ASHRAE Standard 140-2011

Test Results Comparison
for
Section 5.3 - HVAC Equipment Performance Tests CE300-CE545

Results for Autodesk Green Building Studio September 8, 2013
(GBS Sep 2013)
vs.
Informative Annex B16, Section B16.5.2 Example Results

Prepared By
Autodesk
(GBS Sep 2013)

Results Developed
08-Sep-2013

ASHRAE Standard 140-2011
Participating Organizations and Computer Programs for
Quasi-analytical Solutions and Example Simulation Results
Section 5.3 - HVAC Equipment Performance Tests CE300-CE545

The quasi-analytical solutions and programs used to generate the example simulation results are described in Table B17-2. The first column of Table B17-2 ("Model"), indicates the proper program name and version number, or indicates a quasi-analytical solution.

The second column ("Authoring Organization") indicates the national research facility, university, or industry organization with expertise in building science that wrote the simulation software or did the quasi-analytical solutions

The third column ("Implemented By") indicates the national research facility, university, or industry organization with expertise in building science that performed the simulations or did the quasi-analytical solutions.

The entries in the fourth column are the abbreviations for the simulations and quasi-analytical solutions generally used in the tables and charts which follow.

See Standard 140, Annex B17 for further details.

TABLE B17-2
Participating Organizations and Computer Programs

Model	Authoring Organization	Implemented By	Abbreviation
CODYRUN/LGIMAT	Universite de la Reunion Island, France	Universite de la Reunion Island, France	CODYRUN/UR
DOE-2.1E version 120 (ESTSC release)	LANL/LBNL/ESTSC/JJH,[a,b,c,d] United States	NREL/JNA,[e] United States	DOE-2.1E-E/NREL DOE21E-E
DOE-2.2 NT42j	LBNL/JJH,[b,d] United States	NREL/JNA,e United States	DOE-2.2/NREL
EnergyPlus 1.1.0.020	LBNL/UIUC/CERL/OSU/GARD Analytics/FSEC/DOE-BT,[b,f,g,h,i,j]	GARD Analytics, United States	EnergyPlus/GARD
HOT3000/ESP-r	CETC/ESRU,[k,l] Canada/United Kingdom	CETC,[k] Canada	HOT3000/NRCan
TRNSYS 14.2-TUD with real controller model	University of Wisconsin, USA; Technische Universität Dresden, Ger.	Technische Universität Dresden, Germany	TRNSYS/TUD

[a]LANL: Los Alamos National Laboratory, United States
[b]LBNL: Lawrence Berkeley National Laboratory, United States
[c]ESTSC: Energy Science and Technology Software Center (at Oak Ridge National Laboratory, USA)
[d]JJH: James J. Hirsch & Associates, United States
[e]NREL/JNA: National Renewable Energy Laboratory/J. Neymark & Associates, United States
[f]UIUC: University of Illinois Urbana/Champaign, United States
[g]CERL: U.S. Army Corps of Engineers, Construction Engineering Research Laboratories, United States
[h]OSU: Oklahoma State University, United States
[i]FSEC: University of Central Florida, Florida Solar Energy Center, United States
[j]DOE-BT: U.S. Department of Energy, Office of Building Technologies, Energy Efficiency and Renewable Energy, United States
[k]CETC:CANMET Energy Technology Centre, Natural Resources Canada, Canada

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Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-1. Annual Space Cooling Electricity Consumption (Total, Compressor)

Energy Consumption, Total (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	35634	34750	34755	34746	34976	35070	34746	35634	34988	2.5%	34778	34778
CE310	39973	39379	39384	39290	39520	39608	39290	39973	39526	1.7%	39411	39411
CE320	40060	38745	38792	39079	39401	39457	38745	40060	39256	3.3%	39005	39005
CE330	40963	39708	39438	40143	40535	40330	39438	40963	40186	3.8%	39573	39573
CE340	40619	39358	39265	39783	40065	39947	39265	40619	39840	3.4%	39269	39269
CE350	32237	30547	30548	31145	31587	31742	30547	32237	31301	5.4%	30904	30904
CE360	55299	54064	54016	54705	54843	55068	54016	55299	54666	2.3%	54024	54024
CE400	32045	30846	30876	31013		31413	30846	32045	31239	3.8%	30907	30907
CE410	32078	31668	31699			31503	31503	32078	31737	1.8%	31638	31638
CE420	33387	32530	32910	32736		33208	32530	33387	32954	2.6%	32555	32555
CE430	32538	31932	31811	31772		31818	31772	32538	31974	2.4%	31848	31848
CE440	33691	33032	32973	33032		33248	32973	33691	33195	2.2%	32991	32991
CE500	22338	22817	22822	23035	22323	23138	22323	23138	22745	3.6%	22877	22877
CE500 May-Sep	17391	17872	17870	17996	17435	18051	17391	18051	17769	3.7%	17914	17914
CE510 May-Sep	34609	35971	35970	35732	34849	35845	34609	35971	35496	3.8%	35909	35909
CE520	24987	25389	25390	25017	25131	25781	24987	25781	25282	3.1%	25299	25299
CE522	23544	24293	24307	24078	23620	24360	23544	24360	24034	3.4%	24359	24359
CE525	20321	20408	20421	20702	20242	21323	20242	21323	20569	5.3%	20447	20447
CE530	17281	17540	17537	17742	17442	17875	17281	17875	17570	3.4%	17622	17622
CE540	19430	19878	19874	19061	19537	20164	19061	20164	19657	5.6%	19901	19901
CE545	15687	15802	15791	16636	15791	16339	15687	16636	16008	5.9%	15822	15822

Energy Consumption, Compressor (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	22354	21569	21573		21770	21876	21569	22354	21828	3.6%	21595	21595
CE310	26340	25813	25817		25937	26053	25813	26340	25992	2.0%	25842	25842
CE320	26433	25250	25294		25846	25912	25250	26433	25747	4.6%	25485	25485
CE330	27300	26172	25925		26928	26775	25925	27300	26620	5.2%	26042	26042
CE340	26963	25829	25745		26473	26400	25745	26963	26282	4.6%	25745	25745
CE350	19317	17802	17801		18738	18891	17801	19317	18510	8.2%	18125	18125
CE360	40106	38999	38955		39697	39941	38955	40106	39540	2.9%	38961	38961
CE400	19179	18106	18131			18629	18106	19179	18511	5.8%	18159	18159
CE410	19204	18823	18850			18685	18685	19204	18891	2.8%	18796	18796
CE420	20359	19596	19934			20214	19596	20359	20026	3.8%	19618	19618
CE430	19599	19059	18951			18966	18951	19599	19144	3.4%	18985	18985
CE440	20629	20042	19989			20249	19989	20629	20227	3.2%	20006	20006
CE500	17854	18473	18478		17858	18522	17854	18522	18237	3.7%	18458	18458
CE500 May-Sep	13942	14508	14506		13989	14491	13942	14508	14287	4.0%	14498	14498
CE510 May-Sep	27748	28811	28810		27902	28721	27748	28811	28398	3.7%	28766	28766
CE520	19521	20121	20126		19655	20185	19521	20185	19922	3.3%	19981	19981
CE522	18620	19407	19418		18690	19281	18620	19418	19083	4.2%	19396	19396
CE525	16558	16880	16893		16507	17443	16507	17443	16856	5.6%	16902	16902
CE530	13657	14127	14124		13856	14172	13657	14172	13987	3.7%	14152	14152
CE540	15021	15680	15677		15164	15664	15021	15680	15441	4.3%	15740	15740
CE545	12622	12967	12957		12751	13215	12622	13215	12902	4.6%	12983	12983

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-2. Annual Space Cooling Electricity Consumption (Supply Fan, Condenser Fan)

Energy Consumption, Supply Fan (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE310	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE320	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE330	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE340	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE350	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE360	10880	10880	10880	10862	10880	10880	10862	10880	10877	0.2%	10880	10880
CE400	10880	10880	10880	10862		10880	10862	10880	10876	0.2%	10880	10880
CE410	10880	10880	10880			10880	10880	10880	10880	0.0%	10880	10880
CE420	10880	10880	10880	10862		10880	10862	10880	10876	0.2%	10880	10880
CE430	10880	10880	10880	10862		10880	10862	10880	10876	0.2%	10880	10880
CE440	10880	10880	10880	10862		10880	10862	10880	10876	0.2%	10880	10880
CE500	2564	2369	2369	2628	2553	2639	2369	2639	2520	10.7%	2444	2444
CE500 May-Sep	1972	1837	1837	2029	1970	2035	1837	2035	1947	10.2%	1890	1890
CE510 May-Sep	3923	4099	4099	4063	3972	4073	3923	4099	4038	4.4%	4086	4086
CE520	3125	2874	2871	3019	3131	3200	2871	3200	3037	10.8%	2933	2933
CE522	2816	2704	2707	2843	2819	2904	2704	2904	2799	7.1%	2780	2780
CE525	2152	1886	1885	2180	2136	2221	1885	2221	2077	16.2%	1900	1900
CE530	2072	1833	1833	2090	2051	2117	1833	2117	1999	14.2%	1884	1884
CE540	2522	2258	2258	2309	2500	2573	2258	2573	2403	13.1%	2258	2258
CE545	1753	1501	1501	1871	1739	1786	1501	1871	1692	21.9%	1502	1502
Energy Consumption, Condenser Fan (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	2400	2301	2302		2326	2323	2301	2400	2331	4.3%	2304	2304
CE310	2754	2686	2687		2703	2691	2686	2754	2704	2.5%	2690	2690
CE320	2747	2615	2618		2675	2681	2615	2747	2667	4.9%	2639	2639
CE330	2784	2656	2633		2727	2693	2633	2784	2699	5.6%	2651	2651
CE340	2776	2649	2640		2713	2684	2640	2776	2692	5.1%	2644	2644
CE350	2040	1865	1867		1969	1970	1865	2040	1942	9.0%	1899	1899
CE360	4313	4185	4181		4266	4272	4181	4313	4243	3.1%	4183	4183
CE400	1986	1860	1865			1902	1860	1986	1903	6.6%	1868	1868
CE410	1994	1965	1969			1936	1936	1994	1966	3.0%	1962	1962
CE420	2149	2054	2096			2115	2054	2149	2103	4.5%	2057	2057
CE430	2059	1993	1980			1970	1970	2059	2001	4.5%	1984	1984
CE440	2182	2110	2104			2120	2104	2182	2129	3.7%	2105	2105
CE500	1920	1975	1975		1912	1976	1912	1976	1952	3.3%	1974	1974
CE500 May-Sep	1477	1527	1527		1476	1524	1476	1527	1506	3.4%	1527	1527
CE510 May-Sep	2938	3061	3061		2974	3050	2938	3061	3017	4.1%	3058	3058
CE520	2340	2394	2393		2345	2396	2340	2396	2374	2.4%	2385	2385
CE522	2108	2182	2182		2111	2174	2108	2182	2151	3.4%	2182	2182
CE525	1611	1642	1643		1599	1663	1599	1663	1632	3.9%	1645	1645
CE530	1552	1580	1580		1536	1585	1536	1585	1567	3.1%	1585	1585
CE540	1888	1940	1939		1872	1926	1872	1940	1913	3.5%	1903	1903
CE545	1312	1334	1333		1302	1337	1302	1337	1324	2.7%	1337	1337

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

Table B16.5.2-3. Weather Data Checks, CE300 Only

							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Variable	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
Annual Mean Output												
ODB (°C)	19.91	19.89	19.89	19.91	19.91	19.91	19.89	19.91	19.91	0.1%	19.91	19.91
OHR (kg/kg)	0.01164	0.01160	0.01160	0.01159	0.01165	0.01160	0.01159	0.01165	0.01161	0.5%	0.01163	0.01163
Annual Hourly Integrated Maxima												
ODB (°C)	34.70	35.00	35.00	34.78	35.00	35.00	34.70	35.00	34.91	0.9%	35.00	35.00
OHR (kg/kg)	0.02188	0.02250	0.02250	0.02184	0.02241	0.02230	0.02184	0.02250	0.02224	3.0%	0.02230	0.02230

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-4. Annual Space Cooling Coil Loads (Total, Sensible)

Total Sensible + Latent (kWh,thermal)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	80427	77283	77292	77318	77745	78257	77283	80427	78054	4.0%	77301	77301
CE310	99342	97395	97412	96448	97296	97261	96448	99342	97526	3.0%	97404	97404
CE320	99792	96356	96493	96084	97141	96957	96084	99792	97137	3.8%	96755	96755
CE330	105013	100730	100993	102211	103713	102008	100730	105013	102445	4.2%	101794	101794
CE340	102728	99028	99223	99709	100676	99753	99028	102728	100186	3.7%	99170	99170
CE350	69388	63736	63635	65790	66860	67389	63635	69388	66133	8.7%	64941	64941
CE360	162974	159807	159854	161248	161200	162168	159807	162974	161209	2.0%	160149	160149
CE400	68793	64918	65025	65414		66898	64918	68793	66209	5.9%	65046	65046
CE410	68673	66780	66844			66175	66175	68673	67118	3.7%	66564	66564
CE420	72609	69611	70882	70349		71803	69611	72609	71051	4.2%	69596	69596
CE430	69756	67641	67219	67141		67200	67141	69756	67792	3.9%	67276	67276
CE440	73711	71380	71181	71417		72029	71181	73711	71944	3.5%	71161	71161
CE500	63357	65996	65992	65571	63105	65614	63105	65996	64939	4.5%	65860	65860
CE500 May-Sep	48443	50693	50690	50354	48440	50357	48440	50693	49830	4.5%	50585	50585
CE510 May-Sep	108974	114018	114015	112793	108979	112781	108974	114018	111927	4.5%	113772	113772
CE520	63422	66571	66565	66088	63212	66146	63212	66571	65334	5.1%	66201	66201
CE522	63389	66373	66372	65851	63157	65900	63157	66373	65174	4.9%	66175	66175
CE525	63293	65399	65395	64973	63002	65155	63002	65399	64536	3.7%	65353	65353
CE530	45046	46634	46631	46944	44875	47002	44875	47002	46189	4.6%	46581	46581
CE540	45113	47130	47126	47297	44980	47462	44980	47462	46518	5.3%	47203	47203
CE545	44981	46240	46236	46612	44775	46668	44775	46668	45919	4.1%	46184	46184

Sensible Coil Load (kWh,thermal)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE300	56662	55797	55805	55252	55209	55191	55191	56662	55653	2.6%	55689	55689
CE310	56256	56301	56313	55225	55185	55083	55083	56313	55727	2.2%	56200	56200
CE320	62859	62697	62747	62043	62009	62734	62009	62859	62515	1.4%	62762	62762
CE330	63083	63311	63328	63779	62649	61822	61822	63779	62995	3.1%	63779	63779
CE340	63033	63053	63111	62886	62381	61406	61406	63111	62645	2.7%	63086	63086
CE350	50371	47684	47677	48545	48589	48768	47677	50371	48606	5.5%	48567	48567
CE360	134977	134920	134940	135287	134206	134697	134206	135287	134838	0.8%	135111	135111
CE400	41952	41419	41437	40688		41181	40688	41952	41335	3.1%	41301	41301
CE410	45677	47659	47660			45585	45585	47660	46645	4.4%	47335	47335
CE420	50390	49666	50612	49524		49984	49524	50612	50035	2.2%	49519	49519
CE430	47863	47731	47454	46739		46143	46143	47863	47186	3.6%	47419	47419
CE440	50876	50593	50492	50060		49785	49785	50876	50361	2.2%	50410	50410
CE500	45044	47650	47646	47491	44874	47530	44874	47650	46706	5.9%	47631	47631
CE500 May-Sep	34443	36596	36593	36476	34448	36480	34443	36596	35839	6.0%	36592	36592
CE510 May-Sep	77489	82306	82303	81566	77499	81563	77489	82306	80454	6.0%	82288	82288
CE520	45110	48102	48096	47986	44977	48059	44977	48102	47055	6.6%	48004	48004
CE522	45076	47962	47961	47758	44924	47795	44924	47962	46913	6.5%	47948	47948
CE525	44979	47218	47213	46930	44775	47110	44775	47218	46371	5.3%	47135	47135
CE530	45046	46574	46570	46944	44874	47002	44874	47002	46168	4.6%	46581	46581
CE540	45112	47023	47019	47288	44977	47460	44977	47460	46480	5.3%	47203	47203
CE545	44981	46214	46210	46612	44775	46668	44775	46668	45910	4.1%	46184	46184

* ABS[(Max-Min)/(Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-5. Annual Space Cooling Coil Loads (Latent)

Latent Coil Load(kWh,thermal)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE300	23765	21487	21487	22066	22535	23067	21487	23765	22401	10.2%	21611	21611
CE310	43086	41094	41099	41222	42111	42178	41094	43086	41798	4.8%	41204	41204
CE320	36932	33659	33746	34040	35133	34224	33659	36932	34622	9.5%	33992	33992
CE330	41929	37419	37666	38433	41063	40186	37419	41929	39449	11.4%	38015	38015
CE340	39695	35974	36113	36823	38296	38346	35974	39695	37541	9.9%	36084	36084
CE350	19017	16052	15958	17245	18271	18621	15958	19017	17527	17.5%	16374	16374
CE360	27997	24887	24914	25961	26994	27470	24887	27997	26371	11.8%	25039	25039
CE400	26840	23498	23588	24726		25717	23498	26840	24874	13.4%	23745	23745
CE410	22996	19121	19184			20590	19121	22996	20473	18.9%	19229	19229
CE420	22219	19945	20270	20826		21855	19945	22219	21023	10.8%	20077	20077
CE430	21893	19909	19765	20403		21057	19765	21893	20605	10.3%	19857	19857
CE440	22835	20788	20689	21357		22244	20689	22835	21583	9.9%	20752	20752
CE500	18313	18346	18346	18080	18231	18084	18080	18346	18233	1.5%	18229	18229
CE500 May-Sep	14000	14097	14097	13879	13991	13877	13877	14097	13990	1.6%	13994	13994
CE510 May-Sep	31485	31712	31712	31226	31480	31217	31217	31712	31472	1.6%	31483	31483
CE520	18312	18470	18470	18101	18235	18087	18087	18470	18279	2.1%	18197	18197
CE522	18313	18411	18410	18093	18233	18104	18093	18411	18261	1.7%	18227	18227
CE525	18314	18182	18182	18044	18227	18045	18044	18314	18165	1.5%	18218	18218
CE530	0	61	61	0	1	0	0	61	20	297.1%	0	0
CE540	1	107	107	9	3	2	1	107	38	278.2%	0	0
CE545	0	25	25	0	0	0	0	25	9	300.0%	0	0

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-6. Various Annual Means (COP2, IDB)

COP2							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE300	3.249	3.238	3.237	3.237	3.226	3.230	3.226	3.249	3.236	0.7%	3.235	3.235
CE310	3.415	3.417	3.417	3.393	3.397	3.380	3.380	3.417	3.403	1.1%	3.414	3.414
CE320	3.420	3.458	3.457	3.405	3.406	3.390	3.390	3.458	3.423	2.0%	3.440	3.440
CE330	3.491	3.494	3.536	3.491	3.497	3.460	3.460	3.536	3.495	2.2%	3.548	3.548
CE340	3.454	3.477	3.496	3.448	3.450	3.420	3.420	3.496	3.457	2.2%	3.493	3.493
CE350	3.249	3.241	3.235	3.244	3.229	3.230	3.229	3.249	3.238	0.6%	3.243	3.243
CE360	3.669	3.701	3.706	3.678	3.667	3.660	3.660	3.706	3.680	1.2%	3.712	3.712
CE400	3.250	3.251	3.252	3.246		3.260	3.246	3.260	3.252	0.4%	3.248	3.248
CE410	3.240	3.212	3.211			3.210	3.210	3.240	3.218	0.9%	3.207	3.207
CE420	3.226	3.215	3.218	3.216		3.210	3.210	3.226	3.217	0.5%	3.211	3.211
CE430	3.221	3.213	3.211	3.211		3.210	3.210	3.221	3.213	0.3%	3.208	3.208
CE440	3.231	3.222	3.222	3.221		3.220	3.220	3.231	3.223	0.4%	3.218	3.218
CE500	3.204	3.227	3.227	3.213	3.192	3.200	3.192	3.227	3.211	1.1%	3.223	3.223
CE500 May-Sep	3.142	3.161	3.162	3.154	3.132	3.140	3.132	3.162	3.148	0.9%	3.157	3.157
CE510 May-Sep	3.551	3.577	3.577	3.562	3.530	3.550	3.530	3.577	3.558	1.3%	3.575	3.575
CE520	2.901	2.957	2.956	3.004	2.873	2.920	2.873	3.004	2.935	4.5%	2.960	2.960
CE522	3.058	3.074	3.073	3.101	3.036	3.070	3.036	3.101	3.069	2.1%	3.067	3.067
CE525	3.484	3.531	3.528	3.508	3.480	3.410	3.410	3.531	3.490	3.5%	3.524	3.524
CE530	2.962	2.969	2.969	2.999	2.916	2.980	2.916	2.999	2.966	2.8%	2.960	2.960
CE540	2.668	2.675	2.675	2.823	2.640	2.690	2.640	2.823	2.695	6.8%	2.675	2.675
CE545	3.228	3.233	3.236	3.157	3.186	3.200	3.157	3.236	3.207	2.5%	3.225	3.225

IDB (°C)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE300	23.62	24.06	24.06	24.09	24.08	23.99	23.62	24.09	23.98	1.9%	24.15	24.15
CE310	23.76	24.11	24.06	24.09	24.09	24.01	23.76	24.11	24.02	1.5%	24.17	24.17
CE320	23.90	24.39	24.39	24.25	24.33	24.53	23.90	24.53	24.30	2.6%	24.45	24.45
CE330	23.88	24.28	24.28	24.27	24.30	24.18	23.88	24.30	24.20	1.7%	24.29	24.29
CE340	23.88	24.28	24.28	24.30	24.31	24.21	23.88	24.31	24.21	1.8%	24.30	24.30
CE350	25.66	26.17	26.17	26.24	26.27	26.15	25.66	26.27	26.11	2.3%	26.18	26.18
CE360	25.36	25.61	25.56	25.32	25.48	25.37	25.32	25.61	25.45	1.1%	25.70	25.70
CE400	24.13	24.06	24.06	24.09		23.99	23.99	24.13	24.06	0.6%	24.16	24.16
CE410	24.12	24.06	24.06			23.99	23.99	24.12	24.06	0.5%	24.15	24.15
CE420	23.93	24.06	24.06	24.09		23.99	23.93	24.09	24.02	0.7%	24.15	24.15
CE430	23.99	24.06	24.06	24.09		23.99	23.99	24.09	24.04	0.4%	24.15	24.15
CE440	23.91	24.06	24.06	24.09		23.99	23.91	24.09	24.02	0.7%	24.15	24.15
CE500	20.23	20.67	20.56	20.38	21.10	22.86	20.23	22.86	20.97	12.5%	23.21	23.21
CE500 May-Sep	24.57	25.00	25.00	24.98	25.00	25.00	24.57	25.00	24.93	1.7%	24.97	24.97
CE510 May-Sep	25.82	25.11	25.11	24.96	25.00	25.00	24.96	25.82	25.17	3.4%	25.11	25.11
CE520	13.52	13.78	13.72	13.58	14.14	14.89	13.52	14.89	13.94	9.9%	12.50	12.50
CE522	16.95	17.28	17.22	17.00	17.73	18.70	16.95	18.70	17.48	10.0%	17.09	17.09
CE525	26.84	27.39	27.28	27.10	27.77	30.69	26.84	30.69	27.85	13.8%	30.79	30.79
CE530	20.03	20.61	20.56	20.59	21.10	22.86	20.03	22.86	20.96	13.5%	20.68	20.68
CE540	13.29	13.78	13.72	13.79	14.14	14.98	13.29	14.98	13.95	12.1%	14.77	14.77
CE545	26.61	27.33	27.28	27.31	27.72	30.69	26.61	30.69	27.82	14.7%	28.41	28.41

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-7. Various Annual Means (Humidity Ratio, Zone Relative Humidity)

Humidity Ratio (kg/kg)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013	GBS v3.4
CE300	0.0091	0.0092	0.0092	0.0093	0.0092	0.0092	0.0091	0.0093	0.0092	2.4%	0.0092	0.0092
CE310	0.0111	0.0113	0.0113	0.0113	0.0112	0.0111	0.0111	0.0113	0.0112	2.0%	0.0113	0.0113
CE320	0.0100	0.0101	0.0101	0.0101	0.0100	0.0099	0.0099	0.0101	0.0100	2.1%	0.0101	0.0101
CE330	0.0097	0.0099	0.0099	0.0100	0.0098	0.0099	0.0097	0.0100	0.0099	2.3%	0.0099	0.0099
CE340	0.0098	0.0099	0.0099	0.0100	0.0099	0.0099	0.0098	0.0100	0.0099	1.9%	0.0099	0.0099
CE350	0.0097	0.0100	0.0100	0.0099	0.0098	0.0098	0.0097	0.0100	0.0099	3.0%	0.0100	0.0100
CE360	0.0085	0.0087	0.0087	0.0088	0.0086	0.0086	0.0085	0.0088	0.0086	3.1%	0.0087	0.0087
CE400	0.0098	0.0100	0.0100	0.0101		0.0100	0.0098	0.0101	0.0100	2.9%	0.0100	0.0100
CE410	0.0097	0.0095	0.0095			0.0095	0.0095	0.0097	0.0096	2.5%	0.0095	0.0095
CE420	0.0093	0.0094	0.0094	0.0094		0.0093	0.0093	0.0094	0.0094	2.0%	0.0094	0.0094
CE430	0.0093	0.0094	0.0094	0.0095		0.0094	0.0093	0.0095	0.0094	1.9%	0.0094	0.0094
CE440	0.0092	0.0093	0.0093	0.0093		0.0092	0.0092	0.0093	0.0093	1.9%	0.0093	0.0093
CE500	0.0098			0.0094	0.0102	0.0107	0.0094	0.0107	0.0100	13.2%	0.0066	0.0066
CE500 May-Sep	0.0110	0.0114	0.0114	0.0113	0.0113	0.0109	0.0109	0.0114	0.0112	4.5%	0.0113	0.0113
CE510 May-Sep	0.0114	0.0114	0.0114	0.0113	0.0113	0.0109	0.0109	0.0114	0.0113	4.4%	0.0114	0.0114
CE520	0.0067			0.0060	0.0070	0.0076	0.0060	0.0076	0.0068	23.1%	0.0045	0.0045
CE522	0.0082			0.0076	0.0086	0.0090	0.0076	0.0090	0.0083	16.8%	0.0054	0.0054
CE525	0.0137			0.0138	0.0140	0.0151	0.0137	0.0151	0.0141	9.8%	0.0098	0.0098
CE530	0.0062			0.0067	0.0058	0.0067	0.0058	0.0067	0.0064	14.4%	0.0044	0.0044
CE540	0.0045			0.0043	0.0039	0.0046	0.0039	0.0046	0.0043	17.9%	0.0031	0.0031
CE545	0.0062			0.0067	0.0067	0.0072	0.0062	0.0072	0.0067	14.8%	0.0064	0.0064

Relative Humidity (%)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013	GBS v3.4
CE300	48.61	48.26	48.28	48.59	47.83	47.93	47.83	48.61	48.25	1.6%	48.06	48.06
CE310	58.33	58.51	58.53	58.55	57.84	57.80	57.80	58.55	58.26	1.3%	58.34	58.34
CE320	52.01	51.21	51.25	51.84	51.10	49.94	49.94	52.01	51.22	4.0%	51.15	51.15
CE330	50.84	50.58	50.65	51.18	50.08	50.70	50.08	51.18	50.67	2.2%	50.61	50.61
CE340	51.09	50.69	50.73	51.15	50.30	50.78	50.30	51.15	50.79	1.7%	50.69	50.69
CE350	45.48	45.45	45.55	45.17	44.32	44.56	44.32	45.55	45.09	2.7%	45.30	45.30
CE360	41.03	41.49	41.49	42.37	40.87	41.21	40.87	42.37	41.41	3.6%	41.26	41.26
CE400	50.77	52.21	52.25	52.55		52.01	50.77	52.55	51.96	3.4%	52.08	52.08
CE410	50.50	49.65	49.63			49.75	49.63	50.50	49.88	1.7%	49.44	49.44
CE420	48.78	49.14	48.97	49.40		48.76	48.76	49.40	49.01	1.3%	48.93	48.93
CE430	48.82	49.17	49.30	49.60		49.17	48.82	49.60	49.21	1.6%	49.07	49.07
CE440	48.33	48.46	48.57	48.83		48.23	48.23	48.83	48.48	1.2%	48.35	48.35
CE500	66.53			59.20	65.94	63.73	59.20	66.53	63.85	11.5%	33.51	33.51
CE500 May-Sep	57.05	57.47	57.47	57.32	57.07	55.13	55.13	57.47	56.92	4.1%	57.20	57.20
CE510 May-Sep	54.70	57.36	57.36	57.44	57.06	55.24	54.70	57.44	56.53	4.8%	57.16	57.16
CE520	69.87			61.40	70.23	72.17	61.40	72.17	68.42	15.7%	42.68	42.68
CE522	68.68			60.75	68.23	68.11	60.75	68.68	66.44	11.9%	37.11	37.11
CE525	61.47			54.99	60.14	57.37	54.99	61.47	58.49	11.1%	27.69	27.69
CE530	46.73			48.97	41.45	39.60	39.60	48.97	44.19	21.2%	22.60	22.60
CE540	48.52			46.31	40.05	43.82	40.05	48.52	44.67	19.0%	29.58	29.58
CE545	36.62			38.63	36.87	29.20	29.20	38.63	35.33	26.7%	18.32	18.32

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-8. f(ODB) Sensitivity CE500 and CE530, April 30 and June 25 (Energy, Coil Loads)

							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
Energy Consumption, Compr. + Both Fans (Wh,e)												
CE500Apr30	3893	3975	3975	4029	3901	4073	3893	4073	3974	4.5%	3994	3994
CE500Jun25	5045	5204	5204	5229	5067	5230	5045	5230	5163	3.6%	5211	5211
Del CE500	1152	1229	1229	1200	1165	1157	1152	1229	1189	6.5%	1217	1217
CE530Apr30	3023	3062	3062	3101	3092	3144	3023	3144	3081	3.9%	3072	3072
CE530Jun25	3894	3978	3978	4029	3935	4043	3894	4043	3976	3.7%	3999	3999
Del CE530	871	916	916	927	843	899	843	927	896	9.4%	927	927
Energy Consumption, Compressor (Wh,e)												
CE500Apr30	3015	3120	3120		3020	3159	3015	3159	3087	4.7%	3123	3123
CE500Jun25	4084	4264	4263		4106	4239	4084	4264	4191	4.3%	4257	4257
Del CE500	1069	1144	1144		1086	1080	1069	1144	1105	6.7%	1134	1134
CE530Apr30	2311	2390	2390		2378	2411	2311	2411	2376	4.2%	2390	2390
CE530Jun25	3118	3243	3243		3166	3248	3118	3248	3204	4.1%	3253	3253
Del CE530	807	853	853		787	837	787	853	827	8.0%	863	863
Energy Consumption, Condenser Fan (Wh,e)												
CE500Apr30	376	389	389		377	391	376	391	385	3.9%	390	390
CE500Jun25	411	426	426		411	424	411	426	420	3.6%	426	426
Del CE500	35	37	37		34	33	33	37	35	12.0%	36	36
CE530Apr30	305	311	311		305	314	305	314	309	3.1%	311	311
CE530Jun25	332	340	340		329	340	329	340	336	3.2%	341	341
Del CE530	28	28	29		24	26	24	29	27	17.0%	30	30
Energy Consumption, Supply Fan (Wh,e)												
CE500Apr30	502	467	466	519	504	522	466	522	497	11.2%	481	481
CE500Jun25	550	514	514	566	549	566	514	566	543	9.5%	528	528
Del CE500	47	48	48	47	45	44	44	48	47	8.5%	47	47
CE530Apr30	407	361	361	412	408	419	361	419	395	14.8%	371	371
CE530Jun25	444	396	396	450	440	454	396	454	430	13.6%	406	406
Del CE530	37	35	35	38	32	35	32	38	35	16.0%	35	35
Sensible + Latent Coil Load (Wh,th)												
CE500Apr30	13186	13733	13733	13655	13170	13673	13170	13733	13525	4.2%	13732	13732
CE500Jun25	13188	13838	13837	13733	13198	13727	13188	13838	13587	4.8%	13794	13794
Del CE500	2	105	104	78	29	54	2	105	62	165.3%	62	62
CE530Apr30	9353	9721	9721	9775	9365	9798	9353	9798	9622	4.6%	9705	9705
CE530Jun25	9376	9761	9761	9835	9388	9834	9376	9835	9659	4.8%	9769	9769
Del CE530	23	40	39	60	22	36	22	60	37	102.8%	65	65
Sensible Coil Load (Wh,th)												
CE500Apr30	9375	9925	9925	9884	9365	9902	9365	9925	9729	5.8%	9921	9921
CE500Jun25	9378	9981	9981	9953	9388	9946	9378	9981	9771	6.2%	9983	9983
Del CE500	3	56	56	69	22	44	3	69	42	158.2%	62	62
CE530Apr30	9353	9721	9721	9775	9365	9798	9353	9798	9622	4.6%	9705	9705
CE530Jun25	9376	9761	9761	9835	9388	9834	9376	9835	9659	4.8%	9769	9769
Del CE530	23	40	39	60	22	36	22	60	37	102.9%	65	65
Latent Coil Load (Wh,th)												
CE500Apr30	3811	3808	3808	3772	3804	3770	3770	3811	3795	1.1%	3811	3811
CE500Jun25	3810	3856	3856	3781	3810	3780	3780	3856	3816	2.0%	3811	3811
Del CE500	-1	48	48	9	6	10	-1	48	20	242.3%	0	0
CE530Apr30	0	0	0	0	0	0	0	0	0	----	0	0
CE530Jun25	0	0	0	0	0	0	0	0	0	----	0	0
Del CE530	0	0	0	0	0	0	0	0	0	----	0	0

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-9. f(ODB) Sensitivity CE500 and CE530, April 30 and June 25 (COP2, Zone Conditions)

							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
Humidity Ratio (kg/kg)												
CE500Apr30	0.0107	0.0110	0.0110	0.0110	0.0109	0.0160	0.0107	0.0160	0.0118	45.3%	0.0110	0.0110
CE500Jun25	0.0112	0.0115	0.0115	0.0115	0.0115	0.0110	0.0110	0.0115	0.0114	4.4%	0.0115	0.0115
Del CE500	0.0005	0.0005	0.0005	0.0005	0.0005	-0.0050	-0.0050	0.0005	-0.0004	1334.8%	0.0005	0.0005
CE530Apr30	0.0062	0.0071	0.0071	0.0068	0.0055	0.0067	0.0055	0.0071	0.0066	24.6%	0.0071	0.0071
CE530Jun25	0.0062	0.0078	0.0078	0.0068	0.0055	0.0067	0.0055	0.0078	0.0068	34.2%	0.0077	0.0077
Del CE530	0.0000	0.0007	0.0007	0.0000	0.0000	0.0000	0.0000	0.0007	0.0002	304.5%	0.0006	0.0006
COP2												
CE500Apr30	3.845	3.914	3.914	3.850	3.837	3.850	3.837	3.914	3.868	2.0%	0.000	0.000
CE500Jun25	2.931	2.951	2.951	2.943	2.921	2.940	2.921	2.951	2.939	1.0%	0.000	0.000
Del CE500	-0.914	-0.963	-0.963	-0.907	-0.916	-0.910	-0.963	-0.907	-0.929	6.1%	0.000	0.000
CE530Apr30	3.543	3.599	3.599	3.441	3.460	3.590	3.441	3.599	3.539	4.5%	0.000	0.000
CE530Jun25	2.720	2.724	2.724	2.780	2.690	2.740	2.690	2.780	2.730	3.3%	0.000	0.000
Del CE530	-0.823	-0.874	-0.875	-0.662	-0.770	-0.850	-0.875	-0.662	-0.809	26.3%	0.000	0.000
ODB (°C)												
CE500Apr30	16.79	16.83	16.83	16.81	16.88	16.96	16.79	16.96	16.85	1.0%	16.85	16.85
CE500Jun25	29.52	29.50	29.50	29.52	29.52	29.50	29.50	29.52	29.51	0.1%	29.51	29.51
Del CE500	12.73	12.67	12.67	12.70	12.63	12.54	12.54	12.73	12.66	1.5%	12.66	12.66
CE530Apr30	16.79	16.83	16.83	16.81	16.88	16.96	16.79	16.96	16.85	1.0%	16.85	16.85
CE530Jun25	29.52	29.50	29.50	29.52	29.52	29.50	29.50	29.52	29.51	0.1%	29.51	29.51
Del CE530	12.73	12.67	12.67	12.70	12.63	12.54	12.54	12.73	12.66	1.5%	12.66	12.66
EDB (°C)												
CE500Apr30	24.64	24.94	24.94	24.98	25.00	25.00	24.64	25.00	24.92	1.4%	24.97	24.97
CE500Jun25	24.55	25.00	25.00	24.98	25.00	25.00	24.55	25.00	24.92	1.8%	24.98	24.98
Del CE500	-0.09	0.06	0.06	0.00	0.00	0.00	-0.09	0.06	0.00	4740.8%	0.01	0.01
CE530Apr30	24.37	24.94	24.67	25.00	25.00	25.00	24.37	25.00	24.83	2.6%	24.94	24.94
CE530Jun25	24.35	24.94	24.94	25.00	25.00	25.00	24.35	25.00	24.87	2.6%	24.95	24.95
Del CE530	-0.01	0.00	0.28	0.00	0.00	0.00	-0.01	0.28	0.04	651.2%	0.01	0.01

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-10. Hourly Integrated Maxima (Total Cooling System Energy Consumption and Total Coil Load)

Energy Consumption, Compressor + Both Fans (Wh,e)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	11626	20-Jul	15	11564	20-Jul	15	11602	20-Jul	15	11900	20-Jul	15	11932	20-Jul	15	11548	20-Jul	15	11548	11932	11695	3.3%	11367	20-Jul	15	11367	20-Jul	15
CE310	12594	20-Jul	15	12583	20-Jul	15	12595	20-Jul	15	12541	20-Jul	15	12653	20-Jul	15	12162	16-Aug	16	12162	12653	12521	3.9%	12450	20-Jul	15	12450	20-Jul	15
CE320	13028	20-Jul	15	12916	20-Jul	15	12981	20-Jul	15	12954	20-Jul	15	13104	20-Jul	15	12875	20-Jul	14	12875	13104	12976	1.8%	12886	20-Jul	15	12886	20-Jul	15
CE330	13347	20-Jul	15	13212	20-Jul	15	13407	20-Jul	15	13314	20-Jul	15	13467	20-Jul	15	13335	20-Jul	15	13212	13467	13347	1.9%	13356	20-Jul	15	13356	20-Jul	15
CE340	13181	20-Jul	15	13158	20-Jul	15	13190	20-Jul	15	13134	20-Jul	15	13277	20-Jul	15	13101	20-Jul	14	13101	13277	13174	1.3%	13156	20-Jul	15	13156	20-Jul	15
CE350	11627	20-Jul	15	11654	20-Jul	15	11602	20-Jul	15	11900	20-Jul	15	11932	20-Jul	15	11546	20-Jul	15	11546	11932	11710	3.3%	11673	20-Jul	15	11673	20-Jul	15
CE360	12770	20-Jul	15	12736	20-Jul	15	12726	20-Jul	15	12744	20-Jul	15	12863	20-Jul	15	12762	20-Jul	14	12726	12863	12767	1.1%	12638	20-Jul	15	12638	20-Jul	15
CE400	11628	20-Jul	15	11564	20-Jul	15	11677	18-Sep	15	11900	20-Jul	15				11519	20-Jul	15	11519	11900	11658	3.3%	11412	2-Oct	14	11412	2-Oct	14
CE410	11628	20-Jul	15	11564	20-Jul	15	11602	20-Jul	15							11549	20-Jul	15	11549	11628	11586	0.7%	11367	20-Jul	15	11367	20-Jul	15
CE420	11626	20-Jul	15	11564	20-Jul	15	11602	20-Jul	15	11900	20-Jul	15				11548	20-Jul	15	11548	11900	11648	3.0%	11367	20-Jul	15	11367	20-Jul	15
CE430	11626	20-Jul	15	11564	20-Jul	15	11602	20-Jul	15	11900	20-Jul	15				11548	20-Jul	15	11548	11900	11648	3.0%	11367	20-Jul	15	11367	20-Jul	15
CE440	11626	20-Jul	15	11564	20-Jul	15	11602	20-Jul	15	11900	20-Jul	15				11461	16-Aug	16	11461	11900	11631	3.8%	11367	20-Jul	15	11367	20-Jul	15
CE500	10166	20-Jul	15	10431	20-Jul	15	10425	20-Jul	15	10399	20-Jul	15	10177	20-Jul	15	10274	4-Jun	15	10166	10431	10312	2.6%	10187	20-Jul	15	10187	20-Jul	15
CE510	11205	20-Jul	15	11590	20-Jul	15	11587	20-Jul	15	11410	20-Jul	15	11186	20-Jul	15	11344	20-Jul	14	11186	11590	11387	3.5%	11558	20-Jul	15	11558	20-Jul	15
CE520	11035	20-Jul	15	10989	20-Jul	15	11014	20-Jul	15	11101	20-Jul	15	11044	20-Jul	15	10684	4-Jun	15	10684	11101	10978	3.8%	10241	20-Jul	15	10241	20-Jul	15
CE522	10431	20-Jul	15	10972	20-Jul	15	10966	20-Jul	15	10762	20-Jul	15	10639	20-Jul	15	10747	16-Aug	15	10431	10972	10753	5.0%	10719	20-Jul	15	10719	20-Jul	15
CE525	9367	20-Jul	15	9538	20-Jul	15	9531	20-Jul	15	9570	20-Jul	15	9419	20-Jul	15	9585	16-Aug	15	9367	9585	9502	2.3%	9288	20-Jul	15	9288	20-Jul	15
CE530	8028	20-Jul	15	8059	20-Jul	15	8055	20-Jul	15	8171	20-Jul	15	7992	20-Jul	15	8089	16-Aug	15	7992	8171	8066	2.2%	7821	20-Jul	15	7821	20-Jul	15
CE540	8699	20-Jul	15	8943	20-Jul	15	8939	20-Jul	15	8677	20-Jul	15	8846	20-Jul	15	8985	16-Aug	15	8677	8985	8848	3.5%	8644	20-Jul	15	8644	20-Jul	15
CE545	7205	20-Jul	15	7350	20-Jul	15	7346	20-Jul	15	7763	20-Jul	15	7351	20-Jul	15	7471	4-Jun	15	7205	7763	7414	7.5%	7102	20-Jul	15	7102	20-Jul	15

