CARRIER PRODUCTS AND LEED® CERTIFICATION

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INTRODUCTION

The LEED® (Leadership in Energy and Environmental Design) green building certification program is the preeminent program for rating the design, construction and operation of green buildings. The program was developed by the U.S. Green Building Council® (USGBC) and is administered by the GBCI™ (Green Building Certification Institute). By optimizing energy and resource use, green buildings not only reduce environmental impacts, but also benefit building owners and occupants. Green building practices reduce operating costs, increase worker productivity, and promote healthy indoor air quality.

The LEED green building certification program is a widely recognized, voluntary third-party certification program. In fact, several US federal government agencies, and state and local governments now require that official projects demonstrate compliance with the requirements of the LEED green building certification program. Elements of the LEED rating systems have been written into building codes throughout the U.S.

This paper provides a high-level overview of the LEED green building certification program and describes where high-performance heating, ventilating, and air conditioning (HVAC) systems and products play a critical role in optimizing green building performance. The paper focuses on the application of LEED 2009 for New Construction and Major Renovations™ (LEED for New Construction) and LEED for Existing Buildings: Operations and Maintenance™ (LEED for Existing Buildings: O&M) in North America.

*LEED is a registered trademark of the U.S. Green Building Council.

The first LEED rating system was released in 2000. The LEED green building certification program has since evolved to include standards that cover all aspects of the design, construction, operation and maintenance of green buildings. In 2009, there were significant changes to the LEED green building certification program, including:

1. The point totals have been increased, with the primary emphasis on building energy use and transportation of building occupants. The goal of these changes is to reduce the carbon footprint of a building.
2. The LEED green building certification program has been updated to reference ASHRAE 90.1-2007 and 62.1-2007 and other industry standards used for certification.
3. All the rating systems in the LEED green building certification program now have common point totals and levels of certification.
4. A new credit category, Regional Priority credits, has been added. Additional points may be earned for incorporating strategies that address regional environmental issues. An example of a regional issue is the use of water in the Southwest U.S.A.
5. Across the LEED green building certification program, the credit requirements among the different LEED 2009 rating systems have been reconciled for consistency.
6. In LEED for New Construction, a new prerequisite has been added for water efficiency. One additional point has been added in the Innovation in Design credit category.
7. In LEED for Existing Buildings: O&M, one additional point has been added in the Innovation in Operations credit category.
8. Point thresholds have been changed to better reflect the impact that a particular credit can have on the environment and human health and productivity. For example, the use of renewable energy now receives a higher number of points than in earlier versions as a result of the recognition of the important role played by renewable energy in reducing our carbon footprint.
9. Minimum Program Requirements (MPRs) limit the application of the LEED rating system to permanent buildings with a minimum of 1000 square feet (ft^2) and at least one full-time equivalent employee (FTE). In order to become certified, building owners must now agree to share their energy and water consumption data for at least three years following certification. Additional requirements include minimum occupancy and site boundary requirements.

LEED GREEN BUILDING CERTIFICATION PROGRAM OVERVIEW

GREEN BUILDING DESIGN AND CONSTRUCTION

The credit categories in this group address the design and construction process for green buildings. LEED certification applies permanently to these buildings and cannot be increased or revoked. There are currently five LEED rating systems that relate to green building and construction: LEED for New Construction, LEED for Schools ™, LEED for Core & Shell™, LEED for Retail: New Construction ™ and LEED for Healthcare™. These ratings are best applied when the primary goal is to achieve certification for design related activities, whether the building is new or existing.

The **LEED for New Construction & Major Renovations** rating system covers new design and construction and major renovation projects for commercial, high-rise residential and institutional buildings, where at least 50% of the space is owner occupied. Projects which do not meet these requirements should use the LEED for Core & Shell or LEED for Commercial Interiors™. Points are issued in seven credit categories:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy & Atmosphere (EA)
- Materials & Resources (MR)
- Indoor Environmental Quality (IEQ)
- Innovation in Design (ID)
- Regional Priority (RP)

The focus of LEED for New Construction is on design issues, whether for new buildings or existing buildings undergoing major renovation.

All commercial and institutional buildings (except K-12 school buildings) are eligible for certification under LEED for New Construction, including office buildings, retail and service establishments, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants, and laboratories. Also covered under this rating system are libraries, museums, and churches.

The **LEED for Schools** rating system is based on LEED for New Construction but is tailored to address issues specific to the design and construction of K-12 schools, such as classroom acoustics, master planning, mold prevention and environmental site assessment.

Currently, all new construction and major renovations of K-12 school facilities seeking LEED certification must use LEED for Schools. LEED for New Construction can no longer be applied to K-12 school building projects.

LEED for Core & Shell establishes standards for basic building elements, such as structure and building level systems, which are under the control of the building developer. LEED for Core & Shell is used for the design of new buildings or major renovations of existing buildings where less than 50% of the building is owner occupied.

LEED for Retail: New Construction takes into account that retail businesses often use a standard store layout and duplicate it in many locations. Retail stores also have unique lighting, occupancy and other requirements which are addressed in LEED for Retail: New Construction.

LEED for Healthcare guides the design and construction of both new buildings and major renovations of existing buildings, and can be applied to inpatient, outpatient and licensed long-term care facilities, medical offices, assisted living facilities and medical education and research centers. Health care applications have many special requirements in terms of ventilation air, filtration, and pressure relationships requirements that are different than other types of buildings. The LEED for Healthcare rating system was developed based on the requirements in the *Green Guide for Health Care™*.

GREEN BUILDING INTERIOR DESIGN AND CONSTRUCTION

The credit categories in this section address the needs associated with tenant fit-out of office and retail spaces, where the building shell and basic systems are designed by the a building owner or developer. The two rating systems that address interior design and construction are: LEED for Commercial Interiors™, and LEED for Retail: Commercial Interiors™. These rating systems are frequently used in conjunction with LEED for Core & Shell and are design oriented. Certification applies permanently to spaces.

LEED for Commercial Interiors includes credit categories that are similar to those found in LEED for New Construction. Under LEED for Commercial Interior, however, the focus is on categories that may be under the control of the building owners and/or tenants. For instance, energy performance optimization addresses lighting and lighting controls, while resource utilization addresses interior building systems and furnishings. This LEED rating system may be applied to interior spaces where the building owner occupies less than 50% of the space.

LEED for Retail: Commercial Interiors addresses the special needs of chain retailers, who frequently rent space and fit it out to meet their specific needs.

GREEN BUILDING OPERATIONS & MAINTENANCE

Green building operations and maintenance are addressed in one rating system, LEED for Existing Buildings: Operations & Maintenance. This rating system can be applied to buildings that were previously certified under one of the other LEED rating systems or have never been certified. Greater than 50% of the space in these buildings must be occupied and the focus is on operational performance, not design. LEED for Existing Buildings: O&M does not apply to buildings where more than 50% of the space or 50% of the occupants are impacted by renovation. Projects that exceed these percentages should use one of the design and construction LEED rating systems. Unlike the other rating systems, LEED for Existing Buildings: O&M requires recertification. Buildings can apply for recertification as frequently as each year but must file for recertification at least once every 5 years to maintain their LEED for Existing Buildings: O&M status. It is possible to improve the certification level during recertification. An additional system for schools is under consideration.

The focus of **LEED for Existing Buildings: O&M** is on building operational metrics and the documentation and verification of sustainable practices. LEED for Existing Buildings: O&M credit categories are the same as those for LEED for New Construction, with the exception that innovation points are awarded under Innovations in Operations (IO) in the LEED for Existing Buildings: O&M rating system. LEED for Existing Buildings: O&M applies to the same building types as LEED for New Construction (i.e., office buildings, retail and service establishments, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants, laboratories, libraries, museums, and churches) and also includes schools (K-12).

LEED for Existing Buildings: O&M can be applied to existing buildings not already LEED certified, as well as buildings certified under the one of the other LEED rating systems (e.g., LEED for New Construction, LEED for Core & Shell, and LEED for Schools). Even if the building was previously LEED certified in one of the other rating systems, the LEED for Existing Buildings: O&M application is considered a separate, initial application.

USGBC encourages building owners to start the building performance recording period for LEED for Existing Buildings: O&M as soon as achieving certification in one of the other rating systems.

GREEN RESIDENTIAL BUILDINGS

The LEED for Homes™ rating system applies to the new construction and total renovation of existing single family and multi-family homes with fewer than four stories above grade. Homebuilders interested in participating in the LEED for Homes program are required to contact a LEED for Homes Provider organization. LEED for Homes Provider has three primary roles: 1) Marketing LEED to builders; 2) Providing green home rating support services to builders; and 3) Training, coordinating and overseeing LEED qualified inspectors and builder support staff. Unlike the other rating systems, the LEED for Homes certification process requires a LEED for Homes Green Rater, who may work directly for a LEED for Homes Provider or contract independently with one or several Providers. The primarily role of the LEED for Homes Green Rater is the oversight of all verification services on a LEED for Homes registered project.

LEED for Homes covers the same basic credit categories as the other rating systems, but with distinct differences. LEED for Homes includes two unique credit categories: 1) Location and Linkages, and 2) Awareness and Education. This rating system includes both performance and prescriptive requirements. Another difference in LEED for Homes is the number of available options for credits as compared to the other rating systems. The LEED for Homes Green Rater may choose to use either the prescriptive or performance based approach.

GREEN NEIGHBORHOODS

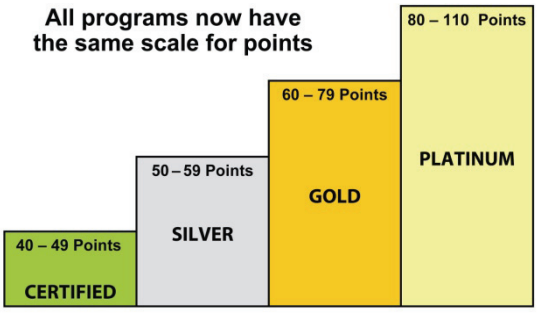
The LEED for Neighborhood Development™ rating system addresses sites with multiple buildings and sustainable infrastructure design. LEED for Neighborhood Development focuses on site selection, design, and construction elements of neighborhoods from both a local and regional perspective. This rating system has four credit categories: Smart Location and Linkage, Neighborhood Pattern and Design, Green Infrastructure and Buildings, and Innovation and Design Process. Individual buildings in a LEED for Neighborhood Development registered project are required to pursue LEED certification in one of the other LEED rating systems, such as LEED for New Construction.

LEED GREEN BUILDING CERTIFICATION PROGRAM AND HVAC PRODUCTS AND SERVICES

The LEED 2009 rating systems for LEED for New Construction and LEED for Existing Buildings: O&M award points for achieving credits in the following categories:

- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy & Atmosphere (EA)
- Materials & Resources (MR)
- Indoor Environmental Quality (IEQ)
- Regional Priority (RP)

The seventh category for LEED for New Construction is Innovation in Design (ID), and the seventh category for LEED for Existing Buildings: O&M is Innovation in Operations (IO). Projects can achieve LEED Certified, LEED Silver, LEED Gold, or LEED Platinum level of certification, depending on the number of points awarded. (See Fig. 1.) The majority of credits in the LEED rating systems are performance-based and achieving them is dependent on the impacts to the overall building. The contribution any product or system may make to the points achieved depends on how it impacts the entire building and its operations.



NOTE: Due to credit requirements, no project can obtain the full 110 points.

Fig. 1. 110 Possible LEED Points

The LEED green building certification program does not certify products or services. However, the selection of products or service programs is critical to obtaining LEED certification for a registered project because the right products or service programs can help meet the goals of green construction and ongoing operation and maintenance. The choice of heating, ventilating, and air conditioning (HVAC) products, in particular, can have a significant impact on LEED certification, as the HVAC system directly impacts two categories that together influence 40% of the available points. (See Fig. 2 and 3.)

The achievement of points in any particular area depends on the combination of products selected and the specific application of those products. Therefore, no products or systems can claim that their use will guarantee that LEED points will be awarded.

Carrier HVAC products, which are built to high standards of energy efficiency and indoor air quality, can assist building owners with earning LEED points in the credit categories of Energy & Atmosphere (EA) and Indoor Environmental Quality (IEQ). Success in the credit category of Energy & Atmosphere is more important than ever. Under the LEED 2009 for New Construction rating system, EA Prerequisite 2: Minimum Energy Performance requires that a building's energy performance be at least 10% better than the requirements of ASHRAE 90.1-2007. Efficiency ratings that are based on part-load as well as full-load efficiency are better indicators of a high-efficiency product. Meeting the benchmark for commercial building energy codes in the United States is no longer satisfactory for earning LEED certification. HVAC products, as a minimum, must be at least at the levels required by ASHRAE 90.1-2007 or must meet nationally-implemented federal requirements that exceed the requirements of ASHRAE 90.1-2007. Many Carrier products offer multiple lines that provide efficiencies higher than the minimum required ASHRAE efficiencies.

The Energy & Atmosphere credit category also includes credits for commissioning and measurement and verification (M&V). Building controls are important elements in achieving both of these credits. Carrier's i-Vu® open control system is capable of managing and monitoring HVAC systems and easily integrates with other building systems, such as lighting. One of the requirements for the thermal comfort verification credit is that the building automation system (BAS) provides monitoring and trend logging of space temperature and humidity conditions. Carrier's i-Vu® open control system can be configured to meet these criteria.

Carrier products can also contribute to LEED for New Construction Innovation in Design credits. In this credit category, ID Credits 1.1 through 1.5 provide the opportunity to earn points for exceeding requirements in one of the other five credit categories (i.e., Sustainable Site, Water Efficiency, Energy & Atmosphere, Materials & Resources, and Indoor Environmental Quality).

Points in the Innovation in Design credit category may also be earned by demonstrating performance in an area of green building or sustainability that is not addressed in the rating system. One innovative Carrier product that may contribute to a credit in the ID category is Carrier's Microsteam® turbine generator. Carrier's Microsteam turbine provides sustainable energy recovery by using existing steam sources to generate usable electric energy. Contact a Carrier Sales Engineer to discuss other HVAC systems that may contribute to earning ID Credits.

New school construction projects are certified under the LEED for Schools rating system. Within this rating system, Carrier products can contribute to IEQ Credit 9: Enhanced Acoustical Performance. This credit awards points for reducing background noise in learning spaces, which can be achieved through sound and vibration control of HVAC equipment.

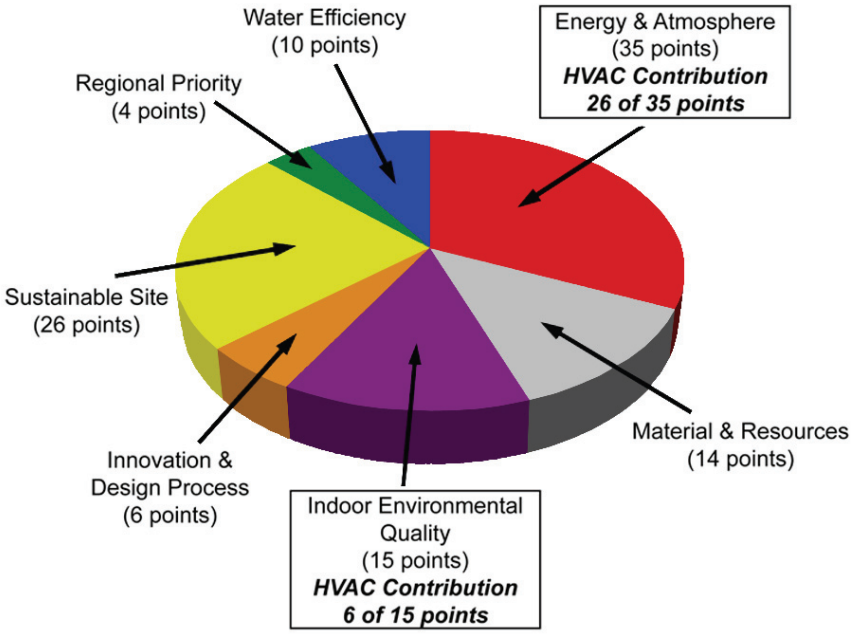


Fig. 2. Overview of LEED for New Construction & Major Renovations

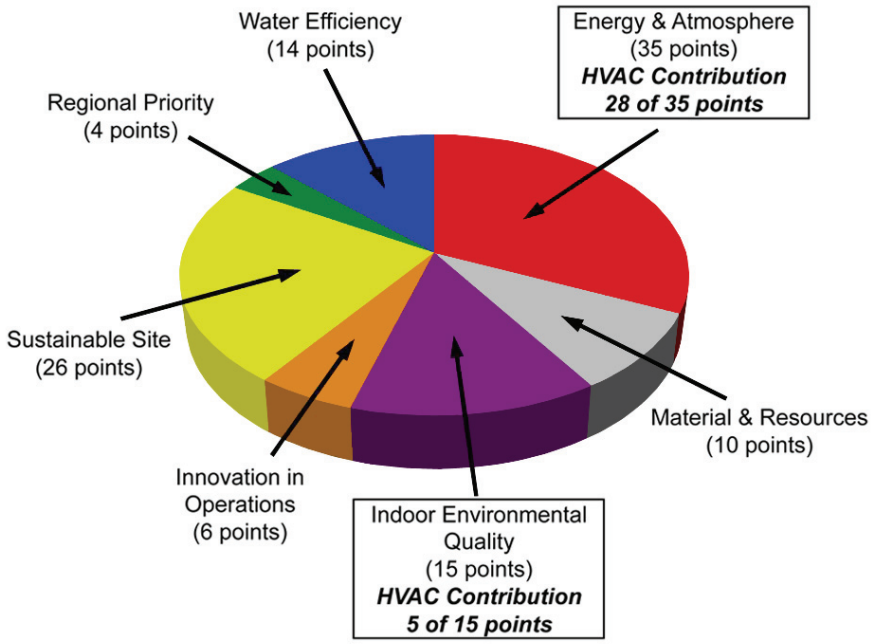


Fig. 3. Overview of LEED for Existing Buildings: Operations & Maintenance

Carrier product and service offerings can contribute to meeting the goals of LEED for Existing Buildings: O&M through preventive ongoing maintenance solutions and modernization upgrades to equipment, controls, and systems. Carrier's service staff can help building owners and facility managers create and execute plans for achieving and maintaining LEED for Existing Buildings: O&M certification. Services available include remote equipment and system monitoring, demand control ventilation monitoring and adjustment, and both unit and performance analysis. Preventive maintenance service agreements are available for all brands of rooftops, chillers, packaged products, water source heat pumps, boilers, compressors, air-handlers, cooling towers, pumps, variable speed drives, controls, and accessories. Carrier can also install and service building automation and control systems and energy saving solutions, including microturbines and variable speed drives, and perform upgrades to equipment. Remote monitoring capability for system and equipment diagnostics and operating controls are also available. These products and services can contribute to sustainable, efficient operation of a building and should be considered by owners seeking LEED for Existing Buildings: O&M certification or recertification at a higher level than previously awarded.

