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Standard Terminology Relating to Food Service Equipment[1]

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1. Scope

1.1 This terminology covers definitions for various terms and equipment listed in the test methods and specifications for Committee F-26 on Food Service Equipment.

2. Referenced Documents

2.1 *ASTM Standards:*

F 759 Specification for Hot Chocolate Beverage Dispensers[2]

F 858 Specification for Hot-Sanitizing Commercial Dishwashing Machines, Single Tank, Conveyor Rack Type[3]

F 859 Specification for Heat-Sanitizing Commercial Dishwashing Machines, Multiple Tank, Conveyor Rack Type[3]

F 860 Specification for Heat Sanitizing Commercial Dishwashing Machines, Multiple Tank, Rackless Conveyor Type[3]

F 861 Specification for Commercial Dishwashing Racks[3]

F 917 Specification for Commercial Food Waste Disposers[3]

F 918 Specification for Noncarbonated Mechanically Refrigerated, Beverage Dispenser (Visible Product)[3]

F 919 Specification for Slicing Machines, Food, Electric[3]

F 952 Specification for Mixing Machines, Food, Electric[3]

F 953 Specification for Commercial Dishwashing Machines (Stationary Rack, Dump Type) Chemical Sanitizing[3]

F 1021 Specification for Feeders, Detergent, Rinse Agent, and Sanitizing Agent for Commercial Dishwashing and Glasswashing Machines[3]

F 1022 Specification for Chemical Sanitizing Commercial Dishwashing Machines, Recirculated Wash, Fresh Water Rinse Type[3]

F 1023 Specification for Dispensers, Powdered Iced Tea[3]

F 1024 Specification for Dispensers, Rehydrated Mashed Potato[3]

F 1047 Specification for Frying and Braising, Tilting Type[3]

F 1114 Specification for Heat Sanitizing Commercial Pot, Pan, and Utensil Station Rack Type Water-Driven Rotary Spray[3]

F 1126 Specification for Food Cutters, Electric[3]

F 1150 Specification for Commercial Food Waste Pulper and Waterpress Assembly[3]

F 1202 Specification for Washing Machines, Heat Sanitizing, Commercial, Pot, Pan, and Utensil Vertically Oscillating Arm Type[3]

F 1203 Specification for Washing Machines-Pot, Pan, and Utensil, Heat Sanitizing, Commercial Rotary Conveyor Type[3]

F 1237 Specification for Commercial Dishwashing Machines, Multiple-Tank, Continuous Oval-Conveyor Type, Heat Sanitizing[3]

F 1275 Test Method for the Performance of Griddles[3]

F 1299 Specification for Food Service Equipment Hoods for Cooking Appliances[3]

F 1360 Specification for Ovens, Microwave, Electric[3]

F 1361 Test Method for the Performance of Open Deep Fat Fryers[3]

F 1371 Specification for Vegetable Peeling Machines, Electric[3]

F 1495 Specification for Oven, Combination, Electric[3]

F 1484 Test Method for the Performance of Steam Cookers[3]

F 1496 Test Method for the Performance of Convection Ovens[3]

F 1521 Test Method for the Performance of Range Tops[3]

F 1605 Test Method for the Performance of Double-Sided Griddles[3]

F 1639 Test Method for the Performance of Combination Ovens[3]

F 1695 Test Method for the Performance of Underfired Broilers[3]

F 1696 Test Method for the Energy Performance of Single Rack, Hot Water Sanitizing, Door Type Commercial Dishwashing Machines[3]

F 1704 Test Method for the Performance of Commercial Kitchen Ventilation Systems[3]

2.2 *ANSI Standard:*[4]

ANSI Z83 American National Standard for Gas Food Service Equipment

2.3 *UL Standards:*[5]

ANSI/UL Standard No. 197 Commercial Electric Cooking Appliances

UL Standard No. 710 Grease Extractors for Exhause Ducts

[1] This terminology is under the jurisdiction of ASTM Committee F26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.91 on Editorial and Nomenclature.

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[2] Discontinued; See *1994 Annual Book of ASTM Standards*, Vol 15.07.

[3] *Annual Book of ASTM Standards*, Vol 15.07.

[4] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor New York, NY 10036.

