

# Summary for Input Data



Property Reference	Apt 4	Issued on Date	28/02/2024
Assessment Reference	Proposed v2	Prop Type Ref	
Property	80, Church Street, Edmonton, N9 9PB		

SAP Rating	96 A	DER	9.72	TER	15.33
Environmental	94 A	% DER < TER			36.59
CO <sub>2</sub> Emissions (t/year)	0.39	DFEE	33.00	TFEE	33.32
Compliance Check	See BREL	% DFEE < TFEE			0.96
% DPER < TPER	36.40	DPER	51.70	TPER	81.28

Assessor Details	Mr. Joe Cantwell Dillon	Assessor ID	BL89-0001
Client			

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

Orientation	Northeast	
Property Tenure	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Top-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m <sup>2</sup> K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Basement:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	Ground floor:	16.47 m	46.42 m <sup>2</sup>	2.39 m
	1st Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	2nd Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	3rd Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	4th Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	5th Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	6th Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m
	7th Storey:	0.00 m	0.00 m <sup>2</sup>	0.00 m

8.0 Living Area	36.80	m <sup>2</sup>
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9.0 External Walls		Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area(m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Res	Shelter	Openings	Area Calculation Type
		Dormer	Timber Frame	Timber framed wall (two layers of plasterboard)	0.15	18.00	13.24	7.01	0.00	None	6.23	Enter Gross Area
		Ashlar	Timber Frame	Timber framed wall (two layers of plasterboard)	0.11	18.00	15.51	15.51	0.00	None	0.00	Enter Gross Area

9.1 Party Walls		Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )	Shelter Res	Shelter
		Party Wall 1	Solid Wall	Other	0.00	0.00	32.48	0.00	None

9.2 Internal Walls		Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
		Internal Wall 1	Plasterboard on timber frame	9.00	46.34

10.0 External Roofs	
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# Summary for Input Data



Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	38.04	38.04	None	0.00	Enter Gross Area	0.00
Sloped Roof	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	14.60	12.29	None	0.00	Enter Gross Area	2.31

## 11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Floor 1	Lowest occupied	Other	0.00	46.42

## 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Window	Manufacturer	Window	Double Low-E Soft 0.1		Air Filled	0.63	Wood	0.70	1.20
Roof lights	Manufacturer	Roof Light	Double Low-E Soft 0.1		Air Filled	0.63	Wood	0.70	1.30

## 13.0 Openings

Name	Opening Type	Location	Orientation	Area (m <sup>2</sup> )	Pitch
RW	Window	Dormer	South West	6.23	0
LSR	Roof lights	Sloped Roof	South East	2.31	55

## 14.0 Conservatory

## 15.0 Draught Proofing

 %

## 16.0 Draught Lobby

## 17.0 Thermal Bridging

## 17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Gov Approved Scheme	2.96	0.08	0.08 ROI	No
E3 Sill	Gov Approved Scheme	2.96	0.15	0.15 ROI	No
E4 Jamb	Gov Approved Scheme	4.20	0.03	0.03 ROI	No
E7 Party floor between dwellings (in blocks of flats)	Gov Approved Scheme	5.43	0.13	0.13 ROI	No
E14 Flat roof	Gov Approved Scheme	4.75	0.08	0.08 ROI	No
E17 Corner (inverted – internal area greater than external area)	Gov Approved Scheme	2.50	-0.01	-0.01 ROI	No
E18 Party wall between dwellings	Independently assessed	10.00	0.12	0.12	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	13.04	0.00	0.00	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	12.64	0.24	0.24	No
R6 Flat ceiling	Table K1 - Default	9.52	0.12	0.12	No
P5 Party wall - Roof (insulation at rafter level)	Independently assessed	0.70	0.24	0.24	No
E13 Gable (insulation at rafter level)	Gov Approved Scheme	1.19	0.02	0.02 ROI	No
R1 Head of roof window	Table K1 - Default	2.34	0.24	0.24	No
R2 Sill of roof window	Table K1 - Default	2.34	0.24	0.24	No
R3 Jamb of roof window	Table K1 - Default	5.88	0.24	0.24	No
R4 Ridge (vaulted ceiling)	Table K1 - Default	1.37	0.12	0.12	No
R8 Roof to wall (rafter)	Table K1 - Default	11.16	0.12	0.12	No

Y-value  W/m<sup>2</sup>K

Description

## 18.0 Pressure Testing

Designed AP<sub>50</sub>  m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Property Tested?

