TurboChef Technologies Inc.

HhC 2020 Ventless Submittal Information

Project _____

Item No. _____

Quantity _____

HIGH h CONVEYOR 2020™

EXTERIOR CONSTRUCTION

- 430 stainless steel front, top, sides and back
- Cool to touch covers and panels

INTERIOR CONSTRUCTION

- Stainless steel interior
- 20-inch cook chamber

STANDARD FEATURES

- Small footprint with throughput exceeding other 28-inch conveyors
- Independently-controlled top and bottom air impingement
- Variable-speed High h recirculating impingement airflow system
- Stackable design up to 3 high (requires stacking kits)
- Variable-speed blower motors
- Easy to clean mono-finger design
- Idle mode for energy conservation
- Built-in self diagnostics for monitoring oven components
- Left or right feed conveyor belt direction via software
- Includes plug and cord (6 ft. nominal)
- Includes two 6" conveyor extensions
- Warranty – one year parts and labor
- Smart voltage sensor technology (U.S. only)

OPTIONAL FEATURES

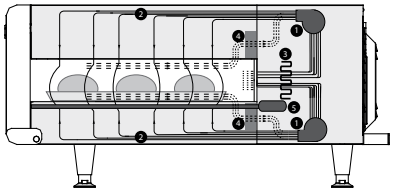
- Split belt with individually-adjustable speed settings (split 50/50 and 70/30)
- Dual catalytic converters for ventless operation.†

PERFORMANCE

- The High h Conveyor 2020 offers high-heat transfer rates for accelerated cooking, a small enough footprint to fit virtually any application, and does not require the energy consumption and higher HVAC needs of larger ovens.

VENTILATION

- UL (KNLZ) listed for ventless operation.†
- EPA 202 test (8 hr):
  - Product: Pepperoni Pizza
    Results: 1.05 mg/m^3
  - Product: Sandwiches
    Results: 1.91 mg/m^3
    Ventless Requirement: <5.00 mg/m^3
- Internal catalytic filtration to limit smoke, grease, and odor emissions.



1. Blower Motor
2. Impinged Air
3. Impingement Heater
4. Catalytic Converters (optional)
5. Conveyor Motor

ANSI/NSF #4
81Y5

This product conforms to the ventilation recommendations set forth by NFPA96 using EPA202 test method.

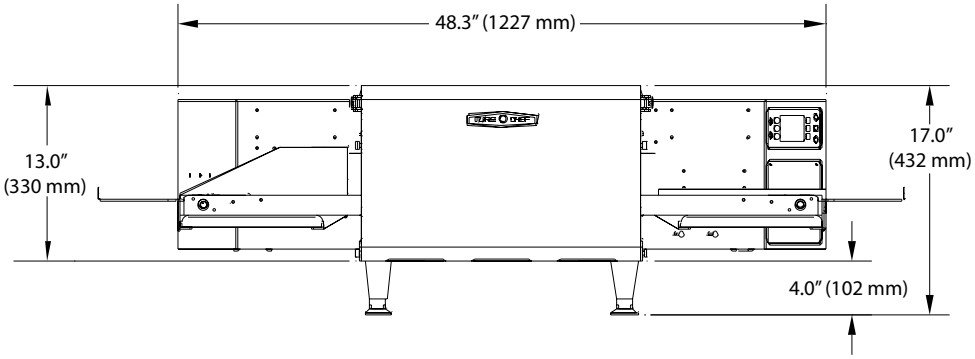
† Ventless certification is for all food items except for foods classified as "fatty raw proteins." Such foods include bone-in, skin-on chicken, raw hamburger meat, raw bacon, raw sausage, steaks, etc. If cooking these types of foods, consult local HVAC codes and authorities to ensure compliance with ventilation requirements.

Ultimate ventless allowance is dependent upon AHJ approval, as some jurisdictions may not recognize the UL certification or application. If you have questions regarding ventless certifications or local codes please email ventless.help@turbochef.com

