Blodgett Double Deck Conveyor Oven, MT3855G
With In-Vent Ventilation System, AB2B
Performance Test

Application of ASTM Standard
Test Method F 1817-97

FSTC Report 5011.98.62

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Acknowledgments

The establishment of a Food Service Technology Center reflects PG&E's commitment to the food service industry. The goal of the research project is to provide PG&E's customers with information to help them evaluate technically innovative cooking appliances and make informed equipment purchases regarding advanced technologies and energy sources. The project was the result of many people and departments working together within PG&E and the overwhelming support of the commercial equipment manufacturers who supplied the cooking appliances for testing.
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Specific appreciation is extended to The Blodgett Oven Company for supplying the Food Service Technology Center with the Model MT3855G gas conveyor oven and the In-Vent AB2B integrated ventilation system for controlled testing in the appliance laboratory.

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Executive Summary

The Blodgett double deck conveyor oven, model MT3855G, with the In-Vent AB2B Ventilation System represents the marriage of solid oven performance with the innovative design of an integrated ventilation system. The oven uses air impingement for cooking food product and it's operation is controlled by a remote electronic module. The In-Vent integrated ventilation system affords several significant advantages over a standard exhaust hood set up, without adversely affecting oven performance.

The Food Service Technology Center (FSTC) tested the Blodgett conveyor oven under the tightly controlled conditions of the American Society for Testing and Materials' (ASTM) Standard Test Method.[1] Oven performance is characterized by preheat energy consumption and duration, idle energy rate, cooking energy efficiency and production capacity.

Cooking energy efficiency and production capacity results are obtained from the cooking of standardized test pizzas under light load and heavy load testing scenarios. A summary of the test results is presented in Table ES-1.

Executive Summary

Table ES-1. Summary of Performance: Blodgett double deck conveyor oven, Model MT3855G with In-Vent AB2B integrated ventilation system*.

Preheat and Idle Rate Tests	
Rated Energy Input Rate (Btu/h)	150,000
Measured Energy Input Rate (Btu/h)	148,500
Fan / Control Energy Rate (kW)	0.38
Preheat Time (min)	8.9
Preheat Energy (Btu)	21,100
Idle Energy Rate (Btu/h)	56,900
Light Load Pizza Efficiency Tests (6 pizzas)	
Cook Time (min)	5.4
Cooking Energy Efficiency (%)	10.4
Gas Cooking Energy Rate (Btu/h)	65,300
Electric Cooking Energy Rate (kW)	0.38
Heavy Load Pizza Efficiency and Production Capacity Tests (24 pizzas)	
Cook Time (min)	5.4
Cooking Energy Efficiency (%)	42.8
Gas Cooking Energy Rate (Btu/h)	97,100
Electric Cooking Energy Rate (kW)	0.38
Production Capacity (pizzas/h)	215.9

* Results are for the bottom deck of oven with top deck turned off

Executive Summary

The wide belt and double deck configuration of the Blodgett conveyor oven allow for a higher production capacity than narrower, single deck ovens. With both decks operating, the oven could cook as many as 430 test pizzas per hour.

With the In-Vent integrated ventilation system, the front of the oven remains cool which improves operator comfort and safety and also minimizes heat gain to the surrounding space. Outside air can be used for 75% of the make-up air supply, so costly tempered make-up air use is minimized. The In-Vent is also noticeably quieter than traditional canopy hood configurations. These advantages over standard hoods come without penalty to the performance of the oven. The oven's cooking efficiencies of 10.4% and 42.8% are directly comparable to other conveyor ovens of it's size tested to date at the FSTC.

1 Introduction

Background

Conveyor ovens allow for the rapid cooking of food products with consistency and ease of operator use. Beyond the initial capital cost, conveyor ovens can be evaluated with regards to long-term operational cost and performance as characterized by cooking energy efficiency, idle energy consumption and production capacity.

The integrated ventilation system surrounds the majority of the oven's exterior, eliminating the need for a separate exhaust hood.

With support from the Electric Power Research Institute (EPRI) and the Gas Research Institute (GRI), PG&E's Food Service Technology Center (FSTC) developed a uniform testing procedure to evaluate the performance of gas and electric conveyor ovens. This test procedure was submitted to the American Society for Testing and Materials (ASTM) and accepted as a standard test method (Designation F 1817-97) in 1997.[1] PG&E's *Development and Validation of a Uniform Testing Procedure for Conveyor Ovens* documents the developmental procedures and test results of several gas and electric conveyor ovens.[2]

The Blodgett double deck conveyor oven, model MT3855G consists of two identical gas fired conveyor ovens, or decks, stacked one on top of the other. The In-Vent AB2B integrated ventilation system was specifically designed to work with the Blodgett MT3855G oven. The ventilation system surrounds the majority of the oven's exterior, eliminating the need for a separate exhaust hood. Oven control is handled by independent solid state electronic controllers to allow the top and bottom oven decks to be operated with different cook times and/or temperatures. The Blodgett conveyor oven was tested according to the ASTM procedure, and this report documents the results. The glossary in Appendix A provides a quick reference to the terms used in this report.

Introduction

Objective

The objective of this report is to examine the operation and performance of the Blodgett double deck conveyor oven, model MT3855G with the In-Vent AB2B ventilation system, under the controlled conditions of the ASTM Standard Test Method. The scope of this testing is as follows:

1. Accuracy of thermostat is checked at a setting of 475°F and the thermostat is adjusted if necessary.
2. Energy input rate is determined to confirm that the oven is operating within 5% of the nameplate energy input rate.
3. Preheat energy and time are determined.
4. Idle energy rate is determined at a thermostat set point of 475°F.
5. Cooking energy efficiency and production rate are determined during light and heavy load cooking tests using pizza as a food product.

