RESIDENTIAL ENERGY CONSERVATION CODE

ALL DECKS FOOTINGS REQUIRED

INTRODUCTION

Charles County has adopted and is currently enforcing the 2012 Edition of the International Energy Conservation Code (IECC). The IECC replaces Chapter 11 of the International Residential Code (IRC). All permitted applications submitted on, or after November 30th, 2012 shall comply with the provisions of the 2012 IECC.

A. APPLICABILITY

Existing buildings and historic designated buildings are exempt from these codes. New work in alterations, change of occupancy, renovations or repairs must comply with the requirements of these codes without creating or extending any nonconformity in the existing building related to energy efficiency, including the capacity of mechanical systems. Unconditioned additions separated from the existing building by building thermal envelope assemblies are exempted from complying with the building envelope requirements. A conditioned addition alone must comply with the code requirements; alternatively, the existing building and addition can comply with code requirements as one building. Section R101.4.3 of the IECC lists a few exceptions provided the energy use of the building is not increased.

***GENERAL DEFINITIONS*:**

ABOVE-GRADE WALL – A wall more than 50% above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

ACCESSIBLE – Admitting close approach as a result of not being guarded by lock doors, elevation or other effective means (see “Readily accessible”)

ADDITION – An extension or increase in the conditioned space floor area or height of a building or structure.

AIR BARRIER – Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.

ALTERATION - Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

APPROVED - Approval by the Code Official as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations.

AUTOMATIC - Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

BASEMENT WALL - A wall 50 percent or more below grade and enclosing conditioned space.

BUILDING - Any structure used or intended for supporting or sheltering any use or occupancy.

BUILDING THERMAL ENVELOPE - The basement walls, exterior walls, floor, roof, and any other building element that encloses conditioned space. This boundary also includes the boundary between conditioned space and any exempt or unconditioned space.

C-FACTOR (THERMAL CONDUCTANCE) - The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time

rate of heat flow per unit area and the unit temperature difference between the warm side and the cold side surfaces.

CODE OFFICIAL - The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COMMERCIAL BUILDING - For this code, all buildings that are not included in the definition of "Residential buildings".

CONDITIONED FLOOR AREA - The horizontal projection of the floors associated with the conditioned space.

CONDTIONED SPACE - An area or room within a building being heated or cooled, containing un-insulated ducts, or with a fixed opening directly into an adjacent conditioned space.

CONTINUOUS AIR BARRIER - A combination of materials and assemblies that restrict or prevent the passage of air through the building envelope.

CRAWL SPACE WALL - The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.

CURTAIN WALL - Fenestration products used to create an external non-load bearing wall that is designed to separate the exterior and interior environments.

DAYLIGHT ZONE -

Under skylights: The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimensions in that direction plus either the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.

Adjacent to vertical fenestration: The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight zone depth is assumed to extend into the space a distance of 15 feet (4572 mm) or to the nearest ceiling height opaque partition, whichever is less. The daylight zone width is assumed to

be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration; whichever is least.

DEMAND RECIRCULATION WATER SYSTEM - A water distribution system where pump(s) prime the service hot water piping with heated water upon demand for hot water.

DEMAND CONTROL VENTILATION (DCV) - A ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than the occupancy.

DUCT - A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEMS - A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT - A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

ECONOMIZER, AIR - A duct or damper arrangement and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling during mild or cold weather.

ECONOMIZER, WATER - A system where the supply air of a cooling system is cooled indirectly with water that is itself cooled by heat or mass transfer to the environment without the use of mechanical cooling.

ENERGY ANALYSIS - A method for estimating the annual energy use of the proposed design and standard reference design based on estimates of energy use.

ENERGY COST - The total annual estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

ENERGY RECOVERY VENTILATION SYSTEM - Systems that employ air-to-air heat exchangers to recover energy from exhaust air for the purpose preheating, pre-cooling, humidifying or dehumidifying outdoor ventilation air prior to supplying the air to a space, either directly or as part of a HVAC system.