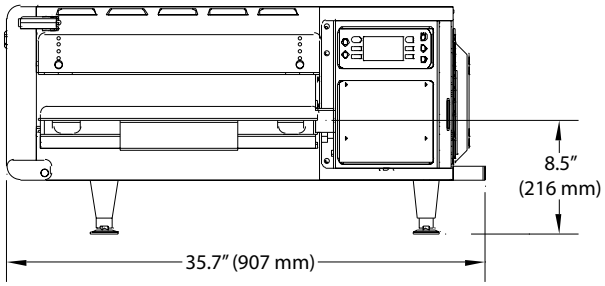
HIGH h CONVEYOR 2020™

HIGH h CONVEYOR 2020™

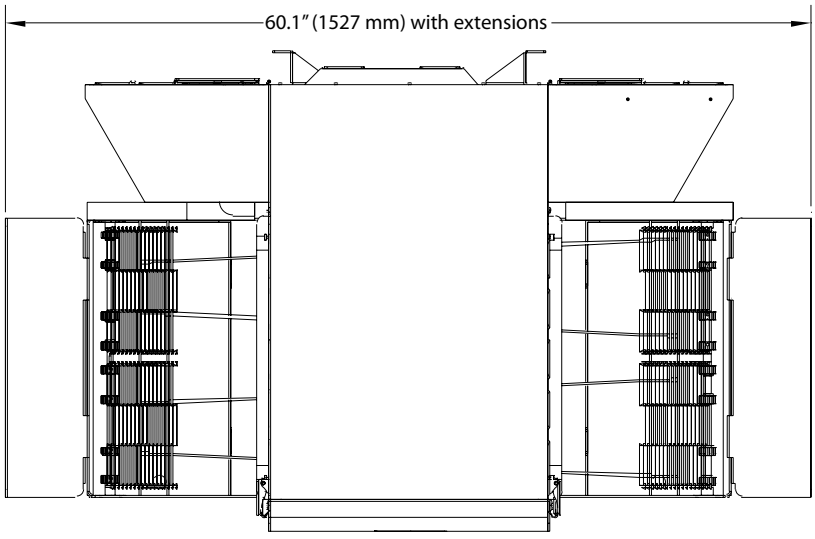
Front View



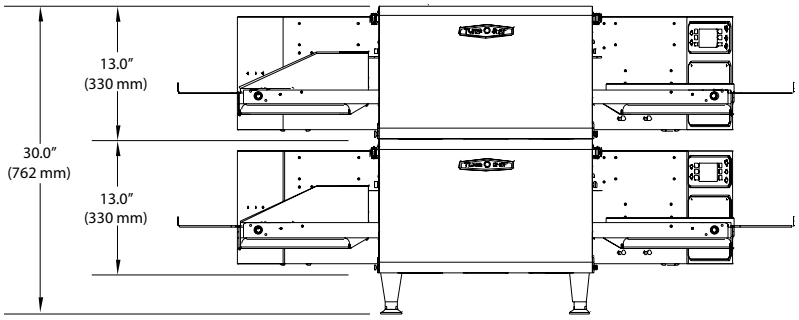
Side View

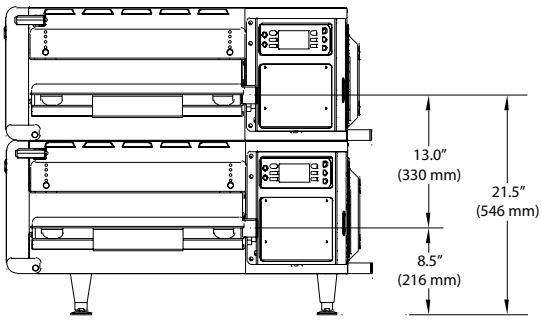


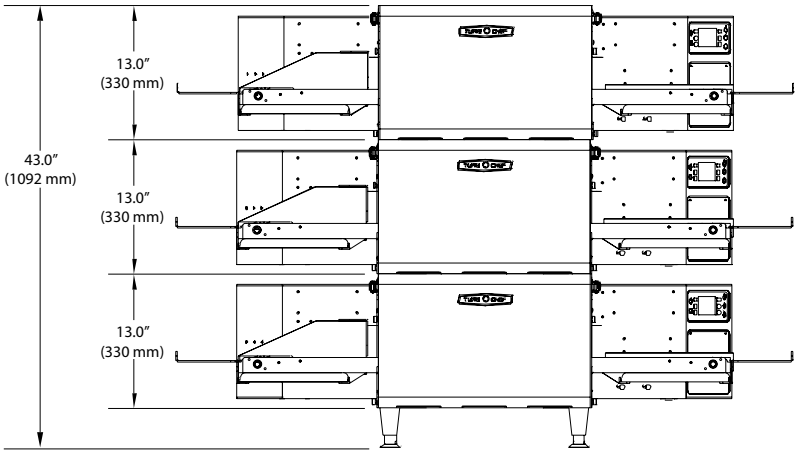
Top View

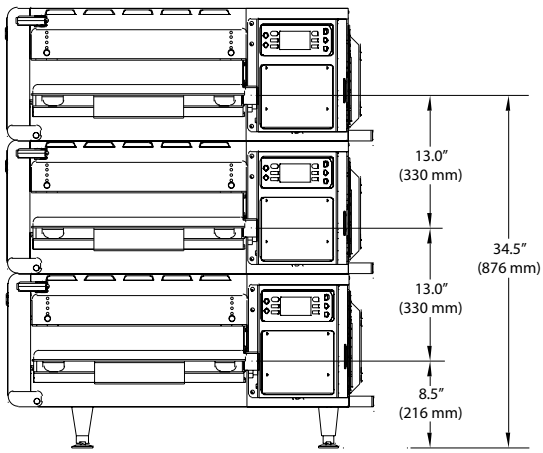


Stacked Views







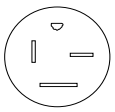


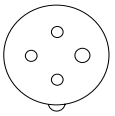
DIMENSIONS		
SINGLE UNITS		
Height	17.0″	432 mm
Width	48.3″	1227 mm
Depth	35.7″	907 mm
Weight	195 lbs.	88.5 kg
Cook Chamber		
Baking Area	2.8 ft^2	0.26 m^2
Belt Length	48.3″	1227 mm
Belt Width (Single)	20″	508 mm
Belt Width (50/50 Split)	9.5″ / 9.5″	241 mm / 241 mm
Belt Width (70/30 Split)	15″ / 4″	381 mm / 102 mm
Adjustable Opening (Min/Max)	1″ / 3″	25 mm / 76 mm
Max Operating Temp	550°F	288°C
Bake Time Range	30 seconds to 15 minutes	
Wall Clearance		
Top	10″	254 mm
Sides	0″	0 mm
Back	0″	0 mm

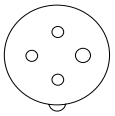
SHIPPING INFORMATION
U.S.: All ovens shipped within the U.S. are packaged in a double-wall corrugated box banded to a wooden skid. **International:** All International ovens shipped via Air or Less than Container Loads are packaged in wooden crates.
Box size: 55" (1,397 mm) x 43" (1,092 mm) x 27" (686 mm) **Crate size:** 58" (1,473 mm) x 46" (1,168 mm) x 28" (711 mm) **Item class:** 85 NMFC #26770 HS code 8419.81
Approximate boxed weight: 300 lb. (136 kg) **Approximate crated weight:** 410 lb. (186 kg)
Minimum entry clearance required for box: 27.5" (699 mm) **Minimum entry clearance required for crate:** 28.5" (724 mm)

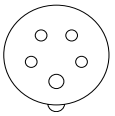
SEE OPPOSITE SIDE FOR ILLUSTRATIONS

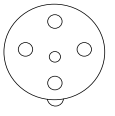
TurboChef Global Operations
2801 Trade Center Drive
Carrollton, Texas 75007 USA
US: 800.90TURBO (800.908.8726)
International: +1 214.379.6000
Fax: +1 214.379.6073
turbochef.com

ELECTRICAL SPECIFICATIONS - USA		
HCT-4215-1 (Single Belt) HCT-4215-4 (50 / 50 Split Belt) HCT-4215-7 (70 / 30 Split Belt) HCT-4215-16 (65 / 35 Split Belt)		 NEMA 15-50P
Phase	3 Phase	
Voltage	208/240 VAC	
Frequency	50/60 Hz	
Current Draw	40 Amp	
Supply	4 Wire	
Breakers	50 Amp	

ELECTRICAL SPECIFICATIONS - CANADA		
HCT-4215-10C (Single Belt) HCT-4215-11C (50 / 50 Split Belt) HCT-4215-12C (70 / 30 Split Belt)		 UL 4 Pin, 60 Amp
Phase	3 Phase	
Voltage	208/240 VAC	
Frequency	50/60 Hz	
Current Draw	40/46 Amp	
Supply	4 Wire	
Breakers	50/60 Amp	

ELECTRICAL SPECIFICATIONS - EUROPE/ASIA (DELTA)		
HCT-4215-2D (Single Belt) HCT-4215-5D (50 / 50 Split Belt) HCT-4215-8D (70 / 30 Split Belt) HCT-4215-24D (65 / 35 Split Belt)		 IEC 4 Pin, 63 Amp
Phase	3 Phase	
Voltage	220 - 240 VAC	
Frequency	50/60 Hz	
Current Draw	40 Amp	
Supply	4 Wire	
Breakers	50 Amp	

