

Our reference C2021062/gw

NHC Developments Ltd
Unit 7/8,
Wellbury Park,
Ackcliffe Industrial Park,
Co Durham,
DL5 6ZE

For the attention of Mr. Mark Fenwick, Development Director

15th July 2020

Dear Mark,

Re: Cloughton Woods Forest Lodges, Filey, Scarborough – 3 new build forest lodges

Further to your recent instruction please find enclosed the initial design stage SAP 2012 calculation for the above project.

The enclosed documentation has been calculated in accordance with SAP 2012, Approved Document Part L1A 2010 (with latest amendments).

Design Data

Orientation has been taken as North for the entrance door to each Lodge

The calculation for the lodge design has been carried out using the design criteria detailed below:

“U” Values

External walls	= 0.21 w/m ² k
Flat roof	= 0.12 w/m ² k
Timber exposed floor	= 0.25 w/m ² k
Windows/glazed doors	= 1.40 w/m ² k (double glazed, Low e soft coat 0.5)
Entrance doors	= 1.60 w/m ² k

HIBEC Ltd
106A High Street
Henley in Arden
Warwickshire
B95 5BY

Registered office as above

Please note window/door “U” values are whole unit values **not** centre pane.

Manufacturer’s data with a glass g factor of 0.63 has been used in the SAP calculation.

Thermal bridging

All thermal bridging has been calculated for the various junctions.
Thermal bridging is either, approved detail, default or independently assessed.
(See enclosed thermal bridging sheets for full details).

Thermal Mass Parameter

Thermal mass has been set as low for all constructions

Services

Heating	=	Electric air source heat pump (ASHP) with seasonal efficiencies of 225.9% winter and 272.7% summer Based on Samsung ASHP
Hot water	=	Via the ASHP to 150 Litre indirect cylinder complete with separate time control, and cylinder thermostat. Cylinder standing loss not exceeding 1.89Kwhr/day
Controls	=	Time and temperature control to radiator/under floor heating
Secondary heating	=	Closed wood burning stove with a seasonal efficiency of 65% minimum.
Ventilation	=	Intermittent extract fans to kitchen, bathroom/ensuite
Air tightness	=	A design air tightness of 5.00 has been used in the SAP calculation.
No of LEL’s	=	100% low energy.



SAP Results

Based on the above specification:

The proposed lodges **comply** with the requirements of SAP 2012/ADL1A 2010 for DER better or equal to the TER.

The proposed lodges **comply** with the requirements of SAP 2012/ADL1A 2010 for DFEE better or equal to the TFEE.

The proposed lodges **comply** with the general requirements as defined in SAP 2012 and the domestic compliance guide.

Planning Condition- Energy/Co2 emissions savings from renewable energy

To meet the planning requirements for a minimum of 10% reduction in energy/emissions from renewable we have assessed the above design as follows:

To show both the reduction in energy and Co2 emissions we have provided a benchmark SAP calculation changing the heating source to 100% efficient electric panel heaters and electric immersion heater (for hot water generation).

The Electric air source heat pump is accepted as a renewable energy source and the seasonal efficiencies result in large energy/Co2 savings, this can be demonstrated as follows:

Extracting the Energy/ Co2 figures from the SAP calculations:

Cell (238, page 5) As Designed SAP total delivered energy = 3437.40 Kwhr/year

Cell (238, page 5) Benchmark SAP total delivered energy = 7683.47 Kwhr/year

Cell (261, Page 5) As Designed SAP total Co2 emissions = 1784.00 KgCo2/year

Cell (261, Page 5) Benchmark SAP total Co2 emissions = 3229.25 KgCo2/year

If we now calculate the %reductions;

Total energy reduction = $1 - (3437.40/7683.47) \times 100 = 55.26\%$

Total emissions reduction = $1 - (1784.00/3229.25) \times 100 = 44.75\%$



Conclusion:

Each of the lodges will meet the planning requirement. Final orientation and selected ASHP will have an effect on the above calculations but the percentage reduction is large so effects will be minimal.

Both the Energy/Co2 reductions from renewable energy source are significantly greater than the minimum planning requirement of 10%.

We trust we have interpreted your requirements correctly but, should you wish to change any of the services/construction data or have any queries please do not hesitate to contact us

Yours sincerely

Gary White

Gary White
Director



elmhurst
energy

NYMNP A

16/07/2020



SAP Report Submission for Building Regulations Compliance

Client:

Project: Units 1 to 3, Cloughton Woods
Filey, SCARBOROUGH, YO13 0AW

Contact: Gary White
Hibec Limited

Report Issue Date: 15/07/2020

EXCELLENCE
IN ENERGY
ASSESSMENT

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2021062			Issued on Date	15/07/2020
Assessment Reference	Benchmark	Prop Type Ref			
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW				
SAP Rating	61 D	DER	40.03	TER	34.86
Environmental	67 D	% DER<TER	-14.84		
CO ₂ Emissions (t/year)	3.09	DFEE	72.34	TFEE	81.04
General Requirements Compliance	Fail	% DFEE<TFEE	10.74		
Assessor Details	Mr. Gary White, Hibec Limited,			Assessor ID	4104-0001
Client					

FULL SAP CALCULATION PRINTOUT

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

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

DWELLING AS DESIGNED

Detached Bungalow, total floor area 80 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: Electricity
Fuel factor: 1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 34.86 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 40.03 kgCO₂/m² Fail
Excess emissions = 5.17 kgCO₂/m² (14.8%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 81.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE) 72.3 kWh/m²/yr OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	OK
Floor	0.25 (max. 0.25)	0.25 (max. 0.70)	OK
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	1.41 (max. 2.00)	1.60 (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: 5.00 (design value)
Maximum: 10.0 OK

4 Heating efficiency

Main heating system: Room heaters - Electric
Panel, convector or radiant heaters

Secondary heating system: Room heaters - Wood Logs

Closed room heater

Efficiency: 65%
Minimum: 65% OK

5 Cylinder insulation

Hot water storage: Measured cylinder loss: 1.89 kWh/day
Permitted by DBSCG 1.89 OK
Primary pipework insulated: No primary pipework

6 Controls

Space heating controls: Appliance thermostats OK

Hot water controls: Cylinderstat 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 (North East England): Not significant OK

Based on:

Overshading: Average
Windows facing North: 10.04 m², No overhang
Windows facing East: 0.87 m², No overhang
Windows facing South: 11.61 m², No overhang
Windows facing West: 7.98 m², No overhang
Air change rate: 6.00 ach
Blinds/curtains: None

10 Key features

Roof U-value: 0.12 W/m²K
Thermal bridging y-value: 0.023 W/m²K
Secondary heating (wood logs)
Secondary heating fuel: wood logs

