



2019-04-23

Christa Pieper  
Alto-Shaam Inc.  
W164 N9221 Water St  
PO Box 450  
Menomonee Falls, WI, 53052, US

E-mail: ChristaP@Alto-Shaam.com

Reference: Project : 4788896948 P.O. Number: N/A

Product: EPA 202 TEST METHOD: USING THE ALTO-SHAAM MODEL CTP10.20E COOKING  
THE BELOW FOOD PRODUCT AS MEDIA.

Dear Ms. Pieper,

Per your request, project 4788896948 was opened for the evaluation of grease-laden vapors produced from the Model CTP10.20E.

The scope of this project was to determine the total grease emissions from cooking meat cakes, as the specified food load as noted in Appendix A. Testing is conducted in accordance with EPA Method 202 test guidelines to determine ultimate results. Results are used to determine compliance with Section 59 of UL710B, the Standard for Recirculating Systems, formerly Section 14 of UL 197, Eighth Edition, Supplement SB, and paragraph 4.1.1.2 of NFPA96, the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. The test was conducted at our facility in Northbrook, IL on April 12<sup>th</sup>, 2019. This letter will report the results of the EPA202 test.

For the record, the test was conducted using the Alto-Shaam Model CTP10.20E, rated 208-240 V, 28.9 – 38.5 kW, 3ph. The model CTP10.20E was used for testing purpose and considered representative of Models CT followed by P or C, followed by 6-10, 10-10, 7-20, 10-20, 20-10, 20-20, followed by E or G and may have suffix VH; Model CTX4-10E, CTM6-10E, CTM10-10E may have suffix C or VH. The test media, food load and oven programming as shown in Appendix A were specified by Alto-Shaam Inc. The results are considered to comply with UL710B, Section 59, formerly Section 14 of UL 197, Eighth Edition, Supplement SB, and NFPA96, paragraph 4.1.1.2 when tested with the specified food load and maximum cook times since the total amount of grease-laden effluents collected was 0.77 mg/m<sup>3</sup>, which is less than 5 mg/m<sup>3</sup> limit. No evaluation was conducted in regards to fire protection.

Also, for the record, the test was conducted using the Alto-Shaam Model CTP10.20E, rated 208-240 V, 28.9 – 38.5 kW, 3ph. The model CTP10.20E was used for testing purpose and considered representative of Models CT followed by P or C, followed by 6-10, 10-10, 7-20, 10-20, 20-10, 20-20, followed by E or G and may have suffix VH; Model CTX4-10E, CTM6-10E, CTM10-10E may have suffix C or VH. The test media, food load and oven programming as shown in Appendix B were specified by Alto-Shaam Inc. The results are considered to comply with UL710B, Section 59, formerly Section 14 of UL 197, Eighth Edition, Supplement SB, and NFPA96, paragraph 4.1.1.2 when tested with the specified food load and maximum cook times since the total amount of grease-laden effluents collected was 0.74 mg/m<sup>3</sup>, which is less than 5 mg/m<sup>3</sup> limit. No evaluation was conducted in regards to fire protection.



The issuance of this report in no way implies Listing, Classification or Recognition by UL LLC and does not authorize the use of UL Listing, Classification or Recognition Marks or any other reference to UL LLC on the product or system. UL LLC authorizes the above named company to reproduce this Report provided it is reproduced in its entirety. The name, Brand or Marks of UL LLC cannot be used in any packaging, advertising, promotion or marketing relating to the data in this Report, without UL's prior written permission.

UL, its employees and agents shall not be responsible to anyone for the use or nonuse of the information contained in this Report, and shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use of, or inability to use, the information contained in this Report.

This letter will serve to report that all tests on the subject product have been completed. All information generated will be retained for future use. This concludes all work associated with Project 4788896948 and we are therefore closing this project. Our Accounting Department has been instructed to bill you for all charges incurred.

Thank you for the opportunity to provide your company with these services. Please do not hesitate to contact us if you should have any questions or comments.

Very truly yours,

A handwritten signature in black ink that reads "Smit Thakkar".

