BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

1 Museum St (Be Green)

As designed

Date: Wed Jan 27 15:25:39 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

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: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	12.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	12.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	9.3
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.26	G0000009:Surf[3]
Floor	0.25	0.23	0.25	G2000159:Surf[0]
Roof	0.25	0.12	0.12	G3000000:Surf[118]
Windows***, roof windows, and rooflights	2.2	1.36	1.6	G1000037: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	-	-	No High usage entrance doors in building

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

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	>0.95

1- Radiator + Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	-	0.2	0	-
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					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.					

2- Radiator + Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	-	0.2	0	-
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					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.					

3- Office VRF+ HR CMM System

	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	0.65
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- Reception VRF+ HR

	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	0.65
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.					

5- Comms Room DX

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.8	3.66	-	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.					

6- Staff Areas + HR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3.5	0	0	0.9
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.					

7- Radiator + Supply

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	-	0.2	0	0.9
Standard value	2.5*	N/A	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.					

8- Securty & Fire Office VRF+ HR

	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	0.65
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- DHW Local Electric

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

2- DHW Basement

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	3.5	0.002
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		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
G1 Office	-	-	-	2	-	-	-	-	-	-	N/A
G2 Office	-	-	-	2	-	-	-	-	-	-	N/A
G3 Office	-	-	-	2	-	-	-	-	-	-	N/A
G4 Office	-	-	-	2	-	-	-	-	-	-	N/A
G5 Office	-	-	-	2	-	-	-	-	-	-	N/A
G6 Office	-	-	-	2	-	-	-	-	-	-	N/A
G7 Office	-	-	-	2	-	-	-	-	-	-	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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
G8 Office	-	-	-	2	-	-	-	-	-	-	N/A
G9 Office	-	-	-	2	-	-	-	-	-	-	N/A
G10 Office	-	-	-	2	-	-	-	-	-	-	N/A
G11 Office	-	-	-	2	-	-	-	-	-	-	N/A
G11 Office	-	-	-	2	-	-	-	-	-	-	N/A
G12 Office	-	-	-	2	-	-	-	-	-	-	N/A
G13 Office	-	-	-	2	-	-	-	-	-	-	N/A
G14 Office	-	-	-	2	-	-	-	-	-	-	N/A
G15 Office	-	-	-	2	-	-	-	-	-	-	N/A
G16 Office	-	-	-	2	-	-	-	-	-	-	N/A
G17 Office	-	-	-	2	-	-	-	-	-	-	N/A
G18 Office	-	-	-	2	-	-	-	-	-	-	N/A
G19 Office	-	-	-	2	-	-	-	-	-	-	N/A
G20 Office	-	-	-	2	-	-	-	-	-	-	N/A
G0 Lobby	-	-	-	2	-	-	-	-	-	-	N/A
G-1 Cycle Store	-	-	0.3	-	-	-	-	-	-	-	N/A
G-1 Cycle Store	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 Staff Room	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 FM Office	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Drying Room	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Shower	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Shower	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 Unisex Shower	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Shower	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 Office Showers	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Office Showers	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Showers	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 Showers	-	-	-	1.1	-	-	-	-	-	-	N/A
G-2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G-2 Shower Vent	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G0 Security & Fire Risk Centre	-	-	-	2	-	-	-	-	-	-	N/A
G0 Post Room TBC	-	-	-	2	-	-	-	-	-	-	N/A
G0 Tenant Entrance	-	-	-	2	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
G1 Lift Lobby	-	100	-	68

