

# Composite Mock Up of C406 Points Option with CE218 Modifications

A complete mock-up of the new C406 Points Option approach is outlined in the following code language. This includes CE218 and all associated proposals, including the following which are highlighted throughout:

CE218	C406	Base Proposal that Converts Packages to Points
CE226	C406.3.3 and 3.3	Lighting
CE229	C406.4	Enhanced Digital Lighting Controls
CE232	C406.9	Controlled Receptacles
CE235	C406.10	Extra Area Daylight Responsive Controls
CE240	C406.11	Efficient Kitchen Equipment

*Add the following definitions:*

**LUMEN MAINTENANCE CONTROLS:** A lighting control strategy that adjusts luminaire power over time to maintain constant light output as luminaires age, dirt accumulates or both. This strategy allows for energy savings in the life of the system then increases power as the system ages.

**HIGH END TRIM:** A lighting control strategy that sets the required maximum light level for each space.

## SECTION C406

**Post 3/26 errata; Preferred Floor Modifications**

## SECTION C406

### ADDITIONAL EFFICIENCY REQUIREMENTS PACKAGE OPTIONS

**C406.1 Additional energy efficiency credit requirements.** ~~Buildings shall comply~~ New buildings shall achieve a total of 10 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from point calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by the floor area of each group to determine the weighted average building credit. Alternatively, credits shall be calculated in accordance with the relevant subsection of C406. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9

Add new text as follows:

**Table C406.1(1)  
Additional Energy Efficiency Credits for Group B Occupancies**

Sub-section / Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	1	NA	1
C406.2.2: 5% Cooling	6	6	5	5	4	4	3	3	3	2	2	2	1	2	2	2	1
C406.2.3: 10% Heating	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	2	1	1	2	2	NA	1
C406.2.4: 10% Cooling	11	12	10	9	7	7	6	5	6	4	4	5	3	4	3	3	3
C406.3.1: 10% LPA	9	8	9	9	9	9	10	8	9	9	7	8	8	6	7	7	6
C406.3.3: Lamp Efficacy	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.4: Digital Lt Ctrl	2 4	2 4	2 4	2 4	2 4	2 4	2 4	2 3	2 4	2 4	2 3	2 3	2 4	1 3	2 3	1 3	1 3
C406.5: Renewable	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
C406.6: DOAS	4	4	4	4	4	3	2	5	3	2	5	3	2	7	4	5	3
C406.7.1: SWH HR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.2: SWH NG eff	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.3: SWH HP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.8: 85% UA	1	4	2	4	4	3	NA	7	4	5	10	7	6	11	10	14	16
C406.9: Low Leakage Env.	2	1	1	2	4	1	NA	8	2	3	<del>1</del> 1	4	1	<del>1</del> 5	8	<del>1</del> 1	6
C406.10: Controlled Receptacles	15	14	15	15	14	15	17	12	15	13	11	13	13	10	12	10	9
C406.11: Added Daylit	7	6	7	7	6	7	8	6	7	6	5	6	6	5	6	5	4

**Table C406.1(2)**  
**Additional Energy Efficiency Credits for Group R and I Occupancies**

Sub-section / Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating	NA	NA	NA	NA	1	NA	NA	1	NA	1	1	1	1	2	1	2	2
C406.2.2: 5% Cooling	3	3	2	2	1	1	1	1	1	NA	1	1	NA	1	1	1	NA
C406.2.3: 10% Heating	NA	NA	NA	NA	1	NA	NA	1	1	1	2	2	1	3	2	3	4
C406.2.4: 10% Cooling	5	5	4	3	2	3	1	2	2	1	1	1	1	1	1	1	1
C406.3.1: 10% LPA	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2
C406.3.3: Lamp Efficacy	2	2	2	2	1	2	2	1	1	1	1	1	1	1	1	1	1
C406.4: Digital Lt Ctrl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.5: Renewable	8	8	8	8	7	8	8	7	7	7	7	7	7	7	7	7	7
C406.6: DOAS	3	4	3	3	4	2	NA	6	3	4	8	5	5	10	7	11	12
C406.7.1: SWH HR	10	9	11	10	13	12	15	14	14	15	14	14	16	14	15	15	15
C406.7.2: SWH NG eff	5	5	6	6	8	7	8	8	8	9	9	9	10	10	9	10	11
C406.7.3: SWH HP	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C406.8: 85% UA	3	6	3	5	4	4	1	4	3	3	4	5	3	5	4	6	6
C406.9: Low Leak Env.	6	5	3	11	6	4	NA	7	3	3	9	5	1	13	6	8	3
C406.10: Controlled Receptacles	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.11: Added Daylit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table C406.1(3)**  
**Additional Energy Efficiency Credits for Group E Occupancies**