ENERGY SIMULATION TOOL - An approved software program or calculation-based methodology that projects the annual energy use of a building.

ENTRANCE DOOR - Fenestration products used for ingress, egress, and access in nonresidential buildings, including, but not limited to, exterior entrances that utilize latching hardware and automatic closers and contain over 50-percent glass specifically designed to withstand heavy use and possibly abuse.

EXTERIOR WALL - Walls including both above-grade walls and basement walls.

FAN BRAKE HORSEPOWER (BHP) - The horsepower delivered to the fan's shaft. Brake horsepower does not include the mechanical drive losses (belts, gears, etc.).

FAN SYSTEM BHP - The sum of the fan brake horsepower of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the conditioned space(s) and return it to the source or exhaust it to the outdoors.

FAN SYSTEM DESIGN CONDITIONS - Operating conditions that can be expected to occur during normal system operation that result in the highest supply fan airflow rate to conditioned spaces served by the system.

FAN SYSTEM MOTOR NAMEPLATE HP - The sum of the motor nameplate horsepower of all fans that are required to operate at design conditions to supply air from the heating or cooling source to the conditioned space(s) and return it to the source or exhaust it to the outdoors.

FENESTRATION - Skylights, roof windows, vertical windows (fixed or

moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors. Fenestration includes products with glass and non-glass glazing materials.

FENESTRATION PRODUCT, SITE-BUILT - A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls and atrium roof systems.

F-FACTOR - The perimeter heat loss factor for slab-on-grade floors (Btu/h x It x OF) [W/(m x K)].

HEAT TRAP - An arrangement of piping and fittings, such as elbows, or a commercially available heat trap that prevents thermo-syphoning of hot water during standby periods.

HEATED SLAB - Slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH-EFFICACY LAMPS - Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts,

2. 50 lumens per watt for lamps over 15 watts to 40 watts, and

3. 40 lumens per watt for lamps 15 watts or less.

HUMIDISTAT - A regulatory device, actuated by changes in humidity, used for automatic control of relative humidity.

INFILTRATION - The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INSULATING SHEATHING - An insulating board with a core material having a minimum R-value of R-2.

LABELED - Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above - labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED - Equipment, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-VOLTAGE LIGHTING - Lighting equipment powered through a transformer such as a cable conductor, a rail conductor and track lighting.

MANUAL - Capable of being operated by personal intervention (see "Automatic").

NAMEPLATE HORSEPOWER - The nominal motor horsepower rating stamped on the motor nameplate.

PROPOSED DESIGN - a description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.

READILY ACCESSIBLE - Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "Accessible").

REPAIR - The reconstruction or renewal of any part of an existing building.

RESIDENTIAL BUILDING - For this code, includes detached one and two family dwellings and multiple single family dwellings (Townhouses) as well as R-2, R3 and R-4 buildings three stories or less in height above grade.

ROOF ASSEMBLY - A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

R-VALUE (THERMAL RESISTANCE) - The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area (h x ft^2 x of/Btu) [(m^2 x K)/W].

SCREW LAMP HOLDERS - A lamp base that requires a screw-in-type lamp, such as a compact fluorescent, incandescent, or tungsten-halogen bulb.

SERVICE WATER HEATING - Supply of hot water for purposes other than comfort heating.

SKYLIGHT - Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.5 rad) or more from horizontal. Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.

SLEEPING UNIT - A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

SOLAR HEAT GAIN COEFFICIENT (SHGC) - The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, either by conduction or convection into the targeted space.

STANDARD REFERENCE DESIGN - A version of the proposed design that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

STOREFRONT - A nonresidential system of doors and windows mulled as a

composite fenestration structure that has been designed to resist heavy use. Storefront systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings.

SUNROOM - A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

THERMAL ISOLATION - Physical and space conditioning separation from conditioned space(s). The conditioned space(s) shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

THERMOSTAT - An automatic control device used to maintain temperature at a fixed or adjustable set point.