LEED for Existing Buildings: O&M requires monitoring performance of HVAC systems, and other building energy and water systems. Carrier's i-Vu® open control system can provide optimized building control of systems and also gather and record data for initial certification and for the required ongoing trend and data collection required for recertification. Almost one half of all the points in LEED for Existing Buildings: O&M are impacted by the application of the BAS.

Carrier products and services may also contribute to points earned in the Regional Priority category. For example, energy saving features are very important in the Northeastern United States, while air quality products may contribute to the Regional Priority category in areas with poor outdoor air quality.

The following section describes the prerequisite and credit requirements in the LEED for New Construction and LEED for Existing Buildings: O&M that are most applicable to HVAC equipment. The EA and IEQ credit categories address HVAC equipment in the LEED for New Construction rating system, and the EA, IEQ and WE credit categories address HVAC equipment in the LEED for Existing Buildings: O&M rating system.

NOTE: This document only covers the prerequisite and credit requirements that involve HVAC equipment. This paper does not address all of the prerequisite requirements that are required for LEED certification.

Products are not reviewed or certified under LEED. LEED credit requirements cover the performance of materials in aggregate, not the performance of individual products or brands. For more information on LEED, visit: www.usgbc.org.

LEED FOR NEW CONSTRUCTION & MAJOR RENOVATIONS

ENERGY & ATMOSPHERE (EA)
26 HVAC-RELATED LEED POINTS POSSIBLE

NOTE: All three prerequisites in the EA credit category directly relate to HVAC equipment. The Carrier products referenced comply with the requirements of each of these prerequisites under LEED.

EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems

Provide commissioning services that assure that the owner's requirements are met in the finished building. The Building Automation System (BAS) is an important component which must be commissioned and can provide the systems control and logging required to execute the commissioning plan. Carrier's i-Vu® open control system has features which can enhance this process.

EA Prerequisite 2: Minimum Energy Performance

Establish the minimum level of energy efficiency for the building or system by specifying Carrier equipment that exceeds the energy efficiency and control requirements of ASHRAE 90.1-2007. It should be noted that for some products, such as rooftops, new efficiency levels have been implemented by federal law which exceed ASHRAE 90.1-2007 and can be found in ASHRAE 90.1-2010.

EA Prerequisite 3: Fundamental Refrigerant Management

Reduce ozone depletion by specifying units that do not use chlorofluorocarbon (CFC) refrigerants. All new Carrier equipment uses non-CFC refrigerants and Carrier can assist with replacement equipment or the conversion to non-CFC refrigerants for many types of existing equipment.

EA Credit 1: Optimize Energy Performance 1 to 19 Points

One component of this credit requires the reduction of the energy cost of the proposed building compared to ASHRAE 90.1-2007 minimum tables and beyond the performance level required to meet EA Prerequisite 2. Carrier units that are designed for efficient part-load performance, heat reclaim, or that include energy saving features such as demand controlled ventilation (DCV) can contribute towards satisfying this credit under LEED. In addition, the Carrier HAP (Hourly Analysis Program) is a program that can be used in the energy analysis component of this credit. The HAP program can run analysis programs that comply with the modeling requirements for this credit and produce reports that are easily transferable to LEED templates.

EA Credit 3: Enhanced Commissioning 2 Points

Review system operation. In addition to the requirements of EA Prerequisite 1, this credit requires a review of building systems operations with the building staff within 10 months of substantial completion. A BAS that controls, monitors, and trends and logs building system operation can help identify operational problems and provide recordable data. Carrier's i-Vu® open control system can be a valuable tool in this process.

EA Credit 4: Enhanced Refrigerant Management 2 Points

Minimize the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) of the system. Carrier units that use reduced refrigerant charges and environmentally sound refrigerants, such as Puron® refrigerant (R-410A) and R-134a and Carrier's absorption chillers, which use water as the refrigerant, contribute toward satisfying this credit under LEED. Novation® heat exchanger technology with microchannel condenser coils can reduce required refrigerant charge by up to 40% compared to traditional coil technology. This credit only allows the assumption of a 2% leak rate. There is no approved test procedure for verification of a leak rate, and claiming a leak rate lower than 2% is not allowed under LEED.

General guidelines for charge determination:

ODP/GWP calculation for acceptable charge of R-134a

- packaged unit—2.8 lb/ton
- scroll or reciprocating chillers—3.30 lb/ton
- centrifugal or screw chillers— 3.03 lb/ton

ODP/GWP calculation for acceptable charge of R-410A

- packaged unit—1.98 lb/ton
- scroll or reciprocating chillers—2.11 lb/ton
- centrifugal or screw chillers—2.17 lb/ton

NOTE: The actual acceptable refrigerant charge values are based on job weighted average.

EA Credit 5: Measurement and Verification
3 Points

Develop and implement a plan to measure and record building energy consumption over time. Carrier equipment and building control systems, such as Carrier's i-Vu® open control system, can be configured to measure and record energy usage and monitor the performance of fans, compressors, heating devices, and all other energy-using systems in the building. Data can be collected and used to develop trend logs.

One of the new Minimum Program Requirements (MPRs) is to provide energy and water consumption data to USGBC. The ability of the BAS to track this required data contributes toward satisfying EA Credit 5 and the MPRs under LEED.

INDOOR ENVIRONMENTAL QUALITY (IEQ)
6 HVAC-RELATED LEED POINTS POSSIBLE

NOTE: There are two prerequisites in the IEQ credit category, but only one relates to HVAC equipment. Carrier products referenced contribute towards satisfying IEQ Prerequisite 1 under LEED.

IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

Establish minimum indoor air quality (IAQ) performance by specifying units that meet the ventilation rates described in ASHRAE 62.1-2007 and unit construction that enhances indoor air quality. The Carrier units applicable to this prerequisite (all airside equipment including rooftop units, air handlers, vertical packaged units, water source heat pumps, packaged terminal air conditioners, and fan coil units) comply with the construction and performance requirements of IEQ Prerequisite 1 under LEED, including the required MERV 6 filters in units.

IEQ Credit 1: Outdoor Air Delivery Monitoring
1 Point

Install permanent monitoring systems to ensure ventilation meets ASHRAE 62.1-2007. This credit requires monitoring of carbon dioxide in densely occupied spaces and monitoring of outdoor airflow in other spaces. Carrier units that use DCV (demand controlled ventilation) with monitored output or that use air-handling units with airflow stations contribute towards satisfying IEQ Credit 1 under LEED.

IEQ Credit 2: Increased Ventilation
1 Point

Improve IAQ by increasing the outdoor air ventilation to 30% above that required by ASHRAE 62.1-2007. Ventilation load represents one of the largest elements of the heating and cooling load. Since increased ventilation will tend to increase the heating and cooling load and impact space humidity, options that recover energy or control humidity should be considered. Carrier offers equipment and options [such as energy recovery, DOAS (Dedicated Outdoor Air Systems)], outdoor humidity control, air handlers, and rooftop units that can contribute toward satisfying IEQ Credit 2 under LEED while promoting energy efficiency.

IEQ Credit 5: Indoor Chemical and Pollutant Source Control
1 Point

Minimize and control pollutant entry into building systems. Carrier air-handling units and rooftop units can be provided with a MERV (Minimum Efficiency Reporting Value) 13 filter system.

IEQ Credit 6.2: Controllability of Systems—Thermal Comfort
1 Point

Provide individual comfort control for 50% of the building's occupants. Carrier systems that may be configured to comply with the IEQ Credit 6.2 requirements under LEED include variable volume and temperature (VVT®) systems designed for small zones, UFAD (underfloor air distribution) systems, chilled beam systems, and individual room terminal units.

IEQ Credit 7.1: Thermal Comfort—Design
1 Point

Control and maintain humidity and temperature, and comply with the requirements of ASHRAE 55-2004. Carrier rooftop units and air handlers coupled with Carrier building controls contribute toward satisfying the IEQ Credit 7.1 requirement and dehumidification options can maintain humidity control throughout all seasons. Permanent monitoring of comfort conditions is required.

IEQ Credit 7.2: Thermal Comfort—Verification
1 Point

Permanent monitoring of space comfort conditions. This credit can only be obtained if Credit 7.1, Thermal Comfort: Design is achieved, and requires that permanent monitoring of space comfort conditions can be maintained. Carrier's i-Vu® open control system can contribute towards satisfying IEQ Credit 7.2 under LEED.

LEED FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE

ENERGY & ATMOSPHERE (EA)
28 HVAC-RELATED LEED POINTS
POSSIBLE

NOTE: There are three prerequisites in the EA credit category that relate to HVAC equipment. The Carrier products referenced comply with the requirements of EA Prerequisite 1, EA Prerequisite 2, and EA Prerequisite 3 under LEED.

EA Prerequisite 1: Energy Efficiency Best Management Practices—Planning, Documentation, and Opportunity Assessment

Document the equipment sequence of operations and develop a building operating and maintenance plan to ensure that energy efficient operating strategies are maintained. This prerequisite requires an energy audit that meets the requirements of the ASHRAE Level I walk-through assessment. Carrier's staff includes experts who are trained in conducting energy audits and who can help conduct an audit and determine cost effective upgrades and operational improvements. Carrier offers preventive maintenance service agreements for all brands of rooftops, chillers, boilers, compressors, air-handler, cooling towers, pumps, variable speed drives, controls and accessories. Agreements can provide both preventive and predictive maintenance, and remote monitoring capabilities.

EA Prerequisite 2: Minimum Energy Efficiency Performance

Proper maintenance and operation can have a significant impact on a building's ENERGY STAR® energy performance rating. Through its preventive maintenance service agreements, Carrier can help maintain equipment and systems at high performance levels. Carrier also offers a complete line of building controls to keep the system operating at peak efficiency and which can provide the reports necessary for the ENERGY STAR Portfolio Manager tool and to maintain LEED recertification requirements. Carrier has many new products and services to upgrade the building HVAC system and improve the building's energy performance.

EA Prerequisite 3: Fundamental Refrigerant Management

Minimize the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) of the system. All new Carrier equipment uses non-CFC refrigerants and can be specified for new HVAC systems or replacement equipment and building modernization. For those systems still using CFC refrigerants, Carrier can maintain the equipment to help keep the leak rates within the required limits and can also provide options for refrigerant containment, refrigerant conversion, or planned unit replacement.

EA Credit 1: Optimize Energy Performance 1 to 18 Points

Points are awarded for achieving increasing levels of ENERGY STAR energy performance ratings. Proper building system operations and maintenance and energy improvements through system upgrades and new equipment, controls, and accessories can improve the ENERGY STAR energy performance rating. Carrier has a wide range of high-efficiency products, from the 23XRV chiller to high performance water source heat pump units and rooftop units, which can contribute to a building's energy efficiency. Carrier also offers system upgrades, such as variable speed drive (VSD) retrofits on existing chillers, air handlers and pumps, and services, such as duct sealing, which can have a significant impact on reducing energy use. Since the ENERGY STAR energy performance rating is based on performance over time, establishing maintenance programs and the monitoring and recording of energy usage patterns is important to keep the building operating at design efficiency levels. Carrier's i-Vu® open control system can keep the building operating at peak performance and provide the trend logging required by this credit.

LEED FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE (cont)

ENERGY & ATMOSPHERE (EA)
28 HVAC-RELATED LEED POINTS
POSSIBLE (cont)

EA Credit 2.1: Existing Building Commissioning—Investigation and Analysis
2 Points

Over time, building occupancy and use patterns normally change from design conditions. Unless usage patterns are re-evaluated, equipment operation may become less efficient. Carrier has trained staff to help building owners and managers determine if their building systems are operating at peak performance for the current building usage.

EA Credit 2.2: Existing Building Commissioning—Implementation
2 Points

This credit provides an opportunity to implement changes in the HVAC system operation and to upgrade components to better meet the building's current needs. Carrier provides services that maintain and recondition HVAC equipment, restoring operation to optimal levels. Carrier also has a full line of energy efficient HVAC products and add-on components, such as VSDs (variable speed drives for chillers, air handlers, and pumps) which can be retrofitted to existing HVAC systems to help the system better match load conditions of the current building and reduce energy consumption.

EA Credit 2.3: Existing Building Commissioning—Ongoing Commissioning
2 Points

Maintaining building systems at peak operations requires continuously monitoring performance and routinely adjusting to changes in building use and operation. Carrier provides services for regular commissioning and Carrier's i-Vu® open control system offers scheduled assessment and monitoring of building systems' performance.

EA Credit 3.1: Performance Measurement—Building Automation System
1 Point

One of the best technologies for determining if the building is operating efficiently is a building automation system, which monitors energy use and provides usage trends. Carrier can provide building automation systems that meter and track the use of energy at the building and individual system level.

EA Credit 3.2: Performance Measurement—System-Level Metering
2 Points

Measuring energy consumption at the HVAC system level provides information that can be used to determine when adjustment or maintenance is required. Carrier's i-Vu® open control system measures and records system level energy use data for all types of fuel sources.

EA Credit 5: Enhanced Refrigerant Management
1 Point

Use refrigerants that minimize the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) of the building's HVAC system. Carrier can provide a full line of replacement HVAC equipment that uses reduced refrigerant charges and environmentally sound refrigerants, such as Puron® refrigerant (R-410A) and R-134a, which contribute towards satisfying EA Credit 5 under LEED. Carrier's absorption chillers use water as the refrigerant, for cooling without CFCs. Novation® heat exchanger technology with microchannel condenser coils can reduce required refrigerant charge by up to 40% compared to traditional coil technology. This credit only allows the assumption of a 2% leak rate. There is no approved test procedure for verification of a leak rate, and claiming a leak rate lower than 2% is not allowed under LEED.

General guidelines for charge determination:

ODP/GWP calculation for acceptable charge of R-134a

- packaged unit—2.8 lb/ton
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- centrifugal or screw chillers— 3.03 lb/ton

ODP/GWP calculation for acceptable charge of R-410A

- packaged unit—1.98 lb/ton
- scroll or reciprocating chillers—2.11 lb/ton
- centrifugal or screw chillers—2.17 lb/ton

NOTE: The actual acceptable refrigerant charge values are based on job weighted average.

LEED FOR EXISTING BUILDINGS: OPERATIONS AND MAINTENANCE (cont)

INDOOR ENVIRONMENTAL QUALITY (IEQ)
5 HVAC-RELATED LEED POINTS
POSSIBLE

NOTE: There are three prerequisites in the IEQ credit category, but only one relates to HVAC equipment. The Carrier products referenced comply with the requirements of IEQ Prerequisite 1.

IEQ Prerequisite 1: Minimum Indoor Air Quality Performance

Modify or maintain air handling units (including rooftop units and indoor self contained units) to supply a ventilation rate that meets the outdoor air ventilation rates described in ASHRAE 62.1-2007. Implement and maintain an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC units as they relate to outdoor air introduction and exhaust. This prerequisite requires that all air handlers provide the ventilation air required by the ASHRAE standard or the required minimum airflow under LEED. This prerequisite also requires that exhaust systems be checked regularly. Carrier can provide building controls and make system adjustments and modifications that improve airflow and track the systems operation.

IEQ Credit 1.1: Indoor Air Quality Best Management Practices—Indoor Air Quality Management Program
1 Point

Enhance indoor air quality by optimizing practices to prevent and correct indoor air quality problems and maintain the well-being of the occupant. This credit requires the implementation of an Indoor Air Quality (IAQ) management program based on EPA's "Indoor Air Quality Building Education and Assessment Model (I-Beam)," EPA Reference Number 402-01-001, December 2002. Carrier's trained staff can provide assistance in identifying HVAC system operation and performance issues that can compromise building IAQ. They also provide assistance in correcting the problems and instituting controls and procedures to help prevent future IAQ issues.

IEQ Credit 1.2: Indoor Air Quality Best Management Practices—Outdoor Air Delivery Monitoring
1 Point

Provide ventilation system monitoring capabilities. This credit requires monitoring of carbon dioxide (CO_2) in densely occupied spaces and monitoring of outdoor airflow in other spaces. Carrier units that use demand controlled ventilation (DCV) when output can be monitored or air-handling units with airflow stations can both contribute towards satisfying this credit under LEED. Maintaining performance logs can also ontribute to satisfying this credit. Carrier's i-Vu® open control system provides monitoring and trend logging functions.

IEQ Credit 1.3: Indoor Air Quality Best Management Practices—Increased Ventilation
1 Point

Improve IAQ by increasing the outdoor air ventilation to 30% above that required by ASHRAE 62.1-2007. Carrier offers HVAC system options, such as energy recovery and outdoor humidity control, which can contribute to meeting this requirement while maintaining energy efficiency.

IEQ Credit 1.4: Indoor Air Quality Best Management Practices—Reduce Particulates in Air Distribution
1 Point

Reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants using filtration media with a MERV (Minimum Efficiency Reporting Value) rating of 13 or greater for all outside air intakes and inside air recirculation returns. Carrier provides after-market system retrofits using a technology solution that includes air filtration of particles and dirt and lower airside pressure drop for energy savings and germicidal air purification. Additionally, Carrier can help establish and institute a filter maintenance plan, which complies with the on-going maintenance requirements of this credit.

IEQ Credit 2.3: Occupant Comfort—Thermal Comfort Monitoring
1 Point

Provide continuous monitoring and optimization of systems that regulate indoor comfort and conditions (air temperature, humidity, air speed and radiant temperature) in occupied spaces to comply with the comfort criteria of ASHRAE Standard 55-2004. Carrier control systems with system and equipment diagnostic capabilities can provide remote monitoring of operating control limits.

LEED FOR EXISTING BUILDINGS: OPERATIONS & MAINTENANCE (cont)

WATER EFFICIENCY (WE)
2 HVAC-RELATED LEED POINTS POSSIBLE

NOTE: There is only one prerequisite in the WE credit category and it does not relate to HVAC equipment.

WE Credit 4.1: Cooling Tower Water Management—Chemical Management 1 Point

Although water-cooled equipment is more efficient than air-cooled equipment, cooling towers are a significant source of a building's water usage, which may be a consideration in places where water is a scarce resource. If not managed correctly, chemicals used in a cooling tower's water treatment can result in an increase in the use of water (blow-down). A good water treatment program can maintain water conditions while reducing the need for blow-down. Carrier can assist in developing a cooling tower maintenance plan that will maintain optimum water conditions without excess water usage, reducing blow-down and make-up water needs.

WE Credit 4. 2: Cooling Tower Water Management—Non-Potable Water Source Use 1 Point

Water from other building sources can be used to reduce the use of potable water for cooling tower operation. In addition, proper control of the cooling tower can reduce the initial need for water. Cooling tower water use can be minimized through proper maintenance, treatment, and control. Carrier can help develop and implement a plan to minimize water use and maintain the cooling tower at peak performance.

