



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

**BOARD OF MECHANICAL RULES
BUREAU OF CONSTRUCTION CODES**

Conference room 3, First Floor
2501 Woodlake Circle
Okemos, Michigan 48864

AGENDA

November 16, 2011

9:00 a.m.

- | | | |
|-----|--|---------------------------|
| 1. | Call to Order and Determination of Quorum | R. Jagenberg |
| 2. | Approval of Agenda (Page 1) | R. Jagenberg |
| 3. | Approval of Minutes – (August 24, 2011 (Pages 2-5) | R. Jagenberg |
| 4. | Applicant Request to Appear (Pages 6-19)
Richard Lenski | J. Paradine
M-11-004 |
| 5. | New Products (Pages 20-64)
Flamebar BW11 Grease Duct | J. Paradine
MA #11-003 |
| 6. | Chiefs Report | J. Paradine |
| 7. | Old Business | R. Jagenberg |
| 8. | New Business | R. Jagenberg |
| 9. | Public Comment | R. Jagenberg |
| 10. | Next Meeting – February 15, 2012 | R. Jagenberg |
| 11. | Adjournment | R. Jagenberg |

The meeting site and parking is accessible. Individuals attending the meeting are requested to refrain from using heavily scented personal care products in order to enhance accessibility for everyone. People with disabilities requiring additional services (such as materials in alternative format) in order to participate in the meeting should call Dawn Canfield at (517) 241-9325 at least 10 working days before the event.

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BOARD OF MECHANICAL RULES
BUREAU OF CONSTRUCTION CODES

Conference Room 3
2501 Woodlake Circle
Okemos, Michigan 48864

MINUTES
August 24, 2011
9:00 a.m.

MEMBERS PRESENT

Mr. H. Edward Bartram
Mr. Christopher Fuller
Mr. Lawrence Hale
Mr. Robert Jagenberg
Mr. Gerald Philo
Mr. George B. Shields
Mr. William Steele
Mr. Raymond Coy
Mr. Mark Mangione

MEMBERS ABSENT

Mr. Kevin Carden
Mr. Gary VanOchten
Mr. Tony SanFilippo
Mr. Michael Olgetree
Mr. Christopher Stockwell
Mr. Charles Wash

MICHIGAN DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS,

PERSONNEL ATTENDING

Mr. Irvin J. Poke, Director
Mr. Keith Lambert, Deputy Director
Mr. Kevin Kalakay, Chief, Mechanical Division
Mr. Jon Paradine, Assistant Chief, Mechanical Division
Ms. Dawn Canfield, Secretary, Mechanical Division

OTHERS IN ATTENDANCE

Mr. Lynn Briggs, Contractors Legislative Services
Mr. Mark Kidd, MIACCA
Mr. Stephen Wylie, Consumers Energy
Mr. Clarence Donaldson
Ms. Cynthia Maher, MPMCA

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1. **CALL TO ORDER AND DETERMINATION OF QUORUM**

Chairman Jagenberg called the meeting to order at 9:01 a.m. A quorum was determined at that time.

Chief Kalakay wanted to address the board prior to proceeding with the meeting. Chief Kalakay announced that Dawn Canfield has accepted the position of Secretary within the Mechanical Division. Chief Kalakay also introduced Christopher Fuller as the new board member representing HVAC Equipment.

2. **APPROVAL OF AGENDA**

A **MOTION** was made by Board Member Bartrum and Supported by Board Member Shields to approve the Agenda. **MOTION CARRIED.**

3. **APPROVAL OF MINUTES**

A **MOTION** was made by Board Member Magione and supported by Board Member Hale to approve the minutes of the May 18, 2011 meeting. **MOTION CARRIED.**

4. **GOOD MORAL CHARACTER APPEALS**

Mr. Clarence Donaldson, Mechanical Contractor Appeal, Document M-11-03, appeared before the Board requesting an appeal to the denial of the application for license examination. His application was denied based on a Good Moral Character review.

Mr. Donaldson was questioned by the board regarding his personal history. Mr. Donaldson provided the board with this information which included his employment and marital status.

After the discussion, Board Member Coy made a **MOTION** that we approve applicant to test and motion was supported by Board Member Steele. **MOTION CARRIED**

5. **NEW PRODUCTS**

Rinnai America Corp presented an application requesting approval by the Board of Mechanical Rules for the use of Rinnai Hydronic Air Handler AHB. Chief Kalakay indicated that Rinnai Hydronic AHA series Air Handler was previously approved by the Board in 2009. He then indicated that the only difference between the AHA series and AHB series is that the AHB series comes equipped with an ECM motor.

Chief Kalakay stated prior to the presentation that he recommended approval of the product.

After discussion and questions by the board, a MOTION was made by Board Member Magione, and supported by Board Member Bartrum to approve the Rinnai Hydronic Air Handler AHB. **MOTION CARRIED.**

6. **CHIEF'S REPORT**

Mr. Kalakay provided information on the following issues:

1. Mr. Kalakay indicated that there is not any additional information regarding amending the Forbes Mechanical Act.
2. Mr. Kalakay indicated that the Mechanical Division is in the process of updating our examinations to the 2009 code cycle.
3. Mr. Kalakay stated that the Division is in the process of forming the 2012 Code Committee. He indicated that now is the time to submit any questions regarding specific code items so that they may be provided to the code committee.
4. Mr. Kalakay mentioned the Board of Mechanical Rules will have seven (7) expiring board member terms in October 2011. It is his understanding that unless you are notified by the governor, you are required to attend, unless there is some reason you do not wish to.
5. Board Member Bartrum asked Mr. Kalakay regarding status of the Wirsbo joint committee with the Plumbing Division. Mr. Kalakay stated that Mr. Konyndyk is gathering information and putting it together.

7. **UNFINISHED BUSINESS**

None

8. **NEW BUSINESS**

The 2012 Board of Mechanical Rules meeting schedule was presented for review. A MOTION was made by Board Member Shields and supported by Board Member Steele. MOTION CARRIED.

9. **PUBLIC COMMENT**

Mr. Lynn Briggs posed questions regarding House Bill 4561, fireplace gasket doors, installation of gas water heaters, carbon monoxide detectors, piping insulation requirements, and privatization of inspectors. Irvin Poke, Director of the Bureau of Construction Codes and Chief Kalakay provided responses to the inquiries.

Ms. Cynthia Maher, MPMCA spoke in regard to the lawsuit by the Michigan Association of Home Builders against the City of Troy and also indicated that there is a bill, that has not been introduced yet, that addresses the police power question.

10. **NEXT MEETING**

The next Board meeting will be held on November 16, 2011.

11. **ADJOURNMENT**

A MOTION was made by Board Member Bartram and supported by Board Member Steel to adjourn the meeting at 10:34 AM Standard Eastern Time. MOTION CARRIED.

APPROVED:

Robert Jagenberg, Chairperson

Date



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

October 26, 2011

M-11-004

TO: Member of the Board of Mechanical Rules
FROM: Kevin D. Kalakay, Chief, Mechanical Division 
SUBJECT: Request to appear to present evidence of eligibility for examination

APPLICANT REPRESENTATIVE: RICHARD LENSKI

AUTHORITY:

The Forbes Mechanical Contractors Act of 1984 PA 192.

REQUEST:

Mr. Lenski is requesting to appear before the Board of Mechanical Rules to present evidence of eligibility for the "Limited heating service" examination.

FINDINGS:

1. Mr. Lenski's experience in the servicing of commercial kitchen cooking and washing equipment is not applicable.
2. Mr. Lenski's does not possess the required experience in servicing gas-fired, oil-fired or solid fuel-fired heating equipment.
3. Mr. Lenski does possess some CSD-1 testing experience.
4. Mr. Lenski does possess a Class 2B Boiler Installer's License.
5. Mr. Lenski has completed 2.0 college credit hours of heating fundamentals.

APPLICABLE RULE:

R 338.903. The Forbes Mechanical Contractors Act of 1984 as Amended, being Act 192 of the Michigan Compiled Laws.

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RECOMMENDATION:

Staff finds that Mr. Lenski did not provide evidence that he has attained a minimum of 3 years experience for the "Limited heating service" classification as indicated in R338.903 and advises the board that Mr. Lenski does not qualify for examination.



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BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

October 18, 2011

Richard Lenski
[REDACTED]
[REDACTED]

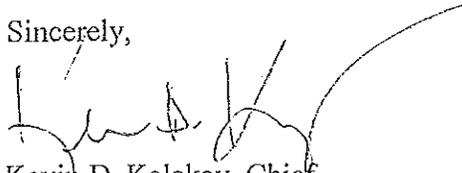
Dear Mr. Lenski:

The Bureau of Construction Codes, Mechanical Division, has received your request to appear before the Board of Mechanical Rules regarding denial of your examination application.

Your request will be scheduled for the State Board of Mechanical Rules meeting. The next meeting will be held on November 16, 2011, located at 2501 Woodlake Circle, Okemos, Michigan. The Board of Mechanical Rules Board meeting will begin promptly at 9:00 a.m., Eastern Standard Time.

Please contact me at 517/241-9325, if you have any further questions in this matter prior to the meeting.

Sincerely,


Kevin D. Kalakay, Chief
Mechanical Division

KDK/dmc

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Richard A. Lenski
~~██████████~~, MI ~~██████████~~

Student Name
 Richard A. Lenski
 Student Birthdate
 07/01
 MCC Student ID No.
 0652182
 UIC
 Date of Transcript
 Aug 31 2011

COURSE	Course Title	CRD	GRD	R	GRDPT	COURSE	Course Title	CRD	GRD	R	GRDPT
Transfer Credit											
Oakland Community Co	001607	3.00				ATD175	FALL 1981 (08/26/1981 to 12/19/1981)	2.00	A		8.00
Term GPA	0.000	Credit	3.00			ATD176	SHT MTL-PAR LN LAY	2.00	A		8.00
Cum GPA	0.000	Credit	3.00			ATM116	SHT MTL-PAD LN&TRI	2.00	A		8.00
							ALGEBRA	2.00	A		8.00
							Term GPA	4.000	Credit	6.00	
							Cum GPA	3.625	Credit	35.00	
SPRING 1976 (01/06/1976 to 05/13/1976)											
AT2013	FUND NON-ELEC TRDS	2.00	A		8.00	End of official record.					
Term GPA	4.000	Credit	2.00								
Cum GPA	4.000	Credit	5.00								
SPRING 1977 (01/11/1977 to 05/12/1977)											
ATC118	ELEC BLPRT RDG-RES	2.00	B		6.00						
ATC125	WIRING RESIDENTIAL	2.00	B		6.00						
ATM115	SHOP ARITHMETIC	2.00	A		6.00						
Term GPA	3.333	Credit	6.00								
Cum GPA	3.500	Credit	11.00								
FALL 1979 (08/23/1979 to 12/15/1979)											
ATC110	BLPRT I & MATH I	2.00	A		8.00						
ATR110	REFRIGERATION FUND	2.00	B		6.00						
ATS115	STM HEAT FUND	2.00	B		6.00						
Term GPA	3.333	Credit	6.00								
Cum GPA	3.429	Credit	17.00								
SPRING 1980 (01/09/1980 to 05/10/1980)											
ATC115	BLPRT II & MATH II	2.00	A		8.00						
ATE130	ELEC TBS EQUIP&CIRC	2.00	A		8.00						
ATE110	FLUID POWER FUND	2.00	A		8.00						
Term GPA	4.000	Credit	6.00								
Cum GPA	3.600	Credit	23.00								
SPRING 1981 (01/13/1981 to 05/16/1981)											
ATC116	COST ESTIMATING	2.00	A		8.00						
ATP110	PLUMBING FUNDMENTS	2.00	B		6.00						
ATP111	DRAIN, WASTE & VENT	2.00	B		6.00						
Term GPA	3.333	Credit	6.00								
Cum GPA	3.519	Credit	29.00								

Continued on next column/page

THE NEXT DOCUMENT IS SIGNATURE AND SEAL BELOW ARE DISTORTED

NOTE: This transcript contains verifiable SCRP SAFE security features. The signature of the College Registrar is done on a blue background and will distort or disappear when photocopied. The name of the institution or their logo type over the face of the end of manuscript and appears or distorts when photocopied. When photocopied, student records should read: MACOMB COMMUNITY COLLEGE and "COPY COPY COPY" must appear at alternate lines on each transcript page. A valid transcript must accompany each course security feature.

License: 7111811 Location: _____
 Status: ISSUED CONTRACTOR: MICHAELS, THOMAS E
 Date: 07/18/1998 Back Stop

S MAIN, CUSTER 53
 LAKE AVE, IRONWOOD 27



Base Information

MICHAELS, ROBERT W	LICENSE
MICHAELS, RONALD	OWNER
MICHAELS, RONALD	OWNER
MICHAELS, RONALD	APPLICA
MICHAELS, RONALD	OWNER
MICHAELS, RONALD F	CONTRA
MICHAELS, RONALD F	CONTRA
MICHAELS, RONALD F	LICENSE
MICHAELS, RONALD F	OWNER
MICHAELS, RONALD F	APPLICA
MICHAELS, RONALD F JR	CONTRA
MICHAELS, RONALD F JR	LICENSE
MICHAELS, THOMAS E	CONTRA
MICHAELS, THOMAS E	LICENSE
MICHAELSEN, ARTHUR E	CONTRA
MICHAELSEN, ARTHUR E	LICENSE
MICHAELSON CONNOR	APPLICA
MICHAELSON CONNOR & BOAL	OWNER
MICHAELSON CONNOR &	OWNER
MICHAELSON LEONARD	OWNER
MICHAELSON NATHAN	BLRREP
MICHAELSON NATHAN	OWNER
MICHAELSON NATHAN	APPLICA

Batch H: _____
 Status: ISSUED
 History: 1997 - 2013

0	0
0	0
0	0

Revision Date: 10/01/2010 Hold: 0
 License Classes: 2 4 5 7
 License ID: 7111811
 Cont of Rec: MICHAELS, THOMAS E
 Company: THOMAS E MICHAELS
 Prev. Co. 2: _____
 Prev. Co. 3: _____
 Address: _____
 Phone: _____ Zip: _____
 SSN: _____
 County: 47 | LIVINGSTON Type of Business: 11
 Licensee: MICHAELS, THOMAS E

License (Y/N): Y \$300.00
 Manual-1 Year: \$0.00
 Current Fee: \$300.00
 Previous Fees: \$869.00
 Exams (qty): 0 \$0.00
 BALANCE DUE: \$0.00

Applied: 01/01/1997 Effective: 10/01/2010
 Issued: 01/01/1997 Expires: 09/31/2013
 Renewal: 06/09/2010 Inactive: / /

Search By: C APD Number C Address C Parcel

Names > MICHAEL

Filter: Status: _____ Insp Area: _____ Entered Date: _____
 Type: _____ Status Class: _____ Between: / /
 SubType: _____ Dept: _____ and: / /
 Category: _____ Division: _____ Clear



- Show Address Attachments
- Select Multiple
- Select Range
- Back Stop



EQUIPMENT CARE - FOODSERVICE EQUIPMENT PARTS & SERVICE

28404 Hales
Madison Heights, MI 48071

September 16, 2011

Department of Energy
Labor & Economic Growth Bureau of Construction Codes
Mechanical Division
P.O. Box 30254
Lansing, MI 48909

Dear Sir,

In response to your letter dated September 6, 2011, received on September 13, 2011, I am requesting to have my file reviewed and to appear before the Board to present evidence of my experience so I may take the test for the Mechanical Contractors License #5, for Limited Heating so we may continue to perform the CSD 1 testing for our customers. First, let me give you a brief history of our need for the license in our business and why we feel we should be considered. Then I will give you my qualifications and then will provide evidence to the board of work history, training and experience in the field when I appear before them.

Ecolab Equipment Care (formally known as GCS Service) is a national service agency that services and repairs commercial cooking equipment and refrigeration equipment for commercial uses, including restaurants, hospitals, schools, nursing homes and other institutions. Our local branch employs 14 people that cover southeastern Michigan. We did have a licensed employee and did perform CSD1 testing for our customers under his license but because of a serious illness he is no longer with us. We now know this wasn't fully in compliance with the rules and regulations in that Mr. Michaels license didn't list Ecolab as his employer and since he was not my supervisor, he cannot sign for me to take the test. But the fact is that we carved out a valuable service for our customers doing the CSD1 tests. The real and immediate advantages for our customers were that they trusted us and we didn't overcharge them like many of the heating companies do. In talking with boiler inspectors, I have found many customers, not using us were charged upward to \$300 for a simple CSD1 test; where as we only charge an hourly rate. Another advantage for us to continue the testing is the important consideration that we know the controls, solid state and otherwise, and heating cooling companies can only guess what the controls functions are in many cases. The CSD1 testing is on hold until we can resolve the license situation. We like other companies cannot afford to just simply hire someone at this time unless we fire someone. That is not an option for us as we are a family, a team, who wants to continue to keep working and hopefully grow as the economy gets better. So at this time we must resolve the license issue.