Sub-section / Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating	NA	NA	NA	NA	1	1	1	1	1	2	1	2	1	2	2	3	4
C406.2.2: 5% Cooling	4	4	3	3	2	2	2	2	1	1	1	1	NA	1	1	1	NA
C406.2.3: 10% Heating	NA	NA	NA	1	1	1	1	2	3	4	3	4	3	4	3	5	7
C406.2.4: 10% Cooling	7	8	7	6	5	4	3	4	3	1	2	2	1	2	2	2	1
C406.3.1: 10% LPA	8	8	8	9	8	9	9	8	9	9	8	9	8	7	8	7	7
C406.3.3: Lamp Efficacy	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.4: Digital Lt Ctrl	2 3	2 4	2 3	2 4	2 3	2 4	2 3	2 4	2 5	2 4	2 4	3 5	2 3	2 4	2 4	2 3	3 2
C406.5: Renewable	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5
C406.6: DOAS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.1: SWH HR <sup>a</sup>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C406.7.2: SWH NG eff <sup>a</sup>	NA	1	1	1	1	1	1	2	2	3	2	3	2	3	3	3	5
C406.7.3: SWH HPWH <sup>a</sup>	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	1	1	NA	1	1	1	1
C406.8: 85% UA	3	7	3	4	2	4	1	1	3	1	2	3	NA	4	3	6	9
C406.9: Low Leak Env.	1	1	1	2	NA	NA	NA	NA	NA	NA	1	NA	NA	4	1	4	3
C406.10: Controlled Receptacles	20	19	20	20	20	21	22	20	21	21	20	20	21	18	19	17	15
C406.11: Added Daylit	2	1	2	2	3	3	3	3	3	2	3	3	3	1	2	NA	NA

<sup>a</sup> for schools with full service kitchens or showers

**Table C406.1(4)  
Additional Energy Efficiency Credits for Group M Occupancies**

Sub-section / Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating	NA	NA	NA	NA	1	1	NA	1	1	2	2	2	2	3	2	3	4
C406.2.2: 5% Cooling	5	6	4	4	3	3	1	2	2	1	1	2	NA	1	1	1	NA
C406.2.3: 10% Heating	NA	NA	NA	1	1	1	1	2	2	4	3	4	5	5	3	6	8
C406.2.4: 10% Cooling	9	12	9	8	6	6	3	4	4	1	2	3	NA	2	2	2	1
C406.3.1: 10% LPA	13	13	15	14	16	14	17	15	15	14	12	14	14	16	16	14	12
C406.3.3: Lamp Efficacy	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.4: Digital Lt Ctrl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.5: Renewable	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	6
C406.6: DOAS	3	4	3	3	3	3	1	3	2	2	2	3	2	4	3	4	4
C406.7.1: SWH HR	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.2: SWH NG eff	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.7.3: SWH HP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.8: 85% UA	4	6	3	4	3	3	1	6	4	4	4	5	4	6	5	8	9
C406.9: Low Leak Env.	1	1	1	2	1	1	NA	3	1	1	3	2	1	7	3	6	3
C406.10: Controlled Receptacles	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.11: Added Daylit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table C406.1(5)  
Additional Energy Efficiency Credits for Other<sup>a</sup> Occupancies**

