BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Modular and Portable**

ESCP Europe Business School

As designed

Date: Wed May 17 08:41:03 2023

Administrative information

Building Details

Address: 527 Finchley Road, London, NW3 7BG

Certifier details

Name: Penny Carey

Telephone number: 01904 681876

Address: Portakabin Ltd, New Lane, Huntington, York, YO32 9PT

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.19

BRUKL compliance module version: v6.1.e.0

Foundation area [m^2]: 280.15

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	6.5	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	5.52	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	69.48	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	59.6	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER
Multiplying factors applied to TER and TPER, respectively	1.3	1.3

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

The U-values below are expected to be checked by the Building Control Body against the limiting standards which are appropriate for the modules' date of manufacture. No automatic checking has been performed by the software.

Fabric element	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls	0.35	0.35	L0000000_W1
Floors	0.23	0.23	L0000000_F_A0
Pitched roofs	-	-	No heat loss pitched roofs
Flat roofs	0.25	0.25	L0000000_C
Windows* and roof windows	1.34	1.34	L0000000_W1_O0
Rooflights**	-	-	No external rooflights
Personnel doors	1.09	1.16	L0000001_W1_O0
Vehicle access & similar large doors	-	-	No external vehicle access doors
High usage entrance doors	-	-	No external high usage entrance doors

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

* Display windows and similar glazing are excluded.
** Values for rooflights refer to the horizontal position.

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

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

Building services

The parameters below are expected to be checked by the Building Control Body against the limiting standards which are appropriate for the modules' date of manufacture. No automatic checking has been performed by the software.

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- Daikin Ceiling Mounted Cassette Unit FUA100A

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
4.5	4.24	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

2- 1kW Electric Wall Panel Heater

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
1	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

1- SYST0056-DHW

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
1	-

Local mechanical ventilation and exhaust

Zone	**Supply/extract SFP [W/(l/s)]**	**HR seasonal efficiency**	**Exhaust SFP [W/(l/s)]**
L0: Classroom 2	-	-	0.3
L0: Classroom 1	-	-	0.3

General lighting and display lighting	**General luminaire**	**Display light source**	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
L0: Classroom 2	129	-	-
L0: Classroom 1	129	-	-
L0: Lobby	79	-	-

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?**
L0: Classroom 2	NO (-68.2%)	NO
L0: Classroom 1	NO (-68.2%)	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]	273.9	273.9
External area [m^2]	751.7	751.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	238.35	216.75
Average U-value [W/m^2K]	0.32	0.29
Alpha value* [%]	29.14	16.7

* 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
100	**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	13.61	13.85
Cooling	5.16	5.53
Auxiliary	2.04	2.71
Lighting	9.94	7.67
Hot water	8.42	8.42
Equipment*	16.33	16.33
TOTAL**	**39.17**	**38.18**

* 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	0	2.27
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*2.27*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	246.57	211.79
Primary energy [kWh_{PE}/m^2]	59.6	53.44
Total emissions [kg/m^2]	5.52	5

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] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	153.8	87	10.2	5.3	2.1	4.19	4.56	4.5	6.42
	Notional	117	90	12.3	5.7	2.8	2.64	4.4	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	395.6	60.8	137.4	0	0	0.8	0	1	0
	Notional	336	51.5	69.7	0	0	1.34	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