Appliance Description

The Blodgett ovens are stainless-steel, gas fired, electronically controlled, double deck conveyor ovens. The stacked oven decks are identical and operate independently of one another. When running, each oven deck draws heated air through fans which force it into the oven cavity. The heated air is distributed by air fingers below the stainless steel wire conveyor belt, and by an air plate above. Each oven deck has a 38 inch wide by 55 inch long oven cavity and a 150,000 Btu/h input rate. A separate electronic controller is connected to each oven deck by a computer cable which allows remote wall mounting of the controllers. The In-Vent integrated ventilation system, which surrounds the majority of each deck's exterior, operates in the same manner regardless of whether one or both decks are running. Outdoor makeup air is washed over the top and front of the oven decks, while hot air is simultaneously exhausted and filtered from the ends.

Appliance specifications are listed in Table 1-1, and the manufacturer's literature is in Appendix B.

Table 1-1. Appliance Specifications.

Manufacturer	The Boldgett Oven Company
Model	MT3855G
Generic Appliance Type	Conveyor Oven
Rated Input	150,000 Btu/h
Technology	Air Impingement
Construction (Oven)	Stainless Steel Exterior
Construction (Invent)	Stainless Steel Exterior Surfaces
	Aluminzed Steel Interior Surfaces
Controls	Remote Solid State Electronic Control
Belt Width	38”
Dimensions (Oven Only)	91” X 58” X 64.5”
Dimensions (With Invent)	91” X 62” X 77.25”
Approx. Weight (Ovens Only)	2500 lbs.
Approx. Weight (With In-Vent)	2800 lbs.

2 Methods

Setup and Instrumentation

The oven was assembled in accordance with the Blodgett instruction manual included with the oven. The In-Vent ventilation system was then installed on the oven in accordance with the instruction manual included with the ventilation system. Figures 2-1 and 2-2 show the oven both before and after installation of the In-Vent ventilation system.

Figure 2-1.
Blodgett Ovens Before Installation of In-Vent

Figure 2-2.
Blodgett Ovens After Installation of In-Vent

Methods

The assembled oven, with the ventilation system installed, was positioned on a level tile floor with a minimum of 12 inches clearance from any adjacent wall. Exhaust and make-up air were supplied to the In-Vent ventilation system at a rate of 1,600 cfm for the exhaust, and 1,200 cfm for the make-up. The make-up air was introduced into the In-Vent system at 75 ± 5°F.

Gas consumption was monitored using a positive displacement meter which generated a pulse for every 0.1 ft^3 of gas used. Power and energy were measured with a watt/watt-hour transducer that generated an analog signal for instantaneous power and a pulse for every 10 Wh used. Oven cavity temperature was monitored with a 24 gauge type K fiberglass insulated thermocouple wire located in the center of the oven cavity and 2 inches above the belt. The transducer and thermocouples were connected to a computerized data acquisition unit that recorded data every 5 seconds. A voltage regulator, connected to the oven, maintained a constant voltage for all tests. All test apparatus were installed in accordance with Section 9 of the ASTM test method.[1]

After instrumentation, it was determined through idle-rate testing that each oven deck could be operated without any detectable impact on the operation of the other. This meant that either oven deck would operate and perform exactly the same regardless of whether or not the other deck was running. Therefore, for simplicity, the performance tests were applied to the bottom deck of the oven with the top deck not running. The results obtained can then be doubled where necessary to obtain the performance characteristics of the oven with both decks operating.

For the remainder of the Methods section of this report, as in the Results section, “the oven” will refer to the bottom oven deck to which the standard test method is being applied, rather than to the whole appliance consisting of both oven decks and the ventilation system.

Methods

Energy Input Rate and Thermostat Calibration

The energy input rate was determined by turning the oven on and measuring the gas consumed from the time the burners first ignited until the time when the burners first cycled off. The gas consumed and the time elapsed are used to calculate the maximum energy input rate. Thermostat calibration was verified by allowing the oven to operate with the thermostat set to the specified operating temperature of 475°F for a period of one hour, and then monitoring the oven cavity temperature for a period of thirty minutes.

Preheat and Idle Rate Tests

Preheat tests recorded the time and energy required for the oven to increase the cavity temperature from 75 ± 5°F to 465°F. Recording began when the oven was first turned on and ended when the temperature in the oven cavity reached 465°F. Although the specified operating temperature is 475°F, research at PG&E's Food Service Technology Center has indicated that a conveyor oven is sufficiently preheated and ready to cook when the oven temperature is within 10°F of the oven set point (that is, 465°F when the thermostat is set to maintain 475°F).

After the oven was preheated, it was allowed to stabilize for one hour, and then idle energy consumption was monitored for a 2-hour period.

Light Load Pizza Efficiency Tests

Light load pizza tests are used to calculate cooking energy efficiency under partial loading conditions, as when the oven is cooking pizzas intermittently or at a rate below it's maximum capacity.

Cooking energy efficiency tests were performed with a uniform test pizza as the food product. Pizza crusts were 12-inch diameter, par-baked crusts weighing 0.9 ± 0.2 lb and having a moisture content of 36 ± 3% by weight. Pizza sauce was a simple, tomato based sauce with a moisture content of 87 ± 3% by weight. Pizza cheese was part-skim, low moisture, shredded mozzarella cheese with a moisture content of 50 ± 2% by weight. All ingredients were verified for proper moisture content by gravimetric moisture analysis.

Methods

The pizzas were comprised of a pizza crust, pizza sauce and pizza cheese according to the following: 0.25 lb of pizza sauce spread uniformly on top of a pizza crust to within 0.5 inch of the edge, and 0.375 lb of pizza cheese spread uniformly over the pizza sauce. The pizzas were then placed on sheet pans and covered with plastic wrap. The pizzas were stabilized in a refrigerator for a minimum of 18 hours before testing to ensure temperature uniformity of 39 ± 1°F.

Pizza doneness requires a final pizza temperature of 195 ± 3°F. The final pizza temperature was measured by placing six hypodermic-style thermocouple probes on the surface of the pizza, located 3 inches from the center of the pizza and equidistant from each other. The probes were allowed to penetrate the cheese and rest in the crust-sauce interface. The highest average temperature of the six probes during measurement was the final pizza temperature. For consistency and simplicity, the probes were attached to a lightweight plastic disc which held the relative position of each probe constant from pizza to pizza. Figure 2-3 shows the thermocouple probe structure in use.