U-FACTOR (THERMAL TRANSMITTANCE) - The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h x ff x OF) [W/(m² x K)].

VENTILATION - The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR - That portion of supply air that comes from outside (outdoors) plus any re-circulated air that has been treated to maintain the desired quality of air within a designated space.

VISIBLE TRANSMITTANCE [VT] - The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, Visible Transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM - An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

ZONE - A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be

maintained throughout using a single controlling device.

B. CHARLES COUNTY CLIMATE ZONE

The code establishes many requirements such as wall and roof insulation R-values, window and door thermal U-factors as well as provisions that affect the mechanical systems based upon the climate where the building is located. Charles County is in Climate Zone 4A. The table below represents the thermal criteria for Charles County:

CLIMATE ZONE	THERMAL CRITERIA	
	IP Units	**SI Units**
4A	CDD50°F s4500 and HDD65°Fs5400	CDDlO°Cs2500 and HDD18°C3000

For SI: OC = [OF-32]/1.8

The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72° F (22 ° C) for heating and minimum of 75 ° F (24 ° C) for cooling.

C. METHODS OF COMPLIANCE

The codes address the design of energy-efficient building envelope (consisting of roof/ceiling, walls, floors, foundation assemblies that surround the conditioned space) and the selection and installation of energy efficient mechanical and service water heating. The building envelope requirements are addressing insulation, fenestration and air leakage.

There are TWO practical conformance options/paths:

METHOD 1 - (Prescriptive is the simplest and the most direct. This path requires compliance with sections R401 through R404.1.1. Method 1 includes all the prescriptive and mandatory Residential requirements.

METHOD 2 - Simulated Performance Alternative (R405). All mandatory requirements in R402.4 through R404 shall be met.

D. MANDATORY REQUIREMENTS FOR BOTH METHODS

R402.4. AIR LEAKAGE

Building Thermal Envelope: The building thermal envelope shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weather-stripped or otherwise sealed with an air barrier material, suitable film or solid material:

1. All joints, seams and penetrations.
2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating a garage from conditioned spaces.
8. Behind tubs and showers and exterior walls.
9. Common walls between dwelling units.
10. Attic access openings.
11. Rim joist junction.
12. Other sources of infiltration.

***NOTE: Air permeable insulation shall NOT be used as a sealing material**.

R402.4.1.2. TESTING

The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding 3 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Testing shall be conducted by a third party. A written report of the test results shall be signed by a third party conducting the test and provided to the building inspector not later than the final building inspection. Testing shall be performed at any time after

the creation of all penetrations of the building thermal envelope.

R402.4.2 FIREPLACES

New wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air. An air barrier shall be installed on fireplace walls. Fireplaces shall have door gaskets.

R402.4.4. RECESSED LIGHTING

Recessed luminaries in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaries shall be IC-rated and labeled as having air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaries shall be sealed with a gasket of caulk (or per manufacturer's specification) between the housing and the interior wall or ceiling covering.

R402.5 MAXIMUM FENESTRATION U-FACTOR AND SHGC (MANDATORY)

The area-weighted average maximum fenestration U-factor permitted using trade-offs from Section 402.1.4 or R405 shall be 0.48 in for vertical fenestration, and 0.75 for skylights. The maximum SHGC for glazed fenestration and skylights is 0.40.

R403. SYSTEMS (HEATING AND COOLING AND SERVICE WATER HEATING)

Heating and Cooling Equipment Controls – At least one pre-programmed programmable thermostat is required when using a forced air system. Separate thermostats are required for each heating/cooling zone in the dwelling.

Duct Insulation – Supply and return ducts located outside the thermal building envelope shall be insulated to an R-8. Ducts in the floor trusses can be insulated to an R-6. Ductwork completely within the building thermal envelope does not need to be insulated.

Duct Sealing - All ducts, air handlers, filter boxes, and building cavities must be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Duct tightness shall be verified by either a Post-construction Test or Rough-In test -Total leakage shall be less than or equal to 4 cfm (113.3 Um) per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system. Duct tightness testing is not required when the ducts and air handlers are located entirely within the building thermal envelope.