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G1 Lift Lobby	-	100	-	38
G1 Lift Lobby	-	100	-	48
G1 Staircase	-	100	-	40
G1 Staircase	-	100	-	39
G1 WC	-	100	-	147
G1 Office	140	-	-	4674
G2 Office	140	-	-	4674
G2 Lift Lobby	-	100	-	68
G2 Lift Lobby	-	100	-	38
G2 Lift Lobby	-	100	-	48
G2 Staircase	-	100	-	40
G2 Staircase	-	100	-	39
G2 WC	-	100	-	147
G3 Office	140	-	-	4674
G3 Lift Lobby	-	100	-	68
G3 Lift Lobby	-	100	-	38
G3 Lift Lobby	-	100	-	48
G3 Staircase	-	100	-	40
G3 Staircase	-	100	-	39
G3 WC	-	100	-	147
G4 Office	140	-	-	4674
G4 Lift Lobby	-	100	-	68
G4 Lift Lobby	-	100	-	38
G4 Lift Lobby	-	100	-	48
G4 Staircase	-	100	-	40
G4 Staircase	-	100	-	39
G4 WC	-	100	-	147
G5 Lift Lobby	-	100	-	68
G5 Lift Lobby	-	100	-	38
G5 Lift Lobby	-	100	-	48
G5 Staircase	-	100	-	40
G5 Staircase	-	100	-	39
G5 WC	-	100	-	147
G5 Office	140	-	-	4111
G6 Lift Lobby	-	100	-	68
G6 Lift Lobby	-	100	-	38
G6 Lift Lobby	-	100	-	48
G6 Staircase	-	100	-	40
G6 Staircase	-	100	-	39
G6 WC	-	100	-	147
G6 Office	140	-	-	4111
G7 Lift Lobby	-	100	-	68
G7 Lift Lobby	-	100	-	38

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G7 Lift Lobby	-	100	-	48
G7 Staircase	-	100	-	40
G7 Staircase	-	100	-	39
G7 WC	-	100	-	147
G7 Office	140	-	-	4111
G8 Lift Lobby	-	100	-	68
G8 Lift Lobby	-	100	-	38
G8 Lift Lobby	-	100	-	48
G8 Staircase	-	100	-	40
G8 Staircase	-	100	-	39
G8 WC	-	100	-	147
G8 Office	140	-	-	3145
G9 Lift Lobby	-	100	-	68
G9 Lift Lobby	-	100	-	38
G9 Lift Lobby	-	100	-	48
G9 Staircase	-	100	-	40
G9 Staircase	-	100	-	39
G9 WC	-	100	-	147
G9 Office	140	-	-	3145
G10 Lift Lobby	-	100	-	68
G10 Lift Lobby	-	100	-	38
G10 Lift Lobby	-	100	-	48
G10 Staircase	-	100	-	40
G10 Staircase	-	100	-	39
G10 WC	-	100	-	147
G10 Office	140	-	-	3145
G11 Staircase	-	100	-	40
G11 Staircase	-	100	-	39
G11 WC	-	100	-	147
G11 Office	100	-	-	799
G11 Circulation	-	100	-	131
G11 Office	140	-	-	1296
G11 Lift Lobby	-	100	-	33
G11 Lift Lobby	-	100	-	44
G12 Staircase	-	100	-	39
G12 Office	140	-	-	2125
G12 Lift Lobby	-	100	-	33
G12 Lift Lobby	-	100	-	44
G12 Circulation	-	100	-	58
G12 WC	-	100	-	82
G12 Staircase	-	100	-	29
G13 Staircase	-	100	-	39
G13 Office	140	-	-	2125

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G13 Lift Lobby	-	100	-	33
G13 Lift Lobby	-	100	-	44
G13 Circulation	-	100	-	58
G13 WC	-	100	-	82
G13 Staircase	-	100	-	29
G14 Staircase	-	100	-	39
G14 Office	140	-	-	2125
G14 Lift Lobby	-	100	-	33
G14 Lift Lobby	-	100	-	44
G14 Circulation	-	100	-	58
G14 WC	-	100	-	82
G14 Staircase	-	100	-	29
G15 Staircase	-	100	-	39
G15 Office	140	-	-	2125
G15 Lift Lobby	-	100	-	33
G15 Lift Lobby	-	100	-	44
G15 Circulation	-	100	-	58
G15 WC	-	100	-	82
G15 Staircase	-	100	-	29
G16 Staircase	-	100	-	39
G16 Office	140	-	-	2125
G16 Lift Lobby	-	100	-	33
G16 Lift Lobby	-	100	-	44
G16 Circulation	-	100	-	58
G16 WC	-	100	-	82
G16 Staircase	-	100	-	29
G17 Staircase	-	100	-	39
G17 Office	140	-	-	2125
G17 Lift Lobby	-	100	-	33
G17 Lift Lobby	-	100	-	44
G17 Circulation	-	100	-	58
G17 WC	-	100	-	82
G17 Staircase	-	100	-	29
G18 Staircase	-	100	-	39
G18 Office	140	-	-	2125
G18 Lift Lobby	-	100	-	33
G18 Lift Lobby	-	100	-	44
G18 Circulation	-	100	-	58
G18 WC	-	100	-	82
G18 Staircase	-	100	-	29
G19 Staircase	-	100	-	39
G19 Office	140	-	-	2125
G19 Lift Lobby	-	100	-	33

