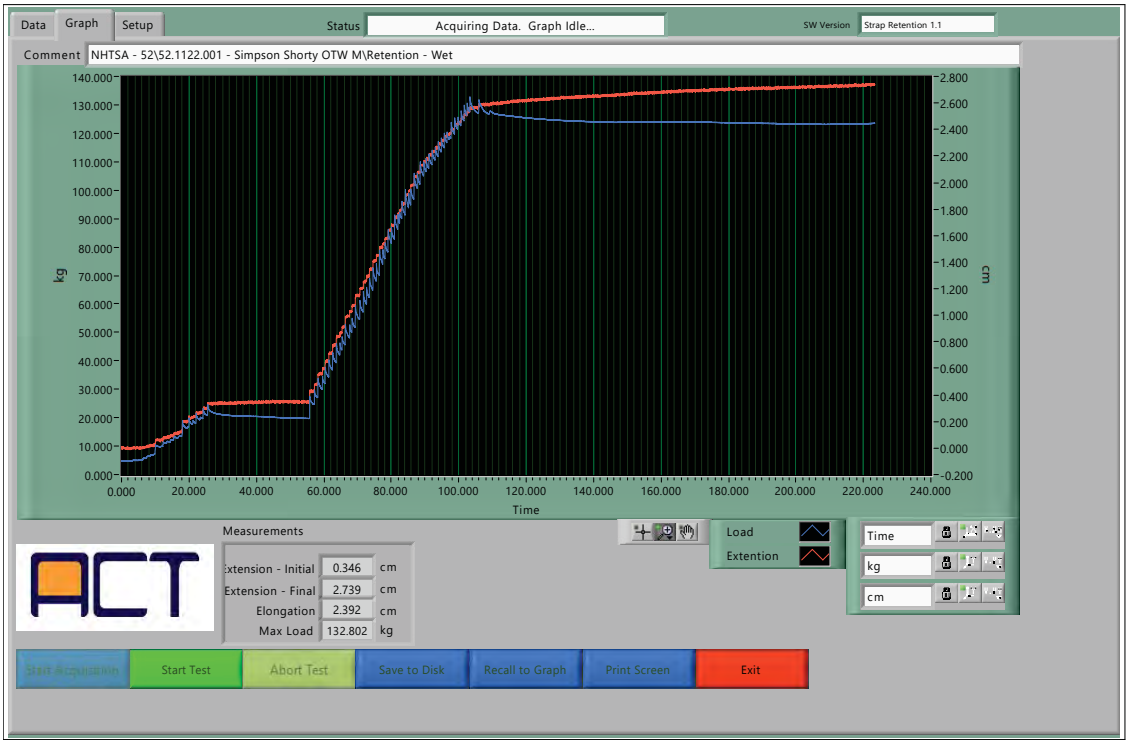
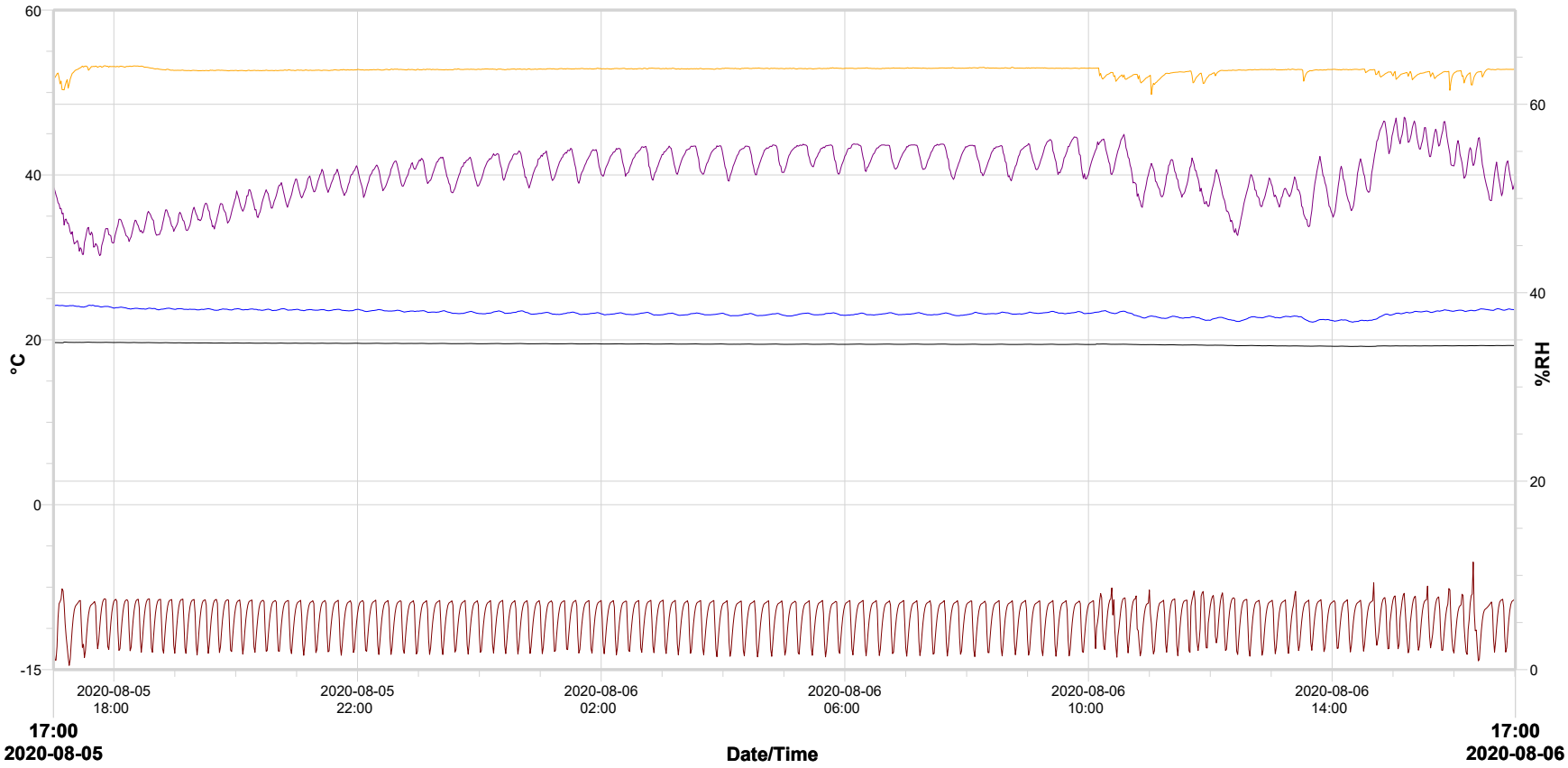




