State of California **California Natural Resources Agency**

M e m o r a n d u m

To: Commissioners **Date:** April 11, 2014

Telephone:

From: Dee Anne Ross
Building Standards Office
California Energy Commission
1516 Ninth Street
Sacramento CA 95814-5512

Subject: CBECC-Res 1f Agenda Back-Up Materials, April 22, 2014, Business Meeting, Item 8

CBECC-Res is the residential public domain software for complying with the 2013 Building Energy Efficiency Standards. Although not explicitly subject to the requirements of privately developed software, for which approval as an alternative calculation method (ACM) must be obtained, staff subjected the public domain software to the same review to ensure it accurately models building energy consumption.

The 2013 Residential Alternative Calculation Method Approval Manual (CEC 400-2012-007-CMF), Section 1.2.3, specifies the requirements for approving amendments to software. It states that compliance software approval shall be amended when optional modeling capabilities are added.

Appendix A of the 2013 Residential Alternative Calculation Method Reference Manual (CEC 400-2013-003-SD) contains the details of the certification tests. The purpose of the tests is to demonstrate that software successfully integrates the Compliance Manager, which is the simulation and compliance rule implementation software established by the Energy Commission and used by all approved residential compliance software. A test data set (TDS) with specific descriptions and details of the tests, inputs, and a spreadsheet of compliance results, is provided as additional back-up material for this business meeting item. The document identifies, for example, Test T07 as “common measures” which are spelled out on subsequent pages as a 92% furnace, a 16 SEER/14 EER cooling system, 2% duct leakage testing, quality insulation installation (QII), and so on.

Staff evaluated the input files and compared the test results as documented in the TDS to ensure compliance with all applicable requirements from the ACM Approval Manual and Reference Manual. Additionally, each time the software is changed a complete and full set of tests results is produced and evaluated to ensure results are still correct. All required items (see ACM Reference Manual, Appendix A, Sections A1, A2, and A3) were provided and are publicly available on the software web site.

As part of the approval process previous versions of software approval are rescinded, and the approval allows time for users of the software to incorporate the new version into their workflow. Staff took into account market needs in determining appropriate timeframes so as not to cause a hardship.

Summary of Residential ACM Tests

Comparison Date:	4/11/2014
Comparison Author:	Ken Nittler
Candidate Software:	CBECC-Res 2013 1f (574)
Reference Software:	CBECC-Res 2013 1f (574)
Tolerance:	0.03

Test	Pass	Description
T01	Pass	Standard Design in All Zones for Prototype S2100ft2
T02	Pass	Standard Design in All Zones for Prototype S2700ft2
T03	Pass	Standard Design in All Zones for Prototype S6960ft2
T04	Pass	Proposed Design in All Zones for Prototype P2100ft2
T05	Pass	Proposed Design in All Zones for Prototype P2700ft2
T06	Pass	Proposed Design in All Zones for Prototype P6960ft2
T07	Pass	Common Measures in Zone 12 for Prototype P2100ft2
T08	Pass	Water Heating in Zone 12 for Prototype P2100ft2
T09	Pass	Multiple Orientation in Zone 12 for Prototype S2100ft2/P2100ft2
T10	Pass	Multi Family Water Heating in Zone 12 for Prototype S6960ft2
T11	Pass	Source Energy in Zone 12 for Prototype S2100ft2
T12	Pass	E+A+A Base & Windows in Zone 12 for Prototype P1665ft2
T13	Pass	E+A+A Walls & HVAC in Zone 12 for Prototype P1665ft2

Comparison between Reference & Candidate Software in kTDV/ft2

Comparison Date: 4/11/2014
Comparison Author: Ken Nittler
Candidate Software: CBECC-Res 2013 1f (574)