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G19 Lift Lobby	-	100	-	44
G19 Circulation	-	100	-	58
G19 WC	-	100	-	82
G19 Staircase	-	100	-	29
G20 Staircase	-	100	-	39
G20 Office	140	-	-	2125
G20 Lift Lobby	-	100	-	33
G20 Lift Lobby	-	100	-	44
G20 Circulation	-	100	-	58
G20 WC	-	100	-	82
G20 Staircase	-	100	-	29
G12 WC	-	100	-	41
G12 Acc WC	-	100	-	41
G13 WC	-	100	-	41
G13 Acc WC	-	100	-	41
G14 Acc WC	-	100	-	41
G14 WC	-	100	-	41
G15 WC	-	100	-	41
G15 Acc WC	-	100	-	41
G16 WC	-	100	-	41
G16 Acc WC	-	100	-	41
G17 WC	-	100	-	41
G17 Acc WC	-	100	-	41
G18 WC	-	100	-	41
G18 Acc WC	-	100	-	41
G19 WC	-	100	-	41
G19 Acc WC	-	100	-	41
G20 WC	-	100	-	41
G20 Acc WC	-	100	-	41
G0 Staircase	-	100	-	62
G0 Staircase	-	100	-	47
G0 Circulation	-	100	-	158
G0 Cycle Store Entrance	-	100	-	101
G0 Lobby	-	100	65	484
G-2 Staircase	-	100	-	62
G-2 Circulation	-	100	-	119
G-1 Comms	100	-	-	66
G-1 Comms	100	-	-	90
G-1 Staircase	-	100	-	38
G-1 Circulation	-	100	-	42
G-2 AHU Plant	100	-	-	462
G-2 Sprinker Plant	100	-	-	469
G-2 Sprinker Plant	100	-	-	201

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G-2 Switch Room	100	-	-	248
G-1 Cycle Store	100	-	-	301
G-1 Cycle Store	100	-	-	60
G-2 WC Extract	100	-	-	121
G-2 Staff Room	100	-	-	358
G-2 Staircase	-	100	-	36
G-2 Circulation	-	100	-	40
G-2 FM Office	100	-	-	144
G-2 Refuse Store	100	-	-	28
G-2 Refuse Store	100	-	-	29
G-2 Refuse Store	100	-	-	13
G-2 Refuse Store	100	-	-	7
G-2 Drying Room	-	100	-	31
G-2 Shower	-	100	-	19
G-2 Shower	-	100	-	14
G-2 WC	-	100	-	28
G-2 WC	-	100	-	36
G-2 WC	-	100	-	25
G-2 WC	-	100	-	40
G-2 Unisex Shower	-	100	-	19
G-2 Shower	-	100	-	17
G-2 WC	-	100	-	37
G-2 Office Showers	-	100	-	104
G-2 Office Showers	-	100	-	42
G-2 Showers	-	100	-	49
G-2 Showers	-	100	-	131
G-2 Circulation	-	100	-	176
G-2 Circulation	-	100	-	16
G-2 Circulation	-	100	-	7
G-2 WC	-	100	-	29
G-2 Circulation	-	100	-	39
G-2 Storage	100	-	-	17
G-2 Circulation	-	100	-	81
G-2 Circulation	-	100	-	62
G-2 Circulation	-	100	-	43
G-2 Shower Vent	-	100	-	41
G-2 AHU Plant	100	-	-	575
G-2 Lift Safety Switch Room	100	-	-	189
G0 WC	-	100	-	82
G0 Circulation	-	100	-	153
G0 Circulation	-	100	-	25
G0 Security & Fire Risk Centre	100	-	-	218
G0 Post Room TBC	100	-	-	254

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G0 Tenant Entrance	-	100	65	414