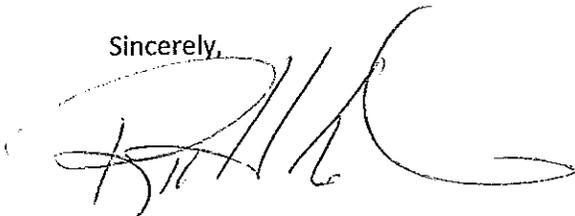
My qualifications start with my four years in the Air Force in an outfit called RED HORSE. We were the equivalent to Seabees of the Navy. We were and they still are a mobile task force, cross trained in all phases of setting up temporary bases in hostile environments; which included everything from heavy equipment operation, to runways, lighting, portable housing, kitchens, water plants and security. My primary training was in Water and Waste Processing; which included running a water plant which contained pumps, compressors, chemical treatments, carbon dioxide compressors, salt water distillation units, and all pertinent equipment involved with water treatment.

Now we move on to the last 38 years of employment; seven of which were as Detroit manager, with Ecolab Equipment Care (GCS Service, Inc.). I started with them in 1972, fresh out of the Air Force. The duties of this job include the repair on all kitchen cooking and ware washing equipment. From the simplest warmer to ovens as large as 10' X 10' which include roofs fans and dampers, steam cooking and heaters I have serviced all these years. A thermostat is a thermostat and a safety is a safety; all the basics are the same whether it applies to cooking or heating. Also attached to this letter is a copy of my transcript from Macomb College of the classes I have taken. Also over the years, I have attended many classes of manufactures of equipment learning their theories of operation and how to repair them.

While I understand this experience may not 100% fill the mold of the person who is allowed to test for the license; but I can say my experience is extensive in the heating field. We fill a unique need in the industry in that we completely understand the equipment we service, whereas personnel in the heating field would only guess at times because of the specific equipment we service. We need the license to continue to grow and service our customers. I feel I could pass the test when taken. And if you see the need, make it a restricted license to allow use to stay only in the field we service. We have no plans to expand past what we service now. An oven, with all the new controls on them, is just a small furnace. A 300,000 BTU boiler is just the same in principle and operation a building heating boiler. I have two customers that have mechanical licenses higher than #5 that said they will write letters that would attest to my knowledge.

Just today I ran into Deputy Boiler Inspector Amang Villarama who said he would also vouch for me. I request to meet the board and present evidence of my experience and knowledge.

Sincerely,

A handwritten signature in black ink, appearing to read 'Richard Lenski', with a large, sweeping flourish extending to the right.

Richard Lenski
Senior Tech, Ecolab Equipment Care



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

September 6, 2011

Richard Lenski

~~XXXXXXXXXX~~
~~XXXXXXXXXX~~, MI ~~XXXX~~

Dear Mr. Lenski:

The Mechanical Division has received your application for Mechanical Contractor Licensing Examination. Upon review, it has been determined that the following additional information is required before further processing of your application.

Rule 903 (3) indicates that if an applicant is unable to comply with the requirements set forth in the rules, he or she may wish to send a written request to the Board of Mechanical Rules to review your file and/or to appear before the Board to present evidence as to your eligibility for examination. You must be able to provide verifiable proof to the Board of your work experience in each classification you requesting to test.

If appropriate, return the required information along with this letter to: Department of Energy, Labor & Economic Growth, Bureau of Construction Codes, Mechanical Division, P.O. Box 30254, Lansing, Michigan 48909. If we do not receive a response within 15 days from the date of this letter, your application for examination will be denied in accordance with Rule 902(5) and (6).

If you have any questions regarding the information in this letter, please contact this office at 517/241-9325, preferably after 10:00 a.m. on weekdays.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathon Paradine".

Jonathon Paradine, Assistant Chief
Mechanical Division

JFP/dmc

Providing for Michigan's Safety in the Built Environment

Background Information

Have you been convicted of a felony or misdemeanor? Yes No

If yes, complete the Conviction History section below; otherwise skip forward to the Certification and Signature section.

Conviction History

In accordance with the Former Offenders Act, 1974 PA 381, this is to provide you with an opportunity to explain your affirmative response to the question above which asked if you had ever been convicted of a felony or misdemeanor.

If you are unsure of the exact details, respond to the best of your knowledge. The information requested on this form is required under 1984 PA 192 and will be used to process your application. Attach additional sheet(s) if necessary.

YOUR NAME WHEN CONVICTED

INDICATE CONVICTION(S) FOR WHICH YOU WERE CHARGED

DATE(S) OF CONVICTION(S) AND SENTENCE(S)

NAME AND ADDRESS OF SENTENCING COURT(S)

CHECK YES OR NO TO THE FOLLOWING

1. Are you currently an inmate? Yes No

2. Are you currently on probation / parole? Yes No

3. If yes, provide the name, address and telephone number of the correctional facility, probation officer or parole officer.

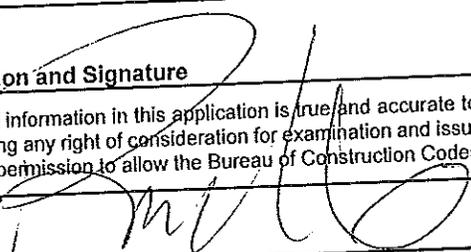
RELEASE DATE FROM CUSTODY, PROBATION OR PAROLE

REHABILITATION PROGRAMS ENROLLED IN OR COMPLETED

Certification and Signature

I certify all information in this application is true and accurate to the best of my knowledge. I understand any falsification of material facts will result in my forfeiting any right of consideration for examination and issuance of a mechanical contractor's license by the state of Michigan. By signing this form, I give my permission to allow the Bureau of Construction Codes to contact appropriate agencies regarding my conviction(s) history.

SIGNATURE



DATE

8-5-11

Education

Are you currently attending or a graduate of a recognized trade school? Yes No

If yes, attach a copy of your official transcript or, if applicable, a copy of your original diploma. A maximum of one year of the required three years of experience may be applied.

Examination Location

Examinations are given in Lansing. Refer to the enclosed "Mechanical Contractor Examination Schedule" for examination dates. Please note your preferred examination date. If approved for examination, an admission card will be mailed to you approximately 10 days prior to the examination date. If the examination you have selected is full, you will be scheduled for the next available examination.

Preferred Date _____ No Preference - Next Available Examination

If you have a learning disability, a psychological disability, or other hidden disability that requires an accommodation in testing, submit written documentation from an appropriate professional (education professional, doctor, psychologist, psychiatrist) to certify that your disabling condition requires the requested test accommodation. Forms are available from this office.

Experience Record

Applicant must provide **notarized statements from employer on company letterhead** verifying work experience in accordance with Section 338.976 of the Forbes Mechanical Contractors Act, and R 338.903 of the Board of Mechanical Rules license examination procedures. Notarized statements shall document 3 years of experience in each of the work classifications applied for, as checked on page 1 of this application. Each notarized statement must include a detailed description of the work performed, the length of time and dates that the work was performed, the employer under which the work was performed, and the title of the individual signing the statement.

CONTINUE TO PAGE 3

Number: 312861 Location: _____
 Status: ISSUED BLRINSTALL: LENSKI RICHARD A
 Date: 11/23/1998 Back Stop

Screen Fees Doc LIHN People Relate

License Fees & Dates

License Status: ISSUED Federal ID: 13-0758620 Update Exp Back
 Welding Procedure(Y/N): N County: 50 MACOMB
 Comments: _____

LICENSE FEES		LICENSE DATES	
Current Fees(Y/N): Y	\$80.00	Record Entered:	11/23/1998
Other Fees:	\$0.00	License Expires:	12/31/2011
Total Previous Fees:	\$0.00	Renewal Issue Date:	10/28/2010
TOTAL FEES:	\$995.00	Validation Date:	10/23/2006
Payments:	\$995.00		
BALANCE DUE:	\$0.00		

CAED DATA

Name:	LENSKI RICHARD A	Phone Number:	██████████
Address 1:	ECOLAB GCS	FAX Number:	██████████
Address 2:	██████████	Class:	2B
Address 3:	██████████ MI	CAED Status:	ISSUED
Zip Code:	██████████	License Expires:	12/31/2011

Copy of Boilers license



Jim Murdock
DISTRICT MANAGER

800-822-2303
248-250-6352
248-240-9709

1264 Chaucer Dr.
Troy, MI. 48083
James.murdock@ecolab.com

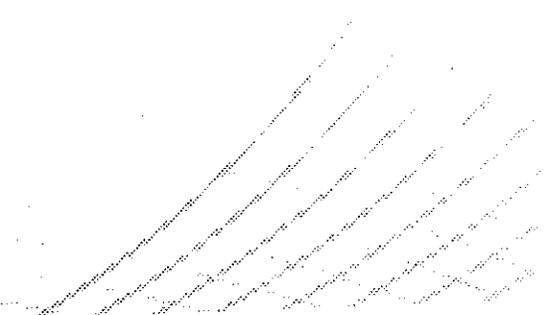
To Whom It May Concern:

Mr. Richard Lenski has been an employee of Ecolab/GCS Service since 1972. During that time he has learned from senior techs and now uses that knowledge to teach newer and inexperienced personal. There are few jobs in the field of restaurant equipment repair he hasn't tackled.

His schooling has included but is not limited to the following formal education.

- 1968 Water and Waste Processing Specialist US Air Force School
 - 1977 – 1983 Macomb Community College classes:
 - Blue Print read part 1 and 2
 - Cost Estimating
 - Sheet Metal layout part 1 and 2
 - Wiring- Residential
 - Electrical blueprint reading
 - Heat Fundamentals *
 - Refrigeration Fundamentals
 - Plumbing Fundamentals
 - Plumbing Code
 - Drain, Waste and Vent
 - 2011 National Board online course:
 - Controls, Safety Devices for Automatically Controls *
- Boilers (CSD1)

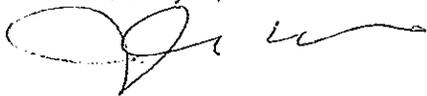
During that time he has performed the tasks of repair of cooking equipment such as ranges, fryers, steamer, kettles, boilers, broilers, dishwashers, booster heaters, water heaters and warmers. Troubleshooting, calibration and adjustment and changes of controls such as gas safeties, thermostats, steam controls and preventative maintenance has been performed by him all through the years.



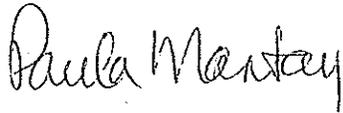
He has installed boilers under his Class 2B boiler installer's license (#312861 2B). Including boilers at the Troy Marriot, Northfield Hilton among many others and supervised many fellow technicians with installations.

During the last several years he has performed the CSD1 testing under the guidance and license of Tom Michaels' (#711811) an employee of GCS Service/Ecolab.

Thank you,



Jim Murdock
Ecolab Equipment Care



PAULA MANTAY
Notary Public, State of Michigan
County of Oakland
My Commission Expires 02-15-2017
Acting In the County of _____

Aug 10, 2011.



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

October 19, 2011

TO: Members of the State Board of Mechanical Rules
FROM: Kevin D. Kalakay, Chief, Mechanical Division
SUBJECT: Product Evaluation for Flamebar BW11
Commercial Kitchen Grease Duct System

The applicant has filed a petition application for approval of a product.

APPLICANT REPRESENTATIVE:

Mr. Joe Vincenti

APPLICANT:

Firespray International
12524 Renoir Lane
Dallas, Texas 75230

AUTHORITY:

Section 21 of Act 230, 1972 being section 125.1521 of the Michigan Compiled Laws.
MCL 125.1521 of 1972 PA 230
MCL 338.975 of 1984 PA 192

PRODUCT:

Flamebar BW11 Commercial Kitchen Grease Duct System

Providing for Michigan's Safety in the Built Environment

LARA is an equal opportunity employer
Auxiliary aids, services and other reasonable accommodations are available upon request to individuals with disabilities.
P.O. BOX 30254 • LANSING, MICHIGAN 48909
www.michigan.gov/bcc • Telephone (517) 241-9302 • Fax (517) 241-9570

DESCRIPTION:

Product is fabricated of 20 gage galvanized steel and incorporates a water based coating sprayed onto the external surface of the duct at approximately 1 mm thickness. Joints include a specially rated gasket. Installed duct sections are field insulated with 2 layers of Unifrax Elite 1.5" Fyre Wrap.

APPLICATION:

Product is used as a commercial kitchen grease duct.

TEST REPORTS:

Intertek 3193675SAT005 EEV REV 1 and 3198017SAT004 EEV

FINDINGS:

The 2009 Michigan Mechanical Code section **506.3.1.1** titled **Grease duct materials** states in part: grease ducts serving Type I hoods shall be constructed of steel having a minimum thickness of **No. 16 gage** or stainless steel not less than **No. 18 gage**

Exception: "Factory-built" commercial kitchen grease ducts listed and labeled in accordance with UL 1978 and installed in accordance with Section 304.1"

The applicant has submitted documentation stating that the product is a listed system to ASTM E-2336. That standard is not applicable as ASTM E 2336 is a standard for fire-resistive grease duct enclosure systems, not factory built grease ducts.

The applicant has submitted documentation the product has been successfully *tested* to every performance measure of UL 1978. The code specifically states that factory-built grease ducts shall be listed and labeled in accordance with UL 1978. There are no exceptions to meeting a listing standard and exceptions to UL 1978 are listed in Intertek's report.

Members of the State Board of Mechanical Rules

Page 3

October 19, 2011

RECOMMENDATION:

Staff has expressed concerns to the applicant that the product does not meet the intent of the code. Staff advises the board that the product is not acceptable under the code; therefore, the board should not approve a recommendation to the State of Michigan Construction Code Commission for acceptability.

KDK/dmc



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
BUREAU OF CONSTRUCTION CODES
IRVIN J. POKE
DIRECTOR

STEVEN H. HILFINGER
DIRECTOR

October 18, 2011

Joe Vincent
Firespray Intl. Ltd.
12524 Renoir Lane
Dallas, TX 75230

Dear Mr. Vincent:

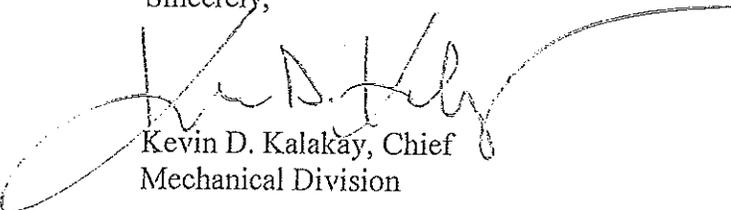
On November 16, 2011, the Board of Mechanical Rules will consider your application for approval of Flamebar Grease Duct.

If you would like input on this action, you should be present at the Okemos Office Building, 2501 Woodlake Circle, Okemos, Michigan at 9:00 a.m. in Conference Room 3.

The meeting site is accessible, including handicapped parking. Individuals attending the meeting are requested to refrain from using heavily scented personal care products, in order to enhance accessibility for everyone. People with disabilities requiring additional accommodations in order to participate in the meeting should contact the Mechanical Division at 517/241-9325 at least (10) working days before the event.

If you have any further questions, please contact our office at the above reference number.

Sincerely,



Kevin D. Kalakay, Chief
Mechanical Division

KDK/dmc

Providing for Michigan's Safety in the Built Environment

LARA is an equal opportunity employer
Auxiliary aids, services and other reasonable accommodations are available upon request to individuals with disabilities.
P.O. BOX 30254 • LANSING, MICHIGAN 48909
www.michigan.gov/bcc • Telephone (517) 241-9302 • Fax (517) 241-9570



July 26, 2011

Mr. Kevin Kalakay
MICHIGAN DEPARTMENT OF LICENSING
AND REGULATORY AFFAIRS
Bureau of Construction Codes
PO Box 30255
Lansing, MI 48909

Re: Petition Application for Approval of Flamebar Grease Duct System

Dear Mr. Kalakay,

Please find attached submission materials required for your evaluation of Flamebar Grease Duct for Michigan State Approval. The completed application is enclosed, in addition to all relevant test documentation and product literature required to support the application.

Our Flamebar Commercial Kitchen Grease Duct is fabricated of 20gauge galvanized sheet metal and incorporates a 1mm layer of water based coating applied to the outer surface of the duct. We supply a specialized gasket material for the joints and it is then installed by independent contractors to our standards. The installed grease duct is then wrapped with two layers of Unifrax Fyrewrap Elite 1.5 insulation on site.

The product is a listed system to ASTM E-2336 (Grease Duct with Field Applied Wrap Enclosure) by Intertek ETL Semko, a Nationally Recognized Test Laboratory (NRTL) by OSHA. We have also successfully tested to every performance requirement of UL 1978 (Grease Ducts), and all testing is documented in the attached Intertek Test Report.

The coating is applied by our authorized licensees at their spray shop facility, and they in turn are monitored by Intertek a part of the Listing Follow-Up Service. Firespray, and/or its licensees, perform a site inspection of the project once completed and provide a signed Certificate of Conformity stating compliance to Firespray's Standards (STD 381-384)

Our Grease Duct System has been approved in numerous cities across the USA including Miami, Orlando, Houston, San Antonio, Washington DC, Atlanta, Cleveland, Las Vegas, Nashville, and many more. It has also been installed internationally for over 20 years, and I have included a project listing that highlights our highest profile jobs for your review.



I understand that following your review of the System it will be presented at the Mechanical Review Board, and that I am able to support this review. Could you please notify me of the date for the review once established?

If you should require any additional materials to support the review process, please do not hesitate to contact me directly. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe Vincenti".