CARRIER PRODUCTS AND LEED CERTIFICATION

The charts on the following pages list the key components of the major types of HVAC systems and the Carrier products that contribute toward satisfying the respective credits under LEED.

Products are not reviewed or certified under LEED. LEED credit requirements cover the performance of materials in aggregate, not the performance of individual products or brands. Therefore, no products, programs, or services can claim that their use will guarantee the achievement of LEED points.

CARRIER PRODUCTS CONTRIBUTE TO LEED CERTIFICATION
NEW CONSTRUCTION AND MAJOR RENOVATIONS

SYSTEM TYPE	SIZE RANGE (Tons)	SYSTEM COMPONENT			
		Refrigeration	Air Handler	Terminal	Control System
Constant Volume DX Single Zone Outdoor Packaged Rooftop Unit System					
Carrier Products	2-5	48/50XL,XL-A,VL,VL-A,ES,ES-A 50XT,XT-A, 50VT,VT-A, EZ, EZ-A 48XT, XT-A, VT, VT-A, EZ-A		None	Infinity® Programmable Control or Performance™ Programmable Control
	3-12.5	48/50HC, 48/50TC 50TCQ, 50HCQ			i-Vu® Open Control System
	15-27.5	48/50TC, 48/50HC, 50TCQ			i-Vu Open Control System
	20 - 60	48/50A			ComfortLink™ Controls and i-Vu Open Control System
	30 - 100	48/50P			ComfortLink Controls and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		N/A	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Variable Volume and Temperature (VVT®) DX Outdoor Packaged Rooftop Unit System					
Carrier Products	3-12.5	48/50HC, 48/50TC 50TCQ, 50HCQ		OPND, OPNDR 35E, 35J, 35K 45M, 45N, 45R	i-Vu® Open Control System
	15-27.5	48/50TC,48/50HC,50TCQ			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Variable Air Volume (VAV) DX Outdoor Packaged Rooftop Unit System					
Carrier Products	4 & 5	48/50PD		35BD 35E, 35J, 35K 35L, 35N, 45M, 45N, 45R	i-Vu Open Control System
	20-60	48/50A			ComfortLink Controls and i-Vu Open Control System
	30-100	48/50P			ComfortLink Controls and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Constant Volume DX Dedicated Outdoor Air Unit System					
Carrier Products	6-35	62D		None	Microprocessor Control and i-Vu Open Control System
	N/A	62E			Microprocessor Control and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		N/A	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*

Examples of specific product arrangement for highlighted systems are shown on pages 19-51.

NOTE: Not all credits apply to all units

SYSTEM TYPE	SIZE RANGE (Tons)	SYSTEM COMPONENT			
		Refrigeration	Air Handler	Terminal	Control System
Constant Volume DX Split System					
Carrier Products	6-20	38AUZ, 38AUD 38AUQ	40RUA 39M,L,S	None	i-Vu Open Control System
	25-65	38APS			ComfortLink Controls and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	N/A	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Variable Volume and Temperature (VVT) DX Split System					
Carrier Products	6-20	38AUZ, 38AUD 38AUQ	40RUA 39M,L,S	OPND, OPNDR 35E, 35J, 35K 45M, 45N, 45R	i-Vu Open Control System
	25-65	38APS,APD			ComfortLink™ Controls and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Variable Air Volume (VAV) DX Split System					
Carrier Products	6-20	38AUZ, 38AUD 38AUQ	39M,L,S	35BD 35E, 35J, 35K 35L, 35N, 45M, 45N, 45R	i-Vu Open Control System
	25-65	38APS,APD			ComfortLink™ Controls and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Constant Volume DX Indoor Packaged Unit System					
Carrier Products	2-8	50AH		None	i-Vu Open Control System
	5-20	50XCW, 50XCA, 50XCR with 09XC			
	20-30	50BVC			
	30-60	50BVT			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 3* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*
Variable Volume and Temperature (VVT) DX Indoor Packaged Unit System					
Carrier Products	5-20	50XCW, 50XCA, 50XCR with 09XC		OPND, OPNDR 35E, 35J, 35K 45M, 45N, 45R	i-Vu Open Control System
	20-30	50BVC			
	30-60	50BVT			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*

CARRIER PRODUCTS CONTRIBUTE TO LEED CERTIFICATION – NEW CONSTRUCTION AND MAJOR RENOVATIONS (CONT)

SYSTEM TYPE	SIZE RANGE (Tons)	SYSTEM COMPONENT			
		Refrigeration	Air Handler	Terminal	Control System
Variable Air Volume (VAV) DX Indoor Packaged Unit System					
Carrier Products	20-30	50BVJ		35BD 35E, 35J, 35K 35L, 35N, 45M, 45N, 45R	i-Vu Open Control System
	30-60	50BVW			
	60-100	50XJ			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 1* *EA Credit 3* *EA Credit 5* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Constant Volume Boiler-Tower Loop DX Water Source Heat Pump System					
Carrier Products	1/2 - 10	50PTH, 50PSH 50PCH, 50P1H, 50HQP		None	UCXP Loop Controller and i-Vu Open Control System
	1/2 - 25	50VS, 50PSV, 50PTV 50VQP, 50PCV, 50P1V			
	1/2 - 6	50PSD, 50PTD			
	3/4 - 1-1/2	50PEC			
	3 - 30	50PSW	42 Series fan coils		
	18-30	50BVQ			
	30-60	50BVV			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 5* *IEQ Credit 6.2* *IEQ Credit 7.1*		N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 3* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*
Constant Volume Ground Source Loop DX Water Source Heat Pump System					
Carrier Products	1/2 - 10	50PTH, 50PSH 50PCH, 50P1H, 50HQP		None	UC Open Loop Controller and i-Vu Open Control System
	1/2 - 25	50VS, 50PSV, 50PTV 50VQP, 50PCV, 50P1V			
	1/2 - 6	50PSD, 50PTD			
	3/4 - 1-1/2	50PEC			
	3 - 30	50PSW	42 Series fan coils		
	18-30	50BVQ			
	30-60	50BVV			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 5* *IEQ Credit 6.2* *IEQ Credit 7.1*		N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 3* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*
Tower Loop Variable Air Volume DX Water Source Heat Pump System					
Carrier Products	7- 25	50VQP		OPND, OPNDR 35E, 35J, 35K 45M, 45N, 45R	UCXP Loop Controller and i-Vu Open Control System
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 5* *IEQ Credit 6.2* *IEQ Credit 7.1*		*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 3* *EA Credit 4* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*

Examples of specific product arrangement for highlighted systems are shown on pages 19-51.

NOTE: Not all credits apply to all units

SYSTEM TYPE	SIZE RANGE (Tons)	SYSTEM COMPONENT			
		Refrigeration	Air Handler	Terminal	Control System
Constant Volume Chilled Water Fan Coil System					
Carrier Products	10-500	30RAP,RB,XA,HXA (Air-Cooled)	42B,42D,42C,42S,42V,42WKN		i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW, MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Credit 3* *EA Credit 5* *IEQ Credit 7.1* *IEQ Credit 7.2*
Constant Volume Chilled Water System					
Carrier Products	10-500	30RAP,RB,XA,HXA (Air-Cooled)	39M,L,S 40RUS	35N 45J,45K,45Q	i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW,MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Prerequisite 2* *EA Credit 3* *EA Credit 5* *IEQ Credit 1* *IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Variable Air Volume (VAV) Chilled Water System					
Carrier Products	10-500	30RAP,RB,XA,HXA (Air-Cooled)	39M,L,S	35BD 35E, 35J, 35K 35L, 35N, 45M, 45N, 45R	i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW,MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Prerequisite 2* *EA Credit 3* *EA Credit 5* *IEQ Credit 1* *IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Underfloor Air Distribution (UFAD) System					
Carrier Products	10-500	30RAP,RB,XA,HXA (Air-Cooled)	39 M,L,S	35BF-R, 35BF-D 35BF-V, 35BF-CT 42K 45X, 45U	i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW,MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Prerequisite 2* *EA Credit 3* *EA Credit 5* *IEQ Credit 1* *IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*

CARRIER PRODUCTS CONTRIBUTE TO LEED CERTIFICATION – NEW CONSTRUCTION AND MAJOR RENOVATIONS (CONT)

SYSTEM TYPE	SIZE RANGE (Tons)	SYSTEM COMPONENT			
		Refrigeration	Air Handler	Terminal	Control System
Chilled Beam System					
Carrier Products	10-500	30RAP,RB,XA,HXA (Air-Cooled)	39 M,L,S	36CBA, 36CBP	i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW, MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*	*EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*	*EA Prerequisite 1* *EA Prerequisite 2* *EA Credit 3* *EA Credit 5* *IEQ Credit 1* *IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Classroom Unit Ventilators					
Carrier Products	10-500	30RAP,RB,XA HXA (Air-Cooled)	40UV, UH		i-Vu Open Control System
	70-1500	19XR,XRV, 23XRV, 30XW, MPV (Water-Cooled)			
	80-500	16TJ,LJ,DJ,NK (Absorption)			
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*		*EA Prerequisite 1* *EA Prerequisite 2* *EA Credit 3* *EA Credit 5* *IEQ Credit 1* *IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Ductfree Split Systems					
Carrier Products	3/4 - 3	38GXC 38MVC 38HDF 38HDR RAVAT RASLA 38QFR 38GXQ 38MVQ 38QRR 38GXM	40GXC 40MVC 40QNC, 40KMC 40QAC RAVKR, RAVUT, RAVCT RASLK 40QNQ, 40KMQ 40GXQ 40MVQ 40QAQ 40GXM		Microprocessor Control
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 6.2* *IEQ Credit 7.1*		*IEQ Credit 6.2* *IEQ Credit 7.1* *IEQ Credit 7.2*
Residential Split System					
Carrier Products	1-1/2 - 5	24ABA, 24APA 24ACA, 24ANA 25HBA, 25HPA 25HCA,25HNA 38HDR, 38HQR	FE4 , FV4, FX4 CAP, CAN, CAS 58MBV, 58MTB, 58MXB 58MCB 58MVC		Infinity® Programmable Control with SAM
LEED Categories	N/A	*EA Prerequisite 2* *EA Prerequisite 3* *EA Credit 1* *EA Credit 4*	*EA Prerequisite 2* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 1* *IEQ Credit 2* *IEQ Credit 5* *IEQ Credit 7.1*		*EA Prerequisite 1* *EA Credit 1* *IEQ Prerequisite 1* *IEQ Credit 7.1* *IEQ Credit 7.2*

Examples of specific product arrangement for highlighted systems are shown on pages 19-51.

NOTE: Not all credits apply to all units

SYSTEM DIAGRAMS

The system diagrams on the following pages provide examples of product arrangements and the ways in which Carrier products can contribute to obtaining LEED certification.

Many of the systems shown feature Carrier's i-Vu® open control system, which can contribute to achieving HVAC related credits in Energy & Atmosphere (EA) and Indoor Environmental Quality (IEQ) under LEED for New Construction & Major Renovations.

NOTE: System diagrams are provided as examples and for reference purposes only. Please refer to LEED criteria available from the U.S. Green Building Council and to Product Data catalogs for unit performance data and available options and accessories to help determine if a particular size or configuration of equipment will contribute to LEED certification.

i-Vu Open Control System

EA Prerequisite 1 – Basic Commissioning

- System integration commissioning software provides dynamic analysis, trending, monitoring, alarms and reports to perform commissioning tests
- Forced sequence of operation through the i-Vu system interface as part of the System Performance Testing procedure aids in commissioning
- Intuitive alarm viewer allows CxA (commissioning agent) to investigate and troubleshoot system problems
- Automatic trending and advanced reporting from the i-Vu system provides a clear history of important building conditions
- Supports CxA driven verification procedures and reporting requirements

EA Credit 1 – Optimize Energy Performance

- Demand controlled ventilation (DCV) reduces ventilation air requirements in response to occupancy
- Universal controller supports demand limiting to reduce peak energy consumption
- Supports Night Time Free Cooling and Optimal Start routines
- Integrates with economizer control to provide free cooling cycle
- Provides scheduling capability for energy efficiency
- System controls integrate operation of boilers, cooling tower and pumps on water cooled systems

EA Credit 3 – Enhanced Commissioning

- System can control, monitor, and trend and log building system operation to help identify operational problems and provide recordable data for required 10-month follow-up commissioning.

EA Credit 5 – Measurement & Verification

- Energy monitoring provides measurement and verification of all energy using systems including lighting and other power loads with UCXP through BACnet* communications including connection to Lonworks† and Modbus** systems
- ECM (energy conservation measure) allows isolation of HVAC systems to evaluate energy system performance
- Programmable controllers, data collection, trend logging and advanced reporting allow for monitoring and analysis of energy performance of all building energy consuming devices

IEQ Prerequisite 1 – Minimum IAQ Performance

- Ventilation air control and relief integration with overall system operation
- Humidity measurement and tracking can provide system control to HVAC system components for space humidity control

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- System can integrate with DCV and airflow monitoring stations to track and control outdoor ventilation air based on occupant demand with the UCXP

IEQ Credit 2 – Increased Ventilation

- Systems controls can track outdoor ventilation air and control energy recovery units to provide increased outdoor air while minimizing energy penalty

IEQ Credit 7.1 – Thermal Comfort: Design

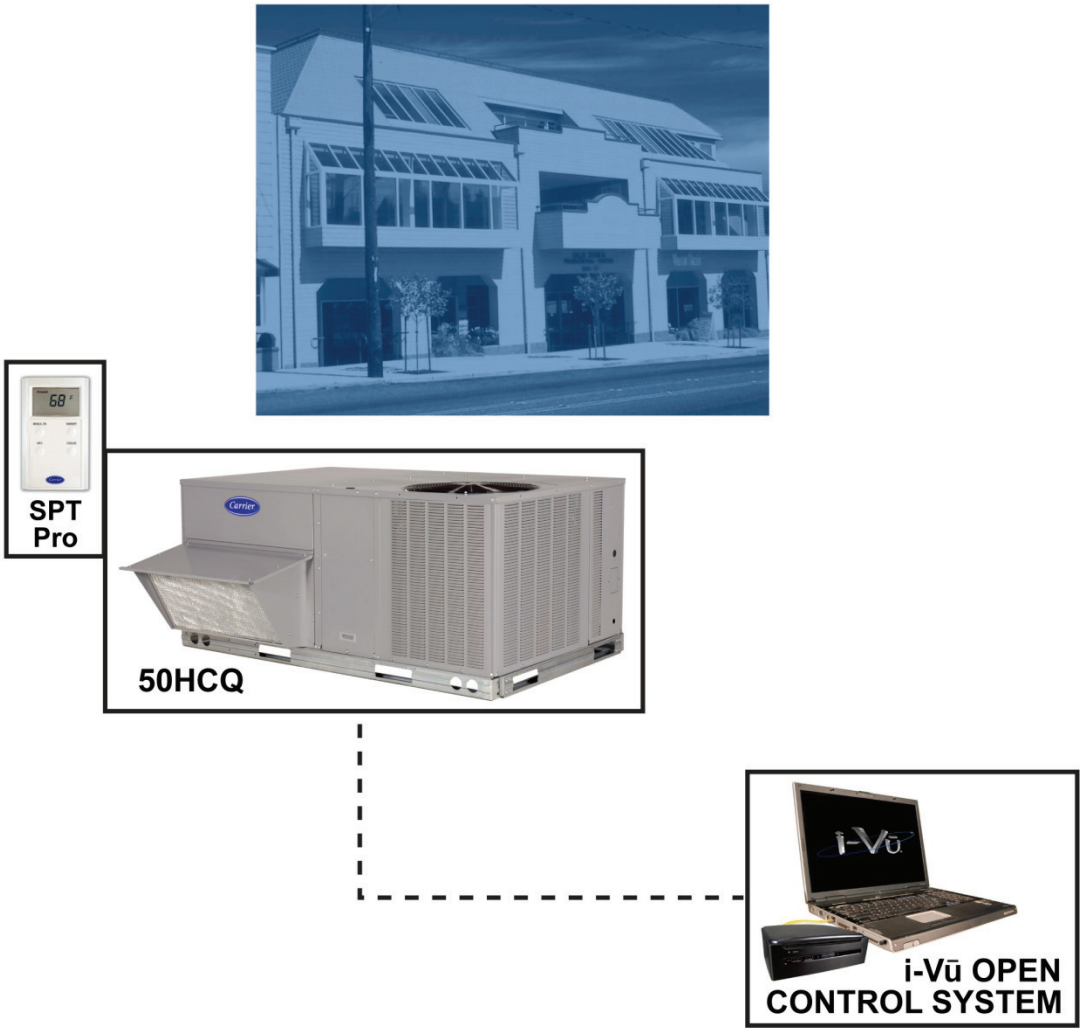
- Space level temperature control with humidity or IAQ override
- System reset based on schedules, demand or temperature

IEQ Credit 7.2– Thermal Comfort: Verification

- Provides permanent monitoring, trend logging and reports of space temperature and humidity conditions

*Sponsored by ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)
†Registered trademark of Echelon Corporation
**Registered trademark of Schneider Electric

Constant Volume DX Single Zone Outdoor Packaged Rooftop System
Carrier Products – System Diagram



System Description

Constant volume DX single zone outdoor packaged rooftop systems consist of a DX packaged unit serving a single space or group of spaces with similar thermal characteristics.