Test	Run	Description	Pass/Fail	Reference Proposed	Candidate Proposed	Percent Difference	Within Tolerance	Standard Equals	Reference Standard	Candidate Standard	Percent Difference	Within Tolerance
T01	**Standard Design in All Zones for Prototype S2100ft2**							**Standard = Proposed for this test**				
T01	R01	Zone 01	Pass	49.46	49.46	0.00%	Yes	49.46	49.46	49.46	0.00%	Yes
T01	R02	Zone 02	Pass	39.67	39.67	0.00%	Yes	39.64	39.64	39.64	0.00%	Yes
T01	R03	Zone 03	Pass	29.14	29.14	0.00%	Yes	29.14	29.14	29.14	0.00%	Yes
T01	R04	Zone 04	Pass	35.44	35.44	0.00%	Yes	35.44	35.44	35.44	0.00%	Yes
T01	R05	Zone 05	Pass	26.70	26.70	0.00%	Yes	26.70	26.70	26.70	0.00%	Yes
T01	R06	Zone 06	Pass	22.59	22.59	0.00%	Yes	22.59	22.59	22.59	0.00%	Yes
T01	R07	Zone 07	Pass	16.55	16.55	0.00%	Yes	16.55	16.55	16.55	0.00%	Yes
T01	R08	Zone 08	Pass	28.66	28.66	0.00%	Yes	28.66	28.66	28.66	0.00%	Yes
T01	R09	Zone 09	Pass	41.21	41.21	0.00%	Yes	41.21	41.21	41.21	0.00%	Yes
T01	R10	Zone 10	Pass	42.73	42.73	0.00%	Yes	42.73	42.73	42.73	0.00%	Yes
T01	R11	Zone 11	Pass	75.35	75.35	0.00%	Yes	75.35	75.35	75.35	0.00%	Yes
T01	R12	Zone 12	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T01	R13	Zone 13	Pass	78.01	78.01	0.00%	Yes	78.01	78.01	78.01	0.00%	Yes
T01	R14	Zone 14	Pass	71.05	71.05	0.00%	Yes	71.05	71.05	71.05	0.00%	Yes
T01	R15	Zone 15	Pass	112.40	112.40	0.00%	Yes	112.40	112.40	112.40	0.00%	Yes
T01	R16	Zone 16	Pass	69.03	69.03	0.00%	Yes	69.03	69.03	69.03	0.00%	Yes
Result T01			**Pass**									
T02	**Standard Design in All Zones for Prototype S2700ft2**							**Standard = Proposed for this test**				
T02	R01	Zone 01	Pass	40.41	40.41	0.00%	Yes	40.41	40.41	40.41	0.00%	Yes
T02	R02	Zone 02	Pass	34.84	34.84	0.00%	Yes	34.84	34.84	34.84	0.00%	Yes
T02	R03	Zone 03	Pass	24.24	24.24	0.00%	Yes	24.24	24.24	24.24	0.00%	Yes
T02	R04	Zone 04	Pass	31.69	31.69	0.00%	Yes	31.69	31.69	31.69	0.00%	Yes
T02	R05	Zone 05	Pass	21.68	21.68	0.00%	Yes	21.68	21.68	21.68	0.00%	Yes
T02	R06	Zone 06	Pass	20.13	20.13	0.00%	Yes	20.13	20.13	20.13	0.00%	Yes
T02	R07	Zone 07	Pass	14.21	14.21	0.00%	Yes	14.21	14.21	14.21	0.00%	Yes
T02	R08	Zone 08	Pass	26.82	26.82	0.00%	Yes	26.82	26.82	26.82	0.00%	Yes
T02	R09	Zone 09	Pass	39.95	39.95	0.00%	Yes	39.95	39.95	39.95	0.00%	Yes
T02	R10	Zone 10	Pass	41.27	41.27	0.00%	Yes	41.27	41.27	41.27	0.00%	Yes
T02	R11	Zone 11	Pass	74.39	74.39	0.00%	Yes	74.39	74.39	74.39	0.00%	Yes
T02	R12	Zone 12	Pass	50.79	50.79	0.00%	Yes	50.79	50.79	50.79	0.00%	Yes
T02	R13	Zone 13	Pass	77.59	77.59	0.00%	Yes	77.59	77.59	77.59	0.00%	Yes
T02	R14	Zone 14	Pass	70.69	70.69	0.00%	Yes	70.69	70.69	70.69	0.00%	Yes
T02	R15	Zone 15	Pass	109.60	109.60	0.00%	Yes	109.60	109.60	109.60	0.00%	Yes