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	80.4500 (1b)	3.4400 (2b)	276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	276.7480 (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				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3584 (18)
Number of sides sheltered					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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
door			2.2100	1.6000	3.5360		(26a)
windows (Uw = 1.40)			30.5000	1.3258	40.4356		(27)
Heat Loss Floor			80.4500	0.2500	20.1125		(28b)
External Wall	130.1800	32.7100	97.4700	0.2100	20.4687		(29a)
External Roof	83.7700		83.7700	0.1200	10.0524		(30)
Total net area of external elements Aum(A, m ²)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	94.6052	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6419 (36)
Total fabric heat loss							(33) + (36) =
							101.2471 (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	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	155.0691	154.7522	154.4417	152.9831	152.7103	151.4399	151.4399	151.2046	151.9292	152.7103	153.2623	153.8395 (39)
Average = Sum(39)m / 12 =												152.9818 (39)
HLP	1.9275	1.9236	1.9197	1.9016	1.8982	1.8824	1.8824	1.8795	1.8885	1.8982	1.9051	1.9122 (40)
HLP (average)												1.9016 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy conte	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												Total = Sum(45)m =
Distribution loss (46)m = 0.15 x (45)m	22.7304	19.8801	20.5145	17.8850	17.1611	14.8087	13.7225	15.7467	15.9348	18.5705	20.2711	22.0131 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8900 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.6000 (49)
Temperature factor from Table 2b												1.1340 (55)
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (56)
If cylinder contains dedicated solar storage	35.1540	31.7520	35.1540	34.0200	35.1540	34.0200	35.1540	35.1540	34.0200	35.1540	34.0200	35.1540 (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)
Total heat required for water heating calculated for each month	186.6897	164.2861	171.9173	153.2536	149.5615	132.7449	126.6372	140.1323	140.2520	158.9572	169.1609	181.9082 (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	186.6897	164.2861	171.9173	153.2536	149.5615	132.7449	126.6372	140.1323	140.2520	158.9572	169.1609	181.9082 (64)
Heat gains from water heating, kWh/month	78.5088	69.4692	73.5970	66.8612	66.1637	60.0420	58.5414	63.0285	62.5382	69.2878	72.1503	76.9190 (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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6469	17.4502	14.1915	10.7438	8.0312	6.7802	7.3263	9.5230	12.7817	16.2293	18.9420	20.1929 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567 (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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538 (71)
Water heating gains (Table 5)	105.5226	103.3768	98.9207	92.8627	88.9297	83.3917	78.6846	84.7157	86.8585	93.1287	100.2088	103.3857 (72)
Total internal gains	405.6181	403.5624	390.0849	368.3110	346.1789	324.8349	310.9502	316.8911	328.0555	350.0415	375.3207	394.3036 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
North	10.0400	10.6334	0.6300	0.7000	0.7700	32.6270 (74)						
East	0.8700	19.6403	0.6300	0.7000	0.7700	5.2220 (76)						
South	11.6100	46.7521	0.6300	0.7000	0.7700	165.8841 (78)						
West	7.9800	19.6403	0.6300	0.7000	0.7700	47.8985 (80)						
Solar gains	251.6317	437.9424	623.1507	810.9024	942.7151	950.7871	910.4831	810.0395	687.9298	490.5532	303.1139	214.2224 (83)
Total gains	657.2498	841.5048	1013.2356	1179.2134	1288.8940	1275.6221	1221.4332	1126.9306	1015.9853	840.5947	678.4347	608.5260 (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	14.4111	14.4406	14.4697	14.6076	14.6337	14.7565	14.7565	14.7795	14.7090	14.6337	14.5810	14.5263
alpha	1.9607	1.9627	1.9646	1.9738	1.9756	1.9838	1.9838	1.9853	1.9806	1.9756	1.9721	1.9684
util living area	0.9484	0.9180	0.8726	0.7982	0.6956	0.5706	0.4564	0.4984	0.6748	0.8423	0.9262	0.9550 (86)
MIT	17.5655	17.9942	18.6275	19.3988	20.0776	20.5730	20.8074	20.7630	20.3594	19.4497	18.3595	17.4854 (87)
Th 2	19.3821	19.3848	19.3874	19.3997	19.4021	19.4129	19.4129	19.4149	19.4087	19.4021	19.3974	19.3925 (88)
util rest of house	0.9389	0.9034	0.8493	0.7597	0.6331	0.4720	0.3194	0.3617	0.5856	0.8031	0.9104	0.9467 (89)
MIT 2	15.0348	15.6397	16.5276	17.5909	18.4842	19.0881	19.3210	19.2912	18.8677	17.6966	16.1748	14.9239 (90)
Living area fraction	fLA = Living area / (4) = 0.3794 (91)											
MIT	15.9949	16.5329	17.3242	18.2768	19.0886	19.6514	19.8849	19.8495	19.4336	18.3617	17.0036	15.8956 (92)
Temperature adjustment	0.0000											
adjusted MIT	15.9949	16.5329	17.3242	18.2768	19.0886	19.6514	19.8849	19.8495	19.4336	18.3617	17.0036	15.8956 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9083	0.8662	0.8095	0.7263	0.6189	0.4884	0.3637	0.4030	0.5872	0.7696	0.8756	0.9184 (94)
Useful gains	596.9864	728.9369	820.2643	856.4763	797.7469	623.0752	444.1802	454.1154	596.6242	646.9630	594.0674	558.8684 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1813.5169	1800.2147	1671.7126	1434.4899	1128.3216	764.9828	497.4596	521.5827	810.3326	1185.2895	1517.8544	1799.2497 (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	905.0987	719.8987	633.4775	416.1698	245.9476	0.0000	0.0000	0.0000	0.0000	400.5149	665.1266	922.8437 (98)
Space heating	4909.0775 (98)											
Space heating per m2	(98) / (4) = 61.0202 (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)													0.2000 (201)
Fraction of space heat from main system(s)													0.8000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of secondary/supplementary heating system, %													65.0000 (208)
Space heating requirement													3927.2620 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	905.0987	719.8987	633.4775	416.1698	245.9476	0.0000	0.0000	0.0000	0.0000	400.5149	665.1266	922.8437	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	724.0790	575.9190	506.7820	332.9359	196.7581	0.0000	0.0000	0.0000	0.0000	320.4119	532.1013	738.2750	(211)
Water heating requirement	278.4919	221.5073	194.9162	128.0523	75.6762	0.0000	0.0000	0.0000	0.0000	123.2353	204.6544	283.9519	(215)
Water heating													
Water heating requirement	186.6897	164.2861	171.9173	153.2536	149.5615	132.7449	126.6372	140.1323	140.2520	158.9572	169.1609	181.9082	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	186.6897	164.2861	171.9173	153.2536	149.5615	132.7449	126.6372	140.1323	140.2520	158.9572	169.1609	181.9082	(219)
Water heating fuel used													1875.5009 (219)
Annual totals kWh/year													
Space heating fuel - main system													3927.2620 (211)
Space heating fuel - secondary													1510.4854 (215)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													346.9704 (232)
Total delivered energy for all uses													7660.2187 (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	3927.2620	0.5190	2038.2490 (261)
Space heating - secondary	1510.4854	0.0190	28.6992 (263)
Water heating (other fuel)	1875.5009	0.5190	973.3850 (264)
Space and water heating			3040.3332 (265)
Pumps and fans	0.0000	0.0000	0.0000 (267)
Energy for lighting	346.9704	0.5190	180.0776 (268)
Total CO2, kg/year			3220.4108 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			40.0300 (273)

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

DER			40.0300 ZC1
Total Floor Area		TFA	80.4500
Assumed number of occupants		N	2.4713
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190
CO2 emissions from appliances, equation (L14)			16.2326 ZC2
CO2 emissions from cooking, equation (L16)			2.2164 ZC3
Total CO2 emissions			58.4791 ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000 ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000 ZC7
Net CO2 emissions			58.4791 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.4500 (1b)	3.4400 (2b)	276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	276.7480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.3584	(18)
Number of sides sheltered				1	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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 Semi-glazed door			2.2100	1.2000	2.6520		(26a)
TER Opening Type (Uw = 1.40)			17.9100	1.3258	23.7443		(27)
Heat Loss Floor			80.4500	0.1300	10.4585		(28b)
External Wall	130.1800	20.1200	110.0600	0.1800	19.8108		(29a)
External Roof	83.7700		83.7700	0.1300	10.8901		(30)
Total net area of external elements Aum(A, m2)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	67.5557	(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)	12.8296 (36)
Total fabric heat loss	(33) + (36) = 80.3853 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	134.2073	133.8905	133.5799	132.1214	131.8485	130.5781	130.5781	130.3429	131.0675	131.8485	132.4005	132.9777 (39)
Average = Sum(39)m / 12 =												132.1201 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.6682	1.6643	1.6604	1.6423	1.6389	1.6231	1.6231	1.6202	1.6292	1.6389	1.6457	1.6529 (40)
HLP (average)												1.6423 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy conte	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												Total = Sum(45)m = 1461.5909 (45)
Distribution loss (46)m = 0.15 x (45)m	22.7304	19.8801	20.5145	17.8850	17.1611	14.8087	13.7225	15.7467	15.9348	18.5705	20.2711	22.0131 (46)
Water storage loss:												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491 (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	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491 (64)
Heat gains from water heating, kWh/month	87.6615	77.7362	82.7497	75.7186	75.3164	68.8995	67.6941	72.1812	71.3956	78.4405	81.0078	86.0717 (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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6475	17.4507	14.1919	10.7442	8.0314	6.7804	7.3265	9.5233	12.7821	16.2298	18.9426	20.1936 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567 (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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538 (71)
Water heating gains (Table 5)	117.8247	115.6788	111.2228	105.1648	101.2317	95.6938	90.9867	97.0177	99.1606	105.4308	112.5109	115.6878 (72)
Total internal gains	420.9208	418.8650	405.3873	383.6134	361.4811	340.1372	326.2524	332.1934	343.3579	365.3440	390.6233	409.6063 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W						
North	5.8900	10.6334	0.6300	0.7000	0.7700	19.1407 (74)						
East	0.5100	19.6403	0.6300	0.7000	0.7700	3.0612 (76)						
South	6.8200	46.7521	0.6300	0.7000	0.7700	97.4444 (78)						
West	4.6900	19.6403	0.6300	0.7000	0.7700	28.1509 (80)						
Solar gains	147.7972	257.2252	365.9973	476.2492	553.6419	558.3722	534.7070	475.7343	404.0377	288.1238	178.0352	125.8249 (83)
Total gains	568.7180	676.0902	771.3847	859.8626	915.1231	898.5094	860.9594	807.9278	747.3956	653.4678	568.6586	535.4312 (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	41.6282	41.7267	41.8237	42.2854	42.3729	42.7852	42.7852	42.8624	42.6254	42.3729	42.1962	42.0131
alpha	3.7752	3.7818	3.7882	3.8190	3.8249	3.8523	3.8523	3.8575	3.8417	3.8249	3.8131	3.8009
util living area	0.9958	0.9914	0.9814	0.9544	0.8905	0.7642	0.6130	0.6630	0.8615	0.9684	0.9921	0.9967 (86)
MIT	19.2133	19.4145	19.7398	20.1665	20.5591	20.8398	20.9497	20.9312	20.7204	20.2085	19.6336	19.1816 (87)
Th 2	19.5637	19.5665	19.5693	19.5825	19.5849	19.5964	19.5964	19.5986	19.5920	19.5849	19.5800	19.5748 (88)
util rest of house	0.9943	0.9883	0.9742	0.9352	0.8400	0.6526	0.4423	0.4958	0.7783	0.9512	0.9887	0.9955 (89)
MIT 2	17.2467	17.5412	18.0138	18.6296	19.1596	19.4925	19.5800	19.5728	19.3748	18.7009	17.8704	17.2073 (90)
Living area fraction	fLA = Living area / (4) =											0.3794 (91)
MIT	17.9928	18.2519	18.6686	19.2127	19.6906	20.0036	20.0996	20.0881	19.8852	19.2728	18.5393	17.9562 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9928	18.2519	18.6686	19.2127	19.6906	20.0036	20.0996	20.0881	19.8852	19.2728	18.5393	17.9562 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9917	0.9841	0.9679	0.9286	0.8446	0.6891	0.5080	0.5596	0.7991	0.9460	0.9850	0.9934 (94)
Useful gains	564.0115	665.3543	746.6153	798.5002	772.8773	619.1228	437.3788	452.1509	597.2780	618.1535	560.1061	531.8712 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1837.6686	1787.6862	1625.4814	1362.5225	1053.5428	705.5912	456.9711	480.7211	758.2579	1143.4959	1514.5711	1829.2739 (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	947.6009	754.2070	653.8764	406.0960	208.8151	0.0000	0.0000	0.0000	0.0000	390.8547	687.2148	965.2676 (98)
Space heating												5013.9326 (98)
Space heating per m2												(98) / (4) = 62.3236 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													5362.4948 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	947.6009	754.2070	653.8764	406.0960	208.8151	0.0000	0.0000	0.0000	0.0000	390.8547	687.2148	965.2676	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	1013.4769	806.6385	699.3330	434.3273	223.3317	0.0000	0.0000	0.0000	0.0000	418.0265	734.9891	1032.3718	(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	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491	(64)
Efficiency of water heater (217)m	88.4491	88.2748	87.9183	87.1343	85.5085	79.8000	79.8000	79.8000	79.8000	86.9600	88.0471	79.8000	(216)
Fuel for water heating, kWh/month	224.0052	197.8140	208.5553	188.5887	188.2882	180.2215	173.0302	189.9413	189.6289	195.9500	204.7004	218.4260	(219)
Water heating fuel used													2359.1499 (219)
Annual totals kWh/year													
Space heating fuel - main system													5362.4948 (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)													346.9810 (232)
Total delivered energy for all uses													8143.6257 (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	5362.4948	0.2160	1158.2989 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2359.1499	0.2160	509.5764 (264)
Space and water heating			1667.8753 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	346.9810	0.5190	180.0831 (268)
Total CO2, kg/m2/year			1886.8834 (272)
Emissions per m2 for space and water heating			20.7318 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.2384 (272b)
Emissions per m2 for pumps and fans			0.4838 (272c)
Target Carbon Dioxide Emission Rate (TER) = (20.7318 * 1.55) + 2.2384 + 0.4838, rounded to 2 d.p.			34.8600 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2021062	Issued on Date	15/07/2020
Assessment Reference	Benchmark	Prop Type Ref	
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW		