[5] Available from Underwriters Laboratories, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

UL Standard No. 763 Motor-Operated Commercial Food Preparing Machines
UL Standard No. 969 Marking and Labeling Systems
2.4 *NSF International Standards:*[4]
ANSI/NSF Standard No. 2 Food Service Equipment
ANSI/NSF Standard No. 4 Commercial Cooking, Rethermalization and Powdered Hot Food Holding and Transport Equipment
ANSI/NSF Standard No. 8 Commercial Powdered Food Preparation Equipment
ANSI/NSF Standard No. 3 Commercial Spray-Type Dishwashing and Glasswashing Machines
2.5 *NFPA Standard:*[6]
NFPA Standard No. 96

3. Terminology

3.1 *Definitions–Food Service Appliances:*

braising pan—equipment suitable for the preparation of foods by several methods, such as frying, braising, boiling and simmering.

broiler, conveyor—equipment that carries the food product on a wire rack through a tunnel that heats using high temperature radiant heat sources above and or below the rack, for cooking on one or both sides of the food product at once. See **broiler, overfired** and **broiler, underfired**.

broiler, overfired—equipment with a high temperature radiant heat source above a grate for cooking food.

upright broiler— a heavy duty freestanding piece of equipment with a high input rate and production capacity among overfired broilers. See **broiler, overfired**.

salamander—a medium duty broiler, with approximately half the depth of an upright, and generally mounted above a commercial range. See **broiler, overfired**.

broiler, underfired—equipment with a high temperature radiant heat source below a grate for cooking food, including charbroiler, radiant-broilers, smokeless broilers, etc..

cheesemelter—a low input unit, designed to melt cheese on top of specialty foods, but usually incapable of fully cooking a food item such as steak or chicken. See **broiler, overfired**.

dishwashing machine, commercial—machines that uniformly wash, rinse, and sanitize kitchen ware. The machines shall be capable of removing physical soil from properly racked and prescraped tableware, and sanitizing multiple-use tableware.

booster heater— the water heater responsible for heating and maintaining the final sanitizing rinse water (to a minimum of 180°F) to dishwater, may be separate from dishwater or integral.

chemical sanitizing—solution to destroy or kill any residual bacteria from multiple-use tableware.

chemical sanitizing, recirculated wash, fresh water rinse type—machines with a final rinse using fresh water from an outside source combined with chemical sanitizing solution; additional parts: chemical sanitizing equipment. See **dishwashing machine, commercial**.

chemical sanitizing, stationary rack, dump type—machines with chemical sanitizing solution added to the rinse cycle; additional parts: chemical sanitizing equipment. See **dishwashing machine, commercial**.

conveyor—a mechanism designed to move racked/unracked dishware through the treatment stages and out to the clean end of conveyor type dishwashing machines.

detergent feeder— a device that automatically feeds detergents into wash tanks of spray-type commercial dishwashing and glasswashing machines.

dish rack—a peg type, polypropylene, or other noncorrosive material rack designed to hold tableware in place during washing.

dishwater inlet— incoming water to dishwater.

heat sanitize— fresh water, heater to a minimum specified temperature (usually a minimum of 180°F), to destroy or kill any residual bacteria from tableware.

heat sanitizing, conveyor rack type—machines that automatically convey racks of soiled tableware through treatment stages and final heat sanitizing rinse, conveying them out at the clean end of the machine; additional parts: rinse chamber, heating equipment, and conveying mechanism. See **dishwashing machine, commercial**.

heat sanitizing, stationary rack type—manually fed machines, includes a final heat sanitizing rinse; additional parts: heating equipment. See **dishwashing machine, commercial**.

heat sanitizing, continuous oval-conveyor type—dishwashing machine and conveyor-table when assembled, shall form an oval-shaped dish handling system. Machines shall automatically convey racks of soiled tableware through the treatment stages, including a final heat sanitizing rinse of the machine, conveying them out to the clean tableware removal area of the conveyor: additional parts: recirculating pre-wash chamber, rinse chamber, conveying mechanisms, heating equipment and horizontal conveyor tables. See **dishwashing machine, commercial**.

heat sanitizing, rackless conveyor type—machines shall automatically convey unracked soiled tableware through the treatment stages, includes a final heat sanitizing rinse, conveying them out at the clean end of the machine; additional parts: rinse chamber, conveying mechanisms, and heating equipment. See **dishwashing machine, commercial**.

pot, pan, and utensil washing machine, commercial—see **pot, pan, and utensil washing machines, commercial**.

rinse additive feeder—a device that automatically feeds rinse additives into recirculated or non-recirculated rinse water of spray-type commercial dishwashing and glasswashing machines.

