Rapid Decompression Testing

Decompression Tests 2017

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ForeFlight
Intelligent Apps for Pilots™

Element Materials Technology

Portland/Denver/Seattle

Report ETC D2801

January 12, 2017

For: ForeFlight, LLC

Prepared By: Meg Talbert — Digitally signed by Meg Talbert DN: cn=Meg Talbert, o=Element Materials Technology, ou=Quality, email=meg.talbert@element.com, c=US Date: 2017.01.12 17:19:39 -07'00'

Element Denver Quality Administrator — January 10, 2017 (Date)

Reviewed By: Michael Bosica — Digitally signed by Michael Bosica DN: cn=Michael Bosica, o=Element Materials Technology, ou=Management - Denver, email=michael.bosica@element.com, c=US Date: 2017.01.12 16:03:26 -07'00'

For Element Denver Laboratory Manager — January 10, 2017 (Date)

Administrative Data

Prepared for: ForeFlight, LLC

Test Facility: Element Denver
1530 Vista View Dr
Longmont, CO 80504
(720) 340-7810

Test(s) Performed	Test Specification (Paragraph/Section)
Decompression	ForeFlight SOW Per e-mail REF: RTCA DO-160G

Item(s) Tested (Description)	Part Number(s)	Serial Number(s)
Apple iPad	Pro 9.7	DMPRL1HFGXQ5
Apple iPad	Air 2	DMPQV6TBG5YM

Rev.	Reason For Revision	Date	Approval
---	Report Issued.	January 10, 2017	MJT

Date Test Items Received: 12/28/2016

Testing Initiated Date: 12/29/2016

Testing Completed Date: 12/29/2016

Element – Portland/Denver/Seattle

January 12, 2017 Certification No: ETC D2801

Attention:

ForeFlight, LLC

Reference: a. Element Job No.: D2801

b. Element Quote No.: EPO0001909Q

c. Customer Purchase Order No.: 161213A

d. Technical Specification: 1. ForeFlight SOW Per E-mail

Element Materials Technology – Portland hereby certifies that the following test sample(s) were subjected to the following test(s).

Quantity	Description	Model/Part Number	Serial Number(s)
1	Apple iPad	Pro 9.7	
1	Apple iPad	Air 2	

1. Decompression per Reference (b) and (d1), the operating samples were subjected to an altitude exposure at a pressure of 10.91 psiA corresponding to an altitude of 8,000 feet followed by reduction in pressure to 1.32 psiA corresponding to an altitude of 55,000 feet, within 15 seconds. This pressure was then be maintained for at least 10 minutes.

Testing was done in accordance with the above references as evidenced and reported in the accompanying data. The test samples were returned to the customer for evaluation.

The original of this report is on file at Element Materials Technology, Inc. under the above referenced certification number for review by authorized personnel. The results of the testing reported herein relate only to the actual items tested.

Respectfully submitted,

Meg Talbert
Quality Administrator
Element – Portland/Denver/Seattle

The objective of this test program was to subject customer provided test hardware to environmental simulation in compliance with customer stated specification, including any authorized modification, deviations or concessions to the original requirements. The hardware consisted of items identified in the appropriate sections of this report. In addition to test hardware identification, each section contains information that descr bes the associated test setup and performance and the resulting data. Element Materials Technology, Inc. measuring instruments used in testing were calibrated according to the requirements of ANSI/NCSL Z540-1 and ISO/IEC 17025, and are traceable NIST or NMI. Calibration records are on file and available for inspection by request. Because the test methods are well established and are qualitative or semi-quantitative in nature, Element Materials Technology, Inc., Inc. does not apply measurement uncertainty unless obligated by contract. Any test hardware operational setups and resulting evaluations or inspections performed by the customer are not included in this report, unless they were explicitly requested. While observations and/or specification compliance statements may be reported, no interpretations or opinions regarding customer product performance are intended. Unless otherwise indicated in the appropriate report section, all contract obligations were met and the test objective achieved.

Section 1 – Job Information

Job Number: D2801
Customer: ForeFlight

Date Started: 12/29/2016
Date Completed: 12/29/2016

Responsible Technician: Steve Milton / Michael 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 samples will be exposed to an altitude of 8,000 feet or 10.91 psiA allowing the samples to stabilize (2 hours), then reduce the pressure to 55,000 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 samples 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	Pro 9.7		1
Apple iPad	Air 2		1

