

Project name

WCR B2-A-Commercial (Be Green)

As designed

Date: Thu May 30 11:52:58 2019

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.11

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.11

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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	33.1
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	33.1
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	24.8
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	0.15	0.15	G0000006:Surf[2]
Floor	0.25	0.13	0.13	G0000006:Surf[0]
Roof	0.25	0.13	0.13	G0000006:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	G000000A:Surf[3]
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	-	-	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	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	<0.9

1- VRF Swimming Pool

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

2- VRF Swimming Pool Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

3- VRF Office Ground Floor

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

4- VRF Restaurant

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

5- VRF Cafe

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

6- VRF Kitchen

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

7- VRF Office 1st Floor

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

8- VRF Gym

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

9- VRF Gym Studio

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

10- VRF Gym Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

11- VRF Gym Training Room

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	5	0	0	0.7
Standard value	2.5*	3.2	N/A	N/A	0.5
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.					

1- DHW Swimming Pool

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.24	0.005
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

2- DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.24	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

3- DHW Gym

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.24	0.005
Standard value	2*	N/A

* Standard shown is for all types except absorption and gas engine heat pumps.

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	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
G0B Swimming Pool		-	-	-	1.6	-	-	-	-	-	-	N/A
G0B Office		-	-	-	1.6	-	-	-	-	-	-	N/A
G0 B2 Office		-	-	-	1.6	-	-	-	-	-	-	N/A
G0 B2 Restaurant		-	-	-	1.6	-	-	-	-	-	-	N/A
G0 B2 Cafe		-	-	-	1.6	-	-	-	-	-	-	N/A
G0 B2 Kitchen		-	-	-	1.6	-	-	-	-	-	-	N/A
G1 B2 Offices		-	-	-	1.6	-	-	-	-	-	-	N/A
G1 B2 Gym		-	-	-	1.6	-	-	-	-	-	-	N/A
G1 B2 Studio		-	-	-	1.6	-	-	-	-	-	-	N/A
G1 B2 Office		-	-	-	1.6	-	-	-	-	-	-	N/A
G1 B2 Training		-	-	-	1.6	-	-	-	-	-	-	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	
G0B Swimming Pool		-	120	-	1470
G0B Showers		-	120	-	75
G0B Circulation		-	120	-	74
G0B Changing		-	120	-	186
G0B BOH		120	-	-	38
G0B Circulation		-	120	-	118
G0B Office		120	-	-	209
G0B Circulation		-	120	-	101
G0B BOH		120	-	-	30
G0 B2 Office		120	-	-	2738
G0 B2 Restaurant		-	120	120	270

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
		60	60	22	
G0 B2 Circulation		-	120	-	230
G0 B2 Circulation		-	120	-	44
G0 B2-A WC		-	120	-	136
G0 B2 BOH		120	-	-	25
G0 B2 WC		-	120	-	49
G0 B2 Cafe		-	120	120	200
G0 B2 Kitchen		-	120	-	329
G0 B2 Circulation		-	120	-	34
G0 B2 BOH		120	-	-	23
G1 B2 Circulation		-	120	-	48
G1 B2 Circulation		-	120	-	56
G1 B2 Offices		120	-	-	3953
G1 B2 Gym		-	120	-	192
G1 B2 Studio		-	120	-	177
G1 B2 Office		120	-	-	107
G1 B2 Training		120	-	-	313
G1 B2 Changing		-	120	-	43
G1 B2 WC		-	120	-	50
G1 B2 Changing		-	120	-	44
G1 B2 WC		-	120	-	77

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?
G0B Swimming Pool	N/A	N/A
G0B Office	N/A	N/A
G0 B2 Office	NO (-13.3%)	NO
G0 B2 Restaurant	NO (-56.9%)	YES
G0 B2 Cafe	NO (-28.2%)	NO
G0 B2 Kitchen	N/A	N/A
G1 B2 Offices	NO (-17.5%)	NO
G1 B2 Gym	N/A	N/A
G1 B2 Studio	N/A	N/A
G1 B2 Office	N/A	N/A
G1 B2 Training	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?	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
Area [m ²]	2918.8	2918.8
External area [m ²]	5124.2	5124.2
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1438.41	1920.33
Average U-value [W/m ² K]	0.28	0.37
Alpha value* [%]	10.06	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
9	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
55	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
36	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	6.78	11.83
Cooling	5.37	5.61
Auxiliary	8.25	4.07
Lighting	9.24	21.22
Hot water	28.61	30.69
Equipment*	40.46	40.46
TOTAL**	58.26	73.42

* 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	2.9	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]	167.97	185.48
Primary energy* [kWh/m ²]	239.24	299.98
Total emissions [kg/m ²]	24.8	33.1

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

HVAC Systems Performance

System Type	Heat dem MJ/m ²	Cool dem MJ/m ²	Heat con kWh/m ²	Cool con kWh/m ²	Aux con kWh/m ²	Heat SSEFF	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	32.9	109.1	2.3	8.1	3.9	3.92	3.74	4	5
Notional	0	0	0	0	0	0	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	34.2	110.3	2.4	8.2	3.9	3.92	3.74	4	5
Notional	34.3	84.1	3.7	6.2	2.1	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	521.8	0	36.9	0	19.4	3.92	3.74	4	5
Notional	36.5	97.5	4	7.1	2.1	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	12.5	32.9	0.9	2.4	47.2	3.92	3.74	4	5
Notional	657.5	0	71.4	0	10.9	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	205.1	121.8	14.5	9.1	13.2	3.92	3.74	4	5
Notional	29.1	73.5	3.2	5.4	16.5	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0	674.7	0	50.2	20.1	3.92	3.74	4	5
Notional	84.6	234.6	9.2	17.2	7	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	79.4	126.3	5.6	9.4	20	3.92	3.74	4	5
Notional	0	781.6	0	57.3	10.6	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	24.4	207.8	1.7	15.4	8.4	3.92	3.74	4	5
Notional	52.3	210	5.7	15.4	7	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	1.9	15.8	0.1	1.2	30.8	3.92	3.74	4	5
Notional	25.2	286.7	2.7	21	2.9	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	133.8	94.1	9.5	7	8.4	3.92	3.74	4	5
Notional	16.7	31.2	1.8	2.3	17.3	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	49.3	80.5	3.5	6	8.4	3.92	3.74	4	5
Notional	103.7	186.7	11.3	13.7	2.9	2.56	3.79	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	44.8	136.8	4.9	10	2.9	2.56	3.79	----	----

Key to terms

Heat dem [MJ/m ²]	= Heating energy demand
Cool dem [MJ/m ²]	= Cooling energy demand
Heat con [kWh/m ²]	= Heating energy consumption
Cool con [kWh/m ²]	= Cooling energy consumption
Aux con [kWh/m ²]	= 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	0.15	G0000006:Surf[2]
Floor	0.2	0.13	G0000006:Surf[0]
Roof	0.15	0.13	G0000006:Surf[1]
Windows, roof windows, and rooflights	1.5	1.4	G000000A:Surf[3]
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	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m ² K)]		U _{i-Min} = Minimum individual element U-values [W/(m ² K)]	
* 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