# Travelodge, The Arena, Stockley Park

Energy Statement

On Behalf of

BBC Pension Trust

Revision No: 03

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# 1. Executive Summary

## 1.1 General

The energy statement has been prepared on behalf of BBC Pension Trust and is in support of the proposed refurbishment of the existing public house and office building into a Travelodge hotel, and the 7-bedroom conversion from bar/café within the existing Travelodge at The Arena, Stockley Park.

The statement addresses the energy requirements of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) and GLA 'Energy Assessment Guidance' (June 2022).

The statement provides an assessment of the energy consumption and associated carbon dioxide emissions for the proposed development utilising predicted consumption data and identifies the target amount of energy generation and carbon savings to be provided from decentralised energy and on-site renewable energy generation technology.

## 1.2 Energy Efficiency and Demand Reduction Measures (BE LEAN)

The following specific measures are proposed to achieve an energy demand reduction at the development:

- Improve U-values of the external envelope.
- Improve U-value of glazing.
- Improve air permeability of building envelope.
- Improved efficiency of the space heating, cooling and hot water.
- Use of energy efficient lighting.
- Use of intelligent lighting controls.
- Use of variable speed pumps, fans and drives to match supply and demand.
- Improve efficiency of heat recovery to mechanical ventilation systems.

Following the incorporation of energy efficiency measures, the BER emissions of the development are 101.6 tonnes$CO_2$/annum, an improvement of 23% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.

## 1.3 Supply Energy Efficiently via Decentralised Energy (BE CLEAN)

Policy SI3 of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) requires that possible connection to existing heating or cooling networks should be evaluated before site wide combined heat and power systems are investigated.

The London Heat Map network has been consulted and one existing and one proposed district heating network have been identified in the wider area (see the image below), however neither are in close enough proximity to be feasibly connected to the development. Connection to an existing or proposed district heating network has been discounted for this scheme.

The domestic hot water base load for the existing hotel is already provided via a CHP unit and gas-fired water heaters. It is proposed the 7-bedrooms conversion within the existing hotel will connect to this existing system to provide their hot water demand.

For the main conversion and refurbishment aspect of the scheme, CHP is not proposed to generate space heating or hot water. As a result of the energy modelling, greater carbon savings have been deemed achievable through the use of air source heat pumps to generate space heating and hot water, therefore CHP has been discounted.

The 'Be clean' energy model does not incorporate any further changes to the 'Be lean' energy model, as no district heating or additional CHP systems are proposed to be included within the development.

The BER emissions of the development are 101.6 tonnes$CO_2$/annum, an improvement of 23% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum. No further savings are achieved for the 'Be clean' model.

## 1.4 Renewable Energy Technologies (BE GREEN)

Air source heat pumps will be incorporated into the proposed hotel scheme as a source of low carbon energy to meet a significant proportion of the space heating and cooling, and hot water demand. The installation of 111$m^2$ of solar photovoltaics will be integrated to maximise the available roof area.

Following the incorporation of low and zero carbon technologies, the BER emissions of the development are 18.0 tonnes$CO_2$/annum, an improvement of 86% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.

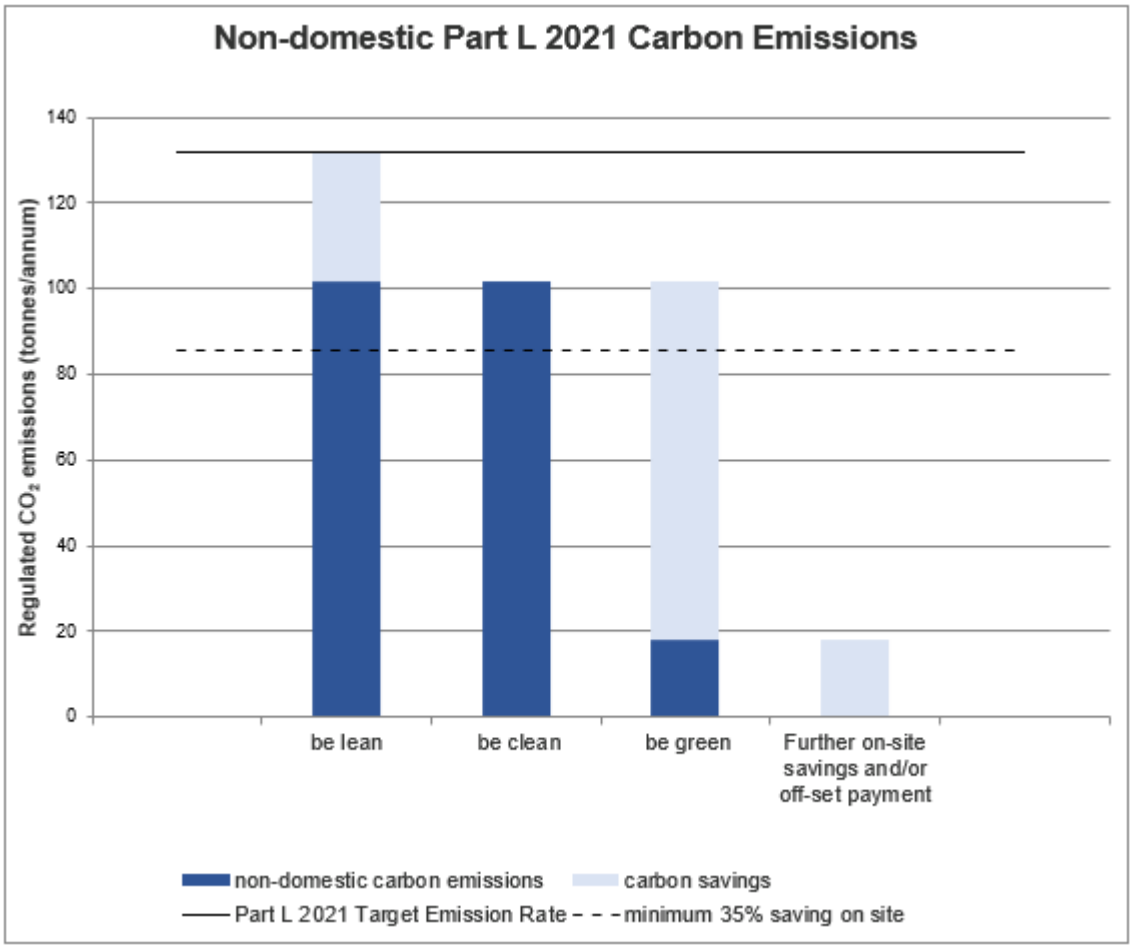
## 1.5 Summary

The GLA Carbon Emission Reporting Spreadsheet is included within Appendix F, with a summary of the shown in the table below.

| | Carbon dioxide emissions for non-domestic buildings (Tonnes $CO_2$ per annum) | |
|---|---|---|
| | **Regulated** | **Unregulated** |
| **Baseline: Existing building with notional specification** | 131.9 | 13.6 |
| **After energy demand reduction (be lean)** | 101.6 | 13.6 |
| **After heat network connection (be clean)** | 101.6 | 13.6 |
| **After renewable energy (be green)** | 18.0 | 13.6 |

| | Regulated non-domestic carbon dioxide savings | |
|---|---|---|
| | **(Tonnes $CO_2$ per annum)** | **(%)** |
| **Be lean: savings from energy demand reduction** | 30.3 | 23% |
| **Be clean: savings from heat network** | 0.0 | 0% |
| **Be green: savings from renewable energy** | 83.6 | 63% |
| **Total Cumulative Savings** | 113.9 | 86% |

The BER emissions of the proposed development are 18.0 tonnes$CO_2$/annum, an improvement of 86% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.




## 1.6 Carbon Offset

In accordance with the GLA 'Energy Assessment Guidance' (June 2022) and GLA 'Carbon Offsetting Guide' (June 2022), the remaining 18.0 tonnes tonnes$CO_2$/annum will be offset. This is calculated over 30 years using the GLA's recommended price of £95 tonne/annum, shown below.

**18.0 tonnes * £95 * 30 years = £51,407**

# 2. Introduction

## 2.1 General

The energy statement has been prepared on behalf of BBC Pension Trust and is in support of the proposed refurbishment of the existing public house and office building into a Travelodge hotel, and the 7-bedroom conversion from bar/café within the existing Travelodge at The Arena, Stockley Park.

The statement addresses the energy requirements of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) and GLA 'Energy Assessment Guidance' (June 2022).

The statement provides an assessment of the energy consumption and associated carbon dioxide emissions for the proposed development utilising predicted consumption data and identifies the target amount of energy generation and carbon savings to be provided from decentralised energy and on-site renewable energy generation technology.

# 3. Policy Review

## 3.1 General

This section summarises the policy context for the development energy statement, with a focus upon sustainability, energy and carbon reduction and the various policies from international to local level.

## 3.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF or the Framework) was introduced in March 2012 to set out government planning policy for England, removing all regional level planning policy in favour of 'a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.'

A number of iterations have since been published, with the last revision in December 2024. All new Local and Neighbourhood Plans and reviews must align with the polices of the Framework.

The Framework states clearly that the purpose of planning is to help deliver sustainable development and defines three mutually dependent pillars that must be equally considered in order to achieve this:

- Economic;
- Social; and
- Environmental.

There is a clear focus upon:

- Promoting high-quality design for new homes and places;
- Offering stronger protection for the environment;
- Constructing the right number of homes in the right places; and
- Focusing on greater responsibility and accountability of councils and developers for housing delivery.

## 3.3 Regional Policy

### 3.3.1 The London Plan (March 2021)

The following sections of the 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) are specifically pertinent to the production of this energy statement.

**Policy SI2 Minimising Greenhouse Gas Emissions**

A: Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

1) be lean: use less energy and manage demand during operation
2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly

3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site

4) be seen: monitor, verify and report on energy performance.

B: Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

C: A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1) through a cash in lieu contribution to the borough's carbon offset fund, or

2) off-site provided that an alternative proposal is identified and delivery is certain.

D: Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

E: Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

F: Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

**Policy SI3 Energy Infrastructure**

A: Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.

B: Energy masterplans should be developed for large-scale development locations (such as those outlined in Part A and other opportunities) which establish the most effective energy supply options. Energy masterplans should identify:

1) major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing)

2) heat loads from existing buildings that can be connected to future phases of a heat network

3) major heat supply plant including opportunities to utilise heat from energy from waste plants

4) secondary heat sources, including both environmental and waste heat

5) opportunities for low and ambient temperature heat networks

6) possible land for energy centres and/or energy storage

7) possible heating and cooling network routes

8) opportunities for futureproofing utility infrastructure networks to minimise the impact from road works

9) infrastructure and land requirements for electricity and gas supplies

10) implementation options for delivering feasible projects, considering issues of procurement, funding and risk, and the role of the public sector

11) opportunities to maximise renewable electricity generation and incorporate demand-side response measures.

C: Development Plans should:

1) identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure

2) identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.

D: Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system:

1) the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

    a) connect to local existing or planned heat networks

    b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)

    c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)

    d) use ultra-low NOx gas boilers

2) CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements in Part B of Policy SI 1 Improving air quality

3) where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

E: Heat networks should achieve good practice design and specification standards for primary, secondary and tertiary systems comparable to those set out in the CIBSE/ADE Code of Practice CP1 or equivalent.

**Policy SI4 Managing Heat Risk**

A: Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B: Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

## 3.4 Local Policy

### 3.4.1 Local Plan

The Hillingdon 'A vision for 2026: Local Plan: Part 1 Strategic Policies' was adopted November 2012 and contains the following policies relating to Energy and Sustainability:

**Policy EM1: Climate Change Adaptation and Mitigation**

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1) Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2) Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3) Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4) Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5) Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6) Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.

7) Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation as part of their proposals.

8) Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricty and a greater use of waste as a resource.

9) Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10) Locating and designing development to minimise the probability and impacts of flooding.

11) Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.

12) Giving preference to development of previously developed land to avoid the loss of further green areas.

# 4. Energy

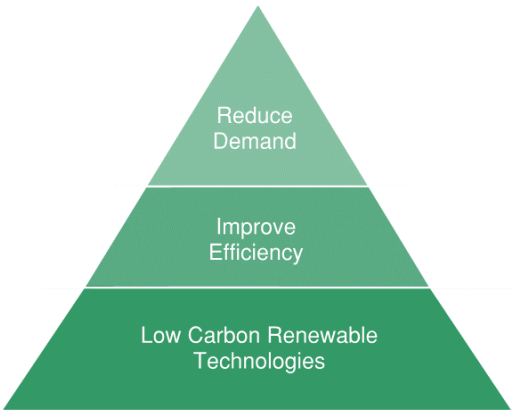
## 4.1 General

The requirements of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) and GLA 'Energy Assessment Guidance' (June 2022) are addressed within this energy statement.

## 4.2 Energy Hierarchy

The energy hierarchy is a classification of energy strategies, prioritised to assist progress towards a more sustainable energy system. It is represented in the figure below and highlights the priority of each step within the hierarchy as you progress downwards through the strata.

Energy demand reduction provides the greatest opportunity for minimising a building's potential $CO_2$ emissions. Design strategies typically include building form and fabric measures (passive design) and energy efficient building services (active design). Focusing on form and fabric in particular at an early stage in the build process is often the most cost-effective way to reduce energy consumption and $CO_2$ emissions. Following demand reduction measures, the residual $CO_2$ emissions can be reduced through low or zero carbon technologies.




Prioritising a reduction in overall energy demand is the most effective way in which to minimise environmental impacts associated with energy use. The use of efficient technologies and renewables to supply the remaining load results in lower greenhouse gas emissions as compared with the use of conventional alternatives.

Cost effective measures can be adopted to reduce energy demand without making a significant impact on the design, appearance or character of the building. It is intended to implement energy efficiency measures to improve on the minimum standards required in Part L of the Building Regulations.

The following sections detail how the carbon dioxide emissions are proposed to be reduced in line with the sequence of priorities set out in the GLA policy following the principles of the energy hierarchy.

# 5. Energy Efficiency and Demand Reduction Measures (BE LEAN)

## 5.1 General

Prioritising a reduction in overall energy demand is the most effective way in which to minimise environmental impacts associated with energy use. The use of efficient technologies and renewables to supply the remaining load results in lower greenhouse gas emissions as compared with the use of conventional alternatives.

Cost effective measures can be adopted to reduce energy demand without making a significant impact on the design, appearance or character of the building. It is intended to implement energy efficiency measures to improve on the minimum standards required in Part L of the Building Regulations.

## 5.2 Proposed Strategy

The following specific measures are proposed to achieve an energy demand reduction at the development:

- Improve U-values of the external envelope.
- Improve U-value of glazing.
- Improve air permeability of building envelope
- Improved efficiency of the space heating, cooling and hot water.
- Use of energy efficient lighting.
- Use of intelligent lighting controls.
- Use of variable speed pumps, fans and drives to match supply and demand.
- Improve efficiency of heat recovery to mechanical ventilation systems.

## 5.3 Energy modelling software

### 5.3.1 EDSL TAS

The development has been modelled using the computer modelling package EDSL Tas Part L2A 2021 Version 9.5.6 interfaced to SBEM Version 6.1.e.0 which is based on BRE's standard calculation tool and uses a dynamic simulation method for checking compliance.

The geographically nearest CIBSE Test Reference Year (TRY) has been used which is London.

The energy model has been produced to predict the actual energy consumption of the building. When a simulation is performed, a 'notional' building is created. This building has the same shape and patterns of use as the actual designed building, but makes standard assumptions regarding the heating, cooling and ventilation plant, lighting and building fabric. The energy consumption of this building is predicted using the software.

### 5.3.2 Non-Regulated Energy

The London Plan requires the unregulated energy demand and carbon emissions from the development to be shown.