- Units may be roof or slab mounted as required for the installation.
- Units include the indoor fan system, a complete cooling system and may include a heating section. The heating section may be gas, electric or heat pump (as shown here).
- During occupied periods the fan provides constant air volume and is cycled with the heat during unoccupied periods. A sensor in the space cycles the cooling and heating to meet space requirements.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units. Units can be equipped with economizers, heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Constant Volume DX Single Zone Outdoor Packaged Rooftop System
Carrier Products – Contributions to LEED Certification

50HCQ Packaged Rooftop Heat Pump

EA Prerequisite 2 – Minimum Energy Performance

- ASHRAE compliant and ENERGY STAR® qualified

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- SEER to 15.8, EERs to 11.8, IEERs to 12.8
- HSPFs to 8.2, COPs to 2.4
- Two stage capacity control size 7-1/2 and above
- Electric drive X13 (5 speed/torque) motor (sizes 04 to 06)
- Integrated economizer options optimize the use of free cooling
- Low-leakage (less than 2%) outdoor air dampers
- Energy recovery and heat recovery options for ventilation air
- Demand control compatible (DCV)

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements
- Ventilation air control options, economizer and exhaust
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE 62 Standard, sloping design; side or center drain

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Demand controlled ventilation (DCV)compatible

IEQ Credit 2 – Increased Ventilation

- Economizer options for increased outdoor air capability
- Energy recovery options to reduce impact of ventilation air

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- 2-in. filter tracks for MERV 8 or field supplied MERV 13 filters

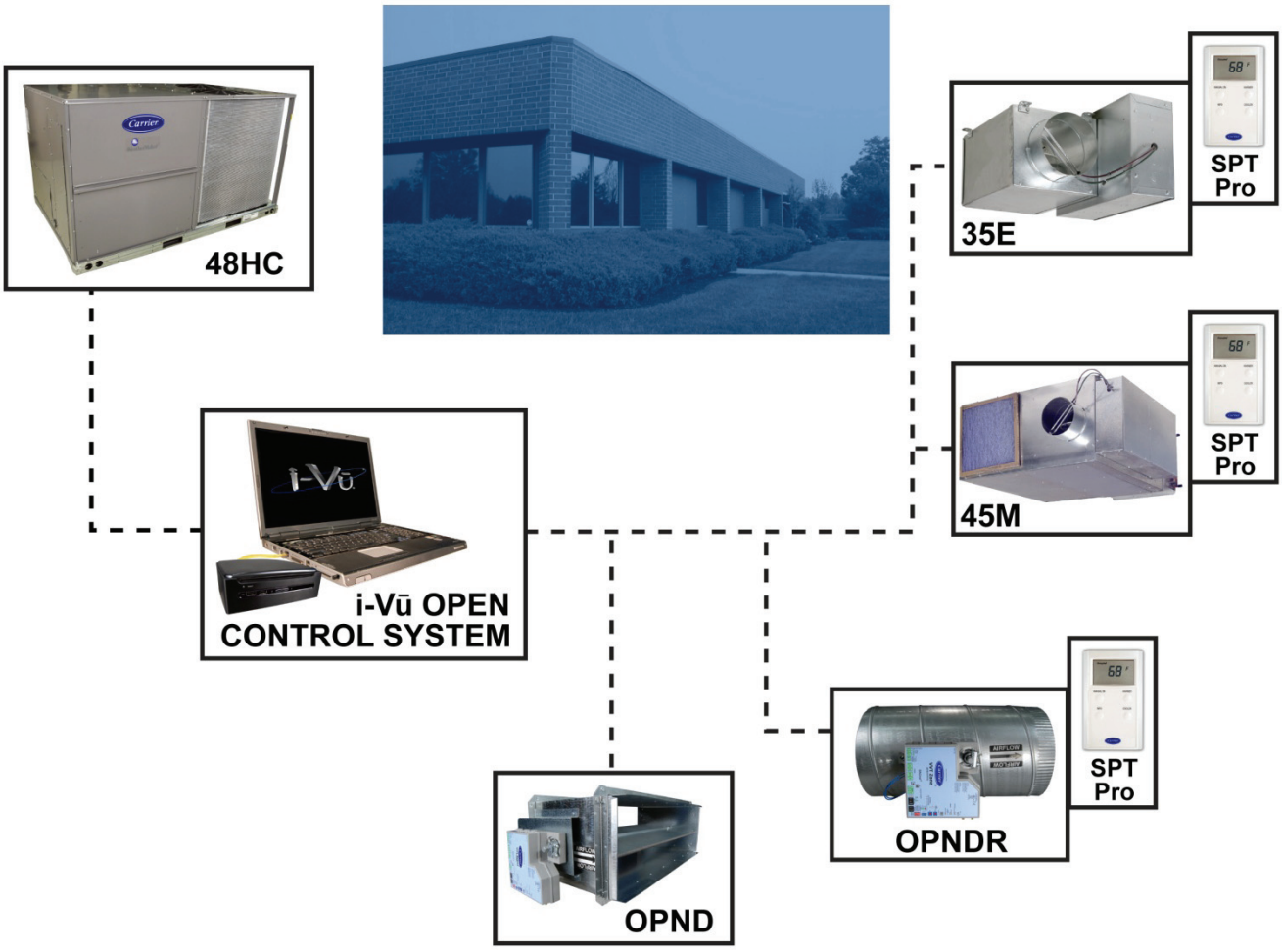
IEQ Credit 7.1 – Thermal Comfort: Design

- Demand controlled ventilation (DCV) compatible

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Variable Volume and Temperature (VVT®) DX Outdoor Packaged Rooftop Unit System
Carrier Products – System Diagram



System Description

The variable volume and temperature (VVT) system provides many of the comfort benefits of a variable air volume system while using a constant volume single zone outdoor packaged rooftop.

- Space sensors in each zone control a zone damper which modulates the volume of air supplied to the zone. As zone dampers close, a bypass damper opens to return air to the rooftop unit, keeping the unit air supply constant.
- Unit does not provide simultaneous heating and cooling but does allow the unit to switch between heating and cooling as required. The heating section may be gas, electric, or heat pump.
- Unit modulates heating and cooling stages and switches between modes based on a polling of the zones in order to satisfy the zone with the greatest demand.
- During occupied periods the fan provides constant air volume and is cycled with the heat during unoccupied periods. Units can be connected through network controls to provide remote monitoring and control and integration with other units. Units can be equipped with economizers, heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Variable Volume and Temperature (VVT®) DX Outdoor Packaged Rooftop Unit System
Carrier Products – Contributions to LEED Certification

48HC Packaged Gas Electric Rooftop

EA Prerequisite 2 – Minimum Energy Performance

- ASHRAE compliant and ENERGY STAR qualified

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- SEER to 15.6, EER to 13.0, IPLV to 13.0
- Gas efficiencies up to 82%
- Two-stage capacity control on unit with capacities of 7-1/2 tons or greater
- Electric drive X13 (5 speed/torque) motor (3 to 5 ton units)
- Integrated economizer options optimize the use of free cooling
- Low-leakage (less than 2%) outdoor air dampers
- Energy and heat recovery options for ventilation air
- Demand controlled ventilation (DCV) compatible
- High performance belt drive motor with variable pitch pulleys and quick adjust belt system

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron refrigerant® (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements
- Ventilation air control options, economizer and exhaust
- Exclusive non-corrosive composite condensate pan in accordance with ASHRAE 62 Standard, sloping design; side or center drain
- Optional Humidi-MiZer® on-demand adaptive dehumidification system

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Economizer options for increased outdoor air capability
- Energy recovery options to reduce impact of ventilation air

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- 2 inch filter tracks for MERV 8 and MERV 13 filters

IEQ Credit 7.1 – Thermal Comfort: Design

- Demand controlled ventilation (DCV) compatible

OPNDR, OPND, 35E and 45M

EA Credit 1 – Optimize Energy Performance

- Demand controlled ventilation (DCV) compatible
- Low-leakage damper blade has a flexible gasket for tight airflow shutoff
- Electric or hot water reheat coils (factory-installed option) with controls minimize heating excess heating of ventilation air
- Electric heat (1 to 3 stages) or proportional heat (factory-installed option) for precise temperature control
- 45M parallel fan-powered units that draw primary air from the air unit and warm air from the return plenum to satisfy zone temperature requirements
- 45 Series ECM (electronically commutated motor) fan motors available on some sizes

IEQ Prerequisite 1 – Minimum IAQ Performance

- Minimum ventilation control to comply with ASHRAE 62.1
- IAQ sensor input allows override of ventilation
- Many linings available to meet all IAQ (indoor air quality) designs

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Wide range of sizes down to 45 cfm provide comfort control for small spaces

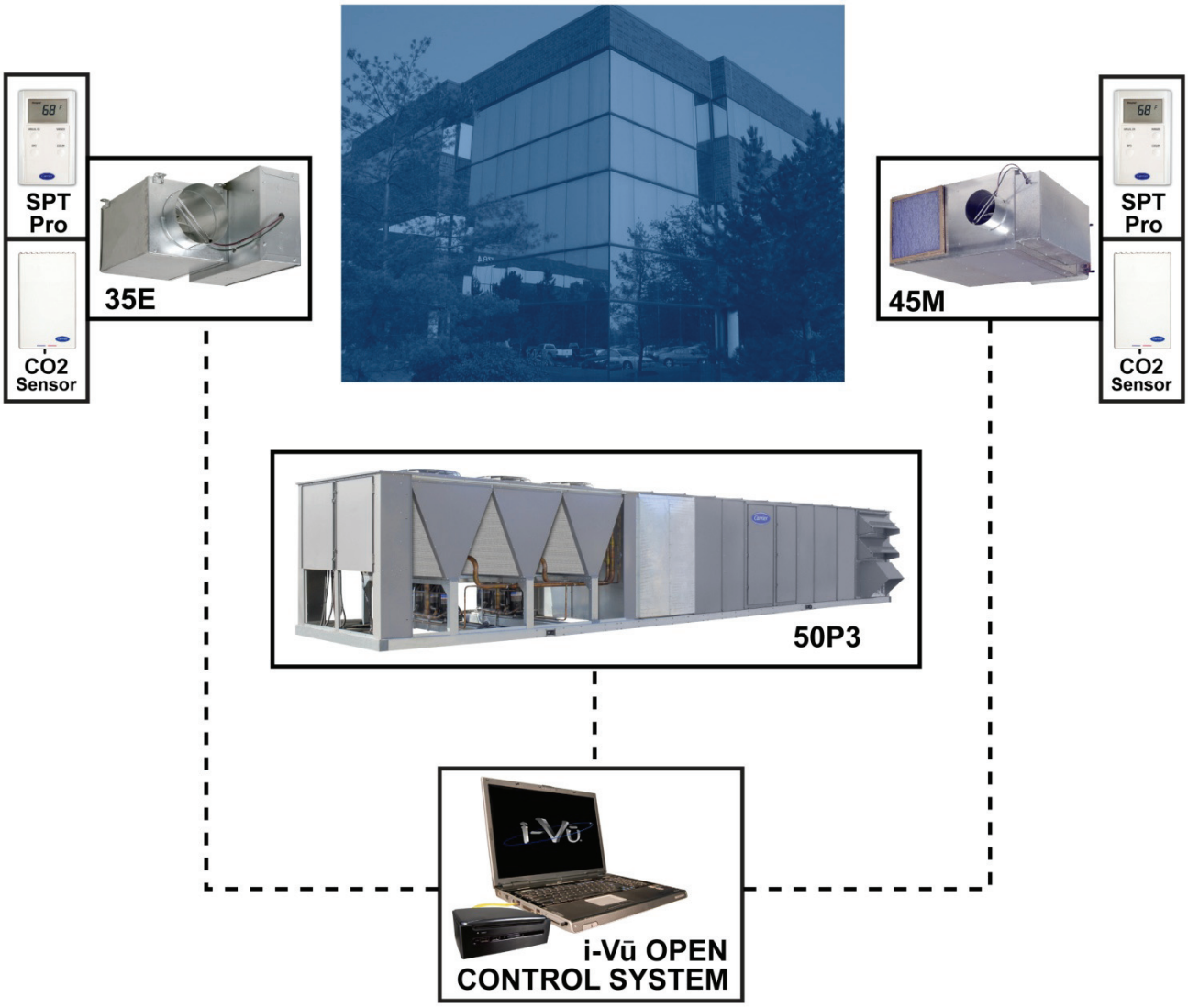
IEQ Credit 7.1 – Thermal Comfort: Design

- Adjustable airflow minimums with heating capability maintain comfort and minimum air change requirements
- Capable of zone humidity monitoring and control (dehumidification) with field-installed humidity sensor
- Combination space temperature and humidity sensor to maintain ASHRAE 55 thermal comfort criteria

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Variable Air Volume (VAV) DX Outdoor Packaged Rooftop Unit System
Carrier Products – System Diagram



System Description

The variable air volume packaged rooftop system consists of a DX packaged unit serving a number of spaces or groups of spaces.

- A VAV terminal in each space controls the volume of air to the space in response to a room sensor. Unit controls maintain a constant leaving air temperature while sensors in the space modulate a damper in the terminals units to vary the volume of air to meet the space load.
- Indoor fan will run continuously during the occupied period. The unit may have a warm-up cycle at the start of the occupied period, however, when the unit enters cooling it remains in cooling for the rest of the occupied period.
- Heating coils (electric or hot water) in the terminal provide for heating during the occupied period. When 45 Series fan-powered boxes are used, the first stage of heat is provided by recirculated air from the return plenum. In the unoccupied period the unit will heat or cool and the fan will cycle as required.
- Units consist of the indoor fan, multi-stage DX air conditioning system and heating section. Units may be roof or slab mounted as required for the installation. The unit heating section may be gas or electric.
- The unit can be connected through network controls to provide remote monitoring and control and integration with other units. Units can be equipped with economizers, heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Variable Air Volume (VAV) DX Outdoor Packaged Rooftop Unit System
Carrier Products – Contributions to LEED Certification

50P3 Packaged Rooftop

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiency levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- High efficiency digital scroll compressors with two-stage unloading provide up to 8 steps of cooling capacity control for excellent part load control and increased efficiency
- Integrated outdoor air economizer with outdoor air hood, ultra low-leakage dampers and integrated compressor operation for lower energy consumption
- Premium-efficiency fan motors for low energy consumption
- VFD supply fan duct pressure control on VAV models to minimize fan energy consumption
- ComfortLink™ controls for demand limiting to reduce building peak energy consumption
- Reset supply air temperature control to reduce energy consumption
- Demand controlled ventilation (DCV) compatible

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)
- Novation® heat exchanger technology with microchannel condenser coils with refrigerant charge of <1.98 lb/ton charge

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements
- Integrated outdoor air economizer to allow ASHRAE 62.1 ventilation rates and exhaust control options

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- ComfortLink controls with outdoor airflow monitoring station
- IAQ function provides DCV for ventilation air quantity with modulating outside air damper position proportional to the space CO_2 levels
- ComfortLink controls with space CO_2 sensing capability

IEQ Credit 2 – Increased Ventilation

- Optional high-capacity modulating power exhaust and integrated economizer for higher space exhaust requirements on 75 to 100 ton units
- Integrated outdoor air economizer with outdoor air hood, ultra low-leakage dampers and integrated compressor operation for increased ventilation capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Optional 22-in. deep bag filters (30 to 70 ton units) or angle filter track can be field-modified to accept 4-in. deep filters for MERV 13 or better filtration

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple stage evaporator discharge temperature (EDT) control modulates the system capacity to maintain the supply air temperature within ASHRAE 55 thermal comfort criteria
- Intertwined evaporator coils for full-face active operation at part load conditions to maintain accurate supply air temperatures
- ComfortLink controls with space temperature sensor (SPT) to maintain zone dry-bulb temperature within ASHRAE 55 thermal comfort criteria
- Humidi-MiZer® adaptive dehumidification system for common subcooling/hot gas reheat dehumidification for maximum system control
- Space humidity sensor enables Humidi-MiZer control to maintain ASHRAE 55 thermal comfort criteria

35E, 45M

EA Credit 1 – Optimize Energy Performance

- Reduced fan energy with variable air volume (VAV) terminal
- Demand controlled ventilation (DCV) compatible
- Linear, multiple-point, averaging velocity sensor for accurate modulation of supply air to each zone
- Low leakage damper blade has a flexible gasket for tight airflow shutoff
- Electric or hot water reheat coils (factory-installed option) with controls minimize heating excess heating of ventilation air
- Electric heat (1 to 3 stages) or proportional heat (factory-installed option) for precise temperature control
- 45M parallel fan powered units that draw primary air from the air unit and warm air from the return plenum to satisfy zone temperature requirements
- 45 Series ECM (electronically commutated motor) fan motors available on some sizes

IEQ Prerequisite 1 – Minimum IAQ Performance

- Minimum ventilation control to comply with ASHRAE 62.1
- IAQ sensor input allows override of ventilation
- Many linings available to meet all IAQ (indoor air quality) designs

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

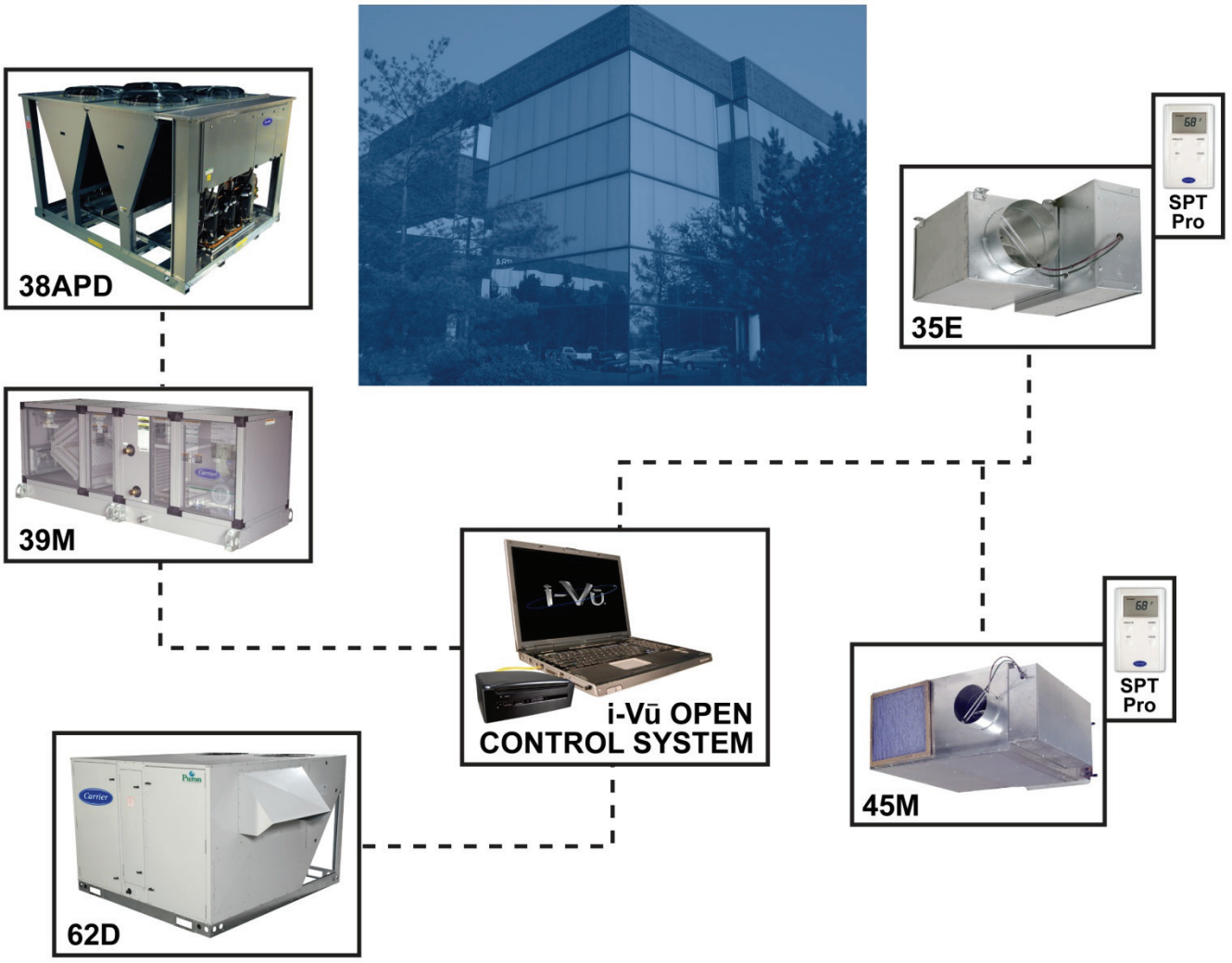
- Wide range of sizes down to 45 CFM provide comfort control for small spaces

IEQ Credit 7.1 – Thermal Comfort: Design

- Adjustable airflow minimums with heating capability maintain comfort and minimum air changes
- Capable of zone humidity monitoring and control (dehumidification) with field-installed humidity sensor
- Combination space temperature and humidity sensor to maintain ASHRAE 55 thermal comfort criteria

i-Vu Open Control System – See page 19

Variable Air Volume (VAV) DX Split System
Carrier Products – System Diagram



Variable Air Volume (VAV) DX Split System
System Description

The variable air volume (VAV) split system consists of a condensing unit located outdoors and an air handler located indoors connected by refrigerant piping.