Figure 2-3. Thermocouple Probe Structure in use.

For purposes of testing, the oven cavity size of 38 inches by 55 inches is rounded down to the nearest foot, in this case to 3 feet by 4 feet. This dictated that 4 rows of 3 pizzas (12 total) were needed for each of the light load tests. For convenience, the pizzas were pre-weighed so only the final after-cook weight needed to be taken during the test. The pizzas were removed from the refrigerator and quickly loaded onto the conveyor belt so that no more than one minute elapsed before the cooking process began. Each row was placed with the middle pizza centered on the belt, and with the leading edge of the pizza adjacent to the entrance of the oven cavity. The other two pizzas were placed directly next to the middle one, such that the extra conveyor width fell equally to each side of the pizza row, rather than on just one side or between the pizzas. After cooking, the center pizza from each row was chosen for final temperature determination. All pizzas were weighed after cooking for use in the energy efficiency calculations. Figure 2-4 shows a row of pizzas being loaded for a light load test.

Figure 2-4. Loading a Row of Pizzas for Testing.

Methods

Heavy Load Pizza Efficiency and Production Capacity Tests

The heavy load pizza tests are used to calculate cooking energy efficiency and production capacity when the oven is under maximum loading conditions.

The heavy load tests required preparation of 16 rows of 3 pizzas (48 total) for each run. The pizzas were prepared, pre-weighed and stabilized as in the light load tests. The pizza rows are placed one after the other on the conveyor such that the leading edge of the new row of pizzas is directly next to the trailing edge of the previous row. Each individual row is placed on the conveyor in the same manner as in the light load test, with the middle pizza centered on the conveyor. All pizzas were weighed after cooking for use in the energy efficiency calculations.

Due to the large number of pizzas cooked during the heavy load tests, a minimum of three researchers were needed to conduct the tests smoothly- one for loading the pizzas into the oven, one for removing the pizzas and final weighing, and one for final temperature determination.

Both light and heavy load tests were performed in triplicate to ensure that the reported cooking energy efficiency and production capacity results had an uncertainty of less than ±10%. The results from each test run were averaged, and the absolute uncertainty was calculated based on the standard deviation of the results.

The ASTM results reporting sheets appear in Appendix C, and the cooking energy efficiency data sheets appear in Appendix D.

3 Results

Energy Input Rate and Thermostat Calibration

The energy input rate was measured and compared with the manufacturer's nameplate value to ensure the oven was operating within its specified parameters. The maximum energy input rate was 148,500 Btu/h, 1.0% lower than the nameplate rate of 150,000 Btu/h, and within the 5% tolerance of the ASTM standard. The oven cavity temperature was monitored to verify that the oven was operating at 475 ± 5°F. At the thermostat set point of 475°F the oven cavity temperature averaged 474.3°F.

Preheat and Idle Rate Tests

Preheat Energy and Time

Time and energy were monitored starting from the time the on/off button on the controller was pushed. Any time that elapsed before the igniting of the burners is included in the test. The preheat cycle consumed 21,100 Btu over a period of 8.9 min.

Idle Energy Rate

The oven was allowed to stabilize for one hour following the preheat test with the thermostat set to 475°F. Thereafter, the energy consumption was monitored over a 2-hour period. The idle energy rate was calculated to be 56,900 Btu/h, which is 38% of the oven's rated input.

Test Results

The oven's preheat curve is shown in Figure 3-1. The rated energy input, preheat energy, and idle rate test results are summarized in Table 3-1.

Results

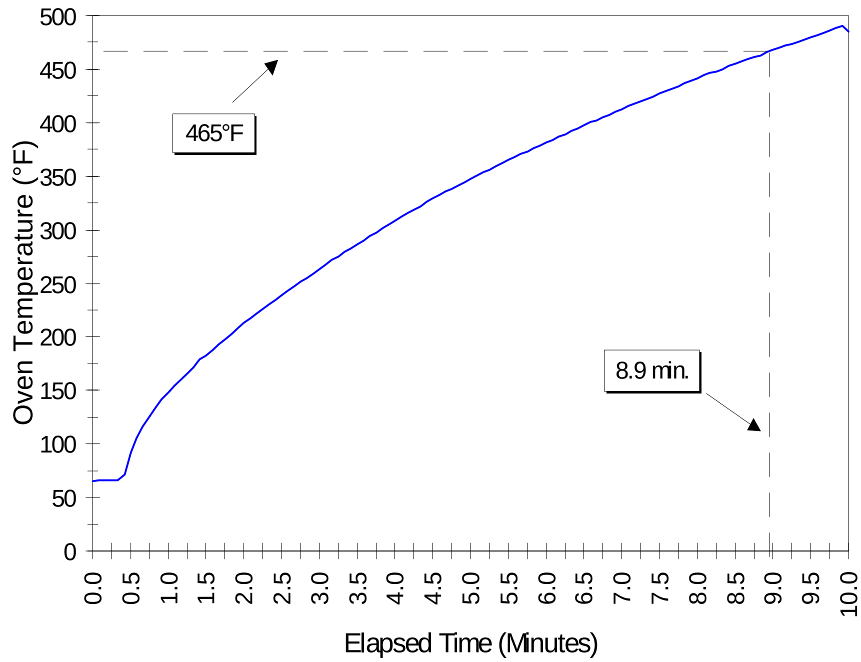

Figure 3-1. Preheat Characteristics

Table 3-1. Input, Preheat, and Idle Rate Test Results.

Rated Energy Input Rate (Btu/h)	150,000*
Measured Energy Input Rate (Btu/h)	148,500*
Preheat	
Time (min)	8.9
Energy (Btu)	21,100*
Idle Energy Rate	
Energy Rate (Btu/h)	56,900*

* With both oven decks operating, these numbers would be doubled.