Smit Thakkar  
Associate Project Engineer  
E-mail: Smit.Thakkar@ul.com

Reviewed by:

A handwritten signature in black ink that reads "William G. Morler".

Bill Morler  
Engineering Leader  
E-mail: William.Morler@ul.com



## APPENDIX: A

CLIENT INFORMATION	
Company Name	Alto-Shaam Inc.
Address	W164 N9221 Water St Po Box 450 Menomonee Falls, WI, 53052-0450

AUDIT INFORMATION:				
Description of Tests	Per Standard No.	UL 197	Edition/Revision Date	10 <sup>th</sup> 2018-01-26
		CSA C22.2 No. 109-17		3 <sup>rd</sup> 2017-05-01
		UL 710B		2 <sup>nd</sup> 8/14/2014
[X] Tests Conducted by <sup>1</sup> KRZYSZTOF SROKA				
[X] UL Staff supervising UL Staff in training Leo Carrillo				

TESTS TO BE CONDUCTED:				
Test No.	Start	Done <sup>3</sup>	Test Name	<input type="checkbox"/> Comments/Parameters <input type="checkbox"/> Tests Conducted by <sup>2</sup> <input type="checkbox"/> Link to separate data files <sup>4</sup>
1	2019-04-09	2019-04-12	<u>POWER INPUT TEST</u> (THREE PHASE): RATING (CSA 22.2 109-M1981):	
2	2019-04-09	2019-04-11	CAPTURE TEST:	
3	2019-04-12	2019-04-22	<u>EMISSION TEST</u> :	

Special Instructions -

[x] No general environmental conditions are specified in the Standard(s) or have been identified that could affect the test results or measurements.

#### RISK ANALYSIS RELATED TO TESTING PERFORMANCE:

The following types of risks have been identified. Take necessary precautions. This list is not all inclusive.

[x] Electric shock	[ ] Radiation
[x] Energy related hazards	[ ] Chemical hazards
[x] Fire	[ ] Noise
[x] Heat related hazards	[ ] Vibration
[x] Mechanical	[ ] Other (Specify)___

#### GENERAL TEST CONSIDERATIONS - ALL TESTS:

[Power Supply Connections]

Unless otherwise specified in the individual test methods, the appliance was connected to a 240 volt source of supply at ~~±50±~~ [60] Hz.

This supply connection was based on

- [x] The marked voltage rating
- [ ] The highest voltage of the applicable range of voltages



TEST LOCATION: (To be completed by Staff Conducting the Testing)					
<input checked="" type="checkbox"/> UL or Affiliate	<input type="checkbox"/> WTDP	<input type="checkbox"/> CTDP	<input type="checkbox"/> TPTDP	<input type="checkbox"/> TCP	<input type="checkbox"/> PPP
Company Name: UL LLC					
Address: 333 Pfingsten Rd, Northbrook, IL 60062					

TEST EQUIPMENT INFORMATION

UL test equipment information is recorded on Meter Use.

TEST SAMPLE IDENTIFICATION:

The table below is provided to establish correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Card No.	Date Received	<input type="checkbox"/> Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
2092348	2019-02-18	All	1	Alto-Shaam Inc., Model CTP10.20E, 208-240 Volt, 28.9 - 38.5 kW, 3PH, 50/60Hz.



**POWER INPUT TEST (THREE PHASE):  
RATING (CSA 22.2 109-M1981):**

UL 197 Sec. 47  
(6.2)

METHOD

**[x]** The supply voltage was adjusted to voltage and frequency as noted in "General Test Considerations", 240 V, 60 Hz.

**[x]** (c-UL) - To determine the proper test voltage for the Temperature (Normal) and Temperature (Abnormal) tests, the supply voltage was adjusted to the increased test voltage as noted below. Following the test at increased test voltage, the supply voltage was adjusted to the value necessary to cause the appliance to draw the increased test power, calculated as specified below.

Increased Test Voltage ( $V_t$ ): 216V for appliances rated 208V.  
250V for appliances rated between 220V-250V.

