COMMERCIAL ENERGY CODE

BUILDING ENVELOPE, MECHANICAL, SERVICE WATER HEATING AND LIGHTING

CHARLES COUNTY IECC POLICY

Beginning November 30th, 2012 all permit applications will need to be in compliance with the 2012 Edition of the International Energy Conservation Code (IECC). IECC is a performance-based code, which regulates the design and construction of commercial and multi-family residential buildings for thermal resistance, air leakage, and mechanical, electrical, water-heating, and lighting systems efficiency.

There are three paths to achieving compliance with the commercial provisions of the IECC: **The mandatory requirements of the IECC/ASHRAE 90.1 must be met in all cases.**

- **The requirements of the ANSI/ASHRAE/IESNA 90.1 – 2010 in its entirety.**

- **Prescriptive Path –** Commercial building projects shall meet the requirements in Section C402 Building Envelope Requirements, C403 Building Mechanical Systems, C404 Service Water Heating and C405 Electrical Power and Lighting Systems, as well as one additional provision from C406.2, C406.3 or C406.4.

- **Total Building Performance -** Buildings conforming to Section C506, provided Sections C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6, C405.7 and C407 are each satisfied. The building energy cost shall be equal to or less than 85% of the standard reference design building.

C401.2.1 Additions, Alterations and repairs to existing buildings shall comply with one of the following:

- Sections C402, C403, C404 and C405; or
- ANSI/ASHRAE/IESNA 90.1 – 2010

1. BUILDING ENVELOPE REQUIREMENTS (PRESCRIPTIVE)

In order to establish compliance with the building envelope requirements of the 2012 IECC, proposed insulation types and levels shall be specified on the construction drawings at the time of plan review submittal. For the purpose of plan review, provided on separate sheets, the building shall be divided into the following components; these components shall be depicted within the building thermal envelope:

A. ROOF AND CEILING COMPONENTS

CEILINGS

- Flat ceiling
- Cathedral or vaulted ceiling
- Dormer roofs
- Bay window roofs
- Overhead portions of an interior stairway to the attic
- Attic hatches (more than 30 degrees from vertical, otherwise classified as walls)
- A-frames (8 feet above finished floor of top story)

FENESTRATION

- Skylights and roof window assemblies

FLOORS OVER OUTSIDE AIR

- Floors of overhangs (such as the floor above an entryway to a garage)
- Floor cantilevers
- Floors of an elevated structure

B. WALL COMPONENTS

WALLS

- Opaque portions of above grade walls
- Basement walls and knee walls less than 50% below grade
- Peripheral edges of floors
- Gable end walls enclosing conditioned space
- Dormer walls
- Roof or attic knee walls

- Through wall chimneys
- Walls of an interior stairway to an unconditioned basement or space
- Walls enclosing a mansard roof
- Curtain walls
- Skylight shafts

FENESTRATION

- Windows, including basement windows (glass and non-glass glazing materials)
- Sliding glass doors
- Opaque doors, glazed doors and combination opaque/glazed doors
- Storefront glazing, curtain walls and commercial entrance doors
- Loading dock doors

C. FLOOR AND FOUNDATION COMPONENTS

FLOORS OVER OUTDOOR AIR OR UNCONDITIONED SPACE

- Floors over an unconditioned crawl space, basement, garage or similar unconditioned space.

BASEMENT WALLS

- Opaque portions of individual basement walls 85% or more below-grade and basement knee walls where the basement knee wall is 85% or more below grade. Note: Above-grade walls are walls on the exterior of the building and completely above grade or are more than 15% above grade.

SLAB EDGE

- Insulation of slab-on-grade floors

CRAWL SPACE WALLS

- Walls of crawl spaces below un-insulated floors

THE FOLLOWING FORMAT SHALL BE USED FOR ALL IECC PLAN REVIEW SUBMITTALS USING THE PRESCRIPTIVE PATH (IECC SECTION C402)

ENVELOPE DESIGN WORKSHEET FOR COMMERCIAL BUILDINGS, IECC SECTION C402 (PRESCRIPTIVE PATH)

OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

FROM TABLE C402.1.2

ROOFS	GROUP R	ALL OTHERS	PROPOSED
Insulation entirely above deck	U-0.039	U-0.039	
Metal Buildings	U-0.035	U-0.035	
Attic and other	U-0.027	U-0.027	

WALLS ABOVE GRADE			
Mass	U-0.090	U-0.104	
Metal Building	U-0.052	U-0.052	
Metal Framed	U-0.064	U-0.064	
Wood framed and other	U-0.064	U-0.064	

BELOW GRADE WALLS			
Below grade wall[a]	C-0.119	C-0.119	

FLOORS			
Mass	U-0.074	U-0.076	
Joist/framing	U-0.033	U-0.033	

SLAB-ON-GRADE FLOORS			
Unheated slabs	F-0.540	F-0.540	
Heated slabs	F-0.650	F-0.650	

a. When slabs are placed below-grade, below grade walls must meet the F-factor requirements for perimeter insulation according to the heated slab-on-grade construction.

