Report No. 12136

Electricity Reduction Pilot Program

CONDUCTED FOR

The ESTEE LAUDER COMPANIES INC.

LOCATED AT

350 South Service Road, Melville, NY

TEST RESULTS
FOR
AIR CONDITIONING UNIT SERVING CAFETERIA
AND
WALK-IN REFRIGERATOR

A Confidential Report
Prepared by
Intellidyne LLC
www.intellidyne.green

ESTEE LAUDER PILOT STUDY
REPORT SUMMARY

The attached technical report summarizes the Energy Saving Performance of the ***IntelliCon®*** CAC energy saving control which was installed on the Carrier 80 Ton roof-top air conditioning system serving the Cafeteria and the ***IntelliCon®*** RU energy saving control which was installed on the Climate Control (Snyder General) 15 HP refrigeration system serving the Walk-In Refrigerator for Raw Products.

The ***IntelliCon®*** unit was installed at the Estee Lauder manufacturing plant located at 350 South Service Road in Melville NY and these systems operate on a 24 hours per day, 7 days per week basis. Validation data was collected from August 14, 2004 to September 6, 2004 on the walk-in refrigeration system and from August 19, 2004 to September 5, 2004 on the cafeteria air conditioning system. The test data was collected using "alternating day" methodology which is further describe later in this report. The test data in this report reflects a reduction in run-time and a significant reduction in cycling on each of the systems. With the ***IntelliCon®*** control installed, the cafeteria air conditioning system achieved a reduction in total **run-time of 13.84%** and a significant **reduction in the on/off cycling of 13.2%.** The walk-in refrigeration system achieved a reduction in total **run-time of 11.93%** and a significant **reduction in the on/off cycling of 15.9%.**

The individual test report for each system contains the comparative "run time" hours that supports the summary results and further details the specific length of the test and the number of compressor on/off cycles. These reductions were achieved with no degradation of the temperature maintenance and no noticeable impact to the buildings occupants. Detailed data on solar load, outdoor temperature and space temperature was also collected and is part of this final report.

This "pilot study" clearly shows the ***IntelliCon®*** control delivered above the minimum guaranteed savings of 10% and, by significantly reducing "cycling", should provide the additional benefit of extending the operational life of each system where the ***IntelliCon®*** control is installed.

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Test Report

Report No. 12136-1

Date: 09/09/04

Customer:

The ESTEE LAUDER Companies Inc.
350 South Service Road
Melville, NY 11747

Contact: Franco de Garay

Test Site Location:

The ESTEE LAUDER Companies Inc.
350 South Service Road
Melville, NY 11747

Contact: Daniel Bloom

Test Type: ☐ HEATING ☑ AIR CONDITIONING ☐ REFRIGERATION ☐ OTHER:

Product Tested: ☐ HW ☐ LCH ☐ LCS ☐ CHW ☐ CHS ☐ AC ☑ CAC ☑ RU ☐ OTHER:

Type of Equipment:

Manufacturer: Carrier
Model: 38AE064 610
Cooling Capacity: 80 Ton (2-40 Ton compressors)
Application: HVAC for Cafeteria
Volt, Amps, Ph: 462, 38.8 A_{avg}, 3ø
Equipment Location: Roof

Test Start Date: 08/19/04

Test End Date: 09/05/04

No. of Days in Test: 18

COMPRESSOR RUN-TIME: ☑ in HRS. ☐ in MIN.

***IntelliCon* ON-DAYS:** 129:39:44

***IntelliCon* OFF-DAYS:** 150:29:53

RUN-TIME was reduced by: **13.84%**

COMPRESSOR USAGE FACTOR

***IntelliCon* On-Days:** **60%**

***IntelliCon* Off-Days:** **70%**

COOLING DEGREE-DAYS (FOR TEST PERIOD)

IntelliCon ON-DAYS: 57

IntelliCon OFF-DAYS: 57

Total Degree-Days: 114

It was **< 1%** **Cooler on the ON-Days.**

SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)

IntelliCon ON-DAYS: 668

IntelliCon OFF-DAYS: 646

It was **3.43%** **Sunnier on the On-Days.**

COMPRESSOR CYCLING REDUCTION:

IntelliCon ON-DAYS: 877

IntelliCon OFF-DAYS: 1010

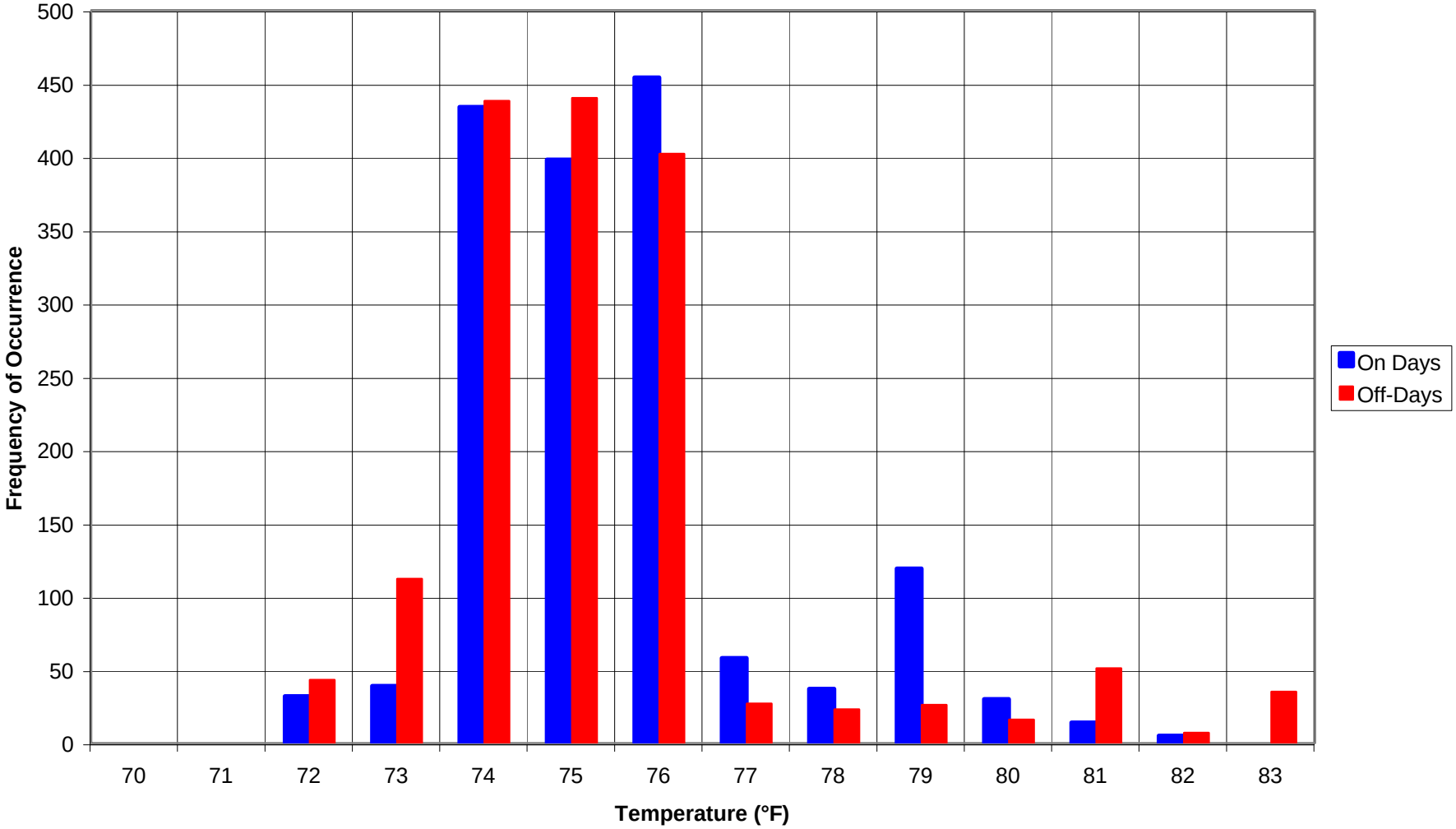
Cycling was reduced by: **13.2%**

Savings = 13.84%

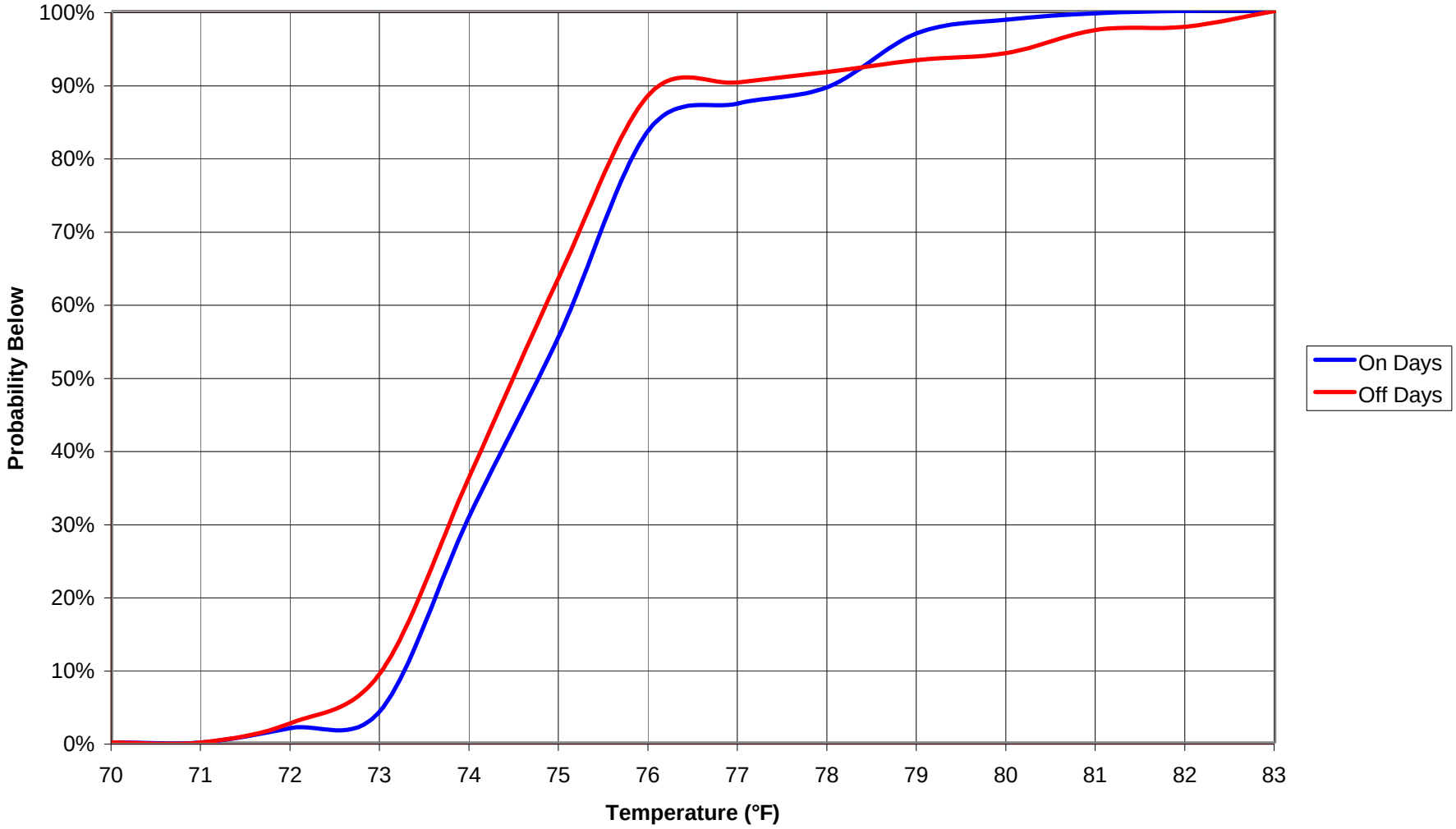
COMMENTS:

Note: Effects of Solar Load and Outdoor Air Temperature fluctuations were minimal for the test period. As such, there was no need to compensate for their influence. Due to problems with the 1st Stage Compressor, the test was restarted on 8/19. Due again to Compressor problems the first stage was out of commission from 8/24 through 9/4. Because this unit has two compressors, the runtimes for both are combined and are treated as one for analysis purposes. The individual run-times for the compressors are as follows: Compressor #1 On-Days = 22.8 Hrs. Off-Days = 35.2 Hrs., Compressor #2 On-Days = 106.9 Hrs. Off-Days = 115.3 Hrs. Note that compressor #1 only ran for 6 days during the 18-day test period. Space Temperature maintenance was virtually unchanged during the test period.