T02	R16	Zone 16	Pass	65.41	65.41	0.00%	Yes	65.41	65.41	65.41	0.00%	Yes
Result T02			**Pass**									
T03	**Standard Design in All Zones for Prototype S6960ft2**							**Standard = Proposed for this test**				
T03	R01	Zone 01	Pass	45.99	45.99	0.00%	Yes	45.99	45.99	45.99	0.00%	Yes
T03	R02	Zone 02	Pass	48.22	48.22	0.00%	Yes	48.22	48.22	48.22	0.00%	Yes
T03	R03	Zone 03	Pass	36.28	36.28	0.00%	Yes	36.28	36.28	36.28	0.00%	Yes
T03	R04	Zone 04	Pass	46.22	46.22	0.00%	Yes	46.22	46.22	46.22	0.00%	Yes
T03	R05	Zone 05	Pass	34.84	34.84	0.00%	Yes	34.84	34.84	34.84	0.00%	Yes
T03	R06	Zone 06	Pass	36.23	36.23	0.00%	Yes	36.23	36.23	36.23	0.00%	Yes
T03	R07	Zone 07	Pass	33.16	33.16	0.00%	Yes	33.16	33.16	33.16	0.00%	Yes
T03	R08	Zone 08	Pass	46.97	46.97	0.00%	Yes	46.97	46.97	46.97	0.00%	Yes
T03	R09	Zone 09	Pass	57.83	57.83	0.00%	Yes	57.83	57.83	57.83	0.00%	Yes
T03	R10	Zone 10	Pass	59.29	59.29	0.00%	Yes	59.29	59.29	59.29	0.00%	Yes
T03	R11	Zone 11	Pass	83.75	83.75	0.00%	Yes	83.75	83.75	83.75	0.00%	Yes
T03	R12	Zone 12	Pass	66.74	66.74	0.00%	Yes	66.74	66.74	66.74	0.00%	Yes
T03	R13	Zone 13	Pass	85.43	85.43	0.00%	Yes	85.43	85.43	85.43	0.00%	Yes
T03	R14	Zone 14	Pass	79.84	79.84	0.00%	Yes	79.84	79.84	79.84	0.00%	Yes
T03	R15	Zone 15	Pass	120.92	120.92	0.00%	Yes	120.92	120.92	120.92	0.00%	Yes
T03	R16	Zone 16	Pass	71.17	71.17	0.00%	Yes	71.17	71.17	71.17	0.00%	Yes
Result T03			**Pass**									
T04	**Proposed Design in All Zones for Prototype P2100ft2**							**Standard = T01 Standard for this test**				
T04	R01	Zone 01	Pass	47.69	47.69	0.00%	Yes	49.46	49.46	49.46	0.00%	Yes
T04	R02	Zone 02	Pass	37.81	37.81	0.00%	Yes	39.64	39.64	39.64	0.00%	Yes
T04	R03	Zone 03	Pass	27.11	27.11	0.00%	Yes	29.14	29.14	29.14	0.00%	Yes
T04	R04	Zone 04	Pass	33.40	33.40	0.00%	Yes	35.44	35.44	35.44	0.00%	Yes
T04	R05	Zone 05	Pass	24.59	24.59	0.00%	Yes	26.70	26.70	26.70	0.00%	Yes
T04	R06	Zone 06	Pass	21.07	21.07	0.00%	Yes	22.59	22.59	22.59	0.00%	Yes
T04	R07	Zone 07	Pass	15.90	15.90	0.00%	Yes	16.55	16.55	16.55	0.00%	Yes
T04	R08	Zone 08	Pass	26.27	26.27	0.00%	Yes	28.66	28.66	28.66	0.00%	Yes
T04	R09	Zone 09	Pass	37.57	37.57	0.00%	Yes	41.21	41.21	41.21	0.00%	Yes
T04	R10	Zone 10	Pass	38.73	38.73	0.00%	Yes	42.73	42.73	42.73	0.00%	Yes
T04	R11	Zone 11	Pass	69.73	69.73	0.00%	Yes	75.35	75.35	75.35	0.00%	Yes
T04	R12	Zone 12	Pass	47.78	47.78	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T04	R13	Zone 13	Pass	72.27	72.27	0.00%	Yes	78.01	78.01	78.01	0.00%	Yes
T04	R14	Zone 14	Pass	64.38	64.38	0.00%	Yes	71.05	71.05	71.05	0.00%	Yes
T04	R15	Zone 15	Pass	106.47	106.47	0.00%	Yes	112.40	112.40	112.40	0.00%	Yes