Results

Cooking Tests

The oven was subjected to two cooking tests: light load pizza and heavy load pizza. The gas consumption, electric energy consumption, elapsed cook time, oven cavity temperature, and ambient temperature were monitored for the duration of each test at five second intervals. During final pizza temperature determination, the readings of the temperature probes were also recorded at five second intervals.

Light Load Pizza Efficiency Tests

The light load tests were used to determine the oven's performance under partial load conditions. The oven completed the test in 10.8 minutes, while delivering 10.4% cooking efficiency at a production rate of 33.3 pizza/hr.

Heavy Load Pizza Efficiency and Production Capacity Tests

The heavy load tests were used to determine the oven's performance when operating the oven at it's maximum capacity. The oven completed the heavy load test in 6.7 minutes, while delivering 42.8 % cooking efficiency and a 215.9 pizza/h production capacity.

Test Results

Cooking energy efficiency is defined as the quantity of energy consumed by the pizzas expressed as a percentage of energy consumed by the oven during the cooking test. The mathematical expression is therefore:

$$\text{Cooking Energy Efficiency \%} = \frac{E_{pizza}}{E_{oven}} \times 100\%$$

Energy imparted into the pizza is calculated using the measured values of initial and final pizza temperature, initial and final pizza weight, the specific heat of the pizza (based on the average specified pizza), and the heat of vaporization of water at 212°F.

Results

Energy consumed by the oven is determined by adding gas and electric energy use during the test. Appendix D lists the physical properties and measured values of each test run. Using the detailed equations provided in Section 11 of the conveyor oven ASTM Standard Test Method, the cooking energy efficiencies can be readily calculated. Table 3-2 summarizes the MT3855G oven's performance under the ASTM test method.

Table 3-2. Cooking Energy Efficiency and Production Capacity Test Results.

	Light Load Pizza	Heavy Load Pizza
Number of pizzas	6*	24*
Test Time (min)	10.8	6.7
Gas Cooking Energy Rate (Btu/h)	65,300*	97,100*
Electric Cooking Energy Rate (kW)	0.38*	0.38*
Energy Efficiency (%)	10.4	42.8
Production Rate (pizzas/h)	33.3*	-
Production Capacity (pizzas/h)	-	215.9*

* With both oven decks operating, these numbers would be doubled.

4 Conclusions

The Blodgett double deck conveyor oven model MT3855G with In-Vent AB2B ventilation system performed very well under the conditions of the ASTM standard test method. The oven cooked consistent pizzas which were evenly done at every position along the conveyor, while the In-Vent ventilation system did not impede any of it's functions.

The oven was quick to heat up and simple to operate. The remote wall-mounted computer controller made temperature and conveyor speed changes easy to adjust.

The In-Vent ventilation system allowed the front of the oven to stay cool to the touch and provided a high level of operator comfort, while decreasing the noise level associated with a standard exhaust hood. All operational, cleaning and maintenance functions of the oven are left intact with the ventilation system installed. Removable panels allow access to the integral filters and other inside surfaces for easy cleaning.

The In-Vent ventilation system also allowed for optimized ventilation of the oven. A similar oven under a standard canopy exhaust hood would require about 2,400 cfm for proper ventilation. The fact that the Invent ventilation system could properly ventilate the oven at 1,600 cfm meant that the necessary exhaust was reduced by 800 cfm. This net reduction in exhaust would save energy in a food service facility by reducing the exhaust fan requirements and the requirements for make-up air.

Furthermore, the fact that 75% of the required make-up air passes through the plenum surrounding the oven before mixing with the room air means that in many cases untempered air can be used to ventilate the oven.

The In-Vent exhaust strategy is one of the best examples of an engineered, optimized, ventilation system available to end-users.

Conclusions

The ventilation system also did not affect the performance of the oven. The cooking energy efficiencies of 10.4% and 42.8% are comparable with similar conveyor ovens tested at the FSTC to date, using a standard exhaust hood. With it's ease of use, solid performance and many advantages of the integrated ventilation system, this oven is an excellent option for anyone considering a conveyor type oven.

5 References

1. American Society for Testing and Materials. 1997. *Standard Test Method for the Performance of Conveyor Ovens.* ASTM Designation F 1817-97, in *Annual Book of ASTM Standards,* Philadelphia: American Society for Testing and Materials.

2. Pacific Gas and Electric Company. Publication Pending. Development and Validation of a Uniform Testing Procedure for Conveyor Ovens.

Appendixes

A Glossary

Conveyor Oven
An appliance that carries the food product on a moving conveyor into and through a heated chamber. The chamber may be heated by gas or electric forced convection, radiants, or quartz tubes. Top and bottom heat may be independently controlled.

Conveyor Speed
Time required for a single point on the conveyor belt to travel through the oven cavity.

Cook Time
Time required for an entire pizza to travel through the oven cavity, measured from the time when the leading edge of the pizza enters the oven cavity, to the time when the trailing edge of the pizza exits the oven cavity.

Cooking Energy Efficiency
Energy Efficiency
Quantity of energy imparted to the specified food product expressed as a percentage of energy consumed by the conveyor oven during the cooking event.

Cooking Energy Rate
Cooking Energy Consumption Rate
Average rate of energy consumption (Btu/h or kW) during the cooking energy efficiency test. Refers to all loading scenarios (heavy,light).

Energy Input Rate
Rate at which a conveyor oven consumes energy (Btu/h or kW).

Idle Energy Rate
Idle Rate
The conveyor oven's rate of energy consumption (kW or Btu/h), when empty, required to maintain it's cavity temperature at the specified thermostat set point.

Maximum energy input rate
Measured Energy Input
Measured Peak Energy Input Rate
Peak Rate of Energy Input Rate
Peak rate at which a conveyor oven consumes energy (Btu/h or kW).

Oven Cavity
That portion of the conveyor oven in which food products are heated or cooked.

Pilot Energy Rate
Rate of energy consumption (Btu/h) by a conveyor oven's continuous pilot (if applicable).