Building framing cavities shall not be used as ducts or plenums.

Mechanical System Piping Insulation: R-3 for piping carrying fluids at > 105°F or < 55°F is required.

R403.4 SERVICE HOT WATER SYSTEMS

Circulating hot water systems shall include a manual or automatic switch that can turn off the system when it is not in use.

R403.5 MECHANICAL VENTILATION

The building shall be provided with [Whole House] ventilation that meets the requirements of the International Residential Code (M1507). Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system in not operating.

DWELLING UNIT FLOOR AREA (SQ FT)	0-1 BEDROOMS	2-3 BEDROOMS	4-5 BEDROOMS	6-7 BEDROOMS	MORE THAN 7 BEDROOMS
< 1,500	30 cfm	45 cfm	60 cfm	75 cfm	90 cfm
1,501 – 3,000	45 cfm	60 cfm	75 cfm	90 cfm	105 cfm
3,001 – 4,500	60 cfm	75 cfm	90 cfm	105 cfm	120 cfm
4,501 – 6,000	75 cfm	90 cfm	105 cfm	120 cfm	135 cfm
6,001 – 7,500	90 cfm	105 cfm	120 cfm	135 cfm	150 cfm
More than 7,500	105 cfm	120 cfm	135 cfm	150 cfm	165 cfm

SECTION M1507

MECHANICAL VENTILATION M1507.1 GENERAL - Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

M1507.2 RECIRCULATION OF AIR - Exhaust air from bathrooms and toilet rooms shall not be re-circulated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas inside the building.

M1507.3 WHOLE HOUSE MECHANICAL VENTILATION SYSTEM - Whole-house mechanical ventilation systems shall be designed

in accordance with Sections M1507.3.1 through M1507.3.3.

M1507.3.1 SYSTEM DESIGN - The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.

M1507.3.2 SYSTEM CONTROLS - The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

M1507.3.3 MECHANICAL VENTILATION RATE - The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1). Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour segment and the ventilation rate prescribed in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).

**** TABLE M1507.3.3(1) CONTINUOUS WHOLE·HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS LISTED ABOVE ****

TABLE M1507.3.3(2) INTERMITTENT WHOLE HOUSE MECHANICAL VENTILATION RATE FACTORS [a´b]

RUN-TIME % - 4 HR SEGMENT	25%	33%	50%	66%	75%	100%
FACTOR[a]	4	3	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited

M1507.4 MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE- AND TWO-FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES
KITCHENS	100 cfm intermittent or 25 cfm continuous
BATHROOMS – TOILET ROOMS	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

R403.6 EQUIPMENT SIZING

Heating and cooling equipment shall be sized based on building loads calculated in accordance with ACCA (Air Conditioning Contractors of America) Manual-J, a simplified method of calculating heating and cooling loads. The Manual-J calculations must be submitted upon application for the mechanical permit only. l

E. PLAN SUBMITTAL REQUIREMENTS

METHOD 1 (THREE OPTIONS)

COMPLIANCE WITH PRESCRIPTIVE COMPONENT REQUIREMENTS

BASED ON R-VALUES OR U-FACTORS

1. The exact location of the building thermal envelope shall be marked out on the plans, details, and cross-sections.

2. Provide all insulation R-values or U-factors, materials, and locations to be installed (walls, ceilings, cantilever floors, floors over garage, crawl space, basement walls, etc.). Per Tables: R402.1.1 or R402.1.3 or R402.2.6 for Steel-Framed construction. This information shall be captured on the Residential Energy Compliance Certificate (See sample later in this packet).

3. Provide all fenestration U-factors for all glazing for each window and door per Table R402.1.1 (schedule supplied by designer).

4. Provide details on how all areas listed in Section R402.4.1.1 (table) will be protected against air leakage.

5. Indicate if crawlspace(s) are conditioned or vented; exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped/sealed.