OPAQUE THERMAL ENVELOPE REQUIREMENTS

FROM TABLE C402.2

ROOFS	GROUP R	ALL OTHERS	PROPOSED
Insulation entirely above deck	R-25ci	R-25ci	
Metal buildings with R-5 thermal blocks [1/2]	R-19+R-11 LS	R-19+R-11 LS	
Attic and other	R-38	R-38	

WALLS ABOVE GRADE			
Mass	R-11.4ci	R-9.5ci	
Metal Building [2]	R-13+R-13ci	R-13+R-13ci	
Metal Framed	R-13+R-7.5ci	R-13+R-7.5ci	
Wood framed and other	R-13+R-3.8ci or R-20	R-13+R-3.8ci or R-20	

WALLS, BELOW GRADE			
Below Grade Wall [4]	R-7.5ci	R-7.5ci	

FLOORS			
Mass	R-10.4ci	R-10ci	
Joist/framing	R-30	R-30	

SLAB-ON-GRADE FLOORS			
Unheated slabs	R-10 for 24” below	NR	
Heated slabs	R-15 for 24” below	R-15 for 24” below	

OPAQUE DOORS			
Swinging	U-0.61	U-0.61	
Roll-up or sliding	R-4.75	R-4.75	

For SI: 1 inch = 25.4mm

CI = Continuous insulation

1. When using R-value compliance method, a thermal spacer block is required, otherwise use the U-factor compliance method. (see Tables 402.1.2 and 402.2)
2. Assembly descriptions can be found in ASHRAE Appendix A.

3. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, un-grouted or partially grouted at 32 inches or less on center vertically or 48 inches or less on center horizontally, with un-grouted cores filled with material having a maximum thermal conductivity of 0.44 Btu-in./h-f²F.
4. When heated slabs are placed below grade, below-grade walls must meet the exterior insulation requirements for perimeter insulation according to the heated slab-on-grade construction.
5. Steel floor joist systems shall be to R-38

BUILDING ENVELOPE REQUIREMENTS, FENESTRATION

FROM TABLE C402.3 – CLIMATE ZONE 4A (CHARLES COUNTY)

VERTICAL FENESTRATION (30% MAXIMUM OF ABOVE-GRADE WALL

U-FACTOR

Fixed Fenestration	0.38
Operable Fenestration	0.45
Entrance Doors	0.77

SHGC

SHGC	0.40

SKYLIGHTS

U-Factor	0.50
SHGC	0.40

SKYLIGHTS (3% MAXIMUM)

U-Factor	0.60
SHGC	0.40

BUILDING ENVELOPE COMPLIANCE WORKSHEET FOR THE IECC 2012

PLEASE COMPLETE ALL INFORMATION – PRINT CLEARLY – REQUIRED FOR ALL PROJECT PLANS SECTION 1 – PROJECT INFORMATION		
PROJECT NAME		**PERMIT #**
PROJECT ADDRESS		**DATE**
OWNER/AGENT	TELEPHONE	**CHECKED BY**
DOCUMENTATION AUTHOR	TELEPHONE	**DATE** FOR DEPARTMENT USE ONLY

SECTION 2 – GENERAL INFORMATION
BUILDING FLOOR AREA:
WINDOW-WALL RATIO (WWR): GROSS FENESTRATION AREA _____ GROSS ABOVE GRADE WALL AREA _____ X 100 _____
PROJECT DESCRIPTION □ NEW CONSTRUCTION □ ADDITION □ ALTERATION □ Un-CONDITIONED SHELL

