

## Project name

**ESC2137 - Unit 5 - Be Lean**

As designed

Date: Mon Nov 04 18:52:59 2024

## Administrative information

## Building Details

Address: Dyson's Road, Edmonton, N18

## Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

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

## Certifier details

Name: James Tickle

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Address: Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW

Criterion 1: The calculated CO<sub>2</sub> emission rate for the building must not exceed the target

|                                                                                                    |                     |
|----------------------------------------------------------------------------------------------------|---------------------|
| CO <sub>2</sub> emission rate from the notional building, kgCO <sub>2</sub> /m <sup>2</sup> .annum | 24.5                |
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> .annum               | 24.5                |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> .annum             | 18.5                |
| 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 <sub>a</sub> -Limit | U <sub>a</sub> -Calc | U <sub>i</sub> -Calc | Surface where the maximum value occurs*  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------|----------------------|------------------------------------------|
| Wall**                                                                                                                                                                                                                                                                            | 0.35                  | 0.21                 | 0.26                 | CR000000:Surf[5]                         |
| Floor                                                                                                                                                                                                                                                                             | 0.25                  | 0.22                 | 0.22                 | 00000017:Surf[0]                         |
| Roof                                                                                                                                                                                                                                                                              | 0.25                  | 0.18                 | 0.18                 | FF000002:Surf[5]                         |
| Windows***, roof windows, and rooflights                                                                                                                                                                                                                                          | 2.2                   | 1.27                 | 1.51                 | WR000000:Surf[15]                        |
| Personnel doors                                                                                                                                                                                                                                                                   | 2.2                   | 1.5                  | 1.5                  | WR000000:Surf[1]                         |
| Vehicle access & similar large doors                                                                                                                                                                                                                                              | 1.5                   | 1.1                  | 1.1                  | WR000000:Surf[5]                         |
| High usage entrance doors                                                                                                                                                                                                                                                         | 3.5                   | -                    | -                    | No high usage entrance doors in building |
| U <sub>a</sub> -Limit = Limiting area-weighted average U-values [W/(m <sup>2</sup> K)]<br>U <sub>a</sub> -Calc = Calculated area-weighted average U-values [W/(m <sup>2</sup> K)]<br>U <sub>i</sub> -Calc = Calculated maximum individual element U-values [W/(m <sup>2</sup> K)] |                       |                      |                      |                                          |
| * 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 <sup>3</sup> /(h.m <sup>2</sup> ) 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- LTHW via Gas Boiler

|                                                                                                                                                                                                                                                   | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|---------------|---------------|
| This system                                                                                                                                                                                                                                       | 0.91               | -                  | 0                  | -             | 0.65          |
| 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. |                    |                    |                    |               |               |

### 2- Gas Heating

|                                                                                                                                                                                                                                                   | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|---------------|---------------|
| This system                                                                                                                                                                                                                                       | 0.91               | -                  | 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. |                    |                    |                    |               |               |

"No HWS in project, or hot water is provided by HVAC system"

### 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 |
| Unit 5 - Cupboard Cleaners | -             | -   | 0.4 | -   | -   | -   | -   | -   | - | - | -             | N/A      |
| Unit 5 - GF WC             | -             | -   | 0.4 | -   | -   | -   | -   | -   | - | - | -             | N/A      |
| Unit 5 - 1st WC            | -             | -   | 0.4 | -   | -   | -   | -   | -   | - | - | -             | 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           |                      |
| Unit 5 - Cupboard Cleaners | 159                      | -    | -            | 5                    |
| Unit 5 - GF Reception      | -                        | 125  | 120          | 111                  |
| Unit 5 - GF WC             | -                        | 106  | -            | 64                   |

| General lighting and display lighting | Luminous efficacy [lm/W] |      |              |                      |
|---------------------------------------|--------------------------|------|--------------|----------------------|
| Zone name                             | Luminaire                | Lamp | Display lamp | General lighting [W] |
| Standard value                        | 60                       | 60   | 22           |                      |
| Unit 5 - 1st Office Open              | 162                      | -    | -            | 132                  |
| Unit 5 - 1st Circulation Landing      | -                        | 100  | -            | 33                   |
| Unit 5 - 1st WC                       | -                        | 134  | -            | 39                   |
| Unit 5 - Warehouse/Mezz               | 140                      | -    | -            | 1389                 |
| Unit 5 - GF Circulation Staircase     | -                        | 125  | -            | 61                   |

