10 Braising Pans

Introduction

Braising pans, also known as tilting skillets or tilting-frying pans are among the most versatile appliances found in the commercial kitchen. They are used to braise, sauté, broil, roast, boil, fry, griddle, proof, hold, simmer, melt and steam. They can also be used as a steam table to hold warm foods.

In appearance, a braising pan resembles a flat-bottomed kettle. In practice, it combines the characteristics of a steam kettle and a griddle. The cooking surface is like a griddle plate, heated from beneath by atmospheric gas burners or electric elements. But this “griddle” plate has walls on all four sides so as to form a shallow rectangular pan. Energy input ranges from 6 to 18 kW for electric appliances and 6 to 120 kBtu/h for gas units. Capacities vary from 10-50 gal (38-190 L).

Figure 10-1.
40-gallon braising pan.
Photo: Groen Inc.

Braising pans are commonly freestanding, on an open stationary frame of tubular steel (Figure 10-1) or equipped with casters. They also may be on a cabinet-style base, wall-mounted on trunnions, with smaller braising pans as tabletop configurations. Since they are often used for simmering, braising pans are typically equipped with a lid, which is usually mounted on the frame and counterbalanced.

One characteristic feature of braising pans is the ability to tilt forward between 10 and 110° for pouring and cleaning. A lever or hand wheel, or more rarely an electric motor, brings the pan forward and holds it in a tilted position. A safety switch cuts off power to the burner or elements when the tilt exceeds a certain angle. Some cooking is done at a slight incline: grease from bacon and ground beef can be drained forward as it forms.

The front rim of the pan has a lip or spout to guide food into serving pans when the skillet is tilted for pouring, and a common feature of many tilting skillets is a rack positioned to hold steam table trays just below this spout for filling as seen in Figure 10-2. Some braising pans are also equipped with a draw-off valve, so that food can be decanted from the bottom of the pan while it is horizontal.

Figure 10-2.

Braising pan with food receiving pan support mounts under pouring lip.

Photo: Vulcan-Hart

The braising pan can save time, money and line space in a commercial kitchen by performing the jobs of several different appliances. Throughout the day, the braising pan may provide extra griddle space for breakfast or lunch; be used as a kettle to prepare rice or pasta; be rolled to the serving line and used as a holding cabinet; be fitted with steamer baskets to prepare vegetables or rethermalizing frozen food, with a rack to wet-roast meat, or with fry baskets to prepare French fried potatoes and other foods typically prepared in a deep fat fryer.

This appliance is particularly well suited to moving from one mode of cooking to another. The procedure for making stew provides a distinctive example. A cook can braise the meat in the hot pan, allowing the juices to remain in the bottom. When the meat is cooked, he adds water, vegetables and spices into the pan. With the lid down, the stew is left to simmer for several hours. When it is done, the cook tilts the skillet to fill pans for the serving line and keeps the rest warm through mealtime.

One manufacturer is about to launch its steam skillet. The 40-gallan capacity Accu-Steam Skillet™ uses AccuTemp griddle technology to steam heat the pan bottom, providing uniform heating and gentle no-scorch “kettle” cooking and near instant recovery for high volume braising of meats and griddle cooking applications.

Braising Pan Performance

The Food Service Technology Center (FSTC) developed an ASTM standard test method[1] for braising pans. Performance parameters include maximum input rate, production capacity, cooking-energy efficiency and rate of energy use while simmering. The test method allows manufacturers and users to objectively evaluate energy performance and production capacity from different labs.

A skillet that is the right size for the kitchen will be used more often. A study by Pacific Gas and Electric Company at their production test kitchen[1] showed that the foodservice staff began to use the braising pan regularly only after a 32-gallon braising pan was replaced with a smaller 18-gallon braising pan.