Sub-section / Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% Heating	NA	NA	NA	NA	1	1	1	1	1	2	1	2	1	2	2	3	3
C406.2.2: 5% Cooling	5	5	4	4	3	3	2	2	2	1	1	2	1	1	1	1	1
C406.2.3: 10% Heating	NA	NA	NA	1	1	1	1	2	2	3	3	3	3	4	3	5	5
C406.2.4: 10% Cooling	8	9	8	7	5	5	3	4	4	2	2	3	2	2	2	2	2
C406.3.1: 10% LPA	8	8	9	9	9	9	10	8	9	9	7	8	8	8	8	8	7
C406.3.3: Lamp Efficacy	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C406.4: Enh. Digital Light Control	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>
C406.5: Renewable	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7
C406.6: DOAS	3	4	3	3	4	3	2	5	3	3	5	4	3	7	5	7	6
C406.7.1: SWH HR <sup>b</sup>	10	9	11	10	13	12	15	14	14	15	14	14	16	14	15	15	15
C406.7.2: SWH FF eff <sup>b</sup>	5	5	6	6	8	7	8	8	8	9	9	9	10	10	9	10	11
C406.7.3: SWH HPWH <sup>b</sup>	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C406.8: 85% UA	3	6	3	4	3	4	1	5	4	3	5	5	4	7	6	9	10
C406.9: Low Leak Env.	3	2	2	4	4	2	NA	6	2	2	6	4	1	10	5	7	4
C406.10: Controlled Receptacles	<u>18</u>	<u>17</u>	<u>18</u>	<u>18</u>	<u>17</u>	<u>18</u>	<u>20</u>	<u>16</u>	<u>18</u>	<u>17</u>	<u>16</u>	<u>17</u>	<u>17</u>	<u>14</u>	<u>16</u>	<u>14</u>	<u>12</u>
C406.11: Added Daylit	<u>3</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>2</u>	NA

<sup>a</sup> Other occupancy groups include all Groups except for Groups B, R, I, E, and M.

<sup>b</sup> for occupancy groups listed in C406.7.1

**C406.1.1 Tenant spaces.** Tenant spaces shall comply with sufficient options from Tables C406.1(1) through C406.1(5) to achieve a minimum number of 5 credits, where credits are selected from Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively, tenant spaces shall comply with Section C406.5 w Where the entire building complies using credits from Section C406.5, C406.8 or C406.9, tenant spaces within the building shall be deemed to comply with this section. is in compliance.

**Exception:** Previously occupied tenant spaces that comply with this code in accordance with Section C501.

**C406.2 More efficient HVAC equipment performance.**

Equipment shall exceed the minimum efficiency requirements listed in Tables C403.3.2(1) through C403.3.2(97) by 10 percent, in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. and Variable refrigerant flow systems shall exceed listed in the energy efficiency provisions of ANSI/ASHRAE/IESNA 90.1 by 10 percent. in accordance with Sections C406.2.1, C406.2, C406.2.3 or C406.4. Equipment shall also meet applicable requirements of Section C403. Energy efficiency credits for heating shall be selected from C406.2.1 or C406.2.3 and energy efficiency credits for cooling shall be selected from C406.2.2 or C406.2.4. Selected credits shall include a heating or cooling energy efficiency credit or both. Equipment not listed in Tables C403.3.2(1) through C403.3.2(97) and Variable refrigerant flow systems not listed in the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 shall be limited to 10 percent of the total building system capacity for heating equipment where selecting C406.2.1 or C406.2.3 and cooling equipment where selecting C406.2.2 or C406.2.4.

**C406.2.1 More efficient HVAC heating performance.** Equipment shall exceed the minimum heating efficiency requirements by 5 percent.

**C406.2.2 More efficient HVAC cooling performance.** Equipment shall exceed the minimum cooling and heat rejection efficiency requirements by 5 percent. Where multiple cooling performance requirements are provided, the equipment shall exceed the annual energy requirement, including IEER, SEER, and IPLV.

**C406.2.3 High efficiency HVAC heating performance.** Equipment shall exceed the minimum heating efficiency requirements by 10 percent.

**C406.2.4 High efficiency HVAC cooling performance.** Equipment shall exceed the minimum cooling and heat rejection efficiency requirements by 10 percent. Where multiple cooling performance requirements are provided, the equipment shall exceed the annual energy requirement, including IEER, SEER, and IPLV.

**C406.3 Reduced lighting power.** Buildings shall comply with Section C406.3.1 or C406.3.2 and dwelling units and sleeping units within the building shall comply with C406.3.3.

**C406.3.1 Reduced lighting power by more than 10%.** The total connected interior lighting power calculated in accordance with Section C405.3.1 shall be less than 90 percent of the total lighting power allowance calculated in accordance with Section C405.3.2.

