

## Section 2.1: Planning and Environmental Certificates

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### 2.1.2 SBEM

# BRUKL Output Document



Compliance with England Building Regulations Part L 2021

Project name

Shell and Core

Unit 3

As built

Date: Fri May 31 11:40:11 2024

## Administrative information

### Building Details

Address: Panattoni Park, Bolton, BL5 3FT

### Certifier details

Name: Nathan Evans

Telephone number: 08000122219

Address: Low Moor Mill, Albert Road, Morley, Leeds, LS27 8LD

### Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

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

Foundation area [m<sup>2</sup>]: 189.24

The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum	1.51
Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum	1.25
Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum	15.92
Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum	13.33
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER   BPER ≤ TPER

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

Fabric element	U <sub>a-Limit</sub>	U <sub>a-Calc</sub>	U <sub>i-Calc</sub>	First surface with maximum value
Walls*	0.26	0.26	0.26	WR000001:Surf[52]
Floors	0.18	0.16	0.59	FF000000:Surf[1]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	WR000001:Surf[32]
Windows** and roof windows	1.6	1.5	1.5	01000000:Surf[0]
Rooflights***	2.2	1.6	1.6	WR000001:Surf[0]
Personnel doors^	1.6	1.6	1.6	WR000001:Surf[116]
Vehicle access & similar large doors	1.3	1.3	1.3	WR000001:Surf[118]
High usage entrance doors	3	-	-	No high usage entrance doors in building

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]

U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]

U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>K)]

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

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

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

^ For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K

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

Air permeability	Limiting standard	This building
m <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa	8	1.67

## Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

### 1- HVAC 01: ASHP LTHW NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.57	-	0.3	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

### 2- HVAC 02: ASHP LTHW EV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.57	-	0.3	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

### 3- HVAC 03: VRF MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.57	4.85	0	-	0.7
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

### 4- HVAC 02: ASHP LTHW MV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.57	-	0.3	-	0.7
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

### 1- DHW 01: ASHP

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	5.57	0.013
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

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

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
00.03.Acc. WC & Shower	-	-	0.3	-	-	-	-	-	-	-	N/A
01.23.Open Plan Office	-	-	-	1.4	-	-	-	-	-	-	N/A
01.22.Kitchenette	-	-	-	1.4	-	-	-	-	-	-	N/A
01.15.WC Lobby	-	-	-	1.4	-	-	-	-	-	-	N/A

#### Shell and core configuration

Zone	Excluded from calculation?
00.01.Staircase	NO
00.03.Acc. WC & Shower	NO
00.04.Cleaners Store	NO
00.08.Warehouse	NO
01.21.Landing	NO
01.11.Staircase FF	NO
01.09.Plant Storage Space	NO
01.23.Open Plan Office	NO
01.22.Kitchenette	NO
01.20.WC	NO
01.19.WC	NO
01.18.WC	NO
01.17.WC	NO
01.16.WC	NO
01.15.WC Lobby	NO
01.14.Cleaners	NO
01.13.Acc WC	NO
00.07.Staircase	NO
01.24.Staircase	NO
00.05.Reception	NO

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
00.01.Staircase		122	-	-
00.03.Acc. WC & Shower		106	-	-
00.04.Cleaners Store		99	-	-
00.08.Warehouse		100	-	-
01.21.Landing		152	-	-
01.11.Staircase FF		122	-	-
01.09.Plant Storage Space		132	-	-
01.23.Open Plan Office		144	-	-
01.22.Kitchenette		179	-	-
01.20.WC		105	-	-
01.19.WC		99	-	-
01.18.WC		104	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m <sup>2</sup> ]
	Standard value	95	80	0.3
01.17.WC		104	-	-
01.16.WC		103	-	-
01.15.WC Lobby		95	-	-
01.14.Cleaners		62	-	-
01.13.Acc WC		91	-	-
00.07.Staircase		160	-	-
01.24.Staircase		160	-	-
00.05.Reception		149	149	0.906

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.08.Warehouse	YES (+100.4%)	NO
01.23.Open Plan Office	NO (-7.2%)	NO
01.22.Kitchenette	NO (-56.6%)	NO
00.05.Reception	YES (+8%)	NO

### Regulation 25A: Consideration of high efficiency 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
Floor area [m <sup>2</sup> ]	4843.9	4843.9
External area [m <sup>2</sup> ]	11535.6	11535.6
Weather	MAN	MAN
Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa]	2	5
Average conductance [W/K]	3236.06	3310.47
Average U-value [W/m <sup>2</sup> K]	0.28	0.29
Alpha value* [%]	24.99	10

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

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
 Restaurants and Cafes/Drinking Establishments/Takeaways  
 Offices and Workshop Businesses  
 General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
 Residential Institutions: Hospitals and Care Homes  
 Residential Institutions: Residential Schools  
 Residential Institutions: Universities and Colleges  
 Secure Residential Institutions  
 Residential Spaces  
 Non-residential Institutions: Community/Day Centre  
 Non-residential Institutions: Libraries, Museums, and Galleries  
 Non-residential Institutions: Education  
 Non-residential Institutions: Primary Health Care Building  
 Non-residential Institutions: Crown and County Courts  
 General Assembly and Leisure, Night Clubs, and Theatres  
 Others: Passenger Terminals  
 Others: Emergency Services  
 Others: Miscellaneous 24hr Activities  
 Others: Car Parks 24 hrs  
 Others: Stand Alone Utility Block

## Energy Consumption by End Use [kWh/m<sup>2</sup>]

	Actual	Notional
Heating	0.86	2.06
Cooling	0.5	0.17
Auxiliary	0.44	0.33
Lighting	5.88	6.67
Hot water	0.99	1.35
Equipment*	32.56	32.56
<b>TOTAL **</b>	<b>8.69</b>	<b>10.59</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	0.28	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

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

	Actual	Notional
Heating + cooling demand [MJ/m <sup>2</sup> ]	23.11	23.49
Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ]	13.33	15.92
Total emissions [kg/m <sup>2</sup> ]	1.25	1.51

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	301.8	0	16	0	2.5	5.23	0	5.57	0	
Notional	286.1	0	28.6	0	1.2	2.78	0	----	----	
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	249.1	0	13.2	0	11.9	5.23	0	5.57	0	
Notional	244.2	0	24.4	0	18.3	2.78	0	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	158.6	154.8	8.1	11.9	5.7	5.46	3.62	5.57	4.85	
Notional	265	66.7	26.5	4	3.6	2.78	4.63	----	----	
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	141.3	0	7.5	0	7.7	5.23	0	5.57	0	
Notional	170.3	0	17	0	4.8	2.78	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