SAP Rating	61 D	DER	40.03	TER	34.86
Environmental	67 D	% DER<TER	-14.84		
CO ₂ Emissions (t/year)	3.09	DFEE	72.34	TfEE	81.04
General Requirements Compliance	Fail	% DFEE<TFEE	10.74		

Assessor Details	Mr. Gary White, Hibec Limited,	Assessor ID	4104-0001
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Client	
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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	80.4500 (1b)	x 3.4400 (2b)	= 276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 276.7480 (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				3 + 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.3584	(18)
Number of sides sheltered				1	(19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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					
door			2.2100	1.6000	3.5360		(26a)					
windows (U _w = 1.40)			30.5000	1.3258	40.4356		(27)					
Heat Loss Floor			80.4500	0.2500	20.1125		(28b)					
External Wall	130.1800	32.7100	97.4700	0.2100	20.4687		(29a)					
External Roof	83.7700		83.7700	0.1200	10.0524		(30)					
Total net area of external elements A _{um} (A, m ²)			294.4000				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	94.6052	(33)					
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							100.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6419 (36)					
Total fabric heat loss							(33) + (36) =	101.2471 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	155.0691	154.7522	154.4417	152.9831	152.7103	151.4399	151.4399	151.2046	151.9292	152.7103	153.2623	153.8395 (39)
Average = Sum(39)m / 12 =												152.9818 (39)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.9275	1.9236	1.9197	1.9016	1.8982	1.8824	1.8824	1.8795	1.8885	1.8982	1.9051	1.9122 (40)
HLP (average)												1.9016 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy content (annual)	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												1461.5909 (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	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	32.2013	28.1635	29.0622	25.3371	24.3116	20.9790	19.4402	22.3079	22.5743	26.3082	28.7174	31.1853 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts												
(66)m	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6469	17.4502	14.1915	10.7438	8.0312	6.7802	7.3263	9.5230	12.7817	16.2293	18.9420	20.1929 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567 (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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538 (71)
Water heating gains (Table 5)	43.2814	41.9100	39.0621	35.1905	32.6769	29.1376	26.1293	29.9837	31.3532	35.3605	39.8853	41.9157 (72)
Total internal gains	343.3769	342.0956	330.2263	310.6388	289.9260	270.5808	258.3948	262.1591	272.5501	292.2732	314.9972	332.8336 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	10.0400	10.6334	0.6300	0.7000	0.7700	32.6270 (74)						
East	0.8700	19.6403	0.6300	0.7000	0.7700	5.2220 (76)						
South	11.6100	46.7521	0.6300	0.7000	0.7700	165.8841 (78)						
West	7.9800	19.6403	0.6300	0.7000	0.7700	47.8985 (80)						
Solar gains	251.6317	437.9424	623.1507	810.9024	942.7151	950.7871	910.4831	810.0395	687.9298	490.5532	303.1139	214.2224 (83)
Total gains	595.0086	780.0380	953.3770	1121.5412	1232.6411	1221.3679	1168.8779	1072.1986	960.4799	782.8264	618.1112	547.0560 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	14.4111	14.4406	14.4697	14.6076	14.6337	14.7565	14.7565	14.7795	14.7090	14.6337	14.5810	14.5263
alpha	1.9607	1.9627	1.9646	1.9738	1.9756	1.9838	1.9838	1.9853	1.9806	1.9756	1.9721	1.9684
util living area	0.9564	0.9274	0.8835	0.8108	0.7097	0.5858	0.4712	0.5156	0.6931	0.8573	0.9365	0.9625 (86)
MIT	17.4707	17.9082	18.5542	19.3427	20.0393	20.5510	20.7955	20.7473	20.3242	19.3846	18.2726	17.3896 (87)
Th 2	19.3821	19.3848	19.3874	19.3997	19.4021	19.4129	19.4129	19.4149	19.4087	19.4021	19.3974	19.3925 (88)
util rest of house	0.9482	0.9141	0.8617	0.7737	0.6483	0.4868	0.3315	0.3767	0.6051	0.8206	0.9226	0.9555 (89)
MIT 2	16.2825	16.7120	17.3413	18.1002	18.7378	19.1752	19.3449	19.3228	19.0106	18.1658	17.0866	16.2092 (90)
Living area fraction												0.3794 (91)
MIT	16.7333	17.1658	17.8014	18.5716	19.2315	19.6971	19.8952	19.8632	19.5090	18.6282	17.5365	16.6570 (92)
Temperature adjustment												0.0000
adjusted MIT	16.7333	17.1658	17.8014	18.5716	19.2315	19.6971	19.8952	19.8632	19.5090	18.6282	17.5365	16.6570 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9289	0.8892	0.8341	0.7505	0.6407	0.5065	0.3778	0.4201	0.6116	0.7978	0.9000	0.9379 (94)

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Useful gains	552.6743	693.6267	795.1728	841.6954	789.7472	618.6085	441.6474	450.4547	587.4036	624.5154	556.2892	513.0943 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
Month fracti	1928.0172	1898.1577	1745.4136	1479.5855	1150.1448	771.9040	499.0229	523.6506	821.7794	1225.9864	1599.5246	1916.3822 (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	1023.2551	809.4448	706.9792	459.2809	268.1358	0.0000	0.0000	0.0000	0.0000	447.4944	751.1295	1044.0462 (98)
Space heating per m2												5509.7658 (98)
												(98) / (4) = 68.4868 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1423.5350	1120.6552	1149.1553	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.6863	0.7473	0.7158	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	977.0261	837.4893	822.5525	0.0000	0.0000	0.0000	0.0000 (102)
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												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	390.7326	460.5035	388.6838	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												1239.9199 (104)
Intermittency factor (Table 10b)												FC = cooled area / (4) = 1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	97.6832	115.1259	97.1709	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												309.9800 (107)
Energy for space heating												3.8531 (108)
Energy for space cooling												68.4868 (99)
Total												3.8531 (108)
Dwelling Fabric Energy Efficiency (DFEE)												72.3399 (109)
												72.3 (109)

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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	80.4500 (1b)	3.4400 (2b)	276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	276.7480 (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				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3584 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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
TER Semi-glazed door			2.2100	1.2000	2.6520		(26a)
TER Opening Type (Uw = 1.40)			17.9100	1.3258	23.7443		(27)
Heat Loss Floor			80.4500	0.1300	10.4585		(28b)
External Wall	130.1800	20.1200	110.0600	0.1800	19.8108		(29a)
External Roof	83.7700		83.7700	0.1300	10.8901		(30)
Total net area of external elements Aum(A, m ²)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	67.5557	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.8296 (36)
Total fabric heat loss							(33) + (36) = 80.3853 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Average = Sum(39)m / 12 =	134.2073	133.8905	133.5799	132.1214	131.8485	130.5781	130.5781	130.3429	131.0675	131.8485	132.4005	132.9777 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6682	1.6643	1.6604	1.6423	1.6389	1.6231	1.6231	1.6202	1.6292	1.6389	1.6457	1.6529 (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	2.4713 (42)											
Average daily hot water use (litres/day)	92.8944 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy content (annual)	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1461.5909 (45)
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)

