# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## 1 Museum St (Be Lean)

As designed

**Date:** Wed Jan 27 15:54:57 2021

## Administrative information

### Building Details

**Address:** Address 1, City, Postcode

### Certification tool

**Calculation engine:** Apache

**Calculation engine version:** 7.0.13

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.13

**BRUKL compliance check version:** v5.6.b.0

### Certifier details

**Name:** Name

**Telephone number:** Phone

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

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

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 13.2 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 13.2 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 10.1 |
| 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 | 0.16 | 0.26 | G0000009:Surf[3] |
| Floor | 0.25 | 0.23 | 0.25 | G2000159:Surf[0] |
| Roof | 0.25 | 0.12 | 0.12 | G3000000:Surf[118] |
| Windows***, roof windows, and rooflights | 2.2 | 1.36 | 1.6 | G1000037:Surf[0] |
| Personnel doors | 2.2 | - | - | No Personnel doors in building |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

$U_{a\text{-}Limit}$ = 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 | 3 |

## 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** | YES |
| **Whole building electric power factor achieved by power factor correction** | >0.95 |

1- Radiator + Nat Vent

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |

* 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.

2- Radiator + Extract

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |

* 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.

3- Office VRF+ HR CMM System

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.8 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.65 |
| **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. 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.

4- Reception VRF+ HR

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.8 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.65 |
| **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. 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.

5- Comms Room DX

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.66 | - | 0 | - |
| **Standard value** | 0.91* | 2.6 | 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. 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.

6- Staff Areas + HR

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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.

7- Radiator + Supply

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | 0.9 |
| **Standard value** | 0.91* | N/A | N/A | N/A | 0.5 |
| **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. 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. | | | | | |

8- Securty & Fire Office VRF+ HR

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.8 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.65 |
| **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. 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- DHW Local Point of use

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.9 | - |
| **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. | | |

2- DHW Basement

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.9 | 0.002 |
| **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 |
| G1 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G2 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G3 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G4 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G5 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G6 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |

| 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 |
| G7 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G8 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G9 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G10 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G11 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G11 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G12 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G13 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G14 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G15 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G16 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G17 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G18 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G19 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G20 Office | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G0 Lobby | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G-1 Cycle Store | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-1 Cycle Store | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 Staff Room | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 FM Office | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Drying Room | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Shower | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Shower | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 Unisex Shower | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Shower | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 Office Showers | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Office Showers | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Showers | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 Showers | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G-2 Shower Vent | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G0 Security & Fire Risk Centre | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G0 Post Room TBC | - | - | - | 2 | - | - | - | - | - | - | N/A |
| G0 Tenant Entrance | - | - | - | 2 | - | - | - | - | - | - | 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 | |
| G1 Lift Lobby | - | 100 | - | 68 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G1 Lift Lobby | - | 100 | - | 38 |
| G1 Lift Lobby | - | 100 | - | 48 |
| G1 Staircase | - | 100 | - | 40 |
| G1 Staircase | - | 100 | - | 39 |
| G1 WC | - | 100 | - | 147 |
| G1 Office | 140 | - | - | 4674 |
| G2 Office | 140 | - | - | 4674 |
| G2 Lift Lobby | - | 100 | - | 68 |
| G2 Lift Lobby | - | 100 | - | 38 |
| G2 Lift Lobby | - | 100 | - | 48 |
| G2 Staircase | - | 100 | - | 40 |
| G2 Staircase | - | 100 | - | 39 |
| G2 WC | - | 100 | - | 147 |
| G3 Office | 140 | - | - | 4674 |
| G3 Lift Lobby | - | 100 | - | 68 |
| G3 Lift Lobby | - | 100 | - | 38 |
| G3 Lift Lobby | - | 100 | - | 48 |
| G3 Staircase | - | 100 | - | 40 |
| G3 Staircase | - | 100 | - | 39 |
| G3 WC | - | 100 | - | 147 |
| G4 Office | 140 | - | - | 4674 |
| G4 Lift Lobby | - | 100 | - | 68 |
| G4 Lift Lobby | - | 100 | - | 38 |
| G4 Lift Lobby | - | 100 | - | 48 |
| G4 Staircase | - | 100 | - | 40 |
| G4 Staircase | - | 100 | - | 39 |
| G4 WC | - | 100 | - | 147 |
| G5 Lift Lobby | - | 100 | - | 68 |
| G5 Lift Lobby | - | 100 | - | 38 |
| G5 Lift Lobby | - | 100 | - | 48 |
| G5 Staircase | - | 100 | - | 40 |
| G5 Staircase | - | 100 | - | 39 |
| G5 WC | - | 100 | - | 147 |
| G5 Office | 140 | - | - | 4111 |
| G6 Lift Lobby | - | 100 | - | 68 |
| G6 Lift Lobby | - | 100 | - | 38 |
| G6 Lift Lobby | - | 100 | - | 48 |
| G6 Staircase | - | 100 | - | 40 |
| G6 Staircase | - | 100 | - | 39 |
| G6 WC | - | 100 | - | 147 |
| G6 Office | 140 | - | - | 4111 |
| G7 Lift Lobby | - | 100 | - | 68 |
| G7 Lift Lobby | - | 100 | - | 38 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G7 Lift Lobby | - | 100 | - | 48 |
| G7 Staircase | - | 100 | - | 40 |
| G7 Staircase | - | 100 | - | 39 |
| G7 WC | - | 100 | - | 147 |
| G7 Office | 140 | - | - | 4111 |
| G8 Lift Lobby | - | 100 | - | 68 |
| G8 Lift Lobby | - | 100 | - | 38 |
| G8 Lift Lobby | - | 100 | - | 48 |
| G8 Staircase | - | 100 | - | 40 |
| G8 Staircase | - | 100 | - | 39 |
| G8 WC | - | 100 | - | 147 |
| G8 Office | 140 | - | - | 3145 |
| G9 Lift Lobby | - | 100 | - | 68 |
| G9 Lift Lobby | - | 100 | - | 38 |
| G9 Lift Lobby | - | 100 | - | 48 |
| G9 Staircase | - | 100 | - | 40 |
| G9 Staircase | - | 100 | - | 39 |
| G9 WC | - | 100 | - | 147 |
| G9 Office | 140 | - | - | 3145 |
| G10 Lift Lobby | - | 100 | - | 68 |
| G10 Lift Lobby | - | 100 | - | 38 |
| G10 Lift Lobby | - | 100 | - | 48 |
| G10 Staircase | - | 100 | - | 40 |
| G10 Staircase | - | 100 | - | 39 |
| G10 WC | - | 100 | - | 147 |
| G10 Office | 140 | - | - | 3145 |
| G11 Staircase | - | 100 | - | 40 |
| G11 Staircase | - | 100 | - | 39 |
| G11 WC | - | 100 | - | 147 |
| G11 Office | 100 | - | - | 799 |
| G11 Circulation | - | 100 | - | 131 |
| G11 Office | 140 | - | - | 1296 |
| G11 Lift Lobby | - | 100 | - | 33 |
| G11 Lift Lobby | - | 100 | - | 44 |
| G12 Staircase | - | 100 | - | 39 |
| G12 Office | 140 | - | - | 2125 |
| G12 Lift Lobby | - | 100 | - | 33 |
| G12 Lift Lobby | - | 100 | - | 44 |
| G12 Circulation | - | 100 | - | 58 |
| G12 WC | - | 100 | - | 82 |
| G12 Staircase | - | 100 | - | 29 |
| G13 Staircase | - | 100 | - | 39 |
| G13 Office | 140 | - | - | 2125 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G13 Lift Lobby | - | 100 | - | 33 |
| G13 Lift Lobby | - | 100 | - | 44 |
| G13 Circulation | - | 100 | - | 58 |
| G13 WC | - | 100 | - | 82 |
| G13 Staircase | - | 100 | - | 29 |
| G14 Staircase | - | 100 | - | 39 |
| G14 Office | 140 | - | - | 2125 |
| G14 Lift Lobby | - | 100 | - | 33 |
| G14 Lift Lobby | - | 100 | - | 44 |
| G14 Circulation | - | 100 | - | 58 |
| G14 WC | - | 100 | - | 82 |
| G14 Staircase | - | 100 | - | 29 |
| G15 Staircase | - | 100 | - | 39 |
| G15 Office | 140 | - | - | 2125 |
| G15 Lift Lobby | - | 100 | - | 33 |
| G15 Lift Lobby | - | 100 | - | 44 |
| G15 Circulation | - | 100 | - | 58 |
| G15 WC | - | 100 | - | 82 |
| G15 Staircase | - | 100 | - | 29 |
| G16 Staircase | - | 100 | - | 39 |
| G16 Office | 140 | - | - | 2125 |
| G16 Lift Lobby | - | 100 | - | 33 |
| G16 Lift Lobby | - | 100 | - | 44 |
| G16 Circulation | - | 100 | - | 58 |
| G16 WC | - | 100 | - | 82 |
| G16 Staircase | - | 100 | - | 29 |
| G17 Staircase | - | 100 | - | 39 |
| G17 Office | 140 | - | - | 2125 |
| G17 Lift Lobby | - | 100 | - | 33 |
| G17 Lift Lobby | - | 100 | - | 44 |
| G17 Circulation | - | 100 | - | 58 |
| G17 WC | - | 100 | - | 82 |
| G17 Staircase | - | 100 | - | 29 |
| G18 Staircase | - | 100 | - | 39 |
| G18 Office | 140 | - | - | 2125 |
| G18 Lift Lobby | - | 100 | - | 33 |
| G18 Lift Lobby | - | 100 | - | 44 |
| G18 Circulation | - | 100 | - | 58 |
| G18 WC | - | 100 | - | 82 |
| G18 Staircase | - | 100 | - | 29 |
| G19 Staircase | - | 100 | - | 39 |
| G19 Office | 140 | - | - | 2125 |
| G19 Lift Lobby | - | 100 | - | 33 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G19 Lift Lobby | - | 100 | - | 44 |
| G19 Circulation | - | 100 | - | 58 |
| G19 WC | - | 100 | - | 82 |
| G19 Staircase | - | 100 | - | 29 |
| G20 Staircase | - | 100 | - | 39 |
| G20 Office | 140 | - | - | 2125 |
| G20 Lift Lobby | - | 100 | - | 33 |
| G20 Lift Lobby | - | 100 | - | 44 |
| G20 Circulation | - | 100 | - | 58 |
| G20 WC | - | 100 | - | 82 |
| G20 Staircase | - | 100 | - | 29 |
| G12 WC | - | 100 | - | 41 |
| G12 Acc WC | - | 100 | - | 41 |
| G13 WC | - | 100 | - | 41 |
| G13 Acc WC | - | 100 | - | 41 |
| G14 Acc WC | - | 100 | - | 41 |
| G14 WC | - | 100 | - | 41 |
| G15 WC | - | 100 | - | 41 |
| G15 Acc WC | - | 100 | - | 41 |
| G16 WC | - | 100 | - | 41 |
| G16 Acc WC | - | 100 | - | 41 |
| G17 WC | - | 100 | - | 41 |
| G17 Acc WC | - | 100 | - | 41 |
| G18 WC | - | 100 | - | 41 |
| G18 Acc WC | - | 100 | - | 41 |
| G19 WC | - | 100 | - | 41 |
| G19 Acc WC | - | 100 | - | 41 |
| G20 WC | - | 100 | - | 41 |
| G20 Acc WC | - | 100 | - | 41 |
| G0 Staircase | - | 100 | - | 62 |
| G0 Staircase | - | 100 | - | 47 |
| G0 Circulation | - | 100 | - | 158 |
| G0 Cycle Store Entrance | - | 100 | - | 101 |
| G0 Lobby | - | 100 | 65 | 484 |
| G-2 Staircase | - | 100 | - | 62 |
| G-2 Circulation | - | 100 | - | 119 |
| G-1 Comms | 100 | - | - | 66 |
| G-1 Comms | 100 | - | - | 90 |
| G-1 Staircase | - | 100 | - | 38 |
| G-1 Circulation | - | 100 | - | 42 |
| G-2 AHU Plant | 100 | - | - | 462 |
| G-2 Sprinker Plant | 100 | - | - | 469 |
| G-2 Sprinker Plant | 100 | - | - | 201 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G-2 Switch Room | 100 | - | - | 248 |
| G-1 Cycle Store | 100 | - | - | 301 |
| G-1 Cycle Store | 100 | - | - | 60 |
| G-2 WC Extract | 100 | - | - | 121 |
| G-2 Staff Room | 100 | - | - | 358 |
| G-2 Staircase | - | 100 | - | 36 |
| G-2 Circulation | - | 100 | - | 40 |
| G-2 FM Office | 100 | - | - | 144 |
| G-2 Refuse Store | 100 | - | - | 28 |
| G-2 Refuse Store | 100 | - | - | 29 |
| G-2 Refuse Store | 100 | - | - | 13 |
| G-2 Refuse Store | 100 | - | - | 7 |
| G-2 Drying Room | - | 100 | - | 31 |
| G-2 Shower | - | 100 | - | 19 |
| G-2 Shower | - | 100 | - | 14 |
| G-2 WC | - | 100 | - | 28 |
| G-2 WC | - | 100 | - | 36 |
| G-2 WC | - | 100 | - | 25 |
| G-2 WC | - | 100 | - | 40 |
| G-2 Unisex Shower | - | 100 | - | 19 |
| G-2 Shower | - | 100 | - | 17 |
| G-2 WC | - | 100 | - | 37 |
| G-2 Office Showers | - | 100 | - | 104 |
| G-2 Office Showers | - | 100 | - | 42 |
| G-2 Showers | - | 100 | - | 49 |
| G-2 Showers | - | 100 | - | 131 |
| G-2 Circulation | - | 100 | - | 176 |
| G-2 Circulation | - | 100 | - | 16 |
| G-2 Circulation | - | 100 | - | 7 |
| G-2 WC | - | 100 | - | 29 |
| G-2 Circulation | - | 100 | - | 39 |
| G-2 Storage | 100 | - | - | 17 |
| G-2 Circulation | - | 100 | - | 81 |
| G-2 Circulation | - | 100 | - | 62 |
| G-2 Circulation | - | 100 | - | 43 |
| G-2 Shower Vent | - | 100 | - | 41 |
| G-2 AHU Plant | 100 | - | - | 575 |
| G-2 Lift Safety Switch Room | 100 | - | - | 189 |
| G0 WC | - | 100 | - | 82 |
| G0 Circulation | - | 100 | - | 153 |
| G0 Circulation | - | 100 | - | 25 |
| G0 Security & Fire Risk Centre | 100 | - | - | 218 |
| G0 Post Room TBC | 100 | - | - | 254 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G0 Tenant Entrance | - | 100 | 65 | 414 |

