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OFFICE OF
AIR AND RADIATION

**Summary of Rationale for ENERGY STAR® Commercial Food Service Equipment
Including Hot Food Holding Cabinet, Fryer, and Steam Cooker Specifications**

I. Introduction and Background

This memorandum provides a summary of EPA's rationale in developing the following new ENERGY STAR commercial food service equipment specifications: hot food holding cabinets; fryers; and steam cookers. It contains the following information:

- Summary of the key requirements of the specifications
- Key milestones in the development of the specifications
- Summary of comments provided by stakeholders throughout the development process
- EPA's rationale for deciding on key elements of the Final specifications

II. Summary of Key Requirements

In 2001, EPA launched its new ENERGY STAR commercial food service category with a specification for solid door reach-in refrigerators and freezers. EPA's goal in developing specifications for hot food holding cabinets, fryers, and steam cookers was to expand the suite of energy-efficient product offerings and increase the savings potential within the commercial kitchen. The following are the key requirements of these new specifications:

Hot Food Holding Cabinets

- ENERGY STAR performance is based on maximum idle energy rate: 40 watts/ft³.
- Manufacturers may use test results for the smallest model to qualify the entire family as ENERGY STAR.

Fryers

- Specification applies to gas and electric open, deep-fat fryer models.
- ENERGY STAR performance is based on heavy load (fryer) cooking energy efficiency and idle energy rate, see below:

Energy Efficiency Requirements for Open Deep-Fat Gas Fryers	
Heavy Load (French fry) Cooking Energy Efficiency	$\geq 50\%$
Idle Energy Rate	$\leq 9,000$ Btu/hr*

*Based on 15-inch fryer

Energy Efficiency Requirements for Open Deep-Fat Electric Fryers	
Heavy Load (French fry) Cooking Energy Efficiency	$\geq 80\%$
Idle Energy Rate	≤ 1000 watts*

*Based on 15-inch fryer

Steam Cookers

- Specification applies to gas and electric countertop, wall-mounted, and floor models.
- ENERGY STAR performance is based on heavy load (potato) cooking energy efficiency and idle energy rate, see below:

Energy Efficiency Requirements for Electric Steam Cookers		
Pan Capacity	Cooking Energy Efficiency*	Idle Rate (watts)
3-pan	50%	400
4-pan	50%	530
5-pan	50%	670
6-pan	50%	800

Energy Efficiency Requirements for Gas Steam Cookers		
Pan Capacity	Cooking Energy Efficiency*	Idle Rate (Btu/h)
3-pan	38%	6,250
4-pan	38%	8,350
5-pan	38%	10,400
6-pan	38%	12,500

*Cooking Energy Efficiency is based on heavy load (potato) cooking capacity.

III. Key Milestones of Specification Development

The three product specifications were developed and finalized in less than one year, which included the following key milestones:

- Industry stakeholder meetings held in conjunction with the National Restaurant Association (NRA) Show in Chicago, IL, May 20, 2003.
- Three draft versions of each specification released for stakeholder comment prior to finalization.
- Launch of new specifications at the National Association of Food Equipment Manufacturers (NAFEM) Show, September 5-7, 2003.

Throughout the product development process, all draft versions of the specification and stakeholder comments were posted to the ENERGY STAR Web site, with approval from the submitters.

IV. Summary of Stakeholder Input

In developing the product specifications EPA considered comments provided during the May industry stakeholder meetings as well as written comments submitted to EPA by equipment manufacturers and other industry stakeholders. The key comments are summarized below, along with EPA's responses:

Hot Food Holding Cabinets

- Some manufacturers were interested in including additional product categories under the specification, specifically dual function (cook and hold) equipment.

EPA Response: Only those models whose only function is to hold food at a specific and constant temperature can qualify under the specification. To consider dual function equipment EPA would have to take into account cooking performance as well. EPA may consider this product type in future versions of the specification based on manufacturer interest and available data.

- Manufacturers expressed concern with EPA's initial use of full-, three quarter, and half-size subcategories when setting performance requirements for the varying sizes of cabinets. These subcategories could be challenging to define and often differ from one manufacturer to the next. It was suggested that EPA determine internal volume and cabinet dimensions and then set a performance requirement based on these metrics. Manufacturers further suggested a Watts/ft³ measurement.

EPA Response: EPA based its initial requirements on recommendations made by the Federal Energy Management Program (FEMP) for full-sized units. In an attempt to allow all cabinet sizes available in the marketplace to qualify as ENERGY STAR, EPA created performance levels for three quarter and half-size models. These proposed levels were based on test data and discussions with industry. However, in response to these concerns EPA re-evaluated its dataset and proposed a 40 Watts/ft³ idle energy rate requirement that could apply to all cabinet sizes based on the internal dimensions of a standard full-size cabinet consuming 800 watts at 150 degrees F.

- Hot food holding cabinets are typically sold as part of a larger family of models all of which have the same engineering design but vary in internal cabinet size. Since in all cases, the smallest cabinet consumes the most energy, based on the Watts to volume ratio, it could be tested and submitted for ENERGY STAR qualification and represent the maximum energy consumption of any one model within that family.

