wyle laboratories

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REPORT NO.: 53741-01

WYLE JOB NO.: 53741

CLIENT P.O. NO.: 14302

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TEST REPORT
ENVIRONMENTAL VERIFICATION
ON
PROTOTYPE MICROHOOD EXTINGUISHERS
FOR
WILLIAMS-PYRO, INC.
WYLE REPORT NO. 53741-01

Williams-Pyro, Inc.
200 Greenleaf Street
Fort Worth, TX 76107

STATE OF ALABAMA
COUNTY OF MADISON }

Robert L. Porter, Department Manager, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted testing and is to the best of his knowledge true and correct in all respects.

Robert L Porter

SUBSCRIBED and sworn to before me this 27th day of October, 2006

Patricia Phillips
Notary Public in and for the State of Alabama at Large

My Commission expires Jan 7, 2009

SEAL

Wyle shall have no liability for damages of any kind to person or property, including special or consequential damages, resulting from Wyle's providing the services covered by this report.

TEST BY: Anthony Murks 10/26/06
Anthony Murks, Project Engineer — Date

APPROVED BY: David R. Bailey 10/26/06
David R. Bailey, Engineering Supervisor — Date

WYLE Q.A.: Brenda Mercer 10/27/06
FW Raul Terceno, Quality Assurance Manager — Date

(pap)

ACCREDITED
Cert No. 845.02

QMI REGISTERED
ISO 9001:2000

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1.0 INTRODUCTION

1.1 Scope

This report documents the test procedures followed and the results obtained during testing performed on 15 MicroHood Stove Top Prototype Fire Suppressor Assemblies. Testing was performed from July 17 to October 13, 2006, at Wyle Laboratories' Huntsville, Alabama, Test Facility.

1.2 References

- Williams-Pyro, Inc. Purchase Order No. 14302
- Wyle Laboratories' Quotation No. 542/034272-C2/DB
- Wyle Laboratories' Quality Assurance Program Manual, Revision 2
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- MIL-STD-45662A, "Calibration System Requirements"

1.3 Test Specimen Description

The specimens tested are 15 Under Hood Microwave (MicroHood) Stove Top Fire Suppressors, which have a new mounting design and dispenser.

The specimens were initially received at Wyle Laboratories on July 17, 2006. The receiving inspections revealed the test specimens to be in good condition.

1.4 Summary

The Fire Suppressors, as described in paragraph 1.3, were subjected to Functional Testing in accordance with Wyle Laboratories' Quotation No. 542/034272-C2/DB. The Fire Suppressors completed testing with one anomaly noted. Details of this anomaly are presented in this report. The anomaly caused a redesign in the deployment mechanism. Subsequent testing using the new design proved to be 100% successful.

The new design dispenser is designed to expel the extinguishing media in the forward compartment in a fan shape. The dispenser rear compartment is in the same manner as the original STFS and represents an acceptable component of the assembly.

1.0 INTRODUCTION (Continued)

1.4 Summary (Continued)

This prototype testing represents qualification of the dispenser and the suppressor media container as it differs from a standard STFS unit. As a separate product, Williams Pyro is responsible for maintaining documentation on design and part number in a similar fashion as has been performed under the STFS Program. The part number and label design must be presented to Wyle Laboratories for approval prior to any shipments.

The results contained herein apply only to the test specimens identified in this report.

2.0 TEST PROCEDURES AND RESULTS

2.1 Wall-Mount Pull-Out Test

One Fire Suppressor was subjected to Wall-Mount Pull-Out Testing in accordance with Wyle Laboratories' Quotation No. 542/034272-C2/DB. One Fire Suppressor was mounted to 5/8-inch sheetrock wallboard using plastic anchors and screws supplied by Williams Pyro and intended for distribution with each Fire Suppressor. The Fire Suppressor was then subjected to increasing weight of up to 5 times the weight of the specimen.

Pretest inspection of the Fire Suppressor revealed the specimen weighed 715.8 grams (1.58 lbs.), including the mounting bracket. A total of 7.9 pounds was applied to the Fire Suppressor and was allowed to hang for a period of at least 5 minutes. The Fire Suppressor did not fall or pull out from the drywall installation.