- Ventilation air is provided through the air handler or through a dedicated ventilation unit, such as the 62D unit shown here.
- A VAV terminal in each space controls the volume of air to the space in response to a room sensor.
- Unit controls maintain a constant leaving air temperature while sensors in the space modulate a damper in the terminals units to vary the volume of air to meet the space load.
- Indoor fan will run continuously during the occupied period. The unit may have a warm-up cycle at the start of the occupied period, however when the unit enters cooling it remains in cooling for the rest of the occupied period.
- Heating coils (electric or hot water) in the terminal provide for heating during the occupied period. When 45 Series fan-powered boxes are used, the first stage of heat is provided by recirculated air from the return plenum. In the unoccupied period, the unit will heat or cool and the fan will cycle as required.
- Condensing unit contains the condenser and compressor and the air handler contains the indoor fan. The air handler may contain a heating coil for preheat and warm-up which may be from hot water, steam, or electric heat or a gas furnace.
- Dedicated outdoor air unit provides heating and cooling to condition the ventilation air to a neutral temperature as compared to space temperature.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units. Air handlers can be equipped with economizers, heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

VAV DX Split System
Carrier Products – Contributions to LEED Certification

38APD Split System Condensing Unit

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- EER up to 11.5 and IPLV up to 15.7 for low energy consumption during full and part load operation
- Optional digital scroll compressors for incremental unloading down to 5% of nominal capacity for to better

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Continued on next page

62D Dedicated Outdoor Air Unit

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- Minimizes energy consumption through dedicated outdoor air system with energy recovery
- AHRI certified energy (enthalpy) wheel in accordance with AHRI Standard 1060 for increased energy recovery and low energy consumption for 100% outdoor air systems
- Optional Digital Scroll™ modulating compression technology increases part load efficiencies reduces energy consumption
- VFD controlled fan motor matches fan speed with CO_2 (DCV) or delivery pressure needs for reduced fan energy consumption
- Liquid sub-cooling coil for improved cycle efficiencies and lower energy consumption
- Modulating hot gas reheat (HGRH) minimizes demand of electric heating coils while improving refrigeration cycle efficiencies
- SCR controlled electric heat matches coil output to heating

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the energy recovery unit
- Complies with ASHRAE 62.1 construction requirements

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Dedicated ventilation to each space provides ASHRAE minimum ventilation without the need to compensate for system effectiveness

IEQ Credit 2 – Increased Ventilation

- VFD driven supply and exhaust fans for mechanical ventilation rates 30% higher than ASHRAE 62.1 minimum levels

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with MERV 14 filter media

IEQ Credit 7.1 – Thermal Comfort: Design

- Microprocessor based controls to maintain fixed supply air dry-bulb temperature within ASHRAE 55 design comfort criteria
- Active mechanical conditioning of ventilation air within comfort conditions

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air handling unit

IEQ Credit 1– Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu open control system and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

Continued on next page

35E, 45M

EA Credit 1 – Optimize Energy Performance

- Reduced fan energy with variable air volume (VAV) terminal
- Demand controlled ventilation (DCV) compatible
- Linear, multiple-point, averaging velocity sensor for accurate modulation of supply air to each zone
- Low-leakage damper blade has a flexible gasket for tight airflow shutoff
- Electric or hot water reheat coils (factory-installed option) with controls minimize heating excess heating of ventilation air
- Electric heat (1 to 3 stages) or proportional heat (factory-installed option) for precise temperature control
- 45M parallel fan-powered units that draw primary air from the air unit and warm air from the return plenum to satisfy zone temperature requirements
- 45 Series ECM (electronically commutated motor) fan motors available on some sizes

IEQ Prerequisite 1 – Minimum IAQ Performance

- Minimum ventilation control to comply with ASHRAE 62.1
- IAQ sensor input allows override of ventilation
- Many linings available to meet all IAQ (indoor air quality) designs

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Wide range of sizes down to 45 cfm provide comfort control for small spaces

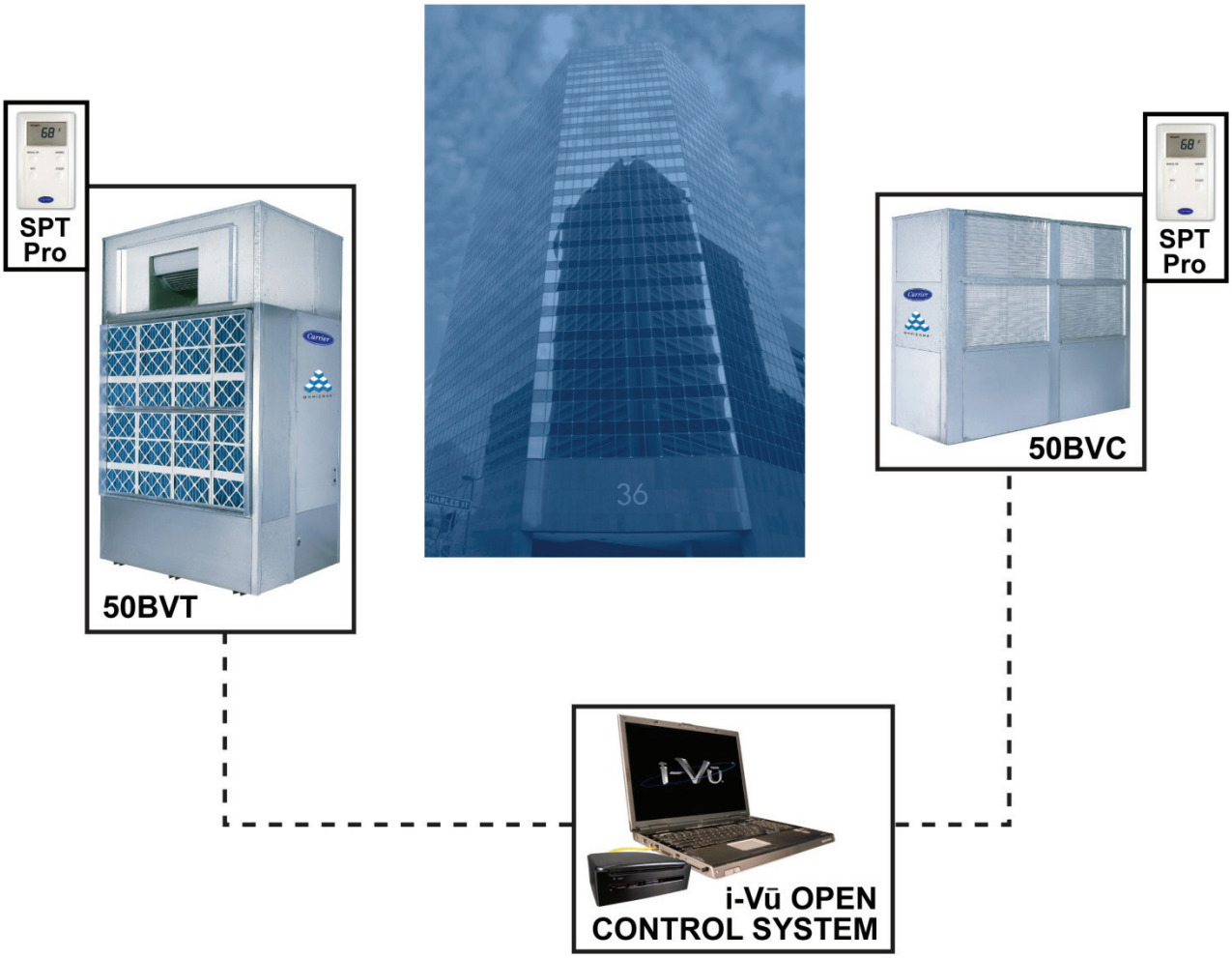
IEQ Credit 7.1 – Thermal Comfort: Design

- Adjustable airflow minimums with heating capability maintain comfort and minimum air changes
- Capable of zone humidity monitoring and control (dehumidification) with field-installed humidity sensor
- Combination space temperature and humidity sensor to maintain ASHRAE 55 thermal comfort criteria

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Constant Volume DX Indoor Packaged Unit System
Carrier Products – System Diagram



System Description

Constant volume DX indoor packaged unit systems consist of a DX packaged unit located inside the building that serves a single space or group of spaces with similar thermal characteristics.

- Units may be water-cooled, air-cooled with integral condenser, or air-cooled using a remote condenser.
- Units include the indoor fan system, a complete cooling system (except for the condenser in air-cooled split units), and may include a heating section. The heating section may be hot water, steam, electric, or heat pump.
- During occupied periods the fan provides constant air volume and is cycled with the heat during unoccupied periods. A sensor in the space cycles the cooling and heating to meet space requirements.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units. Units can be equipped with economizers, heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Constant Volume DX Indoor Packaged Unit System
Carrier Products – Contributions to LEED Certification

50BVT, 50BVC Indoor Packaged Units

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- High cooling efficiencies up to 14.8 EER for low energy consumption
- Water-side economizer for reduced energy consumption
- Hot-gas reheat to improve cycle efficiencies and minimize energy consumption
- Demand controlled ventilation (DCV) compatible

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron refrigerant (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements
- Ventilation air control with optional airside economizer

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Economizer options for increased outdoor air capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- 4-in. wide filter track suitable for MERV 14 filter media

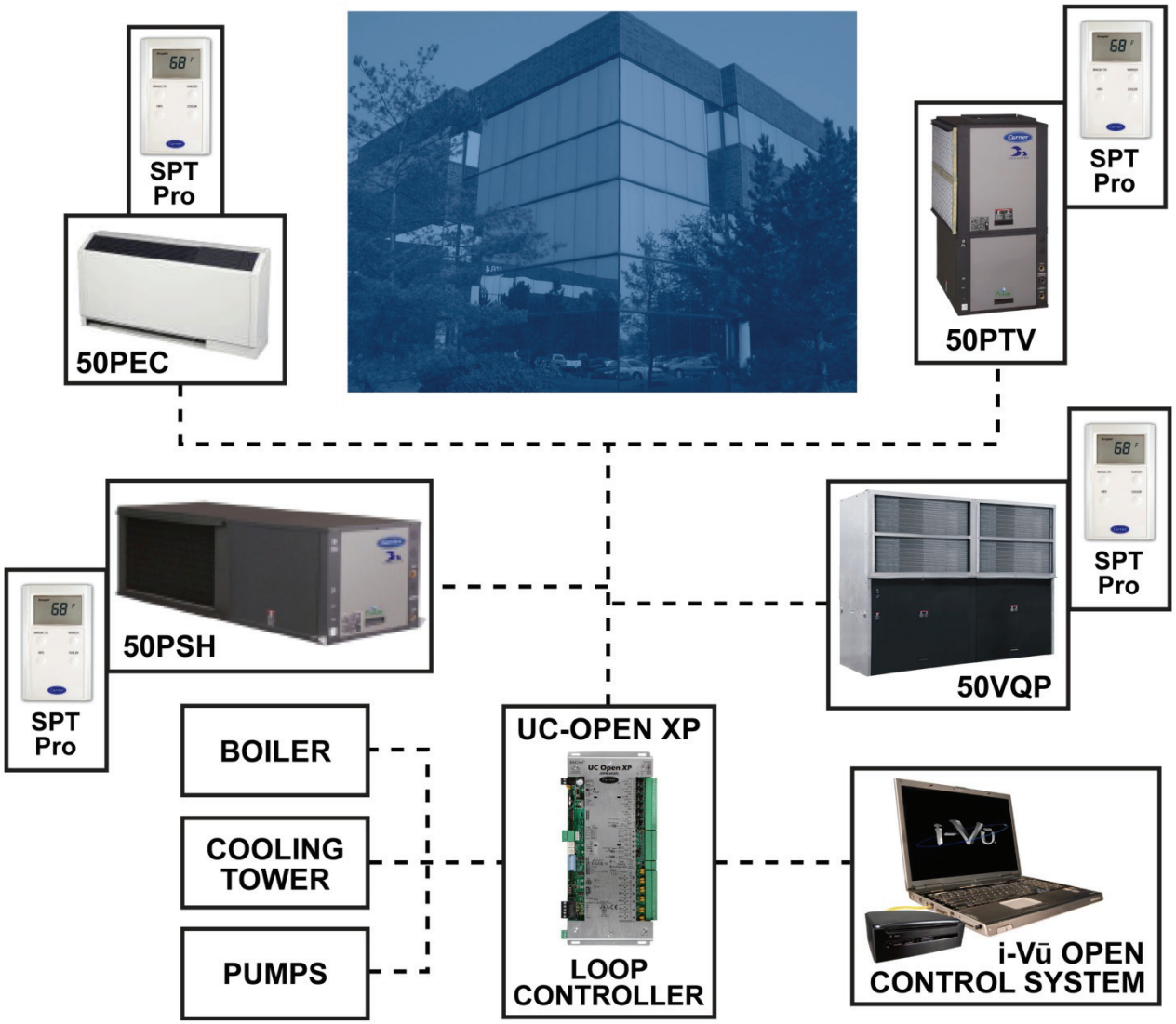
IEQ Credit 7.1 – Thermal Comfort: Design

- Demand controlled ventilation (DCV) compatible
- Hot-gas reheat for indoor humidity control to meet ASHRAE 55 thermal comfort criteria
- Unit mounted controls to maintain zone dry-bulb temperature within ASHRAE 55 thermal comfort criteria

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Constant Volume Boiler-Tower Loop Water Source Heat Pump (WSHP) System
Carrier Products – System Diagram



System Description

The boiler-tower loop water source heat pump system consists of a packaged water source heat pump (WSHP) located in or near each conditioned zone.

- A space sensor cycles the unit to provide reverse cycle heating and DX cooling as required by the zone.
- Units are connected by a condenser water piping system and the WSHP units reject or absorb heat from the water loop. This allows heat from spaces requiring cooling to be transferred to spaces requiring heating. A cooling tower provides heat rejection capability when the loop has excess heat and a boiler provides heat when the loop has insufficient heating capacity.
- The operation of the loop pumps, boiler, and cooling tower is controlled through a loop control panel. System network controls allow centralized control, data trending and alarm indication along with integration to other building systems.
- Additional options may provide humidity control through condenser reheat coils and water-side economizers can provide integrated free cooling.
- Ventilation air is brought directly to the unit to be mixed with return air or a separate dedicated outdoor air ventilation air system (DOAS) provides partially conditioned air to each zone.
- Units may be horizontal, vertical, console, vertical stack or rooftop.
- Units are normally constant volume except in larger sizes which may be VAV.

Constant Volume Boiler-Tower Loop Water Source Heat Pump (WSHP) System
Carrier Products – Contributions to LEED Certification

50PEC, PTV, PSH, VQP Water Source Heat Pump (WSHP) Units

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- EERs to 18.3, COP to 6.3, ENERGY STAR certified
- Individual zone heating and cooling without excess energy consumption
- System moves energy from zones with excess heat to zones needing heat
- Two-stage capacity control on units with capacity of 7 tons or greater
- Two-stage unloading scroll compressor (50PT) provides excellent part load control and increased efficiency
- Integrally controlled motor (ICM) and electronically commutated motor (ECM) fan motors reduce fan energy at start-up and during normal operation
- Optional 2-way water-side control valve to support variable flow pumping system for reduced pumping energy
- Equipped with performance monitor to ensure efficient heat pump operation
- Demand controlled ventilation (DCV) compatible

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Demand controlled ventilation (DCV) compatible

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Optional 2- in. filter tracks for MERV 8 and MERV 13 filters

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Small incremental capacity ranges starting at 1/2 ton (50PS), 2 tons (50PT), and 3/4 ton (50PEC) to allow each space to be controlled by a single heat pump unit

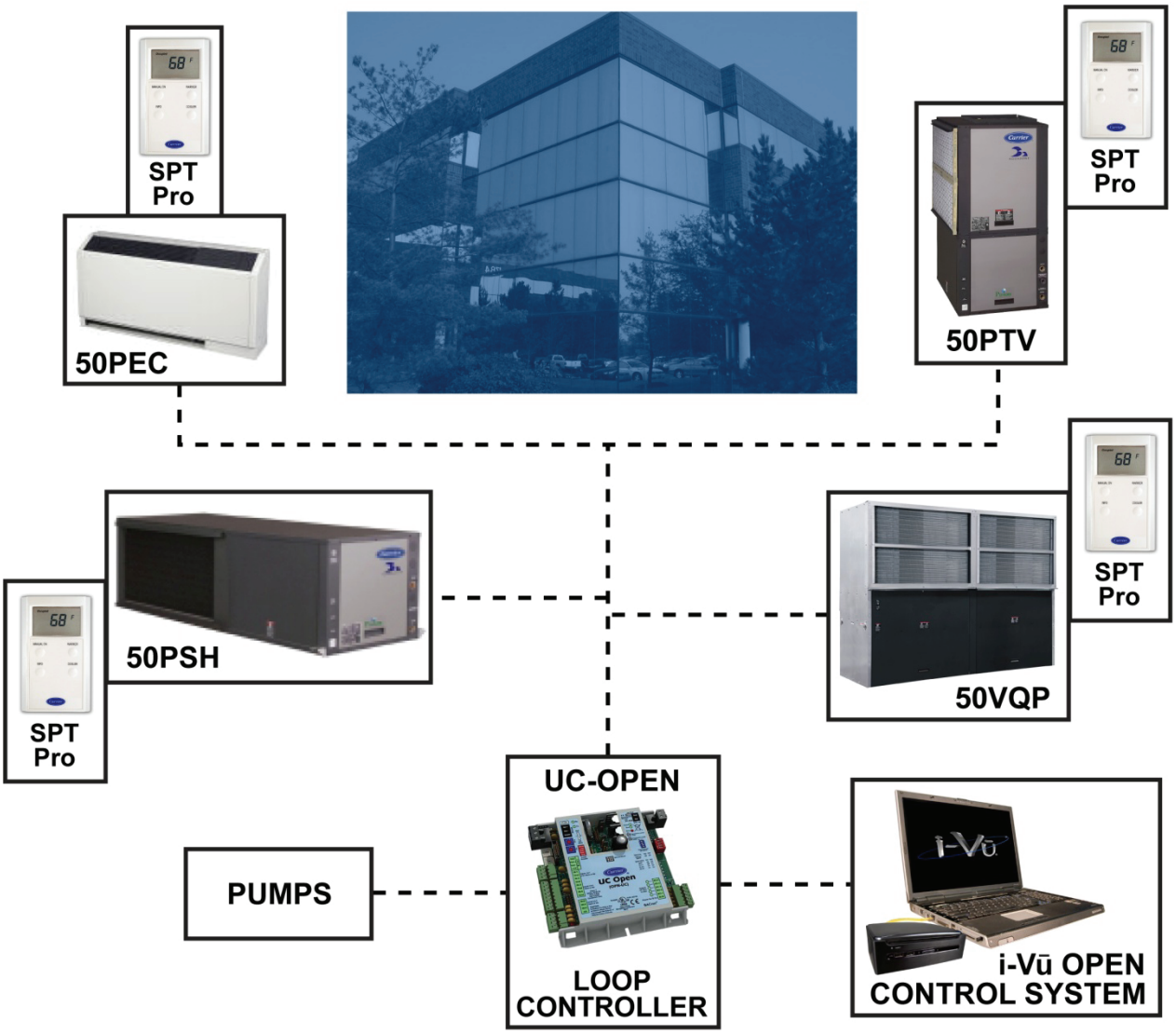
IEQ Credit 7.1 – Thermal Comfort: Design

- Microprocessor based controls to maintain zone dry-bulb temperature within ASHRAE 55 design comfort criteria
- Optional modulating hot water reheat (HWR on 50PS, 50PT) for dehumidification capability to meet ASHRAE 55 thermal comfort criteria
- Optional ECM equipped units (50PS, 50PT) with modulating hot water reheat and RH zone sensor to control zone relative humidity levels within ASHRAE 55 comfort criteria
- Demand controlled ventilation (DCV) compatible

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Constant Volume Ground Source DX Water Source Heat Pump (WSHP) System
Carrier Products – System Diagram



System Description

The constant volume ground source heat pump system consists of a packaged water source heat pump (WSHP) located in or near each conditioned zone.