Preheat Energy
Amount of energy consumed (Btu/h or kWh) by the conveyor oven while preheating it's cavity from ambient temperature to the specified thermostat set point.

Preheat Time
Time (min.) required for the conveyor oven cavity to preheat from ambient temperature to the specified thermostat set point.

Glossary

Production Capacity

Maximum rate (lb(kg)/h) at which a conveyor oven can bring the specified food product to a specified "cooked" condition.

Production Rate

Rate (lb(kg)/h) at which a conveyor oven can bring the specified food product to a specified "cooked" condition.

Uncertainty

Measure of systematic and precision errors in specified instrumentation or measure of repeatability of a reported test result.

B Appliance Specifications

Appendix B includes the product literature for the Blodgett conveyor oven, model MT3855G with In-Vent AB2B ventilation system.

MT3855G

Project ____________________

Item No. ____________________

Quantity ____________________

MODEL MT3855G

Gas Conveyor Oven

Shown with optional false front

OPTIONS AND ACCESSORIES

(AT ADDITIONAL CHARGE)

- **Legs/casters:**
  - ❑ 17-1/4" (438mm) black legs with casters
  - ❑ 23-1/4" (591mm) black legs with casters
  - ❑ Triple stack base with casters
- **Shelf extension:**
  - ❑ 6" (152mm)
  - ❑ 10" (254mm)
- **Conveyor belt configurations:**
  - ❑ Twin belt - two 19" (483mm) belts
  - ❑ Split belt - one 8" (203mm) and one 29" (737mm) belt
- **Flexible gas hose with quick disconnect and restraining device:**
  - ❑ 36" (914mm)
  - ❑ 48" (1219mm)

  Note: Two 48" (1219mm) and one 36" (914mm) hose on triple model

❑ 10' (3.0M) cord with receptacle

❑ Stacking rail

❑ One year additional extended warranty*

Blodgett conveyor oven with 38" (965mm) wide belt and 55" (1397mm) baking zone length. Single, double or triple stack models are available. All data is shown per oven section, unless otherwise indicated.

EXTERIOR CONSTRUCTION

- Stainless steel front, top and sides
- Aluminized steel back and bottom
- Side loading stainless steel door and handle
- 2" (51mm) Vitreous fiber insulation at top, back and sides
- 1" (25mm) Ceramic fiber insulation top, bottom, front, back and sides

INTERIOR CONSTRUCTION

- Aluminized steel nozzles and bottom surface
- Aluminized steel air flow plates at top
- 38" (965mm) stainless steel wire mesh conveyor belt
- Three single inlet blowers above the combustion area for air circulation

OPERATION

- Heat transferred through forced convection (impingement)
- Open vented baking compartment
- Electronic spark ignition control system
- Gas power type burner has mixer with adjustable shutter and sight window
- Internal gas pressure regulator
- Remote microprocessor based controls with solid state 600°F (315.5°C) maximum thermostat and belt speed control with digital display
- Three blower motors (1/3 HP minimum) with thermal overload protectors
- Centrifugal cooling fan

STANDARD FEATURES

- Computerized remote control
- Folding conveyor
- Belt direction: (must specify)
  ❑ left to right ❑ right to left
- Product stops
- Oven start-up
- One year parts & labor warranty*

* *For all international markets, contact your local distributor.*

The Australian Gas Association

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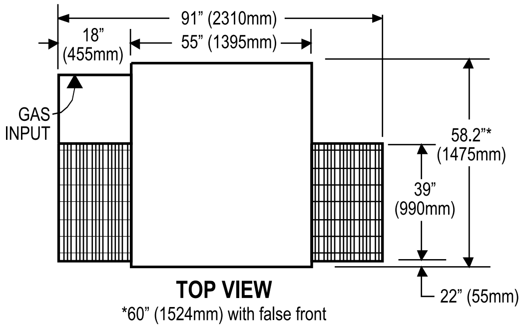
BLODGETT®

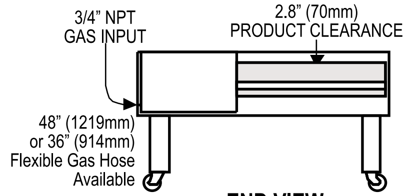
MODEL MT3855G

APPROVAL/STAMP

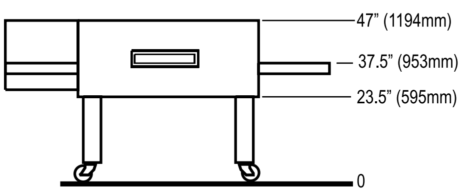


TOP VIEW

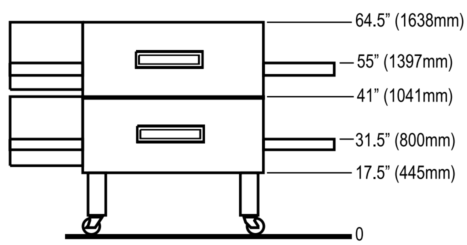
*60” (1524mm) with false front



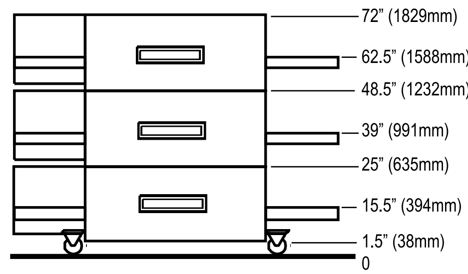
END VIEW



SIDE VIEW



SIDE VIEW



SIDE VIEW

SHORT FORM SPECIFICATIONS

Provide Blodgett Conveyor Oven model MT3855G conveyor oven. Unit shall be gas fired and shall cook by means of forced, heated air (impingement). Unit shall be (single/double/triple) deck supported by (specify stand type from options list) . Each deck shall be fully independent, of stainless steel construction, and fully insulated on all sides. Provide with electronic spark ignition gas fired baking compartment with three blowers to evenly distribute heat across baking zone. Conveyor belt shall be 38" (965mm) wide and constructed of stainless steel wire mesh; baking zone length shall be 55" (1395mm). Unit shall be provided with glassl side loading door. Remote control panel shall be solid state with 600°F (315.5°C) maximum thermostat and digital display of adjustable belt speed. Provide start-up inspection service by a factory authorized service agent. Provide options and accessories as indicated.