Joe P. Vincenti
VP Sales & Marketing

FIRESPRAY INTERNATIONAL
JoeVincenti@FiresprayUSA.com
(972) 365-5302

Petition Application for Approval of Material, Product or Method
 Michigan Department of Licensing and Regulatory Affairs
 Bureau of Construction Codes
 P.O. Box 30255, Lansing, MI 48909
 www.michigan.gov/bcc

Agency Use Only

Application Fee: \$500.00

Authority: 1972 PA 230 Completion: Mandatory Penalty: Use of material, product or method will not be approved	LARA is an equal opportunity employer/program. Auxiliary aids, services and other reasonable accommodations are available upon request to individuals with disabilities.
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PRODUCT INFORMATION

NATURE OF APPLICATION

Material
 Product
 Method of Manufacture or Construction
 Component

CODE UNDER WHICH APPROVAL IS SOUGHT

Building (140)
 Electrical (115)
 Mechanical (130)
 Plumbing (98)

NAME OF MATERIAL, PRODUCT OR METHOD OF MANUFACTURE (Limit To One Item Per Application)

Flamebar BW11 Commercial Kitchen Grease Duct System

OTHER IDENTIFICATION (Model Number)

DESCRIPTION (Use Additional Sheets If Necessary)

The product is fabricated of rectangular 20 gage galvanized steel and incorporates a water based coating sprayed on to the external surface of the duct at approximately 1mm thickness. Joints include a specialty rated gasket. Installed duct sections are insulated with 2 layers of Unifrax Elite 1.5" fyre wrap.

INTENDED USE (Use Additional Sheets If Necessary)

The product is used for commercial kitchen grease duct applications.

DATA SUBMITTED

<input checked="" type="checkbox"/> Letter <input checked="" type="checkbox"/> Manual <input checked="" type="checkbox"/> Standards <input type="checkbox"/> Installation Instructions <input checked="" type="checkbox"/> Display Catalog	Reports <input type="checkbox"/> ICC - NES <input type="checkbox"/> BOCA - NES <input type="checkbox"/> ICBO <input type="checkbox"/> SBCC <input type="checkbox"/> NRB <input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/> Product Sample or Model <input type="checkbox"/> Prior Approvals by Other Agencies <input type="checkbox"/> Recommendations by Model Code Bodies
--	---	--

LABORATORY TEST BY

Intertek ETL Semko. Listed to ASTM E-2336 Grease Duct w/ Field Applied Wrap Encl. Tested to UL1978 Grease Ducts.

PILOT SERVICE EXPERIENCE AND CONDITIONS (Use Additional Sheets If Necessary)

Product has been used and/or approved in Washington DC, Miami & Orlando FL, San Antonio and Houston TX, Atlanta GA, Cleveland OH, Nashville TN, Las Vegas NV and more.

RESTRICTIONS FOR USE (Use Additional Sheets If Necessary)

Rectangular Duct size limited to 49" side length.

APPLICANT (Note: All correspondence will be sent to this address)

NAME OF COMPANY

Firespray International

APPLICANT NAME

Joe Vincenti

ADDRESS

12524 Renoir Lane

CITY	STATE	ZIP CODE	TELEPHONE NUMBER (Include Area Code)
------	-------	----------	--------------------------------------

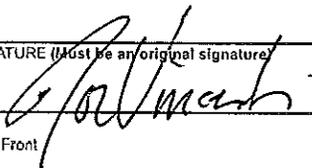
Dallas

TX

75230

(972) 365-5302

APPLICANT SIGNATURE (Must be an original signature)	DATE	FAX NUMBER (Include Area Code)
---	------	--------------------------------



7-26-2011

—



July 26, 2011

Mr. Kevin Kalakay
MICHIGAN DEPARTMENT OF LICENSING
AND REGULATORY AFFAIRS
Bureau of Construction Codes
PO Box 30255
Lansing, MI 48909

Re: Petition Application for Approval of Flamebar Grease Duct System

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The product is a listed system to ASTM E-2336 (Grease Duct with Field Applied Wrap Enclosure) by Intertek ETL Semko, a Nationally Recognized Test Laboratory (NRTL) by OSHA. We have also successfully tested to every performance requirement of UL 1978 (Grease Ducts), and all testing is documented in the attached Intertek Test Report.

The coating is applied by our authorized licensees at their spray shop facility, and they in turn are monitored by Intertek a part of the Listing Follow-Up Service. Firespray, and/or its licensees, perform a site inspection of the project once completed and provide a signed Certificate of Conformity stating compliance to Firespray's Standards (STD 381-384)

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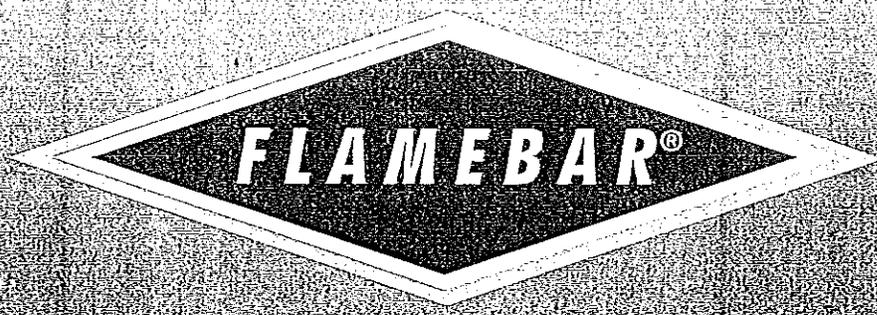
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Sincerely,

Joe P. Vincenti
VP Sales & Marketing

FIRESPRAY INTERNATIONAL
JoeVincenti@FiresprayUSA.com
(972) 365-5302



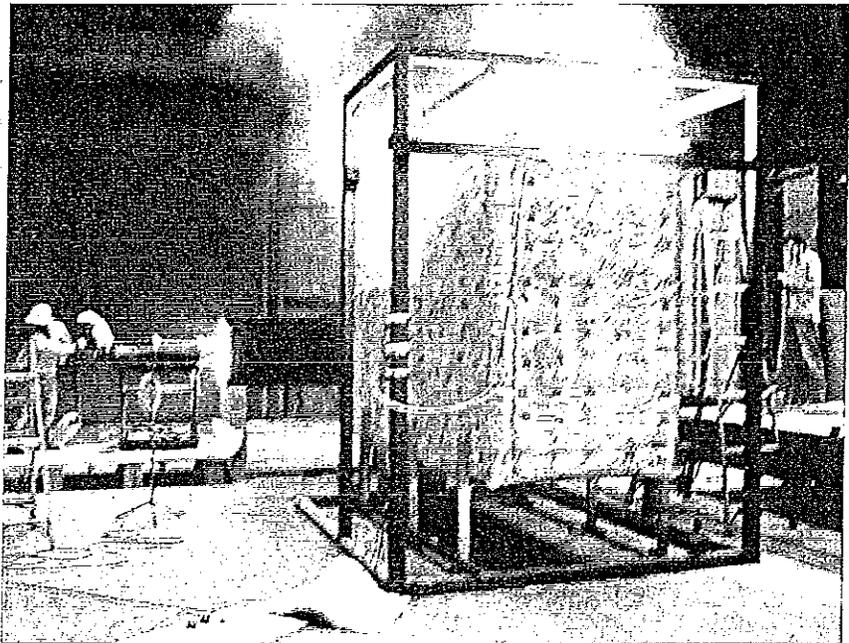
Flamebar BW11/FyreWrap® for Commercial Kitchen Grease Ducts

TESTED & LISTED TO THE REQUIREMENTS OF ASTM E-2336, NFPA 96 and UL1978, TO PROVIDE A TWO HOUR RATING

AT LAST

Rectangular grease duct constructed in flanged sections up to 49" x 49".

No more costly site welding and fabrication resulting in lighter grease duct, speedier installation and major cost savings.



FLAMEBAR BW11 Internal Grease duct test to ASTM E-2336

Flamebar BW11/FyreWrap® max 2.0 Properties and Listing as a Grease Duct

ASTM E-2336 ASTM E-2336 Internal Grease Duct Test	Complies Zero clearance to combustibles at all locations on wrap
ASTM E-119 Full Scale Engulfment Test	2 Hour Fire Rating
ASTM E-84/UL 723 Surface Burning Characteristics	UL File No. R14514 (FyreWrap® max 2.0)
Flame Spread Rating Smoke Development Rating	Unfaced Blanket Encapsulated Zero <25 Zero <50
ASTM E-814 Firestop Test	F-Rating = 2 hours T-Rating = 2 hours
ASTM E-136 Non Combustibility Test	Complies
ASTM C-518 Durability Test	Complies

Flamebar BW11 Fire Rated Grease Ductwork

Construction

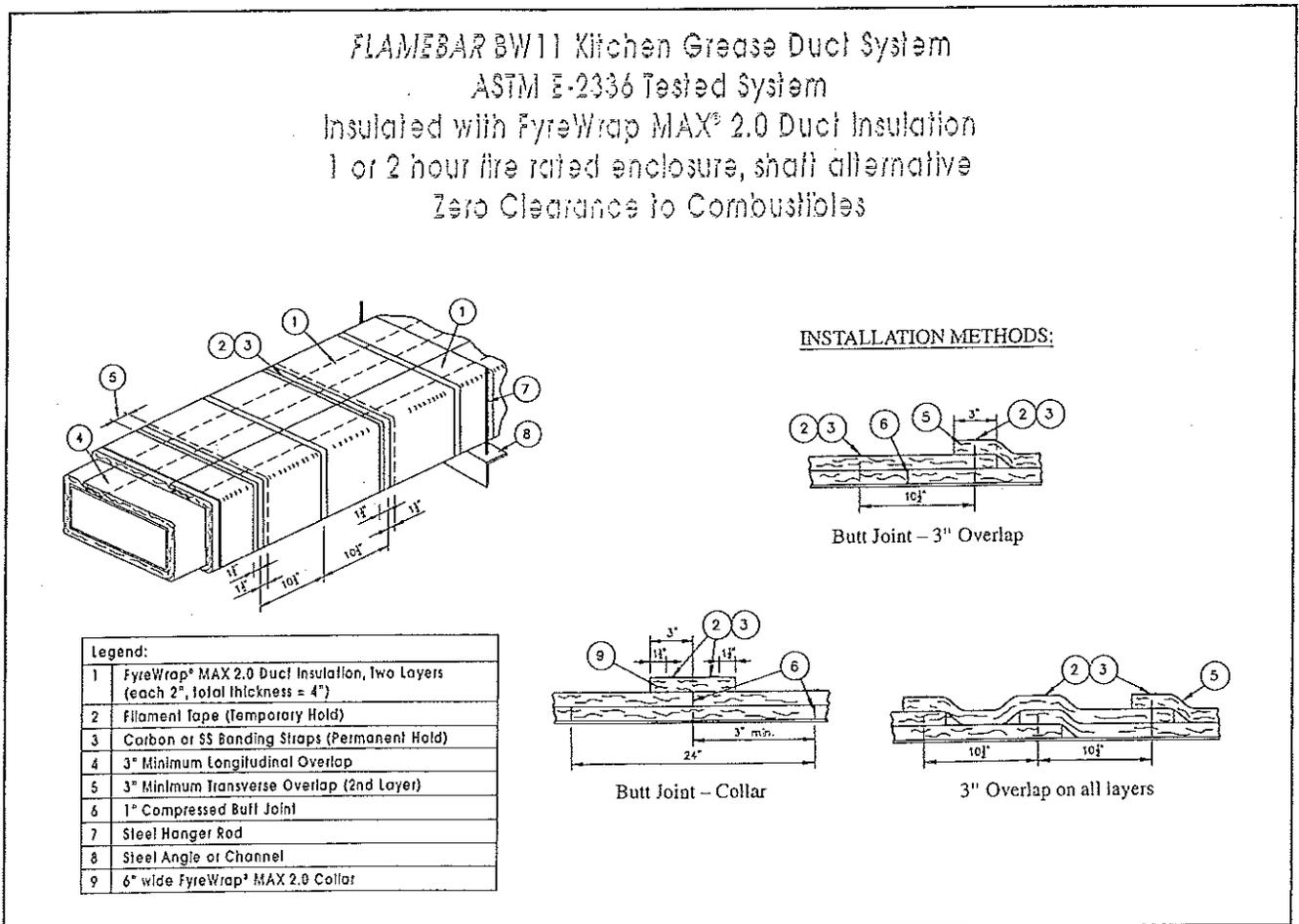
FLAMEBAR BW11 grease duct is constructed from 20 gage galvanized sheet steel in flanged lengths up to 49" x 49" cross section. The duct is then degreased and factory fire sprayed with **FLAMEBAR BW11** which is a specially formulated water based compound which contains selected mineral fillers in a lower permeability elastomeric binder to a thickness of approximately 0.04" to give a finished product. The ductwork is produced in flanged sections, each approximately 59" long, and is assembled on site using **FLAMEBAR** gaskets and sealants. The ductwork is then wrapped with **FyreWrap® max 2.0** duct insulation, consisting of two layers applied directly to the duct surface. The **FyreWrap® max 2.0** may be installed at zero clearance to combustibles at all locations on the wrap.

All the above components are necessary to achieve ASTM E-2336 listing.

The first layer of insulation can be installed with transverse (perimeter) joints butted and minimum 3" longitudinal overlaps.

All overlaps for the second or outer layer are required to be a minimum of 3". For the second layer, transverse (perimeter) overlaps of adjacent blankets may be installed using one of the following three methods as shown in Figure 1.

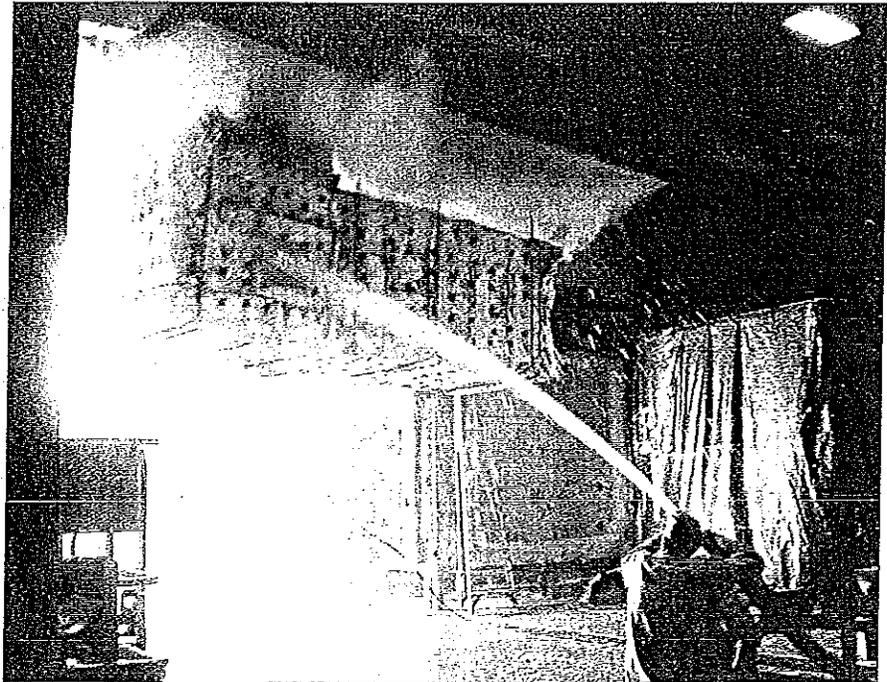
Figure 1 - layer detail



Flamebar BW11 Fire Rated Grease Ductwork

Access Doors

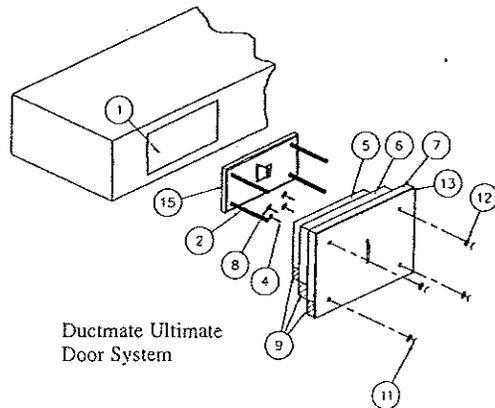
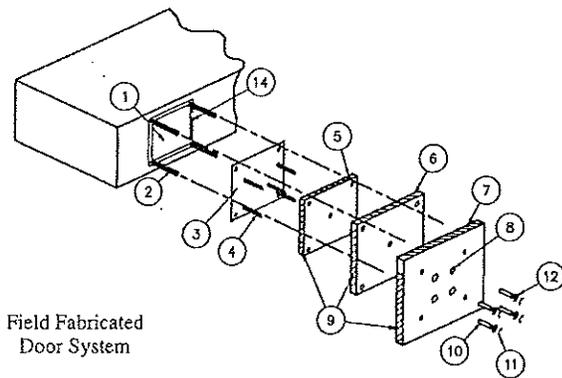
Field fabricated and pre-fabricated grease duct access doors are permitted for use with **FLAMEBAR** grease ducting. Installation details are provided in Figure 2, either as field fabricated access doors or prefabricated Ductmate Ultimate.