Benchmark Energy Efficiency

An ASTM standard test method for braising pans was developed by the Food Service Technology Center (F1786-97).[1] The ASTM method reports several parameters of steamer performance including maximum input rate, production capacity, cooking-energy efficiency and rate of energy use while simmering. Based on the Food Service Technology Center's work associated with developing the standard test method and on data from the University of Minnesota,[3] a range of energy efficiencies for both gas and electric skillets are presented in Table 10-1.

Table 10-1. Energy Efficiency for Braising Pans.

Gas Braising Pans	30 – 50%
Electric Braising Pans	80 – 95%

The Minnesota study compared two 18-gal (68 L) braising pans, one electric and one gas. They found a cooking efficiency of 52% for the gas-powered braising pan and 79% for the electric. The gas unit heated water much faster than the electric unit, but consumed 1.8 times more energy.

The gap between gas and electric performance should narrow as better technology is applied to gas braising pans. Most skillets in use are older models that don't take advantage of standard efficiency measures such as insulation or advanced burner/heat exchanger design.

Braising Pan Energy Consumption

Projected energy consumption for gas and electric braising pans are presented in Table 10-2 and Table 10-3. Daily energy consumption for braising pans was calculated by multiplying the median rated energy input for each skillet by its duty cycle and the hours of operation. The duty cycles are based on monitoring two gas and two electric tilting skillets in Pacific Gas and Electric Company's Production Test Kitchen.[1] The duty cycle of an appliance is defined as the average rate of energy consumption expressed as a percentage of the rated energy input or the peak rate at which an appliance can use energy. Typical operating hours were gleaned from in-kitchen observations along with data from an unpublished proprietary end-use monitoring study. Projected annual energy consumption was determined by assuming a 6-day per week, 52-week per year operation.

Table 10-2. Projected Energy Consumption for Gas Braising Pans.

	Nominal Size	Rated Energy Input (kBtu/h)	Duty Cycle (%)	Avg. Energy Consumption (kBtu/h)	Typical Operating Hours (h/d)[a]	Annual Energy Consumption (kBtu)[b]
Braising Pan	10-50 gal	60 - 120				
(Median)	30	90	45[c]	40	4	49,900

[a] Operating hours or appliance "on time" is the total period of time that an appliance is operated from the time it is turned "on" to the time it is turned "off".
[b] The annual energy consumption calculation is based on the average energy consumption rate x the typical operating hours x 6 days per week x 52 weeks per year.
[c] The duty cycle is based on monitoring two gas braising pans with input rates of 85 kBtu/h and 62 kBtu/h in a real-world production kitchen (FSTC unpublished data). An associated average energy consumption rate of 40 kBtu/h was calculated.

Table 10-3. Projected Energy Consumption for Electric Braising Pans.

	Nominal Size	Rated Energy Input (kW)	Duty Cycle (%)	Avg. Energy Consumption (kW)	Typical Operating Hours. (h/d)[a]	Annual Energy Consumption (kWh)[b]	(kBtu)[c]
Braising Pan	10-50 gal	6 - 18					
(Median)	30	12	60[d]	7	4	8,730	29,800

[a] Operating hours or appliance "on time" is the total period of time that an appliance is operated from the time it is turned "on" to the time it is turned "off".
[b] The annual energy consumption calculation is based on the average energy consumption rate x the typical operating hours x 6 days per week x 52 weeks per year.
[c] Conversion Factor: 1 kW = 3.413 kBtu/h.
[d] The duty cycle is based on monitoring two electric tilting skillets with input rates of 9 kW and 11 kW in a real-world production kitchen.[1] An associated average energy consumption rate of 7 kW was calculated.

Ventilation Requirements

Braising pans are classified as light-duty equipment from the perspective of exhaust ventilation. For a wall-mounted canopy hood, the design ventilation rate for this equipment would range from 150 to 200 cfm (75 to 100 L/s) per linear foot of hood.