The Part L 2021 software includes an indicative calculation for 'Equipment' within a building based upon historical data for similar buildings and uses. This includes the small power and process energy not taken into account within the Part L model.

The equipment energy predicted for the proposed development utilising the software figures is 60.15kWh/$m^2$ (97.74MWh/annum), an equivalent of 13.55 tonnes$CO_2$/annum.

## 5.4 Energy Efficiency and Demand Reduction Measures

### 5.4.1 Major Refurbishment

As noted within the GLA 'Energy Assessment Guidance' (June 2022), where a major refurbishment is to be carried out, an estimate of the $CO_2$ savings from the refurbished building will be expected. To provide this, applicants are required to estimate the CO2 emission baseline performance of the existing building using Building Regulations approved compliance software.

Applicants are required to generate baseline $CO_2$ emissions assuming the notional specification for existing buildings, shown in Appendix 3 of the GLA 'Energy Assessment Guidance' (June 2022), and which is based on Approved Documents L1 and L2. This will provide a consistent baseline across all refurbishments and clearly distinguish the improvements in $CO_2$ emissions that are over and above what would ordinarily be undertaken through meeting Building Regulation requirements.

There will be instances where the energy performance of existing elements is more efficient than the Notional Specification for Existing Buildings. In this case the actual energy performance of the building element should be used. For change of use applications, the Part L model for estimating $CO_2$ emissions should use the same building Use Class for the baseline as for the proposed development.

Once the baseline has been established, applicants will be expected to demonstrate that they have incorporated improvement measures that maximise performance at each stage of the energy hierarchy.

The BER/DER of the refurbished building should be determined following improvements at each stage of the energy hierarchy using Building Regulations compliance software. These figures should then be used to report the $CO_2$ savings at each stage of the energy hierarchy in the carbon emissions reporting spreadsheet and included in the energy assessment.

It is acknowledged within the GLA 'Energy Assessment Guidance' (June 2022) that the level of carbon savings that can be achieved through a refurbishment can vary considerably, however every effort should be made to improve the energy performance of the building in line with London Plan carbon targets and to follow the energy hierarchy.

### 5.4.2 Building Fabric

The baseline and improved 'Be lean' building fabric assumptions are noted in the table below. The baseline figures are in line with the notional specification for existing buildings, shown in Appendix 3 of the GLA 'Energy Assessment Guidance' (June 2022) unless indicated otherwise.

| Element | Existing building | Proposed 'Be Lean' building |
|---|---|---|
| External Wall (Cavity Insulation) | U0.50 in-line with existing building specification | U0.18 to upgraded areas |
| Roof (Flat Roof) | U0.18 | U0.16 |
| Floor | U0.25 | U0.25 |
| Glazing (inc g-value) | U1.40 (0.40) | U1.40 (0.29) |
| Door | U2.20 | U2.20 |
| Air permeability | 25 | 10 |

### 5.4.3 Building Services

The baseline and improved 'Be lean' building services assumptions are noted in the table below. The baseline figures are in line with the notional specification for existing buildings, shown in Appendix 3 of the GLA 'Energy Assessment Guidance' (June 2022) unless indicated otherwise.

| System | Existing building | Proposed 'Be Lean' building |
|---|---|---|
| Space heating | 91% Natural Gas | 98% Natural Gas |
| Hot Water | 91% Natural Gas | 98% Natural Gas |
| Cooling | SEER 5.0 | SEER 5.0 |
| Ventilation (Central S&E) | 2.60 W/l/s | 1.80 W/l/s |
| Ventilation (Local S&E) | 2.00 W/l/s | 1.20 W/l/s |
| Heat Recovery | 70% | 70% (Central)<br>75% (Local) |
| Lighting | 60Llm/cW | See lighting summary below. |

The hotel operator's Mechanical, Electrical and Public Health Services Standard Specification specifies heat pumps to generate space heating and cooling. The generation of heat from the heat pump is incorporated within section 7 of this report as a source of low carbon energy.

For the purposes of the 'Be lean' energy efficient energy model, the space heating and hot water are assumed to be generated through gas-fired radiators at 98% efficiency. Space cooling will be via chillers with an EER of 5.00.

The following lighting efficiency and controls have been assumed in line with the standard hotel operator's lighting information:

- En-suite Bathrooms: 94 Llm/cW; Manual On/ Manual Off; No daylight control.
- Bedrooms: 94 Llm/cW; Manual On/ Manual Off; No daylight control.
- Bedroom Corridors: 125 Llm/cW; Auto On/ Auto Off; No daylight control.
- Circulation: 110 Llm/cW; Manual On/ Manual Off; No daylight control.
- WC: 110 Llm/cW; Auto On/ Auto Off; No daylight control.
- Kitchen: 140 Llm/cW; Manual On/ Manual Off; No daylight control.

- Bar/Cafe: 140 Llm/cW; Manual On/ Manual Off; No daylight control, 116 Llm/cW display lighting.
- Linen Rooms: 140 Llm/cW; Manual On/ Manual Off; No daylight control.
- Office, Staffroom: 140 Llm/cW; Manual On/ Manual Off; No daylight control.
- Plant: 95 Llm/cW; Manual On/ Manual Off; No daylight control.
- Reception, Foyer: 116 Llm/cW; Manual On/ Manual Off; No daylight control, 116 Llm/cW display lighting.
- Store: 140 Llm/cW; Manual On/ Manual Off; No daylight control.

Other HVAC modelling assumptions are as follows:

- Electrical Power Factor Correction:<0.90
- No light metering with warning about out-of-range values.
- No heat monitoring with warning about out-of-range values.

## 5.5 $CO_2$ Emissions

The baseline energy model summary representing the existing building with the notional specification is included within Appendix A. The 'Be lean' energy model summary includes the proposed energy efficiency and demand reduction measures, in accordance with the GLA 'Energy Assessment Guidance' (June 2022) is included within Appendix B. The GLA Carbon Emission Reporting Spreadsheet is included within Appendix F, with a summary of the regulated carbon savings for the 'Be lean' stage shown in the table below.

| | **Carbon dioxide emissions for non-domestic buildings (Tonnes $CO_2$ per annum)** | |
|---|---|---|
| | **Regulated** | **Unregulated** |
| **Baseline: Existing building with notional specification** | 131.9 | 13.6 |
| **After energy demand reduction (be lean)** | 101.6 | 13.6 |

| | **Regulated non-domestic carbon dioxide savings** | |
|---|---|---|
| | **(Tonnes $CO_2$ per annum)** | **(%)** |
| **Be lean: savings from energy demand reduction** | 30.3 | 23% |

Following the incorporation of energy efficiency measures, the BER emissions of the development are 101.6 tonnes$CO_2$/annum, an improvement of 23% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.

# 6. Supply Energy Efficiently via Decentralised Energy (BE CLEAN)

## 6.1 General

Policy SI3 of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) requires that possible connection to existing heating or cooling networks should be evaluated before site wide combined heat and power systems are investigated.

The high year round domestic hot water demand makes the use of a combined heat and power plant potentially feasible for this building. However, the pattern of demand for both heat and electricity across the day needs to be considered which has implications for the economic feasibility of combined heat and power plant.

A Combined Heat and Power (CHP) system is an efficient way of generating electricity onsite with the benefit of reduced fuel costs (gas being cheaper than electricity) and reduced carbon emissions. Heat generated from the gas engine can be used to produce hot water for heating and domestic hot water.

## 6.2 Constraints and feasibility

### 6.2.1 Operator Constraints

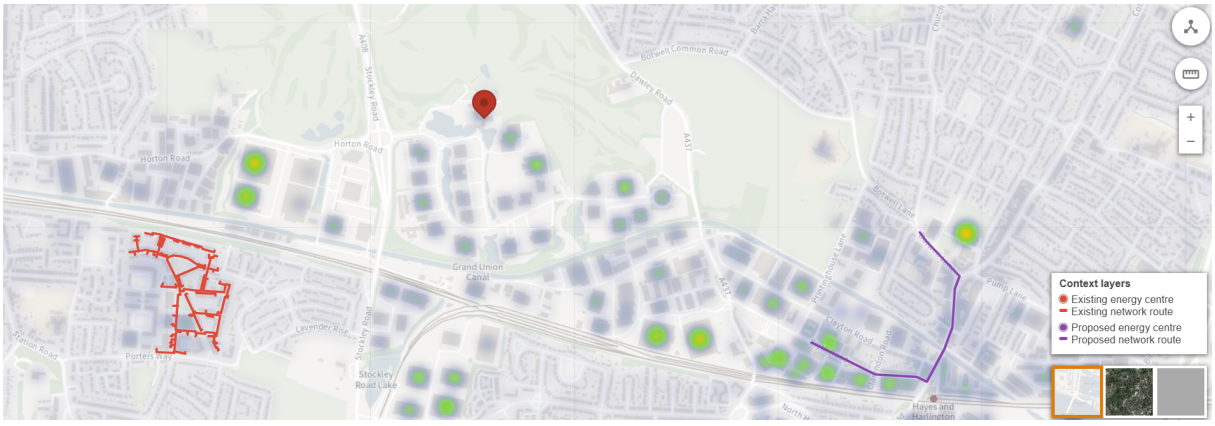
CHP for heating and hot water will potentially be suitable however the proposed hotel's requirement for heating via heat pumps means a CHP scheme may only be suitable for the hot water installation.

CCHP (Combined Cooling and Heating Power) requires cooling to form a significant element of the development's energy consumption. The proposed requirement for cooling via air source pumps means CCHP would not be feasible.

### 6.2.2 Site Constraints

In accordance with policy SI3 of The London Plan existing heating networks have been investigated for possible connection.

The London Heat Map network has been consulted and one existing and one proposed district heating network have been identified in the wider area (see the image below), however neither are in close enough proximity to be feasibly connected to the development.




Connection to an existing or proposed district heating network has been discounted for this scheme.

### 6.2.3 Engineering Feasibility

Integrated CHP into a hotel facility without the type of constant base load which would normally be provided by leisure facilities requires careful consideration since the CHP units need to be sized to match the available base load without excessive cycling which would reduce the effectiveness and life expectancy of the units.

The domestic hot water base load for the existing hotel is already provided via a CHP unit and gas-fired water heaters. It is proposed the 7-bedrooms conversion within the existing hotel will connect to this existing system to provide their hot water demand.

For the main refurbishment aspect of the scheme, CHP is not proposed to generate space heating or hot water. As a result of the energy modelling, greater carbon savings have been deemed achievable through the use of air source heat pumps to generate space heating and hot water, therefore CHP has been discounted.

## 6.3 $CO_2$ Emissions

The 'Be clean' energy model does not incorporate any further changes to the 'Be lean' energy model, as no district heating or additional CHP systems are proposed to be included within the development. The 'Be clean' energy summary is included in Appendix C. The GLA Carbon Emission Reporting Spreadsheet is included within Appendix F, with a summary of the regulated carbon savings for the 'Be clean' stage shown in the table below.

| | **Carbon dioxide emissions for non-domestic buildings (Tonnes $CO_2$ per annum)** | |
|---|---|---|
| | **Regulated** | **Unregulated** |
| **Baseline: Existing building with notional specification** | 131.9 | 13.6 |
| **After energy demand reduction (be lean)** | 101.6 | 13.6 |
| **After heat network connection (be clean)** | 101.6 | 13.6 |

| | **Regulated non-domestic carbon dioxide savings** | |
|---|---|---|
| | **(Tonnes $CO_2$ per annum)** | **(%)** |
| **Be lean: savings from energy demand reduction** | 30.3 | 23% |
| **Be clean: savings from heat network** | 0.0 | 0% |

The BER emissions of the development are 101.6 tonnes$CO_2$/annum, an improvement of 23% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum. No further savings are achieved for the 'Be clean' model.

# 7. Renewable Energy Technologies (BE GREEN)

## 7.1 Low/ Zero carbon technologies

The feasibility of a number of potentially appropriate renewable energy technologies has been investigated for the proposed development.

| Technology | Suitable? | Observations |
|---|---|---|
| Air source heat pumps | √ | Proposed to generate space heating and cooling, plus the domestic hot water. |
| Ground source heat pumps | X | Existing building and lack of available ground space precludes formation of boreholes. |
| Biomass hot water | X | Insufficient plant, fuel storage and delivery space at basement/ground floor for fuel storage. Fuel delivery difficulties. |
| Solar water heating | X | Not compatible with ASHP or CHP in the hotel. |
| Photovoltaics | √ | Roof space available and proposed within the scheme. |
| Wind turbines | X | Poor yield within urbanised area and likely planning issues. |

The hotel operator's specification requires the use of heat pumps within the bedrooms, foyer, reception and offices to provide heating and cooling. The proposed air source heat pumps will provide space heating at a SCOP between 4.39-4.53 and cooling at a SEER between 7.05-7.78. It is proposed for air source heat pumps to meet the domestic hot water demand for the main refurbishment at a SCOP of 4.53 to units 1–4 COP of 3.66 to unit 5. The manufacturer datasheets confirming the efficiencies used within the energy model are included within Appendix E.

Potential carbon emission savings from biomass are significant however there is limited ground floor area for biomass fuel storage and plant space, therefore this has been discounted.

It is acknowledged that the potential energy saving from solar water heating could be significant, however this technology is not compatible with the proposed air source heat pump system, or CHP within the existing building.

There is available roof space for the installation of solar photovoltaics and this technology will be compatible with the proposed air source heat pump systems. A 111m$^2$ area of solar photovoltaics has been proposed to maximise available space on the roof.

A wind turbine would be able to provide zero carbon energy, however the yield would be compromised by the urbanised surroundings creating greater wind turbulence.

## 7.2 $CO_2$ Emissions

The 'Be green' energy model includes the low and zero carbon technologies, in accordance with the GLA 'Energy Assessment Guidance' (June 2022) is included within Appendix D. The GLA Carbon Emission Reporting Spreadsheet is included within Appendix F, with a summary of the regulated carbon savings for the 'Be green' stage shown in the table below.

| | Carbon dioxide emissions for non-domestic buildings (Tonnes $CO_2$ per annum) | |
|---|---|---|
| | **Regulated** | **Unregulated** |
| **Baseline: Existing building with notional specification** | 131.9 | 13.6 |
| **After energy demand reduction (be lean)** | 101.6 | 13.6 |
| **After heat network connection (be clean)** | 101.6 | 13.6 |
| **After renewable energy (be green)** | 18.0 | 13.6 |

| | Regulated non-domestic carbon dioxide savings | |
|---|---|---|
| | **(Tonnes $CO_2$ per annum)** | **(%)** |
| **Be lean: savings from energy demand reduction** | 30.3 | 23% |
| **Be clean: savings from heat network** | 0.0 | 0% |
| **Be green: savings from renewable energy** | 83.6 | 63% |

Following the incorporation of low and zero carbon technologies, the BER emissions of the development are 18.0 tonnes$CO_2$/annum, an improvement of 86% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.

In accordance with the GLA 'Energy Assessment Guidance' (June 2022) and GLA 'Carbon Offsetting Guide' (June 2022), the remaining 18.0 tonnes tonnes$CO_2$/annum will be offset. This is calculated over 30 years using the GLA's recommended price of £95 tonne/annum, shown below.

**18.0 tonnes * £95 * 30 years = £51,407**

# 8. Cooling

## 8.1 General

Policy SI4 of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) requires that developments seek to reduce the risk of overheating and excessive heat generation. The cooling hierarchy has been followed to reduce the potential for overheating and reliance on air conditioning systems as follows:

- Energy efficient refurbishment of the building envelope including thermal insulation representing an increase in performance above the existing building.
- Low g-value glazing proposed to all new glazing.
- Internal blinds and curtains where required to reduce heat gain.
- Exposed internal mass where practical to manage heat gain.
- Mechanical ventilation to occupied areas.
- Active cooling in the form of low energy air source heat pumps system will be incorporated following these actions.