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?
G1 Office	NO (-68.3%)	NO
G2 Office	NO (-72.6%)	NO
G3 Office	NO (-68.3%)	NO
G4 Office	NO (-60.4%)	NO
G5 Office	NO (-57.1%)	NO
G6 Office	NO (-56.6%)	NO
G7 Office	NO (-56%)	NO
G8 Office	NO (-55.9%)	NO
G9 Office	NO (-54.8%)	NO
G10 Office	NO (-51.4%)	NO
G11 Office	NO (-56.9%)	NO
G11 Office	NO (-53.1%)	NO
G12 Office	NO (-52.4%)	NO
G13 Office	NO (-52.4%)	NO
G14 Office	NO (-52.4%)	NO
G15 Office	NO (-52.4%)	NO
G16 Office	NO (-52.5%)	NO
G17 Office	NO (-52.4%)	NO
G18 Office	NO (-52.5%)	NO
G19 Office	NO (-52.4%)	NO
G20 Office	NO (-43.7%)	NO
G0 Lobby	NO (-43%)	NO
G-1 Comms	N/A	N/A
G-1 Comms	N/A	N/A
G-2 Staff Room	N/A	N/A
G-2 FM Office	N/A	N/A
G0 Security & Fire Risk Centre	N/A	N/A
G0 Post Room TBC	N/A	N/A
G0 Tenant Entrance	NO (-56.4%)	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?	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]	19737.2	19737.2
External area [m^2]	14901.6	14491.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	9644.66	8433.33
Average U-value [W/m^2K]	0.65	0.58
Alpha value* [%]	10.48	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
100	**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
	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	2.65	1.97
Cooling	3.18	4.5
Auxiliary	4.02	1.88
Lighting	4.82	13.62
Hot water	3.69	4.32
Equipment*	39.72	39.72
TOTAL**	**18.36**	**26.3**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	59.12	64.25
Primary energy* [kWh/m^2]	54.94	74.27
Total emissions [kg/m^2]	9.3	12.9

* 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	28.3	37.7	2.4	4.2	4.9	3.26	2.49	3.5	3.5
	Notional	15.1	62	1.6	6.1	2.1	2.56	2.84	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	49.7	0	4.4	0	1.1	3.12	0	3.5	0
	Notional	39	0	4.2	0	1	2.56	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	27.9	21.1	2.4	2.4	4.4	3.26	2.49	3.5	3.5
	Notional	7.2	20.2	0.8	2	1.9	2.56	2.84	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	0	0	0	0	3.54	4.76	3.8	6.7
	Notional	0	0	0	0	0	2.56	2.84	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	31.2	92.5	2.7	10.3	4.3	3.26	2.49	3.5	3.5
	Notional	22.9	56.7	2.5	5.5	2.1	2.56	2.84	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	34.5	0	3.1	0	2.1	3.12	0	3.5	0
	Notional	19.5	0	2.1	0	2.2	2.56	0	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	40.2	0	3.6	0	6.2	3.12	0	3.5	0
	Notional	35.9	0	3.9	0	3.3	2.56	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	23.6	190.6	2	21.3	4.9	3.26	2.49	3.5	3.5
	Notional	13.4	151.8	1.5	11.1	2.1	2.56	3.79	----	----
[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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	G1000037:Surf[9]
Floor	0.2	0.11	G0000009:Surf[5]
Roof	0.15	0.12	G3000000:Surf[118]
Windows, roof windows, and rooflights	1.5	0.12	G1000080:Surf[12]
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

$U_{i\text{-}Typ}$ = 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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

1 Museum St Retail (Be Green)

As designed

Date: Mon Feb 01 18:23:05 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

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: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	36.7
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	36.7
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	20
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.26	G0000002:Surf[16]
Floor	0.25	0.22	0.22	G0000002:Surf[0]
Roof	0.25	0.12	0.12	G0000002:Surf[1]
Windows***, roof windows, and rooflights	2.2	1	1	G0000002:Surf[2]
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	2.2	2.2	G0000002:Surf[12]

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

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	>0.95

1- Radiator + Nat Vent

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	0.2	0	-
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					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.					

2- Radiator + Extract

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	-	0.2	0	-
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					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.					

3- Retail VRF

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	3.5	0	0	0.9
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.					

