



HOUSTON RESIDENTIAL ENERGY CODE 15% PHASED STANDARD GUIDELINE

BACKGROUND

The 2006 International Energy Conservation Code with Houston Amendments was adopted in January 2009. This document contained Houston amendments to be phased in starting October 2009 which will increase energy efficiency by 15%. Under the phased standards, customers will be allowed to choose 1 of 3 methods to show compliance.

PROJECTS AFFECTED

New construction projects for any one or two family dwelling or multifamily structures up to and including 3 stories. Remodel projects and additions are exempt from the 15% above code provisions.

METHODS OF COMPLIANCE

Projects have **three methods** to show compliance with the above code items:

1. **An Above Code Program:** Energy Star, or other above code program when approved.
2. **Software and Testing:** IC3 Software or other software when approved, along with duct blaster and blower door tests.
3. **Houston Prescriptive Option Packages:** Groups are listed in the tables that have been approved to meet 15% above code compliance.

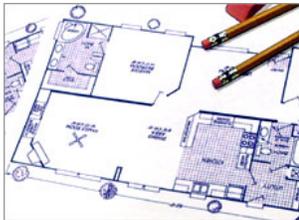


= This product or information can be viewed at our **Green Building Resource Center**.

ENFORCEMENT OF THE THREE METHODS OF COMPLIANCE

METHOD 1: Above Code Program

An above code program is a program such as Energy Star or Environments for Living or other program that the City has approved as meeting the 15% minimum above code.



When projects choose the Above Code Program method the following will be reviewed:

The appropriate software report will need to be provided at the time the plans are reviewed. The Energy Star program requires the Energy Gauge and REM/Rate software reports. Please ensure the information on the report submitted matches the details that are contained in the plans.

Inspectors will review the compliance report on the plans and ensure that the stated items and ratings are the same as the installed values.

METHOD 2: Software and Testing

This method will allow for easier compliance. The applicant must provide one of the following software reports: IC3, ResCheck – 2001 IECC code edition (temporarily allowed), Energy Gauge or REM/Rate Software. The software will need to indicate the percentage above code that the building passes. The report must be submitted for plan review. REM/rate provides a HERS score rather than a percentage. A REM/rate report will need to indicate a HERS Index of 85 or lower.

When choosing this method, the applicant will need to have the duct blaster and blower door testing performed with favorable results to show that the building envelope and ducts are not leaking beyond a certain percentage. Ducts shall not leak more than 10% of total design airflow and envelope testing shall not exceed .35 ACHn. HVAC Inspections will collect the Duct Blaster and Blower Door Test results upon completion of these tests prior to the Final HVAC inspection being approved.

METHOD 3: Houston Prescriptive Tables

After selecting an option package for compliance, the applicant must complete the supplemental page in the Houston Energy Code Form. Each item in the package will be required for compliance. The tables are listed in the back of this document.



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GROUPS FOR COMBINED ENERGY SAVINGS FOR ONE AND TWO FAMILY STRUCTURES WITH NATURAL GAS HEATING

PLEASE NOTE ALL ELECTRIC HOMES WILL NEED TO CHOOSE EITHER THE ABOVE CODE OR SOFTWARE AND TESTING METHOD.

