BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

BARKAT

As designed

Date: Tue Jan 17 12:29:53 2023

Administrative information

Building Details

Address:

Certifier details

Name: Neil Ingham

Telephone number:

Address: Holborn Tower, London,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.d.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.1.3

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

Foundation area [m²]: 432.79

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.99	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.75	
Target primary energy rate (TPER), $kWh/m^2.annum$	31.61	
Building primary energy rate (BPER), $kWh/m^2.annum$	29.24	
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	0.15	0.15	Block 1 - STORE_W_8
Floors	0.18	0.14	0.14	Block 1 - STORE_F_3
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	Block 5 - CIRCULATION_R_5
Windows** and roof windows	1.6	1.4	1.4	Block 1 - OFFICE_G_7
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
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/(m²K)]

$U_{i\text{-Calc}}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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
m³/(h.m²) at 50 Pa	8	3

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	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.7	-	-	-	-
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					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- 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
Block 1 - SHOWER	-	-	0.4	-	-	-	-	-	-	-	N/A
Block 1 - WC	-	-	0.4	-	-	-	-	-	-	-	N/A
Block 2 - WC	-	-	0.4	-	-	-	-	-	-	-	N/A
Block 5 - WC	-	-	0.4	-	-	-	-	-	-	-	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
Block 1 - PLANT	120	-	-
Block 1 - STORE	120	-	-
Block 1 - OFFICE	140	-	-
Block 1 - CORE 1	120	-	-
Block 1 - CIRCULATION	120	-	-
Block 1 - CORE	120	-	-

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
Block 1 - CYCLE STORE	140	-	-
Block 1 - SHOWER	100	-	-
Block 1 - WC	100	-	-
Block 2 - WC	100	-	-
Block 2 - CORE 1	120	-	-
Block 2 - CIRCULATION	120	-	-
Block 2 - CORE	120	-	-
Block 2 - OFFICE	140	-	-
Block 2 - STORE	120	-	-
Block 5 - WC	100	-	-
Block 5 - CORE 1	120	-	-
Block 5 - CIRCULATION	120	-	-
Block 5 - OFFICE	140	-	-
Block 5 - STORE	120	-	-
Block 4 - STORE	120	-	-
Block 4 - OFFICE 1	140	-	-
Block 4 - CORE 1	120	-	-
Block 4 - CIRCULATION	120	-	-
Block 4 - CORE	120	-	-
Block 4 - OFFICE	140	-	-

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?
Block 1 - OFFICE	YES (+28.1%)	NO
Block 2 - OFFICE	YES (+65.3%)	NO
Block 5 - OFFICE	YES (+108.9%)	NO
Block 4 - OFFICE 1	YES (+12.1%)	NO
Block 4 - OFFICE	YES (+58.1%)	NO

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 [m²]	439.8	439.8
External area [m²]	543.4	543.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	194.1	230.75
Average U-value [W/m²K]	0.36	0.42
Alpha value* [%]	22.04	25.42

* 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
100	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	Storage or Distribution
	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/m²]

	Actual	Notional
Heating	6.07	7.64
Cooling	0	0
Auxiliary	1.83	1.75
Lighting	6.94	7.48
Hot water	4.22	4.22
Equipment*	31.42	31.42
TOTAL**	**19.05**	**21.09**

* 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	215.04	156.76
Primary energy [kWh/m²]	29.24	31.61
Total emissions [kg/m²]	2.76	2.99

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	0	830	0	0	0	0	0	0	0
	Notional	0	839.9	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Natural Gas										
	Actual	56.2	149	6.2	0	1.9	2.53	0	2.7	0
	Notional	73.7	72	7.8	0	1.8	2.64	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

DER WORKSHEET

Dwelling Reference: 23178
Dwelling Type: New Extension
NW3 5HT

1. Overall dwelling dimensions

	Area(m²)		Av. Height(m)		Volume(m³)	
Ground Floor	70.66 (1a)	x	2.7	(2a) =	190.78	(3a)
First Floor	70.66 (1b)	x	2.9	(2b) =	204.91	(3b)
Total floor area TFA					141.32	(4)
Dwelling volume					395.7	(5)

