



elmhurst  
energy



## SAP Report Submission for Building Regulations Compliance

Client:

Project: Abbey Road Retail Park  
Barking

Contact: Heidi Pateman  
Heidi Pateman  
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Report Issue Date: 24/02/2022

EXCELLENCE  
IN ENERGY  
ASSESSMENT

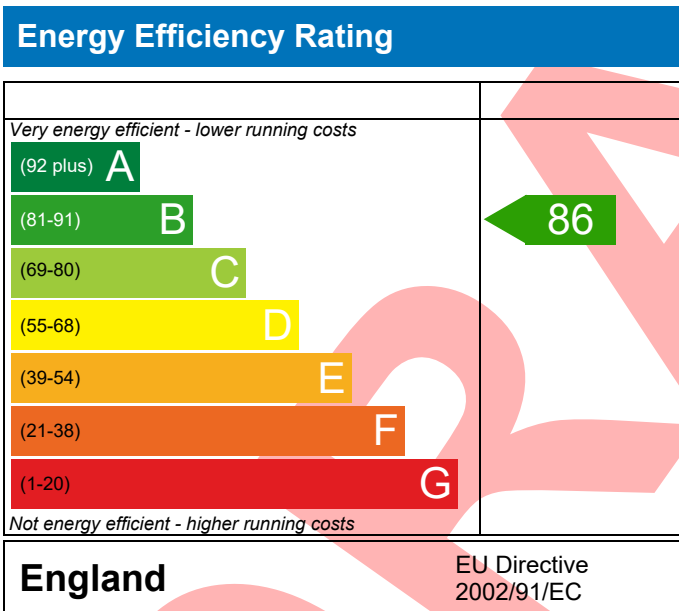
# PREDICTED ENERGY ASSESSMENT

Abbey Road Retail Park,  
Barking

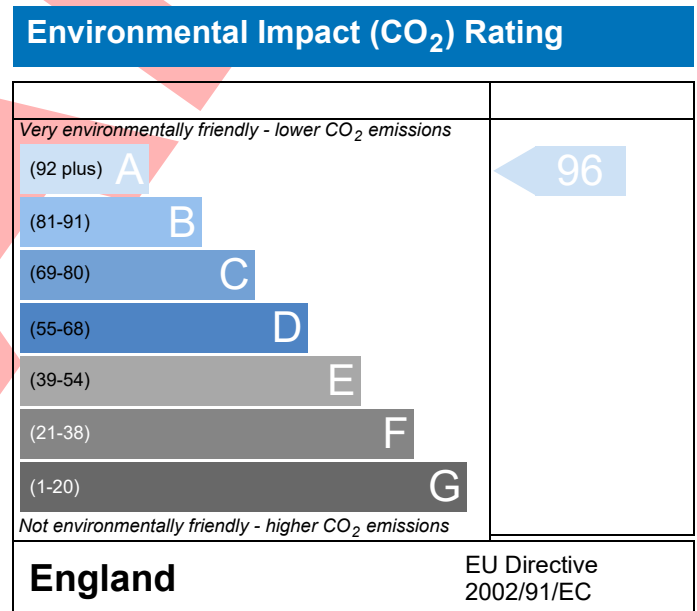
Dwelling type: Flat, Mid-Terrace  
Date of assessment: 24/02/2022  
Produced by: Heidi Pateman  
Total floor area: 54.74 m<sup>2</sup>

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO<sub>2</sub>) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)

Property Reference	WH190 Plot 370		Issued on Date	24/02/2022	
Assessment Reference	Plot 370	Prop Type Ref	Flat Type B1N-10		
Property	Abbey Road Retail Park, Barking				
SAP Rating	86 B	DER	7.23	TER	14.78
Environmental	96 A	% DER<TER	51.08		
CO <sub>2</sub> Emissions (t/year)	0.32	DFEE	26.58	TFEE	28.67
General Requirements Compliance	Pass	% DFEE<TFEE	7.29		
Assessor Details	Mr. Paul Pasifull, Stansted Environmental Services, Tel: 01277225709, paul@sestesting.com			Assessor ID	P722-0001
Client					

### SUMMARY FOR INPUT DATA FOR New Build (As Designed)

#### Criterion 1 – Achieving the TER and TFEE rate

##### 1a TER and DER

Fuel for main heating	Mains gas (c)		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	14.78	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	7.23	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-7.55 (-51.1%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	28.67	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	26.58	kWh/m <sup>2</sup> /yr	
	-2.1 (-7.3%)	kWh/m <sup>2</sup> /yr	Pass

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.27 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	Pass

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa	
Maximum	10.0	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa	Pass

##### Limiting System Efficiencies

##### 4 Heating efficiency

Main heating system	Community heating scheme	-
Secondary heating system	None	

##### 5 Cylinder insulation

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# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)

Hot water storage	Measured cylinder loss: 0.40 kWh/day Permitted by DBSCG 0.50	Pass
Primary pipework insulated	No primary pipework	

### 6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and at least two room stats	Pass
Hot water controls	No cylinderstat	

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
Minimum	75	%	Pass

### 8 Mechanical ventilation

Continuous extract system		
Specific fan power	0.14	
Maximum	0.7	Pass

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (Thames Valley)	Slight	Pass
Based on:		
Overshading	Average	
Windows facing East	9.06 m <sup>2</sup> , No overhang	
Air change rate	4.00 ach	
Blinds/curtains	None	

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type	U-value		
Solid Wall	0.00	W/m <sup>2</sup> K	Pass
Filled Cavity with Edge Sealing	0.00	W/m <sup>2</sup> K	Pass

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa	
Maximum	10.0	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa	Pass

### 10 Key features

External wall U-value	0.14	W/m <sup>2</sup> K
External wall U-value	0.14	W/m <sup>2</sup> K
Party wall U-value	0.00	W/m <sup>2</sup> K
Party wall U-value	0.00	W/m <sup>2</sup> K
Air permeability	3.0	m <sup>3</sup> /m <sup>2</sup> h
Community CHP, Mains gas	N/A	
Photovoltaic array	265.00	kWh/Year