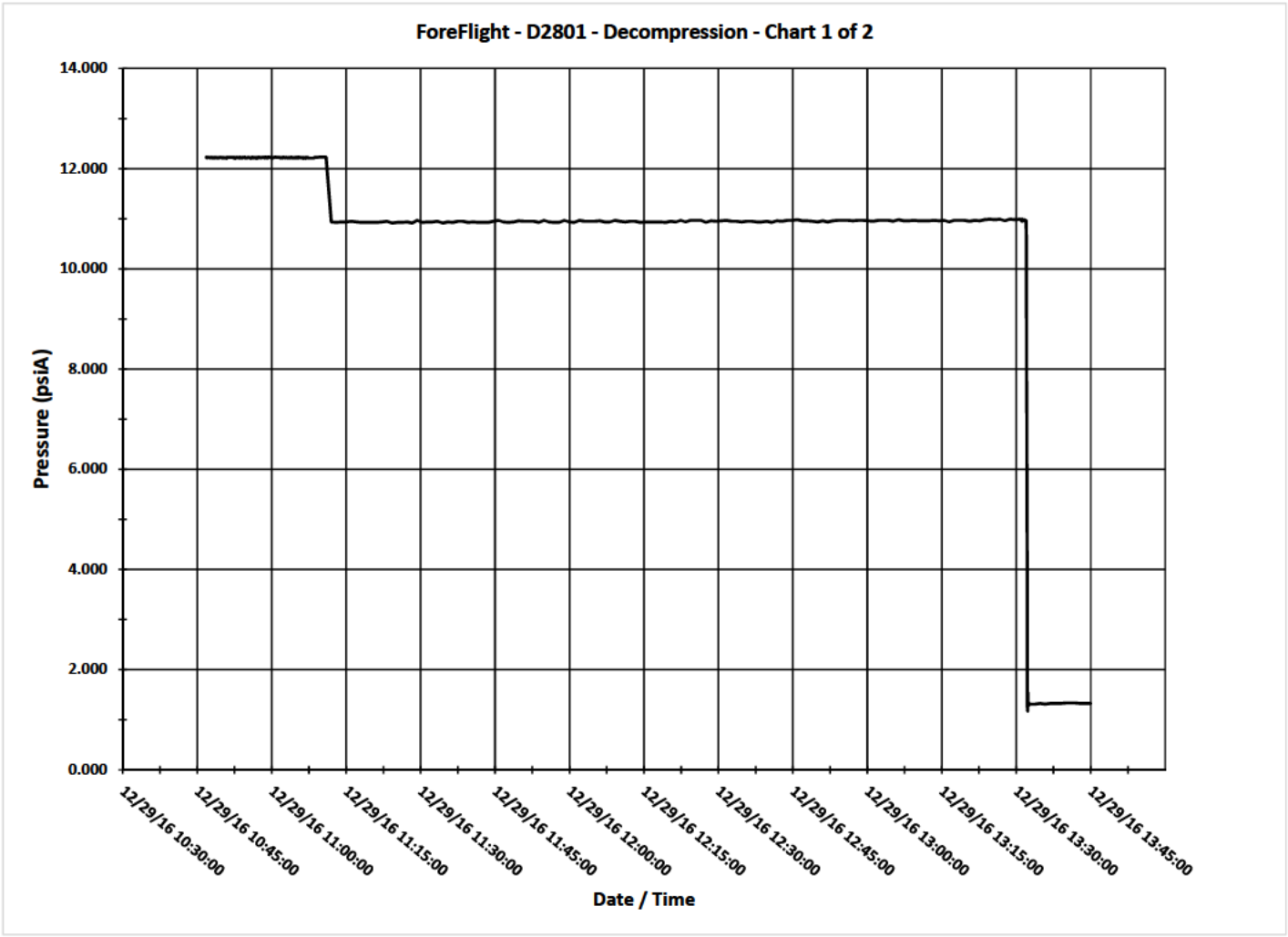
Section 4 – Test Equipment

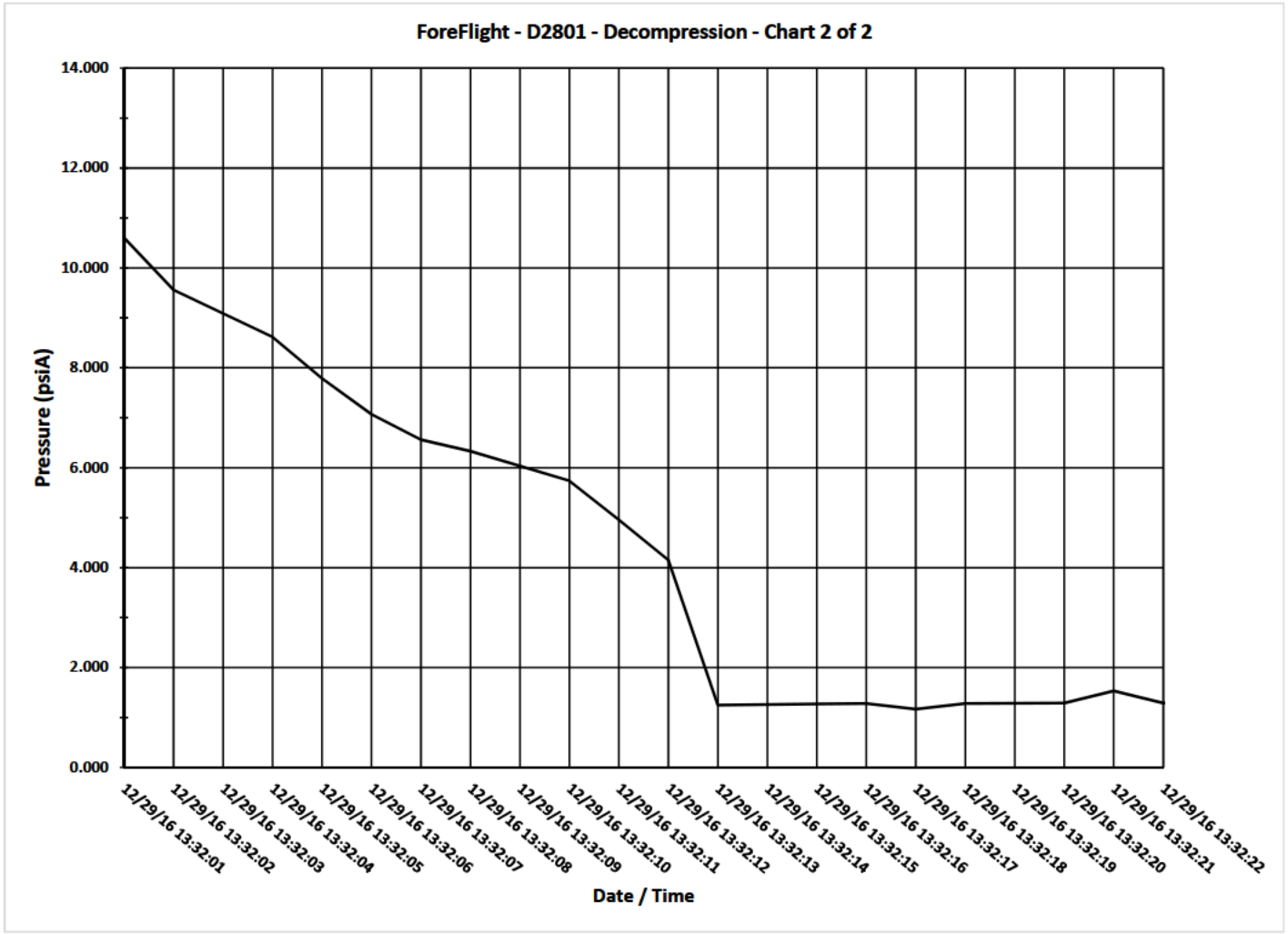
ID No.	Description	Manufacturer	Model No.	Serial No.	Last Cal	Next Cal
FR513	Temperature/Relative Humidity Meter	Cole-Parmer	90080-03	160173038	03/05/16	03/05/18
FR332	Presser Transducer	Omega	PX303-100A5V	N/A	01/19/16	01/19/17
1151	Pressure Vessel	N/A	N/A	N/A	Reference Only	
FR411	Data Acquisition/Switch Unit	Hewlett Packard	34970A	US37010202	04/28/16	04/28/17
FR412	Data acquisition Plug In Module	Hewlett Packard	34901A	US37000277	04/28/16	04/28/17
1228	Pressure Chamber	Tenney	8S	25720-02	Reference Only	
1208	Pressure Chamber	Tenney	27ST-100-400	8190	Reference Only	

Section 5 – Test Log

Laboratory Temperature: +71°F Laboratory Humidity: 20%RH

Initials	Date	Time	Notes	Photo
SM	12/29/2016	936	Begin setting up in pressure vessel #1151.	☐
SM	12/29/2016	1108	Take photos of the samples.	☒
SM	12/29/2016	1110	Seal the vessel and begin the ramp to 8,000 feet 10.91 psiA.	☐
SM	12/29/2016	1115	The vessel pressure is at 8,000 feet. Begin the two hour soak.	☐
SM	12/29/2016	1332	Reduce the pressure to 1.32 PSiA. The transition occurred within 15 seconds.	☐