1- DHW Local Electric

	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**
G0 Cafe WC	-	-	0.3	-	-	-	-	-	-	-	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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
G0 Flexible GF Uses Class E	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses Class E	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses Class E	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses Class E	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses Class E	-	-	-	1.1	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
G0 Cafe Circulation	-	100	-	22
G0 Cafe BOH	-	100	-	58
G0 Cafe WC	-	100	-	83
G0 Flexible GF Uses Class E	-	100	65	1446
G0 Flexible GF Uses Class E	-	100	65	1253
G0 Flexible GF Uses Class E	-	100	65	1222
G0 Flexible GF Uses Class E	-	100	65	1754
G0 Flexible GF Uses Class E	-	100	65	883

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?
G0 Flexible GF Uses Class E	NO (-10%)	NO
G0 Flexible GF Uses Class E	NO (-29.3%)	NO
G0 Flexible GF Uses Class E	NO (-72.3%)	NO
G0 Flexible GF Uses Class E	NO (-70.7%)	NO
G0 Flexible GF Uses Class E	NO (-77.1%)	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?	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]	648.7	648.7
External area [m^2]	839.1	839.1
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	401.09	427.4
Average U-value [W/m^2K]	0.48	0.51
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 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/m^2]

	Actual	Notional
Heating	3.04	2.32
Cooling	3.69	5.82
Auxiliary	5.02	3.01
Lighting	26.07	60.35
Hot water	1.63	1.79
Equipment*	19.91	19.91
TOTAL**	**39.45**	**73.28**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	68.6	80.88
Primary energy* [kWh/m^2]	118.08	215.96
Total emissions [kg/m^2]	20	36.7

* 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] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	92.1	0	8.2	0	1.3	3.12	0	3.5	0
	Notional	45.9	0	5	0	1.2	2.56	0	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	62.5	0	5.6	0	2.8	3.12	0	3.5	0
	Notional	27.8	0	3	0	3.2	2.56	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	33.6	34.5	2.9	3.9	5.2	3.26	2.49	3.5	3.5
	Notional	20.6	62.1	2.2	6.1	3.1	2.56	2.84	----	----

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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.14	G0000002:Surf[7]
Floor	0.2	0.22	G0000002:Surf[0]
Roof	0.15	0.12	G0000002:Surf[1]
Windows, roof windows, and rooflights	1.5	1	G0000002:Surf[2]
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	2.2	G0000002:Surf[12]

$U_{i\text{-}Typ}$ = 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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Grape St (Be Green)

As designed

Date: Fri Feb 26 11:07:24 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

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: Neil Bajaj

Telephone number: 020 3514 3080

Address: Airport House Business Centre, Croydon, CR0 0XZ

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	16.6
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	16.6
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	14.2
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	G0000002:Surf[1]
Floor	0.25	0.22	0.22	G0000002:Surf[0]
Roof	0.25	0.12	0.12	G1000001:Surf[11]
Windows***, roof windows, and rooflights	2.2	1.11	1.3	G1000001:Surf[0]
Personnel doors	2.2	2.2	2.2	G4000000:Surf[2]
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

$U_{a\text{-}Limit}$ = 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	3.5

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 + HR

	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	0.65
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.					

2- Electric Panel Heater + Extract

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0.2	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- Electric Panel Heater

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	1	-	0.2	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

4- Comms Room DX

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.8	3.66	-	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- DHW

	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
G1 Office	-	-	-	1.5	-	-	-	-	-	-	N/A
G2 Office	-	-	-	1.5	-	-	-	-	-	-	N/A
G3 Office	-	-	-	1.5	-	-	-	-	-	-	N/A
G0 Kitchen	-	-	-	1.5	-	-	-	-	-	-	N/A
G0 Cafe/Bar	-	-	-	1.5	-	-	-	-	-	-	N/A
G0 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G0 WC Lobby	-	-	0.3	-	-	-	-	-	-	-	N/A
G0 Reception	-	-	-	1.5	-	-	-	-	-	-	N/A
G0 Cleaners Cupd	-	-	0.3	-	-	-	-	-	-	-	N/A
G0 MDF/IDF Comms	-	-	0.3	-	-	-	-	-	-	-	N/A
G1 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G2 Cleaners Cupd	-	-	0.3	-	-	-	-	-	-	-	N/A
G2 WC	-	-	0.3	-	-	-	-	-	-	-	N/A
G3 Cleaners Cupd	-	-	0.3	-	-	-	-	-	-	-	N/A
G3 WC	-	-	0.3	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
G1 Office	140	-	-	1762
G2 Office	140	-	-	1558
G3 Office	140	-	-	1574
G0 DDA WC	-	100	-	49
G0 Kitchen	-	100	-	226
G0 Cafe/Bar	-	100	-	411
G0 WC	-	100	-	80
G0 WC Lobby	-	100	-	47
G0 Mail Room	140	-	-	88
G0 Staircase	-	100	-	95
G0 Reception	-	100	100	436
G0 Circulation	-	100	-	55
G0 Circulation	-	100	-	52
G0 Circulation	-	100	-	5
G0 Cleaners Cupd	100	-	-	14
G0 MDF/IDF Comms	100	-	-	73
G1 Staircase	-	100	-	90
G1 WC	-	100	-	110
G2 Cleaners Cupd	100	-	-	24
G2 WC	-	100	-	104
G2 Staircase	-	100	-	90
G3 Cleaners Cupd	100	-	-	24
G3 WC	-	100	-	110
G3 Staircase	-	100	-	95