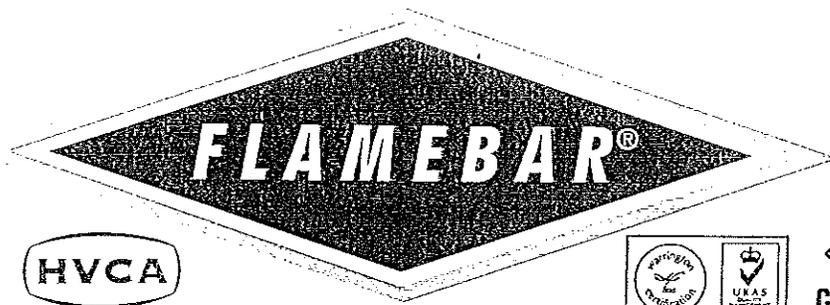
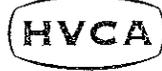
FLAMEBAR BW11 ASTM E-2336 fire engulfment test showing ASTM E119 hose stream test at 30psi for 6½ minutes

Figure 2

FLAMEBAR BW11 Commercial Kitchen Grease Duct System Access Door Systems



Legend:	
1	Access Door Opening
2	All Thread Rods
3	Access Door Cover Panel 16 Gauge (field fab. only)
4	Insulation Pins – Welded to Cover
5	First Layer FyreWrap® MAX 2.0
6	Second Layer FyreWrap® MAX 2.0, 1" Overlap
7	Third Layer FyreWrap® MAX 2.0, 1" Overlap
8	Speed Clips/Washers
9	Cut Edges Sealed With Aluminum Foil Tape
10	Spool pieces for threaded rods (optional field fab. only)
11	Wing Nuts
12	Washers
13	Insulation plate
14	Ceramic fiber gasket, ½" thick
15	Prefabricated access door



Quality Systems Certificate No. 414
Approved to ISO 9001:2008

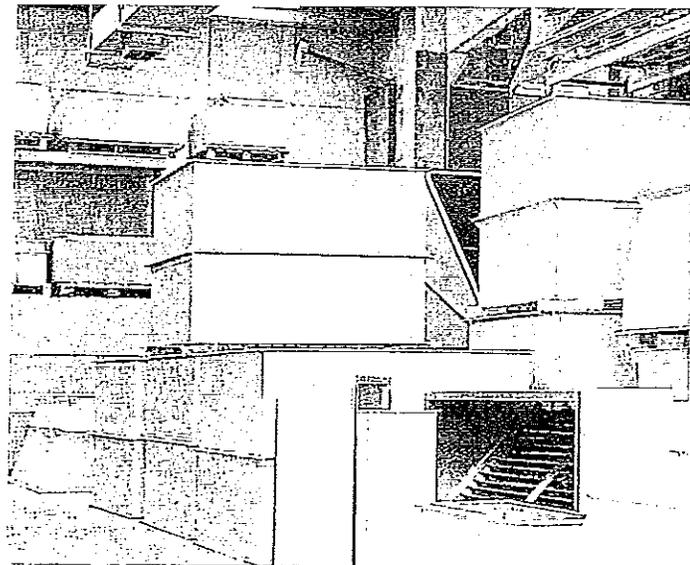
COATED DUCTS
FOR USE IN
FIRE RESISTIVE
DUCT ASSEMBLIES
SEE UL BUILDING
MATERIALS DIRECTORY
E8L 6962

Flamebar BW11 Fire Rated Ductwork to UL 1978

UL 1978 Section	UL 1978 Section 11.3						
	a	b	c	d	e	f	g
14 Temperature Test - 500°F (280°C) Flue Gases	Pass	Pass	Pass	N/A	N/A	Pass	Pass
15 Abnormal Temperature Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
16 Leakage Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
17 Vertical Support Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.1 General	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.2 Impact Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.3 Longitudinal Force Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.4 Load Test for Grease Duct Elbows	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.5 Grease Duct Joint Load Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests - 18.6 Grease Duct Joint Torison Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
19 Fire and Leakage Test of Grease Duct Access Doors and Fillings	Pass	Pass	Pass	N/A	N/A	Pass	Pass
20 Pressure Tests for Fillings Exposed to Fire Extinguishing System Pressure	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation and Change in Volume Tests of Gaskets and Seal - 21.1 General	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation and Change in Volume Tests of Gaskets and Seal - 21.2 Tensile strength and ultimate elongation tests	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation and Change in Volume Tests of Gaskets and Seal - 21.3 Volume change test	N/A	N/A	N/A	N/A	N/A	N/A	N/A

UL 1978 Section 11.4a requires that the thermal insulation remain in its intended position. The Unifrax FyreWrap® Max 2.0 thermal insulation is mechanically attached to the Firespray BW11 Grease Duct Assembly, using standard copper-coated steel insulation pins and standard 2.5 inch square speed-clip washers. The Unifrax FyreWrap® Max 2.0 thermal insulation remained in place during all tests. Therefore, the requirements of UL 1978 Section 11.4a are met by the Firespray BW11 Grease Duct Assembly with the applicable layer(s) Unifrax thermal insulation applied.

UL 1978 Section 11.4b requires that the thermal conductivity of the thermal insulation not be increased reducing its effectiveness, UL 1978 does not provide a method for determining the thermal conductivity or when the thermal conductivity tests are to be conducted or where the samples are to be taken. Therefore, an analytical assessment of Unifrax FyreWrap® Max 2.0 thermal insulation is being used. According to published information, "FireWrap® Max 2.0 incorporates Insulfrax® Thermal Insulation as its core material." Insulfrax calcium-magnesium-silicate fiber is recommended for continuous use at temperatures up to 1000°C (1832°F). Sections d and e relate to porcelain-coated ducts only.



FLAMEBAR BW11 duct

FOR FURTHER INFORMATION PLEASE REFER TO OUR TECHNICAL AND APPLICATIONS MANUALS



LICENSEE

Tel: +540 292 9521
kenbaker@firespray.eu.com

FIRESPRAY INTERNATIONAL LTD. FLAMEBAR HOUSE SOUTH ROAD TEMPLEFIELDS HARLOW ESSEX CM20 2AR ENGLAND
TEL: +44 1279 634230. FAX: +44 1279 634232 e-mail: sales@firespray.eu.com www.firespray.eu.com

This Technical Leaflet has been produced by Firespray International Ltd who have a Policy of continuous Product and System Improvement and reserve the right to change Methods and Specifications without notice.

REPORT NUMBER: 3193675SAT005 EEV REV 1 and
3198017SAT004 EEV
ORIGINAL ISSUE DATE: May 14, 2010
REVISION AND DATE: Revision 1 – May 29, 2010

EVALUATION CENTER
Intertek
16015 Shady Falls Road
Elmendorf, TX 78112

RENDERED TO

**FIRESPRAY INTERNATIONAL LTD
FLAMEBAR HOUSE SOUTH ROAD
HARLOW CM202AR UNITED KINGDOM**

PRODUCT EVALUATED: Flamebar BW11 Fire Duct
EVALUATION PROPERTY: (Fire Resistance)

Engineering Evaluation of Flamebar BW11 Fire Duct for compliance with the applicable requirements of the following criteria:

- ANSII/ASTM E 2336-04 *Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems*
- UL 1978 *GREASE DUCTS*, Third Edition January 21, 2005

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

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2 Introduction

Intertek is conducting an engineering evaluation, for Firespray International Limited, on Flamebar BW11 Fire Duct, with steel angle flanges or Ductmate flanges to evaluate fire resistance. The evaluation is being conducted to determine if the tested Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 thermal insulation will maintain compliance or show equivalency with: *ANSI/ASTM E 2336-04 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems* and the mechanical and leakage requirements of UL 1978 *GREASE DUCTS*, Third Edition January 21, 2005.

ASTM E 2336 does not specify a specific grease duct construction or materials. Only that the grease duct meets the provisions and conditions of compliance set forth in the test standard. However, the tested 20 GA galvanized steel Flamebar BW11 Fire Duct protected with Unifrax thermal insulation is not a standard code compliant grease duct under the following provision:

506.3.1.1 Grease duct materials. Grease ducts serving Type I hoods shall be constructed of steel not less than 0.055 inch (1.4 mm) (No. 16 Gage) in thickness or stainless steel not less than 0.044 inch (1.1 mm) (No. 18 Gage) in thickness.

Though not a requirement of ASTM E 2336, Intertek required testing the mechanical and leakage tests to provide additional information to the Authorities Having Jurisdiction (AHJ). Intertek uses UL 1978 tests for this purpose.

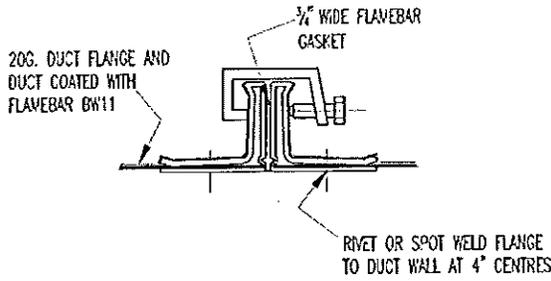
3 Product and Assembly Description

3.1. Product and/or Assembly Description

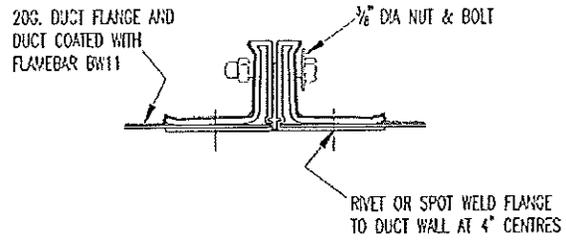
Firespray International's Flamebar BW11 Fire Duct is composed of rectangular, 20 GA, galvanized steel, maximum 60-inch long, sections coated with BW11. The Flamebar BW 11 is a specialty formulated water based compound that contains selected mineral fibers in a low permeability elastomeric binder to a thickness of 0.04 inches to provide a finished coating over grease ducts. Firespray International's Flamebar BW11 Fire Duct is available with various types of flanges. Sizes over 19-inches wide require intermediate reinforcement: steel angles. Firespray International's Flamebar BW11 Fire Duct is then protected with two layers of nominal 2-inch thick, nominal 8-pcf density, Unifrax Max 2.0 Insulation. The sections will either be bolted connections or mechanical connections made using a G-clamp.

Flamebar BW11 Fire Duct			
Maximum Width & Height Dimensions	Minimum Wall Thickness	Flange Type	Connection Method
≤24 x 24	20 GA	Ductmate 25	G Clamps @ 9-inch Φ & 5/16-inch Corner Bolts
≤24 x 24	20 GA	Minimum 1.25 x 1.25 x 1/4 Steel Angle or Ductmate 25	5/16-inch Bolts @ 9-inch Φ in Field & at Corners
≤36 x 36	20 GA	Ductmate 35	G Clamps @ 9-inch Φ & 3/8-inch Corner Bolts
≤36 x 36	20 GA	Minimum 1.5 x 1.5 x 1/4 Steel Angle or Ductmate 35	3/8-inch Bolts @ 9-inch Φ in Field & at Corners
≤42 x 42	20 GA	Ductmate 45	G Clamps @ 9-inch Φ & 1/2-inch Corner Bolts
≤42 x 42	20 GA	Minimum 1.75 x 1.75 x 1/4 Steel Angle or Ductmate 45	3/8-inch Bolts @ 9-inch Φ in Field & 1/2-inch Bolts at Corners
≤49 x 49	20 GA	Minimum 2 x 2 x 3/16 Steel Angle	3/8-inch Bolts @ 6-inch Φ in Field & 1/2-inch Bolts at Corners

Based on the above information, the following flange drawings are included for reference.