T04	R16	Zone 16	Pass	64.99	64.99	0.00%	Yes	69.03	69.03	69.03	0.00%	Yes
Result T04			**Pass**									
T05	**Proposed Design in All Zones for Prototype P2700ft2**							**Standard = T02 Standard for this test**				
T05	R01	Zone 01	Pass	38.47	38.47	0.00%	Yes	40.41	40.41	40.41	0.00%	Yes
T05	R02	Zone 02	Pass	32.76	32.76	0.00%	Yes	34.84	34.84	34.84	0.00%	Yes
T05	R03	Zone 03	Pass	22.13	22.13	0.00%	Yes	24.24	24.24	24.24	0.00%	Yes
T05	R04	Zone 04	Pass	29.34	29.34	0.00%	Yes	31.69	31.69	31.69	0.00%	Yes
T05	R05	Zone 05	Pass	19.62	19.62	0.00%	Yes	21.68	21.68	21.68	0.00%	Yes
T05	R06	Zone 06	Pass	18.63	18.63	0.00%	Yes	20.13	20.13	20.13	0.00%	Yes
T05	R07	Zone 07	Pass	13.61	13.61	0.00%	Yes	14.21	14.21	14.21	0.00%	Yes
T05	R08	Zone 08	Pass	24.31	24.31	0.00%	Yes	26.82	26.82	26.82	0.00%	Yes
T05	R09	Zone 09	Pass	35.96	35.96	0.00%	Yes	39.95	39.95	39.95	0.00%	Yes
T05	R10	Zone 10	Pass	37.01	37.01	0.00%	Yes	41.27	41.27	41.27	0.00%	Yes
T05	R11	Zone 11	Pass	68.05	68.05	0.00%	Yes	74.39	74.39	74.39	0.00%	Yes
T05	R12	Zone 12	Pass	45.83	45.83	0.00%	Yes	50.79	50.79	50.79	0.00%	Yes
T05	R13	Zone 13	Pass	70.87	70.87	0.00%	Yes	77.59	77.59	77.59	0.00%	Yes
T05	R14	Zone 14	Pass	63.28	63.28	0.00%	Yes	70.69	70.69	70.69	0.00%	Yes
T05	R15	Zone 15	Pass	102.33	102.33	0.00%	Yes	109.60	109.60	109.60	0.00%	Yes
T05	R16	Zone 16	Pass	60.81	60.81	0.00%	Yes	65.41	65.41	65.41	0.00%	Yes
Result T05			**Pass**									
T06	**Proposed Design in All Zones for Prototype P6960ft2**							**Standard = T03 Standard for this test**				
T06	R01	Zone 01	Pass	46.75	46.75	0.00%	Yes	45.99	45.99	45.99	0.00%	Yes
T06	R02	Zone 02	Pass	46.03	46.03	0.00%	Yes	48.22	48.22	48.22	0.00%	Yes
T06	R03	Zone 03	Pass	35.07	35.07	0.00%	Yes	36.28	36.28	36.28	0.00%	Yes
T06	R04	Zone 04	Pass	42.70	42.70	0.00%	Yes	46.22	46.22	46.22	0.00%	Yes
T06	R05	Zone 05	Pass	33.91	33.91	0.00%	Yes	34.84	34.84	34.84	0.00%	Yes
T06	R06	Zone 06	Pass	34.33	34.33	0.00%	Yes	36.23	36.23	36.23	0.00%	Yes
T06	R07	Zone 07	Pass	31.18	31.18	0.00%	Yes	33.16	33.16	33.16	0.00%	Yes
T06	R08	Zone 08	Pass	43.74	43.74	0.00%	Yes	46.97	46.97	46.97	0.00%	Yes
T06	R09	Zone 09	Pass	52.80	52.80	0.00%	Yes	57.83	57.83	57.83	0.00%	Yes
T06	R10	Zone 10	Pass	54.36	54.36	0.00%	Yes	59.29	59.29	59.29	0.00%	Yes
T06	R11	Zone 11	Pass	77.96	77.96	0.00%	Yes	83.75	83.75	83.75	0.00%	Yes
T06	R12	Zone 12	Pass	61.54	61.54	0.00%	Yes	66.74	66.74	66.74	0.00%	Yes
T06	R13	Zone 13	Pass	78.82	78.82	0.00%	Yes	85.43	85.43	85.43	0.00%	Yes
T06	R14	Zone 14	Pass	73.85	73.85	0.00%	Yes	79.84	79.84	79.84	0.00%	Yes
T06	R15	Zone 15	Pass	112.33	112.33	0.00%	Yes	120.92	120.92	120.92	0.00%	Yes
T06	R16	Zone 16	Pass	68.32	68.32	0.00%	Yes	71.17	71.17	71.17	0.00%	Yes
Result T06			**Pass**									
T07	**Common Measures in Zone 12 for Prototype P2100ft2**							**Standard = T01 Standard for this test**				