Increased Test Current ( $I_t$ ):  $I_r(V_t/V_r) = \text{_____}$  A

Increased Test Power ( $W_t$ ):  $W_r(V_t/V_r)^2 = \underline{41.8}$  (kW)

Where  $V_r$ ,  $I_r$ , and  $W_r$ , are the rated voltage, current, and power of the appliance, respectively. Note: when the appliance is rated for a range of voltages, the mean of the range is to be used as  $V_r$ .

PARAMETERS

Appliance Ratings:

Volts: 208 - 240; Current: \_\_\_\_\_ A; Power: 28.9 - 38.5 (kW)

RESULTS

Operating Conditions	Specified					Measured						
	Volts	Amps			Power, (kW)	Volts			Amps			Power (kW)
		L1	L2	L3		L1-L2	L2-L3	L1-L3	L1	L2	L3	
Full power operation, rated voltage	240	---	---	---	---	242	241	241	79.4	98.9	96.1	38.1
<b>[x]</b> Full power operation, rated power	---	---	---	---	38.5	244	242	243	79.8	99.2	96.6	38.5
C-UL Operating Conditions												
Full power operation, increased test voltage	250	---	---	---	---	252	250	251	82.0	101.8	99.4	40.9
<b>[x]</b> Full power operation, increased test power	---	---	---	---	41.8	255	253	254	82.9	102.8	100.6	41.8

**[x]** The input power [was] [~~was not~~] between 90% and 105% of the rated input power when the appliance was energized at rated voltage.



**CAPTURE TEST:**

UL 710B Sec. 58  
UL 710 Sec. 31

**METHOD**

The model CTP10.20E cooking appliance was placed under a hood operating at 500 CFM. Food product as specified below was then used for testing, see Emission Testing for specific details. The cooking area is to be observed for the presence of visible smoke and grease-laden air, and the hood assembly shall completely capture all of the emission as determined by observation.

**COOKING PRODUCT**

**[x]** Meat Cakes - Meat cakes, (Ground Beef, nominal 73 % lean, 4 in. diameter, minimum 1/4 in. thick and weighing not less than 5 oz.) The meat cakes were Thawed.

**COOKING METHOD**

**[Other]**

The quantity of meat cakes were placed on the pans to the maximum permitted by the area of the cooking surface (20 Qty) per tray unit holds 11 full trays. The meat cakes were cooked for 7 mins and new patties were placed for 8 hours (total of 11,660 patties). The test was repeated at least once or until complete capture could be determined.

Below is the Meat Cakes Recipe provided by the client:

Internal temp of cooked product must be 160°F  
Cooking Mode: Combi  
Humidity setting: 100%  
Oven temp setting: 375°F  
Fan speed setting: 60

Note to lab: Use the provided recipe as a starting point and check if it can be changed to cook faster.

**RESULTS**

Their ~~[was]~~ **[was not]** the presence of visible smoke and grease-laden air from the appliance during testing.

The sample **[did]** ~~[did not]~~ capture all of the emissions from the cooking appliance.

Note: Two trials were done as follow:

Settings	Combi mode	Convection mode
Temperature	400F	575F
Time	7 mins	8 mins
Fan	100%	100%
Humidity	100%	N/A
Mode	Turbo	Turbo



## METHOD

## TEST FOR EVOLUTION OF SMOKE OR GREASE-LADEN AIR (400°F):

The model CTP10.20E cooking appliance was placed under a hood operating at 500 CFM, and was tested using a method derived from EPA Method 202. Underwriters Laboratories provided meat cakes, 1/4 in. thick, 4 in. diameter for the test.

A 12 in. by 6 in. rectangular, 108 in. tall sheet metal stack was constructed on top of the hood. A sampling port was located approximately 80 in. downstream from the hood exhaust, at which point it was determined there was laminar flow. The sampler was assembled and an out of stack filter was used. A pre-leak check was conducted and determined to be < 0.02 ft/min. Sampling was determined to be done at 8 traverse points.

