Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay	Project	Unit 1 66 Borstal Hill Whitstable
	Kent		Kent
	CT67EH		CT54NB

Code for Sustainable Homes

Assessor Name:	Mark Attlesey					
Assessor No.:	ECMK300581					
Ene 1:	Dwelling Emission Rating					
TER:	18.07					
DER:	17.75					
% improvement:	1.8%					
Credits:	0					
Level:	n/a					
Ene 2:	Fabric Energy Efficiency					
Dwelling Type:	Detached house					
FEE:	55.6					
Target FEE:	46.0					
Credits:	3					
Ene 7:	Low and Zero Carbon Technologies	s				
Energy is supplied	by low or zero carbon technologies:	No				
Reduction in CO2	emissions as a result:	n/a				
		Standar	rd case	Actual	case	
		kWh/m²/year	kg/m²/year	kWh/m²/year	kg/m²/year	
DER			20.5301		17.7464	(ZC1)
CO2 emissions fro	m appliances		15.1547		15.1547	(ZC2)
CO2 emissions fro	om cooking		1.8375		1.8375	(ZC3)
Total CO2 emissic	ns		37.5222		34.7385	(ZC4)
Residual CO2 emi	ssions offset from biofuel CHP		0.0000		0.0000	(ZC5)
Additional allowab	legeneration	0.0000		0.0000		(ZC6)
Resulting CO2 em	issions offset		0.0000		0.0000	(ZC7)
Net CO2 emission	S		37.5222		34.7385	(ZC8)
Reduction in emiss	ions	= 100 x = 100 x = 0%	(1 - (ZC8actu (1 - (34.7385	ual / ZC8standa 5 / 37.5222))	rd))	я
Credits		0				

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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent 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)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	bur
							main + s	seonda	ry + othe	er		
Numbe	r of ohim	0000					neating	`	v 40		0.00	(60)
Numbe		fluor					0 + 0 + 0)	x 40 x 20		0.00	(0a) (6b)
Numbe	or of inter	mittent fo	ne				0+0+0)	x 20 v 10		40.00	(00) (7a)
Numbe	rofpace	ivovonte	115				4		x 10 x 10		40.00	(7a) (7b)
Numbe	er of fluel	ess gas f	ires				0		x 40		0.00	(7b) (7c)
											A * 1	
Infiltrat	ion duo t	o obimno	wa fana	and flue	-						Air chang	Jes per nour
Drocou	ion due t		eys, ians	and live	S				E 00		0.17	(8)
Airpor	ne lest, i mochility	esuit qot	J						5.00		0.40	(17)
Airpen	readinty			rad							0.42	(10)
Sholto	factor	S ON WHIC	in sheller	eu							2.00	(19)
Infiltrat	ion rate i	ocornora	ting shall	orfactor							0.00	(20)
Infiltrat	ion rate r	nodified	for month	ler racior	speed						0.55	(21)
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	
0.10						0.00		1			52 50	(22)
Wind F	actor										02.00	(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	for shelf	ter and v	vind spee	ed)					
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
					π.		R				4.63	(22b)
Ventila Effectiv	tion : nat /e air cha	ural vent inge rate	ilation, ir	ntermitte	nt extrac	ct fans						
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses and heat loss parameter								
Element	Gross	Openings	Netarea	U-value	ΑxU	kappa-value	AxK	
	area, m²	m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K	
Window - Double	e-glazed,		0.200	1.15 (1.20)	0.23			(27)
argon filled, low-	·E, En=0.2,							
hard coat (East)								
Specified U-Va	alue = 1.20							
Window - Double	e-glazed,		2.880	1.15 (1.20)	3.30			(27)
argon filled, low-	·E, En=0.2,							
hard coat (West)							
Specified U-Va	alue = 1.20							
Window - Double	e-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, low-	·E, En=0.2,							
hard coat (East)								
Specified U-Va	alue = 1.20							
Window - Double	e-glazed,		0.550	1.15 (1.20)	0.63			(27)
argon filled, low-	·E, En=0.2,							
hard coat (South	າ)							
Specified U-Va	alue = 1.20							
Full glazed door	-		2.630	1.20	3.16			(26)
Double-glazed, a	argon filled,							
low-E, En=0.2, ł	nard coat							
(South)								
Specified U-Va	alue = 1.20							
Full glazed door	-		3.780	1.20	4.54			(26)
Double-glazed, a	argon filled,							
low-E, En=0.2, ł	nard coat							
(East)								
Specified U-Va	alue = 1.20							
Full glazed door	-		6.680	1.20	8.02			(26)
Double-glazed, a	argon filled,							
low-E, En=0.2, ł	nard coat							
(West)								
Specified U-Va	alue = 1.20							
Rooflight at 70°	or less -		4.670	1.15 (1.20)	5.35			(27)
Double-glazed, a	argon filled,							
low-E, En=0.2, ł	nard coat							
(n/a)								
Velux Specifie	d U-Value = ´	1.20						
Walls			4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheek	(S -							
Weatherboard	/Battens/9O	SB/51						
Cavity/140 Tim	nber Frame In	sulated						
With 120 Celot	ex XR4000 B	etween						
Studs/12.5 P'b	d							
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (Weath	herboard/Bat	tens/100						
Medium Dense	e Block)/51 C	avity/140						
Timber Frame	Insulated Wit	th 120						
Celotex XR400	00 Between S	tuds/12.5						
P'bd								10 -
Groundfloors	D	450	50.31	0.12	6.04	75.00	3773.25	(28)
Beam/Medium	Dense Block	k/150						
Kingspan TF7(J/Screed							

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3. Heat	losses a	and heat	t loss pa	rameter								
Element		Gross	Ope	enings	Netarea	a U-v	/alue	ΑxU	ka	ppa-value	э АхК	
		area, m ²	m²		A, m²	W/	m²K	W/K	kJ	/m²K	kJ/K	
Flat roof	S				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kii	ngspan T	R27 Ove	er Joists									
Pitched 150 Kii	roofs ins ngspan k	ulated be <7 Betwe	etween ra en	afters	56.37	7	0.12	6.7	6	9.00	507.33	(30)
Rafters	s/52.5 Ki	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embrane	e								
Total are	ea of exte	ernal ele	ments Si	gma A, r	n²						242.2	10 (31)
Fabric h	eat loss,	W/K									64.7	78 (33)
Heat cap	oacity										5267.8	38 (34)
Thermal	mass pa	arameter	, kJ/m²K								52.3	35 (35)
Effect of	thermal	bridges									36.3	32 (36)
I otal fat	pric heat	loss	1. (. 1								101.1	10 (37)
Ventilati	on heat I	oss calc	ulated m	onthly					1	1		
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat tra	nsfer coe	efficient,	W/K									
149.12	148.80	148.49	147.05	146.78	145.52	145.52	145.29	146.00	146.78	147.33	147.90	
Heatles	enaram	otor (HI [$D \ 10/m^2$	ĸ							147.(05 (39)
), \\/		4.45	4.45		4.45	4.40	4.40	4 47	
1.48	1.48	1.48	1.46	1.46	1.45	1.45	1.44	1.45	1.46	1.46	1.47	
HLP (ave Number	erage) of days i	n month	(Table 1	a)							1.4	46 (40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

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4. Wate Assume	er heating ed occupa	g energ ancy, N	y require	ements							kWh/year 2.75
Annual	average	hot wate	r usage ir	n litres pe	er day Vd	,average	e				99.40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	oer day f	or each r	nonth						
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34
Energy	content o	of hot wa	ter used								
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03
Energy Distribu	content (a tion loss	annual)									1563.92
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55
Volume Temper Energy Total sto	factor ature fact lost from orage los	or store (k)	Wh/day)								0.0000 0.0000 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
Net stor	age loss	л		A	3			R			
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	loss	π		A	A			A			
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Combi l	oss calcu	ulated for	each mo	onth							
17.47	15.75	17.36	16.68	17.14	16.47	16.95	17.07	16.58	17.26	16.82	17.43
Total he	eat require	ed for wa	iter heati	ng calcul	ated for o	each mo	nth				
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Output f	from wate	er heater	for each	month, l	«Wh/mor	nth					
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Heat ga	ins from	water he	ating, kV	/h/month	1						1766.89
58.28	51.09	53.00	46.59	44.99	39.24	36.78	41.62	41.94	48.36	52.29	56.57

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5. Internal gains

	li	n	ir	(r	1	1	r	n	1	r
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts									
164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71
Lighting	gains										
62.02	55.08	44.80	33.91	25.35	21.40	23.13	30.06	40.35	51.23	59.79	63.74
Appliand	ces gains	5									
384.07	388.05	378.01	356.63	329.64	304.28	287.33	283.34	293.39	314.77	341.76	367.12
Cooking	gains			~	A						A
54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22
Pumpsa	and fans	gains		~	A						A
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	e.g. evap	oration (r	negative	values)	A						A
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ins									
78.33	76.03	71.23	64.71	60.47	54.50	49.44	55.94	58.25	65.00	72.62	76.04
Total int	ernal gai	ns									
636.54	631.28	606.16	567.37	527.58	492.30	472.02	481.46	504.10	543.12	586.29	619.02

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 2.880 19.64	0.72 x 0.70	0.77	19.7562
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				
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)				
Velux Specified U-Value = 1.20				

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7. Mean internal temperature

Temper Heating	rature dui system r	ring heati responsiv	ing period eness	ds in the	living are	a, Th1 (°	C)				21.0 1.0)0 (8)0	85)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	_!		Л	н		Л	л		л				
9.81	9.83	9.85	9.95	9.97	10.06	10.06	10.07	10.02	9.97	9.93	9.89		
alpha		JL											
1.65	1.66	1.66	1.66	1.66	1.67	1.67	1.67	1.67	1.66	1.66	1.66		
Utilisati	on factor	for gains	for living	area	λ.				λ.				
0.88	0.83	0.76	0.66	0.54	0.42	0.33	0.37	0.54	0.73	0.85	0.89	(8	86)
Meanir	nternal ter	nperatur	e in living	garea T1	λ.				λ.				
17.39	17.86	18.59	19.45	20.14	20.61	20.82	20.77	20.37	19.42	18.24	17.30	(8	87)
Temper	rature du	ring heati	ng perio	ds in rest	of dwelli	ng Th2							
19.70	19.70	19.71	19.72	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71	(8	88)
Utilisati	on factor	for gains	for rest	of dwellir	ng								
0.87	0.82	0.74	0.63	0.49	0.36	0.25	0.28	0.47	0.70	0.83	0.88	(8	89)
Mean ir	nternal ter	mperatur	e in the r	est of dv	velling T2	2							
15.14	15.78	16.78	17.93	18.82	19.39	19.61	19.58	19.14	17.92	16.33	15.01	(9	90)
Living a	rea fracti	on (50.3′	1/100.62	2)							0.5	0 (9	91)
Meanir	iternal ter	nperatur	e (for the	whole d	welling)								
16.27	16.82	17.69	18.69	19.48	20.00	20.22	20.17	19.76	18.67	17.28	16.15	(9	92)
Apply a	djustmen	t to the m	nean inte	rnal tem	perature	, where a	appropria	ate					
16.27	16.82	17.69	18.69	19.48	20.00	20.22	20.17	19.76	18.67	17.28	16.15	(9	93)

8. Space heating requirement

-											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	on factor	for gains									
0.82	0.77	0.69	0.59	0.49	0.37	0.28	0.32	0.48	0.66	0.78	0.83
Useful g	ains										
708.11	821.43	911.92	941.55	858.01	657.62	471.68	480.25	627.77	698.14	677.31	672.09
Monthly	average	external	temperat	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	s rate for	mean in	ternal ter	mperatui	re						
1784.55	1774.10	1661.51	1439.97	1141.97	785.27	526.07	548.45	825.76	1184.39	1500.13	1768.00
Fraction	of month	h for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	i, kWh/m	onth		A			
800.87	640.19	557.69	358.86	211.27	-	-	-	-	361.77	592.43	815.36
Total sp	ace heat	ing requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)	st		4338.45
Space h	eating re	quireme	nt per m²	² (kWh/m	²/year)						43.12

8c. Space cooling requirement - not applicable

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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.

9a. Energy requirements

	- 57 4-										kWh/year	
No seco Fraction Efficience	ondary he of space cy of mai	eating sys e heat fro n heating	stem sel om main g system	ected system(:	s)			9	1.0000 2.80%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Spaceh	eating re	quireme	nt			Л			Л	Л		
800.87	640.19	557.69	358.86	211.27	-	-	-	-	361.77	592.43	815.36	(98)
Append	ix Q - mo	onthly ene	ergy save	ed (main	heating	system ?	1)	A	JL	JL		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	neating fu	iel (main	heating	system 1	Î)				R.			
863.01	689.86	600.96	386.71	227.66	-	-	-	-	389.84	638.40	878.62	(211)
Append	ix Q - mo	onthly ene	ergy save	ed (main	heating	system 2	2)		л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space h	neating fu	iel (main	heating	system 2	2)							
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	ix Q - mo	nthly ene	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)
Spaceh	eating fu	el (secor	ndary)									
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterh	eating											
Waterh	eatingree	quiremer	nt	1	,	n 	7		7	1 .	1	
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(64)
Efficiend	cy of wate	er heater	1	1		1	7		7	1	87.10	(216)
89.29	89.25	89.17	89.01	88.71	87.10	87.10	87.10	87.10	88.99	89.21	89.31	(217)
Waterh	eating fu	el	1	1		1	7		7	1	1	
201.15	176.53	183.57	162.07	157.32	140.19	131.84	148.56	149.54	168.25	180.95	195.34	(219)
Annual f Space h Space h Water h	totals neating fu neating fu eating fue	iel used, el (secor el	main sys ndary)	stem 1	an-hot						kWh/year 4675.06 0.00 1995.33	(211) (215) (219)
central boiler v	heating with a fan	pump -assisted or the ab	d flue ove, kWł	n/year	φ-not						30.00 45.00 75.00	(230c) (230e) (231)
Electrici Energys Append	ty for ligh saving/ge ix Q -	nting (100 eneration	0.00% fix technolo	ed LEL) ogies							438.10	(232)
Energ Energ	y saved o y used ()	or genera :	ated ():								0.000 0.000	(236a) (237a)
Total de	livered e	nergy for	alluses								7183.49	(238)

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10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	4675.057	3.480	162.69	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Waterheating				
Water heating cost	1995.33	3.480	69.44	(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	438.096	13.190	57.78	(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			419.81	(255)
11a. SAP rating				
Energy cost deflator			0.42	(256)

Energy cost factor (ECF)	1.21	(257)
SAPvalue	83.11	
SAP rating	83	(258)
SAP band	В	

12a. Carbon dioxide emissions

	Energy	Emission factor	Emission	S
	kWh/year	kg CO2/kWh	kg CO2/ye	ear
Space heating, main system 1	4675.06	0.216	1009.81	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	1995.33	0.216	430.99	(264)
Space and water heating			1440.80	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	438.10	0.519	227.37	(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			1707.10	(272)
			kg/m²/yea	r
CO2 emissions per m ²			16.97	(273)
Elvalue			84.29	(273a)
El rating			84	(274)
El band			В	
Calculation of stars for heating and DHW				
Main heating energy efficiency	(3.48 / 0.898	0) x (1 + (0.29 x 0.00))	= 3.8753, st	ars = 4

Main heating energy efficiency Main heating environmental impact Water heating energy efficiency Water heating environmental impact (3.48 / 0.8980) x (1 + (0.29 x 0.00)) = 3.8753, stars = 4 (0.2160 / 0.8980) x (1 + (0.29 x 0.00)) = 0.2405, stars = 4 3.48 / 0.8845 = 3.9346, stars = 4 0.2160 / 0.8845 = 0.2442, stars = 4

