Attention: The Certifier

Ref: Certification Letter - Woodson Recirculation Hoods NCC2022 b.docx

Date: 15/12/2022

Re: Certification of Stoddart's Woodson W.CHD750, W.CHD1000
Distributed by Stoddart Australia

Application Certified: All cooking.
Certified Models: W.CHD750, W.CHD1000

Special Notes:

- Background ventilation rate is to be calculated according to code, but it must exceed 90lps per appliance.
- For any installation in an air-conditioned environment, the top of the hood is to be greater than 300mm below the ceiling. A deflection accessory from Stoddart can be used.
- There is limit of three (3) to the number of units that can be placed in a room.
- We remind HVAC engineers that background ventilation is not kitchen exhaust – it is general exhaust. It does not require AS1668.1-2015 compliance requirements.
- **The distributor has signalled their intention to use this recirculation hood for their larger fryer unit that is up to 600mm deep. For the testing, we adjusted the overhang of the hood to mimic this potential configuration. The results of these tests were sufficient for us to extend this certification to that configuration, on the condition that the basis for certification is met.**

Certification can be used throughout Australia & New Zealand. The reference to the National Construction Code of Australia can be replaced by the relevant portions of the New Zealand Building Act as it applies to New Zealand.

To whom it may concern,

Stoddart has created a recirculating system that is within their range as an integrated ***Woodson*** hood. No external kitchen hood is required, on the following conditions:

1) that the room in which it is placed is ventilated **for food preparation** in accordance with AS1668.2-2012 and
2) the basis for certification is maintained.

This certificate addresses AS1668.2-2012 compliance, using the "manufacturer's specification" as the compliance pathway and its relevant "vent-less" benchmark – UL710B. As a vent-less appliance, the hood is tested with the appliance it serves, as it is controlled by this appliance. We have tested the appliance & hood together and penalised the testing by placing sensors in conservative locations.
The unit uses it's G4/F7 Particulate & Activated Carbon Filters to control the egress of moisture and/or grease into the surrounds, and hence, it produces an environment compliant to FV6.1 when coupled with the minimum ventilation (i.e. the background ventilation) required for any commercial food preparation space.
The air treatment system produces good results, but it must be installed by a Stoddart Australia representative and maintained in accordance with their operations manual. There are no self-cleaning functions available.

The treatment performance is such that the **NCC2022 FP6.4 a) & b)** are satisfied without using an independent exhaust hood as required by **NCC2022 F6.12 DTS**[1]. This certificate outlines the basis for that exemption. It requires the space continues to be ventilated with the minimum dilution provided by code-required ventilation required for any food preparation activity. The appliance cannot be operated in a completely sealed room with no ventilation.

NCC2022 requires two performance criteria are satisfied:-

- FP6.4 – *A mechanical air-handling system installed in a building must control-*
  (a) the circulation of objectionable odours; and
  (b) the accumulation of harmful contamination by micro-organisms, pathogens and toxins.
- FP6.5 – *Contaminated air must be disposed of in a manner which does not unduly create a nuisance or hazard to people in the building or other property.*

The appliance's emissions are contained due to the complete enclosure of the cooking process by the appliance. The recirculation air path uses filtration to condense grease, moisture and particles out of the air-stream. The background ventilation provides the remaining dilution to maintain air quality within the requirements of **Verification Method FV6.1**.

To achieve compliance with the **Australian/New Zealand Standard AS1668.2-2012**, the hood is tested to the international standard **UL710B,** using the manufacturer's compliance pathway in AS1668.2-2012.

Compliance Status for UL710B & SEED Additional Testing

Pollutant	UL710B Criteria	Complies?	SEED Additional Testing	Criteria	Complies?
PM_{10}	<5mg/m^3 average	Yes	Relative Humidity	<10% RH over an hour	Yes
Grease	<0.01mg grease per hour	Yes	Regular Breach	Not Observed	Yes

Compliance Status of FV6.1

Pollutant	Criteria	Complies?	Pollutant	Criteria	Complies?
Carbon dioxide	850ppm 8hr average	Yes	Formaldehyde	0.1mg/m^3 15 minute average	Yes
Carbon Monoxide	50ppm 30minute average	Yes	Nitrogen dioxide	90ppm 15minute average	Yes
Carbon Monoxide	90ppm 15minute average	Yes	Nitrogen dioxide	90ppm 15minute average	Yes
Carbon Monoxide	25ppm 1hour average	Yes	Ozone	90ppm 15minute average	Yes
Carbon Monoxide	10ppm 8hour average	Yes	VOC	0.5mg/m^3 1 hour average	Yes

[1] DTS – Deemed to satisfy

Pollutant	Criteria	Complies?	Pollutant	Criteria	Complies?
Particulate Matter $PM_{2.5}$	0.01mg/m^3 1 year average	Yes	Particulate Matter PM_{10}	0.02mg/m^3 1 year average	Yes
Particulate Matter $PM_{2.5}$	0.025mg/m^3 24 hour average	Yes	Particulate Matter PM_{10}	0.05mg/m^3 24 hour average	Yes

It has been queried why this certificate does not also address FP6.1 (condensate & moisture management in residential spaces) & F6.3 (all pollutant exhaust systems in residential systems must be ducted outside).

I have addressed why this code portion is not applicable in a separate document. However, it must be stressed that ***condensate & moisture management*** are addressed by the correct design and installation of this machine in a commercial kitchen setting, in accordance with the certificate's requirements.

In any air-conditioned environment, where the discharge is within 300mm of the ceiling, the discharge deflection accessory should be installed.

Calculations and Measurements

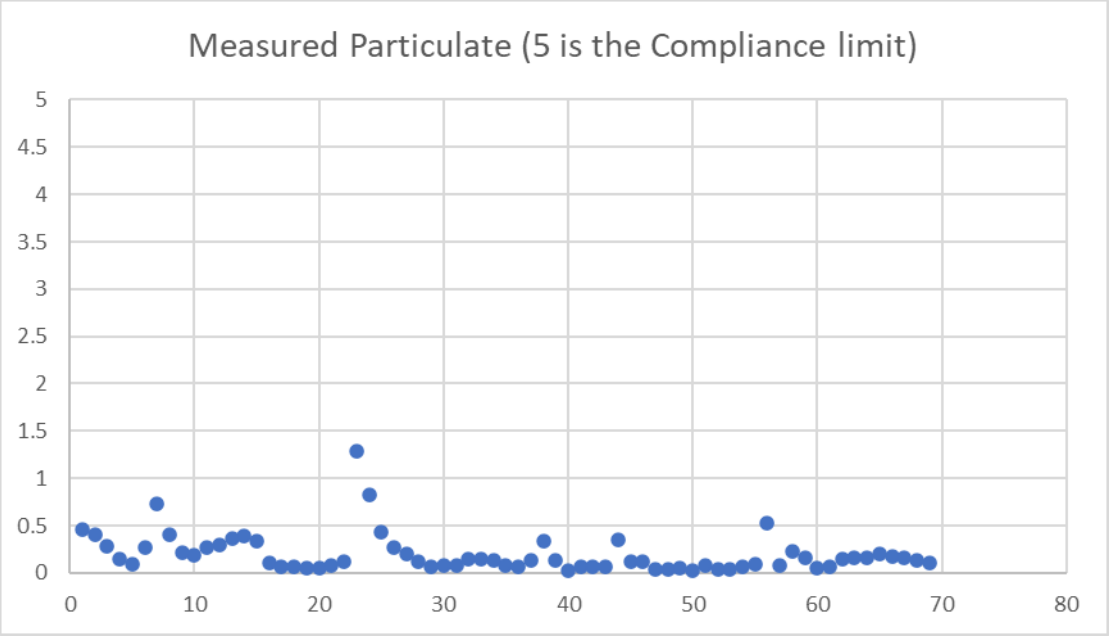
The following calculations and measurements were taken from the SEED testing event.

Pollutant	Criteria	Outside Air Values	Operational Gradient	Filtration Effect	Operational Time (hrs)	Actual Result	Compliant?
Carbon dioxide	850	392	140	0	8	568	Yes
Carbon Monoxide	10	4.0	0.0	0	8	4.0	Yes
Particulate Matter $PM_{2.5}$	0.025	0.01	0.008	0.0007	8	0.018	Yes
Particulate Matter PM_{10}	5	0.45	0.25	0.4	8	2.4	Yes
Grease	0.01	0.0	0.0005	0.0006	8	0.0063	Yes
Relative Humidity	60%	52%	6%	3%	8	55%	Yes
Formaldehyde	0.1	0	0.07	0.045	8	0.03	Yes
VOC	0.5	0.05	0.002	0	8	0.06	Yes
Nitrogen dioxide	0.2	0.05	0	0	8	0.05	Yes