## 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? |
|---|---|---|
| G1 Office | NO (-68.3%) | NO |
| G2 Office | NO (-72.6%) | NO |
| G3 Office | NO (-68.3%) | NO |
| G4 Office | NO (-60.4%) | NO |
| G5 Office | NO (-57.1%) | NO |
| G6 Office | NO (-56.6%) | NO |
| G7 Office | NO (-56%) | NO |
| G8 Office | NO (-55.9%) | NO |
| G9 Office | NO (-54.8%) | NO |
| G10 Office | NO (-51.4%) | NO |
| G11 Office | NO (-56.9%) | NO |
| G11 Office | NO (-53.1%) | NO |
| G12 Office | NO (-52.4%) | NO |
| G13 Office | NO (-52.4%) | NO |
| G14 Office | NO (-52.4%) | NO |
| G15 Office | NO (-52.4%) | NO |
| G16 Office | NO (-52.5%) | NO |
| G17 Office | NO (-52.4%) | NO |
| G18 Office | NO (-52.5%) | NO |
| G19 Office | NO (-52.4%) | NO |
| G20 Office | NO (-43.7%) | NO |
| G0 Lobby | NO (-43%) | NO |
| G-1 Comms | N/A | N/A |
| G-1 Comms | N/A | N/A |
| G-2 Staff Room | N/A | N/A |
| G-2 FM Office | N/A | N/A |
| G0 Security & Fire Risk Centre | N/A | N/A |
| G0 Post Room TBC | N/A | N/A |
| G0 Tenant Entrance | NO (-56.4%) | 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 [$m^2$] | 19737.2 | 19737.2 |
| External area [$m^2$] | 14901.6 | 14491.7 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 3 |
| Average conductance [W/K] | 9644.66 | 8433.33 |
| Average U-value [$W/m^2K$] | 0.65 | 0.58 |
| Alpha value* [%] | 10.48 | 10 |

* 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 | 10.17 | 5.86 |
| Cooling | 3.18 | 4.5 |
| Auxiliary | 4.02 | 1.88 |
| Lighting | 4.82 | 13.62 |
| Hot water | 8.54 | 8.22 |
| Equipment* | 39.72 | 39.72 |
| **TOTAL**** | **30.74** | **34.08** |

* 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 [$MJ/m^2$] | 59.12 | 64.25 |
| Primary energy* [$kWh/m^2$] | 58.83 | 77.04 |
| Total emissions [$kg/m^2$] | 10.1 | 13.2 |