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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT67EH	Project	Unit 1 66 Borstal Hill Whitstable Kent CT54NB

SAP 2012 worksheet for notional dwelling - calculation of target emissions

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	bur
							main + s	eonda	ry + othe	er		
Numbe	or of chim	nove					$0 \pm 0 \pm 0$		v 40		0.00	(62)
Numbe	rofoner	nteys					0 + 0 + 0 0 + 0 + 0		x 20		0.00	(6b)
Numbe	of inter	mittent fa	ans				4		x 10		40.00	(00) (7a)
Numbe	rofpass	ive vents					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						0.17	(8)
Pressu	re test, r	esult q50)						5.00			(17)
Air peri	neability	,									0.42	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	factor										0.85	(20)
Infiltrat	ion rate ii	ncorpora	ting shelt	ter factor							0.35	(21)
Infiltrat	ion rate r	nodified	for month	nly 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	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	
Adjust	ad infiltra	tion roto	(allowing	for aboli	torondu	uind on or	ad)				13.13	(22a)
Adjuste			(allowing	JIOI Shell	ler and v	vind spee		-1				
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
Vontila	tion · nat	ural vont	ilation ir	otormitto	nt ovtra	ot fane					4.63	(22b)
Effectiv	/e air cha	ingerate	ination, ll	Rennille		1 10113						
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses	and heat los	s parameter	•			
Element	Gross	Openings	Netarea	U-value	ΑxU	
	area, m²	m²	A, m²	W/m²K	W/K	
Window - Double	e-glazed,		0.200	1.33 (1.40)	0.27	(27)
air-filled, low-E,	En=0.1, soft					
coat (East)						
Specified U-Va	alue = 1.20					
Window - Double	e-glazed,		2.820	1.33 (1.40)	3.74	(27)
air-filled, low-E,	En=0.1, soft					
coat (West)						
Specified U-Va	alue = 1.20					
Window - Double	e-glazed,		4.230	1.33 (1.40)	5.61	(27)
air-filled, low-E,	En=0.1, soft					
coat (East)						
Specified U-Va	alue = 1.20					
Window - Double	e-glazed,		0.540	1.33 (1.40)	0.72	(27)
air-filled, low-E,	En=0.1, soft					
coat (South)						
Specified U-Va	alue = 1.20					
Full glazed door	-		2.570	1.40	3.60	(26)
Double-glazed, a	ir-filled,					
low-E, En=0.1, s	soft coat					
(South)						
Specified U-Va	alue = 1.20					
Full glazed door	-		3.700	1.40	5.18	(26)
Double-glazed, a	ir-filled,					
low-E, En=0.1, s	soft coat					
(East)						
Specified U-Va	alue = 1.20					
Full glazed door	-		6.530	1.40	9.14	(26)
Double-glazed, a	air-filled,					
low-E, En=0.1, s	soft coat					
(West)						
Specified U-Va	alue = 1.20					
Rooflight at 70°	or less -		4.570	1.59 (1.70)	7.27	(27)
Double-glazed, a	air-filled,					
low-E, En=0.1, s	soft coat					
(n/a)						
Velux Specifie	d U-Value = ´	1.20				
Walls			4.15	0.18	0.75	(29)
Dormer Cheek	s -					
Weatherboard	Battens/9O	SB/51				
Cavity/140 Tim	ber Frame In	sulated				
With 120 Celot	ex XR4000 B	etween				
Studs/12.5 P'b	d					
Walls			102.65	0.18	18.48	(29)
Brick or (Weath	herboard/Bat	tens/100				
Medium Dense	Block)/51 C	avity/140				
Timber Frame	Insulated Wil	th 120				
Celotex XR400	00 Between S	tuds/12.5				
P'bd				- • -	-	
Groundfloors	_	// = 0	50.31	0.13	6.54	(28)
Beam/Medium	Dense Block	k/150				
Kingspan TF70	/Screed					

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3. Heat	losses a	and heat	t loss pa	rameter								
Element		Gross	Öpe	enings	Netarea	a U-	value	ΑxU				
		area, m ²	² m ²		A, m²	W	/m²K	W/K				
Flat roof	s				3.36	6	0.13	0.4	4			(30)
150 Kir	ngspan T	R27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	56.47	7	0.13	7.3	34			(30)
150 Kii	ngspan k	<7 Betwe	en									
Rafters	s/52.5 Ki	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embran	e								
Total are	ea of exte	ernal elei	ments Si	ama A. r	n²						242.2	10 (31)
Fabric h	eat loss.	W/K		3 , .							69.0)6 (33)
Thermal	masspa	arameter	, kJ/m²K	(user-sp	ecified T	MP)					250.0	00 (35)
Effect of	thermal	bridges									12.1	11 (36)
Total fab	oric heat	loss									81.1	17 (37)
Ventilati	on heat l	loss calc	ulated m	onthly								
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat trai	nsfer coe	efficient,	W/K									
129.19	128.87	128.56	127.12	126.85	125.59	125.59	125.35	126.07	126.85	127.39	127.97	
											127.1	12 (39)
Heat los	s param	eter (HLF	⁻), W/m²	K								
1.28	1.28	1.28	1.26	1.26	1.25	1.25	1.25	1.25	1.26	1.27	1.27	
HLP (ave	erage)										1.2	26 (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	

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4. Wate Assume	<i>r heatin</i> d occupa	g energ y ancy, N	y require	ements							kWh/year 2.75
Annual average hot water usage in litres per day Vd,average											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wate	er usage	in litres p	ber day f	or each r	nonth						
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34
Energy	content c	of hot wat	ter used								
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03
Energy of Distribut	content (a tion loss	annual)									1563.92
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55
Hot wate Volume Tempera Energy I Total sto	er cylinde factor ature fact lost from prage los	er loss fa or store (k\ s	ctor (kW Nh/day)	h/day)							0.0000 0.0000 0.0000 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
Net stor	age loss	J	1	л	J	Л	J		J	1	1
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	loss			A	3			R	Л		A
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Combi lo	oss calcu	lated for	each mo	onth				R	J		
50.96	46.03	50.96	48.04	47.61	44.12	45.59	47.61	48.04	50.96	49.32	50.96
Total he	at require	ed for wa	ter heati	ng calcul	ated for	each mo	nth		,		
213.10	187.84	197.30	175.62	170.03	149.75	143.48	159.94	161.71	183.43	193.92	207.99
Output f	rom wate	er heater	for each	month, l	(Wh/mor	nth					
213.10	187.84	197.30	175.62	170.03	149.75	143.48	159.94	161.71	183.43	193.92	207.99
Heat gai	ins from	water he	ating, kW	/h/month	1						2144.11
66.65	58.66	61.40	54.43	52.61	46.15	43.94	49.25	49.80	56.79	60.41	64.95

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5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts			PL			a			,
137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26
Lighting	gains			~				a			
24.93	22.14	18.00	13.63	10.19	8.60	9.29	12.08	16.22	20.59	24.03	25.62
Appliand	ces gains	6									
257.33	260.00	253.27	238.94	220.86	203.86	192.51	189.84	196.57	210.89	228.98	245.97
Cooking	gains										
36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73
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	e.g. evap	oration (r	negative	values)							
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ains									
89.59	87.29	82.52	75.60	70.71	64.10	59.07	66.20	69.17	76.33	83.90	87.30
Total int	ernal gai	ns									
439.02	436.60	420.97	395.35	368.93	343.75	328.05	335.30	349.14	374.99	404.09	426.07

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E,	0.9 x 0.200 19.64	0.63 x 0.70	0.77	1.2005
En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 2.820 19.64	0.63 x 0.70	0.77	16.9265
En=0.1, soft coat (West)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 4.230 19.64	0.63 x 0.70	0.77	25.3898
En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 0.540 46.75	0.63 x 0.70	0.77	7.7155
En=0.1, soft coat (South)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 2.570 46.75	0.63 x 0.70	0.77	36.7203
low-E, En=0.1, soft coat (South)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 3.700 19.64	0.63 x 0.70	0.77	22.2086
low-E, En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 6.530 19.64	0.63 x 0.70	0.77	39.1951
low-E, En=0.1, soft coat (West)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.570 26.00	0.63 x 0.70	1.00	47.1597
air-filled, low-E, En=0.1, soft coat (n/a)				
Velux Specified U-Value = 1.20				

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7. Mean internal temperature

Tempe	rature du	ring heat	ing perio	ds in the	living are	a, Th1 (°	C)				21.0)0 (85)
Heating	gsystemi	responsi	veness								1.0	0
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau					X							
54.09	54.22	54.35	54.97	55.09	55.64	55.64	55.74	55.42	55.09	54.85	54.60	
alpha	1											
4.61	4.61	4.62	4.66	4.67	4.71	4.71	4.72	4.69	4.67	4.66	4.64	
Utilisati	ion factor	for gains	forliving	area	х			-RR				
1.00	0.99	0.97	0.89	0.74	0.55	0.40	0.46	0.74	0.96	0.99	1.00	(86)
Meanir	nternal tei	mperatui	e in living	garea T1	х.							
19.61	19.84	20.21	20.63	20.88	20.98	21.00	20.99	20.91	20.51	19.97	19.57	(87)
Tempe	rature du	ring heat	ing perio	ds in rest	of dwelli	ng Th2						
19.85	19.86	19.86	19.87	19.87	19.88	19.88	19.88	19.88	19.87	19.87	19.86	(88)
Utilisati	ion factor	for gains	for rest	of dwellir	ng							
1.00	0.99	0.96	0.86	0.67	0.46	0.30	0.35	0.65	0.94	0.99	1.00	(89)
Mean ir	nternal te	mperatu	re in the r	est of dw	velling T2	2						
18.02	18.36	18.88	19.46	19.77	19.87	19.88	19.88	19.82	19.32	18.55	17.97	(90)
Livinga	area fracti	on (50.3	1/100.62	2)		Ju	<u>,</u>		_1		0.5	60 (91)
Meanir	nternal ter	mperatui	e (for the	whole d	welling)							
18.81	19.10	19.54	20.04	20.33	20.42	20.44	20.44	20.36	19.91	19.26	18.77	(92)
Apply a	djustmer	nt to the n	nean inte	rnal tem	perature	, where a	appropria	ate				
18.81	19.10	19.54	20.04	20.33	20.42	20.44	20.44	20.36	19.91	19.26	18.77	(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	n factor	for gains									
1.00	0.99	0.96	0.87	0.70	0.50	0.35	0.41	0.69	0.94	0.99	1.00
Useful g	ains										
632.65	801.80	982.00	1096.40	1000.20	715.80	479.66	501.35	725.32	765.51	640.91	586.92
Monthly	average	external	temperat	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	s rate for	mean in	ternal tei	mperatur	е						
1875.08	1829.91	1677.00	1416.61	1094.37	731.33	482.01	505.96	789.82	1181.48	1549.08	1864.59
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth					
924.37	690.89	517.08	230.55	70.07	-	-	-	-	309.49	653.88	950.58
Total spa Space h	ace heat eating re	ing requi quireme	rement p nt per m²	er year ((kWh/m	kWh/yea ²/year)	ar) (Octo	ber to Ma	ay)			4346.91 43.20

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9a. Energy requirements

		_									kWh/year	
No seco Fraction Efficien	ondary he n of space cy of mai	eating sy e heat fro n heating	stem sel om main g system	ected system(:	s)			9	1.0000 3.40%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space	neating re	quireme	nt	J	1	1			JL	Л][]	
924.37	690.89	517.08	230.55	70.07	-	-	-	-	309.49	653.88	950.58	(98)
Append	lix Q - mo	nthly en	ergy save	ed (main	heating	system	1)	J	Л	Л	JLJ	
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space I	heating fu	lel (main	heating	system 1	1)					Л		
989.69	739.71	553.62	246.84	75.02	-	-	-	-	331.36	700.09	1017.76	(211)
Append	lix Q - mo	nthly en	ergy sav	ed (main	heating	system	2)			Л		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space I	neating fu	iel (main	heating	system 2	2)			х				
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	lix Q - mo	onthly ene	ergy save	ed (seco	ndary he	ating sys	stem)		R.			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space	neating fu	el (secor	ndary)									
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterh	eating											
Waterh	eatingre	quiremer	าt	1	r	1	7	·	1	٠ <u>ــــــــــــــــــــــــــــــــــــ</u>	1	
213.10	187.84	197.30	175.62	170.03	149.75	143.48	159.94	161.71	183.43	193.92	207.99	(64)
Efficien	cy of wate	er heater	nr	1	r	1	7	·	1	٠ <u>ــــــــــــــــــــــــــــــــــــ</u>	80.30	(216)
88.32	88.03	87.37	85.74	83.01	80.30	80.30	80.30	80.30	86.36	87.87	88.40	(217)
Waterh	eating fu	el	76	1	η	10		v	10	۱ <u>. </u>]]	(- (-)
241.29	213.38	225.83	204.83	204.84	186.49	178.67	199.18	201.38	212.41	220.68	235.27	(219)
Annual Space I Space I Water h Electric	totals heating functing function heating function heating function	uel used, el (secor el mps, fan:	main sy ndary) s and ele	stem 1 ectric kee	ep-hot						kWh/year 4654.08 0.00 2524.26	(211) (215) (219)
centra boiler Total el	l heating with a far ectricity f	pump assisted or the ab	d flue ove, kWl	n/year							30.00 45.00 75.00	(230c) (230e) (231)
Electric Energy Append Energ Energ	ity for ligh saving/ge lix Q - ly saved () gy used ()	or generation	technolo ():	ed LEL) ogies							0.000 0.000	(232) (236a) (237a)
Total de	elivered e	nergy for	alluses								7693.52	(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	4654.08	0.216	1005.28	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	2524.26	0.216	545.24	(264)
Space and water heating			1550.52	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	440.19	0.519	228.46	(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			1817.90	(272)

	kg/m²/year	•
Emissions per m ² for space and water heating	15.41	(272a)
Emissions per m ² for lighting	2.27	(272b)
Emissions per m ² for pumps and fans	0.39	(272c)
Target Carbon Dioxide Emission Rate (TER)	18.07	(273)

 $= (15.4097 \times 1.00) + 2.2705 + 0.3869$

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Project Information

Building type Detached house

Reference Date Client	J5067-1 7 October 2019 DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent	Project	Unit 1 66 Borstal Hill Whitstable Kent
	CT67EH		CT54NB