Test Method

As Built AP<sub>50</sub>  m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

## 19.0 Mechanical Ventilation

### Mechanical Ventilation

Mechanical Ventilation System Present

## 20.0 Fans, Open Fireplaces, Flues

### 21.0 Fixed Cooling System

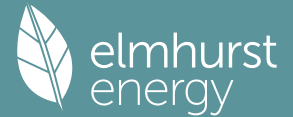
### 22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	80.00	5	400	10

### 24.0 Main Heating 1

# Summary for Input Data



Percentage of Heat	100.00	%
Database Ref. No.	17955	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2110	
Delayed Start Stat	Yes	
Burner Control	Modulating	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

**25.0 Main Heating 2**

**26.0 Heat Networks**

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None								
Heat source 2	None								
Heat source 3	None								
Heat source 4	None								
Heat source 5	None								

**28.0 Water Heating**

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

**28.1 Showers**

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
s1	Vented hot water system	7.00		No	

# Summary for Input Data



## 28.3 Waste Water Heat Recovery System

### 29.0 Hot Water Cylinder

None	
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

### 31.0 Thermal Store

None

### 32.0 Photovoltaic Unit

One Dwelling	
Export Capable Meter?	Yes
Connected To Dwelling	Yes
Diverter	No
Battery Capacity [kWh]	0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
3.25	South West	30°	Modest	No	No	0.80		

### 34.0 Small-scale Hydro

None		
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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### Recommendations

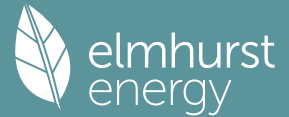
#### Lower cost measures

None

#### Further measures to achieve even higher standards

None

# Full SAP Calculation Printout



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CO <sub>2</sub> Emissions (t/year)	0.39	DFEE	33.00	TFEE	33.32
Compliance Check	See BREL	% DFEE < TFEE	0.96		
% DPER < TPER	36.40	DPER	51.70	TPER	81.28
Assessor Details	Mr. Joe Cantwell Dillon			Assessor ID	BL89-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)  
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

### 1. Overall dwelling characteristics

	Area (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	46.4200 (1b)	2.3900 (2b)	110.9438 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	46.4200		110.9438 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.9438 (5)

### 2. Ventilation rate

	m <sup>3</sup> per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		4.0000 (17)
Infiltration rate		0.2000 (18)
Number of sides sheltered		2 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1700 (21)

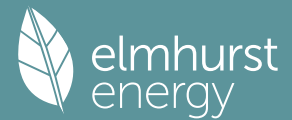
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Effective ac	0.5235	0.5226	0.5217	0.5175	0.5167	0.5130	0.5130	0.5124	0.5144	0.5167	0.5183	0.5200 (25)

### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K
Window (Uw = 1.20)			6.2300	1.1450	7.1336		(27)
LSR			2.3100	1.2357	2.8546		(27a)
Dormer	13.2400	6.2300	7.0100	0.1500	1.0515	18.0000	126.1800 (29a)
Ashlar	15.5100		15.5100	0.1100	1.7061	18.0000	279.1800 (29a)
Flat Roof	38.0400		38.0400	0.1400	5.3256	9.0000	342.3600 (30)
Sloped Roof	14.6000	2.3100	12.2900	0.1500	1.8435	9.0000	110.6100 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			81.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 19.9149		(33)
Party Wall 1			32.4800	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			46.4200			0.0000	0.0000 (32d)
Internal Wall 1			46.3400			9.0000	417.0600 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 1275.3900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							27.4750 (35)
Thermal bridges (User defined value 0.085 * total exposed area)							6.9182 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 26.8330 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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# Full SAP Calculation Printout