**C406.3.2 Reduced lighting power by more than 15 percent.** Where the total connected interior lighting power calculated in accordance with Section C405.3.1 is less than 85 percent of the total lighting power allowance calculated in accordance with Section C405.3.2, additional energy efficiency credits shall be determined based on Equation 4-12, rounded to the nearest whole number.

$$AEEC_{LPA} = AEEC_{10} \times 10 \times (LPA - LPD) / LPA \quad (\text{Equation 4-12})$$

Where:

$AEEC_{LPA}$  = C406.3.2 additional energy efficiency credits

LPD = total connected interior lighting power calculated in accordance with Section C405.3.1

LPA = total lighting power allowance calculated in accordance with Section C405.3.2

$AEEC_{10}$  = C406.3.1 credits from Tables C406.1(1) through C406.1(5)

**C406.3.3 Lamp efficacy.** Not less than 95 percent of the interior lighting power (watts) from lamps in permanently installed light fixtures in dwelling units and sleeping units shall be provided by lamps with a minimum efficacy of 65 lumens per watt.

**C406.4 Enhanced digital lighting controls.** At least 90 percent of the building floor area shall have interior lighting in the building shall have with the following enhanced lighting controls for luminaires providing *general lighting*, that shall be located, scheduled and operated in accordance with Section C405.2.2.

1. Luminaires shall be configured for continuous dimming.
2. Luminaires shall be addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of not more than four luminaries shall be allowed.
3. Not more than eight luminaires shall be controlled together in a *daylight zone*.
4. Fixtures shall be controlled through a digital control system that includes the following function:
  - 4.1. Control reconfiguration based on digital addressability.
  - 4.2. Load shedding.
  - 4.3. Individual user control of overhead general illumination in open offices.
  - 4.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4.
6. Functional testing of lighting controls shall comply with Section C408. *High end trim controls shall be enabled and configured to limit the initial maximum output or maximum power draw of the controlled lighting to 85 percent or less of full light output or full power draw for the following:*
  - 6.1 All areas that have *lumen maintenance controls*, and
  - 6.2 50% of the remaining floor area.

**406.5 On-site renewable energy.** Buildings shall comply with Section C406.5.1 or C406.5.2.

**C406.5.1 Basic Renewable Credit.** The total minimum ratings of on-site renewable energy systems shall be one of the following:

1. Not less than ~~1.71~~ 0.86 Btu/h per square foot (~~5.4~~ 2.7 W/m<sup>2</sup>) or ~~0.50~~ 0.25 watts per square foot (~~5.4~~ 2.7 W/m<sup>2</sup>) of conditioned floor area.
2. Not less than ~~3~~ 2 percent of the annual energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4.

**C406.5.2 Enhanced Renewable Credits.** Where the total minimum ratings of on-site renewable energy systems exceeds the rating in C406.5.1(1), additional energy efficiency credits shall be determined based on Equation 4-13, rounded to the nearest whole number.

$$AEEC_{RRa} = AEEC_{2.5} \times RRa / RR_1 \quad \text{(Equation 4-13)}$$

Where:

$AEEC_{RRa}$  = C406.5.2 additional energy efficiency credits

$RRa$  = actual total minimum ratings of on-site renewable energy systems in Btu/h  $\frac{W}{ft^2}$ , or  $\frac{W}{m^2}$

$RR_1$  = minimum ratings of on-site renewable energy systems required by C406.5.1(1) in Btu/h,  $\frac{W}{ft^2}$ , or  $\frac{W}{m^2}$

$AEEC_{2.5}$  = C406.5.1 credits from Tables C406.1(1) through C406.1(5)

**C406.6 Dedicated outdoor air system.** Buildings containing equipment or systems regulated by Section C403.3.4, C403.4.3, C403.4.4, C403.4.5, C403.6, C403.8.4, C403.8.5, C403.8.5.1, C403.9.1, C403.9.2, C403.9.3 or C403.9.4 shall be equipped with an independent ventilation system designed to provide not less than the minimum 100-percent outdoor air to each individual occupied space, as specified by the *International Mechanical Code*. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply-air temperature not less than 25 percent of the difference between the design supply-air temperature and the design room-air temperature.

**C406.7 Reduced energy use in service water heating.** Buildings shall comply with Sections C406.7.1 and either C406.7.2, C406.7.3 or C406.7.4.

