

PREDICTED ENERGY ASSESSMENT

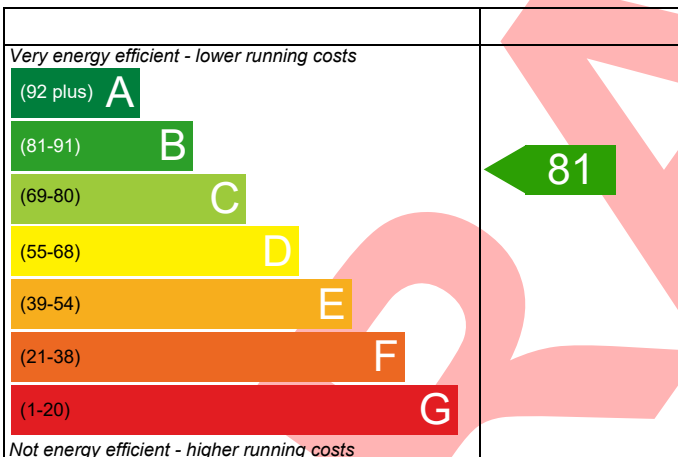
379, 1 Bed,
K, B

Dwelling type: Flat, Semi-Detached
Date of assessment: 22/01/2024
Produced by: Katarzyna Gotlib
Total floor area: 48.15 m²

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 (CO₂) emissions.

Energy Efficiency Rating

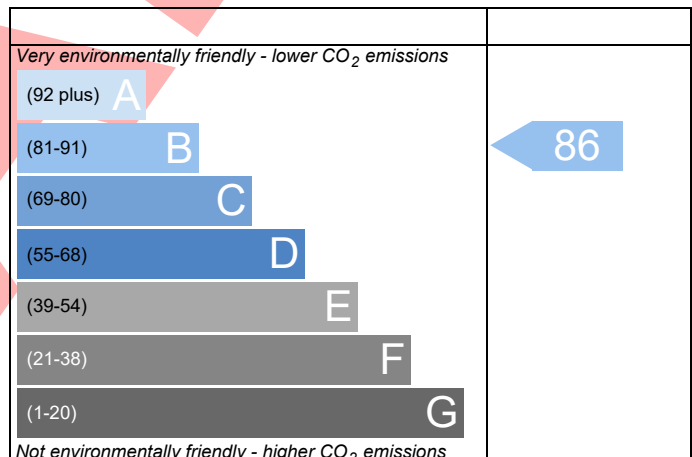


England

EU Directive
2002/91/EC

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.

Environmental Impact (CO₂) Rating



England

EU Directive
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) 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	4907-Z852-6657-0379	Issued on Date	22/01/2024
Assessment Reference	379	Prop Type Ref	Leadon End GFM Op
Property	379, 1 Bed, K, B		

SAP Rating	81 B	DER	22.87	TER	22.91
Environmental	86 B	% DER<TER	0.19		
CO ₂ Emissions (t/year)	0.94	DFEE	55.85	TFEE	59.56
General Requirements Compliance	Pass	% DFEE<TFEE	6.23		

Assessor Details	Mrs. Katarzyna Gotlib, Katarzyna Gotlib, Tel: 01884 242 050, kat.gotlib@aessc.co.uk	Assessor ID	Z852-0001
Client	Redrow, Redrow		

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		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	22.91	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	22.87	kgCO ₂ /m ²	Pass
	-0.04 (-0.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	59.56	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	55.85	kWh/m ² /yr	
	-3.7 (-6.2%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.28 (max. 0.30)	0.28 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	Pass
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	Pass
Openings	1.30 (max. 2.00)	1.50 (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	5.01 (design value)	m ³ /(h.m ²) @ 50 Pa	
Maximum	10.0	m ³ /(h.m ²) @ 50 Pa	Pass

Limiting System Efficiencies

4 Heating efficiency

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BUILDING REGULATION COMPLIANCE

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESP1 35
Combi boiler
Efficiency: 89.6% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Severn Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing South East

1.62 m², No overhang

Windows facing North West

1.94 m², 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

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.01 (design value)

m³/(h.m²) @ 50 Pa

Maximum

10.0

m³/(h.m²) @ 50 Pa

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.11

W/m²K

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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
Totals	£0	£0	B 81	B 86	

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FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	4907-Z852-6657-0379				Issued on Date	22/01/2024
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Environmental	86 B	% DER<TER	0.19			
CO ₂ Emissions (t/year)	0.94	DFEE	55.85	TFEE	59.56	
General Requirements Compliance	Pass	% DFEE<TFEE	6.23			
Assessor Details	Mrs. Katarzyna Gotlib, Katarzyna Gotlib, Tel: 01884 242 050, kat.gotlib@aessc.co.uk				Assessor ID	Z852-0001
Client	Redrow, Redrow					

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

Ground-floor flat, total floor area 48 m²

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
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 22.91 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 22.87 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)59.6 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)55.9 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.28 (max. 0.30)	0.28 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.30 (max. 2.00)	1.50 (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: 5.01 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal LOGIC COMBI ESP1 35
Combi boiler
Efficiency: 89.6% SEDBUK2009
Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Severn Valley): Not significant OK
Based on:
Overshading: Average
Windows facing South East: 1.62 m², No overhang
Windows facing North West: 1.94 m², No overhang
Air change rate: 4.00 ach
Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K
Roof U-value 0.11 W/m²K

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 ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1798 (8)
Pressure test					Yes
Measured/design AP50					5.0100
Infiltration rate					0.4303 (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) =		0.3658 (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	0.4664	0.4572	0.4481	0.4023	0.3932	0.3475	0.3475	0.3383	0.3658	0.3932	0.4115	0.4298 (22b)
Effective ac	0.6087	0.6045	0.6004	0.5809	0.5773	0.5604	0.5604	0.5572	0.5669	0.5773	0.5847	0.5924 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0600	1.2000	2.4720		(26)
Window (Uw = 1.24)			3.5600	1.1814	4.2058		(27)
Half Glazed Door			2.0600	1.5000	3.0900		(26a)
Jetfloor 80mm			48.1500	0.1700	8.1855	75.0000	3611.2500 (28a)
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.2800	16.2512	52.3000	3035.4920 (29a)
400mm Plane Ceiling	1.6600		1.6600	0.1100	0.1826	9.0000	14.9400 (30)
Total net area of external elements Aum(A, m ²)			115.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3871		(33)
E-WM-23/24/30				13.9600	0.0000	45.0000	628.2000 (32)
E-FC-11				46.4900		70.0000	3254.3000 (32b)
GF Timber				68.2500		9.0000	614.2500 (32c)
Cavity Wall to Store				19.2000		52.3000	1004.1600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12162.5920 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							252.5980 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.1760 (36)
Total fabric heat loss						(33) + (36) =	40.5631 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	22.3437	22.1887	22.0368	21.3233	21.1897	20.5683	20.5683	20.4532	20.8076	21.1897	21.4598	21.7422 (38)
Heat transfer coeff	62.9068	62.7518	62.5999	61.8863	61.7528	61.1313	61.1313	61.0162	61.3707	61.7528	62.0229	62.3052 (39)
Average = Sum(39)m / 12 =												61.8857 (39)
HLP	1.3065	1.3033	1.3001	1.2853	1.2825	1.2696	1.2696	1.2672	1.2746	1.2825	1.2881	1.2940 (40)
HLP (average)												1.2853 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Daily hot water use	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)												Total = Sum(45)m = 1149.3642 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

