Kitchen Equipment Additional Package

IECC: C406.12 (New), C406.12(1) (New), C406.12(2) (New), C406.12(3) (New), C406.12(4) (New), ASTM Chapter 06 (New)

Proponent: Nicholas O'Neil, NW Energy Codes Group, representing NW Energy Codes Group (noneil@energy350.com)

2018 International Energy Conservation Code

Add new text as follows:

C406.12 Efficient Kitchen Equipment For buildings and spaces designated as Group A-2, or facilities whose primary business type involves the use of a commercial kitchen with at least one gas or electric fryer, all fryers, dishwashers, steam cookers and ovens shall comply with all of the following:

1. Achieve performance levels in accordance with the equipment specifications listed in Tables C406.12 (1) through (4) when rated in accordance with the applicable test procedure.
2. Be installed prior to the issuance of the Certificate of Occupancy.
3. Have associated performance levels listed on the construction documents submitted for permitting.

C406.12(1)
Minimum Efficiency Requirements: Commercial Fryers

Fryer Type	Heavy-Load Cooking Energy Efficiency	Idle Energy Rate	Test Procedure
Standard Open Deep-Fat Gas Fryers	≥ 50%	≤ 9,000 Btu/hr	ASTM Standard F1361-17
Standard Open Deep-Fat Electric Fryers	≥ 83%	≤ 800 watts	
Large Vat Open Deep-Fat Gas Fryers	≥ 50%	≤ 12,000 Btu/hr	ASTM Standard F2144-17
Large Vat Open Deep-Fat Electric Fryers	≥ 80%	≤ 1,100 watts	

C406.12(2)
Minimum Efficiency Requirements: Commercial Steam Cookers

Fuel Type	Pan Capacity	Cooking Energy Efficiency[a]	Idle Rate	Test Procedure
Electric Steam	3-pan	50%	400 watts	ASTM Standard F1484-18
	4-pan	50%	530 watts	
	5-pan	50%	670 watts	
	6-pan and larger	50%	800 watts	
Gas Steam	3-pan	38%	6,250 Btu/h	
	4-pan	38%	8,350 Btu/h	
	5-pan	38%	10,400 Btu/h	
	6-pan and larger	38%	12,500 Btu/h	

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

C406.12(3)
Minimum Efficiency Requirements: Commercial Dishwashers

	High Temp Efficiency Requirements		Low Temp Efficiency Requirements		Test Procedure
Machine Type	**Idle Energy Rate[a]**	**Water Consumption[b]**	**Idle Energy Rate[a]**	**Water Consumption[b]**	
Under Counter	≤ 0.50 kW	≤ 0.86 GPR	≤ 0.50 kW	≤ 1.19 GPR	ASTM Standard F1696-18 ASTM Standard F1920-15
Stationary Single Tank Door	≤ 0.70 kW	≤ 0.89 GPR	≤ 0.60 kW	≤ 1.18 GPR	
Pot, Pan, and Utensil	≤ 1.20 kW	≤ 0.58 GPR	≤ 1.00 kW	≤ 0.58 GPSF	
Single Tank Conveyor	≤ 1.50 kW	≤ 0.70 GPR	≤ 1.50 kW	≤ 0.79 GPR	
Multiple Tank Conveyor	≤ 2.25 kW	≤ 0.54 GPR	≤ 2.00 kW	≤ 0.54 GPR	
Single Tank Flight Type	Reported	GPH ≤ 2.975x + 55.00	Reported	GPH ≤ 2.975x + 55.00	
Multiple Tank Flight Type	Reported	GPH ≤ 4.96x + 17.00	Reported	GPH ≤ 4.96x + 17.00	

a. Idle results should be measured with the door closed and represent the total idle energy consumed by the machine including all tank heater(s) and controls. Booster heater (internal or external) energy consumption should not be part of this measurement unless it cannot be separately monitored.

b. GPR = gallons per rack; GPSF = gallons per square foot of rack; GPH = gallons per hour; x = sf of conveyor belt (i.e., W*L) /min (max conveyor speed).