The below table shows the area weighted average for the actual and notional cooling demand:

| | **Area weighted average building cooling demand (kWh/m²)** |
|---|---|
| **Actual** | 3.22 |
| **Notional** | 4.65 |

The actual building's cooling demand is shown to be lower than the notional as required within The London Plan: Spatial Development Strategy for Greater London (March 2021) and the GLA 'Energy Assessment Guidance' (June 2022).

# 9. Summary

## 9.1 General

To address the requirements of 'The London Plan: The Spatial Development Strategy for Greater London' (March 2021) and GLA 'Energy Assessment Guidance' (June 2022), the principles of the energy hierarchy have been followed to determine the energy strategy for the proposed development.

Energy efficiency and demand reduction measures will be applied to the refurbished and converted aspects of the development to improve the performance beyond the existing building and the minimum requirements in Part L of the Building Regulations.

Connection to an existing or proposed district heating network has been discounted for this scheme, as neither the existing or proposed district heating networks are in close enough proximity to be feasibly connected to the development.

Air source heat pumps will be incorporated into the proposed hotel scheme as a source of low carbon energy to meet a significant proportion of the space heating and cooling, and hot water demand, plus roof mounted solar photovoltaics as a source of zero carbon energy.

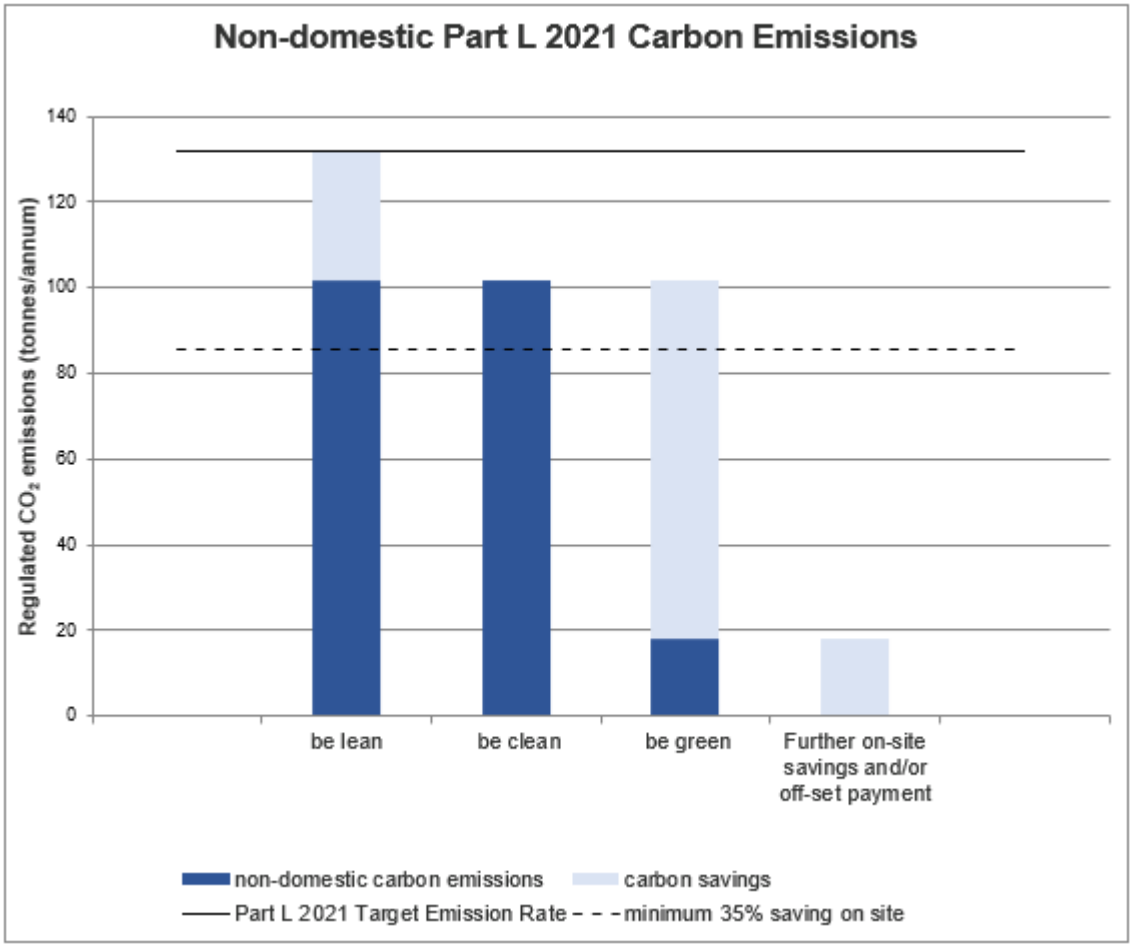
## 9.2 $CO_2$ Emissions

The final 'Be green' energy model includes energy efficiency and demand reduction measures, plus the proposed low and zero carbon technologies, in accordance with the GLA 'Energy Assessment Guidance' (June 2022) and is included within Appendix D. The GLA Carbon Emission Reporting Spreadsheet is included within Appendix F, with a summary of the shown in the table below.

| | **Carbon dioxide emissions for non-domestic buildings (Tonnes $CO_2$ per annum)** | |
|---|---|---|
| | **Regulated** | **Unregulated** |
| **Baseline: Existing building with notional specification** | 131.9 | 13.6 |
| **After energy demand reduction (be lean)** | 101.6 | 13.6 |
| **After heat network connection (be clean)** | 101.6 | 13.6 |
| **After renewable energy (be green)** | 18.0 | 13.6 |

| | **Regulated non-domestic carbon dioxide savings** | |
|---|---|---|
| | **(Tonnes $CO_2$ per annum)** | **(%)** |
| **Be lean: savings from energy demand reduction** | 30.3 | 23% |
| **Be clean: savings from heat network** | 0.0 | 0% |
| **Be green: savings from renewable energy** | 83.6 | 63% |
| **Total Cumulative Savings** | 113.9 | 86% |

The BER emissions of the proposed development are 18.0 tonnes$CO_2$/annum, an improvement of 86% above the Baseline Building BER of 131.9 tonnes$CO_2$/annum.




## 9.3 Carbon Offset

In accordance with the GLA 'Energy Assessment Guidance' (June 2022) and GLA 'Carbon Offsetting Guide' (June 2022), the remaining 18.0 tonnes tonnes$CO_2$/annum will be offset. This is calculated over 30 years using the GLA's recommended price of £95 tonne/annum, shown below.

**18.0 tonnes * £95 * 30 years = £51,407**

# Appendix A: Energy Model Data – Baseline

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

**Project name**

## Travelodge, Stockley Park - Baseline

As designed

**Date:** Fri Jan 24 13:04:23 2025

## Administrative information

### Building Details

**Address:** Travelodge, The Arena, Stockley Park, LONDON,

### Certifier details

**Name:** Sam Jones

**Telephone number:** 0113 730 3430

**Address:** Craven House, 14-18 York Road, WETHERBY, LS22 6SL

### Certification tool

**Calculation engine:** TAS

**Calculation engine version:** "v9.5.6"

**Interface to calculation engine:** TAS

**Interface to calculation engine version:** v9.5.6

**BRUKL compliance module version:** v6.1.e.0

**Foundation area [m²]:** 426.53

## The $CO_2$ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

| | | |
|---|---|---|
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2annum$ | 47.39 | |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2annum$ | 81.18 | |
| Target primary energy rate (TPER), $kWh_{PE}/m^2annum$ | 263.88 | |
| Building primary energy rate (BPER), $kWh_{PE}/m^2annum$ | 473.44 | |
| Do the building's emission and primary energy rates exceed the targets? | BER > TER | BPER > TPER |

## The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

| Fabric element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | First surface with maximum value |
|---|---|---|---|---|
| Walls* | 0.26 | 0.5 | 0.5 | External Wall |
| Floors | 0.18 | 0.25 | 0.25 | Exposed Floor |
| Pitched roofs | 0.16 | 0.24 | 1.4 | Roof - glazed |
| Flat roofs | 0.18 | - | - | No flat roofs in project |
| Windows** and roof windows | 1.6 | 1.4 | 1.4 | Rotunda Glazing |
| Rooflights*** | 2.2 | - | - | No rooflights in project |
| Personnel doors^ | 1.6 | 2.2 | 2.2 | Door 1.1m*2.1m |
| Vehicle access & similar large doors | 1.3 | - | - | No vehicle access or similar large doors in project |
| High usage entrance doors | 3 | - | - | No high usage entrance doors in project |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air permeability | Limiting standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 8 | 25 |

## Building services

**For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.**

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- GF Bedrooms 1-12 - Mech Vent VRF (26 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 5 | - | 2.6 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

2- 1F Bedrooms 1-31 - Mech Vent VRF (62 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 5 | - | 2.6 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- 1F Bedrooms 32-43 - Mech Vent VRF (14 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 5 | - | 2.6 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

4- Mech Vent VRF - Reception, Bar/Cafe, Office (5 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 5 | - | - | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

5- Mech Vent - WC (GF Acc WC)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | - | 2.6 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

6- Ext Only - Linen (3 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | - | 1.3 | - |
| **Standard value** | 0.93* | N/A | N/A | 1.9^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

7- Mech Vent - Kitchen (GF Kitchen)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | - | 2.6 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- 91% Gas

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.91 | 0 |
| **Standard value** | 0.91 | N/A |

**Zone-level mechanical ventilation, exhaust, and terminal units**

| ID | System type in the Approved Documents |
|---|---|
| A | Local supply or extract ventilation units |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal balanced supply and extract ventilation system |
| E | Local balanced supply and extract ventilation units |
| F | Other local ventilation units |
| G | Fan assisted terminal variable air volume units |
| H | Fan coil units |
| I | Kitchen extract with the fan remote from the zone and a grease filter |

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 | Zone | Standard |
| GF Office | - | - | - | - | 2 | - | - | - | - | - | N/A |
| GF Staff Room | - | - | - | - | 2 | - | - | - | - | - | N/A |
| GF Reception | - | - | - | - | 2 | - | - | - | - | - | N/A |
| GF Bar Cafe | - | - | - | - | 2 | - | - | - | - | - | N/A |
| GF Bar Cafe Rotunda | - | - | - | - | 2 | - | - | - | - | - | N/A |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 001 | 60 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 002 | 60 | - | - |
| C1_Bath 003 | 60 | - | - |
| C1_Bath 004 | 60 | - | - |
| C1_Bath 005 | 60 | - | - |
| C1_Bath 006 | 60 | - | - |
| C1_Bath 007 | 60 | - | - |
| C1_Bath 008 | 60 | - | - |
| C1_Bath 009 | 60 | - | - |
| C1_Bath 010 | 60 | - | - |
| C1_Bath 011 | 60 | - | - |
| C1_Bath 012 | 60 | - | - |
| C1_Bath 013 | 60 | - | - |
| C1_Bath 101 | 60 | - | - |
| C1_Bath 102 | 60 | - | - |
| C1_Bath 103 | 60 | - | - |
| C1_Bath 104 | 60 | - | - |
| C1_Bath 105 | 60 | - | - |
| C1_Bath 106 | 60 | - | - |
| C1_Bath 107 | 60 | - | - |
| C1_Bath 108 | 60 | - | - |
| C1_Bath 109 | 60 | - | - |
| C1_Bath 110 | 60 | - | - |
| C1_Bath 111 | 60 | - | - |
| C1_Bath 112 | 60 | - | - |
| C1_Bath 113 | 60 | - | - |
| C1_Bath 114 | 60 | - | - |
| C1_Bath 115 | 60 | - | - |
| C1_Bath 116 | 60 | - | - |
| C1_Bath 117 | 60 | - | - |
| C1_Bath 118 | 60 | - | - |
| C1_Bath 119 | 60 | - | - |
| C1_Bath 120 | 60 | - | - |
| C1_Bath 121 | 60 | - | - |
| C1_Bath 122 | 60 | - | - |
| C1_Bath 123 | 60 | - | - |
| C1_Bath 124 | 60 | - | - |
| C1_Bath 125 | 60 | - | - |
| C1_Bath 126 | 60 | - | - |
| C1_Bath 127 | 60 | - | - |
| C1_Bath 128 | 60 | - | - |
| C1_Bath 129 | 60 | - | - |
| C1_Bath 130 | 60 | - | - |
| C1_Bath 131 | 60 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 132 | 60 | - | - |
| C1_Bath 133 | 60 | - | - |
| C1_Bath 134 | 60 | - | - |
| C1_Bath 135 | 60 | - | - |
| C1_Bath 136 | 60 | - | - |
| C1_Bath 137 | 60 | - | - |
| C1_Bath 138 | 60 | - | - |
| C1_Bedroom 001 | 60 | - | - |
| C1_Bedroom 002 | 60 | - | - |
| C1_Bedroom 003 | 60 | - | - |
| C1_Bedroom 004 | 60 | - | - |
| C1_Bedroom 005 | 60 | - | - |
| C1_Bedroom 006 | 60 | - | - |
| C1_Bedroom 007 | 60 | - | - |
| C1_Bedroom 008 | 60 | - | - |
| C1_Bedroom 009 | 60 | - | - |
| C1_Bedroom 010 | 60 | - | - |
| C1_Bedroom 011 | 60 | - | - |
| C1_Bedroom 012 | 60 | - | - |
| C1_Bedroom 013 | 60 | - | - |
| C1_Bedroom 101 | 60 | - | - |
| C1_Bedroom 102 | 60 | - | - |
| C1_Bedroom 103 | 60 | - | - |
| C1_Bedroom 104 | 60 | - | - |
| C1_Bedroom 105 | 60 | - | - |
| C1_Bedroom 106 | 60 | - | - |
| C1_Bedroom 107 | 60 | - | - |
| C1_Bedroom 108 | 60 | - | - |
| C1_Bedroom 109 | 60 | - | - |
| C1_Bedroom 110 | 60 | - | - |
| C1_Bedroom 111 | 60 | - | - |
| C1_Bedroom 112 | 60 | - | - |
| C1_Bedroom 113 | 60 | - | - |
| C1_Bedroom 114 | 60 | - | - |
| C1_Bedroom 115 | 60 | - | - |
| C1_Bedroom 116 | 60 | - | - |
| C1_Bedroom 117 | 60 | - | - |
| C1_Bedroom 118 | 60 | - | - |
| C1_Bedroom 119 | 60 | - | - |
| C1_Bedroom 120 | 60 | - | - |
| C1_Bedroom 121 | 60 | - | - |
| C1_Bedroom 122 | 60 | - | - |
| C1_Bedroom 123 | 60 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bedroom 124 | 60 | - | - |
| C1_Bedroom 125 | 60 | - | - |
| C1_Bedroom 126 | 60 | - | - |
| C1_Bedroom 127 | 60 | - | - |
| C1_Bedroom 128 | 60 | - | - |
| C1_Bedroom 129 | 60 | - | - |
| C1_Bedroom 130 | 60 | - | - |
| C1_Bedroom 131 | 60 | - | - |
| C1_Bedroom 132 | 60 | - | - |
| C1_Bedroom 133 | 60 | - | - |
| C1_Bedroom 134 | 60 | - | - |
| C1_Bedroom 135 | 60 | - | - |
| C1_Bedroom 136 | 60 | - | - |
| C1_Bedroom 137 | 60 | - | - |
| C1_Bedroom 138 | 60 | - | - |
| GF Office | 60 | - | - |
| GF Staff Room | 60 | - | - |
| GF Reception | 60 | 22 | - |
| GF Linen Intake | 60 | - | - |
| 1F Store | 60 | - | - |
| 1F Linen 1 | 60 | - | - |
| 1F Linen 2 | 60 | - | - |
| GF Plant | 60 | - | - |
| GF Stairs | 60 | - | - |
| GF WC Lobby | 60 | - | - |
| GF Bedroom Corridor | 60 | - | - |
| GF Cafe Circulation | 60 | - | - |
| 1F Bedroom Corridor 1 | 60 | - | - |
| 1F Bedroom Corridor 2 | 60 | - | - |
| 1F Refuge | 60 | - | - |
| 1F Stairs | 60 | - | - |
| GF Bar Cafe | 60 | 22 | - |
| GF Bar Cafe Rotunda | 60 | 22 | - |
| GF Kitchen | 60 | - | - |
| GF Acc WC | 60 | - | - |