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)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m³ per ho	our
							main + s	seonda	ry + othe	er		
							heating					
Numbe	r of chim	neys					0 + 0 + 0)	x 40		0.00	(6a)
Numbe	r of open	flues					0 + 0 + 0)	x 20		0.00	(6b)
Numbe	r of interi	mittent fa	ans				4		x 10		40.00	(7a)
Numbe	rofpassi	ive vents	5				0		x 10		0.00	(7b)
Numbe	r of fluele	ess gas f	ires				0		x 40		0.00	(7c)
											Air chang	jes per hour
Infiltrati	on due te	o chimne	eys, fans	and flue:	S						0.17	(8)
Pressu	re test, r	esult q50	C						5.00			(17)
Air perr	neability										0.42	(18)
Numbe	r of sides	s on whic	ch shelte	red							2.00	(19)
Shelter	factor										0.85	(20)
Infiltrati	on rate ir	ncorpora	ting shel	ter factor							0.35	(21)
Infiltrati	on rate n	nodified t	for month	nly 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	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							1			13.13	(22a)
Adjuste	d infiltra	tion rate	(allowing	for shelf	er and w	ind spee	ed)					()
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
											4.63	(22b)
Ventilat Effectiv	ion : nat e air cha	ural vent nge rate	tilation, ir	ntermitte	nt extrac	t fans						
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses	and heat los	ss paramete	r					
Element	Gross area, m ²	Openings m ²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double	e-glazed.		0.200	1.15 (1.20)	0.23			(27)
argon filled, low-	E. En=0.2.		0.200		0.20			(=-)
hard coat (East)	_, 0,							
Specified U-Va	alue = 1.20							
Window - Double	e-alazed.		0.550	1.15 (1.20)	0.63			(27)
argon filled. low-	E. En=0.2.							()
hard coat (South	_,, 1)							
Specified U-Va	, alue = 1.20							
Window - Double	e-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, low-	E, En=0.2,			- (-)				()
hard coat (East)								
Specified U-Va	alue = 1.20							
Window - Double	e-glazed,		2.880	1.15 (1.20)	3.30			(27)
argon filled. low-	E. En=0.2.							()
hard coat (West))							
Specified U-Va	, alue = 1.20							
Full glazed door	-		6.680	1.20	8.02			(26)
Double-glazed, a	argon filled,							()
low-E, En=0.2, h	nard coat							
(West)								
Specified U-Va	alue = 1.20							
Full glazed door	-		3.780	1.20	4.54			(26)
Double-glazed, a	argon filled,			-				()
low-E, En=0.2, h	nard coat							
(East)								
Specified U-Va	alue = 1.20							
Full glazed door	-		2.630	1.20	3.16			(26)
Double-glazed, a	argon filled,			-				()
low-E, En=0.2, h	nard coat							
(South)								
Specified U-Va	alue = 1.20							
Rooflight at 70°	or less -		4.670	1.15 (1.20)	5.35			(27)
Double-glazed, a	argon filled,			· · ·				()
low-E, En=0.2, h	nard coat							
(n/a)								
Velux Specifie	d U-Value =	1.20						
Walls			4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheek	S -							. ,
Weatherboard	/Battens/9O	SB/51						
Cavity/140 Tim	iber Frame In	sulated						
With 120 Celot	ex XR4000 E	Between						
Studs/12.5 P'b	d							
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (Weath	nerboard/Bat	tens/100						
Medium Dense	e Block)/51 C	avity/140						
Timber Frame	Insulated Wi	th 120						
Celotex XR400	00 Between S	Studs/12.5						
P'bd								
Ground floors			50.31	0.12	6.04	75.00	3773.25	(28)
Beam/Medium	Dense Block	k/150						
Kingspan TF70)/Screed							
			Pa	age 22 of 84				

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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	Ope	enings	Netare	a U-v	/alue	ΑxU	ka	ppa-value	еАхК	
		area, m ²	m²		A, m²	W/	m²K	W/K	kJ	l/m²K	kJ/K	
Flat roof	S				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kii	ngspan T	R27 Ove	er Joists									
Pitched 150 Ki	roofs ins ngspan k	ulated be <7 Betwe	etween ra en	afters	56.37	7	0.12	6.7	6	9.00	507.33	3 (30)
Rafters	s/52.5 Ki	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embrane	e								
-	<i>.</i>										0.40	10 (0A)
I otal are	ea of exte	ernal elei	ments Si	gma A, r	n²						242.	10 (31)
Fabric h	eat loss,	, VV/K									64.	78 (33)
Heat cap	Dacity		1.1/								0.0	JU (34)
I nermai	mass pa	arameter	, ĸJ/m²ĸ								52.	35 (35)
Ellect of	thermal	bridges									30.	3Z (30) 10 (37)
Ventileti	on hoot l		ulated m	onthly							101.	10 (37)
venuau	Un neat i				1	1	1	v	າ	10	1	1 ()
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat tra	nsfer coe	efficient,	W/K									
149.12	148.80	148.49	147.05	146.78	145.52	145.52	145.29	146.00	146.78	147.33	147.90	
											147.0	05 (39)
Heat los	s param	eter (HLF	P), W/m²	K								
1.48	1.48	1.48	1.46	1.46	1.45	1.45	1.44	1.45	1.46	1.46	1.47	
HLP (ave	erage)										1.4	46 (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]

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4. Wate Assume	er heating ed occupa	g energ ancy, N	y require rusage ir	ements	er dav Vd	average	2				kWh/year 2.75 99 40	(42) (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(10)
Hot wat	er usage	in litres	per day f	or each r	nonth	J			J][
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34	(44)
Energy	content o	of hot wa	ter used	л		1	1		1	Л		
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03	
Energy Distribu	content (a tion loss	annual)		и	я			я	JL		1563.92	(45)
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55	(46)
Hot wat Volume Temper Energy Total sto	er cylinde factor ature fact lost from orage los	er loss fa or store (k\ s	ctor (kW Nh/day)	h/day)							0.000 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	0.00	(56)
Net stor	age loss	Л	1	л	J	1	J		J	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	л		A	3			R				
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 l	oss calcu	lated for	each mo	onth				R				
17.47	15.75	17.36	16.68	17.14	16.47	16.95	17.07	16.58	17.26	16.82	17.43	(61)
Total he	eat require	ed for wa	ter heati	ng calcul	ated for	each mo	nth					
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(62)
Output f	from wate	er heater	for each	month, l	«Wh/mor	nth						
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(64)
Heat ga	ins from	water he	ating, kW	/h/month) "	10	16		10	1	1766.89	(64)
58.28	51.09	53.00	46.59	44.99	39.24	36.78	41.62	41.94	48.36	52.29	56.57	(65)

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5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Metabolic gains, Watts													
137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26		
Lighting gains													
24.81	22.03	17.92	13.57	10.14	8.56	9.25	12.02	16.14	20.49	23.92	25.50		
Appliand	ces gains	5		~							~		
257.33	260.00	253.27	238.94	220.86	203.86	192.51	189.84	196.57	210.89	228.98	245.97		
Cooking	gains												
36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73		
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	e.g.evap	oration (r	negative	values)									
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81		
Water h	eating ga	ains											
78.33	76.03	71.23	64.71	60.47	54.50	49.44	55.94	58.25	65.00	72.62	76.04		
Total internal gains													
427.65	425.23	409.60	384.39	358.65	334.11	318.38	324.98	338.14	363.57	392.69	414.68		

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 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 2.880 19.64	0.72 x 0.70	0.77	19.7562
En=0.2, hard coat (West)				
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				

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7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) Heating system responsiveness							21.0 1.0)0)0	(85)				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau				A	я								
9.81	9.83	9.85	9.95	9.97	10.06	10.06	10.07	10.02	9.97	9.93	9.89		
alpha		JL		A	я			A					
1.65	1.66	1.66	1.66	1.66	1.67	1.67	1.67	1.67	1.66	1.66	1.66		
Utilisati	on factor	for gains	for living	area	A				κ				
0.92	0.87	0.80	0.70	0.57	0.45	0.36	0.40	0.58	0.78	0.89	0.93		(86)
Mean ir	nternal ter	mperatur	e in living	area T1									
17.06	17.57	18.37	19.31	20.06	20.56	20.79	20.74	20.29	19.23	17.95	16.96		(87)
Temperature during heating periods in rest of dwelling Th2													
19.70	19.70	19.71	19.72	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71		(88)
Utilisati	on factor	for gains	for rest of	of dwellir	ng				κ.				
0.91	0.86	0.78	0.66	0.53	0.39	0.27	0.31	0.52	0.75	0.87	0.92		(89)
Mean ir	nternal ter	mperatu	e in the r	est of dw	elling T2	2							
14.69	15.39	16.49	17.75	18.72	19.34	19.60	19.55	19.05	17.69	15.94	14.55		(90)
Living a	rea fracti	on (50.3 [,]	1/100.62	2)	л						0.5	50	(91)
Meanir	iternal ter	mperatur	e (for the	whole d	welling)								
15.87	16.48	17.43	18.53	19.39	19.95	20.20	20.15	19.67	18.46	16.95	15.76		(92)
Apply adjustment to the mean internal temperature, where appropriate													
15.87	16.48	17.43	18.53	19.39	19.95	20.20	20.15	19.67	18.46	16.95	15.76		(93)

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	on factor	for gains									
0.86	0.81	0.73	0.63	0.51	0.40	0.30	0.34	0.51	0.71	0.83	0.88
Useful g	ains										
567.95	700.79	818.72	879.37	821.23	638.65	462.21	467.41	592.58	620.96	559.91	530.44
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	s rate for	mean in	ternal te	mperatur	е						
1725.93	1723.45	1622.96	1415.61	1128.69	779.06	523.19	544.44	813.23	1153.11	1451.04	1709.09
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth		A			
861.54	687.22	598.35	386.09	228.76	-	-	-	-	395.92	641.62	876.91
Total spa Space h	ace heat eating re	ing requi	rement p nt per m ²	er year ((kWh/m	kWh/yea ²/year)	ar) (Octo	ber to Ma	ay)	st	n	4676.42 46.48

8c. Space cooling requirement - not applicable

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9a. Energy requirements

	- 57 4-										kWh/year	
No seco Fraction Efficience	ndary he of space cy of mai	eating sy e heat fro n heating	stem sel om main g system	ected system(:	s)			9	1.0000 2.80%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space h	eating re	quireme	nt	л		Л	л		л	Л		
861.54	687.22	598.35	386.09	228.76	-	-	-	-	395.92	641.62	876.91	(98)
Append	ix Q - mo	nthly en	ergy save	ed (main	heating	system '	1)		J			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	eating fu	uel (main	heating	system 1	1)	л	л		Л	л		
928.39	740.54	644.77	416.05	246.50	-	-	-	-	426.64	691.40	944.95	(211)
Append	ix Q - mo	onthly en	ergy save	ed (main	heating	system 2	2)	R	л			
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space h	eating fu	uel (main	heating	system 2	2)							
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	ix Q - mo	onthly ene	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	iel (secor	ndary)									
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
<u>Waterhe</u> Waterhe	eating eating re	quiremer	nt									
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(64)
Efficience	cy of wate	er heater									87.10	(216)
89.32	89.28	89.21	89.05	88.76	87.10	87.10	87.10	87.10	89.04	89.24	89.34	(217)
Waterh	eating fu	el										
201.09	176.47	183.51	162.00	157.23	140.19	131.84	148.56	149.54	168.16	180.88	195.28	(219)
Annual t Space h Space h Water he Electrici	totals leating fu eating fu eating fu	uel used, iel (secor el mps_fan;	main sys ndary) s and ele	stem 1	ap-hot						kWh/year 5039.24 0.00 1994.75	(211) (215) (219)
central boiler v	heating vith a far	pump n-assisted	d flue	-/	SP 1101						30.00 45.00	(230c) (230e)
Electrici Energys Appendi	ty for ligh saving/ge ix Q -	or the ab nting (100 eneration	0ve, kvvr 0.00% fix technolo	ivear ed LEL) ogies							438.10	(231) (232)
Energy Energy	y saved () y used ()	or genera):	ated ():								0.000 0.000	(236a) (237a)
Total de	livered e	nergy for	alluses								7547.08	(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	5039.24	0.216	1088.48	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Waterheating	1994.75	0.216	430.87	(264)
Space and water heating			1519.34	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	438.10	0.519	227.37	(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			1785.64	(272)

Dwelling Carbon Dioxide Emission Rate (DER)

kg/m²/year 17.75 (273)

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Project Info Building type	ormation Detached house			
Reference Date Client	J5067-1 7 October 2019 DCM Architectural Consu 25 Pigeon Lane Herne Bay Kent CT6 7EH	Itants Ltd Project	Unit 1 66 Borstal Hill Whitstable Kent CT54NB	
REGULATI assessed by	ON COMPLIANCE REPOR program JPA Designer ve	RT - Approved Docu rsion 6.04a1, printed o	ment L1A, 2012 Edition, England on 7/10/2019 at 16:20:18	
New dwellin	ng as designed			
1 TER and Fuel for mai Target Carb Dwelling Ca	DER n heating system: Gas (mai on Dioxide Emission Rate rbon Dioxide Emission Rate	ins) (fuel factor = 1.00) TER = 18.07 DER = 17.75	ОК
1b TFEE an Target Fabri Dwelling Fal	d DFEE c Energy Efficiency (TFEE) pric Energy Efficiency (DFE	E)	TFEE = 56.9 DFEE = 55.6	ОК
2a Thermal	bridging Thermal bridging	g calculated using defa	aulty-value of 0.15	
2b Fabric U	-values			
	<u>Element</u> Wall Floor Roof Openings	<u>Average</u> 0.20 (max. 0.30) 0.12 (max. 0.25) 0.12 (max. 0.20) 1.20 (max. 2.00)	<u>Highest</u> 0.21 (max. 0.70) 0.12 (max. 0.70) 0.15 (max. 0.35) 1.20 (max. 3.30)	OK OK OK
3 Air perme	ability Air permeability Maximum :	at 50 pascals:	5.00 10.00	ОК
4 Heating e Main heating	fficiency g system: Boiler and radiat	ors, mains gas		
Source of ef	Aipna in Fec 40G ficiency: from boiler datab Alpha InTec 40G	ase S Efficiency: 88.9% (Minimum: 88.0%)	SEDBUK2009	ОК
Secondary h	neating system: None -			
		B		

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6 Controls	ince Operation on Opide" but the DOL O	
(Also refer to Domestic Building Serv	Time and temperature zone control	OK
Space fleating controls	No ovlindor	UK
	No cyllider	OK
Boller Interlock	t es Ne culindor	UK
7 Low energy lights		
e., e.e.g,ge	Percentage of fixed lights with low-energy fittings: 100.0%	
	Minimum: 75.0%	OK
8 Mechanical ventilation		
	Notapplicable	
9 Summertime temperature		
Overheating risk (South East England	Ŋ.	OK
eventionaling non (could have highlight	Slight	OK
Based on:	Chight	ÖN
Thermal mass parameter :	52.35	
Overshading ·	Average of unknown (20-60 % sky blocked)	
Orientation · Fast		
Ventilation rate :	8 00	
Blinds/curtains ·		
None with blinds/shutters closed 0.	00% of daylight hours	
10 Key teatures		

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

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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent CT5 4NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:20 PM

Unit 1, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

		Page 31 of 84	
Window	area = 0.55	U = 1.20	- Double-glazed, argon filled, low-E, En=0.2, hard coat (South)
Overshading:	Average or unknow	vn (20-60 % sky blocked	d)
Windows Window	area = 0.20	U = 1.20	- Double-glazed, argon filled, low-E, En=0.2, hard coat (East)
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)
Doors Full glazed door	area = 6.68	U = 1.20	- Double-glazed, argon filled, low-E, En=0.2,
Front of dwelling faces:	East		
Living area:	50.31 (fraction 0.50	00)	
Property description Dwelling type: Ground floor (1) First floor	Detached house area = 50.31m ² area = 50.31m ²	storey height = 2.31m storey height = 2.50m	
Located in: Region: Postcode: UPRN: Date of assessment: Date of certificate: Assessment type: Tenure: Transaction type: Related party disclosure: PCDF revision number:	England South East Englan CT5 4NB 2019-10-07 2019-10-07 New dwelling as de Unknown New dwelling No related party 367	nd esigned	
Unit 1 66 Borstal Hill Whitstable Kent CT54NB			

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Building type Detached house

Reference Date Client	J5067-1 7 October 2019 DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent	Project	Unit 1 66 Borstal Hill Whitstable Kent
	Kent CT67EH		Kent CT54NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:20 PM

