

## Project name

**IMRI Wing - BE CLEAN**

As designed

Date: Wed May 03 18:59:32 2017

## Administrative information

## Building Details

Address: LONDON,

## Certification tool

Calculation engine: SBEM

Calculation engine version: v5.3.a.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v5.0.3

BRUKL compliance check version: v5.3.a.0

## Owner Details

Name:

Telephone number:

Address: , ,

## Certifier details

Name: Levent Ulfet

Telephone number: 020 8150 8288

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

Criterion 1: The calculated CO<sub>2</sub> emission rate for the building must not exceed the target

CO <sub>2</sub> emission rate from the notional building, kgCO <sub>2</sub> /m <sup>2</sup> .annum	78.2
Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> .annum	78.2
Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> .annum	65.5
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 <sub>a</sub> -Limit	U <sub>a</sub> -Calc	U <sub>i</sub> -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	Level 03 - MRI B3322_W_5
Floor	0.25	0.15	0.15	Level 03 - MRI B3322_F_4
Roof	0.25	0.15	0.15	Level 03 - Prep Rm B3312_R_5
Windows***, roof windows, and rooflights	2.2	2.2	2.2	Level 03 - Control Rm B3324_G_6
Personnel doors	2.2	2.2	2.2	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 <sub>a</sub> -Limit = Limiting area-weighted average U-values [W/(m <sup>2</sup> K)] U <sub>a</sub> -Calc = Calculated area-weighted average U-values [W/(m <sup>2</sup> K)] U <sub>i</sub> -Calc = Calculated maximum individual element U-values [W/(m <sup>2</sup> 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 <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa	10	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	>0.95

### 1- AHU 02 (CHP & Chiller)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
<b>This system</b>	0.88	3.35	-	1.14	0.71
<b>Standard value</b>	0.91*	N/A	N/A	1.6^	0.5
<b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>					YES
* 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.					
^ Allowed SFP may be increased by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

### 2- AHU 01 (CHP & Chiller)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
<b>This system</b>	0.88	3.35	-	1.34	0.71
<b>Standard value</b>	0.91*	N/A	N/A	1.6^	0.5
<b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>					YES
* 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.					
^ Allowed SFP may be increased by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

### 3- LST Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
<b>This system</b>	0.88	-	-	-	-
<b>Standard value</b>	0.91*	N/A	N/A	N/A	N/A
<b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>					YES
* 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]
<b>This building</b>	Hot water provided by HVAC system	-
<b>Standard value</b>	N/A	N/A

### 1- CHP 1

	CHPQA quality index	CHP electrical efficiency
<b>This building</b>	110	0.78
<b>Standard value</b>	105	0.2

## 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		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Level 04 - Plant Rm B4312	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - Bunded Area	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - Corridor B4300	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - LV Switch B4306	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - MRI Equip B4310	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - UPS B4308	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - Generator B4304	-	-	-	-	-	-	-	-	-	-	N/A
Level 04 - Duct B4302	-	-	-	-	-	-	-	-	-	-	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 - Stairway B2308	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Reception B2312	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Consultant 01 B2316	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Store B2310	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Corridor B2314	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - GAIT B2322	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - WC B2324	-	-	0.5	-	-	-	-	-	-	-	N/A
Level 02 - Cleaners B2328	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Gym B2330	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Store B2331	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Consultant 02 B2318	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Plaster Rm B2320	-	-	-	-	-	-	-	-	-	-	N/A
Level 02 - Store B2321	-	-	-	-	-	-	-	-	-	-	N/A
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 - Corridor B3300	-	-	-	-	-	-	-	-	-	-	N/A
Level 03 - WC B3304	-	-	0.5	-	-	-	-	-	-	-	N/A
Level 03 - Store B3302	-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	<b>Standard value</b>	60	60	22	
Level 04 - Plant Rm B4312		100	-	-	264
Level 04 - Bunded Area		100	-	-	70
Level 04 - Corridor B4300		-	100	-	53
Level 04 - LV Switch B4306		100	-	-	60
Level 04 - MRI Equip B4310		100	-	-	50
Level 04 - UPS B4308		100	-	-	32
Level 04 - Generator B4304		100	-	-	50
Level 04 - Duct B4302		96	-	-	14
Level 03 - MRI B3322		-	60	-	1673
Level 03 - Anaesthetic Rm B3320		-	95	-	399
Level 03 - Control Rm B3324		-	95	-	448
Level 03 - Theatre B3314		-	95	-	1061
Level 03 - Prep Rm B3312		-	95	-	357
Level 03 - Anaesthetic Rm B3318		-	95	-	411
Level 02 - Corridor B2300		-	82	-	59
Level 02 - IT Hub B2302		106	-	-	18
Level 02 - Disposal Rm B2304		107	-	-	26
Level 02 - Changing B2306		-	106	-	24
Level 02 - Store B2309		96	-	-	17
Level 02 - Stairway B2308		-	82	-	77
Level 02 - Reception B2312		-	83	83	368
Level 02 - Consultant 01 B2316		-	107	-	152
Level 02 - Store B2310		96	-	-	14
Level 02 - Corridor B2314		-	82	-	50
Level 02 - GAIT B2322		-	83	-	252
Level 02 - WC B2324		-	86	-	61
Level 02 - Cleaners B2328		86	-	-	44
Level 02 - Gym B2330		-	83	-	480
Level 02 - Store B2331		107	-	-	51
Level 02 - Consultant 02 B2318		-	107	-	150
Level 02 - Plaster Rm B2320		107	-	-	49
Level 02 - Store B2321		86	-	-	43
Level 02 - WC B2326		-	86	-	32
Level 03 - Corridor B3308		-	66	-	100
Level 03 - Dirty Utility B3310		95	-	-	53
Level 03 - Corridor B3306		-	84	-	48
Level 03 - Stairway B3ST-06		-	86	-	61
Level 03 - Metal Check B3326		-	95	-	314
Level 03 - Corridor B3300		-	66	-	108
Level 03 - WC B3304		-	86	-	50
Level 03 - Store B3302		95	-	-	92