**C406.7.1 Building type.** To qualify for this credit, the building shall contain one of the following use groups and the additional energy efficiency credit shall be prorated by conditioned floor area of the portion of the building comprised of the following use groups.  
~~types to use this compliance method:~~

1. *Group R-1:* Boarding houses, hotels or motels.
2. *Group I-2:* Hospitals, psychiatric hospitals and nursing homes.
3. *Group A-2:* Restaurants and banquet halls or buildings containing food preparation areas.
4. *Group F:* Laundries.
5. *Group R-2.*
6. *Group A-3:* Health clubs and spas.
7. *Group E:* Schools with full-service kitchens or locker rooms with showers.
- ~~87.~~ Buildings showing a service hot water load of 10 percent or more of total building energy loads, as shown with an energy analysis as described in Section C407.

**C406.7.21 Recovered or renewable water heating Load fraction.** ~~The building service water-heating system shall have one or more of the following that are sized to provide not less than 60 30 percent of the building's annual hot water requirements, or sized to provide 100 70 percent of the building's annual hot water requirements if the building is required to shall otherwise-comply with Section C403.9.5:~~

1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, or process equipment.
2. *On-site renewable energy* water-heating systems.

**Add new text as follows:**

**C406.7.3 Efficient fossil fuel water heater.** The combined input-capacity-weighted-average equipment rating of all fossil fuel water heating equipment in the building shall be not less than 95% Et or 0.95 EF. This option shall receive only half the listed credits for buildings required to comply with C404.2.1.



**C406.7.4 Heat pump water heater.** Where electric resistance water heaters are allowed, all service hot water system heating requirements shall be met using heat pump technology with a combined input-capacity-weighted-average EF of 3.0. Air-source heat pump water heaters shall not draw conditioned air from within the building, except exhaust air that would otherwise be exhausted to the exterior.

**C406.8 Enhanced envelope performance.** The total UA of the building thermal envelope as designed shall be not less than 15 percent below the total UA of the building thermal envelope in accordance with Section C402.1.5.

**C406.9 Reduced air infiltration.** Air infiltration shall be verified by whole-building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air-leakage rate of the building envelope shall not exceed 0.25 cfm/ft<sup>2</sup> (2.0 L/s × m<sup>2</sup>) under a pressure differential of 0.3 inches water column (75 Pa), with the calculated surface area being the sum of the above- and below-grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

**Exception:** For buildings having over 50,000 square feet (5 000 m<sup>2</sup>) of conditioned floor area, air leakage testing need not be conducted on the whole building where testing is conducted on representative above-grade sections of the building. Tested areas shall total not less than 25 percent of the conditioned floor area and shall be tested in accordance with this section.

**C406.10 Controlled Receptacles.** At least 50 percent of all 125 volt 15- and 20-ampere receptacles installed in private offices, open offices, conference rooms, breakrooms, individual workstations, and classrooms, including those installed in modular partitions and modular office workstation systems, shall be controlled as required by this section. Either split receptacles shall be provided, with the top receptacle(s) controlled, or a controlled receptacle shall be located within 12 inches (0.3 M) of each uncontrolled receptacle. Alternatively, non-controlled receptacles in a single modular workstation located not more than 72 inches from a controlled receptacle serving that workstation. Controlled receptacles shall be visibly differentiated from standard receptacles and shall be controlled by one of the following automatic control devices:

1. An occupant sensor that turns receptacle power off when no occupants have been detected for a maximum of 20 minutes.
2. A time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be capable of providing an independent schedule for each portion of the building not to exceed 5,000 square feet (460 m<sup>2</sup>) and not to exceed one full floor. The device shall be capable of being overridden for periods of up to two hours by an override switch accessible to occupants. Any individual override switch shall control the controlled receptacles for a maximum area of 5,000 square feet (460 m<sup>2</sup>).

**Exception:** Receptacles designated for specific equipment requiring 24-hour operation, for building maintenance functions, or for specific safety or security equipment.

**C406.11 Extra Area Daylight Responsive Controls.** Building shall not use the energy efficiency credits for Section C406.7, enhanced lighting control, and shall provide continuous dimming *daylight responsive controls* for 150 percent of the area required to have *daylight responsive controls* in toplit zones and sidelit zones in Section C405.2.3 or as required by Section C402.4.1.1. Toplit and sidelit zones as defined in Sections C405.2.3.2 and C405.2.3.3 shall be controlled separately from adjacent daylight zones.

