Element Materials Technology Denver
1530 Vista View Drive
Longmont, CO 80504
P 720-340-7810

Decompression Test Report

Date: May 2, 2019
Report Number: R9132A

ForeFlight, LLC

Prepared By:	Rachel Launer Element Denver Technical Writer	03/22/2019 Date
Reviewed By:	Michael Bosica Element Denver Quality Administrator	03/26/2019 Date
Concurred By:	Meg Talbert Element Denver Quality Administrator	03/27/2019 Date

Element Materials Technology Denver
1530 Vista View Drive
Longmont, CO 80504
P 720-340-7810

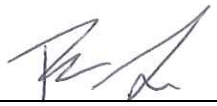
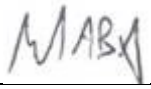
Revised By:	 Rachel Launer Element Denver Technical Writer	04/29/2019 Date
Reviewed By:	 Michael Bosica Element Denver Quality Administrator	04/30/2019 Date
Concurred By:	 Todd Luttmer EPO General Manager	04/29/2019 Date

TABLE OF CONTENTS

ADMINISTRATIVE DATA

Prepared For:	ForeFlight, LLC
Tests Performed:	Per Table 1 on page 6
Test Facility:	Element Materials Technology Denver 1530 Vista View Drive Longmont, CO 80504 720-340-7810
Test Unit Description(s):	(1) Apple iPad 9.7" 6th Gen, (1) Apple iPad Pro 11", (1) Sentry, (1) Stratus 3
Part Number(s):	A1954, A1980, FFSEN1
Serial Number(s):	
Primary Test Specification(s):	ForeFlight SOW via email dated 02/27/2019 , referencing RTCA DO-160G
Purchase Order Number(s):	190304A
Element Job Number:	9132P
Element Quote Number(s):	EPO009132Q
Project Begin Date:	03/14/2019
Project Completion Date:	03/14/2019
Test Report Completion Date:	May 2, 2019

Element Materials Technology Denver
1530 Vista View Drive
Longmont, CO 80504
P 720-340-7810

REVISIONS

Revision	Description	Date	Approval
N/A	Original Release	May 2, 2019	RL
A	Customer Requested Sample Name Changes	April 29, 2019	RL

1.0 Introduction

1.1 Scope

This document describes procedures and results of testing performed to the specification(s) and/or requirement(s) detailed herein. The results described in this report relate only to the specific items tested.

1.2 Purpose

The purpose of this test was to demonstrate that the test samples met or exceeded the design specifications and/or requirements during or upon completion of exposure to the testing detailed herein.

1.3 Test Sequence

The following test was performed:

Table 1 – Test Performed

Test	Start Date	End Date
Decompression	03/14/2019	03/14/2019

2.0 Applicable Documents

2.1 Specification

ForeFlight SOW via email dated 02/27/2019 , referencing RTCA DO-160G

3.0 General information

3.1 Test Equipment

All test instrumentation was calibrated in accordance with ANSI/NCSL Z540.1, Z540.3 or ISO 10012 as applicable, and are traceable to the National Institute of Standards and Technology (NIST) or other National Metrology Institute (NMI). Test equipment lists are available in individual test detail sections.

3.2 Test Conditions

Unless specified herein, all tests and measurements were performed at the room ambient conditions existing at the laboratory during testing:

Temperature:	10°C to 40°C
Relative Humidity:	0% to 80%

3.3 Test Witnessing/Monitoring

All testing was conducted by a qualified Element Technician and/or Test Engineer under the direction and cognizance of the Lab Manager and Quality Assurance.

3.4 Test Recording

Chronological logs of all significant events are maintained by test lab personnel and indicate date, times and descriptions of conditions. These logs, as listed in Appendix A, are used as reference and retained at Element, and are available upon request.

3.5 Decision Rule

Based upon the type of testing being categorized as CAT I (Quantitative or Semi-Quantitative) as defined in A2LA's P103 Policy on Estimating Measurement Uncertainty for Testing Laboratories, decision rules are not required.

4.0 Decompression Test Details

4.1 Setup

4.1.1 One (1) Apple iPad 9.7" 6th Gen, S/N: ; One (1) Apple iPad Pro 11", S/N: ; One (1) Sentry, S/N: ; and One (1) Stratus 3, S/N: were visually inspected with no signs of damage, deformation, discoloration, corrosion or any other anomalies noted.