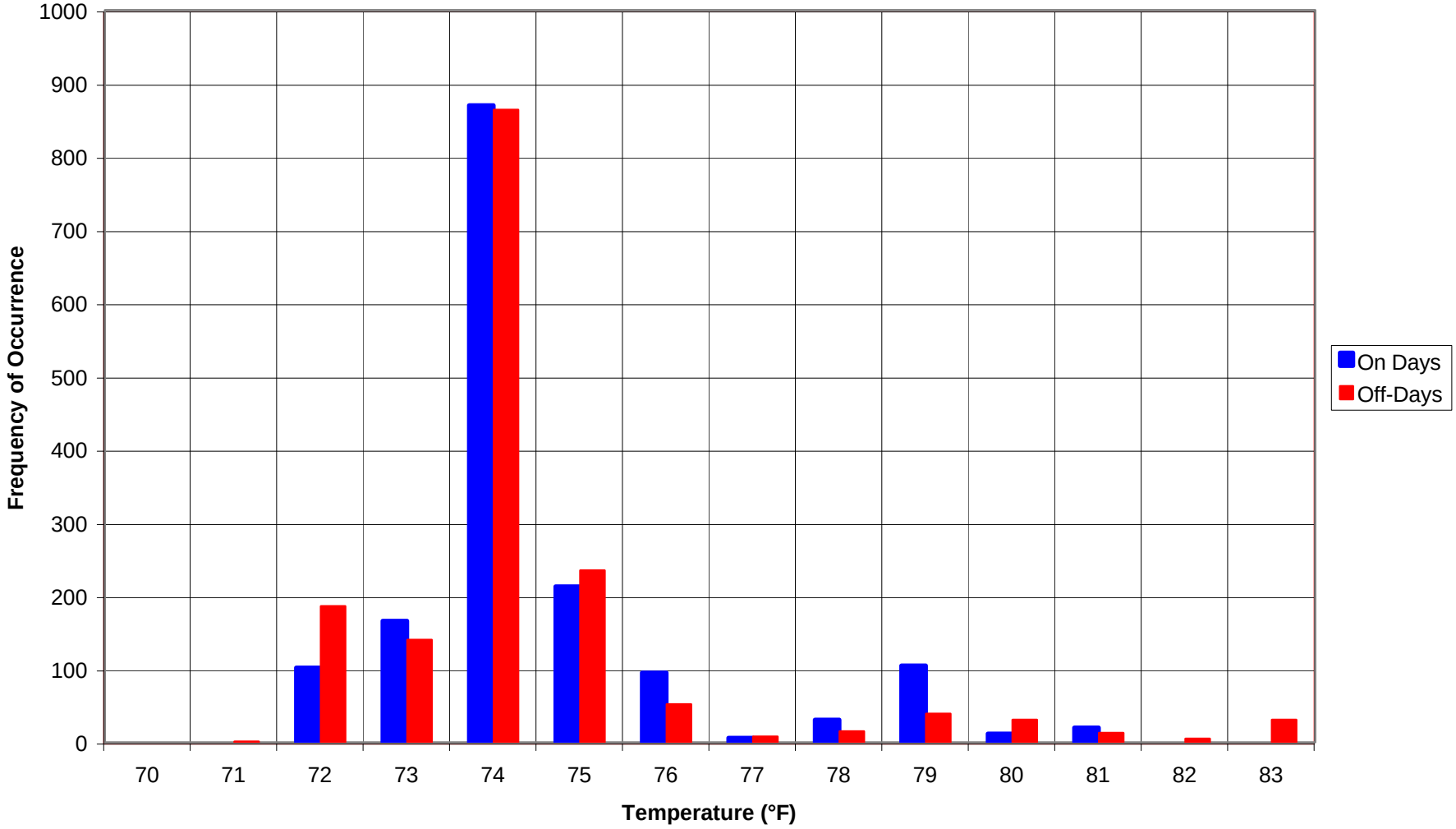
ESTEE LAUDER
Space Temperature East Histogram



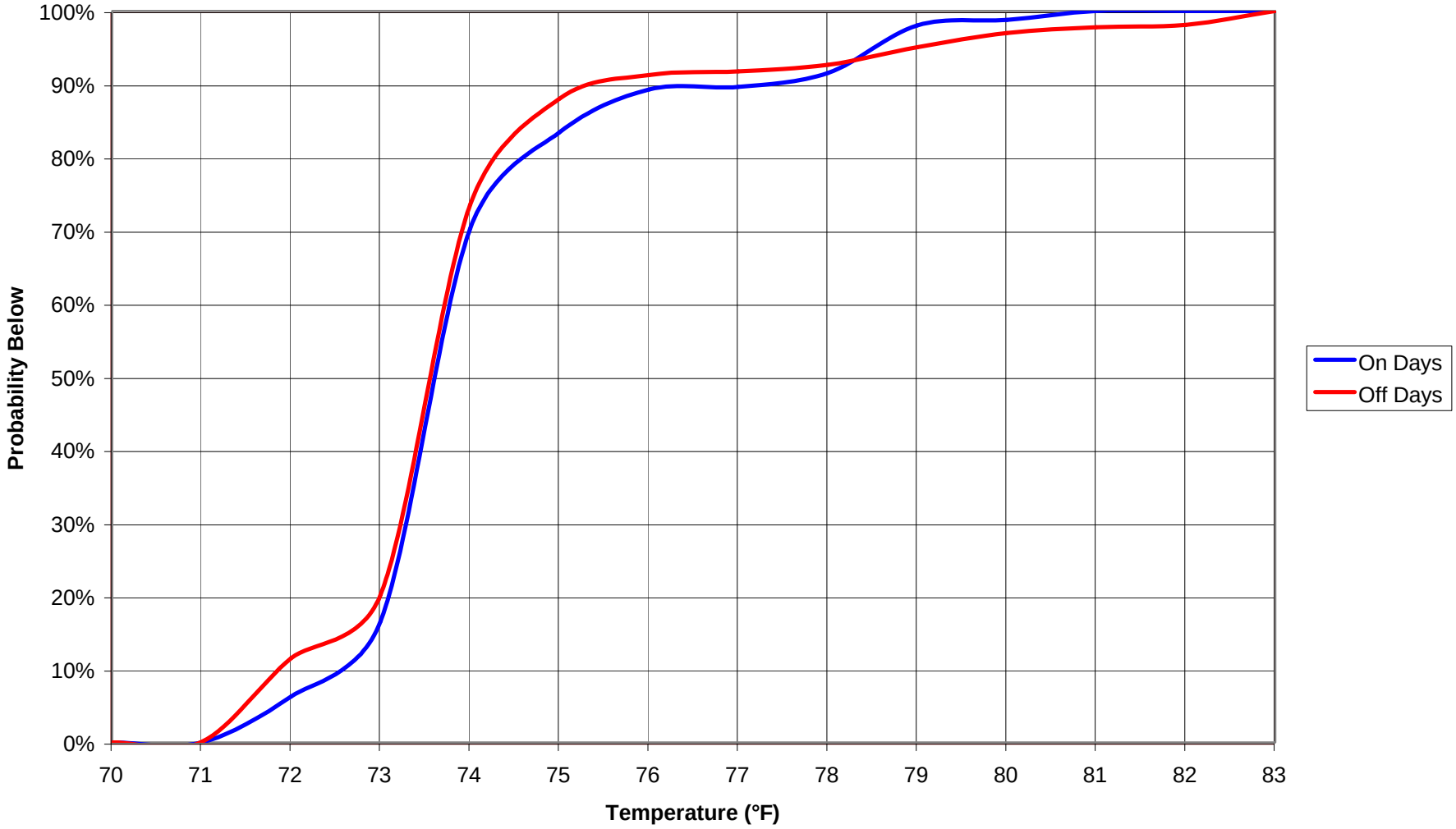
ESTEE LAUDER
Space Temperature East Probabilities