sanitizing agent feeder—a device that automatically feeds sanitizer into recirculated or non-recirculated rinse water of spray-type commercial dishwashing and glasswashing machines.

tank heater—heating system that maintains the dishwasher's wash tank temperature.

dispenser—commercial equipment designed to deliver a beverage or food product.

aeration system— a type of circulation system that causes the

[6] Available from The National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101.

beverage to cascade across the top and down the sides of the bowl interior incorporating sir into the beverage.

circulation system—the system that moves the beverage within the bowl to ensure proper cooling and mixing.

hot chocolate dispenser—commercial equipment designed to deliver a predetermined amount of hot chocolate flavored beverage.

noncarbonated mechanically refrigerated visible product, beverage dispenser—counter-top equipment, mechanically refrigerated, with a transparent, impact-resistant container designed to afford a visual display of the beverage.

powdered iced tea dispenser—commercial equipment designed to deliver a portion of instant tea, usually mixed with tap water and dispensed into a container with ice.

rehydrated mashed potato dispenser—commercial equipment designed to deliver whipped or mashed potatoes.

throw—a quantity of liquid or powder ingredient that is augured, pumped, or dispensed into a liquid of larger mass and makes up the basic flavoring and/or solid of a finished product.

whippers—a mechanical device used to beat air into a beverage so as to change its properties from a liquid drink to a frothy drink.

exhaust hood—a device that captures hot air, odors, and vapors produced in the cooking process and directs them to an exhaust fan.

canopy—a covering fixed above cooking equipment and overhanging on all sides of its unclosed sides, whose lower edge is a minimum height of 6 ft 6 in. from the finished floor. The purpose of the canopy is to contain and capture the unwanted by-products resulting from cooking activities and may be Type I or Type II. See *Type I*, *Type II*, and **exhaust hood**.

wall-mounted canopy—used for all types of cooking equipment located against a wall. See *canopy*.

single island canopy—used for all types of cooking equipment in a single line island configuration. See *canopy*.

double island canopy—used for all types of cooking equipment mounted back to back in an island configuration. See *canopy*.

grease removal devices:

baffle filters— a series of vertical baffles designed to capture grease and drain it away to a container. The filters are arranged in a channel or bracket for easy insertion into, and removal from, the hood for cleaning, and are usually constructed of aluminum, steel, or stainless steel and they come in various standard sizes. See **exhaust hood**.

grease extractors— a system of components designed for integration within the exhaust hood for the removal of the airborne grease particles and the condensate of grease vapors, or both, for immediate or future disposal. See **exhaust hood**.

removal extractor— a series of horizontal baffles, usually constructed of stainless steel, designed to remove grease and drain it away to a container. They are cleaned by running them through a dishwasher or by soaking and rinsing. *See grease extractors*.

stationary extractor—a series of horizontal baffles that run the full length of the exhaust hood and are not removable for cleaning. It includes one or more water manifolds with spray nozzles that, upon activation, wash the grease extractor with hot, detergent-injected water, removing the accumulation of grease from the extractor. See *grease extractors*.

makeup air—the supply of outside air, tempered or untempered, to a building in a controlled manner for the replacement of air exhausted through the hood, or the supply of outside air, untempered, into the hood to reduce the amount of tempered air exhausted from the building.

hood with integrated makeup air—an exhaust hood that introduces makeup air through a plenum, as an integral part of the hood. Integral makeup air options include *down discharge, front face discharge*, or *internal discharge* (*short-circuit*), or both.

down discharge— makeup air method is used when spot cooling of the cooking staff is desired to help relieve the effects of severe radiant heat generated from equipment such as charbroilers. The makeup air must be heated or cooled, or both, depending on the climate.

front face discharge—makeup air method that is very flexible, but should be directed away from the hood, but the closer the air outlet's lower edge is to the bottom of the hood, the lower the velocity must be to avoid drawing effluent out of the hood.

internal discharge—method in which makeup air is introduced inside the hood. This design has limited application, and the amount of supply air able to be introduced varies considerable with the type of cooking equipment and the exhaust flow rate. Makeup air may be untempered depending on climatic conditions.

short-circuit— see *internal discharge*.

noncanopy—a fixed device located in close proximity over cooking equipment and in some cases having a shelf-like appearance. The purpose of which is to channel air movement to contain and capture the unwanted by-products resulting from cooking activities.

backshelf—used for counter-height equipment typically located against a wall, but could be freestanding.

eyebrow—used for direct mounting to ovens and some dishwashers.

pass-over style— used over counter-height equipment when pass-over configuration (from the cooking side to the serving side) is required.