	17.8747	15.6333	16.1322	14.0644	13.4951	11.6453	10.7911	12.3829	12.5308	14.6034	15.9408	17.3107 (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	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)
Combi loss	13.9864	12.6190	13.9489	13.4739	13.9048	13.4353	13.8701	13.8926	13.4563	13.9307	13.5103	13.9791 (61)
Total heat required for water heating calculated for each month	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (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	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
Heat gains from water heating, kWh/month	43.1188	37.8086	39.2469	34.5446	33.3904	29.1725	27.3877	30.9219	31.1407	35.8536	38.7130	41.8668 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	15.5482	13.8098	11.2309	8.5025	6.3557	5.3658	5.7979	7.5363	10.1152	12.8436	14.9904	15.9804 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	142.4307	143.9087	140.1842	132.2552	122.2463	112.8394	106.5550	105.0770	108.8015	116.7304	126.7393	136.1463 (68)
Pumps, fans	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319 (71)
Total internal gains	57.9554	56.2627	52.7512	47.9786	44.8796	40.5174	36.8114	41.5617	43.2509	48.1903	53.7680	56.2725 (72)
	266.4712	264.5182	254.7032	239.2733	224.0186	209.2595	199.7013	204.7120	212.7046	228.3013	246.0347	258.9361 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast				1.6200	36.7938		0.5200		0.0000		0.7700		23.8662 (77)
Northwest				1.9400	11.2829		0.5200		0.0000		0.7700		8.7643 (81)
Solar gains	32.6306	58.4931	87.7653	121.7064	148.1514	152.2838	144.6523	124.1275	99.3938	66.7322	39.6140		27.5819 (83)
Total gains	299.1018	323.0112	342.4685	360.9797	372.1701	361.5433	344.3535	328.8395	312.0984	295.0335	285.6488		286.5180 (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	53.7064	53.8391	53.9697	54.5920	54.7100	55.2662	55.2662	55.3705	55.0507	54.7100	54.4718	54.2249
alpha	4.5804	4.5893	4.5980	4.6395	4.6473	4.6844	4.6844	4.6914	4.6700	4.6473	4.6315	4.6150
util living area	0.9977	0.9964	0.9929	0.9822	0.9487	0.8550	0.7099	0.7534	0.9231	0.9853	0.9960	0.9982 (86)
MIT	19.5850	19.7040	19.9308	20.2554	20.5820	20.8445	20.9535	20.9376	20.7439	20.3358	19.9097	19.5656 (87)
Th 2	19.8358	19.8383	19.8408	19.8524	19.8546	19.8647	19.8647	19.8666	19.8608	19.8546	19.8502	19.8456 (88)
util rest of house	0.9969	0.9951	0.9901	0.9741	0.9218	0.7730	0.5597	0.6117	0.8708	0.9771	0.9943	0.9975 (89)
MIT 2	18.5581	18.6787	18.9065	19.2364	19.5513	19.7845	19.8518	19.8470	19.7061	19.3194	18.8936	18.5464 (90)
Living area fraction												
MIT	18.9955	19.1154	19.3428	19.6705	19.9904	20.2360	20.3211	20.3116	20.1482	19.7524	19.3264	18.9805 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.8455	18.9654	19.1928	19.5205	19.8404	20.0860	20.1711	20.1616	19.9982	19.6024	19.1764	18.8305 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9960	0.9937	0.9880	0.9711	0.9214	0.7918	0.6043	0.6532	0.8787	0.9746	0.9928	0.9967 (94)
Ext temp.	297.8982	320.9723	338.3661	350.5312	342.9152	286.2546	208.0917	214.7826	274.2501	287.5356	283.6062	285.5755 (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	915.0090	882.6306	794.5672	657.2627	502.6902	335.3665	218.3059	229.5156	361.9746	555.9214	749.0150	911.5596 (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	459.1304	377.4344	339.4136	220.8466	118.8726	0.0000	0.0000	0.0000	0.0000	199.6790	335.0943	465.7322 (98)
Space heating per m2												2516.2033 (98)
										(98) / (4) =		52.2576 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 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 %)												90.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2780.3351 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	459.1304	377.4344	339.4136	220.8466	118.8726	0.0000	0.0000	0.0000	0.0000	199.6790	335.0943	465.7322 (98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000 (210)
Space heating fuel (main heating system)	507.3264	417.0546	375.0427	244.0294	131.3509	0.0000	0.0000	0.0000	0.0000	220.6398	370.2700	514.6212 (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												
Water heating requirement	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
Efficiency of water heater (217)m	89.7603	89.7226	89.6339	89.4286	88.9790	87.3000	87.3000	87.3000	87.3000	89.3282	89.6348	87.3000 (216)
Fuel for water heating, kWh/month	148.3404	130.2247	135.5476	119.9132	116.7381	104.3190	98.2938	110.4757	111.1053	124.5820	133.6336	144.1046 (219)
Water heating fuel used												1477.2782 (219)
Annual totals kWh/year												
Space heating fuel - main system												2780.3351 (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)												274.5864 (232)
Total delivered energy for all uses												4607.1997 (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	2780.3351	0.2160	600.5524 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1477.2782	0.2160	319.0921 (264)
Space and water heating			919.6445 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	274.5864	0.5190	142.5103 (268)
Total CO2, kg/year			1101.0798 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			22.8700 (273)

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

DER		22.8700 ZC1
Total Floor Area	TFA	48.1500
Assumed number of occupants	N	1.6358
CO2 emission factor in Table 12 for electricity displaced from grid	EF	0.5190
CO2 emissions from appliances, equation (L14)		17.5289 ZC2
CO2 emissions from cooking, equation (L16)		3.2868 ZC3
Total CO2 emissions		43.6856 ZC4
Residual CO2 emissions offset from biofuel CHP		0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year		0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation		0.0000 ZC7
Net CO2 emissions		43.6856 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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					20.0000 / (5) = 0.1798 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4298 (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) = 0.3653 (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	0.4658	0.4567	0.4475	0.4019	0.3927	0.3471	0.3471	0.3379	0.3653	0.3927	0.4110	0.4293 (22b)
Effective ac	0.6085	0.6043	0.6001	0.5808	0.5771	0.5602	0.5602	0.5571	0.5667	0.5771	0.5845	0.5921 (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 Opaque door			2.0600	1.0000	2.0600			(26)					
TER Semi-glazed door			2.0600	1.2000	2.4720			(26a)					
TER Opening Type (Uw = 1.40)			3.5600	1.3258	4.7197			(27)					
Jetfloor 80mm			48.1500	0.1300	6.2595			(28a)					
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.1800	10.4472			(29a)					
400mm Plane Ceiling	1.6600		1.6600	0.1300	0.2158			(30)					
Total net area of external elements Aum(A, m2)			115.5300					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1742			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								9.4076 (36)					
Total fabric heat loss						(33) + (36) =	35.5818	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.3345	Feb 22.1798	Mar 22.0283	Apr 21.3164	May 21.1832	Jun 20.5631	Jul 20.5631	Aug 20.4483	Sep 20.8019	Oct 21.1832	Nov 21.4526	Dec 21.7343	(38)
Heat transfer coeff	57.9163	57.7616	57.6101	56.8981	56.7650	56.1449	56.1449	56.0301	56.3837	56.7650	57.0344	57.3161	(39)
Average = Sum(39)m / 12 =												56.8975	(39)
HLP	Jan 1.2028	Feb 1.1996	Mar 1.1965	Apr 1.1817	May 1.1789	Jun 1.1660	Jul 1.1660	Aug 1.1637	Sep 1.1710	Oct 1.1789	Nov 1.1845	Dec 1.1904	(40)
HLP (average)												1.1817	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)										Total = Sum(45)m =		1149.3642 (45)
Distribution loss (46)m = 0.15 x (45)m												
	17.8747	15.6333	16.1322	14.0644	13.4951	11.6453	10.7911	12.3829	12.5308	14.6034	15.9408	17.3107 (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												