The oven was operated normally by cooking the following foods:

## [Other]

Meat cakes - cooked for 7 mins and new patties were placed for 8 hours (total of 11,660 patties). The quantity of meat cakes were placed on the pans to the maximum permitted by the area of the cooking surface (20Qty) per tray unit holds 11 full trays.

The cooking cycle was repeated for 8 hours of continuous cooking.

During the cooking operation, it was noted whether or not visible effluents evolved from the air exhaust of the hood. Gauge, meter and temperature readings were taken and recorded every 10 min. After cooking, the condition of the duct was noted and a post-leak check was conducted and determined to be < 0.02 ft<sup>3</sup>/min.

After being allowed to cool, the sampling equipment was disassembled. The glass-filter is to be removed using a pair of forceps and placed in a clean petri dish. The dish is to be sealed and labeled "SAMPLE 1".

A sample of the acetone of the same volume that will be used to rinse-out the nozzle and probe is to be placed into a clean sample bottle, sealed, and labeled "SAMPLE 2". The level of the liquid in the sample bottle is to be recorded.

The inside of the nozzle and probe is to be rinsed with acetone taking care to collect all the rinse material in a clean sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 3", and the level of the liquid in the bottle is to be recorded.

The liquid in the first three impingers is to be measured and the total volume is to be recorded which will be compared to the original volume. The liquid is to be quantitatively transferred to a clean sample bottle. Each impinger and the connecting glassware including the probe extension are to be rinsed twice with water. The rinse water is to be collected and added to the same sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 4" and the level of the liquid in the bottle is to be recorded.



This rinse process is to be repeated with two rinses of methylene chloride ( $\text{MeCl}_2$ ). The rinses are to be recovered in a clean sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 5" and the level of the liquid in the bottle is to be recorded.

A volume of water approximately equivalent to the volume of water used to rinse and a volume of  $\text{MeCl}_2$  approximately equivalent to the volume of  $\text{MeCl}_2$  used to rinse is to be placed in two clean sample bottles. The sample bottles are to be sealed, labeled "SAMPLE 6" and "SAMPLE 7" respectively, and the level of the liquid in the bottles is to be recorded.

The weight of the fourth impinger containing the silica gel is to be recorded and then the silica gel can be discarded.

The analysis phase was done in accordance with EPA Method 202, using the out of stack filter.

#### RESULTS

The results [~~are~~] [~~are not~~] considered acceptable because there [~~was~~] [~~was no~~] visible smoke emitted from the exhaust of the hood during the normal cooking operation. There [~~was~~] [~~was no~~] noticeable amounts of smoke accumulated in the test room after 8 hours of continuous cooking.

The total amount of grease-laden effluents collected by the sampling equipment was found to be  $0.77 \text{ mg/m}^3$ , which is [~~less~~] [~~more~~] than  $5 \text{ mg/m}^3$ .

The total grease emissions (per clause 78.2 of 710B) in pounds per hour per linear food of hood was  $0.000370 \text{ lb/hr/ft}$ .

NOTE: STACK AVG HUMIDITY AND TEMPERATURE:  
STACK TEMPERATURE: 89.4 F  
HUMIDITY INSIDE STACK: 36.7%



CONDENSIBLE MATTER  
(Lab Analysis)

Sample Bottle No.	Description	Volume, ml	Final Wt, mg
2	Acetone (Blank)	66.0	0.0
3	Acetone (Wash)	65.0	2.1
4&5	Solvent Phase(Wash)	190.0	1.7
4&5	Water Phase (Wash)	360.0+410.0=770.0	3.1
6&7	Solvent Phase (Blank)	190.0	0.0
6&7	Water Phase (Blank)	400.0	1.0