(38)m	19.1657	19.1323	19.0996	18.9459	18.9171	18.7832	18.7832	18.7584	18.8348	18.9171	18.9753	19.0361 (38)
Heat transfer coeff	45.9987	45.9653	45.9326	45.7789	45.7501	45.6162	45.6162	45.5914	45.6678	45.7501	45.8083	45.8691 (39)
Average = Sum(39)m / 12 =												45.7787
HLP	Jan 0.9909	Feb 0.9902	Mar 0.9895	Apr 0.9862	May 0.9856	Jun 0.9827	Jul 0.9827	Aug 0.9821	Sep 0.9838	Oct 0.9856	Nov 0.9868	Dec 0.9881 (40)
HLP (average)												0.9862
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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

Assumed occupancy												1.5855 (42)
Hot water usage for mixer showers	50.8026	50.0391	48.9266	46.7980	45.2272	43.4754	42.4796	43.5837	44.7940	46.6749	48.8492	50.6079 (42a)
Hot water usage for baths	21.9700	21.6437	21.1842	20.3370	19.7027	18.9993	18.6193	19.0756	19.5724	20.3250	21.1897	21.8957 (42b)
Hot water usage for other uses	30.8668	29.7444	28.6219	27.4995	26.3771	25.2547	25.2547	26.3771	27.4995	28.6219	29.7444	30.8668 (42c)
Average daily hot water use (litres/day)												95.2687 (43)
Daily hot water use	103.6394	101.4272	98.7328	94.6346	91.3069	87.7293	86.3536	89.0364	91.8659	95.6219	99.7833	103.3705 (44)
Energy conte	164.1395	144.4310	151.7486	129.5500	122.9167	107.8734	104.4372	110.2456	113.2798	129.7580	142.1596	161.8532 (45)
Energy content (annual)												1582.3927
Distribution loss (46)m = 0.15 x (45)m	24.6209	21.6647	22.7623	19.4325	18.4375	16.1810	15.6656	16.5368	16.9920	19.4637	21.3239	24.2780 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	16.3125	14.7178	16.2523	15.6340	16.0944	15.5166	16.0018	16.0353	15.5562	16.1442	15.7149	16.3029 (61)
Total heat required for water heating calculated for each month	180.4519	159.1488	168.0010	145.1840	139.0111	123.3900	120.4390	126.2810	128.8360	145.9022	157.8745	178.1560 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	180.4519	159.1488	168.0010	145.1840	139.0111	123.3900	120.4390	126.2810	128.8360	145.9022	157.8745	178.1560 (64)
Total per year (kWh/year)												1772.6756 (64)
Electric shower(s)												1773 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	58.6545	51.7028	54.5195	46.9839	44.8934	39.7470	38.7258	40.6655	41.5546	47.1806	51.1968	57.8919 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	70.3048	77.8374	70.3048	72.6483	70.3048	72.6483	70.3048	70.3048	72.6483	70.3048	72.6483	70.3048 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	137.9478	139.3793	135.7720	128.0926	118.3988	109.2879	103.2013	101.7698	105.3770	113.0565	122.7503	131.8612 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188 (71)
Water heating gains (Table 5)	78.8367	76.9386	73.2789	65.2554	60.3406	55.2042	52.0508	54.6579	57.7147	63.4148	71.1067	77.8117 (72)
Total internal gains	336.8713	343.9374	329.1378	315.7784	298.8262	283.9224	272.3389	273.5146	282.5221	296.5581	316.2873	329.7597 (73)

## 6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
Southwest		6.2300	36.7938	0.6300	0.7000	0.7700	70.0543 (79)					
Southeast		2.3100	40.7956	0.6300	0.7000	1.0000	37.4030 (82)					
Solar gains	107.4573	186.8108	263.6250	336.8318	384.2197	383.8641	369.1241	333.8168	289.2045	208.8215	129.4442	91.4592 (83)
Total gains	444.3286	530.7482	592.7628	652.6101	683.0459	667.7865	641.4630	607.3314	571.7266	505.3795	445.7315	421.2189 (84)