Senstible + Latent Coil Load (Wh,th)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	32174	08-Jul	15	31401	20-Jul	15	31455	20-Jul	15	32733	20-Jul	15	32502	20-Jul	15	32072	20-Jul	15	31401	32733	32056	4.2%	30560	20-Jul	15	30560	20-Jul	15
CE310	37328	03-Sep	15	36750	3-Sep	16	37033	3-Sep	16	37126	17-Sep	15	37261	3-Sep	15	36991	3-Sep	16	36750	37328	37082	1.6%	36451	3-Sep	15	36451	3-Sep	15
CE320	40318	03-Sep	16	53813	2-Oct	9	53823	2-Oct	9	39765	3-Sep	16	39904	3-Sep	16	39920	3-Sep	16	39765	53823	44590	31.5%	47148	3-Sep	8	47148	3-Sep	8
CE330	43492	02-Oct	9	43628	2-Oct	9	64572	2-Oct	9	43445	2-Oct	9	43978	2-Oct	9	42415	10-Jul	11	42415	64572	46922	47.2%	58320	19-Jun	13	58320	19-Jun	13
CE340	41652	02-Oct	10	50819	2-Oct	9	59549	2-Oct	9	41328	2-Oct	10	41366	3-Sep	15	41132	3-Sep	16	41132	59549	45974	40.1%	52164	19-Jun	13	52164	19-Jun	13
CE350	32092	08-Jul	15	31401	20-Jul	15	31454	20-Jul	15	32733	20-Jul	15	32502	20-Jul	15	32077	20-Jul	15	31401	32733	32043	4.2%	31695	20-Jul	15	31695	20-Jul	15
CE360	38857	02-Oct	10	40613	2-Oct	9	41019	2-Oct	9	38460	2-Oct	11	38322	2-Oct	10	38451	2-Oct	10	38322	41019	39287	6.9%	41232	9-Sep	8	41232	9-Sep	8
CE400	41179	16-Sep	15	40543	18-Sep	14	49838	18-Sep	15	40728	16-Sep	15				40774	16-Sep	14	40543	49838	42612	21.8%	50274	18-Sep	14	50274	18-Sep	14
CE410	32092	08-Jul	15	31401	20-Jul	15	31455	20-Jul	15							32073	20-Jul	15	31401	32092	31755	2.2%	30560	20-Jul	15	30560	20-Jul	15
CE420	32174	08-Jul	15	31401	20-Jul	15	31455	20-Jul	15	32733	20-Jul	15				32072	20-Jul	15	31401	32733	31967	4.2%	30560	20-Jul	15	30560	20-Jul	15
CE430	32174	08-Jul	15	31401	20-Jul	15	31455	20-Jul	15	32733	20-Jul	15				32072	20-Jul	15	31401	32733	31967	4.2%	30560	20-Jul	15	30560	20-Jul	15
CE440	32174	08-Jul	15	31401	20-Jul	15	31455	20-Jul	15	32733	20-Jul	15				31777	8-Jul	16	31401	32733	31908	4.2%	30560	20-Jul	15	30560	20-Jul	15
CE500	27486	28-Oct	15	27707	16-Aug	16	27706	16-Aug	16	27646	29-Jun	16	26567	29-Jun	16	27555	29-Jun	15	26567	27707	27444	4.2%	26551	20-Jul	15	26551	20-Jul	15
CE510	30593	29-Apr	19	31188	20-Jul	15	31188	20-Jul	15	31178	17-Jun	14	29948	17-Jun	14	31097	17-Jun	13	29948	31188	30865	4.0%	31072	20-Jul	15	31072	20-Jul	15
CE520	27330	28-Sep	15	27878	14-Aug	16	27878	23-Jul	16	27653	29-Jun	16	26675	20-Jul	16	28343	23-May	15	26675	28343	27626	6.0%	24233	20-Jul	15	24233	20-Jul	15
CE522	27384	12-Mai	15	27868	16-Aug	16	27866	16-Aug	16	27659	29-Jun	16	26514	29-Jun	16	27636	29-Jun	15	26514	27868	27488	4.9%	26672	20-Jul	15	26672	20-Jul	15
CE525	27740	26-Jul	16	27466	8-Jul	16	27466	8-Jul	16	27577	29-Jun	16	26683	29-Jun	16	27462	29-Jun	15	26683	27740	27399	3.9%	26383	20-Jul	15	26383	20-Jul	15
CE530	19834	29-Mai	15	19576	24-Apr	16	19575	24-Apr	16	19639	20-Jul	15	18776	4-Jun	15	19626	8-Jul	15	18776	19834	19504	5.4%	18511	20-Jul	15	18511	20-Jul	15
CE540	19575	30-Aug	16	19766	24-Apr	16	19766	24-Apr	16	19726	20-Jul	15	18794	4-Jun	15	19799	16-Aug	15	18794	19799	19571	5.1%	18707	20-Jul	15	18707	20-Jul	15
CE545	20075	17-Jun	16	19475	24-Apr	16	19474	24-Apr	16	19540	20-Jul	15	18764	20-Jul	15	19497	4-Jun	15	18764	20075	19471	6.7%	18399	26-Apr	15	18399	26-Apr	15

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-11. Hourly Integrated Maxima (Sensible Coil Load and Latent Coil Load)

Sensible Coil Load (Wh,th)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	23277	20-Jul	16	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15	23457	20-Jul	15	22908	4-Jun	15	22908	23531	23264	2.7%	22514	20-Jul	15	22514	20-Jul	15
CE310	23094	10-Sep	15	23080	10-Sep	16	23119	4-Jun	16	23276	11-Jul	16	23078	10-Sep	15	22649	13-Jun	16	22649	23276	23049	2.7%	22209	10-Sep	15	22209	10-Sep	15
CE320	31316	24-Apr	16	31119	24-Apr	16	31072	24-Apr	16	31972	24-Apr	15	31134	3-Jun	16	30967	24-Apr	15	30967	31972	31263	3.2%	30697	24-Apr	14	30697	24-Apr	14
CE330	33226	14-Jun	14	33410	14-Jun	14	34490	14-Jun	15	34765	14-Jun	15	33997	24-Apr	16	33421	9-Sep	14	33226	34765	33885	4.5%	34384	14-Jun	15	34384	14-Jun	15
CE340	32829	24-Apr	15	32086	16-May	16	32086	16-May	16	32888	24-Apr	15	32940	24-Apr	16	32180	24-Apr	15	32086	32940	32501	2.6%	32290	24-Apr	14	32290	24-Apr	14
CE350	23278	29-Jul	15	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15	23457	20-Jul	15	22876	10-Jul	15	22876	23531	23258	2.8%	23536	20-Jul	15	23536	20-Jul	15
CE360	32061	24-Apr	16	32111	24-Apr	16	32065	24-Apr	16	32621	24-Apr	16	31981	24-Apr	16	32179	24-Apr	15	31981	32621	32170	2.0%	32449	24-Apr	17	32449	24-Apr	17
CE400	23278	29-Jul	15	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15				22877	8-Jul	16	22877	23531	23219	2.8%	22514	20-Jul	15	22514	20-Jul	15
CE410	23266	10-Sep	16	23203	20-Jul	15	23205	20-Jul	15							22893	29-Jul	15	22893	23266	23142	1.6%	22514	20-Jul	15	22514	20-Jul	15
CE420	23277	20-Jul	16	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15				22893	29-Jul	15	22893	23531	23222	2.7%	22514	20-Jul	15	22514	20-Jul	15
CE430	23277	20-Jul	16	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15				22893	29-Jul	15	22893	23531	23222	2.7%	22514	20-Jul	15	22514	20-Jul	15
CE440	23277	20-Jul	16	23203	20-Jul	15	23205	20-Jul	15	23531	20-Jul	15				22875	16-Aug	16	22875	23531	23218	2.8%	22514	20-Jul	15	22514	20-Jul	15
CE500	19549	28-Oct	15	20009	4-Jun	16	20008	10-Sep	16	19849	20-Jul	15	18776	4-Jun	15	19818	29-Jul	15	18776	20009	19668	6.3%	18930	20-Jul	15	18930	20-Jul	15
CE510	21729	29-Apr	19	22513	11-Jul	15	22513	11-Jul	15	22290	20-Jul	15	21121	4-Jun	13	22269	20-Jul	14	21121	22513	22073	6.3%	22499	20-Jul	15	22499	20-Jul	15
CE520	19416	28-Sep	15	20159	26-May	16	20154	26-May	16	19999	20-Jul	15	18969	20-Jul	16	20378	23-May	15	18969	20378	19846	7.1%	16612	20-Jul	15	16612	20-Jul	15
CE522	19489	12-Mai	15	20137	11-Jul	16	20135	11-Jul	16	19934	20-Jul	15	18785	4-Jun	15	19920	16-Aug	15	18785	20137	19733	6.9%	19051	20-Jul	15	19051	20-Jul	15
CE525	19703	26-Jul	16	19850	24-Apr	16	19850	24-Apr	16	19664	20-Jul	15	18759	4-Jun	15	19661	4-Jun	15	18759	19850	19581	5.6%	18762	20-Jul	15	18762	20-Jul	15
CE530	19834	29-Mai	15	19576	24-Apr	16	19575	24-Apr	16	19639	20-Jul	15	18776	4-Jun	15	19626	8-Jul	15	18776	19834	19504	5.4%	18511	20-Jul	15	18511	20-Jul	15
CE540	19575	30-Aug	16	19766	24-Apr	16	19766	24-Apr	16	19726	20-Jul	15	18794	4-Jun	15	19799	16-Aug	15	18794	19799	19571	5.1%	18707	20-Jul	15	18707	20-Jul	15
CE545	20075	17-Jun	16	19475	24-Apr	16	19474	24-Apr	16	19540	20-Jul	15	18759	4-Jun	15	19497	4-Jun	15	18759	20075	19470	6.8%	18399	26-Apr	15	18399	26-Apr	15

Latent Coil Load (Wh,th)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	9636	03-Sep	16	9304	3-Sep	15	9394	3-Sep	15	10235	10-Jul	13	10375	3-Sep	15	10392	3-Sep	15	9304	10392	9889	11.0%	9469	3-Sep	15	9469	3-Sep	15
CE310	15907	03-Sep	15	15139	3-Sep	15	15270	3-Sep	15	16275	4-Aug	15	16112	4-Aug	15	16077	3-Sep	16	15139	16275	15797	7.2%	15408	3-Sep	15	15408	3-Sep	15
CE320	23147	02-Oct	10	31497	2-Oct	9	31503	2-Oct	9	22195	2-Oct	10	21697	17-Sep	12	21929	1-Oct	20	21697	31503	25328	38.7%	26445	1-Oct	8	26445	1-Oct	8
CE330	27825	18-Sep	16	26941	18-Sep	15	40809	2-Oct	9	27134	18-Sep	16	28184	18-Sep	15	27488	18-Sep	15	26941	40809	29730	46.6%	35719	1-Oct	8	35719	1-Oct	8
CE340	24848	02-Oct	9	30451	2-Oct	9	36011	2-Oct	9	23911	2-Oct	10	24225	3-Sep	17	23794	1-Oct	20	23794	36011	27207	44.9%	30348	1-Oct	8	30348	1-Oct	8
CE350	9751	01-Oct	13	9303	3-Sep	15	9393	3-Sep	15	10235	10-Jul	13	10755	2-Oct	8	11603	3-Aug	7	9303	11603	10173	22.6%	9604	3-Sep	15	9604	3-Sep	15
CE360	9275	02-Oct	10	10026	2-Oct	9	10336	2-Oct	9	8520	2-Oct	11	8859	3-Sep	17	8934	3-Sep	17	8520	10336	9325	19.5%	10239	9-Sep	8	10239	9-Sep	8
CE400	27075	16-Sep	15	25578	18-Sep	14	32396	18-Sep	15	26317	16-Sep	14				26645	16-Sep	14	25578	32396	27602	24.7%	31527	18-Sep	14	31527	18-Sep	14
CE410	11139	16-Sep	15	9304	3-Sep	15	9391	3-Sep	15							10377	9-Sep	15	9304	11139	10053	18.3%	9469	3-Sep	15	9469	3-Sep	15
CE420	9751	01-Oct	13	9304	3-Sep	15	9394	3-Sep	15	10235	10-Jul	13				10394	3-Sep	15	9304	10394	9816	11.1%	9469	3-Sep	15	9469	3-Sep	15
CE430	9636	03-Sep	16	11105	24-Oct	14	11101	21-May	15	11074	24-Oct	13				10394	3-Sep	15	9636	11105	10662	13.8%	16368	24-Oct	14	16368	24-Oct	14
CE440	9636	03-Sep	16	9304	3-Sep	15	9391	3-Sep	15	10235	10-Jul	13				10139	3-Sep	15	9304	10235	9741	9.6%	9469	3-Sep	15	9469	3-Sep	15
CE500	7965	06-Oct	15	7733	3-Sep	15	7733	3-Sep	15	7839	29-Jun	16	7805	29-Jun	16	7762	29-Jun	15	7733	7965	7806	3.0%	7621	3-Sep	15	7621	3-Sep	15
CE510	8893	15-Sep	11	8723	2-Oct	9	8723	2-Oct	9	8955	17-Jun	14	8850	17-Jun	14	8874	17-Jun	13	8723	8955	8836	2.6%	8573	2-Oct	9	8573	2-Oct	9
CE520	7914	28-Sep	15	7785	3-Sep	15	7785	3-Sep	15	7699	29-Jun	16	7726	30-Jun	16	7964	23-May	15	7699	7964	7812	3.4%	7621	11-Aug	15	7621	11-Aug	15
CE522	7907	02-Mai	15	7760	3-Sep	15	7760	3-Sep	15	7770	29-Jun	16	7743	29-Jun	16	7745	29-Jun	15	7743	7907	7781	2.1%	7621	3-Sep	15	7621	3-Sep	15
CE525	8037	26-Jul	16	7663	3-Sep	15	7663	3-Sep	15	7947	29-Jun	16	7938	29-Jun	16	7820	29-Jun	15	7663	8037	7845	4.8%	7621	29-Jun	14	7621	29-Jun	14
CE530	0	18-Jun	16	0	0-Jan	0	0	0-Jan	0	1	16-Mar	10	179	11-Mar	11	36	1-Nov	20	0	179	36	497.3%	0	3-Sep	15	0	3-Sep	15
CE540	627	11-Mar	10	0	0-Jan	0	0	0-Jan	0	1655	11-Mar	10	845	11-Mar	10	1181	11-Mar	10	0	1655	718	230.5%	0	3-Sep	15	0	3-Sep	15
CE545	0	01-Jul	16	0	0-Jan	0	0	0-Jan	0	0	23-May	15	4	20-Jul	15	0	1-Jan	1	0	4	1	600.0%	0	3-Sep	15	0	3-Sep	15

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-12. Hourly Integrated Maxima and Minima (COP2)

Maximum COP2

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	4.168	16-Apr	3	3.869	30-Apr	16	3.857	30-Apr	16	3.925	30-Apr	15	3.871	30-Apr	16	3.880	30-Apr	16	3.857	4.168	3.928	7.9%	3.907	30-Apr	14	#DIV/0!	#DIV/0!	#DIV/0!
CE310	4.143	30-Apr	15	4.141	30-Apr	16	4.128	30-Apr	16	4.173	30-Apr	15	4.128	30-Apr	15	4.120	30-Apr	15	4.120	4.173	4.139	1.3%	4.193	30-Apr	14	#DIV/0!	#DIV/0!	#DIV/0!
CE320	4.168	16-Apr	3	5.143	2-Oct	9	4.967	2-Oct	9	3.940	16-Sep	15	3.943	16-Sep	15	4.380	18-Dec	3	3.940	5.143	4.424	27.2%	4.561	3-Sep	8	#DIV/0!	#DIV/0!	#DIV/0!
CE330	4.168	16-Apr	3	4.109	17-Jun	16	5.595	2-Oct	9	4.071	16-Sep	14	4.122	17-Jun	16	4.050	17-Jun	16	4.050	5.595	4.353	35.5%	4.561	3-Sep	8	#DIV/0!	#DIV/0!	#DIV/0!
CE340	4.168	16-Apr	3	4.621	2-Oct	9	5.339	2-Oct	9	3.987	16-Sep	15	4.017	16-Sep	16	3.950	16-Sep	16	3.950	5.339	4.347	32.0%	5.010	3-Sep	8	#DIV/0!	#DIV/0!	#DIV/0!
CE350	4.168	16-Apr	3	3.889	27-Apr	5	3.863	5-Oct	3	4.555	13-Oct	1	3.932	4-Oct	24	3.880	30-Apr	16	3.863	4.555	4.048	17.1%	3.956	30-Apr	14	#DIV/0!	#DIV/0!	#DIV/0!
CE360	4.401	05-Oct	1	4.428	4-Oct	24	4.427	4-Oct	24	4.455	4-Oct	24	4.432	4-Oct	24	4.440	4-Oct	24	4.401	4.455	4.431	1.2%	4.433	4-Oct	24	#DIV/0!	#DIV/0!	#DIV/0!
CE400	4.077	16-Sep	15	4.088	17-Jun	16	4.776	18-Sep	15	4.071	16-Sep	14				4.050	17-Jun	16	4.050	4.776	4.212	17.2%	5.214	18-Sep	14	#DIV/0!	#DIV/0!	#DIV/0!
CE410	3.888	30-Apr	15	3.903	30-Apr	15	3.855	30-Apr	16							3.840	21-May	15	3.840	3.903	3.871	1.6%	3.793	21-May	14	#DIV/0!	#DIV/0!	#DIV/0!
CE420	3.781	27-Sep	16	3.807	21-May	15	3.759	27-Sep	15	3.821	21-May	15				3.940	21-May	13	3.759	3.940	3.822	4.7%	3.750	21-May	15	#DIV/0!	#DIV/0!	#DIV/0!
CE430	3.781	27-Sep	16	3.805	24-Oct	15	3.759	27-Sep	15	3.793	21-May	16				3.930	30-Apr	13	3.759	3.930	3.814	4.5%	3.900	24-Oct	14	#DIV/0!	#DIV/0!	#DIV/0!
CE440	3.883	12-Dez	7	3.774	27-Sep	15	3.759	27-Sep	15	3.802	21-May	15				3.810	30-Apr	15	3.759	3.883	3.806	3.3%	3.793	21-May	14	#DIV/0!	#DIV/0!	#DIV/0!
CE500	4.275	13-Oct	1	7.367	11-Mar	10	5.301	13-Oct	9	4.198	16-Mar	10	4.185	16-Mar	10	4.140	30-Apr	16	4.140	7.367	4.911	65.7%	6.654	30-Mar	24	#DIV/0!	#DIV/0!	#DIV/0!
CE510	4.693	05-Oct	1	7.367	11-Mar	10	5.301	13-Oct	9	4.685	5-Oct	1	4.690	4-Oct	24	4.530	4-May	3	4.530	7.367	5.211	54.4%	6.842	30-Mar	24	#DIV/0!	#DIV/0!	#DIV/0!
CE520	3.814	30-Apr	15	4.896	16-Mar	10	4.652	16-Mar	10	3.938	30-Apr	15	3.802	30-Apr	16	3.840	30-Apr	16	3.802	4.896	4.157	26.3%	6.647	9-Dec	2	#DIV/0!	#DIV/0!	#DIV/0!
CE522	3.986	16-Mar	10	6.233	11-Mar	10	5.678	11-Mar	10	4.042	30-Apr	15	3.986	30-Apr	16	4.000	30-Apr	16	3.986	6.233	4.654	48.3%	6.777	6-Apr	24	#DIV/0!	#DIV/0!	#DIV/0!
CE525	4.718	13-Oct	1	6.325	12-Apr	9	6.031	16-Mar	10	4.704	16-Mar	10	4.638	16-Mar	10	4.400	16-Mar	10	4.400	6.325	5.136	37.5%	6.899	1-Nov	7	#DIV/0!	#DIV/0!	#DIV/0!
CE530	4.006	02-Nov	1	3.981	11-Mar	10	3.850	13-Oct	9	3.925	16-Mar	10	3.840	16-Mar	10	3.880	16-Mar	10	3.840	4.006	3.914	4.2%	4.482	24-Oct	7	#DIV/0!	#DIV/0!	#DIV/0!
CE540	3.456	30-Apr	15	3.456	30-Apr	16	3.455	30-Apr	16	3.696	16-Mar	10	3.667	11-Mar	22	3.690	17-Oct	5	3.455	3.696	3.570	6.7%	5.899	20-Apr	4	#DIV/0!	#DIV/0!	#DIV/0!
CE545	4.250	16-Mar	10	4.275	16-Mar	10	4.428	16-Mar	10	4.166	16-Mar	10	4.156	16-Mar	10	4.170	16-Mar	10	4.156	4.428	4.241	6.4%	8.427	28-Oct	6	#DIV/0!	#DIV/0!	#DIV/0!

Minimum COP2

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	2.793	24-Apr	17	2.798	1-Dec	14	2.801	1-Dec	12	2.782	13-Jun	17	2.786	13-Jun	17	2.810	14-Jun	12	2.782	2.810	2.795	1.0%	2.785	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE310	2.865	01-Dec	15	2.850	1-Dec	14	2.851	1-Dec	12	2.893	1-Dec	15	2.873	1-Dec	15	2.870	1-Dec	14	2.850	2.893	2.867	1.5%	2.835	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE320	2.825	31-Mar	14	2.801	1-Dec	14	2.805	1-Dec	15	2.842	31-Mar	15	2.815	31-Mar	15	2.830	31-Mar	14	2.801	2.842	2.820	1.4%	2.790	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE330	2.825	31-Mar	14	2.798	1-Dec	14	2.801	1-Dec	12	2.844	31-Mar	15	2.823	31-Mar	15	2.840	31-Mar	14	2.798	2.844	2.822	1.6%	2.790	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE340	2.825	31-Mar	14	2.798	1-Dec	14	2.801	1-Dec	12	2.844	31-Mar	15	2.823	31-Mar	15	2.840	31-Mar	14	2.798	2.844	2.822	1.6%	2.785	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE350	2.790	24-Apr	17	2.798	1-Dec	14	2.801	1-Dec	12	2.782	13-Jun	17	2.786	13-Jun	17	2.810	14-Jun	12	2.782	2.810	2.794	1.0%	2.751	24-Apr	16	#DIV/0!	#DIV/0!	#DIV/0!
CE360	2.825	31-Mar	14	2.799	1-Dec	14	2.801	1-Dec	12	2.844	31-Mar	15	2.823	31-Mar	15	2.840	31-Mar	14	2.799	2.844	2.822	1.6%	2.786	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE400	2.782	31-Mar	19	2.734	3-Dec	15	2.735	3-Dec	13	2.782	13-Jun	17				2.810	14-Jun	12	2.734	2.810	2.768	2.7%	2.727	3-Dec	13	#DIV/0!	#DIV/0!	#DIV/0!
CE410	2.786	24-Apr	17	2.798	1-Dec	14	2.801	1-Dec	12							2.810	14-Jun	12	2.786	2.810	2.799	0.9%	2.778	3-Dec	13	#DIV/0!	#DIV/0!	#DIV/0!
CE420	2.793	24-Apr	17	2.798	1-Dec	14	2.801	1-Dec	12	2.782	13-Jun	17				2.810	14-Jun	12	2.782	2.810	2.797	1.0%	2.785	1-Dec	14	#DIV/0!	#DIV/0!	#DIV/0!
CE430	2.771	30-Mar	19	2.734	3-Dec	13	2.735	3-Dec	13	2.782	13-Jun	17				2.810	14-Jun	12	2.734	2.810	2.766	2.7%	2.727	3-Dec	13	#DIV/0!	#DIV/0!	#DIV/0!
CE440	2.782	31-Mar	19	2.734	3-Dec	13	2.735	3-Dec	13	2.782	13-Jun	17				2.810	8-Apr	13	2.734	2.810	2.769	2.7%	2.727	3-Dec	13	#DIV/0!	#DIV/0!	#DIV/0!
CE500	2.685	30-Jul	12	2.693	29-Jul	12	2.652	30-Mar	17	2.705	30-Jul	12	2.666	30-Jul	12	2.710	29-Jul	12	2.652	2.710	2.685	2.2%	2.673	8-Apr	17	#DIV/0!	#DIV/0!	#DIV/0!
CE510	2.888	31-Mar	15	2.817	5-Apr	17	2.652	30-Mar	17	2.865	31-Mar	18	2.882	31-Mar	15	2.900	31-Mar	14	2.652	2.900	2.834	8.8%	2.672	8-Apr	17	#DIV/0!	#DIV/0!	#DIV/0!
CE520	2.442	30-Jul	12	2.463	5-Apr	17	2.394	5-Apr	17	2.532	30-Jul	12	2.333	29-Jan	10	2.470	30-Jul	12	2.333	2.532	2.439	8.1%	2.398	16-Nov	13	#DIV/0!	#DIV/0!	#DIV/0!
CE522	2.569	08-Jul	17	2.572	29-Jul	12	2.562	31-Mar	17	2.613	30-Jul	12	2.429	30-Mar	17	2.590	29-Jul	12	2.429	2.613	2.556	7.2%	2.581	8-Apr	17	#DIV/0!	#DIV/0!	#DIV/0!
CE525	2.911	14-Jul	17	2.939	30-Jul	12	2.814	31-Mar	17	2.940	30-Jul	12	2.894	29-Jul	12	2.900	29-Jul	12	2.814	2.940	2.900	4.3%	2.841	8-Apr	17	#DIV/0!	#DIV/0!	#DIV/0!
CE530	2.501	30-Jul	12	2.495	29-Jul	12	2.498	29-Jul	12	2.532	30-Jul	12	2.473	29-Jul	12	2.520	29-Jul	12	2.473	2.532	2.503	2.3%	2.520	30-Jul	11	#DIV/0!	#DIV/0!	#DIV/0!
CE540	2.253	30-Jul	12	2.261	29-Jul	12	2.262	30-Jul	12	2.383	30-Jul	12	2.143	5-Apr	20	2.280	29-Jul	12	2.143	2.383	2.264	10.6%	2.288	30-Jul	11	#DIV/0!	#DIV/0!	#DIV/0!
CE545	2.733	14-Jul	17	2.720	29-Jul	12	2.722	30-Jul	12	2.660	30-Jul	12	2.692	29-Jul	12	2.720	29-Jul	12	2.660	2.733	2.708	2.7%	2.726	31-Mar	10	#DIV/0!	#DIV/0!	#DIV/0!

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-13. Hourly Integrated Maxima and Minima (IDB)

Maximum IDB (°C)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	26.20	07-Jul	15	25.11	22-Apr	15	25.11	22-Apr	15	25.00	23-Sep	8	25.05	21-Feb	17	26.19	3-Nov	15	25.00	26.20	25.44	4.7%	25.12	10-Jul	15	25.12	10-Jul	15
CE310	27.08	20-Jul	15	26.89	20-Jul	16	26.72	20-Jul	16	26.47	20-Jul	16	26.62	20-Jul	15	27.19	8-Jul	15	26.47	27.19	26.83	2.7%	25.77	10-Jul	15	25.77	10-Jul	15
CE320	32.36	20-Jul	15	31.61	8-Jul	16	31.50	8-Jul	16	31.71	20-Jul	15	32.32	20-Jul	15	31.65	8-Jul	15	31.50	32.36	31.86	2.7%	30.87	20-Jul	15	30.87	20-Jul	15
CE330	32.23	20-Jul	15	31.72	8-Jul	16	32.00	20-Jul	16	31.07	8-Jul	16	31.90	20-Jul	15	31.30	8-Jul	15	31.07	32.23	31.70	3.7%	30.87	20-Jul	15	32.08	20-Jul	15
CE340	32.31	20-Jul	15	31.61	8-Jul	16	31.56	8-Jul	16	31.50	20-Jul	15	32.15	20-Jul	15	31.58	8-Jul	15	31.50	32.31	31.78	2.5%	32.23	20-Jul	15	32.23	20-Jul	15
CE350	34.58	01-Oct	24	34.94	23-Jun	24	34.94	24-Jun	24	35.00	1-Oct	2	35.00	21-Apr	1	35.00	21-Apr	2	34.58	35.00	34.91	1.2%	34.92	1-Oct	23	34.92	1-Oct	23
CE360	33.76	10-Jul	13	32.78	20-Jul	15	32.56	20-Jul	16	32.51	10-Jul	13	33.00	20-Jul	15	33.13	10-Jul	12	32.51	33.76	32.96	3.8%	32.09	8-Jul	19	32.09	8-Jul	19
CE400	27.11	16-Sep	15	27.56	16-Sep	16	28.83	18-Sep	16	26.91	16-Sep	16				26.04	15-Aug	15	26.04	28.83	27.29	10.2%	26.56	2-Oct	15	26.56	2-Oct	15
CE410	26.83	23-Oct	15	25.11	22-Apr	15	25.11	22-Apr	15							26.19	3-Nov	15	25.11	26.83	25.81	6.6%	25.12	10-Jul	15	25.12	10-Jul	15
CE420	26.20	07-Jul	15	25.11	22-Apr	15	25.11	22-Apr	15	25.00	23-Sep	8				26.23	20-Oct	15	25.00	26.23	25.53	4.8%	25.12	10-Jul	15	25.12	10-Jul	15
CE430	27.20	01-Nov	16	25.11	22-Apr	15	25.11	22-Apr	15	25.00	18-May	19				26.45	23-Oct	15	25.00	27.20	25.77	8.5%	25.12	10-Jul	15	25.12	10-Jul	15
CE440	27.05	28-Apr	15	25.11	22-Apr	15	25.11	22-Apr	15	25.00	24-Apr	19				26.26	23-Oct	15	25.00	27.05	25.71	7.9%	25.12	10-Jul	15	25.12	10-Jul	15
CE500	25.81	30-Apr	15	25.11	21-Apr	16	25.11	21-Apr	16	25.00	31-Mar	18	25.02	30-Mar	17	25.00	11-Mar	11	25.00	25.81	25.17	3.2%	25.08	20-Jul	15	25.08	20-Jul	15
CE510	26.10	09-Jul	15	25.11	21-Apr	3	25.11	21-Apr	3	25.00	31-Mar	18	25.02	30-Mar	17	25.00	24-Apr	12	25.00	26.10	25.22	4.4%	25.13	20-Jul	15	25.13	20-Jul	15
CE520	16.12	15-Aug	15	16.11	16-Aug	16	15.94	10-Jul	16	15.00	16-Apr	1	15.98	20-Jul	15	18.62	4-Jun	16	15.00	18.62	16.30	22.2%	15.11	20-Jul	15	15.11	20-Jul	15
CE522	21.01	16-Jul	15	20.11	21-Apr	15	20.11	21-Apr	15	20.00	16-Apr	20	20.05	13-Mar	22	20.93	21-Apr	15	20.00	21.01	20.37	5.0%	20.12	20-Jul	15	20.12	20-Jul	15
CE525	36.08	10-Mai	16	35.06	21-Apr	16	35.06	21-Apr	16	35.00	11-Mar	12	35.00	11-Mar	10	35.00	11-Mar	11	35.00	36.08	35.20	3.1%	35.04	20-Jul	15	35.04	20-Jul	15
CE530	26.12	04-Jun	15	25.06	21-Apr	16	25.06	21-Apr	16	25.00	30-Mar	17	25.02	30-Mar	17	25.00	11-Mar	11	25.00	26.12	25.21	4.4%	25.03	20-Jul	15	25.03	20-Jul	15
CE540	16.15	21-Sep	16	15.11	31-May	16	15.11	31-May	16	15.00	25-Mar	8	15.05	28-Jan	20	15.00	11-Mar	10	15.00	16.15	15.24	7.5%	15.07	20-Jul	15	15.07	20-Jul	15
CE545	35.67	20-Jul	15	35.00	21-Apr	15	35.00	21-Apr	15	35.00	9-Jul	22	35.00	11-Mar	10	35.00	11-Mar	11	35.00	35.67	35.11	1.9%	35.01	28-Apr	15	35.01	28-Apr	15

Minimum IDB (°C)

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	GBS Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	11.25	10-Feb	9	11.25	10-Feb	9
CE310	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	11.25	10-Feb	9	11.25	10-Feb	9
CE320	7.93	06-Jan	6	10.83	6-Jan	7	10.78	6-Jan	7	7.75	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	10.83	8.71	44.1%	12.37	10-Feb	9	12.37	10-Feb	9
CE330	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	12.37	10-Feb	9	8.96	6-Jan	6
CE340	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	8.97	6-Jan	6	8.97	6-Jan	6
CE350	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	8.97	6-Jan	6	8.97	6-Jan	6
CE360	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6	8.00	6-Jan	5	6.99	6-Jan	5	6.99	8.89	8.23	23.1%	11.29	10-Feb	9	11.29	10-Feb	9
CE400	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6				6.99	6-Jan	5	6.99	8.89	8.27	23.0%	11.25	10-Feb	9	11.25	10-Feb	9
CE410	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6							6.99	6-Jan	5	6.99	8.89	8.16	23.3%	11.25	10-Feb	9	11.25	10-Feb	9
CE420	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6				6.99	6-Jan	5	6.99	8.89	8.27	23.0%	11.25	10-Feb	9	11.25	10-Feb	9
CE430	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6				6.99	6-Jan	5	6.99	8.89	8.27	23.0%	11.25	10-Feb	9	11.25	10-Feb	9
CE440	7.93	06-Jan	6	8.89	6-Jan	6	8.83	6-Jan	6	8.72	6-Jan	6				7.00	6-Jan	5	7.00	8.89	8.27	22.8%	11.25	10-Feb	9	11.25	10-Feb	9
CE500	8.43	20-Dec	22	8.17	20-Dec	12	7.94	20-Dec	11	8.94	21-Dec	2	8.54	20-Dec	20	24.04	15-Apr	5	7.94	24.04	11.01	146.2%	16.40	11-Mar	9	16.40	11-Mar	9
CE510	8.43	20-Dec	22	8.17	20-Dec	12	7.94	20-Dec	11	8.94	21-Dec	2	8.54	20-Dec	20	24.04	15-Apr	5	7.94	24.04	11.01	146.2%	16.40	11-Mar	9	16.40	11-Mar	9
CE520	8.31	20-Dec	22	8.11	20-Dec	12	7.89	20-Dec	12	8.83	21-Dec	1	8.51	20-Dec	20	13.57	1-Nov	7	7.89	13.57	9.20	61.7%	0.37	1-Jan	1	0.37	1-Jan	1
CE522	8.41	20-Dec	22	8.17	20-Dec	12	7.94	20-Dec	11	8.90	21-Dec	1	8.54	20-Dec	20	15.98	12-Apr	19	7.94	15.98	9.66	83.3%	1.00	1-Jan	1	1.00	1-Jan	1
CE525	8.44	20-Dec	22	8.17	20-Dec	13	7.94	20-Dec	12	9.01	21-Dec	2	8.54	20-Dec	20	33.01	1-Apr	8	7.94	33.01	12.52	200.2%	16.40	11-Mar	9	16.40	11-Mar	9
CE530	8.42	20-Dec	22	8.17	20-Dec	12	7.94	20-Dec	11	8.94	21-Dec	2	8.54	20-Dec	20	24.04	15-Apr	5	7.94	24.04	11.01	146.3%	1.02	1-Jan	1	1.02	1-Jan	1
CE540	8.23	20-Dec	22	8.11	20-Dec	12	7.89	20-Dec	12	8.83	21-Dec	1	8.51	20-Dec	20	14.95	19-Dec	1	7.89	14.95	9.42	74.9%	13.67	15-Jan	9	13.67	15-Jan	9
CE545	8.45	20-Dec	22	8.17	20-Dec	13	7.94	20-Dec	12	9.01	21-Dec	2	8.54	20-Dec	20	33.01	1-Apr	8	7.94	33.01	12.52	200.2%	0.83	1-Jan	1	0.83	1-Jan	1

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-14. Hourly Integrated Maxima and Minima (Zone Humidity Ratio)

Maximum Humidity Ratio

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	0.0133	16-Nov	17	0.0138	16-Nov	16	0.0137	16-Nov	16	0.0136	16-Nov	17	0.0135	16-Nov	16	0.0134	16-Nov	16	0.0133	0.0138	0.0135	3.8%	0.0137	16-Nov	16	0.0137	16-Nov	16
CE310	0.0158	01-Oct	23	0.0188	15-Oct	9	0.0189	15-Oct	9	0.0156	1-Oct	8	0.0154	2-Oct	8	0.0157	2-Oct	8	0.0154	0.0189	0.0167	20.8%	0.0169	11-Mar	10	0.0169	11-Mar	10
CE320	0.0180	10-Jul	13	0.0177	10-Jul	12	0.0176	10-Jul	12	0.0178	10-Jul	13	0.0175	10-Jul	12	0.0177	10-Jul	12	0.0175	0.0180	0.0177	2.7%	0.0177	10-Jul	12	0.0177	10-Jul	12
CE330	0.0177	10-Jul	12	0.0178	2-Oct	9	0.0177	10-Jul	13	0.0179	10-Jul	12	0.0170	10-Jul	13	0.0177	10-Jul	12	0.0170	0.0179	0.0176	5.0%	0.0177	10-Jul	12	0.0178	10-Jul	13
CE340	0.0179	10-Jul	13	0.0177	10-Jul	12	0.0174	10-Jul	12	0.0178	10-Jul	12	0.0173	10-Jul	13	0.0177	10-Jul	12	0.0173	0.0179	0.0176	3.4%	0.0176	10-Jul	12	0.0176	10-Jul	12
CE350	0.0168	01-Oct	24	0.0199	2-Aug	22	0.0199	2-Aug	22	0.0172	2-Oct	1	0.0165	2-Oct	2	0.0166	2-Oct	1	0.0165	0.0199	0.0178	19.2%	0.0200	1-Oct	20	0.0200	1-Oct	20
CE360	0.0134	10-Jul	13	0.0138	16-Nov	16	0.0137	16-Nov	16	0.0139	10-Jul	13	0.0135	16-Nov	16	0.0134	16-Nov	16	0.0134	0.0139	0.0136	3.4%	0.0137	16-Nov	16	0.0137	16-Nov	16
CE400	0.0169	05-Apr	22	0.0170	5-Apr	21	0.0170	5-Apr	21	0.0169	5-Apr	22				0.0173	22-Apr	6	0.0169	0.0173	0.0170	2.5%	0.0169	2-Apr	5	0.0169	2-Apr	5
CE410	0.0168	05-Apr	22	0.0169	2-Apr	5	0.0169	2-Apr	5							0.0173	22-Apr	6	0.0168	0.0173	0.0170	2.7%	0.0169	2-Apr	5	0.0169	2-Apr	5
CE420	0.0143	02-Apr	10	0.0147	1-Apr	21	0.0141	17-Apr	3	0.0146	2-Apr	18				0.0147	2-Apr	18	0.0141	0.0147	0.0145	4.1%	0.0147	1-Apr	21	0.0147	1-Apr	21
CE430	0.0162	02-Apr	5	0.0156	2-Apr	4	0.0156	2-Apr	4	0.0161	2-Apr	5				0.0158	2-Apr	5	0.0156	0.0162	0.0159	4.0%	0.0154	18-Apr	8	0.0154	18-Apr	8
CE440	0.0133	16-Nov	17	0.0138	16-Nov	16	0.0137	16-Nov	16	0.0136	16-Nov	17				0.0134	16-Nov	16	0.0133	0.0138	0.0136	3.6%	0.0137	16-Nov	16	0.0137	16-Nov	16
CE500	0.0117	11-Jul	15	0.0119	20-Jul	15	0.0118	6-Apr	10	0.0117	20-Jul	15	0.0117	20-Jul	15	0.0115	11-Mar	10	0.0115	0.0119	0.0117	3.4%	0.0138	11-Mar	13	0.0138	11-Mar	13
CE510	0.0119	07-Sep	15	0.0119	20-Jul	15	0.0119	20-Jul	15	0.0117	20-Jul	15	0.0117	20-Jul	15	0.0115	11-Mar	10	0.0115	0.0119	0.0118	3.4%	0.0139	11-Mar	13	0.0139	11-Mar	13
CE520	0.0075	07-Sep	15	0.0077	10-Jul	16	0.0078	29-Mar	10	0.0070	20-Jul	15	0.0076	20-Jul	15	0.0106	5-Jan	16	0.0070	0.0106	0.0080	44.5%	0.0104	12-Mar	16	0.0104	12-Mar	16
CE522	0.0094	20-Jul	16	0.0095	4-Jun	15	0.0138	6-Apr	10	0.0091	20-Jul	15	0.0094	20-Jul	15	0.0107	1-Jan	2	0.0091	0.0138	0.0103	45.4%	0.0123	11-Mar	13	0.0123	11-Mar	13
CE525	0.0179	10-Mai	16	0.0180	20-Jul	15	0.0180	20-Jul	15	0.0185	20-Jul	15	0.0176	20-Jul	15	0.0173	20-Jul	15	0.0173	0.0185	0.0179	6.6%	0.0211	12-Mar	10	0.0211	12-Mar	10
CE530	0.0070	01-Jan	1	0.0081	20-Jul	15	0.0081	20-Jul	15	0.0068	11-Mar	1	0.0055	1-Apr	1	0.0068	26-Oct	9	0.0055	0.0081	0.0070	37.1%	0.0091	5-Apr	9	0.0091	5-Apr	9
CE540	0.0061	01-Jan	1	0.0050	4-Jun	13	0.0063	8-Apr	8	0.0068	11-Mar	1	0.0033	1-Apr	1	0.0063	11-Mar	9	0.0033	0.0068	0.0056	62.6%	0.0052	1-Dec	15	0.0052	1-Dec	15
CE545	0.0070	01-Jan	1	0.0122	20-Jul	15	0.0122	20-Jul	15	0.0068	31-Dec	7	0.0067	1-Apr	1	0.0076	5-Nov	9	0.0067	0.0122	0.0087	63.0%	0.0150	5-Apr	9	0.0150	5-Apr	9

Minimum Humidity Ratio

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE310	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	5-Jan	7	0.0020	5-Jan	7	0.0020	5-Jan	7	0.0017	0.0020	0.0019	17.1%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE320	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE330	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE340	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE350	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE360	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3	0.0020	11-Jan	3	0.0020	5-Jan	6	0.0017	0.0020	0.0019	14.5%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE400	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3				0.0020	5-Jan	6	0.0017	0.0020	0.0018	14.7%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE410	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24							0.0020	5-Jan	6	0.0017	0.0020	0.0018	14.9%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE420	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3				0.0020	5-Jan	6	0.0017	0.0020	0.0018	14.7%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE430	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3				0.0020	5-Jan	6	0.0017	0.0020	0.0018	14.7%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE440	0.0019	11-Jan	3	0.0017	4-Jan	24	0.0017	4-Jan	24	0.0019	11-Jan	3				0.0020	5-Jan	7	0.0017	0.0020	0.0018	14.7%	0.0017	11-Jan	1	0.0017	11-Jan	1
CE500	0.0068	20-Dec	22							0.0070	20-Dec	12	0.0069	20-Dec	20	0.0103	2-Nov	2	0.0068	0.0103	0.0078	44.7%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE510	0.0068	20-Dec	22							0.0070	20-Dec	12	0.0069	20-Dec	20	0.0105	2-Apr	22	0.0068	0.0105	0.0078	47.0%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE520	0.0061	26-Nov	2							0.0065	10-Nov	9	0.0065	27-Nov	23	0.0066	1-Nov	7	0.0061	0.0066	0.0064	7.3%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE522	0.0068	20-Dec	22							0.0070	20-Dec	12	0.0069	20-Dec	20	0.0078	2-Apr	21	0.0068	0.0078	0.0071	14.1%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE525	0.0068	20-Dec	22							0.0070	20-Dec	12	0.0069	20-Dec	20	0.0154	2-Nov	2	0.0068	0.0154	0.0090	94.7%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE530	0.0062	01-Apr	1							0.0067	18-Oct	12	0.0055	1-Nov	21	0.0066	1-Apr	5	0.0055	0.0067	0.0063	20.5%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE540	0.0041	05-Oct	3							0.0038	18-Oct	9	0.0033	29-Apr	23	0.0042	15-Oct	5	0.0033	0.0042	0.0038	24.6%	0.0000	1-Jan	1	0.0000	1-Jan	1
CE545	0.0062	01-Apr	1							0.0068	1-Apr	2	0.0067	20-Jul	15	0.0070	1-Apr	8	0.0062	0.0070	0.0067	11.9%	0.0000	1-Jan	1	0.0000	1-Jan	1

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-15. Hourly Integrated Maxima and Minima (Relative Humidity)

Maximum Relative Humidity

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour	NREL	Date	Hour	NREL	Date	Hour	GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	68.79	16-Nov	17	69.35	16-Nov	16	68.85	16-Nov	16	68.37	16-Nov	17	68.00	16-Nov	16	67.44	16-Nov	16	67.44	69.35	68.47	2.8%	69.05	16-Nov	16	69.05	16-Nov	16
CE310	77.70	02-Oct	4	100.18	15-Oct	9	100.70	15-Oct	9	78.64	2-Oct	8	77.00	12-Jun	8	78.19	2-Oct	8	77.00	100.70	85.40	27.8%	92.55	11-Mar	10	92.55	11-Mar	10
CE320	81.84	18-Sep	10	83.41	2-Oct	9	83.67	22-Apr	18	82.97	18-Sep	10	83.00	3-Sep	17	81.88	16-Sep	20	81.84	83.67	82.79	2.2%	84.71	2-Oct	9	84.71	2-Oct	9
CE330	76.66	22-Sep	20	78.46	2-Oct	9	77.94	18-Sep	9	76.88	3-Sep	10	76.00	10-Jun	18	78.70	2-Sep	12	76.00	78.70	77.44	3.5%	84.71	2-Oct	9	78.95	30-Apr	9
CE340	79.93	18-Sep	10	81.37	18-Sep	9	81.26	22-Apr	18	80.80	18-Sep	10	80.00	3-Sep	17	80.25	16-Sep	20	79.93	81.37	80.60	1.8%	80.84	2-Oct	9	80.84	2-Oct	9
CE350	68.79	16-Nov	17	81.12	7-Aug	21	81.12	7-Aug	21	68.37	16-Nov	17	70.00	2-Oct	8	72.65	3-Aug	7	68.37	81.12	73.67	17.3%	81.10	1-Oct	20	81.10	1-Oct	20
CE360	68.79	16-Nov	17	69.35	16-Nov	16	68.85	16-Nov	16	68.37	16-Nov	17	68.00	16-Nov	16	67.44	16-Nov	16	67.44	69.35	68.47	2.8%	69.00	16-Nov	16	69.00	16-Nov	16
CE400	83.75	05-Apr	22	85.57	5-Apr	21	85.57	5-Apr	21	84.64	5-Apr	22				86.31	22-Apr	6	83.75	86.31	85.17	3.0%	84.98	2-Apr	5	84.98	2-Apr	5
CE410	83.22	05-Apr	22	84.79	2-Apr	5	84.79	2-Apr	5							86.18	22-Apr	6	83.22	86.18	84.75	3.5%	84.98	2-Apr	5	84.98	2-Apr	5
CE420	70.84	02-Apr	10	74.51	17-Apr	7	71.53	17-Apr	3	73.28	2-Apr	18				73.85	2-Apr	18	70.84	74.51	72.80	5.0%	74.25	1-Apr	24	74.25	1-Apr	24
CE430	80.71	02-Apr	5	78.43	2-Apr	4	78.43	2-Apr	4	80.74	2-Apr	5				78.94	2-Apr	5	78.43	80.74	79.45	2.9%	77.60	18-Apr	8	77.60	18-Apr	8
CE440	68.72	16-Nov	17	69.35	16-Nov	16	68.85	16-Nov	16	68.37	16-Nov	17				67.51	16-Nov	16	67.51	69.35	68.56	2.7%	69.05	16-Nov	16	69.05	16-Nov	16
CE500	100.00	21-Nov	24							100.00	21-Nov	9	100.00	14-Nov	5	60.08	1-Apr	5	60.08	100.00	90.02	44.3%	70.91	11-Mar	13	70.91	11-Mar	13
CE510	100.00	21-Nov	24							100.00	21-Nov	9	100.00	14-Nov	5	57.51	1-Apr	5	57.51	100.00	89.38	47.5%	71.03	11-Mar	13	71.03	11-Mar	13
CE520	90.23	20-Dec	22							93.81	20-Dec	11	95.00	20-Dec	17	71.77	16-Aug	17	71.77	95.00	87.70	26.5%	99.99	13-Mar	10	99.99	13-Mar	10
CE522	100.00	18-Dec	8							100.00	15-Dec	22	100.00	15-Dec	1	71.32	5-Apr	17	71.32	100.00	92.83	30.9%	90.82	11-Mar	13	90.82	11-Mar	13
CE525	100.00	12-Nov	20							100.00	12-Nov	19	100.00	11-Nov	23	51.12	1-Apr	8	51.12	100.00	87.78	55.7%	61.29	12-Mar	10	61.29	12-Mar	10
CE530	91.04	20-Dec	22							96.16	20-Dec	11	79.00	20-Dec	8	36.01	20-Apr	21	36.01	96.16	75.55	79.6%	47.41	11-Mar	15	47.41	11-Mar	15
CE540	61.28	20-Dec	22							55.18	20-Dec	11	47.00	20-Dec	6	39.96	18-Apr	18	39.96	61.28	50.85	41.9%	49.60	1-Dec	15	49.60	1-Dec	15
CE545	90.88	20-Dec	22							96.23	20-Dec	11	97.00	20-Dec	4	24.14	24-Dec	1	24.14	97.00	77.06	94.5%	42.81	5-Apr	9	42.81	5-Apr	9

