Appendix B – BRUKL Documents

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Club House - Be Green

As designed

Date: Tue Jun 18 14:21:01 2024

Administrative information

Building Details

Address: TBC

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.24

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.24

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

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m^2]: 316.38

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	4.03	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	2.3	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	42.82	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	22.21	
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	0.18	0.18	0000001F:Surf[8]
Floors	0.18	0.12	0.12	0000001F:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.12	0.12	0000001F:Surf[1]
Windows** and roof windows	1.6	1.6	1.6	0000001F:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.6	1.6	00000020:Surf[6]
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 [$W/(m^2K)$] $U_{i\text{-}Calc}$ = 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	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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- 001 | ASHP CHAV-R450YA-HPB

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.24	-	0	-	0.85
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- 002 | Direct Electric

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0	-	0.85
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					NO

"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**
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Bathroom	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Bathroom	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Club Room	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	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
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Changing Room/Showers	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Bar	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Kitchen	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - Office	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A
00 - WC	-	-	-	0.8	-	-	-	-	-	-	N/A

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 - Changing Room/Showers	100	-	-
00 - Changing Room/Showers	100	-	-
00 - Changing Room/Showers	100	-	-
00 - Changing Room/Showers	100	-	-
00 - Bathroom	100	-	-
00 - Bathroom	100	-	-
00 - CAC 1	100	-	-
00 - Club Room	100	-	-
00 - CAC 2	100	-	-
00 - Changing Room/Showers	100	-	-
00 - Changing Room/Showers	100	-	-
00 - WC	100	-	-
00 - WC	100	-	-
00 - Changing Room/Showers	100	-	-
00 - WC	100	-	-
00 - WC	100	-	-
00 - Changing Room/Showers	100	-	-
00 - Store	100	-	-
00 - Store	100	-	-
00 - Store	100	-	-
00 - Bar	100	-	-
00 - Clean cupboard	100	-	-
00 - Kitchen	100	-	-
00 - WC	100	-	-
00 - Office	100	-	-
00 - Lobby	100	-	-
00 - Plant	100	-	-
00 - WC	100	-	-

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 - Lobby	100	-	-
00 - Cellar	100	-	-
00 - WC	100	-	-
00 - WC	100	-	-

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 - Club Room	NO (-36.6%)	NO
00 - Bar	N/A	N/A
00 - Office	NO (-85.5%)	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]	431.3	431.3
External area [m^2]	1207	1181.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	230.3	0
Average U-value [W/m^2K]	0.19	0
Alpha value* [%]	24.73	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
	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
100	**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	11.24	10.42
Cooling	0	0
Auxiliary	5.36	3.96
Lighting	6.21	6.23
Hot water	9.7	8.06
Equipment*	32.09	32.09
TOTAL**	**32.5**	**28.67**

* 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	18.85	0.02
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*18.85*	*0.02*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	122.75	104.04
Primary energy [kWh_{PE}/m^2]	22.21	42.82
Total emissions [kg/m^2]	2.3	4.03

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: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	180.9	0	16.5	0	5.2	3.04	0	3.24	0
	Notional	153.1	0	15.3	0	2.5	2.78	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	2.1	0	0.7	0	4.5	0.8	0	1	0
	Notional	4.4	0	0.9	0	1.8	1.41	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

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