DIMENSIONS:

Floor space	58.2" (1475mm) W x 91" (2310mm) L
Product clearance	2.75" (70mm)
Combustible wall clearance	0" (0mm)
Belt width	
Standard belt	38" (965mm)
Twin belt	Two 18-1/2" (470mm)
Split belt	One 8" (203mm) and one 29" (737mm)
Baking zone length	55" (1395mm)

GAS SUPPLY: (specify)

	Natural	Propane
Single	3/4" NPT	3/4" NPT
Double stack	1" NPT	1" NPT
Triple stack	1-1/4" NPT	1" NPT

MAXIMUM INPUT:

Single	150,000 BTU/hr
Double	300,000 BTU/hr
Triple	450,000 BTU/hr

Minimum Gas Pressure:	4.5" W.C. for natural gas
	11.0" W.C. for propane gas
Maximum Gas Pressure:	10.5" W.C. for natural gas
	13" W.C. for propane gas

POWER SUPPLY:

Domestic Model:
120/208-240 VAC, 1 Phase, 60 Hz., 9 amp, 3 wire with Ground

Export Model:
240 VAC, 1 phase, 50 Hz., 7 amp, 2 wire with Ground

MINIMUM ENTRY CLEARANCE:

Uncrated	24" (610mm)
Crated	30" (762mm)

SHIPPING INFORMATION:

Approx. Weight:	Crated	Uncrated
Single	1200 lbs. (545 kg)	1060 lbs. (482 kg)
Double	2400 lbs. (1091 kg)	2012 lbs. (915 kg)
Triple	3600 lbs. (1636 kg)	2968 lbs. (1349 kg)

Crate sizes:
29-1/2" (749mm) x 72" (1829mm) x 93" (2362mm)

NOTE: *The company reserves the right to make substitutions of components without prior notice*

BLODGETT OVEN COMPANY
www.blodgett.com
50 Lakeside Avenue, Burlington, VT 05402
Toll Free: (800) 331-5842 • Phone: (802) 860-3700 • Fax: (802) 864-0183

BLODGETT®

VIB3855-1, VIB3855-2, VIB3855-3

Single, Double, Triple
In-Vent® Hood System

In-Vent® Integrated ventilation hood & conveyor system

Prototype VIB3855-3 In-Vent® is shown on Triple Stacked Blodgett Model MT3855 Conveyor Oven which is sold separately.

OPTIONS AND ACCESSORIES
(AT ADDITIONAL CHARGE)

- ❑ Installation

Project ______________________

Item No. ______________________

Quantity ______________________

In-Vent® conveyor oven ventilation hood system.
All data is shown per oven section, unless otherwise indicated.

EXTERIOR CONSTRUCTION
- Stainless steel exterior on front, sides, and ducts
- Integral exhaust and make-up air plenum and duct collar assembly
- Quick release duct fittings and duct extensions
- Front air make-up cooling panels
- Cooling fan motor exhaust plenum
- Conveyor entrance/exit end exhaust plenums
- Heat shields over end exhaust plenums and vertical exhaust corner riser
- Stainless steel ceiling trim pieces included

INTERIOR CONSTRUCTION
- Aluminized steel, 300 and/or 400 series stainless steel
- Insulated supply ducting

OPERATION
- Captures smoke, contaminants and cooking by-products emanating from the oven.
- Minimizes amount of tempered air removed from kitchen by surrounding itself and oven with a layer of untempered make-up air.
- Requires much less exhaust and make-up air flow than conventional overhead hoods.
- Exhausts grease and smoke from directly over conveyors resulting in cleaner oven and environment.
- Cooler surfaces lower radiant heat to room and increase operator safety and comfort significantly

STANDARD FEATURES
- Available in three configurations
  - ❑ VIB3855-1 for single MT3855 oven
  - ❑ VIB3855-2 for double stacked MT3855 ovens
  - ❑ VIB3855-3 for triple stacked MT3855 ovens
- Fully detachable panels without tools
- Quick disconnect ducting for servicing or cleaning
- Adds only 4" to front-to-back dimensions
- Ventilation system controls can be interlocked with the oven's controls
- Modular design for easier handling and cleaning

NSF® UL® cUL®

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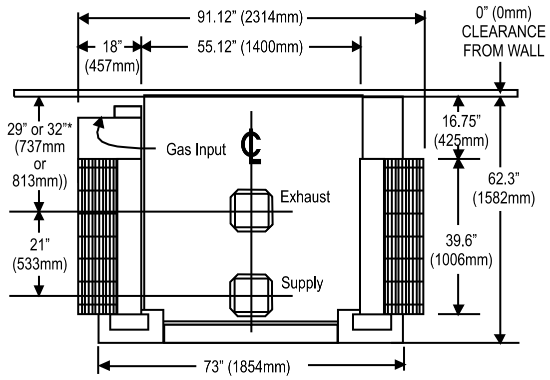
BLODGETT®

VIB3855-1, VIB3855-2, VIB3855-3

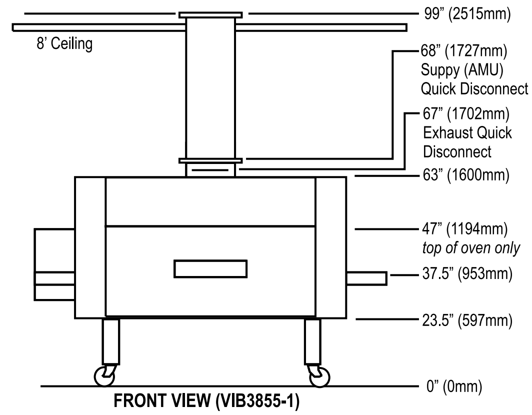
APPROVAL/STAMP

**Ductwork should be terminated 99" (2515mm) above the finished floor (2" (51mm) above an 8' ceiling). All other connections will be supplied with the hood.*

