CAMBRIDGE "LEED-READY" HEATERS FOR GREEN WAREHOUSE PROJECTS

Cambridge Blow-Thru® Space Heaters save energy, reduce a building's carbon footprint and help improve indoor air quality by heating with 100% fresh air. These characteristics make Cambridge direct gas-fired heaters the perfect choice for green buildings. Genuine Cambridge® Heaters ***are ASHRAE 90.1 compliant and considered "LEED-Ready"*** to facilitate the process of obtaining LEED Certification for a green warehouse project.

Why Go Green?

The basic concepts for a Green Building include finding ways of reducing energy use, conserving water, improving indoor air quality, reducing dependence on our natural resources and reducing carbon emissions to stop global warming. The dramatic rise in energy prices and growing concerns over damage being done to our planet has put a spotlight on the Green Building Movement. Federal, state, county and city governments are adopting Green Building Standards and in some cases provide rebates or financial incentives. Developers and contractors have adopted a new term called High Performance Buildings. They promote the advantages of a Green Building in terms of lower operating costs to increase profits, smaller carbon footprint to help prevent global warming and better indoor air quality to increase worker comfort and productivity.

LEED has emerged as the most widely accepted green property rating system for commercial and industrial type buildings. These guidelines help the construction industry determine the level of "greenness" for developing high-performance, sustainable buildings. Recent studies indicate the number of LEED Certified buildings continues to grow and in many areas the supply has not kept up with demand. Developers and property owners are seeing high performance LEED/green buildings obtain higher occupancy, sales price and rental rates.

What is the LEED Green Building Rating System?

The United States Green Building Council (USGBC) developed a set of guidelines, **L**eadership in **E**nergy and **E**nvironmental **D**esign (LEED), in an effort to provide a national standard for green building design. It is a point-based system that includes six categories: Sustainable Site Design, Water Efficiency, ***Energy & Atmosphere***, Materials & Resources Used, ***Indoor Environmental Quality,*** *and Innovation & Design Process.* Energy efficiency and improved indoor air quality are the two areas where selecting the right heating/ventilating system will have the biggest impact.

In the latest version of LEED-NC 2.2 (New Construction and Major Renovations), five of the seven prerequisites and 32 of the 69 available LEED points are found in these two categories. A building requires at least 26 points for LEED certification. Higher levels of Silver (33-38 points), Gold (39-51 points) and Platinum (52+ points) are also available.

In the latest version of LEED –CS 2.0 (Core and Shell Development), five of the seven prerequisites and 25 the 61 available LEED points are found in these two categories. A Core & Shell building requires at least 23 points for LEED certification. Higher levels of Silver (28-33 points), Gold (34-44 points) and Platinum (45+ points) are also available.

For more information, visit the USGBC website at www.usgbc.org/LEED

Cambridge® Heaters are LEED-Ready

You cannot specify or buy any type of heating equipment that is LEED, USGBC or Green certified. That includes Cambridge heaters, even though we are an active member of the USGBC. However specifying Cambridge Heaters means you have chosen heating/ventilating equipment that is considered *LEED-Ready* and meets the basic requirements for use in a LEED certified warehouse. Using the flexibility of our energy efficient, ASHRAE 90.1-2004 compliant design and Cambridge Air Solutions expertise in warehouse heating can help earn up to 19 points as summarized below for the latest version of LEED-NC 2.2.

Energy & Atmosphere (Energy Efficiency)

- EA Credit 1: Optimize Energy Performance	**2-10 points**
- EA Credit 5: Measurement & Verification	**1 point**

Indoor Environmental Quality (Indoor Air Quality – IAQ)

- EQ Credit 1: Outdoor Air Delivery Monitoring	**1 point**
- EQ Credit 2: Increase Ventilation	**1 point**
- EQ Credit 3.1: During Construction IAQ Management	**1 point**
- EQ Credit 3.2 Before Occupancy IAQ Management Plan	**1 point**
- EQ Credit 5: Indoor Pollutant Source Control	**1 point**
- EQ Credit 6.2: Controllability of Systems: Thermal Comfort	**1 point**
- EQ Credit 7.1: Thermal Comfort: Design	**1 point**
- EQ Credit 7.2: Thermal Comfort: Verification	**1 point**

Total points Cambridge can help earn:	**19 points**

Summary of how Cambridge Heaters meet the requirements for a LEED certified warehouse and can help earn up to 19 points.