## The spaces in the building should have appropriate passive control measures to limit solar gains in summer

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 001 | N/A | N/A |
| C1_Bath 002 | N/A | N/A |
| C1_Bath 003 | N/A | N/A |
| C1_Bath 004 | N/A | N/A |
| C1_Bath 005 | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 006 | N/A | N/A |
| C1_Bath 007 | N/A | N/A |
| C1_Bath 008 | N/A | N/A |
| C1_Bath 009 | N/A | N/A |
| C1_Bath 010 | N/A | N/A |
| C1_Bath 011 | N/A | N/A |
| C1_Bath 012 | N/A | N/A |
| C1_Bath 013 | N/A | N/A |
| C1_Bath 101 | N/A | N/A |
| C1_Bath 102 | N/A | N/A |
| C1_Bath 103 | N/A | N/A |
| C1_Bath 104 | N/A | N/A |
| C1_Bath 105 | N/A | N/A |
| C1_Bath 106 | N/A | N/A |
| C1_Bath 107 | N/A | N/A |
| C1_Bath 108 | N/A | N/A |
| C1_Bath 109 | N/A | N/A |
| C1_Bath 110 | N/A | N/A |
| C1_Bath 111 | N/A | N/A |
| C1_Bath 112 | N/A | N/A |
| C1_Bath 113 | N/A | N/A |
| C1_Bath 114 | N/A | N/A |
| C1_Bath 115 | N/A | N/A |
| C1_Bath 116 | N/A | N/A |
| C1_Bath 117 | N/A | N/A |
| C1_Bath 118 | N/A | N/A |
| C1_Bath 119 | N/A | N/A |
| C1_Bath 120 | N/A | N/A |
| C1_Bath 121 | N/A | N/A |
| C1_Bath 122 | N/A | N/A |
| C1_Bath 123 | N/A | N/A |
| C1_Bath 124 | N/A | N/A |
| C1_Bath 125 | N/A | N/A |
| C1_Bath 126 | N/A | N/A |
| C1_Bath 127 | N/A | N/A |
| C1_Bath 128 | N/A | N/A |
| C1_Bath 129 | N/A | N/A |
| C1_Bath 130 | N/A | N/A |
| C1_Bath 131 | N/A | N/A |
| C1_Bath 132 | N/A | N/A |
| C1_Bath 133 | N/A | N/A |
| C1_Bath 134 | N/A | N/A |
| C1_Bath 135 | N/A | N/A |
| C1_Bath 136 | N/A | N/A |
| C1_Bath 137 | N/A | N/A |
| C1_Bath 138 | N/A | N/A |
| C1_Bedroom 001 | NO (-37%) | NO |
| C1_Bedroom 002 | NO (-38%) | NO |
| C1_Bedroom 003 | NO (-40%) | NO |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bedroom 004 | NO (-56%) | NO |
| C1_Bedroom 005 | NO (-38%) | NO |
| C1_Bedroom 006 | NO (-48%) | NO |
| C1_Bedroom 007 | NO (-37%) | NO |
| C1_Bedroom 008 | NO (-46%) | NO |
| C1_Bedroom 009 | NO (-40%) | NO |
| C1_Bedroom 010 | NO (-49%) | NO |
| C1_Bedroom 011 | NO (-38%) | NO |
| C1_Bedroom 012 | NO (-50%) | NO |
| C1_Bedroom 013 | NO (-39%) | NO |
| C1_Bedroom 101 | NO (-39%) | NO |
| C1_Bedroom 102 | NO (-44%) | NO |
| C1_Bedroom 103 | NO (-41%) | NO |
| C1_Bedroom 104 | NO (-49%) | NO |
| C1_Bedroom 105 | NO (-39%) | NO |
| C1_Bedroom 106 | NO (-47%) | NO |
| C1_Bedroom 107 | NO (-38%) | NO |
| C1_Bedroom 108 | NO (-47%) | NO |
| C1_Bedroom 109 | NO (-41%) | NO |
| C1_Bedroom 110 | NO (-49%) | NO |
| C1_Bedroom 111 | NO (-39%) | NO |
| C1_Bedroom 112 | NO (-47%) | NO |
| C1_Bedroom 113 | NO (-40%) | NO |
| C1_Bedroom 114 | NO (-48%) | NO |
| C1_Bedroom 115 | NO (-14%) | NO |
| C1_Bedroom 116 | NO (-44%) | NO |
| C1_Bedroom 117 | NO (-25%) | NO |
| C1_Bedroom 118 | NO (-25%) | NO |
| C1_Bedroom 119 | NO (-61%) | NO |
| C1_Bedroom 120 | NO (-45%) | NO |
| C1_Bedroom 121 | NO (-46%) | NO |
| C1_Bedroom 122 | NO (-41%) | NO |
| C1_Bedroom 123 | NO (-52%) | NO |
| C1_Bedroom 124 | NO (-48%) | NO |
| C1_Bedroom 125 | NO (-50%) | NO |
| C1_Bedroom 126 | NO (-26%) | NO |
| C1_Bedroom 127 | NO (-39%) | NO |
| C1_Bedroom 128 | NO (-42%) | NO |
| C1_Bedroom 129 | NO (-73%) | NO |
| C1_Bedroom 130 | NO (-38%) | NO |
| C1_Bedroom 131 | NO (-41%) | NO |
| C1_Bedroom 132 | NO (-62%) | NO |
| C1_Bedroom 133 | NO (-39%) | NO |
| C1_Bedroom 134 | NO (-47%) | NO |
| C1_Bedroom 135 | NO (-39%) | NO |
| C1_Bedroom 136 | NO (-55%) | NO |
| C1_Bedroom 137 | NO (-49%) | NO |
| C1_Bedroom 138 | NO (-20%) | NO |
| GF Office | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| GF Staff Room | N/A | N/A |
| GF Reception | NO (-15%) | NO |
| GF Bar Cafe | YES (+27%) | NO |
| GF Bar Cafe Rotunda | YES (+864%) | NO |

## Regulation 25A: Consideration of high efficiency alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Floor area [$m^2$] | 1625 | 1625 |
| External area [$m^2$] | 3618 | 3618 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 25 | 3 |
| Average conductance [W/K] | 1565 | 1057 |
| Average U-value [$W/m^2K$] | 0.43 | 0.29 |
| Alpha value* [%] | 24.95 | 9.95 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | Retail/Financial and Professional Services |
| | Restaurants and Cafes/Drinking Establishments/Takeaways |
| | Offices and Workshop Businesses |
| | General Industrial and Special Industrial Groups |
| | Storage or Distribution |
| **100** | **Hotels** |
| | Residential Institutions: Hospitals and Care Homes |
| | Residential Institutions: Residential Schools |
| | Residential Institutions: Universities and Colleges |
| | Secure Residential Institutions |
| | Residential Spaces |
| | Non-residential Institutions: Community/Day Centre |
| | Non-residential Institutions: Libraries, Museums, and Galleries |
| | Non-residential Institutions: Education |
| | Non-residential Institutions: Primary Health Care Building |
| | Non-residential Institutions: Crown and County Courts |
| | General Assembly and Leisure, Night Clubs, and Theatres |
| | Others: Passenger Terminals |
| | Others: Emergency Services |
| | Others: Miscellaneous 24hr Activities |
| | Others: Car Parks 24 hrs |
| | Others: Stand Alone Utility Block |

## Energy Consumption by End Use [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Heating | 128.54 | 21.37 |
| Cooling | 2.67 | 4.65 |
| Auxiliary | 20.46 | 6.26 |
| Lighting | 26.37 | 10.77 |
| Hot water | 225.61 | 196.14 |
| Equipment* | 60.15 | 60.15 |
| **TOTAL**** | **403.65** | **239.2** |

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 0 | 8.71 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |
| *Displaced electricity* | *0* | *8.71* |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 426.96 | 147.13 |
| Primary energy [$kWh_{PE}/m^2$] | 473.44 | 263.88 |
| Total emissions [$kg/m^2$] | 81.18 | 47.39 |

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 505.3 | 6.5 | 171.4 | 0.4 | 21.7 | 0.82 | 5 | 0.91 | 5 |
| | Notional | 86 | 64.4 | 27.8 | 4.1 | 5.7 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 491 | 8.2 | 166.5 | 0.5 | 22.8 | 0.82 | 5 | 0.91 | 5 |
| | Notional | 107.3 | 58.3 | 34.7 | 3.7 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 474.2 | 11 | 160.9 | 0.6 | 22.6 | 0.82 | 5 | 0.91 | 5 |
| | Notional | 96.7 | 64.1 | 31.2 | 4.1 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 510.1 | 334.9 | 173 | 18.6 | 21.5 | 0.82 | 5 | 0.91 | 5 |
| | Notional | 39.3 | 318.7 | 12.7 | 20.1 | 7.4 | 0.86 | 4.4 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 210.9 | 0 | 71.5 | 0 | 25 | 0.82 | 0 | 0.91 | 0 |
| | Notional | 8.1 | 0 | 2.6 | 0 | 22.9 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 463.5 | 0 | 157.2 | 0 | 88.7 | 0.82 | 0 | 0.91 | 0 |
| | Notional | 137.6 | 0 | 44.5 | 0 | 28 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 37.1 | 0 | 12.6 | 0 | 55.6 | 0.82 | 0 | 0.91 | 0 |
| | Notional | 0 | 0 | 0 | 0 | 15.7 | 0 | 0 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

# Appendix B: Energy Model Data – Be lean

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

**Project name**

## Travelodge, Stockley Park - Be Lean

As designed

**Date:** Fri Jan 24 13:21:34 2025

## Administrative information

### Building Details

**Address:** Travelodge, The Arena, Stockley Park, LONDON,

### Certifier details

**Name:** Sam Jones

**Telephone number:** 0113 730 3430

**Address:** Craven House, 14-18 York Road, WETHERBY, LS22 6SL

### Certification tool

**Calculation engine:** TAS

**Calculation engine version:** "v9.5.6"

**Interface to calculation engine:** TAS

**Interface to calculation engine version:** v9.5.6

**BRUKL compliance module version:** v6.1.e.0

**Foundation area [m²]:** 426.53

## The $CO_2$ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

| | | |
|---|---|---|
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2annum$ | 47.39 | |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2annum$ | 62.54 | |
| Target primary energy rate (TPER), $kWh_{PE}/m^2annum$ | 263.88 | |
| Building primary energy rate (BPER), $kWh_{PE}/m^2annum$ | 357.19 | |
| Do the building's emission and primary energy rates exceed the targets? | BER > TER | BPER > TPER |

## The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

| Fabric element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | First surface with maximum value |
|---|---|---|---|---|
| Walls* | 0.26 | 0.27 | 0.5 | External Wall |
| Floors | 0.18 | 0.25 | 0.25 | Exposed Floor |
| Pitched roofs | 0.16 | 0.22 | 1.4 | Roof - glazed |
| Flat roofs | 0.18 | - | - | No flat roofs in project |
| Windows** and roof windows | 1.6 | 1.4 | 1.4 | Rotunda Glazing |
| Rooflights*** | 2.2 | - | - | No rooflights in project |
| Personnel doors^ | 1.6 | 2.2 | 2.2 | Door 1.1m*2.1m |
| Vehicle access & similar large doors | 1.3 | - | - | No vehicle access or similar large doors in project |
| High usage entrance doors | 3 | - | - | No high usage entrance doors in project |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air permeability | Limiting standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 8 | 10 |

## Building services

**For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.**

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- GF Bedrooms 1-12 - Mech Vent VRF (26 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

2- 1F Bedrooms 1-31 - Mech Vent VRF (62 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- 1F Bedrooms 32-43 - Mech Vent VRF (14 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

4- Mech Vent VRF - Reception, Bar/Cafe, Office (5 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | - | 0.75 |
| **Standard value** | 0.93* | 3 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

5- Mech Vent - WC (GF Acc WC)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

6- Ext Only - Linen (3 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 0.9 | - |
| **Standard value** | 0.93* | N/A | N/A | 1.9^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

7- Mech Vent - Kitchen (GF Kitchen)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- 98% Gas

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.98 | 0 |
| **Standard value** | 0.91 | N/A |

**Zone-level mechanical ventilation, exhaust, and terminal units**

| ID | System type in the Approved Documents |
|---|---|
| A | Local supply or extract ventilation units |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal balanced supply and extract ventilation system |
| E | Local balanced supply and extract ventilation units |
| F | Other local ventilation units |
| G | Fan assisted terminal variable air volume units |
| H | Fan coil units |
| I | Kitchen extract with the fan remote from the zone and a grease filter |