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 28.3 | 37.7 | 9.3 | 4.2 | 4.9 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 15.1 | 62 | 4.9 | 6.1 | 2.1 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 49.7 | 0 | 17 | 0 | 1.1 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 39 | 0 | 12.6 | 0 | 1 | 0.86 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 27.9 | 21.1 | 9.1 | 2.4 | 4.4 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 7.2 | 20.2 | 2.3 | 2 | 1.9 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0.85 | 4.76 | 0.91 | 6.7 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 31.2 | 92.5 | 10.2 | 10.3 | 4.3 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 22.9 | 56.7 | 7.4 | 5.5 | 2.1 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 34.5 | 0 | 11.8 | 0 | 2.1 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 19.5 | 0 | 6.3 | 0 | 2.2 | 0.86 | 0 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 40.2 | 0 | 13.7 | 0 | 6.2 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 35.9 | 0 | 11.6 | 0 | 3.3 | 0.86 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 23.6 | 190.6 | 7.7 | 21.3 | 4.9 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 13.4 | 151.8 | 4.3 | 11.1 | 2.1 | 0.86 | 3.79 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 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

# 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 | 0.12 | G1000037:Surf[9] |
| Floor | 0.2 | 0.11 | G0000009:Surf[5] |
| Roof | 0.15 | 0.12 | G3000000:Surf[118] |
| Windows, roof windows, and rooflights | 1.5 | 0.12 | G1000080:Surf[12] |
| Personnel doors | 1.5 | - | No Personnel doors in building |
| Vehicle access & similar large doors | 1.5 | - | No Vehicle access doors in building |
| High usage entrance doors | 1.5 | - | No High usage entrance doors in building |

$U_{i\text{-}Typ}$ = 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 | 3 |

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## 1 Museum St Retail (Be Lean)

As designed

**Date:** Mon Feb 01 20:59:17 2021

## Administrative information

### Building Details

**Address:** Address 1, City, Postcode

### Certification tool

**Calculation engine:** Apache

**Calculation engine version:** 7.0.13

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.13

**BRUKL compliance check version:** v5.6.b.0

### Certifier details

**Name:** Name

**Telephone number:** Phone

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

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

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 36.9 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 36.9 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 20.5 |
| 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 | 0.15 | 0.26 | G0000002:Surf[16] |
| Floor | 0.25 | 0.22 | 0.22 | G0000002:Surf[0] |
| Roof | 0.25 | 0.12 | 0.12 | G0000002:Surf[1] |
| Windows***, roof windows, and rooflights | 2.2 | 1 | 1 | G0000002:Surf[2] |
| Personnel doors | 2.2 | - | - | No Personnel doors in building |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | 2.2 | 2.2 | G0000002:Surf[12] |

$U_{a\text{-}Limit}$ = 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 | 3 |

## 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** | >0.95 |

1- Radiator + Nat Vent

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

2- Radiator + Extract

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

3- Retail VRF

| | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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- DHW System

| | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|---|---|---|
| **This building** | 0.9 | - |
| **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** |
| G0 Cafe WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |

| 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 |
| G0 Flexible GF Uses Class E | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses Class E | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses Class E | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses Class E | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses Class E | - | - | - | 1.1 | - | - | - | - | - | - | 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 | |
| G0 Cafe Circulation | - | 100 | - | 22 |
| G0 Cafe BOH | - | 100 | - | 58 |
| G0 Cafe WC | - | 100 | - | 83 |
| G0 Flexible GF Uses Class E | - | 100 | 65 | 1446 |
| G0 Flexible GF Uses Class E | - | 100 | 65 | 1253 |
| G0 Flexible GF Uses Class E | - | 100 | 65 | 1222 |
| G0 Flexible GF Uses Class E | - | 100 | 65 | 1754 |
| G0 Flexible GF Uses Class E | - | 100 | 65 | 883 |

## 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? |
|---|---|---|
| G0 Flexible GF Uses Class E | NO (-10%) | NO |
| G0 Flexible GF Uses Class E | NO (-29.3%) | NO |
| G0 Flexible GF Uses Class E | NO (-72.3%) | NO |
| G0 Flexible GF Uses Class E | NO (-70.7%) | NO |
| G0 Flexible GF Uses Class E | NO (-77.1%) | 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 [$m^2$] | 648.7 | 648.7 |
| External area [$m^2$] | 839.1 | 839.1 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 3 |
| Average conductance [W/K] | 401.09 | 427.4 |
| Average U-value [$W/m^2K$] | 0.48 | 0.51 |
| Alpha value* [%] | 10 | 10 |

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

## Building Use

| % Area | Building Type |
|---|---|
| **100** | **A1/A2 Retail/Financial and Professional services** |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| | 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 | 11.7 | 6.88 |
| Cooling | 3.69 | 5.82 |
| Auxiliary | 5.02 | 3.01 |
| Lighting | 26.07 | 60.35 |
| Hot water | 1.9 | 1.79 |
| Equipment* | 19.91 | 19.91 |
| **TOTAL**** | **48.39** | **77.85** |

* 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 [$MJ/m^2$] | 68.6 | 80.88 |
| Primary energy* [$kWh/m^2$] | 120.7 | 217.63 |
| Total emissions [$kg/m^2$] | 20.5 | 36.9 |

* 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** | 92.1 | 0 | 31.5 | 0 | 1.3 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 45.9 | 0 | 14.8 | 0 | 1.2 | 0.86 | 0 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 62.5 | 0 | 21.4 | 0 | 2.8 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 27.8 | 0 | 8.9 | 0 | 3.2 | 0.86 | 0 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 33.6 | 34.5 | 11 | 3.9 | 5.2 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 20.6 | 62.1 | 6.6 | 6.1 | 3.1 | 0.86 | 2.84 | ---- | ---- |

