BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Southwark Athletics Centre - Enhanced U-values

As designed

Date: Fri May 15 13:58:43 2020

Administrative information

Building Details

Address: Southwark Athletics Centre, Southwark, LONDON,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.0"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Andrew Parry

Telephone number: 01924 265757

Address: RCM Business Centres, Dewsbury Road, Ossett, Wakefield, WF5 9ND

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	168.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	168.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	154.1
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	0.22	0.22	External Wall
Floor	0.25	0.2	0.2	Ground Floor
Roof	0.25	0.15	0.15	Roof
Windows***, roof windows, and rooflights	2.2	1.41	1.5	Changing Room Windows - Glazing
Personnel doors	2.2	2.02	2.02	Solid Door - Door
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	1.41	1.41	Glazed Door - Door

$U_{a\text{-}Limit}$ = 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	4

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 with Mech. Vent (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	6.5	-	1.9	0.75
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					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

2- Nat. Vent. underfloor Heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.98	-	-	-	-
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					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.					

3- Mech. Vent. Electric Heating (19 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	0.95	0.75
Standard value	N/A	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

4- Mech. Vent with Under Floor Heating (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.98	-	-	1.9	0.75
Standard value	0.91*	N/A	N/A	N/A	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for 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- ECOflo 388/1220

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.97	0
Standard value	0.9*	N/A
* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

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
Changing Room 1 - Changing 1	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 2 - Changing 2	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 3 - Changing 3	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 4 - Changing 4	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 1 Showers - Toilet 1	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 1 WC - Toilet 2	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 1 DDA WC - Toilet 3	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 2 Shower - Toilet 4	-	-	-	1	-	-	-	-	-	-	N/A
Chnaging Room 2 WC - Toilet 5	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 2 DDA WC - Toilet 6	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 3 Shower - Toilet 7	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 3 WC - Toilet 8	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 4 DDA WC - Toilet 9	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 3 DDA WC - Toilet 10	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 4 Shower - Toilet 11	-	-	-	1	-	-	-	-	-	-	N/A
Changing Room 4 WC - Toilet 12	-	-	-	1	-	-	-	-	-	-	N/A
Studio / Meeting Room - FitStud 1	-	-	-	1.9	-	-	-	-	-	-	N/A
Training Room - FitStud 2	-	-	-	1.9	-	-	-	-	-	-	N/A
Cleaners Store - Store 1	-	-	-	1	-	-	-	-	-	-	N/A
Studio Store - Store 2	-	-	-	1	-	-	-	-	-	-	N/A
Office - Office 1	-	-	-	1.9	-	-	-	-	-	-	N/A
Physio / First Aid - Office 2	-	-	-	1.9	-	-	-	-	-	-	N/A
Accessible WC - Toilet 13	-	-	-	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	
Changing Room 1 - Changing 1	-	90	-	49
Changing Room 2 - Changing 2	-	90	-	50
Changing Room 3 - Changing 3	-	90	-	49
Changing Room 4 - Changing 4	-	90	-	49
Changing Room 1 Showers - Toilet 1	-	90	-	46
Changing Room 1 WC - Toilet 2	-	90	-	22
Changing Room 1 DDA WC - Toilet 3	-	90	-	23
Changing Room 2 Shower - Toilet 4	-	90	-	45
Chnaging Room 2 WC - Toilet 5	-	90	-	22
Changing Room 2 DDA WC - Toilet 6	-	90	-	23
Changing Room 3 Shower - Toilet 7	-	90	-	44
Changing Room 3 WC - Toilet 8	-	90	-	22
Changing Room 4 DDA WC - Toilet 9	-	90	-	22
Changing Room 3 DDA WC - Toilet 10	-	90	-	23
Changing Room 4 Shower - Toilet 11	-	90	-	45
Changing Room 4 WC - Toilet 12	-	90	-	23

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Studio / Meeting Room - FitStud 1	-	90	-	212
Training Room - FitStud 2	-	90	-	494
Cleaners Store - Store 1	90	-	-	6
Studio Store - Store 2	90	-	-	10
Office - Office 1	90	-	-	76
Physio / First Aid - Office 2	90	-	-	82
Accessible WC - Toilet 13	-	90	-	37
Canteen / Reception - EatDrink 1	-	90	-	282
Plant Room - Plant 1	90	-	-	59

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?
Studio / Meeting Room - FitStud 1	NO (-69%)	NO
Training Room - FitStud 2	NO (-52%)	NO
Office - Office 1	N/A	N/A
Physio / First Aid - Office 2	N/A	N/A
Canteen / Reception - EatDrink 1	NO (-52%)	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]	604	604
External area [m^2]	1587	1587
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	4	3
Average conductance [W/K]	415	477
Average U-value [W/m^2K]	0.26	0.3
Alpha value* [%]	4.83	4.83

* 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
	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
100	**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	4.37	5.38
Cooling	0.62	1.48
Auxiliary	13.83	12.18
Lighting	11.81	15.24
Hot water	644.31	708.07
Equipment*	33.89	33.89
TOTAL**	**674.94**	**742.35**

* 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]	32.15	38.66
Primary energy* [kWh/m^2]	873.86	957.35
Total emissions [kg/m^2]	154.1	168.9

* 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	0.7	33.3	0.1	1.4	25.4	4	6.5	4	6.5
	Notional	1.1	43.8	0.1	3.4	18.9	2.43	3.6	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	68.1	0	19.6	0	0.8	0.96	0	0.98	0
	Notional	75.2	0	25.5	0	0.8	0.82	0	----	----
[ST] Central heating using air distribution, [HS] Air heater, [HFT] Electricity, [CFT] Electricity										
	Actual	11.1	0	3.1	0	7.5	1	0	1	0
	Notional	6.4	0	2.2	0	11.6	0.82	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	23.3	0	6.7	0	11.9	0.96	0	0.98	0
	Notional	31	0	10.5	0	11	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.22	External Wall
Floor	0.2	0.2	Ground Floor
Roof	0.15	0.15	Roof
Windows, roof windows, and rooflights	1.5	1.41	Main Window - Glazing
Personnel doors	1.5	2.02	Solid Door - Door
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	1.41	Glazed Door - Door

$U_{i\text{-}Typ}$ = 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	4