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 | Zone | Standard |
| GF Office | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Staff Room | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Reception | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe Rotunda | - | - | - | - | 1.2 | - | - | - | - | - | N/A |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 001 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 002 | 94 | - | - |
| C1_Bath 003 | 94 | - | - |
| C1_Bath 004 | 94 | - | - |
| C1_Bath 005 | 94 | - | - |
| C1_Bath 006 | 94 | - | - |
| C1_Bath 007 | 94 | - | - |
| C1_Bath 008 | 94 | - | - |
| C1_Bath 009 | 94 | - | - |
| C1_Bath 010 | 94 | - | - |
| C1_Bath 011 | 94 | - | - |
| C1_Bath 012 | 94 | - | - |
| C1_Bath 013 | 94 | - | - |
| C1_Bath 101 | 94 | - | - |
| C1_Bath 102 | 94 | - | - |
| C1_Bath 103 | 94 | - | - |
| C1_Bath 104 | 94 | - | - |
| C1_Bath 105 | 94 | - | - |
| C1_Bath 106 | 94 | - | - |
| C1_Bath 107 | 94 | - | - |
| C1_Bath 108 | 94 | - | - |
| C1_Bath 109 | 94 | - | - |
| C1_Bath 110 | 94 | - | - |
| C1_Bath 111 | 94 | - | - |
| C1_Bath 112 | 94 | - | - |
| C1_Bath 113 | 94 | - | - |
| C1_Bath 114 | 94 | - | - |
| C1_Bath 115 | 94 | - | - |
| C1_Bath 116 | 94 | - | - |
| C1_Bath 117 | 94 | - | - |
| C1_Bath 118 | 94 | - | - |
| C1_Bath 119 | 94 | - | - |
| C1_Bath 120 | 94 | - | - |
| C1_Bath 121 | 94 | - | - |
| C1_Bath 122 | 94 | - | - |
| C1_Bath 123 | 94 | - | - |
| C1_Bath 124 | 94 | - | - |
| C1_Bath 125 | 94 | - | - |
| C1_Bath 126 | 94 | - | - |
| C1_Bath 127 | 94 | - | - |
| C1_Bath 128 | 94 | - | - |
| C1_Bath 129 | 94 | - | - |
| C1_Bath 130 | 94 | - | - |
| C1_Bath 131 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 132 | 94 | - | - |
| C1_Bath 133 | 94 | - | - |
| C1_Bath 134 | 94 | - | - |
| C1_Bath 135 | 94 | - | - |
| C1_Bath 136 | 94 | - | - |
| C1_Bath 137 | 94 | - | - |
| C1_Bath 138 | 94 | - | - |
| C1_Bedroom 001 | 94 | - | - |
| C1_Bedroom 002 | 94 | - | - |
| C1_Bedroom 003 | 94 | - | - |
| C1_Bedroom 004 | 94 | - | - |
| C1_Bedroom 005 | 94 | - | - |
| C1_Bedroom 006 | 94 | - | - |
| C1_Bedroom 007 | 94 | - | - |
| C1_Bedroom 008 | 94 | - | - |
| C1_Bedroom 009 | 94 | - | - |
| C1_Bedroom 010 | 94 | - | - |
| C1_Bedroom 011 | 94 | - | - |
| C1_Bedroom 012 | 94 | - | - |
| C1_Bedroom 013 | 94 | - | - |
| C1_Bedroom 101 | 94 | - | - |
| C1_Bedroom 102 | 94 | - | - |
| C1_Bedroom 103 | 94 | - | - |
| C1_Bedroom 104 | 94 | - | - |
| C1_Bedroom 105 | 94 | - | - |
| C1_Bedroom 106 | 94 | - | - |
| C1_Bedroom 107 | 94 | - | - |
| C1_Bedroom 108 | 94 | - | - |
| C1_Bedroom 109 | 94 | - | - |
| C1_Bedroom 110 | 94 | - | - |
| C1_Bedroom 111 | 94 | - | - |
| C1_Bedroom 112 | 94 | - | - |
| C1_Bedroom 113 | 94 | - | - |
| C1_Bedroom 114 | 94 | - | - |
| C1_Bedroom 115 | 94 | - | - |
| C1_Bedroom 116 | 94 | - | - |
| C1_Bedroom 117 | 94 | - | - |
| C1_Bedroom 118 | 94 | - | - |
| C1_Bedroom 119 | 94 | - | - |
| C1_Bedroom 120 | 94 | - | - |
| C1_Bedroom 121 | 94 | - | - |
| C1_Bedroom 122 | 94 | - | - |
| C1_Bedroom 123 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bedroom 124 | 94 | - | - |
| C1_Bedroom 125 | 94 | - | - |
| C1_Bedroom 126 | 94 | - | - |
| C1_Bedroom 127 | 94 | - | - |
| C1_Bedroom 128 | 94 | - | - |
| C1_Bedroom 129 | 94 | - | - |
| C1_Bedroom 130 | 94 | - | - |
| C1_Bedroom 131 | 94 | - | - |
| C1_Bedroom 132 | 94 | - | - |
| C1_Bedroom 133 | 94 | - | - |
| C1_Bedroom 134 | 94 | - | - |
| C1_Bedroom 135 | 94 | - | - |
| C1_Bedroom 136 | 94 | - | - |
| C1_Bedroom 137 | 94 | - | - |
| C1_Bedroom 138 | 94 | - | - |
| GF Office | 140 | - | - |
| GF Staff Room | 140 | - | - |
| GF Reception | 116 | 116 | - |
| GF Linen Intake | 140 | - | - |
| 1F Store | 140 | - | - |
| 1F Linen 1 | 140 | - | - |
| 1F Linen 2 | 140 | - | - |
| GF Plant | 95 | - | - |
| GF Stairs | 110 | - | - |
| GF WC Lobby | 110 | - | - |
| GF Bedroom Corridor | 125 | - | - |
| GF Cafe Circulation | 110 | - | - |
| 1F Bedroom Corridor 1 | 125 | - | - |
| 1F Bedroom Corridor 2 | 125 | - | - |
| 1F Refuge | 110 | - | - |
| 1F Stairs | 110 | - | - |
| GF Bar Cafe | 140 | 116 | - |
| GF Bar Cafe Rotunda | 140 | 116 | - |
| GF Kitchen | 140 | - | - |
| GF Acc WC | 110 | - | - |

## The spaces in the building should have appropriate passive control measures to limit solar gains in summer

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 001 | N/A | N/A |
| C1_Bath 002 | N/A | N/A |
| C1_Bath 003 | N/A | N/A |
| C1_Bath 004 | N/A | N/A |
| C1_Bath 005 | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 006 | N/A | N/A |
| C1_Bath 007 | N/A | N/A |
| C1_Bath 008 | N/A | N/A |
| C1_Bath 009 | N/A | N/A |
| C1_Bath 010 | N/A | N/A |
| C1_Bath 011 | N/A | N/A |
| C1_Bath 012 | N/A | N/A |
| C1_Bath 013 | N/A | N/A |
| C1_Bath 101 | N/A | N/A |
| C1_Bath 102 | N/A | N/A |
| C1_Bath 103 | N/A | N/A |
| C1_Bath 104 | N/A | N/A |
| C1_Bath 105 | N/A | N/A |
| C1_Bath 106 | N/A | N/A |
| C1_Bath 107 | N/A | N/A |
| C1_Bath 108 | N/A | N/A |
| C1_Bath 109 | N/A | N/A |
| C1_Bath 110 | N/A | N/A |
| C1_Bath 111 | N/A | N/A |
| C1_Bath 112 | N/A | N/A |
| C1_Bath 113 | N/A | N/A |
| C1_Bath 114 | N/A | N/A |
| C1_Bath 115 | N/A | N/A |
| C1_Bath 116 | N/A | N/A |
| C1_Bath 117 | N/A | N/A |
| C1_Bath 118 | N/A | N/A |
| C1_Bath 119 | N/A | N/A |
| C1_Bath 120 | N/A | N/A |
| C1_Bath 121 | N/A | N/A |
| C1_Bath 122 | N/A | N/A |
| C1_Bath 123 | N/A | N/A |
| C1_Bath 124 | N/A | N/A |
| C1_Bath 125 | N/A | N/A |
| C1_Bath 126 | N/A | N/A |
| C1_Bath 127 | N/A | N/A |
| C1_Bath 128 | N/A | N/A |
| C1_Bath 129 | N/A | N/A |
| C1_Bath 130 | N/A | N/A |
| C1_Bath 131 | N/A | N/A |
| C1_Bath 132 | N/A | N/A |
| C1_Bath 133 | N/A | N/A |
| C1_Bath 134 | N/A | N/A |
| C1_Bath 135 | N/A | N/A |
| C1_Bath 136 | N/A | N/A |
| C1_Bath 137 | N/A | N/A |
| C1_Bath 138 | N/A | N/A |
| C1_Bedroom 001 | NO (-61%) | NO |
| C1_Bedroom 002 | NO (-62%) | NO |
| C1_Bedroom 003 | NO (-64%) | NO |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bedroom 004 | NO (-56%) | NO |
| C1_Bedroom 005 | NO (-62%) | NO |
| C1_Bedroom 006 | NO (-48%) | NO |
| C1_Bedroom 007 | NO (-62%) | NO |
| C1_Bedroom 008 | NO (-46%) | NO |
| C1_Bedroom 009 | NO (-63%) | NO |
| C1_Bedroom 010 | NO (-49%) | NO |
| C1_Bedroom 011 | NO (-62%) | NO |
| C1_Bedroom 012 | NO (-50%) | NO |
| C1_Bedroom 013 | NO (-63%) | NO |
| C1_Bedroom 101 | NO (-63%) | NO |
| C1_Bedroom 102 | NO (-66%) | NO |
| C1_Bedroom 103 | NO (-64%) | NO |
| C1_Bedroom 104 | NO (-69%) | NO |
| C1_Bedroom 105 | NO (-63%) | NO |
| C1_Bedroom 106 | NO (-67%) | NO |
| C1_Bedroom 107 | NO (-62%) | NO |
| C1_Bedroom 108 | NO (-67%) | NO |
| C1_Bedroom 109 | NO (-64%) | NO |
| C1_Bedroom 110 | NO (-69%) | NO |
| C1_Bedroom 111 | NO (-63%) | NO |
| C1_Bedroom 112 | NO (-67%) | NO |
| C1_Bedroom 113 | NO (-63%) | NO |
| C1_Bedroom 114 | NO (-68%) | NO |
| C1_Bedroom 115 | NO (-47%) | NO |
| C1_Bedroom 116 | NO (-65%) | NO |
| C1_Bedroom 117 | NO (-54%) | NO |
| C1_Bedroom 118 | NO (-54%) | NO |
| C1_Bedroom 119 | NO (-76%) | NO |
| C1_Bedroom 120 | NO (-66%) | NO |
| C1_Bedroom 121 | NO (-67%) | NO |
| C1_Bedroom 122 | NO (-64%) | NO |
| C1_Bedroom 123 | NO (-71%) | NO |
| C1_Bedroom 124 | NO (-68%) | NO |
| C1_Bedroom 125 | NO (-70%) | NO |
| C1_Bedroom 126 | NO (-54%) | NO |
| C1_Bedroom 127 | NO (-62%) | NO |
| C1_Bedroom 128 | NO (-65%) | NO |
| C1_Bedroom 129 | NO (-83%) | NO |
| C1_Bedroom 130 | NO (-62%) | NO |
| C1_Bedroom 131 | NO (-64%) | NO |
| C1_Bedroom 132 | NO (-77%) | NO |
| C1_Bedroom 133 | NO (-63%) | NO |
| C1_Bedroom 134 | NO (-68%) | NO |
| C1_Bedroom 135 | NO (-63%) | NO |
| C1_Bedroom 136 | NO (-73%) | NO |
| C1_Bedroom 137 | NO (-69%) | NO |
| C1_Bedroom 138 | NO (-51%) | NO |
| GF Office | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| GF Staff Room | N/A | N/A |
| GF Reception | NO (-48%) | NO |
| GF Bar Cafe | NO (-23%) | NO |
| GF Bar Cafe Rotunda | YES (+611%) | NO |

## Regulation 25A: Consideration of high efficiency alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Floor area [$m^2$] | 1625 | 1625 |
| External area [$m^2$] | 3618 | 3618 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 10 | 3 |
| Average conductance [W/K] | 1299 | 1057 |
| Average U-value [$W/m^2K$] | 0.36 | 0.29 |
| Alpha value* [%] | 24.95 | 9.95 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | Retail/Financial and Professional Services |
| | Restaurants and Cafes/Drinking Establishments/Takeaways |
| | Offices and Workshop Businesses |
| | General Industrial and Special Industrial Groups |
| | Storage or Distribution |
| **100** | **Hotels** |
| | Residential Institutions: Hospitals and Care Homes |
| | Residential Institutions: Residential Schools |
| | Residential Institutions: Universities and Colleges |
| | Secure Residential Institutions |
| | Residential Spaces |
| | Non-residential Institutions: Community/Day Centre |
| | Non-residential Institutions: Libraries, Museums, and Galleries |
| | Non-residential Institutions: Education |
| | Non-residential Institutions: Primary Health Care Building |
| | Non-residential Institutions: Crown and County Courts |
| | General Assembly and Leisure, Night Clubs, and Theatres |
| | Others: Passenger Terminals |
| | Others: Emergency Services |
| | Others: Miscellaneous 24hr Activities |
| | Others: Car Parks 24 hrs |
| | Others: Stand Alone Utility Block |

## Energy Consumption by End Use [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Heating | 69.81 | 21.37 |
| Cooling | 2.32 | 4.65 |
| Auxiliary | 13.98 | 6.26 |
| Lighting | 12.06 | 10.77 |
| Hot water | 209.47 | 196.14 |
| Equipment* | 60.15 | 60.15 |
| **TOTAL**** | **307.63** | **239.2** |

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 0 | 8.71 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |
| *Displaced electricity* | *0* | *8.71* |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 263.38 | 147.13 |
| Primary energy [$kWh_{PE}/m^2$] | 357.19 | 263.88 |
| Total emissions [$kg/m^2$] | 62.54 | 47.39 |

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 284.4 | 10.5 | 89.6 | 0.6 | 15 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 86 | 64.4 | 27.8 | 4.1 | 5.7 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 273.4 | 9.8 | 86.1 | 0.5 | 15.8 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 107.3 | 58.3 | 34.7 | 3.7 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 242.4 | 13.9 | 76.3 | 0.8 | 15.7 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 96.7 | 64.1 | 31.2 | 4.1 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 371.2 | 274.9 | 116.9 | 15.3 | 12.9 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 39.3 | 318.7 | 12.7 | 20.1 | 7.4 | 0.86 | 4.4 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 57.6 | 0 | 18.1 | 0 | 18.4 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 8.1 | 0 | 2.6 | 0 | 22.9 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 267.1 | 0 | 84.1 | 0 | 62.5 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 137.6 | 0 | 44.5 | 0 | 28 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 10.5 | 0 | 3.3 | 0 | 39.9 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 0 | 0 | 0 | 0 | 15.7 | 0 | 0 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

# Appendix C: Energy Model Data – Be clean

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

**Project name**

## Travelodge, Stockley Park - Be Clean

As designed

**Date:** Fri Jan 24 13:29:47 2025

## Administrative information

### Building Details

**Address:** Travelodge, The Arena, Stockley Park, LONDON,

### Certifier details

**Name:** Sam Jones

**Telephone number:** 0113 730 3430

**Address:** Craven House, 14-18 York Road, WETHERBY, LS22 6SL

### Certification tool

**Calculation engine:** TAS

**Calculation engine version:** "v9.5.6"

**Interface to calculation engine:** TAS

**Interface to calculation engine version:** v9.5.6

**BRUKL compliance module version:** v6.1.e.0

**Foundation area [m²]:** 426.53

## The $CO_2$ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

| | | |
|---|---|---|
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2annum$ | 47.39 | |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2annum$ | 62.54 | |
| Target primary energy rate (TPER), $kWh_{PE}/m^2annum$ | 263.88 | |
| Building primary energy rate (BPER), $kWh_{PE}/m^2annum$ | 357.19 | |
| Do the building's emission and primary energy rates exceed the targets? | BER > TER | BPER > TPER |

## The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

| Fabric element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | First surface with maximum value |
|---|---|---|---|---|
| Walls* | 0.26 | 0.27 | 0.5 | External Wall |
| Floors | 0.18 | 0.25 | 0.25 | Exposed Floor |
| Pitched roofs | 0.16 | 0.22 | 1.4 | Roof - glazed |
| Flat roofs | 0.18 | - | - | No flat roofs in project |
| Windows** and roof windows | 1.6 | 1.4 | 1.4 | Rotunda Glazing |
| Rooflights*** | 2.2 | - | - | No rooflights in project |
| Personnel doors^ | 1.6 | 2.2 | 2.2 | Door 1.1m*2.1m |
| Vehicle access & similar large doors | 1.3 | - | - | No vehicle access or similar large doors in project |
| High usage entrance doors | 3 | - | - | No high usage entrance doors in project |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air permeability | Limiting standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 8 | 10 |

## Building services

**For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.**

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- GF Bedrooms 1-12 - Mech Vent VRF (26 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

2- 1F Bedrooms 1-31 - Mech Vent VRF (62 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- 1F Bedrooms 32-43 - Mech Vent VRF (14 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

4- Mech Vent VRF - Reception, Bar/Cafe, Office (5 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | 5 | - | - | 0.75 |
| **Standard value** | 0.93* | 3 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

5- Mech Vent - WC (GF Acc WC)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

6- Ext Only - Linen (3 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 0.9 | - |
| **Standard value** | 0.93* | N/A | N/A | 1.9^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

7- Mech Vent - Kitchen (GF Kitchen)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.98 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- 98% Gas

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.98 | 0 |
| **Standard value** | 0.91 | N/A |

**Zone-level mechanical ventilation, exhaust, and terminal units**

| ID | System type in the Approved Documents |
|---|---|
| A | Local supply or extract ventilation units |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal balanced supply and extract ventilation system |
| E | Local balanced supply and extract ventilation units |
| F | Other local ventilation units |
| G | Fan assisted terminal variable air volume units |
| H | Fan coil units |
| I | Kitchen extract with the fan remote from the zone and a grease filter |