### 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 | 0.14 | G0000002:Surf[7] |
| Floor | 0.2 | 0.22 | G0000002:Surf[0] |
| Roof | 0.15 | 0.12 | G0000002:Surf[1] |
| Windows, roof windows, and rooflights | 1.5 | 1 | G0000002:Surf[2] |
| Personnel doors | 1.5 | - | No Personnel doors in building |
| Vehicle access & similar large doors | 1.5 | - | No Vehicle access doors in building |
| High usage entrance doors | 1.5 | 2.2 | G0000002:Surf[12] |

$U_{i\text{-}Typ}$ = 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 | 3 |

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## High Holborn (Be Lean)

As designed

**Date:** Fri Feb 12 11:49:33 2021

## Administrative information

### Building Details

**Address:** Address 1, City, Postcode

### Certification tool

**Calculation engine:** Apache

**Calculation engine version:** 7.0.13

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.13

**BRUKL compliance check version:** v5.6.b.0

### Certifier details

**Name:** Neil Bajaj

**Telephone number:** 020 3514 3080

**Address:** Airport House Business Centre, Croydon, CR0 0XZ

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

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 17.2 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 17.2 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 14.2 |
| 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 | 0.16 | 0.23 | G0000006:Surf[2] |
| Floor | 0.25 | 0.12 | 0.12 | G0000004:Surf[2] |
| Roof | 0.25 | 0.12 | 0.12 | G0000003:Surf[5] |
| Windows***, roof windows, and rooflights | 2.2 | 1.4 | 1.5 | G100002A:Surf[0] |
| Personnel doors | 2.2 | 2.2 | 2.2 | G0000003:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | 1.2 | 1.2 | G0000006:Surf[9] |

$U_{a\text{-}Limit}$ = 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 | 3 |

## 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** | YES |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- Indirect Heating System 1

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

2- Indirect Heating System 2

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

3- Mini VRF Retail

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 4.48 | 0 | 0 | 0.85 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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- DHW

| | **Water heating efficiency** | **Storage loss factor [kWh/litre per day]** |
|---|---|---|
| **This building** | 0.9 | - |
| **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** |
| G0 Retail | - | - | - | 1.3 | - | - | - | - | - | - | 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 | |
| G2 Landlord Lobby | - | 100 | - | 18 |
| G4 Landlord Lobby | - | 100 | - | 14 |
| G0 Cycle Store | 100 | - | - | 15 |
| G0 Residential Lobby | - | 100 | - | 28 |
| G0 Staircase | - | 100 | - | 26 |
| G0 Retail | - | 100 | 65 | 324 |
| G1 Landlord Lobby | - | 100 | - | 17 |
| G1 Staircase | - | 100 | - | 40 |
| G2 Staircase | - | 100 | - | 30 |
| G3 Landlord Lobby | - | 100 | - | 18 |
| G3 Staircase | - | 100 | - | 30 |
| G4 Staircase | - | 100 | - | 30 |

## 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? |
|---|---|---|
| G0 Staircase | N/A | N/A |
| G0 Retail | NO (-34.4%) | 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 [$m^2$] | 137.5 | 137.5 |
| External area [$m^2$] | 316.1 | 316.1 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 5 |
| Average conductance [W/K] | 147.36 | 204.53 |
| Average U-value [$W/m^2K$] | 0.47 | 0.65 |
| Alpha value* [%] | 10 | 10 |

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

## Building Use

| % Area | Building Type |
|---|---|
| **27** | **A1/A2 Retail/Financial and Professional services** |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| | 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 |
| **73** | **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 | 24.35 | 32.25 |
| Cooling | 1.69 | 0.36 |
| Auxiliary | 1.56 | 0.81 |
| Lighting | 13.76 | 18.98 |
| Hot water | 0.37 | 0.36 |
| Equipment* | 13.56 | 13.56 |
| **TOTAL**** | **41.72** | **52.76** |

* 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 [$MJ/m^2$] | 101.39 | 103.74 |
| Primary energy* [$kWh/m^2$] | 82.37 | 100.09 |
| Total emissions [$kg/m^2$] | 14.2 | 17.2 |

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 144.7 | 120 | 47.4 | 7.1 | 5 | 0.85 | 4.73 | 0.91 | 6.66 |
| | **Notional** | 220.9 | 15.3 | 71.2 | 1.5 | 2.5 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 262.9 | 0 | 89.9 | 0 | 2.6 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 320.9 | 0 | 103.4 | 0 | 1.5 | 0.86 | 0 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 249.7 | 0 | 85.4 | 0 | 2.6 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 334.5 | 0 | 107.8 | 0 | 1.5 | 0.86 | 0 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 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

# 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 | 0.16 | G100002A:Surf[1] |
| Floor | 0.2 | 0.12 | G0000004:Surf[2] |
| Roof | 0.15 | 0.12 | G0000003:Surf[5] |
| Windows, roof windows, and rooflights | 1.5 | 1.2 | G0000006:Surf[1] |
| Personnel doors | 1.5 | 2.2 | G0000003:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | No Vehicle access doors in building |
| High usage entrance doors | 1.5 | 1.2 | G0000006:Surf[9] |

$U_{i\text{-}Typ}$ = 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 |
|---|---|---|
| $m^3/(h.m^2)$ at 50 Pa | 5 | 3 |

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## Grape St (Be Lean)