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G4 Staircase	-	100	-	66
G4 Terrace Lobby	-	100	-	31

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?
G1 Office	NO (-81.4%)	NO
G2 Office	NO (-75.1%)	NO
G3 Office	NO (-55%)	NO
G0 Kitchen	N/A	N/A
G0 Cafe/Bar	NO (-77.1%)	NO
G0 Mail Room	N/A	N/A
G0 Reception	NO (-72%)	NO
G0 MDF/IDF Comms	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]	1787.7	1787.7
External area [m^2]	2352.1	2748.7
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	1015.06	1470.32
Average U-value [W/m^2K]	0.43	0.53
Alpha value* [%]	7.83	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
100	**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
	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	8.38	14.33
Cooling	2.26	1.78
Auxiliary	3.17	1.85
Lighting	5.79	13.11
Hot water	7.76	8.53
Equipment*	38.43	38.43
TOTAL**	**27.36**	**39.6**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	70.17	90.68
Primary energy* [kWh/m^2]	84	83.95
Total emissions [kg/m^2]	14.2	16.6

* 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	41.6	24.7	3.5	2.8	3.8	3.26	2.49	3.5	3.5
	Notional	51.4	22.2	5.6	2.2	2.1	2.56	2.84	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	0	0	0	0	3.54	4.76	3.8	6.7
	Notional	0	0	0	0	0	2.56	3.79	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	80.2	0	27.8	0	0.8	0.8	0	1	0
	Notional	162.8	0	52.4	0	1.5	0.86	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	108.5	0	37.7	0	0	0.8	0	1	0
	Notional	201.5	0	64.9	0	0	0.86	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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	G0000002:Surf[1]
Floor	0.2	0.22	G0000002:Surf[0]
Roof	0.15	0.12	G1000001:Surf[11]
Windows, roof windows, and rooflights	1.5	0.14	G000001E:Surf[6]
Personnel doors	1.5	2.2	G4000000:Surf[2]
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

$U_{i\text{-}Typ}$ = 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	3.5

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

High Holborn (Be Green)

As designed

Date: Fri Feb 12 11:44:08 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

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: Neil Bajaj

Telephone number: 020 3514 3080

Address: Airport House Business Centre, Croydon, CR0 0XZ

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	15.8
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	15.8
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	12.5
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.23	G0000006:Surf[2]
Floor	0.25	0.12	0.12	G0000004:Surf[2]
Roof	0.25	0.12	0.12	G0000003:Surf[5]
Windows***, roof windows, and rooflights	2.2	1.4	1.5	G100002A:Surf[0]
Personnel doors	2.2	2.2	2.2	G0000003:Surf[2]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	1.2	1.2	G0000006: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

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- Indirect Heating System 1

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.22	-	0.2	0	-
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					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.					

2- Indirect Heating System 2

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.47	-	0.2	0	-
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					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.					

3- Mini VRF Retail

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.37	4.48	0	0	0.85
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.					

1- DHW

	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**
G0 Retail	-	-	-	1.3	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G2 Landlord Lobby	-	100	-	18
G4 Landlord Lobby	-	100	-	14
G0 Cycle Store	100	-	-	15
G0 Residential Lobby	-	100	-	28
G0 Staircase	-	100	-	26
G0 Retail	-	100	65	324
G1 Landlord Lobby	-	100	-	17
G1 Staircase	-	100	-	40
G2 Staircase	-	100	-	30
G3 Landlord Lobby	-	100	-	18
G3 Staircase	-	100	-	30
G4 Staircase	-	100	-	30