Minimum Relative Humidity

	TRNSYS			DOE-2.2			DOE21E-E			EnergyPlus			CODYRUN			HOT3000			Statistics, All Results			(Max-Min)	GBS Sep 2013			GBS v3.4		
Case	TUD	Date	Hour							GARD	Date	Hour	UR	Date	Hour	NRCan	Date	Hour	Min	Max	Mean	/Mean*	S Sep 2013	Date	Hour	GBS v3.4	Date	Hour
CE300	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.40	6-Nov	6	15.00	6-Nov	5	14.94	6-Nov	8	11.97	15.00	13.60	22.3%	12.38	6-Nov	4	12.38	6-Nov	4
CE310	13.39	06-Nov	6	11.97	6-Nov	4	11.97	6-Nov	4	15.50	6-Nov	8	16.00	6-Nov	8	15.93	6-Nov	8	11.97	16.00	14.13	28.5%	12.38	6-Nov	4	12.38	6-Nov	4
CE320	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.64	6-Nov	6	15.00	6-Nov	5	12.92	20-Dec	5	11.97	15.00	13.31	22.8%	12.38	6-Nov	4	12.38	6-Nov	4
CE330	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.40	6-Nov	6	15.00	6-Nov	5	14.94	6-Nov	8	11.97	15.00	13.60	22.3%	12.38	6-Nov	4	12.38	6-Nov	4
CE340	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.40	6-Nov	6	15.00	6-Nov	5	14.94	6-Nov	8	11.97	15.00	13.60	22.3%	12.38	6-Nov	4	12.38	6-Nov	4
CE350	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.40	6-Nov	6	15.00	6-Nov	5	14.94	6-Nov	8	11.97	15.00	13.60	22.3%	12.38	6-Nov	4	12.38	6-Nov	4
CE360	13.33	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	14.40	6-Nov	6	15.00	6-Nov	5	14.94	6-Nov	8	11.97	15.00	13.60	22.3%	12.38	6-Nov	4	12.38	6-Nov	4
CE400	13.21	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	13.93	6-Nov	6				14.57	6-Nov	5	11.97	14.57	13.13	19.8%	12.38	6-Nov	4	12.38	6-Nov	4
CE410	13.21	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4							14.58	6-Nov	5	11.97	14.58	12.93	20.2%	12.38	6-Nov	4	12.38	6-Nov	4
CE420	13.21	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	13.93	6-Nov	6				14.59	6-Nov	5	11.97	14.59	13.13	19.9%	12.38	6-Nov	4	12.38	6-Nov	4
CE430	13.21	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	13.93	6-Nov	6				14.58	6-Nov	5	11.97	14.58	13.13	19.9%	12.38	6-Nov	4	12.38	6-Nov	4
CE440	13.21	06-Nov	5	11.97	6-Nov	4	11.97	6-Nov	4	13.93	6-Nov	6				14.54	6-Nov	5	11.97	14.54	13.12	19.6%	12.38	6-Nov	4	12.38	6-Nov	4
CE500	53.41	30-Apr	15							55.17	30-Apr	4	54.00	4-Oct	24	52.83	5-Oct	1	52.83	55.17	53.85	4.3%	0.00	1-Jan	1	0.00	1-Jan	1
CE510	52.09	04-Oct	23							55.29	4-May	3	54.00	4-Oct	23	53.15	4-May	4	52.09	55.29	53.63	6.0%	0.00	1-Jan	1	0.00	1-Jan	1
CE520	61.27	25-Nov	24							61.73	27-Nov	24	61.00	27-Nov	22	61.90	20-Jul	15	61.00	61.90	61.47	1.5%	0.00	1-Jan	1	0.00	1-Jan	1
CE522	58.51	30-Apr	15							59.18	30-Apr	4	60.00	4-Oct	23	57.97	5-Oct	1	57.97	60.00	58.91	3.4%	0.00	1-Jan	1	0.00	1-Jan	1
CE525	45.53	30-Apr	15							47.85	5-Oct	2	44.00	4-May	4	44.40	5-Oct	1	44.00	47.85	45.45	8.5%	0.00	1-Jan	1	0.00	1-Jan	1
CE530	29.59	04-Jun	15							34.03	18-Apr	18	28.00	1-Apr	10	33.68	1-Apr	13	28.00	34.03	31.33	19.2%	0.00	1-Jan	1	0.00	1-Jan	1
CE540	36.47	21-Sep	16							36.00	28-Sep	16	31.00	1-Apr	1	39.74	5-Oct	1	31.00	39.74	35.80	24.4%	0.00	1-Jan	1	0.00	1-Jan	1
CE545	17.12	20-Jul	15							19.23	18-Apr	17	19.00	1-Apr	10	20.14	1-Apr	12	17.12	20.14	18.87	16.0%	0.00	1-Jan	1	0.00	1-Jan	1

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-16. June 28 Hourly Output - Case CE300

TRNSYS-TUD	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	2056	257	8132	6189	1942	0.0091	3.517	18.05	23.41	16.96	0.0113
2	2054	257	8116	6202	1914	0.0090	3.513	18.05	23.37	16.90	0.0113
3	2054	257	8128	6194	1934	0.0091	3.517	18.05	23.38	16.94	0.0113
4	1830	230	7224	5549	1676	0.0090	3.507	17.80	23.37	16.86	0.0111
5	2029	256	8105	6319	1786	0.0088	3.546	17.50	23.35	16.70	0.0106
6	1839	230	7131	5686	1445	0.0087	3.447	18.30	23.42	16.57	0.0106
7	2667	309	9711	7597	2115	0.0092	3.263	22.20	24.04	17.32	0.0121
8	3553	384	12121	9558	2563	0.0095	3.079	26.10	24.57	17.79	0.0122
9	4365	458	14556	11758	2798	0.0097	3.018	28.05	25.09	17.97	0.0115
10	4441	458	14639	11506	3133	0.0101	2.988	28.90	25.28	18.40	0.0124
11	5000	506	16374	12342	4032	0.0104	2.974	30.00	25.36	18.82	0.0138
12	5317	529	17248	12810	4438	0.0107	2.950	30.85	25.59	19.12	0.0140
13	6189	617	20498	16816	3682	0.0101	3.012	30.85	26.53	18.84	0.0123
14	6211	616	20234	17284	2951	0.0098	2.964	31.40	26.56	18.55	0.0115
15	7922	781	26687	22882	3805	0.0096	3.066	31.95	26.78	18.55	0.0121
16	7965	781	26723	22285	4438	0.0097	3.055	32.20	26.56	18.67	0.0133
17	5421	529	17231	13048	4183	0.0108	2.896	31.95	26.20	19.40	0.0145
18	5410	529	17506	12721	4785	0.0112	2.947	31.40	26.23	19.77	0.0152
19	5260	529	17662	12491	5171	0.0111	3.051	29.70	25.70	19.58	0.0151
20	4880	506	16990	11655	5335	0.0110	3.154	27.75	25.17	19.37	0.0157
21	3939	409	13540	8882	4658	0.0111	3.114	27.20	24.65	19.44	0.0169
22	3924	410	13565	8880	4684	0.0112	3.130	26.95	24.74	19.48	0.0169
23	4123	434	14531	9449	5082	0.0112	3.189	26.40	24.67	19.47	0.0169
24	3877	410	13692	8807	4885	0.0113	3.194	26.10	24.73	19.57	0.0171

DOE-2.2	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	1897	237	7552	5889	1663	0.0094	3.539	17.78	23.83	17.34	0.0114
2	1941	240	7630	6070	1560	0.0093	3.499	18.33	23.94	17.29	0.0112
3	1897	237	7550	5881	1669	0.0094	3.538	17.78	23.83	17.34	0.0114
4	1891	237	7534	5878	1656	0.0094	3.540	17.78	23.83	17.34	0.0114
5	1697	215	6798	5675	1123	0.0089	3.555	17.22	23.78	16.85	0.0103
6	2126	259	8136	6439	1698	0.0092	3.411	19.44	24.11	17.30	0.0113
7	3198	352	11076	8342	2734	0.0100	3.120	25.00	24.94	18.39	0.0133
8	3135	332	10291	9070	1221	0.0094	2.968	27.22	25.28	17.78	0.0109
9	4528	469	14786	11873	2913	0.0099	2.959	28.89	25.56	18.36	0.0117
10	4651	479	15340	12039	3301	0.0103	2.990	28.89	25.56	18.68	0.0125
11	5434	537	17455	12812	4643	0.0109	2.923	31.11	25.89	19.48	0.0148
12	5019	498	16215	12612	3603	0.0108	2.939	30.56	25.83	19.23	0.0134
13	6040	597	19723	17139	2584	0.0101	2.972	31.11	25.94	18.56	0.0115
14	6420	633	20808	17638	3170	0.0100	2.950	31.67	26.06	18.60	0.0121
15	7671	751	25387	22196	3191	0.0098	3.014	32.22	26.11	18.46	0.0119
16	8190	800	27581	22528	5053	0.0100	3.068	32.22	26.17	18.84	0.0144
17	5715	561	18205	13599	4605	0.0107	2.901	31.67	26.06	19.35	0.0146
18	5536	544	17933	12830	5103	0.0112	2.950	31.11	25.94	19.75	0.0157
19	4711	481	16012	11876	4137	0.0110	3.084	28.33	25.50	19.32	0.0143
20	4859	504	17082	11532	5550	0.0114	3.185	27.22	25.33	19.76	0.0164
21	3913	405	13435	9302	4133	0.0113	3.111	27.22	25.33	19.76	0.0164
22	3825	399	13280	8974	4307	0.0114	3.144	26.67	25.22	19.80	0.0167
23	3750	395	13192	8787	4404	0.0115	3.183	26.11	25.11	19.84	0.0169
24	3880	407	13724	8799	4925	0.0117	3.201	26.11	25.11	20.14	0.0178

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-16. June 28 Hourly Output - Case CE300 (continued)

DOE-2.1E-E	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	1894	237	7545	5887	1658	0.0094	3.541	17.78	23.83	17.34	0.0114
2	1941	241	7627	6067	1560	0.0093	3.495	18.33	23.94	17.29	0.0112
3	1894	237	7546	5878	1668	0.0094	3.541	17.78	23.83	17.37	0.0114
4	1890	236	7528	5873	1655	0.0094	3.541	17.78	23.83	17.37	0.0114
5	1694	215	6753	5672	1081	0.0090	3.537	17.22	23.78	16.94	0.0103
6	2133	259	8185	6439	1747	0.0092	3.422	19.44	24.11	17.30	0.0113
7	3223	353	11233	8348	2885	0.0098	3.141	25.00	24.94	18.23	0.0133
8	3145	335	10272	9069	1203	0.0094	2.952	27.22	25.28	17.78	0.0109
9	4526	467	14844	11875	2969	0.0099	2.973	28.89	25.56	18.28	0.0117
10	4655	478	15393	12041	3352	0.0102	2.999	28.89	25.56	18.60	0.0125
11	5456	536	17605	12818	4787	0.0107	2.938	31.11	25.89	19.33	0.0148
12	5015	498	16188	12611	3577	0.0108	2.936	30.56	25.83	19.23	0.0134
13	6036	600	19621	17135	2486	0.0102	2.957	31.11	25.94	18.64	0.0115
14	6429	635	20819	17639	3180	0.0100	2.947	31.67	26.06	18.60	0.0121
15	7683	754	25393	22197	3196	0.0098	3.010	32.22	26.11	18.46	0.0119
16	8222	803	27721	22533	5188	0.0098	3.072	32.22	26.17	18.76	0.0144
17	5696	556	18245	13600	4644	0.0107	2.918	31.67	26.06	19.35	0.0146
18	5531	541	17978	12832	5146	0.0112	2.961	31.11	25.94	19.68	0.0157
19	4689	479	15914	11871	4043	0.0111	3.079	28.33	25.50	19.40	0.0143
20	4855	503	17120	11534	5586	0.0113	3.195	27.22	25.33	19.76	0.0164
21	3918	406	13445	9303	4142	0.0113	3.109	27.22	25.33	19.76	0.0164
22	3823	399	13285	8974	4311	0.0114	3.147	26.67	25.22	19.80	0.0167
23	3748	394	13192	8787	4405	0.0115	3.185	26.11	25.11	19.84	0.0169
24	3880	407	13754	8800	4955	0.0117	3.208	26.11	25.11	20.06	0.0178

EnergyPlus	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh) *	(Wh) *	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	2119		7472	5811	1661	0.0094	3.527	17.99	23.95		0.0112
2	2131		7494	5853	1641	0.0094	3.516	18.11	23.96		0.0113
3	2113		7447	5809	1637	0.0094	3.525	17.99	23.95		0.0112
4	2075		7332	5744	1588	0.0093	3.534	17.80	23.92		0.0111
5	1997		7091	5614	1477	0.0092	3.550	17.43	23.86		0.0105
6	2142		7425	6015	1410	0.0090	3.467	18.58	24.03		0.0106
7	2870		9216	7532	1684	0.0093	3.212	22.90	24.68		0.0123
8	3499		10609	8757	1853	0.0096	3.033	26.38	25.21		0.0118
9	4682		14032	11767	2265	0.0098	2.997	28.26	25.49		0.0116
10	4948		14778	11996	2781	0.0102	2.987	28.90	25.59		0.0124
11	5407		15905	12488	3417	0.0106	2.942	30.28	25.79		0.0140
12	5632		16522	12671	3851	0.0109	2.933	30.79	25.87		0.0138
13	7133		21588	17401	4187	0.0104	3.027	30.91	25.88		0.0120
14	6983		20678	17592	3086	0.0100	2.961	31.48	25.97		0.0115
15	8572		26133	22481	3652	0.0098	3.049	32.01	26.05		0.0121
16	8733		26665	22557	4107	0.0099	3.053	32.20	26.08		0.0135
17	5718		16345	13061	3283	0.0106	2.858	31.89	26.04		0.0145
18	5881		17193	12870	4324	0.0112	2.924	31.33	25.95		0.0153
19	5555		16878	12170	4708	0.0113	3.038	29.35	25.65		0.0149
20	5259		16536	11556	4981	0.0113	3.144	27.61	25.39		0.0159
21	4326		13445	9063	4383	0.0116	3.108	27.20	25.33		0.0168
22	4279		13387	8953	4434	0.0116	3.129	26.89	25.29		0.0168
23	4173		13191	8753	4437	0.0116	3.161	26.33	25.20		0.0168
24	4152		13196	8674	4522	0.0117	3.178	26.10	25.17		0.0171

* For EnergyPlus results, the reported compressor energy includes the condenser fan energy.

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-16. June 28 Hourly Output - Case CE300 (continued)

CODYRUN	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	1886	237	7472	5788	1684	0.0093	3.520	17.80	23.92	17.16	0.0111
2	1964	244	7707	5961	1747	0.0093	3.490	18.30	24.00	17.24	0.0115
3	1881	236	7445	5788	1657	0.0092	3.517	17.80	23.92	17.12	0.0111
4	1878	236	7432	5788	1644	0.0092	3.516	17.80	23.92	17.10	0.0111
5	1756	224	7000	5580	1420	0.0090	3.535	17.20	23.83	16.79	0.0102
6	2075	253	7915	6341	1574	0.0090	3.400	19.40	24.16	17.03	0.0110
7	3035	334	10450	8277	2173	0.0095	3.102	25.00	25.00	17.91	0.0131
8	3303	352	10813	9038	1775	0.0093	2.958	27.20	25.33	17.65	0.0111
9	4483	463	14631	11971	2660	0.0097	2.958	28.90	25.59	18.12	0.0120
10	4594	472	15099	11971	3128	0.0100	2.980	28.90	25.59	18.44	0.0128
11	5238	516	16722	12731	3991	0.0106	2.906	31.10	25.91	19.14	0.0148
12	5066	504	16258	12559	3699	0.0106	2.919	30.60	25.84	18.94	0.0133
13	6442	642	21090	17422	3669	0.0100	2.977	31.10	25.91	18.33	0.0113
14	6523	645	21067	17629	3438	0.0098	2.939	31.70	26.00	18.27	0.0117
15	8000	785	26636	22491	4145	0.0096	3.032	32.20	26.08	18.24	0.0124
16	8169	799	27416	22491	4925	0.0097	3.057	32.20	26.08	18.56	0.0142
17	5306	519	16702	12939	3763	0.0104	2.867	31.70	26.00	19.06	0.0147
18	5381	528	17312	12729	4582	0.0109	2.930	31.10	25.91	19.46	0.0157
19	4791	492	16232	11761	4470	0.0109	3.072	28.30	25.50	19.20	0.0145
20	4809	498	16867	11381	5486	0.0113	3.178	27.20	25.33	19.65	0.0169
21	3939	408	13484	9036	4447	0.0113	3.102	27.20	25.33	19.71	0.0169
22	3852	402	13322	8864	4459	0.0114	3.132	26.70	25.25	19.70	0.0168
23	3752	395	13139	8656	4482	0.0114	3.168	26.10	25.16	19.69	0.0169
24	3794	399	13323	8656	4666	0.0115	3.177	26.10	25.16	19.81	0.0173

HOT3000	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	1943	241	7668	5870	1798	0.0093	3.511	17.80	23.94	17.30	0.0111
2	1951	241	7674	5872	1803	0.0093	3.502	18.30	23.94	17.31	0.0114
3	1902	237	7528	5783	1745	0.0092	3.519	17.80	23.90	17.24	0.0111
4	1845	231	7317	5683	1634	0.0091	3.524	17.80	23.84	17.08	0.0111
5	1914	239	7514	5955	1559	0.0090	3.490	17.20	23.98	17.01	0.0102
6	2507	293	9223	7312	1911	0.0092	3.295	19.40	24.58	17.54	0.0110
7	3171	343	10770	8647	2123	0.0095	3.065	25.00	25.16	17.99	0.0131
8	3434	361	11186	9299	1888	0.0094	2.948	27.20	25.45	17.96	0.0110
9	4489	461	14744	11923	2821	0.0097	2.979	28.90	25.58	18.33	0.0120
10	4853	489	15882	12287	3595	0.0102	2.973	28.90	25.74	18.85	0.0127
11	5164	508	16615	12562	4053	0.0106	2.929	31.10	25.86	19.19	0.0148
12	5005	497	16030	12561	3468	0.0104	2.914	30.60	25.86	18.87	0.0132
13	6455	639	21180	17431	3749	0.0100	2.986	31.10	25.94	18.52	0.0113
14	6503	640	21055	17609	3447	0.0097	2.948	31.70	26.02	18.44	0.0117
15	8041	785	27070	22350	4719	0.0098	3.067	32.20	26.13	18.65	0.0123
16	8134	794	27623	22292	5331	0.0098	3.094	32.20	26.03	18.80	0.0142
17	5212	510	16551	12739	3812	0.0103	2.893	31.70	25.94	19.11	0.0147
18	5122	507	16830	12181	4649	0.0109	2.990	31.10	25.70	19.39	0.0156
19	4832	493	16635	11541	5095	0.0110	3.124	28.30	25.41	19.53	0.0145
20	4875	501	17131	11359	5772	0.0114	3.187	27.20	25.33	19.74	0.0168
21	3936	406	13525	8931	4593	0.0114	3.115	27.20	25.29	19.74	0.0168
22	3844	399	13356	8747	4609	0.0114	3.148	26.70	25.21	19.79	0.0168
23	3807	397	13343	8647	4697	0.0114	3.173	26.10	25.16	19.84	0.0168
24	3664	386	12973	8360	4613	0.0115	3.203	26.10	25.04	19.77	0.0173

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-16. June 28 Hourly Output - Case CE300 (continued)

GBS Sep 2013	Energy Consumption		Evaporator Coil Load			Zone Hum.					
	Compressor	Cond Fan	Total	Sensible	Latent	Ratio	COP2	ODB	EDB	EWB	OHR
Hour	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(kg/kg)		(°C)	(°C)	(°C)	(kg/kg)
1	1860	233	7404	5908	1496	0.0093	0.000	17.78	23.85		0.0111
2	1979	245	7778	6085	1693	0.0093	0.000	18.33	23.93		0.0114
3	1855	232	7382	5883	1499	0.0093	0.000	17.78	23.85		0.0111
4	1864	233	7405	5880	1524	0.0092	0.000	17.78	23.85		0.0111
5	1682	213	6737	5674	1063	0.0089	0.000	17.22	23.77		0.0102
6	2127	260	8104	6445	1659	0.0091	0.000	19.44	24.10		0.0111
7	3264	363	11215	8361	2854	0.0097	0.000	25.00	24.94		0.0132
8	3867	409	12963	10571	2392	0.0100	0.000	27.22	25.30		0.0111
9	4452	460	14551	11613	2938	0.0101	0.000	28.89	25.56		0.0119
10	4641	477	15308	11847	3461	0.0103	0.000	28.89	25.57		0.0128
11	5435	539	17393	12739	4654	0.0108	0.000	31.11	25.91		0.0147
12	5786	573	19119	15515	3604	0.0106	0.000	30.56	25.84		0.0132
13	5860	579	19050	16583	2466	0.0102	0.000	31.11	25.95		0.0114
14	7079	699	23358	20215	3143	0.0098	0.000	31.67	26.04		0.0119
15	7594	745	25034	21501	3532	0.0098	0.000	32.22	26.14		0.0123
16	6508	639	20795	16130	4665	0.0103	0.000	32.22	26.13		0.0142
17	5950	583	19117	14421	4696	0.0107	0.000	31.67	26.02		0.0147
18	5773	568	18797	13518	5279	0.0111	0.000	31.11	25.93		0.0158
19	4835	492	16544	12190	4354	0.0111	0.000	28.33	25.50		0.0147
20	4297	447	14855	10186	4668	0.0111	0.000	27.22	25.32		0.0169
21	4111	426	14176	9650	4525	0.0113	0.000	27.22	25.31		0.0169
22	3917	409	13646	9206	4440	0.0114	0.000	26.67	25.23		0.0169
23	3774	397	13291	8895	4395	0.0115	0.000	26.11	25.14		0.0169
24	3855	405	13610	8849	4761	0.0116	0.000	26.11	25.14		0.0175

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By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-17. Delta Annual Space Cooling Electricity Consumptions (Total, Compressor)

Total (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	4340	4629	4629	4545	4543	4538	4340	4629	4537	6.4%	4633	4633
CE320-CE300	4426	3995	4037	4333	4424	4387	3995	4426	4267	10.1%	4226	4226
CE330-CE300	5330	4958	4683	5398	5559	5260	4683	5559	5198	16.8%	4794	4794
CE330-CE320	904	963	646	1064	1134	873	646	1134	931	52.5%	568	568
CE340-CE300	4986	4608	4510	5037	5089	4877	4510	5089	4851	11.9%	4490	4490
CE330-CE340	344	350	173	360	470	383	173	470	347	85.6%	304	304
CE350-CE300	-3397	-4203	-4207	-3601	-3390	-3328	-4207	-3328	-3688	23.8%	-3875	-3875
CE360-CE300	19665	19314	19261	19959	19867	19998	19261	19998	19677	3.7%	19246	19246
CE400-CE300	-3589	-3904	-3879	-3733		-3657	-3904	-3589	-3752	8.4%	-3871	-3871
CE410-CE300	-3555	-3082	-3056			-3567	-3567	-3056	-3315	15.4%	-3141	-3141
CE420-CE300	-2247	-2220	-1845	-2010		-1862	-2247	-1845	-2037	19.7%	-2224	-2224
CE430-CE300	-3096	-2818	-2944	-2973		-3252	-3252	-2818	-3017	14.4%	-2930	-2930
CE440-CE300	-1942	-1718	-1782	-1714		-1822	-1942	-1714	-1796	12.7%	-1787	-1787
CE500-CE300	-13296	-11933	-11933	-11711	-12653	-11932	-13296	-11711	-12243	12.9%	-11901	-11901
CE510-CE500	17218	18099	18100	17736	17414	17794	17218	18100	17727	5.0%	17995	17995
CE525-CE520	-4666	-4981	-4969	-4316	-4889	-4458	-4981	-4316	-4713	14.1%	-4853	-4853
CE530-CE500	-5057	-5277	-5285	-5293	-4880	-5263	-5293	-4880	-5176	8.0%	-5255	-5255
CE545-CE540	-3743	-4076	-4083	-2425	-3745	-3825	-4083	-2425	-3650	45.4%	-4079	-4079

Compressor (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	3986	4244	4244		4167	4177	3986	4244	4164	6.2%	4247	4247
CE320-CE300	4080	3681	3721		4076	4036	3681	4080	3919	10.2%	3891	3891
CE330-CE300	4946	4603	4352		5158	4899	4352	5158	4792	16.8%	4448	4448
CE330-CE320	867	922	631		1082	863	631	1082	873	51.6%	557	557
CE340-CE300	4609	4260	4172		4703	4524	4172	4703	4454	11.9%	4151	4151
CE330-CE340	337	343	180		455	375	180	455	338	81.4%	297	297
CE350-CE300	-3037	-3767	-3772		-3032	-2985	-3772	-2985	-3319	23.7%	-3470	-3470
CE360-CE300	17752	17430	17382		17927	18065	17382	18065	17711	3.9%	17366	17366
CE400-CE300	-3175	-3463	-3442			-3247	-3463	-3175	-3332	8.7%	-3435	-3435
CE410-CE300	-3149	-2746	-2723			-3191	-3191	-2723	-2952	15.9%	-2798	-2798
CE420-CE300	-1995	-1973	-1639			-1662	-1995	-1639	-1817	19.6%	-1977	-1977
CE430-CE300	-2755	-2510	-2622			-2910	-2910	-2510	-2699	14.8%	-2610	-2610
CE440-CE300	-1724	-1527	-1584			-1627	-1724	-1527	-1616	12.2%	-1588	-1588
CE500-CE300	-4499	-3096	-3095		-3912	-3354	-4499	-3095	-3591	39.1%	-3136	-3136
CE510-CE500	13806	14303	14304		13913	14230	13806	14304	14111	3.5%	14268	14268
CE525-CE520	-2963	-3241	-3233		-3148	-2742	-3241	-2742	-3066	16.3%	-3079	-3079
CE530-CE500	-4197	-4346	-4354		-4002	-4350	-4354	-4002	-4250	8.3%	-4306	-4306
CE545-CE540	-2399	-2713	-2720		-2413	-2449	-2720	-2399	-2539	12.6%	-2758	-2758

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-18. Delta Annual Space Cooling Electricity Consumptions (Fans)

Supply Fan (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE320-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE330-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE330-CE320	0	0	0	0	0	0	0	0	0	----	0	0
CE340-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE330-CE340	0	0	0	0	0	0	0	0	0	----	0	0
CE350-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE360-CE300	0	0	0	0	0	0	0	0	0	----	0	0
CE400-CE300	0	0	0	0		0	0	0	0	----	0	0
CE410-CE300	0	0	0			0	0	0	0	----	0	0
CE420-CE300	0	0	0	0		0	0	0	0	----	0	0
CE430-CE300	0	0	0	0		0	0	0	0	----	0	0
CE440-CE300	0	0	0	0		0	0	0	0	----	0	0
CE500-CE300	-8316	-8511	-8511	-8234	-8327	-8241	-8511	-8234	-8357	3.3%	-8436	-8436
CE510-CE500	1951	2262	2262	2034	2002	2038	1951	2262	2092	14.9%	2196	2196
CE525-CE520	-973	-988	-986	-839	-996	-979	-996	-839	-960	16.3%	-1033	-1033
CE530-CE500	-491	-536	-536	-538	-502	-522	-538	-491	-521	9.0%	-560	-560
CE545-CE540	-769	-757	-757	-438	-762	-787	-787	-438	-712	49.0%	-756	-756

Condenser Fan (kWh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	354	385	385		376	368	354	385	374	8.4%	386	386
CE320-CE300	346	314	316		348	358	314	358	337	13.1%	336	336
CE330-CE300	383	355	331		401	370	331	401	368	19.0%	347	347
CE330-CE320	37	41	15		53	12	12	53	32	128.8%	11	11
CE340-CE300	376	348	338		386	361	338	386	362	13.3%	340	340
CE330-CE340	7	7	-7		15	9	-7	15	6	352.1%	7	7
CE350-CE300	-360	-436	-435		-358	-353	-436	-353	-388	21.4%	-405	-405
CE360-CE300	1913	1884	1879		1940	1949	1879	1949	1913	3.7%	1879	1879
CE400-CE300	-414	-441	-437			-421	-441	-414	-428	6.3%	-436	-436
CE410-CE300	-406	-336	-333			-387	-406	-333	-366	20.1%	-342	-342
CE420-CE300	-252	-247	-206			-208	-252	-206	-228	20.1%	-247	-247
CE430-CE300	-341	-308	-322			-353	-353	-308	-331	13.6%	-320	-320
CE440-CE300	-218	-191	-198			-203	-218	-191	-203	13.4%	-199	-199
CE500-CE300	-481	-326	-327		-415	-347	-481	-326	-379	40.8%	-329	-329
CE510-CE500	1461	1534	1534		1499	1526	1461	1534	1511	4.8%	1531	1531
CE525-CE520	-729	-752	-750		-746	-733	-752	-729	-742	3.1%	-741	-741
CE530-CE500	-368	-395	-395		-376	-391	-395	-368	-385	7.0%	-389	-389
CE545-CE540	-576	-606	-606		-571	-589	-606	-571	-589	6.0%	-566	-566

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-19. Delta Annual Cooling Coil Loads

Sensible Coil Load (kWh,th)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	-405	504	508	-27	-24	-108	-405	508	75	1224.5%	511	511
CE320-CE300	6197	6900	6942	6791	6799	7543	6197	7543	6862	19.6%	7073	7073
CE330-CE300	6422	7514	7523	8527	7440	6631	6422	8527	7343	28.7%	8090	8090
CE330-CE320	224	614	581	1735	641	-912	-912	1735	480	550.9%	1016	1016
CE340-CE300	6371	7257	7306	7634	7171	6215	6215	7634	6992	20.3%	7397	7397
CE330-CE340	51	258	217	893	269	416	51	893	351	240.2%	693	693
CE350-CE300	-6291	-8112	-8128	-6707	-6621	-6423	-8128	-6291	-7047	26.1%	-7122	-7122
CE360-CE300	78315	79123	79135	80035	78996	79506	78315	80035	79185	2.2%	79421	79421
CE400-CE300	-14709	-14378	-14368	-14564		-14010	-14709	-14010	-14406	4.9%	-14388	-14388
CE410-CE300	-10985	-8138	-8145			-9606	-10985	-8138	-9219	30.9%	-8354	-8354
CE420-CE300	-6272	-6131	-5193	-5728		-5207	-6272	-5193	-5706	18.9%	-6170	-6170
CE430-CE300	-8798	-8066	-8351	-8513		-9048	-9048	-8066	-8555	11.5%	-8270	-8270
CE440-CE300	-5786	-5204	-5313	-5192		-5406	-5786	-5192	-5380	11.0%	-5280	-5280
CE500-CE300	-11618	-8147	-8159	-7761	-10335	-7661	-11618	-7661	-8947	44.2%	-8059	-8059
CE510-CE500	43046	45710	45710	45091	43051	45083	43046	45710	44615	6.0%	45697	45697
CE525-CE520	-131	-884	-882	-1057	-202	-949	-1057	-131	-684	135.4%	-869	-869
CE530-CE500	2	-1076	-1076	-547	0	-528	-1076	2	-538	200.6%	-1050	-1050
CE545-CE540	-130	-809	-809	-676	-202	-792	-809	-130	-570	119.1%	-1018	-1018

Latent Coil Load(kWh,th)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	19321	19607	19612	19156	19576	19111	19111	19612	19397	2.6%	19592	19592
CE320-CE300	13167	12173	12259	11974	12597	11157	11157	13167	12221	16.4%	12381	12381
CE330-CE300	18164	15932	16179	16367	18528	17119	15932	18528	17048	15.2%	16403	16403
CE330-CE320	4997	3760	3919	4393	5931	5962	3760	5962	4827	45.6%	4022	4022
CE340-CE300	15930	14488	14625	14757	15760	15279	14488	15930	15140	9.5%	14472	14472
CE330-CE340	2234	1445	1553	1610	2768	1840	1445	2768	1908	69.3%	1931	1931
CE350-CE300	-4748	-5435	-5529	-4821	-4264	-4446	-5529	-4264	-4874	26.0%	-5237	-5237
CE360-CE300	4232	3401	3427	3895	4459	4403	3401	4459	3970	26.7%	3427	3427
CE400-CE300	3075	2012	2101	2660		2650	2012	3075	2500	42.5%	2134	2134
CE410-CE300	-769	-2366	-2303			-2477	-2477	-769	-1979	86.3%	-2383	-2383
CE420-CE300	-1546	-1542	-1217	-1240		-1212	-1546	-1212	-1351	24.7%	-1534	-1534
CE430-CE300	-1872	-1577	-1722	-1663		-2010	-2010	-1577	-1769	24.5%	-1754	-1754
CE440-CE300	-930	-699	-798	-709		-823	-930	-699	-792	29.1%	-860	-860
CE500-CE300	-5452	-3141	-3141	-3986	-4304	-4983	-5452	-3141	-4168	55.5%	-3382	-3382
CE510-CE500	17485	17615	17615	17348	17488	17340	17340	17615	17482	1.6%	17490	17490
CE525-CE520	2	-288	-288	-58	-9	-42	-288	2	-114	255.0%	21	21
CE530-CE500	-18313	-18285	-18286	-18080	-18230	-18084	-18313	-18080	-18213	1.3%	-18229	-18229
CE545-CE540	-1	-81	-81	-9	-3	-2	-81	-1	-30	272.0%	0	0

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-20. Delta Various Annual Means (COP2, IDB)

COP2							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE310-CE300	0.166	0.180	0.180	0.155	0.171	0.150	0.150	0.180	0.167	18.0%	0.179	0.179
CE320-CE300	0.171	0.220	0.220	0.168	0.180	0.160	0.160	0.220	0.186	32.3%	0.206	0.206
CE330-CE300	0.242	0.256	0.299	0.253	0.271	0.230	0.230	0.299	0.259	26.7%	0.313	0.313
CE330-CE320	0.071	0.036	0.079	0.086	0.091	0.070	0.036	0.091	0.072	76.3%	0.107	0.107
CE340-CE300	0.205	0.240	0.258	0.210	0.223	0.190	0.190	0.258	0.221	30.9%	0.259	0.259
CE330-CE340	0.036	0.017	0.041	0.043	0.048	0.040	0.017	0.048	0.037	82.5%	0.054	0.054
CE350-CE300	0.000	0.003	-0.002	0.006	0.003	0.000	-0.002	0.006	0.002	498.6%	0.009	0.009
CE360-CE300	0.420	0.463	0.468	0.441	0.440	0.430	0.420	0.468	0.444	10.9%	0.477	0.477
CE400-CE300	0.001	0.014	0.015	0.009		0.030	0.001	0.030	0.014	210.3%	0.013	0.013
CE410-CE300	-0.010	-0.025	-0.027			-0.020	-0.027	-0.010	-0.020	84.0%	-0.028	-0.028
CE420-CE300	-0.023	-0.022	-0.020	-0.021		-0.020	-0.023	-0.020	-0.021	14.9%	-0.024	-0.024
CE430-CE300	-0.028	-0.025	-0.026	-0.026		-0.020	-0.028	-0.020	-0.025	33.0%	-0.026	-0.026
CE440-CE300	-0.018	-0.015	-0.015	-0.016		-0.010	-0.018	-0.010	-0.015	51.9%	-0.016	-0.016
CE500-CE300	-0.045	-0.010	-0.011	-0.024	-0.034	-0.030	-0.045	-0.010	-0.026	135.4%	-0.011	-0.011
CE510-CE500	0.409	0.416	0.416	0.408	0.397	0.410	0.397	0.416	0.409	4.6%	0.418	0.418
CE525-CE520	0.582	0.574	0.572	0.504	0.606	0.490	0.490	0.606	0.555	21.0%	0.564	0.564
CE530-CE500	-0.242	-0.258	-0.257	-0.214	-0.276	-0.220	-0.276	-0.214	-0.245	25.5%	-0.263	-0.263
CE545-CE540	0.560	0.559	0.560	0.334	0.546	0.510	0.334	0.560	0.511	44.3%	0.550	0.550
IDB (°C)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE310-CE300	0.13	0.06	0.00	0.00	0.01	0.02	0.00	0.13	0.04	364.3%	0.02	0.02
CE320-CE300	0.28	0.33	0.33	0.16	0.25	0.54	0.16	0.54	0.32	119.3%	0.29	0.29
CE330-CE300	0.26	0.22	0.22	0.18	0.21	0.19	0.18	0.26	0.21	34.0%	0.13	0.13
CE330-CE320	-0.02	-0.11	-0.11	0.02	-0.03	-0.35	-0.35	0.02	-0.10	365.4%	-0.16	-0.16
CE340-CE300	0.25	0.22	0.22	0.21	0.23	0.22	0.21	0.25	0.23	19.5%	0.15	0.15
CE330-CE340	0.00	0.00	0.00	-0.02	-0.01	-0.03	-0.03	0.00	-0.01	319.0%	-0.02	-0.02
CE350-CE300	2.04	2.11	2.11	2.15	2.19	2.16	2.04	2.19	2.13	7.1%	2.02	2.02
CE360-CE300	1.74	1.56	1.50	1.23	1.40	1.38	1.23	1.74	1.47	34.6%	1.55	1.55
CE400-CE300	0.50	0.00	0.00	0.00		0.00	0.00	0.50	0.10	498.8%	0.01	0.01
CE410-CE300	0.50	0.00	0.00			0.00	0.00	0.50	0.12	400.0%	0.00	0.00
CE420-CE300	0.30	0.00	0.00	0.00		0.00	0.00	0.30	0.06	500.3%	0.00	0.00
CE430-CE300	0.37	0.00	0.00	0.00		0.00	0.00	0.37	0.07	500.3%	0.00	0.00
CE440-CE300	0.29	0.00	0.00	0.00		0.00	0.00	0.29	0.06	500.2%	0.00	0.00
CE500-CE300	-3.39	-3.39	-3.50	-3.71	-2.98	-1.13	-3.71	-1.13	-3.02	85.5%	-0.94	-0.94
CE510-CE500	1.24	0.11	0.11	-0.02	0.00	0.00	-0.02	1.24	0.24	526.6%	0.14	0.14
CE525-CE520	13.33	13.61	13.56	13.53	13.63	15.80	13.33	15.80	13.91	17.8%	18.29	18.29
CE530-CE500	-0.21	-0.06	0.00	0.21	0.00	0.00	-0.21	0.21	-0.01	4302.5%	-2.54	-2.54
CE545-CE540	13.32	13.56	13.56	13.52	13.58	15.71	13.32	15.71	13.87	17.3%	13.64	13.64

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-21. Delta Various Annual Means (Zone Humidity, Relative Humidity)

Humidity Ratio (kg/kg)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0.0020	0.0021	0.0021	0.0020	0.0020	0.0019	0.0019	0.0021	0.0020	9.9%	0.0021	0.0021
CE320-CE300	0.0009	0.0009	0.0009	0.0008	0.0009	0.0007	0.0007	0.0009	0.0009	25.7%	0.0008	0.0008
CE330-CE300	0.0007	0.0007	0.0007	0.0007	0.0006	0.0007	0.0006	0.0007	0.0007	9.3%	0.0007	0.0007
CE330-CE320	-0.0002	-0.0002	-0.0002	-0.0001	-0.0002	0.0000	-0.0002	0.0000	-0.0002	143.9%	-0.0002	-0.0002
CE340-CE300	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	4.1%	0.0007	0.0007
CE330-CE340	-0.0001	0.0000	0.0000	0.0000	-0.0001	0.0000	-0.0001	0.0000	0.0000	277.9%	0.0000	0.0000
CE350-CE300	0.0006	0.0008	0.0008	0.0006	0.0006	0.0006	0.0006	0.0008	0.0007	34.2%	0.0007	0.0007
CE360-CE300	-0.0006	-0.0005	-0.0005	-0.0005	-0.0006	-0.0006	-0.0006	-0.0005	-0.0006	22.0%	-0.0005	-0.0005
CE400-CE300	0.0007	0.0008	0.0008	0.0008		0.0008	0.0007	0.0008	0.0008	8.7%	0.0008	0.0008
CE410-CE300	0.0007	0.0003	0.0003			0.0003	0.0003	0.0007	0.0004	94.5%	0.0003	0.0003
CE420-CE300	0.0002	0.0002	0.0002	0.0002		0.0001	0.0001	0.0002	0.0002	58.3%	0.0002	0.0002
CE430-CE300	0.0002	0.0002	0.0002	0.0002		0.0002	0.0002	0.0002	0.0002	19.7%	0.0002	0.0002
CE440-CE300	0.0001	0.0001	0.0001	0.0000		0.0000	0.0000	0.0001	0.0001	148.5%	0.0001	0.0001
CE500-CE300	0.0007			0.0001	0.0010	0.0015	0.0001	0.0015	0.0008	169.4%	-0.0026	-0.0026
CE510-CE500	0.0004			0.0000	0.0000	0.0000	0.0000	0.0004	0.0001	394.2%	0.0001	0.0001
CE525-CE520	0.0070			0.0078	0.0070	0.0075	0.0070	0.0078	0.0073	10.9%	0.0053	0.0053
CE530-CE500	-0.0035			-0.0027	-0.0044	-0.0040	-0.0044	-0.0027	-0.0037	48.0%	-0.0022	-0.0022
CE545-CE540	0.0018			0.0024	0.0029	0.0026	0.0018	0.0029	0.0024	46.8%	0.0033	0.0033