As designed

**Date:** Fri Feb 26 13:57:25 2021

## Administrative information

### Building Details

**Address:** Address 1, City, Postcode

### Certification tool

**Calculation engine:** Apache

**Calculation engine version:** 7.0.13

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.13

**BRUKL compliance check version:** v5.6.b.0

### Certifier details

**Name:** Neil Bajaj

**Telephone number:** 020 3514 3080

**Address:** Airport House Business Centre, Croydon, CR0 0XZ

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

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 15.4 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 15.4 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 11.5 |
| 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 | 0.2 | 0.2 | G0000002:Surf[1] |
| Floor | 0.25 | 0.22 | 0.22 | G0000002:Surf[0] |
| Roof | 0.25 | 0.12 | 0.12 | G1000001:Surf[11] |
| Windows***, roof windows, and rooflights | 2.2 | 1.11 | 1.3 | G1000001:Surf[0] |
| Personnel doors | 2.2 | 2.2 | 2.2 | G4000000:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

$U_{a\text{-}Limit}$ = 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 | 3.5 |

## 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** | YES |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- VRF + HR

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.5 | 0 | 0 | 0.8 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.65 |
| **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. 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. | | | | | |

2- Electric Panel Heater + Extract

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

3- Electric Panel Heater

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |
| * 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. | | | | | |

4- Comms Room DX

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.66 | - | 0 | - |
| **Standard value** | 0.91* | 2.6 | 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. 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- DHW

| | **Water heating efficiency** | **Storage loss factor [kWh/litre per day]** |
|---|---|---|
| **This building** | 0.9 | - |
| **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 |
| G1 Office | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G2 Office | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G3 Office | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G0 Kitchen | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G0 Cafe/Bar | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G0 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G0 WC Lobby | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G0 Reception | - | - | - | 1.5 | - | - | - | - | - | - | N/A |
| G0 Cleaners Cupd | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G0 MDF/IDF Comms | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G1 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G2 Cleaners Cupd | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G2 WC | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G3 Cleaners Cupd | - | - | 0.3 | - | - | - | - | - | - | - | N/A |
| G3 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 | |
| G1 Office | 140 | - | - | 1762 |
| G2 Office | 140 | - | - | 1558 |
| G3 Office | 140 | - | - | 1574 |
| G0 DDA WC | - | 100 | - | 49 |
| G0 Kitchen | - | 100 | - | 226 |
| G0 Cafe/Bar | - | 100 | - | 411 |
| G0 WC | - | 100 | - | 80 |
| G0 WC Lobby | - | 100 | - | 47 |
| G0 Mail Room | 140 | - | - | 88 |
| G0 Staircase | - | 100 | - | 95 |
| G0 Reception | - | 100 | 100 | 436 |
| G0 Circulation | - | 100 | - | 55 |
| G0 Circulation | - | 100 | - | 52 |
| G0 Circulation | - | 100 | - | 5 |
| G0 Cleaners Cupd | 100 | - | - | 14 |
| G0 MDF/IDF Comms | 100 | - | - | 73 |
| G1 Staircase | - | 100 | - | 90 |
| G1 WC | - | 100 | - | 110 |
| G2 Cleaners Cupd | 100 | - | - | 24 |
| G2 WC | - | 100 | - | 104 |
| G2 Staircase | - | 100 | - | 90 |
| G3 Cleaners Cupd | 100 | - | - | 24 |
| G3 WC | - | 100 | - | 110 |
| G3 Staircase | - | 100 | - | 95 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G4 Staircase | - | 100 | - | 66 |
| G4 Terrace Lobby | - | 100 | - | 31 |

## 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? |
|---|---|---|
| G1 Office | NO (-81.4%) | NO |
| G2 Office | NO (-75.1%) | NO |
| G3 Office | NO (-55%) | NO |
| G0 Kitchen | N/A | N/A |
| G0 Cafe/Bar | NO (-77.1%) | NO |
| G0 Mail Room | N/A | N/A |
| G0 Reception | NO (-72%) | NO |
| G0 MDF/IDF Comms | N/A | N/A |

## 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 [$m^2$] | 1787.7 | 1787.7 |
| External area [$m^2$] | 2352.1 | 2748.7 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 4 | 3 |
| Average conductance [W/K] | 1015.06 | 1470.32 |
| Average U-value [$W/m^2K$] | 0.43 | 0.53 |
| Alpha value* [%] | 7.83 | 10 |

* 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 | 16.58 | 23.34 |
| Cooling | 2.26 | 1.78 |
| Auxiliary | 3.49 | 2.02 |
| Lighting | 5.79 | 13.11 |
| Hot water | 9.07 | 8.53 |
| Equipment* | 38.43 | 38.43 |
| **TOTAL**** | **37.2** | **48.78** |

* 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 [$MJ/m^2$] | 70.17 | 90.68 |
| Primary energy* [$kWh/m^2$] | 66.73 | 89.5 |
| Total emissions [$kg/m^2$] | 11.5 | 15.4 |

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 41.6 | 24.7 | 13.6 | 2.8 | 3.8 | 0.85 | 2.49 | 0.91 | 3.5 |
| | **Notional** | 51.4 | 22.2 | 16.6 | 2.2 | 2.1 | 0.86 | 2.84 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0.85 | 4.76 | 0.91 | 6.7 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 0.86 | 3.79 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 80.2 | 0 | 27.4 | 0 | 2.5 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 162.8 | 0 | 52.4 | 0 | 2.5 | 0.86 | 0 | ---- | ---- |
| **[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 108.5 | 0 | 37.1 | 0 | 2.1 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 201.5 | 0 | 64.9 | 0 | 1 | 0.86 | 0 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 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

# 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 | 0.2 | G0000002:Surf[1] |
| Floor | 0.2 | 0.22 | G0000002:Surf[0] |
| Roof | 0.15 | 0.12 | G1000001:Surf[11] |
| Windows, roof windows, and rooflights | 1.5 | 0.14 | G000001E:Surf[6] |
| Personnel doors | 1.5 | 2.2 | G4000000:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | No Vehicle access doors in building |
| High usage entrance doors | 1.5 | - | No High usage entrance doors in building |