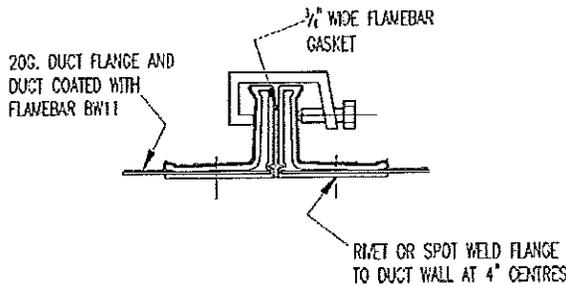


SECTION THROUGH FLANGE
USING G CLAMPS @ 9" CENTRES
& 1/2" NUTS & BOLTS AT EACH CORNER

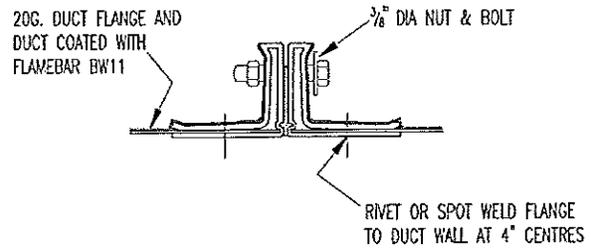


SECTION THROUGH FLANGE
USING 3/8" NUTS & BOLTS @ 9" CENTRES
& 1/2" NUTS & BOLTS AT EACH CORNER

Ductmate 45 Attachment Methods

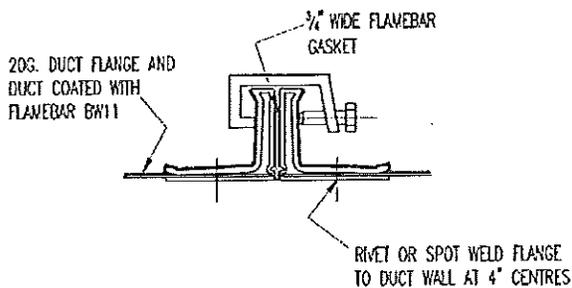


SECTION THROUGH FLANGE
USING G CLAMPS @ 9" CENTRES
& 3/8" NUTS & BOLTS AT EACH CORNER

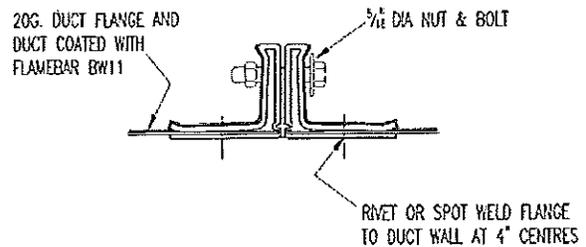


SECTION THROUGH FLANGE
USING 3/8" NUTS & BOLTS @ 9" CENTRES
& 3/8" NUTS & BOLTS AT EACH CORNER

Ductmate 35 Attachment Methods

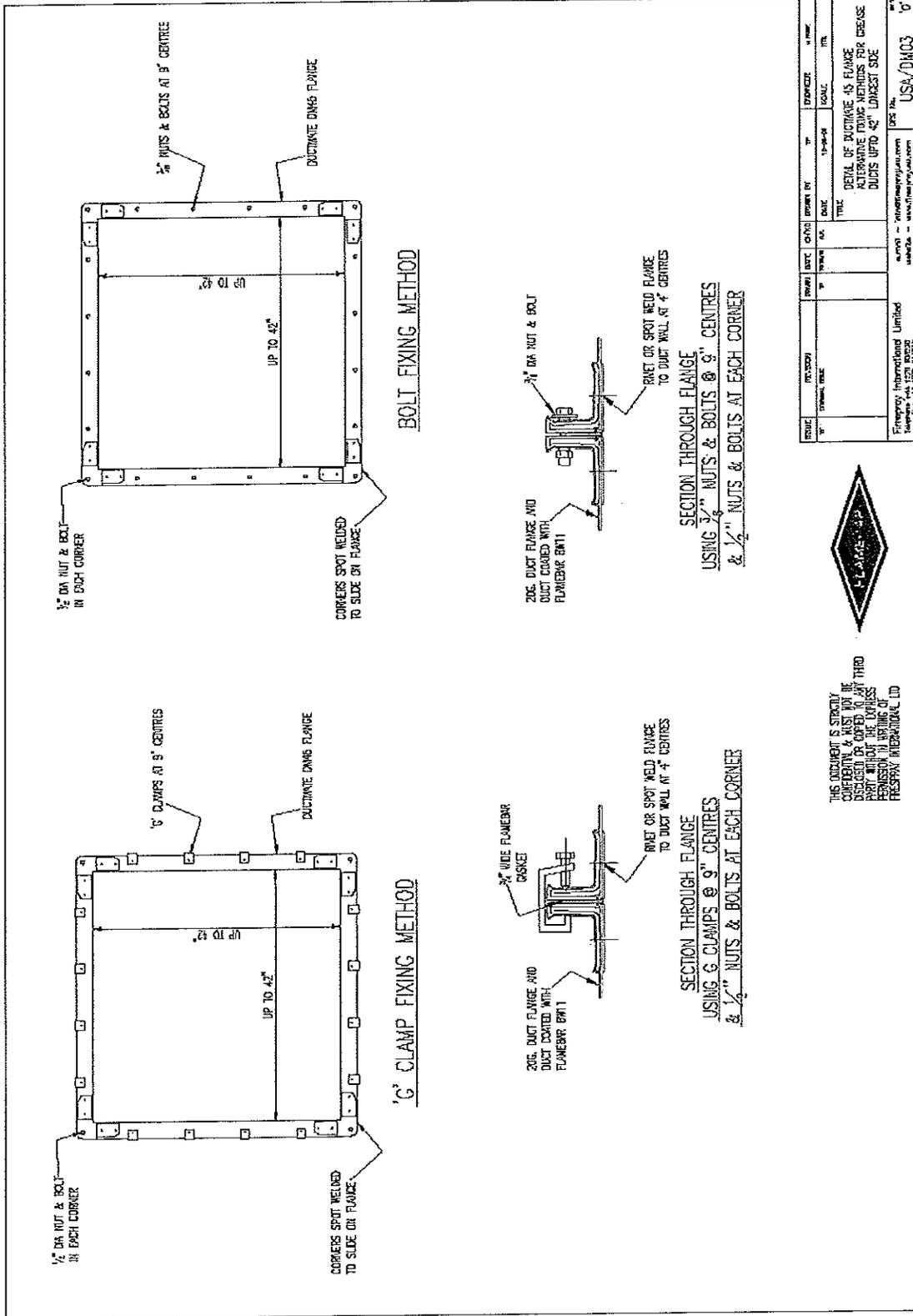


SECTION THROUGH FLANGE
USING G CLAMPS @ 9" CENTRES
& 5/16" NUTS & BOLTS AT EACH CORNER

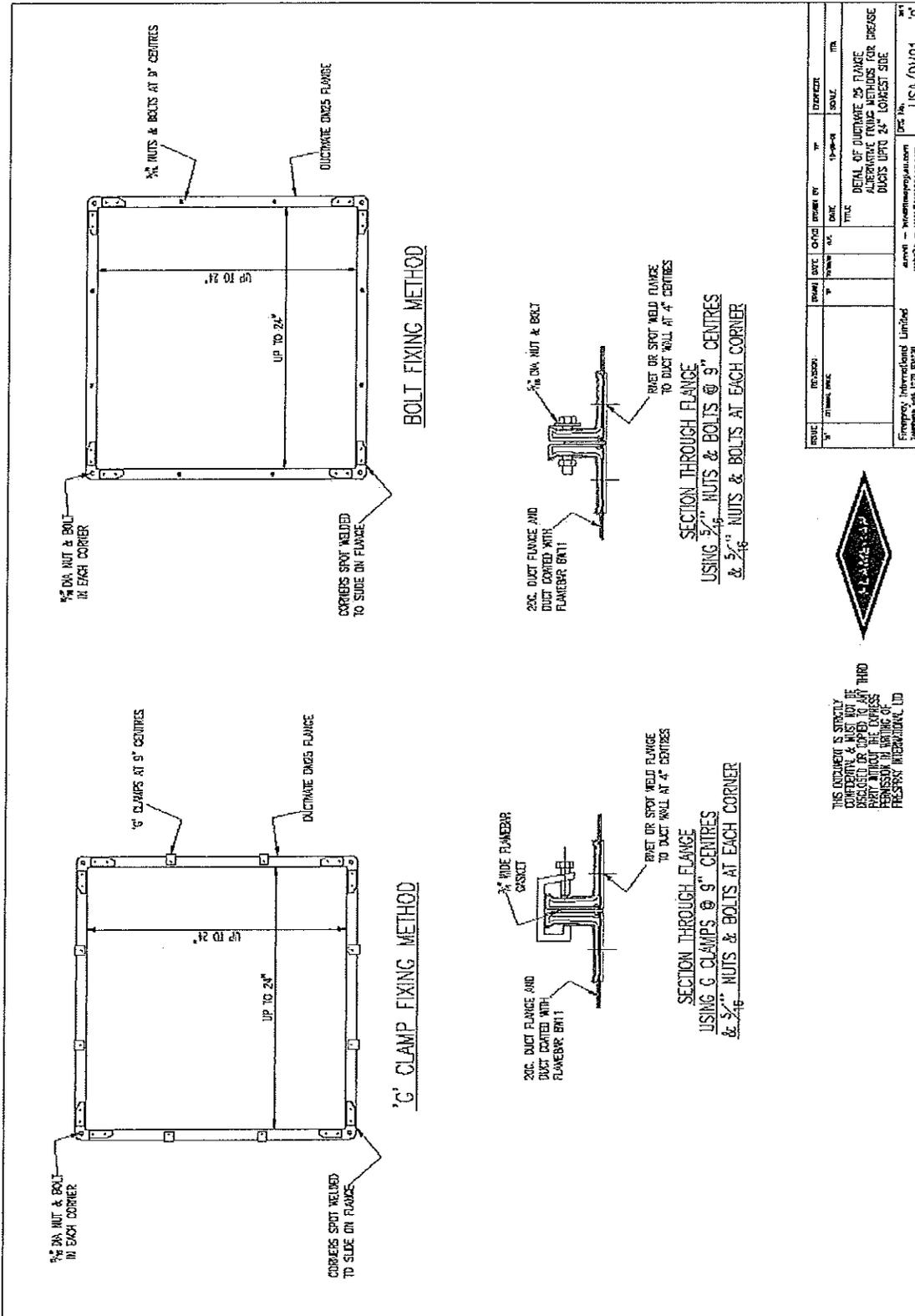


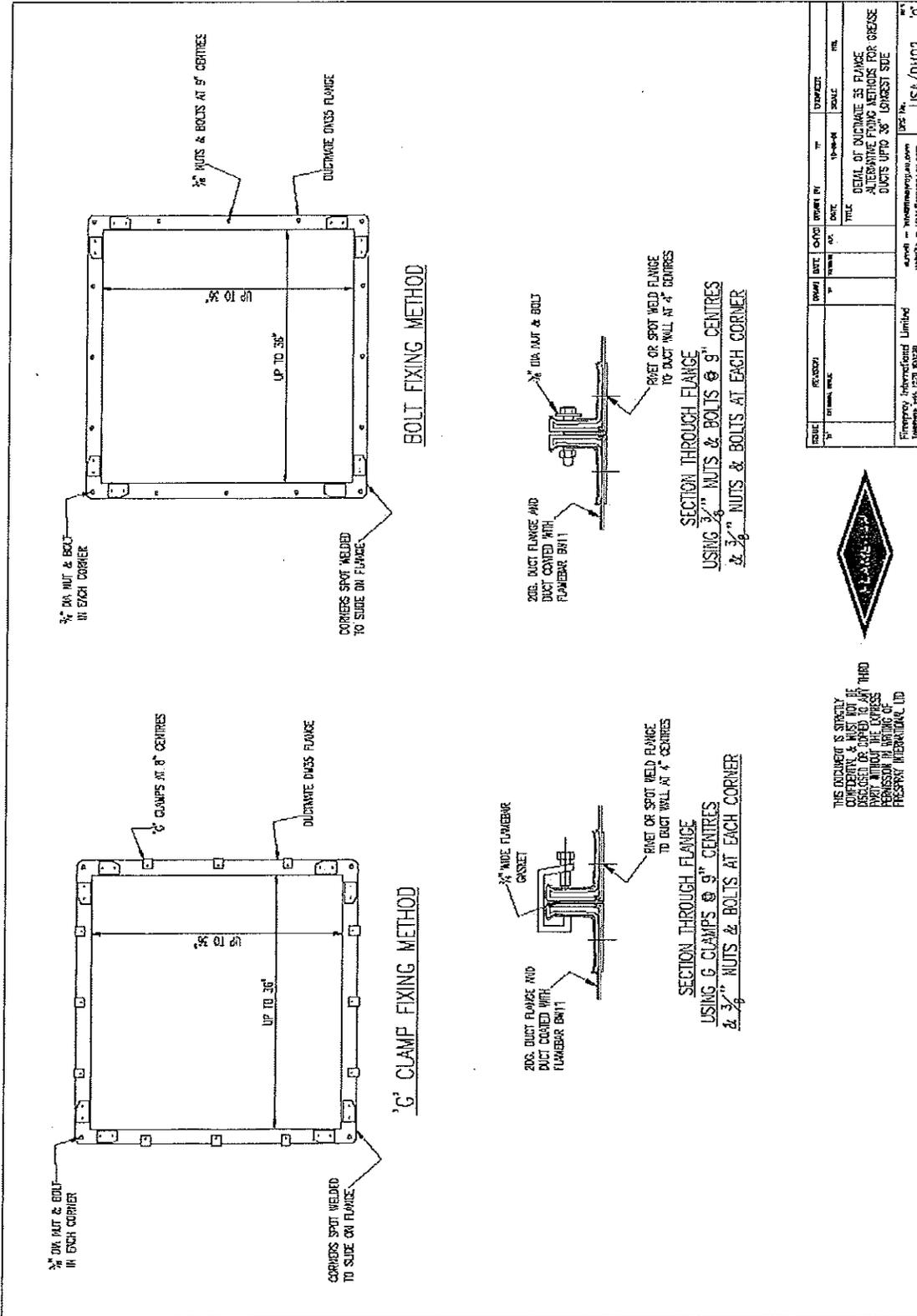
SECTION THROUGH FLANGE
USING 5/16" NUTS & BOLTS @ 9" CENTRES
& 5/16" NUTS & BOLTS AT EACH CORNER

Ductmate 25 Attachment Methods



FORM NO. 3193675	REVISED BY	DATE	SCALE	DATE
3193675	3193675	3193675	3193675	3193675
DRAWN BY		DATE	SCALE	DATE
3193675		3193675	3193675	3193675
DETAIL OF DUCTWIRE AS FLANGE ALTERNATIVE FIXING METHODS FOR DUCTS UP TO 42" LONGEST SIDE				
FIRESPRAY INTERNATIONAL LIMITED			USA/DMS03	
Telephone: 444 575 8022			www.firespray.com	





FLAMEBAR BW11 KITCHEN GREASE DUCT - UP TO 2 HOURS
FIRE ENDURANCE RATING
ASTM E-2336-04 TESTED SYSTEM

THIS DOCUMENT IS SPECIFIC TO THE SYSTEM AS SHOWN AND IS NOT TO BE USED IN ANY OTHER APPLICATION WITHOUT THE EXPRESS PERMISSION OF FIRESPRAY INTERNATIONAL LTD.

RECTANGULAR DUCTWORK SPECIFICATION BASED ON SMOGMA HVCA DUCT CONSTRUCTION STD. 2ND EDITION FOR UP TO 6" WATER CHARGE STATIC. POSITIVE OR NEGATIVE DUCT CONSTRUCTION FROM GGG COATED GALVANISED STEEL OF LOCKFORMING GRADE TO ASTM TO A924, COATED WITH BETWEEN 0.025" AND 0.04" OF EPW1.

Firespray International Limited
170 Hill Street, Suite 100
St. John's, NL A1B 2X9, Canada
Tel: 709-576-1111
Fax: 709-576-1112
www.firespray.com




LONGEST SIDE	GAUGE	STD FLANGE STRAIGHT		DUCTABLE FLANGE OR FLANGE	FLANGE THICKNESS TO DUCT	MAXIMUM STATIC	INTERMEDIATE REINFORCEMENT		CONVENTIONAL JOINTS	THRU ROADS	NO. OF SPUNTS	MAXIMUM SIZE	STABILITY, INTEGRITY AND INSULATION RATING	
		ELASTIC MODULUS T	SEA FLANGE				SEA SYSTEM	ROCK CLASS					MINIMUM SIZE	7" R
UP TO 19"	20G	0.0374 (0.48 cm ²)	1" x 1/2"	D125	-	-	-	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	5"	NONE	19" x 10"	5"	0.30	2 1/2" x 2 1/2" x 1/4" RSA
OVER 19" UP TO 24"	20G	0.0517 (0.65 cm ²)	1 1/2" x 1/2"	D125	-	-	-	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	19" x 19"	5"	0.39	3" x 3" x 1/4" RSA
OVER 24" UP TO 36"	20G	0.0704 (0.88 cm ²)	1 1/2" x 3/4"	D125	-	40"	1 1/2" x 1/2"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	24" x 12"	3"	0.40	3" x 3" x 1/4" RSA
OVER 36" UP TO 42"	20G	0.1024 (1.28 cm ²)	1 1/2" x 3/4"	D125	-	37"	1 1/2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	24" x 24"	3"	0.54	3" x 3" x 1/4" RSA
OVER 42" UP TO 49"	20G	0.1344 (1.68 cm ²)	1 1/2" x 3/4"	D145	-	30"	1 1/2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	36" x 16"	5"	0.59	3" x 1 1/2" CHANNEL
OVER 49" UP TO 60"	20G	0.1824 (2.28 cm ²)	1 1/2" x 3/4"	D145	-	27"	1 1/2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	36" x 36"	5"	0.89	3" x 1 1/2" CHANNEL
OVER 60" UP TO 72"	20G	0.2496 (3.12 cm ²)	2" x 3/4"	-	-	24"	2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	42" x 21"	5"	0.81	3" x 1 1/2" CHANNEL
OVER 72" UP TO 84"	20G	0.3312 (4.14 cm ²)	2" x 3/4"	-	-	30"	2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	42" x 42"	5"	1.10	3" x 1 1/2" CHANNEL
OVER 84" UP TO 96"	20G	0.4224 (5.28 cm ²)	2" x 3/4"	-	-	24"	2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	49" x 25"	5"	1.04	3" x 1 1/2" CHANNEL
OVER 96" UP TO 108"	20G	0.5232 (6.54 cm ²)	2" x 3/4"	-	-	24"	2" x 3/4"	ROUNDED SEAM OR PERIPHERAL LOCK (FL. 1-1)	6"	NONE	49" x 49"	3"	1.31	4" x 2" CHANNEL

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The above fabrication sheet is relevant to the Firespray International's Flamebar BW11 Fire Duct fabrication requirements for both ASTM E 2336 and ISO 6944. The table titled *Stability, Integrity and Insulation Rating* is relevant to ISO 6944, which is outside the scope of this evaluation.

3.2. Product and/or Assembly Traceability:

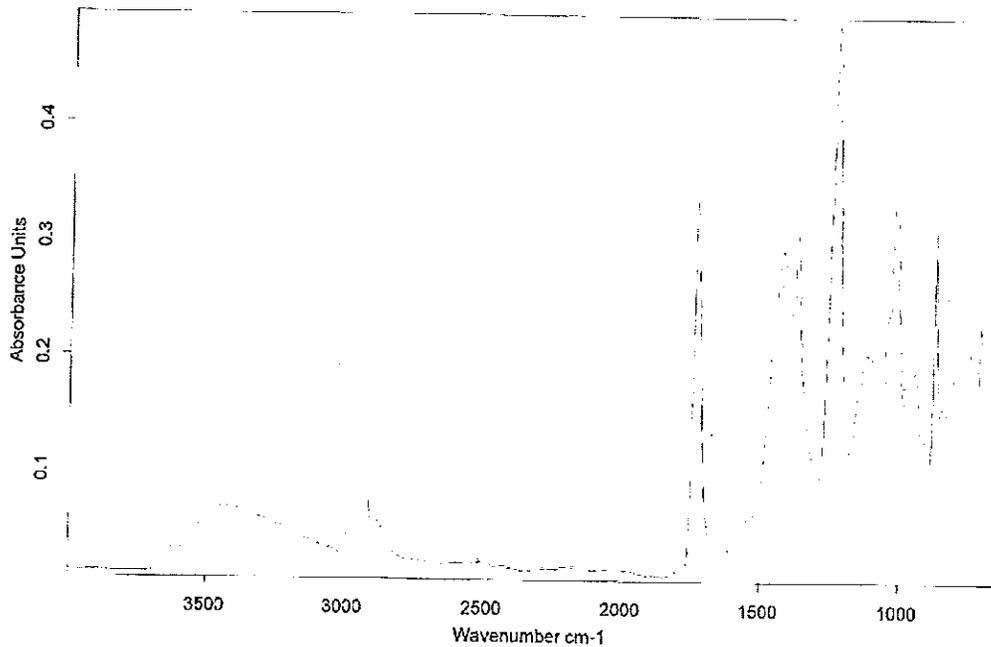
Intertek has used standard traceability and verification methods compliant with the intent relayed in ISO Guide 65 to establish traceability of the tests discussed herein to future production. Intertek has used a verification method to establish a direct link to the test sample and its future production.

3.2.1. Scientific and Analytical Traceability Techniques:

Intertek uses many types of scientific and analytical techniques to ensure product traceability of test samples to the production samples of Intertek certified products. One means that Intertek uses is the Fourier transform infrared (FTIR).

"Fourier transform infrared (FTIR) spectroscopy is a measurement technique for collecting infrared spectra. Instead of recording the amount of energy absorbed when the frequency of the infra-red light is varied (monochromator), the IR light is guided through an interferometer. After passing through the sample, the measured signal is the interferogram. Performing a mathematical Fourier transform on this signal results in a spectrum identical to that from conventional (dispersive) infrared spectroscopy.

FTIR spectrometers are cheaper than conventional spectrometers because building of interferometers is easier than the fabrication of a monochromator. In addition, measurement of a single spectrum is faster for the FTIR technique because the information at all frequencies is collected simultaneously. This allows multiple samples to be collected and averaged together resulting in an improvement in sensitivity. Because of its various advantages, virtually all modern infrared spectrometers are FTIR instruments.^{1"}



C:\Data\Firespray\3114542 Eveready Production Sample - Sample 2	3114542 Eveready Production Sample - Sample 2	ATR Accessory	28/03/2007
C:\Data\Firespray\3114542 Control Sample - Sample 1.0	3114542 Control Sample - Sample 1	ATR Accessory	28/03/2007
C:\Data\Firespray\3114542 Eveready Production Sample - Sample 3	3114542 Eveready Production Sample - Sample 3	ATR Accessory	28/03/2007

1 http://en.wikipedia.org/wiki/Fourier_transform_infrared_spectroscopy#Fourier_transform_infrared_spectroscopy

Intertek has the preceding FTIR scans of the Flamebar BW 11 that is applied to Firespray International's Flamebar BW11 Fire Duct. A sample of the Flamebar BW 11 could be removed from the Flamebar BW11 Fire Duct and compared to the existing scan to ensure traceability to the quality and manufacturing methods in Firespray International's Quality Control Manual. The Flamebar BW11 Fire Duct is extremely simple from a forensic standpoint. The metal thickness, the shape, and dimensions can be measured, documented, and verified using calipers. The Flamebar BW 11 thickness can also be measured, documented, and verified.