### 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? |
|--------------------------|--------------------------------|-----------------------|
| Unit 5 - GF Reception    | NO (-73.9%)                    | NO                    |
| Unit 5 - 1st Office Open | NO (-46.5%)                    | NO                    |
| Unit 5 - Warehouse/Mezz  | NO (-44.1%)                    | 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 <sup>2</sup> ]                                | 480.1  | 480.1    |
| External area [m <sup>2</sup> ]                       | 1643.9 | 1643.9   |
| Weather                                               | LON    | LON      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3      | 7        |
| Average conductance [W/K]                             | 450.24 | 533.25   |
| Average U-value [W/m <sup>2</sup> K]                  | 0.27   | 0.32     |
| Alpha value* [%]                                      | 10.02  | 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             |
|     | B1 Offices and Workshop businesses                                 |
|     | B2 to B7 General Industrial and Special Industrial Groups          |
| 100 | <b>B8 Storage or Distribution</b>                                  |
|     | 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<sup>2</sup>]

|                 | Actual       | Notional     |
|-----------------|--------------|--------------|
| Heating         | 47.58        | 57.29        |
| Cooling         | 0            | 0            |
| Auxiliary       | 4.85         | 0.25         |
| Lighting        | 9.1          | 21.88        |
| Hot water       | 4.51         | 4.3          |
| Equipment*      | 28.91        | 28.91        |
| <b>TOTAL **</b> | <b>66.04</b> | <b>83.73</b> |

\* 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<sup>2</sup>]

|                       | Actual | Notional |
|-----------------------|--------|----------|
| Photovoltaic systems  | 0      | 0        |
| Wind turbines         | 0      | 0        |
| CHP generators        | 0      | 0        |
| Solar thermal systems | 0      | 0        |

## Energy & CO<sub>2</sub> Emissions Summary

|                                               | Actual | Notional |
|-----------------------------------------------|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ] | 139.1  | 185.04   |
| Primary energy* [kWh/m <sup>2</sup> ]         | 106.36 | 141.39   |
| Total emissions [kg/m <sup>2</sup> ]          | 18.5   | 24.5     |

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

## HVAC Systems Performance

| System Type                                                                                          | Heat dem<br>MJ/m2 | Cool dem<br>MJ/m2 | Heat con<br>kWh/m2 | Cool con<br>kWh/m2 | Aux con<br>kWh/m2 | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |
|------------------------------------------------------------------------------------------------------|-------------------|-------------------|--------------------|--------------------|-------------------|---------------|---------------|------------------|------------------|
| [ST] Central heating using water: convectors, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity |                   |                   |                    |                    |                   |               |               |                  |                  |
| Actual                                                                                               | 134.2             | 0                 | 45.9               | 0                  | 5.3               | 0.81          | 0             | 0.91             | 0                |
| Notional                                                                                             | 182.8             | 0                 | 56.1               | 0                  | 0                 | 0.91          | 0             | ----             | ----             |
| [ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity  |                   |                   |                    |                    |                   |               |               |                  |                  |
| Actual                                                                                               | 162.7             | 0                 | 55.7               | 0                  | 2.9               | 0.81          | 0             | 0.91             | 0                |
| Notional                                                                                             | 195.8             | 0                 | 63.1               | 0                  | 1.5               | 0.86          | 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 <sub>i-Typ</sub> | U <sub>i-Min</sub>                                                 | Surface where the minimum value occurs*  |
|--------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------|------------------------------------------|
| Wall                                                                     | 0.23               | 0.21                                                               | 00000034:Surf[3]                         |
| Floor                                                                    | 0.2                | 0.22                                                               | LF000000:Surf[0]                         |
| Roof                                                                     | 0.15               | 0.18                                                               | LF000000:Surf[1]                         |
| Windows, roof windows, and rooflights                                    | 1.5                | 1                                                                  | 00000034:Surf[0]                         |
| Personnel doors                                                          | 1.5                | 1.5                                                                | WR000000:Surf[1]                         |
| Vehicle access & similar large doors                                     | 1.5                | 1.1                                                                | WR000000:Surf[5]                         |
| High usage entrance doors                                                | 1.5                | -                                                                  | No high usage entrance doors in building |
| U <sub>i-Typ</sub> = Typical individual element U-values [W/(m²K)]       |                    | U <sub>i-Min</sub> = 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             |