Report Summary Statistics

#	Location	Zone	Color	Units	Avg	Min	Max	STD	MKT	Samples
1	H0177 - Humidity (1044)	viewLinc/ACT-Helmet Lab (1041)		%RH	52.51	43.94	58.63	2.90	0.00	1440
2	H0177 - Lab Temp. (1042)	viewLinc/ACT-Helmet Lab (1041)		°C	23.24	22.15	24.20	0.41	23.25	1440
3	H0178 - Oven (1046)	viewLinc/ACT-Helmet Lab (1041)		°C	52.70	49.76	53.25	0.40	52.71	1440
4	H0178 - Water (1048)	viewLinc/ACT-Helmet Lab (1041)		°C	19.47	19.20	19.73	0.13	19.47	1440
5	H0179 - Freezer (1050)	viewLinc/ACT-Helmet Lab (1041)		°C	-11.83	-14.50	-6.95	2.30	-13.48	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.

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
H0196	Magnesium Ball Arm	Cadex	NA	7/30/2020	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

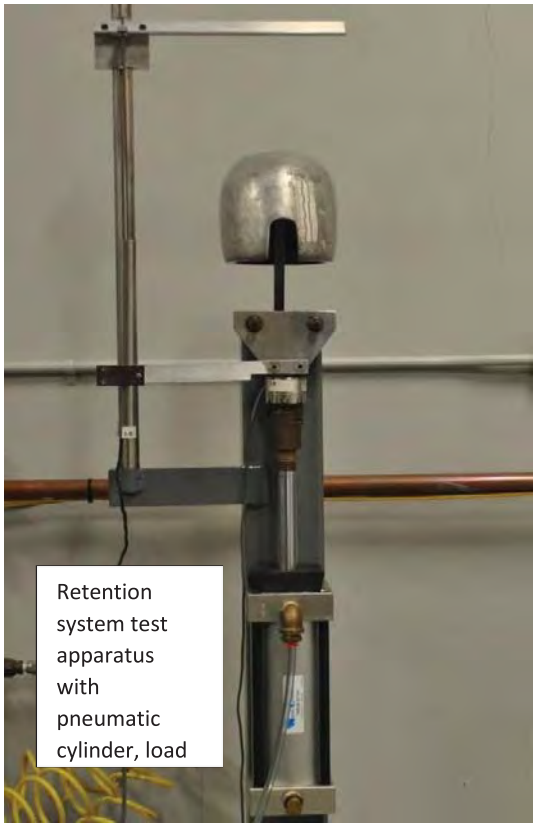
Calibrated Measurement Equipment								
ACT ID	**Description**	**Make/Model**	**S/N**	**Range**	**Accuracy from Cal. Certs**	**Last Calibration**	**Next Calibration**	**Calibration By:**
H0193	Velocity Gate	Velocimeter HVTG Short	HVTG120200 129-1	--	5.77E-02	1/29/2020	1/29/2021	CADEX
H0192	Accelerometer	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