ELECTRICAL SPECIFICATIONS - EUROPE/ASIA (WYE)		
HCT-4215-3W (Single Belt) HCT-4215-6W (50 / 50 Split Belt) HCT-4215-9W (70 / 30 Split Belt) HCT-4215-23W (65 / 35 Split Belt)		 IEC 5 Pin, 32 Amp
Phase	3 Phase	
Voltage	380 - 415 VAC	
Frequency	50/60 Hz	
Current Draw	20 Amp	
Supply	5 Wire	
Breakers	32 Amp	

ELECTRICAL SPECIFICATIONS - AUSTRALIA		
HCT-4215-20W (Single Belt) HCT-4215-21W (50 / 50 Split Belt) HCT-4215-22W (70 / 30 Split Belt)		 IEC 5 Pin, 32 Amp
Phase	3 Phase	
Voltage	380 - 415 VAC	
Frequency	50/60 Hz	
Current Draw	20 Amp	
Supply	5 Wire	
Breakers	32 Amp	

Note: To specify a ventless model on an oven order, add a "-V" to the end of the applicable part numbers listed above.

C UL US 3RUB

LISTED

Commercial Conveyor Oven with Integral Systems for Limiting the Emissions of Grease Laden Air

This Product Conforms to the Ventilation Recommendations Set Forth by NFPA96 Using EPA202 Test Method

HCT-4181 / Rev B / Nov 08

the standard in safety

Underwriters Laboratories

NOTICE OF AUTHORIZATION TO APPLY THE UL MARK

08/21/2009

Turbochef Technologies Inc
Mr. James Pool III
Suite 105
4240 International Pky
Carrollton Tx 75007, Us

Our Reference:	File E319600, Vol. 1	Project Number	09NK09276
Your Reference:	James K. Pool 6/9/09		
Project Scope:	E319600, Listing Evaluation of Grease-Laden Emission From the Model HHC2020 Conveyor Oven.		

Dear Mr. James Pool III:

UL's investigation of your product(s) has been completed under the above Reference Number and the product was determined to comply with the applicable requirements.

This letter temporarily supplements the UL Follow-Up Services Procedure and serves as authorization to apply the UL Mark only at authorized factories under UL's Follow-Up Service Program.

To provide the manufacturer with the intended authorization to use the UL Mark, the addressee must send a copy of this notice to each manufacturing location currently authorized in File E319600, Vol. 1.

This authorization is effective from the date of this Notice and only for products at the indicated manufacturing locations. Records in the Follow-Up Services Procedure covering the product are now being prepared and will be sent in the near future. This letter authorizes application of the UL Mark for 90 days from the date of this letter.

Products that bear the UL Mark shall be identical to those that were evaluated by UL and found to comply with UL's requirements. If changes in construction are discovered, appropriate action will be taken for products not in conformance with UL's requirements and continued use of the UL Mark may be withdrawn. UL may elect to withdraw use of the UL Mark if the Applicant or Manufacturer fails to comply with UL's requirements including ongoing compliance of the product, under UL's Follow-Up Service.

Manufacturer's Note: Section 3 constitutes
UL KNLZ approval for pizzas

Any information and documentation provided to you involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

The contents of this Letter are intended solely for the use of UL and the Applicant. The opinions and findings of UL represent its judgment given with due consideration to the necessary limitations of practical operation in accordance with UL's objectives and purposes. UL shall not otherwise be responsible for the use of or reliance upon the contents of this letter by anyone. UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages, arising out of or in connection with the use or reliance upon the contents of this letter to anyone other than the Applicant as provided in the agreement between UL and Applicant. Any use or reference to UL's name or certification mark(s) by anyone other than the Applicant in accordance with the agreement is prohibited without the express written approval of UL.

Very truly yours,

William Morler

Project Engineer
William.Morler@us.ul.com

NBK9D6C-8A5589

Reviewed by:

Fred Zaplatosch
847-664-2853
Staff Engineer
Fred.Zaplatosch@us.ul.com

Manufacturer note: this section contains UL test data for actual UL compliance testing. Testing was performed with pepperoni pizzas.

File: E319600

Project: 09NK09276

Date: 07/29/2009

Client:

TurboChef

Model:	Product Tested
HHC2020	Conveyor oven

TurboChef
Model: **HHC2020**

Calculations needed for Nozzle Size

$\Delta H_@$	=	40.281		This number is calculated when device is calibrated
% Oxygen	=	20.65	$\%O_2$	Oxygen inside stack during operation
% Carbon	=	0.01	%CO2	Carbon Dioxide inside stack during operation
Stack Temperature	=	22	°C	Temperature inside stack during operation
Barametric Pressure	=	737	mmHg	Barametric pressure at location of meter
Stack Static Pressure	=	-5.842	mm H_2O	Static Pressure inside of duct
Average Square root ΔP	=	2.554	ΔP mm H_2O	Enter pressure differential at each transvers point in mm H_2O, then take square root of ΔP.

	Pressure	CFM		Pressure
1	6.35	486	**5**	7.11
2	7.37	530	**6**	6.60
3	5.59	525	**7**	5.59
4	6.60	535	**8**	7.11
				Avg

# Travers Points		8

Meter Temperature	=	23	°C	
Pitot Tube Coefficient	=	0.84		
% Moisture	=	45		
Sample Rate	=	21.24	Lpm	
Ideal Nozzle Size		9.199	mm	When numbers are entered into calculator, ideal nozzle size will be displayed. Enter number here
		0.362165	in	
Actual Nozzle Size Used		3/8	in	If ideal nozzle size is not available, locate nearest number. Enter what nozzle size was used for testing

TurboChef
Model: **HHC2020**

Start Time: 9:00 Product Tested: **Conveyor oven** Cook Time: 2:15 belt

End Time: 17:00 Barometric Pressure: 737 mmHg Recovery Time: 0.0

Test Date: 07/30/09 Room Ambient: 72F

IMPINGER WEIGHT

Filter Paper Start of Test: 0.6471 g Frit N/A

Filter Paper End of Test: 0.6525 g

Impinger	Start Volume/Weight	Start Weight (lbs)	End Volume/Weight	End Weight (lbs)
1 (ml)	100	1.550	38	1.418
2 (ml)	100	1.518	156	1.644
3 (ml)	0	1.326	28	1.390
4 (g)	200	1.756	266	1.898

