

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
AIR AND RADIATION

**Summary of Rationale for ENERGY STAR® Version 1.0 Commercial
Griddle Specification**

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I. Introduction and Background

The ENERGY STAR Version 1.0 Commercial Griddle specification was finalized on May 8, 2009 and became effective immediately. This memorandum provides the key milestones and decisions that were made in developing and finalizing the requirements of this specification.

The document is divided into the following sections:

- Summary of the ENERGY STAR specification
- Summary of key milestones in the development of the ENERGY STAR specification
- Summary of key comments provided by stakeholders
- EPA's rationale for deciding on key elements of the final ENERGY STAR specification

II. Summary of ENERGY STAR Specification

Key elements of the new Version 1.0 ENERGY STAR specification are provided below:

- The following product types are eligible for ENERGY STAR: thermostatically controlled, electric and gas, single and doubled-sided equipment.
- Qualifying products must meet minimum cooking energy efficiency and maximum *normalized* idle energy rate requirements as presented in Tables 1 and 2, below. The Tier 2 *normalized* idle energy rate for electric griddles will be reviewed prior to January 1, 2011 to ensure it is appropriate for the marketplace. Cooking energy efficiency is based on heavy load conditions per ASTM F1275 and F1605 test standards.

Table 1: Energy Efficiency Requirements for Single and Double Sided Commercial Gas Griddles	
Cooking Energy Efficiency	$\geq 38\%$
<i>Normalized</i> Idle Energy Rate	$\leq 2,650 \text{ Btu/h per ft}^2$

Table 2: Energy Efficiency Requirements for Single and Double Sided Commercial Electric Griddles	
Tier 1: Effective May 8, 2009	
Cooking Energy Efficiency	$\geq 70\%$
Normalized Idle Energy Rate	$\leq 355 \text{ watts/ft}^2$
Tier 2: Effective January 1, 2011	
Cooking Energy Efficiency	$\geq 70\%$
Normalized Idle Energy Rate	$\leq 320 \text{ watts/ft}^2$

- *Normalized* idle energy rate is based on the area of the bottom cooking surface. Formulae for normalizing idle energy rates for gas and electric griddles are provided in Section 3 of the specification.
- Double-sided griddles that include an electric top plate and gas bottom plate must meet the cooking energy efficiency and *normalized* idle energy rate for gas griddles provided in Table 1, above. A formula for normalizing the idle energy rate for these product types is provided in Section 3 of the specification.
- Double-sided griddles may qualify for ENERGY STAR under the following conditions:
 - Integrated, double-sided units with full top platen ($\geq 90\%$ coverage from side to side) must test and qualify as a double-sided griddle.
 - Integrated, double-sided unit with partial platen(s) ($< 90\%$ coverage from side to side) must test and qualify as a single sided griddle (with top up and turned off).
 - Double-sided units with add-on top platens (full or partial) must test and qualify as a single sided griddle (with top up and turned off).
- Manufacturers must test and qualify their griddles using one of the following ASTM standards, as applicable: ASTM F1275, *Standard Test Method for the Performance of Griddles* or ASTM F1605, *Standard Test Method for the Performance of Double-Sided Griddles*. If new testing guidelines are developed for partial platen configurations under ASTM F1605, manufacturers will be required to test and qualify these units for ENERGY STAR using the new test method.
- Test results for a representative unit may be used for qualifying an entire family of products if the tested unit is the 3' option. If the product family includes units smaller than 3' then the manufacturer must test and qualify and report those units separately.
- Each griddle plate option must be tested and results submitted to EPA for ENERGY STAR qualification. Manufacturers selling models that offer more than one griddle plate option must ensure that all options meet the requirements to promote the model as ENERGY STAR. If any one of the options does not qualify then the manufacturer is required to assign a unique identifier to distinguish between ENERGY STAR and non-ENERGY STAR combinations.
- The specification went into effect on May 8, 2009. Tier 2 requirements for electric griddles will go into effect on January 1, 2011.

