Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT67EH CT54NB

Code for Sustainable Homes

Assessor Name: Mark Attlesey
Assessor No.: ECMK300581

Ene 1: Dwelling Emission Rating

TER: 18.40
DER: 18.26
% improvement: 0.8%
Credits: 0
Level: n/a

Ene 2: Fabric Energy Efficiency

Dwelling Type: Detached house

FEE: 56.2 Target FEE: 46.0 Credits: 3

Ene 7: Low and Zero Carbon Technologies

Energy is supplied by low or zero carbon technologies: No Reduction in CO2 emissions as a result: No

reduction in OOZ chilosions as a result.	11/4				
	Standar	d case	Actual	case	
	kWh/m²/year	kg/m²/year	kWh/m²/year	kg/m²/year	
DER		21.1979		18.2634	(ZC1)
CO2 emissions from appliances		15.6080		15.6080	(ZC2)
CO2 emissions from cooking		1.9770		1.9770	(ZC3)
Total CO2 emissions		38.7828		35.8484	(ZC4)
Residual CO2 emissions offset from biofuel CHP		0.0000		0.0000	(ZC5)
Additional allowable generation	0.0000		0.0000	•	(ZC6)
Resulting CO2 emissions offset		0.0000		0.0000	(ZC7)
Net CO2 emissions		38.7828		35.8484	(ZC8)

Reduction in emissions = 100 x (1 - (ZC8actual / ZC8standard))

= 100 x (1 - (35.8484 / 38.7828))

= 0%

0

Credits

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	r		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				4	,	x 10		40.00	(7a)
Numbe	er of pass	ive vents	;				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0	:	x 40		0.00	(7c)
											Air chang	jes per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	3						0.18	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air per	meability										0.43	(18)
Numbe	er of side	s on whic	h shelte	red							2.00	(19)
Shelte	rfactor										0.85	(20)
Infiltrat	ion rate i	ncorpora	ting shel	ter factor							0.37	(21)
Infiltrat	ion rate r	nodified t	for mont	hly wind s	peed							, ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
								1			13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	ind spee	ed)				10.10	(ZZG)
0.47	0.46	0.45	0.40	0.39	0.35	0.35	0.34	0.37	0.39	0.41	0.43	
	I				*						4.80	(22b)
	ition : nat ve air cha		-	ntermitter	nt extrac	t fans						` '
0.61	0.60	0.60	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59	(25)
0.01	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.07	0.50	0.50	0.00	(-0)

2 Hoot loss	os and boot la	ce naramata						
Element	es and heat los Gross	Openings	Netarea	U-value	AxU	kappa-value	ΛνΚ	
Element		m ²		W/m ² K	W/K	kJ/m²K	kJ/K	
Window Dou	area, m²	1114	A, m ²			KJ/III-K	KJ/K	(27)
Window - Dou	-		0.200	1.15 (1.20)	0.23			(27)
argon filled, lo								
hard coat (Ea	•							
•	·Value = 1.20							
Window - Dou	-		0.550	1.15 (1.20)	0.63			(27)
argon filled, lo								
hard coat (So	•							
Specified U-	·Value = 1.20							
Window - Dou	ble-glazed,		2.520	1.15 (1.20)	2.89			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (We	est)							
Specified U-	·Value = 1.20							
Window - Dou	ble-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (Ea	st)							
,	·Value = 1.20							
Full glazed do			6.680	1.20	8.02			(26)
Double-glaze								()
low-E, En=0.2	-							
(West)	-,							
` ,	·Value = 1.20							
Full glazed do			3.780	1.20	4.54			(26)
Double-glaze			3.700	1.20	4.04			(20)
low-E, En=0.2	-							
(East)	L, Haiu Coat							
, ,	·Value = 1.20							
Full glazed do			2.630	1.20	3.16			(26)
-			2.030	1.20	3.10			(20)
Double-glaze	-							
low-E, En=0.2	z, riaiu coat							
(South)	Value 4.00							
	Value = 1.20		4.070	4.45.(4.00)	5.05			(07)
Rooflight at 7			4.670	1.15 (1.20)	5.35			(27)
Double-glaze	_							
low-E, En=0.2	2, hard coat							
(n/a)								
•	fied U-Value =	1.20						4
Walls	_		4.15	0.21	0.87	9.00	37.35	(29)
Dormer Che								
	ard/Battens/9O							
•	imber Frame In							
	lotex XR4000 E	Between						
Studs/12.5 I	P'bd							
Walls			96.74	0.20	19.35	9.00	870.66	(29)
Brick or (We	atherboard/Bat	ttens/100						
	nse Block)/51 C							
Timber Fran	ne Insulated Wi	ith 120						
Celotex XR4	1000 Between S	Studs/12.5						
P'bd								
Ground floors			46.23	0.12	5.55	75.00	3467.25	(28)
Beam/Medi	um Dense Bloc	k/150						. ,
I/in man an TI	70/00000							

JPA Designer Version 6.03x , SAP Version 9.92

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Approval of JPA Designer by BRE applies only to the software, data is not subject to quality control procedures, users are themselves responsible for the accuracy of the data. The results of the calculation should not be accepted without first checking the input data.

3. Heat	losses a	and hear	loss pa	rametei	•								
Element		Gross	•	enings	Netarea		alue /	AxU		appa-valu			
		area, m ²	m ²		A, m²		m²K	W/K		J/m²K	kJ/K		
Flat roof	s				3.36	6	0.15	0.5	0	9.00	30.24	(3	30)
150 Ki	ngspan T	TR27 Ove	er Joists										
Pitched	roofs ins	ulated be	etween ra	afters	51.06	6	0.12	6.1	3	9.00	459.54	(3	30)
150 Ki	ngspan k	<7 Between	en										
Rafter	s/52.5 Ki	ngspan k	<118 Unc	der									
Rafter	s With Br	eather M	embrane	Э									
	ea of exte		ments Si	gma A, r	n²						226.9	`	31)
	eat loss,	, W/K									62.1	•	33)
Heat cap											4865.0	•	34)
	l mass pa		, kJ/m²K								52.6	•	35)
	thermal	-									34.0	, , ,	36)
	oric heat										96.1	19 (3	37)
Ventilati	on heat l	loss calc	ulated m	onthly									
44.65	44.34	44.04	42.62	42.35	41.11	41.11	40.88	41.59	42.35	42.89	43.45	(3	38)
Heat tra	nsfer coe	efficient,	W/K	,					-				
140.85	140.54	140.23	138.81	138.54	137.30	137.30	137.07	137.78	138.54	139.08	139.64		
		,	,		,	,			,	,	138.8	31 (3	39)
Heat los	s param	eter (HLI	²), W/m²	K									
1.52	1.52	1.52	1.50	1.50	1.48	1.48	1.48	1.49	1.50	1.50	1.51		
HLP (ave	erage)	,	,		,	,			,		1.5	50 (4	40)
Number	of days i	in month	(Table 1	a)									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
31	28	31	30	31	30	31	31	30	31	30	31		

Assume	e r heatin g ed occupa average l	ancy, N	-		er day Vd	,average	e				kWh/year 2.66 97.33	(42) (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water	er usage	in litres	oer day f	or each r	nonth							
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
Energy	content c	of hot wat	er used	•	•			•			·	
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Energy of Distribut	content (a	annual)									1531.31	(45)
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06	(46)
Hot wate Hot wate Volume Tempera Energy	oss dete er storage er cylinde factor ature fact lost from orage los	e volume er loss fa or store (k\	(litres) ctor (kW		tests, tak	en from	boiler da	ta record	d		0.00 0.0000 0.0000 0.0000 0.000	(50) (51) (52) (53) (55)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
	age loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(30)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(31)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
	oss calcu				0.00	0.00	0.00	0.00	0.00	0.00	0.00	(00)
17.45	15.73	17.33	16.64	17.10	16.44	16.92	17.04	16.55	17.24	16.80	17.41	(61)
	at require							10.00	17.2	10.00	17.71	(0.)
176.21			141.56			· L	127.02	127.85	146.94	158.39	171.17	(62)
	rom wate			ļ	J		1 1 1	1 100	1 1010 1	100.00		(-)
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17	(64)
		1	IL			JL	JL				1733.95	(64)
Heat gai	ins from	water he	ating, kW	/h/month	า							` '
57.15	50.10	51.98	45.70	44.13	38.50	36.10	40.83	41.14	47.44	51.28	55.48	(65)

5. Internal gains

	_										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts	,	,		,	,			,	,
159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48
Lighting	gains	•									
57.96	51.48	41.86	31.69	23.69	20.00	21.61	28.09	37.71	47.88	55.88	59.57
Appliand	ces gains	5									
363.48	367.25	357.75	337.51	311.97	287.96	271.93	268.15	277.66	297.89	323.44	347.44
Cooking	gains										
53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water he	eating ga	ains	,	,		,	,		,	,	,
76.82	74.56	69.86	63.47	59.32	53.48	48.52	54.88	57.15	63.76	71.22	74.56
Total inte	ernal gaiı	ns									
608.02	603.05	579.23	542.44	504.74	471.20	451.82	460.89	482.27	519.29	560.30	591.34

6. Solar gains (calculation for January)

or colar game (calculation for callually)	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 19.64	•	0.77	1.3720
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 46.75	0.72 x 0.70	0.77	8.9811
En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 19.64	0.72 x 0.70	0.77	17.2867
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 19.64	0.72 x 0.70	0.77	29.7029
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 19.64	0.72 x 0.70	0.77	45.8234
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20	0.0.0.700.40.04	0.70 0.70	0.77	05.0000
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 19.64	0.72 x 0.70	0.77	25.9300
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20	0.0 × 0.000 40.75	0.70 × 0.70	0.77	40.0450
Full glazed door - Double-glazed, argon filled,	0.9 X 2.630 46.75	0.72 X 0.70	0.77	42.9458
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20	0.0 v 4.670.06.00	0.72 x 0.70	1.00	EE 0761
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 26.00	0.72 X 0.70	1.00	55.0761
argon filled, low-E, En=0.2, hard coat (n/a)				
Velux Specified U-Value = 1.20				

	gsystemı	esponsiv	veness								1.00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau											
9.59	9.62	9.64	9.74	9.75	9.84	9.84	9.86	9.81	9.75	9.72	9.68
alpha											
1.64	1.64	1.64	1.65	1.65	1.66	1.66	1.66	1.65	1.65	1.65	1.65
Utilisati	on factor	for gains	for living	area							
0.87	0.83	0.75	0.65	0.53	0.41	0.32	0.36	0.53	0.72	0.84	0.88
Mean ir	nternal te	nperatur	e in livinç	area T1							
17.39	17.87	18.62	19.48	20.16	20.62	20.82	20.78	20.39	19.43	18.25	17.29
Temper	rature du	ring heat	ing perio	ds in rest	of dwelli	ng Th2					_
19.67	19.67	19.68	19.69	19.69	19.70	19.70	19.70	19.69	19.69	19.68	19.68
Utilisati	on factor	for gains	for rest	of dwellir	ng						
0.86	0.81	0.73	0.61	0.48	0.35	0.24	0.27	0.46	0.68	0.82	0.87
Mean ir	nternal te	mperatur	re in the r	est of dw	elling T2	2	,	,	,		
15.13	15.79	16.80	17.94	18.82	19.37	19.59	19.55	19.13	17.92	16.32	15.00
	rea fracti						-				0.50
Mean in	nternal tei	nperatur		whole d	welling)						
16.26	16.83	17.71	18.71	19.49	19.99	20.21	20.17	19.76	18.68	17.28	16.15
Apply a	djustmer	it to the m	nean inte	rnal tem	perature	, where a	ppropria	ite			
16.26	16.83	17.71	18.71	19.49	19.99	20.21	20.17	19.76	18.68	17.28	16.15
8. Spac	ce heatir	na reauii	rement								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	on factor		<u> </u>		1			1 1			
0.81	0.76	0.68	0.58	0.47	0.36	0.27	0.31	0.46	0.65	0.77	0.82
Useful					1			10110	1		
	787.08	874.13	900.88	818.14	624.10	445.72	454.30	597.43	667.59	647.93	642.41
	/ average						1				
		6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Monthly	4.90		0.00				10110	1			0
Monthly 4.30	4.90 ss rate fo		iternal te	mperatu	re						
Monthly 4.30 Heat los	ss rate fo	r mean in		•		495 07	516 32	779 35	1119 13	1416 48	1668 45
Monthly 4.30 Heat los 1684.9	ss rate fo 0 1676.6	r mean in 1571.43	1361.72	•		495.07	516.32	779.35	1119.13	1416.48	1668.45
Monthly 4.30 Heat los 1684.9 Fraction	ss rate fo 0 1676.69 n of mont	r mean in 1571.43 h for hea	1361.72 ting	1079.02		495.07	1	1			
Monthly 4.30 Heat los 1684.9 Fraction 1.00	ss rate fo d 1676.69 n of mont 1.00	1571.43 h for head	1361.72 ting 1.00	1.00	740.54	_	516.32	779.35	1119.13	1416.48	1.00
Monthly 4.30 Heat los 1684.9 Fraction 1.00	ss rate fo d 1676.69 n of mont d 1.00 heating re	1571.43 h for head 1.00 equireme	1361.72 ting 1.00 ent for ea	1.00	740.54	_	1	1			

8c. Space cooling requirement - not applicable

Space heating requirement per m² (kWh/m²/year)

43.75

(99)

9a. Energy requirements

kV	Nh/year
No secondary heating system selected Fraction of space heat from main system(s) Efficiency of main heating system 1.0000 92.80%	(202) (206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Space heating requirement	
749.81 597.79 518.79 331.81 194.10 - - - - 335.94 553.36 763	3.37 (98)
Appendix Q - monthly energy saved (main heating system 1)	
0.00 0.00 0.00 0.00 0.00 0.00 0	0 (210)
Space heating fuel (main heating system 1)	
807.98 644.17 559.04 357.55 209.16 362.01 596.29 822	2.60 (211)
Appendix Q - monthly energy saved (main heating system 2)	
0.00 0.00 0.00 0.00 0.00 0.00 0	0 (212)
Space heating fuel (main heating system 2)	
0.00 0.00 0.00 0.00 0.00 0.00 0	0 (213)
Appendix Q - monthly energy saved (secondary heating system)	
0.00 0.00 0.00 0.00 0.00 0.00 0	0 (214)
Space heating fuel (secondary)	
0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	0 (215)
Waterheating	
Water heating requirement	(0.0)
176.21 154.58 160.62 141.56 136.97 119.88 112.77 127.02 127.85 146.94 158.39 171	
Efficiency of water heater	87.10 (216)
89.27 89.23 89.15 88.98 88.66 87.10 87.10 87.10 87.10 88.96 89.18 89.2	29 (217)
Water heating fuel	(0.40)
197.38 173.24 180.17 159.10 154.48 137.63 129.47 145.84 146.79 165.18 177.59 191	(219)
	Wh/year 358.79 (211)
Space heating fuel (secondary)	0.00 (215)
	958.56 (219)
Electricity for pumps, fans and electric keep-hot	, ,
central heating pump	30.00 (230c)
boiler with a fan-assisted flue Total electricity for the above, kWh/year	45.00 (230e) 75.00 (231)
	409.43 (232)
Energy saving/generation technologies	()
Appendix Q -	
Energy saved or generated ():	0.000 (236a)
Energy used ():	0.000 (237a)
Total delivered energy for all uses 68	801.78 (238)

10a. Fuel costs using Table 12 prices

Space heating - main system 1 4358.792 3.480 151.69 (240) Space heating - main system 2 0.000 0.000 0.000 (241) Water heating 1958.56 3.480 68.16 (247) Mech vent fans cost 0.000 13.190 0.00 (249) Pump/fan energy cost 75.000 13.190 9.89 (249) Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) 120.00 (251) Electricity generated - PVs 0.000 0.000 0.00 0.00 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)		kWh/year	Fuel price p/kWh	£/year	
Water heating Water heating cost 1958.56 3.480 68.16 (247) Mech vent fans cost 0.000 13.190 0.00 (249) Pump/fan energy cost 75.000 13.190 9.89 (249) Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.00 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Space heating - main system 1	4358.792	3.480	151.69	(240)
Water heating cost 1958.56 3.480 68.16 (247) Mech vent fans cost 0.000 13.190 0.00 (249) Pump/fan energy cost 75.000 13.190 9.89 (249) Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.00 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Space heating - main system 2	0.000	0.000	0.00	(241)
Mech vent fans cost 0.000 13.190 0.00 (249) Pump/fan energy cost 75.000 13.190 9.89 (249) Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.00 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Waterheating				
Pump/fan energy cost 75.000 13.190 9.89 (249) Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.00 (252) Appendix Q - - - - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Water heating cost	1958.56	3.480	68.16	(247)
Energy for lighting 409.426 13.190 54.00 (250) Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.000 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.00 (253) Energy used (): 0.000 0.000 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Mech vent fans cost	0.000	13.190	0.00	(249)
Additional standing charges 120.00 (251) Electricity generated - PVs 0.000 0.000 0.000 (252) Appendix Q - Energy saved or generated (): 0.000 0.000 0.000 (253) Energy used (): 0.000 0.000 0.000 0.00 (254) Total energy cost 403.74 (255) 11a. SAP rating Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Pump/fan energy cost	75.000	13.190	9.89	(249)
Electricity generated - PVs 0.000 0.000 0.000 (252)	Energy for lighting	409.426	13.190	54.00	(250)
Electricity generated - PVs 0.000 0.000 0.000 (252)	Additional standing charges			120.00	(251)
Energy saved or generated (): Energy used (): O.000 O.0000 O.0000 O.0000 O.0000 O.0000 O.0000 O.00		0.000	0.000	0.00	(252)
Energy used (): 0.000 0.000 0.000 (254) Total energy cost 403.74 (255) 11a. SAP rating 0.42 (256) Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Appendix Q -				, ,
Total energy cost 403.74 (255) 11a. SAP rating SAP rating 0.42 (256) Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Energy saved or generated ():	0.000	0.000	0.00	(253)
11a. SAP rating Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Energy used ():	0.000	0.000	0.00	(254)
Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	Total energy cost			403.74	(255)
Energy cost deflator 0.42 (256) Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)	11a SAP rating				
Energy cost factor (ECF) 1.23 (257) SAP value 82.79 SAP rating 83 (258)				0.42	(256)
SAP value 82.79 SAP rating 83 (258)	5.			_	
SAP rating 83 (258)	` ,			_	(=3.)
					(258)
SAP band B	_			В	(230)