Filter paper weight before test- 643.1 mg

Filter paper weight after test- 644.1 mg

Analysis

1. The liquid level of all the sample bottles is to be measured.
2. The filter from sample ONE is to be removed and dried to constant weight by means of a desiccator or an oven. The weight of the filter is to be recorded.
3. The volume of sample TWO is to be determined. The liquid is then to be transferred to a beaker and evaporated to dryness. The volume of the liquid and the final weight of the condensable matter are to be recorded.
4. The volume of sample THREE is to be determined. The liquid is then to be transferred to a beaker and evaporated to dryness. The volume of the liquid and the final weight of the condensable matter are to be recorded.
5. The volumes of sample FOUR and FIVE are to be measured.
6. Samples FOUR and FIVE are to be combined. The solvent phase is to be mixed, separated, and then repeated with two  $\text{MeCl}_2$  washes.
7. The solvent extracts obtained from the procedure in 6 are to be placed in a beaker and evaporated to a constant weight. The final weight is to be recorded.
8. The water phase is to be placed in a beaker and evaporated to dryness. The final weight is to be recorded.
9. The volumes of samples SIX and SEVEN are to be determined. Sample bottles SIX and SEVEN are to be analyzed according to procedures 8 and 7 respectively.

## APPENDIX: B



CLIENT INFORMATION	
Company Name	Alto-Shaam Inc
Address	W164 N9221 Water St Po Box 450 Menomonee Falls, WI 53051

AUDIT INFORMATION:				
Description of Tests	Per Standard No.	UL 197	Edition/Revision Date	10 <sup>TH</sup> June 24, 2011
		CSA C22.2 No. 109		M1981 R2009
		UL 710B		2 <sup>nd</sup> September 2 <sup>nd</sup> 2011
<input checked="" type="checkbox"/> Tests Conducted by +		Dennis DeFord/Leo Carrillo/Ken Kingsbury/William G. Morler <hr style="width: 100%;"/> <div style="display: flex; justify-content: space-between;"> <span>Printed Name</span> <span>Signature</span> </div>		
<input type="checkbox"/> UL Staff supervising UL Staff in training		<hr style="width: 100%;"/> <div style="display: flex; justify-content: space-between;"> <span>Printed Name</span> <span>Signature</span> </div>		
Reviewed and accepted by qualified Project Handler		William G. Morler <hr style="width: 100%;"/> <div style="display: flex; justify-content: space-between;"> <span>Printed Name</span> <span><i>William G. Morler</i></span> </div>		

TESTS TO BE CONDUCTED:				
Test No.	Start	Done+++	Test Name	<input type="checkbox"/> Comments/Parameters <input checked="" type="checkbox"/> Tests Conducted by ++
1	2013-10-21	2013-10-26	POWER INPUT TEST (THREE PHASE): RATING (CSA 22.2 109-M1981):	
2	2013-10-21	2013-12-17	DIELECTRIC VOLTAGE-WITHSTAND TEST: DIELECTRIC STRENGTH (CSA 22.2 109-M1981):	William G. Morler
3	2013-10-21	2013-10-26	CAPTURE TEST:	
4	2013-10-21	2013-11-27	<u>EMISSION TEST:</u>	



TEST LOCATION: (To be completed by Staff Conducting the Testing)
<input checked="" type="checkbox"/> UL or Affiliate <input type="checkbox"/> WTDP <input type="checkbox"/> CTDP <input type="checkbox"/> TPTDP <input type="checkbox"/> TCP <input type="checkbox"/> PPP <input type="checkbox"/> WMT <input type="checkbox"/> TMP <input type="checkbox"/> SMT
Company Name: UL LLC / NBK
Address:

TEST EQUIPMENT INFORMATION

UL test equipment information is recorded on Meter Use in UL's Laboratory Project Management (LPM) database.

TEST SAMPLE IDENTIFICATION:

The table below is provided to establish correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Card No.	Date Received	Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
1733100	2013-10-08	ALL	1	Alto-Shaam, Model 10.20, Combi Oven, rated 208-240 V, 16-22.1 kW, 3 PH does not employ integral recirculating system
1733101	2013-10-08	3,4		Oven Vent Hood
1737578	2013-10-15	3,4		Cooking trays
1737579	2013-10-15	3,4		Cooking trays
1737580	2013-10-15	3,4		Cooking trays
1737581	2013-10-15	3,4		Cooking trays
1737582	2013-10-15	3,4		Cooking trays
1739699	2013-10-17	all		Oven cart



POWER INPUT TEST (THREE PHASE):  
RATING (CSA 22.2 109-M1981):

UL 197 Sec. 47  
(6.2)

METHOD

**[X]** The supply voltage was adjusted to voltage and frequency as noted in "General Test Considerations", 240 V, 60 Hz.