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 | Zone | Standard |
| GF Office | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Staff Room | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Reception | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe Rotunda | - | - | - | - | 1.2 | - | - | - | - | - | N/A |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 001 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 002 | 94 | - | - |
| C1_Bath 003 | 94 | - | - |
| C1_Bath 004 | 94 | - | - |
| C1_Bath 005 | 94 | - | - |
| C1_Bath 006 | 94 | - | - |
| C1_Bath 007 | 94 | - | - |
| C1_Bath 008 | 94 | - | - |
| C1_Bath 009 | 94 | - | - |
| C1_Bath 010 | 94 | - | - |
| C1_Bath 011 | 94 | - | - |
| C1_Bath 012 | 94 | - | - |
| C1_Bath 013 | 94 | - | - |
| C1_Bath 101 | 94 | - | - |
| C1_Bath 102 | 94 | - | - |
| C1_Bath 103 | 94 | - | - |
| C1_Bath 104 | 94 | - | - |
| C1_Bath 105 | 94 | - | - |
| C1_Bath 106 | 94 | - | - |
| C1_Bath 107 | 94 | - | - |
| C1_Bath 108 | 94 | - | - |
| C1_Bath 109 | 94 | - | - |
| C1_Bath 110 | 94 | - | - |
| C1_Bath 111 | 94 | - | - |
| C1_Bath 112 | 94 | - | - |
| C1_Bath 113 | 94 | - | - |
| C1_Bath 114 | 94 | - | - |
| C1_Bath 115 | 94 | - | - |
| C1_Bath 116 | 94 | - | - |
| C1_Bath 117 | 94 | - | - |
| C1_Bath 118 | 94 | - | - |
| C1_Bath 119 | 94 | - | - |
| C1_Bath 120 | 94 | - | - |
| C1_Bath 121 | 94 | - | - |
| C1_Bath 122 | 94 | - | - |
| C1_Bath 123 | 94 | - | - |
| C1_Bath 124 | 94 | - | - |
| C1_Bath 125 | 94 | - | - |
| C1_Bath 126 | 94 | - | - |
| C1_Bath 127 | 94 | - | - |
| C1_Bath 128 | 94 | - | - |
| C1_Bath 129 | 94 | - | - |
| C1_Bath 130 | 94 | - | - |
| C1_Bath 131 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 132 | 94 | - | - |
| C1_Bath 133 | 94 | - | - |
| C1_Bath 134 | 94 | - | - |
| C1_Bath 135 | 94 | - | - |
| C1_Bath 136 | 94 | - | - |
| C1_Bath 137 | 94 | - | - |
| C1_Bath 138 | 94 | - | - |
| C1_Bedroom 001 | 94 | - | - |
| C1_Bedroom 002 | 94 | - | - |
| C1_Bedroom 003 | 94 | - | - |
| C1_Bedroom 004 | 94 | - | - |
| C1_Bedroom 005 | 94 | - | - |
| C1_Bedroom 006 | 94 | - | - |
| C1_Bedroom 007 | 94 | - | - |
| C1_Bedroom 008 | 94 | - | - |
| C1_Bedroom 009 | 94 | - | - |
| C1_Bedroom 010 | 94 | - | - |
| C1_Bedroom 011 | 94 | - | - |
| C1_Bedroom 012 | 94 | - | - |
| C1_Bedroom 013 | 94 | - | - |
| C1_Bedroom 101 | 94 | - | - |
| C1_Bedroom 102 | 94 | - | - |
| C1_Bedroom 103 | 94 | - | - |
| C1_Bedroom 104 | 94 | - | - |
| C1_Bedroom 105 | 94 | - | - |
| C1_Bedroom 106 | 94 | - | - |
| C1_Bedroom 107 | 94 | - | - |
| C1_Bedroom 108 | 94 | - | - |
| C1_Bedroom 109 | 94 | - | - |
| C1_Bedroom 110 | 94 | - | - |
| C1_Bedroom 111 | 94 | - | - |
| C1_Bedroom 112 | 94 | - | - |
| C1_Bedroom 113 | 94 | - | - |
| C1_Bedroom 114 | 94 | - | - |
| C1_Bedroom 115 | 94 | - | - |
| C1_Bedroom 116 | 94 | - | - |
| C1_Bedroom 117 | 94 | - | - |
| C1_Bedroom 118 | 94 | - | - |
| C1_Bedroom 119 | 94 | - | - |
| C1_Bedroom 120 | 94 | - | - |
| C1_Bedroom 121 | 94 | - | - |
| C1_Bedroom 122 | 94 | - | - |
| C1_Bedroom 123 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bedroom 124 | 94 | - | - |
| C1_Bedroom 125 | 94 | - | - |
| C1_Bedroom 126 | 94 | - | - |
| C1_Bedroom 127 | 94 | - | - |
| C1_Bedroom 128 | 94 | - | - |
| C1_Bedroom 129 | 94 | - | - |
| C1_Bedroom 130 | 94 | - | - |
| C1_Bedroom 131 | 94 | - | - |
| C1_Bedroom 132 | 94 | - | - |
| C1_Bedroom 133 | 94 | - | - |
| C1_Bedroom 134 | 94 | - | - |
| C1_Bedroom 135 | 94 | - | - |
| C1_Bedroom 136 | 94 | - | - |
| C1_Bedroom 137 | 94 | - | - |
| C1_Bedroom 138 | 94 | - | - |
| GF Office | 140 | - | - |
| GF Staff Room | 140 | - | - |
| GF Reception | 116 | 116 | - |
| GF Linen Intake | 140 | - | - |
| 1F Store | 140 | - | - |
| 1F Linen 1 | 140 | - | - |
| 1F Linen 2 | 140 | - | - |
| GF Plant | 95 | - | - |
| GF Stairs | 110 | - | - |
| GF WC Lobby | 110 | - | - |
| GF Bedroom Corridor | 125 | - | - |
| GF Cafe Circulation | 110 | - | - |
| 1F Bedroom Corridor 1 | 125 | - | - |
| 1F Bedroom Corridor 2 | 125 | - | - |
| 1F Refuge | 110 | - | - |
| 1F Stairs | 110 | - | - |
| GF Bar Cafe | 140 | 116 | - |
| GF Bar Cafe Rotunda | 140 | 116 | - |
| GF Kitchen | 140 | - | - |
| GF Acc WC | 110 | - | - |

## The spaces in the building should have appropriate passive control measures to limit solar gains in summer

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 001 | N/A | N/A |
| C1_Bath 002 | N/A | N/A |
| C1_Bath 003 | N/A | N/A |
| C1_Bath 004 | N/A | N/A |
| C1_Bath 005 | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 006 | N/A | N/A |
| C1_Bath 007 | N/A | N/A |
| C1_Bath 008 | N/A | N/A |
| C1_Bath 009 | N/A | N/A |
| C1_Bath 010 | N/A | N/A |
| C1_Bath 011 | N/A | N/A |
| C1_Bath 012 | N/A | N/A |
| C1_Bath 013 | N/A | N/A |
| C1_Bath 101 | N/A | N/A |
| C1_Bath 102 | N/A | N/A |
| C1_Bath 103 | N/A | N/A |
| C1_Bath 104 | N/A | N/A |
| C1_Bath 105 | N/A | N/A |
| C1_Bath 106 | N/A | N/A |
| C1_Bath 107 | N/A | N/A |
| C1_Bath 108 | N/A | N/A |
| C1_Bath 109 | N/A | N/A |
| C1_Bath 110 | N/A | N/A |
| C1_Bath 111 | N/A | N/A |
| C1_Bath 112 | N/A | N/A |
| C1_Bath 113 | N/A | N/A |
| C1_Bath 114 | N/A | N/A |
| C1_Bath 115 | N/A | N/A |
| C1_Bath 116 | N/A | N/A |
| C1_Bath 117 | N/A | N/A |
| C1_Bath 118 | N/A | N/A |
| C1_Bath 119 | N/A | N/A |
| C1_Bath 120 | N/A | N/A |
| C1_Bath 121 | N/A | N/A |
| C1_Bath 122 | N/A | N/A |
| C1_Bath 123 | N/A | N/A |
| C1_Bath 124 | N/A | N/A |
| C1_Bath 125 | N/A | N/A |
| C1_Bath 126 | N/A | N/A |
| C1_Bath 127 | N/A | N/A |
| C1_Bath 128 | N/A | N/A |
| C1_Bath 129 | N/A | N/A |
| C1_Bath 130 | N/A | N/A |
| C1_Bath 131 | N/A | N/A |
| C1_Bath 132 | N/A | N/A |
| C1_Bath 133 | N/A | N/A |
| C1_Bath 134 | N/A | N/A |
| C1_Bath 135 | N/A | N/A |
| C1_Bath 136 | N/A | N/A |
| C1_Bath 137 | N/A | N/A |
| C1_Bath 138 | N/A | N/A |
| C1_Bedroom 001 | NO (-61%) | NO |
| C1_Bedroom 002 | NO (-62%) | NO |
| C1_Bedroom 003 | NO (-64%) | NO |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bedroom 004 | NO (-56%) | NO |
| C1_Bedroom 005 | NO (-62%) | NO |
| C1_Bedroom 006 | NO (-48%) | NO |
| C1_Bedroom 007 | NO (-62%) | NO |
| C1_Bedroom 008 | NO (-46%) | NO |
| C1_Bedroom 009 | NO (-63%) | NO |
| C1_Bedroom 010 | NO (-49%) | NO |
| C1_Bedroom 011 | NO (-62%) | NO |
| C1_Bedroom 012 | NO (-50%) | NO |
| C1_Bedroom 013 | NO (-63%) | NO |
| C1_Bedroom 101 | NO (-63%) | NO |
| C1_Bedroom 102 | NO (-66%) | NO |
| C1_Bedroom 103 | NO (-64%) | NO |
| C1_Bedroom 104 | NO (-69%) | NO |
| C1_Bedroom 105 | NO (-63%) | NO |
| C1_Bedroom 106 | NO (-67%) | NO |
| C1_Bedroom 107 | NO (-62%) | NO |
| C1_Bedroom 108 | NO (-67%) | NO |
| C1_Bedroom 109 | NO (-64%) | NO |
| C1_Bedroom 110 | NO (-69%) | NO |
| C1_Bedroom 111 | NO (-63%) | NO |
| C1_Bedroom 112 | NO (-67%) | NO |
| C1_Bedroom 113 | NO (-63%) | NO |
| C1_Bedroom 114 | NO (-68%) | NO |
| C1_Bedroom 115 | NO (-47%) | NO |
| C1_Bedroom 116 | NO (-65%) | NO |
| C1_Bedroom 117 | NO (-54%) | NO |
| C1_Bedroom 118 | NO (-54%) | NO |
| C1_Bedroom 119 | NO (-76%) | NO |
| C1_Bedroom 120 | NO (-66%) | NO |
| C1_Bedroom 121 | NO (-67%) | NO |
| C1_Bedroom 122 | NO (-64%) | NO |
| C1_Bedroom 123 | NO (-71%) | NO |
| C1_Bedroom 124 | NO (-68%) | NO |
| C1_Bedroom 125 | NO (-70%) | NO |
| C1_Bedroom 126 | NO (-54%) | NO |
| C1_Bedroom 127 | NO (-62%) | NO |
| C1_Bedroom 128 | NO (-65%) | NO |
| C1_Bedroom 129 | NO (-83%) | NO |
| C1_Bedroom 130 | NO (-62%) | NO |
| C1_Bedroom 131 | NO (-64%) | NO |
| C1_Bedroom 132 | NO (-77%) | NO |
| C1_Bedroom 133 | NO (-63%) | NO |
| C1_Bedroom 134 | NO (-68%) | NO |
| C1_Bedroom 135 | NO (-63%) | NO |
| C1_Bedroom 136 | NO (-73%) | NO |
| C1_Bedroom 137 | NO (-69%) | NO |
| C1_Bedroom 138 | NO (-51%) | NO |
| GF Office | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| GF Staff Room | N/A | N/A |
| GF Reception | NO (-48%) | NO |
| GF Bar Cafe | NO (-23%) | NO |
| GF Bar Cafe Rotunda | YES (+611%) | NO |

## Regulation 25A: Consideration of high efficiency alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Floor area [$m^2$] | 1625 | 1625 |
| External area [$m^2$] | 3618 | 3618 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 10 | 3 |
| Average conductance [W/K] | 1299 | 1057 |
| Average U-value [$W/m^2K$] | 0.36 | 0.29 |
| Alpha value* [%] | 24.95 | 9.95 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | Retail/Financial and Professional Services |
| | Restaurants and Cafes/Drinking Establishments/Takeaways |
| | Offices and Workshop Businesses |
| | General Industrial and Special Industrial Groups |
| | Storage or Distribution |
| **100** | **Hotels** |
| | Residential Institutions: Hospitals and Care Homes |
| | Residential Institutions: Residential Schools |
| | Residential Institutions: Universities and Colleges |
| | Secure Residential Institutions |
| | Residential Spaces |
| | Non-residential Institutions: Community/Day Centre |
| | Non-residential Institutions: Libraries, Museums, and Galleries |
| | Non-residential Institutions: Education |
| | Non-residential Institutions: Primary Health Care Building |
| | Non-residential Institutions: Crown and County Courts |
| | General Assembly and Leisure, Night Clubs, and Theatres |
| | Others: Passenger Terminals |
| | Others: Emergency Services |
| | Others: Miscellaneous 24hr Activities |
| | Others: Car Parks 24 hrs |
| | Others: Stand Alone Utility Block |

## Energy Consumption by End Use [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Heating | 69.81 | 21.37 |
| Cooling | 2.32 | 4.65 |
| Auxiliary | 13.98 | 6.26 |
| Lighting | 12.06 | 10.77 |
| Hot water | 209.47 | 196.14 |
| Equipment* | 60.15 | 60.15 |
| **TOTAL**** | **307.63** | **239.2** |

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 0 | 8.71 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |
| *Displaced electricity* | *0* | *8.71* |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 263.38 | 147.13 |
| Primary energy [$kWh_{PE}/m^2$] | 357.19 | 263.88 |
| Total emissions [$kg/m^2$] | 62.54 | 47.39 |

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 284.4 | 10.5 | 89.6 | 0.6 | 15 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 86 | 64.4 | 27.8 | 4.1 | 5.7 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 273.4 | 9.8 | 86.1 | 0.5 | 15.8 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 107.3 | 58.3 | 34.7 | 3.7 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 242.4 | 13.9 | 76.3 | 0.8 | 15.7 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 96.7 | 64.1 | 31.2 | 4.1 | 6 | 0.86 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 371.2 | 274.9 | 116.9 | 15.3 | 12.9 | 0.88 | 5 | 0.98 | 5 |
| | Notional | 39.3 | 318.7 | 12.7 | 20.1 | 7.4 | 0.86 | 4.4 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 57.6 | 0 | 18.1 | 0 | 18.4 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 8.1 | 0 | 2.6 | 0 | 22.9 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 267.1 | 0 | 84.1 | 0 | 62.5 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 137.6 | 0 | 44.5 | 0 | 28 | 0.86 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity | | | | | | | | | | |
| | Actual | 10.5 | 0 | 3.3 | 0 | 39.9 | 0.88 | 0 | 0.98 | 0 |
| | Notional | 0 | 0 | 0 | 0 | 15.7 | 0 | 0 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