Energy & Atmosphere - (Energy Efficiency)
(11 Total Potential Points)

Minimum Energy Performance (Prerequisite)
Intent - Heating equipment used in a LEED certified building must meet the minimum requirements of ASHRAE Standard 90.1-2004 or applicable local code whichever is more stringent.

Cambridge Contribution
Cambridge heaters are shipped with a label that certifies compliance with ASHRAE Standard 90.1-2004. Consult with Cambridge Air Solutions regarding compliance requirements for the application.

EA Credit 1: Optimize Energy Performance (Potential Points: 2-10)
Intent - This credit offers a maximum of 10 points, the highest number of potential points available compared to all others in the LEED-NC guidelines. Beginning in 2007, all LEED projects must include at least 2 points from this section. 2 to 10 points are awarded for energy cost savings of 14% to 42% for new buildings and 7% to 35% for existing building renovations. To gain the points, it must be demonstrated that the entire building uses less total energy than a baseline building that meets the minimum requirements of ASHRAE 90.1-2004. Total energy consumption includes lighting, heating, air conditioning and typical process loads.

Cambridge Contribution
Documented Cambridge comparative building studies show 40 % to 70% energy savings for high temperature-rise, Blow-Thru Space Heaters versus indirect gas-fired boiler, unit heater, furnace, air turnover and infrared type warehouse heating systems. High-efficiency Cambridge direct gas-fired, Blow-Thru Space Heaters also use less energy than infrared (radiant) heaters and direct gas-fired "draw-thru" type heaters for large warehouse heating applications. Cambridge will work with the person responsible for the project's energy modeling to help maximize the available energy savings from heating/ventilating the warehouse. Our unique expertise in this area includes heating over a billion square feet with this type of equipment.

EA Credit 5: Measurement & Verification (Potential Points: 1)
Intent- Provide ongoing accountability of building energy consumption over time.

Cambridge Contribution
Cambridge can provide the required built-in or remote instrumentation that will meter electric and fuel usage. This will typically require gas and electric meters sized for the min/max range of each heating unit with either manual readouts or EMS interface. Additional meters would be required for other systems such as lighting. Based on the application and the energy estimate method, this requirement may be able to be satisfied with whole-building meters and individual sub-meters may not be required.

Indoor Environmental Quality - (Indoor Air Quality –IAQ)
(8 Total Potential Points)

Minimum IAQ Performance (Prerequisite)
Intent - LEED Certified buildings must meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2004 or applicable local code whichever is more stringent. ASHRAE 62.1 requires a ventilation rate of 0.06 cfm/ft^2 during occupied periods for most warehouse applications.

Cambridge Contribution
Unlike boilers, unit heaters, air turnover units or infrared (radiant) heaters, Cambridge direct gas-fired Blow-Thru heating/ventilating units typically meet this requirement because Genuine Cambridge equipment uses only 100%, non-recirculated fresh outside air.

EQ Credit 1: Outdoor Air Delivery Monitoring - (Potential Points: 1)
Intent - Monitor the ventilation system to help maintain and assure good IAQ for systems that operate with variable amounts of outdoor air. One option for a mechanical ventilation system serving a non-densely occupied area, like a warehouse, is to provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor airflow rate with an accuracy of +/- 15% of the design minimum outdoor air rate as defined by ASHRAE 62.1-2004.

Cambridge Contribution
Since non-recirculating, direct gas-fired Cambridge heater, certified to ANSI Standard Z83.4/CSA3.7 provide a fixed amount of outside air, outdoor air delivering monitoring should not be needed when Cambridge units are used to heat a warehouse. However, Cambridge can supply an outdoor airflow measurement system correctly sized for our equipment with multiple output options to meet this requirement when required.

**Note, not all direct gas-fired heaters are alike. Recirculating type heating equipment (often called 80/20 units) offered by other manufacturers that is certified to ANSI Standard Z83.18 can be difficult to correctly apply in a LEED/Green Building application. This is because the control systems required to maintain good IAQ for these heaters must reduce the allowable temperature rise (heat output) as a function of the proportion of outside air versus recirculated air, regardless of how much heat is required in the building. Another concern is that a recirculating type heater might be acceptable for a building's original use but not acceptable when its use changes at a later date, making them difficult to use for Core and Shell type buildings. Direct gas-fired recirculating heaters are currently not approved for use in Canada and are not included in the 2007 ASHRAE Advanced Energy Design Guide (AEDG) for Small Warehouses. Many engineers do not specify heaters certified to ANSI Z83.18 for this reason there may be concerns using them for LEED/Green Building applications.*

EQ Credit 2: Increase Ventilation - (Potential Points: 1)
Intent - Provide more outdoor air ventilation than that required by ASHRAE 62.1 to improve indoor air quality. For mechanically ventilated spaces this means increasing the ventilation rate by at least 30%. For most warehouse applications this would require a ventilation rate of 0.78 cfm/ft^2 during occupied periods.

