Middleby Marshall®

PS638 VENTLESS SUBMITTAL INFORMATION

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DOC-1010/Revision A/September 2020

Middleby Marshall®

PS638E-V Ventless Electric Conveyor Oven

Project _____

Item No. _____

Quantity _____

WOW! OVEN

STANDARD FEATURES

- Impingement PLUS! low oven profile and dual air return
- Patented Energy Management System (EMS)
- Advanced technology air delivery system bakes up to 30% faster than traditional conveyor ovens
- 38" (914 mm) long cooking chamber
- 26" (660 mm) wide, 65.25" (1656 mm) long conveyor
- Conveyor speed range 1-20 minutes
- "Cool Skin" safety feature keeps the external surface of the oven under 120°F (49°C)
- Removable parts for easy cleanability (drip trays, crumb trays, end panels, air fingers, and conveyor belt)
- One-year parts and labor warranty – includes start-up and demonstration (U.S. only)
- Optional split belt – two 12" (381 mm) belts with individually adjustable speed settings

PERFORMANCE

The Middleby Marshall WOW! conveyor series oven utilizes technology that allows the user full control of the air flow in the baking chamber, resulting in optimal results in cooking product. Air flow is modified through the main control, allowing instant results and full control of air movement, time, and temperature settings.

VENTLESS OPERATION

The Middleby Marshall ventless oven has internal systems for destroying grease laden vapor prior to the grease escaping the oven; therefore, the ovens are certified as non-grease emitting appliances. The PS638E-V has been approved by Intertek for ventless operation (UL © KNLZ listing) and can be installed without the aid of a Type I or Type II hood.*

EPA 202 Test (8hr):

- Product: 439 Pepperoni pizzas
- Results: 3.10 mg/m3
- Ventless Requirements: <5mg/m3

ENERGY MANAGEMENT SYSTEM (EMS)

- Patented EMS provides efficient heat transfer to and from the product
- Efficient heat transfer combined with streams of hot air means these ovens can cook a multitude of products in a fraction of the time
- The top and front of the oven are insulated so they are cool to the touch

CERTIFICATIONS

Intertek Intertek

*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.

DOC-1005/Revision D/September 2020

Middleby Marshall®

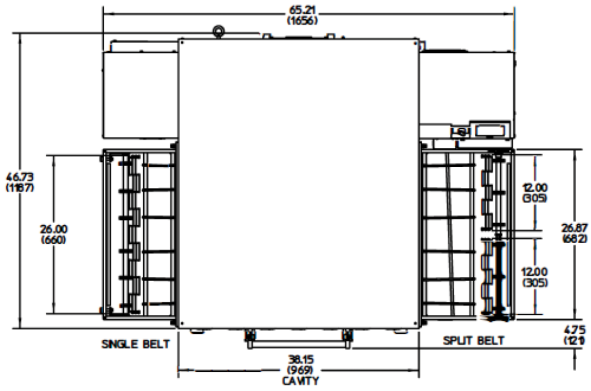
PS638E-V Ventless Electric Conveyor Oven

GENERAL SPECIFICATIONS

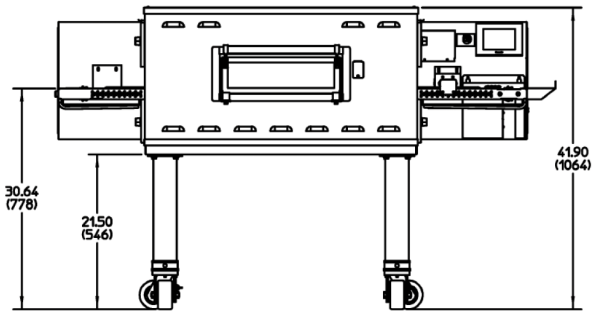
Wall Clearance		
Rear of Conveyor to Wall	0"	0 mm
Control End to Wall	0"	0 mm
Non-control End to Wall	0"	0 mm
Bake Operating Temperature	325°F-600°F	163°C-316°C
Time Range	1-20 minutes	