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Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Heat gains from water heating, kWh/month	32.2013	28.1635	29.0622	25.3371	24.3116	20.9790	19.4402	22.3079	22.5743	26.3082	28.7174	31.1853	31.1853	(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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6475	17.4507	14.1919	10.7442	8.0314	6.7804	7.3265	9.5233	12.7821	16.2298	18.9426	20.1936	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	(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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	(71)
Water heating gains (Table 5)	43.2814	41.9100	39.0621	35.1905	32.6769	29.1376	26.1293	29.9837	31.3532	35.3605	39.8853	41.9157	(72)
Total internal gains	343.3775	342.0962	330.2267	310.6391	289.9263	270.5810	258.3950	262.1594	272.5505	292.2737	314.9978	332.8342	(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							
North	5.8900	10.6334	0.6300	0.7000	0.7700	19.1407 (74)							
East	0.5100	19.6403	0.6300	0.7000	0.7700	3.0612 (76)							
South	6.8200	46.7521	0.6300	0.7000	0.7700	97.4444 (78)							
West	4.6900	19.6403	0.6300	0.7000	0.7700	28.1509 (80)							
Solar gains	147.7972	257.2252	365.9973	476.2492	553.6419	558.3722	534.7070	475.7343	404.0377	288.1238	178.0352	125.8249	(83)
Total gains	491.1747	599.3214	696.2240	786.8883	843.5682	828.9532	793.1020	737.8937	676.5882	580.3975	493.0330	458.6591	(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)	41.6282	41.7267	41.8237	42.2854	42.3729	42.7852	42.7852	42.8624	42.6254	42.3729	42.1962	42.0131	21.0000 (85)
alpha	3.7752	3.7818	3.7882	3.8190	3.8249	3.8523	3.8523	3.8575	3.8417	3.8249	3.8131	3.8009	
util living area	0.9975	0.9943	0.9866	0.9650	0.9107	0.7971	0.6515	0.7049	0.8905	0.9781	0.9952	0.9981	(86)
MIT	19.1319	19.3351	19.6649	20.1008	20.5091	20.8120	20.9378	20.9146	20.6759	20.1387	19.5549	19.1004	(87)
Th 2	19.5637	19.5665	19.5693	19.5825	19.5849	19.5964	19.5964	19.5986	19.5920	19.5849	19.5800	19.5748	(88)
util rest of house	0.9965	0.9922	0.9813	0.9495	0.8665	0.6901	0.4764	0.5360	0.8173	0.9656	0.9930	0.9974	(89)
MIT 2	17.9007	18.1052	18.4344	18.8708	19.2541	19.5101	19.5820	19.5756	19.4129	18.9158	18.3350	17.8775	(90)
Living area fraction	18.3677	18.5718	18.9012	19.3374	19.7302	20.0040	20.0963	20.0835	19.8920	19.3797	18.7978	18.3415	(91)
MIT	18.3677	18.5718	18.9012	19.3374	19.7302	20.0040	20.0963	20.0835	19.8920	19.3797	18.7978	18.3415	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3677	18.5718	18.9012	19.3374	19.7302	20.0040	20.0963	20.0835	19.8920	19.3797	18.7978	18.3415	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	488.9181	593.3831	680.8512	744.3935	735.5951	601.5580	431.7653	443.6386	565.9473	558.9935	488.7410	457.0319	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1887.9941	1830.5215	1656.5514	1379.0080	1058.7666	705.6397	456.5452	480.1241	759.1450	1157.5947	1548.7895	1880.4982	(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	1040.9126	831.3570	725.9209	456.9224	240.4396	0.0000	0.0000	0.0000	0.0000	445.3592	763.2349	1059.0590	(98)
Space heating												5563.2057	(98)
Space heating per m2												69.1511	(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	1227.4344	966.2781	990.6059	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7325	0.8138	0.7790	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	899.1232	786.3538	771.7020	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1061.0441	1017.2273	954.2314	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	116.5830	171.7699	135.8019	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												424.1548	(104)

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Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.1458	42.9425	33.9505	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											106.0387 (107)	
Space cooling per m2											1.3181 (108)	
Energy for space heating											69.1511 (99)	
Energy for space cooling											1.3181 (108)	
Total											70.4692 (109)	
Target Fabric Energy Efficiency (TFEE)											81.0 (109)	



elmhurst
energy

NYMNPA

16/07/2020



SAP Report Submission for Building Regulations Compliance

Client:

Project: Units 1 to 3, Cloughton Woods
Filey, SCARBOROUGH, YO13 0AW

Contact: Gary White
Hibec Limited

Report Issue Date: 15/07/2020

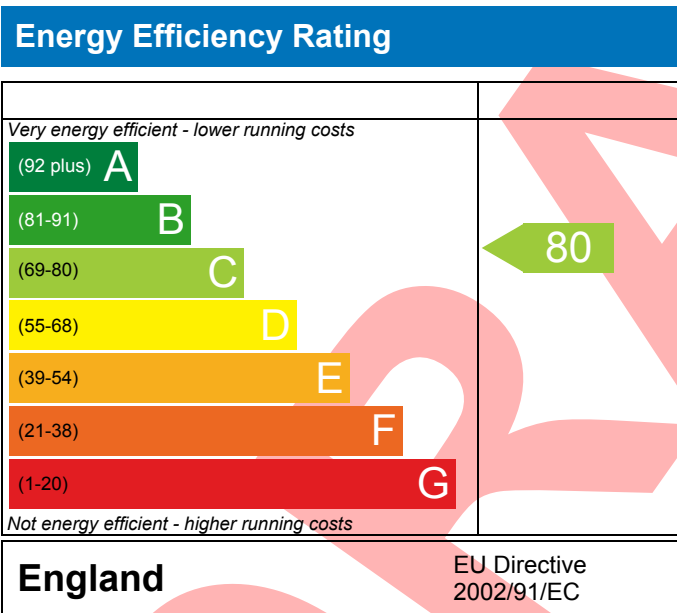
EXCELLENCE
IN ENERGY
ASSESSMENT

Units 1 to 3, Cloughton Woods,
Filey,
SCARBOROUGH,
YO13 0AW

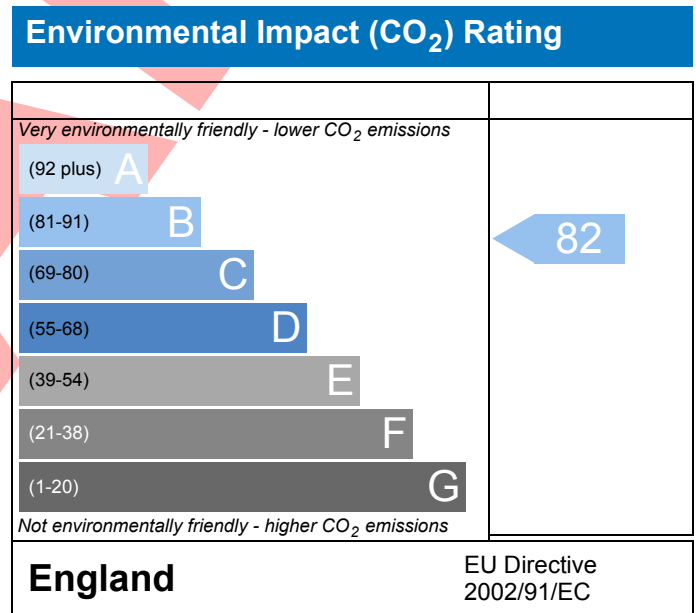
Dwelling type: Bungalow, Detached
Date of assessment: 15/07/2020
Produced by: Hibec Limited
Total floor area: 80.45 m²

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.



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



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (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.

THERMAL BRIDGING

Calculation Type: New Build (As Designed)



Property Reference	C2021062		Issued on Date	15/07/2020	
Assessment Reference	As Designed	Prop Type Ref			
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW				
SAP Rating	80 C	DER	22.13	TER	34.86
Environmental	82 B	% DER<TER	36.51		
CO ₂ Emissions (t/year)	1.70	DFEE	72.34	TFEE	81.04
General Requirements Compliance	Pass	% DFEE<TFEE	10.74		
Assessor Details	Mr. Gary White, Hibec Limited,			Assessor ID	4104-0001
Client					

	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.040	16.50	0.66	
External wall	E3 Sill	Table K1 - Approved	0.040	1.82	0.07	
External wall	E4 Jamb	Table K1 - Approved	0.050	50.32	2.52	
External wall	E5 Ground floor (normal)	Independently assessed	0.042	38.14	1.60	
External wall	E11 Eaves (insulation at rafter level)	Table K1 - Approved	0.040	25.54	1.02	
External wall	E13 Gable (insulation at rafter level)	Table K1 - Approved	0.040	13.12	0.52	
External wall	E16 Corner (normal)	Independently assessed	0.018	13.60	0.24	

Total: **6.64** W/mK:
 Y-Value: **0.023** W/m²K:

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2021062			Issued on Date	15/07/2020
Assessment Reference	As Designed	Prop Type Ref			
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW				
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Client					

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

Detached Bungalow, total floor area 80 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:Electricity
Fuel factor:1.55 (electricity)
Target Carbon Dioxide Emission Rate (TER) 34.86 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 22.13 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)81.0 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)72.3 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	OK
Floor	0.25 (max. 0.25)	0.25 (max. 0.70)	OK
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	OK
Openings	1.41 (max. 2.00)	1.60 (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: 5.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Heat pump with radiators or underfloor - Electric
Samsung Electronics AE050JXYDEH