Relative Humidity (%)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	9.72	10.25	10.25	9.96	10.01	9.87	9.72	10.25	10.01	5.3%	10.28	10.28
CE320-CE300	3.39	2.95	2.97	3.25	3.28	2.01	2.01	3.39	2.97	46.4%	3.10	3.10
CE330-CE300	2.23	2.32	2.37	2.59	2.26	2.77	2.23	2.77	2.42	22.3%	2.56	2.56
CE330-CE320	-1.16	-0.63	-0.60	-0.66	-1.02	0.76	-1.16	0.76	-0.55	347.8%	-0.54	-0.54
CE340-CE300	2.47	2.43	2.45	2.56	2.47	2.85	2.43	2.85	2.54	16.5%	2.63	2.63
CE330-CE340	-0.24	-0.11	-0.08	0.03	-0.21	-0.08	-0.24	0.03	-0.12	232.7%	-0.08	-0.08
CE350-CE300	-3.13	-2.81	-2.73	-3.42	-3.51	-3.37	-3.51	-2.73	-3.16	24.7%	-2.76	-2.76
CE360-CE300	-7.58	-6.77	-6.79	-6.22	-6.96	-6.72	-7.58	-6.22	-6.84	19.9%	-6.79	-6.79
CE400-CE300	2.16	3.95	3.97	3.96		4.08	2.16	4.08	3.62	53.1%	4.02	4.02
CE410-CE300	1.88	1.39	1.35			1.82	1.35	1.88	1.61	33.0%	1.38	1.38
CE420-CE300	0.16	0.88	0.69	0.81		0.83	0.16	0.88	0.67	106.1%	0.87	0.87
CE430-CE300	0.21	0.91	1.02	1.01		1.24	0.21	1.24	0.88	117.8%	1.01	1.01
CE440-CE300	-0.29	0.20	0.29	0.24		0.30	-0.29	0.30	0.15	394.1%	0.29	0.29
CE500-CE300	17.91			10.61	18.12	15.80	10.61	18.12	15.61	48.1%	-14.55	-14.55
CE510-CE500	-2.35			0.11	-0.01	0.11	-2.35	0.11	-0.53	461.4%	-0.04	-0.04
CE525-CE520	-8.41			-6.41	-10.09	-14.80	-14.80	-6.41	-9.93	84.5%	-14.99	-14.99
CE530-CE500	-19.80			-10.22	-24.49	-24.13	-24.49	-10.22	-19.66	72.6%	-10.91	-10.91
CE545-CE540	-11.90			-7.68	-3.18	-14.62	-14.62	-3.18	-9.34	122.5%	-11.27	-11.27

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-22. Delta Hourly Integrated Maximum Total Consumptions

Total Consumption (Wh,e)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	968	1019	993	641	721	614	614	1019	826	49.0%	1083	1083
CE320-CE300	1402	1352	1379	1055	1172	1327	1055	1402	1281	27.1%	1519	1519
CE330-CE300	1721	1648	1805	1414	1535	1787	1414	1805	1652	23.7%	1989	1989
CE330-CE320	319	296	426	360	363	460	296	460	371	44.3%	470	470
CE340-CE300	1555	1594	1588	1234	1345	1553	1234	1594	1478	24.3%	1789	1789
CE330-CE340	166	54	217	180	190	234	54	234	173	103.8%	200	200
CE350-CE300	1	90	0	0	0	-2	-2	90	15	621.2%	306	306
CE360-CE300	1143	1172	1124	844	931	1214	844	1214	1071	34.5%	1271	1271
CE400-CE300	2	0	75	0		-29	-29	75	10	1087.2%	44	44
CE410-CE300	2	0	0			1	0	2	1	258.7%	0	0
CE420-CE300	0	0	0	0		0	0	0	0	----	0	0
CE430-CE300	0	0	0	0		0	0	0	0	500.0%	0	0
CE440-CE300	0	0	0	0		-87	-87	0	-17	500.0%	0	0
CE500-CE300	-1460	-1133	-1177	-1501	-1755	-1274	-1755	-1133	-1383	45.0%	-1180	-1180
CE510-CE500	1038	1159	1162	1011	1009	1070	1009	1162	1075	14.2%	1372	1372
CE525-CE520	-1669	-1451	-1483	-1531	-1625	-1099	-1669	-1099	-1476	38.6%	-952	-952
CE530-CE500	-2138	-2372	-2370	-2228	-2185	-2185	-2372	-2138	-2246	10.4%	-2365	-2365
CE545-CE540	-1494	-1593	-1593	-915	-1495	-1514	-1593	-915	-1434	47.3%	-1542	-1542

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

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Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-23. Delta Hourly Integrated Maximum Coil Loads (Total, Sensible)

Sensible + Latent Coil Load (Wh,th)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	5154	5349	5578	4393	4759	4919	4393	5578	5025	23.6%	5891	5891
CE320-CE300	8144	22412	22368	7032	7402	7848	7032	22412	12534	122.7%	16588	16588
CE330-CE300	11318	12227	33117	10712	11476	10343	10343	33117	14865	153.2%	27760	27760
CE330-CE320	3174	-10185	10749	3680	4074	2495	-10185	10749	2331	898.0%	11172	11172
CE340-CE300	9478	19418	28094	8595	8864	9060	8595	28094	13918	140.1%	21604	21604
CE330-CE340	1840	-7191	5023	2117	2612	1283	-7191	5023	947	1289.3%	6156	6156
CE350-CE300	-82	0	-1	0	0	5	-82	5	-13	669.0%	1135	1135
CE360-CE300	6683	9212	9564	5726	5820	6379	5726	9564	7231	53.1%	10672	10672
CE400-CE300	9005	9142	18383	7995		8702	7995	18383	10645	97.6%	19714	19714
CE410-CE300	-82	0	0			1	-82	1	-20	409.8%	0	0
CE420-CE300	0	0	0	0		0	0	0	0	----	0	0
CE430-CE300	0	0	0	0		0	0	0	0	500.0%	0	0
CE440-CE300	0	0	0	0		-295	-295	0	-59	500.0%	0	0
CE500-CE300	-4689	-3694	-3749	-5087	-5935	-4517	-5935	-3694	-4612	48.6%	-4009	-4009
CE510-CE500	3108	3481	3482	3531	3381	3542	3108	3542	3421	12.7%	4522	4522
CE525-CE520	410	-412	-412	-76	8	-881	-881	410	-227	568.4%	2151	2151
CE530-CE500	-7651	-8131	-8131	-8008	-7791	-7929	-8131	-7651	-7940	6.0%	-8039	-8039
CE545-CE540	500	-291	-292	-187	-30	-302	-302	500	-100	800.3%	-309	-309

Sensible Coil Load (Wh,th)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	-183	-123	-86	-254	-379	-259	-379	-86	-214	136.9%	-306	-306
CE320-CE300	8038	7916	7867	8441	7677	8059	7677	8441	8000	9.6%	8183	8183
CE330-CE300	9949	10207	11285	11234	10540	10513	9949	11285	10621	12.6%	11870	11870
CE330-CE320	1911	2291	3418	2793	2863	2454	1911	3418	2622	57.5%	3688	3688
CE340-CE300	9552	8883	8881	9357	9483	9272	8881	9552	9238	7.3%	9776	9776
CE330-CE340	397	1324	2404	1877	1057	1241	397	2404	1383	145.1%	2095	2095
CE350-CE300	0	0	0	0	0	-32	-32	0	-5	603.8%	1022	1022
CE360-CE300	8783	8908	8860	9090	8524	9271	8524	9271	8906	8.4%	9935	9935
CE400-CE300	0	0	0	0		-31	-31	0	-6	503.2%	0	0
CE410-CE300	-12	0	0			-15	-15	0	-7	224.7%	0	0
CE420-CE300	0	0	0	0		-15	-15	0	-3	500.0%	0	0
CE430-CE300	0	0	0	0		-15	-15	0	-3	500.0%	0	0
CE440-CE300	0	0	0	0		-33	-33	0	-7	500.0%	0	0
CE500-CE300	-3728	-3194	-3197	-3682	-4681	-3090	-4681	-3090	-3595	44.3%	-3585	-3585
CE510-CE500	2180	2504	2505	2441	2345	2451	2180	2505	2404	13.5%	3570	3570
CE525-CE520	287	-309	-304	-336	-210	-717	-717	287	-265	379.1%	2151	2151
CE530-CE500	285	-433	-433	-211	0	-192	-433	285	-164	437.9%	-418	-418
CE545-CE540	500	-291	-292	-187	-35	-302	-302	500	-101	793.7%	-309	-309

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-24. Delta Hourly Integrated Maximum Coil Loads (Latent)

Latent Coil Load (Wh,th)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE310-CE300	6271	5835	5876	6040	5737	5685	5685	6271	5907	9.9%	5939	5939
CE320-CE300	13512	22193	22109	11961	11322	11537	11322	22193	15439	70.4%	16976	16976
CE330-CE300	18190	17637	31415	16899	17809	17096	16899	31415	19841	73.2%	26250	26250
CE330-CE320	4678	-4556	9306	4939	6487	5559	-4556	9306	4402	314.9%	9274	9274
CE340-CE300	15213	21147	26617	13676	13850	13402	13402	26617	17318	76.3%	20880	20880
CE330-CE340	2977	-3510	4798	3223	3959	3694	-3510	4798	2523	329.2%	5371	5371
CE350-CE300	116	-1	-1	1	380	1211	-1	1211	284	426.5%	135	135
CE360-CE300	-361	722	942	-1715	-1516	-1458	-1715	942	-564	470.9%	771	771
CE400-CE300	17440	16274	23002	16082		16253	16082	23002	17810	38.9%	22058	22058
CE410-CE300	1503	0	-3			-15	-15	1503	371	408.9%	0	0
CE420-CE300	115	0	0	0		2	0	115	23	491.5%	0	0
CE430-CE300	0	1801	1707	839		2	0	1801	870	207.1%	6899	6899
CE440-CE300	0	0	-3	0		-253	-253	0	-51	494.1%	0	0
CE500-CE300	-1670	-1571	-1661	-2396	-2570	-2630	-2630	-1571	-2083	50.8%	-1848	-1848
CE510-CE500	927	990	990	1116	1045	1112	927	1116	1030	18.3%	952	952
CE525-CE520	123	-122	-122	249	212	-144	-144	249	33	1201.2%	0	0
CE530-CE500	-7965	-7733	-7733	-7838	-7626	-7726	-7965	-7626	-7770	4.4%	-7621	-7621
CE545-CE540	-627	0	0	-1655	-841	-1181	-1655	0	-717	230.7%	0	0

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-25. Delta Hourly Integrated Maximum and Minimum COP2

Maximum COP2							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	-0.025	0.272	0.271	0.248	0.257	0.240	-0.025	0.272	0.210	141.1%	0.286	
CE320-CE300	0.000	1.274	1.110	0.014	0.073	0.500	0.000	1.274	0.495	257.3%	0.654	
CE330-CE300	0.000	0.240	1.738	0.146	0.251	0.170	0.000	1.738	0.424	409.6%	0.654	
CE330-CE320	0.000	-1.034	0.628	0.132	0.179	-0.330	-1.034	0.628	-0.071	2344.2%	0.000	
CE340-CE300	0.000	0.752	1.482	0.061	0.147	0.070	0.000	1.482	0.419	354.0%	1.103	
CE330-CE340	0.000	-0.512	0.256	0.085	0.105	0.100	-0.512	0.256	0.006	13685.7%	-0.449	
CE350-CE300	0.000	0.020	0.006	0.630	0.061	0.000	0.000	0.630	0.120	526.8%	0.050	
CE360-CE300	0.233	0.559	0.570	0.530	0.561	0.560	0.233	0.570	0.502	67.2%	0.526	
CE400-CE300	-0.091	0.219	0.919	0.146		0.170	-0.091	0.919	0.273	370.7%	1.307	
CE410-CE300	-0.280	0.034	-0.002			-0.040	-0.280	0.034	-0.072	436.1%	-0.114	
CE420-CE300	-0.387	-0.062	-0.098	-0.104		0.060	-0.387	0.060	-0.118	378.3%	-0.157	
CE430-CE300	-0.387	-0.064	-0.098	-0.133		0.050	-0.387	0.050	-0.126	346.0%	-0.007	
CE440-CE300	-0.285	-0.095	-0.098	-0.123		-0.070	-0.285	-0.070	-0.134	160.0%	-0.114	
CE500-CE300	0.107	3.498	1.444	0.273	0.314	0.260	0.107	3.498	0.983	345.1%	2.747	
CE510-CE500	0.417	0.000	0.000	0.487	0.505	0.390	0.000	0.505	0.300	168.4%	0.188	
CE525-CE520	0.904	1.429	1.379	0.766	0.836	0.560	0.560	1.429	0.979	88.8%	0.252	
CE530-CE500	-0.269	-3.386	-1.451	-0.273	-0.345	-0.260	-3.386	-0.260	-0.997	313.5%	-2.172	
CE545-CE540	0.794	0.819	0.973	0.470	0.490	0.480	0.470	0.973	0.671	74.9%	2.527	

Minimum COP2							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0.072	0.052	0.050	0.111	0.087	0.060	0.050	0.111	0.072	84.8%	0.050	
CE320-CE300	0.032	0.003	0.004	0.060	0.029	0.020	0.003	0.060	0.025	231.0%	0.005	
CE330-CE300	0.032	0.000	0.000	0.063	0.038	0.030	0.000	0.063	0.027	231.1%	0.005	
CE330-CE320	0.000	-0.003	-0.004	0.003	0.009	0.010	-0.004	0.010	0.002	584.2%	0.000	
CE340-CE300	0.032	0.000	0.000	0.063	0.038	0.030	0.000	0.063	0.027	231.1%	0.000	
CE330-CE340	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	----	0.005	
CE350-CE300	-0.003	0.000	0.000	0.000	0.000	0.000	-0.003	0.000	0.000	742.2%	-0.034	
CE360-CE300	0.032	0.001	0.000	0.063	0.038	0.030	0.000	0.063	0.027	229.7%	0.001	
CE400-CE300	-0.011	-0.064	-0.066	0.000		0.000	-0.066	0.000	-0.028	233.8%	-0.058	
CE410-CE300	-0.007	0.000	0.000			0.000	-0.007	0.000	-0.002	400.0%	-0.007	
CE420-CE300	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	----	0.000	
CE430-CE300	-0.022	-0.064	-0.066	0.000		0.000	-0.066	0.000	-0.030	217.2%	-0.058	
CE440-CE300	-0.011	-0.064	-0.066	0.000		0.000	-0.066	0.000	-0.028	234.7%	-0.058	
CE500-CE300	-0.108	-0.105	-0.149	-0.076	-0.119	-0.100	-0.149	-0.076	-0.110	66.6%	-0.113	
CE510-CE500	0.203	0.124	0.000	0.160	0.215	0.190	0.000	0.215	0.149	144.8%	0.000	
CE525-CE520	0.469	0.476	0.420	0.408	0.561	0.430	0.408	0.561	0.461	33.2%	0.443	
CE530-CE500	-0.184	-0.198	-0.154	-0.173	-0.193	-0.190	-0.198	-0.154	-0.182	24.2%	-0.153	
CE545-CE540	0.479	0.459	0.460	0.277	0.549	0.440	0.277	0.549	0.444	61.2%	0.438	

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-26. Delta Hourly Integrated Maximum and Minimum IDB

Maximum IDB (°C)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE310-CE300	0.88	1.78	1.61	1.47	1.57	1.00	0.88	1.78	1.39	65.1%	0.65	0.65
CE320-CE300	6.16	6.50	6.39	6.71	7.27	5.46	5.46	7.27	6.41	28.2%	5.75	5.75
CE330-CE300	6.03	6.61	6.89	6.07	6.85	5.11	5.11	6.89	6.26	28.4%	5.75	6.96
CE330-CE320	-0.13	0.11	0.50	-0.64	-0.42	-0.35	-0.64	0.50	-0.15	736.8%	0.00	1.22
CE340-CE300	6.11	6.50	6.45	6.50	7.10	5.39	5.39	7.10	6.34	27.0%	7.11	7.11
CE330-CE340	-0.07	0.11	0.44	-0.43	-0.25	-0.28	-0.43	0.44	-0.08	1078.3%	-1.37	-0.15
CE350-CE300	8.38	9.83	9.83	10.00	9.95	8.81	8.38	10.00	9.47	17.1%	9.80	9.80
CE360-CE300	7.56	7.67	7.45	7.51	7.95	6.94	6.94	7.95	7.51	13.4%	6.97	6.97
CE400-CE300	0.91	2.45	3.72	1.91		-0.15	-0.15	3.72	1.77	218.8%	1.44	1.44
CE410-CE300	0.63	0.00	0.00			0.00	0.00	0.63	0.16	400.0%	0.00	0.00
CE420-CE300	0.00	0.00	0.00	0.00		0.04	0.00	0.04	0.01	500.0%	0.00	0.00
CE430-CE300	1.00	0.00	0.00	0.00		0.26	0.00	1.00	0.25	396.6%	0.00	0.00
CE440-CE300	0.85	0.00	0.00	0.00		0.07	0.00	0.85	0.18	461.5%	0.00	0.00
CE500-CE300	-0.39	0.00	0.00	0.00	-0.03	-1.19	-1.19	0.00	-0.27	441.5%	-0.04	-0.04
CE510-CE500	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.05	600.0%	0.05	0.05
CE525-CE520	19.96	18.95	19.12	20.00	19.02	16.38	16.38	20.00	18.90	19.1%	19.93	19.93
CE530-CE500	0.31	-0.05	-0.05	0.00	0.00	0.00	-0.05	0.31	0.04	1025.2%	-0.06	-0.06
CE545-CE540	19.53	19.89	19.89	20.00	19.95	20.00	19.53	20.00	19.88	2.4%	19.93	19.93

Minimum IDB (°C)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013 GBS Sep 2013	GBS v3.4 GBS v3.4
CE310-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.00	0.00
CE320-CE300	0.00	1.94	1.95	-0.96	0.00	0.00	-0.96	1.95	0.49	597.5%	1.12	1.12
CE330-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	1.12	-2.29
CE330-CE320	0.00	-1.94	-1.95	0.96	0.00	0.00	-1.95	0.96	-0.49	596.8%	0.00	-3.40
CE340-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	-2.27	-2.27
CE330-CE340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----	3.39	-0.01
CE350-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----	-2.27	-2.27
CE360-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.04	0.04
CE400-CE300	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	500.0%	0.00	0.00
CE410-CE300	0.00	0.00	0.00			0.00	0.00	0.00	0.00	----	0.00	0.00
CE420-CE300	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	500.0%	0.00	0.00
CE430-CE300	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	500.0%	0.00	0.00
CE440-CE300	0.00	0.00	0.00	0.00		0.01	0.00	0.01	0.00	500.0%	0.00	0.00
CE500-CE300	0.50	-0.72	-0.89	0.22	0.54	17.05	-0.89	17.05	2.78	644.6%	5.15	5.15
CE510-CE500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.00	0.00
CE525-CE520	0.14	0.06	0.05	0.18	0.03	19.44	0.03	19.44	3.32	585.3%	16.03	16.03
CE530-CE500	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	533.6%	-15.38	-15.38
CE545-CE540	0.22	0.06	0.05	0.18	0.03	18.06	0.03	18.06	3.10	581.6%	-12.84	-12.84

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-27. Delta Hourly Integrated Maximum and Minimum Zone Humidity Ratio

Maximum Humidity Ratio (kg/kg)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0.0025	0.0050	0.0052	0.0020	0.0020	0.0023	0.0020	0.0052	0.0032	102.1%	0.0032	0.0032
CE320-CE300	0.0047	0.0039	0.0039	0.0042	0.0041	0.0043	0.0039	0.0047	0.0042	19.9%	0.0040	0.0040
CE330-CE300	0.0044	0.0040	0.0040	0.0043	0.0036	0.0043	0.0036	0.0044	0.0041	19.0%	0.0040	0.0042
CE330-CE320	-0.0004	0.0001	0.0001	0.0001	-0.0005	0.0000	-0.0005	0.0001	-0.0001	696.5%	0.0000	0.0001
CE340-CE300	0.0046	0.0039	0.0037	0.0042	0.0038	0.0043	0.0037	0.0046	0.0041	21.8%	0.0039	0.0039
CE330-CE340	-0.0002	0.0001	0.0003	0.0001	-0.0002	0.0000	-0.0002	0.0003	0.0000	3174.2%	0.0001	0.0002
CE350-CE300	0.0035	0.0061	0.0062	0.0036	0.0030	0.0032	0.0030	0.0062	0.0043	74.6%	0.0063	0.0063
CE360-CE300	0.0001	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0002	0.0001	366.5%	0.0000	0.0000
CE400-CE300	0.0037	0.0032	0.0033	0.0033		0.0039	0.0032	0.0039	0.0035	20.2%	0.0032	0.0032
CE410-CE300	0.0036	0.0031	0.0032			0.0039	0.0031	0.0039	0.0034	23.3%	0.0032	0.0032
CE420-CE300	0.0010	0.0009	0.0004	0.0010		0.0013	0.0004	0.0013	0.0009	98.3%	0.0010	0.0010
CE430-CE300	0.0029	0.0018	0.0019	0.0025		0.0024	0.0018	0.0029	0.0023	49.6%	0.0018	0.0018
CE440-CE300	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	500.0%	0.0000	0.0000
CE500-CE300	-0.0016	-0.0019	-0.0019	-0.0019	-0.0017	-0.0019	-0.0019	-0.0016	-0.0018	20.6%	0.0002	0.0002
CE510-CE500	0.0002	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	352.6%	0.0000	0.0000
CE525-CE520	0.0104	0.0103	0.0102	0.0115	0.0101	0.0067	0.0067	0.0115	0.0099	48.3%	0.0107	0.0107
CE530-CE500	-0.0047	-0.0038	-0.0037	-0.0049	-0.0062	-0.0047	-0.0062	-0.0037	-0.0047	53.9%	-0.0047	-0.0047
CE545-CE540	0.0009	0.0072	0.0059	0.0000	0.0034	0.0013	0.0000	0.0072	0.0031	230.7%	0.0098	0.0098

Minimum Humidity Ratio (kg/kg)							Statistics, All Results					
Case	TRNSYS TUD	DOE-2.2 NREL	DOE21E-E NREL	EnergyPlus GARD	CODYRUN UR	HOT3000 NRCan	Min	Max	Mean	(Max-Min) /Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001	0.0000	646.4%	0.0000	0.0000
CE320-CE300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	600.0%	0.0000	0.0000
CE330-CE300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	600.0%	0.0000	0.0000
CE330-CE320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	600.0%	0.0000	0.0000
CE340-CE300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	600.0%	0.0000	0.0000
CE330-CE340	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	----	0.0000	0.0000
CE350-CE300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	----	0.0000	0.0000
CE360-CE300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	600.0%	0.0000	0.0000
CE400-CE300	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	500.0%	0.0000	0.0000
CE410-CE300	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	----	0.0000	0.0000
CE420-CE300	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	500.0%	0.0000	0.0000
CE430-CE300	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	500.0%	0.0000	0.0000
CE440-CE300	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	500.0%	0.0000	0.0000
CE500-CE300	0.0050			0.0051	0.0049	0.0083	0.0049	0.0083	0.0058	58.2%	-0.0017	-0.0017
CE510-CE500	0.0000			0.0000	0.0000	0.0002	0.0000	0.0002	0.0001	400.0%	0.0000	0.0000
CE525-CE520	0.0007			0.0005	0.0004	0.0088	0.0004	0.0088	0.0026	322.8%	0.0000	0.0000
CE530-CE500	-0.0006			-0.0003	-0.0015	-0.0037	-0.0037	-0.0003	-0.0015	226.1%	0.0000	0.0000
CE545-CE540	0.0021			0.0030	0.0034	0.0028	0.0021	0.0034	0.0028	47.3%	0.0000	0.0000

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results
By Autodesk (GBS Sep 2013), 08-Sep-2013.

Note: The statistics in the tables below are based on the Standard 140 informative example results.
These statistics do not have any substantial importance and are not to be interpreted as acceptance criteria.

Table B16.5.2-28. Delta Hourly Integrated Maximum and Minimum Zone Relative Humidity

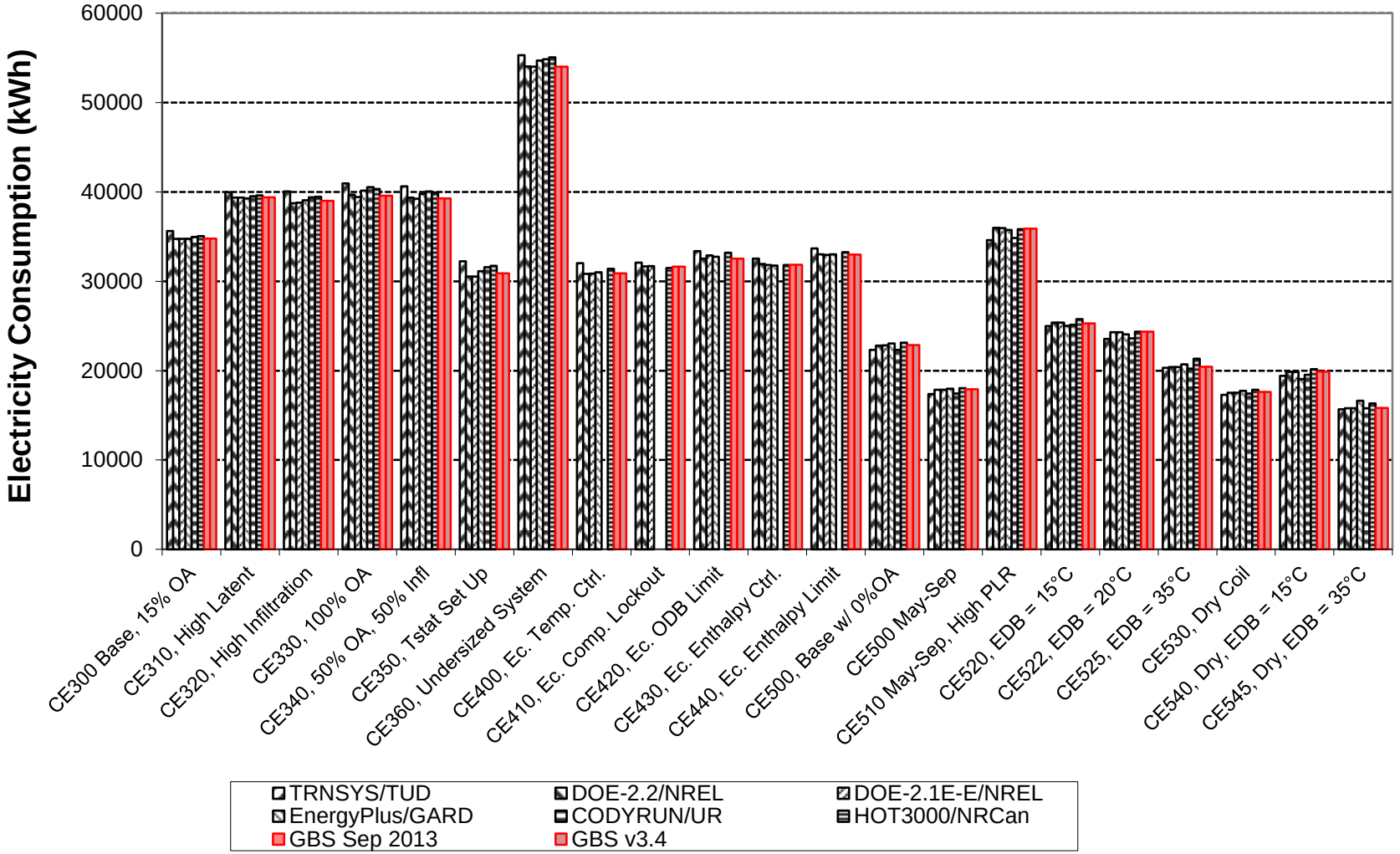
Maximum Relative Humidity (%)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	8.91	30.83	31.85	10.28	9.00	10.75	8.91	31.85	16.94	135.4%	23.51	23.51
CE320-CE300	13.05	14.06	14.82	14.60	15.00	14.44	13.05	15.00	14.33	13.6%	15.66	15.66
CE330-CE300	7.87	9.11	9.09	8.51	8.00	11.26	7.87	11.26	8.97	37.8%	15.66	9.90
CE330-CE320	-5.18	-4.95	-5.73	-6.09	-7.00	-3.18	-7	-3	-5.35	71.3%	0.00	-5.76
CE340-CE300	11.14	12.02	12.41	12.43	12.00	12.81	11	13	12.13	13.8%	11.80	11.80
CE330-CE340	-3.27	-2.91	-3.32	-3.92	-4.00	-1.55	-4	-2	-3.16	77.5%	3.86	-1.90
CE350-CE300	0.00	11.77	12.27	0.00	2.00	5.21	0.00	12.27	5.21	235.6%	12.06	12.06
CE360-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	-0.05	-0.05
CE400-CE300	14.96	16.22	16.72	16.27		18.87	14.96	18.87	16.61	23.5%	15.94	15.94
CE410-CE300	14.44	15.44	15.94			18.74	14.44	18.74	16.14	26.7%	15.94	15.94
CE420-CE300	2.05	5.16	2.68	4.92		6.41	2.05	6.41	4.24	102.7%	5.20	5.20
CE430-CE300	11.92	9.08	9.58	12.38		11.50	9.08	12.38	10.89	30.3%	8.55	8.55
CE440-CE300	-0.06	0.00	0.00	0.00		0.07	-0.06	0.07	0.00	13500.0%	0.00	0.00
CE500-CE300	31.21			31.63	32.00	-7.36	-7.36	32.00	21.87	180.0%	1.86	1.86
CE510-CE500	0.00			0.00	0.00	-2.57	-2.57	0.00	-0.64	400.0%	0.12	0.12
CE525-CE520	9.77			6.19	5.00	-20.65	-20.65	9.77	0.08	39706.5%	-38.70	-38.70
CE530-CE500	-8.96			-3.84	-21.00	-24.07	-24.07	-3.84	-14.47	139.8%	-23.50	-23.50
CE545-CE540	29.60			41.06	50.00	-15.82	-15.82	50.00	26.21	251.1%	-6.78	-6.78

Minimum Relative Humidity (%)							Statistics, All Results					
	TRNSYS	DOE-2.2	DOE21E-E	EnergyPlus	CODYRUN	HOT3000				(Max-Min)	GBS Sep 2013	GBS v3.4
Case	TUD	NREL	NREL	GARD	UR	NRCan	Min	Max	Mean	/Mean*	GBS Sep 2013	GBS v3.4
CE310-CE300	0.06	0.00	0.00	1.10	1.00	0.99	0.00	1.10	0.52	209.6%	0.00	0.00
CE320-CE300	0.00	0.00	0.00	0.24	0.00	-2.02	-2.02	0.24	-0.30	761.2%	0.00	0.00
CE330-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.00	0.00
CE330-CE320	0.00	0.00	0.00	-0.24	0.00	2.02	-0.24	2.02	0.30	761.1%	0.00	0.00
CE340-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.00	0.00
CE330-CE340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----	0.00	0.00
CE350-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----	0.00	0.00
CE360-CE300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0%	0.00	0.00
CE400-CE300	-0.12	0.00	0.00	-0.48		-0.37	-0.48	0.00	-0.19	246.0%	0.00	0.00
CE410-CE300	-0.12	0.00	0.00			-0.36	-0.36	0.00	-0.12	298.7%	0.00	0.00
CE420-CE300	-0.12	0.00	0.00	-0.48		-0.35	-0.48	0.00	-0.19	251.4%	0.00	0.00
CE430-CE300	-0.12	0.00	0.00	-0.48		-0.36	-0.48	0.00	-0.19	248.3%	0.00	0.00
CE440-CE300	-0.12	0.00	0.00	-0.48		-0.40	-0.48	0.00	-0.20	238.1%	0.00	0.00
CE500-CE300	40.07			40.76	39.00	37.89	37.89	40.76	39.43	7.3%	-12.38	-12.38
CE510-CE500	-1.32			0.12	0.00	0.32	-1.32	0.32	-0.22	747.8%	0.00	0.00
CE525-CE520	-15.74			-13.87	-17.00	-17.50	-17.50	-13.87	-16.03	22.6%	0.00	0.00
CE530-CE500	-23.81			-21.14	-26.00	-19.15	-26.00	-19.15	-22.53	30.4%	0.00	0.00
CE545-CE540	-19.35			-16.77	-12.00	-19.60	-19.60	-12.00	-16.93	44.9%	0.00	0.00

* ABS[(Max-Min) / (Mean of Example Simulation Results)]

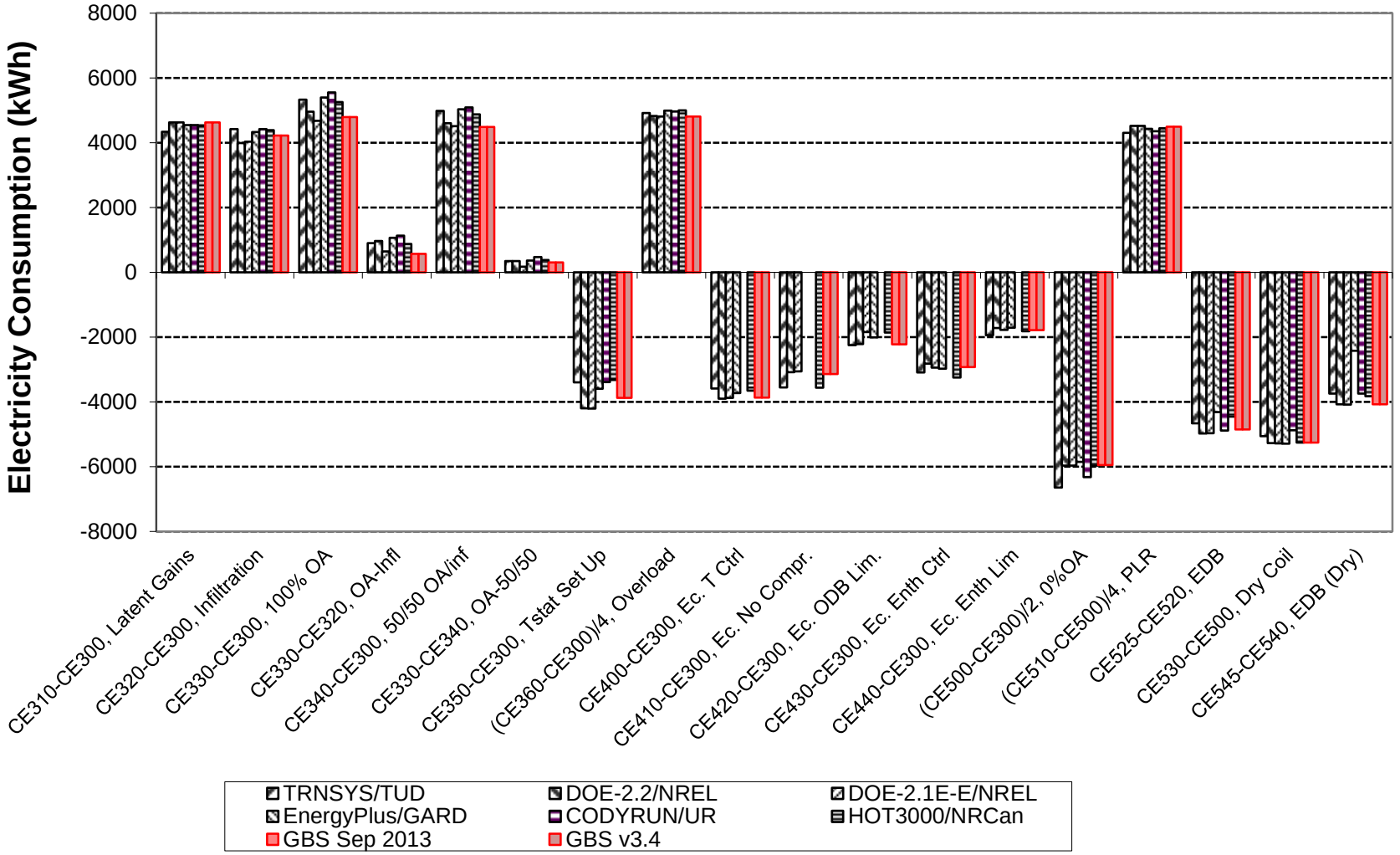
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-1. HVAC BESTEST: CE300 - CE545 Annual Total Electricity Consumption



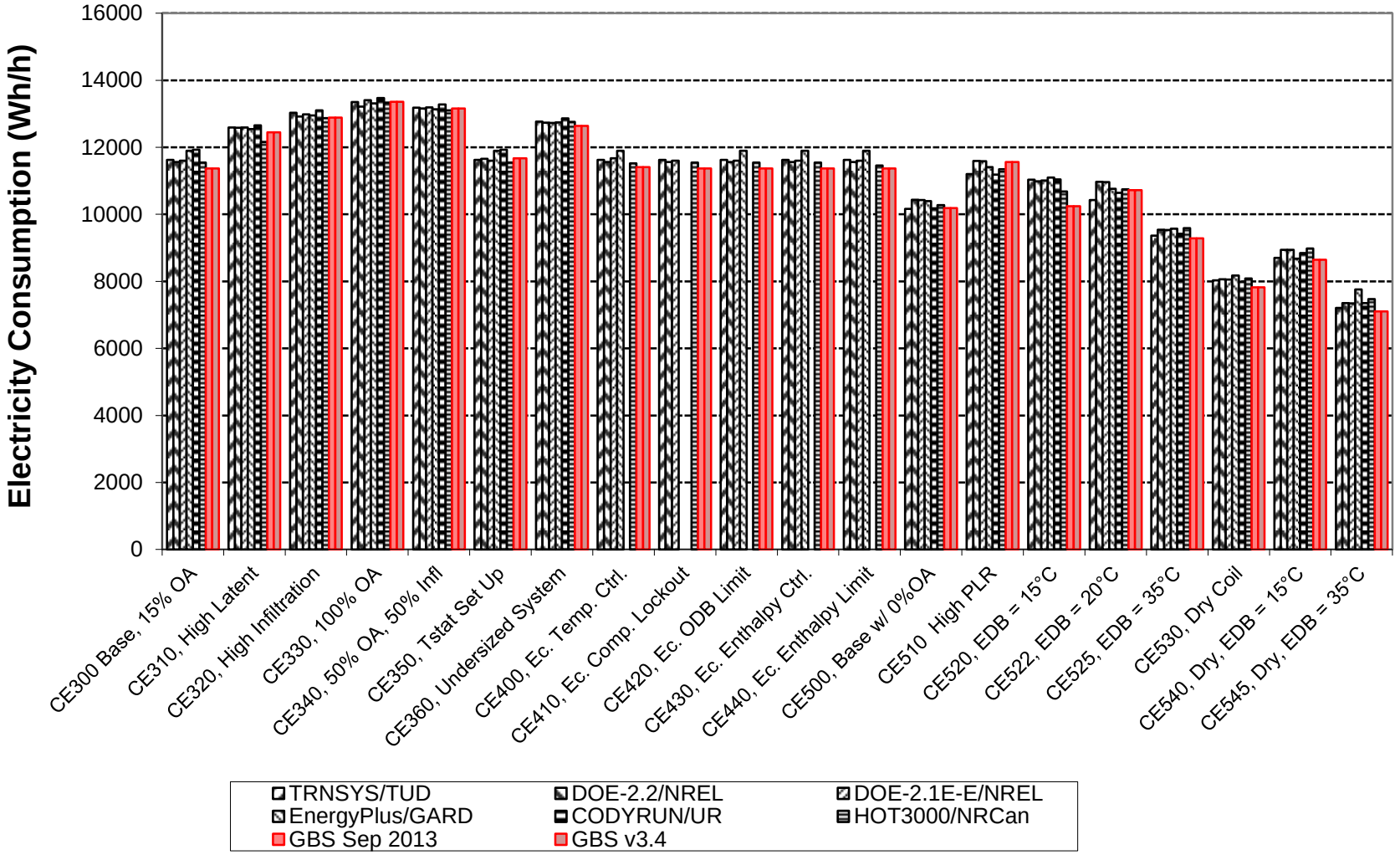
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-2. HVAC BESTEST: CE300 - CE545 Annual Total Space Cooling Electricity Consumption Sensitivities



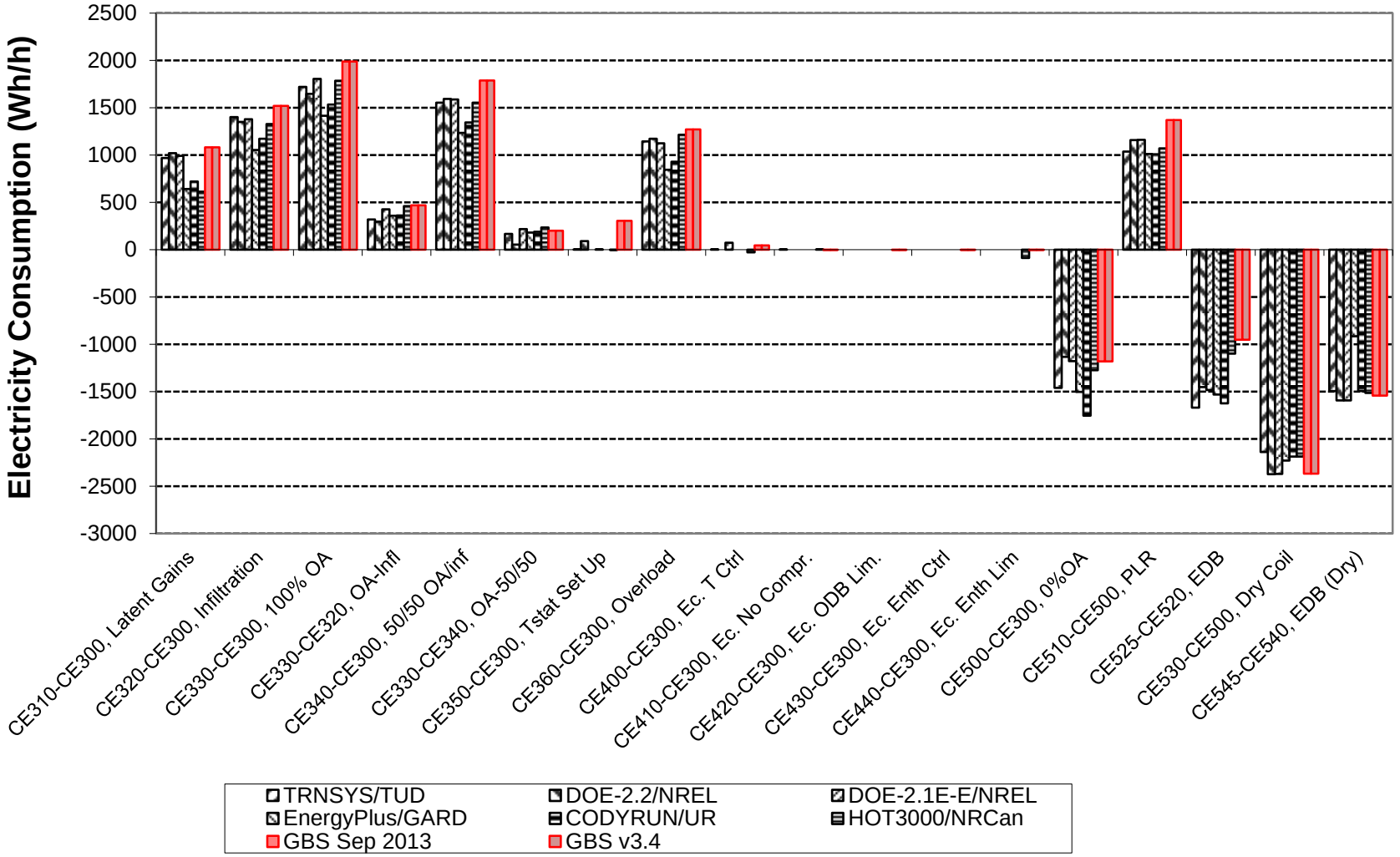
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-3. HVAC BESTEST: CE300 - CE545 Peak Hour Total Electricity Consumption