Timed Meter Readings

Traverse Point Number	Sampling Time Hr/Sec	Gas Meter Reading (m^3)	Orafice Pressure Differential ΔH	Velocity Head ΔP	Pump Vaccum In.hg	Stack Temp ℃	Probe Temp ℃	Box Temp ℃	Impinger Temp ℃	Gas Meter Outlet ℃
Initial	-	144.150	41	5.2	2.4	29	121	122	9	23
1	:10	144.347	39	5.0	2.4	29	121	121	12	25
1	:20	144.542	37	5.0	2.4	29	121	121	14	27
1	:30	144.738	36	5.0	2.4	29	121	121	16	29
1	:40	144.930	36	5.2	2.5	29	121	122	14	30
1	:50	145.125	37	4.9	2.5	30	121	121	14	31
1	1hr	145.319	37	5.0	2.5	29	121	121	15	32
2	:10	145.515	37	4.9	2.5	29	121	121	17	33
2	:20	145.709	38	5.2	2.6	35	121	121	12	34
2	:30	145.905	38	5.2	2.6	35	121	121	12	34
2	:40	146.103	37	5.0	2.8	35	121	122	13	34
2	:50	146.297	37	5.0	2.8	34	121	122	15	34
2	2hr	146.495	38	5.2	2.8	33	121	122	13	34

Traverse Point Number	Sampling Time Hr/Sec	Gas Meter Reading (m^3)	Orafice Pressure Differential ΔH	Velocity Head ΔP	Pump Vaccum In.hg	Stack Temp ℃	Probe Temp ℃	Box Temp ℃	Impinger Temp ℃	Gas Meter Outlet ℃
3	:10	146.689	38	5.0	2.8	33	121	121	13	34
3	:20	146.884	34	5.2	2.8	33	121	122	15	35
3	:30	147.081	38	5.2	2.5	33	121	121	17	35
3	:40	147.289	42	5.0	3.0	33	121	121	13	35
3	:50	147.497	42	5.2	3.0	33	121	121	13	35
3	3hr	147.704	41	5.0	3.0	33	121	122	14	35
4	:10	147.914	42	3.6	3.0	25	121	122	12	35
4	:20	147.125	42	3.6	3.0	25	121	121	12	35
4	:30	147.335	42	3.4	3.0	25	121	122	13	35
4	:40	147.536	42	3.5	3.0	25	121	121	16	35
4	:50	148.745	42	3.4	3.0	25	121	122	17	35
4	4hr	148.947	42	3.6	3.2	25	121	121	14	35
5	:10	149.159	42	3.0	3.2	24	121	121	11	35
5	:20	149.367	42	2.8	3.2	24	121	122	11	35
5	:30	149.713	42	3.0	3.0	24	121	121	13	35
5	:40	149.783	42	2.8	3.0	24	121	121	13	35
5	:50	149.986	42	3.0	3.2	24	121	121	14	35
5	5hr	150.197	42	3.1	3.0	24	121	121	14	35
6	:10	150.405	42	5.4	3.0	31	121	122	10	35
6	:20	150.613	42	5.5	3.0	31	121	122	10	35
6	:30	150.828	42	5.4	3.0	31	121	121	11	35
6	:40	151.025	42	5.4	3.0	31	121	122	13	35
6	:50	151.235	42	5.4	3.0	31	121	122	13	35
6	6hr	151.438	42	5.4	3.0	31	121	122	13	35
7	:10	151.647	43	5.4	3.0	32	121	122	10	35
7	:20	151.857	42	5.6	3.0	32	121	121	10	35
7	:30	152.063	42	5.6	3.0	32	121	122	11	35
7	:40	152.285	42	5.4	3.0	32	121	121	12	35
7	:50	152.479	42	5.4	3.0	32	121	122	13	35
7	7hr	152.684	42	5.4	3.0	32	121	122	12	35
8	:10	152.894	42	4.8	3.0	24	121	122	11	35
8	:20	153.107	42	4.6	3.0	24	121	122	11	35
8	:30	153.321	42	4.8	3.0	23	121	122	10	35
8	:40	153.523	42	4.6	3.0	24	121	122	12	35
8	:50	153.732	42	4.6	3.0	24	121	122	14	35
8	8hr	153.935	41	4.6	3.0	24	121	122	14	35

Average Gas Meter Outlet Temperature: 33.85714 ℃ Δ H = 40.4583333 mm H_2O Tm = 552.94 R

Average Gas Meter Outlet Temperature: 92.94286 ℉ Δ H = 1.59284777 in H_2O

TurboChef
Model: HHC2020

Start Time: 9:00 End Time: 17:00 Test Date: 07/30/09

Cook Time: 2:15 belt Product Tested: **Conveyor oven**

Recovery Time: 0:00 Barometric Pressure: 737

Post-Test Data

Gas Meter Reading initial	144.15	m^3	Gas Meter Reading End	153.94	m^3
Vm	9.79	m^3			
	345.55	ft^3			
Y- Constant	0.949		This data is obtained during device calibration		
Tstd constant	528.0	R			
Tm	552.9	R	Number obtained from Datasheet		
Barometric Pressure	737	mmHg	Barometric Pressure on day of Test		
	29.01575	inHg			
Pstd	30.42	inHg			
Δ H	1.592848	in H_2O			
Vmstd	299.89	ft3			
	8.491898	m3			

Post-Filter Data

Filter paper	652.50	mg	**Weight at End of Test**
Filter AR	647.10	mg	**Weight at Begining of Test**
delta H	5.40	mg	**Change of Weight at End of Test**

Post-Acid Used

Acetone Wash	0.0	mg	Bottle 2	Mc	3.5	mg
Acetone Blank	0.4	mg	Bottle 3			
Impinger Contents	4.8	mg	Bottle 4	**Mn**	8.9	mg
MeCl Wash	1.0	mg	Bottle 5			
MeCl Blank	0.6	mg	Bottle 6			
Water Blank	1.3	mg	Bottle 7			

Total Grease Emisions

Cs=Mn/Vmstd **1.05 mg/m3**

the standard in safety

Underwriters Laboratories

NOTICE OF AUTHORIZATION TO APPLY THE UL MARK

2008-10-07

Mr. James K. Pool III
Turbochef Technologies Inc
Suite 105 4240 International Pky
Carrollton, TX 75007
United States

E-mail: James.pool@turbochef.com

Reference: File E151487 Project 08NK19482 P.O. Number UL710B Conveyor

Product: EPA 202 TEST METHOD: USING TURBOCHEF MODEL HHC2020 CONVEYOR OVEN WITH POTBELLY'S SANDWICHES AS TEST MEDIA.

