



April 2015

Testing EnExPlan software against **ANSI/ASHRAE STANDARD 140-2011**

Standard Method of Testing for the Evaluation of Building Energy Analysis Computer Programs

Summary:

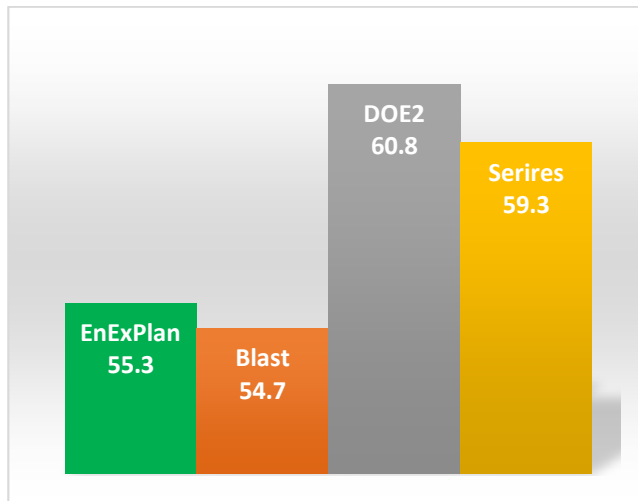
Almiranta put their Energy Efficiency Software **EnExPlan** to the test using Ashrae's most recent standard method **np. 140-2011**. The results shown in this report refer to heating & cooling loads; referenced under **L100AC and L100AL**

Comparing EnExPlan to other energy efficiency programs:

The following charts compare EnExPlan to various computer programs used within Ashrae's standard method number 140-2011. For both methods, a building was created using detailed information provided in the Ashrae standard. The building was then positioned in the city of reference. For heating loads, the city of reference is Colorado Springs and for cooling loads the city of reference is Las Vegas.



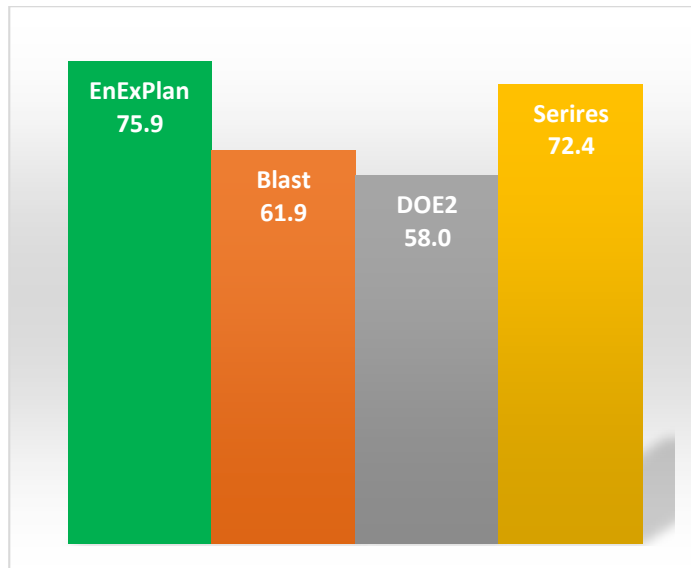
Cooling calculations (Las Vegas building):



Results illustrating the annual cooling load for the designated buildings.

Results are in MBTU/Y (million Btu per year)

Heating calculations (Colorado Springs building):



Results illustrating the annual heating load for the designated buildings.

Results are in MBTU/Y (million Btu per year)



Appendix 1

Las Vegas building

The following table shows the results for the cooling loads for the Las Vegas building.

Table B20-3. HERS BESTEST Tier-1 Example Results – Annual or Seasonal Sensible Cooling Loads (10⁶ Btu/y) for Las Vegas, NV

| Example Results: | | | | Statistics: | | | |
|------------------|-------|-------|---------|-------------|-------|-------|--------------------|
| Test Case | BLAST | DOE | SERIRES | min | max | mean | (max -min) /mean** |
| | 3.0 | 2.1E | 5.7 | | | | |
| L100AL | 54.66 | 60.80 | 59.32 | 54.66 | 60.80 | 58.26 | 11% |
| L110AL | 57.71 | 63.82 | 63.18 | 57.71 | 63.82 | 61.57 | 10% |
| L120AL | 51.36 | 56.14 | 55.01 | 51.36 | 56.14 | 54.17 | 9% |
| L130AL | 36.96 | 41.25 | 38.93 | 36.96 | 41.25 | 39.05 | 11% |
| L140AL | 23.52 | 26.54 | 24.64 | 23.52 | 26.54 | 24.90 | 12% |
| L150AL | 67.73 | 77.35 | 72.03 | 67.73 | 77.35 | 72.37 | 13% |
| L155AL | 54.09 | 59.06 | 57.51 | 54.09 | 59.06 | 56.89 | 9% |
| L160AL | 62.62 | 68.69 | 67.62 | 62.62 | 68.69 | 66.31 | 9% |
| L170AL | 45.83 | 49.08 | 49.30 | 45.83 | 49.30 | 48.07 | 7% |
| L200AL | 65.71 | 73.10 | 76.71 | 65.71 | 76.71 | 71.84 | 15% |
| L202AL | 59.61 | 62.24 | 70.57 | 59.61 | 70.57 | 64.14 | 17% |

** ABS [(max - min) / (mean of Example Results)]

The screenshot on the right is taken from EnExPlan's load calculations menu and highlights the cooling loads resulting from the Las Vegas building. Total annual cooling loads are indicated in the green box and show a total of 55,289 kBtu per year (55.3 MBTU/Y)