GROUPS	MEASURES	EXPLANATION
Group 1	<ul style="list-style-type: none"> Solar Domestic Hot Water System 64 square feet collector area 	<p><u>Solar Domestic Hot Water System</u>: Storage tank type DHW heater with 64 square feet collector area for single-family homes. This system will supply the domestic hot water powered by solar power. This option includes additional plan requirements. Please see Solar Guideline Form No. 1198. This will require a minimum 64 sq. ft. collector area to receive credit.</p>
Group 2	<ul style="list-style-type: none"> Photovoltaic Array for 6kW 	<p><u>Photovoltaic Array for 6kW</u>: Installed according to DC Standard Test Criteria and manufacturer's instructions. This option is to provide credit for the installation of a photovoltaic array that will achieve at least 6kW of energy. This option will have additional code requirements for the anchoring and electrical items. Please see Solar Guideline Form No. 1198.</p>
Group 3	<ul style="list-style-type: none"> Photovoltaic Array for Partial Demand at 4kW 	<p><u>Photovoltaic Array for Partial Demand at 4kW</u> per single family home. Installed according to DC Standard Test Criteria and manufacturer's instructions. This option is to supply some of the home's electrical demand by solar power. This option will need to provide at least 4kW. This will require additional code requirements for anchoring and electrical items. Please see Solar Guideline Form No. 1198.</p>
Group 4	<ul style="list-style-type: none"> Mechanical Systems within Conditioned Spaces 50% Energy Star CFL Indoor Lamps 	<p><u>Mechanical Systems within Conditioned Spaces</u>: Ducts in ventilated attic moved to location within the thermal envelope of conditioned space including unventilated attic space.</p> <p><u>50% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. This package will require the installation of 50% of the lighting fixtures (excluding closets). These fixtures are required to be "pin based" fixtures.</p>
Group 5	<ul style="list-style-type: none"> Photovoltaic Array for Partial Demand at 2kW Decreased Duct Leakage (maximum 10%) 	<p><u>Photovoltaic Array for Partial Demand at 2kW</u> per single family home: Installed according to DC Standard Test Criteria and manufacturer's instructions. This option will have additional code requirements for the anchoring and electrical items. Please see Solar Guideline Form No. 1198.</p> <p><u>Decreased Duct Leakage</u> (maximum 10%): Ducts tested with less than 10 % leakage to outside the building envelope. This option will also require the duct blaster test to ensure 10% or less duct leakage. This test must be performed by a certified/approved agency and done in accordance with one of the standards listed in Section 110.3.2 of the Code. The test results will be picked up by the Mechanical Inspector prior to the final HVAC inspection</p>
Group 6	<ul style="list-style-type: none"> 50% Energy Star CFL Indoor Lamps Tankless water heater (minimum .748 Energy Factor) Decreased Infiltration (maximum .35 ACHn) 	<p><u>50% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. This package will require the installation of 50% of the lighting fixtures (excluding closets). These fixtures are required to be "pin based" fixtures.</p> <p><u>Tankless water heater (minimum .748 Energy Factor for Electric/Gas house)</u>: Manufacturer's rating. Tankless water heater that will serve the domestic hot water for the house is required with a minimum efficiency of .748 or higher.</p> <p><u>Decreased Infiltration (maximum .35 ACHn)</u>: Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8. Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less than .35ACHn. This test shall be performed by a qualified third party.</p>
Group 7	<ul style="list-style-type: none"> 50% Energy Star CFL Indoor Lamps Decreased Duct Leakage (maximum 10%) Improved SEER (minimum 15) 	<p><u>50% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. This package will require the installation of 50% of the lighting fixtures (excluding closets). These fixtures are required to be "pin based" fixtures.</p> <p><u>Decreased Duct Leakage (maximum 10%)</u>: Ducts tested with less than 10 % leakage to outside the building envelope. This option will also require the duct blaster test to ensure 10% or less duct leakage. This test must be performed by a certified/approved agency and done in accordance with one of the standards listed in Section 110.3.2 of the Code. The test results will be picked up by the Mechanical Inspector prior to the final HVAC inspection</p> <p><u>Improved SEER</u>: (minimum 15 for Single Family homes) Manufacturer's nominal rating.</p>



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GROUPS FOR COMBINED ENERGY SAVINGS FOR ONE AND TWO FAMILY STRUCTURES WITH NATURAL GAS HEATING

PLEASE NOTE ALL ELECTRIC HOMES WILL NEED TO CHOOSE EITHER THE ABOVE CODE OR SOFTWARE AND TESTING OPTION.