- A space sensor cycles the unit to provide reverse cycle heating and DX cooling as required by the zone.
- Units are connected by a condenser water piping system which is connected to a piping loop buried in the ground. The ground temperature below the frost line remains nearly constant, providing a very efficient source and sink for thermal energy.
- The WSHP units reject or absorb heat from the water loop. This allows heat from spaces requiring cooling to be transferred to spaces requiring heating. The ground provides heat rejection capability when the loop has excess heat and provides heat when the loop has insufficient heating capacity.
- The operation of the loop pumps is controlled through a loop control panel. System network controls allow centralized control, data trending and alarm indication along with integration to other building systems. Additional options may provide humidity control through condenser reheat coils and waterside economizers can provide integrated free cooling.
- Ventilation air is brought directly to the unit to be mixed with return air or a separate dedicated outdoor air ventilation air system (DOAS) provides partially conditioned air to each zone.
- Units may be horizontal, vertical, console, vertical stack or rooftop.
- Units are normally constant volume except in larger sizes which may be VAV.

Constant Volume Ground Source DX Water Source Heat Pump (WSHP) System
Carrier Products – Contributions to LEED Certification

50PEC, PTV, PSH, VQP Water Source Heat Pump (WSHP) Units

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- Extended operating range from 20 to 110 F to eliminate boiler and tower energy
- High cooling efficiencies up to 27.4 EER (50PS); 24.5 full load EER and 31.5 part load EER (50PT); and 21.3 EER (50PEC) for low energy consumption
- High heating efficiencies up to 5.1 COP (50PS); 4.7 full load and 5.1 part load COP (50PT); and 4.3 COP (50PEC)
- Individual zone heating and cooling without excess energy consumption
- System moves energy from zones with excess heat to zones needing heat
- Two-stage capacity control on units with capacity of 2 tons or greater
- Two-stage unloading scroll compressor (50PT) provides excellent part load control and increased efficiency
- Integrally controlled motor (ICM) and electronically commutated motor (ECM) fan motor reduced fan energy at start-up and during normal operation
- Optional 2-way water-side control valve to support variable flow pumping system for reduced pumping energy
- Equipped with performance monitor to ensure efficient heat pump operation
- Demand controlled ventilation (DCV) compatible

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Demand controlled ventilation (DCV) compatible

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Optional 2 in. filter tracks for MERV 8 and MERV 13 filters

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Small incremental capacity ranges from 1/2 ton (50PS), 2 tons (50PT), 3/4 ton (50PEC) to allow each space to be controlled by a single heat pump unit

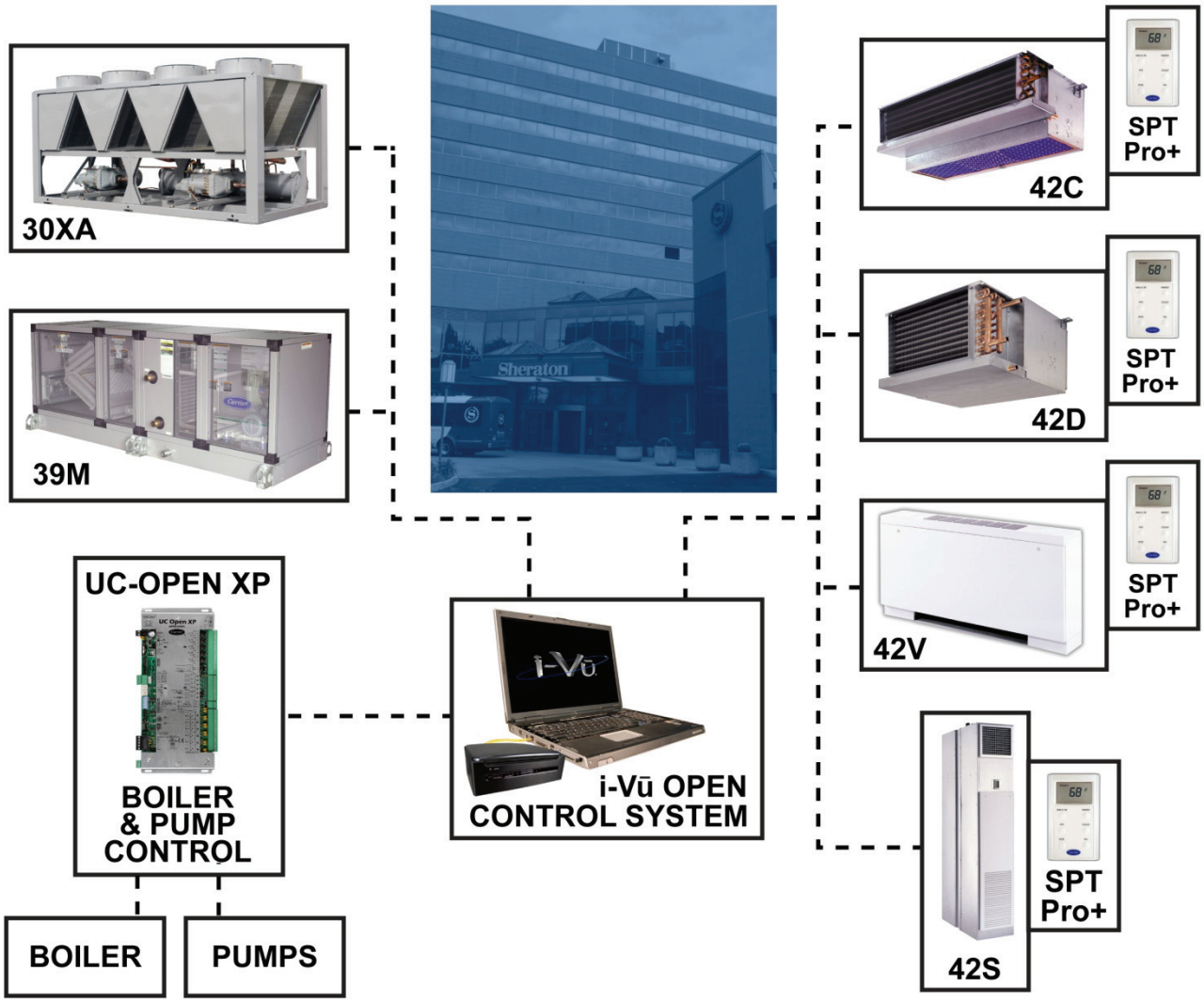
IEQ Credit 7.1 – Thermal Comfort: Design

- Microprocessor based controls to maintain zone dry-bulb temperature within ASHRAE 55 design comfort criteria
- Optional modulating hot water reheat (HWR on 50PS, 50PT) for dehumidification capability to meet ASHRAE 55 thermal comfort criteria
- Optional ECM equipped units (50PS, 50PT) with modulating hot water reheat and RH zone sensor to control zone relative humidity levels within ASHRAE 55 comfort criteria
- Demand control compatible

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Constant Volume Chilled Water Fan Coil System
Carrier Products – System Diagram



System Description

Constant volume chilled water fan coil systems consist of a 2-pipe or 4-pipe fan coil unit located inside each space.

- A sensor in the space cycles the fan coil, using either water valve or fan speed to control the heating and cooling to meet space requirements.
- On 2-pipe systems the fan coils are connected to the boiler and chiller by one set of pipes and the system is either in cooling or in heating mode depending on a schedule. The same coil in the unit is used for both heating and cooling.
- On 4-pipe systems a separate set of pipes connects the fan coils to the boiler and to the chiller. The fan coil has a separate coil for heating and for cooling.
- Ventilation air is provided through a wall box on the fan coil unit or, as shown here, by an air handler which provides neutral temperature ventilation air to each space. Fan coils provided the indoor fan system.
- Chillers can be water-cooled or air-cooled as required by the project.
- During occupied periods the fan provides constant air volume or the fan is cycled between speeds depending on type of coil control used. During unoccupied periods when valve control is used the fan will run intermittently to provide heating or cooling.
- Unit can be connected through network controls to provide remote monitoring and control and integration with other units. Air handlers, when used, can be equipped with heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort. (As an example, the 39M unit is shown in this system.)

Constant Volume Chilled Water Fan Coil System
Carrier Products – Contributions to LEED Certification

30XA Packaged Air-Cooled Chiller

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 134a – no CFCs

EA Credit 1 – Optimize Energy Performance

- Full-load EER values up to 10.9
- IPLV values up to 15.4
- High-efficiency screw compressors
- Minimum of 2 independent refrigerant circuits assure increased efficiency and reliability
- Energy Management Module minimizes chiller energy consumption
- Hydronic pump package with VFD (variable frequency drive) compatibility on unit with nominal capacities of 90-160 tons
- Minimum load control
- Wye-delta starter reduces inrush current demand
- EXV (electronic expansion valve) controls to minimum superheat improving system efficiency
- Chillervisor System Manager III multi-unit control for efficient operation on systems with multiple chillers

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free R-134a refrigerant
- Novation® microchannel heat exchanger (MCHX) condenser coils reduce refrigerant charge

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air-handling unit

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu® open control system and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

42D, 42V, 42S, 42C

EA Credit 1 – Optimize Energy Performance

- Valve and control packages allow matching capacity to room load conditions without increased energy consumption
- 2-pipe or 4-pipe system combinations to match building loads
- 3-speed fans match load requirements with reduced fan energy

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements
- 1-in. MERV 8 filters

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Airflow capacities from 600 to 2000 cfm to allow each space to be controlled by a single fan coil unit

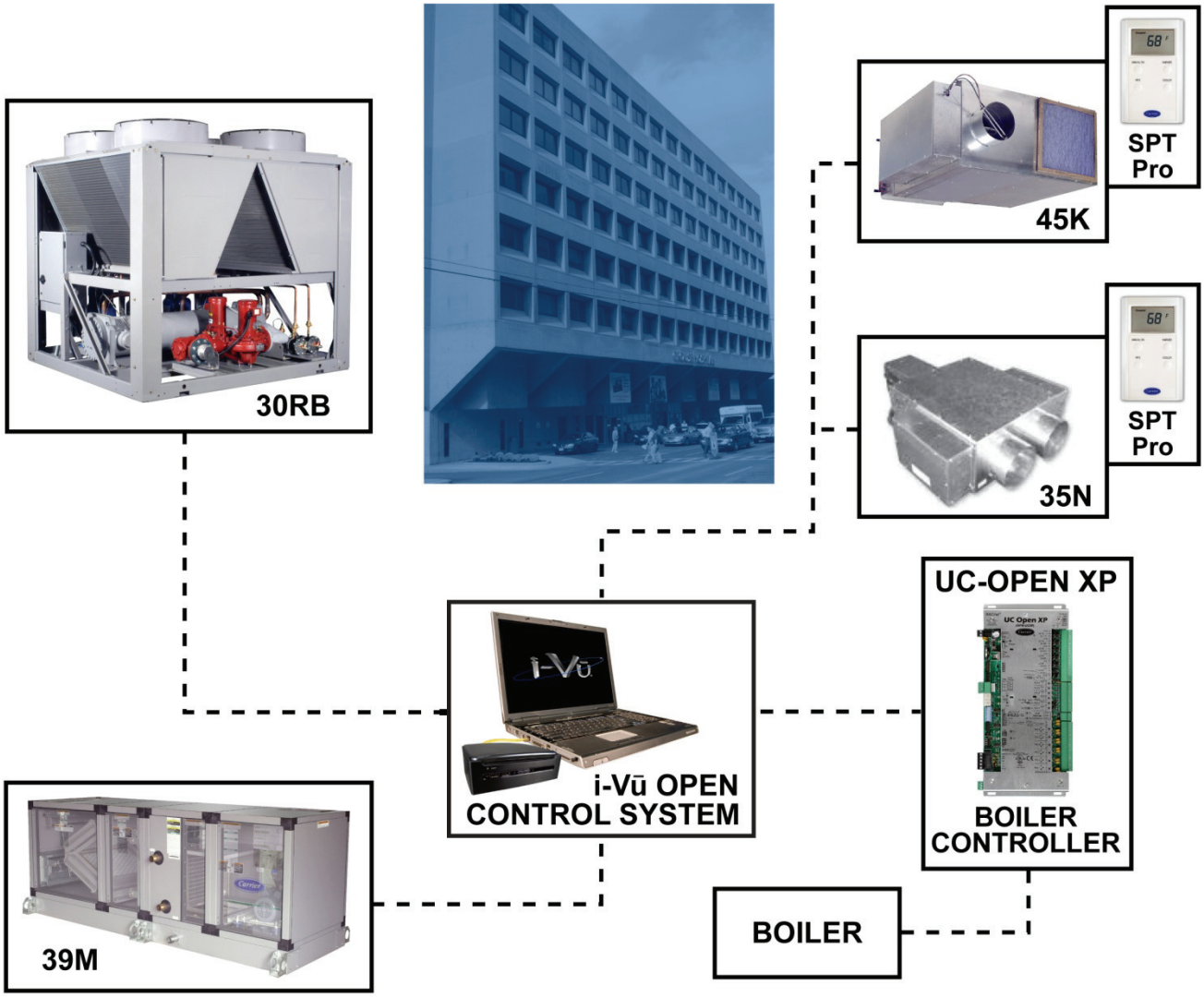
IEQ Credit 7.1 – Thermal Comfort: Design

- Individual unit control regulates temperature in each space provides comfort control in compliance with ASHRAE 55 requirements
- 3-speed fans control airflow to meet comfort conditions

i-Vu Open Control System – See page 19

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Constant Volume Chilled Water System
Carrier Products – System Diagram



System Description

Constant volume chilled water systems consist of chilled water air handlers supplying air to terminal units for each space.