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Combi 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)
Total heat required for water heating calculated for each month	40.9481	35.6405	37.9701	35.3043	34.9920	32.4223	33.5030	34.9920	35.3043	37.9701	38.1862	40.9481 (61)
Solar input	160.1126	139.8625	145.5179	129.0670	124.9597	110.0575	105.4435	117.5447	118.8429	135.3263	144.4582	156.3526 (62)
Output from w/h	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)
Heat gains from water heating, kWh/month	160.1126	139.8625	145.5179	129.0670	124.9597	110.0575	105.4435	117.5447	118.8429	135.3263	144.4582	156.3526 (64)
	49.8592	43.5639	45.2522	40.0022	38.6622	33.9193	32.2959	36.1968	36.6027	41.8635	44.8820	48.6090 (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	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.5482	13.8098	11.2309	8.5025	6.3557	5.3658	5.7979	7.5363	10.1152	12.8436	14.9904	15.9804	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	142.4307	143.9087	140.1842	132.2552	122.2463	112.8394	106.5550	105.0770	108.8015	116.7304	126.7393	136.1463	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	(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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	(71)
Water heating gains (Table 5)	67.0151	64.8273	60.8228	55.5586	51.9654	47.1101	43.4085	48.6516	50.8370	56.2681	62.3361	65.3347	(72)
Total internal gains	275.5310	273.0827	262.7748	246.8533	231.1044	215.8522	206.2984	211.8019	220.2907	236.3791	254.6028	267.9983	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				1.6200	36.7938	0.6300	0.7000	0.7700	18.2164 (77)			
Northwest				1.9400	11.2829	0.6300	0.7000	0.7700	6.6895 (81)			
Solar gains	24.9059	44.6460	66.9886	92.8948	113.0794	116.2335	110.4086	94.7427	75.8642	50.9346	30.2362	21.0524 (83)
Total gains	300.4369	317.7287	329.7634	339.7480	344.1838	332.0857	316.7070	306.5446	296.1549	287.3137	284.8389	289.0507 (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	57.7342	57.8888	58.0411	58.7673	58.9052	59.5557	59.5557	59.6778	59.3034	58.9052	58.6269	58.3388	
alpha	4.8489	4.8593	4.8694	4.9178	4.9270	4.9704	4.9704	4.9785	4.9536	4.9270	4.9085	4.8893	
util living area	0.9976	0.9964	0.9934	0.9840	0.9541	0.8635	0.7155	0.7533	0.9230	0.9850	0.9958	0.9980	(86)
MIT	19.7105	19.8143	20.0179	20.3132	20.6128	20.8589	20.9602	20.9478	20.7752	20.4037	20.0131	19.6941	(87)
Th 2	19.9177	19.9203	19.9228	19.9347	19.9369	19.9473	19.9473	19.9492	19.9433	19.9369	19.9324	19.9277	(88)
util rest of house	0.9968	0.9952	0.9909	0.9770	0.9303	0.7879	0.5745	0.6201	0.8731	0.9770	0.9940	0.9974	(89)
MIT 2	18.2057	18.3592	18.6579	19.0942	19.5181	19.8374	19.9302	19.9242	19.7415	19.2284	18.6584	18.1888	(90)
Living area fraction	18.8467	18.9790	19.2372	19.6134	19.9844	20.2725	20.3690	20.3602	20.1818	19.7290	19.2355	18.8300	(91)
MIT	18.8467	18.9790	19.2372	19.6134	19.9844	20.2725	20.3690	20.3602	20.1818	19.7290	19.2355	18.8300	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8467	18.9790	19.2372	19.6134	19.9844	20.2725	20.3690	20.3602	20.1818	19.7290	19.2355	18.8300	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	299.1311	315.7088	326.0348	330.9859	320.6589	270.5265	201.2094	207.5540	262.6013	280.0928	282.6815	288.0115	(94)
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	(95)
Heat loss rate W	842.4906	813.2275	733.7924	609.5742	470.2656	318.4830	211.6090	221.8925	342.9158	518.2085	692.1401	838.5372	(97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	(97a)
Space heating kWh	404.2595	334.3325	303.3716	200.5836	111.3074	0.0000	0.0000	0.0000	0.0000	177.1581	294.8102	409.5912	(98)
Space heating												2235.4140	(98)
Space heating per m2												46.4260	(99)

8c. Space cooling requirement

Not applicable

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

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2393.3768 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	404.2595	334.3325	303.3716	200.5836	111.3074	0.0000	0.0000	0.0000	0.0000	177.1581	294.8102	409.5912	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	432.8260	357.9577	324.8090	214.7576	119.1728	0.0000	0.0000	0.0000	0.0000	189.6767	315.6426	438.5345	(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	160.1126	139.8625	145.5179	129.0670	124.9597	110.0575	105.4435	117.5447	118.8429	135.3263	144.4582	156.3526	(64)
Efficiency of water heater	87.2854	87.1663	86.8584	86.1571	84.7614	80.3000	80.3000	80.3000	80.3000	85.7302	86.8093	87.3642	(217)
Fuel for water heating, kWh/month	183.4358	160.4548	167.5345	149.8042	147.4252	137.0579	131.3119	146.3820	147.9986	157.8513	166.4087	178.9664	(219)
Water heating fuel used												1874.6313	(219)
Annual totals kWh/year													
Space heating fuel - main system												2393.3768	(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)												274.5864	(232)
Total delivered energy for all uses												4617.5946	(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	2393.3768	0.2160	516.9694 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1874.6313	0.2160	404.9204 (264)
Space and water heating			921.8898 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	274.5864	0.5190	142.5103 (268)
Total CO2, kg/m2/year			1103.3251 (272)
Emissions per m2 for space and water heating			19.1462 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.9597 (272b)
Emissions per m2 for pumps and fans			0.8084 (272c)
Target Carbon Dioxide Emission Rate (TER) = (19.1462 * 1.00) + 2.9597 + 0.8084, rounded to 2 d.p.			22.9100 (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 ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1798 (8)
Measured/design AP50					Yes
Infiltration rate					5.0100
Number of sides sheltered					0.4303 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3658 (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												
	0.4664	0.4572	0.4481	0.4023	0.3932	0.3475	0.3475	0.3383	0.3658	0.3932	0.4115	0.4298 (22b)
Effective ac	0.6087	0.6045	0.6004	0.5809	0.5773	0.5604	0.5604	0.5572	0.5669	0.5773	0.5847	0.5924 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0600	1.2000	2.4720		(26)
Window (Uw = 1.24)			3.5600	1.1814	4.2058		(27)
Half Glazed Door			2.0600	1.5000	3.0900		(26a)
Jetfloor 80mm			48.1500	0.1700	8.1855	75.0000	3611.2500 (28a)
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.2800	16.2512	52.3000	3035.4920 (29a)
400mm Plane Ceiling	1.6600		1.6600	0.1100	0.1826	9.0000	14.9400 (30)
Total net area of external elements Aum(A, m ²)			115.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3871		(33)
E-WM-23/24/30				13.9600	0.0000	45.0000	628.2000 (32)
E-FC-11				46.4900		30.0000	1394.7000 (32b)
GF Timber				68.2500		9.0000	614.2500 (32c)
Cavity Wall to Store				19.2000		52.3000	1004.1600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10302.9920 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							213.9770 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.1760 (36)
Total fabric heat loss						(33) + (36) =	40.5631 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	22.3437	22.1887	22.0368	21.3233	21.1897	20.5683	20.5683	20.4532	20.8076	21.1897	21.4598	21.7422 (38)
Heat transfer coeff	62.9068	62.7518	62.5999	61.8863	61.7528	61.1313	61.1313	61.0162	61.3707	61.7528	62.0229	62.3052 (39)
Average = Sum(39)m / 12 =												61.8857 (39)
HLP	1.3065	1.3033	1.3001	1.2853	1.2825	1.2696	1.2696	1.2672	1.2746	1.2825	1.2881	1.2940 (40)
HLP (average)												1.2853 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Daily hot water use	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)												Total = Sum(45)m = 1149.3642 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Water 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 (46)
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	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 (59)
Heat gains from water heating, kWh/month	25.3225	22.1472	22.8539	19.9246	19.1181	16.4975	15.2873	17.5424	17.7520	20.6882	22.5828	24.5234 (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	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.5482	13.8098	11.2309	8.5025	6.3557	5.3658	5.7979	7.5363	10.1152	12.8436	14.9904	15.9804	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	142.4307	143.9087	140.1842	132.2552	122.2463	112.8394	106.5550	105.0770	108.8015	116.7304	126.7393	136.1463	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	(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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	(71)
Water heating gains (Table 5)	34.0356	32.9571	30.7176	27.6730	25.6964	22.9132	20.5475	23.5786	24.6555	27.8067	31.3650	32.9616	(72)
Total internal gains	239.5514	238.2125	229.6697	215.9677	201.8354	188.6553	180.4373	183.7288	191.1092	204.9177	220.6317	232.6252	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W		
Southeast				1.6200	36.7938	0.5200	0.0000	0.7700		23.8662 (77)		
Northwest				1.9400	11.2829	0.5200	0.0000	0.7700		8.7643 (81)		
Solar gains	32.6306	58.4931	87.7653	121.7064	148.1514	152.2838	144.6523	124.1275	99.3938	66.7322	39.6140	27.5819 (83)
Total gains	272.1820	296.7056	317.4350	337.6741	349.9869	340.9391	325.0896	307.8564	290.5030	271.6499	260.2457	260.2071 (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	45.4950	45.6073	45.7180	46.2452	46.3451	46.8163	46.8163	46.9046	46.6337	46.3451	46.1433	45.9342	
alpha	4.0330	4.0405	4.0479	4.0830	4.0897	4.1211	4.1211	4.1270	4.1089	4.0897	4.0762	4.0623	
util living area	0.9968	0.9950	0.9907	0.9784	0.9440	0.8558	0.7221	0.7661	0.9219	0.9827	0.9947	0.9974	(86)
MIT	19.3382	19.4740	19.7333	20.1038	20.4773	20.7863	20.9264	20.9036	20.6659	20.1958	19.7088	19.3170	(87)
Th 2	19.8358	19.8383	19.8408	19.8524	19.8546	19.8647	19.8647	19.8666	19.8608	19.8546	19.8502	19.8456	(88)
util rest of house	0.9958	0.9934	0.9876	0.9700	0.9183	0.7809	0.5793	0.6336	0.8744	0.9744	0.9927	0.9966	(89)
MIT 2	18.3296	18.4669	18.7269	19.1022	19.4642	19.7452	19.8406	19.8312	19.6472	19.1971	18.7105	18.3159	(90)
Living area fraction									fLA = Living area / (4) =			0.4260	(91)
MIT	18.7592	18.8959	19.1556	19.5289	19.8957	20.1887	20.3031	20.2880	20.0811	19.6225	19.1357	18.7423	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7592	18.8959	19.1556	19.5289	19.8957	20.1887	20.3031	20.2880	20.0811	19.6225	19.1357	18.7423	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9946	0.9917	0.9851	0.9669	0.9194	0.8056	0.6399	0.6888	0.8856	0.9721	0.9911	0.9955	(94)
Ext temp.	270.7090	294.2461	312.6946	326.4993	321.7868	274.6469	208.0313	212.0455	257.2716	264.0791	257.9238	259.0377	(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	909.5818	878.2659	792.2361	657.7803	506.1093	341.6449	226.3758	237.2323	367.0655	557.1659	746.4892	906.0620	(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	475.3214	392.4613	356.7789	238.5223	137.1359	0.0000	0.0000	0.0000	0.0000	218.0566	351.7671	481.3861	(98)
												2651.4295	(98)
												55.0660	(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	574.6343	452.3717	463.7232	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7086	0.7956	0.7668	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	407.1740	359.8995	355.5929	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	461.9051	442.3201	423.5014	0.0000	0.0000	0.0000	0.0000	(103)