DIMENSIONS

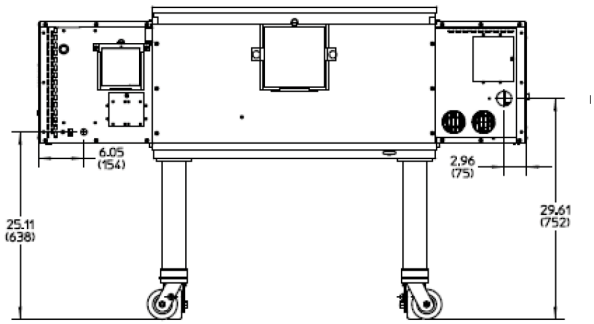
Single Units		
Heating Zone	38"	965 mm
Baking Area	7.1ft²	0.66 m²
Belt Length	65.25"	1,657 mm
Overall Length	65.25"	1,657 mm
Height (22.13"/562 mm legs)*	42"	1,067 mm
Depth	46.25"	1,175 mm
Ship Weight	820 lb.	372 kg
Ship Cube	115 ft³	3.26 m³
Double Stacked Units		
Heating Zone	76"	1,930 mm
Baking Area	14.2 ft²	1.32 m²
Belt Length	65.25"	1,657 mm
Overall Length	65.25"	9,277 mm
Height (11.25"/286 mm legs)*	51.25"	1,302 mm
Depth	46.25"	1,175mm
Ship Weight	1,640 lb.	744 kg
Ship Cube	230 ft³	6.5 m³
Triple Stacked Units		
Heating Zone	114"	2,896 mm
Baking Area	21.3 ft²	1.98 m²
Belt Length	65.25"	1,657 mm
Overall Length	65.25"	1,657 mm
Height (5"/127 mm legs)*	63.5"	1,600 mm
Depth	46.25"	1,175 mm
Ship Weight	2,460 lb.	744 kg
Ship Cube	345 ft³	9.8 m³