III. Key Milestones of Specification Development

Prior to launching the specification development process, EPA conducted market and engineering analyses, that included: an overview of the marketplace (e.g., market actors, product types available, market size); a summary of existing and emerging energy efficient technologies; a snapshot of voluntary and regulatory considerations; an evaluation of existing test standards; and an analysis of the potential energy savings due to high efficiency designs¹. Based on this research, EPA decided to move forward with griddles and officially announced its intention to develop an ENERGY STAR specification on November 20, 2007. This process spanned almost 7 months and included the following key milestones:

— Draft and Final Specifications

- Draft 1 released September 8, 2008 – Cooking energy efficiency and *normalized* idle energy rate levels were proposed for thermostatically controlled, single and double-sided, electric and gas griddles. Manually controlled griddles and fry-top ranges were explicitly excluded from the specification. Formulae for determining *normalized* idle energy rate were presented based on area of the bottom cooking surface. EPA proposed a February 5, 2009 effective date to coincide with the North American Foodservice Equipment Manufacturers (NAFEM) Show, February 5 – 7, 2009.
- Draft 2 released March 9, 2009 – *Normalized* idle energy rate for gas griddles was increased from 2,600 Btu/h per ft² to 2,650 Btu/h per ft². Additional clarification was provided for: measuring the area of the bottom cooking surface; qualification of double-sided griddles with partial top platens; submittal of a 3' representative unit to qualify a product family; and qualifying griddles that come with different griddle plate options. A revised May 1, 2009 effective date was proposed to coincide with the National Restaurant Association (NRA) Show, May 16-19, 2009.
- Final Draft specification released April 15, 2009 – *Normalized* idle energy rate for electric griddles was increased from 320 watt/ft² to 355 watts/ft². Manufacturers would be required to meet the 320 watts/ft² level under a newly proposed Tier 2, effective January 1, 2011. A clarification was made that each individual griddle plate option would need to be tested with the representative model and results submitted to EPA for ENERGY STAR qualification. Additional information is provided regarding the qualification of models that offer several griddle plate options, some of which do not meet ENERGY STAR levels. A slightly revised May 8, 2009 Tier 1 effective date was proposed to allow manufacturers a full two weeks to comment on the final proposal.
- Final Specification released May 8, 2009 – minor revisions were made to Section 4: Test Criteria and Section 6: Future Specification Revisions regarding the reporting of griddles with several griddle plate options and EPA's intent to review the Tier 2 electric *normalized* idle energy rate prior to the January 1, 2011 effective date.

¹ Griddle and Oven Industry and Market Research Report, Griddle Engineering Analysis, April 4, 2007 (Market Research Report updated January 2008).

— Industry Stakeholder Meetings, Correspondence, and Events

- EPA attended the NRA Show, May 18 – 20, 2008 to meet with commercial griddle manufacturers and view products.
- On July 11, 2008, EPA sent an email to industry stakeholders explaining that preliminary cost effectiveness calculations suggested that the cost differential between standard and high efficiency thermostatic griddles may result in an unfavorable payback to the end user. Manufacturers were then encouraged to share equipment pricing data so that EPA could conduct a more detailed cost effectiveness analysis to determine if an ENERGY STAR specification should be developed for this product category.
- EPA hosted an online stakeholder meeting on October 7, 2008 to provide an overview of the ENERGY STAR program and answer questions regarding the specification development process. Notes from this meeting were posted to the Web site.
- On November 19, 2008, an update was distributed to stakeholders regarding the status of the specification development process. EPA decided to take the next few months to collect data, conduct research, and hold additional manufacturer discussions with the goal of: (1) determining how to appropriately address double-sided griddles with top platens that provide only partial coverage and (2) further building EPA's reference data set, particularly for electric models.
- On February 4, 2009, EPA hosted a stakeholder meeting during the NAFEM Show to: discuss stakeholder comments received on the Draft 1 specification; present additional analysis and research; provide initial responses to stakeholder feedback; and propose a timeline for the development process. EPA also met with several commercial griddle manufacturers during the NAFEM Show to view products and discuss the Draft 1 proposal in greater detail.
- EPA launched the new ENERGY STAR Version 1.0 Commercial Griddle specification at the NRA Show held in Chicago, Illinois, May 16-29, 2009 and released an official press notice on May 18.

IV. Summary of Stakeholder Input

EPA received several comments on the draft specifications from a variety of industry stakeholders including: Accutemp, Burger King, Consortium for Energy Efficiency (CEE), Electric Foodservice Council, Pacific Gas & Electric, Southern California Edison Customer Technology Application Center, Southern California Gas, Garland, Taylor Company, and Vulcan-Hart.