(c-UL) - To determine the proper test voltage for the Temperature (Normal) and Temperature (Abnormal) tests, the supply voltage was adjusted to the increased test voltage as noted below. Following the test at increased test voltage, the supply voltage was adjusted to the value necessary to cause the appliance to draw the increased test power, calculated as specified below.

Increased Test Voltage ( $V_t$ ): 216V for appliances rated 208V.  
250V for appliances rated between 220V-250V.

Increased Test Current ( $I_t$ ):  $I_r(V_t/V_r) = \underline{\hspace{2cm}}$  A

Increased Test Power ( $W_t$ ):  $W_r(V_t/V_r)^2 = \underline{24.0}$  (kW)

Where  $V_r$ ,  $I_r$ , and  $W_r$ , are the rated voltage, current, and power of the appliance, respectively. Note: when the appliance is rated for a range of voltages, the mean of the range is to be used as  $V_r$ .

PARAMETERS

Appliance Ratings:

Volts: 208; Current:            A; Power: 22.1 (kW)

POWER INPUT TEST (THREE PHASE): (CONT'D)  
 RATING (CSA 22.2 109-M1981):

UL 197 Sec. 47  
 (6.2)



RESULTS

Operating Conditions	Specified					Measured						
	Volts	Amps			Power, (kW)	Volts			Amps			Power, (W)(kW)
		L1	L2	L3		L1-L2	L2-L3	L1-L3	L1	L2	L3	
Full power operation, rated voltage	208	---	---	---	---	211	219	208.3	67.4	88.6	82.6	29.1
<input type="checkbox"/> Full power operation, rated current	---				---							
<input checked="" type="checkbox"/> Full power operation, rated power	---	---	---	---	22.1							
<input type="checkbox"/> Full power operation, ___V		---	---	---	---							

Note: These readings were taken for verification.

The input current [was] ~~[was not]~~ between 90% and 105% of the rated input current when the appliance was energized at rated voltage.

Note: The input values noted in the input test table were for all elements and convection and fan motors operating at steady state. The actual unit ratings are based on additional options including pump motors and accounts for increase in current when convection motors are reversing that were not included during the input test. The input test shows that the heating elements were operating at their marked input values regardless of the motor load fluctuations.



DIELECTRIC VOLTAGE-WITHSTAND TEST:  
DIELECTRIC STRENGTH (CSA 22.2 109-M1981):

UL 197 Sec. 51  
(6.7)

#### METHOD

The test was conducted with equipment employing a 500 volt-ampere or larger capacity transformer capable of manual or automatic regulation of the output voltage.

The applied potential was increased from zero to the required value in a uniform rate. This potential was held at that value for 1 minute.

During the test, all contacts energizing current-carrying parts (such as conductors, relays, and thermostats) were in the closed position.

Components providing a current path in parallel with the insulation to be tested, such as discharge bleeder resistors for capacitors and EMI filters, [were] [were not] disconnected during the test.

[Appliance which employs water or other liquid] The appliance was tested with a hard water solution of 0.5 grams of calcium sulphate ( $\text{CaSO}_4$ ) per liter of distilled water (0.07 ounces  $\text{CaSO}_4$  per gallon of distilled water). The reservoir was filled to the normal operating level.

#### PRIMARY CIRCUITS

The appliance was operated for 2 hours], sufficient to allow it to attain maximum operating temperature under conditions of intended use.

The appliance was subjected to the application of a 40 - 70 hertz essentially sinusoidal potential for 1 minute without electrical breakdown:

Between live parts of primary circuits and dead metal parts;

The test potential was 1000 volts

#### RESULTS

In each case there ~~[was]~~ [was no] dielectric breakdown.