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emission kg CO2/y	_
Space heating, main system 1	4358.79	0.216	941.50	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	1958.56	0.216	423.05	(264)
Space and water heating			1364.55	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	409.43	0.519	212.49	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1615.97	(272)
			kg/m²/yea	ır
CO2 emissions per m ²			17.48	(273)
Elvalue			84.25	(273a)
El rating			84	(274)

Calculation of stars for heating and DHW

Main heating energy efficiency
Main heating environmental impact
Water heating energy efficiency
Water heating environmental impact

El band

 $(3.48 / 0.8980) \times (1 + (0.29 \times 0.00)) = 3.8753$, stars = 4 $(0.2160 / 0.8980) \times (1 + (0.29 \times 0.00)) = 0.2405$, stars = 4 3.48 / 0.8843 = 3.9354, stars = 4 0.2160 / 0.8843 = 0.2443, stars = 4

В

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Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for notional dwelling - calculation of target emissions

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²) 46.23 46.23	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	r		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				3		x 10		30.00	(7a)
Numbe	er of pass	ive vents	;				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0		x 40		0.00	(7c)
											Air chang	jes per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	3						0.13	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air peri	meability										0.38	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	rfactor										0.85	(20)
Infiltrat	ion rate ii	ncorpora	ting shel	ter factor							0.33	(21)
				hly wind s								, ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
											13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	ind spee	ed)					(====)
0.42	0.41	0.40	0.36	0.35	0.31	0.31	0.30	0.33	0.35	0.37	0.38	
											4.29	(22b)
	ition : nat ve air cha			ntermitter	nt extrac	t fans						
0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57	(25)
0.00	0.00	0.00	0.00		3.00	0.00		3.00		0.07	0.07	()

3. Heat losses and heat loss parameter		Llvalva	A 11	
Element Gross Openings area, m ² m ²	Net area	U-value W/m²K	A x U W/K	
area, m² m² Window - Double-glazed,	A, m ² 0.500	1.33 (1.40)	0.66	(27)
air-filled, low-E, En=0.1, soft	0.500	1.55 (1.40)	0.00	(21)
coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed,	2.300	1.33 (1.40)	3.05	(27)
air-filled, low-E, En=0.1, soft	2.000	1100 (1110)	0.00	(=:)
coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed,	3.950	1.33 (1.40)	5.24	(27)
air-filled, low-E, En=0.1, soft		` ,		` ,
coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed,	0.180	1.33 (1.40)	0.24	(27)
air-filled, low-E, En=0.1, soft				
coat (East)				
Specified U-Value = 1.20				
Full glazed door -	6.090	1.40	8.53	(26)
Double-glazed, air-filled,				
low-E, En=0.1, soft coat				
(West)				
Specified U-Value = 1.20	0.450	4.40	4.00	(20)
Full glazed door -	3.450	1.40	4.83	(26)
Double-glazed, air-filled,				
low-E, En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Full glazed door -	2.400	1.40	3.36	(26)
Double-glazed, air-filled,	2.400	1.40	0.00	(20)
low-E, En=0.1, soft coat				
(South)				
Specified U-Value = 1.20				
Rooflight at 70° or less -	4.260	1.59 (1.70)	6.78	(27)
Double-glazed, air-filled,		, ,		• •
low-E, En=0.1, soft coat				
(n/a)				
Velux Specified U-Value = 1.20				
Walls	98.54	0.18	17.74	(29)
Brick or (Weatherboard/Battens/100				
Medium Dense Block)/51 Cavity/140				
Timber Frame Insulated With 120				
Celotex XR4000 Between Studs/12.5				
P'bd	4 47	0.40	0.75	(20)
Walls Dormer Cheeks -	4.17	0.18	0.75	(29)
Weatherboard/Battens/9 OSB/51				
Cavity/140 Timber Frame Insulated				
With 120 Celotex XR4000 Between				
Studs/12.5 P'bd				
Ground floors	46.23	0.13	6.01	(28)
Beam/Medium Dense Block/150				(=3)
Kingspan TF70/Screed				
.	_	10 (01		

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3. Heat losses and heat loss parameter												
Element		Gross	Ope	enings	Netare	a U-\	/alue	AxU				
		area, m²	m ²		A, m²	W/	m²K	W/K				
Flat roof	s				3.36	6	0.13	0.4	! 4			(30)
150 Kii	ngspan T	R27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	51.47	7	0.13	6.6	69			(30)
150 Ki	ngspan k	<7 Between	en									
Rafters	s/52.5 Ki	ngspan k	<118 Und	der								
Rafters	Rafters With Breather Membrane											
Total are	ea of exte	ernal elei	ments Si	ama A r	n²						226.9	90 (31)
	eat loss,			giria / t, i							64.	, ,
	l mass pa		. kJ/m²K	(user-sp	ecified T	MP)					250.0	- ()
	thermal		,	(,					11.	, ,
	oric heat	_									75.0	, ,
Ventilati	on heat l	oss calc	ulated m	onthly								, ,
43.08	42.83	42.58	41.44	41.23	40.23	40.23	40.05	40.62	41.23	41.66	42.11	(38)
Heat tra	nsfer coe	efficient,	W/K	,			,	,	,	,	,	
118.73	118.48	118.24	117.10	116.88	115.89	115.89	115.71	116.27	116.88	117.32	117.77	
											117.	10 (39)
Heat los	s param	eter (HLF	²), W/m ²	K								
1.28	1.28	1.28	1.27	1.26	1.25	1.25	1.25	1.26	1.26	1.27	1.27	
HLP (ave	0 /										1.3	27 (40)
Number	Number of days in month (Table 1a)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

4. Wate Assume Annual a	kWh/year 2.66 97.33	(42) (43)										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water	er usage	in litres	oer day f	or each r	nonth				,			
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
Energy	content c	of hot wat	ter used									
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Distribution loss												(45)
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06	(46)
Hot water cylinder loss factor (kWh/day) Volume factor Temperature factor 0.0000 (5) 0.0000 (5) 0.0000 (5)											(50) (51) (52) (53) (55)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net stor	age loss	JL	II	JL	JL	J	JL		JI		JL	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary	loss		Л	,	,		Л		,	Л		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi lo	oss calcu	lated for	each mo	onth	,	Л	Л		,			
50.96	46.03	50.59	47.04	46.62	43.20	44.64	46.62	47.04	50.59	49.32	50.96	(61)
Total he	at require	ed for wa	ter heati	ng calcul	ated for	each mo	nth		,			
209.72	184.88	193.87	171.96	166.49	146.63	140.48	156.61	158.34	180.30	190.90	204.71	(62)
Output f	rom wate	er heater	for each	month, l	«Wh/mor	nth			,			
209.72	184.88	193.87	171.96	166.49	146.63	140.48	156.61	158.34	180.30	190.90	204.71	(64)
2104.89 (64) Heat gains from water heating, kWh/month [65.53 57.68 60.29 53.30 51.51 45.19 43.03 48.23 48.77 55.78 59.41 63.86 (65)												
00.00	57.00	00.29	JJ.JU	01.01	40.18	+5.05	+0.23	+0.77	55.76	J3.4 I	03.00	(00)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains, Watts											
132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90
Lighting gains											
23.66	21.01	17.09	12.94	9.67	8.16	8.82	11.47	15.39	19.54	22.81	24.31
Appliances gains											
243.53	246.06	239.69	226.13	209.02	192.94	182.19	179.66	186.03	199.59	216.70	232.79
Cooking gains											
36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water heating gains											
88.08	85.83	81.03	74.02	69.23	62.77	57.83	64.82	67.73	74.97	82.51	85.84
Total internal gains											
421.13	418.77	403.68	378.96	353.79	329.73	314.71	321.82	335.02	359.96	387.89	408.81

6. Solar gains (calculation for January)

o. Colar gams (calculation for bandary)	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E,	0.9 x 0.500 46.75	•	0.77	7.1440
En=0.1, soft coat (South) Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 2.300 19.64	0.63 x 0.70	0.77	13.8053
En=0.1, soft coat (West) Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 3.950 19.64	0.63 x 0.70	0.77	23.7092
En=0.1, soft coat (East)				
Specified U-Value = 1.20 Window - Double-glazed, air-filled, low-E,	0.9 x 0.180 19.64	0.63 x 0.70	0.77	1.0804
En=0.1, soft coat (East)				
Specified U-Value = 1.20 Full glazed door - Double-glazed, air-filled,	0.9 x 6.090 19.64	0.63 x 0.70	0.77	36.5541
low-E, En=0.1, soft coat (West)	0.9 x 0.090 19.04	0.03 x 0.70	0.77	30.3341
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 3.450 19.64	0.63 x 0.70	0.77	20.7080
low-E, En=0.1, soft coat (East) Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 2.400 46.75	0.63 x 0.70	0.77	34.2913
low-E, En=0.1, soft coat (South) Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.260 26.00	0.63 x 0.70	1.00	43.9606
air-filled, low-E, En=0.1, soft coat (n/a)				
Velux Specified U-Value = 1.20				

	n <i>interna</i> rature dui	•		de in the l	living oro	a Th1 (°	C)				21.00
	system r	•	U .	usinine	iivii iy are	a, IIII (C)				1.00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau		JL			JL	JI			J	<u> </u>	
54.08	54.19	54.30	54.83	54.93	55.40	55.40	55.49	55.22	54.93	54.73	54.52
alpha		J	JI.	JL		JI.			J	JL	
4.61	4.61	4.62	4.66	4.66	4.69	4.69	4.70	4.68	4.66	4.65	4.63
Utilisati	on factor	for gains	for living	area		JIL.					
1.00	0.99	0.97	0.89	0.73	0.54	0.40	0.46	0.73	0.95	0.99	1.00
Mean ir	nternal ter	nperatur	e in living	area T1	,	Л			,	И	
19.63	19.86	20.22	20.63	20.89	20.98	21.00	20.99	20.92	20.52	19.98	19.59
Tempe	rature dui	ing heati	ing perio	ds in rest	of dwelli	ng Th2				И	
19.85	19.86	19.86	19.87	19.87	19.88	19.88	19.88	19.87	19.87	19.87	19.86
Utilisati	on factor	for gains	for rest	of dwellin	ng	Л					
1.00	0.99	0.96	0.86	0.67	0.45	0.30	0.35	0.64	0.93	0.99	1.00
Mean ir	nternal te	nperatur	e in the r	est of dw	velling T2	2					
18.04	18.38	18.90	19.47	19.77	19.86	19.88	19.88	19.81	19.33	18.57	17.99
_	rea fracti	`	,		,			-	,		0.50
	ternal ter		,								
18.84	19.12	19.56	20.05	20.33	20.42	20.44	20.43	20.37	19.93	19.28	18.79
	djustmen	t to the m	nean inte	rnal tem	perature	, where a	ppropria	ate			
18.84	19.12	19.56	20.05	20.33	20.42	20.44	20.43	20.37	19.93	19.28	18.79
8. Spac	e heatin	g requii	rement								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jtilisati	on factor	for gains	;	,	,	Л			,	И	
0.99	0.99	0.95	0.86	0.69	0.50	0.35	0.40	0.69	0.93	0.99	1.00
Useful	gains	,	Л	,	,	Л				И	
599.30	754.34	917.62	1017.69	924.18	660.65	442.43	462.64	671.04	716.03	605.44	556.87
Monthly	average	external	tempera	ture		Л			1		,
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	ss rate fo	mean in	ternal te	mperatu	re	Л			1	1	,
1725.8	9 1684.82	1544.36	1305.84	1008.59	674.65	444.55	466.78	728.49	1089.97	1428.41	1718.10
Fraction	n of montl	n for hea	ting	JL	Л	IL	ı	-R	JL	Л	
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	neating re	quireme	nt for ea	ch month	n, kWh/m	onth	JL		JL	JL	J
838.18	625.28	466.29	207.46	62.80	-	-	-	1-	278.21	592.53	863.95
Total sp	ace heat		irement p	ber year ((kWh/yea	ar) (Octo	ber to Ma	ay)	JL	JL.	3934.71
				² (kWh/m		•					42.56

9a. Energy requirements

k	(Wh/year	
No secondary heating system selected Fraction of space heat from main system(s) Efficiency of main heating system 1.0000 93.40%		(202) (206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov De	ес	
Space heating requirement		
838.18 625.28 466.29 207.46 62.80 278.21 592.53 863	3.95	(98)
Appendix Q - monthly energy saved (main heating system 1)		
0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(210)
Space heating fuel (main heating system 1)		
897.41 669.46 499.24 222.12 67.23 - - - 297.87 634.40 929	25.00	(211)
Appendix Q - monthly energy saved (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(212)
Space heating fuel (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(213)
Appendix Q - monthly energy saved (secondary heating system)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(214)
Space heating fuel (secondary)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(215)
Waterheating		
Water heating requirement		(0.4)
	04.71	(64)
Efficiency of water heater	80.30	(216)
	3.27	(217)
Water heating fuel	1.01	(040)
237.83 210.39 222.39 201.06 200.98 182.60 174.95 195.03 197.18 209.31 217.65 23	31.91	(219)
	(Wh/year 4212.75 0.00	(211) (215)
	2481.27	(219)
Electricity for pumps, fans and electric keep-hot	00.00	(000)
central heating pump boiler with a fan-assisted flue	30.00 45.00	(230c) (230e)
Total electricity for the above, kWh/year	75.00	(231)
	417.77	(232)
Energy saving/generation technologies		
Appendix Q -	0.000	(220-)
Energy saved or generated (): Energy used ():	0.000	(236a) (237a)
Total delivered energy for all uses 7	7186.80	(238)

10a. Does not apply

11a. Does not apply

12a. Carbon dioxide emissions

12a. Garbon Gloxide emissions				
	Energy	Emission factor	Emission	
	kWh/year	kg CO2/kWh	kg CO2/y	ear
Space heating, main system 1	4212.75	0.216	909.95	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2481.27	0.216	535.96	(264)
Space and water heating			1445.91	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	417.77	0.519	216.82	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1701.66	(272)
			kg/m²/yea	ır
Emissions per m ² for space and water heating			15.64	(272a)
Emissions per m ² for lighting			2.35	(272b)
Emissions per m ² for pumps and fans			0.42	(272c)
Target Carbon Dioxide Emission Rate (TER) = (15.6382 x 1.00) + 2.3450 + 0.4210			18.40	(273)

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	r		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				4	,	x 10		40.00	(7a)
Numbe	er of pass	ive vents	;				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0	:	x 40		0.00	(7c)
											Air chang	jes per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	3						0.18	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air per	meability										0.43	(18)
Numbe	er of side	s on whic	h shelte	red							2.00	(19)
Shelte	rfactor										0.85	(20)
Infiltrat	ion rate i	ncorpora	ting shel	ter factor							0.37	(21)
Infiltrat	ion rate r	nodified t	for mont	hly wind s	peed							, ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
								1			13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	ind spee	ed)				10.10	(ZZG)
0.47	0.46	0.45	0.40	0.39	0.35	0.35	0.34	0.37	0.39	0.41	0.43	
	I				*						4.80	(22b)
	ition : nat ve air cha		-	ntermitter	nt extrac	t fans						` '
0.61	0.60	0.60	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59	(25)
0.01	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.07	0.50	0.50	0.00	(-0)