T07	R01	Package	Pass	47.78	47.78	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R02	Fenestration U 0.40/S 0.40	Pass	52.90	52.90	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R03	Wall R13	Pass	48.37	48.37	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R04	Ceiling R49	Pass	46.71	46.71	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R05	Furnace AFUE 92	Pass	44.78	44.78	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R06	Air Conditioner SEER 16/EER 14	Pass	46.24	46.24	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R07	No Cool Vent	Pass	51.42	51.42	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R08	Ducts 2% Leakage	Pass	46.59	46.59	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R09	Insulation Construction Quality Improved	Pass	42.93	42.93	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T07	R10	Air Leakage ACH50 2.0	Pass	46.58	46.58	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
Result T07			**Pass**									
T08	**Water Heating in Zone 12 for Prototype P2100ft2**							**Standard = Varies for this test**				
T08	R01	Package	Pass	47.78	47.78	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R02	Parallel Piping	Pass	47.89	47.89	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R03	Small Tankless EF 0.80/Input 195000/0 gal	Pass	43.45	43.45	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R04	Large Tankless RE 0.76/Input 300000/0 gal	Pass	43.95	43.95	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R05	Large Storage RE 0.77/Input 100000/75gal/Stby 0.01	Pass	45.91	45.91	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R06	Large Storage RE 0.77/Input 100000/75gal/Stby 0.03	Pass	51.68	51.68	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R07	Electric Resistance EF 0.92/Input 4500	Pass	65.29	65.29	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R08	Heat Pump EF 2.4/Input 4500	Pass	49.88	49.88	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R09	2 Water Heaters using Multiplier	Pass	52.67	52.67	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T08	R10	2 Water Heaters Using 2 entries	Pass	52.67	52.67	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
Result T08			**Pass**									
T09	**Multiple Orientation in Zone 12 for Prototype S2100ft2/P2100ft2**							**Standard = T01 Standard for this test**				
T09	R01	Single Standard Front 45	Pass	53.65	53.65	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R02	North Standard	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R03	East Standard	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R04	South Standard	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R05	West Standard	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R06	Single Proposed front 45	Pass	53.31	53.31	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R07	North Proposed	Pass	47.78	47.78	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R08	East Proposed	Pass	55.06	55.06	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R09	South Proposed	Pass	48.71	48.71	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T09	R10	West Proposed	Pass	53.89	53.89	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
Result T09			**Pass**									