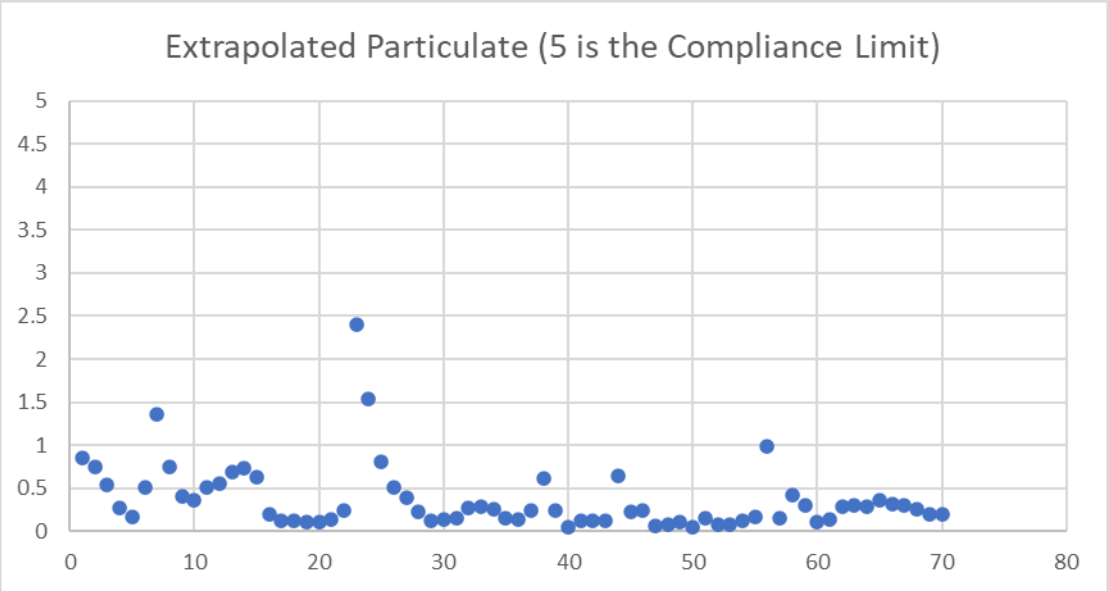
When a certifier is reviewing this certificate for use within a project, they still need a certificate from a credentialled mechanical engineer familiar with the site. The certificate should confirm the following: -

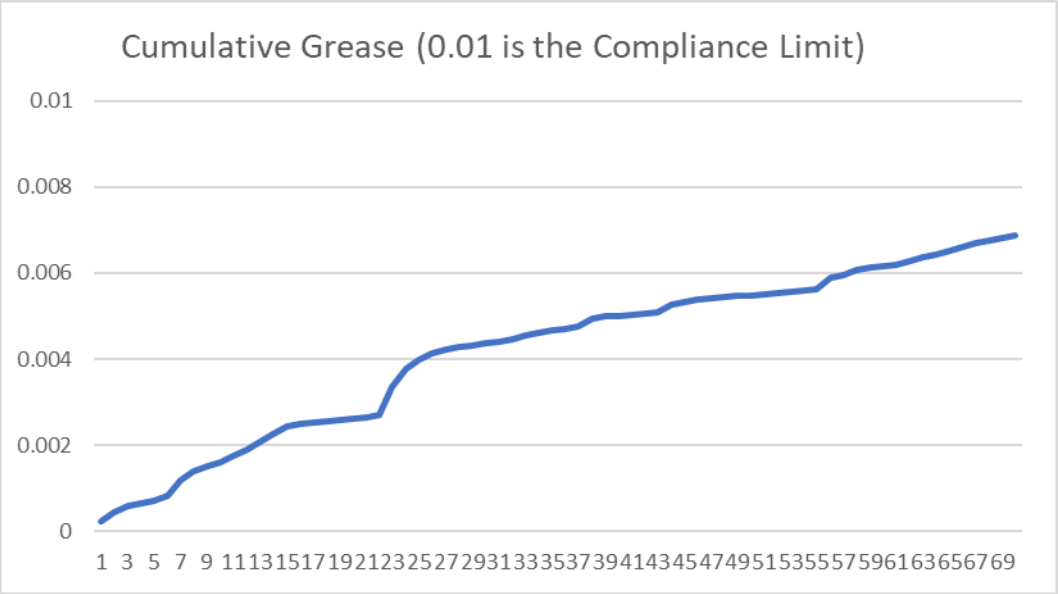
1) That background ventilation is provided as per any food preparation space.
2) That the basis for certification as set out by this certificate is provisioned for.

Measured results are presented below.



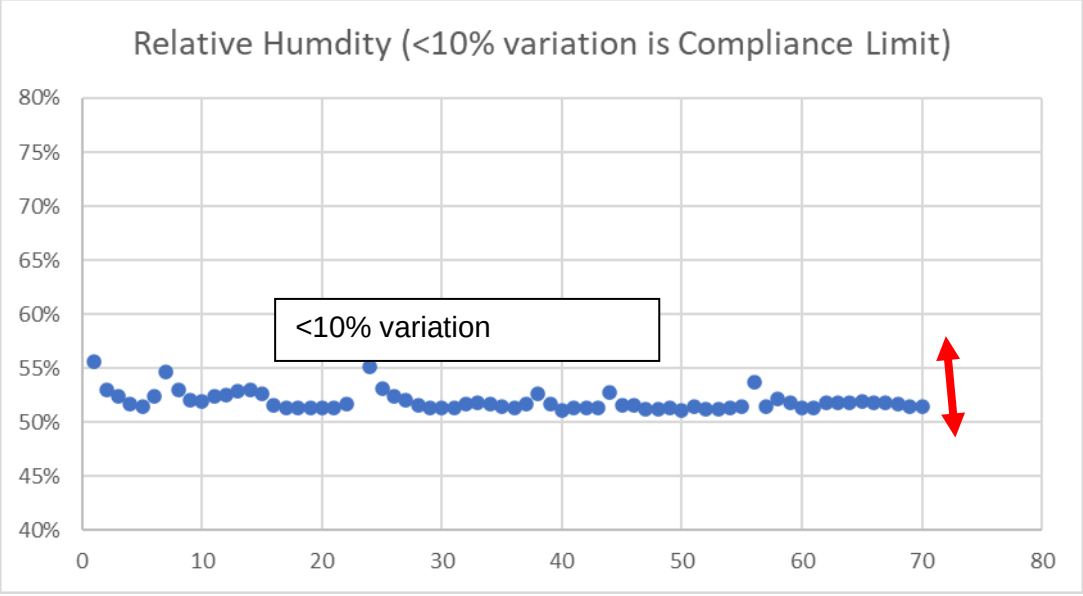
The extrapolated results and their performance against compliance standards are presented below:





The ventless hood complies with UL710B's compliance requirements and hence, it complies with the performance requirements of AS1668.2-2012 & FP6.4 with background ventilation in operation.

We also check against condensation management and the ability of the appliance ventilation system to maintain a reasonable humidity level in the environment, when coupled with background ventilation.



The graph has minor variations corresponding to the opening and closing functions. We don't consider this important as room relative humidity was restored very quickly. The important parameter is the long term gradient or growth in moisture in the space.

CERTIFICATION STATEMENT
Application Certified: All

Certification can be used throughout Australia & New Zealand. The reference to the National Construction Code of Australia can be replaced by the relevant portions of the New Zealand Building Act 2004 as it applies to New Zealand.

To whom it may concern,

As per the requirements of the Building Code of Australia Clause A2.2, I hereby certify as a Chartered Professional Engineer of the Institute of Australia (Mechanical College):-

1. That the filtration performance is such that the **NCC2022 FP6.4 a) & b)** are satisfied without using an independent exhaust hood as required by **NCC2022 F6.12 DTS**
2. That the ventilation performance of the recirculating hood discussed in this certification complies with the relevant Australian & New Zealand Standards listed in the National Construction Code of Australia 2022.
3. That the certification method complies with Clause A2.2 (**NCC**)
4. That the ventilation systems described within the aforementioned range are capable of equivalent performance to that required by the Building Code of Australia and its relevant referenced standard - **Australian Standard AS1668.2-2012**[2]
5. That the same ventilation systems comply with the requirements of the Building Code of Australia, Section F (Health & Amenity).
6. That this has been independently tested and verified by SEED as compliant to UL710B[3]

The basis of this certification is as follows:-

- The capture hood design remains as per the manufacture inspected (described in specifications - Stoddart specification for W.CHD750, W.CHD1000).
- maintenance of the system components is in line with the O&M Manuals and any subsequent Stoddart Australia advice
- no increases to the equipment power input in the appliance that aligns with the hood model. We have 10 KW as the sum of the maximum cooking elements accommodated by a single hood.
- The cooking surface is not to be greater than 600mm from the rear of the hood.
- The room in which the appliance is placed is mechanically ventilated insofar as it complies with the National Construction Code of Australia (aka the Building Code of Australia) for general food preparation. A minimum extraction rate for background ventilation rate should be 70LPS, in case the unit is placed into a uniquely small room.

Attached to this certificate is:-

a. the current definition of Evidence of Suitability at the time of provision
b. Further Discussion, which highlights the calculation methodology and the calculation results for the derivation of air quantities.
c. Further Discussion which highlights compliance with all of the components of the referenced Australian Standard AS 1668.2-2012.
d. Required Maintenance activities (provided by manufacturer) on which the certification is based.

1. The use of mechanical ventilation & air conditioning in buildings – Mechanical Ventilation for acceptable indoor-air quality.
2. UL710B is the relevant testing standard used within the USA for RECIRCULATION HOODS. There is no Australian equivalent. We have used this standard to determine appropriate benchmarks for compliance with a performance approach basis of certification for the National Code of Construction & associated Australian Standards.