3. Heat losses and heat loss para	meter					
Element Gross Openii	ngs Netarea	U-value	AxU	kappa-value		
area, m² m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K	
Window - Double-glazed,	0.200	1.15 (1.20)	0.23			(27)
argon filled, low-E, En=0.2,						
hard coat (East)						
Specified U-Value = 1.20						
Window - Double-glazed,	4.330	1.15 (1.20)	4.96			(27)
argon filled, low-E, En=0.2,						
hard coat (East)						
Specified U-Value = 1.20						(O=)
Window - Double-glazed,	2.520	1.15 (1.20)	2.89			(27)
argon filled, low-E, En=0.2,						
hard coat (West)						
Specified U-Value = 1.20	0.550	4.45 (4.00)	0.00			(07)
Window - Double-glazed,	0.550	1.15 (1.20)	0.63			(27)
argon filled, low-E, En=0.2,						
hard coat (South)						
Specified U-Value = 1.20	2 620	4.00	2.46			(26)
Full glazed door -	2.630	1.20	3.16			(26)
Double-glazed, argon filled, low-E, En=0.2, hard coat						
(South)						
Specified U-Value = 1.20						
Full glazed door -	3.780	1.20	4.54			(26)
Double-glazed, argon filled,	3.700	1.20	4.54			(20)
low-E, En=0.2, hard coat						
(East)						
Specified U-Value = 1.20						
Full glazed door -	6.680	1.20	8.02			(26)
Double-glazed, argon filled,	0.000	0	0.02			(=0)
low-E, En=0.2, hard coat						
(West)						
Specified U-Value = 1.20						
Rooflight at 70° or less -	4.670	1.15 (1.20)	5.35			(27)
Double-glazed, argon filled,		. ,				` ,
low-E, En=0.2, hard coat						
(n/a)						
Velux Specified U-Value = 1.20						
Walls	4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheeks -						
Weatherboard/Battens/9OSB/51						
Cavity/140 Timber Frame Insulated						
With 120 Celotex XR4000 Between	1					
Studs/12.5 P'bd						
Walls	96.74	0.20	19.35	9.00	870.66	(29)
Brick or (Weatherboard/Battens/10						
Medium Dense Block)/51 Cavity/14	Ю					
Timber Frame Insulated With 120	· E					
Celotex XR4000 Between Studs/12	ບ					
P'bd Ground floors	46.23	0.12	5.55	75.00	3/67 25	(20)
Beam/Medium Dense Block/150	40.23	0.1∠	0.00	73.00	3467.25	(28)
Kingspan TF70/Screed						
rangspan ii 10/00lecu						

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3. Heat	losses a	and heat	t loss pa	rameter	•								
Element		Gross	•	enings	Netarea		alue /	AxU		appa-valu			
		area, m ²	² m ²		A, m²		m²K	W/K		J/m²K	kJ/K		
Flat roof	S				3.36	6	0.15	0.5	0	9.00	30.24	((30)
150 Kir	ngspan 1	TR27 Ove	er Joists										
Pitched i	roofs ins	ulated be	etween ra	afters	51.06	6	0.12	6.1	3	9.00	459.54	↓ ((30)
150 Kii	ngspan k	<7 Between	en										
Rafters/52.5 Kingspan K118 Under													
Rafters With Breather Membrane													
Total are	a of ext	ornal ala	mante Si	ama A r	m²						226.9	an ((31)
Fabric h			ilicilis oi	gilia A, i	11						62.1		(33)
Heat cap		, ۷۷/1									0.0		(34)
	•	arameter	k.l/m²K								52.6		(35)
Effect of	•		, 10/111 10								34.0		(36)
Total fab		-									96.1	,	(37)
Ventilati			ulated m	onthly								. • ((0.)
44.65	44.34	44.04	42.62	42.35	41.11	41.11	40.88	41.59	42.35	42.89	43.45	((38)
Heat trai	nsfer coe	efficient,	W/K			,			,		,		
140.85	140.54	140.23	138.81	138.54	137.30	137.30	137.07	137.78	138.54	139.08	139.64		
		,	,		,	,			,		138.8	31 ((39)
Heat los	s param	eter (HLI	²), W/m²	K									
1.52	1.52	1.52	1.50	1.50	1.48	1.48	1.48	1.49	1.50	1.50	1.51		
HLP (ave	erage)				-				-		1.5	50 ((40)
Number	of days i	in month	(Table 1	a)									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
31	28	31	30	31	30	31	31	30	31	30	31		

4. Wate Assume			y require	ements							kWh/year 2.66	(42)
Annuala	average l	not water	usage ir	n litres pe	er day Vd	,average)				97.33	(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot wate	er usage	in litres p	oer day fo	or each r	nonth							
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
Energy	content c	of hot wat	ter used									
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Energy of Distribut		annual)									1531.31	(45)
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06	(46)
store loss determined from EN 13203-2 tests, taken from boiler data record Hot water storage volume (litres) Hot water cylinder loss factor (kWh/day) Volume factor Temperature factor Energy lost from store (kWh/day) Total storage loss 0.00 0.00 0.00 0.00 0.00 0.00										(50) (51) (52) (53) (55)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net stora	age loss	И	Л		я	П	И			Л		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary	loss	,	,		,					,		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi lo	oss calcu	lated for	each mo	onth	,							
17.45	15.73	17.33	16.64	17.10	16.44	16.92	17.04	16.55	17.24	16.80	17.41	(61)
Total hea	at require	ed for wa	ter heatii	ng calcul	ated for e	each mo	nth					
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17	(62)
Output fi	rom wate	er heater	for each	month, l	kWh/mor	nth						
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17	(64)
			ating, kW	,	,			V			1733.95	(64)
57.15	50.10	51.98	45.70	44.13	38.50	36.10	40.83	41.14	47.44	51.28	55.48	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts		,			,			,	
132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90
Lighting	gains										
23.18	20.59	16.75	12.68	9.48	8.00	8.65	11.24	15.08	19.15	22.35	23.83
Appliand	ces gains	;									
243.53	246.06	239.69	226.13	209.02	192.94	182.19	179.66	186.03	199.59	216.70	232.79
Cooking	gains										
36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses	e.g. evap	oration (r	egative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water he	eating ga	ins									
76.82	74.56	69.86	63.47	59.32	53.48	48.52	54.88	57.15	63.76	71.22	74.56
Total internal gains											
409.40	407.07	392.16	368.15	343.68	320.28	305.23	311.65	324.13	348.37	376.14	397.05

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 19.64	0.72 x 0.70	0.77	1.3720
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 19.64	0.72 x 0.70	0.77	29.7029
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 19.64	0.72 x 0.70	0.77	17.2867
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 46.75	0.72 x 0.70	0.77	8.9811
En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 2.630 46.75	0.72 x 0.70	0.77	42.9458
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 19.64	0.72 x 0.70	0.77	25.9300
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 19.64	0.72 x 0.70	0.77	45.8234
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 26.00	0.72 x 0.70	1.00	55.0761
argon filled, low-E, En=0.2, hard coat (n/a)				
Value Chapified II Value - 1 20				

Velux Specified U-Value = 1.20

	<i>n interna</i> rature dui			ds in the l	living are	a, Th1 (°	C)				21.00	(
Heating	system r	esponsiv	veness		J	•	,				1.00	,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
au		,								J.		
9.59	9.62	9.64	9.74	9.75	9.84	9.84	9.86	9.81	9.75	9.72	9.68	
alpha		Л	л.				Л		Л	,		
1.64	1.64	1.64	1.65	1.65	1.66	1.66	1.66	1.65	1.65	1.65	1.65	
Jtilisati	on factor	for gains	for living	area		JL.			,	Л		
0.91	0.87	0.79	0.68	0.56	0.44	0.34	0.39	0.57	0.77	0.88	0.92	(
Mean in	nternal ter	nperatur	e in living	g area T1		JI.				JL		
17.06	17.58	18.40	19.33	20.08	20.58	20.80	20.75	20.30	19.25	17.96	16.96	(
Tempe	rature dui	ing heati	ing perio	ds in rest	of dwelli	ng Th2			JI.	JL		
19.67	19.67	19.68	19.69	19.69	19.70	19.70	19.70	19.69	19.69	19.68	19.68	(
Jtilisati	on factor	for gains	for rest	of dwellir	าg				JI.	II	JL	
0.90	0.85	0.77	0.65	0.51	0.37	0.26	0.30	0.50	0.73	0.87	0.91	(
Mean ir	nternal tei	mperatur	e in the r	rest of dw	elling T2	<u>></u>			JI	JI.		•
14.68	15.40	16.51	17.76	18.72	19.33	19.57	19.53	19.04	17.69	15.94	14.54	(
_iving a	rea fracti	on (46.23	3/92.46)						JI	II	0.50	(
Meanin	nternal ter	npèratur	e (for the	whole d	welling)							`
15.87	16.49	17.45	18.55	19.40	19.95	20.19	20.14	19.67	18.47	16.95	15.75	(
Apply a	djustmen	t to the m	nean inte	rnal tem	perature.	, where a	ppropria	ite	,	И		
15.87	16.49	17.45	18.55	19.40	19.95	20.19	20.14	19.67	18.47	16.95	15.75	(
8. Spac Jan	ce heatin	g requir Mar	rement Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	on factor		<u> </u>	Iviay	Juli	Jui	Aug	Seh	OCI	INOV	Dec	
			1	10.50	10.20	10.00	0.00	0.50	0.00	0.00	0.07	,
0.86	0.80	0.72	0.61	0.50	0.39	0.29	0.33	0.50	0.69	0.82	0.87	(
Useful	_	707.00	044.00	704.00	1007.45	107.04	140.00	F05 50	500.00	500.44	F00.07	,
	674.78	787.99			607.15	437.34	442.88	565.59	596.39	538.41	509.67	(
	average	·			1.4.00	14000	10.10	1 4 4 4 5	1000	T = 40		,
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(
	ss rate for						1	Υ	1	n		
	2 1629.19	JL		1067.04	735.01	492.53	512.76	768.03	1090.20	1370.39	1612.81	(
	of montl	1	ting									
1.00	1.00	1.00	1.00	1.00		-	-		1.00	1.00	1.00	
Space h	neating re	equireme	nt for ea	ch month	າ, kWh/m	onth						
806.29						-	-	-	367.39	599.02	820.73	
	ace heat					ar) (Octo	ber to Ma	ay)			4357.71	(
		quireme									47.13	(

8c. Space cooling requirement - not applicable

9a. Energy requirements

k	:Wh/year	
No secondary heating system selected Fraction of space heat from main system(s) Efficiency of main heating system 1.0000 92.80%		(202) (206)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov De	eC	` ,
Space heating requirement		
806.29 641.37 556.27 356.71 209.93 - - - 367.39 599.02 820	0.73	(98)
Appendix Q - monthly energy saved (main heating system 1)		
0.00 0.00 0.00 0.00 0.00 0.00 0	00	(210)
Space heating fuel (main heating system 1)		
868.84 691.13 599.43 384.39 226.22 395.90 645.50 884	4.41	(211)
Appendix Q - monthly energy saved (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 0.00 0	00	(212)
Space heating fuel (main heating system 2)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00)0	(213)
Appendix Q - monthly energy saved (secondary heating system)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00)0	(214)
Space heating fuel (secondary)		
0.00 0.00 0.00 0.00 0.00 - - - - 0.00 0.00 0.00	00	(215)
Water heating Water heating requirement		
176.21 154.58 160.62 141.56 136.97 119.88 112.77 127.02 127.85 146.94 158.39 17	1.17	(64)
Efficiency of water heater	87.10	(216)
89.30 89.26 89.18 89.02 88.71 87.10 87.10 87.10 87.10 89.01 89.22 89.	.32	(217)
Water heating fuel		
197.32 173.18 180.10 159.03 154.39 137.63 129.47 145.84 146.79 165.08 177.52 197.	1.63	(219)
Space heating fuel used, main system 1 Space heating fuel (secondary) Water heating fuel 1	0.00	(211) (215) (219)
Electricity for pumps, fans and electric keep-hot central heating pump boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting (100.00% fixed LEL) Energy saving/generation technologies Appendix Q -	45.00 75.00	(230c) (230e) (231) (232)
Energy saved or generated (): Energy used ():		(236a) (237a)
Total delivered energy for all uses 7	7138.21	(238)

10a. Does not apply

11a. Does not apply

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	
	kWh/year	kg CO2/kWh	kg CO2/y	
Space heating, main system 1	4695.81	0.216	1014.30	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	1957.97	0.216	422.92	(264)
Space and water heating			1437.22	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	409.43	0.519	212.49	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1688.63	(272)
			kg/m²/yea	ar

18.26

(273)

Dwelling Carbon Dioxide Emission Rate (DER)

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.04a1, printed on 7/10/2019 at 16:22:30

New dwelling as designed

1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate

TER = 18.40

Dwelling Carbon Dioxide Emission Rate

DER = 18.26

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) TFEE = 56.4

Dwelling Fabric Energy Efficiency (DFEE) DFEE = 56.2 OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

2b Fabric U-values

Element Highest <u>Average</u> Wall 0.20 (max. 0.30) 0.21 (max. 0.70) OK 0.12 (max. 0.25) 0.12 (max. 0.70) Floor OK Roof 0.12 (max. 0.20) 0.15 (max. 0.35) OK 1.20 (max. 2.00) 1.20 (max. 3.30) OK **Openings**

OK

3 Air permeability

Air permeability at 50 pascals: 5.00 OK

Maximum: 10.00

4 Heating efficiency

Main heating system:

Boiler and radiators, mains gas

Alpha InTec 40GS

Source of efficiency: from boiler database

Alpha InTec 40GS

Efficiency: 88.9% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None -

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5 Cylinder insulation

Hot water storage No cylinder

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls Time and temperature zone control OK

Hot water controls No cylinder

Boiler Interlock Yes OK

Hot water controls No cylinder

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%

Minimum: 75.0% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South East England):

OK
Slight
OK

Based on:

Thermal mass parameter: 52.62

Overshading: Average or unknown (20-60 % sky blocked)

Orientation : East

Ventilation rate: 8.00

Blinds/curtains:

None with blinds/shutters closed 0.00% of daylight hours

10 Key features

Ground floors U-value 0.12 W/m2K

Pitched roofs insulated between rafters U-value 0.12 W/m²K

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT67EH CT54NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:22 PM

Unit 2, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Unit 2

66 Borstal Hill Whitstable Kent

CT54NB

Located in: England

Region: South East England

Postcode: CT54NB

UPRN:

Date of assessment: 2019-10-07 Date of certificate: 2019-10-07

Assessment type: New dwelling as designed

Tenure: Unknown
Transaction type: New dwelling
Related party disclosure: No related party

PCDF revision number: 367

Property description

Dwelling type: Detached house

Ground floor (1) $area = 46.23m^2$ storey height = 2.31m First floor $area = 46.23m^2$ storey height = 2.50m

Living area: 46.23 (fraction 0.500)

Front of dwelling faces: East

Doors

Full glazed door area = 2.63 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (South)

Full glazed door area = 3.78 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (East)

Full glazed door area = 6.68 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (West)

Windows

Window area = 0.20 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (East)

Overshading: Average or unknown (20-60 % sky blocked)

Window area = 4.33 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (East)

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Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:22 PM

Unit 2, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Overshading: Average or unknown (20-60 % sky blocked)

Window area = 2.52 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (West)

Overshading: Average or unknown (20-60 % sky blocked)

Window area = 0.55 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (South)

Overshading: Average or unknown (20-60 % sky blocked)

Rooflights

Rooflight at 70° or less area = 4.67 U = 1.20 - Double-glazed, argon filled, low-E, En=0.2,

hard coat (n/a)

Overshading: Very little (<20 % sky blocked)

Opaque Elements

Walls area = 4.15 U = 0.21, k = 9.0 Dormer Cheeks - Weatherboard/Battens/9

OSB/51 Cavity/140 Timber Frame Insulated

With 120 Celotex XR4000 Between

Studs/12.5 P'bd

Walls area = 96.74 U = 0.20, k = 9.0 Brick or (Weatherboard/Battens/100 Medium

Dense Block)/51 Cavity/140 Timber Frame Insulated With 120 Celotex XR4000 Between

Studs/12.5 P'bd

Ground floors area = 46.23 U = 0.12, k = 75.0 Beam/Medium Dense Block/150 Kingspan

TF70/Screed

Roofs area = 3.36 U = 0.15, k = 9.0 150 Kingspan TR27 Over Joists

Roofs area = 51.06 U = 0.12, k = 9.0 150 Kingspan K7 Between Rafters/52.5

Kingspan K118 Under Rafters With Breather

Membrane

Thermal bridges: NOT Accredited Construction Details (y = 0.1500)

Thermal mass: Calculated from k values

Pressure test: Yes (q50 - 5.00) : measured in this dwelling : Yes Ventilation: Natural ventilation with intermittent extract fans

Number of chimneys: 0
Number of open flues: 0
Number of intermittent fans: 4
Number of passive stacks: 0
Number of sides sheltered: 2.00

JPA Designer Version 6.03x , SAP Version 9.92 Page 32 of 84

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Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT67EH CT54NB

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Unit 2, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Measured/design q50: 5.00

Main heating system: Central heating systems with radiators or underfloor heating

Gas boilers (including LPG) 1998 or later Condensing combi with automatic ignition

Index: 16766

Eff 87.10% / 89.80% Alpha InTec 40GS

Radiators

Pump in heated space: Yes

Boiler has load or weather compensator: Yes

Boiler Interlock: Yes

Design flow temperature: Unknown Central heating pump 2013 or later

Gas (mains)

Main heating controls: Time and temperature zone control

No

Boiler has load No

compensator:

Boiler has weather Yes

compensator:

Boiler has emhanced load

compensator:

Boiler interlock: Yes

Secondary heating system: None

Water heating: Combination boiler

Combination boiler type: Instantaneous

Solar panel: no

Water use <= 125

litres/person/day:

Yes

Low energy lights: 100.0% of fixed lighting outlets

Total fixed lighting outlets: 25

Electricity tariff: Standard tariff
Photovoltaics 1: Peak kW: 0.00
Photovoltaics 2: Peak kW: 0.00

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Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:22 PM

Unit 2, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Photovoltaics 3: Peak kW: 0.00

Conservatory: No Fixed air conditioning: No

Smoke Control Area: Not specified Additional allowable electricity generation:

0.00kg/m²/year

SAP 2012 Overheating Assessment for New dwelling as designed

Dwelling type Detached house

Number of storeys 2
Cross ventilation possible Yes

Region South East England

Front of dwelling faces East

Overshading Average or unknown (20-60 % sky blocked)

Overhangs (as detailed below)

Thermal mass parameter 52.62 (calculated from construction elements)

Night ventilation No

Ventilation rate during hot weather (ach) 8.00 (Windows fully open)

Summer ventilation heat loss coefficient	587.05	(P1)
Transmission heat loss coefficient	96.19	(37)
Summer heat loss coefficient	683.24	(P2)

Solar gains (calculation for July)	
---------------	-----------------------	--

Orientation	Area	Flux	g & FF	Shading	Gains
East	0.9 x 0.20	110.22	0.72 x 0.70	0.90	9
South	0.9 x 0.55	108.01	0.72 x 0.70	0.90	24
West	0.9 x 2.52	110.22	0.72 x 0.70	0.90	113
East	0.9 x 4.33	110.22	0.72 x 0.70	0.90	195
n/a	0.9 x 4.67	189.00	0.72 x 0.70	1.00	400
Total					1328

	Jun	Jul	Aug	
Solar gains Solar gains	1395	1328	1146	(P3)
Internal gains	468	449	458	
Total summer gains	1863	1777	1603	(P5)
Summer gain/loss ratio	2.73	2.60	2.35	(P6)
External temperature (South East England)	15.2	17.6	17.8	
Thermal mass temperature increment (TMP=52.6)	1.63	1.63	1.63	
Threshold temperature	19.56	21.83	21.78	(P7)
Likelihood of high internal temperature	Not sig.	Slight	Slight	

Assessment of likelihood of high internal temperature Slight

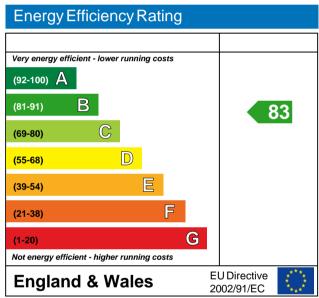
Predicted Energy Assessment

Unit 2 66 Borstal Hill Whitstable Kent CT5 4NB Ref: J5067-2 Dwelling type:
Date of assessment:
Produced by
Total floor area:

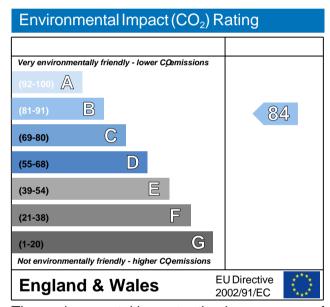
Detached house
7 October 2019
Thermcalc Limited
92 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact 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.

Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT67EH CT54NB

SAP 2012 worksheet for - calculation of fabric energy efficiency

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Groundfloor(1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	r		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				3		x 10		30.00	(7a)
Numbe	er of pass	ive vents	;				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0		x 40		0.00	(7c)
											Air chang	jes per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	3						0.13	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air peri	meability										0.38	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	rfactor										0.85	(20)
Infiltrat	ion rate ii	ncorpora	ting shel	ter factor							0.33	(21)
				hly wind s								, ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
											13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	ind spee	ed)					(====)
0.42	0.41	0.40	0.36	0.35	0.31	0.31	0.30	0.33	0.35	0.37	0.38	
											4.29	(22b)
	ition : nat ve air cha			ntermitter	nt extrac	t fans						
0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57	(25)
0.00	0.00	0.00	0.00		3.00	0.00		3.00		0.07	0.07	()

3. Heat losses and heat loss parameter	3.	Heat I	losses	and	heat	loss	parametei
--	----	--------	--------	-----	------	------	-----------

	3. Heat losses and heat los	ss paramete	r					
E	Element Gross	Openings	Netarea	U-value	AxU	kappa-value		
,	Alindow Double glazed	m²	A, m ²	W/m ² K	W/K	kJ/m²K	kJ/K	(27)
	Window - Double-glazed, argon filled, low-E, En=0.2,		0.200	1.15 (1.20)	0.23			(27)
	nard coat (East)							
٠	Specified U-Value = 1.20							
١	Window - Double-glazed,		0.550	1.15 (1.20)	0.63			(27)
	argon filled, low-E, En=0.2,		0.000	1110 (1120)	0.00			(21)
	nard coat (South)							
•	Specified U-Value = 1.20							
١	Window - Double-glazed,		2.520	1.15 (1.20)	2.89			(27)
	argon filled, low-E, En=0.2,			(1120)				()
	nard coat (West)							
	Specified U-Value = 1.20							
١	Window - Double-glazed,		4.330	1.15 (1.20)	4.96			(27)
	argon filled, low-E, En=0.2,			, ,				, ,
ŀ	nard coat (East)							
	Specified U-Value = 1.20							
F	Full glazed door -		6.680	1.20	8.02			(26)
[Double-glazed, argon filled,							
I	ow-E, En=0.2, hard coat							
((West)							
	Specified U-Value = 1.20							
	Full glazed door -		3.780	1.20	4.54			(26)
	Double-glazed, argon filled,							
	ow-E, En=0.2, hard coat							
((East)							
	Specified U-Value = 1.20		0.000	4.00	0.40			(00)
	Full glazed door -		2.630	1.20	3.16			(26)
	Double-glazed, argon filled,							
	ow-E, En=0.2, hard coat							
(South) Specified U-Value = 1.20							
	Rooflight at 70° or less -		4.670	1.15 (1.20)	5.35			(27)
	Double-glazed, argon filled,		4.070	1.13 (1.20)	5.55			(21)
	ow-E, En=0.2, hard coat							
	'n/a)							
'	Velux Specified U-Value = 1	1.20						
١	Nalls	0	4.15	0.21	0.87	9.00	37.35	(29)
	Dormer Cheeks -							()
	Weatherboard/Battens/9 OS	SB/51						
	Cavity/140 Timber Frame In	sulated						
	With 120 Celotex XR4000 B	Between						
	Studs/12.5 P'bd							
١	Nalls		96.74	0.20	19.35	9.00	870.66	(29)
	Brick or (Weatherboard/Bat							
	Medium Dense Block)/51 C	•						
	Timber Frame Insulated Wi							
	Celotex XR4000 Between S	studs/12.5						
	P'bd		40.00	0.10		75.00	0.40= 0=	(22)
(Ground floors	-/4.50	46.23	0.12	5.55	75.00	3467.25	(28)
	Beam/Medium Dense Block	K/15U						
	Kingspan TF70/Screed							
			D	ago 30 of 94				

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3. Heat	losses a	and heat	loss pa	rametei	•								
Elemen		Gross	•	enings	Netare		/alue	ΑxU		appa-valu			
		area, m ²	m ²		A, m²		m²K	W/K	k	J/m²K	kJ/K		
Flat roof	s				3.36	6	0.15	0.5	50	9.00	30.24		(30)
150 Ki	ngspan T	R27 Ove	er Joists										
Pitched	roofs ins	ulated be	etween ra	afters	51.06	6	0.12	6.1	3	9.00	459.54		(30)
150 Ki	ngspan k	<7 Between	en										
Rafter	s/52.5 Ki	ngspan k	<118 Unc	der									
Rafter	s With Br	eather M	embrane	Э									
Total ar	ea of exte	ernal elei	ments Si	gma A, r	n²						226.9	90	(31)
	eat loss,	W/K									62.1		(33)
Heat ca											4865.0		(34)
	l mass pa		, kJ/m²K								52.6		(35)
	thermal	-									34.0		(36)
	oric heat										96.1	19	(37)
Ventilat	on heat l	oss calc	ulated m	onthly									
43.08	42.83	42.58	41.44	41.23	40.23	40.23	40.05	40.62	41.23	41.66	42.11		(38)
Heat tra	nsfer coe	efficient,	W/K		,	,	,	,	,		,		
139.27	139.02	138.78	137.63	137.42	136.43	136.43	136.24	136.81	137.42	137.85	138.30		
		,	П		,						137.6	3	(39)
Heat los	s param	eter (HLF	P), W/m²	K									
1.51	1.50	1.50	1.49	1.49	1.48	1.48	1.47	1.48	1.49	1.49	1.50		
HLP (av	erage)		!			,			,		1.4	19	(40)
Number	of days i	n month	(Table 1	a)									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements	kWh/year	
Assumed occupancy, N Annual average hot water usage in litres per day Vd,average	2.66 97.33	(42) (43)
	Dec J	(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Hot water usage in litres per day for each month	Dec	
	407.00	(44)
107.06 103.17 99.27 95.38 91.49 87.59 87.59 91.49 95.38 99.27 103.17	107.06	(44)
Energy content of hot water used	150.75	
158.76 138.86 143.29 124.92 119.86 103.43 95.85 109.99 111.30 129.71 141.59	153.75	(4-)
Energy content (annual) Distribution loss	1531.31	(45)
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(46)
store loss determined from EN 13203-2 tests, taken from boiler data record Hot water storage volume (litres) Hot water cylinder loss factor (kWh/day) Volume factor Temperature factor Energy lost from store (kWh/day) Total storage loss	0.00 0.0000 0.0000 0.0000 0.00	(50) (51) (52) (53) (55)
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(56)
Net storage loss		
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(57)
Primary loss		
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(59)
Combi loss calculated for each month		
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(61)
Total heat required for water heating calculated for each month		
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(62)
Output from water heater for each month, kWh/month		
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(64)
Heat gains from water heating, kWh/month	0.00	(64)
33.74 29.51 30.45 26.55 25.47 21.98 20.37 23.37 23.65 27.56 30.09	32.67	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts	,			,	,			,	
132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90
Lighting	gains										
23.18	20.59	16.75	12.68	9.48	8.00	8.65	11.24	15.08	19.15	22.35	23.83
Appliand	ces gains	3									
243.53	246.06	239.69	226.13	209.02	192.94	182.19	179.66	186.03	199.59	216.70	232.79
Cooking	gains										
36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29
Pumps a	and fans	gains									
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Losses	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water he	eating ga	ins									
45.35	43.91	40.93	36.87	34.24	30.53	27.38	31.41	32.85	37.05	41.79	43.92
Total inte	ernal gaiı	ns									
374.93	373.43	360.23	338.55	315.60	294.33	281.08	285.18	296.83	318.66	343.71	363.40

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 19.64	0.72 x 0.70	0.77	1.3720
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 46.75	0.72 x 0.70	0.77	8.9811
En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 19.64	0.72 x 0.70	0.77	17.2867
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 19.64	0.72 x 0.70	0.77	29.7029
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 19.64	0.72 x 0.70	0.77	45.8234
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 19.64	0.72 x 0.70	0.77	25.9300
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 2.630 46.75	0.72 x 0.70	0.77	42.9458
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 26.00	0.72 x 0.70	1.00	55.0761
argon filled, low-E, En=0.2, hard coat (n/a)				
Value Chasified II Value 1 20				

Velux Specified U-Value = 1.20

	<i>n interna</i> rature dur	•		ds in the l	living are	a Th1 <i>(</i> ⁰	C)				21.00
•	system r	•	•		iving arc	α, ππ (0)				1.00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau		JL				J			JI	J	
9.70	9.72	9.74	9.82	9.83	9.91	9.91	9.92	9.88	9.83	9.80	9.77
alpha	_	J		Л	J	JI	JL		JI	JI	
1.65	1.65	1.65	1.65	1.66	1.66	1.66	1.66	1.66	1.66	1.65	1.65
Utilisati	on factor	for gains	for living	area			JL		JI		
0.92	0.87	0.80	0.69	0.56	0.44	0.35	0.39	0.57	0.78	0.89	0.93
Mean ir	nternal ter	nperatur	e in living	area T1	J	JI	JL		JI		
17.03	17.56	18.38	19.33	20.08	20.57	20.80	20.75	20.30	19.22	17.93	16.92
Tempe	rature dur	ing heati	ng perio	ds in rest	of dwelli	ng Th2	JL		JI.	JI.	
19.68	19.68	19.69	19.70	19.70	19.71	19.71	19.71	19.70	19.70	19.69	19.69
Utilisati	on factor	for gains	for rest	of dwellir	ng	JI.	JL		JI.	JI.	
0.91	0.86	0.78	0.65	0.52	0.38	0.26	0.30	0.51	0.74	0.87	0.92
Mean ir	nternal ter	nperatur	e in the r	est of dw	elling T2	2	JL		JL	JI	
16.11	16.63	17.42	18.32	19.01	19.44	19.62	19.59	19.23	18.26	17.01	16.01
Living a	rea fracti	on (46.23	3/92.46)			JI.	Л		JL	JI.	0.50
Mean ir	ternal ter	nperatur	e (for the	whole d	welling)						
16.57	17.09	17.90	18.82	19.54	20.01	20.21	20.17	19.77	18.74	17.47	16.46
Apply a	djustmen	t to the m	nean inte	rnal tem	perature	, where a	ppropria	ite			
16.57	17.09	17.90	18.82	19.54	20.01	20.21	20.17	19.77	18.74	17.47	16.46
8. Spac	ce heatin	g requir	rement								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisati	on factor	for gains									
0.88	0.82	0.74	0.63	0.51	0.39	0.30	0.34	0.51	0.71	0.84	0.89
Usefulç	gains										
527.33	662.79	783.11	844.19	785.49	606.78	436.20	441.65	564.31	590.91	524.15	490.18
Monthly	average	external	tempera	ture			,		,		
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
Heat los	ss rate for	mean in	ternal te	mperatu	re	Л	,		Л	Л	
1708.1	8 1694.98	1582.15	1365.95	1077.76	737.76	492.21	513.13	775.09	1119.00	1429.09	1695.87
Fraction	n of montl	n for heat	ting	JL	J	N.	Л		JL.	IL	л
1.00	1.00	1.00	1.00	1.00	-	-	_	-	1.00	1.00	1.00
Space h	neating re	quireme	nt for ea	ch month	n, kWh/m	onth	JL		JL	JL	
878.55	693.63	594.48	375.67	217.45	-	-	-	-	392.91	651.56	897.04
	ace heat				kWh/ve	ar) (Octo	her to Ma	av)	JL	IL	4701.27
			-	, ,		۵.) (۵۵.۵	DOI TO IVIT	<i></i>			

8c. Space cooling requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	al temper	_	7.01	Iviay	Joan	Jour	/ tug	ССР		1400	D00
_	-	1-	_	1-	14.60	16.60	16.40	1-	1-		-
Leat lo	ss rate V	V			1 1.00	10.00	10.10	<u> </u>			
-	-	1-	-	1-	1282.40	1009.55	1035.44	-	-	-	-
Utilisati	ion facto	for loss						l			
-	-	-	-	-	0.73	0.78	0.75	 -	-	-	-
Useful	loss W	-1				И	И	,		"	
-	-	-	-	-	936.70	787.45	773.51	-	-	-	-
Interna	I gains W	1									
0.00	0.00	0.00	0.00	0.00	445.26	427.68	434.42	0.00	0.00	0.00	0.00
Solar g											
0.00	0.00	0.00	0.00	0.00	1394.74	1328.45	1145.52	0.00	0.00	0.00	0.00
Gains \	N					1	10	,	-1		
	<u> </u>	<u> -</u>			1839.99	1756.13	1579.94		-	-	-
	n of mon					1	nr.	1			
0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
Space	heating k	⟨VVh			1						
-	<u> </u>	<u> </u> -	-		71.15	-5.51	-16.63	-		-	
Space	cooling k	_			050.07	700 70	F00.00	1			
- Total	-	-	-		650.37	720.70	599.98	-	-	-	1071.05
	fraction										1971.05 1.00
	ttency fac	ctor									
-	-	-	-	-	0.25	0.25	0.25	-	-	-	-
Space	cooling re	equireme	ent for mo	onth							
-	-	-	-	-	162.59	180.17	150.00	-	-	-	-
	cooling (492.76
	coolina r	equireme	ent per m	ո² (kWh/r	n²/year)						5.33

	kwn/year	
Energy for space heating	50.85	(99)
Energy for space cooling	5.33	(108)
Total	56.18	(109)
Dwelling Fabric Energy Efficiency	56.2	(109)

Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for - CSH Ene 7 standard case