Type I—exhaust hood designed for removal of grease and smoke. It includes both listed grease filter, baffles, or extractors for removal of the grease and fire suppression equipment. See **exhaust hood**.

Type II—exhaust hood designed for collection and removal of steam, vapor, heat, and odors where grease is not present. It may or may not have filters or baffles and typically does not have a fire suppression system.

ventilator—see **exhaust hood**.

food cutters—machine that uniformly reduces food products to a small particle size for salads, spreads, bread crumbs, and other food service recipes. Reduction of the food product is accomplished by combining the rotation of the product bowl with the perpendicular high speed rotation of a set of stainless steel cutlery knives.

food mixing machines—vertical electric machine that shall be adaptable for mixing, whipping, and beating food products. The size range (as expressed by bowl capacity) from 12 qt to 140 qt and does not include special purpose machines that are intended solely for mixing dough.

agitators—a removable device attached to the power output shaft that extends downward into the mixer bowl and converts or imparts the desired action on the contents of the bowl.

attachment hub— a device featuring an industry-standard square drive, that supports and powers ancillary devices such as a vegetable slicer or chopping attachment.

bowl guard—the barrier, assembled over the bowl area, intended to reduce the user's access to the hazards that exist in the bowl during machine operation.

food service equipment manuals—manuals for food service equipment shall contain as a minimum, complete installation, operating, preventive maintenance, safety warnings, cleaning, and service instructions, including applicable charts and diagrams.

food slicing machines—a machine with electrically-driven rotating slicing blades.

carriage—the device for holding the food product that is manually or automatically reciprocated to bring the product in contact with the knife.

feed chute—a device that can replace the carriage for the purpose of slicing multiple small cross-sectional food products. This device also includes an end weight or spring to permit slicing of product to within the last one-quarter inch.

gage plate—a device that determines the thickness of an individual slice of food product.

gage plate adjuster—a manually operated dial or a lever that is used by the operator to set the *gage plate*. Usual practice is to indicate the thickness by a graduated scale with a 0 (zero) setting to indicate that the *gage plate* is completely closed.

sharpener—the device for holding the sharpening and truing stones. The sharpener can be either attached to the slicer or removable from the slicer's sharpener attachment point. If it is removable, a storage location within the machine structure shall be provided.

food waste disposal, commercial—a device intended for grinding food waste into small particles that are then flushed by water into a sanitary sewer system. Food wastes can be cooked or noncooked soils from the preparation or serving of foods. Use not intended for grinding glass, china, metals, clam or oyster shells, large bones, wood, paper, cardboard, or plastic.

food waste pulper and waterpress assembly, commercial—a device intended for grinding food waste, food service paper, cardboard products, food service plastic products, documents including computer printouts, general office and retail store paper, and cardboard waste. Materials are ground in a water-filled tank (*pulper*) to produce a slurry which is then passed to the waterpress to be dewatered. Use not intended for grinding glass, china, metal, wood, clam, or oyster shells. Any small pieces of metal inadvertently placed in the pulper, such as cardboard box staples, aluminum refreshment cans, or tin food cans, shall be removable from the outside of the pulper tank.

pulper—a water filled tank with a motor driven grinding disk to grind and cut waste material, and mixes this material with water to produce a slurry that is pumped to the waterpress through a sizing screen.

waterpress—a device that de-waters the slurry generated in the pulper by use of a tapered compression cone and perforated screen, then discharges the pulp down a chute to a waste container. Water removed during this process is recirculated to the *pulper* tank in order to conserve fresh water use.

fryer—equipment, including a cooking vessel, in which oils are placed to such a depth that the cooking food is essentially supported by displacement of the cooking fluid within a perforated container rather than by the bottom of the vessel. Heat delivery to the cooking oils varies with fryer models.

donut fryer—see *specialty fryer*.

induction fryer— a thermostatically controlled piece of equipment, including a cooking vessel powered by electromagnetic coils inside stainless steel immersion tubes. The electromagnetic field created by these coils causes eddy currents to form in the metal surrounding them, in which the amount of heat in the metal is controlled by changing the magnetic field surrounding the induction coils in response to the fryer thermostat. See **fryer**.

open deep fat fryer—equipment with a deep kettle containing oil or fat for cooking food within a perforated container. See **fryer**.

pressure fryer— equipment with a deep kettle containing oil or fat covered by a heavy, gasketed lid with a pressure valve. The equipment kettle operates between 10 and 12 psig. See **fryer**.