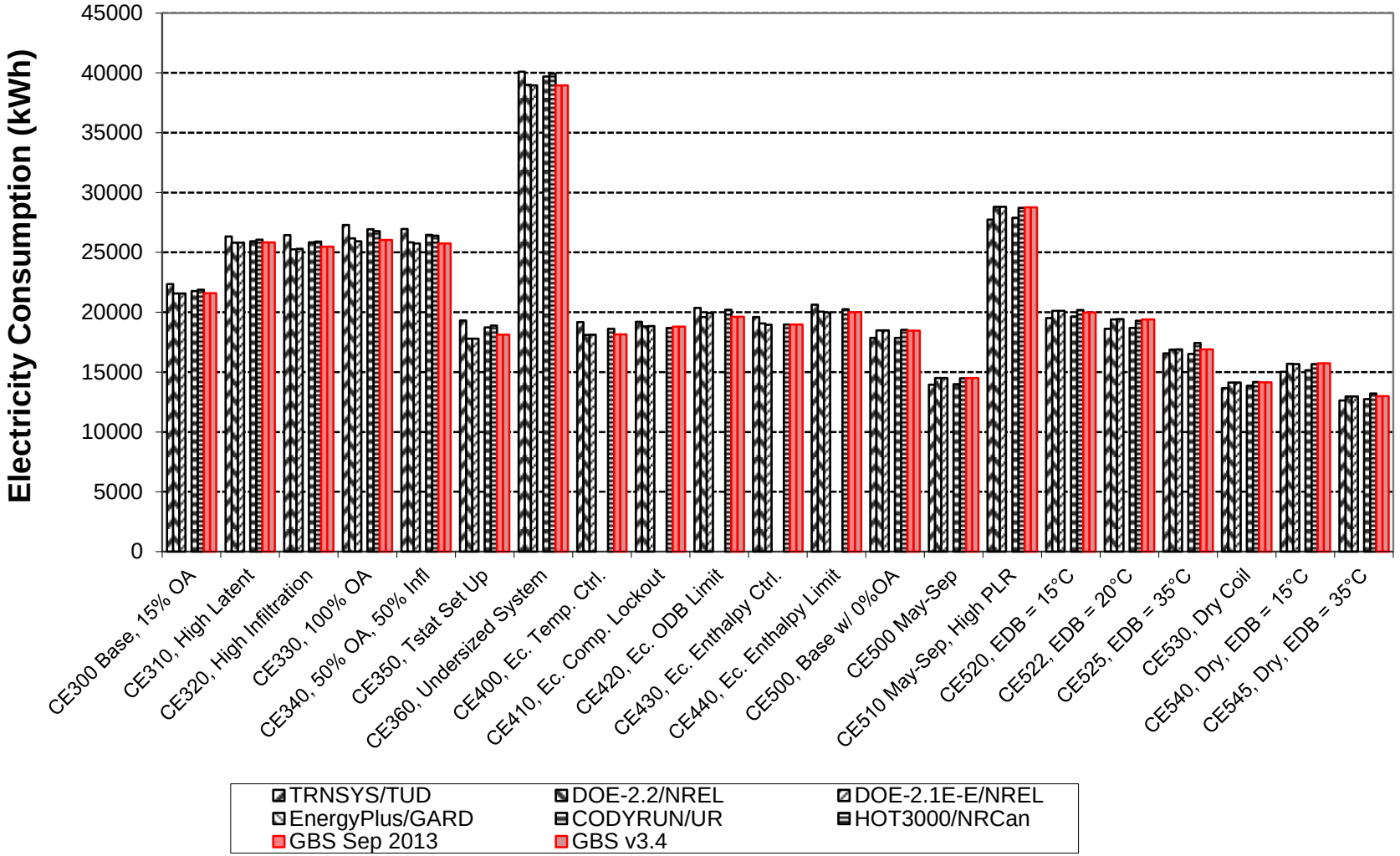
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-4. HVAC BESTEST: CE300 - CE545 Hourly Maximum Total Space Cooling Consumption Sensitivities



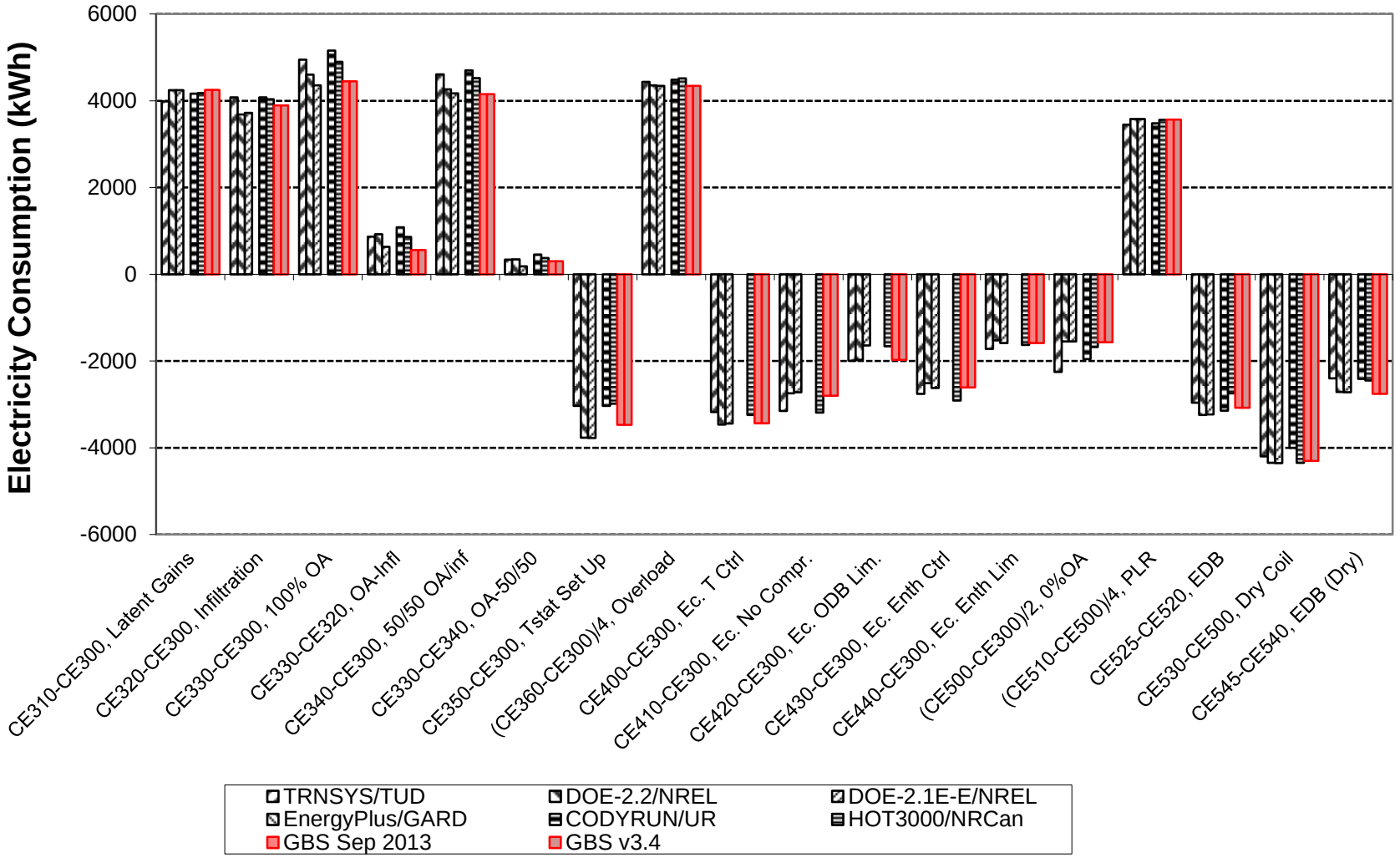
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-5. HVAC BESTEST: CE300 - CE545 Annual Compressor Electricity Consumption



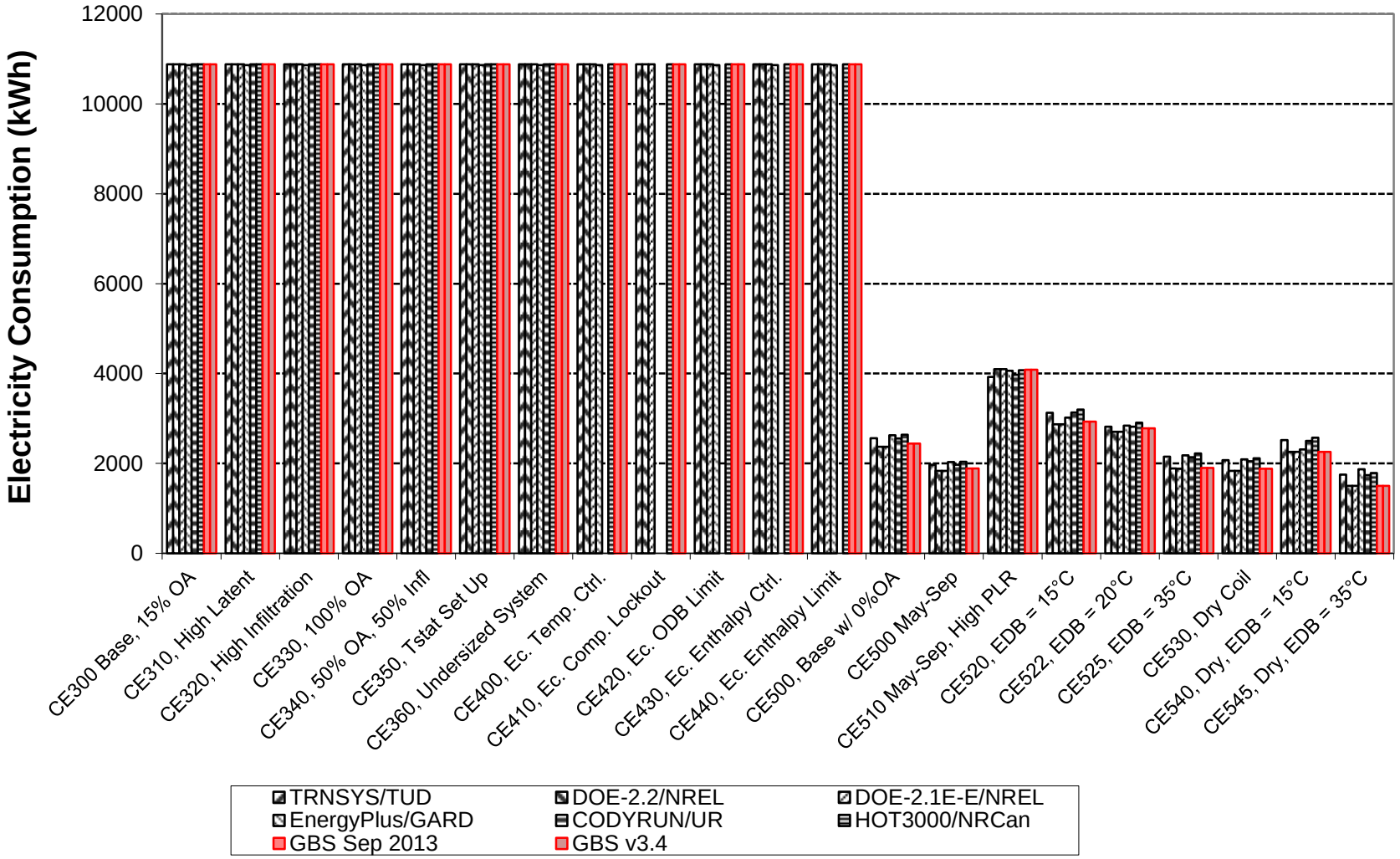
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-6. HVAC BESTEST: CE300 - CE545 Annual Compressor Electricity Consumption Sensitivities



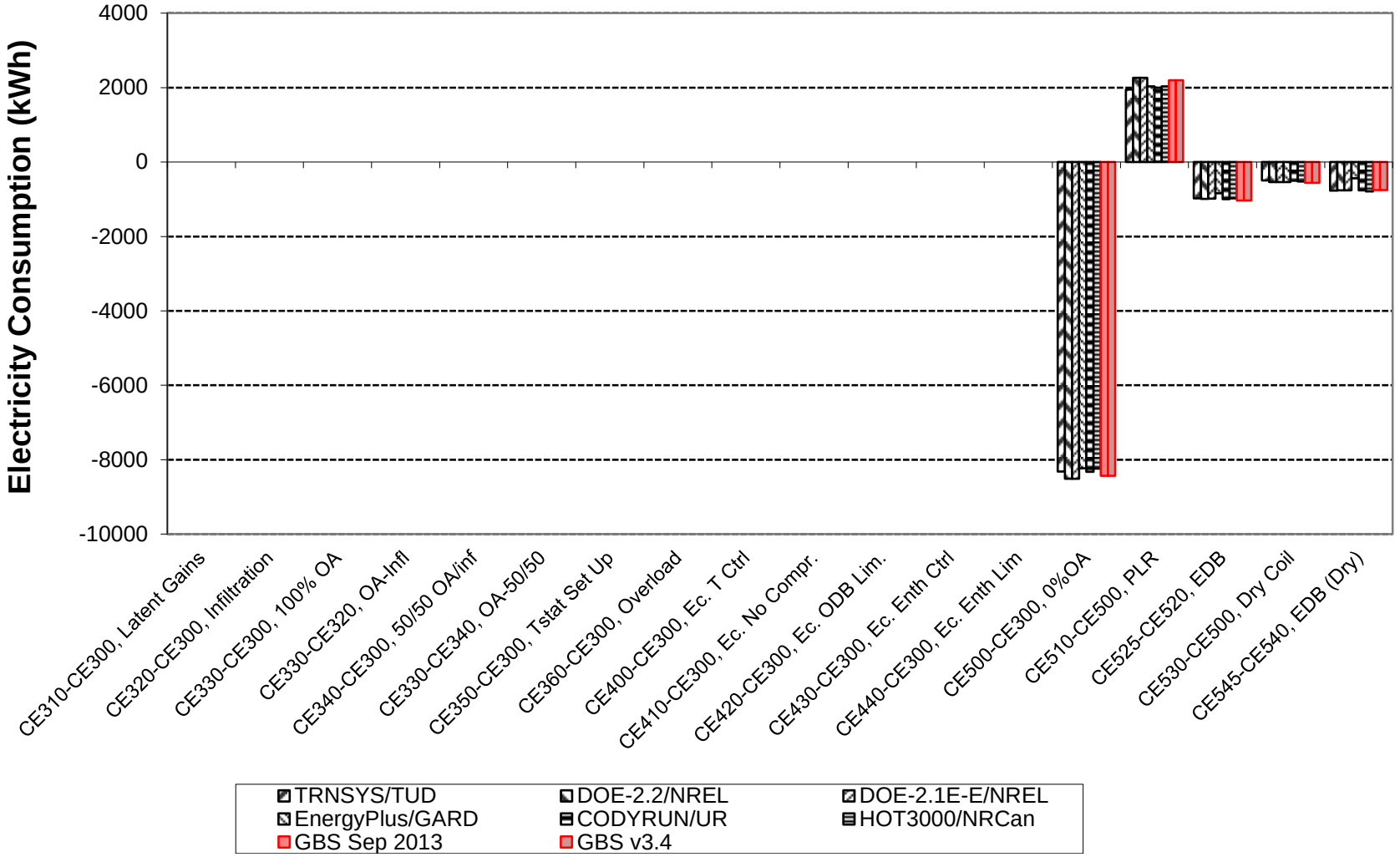
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-7. HVAC BESTEST: CE300 - CE545 Annual Indoor (Supply) Fan Electricity Consumption



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-8. HVAC BESTEST: CE300 - CE545 Annual Indoor (Supply) Fan Electricity Consumption Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-9. HVAC BESTEST: CE300 - CE545 Annual Outdoor (Condenser) Fan Electricity Consumption

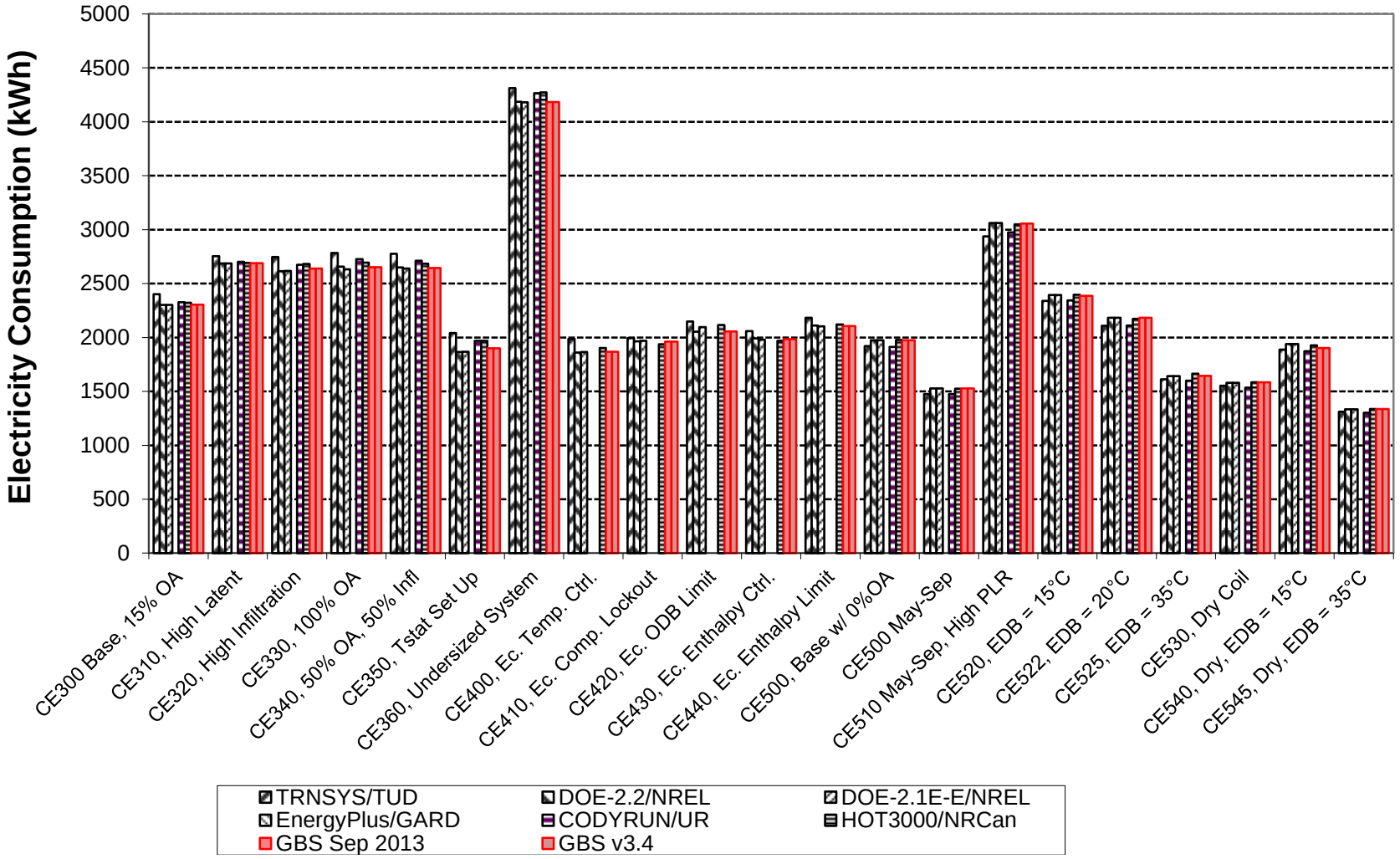
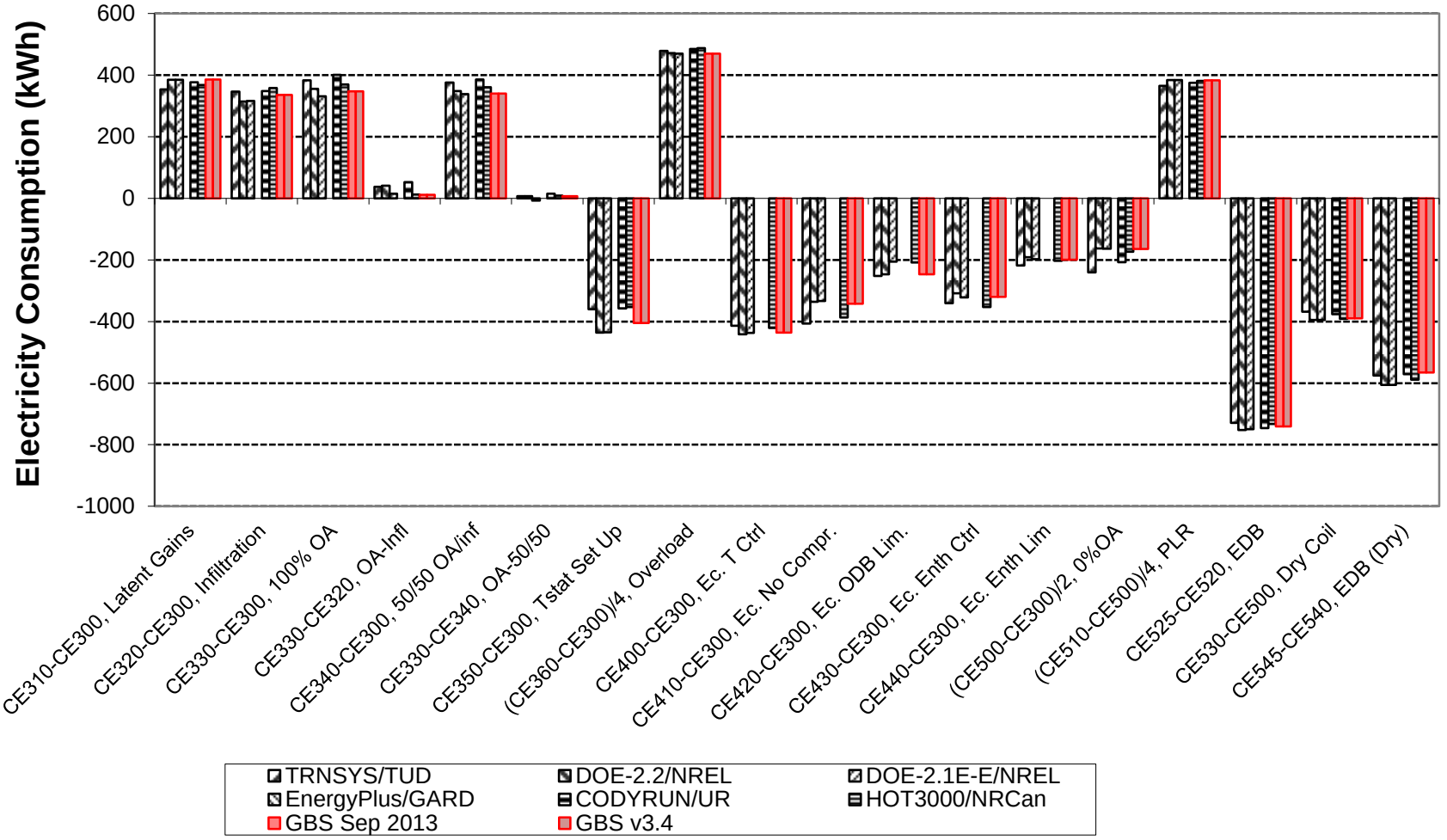
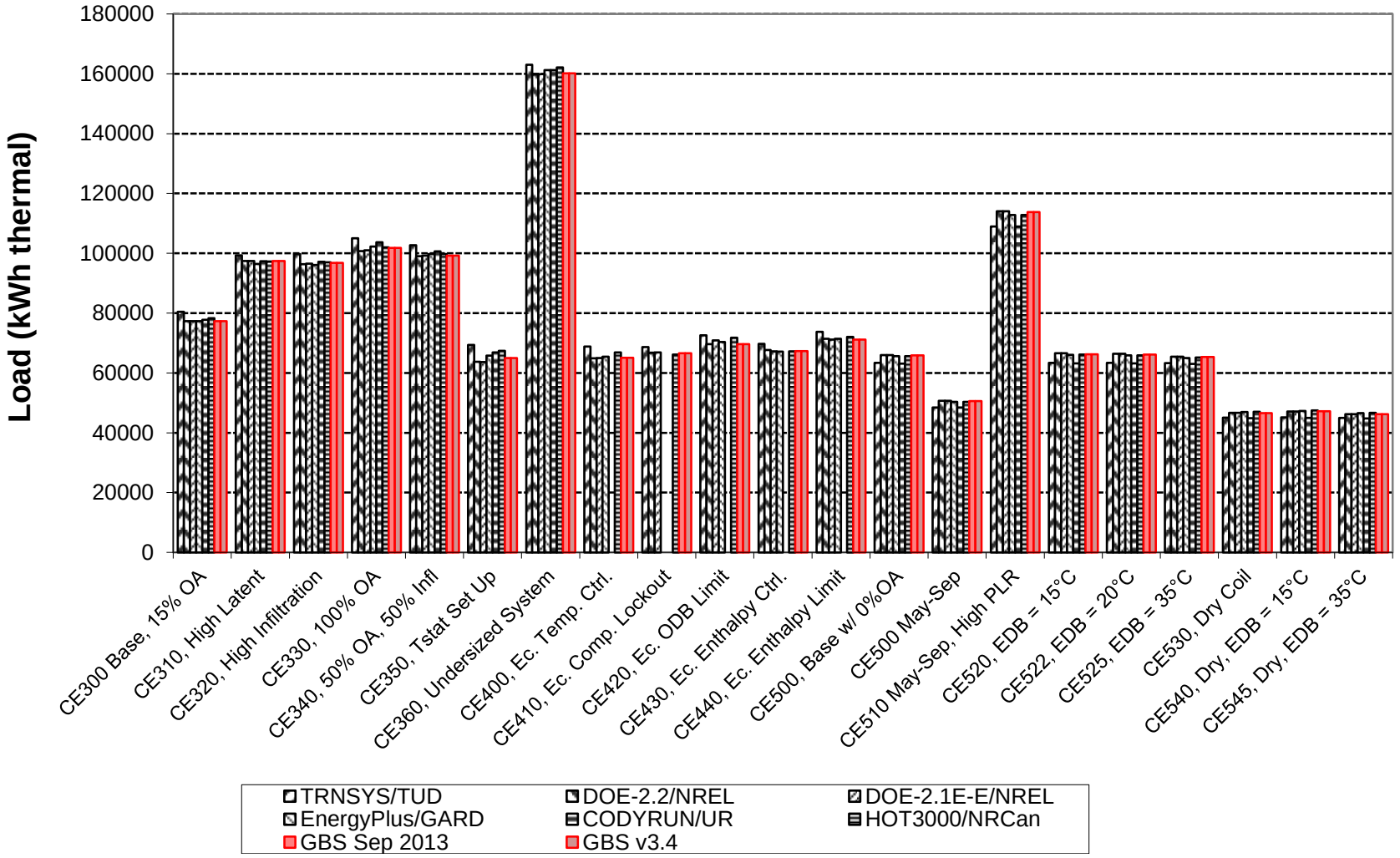


Figure B16.5.2-10. HVAC BESTEST: CE300 - CE545 Annual Outdoor (Condenser) Fan Electricity Consumption Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-11. HVAC BESTEST: CE300 - CE545 Annual Total Coil Load



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-12. HVAC BESTEST: CE300 - CE545 Peak Hour Total Coil Load

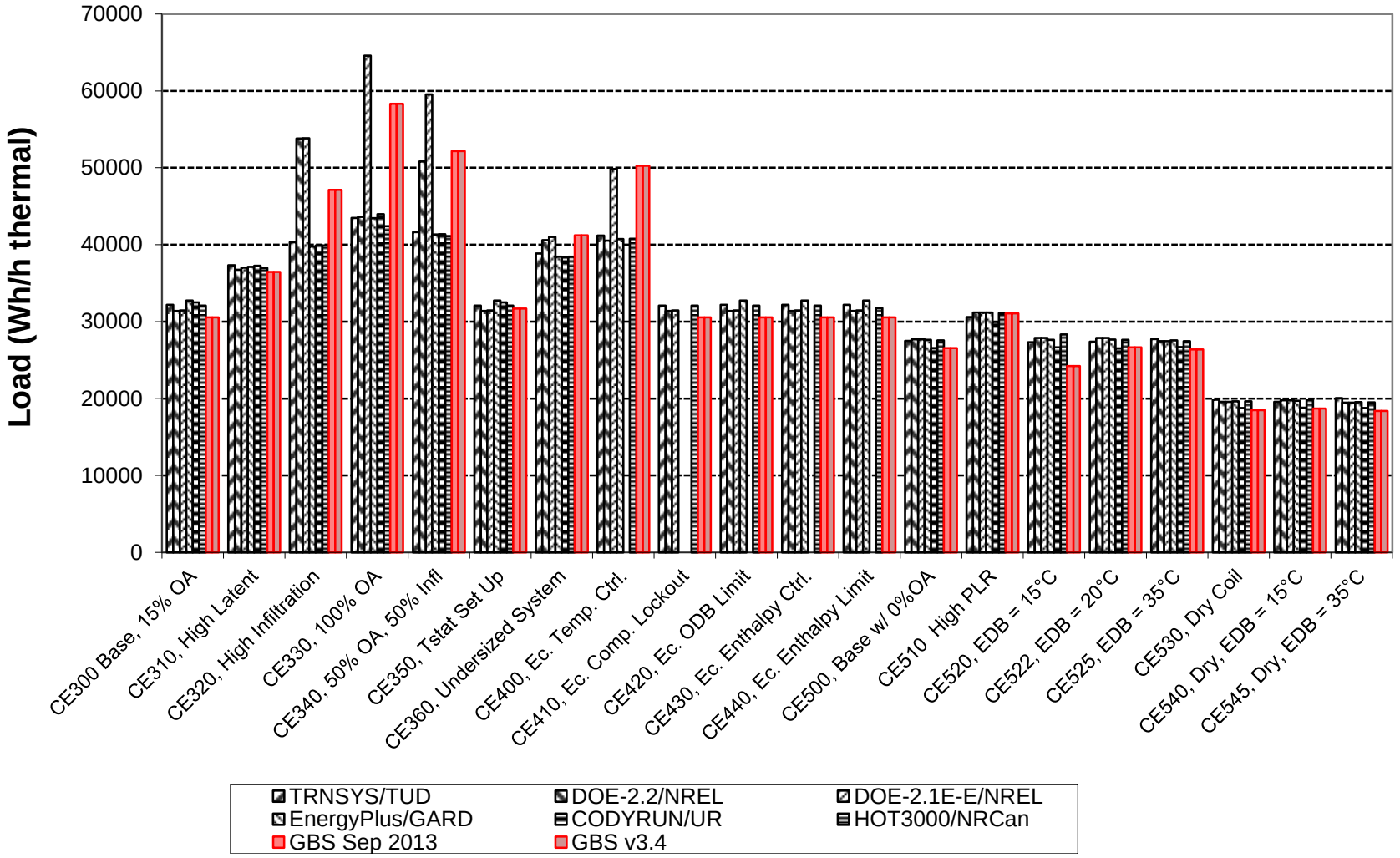
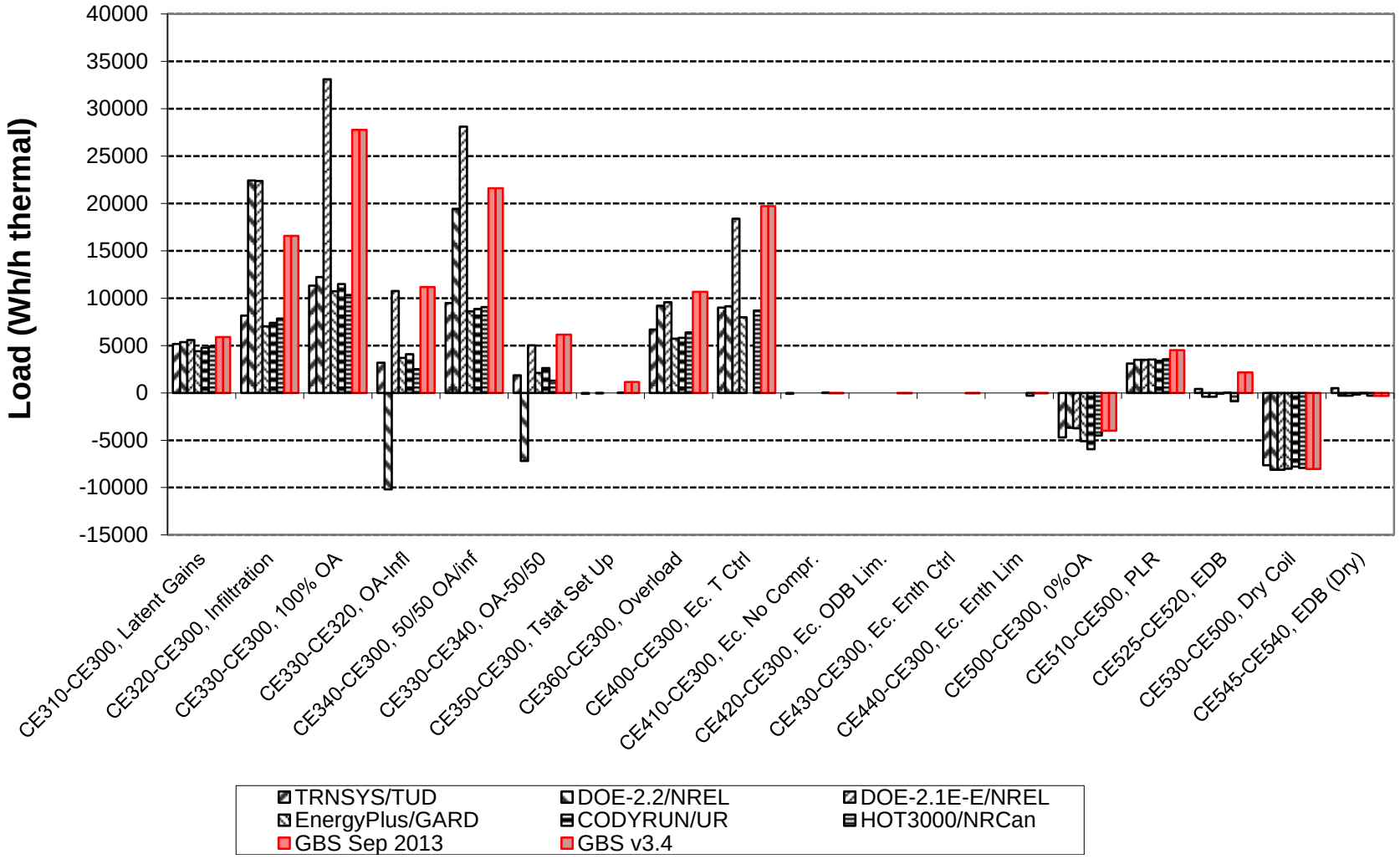
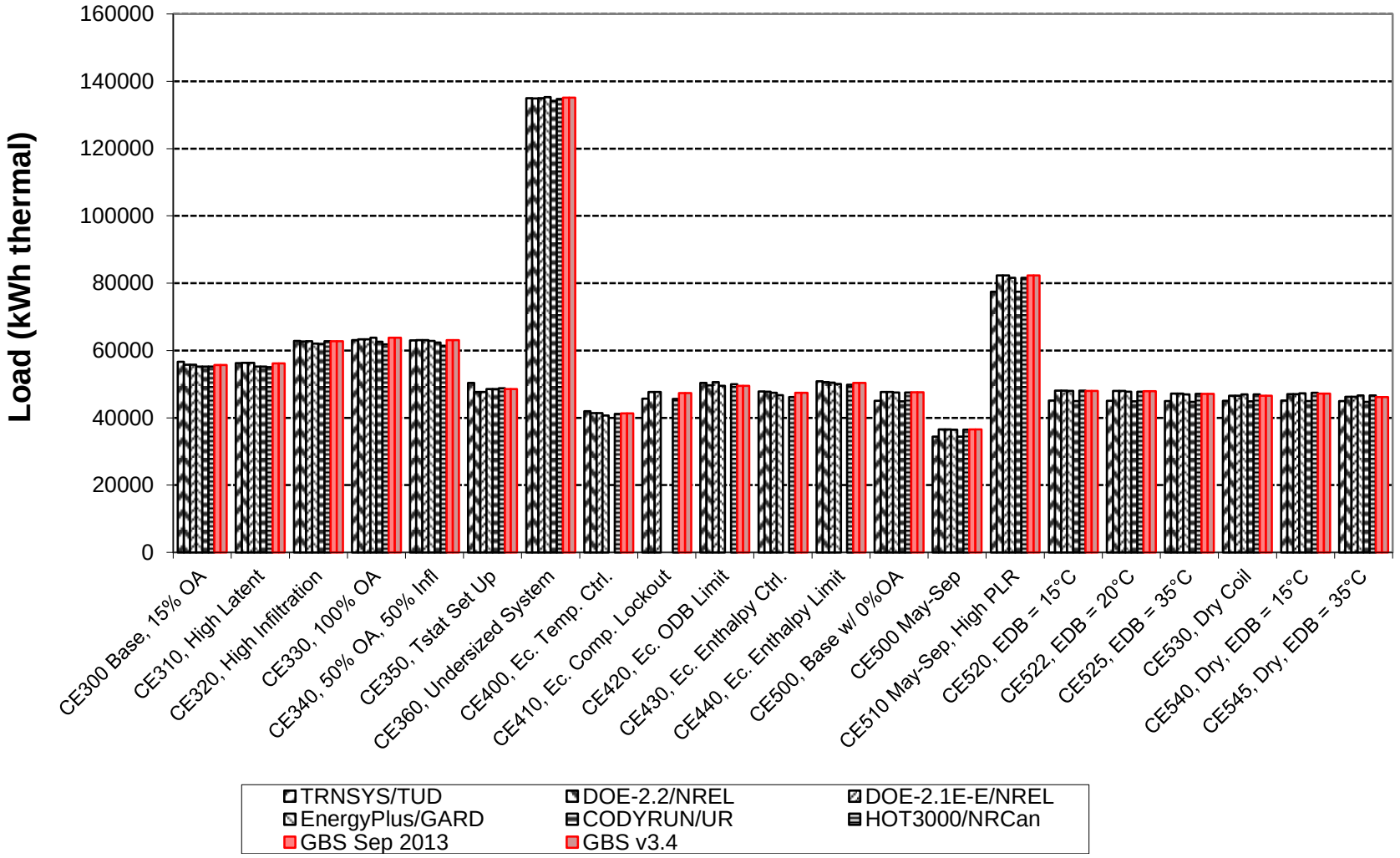


Figure B16.5.2-13. HVAC BESTEST: CE300 - CE545 Hourly Maximum Total Coil Load Sensitivities



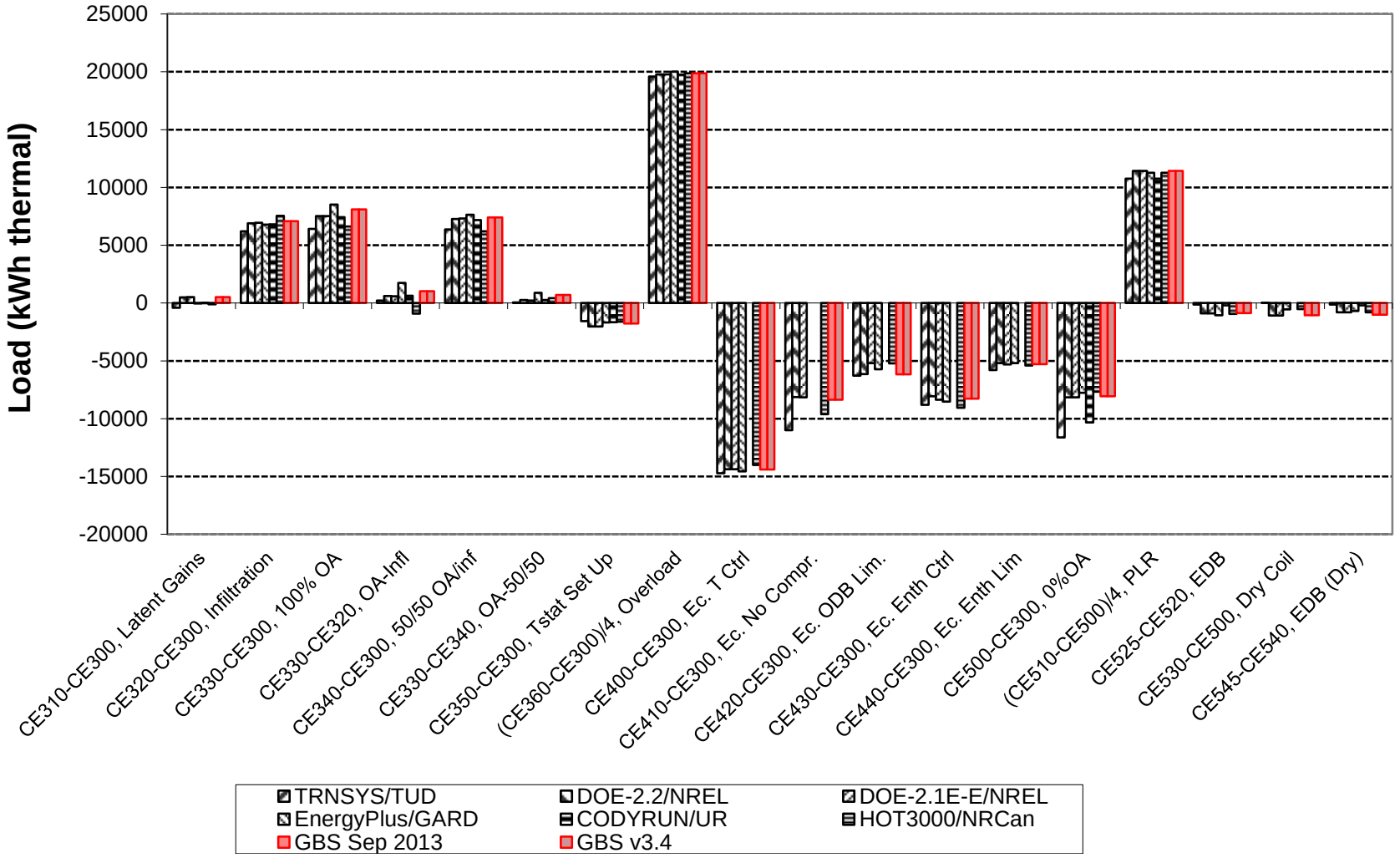
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-14. HVAC BESTEST: CE300 - CE545 Annual Sensible Coil Load



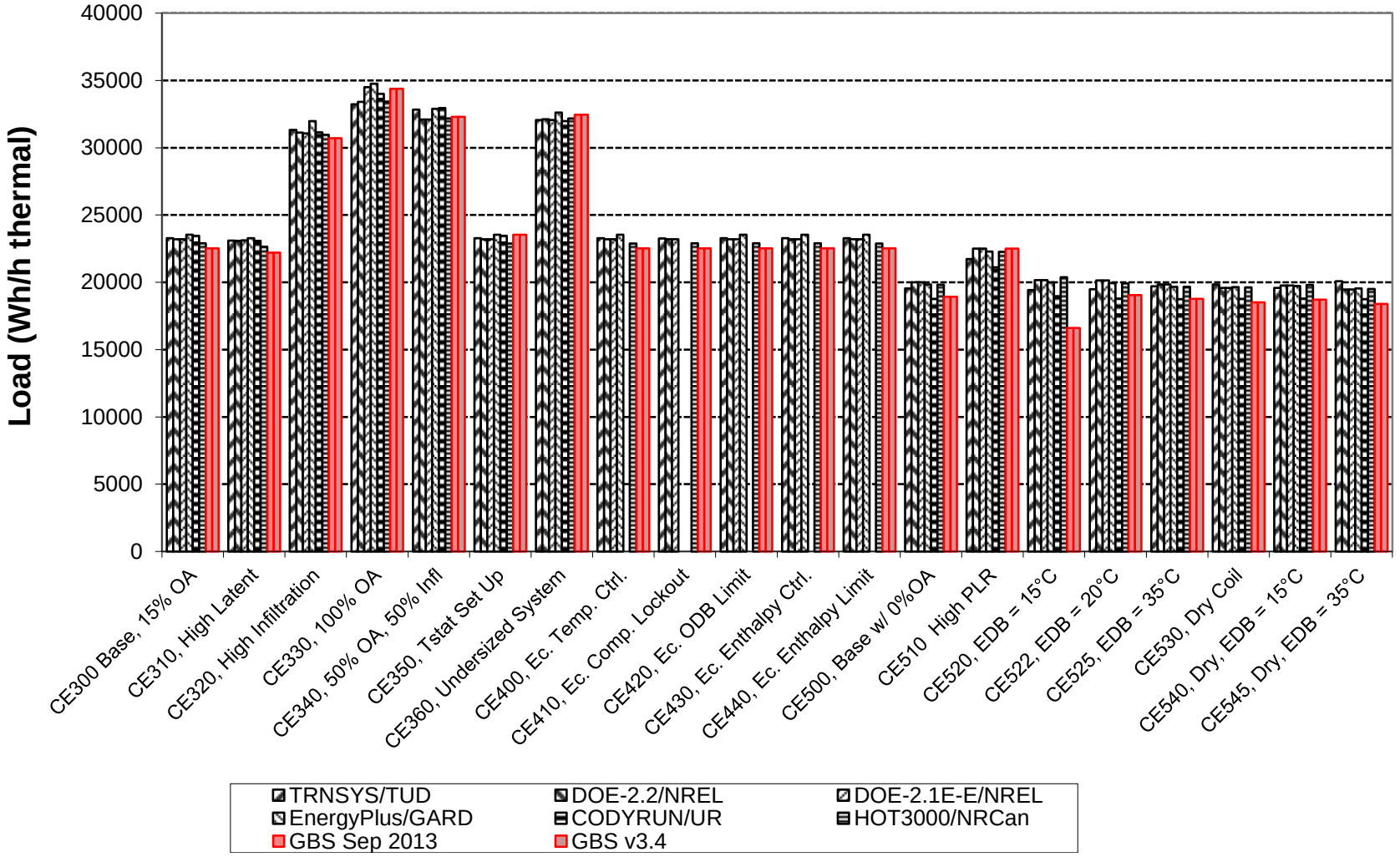
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-15. HVAC BESTEST: CE300 - CE545 Annual Sensible Cooling Load Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-16. HVAC BESTEST: CE300 - CE545 Peak Hour Sensible Coil Load



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-17. HVAC BESTEST: CE300 - CE545 Annual Latent Coil Load