APPENDIX C

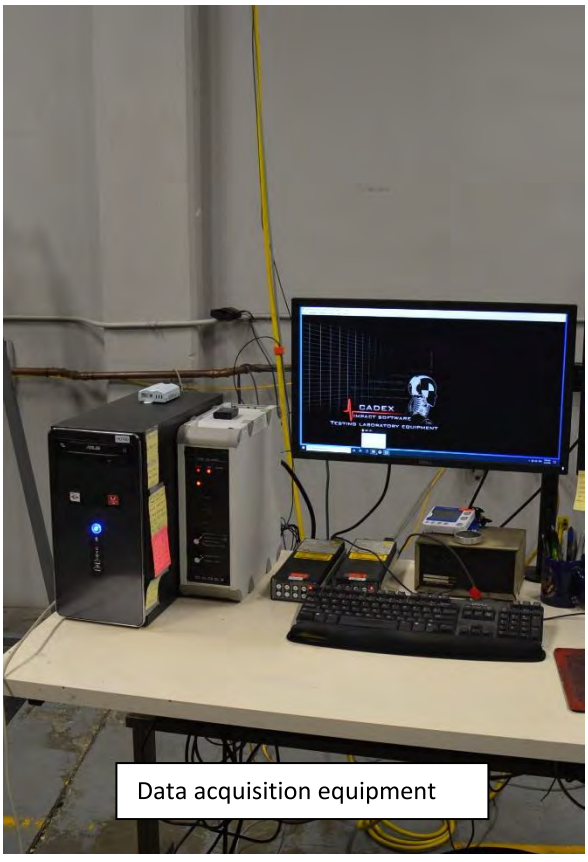
PHOTOGRAPHS

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

Low temperature conditioning cabinet

High temperature conditioning cabinet and water immersion equipment


SIMPSON SHORTY OTW helmet and box showing model designation
SIMPSON
HELMETS
E-52.1172
SIMPSON
MADE IN CHINA
MODEL
SIZE
MFG. DATE
SIMPSON
MEDIUM
2019, 01


SIMPSON SHORTY OTW helmet with test line, front left view
SIMPSON


SIMPSON SHORTY OTW helmet
with test line, rear left view
A52.1122.001
SIMPSON
DOT


SIMPSON SHORTY OTW helmet interior view


SIMPSON SHORTY OTW helmet front and left side hemispherical anvil impact locations
SIMPSON
A2


SIMPSON SHORTY OTW helmet right side and rear flat anvil impact locations
F2
F1
SIMPSON
SHORTY OTW
DOT
SIMPSON