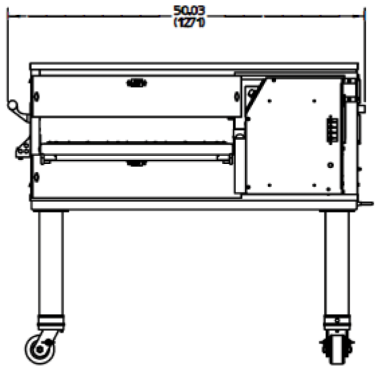
PS638E-V Top View



PS638E-V Front View – Single Unit

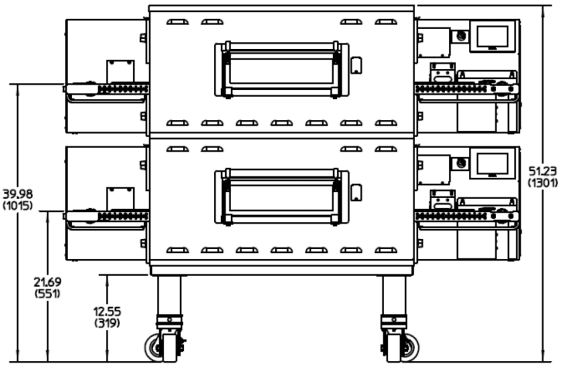


PS638E-V Back View – Electric, Single Unit

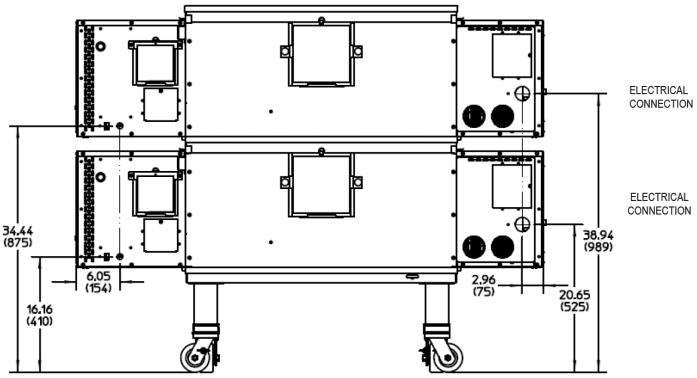


PS638E-V Side View – Electric, Single Unit

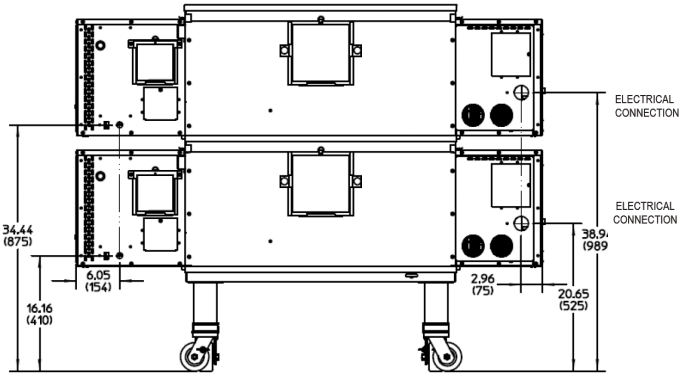
* Height dimensions are shown for standard leg extensions. Customer-specific leg extensions will affect these dimensions. All units are shown with casters. CE-approved ovens use 6" (152 mm) adjustable feet instead of casters.



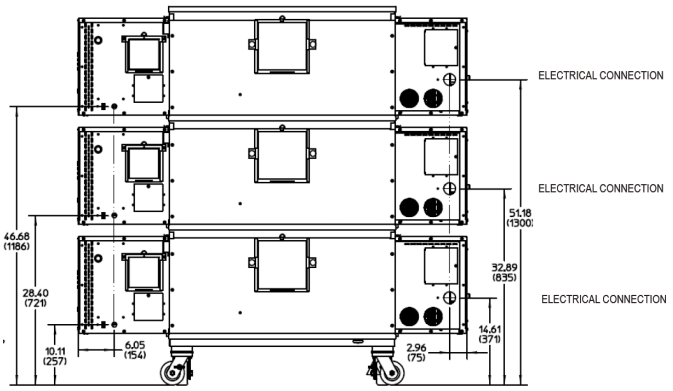
PS638E-V Front View – Double Stacked Units



PS638E-V Front View – Triple Stacked Units



PS638E-V Back View – Electric, Double Stacked Units



PS638E-V Back View – Electric, Triple Stacked Units

NOTE: Height dimensions are shown for standard leg extensions. Customer-specific leg extensions will affect these dimensions. All units are shown with casters. CE-approved ovens use 6" (152 mm) adjustable feet instead of casters.

PS638E-V

Ventless Electric Conveyor Oven

ELECTRICAL SPECIFICATIONS

VOLTAGE	PHASE	FREQUENCY	MAX AMPERAGE*	RATED HEAT INPUT	SUPPLY	BREAKERS
208 V	3	50/60 Hz	63A	22 kW	4-wire (3L+G)	As per local code
240 V	3	50/60 Hz	53A	22 kW	4-wire (3L+G)	As per local code
380 V	3	50/60 Hz	36A	20.25 kW	5-wire (3L+N+G)	As per local code

*The current draw rating shown above are maximum values for normal operation. Amperage draw will be less than the listed value.

Middleby Cooking Systems
1400 Toastmaster Drive
Elgin, IL 60120-9272

Date: SEPTEMBER 18, 2020

Subject: PS638E ENERGY CONSUMPTION / ROOM THERMAL LOAD

PURPOSE:

Testing was carried out to:

- Find the average energy consumption of a PS638E under steady state conditions at 500F, with blower speed 55Hz, with belt speed 4:30.
- Find the excess energy dissipated into the environment during steady state.
- Find the excess energy dissipated when in Energy Saving Mode 1 (blowers reduced to 30Hz)
- Find the excess energy dissipated when cooking pizzas.

PARTICIPANTS:

Ken Christensen
Bill Schjerven
Andrew Ostrowski

PROCEDURE:

1) A PS638E ventless prototype was hooked up to a power sensor and 208V 50HZ three phase power. The voltage and current through each leg was recorded. The oven was brought up to 500F and allowed to run for 5 hours. The power usage was recorded every 15 seconds. The Oven was not loaded with product, and energy saving modes were disabled.
2) The same oven was brought up to 500F and allowed to run for 6 hours. The power usage was recorded every 15 seconds. The Oven was not loaded with product, and Energy Mode 1 was enabled.
3) The same oven was brought up to 500F. The power usage was recorded every 15 seconds. Energy modes were disabled. The Oven was continuously loaded with 12” thin crust cheese pizzas for 1 hour. The excess energy is found by subtracting the energy stored in cooked pizzas from the total power usage of the oven.