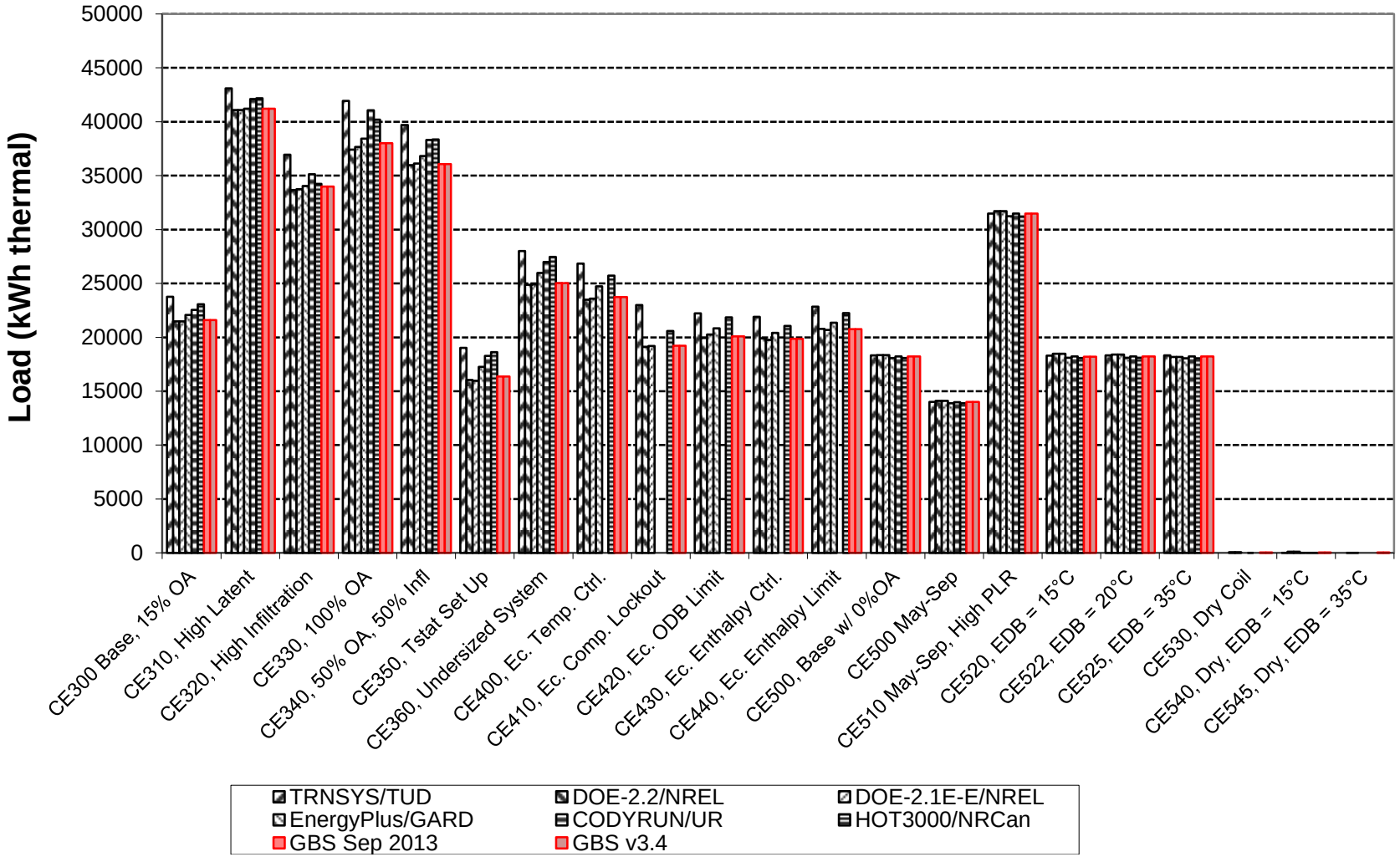
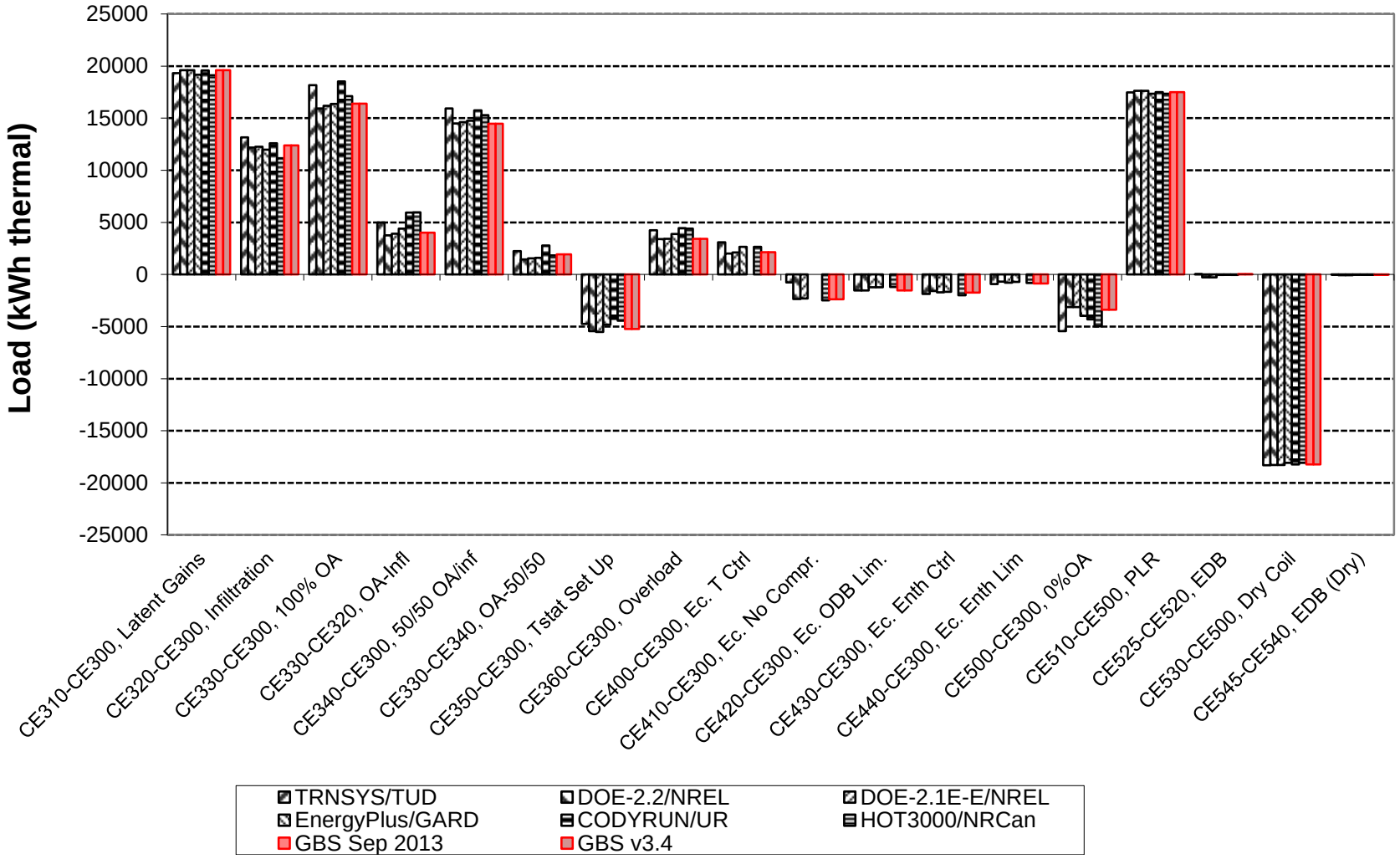


Figure B16.5.2-18. HVAC BESTEST: CE300 - CE545 Annual Latent Cooling Load Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-19. HVAC BESTEST: CE300 - CE545 Peak Hour Latent Coil Load

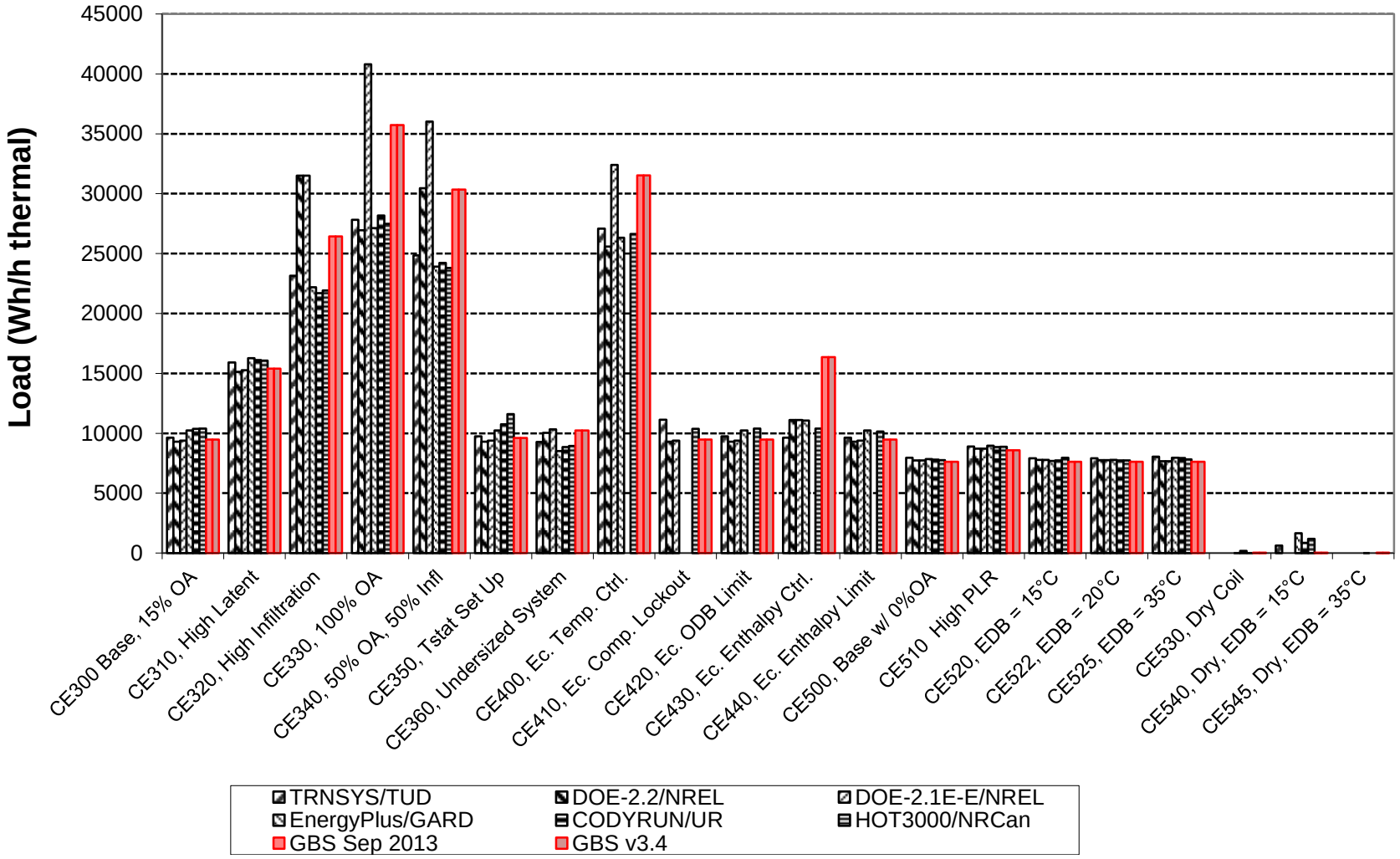
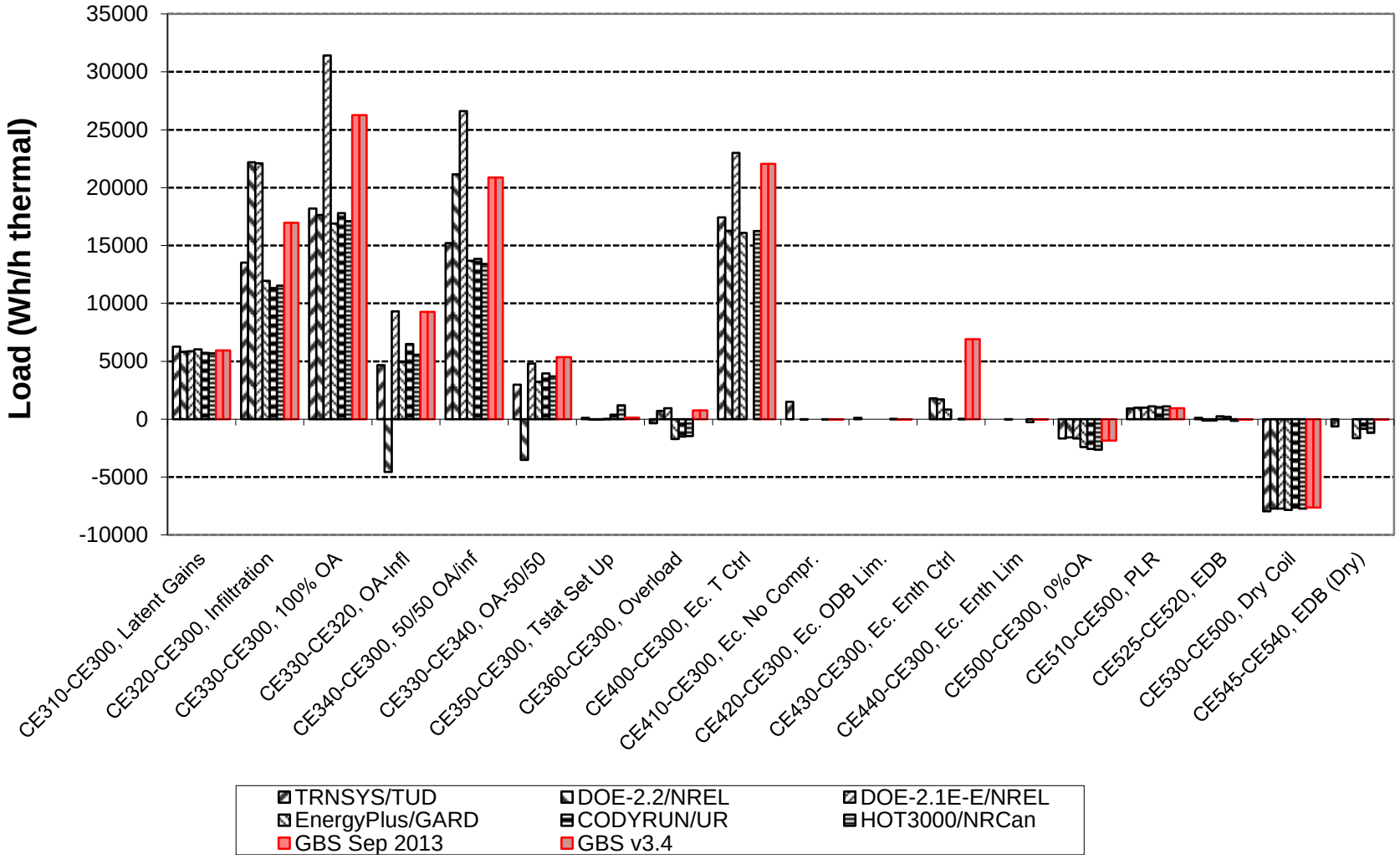
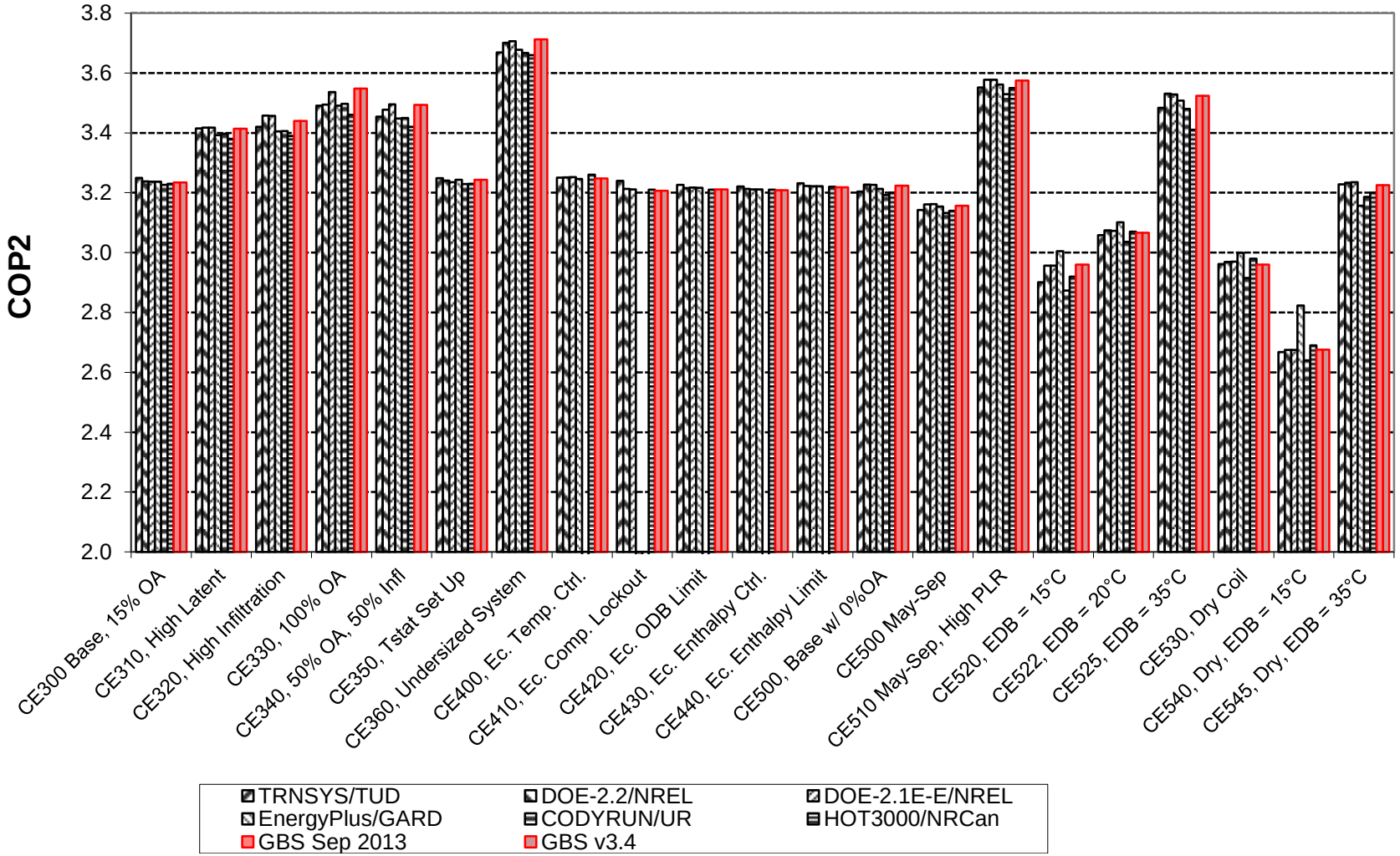


Figure B16.5.2-20. HVAC BESTEST: CE300 - CE545 Hourly Maximum Latent Coil Load Sensitivities



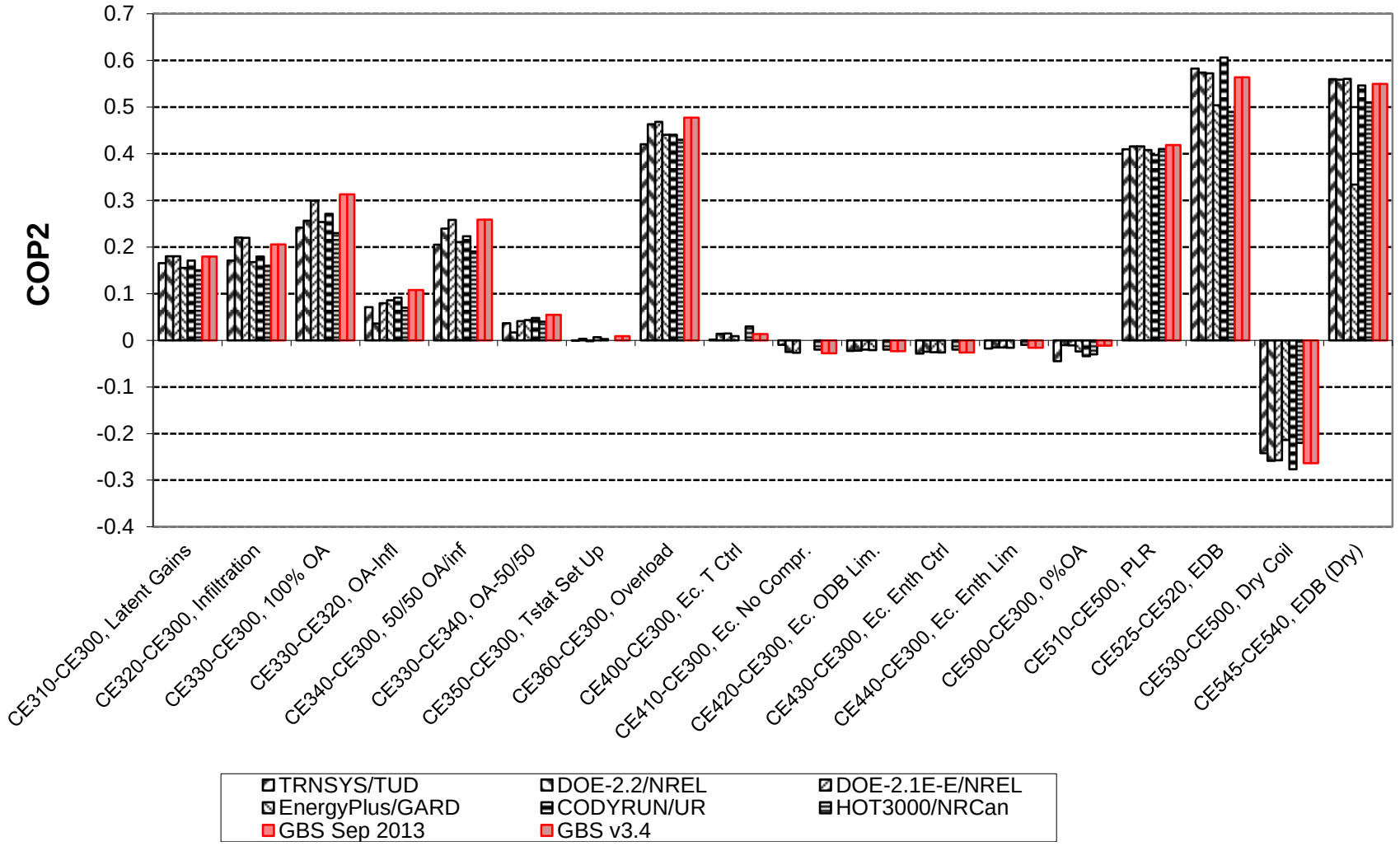
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-21. HVAC BESTEST: CE300 - CE545 Annual Mean COP2



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-22. HVAC BESTEST: CE300 - CE545 Annual Mean COP2 Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-23. HVAC BESTEST: CE300 - CE545 Hourly Maximum COP2

NOTE: GBS v3.4 data unavailable

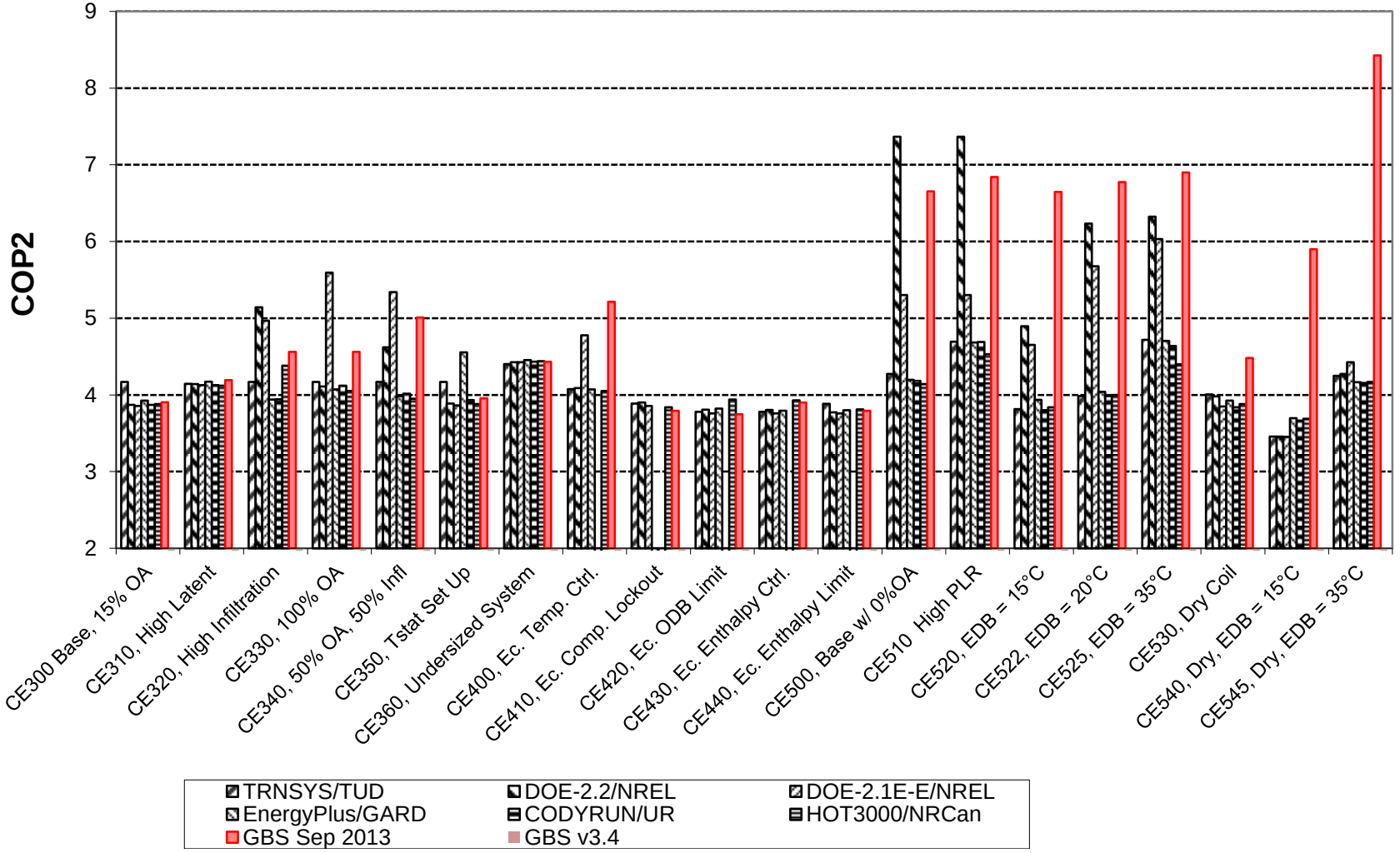


Figure B16.5.2-24. HVAC BESTEST: CE300 - CE545 Hourly Maximum COP2 Sensitivities

NOTE: GBS v3.4 data unavailable

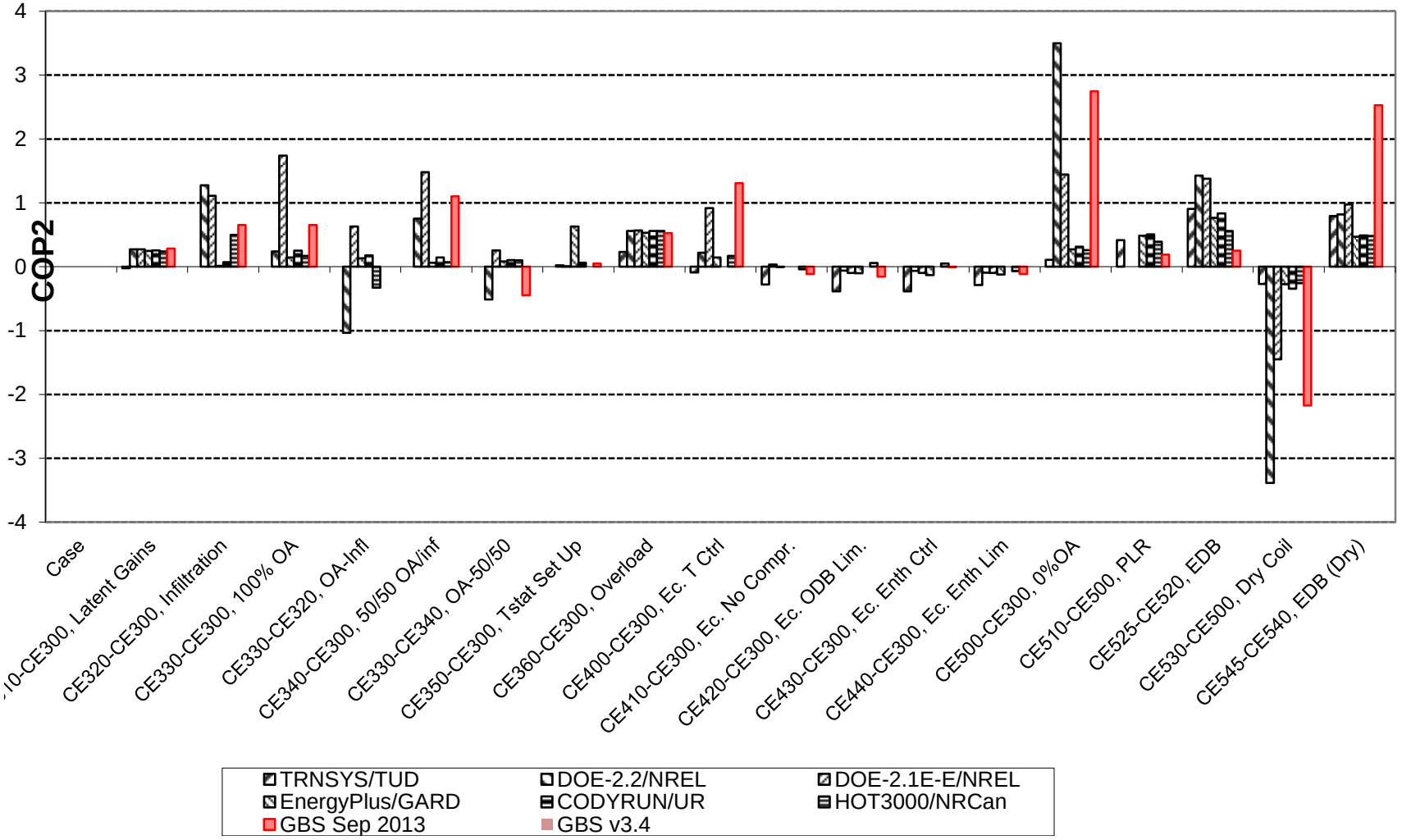
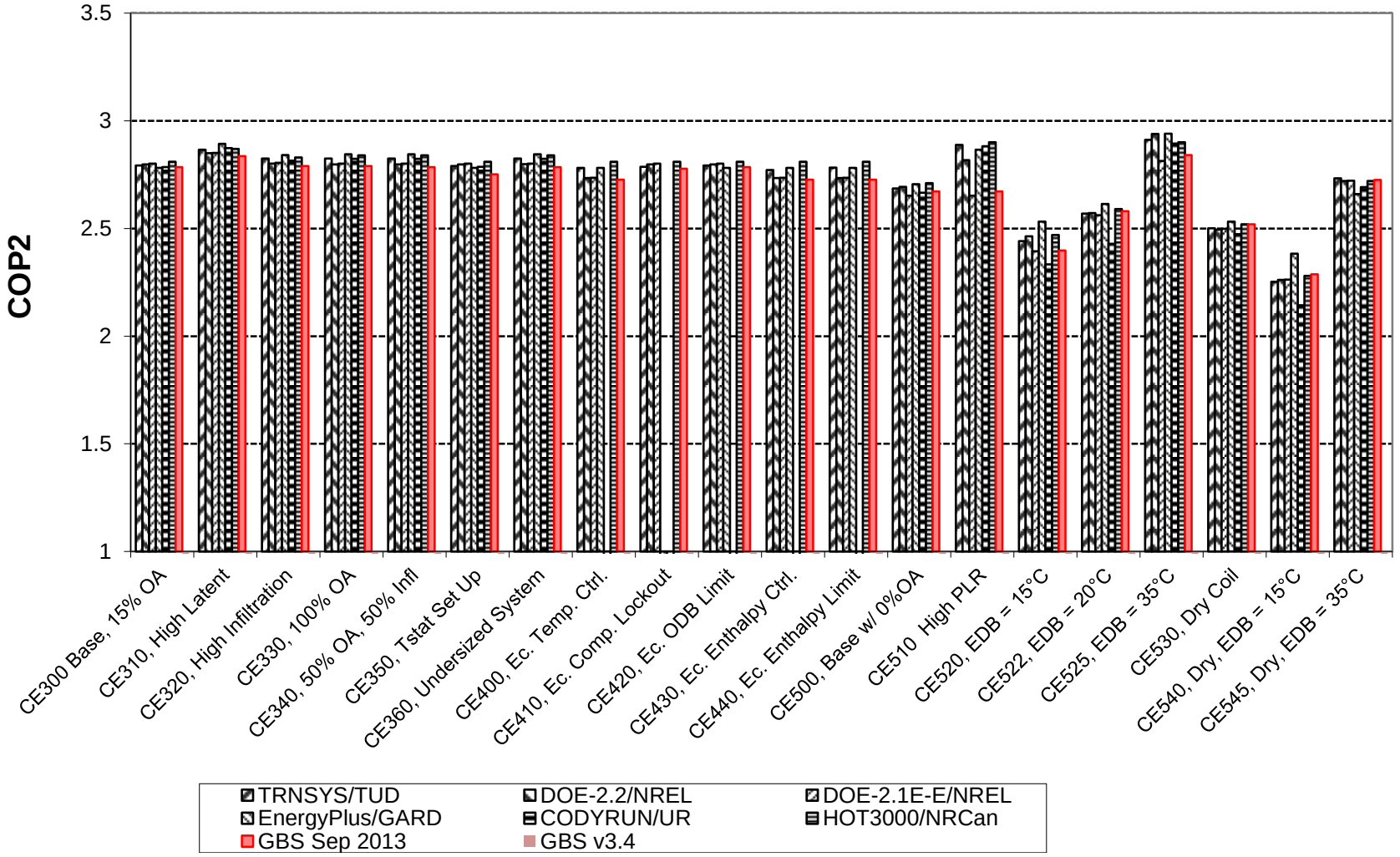
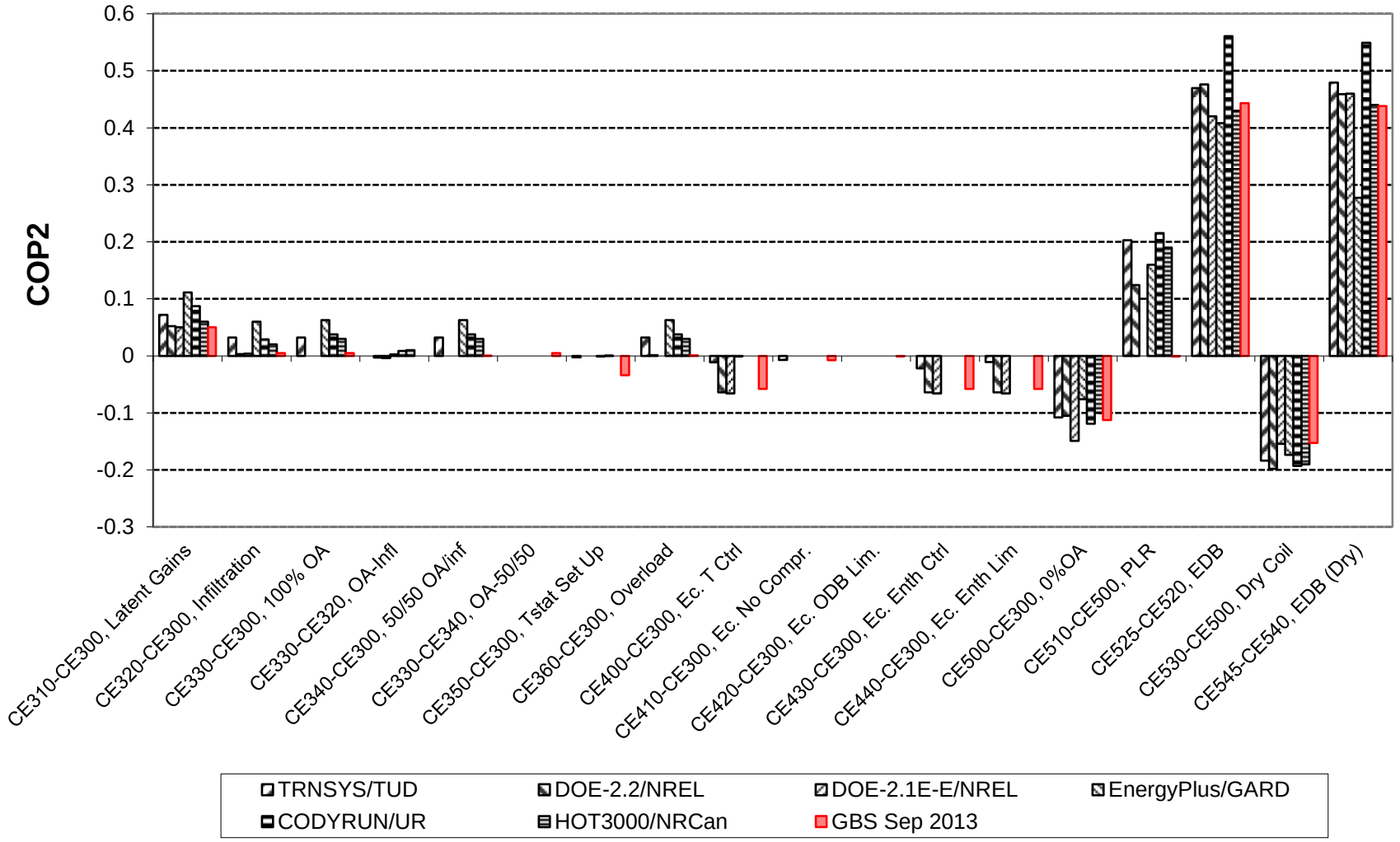


Figure B16.5.2-25. HVAC BESTEST: CE300 - CE545 Hourly Minimum COP2



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-26. HVAC BESTEST: CE300 - CE545 Hourly Minimum COP2 Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-27. HVAC BESTEST: CE300 - CE545 Annual Mean Indoor Dry-Bulb Temperature

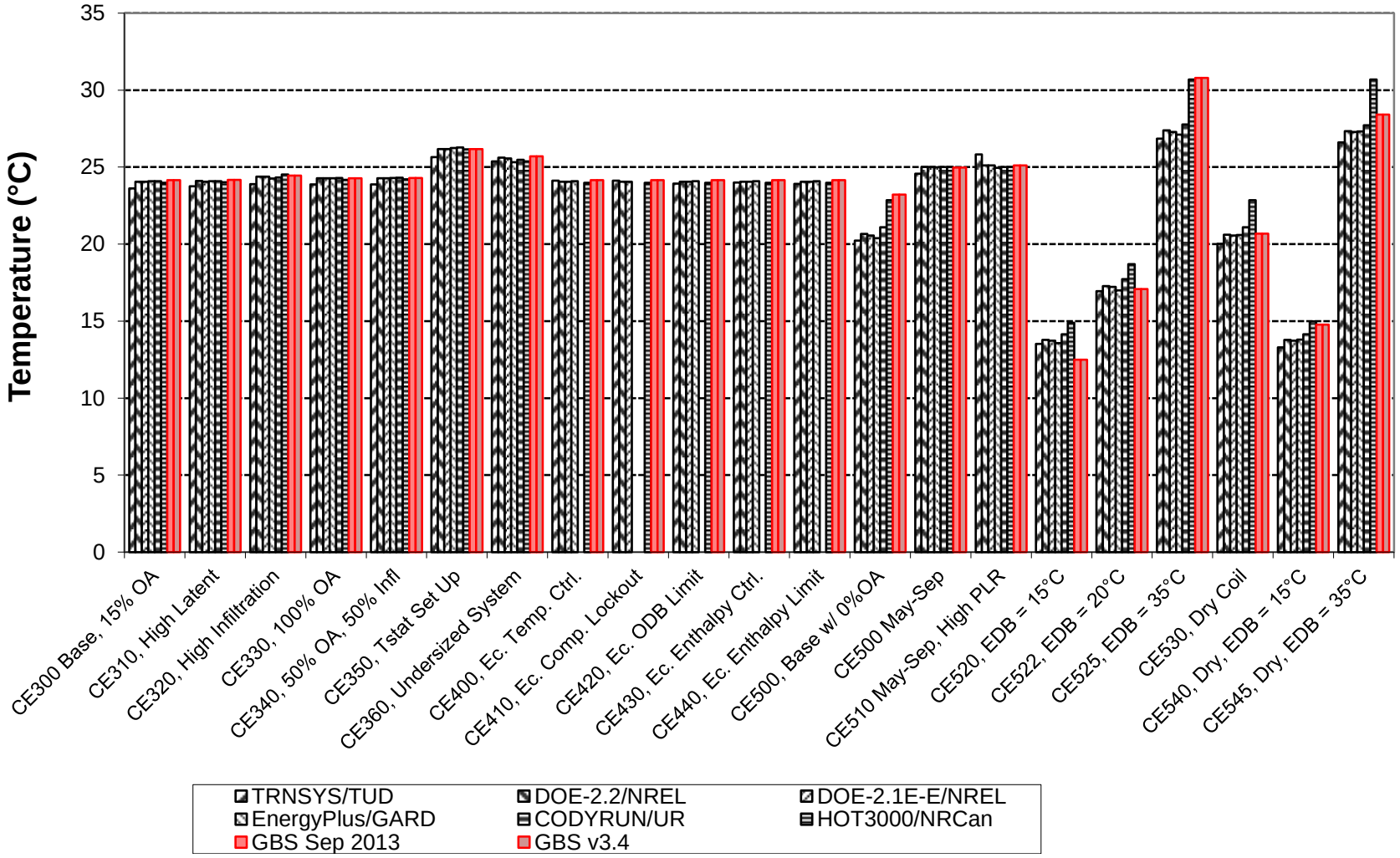
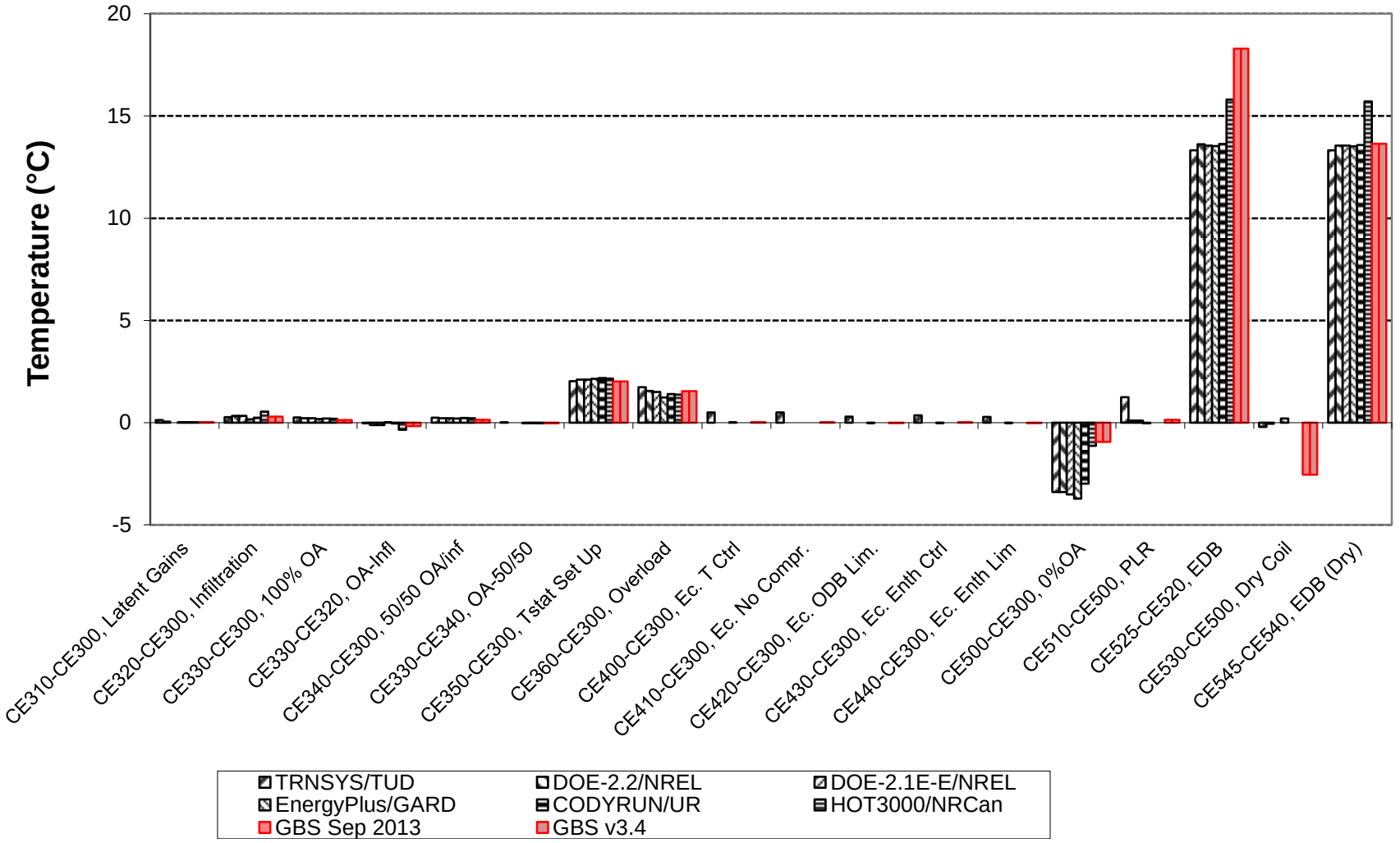
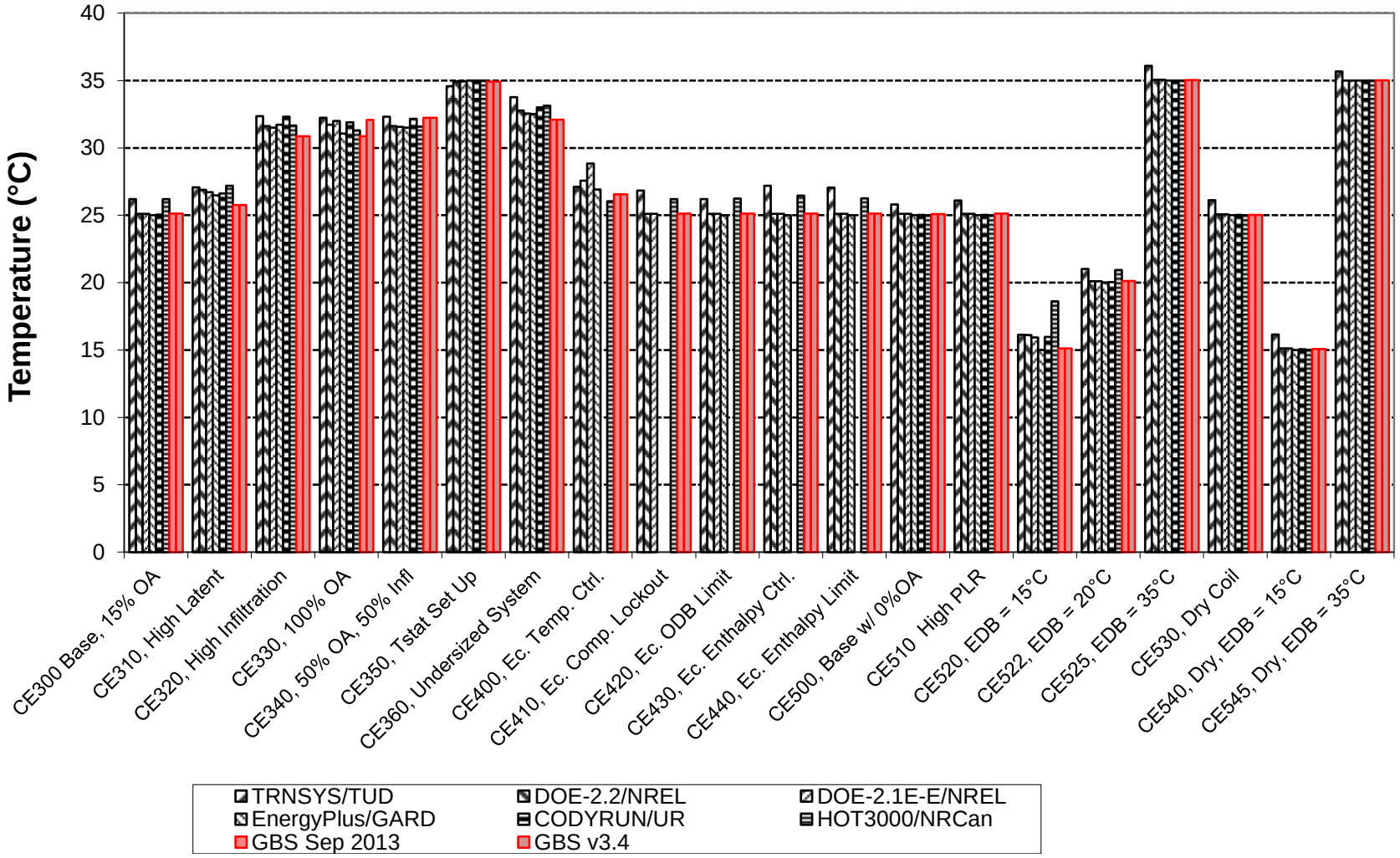