Certification Basis

A series of "worst case" All cooking events were independently tested to determine grease and particulate counts in worst case locations - adjacent the appliance intakes.
This was then compared to the compliance standard required which is a **room & time-weighted average**.
Thus the certification is conservative and independent of room volume, yet the validity criteria must be applied strictly for the certification to remain in place.

Whilst the UL710B standard only requires room average particle count results, SEED certifies using test results in high risk areas (in **locations adjacent the appliance)** as a form of safety factor protecting against unknowns such as other contaminants in the room.

Tests and results

The recirculating hood was tested to confirm it managed pollutant emissions without requiring a conventional exhaust hood. It was tested in a mechanically -ventilated, test kitchen.
We trialled an hour duration All cooking with a load of approximately 75% capacity and then extrapolated results to represent 100% configuration. We extrapolated the "residual" results (i.e. the rise in pollutant levels between cooking events) so that we could predict a pollutant load after cooking at 100% load for 8 hours.

The cooking event results were compliant. Grease load was maintained below 0.01mg/hour. The difference between ambient and the adjacent location was effectively negligible.

The ambient monitor had a regular peak of 1.29 mg/m^3 spike above external conditions. The worst case residual was deduced to be 0.008mg/m^3 per hour cooking. If there was 8 hours of cooking at maximum load, the net impact would be a rise of 0.12mg/m^3 at the discharge.

The test samples have been analysed and the time-averaged particulate matter (PM) concentration (mg/m3) has been extrapolated to be a maximum of 2.4 mg/m^3 measured at the adjacent point. Cleaning is as per maintenance instructions.

Thus we state the worst case discharge condition is expected to be 2.4 mg/m^3. Similarly grease loads will rise to 0.0063 mg per hour. This is the result of a 8-hour day cooking with the appliance fully operational. The result is below the maximum compliance level after extrapolation.

The result of this test definitively supports the use of the Stoddart capture hood with this appliance without the requirement for a conventional exhaust hood. Set against the pass/fail criteria of UL710B, the total PM concentration produced by the appliance is predicted to be less than 2.4 mg/m^3 and this is within the standard's limits of 5 mg/m^3.

Compliance statement

The correct use of the equipment satisfies the ventilation performance requirements of AS1668.2-2012, which is a compulsory standard required by the National Construction Code 2022.

This certificate is valid until the following validity criterion is breached:-

1) The ventilation hood design is altered, or
2) The manufacturer permits any downgrade of the fan size or
3) the models undergo a significant upgrade of element size (i.e. above 10KW) or
4) background ventilation is not provided.

The certification requires the owner of the hood to maintain filters in a good condition. A definition of Background Ventilation is also included at the rear.

The motivation for not using a conventional kitchen extraction hood includes:-

1. Greater ease of use
2. More efficient ventilation service provision
3. Reduced spatial impact

Yours sincerely
For and on behalf of SEED

Rob Lord
MIEAust CPEng
Director of SEED
Chartered Professional Engineer (Institute of Engineers Australia)
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Relevant Components of the Building Code of Australia Volume 1
Clause A2.2 Evidence of suitability

The following excerpt is provided from within the BCA Volume 1. The components relevant to this certificate are highlighted in **BOLD** below:-

(a) Subject to A2.3 and A2.4, evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy Provision may be in the form of one or a combination of the following:

(i) A report issued by a Registered Testing Authority, showing that the material or form of construction has been submitted to the tests listed in the report, and setting out the results of those tests and any other relevant information that demonstrates its suitability for use in the building.

(ii) A current Certificate of Conformity or a current Certificate of Accreditation.

(iii) A certificate from a professional engineer or other appropriately qualified person which—

(A) certifies that a material, design, or form of construction complies with the requirements of the BCA; and

(B) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.

(iv) A current certificate issued by a product certification body that has been accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

*(v) * * * * **

(vi) Any other form of documentary evidence that correctly describes the properties and performance of the material,

(b) Evidence to support that a calculation method complies with an ABCB protocol may be in the form of one or a combination of the following:

(i) A certificate from a professional engineer or other appropriately qualified person which—

(A) certifies that the calculation method complies with a relevant ABCB protocol; and

(B) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice and other publications have been relied upon.

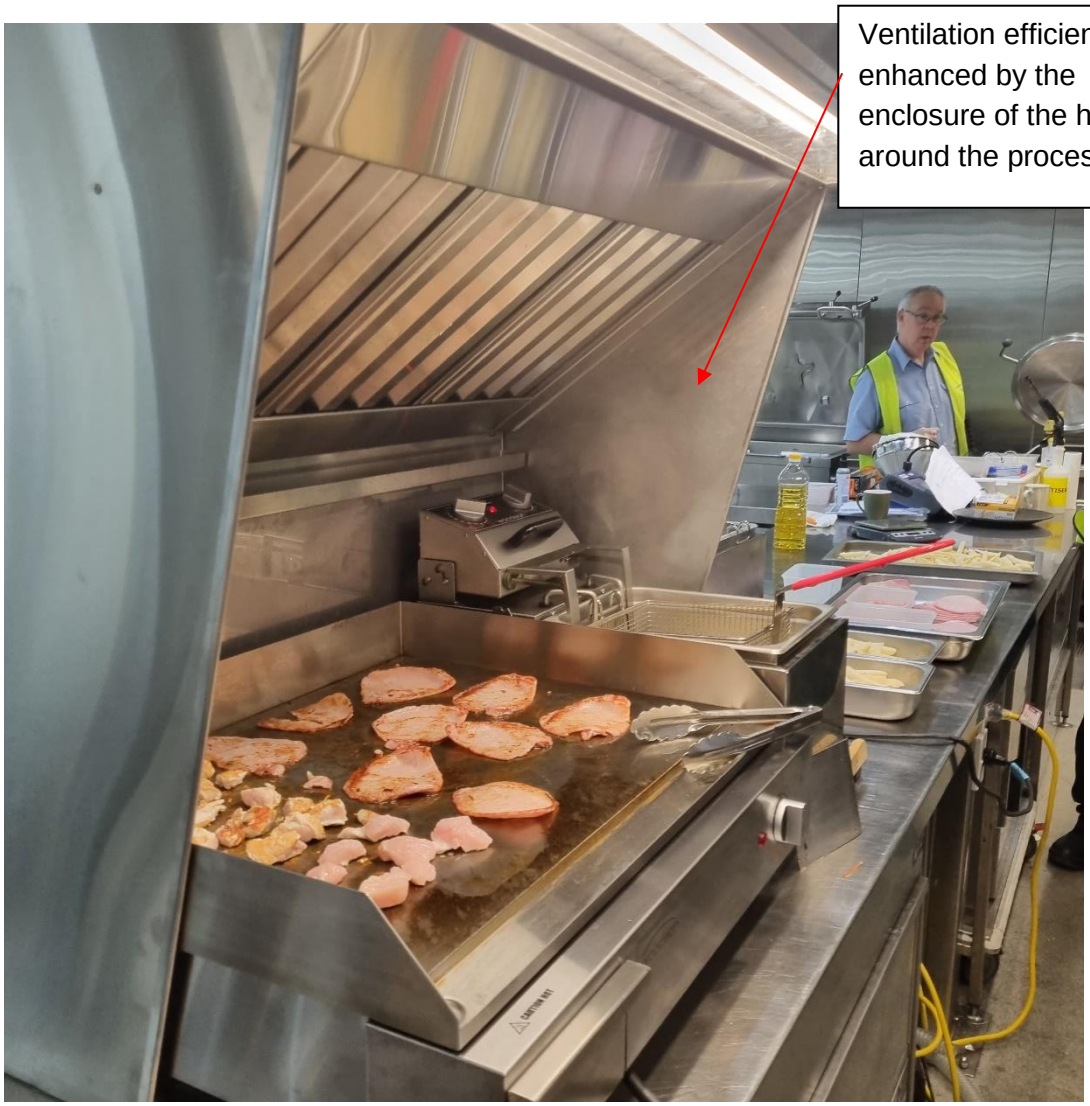
(ii) Any other form of documentary evidence that correctly describes how the calculation method complies with a relevant ABCB protocol.

Further Discussion

What is the ventilation principle behind a RECIRCULATING HOOD?
The primary benefit of recirculating hood systems is that they permit smaller exhaust air quantities and hence lower air conditioning costs. They are ideal for installations in building designs where it is impractical or too expensive to exhaust large ducts to the outdoors.

UL 710B is the Underwriter's Laboratory standard which covers commercial cooking appliances provided with integral ventilation systems (UL710B-KNLZ) which are intended for installation in commercial establishments for the preparation of food. These devices may incorporate an air filtering system enclosed in a hooded or otherwise contained area intended to capture air from the cooking process area. The hood assembly generally includes a fan, collection hood, or equivalent design feature, air filtering system (consisting of a grease filter with other filters). In some locations, authorities may also require a fire actuated damper, and a fire extinguishing system unit.

The test method for condensable particulate used to exempt cooking equipment from having a ducted exhaust system will identify a TLV concentration of 5mg/m^3 at 250 L/s rate of recirculation for commercial cooking equipment exemption. This equates to total condensable particulate (grease)/hour of .01mg.



This product is mainly used to grill and fry food. Hence that was the testing we undertook as it also represents the most significant grease and protein load.

What is the Audit Trail from the Building Code of Australia to the permissible use of this product?

