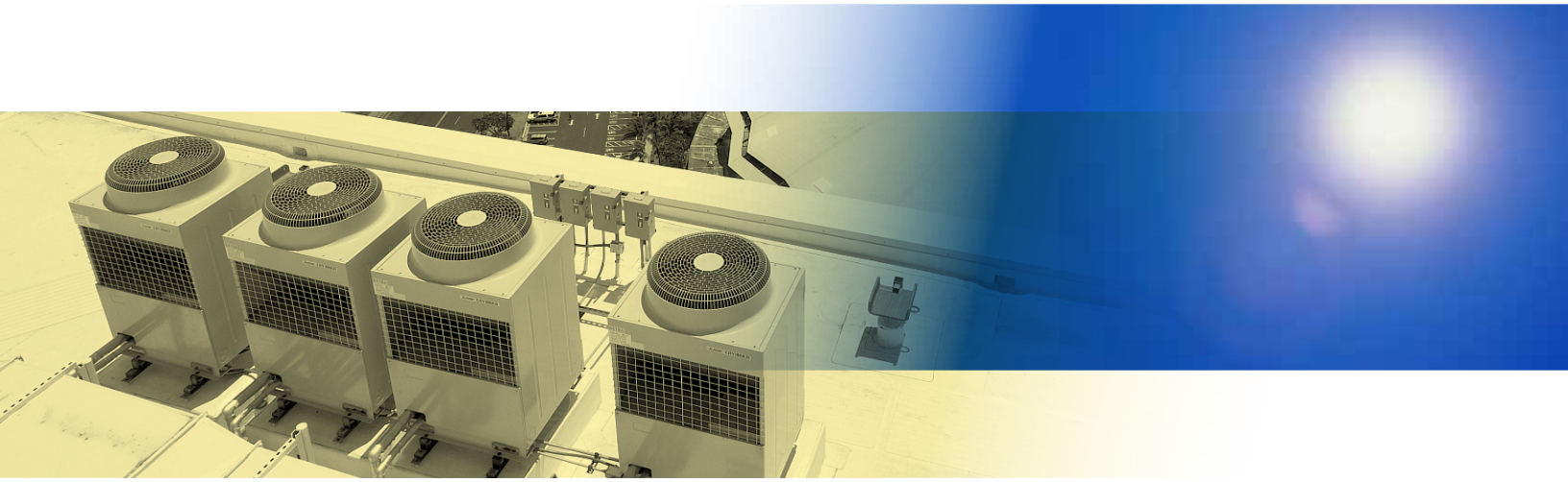
How to Achieve LEED Points by Installing VRF HVAC Systems



White Paper

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A state-of-the-art HVAC technology, Variable Refrigerant Flow (VRF) zoning systems are poised for dramatic growth in all areas of commercial construction because they provide precise zoned control that can contribute points toward LEED® certifications. This paper describes the major benefits of VRF systems and how to garner LEED points by applying these systems.

But first, a quick review of this cutting-edge technology. VRF zoning is a method of providing precise comfort control to buildings with multiple floors and areas by moving refrigerant to the zone to be heated or cooled. The systems, which can simultaneously cool some zones while heating others, have many benefits, including the following:

Mercy Corps International, Portland, Ore., LEED Platinum

Energy efficiency. Because the INVERTER compressor varies its motor rotation speed and capacity (the indoor units vary their capacity, too), the system precisely meets each zone's load. Power consumption is reduced because the system operates only at the levels needed to maintain a constant, comfortable indoor environment. Certain indoor units have sensors that compare air and floor temperatures and adjust the output as needed to optimize comfort.

Design and installation flexibility. The compact compressors and components of a VRF zoning system can be installed in smaller indoor and outdoor spaces, and they require less piping and duct space. They generally include two refrigerant pipes with a non-polar, two-wire control connection that equate to faster installations with fewer installers.

Lighter weight. VRF systems are 31 percent lighter than chilled-water systems, so they are easier to handle and cost less to transport. Moreover, the load can be distributed across an existing structure or avoided by mounting on the ground.