Cambridge Contribution
Direct gas-fired Cambridge heaters certified to ANSI standard Z83.4/CSA3.7 can help meet this requirement because our units use only 100% non-recirculated outside air. However, for some warehouse applications it may not make sense to dramatically increase ventilation for large unoccupied areas because it will increase equipment costs, operating costs and energy use without any significant benefit to the building's occupants. Consult with Cambridge Air Solutions to explore the best options for this credit.

EQ Credit 3.1 – During Construction IAQ Management Plan: - (Potential Points: 1)
Intent - Reduce IAQ problems resulting from the construction/renovation process in order to help sustain the comfort and well being of the construction workers.

Cambridge Contribution
Unlike conventional air handlers and VAV type HVAC systems, Cambridge heaters require no ductwork and are often installed early in the construction process to provide temporary heat and ventilation with outside air during construction. This eliminates the cost and need to rent separate temporary heating/ventilating equipment to obtain this point.

EQ Credit 3.2 – Before Occupancy IAQ Management Plan: (Potential Points: 1)
Intent - Reduce IAQ problems resulting from the construction/renovation process in order to help sustain the comfort and well being of the building's initial occupants.

Cambridge Contribution
After construction ends, Cambridge heaters can help "flush out the building" prior to occupancy by providing the required supply volume of 100% tempered fresh outside air. This can reduce or completely eliminate the cost and need to rent separate temporary heating/ventilating equipment to obtain this point.

EQ Credit 5: Indoor Pollutant Source Control - (Potential Points: 1)
Intent - Minimize the exposure of building occupants to potentially harmful particulates and chemical pollutants. One component of doing this is to provide regularly occupied areas of the building with an increased level of air filtration. This applies to both outside air and return air that is delivered as supply air to the specified occupied areas. Providing air filtration media prior to building occupancy that has a Minimum Efficiency Rating Value (MERV) of 13 or better will satisfy this requirement.

Cambridge Contribution
Cambridge heaters can be supplied with optional MERV 13 filters. This can be an expensive option in terms of the special filters, increased pressure drop and impact on energy efficiency. This may or may not be an appropriate requirement for large, open warehouse facilities. Consult with Cambridge Air Solutions to explore the best options for this credit.

EQ Credit 6.2: Controllability of Systems: Thermal Comfort - (Potential Points: 1)
Intent - Provide a high level of thermal comfort system control by individual occupants or by specific groups in multi-occupant spaces to promote the productivity, comfort and well-being of building occupants.

Cambridge Contribution
Cambridge heaters can include the necessary controls to meet the requirement of allowing the building occupants to make adjustments to the system settings to suit individual/group requirements.
The Cambridge system can also control the air temperature, air speed and humidity (with optional cooling coils) to help meet the thermal comfort conditions as specified in ASHRAE Standard 55-2004..

EQ Credit 7.1: Thermal Comfort: Design – (Potential Points: 1)
Intent - Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

Cambridge Contribution
Cambridge can provide the criteria for the basis of the design to meet the requirements of the thermal comfort conditions of ASHRAE Standard 55-2004

EQ Credit 7.2: Thermal Comfort: Verification - (Potential Points: 1)
Intent - Provide for the assessment of building thermal comfort over time.

Cambridge Contribution
Cambridge can assist with the selection and application of monitoring devices required to implement this requirement and any corrective actions required to address identified problems.

Conclusion

There are many benefits of an energy efficient Green Warehouse designed and built to LEED standards. The nice thing about using Cambridge Blow-Thru® Space Heaters in LEED/Green Buildings is that the engineer, contractor and building owner are all dealing with a proven energy efficient warehouse heating technology that is just as cost effective when used in a non-green facility. Best of all, energy efficient Cambridge Blow-Thru type heaters are ASHRAE 90.1 Compliant and *LEED-Ready*. That means you can specify Cambridge type Blow-Thru Space Heaters for any warehouse project before making a final decision to go for LEED certification. The final heater design, ratings, instrumentation and filters can be determined at a later date to help obtain the specific LEED points as needed.

For more information on Genuine Green Cambridge heaters, visit our website at **www.cambridge-eng.com** .