

Project name

01 Baseline as BER - IMRI Wing (L2B)

As designed

Date: Fri Jan 25 14:33:03 2019

Administrative information

Building Details

Address: LONDON,

Owner Details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.4.b.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v5.4.0

BRUKL compliance check version: v5.4.b.0

Certifier details

Name: Levent Ulfet

Telephone number: 020 8150 8288

Address: The Enterprise Centre Cranborne Road, Potters Bar, EN6 3DQ

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

The building does not comply with England Building Regulations Part L 2013

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	98.2
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	98.2
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	145.6
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	0.28	0.28	Level 02 - Reception B2312_W_8
Floor	0.25	0.22	0.22	Level 02 - Reception B2312_S_3
Roof	0.25	0.22	0.22	Level 02 - Reception B2312_R_5
Windows***, roof windows, and rooflights	2.2	1.8	1.8	Level 02 - GAIT B2322_G_11
Personnel doors	2.2	1.8	1.8	Level 02 - GAIT B2322_D_8
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
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	>0.95

1- VRF System

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.55	-	-	-
Standard value	0.91*	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 gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- AHU 02 (via existing Boiler/CHP/Chiller)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.55	-	1.6	0.5
Standard value	0.91*	2.55	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

3- AHU 01 (via existing Boiler/CHP/Chiller)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	2.55	-	1.6	0.5
Standard value	0.91*	2.55	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

4- LST Radiators (via existing Boiler/CHP)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
Standard value	0.91*	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 gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

1- HWS from CHP

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	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	Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
Level 04 - Theatre & MRI B4321	-	-	-	-	-	-	-	-	-	-	N/A	
Level 04 - MRI Equipment B4304	-	-	-	-	-	-	-	-	-	-	N/A	
Level 04 - Corridor B4300	-	-	-	-	-	-	-	-	-	-	N/A	
Level 04 - IT Hub B4305	-	-	-	-	-	-	-	-	-	-	N/A	
Level 04 - UPS B4308	-	-	-	-	-	-	-	-	-	-	N/A	
Level 04 - LV Switch B4306	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Reception B2312	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - GAIT B2322	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Gym B2330	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Consult B2318	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Consult B2316	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Plaster Rm B2320	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - MRI B3322	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - Anaesthetic Rm B3320	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - Control Rm B3324	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - Theatre B3314	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - Prep Rm B3312	-	-	-	-	-	-	-	-	-	-	N/A	
Level 03 - Anaesthetic Rm B3318	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Corridor B2300	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - IT Hub B2302	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Disposal Rm B2304	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Changing B2306	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2309	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2310	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2310	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Corridor B2314	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - WC B2324	-	-	0.5	-	-	-	-	-	-	-	N/A	
Level 02 - Cleaners B2328	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2331	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2321	-	-	-	-	-	-	-	-	-	-	N/A	
Level 02 - Store B2317	-	-	-	-	-	-	-	-	-	-	N/A	

Zone name	SFP [W/(l/s)]									HR efficiency	
	A	B	C	D	E	F	G	H	I	Zone	Standard
ID of system type	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
Level 02 - WC B2326	-	-	0.5	-	-	-	-	-	-	-	N/A
Level 03 - Corridor B3308	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - Dirty Utility B3310	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - Corridor B3306	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - Stairway B3ST-06	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - Metal Check B3326	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - Sterile Store B3302	-	1.1	-	-	-	-	-	-	-	-	N/A
Level 03 - Corridor B3300	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - WC B3304	-	-	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value		60	60	22	
Level 04 - Theatre & MRI B4321		60	-	-	489
Level 04 - MRI Equipment B4304		60	-	-	58
Level 04 - Corridor B4300		-	60	-	79
Level 04 - IT Hub B4305		60	-	-	38
Level 04 - UPS B4308		60	-	-	53
Level 04 - LV Switch B4306		60	-	-	86
Level 02 - Reception B2312		-	60	22	493
Level 02 - GAIT B2322		-	60	-	349
Level 02 - Gym B2330		-	60	-	332
Level 02 - Consult B2318		-	60	-	266
Level 02 - Consult B2316		-	60	-	286
Level 02 - Plaster Rm B2320		-	60	-	291
Level 03 - MRI B3322		-	60	-	1673
Level 03 - Anaesthetic Rm B3320		-	60	-	629
Level 03 - Control Rm B3324		-	60	-	707
Level 03 - Theatre B3314		-	60	-	1673
Level 03 - Prep Rm B3312		-	60	-	563
Level 03 - Anaesthetic Rm B3318		-	60	-	648
Level 02 - Corridor B2300		-	60	-	81
Level 02 - IT Hub B2302		60	-	-	31
Level 02 - Disposal Rm B2304		60	-	-	46
Level 02 - Changing B2306		-	60	-	43
Level 02 - Store B2309		60	-	-	28
Level 02 - Store B2310		60	-	-	164
Level 02 - Store B2310		60	-	-	17
Level 02 - Corridor B2314		-	60	-	68
Level 02 - WC B2324		-	60	-	87
Level 02 - Cleaners B2328		60	-	-	63
Level 02 - Store B2331		60	-	-	91
Level 02 - Store B2321		60	-	-	62