Summary

The Building Code of Australia requires compliance to AS 1668.2-2012 as this is the gazetted standard. Many certifiers or health departments have also asked for earlier editions of AS 1668.2 (namely 2002 or 1991). Fortunately, all of these standards have identical requirements for this type of ventilation so compliance is demonstrated to all aforementioned standards.

AS1668.2 requirements fall into two categories:-

1) Material or physical (compliance to a set of 4 conditions)
2) Performance (compliance to a proven standard – such as UL710B).

This certificate will demonstrate the compliance for the physical and material requirements (through visual inspections and certification) and also the performance requirements (through testing).

Detailed Audit Trail

The flow chart below is "Figure 1.1 Flow Chart for the Selection of Ventilation Systems" from AS1668.2 – 2012. It establishes that Section 3 and in particular Figure 3.1 is the correct procedure for this application.

AS 1668.2—2012 8

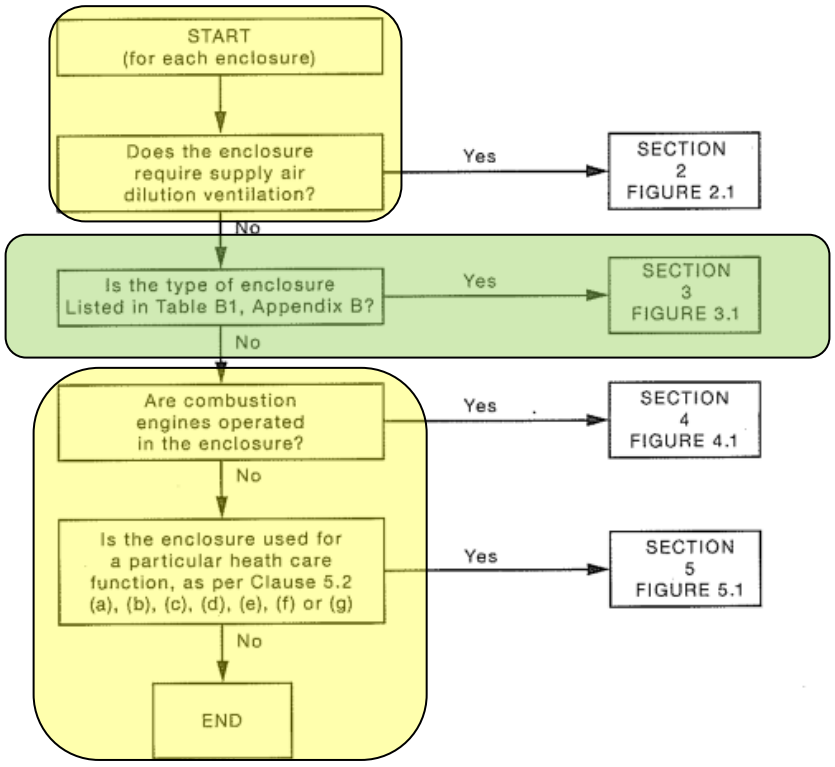
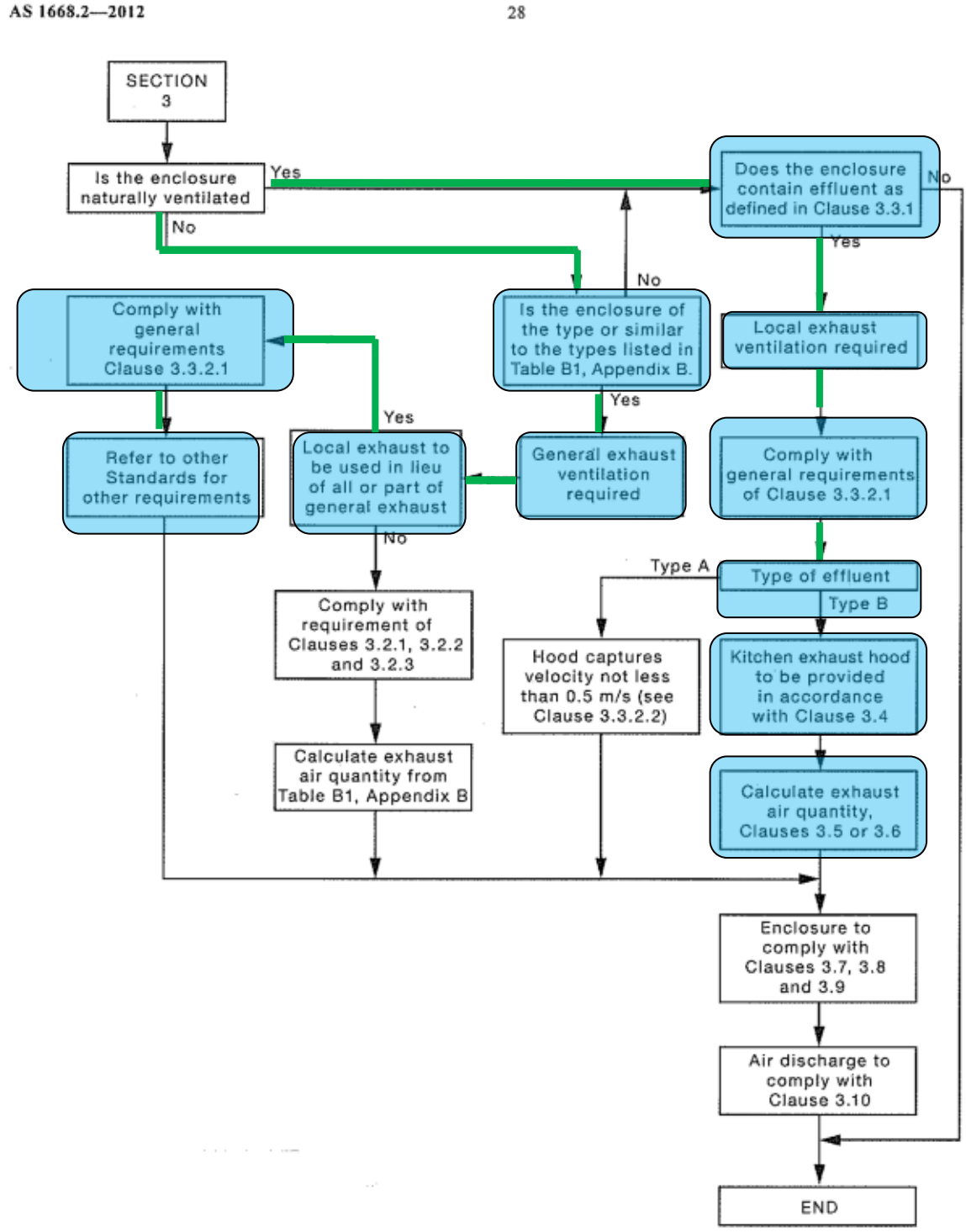


FIGURE 1.1 FLOW CHART FOR THE SELECTION OF VENTILATION SYSTEMS

Figure 3.1 of Section 3 allows local exhaust to be used in lieu for part or all of the general exhaust.

It identifies Clause 3.3.2.1 as the legitimate clause for approval and also requires the designer to comply with other elements such as satisfactory discharge of exhaust.

It also identifies Clause 3.4 as a necessary standard for compliance.



Thus the hood must satisfy both clause 3.3.2.1 (physical or material requirements) and also Clause 4 (performance requirements).

In complying with Clause 3.4, we are also directed to comply with Clause 3.5 & Clause 3.6, all of which ultimately state that the hood shall perform to a "proven standard". The only well-known standard in the developed world for recirculating hoods is the American standard UL710B standard.

AS 1668.2-2012 Clause 3.3.2.1

The clause 3.3.2.1 lists the 4 conditions (a-d) for approval and it is re-presented below. The highlighted section demonstrates the local airflow depends on the application and designers should refer to relevant guidance material. The conditions are:-

3.3.2 Effluent removal

3.3.2.1 *General requirements*

The removal of effluent by means of local exhaust shall be as follows:

(a) The effluent shall be collected as it is being produced, as close as practicable to the source of generation, using special surroundings, hoods, surface-mounted exhaust-air intakes and similar means. The airflow rates shall be such as will ensure positive capture and removal of the effluent.

(b) Local exhaust shall be permitted to complement and/or substitute for general exhaust.

(c) Make-up air openings, or mechanical ventilation system air outlets to an enclosure in which an exhaust hood is situated, shall be distributed and designed so as not to be detrimental to the performance of the hood, or cause excessive cross-draughts over any ventilated apparatus. Outdoor air for make-up shall be introduced so as not to adversely affect air-conditioning systems.

NOTE: Subject to documentary evidence of performance, proprietary exhaust hoods incorporating make-up air systems are considered to meet the requirements of this Clause.

(d) Sufficient airflow shall be suitably distributed over exhaust hoods to effectively capture and convey all convected heat fumes and other aerosols to hood exhaust openings.

NOTE: Local exhaust airflow rates vary depending on the application. Users and designers should refer to relevant guidance material, including Standards for applications outside the scope of this document. Some of the relevant Australian Standards are included in Appendix O. In the absence of relevant Australian Standards, the current recommendations that appear in the ACGIH *Industrial Ventilation: A Manual of Recommended Practice should be adopted.*

C3.3.2.1 Apart from establishing requirements for local exhaust, the Standard does not attempt to prescribe the form, hood velocities or airflow rates of hoods or other means used for local exhaust of effluents with the exception of kitchen exhaust. Australian Standards for the design of laboratories should be referred to in regard to local exhaust and make-up air provisions in such applications.

