2.1.2 BRUKL / SBEM

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Poyle 80

As built

Date: Wed Sep 04 15:00:10 2024

Administrative information

Building Details

Address: Poyle 80, Slough, SL3 0BB

Certifier details

Name: Nathan Evans

Telephone number:

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

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 module version: v6.1.e.1

Foundation area [m^2]: 301.15

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	1.81	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	0.89	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	19.6	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	9.1	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.26	0.26	00000002:Surf[3]
Floors	0.18	0.18	0.18	00000006:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	00000002:Surf[42]
Windows** and roof windows	1.6	1.5	1.5	01000003:Surf[0]
Rooflights***	2.2	1.6	1.6	00000002:Surf[20]
Personnel doors^	1.6	1.6	1.6	00000002:Surf[1]
Vehicle access & similar large doors	1.3	1.19	1.3	00000002:Surf[10]
High usage entrance doors	3	-	-	No high usage entrance doors in building

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

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

* 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^2K

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
$m^3/(h.m^2)$ at 50 Pa	8	1.3

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	>0.95

1- HVAC 01a: ASHP Rad NV

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.26	-	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 01b: ASHP Rad EV

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.26	-	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 02: VRF MVHR

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.31	6.96	0	-	0.72
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.					

1- DHW 01: ASHP

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	2.76	0.006
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**
00.06 - Acc. WC	-	-	0.5	-	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
01.01 - Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
01.04 - Open Plan Office	-	-	-	1.4	-	-	-	-	-	-	N/A
01.08 - Male WC	-	-	0.5	-	-	-	-	-	-	-	N/A
01.12 - Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
01.14 - Tea Point	-	-	-	1.4	-	-	-	-	-	-	N/A
01.19 - Female WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00.01 - Entrance	-	-	-	1.4	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Excluded from calculation?
00.00 - Warehouse	NO
00.04 - Stairs	NO
00.05 - Shower	NO
00.06 - Acc. WC	NO
00.07 - Stairs	NO
00.08 - Undercroft	NO
01.00 - Stairs	NO
01.01 - Acc. WC	NO
01.03 - Tea Point	NO
01.04 - Open Plan Office	NO
01.06 - Cleaner's Cupboard	NO
01.07 - Lobby	NO
01.08 - Male WC	NO
01.10 - Store	NO
01.12 - Acc. WC	NO
01.13 - Landing	NO
01.14 - Tea Point	NO
01.15 - Lobby	NO
01.17 - Stairs	NO
01.19 - Female WC	NO
02.00 - Stairs	NO
02.01 - Stairs	NO
00.01 - Entrance	NO
02.02 - Plant Room	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
00.00 - Warehouse	130	-	-
00.04 - Stairs	117	-	-
00.05 - Shower	123	-	-
00.06 - Acc. WC	123	-	-
00.07 - Stairs	130	-	-

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
00.08 - Undercroft	95	-	-
01.00 - Stairs	130	-	-
01.01 - Acc. WC	119	-	-
01.03 - Tea Point	119	-	-
01.04 - Open Plan Office	111	-	-
01.06 - Cleaner's Cupboard	130	-	-
01.07 - Lobby	119	-	-
01.08 - Male WC	119	-	-
01.10 - Store	130	-	-
01.12 - Acc. WC	119	-	-
01.13 - Landing	123	-	-
01.14 - Tea Point	111	-	-
01.15 - Lobby	119	-	-
01.17 - Stairs	123	-	-
01.19 - Female WC	119	-	-
02.00 - Stairs	119	-	-
02.01 - Stairs	130	-	-
00.01 - Entrance	123	91	1.48
02.02 - Plant Room	134	-	-

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?
00.00 - Warehouse	YES (+201%)	NO
00.08 - Undercroft	YES (+53.3%)	NO
01.03 - Tea Point	N/A	N/A
01.04 - Open Plan Office	NO (-14.1%)	NO
01.14 - Tea Point	NO (-2.1%)	NO
00.01 - Entrance	YES (+139.4%)	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^2]	8100.9	8100.9
External area [m^2]	17611.9	17611.9
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	5
Average conductance [W/K]	5812.74	5131.38
Average U-value [W/m^2K]	0.33	0.29
Alpha value* [%]	25.03	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^2]

	Actual	Notional
Heating	0.84	1.02
Cooling	1.35	0.9
Auxiliary	0.72	0.54
Lighting	5.8	8.69
Hot water	2.64	2.02
Equipment*	44.89	44.89
TOTAL**	**11.36**	**13.18**

* 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	5.27	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0.4	0
Displaced electricity	*5.27*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	36.28	25.27
Primary energy [kWh_{PE}/m^2]	9.1	19.6
Total emissions [kg/m^2]	0.89	1.81

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] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	154.9	0	14.1	0	2.1	3.06	0	3.26	0
	Notional	168.9	0	16.9	0	1.2	2.78	0	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	119.5	0	10.8	0	14.4	3.06	0	3.26	0
	Notional	113.6	0	11.4	0	16	2.78	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	77.9	318.8	5.1	17	5.8	4.23	5.2	4.31	6.96
	Notional	64.8	189.3	6.5	11.4	3.6	2.78	4.63	----	----
[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