

How Cool-phase® qualifies for BREEAM

Prepared by Mirko Farnetani - October 2013

This document was authored to provide information on how Cool-phase® Low Energy ventilation and Natural Cooling systems qualify for BREEAM New Construction-Non-Domestic Buildings 2011¹.

Man 04 Building User Guide

Contributing in obtaining One credit

As standard Cool-phase® systems are supplied with comprehensive user information and a formal Operating and Maintenance manual. These guides contribute in instructing the non-technical building users and the facility managers in how to use the low-energy cooling and ventilation systems effectively. As part of our package of works we also include for a commissioning visit which allows face to face onsite training of end users.

Man 05 Life Cycle Costs and Service Life Planning

Contributing in obtaining One credit

The Monodraught Cool-phase® Life Cycle Cost (LCC) analysis provides information for designs at RIBA Work Stages C/D.

The LCC has been carried out over a study period of 20 years in accordance with the PD 156865:2008² (a supplement to BS ISO 15686-5:2008) showing discounted cash flow terms:

- Cool-phase® capital expenditure.
- Operation – includes as a minimum of utilities, cleaning, and management costs.
- Maintenance – includes as a minimum, planned maintenance, replacement and repair costs.

The Cool-phase® maintenance strategy illustrates further that the systems are of high value.

Contributing in obtaining One credit

Monodraught is able to demonstrate Cool-phase® performance criteria for the building by providing IES-VE dynamic thermal simulation assessments. Life Cycle Cost analysis of Cool-phase® provides the appropriate source of information for alternative system option comparison; for this purpose the Cool-phase® LCC analysis clearly shows building energy consumption over the operational life span of the building and maintenance requirement.

Furthermore, Cool-phase® is easily dismantlable, for movement within estates and the majority of its elements widely recyclable.

Contributing in obtaining One credit

The Cool-phase® LCC can be easily updated during RIBA Work Stage D/E.

The Cool-phase® LCC analysis includes for:

- The extent to which maintenance has been designed out in terms of safety, efficiency and cost-effective operations.
- How the removal and replacement of Cool-phase® system, within the design life of the building, has been facilitated by the building design and specification.

Hea 02 Indoor Air Quality (Criterion 1 Minimising sources of air pollution)

Contributing in obtaining One credit

Cool-phase® deals with both removal of contaminant sources and dilution control of contaminant sources by providing the required volume of fresh air. The night charge process is a valid procedure for pre-occupancy flush. The system's filters contribute in reducing the ingress of external polluted air into the building. The ventilation rate of Cool-phase® is controlled by ambient CO₂ level sensors that modulate the fan speed in order to provide demand control and meet fresh air requirements.



¹ BRE (2012), BREEAM New Construction, Non-Domestic Buildings, Technical Manual SD5073-3.3:2011, BRE Global Ltd

² PD 156865:2008 Standardized method of life cycle costing for construction procurement: a supplement to BS ISO 15686-5 Buildings and constructed assets - Service life planning - Part 5: Life cycle costing

Hea 03 Thermal Comfort

Contributing in obtaining One credit

Monodraught has developed a Cool-phase® performance component in order to be used with IES Virtual Environment (VE) Pro that is the most powerful suite of building performance analysis tools available, and it is therefore the primary design tool used by all of Monodraught's Design Engineers. The ApacheSim thermal simulation engine, supported by the SunCast and Macroflo modules, complies with the requirements of CIBSE Application Manual AM11, and the software is recognised as one of the most accurate means of modelling ventilation strategies using bulk air flow simulation.

IES-VE can provide thermal comfort results in occupied spaces in accordance with the criteria set out in CIBSE Guide A, PSBP and Building Bulletin 101 guidelines. Simultaneously, the Time Out of Range (TOR) metric can be easily available to users.



Contributing in obtaining One credit

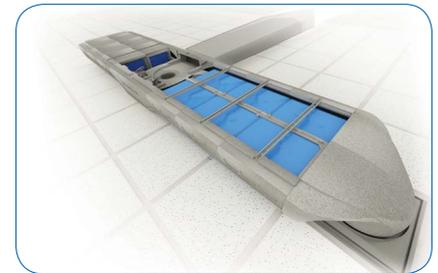
Modelling Cool-phase® in IES-VE provides the temperature control strategy regarding the building in question.

The VE can address multiple requirements for proposed heating and cooling by setting myriad of dynamic thermal modelling parameters.

Ene 01 Reduction of emissions

Contributing in obtaining Fifteen credits

The Cool-phase® system can radically reduce energy consumption by up to 90%, compared to a conventional cooling system. Cool-phase® uses energy efficient variable speed fan, with no compressors, pumps or other energy intensive components. The reduction in energy usage combined with low servicing and maintenance costs and a long life span result in a strong financial case over traditional cooling approaches. In consequence of that, carbon dioxide emission rate abatement is proportionally consistent.



Ene 02 Energy monitoring

Contributing in obtaining One credit

Cool-phase® can be sub-metered in order to quantify the "Fan" and "Small Power" consumption. Each system is equipped with a data logging function which can quantify energy usage.

Ene 04 Low and zero Carbon Technologies (Criterion 3 Free Cooling)

Contributing in obtaining Four credits

Cool-phase® uses the concept of a 'thermal battery' to capture and store heat. The thermal batteries use the latent heat property of materials to store large amounts of energy, which is charged and discharged by passing air through a heat exchanger. Materials that change phase at room temperature are frequently referred to as Phase Change Materials (PCMs).

At night, cool outside air is passed through the heat exchanger recharging the thermal batteries and releasing the heat built up during the day. During the occupied hours the thermal energy stored within the unit is released into the ambient. The total cooling over a 24 hour period is the sum of the free cooling (when it is cooler outside than inside), the effects of night time cooling (cooling the fabric of the building down and dissipating the heat built up during the previous day), and the use of the energy stored within the thermal batteries to temper the air.

Cool-phase® does not require any external units. This makes Cool-phase® particularly applicable in scenarios where access to outside space, or planning permission, are an issue.

The low-energy design concept of Cool-phase® scales down energy consumption and subsequent carbon dioxide emissions.

The Life Cycle Assessment of Cool-phase®, conducted in accordance with ISO 14044:2006³, illustrates shallow carbon impact.

Contributing in obtaining One credit

During the non-heating season, Cool-phase®, in nocturnal mode, provides free night-time cooling for recharging the thermal batteries.

According to the Directive 2009/28/EC of the European Parliament, PCM cooling stored in Thermal Batteries made by PCM can be classified as per Article 2 'aerothermal energy' means energy stored in the form of heat in the ambient air; hence Cool-phase® can be deemed a local Low Zero Carbon source.

³ ISO 14044:2006 Environmental Management Life Cycle Analysis, principals and Framework, International Standards Organisation, Geneva