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Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

Month fraction	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	39.4064	61.3209	50.5239	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												151.2513 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
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 (107)
Space cooling per m2												37.8128 (107)
Energy for space heating												0.7853 (108)
Energy for space cooling												55.0660 (99)
Total												0.7853 (108)
Dwelling Fabric Energy Efficiency (DFEE)												55.8513 (109)
												55.9 (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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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) = 0.1798 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4298 (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) = 0.3653 (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	0.4658	0.4567	0.4475	0.4019	0.3927	0.3471	0.3471	0.3379	0.3653	0.3927	0.4110	0.4293 (22b)
Effective ac	0.6085	0.6043	0.6001	0.5808	0.5771	0.5602	0.5602	0.5571	0.5667	0.5771	0.5845	0.5921 (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 Opaque door			2.0600	1.0000	2.0600			(26)					
TER Semi-glazed door			2.0600	1.2000	2.4720			(26a)					
TER Opening Type (Uw = 1.40)			3.5600	1.3258	4.7197			(27)					
Jetfloor 80mm			48.1500	0.1300	6.2595			(28a)					
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.1800	10.4472			(29a)					
400mm Plane Ceiling	1.6600		1.6600	0.1300	0.2158			(30)					
Total net area of external elements Aum(A, m2)			115.5300					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.1742			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								9.4076 (36)					
Total fabric heat loss						(33) + (36) =		35.5818 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 22.3345	Feb 22.1798	Mar 22.0283	Apr 21.3164	May 21.1832	Jun 20.5631	Jul 20.5631	Aug 20.4483	Sep 20.8019	Oct 21.1832	Nov 21.4526	Dec 21.7343	(38)
Heat transfer coeff	57.9163	57.7616	57.6101	56.8981	56.7650	56.1449	56.1449	56.0301	56.3837	56.7650	57.0344	57.3161	(39)
Average = Sum(39)m / 12 =												56.8975	(39)
HLP	Jan 1.2028	Feb 1.1996	Mar 1.1965	Apr 1.1817	May 1.1789	Jun 1.1660	Jul 1.1660	Aug 1.1637	Sep 1.1710	Oct 1.1789	Nov 1.1845	Dec 1.1904	(40)
HLP (average)												1.1817	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Daily hot water use	Jan 80.3552	Feb 77.4332	Mar 74.5112	Apr 71.5892	May 68.6672	Jun 65.7452	Jul 65.7452	Aug 68.6672	Sep 71.5892	Oct 74.5112	Nov 77.4332	Dec 80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)										Total = Sum(45)m =		1149.3642 (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												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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)
Heat gains from water heating, kWh/month	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)
	25.3225	22.1472	22.8539	19.9246	19.1181	16.4975	15.2873	17.5424	17.7520	20.6882	22.5828	24.5234 (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	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899	81.7899 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	15.5482	13.8098	11.2309	8.5025	6.3557	5.3658	5.7979	7.5363	10.1152	12.8436	14.9904	15.9804 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	142.4307	143.9087	140.1842	132.2552	122.2463	112.8394	106.5550	105.0770	108.8015	116.7304	126.7393	136.1463 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790	31.1790 (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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319 (71)
Water heating gains (Table 5)	34.0356	32.9571	30.7176	27.6730	25.6964	22.9132	20.5475	23.5786	24.6555	27.8067	31.3650	32.9616 (72)
Total internal gains	239.5514	238.2125	229.6697	215.9677	201.8354	188.6553	180.4373	183.7288	191.1092	204.9177	220.6317	232.6252 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southeast	1.6200	36.7938	0.6300	0.7000	0.7700	18.2164 (77)
Northwest	1.9400	11.2829	0.6300	0.7000	0.7700	6.6895 (81)

Solar gains	24.9059	44.6460	66.9886	92.8948	113.0794	116.2335	110.4086	94.7427	75.8642	50.9346	30.2362	21.0524 (83)
Total gains	264.4573	282.8585	296.6582	308.8625	314.9149	304.8888	290.8460	278.4716	266.9734	255.8524	250.8678	253.6776 (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	57.7342	57.8888	58.0411	58.7673	58.9052	59.5557	59.5557	59.6778	59.3034	58.9052	58.6269	58.3388
alpha	4.8489	4.8593	4.8694	4.9178	4.9270	4.9704	4.9704	4.9785	4.9536	4.9270	4.9085	4.8893
util living area	0.9986	0.9979	0.9958	0.9892	0.9668	0.8929	0.7581	0.7990	0.9456	0.9907	0.9976	0.9989 (86)
MIT	19.6417	19.7480	19.9557	20.2574	20.5664	20.8306	20.9484	20.9314	20.7346	20.3464	19.9484	19.6262 (87)
Th 2	19.9177	19.9203	19.9228	19.9347	19.9369	19.9473	19.9473	19.9492	19.9433	19.9369	19.9324	19.9277 (88)
util rest of house	0.9982	0.9971	0.9942	0.9842	0.9485	0.8260	0.6180	0.6700	0.9063	0.9855	0.9966	0.9985 (89)
MIT 2	18.6803	18.7884	18.9976	19.3066	19.6092	19.8532	19.9313	19.9253	19.7732	19.3978	18.9984	18.6727 (90)
Living area fraction									fLA = Living area / (4) =			0.4260 (91)
MIT	19.0898	19.1971	19.4057	19.7116	20.0170	20.2695	20.3646	20.3539	20.1827	19.8018	19.4031	19.0789 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0898	19.1971	19.4057	19.7116	20.0170	20.2695	20.3646	20.3539	20.1827	19.8018	19.4031	19.0789 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9977	0.9964	0.9931	0.9829	0.9502	0.8499	0.6790	0.7257	0.9173	0.9846	0.9959	0.9981 (94)
Ext temp.	263.8443	281.8372	294.6160	303.5802	299.2303	259.1311	197.4779	202.0732	244.9002	251.9180	249.8311	253.2025 (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	856.5693	825.8259	743.4999	615.1603	472.1121	318.3149	211.3604	221.5354	342.9675	522.3418	701.6979	852.7997 (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	440.9874	365.5604	333.9696	224.3377	128.6241	0.0000	0.0000	0.0000	0.0000	201.1953	325.3441	446.1003 (98)
Space heating per m2										(98) / (4) =		2466.1189 (98)
												51.2174 (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	527.7621	415.4723	425.8286	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7254	0.8188	0.7931	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	382.8231	340.1931	337.7412	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	419.7685	402.2951	389.1555	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	26.6007	46.2039	38.2523	0.0000	0.0000	0.0000	0.0000 (104)
Space cooling												111.0568 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Intermittency factor (Table 10b)	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 kWh	0.0000	0.0000	0.0000	0.0000	6.6502	11.5510	9.5631	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											27.7642 (107)
Space cooling per m2											0.5766 (108)
Energy for space heating											51.2174 (99)
Energy for space cooling											0.5766 (108)
Total											51.7940 (109)
Target Fabric Energy Efficiency (TFEE)											59.6 (109)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1798 (8)
Measured/design AP50					Yes
Infiltration rate					5.0100
Number of sides sheltered					0.4303 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.7000	4.3000	4.3000	3.8000	3.8000	3.7000	3.8000	4.3000	4.3000	4.6000 (22)
Wind factor	1.2250	1.1500	1.1750	1.0750	1.0750	0.9500	0.9500	0.9250	0.9500	1.0750	1.0750	1.1500 (22a)
Adj infilt rate												
	0.4481	0.4206	0.4298	0.3932	0.3932	0.3475	0.3475	0.3383	0.3475	0.3932	0.3932	0.4206 (22b)
Effective ac	0.6004	0.5885	0.5924	0.5773	0.5773	0.5604	0.5604	0.5572	0.5604	0.5773	0.5773	0.5885 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0600	1.2000	2.4720		(26)
Window (Uw = 1.24)			3.5600	1.1814	4.2058		(27)
Half Glazed Door			2.0600	1.5000	3.0900		(26a)
Jetfloor 80mm			48.1500	0.1700	8.1855	75.0000	3611.2500 (28a)
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.2800	16.2512	52.3000	3035.4920 (29a)
400mm Plane Ceiling	1.6600		1.6600	0.1100	0.1826	9.0000	14.9400 (30)
Total net area of external elements Aum(A, m ²)			115.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3871		(33)
E-WM-23/24/30				13.9600	0.0000	45.0000	628.2000 (32)
E-FC-11				46.4900		70.0000	3254.3000 (32b)
GF Timber				68.2500		9.0000	614.2500 (32c)
Cavity Wall to Store				19.2000		52.3000	1004.1600 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