$U_{i\text{-}Typ}$ = 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 | 3.5 |

# BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

**Project name**

## West Central Street (Be Lean)

As designed

**Date:** Fri Feb 26 14:06:08 2021

## Administrative information

### Building Details

**Address:** Address 1, City, Post Code

### Certification tool

**Calculation engine:** Apache

**Calculation engine version:** 7.0.13

**Interface to calculation engine:** IES Virtual Environment

**Interface to calculation engine version:** 7.0.13

**BRUKL compliance check version:** v5.6.b.0

### Certifier details

**Name:** Neil Bajaj

**Telephone number:** 020 3514 3080

**Address:** Airport House Business Centre, Croydon, CR0 0XZ

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

| | |
|---|---|
| $CO_2$ emission rate from the notional building, $kgCO_2/m^2.annum$ | 20 |
| Target $CO_2$ emission rate (TER), $kgCO_2/m^2.annum$ | 20 |
| Building $CO_2$ emission rate (BER), $kgCO_2/m^2.annum$ | 15 |
| 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 | 0.21 | 0.33 | G0000006:Surf[4] |
| Floor | 0.25 | 0.21 | 0.21 | G000000D:Surf[6] |
| Roof | 0.25 | 0.12 | 0.12 | G000000D:Surf[7] |
| Windows***, roof windows, and rooflights | 2.2 | 1.08 | 1.6 | G1000005:Surf[1] |
| Personnel doors | 2.2 | 2.2 | 2.2 | G0000022:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | - | No Vehicle access doors in building |
| High usage entrance doors | 3.5 | - | - | No High usage entrance doors in building |

$U_{a\text{-}Limit}$ = 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 | 3 |

## 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** | YES |
| **Whole building electric power factor achieved by power factor correction** | <0.9 |

1- Residential Heat Pump

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | - | 0.2 | 0 | - |
| **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** | | | | | NO |

* 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.

2- Retail Unit 10-12 MS Heat Pump

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 4.03 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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.

3- Retail Unit 16a Heat Pump

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.65 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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.

4- Retail Unit 317 NOS Heat Pump

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 3.3 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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.

5- Retail Unit 218 Heat Pump

| | **Heating efficiency** | **Cooling efficiency** | **Radiant efficiency** | **SFP [W/(l/s)]** | **HR efficiency** |
|---|---|---|---|---|---|
| **This system** | 0.91 | 5.78 | 0 | 0 | 0.9 |
| **Standard value** | 0.91* | 2.6 | N/A | N/A | 0.5 |
| **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. 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- DHW

| | **Water heating efficiency** | **Storage loss factor [kWh/litre per day]** |
|---|---|---|
| **This building** | 0.9 | - |
| **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 |
| G0 Flexible GF Uses (Class E) 10-12 MS | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses (Class E) 16A | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses (Class E) 317 | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Circulation | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G0 Flexible GF Uses (Class E) 218 | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-1 Flexible GF Uses (Class E) 317 | - | - | - | 1.1 | - | - | - | - | - | - | N/A |
| G-1 Flexible GF Uses (Class E) 218 | - | - | - | 1.1 | - | - | - | - | - | - | N/A |

**General lighting and display lighting**

| Zone name | Luminous efficacy [lm/W] | | | General lighting [W] |
|---|---|---|---|---|
| | Luminaire | Lamp | Display lamp | |
| Standard value | 60 | 60 | 22 | |
| G1 Cupd | - | 100 | - | 22 |
| G1 Cupd | - | 100 | - | 4 |
| G1 Lift Lobby | - | 100 | - | 23 |
| G1 Staircase | - | 100 | - | 33 |
| 103 Cupd | - | 100 | - | 11 |
| G2 Cupd | - | 100 | - | 18 |
| G2 Cupd | - | 100 | - | 4 |
| G2 Lift Lobby | - | 100 | - | 20 |
| G2 Staircase | - | 100 | - | 31 |
| 203 Cupd | - | 100 | - | 11 |
| G0 Flexible GF Uses (Class E) 10-12 MS | - | 100 | 40 | 622 |
| G0 Flexible GF Uses (Class E) 16A | - | 100 | 40 | 826 |
| G0 UKPN Substation | 100 | - | - | 92 |
| G0 Circulation | - | 100 | - | 40 |
| G0 Resi Circulation | - | 100 | - | 27 |
| G0 Flexible GF Uses (Class E) 317 | - | 100 | 40 | 532 |
| G0 Corridor | - | 100 | - | 53 |
| G0 Resi Circulation | - | 100 | - | 33 |
| G2 Cupd | - | 100 | - | 21 |