Dear Mr. Pool,

Per your request, project 08NK19482 was opened for the evaluation of grease-laden vapors produced from a variety of Potbelly Sandwiches in a Turbochef Technologies Model HHC2020 conveyor oven. The scope of the project was to determine the grease emissions from the Turbochef Technologies conveyor oven in accordance with EPA Method 202 test guidelines to demonstrate compliance with UL710B, the Standard for Recirculating Systems, Sec. 17 and NFPA96, the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, paragraph 4.1.1.2. The test was conducted at our facility in Northbrook, IL on September 24th, 2008. This letter will report the results of the EPA202 test.

For the record, the test was conducted using a Turbochef Model HHC2020 conveyor oven, cooking a variety of Potbelly's sandwiches as specified by Turbochef Technologies in Appendix A. Please see the attached page (Appendix A) for the test method and results of the test. The results are considered to comply with UL710B, Section 17 and NFPA96, paragraph 4.1.1.2 since the measured values of 1.91 mg/m^3 was less than the 5-mg/m^3 limit. No evaluation was conducted in regards to fire protection.

This letter will serve to report that all tests on the subject product have been completed with acceptable results. All information generated will be retained for future use. This concludes all work associated with Project 08NK19482 and we are therefore closing this project. Our Accounting Department has been instructed to bill you for all charges incurred.

Should you have any questions or comments concerning the above, please feel free to contact the undersigned.

Sincerely,

William G. Morler

Bill Morler
Project Engineer
Department: 3015CNBK
Tel: 847-664-1852
Fax: 847-407-1852
E-mail: William.Morler@us.ul.com

Reviewed by:

Fred Zaplatosch

Fred Zaplatosch
Staff Engineer
Department: 3015CNBK
E-mail: fred.zaplatosch@us.ul.com

A P P E N D I X: A

TEST FOR EVOLUTION OF SMOKE OR GREASE-LADEN AIR:

The Turbochef model HHC2020 conveyor oven was tested using the method derived from EPA Method 202. The manufacturer also provided the following food load as noted below:

FOOD (Sandwich Type)	SANDWICHES COOKED	PERCENT COOKED
Turkey / Cheese	555	33 %
Wreck	393	23 %
Italian / Cheese	294	18 %
Chicken Salad	166	10 %
Roast Beef / Cheese	144	9 %
Ham / Cheese	120	7 %
TOTAL COOKED	1672	100 %

An 8 in. by 6 in. rectangular, 108 in. tall sheet metal stack was constructed on top of a sheet metal hood and mounted above the exhaust vent of the induction cooker. A sampling port was located approximately 80 in. downstream from the hood exhaust, at which point it was determined there was laminar flow. The hood exhaust was maintained at 500 CFM throughout the duration of testing. 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 done at 8 traverse points.

The oven was operated normally by cooking the following foods at a temperature of 590°F:

One Complete Cycle (1 Hr)

FOOD (Sandwich Type)	Sandwiches Per Hour (Approx)	Cook Time (min)	Product Interval (sec)
Turkey w/Cheese	71	1	20
Wreck	53		
Italian w/Cheese	38		
Chicken Salad	22		
Roast Beef w/Cheese	20		
Ham w/Cheese	16		

Two sandwiches were placed on the conveyor at a time with an interval between sandwiches as described above. 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 filter was removed, and placed into a sample container labeled No. 1. The liquid in impingers Nos. 1, 2, and 3 were volumetrically measured and transferred to sample container No. 3. The silica gel and impinger No. 4 was transferred to sample container No. 5. The nozzle, probe and impingers were rinsed three times with water and the rinse was added to container No. 3. These parts were also rinsed three times with acetone and transferred to container No. 4. All additional inter surfaces of the sampling terrain glassware were rinsed with methylene chloride three times; the rinse was transferred to container No. 6. A blank of acetone approximately equivalent to the amount used for rinses was aliquoted into container No. 2, the same was done for the distilled de-ionized water and methylene chloride except that these were aliquoted into their own individual containers labeled No. 7 and 8 respectively. All containers were properly labeled and sealed, then the liquid levels in all the containers were marked.

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

RESULTS:

There was no visible smoke was emitted from the exhaust of the hood during the normal cooking operation. There was no noticeable amount 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 1.91 mg/m^3, which is less than 5 mg/m^3.

ONLINE CERTIFICATIONS DIRECTORY

KNLZ7.E151487
Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air Certified for Canada

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Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air Certified for Canada

See General Information for Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air Certified for Canada

TURBOCHEF TECHNOLOGIES INC E151487
SUITE 105
4240 INTERNATIONAL PKY
CARROLLTON, TX 75007 USA

Commercial microwave/convection ovens, Models* C3/C, HHB, HHB2, NGC, i3, i5.

Conveyor oven, Model HHC2020.

"*" - The basic standard used to investigate the "Microwave Cooking Appliances" products is UL 923.

Last Updated on 2009-09-08

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ONLINE CERTIFICATIONS DIRECTORY

KNLZ.GuideInfo
Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air

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[Heaters and Heating Equipment] (Heaters, Cooking Appliances) Commercial Cooking Appliances with Integral Systems for Limiting the Emission of Grease-laden Air

See General Information for Heaters, Cooking Appliances

This category covers cooking equipment intended for commercial use, such as pressurized deep fat fryers and other appliances for use in commercial kitchens, restaurants or other business establishments where food is prepared. Each appliance covered in this category is manufactured with an integral system feature to limit the emission of grease-laden air from the cooking process to the room ambient.

These appliances have been evaluated for the limit of 5 mg/m^3 for the emission of grease-laden air to the room ambient in accordance with the recommendations of the National Fire Protection Association Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96, using the EPA-202 test method prescribed for cooking appliances provided with integral recirculating air systems.

These products are not intended for connection to a ducted exhaust system.

Appliances in this category are not provided with an integral fire extinguishing system. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to fire extinguishing systems, such as the need for field installed systems in accordance with NFPA 96.

For products with integral recirculating systems including fire extinguishing systems, refer to Commercial, with Integral Recirculating Systems (KNKG).

In cases where the nature or construction of equipment is such that special precautions beyond the requirements of the National Electrical Code must be observed in installations or use, suitable warning or special instructions are marked on the equipment.

Appliances Listed in this category are suitable for wiring with either copper or aluminum power supply conductors unless marked "Use Copper Wire Only For Power Supply Connections" .