Provided below is a summary of key stakeholder comments and EPA responses. More detailed comments and responses are provided in note boxes found throughout the draft specifications. All materials related to the specification development process are available in the ENERGY STAR Product Development Archives located at: www.energystar.gov/productdevelopment.

Comment: One stakeholder expressed concern with the requirement that manufacturing partners report ENERGY STAR shipment data to EPA. This information is proprietary and reporting to

EPA should be voluntary. It was suggested that EPA collect the data directly from end users, which would be a more meaningful representation of market penetration.

EPA Response: The collection of shipment data is an important tool in EPA's efforts to measure the growth and success of the ENERGY STAR program. Shipment data is collected from ENERGY STAR partners across more than 60 product categories. This data is submitted directly to EPA's consultant who then aggregates it for submittal to EPA. Manufacturers are allowed to submit data to EPA through a third party organization that can then provide an aggregate number representing all of the partners. In the commercial foodservice sector, EPA does not partner with end users and therefore, it would be very difficult to obtain this information. While the current approach of collecting shipment data has its limitations it has been quite effective for estimating total market penetration for commercial foodservice equipment.

Comment: One stakeholder suggested that useable cooking surface area be used when calculating *normalized* idle energy rate, rather than maximum cooking surface area. It was pointed out that Fisher Nickel, Inc. has conducted these types of tests on behalf of PG&E's Food Service Technology Center and the results are available on their Web site.

EPA Response: The purpose of measuring useable cooking surface area has been to provide a visual representation of product performance for end users. The reports made available on the Fisher Nickel, Inc. Web site were used to provide an estimate on temperature uniformity and are not an accurate representation. While uniformity is important to EPA there lacks an industry accepted method for determining it in a consistent manner. Therefore, EPA decided that determining *normalized* Idle energy rate using the "splashguard to splashguard and splashguard to grease trough" method would continue to be the approach for determining the maximum energy allowance.

Comment: Several stakeholders suggested that EPA set the *normalized* energy rate for gas griddles at 2,650 Btu/h per ft² (i.e., increase from 2,600 as proposed in Draft 1) to better represent the natural break between high and standard efficiency, demonstrated by the EPA data set, and to ensure a wider selection of qualifying single-sided griddles.

Response: Increasing the *normalized* idle energy rate for gas griddles resulted in only a slight increase in compliance rate (i.e., 22% to 26%). EPA made this change because the new level continued to represent approximately the top quartile of performers in regards to energy efficiency, which is a key guiding principle.

Comment: One stakeholder suggested that EPA use the water boil efficiency test, which is more consistent and repeatable, and would eliminate the need for laborious cooking energy efficiency tests, which is required in the ASTM test methods.

EPA Response: The water boil efficiency test method was dropped from the ASTM test standards in 1995 because there was no clear relationship between cooking energy efficiency and water boil efficiency. Water boil efficiency is not representative of actual cooking performance in operation, which end users need to make purchasing decisions. The industry as a whole moved away from water boil efficiency and has been using the cooking energy efficiency test method to convey energy and cooking performance to end users for the past decade. Finally, the water boil efficiency test only focuses on heat transfer efficiency and does not take into account smart controls. Manufacturers should be rewarded for incorporating power management techniques into product design to reduce energy use in idle. Therefore, EPA decided to retain the

requirement that manufacturers measure cooking energy efficiency based on the current ASTM F1605 and F1275 test standards.

Comment: One stakeholder expressed concern with data quality and suggested that the reporting of qualified ENERGY STAR models be provided by organizations certified to test to ASTM F1275 and F1605. Another concern was how EPA would ensure that units shipped into the field continue to meet the specification.

EPA Response: While EPA is generally interested in opportunities to strengthen ENERGY STAR testing requirements and ensure the quality of data reported for qualification, ASTM does not certify test laboratories. Instead, EPA decided to require manufacturers to sign the ENERGY STAR Qualified Product Information form declaring that the information presented to EPA is accurate.