SM	12/29/2016	1333	Hold for at least 10 minutes then return the vessel to site level pressure.	☐
SM	12/29/2016	1345	The exposure is complete.	☐
SM	12/29/2016	1349	Remove the samples from the vessel. Take post exposure photos.	☐
SM	12/29/2016	1400	The testing is complete the samples will be returned to the customer.	☐


ForeFlight - D2801 - Decompression - Chart 1 of 2
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
Pressure (psiA)
12/29/16 10:30:00
12/29/16 10:45:00
12/29/16 11:00:00
12/29/16 11:15:00
12/29/16 11:30:00
12/29/16 11:45:00
12/29/16 12:00:00
12/29/16 12:15:00
12/29/16 12:30:00
12/29/16 12:45:00
12/29/16 13:00:00
12/29/16 13:15:00
12/29/16 13:30:00
12/29/16 13:45:00
Date / Time


ForeFlight - D2801 - Decompression - Chart 2 of 2
Pressure (psiA)
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
12/29/16 13:32:01
12/29/16 13:32:02
12/29/16 13:32:03
12/29/16 13:32:04
12/29/16 13:32:05
12/29/16 13:32:06
12/29/16 13:32:07
12/29/16 13:32:08
12/29/16 13:32:09
12/29/16 13:32:10
12/29/16 13:32:11
12/29/16 13:32:12
12/29/16 13:32:13
12/29/16 13:32:14
12/29/16 13:32:15
12/29/16 13:32:16
12/29/16 13:32:17
12/29/16 13:32:18
12/29/16 13:32:19
12/29/16 13:32:20
12/29/16 13:32:21
12/29/16 13:32:22
Date / Time