# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## Abacus Belsize Primary - BUSINESS & ENTERPRISE SPACE

As designed

**Date:** Fri Jul 19 12:49:11 2019

## Administrative information

### Building Details

**Address:** 26 Rosslyn Hill, London, NW3 1PD

### Certification tool

**Calculation engine:** SBEM

**Calculation engine version:** v5.6.a.1

**Interface to calculation engine:** Virtual Environment

**Interface to calculation engine version:** v7.0.11

**BRUKL compliance check version:** v5.6.a.1

### Owner Details

**Name:** ESFA

**Telephone number:** Phone

**Address:** Street Address, City, Postcode

### Certifier details

**Name:** Konstantinos Pyrintsos

**Telephone number:** 01275813500

**Address:** 65 Macrae Road, Bristol, BS20 0DD

## Criterion 1: The calculated $CO_2$ emission rate for the building must not exceed the target

The building does not comply with England Building Regulations Part L 2013

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 18.1 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 18.1 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 50.5 |
| Are emissions from the building less than or equal to the target? | BER > TER |
| Are as built details the same as used in the BER calculations? | Separate submission |

## Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

**Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.**

**Building fabric**

| Element | $U_{a\text{-}Limit}$ | $U_{a\text{-}Calc}$ | $U_{i\text{-}Calc}$ | Surface where the maximum value occurs* |
|---|---|---|---|---|
| Wall** | 0.35 | 1.1 | 1.25 | FF000000_W1 |
| Floor | 0.25 | 1.55 | 2.41 | GR000000_F_A2 |
| Roof | 0.25 | 2.57 | 2.8 | FF000000_C |
| Windows***, roof windows, and rooflights | 2.2 | 4.1 | 5.75 | FF000006_C_O0 |
| Personnel doors | 2.2 | 2.2 | 2.2 | FF000000_W1_O1 |
| Vehicle access & similar large doors | 1.5 | - | - | "No external vehicle access doors" |
| High usage entrance doors | 3.5 | - | - | "No external high usage entrance doors" |

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values $[W/(m^2K)]$
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values $[W/(m^2K)]$
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values $[W/(m^2K)]$

* There might be more than one surface where the maximum U-value occurs.
** 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.
N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air Permeability | Worst acceptable standard | This building |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 10 | 7 |

## Building services

**The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.**

| | |
|---|---|
| **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- Gas Condening Boilers-Rads-NatVent-Direct Gas Fired Water Heater

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.96 | - | - | - | - |
| **Standard value** | 0.91* | N/A | N/A | N/A | N/A |
| **Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system** | | | | | YES |

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- SYST0006-DHW

| | **Water heating efficiency** | **Storage loss factor [kWh/litre per day]** |
|---|---|---|
| **This building** | 0.91 | 0.018 |
| **Standard value** | 0.9* | N/A |

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

### Local mechanical ventilation, exhaust, and terminal units

| **ID** | **System type in Non-domestic Building Services Compliance Guide** |
|---|---|
| A | Local supply or extract ventilation units serving a single area |
| 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 supply and extract ventilation units serving a single room or zone with heating and heat recovery |
| E | Local supply and extract ventilation system serving a single area with heating and heat recovery |
| F | Other local ventilation units |
| G | Fan-assisted terminal VAV unit |
| H | Fan coil units |
| I | Zonal extract system where the fan is remote from the zone with grease filter |

| **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 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 | **Zone** | **Standard** |
| FF-B&E WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |

### General lighting and display lighting

| | **Luminous efficacy [lm/W]** | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| FF-B&E Lobby IF | - | 70 | - | 232 |
| FF-B&E WC | - | 70 | - | 88 |
| GF-B&E Space 1 | 70 | - | - | 680 |
| GF-B&E Stairs | - | 70 | - | 62 |
| GF-B&E Lobby | - | 70 | - | 297 |
| FF-B&E Space 2-stairs | - | 70 | - | 104 |
| FF-B&E Space 2 | 70 | - | - | 748 |

## Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

| Zone | Solar gain limit exceeded? (%) | Internal blinds used? |
|---|---|---|
| GF-B&E Space 1 | NO (-38.6%) | NO |
| FF-B&E Space 2 | NO (-13.6%) | NO |

## Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

## Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

## EPBD (Recast): Consideration of alternative energy systems

| | |
|---|---|
| **Were alternative energy systems considered and analysed as part of the design process?** | YES |
| Is evidence of such assessment available as a separate submission? | YES |
| Are any such measures included in the proposed design? | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

| | Actual | Notional |
|---|---|---|
| Area [$m^2$] | 289.4 | 289.4 |
| External area [$m^2$] | 514.6 | 514.6 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 7 | 3 |
| Average conductance [W/K] | 943.71 | 316.6 |
| Average U-value [$W/m^2K$] | 1.83 | 0.62 |
| Alpha value* [%] | 5.55 | 22.04 |

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

## Building Use

| % Area | Building Type |
|---|---|
| | A1/A2 Retail/Financial and Professional services |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| **100** | **B1 Offices and Workshop businesses** |
| | B2 to B7 General Industrial and Special Industrial Groups |
| | B8 Storage or Distribution |
| | C1 Hotels |
| | C2 Residential Institutions: Hospitals and Care Homes |
| | C2 Residential Institutions: Residential schools |
| | C2 Residential Institutions: Universities and colleges |
| | C2A Secure Residential Institutions |
| | Residential spaces |
| | D1 Non-residential Institutions: Community/Day Centre |
| | D1 Non-residential Institutions: Libraries, Museums, and Galleries |
| | D1 Non-residential Institutions: Education |
| | D1 Non-residential Institutions: Primary Health Care Building |
| | D1 Non-residential Institutions: Crown and County Courts |
| | D2 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 | 165.72 | 48.15 |
| Cooling | 0 | 0 |
| Auxiliary | 4.02 | 1.09 |
| Lighting | 21.49 | 13.44 |
| Hot water | 6.55 | 1.79 |
| Equipment* | 26.04 | 26.04 |
| **TOTAL**** | **197.78** | **64.47** |

* 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 | 0 |
| Wind turbines | 0 | 0 |
| CHP generators | 0 | 0 |
| Solar thermal systems | 0 | 0 |

## Energy & $CO_2$ Emissions Summary

| | Actual | Notional |
|---|---|---|
| Heating + cooling demand [$MJ/m^2$] | 665.24 | 263.2 |
| Primary energy* [$kWh/m^2$] | 288.49 | 104.41 |
| Total emissions [$kg/m^2$] | 50.5 | 18.1 |

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

## 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] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 535.7 | 129.5 | 165.7 | 0 | 1.4 | 0.9 | 0 | 0.96 | 0 |
| | **Notional** | 142 | 121.2 | 48.2 | 0 | 1.1 | 0.82 | 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

# Key Features

**The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.**

**Building fabric**

| Element | $U_{i\text{-}Typ}$ | $U_{i\text{-}Min}$ | Surface where the minimum value occurs* |
|---|---|---|---|
| Wall | 0.23 | 1.03 | FF000000_W0 |
| Floor | 0.2 | 0.22 | FF000006_F |
| Roof | 0.15 | 2.5 | FF000006_C |
| Windows, roof windows, and rooflights | 1.5 | 2.89 | FF000000_W0_O0 |
| Personnel doors | 1.5 | 2.2 | FF000000_W1_O1 |
| Vehicle access & similar large doors | 1.5 | - | "No external vehicle access doors" |
| High usage entrance doors | 1.5 | - | "No external high usage entrance doors" |

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

| Air Permeability | Typical value | This building |
|---|---|---|
| m³/(h.m²) at 50 Pa | 5 | 7 |