GROUPS	MEASURES	EXPLANATION
Group 8	<ul style="list-style-type: none"> Decreased Duct Leakage (maximum 10%) Improved SEER (minimum 15) Decreased SHGC (maximum .35) & U-Factor (maximum .35) Decreased Infiltration (maximum .35 ACHn) 	<p><u>Decreased Duct Leakage (maximum 10%):</u> Ducts tested with less than 10 % leakage to outside the building envelope. This option will also require the duct blaster test to ensure 10% or less duct leakage. This test must be performed by a certified/approved agency and done in accordance with one of the standards listed in Section 110.3.2 of the Code. The test results will be picked up by the Mechanical Inspector prior to the final HVAC inspection</p> <p><u>Improved SEER:</u> (minimum 15 for Single Family homes): <i>Manufacturer's nominal rating.</i></p> <p><u>Decreased SHGC (maximum .35) & U-factor (maximum .35):</u> <i>NFRC 100 and 200.</i> These values may be averaged.</p> <p><u>Decreased Infiltration (maximum .35 ACHn):</u> <i>Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8.</i> Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less than .35ACHn. This test shall be performed by a qualified third party.</p>
Group 9	<ul style="list-style-type: none"> Decreased Duct Leakage (maximum 6%) Decreased SHGC (maximum .35) & U-Factor (maximum .35) Window Shading and Redistribution (minimum S= 45%) 	<p><u>Decreased Duct Leakage (maximum 6%):</u> Ducts tested with less than 6 % leakage to outside the building envelope.</p> <p><u>Decreased SHGC (maximum .35) & U-factor (maximum .35):</u> <i>NFRC 100 and 200.</i> These values may be averaged.</p> <p><u>Window Shading and Redistribution:</u> <i>Maximum total window area of 18% window to floor ratio. Window orientation with a minimum 1.5 ft overhang (Projection Factor=.25) on all sides. A minimum of 45 % of the total window area shall be on the south or within 15 degrees of south.</i></p>
Group 10	<ul style="list-style-type: none"> Improved Furnace Efficiency (minimum .93 AFUE) Decreased Infiltration (maximum .35 ACHn) Decreased Duct Leakage (maximum 10%) Improved SEER (minimum 15) 	<p><u>Improved Furnace Efficiency (Minimum .93 AFUE):</u> <i>Manufacturer's nominal rating.</i></p> <p><u>Decreased Infiltration (maximum .35 ACHn):</u> <i>Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8.</i> Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less then .35ACHn. This test shall be performed by a qualified third party.</p> <p><u>Decreased Duct Leakage (maximum 10%):</u> Ducts tested with less than 10 % leakage to outside the building envelope. This test shall be performed by a qualified third party.</p> <p><u>Improved SEER:</u> (minimum 15 for Single Family): <i>Manufacturer's nominal rating.</i></p>





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TABLE 110(3) COMBINED ENERGY SAVINGS FOR MULTI-FAMILY STRUCTURES WITH ELECTRIC RESISTANCE HEATING