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	er		
							heating					
Numbe	er of chim	neys					0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				4 x				40.00	(7a)
Numbe	er of pass	ive vents	;				0 x 10				0.00	(7b)
Numbe	er of fluele	ess gas f	ires				0		x 40		0.00	(7c)
											Air chang	ges per hour
Infiltrat	ion due t	o chimne	eys, fans	and flue	S						0.18	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air peri	meability										0.43	(18)
Numbe	er of sides	s on whic	ch shelte	red							2.00	(19)
Shelter	rfactor										0.85	(20)
	ion rate ir										0.37	(21)
Infiltrat	tion rate n	nodified	for mont	hly wind s	speed							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	Cotor										52.50	(22)
		4.00	1.40	4.07	0.05	0.05	0.00	4.00	4.07	4.40	4.40	
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
			,								13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelf	er and w	vind spee	ed)					
0.47	0.46	0.45	0.40	0.39	0.35	0.35	0.34	0.37	0.39	0.41	0.43	
											4.80	(22b)
Ventila	ition : nat	ural vent	tilation, ii	ntermitte	nt extrac	t fans						•
Effectiv	ve air cha	nge rate										
0.61	0.60	0.60	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59	(25)
0.61	0.60	0.60	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59	(25)

3. Heat losses and heat loss paral	ımeter
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	es and neat io	•						
Element	Gross	Openings	Netarea	U-value	AxU	kappa-value		
	area, m²	m²	A, m ²	W/m²K	W/K	kJ/m²K	kJ/K	(O=)
Window - Dou	•		0.200	1.15 (1.20)	0.23			(27)
argon filled, lo								
hard coat (Ea	•							
•	-Value = 1.20							
Window - Dou	-		0.550	1.15 (1.20)	0.63			(27)
argon filled, lo								
hard coat (So	•							
Specified U-	-Value = 1.20							
Window - Dou	ble-glazed,		2.520	1.15 (1.20)	2.89			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (We	est)							
Specified U-	-Value = 1.20							
Window - Dou	ble-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (Ea	st)							
Specified U-	-Value = 1.20							
Full glazed do			6.680	1.20	8.02			(26)
Double-glaze								` ,
low-E, En=0.2	-							
(West)	•							
` '	-Value = 1.20							
Full glazed do			3.780	1.20	4.54			(26)
Double-glaze				0				()
low-E, En=0.2	-							
(East)	_,a.a ooat							
, ,	-Value = 1.20							
Full glazed do			2.630	1.20	3.16			(26)
Double-glaze			2.000	1.20	0.10			(20)
low-E, En=0.2	_							
(South)	z, nara coat							
` ,	-Value = 1.20							
Rooflight at 7			4.670	1.15 (1.20)	5.35			(27)
Double-glaze			4.070	1.13 (1.20)	3.33			(21)
low-E, En=0.2	-							
•	z, naru coat							
(n/a)	fied II Value –	1 20						
Walls	fied U-Value =	1.20	115	0.21	0.07	0.00	27.25	(20)
Dormer Che	oko		4.15	0.21	0.87	9.00	37.35	(29)
	ard/Battens/90	CD/E1						
•	Fimber Frame Ir							
	elotex XR4000 E	setween						
Studs/12.5 I	P ba		00.74	0.00	40.05	0.00	070.00	(20)
Walls	ath ark a and /Day	tto=0/400	96.74	0.20	19.35	9.00	870.66	(29)
•	atherboard/Bat							
	nse Block)/51 C ne Insulated Wi	•						
	4000 Between S	otuus/ 12.5						
P'bd			40.00	0.40	FFF	7F 00	2467.05	(00)
Ground floors	um Danas Di	k/450	46.23	0.12	5.55	75.00	3467.25	(28)
	um Dense Bloc	K/ 15U						
Kingspan TF	-70/Screed							
			P	age 47 of 84				

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3. Heat losses and heat le	oss parameter
----------------------------	---------------

Element	t	Gross area, m ²		enings	Net area		/alue m²K	A x U W/K		ippa-value I/m²K	A x K kJ/K	
Flat roof	-				3.36	6	0.15	0.5	0	9.00	30.24	(30)
	ngspan T											
150 Ki	roofs ins ngspan k s/52.5 Ki s With Br	K7 Betwe	en (118 Und	ler	51.06	6	0.12	6.1	3	9.00	459.54	(30)
Total are	ea of exte	ernal elei	ments Si	gma A, r	n²						226.9	90 (31)
	eat loss,										62.1	
Heat cap	pacity										4865.0)4 (34)
	l mass pa		, kJ/m²K								52.6	35)
Effect of	thermal	bridges									34.0)4 (36)
	oric heat										96.1	9 (37)
Ventilati	on heat I	oss calc	ulated m	onthly								
44.65	44.34	44.04	42.62	42.35	41.11	41.11	40.88	41.59	42.35	42.89	43.45	(38)
Heat tra	nsfer coe	efficient,	W/K									
140.85	140.54	140.23	138.81	138.54	137.30	137.30	137.07	137.78	138.54	139.08	139.64	
Heat los	s param	eter (HLF	P), W/m²	K							138.8	31 (39)
1.52	1.52	1.52	1.50	1.50	1.48	1.48	1.48	1.49	1.50	1.50	1.51	
HLP (ave	erage)	,	,	,			,		,		1.5	50 (40)
Number	of days i	n month	(Table 1	a)								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

Assume		ancy, N	•		or day Vd	,average	.				kWh/year 2.66 97.33	(42) (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec J	(43)
	er usage	<u> </u>	•		L	Joan	/ lug	Гоор	000	1407		
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
Energy	content c	f hot wat	er used			Л	И		JI.	Л		
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Energy of Distribut	content (a tion loss	annual)									1531.31	(45)
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06	(46)
Hot wate Volume Tempera Energy I	er storage er cylinde factor ature fact ost from orage los	er loss fa or hot wate	ctor (kW		lay)						150.00 0.0191 0.9283 0.5400 1.44	(50) (51) (52) (53) (55)
44.53	40.22	44.53	43.09	44.53	43.09	44.53	44.53	43.09	44.53	43.09	44.53	(56)
Net stora	age loss					,		^		,		
44.53	40.22	44.53	43.09	44.53	43.09	44.53	44.53	43.09	44.53	43.09	44.53	(57)
Primary	loss			,				,				
23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26	(59)
Total he	at require	ed for wa	ter heati	ng calcul	ated for	each mo	nth					
226.55	200.09	211.08	190.52	187.66	169.04	163.64	177.78	176.90	197.50	207.19	221.55	(62)
Output f	rom wate	er heater	for each	month, k	(Wh/mor	nth						
226.55	200.09	211.08	190.52	187.66	169.04	163.64	177.78	176.90	197.50	207.19	221.55	(64)
				n /							2329.49	(64)
	ns from	ir.	,	1	ır	100.10		100.10		100 -0	10=00	(05)
107.02	95.15	101.88	94.02	94.09	86.87	86.10	90.80	89.49	97.36	99.56	105.36	(65)

5. Internal gains

	_										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts	,	,		,	,				,
132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90
Lighting	gains										
23.18	20.59	16.75	12.68	9.48	8.00	8.65	11.24	15.08	19.15	22.35	23.83
Appliand	ces gains	5									
243.53	246.06	239.69	226.13	209.02	192.94	182.19	179.66	186.03	199.59	216.70	232.79
Cooking	gains										
36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water he	eating ga	ains	,	,	,	,	,		,	,	,
143.85	141.60	136.93	130.58	126.46	120.66	115.73	122.05	124.29	130.86	138.28	141.61
Total internal gains											
476.43	474.12	459.23	435.26	410.83	387.46	372.43	378.82	391.27	415.47	443.20	464.09
	,		ļ								

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 19.64	0.72 x 0.70	0.77	1.3720
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 46.75	0.72 x 0.70	0.77	8.9811
En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 19.64	0.72 x 0.70	0.77	17.2867
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 19.64	0.72 x 0.70	0.77	29.7029
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 19.64	0.72 x 0.70	0.77	45.8234
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 19.64	0.72 x 0.70	0.77	25.9300
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 2.630 46.75	0.72 x 0.70	0.77	42.9458
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 26.00	0.72 x 0.70	1.00	55.0761
argon filled, low-E, En=0.2, hard coat (n/a)				
Velux Specified U-Value = 1.20				

Heating s		esponsiv	.	ds in the I	Ü	,	,				
Jan											1.00
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
au									,	,	
9.59	9.62	9.64	9.74	9.75	9.84	9.84	9.86	9.81	9.75	9.72	9.68
alpha										,	
1.64	1.64	1.64	1.65	1.65	1.66	1.66	1.66	1.65	1.65	1.65	1.65
Jtilisatio	n factor t	for gains	for living	area	,		J.		J.		
0.90	0.85	0.78	0.67	0.55	0.43	0.33	0.37	0.55	0.75	0.87	0.91
Mean into	ernal ten	nperatur	e in living	area T1		Я	,	^	Л		
17.18	17.69	18.48	19.39	20.11	20.59	20.81	20.76	20.34	19.32	18.07	17.08
Гетрега	ature dur	ing heati	ng perio	ds in rest	of dwelli	ng Th2	Л	,	,		
19.67	19.67	19.68	19.69	19.69	19.70	19.70	19.70	19.69	19.69	19.68	19.68
Jtilisatio	n factor	for gains	for rest	of dwellin	ng	Л	,	^	Л		
0.89	0.84	0.76	0.63	0.50	0.36	0.25	0.29	0.48	0.71	0.85	0.90
Mean into	ernal ter	nperatur	e in the r	est of dw	elling T2	2			,		
16.24	16.74	17.51	18.38	19.03	19.45	19.62	19.59	19.26	18.34	17.14	16.15
_iving are	ea fractio	on (46.23	3/92.46)			Л			,		0.50
√lean inte	ernal ten	nperatur	e (for the	whole d	welling)						
16.71	17.21	17.99	18.88	19.57	20.02	20.21	20.18	19.80	18.83	17.60	16.62
Apply adj	justmen	t to the m	nean inte	rnal tem	perature	, where a	ppropria	te			
16.71	17.21	17.99	18.88	19.57	20.02	20.21	20.18	19.80	18.83	17.60	16.62
	e heatin Feb	g requir Mar	rement Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		for gains			100		<u> </u>	<u> Cop</u>			
	0.80	0.72	0.61	0.49	0.38	0.28	0.32	0.49	0.69	0.81	0.86
Jseful ga		0.72	0.01	0.40	0.00	0.20	0.02	0.40	0.00	0.01	0.00
	725.21	832.79	879.10	808.20	619.44	443.15	450.52	585.77	634.90	588.18	564.14
		external		<u></u>	013.44	110.10	100.02	000.77	004.00	000.10	004.14
	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
				mperatu		10.00	10.40	14.10	10.00	7.10	4.20
				1090.93		496.12	517.61	785.44	1140 51	1460 78	1733.89
		for heat		1000.00	1744.00	430.12	017.01	700.44	1140.51	1400.70	1700.00
1.00	1.00	1.00	1.00	1.00	1_	1_	-	1-	1.00	1.00	1.00
				ch month	l kW/h/m	onth	<u> </u>	<u> </u>	1.00	1.00	1.00
Space He							-	1-	376.17	628.28	870.29
05/ //	675 65								" >/D I/	n/A /X	. AUL/MI
	675.65	579.37		er year (ar) (Octo			370.17	020.20	4559.37

8c. Space cooling requirement - not applicable

9a. Energy requirements

		uiremen									kWh/year	
Fraction	of space	eating sy e heat fro n heatino	m main	system(s	s)			8	1.0000 8.80%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space h	eating re	quireme	nt			Л				Л		
854.41	675.65	579.37	364.85	210.35	-	-	-	-	376.17	628.28	870.29	(98)
Appendi	ix Q - mo	nthly en	ergy save	ed (main	heating	system	1)		,			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	eating fu	iel (main	heating	system 1	1)				,			
962.17	760.87	652.45	410.87	236.88	[-	-	-	-	423.62	707.52	980.06	(211)
Appendi	ix Q - mo	nthly en	ergy save	ed (main	heating	system 2	2)					
0.00	0.00	0.00	0.00	0.00	[-	-	-	-	0.00	0.00	0.00	(212)
Space h	eating fu	iel (main	heating	system 2	2)							
0.00	0.00	0.00	0.00	0.00	[-	-	-	[-	0.00	0.00	0.00	(213)
Appendi	ix Q - mo	nthly en	ergy save	ed (seco	ndary he	ating sys	stem)					
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space h	eating fu	el (secor	ndary)									
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterhe												
		quiremer	nr.	10		nr.				nr.		
			190.52	187.66	169.04	163.64	177.78	176.90	197.50	207.19	221.55	(64)
	,	er heater		10		n.				nin-	79.50	(216)
86.67	86.49	86.11	85.37	84.16	79.50	79.50	79.50	79.50	85.36	86.30	86.74	(217)
_	eating fu		1	10		ni .				nin-		
261.38	231.34	245.13	223.17	222.98	212.63	205.83	223.62	222.52	231.37	240.09	255.41	(219)
Annual t	totals										kWh/year	
Space h	eating fu	uel used,	main sys	stem 1							5134.43	(211)
		el (secor	ndary)								0.00	(215)
Waterhe	-										2775.46	(219)
	ty for pui heating	mps, fan:	s and ele	ectric kee	p-not						30.00	(230c)
		pump n-assiste	d flue								45.00	(230e)
		or the ab		n/vear							75.00	(231)
	•	nting (100		•							409.43	(232)
• • • • • • • • • • • • • • • • • • • •		eneration	technolo	ogies								
Appendi											0.000	(000-)
	y saved () y used ()	or genera	iiea ():								0.000 0.000	(236a) (237a)
Litery	y useu ()	,.									0.000	(201a)
Total de	livered e	nergy for	all uses								8394.32	(238)

10a. Does not apply

11a. Does not apply

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12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	S
	kWh/year	kg CO2/kWh	kg CO2/y	ear
Space heating, main system 1	5134.43	0.216	1109.04	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2775.46	0.216	599.50	(264)
Space and water heating			1708.54	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	409.43	0.519	212.49	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1959.95	(272)
			kg/m²/yea	ar

21.20 (273)

Dwelling Carbon Dioxide Emission Rate (DER)

Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	r		
							heating					
Numbe	er of chim	neys					0 + 0 + 0		x 40		0.00	(6a)
Numbe	er of open	flues					0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of interr	mittent fa	ns				3		x 10		30.00	(7a)
Numbe	er of passi	ve vents					0		x 10		0.00	(7b)
Numbe	er of fluele	ess gas fi	res				0		x 40		0.00	(7c)
											Air chang	ges per hour
Infiltrat	ion due to	chimne	ys, fans	and flues	3						0.13	(8)
Pressu	ire test, re	esult q50)						5.00			(17)
Air peri	meability	·									0.38	(18)
Numbe	er of sides	on whic	h shelter	ed							2.00	(19)
Shelter	rfactor										0.85	(20)
Infiltrat	ion rate ir	corporat	ting shelt	erfactor							0.33	(21)
Infiltrat	ion rate n	nodified f	or month	lly wind s	peed							, ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
\^(' =	- ,			,	,					1	52.50	(22)
Wind F				16		-it	16			10		
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
						-,-					13.13	(22a)
Adjuste	ed infiltrat	ion rate ((allowing	for shelt	er and w	ind spee	d)					
0.42	0.41	0.40	0.36	0.35	0.31	0.31	0.30	0.33	0.35	0.37	0.38	
						_					4.29	(22b)
	tion : nati		ılation, in	itermitter	nt extract	tans						
Effectiv	ve air cha	nge rate										
0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57	(25)

Element	es and heat lo Gross	Openings	Netarea	U-value	AxU	kappa-value	$A \times K$	
	area, m²	m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K	
Window - Do	•		3.950	1.33 (1.40)	5.24			(27)
	-E, En=0.1, sof	t						
coat (East)								
•	J-Value = 1.20			4 00 (4 40)	0.05			(07)
Window - Dou	•		2.300	1.33 (1.40)	3.05			(27)
	-E, En=0.1, sof	l .						
coat (West)	J-Value = 1.20							
Window - Do			0.500	1.33 (1.40)	0.66			(27)
	.E, En=0.1, sof	t	0.500	1.33 (1.40)	0.00			(21)
coat (South)	-L, LII=0.1, 30II	·						
, ,	J-Value = 1.20							
Window - Do			0.180	1.33 (1.40)	0.24			(27)
	-E, En=0.1, sof	t	01100		•			()
coat (East)	, - ,							
	J-Value = 1.20							
Full glazed d			2.400	1.40	3.36			(26)
Double-glaze	ed, air-filled,							
low-E, En=0.	1, soft coat							
(South)								
•	J-Value = 1.20							
Full glazed d			3.450	1.40	4.83			(26)
Double-glaze								
low-E, En=0.	1, soft coat							
(East)	I Value – 1 20							
Full glazed d	J-Value = 1.20		6.090	1.40	8.53			(26)
Double-glaze			0.090	1.40	0.55			(20)
low-E, En=0.								
(West)	,, con coar							
` ,	J-Value = 1.20							
Rooflight at 7			4.260	1.59 (1.70)	6.78			(27)
Double-glaze				, ,				()
low-E, En=0.								
(n/a)								
Velux Spec	ified U-Value =	: 1.20						
Walls			98.54	0.18	17.74	9.00	886.86	(29)
	eatherboard/Ba							
	nse Block)/51 (
	me Insulated W							
	4000 Between	Studs/12.5						
P'bd			4.47	0.40	0.75	0.00	07.50	(00)
Walls	ooks		4.17	0.18	0.75	9.00	37.53	(29)
Dormer Cho	еекs - ard/Battens/9 С	19R/51						
	Timber Frame I							
•	elotex XR4000							
VVIII 120 C		DOLWOOII						

JPA Designer Version 6.03x , SAP Version 9.92

Beam/Medium Dense Block/150

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0.13

6.01

75.00

3467.25

(28)

46.23

Licensed to Thermcalc Limited

Kingspan TF70/Screed

Studs/12.5 P'bd Ground floors

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Approval of JPA Designer by BRE applies only to the software, data is not subject to quality control procedures, users are themselves responsible for the accuracy of the data. The results of the calculation should not be accepted without first checking the input data.

