

Project name

Shell and Core

Unit G4

As built

Date: Fri Oct 21 09:06:54 2022

Administrative information

Building Details

Address: Unit G4, Rochdale, OL16 4UP

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Christos Papantoniou

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Address: 1 Russells Mews, Bristol, BS37 6BJ

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	28
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	28
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	24.7
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 -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.24	0.24	NT00001B:Surf[4]
Floor	0.25	0.15	0.15	NT00001B:Surf[0]
Roof	0.25	0.17	0.17	NT00001B:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.06	1.42	NT00001B:Surf[2]
Personnel doors	2.2	1.8	1.8	NT00001D:Surf[1]
Vehicle access & similar large doors	1.5	1.1	1.1	NT000024:Surf[70]
High usage entrance doors	3.5	-	-	No High usage entrance doors in building
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* 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	1.49

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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric panel heater

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0	0	-
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

2- Electric panel heater with extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0	0	-
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

3- ASHP (MVHR)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3.5	0	0	0.8
Standard value	2.5*	2.6	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

4- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3.5	0	0	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* 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.					

1- Instantaneous hot water

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

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	
Unit 4_GF_WC	0.3	-	-	-	-	-	-	-	-	-	N/A	
Unit 4_GF_Cleaners cupboard	0.3	-	-	-	-	-	-	-	-	-	N/A	
Unit 4_1F_Office 2	-	-	-	1.1	-	-	-	-	-	-	N/A	
Unit 4_1F_WCs	0.3	-	-	-	-	-	-	-	-	-	N/A	
Unit 4_1F_Kitchenette	-	-	-	1.1	-	-	-	-	-	-	N/A	
Unit 4_1F_Office 1	-	-	-	1.1	-	-	-	-	-	-	N/A	

Shell and core configuration

Zone	Excluded from calculation?
Unit 4_GF_Entrance	NO
Unit 4_GF_WC	NO
Unit 4_GF_Cleaners cupboard	NO
Unit 4_GF_Stairs	NO
Unit 4_1F_Office 2	NO
Unit 4_1F_WCs	NO
Unit 4_1F_Circulation	NO
Unit 4_1F_Stairs	NO
Unit 4_1F_Kitchenette	NO
Unit 4_1F_Office 1	NO
Unit 4_GF_Warehouse	YES

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value		60	60	22	
Unit 4_GF_Entrance		-	80	-	100
Unit 4_GF_WC		-	80	-	46
Unit 4_GF_Cleaners cupboard		80	-	-	13
Unit 4_GF_Stairs		-	80	-	46
Unit 4_1F_Office 2		100	-	-	716
Unit 4_1F_WCs		-	80	-	144
Unit 4_1F_Circulation		-	80	-	93
Unit 4_1F_Stairs		-	80	-	64
Unit 4_1F_Kitchenette		80	-	-	77
Unit 4_1F_Office 1		100	-	-	977
Unit 4_GF_Warehouse		60	-	-	24348

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?
Unit 4_1F_Office 2	NO (-72.1%)	NO
Unit 4_1F_Kitchenette	NO (-73%)	NO
Unit 4_1F_Office 1	NO (-67.1%)	NO
Unit 4_GF_Warehouse	NO (-56.9%)	NO

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]	397.6	397.6
External area [m ²]	8915.5	8915.5
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	1	7
Average conductance [W/K]	1992.26	2844.69
Average U-value [W/m ² K]	0.22	0.32
Alpha value* [%]	10	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
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
100	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/m²]

	Actual	Notional
Heating	20.59	29.29
Cooling	4.46	4.03
Auxiliary	4.32	4.03
Lighting	15.3	23.47
Hot water	2.98	3.27
Equipment*	33.55	33.55
TOTAL **	47.65	64.1

* 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/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	141.72	198.54
Primary energy* [kWh/m ²]	146.3	146.55
Total emissions [kg/m ²]	24.7	28

* 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] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	123	0	42.7	0	0	0.8	0	1	0	
Notional	162.2	0	52.3	0	0	0.86	0	----	----	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	159.2	0	55.3	0	18.3	0.8	0	1	0	
Notional	245.6	0	79.1	0	23.2	0.86	0	----	----	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	0	0	0	0	0	3.26	2.7	3.5	3.8	
Notional	0	0	0	0	0	2.56	3.79	----	----	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	80.6	67.3	6.9	6.9	4.6	3.26	2.7	3.5	3.8	
Notional	123.5	85.5	13.4	6.3	3.6	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 Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.23	NT00001B:Surf[3]
Floor	0.2	0.15	NT00001B:Surf[0]
Roof	0.15	0.17	NT00001B:Surf[1]
Windows, roof windows, and rooflights	1.5	1	NT000024:Surf[4]
Personnel doors	1.5	1.8	NT00001D:Surf[1]
Vehicle access & similar large doors	1.5	1.1	NT000024:Surf[70]
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-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	1.49