BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Warehouse

As built

Date: Fri Nov 24 18:14:52 2023

Administrative information

Building Details

Address: SARACO INDUSTRIES LTD, UNIT B, EGERTON STREET, FARNWORTH, BOLTON, BL4 7ER

Certifier details

Name: Richard Lee

Telephone number: 07875753571

Address: 11 Windermere Avenue, Poulton-Le-Fylde, FY6 8FS

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: iSBEM

Interface to calculation engine version: v6.1.e

BRUKL compliance module version: v6.1.e.0

Foundation area [m^2]: 316.5

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	4.11	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	3.58	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	43.42	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	36.44	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.3	0.5	Z12/1 Tea Bew Area/sei
Floors	0.18	0.27	0.36	Z5/0 Toilets/f
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.2	0.2	Z6/1 Landing/c
Windows** and roof windows	1.6	1.6	1.6	Z1/0 Entrance Area/s/g
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	Z16/Door/e
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

* 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. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	8

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Electric (Room Heater)

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

2- AC (Open Plan)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.4	6.8	-	-	-
Standard value	2.5*	5	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.					

3- AC (Office 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.1	6.5	-	-	-
Standard value	2.5*	5	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.					

4- AC (Office 2)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.2	6.1	-	-	-
Standard value	2.5*	5	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.					

5- AC (Meeting Room)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.6	6.8	-	-	-
Standard value	2.5*	5	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.					

6- AC (Managers Office)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.7	8	-	-	-
Standard value	2.5*	5	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.					

7- AC (Office Units)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.4	6.2	-	-	-
Standard value	2.5*	5	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.					

8- AC (Waiting Area)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.8	8.1	-	-	-
Standard value	2.5*	5	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.					

9- AC (Canteen)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.4	6.8	-	-	-
Standard value	2.5*	5	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.					

10- AC (Prayer Room)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.7	8	-	-	-
Standard value	2.5*	5	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.					

1- HWS - 15L SA

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.024
Standard value	1	N/A

2- HWS - POU

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

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
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 balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Z5/0 Toilets	0.3	-	-	-	-	-	-	-	-	-	N/A
Z11/1 Shower	0.3	-	-	-	-	-	-	-	-	-	N/A
Z15/0 Toilets & Shower	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
Z13/0 Warehouse Lobby	130	-	-
Z18/0 Warehouse	140	-	-
Z1/0 Entrance Area	130	100	1.35
Z5/0 Toilets	130	-	-
Z6/1 Landing	130	-	-
Z11/1 Shower	130	-	-
Z12/1 Tea Bew Area	130	-	-
Z14/0 Lobby Area	130	-	-
Z15/0 Toilets & Shower	130	-	-
Z2/0 Open Plan Office	130	-	-
Z3/0 Office 1	130	-	-
Z4/0 Office 2	130	-	-
Z7/1 Meeting Room	130	-	-
Z8/1 Managers Office	130	-	-
Z9/1 Office Units	130	-	-
Z10/1 Waiting Area	130	100	1.35
Z16/0 Canteen	130	-	-
Z17/0 Prayer Rooms	130	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Z18/0 Warehouse	NO (-0.4%)	YES
Z1/0 Entrance Area	YES (+78.2%)	YES
Z12/1 Tea Bew Area	N/A	N/A
Z2/0 Open Plan Office	NO (-61.4%)	NO
Z3/0 Office 1	N/A	N/A
Z4/0 Office 2	N/A	N/A
Z7/1 Meeting Room	NO (-4.8%)	NO
Z8/1 Managers Office	NO (-4.5%)	NO
Z9/1 Office Units	N/A	N/A
Z10/1 Waiting Area	N/A	N/A
Z16/0 Canteen	NO (-81.4%)	NO
Z17/0 Prayer Rooms	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	1728	1728
External area [m^2]	4392.7	4392.7
Weather	MAN	MAN
Infiltration [m^3/hm^2@ 50Pa]	8	5
Average conductance [W/K]	1377.51	1421.2
Average U-value [W/m^2K]	0.31	0.32
Alpha value* [%]	41.66	55.95

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
99	**General Industrial and Special Industrial Groups**
	Storage or Distribution
1	**Hotels**
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	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	17.65	13.92
Cooling	1.85	1.74
Auxiliary	0.46	0.61
Lighting	8.79	6.44
Hot water	13.97	13.73
Equipment*	33.39	33.39
TOTAL**	**42.72**	**36.44**

* 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	19.57	7.35
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*19.57*	*7.35*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	306.41	293.91
Primary energy [kWh_{PE}/m^2]	36.44	43.42
Total emissions [kg/m^2]	3.58	4.11

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] No Heating or Cooling										
	Actual	206.1	62.8	0	0	0	0	0	0	0
	Notional	199	62.3	0	0	0	0	0	----	----
[ST] Other local room heater - unfanned, [HS] Room heater, [HFT] Electricity, [CFT] Electricity										
	Actual	480.4	165.4	166.8	0	5.3	0.8	0	1	0
	Notional	454.8	80.3	94.3	0	7	1.34	0	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	132.8	143.8	9	8.3	0	4.1	4.83	4.4	6.8
	Notional	226.5	80.6	23.8	5.1	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	96.5	92.3	7	5.6	0	3.82	4.62	4.1	6.5
	Notional	59.1	133.3	6.2	8.4	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	157.7	55	11.2	3.5	0	3.91	4.33	4.2	6.1
	Notional	76.4	115	8	7.3	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	222.4	217.1	14.4	12.5	0	4.29	4.83	4.6	6.8
	Notional	229.6	145.5	24.2	9.2	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	192.9	215.6	12.2	10.5	0	4.38	5.68	4.7	8
	Notional	205.7	143	21.6	9	0	2.64	4.4	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	207	124.1	14	7.8	0	4.1	4.4	4.4	6.2
	Notional	104.5	144	11	9.1	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	71.6	74.7	4.4	3.6	0	4.47	5.75	4.8	8.1
	Notional	43	75.9	4.5	4.8	0	2.64	4.4	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	193.5	20	13.1	1.2	0	4.1	4.83	4.4	6.8
	Notional	230.4	45.6	24.2	2.9	0	2.64	4.4	----	----
[ST] Single room cooling system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	271.6	84.5	17.2	4.1	0	4.38	5.68	4.7	8
	Notional	335.1	125	35.3	7.9	0	2.64	4.4	----	----

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