EPA Response: EPA agreed to allow manufacturers to test and qualify the smallest cabinet within a family and receive ENERGY STAR qualification for that entire family of models. To ensure that all of the cabinets being qualified are identical to the representative model, specification sheets must be provided along with the product submittal form displaying the design and insulation specifications for each subsequent model.

- One manufacturer requested that EPA increase the maximum idle energy rate from 40 to 50 Watts/ft³ to allow more glass door models to qualify as ENERGY STAR.

EPA Response: EPA's primary goal in setting the 40 Watts/ft³ level was to offer ENERGY STAR as a way to identify and separate the insulated and non-insulated solid door/solid wall cabinets the more efficient hot food holding cabinets available in the market. While glass door units are eligible to qualify as ENERGY STAR, it is not EPA's intention to adjust this level to allow them to qualify. Rather, it is EPA's hope that manufacturers with glass door units will make the necessary design changes to these units, such as using better insulated glass or additional wall insulation, to increase their efficiency.

Fryers

- Some manufacturers thought that all fryers (e.g., specialty, kettle) that are able to meet the specification requirements should be able to qualify as ENERGY STAR.

EPA Response: EPA's decision to exclude specialty and kettle fryers was based on the fact that there are different test methods for these types of products. Based on industry interest and available test data EPA may consider these product types in the future.

- A number of manufacturers felt that the specification should also address idle rates for other fryer sizes in addition to the proposed standard 15-inch fryer level.

EPA Response: A 15-inch fryer is standard size for most floor and counter top open fryers. In addition, data made available by the Food Service Technology Center (FSTC) and used by EPA to determine the performance requirement proposed in the specification was limited to 14.5- and 15-inch models. More testing would need to be done to determine an appropriate performance level for other sizes. Stakeholders agreed that the 15-inch fryer was a good place to start since the majority of fryers available and sold in the marketplace fall into this category. Given manufacturer interest, EPA may consider other sizes in future versions of the specification.

- A suggestion was made to consider production capacity as part of the requirements.

EPA Response: EPA sees this as a separate selling feature of the equipment. The ENERGY STAR mark makes it easy for the purchaser to identify models in the marketplace that will save them energy and money. Other features, such as product capacity, are additional decision points that the customer needs to consider, and lay outside the scope of this specification.

- Understanding EPA's desire for ENERGY STAR to represent the top 25% of models found in the marketplace, there was some concern that the proposed 6,500 Btu/hr maximum idle energy rate for gas models and 800 W maximum idle energy rate for electric models would actually exclude fryers that would otherwise fall within this category. Some of the best performing models found in the marketplace performed well above the cooking energy efficiency requirement but fell short of the maximum idle energy rate. EPA was asked to raise these requirements to 9,000 Btu/hr and 1,000 W, respectively.

EPA Response: It is EPA's intent to develop specifications that are challenging but represent and reward the top performers already found in the marketplace. In response to this concern EPA proposed new 9,000 Btu/hr and 1,000 W maximum idle energy rates in the Draft 2 version of the fryer specification and received no objections to these changes.

- Some manufacturers thought that the NAFEM Show may be a little too aggressive of a schedule to launch a specification.

EPA Response: The NAFEM Show was chosen in the interest of the manufacturers. EPA wanted to launch the program at a venue that benefited the program partners and gave them the most exposure. Once the specification was finalized, EPA offered program partners swift qualification of models meeting ENERGY STAR requirements so that partner could display these models in their booths during the show and benefit from EPA's outreach and PR efforts.

Steam Cookers

- The first version of the steam cooker specification applied only to pressureless models. Manufacturers expressed interest in expanding the program to pressure cookers, pointing out that they perform better than boiler-based models and could reach high efficiencies. Two compelling arguments for including pressure cookers were presented to EPA: (1) pressure and pressureless models are tested under the same ASTM standard and perform at similar efficiency levels and (2) if only one product type were allowed to qualify and display the ENERGY STAR mark then end users could be in danger of purchasing the wrong equipment for their specific application.

EPA Response: To allow pressure steamers to qualify EPA revised the specification to cover all commercial steam cookers and technologies. Definitions for individual technologies, previously included in the Draft 1 version of the specification, were removed and a general steam cooker definition was provided in the final specification.

- Initially EPA proposed a 400 W maximum idle energy rate for electric steamers, which was based on FEMP recommendations and normalized for a 3-pan capacity. To allow for a fair comparison of idle rates for different pan sizes of steam cookers, EPA developed a normalization equation so that 4-pan, 5-pan, or 6-pan capacity steamers would have the opportunity to qualify. However, manufacturers expressed concern with using an equation to qualify products.

EPA Response: In response to this concern and to avoid any confusion with using an equation to qualify products, EPA developed a simple table of required idle energy rates for 3-, 4-, 5-, and 6-pan steam cookers.

- One manufacturer suggested dividing steam cookers into three subcategories (e.g., connectionless, boilerless, and pressurized cooking compartment) and setting performance requirements for each arguing that each classification has its own distinct market base.