specialty fryer— equipment with a wide and shallow cooking area that allows a layer of food to be lowered into oil on a screen or shallow basket (that is, donut and fish/chicken fryers). See **fryer**.

griddle—equipment for cooking food in its own juices or oil by direct contact with a hot surface.

chrome-finished griddle—equipment with a polished chrome-finished cooking surface that is easier to clean and radiates less heat towards the chef and the kitchen. See **griddle**.

double-sided griddle—equipment for cooking food by direct contact with two hot surfaces. See **griddle**.

grooved griddle— equipment with a grooved cooking surface that imitates characteristic striped sear mark of a charbroiler. See **griddle**.

single-sided griddle—See **griddle**.

oven—general purpose equipment, operating in dry heat mode, used primarily for baking and roasting food products.

cavity—that portion of the oven in which food may be heated, cooked, or defrosted.

combination oven— equipment that combines the function of hot air convection or super-heated steam heating, or both, to perform steaming, baking, roasting, rethermalizing, and proofing of various food products. See **oven**.

combination oven/steamer—See *combination oven*.

convection oven, commercial—equipment for cooking food by forcing hot air over surface of the food using a fan in a

closed cavity. See **oven**.

conveyor oven— equipment 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. See **oven**.

deck oven—equipment where the cavity is generally wider than it is tall, and the bottom of the cavity is called the deck. See **oven**.

door—the movable barrier that permits access to the cavity for placement or removal of food, and whose function is to prevent emission of energy from the passage or opening that provides access to the cavity.

microwave oven— equipment that uses ultrahigh frequency electromagnetic radiation in the bands of 915 ± 25 and 2450 ± 50 MHz to prepare food.

interlock—a device or system, either electrical, mechanical, or electromechanical, that serves to prevent exposure to an electric shock, physical injury, or excessive radiation emission when a door, cover, or access panel is opened or removed.

magnetron—a type of microwave energy generator usually used in microwave cooking equipment.

microwave radiation emission—the microwave energy to which persons might be exposed during operation or servicing of microwave cooking equipment.

viewing screen— feature of microwave equipment, usually part of the door assembly, that is opaque to microwave energy, but visually transparent to provide viewing of the oven contents.

pizza oven—See *conveyor oven* or *deck oven*.

pans—containers used to hold the food product in the oven capacity: (*1*) a full-size bake pan is nominally 18 by 26 by 1 in. (457 by 660 by 25 mm), (*2*) a half size bake pan is nominally 18 by 13 by 1 in. (457 by 330 by 25 mm), and (*3*) a steam pan is nominally 12 by 20 by 2.5 in. (305 by 508 by 64 mm).

pasta cooker—equipment, including a cooking vessel, in which the cooking medium, water or a water-oil mixture, (see **cooking medium**) is placed to such a depth that the cooking of food is essentially supported by displacement of the cooking medium rather than by the bottom of the vessel. Heat is delivered to the cooking medium by means of an immersed electric element or band wrapped vessel (electric pasta cooker), or by heat transfer from gas burners through either the walls of the pasta cooker or through tubes passing through the cooking fluid (gas pasta cooker).

auto-fill—a water height sensor devise that activates a fresh water fill solenoid if the water level in the cooking vessel drops below predetermined height.

over-flow drain— a drain for eliminating the excess foam and starch created during the cooking process.

pot, pan, and utensils washing machine, commercial—machines that uniformly wash, rinse, and heat-sanitize food preparation utensils. The machines are capable of removing physical soil and sanitizing multiple pots, pans, and utensils from properly racked and pre-scraped multiple items.

station rack type, water-driven rotary spray type—See **pot, pan, and utensils washing machine**.

vertically oscillating arm type—See **pot, pan, and utensils washing machine**.

rotary conveyor type—See **pot, pan, and utensils washing machine**.

range—equipment for cooking food by direct or indirect heat transfer from one or more cooking units, to one or more cooking containers.

