2024-12-09

Chefeon Inc.
1621 E Saint Andrew Pl # 202
Santa Ana, CA, 92705

E-mail: chefeon@chefeon.com

Reference: Project: 4791449478

Product: EPA 202 TEST METHOD: USING THE COMMERCIAL COOKING ROBOT, MODEL XA460 USING THE BELOW FOOD PRODUCT AS MEDIA.

Chefeon Inc,

Per your request, project 4791449478 was opened for the evaluation of grease-laden vapors produced from the commercial cooking robot, Model XA460.

The scope of this project was to determine the total grease emissions from cooking per manufacturer's instructions, as the specified food load as noted in Appendix A. Appendix B indicates different recipes from the menu. 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, Second Edition, 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 November 26th, 2024. This letter will report the results of the EPA202 test.

For the record, the test was conducted using the Chefeon cooking robot, Model XA460, rated 208 V, 3 phase, 8000 W. The test media, food load and oven programming as shown in Appendix A and B were provided by the client. The results are considered to be compliant 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 0.93 mg/m^3, which is less the 5 mg/m^3 limit. No evaluation was conducted in regard to fire protection.

UL LLC did not select the samples, determine whether the samples were representative of production samples or witness the production of the test samples, nor were we provided with information relative to the formulation or identification of component materials used in the test samples. The test results apply only to the actual samples tested.

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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 4791449478 and we are therefore closing the 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,



Smit Thakkar
Project Engineer
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Reviewed by:



Fred Zaplatosch
Sr. Staff Engineer
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APPENDIX: A

CLIENT INFORMATION	
Company Name	Chefeon Inc.
Address	1621 E Saint Andrew Pl # 202 Santa Ana, CA, 92705-4932, US

AUDIT INFORMATION:	
Description of Tests Per Standard Number and Edition/ Revision Date	UL 197, Commercial Electric Cooking Appliances, Edition 10, Revision Date 04/07/2023
	CSA C22.2 No. 109 3rd 2023-03
[x] Tests Conducted by[1]	FERNANDO FERNANDEZ JR / JESUS MARTINEZ JR
[X] UL Staff supervising UL Staff in training	Leo Carrillo

TESTS TO BE CONDUCTED:

Test No.	Done[3]	Test Name	**[ ]** Comments/Parameters **[ ]** Tests Conducted by[2] **[ ]** Link to separate data files[4] **[ ]** CTF Stage/LSV declaration[5]
1	12/02/2024	POWER INPUT TEST THREE PHASE RATING CSA 22 2 109	
2	11/25/2024	CAPTURE TEST	
3	12/06/2024	EMISSION TEST	

Special Instructions -

[X] Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Ambient Temperature, C ~~?~~10-40 Relative Humidity, % ~~?~~ Barometric Pressure, mBar ~~?~~

[] 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)__?

TEST LOCATION: (To be completed by Staff Conducting the Testing)					
[x]UL or Affiliate	[]WTDP	[]CTDP	[]TPTDP	[]TCP	[]PPP
	[]RWT (WTDP only)		[]SCTDP	[]PWT	
	[]CTF Stage 1	[]CTF Stage 2	[]CTF Stage 3	[]CTF Stage 4	[]LSV (CTF 2, 3, or 4)
Note: RWT must be selected with WTDP. LSV must be selected with CTF Stage 2, 3, or 4					
Company Name: UL LLC					
Address: 333 Pfingsten Rd Northbrook IL 60062					

TEST EQUIPMENT INFORMATION

[X] 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	[] Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
7544312	2024-10-16	All	1	Chefeon, Complete assembly of Automatic IH Commercial Cooking Machine, Model XA-460, rated 208 V, 8000 W, 3 ph

POWER INPUT TEST (THREE PHASE): UL 197 Sec. 47 (6.2)

RATING (CSA 22.2 109):

METHOD

[x] The supply voltage was adjusted to voltage and frequency as noted in "General Test Considerations", **[**208 V**]**, **[**60 Hz**]**.

[ ] The supply voltage was adjusted to the **[**rated voltage**]** **[**mean of the rated voltage range**]** at rated frequency, **[**___ V**]**, **[**___ Hz**]**.

The power input was measured with the appliance at the intended operating temperature under full-load conditions.