Unit 1, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Overshading:	Average or unknow	wn (20-60 % sky block	ed)
Window	area = 4.33	U = 1.20	- Double-glazed, argon filled, low-E, En=0.2, hard coat (East)
Overshading:	Average or unknow	wn (20-60 % sky block	ed)
Window	area = 2.88	U = 1.20	- Double-glazed, argon filled, low-E, En=0.2, hard coat (West)
Overshading:	Average or unknow	wn (20-60 % sky block	ed)
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
Walls	area = 102.19	U = 0.20, k = 9.0	Studs/12.5 P'bd 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	area = 50.31	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
RUUIS	alea = 50.57	0 = 0.12, K = 9.0	Kingspan K118 Under Rafters With Breather Membrane
Thermal bridges:	NOT Accredited C	construction Details (y	= 0.1500)
Thermal mass: Pressure test: Ventilation: Number of chimneys: Number of open flues: Number of intermittent fans: Number of passive stacks:	Calculated from ky Yes (q50 - 5.00) : Natural ventilation 0 4 0	values measured in this dwel with intermittent extra	ling : Yes ct fans
Number of sides sheltered:	2.00	Page 32 of 84	
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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent CT54NB

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Unit 1, 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: Boiler has load compensator:	Time and temperature zone control No
Boiler has weather compensator:	Yes
Boiler has emhanced load compensator:	No
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: Total fixed lighting outlets: Electricity tariff: Photovoltaics 1:	100.0% of fixed lighting outlets 25 Standard tariff Peak kW: 0.00
Photovoltaics 2:	Peak kW: 0.00

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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent CT5 4NB

SAP 2012 input data Printed on 7 Oct 2019 at 04:20 PM

Unit 1, 66 Borstal Hill, Whitstable, Kent, CT5 4NB

Photovoltaics 3:Peak kW: 0.00Conservatory:NoFixed air conditioning:NoSmoke Control Area:Not specifiedAdditional allowable electricity generation :0.00kg/m²/year

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SAP 2012 Overheating Assessment for New dwelling as designed

Dwelling type Number of storeys Cross ventilation possible Region Front of dwelling faces Overshading Overhangs Thermal mass parameter Night ventilation Ventilation rate during hor	Detached house 2 Yes South East England East Average or unknown (20-60 % sky blocked) (as detailed below) 52.35 (calculated from construction elements) No 8.00 (Windows fully open)						
Summer ventilation heat loss coefficient Transmission heat loss coefficient Summer heat loss coefficient				6 1 7	38.86 01.10 39.96	(P1) (37) (P2)	
Solar gains (calculation fo	or July)						
Orientation	Area	Flux	g & FF	Sh	ading	Gains	
East	0.9 x 0.20	110.22	0.72 x 0.7	0	0.90	ę	9
West	0.9 x 2.88	110.22	0.72 x 0.7	0	0.90	130	0
East	0.9 x 4.33	110.22	0.72 x 0.7	0	0.90	19	5
South	0.9 x 0.55	108.01	0.72 x 0.7	0	0.90	24	4
n/a	0.9 x 4.67	189.00	0.72 x 0.7	0	1.00 400		0
Total						134	5
				Jun	Jul	Aug	
Solar gains				1412	1345	1159	(P3)
Internal gains				489	469	478	
Total summer gains				1901	1814	1638	(P5)
Summer gain/loss ratio				2.57	2.45	2.21	(P6)
External temperature (South East England)				15.2	17.6	17.8	
Thermal mass temperature increment (TMP=52.4)				1.63	1.63	1.63	
Threshold temperature	·		19.40	21.68	21.65	(P7)	
Likelihood of high internal			Not sig.	Slight	Slight		
Assessment of likelihood of high internal temperature					Slight		

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Predicted Energy Assessment

Unit 1 66 Borstal Hill Whitstable Kent CT5 4NB Ref: J5067-1 Dwelling type: Date of assessment: Produced by Total floor area: Detached house 7 October 2019 Thermcalc Limited 101 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 (CO_2) emissions. The higher the rating the less impact it has on the environment.
Project Information

Building type Detached house

Reference	J5067-1		
Date	7 October 2019		
Client	DCM Architectural Consultants Ltd	Project	Unit 1
	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)	
Ground floor (1)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	our
							main + s	seonda	ry + othe	er		
Numbe	er of chim	nevs					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	erofpass	ive vents	5				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 flues	S						0.17	(8)
Pressu	ire test, r	esult q50	C						5.00			(17)
Airper	meability	/									0.42	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelte	factor										0.85	(20)
Infiltrat	ion rate i	ncorpora	iting shel	ter factor							0.35	(21)
Infiltrat	ion rate r	nodified	for month	nly 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	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	
۸ مانی مد	a al infiltra	tion roto	(allawing	for oboli		uin al an au					13.13	(22a)
Adjuste	ed inilitra	ition rate	(allowing	g for shell	er and v	vina spee	ea)	- Y				
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
Vontilo	tion , not	hurolycon	tilation in	tormitto	at avtra	ttopo					4.63	(22b)
Effectiv	ve air cha	ange rate	uiation, Ir	itermitter	n extrac	ans						
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses an	nd heat los	ss paramete	r					
Element G	Bross rea, m²	Openings m²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-g	lazed,		0.200	1.15 (1.20)	0.23			(27)
argon filled, low-E,	En=0.2,							
hard coat (East)								
Specified U-Valu	e = 1.20							
Window - Double-g	lazed,		2.880	1.15 (1.20)	3.30			(27)
argon filled, low-E,	En=0.2,							
hard coat (West)								
Specified U-Valu	e = 1.20							
Window - Double-g	lazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, low-E,	En=0.2,							
hard coat (East)								
Specified U-Valu	e = 1.20							
Window - Double-g	jlazed,		0.550	1.15 (1.20)	0.63			(27)
argon filled, low-E,	En=0.2,							
hard coat (South)								
Specified U-Valu	e = 1.20							
Full glazed door -			2.630	1.20	3.16			(26)
Double-glazed, arg	gon filled,							
low-E, En=0.2, ha	rd coat							
(South)								
Specified U-Valu	ie = 1.20							
Full glazed door -			3.780	1.20	4.54			(26)
Double-glazed, arg	gon filled,							
low-E, En=0.2, ha	rd coat							
(East)	4.00							
Specified U-Valu	e = 1.20			4.00	0.00			(00)
Full glazed door -			6.680	1.20	8.02			(26)
Double-glazed, arg	jon filled,							
10W-E, $En=0.2$, nat	d coat							
	1 20							
Pooflight at 70° or			4 670	1 15 (1 20)	5 25			(27)
Double-glazed ar	iess - ion filled		4.070	1.15 (1.20)	5.55			(27)
low-E En=0.2 has	rd coat							
(n/2)	ucuai							
Velux Specified I	l-Value – 1	1 20						
Walls		1.20	4 15	0.21	0.87	9.00	37 35	(29)
Dormer Cheeks			4.10	0.21	0.07	0.00	07.00	(20)
Weatherboard/B	attens/90	SB/51						
Cavity/140 Timbe	er Frame In	sulated						
With 120 Celotex	XR4000B	etween						
Studs/12.5 P'bd								
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (Weathe	rboard/Bat	tens/100						()
Medium Dense E	Block)/51 C	avity/140						
Timber Frame In	sulated Wit	th 120						
Celotex XR4000	Between S	tuds/12.5						
P'bd								
Ground floors			50.31	0.12	6.04	75.00	3773.25	(28)
Beam/Medium D	ense Block	k/150						
Kingspan TF70/S	Screed							

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 $C: \label{eq:constraint} C: \label{eq:constr$ 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	Ope	enings	Netarea	a U-v	alue	ΑxU	ka	appa-value	әАхК	
		area, m ²	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 Kii	ngspan T	R27 Ove	er Joists									
Pitched 150 Ki	roofs ins ngspan k	ulated be <7 Betwe	etween ra en	afters	56.37	7	0.12	6.7	6	9.00	507.33	3 (30)
Rafters	s/52.5 Ki	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embrane	e								
Total are	ea of exte	ernal elei	ments Si	ama Ar	n²						242	10 (31)
Fabric h	eat loss.	W/K		gina / i, i							64.	78 (33)
Heat car	oacity										5267.	
Thermal	mass pa	arameter	. kJ/m²K								52.3	35 (35)
Effect of	thermal	bridaes	,								36.3	32 (36)
Total fab	oric heat	loss									101.	10 (37)
Ventilati	on heat l	oss calc	ulated m	onthly								()
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat tra	nsfer coe	efficient,	W/K									
149.12	148.80	148.49	147.05	146.78	145.52	145.52	145.29	146.00	146.78	147.33	147.90]
											147.	05 (39)
Heat los	s param	eter (HLF	P), W/m²	K								
1.48	1.48	1.48	1.46	1.46	1.45	1.45	1.44	1.45	1.46	1.46	1.47]
HLP (ave	erage)										1.4	46 (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	

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SAP 2012 worksheet for	- calculation of	f fabric energy	efficiency
------------------------	------------------	-----------------	------------

4. Wate Assume	er heatin ed occup	g energ ancy, N	y require	ements							kWh/year 2.75
Annual	average	hot wate	r usage ii	n litres pe	er day Vd	l,averag	е				99.40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	ter usage	in litres	oer day f	or each r	nonth						
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34
Energy	content o	of hot wa	ter used		л				, Contraction of the second seco		
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03
Energy Distribu	content (a Ition loss	annual)									1563.92
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Volume Temper Energy Total st	e factor rature fact lost from orage los	or store (k\ s	Wh/day)		1				1		0.0000 0.0000 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
Net sto	rage loss	7	1	1	7				7	70	
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	/ loss	7	1	1	7				7	70	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Combi l	loss calcu	ulated 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
Total he	eat requir	ed for wa	iter heati	ng calcu	lated for	each mo	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
Output	from wate	er heater	for each	month, l	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
Heat ga	ains from	water he	ating, kV	Vh/montł	<u>ן</u>	7		Y			0.00
34.46	30.14	31.10	27.11	26.01	22.45	20.80	23.87	24.15	28.15	30.73	33.37

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5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts			n			A			
137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26
Lighting	gains			~				A			
24.81	22.03	17.92	13.57	10.14	8.56	9.25	12.02	16.14	20.49	23.92	25.50
Appliand	ces gains	5									
257.33	260.00	253.27	238.94	220.86	203.86	192.51	189.84	196.57	210.89	228.98	245.97
Cooking	gains										
36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73
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)							
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ins									
46.31	44.84	41.80	37.65	34.96	31.18	27.96	32.08	33.55	37.84	42.68	44.85
Total int	ernal gai	ns		ч							· <u> </u>
392.62	391.05	377.16	354.34	330.14	307.78	293.90	298.13	310.43	333.40	359.75	380.50

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 2.880 19.64	0.72 x 0.70	0.77	19.7562
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				
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)				
Velux Specified U-Value = 1.20				

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

7. Mean internal temperature

Temper Heating	rature dui system r	ring heati responsiv	ing perio veness	ds in the	living are	a, Th1 (°	C)				21.00 1.00	(85)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau		л			л				, contract of the second se			
9.81	9.83	9.85	9.95	9.97	10.06	10.06	10.07	10.02	9.97	9.93	9.89	
alpha		л			л				, Contraction of the second seco			
1.65	1.66	1.66	1.66	1.66	1.67	1.67	1.67	1.67	1.66	1.66	1.66	
Utilisati	on factor	for gains	forliving	area	я							
0.92	0.88	0.81	0.70	0.58	0.46	0.36	0.41	0.59	0.79	0.89	0.93	(86)
Meanir	iternal ter	mperatur	e in living	garea T1	я							
17.00	17.52	18.33	19.28	20.04	20.55	20.79	20.74	20.27	19.19	17.90	16.90	(87)
Temper	rature dui	ring heati	ing perio	ds in rest	of dwelli	ng Th2			λ.			
19.70	19.70	19.71	19.72	19.72	19.73	19.73	19.73	19.72	19.72	19.71	19.71	(88)
Utilisati	on factor	for gains	for rest	of dwellir	ng				л			
0.91	0.87	0.79	0.67	0.53	0.39	0.27	0.32	0.52	0.76	0.88	0.92	(89)
Mean ir	iternal ter	mperatur	e in the r	est of dw	velling T2	2						
16.09	16.60	17.39	18.30	19.00	19.45	19.63	19.60	19.24	18.25	17.00	16.00	(90)
Livinga	rea fracti	on (50.3 ²	1/100.62	2)	л	Ju	<u>.</u>		JL		0.50	(91)
Meanir	iternal ter	nperatur	e (for the	whole d	welling)							
16.55	17.06	17.86	18.79	19.52	20.00	20.21	20.17	19.75	18.72	17.45	16.45	(92)
Apply a	djustmen	t to the m	nean inte	rnal tem	perature	, where a	ppropria	ate				
16.55	17.06	17.86	18.79	19.52	20.00	20.21	20.17	19.75	18.72	17.45	16.45	(93)

8. Space heating requirement

-											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	on factor	for gains									
0.88	0.83	0.75	0.64	0.52	0.41	0.31	0.35	0.53	0.72	0.85	0.89
Useful g	ains										
548.91	688.69	814.53	881.15	824.19	640.20	462.62	467.54	592.61	615.85	545.29	510.40
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	s rate for	mean in	ternal te	mperatui	re						
1826.31	1809.58	1687.00	1454.31	1148.03	786.26	525.56	547.53	825.62	1191.90	1524.74	1811.83
Fraction	of month	h for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	i, kWh/m	onth		A			
950.38	753.23	649.12	412.67	240.94	-	-	-	-	428.58	705.20	968.26
Total sp	ace heat	ing requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)			5108.3
Space h	eating re	quireme	nt per m ²	(KVVh/m	∠/year)						50.7

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8c. Space cooling requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Externa	Itempera	aturers		A	д						
-	-	-	-	-	14.60	16.60	16.40	-	-	-	-
Heat los	s rate W	 /	1	A	л	1					
-	-	-	-	-	1367.88	1076.84	1104.17	-	-	-	-
Utilisatio	on factor	for loss		A	я						
-	-	-	-	-	0.72	0.77	0.74	-	-	-	-
Useful I	oss W	л		A	я						
-	-	-	-	-	984.61	829.95	814.01	-	-	-	-
Internal	gains W	л		A							
0.00	0.00	0.00	0.00	0.00	465.98	447.53	454.61	0.00	0.00	0.00	0.00
Solar ga	ains W	π		A							
0.00	0.00	0.00	0.00	0.00	1411.75	1344.65	1159.43	0.00	0.00	0.00	0.00
Gains V	V	,									
-	-	-	-	-	1877.73	1792.19	1614.04	-	-	-	-
Fractior	of mont	h for cool	ing	A	д						
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 h	eating k	Wh		A	я						
-	-	-	-	-	78.55	-4.95	-16.88	-	-	-	-
Space o	cooling k	Wh			<i>х</i>			a			
-	-	-	-	-	643.04	715.91	595.22	-	-	-	-
Total		л		A							1954.18
Cooled	raction										1.00
Intermit	tency fac	tor	1	1					7		
<u> </u>	- 	-	-	-	0.25	0.25	0.25	-	-	-	-
Spaced	ooling re	quireme	nt for moi	nth	Y	1	1	r	70		
		-	-	-	160.76	178.98	148.81	-	-	-	I- I