ESTEE LAUDER
Space Temperature West Histogram



ESTEE LAUDER
Space Temperature West Probabilities



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Test Report

Report No. 12136-2

Date: 09/09/04

Customer:

The ESTEE LAUDER Companies Inc.
350 South Service Road
Melville, NY 11747

Contact: Franco de Garay

Test Site Location:

The ESTEE LAUDER Companies Inc.
350 South Service Road
Melville, NY 11747

Contact: Daniel Bloom

Test Type: ☐ HEATING ☐ AIR CONDITIONING ☑ REFRIGERATION ☐ OTHER:

Product Tested: ☐ HW ☐ LCH ☐ LCS ☐ CHW ☐ CHS ☐ AC ☐ CAC ☑ RU ☐ OTHER:

Type of Equipment:

Manufacturer: Climate Control (Snyder General)
Model: SC-150-H2D WTFO 1922
HP: 15
Application: Walk-In Refrigerator for Raw Products
Volt, Amps, Ph: 460, 19.6 A_{avg}, 3ø
Equipment Location: Roof

Test Start Date: 08/14/04

Test End Date: 09/06/04

No. of Days in Test: 24

COMPRESSOR RUN-TIME:

☑ in HRS. ☐ in MIN.

***IntelliCon* ON-DAYS:** 115:13:14

***IntelliCon* OFF-DAYS:** 130:50:04

RUN-TIME was reduced by: 11.93%

COMPRESSOR USAGE FACTOR

***IntelliCon* On-Days:** 40%

***IntelliCon* Off-Days:** 45%

COOLING DEGREE-DAYS (FOR TEST PERIOD)

IntelliCon ON-DAYS: 57

IntelliCon OFF-DAYS: 57

Total Degree-Days: 114

It was < 1% **Cooler on the ON-Days.**

SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)

IntelliCon ON-DAYS: 668

IntelliCon OFF-DAYS: 646

It was 3.43% **Sunnier on the On-Days.**

COMPRESSOR CYCLING REDUCTION:

IntelliCon ON-DAYS: 830

IntelliCon OFF-DAYS: 987

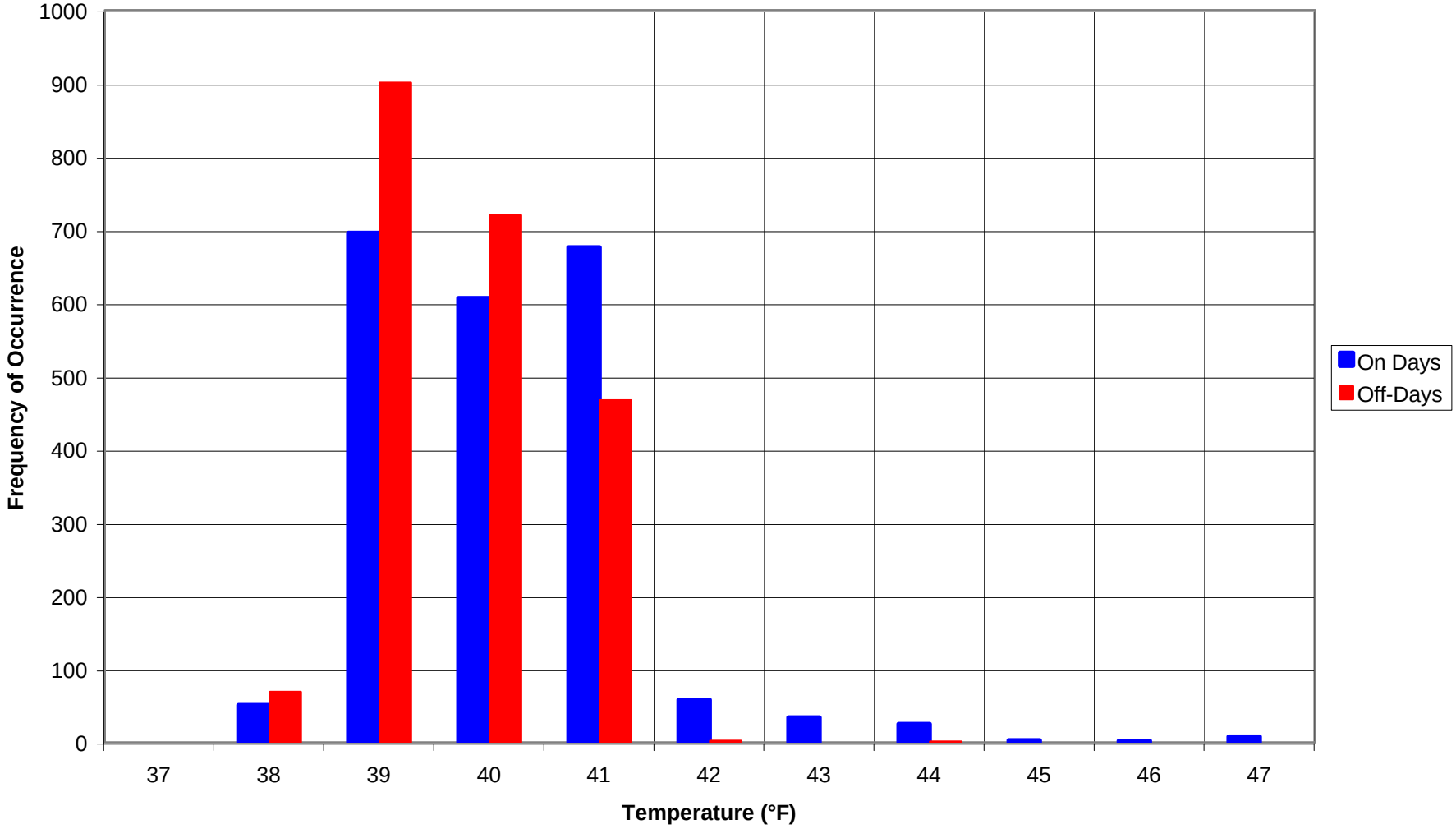
Cycling was reduced by: 15.9%

Savings = 11.93%

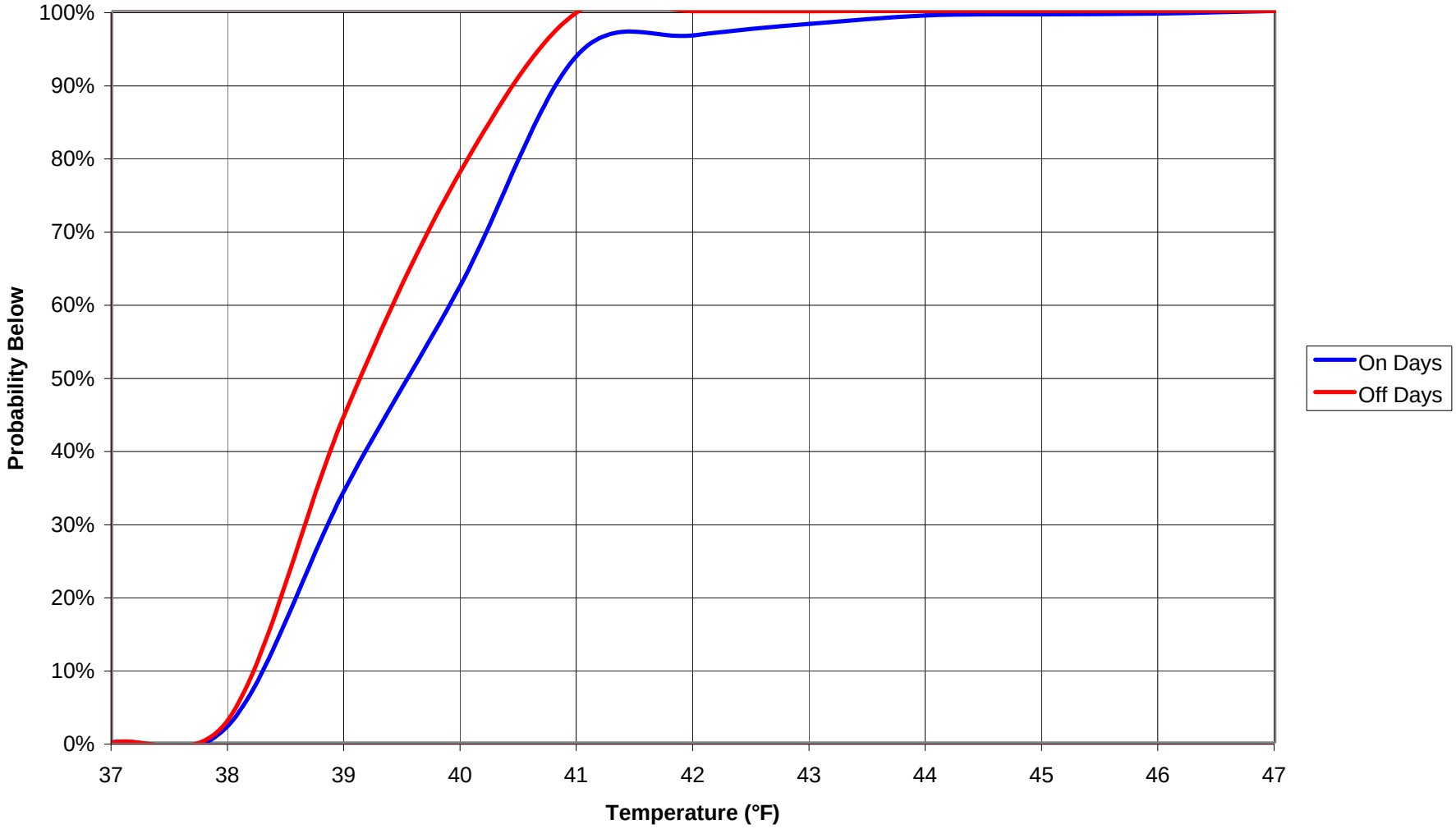
COMMENTS:

Note: Effects of Solar Load and Outdoor Air Temperature fluctuations were minimal for the test period. As such, there was no need to compensate for their influence. Temperature data shows three distinct setpoints which had no correlation to whether or not the IntelliCon was On or Off. The most likely cause of this variation is the deadband of the temperature control system. Space Temperature maintenance was virtually unchanged during the test period as demonstrated in the accompanying charts.