SECTION 3 – REQUIREMENT CHECKLIST						
AIR LEAKAGE AND COMPONENTS CERTIFICATION REQUIREMENTS				**YES**	**NO**	**NOTES**
All joints/penetrations are caulked, gasketed, weather-stripped or otherwise sealed.						
Windows, doors and skylights certified as meeting leakage requirements.						
Compound R-values and U-factors are labeled as listed.						
DESCRIPTION		**PROPOSED R-VALUE**	**MIMIMUM R-VALUE**			
WALL TYPE 1						
WALL TYPE 2						
WALL TYPE 3						
WALL TYPE 4						
ROOF TYPE 1						
ROOF TYPE 2						
ROOF TYPE 3						
FLOOR TYPE 1						
FLOOR TYPE 2						
		PROPOSED U-VALUE	**MAXIMUM U-VALUE**			
WINDOW 1						
WINDOW 2						
WINDOW 3						
SKYLIGHT 1						
SKYLIGHT 2						
Skylights less than 3% of the Total Roof Area _____ % of Roof						
Outdoor air intake and exhaust openings, motorized or gravity						
Vestibules / Exceptions: 1-6						
Recessed luminaries installed in thermal envelope, sealed/gasketed						

SECTION 4 – COMPLIANCE STATEMENT		
The proposed building design represented in these documents is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed building design meets the 2012 IECC requirements.		
Principal Architect/Designer – Name [1]	Signature	Date
[1] Include the designer's license or registration number		

MECHANICAL SYSTEMS COMPLIANCE WORKSHEET FOR THE IECC 2012

PLEASE COMPLETE ALL INFORMATION – PRINT CLEARLY – REQUIRED FOR ALL PROJECT PLANS SECTION 1 – PROJECT INFORMATION		
PROJECT NAME		**PERMIT #**
PROJECT ADDRESS		**DATE**
OWNER/AGENT	TELEPHONE	**CHECKED BY**
DOCUMENTATION AUTHOR	TELEPHONE	**DATE** FOR DEPARTMENT USE ONLY

SECTION 2 – GENERAL INFORMATION
BUILDING FLOOR AREA:
PROJECT DESCRIPTION □ NEW CONSTRUCTION □ ADDITION □ ALTERATION □ Un-CONDITIONED SHELL

SECTION 3 – REQUIREMENT CHECKLIST			
BUILDING MECHANICAL SYSTEMS	**YES**	**NO**	**NOTES**
ASHRAE/IESNA 90.1 STANDARD USED FOR COMPLIANCE			
SIMPLE SYSTEM – (UNITARY/PACKAGED)			
COMPLEX SYSTEM			
LOAD CALCULATION PER ASHRAE/ACCA STANDARD 183			
EQUIPMENT SIZE TO LOAD			
EFFICIENCIES PER TABLES C403.2.3(1) – C403.2.3(9)			
THERMOSTATIC CONTROLS FOR EACH ZONE			
HEAT PUMP SUPPLEMENTARY HEAT CONTROLS			
AUTOMATIC/PROGRAMMABLE OFF-HOUR CONTROL FOR EACH ZONE			
SHUTOFF DAMPER CONTROLS/MOTORIZED			
SHUTOFF DAMPER CONTROLS/GRAVITY			
SNOW MELT SYSTEM			
VENTILATION REQUIREMENTS PER IMC CHAPTER 4			
DEMAND CONTROLLED VENTILATION			
ENERGY RECOVERY VENTILATION SYSTEM PER TABLE C403.2.6			
DUCTWORK DESIGNED, INSULATED AND SEALED PER IECC/IMC			
HVAC PIPING INSULATED PER TABLE C403.2.8			
MECHANICAL SYSTEMS COMMISSIONING AND COMPLETION PER C408.2			
AIR SYSTEMS HORSEPOWER RATING EXCEEDS 5HP			

BUILDING MECHANICAL SYSTEMS	YES	NO	NOTES
HEATING OUTSIDE OF BUILDING, CONTROLS PROVIDED			
ECONOMIZER, REQUIRED FOR COOLING SYSTEMS ≥ 33,000 Btu/h			
VARIABLE AIR VOLUME FAN CONTROL FOR MOTORS ≥ 7.5hp			
CONTROLS FOR HYDRONIC SYSTEM ≥ 300,000 Btu/h			
HYDRONIC (WATER LOOP) HEAT PUMP SYSTEMS			
UTILIZING HEAT REJECTION EQUIPMENT			
20 ° DEADBAND OR OPTIMIZED CONTROLLER			
OPEN OR CLOSED LOOP OR SEPARATE HEAT EXCHANGER			
PART LOAD CONTROL METHOD 1 or 2 for ≥ 300,000 Btu/h			
PUMP ISOLATION FOR 2 OR MORE CHILLERS/BOILERS			
FAN SPEED CONTROL FOR MOTORS ≥ 7.5hp			
SERVING MULTIPLE ZONES (COMPLEX) SHALL BE VAV SYSTEM 30% MAX AIR TO EACH ZONE			
300 cfm WHEN ≤ 10% OF TOTAL SYSTEM SUPPLY RATE			
MINIMUM VENTILATION REQUIREMENTS OF IMC CHAPTER 4			
EXCEPTIONS: 1-6			
SERVICE HOT WATER HEAT RECOVERY, 1 OR 2			
EXCEPTIONS: 1-2			
SERVICE HOT WATER PER TABLE C404.2			
SERVICE HOT WATER SETPOINT TEMPERATURE CONTROL			
SERVICE HOT WATER, HEAT TRAPS REQUIRED			
SERVICE HOT WATER PIPE INSULATION, 1" THICK MINIMUM			
SERVICE HOT WATER AUTOMATIC OR MANUAL SHUTOFF CONTROL			