8f. Fabric Energy Efficiency

	kWh/year	
Energy for space heating	50.77	(99)
Energy for space cooling	4.86	(108)
Total	55.62	(109)
Dwelling Fabric Energy Efficiency	55.6	(109)

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Project Information

Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent 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)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	our
							main + s	seonda	ary + othe	er	-	
Numbe	er of chim	nevs					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	erofpass	ive vents	5				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						0.17	(8)
Pressu	ire test, r	esult q50	C						5.00			(17)
Airper	meability	/									0.42	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	factor										0.85	(20)
Infiltrat	ion rate i	ncorpora	iting shel	ter factor							0.35	(21)
Infiltrat	ion rate r	nodified	for month	nly 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	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	
			(- II	(- 1)	~	л		13.13	(22a)
Adjuste	ed infiltra	ition rate	(allowing	for shell	er and v	vina spee	ea)					
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
Martila	4										4.63	(22b)
Effectiv	ve air cha	ange rate	liation, ir	itermittel	n extrac	arians						
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Doubl	e-glazed,		0.200	1.15 (1.20)	0.23			(27)
argon filled, low	′-E, En=0.2,							
hard coat (East)							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		2.880	1.15 (1.20)	3.30			(27)
argon filled, low	′-E, En=0.2,							
hard coat (Wes	t)							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, low	-Е, En=0.2,							
hard coat (East)							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		0.550	1.15 (1.20)	0.63			(27)
argon filled, low	′-E, En=0.2,							
hard coat (Sout	h)							
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	alue = 1.20							(00)
Full glazed doo	r -		3.780	1.20	4.54			(26)
Double-glazed,	argon filled,							
IOW-E, En=0.2,	nard coat							
(East)								
Specified U-V	alue = 1.20		C C 0 0	4.00	0.00			(00)
Full glazed doo	race filled		0.080	1.20	0.02			(20)
Low E En-0.2	argonilleu,							
10W-E, $EII=0.2$, $(Most)$	naiu coal							
(West) Specified LLV	aluo – 1 20							
Rooflight at 70°	or less -		4 670	1 15 (1 20)	5 35			(27)
Double-diazed	argon filled		4.070	1.15 (1.20)	0.00			(21)
low-F En=0.2	hard coat							
(n/a)								
Velux Specifie	ed U-Value =	1 20						
Walls			4.15	0.21	0.87	9.00	37.35	(29)
Dormer Cheel	ks-			0	0.01	0100	0.100	()
Weatherboard	d/Battens/9O	SB/51						
Cavity/140 Tir	nber Frame In	sulated						
With 120 Celo	tex XR4000 E	Between						
Studs/12.5 P'l	bc							
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (Weat	herboard/Bat	tens/100						
Medium Dens	e Block)/51 C	avity/140						
Timber Frame	e Insulated Wi	th 120						
Celotex XR40	00 Between S	Studs/12.5						
P'bd								
Ground floors			50.31	0.12	6.04	75.00	3773.25	(28)
Beam/Mediun	n Dense Blocl	k/150						
Kingspan TF7	0/Screed							

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3. Heat	losses a	and heat	loss pa	rameter	•							
Element		Gross	Ope	enings	Netare	a U-v	/alue	ΑxU	ka	appa-value	әАхК	
		area, m²	m²		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 Kii	ngspan T	R27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	56.37	7	0.12	6.7	6	9.00	507.33	3 (30)
Rafter	2/52 5 Ki	ngenank	(1181 Inc	lor								
Rafter	s/JZ.JINI	aathar M	embrand									
Manen			embrand	5								
Total are	ea of exte	ernal elei	ments Si	gma A, r	n²						242.	10 (31)
Fabric h	eat loss,	W/K		-							64.	78 (33)
Heat cap	oacity										5267.	88 (34)
Thermal mass parameter, kJ/m ² K 52.35 (35)												
Effect of	thermal	bridges									36.	32 (36)
Total fab	oric heat	loss									101.	10 (37)
Ventilati	on heat l	oss calc	ulated m	onthly								
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat tra	nsfer coe	efficient,	W/K									-
149.12	148.80	148.49	147.05	146.78	145.52	145.52	145.29	146.00	146.78	147.33	147.90]
											147.	05 (39)
Heat los	s param	eter (HLF	P), W/m²	K								
1.48	1.48	1.48	1.46	1.46	1.45	1.45	1.44	1.45	1.46	1.46	1.47]
HLP (ave	erage)										1.4	46 (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]

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4. Wate Assume	er heating ed occupa	g energy ancy, N	/ require	ements							kWh/year 2.75	(42)
Annuala	average l	not water	usage ir	n litres pe	er day Vd	,average)		0	2	99.40	(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot wate	er usage	in litres p	per day f	or each r	nonth							
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34	(44)
Energy	content c	of hot wat	er used									
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03	
Energy of Distribut	content (a tion loss	annual)		и	я.			R	1		1563.92	(45)
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55	(46)
Hot water storage volume (litres)150.00Hot water cylinder loss factor (kWh/day)0.0191Volume factor0.9283Temperature factor0.5400Energy lost from hot water cylinder (kWh/day)1.44Total storage loss1.44											(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 stor	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 e	ach mo	nth]	JL]]	. ,
229.94	203.04	214.13	193.19	190.21	171.24	165.68	180.12	179.27	200.26	210.21	224.82	(62)
Output f	rom wate	er heater	for each	month, k	wh/mor	hth	<u>.</u>		л	Л		
229.94	203.04	214.13	193.19	190.21	171.24	165.68	180.12	179.27	200.26	210.21	224.82	(64)
Heat ga	ins from	water hea	ating, kW	/h/month		00 70	04 50			100 50	2362.10	(64)
108.15	96.14	102.89	94.90	94.94	01.01	80.78	91.58	90.28	98.28	100.56	106.44	(60)

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5. Internal gains

	-										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	lic gains,	Watts		~				a			
137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26
Lighting	gains										
24.81	22.03	17.92	13.57	10.14	8.56	9.25	12.02	16.14	20.49	23.92	25.50
Appliand	ces gains	6									
257.33	260.00	253.27	238.94	220.86	203.86	192.51	189.84	196.57	210.89	228.98	245.97
Cooking	gains										
36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73
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	e.g.evap	oration (r	negative	values)							
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water he	eating ga	ains									
145.36	143.06	138.29	131.81	127.60	121.68	116.64	123.09	125.39	132.10	139.67	143.07
Total inte	ernal gai	ns		·			s				
494.67	492.27	476.66	451.50	425.78	401.28	385.58	392.14	405.27	430.66	459.74	481.72
		<u>الــــــــــــــــــــــــــــــــــــ</u>	n		L			n			A

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 2.880 19.64	0.72 x 0.70	0.77	19.7562
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				
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)				
Velux Specified U-Value = 1.20				

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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.

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) Heating system responsiveness

1.00 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec tau 9.81 9.83 9.85 9.95 9.97 10.06 10.06 10.07 10.02 9.97 9.93 9.89 alpha 1.65 1.66 1.66 1.66 1.66 1.67 1.67 1.67 1.67 1.66 1.66 1.66 Utilisation factor for gains for living area (86) 0.90 0.86 0.79 0.68 0.56 0.44 0.34 0.39 0.56 0.76 0.87 0.91 Mean internal temperature in living area T1 17.17 17.67 18.45 19.36 20.09 20.81 20.76 20.33 19.30 17.07 (87) 20.58 18.06 Temperature during heating periods in rest of dwelling Th2 19.72 19.70 19.70 19.71 19.72 19.73 19.73 19.73 19.72 19.72 19.71 19.71 (88)Utilisation factor for gains for rest of dwelling 0.89 0.85 0.77 0.65 0.51 0.37 0.26 0.30 0.50 0.73 0.86 0.90 (89) Mean internal temperature in the rest of dwelling T2 16.26 16.75 17.50 18.37 19.04 19.47 (90)19.64 19.61 19.27 18.35 17.14 16.17 Living area fraction (50.31/100.62) 0.50 (91) Mean internal temperature (for the whole dwelling) 17.98 18.87 19.80 16.71 17.21 19.57 20.03 20.22 20.18 18.82 17.60 (92)16.62 Apply adjustment to the mean internal temperature, where appropriate

21.00

(85)

16.71 17.21 17.98 18.87 19.57 20.03 20.22 20.18 19.80 18.82 17.60 16.62 (93)

8. Space heating requirement

-											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatio	on factor	for gains							λ		
0.86	0.81	0.73	0.62	0.51	0.39	0.29	0.33	0.50	0.70	0.82	0.87
Useful g	ains								λ		
622.47	752.27	864.85	916.01	845.95	651.88	468.54	475.68	613.97	660.78	610.64	585.67
Monthly	average	external	temperat	ture					λ		
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	s rate for	mean in	ternal tei	mperatui	re						
1851.21	1831.32	1704.14	1465.75	1154.74	789.61	527.18	549.80	832.19	1207.03	1546.96	1837.14
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	i, kWh/m	onth			,		
914.19	725.12	624.43	395.81	229.74	-	-	-	-	406.41	674.15	931.10
Total sp	ace heat	ing requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)	н		4900.9
Space h	eating re	quireme	nt per m²	(kWh/m	²/year)						48.7

8c. Space cooling requirement - not applicable

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9a. Energy requirements

	- 57 4-										kWh/year	
No seco Fraction Efficience	ndary he of space cy of mai	eating sys e heat fro n heating	stem selo om main g system	ected system(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	JI		JL	Л		
914.19	725.12	624.43	395.81	229.74	-	-	-	-	406.41	674.15	931.10	(98)
Appendi	ix Q - mo	nthly ene	ergy save	ed (main	heating	system '	1)	R				
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)		н	R				
1029.49	816.58	703.19	445.73	258.72	-	-	-	-	457.67	759.18	1048.53	(211)
Appendi	ix Q - mo	nthly ene	ergy save	ed (main	heating	system 2	2)	R				
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 ene	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)
Water he	<u>eating</u> eating red	quiremer	nt									
229.94	203.04	. 214.13	193.19	190.21	171.24	165.68	180.12	179.27	200.26	210.21	224.82	(64)
Efficienc	cy of wate	er heater									79.50	(216)
86.76	86.58	86.22	85.52	84.33	79.50	79.50	79.50	79.50	85.50	86.40	86.82	(217)
Waterhe	eating fu	el		1	JI][I	J[][. ,
265.02	234.50	248.34	225.90	225.55	215.40	208.40	226.56	225.50	234.23	243.30	258.94	(219)
Annual t Space h Space h Water he	totals leating fu eating fu eating fue	iel used, el (secor el	main sys idary)	stem 1	an-hot						kWh/year 5519.09 0.00 2811.64	(211) (215) (219)
central boiler v Total ele Electrici Energys	heating vith a fan ectricity fo ty for ligh saving/ge	pump -assisted or the abo nting (100 eneration	d flue ove, kWł).00% fix technolo	n/year ed LEL)	p-not						30.00 45.00 75.00 438.10	(230c) (230e) (231) (232)
Energy	y saved o y used ()	or genera :	ated ():								0.000 0.000	(236a) (237a)
i otal de	livered e	nergy for	alluses								8843.83	(238)

10a. Does not apply

11a. Does not apply

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12a. Carbon dioxide emissions

	Energy	Emission factor	Emissions		
	kWh/year	kg CO2/kWh	kg CO2/y	ear	
Space heating, main system 1	5519.09	0.216	1192.12	(261)	
Space heating, main system 2	0.00	0.000	0.00	(262)	
Space heating, secondary	0.00	0.519	0.00	(263)	
Waterheating	2811.64	0.216	607.31	(264)	
Space and water heating			1799.44	(265)	
Electricity for pumps and fans	75.00	0.519	38.93	(267)	
Electricity for lighting	438.10	0.519	227.37	(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			2065.73	(272)	

Dwelling Carbon Dioxide Emission Rate (DER)

kg/m²/year 20.53 (273)

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Project Information

Building type Detached house

Reference Date Client	J5067-1 7 October 2019 DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent CT54NB
	CT67EH		CT54NB

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per hour		
							main + s heating	seonda	ry + othe	er			
Numbe	r of chim	neys					0 + 0 + 0)	x 40		0.00	(6a)	
Numbe	r of oper	flues					0 + 0 + 0)	x 20		0.00	(6b)	
Numbe	or of inter	mittent fa	ans				4		x 10		40.00	(7a)	
Numbe	rofpass	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	eys, fans	and flue	S						0.17	(8)	
Pressu	re test, r	esult q50)						5.00			(17)	
Airper	neability										0.42	(18)	
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)	
Shelter	factor										0.85	(20)	
Infiltrat	ion rate ir	ncorpora	ting shelt	ter factor							0.35	(21)	
Infiltrat	ion rate r	nodified	for month	nly 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 E	actor										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		
Adjuste	ed infiltra	tion rate	(allowing	for shelt	er and w	ind spe	ed)				13.13	(22a)	
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41		
	I								JL	J	4.63	(22b)	
Ventila Effectiv	tion : nat /e air cha	ural vent	ilation, ir	ntermitte	nt extrac	t fans							
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)	
L									/L				

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3. Heat losses and heat loss parameter

Element	Gross area, m ²	Openings m²	Netarea A, m ²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window-Doub air-filled, low-E coat (East)	le-glazed, , En=0.1, soft		0.200	1.33 (1.40)	0.27			(27)
Window - Doub air-filled, low-E	le-glazed, En=0.1, soft		0.540	1.33 (1.40)	0.72			(27)
coat (South) Specified U-V	′alue = 1.20		(5.04			(07)
air-filled, low-E coat (East)	ie-glazed, , En=0.1, soft		4.230	1.33 (1.40)	5.61			(27)
Specified U-V Window - Doub air-filled, low-E	′alue = 1.20 le-glazed, , En=0.1, soft		2.820	1.33 (1.40)	3.74			(27)
Specified U-V Full glazed doo Double-glazed, low-E, En=0.1,	′alue = 1.20 r - air-filled, soft coat		6.530	1.40	9.14			(26)
(West) Specified U-V Full glazed doo Double-glazed, low-E, En=0.1,	′alue = 1.20 r - air-filled, soft coat		3.700	1.40	5.18			(26)
(East) Specified U-V Full glazed doo Double-glazed,	′alue = 1.20 r - air-filled,		2.570	1.40	3.60			(26)
Iow-E, En=0.1, (South) Specified U-V Rooflight at 70° Double-glazed, Iow-E, En=0.1,	soft coat 'alue = 1.20 ' or less - air-filled, soft coat		4.570	1.59 (1.70)	7.27			(27)
Velux Specifie Walls Dormer Chee Weatherboard Cavity/140 Tir	ed U-Value = ks - d/Battens/9 OS nber Frame In	1.20 SB/51 sulated	4.15	0.18	0.75	9.00	37.35	(29)
With 120 Celd Studs/12.5 P' Walls Brick or (Wear Medium Dens Timber Frame Celotex XR40	otex XR4000 B bd therboard/Bat se Block)/51 C e Insulated Wit 00 Between S	eetween tens/100 avity/140 th 120 tuds/12.5	102.65	0.18	18.48	9.00	923.85	(29)
P'bd Ground floors Beam/Mediur Kingspan TF7	n Dense Block 0/Screed	√150	50.31	0.13	6.54	75.00	3773.25	(28)