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Level 02 - Store B2317		60	-	-	16
Level 02 - WC B2326		-	60	-	45
Level 03 - Corridor B3308		-	60	-	111
Level 03 - Dirty Utility B3310		60	-	-	84
Level 03 - Corridor B3306		-	60	-	86
Level 03 - Stairway B3ST-06		-	60	-	88
Level 03 - Metal Check B3326		-	60	-	520
Level 03 - Sterile Store B3302		60	-	-	144
Level 03 - Corridor B3300		-	60	-	95
Level 03 - WC B3304		-	60	-	62

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?
Level 02 - Reception B2312	N/A	N/A
Level 02 - GAIT B2322	NO (-79.1%)	NO
Level 02 - Gym B2330	NO (-81.6%)	NO
Level 02 - Consult B2318	NO (-60.3%)	NO
Level 02 - Consult B2316	NO (-39.5%)	NO
Level 02 - Plaster Rm B2320	NO (-65.8%)	NO
Level 03 - MRI B3322	N/A	N/A
Level 03 - Anaesthetic Rm B3320	N/A	N/A
Level 03 - Control Rm B3324	N/A	N/A
Level 03 - Theatre B3314	N/A	N/A
Level 03 - Prep Rm B3312	N/A	N/A
Level 03 - Anaesthetic Rm B3318	N/A	N/A
Level 03 - Metal Check B3326	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?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	880.7	880.7
External area [m ²]	2028.4	2028.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	606.99	648.42
Average U-value [W/m ² K]	0.3	0.32
Alpha value* [%]	57.69	10.49

* 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
	B8 Storage or Distribution
	C1 Hotels
89	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
11	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
1	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	65.72	48.64
Cooling	106.03	37.8
Auxiliary	83.46	68.8
Lighting	67.57	63.96
Hot water	6.29	6.29
Equipment*	248.18	248.18
TOTAL**	329.08	225.5

* 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]	815.37	737.95
Primary energy* [kWh/m ²]	857.31	577.57
Total emissions [kg/m ²]	145.6	98.2

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

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling									
Actual	102.8	4.4	0	0	0	0	0	0	0
Notional	62.5	16.7	0	0	0	0	0	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	261.6	226.5	85.7	34.7	0	0.85	1.81	0.91	2.55
Notional	216.8	347.8	73.5	26.8	0	0.82	3.6	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	99.7	2449	29	508.1	246	0.96	1.34	0.91	2.55
Notional	28.5	2110.4	9.7	162.8	170.5	0.82	3.6	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	551.1	1687.2	160.1	350	486.4	0.96	1.34	0.91	2.55
Notional	230.4	1439.7	78.2	111.1	432	0.82	3.6	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	218.6	195.9	74.8	0	4.7	0.81	0	0.91	0
Notional	194.1	282.4	65.8	0	4.9	0.82	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-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.28	Level 02 - Reception B2312_W_8
Floor	0.2	0.22	Level 02 - Reception B2312_S_3
Roof	0.15	0.22	Level 02 - Reception B2312_R_5
Windows, roof windows, and rooflights	1.5	1.8	Level 02 - GAIT B2322_G_11
Personnel doors	1.5	1.8	Level 02 - GAIT B2322_D_8
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
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