## 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan 7.7018	Feb 7.7074	Mar 7.7129	Apr 7.7388	May 7.7437	Jun 7.7664	Jul 7.7664	Aug 7.7707	Sep 7.7577	Oct 7.7437	Nov 7.7339	Dec 7.7236
alpha	1.5135	1.5138	1.5142	1.5159	1.5162	1.5178	1.5178	1.5180	1.5172	1.5162	1.5156	1.5149
util living area	0.7537	0.6981	0.6369	0.5526	0.4583	0.3571	0.2739	0.2970	0.4222	0.5843	0.7050	0.7675 (86)
MIT	17.4384	17.9609	18.6261	19.4052	20.0718	20.5577	20.7933	20.7571	20.3904	19.5100	18.3405	17.3150 (87)
Th 2	20.0909	20.0915	20.0921	20.0949	20.0954	20.0978	20.0978	20.0982	20.0969	20.0954	20.0943	20.0932 (88)
util rest of house												
MIT 2	0.7398	0.6821	0.6178	0.5287	0.4279	0.3176	0.2254	0.2478	0.3821	0.5565	0.6866	0.7542 (89)
MIT 2	16.1019	16.7163	17.4998	18.4087	19.1705	19.7068	19.9467	19.9150	19.5378	18.5521	17.1830	15.9574 (90)

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Living area fraction									FLA = Living area / (4) =			0.7928 (91)
MIT	17.1614	17.7030	18.3927	19.1987	19.8850	20.3813	20.6178	20.5826	20.2137	19.3115	18.1006	17.0337 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.0114	17.5530	18.2427	19.0487	19.7350	20.2313	20.4678	20.4326	20.0637	19.1615	17.9506	16.8837 (93)

## 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.6821	0.6295	0.5736	0.4987	0.4152	0.3236	0.2458	0.2665	0.3806	0.5248	0.6349	0.6957 (94)
Useful gains	303.0799	334.1084	340.0313	325.4534	283.5707	216.1254	157.6756	161.8693	217.5861	265.2035	283.0167	293.0563 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	584.7084	581.5986	539.3728	464.5962	367.6008	256.8797	176.4357	183.8500	272.3491	391.6892	497.0472	581.7883 (97)
Space heating kWh	209.5316	166.3135	148.3101	100.1828	62.5183	0.0000	0.0000	0.0000	0.0000	94.1054	154.1020	214.8166 (98a)
Space heating requirement - total per year (kWh/year)												1149.8802
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	209.5316	166.3135	148.3101	100.1828	62.5183	0.0000	0.0000	0.0000	0.0000	94.1054	154.1020	214.8166 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1149.8802
Space heating per m2												(98c) / (4) = 24.7712 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													89.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	209.5316	166.3135	148.3101	100.1828	62.5183	0.0000	0.0000	0.0000	0.0000	94.1054	154.1020	214.8166 (98)	
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000 (210)	
Space heating fuel (main heating system)	235.4288	186.8691	166.6406	112.5649	70.2453	0.0000	0.0000	0.0000	0.0000	105.7364	173.1483	241.3669 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	180.4519	159.1488	168.0010	145.1840	139.0111	123.3900	120.4390	126.2810	128.8360	145.9022	157.8745	178.1560 (64)	
Efficiency of water heater													87.3000 (216)
(217)m	88.2052	88.1605	88.0889	87.9862	87.8204	87.3000	87.3000	87.3000	87.3000	87.9588	88.1315	88.2212 (217)	
Fuel for water heating, kWh/month	204.5819	180.5216	190.7175	165.0077	158.2903	141.3402	137.9600	144.6518	147.5785	165.8757	179.1351	201.9425 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)	
Lighting	15.9846	12.8235	11.5461	8.4592	6.5341	5.3384	6.5341	7.7479	10.0637	13.2041	14.9140	16.4289 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.9368	-45.5420	-64.1586	-69.8652	-72.9894	-67.3554	-66.5824	-64.0466	-58.8373	-51.2640	-35.8471	-28.5040 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-24.3691	-52.6976	-108.9636	-168.7402	-226.1455	-228.1889	-224.4697	-187.6042	-133.8503	-76.0117	-32.6682	-19.0706 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													1292.0003 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													87.3000
Water heating fuel used													2017.6027 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													129.0051 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-2140.7084 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													1383.8996 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1292.0003	0.2100	271.3201 (261)