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3. Heat	losses a	and heat	loss pa	rameter									
Element		Gross	Öpe	enings	Netarea	a U-v	/alue	ΑxU	ka	appa-value	әАхК		
		area, m ²	m²		A, m²	W/	m²K	W/K	k.	I∕m²K	kJ/K		
Flat roof	S				3.36	6	0.13	0.4	4	9.00	30.24	(30)	
150 Kii	ngspan T	R27 Ove	er Joists										
Pitched	roofs ins	ulated be	etween ra	afters	56.47	7	0.13	7.3	4	9.00	508.23	3 (30)	
150 Kii	ngspan k	<7 Betwe	en										
Rafters/52.5 Kingspan K118 Under													
Rafters	s With Br	eather M	embrane	Э									
Total are	ea of exte	ernal elei	ments Si	gma A, r	n²						242.	10 (31)	
Fabric heat loss, W/K 69.06													
Thermal mass parameter, kJ/m ² K (user-specified TMP) 250.00													
Effect of	thermal	bridges									12.	11 (36)	
Total fat	oric heat	loss									81.	17 (37)	
Ventilati	on heat l	oss calc	ulated m	onthly									
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)	
Heat tra	nsfer coe	efficient,	W/K										
129.19	128.87	128.56	127.12	126.85	125.59	125.59	125.35	126.07	126.85	127.39	127.97		
											127.	12 (39)	
Heat los	s param	eter (HLF	P), W/m²	K									
1.28	1.28	1.28	1.26	1.26	1.25	1.25	1.25	1.25	1.26	1.27	1.27		
HLP (ave	erage)										1.:	26 (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		

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4. Water heating energy requirements Assumed occupancy, N												(42
Annual	average	hot water	^r usage ir	n litres pe	er day Vd	l,average	e				99.40	(43
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot wat	er usage	in litres	ber day f	or each r	nonth			Χ	л			
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34	(44
Energy	content o	of hot wat	ter used									
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03	
Energy Distribu	content (a tion loss	annual)									1563.92	(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 wate Volume Tempera Energy Total sto	er cylinde factor ature fact lost from orage los	er loss fa or store (k\ s	ctor (kW Wh/day)	h/day)							0.0000 0.0000 0.0000 0.000	(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	Л	1	Л	,	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	(57
Primary	loss	π		A					π			
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 l	oss calcu	ulated for	each mo	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 requir	ed for wa	ter heati	ng calcul	ated 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	<wh mor<="" td=""><td>nth</td><td></td><td></td><td></td><td></td><td></td><td></td></wh>	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
Heat ga	ins from	water he	ating, kW	/h/month	ı						0.00	(64
34.46	30.14	31.10	27.11	26.01	22.45	20.80	23.87	24.15	28.15	30.73	33.37	(65

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5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	lic gains,	Watts		~				a			
137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26	137.26
Lighting	gains			~				a			
24.93	22.14	18.00	13.63	10.19	8.60	9.29	12.08	16.22	20.59	24.03	25.62
Appliand	ces gains	5									
257.33	260.00	253.27	238.94	220.86	203.86	192.51	189.84	196.57	210.89	228.98	245.97
Cooking	gains										
36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73	36.73
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)							
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water he	eating ga	ins									
46.31	44.84	41.80	37.65	34.96	31.18	27.96	32.08	33.55	37.84	42.68	44.85
Total inte	ernal gai	ns		с <u></u>	ч		s.		5.		
392.74	391.16	377.25	354.40	330.19	307.82	293.94	298.18	310.51	333.50	359.86	380.62

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E,	0.9 x 0.200 19.64	0.63 x 0.70	0.77	1.2005
En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 0.540 46.75	0.63 x 0.70	0.77	7.7155
En=0.1, soft coat (South)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 4.230 19.64	0.63 x 0.70	0.77	25.3898
En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Window - Double-glazed, air-filled, low-E,	0.9 x 2.820 19.64	0.63 x 0.70	0.77	16.9265
En=0.1, soft coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 6.530 19.64	0.63 x 0.70	0.77	39.1951
low-E, En=0.1, soft coat (West)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 3.700 19.64	0.63 x 0.70	0.77	22.2086
low-E, En=0.1, soft coat (East)				
Specified U-Value = 1.20				
Full glazed door - Double-glazed, air-filled,	0.9 x 2.570 46.75	0.63 x 0.70	0.77	36.7203
low-E, En=0.1, soft coat (South)				
Specified U-Value = 1.20				
Rooflight at 70° or less - Double-glazed,	0.9 x 4.570 26.00	0.63 x 0.70	1.00	47.1597
air-filled, low-E, En=0.1, soft coat (n/a)				
Velux Specified U-Value = 1.20				

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7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C)

21.00 (85) 1.00

Heating system responsiveness

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	II	Л		J	Л	JL]		
54.09	54.22	54.35	54.97	55.09	55.64	55.64	55.74	55.42	55.09	54.85	54.60
alpha		л		л	л						
4.61	4.61	4.62	4.66	4.67	4.71	4.71	4.72	4.69	4.67	4.66	4.64
Utilisatio	on factor	for gains	forliving	area	A.			~			
1.00	0.99	0.97	0.90	0.75	0.56	0.41	0.48	0.76	0.96	1.00	1.00
Mean in	iternal ter	nperatur	e in living	garea T1	A.			~			
19.57	19.80	20.17	20.60	20.88	20.98	21.00	20.99	20.90	20.48	19.93	19.53
Temper	ature du	ring heat	ing perio	ds in rest	of dwelli	ng Th2		~			
19.85	19.86	19.86	19.87	19.87	19.88	19.88	19.88	19.88	19.87	19.87	19.86
Utilisatio	on factor	for gains	for rest	of dwellir	ng			~			
1.00	0.99	0.97	0.87	0.69	0.47	0.31	0.37	0.67	0.95	0.99	1.00
Mean in	iternal tei	mperatu	re in the r	est of dw	velling T2	2					
18.56	18.79	19.16	19.57	19.80	19.87	19.88	19.88	19.83	19.47	18.93	18.53
Living a Mean in	rea fracti iternal ter	on (50.3 [,] nperatur	1 / 100.62 e (for the	2) whole dv	welling)		Л	A			0.50
19.06	19.30	19.67	20.09	20.34	20.42	20.44	20.44	20.37	19.97	19.43	19.03
Apply a	djustmen	t to the n	nean inte	rnal tem	perature	, where a	appropria	ite	_1	ц	<u></u>
19.06	19.30	19.67	20.09	20.34	20.42	20.44	20.44	20.37	19.97	19.43	19.03

8. Space heating requirement

•		• ·									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	on 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 g	ains										
587.43	759.43	947.17	1076.20	992.86	714.30	479.39	500.72	717.78	735.11	598.88	542.22
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	s rate for	mean in	ternal te	mperatui	e						
1907.33	1855.46	1692.56	1422.17	1095.44	731.39	482.00	505.94	790.12	1188.79	1570.72	1897.79
Fraction	of month	n for heat	ing								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	, kWh/m	onth					
982.00	736.53	554.57	249.10	76.32	-	-	-	-	337.54	699.72	1008.55
Total sp	ace heat	ing requi	rement p	er year (kWh/yea	ar) (Octo	ber to Ma	ay)	5		4644.33
Space h	eating re	quireme	nt per m²	²(kWh/m	²/year)						46.16

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8c. Space cooling requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Externa	Itempera	aturers									
-	-	-	-	-	14.60	16.60	16.40	-	-	-	-
Heat los	ss rate W	 /	1	A			1	A			
-	-	-	-	-	1180.53	929.35	952.70	-	-	-	-
Utilisatio	on factor	for loss		A	3			R			
-	-	-	-	-	0.93	0.97	0.95	-	-	-	-
Useful I	oss W	л		A				R			
-	-	-	-	-	1102.83	897.67	902.81	-	-	-	-
Internal	gains W	л		а	л			л	N		
0.00	0.00	0.00	0.00	0.00	466.08	447.64	454.75	0.00	0.00	0.00	0.00
Solar ga	ains W	л		A				R			
0.00	0.00	0.00	0.00	0.00	1208.45	1151.01	992.46	0.00	0.00	0.00	0.00
Gains V	V	J	1	A				A			
-	-	-	-	-	1674.53	1598.66	1447.21	-	-	-	-
Fraction	of mont	h for cool	ing	л		L	л		_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 h	heating k	Wh	1	л		<u></u>	л		_1	_!	
-	-	-	-	-	1331.58	1553.90	1534.01	-	-	-	-
Space of	cooling k	Ŵh	1	А			1	n			
-	-	-	-	-	411.62	521.53	405.04	-	-	-	-
Total	1	Л	1	л	J	L	И			_I	1338.19
Cooled	fraction										1.00
Intermit	tency fac	tor	1		1		1	Y			
-	-	-	-	-	0.25	0.25	0.25	-	-	-	-
Space c	cooling re	quireme	nt for mo	nth	1		1	Y			
-	-	-	-	-	102.91	130.38	101.26	-	-	-	-
Space of	cooling (J	une to A	ugust)		2/1/00-21						334.55
Space of	cooling re	quireme	nt per m ²	(KVVN/M	-/year)						3.32

8f. Fabric Energy Efficiency

<i></i>	kWh/year	
Energy for space heating	46.16 (9	9)
Energy for space cooling	3.32 (1)	08)
Total	49.48 (1)	09)
Target Fabric Energy Efficiency	56.9 (1)	09)
-10.1920×1.15 rounded to 1 d p		

= 49.4820 x 1.15, rounded to 1 d.p.

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Project Information

Building type Detached house

Reference Date Client	J5067-1 7 October 2019 DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent	Project	Unit 1 66 Borstal Hill Whitstable Kent
	Kent CT67EH		Kent CT54NB

SAP 2012 worksheet for - calculation of Heat Demand

1. Overall dwelling dimensions

	Area	Av. Storey	Volume	
	(m²)	height (m)	(m³)	
Ground floor (1)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	our
							main + s	eonda	ry + othe	er	-	
Numbe	er of chim	nevs					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	rofpass	ive vents	;				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 flues	6						0.17	(8)
Pressu	re test, r	esult q50)						5.00			(17)
Air peri	neability	,									0.42	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelter	factor										0.85	(20)
Infiltrat	ion rate i	ncorpora	ting shelt	ter factor							0.35	(21)
Infiltrat	ion rate r	nodified	for month	nly 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	
Wind F	actor										57.60	(22)
1.43	1.35	1.27	1.13	1.15	1.02	1.05	1.07	1.13	1.23	1.25	1.32	
A	I : f : f	4:	(- in -	. f 4			1)				14.40	(22a)
Adjuste	ed inflitra	tion rate	(allowing	for shelt	er and w	/ind spee	ea)	- Y				
0.50	0.48	0.45	0.40	0.41	0.36	0.37	0.38	0.40	0.43	0.44	0.47	
Vontila	tion : not	ural von	ilation ir	tormitto	ot ovtroo	t fanc					5.08	(22b)
Effectiv	/e air cha	angerate	ination, li	itermitter	IL EXILAC	11115						
0.63	0.61	0.60	0.58	0.58	0.57	0.57	0.57	0.58	0.59	0.60	0.61	(25)

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3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Doubl	e-glazed,		0.200	1.15 (1.20)	0.23			(27)
argon filled, low	-E, En=0.2,							
hard coat (East))							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		2.880	1.15 (1.20)	3.30			(27)
argon filled, low	-E, En=0.2,							
hard coat (Wes	t)							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		4.330	1.15 (1.20)	4.96			(27)
argon filled, low	-E, En=0.2,							
hard coat (East))							
Specified U-V	alue = 1.20							
Window - Doubl	e-glazed,		0.550	1.15 (1.20)	0.63			(27)
argon filled, low	-E, En=0.2,							
hard coat (Sout	h)							
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	alue = 1.20				. – .			(0.0)
Full glazed door	r -		3.780	1.20	4.54			(26)
Double-glazed,	argon filled,							
low-E, En=0.2,	hard coat							
(East)	alua 1.00							
Specified U-V	alue = 1.20			4.00	0.00			(00)
Full glazed dool	r - oraon fillod		6.680	1.20	8.02			(26)
Louble-glazed,	argon illied,							
IOW-E, En=0.2,	naro coat							
Pooflight at 70°	alue = 1.20		4 670	1 15 (1 20)	5 25			(27)
Nouhlo glazod	orgon filled		4.070	1.15 (1.20)	5.55			(27)
low-E En=0.2	argornileu, bard coat							
(n/2)								
Velux Specifie	- aule\/-I he	1 20						
Walls		1.20	4 15	0.21	0.87	9.00	37 35	(29)
Dormer Cheel	ks-		4.10	0.21	0.07	0.00	01.00	(20)
Weatherboard	d/Battens/90	SB/51						
Cavity/140 Tin	nber Frame In	sulated						
With 120 Celo	tex XR4000 E	Between						
Studs/12.5 P'b	bd							
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (Weat	herboard/Bat	tens/100						()
Medium Dens	e Block)/51 C	avity/140						
Timber Frame	Insulated Wi	th 120						
Celotex XR40	00 Between S	Studs/12.5						
P'bd								
Ground floors			50.31	0.12	6.04	75.00	3773.25	(28)
Beam/Mediun	n Dense Blocl	k/150						
Kingspan TF7	0/Screed							

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 $C: \label{eq:constraint} C: \label{eq:constr$ 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	Öpe	enings	Netarea	a U-v	value	ΑxU	ka	appa-value	э АхК	
		area, m ²	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 Kii	ngspan T	R27 Ove	er Joists									
Pitched 150 Kir	roofs ins ngspan k	ulated be <7 Betwe	etween ra en	afters	56.37	7	0.12	6.7	6	9.00	507.33	(30)
Rafters	s/52.5 Ki	ngspan k	(118 Und	der								
Rafters	s With Br	eather M	embrane	Э								
Total are	ea of exte	ernal ele	ments Si	gma A, r	n²						242.2	0 (31)
Fabric h	eat loss,	W/K									64.7	78 (33)
Heat cap	oacity										5267.8	38 (34)
Thermal	mass pa	arameter	, kJ/m²K								52.3	35 (35)
Effect of	thermal	bridges									36.3	32 (36)
Total fat	oric heat	loss									101.1	0 (37)
Ventilati	on heat l	oss calc	ulated m	onthly								
50.03	49.00	48.02	46.23	46.51	45.16	45.41	45.68	46.23	47.39	47.70	48.66	(38)
Heat tra	nsfer coe	efficient,	W/K						,			
151.13	150.10	149.12	147.33	147.61	146.26	146.51	146.78	147.33	148.49	148.80	149.76	
											148.2	27 (39)
Heat los	s param	eter (HLF	^D), W/m²	K								
1.50	1.49	1.48	1.46	1.47	1.45	1.46	1.46	1.46	1.48	1.48	1.49	
HLP (ave	erage)										1.4	47 (40)
Number	of days i	n month	(Table 1	a)								
	,		•									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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4. Wate Assume	er heating ed occupa	g energ y ancy, N	y require	ements							kWh/year 2.75
Annual	averagel	not water	r usage ir	n litres pe	er day Vd	l,average	;				99.40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wate	er usage	in litres p	per day f	or each r	nonth			R	J		
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34
Energy	content c	of hot wat	ter used	л	A				<u>, с</u>		
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03
Energy Distribu	content (a tion loss	annual)		A				A			1563.92
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55
Tempera Energy Total sto 0.00	ature fact lost from orage los	or store (k\ s 0.00	Wh/day) 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000 0.00
Net stor	rage loss			А	3	л		R	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
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
Combi l	oss calcu	lated for	each mo	onth							
17.47	15.75	17.36	16.68	17.14	16.47	16.95	17.07	16.58	17.26	16.82	17.43
Total he	eat require	ed for wa	iter heati	ng calcul	ated for	each mo	nth				
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Output f	from wate	er heater	for each	month, l	«Wh/mor	nth					
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Water h Heat ga	neating c iins from v	lemand water he	ating, kV	/h/month	ı						1766.89 1767
58.28	51.09	53.00	46.59	44.99	39.24	36.78	41.62	41.94	48.36	52.29	56.57