2. Ventilation Rate

Chimneys/Flues	0	x	80 =	0	(6a)
Open chimneys	0	x	20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x	10 =	0	(6c)
Flues attached to solid fuel boiler	0	x	20 =	0	(6d)
Flues attached to other heater	0	x	35 =	0	(6e)
Number of blocked chimneys	0	x	20 =	0	(6f)
Number of intermittent extract fans	6	x	10 =	60	(7a)
Number of passive vents	0	x	10 =	0	(7b)
Number of flueless gas fires	0	x	40 =	0	(7c)

	Air changes per hour		
Number of storeys in the dwelling (ns)	0.15	0.15	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc	0	0	(9)
Additional infiltration	0	0	(10)
Structural infiltration	0	0	(11)
Suspended wooden ground floor	0	0	(12)
No draught lobby	0	0	(13)
Percentage of windows and doors draught proofed	0	0	(14)
Window infiltration	0	0	(15)
Infiltration rate	0	0	(16)
Air permeability value, AP50, (m³/h/m²)	5	5	(17)
Air permeability value, AP4, (m³/h/m²)	0	0	(17a)
Air permeability value)	0.4	0.4	(18)
Number of sides on which dwelling is sheltered	0	0	(19)
Shelter factor		1	(20)
Infiltration rate incorporating shelter factor		0.4	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Monthly average wind speed from Table U2	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind Factor	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)	0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47	5.27	(22b)

Calculate effective air change rate for the applicable case:

	0	(23a)
	0	(23b)
	0	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR)	0	0	0	0	0	0	0	0	0	0	0	0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV)	0	0	0	0	0	0	0	0	0	0	0	0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside	0	0	0	0	0	0	0	0	0	0	0	0	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	(24d)
Effective air change rate	0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	(25)
Effective air change rate from PCDB:	0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k -value

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²	U-value W/m2K	A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Solid door							0	(26)
Semi-glazed door							0	(26a)
Window							44.51	(27)
Roof window							0	(27a)
Basement floor				0			0	(28)
Ground floor				0			0	(28a)
Exposed floor				1413.2			4.95	(28b)
Basement wall				0			0	(29)
External wall				1141.28			11.76	(29a)
Roof				635.94			8.48	(30)
Total area of external elements ∑A, m²							265.08	(31)

Party Wall	0	(32)
Party floor	0	(32a)
Party ceiling	0	(32b)
Internal wall **	0	(33c)
Internal floor	0	(32d)
Internal ceiling floor	0	(32e)
Fabric heat loss, W/K = ∑ (A x U)	69.69	(33)
Heat capacity Cm = ∑(A x k)	5075.62	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	250	(35)
Linear Thermal bridges: ∑ (L x Ψ) calculated using Appendix K	0	(36)
Point Thermal bridges: ∑χ (W/K) if significant point thermal bridge present and values available	0	(36a)
Total fabric heat loss H = ∑(A × U) + ∑(L × Ψ) +∑χ	69.69	(37)

Ventilation heat loss calculated monthly

82.41	81.75	81.09	78.03	77.46	74.79	74.79	74.3	75.82	77.46	78.62	79.83		(38)

Heat transfer coefficient, W/K

152.1	151.43	150.78	147.72	147.15	144.48	144.48	143.99	145.51	147.15	148.31	149.52		(39)

Heat loss parameter (HLP), W/m²K

1.08	1.07	1.07	1.05	1.04	1.02	1.02	1.02	1.03	1.04	1.05	1.06		(40)

Number of days in month (Table 1a)

31	28	31	30	31	30	31	31	30	31	30	31		(41)

4. Water heating energy requirement

Assumed occupancy, N	2.92	(42)

Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)