Secondary heating system: Room heaters - Wood Logs

Closed room heater

Efficiency: 65%
Minimum: 65% OK

5 Cylinder insulation

Hot water storage Measured cylinder loss: 1.89 kWh/day
Permitted by DBSCG 1.89 OK
Primary pipework insulated: Yes OK

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

Cylinderstat OK
Independent timer for DHW 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 (North East England): Not significant OK

Based on:

Overshading: Average
Windows facing North: 10.04 m², No overhang
Windows facing East: 0.87 m², No overhang
Windows facing South: 11.61 m², No overhang
Windows facing West: 7.98 m², No overhang
Air change rate: 6.00 ach
Blinds/curtains: None

10 Key features

Roof U-value 0.12 W/m²K
Thermal bridging y-value 0.023 W/m²K
Secondary heating (wood logs)
Secondary heating fuel: wood logs

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	80.4500 (1b)	3.4400 (2b)	276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	276.7480 (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				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3584 (18)
Number of sides sheltered					1 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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
door			2.2100	1.6000	3.5360		(26a)
windows (Uw = 1.40)			30.5000	1.3258	40.4356		(27)
Heat Loss Floor			80.4500	0.2500	20.1125		(28b)
External Wall	130.1800	32.7100	97.4700	0.2100	20.4687		(29a)
External Roof	83.7700		83.7700	0.1200	10.0524		(30)
Total net area of external elements Aum(A, m ²)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	94.6052	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6419 (36)
Total fabric heat loss							(33) + (36) =

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	155.0691	154.7522	154.4417	152.9831	152.7103	151.4399	151.4399	151.2046	151.9292	152.7103	153.2623	153.8395 (39)
Average = Sum(39)m / 12 =												152.9818 (39)
HLP	1.9275	1.9236	1.9197	1.9016	1.8982	1.8824	1.8824	1.8795	1.8885	1.8982	1.9051	1.9122 (40)
HLP (average)												1.9016 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy conte	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												Total = Sum(45)m =
Distribution loss (46)m = 0.15 x (45)m	22.7304	19.8801	20.5145	17.8850	17.1611	14.8087	13.7225	15.7467	15.9348	18.5705	20.2711	22.0131 (46)
Water storage loss:												150.0000 (47)
Store volume												1.8900 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												1.0206 (55)
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Total storage loss	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386	(56)
If cylinder contains dedicated solar storage	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	206.4367	182.1221	191.6643	172.3636	169.3085	151.8549	146.3842	159.8793	159.3620	178.7042	188.2709	201.6552	(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	206.4367	182.1221	191.6643	172.3636	169.3085	151.8549	146.3842	159.8793	159.3620	178.7042	188.2709	201.6552	(64)
Heat gains from water heating, kWh/month	94.3064	83.7380	89.3946	82.1492	81.9613	75.3300	74.3390	78.8261	77.8262	85.0854	87.4383	92.7166	(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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6469	17.4502	14.1915	10.7438	8.0312	6.7802	7.3263	9.5230	12.7817	16.2293	18.9420	20.1929	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	(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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	(71)
Water heating gains (Table 5)	126.7559	124.6101	120.1540	114.0961	110.1630	104.6251	99.9179	105.9490	108.0919	114.3621	121.4421	124.6191	(72)
Total internal gains	426.8515	424.7958	411.3182	389.5444	367.4122	346.0682	332.1835	338.1244	349.2888	371.2748	396.5540	415.5370	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	Specific data FF or Table 6c	Access factor Table 6d	Gains W							
North	10.0400	10.6334	0.6300	0.7000	0.7700	32.6270	(74)						
East	0.8700	19.6403	0.6300	0.7000	0.7700	5.2220	(76)						
South	11.6100	46.7521	0.6300	0.7000	0.7700	165.8841	(78)						
West	7.9800	19.6403	0.6300	0.7000	0.7700	47.8985	(80)						
Solar gains	251.6317	437.9424	623.1507	810.9024	942.7151	950.7871	910.4831	810.0395	687.9298	490.5532	303.1139	214.2224	(83)
Total gains	678.4832	862.7382	1034.4689	1200.4468	1310.1273	1296.8554	1242.6666	1148.1639	1037.2186	861.8280	699.6680	629.7593	(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	14.4111	14.4406	14.4697	14.6076	14.6337	14.7565	14.7565	14.7795	14.7090	14.6337	14.5810	14.5263			
alpha	1.9607	1.9627	1.9646	1.9738	1.9756	1.9838	1.9838	1.9853	1.9806	1.9756	1.9721	1.9684			
util living area	0.9456	0.9148	0.8687	0.7935	0.6903	0.5649	0.4507	0.4920	0.6680	0.8368	0.9224	0.9523	(86)		
Tweekday	15.0796	15.6800	16.5617	17.6164	18.4998	19.0952	19.3235	19.2946	18.8804	17.7261	16.2162	14.9699			
Tweekend	18.8022	19.0773	19.4839	19.9786	20.4130	20.7294	20.8784	20.8505	20.5944	20.0134	19.3136	18.7507			
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0			
24 / 9	0	0	0	0	0	0	0	0	0	0	0	0			
16 / 9	4	0	0	0	0	0	0	0	0	0	0	0			
MIT	17.8228	18.0233	18.6583	19.4040	20.0935	20.5842	20.8123	20.7692	20.3663	19.4763	18.3649	17.5260	(87)		
Th 2	19.3821	19.3848	19.3874	19.3997	19.4021	19.4129	19.4129	19.4149	19.4087	19.4021	19.3974	19.3925	(88)		
util rest of house	0.9356	0.8996	0.8450	0.7546	0.6276	0.4664	0.3147	0.3562	0.5784	0.7967	0.9060	0.9436	(89)		
Tweekday	15.0796	15.6800	16.5617	17.6164	18.4998	19.0952	19.3235	19.2946	18.8804	17.7261	16.2162	14.9699			
Tweekend	15.0796	15.6800	16.5617	17.6164	18.4998	19.0952	19.3235	19.2946	18.8804	17.7261	16.2162	14.9699			
MIT 2	15.0796	15.6800	16.5617	17.6164	18.4998	19.0952	19.3235	19.2946	18.8804	17.7261	16.2162	14.9699	(90)		
Living area fraction													fLA = Living area / (4) =	0.3794	(91)
MIT	16.1203	16.5690	17.3571	18.2945	19.1044	19.6601	19.8883	19.8540	19.4441	18.3901	17.0313	15.9396	(92)		
Temperature adjustment														0.0000	
adjusted MIT	16.1203	16.5690	17.3571	18.2945	19.1044	19.6601	19.8883	19.8540	19.4441	18.3901	17.0313	15.9396	(93)		

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Useful gains	614.2119	743.6783	832.9031	866.0323	804.4911	626.8921	445.9383	456.4016	602.3326	658.1590	609.0370	575.8357	(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	(96)		
Heat loss rate W	1832.9583	1805.7980	1676.7891	1437.2038	1130.7314	766.2962	497.9761	522.2659	811.9255	1189.6261	1522.0970	1806.0078	(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	906.7474	713.7445	627.8512	411.2435	242.7228	0.0000	0.0000	0.0000	0.0000	395.4115	657.4032	915.2481	(98)		
Space heating													4870.3720	(98)	
Space heating per m2													(98) / (4) =	60.5391	(99)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 %)													214.6374 (206)
Efficiency of secondary/supplementary heating system, %													65.0000 (208)
Space heating requirement													2269.1164 (211)
Space heating requirement	906.7474	713.7445	627.8512	411.2435	242.7228	0.0000	0.0000	0.0000	0.0000	395.4115	657.4032	915.2481	(98)
Space heating efficiency (main heating system 1)	214.6374	214.6374	214.6374	214.6374	214.6374	0.0000	0.0000	0.0000	0.0000	214.6374	214.6374	214.6374	(210)
Space heating fuel (main heating system)	422.4555	332.5350	292.5172	191.5992	113.0851	0.0000	0.0000	0.0000	0.0000	184.2230	306.2855	426.4160	(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	206.4367	182.1221	191.6643	172.3636	169.3085	151.8549	146.3842	159.8793	159.3620	178.7042	188.2709	201.6552	(64)
Efficiency of water heater (217)m	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	259.0650	(216)
Fuel for water heating, kWh/month	79.6853	70.2998	73.9831	66.5329	65.3537	58.6165	56.5048	61.7140	61.5143	68.9805	72.6732	77.8396	(219)
Water heating fuel used													813.6977 (219)
Annual totals kWh/year													
Space heating fuel - main system													2269.1164 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													346.9704 (232)
Total delivered energy for all uses													3429.7845 (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	2269.1164	0.5190	1177.6714 (261)
Space heating - secondary	0.0000	0.0190	0.0000 (263)
Water heating (other fuel)	813.6977	0.5190	422.3091 (264)
Space and water heating			1599.9805 (265)
Pumps and fans	0.0000	0.0000	0.0000 (267)
Energy for lighting	346.9704	0.5190	180.0776 (268)
Total CO2, kg/year			1780.0581 (272)
Dwelling Carbon Dioxide Emission Rate (DER)			22.1300 (273)