- A sensor in the space modulates dampers in the terminal box to control the amount of primary air from the air handler to control the cooling capacity.
- In a double duct terminal the hot or neutral damper opens as the primary air damper closes mixing air supplied to the space so that the volume of air to the space is constant. With series fan powered terminals the fan in the terminal pulls air from the ceiling plenum and mixes it with the primary air so that the air supplied to the space is constant.
- Indoor fan in the air handler will run continuously during the occupied period. The unit may have a warm-up cycle at the start of the occupied period, however when the unit enters cooling it remains in cooling for the rest of the occupied period.
- Heating coils, electric or hot water in the terminal provide for heating during the occupied period.
- Chillers can be water-cooled or air-cooled as required by the project. During occupied periods the system provides constant air volume to the space. During unoccupied periods the fan will run intermittently to provide heating or cooling.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units. Air handlers, when used can be equipped with heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Constant Volume Chilled Water System
Carrier Products – Contributions to LEED Certification

30RB Air-Cooled Packaged Chiller

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- Full-load EER up to 9.7 and IPLV up to 14.2 for low energy consumption during full and part load operation
- Full heat reclaim option to lower overall building energy consumption significantly, producing simultaneous chilled and tempered hot water for total COP (coefficient of performance) values of 6.0 or greater
- Multiple scroll compressors and 3600-step electronic expansion valve provide excellent part load control
- AeroAcoustic™ fan system provides quiet fan operation with low condenser fan horsepower
- Energy management module (EMM) provides remote demand limiting ability to reduce building peak energy consumption
- Microprocessor-based Product Integrated Control (PIC) III controls with leaving chilled water temperature control to ensure accurate chilled water temperatures for precise sensible and latent cooling capability

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air handling unit

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu open control system and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

35N, 45K

EA Credit 1 – Optimize Energy Performance

- Demand controlled ventilation (DCV) compatible
- Linear, multiple-point, averaging velocity sensor for accurate modulation of supply air to each zone
- Low leakage damper blade has a flexible gasket for tight airflow shutoff
- Electric or hot water reheat coils (factory-installed option) with controls minimize heating excess heating of ventilation air
- Electric heat (1 to 3 stages) or proportional heat (factory-installed option) for precise temperature control
- 45K series fan powered units that draw primary air from the air unit and warm air from the return plenum to satisfy zone temperature requirements while maintaining constant room airflow
- 45 Series ECM (electronically commutated motor) fan motors available on some sizes

IEQ Prerequisite 1 – Minimum IAQ Performance

- Minimum ventilation control to comply with ASHRAE 62.1
- IAQ sensor input allows override of ventilation
- Many linings available to meet all IAQ (indoor air quality) designs

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

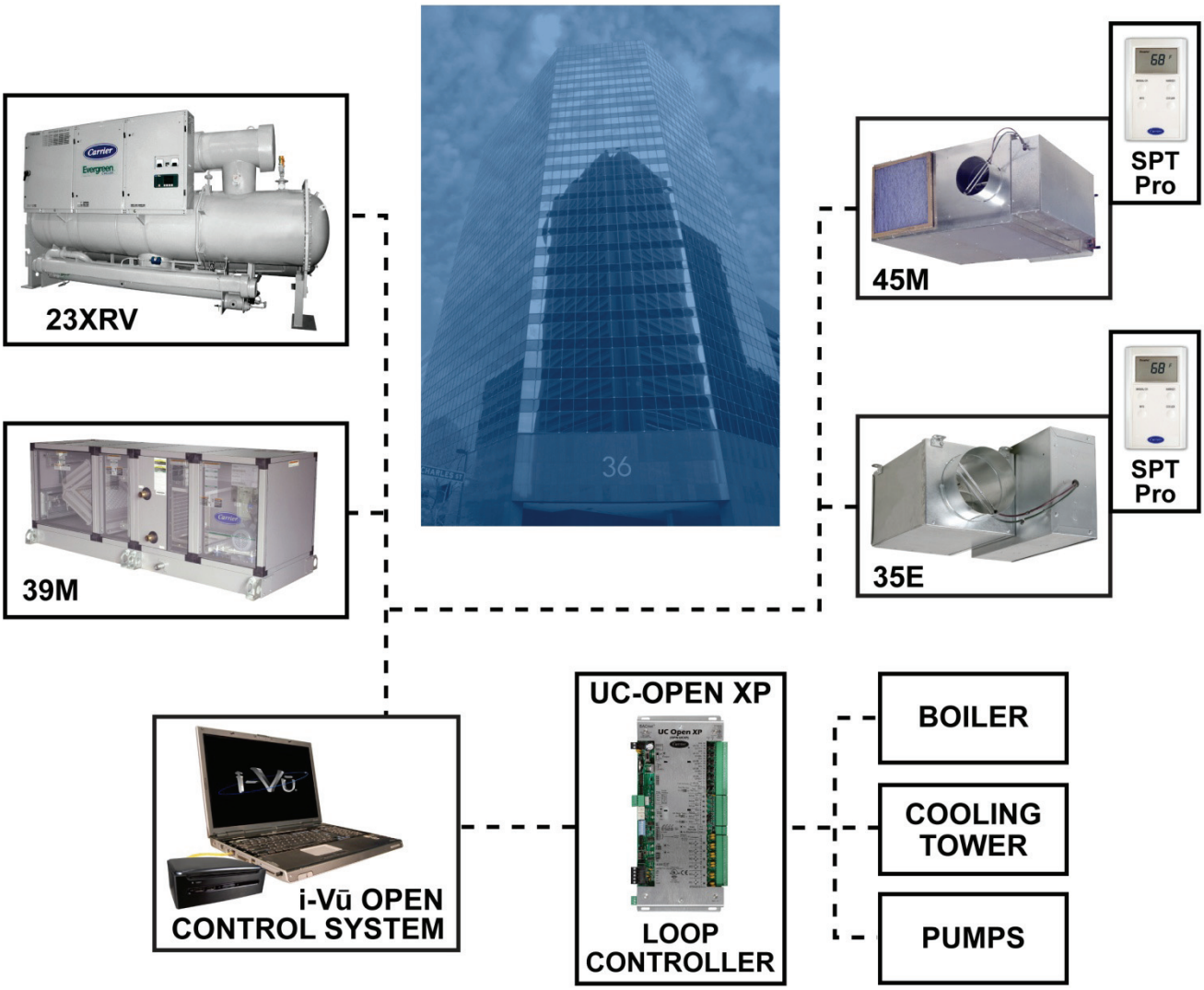
- Wide range of sizes down to 45 cfm provide comfort control for small spaces

IEQ Credit 7.1 – Thermal Comfort: Design

- Adjustable airflow minimums with heating capability maintain comfort and minimum air changes
- Capable of zone humidity monitoring and control (dehumidification) with field-installed humidity sensor
- Combination space temperature and humidity sensor to maintain ASHRAE 55 thermal comfort criteria
- Constant airflow in the space results in more uniform air motion and temperature conditions improving comfort

i-Vu Open Control System – See page 19

Variable Air Volume (VAV) Chilled Water System
Carrier Products – System Diagram



System Description

The variable air volume chilled water systems consist of chilled water air handlers supplying air to terminal units for each space.

- Cooling is provided by chilled water supplied by a chiller and heating is provided by hot water or steam from a boiler or electric heating coils.
- A VAV terminal in each space controls the volume of air to the space in response to a room sensor. The unit controls maintain a constant leaving air temperature while sensors in the space modulate a damper in the terminals units to vary the volume of air to meet the space load.
- Indoor fan will run continuously during the occupied period. The unit may have a warm-up cycle at the start of the occupied period, however when the unit enters cooling it remains in cooling for the rest of the occupied period.
- Heating coils (electric or hot water) in the terminal provide for heating during the occupied period.
- When 45 Series fan-powered boxes are used, the first stage of heat is provided by recirculated air from the return plenum. In the unoccupied period the unit will heat or cool and the fan will cycle as required.
- Air handler may contain a heating coil for preheat and warm-up which may be from hot water, steam, or electric heat or a gas furnace.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units. Air handlers, when used can be equipped with heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Variable Air Volume (VAV) Chilled Water System
Carrier Products – Contributions to LEED Certification

23XRV Variable Speed Screw Chiller

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 134a – no CFCs

EA Credit 1 – Optimize Energy Performance

- Integrated variable speed compression technology with an IPLV as low as 0.33 kW/ton for low energy consumption during part load operation
- Internally/externally enhanced 0.025 in. (0.635 mm) copper tubing heat exchangers for exceptional full load efficiency as low as 0.53 kW/ton
- Refrigerant-cooled, unit-mounted variable frequency drive for efficient part load operation to match building loads
- Operation of up to 0.99 power factor to minimize electrical costs
- Microprocessor-based Product Integrated Control (PIC) III allows series counter-flow dual chiller operation for up to 10% reduction in energy consumption
- Demand limiting capability with Carrier Comfort Network® (CCN) communication link to reduce peak kW
- Variable cooler flow capability to allow variable primary flow applications for reduce pump energy
- Full load EER values up to 10.9
- Chillervisor System Manager III multi-unit control for efficient operation on systems with multiple chillers

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free R-134a refrigerant

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air handling unit

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu open control system and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

35E, 45M

EA Credit 1 – Optimize Energy Performance

- Reduced fan energy with variable air volume (VAV) terminal
- Demand controlled ventilation (DCV) compatible
- Linear, multiple-point, averaging velocity sensor for accurate modulation of supply air to each zone
- Low-leakage damper blade has a flexible gasket for tight airflow shutoff
- Electric or hot water reheat coils (factory-installed option) with controls minimize heating excess heating of ventilation air
- Electric heat (1 to 3 stages) or proportional heat (factory-installed option) for precise temperature control
- 45M parallel fan-powered units that draw primary air from the air unit and warm air from the return plenum to satisfy zone temperature requirements
- 45 Series ECM (electronically commutated motor) fan motors available on some sizes

IEQ Prerequisite 1 – Minimum IAQ Performance

- Minimum ventilation control to comply with ASHRAE 62.1
- IAQ sensor input allows override of ventilation
- Many linings available to meet all IAQ (indoor air quality) designs

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

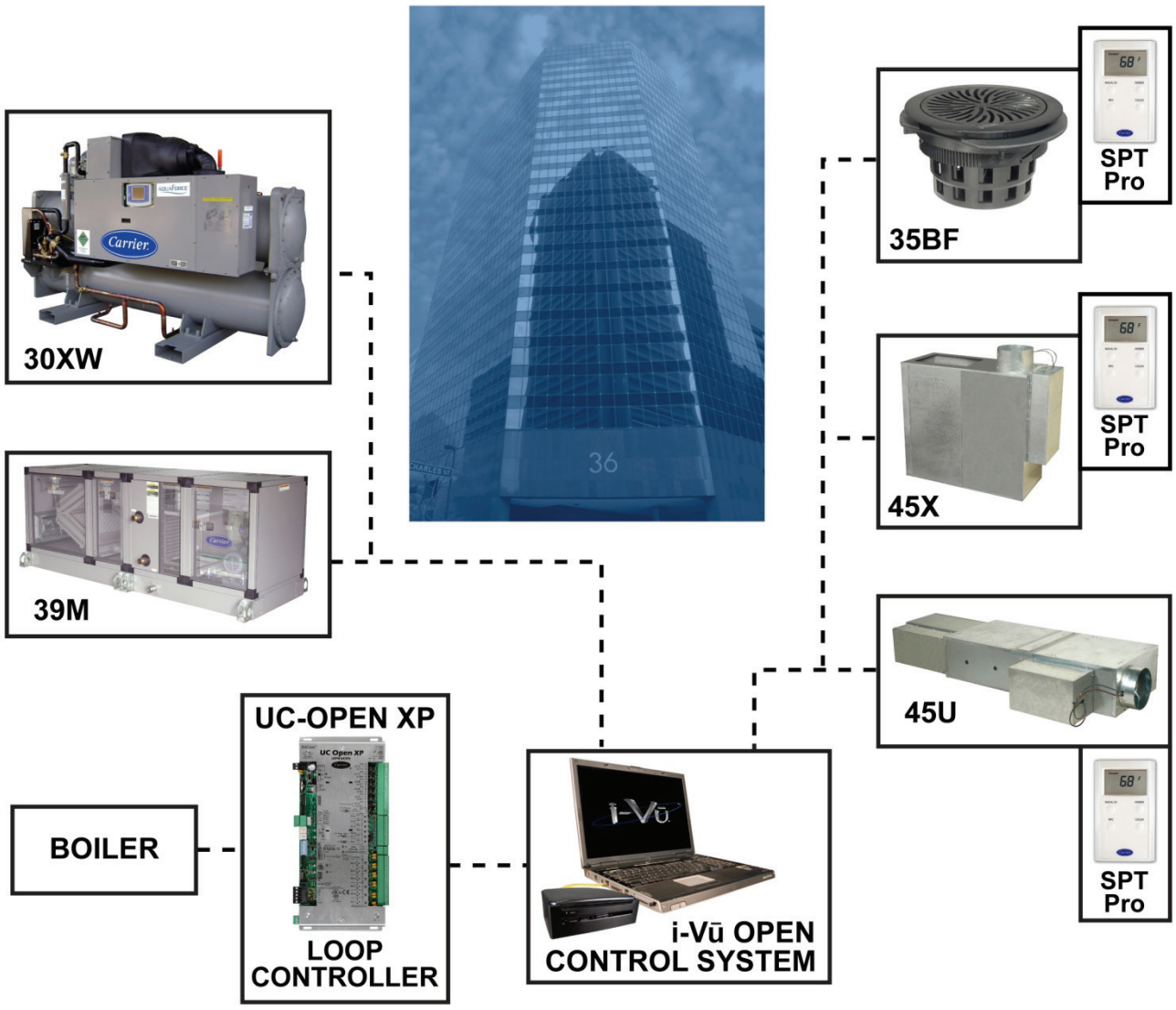
- Wide range of sizes down to 45 cfm provide comfort control for small spaces

IEQ Credit 7.1 – Thermal Comfort: Design

- Adjustable airflow minimums with heating capability maintain comfort and minimum air changes
- Capable of zone humidity monitoring and control (dehumidification) with field-installed humidity sensor
- Combination space temperature and humidity sensor to maintain ASHRAE 55 thermal comfort criteria

i-Vu Open Control System – See page 19

Underfloor Air Distribution (UFAD) System
Carrier Products – System Diagram



Underfloor Air Distribution (UFAD) System
System Description

The underfloor air distribution system pressurizes a floor plenum with air supplied from an air handler through a 45X mixing box.

- The floor pressure is at a very low pressure, about 0.1 in. wg.
- The 35B swirl diffusers are placed through the floor panels in the spaces to be conditioned. Occupants can adjust the swirl diffuser to adjust the system to meet their individual comfort needs.
- Air supplied through the swirl diffuser only mixes in the bottom 2 to 3 feet of the space. Then heat from people and equipment in the space causes the air to warm and rise to the ceiling. This creates a stagnation layer near the ceiling but provides ventilation air in the occupant breathing zone.
- The 45X mixing box varies the volume of the air supplied from the air handler with return to maintain the floor pressure. The air handler conditions the air to the space to meet cooling requirements. The heating loads and excess cooling along the building perimeter are handled by 42K fan coils or 45U series mixing boxes located in the floor plenum.
- Units in the system can be connected through network controls to provide remote monitoring and control and integration with other units. Air handlers, when used can be equipped with heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Underfloor Air Distribution (UFAD) System
Carrier Products – Contributions to LEED Certification

30XW Screw Chiller

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 134a – no CFCs

EA Credit 1 – Optimize Energy Performance

- Positive displacement, twin screw compressors for certified IPLV efficiencies to 0.468 kW/ton for reduced energy consumption
- Heat recovery mode to produce hot water up to 140 F while generating chilled water for combined cooling/heating COP values up to 6.0
- Infinitely variable slide valve capacity control allows the chillers to exactly match actual load conditions, delivering excellent part load performance
- High-efficiency heat exchanger tubing with advanced internally and externally enhanced geometry improves chiller performance by reducing overall resistance to heat transfer while reducing chiller energy consumption
- Microprocessor-based controls allows chilled liquid temperature reset for operation at reduced lift, saving energy when warmer chilled liquid can be used
- Demand limiting holds chillers at present capacity and prevents any other 30XW chillers from starting or unloads compressors to avoid demand charges and reduce peak kW for lower energy costs
- Demand limiting capability with Carrier Comfort Network® (CCN) communication link to reduce peak kW
- Variable cooler flow capability to allow variable primary flow applications for reduced pumping energy
- Chillervisor System Manager III multi-unit control for efficient operation on systems with multiple chillers

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free R-134a refrigerant

Continued on next page

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air-handling unit

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu® open control system and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

i-Vu Open Control System – See page 19

Continued on next page

Underfloor Air Distribution (UFAD) System *(cont)*
Carrier Products – Contributions to LEED Certification *(cont)*

35BF, 45X, 45U

EA Credit 1 – Optimize Energy Performance

- 39M air-handling source can provide 55 F air; the 45X access floor air terminal unit will blend the supply and return air to provide a typical 63 F air underfloor to reduce airflow, system pressures and system energy consumption; mixing is done at a floor zone level to improve IAQ while minimizing fan energy consumption
- Exceptional ventilation effectiveness with less fan energy from air distribution within occupant breathing zone
- Rated in accordance with ARI standard 880 to ensure accurate performance and energy consumption
- Electronically commutated motor (ECM) with auto fan control to minimize terminal fan energy
- Terminal controls can provide demand controlled ventilation (DCV) to meet required ventilation without wasting energy
- 45X liner options to reduce thermal energy loss including; 1-in. dual density fiberglass insulation, foil encapsulated fiberglass insulation, cellular insulation, Steriliner (rigid board insulation)
- Reduced fan energy with variable air volume (VAV) terminal
- Demand controlled ventilation (DCV) compatible

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air into each space

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

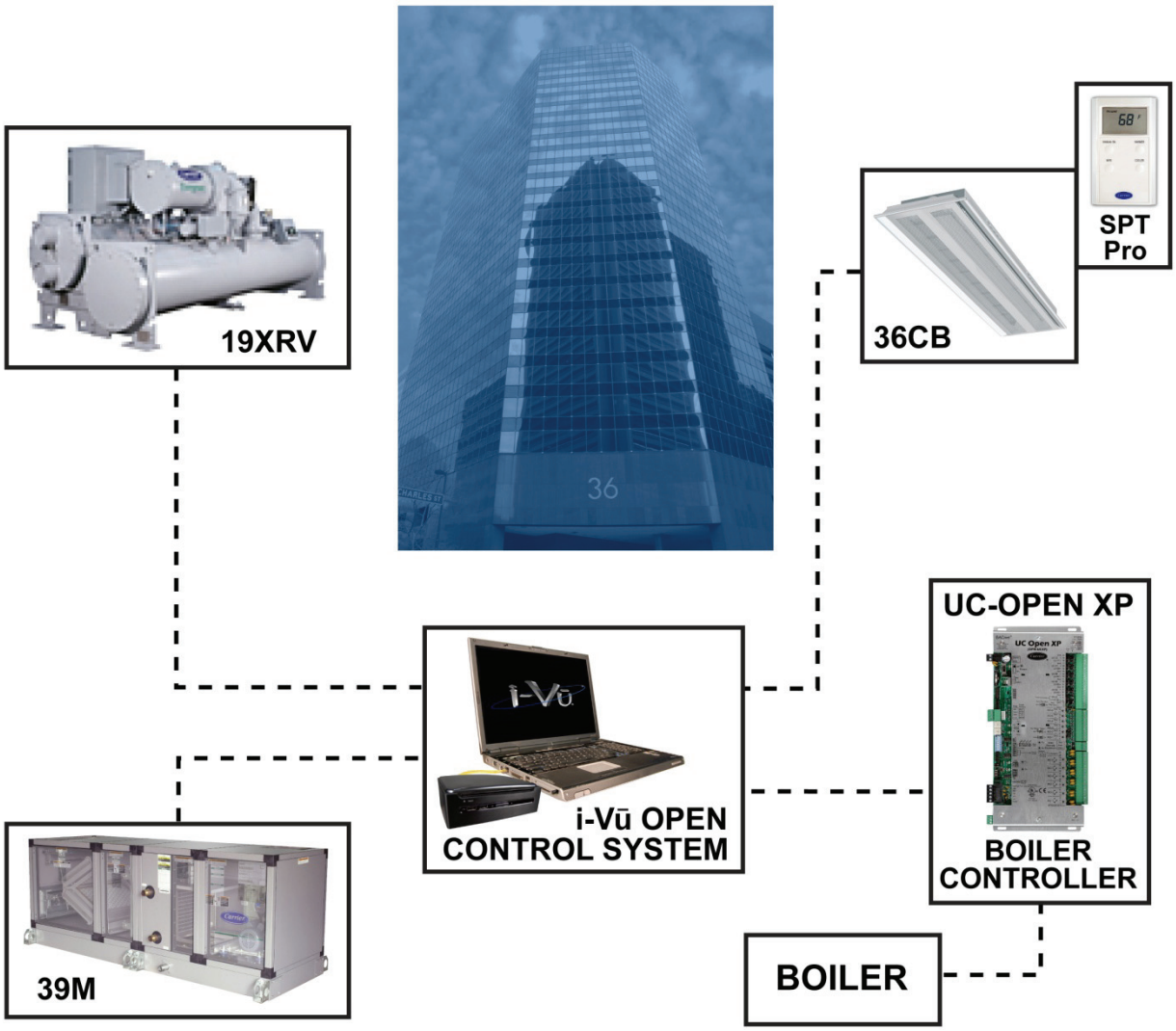
- Small incremental air flow range as low as 50 cfm (45X) with ability to allow occupants to control temperatures in individual work spaces
- 35BF diffuser with flow regulator can be manually operated without core

IEQ Credit 7.1 – Thermal Comfort: Design

- Linear, multiple-point, averaging velocity sensor for accurate modulation of supply air to each zone
- Damper blade has a flexible gasket for tight airflow shutoff

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Chilled Beam System
Carrier Products – System Diagram



System Description

The active chilled beam system shown consists of ceiling mounted panels for each space that have hot or cold water circulated in them to provide sensible space control.