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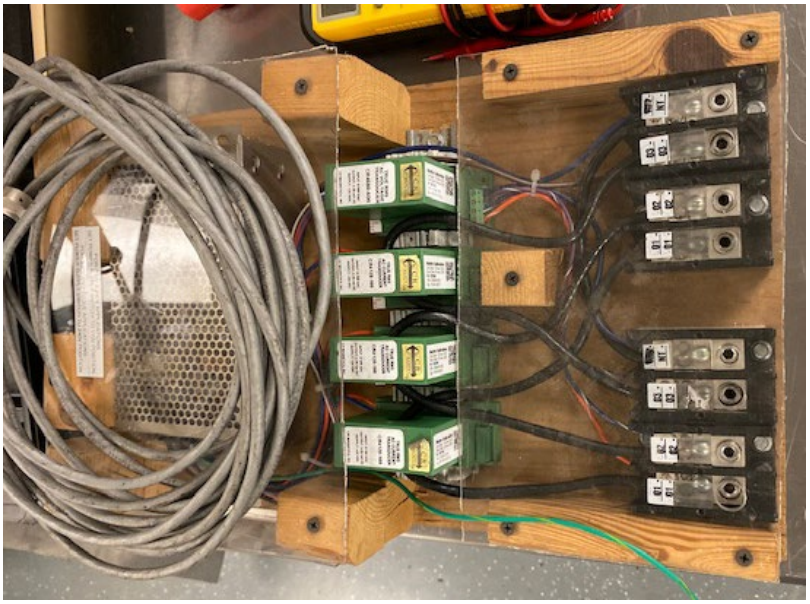
TOOLS:
The Oven is wired to the Load terminals of the data acquisition unit. The Line terminals are wired to a 208V 50Hz three phase generator. The values are read from the data acquisition unit and logged in a computer.

1) PS638E Ventless
   500F – 55Hz – 4:30

2) Data Acquisition Unit



3) Computer (not pictured)

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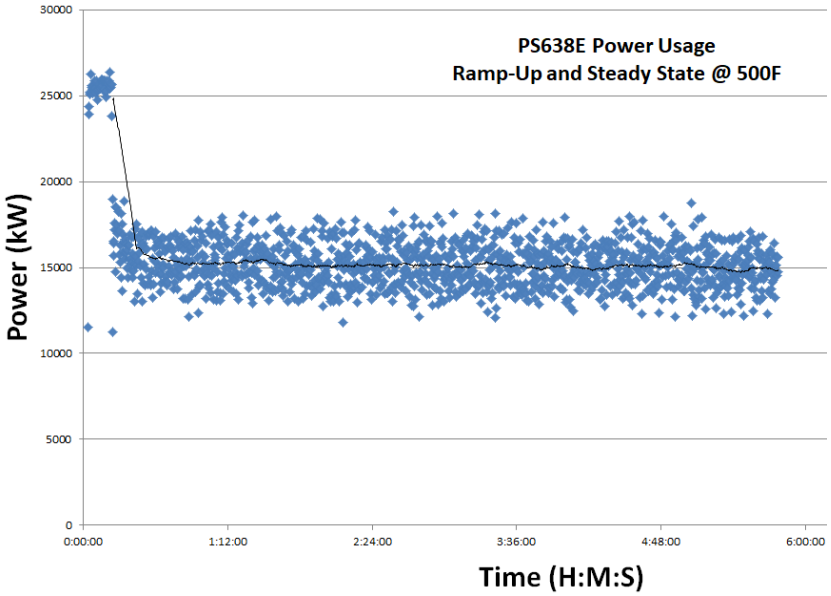
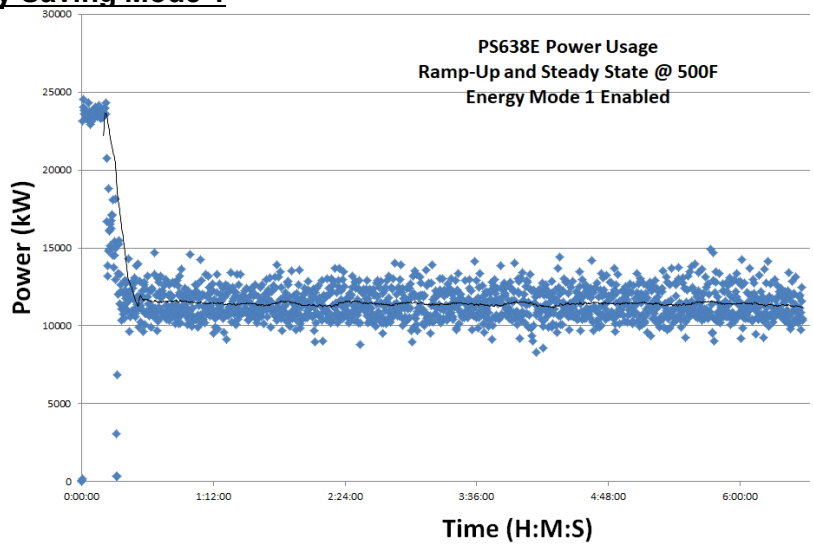
RESULTS:

Part 1: Steady State



The average power usage at 500F steady state is 15.2kW, or 51,700 BTU/hr. This is the excess power dissipated into the environment that will need to be accounted for when designing store HVAC. This result is per oven, and for a double stack the result will need to be doubled.

Part 2: Energy Saving Mode 1



The average power usage / excess power dissipated in Energy Mode 1 at 500F is 11.4kW or 38,900 BTU/hr. This is a reduction of 25% compared to steady state without energy modes enabled

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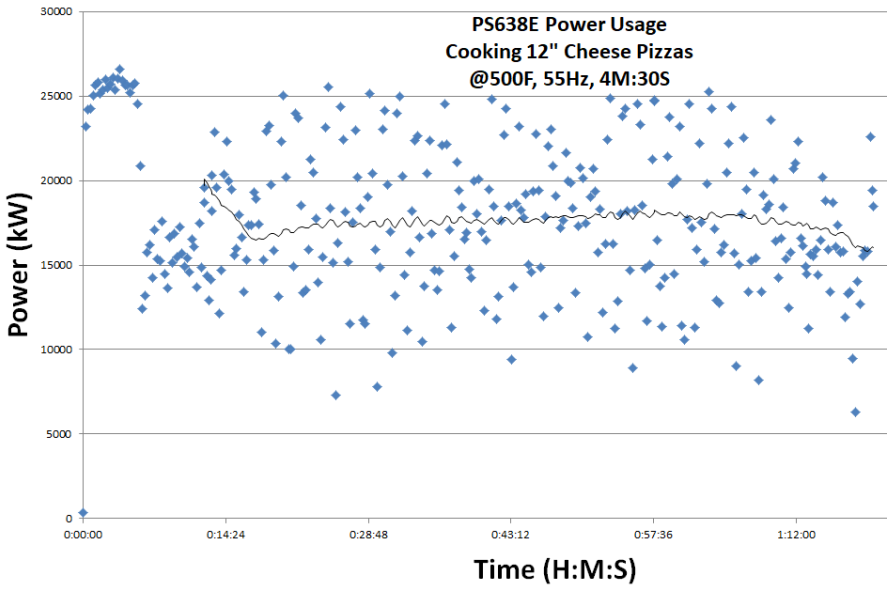
Part 3: Cooking Pizzas



The Average Energy Usage while Cooking Pizzas was 17.7kW, or 60,500 BTU/Hr. The Pizzas were increased in temperature from 70F to 200F. The Specific Heat Capacity of Mozarella is about 3.7J/gK, of Crust is 1.7J/gK, and of sauce is 3.8J/gK. The average mass of Cheese, Crust, and Sauce in a 12” thin crust pizza is 125g, 135g, and 225g respectively. In one hour, a PS638 cooks 55 pizzas in one hour. The total energy removed by the hot pizzas in one is found by multiplying the specific heat capacities by the mass of each component of one pizza and the difference in temperature between start and finish. In one hour, 6,126kJ is transferred to the pizzas, or 1.7kWh. On average, 1.7kW is transferred into the pizzas, therefore 16.0kW or 54,600 BTU/Hr is transferred to the environment. This result will be increased the longer the pizzas are allowed to cool before being delivered to customers.

