BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name **Shell and Core**

Commercial Unit

As built

Date: Thu Aug 17 12:43:51 2023

Administrative information

Building Details

Address: 2 Old Mill Street, MANCHESTER, M4 6NA

Certification tool

Calculation engine: Apache

Calculation engine version: 6.4.0.16

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 6.4.0.16

BRUKL compliance check version: v4.1.h.0

Certifier details

Name: Julian Maybury

Telephone number: 07747 690076

Address: JJMTEC Ltd., 6 Northop Road, Wirral, CH45 4QD

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

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	41.2
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	41.2
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	25.6
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.17	0.17	L0000032:Surf[12]
Floor	0.25	0.18	0.18	L0000032:Surf[37]
Roof	0.25	-	-	UNKNOWN
Windows***, roof windows, and rooflights	2.2	0.96	0.96	L0000032:Surf[0]
Personnel doors	2.2	-	-	No personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No vehicle access doors in building
High usage entrance doors	3.5	0.96	0.96	L0000032:Surf[9]

$U_{a\text{-}Limit}$ = 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

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

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- DX Split System (Retail)

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
4.6	6.3	-	0.8
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

1- DHWS (Retail)

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)]**
L00: Commercial Unit	1.1	-	-

Shell and core configuration

Zone	**Excluded from calculation?**
L00: Commercial Unit	NO

General lighting and display lighting

Zone	**General lighting [W]**	**Display lamps efficacy [lm/W]**
L00: Commercial Unit	0	60

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?**
L00: Commercial Unit	NO (-26%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the 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?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	284.4	284.4
External area [m^2]	522.6	522.6
Weather	MAN	MAN
Infiltration [m^3/hm^2@ 50Pa]	3	5
Average conductance [W/K]	180.64	238.51
Average U-value [W/m^2K]	0.35	0.46
Alpha value* [%]	10	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
100	**A1/A2 Retail/Financial and Professional services**
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: 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	3.58	5.03
Cooling	6.43	8.14
Auxiliary	4.06	4.01
Lighting	33.84	63.43
Hot water	1.7	1.93
Equipment*	20.26	20.26
TOTAL**	**49.61**	**82.54**

* Energy used by equipment does not count towards the total for 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m^2]	158.78	157.29
Primary energy* [kWh/m^2]	144.86	237.45
Total emissions [kg/m^2]	25.6	41.2

* 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] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	55.2	103.6	3.6	6.4	4.1	4.29	4.47	4.6	6.3
	Notional	46.3	111	5	8.1	4	2.56	3.79	----	----

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 BCO can give particular attention to items with specifications that 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	0.17	L0000032:Surf[12]
Floor	0.2	0.18	L0000032:Surf[37]
Roof	0.15	-	UNKNOWN
Windows, roof windows, and rooflights	1.5	0.96	L0000032:Surf[0]
Personnel doors	1.5	-	No personnel doors in building
Vehicle access & similar large doors	1.5	-	No vehicle access doors in building
High usage entrance doors	1.5	0.96	L0000032:Surf[9]

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

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

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3