AS 1668.2-2012 Clauses 3.4, 3.5 & 3.6

Clause 3.4.1 identifies that alternative exhaust designs may be utilised provided it can be established that the performance of such systems is equivalent to the performance of hoods in this Section.

3.4 KITCHEN EXHAUST HOODS

3.4.1 General

Requirements for kitchen exhaust hoods are set out in this Clause for the seven common types and configurations of hoods that apply to the seven most common types of cooking processes. Clause 3.5 sets out a prescriptive procedure for hood design and Clause 3.6 sets out a detailed procedure for hood design. Required kitchen exhaust hoods shall comply with Clause 3.5 or 3.6. Construction and installation requirements of kitchen exhaust hoods shall be in accordance with Appendix E.

Alternative exhaust hood designs, including proprietary designs, engineered ventilated ceiling systems and specialized (application specific) designs, may be used provided it can be established that the performance of such systems is at least equivalent to the performance of the hoods described in this Section.

Clause 3.4.2 identifies that the integral hood with vat appliance is Hood type 7 – Proprietary equipment.

3.4.2 Hood and cooking process types

3.4.2.1 *General*

The seven common types and configurations of hoods and the seven types of cooking processes are defined in Clauses 3.4.2.2 and 3.4.2.3.

3.4.2.2 *Hood type nomenclature*

Hood type nomenclature is as follows (refer also to Appendix E):

(a) *Hood Type 1* Low sidewall where the canopy does not extend at least 150 mm beyond the edge of the cooking surface (see Figure E3, Appendix E).

(b) *Hood Type 2* Corner-mounted, subject to a maximum length to width ratio of 2:1 (see Figure E4, Appendix E).

(c) *Hood Type 3* Sidewall (see Figure E5, Appendix E).

(d) *Hood Type 4* Island (see Figure E6, Appendix E).

(e) *Hood Type 5* Ventilated ceiling (see Figure E12, Appendix E).

(f) *Hood Type 6* Eyebrow hood (see Figure E10, Appendix E).

(g) *Hood Type 7* Proprietary equipment.

Clause 3.4.5 identifies that the correct installation of proprietary hoods permit the omission of separate exhaust hoods. In this instance, the correct operation of the hood maintains air quality at acceptable conditions at reduced airflows, improved energy performance and reduced spatial impact.

3.4.5 Proprietary exhaust allowance

Where kitchen appliances are provided with proprietary exhaust systems, that is, exhaust spigots ready for connection to an exhaust system, the exhaust airflow rate shall be in accordance with the manufacturer's requirements. In this case, omission of separate exhaust hoods shall be permitted (see Clause 3.4.1).

Clause 3.5 includes Table 3.1. Table 3.1 identifies that for Hood type 7, the airflow rate is to be as per manufacturer's requirements.

TABLE 3.1

CALCULATION OF MINIMUM HOOD EXHAUST AIRFLOW RATE

Hood type	Cooking process					
	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
Hood Type 1 Low sidewall	$Q = 400 \times L$	$Q = 600 \times L$	$Q = 800 \times L$	$Q = 800 \times L$	N/A	N/A
Hood Type 2 Corner mounted Hood Type 3 Sidewall Hood Type 4 Island	$Q = 190 \times P \times H$	$Q = 190 \times P \times H$	$Q = 375 \times P \times H$	$Q = 375 \times P \times H$	$Q = 320 \times P \times H$	$Q = 320 \times P \times H$
Hood Type 6 Eyebrow	$Q = 250 \times P$	N/A	N/A	N/A	NA	$Q = 250 \times P$
Hood Types 5 + 7	As per manufacturer's requirements					

Clause 3.6 applies to Hood types 5 & 7 only and identifies that proprietary hoods shall be designed to a proven and tested standard. In this instance, SEED has identified the relevant standard is UL 710B.

3.6 VENTILATED CEILINGS AND PROPRIETARY KITCHEN EXHAUST EQUIPMENT (HOOD TYPES 5 AND 7)

Ventilated ceilings or proprietary kitchen exhaust hoods not covered under Clauses 3.4 and 3.5 shall be designed to a proven and tested Standard. The basis for these designs is to lower energy costs by reducing exhaust air requirements and, consequently, they generally require more detailed calculation methods.

NOTES:

1 The acceptable measure of performance of the equipment (ventilated ceiling or exhaust hood) is to capture and contain all effluent without spillage.

2 Typical Standards and/or guidelines include the following:

(a) The German guideline VDI 2052, *Ventilation equipment for kitchens*.

(b) The German Standard DIN 18869, *Equipment for Commercial Kitchens—Components for Ventilation (all parts)*.

Description of UL 710B-2011

The UL website states that this category covers products intended for installation with specific certified commercial cooking and cooking appliances, such as ovens, griddles, ovens and other appliances that are installed in commercial establishments where food is prepared.

Recirculating hoods generally consist of a fan, collection hood, and optionally, an air-filtering system consisting of a grease filter.

These systems are intended for venting filtered cooking effluent back into the local environment near which the equipment is located.

The performance test we use is the Commercial cooking appliances with integral recirculating ventilation systems. This is covered under UL710B Commercial Cooking Appliances with Integral Recirculating Ventilation Systems (KNKG).

For this test, this represents a higher degree of conservatism.

Key criteria include:-

1) Room volume-weighted time-averaged particulate count <**5 mg/m^3.**
2) Sufficient airflow that air from the appliance does not escape treatment.
3) Equate to total condensable particulate (grease)/hour of .01mg or less.

Description of Equipment

We observed the equipment we tested as follows:-

1) It was fabricated from Stainless Steel.
2) It was built with a bespoke frame, which was integral to the appliance. The electrical switchgear was at the rear and away from harm.
3) Most construction was welded, some was screwed where access and assembly was required.

What are the conditions for approval (supplier certification only) and how are they met?

Conditions for Approval	How are they met?
Effluent shall be collected as close as practicable to the source using special surroundings	 Discharge of effluent is minimal as the appliance encloses the foods and the filter treats all thermic air airflow.
Local exhaust rates shall be in accordance with relevant Australian	The various versions of Australian Standard AS1668.2 deliberately do not address the airflow rates for proprietary exhaust systems.

Conditions for Approval	How are they met?
Standards or the American Conference of Governmental Industrial Hygienists Industrial Ventilation manual	However, the International Mechanical Code (specifically Section 506 - Commercial Kitchen Hood Ventilation System Ducts and Exhaust Equipment & Section 507 - Commercial Kitchen Hoods & Section 508 - Commercial Kitchen Makeup Air) does provide for RECIRCULATING HOOD configurations with the requirement of UL 710B compliance. In effect, the compliance requirements for airflow are that the particulate count does not exceed 5mg/m^3 over a typical cooking period. The following section outlines the insitu testing undertaken to demonstrate this performance.
Local exhaust may be a substitute for general exhaust where the resultant contamination level is equal or less that of general exhaust	As mentioned above, the standard for RECIRCULATING HOODs is UL710B which outlines the testing method, and references **U.S. Environmental Protection Agency (EPA) Test Method 202**: The test method for condensable particulate used to exempt cooking equipment from having an exhaust system shall :- • Identify a TLV concentration of 5mg/m^3 at 50 L/s rate of exhaust for commercial cooking equipment exemption. • Equate to total condensable particulate (grease)/hour of .01mg. Independent testing was undertaken and the results are at the rear of this document. The requirement to ventilate the remainder of the kitchen is undertaken by the mechanical designer for the site's installation and is not included by this certification.

Make-up air openings shall be positioned so as to not be detrimental to capture	The images within this document portray that the hood has **clearly defined** air intake points i.e. the configuration:-  This configuration assists capture by controlling the airflow patterns around the **hood**.

Sufficient airflow shall be distributed evenly across the hood	The hood encloses the **appliance** so the concern about uneven capture is unwarranted. The filter assembly also creates an even air suction. 

In addition, AS1668.2 also requires construction related compliance:-

Compliance to the kitchen hood references in AS1668.2 (Appendix E) is valid for the following items:-

- construction-related items
- maintenance related items
- distances between heat sources and grease arresting devices

Visual inspection of the hoods and review of the workshop drawings confirms construction related compliance with Appendix E:-

- Compliance with E3.1 is self-evident.
- Compliance with E3.2 is self-evident.
- Compliance with E3.3 is self-evident.
- Compliance with E3.4.1 is achieved.
- Compliance with E3.4.2 is self-evident.
- Compliance with E3.4.3 is self-evident.
- Compliance with E3.4.4 is achieved. The hood achieves containment through enclosure over the pollutant source.
- Compliance with E3.4.5 is self evident.

Maintenance & Cleaning

The detailed maintenance procedures are provided by the manufacturer's installation manual and the manual lists activities. SEED believes the procedures can be easily followed. It is noted that regular cleaning of internal surfaces is necessary.

Compliance with the manufacturer's instructions is the basis of this certification.