GROUPS	MEASURES	EXPLANATION
Group 1	<ul style="list-style-type: none"> PV Array for Partial Demand at 2kW/unit 	<p><u>Photovoltaic Array for Partial Demand at 2kW per unit</u>: Installed according to DC Standard Test Criteria and manufacturer's instructions</p>
Group 2	<ul style="list-style-type: none"> Solar DHW System (21 sq. ft. collector area/unit) 	<p><u>Solar Domestic Hot Water System</u>: Storage tank type DHW heater with 21 square feet collector area per unit is required for multifamily structures. The domestic hot water system is powered by solar power. This option includes additional plan requirements. Please see Solar Guideline Form 1198. This will require a minimum 21 sq. ft. collector area per unit to receive credit.</p>
Group 3	<ul style="list-style-type: none"> 50% Energy Star CFL Indoor Lamps Mechanical in Conditioned Space Improved SEER (minimum 14) Decreased SHGC (maximum .35) and U-Factor (0.35 maximum) Decreased Infiltration (maximum .35 ACHn) 	<p><u>50% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. This package will require the installation of 50% of the lighting fixtures (excluding closets). These fixtures are required to be "pin based" fixtures.</p> <p><u>Mechanical Systems within Conditioned Spaces</u> (upper floor only in multifamily): Ducts in ventilated attic moved into a location within the thermal envelope of conditioned space including unventilated attic space.</p> <p><u>Improved SEER</u>: (minimum 14 for multi-family units): Manufacturer's nominal rating.</p> <p><u>Decreased SHGC</u> (maximum .35) & U-factor (maximum .35): NFRC 100 and 200. These values may be averaged.</p> <p><u>Decreased Infiltration</u> (maximum .35 ACHn): Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8 Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less than .35ACHn. This test shall be performed by a qualified third party.</p>
Group 4	<ul style="list-style-type: none"> Tankless water heater (minimum .748 Energy Factor) Decreased Duct Leakage (maximum 6%) Upper Floor Only Improved SEER (minimum 14) Reduced Infiltration (maximum .35 ACHn) 25% Energy Star CFL Indoor Lamps Decreased SHGC (maximum .35) and U- Factor (0.35 maximum) 	<p><u>Tankless water heater</u> (minimum .748 Energy Factor for Electric/Gas unit): Manufacturer's rating. Tankless water heater that will serve the domestic hot water for the unit is required with a minimum efficiency of .748 or higher.</p> <p><u>Decreased Duct Leakage</u> (maximum 6%): Ducts tested with less than 6 % leakage to outside the building envelope</p> <p><u>Improved SEER</u>: (minimum 14 for multi-family units): Manufacturer's nominal rating.</p> <p><u>Decreased Infiltration</u> (maximum .35 ACHn): Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8 Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less than .35ACHn. This test shall be performed by a qualified third party.</p> <p><u>25% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. These fixtures are required to be "pin based" fixtures.</p> <p><u>Decreased SHGC</u> (maximum .35) & U-factor (maximum .35): NFRC 100 and 200. These values may be averaged.</p>
Group 5	<ul style="list-style-type: none"> 50% Energy Star CFL Indoor Lamps Decreased Duct Leakage (maximum 10%) Improved SEER (minimum 14) Decreased SHGC (maximum .35) and U- Factor (0.35 maximum) Reduced Infiltration (maximum .35 ACHn) 	<p><u>50% Energy Star CFL Indoor Lamps</u>: Permanent Compact Florescent fixtures excluding closets. This package will require the installation of 50% of the lighting fixtures (excluding closets). These fixtures are required to be "pin based" fixtures.</p> <p><u>Decreased Duct Leakage</u> (maximum 10%): Ducts tested with less than 10 % leakage to outside the building envelope.</p> <p><u>Improved SEER</u>: (minimum 14 for multi-family units): Manufacturer's nominal rating.</p> <p><u>Decreased SHGC</u> (maximum .35) & U-factor (maximum .35): NFRC 100 and 200. These pin based values may be averaged.</p> <p><u>Decreased Infiltration</u> (maximum .35 ACHn): Base case formula for ACHn is Normalized Leakage 0.57 x Weather Factor 0.8 Less infiltration can be achieved by improving the sealing and gasketing of the envelope. This option package will require a blower door test to confirm air leakage is less than .35ACHn. This test shall be performed by a qualified third party.</p>



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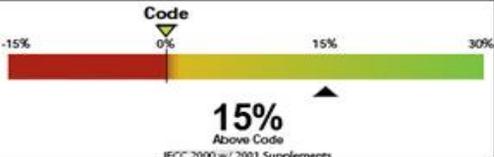
EXAMPLES OF IC3 SOFTWARE COMPLIANCE PRINT-OUTS

