Aeroblaze Laboratory Inc.
12819 Harmon Rd, #575
Fort Worth, TX 76177
www.aeroblazelab.com

FLAMMABILITY TEST REPORT

TEST REPORT #1325.1R, Rev IR

HOT-STOP® 'L'

LITHIUM ION FIRE CONTAINMENT KIT

TABLET SIZE

Prepared for

INDUSTRIAL ENERGY PRODUCTS, INC.

56 Newcomer Rd, Mount Joy, PA 17552

Aeroblaze Laboratory Inc.
12819 Harmon Rd, #575
Fort Worth, TX 76177
www.aeroblazelab.com

REVISION HISTORY

REV.	DESCRIPTION	Date	Approval
IR	Initial Release.	May 16, 2018	A. Feghali

The changes made in the most recent release/revision are indicated in the body of the document using a vertical bar in the right margin.

Aeroblaze Laboratory Inc.
12819 Harmon Rd, #575
Fort Worth, TX 76177
www.aeroblazelab.com

TABLE OF CONTENTS

1.0 INTRODUCTION 4
2.0 SCOPE OF TESTING 5
3.0 TEST FACILITES 5
4.0 TESTING PROCEDURE 5
5.0 TEST RESULTS 8
Appendix A Test Data Sheet 9

TABLE OF FIGURES

Figure 1 - Example of Containment Kit 4
Figure 2. Tablet Device for Testing 5
Figure 3. Propane Torch Igniting Tablet 6
Figure 4. Tablet Dropped into Containment Kit 6
Figure 5. Flame Appears to Extinguish 7
Figure 6. Kit Under Observation 7
Figure 7. Battery Post-test 8
Figure 8. Containment Kit Post-test 8

Aeroblaze Laboratory Inc.
12819 Harmon Rd, #575
Fort Worth, TX 76177
www.aeroblazelab.com

1.0 INTRODUCTION

Lithium Ion battery powered electronic devices have been identified as in-flight fire hazards due to the potential battery malfunctions that can result in toxic smoke, violent fires, and explosions. These fires are difficult to contain inside an aircraft or in sensitive environments. To make matters worse, many smart phones and laptops are now waterproof – thus preventing water from reaching the cells of the battery.

The HOT-STOP® 'L' Fire Containment Kit is a well-known solution which has safely contained fires, explosions and toxic smoke emissions from Lithium Ion powered devices without the aid of a water supply. HOT-STOP® is a registered trademark of Industrial Energy Products, Inc.

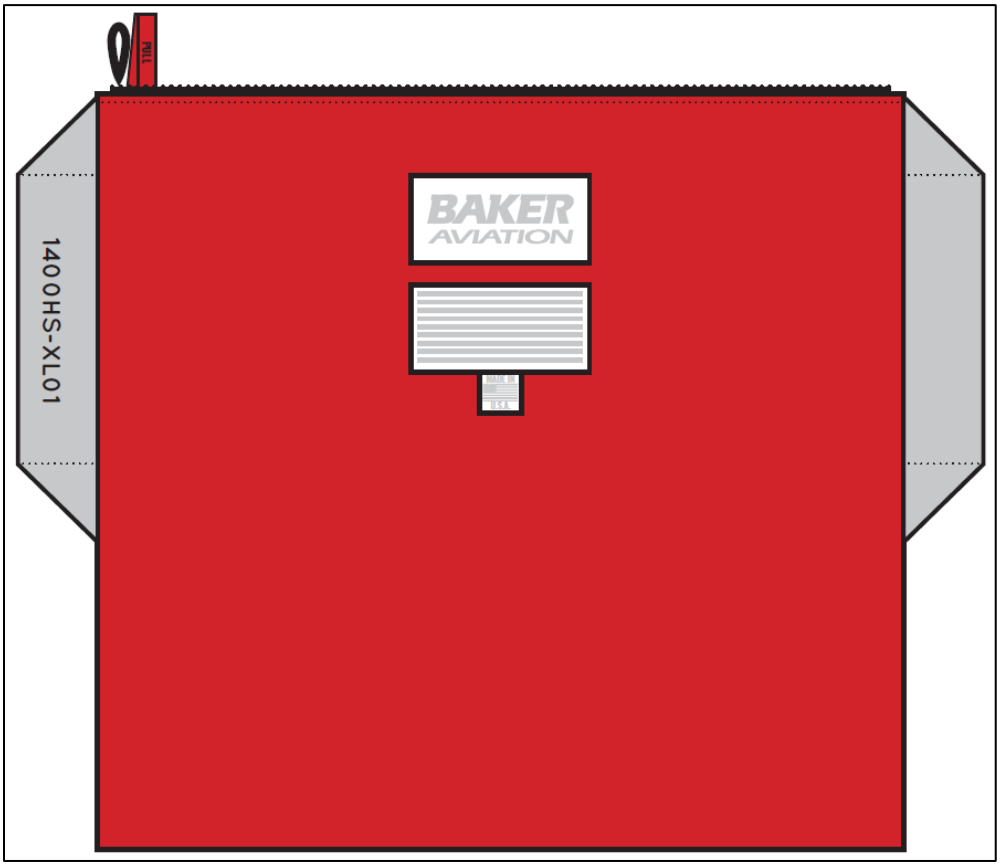

Figure 1 - Example of Containment Kit

To prove the effectiveness of the containment kit against newer, more powerful and waterproof devices, testing must be performed to show that the kit continues to contain battery explosions and subsequent fires.

