BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Avalon House New Proposed Blinds 2021 Lean

As designed

Date: Fri May 24 10:58:44 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 309.59

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	4.31	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	3.91	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	46.57	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	42.06	
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	0.12	0.12	L0000031:Surf[0]
Floors	0.18	0.1	0.1	L0000050:Surf[8]
Pitched roofs	0.16	0.1	0.1	L0000040:Surf[14]
Flat roofs	0.18	0.1	0.1	L0000039:Surf[3]
Windows** and roof windows	1.6	1	1	L000001E:Surf[0]
Rooflights***	2.2	2.1	2.1	L0000040:Surf[2]
Personnel doors^	1.6	1.6	1.6	L000002A:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

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

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

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

* 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	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- 04_Rad_Elec_MV

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1.34	-	0.3	-	0.75
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- 03_GF01_FCU _ASHP_GF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	3.76	0	1.6	0.8
Standard value	2.5*	N/A	N/A	2^	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.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

3- 06_Rad_Elec_NV

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1.34	-	0.3	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- 02_ TH_ASHP_Perimeter Offices_UF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	3.76	0	1.6	0.8
Standard value	2.5*	4.5**	N/A	2^	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.

** Standard shown is for air-cooled chillers >=400 kW. For chillers <400 kW, limiting SEER is 4.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

5- 01_ AHU_ASHP_DV_Internal Offices_UF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	2.64	3.76	0	1.6	0.8
Standard value	2.5*	4.5**	N/A	2^	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.

** Standard shown is for air-cooled chillers >=400 kW. For chillers <400 kW, limiting SEER is 4.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

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

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
L03-Acc WC	-	-	-	1.6	-	-	-	-	-	-	N/A
L03-Lift Lobby	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-WC	-	-	-	1.6	-	-	-	-	-	-	N/A
L03-WC Lobby 1	-	-	-	1.6	-	-	-	-	-	-	N/A
L03-WC Lobby 2	-	-	-	1.6	-	-	-	-	-	-	N/A
L03-Office PER3	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-Office PER2	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-Office PER2	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-Plant	-	-	-	1.6	-	-	-	-	-	-	N/A
L04-Circulation	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-Office PER1	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-Lift Lobby	-	-	-	-	-	-	-	0.2	-	-	N/A
L04-WC Lobby 1	-	-	-	1.6	-	-	-	-	-	-	N/A
L04-WC	-	-	-	1.6	-	-	-	-	-	-	N/A
L00-Office 1-New	-	-	-	-	-	-	-	0.2	-	-	N/A
L01-Office PER4-New	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-Office PER2	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-Office PER2	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-Office PER1	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-Office PER1	-	-	-	-	-	-	-	0.2	-	-	N/A
L03-Office PER1	-	-	-	-	-	-	-	0.2	-	-	N/A

General lighting and display lighting

Zone name	General luminaire	Display light source	
	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
L03-Acc WC	120	-	-
L03-Lift Lobby	120	-	-
L03-Stairs 01	120	-	-
L03-Stairs 02	120	-	-

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
L03-Stairs 03	120	-	-
L03-WC	120	-	-
L03-WC Lobby 1	120	-	-
L03-WC Lobby 2	120	-	-
L04-Stairs 03	120	-	-
L03-Office PER3	140	-	-
L04-Office PER2	141	-	-
L04-Office PER2	360	-	-
L04-Plant	120	-	-
L04-Circulation	120	-	-
L04-Office PER1	132	-	-
L04-Office CORE	133	-	-
L04-Stairs 01	120	-	-
L04-Lift Lobby	120	-	-
L04-WC Lobby 1	120	-	-
L04-WC	120	-	-
L00-Office 1-New	138	-	-
L01-Office PER4-New	137	-	-
L03-Office PER2	142	-	-
L03-Office PER2	136	-	-
L03-Office PER1	136	-	-
L03-Office PER1	134	-	-
L03-Office PER1	135	-	-
L03-Office CORE 1	135	-	-

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?
L03-Lift Lobby	N/A	N/A
L03-Office PER3	NO (-88.4%)	YES
L04-Office PER2	NO (-86.5%)	YES
L04-Office PER2	N/A	N/A
L04-Circulation	N/A	N/A
L04-Office PER1	NO (-60.7%)	YES
L04-Office CORE	N/A	N/A
L04-Lift Lobby	NO (-59.4%)	YES
L00-Office 1-New	NO (-89.7%)	YES
L01-Office PER4-New	NO (-91%)	YES
L03-Office PER2	NO (-83.7%)	YES
L03-Office PER2	NO (-79.5%)	YES
L03-Office PER1	NO (-91.2%)	YES
L03-Office PER1	NO (-76.8%)	YES
L03-Office PER1	NO (-89.7%)	YES
L03-Office CORE 1	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
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
Floor area [m^2]	1238.4	1238.4
External area [m^2]	1792.8	1792.8
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	610.37	725.32
Average U-value [W/m^2K]	0.34	0.4
Alpha value* [%]	22.03	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
100	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	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	8.52	5.9
Cooling	2.97	4.16
Auxiliary	8.55	8.69
Lighting	5.8	11.93
Hot water	2.48	2.24
Equipment*	38.28	38.28
TOTAL**	**28.31**	**32.91**

* 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	1.45
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*1.45*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	93.82	112.9
Primary energy [kWh_{PE}/m^2]	42.06	46.57
Total emissions [kg/m^2]	3.91	4.31

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] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	53.6	37	6.1	3.4	7	2.44	3.01	2.64	3.76
	Notional	55.3	77.4	5.5	4.6	11	2.78	4.63	----	----
[ST] Constant volume system (variable fresh air rate), [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	39.5	39.2	3.6	4.4	19.1	3.09	2.45	2.64	3.76
	Notional	17.8	86.9	1.8	5.2	9.2	2.78	4.63	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	67.7	34.4	7.7	3.2	7.2	2.44	3.01	2.64	3.76
	Notional	33	79.4	3.3	4.8	10.1	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	131.8	0	32.4	0	0	1.13	0	1.34	0
	Notional	184.1	0	36.3	0	0	1.41	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	20.3	0	5	0	5.6	1.13	0	1.34	0
	Notional	33.5	0	6.6	0	1.2	1.41	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