Lower life-cycle costs. Because VRF systems have fewer components and ductwork than other HVAC systems, initial equipment and installation costs are reduced. Plus, changing or cleaning the filters is the only required periodic maintenance.

Quiet operation. Sound levels are greatly reduced because the INVERTER compressor ramps up and down smoothly. The compressor is also housed in its own compartment surrounded by sound insulation. The condenser fan rarely runs at full speed and is designed for quiet performance.

Discreet indoor units. The wide variety of indoor wall-mounted and ceiling-concealed styles provides more design options than other systems.

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ACHIEVING LEED POINTS WITH VRF SYSTEMS

For LEED certification, VRF systems can contribute a great number of points in the Energy & Atmosphere (EA) and Indoor Environmental Quality (IEQ) categories in the following LEED ratings: New Construction and Major Renovations; Core and Shell Development; Existing Buildings; Schools (new and renovation); and Retail (new and renovation). As of Jan. 1, 2012, healthcare facilities have been moved from the New Construction rating into the new LEED for Healthcare program.

For all LEED rating certifications, buildings can gain points for the following categories:

ENERGY & ATMOSPHERE (EA)

Prerequisite: Fundamental Commissioning of the Building Energy Systems
VRF system controls allow for easy testing, setting and adjusting of the entire system.

Prerequisite: Minimum Energy Performance
VRF equipment offers many energy-saving features that help meet this prerequisite.

Eley Guild Hardy Architects, Biloxi, Miss., LEED Certified

Credit: Optimize Energy Performance
VRF systems are ideal for achieving points based on how much the project's predicted energy costs can be reduced.

Credit: Measurement and Verification
Measurement and verification of the entire system are done with integrated maintenance software. In addition to monitoring and collecting system data, the software saves data for trending and system analysis.

INDOOR ENVIRONMENTAL QUALITY (IEQ)

Prerequisite: Minimum IAQ Performance
VRF systems can often meet minimum outside air requirements through the ventilation connections of indoor units.

Credit: Outdoor Air Delivery Monitoring
When Energy Recovery Ventilation (ERV) is included, some VRF systems can earn points toward outdoor air delivery monitoring, increased ventilation and indoor air quality management during construction. An ERV can be used with CO^2 sensors integrated into the VRF controls network. Also, VRF indoor units can be designed to avoid cross-contaminating zone air.

Credit: Controllability of Systems — Thermal Comfort
VRF's zoning capability allows occupant control with wall-mounted remote controllers.

Credit: Thermal Comfort — Design
VRF systems and the building envelope must be designed to meet requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.

Credit: Thermal Comfort — Verification
When properly designed into a building, VRF systems provide temperature and humidity control in accordance with ASHRAE 55-2004 guidelines.

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Other LEED points also can be gained in the following specific ratings:

HEALTHCARE IEQ

Credit: Acoustic Environment

Many VRF indoor units have tested noise levels that fall at or below the given ranges in the 2010 FGI Guidelines' Table 1.2-2 Minimum-Maximum Design Criteria for Noise.

Credit: Community Contaminant Prevention-Airborne Releases

VRF systems do not include any gas-fired equipment, so there are no products of combustion to contain.

SCHOOLS IEQ

Prerequisite: Minimum Acoustic Environment

Many VRF system indoor units have tested noise levels that fall at or below 45 dB(A) as specified.

Pacific University, Burlingham Hall, Forest Grove, Ore., LEED Gold

Credit: Mold Prevention

When properly designed into a building, VRF systems meet humidity requirements.

For more information about how VRF systems can contribute to LEED certifications, visit the U.S. Green Council's website.

CASE STUDIES

VRF systems are sustainable, cost-effective HVAC systems that offer many benefits, including energy savings, increased comfort, design and installation flexibility, lower maintenance costs and quiet operation. As important, VRF technology offers the ability to capture a significant number of points toward LEED certification.

Mitsubishi Electric VRF zoning systems have been used in many LEED-certified commercial projects, from Certified to Platinum ratings. Visit these and other commercial case studies at www.mehvaccasestudies.com.

For more information about Mitsubishi Electric HVAC products, visit www.mitsubishipro.com.

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