SECTION 4 – COMPLIANCE STATEMENT		
The proposed mechanical design represented in these documents is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed building design meets the 2012 IECC and 2012 IMC requirements		
Principal Mechanical Designer – Name [1]	Signature	Date
[1] Include the designer's license or registration number		

LIGHTING COMPLIANCE WORKSHEET FOR THE IECC 2012

PLEASE COMPLETE ALL INFORMATION – PRINT CLEARLY – REQUIRED FOR ALL PROJECT PLANS SECTION 1 – PROJECT INFORMATION		
PROJECT NAME		**PERMIT #**
PROJECT ADDRESS		**DATE**
OWNER/AGENT	TELEPHONE	**CHECKED BY**
DOCUMENTATION AUTHOR	TELEPHONE	**DATE** FOR DEPARTMENT USE ONLY

SECTION 2 – GENERAL INFORMATION			
BUILDING FLOOR AREA:			
PROJECT DESCRIPTION	□ NEW CONSTRUCTION	□ ADDITION	□ ALTERATION
METHOD OF LIGHTING COMPLIANCE	□ ENTIRE BUILDING	□ TENANT AREA OR PORTION OF BUILDING	

SECTION 3 – REQUIREMENT CHECKLIST			
LIGHTING CONTROLS, SWITCHING AND WIRING	**YES**	**NO**	**NOTES**
ASHRAE/IESNA 90.1 STANDARD USED FOR COMPLIANCE			
INDEPENDENT CONTROLS FOR EACH INTERIOR SPACE			
LIGHT REDUCTION CONTROLS TO REDUCE CONNECTED LOAD > 50% CONTROL ALL LUMINARIES			
DUAL SWITCHING/ALTERNATE LUMINARIES			
SWITCHING EACH LUMINAIRE OR LAMP			
SWITCHING MIDDLE OR INDIVIDUAL LUMINARIES			
AUTOMATIC LIGHTING SHUTOFF FOR ALL AREAS OCCUPANCY SENSORS			
OCCUPANT OVERRIDE – 5000 ft2 MAXIMUM AREA			
DAYLIGHT ZONE CONTROL – 2500 ft2 MAXIMUM AREA			
MANUAL DAYLIGHTING CONTROLS			
AUTOMATIC DAYLIGHTING CONTROLS			
INDEPENDENT CONTROLS FOR EACH DAYLIGHT ZONE			
MULTI-LEVEL LIGHTING CONTROLS *SPECIFIC APPLICATION CONTROLS*			
CHOOSE APPLICATIONS 1-6			
EXTERIOR LIGHTING CONTROLS PHOTO SENSOR AND TIME SWITCH			

LIGHTING CONTROLS, SWITCHING AND WIRING	**YES**	**NO**	**NOTES**
ASTRONOMICAL TIME SWITCH			
TANDEM WIRING FLUORESCENT LUMINARIES/RECESSED/WITHIN 10' OF EACH OTHER			
FLUORESCENT LUMINARIES/PENDANT WITHIN 1' OF EACH OTHER			

BUILDING LIGHTING POWER, INTERIOR

SPACE-BY-SPACE METHOD. ATTACH ADDITIONAL PAGES AS NEEDED.