It is the manufacturer's responsibility for making sure that the units shipped into the marketplace match the design of the representative model initially qualified for ENERGY STAR. However, EPA does have the right to pull products from the marketplace at any time to determine whether or not they perform to manufacturer claims. EPA also relies on its ENERGY STAR partners to alert EPA of non-compliance to help protect the integrity of the brand.

Comment: Several stakeholders expressed concern with the treatment of griddles with partial top platens in the specification. Although the ASTM F1605 test standard could be used to measure idle, it does not currently include a method for cooking energy efficiency using partial top platens. These griddle designs are increasing in popularity and offer the end user increased flexibility in operation. Some stakeholders were also concerned that manufacturers selling optional add-on top platens (full and partial) might qualify the unit as a double-sided configuration but then sell it as a single-sided unit, which may not meet the requirements.

Response: In lieu of an industry accepted method for testing double-sided griddles with partial top platens, EPA decided to require manufacturers to test these product types in the worst case scenario configuration, which would be single-sided (top up and turned off). To address concerns regarding griddles that are tested as double-sided but also sold as single-sided, EPA included a requirement that any griddle sold with an optional add-on top platen (full or partial) would be required to qualify for ENERGY STAR based on the single-sided configuration. EPA defined full and partial double-sided griddles based on total coverage of the top platen(s). Specifically:

- (1) Integrated, double-sided units with full top platen ($\geq 90\%$ coverage from side to side) must test and qualify as a double-sided griddle.
- (2) Integrated, double-sided unit with partial platen(s) ($< 90\%$ coverage from side to side) must test and qualify as a single sided griddle (with top up and turned off).
- (3) Double-sided units with add-on top platens (full or partial) must test and qualify as a single sided griddle (with top up and turned off).

A statement was also added in Section 6 of the specification that if new testing guidelines are developed for partial platen configurations (i.e., ASTM F1605 standard is revised), manufacturers will be required to test and qualify these units for ENERGY STAR using the new test method.

Comment: Several stakeholders brought up the issue of qualifying griddles with different griddle plate options (e.g., chrome vs. steel, grooved vs. flat). Feedback indicated that typically, the model number will not change based on griddle plate, which could impact the energy profile of the griddle.

Response: It is important that the end user receive clear information on those combinations that meet ENERGY STAR requirements. Based on discussions with industry experts, EPA found that griddle plate performance can be unpredictable. Therefore, clarification was added to the specification that each individual griddle plate option must be tested and results submitted to EPA for ENERGY STAR qualification. In the case where a model offers multiple griddle plate options, some of which do not meet ENERGY STAR requirements, a unique identifier must be used that provides clear delineation between ENERGY STAR qualified and non-compliant options. EPA will closely monitor the use of the ENERGY STAR mark and address any cases where a manufacturer might be misrepresenting qualification.

Comment: One stakeholder recommended that EPA include definitions for efficiency terms used to calculate annual energy consumption, including “production capacity” and “pre-heat energy”.

Response: The purpose of Section 1: Definitions is to define those terms referenced in the Eligibility Criteria. Therefore, terms such as production capacity and pre-heat energy are outside the scope of the ENERGY STAR specification because there are no requirements for these measurements. Furthermore, the ASTM test standards referenced in the ENERGY STAR specification can be used to identify these terms, if needed.

Comment: One stakeholder expressed concern regarding the allowable margin of error for measuring cooking energy efficiency for purposes of ENERGY STAR qualification.

Response: The current ASTM test standards address uncertainty by requiring three tests to be conducted and applying the Student T test to the results, which determines the validity of the average based on sample size. The test method uses standard deviation to ensure accuracy. Furthermore, the 10% uncertainty requirement represents the maximum allowed. In practice, testing engineers at PG&E’s Food Service Technology Center are seeing uncertainties of 5% or less. As a result, EPA decided to rely on the ASTM test method to address uncertainty instead of attaching such a requirement to the performance levels within the specification.

Comment: Several stakeholders were concerned that the proposed *normalized* idle energy rate of 320 watts/ft² for electric griddles might be too stringent. Feedback suggested that the proposed Draft 1 levels represented significantly less than the desired 25% target because standard efficiency units are not well represented in EPA the data set.

One stakeholder submitted a proposal for calculating electric idle energy rate based on the proposed gas idle energy rate.