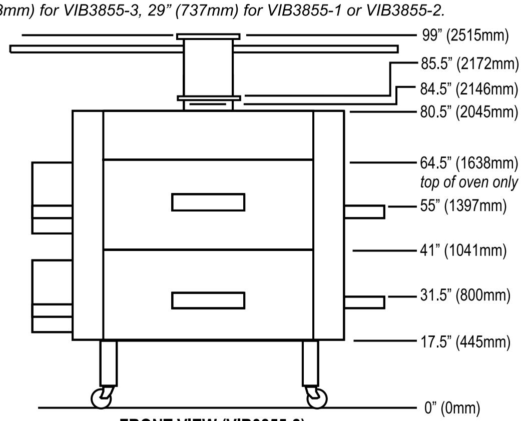


TOP VIEW

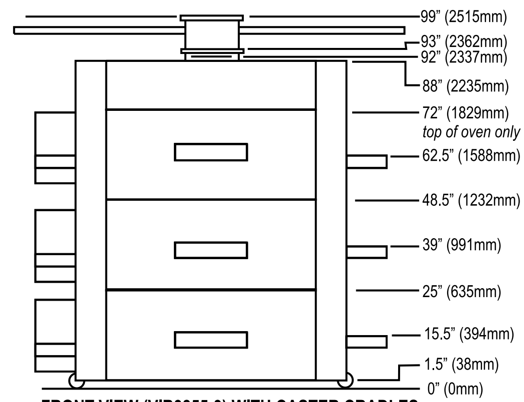
* 32" (813mm) for VIB3855-3, 29" (737mm) for VIB3855-1 or VIB3855-2.



FRONT VIEW (VIB3855-1)



FRONT VIEW (VIB3855-2)



FRONT VIEW (VIB3855-3) WITH CASTER CRADLES

SHORT FORM SPECIFICATIONS	
Universal specification, based on specification sheet for specific system with specific oven model. **SYSTEM** VIB3855-1, VIB3855-2, VIB3855-3 **OVEN MODEL** MT3855G	Provide Blodgett In-Vent® ventilation system, engineered for Blodgett model MT3855 conveyor oven. Exterior shall be stainless steel on front sides and ducts. Interior shall be of aluminized steel. Baffle grease filters shall be of galvanized steel or aluminum construction. All exterior panels removable without the use of tools for access to mechanicals and cleaning. Integral exhaust and make-up air plenums connected to stainless steel duct collars with quick disconnect assemblies. Ventilation system shall comply with ANSI/NSF-2 and UL-710. Provide factory authorized assembly and installation at additional cost, per ANSI/NFPA-96. Ductwork between extension duct collars and rooftop equipment, and rooftop equipment not included.

DIMENSIONS:

Floor space 91.12" (2314mm) W x 62.3" (1852mm) D

AIRFLOW REQUIREMENTS:

Model	Supply	Exhaust
Duct Size (all models):	12" x 12" (305mm x 305mm)	12" x 12" (305mm x 305mm)
VIB3855-1:		
CFM:	1100 CFM	1500 CFM
Static Pressure:	0.02-0.03" W.C. (5-7 Pa)	1.5" W.C. (373 Pa)
VIB3855-2:		
CFM:	1450 CFM	1850 CFM
Static Pressure:	0.09" W.C. (22 Pa)	1.4" W.C. (348 Pa)
VIB3855-3:		
CFM:	1800 CFM	2200 CFM
Static Pressure:	0.12" W.C. (30 Pa)	1.8" W.C. (448 Pa)

MINIMUM ENTRY CLEARANCE:

Largest uncrated component
55" x 46.3" x 20" (1397mm x 1176mm x 508mm)

SHIPPING INFORMATION:

Weight:

VIB3855-1	360 lbs. (164 kg)
VIB3855-2	460 lbs. (209 kg)
VIB3855-3	560 lbs. (255 kg)

Crate size:

VIB3855-1	Palletized size and number not yet finalized
VIB3855-2	Palletized size and number not yet finalized
VIB3855-3	Palletized size and number not yet finalized

***NOTE:** The company reserves the right to make substitutions of components without prior notice*

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C Results Reporting Sheets

<u>Manufacturer:</u> The Blodgett Oven Company

<u>Model:</u>

Conveyor Oven	MT3855
Integrated Ventilation System	In-Vent AB2B

<u>Date:</u> July, 98

Section 11.1 Test Oven

Description of operational characteristics: The oven draws heated air through fans which force it into the oven cavity through air distribution fingers below the conveyor belt, and an air distribution plate above. A remote electronic controller handles all operating functions. The integrated ventilation hood supplies make-up and exhaust air which is manually turned on and off while the oven is in operation.

Section 11.2 Apparatus

The oven, with integrated ventilation system in place, was installed on a level, tiled floor and at least twelve inches from any adjacent wall. Exhaust and make-up air were supplied to the ventilation system as specified by the manufacturer.

The oven was instrumented using a positive displacement gas meter, a watt/watt-hour transducer, and a 24 gauge, type K fiberglass insulated thermocouple wire (for oven cavity temperature measurement). A voltage regulator maintained a constant voltage for all tests and data was recorded at five second intervals by a computerized data acquisition unit. All test apparatus were installed in accordance with Section 9 of the ASTM test method, with the exception of the integrated ventilation system, which eliminated the need for a canopy exhaust hood.