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# RECOMMENDATIONS

	Typical cost	Typical savings per year	Energy efficiency	Environmental impact	Result
Low energy lights			0	0	Already installed
Solar water heating			0	0	Not applicable
Photovoltaic			0	0	Not applicable
Wind turbine			0	0	Not applicable
<b>Totals</b>	<b>£0</b>	<b>£0</b>	<b>B 86</b>	<b>A 96</b>	

**DRAFT**

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# THERMAL BRIDGING

## Calculation Type: New Build (As Designed)

Property Reference	WH190 Plot 370		Issued on Date	24/02/2022	
Assessment Reference	Plot 370	Prop Type Ref	Flat Type B1N-10		
Property	Abbey Road Retail Park, Barking				
SAP Rating	86 B	DER	7.23	TER	14.78
Environmental	96 A	% DER<TER	51.08		
CO <sub>2</sub> Emissions (t/year)	0.32	DFEE	26.58	TFEE	28.67
General Requirements Compliance	Pass	% DFEE<TFEE	7.29		
Assessor Details	Mr. Paul Pasifull, Stansted Environmental Services, Tel: 01277225709, paul@sestesting.com			Assessor ID	P722-0001
Client					

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Table K1 - Approved	0.300	4.30	1.29	
External wall	E4 Jamb	Table K1 - Approved	0.050	8.44	0.42	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	8.77	0.61	
External wall	E7 Party floor between dwellings (in blocks of flats)	Table K1 - Approved	0.070	8.77	0.61	
External wall	E18 Party wall between dwellings	Table K1 - Approved	0.060	2.68	0.16	
External wall	E25 Staggered party wall between dwellings	Table K1 - Default	0.120	2.68	0.32	
Party wall	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	0.000	24.75	0.00	
Party wall	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	0.000	24.75	0.00	

Total: **3.42** W/mK:  
 Y-Value: **0.146** W/m<sup>2</sup>K:

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

<b>Property Reference</b>	WH190 Plot 370			<b>Issued on Date</b>	24/02/2022
<b>Assessment Reference</b>	Plot 370	<b>Prop Type Ref</b>	Flat Type B1N-10		
<b>Property</b>	Abbey Road Retail Park, Barking				
<b>SAP Rating</b>	86 B	<b>DER</b>	7.23	<b>TER</b>	14.78
<b>Environmental</b>	96 A	<b>% DER&lt;TER</b>	51.08		
<b>CO<sub>2</sub> Emissions (t/year)</b>	0.32	<b>DFEE</b>	26.58	<b>TFEE</b>	28.67
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	7.29		
<b>Assessor Details</b>	Mr. Paul Pasifull, Stansted Environmental Services, Tel: 01277225709, paul@sestesting.com			<b>Assessor ID</b>	P722-0001
<b>Client</b>					

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Mid-floor flat, total floor area 55 m<sup>2</sup>

This report covers items included within the SAP calculations.  
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating:Mains gas (c)  
Fuel factor:1.00 (mains gas)  
Target Carbon Dioxide Emission Rate (TER) 14.78 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 7.23 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)28.7 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE)26.6 kWh/m<sup>2</sup>/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	(no floor)		
Roof	(no roof)		
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 3.00 (design value)  
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Community heating scheme -  
Secondary heating system: None

5 Cylinder insulation

Hot water storage Measured cylinder loss: 0.40 kWh/day  
Permitted by DBSCG 0.50 OK  
Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Charging system linked to use of community heating, programmer and at least two room statsOK  
Hot water controls: No cylinderstat

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%  
Minimum 75% OK

8 Mechanical ventilation

Continuous extract system  
Specific fan power: 0.14  
Maximum 0.7 OK

9 Summertime temperature

Overheating risk (Thames Valley): Slight OK  
Based on:  
Overshading: Average  
Windows facing East: 9.06 m<sup>2</sup>, No overhang  
Air change rate: 4.00 ach  
Blinds/curtains: None

10 Key features

External wall U-value 0.14 W/m<sup>2</sup>K  
External wall U-value 0.14 W/m<sup>2</sup>K  
Party wall U-value 0.00 W/m<sup>2</sup>K  
Party wall U-value 0.00 W/m<sup>2</sup>K  
Air permeability 3.0 m<sup>3</sup>/m<sup>2</sup>h  
Community CHP, Mains gas  
Photovoltaic array 265.00 kWh/Year



# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	54.7400 (1b)	x 2.5000 (2b)	= 136.8500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.8500 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				0 * 10 =	0.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				0.0000 / (5) =	0.0000 (8)
Pressure test				Yes	
Measured/design AP50					3.0000
Infiltration rate					0.1500 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate				0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation:												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Windows (Uw = 1.40)			9.0600	1.3258	12.0114		(27)
2. Column wall	6.2800		6.2800	0.2700	1.6956	150.0000	942.0000 (29a)
3. Uni panel cladding	14.1800	9.0600	5.1200	0.1400	0.7168	14.0000	71.6800 (29a)
1. Uni panel brick	2.9800		2.9800	0.1400	0.4172	14.0000	41.7200 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			23.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.8410		(33)
Party Wall 1			41.8400	0.0000	0.0000	180.0000	7531.2000 (32)
Party Wall 2			26.2200	0.0000	0.0000	70.0000	1835.4000 (32)
Party Floor			54.7400			40.0000	2189.6000 (32d)
Party Ceilings			54.7400			40.0000	2189.6000 (32b)
Internal Wall - SFS			78.0000			9.0000	702.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 15503.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							283.2152 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.4222 (36)
Total fabric heat loss							(33) + (36) = 18.2632 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803	22.5803 (38)
Average = Sum(39)m / 12 =	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434	40.8434 (39)
HLP	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461	0.7461 (40)
HLP (average)												0.7461 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

#### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8297 (42)
Average daily hot water use (litres/day)												77.6563 (43)
Daily hot water use	85.4219	82.3156	79.2094	76.1031	72.9969	69.8906	69.8906	72.9969	76.1031	79.2094	82.3156	85.4219 (44)
Energy conte	126.6782	110.7935	114.3290	99.6748	95.6404	82.5304	76.4765	87.7579	88.8060	103.4948	112.9727	122.6811 (45)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)													Total = Sum (45)m =	1221.8353 (45)
Distribution loss (46)m = 0.15 x (45)m														
	19.0017	16.6190	17.1494	14.9512	14.3461	12.3796	11.4715	13.1637	13.3209	15.5242	16.9459	18.4022	(46)	
Water storage loss:														
Store volume														10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):														0.4000 (48)
Temperature factor from Table 2b														1.0000 (49)
Enter (49) or (54) in (55)														0.4000 (55)
Total storage loss	12.4000	11.2000	12.4000	12.0000	12.4000	12.0000	12.4000	12.4000	12.0000	12.4000	12.0000	12.4000	(56)	
If cylinder contains dedicated solar storage	12.4000	11.2000	12.4000	12.0000	12.4000	12.0000	12.4000	12.4000	12.0000	12.4000	12.0000	12.4000	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month	162.3406	143.0047	149.9914	134.1868	131.3028	117.0424	112.1389	123.4203	123.3180	139.1572	147.4847	158.3435	(62)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)	
													Solar input (sum of months) = Sum (63)m =	0.0000 (63)
Output from w/h	162.3406	143.0047	149.9914	134.1868	131.3028	117.0424	112.1389	123.4203	123.3180	139.1572	147.4847	158.3435	(64)	
													Total per year (kWh/year) = Sum (64)m =	1641.7313 (64)
Heat gains from water heating, kWh/month	70.6504	62.6078	66.5443	60.7515	60.3303	55.0509	53.9584	57.7094	57.1376	62.9420	65.1730	69.3214	(65)	

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7397	13.0917	10.6469	8.0604	6.0252	5.0867	5.4964	7.1444	9.5892	12.1757	14.2109	15.1494	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.5153	161.1706	156.9994	148.1193	136.9098	126.3745	119.3363	117.6810	121.8522	130.7323	141.9418	152.4771	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	(71)
Water heating gains (Table 5)	94.9602	93.1664	89.4413	84.3770	81.0892	76.4596	72.5247	77.5664	79.3578	84.5994	90.5181	93.1739	(72)
Total internal gains	319.6613	317.8747	307.5336	291.0028	274.4703	258.3670	247.8034	252.8379	261.2453	277.9535	297.1168	311.2464	(73)

#### 6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m <sup>2</sup>	Table 6a	Specific data	Specific data	factor	W							
		W/m <sup>2</sup>	or Table 6b	or Table 6c	Table 6d								
East	9.0600	19.6403	0.4200	0.7000	0.7700	36.2540 (76)							
Solar gains	36.2540	70.9205	116.7960	170.3400	208.7581	213.7011	203.4521	174.7624	135.8386	84.1532	45.2045	29.8135	(83)
Total gains	355.9153	388.7952	424.3296	461.3428	483.2284	472.0680	451.2556	427.6003	397.0839	362.1067	342.3213	341.0599	(84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	105.4379	
alpha	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	8.0292	
util living area	0.9974	0.9939	0.9795	0.9173	0.7586	0.5516	0.3981	0.4390	0.6960	0.9463	0.9931	0.9982	(86)
MIT	20.4559	20.5490	20.7063	20.8819	20.9779	20.9983	20.9999	20.9998	20.9909	20.8635	20.6211	20.4249	(87)
Th 2	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	20.3003	(88)
util rest of house	0.9965	0.9919	0.9726	0.8933	0.7107	0.4923	0.3349	0.3725	0.6314	0.9249	0.9903	0.9975	(89)
MIT 2	19.5723	19.7074	19.9325	20.1699	20.2811	20.2993	20.3002	20.3002	20.2941	20.1509	19.8127	19.5271	(90)
Living area fraction	20.0682	20.1797	20.3667	20.5695	20.6722	20.6916	20.6929	20.6928	20.6852	20.5508	20.2664	20.0309	(91)
Temperature adjustment	20.0682	20.1797	20.3667	20.5695	20.6722	20.6916	20.6929	20.6928	20.6852	20.5508	20.2664	20.0309	(92)
adjusted MIT	20.0682	20.1797	20.3667	20.5695	20.6722	20.6916	20.6929	20.6928	20.6852	20.5508	20.2664	20.0309	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	354.5473	385.4683	413.0193	416.6719	355.9844	248.1107	167.1307	175.2512	265.0428	337.9727	338.9538	340.1091	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	644.0263	624.0750	566.3649	476.6209	366.4542	248.8005	167.1669	175.3318	268.9604	406.4249	537.7606	646.5899	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	215.3724	160.3436	114.0891	43.1633	7.7895	0.0000	0.0000	0.0000	0.0000	50.9285	143.1409	228.0218	(98)
Space heating													962.8491 (98)
Space heating per m2													(98) / (4) = 17.5895 (99)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

#### 8c. Space cooling requirement

Not applicable

#### 9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (301)
Fraction of space heat from community system	1.0000 (302)
Fraction of heat from community Boilers	0.1740 (303a)
Fraction of heat from community Combined Heat and Power	0.8260 (303b)
Fraction of total space heat from community Boilers	0.1740 (304a)
Fraction of total space heat from community Combined Heat and Power	0.8260 (304b)
Factor for control and charging method (Table 4c(3)) for community space heating	1.0000 (305)
Factor for control and charging method (Table 4c(3)) for community water heating	1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system	1.0500 (306)
Space heating:	
Annual space heating requirement	962.8491 (98)
Space heat from Boilers = (98) x 0.17 x 1.00 x 1.05	175.9125 (307a)
Space heat from Combined Heat and Power = (98) x 0.83 x 1.00 x 1.05	835.0790 (307b)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000 (309)
Water heating	
Annual water heating requirement	1641.7313 (64)
Water heat from Boilers = (64) x 0.17 x 1.00 x 1.05	299.9443 (310a)
Water heat from Combined Heat and Power = (64) x 0.83 x 1.00 x 1.05	1423.8736 (310b)
Electricity used for heat distribution	27.3481 (313)
Annual totals kWh/year	
Electricity for pumps and fans:	
(MEVCentralised, Database: in-use factor = 1.3000, SFP = 0.1820)	
mechanical ventilation fans (SFP = 0.1820)	30.3862 (330a)
Total electricity for the above, kWh/year	30.3862 (331)
Electricity for lighting (calculated in Appendix L)	260.3076 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
Total delivered energy for all uses	3025.5032 (338)