3. Heat	losses a	and heat	t loss pa	rameter	•							
Element		Gross	Оре	enings	Netarea		/alue	A x U		appa-valu		
		area, m2	m ²		A, m²		m²K	W/K	k	J/m²K	kJ/K	
Flat roof	-				3.36	6	0.13	0.4	4	9.00	30.24	(30)
	.	TR27 Ove										
		ulated be		afters	51.47	7	0.13	6.6	9	9.00	463.23	(30)
	• .	<7 Between										
Rafters/52.5 Kingspan K118 Under Rafters With Breather Membrane												
Rafters	s With Br	eather M	lembrane	Э								
Total are	ea of exte	ernal ele	ments Si	ama A r	n²						226.9	90 (31)
Fabric h				9	•••						64.3	, ,
		arameter	, kJ/m²K	(user-sp	ecified TI	MP)					250.0	` ,
Effect of			,			,					11.3	, ,
Total fab	oric heat	loss									75.6	
Ventilati	on heat l	loss calc	ulated m	onthly								
43.08	42.83	42.58	41.44	41.23	40.23	40.23	40.05	40.62	41.23	41.66	42.11	(38)
Heat tra	nsfer coe	efficient,	W/K									
118.73	118.48	118.24	117.10	116.88	115.89	115.89	115.71	116.27	116.88	117.32	117.77	
											117.1	10 (39)
Heat los	s param	eter (HLI	²), W/m ²	K								
1.28	1.28	1.28	1.27	1.26	1.25	1.25	1.25	1.26	1.26	1.27	1.27	
HLP (ave	0 /										1.2	27 (40)
Number	,	in month	(Table 1	a)	v.							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

	4. Water heating energy requirementskWh/yearAssumed occupancy, N2.66											
	average l		r usage ii	n litres pe	er day Vd	l,average	9				97.33	(42) (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot wate	er usage	in litres	oer day f	or each r	month							
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
Energy	content c	of hot wa	ter used		7				,			
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Energy content (annual) 1531.31 (4) Distribution loss												(45)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(46)
Hot water cylinder loss factor (kWh/day) Volume factor Temperature factor 0.0000 (5) 0.0000 (6) 0.0000											(50) (51) (52) (53) (55)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net stor	age loss		.H			Л	А		,			
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary	loss								,			
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
Combi lo	oss calcu	lated for	each m	onth								
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)
Total he	at require	ed for wa	ter heati	ng calcu	lated for	each mo	nth					
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(62)
Output f	rom wate	er heater	for each	month, I	kWh/moi	nth						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(64)
0.00 (64) Heat gains from water heating, kWh/month											(64)	
33.74	29.51	30.45	26.55	25.47	21.98	20.37	23.37	23.65	27.56	30.09	32.67	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts			,	,			,	,	
132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90	132.90
Lighting gains											
23.66	21.01	17.09	12.94	9.67	8.16	8.82	11.47	15.39	19.54	22.81	24.31
Appliances gains											
243.53	246.06	239.69	226.13	209.02	192.94	182.19	179.66	186.03	199.59	216.70	232.79
Cooking gains											
36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29	36.29
Pumps a	and fans	gains									
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lossese	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water heating gains											
45.35	43.91	40.93	36.87	34.24	30.53	27.38	31.41	32.85	37.05	41.79	43.92
Total internal gains											
375.40	373.85	360.57	338.81	315.79	294.50	281.26	285.41	297.14	319.05	344.17	363.88

6. Solar gains (calculation for January)

o. Solar gams (calculation for samually)	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E,	0.9 x 3.950 19.64	· ·	0.77	23.7092
En=0.1, soft coat (East)	0.0 % 0.000 .0.0	0.00 % 0 0	•	
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 2.300 19.64	0.63 x 0.70	0.77	13.8053
En=0.1, soft coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 0.500 46.75	0.63 x 0.70	0.77	7.1440
En=0.1, soft coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 0.180 19.64	0.63 x 0.70	0.77	1.0804
En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 2.400 46.75	0.63 x 0.70	0.77	34.2913
low-E, En=0.1, soft coat (South)				
Specified U-Value = 1.20	0.0 0.450.40.04	0.00 0.70	0 77	00 7000
Full glazed door - Double-glazed, air-filled,	0.9 x 3.450 19.64	0.63 x 0.70	0.77	20.7080
low-E, En=0.1, soft coat (East)				
Specified U-Value = 1.20	0.0 × 0.000.40.04	0.00 + 0.70	0.77	OC 5544
Full glazed door - Double-glazed, air-filled,	0.9 x 6.090 19.64	0.63 x 0.70	0.77	36.5541
low-E, En=0.1, soft coat (West)				
Specified U-Value = 1.20	0.9 x 4.260 26.00	0.63 x 0.70	1.00	43.9606
Rooflight at 70° or less - Double-glazed, air-filled, low-E, En=0.1, soft coat (n/a)	0.9 X 4.200 20.00	0.63 X 0.70	1.00	43.9000
Velux Specified U-Value = 1.20				
velux opecilieu o-value – 1.20				

54.08 54.19 54.30 54.83 54.93 55.40 55.40 55.49 55.22 54.93 54.73 54.5 alpha 4.61 4.61 4.62 4.66 4.66 4.69 4.69 4.70 4.68 4.66 4.65 4.63 Utilisation factor for gains for living area 1.00 0.99 0.97 0.90 0.74 0.55 0.41 0.47 0.75 0.96 1.00 1.00 Mean internal temperature in living area T1 19.58 19.82 20.19 20.61 20.88 20.98 21.00 20.99 20.91 20.49 19.94 19.5 Temperature during heating periods in rest of dwelling Th2 19.85 19.86 19.86 19.87 19.87 19.88 19.88 19.87 19.87 19.8 Utilisation factor for gains for rest of dwelling 1.00 0.99 0.96 0.87 0.68 0.46 0.31 0.36 0.66 0.94 0.99 1.00 Mean internal temperature in the rest of dwelling
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Utilisation factor for gains for living area 1.00 0.99 0.97 0.90 0.74 0.55 0.41 0.47 0.75 0.96 1.00 1.00 Mean internal temperature in living area T1 19.58 19.82 20.19 20.61 20.88 20.98 21.00 20.99 20.91 20.49 19.94 19.5 Temperature during heating periods in rest of dwelling Th2 19.85 19.86 19.86 19.87 19.87 19.88 19.88 19.88 19.87 19.87 19.87 19.8 Utilisation factor for gains for rest of dwelling 1.00 0.99 0.96 0.87 0.68 0.46 0.31 0.36 0.66 0.94 0.99 1.00 Mean internal temperature in the rest of dwelling T2 18.57 18.81 19.17 19.57 19.80 19.87 19.88 19.88 19.83 19.47 18.94 18.5 Living area fraction (46.23/92.46) Mean internal temperature (for the whole dwelling) 19.08 19.31 19.68 20.09 20.34 20.42 20.44 20.43 20.37 19.98 19.44 19.0 Apply adjustment to the mean internal temperature, where appropriate
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Apply adjustment to the mean internal temperature, where appropriate
10.09 10.21 10.69 20.00 20.24 20.42 20.44 20.42 20.27 10.09 10.44 10.0
19.06 19.51 19.06 20.09 20.54 20.42 20.44 20.45 20.57 19.96 19.44 19.0
8. Space heating requirement Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Utilisation factor for gains
1.00 0.99 0.96 0.88 0.71 0.51 0.36 0.42 0.71 0.95 0.99 1.00
Useful gains
554.73 712.68 883.62 998.19 917.13 659.20 442.18 462.03 663.87 686.50 564.09 512.
Monthly average external temperature
4.30 4.90 6.50 8.90 11.70 14.60 16.60 16.40 14.10 10.60 7.10 4.20
Heat loss rate for mean internal temperature
1754.68 1707.51 1558.03 1310.67 1009.48 674.70 444.54 466.75 728.70 1096.24 1447.63 1747
Fraction of month for heating
1.00 1.00 1.00 1.00 1.00 - - - - 1.00 1.00 1.00
Space heating requirement for each month, kWh/month
892.76 668.53 501.76 224.98 68.71 - - - 304.85 636.14 918.
Total space heating requirement per year (kWh/year) (October to May) 42
Space heating requirement per m² (kWh/m²/year)

8c. Space cooling requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Externa	Itemper	aturers									
-	-	-	-	-	14.60	16.60	16.40	-	-	-	-
Heat los	ss rate V	V									
-	_	-	-	-	1089.37	857.59	879.36	-	-	-	-
Utilisati	on factor	r for loss									
-	-	-	-	-	0.94	0.97	0.95]-	-	-	-
Useful I	oss W								-1		
-	-	-	-	-	1019.21	829.02	834.49]-	-	-	-
Internal	gains W	<i>I</i>			,						
0.00	0.00	0.00	0.00	0.00	445.66	428.12	435.00	0.00	0.00	0.00	0.00
Solar ga	ains W					•					
0.00	0.00	0.00	0.00	0.00	1113.11	1060.21	914.21	0.00	0.00	0.00	0.00
Gains V	V										
-	-	-	-	-	1558.77	1488.32	1349.20	-	-	-	-
Fraction	of mon	th for coo	ling				,			,	
0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00
Space l	neating k	κWh	·							,	
-	-	-	-	-	1228.60	1433.88	1415.88	-	-	-	-
Space of	cooling k	Wh	-		-						
-	-	-	-	-	388.48	490.53	382.95	-	-	-	-
Total											1261.95
Cooled		otor									1.00
memm	tency fac		1		0.05	0.05	0.05	γ			
- Space of	-	 equireme	- nt for mo	- nth	0.25	0.25	0.25	-	-	-	-
	1 -	equireme	TILIOI IIIO	1	07.40	100.00	05.74	γ			
-	-	- 	-	-	97.12	122.63	95.74	-	-	-	- 245.40
		June to A equireme		2 (k\N/h/m	2/vear)						315.49 3.41
Opaco (,coming it	oquiioiiio	in poi iii	(1	, y our j						0.11

	kwn/year	
Energy for space heating	45.61	(99)
Energy for space cooling	3.41	(108)
Total	49.02	(109)
Target Fabric Energy Efficiency	56.4	(109)
= 49.0174 x 1.15, rounded to 1 d.p.		

Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for - calculation of Heat Demand

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Groundfloor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per ho	our
							main + s	eondar	y + othe	er		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				4		x 10		40.00	(7a)
Numbe	er of pass	ive vents	3				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0		x 40		0.00	(7c)
											Air chang	ges per hour
Infiltrat	ion due t	o chimne	eys, fans	and flue	S						0.18	(8)
Pressu	ire test, r	esult q50	0						5.00			(17)
Air peri	meability	,									0.43	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	rfactor										0.85	(20)
Infiltrat	ion rate i	ncorpora	iting shel	ter factor							0.37	(21)
Infiltrat	ion rate r	nodified	for mont	hly wind s	speed							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.70	5.40	5.10	4.50	4.60	4.10	4.20	4.30	4.50	4.90	5.00	5.30	
Wind F	ootor										57.60	(22)
		4.07	4.40	4.45	4.00	4.05	4.07	4.40	4.00	4.05	4.00	
1.43	1.35	1.27	1.13	1.15	1.02	1.05	1.07	1.13	1.23	1.25	1.32	
			,								14.40	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shel	ter and v	vind spee	ed)					
0.52	0.49	0.47	0.41	0.42	0.37	0.38	0.39	0.41	0.45	0.46	0.48	
						JL					5.26	(22b)
Ventila	tion : nat	tural ven	tilation. i	ntermitte	nt extrac	t fans						-/
	ve air cha			. ,								
0.64	0.62	0.61	0.58	0.59	0.57	0.57	0.58	0.58	0.60	0.60	0.62	(25)
												` '

3.	Heat	losses	and	heat	loss	parameter
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Element	Gross area, m ²	Openings m ²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Doubl		111	0.200	1.15 (1.20)	0.23	KO/III IX	NO/IX	(27)
argon filled, low	-		0.200	1.13 (1.20)	0.20			(21)
hard coat (East								
Specified U-V	•							
Window - Doubl			0.550	1.15 (1.20)	0.63			(27)
argon filled, low	-		0.550	1.13 (1.20)	0.00			(21)
hard coat (Sout								
Specified U-V	•							
Window - Doubl			2.520	1.15 (1.20)	2.89			(27)
argon filled, low	•		2.020	(11.20)	2.00			()
hard coat (Wes								
Specified U-V	•							
Window - Doubl			4.330	1.15 (1.20)	4.96			(27)
argon filled, low	-			(,				(/
hard coat (East								
Specified U-V	•							
Full glazed doo			6.680	1.20	8.02			(26)
Double-glazed,								(- /
low-E, En=0.2,	_							
(West)								
Specified U-V	alue = 1.20							
Full glazed doo	r -		3.780	1.20	4.54			(26)
Double-glazed,	argon filled,							
low-E, En=0.2,	hard coat							
(East)								
Specified U-V	alue = 1.20							
Full glazed doo	r -		2.630	1.20	3.16			(26)
Double-glazed,	argon filled,							
low-E, En=0.2,	hard coat							
(South)								
Specified U-V								
Rooflight at 70°			4.670	1.15 (1.20)	5.35			(27)
Double-glazed,	-							
low-E, En=0.2,	hard coat							
(n/a)								
Velux Specifie	ed U-Value =	1.20						(00)
Walls			4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheel		OD/54						
Weatherboard								
Cavity/140 Tir With 120 Celo								
Studs/12.5 P'l		Detween						
Walls	Ju		96.74	0.20	19.35	9.00	870.66	(20)
Brick or (Weat	herhoard/Ra	ttens/100	90.74	0.20	19.55	9.00	070.00	(29)
Medium Dens								
Timber Frame	•	•						
Celotex XR40								
P'bd	23200011	2.3.00, .2.0						
Ground floors			46.23	0.12	5.55	75.00	3467.25	(28)
Beam/Mediur	n Dense Bloc	:k/150	- -		-	-		` -1
Kingspan TF7								
			Da	ge 64 of 84				

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3.	Heat	losses	and	heat	loss	parameter
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Element		Gross	•	enings	Netarea		alue	AxU		ppa-value		
		area, m ²	m²		A, m ²		m²K	W/K		/m²K	kJ/K	(00)
Flat roof	-				3.36	5	0.15	0.5	0	9.00	30.24	(30)
	• .	R27 Ove										
Pitched				afters	51.06	5	0.12	6.1	3	9.00	459.54	(30)
	• .	(7 Betwe										
Rafters	s/52.5 Kii	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embrane	e								
Total are	ea of exte	ernal elei	ments Si	gma A, r	n²						226.9	00 (31)
Fabric h	eat loss,	W/K		_							62.1	6 (33)
Heat cap	oacity										4865.0	(34)
Thermal	mass pa	arameter	, kJ/m²K								52.6	35)
·												(36)
Total fab	ric heat	loss									96.1	9 (37)
Ventilati	on heat l	oss calc	ulated m	onthly								
46.64	45.62	44.65	42.89	43.17	41.84	42.09	42.35	42.89	44.04	44.34	45.29	(38)
Heat trai	nsfer coe	efficient,	W/K									
142.83	141.81	140.85	139.08	139.36	138.03	138.28	138.54	139.08	140.23	140.54	141.48	
											140.0	1 (39)
Heat los	s param	eter (HLF	P), W/m²	K								
1.54	1.53	1.52	1.50	1.51	1.49	1.50	1.50	1.50	1.52	1.52	1.53	
HLP (ave											1.5	(40)
Number	of days i	n month	(Table 1	a)								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

Assume	d occup	•	•		er dav Vd	,average	.				kWh/year 2.66 97.33	(42) (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(10)
		in litres p			J] Gui	ı, tag	ТООР				
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06	(44)
		f hot wat		l		JI.	<u> </u>		<u> </u>	<u> </u>		` ,
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75	
Energy of Distribut	content (a	annual)	JL.		,	JL	1		11	Л	1531.31	(45)
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06	(46)
Hot water cylinder loss factor (kWh/day) Volume factor Temperature factor Energy lost from store (kWh/day) Total storage loss											(50) (51) (52) (53) (55)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(56)
Net stora	age loss	,	,			Л						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(57)
Primary	loss											
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
	nr.	lated for	nic .			7				-yr-		
17.45	15.73	17.33	16.64	17.10	16.44	16.92	17.04	16.55	17.24	16.80	17.41	(61)
						each mo	1		10	ni .		
176.21	154.58	160.62	141.56		J	112.77	127.02	127.85	146.94	158.39	171.17	(62)
		er heater				, in	10		1	nr.		
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17	(64)
	ins from	water he			·						1733.95 1734	(64) (64)
57.15	50.10	51.98	45.70	44.13	38.50	36.10	40.83	41.14	47.44	51.28	55.48	(65)