Commercial cooking appliances of certain types are designed for permanent connections to water supply and sewer lines at the point of installation. Authorities having jurisdiction should be consulted as to the requirements for this equipment with respect to sanitation and connection to water supply and waste disposal lines.

Neither the toxicity of coatings nor the physiological effects on persons consuming food products prepared by use of these appliances has been investigated.

For cooking oil filters that are not an integral part of another appliance, see Commercial Filters for Cooking Oil (KNRF).

For additional information, see Electrical Equipment for Use in Ordinary Locations (AALZ) and Heating, Cooling, Ventilating and Cooking Equipment (AAHC).

The basic standard used to investigate products in this category is ANSI/UL 197, "Commercial Electric Cooking Appliances".

Appliances Listed in this category with an integral cooking oil filter have been additionally investigated to the requirements in the standard "Commercial Filters for Cooking Oil", ANSI/UL 1889.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the name and/or symbol of Underwriters Laboratories Inc. (as illustrated in the Introduction of this Directory) together with the word "LISTED," a control number and one of the following product names as appropriate: "Commercial Cooking Appliance," "Cooking Appliance," or other appropriate product identity specified in the individual Listing, along with the words "with integral system for limiting the emission of grease-laden air. "

Last Updated on 1999-02-19

Questions? Notice of Disclaimer Page Top

TURBOCHEF TECHNOLOGIES, INC.

Installation Recommendations

TurboChef ventless ovens have internal systems for destroying grease laden vapor prior to the grease escaping the oven; therefore, the ovens are certified as non-grease emitting appliances. When following our recommendations, TurboChef ovens can be installed without the aid of a Type I or Type II hood per International Mechanical Code (2006, 2009, and 2012), NFPA 96, NFPA 101 (Life Safety Code), EPA 202, and Underwriter's Laboratory (UL KNLZ).

The following guide is intended to give relevant information for the ventless installation, operation, and maintenance of TurboChef ovens. It is important that these guidelines are followed and that the oven and surrounding areas be maintained regularly for optimal performance.

Certifications

Safety – cULus, TUV (CE)
Sanitation – NSF*, UL EPH*
Ventless – UL (KNLZ)

Electrical Requirements

TurboChef ovens must be installed on a circuit equal to the ratings listed below, per NEC sec 210.23, permissable loads.

Oven	Voltage	Current	Phase
Sōta (i1)	208/240 VAC	30 amp	1 Ph
Sōta Single Mag (i1)	208/240 VAC	20 amp	1 Ph
i3	208/240 VAC 208/240 VAC	40 amp 30 amp	1 Ph 3 Ph
i5	208/240 VAC 208/240 VAC	50 amp 30 amp	1 Ph 3 Ph
Encore/Encore 2	208/240 VAC	30 amp	1 Ph
Tornado	208/240 VAC	30 amp	1 Ph
C3	208/240 VAC	50 amp	1 Ph
HhC 2620	208/240 VAC	50 amp	3 Ph
HhC 2020	208/240 VAC	50 amp	3 Ph
HhC 1618	208/240 VAC 208/240 VAC	30 amp 50 amp	3 Ph 1 Ph
HhB 2	208/240 VAC	30 amp	1 Ph
Double Batch	208/240 VAC 208/240 VAC	50 amp 30 amp	1 Ph 3 Ph
Waterless Steamer (i1)	208/240 VAC	30 amp	1 Ph
Panini (i1)	208/240 VAC	30 amp	1 Ph
Fire	208/240 VAC	30 amp	1 Ph
Bullet	208/240 VAC	30 amp	1 Ph

* NSF certification applies to the Tornado, C3, and HhB 2 ovens only. UL EPH certification applies to all ovens except the C3.

Menu Requirements

TurboChef ovens have been approved by Underwriter's Laboratory for ventless operation (UL KNLZ listing) for all food items EXCEPT for foods classified as "fatty raw proteins." Such foods include bone-in, skin-on chicken, raw hamburger meat, raw bacon, raw sausage, steaks, etc.

The TurboChef certification includes precooked food items such as pizza toppings, sandwich meats, frozen appetizers, and cheeses. Additionally, raw, lean meats such as boneless, skinless chicken breasts and fish fall within the certification.

Cleaning Requirements

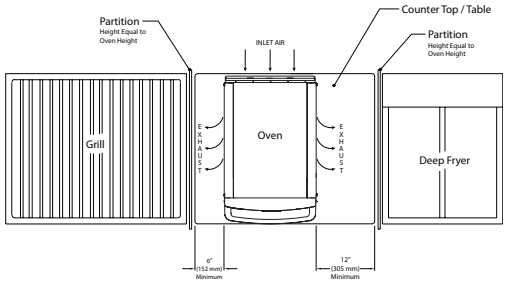
To ensure continued compliance with all health, building, and fire codes, users are required to:

- ☐ Use only TurboChef-approved cleaning chemicals.
- ☐ Follow monthly and quarterly cleaning instructions provided in the manual. Post cleaning instructions near the oven.
- ☐ Ventless installation requires that the areas around the oven (walls, ceilings, kitchen equipment, etc.) be cleaned as needed but no less than once every other month.

Installation Near Open Heat Source

When placing a TurboChef oven near an open heat source (see illustration below), strictly adhere to the following:

- If the oven is being placed near a grill or stove, a divider must exist between the oven and the open heat source, with a minimum of 6" (152 mm) between the oven and the divider.
- If the oven is being placed near a fryer, a divider must exist between the oven and fryer, with a minimum of 12" (305 mm) between the oven and the divider.
- The height of the divider must be greater than or equal to the height of the oven.



Oven Clearances

Verify the oven location has the following clearances on the top and each side. TurboChef ovens have built-in back bumpers that allow for the necessary spacing from the oven to the back wall.

Oven	Top	Sides
Sŏta / Sŏta Single Mag (i1)	5" (127 mm)	2" (51 mm)
i3	19" (483 mm)	2" (51 mm)
i5	19" (483 mm)	2" (51 mm)
Encore/Encore 2	5" (127 mm)	2" (51 mm)
Tornado	4" (102 mm)	2" (51 mm)
C3	4" (102 mm)	2" (51 mm)
HhC 2620	10" (254 mm)	0" (0 mm)
HhC 2020	10" (254 mm)	0" (0 mm)
HhC 1618	10" (254 mm)	0" (0 mm)
HhB 2	2" (51 mm)	2" (51 mm)
Double Batch	2" (51 mm)	2" (51 mm)
Waterless Steamer (i1)	5" (127 mm)	2" (51 mm)
Panini (i1)	5" (127 mm)	2" (51 mm)
Fire	2" (51 mm)	2" (51 mm)
Bullet	5" (127 mm)	2" (51 mm)

Ventilation

TurboChef ovens must be installed in a well-ventilated space. The space should have an exhaust rate of .70 cfm per square foot of kitchen space and an additional 100 sq. ft. (9.3 m^2) of virtual space per ventless cooking appliance (TurboChef or any other).