3.3. Product and/or Assembly Certification:

The Flamebar BW 11 is a specialty formulated water based compound that contains selected mineral fibers in a low permeability elastomeric binder to a thickness of 0.04 inches to provide a finished product. Flamebar BW 11 is an Intertek certified product under the Quality Control manual (QCM) designated Project Number 3114842SAT007.

The Flamebar BW 11 is located on SpecDIRECT, SPEC ID 16257, "Firespray International Ltd." The Flamebar BW 11 listing report can be accessed as follows:

<http://www.spec-direct.com/Pages/BP/LandingBP.aspx>

After website is loaded, click "Free Access". When the SpecDIRECT "Main Page" appears hold the pointer of the word "Home," which is a dropdown menu. Move the cursor down to "Search" and click it. When the SpecDIRECT "Basic Search" page appears, move the cursor to the dropdown arrow on the right hand side of the "Organization" line. Click it. Then click "Any Organization." Type the name of the company. Do not hit the return key. Move the cursor to the bottom of the page and click "Search." A list of the active certified products will appear. Click the line bearing the name of the certified product that you want to view. Do not hit the return key. Move the cursor to the bottom of the page and click "View." The SpecDIRECT specification for that certified product will appear. To view the Listing, move the cursor to the bottom right hand corner to the dropdown menu and click "Print Report."

When clients are submitting information to ICC Evaluation Service, Inc. (ICC-ES) to obtain an Evaluation Report based on Acceptance Criteria developed by that Authority Having Jurisdiction, Intertek strives to provide a clear understanding of how Intertek decided to certify a product. This understanding may assist ICC-ES in their examination process.

Evaluation reports issued by ICC Evaluation Service, Inc. (ICC-ES) are based upon performance features of the International family of codes and other widely adopted code families, including the Uniform Codes, the BOCA National Codes, and the SBCCI Standard Codes. Section 104.11 of the *International Building Code*® reads as follows:

The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

Similar provisions are contained in the Uniform Codes, the National Codes, and the Standard Codes.

Authorities Having Jurisdiction (AHJ) should be consulted in all cases as to the particular requirements covering the installation and use of Intertek certified products, equipment, systems, devices and

materials. The AHJ should be consulted before construction. Fire resistance assemblies and products are developed by the design submitter and have been investigated by Intertek for compliance with specific requirements. The published information (product and design listings) cannot always address every construction nuance encountered in the field. When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the test standard referenced for each Intertek certified product. The test standard includes specifics concerning alternate materials and alternate methods of construction. Only products which bear Intertek's Mark are considered as certified. The appearance of a company's name or product in Intertek Directory of Listed Building Products does not in itself assure that products so identified have been manufactured under Intertek's Follow-Up Service. Only those products bearing the Intertek Mark should be considered to be Listed and covered under Intertek's Follow-Up Service. Always verify the Mark on the product before using it.

4 Reference Documents

As part of this evaluation, Intertek has directly or indirectly used the following referenced documents:

As part of this evaluation, Intertek has used the following referenced documents:

- Acceptance Criteria for Grease Ducts, Flexible Enclosure Systems, AC101, October 2004, ICC Evaluation Services, Inc.
- American Institute of Steel Construction, *Manual of Steel Construction – Allowable Stress Design*, Ninth Edition
- ANSI/ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*
- ANSI/ASTM E 814, *Standard Test Method for Fire Tests of Through-Penetration Fire Stops*
- ASTM E 2336, *Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems*
- ASTM STP 1163, *Fire Standards in the International Marketplace*
- Client File - Firespray International Limited
- Client File – Unifrax I LLC
- Egan, M. D., *Concepts in Building Fire Safety*, 1978.
- Harmathy T.Z., *Ten Rules of Fire Endurance Ratings*, May 1965 Edition of Fire Technology (35)
- ICC ES (AC101) *Grease Duct Enclosure Assemblies*
- ICC ES (AC179) *Metallic HVAC Duct Enclosure Assemblies*
- ISO 6944 *FIRE RESISTANCE TESTS - VENTILATION DUCTS*
- ISO/TR 12470 Fire resistance tests — Guidance on the application and extension of results.
- Lie, T. T., *Fire and Buildings*, Applied Science Publishers, Ltd., 1972.
- *Intertek Directory of Listed Building Products, Materials and Assemblies* (online)
- Quintiere, J., "The Spread of Fire from a Compartment," *ASTM STP 685*, E. E. Smith and T. Z. Harmathy, Eds., ASTM International, West Conshohocken, PA 1978, pp. 139–168.
- TECHNICAL REPORT ISO/TR 12470 First edition 1998-07-15 Fire resistance tests — Guidance on the application and extension of results
- The 2003 International Building Code®
- The SFPE Handbook of Fire Protection Engineering, 2nd Edition
- UL 1479 Fire Tests of Through-Penetration Firestops
- UL 1978 Standard for Grease Ducts (February 16, 1996)
- UL 2221 Standard for Fire Endurance Performance of Grease Duct Enclosure Assemblies, First Edition

5 Evaluation Method

Evaluate Firespray International's Flamebar BW11 Fire Duct with Steel Angles or Ductmate Flanges for Product Certification to ASTM E2336

This evaluation is being conducted solely for the above italicized referenced project or use or both. Due to the variables that exist from project to project and the fact that each evaluation requires review of the most current existing data and information, this evaluation is not to be used as justification for any other opinion nor used for any other project, without the express written consent of Intertek. This report should serve as Intertek's opinion regarding the use of the certified product in the conditions described herein. The materials used on the project, which are applied in compliance with Intertek Design Listings, must bear the Intertek listing mark. All certified products must be installed in accordance with the details contained in Intertek's *Directory of Listed Building Products*.

5.1. General:

A substantial amount of testing has been conducted on the Flamebar BW11 Fire Duct and Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation. This evaluation is a summary of the tests conducted and the results of those assessments. The projects referenced herein are contained in Intertek files for Firespray International Limited and Unifrax I LLC. Unifrax I LLC has allowed the use of their test data to Firespray International Limited under the condition that the actual test reports are not revealed to Firespray International Limited.

5.2. ASTM E 2336:

ASTM E 2336 is composed of five tests that either the tested Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation or the Unifrax Max 2.0 Insulation alone.

ASTM E 2336, Section 16, <i>Conditions of Compliance</i>			
Test Type	Test Standard	Product	Source of Compliance Data
Non-Combustibility	ASTM E136	Unifrax Max 2.0 Insulation	UL Project R14514/00NK24556 and Intertek Project 3152560SAT-005
Fire Resistance	ASTM E119	Unifrax Max 2.0 Insulation	Intertek Projects #16201-106568 and 3152560SAT-005
Durability	ASTM C518	Unifrax Max 2.0 Insulation	UL Project R14514/00NK24556 and Intertek Project 3152560SAT-005
Internal Fire	ASTM E2336	Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation	Intertek Projects 3152560SAT023, 3152560SAT025, 3152560SAT026, 3173568SAT006, 3198017SAT003, 3198017SAT013, 3198017SAT017
Fire-Engulfment	ASTM E2336 & ASTM E814	Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation	Intertek Project 3152560SAT-014

The above summary table of various tests and evaluations confirms that the Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation complies with Section 16 Conditions of Compliance of ASTM E 2336.

5.3. UL1978:

As previously stated, there are no additional conditions of compliance for ASTM E 2336 other than those stated above. However, the Flamebar BW11 Fire Duct is *constructed of steel less than 0.055 inch (1.4 mm) (No. 16 Gage) in thickness or stainless steel less than 0.044 inch (1.1 mm) (No. 18 Gage) in thickness*. The Flamebar BW11 Fire Duct is a 20 GA galvanized steel construction. The Flamebar BW11 Fire Duct was subjected to the following mechanical and leakage tests in accordance with UL 1978.

UL 1978 has many sections related to various aspects of grease ducts. In order to ensure that each appropriate test section is addressed the following list is provided. N/T abbreviation stands for not a testing requirement.

- 1 Scope – N/T
- 2 Components – N/T
- 3 Units of Measurement – N/T
- 4 Undated References – N/T
- 5 Terminology – N/T
- 6 Glossary – N/T
- 7 Materials – Refer to Explanation
- UL1978 Section 7.3 requires that the, "Parts of a grease duct or conduit subject to contact by grease laden vapors shall be of stainless steel or porcelain-coated steel of the minimum thickness specified in Table 7.1." UL1978 Section 7.3 even requires a 16 GA steel duct to have a porcelain coating: yet the code does not. The Flamebar BW11 Fire Resistant Ductwork (Grease Duct) steel (0.040-inches) is twice as thick as the 0.018 inch thick requirement for galvanized steel usage required by UL1978 Table 7.1 Minimum Thickness of Sheet Metal. Therefore, the manufacturer does not apply porcelain enamel. The codes referenced in UL1978 do not require steel to be coated with porcelain. Intertek recommends that the Authority Having Jurisdiction (AHJ) evaluate the importance of the porcelain enamel when the galvanized steel is almost twice as thick as the required UL1978 steel thickness.*
- 8 Assembly – N/T
- 9 Joints – N/T
- 10 Support Assembly – N/T
- 11 General – N/T
- 12 Test Installations – N/T
- 13 Temperature Measurement – N/T
- 14 Temperature Test – 500°F (260°C) Flue Gases – Tested to ASTM E2336
- 15 Abnormal Temperature Test – Tested to ASTM E2336
- 16 Leakage Test
- 17 Vertical Support Test
- 18 Strength Tests
 - 18.1 General
 - 18.2 Impact test
 - 18.3 Longitudinal force test
 - 18.4 Load test for grease duct elbows
 - 18.5 Grease duct joint load test
 - 18.6 Grease duct joint torsion test
- 19 Fire And Leakage Test Of Grease Duct Access Doors and Fittings
- 20 Pressure Tests For Fittings Exposed To Fire Extinguishing System Pressure – Refer to Explanation
Not part of the Firespray BW 11 Grease Duct Assembly
- 21 Tensile Strength, Elongation, And Change In Volume Tests Of Gaskets And Seals
 - 21.1 General
 - 21.2 Tensile strength and ultimate elongation tests
 - 21.3 Volume change test
- 22 General – N/T
- 23 Installation Instructions – N/T

5.3.1.UL1978: Mechanical and Leakage Tests:

The following table provides the test results and evaluation of tests conducted in accordance with UL 1978 under Intertek Projects 3173568SAT003, 3193675SAT001 and 3193675SAT004.

UL1978 Section	Requirement	Result
16 Leakage Test	No leakage or flame through or around joints	Passed
17 Vertical Support Test	4 times load of heaviest grease duct: 1683.2 lbs (763.5 kg).	Passed: Vertical support sustained almost twice the requirement: 3187.9 lbs (1446 kg)
18 Strength Tests – 18.1 General	Refer to Subsections for Tests	Passed All Subsections
18 Strength Tests – 18.2 Impact test	Impact at joint and impact at mid span, rotated and impacted at locations again	Passed: No damage to joint or wall section
18 Strength Tests – 18.3 Longitudinal force test	Sustain a longitudinal force of 100 pounds (445 N) for 5 minutes	Passed: Sustained 1697.6 lbs (7554.3 N) load for over 5 minutes, exceeded requirement by an approximate factor of safety of 16.9
18 Strength Tests – 18.4 Load test for grease duct elbows	4 times load of longest supported section: 841.4 lbs (381.7 kg).	Passed: Sustained 1113.3 lbs (505 kg) load for over 5 minutes, exceeded requirement by an approximate factor of safety of 1.3
18 Strength Tests – 18.5 Grease duct joint load test	4 times load of longest section between supports: 775.6 lbs (351.8 kg).	Passed: Sustained 2414.0 lbs (1095 kg) for over 5 minutes, exceeded requirement by an approximate factor of safety of 2.8
18 Strength Tests – 18.6 Grease duct joint torsion test	Cleaning brush sized to grease duct, inserted to mid span, turned 10 times to simulate cleaning methods	Passed: Exceeded 10 turns, push/pulls at mid span and also applied test at joint
19 Fire & Leakage Test of Grease Duct Access Doors and Fittings	No leakage or flame through or around joints	Passed: Tested both field fabricated access door and factory fabricated access door

5.3.2.UL1978: Gasket Tests:

The Flamebar HD SCN Gaskets are made of closed cell foam with pressure sensitive tape measuring 15 mm wide x 6 mm thick uncompressed (0.59 x 0.24 inches) were assessed under Intertek Project 3173568SAT003.

21 Tensile Strength, Elongation, & Change in Volume Tests of Gaskets & seals	No deterioration such as cracking, hardening, softening, melting, or damage	Passed: 21.2.2 the complete part used because tensile and elongation of the part using dumbbell specimens in 21.2.1 not practical
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5.3.3.UL1978: Performance Criteria:

UL1978 Section 11.3 requires that after the Firespray BW 11 Grease Duct Assembly is subjected to the following tests:

- 14 Temperature Test – 500°F (260°C) Flue Gases
- 15 Abnormal Temperature Test
- 16 Leakage Test
- 17 Vertical Support Test
- 18 Strength Tests
- 18.1 General
- 18.2 Impact test

- 18.3 Longitudinal force test
- 18.4 Load test for grease duct elbows
- 18.5 Grease duct joint load test
- 18.6 Grease duct joint torsion test
- 19 Fire And Leakage Test Of Grease Duct Access Doors and Fittings
- 20 Pressure Tests For Fittings Exposed To Fire Extinguishing System Pressure
- 21 Tensile Strength, Elongation, And Change In Volume Tests Of Gaskets And Seals
- 21.1 General
- 21.2 Tensile strength and ultimate elongation tests
- 21.3 Volume change test

UL1978 Section 11.3 requires that after the Firespray BW 11 Grease Duct Assembly is subjected to the above tests that the grease duct assembly complies with the following:

- "a) No part of the grease duct or grease duct assembly shall be damaged such that it will not continue to function as intended;
 Exception: Distortion of the grease duct that does not impair its function or its structural integrity (such as rupture, broken welds, etc.) shall be determined as acceptable for future use.
- b) The effectiveness of any required protective coating or finish on metal parts shall not be reduced;
- c) A ceramic material shall not show evidence of cracking, disintegration, or spalling such that serviceability of any part of an assembly is impaired;
- d) Cracks shall not be observable in porcelain enamel used as a required protective coating when the surface is examined under a microscope of 60 magnification;
- e) The reflectivity of a surface shall not be impaired if the reflectivity is utilized to reduce the risk of fire;
- f) Burning or scaling of metal parts shall not be evident upon visual observation; and
 Exception: Scaling of grease duct inner casing material that does not impair the function or structural integrity (such as a rupture or broken welds) of the grease duct is acceptable after the Abnormal Temperature Test, Section 15.
- g) The effectiveness of insulating material shall not be reduced."

Refer to the following table for a summary of the above UL 1978 performance requirements: a through g. The Firespray BW 11 Grease Duct Assembly was evaluated under the more severe fire exposure conditions of ASTM E 2336 instead of the UL 1978, Sections 14 and 15. The Firespray BW 11 Grease Duct Assembly does not employ porcelain enamel or surface reflectivity to reduce the risk of fire. Therefore, the subsections d and e are not applicable (N/A). Section 21 is based on the performance of the gaskets: Flamebar HD SCN Gaskets, which are made of closed cell foam with pressure sensitive tape measuring 15 mm wide x 6 mm thick uncompressed (0.59 x 0.24 inches). Therefore, the subsections a through g are not applicable (N/A) to any of the requirements. Note: Subsections, a through g, do not discuss performance of closed cell foam gaskets.

Table of Compliance Based on UL1978, Section 11.3							
UL1978 Section	UL1978 Section 11.3 Conditions						
	a	b	c	d	e	f	g
14 Temperature Test – 500°F (260°C) Flue Gases (ASTM E 2336 Exposure)	Pass	Pass	Pass	N/A	N/A	Pass	Pass
15 Abnormal Temperature Test (ASTM E 2336 Exposure)	Pass	Pass	Pass	N/A	N/A	Pass	Pass
16 Leakage Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
17 Vertical Support Test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.1 General	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.2 Impact test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.3 Longitudinal force test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.4 Load test for grease duct elbows	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.5 Grease duct joint load test	Pass	Pass	Pass	N/A	N/A	Pass	Pass
18 Strength Tests – 18.6 Grease duct joint torsion test	Pass	Pass	Pass	N/A	N/A	Pass	Pass

19 Fire And Leakage Test Of Grease Duct Access Doors and Fittings	Pass	Pass	Pass	N/A	N/A	Pass	Pass
20 Pressure Tests For Fittings Exposed To Fire Extinguishing System Pressure	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation, And Change In Volume Tests Of Gaskets And Seal – 21.1 General	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation, And Change In Volume Tests Of Gaskets And Seal – 21.2 Tensile strength and ultimate elongation tests	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21 Tensile Strength, Elongation, And Change In Volume Tests Of Gaskets And Seal – 21.3 Volume change test	N/A	N/A	N/A	N/A	N/A	N/A	N/A

6 Conclusion

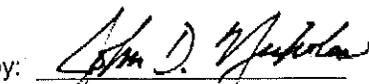
Intertek is conducting an engineering evaluation, for Firespray International Limited., on Flamebar BW11 Fire Duct, with steel angle flanges or Ductmate flanges to evaluate fire resistance. The evaluation is being conducted to determine if the tested Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation will maintain compliance or show equivalency with: *ANSI/ASTM E 2336-04 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems* and the mechanical and leakage requirements of UL 1978 *GREASE DUCTS*, Third Edition January 21, 2005.