**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 03 - MRI B3322	N/A	N/A
Level 03 - Anaesthetic Rm B3320	N/A	N/A
Level 03 - Control Rm B3324	NO (-82.5%)	NO
Level 03 - Theatre B3314	N/A	N/A
Level 03 - Prep Rm B3312	NO (-71.7%)	NO
Level 03 - Anaesthetic Rm B3318	N/A	N/A
Level 02 - Reception B2312	NO (-80%)	NO
Level 02 - Consultant 01 B2316	NO (-44.8%)	NO
Level 02 - GAIT B2322	NO (-79.1%)	NO
Level 02 - Gym B2330	NO (-81.6%)	NO
Level 02 - Consultant 02 B2318	NO (-60.3%)	NO
Level 03 - Metal Check B3326	NO (-86.8%)	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**

<b>Were alternative energy systems considered and analysed as part of the design process?</b>	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 <sup>2</sup> ]	919	919
External area [m <sup>2</sup> ]	2208.1	2208.1
Weather	LON	LON
Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa]	5	3
Average conductance [W/K]	548.3	696.75
Average U-value [W/m <sup>2</sup> K]	0.25	0.32
Alpha value* [%]	72.22	9.68

\* 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
<b>99</b>	<b>C2 Residential Institutions: Hospitals and Care Homes</b>
	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
<b>1</b>	<b>Others: Miscellaneous 24hr activities</b>
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

## Energy Consumption by End Use [kWh/m<sup>2</sup>]

	Actual	Notional
Heating	54.98	49.01
Cooling	64.41	28.53
Auxiliary	44.45	49.13
Lighting	38.3	53.41
Hot water	6.51	5.91
Equipment*	251.72	251.72
<b>TOTAL**</b>	<b>165.78</b>	<b>186</b>

\* Energy used by equipment does not count towards the total for calculating emissions.

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

## Energy Production by Technology [kWh/m<sup>2</sup>]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	42.86	0
Solar thermal systems	0	0

## Energy & CO<sub>2</sub> Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m <sup>2</sup> ]	719.78	685.72
Primary energy* [kWh/m <sup>2</sup> ]	383.9	459.35
Total emissions [kg/m <sup>2</sup> ]	65.5	78.2

\* 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	
<b>[ST] No Heating or Cooling</b>										
<b>Actual</b>	106.2	2.1	0	0	0	0	0	0	0	
<b>Notional</b>	54.9	4.9	0	0	0	0	0	----	----	
<b>[ST] Constant volume system (fixed fresh air rate), [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity</b>										
<b>Actual</b>	2.5	2650	0.7	368.4	148.2	0.92	2	0.88	3.35	
<b>Notional</b>	32.8	2085.1	11.1	160.9	146.3	0.82	3.6	----	----	
<b>[ST] Constant volume system (fixed fresh air rate), [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity</b>										
<b>Actual</b>	20.9	1554.8	6.2	223.3	241.4	0.94	1.93	0.88	3.35	
<b>Notional</b>	246.3	1314.2	83.5	101.4	295.9	0.82	3.6	----	----	
<b>[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity</b>										
<b>Actual</b>	27.2	148.1	9.1	0	4.7	0.83	0	0.88	0	
<b>Notional</b>	213.4	291.1	72.4	0	3.2	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 <sub>i-Typ</sub>	U <sub>i-Min</sub>	Surface where the minimum value occurs*
Wall	0.23	0.15	Level 03 - MRI B3322_W_5
Floor	0.2	0.15	Level 03 - MRI B3322_F_4
Roof	0.15	0.15	Level 03 - Prep Rm B3312_R_5
Windows, roof windows, and rooflights	1.5	2.2	Level 03 - Control Rm B3324_G_6
Personnel doors	1.5	2.2	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 <sub>i-Typ</sub> = Typical individual element U-values [W/(m <sup>2</sup> K)]		U <sub>i-Min</sub> = Minimum individual element U-values [W/(m <sup>2</sup> K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa	5	5