



ENERGY SYSTEMS LABORATORY

Texas Engineering Experiment Station
Texas A&M University System

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College Station, Texas 77843-3581

August 30, 2002

To All Interested Parties in SB-5 Implementation:

The Energy Systems Laboratory (ESL) has received several written and verbal requests to analyze and determine if the United States Environmental Protection Agency's (EPA) Energy Star New Homes Program can be used to achieve equivalency to the Texas Building Energy Performance Standards (TBEPS) as defined by Senate Bill 5, 77th Legislature.

The Building Option Packages (BOPS) developed by the EPA for use in Texas that are posted on the Laboratory's SB-5 Web page meet or exceed the prescriptive energy requirements of the IRC2000/IECC2000 with 2001 Supplement. It is also our determination that any residential building design that meets or exceeds the equivalent energy performance levels of the posted BOPS could be used by Texas municipal code officials as evidence of compliance with the performance requirements of the Texas Building Energy Performance Standards (TBEPS) provided that the design meets all other mandatory code requirements as defined by the local code official.

The Laboratory stands ready to analyze additional BOPS for equivalency to the TBEPS. Also, the Laboratory can assist municipal code officials, on a fee basis, to determine if other alternative design packages are TBEPS code equivalent.

The Energy Star New Homes Program and its providers offer significant energy and emissions reductions to Texas. If you or your staff have any questions, do not hesitate to contact me at 979-845-9213.

Sincerely,

W. Dan Turner, P.E., Ph.D.

Director

Energy Systems Laboratory

Texas Engineering Experiment Station

Texas A&M University System

Energy Systems Laboratory Senate Bill 5 Web pages: <http://eslsb5.tamu.edu>

Building Option Packages (BOPS) for A-1 Single Family Residences in Climate Zone # 3

BOP Number	Maximum Window to Floor Area Ratio	Window Requirements		Minimum Insulation Requirements						Infiltration	Minimum Equipment Requirements		Status
		Max. U-value	Max. SHGC	Attic	Exterior Wall	Floor Above Unheated Space	Basement Wall	Slab	Crawlspace Wall		Max. Rate (ACH)	Heat (AFUE)	
Z3-1-ES	18%	0.65	0.40	R-30	R-13	R-11	R-6	R-0	R-6	0.35	80%	11	Pass
Z3-2-ES	18%	0.60	0.35	R-30	R-11	R-11	R-6	R-0	R-6	0.35	80%	11	Pass
Z3-3-ES	21%	0.60	0.40	R-19	R-11	R-11	R-6	R-0	R-6	0.35	80%	14	Pass

Energy Systems Laboratory Code Traceable Test Suite Reference House Characteristics:	Other Footnotes:
<ol style="list-style-type: none"> 1. No exterior shading devices, adjacent buildings or shade trees. 2. No movable window shades. 3. Window calculations comply with NFRC 100 and 200. 4. Window SHGC per Section 402.1.3.1.4 (IECC 2000/2001 Supplement). 5. Window U-value, attic and exterior wall insulation per Table 502.2.4(3) (IECC 2000/2001 Supplement). 6. Slab on grade foundation. No basement or crawlspace. 7. Heating and cooling equipment are sized by DOE-2.1E (Version-119). 8. Thermostat setting per Table 402.1.3.5 (IECC 2000/2001 Supplement). 9. Water heater efficiency is according to NAECA 1987. 10. Infiltration rate complies with ASHRAE Standard 136-1993. 11. HVAC equipment performance per Table 503.2 (IECC 2000/2001 Supplement). 12. For climate zone 3, the Houston TMY2 weather file was used. 	<ol style="list-style-type: none"> 1. The Energy Systems Laboratory continues to conduct ongoing analysis of BOPs in Climate Zones 3, 4, 5, & 6 including electric heat pump and electric water heating options and will publish the results as soon as practical. It is our intent that the approved Energy Star BOPs represent both gas and electric options. 2. The Laboratory will continue to work closely on the technical details with the EPA to determine which Builder Option Packages meet or exceed the Texas Building Energy Performance Standards for all fuel types. The BOPs submitted in April 2002 to the Laboratory for evaluation that were withdrawn by EPA, are not published. 3. It is not our intent to evaluate all possible BOPs for use in Texas by the Energy Star program, but rather to give a representative sample to be used as benchmarks by local code officials for helping determine Texas code compliance. 4. For the Energy Star footnotes that govern the use of these BOPs, see (www.energystar.gov).