(28)...(30) + (32) + (32a)...(32e) = 12162.5920 (34)
252.5980 (35)
6.1760 (36)
(33) + (36) = 40.5631 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	22.0368	21.5995	21.7422	21.1897	21.1897	20.5683	20.5683	20.4532	20.5683	21.1897	21.1897	21.5995 (38)
Heat transfer coeff	62.5999	62.1625	62.3052	61.7528	61.7528	61.1313	61.1313	61.0162	61.1313	61.7528	61.7528	62.1625 (39)
Average = Sum(39)m / 12 =												61.7210 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3001	1.2910	1.2940	1.2825	1.2825	1.2696	1.2696	1.2672	1.2696	1.2825	1.2825	1.2910 (40)
HLP (average)												1.2818 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Average daily hot water use (litres/day)

1.6358 (42)
73.0502 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)												Total = Sum(45)m = 1149.3642 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF HEAT DEMAND 09 Jan 2014

Water storage loss:	17.8747	15.6333	16.1322	14.0644	13.4951	11.6453	10.7911	12.3829	12.5308	14.6034	15.9408	17.3107 (46)
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	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)
Combi loss	13.9864	12.6190	13.9489	13.4739	13.9048	13.4353	13.8701	13.8926	13.4563	13.9307	13.5103	13.9791 (61)
Total heat required for water heating calculated for each month	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (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	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
RHI water heating demand	43.1188	37.8086	39.2469	34.5446	33.3904	29.1725	27.3877	30.9219	31.1407	35.8536	38.7130	41.8668 (65)
Heat gains from water heating, kWh/month												1313 (64)
												1313 (64)

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	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.8705	34.5245	28.0772	21.2562	15.8893	13.4144	14.4947	18.8408	25.2881	32.1090	37.4760	39.9509 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	212.5831	214.7891	209.2301	197.3959	182.4572	168.4170	159.0373	156.8313	162.3902	174.2245	189.1632	203.2034 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506 (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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319 (71)
Water heating gains (Table 5)	57.9554	56.2627	52.7512	47.9786	44.8796	40.5174	36.8114	41.5617	43.2509	48.1903	53.7680	56.2725 (72)
Total internal gains	391.5756	387.7428	372.2250	348.7973	325.3927	304.5154	292.5100	299.4004	313.0958	336.6904	362.5737	381.5933 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				1.6200	43.0593	0.5200	0.0000	0.7700	27.9303 (77)			
Northwest				1.9400	13.7804	0.5200	0.0000	0.7700	10.7043 (81)			
Solar gains	38.6346	61.7504	93.6057	133.5985	154.0254	171.3382	156.8143	136.8786	110.0597	72.5163	4.6241	31.5606 (83)
Total gains	430.2102	449.4932	465.8307	482.3957	479.4181	475.8536	449.3243	436.2790	423.1555	409.2067	367.1978	413.1539 (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)												
tau	53.9697	54.3494	54.2249	54.7100	54.7100	55.2662	55.2662	55.3705	55.2662	54.7100	54.7100	54.3494
alpha	4.5980	4.6233	4.6150	4.6473	4.6473	4.6844	4.6844	4.6914	4.6844	4.6473	4.6473	4.6233
util living area	0.9885	0.9848	0.9734	0.9434	0.8703	0.7032	0.5643	0.5780	0.8039	0.9429	0.9863	0.9901 (86)
MIT	19.9026	19.9940	20.2103	20.4947	20.7616	20.9391	20.9824	20.9807	20.8801	20.5739	20.1442	19.8836 (87)
Th 2	19.8408	19.8479	19.8456	19.8546	19.8546	19.8647	19.8647	19.8666	19.8647	19.8546	19.8546	19.8479 (88)
util rest of house	0.9846	0.9797	0.9639	0.9215	0.8171	0.5971	0.4258	0.4374	0.7152	0.9159	0.9807	0.9868 (89)
MIT 2	18.8770	18.9726	19.1831	19.4630	19.7016	19.8396	19.8607	19.8621	19.8052	19.5413	19.1285	18.8640 (90)
Living area fraction									fLA = Living area / (4) =			0.4260 (91)
MIT	19.3139	19.4077	19.6206	19.9025	20.1531	20.3080	20.3385	20.3386	20.2631	19.9811	19.5611	19.2983 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.1639	19.2577	19.4706	19.7525	20.0031	20.1580	20.1885	20.1886	20.1131	19.8311	19.4111	19.1483 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	422.3149	438.8736	447.1803	443.3717	395.5255	298.1888	209.7915	209.0345	311.8782	374.5262	359.0209	406.5753 (95)
Ext temp.	4.9000	5.3000	7.0000	9.3000	12.2000	15.0000	16.7000	16.7000	14.4000	11.1000	7.8000	4.9000 (96)
Heat loss rate W	892.9155	867.6444	776.9863	645.4684	481.8627	315.3133	213.2552	212.8598	349.2476	539.1727	717.0196	885.7129 (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	350.1269	288.1339	245.3756	145.5096	64.2349	0.0000	0.0000	0.0000	0.0000	122.4970	257.7591	356.4783 (98)
Space heating												1830.1154 (98)
RHI space heating demand												1830 (98)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF HEAT DEMAND 09 Jan 2014

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =					Air changes per hour
Pressure test					20.0000 / (5) = 0.1798 (8)
Measured/design AP50					Yes
Infiltration rate					5.0100
Number of sides sheltered					0.4303 (18)
					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3658 (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	0.4664	0.4572	0.4481	0.4023	0.3932	0.3475	0.3475	0.3383	0.3658	0.3932	0.4115	0.4298 (22b)
	0.6087	0.6045	0.6004	0.5809	0.5773	0.5604	0.5604	0.5572	0.5669	0.5773	0.5847	0.5924 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0600	1.2000	2.4720		(26)
Window (Uw = 1.24)			3.5600	1.1814	4.2058		(27)
Half Glazed Door			2.0600	1.5000	3.0900		(26a)
Jetfloor 80mm			48.1500	0.1700	8.1855	75.0000	3611.2500 (28a)
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.2800	16.2512	52.3000	3035.4920 (29a)
400mm Plane Ceiling	1.6600		1.6600	0.1100	0.1826	9.0000	14.9400 (30)
Total net area of external elements Aum(A, m ²)			115.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3871		(33)
E-WM-23/24/30				13.9600	0.0000	45.0000	628.2000 (32)
E-FC-11				46.4900		70.0000	3254.3000 (32b)
GF Timber				68.2500		9.0000	614.2500 (32c)
Cavity Wall to Store				19.2000		52.3000	1004.1600 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12162.5920 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							252.5980 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.1760 (36)
Total fabric heat loss							(33) + (36) = 40.5631 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	22.3437	22.1887	22.0368	21.3233	21.1897	20.5683	20.5683	20.4532	20.8076	21.1897	21.4598	21.7422 (38)
Heat transfer coeff	62.9068	62.7518	62.5999	61.8863	61.7528	61.1313	61.1313	61.0162	61.3707	61.7528	62.0229	62.3052 (39)
Average = Sum(39)m / 12 =												61.8857 (39)
HLP	1.3065	1.3033	1.3001	1.2853	1.2825	1.2696	1.2696	1.2672	1.2746	1.2825	1.2881	1.2940 (40)
HLP (average)												1.2853 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Daily hot water use	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy conte	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Energy content (annual)												Total = Sum(45)m = 1149.3642 (45)
Distribution loss (46)m = 0.15 x (45)m												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 09 Jan 2014

