ANSI/ASHRAE Standard 140

Some result differences were noted between the February 14, 2014 release of Autodesk Green Building Studio (DOE-2.2 48r 64-bit) and GBS version 3.4. Version 3.4 is the latest version of GBS to be STD-140 test results submitted for evaluation; the version 3.4 results were evaluated and met the criteria, under ANSI/ASHRAE Standard 140, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs).

Conclusion: There is no meaningful difference between GBS DOE-2.2 48r 64-bit release results and other simulation tools.
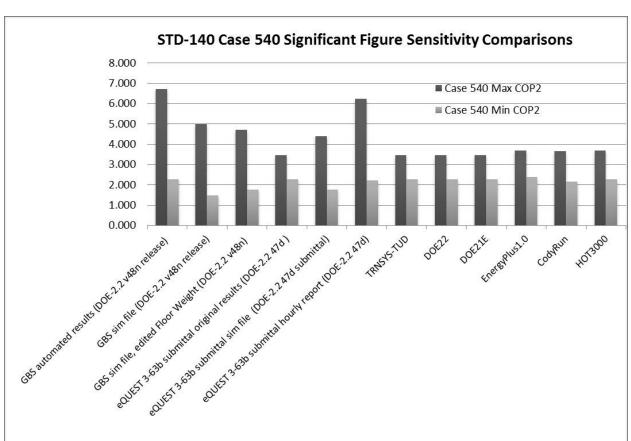
The minor differences, where noted, are due to computational changes to DOE-2.2 48r. Refer to this blog article for more details: [Autodesk Green Building Studio Adopts the newest DOE-2.2 version (48r in 64-bit) for our February 14, 2014 Release](#).

Differences between GBS results and other simulation tools, where noted in Section 5-3b for calculation of COP2 minimum and maximum values are due to the sensitivity of significant figures used in calculating the COP2 for cases 500-545. The COP2 values equal (total coil load, sensible + latent) / (combined compressor and outdoor fan consumption). GBS data was missing from v3.4 submittal of section 5-3B: Annual Hourly Integrated Maxima and Minima - COP2 and Zone, therefor a comparison to our previous STD140 submittal is not possible.
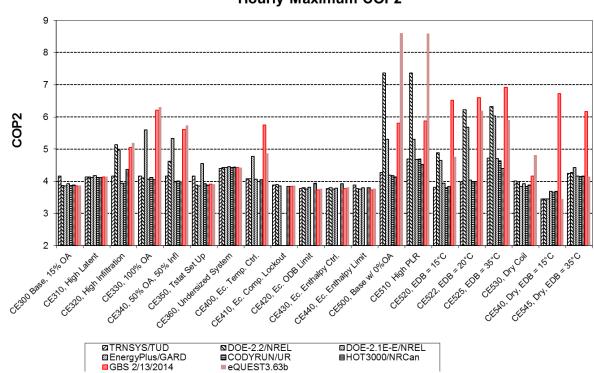
Results from the DOE-2.2/eQUEST simulations can be obtained through either hourly reports in spreadsheet form, or simulation results in non-spreadsheet form. These two different outputs report to different significant figures. The example below of Case 540 from Section 5-3b looks in more detail at the sensitivity of the COP2 calculations to significant figures for the coil loads, compressor, and outdoor fan consumption results. GBS uses the DOE-2.2 simulation engine so results should be comparable to DOE2.2 as well as eQUEST, with differences due to different input values rather than the simulation engine itself. The comparative results for DOE-2.2 and eQUEST are from DOE-2.2 47d, an older version of DOE-2.2--the most current release of GBS uses version 48r and runs it in a 64-bit compilation.

One of the input values where GBS uses a different value than DOE-2.2/eQUEST is the FLOOR-WEIGHT. GBS uses 8.0, while eQUEST 3-63b and DOE-2.2 47d uses 0.74. When edits were made to the GBS FLOOR-WEIGHT value to match eQUEST 3-63b and DOE-2.3 47d, there were some changes to the results (see below). The eQUEST definition of FLOOR-WEIGHT:

> Specifies the composite weight of the floor, furnishings, and interior walls of a space divided by the floor area of the space. The input value determines the weighting factors associated with the space. Higher values give a longer lag time between heat gains and resultant cooling loads, and greater damping of peak loads. If 0.0 is input (the default) the program will calculate Custom Weighting Factors. For other values ASHRAE weighting factors are used

The figure "STD-140 Case 540 Significant Figure Sensitivity Comparisons" shows the comparison of calculated COP2 min and max values between GBS and the eQUEST 3.63b submittal The sim file values results are reasonably close; as well as the hourly report values between the two.
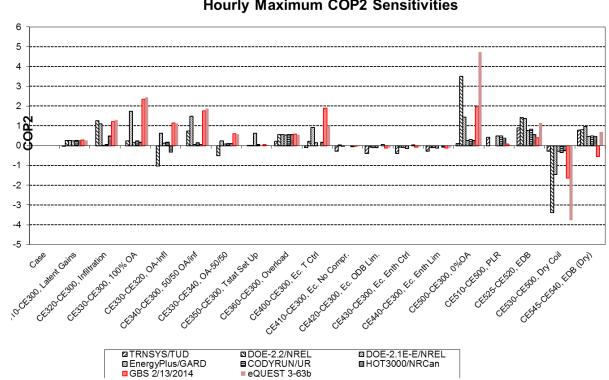
Figure B16.5.2-23. HVAC BESTEST: CE300 - CE545
Hourly Maximum COP2

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