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5. Internal gains

	I — ·										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	NOV	Dec
Metabol	lic gains,	Watts									
164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71
Lighting	gains										
62.02	55.08	44.80	33.91	25.35	21.40	23.13	30.06	40.35	51.23	59.79	63.74
Applian	ces gains	6		~							A
384.07	388.05	378.01	356.63	329.64	304.28	287.33	283.34	293.39	314.77	341.76	367.12
Cooking	gains	λ		~							A
54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22
Pumps	and fans	gains		~							A
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)							A
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ains			A			a			A
78.33	76.03	71.23	64.71	60.47	54.50	49.44	55.94	58.25	65.00	72.62	76.04
Total int	ernal gai	ns									R
636.54	631.28	606.16	567.37	527.58	492.30	472.02	481.46	504.10	543.12	586.29	619.02

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 2.880 23.77	0.72 x 0.70	0.77	23.9055
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				
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				
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				
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 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				
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				

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7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) Heating system responsiveness

Heating	g system i	esponsi	veness								1.(00
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]
tau	<u> </u>		JI	л		<u>.</u>					<u></u>	,
9.68	9.75	9.81	9.93	9.91	10.01	9.99	9.97	9.93	9.85	9.83	9.77	
alpha	- JL	JL			24				J		- PL	
1.65	1.65	1.65	1.66	1.66	1.67	1.67	1.66	1.66	1.66	1.66	1.65	
Utilisati	on factor	for gains	for living	area	2	н.		R	Л		- P.	
0.86	0.82	0.74	0.60	0.47	0.33	0.21	0.22	0.41	0.66	0.81	0.87	3) (8
Mean ir	nternal tei	mperatu	re in living	garea T1	2	н.						
17.78	18.12	18.92	19.80	20.41	20.78	20.95	20.94	20.69	19.87	18.75	17.77	3) (8
Tempe	rature du	ring heat	ing perio	ds in rest	of dwelli	ng Th2					R.	
19.69	19.69	19.70	19.71	19.71	19.72	19.72	19.72	19.71	19.71	19.70	19.70	3) (8
Utilisati	on factor	for gains	s for rest	of dwellir	ng							
0.84	0.80	0.71	0.56	0.42	0.26	0.12	0.12	0.33	0.61	0.78	0.86	3) (8
Mean ir	nternal te	mperatu	re in the r	est of dv	velling T2	2					R	
15.68	16.14	17.22	18.37	19.14	19.57	19.70	19.70	19.49	18.51	17.02	15.67	(9
Living a Mean in	rea fracti	on (50.3 mperatur	1 / 100.62 re (for the	2) whole d	wellina)						0.	50 (9
16 73	17 13	18.07		10.78	20.18	20.32	20.32	20.00	10 10	17.88	16 72] ((
	diustmor	10.07	noan inte		<u>20.10</u>	where <i>c</i>			19.19	17.00	10.72] (3
									40.40	47.00	140 70	1 "
16.73	17.13	18.07	19.08	19.78	20.18	20.32	20.32	20.09	19.19	17.88	16.72	(£

(85)

21.00

8. Space heating requirement

-											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisatic	n factor	for gains		к	~			n			
0.79	0.75	0.67	0.54	0.42	0.29	0.16	0.17	0.36	0.59	0.74	0.81
Useful g	ains			A							
723.99	820.19	904.33	942.01	789.94	557.58	298.08	282.71	522.60	670.32	685.26	670.87
Monthly	average	external	tempera	ture							
5.50	5.80	7.60	10.00	13.10	15.90	18.20	18.30	15.90	12.30	8.70	5.80
Heat los	s rate for	mean in	ternal te	mperatu	re						
1696.76	1700.96	1560.85	1338.26	985.79	625.36	311.25	296.63	617.28	1023.33	1366.49	1635.54
Fraction	of month	n for heat	ting								
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
Space h	eating re	quireme	nt for eac	ch month	i, kWh/m	onth		R			
723.74	591.88	488.44	285.30	145.71	-	-	-	-	262.64	490.48	717.72
Total spa	ace heat	ing requi	rement p	ber year (kWh/yea	ar) (Octo	ber to Ma	ay)			3705.92
Space h	eating re	quireme	nt per m ²	² (kWh/m	²/year)						36.83
Space h	eating o	demand									370
Water h	eating d	lemand									1767

8c. Space cooling requirement - not applicable

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Project Information

Building type Detached house

Date 7 October 2019 Client DCM Architectural Consultants Ltd Pro 25 Pigeon Lane Herne Bay Kent CT6 7EH	oject Unit 1 66 Borstal Hill Whitstable Kent CT54NB
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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)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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

2. Ventilation rate

											m³ per ho	bur
							main + s heating	seonda	ry + othe	er		
Number	neys					0 + 0 + 0)	x 40		0.00	(6a)	
Number	ofopen	flues					0 + 0 + 0)	x 20		0.00	(6b)
Number	ofinter	mittent fa	ans				4		x 10		40.00	(7a)
Number	ofpass	ive vents	;				0		x 10		0.00	(7b)
Number of flueless gas fires							0		x 40		0.00	(7c)
											Air chang	ges per hour
Infiltratio	Infiltration due to chimneys, fans and flues										0.17	(8)
Pressur	esult q50)						5.00			(17)	
Airperm										0.42	(18)	
Number of sides on which sheltered											2.00	(19)
Shelterf	actor										0.85	(20)
Infiltratio	on rate ir	ncorpora	ting shel	ter factor							0.35	(21)
Infiltratio	on rate n	nodified	for month	nly 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 Fa	actor										57.60	(22)
1.43	1.35	1.27	1.13	1.15	1.02	1.05	1.07	1.13	1.23	1.25	1.32	
							I]]		14.40	(22a)
Adjuste	d infiltra	tion rate	(allowing	for shel	ter and v	vind spe	ed)					
0.50	0.48	0.45	0.40	0.41	0.36	0.37	0.38	0.40	0.43	0.44	0.47	
											5.08	(22b)
Ventilati Effective	on : nat e air cha	ural vent nge rate	ilation, ir	ntermitte	nt extrac	t fans						
0.63	0.61	0.60	0.58	0.58	0.57	0.57	0.57	0.58	0.59	0.60	0.61	(25)

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

3. Heat losses and heat loss parameter										
Element G	Gross	Openings	Netarea	U-value	AxU	kappa-value	AxK			
a	rea, m²	m²	A, m²	W/m²K	W/K	kJ/m²K	kJ/K			
Window - Double-g	glazed,		0.200	1.15 (1.20)	0.23			(27)		
argon filled, low-E,	, En=0.2,									
hard coat (East)										
Specified U-Valu	ie = 1.20									
Window - Double-g	glazed,		2.880	1.15 (1.20)	3.30			(27)		
argon filled, low-E,	, En=0.2,									
hard coat (West)										
Specified U-Valu	ie = 1.20									
Window - Double-g	glazed,		4.330	1.15 (1.20)	4.96			(27)		
argon filled, low-E,	, En=0.2,									
hard coat (East)										
Specified U-Valu	ie = 1.20									
Window - Double-g	glazed,		0.550	1.15 (1.20)	0.63			(27)		
argon filled, low-E	En=0.2,			. ,						
hard coat (South)										
Specified U-Valu	ie = 1.20									
Full glazed door -			2.630	1.20	3.16			(26)		
Double-glazed, arg	on filled,							()		
low-E, En=0.2, ha	rd coat									
(South)										
Specified U-Valu	ie = 1.20									
Full glazed door -			3.780	1.20	4.54			(26)		
Double-glazed, arc	on filled.				-			(-)		
low-E. En=0.2. ha	rd coat									
(East)										
Specified U-Valu	e = 1.20									
Full glazed door -			6,680	1.20	8.02			(26)		
Double-glazed arc	non filled		01000		0.02			(_0)		
low-E En=0.2 ha	rd coat									
(West)										
Specified U-Valu	ie = 1 20									
Rooflight at 70° or	less -		4 670	1 15 (1 20)	5.35			(27)		
Double-glazed ar	non filled		4.070	1110 (1120)	0.00			(27)		
low-E En=0.2 ha	rd coat									
(n/a)										
Velux Specified I	l-Value – 1	1 20								
Walls		1.20	4 15	0.21	0.87	9.00	37 35	(20)		
Dormer Cheeks	_		4.15	0.21	0.07	9.00	57.55	(29)		
Weatherboard/B	attons/00	SB/51								
Cavity/140 Timbr	allens/300	sulated								
With 120 Colotox	VD 1000 D	otwoon								
Stude/12 5 P'bd	XIX4000 D	etween								
Malle			102 10	0.20	20.44	0.00	010 71	(20)		
Prick or (Mootho	rboard/Rat	topc/100	102.19	0.20	20.44	9.00	919.71	(29)		
Modium Donco F	lock)/51 C	$\frac{1013}{100}$								
Timbor Fromo In		avily/140								
	Botwoon C	tude/12.5								
	Dermeen 2	12.3								
r uu Croundflaara			E0 24	0.40	6.04	75.00	2772 05	(20)		
		/150	50.31	0.12	0.04	15.00	3113.23	(Zŏ)		
Kingenen TE70/C	Corocd	V150								
Kingspan IF70/3	oleeu									

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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		Ope	enings	Netarea	√etarea U		ΑxU	ka	kappa-value		
		area, m ²	m²		A, m²	W/	m²K	W/K	kJ	/m²K	kJ/K	
Flat roof	s				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kii	ngspan T	R27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	56.37	7	0.12	6.7	6	9.00	507.33	(30)
150 Ki	ngspan k	K7 Between K7 Betwe	en									
Rafters/52.5 Kingspan K118 Under												
Rafters With Breather Membrane												
Total area of external elements Sigma A, m²242.10(31)												0 (31)
Fabric heat loss, W/K64.78												78 (33)
Heat capacity 5267.88 (3												38 (34)
Thermal mass parameter, kJ/m²K52.35(3)											35 (35)	
Effect of thermal bridges36.32(36.32)											32 (36)	
Total fabric heat loss101.10(37)											0 (37)	
Ventilation heat loss calculated monthly												
50.03	49.00	48.02	46.23	46.51	45.16	45.41	45.68	46.23	47.39	47.70	48.66	(38)
Heat tra	nsfer coe	efficient,	W/K					,				
151.13	150.10	149.12	147.33	147.61	146.26	146.51	146.78	147.33	148.49	148.80	149.76	
											148.2	27 (39)
Heat los	s param	eter (HLF	⁻), W/m²	K								
1.50	1.49	1.48	1.46	1.47	1.45	1.46	1.46	1.46	1.48	1.48	1.49	
HLP (average) 1.47 (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	

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

4. Wate Assume	er heating ed occupa	g energ ancy, N	y require	ements							kWh/year 2.75
Annual	average	hot wate	r usage ir	n litres pe	er day Vd	,average	9				99.40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot wat	er usage	in litres	per day f	or each r	nonth			л			
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34
Energy	content c	of hot wa	ter used		A			A			
162.15	141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03
Energy Distribu	content (a tion loss	annual)									1563.92
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55
Volume Temper Energy Total sto	factor ature fact lost from orage los	or store (k\ s	Wh/day)								0.0000 0.0000 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
Net stor	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
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
Combi I	oss calcu	lated for	each mo	onth							
17.47	15.75	17.36	16.68	17.14	16.47	16.95	17.07	16.58	17.26	16.82	17.43
Total he	eat require	ed for wa	iter heati	ng calcul	ated for o	each mo	nth				
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Output f	from wate	er heater	for each	month, l	«Wh/mor	nth					
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46
Heat ga	ins from	water he	ating, kV	/h/month	 ו						1766.89
58.28	51.09	53.00	46.59	44.99	39.24	36.78	41.62	41.94	48.36	52.29	56.57

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

5. Internal gains

	li	n	ir	(r	1	1	r	n	1	r
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts									
164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71
Lighting	gains										
62.02	55.08	44.80	33.91	25.35	21.40	23.13	30.06	40.35	51.23	59.79	63.74
Appliand	ces gains	5									
384.07	388.05	378.01	356.63	329.64	304.28	287.33	283.34	293.39	314.77	341.76	367.12
Cooking	gains			~	A						A
54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22
Pumpsa	and fans	gains		~	A						A
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	e.g. evap	oration (r	negative	values)	A						A
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ins									
78.33	76.03	71.23	64.71	60.47	54.50	49.44	55.94	58.25	65.00	72.62	76.04
Total int	ernal gai	ns									
636.54	631.28	606.16	567.37	527.58	492.30	472.02	481.46	504.10	543.12	586.29	619.02

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 2.880 23.77	0.72 x 0.70	0.77	23.9055
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				
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				
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				
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 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				
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				

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

7. Mean internal temperature

Temper Heating	ature dui system r	ring heati responsiv	ing period veness	ds in the l	living are	a, Th1 (°	C)				21.0 1.0)0)0	(85)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau					A								
9.68	9.75	9.81	9.93	9.91	10.01	9.99	9.97	9.93	9.85	9.83	9.77		
alpha		л		л	<u>д</u>								
1.65	1.65	1.65	1.66	1.66	1.67	1.67	1.66	1.66	1.66	1.66	1.65		
Utilisati	on factor	for gains	for living	area	A				λ.				
0.86	0.82	0.74	0.60	0.47	0.33	0.21	0.22	0.41	0.66	0.81	0.87		(86)
Mean internal temperature in living area T1													
17.78	18.12	18.92	19.80	20.41	20.78	20.95	20.94	20.69	19.87	18.75	17.77		(87)
Temperature during heating periods in rest of dwelling Th2													
19.69	19.69	19.70	19.71	19.71	19.72	19.72	19.72	19.71	19.71	19.70	19.70		(88)
Utilisati	on factor	for gains	for rest	of dwellir	ng				π				
0.84	0.80	0.71	0.56	0.42	0.26	0.12	0.12	0.33	0.61	0.78	0.86		(89)
Mean ir	iternal tei	mperatu	e in the r	est of dw	velling T2	2							
15.68	16.14	17.22	18.37	19.14	19.57	19.70	19.70	19.49	18.51	17.02	15.67		(90)
Living a	rea fracti	on (50.3 ⁻	1/100.62	2)	я						0.5	50	(91)
Meanin	iternal ter	nperatur	e (for the	whole d	welling)								
16.73	17.13	18.07	19.08	19.78	20.18	20.32	20.32	20.09	19.19	17.88	16.72		(92)
Apply adjustment to the mean internal temperature, where appropriate													
16.73	17.13	18.07	19.08	19.78	20.18	20.32	20.32	20.09	19.19	17.88	16.72		(93)

8. Space heating requirement

-												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisatio	on factor	for gains										
0.79	0.75	0.67	0.54	0.42	0.29	0.16	0.17	0.36	0.59	0.74	0.81	
Useful g	ains											
723.99	820.19	904.33	942.01	789.94	557.58	298.08	282.71	522.60	670.32	685.26	670.87	
Monthly	average	external	tempera	ture								
5.50	5.80	7.60	10.00	13.10	15.90	18.20	18.30	15.90	12.30	8.70	5.80	
Heat los	s rate for	mean in	ternal te	mperatu	re							
1696.76	1700.96	1560.85	1338.26	985.79	625.36	311.25	296.63	617.28	1023.33	1366.49	1635.54	
Fraction	of month	h for heat	ting									
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space h	eating re	quireme	nt for eac	ch month	n, kWh/m	onth						
723.74	591.88	488.44	285.30	145.71	-	-	-	-	262.64	490.48	717.72	
Total sp Space h	Fotal space heating requirement per year (kWh/year) (October to May)3705.92Space heating requirement per m² (kWh/m²/year)36.83										2 3	