6. Indicate duct insulation R-values, minimum R-6, R-8 in attics. Insulation not required if ductwork is completely within the building thermal envelope.

7. Indicate duct sealing methods per IMC M1601.4.1.

The information required in Points 1 and 2 can be summarized on worksheets located on Page 16 for R-values or on Page 17 for U-Factors. The remaining information can be captured on the drawings in schedules, notes, and other supplementary worksheets or calculations.

When a Mechanical Permit is required for installation of HVAC equipment, the

applicant for the mechanical permit must provide the ACCA Manual J 8th edition calculation package for the HVAC Equipment Sizing.

PRESCRIPTIVE REQUIREMENTS WORKSHEET (R-VALUES) (METHOD 1, OPTION 1)

APPLICANT NAME _____
DATE _____
APPLICANT ADDRESS _____
PHONE NUMBER _____
BUILDING ADDRESS_____
PERMIT NUMBER_____

CRITERIA	REQUIRED	PROVIDED	ASSEMBLY DESCRIPTION
WINDOWS/DOORS – MAXIMUM U-FACTOR MAX SHGC – GLAZED FENESTRATION	.35 0.40		
SKYLIGHTS – MAXIMUM U-FACTOR MAX SHGC	.55 0.40		
CEILINGS	R-49		
WALLS (WOOD FRAMING)	R-20 or 13+5		
MASS WALLS	**R-8/13		
BASEMENT WALLS	*R-10/13		
FLOORS	R-19		
SLAB PERIMETER – R-VALUE AND DEPTH	R-10, 2ft		
CRAWLSPACE	*R-10/13		

Insulation material used in layers, such as framing cavity insulation and insulation sheathing, shall be summed to compute the component R-value.
*** THE FIRST R-VALUE** applies to continuous insulation, the second to framing cavity insulation. "10/13 means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation on the interior of the basement wall".
****THE SECOND R-VALUE** applies when more than half the insulation is on the interior of the mass wall.

- **THERMALLY ISOLATED SUNROOM, CHECK BOX IF APPLICABLE.**

  Minimum ceiling R-value for Sunroom (R-19)
  Minimum Wall R-Value (R-13)

New wall(s) separating a sunroom from conditioned space shall meet the building thermal envelope

requirements.

I hereby certify that the building design represented in the attached construction documents has been designed to meet or exceed the requirements of the 2012 Edition of the International Energy Conservation Code (IECC)

_____ _____ _____

BUILDER/DESIGNER/CONTRACTOR COMPANY NAME DATE

PRESCRIPTIVE REQUIREMENTS WORKSHEET (EQUIVALENT U-FACTORS) (METHOD 1, OPTION 2)

Criteria	Required	Provided	Assembly Description
Fenestration Max SHGC -glazed fenestration	.35 .40		
Skylight Max SHGC	.55 .40		
Ceilings	.026		
Frame Wall	.057		
Mass Wall	.098		
Floor	.047		
Basement Wall	.059		
Crawl Space Wall	.065		

APPLICANT NAME _____
DATE _____
APPLICANT ADDRESS _____
PHONE NUMBER _____
BUILDING ADDRESS_____
PERMIT NUMBER_____

GLAZING U-FACTORS must be tested and documented by the manufacturer in accordance with the National Fenestration Rating Council (NFRC 100) test procedure or taken from the Default Tables R303.1.3(1) and R303.1.3(2) in the 2012 IECC, Chapter 3. Non-fenestration U-factors must be determined from measurement, calculation, or approved sources for each component

I hereby certify that the building design represented in the attached construction documents has been designed to meet or exceed the requirements of:

- 2012 Edition International Energy Conservation Code (IECC)

_____	_____	_____
BUILDER/DESIGNER/CONTRACTOR	COMPANY NAME	DATE

TOTAL UA ALTERNATIVE (METHOD 1, OPTION 3)

PRESCRIPTIVE COMPLIANCE

BASED ON U-FACTORS

Provide all information as outlined in points 1 thru 6 on page 11. The worksheet starting on page 15 can be used to show compliance.