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?
G0 Staircase	N/A	N/A
G0 Retail	NO (-34.4%)	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?	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]	137.5	137.5
External area [m^2]	316.1	316.1
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	5
Average conductance [W/K]	147.36	204.53
Average U-value [W/m^2K]	0.47	0.65
Alpha value* [%]	10	10

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

Building Use

% Area	Building Type
27	**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 Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
73	**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/m^2]

	Actual	Notional
Heating	6.69	10.87
Cooling	1.69	0.36
Auxiliary	1.56	0.81
Lighting	13.76	18.98
Hot water	0.33	0.36
Equipment*	13.56	13.56
TOTAL**	**24.03**	**31.38**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	101.39	103.74
Primary energy* [kWh/m^2]	73.77	93.24
Total emissions [kg/m^2]	12.5	15.8

* 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	144.7	120	12.8	7.1	5	3.14	4.73	3.37	6.66
	Notional	220.9	15.3	24	1.5	2.5	2.56	2.84	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	262.9	0	25.4	0	2.6	2.87	0	3.22	0
	Notional	320.9	0	34.9	0	1.5	2.56	0	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	249.7	0	22.4	0	2.6	3.1	0	3.47	0
	Notional	334.5	0	36.3	0	1.5	2.56	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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.16	G100002A:Surf[1]
Floor	0.2	0.12	G0000004:Surf[2]
Roof	0.15	0.12	G0000003:Surf[5]
Windows, roof windows, and rooflights	1.5	1.2	G0000006:Surf[1]
Personnel doors	1.5	2.2	G0000003:Surf[2]
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	1.2	G0000006: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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

West Central Street (Be Green)

As designed

Date: Fri Feb 26 09:13:11 2021

Administrative information

Building Details

Address: Address 1, City, Post Code

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: Neil Bajaj

Telephone number: 020 3514 3080

Address: Airport House Business Centre, Croydon, CR0 0XZ

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	19.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	19.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	14.9
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.21	0.33	G0000006:Surf[4]
Floor	0.25	0.21	0.21	G000000D:Surf[6]
Roof	0.25	0.12	0.12	G000000D:Surf[7]
Windows***, roof windows, and rooflights	2.2	1.08	1.6	G1000005:Surf[1]
Personnel doors	2.2	2.2	2.2	G0000022:Surf[2]
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

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

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- Residential Heat Pump

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.8	-	0.2	0	-
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					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.					

2- Retail Unit 10-12 MS Heat Pump

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.37	4.03	0	0	0.9
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.					

3- Retail Unit 16a Heat Pump

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.53	3.65	0	0	0.9
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- Retail Unit 317 NOS Heat Pump

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.34	3.3	0	0	0.9
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.					

5- Retail Unit 218 Heat Pump

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	4.56	5.78	0	0	0.9
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.					

1- DHW

	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
G0 Flexible GF Uses (Class E) 10-12 MS	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses (Class E) 16A	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses (Class E) 317	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Circulation	-	-	-	1.1	-	-	-	-	-	-	N/A
G0 Flexible GF Uses (Class E) 218	-	-	-	1.1	-	-	-	-	-	-	N/A
G-1 Flexible GF Uses (Class E) 317	-	-	-	1.1	-	-	-	-	-	-	N/A
G-1 Flexible GF Uses (Class E) 218	-	-	-	1.1	-	-	-	-	-	-	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	
G1 Cupd	-	100	-	22
G1 Cupd	-	100	-	4
G1 Lift Lobby	-	100	-	23
G1 Staircase	-	100	-	33
103 Cupd	-	100	-	11
G2 Cupd	-	100	-	18
G2 Cupd	-	100	-	4
G2 Lift Lobby	-	100	-	20
G2 Staircase	-	100	-	31
203 Cupd	-	100	-	11
G0 Flexible GF Uses (Class E) 10-12 MS	-	100	40	622
G0 Flexible GF Uses (Class E) 16A	-	100	40	826
G0 UKPN Substation	100	-	-	92
G0 Circulation	-	100	-	40
G0 Resi Circulation	-	100	-	27
G0 Flexible GF Uses (Class E) 317	-	100	40	532
G0 Corridor	-	100	-	53
G0 Resi Circulation	-	100	-	33
G2 Cupd	-	100	-	21