T10	**Multi Family Water Heating in Zone 12 for Prototype S6960ft2**							**Standard = Varies for this test**				
T10	R01	8 Storage	Pass	66.74	66.74	0.00%	Yes	66.74	66.74	66.74	0.00%	Yes
T10	R02	8 Storage 2 Systems	Pass	66.74	66.74	0.00%	Yes	66.74	66.74	66.74	0.00%	Yes
T10	R03	8 LgStor	Pass	62.16	62.16	0.00%	Yes	66.74	66.74	66.74	0.00%	Yes
T10	R04	2 LgStor Central Solar	Pass	53.46	53.46	0.00%	Yes	59.01	59.01	59.01	0.00%	Yes
T10	R05	2 LgStor Central Solar Recirc	Pass	57.95	57.95	0.00%	Yes	59.01	59.01	59.01	0.00%	Yes
T10	R06	2 LgStor Central Recirc	Pass	62.63	62.63	0.00%	Yes	59.01	59.01	59.01	0.00%	Yes
T10	R07	2 SmInstantant Central Solar	Pass	52.25	52.25	0.00%	Yes	55.66	55.66	55.66	0.00%	Yes
T10	R08	2 SmInstantant Central Solar Recirc	Pass	57.02	57.02	0.00%	Yes	55.66	55.66	55.66	0.00%	Yes
T10	R09	1 Indirect Central Solar	Pass	53.75	53.75	0.00%	Yes	59.26	59.26	59.26	0.00%	Yes
T10	R10	1 Indirect Central Solar Recirc	Pass	58.64	58.64	0.00%	Yes	59.26	59.26	59.26	0.00%	Yes
Result T10			**Pass**									
T11	**Source Energy in Zone 12 for Prototype S2100ft2**							**Standard = Varies for this test**				
T11	R01	Package	Pass	52.19	52.19	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T11	R02	Package No Natural Gas	Pass	105.85	105.85	0.00%	Yes	105.85	105.85	105.85	0.00%	Yes
T11	R03	Electric DHW	Pass	68.59	68.59	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T11	R04	Electric DHW no Natural Gas	Pass	100.37	100.37	0.00%	Yes	100.37	100.37	100.37	0.00%	Yes
T11	R05	Heatpump DHW	Pass	54.29	54.29	0.00%	Yes	52.19	52.19	52.19	0.00%	Yes
T11	R06	Heatpump DHW no Natural Gas	Pass	86.07	86.07	0.00%	Yes	100.37	100.37	100.37	0.00%	Yes
T11	R07	Heatpump HVAC	Pass	49.42	49.42	0.00%	Yes	50.28	50.28	50.28	0.00%	Yes
T11	R08	Heatpump HVAC no Natural Gas	Pass	71.30	71.30	0.00%	Yes	72.16	72.16	72.16	0.00%	Yes
T11	R09	Heatpump HVAC & DHW	Pass	51.52	51.52	0.00%	Yes	50.28	50.28	50.28	0.00%	Yes
T11	R10	Heatpump HVAC & DHW no Natural Gas	Pass	51.52	51.52	0.00%	Yes	66.68	66.68	66.68	0.00%	Yes
Result T11			**Pass**									
T12	**E+A+A Base & Windows in Zone 12 for Prototype P1665ft2**							**Standard = Varies for this test**				
T12	R01	E 1440ft2 as New Construction	Pass	192.17	192.17	0.00%	Yes	126.77	126.77	126.77	0.00%	Yes
