Rapid Decompression Testing

Decompression Tests 2018

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ForeFlight
Intelligent Apps for Pilots™

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

Decompression Test Report

Date: July 13, 2018
Report Number: R6716

ForeFlight LLC

Prepared By:	Meg Talbert Element Denver Quality Administrator	07/13/2018 Date
Reviewed By:	Michael Bosica Element Denver Lab Manager	07/13/2018 Date
Concurred By:	Jacqueline Booher EPO Deputy Quality Manager	07/16/2018 Date

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ADMINISTRATIVE DATA

Prepared For:	ForeFlight LLC
Test(s) Performed:	Decompression testing per Table 1 on page 5
Test Facility:	Element Materials Technology Denver 1530 Vista View Drive Longmont, CO 80504 720-340-7810
Test Unit Description(s):	Apple iPad
Part Number(s):	A1822
Serial Number(s):	
Primary Test Specification(s):	ForeFlight SOW per email dated 6-4-18
Purchase Order Number(s):	PO 180614A
Element Job Number:	6716P
Element Quote Number(s):	EPO006716Q-1
Project Begin Date:	06/28/2018
Project Completion Date:	06/28/2018
Test Report Completion Date:	July 13, 2018

REVISIONS

Revision	Description	Date	Approval
N/A	Original Release	July 13, 2018	MJT

1.0 INTRODUCTION

1.1 Scope

This document describes procedures and performance of the Decompression Tests performed in accordance with specification: ForeFlight SOW per email dated 6-4-18. 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 specimens met or exceeded the design specification requirements during or upon completion of exposure to the stresses detailed herein.

1.3 Test Sequence

The following tests were conducted during the course of Environmental Testing:

Table 1 – Environmental Test Sequence

Test	Start Date	End Date
Decompression	06/28/2018	06/28/2018

2.0 APPLICABLE DOCUMENTS

2.1 Specification

ForeFlight SOW per email dated 6-4-18, received , REF: RTCA DO-160G, reference older Quote EPO0001909Q.

3.0 GENERAL INFORMATION

3.1 Test Equipment

All test instrumentation was calibrated in accordance with ANSI/NCSL Z540.3 or ISO 10012, as applicable, and is traceable to a recognized National Metrology Institute (NMI). The following table lists the equipment used during the testing:

Table 2 – Decompression Equipment
Test Dates: 06/28/2018 to 06/28/2018

ID#	Description	Mfg.	Model#	Serial#	Last Cal	Next Cal
FR616	Temperature/Relative Humidity Meter	Digi-Sense	90080-03	170855567	12/06/17	12/06/19
FR411	Data Acquisition/Switch Unit	HP	34970A	US37010202	04/13/18	04/13/19
1151	Small Pressure Vessel	N/A	N/A	N/A	Reference Only	
FR332	Presser Transducer	Omega	PX303-100A5V	N/A	01/11/18	01/11/19
1228	Small Altitude Chamber	Tenney	8S	25720-02	Reference Only	
1208	Large Altitude	Tenney	27ST-100-400	8190	Reference Only	
FR569	Stopwatch	Digi-Sense	94460-28	170093811	04/10/17	04/10/19

3.0 GENERAL INFORMATION (continued)

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:	Ambient to 90%

3.3 Test Witnessing/Monitoring

All testing was conducted by a qualified Element Environmental Test Technician 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 C, are used as reference, retained at Element and available upon request. Test setup photographs are provided in Appendix A, with any additional charts, plots, or graphs provided in Appendix B.

4.0 Decompression Procedures

4.1 Setup

4.1.1 One (1) Apple iPad P/N: A1822 with S/N: was visually inspected with no signs of deformation, discoloration, or any other anomalies noted.

4.1.2 Operating sample was prepared and placed into Vessel 1151.

4.1.3 A secondary chamber, 1208, was prepared for the decompression event.

4.2 Steps

4.2.1 Began pressure stabilization at 8,000 feet (10.91psiA) and stabilized sample for 2 hours.

4.2.2 Valve was opened between the two chambers to subject the sample to a reduction in pressure to 50,000 feet (1.32psiA) within 15 seconds.