Building Option Packages (BOPS) for A-1 Single Family Residences in Climate Zone # 4

BOP Number	Maximum Window to Floor Area Ratio	Window Requirements		Minimum Insulation Requirements						Infiltration	Minimum Equipment Requirements		Status
		Max. U-value	Max. SHGC	Attic	Exterior Wall	Floor Above Unheated Space	Basement Wall	Slab	Crawlspace Wall	Max. Rate (ACH)	Heat (AFUE)	Cool (SEER)	
Z4-1-ES	18%	0.65	0.40	R-30	R-13	R-11	R-6	R-0	R-6	0.35	80%	11	Pass
Z4-2-ES	18%	0.60	0.35	R-30	R-11	R-11	R-6	R-0	R-6	0.35	80%	11	Pass

Energy Systems Laboratory Code Traceable Test Suite Reference House Characteristics:	Other Footnotes:
<ol style="list-style-type: none"> 1. No exterior shading devices, adjacent buildings or shade trees. 2. No movable window shades. 3. Window calculations comply with NFRC 100 and 200. 4. Window SHGC per Section 402.1.3.1.4 (IECC 2000/2001 Supplement). 5. Window U-value, attic and exterior wall insulation per Table 502.2.4(3) (IECC 2000/2001 Supplement). 6. Slab on grade foundation. No basement or crawlspace. 7. Heating and cooling equipment are sized by DOE-2.1E (Version-119). 8. Thermostat setting per Table 402.1.3.5 (IECC 2000/2001 Supplement). 9. Water heater efficiency is according to NAECA 1987. 10. Infiltration rate complies with ASHRAE Standard 136-1993. 11. HVAC equipment performance per Table 503.2 (IECC 2000/2001 Supplement). 12. For climate zone 4, the Houston TMY2 weather file was used. 	<ol style="list-style-type: none"> 1. The Energy Systems Laboratory continues to conduct ongoing analysis of BOPs in Climate Zones 3, 4, 5, & 6 including electric heat pump and electric water heating options and will publish the results as soon as practical. It is our intent that the approved Energy Star BOPs represent both gas and electric options. 2. The Laboratory will continue to work closely on the technical details with the EPA to determine which Builder Option Packages meet or exceed the Texas Building Energy Performance Standards for all fuel types. The BOPs submitted in April 2002 to the Laboratory for evaluation that were withdrawn by EPA, are not published. 3. It is not our intent to evaluate all possible BOPs for use in Texas by the Energy Star program, but rather to give a representative sample to be used as benchmarks by local code officials for helping determine Texas code compliance. 4. For the Energy Star footnotes that govern the use of these BOPs, see (www.energystar.gov).

Building Option Packages (BOPS) for A-1 Single Family Residences in Climate Zone # 5

BOP Number	Maximum Window to Floor Area Ratio	Window Requirements		Minimum Insulation Requirements						Infiltration	Minimum Equipment Requirements		Status
		Max U-value	Max SHGC	Attic	Exterior Wall	Floor Above Unheated Space	Basement Wall	Slab	Crawlspace Wall	Max Rate (ACH)	Heat (AFUE)	Cool (SEER)	
Z5-1-ES	15%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	10	Pass
Z5-2-ES	18%	0.45	0.35	R-38	R-13	R-19	R-7	R-0	R-8	0.35	80%	10	Pass
Z5-3-ES	18%	0.45	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	11	Pass
Z5-4-ES	21%	0.40	0.35	R-30	R-15	R-19	R-7	R-0	R-8	0.35	80%	11	Pass
Z5-5-ES	18%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z5-6-ES	21%	0.40	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z5-7-ES	21%	0.50	0.40	R-30	R-15	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z5-8-ES	18%	0.55	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	14	Pass
Z5-9-ES	21%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	13	Pass

