BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Avalon House New Green Proposed Blinds 2013

As designed

Date: Thu May 23 21:55:21 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 check version: v5.6.b.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	22.5
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	22.5
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	6
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.12	0.12	L0000031:Surf[0]
Floor	0.25	0.1	0.1	L0000029:Surf[0]
Roof	0.25	0.1	0.1	L0000040:Surf[14]
Windows***, roof windows, and rooflights	2.2	1.26	1.8	L0000040:Surf[2]
Personnel doors	2.2	1.6	1.6	L000002A:Surf[0]
Vehicle access & similar large doors	1.5	-	-	No vehicle access doors in building
High usage entrance doors	3.5	-	-	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 [$W/(m^2K)$]

* 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
$m^3/(h.m^2)$ 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	>0.95

1- 04_Rad_Elec_MV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.3	-	0.75
Standard value	N/A	N/A	N/A	N/A	0.5
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	3.62	3.76	0	1.6	0.8
Standard value	2.5*	3.2	N/A	1.6^	0.65
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

3- 06_Rad_Elec_NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	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	3.62	3.76	0	1.6	0.8
Standard value	2.5*	2.55	N/A	1.6^	0.65
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

5- 01_ AHU_ASHP_DV_Internal Offices_UF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.62	3.76	0	1.6	0.8
Standard value	2.5*	2.55	N/A	1.6^	0.65
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. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

"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
L01-WC Lobby 1	-	-	-	1.6	-	-	-	-	-	-	N/A
L01-WC Lobby 2	-	-	-	1.6	-	-	-	-	-	-	N/A
L02-WC Lobby 1	-	-	-	1.6	-	-	-	-	-	-	N/A
L02-WC Lobby 2	-	-	-	1.6	-	-	-	-	-	-	N/A
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-WC Lobby 1	-	-	-	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	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
L01-WC Lobby 1	-	120	-	28

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
L01-WC Lobby 2	-	120	-	28
L02-WC Lobby 1	-	120	-	27
L02-WC Lobby 2	-	120	-	27
L03-Acc WC	-	120	-	37
L03-Lift Lobby	-	120	-	38
L03-Stairs 01	-	120	-	35
L03-Stairs 02	-	120	-	30
L03-Stairs 03	-	120	-	30
L03-WC	-	120	-	76
L03-WC Lobby 1	-	120	-	28
L03-WC Lobby 2	-	120	-	28
L04-Stairs 03	-	120	-	30
L03-Office PER3	140	-	-	306
L04-Office PER2	141	-	-	493
L04-Office PER2	358	-	-	21
L04-Plant	120	-	-	55
L04-Circulation	-	120	-	32
L04-Office PER1	132	-	-	590
L04-Office CORE	133	-	-	330
L04-Stairs 01	-	120	-	35
L04-Lift Lobby	-	120	-	38
L04-WC Lobby 1	-	120	-	27
L04-WC	-	120	-	40
L00-WC Lobby 1	-	120	-	40
L00-Office 1-New	138	-	-	241
L01-Office PER4-New	137	-	-	241
L03-Office PER2	142	-	-	188
L03-Office PER2	136	-	-	277
L03-Office PER1	136	-	-	431
L03-Office PER1	134	-	-	93
L03-Office PER1	135	-	-	634
L03-Office CORE 1	135	-	-	596

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?
L03-Lift Lobby	N/A	N/A
L03-Office PER3	NO (-92%)	YES
L04-Office PER2	NO (-90.5%)	YES
L04-Office PER2	N/A	N/A
L04-Circulation	N/A	N/A
L04-Office PER1	NO (-72.6%)	YES
L04-Office CORE	N/A	N/A
L04-Lift Lobby	NO (-71.7%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00-Office 1-New	NO (-93.2%)	YES
L01-Office PER4-New	NO (-94%)	YES
L03-Office PER2	NO (-88.6%)	YES
L03-Office PER2	NO (-85.6%)	YES
L03-Office PER1	NO (-93.9%)	YES
L03-Office PER1	NO (-83.8%)	YES
L03-Office PER1	NO (-92.8%)	YES
L03-Office CORE 1	N/A	N/A

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?	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
Area [m^2]	1292.4	1292.4
External area [m^2]	1807.4	1807.4
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	611.83	872.36
Average U-value [W/m^2K]	0.34	0.48
Alpha value* [%]	8.81	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
100	**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^2]

	Actual	Notional
Heating	5.28	7.31
Cooling	3.38	7.15
Auxiliary	9.31	10.74
Lighting	5.86	19.41
Hot water	2.37	2.48
Equipment*	36.96	36.96
TOTAL**	**26.2**	**47.08**

* 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	13.96	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	75.8	137.56
Primary energy* [kWh/m^2]	78.44	127.77
Total emissions [kg/m^2]	6	22.5

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

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] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	32.5	45.3	2.7	4.2	8.4	3.34	3.01	3.62	3.76
	Notional	62.5	119.1	6.8	8.7	14.3	2.56	3.79	----	----
[ST] Constant volume system (variable fresh air rate), [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	27.3	46.8	1.8	5.3	19.1	4.24	2.45	3.62	3.76
	Notional	16.2	122.8	1.8	9	11.6	2.56	3.79	----	----
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	44.9	40.7	3.7	3.8	8.5	3.34	3.01	3.62	3.76
	Notional	31.6	117.3	3.4	8.6	12.9	2.56	3.79	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	100.3	0	33.1	0	0	0.84	0	1	0
	Notional	164.8	0	53.1	0	0	0.86	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	7.4	0	2.4	0	5.9	0.84	0	1	0
	Notional	20.6	0	6.6	0	2.1	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	L0000031:Surf[0]
Floor	0.2	0.1	L0000029:Surf[0]
Roof	0.15	0.1	L0000040:Surf[14]
Windows, roof windows, and rooflights	1.5	1	L000001E:Surf[0]
Personnel doors	1.5	1.6	L000002A:Surf[0]
Vehicle access & similar large doors	1.5	-	No vehicle access doors in building
High usage entrance doors	1.5	-	No high usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m^2K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m^2K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	3