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
G2 Cupd	-	100	-	4
G2 Lift Lobby	-	100	-	22
G2 Staircase	-	100	-	33
203 Cupd	-	100	-	11
G2 Cupd	-	100	-	21
G2 Cupd	-	100	-	4
G2 Lift Lobby	-	100	-	22
G2 Staircase	-	100	-	33
203 Cupd	-	100	-	11
G1 Resi Staircase	-	100	-	32
G1 Resi Lobby	-	100	-	60
G2 Resi Staircase	-	100	-	29
G2 Resi Lobby	-	100	-	31
G3 Resi Staircase	-	100	-	29
G3 Resi Lobby	-	100	-	31
G3 Resi Staircase	-	100	-	29
G3 Resi Lobby	-	100	-	31
G-1 Basement Circulation	-	100	-	37
G-1 Basement Circulation	-	100	-	34
G-1 Basement Store	100	-	-	12
G-1 Basement Plant Room	100	-	-	406
G-1 Basement Cycle Store	100	-	-	86
G-1 Basement Circulation	-	100	-	82
G-1 Basement Plant Room	100	-	-	165
G-1 Basement Circulation	-	100	-	96
G-1 Basement Plant Room	100	-	-	448
G-1 Basement Plant Room	100	-	-	126
G-1 Basement Circulation	-	100	-	35
G0 Resi Lobby	-	100	-	44
G0 Riser	-	100	-	21
G0 Resi Circulation	-	100	-	47
G0 Circulation	-	100	40	201
G0 Circulation	-	100	-	29
G0 Flexible GF Uses (Class E) 218	-	100	40	2693
G0 Bin Store	100	-	-	37
G0 Cycle Store	100	-	-	23
G0 Circulation	100	-	-	10
G0 Resi Lobby	-	100	-	47
G-1 Flexible GF Uses (Class E) 317	-	100	40	651
G-1 Flexible GF Uses (Class E) 218	-	100	40	802

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?
G0 Flexible GF Uses (Class E) 10-12 MS	NO (-41.1%)	NO
G0 Flexible GF Uses (Class E) 16A	NO (-76.2%)	NO
G0 Resi Circulation	N/A	N/A
G0 Flexible GF Uses (Class E) 317	NO (-50.6%)	NO
G0 Resi Circulation	N/A	N/A
G0 Resi Lobby	NO (-51.1%)	NO
G0 Circulation	NO (-99.9%)	NO
G0 Flexible GF Uses (Class E) 218	NO (-29.5%)	NO
G0 Resi Lobby	NO (-86.8%)	NO
G-1 Flexible GF Uses (Class E) 317	N/A	N/A
G-1 Flexible GF Uses (Class E) 218	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]	1733	1733
External area [m^2]	2352.2	2352.2
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	648.25	916.33
Average U-value [W/m^2K]	0.28	0.39
Alpha value* [%]	10.05	10

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

Building Use

% Area	Building Type
80	**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 Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
20	**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/m^2]

	Actual	Notional
Heating	0.4	1.5
Cooling	7.41	8.28
Auxiliary	2.4	1.5
Lighting	17.91	27.61
Hot water	0.64	0.7
Equipment*	68.9	68.9
TOTAL**	**28.77**	**39.59**

* 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	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	112.94	126.76
Primary energy* [kWh/m^2]	88.32	117.18
Total emissions [kg/m^2]	14.9	19.9

* 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	0	275.5	0	16.2	3.4	3.29	4.73	3.53	6.66
	Notional	0	245.5	0	18	2	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	0	275.2	0	21	4.9	4.25	3.64	4.56	5.13
	Notional	0.3	315	0	23.1	2.9	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	25.4	267.5	2.2	15.7	5.2	3.14	4.73	3.37	6.66
	Notional	41.5	198.5	4.5	14.5	3.1	2.56	3.79	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	4	177.5	0.4	10.6	5.2	3.11	4.66	3.34	6.57
	Notional	4.7	207.7	0.5	15.2	3.1	2.56	3.79	----	----
[ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	34.9	0	2.3	0	2.6	4.28	0	4.8	0
	Notional	94.1	0	10.2	0	1.5	2.56	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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.16	G1000006:Surf[1]
Floor	0.2	0.21	G000000D:Surf[6]
Roof	0.15	0.12	G000000D:Surf[7]
Windows, roof windows, and rooflights	1.5	1	G000000D:Surf[0]
Personnel doors	1.5	2.2	G0000022:Surf[2]
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

$U_{i\text{-}Typ}$ = 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