Attached are two graphs. The first is the power consumption of the “D” rack. The red indicators are pre-conversion power consumption while the green indicators are post conversion data. The post conversion data was taken over a longer period; therefore the difference in the number of readings. The ‘pre’ data was taken with a daily ambient average of 52*F (high = 78*, low = 29*). The ‘post’ data was taken with a daily average of 59*F (high = 85*, low = 32*). The information was supplied by the National Weather Service.

As shown, the power consumption was dramatically less post conversion. The second graph illustrates the reason for the change in power consumption.

By taking the individual compressor models and using the design conditions specified on the Hill-Phoenix Refrigeration rack specification sheet, we determined the system mass flow for R-22 with the Carlyle compressor program (Carwin v. 1.64). The mass flow was entered into ICOR/Rhodia cycle program (IS Cool v. 1.3) and the capacities and power consumptions confirmed to the listed capacities and consumptions from the spec sheet at the design conditions. The program determined a CFH (cubic feet per hour).

The program is then changed to the R-422A properties at the same conditions and the results documented. The R-22 capacities are plotted versus the R-422A results. This shows a 9% increase in capacity. We then repeated this exercise using the measured ambient temperature in determining the operating condensing temperature. This showed a 13% increase in individual compressor capacity.

Note: The first 3 compressor (6.5, 7.5, & 10 hp) models were listed in the Carwin program. The15 hp model wasn’t listed in the index. We therefore compared the capacity and power consumption listed in the Phoenix spec sheet to the compressor selections available in the program database. Using the same trending the first 3 compressors exhibited, a model was selected and utilized for this illustration.

An additional benefit for the system is an increase in the ‘natural’ sub-cooling that occurred after conversion. Although the sub-cooling was not measured leaving the condenser it was observed that the liquid sub-coolers were under less demand. This confirms our experience from testing and with other conversions. This makes more system capacity available (up to 5 tons).

With the increase in capacity of the compressors and more capacity available through less demand from the liquid sub-cooler, it is evident that it took less compressors operating to achieve set point, corresponding to the decrease in power consumption.

We also noted that after conversion the discharge gas desuperheater on the low temp rack did not operate. Lower discharge gas temperatures with the associated benefits will contribute to compressor longevity and maintenance savings.

Recognizing that all systems and conditions are different, we feel the results represented here are the norm not the exception.

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