Alternately, provide a copy of ResCheck calculations. The submitted ResCheck printout shall show all of the following specific information: orientation of each individual wall; insulation types, R-values and whether continuous or cavity; accurate square footage; and accurate window and door sizes and the specific wall in which they are located, along with the U factor.

Builders who have "Plans on File" plans shall provide the worst case orientation for the ResCheck (based on the orientation of the exterior walls). Subsequent submissions will indicate if each proposed building exceeds the worst case scenario or new ResCheck calculations shall be provided with the application.

If the total *building thermal envelope* UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table 402.1.3 (multiplied by the same assembly are as in the proposed building), the building shall be considered in compliance with Table 402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials.

ResCheck™

Charles County accepts ResCheck™ program as a tool for energy code compliance. The ResCheck™ program can be downloaded at www.energycodes.gov. An online version of ResCheck™ (ResCheck Web) can be utilized without having to download or install any software on your computer.

TOTAL UA ALTERNATIVE WORKSHEET (METHOD 1, OPTION 3)

APPLICANT NAME _____
DATE _____
APPLICANT ADDRESS _____
PHONE NUMBER _____
BUILDING ADDRESS_____
PERMIT NUMBER_____

EXTERIOR WALL ASSEMBLY

COMPONENT	DESCRIPTION	R-VALUE	U-FACTOR U = 1/R	AREA (ft^2)	A x U
Wall 1					
Wall 2					
Ceiling 1					
Ceiling 2					
Door 1					
Door 2					
Other					
Total					

Uo	Overall Uo for exterior wall = (A x U) total ÷ A total				

□ MEETS CODE □ DOES NOT MEET CODE

FLOOR ASSEMBLY

COMPONENT	DESCRIPTION	R-VALUE	U-FACTOR U = 1/R	AREA (ft^2)	A x U
Floor 1					
Floor 2					
Other					
Total					
Uo	Overall Uo for floor assembly = (A x U) total ÷ A total				

□ MEETS CODE □ DOES NOT MEET CODE

ROOF/CEILING ASSEMBLY

COMPONENT	DESCRIPTION	R-VALUE	U-FACTOR U = 1/R	AREA (ft^2)	A x U
Ceiling 1					
Ceiling 2					
Other					
Total					
Uo	Overall Uo for Roof/Ceiling = (A x U) total ÷ A total				

□ MEETS CODE □ DOES NOT MEET CODE

BASEMENT WALL ASSEMBLY

COMPONENT	DESCRIPTION	R-VALUE	U-FACTOR U = 1/R	AREA (ft^2)	A x U
Basement Wall					

□ MEETS CODE □ DOES NOT MEET CODE

CRAWL SPACE WALL ASSEMBLY

COMPONENT	DESCRIPTION	R-VALUE	U-FACTOR U = 1/R	AREA (ft^2)	A x U
Crawlspace Wall					

□ MEETS CODE □ DOES NOT MEET CODE

OVERALL ENVELOPE CONFORMANCE

ASSEMBLY	Uo	Uo-Required	TOTAL AREA	AxUo	AxUrequired
Exterior Wall					
Floor					
Roof/Ceiling					
Total (AxUo)					
Total (AxU required)					

If the Total AxUo is less than the Total AxU required the building complies with the IECC even though the individual components do not. Basement and crawl space walls must meet the requirements of the basic requirement table above.

I hereby certify that the building design represented in the attached construction documents has been designed to meet the requirements of the 2012 Edition International Energy Conservation Code (IECC)

_____ _____ _____

BUILDER/DESIGNER/CONTRACTOR COMPANY NAME DATE

METHOD 2

COMPLIANCE WITH PERFORMANCE REQUIREMENTS

R405 -SIMULATED PERFORMANCE ALTERNATIVE

The permit applicant shall submit documentation signed and sealed by a licensed design professional registered in Maryland, including:

1. Address of residence
2. Permit number
3. Analysis shall include heating, cooling and service water heating energy only
4. All mandatory requirements of the 2012 IECC (Residential) shall be met
5. Inspection checklist documenting the building component characteristics of the proposed design, see Table R404.5.2(1) of IECC

6. Accurate square footage
7. Mechanical system features
8. Name of individual completing the report.
9. Name and version of the compliance software tool

APPROVED COMPLIANCE SOFTWARE

RemRate

RemDesign

Energy Gauge

ENERGY EFFICIENCY CERTIFICATE OF COMPLIANCE

ADDRESS _____ RESIDENTIAL COMPLIANCE PATH

(ONLY **ONE** SHALL APPLY)

PERMIT NUMBER _____ Prescriptive R □ Prescriptive U □

Prescriptive UA □ Performance □

Building Envelope Air Leakage ___ Air changes Per Hour (Max 3)

Duct System Air leakage _____ cfm per 100sf

Post Const. Testing □ Rough-in Testing □

Ceiling R or U-Value _____

Heating System Efficiency _____

Wood Frame Wall R or U-value _____

Cooling System Efficiency _____

Mass Wall R or U-value _____

Water Heating Efficiency _____

Floor R or U-value _____

Basement Wall R-value _____

Slab R-value _____ Depth _____

Crawl Space R-value _____

Crawl Space R-value _____ Gas Fired Unvented Room Heater ☐

Fenestration U-value _____ SHGC _____ Electric Furnace ☐

Skylight U-factor _____ SHGC _____ Baseboard Electric Heat ☐

Ducts Outside of Thermal Envelope R-value: Supply R-8 ☐ Other R-6 ☐

I certify the information contained on this certificate is true and complete:

Builder/Designer _____ Signature _____ Date _____

IECC 2012 CHAPTER 4, Section R401.3 CERTIFICATE

A permanent certificate shall be completed and posted on or in the electrical distribution panel by the builder or registered design professional. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

RESIDENTIAL INSPECTION/REPORT CERTIFICATE

RESIDENTIAL BUILDING PERMITS

Charles County Codes, Permits and Inspection Services (CPIS) will accept this report in lieu of inspecting the work noted below. This inspection must be certified by a contractor possessing a State of Maryland Master Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) license, or a professional engineer licensed in Maryland, or the permit holder.

Section 503.2.2 of the International Energy Conservation Code (IECC), 2012 Edition, requires that all ducts, filter boxes and building cavities used as ducts are tested for tightness. Duct tightness test is **not** required if the air handler and all ducts are located within the conditioned space.

TEST RESULTS

1. **POST-CONSTRUCTION TEST**

□ Leakage to outdoors _____ per 100 ft² (9.29 m²) of conditioned floor area

□ Leakage _____ per 100 ft² (9.29 m²) of conditioned floor area

When tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure, all register boots shall be taped or otherwise sealed during the test.

2. ROUGH-IN TEST

□ Total Leakage _____ per 100 ft² (9.29 m²) of conditioned floor area

When tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the rough in system, including the manufacturer's air handler end closure, all register boots shall be taped or otherwise sealed during the test. If the air handler is **not** installed at the time of the test, total leakage shall be less than or equal to 4 cfm (1.89 L/s) per 100 ft² (9.29 m²) of conditioned floor area.

CERTIFICATION OF TEST RESULTS

I certify this report is true and that the equipment has been tested in compliance with the IECC as appropriate. The certification represents the completion of this phase of construction.

MECHANICAL PERMIT NUMBER _____ DATE TESTED _____

_____

NAME (PRINT) OF AUTHORIZED INDIVIDUAL

□ MD HVACR MASTER LICENSE NUMBER _____

□ MD PROFESSIONAL ENGINEER LICENSE NUMBER _____

□ PERMIT HOLDER

SIGNATURE _____ SEAL (PE ONLY)

PROVIDE AN ORIGINAL COPY TO THE INSPECTOR AT THE JOB SITE
SUPPLEMENTAL TESTING REPORTS AND INSPECTION RECORDS SHALL BE ATTACHED TO THIS REPORT