Chinese wok range— equipment characterized as having one or more "wells" or chamber and designed to use a wok as the cooking utensil. See **range**.

induction range— an electric range that causes heat to be generated directly in the magnetic material comprising the cooking container by means of an induced electromagnetic field. The amount of heat generated in the cooking container is controlled by varying the strength of the magnetic field. See **range**.

hot top range— equipment with a heavy cast-iron top on which pots and pans are placed, intended for heavy duty continuous cooking. See **range**.

rotisserie—a device fitted with one more mechanically rotated spits that hold the meat or poultry in position near a fixed heat source while the food is slowly being cooked on all sides.

rotisserie broiler—equipment designed for continuous loading and cooking with vertically stacked spits. See **rotisserie**.

rotisserie oven— equipment designed for batch cooking, with the individual spits arranged on a rotating wheel within a closed cavity. See **rotisserie**.

steam cooker—cooking equipment wherein heat is imparted to food in a closed compartment. The compartment can be at or above atmospheric pressure and the steam can be static or circulated. The pressure occurring in the food compartment of these steamers during cooking ranges from zero gage psi pressure to 15 psig.

boiler—self-contained electric, gas, or steam coil-powered vessel wherein water is boiled to produce steam for the steam cooker.

high-pressure steam cooker—equipment wherein the cooking compartment operates between 10 psig and 15 psig. See **steam cooker**.

low-pressure steam cooker—equipment wherein the cooking compartment operates between 3 and 9.9 psig. See **steam cooker**.

pressure-less steam cooker—equipment where in the cooking compartment operates between 0 and 2.9 psig. See **steam cooker**.

steam jacketed kettle—cooking equipment comprised of two hemispherical metal shells of different sizes, the smaller shell inserted into the larger shell and fastened in a way that provides a space around its bottom and up its sides to form a pressure vessel with one-half, two-thirds, or full jacketing, wherein heat is imparted to food by steam circulating through the jacket.

freeboard—the distance between the level of liquid in the kettle and the top of the lip of the kettle.

tilting skillet—see **braising pan**.

vegetable peeling machine, electric—machine consisting of

the following: a cylinder having an abrasive or ribbed wall; an abrasive disk with lobes; a peel trap (when waste disposer is not specified); a waste outlet, a water inlet and air-gap type sprayer; and a cylinder cover.

3.2 *Definitions–Productivity and Energy Performance:*

booster heater inlet temperature—the temperature of water being supplied to the booster heater (see **dishwashing machine, commercial:** *booster heater*) measured at the booster heater inlet.

cold zone—the volume in the fryer below the heating element or heat exchanger surface designed to remain cooler than the cook zone. See **fryer**.

cook zone—the volume of oil in the fryer in which foods are cooker; typically the entire volume from the heating element(s), or heat exchange surface to the surface of the frying-medium. See **fryer**.

condensate—a mixture of condensed steam and cooling water, exiting cooking equipment and if applicable, directed to the floor drain.

cooking area—See **cooking surface**.

cooking cavity—the volume within equipment.

cooking container—a vessel used to hold the food product that is being heated by the equipment.

cooking energy—energy consumed (Btu or kJ) by the equipment as it is used to cook a specified food product to a specified cooked condition under all cooking-load (see **load**) scenarios, $E_{equipment}$.

cooking energy efficiency—quantity of energy imparted to the specified food product, expressed as a percentage of energy consumed by the equipment during the cooking event, η_{cook}.

$$\eta_{cook} = \frac{E_{food}}{E_{appliance}} \times 100 \quad (1)$$

where:

$\eta cook$ = see *cooking energy efficiency*,

$E_{equipment}$ = energy into the equipment (see *cooking energy*),

E_{food} = see energy to food, and

$$= E_{sens} + E_{thaw} + E_{evap} \quad (2)$$

where:

E_{sens} = quantity of heat added to food product, that causes their temperature to increase from the starting temperature to the average bulk temperature of a "done" food product,

$$= (W_i)\,(C_p)\,(T_f - T_i) \quad (3)$$

where:

W_i = initial weight of food product, lb (kg), as specified in the applicable standard test method,

C_p = specific heat of food product, Btu/lb, °F (kJ/kg, °C), as specified in the applicable standard test methods,

T_f = final cooked temperature of food product, °F (°C), as specified in the applicable standard test method,

T_i = initial internal temperature of food product, °F (°C), as specified in the applicable standard test method.

where:

E_{thaw} = latent heat (of fusion) added to the food product, that causes the moisture (in the form of ice) contained in the food product to melt when the temperature of the food product reaches 32°F (0°C) (the additional heat required to melt the ice is not reflected by a change in the temperature of the food product), Btu (kJ),

$$= W_{iw} \times Hf \quad (4)$$

where:

W_{iw} = initial weight of water in the food product, lb (kg),

H_f = heat of fusion, Btu/lb (kJ/kg), and

= 144 Btu/lb (36 kJ/kg) at 32°F (0°C).