| General lighting and display lighting | Luminous efficacy [lm/W] | | | |
|---|---|---|---|---|
| **Zone name** | **Luminaire** | **Lamp** | **Display lamp** | **General lighting [W]** |
| **Standard value** | 60 | 60 | 22 | |
| G2 Cupd | - | 100 | - | 4 |
| G2 Lift Lobby | - | 100 | - | 22 |
| G2 Staircase | - | 100 | - | 33 |
| 203 Cupd | - | 100 | - | 11 |
| G2 Cupd | - | 100 | - | 21 |
| G2 Cupd | - | 100 | - | 4 |
| G2 Lift Lobby | - | 100 | - | 22 |
| G2 Staircase | - | 100 | - | 33 |
| 203 Cupd | - | 100 | - | 11 |
| G1 Resi Staircase | - | 100 | - | 32 |
| G1 Resi Lobby | - | 100 | - | 60 |
| G2 Resi Staircase | - | 100 | - | 29 |
| G2 Resi Lobby | - | 100 | - | 31 |
| G3 Resi Staircase | - | 100 | - | 29 |
| G3 Resi Lobby | - | 100 | - | 31 |
| G3 Resi Staircase | - | 100 | - | 29 |
| G3 Resi Lobby | - | 100 | - | 31 |
| G-1 Basement Circulation | - | 100 | - | 37 |
| G-1 Basement Circulation | - | 100 | - | 34 |
| G-1 Basement Store | 100 | - | - | 12 |
| G-1 Basement Plant Room | 100 | - | - | 406 |
| G-1 Basement Cycle Store | 100 | - | - | 86 |
| G-1 Basement Circulation | - | 100 | - | 82 |
| G-1 Basement Plant Room | 100 | - | - | 165 |
| G-1 Basement Circulation | - | 100 | - | 96 |
| G-1 Basement Plant Room | 100 | - | - | 448 |
| G-1 Basement Plant Room | 100 | - | - | 126 |
| G-1 Basement Circulation | - | 100 | - | 35 |
| G0 Resi Lobby | - | 100 | - | 44 |
| G0 Riser | - | 100 | - | 21 |
| G0 Resi Circulation | - | 100 | - | 47 |
| G0 Circulation | - | 100 | 40 | 201 |
| G0 Circulation | - | 100 | - | 29 |
| G0 Flexible GF Uses (Class E) 218 | - | 100 | 40 | 2693 |
| G0 Bin Store | 100 | - | - | 37 |
| G0 Cycle Store | 100 | - | - | 23 |
| G0 Circulation | 100 | - | - | 10 |
| G0 Resi Lobby | - | 100 | - | 47 |
| G-1 Flexible GF Uses (Class E) 317 | - | 100 | 40 | 651 |
| G-1 Flexible GF Uses (Class E) 218 | - | 100 | 40 | 802 |

## 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? |
|---|---|---|
| G0 Flexible GF Uses (Class E) 10-12 MS | NO (-41.1%) | NO |
| G0 Flexible GF Uses (Class E) 16A | NO (-76.2%) | NO |
| G0 Resi Circulation | N/A | N/A |
| G0 Flexible GF Uses (Class E) 317 | NO (-50.6%) | NO |
| G0 Resi Circulation | N/A | N/A |
| G0 Resi Lobby | NO (-51.1%) | NO |
| G0 Circulation | NO (-99.9%) | NO |
| G0 Flexible GF Uses (Class E) 218 | NO (-29.5%) | NO |
| G0 Resi Lobby | NO (-86.8%) | NO |
| G-1 Flexible GF Uses (Class E) 317 | N/A | N/A |
| G-1 Flexible GF Uses (Class E) 218 | N/A | N/A |

## 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 [$m^2$] | 1733 | 1733 |
| External area [$m^2$] | 2352.2 | 2352.2 |
| Weather | LON | LON |
| Infiltration [$m^3/hm^2$@ 50Pa] | 3 | 3 |
| Average conductance [W/K] | 648.25 | 916.33 |
| Average U-value [$W/m^2K$] | 0.28 | 0.39 |
| Alpha value* [%] | 10.05 | 10 |

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

## Building Use

| % Area | Building Type |
|---|---|
| **80** | **A1/A2 Retail/Financial and Professional services** |
| | A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways |
| | 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 |
| **20** | **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 | 1.93 | 4.45 |
| Cooling | 7.41 | 8.28 |
| Auxiliary | 2.4 | 1.5 |
| Lighting | 17.91 | 27.61 |
| Hot water | 0.75 | 0.7 |
| Equipment* | 68.9 | 68.9 |
| **TOTAL**** | **30.4** | **42.54** |

* 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 [$MJ/m^2$] | 112.94 | 126.76 |
| Primary energy* [$kWh/m^2$] | 88.39 | 118.2 |
| Total emissions [$kg/m^2$] | 15 | 20 |

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 0 | 275.5 | 0 | 16.2 | 3.4 | 0.85 | 4.73 | 0.91 | 6.66 |
| | **Notional** | 0 | 245.5 | 0 | 18 | 2 | 0.86 | 3.79 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 0 | 275.2 | 0 | 21 | 4.9 | 0.85 | 3.64 | 0.91 | 5.13 |
| | **Notional** | 0.3 | 315 | 0.1 | 23.1 | 2.9 | 0.86 | 3.79 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 25.4 | 267.5 | 8.3 | 15.7 | 5.2 | 0.85 | 4.73 | 0.91 | 6.66 |
| | **Notional** | 41.5 | 198.5 | 13.4 | 14.5 | 3.1 | 0.86 | 3.79 | ---- | ---- |
| **[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 4 | 177.5 | 1.3 | 10.6 | 5.2 | 0.85 | 4.66 | 0.91 | 6.57 |
| | **Notional** | 4.7 | 207.7 | 1.5 | 15.2 | 3.1 | 0.86 | 3.79 | ---- | ---- |
| **[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity** | | | | | | | | | | |
| | **Actual** | 34.9 | 0 | 11.9 | 0 | 2.6 | 0.81 | 0 | 0.91 | 0 |
| | **Notional** | 94.1 | 0 | 30.3 | 0 | 1.5 | 0.86 | 0 | ---- | ---- |
| **[ST] No Heating or Cooling** | | | | | | | | | | |
| | **Actual** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Notional** | 0 | 0 | 0 | 0 | 0 | 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

# 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 | 0.16 | G1000006:Surf[1] |
| Floor | 0.2 | 0.21 | G000000D:Surf[6] |
| Roof | 0.15 | 0.12 | G000000D:Surf[7] |
| Windows, roof windows, and rooflights | 1.5 | 1 | G000000D:Surf[0] |
| Personnel doors | 1.5 | 2.2 | G0000022:Surf[2] |
| Vehicle access & similar large doors | 1.5 | - | No Vehicle access doors in building |
| High usage entrance doors | 1.5 | - | No High usage entrance doors in building |

$U_{i\text{-}Typ}$ = 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 | 3 |