73.17	72.07	70.47	67.4	65.14	62.62	61.18	62.77	64.52	67.23	70.36	72.89		(42a)

Hot water usage in litres per day for baths, Vd,bath (from Appendix J)

31.59	31.12	30.46	29.24	28.33	27.32	26.77	27.43	28.14	29.22	30.47	31.48		(42b)

Hot water usage in litres per day for other uses, Vd,other (from Appendix J)

44.53	42.91	41.29	39.67	38.05	36.43	36.43	38.05	39.67	41.29	42.91	44.53		(42c)

Annual average hot water usage in litres per day Vd,average (from Appendix J)	137.42	(43)

Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)

149.29	146.1	142.22	136.32	131.52	126.37	124.39	128.25	132.33	137.74	143.73	148.9	1647.17	(44)

Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)

236.44	208.05	218.59	186.61	177.05	155.38	150.44	158.8	163.18	186.91	204.78	233.15	2279.37	(45)

Distribution loss (46) = 0.15 x (45)

35.47	31.21	32.79	27.99	26.56	23.31	22.57	23.82	24.48	28.04	30.72	34.97		(46)

Storage volume (litres) including any solar or WWHRS storage within same vessel	1.1	(47)
Water storage loss (or HIU loss)		
a) If manufacturer's declared loss factor is known (kWh/day):	0.54	(48)
Temperature factor from Table 2b	0.54	(49)

Energy lost from water storage, kWh/day (48) x (49) =	0.65	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.59	(55)

Water storage (or HIU) loss calculated for each month (56) = (55) × (41)

18.41	16.63	18.41	17.82	18.41	17.82	18.41	18.41	17.82	18.41	17.82	18.41	(56)

If the vessel contains dedicated solar storage or dedicated WWHRS storage,

(57)m = (56)m ▯ [(47) – Vs] ÷ (47), else (57)m = (56)m

where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).

18.41	16.63	18.41	17.82	18.41	17.82	18.41	18.41	17.82	18.41	17.82	18.41	(57)

Primary circuit loss for each month from Table 3

modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only heat networks)

23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)

Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)

-40.13	-36.25	-40.13	-38.84	-40.13	-38.84	-40.13	-40.13	-38.84	-40.13	-38.84	-40.13	(61)

Total heat required for water heating calculated for each month (62) = 0.85 × (45) + (46) + (57) + (59) + (61)

237.98	209.44	220.13	188.11	178.6	156.88	151.98	160.35	164.67	188.46	206.27	234.69	2297.58	(62)

CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)

65.2	57.66	60.38	50	46.6	39.87	37.37	39.74	41.25	48.63	55.1	63.99	(63a)

PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)

0	0	0	0	0	0	0	0	0	0	0	0	(63b)

Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)

0	0	0	0	0	0	0	0	0	0	0	0	(63c)

FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)

37.01	31.96	32.37	26.43	13.39	6.53	6.39	6.73	6.88	27.18	31.35	36.65	(63d)

Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)

135.77	119.82	127.38	111.68	118.61	110.48	108.21	113.88	116.54	112.65	119.83	134.05	1428.89	(64)

Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)

0	0	0	0	0	0	0	0	0	0	0	0	(64a)

Heat gains from water heating, kWh/month 0.25 x [0.85 × (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]

101.92	90.23	95.99	84.6	82.18	74.22	73.33	76.11	76.81	85.46	90.64	100.83	(65)

include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network

5. Internal gains (see Tables 5 and 5a)

Metabolic gains (Table 5), watts

145.98	145.98	145.98	145.98	145.98	145.98	145.98	145.98	145.98	145.98	145.98	145.98	(66)

Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

156.82	173.62	156.82	162.04	156.82	162.04	156.82	156.82	162.04	156.82	162.04	156.82	(67)

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5

310.91	314.13	306	288.7	266.85	246.31	232.6	229.37	237.5	254.81	276.66	297.19	(68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	37.6	(69)

Pumps and fans gains (Table 5a)