where:

E_{evap} = latent heat (of vaporization) added to the food product, that causes some of the moisture contained in the food product to evaporate. Similar to the heat fusion, the heat of vaporization cannot be perceived by a change in temperature and must be calculated after determining how much moisture was lost from a "done" food product.

$$= W_{loss} \times H_v \quad (5)$$

where:

W_{loss} = weight loss of water during cooking, lb (kg),

H_v = heat of vaporization, Btu/lb (kJ/Kg),

= 970 Btu/lb (2256 kJ/kg) at 212°F (100°C), and

where:

$E_{equipment}$ = energy into equipment, Btu (kJ).

cooking energy rate—average rate of energy consumption (Btu/h or kJ) during the cooking energy efficiency tests, refers to all loading scenarios, $E_{cook\ rate}$.

$$E_{cook\ rate} = \frac{E_{cook} \times 60}{t_{cook}} \quad (6)$$

where:

E_{cook} = equipment energy consumption, and

t_{cook} = cook time, min.

cooking medium—a substance within equipment that transfers heat to the food product, e.g., oil in a fryer, water in a pasta cooker, or air in an oven.

cooking surface—an area of the equipment that receives a source of heat upon which a food product is cooked (or defrosted), for example, griddle surface, element or burner of a range, or broiler grate.

cook time—time required to cook the specified food product to a specified cooked condition during a cooking energy efficiency (see **cooking energy efficiency**) test.

cooking unit—a heating device located on the equipment that is powered by a single heat source comprised of either a gas burner or an electrical element, that is independently controlled.

dishload—a dishrack (see **dishwashing machine, commercial:** *dishrack*), loaded with ten 9 in. plates of a specified weight, used to put a thermal load in the dishwasher during the washing energy test.

dishwater inlet temperature—the temperature of the incoming water to dishwater, measured at the dishwater inlet

connection. See **dishwashing machine, commercial**and *dishwasher inlet*.

energy input rate—peak rate (Btu/h or kW) at which the equipment consumes energy; typically reflected during preheating, $E_{input\ rate}$.

$$E_{input\ rate} = \frac{E \times 60}{t} \quad (7)$$

where:
$E_{input\ rate}$ = measured peak energy input rate. Btu/h, kW,
E = energy consumed during period of peak energy input, Btu, kWh or kJ and, and
t = period of peak energy input, min.

energy-to-food—the energy (Btu or kWh) imparted to a food product during a cooking energy efficiency (see **cooking energy efficiency**) test, E_{food}.

energy utilization—amount of energy used, E_{util}.

$$E_{util} = \frac{H_g}{P} \quad (8)$$

where:
E_{util} = energy utilization, Btu/lb
Hg = amount of energy burned, Btu, and
P = weight of product, lb.

fan/control energy rate—the rate of energy consumption (Btu/h or kW) by the equipment's controls or fan motor, to both, E_{fan}.

$$E_{fan} = \frac{E_{fan} \times 60}{t_{preheat} \times 1000} \quad (9)$$

where:
E_{fan} = fan/control energy measured in Btu or Wh, and
$t_{preheat}$ = preheat time, min.

heat-up efficiency—the energy imparted to a food product, expressed as a percentage of energy consumed by the equipment during a cooking event, in which a food product is heated from a predetermined initial temperature to a predetermined final temperature, η *heat-up*.

heat-up temperature response—temperature rise on the surface of a steel plate during the test period in accordance with the heat-up temperature-response test.

higher heating value—the energy content of gas (Btu/ft^3), measured at standard conditions, *HV*.

hot zone—the area surrounding the heating element(s) or heat exchanger surface.

idle energy rate—the average rate of energy consumed (Btu/h or kW) by the equipment while it is "holding" the cooking medium, cavity, or surface (see **cooking medium, cooking cavity or cooking surface**) at the equipment's thermostat set point, $E_{idle\ rate}$.

$$E_{idle\ rate} = \frac{E_{idle \times 60}}{t_{idle}} \quad (10)$$

where:
$E_{idle\ rate}$ = idle energy rate,
E_{idle} = idle energy consumption, Btu, kWh or kJ, and,
t_{idle} = length of idle test period, min.

load—the amount of food to be cooked during a cooking energy efficiency (see **cooking energy efficiency**) test.

measured energy input rate—peak rate at which the equipment consumes energy, measured during a period when the equipment is operating at full input.