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Elgin, IL 60120-9272

FINAL RESULTS

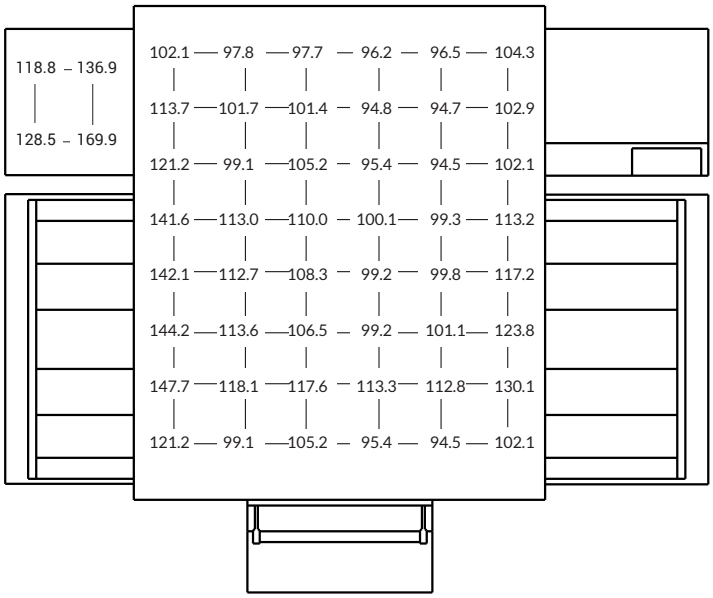
Conditions	Excess Energy (kW)	Excess Energy (BTU/Hr)
Steady State @ 500F	15.2	51,700
Energy Mode 1 @ 500F	11.4	38,900
Continuously Cooking 12” Pizzas @ 500F	16.0	54,600

Middleby Marshall®

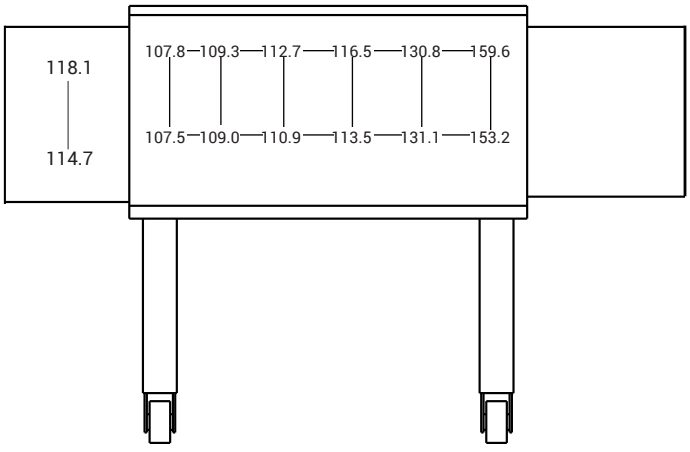
PS638 Electric or Gas Conveyor Oven

CATALYST SKIN TEMPERATURE TESTS (Values in °F)