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts									
159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48
Lighting gains											
57.96	51.48	41.86	31.69	23.69	20.00	21.61	28.09	37.71	47.88	55.88	59.57
Appliances gains											
363.48	367.25	357.75	337.51	311.97	287.96	271.93	268.15	277.66	297.89	323.44	347.44
Cooking gains											
53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Lossese	g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water heating gains											
76.82	74.56	69.86	63.47	59.32	53.48	48.52	54.88	57.15	63.76	71.22	74.56
Total inte	ernal gair	ns									
608.02	603.05	579.23	542.44	504.74	471.20	451.82	460.89	482.27	519.29	560.30	591.34

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 23.77	0.72 x 0.70	0.77	1.6601
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 53.90	0.72 x 0.70	0.77	10.3539
En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 23.77	0.72 x 0.70	0.77	20.9173
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 23.77	0.72 x 0.70	0.77	35.9413
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 23.77	0.72 x 0.70	0.77	55.4475
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 23.77	0.72 x 0.70	0.77	31.3760
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 2.630 53.90	0.72 x 0.70	0.77	49.5106
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 32.00	0.72 x 0.70	1.00	67.7860
argon filled, low-E, En=0.2, hard coat (n/a)				
Velux Specified U-Value = 1.20				

7. Mean internal temperature Temperature during heating periods in the living area, Th1 (°C) Heating system responsiveness 21.00 1.00											(85)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau												
9.46	9.53	9.59	9.72	9.70	9.79	9.77	9.75	9.72	9.64	9.62	9.55	
alpha		JI.	JI.			JI			,	-J.		
1.63	1.64	1.64	1.65	1.65	1.65	1.65	1.65	1.65	1.64	1.64	1.64	
Utilisati	on factor	for gains	for living	area					,			
0.85	0.81	0.73	0.59	0.46	0.32	0.20	0.21	0.40	0.65	0.80	0.87	(86)
Mean in	nternal tei	mperatur	e in living	area T1								
17.78	18.13	18.94	19.82	20.43	20.79	20.95	20.94	20.70	19.88	18.76	17.77	(87)
Temper	rature du	ring heat	ing perio	ds in rest	of dwelli	ng Th2						
19.65	19.66	19.67	19.68	19.68	19.69	19.69	19.69	19.68	19.68	19.67	19.66	(88)
Utilisati	on factor	for gains	for rest	of dwellir	ng							
0.84	0.79	0.70	0.55	0.40	0.25	0.11	0.11	0.32	0.60	0.77	0.85	(89)
Mean in	nternal te	mperatui	re in the i	est of dv	velling T2	2						
15.67	16.15	17.23	18.38	19.13	19.54	19.68	19.67	19.47	18.51	17.02	15.66	(90)
_	rea fracti	•	,								0.50	(91)
	nternal ter		,			1	1			1		
16.72	17.14	18.08	19.10	19.78	20.17	20.31	20.31	20.08	19.20	17.89	16.72	(92)
	djustmer			,	•					1		
16.72	17.14	18.08	19.10	19.78	20.17	20.31	20.31	20.08	19.20	17.89	16.72	(93)
8 Snac	ce heatin	na reaui	romont									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	on factor			Iviay	Joan	Joan	rug	ТООР		1101	1000	
0.79	0.74	0.65	0.53	0.41	0.28	0.15	0.16	0.35	0.58	0.73	0.80	(94)
Useful		0.00	0.00	0.11	0.20	0.10	0.10	10.00	0.00	0.70	0.00	(0.)
692.49		866.24	899.91	751.49	527.45	280.02	265.55	495.26	639.91	655.36	641.15	(95)
	/average				1021110		200.00	100.20	000.01	000.00	011110	()
5.50	5.80	7.60	10.00	13.10	15.90	18.20	18.30	15.90	12.30	8.70	5.80	(96)
	ss rate fo					10.20	10.00	1 . 0.00		00	0.00	()
	7 1608.12					291.88	278.10	581.77	967.04	1291.08	1544.38	(97)
	n of mont			1000.02	1000.02			100			1.09	(- /
1.00	1.00	1.00	1.00	1.00	1-	_	-	1-	1.00	1.00	1.00	
	neating re				่ n, kWh/m	nonth						
677.55			263.08			_	-	1-	243.38	457.72	672.00	
	pace heat				.	ar) (Octo		av)		_ · ~· ·· <u>~</u>	3453.88	(98)
	neating re	•		•	` •	u., (0010		<i>)</i> /			37.36	(99)
	heating heating of										3454 1734	(98) (64)

8c. Space cooling requirement - not applicable

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Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for - calculation of EPC Costs, Emissions And Primary Energy

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

SAP 2012 worksheet for - calculation of EPC Costs, Emissions And Primary Energy

2. Ventilation rate

											m³ per ho	ur
							main + s heating	eondar	y + othe	r		
Numbe	er of chim	nove					0 + 0 + 0	,	x 40		0.00	(6a)
	er of oper						0 + 0 + 0		x 20		0.00	(6b)
	er of inter		ane				4		x 10		40.00	(7a)
	er of pass		-				0		x 10		0.00	(7b)
	er of fluel						0		x 40		0.00	(7c)
rambe	or mach	coo gao i	1100				J	•	λ 40		0.00	(70)
											Air chang	es per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	3						0.18	(8)
Pressu	ıre test, r	esult q50)						5.00			(17)
Air per	meability	•									0.43	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelte	rfactor										0.85	(20)
Infiltration rate incorporating shelter factor										0.37	(21)	
Infiltrat	ion rate r	nodified	for montl	hly wind s	peed							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.70	5.40	5.10	4.50	4.60	4.10	4.20	4.30	4.50	4.90	5.00	5.30	
	_	,				,	,		,		57.60	(22)
Wind F	actor											
1.43	1.35	1.27	1.13	1.15	1.02	1.05	1.07	1.13	1.23	1.25	1.32	
	,		,				,				14.40	(22a)
Adjuste	ed infiltra	tion rate	(allowing	g for shelt	er and w	ind spee	ed)					
0.52	0.49	0.47	0.41	0.42	0.37	0.38	0.39	0.41	0.45	0.46	0.48	
	Л	, l		,		_ и	.,			- И	5.26	(22b)
				ntermitter	nt extrac	t fans						• •
Effectiv	ve air cha	inge rate										
0.64	0.62	0.61	0.58	0.59	0.57	0.57	0.58	0.58	0.60	0.60	0.62	(25)

SAP 2012 worksheet for - calculation of EPC Costs, Emissions And Primary Energy

3. Heat losses and heat loss paramete	er					
Element Gross Openings	Netarea	U-value	AxU	kappa-value	ΑxΚ	
area, m² m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K	
Window - Double-glazed,	0.200	1.15 (1.20)	0.23			(27)
argon filled, low-E, En=0.2,	0.200	()				(—-)
hard coat (East)						
Specified U-Value = 1.20						
Window - Double-glazed,	0.550	1.15 (1.20)	0.63			(27)
argon filled, low-E, En=0.2,	0.550	1.13 (1.20)	0.00			(21)
hard coat (South)						
` ,						
Specified U-Value = 1.20	0.500	4.45 (4.00)	0.00			(07)
Window - Double-glazed,	2.520	1.15 (1.20)	2.89			(27)
argon filled, low-E, En=0.2,						
hard coat (West)						
Specified U-Value = 1.20						()
Window - Double-glazed,	4.330	1.15 (1.20)	4.96			(27)
argon filled, low-E, En=0.2,						
hard coat (East)						
Specified U-Value = 1.20						
Full glazed door -	6.680	1.20	8.02			(26)
Double-glazed, argon filled,						
low-E, En=0.2, hard coat						
(West)						
Specified U-Value = 1.20						
Full glazed door -	3.780	1.20	4.54			(26)
Double-glazed, argon filled,						()
low-E, En=0.2, hard coat						
(East)						
Specified U-Value = 1.20						
Full glazed door -	2.630	1.20	3.16			(26)
Double-glazed, argon filled,	2.000	1120	00			(20)
low-E, En=0.2, hard coat						
(South)						
Specified U-Value = 1.20						
Rooflight at 70° or less -	4.670	4 45 (4 20)	E 25			(27)
•	4.670	1.15 (1.20)	5.35			(27)
Double-glazed, argon filled,						
low-E, En=0.2, hard coat						
(n/a)						
Velux Specified U-Value = 1.20						(00)
Walls	4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheeks -						
Weatherboard/Battens/9 OSB/51						
Cavity/140 Timber Frame Insulated						
With 120 Celotex XR4000 Between						
Studs/12.5 P'bd						
Walls	96.74	0.20	19.35	9.00	870.66	(29)
Brick or (Weatherboard/Battens/100						
Medium Dense Block)/51 Cavity/140						
Timber Frame Insulated With 120						
Celotex XR4000 Between Studs/12.5						
P'bd						
Groundfloors	46.23	0.12	5.55	75.00	3467.25	(28)
Beam/Medium Dense Block/150		2		2.22		(/
Vice was an TEZO/Oans and						

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SAP 2012 worksheet for - calculation of EPC Costs, Emissions And Primary Energy

3. Heat	losses a	and heat	t loss pa	rameter								
Element	:	Gross	•	enings	Netare		/alue	A x U		appa-valu		
		area, m ²	m ²		A, m²		m²K	W/K	k٠	I/m²K	kJ/K	
Flat roof	s				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kii	ngspan T	TR27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	51.06	ô	0.12	6.1	3	9.00	459.54	(30)
150 Ki	ngspan k	<7 Between	en									
Rafters	s/52.5 Ki	ngspan k	(118 Und	der								
Rafters	s With Br	eather M	embrane	Э								
Total are	ea of exte	ernal elei	ments Si	gma A, r	n²						226.9	0 (31)
Fabric h	eat loss.	, W/K									62.1	6 (33)
Heat car	pacity										4865.0)4 (34)
·												i (35)
Effect of	thermal	bridges									34.0)4 (36)
Total fab	oric heat	loss									96.1	9 (37)
Ventilati	on heat l	loss calc	ulated m	onthly								, ,
46.64	45.62	44.65	42.89	43.17	41.84	42.09	42.35	42.89	44.04	44.34	45.29	(38)
Heat tra	nsfer coe	efficient,	W/K	,					,		,	
142.83	141.81	140.85	139.08	139.36	138.03	138.28	138.54	139.08	140.23	140.54	141.48	
	JI	JL	JI.			JI	ı			JI	140.0	1 (39)
Heat los	s param	eter (HLF	P), W/m²	K								()
1.54	1.53	1.52	1.50	1.51	1.49	1.50	1.50	1.50	1.52	1.52	1.53	
HLP (ave	erage)		,		,		,		,		1.5	(40)
Number	of days i	in month	(Table 1	a)								` ,
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

	er heating		y require	ements							kWh/yea
	average l	•	usage ir	n litres pe	er day Vd	,average)				97.33
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	per day fo	or each r	nonth	J				Л	
107.06	103.17	99.27	95.38	91.49	87.59	87.59	91.49	95.38	99.27	103.17	107.06
Energy	content c	f hot wa	ter used	,		,			,		
158.76	138.86	143.29	124.92	119.86	103.43	95.85	109.99	111.30	129.71	141.59	153.75
٠.	content (a	annual)						•			1531.31
23.81	20.83	21.49	18.74	17.98	15.52	14.38	16.50	16.69	19.46	21.24	23.06
Volume Temper Energy	ature fact lost from	or store (k\	`	h/day)							0.0000 0.0000 0.0000 0.00
	orage los		0.00	0.00	0.00	0.00	10.00	10.00	0.00	0.00	0.00
0.00	0.00 age loss	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Primary		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	oss calcu				10.00	0.00	10.00	10.00	10.00	0.00	0.00
17.45	15.73	17.33	16.64	17.10	16.44	16.92	17.04	16.55	17.24	16.80	17.41
Total he	at require	ed for wa	ter heatii	⊩ ng calcul	ated for e	each mo	nth		1	JI.	
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17
Output f	rom wate	r heater	for each	month, k	«Wh/mor		JL		JI	JI	
176.21	154.58	160.62	141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17
Heat ga	ins from	water he	ating, kW	/h/month	1	JL	JL	Л	JL	JL	1733.95
57.15	50.10	51.98	45.70	44.13	38.50	36.10	40.83	41.14	47.44	51.28	55.48

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts		,						,	
159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48
Lighting	gains										
57.96	51.48	41.86	31.69	23.69	20.00	21.61	28.09	37.71	47.88	55.88	59.57
Appliand	ces gains	;									
363.48	367.25	357.75	337.51	311.97	287.96	271.93	268.15	277.66	297.89	323.44	347.44
Cooking	gains										
53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61
Pumps a	and fans	gains									
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses	e.g. evap	oration (r	negative	values)							
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water h	eating ga	ins	,	,		,	,		,	,	
76.82	74.56	69.86	63.47	59.32	53.48	48.52	54.88	57.15	63.76	71.22	74.56
Total int	ernal gaiı	าร									
608.02	603.05	579.23	542.44	504.74	471.20	451.82	460.89	482.27	519.29	560.30	591.34

6. Solar gains (calculation for January)

o. Colar gams (calculation for bandary)	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled, low-E,	0.9 x 0.200 23.77	•	0.77	1.6601
En=0.2, hard coat (East)	0.5 x 0.200 25.11	0.72 X 0.70	0.77	1.0001
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 0.550 53.90	0.72 x 0.70	0.77	10.3539
En=0.2, hard coat (South)	0.0 × 0.000 00.00	0.7.2 % 0.7.0	0	10.0000
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 2.520 23.77	0.72 x 0.70	0.77	20.9173
En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, argon filled, low-E,	0.9 x 4.330 23.77	0.72 x 0.70	0.77	35.9413
En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 6.680 23.77	0.72 x 0.70	0.77	55.4475
low-E, En=0.2, hard coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 3.780 23.77	0.72 x 0.70	0.77	31.3760
low-E, En=0.2, hard coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, argon filled,	0.9 x 2.630 53.90	0.72 x 0.70	0.77	49.5106
low-E, En=0.2, hard coat (South)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.670 32.00	0.72×0.70	1.00	67.7860
argon filled, low-E, En=0.2, hard coat (n/a)				
Velux Specified U-Value = 1.20				