4.2.3 Exposed sample to 10 minutes at 50,000 feet.

4.2.4 Vessel pressure was returned to site level and sample was removed.

4.2.4.1 Post exposure showed sample operational.

4.2.5 Upon test completion, at ambient conditions, the sample was visually inspected, 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.

4.3.2 Test photographs provided in Appendix A.

4.3.3 Applicable graphs, charts, and/or plots provided in Appendix B.

APPENDIX A – TEST PHOTOGRAPHS

Decompression

Photo 1 – *Example of setup within pressure vessel, functional*

Photo 2 – *Post-Exposure, functional*

APPENDIX B – TEST PLOTS, CHARTS, GRAPHS

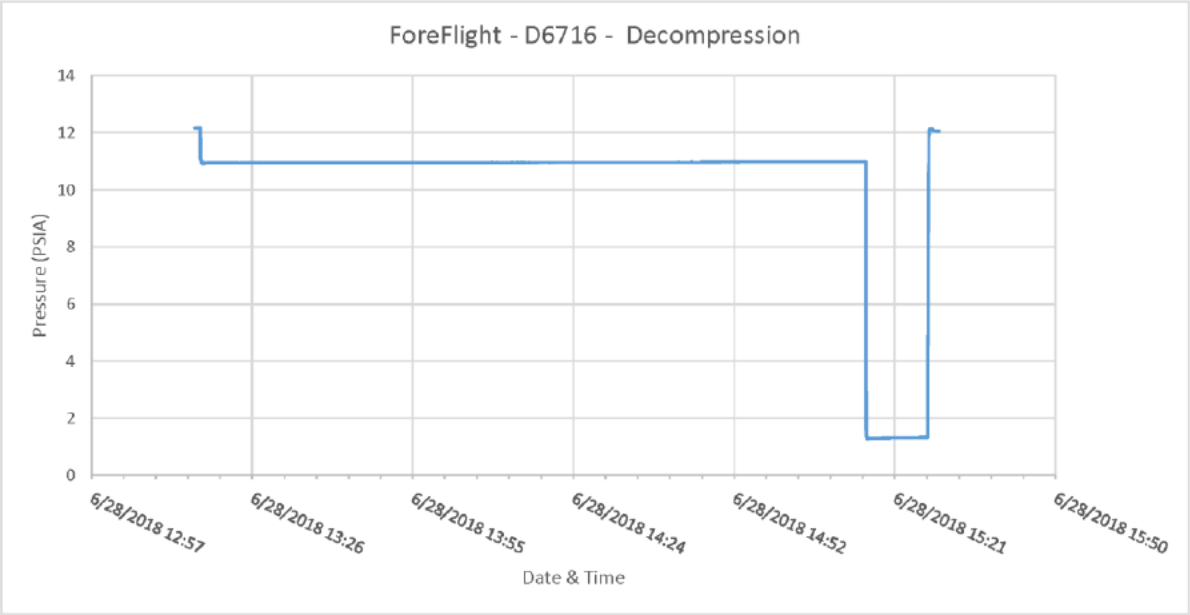

Figure 1 – Decompression (Soak) Chart 1 of 2

APPENDIX B (continued)