pilot energy rate—average rate of energy consumption (Btu/h or kW) by the equipment's continuous, $E_{pilot\ rate}$.

$$E_{pilot\ rate} = \frac{E_{pilot \times 60}}{t_{pilot}} \quad (11)$$

where:
$E_{pilot\ rate}$ = pilot energy rate,
E_{pilot} = pilot energy consumption during the test period, Btu, kWu or kJ, and
t_{pilot} = length of pilot of test period, min.

preheat—to heat the equipment's cooking medium, cavity, or surface (see **cooking medium, cooking cavity,** or **cooking surface**) from a predetermined ambient temperature to the equipment's thermostatic set point.

preheat duration—total time required for preheat (see **preheat**), from preheat initiation at controls to when the equipment is ready to cook.

preheat energy—amount of energy consumed (Btu, kJ or kWh) by the equipment while heating the equipment's cooking medium, cavity, or surface (see **cooking medium, cooking cavity**, or **cooking surface**) from an ambient temperature to a thermostat set point, E_p.

preheat rate—average rate at which the temperature of the equipment's cooking medium, cavity, or surface (see **cooking medium, cooking cavity,** or **cooking surface**) is heated from a predetermined ambient temperature to the equipment's thermostat set point.

preheat time—time required for the equipment to heat from the ambient room to a specified and calibrated operating temperature, or thermostat set point, T_p.

preparation time—the time from the removal of a cooked load (see **load**) from the equipment until the next load is entered in the equipment.

pressure correction factor—a multiplier that adjusts the measured gas volume to the actual volume at standard gas pressure, P_{cf}.

$$= \frac{absolute\ actual\ gas\ pressure\ psia}{absolute\ standard\ pressure\ psia} \quad (12)$$

$$= \frac{gas\ gage\ pressure\ psig + barometric\ pressure\ psia}{absolute\ standard\ pressure\ psia} \quad (13)$$

NOTE 1—Absolute standard gas temperature and pressure used in this calculation should be the same values used for determining the higher heating value. PG&E standard conditions are 519.67°R and 14.73 psia.

production capacity—maximum rate (lb/h) at which the equipment can bring the specified food product to a specified" cooked" condition in accordance with the cooking energy efficiency test (see **cooking energy efficiency**), *PC*.

$$PC = \frac{W \times 60}{t} \quad (14)$$

where:
PC = production capacity of the equipment, lb/h (kg/h),
W = total weight of food cooked during cooking test, lb (kg), and
t = total time of cooking test, min.

production rate—rate (lb/h) at which the equipment brings the specified food product to a specified "cooked" condition, *PR*.

ready temperature—a predetermined starting temperature point for the washing energy test, which may vary with each dishwasher.

recovery time—the time from the removal of the food product from the cooking equipment until the cooking medium, cavity, or surface (see **cooking medium, cooking cavity,** or **cooking surface**) is back up to temperature as indicated by thermostat(s) controlling the cooking medium, cavity, or surface cycling at their set point(s), $t_{recovery}$.

temperature correction factor—a multiplier that adjusts the measured gas volume to the actual volume at standard gas temperature, T_{cf}.

$$= \frac{absolute\ standard\ gas\ temperature\ °R}{absolute\ actual\ gas\ temperature\ °R} \quad (15)$$

$$= \frac{absolute\ standard\ gas\ temperature\ °R}{[gas\ temperature\ °F + 459.67]\ °R} \quad (16)$$

temperature uniformity—the comparison of individual temperatures measured on the surface of a steel plate at the end of the test period in accordance with the heat-up temperature-response (see **heat-up temperature-response**) test.

uncertainty—measure of the combination of the bias and precision error in specified instrumentation, or the measure of the repeatability of a reported test result.

washing period—the period of time from the beginning of the dishwasher's wash cycle until the end of the final rinse.

water consumption—the total amount of water consumed by the equipment during an event such as cooling water for condensing, cooking, or preheating.

water boil efficiency—the energy (latent heat of vaporization) required to boil water from the cooking medium (see **cooking medium**), expressed as a percentage of the quantity of energy input to the equipment during the boil-off period, η *water boil*.

$$\eta waterboil(\%) = \frac{W \times E_{vap} \times 100}{E_{input}} \quad (17)$$

where:

W = weight loss of water, lb (g),
E_{vap} = heat of vaporization of water, Btu/lb (J/kg),
= 970 Btu/lb (2256 kJ/kg) at standard pressure (29.921 in. Hg), and
E_{input} = energy consumed by the equipment, Btu.