Ventilation Performance Testing

Summary:-

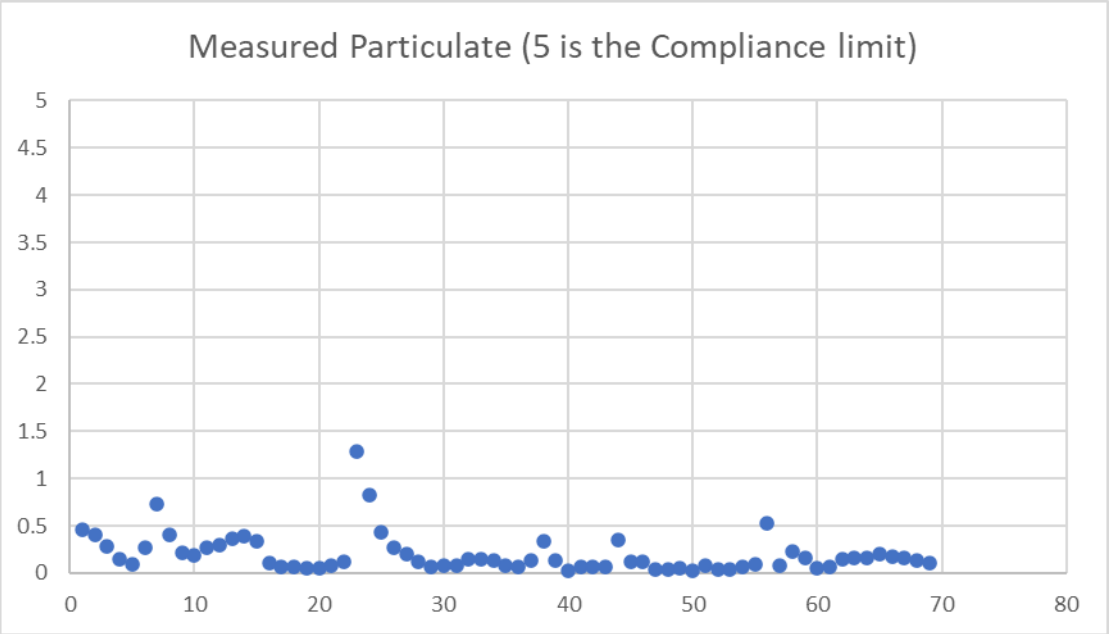
On 13/12/2022, a 2-hour cooking emissions test was undertaken by SEED. The appliance tested was the model Stoddart W.CDH.1000, powered by electricity.

It was tested in a mechanically ventilated test kitchen and there were no surrounding ventilation systems that were operating. Thus for our purposes, it was an appropriate environment.

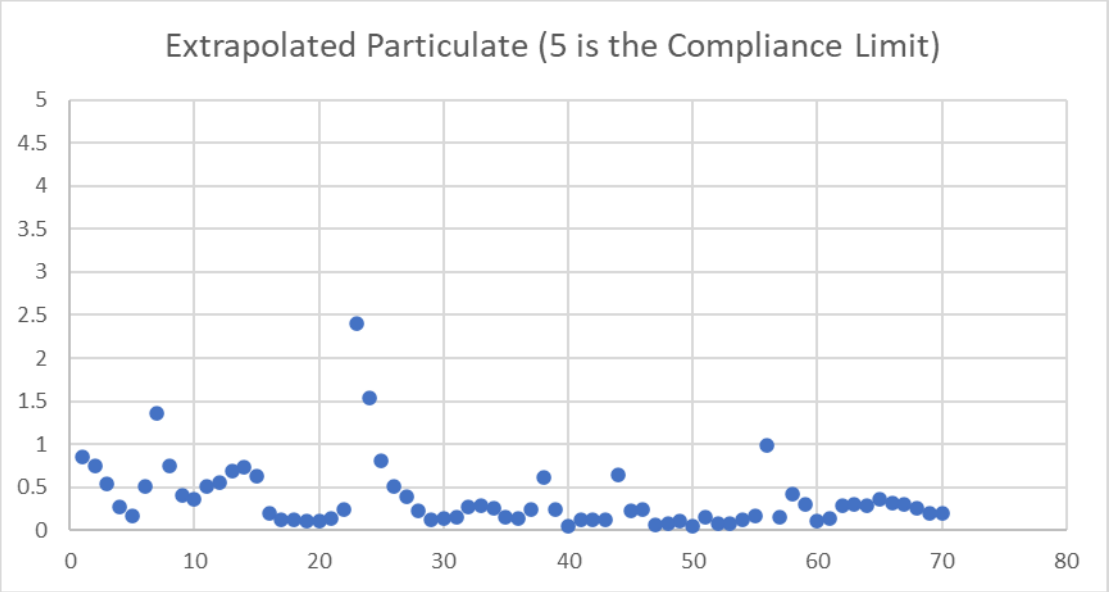
This captured a worst-case scenario for the ventilation system. Grilling and frying food was undertaken under the hood.

The test samples have been analysed and the peak particulate matter (PM) concentration (mg/m^3) has been measured to be a **peak of 1.29 mg/m^3** measured at the worst case point. This was using a load of considered to be 75% of the maximum capacity. When extrapolated

for 100% load, the peak pollutant residual is calculated as 0.12 mg/m^3 determined as 0.008mg/m^3/hr for an 8 hour day.



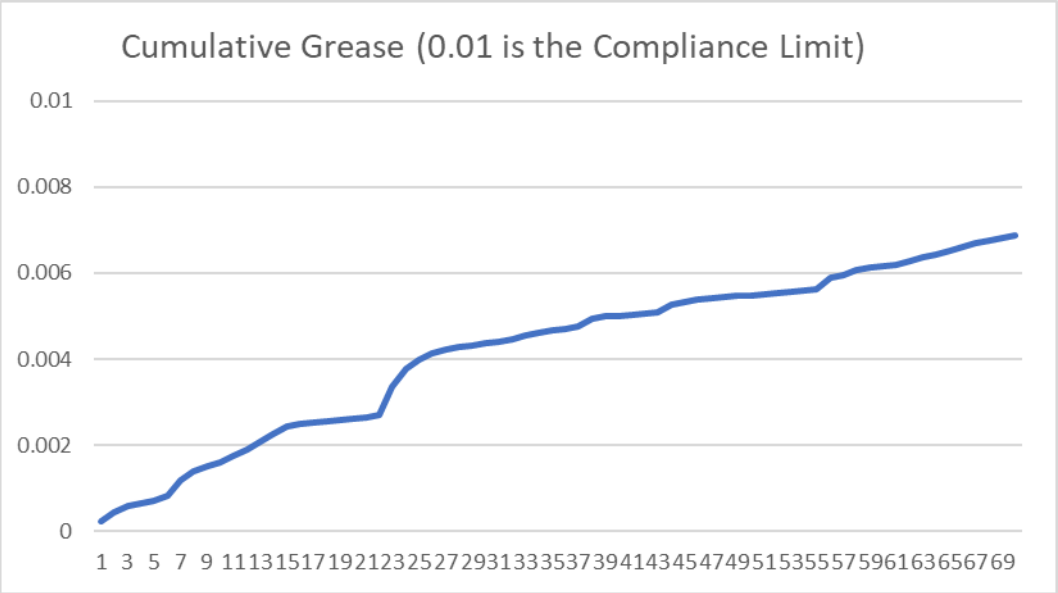
The extrapolated results and their performance against compliance standards are presented below:



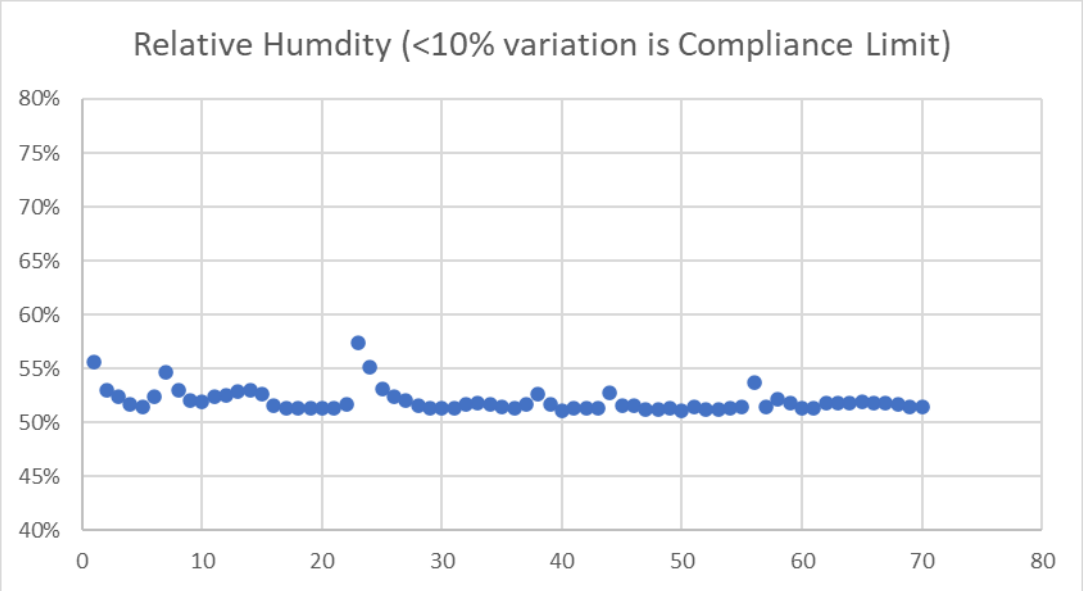
Note that we have used an extrapolation factor of 3.

