GPG FINDINGS

The GPG program enables GSA to make sound investment decisions in next generation building technologies based on their real world performance.

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031

VARIABLE-SPEED DIRECT-DRIVE SCREW CHILLER

OPPORTUNITY

What is the impact of improved chiller operations on GSA?

TECHNOLOGY

How does this Variable-Speed Screw (VSS) Chiller work?

CAPACITY CONTROLLED BY REGULATING MOTOR SPEED ALONE

THREE SCREW ROTORS AND A VARIABLE-SPEED MOTOR ARE THE ONLY MOVING PARTS; THERE ARE NO UNLOADERS.

M&V

Where did Measurement and Verification occur?

OAK RIDGE NATIONAL LABORATORY assessed a variable-speed direct-drive screw (VSS) chiller against a baseline variable-speed magnetic bearing chiller (MBC). The chillers were installed at the Sidney R. Yates Building in Washington, D.C. and connected to the same chilled water and condenser water loops, creating operating conditions as close to identical as possible within a real-world environment.

RESULTS

How did the Variable-Speed Screw Chiller perform in M&V at the test bed location?

High

EFFICIENCY

ENERGY PERFORMANCE COMPARED TO BASELINE MBC

Range

OF OPERATING CONDITIONS MET

Condenser water temperature ranged from 55°F to over 95°F.

Quiet

PERFORMANCE

77-83 DECIBELS

For both VSS & MBC

Average Energy Consumption at the Yates Building

VSS savings over baseline MBC could range from +24% to -4% due to field measurement uncertainty.

ConSIDER VSS & MBC FOR END-OF-LIFE REPLACEMENT

Both chillers performed effectively and have rated energy consumption that is more than 35% better than FEMP standards for water-cooled chillers. Individual site characteristics will determine the most cost-effective chiller for the application.

*Variable-Speed Screw Chiller, Sidney Yates Building, Washington, OC Dan Howett (PE), Mark Adams (IRNL), George Ostrouchov PhD, revised August 2017, p.4
*Image courtesy of Carrier, used with permission
*Variable-Speed Screw Chiller, Sidney Yates Building, Washington, OC Dan Howett (PE), Mark Adams (IRNL), George Ostrouchov PhD, revised August 2017, p.3
*Ibid, p.25
*Ibid, p.29 (as measured in a lab setting)
*Ibid, p.7

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