Photographs of the test specimens are provided in Attachment A. A modified version of Wyle Laboratories' Quotation No. 542/034272-C2/DB is presented in Attachment C.

2.2 High Temperature Test

Four Fire Suppressors were subjected to High Temperature Testing in accordance with Wyle Laboratories' Quotation No. 542/034272-C2/DB. Four Prototype Fire Suppressors were subjected to a 30-day Constant Temperature Test.

The four Prototype Fire Suppressors were placed in a Thermal Chamber and the temperature was adjusted to 130°F and maintained for 30 days. At the conclusion of the exposure period, the Fire Suppressors were removed from the test chamber and installed onto a mounting platform and actuated. Three Fire Suppressors acted improperly (reference Notice of Anomaly No. 1, which is presented in this report).

2.0 TEST PROCEDURES AND RESULTS (Continued)

2.2 High Temperature Test (Continued)

The High Temperature evaluation was successful for the dispenser media containers. It was determined that the dispenser release mechanism was at fault in the Fire Suppressors that did not operate correctly.

Upon re-submission of 10 revised design specimens to Wyle, an abbreviated 5-day thermal exposure at 145°F was performed. Results are included in the following tests.

A photograph of the test setup is presented in Attachment A. The Instrumentation Equipment Sheet for the test setup is presented in Attachment B. A modified version of Wyle Laboratories' Quotation No. 542/034272-C2/DB is presented in Attachment C. Temperature records are maintained on file at Wyle Laboratories.

2.3 Activation Tests

Six Fire Suppressors were subjected to Activation Testing in accordance with Wyle Laboratories' Quotation No. 542/034272-C2/DB. Six Prototype Fire Suppressors were dry fired (manual activation by igniting the fuse) to visually verify the operability of the specimens after being subjected to the 5-day high temperature exposure.

Six Fire Suppressors equal 12 containers of the suppression media.

The subsequent re-submission and retesting of new redesign specimens, as noted in paragraph 2.1 above, proved to be 100% successful. The new design is denoted by a front clip holding a section of solder that is burned (melted) away during activation.

Photographs of the test setup are presented in Attachment A. A modified version of Wyle Laboratories' Quotation No. 542/034272-C2/DB is presented in Attachment C. A Video of the activations is on file at Wyle Laboratories and is available for review.

2.4 Fire Suppression Tests

Three specimens were evaluated for Fire Suppression using UL1254 and UL300 as a guide. Testing involved mounting specimens under a simulated microwave hood at two different installation heights of 15 inches and 22 inches, as measured from the top of the stove eye to the bottom of the Suppressor.

2.0 TEST PROCEDURES AND RESULTS (Continued)

2.4 Fire Suppression Tests (Continued)

For fire generation, two tests were performed using a 14-inch cast iron skillet with 1/2 inch of vegetable oil. The oil was preheated to approximately 675°F and auto ignited using a conventional electric stove. The resulting fire lasted approximately one minute before activation of the Fire Suppressor. For these tests only the forward unit (front stove eye) was under consideration as the rear units are a standard STFS unit.

The first two tests were performed, one sample each, at 15-inch and 22-inch installation heights. It was witnessed and verified that the new design did activate properly and allowed the extinguishing media to envelope the burning oil. Successful activation was followed by complete extinguishment of the fire. A 5-minute period was then observed for re-flash with power to the stove still applied. No re-flash was noted. The area around the skillet and stove top was inspected and very little splashing was found.

The third test was performed from a height of 22 inches with 1 inch of vegetable oil. Testing was performed as above. The forward unit activated properly and was able to extinguish the fire with very little splash. The re-flash watch after 5 minutes with the power to the stove still applied revealed no re-flash.

Photographs of the units under test are provided in Attachment A. A modified version of Wyle Laboratories' Quotation No. 542/034272-C2/DB is presented in Attachment C. A video of the activations is also on file at Wyle Laboratories and is available for review.

3.0 CONCLUSION

The incorporation of the distribution device for applications requiring installation under a microwave hood has been successfully demonstrated. The design review phase will be conducted with Williams Pyro after finalization of production plans. Similarly, the new product will be assigned a control number and reference file. The new control number will be required to be displayed on the resulting label similar to the current STFS, or elsewhere on the product upon agreement between Wyle and Williams Pyro.