#### 12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Boilers			91.4000 (367a)
Space heating from Boilers	520.6311	0.2160	112.4563 (367)
Electrical efficiency of CHP unit			33.2000 (361)
Heat efficiency of CHP unit			38.6000 (362)
Space heating from Combined Heat and Power	2163.4172	0.2160	467.2981 (363)
less credit emissions for electricity	-718.2545	0.5190	-372.7741 (364)
Water heating from Combined Heat and Power	3688.7916	0.2160	796.7790 (365)
less credit emissions for electricity	-1224.6788	0.5190	-635.6083 (366)
Electrical energy for heat distribution	27.3481	0.5190	14.1937 (372)
Total CO2 associated with community systems (negative value allowed since DFEE <= TFEE)			382.3447 (373)
Space and water heating			382.3447 (376)
Pumps and fans	30.3862	0.5190	15.7704 (378)
Energy for lighting	260.3076	0.5190	135.0996 (379)
Energy saving/generation technologies			
PV Unit	-265.0000	0.5190	-137.5350 (380)
Total CO2, kg/year			395.6797 (383)
Dwelling Carbon Dioxide Emission Rate (DER)			7.2300 (384)

#### 16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER	7.2300 ZC1
Total Floor Area	TFA 54.7400
Assumed number of occupants	N 1.8297
CO2 emission factor in Table 12 for electricity displaced from grid	EF 0.5190
CO2 emissions from appliances, equation (L14)	17.2681 ZC2
CO2 emissions from cooking, equation (L16)	2.9761 ZC3
Total CO2 emissions	27.4742 ZC4
Residual CO2 emissions offset from biofuel CHP	0.0000 ZC5
Additional allowable electricity generation, kWh/m <sup>2</sup> /year	0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation	0.0000 ZC7
Net CO2 emissions	27.4742 ZC8

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF TARGET EMISSIONS 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	54.7400 (1b)	x 2.5000 (2b)	= 136.8500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.8500 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1461 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3961 (18)
Number of sides sheltered					2 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3367 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4293	0.4209	0.4125	0.3704	0.3620	0.3199	0.3199	0.3115	0.3367	0.3620	0.3788	0.3957 (22b)
Effective ac	0.5922	0.5886	0.5851	0.5686	0.5655	0.5512	0.5512	0.5485	0.5567	0.5655	0.5718	0.5783 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.40)			9.0600	1.3258	12.0114		(27)
2. Column wall	6.2800		6.2800	0.1800	1.1304		(29a)
3. Uni panel cladding	14.1800	9.0600	5.1200	0.1800	0.9216		(29a)
1. Uni panel brick	2.9800		2.9800	0.1800	0.5364		(29a)
Total net area of external elements Aum(A, m2)			23.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5998		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.1864 (36)
Total fabric heat loss						(33) + (36) =	16.7862 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	26.7422	26.5806	26.4222	25.6781	25.5389	24.8908	24.8908	24.7708	25.1405	25.5389	25.8205	26.1149 (38)
Heat transfer coeff	43.5284	43.3667	43.2083	42.4643	42.3251	41.6770	41.6770	41.5570	41.9266	42.3251	42.6067	42.9011 (39)
Average = Sum(39)m / 12 =												42.4636 (39)
HLP	0.7952	0.7922	0.7893	0.7757	0.7732	0.7614	0.7614	0.7592	0.7659	0.7732	0.7783	0.7837 (40)
HLP (average)												0.7757 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

#### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8297 (42)
Average daily hot water use (litres/day)												77.6563 (43)
Daily hot water use	85.4219	82.3156	79.2094	76.1031	72.9969	69.8906	69.8906	72.9969	76.1031	79.2094	82.3156	85.4219 (44)
Energy conte	126.6782	110.7935	114.3290	99.6748	95.6404	82.5304	76.4765	87.7579	88.8060	103.4948	112.9727	122.6811 (45)
Energy content (annual)												Total = Sum(45)m = 1221.8353 (45)
Distribution loss (46)m = 0.15 x (45)m	19.0017	16.6190	17.1494	14.9512	14.3461	12.3796	11.4715	13.1637	13.3209	15.5242	16.9459	18.4022 (46)
Water storage loss:												
Store volume												10.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												0.3712 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.2005 (55)
Total storage loss												

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

If cylinder contains dedicated solar storage	6.2141	5.6127	6.2141	6.0136	6.2141	6.0136	6.2141	6.2141	6.0136	6.2141	6.0136	6.2141 (56)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	156.1547	137.4175	143.8055	128.2005	125.1169	111.0560	105.9530	117.2344	117.3317	132.9714	141.4984	152.1576 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	156.1547	137.4175	143.8055	128.2005	125.1169	111.0560	105.9530	117.2344	117.3317	132.9714	141.4984	152.1576 (64)
Heat gains from water heating, kWh/month	65.7017	58.1380	61.5956	55.9624	55.3816	50.2619	49.0096	52.7607	52.3485	57.9932	60.3839	64.3727 (65)