Single Family House

Project Information | Floors | Windows | Insulation / Mechanical | HVAC / DHW | Roof | Horizontal Projections | Status

Project Details for: Energy Star Exmpl

<p>Project Information</p> <p>Energy Code: IECC 2000/2001 Builder Name: Energy Star 111 Builder Phone: 7135357856 Site Street Address: 1112 Houston City: Houston Zip: 77002 County: HARRIS Notes:</p> <p>Floors</p> <p>First Floor: Conditioned Floor Area: 2400 sq ft Perimeter of Conditioned Space: 200 ft Ceiling Height: 9 ft Orientation: north Number of Bedrooms: 4</p> <p>Windows</p> <p>Solar Heat Gain Coefficient: 0.25</p>	<p>Insulation / Mechanical</p> <p>Wall Cavity Insulation: R-13 Insulated Wall Sheathing: R-0 Exterior Finish: Vinyl Siding Total Roof/Ceiling Insulation: R-19</p> <p>HVAC / DHW</p> <p>Heating Type: Natural Gas Heating Efficiency: 0.9 AFUE Mechanical in Conditioned Space: No A/C Efficiency (SEER): 15 SEER A/C Size (tons): 3.5 Water Heater Type: Natural Gas Water Heater Energy Factor: 0.78</p> <p>Roof</p> <p>Roof Covering Material: Comp Shingle Radiant Barrier: Yes Flat Roof Area: 0 sq ft Cathedral Ceiling Area: 0 sq ft Attic Floor Area: 2400 sq ft</p>	<p>Project Status</p> <p style="color: green; font-weight: bold;">15% Above Code</p> <p style="color: green; font-weight: bold;">Congratulations! Your project has passed code requirements!</p> <div style="text-align: center;">  <p>Print Certificate</p> </div>
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<div style="text-align: center;">  <h2 style="margin: 0;">Energy Certificate</h2> <p style="margin: 0;">for Single Family House</p> <p style="margin: 0;">1112 Houston Houston, 77002 HARRIS</p> </div> <div style="text-align: center; margin-top: 10px;"> <p>Code</p>  <p style="font-weight: bold; font-size: 1.2em;">15% Above Code</p> <p style="font-size: 0.8em;">IECC 2000 w/ 2001 Supplements</p> </div> <div style="margin-top: 10px;"> <p>Emissions Reduction</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">NOx:</td> <td style="padding: 2px;">3.86 lbs</td> </tr> <tr> <td style="padding: 2px;">SOx:</td> <td style="padding: 2px;">2.93 lbs</td> </tr> <tr> <td style="padding: 2px;">CO2:</td> <td style="padding: 2px;">3190.43 lbs</td> </tr> </table> <p style="font-size: 0.8em; margin-top: 5px;">This house could save as much as 115.95 lbs NOx, 88.03 lbs SOx, and 95712.79 lbs CO2 over the typical 30 year mortgage. If only 10% of all new homes in Texas were like this home, Texas would save 30.92 tons NOx, 23.48 tons SOx and 25523.41 tons CO2 a year</p> </div>	NOx:	3.86 lbs	SOx:	2.93 lbs	CO2:	3190.43 lbs	<p>Certificate #: 739316 Builder: Energy Star 111 Builder Phone: (713) 535 - 7856 Date: 10/22/2009</p> <p>Notes:</p> <div style="border: 1px solid gray; padding: 10px; text-align: center; margin-top: 10px;"> <h1 style="font-size: 3em; color: lightgray; opacity: 0.5;">IC3</h1>  </div> <div style="text-align: center; margin-top: 10px;">  <p style="font-size: 0.8em;">© 2009 Energy Systems Laboratory Texas Engineering Experiment Station The Engineering Agency of the State of Texas 'IC3' 3.4.9</p>  </div>
NOx:	3.86 lbs						
SOx:	2.93 lbs						
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