Therefore, on a worst case day, the peak pollutant is calculated to rise to **2.4 mg/m^3**, which reflects an unlikely scenario of 100% load for the appliance operating for 8 hours. We have nominated a certification rate of 2.4 mg/m^3.

Note, the compliance level is 5 mg/m^3. UL710B requires this to be assessed as a time-averaged result. Note also we are testing at the worst case in the room whereas the compliance level is meant to be in the centre of the room.



We were able to compare the grease levels (i.e. the non condensibles) against the compliance level. When looking at this graph, we want to see that the ambient levels stay below the compliance level of a 0.01 mg/m^3/hr compliance level.

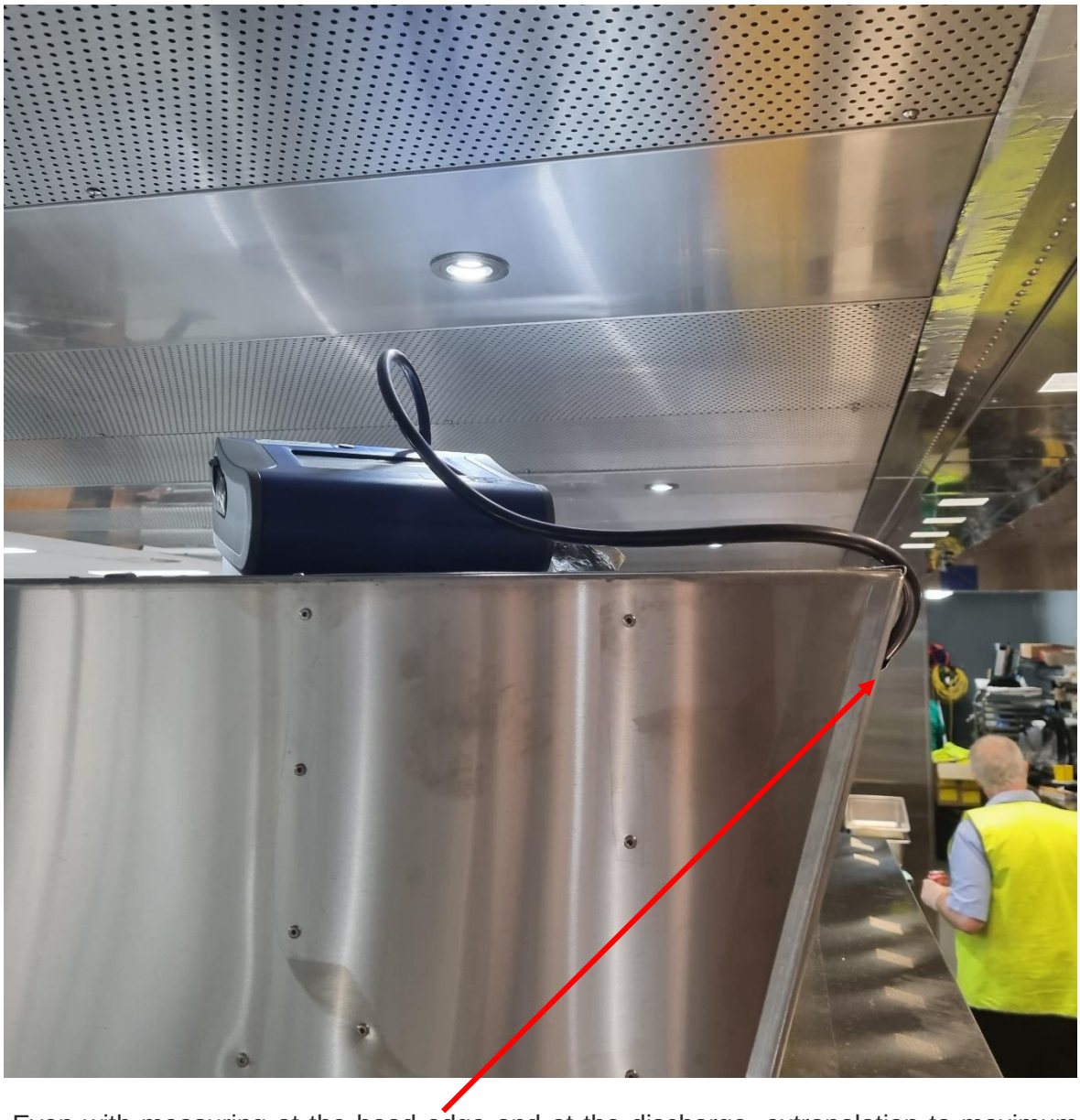


Note we test for relative humidity increase as a consideration of potential condensation within the room.

Commentary:-

The space had sufficient background ventilation to comply with AS 1668.2 2012 as the space was mechanically -ventilated for food preparation. One background ventilation was left on and SEED verified all other systems be turned off to achieve a conservative result.

The appliance operated under the control of the control panel throughout the test. The operator's control panel allows simple on/off control and manages cooking activities.



Even with measuring at the hood edge and at the discharge, extrapolation to maximum loading and for longer durations, the resultant level of 2.4 mg/m^3 is still a compliant result.

Compliance statement

The result of this test definitively supports the use of hood without the requirement for a conventional exhaust hood.

Set against the pass/fail criteria of UL710B, the total PM concentration produced by the appliance is assessed at 2.4 mg/m^3 which falls well below the standard's limits of 5.0mg/m^3. Similarly the grease result of 0.0043 mg/hr grease is well below the standard's limit of .01mg/hr.

By extension, the correct use of the hood satisfies the ventilation performance requirements of AS1688.2-2012, which is a compulsory standard required by the National Construction Code. By extension, it also complies with AS1668.2 1991, and AS1668.2-2002.

The ambient sensors were placed at the discharge and held in position throughout the test.

As the space was barely sufficient for mechanical ventilation compliance, we considered it a risk to certify for naturally ventilated spaces. Hence we have imposed a condition for the space to have a small mechanical extraction point near the discharge.

There are minimum conditions attached to this certification of ventilation performance, namely:-

1) The appliance must be regularly cleaned and maintained as per Stoddart Australia instructions.
2) The background ventilation must be in accordance with the Building Code of Australia.
3) The filtration design remains as per manufacture.

Sincerely,

Rob Lord
SEED Emissions Researcher

Ventilation Testing Procedure & Observations

The test was conducted using trained staff from the distributor, so it captured the effect of staff training and typical operational procedures.

The ambient monitors were placed at the discharge point.

Food was cooked at typical temperatures. The intensity of cooking was as if the appliance was working within a busy restaurant. The appliance had been prewarmed, so the cooking was conducted at operating temperatures.

The cooking equipment under the hood was adjusted to reflect a larger fryer (i.e. a smaller overhang) which would be the outcome of the large Woodson Fryer unit. The greatest depth from the rear of the hood that is certified is 600mm.

Upon completion of the cooking for the day, several items need to happen before the next cooking event:-

1) The cleaning processes in the manual need to be initiated.
2) The inner surfaces need to be cleaned and wiped out internally.

Background ventilation

Background ventilation is the minimum ventilation required by the Building Code of Australia. It can take the form of natural ventilation (i.e. open doors and windows) or mechanical ventilation (fan-forced outside air supply).

An architect or a mechanical engineer usually determines and certifies that the space is "occupiable" – this comes with an assessment that background ventilation has been provided adequately.

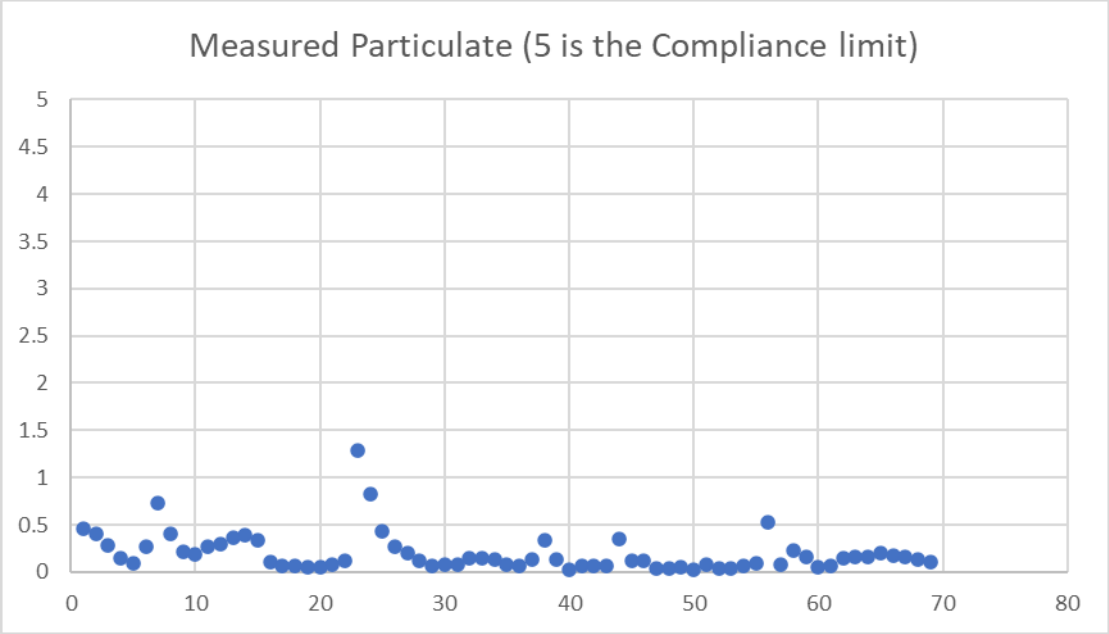
This certification is reliant upon provision by others of minimum (only) background ventilation. You cannot operate this device in a completely sealed room and expect that pollutants will not be distributed into the room.