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7397	13.0917	10.6469	8.0604	6.0252	5.0867	5.4964	7.1444	9.5892	12.1757	14.2109	15.1494 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.5153	161.1706	156.9994	148.1193	136.9098	126.3745	119.3363	117.6810	121.8522	130.7323	141.9418	152.4771 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895 (71)
Water heating gains (Table 5)	88.3087	86.5149	82.7898	77.7255	74.4377	69.8081	65.8732	70.9149	72.7063	77.9479	83.8666	86.5224 (72)
Total internal gains	316.0098	314.2232	303.8821	287.3513	270.8188	254.7155	244.1519	249.1864	257.5938	274.3020	293.4653	307.5949 (73)

#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data or Table 6b	g Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
East	9.0600	19.6403	0.6300	0.7000	0.7700	54.3810 (76)						
Solar gains	54.3810	106.3808	175.1940	255.5101	313.1372	320.5516	305.1782	262.1436	203.7579	126.2298	67.8067	44.7203 (83)
Total gains	370.3908	420.6040	479.0761	542.8613	583.9559	575.2671	549.3301	511.3300	461.3517	400.5318	361.2720	352.3152 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th <sub>l</sub> (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil <sub>m</sub> (see Table 9a)	0.9950	0.9874	0.9576	0.8492	0.6595	0.4626	0.3337	0.3736	0.6181	0.9120	0.9872	0.9963 (86)
MIT	20.3427	20.4808	20.6919	20.9027	20.9843	20.9989	20.9999	20.9998	20.9924	20.8621	20.5664	20.3204 (87)
Th 2	20.2575	20.2601	20.2626	20.2744	20.2766	20.2869	20.2869	20.2889	20.2830	20.2766	20.2721	20.2675 (88)
util rest of house	0.9936	0.9837	0.9461	0.8180	0.6130	0.4116	0.2797	0.3160	0.5576	0.8843	0.9828	0.9952 (89)
MIT 2	19.3801	19.5817	19.8822	20.1694	20.2629	20.2862	20.2869	20.2888	20.2776	20.1273	19.7165	19.3556 (90)
Living area fraction	19.9203	20.0863	20.3366	20.5809	20.6678	20.6862	20.6870	20.6878	20.6787	20.5396	20.1935	19.8970 (92)
Temperature adjustment	19.9203	20.0863	20.3366	20.5809	20.6678	20.6862	20.6870	20.6878	20.6787	20.5396	20.1935	19.8970 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9927	0.9827	0.9474	0.8317	0.6384	0.4402	0.3100	0.3484	0.5913	0.8952	0.9822	0.9945 (94)
Useful gains	367.6931	413.3235	453.8531	451.5124	372.7985	253.2220	170.3061	178.1227	272.8169	358.5601	354.8487	350.3898 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	679.9259	658.5790	597.8573	496.0223	379.5615	253.6527	170.3356	178.1880	275.8248	420.6955	557.8691	673.4191 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	232.3012	164.8117	107.1391	32.0471	5.0317	0.0000	0.0000	0.0000	0.0000	46.2287	146.1747	240.3338 (98)
Space heating												974.0682 (98)
Space heating per m <sup>2</sup>												17.7945 (99)

#### 8c. Space cooling requirement

Not applicable

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												93.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												1041.7842 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	232.3012	164.8117	107.1391	32.0471	5.0317	0.0000	0.0000	0.0000	0.0000	46.2287	146.1747	240.3338 (98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000 (210)
Space heating fuel (main heating system)	248.4505	176.2692	114.5873	34.2750	5.3815	0.0000	0.0000	0.0000	0.0000	49.4425	156.3366	257.0415 (211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	156.1547	137.4175	143.8055	128.2005	125.1169	111.0560	105.9530	117.2344	117.3317	132.9714	141.4984	152.1576 (64)
Efficiency of water heater (217)m	85.8715	85.2996	84.0423	81.7325	80.1664	79.8000	79.8000	79.8000	79.8000	82.3105	84.9006	79.8000 (216)
Fuel for water heating, kWh/month	181.8470	161.0997	171.1108	156.8536	156.0714	139.1679	132.7732	146.9103	147.0322	161.5484	166.6636	176.8695 (219)
Water heating fuel used												1897.9476 (219)
Annual totals kWh/year												
Space heating fuel - main system												1041.7842 (211)
Space heating fuel - secondary												0.0000 (215)
Electricity for pumps and fans:												
central heating pump												30.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												75.0000 (231)
Electricity for lighting (calculated in Appendix L)												260.3076 (232)
Total delivered energy for all uses												3275.0394 (238)

#### 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1041.7842	0.2160	225.0254 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1897.9476	0.2160	409.9567 (264)
Space and water heating			634.9821 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	260.3076	0.5190	135.0996 (268)
Total CO2, kg/m2/year			809.0067 (272)
Emissions per m2 for space and water heating			11.6000 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.4680 (272b)
Emissions per m2 for pumps and fans			0.7111 (272c)
Target Carbon Dioxide Emission Rate (TER) = (11.6000 * 1.00) + 2.4680 + 0.7111, rounded to 2 d.p.			14.7800 (273)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	54.7400 (1b)	x 2.5000 (2b)	= 136.8500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.8500 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.1461 (8)
Pressure test				Yes	
Measured/design AP50					3.0000
Infiltration rate					0.2961 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.2517 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.3209	0.3147	0.3084	0.2769	0.2706	0.2391	0.2391	0.2328	0.2517	0.2706	0.2832	0.2958 (22b)
Effective ac	0.5515	0.5495	0.5475	0.5383	0.5366	0.5286	0.5286	0.5271	0.5317	0.5366	0.5401	0.5437 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Windows (Uw = 1.40)			9.0600	1.3258	12.0114		(27)
2. Column wall	6.2800		6.2800	0.2700	1.6956	150.0000	942.0000 (29a)
3. Uni panel cladding	14.1800	9.0600	5.1200	0.1400	0.7168	14.0000	71.6800 (29a)
1. Uni panel brick	2.9800		2.9800	0.1400	0.4172	14.0000	41.7200 (29a)
Total net area of external elements Aum(A, m <sup>2</sup> )			23.4400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	14.8410	(33)
Party Wall 1			41.8400	0.0000	0.0000	180.0000	7531.2000 (32)
Party Wall 2			26.2200	0.0000	0.0000	70.0000	1835.4000 (32)
Party Floor			54.7400			40.0000	2189.6000 (32d)
Party Ceilings			54.7400			30.0000	1642.2000 (32b)
Internal Wall - SFS			78.0000			9.0000	702.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =	14955.8000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							273.2152 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.4222 (36)
Total fabric heat loss						(33) + (36) =	18.2632 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	24.9062	24.8159	24.7273	24.3115	24.2337	23.8715	23.8715	23.8045	24.0110	24.2337	24.3911	24.5556 (38)
Heat transfer coeff	43.1693	43.0790	42.9905	42.5747	42.4969	42.1347	42.1347	42.0676	42.2742	42.4969	42.6543	42.8188 (39)
Average = Sum(39)m / 12 =												42.5743 (39)
HLP	0.7886	0.7870	0.7854	0.7778	0.7763	0.7697	0.7697	0.7685	0.7723	0.7763	0.7792	0.7822 (40)
HLP (average)												0.7778 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

#### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8297 (42)
Average daily hot water use (litres/day)												77.6563 (43)
Daily hot water use	85.4219	82.3156	79.2094	76.1031	72.9969	69.8906	69.8906	72.9969	76.1031	79.2094	82.3156	85.4219 (44)
Energy conte	126.6782	110.7935	114.3290	99.6748	95.6404	82.5304	76.4765	87.7579	88.8060	103.4948	112.9727	122.6811 (45)
Energy content (annual)										Total = Sum(45)m =		1221.8353 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)

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### CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	26.9191	23.5436	24.2949	21.1809	20.3236	17.5377	16.2513	18.6486	18.8713	21.9927	24.0067	26.0697		(65)

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7397	13.0917	10.6469	8.0604	6.0252	5.0867	5.4964	7.1444	9.5892	12.1757	14.2109	15.1494	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.5153	161.1706	156.9994	148.1193	136.9098	126.3745	119.3363	117.6810	121.8522	130.7323	141.9418	152.4771	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	(71)
Water heating gains (Table 5)	36.1816	35.0352	32.6545	29.4179	27.3166	24.3579	21.8431	25.0653	26.2101	29.5600	33.3426	35.0400	(72)
Total internal gains	260.8827	259.7435	250.7467	236.0436	220.6977	206.2652	197.1218	200.3368	208.0976	222.9141	239.9413	253.1124	(73)

#### 6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d				Gains W
East			9.0600	19.6403	0.4200		0.7000	0.7700				36.2540 (76)
Solar gains	36.2540	70.9205	116.7960	170.3400	208.7581	213.7011	203.4521	174.7624	135.8386	84.1532	45.2045	29.8135 (83)
Total gains	297.1367	330.6640	367.5428	406.3837	429.4559	419.9663	400.5740	375.0991	343.9363	307.0673	285.1458	282.9260 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	96.2347	96.4365	96.6351	97.5789	97.7575	98.5978	98.5978	98.7550	98.2724	97.7575	97.3968	97.0225	
alpha	7.4156	7.4291	7.4423	7.5053	7.5172	7.5732	7.5732	7.5837	7.5515	7.5172	7.4931	7.4682	
util living area	0.9992	0.9979	0.9919	0.9589	0.8428	0.6339	0.4621	0.5142	0.7990	0.9793	0.9978	0.9994	(86)
MIT	20.2780	20.3807	20.5590	20.7860	20.9432	20.9941	20.9995	20.9989	20.9711	20.7589	20.4740	20.2557	(87)
Th 2	20.2632	20.2646	20.2660	20.2726	20.2739	20.2796	20.2796	20.2807	20.2774	20.2739	20.2714	20.2688	(88)
util rest of house	0.9989	0.9971	0.9889	0.9443	0.7988	0.5663	0.3869	0.4348	0.7340	0.9692	0.9969	0.9992	(89)
MIT 2	19.5952	19.6988	19.8770	20.1013	20.2375	20.2771	20.2795	20.2804	20.2626	20.0802	19.7980	19.5778	(90)
Living area fraction									fLA = Living area / (4) =			0.5612	(91)
MIT	19.9784	20.0815	20.2598	20.4855	20.6336	20.6795	20.6836	20.6837	20.6602	20.4611	20.1774	19.9582	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9784	20.0815	20.2598	20.4855	20.6336	20.6795	20.6836	20.6837	20.6602	20.4611	20.1774	19.9582	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9987	0.9969	0.9888	0.9490	0.8216	0.6042	0.4291	0.4795	0.7698	0.9722	0.9968	0.9991	(94)
Ext temp.	296.7642	329.6303	363.4378	385.6747	352.8339	253.7597	171.8970	179.8421	264.7639	298.5393	284.2295	282.6766	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	676.8248	654.0034	591.5385	493.2496	379.6484	256.1581	172.0602	180.2033	277.3286	419.0663	557.8062	674.7491	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating per m2	282.7651	217.9787	169.7069	77.4540	19.9500	0.0000	0.0000	0.0000	0.0000	89.6721	196.9752	291.7020	(98)
											(98) / (4) =	1346.2041	(98)
												24.5927	(99)

#### 8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	396.0662	311.7968	319.7140	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9776	0.9930	0.9886	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	387.1842	309.6185	316.0766	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	559.8768	535.9021	507.2403	0.0000	0.0000	0.0000	0.0000	(103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	(103a)
Space cooling kWh													



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Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	124.3387	168.3550	142.2258	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												434.9194 (104)
Intermittency factor (Table 10b)												1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	31.0847	42.0887	35.5564	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												108.7299 (107)
Energy for space heating												1.9863 (108)
Energy for space cooling												24.5927 (99)
Total												1.9863 (108)
Dwelling Fabric Energy Efficiency (DFEE)												26.5790 (109)
												26.6 (109)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
 CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