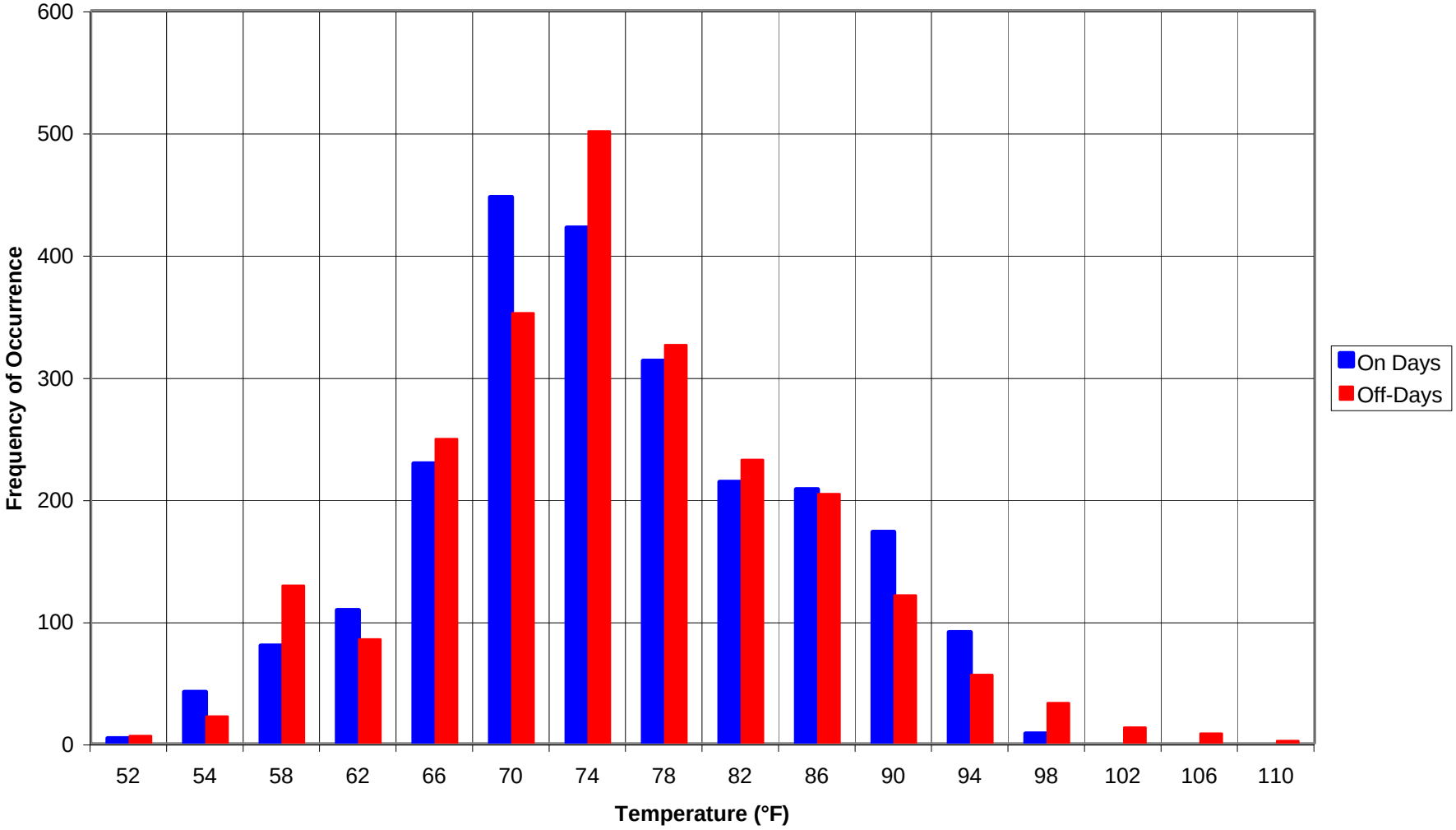
ESTEE LAUDER
Walk-In Refrigerator Temperature Histogram



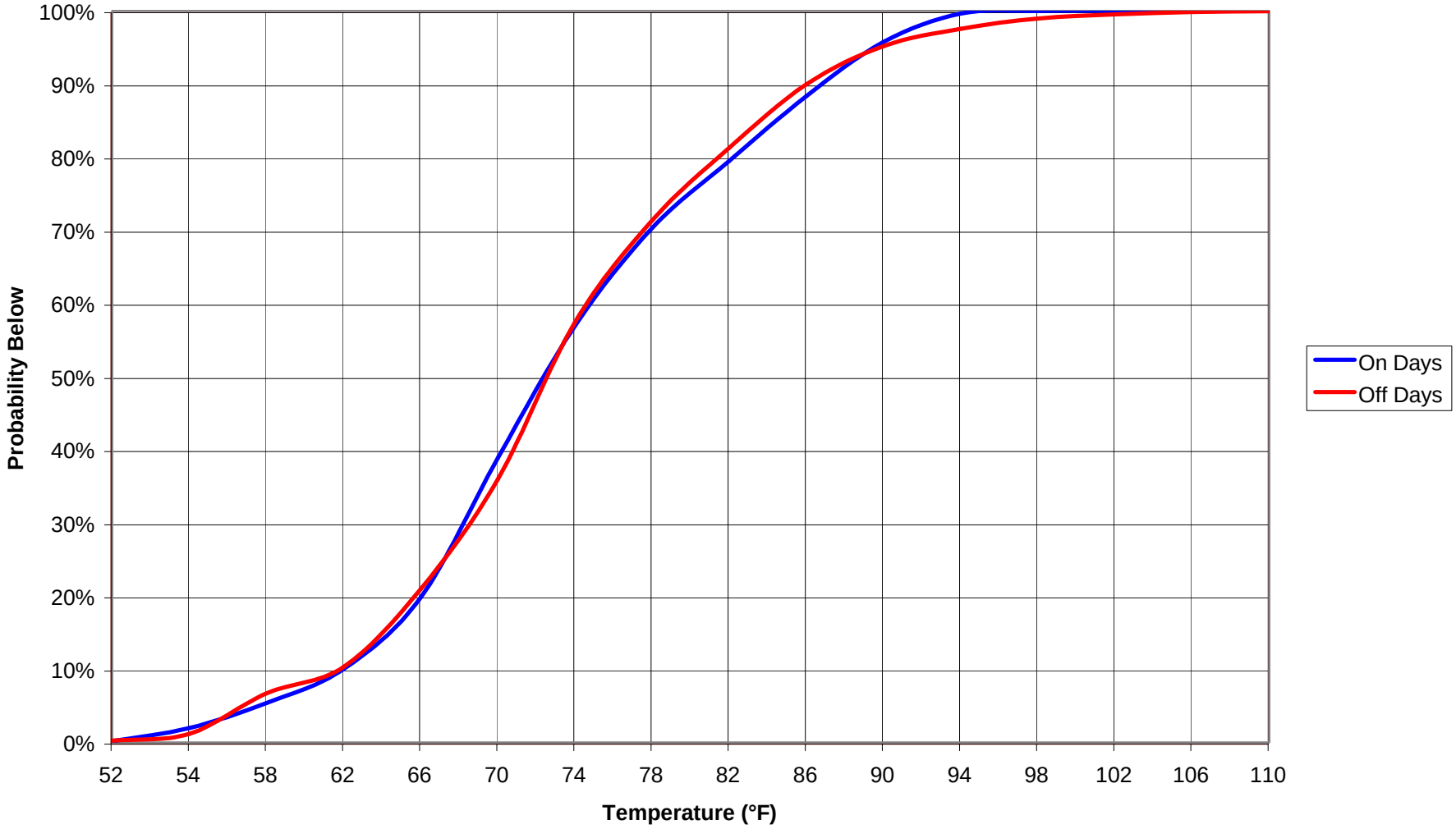
ESTEE LAUDER
Walk-In Refrigerator Temperature Probabilities