02/03/2015 19:37 Active User Test Ashrae

Equipment Help Logout Active Building: Ashrae L100A

| Ventilation | | | | Cooling | | | | |
|-------------|------------------|---------|-------|-----------------------|---------------|--------------|----------------------------------|-----------------|
| Area | Consumption(kWh) | | | Total Loads btu/hr | Consumption | | | |
| | Cooling | Heating | Other | | Total kBTU | Elec. kWh | Natural Gas m ³ | Propane lbs. |
| | 0 | 0 | | 37,093 | 55,289 | 19,197 | 0.0 | 0.0 |
| | 0 | 0 | | 0 | 0 | 0 | 0.0 | 0.0 |
| | 0 | 0 | | 0 | 0 | 0 | 0.0 | 0.0 |
| | 0 | 0 | | 0 | 0 | 0 | 0.0 | 0.0 |
| | 0 | 0 | | 0 | 0 | 0 | 0.0 | 0.0 |
| | 0.0 | 0 | 0 | 37,093 | 55,289 | 19,197 | 0.0 | 0.0 |

Colorado Springs building

The following table shows the results for the heating loads for the Colorado Springs building.

| Example Results Seasonal Loads | | | | | | | | |
|--|--------------|-------------|-----------------|--------|-------------|--------|----------------------|--|
| Table B20-1. HERS BESTEST Tier-1 Example Results – Annual or Seasonal Heating Loads (10 ⁶ Btu/y) for Colorado Springs, CO | | | | | | | | |
| Example Results: | | | | | Statistics: | | | |
| Test Case | BLAST 3.0 | DOE 2.1E | SERIERES 5.7 | min | max | mean | (max - min) / mean** | |
| L100AC | 61.94 | 58.00 | 72.39 | 58.00 | 72.39 | 64.11 | 22% | |
| L110AC | 85.95 | 81.39 | 96.53 | 81.39 | 96.53 | 87.96 | 17% | |
| L120AC | 50.27 | 45.10 | 57.82 | 45.10 | 57.82 | 51.06 | 25% | |
| L130AC | 46.35 | 45.84 | 49.98 | 45.84 | 49.98 | 47.39 | 9% | |
| L140AC | 49.15 | 47.25 | 52.48 | 47.25 | 52.48 | 49.63 | 11% | |
| L150AC | 54.93 | 49.48 | 64.03 | 49.48 | 64.03 | 56.15 | 26% | |
| L155AC | 57.39 | 52.30 | 66.90 | 52.30 | 66.90 | 58.86 | 25% | |
| L160AC | 62.90 | 58.29 | 73.51 | 58.29 | 73.51 | 64.90 | 23% | |
| L170AC | 73.06 | 71.65 | 85.46 | 71.65 | 85.46 | 76.72 | 18% | |
| L200AC | 133.97 | 136.12 | 168.34 | 133.97 | 168.34 | 146.14 | 24% | |
| L202AC | 137.47 | 142.06 | 172.55 | 137.47 | 172.55 | 150.69 | 23% | |
| L302AC | 70.50 | 67.44 | 82.92 | 67.44 | 82.92 | 73.62 | 21% | |
| L302BC | 65.24 | 60.12 | 73.10 | 60.12 | 73.10 | 66.15 | 20% | |
| L304AC | 60.05 | 56.64 | 69.16 | 56.64 | 69.16 | 61.95 | 20% | |
| L304BC | 55.59 | 50.12 | 61.59 | 50.12 | 61.59 | 55.77 | 21% | |
| L322A1 | 91.65 | 88.26 | 105.94 | 88.26 | 105.94 | 95.28 | 19% | |
| L322A2 | 92.49 | 86.32 | 107.68 | 86.32 | 107.68 | 95.50 | 22% | |
| L322B1 | 81.82 | 77.72 | 92.39 | 77.72 | 92.39 | 83.98 | 17% | |
| L322B2 | 87.97 | 82.87 | 92.10 | 82.87 | 92.10 | 87.65 | 11% | |
| L324A1 | 64.91 | 61.11 | 72.58 | 61.11 | 72.58 | 66.20 | 17% | |
| L324A2 | 65.01 | 60.31 | 73.47 | 60.31 | 73.47 | 66.26 | 20% | |
| L324B1 | 56.59 | 50.38 | 62.45 | 50.38 | 62.45 | 56.47 | 21% | |
| L324B2 | 60.40 | 51.88 | 65.30 | 51.88 | 65.30 | 59.19 | 23% | |

** ABS [(max - min) / (mean of Example Results)]

The screenshot on the right is taken from EnExPlan’s load calculations menu and highlights the heating loads resulting from the Colorado Springs building. Total annual heating loads are indicated in the green box and show a total of 75,933 kBTU per year (75.9 MBTU/Y)

| 02/03/2015 19:33Active User Test Ashrae | | | | | | | | | |
|---|----------------------------|--------------|----------------|--------|---------------|--------|---------------|------------|--|
| Equipment ▾ Help ▾ Logout Active Building: L100AC Proper2 | | | | | | | | | |
| Cooling | | | | | Space Heating | | | | |
| Consumption | | | | Loads | Consumption | | Heating Loads | | |
| Elec. kWh | Natural Gas m ³ | Propane lbs. | Oil US gallons | btu/hr | kBTU | btu/hr | Total kBTU | Efficiency | |
| 0 | 0.0 | 0.0 | 0.0 | 39,859 | 75,933 | 39,859 | 75,933 | 38 | |
| 0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | | |
| 0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | | |
| 0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | | |
| 0 | 0.0 | 0.0 | 0.0 | 0 | 0 | 0 | 0 | | |
| 0 | 0.0 | 0.0 | 0.0 | 39,859 | 75,933 | 39,859 | 75,933 | 38 | |