#### 1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	54.7400 (1b)	x 2.5000 (2b)	= 136.8500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 136.8500 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	+	0	=	0 * 40 = 0.0000 (6a)
Number of open flues	0	+	0	=	0 * 20 = 0.0000 (6b)
Number of intermittent fans					2 * 10 = 20.0000 (7a)
Number of passive vents					0 * 10 = 0.0000 (7b)
Number of flueless gas fires					0 * 40 = 0.0000 (7c)
					Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1461 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.3961 (18)
Number of sides sheltered					2 (19)
Shelter factor					(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor					(21) = (18) x (20) = 0.3367 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4293	0.4209	0.4125	0.3704	0.3620	0.3199	0.3199	0.3115	0.3367	0.3620	0.3788	0.3957 (22b)
Effective ac	0.5922	0.5886	0.5851	0.5686	0.5655	0.5512	0.5512	0.5485	0.5567	0.5655	0.5718	0.5783 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.40)			9.0600	1.3258	12.0114		(27)
2. Column wall	6.2800		6.2800	0.1800	1.1304		(29a)
3. Uni panel cladding	14.1800	9.0600	5.1200	0.1800	0.9216		(29a)
1. Uni panel brick	2.9800		2.9800	0.1800	0.5364		(29a)
Total net area of external elements Aum(A, m2)			23.4400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5998		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.1864 (36)
Total fabric heat loss							(33) + (36) = 16.7862 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	26.7422	26.5806	26.4222	25.6781	25.5389	24.8908	24.8908	24.7708	25.1405	25.5389	25.8205	26.1149 (38)
Heat transfer coeff	43.5284	43.3667	43.2083	42.4643	42.3251	41.6770	41.6770	41.5570	41.9266	42.3251	42.6067	42.9011 (39)
Average = Sum(39)m / 12 =	42.4636 (39)											
HLP	0.7952	0.7922	0.7893	0.7757	0.7732	0.7614	0.7614	0.7592	0.7659	0.7732	0.7783	0.7837 (40)
HLP (average)	0.7757 (40)											
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

#### 4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												
Average daily hot water use (litres/day)	77.6563 (43)											
Daily hot water use	85.4219	82.3156	79.2094	76.1031	72.9969	69.8906	69.8906	72.9969	76.1031	79.2094	82.3156	85.4219 (44)
Energy conte	126.6782	110.7935	114.3290	99.6748	95.6404	82.5304	76.4765	87.7579	88.8060	103.4948	112.9727	122.6811 (45)
Energy content (annual)	Total = Sum(45)m = 1221.8353 (45)											
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)

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### CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Heat gains from water heating, kWh/month  
 26.9191 23.5436 24.2949 21.1809 20.3236 17.5377 16.2513 18.6486 18.8713 21.9927 24.0067 26.0697 (65)

#### 5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869	91.4869 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.7397	13.0917	10.6469	8.0604	6.0252	5.0867	5.4964	7.1444	9.5892	12.1757	14.2109	15.1494 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.5153	161.1706	156.9994	148.1193	136.9098	126.3745	119.3363	117.6810	121.8522	130.7323	141.9418	152.4771 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487	32.1487 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895	-73.1895 (71)
Water heating gains (Table 5)	36.1816	35.0352	32.6545	29.4179	27.3166	24.3579	21.8431	25.0653	26.2101	29.5600	33.3426	35.0400 (72)
Total internal gains	260.8827	259.7435	250.7467	236.0436	220.6977	206.2652	197.1218	200.3368	208.0976	222.9141	239.9413	253.1124 (73)

#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W				
East	9.0600	19.6403	0.6300	0.7000	0.7700		54.3810 (76)					
Solar gains	54.3810	106.3808	175.1940	255.5101	313.1372	320.5516	305.1782	262.1436	203.7579	126.2298	67.8067	44.7203 (83)
Total gains	315.2637	366.1243	425.9408	491.5537	533.8349	526.8169	502.3000	462.4803	411.8556	349.1439	307.7481	297.8327 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	87.3313	87.6568	87.9781	89.5197	89.8141	91.2107	91.2107	91.4741	90.6677	89.8141	89.2205	88.6082
alpha	6.8221	6.8438	6.8652	6.9680	6.9876	7.0807	7.0807	7.0983	7.0445	6.9876	6.9480	6.9072
util living area	0.9981	0.9942	0.9762	0.8930	0.7121	0.5043	0.3649	0.4129	0.6840	0.9514	0.9949	0.9987 (86)
MIT	20.2438	20.3867	20.6131	20.8622	20.9752	20.9980	20.9998	20.9996	20.9860	20.8010	20.4736	20.2218 (87)
Th 2	20.2575	20.2601	20.2626	20.2744	20.2766	20.2869	20.2869	20.2889	20.2830	20.2766	20.2721	20.2675 (88)
util rest of house	0.9975	0.9924	0.9690	0.8667	0.6646	0.4490	0.3059	0.3493	0.6203	0.9329	0.9930	0.9983 (89)
MIT 2	19.5603	19.7044	19.9286	20.1695	20.2615	20.2861	20.2869	20.2887	20.2760	20.1222	19.8017	19.5469 (90)
Living area fraction										fLA = Living area / (4) =		
MIT	19.9439	20.0873	20.3127	20.5582	20.6620	20.6856	20.6870	20.6877	20.6744	20.5031	20.1788	19.9257 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9439	20.0873	20.3127	20.5582	20.6620	20.6856	20.6870	20.6877	20.6744	20.5031	20.1788	19.9257 (93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9972	0.9919	0.9696	0.8776	0.6903	0.4800	0.3390	0.3850	0.6557	0.9393	0.9927	0.9980 (94)
Useful gains	314.3763	363.1713	412.9932	431.3785	368.5304	252.8856	170.2804	178.0574	270.0364	327.9600	305.5013	297.2454 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	680.9526	658.6236	596.8240	495.0578	379.3170	253.6310	170.3337	178.1831	275.6444	419.1511	557.2429	674.6482 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	272.7328	198.5439	136.7701	45.8491	8.0253	0.0000	0.0000	0.0000	0.0000	67.8462	181.2539	280.7877 (98)
Space heating per m <sup>2</sup>												1191.8090 (98)
												(98) / (4) = 21.7722 (99)