Operation of the test equipment was checked before and after the test by observing breaker operation with:

leads connected together

a checking resistor



CAPTURE TEST:

UL 710B Sec. 58  
UL 710 Sec. 31

METHOD

The model 10.20 Combi Oven without Hood was placed under a hood operating at 500 CFM. Food product as specified below was then used for testing, see Emission Testing for specific details. The cooking area is to be observed for the presence of visible smoke and grease-laden air, and the hood assembly shall completely capture all of the emission as determined by observation.

COOKING PRODUCT

**[X]** Other - Quartered Chickens weighing 2.97 lbs. avg.

COOKING METHOD

[Other]  
each load consisted of 25 Quartered Chickens weighing 2.97 lbs. average cooked for 25 minutes at 350F/80% Humidity (turbo on)

RESULTS

COMBI-OVEN WITHOUT RECIRCULATING HOOD

There ~~[was]~~ [was not] the presence of visible smoke and grease-laden air from the appliance during testing.

The sample [did] ~~[did not]~~ capture all of the emissions from the cooking appliance.

COMBI-OVEN WITH RECIRCULATING HOOD

There ~~[was]~~ [was not] the presence of visible smoke and grease-laden air from the appliance during testing.

The sample [did] ~~[did not]~~ capture all of the emissions from the cooking appliance.



METHOD

TEST FOR EVOLUTION OF SMOKE OR GREASE-LADEN AIR (350°F):

The model 20.10 cooking appliance was placed under a hood operating at 500 CFM, and was tested using a method derived from EPA Method 202. The Underwriters Laboratories provided the food load for the test.

A 12 in. by 6 in. rectangular, 108 in. tall sheet metal stack was constructed on top of the hood. A sampling port was located approximately 80 in. downstream from the hood exhaust, at which point it was determined there was laminar flow. The sampler was assembled and an out of stack filter was used. A pre-leak check was conducted and determined to be < 0.02 ft/min. Sampling was determined to be done at 8 traverse points.

The oven was operated normally by cooking the following foods:

[Other]

Chickens of 2.97 lbs. (average) Weights.

APPLIANCE SETTINGS	
Cook Time	25 minutes
Temperature Set-point	350F
Humidity Set-point	80%
Fan set-point	100%
other	TURBO

NOTE: Cook time was determined by placing thermocouples into random chicken quarters (breast and thigh) and cooking to temp as defined by FoodSafety.gov (15498 2013-12-13)

The cooking cycle was repeated for 8 hours of continuous cooking.

During the cooking operation, it was noted whether or not visible effluents evolved from the air exhaust of the hood. Gauge, meter and temperature readings were taken and recorded every 10 min. After cooking, the condition of the duct was noted and a post-leak check was conducted and determined to be < 0.02 ft<sup>3</sup>/min.



After being allowed to cool, the sampling equipment was disassembled. The glass-filter is to be removed using a pair of forceps and placed in a clean petri dish. The dish is to be sealed and labeled "SAMPLE 1".

A sample of the acetone of the same volume that will be used to rinse-out the nozzle and probe is to be placed into a clean sample bottle, sealed, and labeled "SAMPLE 2". The level of the liquid in the sample bottle is to be recorded.

The inside of the nozzle and probe is to be rinsed with acetone taking care to collect all the rinse material in a clean sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 3", and the level of the liquid in the bottle is to be recorded.

The liquid in the first three impingers is to be measured and the total volume is to be recorded which will be compared to the original volume. The liquid is to be quantitatively transferred to a clean sample bottle. Each impinger and the connecting glassware including the probe extension are to be rinsed twice with water. The rinse water is to be collected and added to the same sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 4" and the level of the liquid in the bottle is to be recorded.

This rinse process is to be repeated with two rinses of methylene chloride ( $\text{MeCl}_2$ ). The rinses are to be recovered in a clean sample bottle. The sample bottle is to be sealed, labeled "SAMPLE 5" and the level of the liquid in the bottle is to be recorded.