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

	DER	TFA	N	EF	
Total Floor Area		80.4500			ZC1
Assumed number of occupants			2.4713		
CO2 emission factor in Table 12 for electricity displaced from grid				0.5190	
CO2 emissions from appliances, equation (L14)					16.2326 ZC2
CO2 emissions from cooking, equation (L16)					2.2164 ZC3
Total CO2 emissions					40.5791 ZC4
Residual CO2 emissions offset from biofuel CHP					0.0000 ZC5
Additional allowable electricity generation, kWh/m ² /year					0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation					0.0000 ZC7
Net CO2 emissions					40.5791 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	80.4500 (1b)	3.4400 (2b)	276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	276.7480 (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				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.3584	(18)
Number of sides sheltered				1	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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
TER Semi-glazed door			2.2100	1.2000	2.6520		(26a)
TER Opening Type (Uw = 1.40)			17.9100	1.3258	23.7443		(27)
Heat Loss Floor			80.4500	0.1300	10.4585		(28b)
External Wall	130.1800	20.1200	110.0600	0.1800	19.8108		(29a)
External Roof	83.7700		83.7700	0.1300	10.8901		(30)
Total net area of external elements Aum(A, m ²)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	67.5557	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.8296 (36)
Total fabric heat loss							(33) + (36) = 80.3853 (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	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	134.2073	133.8905	133.5799	132.1214	131.8485	130.5781	130.5781	130.3429	131.0675	131.8485	132.4005	132.9777 (39)
Average = Sum(39)m / 12 =												132.1201 (39)
HLP	1.6682	1.6643	1.6604	1.6423	1.6389	1.6231	1.6231	1.6202	1.6292	1.6389	1.6457	1.6529 (40)
HLP (average)												1.6423 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy conte	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												Total = Sum(45)m = 1461.5909 (45)
Distribution loss (46)m = 0.15 x (45)m	22.7304	19.8801	20.5145	17.8850	17.1611	14.8087	13.7225	15.7467	15.9348	18.5705	20.2711	22.0131 (46)
Water storage loss:												150.0000 (47)
Store volume												1.3938 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7527 (55)
Enter (49) or (54) in (55)												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491 (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	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491 (64)
Heat gains from water heating, kWh/month	87.6615	77.7362	82.7497	75.7186	75.3164	68.8995	67.6941	72.1812	71.3956	78.4405	81.0078	86.0717 (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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6475	17.4507	14.1919	10.7442	8.0314	6.7804	7.3265	9.5233	12.7821	16.2298	18.9426	20.1936 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567 (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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538 (71)
Water heating gains (Table 5)	117.8247	115.6788	111.2228	105.1648	101.2317	95.6938	90.9867	97.0177	99.1606	105.4308	112.5109	115.6878 (72)
Total internal gains	420.9208	418.8650	405.3873	383.6134	361.4811	340.1372	326.2524	332.1934	343.3579	365.3440	390.6233	409.6063 (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						
North	5.8900	10.6334	0.6300	0.7000	0.7700	19.1407 (74)						
East	0.5100	19.6403	0.6300	0.7000	0.7700	3.0612 (76)						
South	6.8200	46.7521	0.6300	0.7000	0.7700	97.4444 (78)						
West	4.6900	19.6403	0.6300	0.7000	0.7700	28.1509 (80)						
Solar gains	147.7972	257.2252	365.9973	476.2492	553.6419	558.3722	534.7070	475.7343	404.0377	288.1238	178.0352	125.8249 (83)
Total gains	568.7180	676.0902	771.3847	859.8626	915.1231	898.5094	860.9594	807.9278	747.3956	653.4678	568.6586	535.4312 (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	41.6282	41.7267	41.8237	42.2854	42.3729	42.7852	42.7852	42.8624	42.6254	42.3729	42.1962	42.0131
alpha	3.7752	3.7818	3.7882	3.8190	3.8249	3.8523	3.8523	3.8575	3.8417	3.8249	3.8131	3.8009
util living area	0.9958	0.9914	0.9814	0.9544	0.8905	0.7642	0.6130	0.6630	0.8615	0.9684	0.9921	0.9967 (86)
MIT	19.2133	19.4145	19.7398	20.1665	20.5591	20.8398	20.9497	20.9312	20.7204	20.2085	19.6336	19.1816 (87)
Th 2	19.5637	19.5665	19.5693	19.5825	19.5849	19.5964	19.5964	19.5986	19.5920	19.5849	19.5800	19.5748 (88)
util rest of house	0.9943	0.9883	0.9742	0.9352	0.8400	0.6526	0.4423	0.4958	0.7783	0.9512	0.9887	0.9955 (89)
MIT 2	17.2467	17.5412	18.0138	18.6296	19.1596	19.4925	19.5800	19.5728	19.3748	18.7009	17.8704	17.2073 (90)
Living area fraction	fLA = Living area / (4) =											0.3794 (91)
MIT	17.9928	18.2519	18.6686	19.2127	19.6906	20.0036	20.0996	20.0881	19.8852	19.2728	18.5393	17.9562 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9928	18.2519	18.6686	19.2127	19.6906	20.0036	20.0996	20.0881	19.8852	19.2728	18.5393	17.9562 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9917	0.9841	0.9679	0.9286	0.8446	0.6891	0.5080	0.5596	0.7991	0.9460	0.9850	0.9934 (94)
Useful gains	564.0115	665.3543	746.6153	798.5002	772.8773	619.1228	437.3788	452.1509	597.2780	618.1535	560.1061	531.8712 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1837.6686	1787.6862	1625.4814	1362.5225	1053.5428	705.5912	456.9711	480.7211	758.2579	1143.4959	1514.5711	1829.2739 (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	947.6009	754.2070	653.8764	406.0960	208.8151	0.0000	0.0000	0.0000	0.0000	390.8547	687.2148	965.2676 (98)
Space heating												5013.9326 (98)
Space heating per m2												(98) / (4) = 62.3236 (99)

8c. Space cooling requirement

Not applicable

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF TARGET EMISSIONS 09 Jan 2014

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													5362.4948 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	947.6009	754.2070	653.8764	406.0960	208.8151	0.0000	0.0000	0.0000	0.0000	390.8547	687.2148	965.2676	(98)
Space heating efficiency (main heating system 1)	93.5000	93.5000	93.5000	93.5000	93.5000	0.0000	0.0000	0.0000	0.0000	93.5000	93.5000	93.5000	(210)
Space heating fuel (main heating system)	1013.4769	806.6385	699.3330	434.3273	223.3317	0.0000	0.0000	0.0000	0.0000	418.0265	734.9891	1032.3718	(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	198.1306	174.6198	183.3582	164.3254	161.0024	143.8168	138.0781	151.5732	151.3239	170.3981	180.2327	193.3491	(64)
Efficiency of water heater (217)m	88.4491	88.2748	87.9183	87.1343	85.5085	79.8000	79.8000	79.8000	79.8000	86.9600	88.0471	79.8000	(216)
Fuel for water heating, kWh/month	224.0052	197.8140	208.5553	188.5887	188.2882	180.2215	173.0302	189.9413	189.6289	195.9500	204.7004	218.4260	(219)
Water heating fuel used													2359.1499 (219)
Annual totals kWh/year													
Space heating fuel - main system													5362.4948 (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)													346.9810 (232)
Total delivered energy for all uses													8143.6257 (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	5362.4948	0.2160	1158.2989 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2359.1499	0.2160	509.5764 (264)
Space and water heating			1667.8753 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	346.9810	0.5190	180.0831 (268)
Total CO2, kg/m2/year			1886.8834 (272)
Emissions per m2 for space and water heating			20.7318 (272a)
Fuel factor (electricity)			1.5500
Emissions per m2 for lighting			2.2384 (272b)
Emissions per m2 for pumps and fans			0.4838 (272c)
Target Carbon Dioxide Emission Rate (TER) = (20.7318 * 1.55) + 2.2384 + 0.4838, rounded to 2 d.p.			34.8600 (273)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2021062	Issued on Date	15/07/2020
Assessment Reference	As Designed	Prop Type Ref	
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW		

SAP Rating	80 C	DER	22.13	TER	34.86
Environmental	82 B	% DER<TER	36.51		
CO ₂ Emissions (t/year)	1.70	DFEE	72.34	TTEE	81.04
General Requirements Compliance	Pass	% DFEE<TFEE	10.74		

Assessor Details	Mr. Gary White, Hibec Limited,	Assessor ID	4104-0001
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Client	
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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	80.4500 (1b)	x 3.4400 (2b)	= 276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 276.7480 (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				3 + 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate				0.3584 (18)	
Number of sides sheltered				1 (19)	
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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					
door			2.2100	1.6000	3.5360		(26a)					
windows (U _w = 1.40)			30.5000	1.3258	40.4356		(27)					
Heat Loss Floor			80.4500	0.2500	20.1125		(28b)					
External Wall	130.1800	32.7100	97.4700	0.2100	20.4687		(29a)					
External Roof	83.7700		83.7700	0.1200	10.0524		(30)					
Total net area of external elements A _{um} (A, m ²)			294.4000				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	94.6052	(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.6419 (36)					
Total fabric heat loss							(33) + (36) =	101.2471 (37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Heat transfer coeff	155.0691	154.7522	154.4417	152.9831	152.7103	151.4399	151.4399	151.2046	151.9292	152.7103	153.2623	153.8395 (39)
Average = Sum(39)m / 12 =								152.9818 (39)				