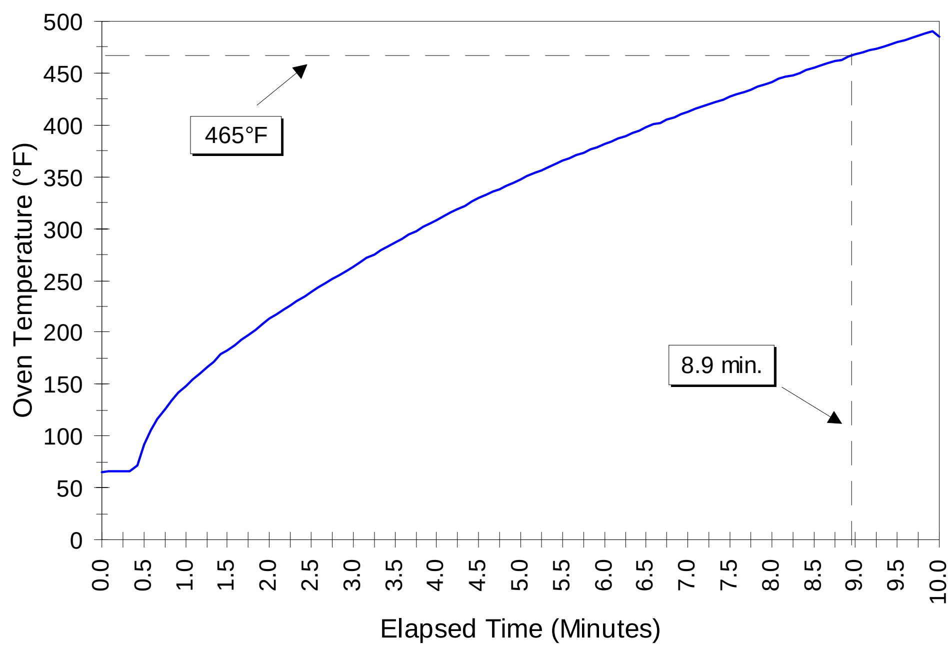
Section 11.4 Energy Input Rate

Test Voltage	208 V
Gas Heating Value	1028.9 Btu/ft^3
Rated	150,000 Btu
Measured	148,500 Btu
Percent Difference between Measured and Rated	1.0 %
Fan / Control Energy Rate (Gas Ovens Only)	0.38 kW

Section 11.5 Preheat Energy and Time

Test Voltage	208 V
Gas Heating Value	1028.9 Btu/ft^3
Energy Consumption	21,100 Btu
Time from 75°F to 465°F	8.9 min

Preheat Characteristics



Results Reporting Sheets

Section 11.6 Idle Energy Rate

Test Voltage	208 V
Gas Heating Value	1028.3 Btu/ft^3
Idle Energy Rate	56,900 Btu/h

Section 11.7 Pilot Energy Rate

Gas Heating Value	N/A
Pilot Energy Rate	N/A

Section 11.8 Cooking Energy Efficiency and Cooking Energy Rate

Cook Time Determination:

Cook Time	5.4 min
Conveyor Speed	3.5 min

Light Load:

Test Voltage	208 V
Gas Heating Value	1026.3 Btu/ft^3
Cooking Energy Efficiency	10.4 ± 0.4 %
Gas Cooking Energy Rate	65,300 Btu/h
Electric Cooking Energy Rate	0.38 kW

Heavy Load:

Test Voltage	208 V
Gas Heating Value	1027.4 Btu/ft^3
Cooking Energy Efficiency	42.8 ± 0.6 %
Gas Cooking Energy Rate	97,100Btu/h
Electric Cooking Energy Rate	0.38 kW
Production Capacity	215.9 Pizzas/h

D Cooking Energy Efficiency Data

Table D-1. Physical Properties.

Specific Heat (Btu/lb °F)	
Pizza	0.593
Latent Heat (Btu/lb)	
Vaporization, Water	970

Table D-2. Light Load Pizza Efficiency Test Data.

Measured Values	Repetition #1	Repetition #2	Repetition #3
Number of Pizzas	6	6	6
Conveyor Speed (min)	3.5	3.5	3.5
Initial Pizza Temperature (°F)	40	40	40
Final Average Pizza Temperature (°F)	196.6	194.9	193.7
Total Initial Pizza Weight (lb)	8.576	8.751	8.659
Total Final Pizza Weight (lb)	8.112	8.265	8.205
Test Time (min.)	10.8	10.8	10.8
Gas Volume (ft^3)	12.1	12.1	12.0
Electric Energy (Wh)	68	69	69
Calculated Values			
Energy Consumed by Pizzas (Btu)	1200	1300	1200
Gas Energy Consumed by Oven (Btu)	11,700	11,800	11,700
Electric Energy Consumed by Oven (Btu)	230	230	230
Total Energy Consumed by Oven(Btu)	11,900	12,000	11,900
Cooking Energy Efficiency (%)	**10.4**	**10.6**	**10.3**
Gas Cooking Energy Rate (Btu/h)	**65,400**	**65,300**	**65,000**
Electric Cooking Energy Rate (kW)	**0.38**	**0.38**	**0.38**

Cooking Energy Efficiency Data

Table D-3. Heavy Load Pizza Efficiency Test Data.

Measured Values	Repetition #1	Repetition #2	Repetition #3
Number of Pizzas	24	24	24
Conveyor Speed (min)	3.5	3.5	3.5
Initial Pizza Temperature (°F)	40	40	40
Final Average Pizza Temperature (°F)	195.3	193.7	193.7
Total Initial Pizza Weight (lb)	34.506	34.750	34.749
Total Final Pizza Weight (lb)	32.988	33.162	33.116
Test Time (min.)	6.7	6.7	6.7
Gas Volume (ft^3)	11.1	11.1	11.4
Electric Energy (Wh)	43	42	42
Calculated Values			
Energy Consumed by Pizzas (Btu)	4700	4700	4800
Gas Energy Consumed by Oven (Btu)	10,700	10,900	10,900
Electric Energy Consumed by Oven (Btu)	150	140	140
Total Energy Consumed by Oven(Btu)	10,900	11,000	11,000
Cooking Energy Efficiency (%)	**43.0**	**42.6**	**43.0**
Gas Cooking Energy Rate (Btu/h)	**94,800**	**98,100**	**98,200**
Electric Cooking Energy Rate (kW)	**0.38**	**0.38**	**0.38**
Production Capacity (Pizzas/h)	**215.9**	**215.9**	**215.9**