8c. Space cooling requirement - not applicable

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9a. Energy requirements

	37 - 4-										kWh/year	
No seco Fraction Efficient	ondary he n of space cv of mai	eating sy e heat fro n heating	stem sel om main o svstem	ected system(:	s)			9	1.0000 2.80%			(202) (206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Αυα	Sep	Oct	Nov	Dec	()
Spaceh	eating re	quireme	nt	Inay		0 di	, .ag					
723.74	591.88	488.44	285.30	145.71	-	-	-	-	262.64	490.48	717.72	(98)
Append	lix Q - mo	nthly en	ergy save	ed (main	heating	system '	1)		JI	JL		、 ,
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space h	neating fu	lel (main	heating	system 1		Л	1		J	Л		
779.89	637.80	526.34	307.44	157.02	-	-	-	-	283.02	528.54	773.40	(211)
Append	lix Q - ma	nthly en	ergy save	∎ ed (main	heating	system 2	2)		JI	JI		. ,
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space h	neating fu	iel (main	heating	system 2	<u>2</u>)	Л	1		л	Л		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Append	lix Q - mo	onthly ene	ergy save	ed (seco	ndary he	ating sys	stem)		Л	Л		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Spaceh	eating fu	el (secor	ndary)	л		Л	J		Л	Л		
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Waterh	eating	л	Л	л		Л			л	Л		
Waterh	eating rea	quiremer	nt									
179.61	157.56	163.70	144.26	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(64)
Efficien	cy of wate	er heater									87.10	(216)
89.25	89.22	89.11	88.87	88.46	87.10	87.10	87.10	87.10	88.80	89.12	89.26	(217)
Water h	eating fu	el								_		
201.25	176.60	183.71	162.32	157.76	140.19	131.84	148.56	149.54	168.62	181.14	195.46	(219)
Annual Space h Space h Water h	totals neating fu neating fu eating fue	uel used, el (secor el	main sys ndary) s and ele	stem 1	n-hot						kWh/year 3993.45 0.00 1996.99	(211) (215) (219)
central boiler	heating with a fan	pump i-assiste	d flue		p not						30.00 45.00 75.00	(230c) (230e)
Electrici	ity for ligh saving/ge	nting (100 eneration	0.00% fix technolo	ed LEL)							438.10	(231) (232)
Energ	y saved o ly used ()	or genera ::	ated ():								0.000 0.000	(236a) (237a)
Total de	elivered e	nergy for	alluses								6503.54	(238)

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

kWh/year	Fuel price p/kWh	£/year	
3993.452	4.040	161.34	(240)
0.000	0.000	0.00	(241)
1996.99	4.040	80.68	(247)
0.000	14.460	0.00	(249)
75.000	14.460	10.85	(249)
438.096	14.460	63.35	(250)
		113.00	(251)
0.000	0.000	0.00	(252)
0.000	-1.000	0.00	(253)
0.000	-1.000	0.00	(254)
		429.21	(255)
	kWh/year 3993.452 0.000 1996.99 0.000 75.000 438.096 0.000 0.000 0.000	kWh/yearFuel price p/kWh3993.4524.0400.0000.0001996.994.0400.00014.46075.00014.460438.09614.4600.0000.0000.000-1.0000.000-1.0000.000-1.000	kWh/year Fuel price p/kWh £/year 3993.452 4.040 161.34 0.000 0.000 0.00 1996.99 4.040 80.68 0.000 14.460 0.00 75.000 14.460 10.85 438.096 14.460 63.35 113.00 0.000 0.00 0.000 -1.000 0.00 0.000 -1.000 0.00 0.000 -1.000 429.21

12a. Carbon dioxide emissions

	Energy	Emission factor	Emissions		
	kWh/year	kg CO2/kWh	kg CO2/y	ear	
Space heating, main system 1	3993.45	0.216	862.59	(261)	
Space heating, main system 2	0.00	0.000	0.00	(262)	
Space heating, secondary	0.00	0.519	0.00	(263)	
Waterheating	1996.99	0.216	431.35	(264)	
Space and water heating			1293.94	(265)	
Electricity for pumps and fans	75.00	0.519	38.93	(267)	
Electricity for lighting	438.10	0.519	227.37	(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			1560.23	(272)	

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13a. Primary energy

	Energy	Primary	P. Energy	1
	kWh/year	factor	(kWh/yea	r)
Space heating, main	3993.45	1.220	4872.01	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	3.070	0.00	(263)
Waterheating	1996.99	1.220	2436.33	(264)
Space and water heating			7308.34	(265)
Electricity for pumps/fans	75.00	3.070	230.25	(267)
Electricity for lighting	438.10	3.070	1344.96	(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			8883.54	(272)
Primary energy kWh/m²/year			88.29	(273)

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Building type Detached house

Reference Date	J5067-1 7 October 2019		
Client	DCM Architectural Consultants Ltd 25 Pigeon Lane Herne Bay Kent CT6 7EH	Project	Unit 1 66 Borstal Hill Whitstable Kent 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)	50.31	2.31	116.22	(3a)
First floor	50.31	2.50	125.78	(3b)
Total floor area	100.62			(4)
Dwelling volume (m ³)			241.99	(5)

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2. Ventilation rate

											m ³ per ho	our
							main + s	seonda	ry + othe	er		
Numbe	er of chim	nevs					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	erofpass	ive vents	5				0		x 10		0.00	(7b)
Numbe	er of fluel	ess gas f	ires				0		x 40		0.00	(7c)
											Air chan	ges per hour
Infiltrat	ion due t	o chimne	eys, fans	and flues	S						0.17	(8)
Pressu	ire test, r	esult q50	C						5.00			(17)
Airper	meability	,									0.42	(18)
Numbe	er of side	s on whic	ch shelte	red							2.00	(19)
Shelte	rfactor										0.85	(20)
Infiltrat	ion rate i	ncorpora	iting shel	ter factor							0.35	(21)
Infiltrat	ion rate r	nodified	for month	nly 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	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	
Δdiust	ad infiltra	tion rate	(allowing	for shall	orandw	vind snow	ed)				13.13	(22a)
0.45	0.44	0.43	0.39	0.38	0.34	0.34	0.33	0.35	0.38	0.40	0.41	
Ventils	tion · nat	ural vent	tilation in	ntermitte	nt extrac	t fans					4.63	(22b)
Effectiv	ve air cha	ange rate			it extrac							
0.60	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59	(25)

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3. Heat losses and	heat los	s paramete	r					
Element Gro are	oss a, m²	Openings m ²	Netarea A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K	
Window - Double-gla	zed,		0.200	1.15 (1.20)	0.23			(27)
argon filled, low-E, E	n=0.2,							
hard coat (East)								
Specified U-Value	= 1.20							
Window - Double-gla	ized,		2.880	1.15 (1.20)	3.30			(27)
argon filled, low-E, E	n=0.2,							
hard coat (West)								
Specified U-Value	= 1.20							()
Window - Double-gla	ized,		4.330	1.15 (1.20)	4.96			(27)
argon filled, IOW-E, E	n=0.2,							
nard coat (East)	4.00							
Specified U-Value	= 1.20		0 5 5 0	4 4 5 (4 00)	0.00			(07)
window - Double-gla	izea,		0.550	1.15 (1.20)	0.63			(27)
argon illied, low-E, E	n=0.2,							
naru coal (South)	_ 1 20							
Specified U-value	= 1.20		2 6 2 0	1 20	2 16			(26)
Pull glazed uool -	nfilled		2.030	1.20	5.10			(20)
low-E En=0.2 hard	coat							
(South)	coat							
Specified U-Value	= 1 20							
Full glazed door -	- 1.20		3 780	1 20	4 54			(26)
Double-glazed argo	n filled		0.700	1.20	1.01			(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, argo	n filled.							(-)
low-E, En=0.2, hard	coat							
(West)								
Specified U-Value	= 1.20							
Rooflight at 70° or le	ss -		4.670	1.15 (1.20)	5.35			(27)
Double-glazed, argo	n 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/Bat	tens/905	SB/51						
Cavity/140 Timber	Frame Ins	sulated						
With 120 Celotex X	R4000 B	etween						
Studs/12.5 P'bd			100.10		00.44	0.00	040 74	(00)
Walls			102.19	0.20	20.44	9.00	919.71	(29)
Brick or (weatherp	oard/Batt	ens/100						
Timber Frome Incu	UCK)/51 Ca	avily/140						
	naleu vvil	11 120 tude/12 5						
D'bd	elweens	12.5						
Groundfloore			50 21	0.12	6.04	75.00	3773 25	(28)
Beam/Medium Der	nse Block	/150	50.51	0.12	0.04	75.00	5115.25	(20)
Kingspan TF70/Ser	reed	. 100						
			-					
	00.0		Pa	age o'i OT 84				

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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	loss pa	rameter	•							
Element		Gross	Ope	enings	Netare	a U-v	alue	ΑxU	ka	ppa-value	э АхК	
		area, m ²	m²		A, m²	W/	m²K	W/K	kJ	/m²K	kJ/K	
Flat roof	s				3.36	6	0.15	0.5	0	9.00	30.24	(30)
150 Kir	ngspan T	R27 Ove	er Joists									
Pitched	roofs ins	ulated be	etween ra	afters	56.37	7	0.12	6.7	6	9.00	507.33	3 (30)
150 Kii	ngspan k	K7 Between K7 Betwe	en									
Rafters	s/52.5 Ki	ngspan k	(118 Und	ler								
Rafters	s With Br	eather M	embrane	e								
I otal are	ea of exte	ernal elei	ments Si	gma A, r	n²						242.1	10 (31)
Fabric h	eat loss,	W/K									64.7	(8 (33)
Heat cap	bacity		1 1/								5267.8	38 (34)
I nermai	mass pa	arameter	, ĸJ/m²ĸ								52.3	35 (35)
Effect of	thermai	bridges									30.3	3Z (36)
Ventileti	onc neat			onthly							101.	10 (37)
ventilati	on neat i		ulated m	onuniy	v	1	1	Y	1	1		
48.02	47.70	47.39	45.95	45.68	44.42	44.42	44.19	44.90	45.68	46.23	46.80	(38)
Heat trai	nsfer coe	efficient,	W/K									
149.12	148.80	148.49	147.05	146.78	145.52	145.52	145.29	146.00	146.78	147.33	147.90	
											147.0)5 (39)
Heat los	s param	eter (HLF	P), W/m²	K								
1.48	1.48	1.48	1.46	1.46	1.45	1.45	1.44	1.45	1.46	1.46	1.47	
HLP (ave	erage)										1.4	46 (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	

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4. Wat Assum	er heatin ed occup	g energ ancy, N	y requir e	ements	ar day \/d	average					kWh/year 2.75	(42)
Annua	average		usayen			,average	-	0		N.	99.40	(43)
Jan	Feb	iviar	Apr	Гмау	Jun	Jui	Aug	Sep	Oct	INOV	Dec	
Hot wa	ter usage	in litres	per day f	or each i	month	1	v	r	1		·	
109.34	105.36	101.39	97.41	93.43	89.46	89.46	93.43	97.41	101.39	105.36	109.34	(44)
Energy	content o	of hot wa	ter used									
162.15	5 141.81	146.34	127.58	122.42	105.64	97.89	112.33	113.67	132.47	144.60	157.03	
Energy Distrib	content (a ution loss	annual)									1563.92	(45)
24.32	21.27	21.95	19.14	18.36	15.85	14.68	16.85	17.05	19.87	21.69	23.55	(46)
store Hot wa Hot wa Volume Tempe Energy Total s	loss dete ter storag ter cylinde e factor rature fact v lost from torage los	rmined fr e volume er loss fa cor store (k ¹ s	rom EN ′ (litres) ctor (kW Wh/day)	13203-2 /h/day)	tests, tak	en from	boiler da	ita 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)
Net sto	orage loss	Л	л	R	я	μ	л	R	Д			
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)
Primar	v loss fact	tor		1	1			1	1			
1 00	1 00	0.94	0.70	0.45	0 44	0 44	0.48	0.76	0.94	1.00	1 00	
Primar	v loss	0.04	0.70	10.40		0.77		10.10	0.04	1.00	1.00	
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(50)
Combi		U.UU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(59)
					40.47	40.05	47.07	10.50	47.00	40.00	47.40	(04)
17.47	15.75	17.36	16.68	17.14	16.47	16.95	17.07	16.58	17.26	16.82	17.43	(61)
I otal h	eat requir	ed for wa	iter heati	ng calcu	lated for	each mo	nth	1				(00)
179.61 Aperf	157.56 ure area o	163.70 of solar p	144.26 anel	139.55	122.11	114.84	129.40	130.25	149.73	161.42	174.46	(62) (H1)
Colle Colle Colle Colle Colle Colle Colle Solar Solar Solar Colle Dedic Effec Daily Volur Veff/ Solar Solar D Colle Dedic Effec Daily Volur Colle Coll	ctor zero- ctor heat ctor 2nd c ctor effect ctor perfo al solar ra shading fa energy av stment fac /load ratio ctor perfo cated sola tive solar hot water me ratio V / factor - input DHW input -42.08 from wate	loss efficiences e	tiency fficient tt loss coe atio per m ² nowers actor e volume d -96.04 for each	efficient fficient	-116.65 kWh/mor	-115.11 nth Page 8	-100.57	107 181 7 7 9 -86	0.7000 1.8000 0.0050 1.8063 2.5804 79.5246 0.8000 1.6014 1.0000 1.1596 0.5778 0.8793 75.0000 75.0000 75.0000 99.3983 0.7545 0.9437 59.5421 -53.79	-29.91	-21.10	
JP54P4	igner 6/248	19 <u>9</u> 2.034 ,	548.22 ^{rsi}	ip 20:90	5.45	⊬age 8 3 0.00	28.83	51.48	95.94	131.51	153.36	(64)
C:\Users Heat g	marka\Drop ainsi from		orive\THER	MCALCLI	MITED FO	LDER\SAF	CALCUL	ATIONS\Jo subject to	bbsJ4701 - quality_cor	J5200\J50	67-1.JDP J5067- dures, users are	₁ (64) themse
58.28	sp o5;\$ib)9 fo	53€00 cu	12468.5519the	⊈ 424 43997h	39 <u>99.12</u> 14; of	1366.78 Cu	ation <u>62</u> no	µl41n. 94⊅e	a 499:316 d	wgbooggfire	t 569577 ing the in	np (165) a

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Metabol	ic gains,	Watts									
164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71	164.71
Lighting	gains	,			A			A			
62.02	55.08	44.80	33.91	25.35	21.40	23.13	30.06	40.35	51.23	59.79	63.74
Applian	ces gains	6		A	A						R
384.07	388.05	378.01	356.63	329.64	304.28	287.33	283.34	293.39	314.77	341.76	367.12
Cooking	gains										
54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22	54.22
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. evap	oration (r	negative	values)							
-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81	-109.81
Water h	eating ga	ains									
78.33	76.03	71.23	64.71	60.47	54.50	49.44	55.94	58.25	65.00	72.62	76.04
Total int	ernal gai	ns		<i></i>	21		s.		st		n
636.54	631.28	606.16	567.37	527.58	492.30	472.02	481.46	504.10	543.12	586.29	619.02

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