**C406.12 Efficient Kitchen Equipment.** For buildings and spaces designated as Group A-2, or facilities that include 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.

Energy efficiency credits for efficient kitchen equipment shall be independent of climate zone and determined based on Equation 4-14, rounded to the nearest whole number.

$$AEEC_k = 20 \times AreaK / AreaB \quad \text{(Equation 4-14)}$$

Where:

- AEEC<sub>k</sub> = C406.12 additional energy efficiency credits
- AreaK = Floor area of full service kitchen (ft<sup>2</sup> or m<sup>2</sup>)
- AreaB = Gross floor area of building (ft<sup>2</sup> or m<sup>2</sup>)

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

	<u>Heavy-Load Cooking Energy Efficiency</u>	<u>Idle Energy Rate</u>	<u>Test Procedure</u>
<u>Standard Open Deep-Fat Gas Fryers</u>	<u>≥ 50%</u>	<u>≤ 9,000 Btu/hr</u>	<u>ASTM Standard F1361-07</u>
<u>Standard Open Deep-Fat Electric Fryers</u>	<u>≥ 83%</u>	<u>≤ 800 watts</u>	
<u>Large Vat Open Deep-Fat Gas Fryers</u>	<u>≥ 50%</u>	<u>≤ 12,000 Btu/hr</u>	<u>ASTM Standard F2144-17</u>
<u>Large Vat Open Deep-Fat Electric Fryers</u>	<u>≥ 80%</u>	<u>≤ 1,100 watts</u>	

**Table C406.12 (2)**

**Minimum Efficiency Requirements: Commercial Steam Cookers**

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

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

**Table C406.12 (3)**

**Minimum Efficiency Requirements: Commercial Dishwashers**

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

<sup>a</sup> 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.

<sup>b</sup> 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).

<u>Fuel Type</u>	<u>Classification</u>	<u>Idle Rate</u>	<u>Cooking-Energy Efficiency, %</u>	<u>Test Procedure</u>
<b><u>Convection Ovens</u></b>				
<u>Gas</u>	<u>Full-Size</u>	<u>≤ 12,000 Btu/h</u>	<u>≥ 46</u>	<u>ASTM F1496 - 13</u>
<u>Electric</u>	<u>Half-Size</u>	<u>≤ 1.0 Btu/h</u>	<u>≥ 71</u>	
	<u>Full-Size</u>	<u>≤ 1.60 Btu/h</u>		
<b><u>Combination Ovens</u></b>				

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

<u>Fuel Type</u>	<u>Classification</u>	<u>Idle Rate</u>	<u>Cooking-Energy Efficiency, %</u>	<u>Test Procedure</u>
<b>Convection Ovens</b>				
<u>Gas</u>	<u>Full-Size</u>	$\leq 12,000 \text{ Btu/h}$	$\geq 46$	<u>ASTM F1496 - 13</u>
<u>Electric</u>	<u>Half-Size</u>	$\leq 1.0 \text{ Btu/h}$	$\geq 71$	
	<u>Full-Size</u>	$\leq 1.60 \text{ Btu/h}$		
<b>Combination Ovens</b>				
<u>Gas</u>	<u>Steam Mode</u>	$\leq 200P^a + 6,511 \text{ Btu/h}$	$\geq 41$	<u>ASTM F2861 - 17</u>
	<u>Convection Mode</u>	$\leq 150P^a + 5,425 \text{ Btu/h}$	$\geq 56$	
<u>Electric</u>	<u>Steam Mode</u>	$\leq 0.133P^a + 0.6400 \text{ kW}$	$\geq 55$	
	<u>Convection Mode</u>	$\leq 0.080P^a + 0.4989 \text{ kW}$	$\geq 76$	
<b>Rack Ovens</b>				
<u>Gas</u>	<u>Single</u>	$\leq 25,000 \text{ Btu/h}$	$\geq 48$	<u>ASTM F2093 - 18</u>
	<u>Double</u>	$\leq 30,000 \text{ Btu/h}$	$\geq 52$	

b. P = Pan Capacity: The number of steam table pans the combination oven is able to accommodate as per the ASTM F – 1495 – 14a standard specification.

## ASTM ASTM International

100 Barr Harbor Drive, P.O. Box C700  
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F1361-17: Standard Test Method for Performance of Open Deep Fat Fryers

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

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

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

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

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

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

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

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