

Ene04

Low carbon design

Passive design

Objective:

The aim of the free cooling credit is to **remove the need for active cooling** throughout the building. The passive design analysis credit is intended to encourage project teams to **proactively consider** the ways in which the building could benefit from, and adopt, passive design measures.

Actions:

- Identify opportunities for passive design
- Implement the passive design measures
- Quantify reduced total energy demand
- Undertake free cooling analysis
- Identify opportunities for implementation of free cooling
- Incorporate a free cooling strategy / natural ventilation

Passive design analysis

The project team should analyse the proposed building design and development during **RIBA Stage 2** to identify opportunities for the implementation of passive design measures.

As a minimum the **passive design analysis** should cover:

- Site location
- Site weather
- Microclimate
- Building layout
- Building orientation
- Building form
- Building fabric
- Thermal mass or other fabric thermal storage
- Building occupancy type
- Daylighting strategy
- Ventilation strategy
- Adaptation to climate change

Note: This document is intended as guidance only. Consult your BREEAM AP or Assessor to ensure compliance is achieved.

Any savings resulting from the incorporation of passive design measures should be demonstrated by **comparing the energy demand** and CO₂-eq emissions for the building with and without the proposed passive design measures adopted, as identified in the passive design analysis.

To enable a **baseline for comparison** to be established, a 'standard building' should be modelled with fabric performance equivalent to that of the local building regulations notional building (or for Scotland, an equivalent compliant building) and without the passive design measures (where feasible, i.e. building orientation is likely to be fixed). The glazing areas specified in the 'standard building' should be the same as those required by the Building Regulations Notional building.

Free cooling analysis

This is to be included as part of the passive design analysis and should demonstrate consideration of the **following technologies**:

- Night-time cooling (which could include the use of a high exposed thermal mass)
- Ground coupled air cooling
- Displacement ventilation (not linked to any active cooling system)
- Ground water cooling
- Surface water cooling
- Evaporative cooling, direct or indirect
- Desiccant dehumidification and evaporative cooling, using waste heat
- Absorption cooling, using waste heat.

The free cooling analysis should apply to **all occupied spaces** in the building, however small IT rooms and lift motor rooms are excluded.

It should be demonstrated that the free cooling can meet the **building's cooling demand**. The calculation methods should consider the passive design measures included in the analysis and should be carried out by a building services engineer who is a member of **CIBSE or by an accredited energy assessor**. Where the free cooling approaches chosen cannot be adequately modelled by these methods, the use of any alternative methods should be justified by the building services engineer or accredited energy assessor, demonstrating that these methods are appropriate.

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