4.0 TEST EQUIPMENT AND INSTRUMENTATION

All instrumentation, measuring, and test equipment used in the performance of this test program were calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL Z540-1, ISO 10012-1, and Military Specification MIL-STD-45662A. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

5.0 QUALITY ASSURANCE PROGRAM

All work performed on this test program was completed in accordance with Wyle Laboratories' Quality Assurance Program.

The Wyle Laboratories, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001:2000 International Quality Standard. Registration has been completed by Quality Management Institute (QMI), a Division of Canadian Standards Association (CSA).

Wyle Laboratories is accredited (Certificate No.: 845.02) by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with Wyle's scope of accreditation unless otherwise stated in this report.

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ORIGINAL **NOTICE OF ANOMALY** DATE: August 21, 2006

NOTICE NO: 1 P.O. NUMBER: 14302 CONTRACT NO: N/A
CUSTOMER: Williams Pyro WYLE JOB NO: 53741
NOTIFICATION MADE TO: Preston Weintraub NOTIFICATION DATE: August 18, 2006
NOTIFICATION MADE BY: David Bailey VIA: Verbal

CATEGORY: [X] SPECIMEN [ ] PROCEDURE [ ] TEST EQUIPMENT DATE OF ANOMALY: August 18, 2006
PART NAME: Stove Top Fire Stop PART NO. MicroHood
TEST: Fire Test I.D. NO. N/A
SPECIFICATION: UL-1254 and UL-300 PARA. NO. N/A

REQUIREMENTS:

Fire Testing and Functional Testing of Fire Stop Specimens.

DESCRIPTION OF ANOMALY:

Thirteen samples were received and functionally tested. Three samples were tested in actual fire conditions, where one unit failed to deploy properly when the lid malfunctioned. Ten additional units were functionally tested in a "dry fire" mode by igniting the fuse directly. Of these ten units, four failed to actuate properly. Three of the four were from the 30-day High Temperature Storage Test. Failures were limited to the forward unit with the new ramp design. Units in the rear position actuated properly.

DISPOSITION • COMMENTS • RECOMMENDATIONS:

This document serves to notify Williams Pyro of the test results and is for their disposition.

RESPONSIBILITY TO ANALYZE ANOMALIES AND COMPLY WITH 10 CFR PART 21: ■ CUSTOMER □ WYLE

VERIFICATION:
TEST WITNESS: N/A
REPRESENTING: N/A
QUALITY ASSURANCE: 8/22/06

PROJECT ENGINEER: 8/21/06
David D. Bailey
PROJECT MANAGER: 8/22/06
Robert L. Porter
INTERDEPARTMENTAL COORDINATION:

WH 1066, Revised JUL '94

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ATTACHMENT A

PHOTOGRAPHS

Photograph No. 1
Typical Dry Fire Setup (Initial Design)

Photograph No. 2
Test Setup, 15-Inch Installation Test

Photograph No. 3
Temperature Conditioning Setup

Photograph No. 4
Wall-Mount Test

Photograph No. 5
Wall-Mount, Full-Weight Test

Photograph No. 6
Post Dry Fire Views (Latest Design)

ATTACHMENT B

INSTRUMENTATION EQUIPMENT SHEETS

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INSTRUMENTATION EQUIPMENT SHEET

DATE: 7/17/06 JOB NUMBER: 53741 TEST AREA: ENV CH 52 1
TECHNICIAN: L. IVEY CUSTOMER: WILLIAMS PYRO TYPE TEST: TEMP

NO.	INSTRUMENT	MANUFACTURER	MODEL #	SERIAL #	WYLE #	RANGE	ACCURACY	CAL DATE	CAL DUE
1	TEMP CONTR	WATLOW	SD4C	009630	117831	-200 TO +600°	±0.1%	6/ 5/06	9/ 1/06
2	TEMP CONTR	WATLOW	SD4L	050698	110785	-200 TO +600°	±0.1%	6/ 5/06	9/ 1/06
3	TEMP RECORDER	HONEYWELL	DR450T	914684314400	109452	-200-600°F	.4°F	6/ 5/06	9/ 1/06

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION Larry Ivey 7-17-06 CHECKED & RECEIVED BY David Bailey 7/17/06