Response: EPA acknowledged that the data set used to set the proposed *normalized* idle energy rate for electric griddles was limited. Although the proposal presented to EPA produces a mathematically equivalent idle energy rate threshold for both gas and electric griddles, it fails to adequately account for the differences in idle performance data between the two types of griddles. Specifically, EPA’s data set suggests that electric griddles can operate at a lower relative idle energy rate than their gas-fired counterparts.

In lieu of a fully representative data set, EPA decided to delay the previously proposed energy efficiency requirement of 320 watts/ft² for electric griddles by one year and establish an interim tier. This interim tier allows for a fairly large number of models in the data set to qualify (i.e., 38% compliance rate) but effectively differentiates among products to deliver cost effective savings. Based on EPA’s analysis, at 355 watts/ft², the end user saves almost 2,200 kWh/year, or

\$220/year, and recovers the incremental purchase cost in less than 5 years. The Tier 2 *normalized* idle energy rate of 320 watts/ft², which remains cost effective based on the additional savings delivered, will be reviewed in advance of its effective date to ensure it remains appropriate.

EPA also considered using the average idle energy rate based on existing levels established by the Federal Energy Management Program (FEMP) for federal procurement. FEMP assigned maximum idle energy rate levels (in Watts) based on griddle width. These levels were normalized to determine the average idle energy rate level of 382 Watts/ft². However, more than 60% of the models included in EPA's data set met this level. This compliance rate was significantly higher than EPA's goal of the top 25% and therefore, EPA decided not to adopt the FEMP level.

Comment: Some stakeholders were concerned that models offering high production capacities were being penalized and suggested that *normalized* idle energy rate levels be based on production capacity.

Response: Production capacity is calculated from cooking energy efficiency using the ASTM standards. Idle energy rate represents the energy used while the griddle is *not* cooking (i.e., absence of a cook load) and is a function of the control system, the media through which the heat is transferred, cooling characteristics of the plate as well as several other characteristics including: the type of heat transfer, insulation characteristics, and the amount of heat loss during idle periods. In theory, the components responsible for increasing production capacity should not drive idle energy rate. However, in response to these concerns, EPA plotted production capacity against idle energy rate to determine if there was an observable trend between the two metrics. The EPA data set demonstrated that there is no direct relationship between high production rate and high idle energy rate. In fact, several models included in the data set showed low idle energy rates coupled with superior energy efficiency and high production capacities. Maintaining product performance with an increase in energy efficiency is a guiding principle of the ENERGY STAR program and the current data set supported EPA's goal of offering qualified models that meet end user performance and energy management needs. Therefore, EPA decided to retain a *normalized* energy rate based on griddle size and not production capacity.

However, recognizing that many end users purchase commercial griddles taking into account production capacity, EPA decided to collect and include this information on the ENERGY STAR Qualified Product List.

V. EPA Rationale for Specification

EPA uses a consistent set of criteria in the development and revision of specifications for ENERGY STAR qualified products. These criteria guide EPA in its decision making and help to ensure that the ENERGY STAR mark will continue to be a trustworthy symbol for consumers to rely upon as they purchase products for the home or business and their purchases will deliver substantial environmental protection. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Efficiency level is technically feasible while product performance is maintained or enhanced;
- Labeled products will be cost-effective to the buyer;
- Efficiency can be achieved with several technology options;

- Product differentiation and testing are feasible; and
- Labeling would be effective and recognizable in the market.

Below EPA addresses the ENERGY STAR commercial griddle specification relative to each of these criteria:

- Expected Energy Savings and Environmental Benefits on a National Basis. Commercial griddles that have earned the ENERGY STAR are approximately 10% more energy efficient than standard griddles. Each ENERGY STAR qualified electric griddle can save businesses 2,270 kWh annually, or an average of \$190/year on utility bills. Each ENERGY STAR qualified gas griddle can save 15 MBtu annually, or an average of \$175/year on utility bills. By 2020, if all new shipments were ENERGY STAR qualified units, the program would reduce 625 million pounds of CO² emissions annually.
- Technical Feasibility/Impact on Product Performance/Functionality. With commercial foodservice equipment, end users are most concerned with: food quality, food safety, and time to table. End users simply cannot sacrifice these needs for energy efficiency and therefore, any ENERGY STAR specification developed for this sector must ensure the same or better performance. The ASTM test standards referenced in the ENERGY STAR commercial griddle specification provide end users with a representation of real world usage, including a resulting production capacity which is tied to cooking energy efficiency. Cooking energy efficiency is the ratio of energy absorbed by the food product to the total energy supplied to the griddle during cooking. The higher the cooking energy efficiency the faster cook times. At the time of development, several manufacturers offered models that offered high cooking energy efficiency and production rates while employing designs that reduced heat loss during periods of idle.
- Cost-Effectiveness to the Purchaser. End users purchasing ENERGY STAR qualified commercial griddles on average will see a payback ranging from 1 – 5 years, depending on fuel type, usage, and utility prices. Below are comparisons of models currently available in the marketplace, ENERGY STAR and standard efficiencies, based on a 50% discount off of list price², which is typical in this industry. Please note that the electric griddle example represents the comparison of two specific models because limited data was available to calculate the average cost of standard versus high efficiency. The gas griddle example is based on average costs and energy consumption of high efficiency versus standard efficiency models. Averages were used because there were some instances where the price point for high efficiency was lower than standard efficiency units.

Electric Griddle Payback Analysis

Model	Initial Price	Incremental Cost	Idle Energy Rate (watts/ft ²)	Cooking Energy Efficiency	Annual Energy Consumption (kWh/yr)	Annual Energy Cost*	Annual Dollar Savings	Payback (years)
ENERGY STAR	\$4,059	\$459	298	70%	17,989	\$1,853	\$197	2.3
Standard^	\$3,600		415	76%	19,905	\$2,050		

^ Source: Standard efficiency results provided by PG&E's Food Service Technology Center.

² List prices provided by Auto Quotes. All models are 3 ft width, which is typical in the industry.

Gas Griddle Payback Analysis

Model	Initial Price	Incremental Cost	Normalized Idle Energy Rate (Btuh/ft ²)	Cooking Energy Efficiency	Annual Energy Savings (Mbtu/yr)	Annual Dollar Savings	Payback (years)
ENERGY STAR	\$3,343	\$50	2,650	38%	15	\$176	< 1
Standard	\$3,293		3,500	32%			

* Gas rate = \$11.77/Mbtu, Electric rate = \$0.103/kWh (ENERGY STAR Factoid Workbook, April 2009)

- Achieve Efficiency With Several Technology Options. EPA designs its ENERGY STAR specifications to be performance-based. This means that it strives to recognize the better performing products on the market in terms of energy efficiency regardless of technology. Manufacturers have employed several technologies to reduce idle energy rate and increase cooking energy efficiency. EPA excluded manually controlled griddles because currently, there is no industry accepted test procedure available to measure the cooking energy efficiency of these product types. If a test method is developed, EPA will consider expanding the specification to allow manually controlled griddles to qualify.
- Testing Procedure. The ENERGY STAR specification references ASTM F1275: *Standard Test Method for the Performance of Griddles* and ASTM F1605: *Standard Test Method for the Performance of Double-Sided Griddles*, which are the industry accepted standards for measuring single and double-sided griddle cooking energy efficiency and idle energy rate.
- Product Differentiation and Effectiveness of Labeling. Where feasible, EPA strives to develop ENERGY STAR specifications that represent approximately the top 25% of models available in regards to energy efficiency performance. The levels presented in the Version 1.0 specification represent approximately 26% and 38% of EPA's gas and electric griddle data sets, respectively. While the compliance rate for electric griddles is slightly higher than 25%, it was determined that the EPA data set was not full representative of more energy intensive electric griddles currently available in the marketplace. A tiered approach allows EPA additional time to evaluate the market and determine if a more stringent Tier 2 level is feasible. At the time of launching the specification, several manufacturers had equipment that met the performance requirements and others indicated plans for upgrading existing models to meet the specification.

EPA believes the ENERGY STAR mark serves an important role in the marketplace due to the absence of any other objective basis for end users to identify and manufacturers to promote highly efficient commercial griddles. Several key manufacturers contributed to the development process and many utilities and customers have expressed interest in rebating and purchasing ENERGY STAR qualified commercial griddles. Furthermore, the addition of commercial griddles helps to expand the number of energy and water saving opportunities in the growing suite of ENERGY STAR commercial foodservice equipment.