3	3	3	3	3	0	0	0	0	3	3	3	(70)

Losses e.g. evaporation (negative values) (Table 5

-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	-116.78	(71)

Water heating gains (Table 5)

137	134.27	129.02	117.51	110.46	103.09	98.56	102.3	106.68	114.86	125.9	135.52	(72)

Total internal gains

674.51	691.82	661.63	638.04	603.91	578.24	554.77	555.28	573.02	596.28	634.39	659.32	(73)

6. Solar gains

Solar gains in watts, calculated for each month

115.6	235.3	423.94	696.23	935.87	997.73	933.36	744.09	516.58	287.56	145.45	94.4	(83)

Total gains – internal and solar (watts)

790.11	927.12	1085.57	1334.27	1539.78	1575.97	1488.13	1299.37	1089.6	883.84	779.84	753.73	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, 1,m (see Table 9a)

1	1	0.99	0.94	0.79	0.57	0.42	0.5	0.81	0.98	1	1	(86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

19.93	20.07	20.3	20.63	20.86	20.93	20.94	20.94	20.87	20.56	20.2	19.92	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

20.02	20.02	20.03	20.05	20.05	20.06	20.06	20.07	20.06	20.05	20.04	20.04	(88)

Roof Utilisation factor for gains for rest of dwelling, 2,m (see Table 9a)

1	1	0.98	0.92	0.74	0.5	0.34	0.4	0.74	0.97	1	1	(89)

Roof Mean internal temperature in the rest of dwelling T2

18.76	18.94	19.23	19.66	19.91	19.99	19.99	19.99	19.94	19.58	19.12	18.76	(90)

Living area fraction 0.27 (91)

Mean internal temperature (for the whole dwelling)

19.07	19.24	19.52	19.92	20.16	20.24	20.24	20.25	20.19	19.84	19.41	19.07	(92)

Adjusted mean internal temperature:

18.92	19.09	19.37	19.77	20.01	20.09	20.09	20.1	20.04	19.69	19.26	18.92	(93)

8. Space heating requirement

Utilisation factor for gains,

1	0.99	0.98	0.91	0.73	0.5	0.34	0.41	0.73	0.96	0.99	1	(94)

Useful gains, mGm , W

788	921.06	1063.47	1215.6	1129.88	783.9	504.04	529.85	799.62	850.07	775.07	752.16	(95)

Monthly average external temperature from Table U1

4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	(96)

Heat loss rate for mean internal temperature

2223.81	2148.37	1939.94	1605.37	1222.49	792.83	504.88	532.08	863.74	1337.19	1802.74	2201.04	(97)

Space heating requirement for each month

1068.24	824.75	652.1	280.64	68.91	0	0	0	0	362.42	739.93	1077.96	(98a)

Solar space heating calculated using Appendix H (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	(98b)

Space heating requirement for each month after solar contribution

1068.24	824.75	652.1	280.64	68.91	0	0	0	0	362.42	739.93	1077.96	(98c)

Space heating requirement in kWh/m²/year 35.91 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)

Space cooling requirement for month, whole dwelling, continuous (kWh) (104)

0	0	0	0	0	0	0	0	0	0	0	0	(104)

Cooled fraction 0 (105)

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)

Space cooling requirement for month 0 0

0	0	0	0	0	0	0	0	0	0	0	0	(107)

Space cooling requirement in kWh/m²/year 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency, 0 0 (109)