If the air inlet is for general exhaust, pursuant to requirements for 507.2.2, paragraph 2, locate the air inlet above the center point of each oven.

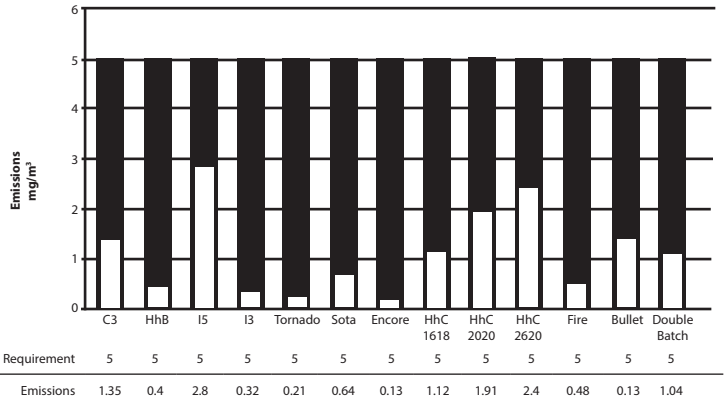
The heat load from TurboChef ovens is mostly sensible. The only latent heat present is due to evaporation during the cooking process. When installing a TurboChef oven, the space must have the following tons of AC per oven installed.

Oven	Tons of AC
Sŏta (i1)	0.29
Sŏta Single Mag (i1)	0.29
i3	0.94
i5	1.31
Encore/Encore 2	0.45
Tornado	0.58
C3	0.63
HhC 2620	1.82
HhC 2020	1.47
HhC 1618	1.00
HhB 2	0.84
Double Batch	1.04
Waterless Steamer (i1)	0.29
Panini (i1)	0.29
Fire	0.50
Bullet	0.13

How the Ovens are Tested

TurboChef ovens are evaluated according to UL. The evaluation entails placing the test oven in an environmental chamber built to capture all emissions escaping during idle, cooking, and door-open conditions. During the eight-hour test period, a typical worst-case food item is cooked continuously, and 100% of condensable and non-condensable emissions from the product are collected and analyzed according to the EPA 202 Test Method. At the conclusion of the test, the total concentration of particulate matter (emissions) must be less than 5.0 mg/m^3 for the oven to be certified for ventless operation. Cooking devices that measure above the 5.0 mg/m^3 threshold are considered to produce grease and must be installed under Type I ventilation, according to International Mechanical Code.

TurboChef ovens are well below the 5.0 mg/m^3 threshold as shown below.



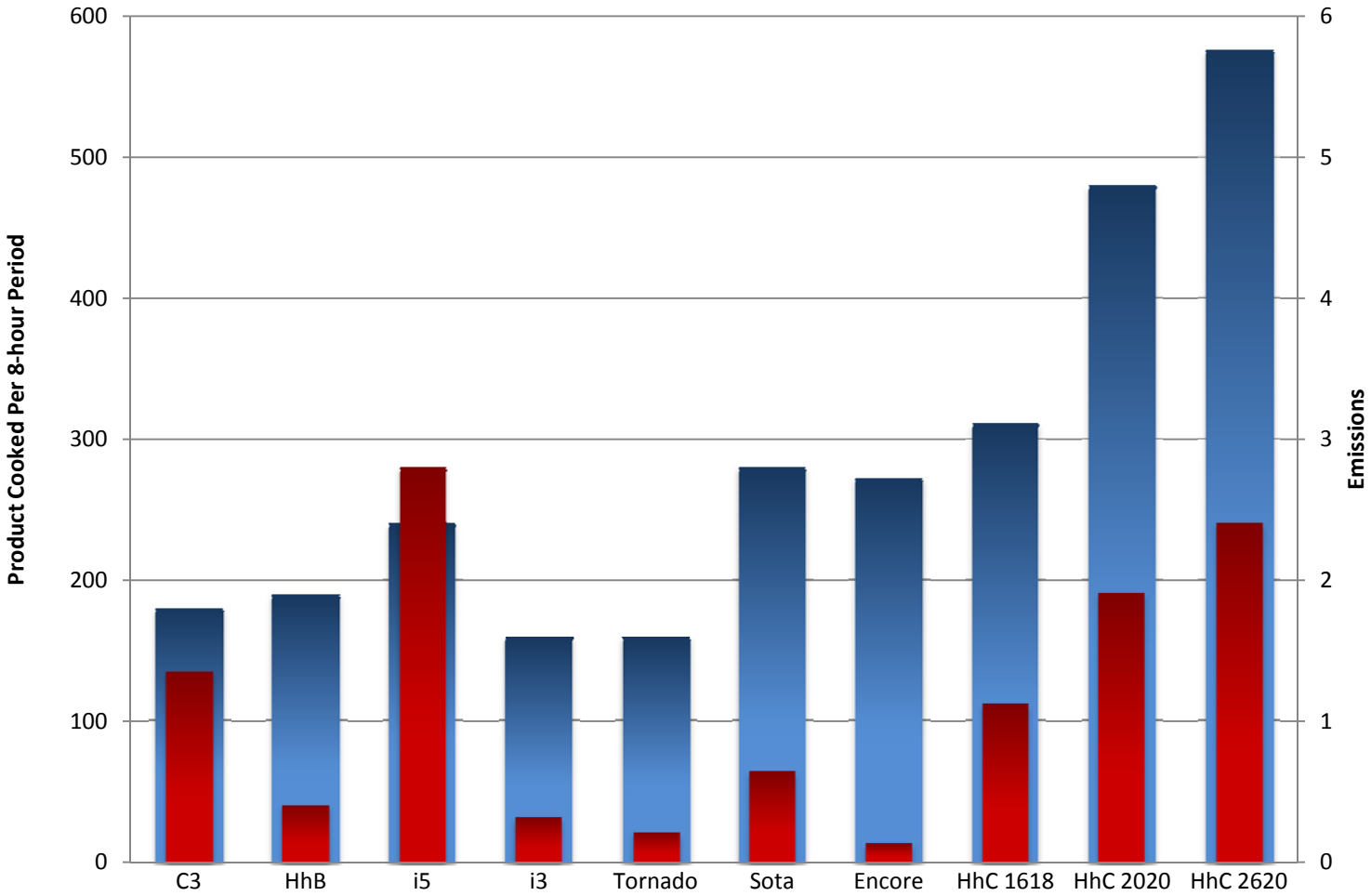
	C3	HhB	I5	I3	Tornado	Sota	Encore	HhC 1618	HhC 2020	HhC 2620	Fire	Bullet	Double Batch
Ventless Requirement	5	5	5	5	5	5	5	5	5	5	5	5	5
Emissions	1.35	0.4	2.8	0.32	0.21	0.64	0.13	1.12	1.91	2.4	0.48	0.13	1.04

NOTE: Certain configurations of TurboChef ovens, such as a triple stacked HhC 2620, may cause emissions to be greater than 5.0 mg/m^3. In these situations, TurboChef recommends that the ovens be installed under a Type I or Type II hood.