Q.A. [signature] 7/17/06

WH-1029A, REV, APR '99

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INSTRUMENTATION EQUIPMENT SHEET

1

DATE: 7/19/06 JOB NUMBER: 53741 TEST AREA: DYN LAB
TECHNICIAN: N. BAKER CUSTOMER: WILLIAMS PYRO TYPE TEST: LOAD

NO.	INSTRUMENT	MANUFACTURER	MODEL #	SERIAL #	WYLE #	RANGE	ACCURACY	CAL DATE	CAL DUE
1	SCALE	SETRA	SUPER COUNT	669980	112286	27LBS	±.005LB	3/ 3/06	3/ 2/07
2	STOP WATCH	EXTECH	365510	N/A	110749	24 HR	3SEC/24HR	5/ 1/06	7/28/06

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION C. N. Baker 7/19/06 CHECKED & RECEIVED BY Dan Bay 7/19/06

Q.A. [signature] 7/19/06

WH-1029A, REV, APR '99

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INSTRUMENTATION EQUIPMENT SHEET

1

DATE: 10/ 4/06 JOB NUMBER: 53741 TEST AREA: ENV CH 34
TECHNICIAN: L. IVEY CUSTOMER: WILLIAMS PYRO TYPE TEST: TEMP

NO.	INSTRUMENT	MANUFACTURER	MODEL #	SERIAL #	WYLE #	RANGE	ACCURACY	CAL DATE	CAL DUE
1	TEMP RECORDER	HONEYWELL	DR450T	903079261800	108673	-200-600°F	.4°F	9/ 6/06	12/ 5/06
2	TEMP ALARM	WATLOW	945	NA	113271	-328 TO +662°	±0.1%	9/ 6/06	12/ 5/06
3	TEMP CONTR	WATLOW	942A	NA	110129	-328 TO +662°	±0.1%	9/ 6/06	12/ 5/06

This is to certify that the above instruments were calibrated using state-of-the-art techniques with standards whose calibration is traceable to the National Institute of Standards and Technology.

INSTRUMENTATION Larry Ivey 10-4-06 CHECKED & RECEIVED BY 10/4/06

Q.A. 10/24/06

WH-1029A, REV, APR '99

ATTACHMENT C

A MODIFIED VERSION OF WYLE LABORATORIES' QUOTATION NO. 542/034272/DB

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Wyle Quotation No. 542/034272/DB

March 23, 2006

Williams- Pyro, Inc.
200 Greenleaf St.
Ft. Worth, TX 76107

Attention: **Preston Weintraub**
E-mail: **preston.weintraub@williams-pyro.com**

Subject: Performance Testing of Microwave STFS

Reference: Williams-Pyro proposal of 2/14/06 and UL1254

Dear Mr. Weintraub:

Wyle Laboratories, Inc. is pleased to submit this Fixed Price Quotation per e-mail dated 3/01/06.

Fixed Price Quotation: The following pricing is provided based on the requirements of your request and the **Technical Provisions** below.

Description	Price
1. Section 26.4 Fire Test of Automatic Unit. 10 samples to be tested. Wyle will also use the Fire Test Section of UL300A to evaluate the design performance	
2. Section 34, 30 day Elevated Temperature Test with Performance Post Test, 6 Units	
3. Section 39, Modified Mounting Device Test at 5 times specimen weight or more, 1 unit	
4. Test Report, Electronic Format on CD ROM	

Notes: Wyle reserves the right to bill on a monthly basis for all effort completed in that month.

Technical Provisions:

1. Wyle recognizes that UL1254 is not a complete match for this application and therefore will include the Fire Test of 300A for supporting the program conclusions.
2. Wyle tests the specimen as a Fire "suppressor" and not identified as an extinguisher.
3. Upon satisfactory completion of all testing, Wyle will issue a "Wyle" listing number for inclusion on an approved Williams-Pyro label.

Schedule:

- Our standard lead time is two (2) weeks. Please call to discuss other arrangements.
- Test Program.....6 weeks
- Test Report..... 3 weeks

Wyle Laboratories, Inc. 7800 Highway 20 West P.O. Box 077777 Huntsville, AL 35807-7777 Tel: (256)837-4411