Based on the information contained and referenced herein, it is Intertek's professional judgment based on sound engineering principles that the following is true:

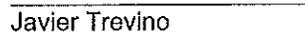
- The Flamebar BW11 Fire Duct protected with Unifrax Max 2.0 Insulation tested under the Intertek and UL Projects referenced herein will maintain compliance or show equivalency with: *ANSI/ASTM E 2336-04 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems*.
- The Flamebar BW11 Fire Duct tested under the Intertek Projects referenced herein maintain compliance or show equivalency with the mechanical and leakage requirements of *UL Standard for Safety for Grease Ducts*, UL 1978 Third Edition, Dated January 21, 2005.
- The Firespray BW 11 Grease Duct Assembly Protected with the applicable layer(s) with Unifrax Max 2.0 Insulation has been evaluated and shows equivalency with *UL Standard for Safety for Grease Ducts*, UL 1978 Third Edition, Dated January 21, 2005, except for the porcelain-coating referenced in Section 7.3, which may not be necessary taking into consideration the increased thickness of the galvanized sheet steel used.
- Appendix A – FyreWrap® Elite™ Duct Insulation (1-1/2-inch, 6-pcf density material) when applied to the Firespray International Limited's Flamebar BW11 Fire Duct will maintain compliance or show equivalency with: *ANSI/ASTM E 2336-04 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems*.
- Appendix B – The Flamebar BW11 sample (FTIR scan) tested under Intertek Project Number 3193675SAT004 as part of the Flamebar BW11 Fire Duct under Intertek Project Number 3193675SAT003 matches the original tested sample (FTIR scan).

INTERTEK

Reported by:


John D. Nicholas
Project Manager and Staff Engineer

Reviewed by:


Javier Trevino
Chief Engineer Fire Safety and Performance

7 APPENDIX A – FyreWrap® Elite™ 1.5 Duct Insulation

The test reports and evaluation projects are the property of Unifrax I LLC. Unifrax granted Intertek permission to use this information as part of the Firespray International Limited approval process with the understanding that the proprietary information or the actual test reports and evaluations are not released to Firespray International Limited.

Intertek Project Numbers 3153948-1 and 3153948-2 were completed on June 18 and June 19, 2008, respectively. The objective of these fire tests was to do side by side comparisons of the temperature transfer through the 2-inch, 8-pcf density, FyreWrap® MAX 2.0 Duct Insulation versus the 1.5-inch, 6-pcf density FyreWrap® Elite™ Duct Insulation. The assessment was conducted using ASTM E119-08a, *Fire Tests of Building Construction and Materials*, as the basis for the conduct of the fire test. The evaluation of the fire test data and the other requirements to comply with ASTM E 2336 was conducted under Intertek Project Numbers 3153948SAT-017 Rev. 1.

Two 10-foot x 10-foot walls were constructed in Intertek laboratory's test frame, using 20 GA, 3-5/8 X 1-1/4 inch steel studs spaced 30 inches on center. Panels of 16 GA sheet steel were stitch welded to the steel studs. A vertical joint was located over the center steel stud. On June 18 and 19, representatives from Unifrax I LLC installed 6-inch, 12 GA steel pins to the sheet steel side of the test assemblies, onto which the Unifrax personnel installed the FyreWrap® MAX 2.0 Duct Insulation and FyreWrap® Elite™ Duct Insulation to be tested. Two layers of the FyreWrap® MAX 2.0 Duct Insulation and FyreWrap® Elite™ Duct Insulation were installed in the same manner, the first layer running horizontally and the second layer running vertically. Both layers were secured to the steel pins using square 12 GA speed clips. The FyreWrap® MAX 2.0 Duct Insulation (2-inch, 8-pcf density material) was applied to the left half of the test assemblies while the FyreWrap® Elite™ Duct Insulation (1-1/2-inch, 6-pcf density material) was applied to the right halves. Six ASTM E 119 thermocouples were attached to the unexposed surface, with unexposed thermocouple numbers 1, 2, and 3 on the FyreWrap® Elite™ Duct Insulation and unexposed thermocouple numbers 4, 5 and 6 on the FyreWrap® MAX 2.0 Duct Insulation. The insulated surface was exposed to the fire during Intertek Project Number 3153948-1 and the un-insulated surface exposed during Intertek Project Numbers 3153948-2.

Intertek Project Number 3153948-1 was initiated at 4:10 pm on Wednesday, June 18th exposing the test assembly to the ASTM E 119 time temperature curve and ran for 121 minutes with the insulation facing the fire (the exposed side). At the end of the test, the unexposed thermocouples over the FyreWrap® Elite™ Duct Insulation (TCs #1 - 3) all registered lower temperatures than those on the FyreWrap® MAX 2.0 Duct Insulation (TCs #4 - 6).

Intertek Project Number 3153948-2 was initiated at 1:58 pm on Thursday, June 19th exposing the test assembly to the ASTM E 119 time temperature curve and, again, ran for 121 minutes, this time with the metal sheet on the exposed side. At the end of the test, the thermocouples over the FyreWrap® Elite™ Duct Insulation (TCs #1 - 3) all registered lower temperatures than those on the FyreWrap® MAX 2.0 Duct Insulation (TCs #4 - 6).

Verification testing confirmed that the FyreWrap® Elite™ Duct Insulation uses same chemistry core insulation material and same scrim covering material as the FyreWrap® MAX 2.0 duct insulation. Therefore, the existing small scale property testing to comply with ASTM E 2336 (ASTM E 136 and ASTM C 518) can be used for the FyreWrap® Elite™ Duct Insulation.

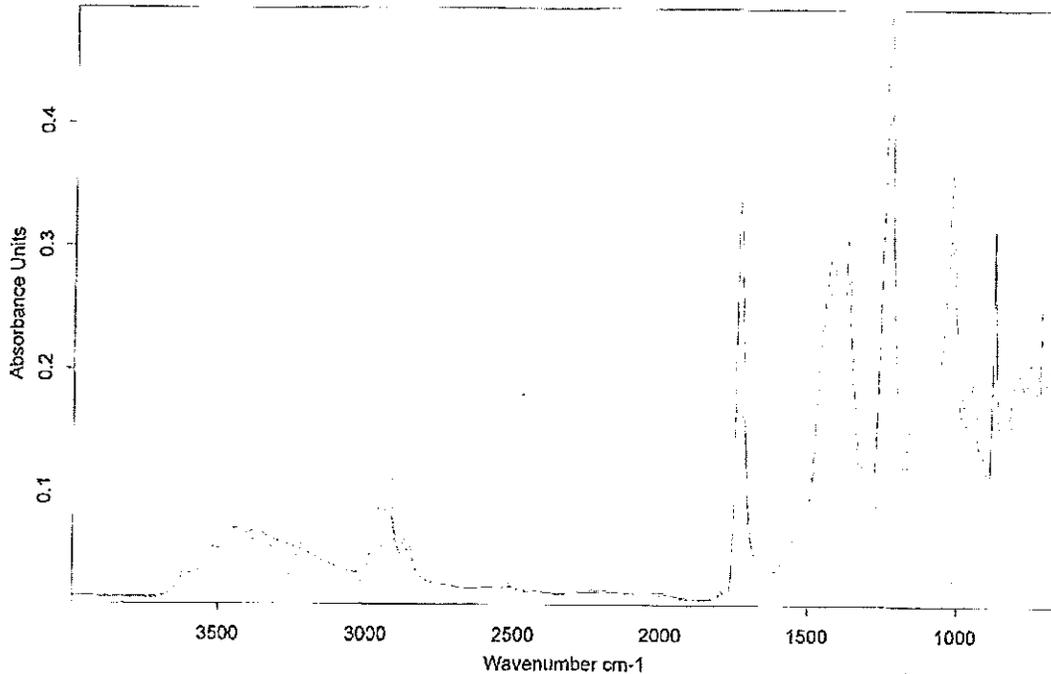
Based on the tests and evaluation referenced herein, the FyreWrap® Elite™ Duct Insulation (1-1/2-inch, 6-pcf density material) performed equal to or better than the FyreWrap® MAX 2.0 Duct Insulation (2-inch, 8-pcf density material) and will comply with ASTM E 2336 when applied to the Firespray International Limited's Flamebar BW11 Fire Duct.

8 APPENDIX B – Verification Test: 3198017SAT004

Intertek uses many types of scientific and analytical techniques to ensure product traceability of test samples to the production samples of Intertek certified products. One means that Intertek uses is the Fourier transform infrared (FTIR).

"Fourier transform infrared (FTIR) spectroscopy is a measurement technique for collecting infrared spectra. Instead of recording the amount of energy absorbed when the frequency of the infra-red light is varied (monochromator), the IR light is guided through an interferometer. After passing through the sample, the measured signal is the interferogram. Performing a mathematical Fourier transform on this signal results in a spectrum identical to that from conventional (dispersive) infrared spectroscopy.

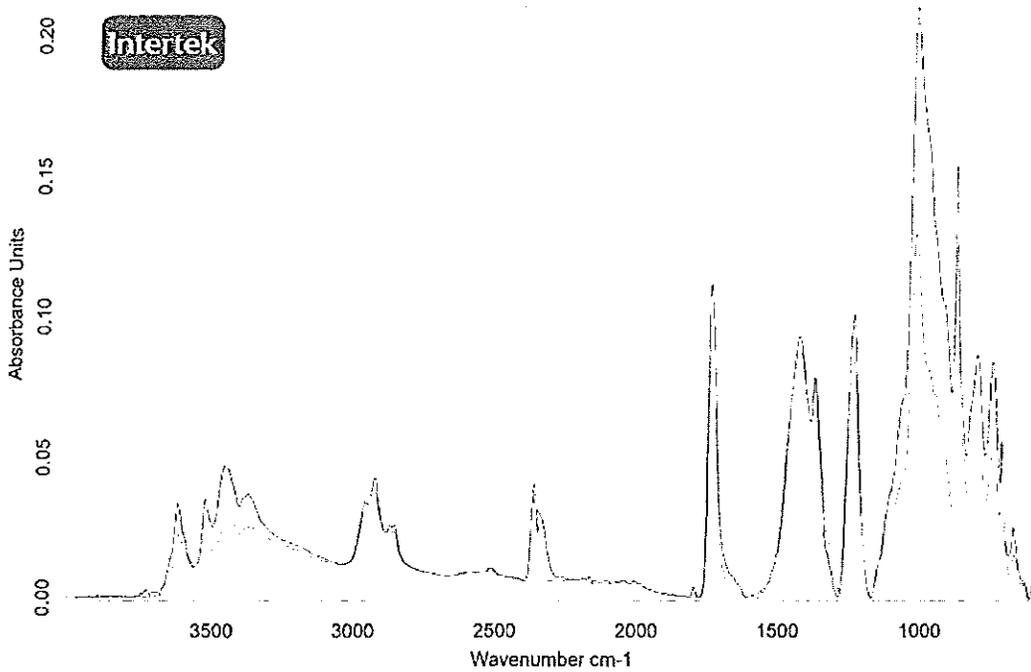
FTIR spectrometers are cheaper than conventional spectrometers because building of interferometers is easier than the fabrication of a monochromator. In addition, measurement of a single spectrum is faster for the FTIR technique because the information at all frequencies is collected simultaneously. This allows multiple samples to be collected and averaged together resulting in an improvement in sensitivity. Because of its various advantages, virtually all modern infrared spectrometers are FTIR instruments.²"



C:\Data\Firespray\3114542 Eval'd Production Sample - Sample 2.1	3114542 Eval'd Production Sample - Sample 2	ATR Accessory	25/03/2007
C:\Data\Firespray\3114542 Control Sample - Sample 1.0	3114542 Control Sample - Sample 1	ATR Accessory	22/03/2007
C:\Data\Firespray\3114542 Eval'd Witnessed Mx Sample - Sample 2.0	3114542 Eval'd Witnessed Mx Sample - Sample 2	ATR Accessory	22/03/2007

Intertek has FTIR scans of the Flamebar BW 11 that is applied to Firespray International's Flamebar BW11 Fire Duct under Intertek Project Number 3113842 referenced above. These FTIR scans are from the original qualifying material described in Firespray International's Quality Control Manual.

² http://en.wikipedia.org/wiki/Fourier_transform_infrared_spectroscopy#Fourier_transform_infrared_spectroscopy



3198017 Firespray International BW11 sampled 12 21 09 scanned 3 5 2010	05/03/2010
Firespray_3152560_Internal.fire.tests_1.6.09_2	13/03/2009

A sample of the Flamebar BW 11 was removed from the Flamebar BW11 Fire Duct under Intertek Project Number 3198017SAT004. This FTIR scan was compared to the existing scan (Intertek Project Number 3113842) to ensure traceability to the quality and manufacturing methods in Firespray International's Quality Control Manual. This FTIR scan was also compared to the last FTIR scan from a sample on Intertek Project Number 3152560, which according to the Intertek chemists at the Verification Center also matched.

The Flamebar BW11 Fire Duct is extremely simple from a forensic standpoint. The metal thickness, the shape, and dimensions were verified using calipers. The Flamebar BW 11 thickness was also verified.

9 LAST PAGE & REVISION SUMMARY

DATE	SUMMARY
May 14, 2010	Original
May 29, 2010	Added Appendix A and Appendix B Added two additional Conclusions based on Appendix A and Appendix B

PROJECTS: NORTH AMERICA

United States of America

California

University of California—Irvine
The Presidio – San Francisco
Letterman Digital Arts Center

Florida

Marlin Stadium
Miami Dade College, Culinary Arts
Aversana, Naples
Maraina Blue, Miami
Navona, Fort Myers
Hampton's, Aventura
Oceanside, Pompano
Sands, Key Biscayne
Madeira, Marco Island
Sunny Isle City Hall
Orchid Beach, Deerfield
One Bal Harbour Resort
Plaza on Brickell, Aventura
55 Miracle Mile, Coral Gables
Capri & Q Club, Fort Lauderdale
Design Company of the Americas
Ocean Tower II, Key Biscayne
Palazzo Del Mare, Fisher Island
Biscayne Landings 1 & 2, Miami
NSU Performing & Visual Arts, Davie
Esplanade Grand, West Palm Beach
Culinary Arts, Miami Dade College
Trump Tower Sunny Isles I, II, III
US Federal Courthouse
Sarasota Hospital
Trump Tower Ft Lauderdale
Orlando Fire Station #12

Georgia

Therrel High School
Savannah Airport

Illinois

St Anthony's Hospital
353 Clark Building, Chicago

British Columbia, Canada

BC Cancer Research Center
Telus William Ferrell Bldg
UBC Museum of Anthropology
Simon Fraser University

Massachusetts

MIT
North Point
Lahey Clinic
One First Street
McCallan Building
Childrens Hospital
Harvard University
Broad Institute (MIT)
Museum of Fine Arts
Convention Center Hotel
Boston University, Metcalf Hall
Harvard College, Hamilton Hall

Michigan

Lemmen Holton Cancer Center

New York

GE World Research

Texas

Discovery Tower
Houston Pavilion Mall
Galveston National Lab
Mission Baptist Hospital
Texas Children's Hospital
National Cardiovascular Ptn's
American First National Bank
Energy Center Office Building, I & II
Methodist Hospital Research Institute

Tennessee

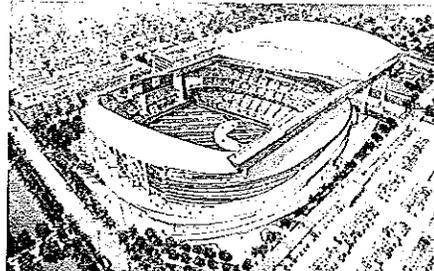
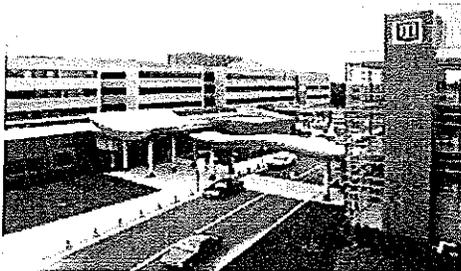
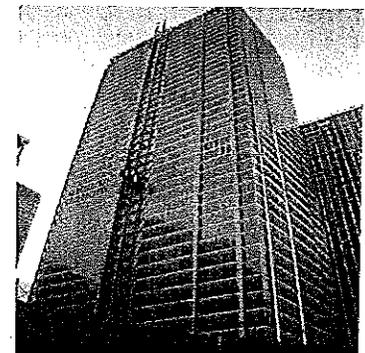
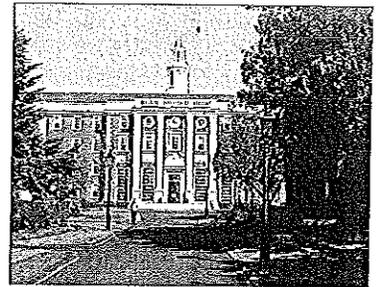
Asurion Laboratories