C406.12(4)
Minimum Efficiency Requirements: Commercial Ovens

Fuel Type	Classification	Idle Rate	Cooking-Energy Efficiency, %	Test Procedure
Convection Ovens				
	Full-Size	≤ 12,000 Btu/h	≥ 46	ASTM F1496-13
Electric	Half-Size	≤ 1.0 Btu/h	≥ 71	
	Full-Size	≤ 1.60 Btu/h		
Combination Ovens				
	Steam Mode	≤ 200P[a]+6,511 Btu/h	≥ 41	ASTM F2861-17
	Convection Mode	≤ 150P[a]+5,425 Btu/h	≥ 56	
Electric	Steam Mode	≤ 0.133P[a]+0.6400 kW	≥ 55	
	Convection Mode	≤ 0.080P[a]+0.4989 kW	≥ 76	
Rack Ovens				
	Single	≤ 25,000 Btu/h	≥ 48	ASTM F2093-18
	Double	≤ 30,000 Btu/h	≥ 52	

a. P = Pan Capacity: The number of steam table pans the combination oven is able to accommodate as per the ASTM F1495-14a standard specification.

Add new standard(s) follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1361-17: Standard Test Method for Performance of Open Deep Fat Fryers

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F2144-17: Standard Test Method for Performance of Large Open Vat Fryers

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1484-18: Standard Test Method for Performance of Steam Cookers

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1696-18: Standard Test Method for Energy Performance of Stationary-Rack,Door-Type Commercial Dishwashing Machines

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1920-15: Standard Test Method for Performance of Rack Conveyor Commercial Dishwashing Machines

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1496-13: Standard Test Method for Performance of Convection Ovens

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F2861-17: Standard Test Method for Enhanced Performance of Combination Oven in Various Modes

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F2093-18: Standard Test Method for Performance of Rack Ovens

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken PA 19428-2959

F1495-14a: Standard Specification for Combination Oven Electric or Gas Fired

Reason Statement: Kitchen equipment uses a large share of building energy use in restaurants, schools, dormitories, hotels, and other facilities with full service kitchens. More efficient equipment saves energy by improving the heat transfer to the cooking process, either through better equipment insulation or other innovations in the appliances. This proposal provides more flexibility to building designers when it is added to the energy efficiency credit choices. It specifically addresses the large energy use of kitchen equipment.
This proposal allows credit for efficient kitchen equipment in Section C406 where extra efficiency options are required. There is a separate proposal that modifies Section C406 from the current requirement to select one of the listed options, to assigning credits to each measure and requiring a certain number of credits. The implementation of this proposal will vary depending on whether that separate energy efficiency credit proposal passes:

- If the C406 energy efficiency credit proposal passes: add the rows for this option listed in this proposal into the

energy efficiency credit tables (C406.1(1) through C406.1(5)) that are created in that proposal and do not make changes to the charging section of C406.1, as that list is deleted by the other proposal.

- If the C406 credits proposal does not pass: this proposal will stand as another independent option that would be available for selection in the list of C406 options. In this case, change the charging section of C406.1 as shown by adding this option to the list of options, but there would be no table row additions, since those tables will not exist.

Bibliography: Hart, R., R. Nambiar, M. Tyler, M., Y. Xie, and J. Zhang. “Relative Credits for Extra Efficiency Measures: Technical Brief.” Pacific Northwest National Laboratory (PNNL), Richland, WA (US), January 2019. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-28370Rev.1.pdf.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The current proposal does not require more investment, but rather expands existing options permitted under the 2018 IECC. The intention is to identify additional options to increase flexibility and more effectively utilize new technologies and construction practices. There is not expected to be an increased cost, as this simply increases the options for C406 beyond what is included in current code. In some cases, costs may be reduced, as the outlined approach provides partial credit for selected items as well as credit for items that may have previously been included in the building design without credit. Costs, and cost effectiveness, are not evaluated for individual measures due to the vast number of potential combinations amongst building types, climates, and selected options. Actual costs will vary based on the items selected by the building designer—architects, engineers, and other involved trades—based on the needs and goals of the individual project.

Kitchen Equipment Additional Package