#### 8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	391.7638	308.4098	315.8332	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9917	0.9974	0.9954	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	388.5134	307.6186	314.3933	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	684.7671	654.8027	609.3741	0.0000	0.0000	0.0000	0.0000 (103)
Month fracti	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000 (103a)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	213.3026	258.3049	219.4658	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling Cooled fraction												691.0734 (104)
Intermittency factor (Table 10b)										fC = cooled area / (4) = 1.0000 (105)		
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)



### CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	53.3257	64.5762	54.8664	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling per m2												172.7683	(107)
Energy for space heating												3.1562	(108)
Energy for space cooling												21.7722	(99)
Total												3.1562	(108)
Target Fabric Energy Efficiency (TFEE)												24.9283	(109)
												28.7	(109)

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	WH190 Plot 370		Issued on Date	24/02/2022	
Assessment Reference	Plot 370	Prop Type Ref	Flat Type B1N-10		
Property	Abbey Road Retail Park, Barking				
SAP Rating	86 B	DER	7.23	TER	14.78
Environmental	96 A	% DER<TER	51.08		
CO <sub>2</sub> Emissions (t/year)	0.32	DFEE	26.58	TFEE	28.67
General Requirements Compliance	Pass	% DFEE<TFEE	7.29		
Assessor Details	Mr. Paul Pasifull, Stansted Environmental Services, Tel: 01277225709, paul@sestesting.com			Assessor ID	P722-0001
Client					

### SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	West
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Urban
1.0 Property Type	Flat, Mid-Terrace
2.0 Number of Storeys	1
3.0 Date Built	2022
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	8.77 m	54.74 m <sup>2</sup>	2.50 m

7.0 Living Area	30.72	m <sup>2</sup>
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	283.22	kJ/m <sup>2</sup> K

9.0 External Walls	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
	2. Column wall	Solid Wall	Solid wall : plasterboard on dabs, 200 mm dense block, insulated externally	0.27	150.00	6.28	6.28
	3. Uni panel cladding	Steel Frame	Steel frame wall (warm frame or hybrid construction)	0.14	14.00	14.18	5.12
	1. Uni panel brick	Steel Frame	Steel frame wall (warm frame or hybrid construction)	0.14	14.00	2.98	2.98

9.1 Party Walls	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
	Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	41.84
	Party Wall 2	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	26.22

9.2 Internal Walls	Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
	Internal Wall - SFS	Other	9.00	78.00

### 10.1 Party Ceilings

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Ceilings	Precast concrete planks floor, screed, carpeted	30.00	54.74

### 11.1 Party Floors

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Floor	Precast concrete planks floor, screed, carpeted	40.00	54.74

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Windows	Manufacturer	Window	Double Low-E Hard 0.2			0.42		0.70	1.40
Full glazed door	Manufacturer	Window	Double Low-E Hard 0.2			0.42		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Windows East	Window	[2] 3. Uni panel cladding	East	None	0.00					9.06	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	4.30	0.300	Yes
Table K1 - Approved	E4 Jamb	8.44	0.050	Yes
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	8.77	0.070	No
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	8.77	0.070	No
Table K1 - Approved	E18 Party wall between dwellings	2.68	0.060	No
Table K1 - Default	E25 Staggered party wall between dwellings	2.68	0.120	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	24.75	0.000	No
Table K1 - Default	P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	24.75	0.000	No

Y-value	<input type="text" value="0.146"/>	W/m <sup>2</sup> K
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### 18.0 Pressure Testing

Designed AP <sub>50</sub>	<input type="text" value="3.00"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested ?	<input type="text"/>	
As Built AP <sub>50</sub>	<input type="text"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

Windows open in hot weather	<input type="text" value="Windows fully open"/>
Cross ventilation possible	<input type="text" value="No"/>
Night Ventilation	<input type="text" value="Yes"/>
Air change rate	<input type="text" value="4.00"/>

#### Mechanical Ventilation

Mechanical Ventilation System Present	<input type="text" value="Yes"/>
Approved Installation	<input type="text" value="Yes"/>
Mechanical Ventilation data Type	<input type="text" value="Database"/>

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Type	Mechanical extract ventilation - centralised
MV Reference Number	500644
Configuration	2
Manufacturer SFP	0.14
Duct Type	Rigid
Wet Rooms	2

### 20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

### 21.0 Fixed Cooling System

No

### 22.0 Lighting

#### Internal

Total number of light fittings	10
Total number of L.E.L. fittings	10
Percentage of L.E.L. fittings	100.00 %

#### External

External lights fitted: No

### 23.0 Electricity Tariff

Standard

### 24.0 Main Heating 1

None

### 26.0 Community Heating

Community Heating: Space and Water Combined

#### Space Community Heating

PCDF Index	n/a
Distribution Loss	Piping system >= 1991, pre-insulated, low temp, variable flow
Controls	CCL Charging system linked to use of community heating, programmer and at least two room stats
SAP Code	2312
PCDF Index	n/a

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical
Heat Source 1	Boilers	Mains Gas	Space and Water	91.40	17.40%		
Heat Source 2	Combined Heat and Power	Mains Gas	Space and Water	91.40	82.60%	38.60	1.00 33.20

### 28.0 Water Heating

Water Heating	HWP From main heating 1
Flue Gas Heat Recovery System	Community Heating
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Water use <= 125 litres/person/day	Yes	
SAP Code	901	
<hr/>		
<b>29.0 Hot Water Cylinder</b>	HIU	
Insulation Type	Measured Loss	
Cylinder Volume	10.00	L
Loss	0.40	kWh/day
<hr/>		
<b>32.0 Photovoltaic Unit</b>	More Dwellings, One Block	
Apportioned	265.00	kWh/Year

### Recommendations

#### Lower cost measures

None

#### Further measures to achieve even higher standards

None