4.1.2 The sample was setup in pressure vessel 1151.

4.1.3 Test equipment utilized for testing as outlined in Table 2.

Table 2 – Decompression Equipment

Test Dates: 03/14/2019 to 03/14/2019

ID#	Description	Mfr.	Model#	Serial#	Cal Date	Cal Due Date
FR616	Temperature/ Humidity Meter (Lab Ambient)	Cole-Parmer	90080-03	170855567	12/06/17	12/06/19
FR332	Presser Transducer	Omega	PX303-100A5V	N/A	01/04/19	01/04/20
1151	Pressure Vessel	N/A	N/A	N/A	Reference Only	
FR511	Data Logger	Hewlett Packard	34970A	MY41007967	01/29/19	01/29/20
FR563	Multiplexer	Hewlett Packard	34901A	MY41094559	01/30/19	01/30/20
1228	Environmental chamber	Tenny	8S	25720-02	07/10/18	07/10/19
1208	Pressure Chamber	Tenney	27ST-100-400	8190	03/12/19	03/12/20

4.2 Steps

4.2.1 The operating samples were exposed to an altitude of 8,000ft (10.91psiA) and stabilized for 2 hours.

4.2.2 The pressure was then reduced within 15 seconds to 55,000ft (1.32psiA) and held for 10 minutes.

4.2.3 Upon test completion, at ambient conditions, the samples were visually inspected, and then returned to customer for final analysis.