2.0 SCOPE OF TESTING

Sample ID	Test	Device	Kit Size
01	Explosion & Fire Containment	Tablet (23.8 Wh)	EVO

3.0 TEST FACILITES

All testing was conducted at the following FAA-listed test laboratory:

Aeroblaze Laboratory
12819 Harmon Rd. #575
Fort Worth, TX 76177 USA

4.0 TESTING PROCEDURE

Warning

All testing was performed at an accredited flammability test laboratory. Technicians running theses tests are trained and wearing protective turnout gear. This gear was necessary because the lab was attempting to create the most catastrophic/severe conditions for testing the containment kit to illustrate a worst-case scenario. The manufacturer doesn't recommend anyone handling a device that is in active thermal runaway.

The device used for testing was a 7.9" tablet with a Li-Po 23.8 Wh battery. The battery was comprised of 2 rectangular cells. The device was charged to 100% battery prior to testing.

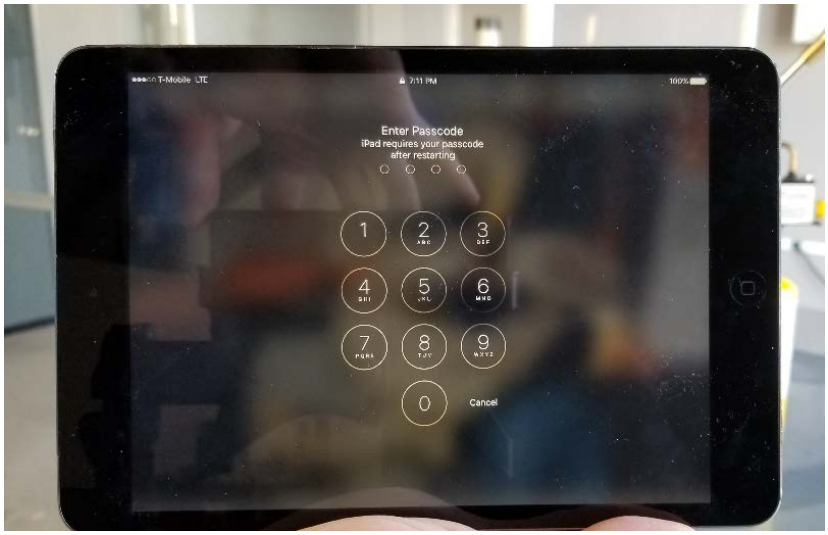

Figure 2. Tablet Device for Testing

A propane torch was used to heat the backside of the tablet until thermal runaway occurred. During this test both cells went into thermal runaway simultaneously.

Figure 3. Propane Torch Igniting Tablet

Once thermal runaway was initiated, the tablet was immediately dropped into the containment kit.

Figure 4. Tablet Dropped into Containment Kit

The containment kit consists of two levels of closures: an inner hook & loop seal and an outer zipper seal. The flame appeared to extinguish immediately upon closing the first seal as shown in Figure 5 below.

Figure 5. Flame Appears to Extinguish

Once the outer zipper was closed, the kit was left alone for observation for approximately 20 minutes. During that time, no further propagation of thermal runaway occurred, and no smoke was observed exiting the bag.

Figure 6. Kit Under Observation

5.0 TEST RESULTS

The HOT-STOP® 'L' Fire Containment Kit successfully contained the thermal runaway and the resulting fire of the tablet. No evidence of smoke was seen coming out of the kit after it was sealed.

Following the test, it was determined that both cells had experienced thermal runaway.

Figure 7. Battery Post-test

After examining the containment kit, no damage was found internally or externally.

Figure 8. Containment Kit Post-test

Appendix A
Test Data Sheet

+1 (817) 668-0628
info@aeroblazelab.com
www.aeroblazelab.com

Aeroblaze Laboratory
12819 Harmon Rd. #575
Fort Worth, TX 76177 USA

Explosion & Fire Containment	TR# 1325.1

Customer Information	Sample Notes
INDUSTRIAL ENERGY PRODUCTS, INC. 56 NEWCOMER ROAD MOUNT JOY, PA 17552	Hot-Stop® 'L' Lithium Ion Fire Containment Kit EVO Tablet Kit

Sample	Kit Type	Burnthrough Observed? (Y/N)	Smoke Emission Observed? (Y/N)
1	EVO	No	No
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

Acceptance Criteria:	Result
The thermal runaway and subsequent fire may not burn through the containment kit.	[X] PASS [ ] FAIL

Notes & Observations:

1. Both cells went into thermal runaway prior to entering the containment kit.
2. No damage to kit found at the end of testing.

Tested by: Leslie Gardner 24-Apr-18
Lab Engineer

Approval: Andrew Feghali 24-Apr-18
Andrew Feghali, Lab Manager

TP-01-01, Rev B

1 of 1