T12	R02	E 1440ft2 as Addition/Alteration	Pass	192.17	192.17	0.00%	Yes	192.17	192.17	192.17	0.00%	Yes
T12	R03	EA 1665ft2	Pass	168.54	168.54	0.00%	Yes	166.34	166.34	166.34	0.00%	Yes
T12	R04	EAA Ceiling R38 Verified	Pass	144.10	144.10	0.00%	Yes	116.17	116.17	116.17	0.00%	Yes
T12	R05	EAA Ceiling R38 Verified Wind U0.41/S0.36	Pass	115.73	115.73	0.00%	Yes	116.17	116.17	116.17	0.00%	Yes
T12	R06	EAA Ceiling R38 Verified Wind U0.41/S0.36 Verified	Pass	115.73	115.73	0.00%	Yes	116.17	116.17	116.17	0.00%	Yes
T12	R07	EAA Ceiling R38 Verified Wind U0.40/S0.35	Pass	115.06	115.06	0.00%	Yes	116.17	116.17	116.17	0.00%	Yes
T12	R08	EAA Ceiling R38 Verified Wind U0.40/S0.35 Verified	Pass	115.06	115.06	0.00%	Yes	145.11	145.11	145.11	0.00%	Yes
T12	R09	EAA Ceiling R38 Verified Wind U0.39/S0.34	Pass	114.37	114.37	0.00%	Yes	116.17	116.17	116.17	0.00%	Yes
T12	R10	EAA Ceiling R38 Verified Wind U0.39/S0.34 Verified	Pass	114.37	114.37	0.00%	Yes	145.11	145.11	145.11	0.00%	Yes
Result T12			**Pass**									
T13	**E+A+A Walls & HVAC in Zone 12 for Prototype P1665ft2**							**Standard = Varies for this test**				
T13	R01	EAA Ceiling R38 Verified Wall R11	Pass	110.37	110.37	0.00%	Yes	81.45	81.45	81.45	0.00%	Yes
T13	R02	EAA Ceiling R38 Verified Wall R11 Verified	Pass	110.37	110.37	0.00%	Yes	81.45	81.45	81.45	0.00%	Yes
T13	R03	EAA Ceiling R38 Verified Wall R13	Pass	108.47	108.47	0.00%	Yes	81.45	81.45	81.45	0.00%	Yes
T13	R04	EAA Ceiling R38 Verified Wall R13 Verified	Pass	108.47	108.47	0.00%	Yes	81.45	81.45	81.45	0.00%	Yes
T13	R05	EAA Ceiling R38 Verified HVAC Worse	Pass	119.79	119.79	0.00%	Yes	80.89	80.89	80.89	0.00%	Yes
T13	R06	EAA Ceiling R38 Verified HVAC Worse Verified	Pass	119.79	119.79	0.00%	Yes	80.89	80.89	80.89	0.00%	Yes
T13	R07	EAA Ceiling R38 Verified HVAC Equal	Pass	98.84	98.84	0.00%	Yes	80.89	80.89	80.89	0.00%	Yes
T13	R08	EAA Ceiling R38 Verified HVAC Equal Verified	Pass	98.84	98.84	0.00%	Yes	100.91	100.91	100.91	0.00%	Yes
T13	R09	EAA Ceiling R38 Verified HVAC Better	Pass	82.46	82.46	0.00%	Yes	80.89	80.89	80.89	0.00%	Yes
T13	R10	EAA Ceiling R38 Verified HVAC Better Verified	Pass	82.46	82.46	0.00%	Yes	100.91	100.91	100.91	0.00%	Yes
Result T13			**Pass**									