# Appendix D: Energy Model Data – Be green

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

**Project name**

## Travelodge, Stockley Park - Be Green

As designed

**Date:** Fri Jan 24 13:38:23 2025

## Administrative information

### Building Details

**Address:** Travelodge, The Arena, Stockley Park, LONDON,

### Certifier details

**Name:** Sam Jones

**Telephone number:** 0113 730 3430

**Address:** Craven House, 14-18 York Road, WETHERBY, LS22 6SL

### Certification tool

**Calculation engine:** TAS

**Calculation engine version:** "v9.5.6"

**Interface to calculation engine:** TAS

**Interface to calculation engine version:** v9.5.6

**BRUKL compliance module version:** v6.1.e.0

**Foundation area [m²]:** 426.53

## The $CO_2$ emission and primary energy rates of the building must not exceed the targets

| | | |
|---|---|---|
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2annum$ | 12.56 | |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2annum$ | 11.1 | |
| Target primary energy rate (TPER), $kWh_{PE}/m^2annum$ | 136.63 | |
| Building primary energy rate (BPER), $kWh_{PE}/m^2annum$ | 118.71 | |
| Do the building's emission and primary energy rates exceed the targets? | BER =< TER | BPER =< TPER |

## The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

| Fabric element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | First surface with maximum value |
|---|---|---|---|---|
| Walls* | 0.26 | 0.27 | 0.5 | External Wall |
| Floors | 0.18 | 0.25 | 0.25 | Exposed Floor |
| Pitched roofs | 0.16 | 0.22 | 1.4 | Roof - glazed |
| Flat roofs | 0.18 | - | - | No flat roofs in project |
| Windows** and roof windows | 1.6 | 1.4 | 1.4 | Rotunda Glazing |
| Rooflights*** | 2.2 | - | - | No rooflights in project |
| Personnel doors^ | 1.6 | 2.2 | 2.2 | Door 1.1m*2.1m |
| Vehicle access & similar large doors | 1.3 | - | - | No vehicle access or similar large doors in project |
| High usage entrance doors | 3 | - | - | No high usage entrance doors in project |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air permeability | Limiting standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 8 | 10 |

## Building services

**For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.**

| | |
|---|---|
| **Whole building lighting automatic monitoring & targeting with alarms for out-of-range values** | NO |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- GF Bedrooms 1-12 - Mech Vent VRF (26 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.39 | 3.6 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

2- 1F Bedrooms 1-31 - Mech Vent VRF (62 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.53 | 3.6 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- 1F Bedrooms 32-43 - Mech Vent VRF (14 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.39 | 3.6 | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | 3 | N/A | 2^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

4- Mech Vent VRF - Reception, Bar/Cafe, Office (5 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 4.45 | 3.6 | - | - | 0.75 |
| **Standard value** | 0.93* | 3 | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

5- Mech Vent - WC (GF Acc WC)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

6- Ext Only - Linen (3 Zones)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | 0.9 | - |
| **Standard value** | 0.93* | N/A | N/A | 1.9^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

7- Mech Vent - Kitchen (GF Kitchen)

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 1 | - | - | 1.8 | 0.7 |
| **Standard value** | 0.93* | N/A | N/A | 1.5^ | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | NO |

* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

1- ASHP Units 1-5

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 4.39 | 0 |
| **Standard value** | 0.91 | N/A |

**Zone-level mechanical ventilation, exhaust, and terminal units**

| ID | System type in the Approved Documents |
|---|---|
| A | Local supply or extract ventilation units |
| B | Zonal supply system where the fan is remote from the zone |
| C | Zonal extract system where the fan is remote from the zone |
| D | Zonal balanced supply and extract ventilation system |
| E | Local balanced supply and extract ventilation units |
| F | Other local ventilation units |
| G | Fan assisted terminal variable air volume units |
| H | Fan coil units |
| I | Kitchen extract with the fan remote from the zone and a grease filter |

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

| Zone name | SFP [W/(l/s)] | | | | | | | | | HR efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID of system type | A | B | C | D | E | F | G | H | I | | |
| Standard value | 0.3 | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 | Zone | Standard |
| GF Office | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Staff Room | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Reception | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe | - | - | - | - | 1.2 | - | - | - | - | - | N/A |
| GF Bar Cafe Rotunda | - | - | - | - | 1.2 | - | - | - | - | - | N/A |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 001 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 002 | 94 | - | - |
| C1_Bath 003 | 94 | - | - |
| C1_Bath 004 | 94 | - | - |
| C1_Bath 005 | 94 | - | - |
| C1_Bath 006 | 94 | - | - |
| C1_Bath 007 | 94 | - | - |
| C1_Bath 008 | 94 | - | - |
| C1_Bath 009 | 94 | - | - |
| C1_Bath 010 | 94 | - | - |
| C1_Bath 011 | 94 | - | - |
| C1_Bath 012 | 94 | - | - |
| C1_Bath 013 | 94 | - | - |
| C1_Bath 101 | 94 | - | - |
| C1_Bath 102 | 94 | - | - |
| C1_Bath 103 | 94 | - | - |
| C1_Bath 104 | 94 | - | - |
| C1_Bath 105 | 94 | - | - |
| C1_Bath 106 | 94 | - | - |
| C1_Bath 107 | 94 | - | - |
| C1_Bath 108 | 94 | - | - |
| C1_Bath 109 | 94 | - | - |
| C1_Bath 110 | 94 | - | - |
| C1_Bath 111 | 94 | - | - |
| C1_Bath 112 | 94 | - | - |
| C1_Bath 113 | 94 | - | - |
| C1_Bath 114 | 94 | - | - |
| C1_Bath 115 | 94 | - | - |
| C1_Bath 116 | 94 | - | - |
| C1_Bath 117 | 94 | - | - |
| C1_Bath 118 | 94 | - | - |
| C1_Bath 119 | 94 | - | - |
| C1_Bath 120 | 94 | - | - |
| C1_Bath 121 | 94 | - | - |
| C1_Bath 122 | 94 | - | - |
| C1_Bath 123 | 94 | - | - |
| C1_Bath 124 | 94 | - | - |
| C1_Bath 125 | 94 | - | - |
| C1_Bath 126 | 94 | - | - |
| C1_Bath 127 | 94 | - | - |
| C1_Bath 128 | 94 | - | - |
| C1_Bath 129 | 94 | - | - |
| C1_Bath 130 | 94 | - | - |
| C1_Bath 131 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bath 132 | 94 | - | - |
| C1_Bath 133 | 94 | - | - |
| C1_Bath 134 | 94 | - | - |
| C1_Bath 135 | 94 | - | - |
| C1_Bath 136 | 94 | - | - |
| C1_Bath 137 | 94 | - | - |
| C1_Bath 138 | 94 | - | - |
| C1_Bedroom 001 | 94 | - | - |
| C1_Bedroom 002 | 94 | - | - |
| C1_Bedroom 003 | 94 | - | - |
| C1_Bedroom 004 | 94 | - | - |
| C1_Bedroom 005 | 94 | - | - |
| C1_Bedroom 006 | 94 | - | - |
| C1_Bedroom 007 | 94 | - | - |
| C1_Bedroom 008 | 94 | - | - |
| C1_Bedroom 009 | 94 | - | - |
| C1_Bedroom 010 | 94 | - | - |
| C1_Bedroom 011 | 94 | - | - |
| C1_Bedroom 012 | 94 | - | - |
| C1_Bedroom 013 | 94 | - | - |
| C1_Bedroom 101 | 94 | - | - |
| C1_Bedroom 102 | 94 | - | - |
| C1_Bedroom 103 | 94 | - | - |
| C1_Bedroom 104 | 94 | - | - |
| C1_Bedroom 105 | 94 | - | - |
| C1_Bedroom 106 | 94 | - | - |
| C1_Bedroom 107 | 94 | - | - |
| C1_Bedroom 108 | 94 | - | - |
| C1_Bedroom 109 | 94 | - | - |
| C1_Bedroom 110 | 94 | - | - |
| C1_Bedroom 111 | 94 | - | - |
| C1_Bedroom 112 | 94 | - | - |
| C1_Bedroom 113 | 94 | - | - |
| C1_Bedroom 114 | 94 | - | - |
| C1_Bedroom 115 | 94 | - | - |
| C1_Bedroom 116 | 94 | - | - |
| C1_Bedroom 117 | 94 | - | - |
| C1_Bedroom 118 | 94 | - | - |
| C1_Bedroom 119 | 94 | - | - |
| C1_Bedroom 120 | 94 | - | - |
| C1_Bedroom 121 | 94 | - | - |
| C1_Bedroom 122 | 94 | - | - |
| C1_Bedroom 123 | 94 | - | - |

| General lighting and display lighting | General luminaire | Display light source | |
|---|---|---|---|
| Zone name | Efficacy [lm/W] | Efficacy [lm/W] | Power density [W/m²] |
| Standard value | 95 | 80 | 0.3 |
| C1_Bedroom 124 | 94 | - | - |
| C1_Bedroom 125 | 94 | - | - |
| C1_Bedroom 126 | 94 | - | - |
| C1_Bedroom 127 | 94 | - | - |
| C1_Bedroom 128 | 94 | - | - |
| C1_Bedroom 129 | 94 | - | - |
| C1_Bedroom 130 | 94 | - | - |
| C1_Bedroom 131 | 94 | - | - |
| C1_Bedroom 132 | 94 | - | - |
| C1_Bedroom 133 | 94 | - | - |
| C1_Bedroom 134 | 94 | - | - |
| C1_Bedroom 135 | 94 | - | - |
| C1_Bedroom 136 | 94 | - | - |
| C1_Bedroom 137 | 94 | - | - |
| C1_Bedroom 138 | 94 | - | - |
| GF Office | 140 | - | - |
| GF Staff Room | 140 | - | - |
| GF Reception | 116 | 116 | - |
| GF Linen Intake | 140 | - | - |
| 1F Store | 140 | - | - |
| 1F Linen 1 | 140 | - | - |
| 1F Linen 2 | 140 | - | - |
| GF Plant | 95 | - | - |
| GF Stairs | 110 | - | - |
| GF WC Lobby | 110 | - | - |
| GF Bedroom Corridor | 125 | - | - |
| GF Cafe Circulation | 110 | - | - |
| 1F Bedroom Corridor 1 | 125 | - | - |
| 1F Bedroom Corridor 2 | 125 | - | - |
| 1F Refuge | 110 | - | - |
| 1F Stairs | 110 | - | - |
| GF Bar Cafe | 140 | 116 | - |
| GF Bar Cafe Rotunda | 140 | 116 | - |
| GF Kitchen | 140 | - | - |
| GF Acc WC | 110 | - | - |

## The spaces in the building should have appropriate passive control measures to limit solar gains in summer

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 001 | N/A | N/A |
| C1_Bath 002 | N/A | N/A |
| C1_Bath 003 | N/A | N/A |
| C1_Bath 004 | N/A | N/A |
| C1_Bath 005 | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bath 006 | N/A | N/A |
| C1_Bath 007 | N/A | N/A |
| C1_Bath 008 | N/A | N/A |
| C1_Bath 009 | N/A | N/A |
| C1_Bath 010 | N/A | N/A |
| C1_Bath 011 | N/A | N/A |
| C1_Bath 012 | N/A | N/A |
| C1_Bath 013 | N/A | N/A |
| C1_Bath 101 | N/A | N/A |
| C1_Bath 102 | N/A | N/A |
| C1_Bath 103 | N/A | N/A |
| C1_Bath 104 | N/A | N/A |
| C1_Bath 105 | N/A | N/A |
| C1_Bath 106 | N/A | N/A |
| C1_Bath 107 | N/A | N/A |
| C1_Bath 108 | N/A | N/A |
| C1_Bath 109 | N/A | N/A |
| C1_Bath 110 | N/A | N/A |
| C1_Bath 111 | N/A | N/A |
| C1_Bath 112 | N/A | N/A |
| C1_Bath 113 | N/A | N/A |
| C1_Bath 114 | N/A | N/A |
| C1_Bath 115 | N/A | N/A |
| C1_Bath 116 | N/A | N/A |
| C1_Bath 117 | N/A | N/A |
| C1_Bath 118 | N/A | N/A |
| C1_Bath 119 | N/A | N/A |
| C1_Bath 120 | N/A | N/A |
| C1_Bath 121 | N/A | N/A |
| C1_Bath 122 | N/A | N/A |
| C1_Bath 123 | N/A | N/A |
| C1_Bath 124 | N/A | N/A |
| C1_Bath 125 | N/A | N/A |
| C1_Bath 126 | N/A | N/A |
| C1_Bath 127 | N/A | N/A |
| C1_Bath 128 | N/A | N/A |
| C1_Bath 129 | N/A | N/A |
| C1_Bath 130 | N/A | N/A |
| C1_Bath 131 | N/A | N/A |
| C1_Bath 132 | N/A | N/A |
| C1_Bath 133 | N/A | N/A |
| C1_Bath 134 | N/A | N/A |
| C1_Bath 135 | N/A | N/A |
| C1_Bath 136 | N/A | N/A |
| C1_Bath 137 | N/A | N/A |
| C1_Bath 138 | N/A | N/A |
| C1_Bedroom 001 | NO (-61%) | NO |
| C1_Bedroom 002 | NO (-62%) | NO |
| C1_Bedroom 003 | NO (-64%) | NO |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| C1_Bedroom 004 | NO (-56%) | NO |
| C1_Bedroom 005 | NO (-62%) | NO |
| C1_Bedroom 006 | NO (-48%) | NO |
| C1_Bedroom 007 | NO (-62%) | NO |
| C1_Bedroom 008 | NO (-46%) | NO |
| C1_Bedroom 009 | NO (-63%) | NO |
| C1_Bedroom 010 | NO (-49%) | NO |
| C1_Bedroom 011 | NO (-62%) | NO |
| C1_Bedroom 012 | NO (-50%) | NO |
| C1_Bedroom 013 | NO (-63%) | NO |
| C1_Bedroom 101 | NO (-63%) | NO |
| C1_Bedroom 102 | NO (-66%) | NO |
| C1_Bedroom 103 | NO (-64%) | NO |
| C1_Bedroom 104 | NO (-69%) | NO |
| C1_Bedroom 105 | NO (-63%) | NO |
| C1_Bedroom 106 | NO (-67%) | NO |
| C1_Bedroom 107 | NO (-62%) | NO |
| C1_Bedroom 108 | NO (-67%) | NO |
| C1_Bedroom 109 | NO (-64%) | NO |
| C1_Bedroom 110 | NO (-69%) | NO |
| C1_Bedroom 111 | NO (-63%) | NO |
| C1_Bedroom 112 | NO (-67%) | NO |
| C1_Bedroom 113 | NO (-63%) | NO |
| C1_Bedroom 114 | NO (-68%) | NO |
| C1_Bedroom 115 | NO (-47%) | NO |
| C1_Bedroom 116 | NO (-65%) | NO |
| C1_Bedroom 117 | NO (-54%) | NO |
| C1_Bedroom 118 | NO (-54%) | NO |
| C1_Bedroom 119 | NO (-76%) | NO |
| C1_Bedroom 120 | NO (-66%) | NO |
| C1_Bedroom 121 | NO (-67%) | NO |
| C1_Bedroom 122 | NO (-64%) | NO |
| C1_Bedroom 123 | NO (-71%) | NO |
| C1_Bedroom 124 | NO (-68%) | NO |
| C1_Bedroom 125 | NO (-70%) | NO |
| C1_Bedroom 126 | NO (-54%) | NO |
| C1_Bedroom 127 | NO (-62%) | NO |
| C1_Bedroom 128 | NO (-65%) | NO |
| C1_Bedroom 129 | NO (-83%) | NO |
| C1_Bedroom 130 | NO (-62%) | NO |
| C1_Bedroom 131 | NO (-64%) | NO |
| C1_Bedroom 132 | NO (-77%) | NO |
| C1_Bedroom 133 | NO (-63%) | NO |
| C1_Bedroom 134 | NO (-68%) | NO |
| C1_Bedroom 135 | NO (-63%) | NO |
| C1_Bedroom 136 | NO (-73%) | NO |
| C1_Bedroom 137 | NO (-69%) | NO |
| C1_Bedroom 138 | NO (-51%) | NO |
| GF Office | N/A | N/A |