Figure B16.5.2-28. HVAC BESTEST: CE300 - CE545 Annual Mean IDB Sensitivities



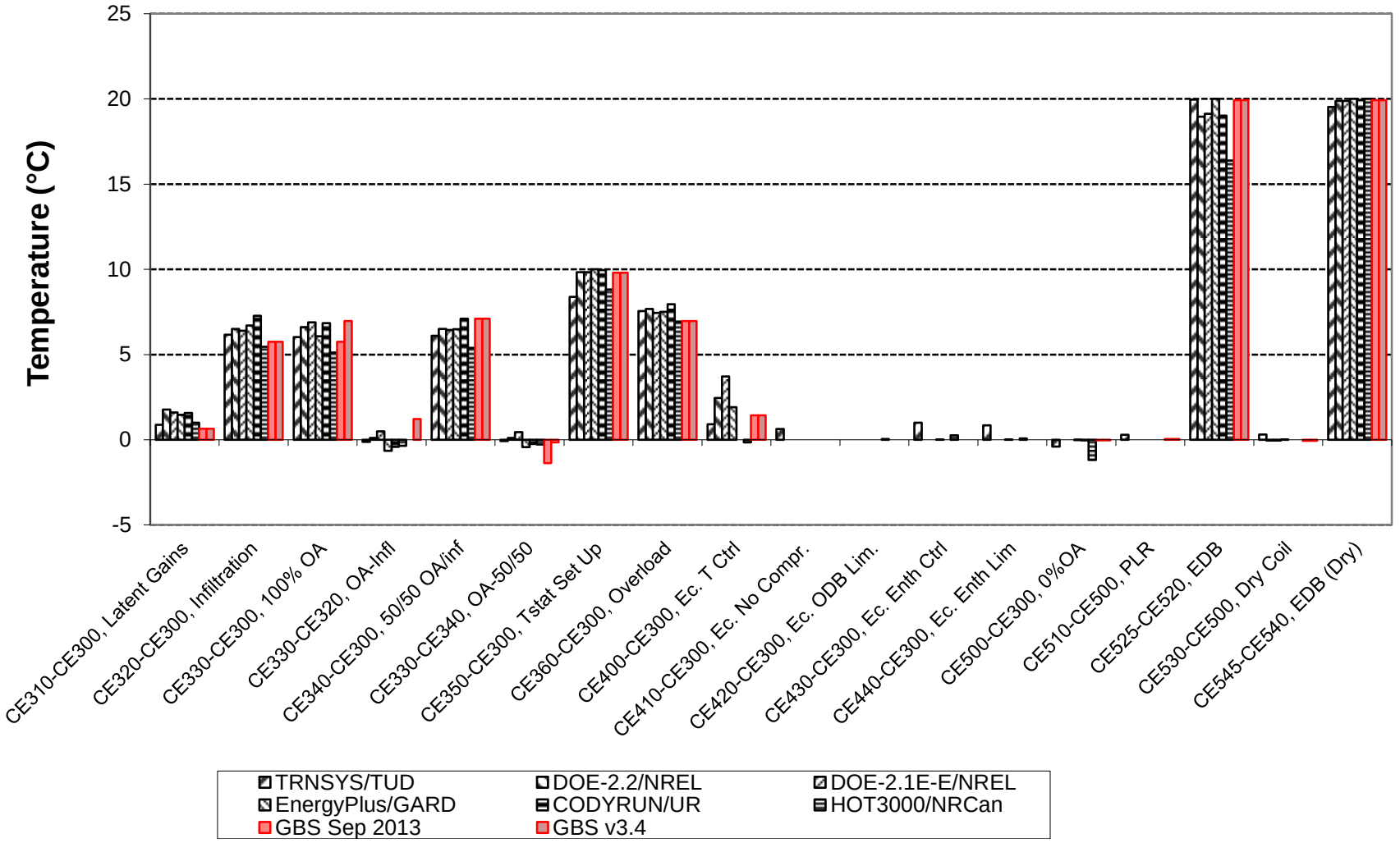
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-29. HVAC BESTEST: CE300 - CE545 Hourly Maximum Indoor Dry-Bulb Temperature



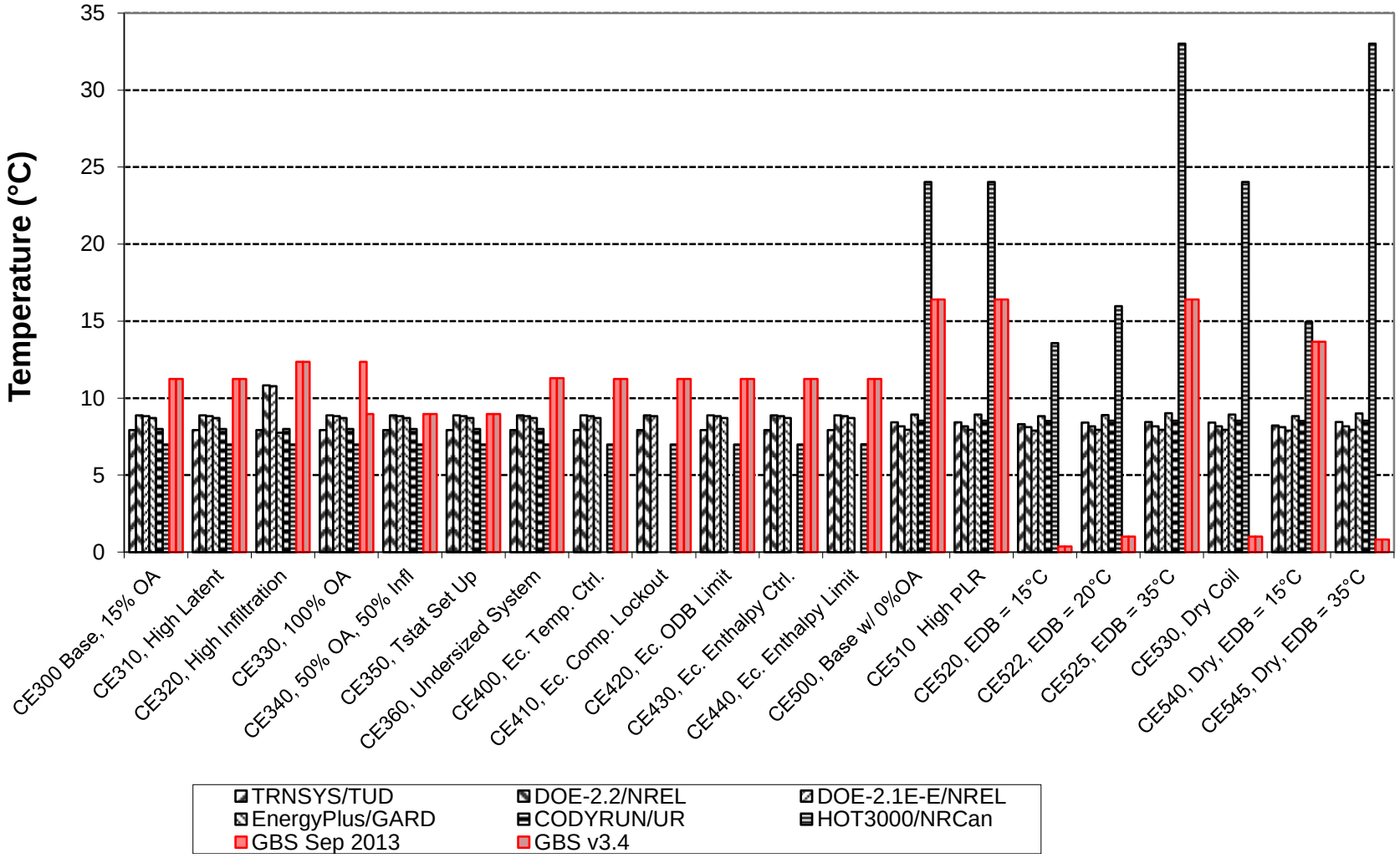
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-30. HVAC BESTEST: CE300 - CE545 Hourly Maximum IDB Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-31. HVAC BESTEST: CE300 - CE545 Hourly Minimum Indoor Dry-Bulb Temperature



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-32. HVAC BESTEST: CE300 - CE545 Annual Mean Zone Humidity Ratio

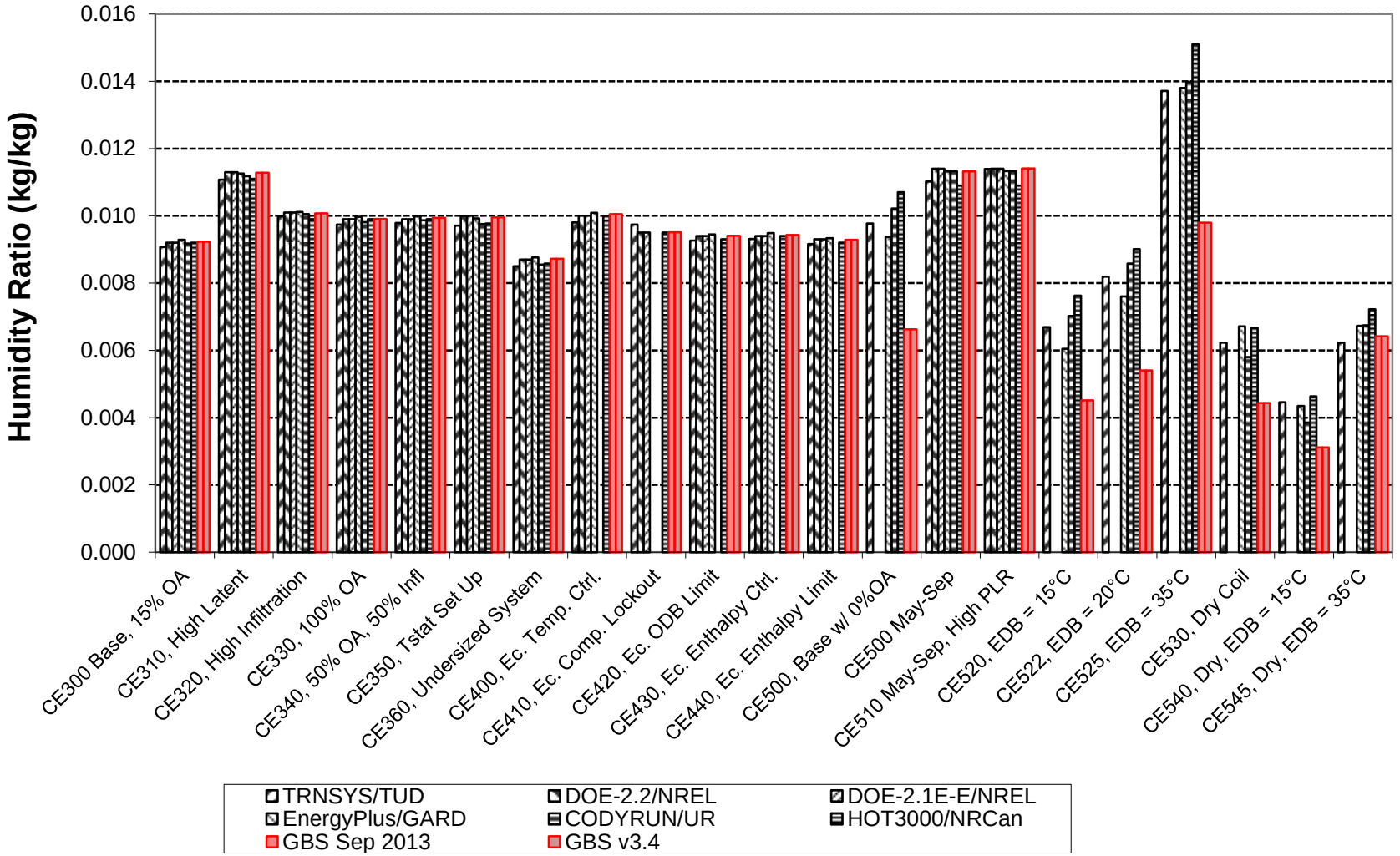
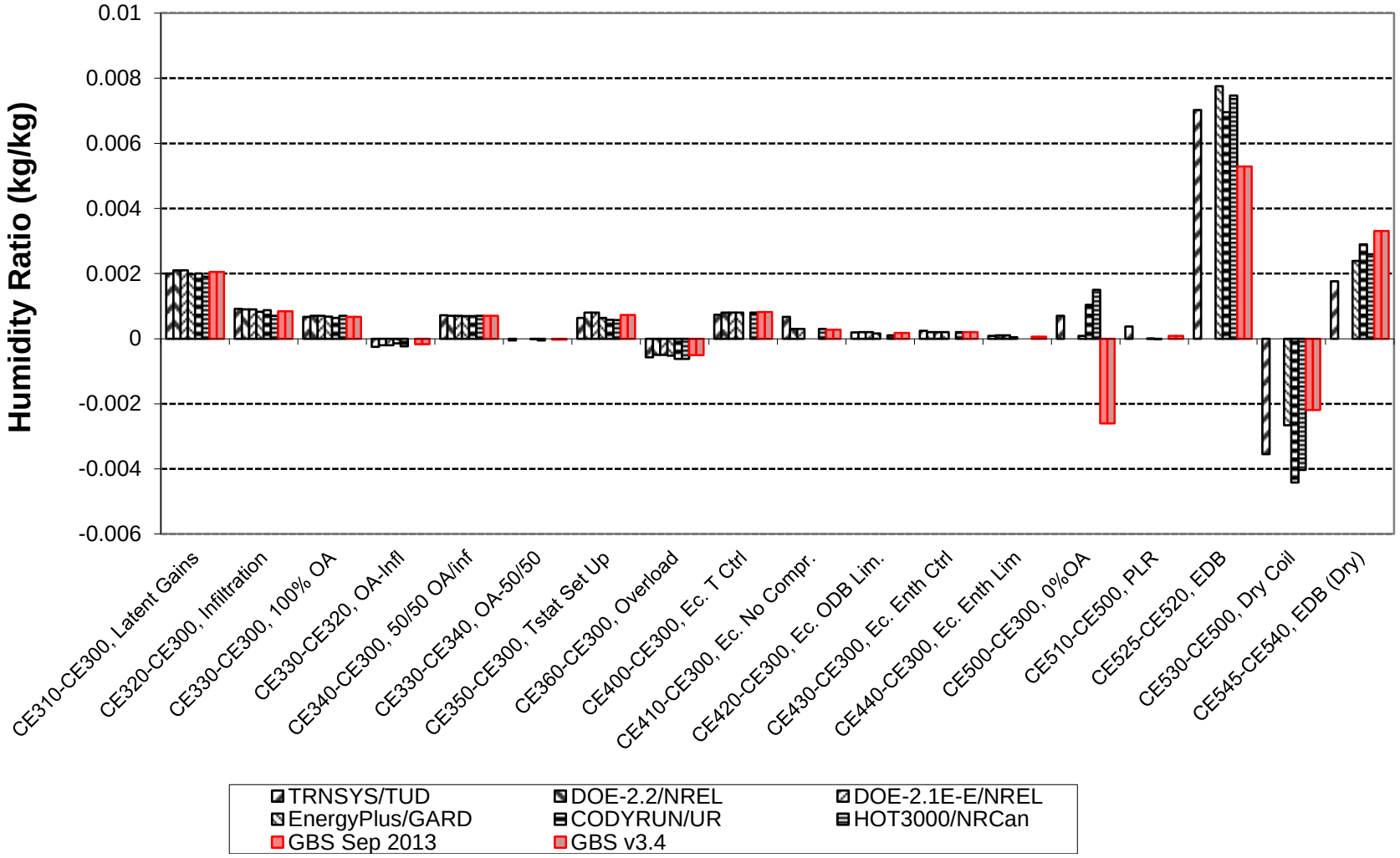
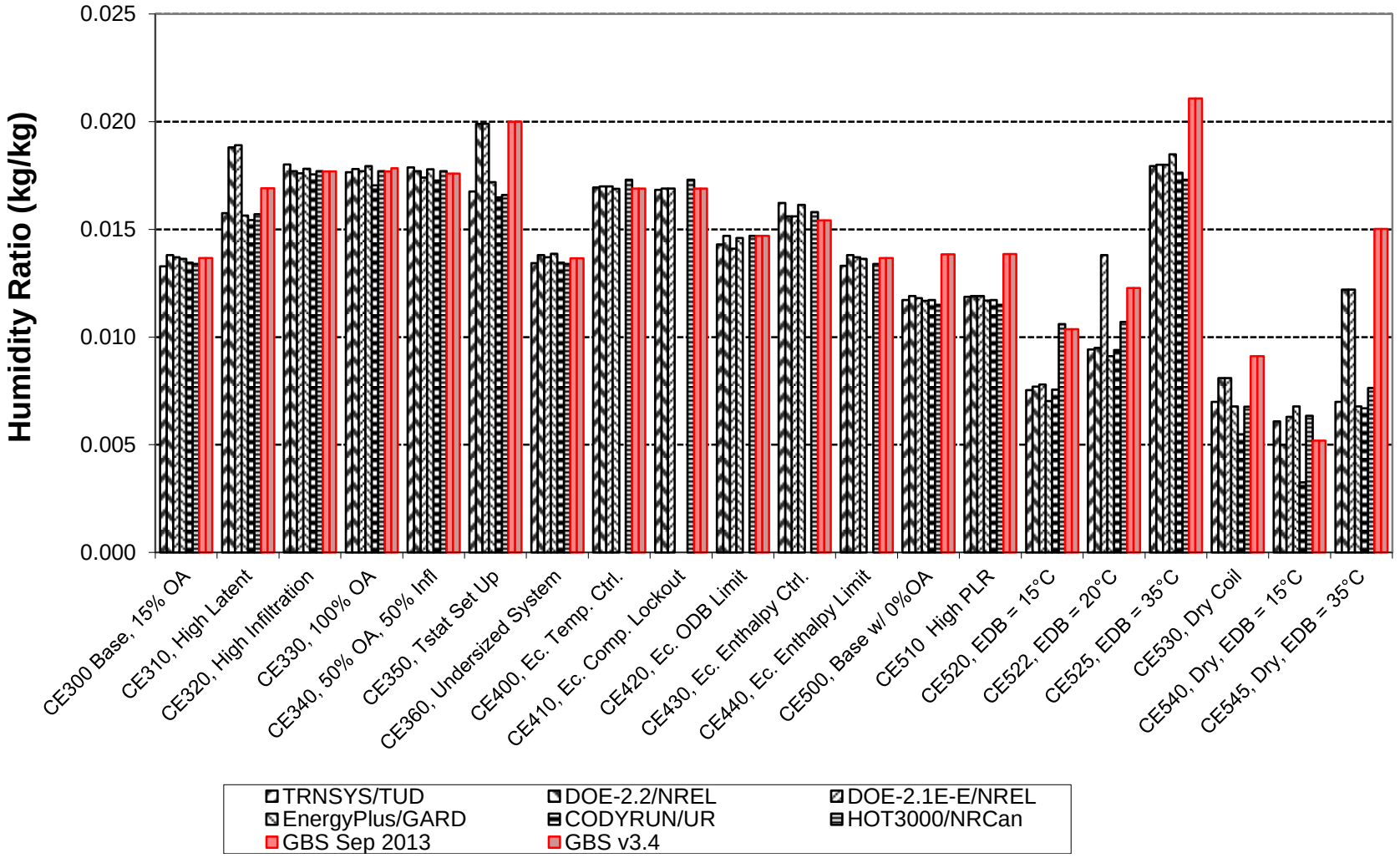


Figure B16.5.2-33. HVAC BESTEST: CE300 - CE545 Annual Mean Humidity Ratio Sensitivities



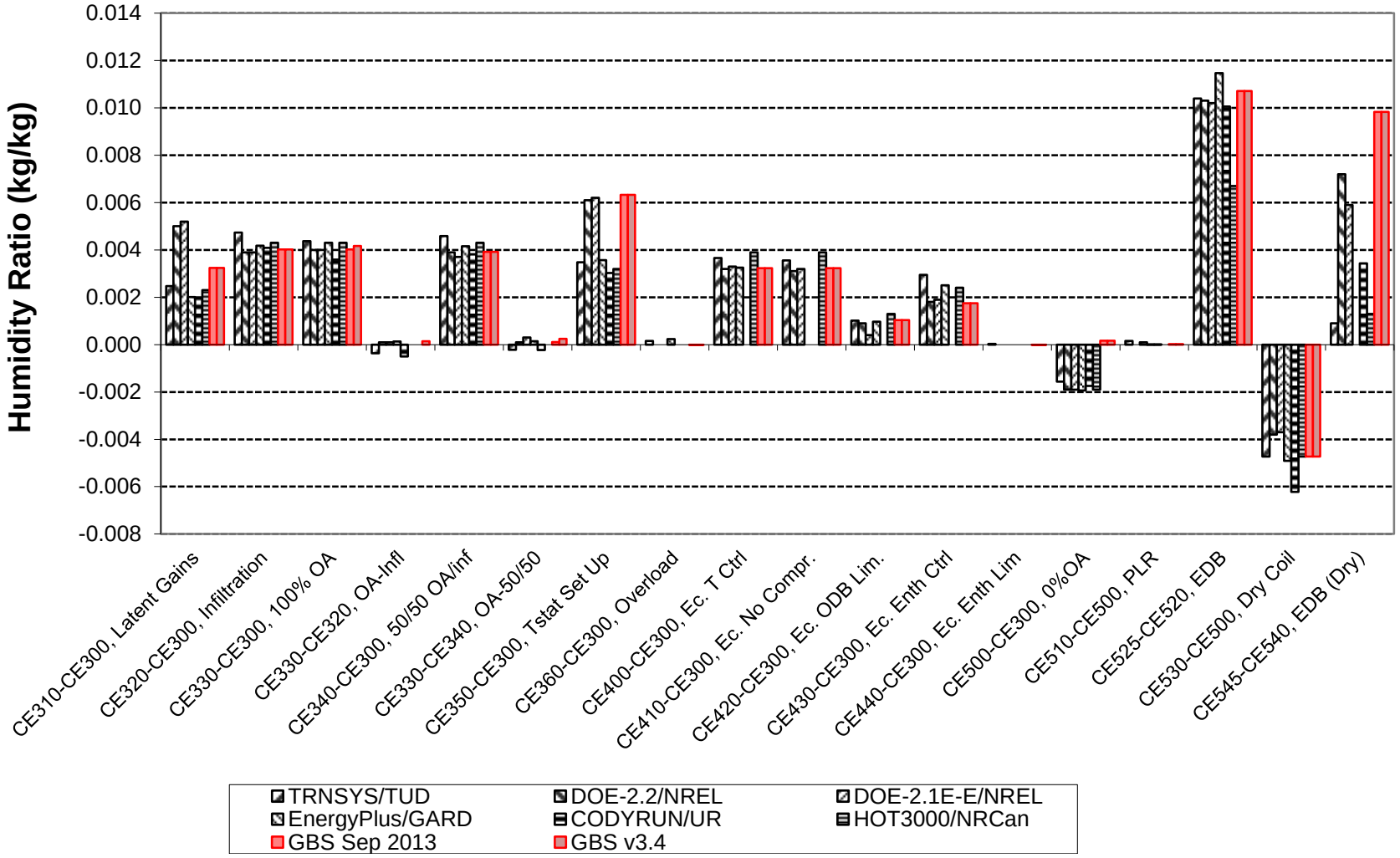
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-34. HVAC BESTEST: CE300 - CE545 Hourly Maximum Zone Humidity Ratio



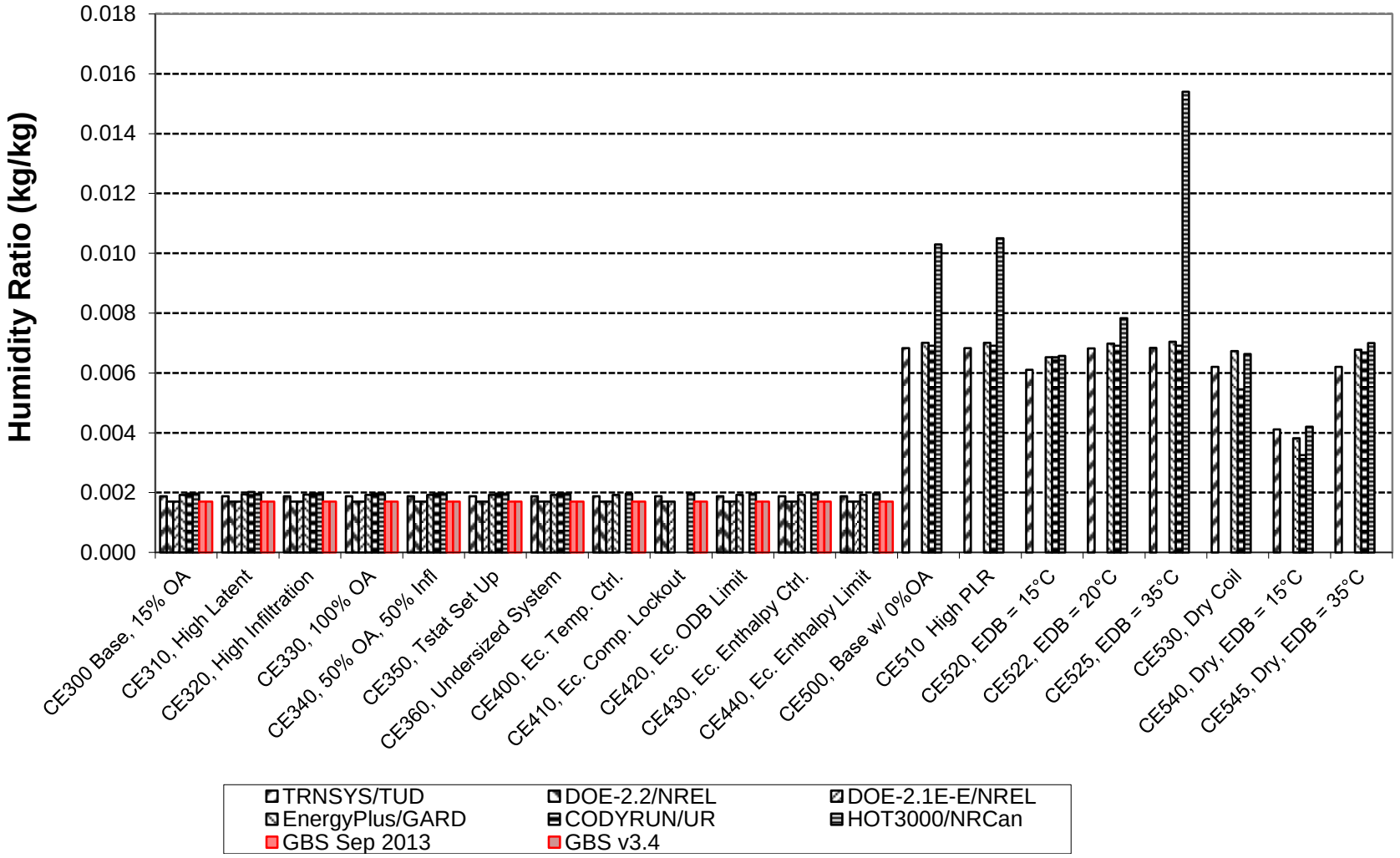
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-35. HVAC BESTEST: CE300 - CE545 Hourly Maximum Humidity Ratio Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-36. HVAC BESTEST: CE300 - CE545 Hourly Minimum Zone Humidity Ratio



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-37. HVAC BESTEST: CE300 - CE545 Annual Mean Relative Humidity

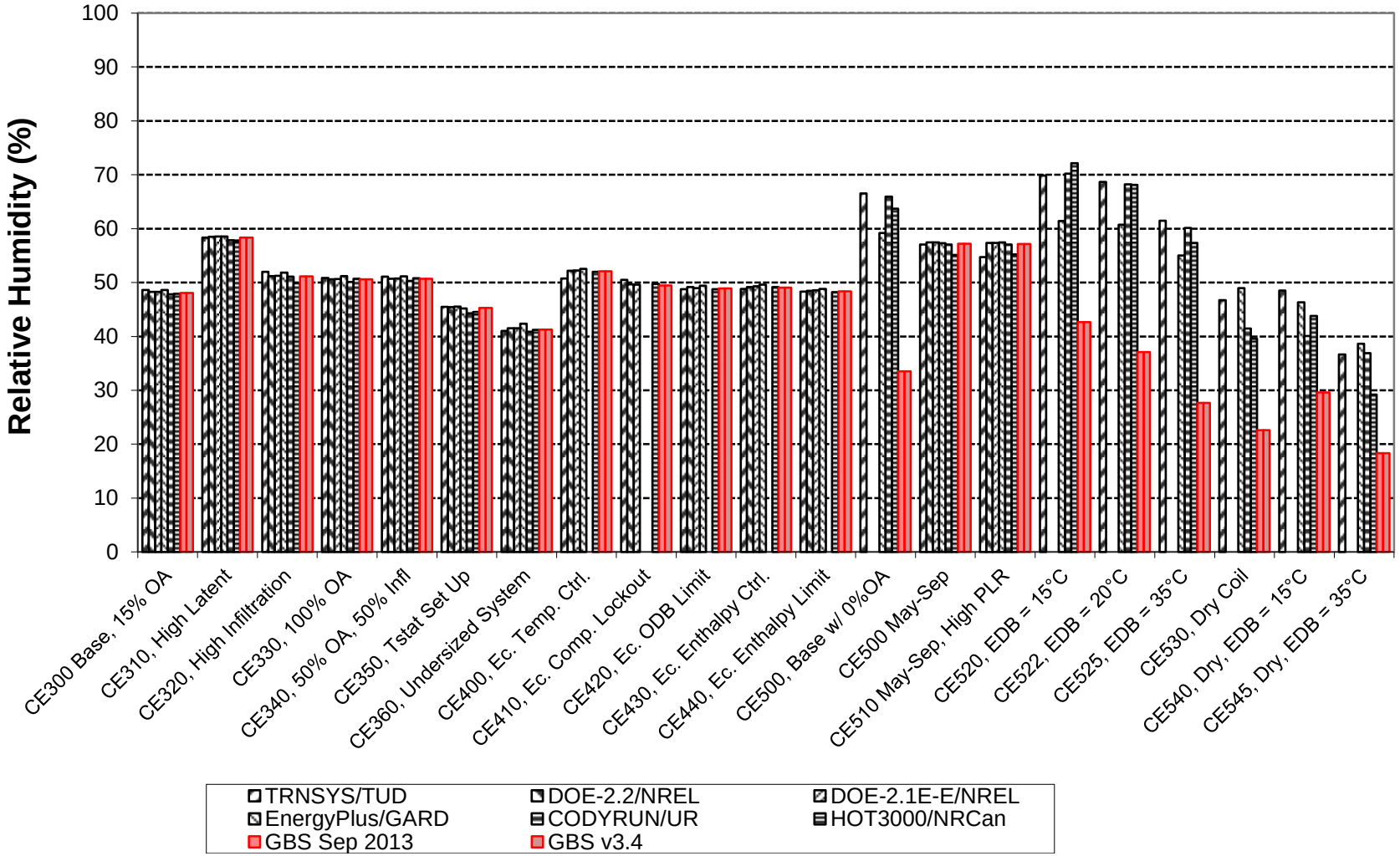
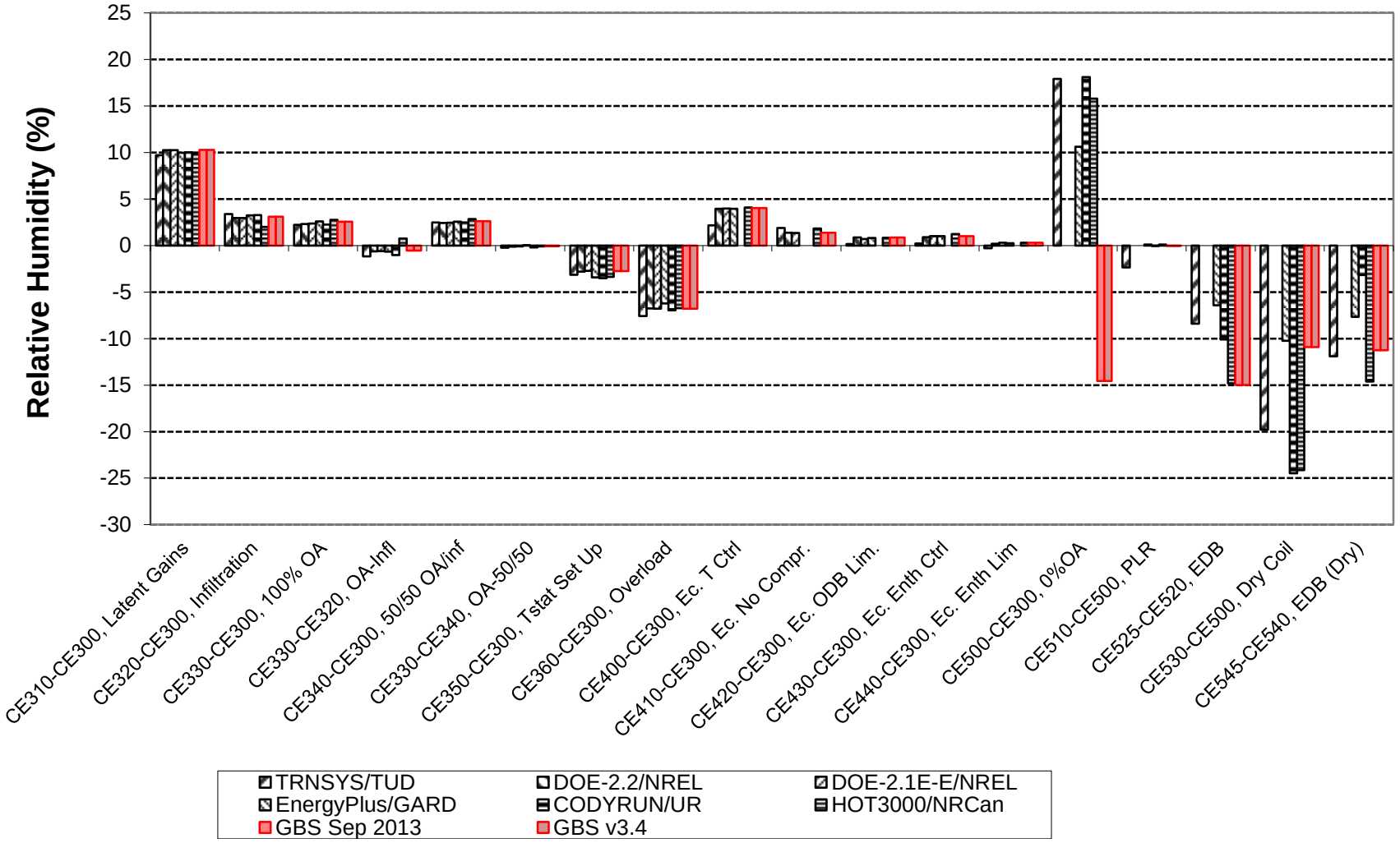
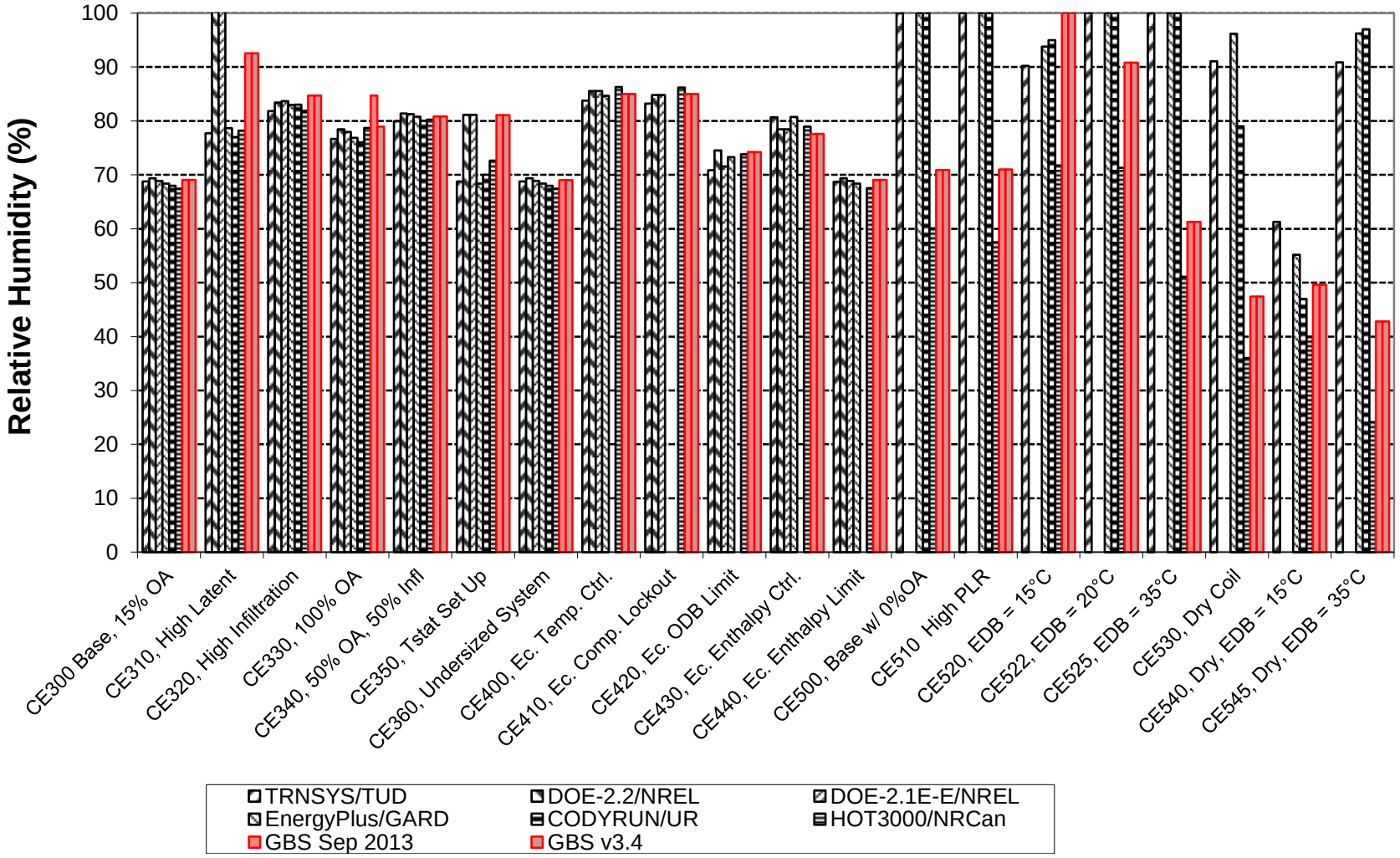


Figure B16.5.2-38. HVAC BESTEST: CE300 - CE545 Annual Mean Relative Humidity Sensitivities