4.3 Results

4.3.1 No signs of damage, deformation, discoloration, corrosion, or any other anomalies noted.

4.0 Decompression Test Details (Continued)

4.4 Photographs

Photo 1 – *Samples Operating for Decompression Testing*

Photo 2 – *Samples Setup for Decompression*

4.0 Decompression Test Details (Continued)

4.4 Photographs (Continued)

Photo 3 – *Samples Setup for Decompression*

Photo 4 – *Sample Conditions Post Decompression Exposure*

4.0 Decompression Test Details (Continued)

4.5 Plots, charts, graphs, etc.

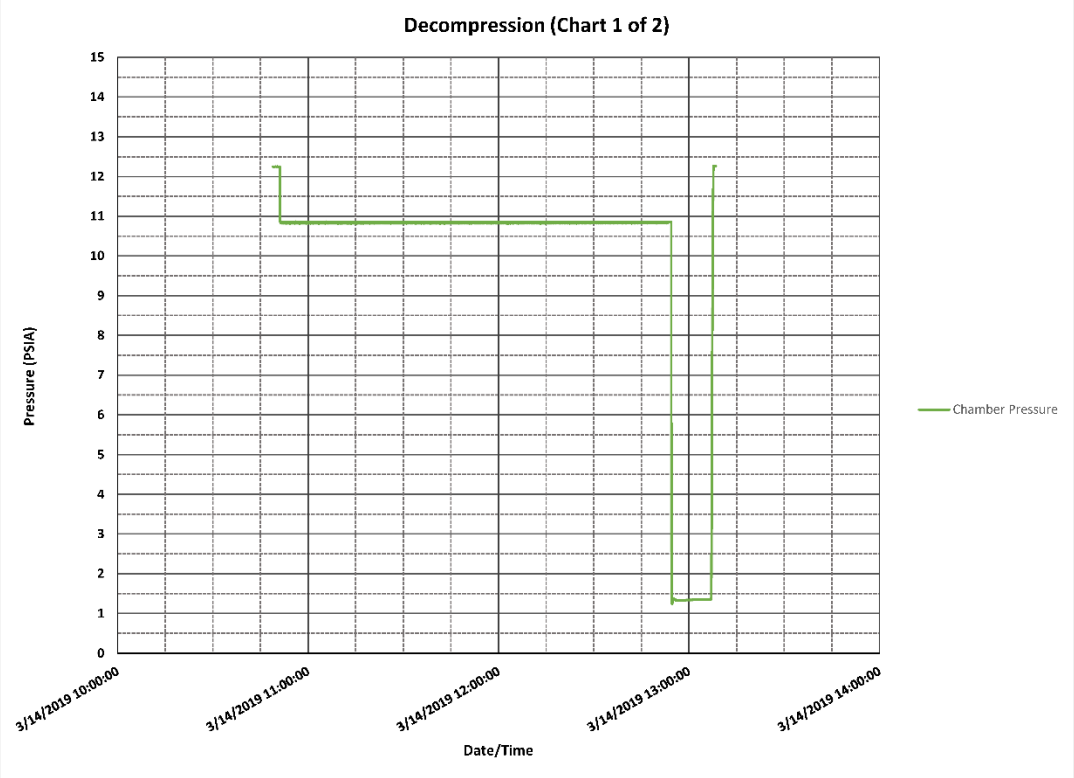


Figure 1 – Decompression Chart, 1 of 2

4.0 Decompression Test Details (Continued)

4.5 Plots, Charts, Graphs, Etc. (Continued)

Figure 2 – Decompression Chart, 2 of 2

APPENDIX A – REFERENCE DOCUMENTS

1. rev c ForeFlight - 9132 – Decompression.docx

element

Element – Portland/Seattle/Denver

TEST DATA LOG

Section 1 – Job Information

Job Number: 9132
Customer: ForeFlight
Date Started: 3/14/2019
Date Completed: 3/14/2019

Responsible Technician: Jacob Hammack, Michael Bosica
Customer Witness: No ☒ Yes ☐ Name:

Peer Review: Jacob Hammack: Michael Bosica *Peer Review Date: 3/14/2019*

Section 2 – Test Parameters

Test Title: Decompression
Test Specification: SOW via email Ref; RTCA DO160G (ref quote EPO0001909Q)
Test Description: The operating samples will be exposed to an altitude of 8,000 feet or 10.91 psiA (±5%) allowing the samples to stabilize (2 hours), then reduce the pressure to 55,000 feet or 1.32 psiA (±5%) this transition shall take place within 15 seconds, then this pressure is to be held for a least 10 minutes. The samples will then be checked for functionality at site level pressure.

Quality Critical Consumable(s) Required: No ☒ Yes ☐ Name(s): Batch/Lot #(s):

Section 3 – Test Sample Information

Sample Description	Sample P/N or Model No.	Sample S/N or Other Identifier	Qty.
Apple iPad 9.7" 6th Gen	A1954		1
Apple iPad Pro 11"	A1980		1
Sentry	FFSEN1		1
Stratus 3	-		1

Section 4 – Test Equipment

ID No.	Description	Manufacturer	Model No.	Serial No.	Last Cal	Next Cal
FR616	Temperature/ Humidity Meter (Lab Ambient)	Cole-Parmer	90080-03	170855567	12/06/17	12/06/19
FR332	Presser Transducer	Omega	PX303-100A5V	N/A	01/04/19	01/04/20
1151	Pressure Vessel	N/A	N/A	N/A	Reference Only	
FR511	Data Logger	Hewlett Packard	34970A	MY41007967	01/29/19	01/29/20
FR563	Multiplexer	Hewlett Packard	34901A	MY41094559	01/30/19	01/30/20
1228	Environmental chamber	Tenny	8S	25720-02	07/10/18	07/10/19
1208	Pressure Chamber	Tenney	27ST-100-400	8190	03/12/19	03/12/20

Section 5 – Test Log

Laboratory Temperature: +72°F Laboratory Humidity: 18%RH

Initials	Date	Time	Notes	Photo
JH	3/14/2019	936	Begin setting up pressure vessel #1151 and calibrate rapid decompression.	☐
JH	3/14/2019	0941	Set up samples operating within chamber [Photos: 8058-8060]	☒
JH	3/14/2019	1050	Seal the vessel and begin the ramp to 8,000 feet 10.91 psiA.	☐
JH	3/14/2019	1051	The vessel pressure is at 8,000 feet. Begin the two hour soak.	☐
JH	3/14/2019	1253	Reduce the pressure to 1.32 PSiA. The transition occurred within 15 seconds.	☐
JH	3/14/2019	1314	Hold for at least 10 minutes then return the vessel to site level pressure.	☐
JH	3/14/2019	1315	The exposure is complete.	☐
JH	3/14/2019	1315	Remove the samples from the vessel. Not abnormal anomalies detected, samples to return to customer [Photo: 8065]	☒

SP 708-3 Test Data Log Form

2nd Edition, Rev. 3, Issue Date: January 18, 2019

End of Report.