Research and Development

Atmospheric Burners

All braising pans now on the market use atmospheric burners. These are the simplest and least expensive type of burner, and using them helps keep the initial cost of the appliance low. Design of the burners and the heat transfer system can have a significant impact on appliance efficiency. In studies of deep-fat fryers, well-designed atmospheric burners demonstrated cooking energy efficiencies that approached those of infrared-burner fryers. However, the same studies show that fryers with poorly designed atmospheric burners have the lowest cooking efficiencies tested.

One manufacturer of braising pans, Groen, uses a heat transfer system that incorporates heat exchanger fins on the bottom of the pan and an insulated combustion chamber. All of these are simple, reliable and inexpensive to implement with a relatively good increase in cooking efficiency.

Figure 10-3. Accu-Steam braising pan.
Photo: AccuTemp

Infrared Burners

Braising pans with high efficiency infrared burners are not yet on the market, but they have been associated with high overall efficiency in appliances such as fryers and griddles. Griddles using infrared burners show higher cooking efficiencies than griddles using atmospheric combustion burners. However, the new Accu-Steam Skillet™ , shown in Figure 10-3, will incorporate the same IR burner design as the AccuTemp griddle. A braising pan heated with infrared burners should enjoy a similar increase in efficiency.

Thermal Fluid

Lang, Inc. developed a prototype thermal fluid griddle in conjunction with GTI, using gas burners to heat oil that is circulated through pipes to heat the griddle plate. It may prove more efficient to transfer heat into a thermal fluid than to use burners under the griddle plate. This system also promises better temperature uniformity on the bottom of the pan, which would be an advantage for those operators who use the braising pan as a backup griddle. Essentially, the new Accu-steam Skillet operates with the simplest working fluid – water and steam.

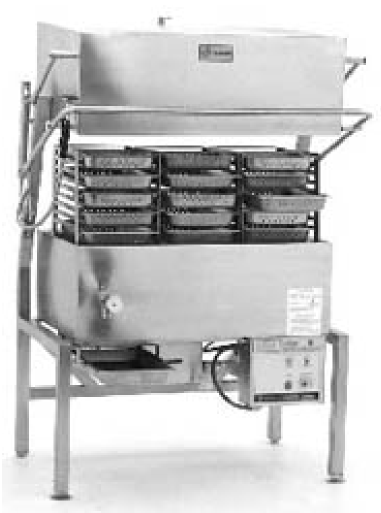

Figure 10-4. Skittle® cooker.
Photo: Legion Ind.

Insulation

Appliances like braising pans spend much of their duty cycle holding food at temperature, as in proofing and simmering. If the lid is open and the food is losing moisture freely, as much as half the energy into the appliance is working to evaporate water. Closing the lid can reduce energy use by 40% to 60%. With the lid down, the major energy loss from the appliance is radiant heat lost to the room. Insulation could further reduce this loss, but insulation is rarely used in braising pans.

Currently, only Legion Industries, Inc. makes a braising pan with insulated sides and under body. The outside of the pan is only warm to the touch when it is filled with 320°F (160°C) oil, demonstrating reduced radiant heat losses due to insulation. The manufacturer also offers a model with a tall, *capsule lid* that is fully insulated (the Skittle™, Figure 10-4).

This manufacturer contends their Skittle works well as a steamer, utilizing gentle closed-cycle steaming and is just as fast as conventional steamers, but with the added plus that there is no boiler. As a griddle surface, it is as hot at the very edges as it is in the center. It also can be used as a deep fat fryer; and when not it use, the capsule lid can be lowered and the insulation will minimize heat gain to the kitchen.[4]

Industry Market Focus

- Support benchmarking of braising pan energy efficiency. Apply the ASTM Standard Test Method to the Accu-Steam Skillet™.
- Support development of advanced burner options for gas braising pans.
- Encourage insulating pan body and lid.

References

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4. Legion Industries, Inc., Pennsylvania. "*The Legion Line*", Newsletter, Special Edition, Vol. 1 No. 5.

Information in this module also references Manufacturers Product Literature, catalogues, and appliance specification sheets.