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



CALCULATION OF FABRIC ENERGY EFFICIENCY 09 Jan 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.9275	1.9236	1.9197	1.9016	1.8982	1.8824	1.8824	1.8795	1.8885	1.8982	1.9051	1.9122 (40)
HLP (average)												1.9016 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.4713 (42)
Average daily hot water use (litres/day)												92.8944 (43)
Daily hot water use	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)
Energy content (annual)	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)
Energy content (annual)												1461.5909 (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	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	32.2013	28.1635	29.0622	25.3371	24.3116	20.9790	19.4402	22.3079	22.5743	26.3082	28.7174	31.1853 (65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains (Table 5), Watts												
(66)m	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6469	17.4502	14.1915	10.7438	8.0312	6.7802	7.3263	9.5230	12.7817	16.2293	18.9420	20.1929 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567 (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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538 (71)
Water heating gains (Table 5)	43.2814	41.9100	39.0621	35.1905	32.6769	29.1376	26.1293	29.9837	31.3532	35.3605	39.8853	41.9157 (72)
Total internal gains	343.3769	342.0956	330.2263	310.6388	289.9260	270.5808	258.3948	262.1591	272.5501	292.2732	314.9972	332.8336 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	10.0400	10.6334	0.6300	0.7000	0.7700	32.6270 (74)						
East	0.8700	19.6403	0.6300	0.7000	0.7700	5.2220 (76)						
South	11.6100	46.7521	0.6300	0.7000	0.7700	165.8841 (78)						
West	7.9800	19.6403	0.6300	0.7000	0.7700	47.8985 (80)						
Solar gains	251.6317	437.9424	623.1507	810.9024	942.7151	950.7871	910.4831	810.0395	687.9298	490.5532	303.1139	214.2224 (83)
Total gains	595.0086	780.0380	953.3770	1121.5412	1232.6411	1221.3679	1168.8779	1072.1986	960.4799	782.8264	618.1112	547.0560 (84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	14.4111	14.4406	14.4697	14.6076	14.6337	14.7565	14.7565	14.7795	14.7090	14.6337	14.5810	14.5263
alpha	1.9607	1.9627	1.9646	1.9738	1.9756	1.9838	1.9838	1.9853	1.9806	1.9756	1.9721	1.9684
util living area	0.9564	0.9274	0.8835	0.8108	0.7097	0.5858	0.4712	0.5156	0.6931	0.8573	0.9365	0.9625 (86)
MIT	17.4707	17.9082	18.5542	19.3427	20.0393	20.5510	20.7955	20.7473	20.3242	19.3846	18.2726	17.3896 (87)
Th 2	19.3821	19.3848	19.3874	19.3997	19.4021	19.4129	19.4129	19.4149	19.4087	19.4021	19.3974	19.3925 (88)
util rest of house	0.9482	0.9141	0.8617	0.7737	0.6483	0.4868	0.3315	0.3767	0.6051	0.8206	0.9226	0.9555 (89)
MIT 2	16.2825	16.7120	17.3413	18.1002	18.7378	19.1752	19.3449	19.3228	19.0106	18.1658	17.0866	16.2092 (90)
Living area fraction												0.3794 (91)
MIT	16.7333	17.1658	17.8014	18.5716	19.2315	19.6971	19.8952	19.8632	19.5090	18.6282	17.5365	16.6570 (92)
Temperature adjustment												0.0000
adjusted MIT	16.7333	17.1658	17.8014	18.5716	19.2315	19.6971	19.8952	19.8632	19.5090	18.6282	17.5365	16.6570 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9289	0.8892	0.8341	0.7505	0.6407	0.5065	0.3778	0.4201	0.6116	0.7978	0.9000	0.9379 (94)

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Useful gains	552.6743	693.6267	795.1728	841.6954	789.7472	618.6085	441.6474	450.4547	587.4036	624.5154	556.2892	513.0943 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W												
Month fracti	1928.0172	1898.1577	1745.4136	1479.5855	1150.1448	771.9040	499.0229	523.6506	821.7794	1225.9864	1599.5246	1916.3822 (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	1023.2551	809.4448	706.9792	459.2809	268.1358	0.0000	0.0000	0.0000	0.0000	447.4944	751.1295	1044.0462 (98)
Space heating per m2												5509.7658 (98)
												(98) / (4) = 68.4868 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	1423.5350	1120.6552	1149.1553	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.6863	0.7473	0.7158	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	977.0261	837.4893	822.5525	0.0000	0.0000	0.0000	0.0000 (102)
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												
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	390.7326	460.5035	388.6838	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												1239.9199 (104)
Intermittency factor (Table 10b)												FC = cooled area / (4) = 1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.2500	0.2500	0.2500	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	97.6832	115.1259	97.1709	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling per m2												309.9800 (107)
Energy for space heating												3.8531 (108)
Energy for space cooling												68.4868 (99)
Total												3.8531 (108)
Dwelling Fabric Energy Efficiency (DFEE)												72.3399 (109)
												72.3 (109)

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Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

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

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.4500 (1b)	x 3.4400 (2b)	= 276.7480 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.4500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 276.7480 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				3 * 10 =	30.0000 (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) =				30.0000 / (5) =	0.1084 (8)
Pressure test				Yes	
Measured/design AP50					5.0000
Infiltration rate					0.3584 (18)
Number of sides sheltered					1 (19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.9250 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3315 (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	0.4227	0.4144	0.4061	0.3647	0.3564	0.3149	0.3149	0.3067	0.3315	0.3564	0.3730	0.3895 (22b)
Effective ac	0.5893	0.5859	0.5825	0.5665	0.5635	0.5496	0.5496	0.5470	0.5550	0.5635	0.5696	0.5759 (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 Semi-glazed door			2.2100	1.2000	2.6520		(26a)
TER Opening Type (Uw = 1.40)			17.9100	1.3258	23.7443		(27)
Heat Loss Floor			80.4500	0.1300	10.4585		(28b)
External Wall	130.1800	20.1200	110.0600	0.1800	19.8108		(29a)
External Roof	83.7700		83.7700	0.1300	10.8901		(30)
Total net area of external elements Aum(A, m2)			294.4000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	67.5557	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.8296 (36)
Total fabric heat loss							(33) + (36) = 80.3853 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	53.8220	53.5052	53.1946	51.7361	51.4632	50.1928	50.1928	49.9576	50.6821	51.4632	52.0152	52.5924 (38)
Average = Sum(39)m / 12 =	134.2073	133.8905	133.5799	132.1214	131.8485	130.5781	130.5781	130.3429	131.0675	131.8485	132.4005	132.9777 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6682	1.6643	1.6604	1.6423	1.6389	1.6231	1.6231	1.6202	1.6292	1.6389	1.6457	1.6529 (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													2.4713 (42)
Average daily hot water use (litres/day)													92.8944 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	102.1839	98.4681	94.7523	91.0365	87.3208	83.6050	83.6050	87.3208	91.0365	94.7523	98.4681	102.1839 (44)	
Energy content (annual)	151.5357	132.5341	136.7633	119.2336	114.4075	98.7249	91.4832	104.9783	106.2320	123.8032	135.1409	146.7542 (45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1461.5909 (45)	
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)	

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Calculation Type: New Build (As Designed)



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Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Heat gains from water heating, kWh/month	32.2013	28.1635	29.0622	25.3371	24.3116	20.9790	19.4402	22.3079	22.5743	26.3082	28.7174	31.1853	(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	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	123.5672	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.6475	17.4507	14.1919	10.7442	8.0314	6.7804	7.3265	9.5233	12.7821	16.2298	18.9426	20.1936	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	220.3785	222.6653	216.9025	204.6343	189.1479	174.5928	164.8691	162.5823	168.3450	180.6133	196.0997	210.6548	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	35.3567	(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)	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	-98.8538	(71)
Water heating gains (Table 5)	43.2814	41.9100	39.0621	35.1905	32.6769	29.1376	26.1293	29.9837	31.3532	35.3605	39.8853	41.9157	(72)
Total internal gains	343.3775	342.0962	330.2267	310.6391	289.9263	270.5810	258.3950	262.1594	272.5505	292.2737	314.9978	332.8342	(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							
North	5.8900	10.6334	0.6300	0.7000	0.7700	19.1407 (74)							
East	0.5100	19.6403	0.6300	0.7000	0.7700	3.0612 (76)							
South	6.8200	46.7521	0.6300	0.7000	0.7700	97.4444 (78)							
West	4.6900	19.6403	0.6300	0.7000	0.7700	28.1509 (80)							
Solar gains	147.7972	257.2252	365.9973	476.2492	553.6419	558.3722	534.7070	475.7343	404.0377	288.1238	178.0352	125.8249	(83)
Total gains	491.1747	599.3214	696.2240	786.8883	843.5682	828.9532	793.1020	737.8937	676.5882	580.3975	493.0330	458.6591	(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)													21.0000 (85)
tau	41.6282	41.7267	41.8237	42.2854	42.3729	42.7852	42.7852	42.8624	42.6254	42.3729	42.1962	42.0131	
alpha	3.7752	3.7818	3.7882	3.8190	3.8249	3.8523	3.8523	3.8575	3.8417	3.8249	3.8131	3.8009	
util living area	0.9975	0.9943	0.9866	0.9650	0.9107	0.7971	0.6515	0.7049	0.8905	0.9781	0.9952	0.9981	(86)
MIT	19.1319	19.3351	19.6649	20.1008	20.5091	20.8120	20.9378	20.9146	20.6759	20.1387	19.5549	19.1004	(87)
Th 2	19.5637	19.5665	19.5693	19.5825	19.5849	19.5964	19.5964	19.5986	19.5920	19.5849	19.5800	19.5748	(88)
util rest of house	0.9965	0.9922	0.9813	0.9495	0.8665	0.6901	0.4764	0.5360	0.8173	0.9656	0.9930	0.9974	(89)
MIT 2	17.9007	18.1052	18.4344	18.8708	19.2541	19.5101	19.5820	19.5756	19.4129	18.9158	18.3350	17.8775	(90)
Living area fraction									fLA = Living area / (4) =				0.3794 (91)
MIT	18.3677	18.5718	18.9012	19.3374	19.7302	20.0040	20.0963	20.0835	19.8920	19.3797	18.7978	18.3415	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3677	18.5718	18.9012	19.3374	19.7302	20.0040	20.0963	20.0835	19.8920	19.3797	18.7978	18.3415	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	488.9181	593.3831	680.8512	744.3935	735.5951	601.5580	431.7653	443.6386	565.9473	558.9935	488.7410	457.0319	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1887.9941	1830.5215	1656.5514	1379.0080	1058.7666	705.6397	456.5452	480.1241	759.1450	1157.5947	1548.7895	1880.4982	(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	1040.9126	831.3570	725.9209	456.9224	240.4396	0.0000	0.0000	0.0000	0.0000	445.3592	763.2349	1059.0590	(98)
Space heating												5563.2057	(98)
Space heating per m2												69.1511	(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	1227.4344	966.2781	990.6059	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7325	0.8138	0.7790	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	899.1232	786.3538	771.7020	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1061.0441	1017.2273	954.2314	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	116.5830	171.7699	135.8019	0.0000	0.0000	0.0000	0.0000	(104)
Space cooling												424.1548	(104)