Water storage loss:	17.8747	15.6333	16.1322	14.0644	13.4951	11.6453	10.7911	12.3829	12.5308	14.6034	15.9408	17.3107 (46)
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	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)
Combi loss	13.9864	12.6190	13.9489	13.4739	13.9048	13.4353	13.8701	13.8926	13.4563	13.9307	13.5103	13.9791 (61)
Total heat required for water heating calculated for each month	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (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	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
Heat gains from water heating, kWh/month	43.1188	37.8086	39.2469	34.5446	33.3904	29.1725	27.3877	30.9219	31.1407	35.8536	38.7130	41.8668 (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	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.8705	34.5245	28.0772	21.2562	15.8893	13.4144	14.4947	18.8408	25.2881	32.1090	37.4760	39.9509 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	212.5831	214.7891	209.2301	197.3959	182.4572	168.4170	159.0373	156.8313	162.3902	174.2245	189.1632	203.2034 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506 (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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319 (71)
Water heating gains (Table 5)	57.9554	56.2627	52.7512	47.9786	44.8796	40.5174	36.8114	41.5617	43.2509	48.1903	53.7680	56.2725 (72)
Total internal gains	391.5756	387.7428	372.2250	348.7973	325.3927	304.5154	292.5100	299.4004	313.0958	336.6904	362.5737	381.5933 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
Southeast				1.6200	36.7938	0.5200	0.0000	0.7700	23.8662 (77)			
Northwest				1.9400	11.2829	0.5200	0.0000	0.7700	8.7643 (81)			
Solar gains	32.6306	58.4931	87.7653	121.7064	148.1514	152.2838	144.6523	124.1275	99.3938	66.7322	39.6140	27.5819 (83)
Total gains	424.2061	446.2359	459.9903	470.5037	473.5441	456.7991	437.1623	423.5279	412.4896	403.4226	402.1878	409.1752 (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)	53.7064	53.8391	53.9697	54.5920	54.7100	55.2662	55.2662	55.3705	55.0507	54.7100	54.4718	54.2249
tau	4.5804	4.5893	4.5980	4.6395	4.6473	4.6844	4.6844	4.6914	4.6700	4.6473	4.6315	4.6150
alpha	0.9906	0.9867	0.9778	0.9536	0.8921	0.7549	0.5893	0.6268	0.8343	0.9538	0.9842	0.9920 (86)
util living area	19.8141	19.9270	20.1375	20.4332	20.7131	20.9121	20.9785	20.9712	20.8499	20.5136	20.1199	19.7917 (87)
MIT	19.8358	19.8383	19.8408	19.8524	19.8546	19.8647	19.8647	19.8666	19.8608	19.8546	19.8502	19.8456 (88)
Th 2	0.9875	0.9823	0.9700	0.9355	0.8472	0.6578	0.4502	0.4896	0.7548	0.9322	0.9781	0.9894 (89)
util rest of house	18.7852	18.8988	19.1082	19.4036	19.6612	19.8243	19.8594	19.8587	19.7810	19.4854	19.1000	18.7708 (90)
MIT 2	19.2235	19.3368	19.5466	19.8422	20.1093	20.2877	20.3361	20.3326	20.2363	19.9233	19.5344	19.2057 (92)
Living area fraction	0.9875	0.9823	0.9700	0.9355	0.8472	0.6578	0.4502	0.4896	0.7548	0.9322	0.9781	0.9894 (89)
MIT	19.2235	19.3368	19.5466	19.8422	20.1093	20.2877	20.3361	20.3326	20.2363	19.9233	19.5344	19.2057 (92)
Temperature adjustment	19.0735	19.1868	19.3966	19.6922	19.9593	20.1377	20.1861	20.1826	20.0863	19.7733	19.3844	19.0557 (93)
adjusted MIT	19.0735	19.1868	19.3966	19.6922	19.9593	20.1377	20.1861	20.1826	20.0863	19.7733	19.3844	19.0557 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9848	0.9791	0.9662	0.9325	0.8520	0.6834	0.4914	0.5301	0.7728	0.9303	0.9748	0.9870 (94)
Ext temp.	417.7763	436.9281	444.4236	438.7236	403.4740	312.1950	214.8278	224.5140	318.7915	375.3128	392.0620	403.8431 (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	929.3504	896.5224	807.3280	667.8881	510.0322	338.5240	219.2240	230.8000	367.3836	566.4799	761.9149	925.5858 (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	380.6112	308.8473	270.0009	164.9984	79.2793	0.0000	0.0000	0.0000	0.0000	142.2284	266.2941	388.1765 (98)
Space heating per m2												2000.4361 (98)
												(98) / (4) = 41.5459 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF ENERGY RATINGS 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 %)													90.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2210.4266 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	380.6112	308.8473	270.0009	164.9984	79.2793	0.0000	0.0000	0.0000	0.0000	142.2284	266.2941	388.1765	(98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000	(210)
Space heating fuel (main heating system)	420.5648	341.2678	298.3435	182.3187	87.6014	0.0000	0.0000	0.0000	0.0000	157.1584	294.2476	428.9243	(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													
Water heating requirement	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836	(64)
Efficiency of water heater (217)m	89.6484	89.5986	89.4821	89.2119	88.6569	87.3000	87.3000	87.3000	87.3000	89.0668	89.4824	87.3000	(216)
Fuel for water heating, kWh/month	148.5257	130.4050	135.7776	120.2045	117.1622	104.3190	98.2938	110.4757	111.1053	124.9476	133.8613	144.2753	(219)
Water heating fuel used												1479.3530	(219)
Annual totals kWh/year													
Space heating fuel - main system												2210.4266	(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)												274.5864	(232)
Total delivered energy for all uses												4039.3660	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2210.4266	3.4800	76.9228 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1479.3530	3.4800	51.4815 (247)
Pumps and fans for heating	75.0000	13.1900	9.8925 (249)
Energy for lighting	274.5864	13.1900	36.2179 (250)
Additional standing charges			120.0000 (251)
Total energy cost			294.5148 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.3279 (257)
SAP value		81.4754
SAP rating (Section 12)		81 (258)
SAP band		B

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	2210.4266	0.2160	477.4521 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1479.3530	0.2160	319.5403 (264)
Space and water heating			796.9924 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	274.5864	0.5190	142.5103 (268)
Total kg/year			978.4277 (272)
CO2 emissions per m2			20.3200 (273)
EI value			85.9249
EI rating			86 (274)
EI band			B

Calculation of stars for heating and DHW

Main heating energy efficiency	$3.48 \times (1 + 0.29 \times 0.00) / 0.9050 = 3.845$, stars = 4
Main heating environmental impact	$0.216 \times (1 + 0.29 \times 0.00) / 0.9050 = 0.2387$, stars = 4
Water heating energy efficiency	$3.48 / 0.8867 = 3.925$, stars = 4
Water heating environmental impact	$0.216 / 0.8867 = 0.2436$, stars = 4

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	48.1500 (1b)	x 2.3100 (2b)	= 111.2265 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 111.2265 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ 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)
Infiltation due to chimneys, flues and fans	= (6a)+(6b)+(7a)+(7b)+(7c) =				Air changes per hour
Pressure test					20.0000 / (5) = 0.1798 (8)
Measured/design AP50					Yes
Infiltation rate					5.0100
Number of sides sheltered					0.4303 (18)
					2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =				0.8500 (20)
Infiltation rate adjusted to include shelter factor	(21) = (18) x (20) =				0.3658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.9000	4.6000	4.7000	4.3000	4.3000	3.8000	3.8000	3.7000	3.8000	4.3000	4.3000	4.6000 (22)
Wind factor	1.2250	1.1500	1.1750	1.0750	1.0750	0.9500	0.9500	0.9250	0.9500	1.0750	1.0750	1.1500 (22a)
Adj infilt rate												
	0.4481	0.4206	0.4298	0.3932	0.3932	0.3475	0.3475	0.3383	0.3475	0.3932	0.3932	0.4206 (22b)
Effective ac	0.6004	0.5885	0.5924	0.5773	0.5773	0.5604	0.5604	0.5572	0.5604	0.5773	0.5773	0.5885 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Door			2.0600	1.2000	2.4720		(26)
Window (Uw = 1.24)			3.5600	1.1814	4.2058		(27)
Half Glazed Door			2.0600	1.5000	3.0900		(26a)
Jetfloor 80mm			48.1500	0.1700	8.1855	75.0000	3611.2500 (28a)
90mm Supafil 34 FF	65.7200	7.6800	58.0400	0.2800	16.2512	52.3000	3035.4920 (29a)
400mm Plane Ceiling	1.6600		1.6600	0.1100	0.1826	9.0000	14.9400 (30)
Total net area of external elements Aum(A, m ²)			115.5300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.3871		(33)
E-WM-23/24/30				13.9600	0.0000	45.0000	628.2000 (32)
E-FC-11				46.4900		70.0000	3254.3000 (32b)
GF Timber				68.2500		9.0000	614.2500 (32c)
Cavity Wall to Store				19.2000		52.3000	1004.1600 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Total fabric heat loss