Contact Information

For questions regarding a ventless installation, email ventless.help@turbochef.com. For questions or concerns regarding an existing installation, contact Customer Service at 1.800.908.8726, Option 1.

UL® (KNLZ)
Emissions by Product
Ventless Requirement: <5.00 mg/m³



	C3	HhB	i5	i3	Tornado	Sota	Encore	HhC 1618	HhC 2020	HhC 2620
Product Cooked Per 8-hour Period	180	190	240	160	160	280	272	311	480	576
Emissions	1.35	0.4	2.8	0.32	0.21	0.64	0.13	1.12	1.91	2.4

HhC-2020

Changeable Parameters		
Operating Time	12	Hours
Energy Costs	$0.11	kWHr
% of Day in Snooze Mode	34%	Percent
% of Day Cooking (Moderate/heavy)	25%	Percent
	OK	

Do Not Change the following values

	Time (min)	Power (Watts)	Cost/Day	Balance of Time (hrs)
Warm up	10	14000	$0.26	11.83
Cooking	180	9200	$3.04	8.83
Snooze	245	4500	$2.02	4.75
Idle	285	6750	$3.53	0
Total/Day			$8.84	**Yearly**
Total/Month			$265.25	**$3,182.98**

HVAC Requirements Per Operating Time -- Note: Approximations Only					
Average Energy Cooking And Idle (J)	**Warmup Energy (J)**	**Total Energy (J)**	**Total average Power (W)**	**Total Environmental Load kBtu/hr**	**Average Cooling Requirement (ton of AC)**
214,866,000.00	8,400,000.00	223,266,000.00	5,168.19	17.64	1.470

COUNTY OF LOS ANGELES
Public Health

JONATHAN E. FIELDING, M.D., M.P.H.
Director and Health Officer

CYNTHIA A. HARDING, M.P.H.
Acting Chief Deputy

ANGELO BELLOMO, R.E.H.S., Director
Environmental Health

TERRI S. WILLIAMS, R.E.H.S.
Assistant Director of Environmental Health

VERONICA BAUCHMAN, R.E.H.S.
Director of Bureau of District Surveillance and Enforcement, Region 2

PLAN CHECK PROGRAM
5050 Commerce Drive
Baldwin Park, California 91706
TEL (626) 430-5560 • FAX (626) 813-1444

www.publichealth.lacounty.gov/ehi/

November 8, 2012

James K. Pool III
President
TurboChef Technologies, Inc.
4240 International Parkway
Carrollton, TX 75007

Ventilation Exemption Plan Check No.	ME-2012-003
Application Type:	Equipment specific 208/240 V; 14.4 KW
Effective Date:	11/8/2012
Expiration Date:	11/8/2017
Telephone:	(214) 379-6000
Email:	james.pool@turbochef.com

Dear Mr. Pool:

RE: EXEMPTION FROM MECHANICAL EXHAUST VENTILATION FOR TURBOCHEF ELECTRIC CONVEYOR OVEN MODEL HIGH H CONVEYOR 2020

The County of Los Angeles Department of Public Health, Environmental Health, Plan Check Program, has completed a review of the TurboChef High h Conveyor (HHC) 2020 oven for exemption from the mechanical exhaust ventilation requirements of Section 114149.1(a) of the California Retail Food Code.

You have provided documentation that this oven has Underwriter's Laboratory UL certification for safety and sanitation, and also provided the UL results of the eight-hour cooking emissions test conducted on the model HHC 2020 oven. The test results indicate that the total amount of grease-laden effluents collected was 1.91 mg/m^3, which is below the limit of 5 mg/ m^3 to be considered a low grease emission appliance.

Therefore, additional mechanical ventilation in the form of a Type I or Type II hood is not required by the County of Los Angeles Department of Public Health, provided the following contingencies are met:

1. There shall be no more than two unventilated TurboChef HHC 2020 ovens per food facility. If the ovens are double stacked, then this is considered two ovens.

2. No other heat producing food related equipment requiring ventilation shall be permitted in a food facility without the addition of mechanical ventilation.

3. The equipment must be installed, serviced, and maintained according to the manufacturer's specifications.

4. Any modification or alteration of the equipment, including any component of the integral air filtration system voids both the ANSI certification of the equipment and this limited exemption.

5. The TurboChef HHC 2020 oven shall be used for the cooking or warming of pizza, bread, bakery products, sandwiches containing ready to eat fillings, vegetables, or similar items only. No raw animal protein products shall be cooked in the equipment unless mechanical ventilation is provided.

6. No items that generate grease-laden vapors shall be prepared or cooked in the unventilated TurboChef HHC 2020 oven. Pre-cooked foods such as animal, fish or skinless poultry protein products may be reheated in the TurboChef HHC 2020.

7. The TurboChef HHC 2020 oven(s) must be operated in a well-ventilated area approved for food preparation.

8. If a food facility that is operating this exempt equipment changes ownership, then the new owner/ operator shall comply under the same operating conditions.

9. This exemption from mechanical exhaust ventilation shall not be deemed to supersede any local building and fire code requirements pertaining to mechanical, electrical and/or fire safety.

This exemption shall be in effect for a period of five years from the date of this letter, or until revoked. Further, this exemption shall not preclude this Department from requiring the installation of mechanical exhaust ventilation when operation of the TurboChef HHC 2020 oven(s) at a specific location results in a sanitation or safety violation.

This letter may be used as evidence of the evaluation of the TurboChef HHC 2020 oven. However, it is not to be construed as an endorsement of the subject items and may not be used for advertising or promotional services.

If you have any questions, please contact the Plan Check Program at (626) 430-5560.

Sincerely,

Swati Bhatt, R.E.H.S.
Chief EHS
Plan Check Program

Denise Noborio, R.E.H.S.
Environmental Health Specialist IV
Plan Check Program