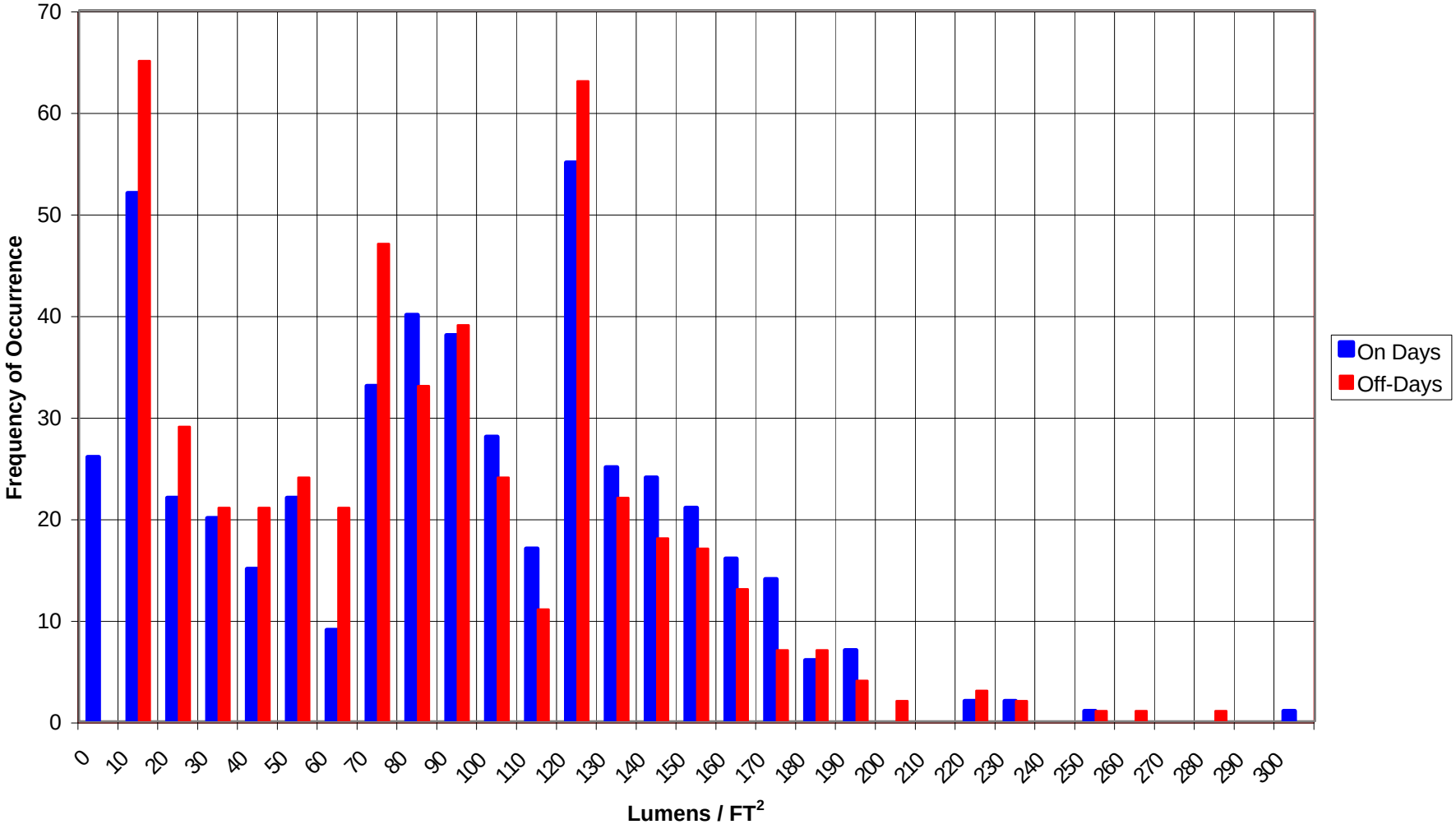
ESTEE LAUDER
Outside Air Temperature Histogram