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| GF Staff Room | N/A | N/A |
| GF Reception | NO (-48%) | NO |
| GF Bar Cafe | NO (-23%) | NO |
| GF Bar Cafe Rotunda | YES (+611%) | NO |

## Regulation 25A: Consideration of high efficiency alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | NO |
| Is evidence of such assessment available as a separate submission? | NO |
| Are any such measures included in the proposed design? | NO |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Floor area [$m^2$] | 1625 | 1625 |
| External area [$m^2$] | 3618 | 3618 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 10 | 3 |
| Average conductance [W/K] | 1299 | 1057 |
| Average U-value [$W/m^2K$] | 0.36 | 0.29 |
| Alpha value* [%] | 24.95 | 9.95 |

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

| % Area | Building Type |
|---|---|
| | Retail/Financial and Professional Services |
| | Restaurants and Cafes/Drinking Establishments/Takeaways |
| | Offices and Workshop Businesses |
| | General Industrial and Special Industrial Groups |
| | Storage or Distribution |
| 100 | **Hotels** |
| | Residential Institutions: Hospitals and Care Homes |
| | Residential Institutions: Residential Schools |
| | Residential Institutions: Universities and Colleges |
| | Secure Residential Institutions |
| | Residential Spaces |
| | Non-residential Institutions: Community/Day Centre |
| | Non-residential Institutions: Libraries, Museums, and Galleries |
| | Non-residential Institutions: Education |
| | Non-residential Institutions: Primary Health Care Building |
| | Non-residential Institutions: Crown and County Courts |
| | General Assembly and Leisure, Night Clubs, and Theatres |
| | Others: Passenger Terminals |
| | Others: Emergency Services |
| | Others: Miscellaneous 24hr Activities |
| | Others: Car Parks 24 hrs |
| | Others: Stand Alone Utility Block |

## Energy Consumption by End Use [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Heating | 15.59 | 7.36 |
| Cooling | 3.22 | 4.65 |
| Auxiliary | 13.98 | 6.26 |
| Lighting | 12.06 | 10.77 |
| Hot water | 46.79 | 63.79 |
| Equipment* | 60.15 | 60.15 |
| **TOTAL**** | **91.63** | **92.83** |

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [$kWh/m^2$]

| | Actual | Notional |
|---|---|---|
| Photovoltaic systems | 13.99 | 0.33 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |
| *Displaced electricity* | *13.99* | *0.33* |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 263.38 | 147.13 |
| Primary energy [$kWh_{PE}/m^2$] | 118.71 | 136.63 |
| Total emissions [$kg/m^2$] | 11.1 | 12.56 |

## HVAC Systems Performance

| System Type | | Heat dem MJ/m2 | Cool dem MJ/m2 | Heat con kWh/m2 | Cool con kWh/m2 | Aux con kWh/m2 | Heat SSEEF | Cool SSEER | Heat gen SEFF | Cool gen SEER |
|---|---|---|---|---|---|---|---|---|---|---|
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 284.4 | 10.5 | 18 | 0.8 | 15 | 4.39 | 3.6 | 4.39 | 3.6 |
| | Notional | 86 | 64.4 | 9 | 4.1 | 5.7 | 2.64 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 273.4 | 9.8 | 16.8 | 0.8 | 15.8 | 4.53 | 3.6 | 4.53 | 3.6 |
| | Notional | 107.3 | 58.3 | 11.3 | 3.7 | 6 | 2.64 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 242.4 | 13.9 | 15.3 | 1.1 | 15.7 | 4.39 | 3.6 | 4.39 | 3.6 |
| | Notional | 96.7 | 64.1 | 10.2 | 4.1 | 6 | 2.64 | 4.4 | ---- | ---- |
| [ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 371.2 | 274.9 | 23.2 | 21.2 | 12.9 | 4.45 | 3.6 | 4.45 | 3.6 |
| | Notional | 39.3 | 318.7 | 4.1 | 20.1 | 7.4 | 2.64 | 4.4 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 57.6 | 0 | 16 | 0 | 18.4 | 1 | 0 | 1 | 0 |
| | Notional | 8.1 | 0 | 1.7 | 0 | 22.9 | 1.34 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 267.1 | 0 | 74.2 | 0 | 62.5 | 1 | 0 | 1 | 0 |
| | Notional | 137.6 | 0 | 28.5 | 0 | 28 | 1.34 | 0 | ---- | ---- |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 10.5 | 0 | 2.9 | 0 | 39.9 | 1 | 0 | 1 | 0 |
| | Notional | 0 | 0 | 0 | 0 | 15.7 | 0 | 0 | ---- | ---- |

### Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

## Appendix E: Manufacturers Datasheet

SAMSUNG

DVM Pro 2.0

# Report

## Project

Customer:

Project Name: 97679BG - Travelodge Stockley Park, 63 bed extension

Location: United Kingdom, NOTTINGHAM

Date: 2024-02-22

## Designer

Name: Bobby Graham

Phone: 01623 646 640

Email: bobby@gallant.co.uk

Address:

## Software

Version: 2.0.1.2

DB version: 20240221-204421

SAMSUNG

DVM Pro 2.0

## Product Specification

### GF/FOH & BOH

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM180AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 18 |
| | Capacity | Cooling | Rated | kW | 50.4 |
| | | Heating | Rated | kW | 50.4 |
| | | | Max | kW | 56.7 |
| Power | Power Input | Cooling | Rated | kW | 17.26 |
| | | Heating | Rated | kW | 13.62 |
| | Current Input | Cooling | Rated | A | 26.79 |
| | | Heating | Rated | A | 21.14 |
| | Current | MCA | | A | 39.2 |
| | | MFA | | A | 50 |
| Efficiency | Cooling | SEER | | W/W | 7.05 |
| | Heating | SCOP | | W/W | 4.45 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 313 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 2 |
| | Output | | | W | 620 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 5/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 1 1/8'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### GF/FOH & BOH (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 7/8'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 10.5 |
| | CO2 emission | | tCO2e | 21.92 |
| Sound | Sound Pressure | Cooling | dB(A) | 59 |
| | Sound Power Level | Cooling | dB(A) | 81 |
| External Dimension | Net Weight | | kg | 274 |
| | Shipping Weight | | kg | 291 |
| | Net Dimensions | W | mm | 1295 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 1363 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

SAMSUNG

DVM Pro 2.0

## Product Specification

### GF/Bedrooms 1-12

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM100AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 10 |
| | Capacity | Cooling | Rated | kW | 28 |
| | | Heating | Rated | kW | 28 |
| | | | Max | kW | 31.5 |
| Power | Power Input | Cooling | Rated | kW | 10.29 |
| | | Heating | Rated | kW | 7.35 |
| | Current Input | Cooling | Rated | A | 15.97 |
| | | Heating | Rated | A | 11.41 |
| | Current | MCA | | A | 21.2 |
| | | MFA | | A | 32 |
| Efficiency | Cooling | SEER | | W/W | 7.22 |
| | Heating | SCOP | | W/W | 4.39 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 181 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 7/8'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### GF/Bedrooms 1-12 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 3/4'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 56 |
| | Sound Power Level | Cooling | dB(A) | 78 |
| External Dimension | Net Weight | | kg | 211 |
| | Shipping Weight | | kg | 225 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### 1F/Bedrooms 1-10

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### 1F/Bedrooms 1-10 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 5/8'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 199 |
| | Shipping Weight | | kg | 213 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### 1F/Bedrooms 11-20

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### 1F/Bedrooms 11-20 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 5/8'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 199 |
| | Shipping Weight | | kg | 213 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### 1F/Bedrooms 21-31

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### 1F/Bedrooms 21-31 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 5/8'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 199 |
| | Shipping Weight | | kg | 213 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### 1F/Bedrooms 32-43

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM100AXVGGR/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HR |
| Performance | HP | | | | 10 |
| | Capacity | Cooling | Rated | kW | 28 |
| | | Heating | Rated | kW | 28 |
| | | | Max | kW | 31.5 |
| Power | Power Input | Cooling | Rated | kW | 10.29 |
| | | Heating | Rated | kW | 7.35 |
| | Current Input | Cooling | Rated | A | 15.97 |
| | | Heating | Rated | A | 11.41 |
| | Current | MCA | | A | 21.2 |
| | | MFA | | A | 32 |
| Efficiency | Cooling | SEER | | W/W | 7.22 |
| | Heating | SCOP | | W/W | 4.39 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 181 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 7/8'' |
| | High Pressure Gas Pipe | Type | | | Welding |

## Product Specification

### 1F/Bedrooms 32-43 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | High Pressure Gas Pipe | Diameter | in | 3/4'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 56 |
| | Sound Power Level | Cooling | dB(A) | 78 |
| External Dimension | Net Weight | | kg | 211 |
| | Shipping Weight | | kg | 225 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### ASHP1

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGH/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HP |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| Wiring connections | Communication | Min. | | ㎟ | 0.75 |

## Product Specification

### ASHP1 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Wiring connections | Communication | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 194 |
| | Shipping Weight | | kg | 208 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### ASHP2

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGH/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HP |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| Wiring connections | Communication | Min. | | ㎟ | 0.75 |

## Product Specification

### ASHP2 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Wiring connections | Communication | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 194 |
| | Shipping Weight | | kg | 208 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### ASHP3

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGH/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HP |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| Wiring connections | Communication | Min. | | ㎟ | 0.75 |

## Product Specification

### ASHP3 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Wiring connections | Communication | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 194 |
| | Shipping Weight | | kg | 208 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### ASHP4

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM080AXVGGH/EU |
| Module | | | | | Single |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HP |
| Performance | HP | | | | 8 |
| | Capacity | Cooling | Rated | kW | 22.4 |
| | | Heating | Rated | kW | 22.4 |
| | | | Max | kW | 25.2 |
| Power | Power Input | Cooling | Rated | kW | 7.37 |
| | | Heating | Rated | kW | 5.86 |
| | Current Input | Cooling | Rated | A | 11.44 |
| | | Heating | Rated | A | 9.09 |
| | Current | MCA | | A | 18 |
| | | MFA | | A | 25 |
| Efficiency | Cooling | SEER | | W/W | 7.78 |
| | Heating | SCOP | | W/W | 4.53 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Top discharge |
| | Air Flow Rate | High | | CMM | 164 |
| | External Static Pressure | Max | | Pa | 107.87 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 1 |
| | Output | | | W | 630 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |
| | Gas Pipe | Type | | | Welding |
| | | Diameter | | in | 3/4'' |
| Wiring connections | Communication | Min. | | ㎟ | 0.75 |

## Product Specification

### ASHP4 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Wiring connections | Communication | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 7 |
| | CO2 emission | | tCO2e | 14.62 |
| Sound | Sound Pressure | Cooling | dB(A) | 53 |
| | Sound Power Level | Cooling | dB(A) | 75 |
| External Dimension | Net Weight | | kg | 194 |
| | Shipping Weight | | kg | 208 |
| | Net Dimensions | W | mm | 930 |
| | | H | mm | 1695 |
| | | D | mm | 765 |
| | Shipping Dimensions | W | mm | 998 |
| | | H | mm | 1887 |
| | | D | mm | 829 |
| Operating Temp. Range | Cooling | Min. | °C | -5 |
| | | Max. | °C | 50 |
| | Heating | Min. | °C | -25 |
| | | Max. | °C | 24 |

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## Product Specification

### ASHP5

### Outdoor Unit

| | | | | | |
|---|---|---|---|---|---|
| Model Name | | | | | AM050BXMDGR/EU |
| Power Supply | | | | Ø, #, V, Hz | 3 \| 4 \| 380-415 \| 50 |
| Mode | | | | | HP/HR |
| Performance | HP | | | | 5 |
| | Capacity | Cooling | Rated | kW | 14 |
| | | Heating | Rated | kW | 14 |
| | | | Max | kW | 16 |
| Power | Power Input | Cooling | Rated | kW | 5 |
| | | Heating | Rated | kW | 3.83 |
| | | | Max | kW | 4.86 |
| | Current Input | Cooling | Rated | A | 7.6 |
| | | Heating | Rated | A | 5.8 |
| | | | Max | A | 7.4 |
| | Current | Minimum Ssc | | MVA | 3.9 |
| | | MCA | | A | 16.1 |
| | | MFA | | A | 20 |
| Efficiency | Cooling | EER | | W/W | 2.8 |
| | Heating | COP | | W/W | 3.66 |
| | | COP(Max) | | W/W | 3.29 |
| Casing | Material | Body | | | GI Steel Plate |
| | | Base | | | GI Steel Plate |
| Heat Exchanger | Type | | | | Fin & Tube |
| | Material | Fin | | | Al |
| | | Tube | | | Cu |
| | Fin Treatment | | | | Anti-corrosion |
| Compressor | Quantity | | | EA | 1 |
| Fan | Type | | | | Propeller |
| | Discharge direction | | | | Horizontal |
| | Air Flow Rate | High | | CMM | 100 |
| | External Static Pressure | Max | | Pa | 29.42 |
| Fan Motor | Type | | | | BLDC |
| | Quantity | | | EA | 2 |
| | Output | | | W | 125 |
| Piping Connections | Liquid Pipe | Type | | | Welding |
| | | Diameter | | in | 3/8'' |

## Product Specification

### ASHP5 (Continued)

### Outdoor Unit

| | | | | |
|---|---|---|---|---|
| Piping Connections | Gas Pipe | Type | | Welding |
| | | Diameter | in | 5/8'' |
| | High Pressure Gas Pipe | Type | | Welding |
| | | Diameter | in | 5/8'' |
| Wiring connections | Communication | Min. | ㎟ | 0.75 |
| | | Comm.Layer | | F1, F2 |
| Refrigerant | Type | | | R410A |
| | Factory Charging | | kg | 3.2 |
| | CO2 emission | | tCO2e | 6.68 |
| Sound | Sound Pressure Level | Cooling | dB(A) | 52 |
| | | Heating | dB(A) | 55 |
| | Sound Power Level | Cooling | dB(A) | 69 |
| External Dimension | Net Weight | | kg | 95 |
| | Shipping Weight | | kg | 105 |
| | Net Dimensions | W | mm | 940 |
| | | H | mm | 1210 |
| | | D | mm | 330 |
| | Shipping Dimensions | W | mm | 995 |
| | | H | mm | 1388 |
| | | D | mm | 426 |
| Operating Temp. Range | Cooling | Min. | ℃ | -5 |
| | | Max. | ℃ | 48 |
| | Heating | Min. | ℃ | -25 |
| | | Max. | ℃ | 26 |

## Appendix F: GLA Carbon Spreadsheet

# Non-residential

**Table 3:** Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

| | Carbon Dioxide Emissions for non-residential buildings (Tonnes $CO_2$ per annum) | |
|---|---|---|
| | Regulated | Unregulated |
| Baseline: Part L 2021 of the Building Regulations Compliant Development | 131.9 | 13.6 |
| After energy demand reduction (be lean) | 101.6 | 13.6 |
| After heat network connection (be clean) | 101.6 | 13.6 |
| After renewable energy (be green) | 18.0 | 13.6 |

**Table 4:** Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

| | Regulated non-residential carbon dioxide savings | |
|---|---|---|
| | Tonnes $CO_2$ per annum | (%) |
| Be lean: savings from energy demand reduction | 30.3 | 23% |
| Be clean: savings from heat network | 0.0 | 0% |
| Be green: savings from renewable energy | 83.6 | 63% |
| **Total Cumulative Savings** | **113.9** | **86%** |
| Annual savings from off-set payment | 18.0 | - |
| | (Tonnes $CO_2$) | |
| **Cumulative savings for off-set payment** | **541** | - |
| **Cash in-lieu contribution (£)** | **51,407** | |

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development