BUILDING AREA TYPE	ALLOWED WATTS	ACTUAL WATTS	LIGHTING CONTROLS Y/N

BUILDING AREA METHOD/SOFTWARE PRINTOUT → ATTACHED			
FULL COMPLIANCE WITH ASHRAE 90.1 DOCUMENTATION ATTACHED →			

BUILDING LIGHTING POWER, EXTERIOR

ZONE	BASE SITE ALLOWANCE	SUM – INDIVIDUAL ALLOWANCES	TOTAL	LIGHTING COMPLIES Y/N

SEPARATELY METERED DWELLING UNITS →			

SECTION 4 – COMPLIANCE STATEMENT		
The proposed lighting design represented in these documents is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed building design meets the 2012 IECC lighting requirements		
Principal Lighting Designer - Name – License #	Signature	Date
THE LIGHTING APPLICATION WORKSHEET MAY BE INCORPORATED INTO THE LIGHTING SCHEDULE		

2. COMPLIANCE DOCUMENTATION (PRESCRIPTIVE)

SEPARATE WORKSHEETS SHALL BE SUBMITTED WITH THE CONSTRUCTION DRAWINGS FOR: Building Envelope Requirements, Building Mechanical Systems, Service Water Heating Systems, Electrical Power and Lighting Systems*;* All related drawings and worksheets shall be prepared by a licensed design professional, appropriately stamped, signed and sealed.

COM check software, available free from the United States Department of Energy (DOE), can be used to generate the necessary worksheets when pursuing compliance under the prescriptive provisions of the IECC or ASHRAE 90.1.

3. AIR LEAKAGE (MANDATORY) AIR BARRIER COMPLIANCE OPTIONS

1. Materials shall have air permeability no greater than 0.004 cfm/ft2 under a pressure differential of 0.3 inches of water, OR: **2.** Assemblies of materials and components shall have an average air leakage not to exceed 0.04 cfm/ft2*,* OR: **3.** The completed building shall be tested and the air leakage rate of the building envelope shall not exceed 0.40 cfm/ft2 at a pressure differential of 0.3 inches of water gauge (2.0 L/s x m ² at 75 Pa) in accordance with ASTM E 779.

All penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. *(*C402A.2*)*

4. BUILDING MECHANICAL SYSTEMS (MANDATORY)

Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.11.

5. SERVICE WATER HEATING (MANDATORY)

Service water-heating equipment shall be provided with controls to allow a set-point of 110°F for equipment serving dwelling units and 90°F for equipment serving other occupancies. The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F.

Water-heating equipment not supplied with integral heat traps and serving non-circulating systems shall be provided with heat traps on the supply and discharge piping associated with the equipment.

Pools and in-ground permanently installed spas shall comply with Sections C404.7.1 through C404.7 .3. All heaters shall be equipped with a readily accessible on-off switch that is mounted outside of the heater to allow shutting off the heater without adjusting the thermostat setting. Time switches or other control method that can automatically turn off and on heaters

and pumps according to a preset schedule shall be installed on all heaters and pumps. Heated pools and in-ground permanently installed spas shall be provided with a vapor-retardant cover. Where pools are capable of being heated to more than 90°F, the cover shall be insulated to R-12. Exception: A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site recovered energy, such as a heat pump or solar energy source computed over an operating season.

6. ELECTRICAL POWER AND LIGHTING SYSTEMS (MANDATORY)

Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low-voltage lighting, shall be fitted for, and contain only, high efficacy lamps.

All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. Each area that is required to have a manual control shall also allow the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 50 percent.

Automatic time switch controls shall be installed to control lighting in all areas of the building. Exceptions:

1. Emergency egress lighting does not need to be controlled by an automatic time switch.
2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.

Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, storage rooms and janitorial closets, and other spaces 300 square feet or less enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with either Section C405.2.2.3.1 or Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet.

Set-point and other controls for calibrating the lighting control device shall be readily accessible.

Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:

1. Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the day lit zone continuously to less than 35 percent of rated power at maximum light output.
2. Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power.

Where multi-level lighting controls are required by this code, the general lighting in the daylight zone shall be separately controlled by at least one multi-level lighting control that reduces the lighting power in response to daylight available in the space. Where the day lit luminance in the space is greater than the rated luminance of the general lighting of daylight zones, the general lighting shall be automatically controlled so that its power draw is no greater than 35 percent of its rated power. The multi-level lighting control shall be located so that calibration and set point adjustment controls are readily accessible and separate from the light sensor.

The total interior lighting power allowance (watts) is determined according to Table C405.5.2(1) using the Building Area Method, or Table C405.5.2(2) using the Space-by-Space Method, for all areas of the building covered in this permit. For the Building Area Method, the interior lighting power allowance is the floor area for each building area type listed in Table C405.5.2(1) times the value from Table C405.5.2(1) for that area.