SIMPSON SHORTY
OTW helmet crown
penetration test location


SIMPSON SHORTY
OTW helmet front right
penetration test location


SIMPSON SHORTY OTW failing
ambient retention sample


SIMPSON SHORTY OTW
ambient sample broken
retention buckle


SIMPSON SHORTY OTW helmet S5.6.1 Labeling
WARNING
OTW

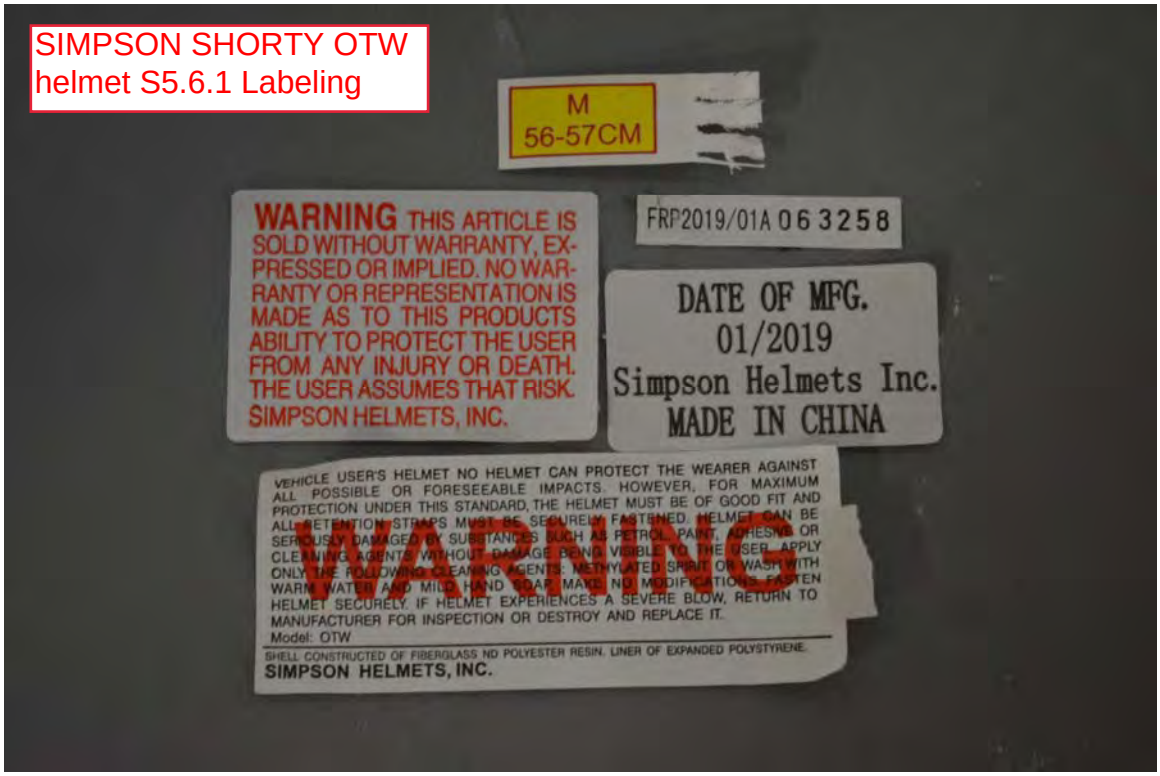

SIMPSON SHORTY OTW helmet S5.6.1 Labeling
FRP2019/01A 06 33
OTW
VEHICLE USER'S HELMET NO HELMET CAN PROTECT THE WEARER AGAINST
ALL POSSIBLE OR FORESEEABLE IMPACTS. HOWEVER, FOR MAXIMUM
PROTECTION UNDER THIS STANDARD, THE HELMET MUST BE OF GOOD FIT AND
ALL RETENTION STRAPS MUST BE SECURELY FASTENED. HELMET CAN BE
SERIOUSLY DAMAGED BY SUBSTANCES SUCH AS PETROL, PAINT, ADHESIVE OR
CLEANING AGENTS WITHOUT DAMAGE BEING VISIBLE TO THE USER, APPLY
ONLY THE FOLLOWING CLEANING AGENTS: METHYLATED SPIRIT OR WASH WITH
WARM WATER AND MILD HAND SOAP. MAKE NO MODIFICATIONS. FASTEN
HELMET SECURELY. IF HELMET EXPERIENCES A SEVERE BLOW, RETURN TO
MANUFACTURER FOR INSPECTION OR DESTROY AND REPLACE IT.
Model: OTW
SHELL CONSTRUCTED OF FIBERGLASS ND POLYESTER RESIN. LINER OF EXPANDED POLYSTYRENE.
SIMPSON HELMETS, INC.

SIMPSON SHORTY OTW helmet
S5.6.1 Labeling permanency failure

SIMPSON SHORTY OTW helmet
S5.6.1 Labeling

SIMPSON SHORTY OTW helmet
S5.6.1 Labeling permanency failure

SIMPSON SHORTY OTW
helmet S5.6.1 Labeling




SIMPSON SHORTY OTW helmet
S5.6.2 Certification Label
SIMPSON
SHORTY OTW
DOT
FMVSS No.218
CERTIFIED