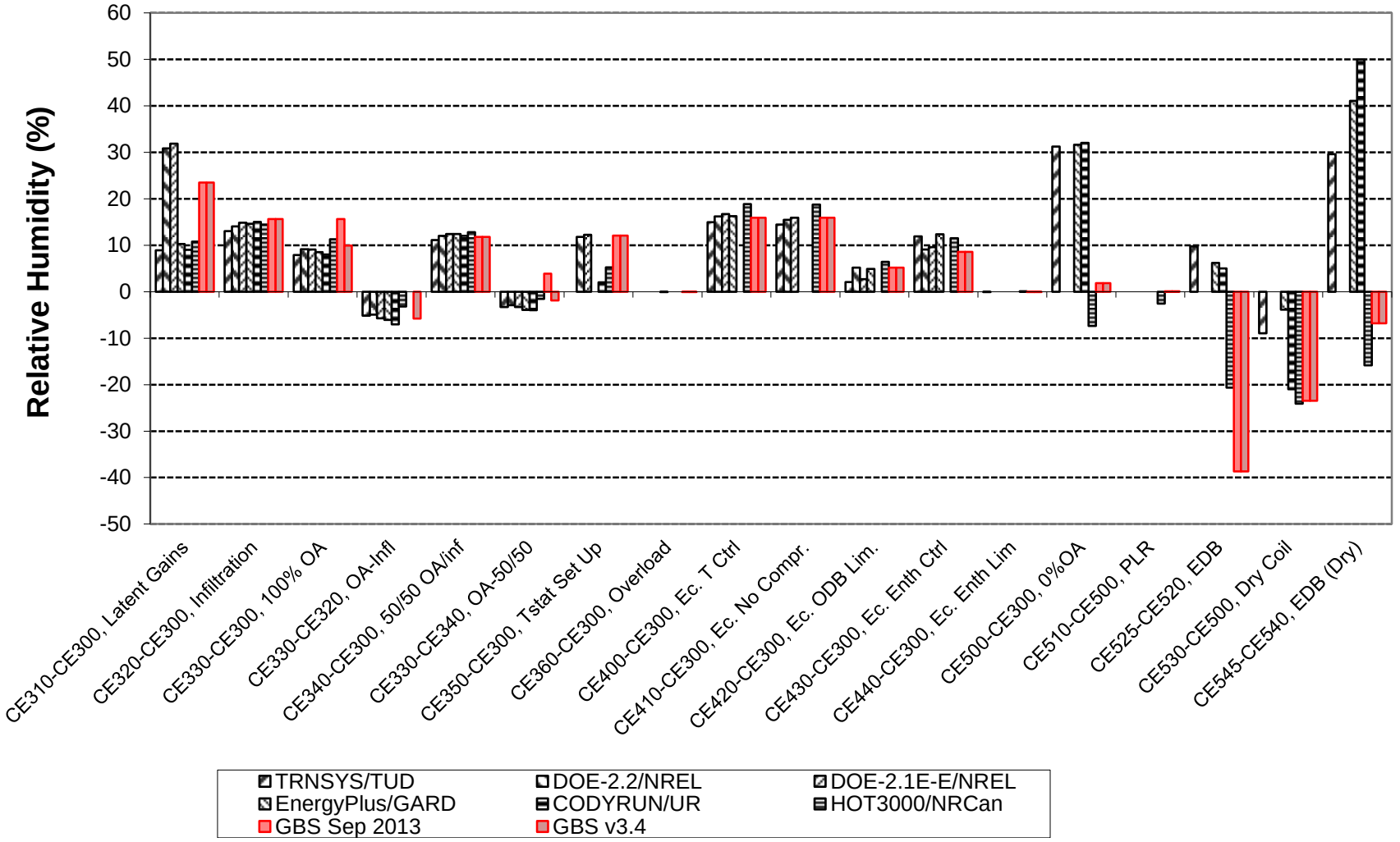
ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-39. HVAC BESTEST: CE300 - CE545 Hourly Maximum Zone Relative Humidity



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-40. HVAC BESTEST: CE300 - CE545 Hourly Maximum Relative Humidity Sensitivities



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-41. HVAC BESTEST: CE300 - CE545 Hourly Minimum Zone Relative Humidity

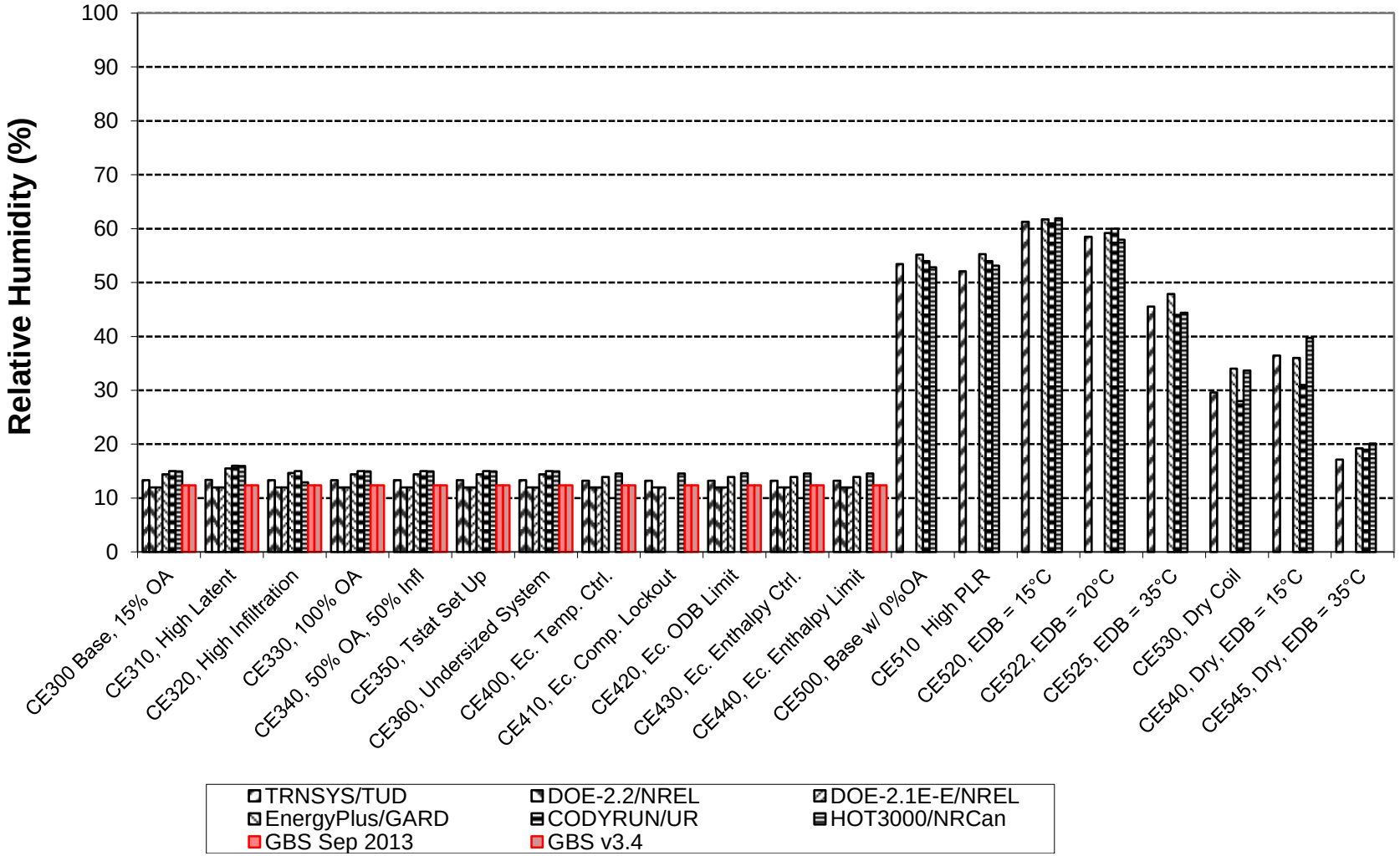


Figure B16.5.2-42. HVAC BESTEST: f(ODB) for CE500, CE530 Specific Day Electricity Consumptions

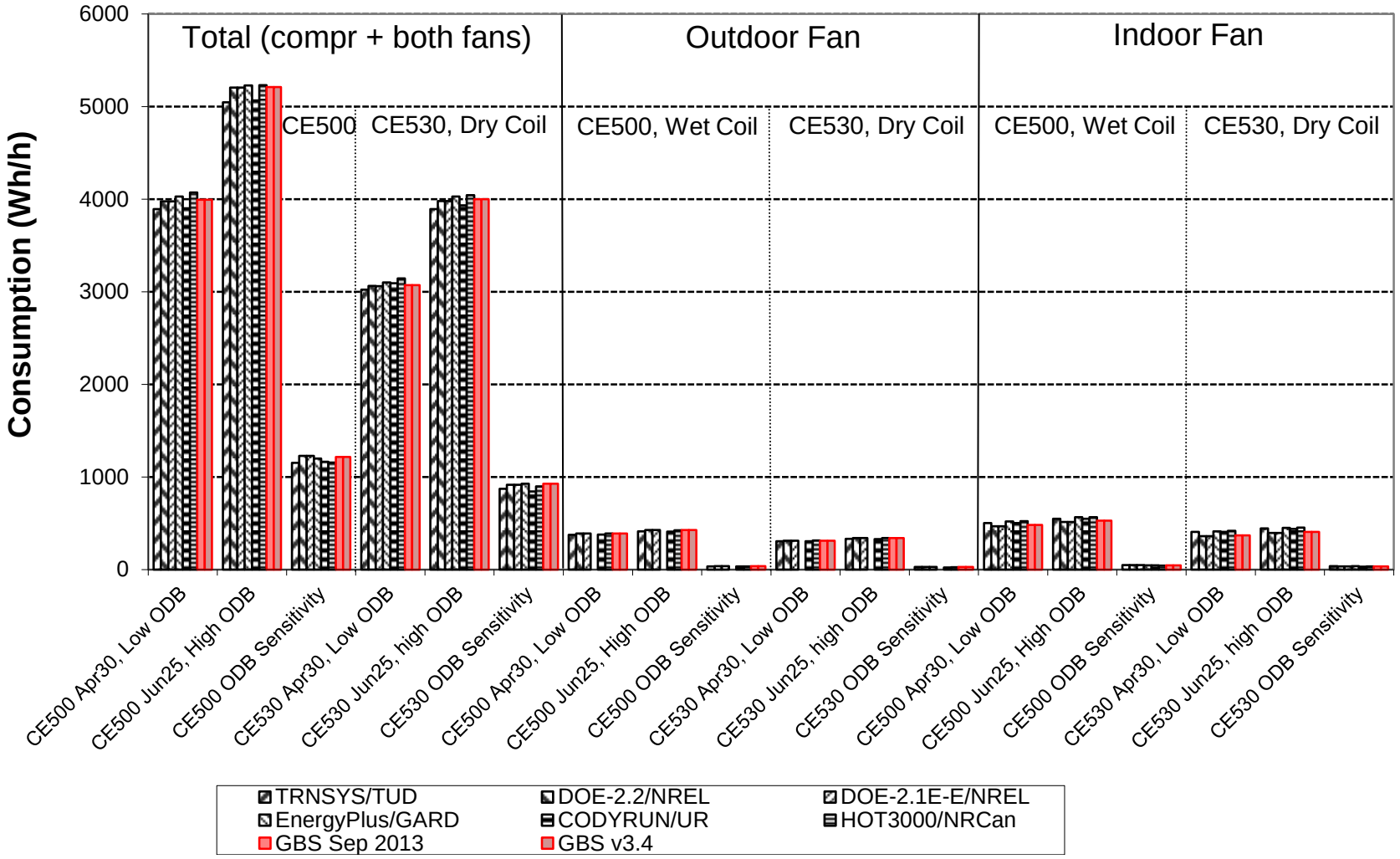


Figure B16.5.2-43. HVAC BESTEST: f(ODB) for CE500, CE530 Specific Day Coil Loads

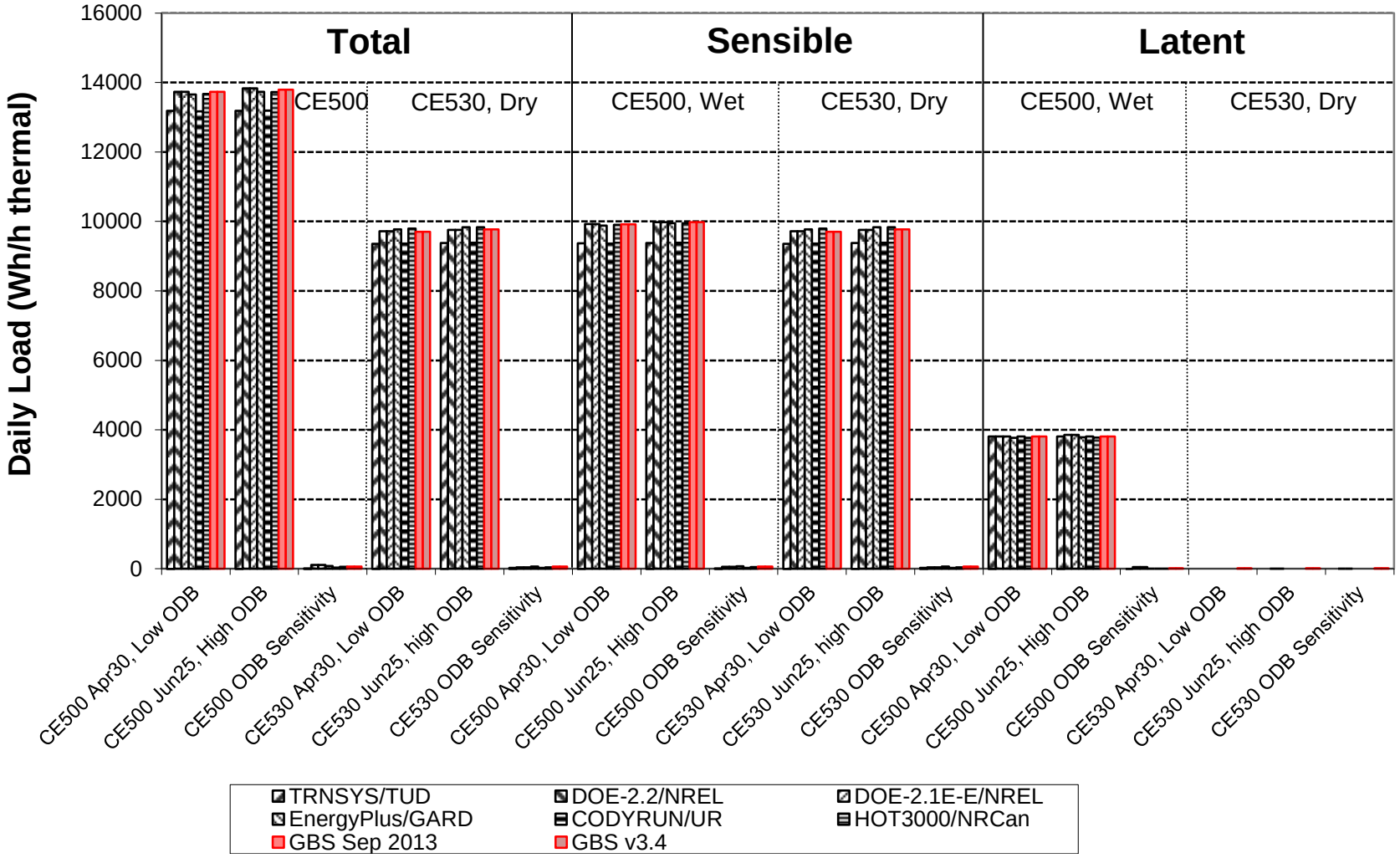


Figure B16.5.2-44. HVAC BESTEST: f(ODB) for CE500, CE530 Specific Day COP2

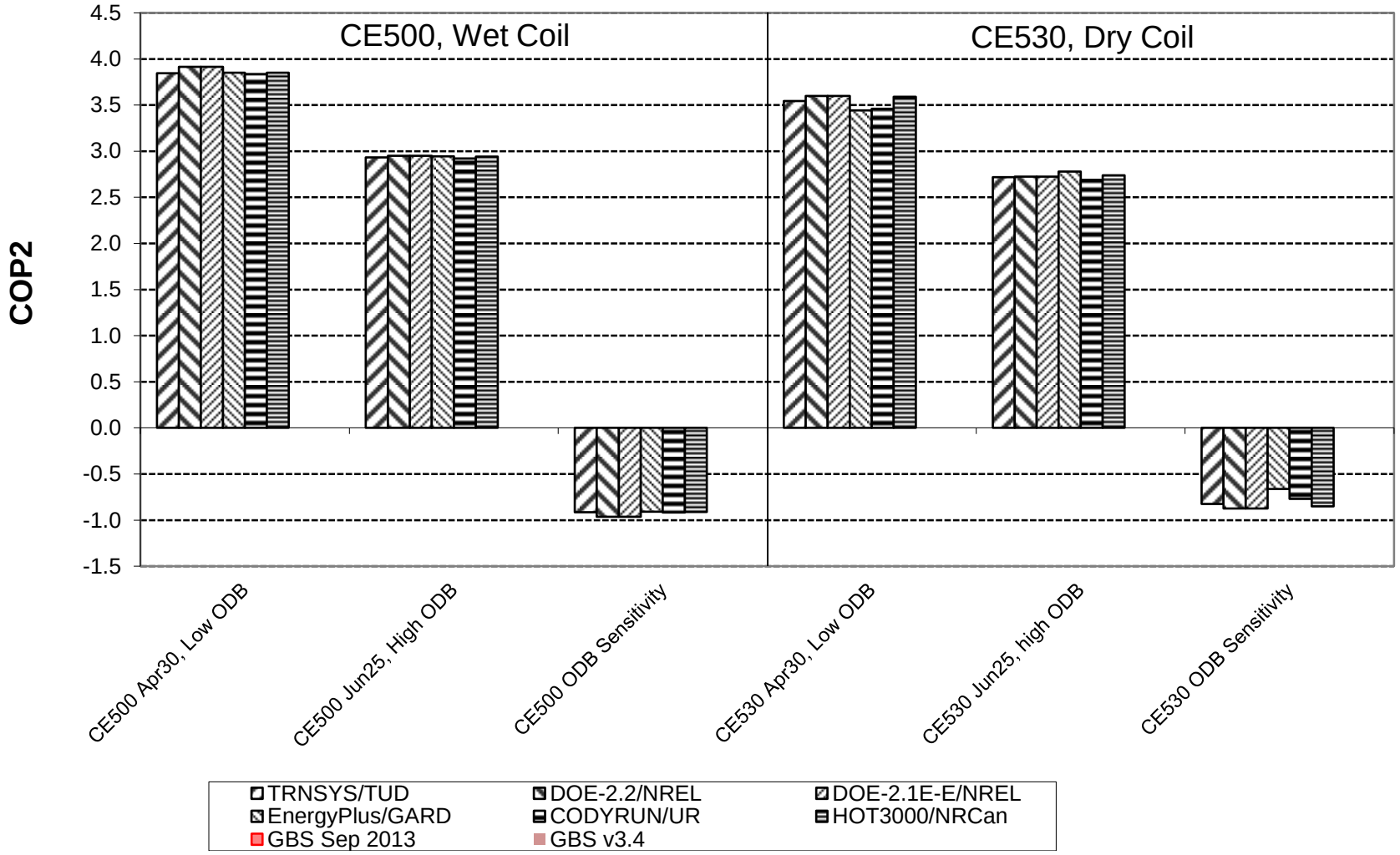
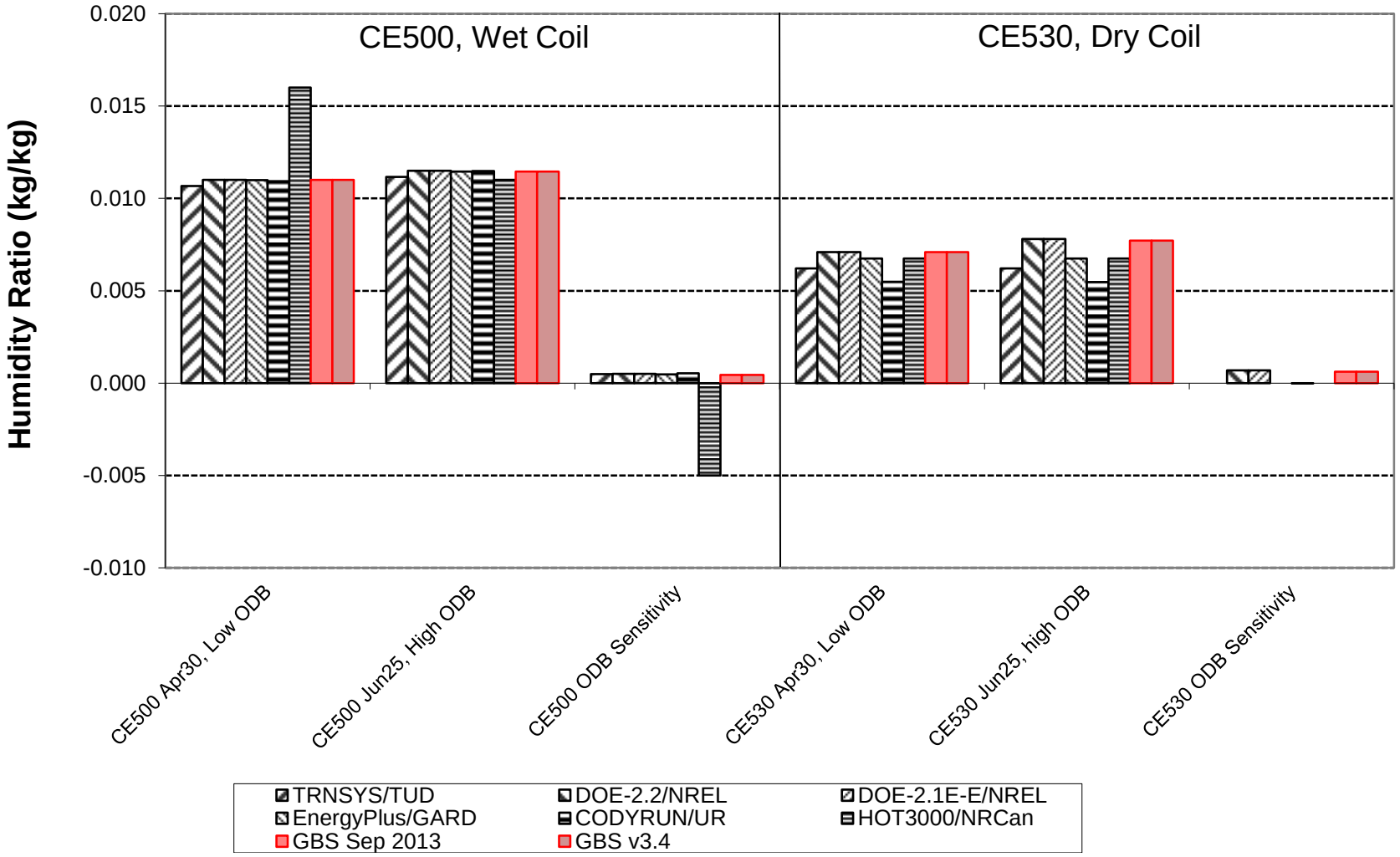


Figure B16.5.2-45. HVAC BESTEST: f(ODB) for CE500, CE530 Specific Day Humidity Ratio



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-46. HVAC BESTEST: CE300 June 28 Hourly Electricity Consumption

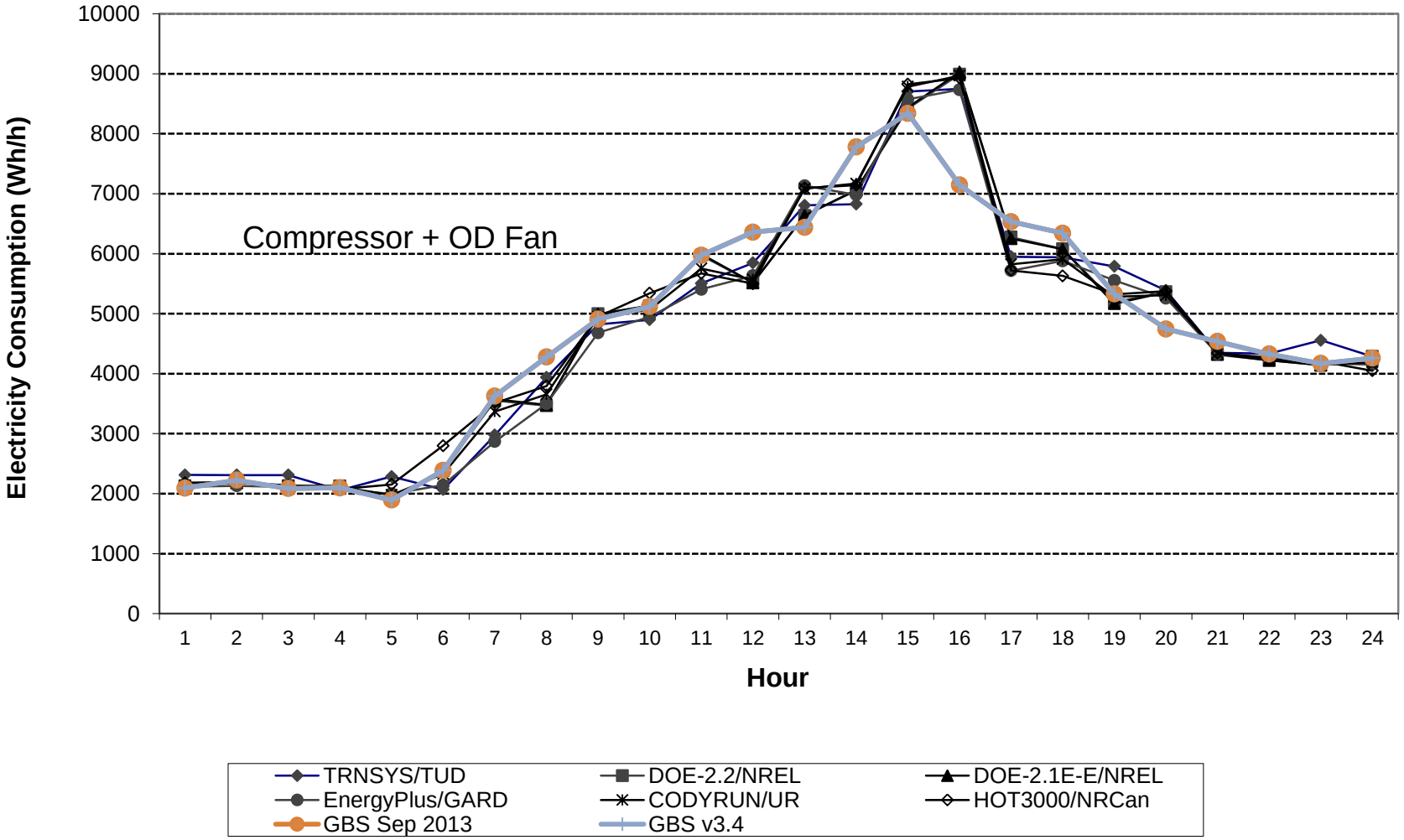


Figure B16.5.2-47. HVAC BESTEST: CE300 June 28 Hourly Coil Loads

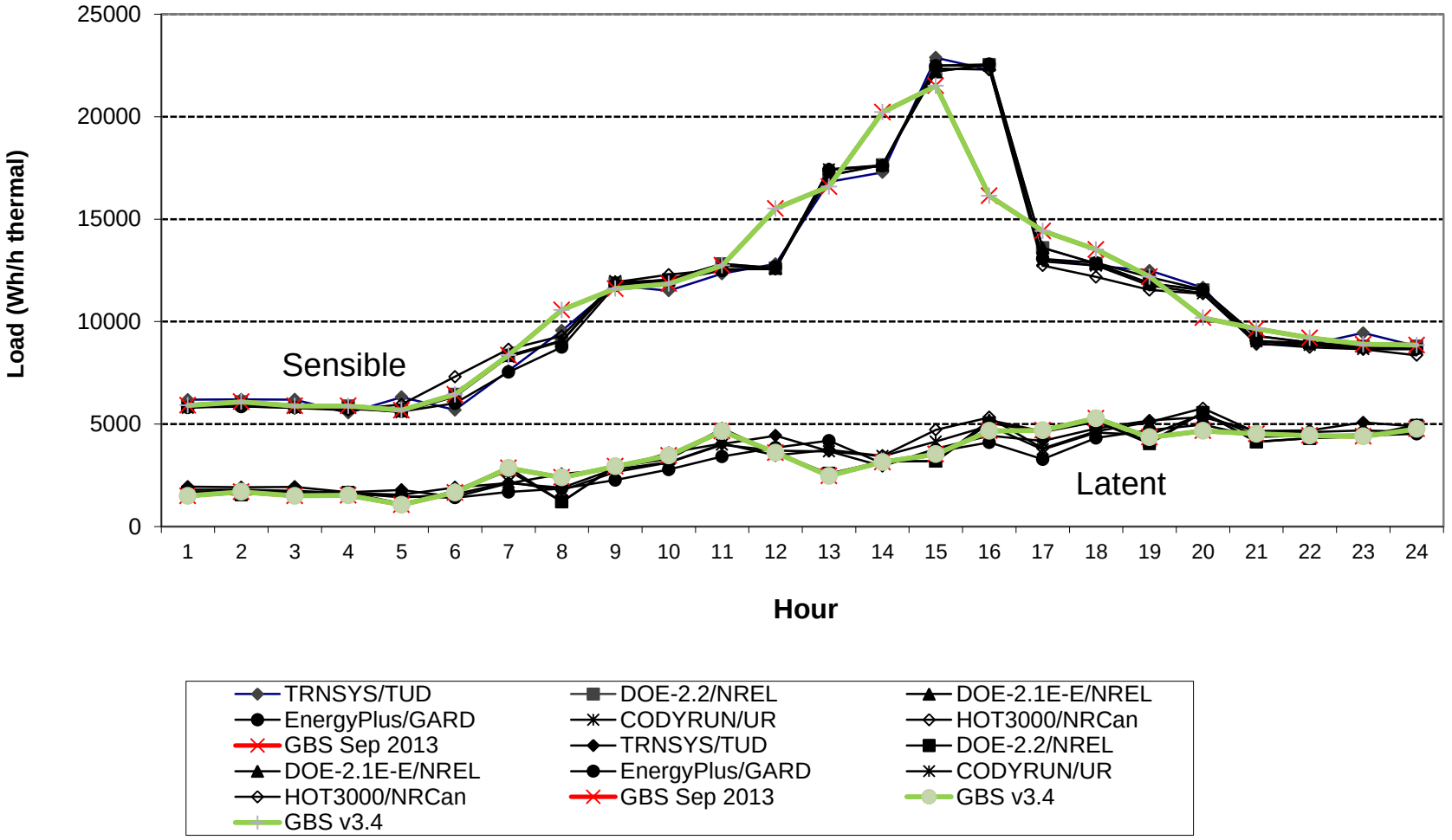


Figure B16.5.2-48. HVAC BESTEST: CE300 June 28 Hourly COP2

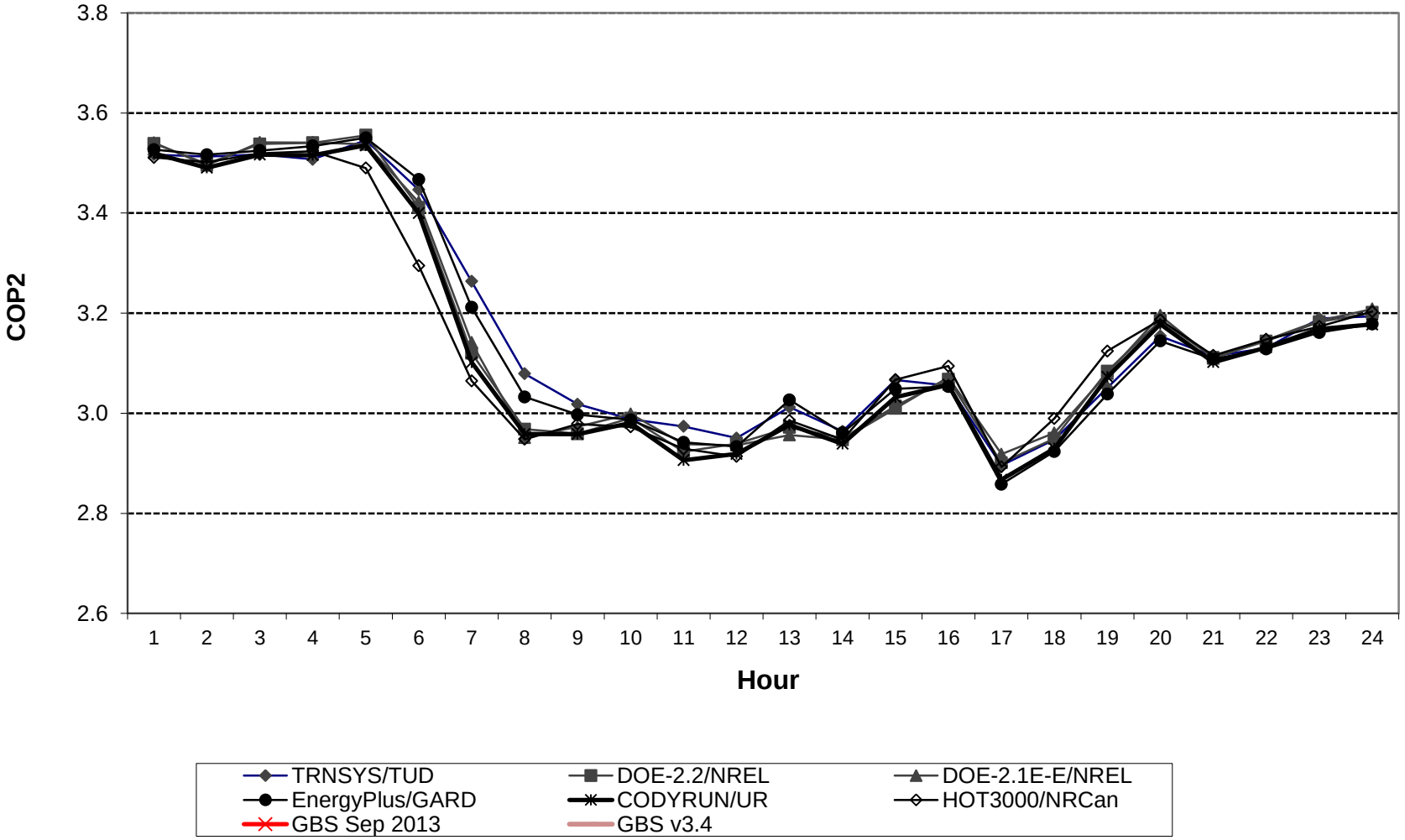
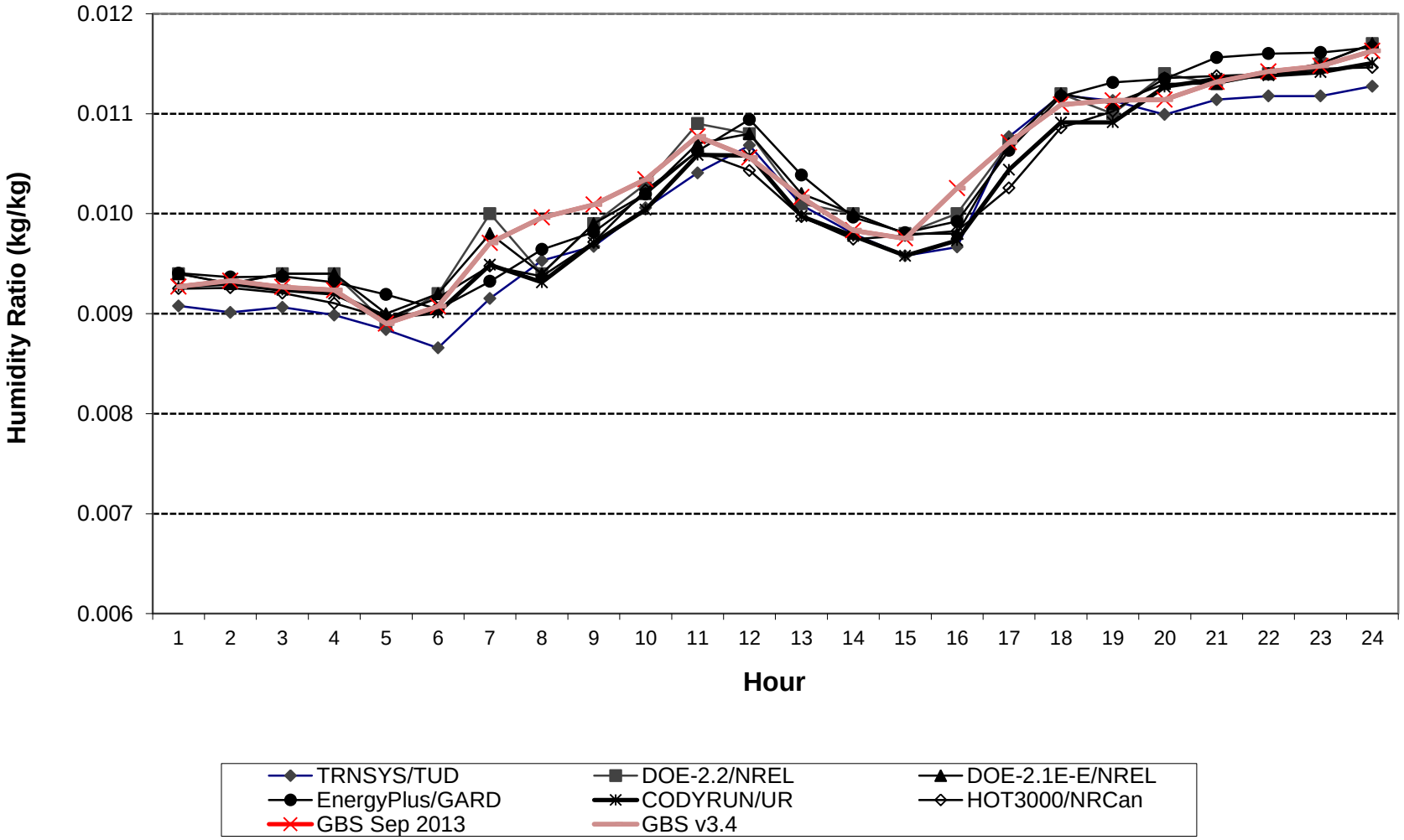
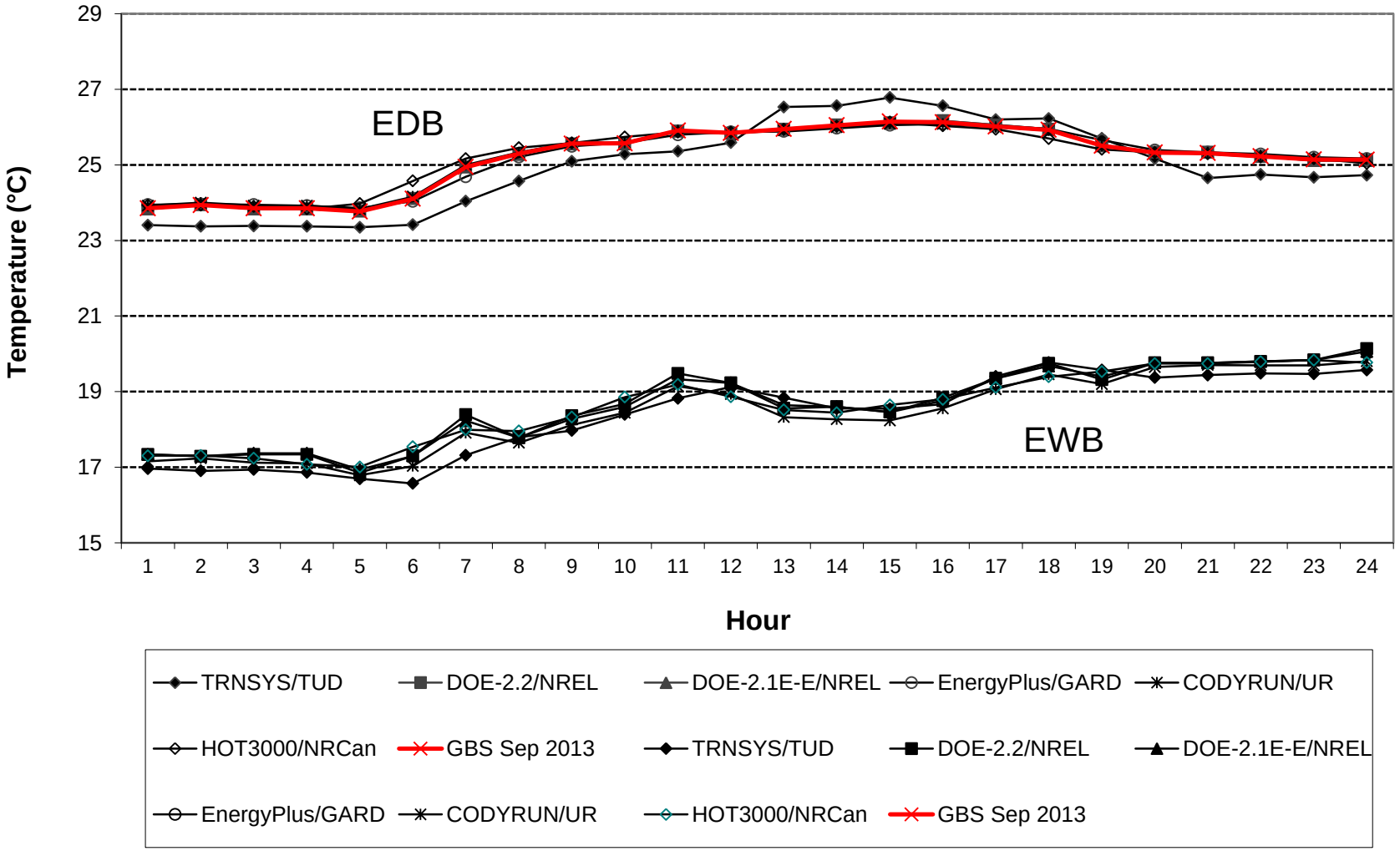


Figure B16.5.2-49. HVAC BESTEST: CE300 June 28 Hourly Zone Humidity Ratio



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-50. HVAC BESTEST: CE300 June 28 Hourly EDB & EWB



ASHRAE Standard 140-2011 Test Results Comparison for Section 5.3 - HVAC Equipment Performance Tests CE300-CE545
Autodesk Green Building Studio September 8, 2013 (GBS Sep 2013) vs. Annex B16, Section B16.5.2 Example Results

Figure B16.5.2-51. HVAC BESTEST: CE300 June 28 Hourly ODB

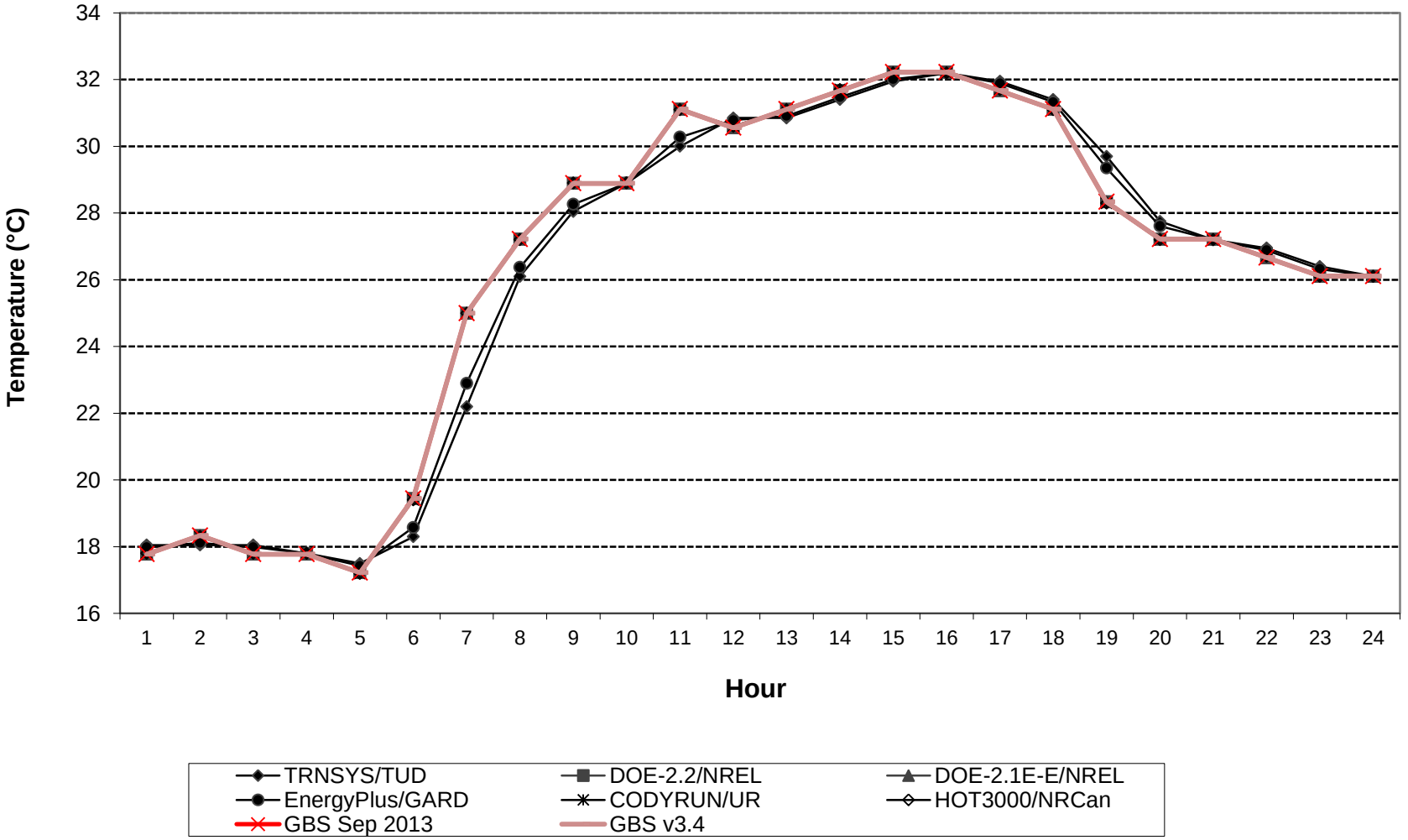


Figure B16.5.2-52. HVAC BESTEST: CE300 June 28 Hourly OHR