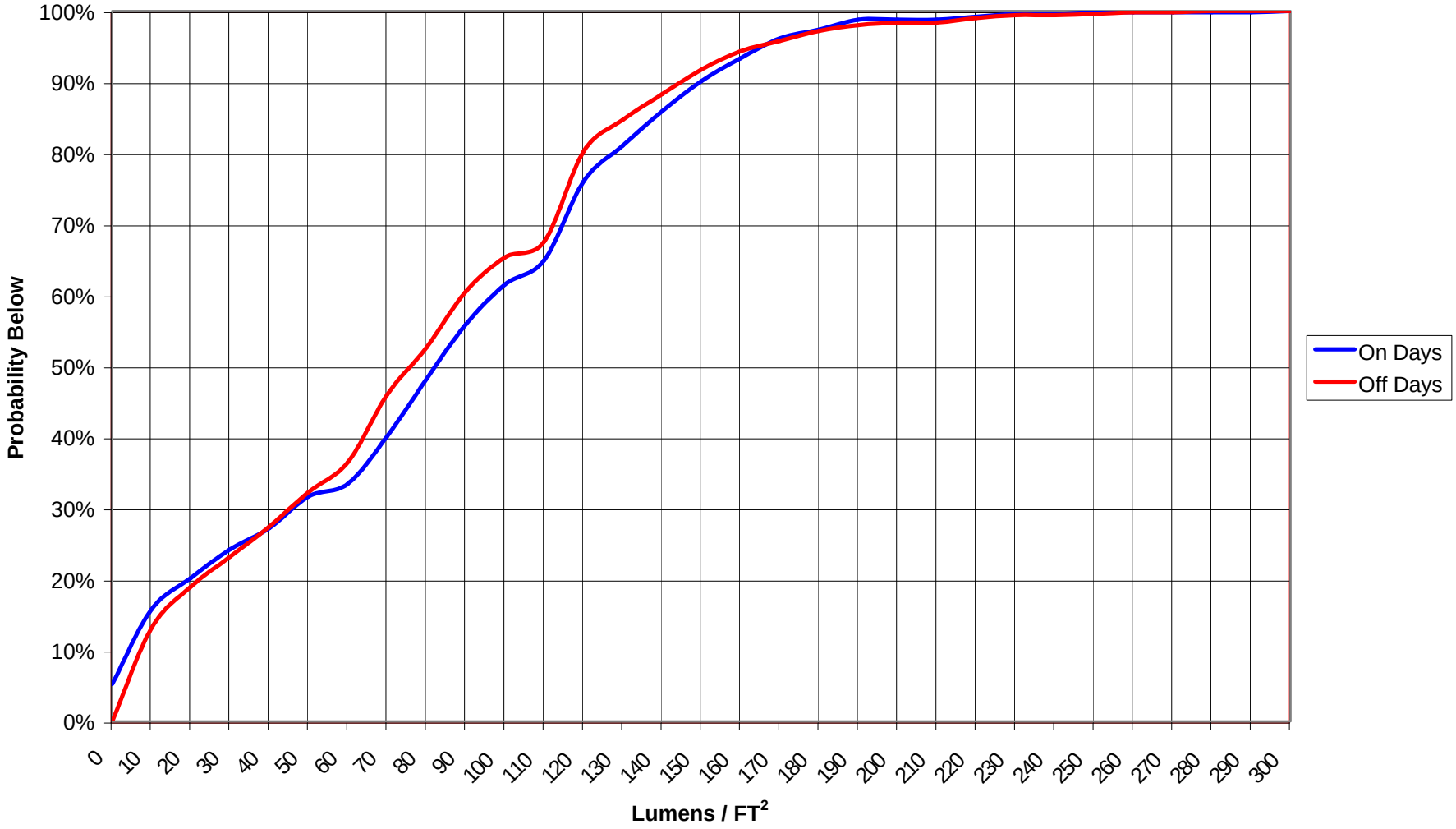
ESTEE LAUDER
Outside Air Temperature Probabilities



ESTEE LAUDER
Solar Load Histogram



ESTEE LAUDER
Solar Load Probabilities



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Testing Methodology

EQUIPMENT USED FOR TESTING PURPOSES

Specific timing and data logging devices are used to gather detailed information about the unit(s) being evaluated. Each device has been carefully selected for its reliability, capability and function. The individual devices INTELLIDYNE uses are explained below.

1. TIME CLOCK:

Manufacturer: Tork Model: 8007V-0

Is used to switch the IntelliCon® product in and out of the circuit. This is done on a 24 hour basis. The result is that the IntelliCon® product is in control ("in" the circuit) one day and not in control ("out" of circuit) the next day. A 14 day time clock was selected so that a complete alternation of days that IntelliCon® is in control would result.

2. CURRENT SWITCH:

Manufacturer: Veris Industries Model: Hawkeye 608/908

The current switch is used to monitor when current is being drawn by the cooling/refrigeration compressor or heating burner. When current is sensed it is "On" when no-current is sensed it is off "OFF". The current switch is used in conjunction with the "Change-of-State" data logger.

3. "CHANGE–OF–STATE" DATA LOGGER:

Manufacturer: Onset Computer Corp. Model: H06-001-02

This device monitors and logs the "change-of-states" (the on / off status) of the unit being tested. It is used in conjunction with the CURRENT SWITCH, above, and time and date-stamps (logs) each change of status. By processing the logged data, the durations for each cycle can be determined.

4. "LIGHT INTENSITY" DATA LOGGER

Manufacturer: Onset Computer Corp. Model: HLI

This data logger is used to monitor and log Light Intensity and is used to determine the solar-load influence on the facility.

5. "T/Rh " DATA LOGGER

Manufacturer: Onset Computer Corp. Model: H08-004-02

This data logger is used to monitor and log the temperature and relative humidity in the conditioned space.

6. "TEMPERATURE" DATA LOGGER

Manufacturer: Onset Computer Corp. Model: H08-001-02

This data logger is used to monitor and log the outdoor air temperature, and is used to determine the degree-day influence on the facility

WHAT DATA IS COLLECTED

Linking all of the above together with the IntelliCon® product being “in” and “out” of the circuit, on alternating days, yields the following data:

? How many on/off cycles per day (if applicable).
? Total “on time” per cycle, per day.
? Total “off time” per cycle, per day.
? What the solar load of the facility was during the test period (if applicable).
? What the relative humidity in the conditioned space was during the test period (if applicable).
? What the temperature of the conditioned space was during the test period (if applicable).
? What the outdoor air temperature was during the test period (if applicable).

How The Data Is Analyzed

Upon completion of the test, all the data is evaluated to calculate the reduction of consumption (savings).

Short-term testing analysis can only be performed properly by the elimination and reduction of as many variables as possible and through the analysis of the data on a statistical basis. The alternating “in” circuit / “out” of circuit testing has the advantage of minimizing the variations due to time-sensitivity, day-of-week sensitivity, degree-day effects, etc.

In order to properly evaluate the data, the following must be determined:

1. A baseline must be established. Baseline consumption data is the “use” or consumption information that is unaffected by the IntelliCon economizer (“out” of circuit). This may be derived during the test (which is what is done here) or from historical records. The advantage of deriving the base-line during the test is that site specific degree-day and solar data may be determined as opposed to weather-service data that may or may not be indicative of the test site.

2. It is necessary to determine what effects or influences are caused by solar- load and degree-day variations. This is done by performing a statistical analysis on the solar and degree-day data collected during the base-line phase.

3. In order to properly compare the two consumption cases (IntelliCon “in” and “out” of circuit), and determine the savings, it is necessary to adjust (or “normalize”) the data collected during the “in-circuit” phase. The consumption data collected when the IntelliCon economizer was “in-circuit”, is “normalized” by compensating for the effects of the solar and degree-day influences that occurred during the same phase of the test. This is accomplished by applying the statistical analysis results of the solar and degree-day influences (collected during the base-line phase) as a means to compensate for the solar and degree-day variations that occurred during the “in” circuit phase of the test.

4. The normalized consumption data acquired during the “in” circuit phase is compared to the base-line data and the savings determined.