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	22.0368	21.5995	21.7422	21.1897	21.1897	20.5683	20.5683	20.4532	20.5683	21.1897	21.1897	21.5995 (38)
Average = Sum(39)m / 12 =	62.5999	62.1625	62.3052	61.7528	61.7528	61.1313	61.1313	61.0162	61.1313	61.7528	61.7528	62.1625 (39)
	61.7210											61.7210 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3001	1.2910	1.2940	1.2825	1.2825	1.2696	1.2696	1.2672	1.2696	1.2825	1.2825	1.2910 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6358 (42)
Average daily hot water use (litres/day)												73.0502 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	80.3552	77.4332	74.5112	71.5892	68.6672	65.7452	65.7452	68.6672	71.5892	74.5112	77.4332	80.3552 (44)
Energy content (annual)	119.1645	104.2220	107.5478	93.7628	89.9676	77.6352	71.9404	82.5527	83.5386	97.3562	106.2719	115.4044 (45)
Distribution loss (46)m = 0.15 x (45)m												1149.3642 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

Water storage loss:	17.8747	15.6333	16.1322	14.0644	13.4951	11.6453	10.7911	12.3829	12.5308	14.6034	15.9408	17.3107 (46)
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	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)
Combi loss	13.9864	12.6190	13.9489	13.4739	13.9048	13.4353	13.8701	13.8926	13.4563	13.9307	13.5103	13.9791 (61)
Total heat required for water heating calculated for each month	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (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	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
Heat gains from water heating, kWh/month	43.1188	37.8086	39.2469	34.5446	33.3904	29.1725	27.3877	30.9219	31.1407	35.8536	38.7130	41.8668 (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	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479	98.1479 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.8705	34.5245	28.0772	21.2562	15.8893	13.4144	14.4947	18.8408	25.2881	32.1090	37.4760	39.9509 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	212.5831	214.7891	209.2301	197.3959	182.4572	168.4170	159.0373	156.8313	162.3902	174.2245	189.1632	203.2034 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506	46.4506 (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)	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319	-65.4319 (71)
Water heating gains (Table 5)	57.9554	56.2627	52.7512	47.9786	44.8796	40.5174	36.8114	41.5617	43.2509	48.1903	53.7680	56.2725 (72)
Total internal gains	391.5756	387.7428	372.2250	348.7973	325.3927	304.5154	292.5100	299.4004	313.0958	336.6904	362.5737	381.5933 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southeast				1.6200	43.0593	0.5200		0.0000		0.7700		27.9303 (77)
Northwest				1.9400	13.7804	0.5200		0.0000		0.7700		10.7043 (81)

Solar gains	38.6346	61.7504	93.6057	133.5985	154.0254	171.3382	156.8143	136.8786	110.0597	72.5163	4.6241	31.5606 (83)
Total gains	430.2102	449.4932	465.8307	482.3957	479.4181	475.8536	449.3243	436.2790	423.1555	409.2067	367.1978	413.1539 (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)	53.9697	54.3494	54.2249	54.7100	54.7100	55.2662	55.2662	55.3705	55.2662	54.7100	54.7100	54.3494
tau	4.5980	4.6233	4.6150	4.6473	4.6473	4.6844	4.6844	4.6914	4.6844	4.6473	4.6473	4.6233
alpha	0.9885	0.9848	0.9734	0.9434	0.8703	0.7032	0.5643	0.5780	0.8039	0.9429	0.9863	0.9901 (86)
util living area	19.9026	19.9940	20.2103	20.4947	20.7616	20.9391	20.9824	20.9807	20.8801	20.5739	20.1442	19.8836 (87)
MIT	19.8408	19.8479	19.8456	19.8546	19.8546	19.8647	19.8647	19.8666	19.8647	19.8546	19.8546	19.8479 (88)
Th 2	0.9846	0.9797	0.9639	0.9215	0.8171	0.5971	0.4258	0.4374	0.7152	0.9159	0.9807	0.9868 (89)
util rest of house	18.8770	18.9726	19.1831	19.4630	19.7016	19.8396	19.8607	19.8621	19.8052	19.5413	19.1285	18.8640 (90)
MIT 2	19.3139	19.4077	19.6206	19.9025	20.1531	20.3080	20.3385	20.3386	20.2631	19.9811	19.5611	19.2983 (92)
Living area fraction	19.1639	19.2577	19.4706	19.7525	20.0031	20.1580	20.1885	20.1886	20.1131	19.8311	19.4111	19.1483 (93)
MIT												
Temperature adjustment												
adjusted MIT												

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9816	0.9764	0.9600	0.9191	0.8250	0.6266	0.4669	0.4791	0.7370	0.9152	0.9777	0.9841 (94)
Useful gains	422.3149	438.8736	447.1803	443.3717	395.5255	298.1888	209.7915	209.0345	311.8782	374.5262	359.0209	406.5753 (95)
Ext temp.	4.9000	5.3000	7.0000	9.3000	12.2000	15.0000	16.7000	16.7000	14.4000	11.1000	7.8000	4.9000 (96)
Heat loss rate W	892.9155	867.6444	776.9863	645.4684	481.8627	315.3133	213.2552	212.8598	349.2476	539.1727	717.0196	885.7129 (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	350.1269	288.1339	245.3756	145.5096	64.2349	0.0000	0.0000	0.0000	0.0000	122.4970	257.7591	356.4783 (98)
Space heating												1830.1154 (98)
Space heating per m2												38.0086 (99)
										(98) / (4) =		38.0086 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 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 %)												90.5000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement												2022.2269 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	350.1269	288.1339	245.3756	145.5096	64.2349	0.0000	0.0000	0.0000	0.0000	122.4970	257.7591	356.4783 (98)
Space heating efficiency (main heating system 1)	90.5000	90.5000	90.5000	90.5000	90.5000	0.0000	0.0000	0.0000	0.0000	90.5000	90.5000	90.5000 (210)
Space heating fuel (main heating system)	386.8805	318.3801	271.1333	160.7841	70.9778	0.0000	0.0000	0.0000	0.0000	135.3558	284.8167	393.8987 (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												
Water heating requirement	133.1509	116.8410	121.4967	107.2367	103.8724	91.0705	85.8105	96.4453	96.9950	111.2869	119.7822	129.3836 (64)
Efficiency of water heater (217)m	89.5952	89.5529	89.4146	89.1141	88.4957	87.3000	87.3000	87.3000	87.3000	88.9480	89.4596	87.3000 (216)
Fuel for water heating, kWh/month	148.6139	130.4714	135.8801	120.3364	117.3757	104.3190	98.2938	110.4757	111.1053	125.1146	133.8953	144.3608 (219)
Water heating fuel used												1480.2421 (219)
Annual totals kWh/year												
Space heating fuel - main system												2022.2269 (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)												274.5864 (232)
Total delivered energy for all uses												3852.0554 (238)

10a. Fuel costs - using BEDF prices (506)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2022.2269	3.7400	75.6313 (240)
Space heating - secondary	0.0000	0.0000	0.0000 (242)
Water heating (other fuel)	1480.2421	3.7400	55.3611 (247)
Pumps and fans for heating	75.0000	20.4300	15.3225 (249)
Energy for lighting	274.5864	20.4300	56.0980 (250)
Additional standing charges			95.0000 (251)
Total energy cost			297.4128 (255)

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	2022.2269	0.2160	436.8010 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1480.2421	0.2160	319.7323 (264)
Space and water heating			756.5333 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	274.5864	0.5190	142.5103 (268)
Total kg/year			937.9686 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2022.2269	1.2200	2467.1168 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1480.2421	1.2200	1805.8954 (264)
Space and water heating			4273.0122 (265)
Pumps and fans	75.0000	3.0700	230.2500 (267)
Energy for lighting	274.5864	3.0700	842.9802 (268)
Primary energy kWh/year			5346.2424 (272)
Primary energy kWh/m2/year			111.0331 (273)

SAP 2012 EPC IMPROVEMENTS

Current energy efficiency rating: B 81
Current environmental impact rating: B 86

(For testing purposes):