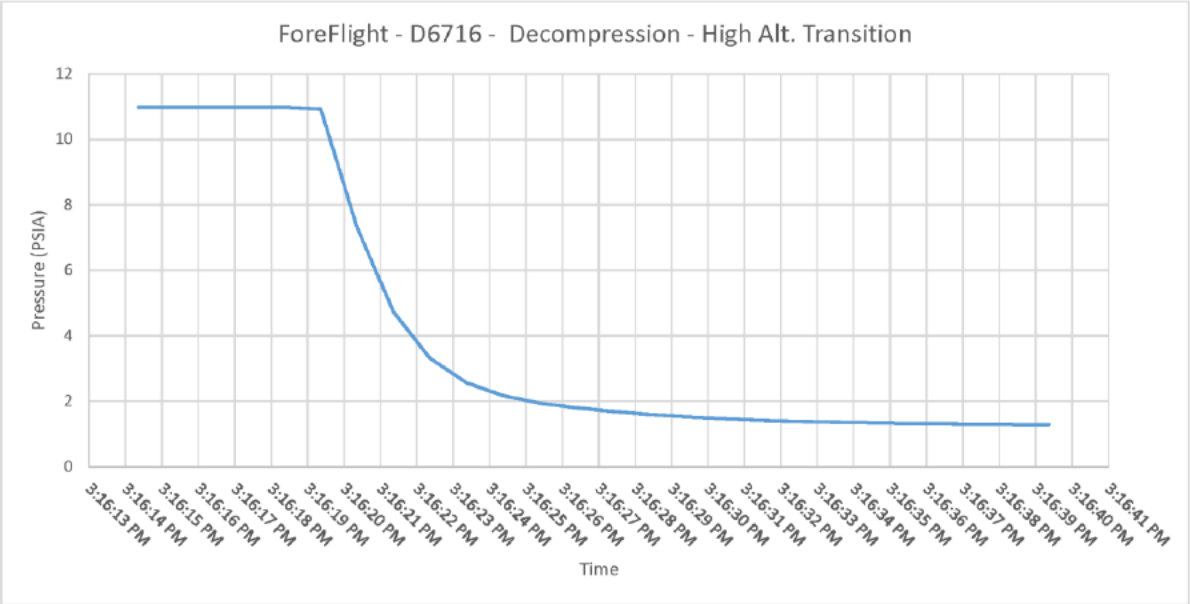

Figure 2 – Decompression (Transition) Chart 2 of 2

APPENDIX C – REFERENCES

1. rev a ForeFlight - D6716 - Decompression.docx

Element – Portland/Denver/Seattle
Test Data Log

Section 1 – Job Information

Job Number: D6716
Customer: ForeFlight LLC
Date Started: 6/28/2018
Date Completed: 6/28/2018

Responsible Technician: E. Geneva/M. Bosica
Customer Witness: No ☒ Yes ☐ Name: N/A

Section 2 – Test Parameters

Test Title: Decompression
Test Specification: ForeFlight SOW : per e-mail, REF:RTCA DO-160G Section 4.6.2 CAT A1
Test Description: The operating sample will be exposed to an altitude of 8,000 feet or 10.91 psiA allowing the sample to stabilize (2 hours), then reduce the pressure to 55,000 feet or 1.32 psiA- this transition shall take place within 15 seconds, then this pressure is to be held for a least 10 minutes. The sample will then be checked for functionality at site level pressure.

Section 3 – Test Sample Information

Sample Description	Sample P/N or Model No.	Sample S/N or Other Identifier	Qty.
Apple iPad	A1822	GG7W4X99HLFD	1

Section 4 – Test Equipment

ID No.	Description	Manufacturer	Model No.	Serial No.	Last Cal	Next Cal
FR616	Temperature/Relative Humidity Meter	Digi-Sense	90080-03	170855567	12/06/17	12/06/19
FR411	Data Acquisition/Switch Unit	HP	34970A	US37010202	04/13/18	04/13/19
1151	Small Pressure Vessel	N/A	N/A	N/A	Reference Only	
FR332	Presser Transducer	Omega	PX303-100A5V	N/A	01/11/18	01/11/19
1228	Small Altitude Chamber	Tenney	8S	25720-02	Reference Only	
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FR569	Stopwatch	Digi-Sense	94460-28	170093811	04/10/17	04/10/19

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Section 5 – Test Log

Laboratory Temperature: +80°F Laboratory Humidity: 28%RH

Initials	Date	Time	Notes	Photo
EG	6/28/2018	1200	Begin setting up in pressure vessel #1151.	☐
EG	6/28/2018	1210	Perform several test runs with sealed empty pressure vessel to dial in the required 15 second transfer time. [Photo 4607]	☒
EG	6/28/2018	1315	Setup the sample and seal the vessel. Begin the ramp to 8,000 feet 10.91 psiA.	☐
EG	6/28/2018	1318	The vessel pressure is at 8,000 feet. Begin the two hour soak.	☐
EG	6/28/2018	1519	Reduce the pressure to 1.32 psiA. The transition occurred within 15 seconds.	☐
EG	6/28/2018	1519	Begin 10 minute soak.	☐
EG	6/28/2018	1529	The exposure is complete.	☐
EG	6/28/2018	1530	Remove the sample from the vessel. [Photo 4616]	☒
EG	6/28/2018	1540	The testing is complete the samples will be returned to the customer.	☐

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End of Report.