Wisconsin

Harley Davidson
Vernon Hospital
Crowne Plaza Hotel
St Luke's Medical Centre
CUNA—Mutual Group Insurance
St Clare Meadows Nursing Home
University of Wisconsin; Madison
St Mary's Catholic Center High School

Ontario, Canada

Credit Valley Hospital
Montfort Hospital



INTERNATIONAL PROJECTS

Middle East

Dubai

Burj Al Arab 7* Hotel (tallest in world)
Burj Tower (tallest building in world)
Burj View Lake Hotel
Sheik Hamdan Award Centre
Festival City Shopping Mall
DIFC Towers (6 buildings)
Raffles Hotel & Wafi Mall
Al Hambra Village Shopping Mall
Movenpick Hotel, Spa & Oceana Residence
Emirates Flight Catering & Crew Training Facilities

Abu Dhabi

Snow Dome
Marine Mall
Twin Towers
Al Jimi Hypermarket
Sheikh Bin Bultti Building
National Exhibition Centre
International Shopping Centre

Sharjah

Mega Mall
Sharjah University
Shop in Mall of Emirates

Brunei

Parliament House
Islamic Bank of Brunei
Brunei International Airport
University of Brunei (Darussalam)

Bahrain

Financial Harbour
World Trade Centre
Bahrain International Airport

Muscat

Muscat Retail Park
Water Purification Plant

Saudi Arabia

King Fhad's University

Kuwait

Kharafi Residential Centre

Oman

City Centre Mall Expansion
Barr Al Jissa Village Hotel
Shangri-La Hotel & Resort

Qatar

Kharama Sub Station
Commercial Bank Plaza
Ceremonial Court & Tower
Qatar Insurance Building
The Pearl Project
Sports Tower, Asian Games
West Bank Residential Tower
Al Reem, Silhouette, Al Wosail, Al Fardan & Al Misnad Towers

Lebanon

Singapore Recreation Club
American University, Beirut
St Andrew's Mission Hospital

Far East

Singapore

Central Mall
IKEA, Tampines
Bugis Junction
Ngee Ann City Mall
Kallang Leisure Park
Sijori Resort, Sentosa
Nanyang Tech University
Starville Condominium
Cuppaga Plaza (refurb)
Singapore Airlines HQ
Tang Tock Seng Hospital
Botanic Garden Herbarium
Majestic Hotel, Bukit Pasoh
Military Complex Jalan Gall Batu
Swissotel Merchant Court Hotel
Robertson Walk Condominium
Haw Par Villa Annex Museum

Thailand

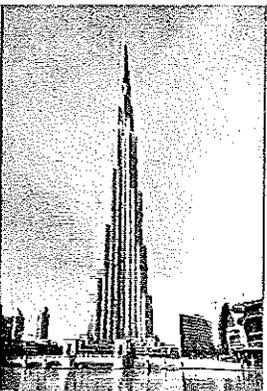
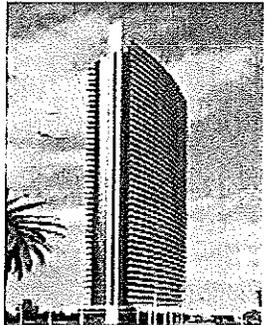
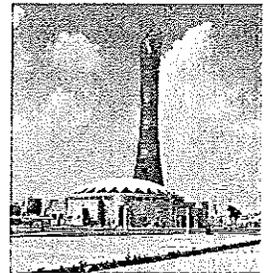
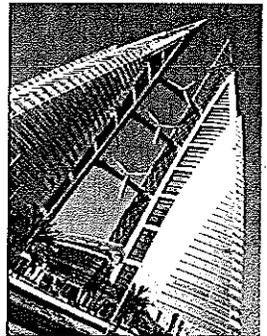
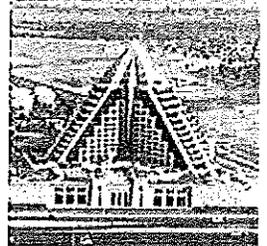
Bank of Thailand
Hyatt Erawan Hotel
King Power Complex
Holiday Inn Silom Hotel
Dusit Thani College, Bangkok
Impact Challenger Convention Centre (largest in world)

Malaysia

Aquaria
Bank Negara
Shangri-la & Traders Hotels
KLCC Convention Centre
Sungai Buloh Hospital (largest in Far East)
Ericsson HQ, Cyberjaya
Syariah Court, Putrajaya
Palace of Justice, Putrajaya
Central Bank Printing Facility
Mid Valley Shopping Centre (largest in SE Asia)
Kuala Lumpur International Airport (main terminal, satellite building & contact pier)
Menara Maxis, Jalan Ampang
Ministry of Finance Building
Ampang Tower Office Building
Menara Landmark (shopping mall)
La Grand Condo, Mont Kiara

Macau

Sands Casino
Wynn Resorts Casino
Holiday Inn (Resort & Casino)
Taipai Hotel (Resort & Casino)
Venetian Macau Casino
Galaxy Starworld (Hotel & Casino)



UK PROJECTS

Commercial Buildings

Bankside
Telstar House
Regent's Place
Bishop's Square
RTI & Cabot Hall
Ropemaker Place
The Grange Hotel
Watermark Place
No.1 Mill Harbour
New Street Square
200 Aldgate Street
20 Gresham Street
120 & 150 Cheapside
16-18 Finsbury Circus
20 Gracechurch Street
60 Threadneedle Street
11 New Cavendish Street
Swiss Re (30 St Mary Axe)
Esso Glenn Buildings 1 & 2

Shopping Complexes

Tesco (Various)
Bluewater (Kent)
Harrods (London)
White City (London)
Marks & Spencer (Various)
The Lowry Centre (Salford)
The Bull Ring (Birmingham)
Festival Place (Basingstoke)

Government Buildings

The House of Lords
The House of Commons
The Department of Transport
Guildhall North Block/Library
The Department of Trade & Industry

Pharmaceutical Centres

Pfizer Headquarters (Sandwich)
Smithkline Beecham HQ
& Research Centre (Harlow)
Glaxo Wellcome Medicines Research
(5 centres)

Hospitals

Guys Hospital
Barnet Hospital
Romford Hospital
Hallamshire Hospital
Leeds General Infirmary
University College London Hospital
Great Ormond Street Children's Hospital

Sports Complexes

Twickenham Stadium
Arsenal Football Stadium
Chelsea Football Stadium
West Ham United Football Stadium
Tottenham Hotspur Football Stadium

Airports

Manchester Airport
Gatwick—South Terminal
Stansted Arrivals Extension
Heathrow Terminals 1-5 & World Cargo Centre

Rail

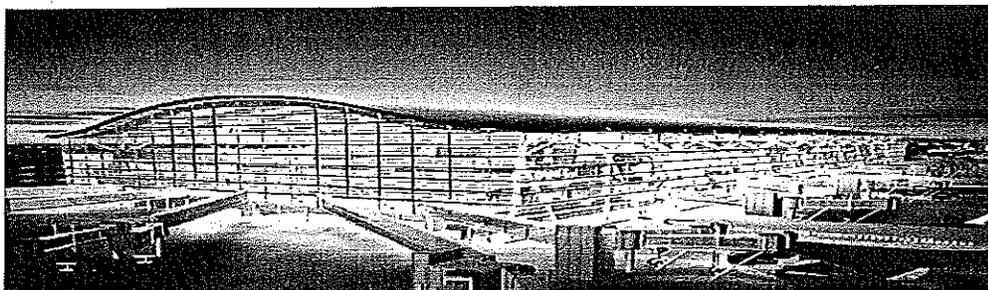
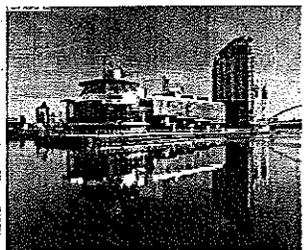
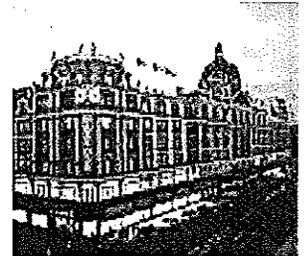
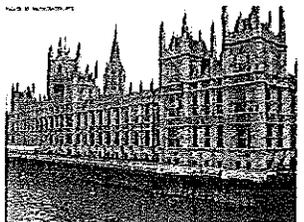
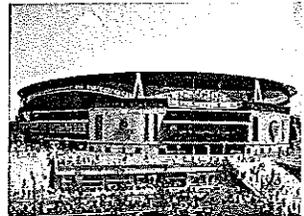
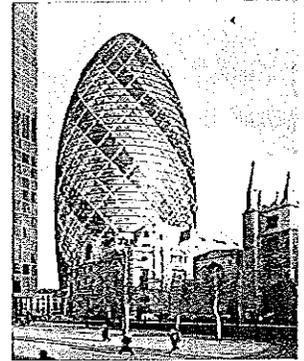
St Pancras Station
King's Cross NTH
Paddington Central

Entertainment

Royal Albert Hall
Royal Court Theatre
Tate Modern Art Gallery
BBC White City & Broadcasting House
The Royal Opera House (Covent Garden)

Canary Wharf

HQ2
BP1 & 2
DS3 East & West
HSBS Building

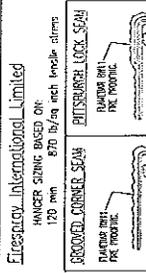


FIRE DUCT
2 HR FIRE ENDURANCE
TO ASTM E-2336-04

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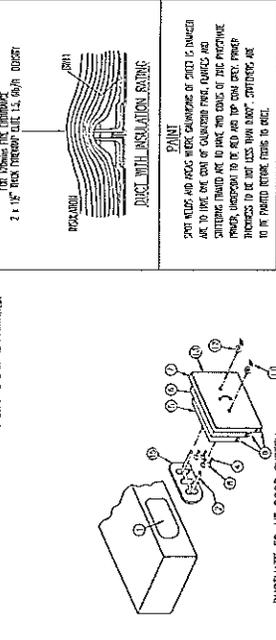
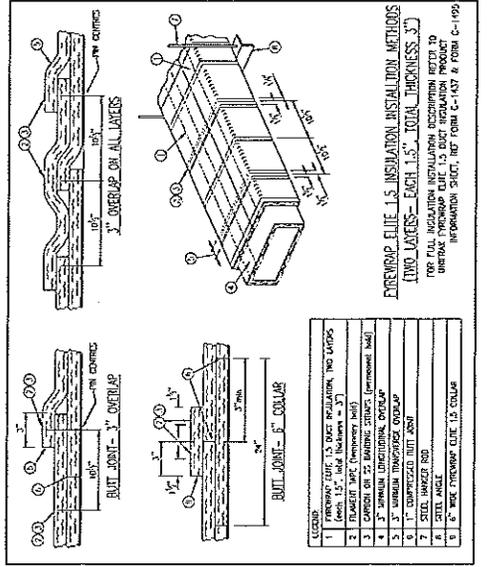
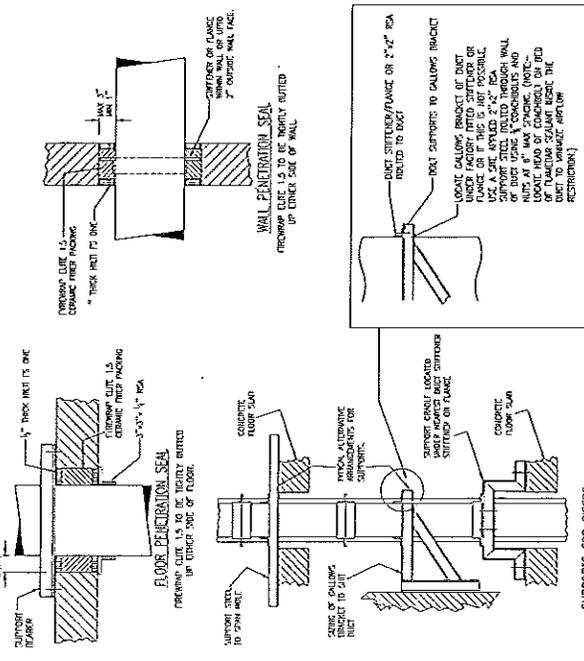
FLAMEBAR BW11 KITCHEN GREASE DUCT - UP TO 2 HOURS FIRE ENDURANCE RATING TESTED & EVALUATED TO ASTM E-2336-04 AND UL 1978

RECTANGULAR DUCTWORK SPECIFICATION BASED ON S.M.A.C.A. H.V.C.A. DUCT CONSTRUCTION STD. 3rd EDITION. FOR UP TO 6" WATER GAUGE STATIC
 POSITIVE OR NEGATIVE DUCT CONSTRUCTION FROM G60 COATED GALVANISED STEEL OF LOCKFORMING GRADE TO ASTM TO A924.
 COATED WITH BETWEEN 0.03" AND 0.04" OF BW11.



LONGEST SIDE	GAUGE	LENGTH	STD FLANGE STRAIGHT		INTERMEDIATE REINFORCEMENT			LONGITUDINAL JOINTS			RADIUS BENDS		HORIZONTAL DUCT 50" BEARER CENTRES			STABILITY, INTEGRITY AND INSULATION RATING
			DUCT/FLANGE	FLANGE FITTING TO DUCT	MAXIMUM SPACING	REIN. CODE	FIXING	CORNER	SHEET	THROAT RADIUS	No. OF SPITTERS	MAXIMUM SIZE	HANGER SIZE	BEARER MEMBER	SIZE	
UP TO 19"	20G	60"	DM25	RIBET OR SPUNWELD @ 6" CRS MAX	-	-	-	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	19" x 10"	3/8"	3" x 3 1/4" RSA	FIG. L-1 FLAMEBAR GASKET		
OVER 19" UP TO 24"	20G	48"	DM25	RIBET OR SPUNWELD @ 6" CRS MAX	-	-	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	19" x 19"	3/8"	3" x 3 1/4" RSA				
OVER 24" UP TO 36"	20G	60"	DM35	RIBET OR SPUNWELD @ 6" CRS MAX	1 1/4" x 1/2"	F	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	24" x 12"	3/8"	3" x 3 1/4" RSA				
OVER 36" UP TO 42"	20G	48"	DM35	RIBET OR SPUNWELD @ 6" CRS MAX	1 1/2" x 3/16"	H	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	24" x 24"	3/8"	3" x 3 1/4" RSA				
		60"	DM45	RIBET OR SPUNWELD @ 6" CRS MAX	1 1/2" x 3/16"	H	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	36" x 18"	1/2"	3" x 1 1/2" CHANNEL				
		60"	DM45	RIBET OR SPUNWELD @ 6" CRS MAX	1 1/2" x 3/16"	I	GROOVED SEAM OR PITSBURGH LOCK FIG. L-1	6"	NOTE	36" x 36"	5/8"	3" x 1 1/2" CHANNEL				

* ALTERNATIVE DIAMETER SIZES CAN BE USED AS LONG AS Z AP IS MAINTAINED.



LEGEND

- ACCESS DOOR OPENING
- ALL THROUGH DUCT
- FLAMEBAR DUCT ACCESS DOOR COVER PANEL (and the seal)
- INSULATION PAINT TO ACCESS DOOR
- FIRE RATED THROUGH DUCT 1.5
- FIRE RATED THROUGH DUCT 1.5
- THROAT RADIUS (FIG. L-1, L-2, L-3)
- SEAM OR PITSBURGH LOCK (FIG. L-1, L-2, L-3)
- OUTER LAYER SEALANT WITH ALUMINUM FILL MAT
- INNER LAYER SEALANT WITH ALUMINUM FILL MAT
- INSULATION PAINT
- INSULATION PAINT
- FLAMEBAR GASKET
- PREPARED ACCESS DOOR

ISSUE	3"	REVISION		DRAWN BY	JA	DATE	14.10.10	CHKD BY	BN	ENGINCEER	T. A. JAVIS
TITLE: BENTON DESIGN LISTED FLAMEBAR BW11 RECTANGULAR KITCHEN GREASE DUCT WORKING UNDER NEGATIVE OR POSITIVE PRESSURE. 2 HOURS FIRE ENDURANCE BASED ON S.M.A.C.A. (MERCIA)											
SCALE: 1/4" = 1'-0"											
DRAWING NO.: 51038(1) 0											

DUCT DIMENSION	INSULATION ATTACHMENT OPTIONS
WIDTH ≤ 24"	BRIDGING ONLY BRIDGING & RIBS (RIBS ON BOTTOM) RIBS ONLY (RIBS ON SIDES)
WIDTH UP TO 42"	BRIDGING ONLY BRIDGING & RIBS (RIBS ON BOTTOM) RIBS ONLY (RIBS ON SIDES)

VERTICAL DUCT SUPPORTED BY FRAMING FLOOR JACKET WITH CORRECTLY SIZED RIGIDLY MOUNTED STRUT HEIGHT OF 4 NOS. ALTERNATELY, CONCRETE TIE-RODS SUPPORTS MAY BE USED.