	n <i>interna</i> rature dur			ds in the l	living are	a. Th1 (°	C)				21.00
	system	•	.		9	ω, (•,				1.00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau						Л			JI.	Л	
9.46	9.53	9.59	9.72	9.70	9.79	9.77	9.75	9.72	9.64	9.62	9.55
alpha					,	Л				И	
1.63	1.64	1.64	1.65	1.65	1.65	1.65	1.65	1.65	1.64	1.64	1.64
Utilisati	on factor	for gains	for living	area	,	Л	,		И	Л	
0.85	0.81	0.73	0.59	0.46	0.32	0.20	0.21	0.40	0.65	0.80	0.87
Mean ir	ternal ter	nperatur	e in livino	area T1	,	Л	,		И	Л	
17.78	18.13	18.94	19.82	20.43	20.79	20.95	20.94	20.70	19.88	18.76	17.77
Tempe	rature dur	ing heati	ng perio	ds in rest	of dwelli	ng Th2	А		,	,	
19.65	19.66	19.67	19.68	19.68	19.69	19.69	19.69	19.68	19.68	19.67	19.66
Utilisati	on factor	for gains	for rest	of dwellin	ng						
0.84	0.79	0.70	0.55	0.40	0.25	0.11	0.11	0.32	0.60	0.77	0.85
Mean ir	ternal ter	nperatur	e in the i	est of dw	velling T2	2			JL	JL	п
15.67	16.15	17.23	18.38	19.13	19.54	19.68	19.67	19.47	18.51	17.02	15.66
_	rea fracti	`	,			Л			,		0.50
Mean ir	iternal ter	nperatur	e (for the	whole d	welling)						
16.72	17.14	18.08	19.10	19.78	20.17	20.31	20.31	20.08	19.20	17.89	16.72
Apply a	djustmen	t to the m	nean inte	rnal tem _l	perature	, where a	ppropria	ite			
16.72	17.14	18.08	19.10	19.78	20.17	20.31	20.31	20.08	19.20	17.89	16.72
8. Spa o Jan	ce heatin	g requir Mar	rement Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisati	on factor	⊩ for gains				l					
									,	Л	JL
0.79	0.74	0.65	1	0.41	0.28	0.15	0.16	0.35	0.58	0.73	0.80
0.79 Useful o	0.74 gains	0.65	0.53	0.41	0.28	0.15	0.16	0.35	0.58	0.73	0.80
Usefulç	gains	J	0.53		J	JI.)[][
Useful (692.49	785.70	866.24	0.53	751.49	J	0.15		0.35)[0.73	0.80
Useful (692.49 Monthly	gains 785.70 average	866.24 external	0.53 899.91 tempera	751.49 ture	527.45	280.02	265.55	495.26	639.91	655.36	641.15
Useful of 692.49 Monthly 5.50	gains 785.70 average 5.80	866.24 external 7.60	0.53 899.91 tempera 10.00	751.49 ture 13.10	527.45	JI.)[][
Useful (692.49 Monthly 5.50 Heat los	785.70 vaverage 5.80 ss rate for	866.24 external 7.60 mean in	0.53 899.91 tempera 10.00 ternal te	751.49 ture 13.10 mperatu	527.45 15.90 re	280.02	265.55	495.26 15.90	639.91	655.36 8.70	5.80
Useful (692.49 Monthly 5.50 Heat los 1603.1	gains 785.70 average 5.80	866.24 external 7.60 mean in	0.53 899.91 tempera 10.00 ternal te	751.49 ture 13.10 mperatu	527.45 15.90 re	280.02	265.55	495.26 15.90	639.91	655.36 8.70	641.15
Useful of 692.49 Monthly 5.50 Heat los 1603.1 Fraction	gains 785.70 vaverage 5.80 ss rate for 71608.12	866.24 external 7.60 mean in 1476.44 n for heaf	0.53 899.91 tempera 10.00 ternal te 1265.29	751.49 ture 13.10 mperatu	527.45 15.90 re	280.02	265.55	495.26 15.90	639.91 12.30 967.04	8.70 1291.08	5.80 1544.38
Useful of 692.49 Monthly 5.50 Heat los 1603.1 Fraction 1.00	785.70 7average 5.80 7 1608.12 7 1.00	866.24 external 7.60 mean in 1476.44 n for heat	0.53 899.91 tempera 10.00 ternal te 1265.29 ting 1.00	751.49 ture 13.10 mperatu 930.92	527.45 15.90 re 589.02	280.02 18.20 291.88	265.55 18.30 278.10	495.26 15.90 581.77	639.91	655.36 8.70	5.80
Useful of 692.49 Monthly 5.50 Heat los 1603.1 Fraction 1.00 Space h	yains 785.70 yaverage 5.80 ss rate for 71608.12 n of month 1.00 neating re	866.24 external 7.60 mean in 1476.44 n for head	0.53 899.91 tempera 10.00 ternal te 1265.29 1.00 ent for ea	751.49 ture 13.10 mperatu 930.92 1.00 ch month	527.45 15.90 re 589.02 - n, kWh/m	280.02 18.20 291.88	265.55 18.30 278.10	495.26 15.90 581.77	639.91 12.30 967.04 1.00	8.70 1291.08	5.80 1544.38
Useful of 692.49 Monthly 5.50 Heat los 1603.1 Fraction 1.00 Space h	785.70 7average 5.80 7 1608.12 7 1.00	866.24 external 7.60 mean in 1476.44 n for head 1.00 equireme 453.99	0.53 899.91 temperal 10.00 ternal te 1265.29 ting 1.00 ent for ea 263.08	751.49 ture 13.10 mperatu 930.92 1.00 ch month	527.45 15.90 re 589.02 - n, kWh/m	280.02 18.20 291.88 	265.55 18.30 278.10	495.26 15.90 581.77 -	639.91 12.30 967.04	8.70 1291.08	5.80 1544.38

8c. Space cooling requirement - not applicable

9a. Energy requirements

									kWh/year	
No secondary heati Fraction of space h Efficiency of main h	eat from main	system(s)			9	1.0000 2.80%			(202) (206)
Jan Feb M	lar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requ	irement	, and the second						J.		
677.55 552.67 45	53.99 263.08	133.49	-	-	-	-	243.38	457.72	672.00	(98)
Appendix Q - month	nly energy sav	ed (mair	heating	system	1)					
0.00 0.00 0.	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel	(main heating	system	1)							
730.12 595.54 48	89.21 283.49	143.85]-	-	-]-	262.26	493.23	724.14	(211)
Appendix Q - month	nly energy sav	ed (mair	n heating	system	2)					
0.00 0.00 0.	0.00	0.00]-	-	-]-	0.00	0.00	0.00	(212)
Space heating fuel	(main heating	system	2)							
0.00 0.00 0.	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - month	nly energy sav	ed (seco	ndary he	ating sy	stem)					
0.00 0.00 0.	0.00	0.00	-	-	-]-	0.00	0.00	0.00	(214)
Space heating fuel ((secondary)									
0.00 0.00 0.	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterheating										
Water heating requi		1	1	10	1	1	1			(O.1)
	60.62 141.56	136.97	119.88	112.77	127.02	127.85	146.94	158.39	171.17	(64)
Efficiency of water h		1	1	16	1		1		87.10	(216)
	9.08 88.84	88.41	87.10	87.10	87.10	87.10	88.76	89.09	89.24	(217)
Water heating fuel			1	10	1	1	1	T		(0.4.0)
197.48 173.31 18	30.31 159.35	154.92	137.63	129.47	145.84	146.79	165.54	177.78	191.81	(219)
Annual totals									kWh/year	
Space heating fuel		stem 1							3721.85	(211)
Space heating fuel ((secondary)								0.00	(215)
Water heating fuel	a fana and al	o otrio ko	on hot						1960.22	(219)
Electricity for pump central heating pu		ecinc ke	ep-not						30.00	(230c)
boiler with a fan-as									45.00	(230e)
Total electricity for t		h/year							75.00	(231)
Electricity for lightin	• ')						409.43	(232)
Energy saving/gene	eration technol	ogies								
Appendix Q - Energy saved or g	renerated ():								0.000	(236a)
Energy used ():	joneratou ().								0.000	(237a)
										()
Total delivered ener	rgy for all uses	;							6166.50	(238)

responsible for the accuracy of the data. The results of the calculation should not be accepted without first checking the input data.

10a. Fuel costs using PCDF prices (rev 367)

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	3721.853	4.040	150.36	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Waterheating				
Water heating cost	1960.22	4.040	79.19	(247)
Mech vent fans cost	0.000	14.460	0.00	(249)
Pump/fan energy cost	75.000	14.460	10.85	(249)
Energy for lighting	409.426	14.460	59.20	(250)
Additional standing charges			113.00	(251)
Electricity generated - PVs	0.000	0.000	0.00	(252)
Appendix Q -				
Energy saved or generated ():	0.000	-1.000	0.00	(253)
Energy used ():	0.000	-1.000	0.00	(254)
Total energy cost			412.60	(255)

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	S
	kWh/year	kg CO2/kWh	kg CO2/y	ear
Space heating, main system 1	3721.85	0.216	803.92	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	1960.22	0.216	423.41	(264)
Space and water heating			1227.33	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	409.43	0.519	212.49	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1478.75	(272)

13a. Primary energy

	Energy	Primary	P. Energy	,
	kWh/year	factor	(kWh/yea	r)
Space heating, main	3721.85	1.220	4540.66	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	3.070	0.00	(263)
Waterheating	1960.22	1.220	2391.47	(264)
Space and water heating			6932.14	(265)
Electricity for pumps/fans	75.00	3.070	230.25	(267)
Electricity for lighting	409.43	3.070	1256.94	(268)
Electricity generated - PV	0.00	3.070	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Electricity generated - wind	0.00	3.070	0.00	(269)
New energy-saving technology:				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Primary energy kWh/year			8419.32	(272)
Primary energy kWh/m²/year			91.06	(273)

Project Information

Building type Detached house

Reference J5067-2

Date 7 October 2019

Client DCM Architectural Consultants Ltd Project Unit 2

25 Pigeon Lane 66 Borstal Hill
Herne Bay Whitstable
Kent Kent
CT6 7EH CT5 4NB

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings for improved dwelling

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	46.23	2.31	106.79	(3a)
First floor	46.23	2.50	115.57	(3b)
Total floor area	92.46			(4)
Dwelling volume (m³)			222.37	(5)

2. Ventilation rate

											m³ per h	our
							main + s	eondar	y + othe	er		
							heating					
	er of chim						0 + 0 + 0		x 40		0.00	(6a)
Numbe	er of oper	flues					0 + 0 + 0		x 20		0.00	(6b)
Numbe	er of inter	mittent fa	ans				4		x 10		40.00	(7a)
Numbe	er of pass	ive vents					0		x 10		0.00	(7b)
Numbe	er of fluele	ess gas f	ires				0		x 40		0.00	(7c)
											Air chan	ges per hour
Infiltrat	ion due t	o chimne	evs, fans	and flue	s						0.18	(8)
	ıre test, r		•						5.00			(17)
	meability										0.43	(18)
	er of sides		ch shelte	red							2.00	(19)
Shelter	rfactor										0.85	(20)
	ion rate ir	ncorpora	tina shel	ter factor							0.37	(21)
	ion rate n	•	_								0.0.	()
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
Wind F	actor										52.50	(22)
		1.00	1.40	4.07	10.05	0.05	0.00	14.00	4.07	1 10	1.40	
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
											13.13	(22a)
Adjuste	ed infiltra	tion rate	(allowing	for shelf	ter and w	ind spe	ed)					
0.47	0.46	0.45	0.40	0.39	0.35	0.35	0.34	0.37	0.39	0.41	0.43	
			,		,					,	4.80	(22b)
Ventila	tion : nat	ural vent	ilation. ir	ntermitte	nt extrac	t fans						, ,
	ve air cha		,									
0.61	0.60	0.60	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59	(25)
5.0.			0.00			0.00		1 3.0.			3.00	()

3. F	leat i	losses	and	heat	loss	parameter
------	--------	--------	-----	------	------	-----------

3. Heat losse		•						
Element	Gross	Openings	Netarea	U-value	AxU	kappa-value		
	area, m²	m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K	
Window - Doul	-		0.200	1.15 (1.20)	0.23			(27)
argon filled, lo								
hard coat (Eas	•							
Specified U-	Value = 1.20							
Window - Doul	ole-glazed,		0.550	1.15 (1.20)	0.63			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (Sou	ıth)							
Specified U-	Value = 1.20							
Window - Doul	ole-glazed,		2.520	1.15 (1.20)	2.89			(27)
argon filled, lo	w-E, En=0.2,							
hard coat (We								
Specified U-	•							
Window - Doul			4.330	1.15 (1.20)	4.96			(27)
argon filled, lo	-			(1120)				` /
hard coat (Eas								
Specified U-	•							
Full glazed do			6.680	1.20	8.02			(26)
Double-glazed			0.000	1.20	0.02			(20)
low-E, En=0.2	-							
(West)	, nard coat							
Specified U-	Value = 1.20							
•			2 700	1.20	4.54			(26)
Full glazed do			3.780	1.20	4.54			(26)
Double-glazed	-							
low-E, En=0.2	, nard coat							
(East)	Value 4.00							
Specified U-			0.000	4.00	0.40			(00)
Full glazed do			2.630	1.20	3.16			(26)
Double-glazed	-							
low-E, En=0.2	, hard coat							
(South)								
Specified U-								
Rooflight at 70			4.670	1.15 (1.20)	5.35			(27)
Double-glazed	-							
low-E, En=0.2	, hard coat							
(n/a)								
Velux Specif	ied U-Value =	1.20						
Walls			4.15	0.21	0.87	9.00	37.35	(29)
Dormer Che								
Weatherboa	rd/Battens/9 O	SB/51						
Cavity/140T	imber Frame Ir	nsulated						
With 120 Cel	otex XR4000 E	Between						
Studs/12.5 F	'bd							
Walls			96.74	0.20	19.35	9.00	870.66	(29)
Brick or (Wea	atherboard/Ba	ttens/100						
Medium Den	se Block)/51 C	Cavity/140						
Timber Fram	e Insulated W	ith 120						
Celotex XR4	000 Between S	Studs/12.5						
P'bd								
Ground floors			46.23	0.12	5.55	75.00	3467.25	(28)
	ım Dense Bloc	k/150	_				-	\ -/
Kingspan TF								
5 1	-		_	04 (04				

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3. Heat losses and heat loss parameter												
Element		Gross	Оре	enings	Netare	a U-\	alue A x U		k	appa-valu	e AxK	
		area, m ²	m ²		A, m²	W/	m²K	W/K	k	J/m²K	kJ/K	
Flat roof	s				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kingspan TR27 Over Joists												
Pitched	roofs ins	ulated be	etween ra	51.06	3	0.12	6.1	3	9.00	459.54	(30)	
150 Ki	ngspan k	(7 Betwe	en								` ,	
Rafters/52.5 Kingspan K118 Under												
Rafters With Breather Membrane												
Total area of external elements Sigma A, m ²											226.9	0 (31)
Fabric heat loss, W/K										62.1	` ,	
Heat capacity										4865.0	` ,	
Thermal mass parameter, kJ/m²K										52.6	` ,	
Effect of thermal bridges											34.0	()
Total fabric heat loss											96.1	` ,
Ventilation heat loss calculated monthly												(0.7)
44.65	44.34	44.04	42.62	42.35	41.11	41.11	40.88	41.59	42.35	42.89	43.45	(38)
]		42.33	41.11	41.11	40.00	41.59	42.33	42.09	43.43	(30)
	nsfer coe	,	1		V	2						
140.85	140.54	140.23	138.81	138.54	137.30	137.30	137.07	137.78	138.54	139.08	139.64	
	,	,				,	,	,	,	,	138.8	1 (39)
Heat loss parameter (HLP), W/m²K												
1.52	1.52	1.52	1.50	1.50	1.48	1.48	1.48	1.49	1.50	1.50	1.51	
HLP(average)												0 (40)
Number of days in month (Table 1a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	
	JL	JL	JL		J	JL	JL		JL	I		

Water heating energy requirements	kWh/year 2.66	(42)
ssumed occupancy, N nnual average hot water usage in litres per day Vd,average	97.33	(42) (43)
an Feb Mar Apr May Jun Jul Aug Sep Oct Nov	Dec	` ,
ot water usage in litres per day for each month		
07.06 103.17 99.27 95.38 91.49 87.59 87.59 91.49 95.38 99.27 103.17	107.06	(44)
nergy content of hot water used		` '
58.76 138.86 143.29 124.92 119.86 103.43 95.85 109.99 111.30 129.71 141.59	153.75	
nergy content (annual)	1531.31	(45)
istribution loss		(40)
3.81 20.83 21.49 18.74 17.98 15.52 14.38 16.50 16.69 19.46 21.24	23.06	(46)
store loss determined from EN 13203-2 tests, taken from boiler data record		()
ot water storage volume (litres)	0.00	(50)
ot water cylinder loss factor (kWh/day) olume factor	0.0000 0.0000	(51) (52)
emperature factor	0.0000	(53)
nergy lost from store (kWh/day)	0.00	(55)
otal storage loss		()
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	0.00	(56)
et storage loss		
	0.00	(57)
rimary loss factor		()
.00 1.00 0.94 0.70 0.45 0.44 0.44 0.48 0.76 0.94 1.00	1.00	
rimary loss	1.00	
	0.00	(59)
ombi loss calculated for each month	0.00	(00)
7.45 15.73 17.33 16.64 17.10 16.44 16.92 17.04 16.55 17.24 16.80	17.41	(61)
otal heat required for water heating calculated for each month	17.41	(01)
	171.17	(62)
	17 1.17	
Aperture area of solar panel 3.0000 Collector zero-loss efficiency 0.7000		(H1) (H2)
Collector heat loss coefficient 1.8000		(H3)
Collector 2nd order heat loss coefficient 0.0050		(H3
Collector effective heat loss coefficient 1.8063		(H3I
Collector performance ratio 2.5804		(H4)
Annual solar radiation per m ² 1079.5246		(H5)
Overshading factor 0.8000		(H6)
Solar energy available 1813.6014 Adjustment factor for showers 1.0000		(H7) (H7)
Solar/load ratio 1.1843		(H8)
Solar utilisation factor 0.5702		(H9)
Collector performance factor 0.8793		(H1
Dedicated solar storage volume 75.0000		(H1
Effective solar volume 75.0000		(H1
Daily hot water demand 97.3255		(H1
Volume ratio Veff/V 0.7706 Veff/V factor 0.9479		(H1:
Solar input -861.8464		(H1 (H1
olar DHW input		(
24.99 -41.70 -71.03 -95.19 -117.60 -115.62 -114.09 -99.68 -78.07 -53.31 -29.64	-20.91	(63)
utput from water heater for each month, kWh/month		()
351P291中72/881中89.559,科5.378751P19.37 4.26 0.00 27.34 49.78 93.63 128.74	150.25	(64)
concod to Thormadia Limitad		. ,
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	rÆrade dind the in	101 <i>6</i> 845

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5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabolic gains, Watts											
159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48	159.48
Lighting gains											
57.96	51.48	41.86	31.69	23.69	20.00	21.61	28.09	37.71	47.88	55.88	59.57
Appliances gains											
363.48	367.25	357.75	337.51	311.97	287.96	271.93	268.15	277.66	297.89	323.44	347.44
Cooking gains											
53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61	53.61
Pumps and fans gains											
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Losses e.g. evaporation (negative values)											
-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32	-106.32
Water heating gains											
76.82	74.56	69.86	63.47	59.32	53.48	48.52	54.88	57.15	63.76	71.22	74.56
Total internal gains											
608.02	603.05	579.23	542.44	504.74	471.20	451.82	460.89	482.27	519.29	560.30	591.34