Energy Systems Laboratory Code Traceable Test Suite Reference House Characteristics:	Other Footnotes:
<ol style="list-style-type: none"> 1. No exterior shading devices, adjacent buildings or shade trees. 2. No movable window shades. 3. Window calculations comply with NFRC 100 and 200. 4. Window SHGC per Section 402.1.3.1.4 (IECC 2000/2001 Supplement). 5. Window U-value, attic and exterior wall insulation per Table 502.2.4(3) (IECC 2000/2001 Supplement). 6. Slab on grade foundation. No basement or crawlspace. 7. Heating and cooling equipment are sized by DOE-2.1E (Version-119). 8. Thermostat setting per Table 402.1.3.5 (IECC 2000/2001 Supplement). 9. Water heater efficiency is according to NAECA 1987. 10. Infiltration rate complies with ASHRAE standard 136-1993. 11. HVAC equipment performance per Table 503.2 (IECC 2000/2001 Supplement). 12. For climate zone 5, Fort Worth TMY2 weather file was used. 	<ol style="list-style-type: none"> 1. The Energy Systems Laboratory continues to conduct ongoing analysis of BOPs in Climate Zones 3, 4, 5, & 6 including electric heat pump and electric water heating options and will publish the results as soon as practical. It is our intent that the approved Energy Star BOPs represent both gas and electric options. 2. The Laboratory will continue to work closely on the technical details with the EPA to determine which Builder Option Packages meet or exceed the Texas Building Energy Performance Standards for all fuel types. The BOPs submitted in April 2002 to the Laboratory for evaluation that were withdrawn by EPA, are not published. 3. It is not our intent to evaluate all possible BOPs for use in Texas by the Energy Star program, but rather to give a representative sample to be used as benchmarks by local code officials for helping determine Texas code compliance. 4. For the Energy Star, footnotes that govern the use of these BOPs, see (www.energystar.gov).

Building Option Packages (BOPS) for A-1 Single Family Residences in Climate Zone # 6

BOP Number	Maximum Window to Floor Area Ratio	Window Requirements		Minimum Insulation Requirements						Infiltration	Minimum Equipment Requirements		Status
		Max U-value	Max SHGC	Attic	Exterior Wall	Floor Above Unheated Space	Basement Wall	Slab	Crawlspace Wall	Max Rate (ACH)	Heat (AFUE)	Cool (SEER)	
Z6-1-ES	15%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	10	Pass
Z6-2-ES	18%	0.45	0.35	R-38	R-13	R-19	R-7	R-0	R-8	0.35	80%	10	Pass
Z6-3-ES	18%	0.45	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	11	Pass
Z6-4-ES	21%	0.40	0.35	R-30	R-15	R-19	R-7	R-0	R-8	0.35	80%	11	Pass
Z6-5-ES	18%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z6-6-ES	21%	0.40	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z6-7-ES	21%	0.50	0.40	R-30	R-15	R-19	R-7	R-0	R-8	0.35	80%	12	Pass
Z6-8-ES	18%	0.55	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	14	Pass
Z6-9-ES	21%	0.50	0.40	R-30	R-13	R-19	R-7	R-0	R-8	0.35	80%	13	Pass

Energy Systems Laboratory Code Traceable Test Suite Reference House Characteristics:	Other Footnotes:
<ol style="list-style-type: none"> 1. No exterior shading devices, adjacent buildings or shade trees. 2. No movable window shades. 3. Window calculations comply with NFRC 100 and 200. 4. Window SHGC per Section 402.1.3.1.4 (IECC 2000/2001 Supplement). 5. Window U-value, attic and exterior wall insulation per Table 502.2.4(3) (IECC 2000/2001 Supplement). 6. Slab on grade foundation. No basement or crawlspace. 7. Heating and cooling equipment are sized by DOE-2.1E (Version-119). 8. Thermostat setting per Table 402.1.3.5 (IECC 2000/2001 Supplement). 9. Water heater efficiency is according to NAECA 1987. 10. Infiltration rate complies with ASHRAE standard 136-1993. 11. HVAC equipment performance per Table 503.2 (IECC 2000/2001 Supplement). 12. For climate zone 6, Fort Worth TMY2 weather file was used. 	<ol style="list-style-type: none"> 1. The Energy Systems Laboratory continues to conduct ongoing analysis of BOPs in Climate Zones 3, 4, 5, & 6 including electric heat pump and electric water heating options and will publish the results as soon as practical. It is our intent that the approved Energy Star BOPs represent both gas and electric options. 2. The Laboratory will continue to work closely on the technical details with the EPA to determine which Builder Option Packages meet or exceed the Texas Building Energy Performance Standards for all fuel types. The BOPs submitted in April 2002 to the Laboratory for evaluation that were withdrawn by EPA, are not published. 3. It is not our intent to evaluate all possible BOPs for use in Texas by the Energy Star program, but rather to give a representative sample to be used as benchmarks by local code officials for helping determine Texas code compliance. 4. For the Energy Star, footnotes that govern the use of these BOPs, see (www.energystar.gov).