For the Space-by-Space Method, the interior lighting power allowance is determined by multiplying the floor area of each space times the value for the space type in Table C405.5.2(2) that most closely represents the proposed use of the space, and then summing the lighting power allowances for all spaces. Tradeoffs among spaces are permitted.

All exterior building grounds luminaries that operate at greater than 100 watts shall contain lamps having a minimum efficacy of BO lumens per watt unless the luminaries is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.B.2.

The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.B.2(2) for the applicable lighting zone. Tradeoffs are allowed only among exterior lighting applications listed in Table C405.B.2(2), Tradable Surfaces section. The lighting zone for the building exterior is determined from Table C405.B.2(1) unless otherwise specified by the local jurisdiction. Exterior lighting for all applications (except those included in the exceptions to Section C405.B.2) shall comply with the requirements of Section C405.B.l.

In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units.

7. ADDITIONAL EFFICIENCY PACKAGE OPTIONS (WHEN USING IECC PRESCRIPTIVE, CHOOSE ONE)

1. Efficient HVAC performance per Section C40B.2
2. Efficient Lighting System per Section C40B.3
3. On-Site Supply of Renewable Energy

8. COMMISSIONING (MANDATORY)

MECHANICAL SYSTEMS COMMISSIONING AND COMPLETION REQUIREMENTS: Prior to passing the final mechanical inspection, the registered design professional shall provide evidence of mechanical systems commissioning and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to DPS upon request. **Exception:** The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h cooling capacity and 600,000 Btu/h heating capacity.

2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

A COMMISSIONING PLAN SHALL BE DEVELOPED BY A REGISTERED DESIGN PROFESSIONAL AND INCLUDE THE FOLLOWING ITEMS:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.

2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.

3. Functions to be tested, including, but not limited to calibrations and economizer controls.

4. Conditions under which the test will be performed. At a minimum, testing shall affirm winter and summer design conditions and full outside air conditions.

5. Measurable criteria for performance.

A PRELIMINARY REPORT OF COMMISSIONING TEST PROCEDURES AND RESULTS SHALL BE COMPLETED AND CERTIFIED BY THE REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY AND PROVIDED TO THE BUILDING OWNER. THE REPORT SHALL BE IDENTIFIED AS "PRELIMINARY COMMISSIONING REPORT" AND SHALL IDENTIFY:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

BUILDINGS OR PORTIONS THEREOF, SHALL NOT PASS THE FINAL MECHANICAL INSPECTION UNTIL SUCH TIME AS CHARLES COUNTY BUILDING INSPECTION STAFF HAS RECEIVED A LETTER OF TRANSMITTAL FROM THE BUILDING OWNER ACKNOWLEDGING THAT THE BUILDING OWNER HAS RECEIVED THE PRELIMINARY COMMISSIONING REPORT.

Codes, Permit and Inspection Services (CPIS) staff shall be permitted to require that a copy of the Preliminary Commissioning Report be made available for review.

THE CONSTRUCTION DOCUMENTS SHALL SPECIFY THAT THE DOCUMENTS DESCRIBED IN THIS SECTION BE PROVIDED TO THE BUILDING OWNER WITHIN 90 DAYS OF THE DATE OF ISSUANCE OF THE USE AND OCCUPANCY

Construction documents shall include the location and performance data on each piece of equipment. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined set-points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.

5. A narrative of how each system is intended to operate, including recommended set-points.

SYSTEM BALANCING REPORT

A written report describing the activities and measurements completed in accordance with Section C408.2.2. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

LIGHTING SYSTEM FUNCTIONAL TESTING

Controls for automatic lighting systems shall comply with Section C408.3.

FUNCTIONAL TESTING

Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where occupant sensors, time switches, programmable schedule controls, photo sensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.

3. Confirm that the placement and sensitivity adjustments for photo sensor controls reduce electric light based on the amount of usable daylight in the space as specified.

TOTAL BUILDING PERFORMANCE OPTION

When pursuing the **TOTAL BUILDING PERFORMANCE PATH** in either IECC or ASHRAE 90.1 a Compliance Report shall be generated using software which documents that the proposed building design has annual energy costs less than or equal to the annual energy costs of the standard reference design shown in Tables C407.5.1 (1), C407.5.1 (2), C407.5.1 (3), C407.5.1(4) and C407.5.1(5).

ACCEPTED CALCULATION SOFTWARE TOOLS: Energy Plus, DOE-2, BLAST and SPARK.