- Room air motion is provided by an air handler located in the mechanical room which forces air through nozzles in the chilled beam panel which in turn induces air motion in the room and improves the thermal efficiency of the chilled beam.
- Air supplied from the air handler is at a dewpoint temperature such that this air absorbs the entire space latent load. Air supplied from the air handler is normally the required ventilation air for the room.
- A sensor in the space controls a valve to the chilled beam panel in response to space heating and cooling demand.
- Chilled water to the panels is supplied from a chiller. Since the temperature of the water required for the chilled beam panel is higher than used in conventional air handlers the chiller can use higher water temperature and therefore save energy.
- Air supplied from the air handler is only ventilation air and the static through the nozzles is relatively low, therefore, the fan energy required to move the air is less than conventional systems.
- Units can be connected through network controls to provide remote monitoring and control and integration with other units.
- Air handlers, when used, can be equipped with heat recovery, filtration options and other options and accessories for improved energy efficiency, IAQ, and comfort.

Chilled Beam System
Carrier Products – Contributions to LEED Certification

19XRV Variable Speed Centrifugal Chiller

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 134a – no CFCs

EA Credit 1 – Optimize Energy Performance

- Refrigerant-cooled variable frequency drive centrifugal compressor for certified IPLV efficiencies to 0.35 kW/ton for reduced energy consumption
- Infinitely variable compressor speed control allows the chillers to match capacity with actual load conditions, delivering excellent part load performance
- High-efficiency heat exchanger with .028 or .035 in. tubing with advanced internally and externally enhanced geometry improves chiller performance by reducing overall resistance to heat transfer while reducing chiller energy consumption
- Aerodynamically contoured impellers with high back sweep main blades and low-profile intermediate splitter blades are aerodynamically contoured to improve compressor full load and part load operating efficiency
- Microprocessor-based controls allows chilled liquid temperature reset for operation at reduced lift, saving energy when warmer chilled liquid can be used
- Demand limiting holds chillers at present capacity and prevents any other 19XRV chillers from starting or unloads compressors to avoid demand charges and reduce peak kW for lower energy costs
- Demand limiting capability with Carrier Comfort Network® (CCN) communication link to reduce peak kW
- Chillervisor System Manager III multi-unit control for efficient operation on systems with multiple chillers

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free R-134a refrigerant

39M Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Motors exceeds ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Optional factory-mounted controls and variable frequency drives to reduce part load fan energy
- Optional high-efficiency fan motors to reduce peak kW, fan heat generation and operating energy
- Sealed panel construction with double-wall R-13 insulation system to minimize thermal energy losses
- Optional CO_2 demand controlled ventilation (DCV) to minimize energy consumption while maintaining appropriate ventilation levels in response to building CO_2 levels.

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air through the air-handling unit

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- Outdoor air monitoring station with controls to ensure accurate measurement of outdoor air flow
- Demand controlled ventilation (DCV) compatible

IEQ Credit 2 – Increased Ventilation

- Optional economizer damper section with i-Vu Open controls and heat recovery capability

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Filter section with minimum MERV 13 for outdoor and return air streams
- Optional filter section for bag and cartridge filters allows for MERV filters up to 16

IEQ Credit 7.1 – Thermal Comfort: Design

- Multiple coil options allow matching design temperature and humidity requirements
- Factory-installed humidifiers for precise indoor climate conditioning
- Demand controlled ventilation (DCV) compatible

36CBA

EA Credit 1 – Optimize Energy Performance

- Decoupled ventilation loads from space sensible cooling and heating loads to minimize fan energy while improving chiller system efficiencies

IEQ Prerequisite 1 – Minimum IAQ Performance

- Allows introduction of ASHRAE 62.1 minimum ventilation air into each space

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

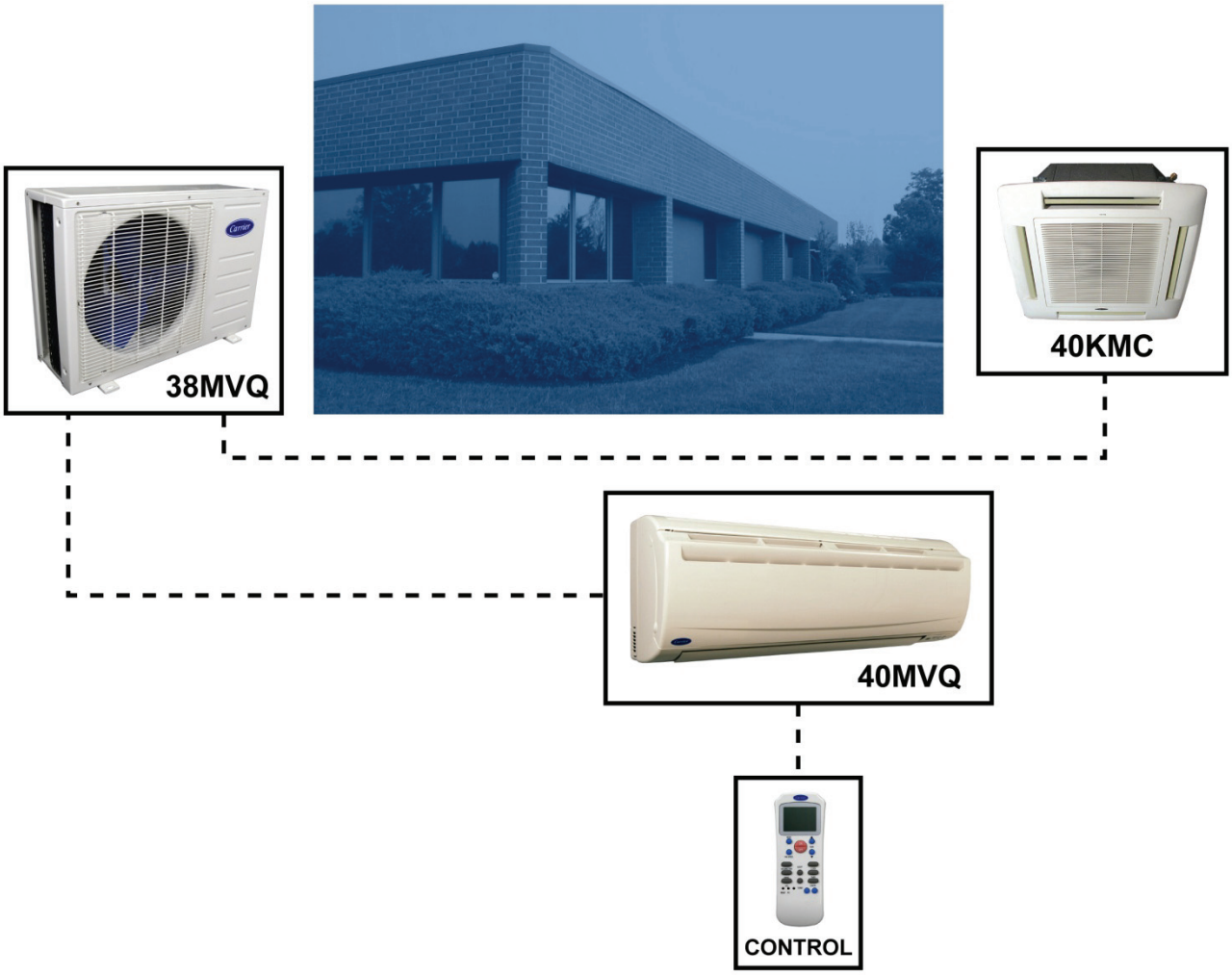
- Small incremental air flow range as low as 11 cfm primary air
- 2 or 3-way control valves on the chilled beam piping circuit enables occupants to maintain individual space comfort levels

IEQ Credit 7.1 – Thermal Comfort: Design

- Small incremental capacity ranges from 11 to 190 cfm of primary air with full range of sensible cooling and heating capacities
- Allows each space to be controlled by an individual space sensor
- Enables increased primary air with exceptional air distribution from induced air current within each space
- High airflow provided by an optional second row of holes on the beam
- Constant and even air movement in the room and steady supply air temperatures to meet ASHRAE 55 occupant thermal comfort criteria

i-Vu Open Control System – See page 19

Ductfree Split System
Carrier Products – System Diagram



System Description

The ductfree split system is a DX matched condensing unit and indoor fan coil unit.

- Units are available as heat pump or cooling only.
- Indoor fan coils can be highwall mounted, underceiling mounted, or in-ceiling cassette mounted.
- Some versions allow the use of multiple fan coils on a single outdoor unit.
- Fan coils are completely room air delivery systems designed to be located in the space.
- Fan coils contain a sweep mode feature which improves air circulation in the room.
- A self contained microprocessor control controls system operation and energy efficiency.
- Some units have ventilation air capability; others require the use of a ventilation air system.

Ductfree Split System
Carrier Products – Contributions to LEED Certification

38MVQ Ductfree Split Condensing Unit

EA Prerequisite 2 – Minimum Energy Performance

- Meets ASHRAE 90.1 minimum efficiencies levels

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- SEER up to 13, up to 7.7 HSPF

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron refrigerant (R-410A)

40MVQ, 40KMC Air Handler

EA Prerequisite 2 – Minimum Energy Performance

- Meets ASHRAE 90.1 minimum efficiencies levels

EA Credit 1 – Optimize Energy Performance

- Matched indoor fan coil or ceiling cassette to outdoor condenser for efficient operation
- The 40MVC/MVQ unit is equipped with a microprocessor controls to operate the system and give optimum levels of comfort and operating efficiency
- Individual room control reduces loss from conditioning unoccupied spaces and, losses from pumps and fans are also eliminated

IEQ Prerequisite 1 – Minimum IAQ Performance

- Complies with ASHRAE 62.1 construction requirements

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

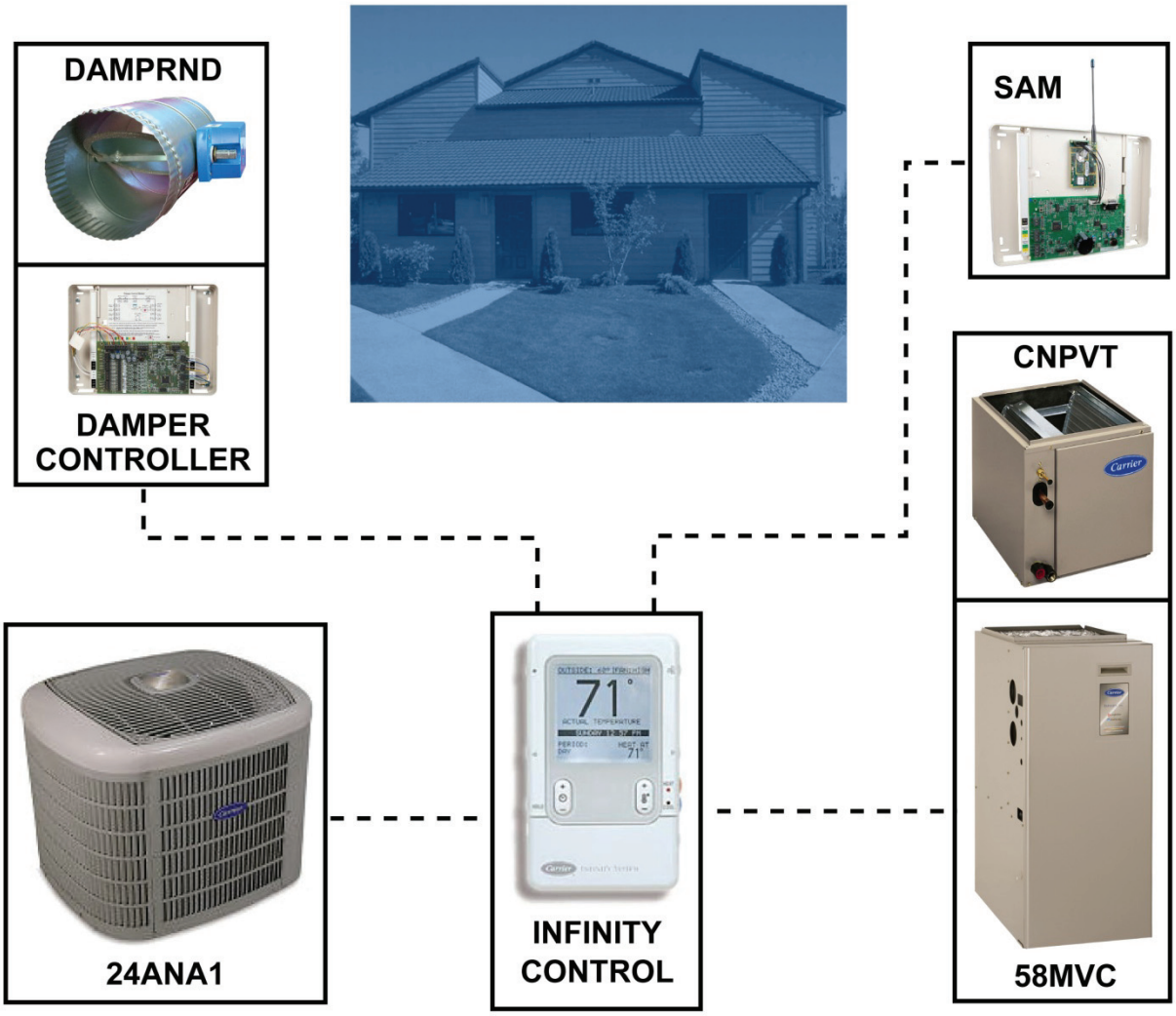
- Small incremental capacities as low as 1-1/2 to 3 tons to allow each space to be controlled by a single indoor fan coil

IEQ Credit 7.1 – Thermal Comfort: Design

- Thermostatically controlled indoor fan coil to maintain ASHRAE 55 design comfort conditions
- Turbo heat mode provides warmer heating air in heat pump mode for increased comfort
- Dehumidification mode to help control space humidity levels and improve comfort
- Air sweep provides room air motion and contributes to comfort
- Heat pump “cold blow” prevention

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

Residential Split System
Carrier Products – System Diagram



System Description

The residential split system consists of a DX outdoor condensing unit connect to an indoor unit connected by refrigerant piping.

- Listed as residential systems, these units are commonly used in many small commercial projects.
- Outdoor section may be an air conditioner or a heat pump.
- Indoor section may be a gas or oil furnace with a coil attached to the furnace or it may be a fan coil with added electric or hot water heat. Some systems provide hybrid heat by combining a gas furnace with a heat pump.
- Indoor unit can also be equipped with humidifiers, improved filter options both mechanical and electronic, heat and energy recovery ventilators and UV-C germicidal lamps.
- The system can also use zoning dampers to provide individual zone control.
- Variable speed fans on the indoor units and multiple capacity stages on the air conditioning can provide many of the benefits of a VAV system for saving fan power and at the same time provide enhanced comfort. The control system can provide enhanced humidity control and when connected to an internet device allows changing and monitoring conditions remotely.

Residential Split System
Carrier Products – Contributions to LEED Certification

24ANA Infinity Split System Cooling Unit

EA Prerequisite 2 – Minimum Energy Performance

- ASHRAE compliant and ENERGY STAR qualified

EA Prerequisite 3 – Fundamental Refrigerant Management

- Units use HFC refrigerant 410A – no CFCs

EA Credit 1 – Optimize Energy Performance

- High efficiencies from 16-21 SEER/12-14.5 EER for low energy consumption
- Two-speed compressor for superior part load efficiency
- Variable speed outdoor condenser fan motor for quiet efficient part load operation

EA Credit 4 – Enhanced Refrigerant Management

- Chlorine-free Puron® refrigerant (R-410A)

58MVC High Efficiency Gas Furnace with CNPVT Coil

EA Prerequisite 2 – Minimum Energy Performance

- Exceeds ASHRAE minimum efficiency requirements and ENERGY STAR qualified

EA Credit 1 – Optimize Energy Performance

- Up to 95.0% AFUE for reduced fuel consumption during heating operation

IEQ Prerequisite 1 – Minimum IAQ Performance

- Construction meets ASHRAE 62.1 requirements

IEQ Credit 1 – Outdoor Air Delivery Monitoring

- With HRV or ERV have the ability to supply ASHRAE required ventilation rates

IEQ Credit 2 – Increased Ventilation

- Heat and energy recovery ventilators allow for the addition of outside ventilation and minimize the energy impact

IEQ Credit 5 – Indoor Chemical & Pollutant Source Control

- Electronic and mechanical filtration up to MERV 15

IEQ Credit 6.2 – Controllability of Systems: Thermal Comfort

- Zone control dampers provide control for small spaces

IEQ Credit – 7.1 Thermal Comfort: Design

- Variable speed fan technology to eliminate "cold blow" while distributing comfortable air conditions to each space

Infinity® Control System with Zoning

EA Prerequisite 1 – Basic Commissioning

- Infinity control provides system read out of operation for ease in commissioning with intuitive screen prompts for system set-up

EA Credit 1 – Optimize Energy Performance

- Complete integration of temperature, humidity and ventilation in all seasons
- Airflow adjustment by zone
- 7-day programmability with 2 to 4 periods per day allow matching use to schedule
- Programmable fan by period for improved energy performance
- When combined with a 58MVC variable-speed furnace for longer heating and cooling runtimes at lower fan speeds provides a more consistent temperature

IEQ Prerequisite 1 – Minimum IAQ Performance

- IdealHumidity™ space humidity control
- Indoor air quality reminders and TrueSense™ dirty filter detection

IEQ Credit 7.1 – Thermal Comfort: Design

- Space comfort control with up to 8 zones of damper control for precise delivery of air flow for accurate temperature and humidity control in various rooms

NOTE: These system diagrams illustrate how each individual product in a system may contribute to meeting the requirements of a credit. The points available are not determined by the number of products that contribute to the credit but are limited to the total number of points allowed for a particular credit under the LEED system.

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