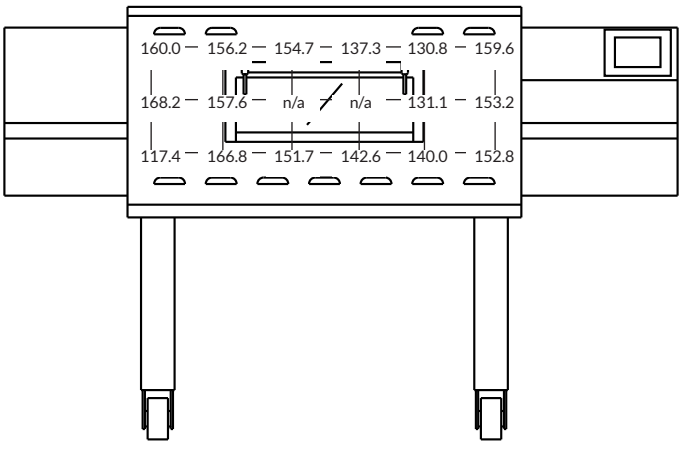
Top of Oven



Rear of Oven



Front of Oven



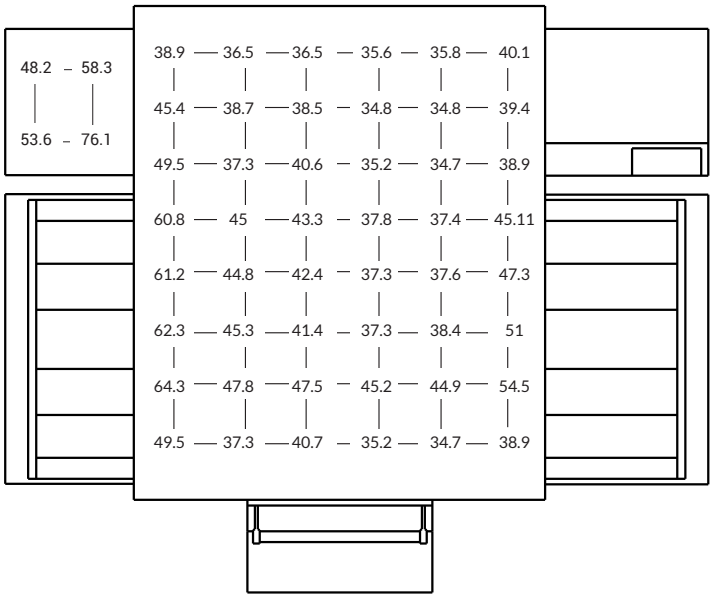
1400 Toastmaster Drive Elgin, IL 60120 USA | (847) 741-3300 | www.middmarshall.com

Middleby Marshall®

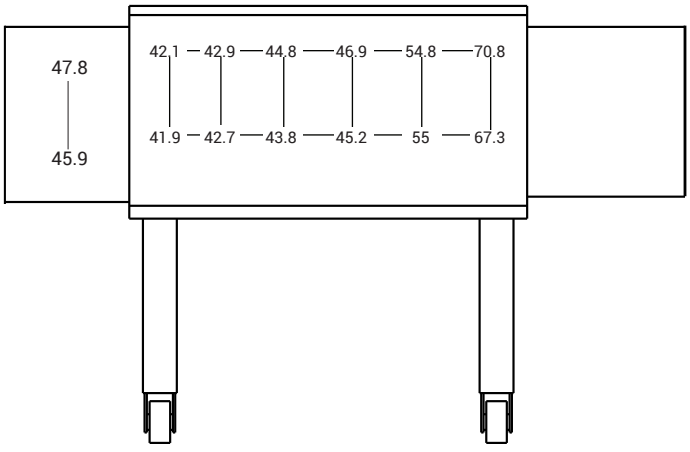
PS638 Electric or Gas Conveyor Oven

CATALYST SKIN TEMPERATURE TESTS (Values in °C)

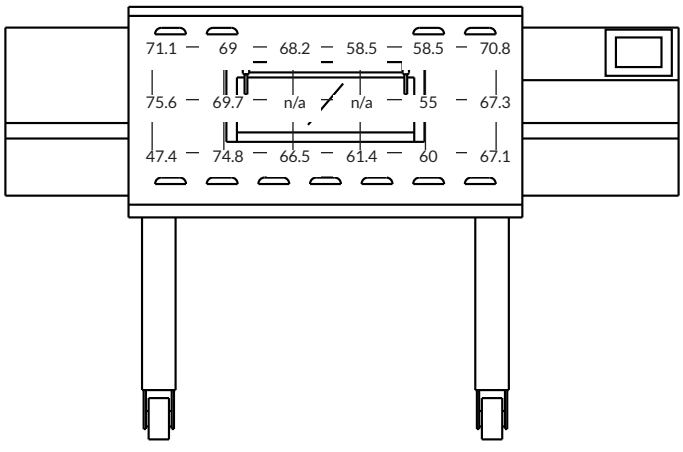
Top of Oven



Rear of Oven



Front of Oven



MIDDLEBY MARSHALL INC.