9a. Energy requirements – Individual heating systems including micro-CHP

Fraction of space heat from secondary/supplementary system,								0					0	(201)
Fraction of space heat from main system(s),													1	(202)
Fraction of main heating from main system 2,													0	(203)
Fraction of total space heat from main system 1,													1	(204)
Fraction of total space heat from main system 2,													0	(205)
Efficiency of main space heating system 1 (in %),													84.9	(206)
Efficiency of main space heating system 2 (in %),													0	(207)
Efficiency of secondary/supplementary heating system, %,													0	(208)
Cooling System Seasonal Energy Efficiency Ratio,								0					0	(209)
Space heating requirement (calculated above),														
0	0	0	0	0	0	0	0	0	0	0	0			(210)
Space heating fuel (main heating system 1), kWh/month								0					0	
1258.24	971.44	768.08	330.55	81.16	0	0	0	0	426.87	871.53	1269.68			(211)
Space heating fuel (main heating system 2), kWh/month								0					0	
0	0	0	0	0	0	0	0	0	0	0	0			(213)
Space heating fuel (secondary), kWh/month								0					0	
0	0	0	0	0	0	0	0	0	0	0	0			(215)
Output from water heater),								0					74.8	(216)
Efficiency of water heater														
83.63	83.47	83.07	81.76	78.22	74.8	74.8	74.8	74.8	82.27	83.33	83.65			(217)
Fuel for water heating														
162.35	143.54	153.34	136.6	151.64	147.7	144.67	152.25	155.8	136.93	143.79	160.24		1788.87	(219)
Space Cooling														
0	0	0	0	0	0	0	0	0	0	0	0			(221)
Annual totals								kWh/year	kWh/year					
Space heating fuel used, main system 1													5977.56	(211)
Space heating fuel used, main system 2													0	(213)
Space heating fuel used, secondary													0	(215)
Water heating fuel used													1788.87	(219)
Electricity for instantaneous electric shower(s)													0	(64a)
Space cooling fuel used													0	(221)
Electricity for pumps, fans and electric keep-hot														
Mechanical vent fans - balanced, extract or positive input from outside								0	0				0	(230a)
warm air heating system fans													0	(230b)
Heating circulation pump or water pump within warm air heating unit													41	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)													0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)													45	(230e)
Maintaining electric keep-hot facility for gas combi boiler													0	(230f)
Pump for solar water heating													0	(230g)
Pump for storage WWHRS													0	(230h)
Total electricity for the above													86	(231)
Electricity for lighting													322.29	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>	Fuel	kWh/year		
energy saved			0	(236a)
energy used			0	(237a)
Total delivered energy for all uses			8174.72	

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		217.58	(240a)
Low-rate fraction	0		217.58	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		217.58	(241a)
Low-rate fraction	0		217.58	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		217.58	(242a)

Low-rate fraction	0		217.58	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Space heating - secondary cost (other fuel)	0		0	(242e)
Water heating (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		0	(243)
Low-rate fraction	0		0	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Water heating cost (other fuel)	0		65.11	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247)				
Energy For instantaneous electric shower(s)	0		0	(247a)
Space cooling	0		0	(248)
Pumps, fans And electric keep-hot	0		14.18	(249)
Energy For lighting	0		53.15	(250)
Additional standing charges	0		92	(251)
Energy saving/generation technologies	0		0	(252)
Appendix Q, <item 1 description>	Fuel	kWh/year		
energy saved Or generated	0		0	(253)
energy used	0		0	(254)
Total energy cost	0		442.03	(255)
11a. SAP rating – Individual heating systems including micro-CHP				
Energy cost deflator	0		0	(256)
Energy cost factor (ECF)	0		0	(257)
SAP rating	0		0	(258)

11a. SAP rating – Individual heating systems including micro-CHP

Energy cost deflator	0.36	(256)
Energy cost factor (ECF)	0.85	(257)
SAP rating	86.16	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissions kg CO2/year	
Space heating - main system 1			1255.29	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			248.74	(264)
Energy for instantaneous electric shower(s)			0	(264a)

Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		11.93	(267)
Electricity for lighting		46.52	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		1562.47	(272)
Dwelling CO2 Emission Rate		11.06	(273)
EI rating		89	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy KWh/year	Emission factor kg	Emissionsr kg CO2/year	
Space heating - main system 1			6754.64	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			2708.39	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			130.1	(281)
Electricity for lighting			494.35	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			10087.47	(286)
Dwelling PE Rate			71.38	(287)