

## Project name

**New commercial unit****As designed****Date:** Wed Feb 07 14:15:39 2018**Administrative information****Building Details****Address:** Land adjacent to the Bell Cottages, Dunstable Road, Studham, Dunstable, LU6 2QG**Certification tool****Calculation engine:** SBEM**Calculation engine version:** v5.3.a.0**Interface to calculation engine:** DesignBuilder SBEM**Interface to calculation engine version:** v5.0.3**BRUKL compliance check version:** v5.3.a.0**Owner Details****Name:****Telephone number:****Address:** , ,**Certifier details****Name:** Mr J Southworth**Telephone number:** 01892 315 466**Address:** Energytest (Commercial) Ltd, 4 St John's Road  
Tunbridge Wells, Kent TN4 9NP**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 | 35.1                |
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> .annum               | 35.1                |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> .annum             | 34.1                |
| 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 <sub>a</sub> -Limit | U <sub>a</sub> -Calc | U <sub>i</sub> -Calc | Surface where the maximum value occurs* |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------|----------------------|-----------------------------------------|
| Wall**                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.35                  | 0.18                 | 0.18                 | Block 1 - Shop area_W_6                 |
| Floor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.25                  | 0.19                 | 0.19                 | Block 1 - Shop area_S_3                 |
| Roof                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.25                  | 0.09                 | 0.09                 | Block 1 - Shop area_R_4                 |
| Windows***, roof windows, and rooflights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2.2                   | 1.6                  | 1.6                  | Block 1 - Shop area_G_9                 |
| Personnel doors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2.2                   | 2.2                  | 2.2                  | Block 1 - Staff area_D_7                |
| Vehicle access & similar large doors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.5                   | -                    | -                    | "No external vehicle access doors"      |
| High usage entrance doors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.5                   | 1.6                  | 1.6                  | Block 1 - Shop area_D_10                |
| 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)]<br>* There might be more than one surface where the maximum U-value occurs.<br>** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.<br>*** Display windows and similar glazing are excluded from the U-value check.<br>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                        | 15*           |
| * Buildings with less than 500 m <sup>2</sup> total useful floor area may avoid the need for a pressure test provided that the air permeability is taken as 15 m <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa. |                           |               |

## Building services

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

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

### 1- Gas combi boiler

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

### 1- Combi boiler

|                | Water heating efficiency          | Storage loss factor [kWh/litre per day] |
|----------------|-----------------------------------|-----------------------------------------|
| This building  | Hot water provided by HVAC system | -                                       |
| Standard value | N/A                               | N/A                                     |

### 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 |   | Zone          | Standard |
| Standard value       | 0.3           | 1.1 | 0.5 | 1.9 | 1.6 | 0.5 | 1.1 | 0.5 | 1 |   |               |          |
| Block 1 - Shop area  | -             | -   | -   | -   | -   | -   | -   | -   | - | - | -             | N/A      |
| Block 1 - WC         | 0.3           | -   | -   | -   | -   | -   | -   | -   | - | - | -             | N/A      |
| Block 1 - Staff area | -             | -   | -   | -   | -   | -   | -   | -   | - | - | -             | 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           |                      |
| Block 1 - Shop area  | -                        | 80   | 80           | 1011                 |
| Block 1 - WC         | -                        | 60   | -            | 46                   |
| Block 1 - Staff area | 80                       | -    | -            | 145                  |

## 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? |
|---------------------|--------------------------------|-----------------------|
| Block 1 - Shop area | NO (-46.2%)                    | NO                    |

| Zone                 | Solar gain limit exceeded? (%) | Internal blinds used? |
|----------------------|--------------------------------|-----------------------|
| Block 1 - Staff area | NO (-88.6%)                    | NO                    |

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

Separate submission

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

Separate submission

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

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

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|                                                       | Actual | Notional |
|-------------------------------------------------------|--------|----------|
| Area [m <sup>2</sup> ]                                | 106.2  | 106.2    |
| External area [m <sup>2</sup> ]                       | 344.9  | 344.9    |
| Weather                                               | LON    | LON      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 15     | 5        |
| Average conductance [W/K]                             | 89.15  | 152.03   |
| Average U-value [W/m <sup>2</sup> K]                  | 0.26   | 0.44     |
| Alpha value* [%]                                      | 30.48  | 19.28    |

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

## Building Use

### % Area Building Type

|     |                                                                    |
|-----|--------------------------------------------------------------------|
| 100 | <b>A1/A2 Retail/Financial and Professional services</b>            |
|     | 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<sup>2</sup>]

|                 | Actual       | Notional     |
|-----------------|--------------|--------------|
| Heating         | 46.85        | 48.54        |
| Cooling         | 0            | 0            |
| Auxiliary       | 2.72         | 1.52         |
| Lighting        | 42.42        | 46.18        |
| Hot water       | 2.35         | 2.35         |
| Equipment*      | 23.88        | 23.88        |
| <b>TOTAL **</b> | <b>94.33</b> | <b>98.59</b> |

\* Energy used by equipment does not count towards the total for 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> ] | 319.85 | 369.79   |
| Primary energy* [kWh/m <sup>2</sup> ]         | 198.58 | 204.87   |
| Total emissions [kg/m <sup>2</sup> ]          | 34.1   | 35.1     |

\* 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: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|                                                                                                     | Actual            | 136.9             | 182.9              | 46.8               | 0                 | 2.7           | 0.81          | 0                | 0.91             | 0    |
|                                                                                                     | Notional          | 143.1             | 226.7              | 48.5               | 0                 | 1.5           | 0.82          | 0                | ----             | ---- |

### Key to terms

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

# Key Features

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

## Building fabric

| Element                                                                  | U <sub>i-Typ</sub> | U <sub>i-Min</sub>                                                 | Surface where the minimum value occurs* |
|--------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------|-----------------------------------------|
| Wall                                                                     | 0.23               | 0.18                                                               | Block 1 - Shop area_W_6                 |
| Floor                                                                    | 0.2                | 0.19                                                               | Block 1 - Shop area_S_3                 |
| Roof                                                                     | 0.15               | 0.09                                                               | Block 1 - Shop area_R_4                 |
| Windows, roof windows, and rooflights                                    | 1.5                | 1.6                                                                | Block 1 - Shop area_G_9                 |
| Personnel doors                                                          | 1.5                | 2.2                                                                | Block 1 - Staff area_D_7                |
| Vehicle access & similar large doors                                     | 1.5                | -                                                                  | "No external vehicle access doors"      |
| High usage entrance doors                                                | 1.5                | 1.6                                                                | Block 1 - Shop area_D_10                |
| 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             | 15            |