PERFORMANCE REPORT

SCOPE OF WORK
Performance – EPA 202 Emissions evaluation

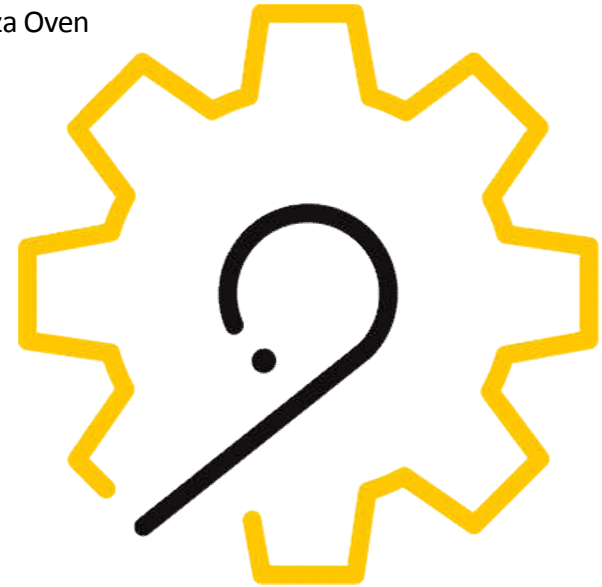
PRODUCT: PS638 Series Electric Conveyor Pizza Oven

REPORT NUMBER
104341351COL-001D

ISSUE DATE
9-JUL-2020

PAGES
5

DOCUMENT CONTROL NUMBER
GFT-OP-10h (6-July-2017)



1717 Arlingate Lane
Columbus, OH 43228
Telephone: 614-279-8090
Facsimile: 614-279-4642
www.intertek.com

PERFORMANCE TEST REPORT

Client	Middleby Marshall Inc. William Schjerven 1400 Toastmaster Dr. Elgin, IL 60120-9274
Project No.	G104341351
Product	PS638 Series Electric Conveyor Pizza Oven
Model	PS638E
Sample Identification Number	COL2005271318-001
Date Received	05/27/20
Condition	Production
Evaluation Date(s)	06/29/2020
Report Number	104341351COL-001B
Report Date	07/9/2020
Standard	**EPA Test Method 202 - Condensable Particulate Matter (Revised 12/1/2010) per UL 710B Standard for Recirculating Systems section 59**

Report Parameters		
Product Cooked	**Tombstone 12" Pepperoni Pizza**	**439 Total Pizzas**
Cook Time	**240**	**Seconds**
Average Stack Velocity	**33.35**	**Ft/s**
Sample Volume	**9.176 (323.995)**	**m^3 (ft^3)**
Emissions Results	**3.10**	**mg/m^3**

Test Setup:

The appliance was set up under a collection mechanism attached to an extraction fan via a 12 inch duct. The test sampling equipment was set up with the measurement site located 10 ft upstream the nearest disturbance (minimum 2 ft) and 3 ft downstream the nearest disturbance (minimum 0.5 ft) per EPA 202. The glassware used in the sampling procedure was prepared via the baking option of EPA Test Method 202 at a temperature of 300°C for 6 hours. The test was run for a duration of 8 hours using 8 total traverse points (2 ports, 4 traverse points each). Each traverse point was sampled for 1 hour respectively. A prior to and post-evaluation leak check was performed and found to have a leak rate of less than 0.02 ft^3/min.

Test Procedure:

The Electric Conveyor Pizza Oven model PS638E was set up and prepared on 6/26/2020 the day before the test. During the setup, a few test runs were made on the model in order to determine that it was functioning properly as well as to establish proper cook time. The product cooked during the test was 12 inch Tombstone pepperoni pizzas. It was determined that a 4 minute cook time at the recipe shown

PERFORMANCE TEST REPORT

in the photographs on page 5 was sufficient to overcook the test recipe. The pizzas were continuously loaded onto the appliance as space on the conveyor belt became available for the full duration of the 8 hour test. A total of 439 pizzas were cooked throughout the 8 hour duration of the test run.

Test Recovery:

Following the completion of the test run, the test data was collected from the sampling program and the post-evaluation leak check was performed. The probe and glassware were subsequently recovered per EPA Test Method 202.

Performance Results:

Once the recovery procedure was completed, the necessary calculations were made per EPA 202 in order to determine the result for grease laden effluent captured. The total amount of grease-laden effluent collected by the sampling train was found to be **3.10 mg/m^3**, which would constitute a passing result in accordance with UL 710B.

Test Performed by:

T. Kennedy
Engineer
09-July-2020

Report Approved by:

M. Lindeman
Operations Manager
28-July-2020

PERFORMANCE TEST REPORT

Photographs:

Test Setup

Oven Recipe

PERFORMANCE TEST REPORT

Test Product