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iAIRE SOLAR HVAC TEST DATA RESULTS
MAY 12th, 2024

iAIRE has been testing the Solar HVAC in several different locations around the country.

iAIRE would like to be able to utilize AHRI to test iAIRE solar HVAC equipment. This **cannot** be done. All AHRI testing is done indoors in a controlled lab environment. Obviously, no sun would ever be focused on the solar panel in this indoor testing. During AHRI testing, they control the temperature going through the evaporator as well as the temperature at the condenser. Because this testing is always done inside, this test would not yield results demonstrating what the solar panel would be capable of adding to the system to reduce the energy consumption of the solar HVAC system being tested. Because of this limitation, the only way that iAIRE can show the benefits of solar HVAC is to either 1) install two (2) units on a building at the same time in the same place (one with the iAIRE solar package and one without) and compare the results or 2) run the data from the solar unit and compare the data to the base unit data with no solar panel added. In either of these cases, iAIRE cannot calculate a SEER rating for the units. The only comparison that can be drawn is a comparison of the average EER or COP data between the solar and non-solar unit over a period of time.

This report will discuss testing results thus far of units in 3 locations listed below:

1. 1.5-ton packaged unit in Orlando Florida with the iAIRE solar package being compared to another5-ton packaged unit without solar at the same location.
2. 2.5-ton residential split system being tested in a home in Carmel Indiana in the heating mode
3. 3.2-ton residential unit in Jupiter Florida in the cooling mode

In all 3 of these tests, iAIRE plumbed the solar panel between the condensing unit and the TXV prior to the evaporator. iAIRE is using the following equipment to obtain the data:

- Entering Air temperature and enthalpy sensor (Greystone Model DWDTBV)
- Leaving air temperature and enthalpy sensor (Greystone Model DWDTBV)
- Watt meter measuring both voltage and amperage (Temco Model SPM1-50-AC)
- Outside weather data was taken online from the city where the unit is located

Unit wattage was calculated using voltage multiplied by amperage

Total BTUs were calculated using (entering air enthalpy – leaving air enthalpy) * cfm *4.5

Sensible BTUs were calculated using entering air temperature – leaving air temperature * cfm * 1.08

Latent BTUs were calculated by Total BTUs – Sensible BTUs

EER cooling = BTU / Watts

COP heating = (BTU * 0.293) / Watts

ORLANDO FL. TESTING

The equipment being tested at Orlando is the following:

Trane Model TSC060G3E0A000. This unit has the iAIRE Solar HVAC package added to it.

This system is a 14 SEER system.

Trane Model TSC060A1E0A1C0. This unit does not have the iAIRE Solar HVAC package added to it.

Both units are on the same office building in Orlando, FL. This building has four (4) total package units serving the entire office building. The building is normally occupied Monday through Friday during normal business hours. The units were being operated with the fan in auto mode. In this setting the fan is running only with a call for cooling. Since this is a commercial building, the fan running continuously would be required to ensure that the proper amount of outside air was being brought into the space. iAIRE ran tests with the thermostat in both Auto and in the On Positions.

To date, the following results have been achieved:
With the fan in the **Auto** Position:

Solar Unit average EER	10.66
Standard Unit average EER	4.62

The Solar Unit is 230.7% higher EER than the standard unit.

With the fan in the **On** Position:

Solar Unit average EER	19.83
Standard Unit average EER	4.06

The Solar unit is 388% higher average EER than the standard unit.

iAIRE did check out the average wattage with just the fans running on these two units.

Solar HVAC	4.74 amps	203.2 V	963.35 Watts
Standard HVAC	5.00 amps	204.02 V	1019.91 Watts

The Solar HVAC units fan is about 5.9% more efficient than the standard unit fan. This difference would increase the above Solar HVAC unit Efficiency over the standard by another 5.9%.

CARMEL IN. TESTING

The equipment being tested in Carmel, is the following:

Carrier Model 25HCE460AP050 5-ton condensing unit

This system is a 14 SEER system.

This unit is installed in a 5,400 square foot home in Carmel, In. The unit is providing the heating and cooling for this house. This system is installed on a 2-zone system. The 2nd floor of the house has a separate thermostat and zone damper. The main floor and the basement are on a separate thermostat and zone damper. If only 1 zone of the house is operating, there is a bypass damper that opens to ensure enough air is moving through the system at all times. This unit is brought on and off by the thermostat to maintain temperature inside the house, so the unit is only operating when there is a call for heating. The fan runs continuously in the house as there is an ionization air cleaner installed in the system.

- Solar Unit average COP 6.20
- Maximum BTU output of the solar unit 85,889
- Maximum BTU output of standard unit 66,935

Since the solar unit is not operating at full capacity all the time, it cannot be compared to the published data to determine a standard unit COP.

The solar unit is producing 18,954 BTUs more than the standard unit, which is 28.3% higher BTUs.

JUPITER, FL. TESTING

The equipment being tested in Carmel, is the following:

iAIRE model SHRPZ-24LH00A00-A 2-ton condensing unit

There are two (2) total systems in the house. There is a 3-ton system that provides heating and air conditioning to the 2nd floor. The 2-ton solar system provides cooling for the main floor of the house. Each unit operates on their own thermostat and the units turn on and off with the call for cooling from the thermostats. These units provide comfort cooling for the house.

- Solar Unit average EER 22.51
- Maximum BTU output of the solar unit 35,969
- Maximum BTU output of standard unit 28,380

The solar unit is running at a very high average EER.

The solar unit is producing 7,589 BTUs more than the standard unit which is 26.7% higher BTUs.

SUMMARY

In all three test sites, **the Solar HVAC units are performing at a higher efficiency than the standard units. In the direct comparison of the 5-ton packaged units, the Solar HVAC is performing approximately 70% better. In the residential systems, by approximately 25%.** Current testing is showing that the solar unit is performing better in both the cooling and heating mode.