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Calculation Type: New Build (As Designed)



CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY 09 Jan 2014

Cooled fraction											FC = cooled area / (4) =	1.0000 (105)
Intermittency factor (Table 10b)	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 kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.1458	42.9425	33.9505	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling											106.0387 (107)	
Space cooling per m2											1.3181 (108)	
Energy for space heating											69.1511 (99)	
Energy for space cooling											1.3181 (108)	
Total											70.4692 (109)	
Target Fabric Energy Efficiency (TFEE)											81.0 (109)	

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)



Property Reference	C2021062	Issued on Date	15/07/2020
Assessment Reference	As Designed	Prop Type Ref	
Property	Units 1 to 3, Cloughton Woods, Filey, SCARBOROUGH, YO13 0AW		

SAP Rating	80 C	DER	22.13	TER	34.86
Environmental	82 B	% DER<TER	36.51		
CO ₂ Emissions (t/year)	1.70	DFEE	72.34	TFEE	81.04
General Requirements Compliance	Pass	% DFEE<TFEE	10.74		

Assessor Details	Mr. Gary White, Hibec Limited	Assessor ID	4104-0001
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Client	
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SAP 2012 OVERHEATING ASSESSMENT FOR New Build (As Designed) 9.92

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

Overheating Calculation Input Data

Dwelling type	Detached Bungalow
Number of storeys	1
Cross ventilation possible	Yes
SAP Region	North East England
Front of dwelling faces	North
Overshading	Average or unknown
Thermal mass parameter	100.0
Night ventilation	No
Ventilation rate during hot weather (ach)	6.00 (Windows fully open)

Overheating Calculation

Summer ventilation heat loss coefficient	547.96 (P1)
Transmission heat loss coefficient	101.25 (37)
Summer heat loss coefficient	649.21 (P2)

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

Solar shading Orientation	Z blinds	Solar access	Z overhangs	Z summer
North	1.000	0.90	1.000	0.900 (P8)
East	1.000	0.90	1.000	0.900 (P8)
South	1.000	0.90	1.000	0.900 (P8)
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
North	10.0400	74.6426	0.6300	0.7000	0.9000	267.6975
East	0.8700	111.2086	0.6300	0.7000	0.9000	34.5606
South	11.6100	110.4126	0.6300	0.7000	0.9000	457.9041
West	7.9800	111.2086	0.6300	0.7000	0.9000	317.0041
total:						1077.1663

	Jun	Jul	Aug	
Solar gains	1107	1077	950	(P3)
Internal gains	484	466	474	
Total summer gains	1591	1543	1424	(P5)
Summer gain/loss ratio	2.45	2.38	2.19	(P6)
Summer external temperature	13.80	15.80	15.60	
Thermal mass temperature increment (TMP = 100.0)	1.30	1.30	1.30	
Threshold temperature	17.55	19.48	19.09	(P7)
Likelihood of high internal temperature	Not significant	Not significant	Not significant	
Assessment of likelihood of high internal temperature:	Not significant			

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



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Assessor Details	Mr. Gary White, Hibec Limited,	Assessor ID	4104-0001
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Client	
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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	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	34.86	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	22.13	kgCO ₂ /m ²	Pass
	-12.73 (-36.5%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	81.04	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	72.34	kWh/m ² /yr	
	-8.7 (-10.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	Pass
Floor	0.25 (max. 0.25)	0.25 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.12 (max. 0.35)	Pass
Openings	1.41 (max. 2.00)	1.60 (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	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Samsung Electronics AE050JXYDEH	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



Secondary heating system

Room heaters - Wood Logs
Closed room heater
Efficiency: 65%
Minimum: 65%

Pass

5 Cylinder insulation

Hot water storage

Measured cylinder loss: 1.89 kWh/day
Permitted by DBSCG 1.89

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

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 (North East England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

10.04 m², No overhang

Windows facing East

0.87 m², No overhang

Windows facing South

11.61 m², No overhang

Windows facing West

7.98 m², No overhang

Air change rate

6.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.12

W/m²K

Thermal bridging y-value

0.023

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

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

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Property Reference	C2021062	Issued on Date	15/07/2020
Assessment Reference	As Designed	Prop Type Ref	
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General Requirements Compliance	Pass	% DFEE<TFEE	10.74		

Assessor Details	Mr. Gary White, Hibec Limited,	Assessor ID	4104-0001
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Client	
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SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Rural
1.0 Property Type	Bungalow, Detached
2.0 Number of Storeys	1
3.0 Date Built	2020
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	38.14 m	80.45 m ²	3.44 m

7.0 Living Area	30.52	m ²
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8.0 Thermal Mass Parameter	Simple calculation - Low	
Thermal Mass	100.00	kJ/m ² K

9.0 External Walls					
Description	Type	Construction	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
External Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.21	130.18	97.47

10.0 External Roofs					
Description	Type	Construction	U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
External Roof	External Slope Roof	Plasterboard, insulated slope	0.12	83.77	83.77

11.0 Heat Loss Floors					
Description	Type	Construction	U-Value (W/m ² K)	Area (m ²)	
Heat Loss Floor	Exposed Floor - Timber	Timber exposed floor, insulation between joists	0.25	80.45	

12.0 Opening Types									
Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.60
windows	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m ²)	Curtain Closed
door	Half Glazed Door	[1] External Wall	North							2.21	
windows	Window	[1] External Wall	North	None	0.00					10.04	
windows	Window	[1] External Wall	East	None	0.00					0.87	
windows	Window	[1] External Wall	South	None	0.00					11.61	
windows	Window	[1] External Wall	West	None	0.00					7.98	

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
Independently assessed	E2 Other lintels (including other steel lintels)	16.50	0.040	Yes
Table K1 - Approved	E3 Sill	1.82	0.040	No
Table K1 - Approved	E4 Jamb	50.32	0.050	Yes
Independently assessed	E5 Ground floor (normal)	38.14	0.042	Yes
Table K1 - Approved	E11 Eaves (insulation at rafter level)	25.54	0.040	No
Table K1 - Approved	E13 Gable (insulation at rafter level)	13.12	0.040	No
Independently assessed	E16 Corner (normal)	13.60	0.018	No

 Y-value

 W/m²K

18.0 Pressure Testing

 Designed AP₅₀

 m³/(h.m²) @ 50 Pa

 Property Tested ?

 As Built AP₅₀

 m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

 Windows open in hot weather

 Cross ventilation possible

 Night Ventilation

 Air change rate

Mechanical Ventilation

 Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0	0	0	0
Number of open flues	0	0	0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

22.0 Lighting

Internal

 Total number of light fittings

 Total number of L.E.L. fittings

 Percentage of L.E.L. fittings %

External

 External lights fitted

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Light and motion sensor	Yes	
23.0 Electricity Tariff	Standard	
24.0 Main Heating 1	Database	
Description	ASHP	
Percentage of Heat	100	%
Database Ref. No.	102638	
Fuel Type	Electricity	
Main Heating	PET	
SAP Code	224	
In Winter	225.9	
In Summer	272.7	
Controls	CHD Time and temperature zone control	
PCDF Controls	0	
Sap Code	2207	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in Wood	
Flow Temperature	Normal (> 45°C)	
25.0 Main Heating 2	None	
Community Heating	None	
27.0 Secondary Heating	RWM	
Secondary Heating	SAP table	
Description	Wood Logs RWM Closed room heater	
SHS efficiency	65.00	%
SAP Code	633	
HETAS Approved System	Yes	
Smoke Control Area	Unknown	
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	
Immersion Only Heating Hot Water	Yes	
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)



Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.89	kWh/day
Pipes insulation	Fully insulated primary pipework	
31.0 Thermal Store	None	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£57	B 82	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£343	A 92	Environmental Impact
	Typical Cost	Typical savings per year	Ratings after improvement	
Wind turbine	£15,000 - £25,000	£669	A 114	Environmental Impact