EPA Response: While developing the specification it was EPA's understanding that a number of models within each of these subcategories were able to meet the proposed performance requirements. In addition, it is not EPA's intent to give one category a competitive advantage over another by setting different specifications within the same marketplace. In the absence of data or other evidence showing that these subcategories should be handled differently EPA applied the same performance requirements to all technologies in the Final specification.

- Some manufacturers were concerned with the required submission of shipment data to EPA.

EPA Response: EPA expressed willingness to work through a third-party, such as NAFEM, to obtain shipment data. The data may be masked and provided in aggregate form. EPA's goal in collecting this information is to gauge the penetration of ENERGY STAR qualified products in the marketplace and to determine if changes are needed to the specification that would yield increased penetration of energy-efficient products.

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 EPA ensure that the ENERGY STAR will continue to be a trustworthy symbol for consumers to rely upon as they purchase products for the home or business and so that their purchases will deliver substantial environmental protection. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Product performance is maintained or enhanced;
- Qualified products will be cost-effective to the buyer;
- Efficiency can be achieved with several technology options, at least one of which is non-proprietary (i.e., not exclusive to proprietary technology);
- Product differentiation and testing are feasible; and
- Labeling would be effective and recognizable in the market.

Below EPA addresses the hot food holding cabinet, fryer, and steam cooker specifications relative to each of these criteria.

- *Expected Energy Savings and Environmental Benefits.* EPA projected that these ENERGY STAR product categories would offer the following annual unit energy savings:
 - Hot food holding cabinet models are 60% more energy-efficient than standard models saving the end user approximately 4,100 kWh in energy each year.
 - Fryer models are up to 25% more energy-efficient than standard models saving the end user approximately 28 MBtu (gas) or 879 kWh (electric) in energy each year.
 - Steam cooker models are up to 60% more energy-efficient than standard models saving the end user approximately 124 MBtu (gas) or 6,620 kWh in energy each year.
 - In addition to saving energy, ENERGY STAR qualified steam cookers also save water — 90% or more when compared with standard steam cooker models (on average 2 gallons of water per hour for ENERGY STAR qualified steam cookers versus 25 to 35 gallons of water per hour for standard models).
 - EPA projects that by 2010, ENERGY STAR commercial cooking equipment will prevent a total of 2.5 million pounds of CO² emissions, which is the equivalent to saving 339,000 acres of trees or taking 215,000 cars off of the road.
- *Product Performance is Maintained or Enhanced.* ENERGY STAR qualified commercial food service equipment also offer the end user the following benefits:
 - ENERGY STAR qualified steam cooker models offer shorter cook times, higher production rate, and reduced heat loss due to better insulation and more efficient steam delivery system.
 - ENERGY STAR qualified fryer models offer shorter cook times and higher production rates through advanced burner and heat exchanger designs. Frypot insulation reduces standby losses resulting in a lower idle energy rate.
 - The better insulation found in the ENERGY STAR qualified hot food holding cabinets also offers better temperature uniformity within the cabinet from top to bottom.
- *Cost-effectiveness.* Cost differentials between ENERGY STAR and standard models are a result of many different design characteristics, only some of which are related to energy efficiency. Control features and insulation materials can also affect price. While end users

may pay more upfront for ENERGY STAR qualified cooking equipment, these products offer additional financial benefits regarding cooking time and efficiency (and associated labor costs) and in most cases the dollar savings achieved would cover the initial cost of the equipment within the first few years of usage.

- *Several Technology Options, including some with Non-proprietary Technology.* EPA believes that several options exist for improving the energy performance of hot food holding cabinets, fryers, and steam cookers. These options include:
 - Electric and/or gas fryer and steam cooker models can be re-engineered and qualify as ENERGY STAR.
 - Performance levels provide for a flexibility in engineering design decisions to meet ENERGY STAR performance levels for: hot food holding cabinets (i.e., insulation, humidity controls, door gaskets); fryers (i.e., insulation, advanced atmospheric burners, advanced heat exchangers); and steam cookers (i.e., convection, vacuum pumps, closed-system design, and a stand-by mode).
- *Product Differentiation and Testing Procedure.* When determining which commercial cooking equipment categories to consider for ENERGY STAR, EPA chose hot food holding cabinets, fryers, and steamers due to the wide range of efficiencies available in the marketplace. Based on available test data and discussions with equipment manufacturers, EPA believes that those models that are able to meet ENERGY STAR requirements represent approximately the top 25% of models in the marketplace.

All three specifications reference existing ASTM test procedures, already being used by manufacturers to measure product performance.

- *Labeling.* Due to the success of the ENERGY STAR commercial solid door reach-in refrigerator and freezer program end users are now demanding more energy-efficient choices for the commercial kitchen. Furthermore, programs such as the ENERGY STAR Small Business and ENERGY STAR Commercial and Industrial programs have been educating their partners (i.e., restaurants, hotels, universities) about the importance of energy saving practices and ENERGY STAR qualified products. These end users are familiar with the ENERGY STAR program and are looking for additional ways to save energy and money.