A volume of water approximately equivalent to the volume of water used to rinse and a volume of  $\text{MeCl}_2$  approximately equivalent to the volume of  $\text{MeCl}_2$  used to rinse is to be placed in two clean sample bottles. The sample bottles are to be sealed, labeled "SAMPLE 6" and "SAMPLE 7" respectively, and the level of the liquid in the bottles is to be recorded.

The weight of the fourth impinger containing the silica gel is to be recorded and then the silica gel can be discarded.

The analysis phase was done in accordance with EPA Method 202, using the out of stack filter.



RESULTS

COMBI-OVEN WITHOUT RECIRCULATING HOOD

The results [are] [~~are not~~] considered acceptable because there [~~was~~] [was no] visible smoke emitted from the exhaust of the hood during the normal cooking operation. There [~~was~~] [was no] noticeable amounts of smoke accumulated in the test room after 8 hours of continuous cooking.

The total amount of grease-laden effluents collected by the sampling equipment was found to be 0.74 mg/m<sup>3</sup>, which is [less] [~~more~~] than 5 mg/m<sup>3</sup>.

The total grease emissions (per clause 78.2 of 710B) in pounds per hour per linear food of hood was 0.000348 lb/hr/ft.

CONDENSIBLE MATTER  
(Lab Analysis)

Sample Bottle No.	Description	Volume, ml	Final Wt, mg
1	Filter Paper	-	613.4
2	Acetone (Blank)	57	1068.8
3	Acetone (Wash)	52	1077.0
4&5	Solvent Phase(Wash)	200	1057.2
4&5	Water Phase (Wash)	660	1086.8
6&7	Solvent Phase (Blank)	190	1051.6
6&7	Water Phase (Blank)	590	1093.0

Filter paper weight before test- 609.6 mg



RESULTS

COMBI-OVEN WITH RECIRCULATING HOOD

The results [are] [~~are not~~] considered acceptable because there [~~was~~] [was no] visible smoke emitted from the exhaust of the hood during the normal cooking operation. There [~~was~~] [was no] noticeable amounts of smoke accumulated in the test room after 8 hours of continuous cooking.

The total amount of grease-laden effluents collected by the sampling equipment was found to be 0.58 mg/m<sup>3</sup>, which is [less] [~~more~~] than 5 mg/m<sup>3</sup>.

The total grease emissions (per clause 78.2 of 710B) in pounds per hour per linear food of hood was 0.000301 lb/hr/ft.

Condensible Matter  
(Lab Analysis)

Sample Bottle No.	Description	Volume, ml	Final Wt, mg
1	Filter Paper	-	606.2
2	Acetone (Blank)	41	1141.4
3	Acetone (Wash)	41	1094.7
4&5	Solvent Phase (Wash)	180	1129.0
4&5	Water Phase (Wash)	550	1120.4
6&7	Solvent Phase (Blank)	560	1107.5
6&7	Water Phase (Blank)	170	1078.4

Filter paper weight before test- 606.3 mg



### Analysis

1. The liquid level of all the sample bottles is to be measured.
2. The filter from sample ONE is to be removed and dried to constant weight by means of a desiccator or an oven. The weight of the filter is to be recorded.
3. The volume of sample TWO is to be determined. The liquid is then to be transferred to a beaker and evaporated to dryness. The volume of the liquid and the final weight of the condensable matter are to be recorded.
4. The volume of sample THREE is to be determined. The liquid is then to be transferred to a beaker and evaporated to dryness. The volume of the liquid and the final weight of the condensable matter are to be recorded.
5. The volumes of sample FOUR and FIVE are to be measured.
6. Samples FOUR and FIVE are to be combined. The solvent phase is to be mixed, separated, and then repeated with two  $\text{MeCl}_2$  washes.
7. The solvent extracts obtained from the procedure in 6 are to be placed in a beaker and evaporated to a constant weight. The final weight is to be recorded.
8. The water phase is to be placed in a beaker and evaporated to dryness. The final weight is to be recorded.
9. The volumes of samples SIX and SEVEN are to be determined. Sample bottles SIX and SEVEN are to be analyzed according to procedures 8 and 7 respectively.