These tests do show that the level of cooking pollutants is so low that amenity can be maintained well above compliance levels and minimum standards with the provision of background ventilation only.

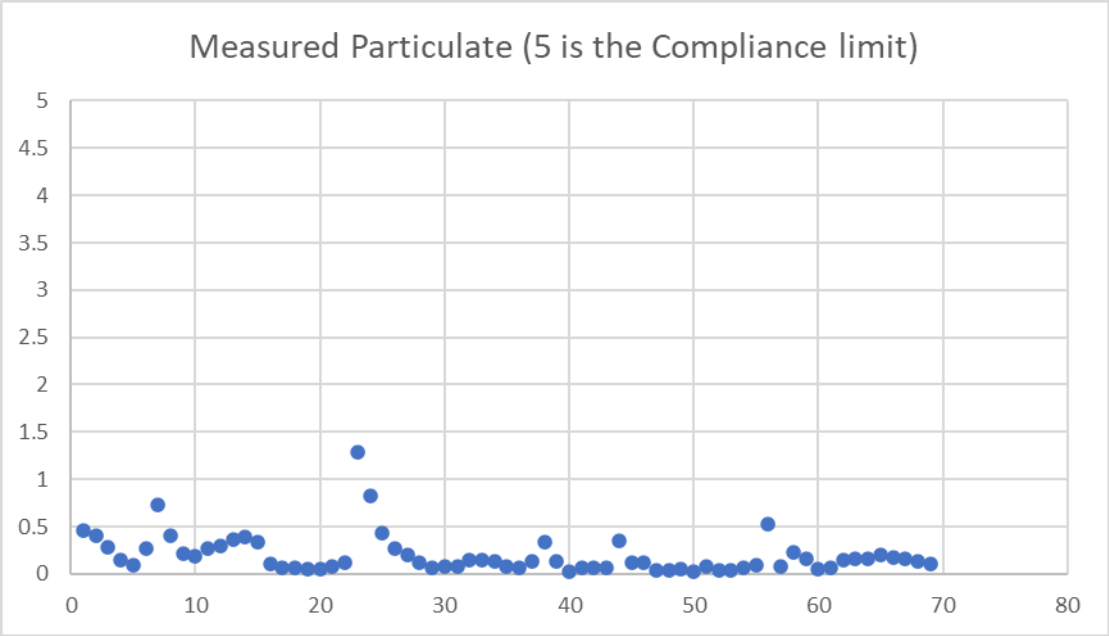
The external conditions were recorded as between 23.5^{0}C & 25^{0}C and 50% to 60% RH typically.

The room temperature stayed at the equilibrium position generally throughout the 2 hours of testing.

Results
Note the results below are the most polluted conditions extrapolated in a worst case location. Whilst UL710B requires the assessment of the average room condition, SEED adopts these worst-case readings as a measure of safety factor.

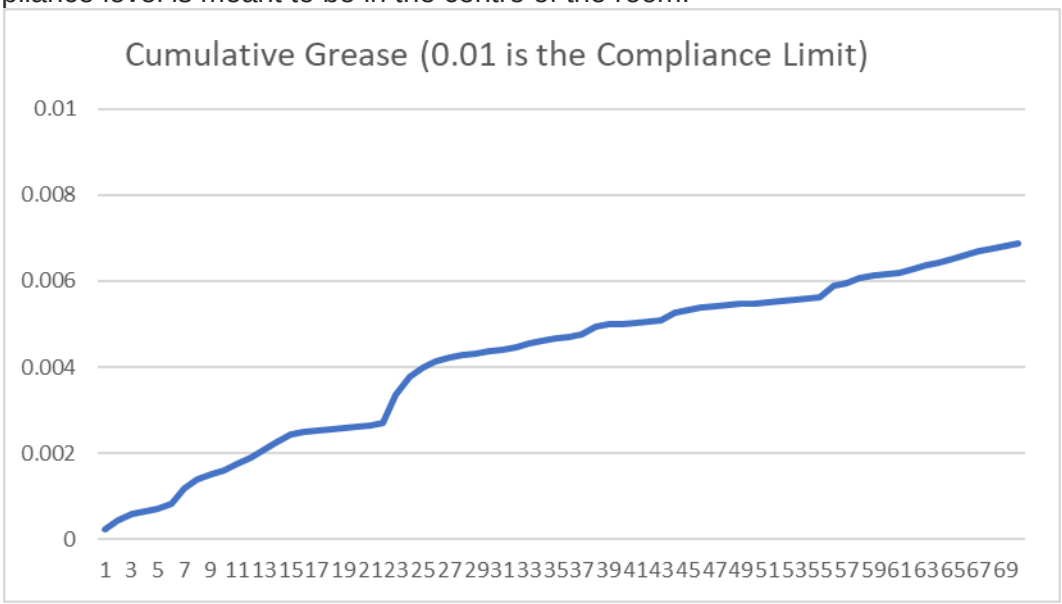


The extrapolated results and their performance against compliance standards are presented below:



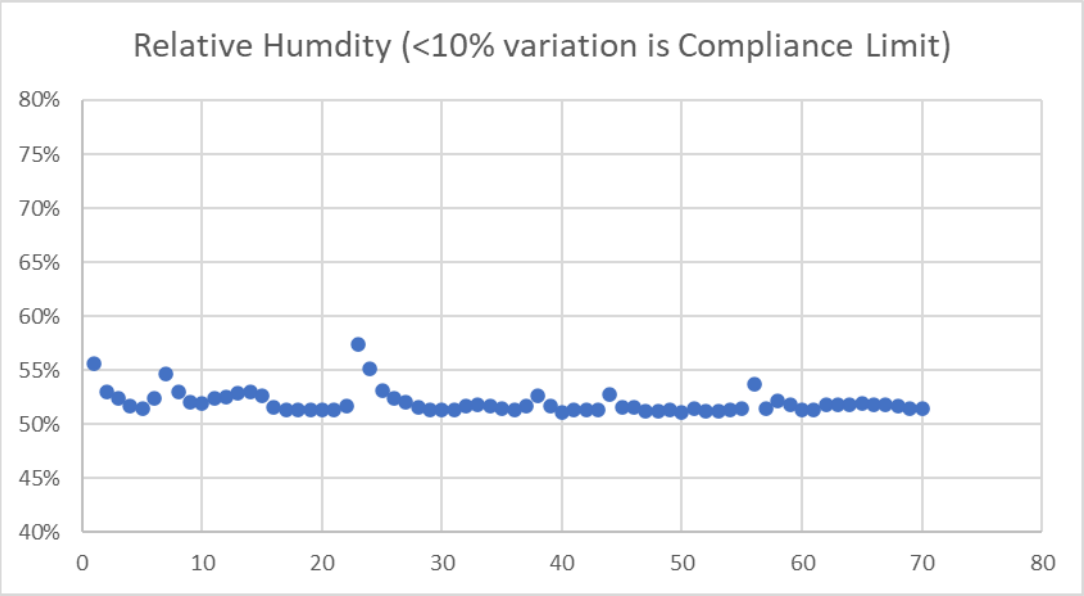
On a worst case day, the peak pollutant is calculated to rise to **2.4 mg/m^3**, which reflects an unlikely scenario of 100% load for the appliance operating for 8 hours. We have predicted a certification rate of **2.4** mg/m^3.

Note, the compliance level is 5 mg/m^3. UL710B requires this to be assessed as a time-averaged result. Note also we are testing at the worst case in the room whereas the compliance level is meant to be in the centre of the room.



We were able to compare the grease levels (i.e. the non condensibles) against the compliance level. When looking at this graph, we want to see that the ambient levels stay below the compliance level of a 0.01 mg/m^3/hr compliance level.

Note we test for relative humidity increase as a consideration of potential condensation within the room. The variation tested is within acceptable limits and does not increase over time.



Discussion of Results
The Stoddart W.CHD750, W.CHD1000 hoods clearly produce an appropriate environment. In particular, it is evident the filtration and the enclosure of the cooking do most of the work for producing an acceptable environment.

Background ventilation is still required though. Notwithstanding code ventilation compliance, the background ventilation is necessary for diluting basic particulate & CO_2. Note also the operator has responsibilities for their own environment. The hood & appliance must be maintained properly & regularly cleaned.

The testing was extrapolated to the worst case "code-compliant" format and it is evident the ventilation performance is still compliant to UL710B. We also tested for relative humidity development as this is a sensible purpose of ventilation. We found that the hood was able to maintain relative humidity.

It is evident from the graphs above that even with All cooking with the maximum capacity of the appliance for a full 8 hours, the anticipated maximum discharge pollutant & grease level are compliant and the relative humidity increase in the room is negligible.

Concluding remarks
These are very good results. We positioned the sensor in the discharge itself.

The filter configuration & the enclosure are the two reasons why the hood can provide a safe, working environment. Hood performance is compliant with the requirements of AS1668.2-2012. The data loggers also provided results for Table FV6.1, used within this certification.

Sincerely,

Rob Lord
SEED Emissions Researcher