[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): $I_r(V_t/V_r)$ = _____ A

Increased Test Power (W_t): $W_r(V_t/V_r)^2$ = _8627_ (W)

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 V_; Current: _____ A; Power: _8000_ (W)

POWER INPUT TEST (THREE PHASE): (CONT'D) UL 197 Sec. 47
RATING (CSA 22.2 109): (6.2)

RESULTS – FOR REFERENCE

Operating Conditions	Specified					Measured						
		Amps			Power,	Volts			Amps			Power,
	Volts	L1	L2	L3	(W)	L1-L2	L2-L3	L1-L3	L1	L2	L3	W
Full power operation, rated voltage	208	---	---	---	---	209.36	208.62	205.65	22.1	20.9	20.9	7407
[x] Full power operation, rated power	---	---	---	---	8000	---	---	---	---	---	--	---
C-UL Operating Conditions												
Full power operation, increased test voltage	216	---	---	---	---	216.6	217.0	216.6	21.0	19.8	19.9	7300
[x] Full power operation, increased test power	---	---	---	---	8627	---	---	---	---	---	---	---

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

*Note: We are unable to reach Full Power Operation of 8000W/8627W. Due to the unit not being able to adjust to the wattage.

Note – For Reference only. – S.T. 2024-12-09.

CAPTURE TEST: UL 710B Sec. 58
UL 710 Sec. 31

METHOD

The model XA-460 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] Other - _Recipes – Chili pork, Kung Pow Chicken (Precooked), Kung Pow Chicken (Raw),Fried Rice, Noodles, Orange Chicken, Black Pepper Beef,Chicken with Mushrooms and Beef with Broccoli. Each recipe cooked for an average time of 3:27Min.

COOKING METHOD

Other **-** The recipes were prepared using Oil Seasonings, fresh meats and vegetables. Total cooked load was 23, 2 for the first hour and 3 per hour for the rest of the 8hr test. The sample was on self-cleaning mode and manually rinsed down by the client after every 5 loads.

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.

EMISSION TEST: UL 710B Sec. 59

METHOD

TEST FOR EVOLUTION OF SMOKE OR GREASE-LADEN AIR (206°C):

The model XA-460 cooking appliance was placed under a hood operating at 500 CFM, and was tested using a method derived from EPA Method 202. The **[**Manufacturer**]** **[**Underwriters Laboratories**]** also 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

Recipes – Chili pork, Kung Pow Chicken (Precooked), Kung Pow Chicken (Raw),Fried Rice, Noodles, Orange Chicken, Black Pepper Beef, Chicken with Mushrooms and Beef with Broccoli.

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^3/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 ($MeCl_2$). 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 $MeCl_2$ approximately equivalent to the volume of $MeCl_2$ 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 _0.93_ mg/m^3, which is [**less**] [~~more~~] than 5 mg/m^3.

The total grease emissions (per clause 78.2 of 710B) in pounds per hour per linear food of hood was _0.000485_ lb/hr/ft.

EMISSION TEST (CONT'D): UL 710B Sec. 59

CONDENSIBLE MATTER
(Lab Analysis)

Sample Bottle No.	Description	Volume, ml	Final Wt, mg
2	Acetone (Blank)	57.0	0.5
3	Acetone (Wash)	64.0	0.8
4&5	Solvent Phase(Wash)	260+350=610	3.2
4&5	Water Phase (Wash)	270.0	3.8
6&7	Solvent Phase (Blank)	280.0	0.7
6&7	Water Phase (Blank)	320.0	0.7

Filter paper weight before test- 602.2 mg
Filter paper weight after test- 602.2 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 $MeCl_2$ 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.

Note: Inside the stack average temperature and average humidity through the 8-hour test are as follow:
Temperature: 76.98F
Humidity: 31.28%

APPENDIX: B

						MINS:SECS
x7	Chili pork					Cook Time
	Veggies	Meat	Veggies	Meat w/Garlic		3:42
	4.84oz	11oz	119.97g	273.79g		
x2	Kung pow chicken Pre cook					Cook time
	Garlic	Nuts	Veggies	Chicken		3:40
	2.9oz	2oz	2.5oz	12.8oz		
x5	Kung pow chicken RAW					Cook Time
	Chicken	Ginger and garlic	Nuts	Veggies		3:50
	1.1lb	47.2g	76.9g	60.8g		
x1	Fried Rice					
	White Rice	Veggies	Eggs	Carrots and peas		
	1.18lb	23.4g	2	108.6g		Cook Time
						4:41
x1	Noodles					
	Sprouts	Green onions	Noodles			
	118.2g	32.59	235.4g			Cook Time
						4:21
x2	Orange chicken					Cook Time
	chicken	veggies				2:07
	1.46lbs	89g				
x1	Black Pepper Beef					Cook Time
	Beef	Veggie				2:31
	197g	149.9g				
x2	Chicken & Mushrooms					Cook time
	Carrots and Mushroom	Chicken				3:01
	178.83g	217.92g				
x2	Beef & Broccoli					Cook Time
	Broccoli and carrots	Beef				3:14
	230.78g	197.4g				