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY 09 Jan 2014

A		Not considered
B		Not considered
C		Not considered
D		Not considered
E	Low energy lighting	Already installed
F		Not considered
G		Not considered
H		Not considered
I		Not considered
J		Not considered
K		Not considered
M		Not considered
N	Solar water heating	Not applicable
O		Not considered
P		Not considered
R		Not considered
S		Not considered
T		Not considered
U	Solar photovoltaic panels	Not applicable
A2		Not considered
A3		Not considered
T2		Not considered
W		Not considered
X		Not considered
Y		Not considered
J2		Not considered
Q2		Not considered
Z1		Not considered
Z2		Not considered
Z3		Not considered
Z4		Not considered
Z5		Not considered
V2	Wind turbine	Not applicable
L2		Not considered
Q3		Not considered
O3		Not considered

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
	Total Savings £0		0.00 kg/m²
Potential energy efficiency rating:		B 81	
Potential environmental impact rating:			B 86

Fuel prices for cost data on this page from database revision number 506 TEST (30 Sep 2022)
Recommendation texts revision number 4.9c (22 Feb 2014)

Typical heating and lighting costs of this home (per year, Severn Valley):

	Current	Potential	Saving
Electricity	£71	£71	£0
Mains gas	£226	£226	£0
Space heating	£186	£186	£0
Water heating	£55	£55	£0
Lighting	£56	£56	£0
Total cost of fuels	£297	£297	£0
Total cost of uses	£297	£297	£0
Delivered energy	80 kWh/m²	80 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.9 tonnes	0.9 tonnes	0.0 tonnes
CO2 emissions per m²	19 kg/m²	19 kg/m²	0 kg/m²
Primary energy	111 kWh/m²	111 kWh/m²	0 kWh/m²

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF ENERGY RATINGS FOR IMPROVED DWELLING 09 Jan 2014

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

No improvements selected / applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING 09 Jan 2014

No improvements selected / applicable

SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) 9.92

Overheating Calculation Input Data

Dwelling type	SemiDetached Flat
Number of storeys	1
Cross ventilation possible	Yes
SAP Region	Severn Valley
Front of dwelling faces	South West
Overshading	Average or unknown
Thermal mass parameter	252.6 (calculated from construction elements)
Night ventilation	No
Ventilation rate during hot weather (ach)	3.00 (Windows half open)

Overheating Calculation

Summer ventilation heat loss coefficient	110.11 (P1)
Transmission heat loss coefficient	40.56 (37)
Summer heat loss coefficient	150.68 (P2)

Overhangs	Ratio	Z_overhangs	Overhang type
Orientation			
South East	0.000	1.000	None
North West	0.000	1.000	None

Solar shading	Z blinds	Solar access	Z overhangs	Z summer
Orientation				
South East	1.000	0.90	1.000	0.900 (P8)
North West	1.000	0.90	1.000	0.900 (P8)

[Jul]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Shading	Gains W
South East	1.6200	121.5729	0.5200	0.0000	0.9000	92.1717
North West	1.9400	100.3588	0.5200	0.0000	0.9000	91.1178
total:						183.2895

	Jun	Jul	Aug	
Solar gains	200	183	160	(P3/P4)
Internal gains	302	290	296	
Total summer gains	502	473	456	(P5)

	3.33	3.14	3.03	
Summer gain/loss ratio	3.33	3.14	3.03	(P6)
Summer external temperature	15.00	16.70	16.70	
Thermal mass temperature increment (TMP = 252.6)	0.23	0.23	0.23	
Threshold temperature	18.56	20.07	19.96	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	

Assessment of likelihood of high internal temperature: Not significant

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	4907-Z852-6657-0379				Issued on Date	22/01/2024
Assessment Reference	379	Prop Type Ref	Leadon End GFM Op			
Property	379, 1 Bed, K, B					
SAP Rating	81 B	DER	22.87	TER	22.91	
Environmental	86 B	% DER<TER	0.19			
CO ₂ Emissions (t/year)	0.94	DFEE	55.85	TFEE	59.56	
General Requirements Compliance	Pass	% DFEE<TFEE	6.23			
Assessor Details	Mrs. Katarzyna Gotlib, Katarzyna Gotlib, Tel: 01884 242 050, kat.gotlib@aessc.co.uk				Assessor ID	Z852-0001
Client	Redrow, Redrow					

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

Orientation	South West						
Property Tenure	Unknown						
Transaction Type	New dwelling						
Terrain Type	Suburban						
1.0 Property Type	Flat, Semi-Detached						
2.0 Number of Storeys	1						
3.0 Date Built	2023						
4.0 Sheltered Sides	2						
5.0 Sunlight/Shade	Average or unknown						
6.0 Measurements							
Ground Floor:		Heat Loss Perimeter		Internal Floor Area		Average Storey Height	
		26.50 m		48.15 m²		2.31 m	
7.0 Living Area	20.51			m²			
8.0 Thermal Mass Parameter	Precise calculation						
Thermal Mass	252.6			kJ/m²K			
9.0 External Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
90mm Supafil 34 FF	Cavity Wall	Other		0.28	52.30	65.72	58.04
9.1 Party Walls							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	
E-WM-23/24/30	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity		0.00	45.00	13.96	
9.2 Internal Walls							
Description	Construction				Kappa (kJ/m²K)	Area (m²)	
GF Timber	Plasterboard on timber frame				9.00	68.25	
Cavity Wall to Store	Other				52.30	19.20	
10.0 External Roofs							
Description	Type	Construction		U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)
400mm Plane Ceiling	External Plane Roof	Plasterboard, insulated at ceiling level		0.11	9.00	1.66	1.66
10.1 Party Ceilings							

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Description	Construction	Kappa (kJ/m²K)	Area (m²)
E-FC-11	Precast concrete plank floor (screed laid on rubber), carpeted	30.00	46.49

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)
Jetfloor 80mm	Ground Floor - Solid	Suspended concrete floor, carpeted	0.17	75.00	48.15

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Solid Door	Manufacture r	Solid Door							1.20
Window	BFRC data	Window	Double Low-E Hard 0.2			0.52			1.24
Patio	BFRC data	Window	Double Low-E Hard 0.2			0.52			1.24
Half Glazed Door	Manufacture r	Half Glazed Door	Double Low-E Hard 0.2			0.72		0.70	1.50
Roof Light	Manufacture r	Roof Window	Double Low-E Hard 0.2			0.72		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
Front Door	Solid Door	[1] 90mm Supafil 34 FF	South West							2.06	
RHS Window	Window	[1] 90mm Supafil 34 FF	South East	None	0.00					1.62	
LHS Window	Window	[1] 90mm Supafil 34 FF	North West	None	0.00					1.94	
LHS Half Glazed	Half Glazed Door	[1] 90mm Supafil 34 FF	North West							2.06	

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	Reference:
Independently assessed	E2 Other lintels (including other steel lintels)	5.22	0.199	No	Redrow EF Series E2 - FF
Independently assessed	E3 Sill	2.96	0.008	No	Redrow EF Series E3 - FF
Independently assessed	E4 Jamb	13.95	0.003	No	Redrow EF Series E4 - FF
Independently assessed	E5 Ground floor (normal)	26.50	0.059	No	E5 - Jetfloor Average - BT02
Table K1 - Approved	E7 Party floor between dwellings (in blocks of flats)	20.55	0.070	No	E7 - MCI-GF-01
Table K1 - Approved	E10 Eaves (insulation at ceiling level)	1.05	0.060	No	Redrow EF Series E10
Independently assessed	E24 Eaves (insulation at ceiling level - inverted)	1.05	0.120	No	E24 - Shared - 1/2
Independently assessed	E12 Gable (insulation at ceiling level)	1.58	0.063	No	E12 - CD0031
Independently assessed	E16 Corner (normal)	7.27	0.051	No	Redrow EF Series E16
Independently assessed	E17 Corner (inverted – internal area greater than external area)	2.31	-0.096	No	Redrow EF Series E17 - FF
Table K1 - Approved	E18 Party wall between dwellings	2.48	0.060	No	Redrow EF Series E18
Table K1 - Default	P8 Party Wall - Exposed floor (inverted)	5.95	0.240	No	P8 - Default
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	1.58	0.035	No	Redrow EF Series P4

Y-value	0.053	W/m²K
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18.0 Pressure Testing

Designed AP ₅₀	5.01	m³/(h.m²) @ 50 Pa
Property Tested ?		
As Built AP ₅₀		m³/(h.m²) @ 50 Pa

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows half open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	4.00

Mechanical Ventilation

Mechanical Ventilation System Present	No
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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				2
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
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23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Database		
Percentage of Heat	100	%
Database Ref. No.	17929	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.5	
In Summer	87.3	
Controls	CBE Programmer, room thermostat and TRVs	
PCDF Controls	0	
Delayed Start Stat	Yes	
Sap Code	2106	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

25.0 Main Heating 2

None

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
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
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	None
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Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None