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Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2017.6027	0.2100	423.6966 (264)
Space and water heating			695.0166 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	129.0051	0.1443	18.6194 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-657.9288	0.1352	-88.9526
PV Unit electricity exported	-1482.7795	0.1252	-185.6249
Total			-274.5776 (269)
Total CO2, kg/year			450.9877 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.7200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1292.0003	1.1300	1459.9603 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2017.6027	1.1300	2279.8910 (278)
Space and water heating			3739.8513 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	129.0051	1.5338	197.8723 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-657.9288	1.4997	-986.7075
PV Unit electricity exported	-1482.7795	0.4595	-681.3327
Total			-1668.0403 (283)
Total Primary energy kWh/year			2399.7841 (286)
Dwelling Primary energy Rate (DPER)			51.7000 (287)

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 SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)  
 CALCULATION OF TARGET EMISSIONS  
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-----  
 1. Overall dwelling characteristics  
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	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	46.4200 (1b)	x 2.3900 (2b)	= 110.9438 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	46.4200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.9438 (5)

-----  
 2. Ventilation rate  
 -----

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1803 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4303 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3657 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4663	0.4572	0.4480	0.4023	0.3932	0.3474	0.3474	0.3383	0.3657	0.3932	0.4114	0.4297 (22b)
Effective ac	0.6087	0.6045	0.6004	0.5809	0.5773	0.5604	0.5604	0.5572	0.5669	0.5773	0.5846	0.5923 (25)

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

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.20)			6.2300	1.1450	7.1336		(27)
LSR			2.3100	1.8519	4.2778		(27a)
Dormer	13.2400	6.2300	7.0100	0.1800	1.2618		(29a)
Ashlar	15.5100		15.5100	0.1800	2.7918		(29a)
Flat Roof	38.0400		38.0400	0.1100	4.1844		(30)
Sloped Roof	14.6000	2.3100	12.2900	0.1100	1.3519		(30)
Total net area of external elements Aum(A, m2)			81.3900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	21.0013	(33)
Party Wall 1			32.4800	0.0000	0.0000		(32)



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Thermal mass parameter (TMP = Cm / TFA) in kJ/m<sup>2</sup>K 27.4750 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	2.9600	0.0500	0.1480
E2 Other lintels (including other steel lintels)	2.9600	0.0500	0.1480
E3 Sill	4.2000	0.0500	0.2100
E4 Jamb	5.4300	0.0700	0.3801
E7 Party floor between dwellings (in blocks of flats)	4.7500	0.0800	0.3800
E14 Flat roof	2.5000	-0.0900	-0.2250
E17 Corner (inverted - internal area greater than external area)	10.0000	0.0600	0.6000
E18 Party wall between dwellings	13.0400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.6400	0.1200	1.5168
P4 Party wall - Roof (insulation at ceiling level)	9.5200	0.0600	0.5712
R6 Flat ceiling	0.7000	0.0800	0.0560
P5 Party wall - Roof (insulation at rafter level)	1.1900	0.0800	0.0952
E13 Gable (insulation at rafter level)	2.3400	0.0800	0.1872
R1 Head of roof window	2.3400	0.0600	0.1404
R2 Sill of roof window	5.8800	0.0800	0.4704
R3 Jamb of roof window	1.3700	0.0800	0.1096
R4 Ridge (vaulted ceiling)	11.1600	0.0600	0.6696
R8 Roof to wall (rafter)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.4575 (36)  
 Point Thermal bridges (36a) = 0.0000  
 Total fabric heat loss (33) + (36) + (36a) = 26.4588 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.2862	22.1316	21.9801	21.2685	21.1353	20.5155	20.5155	20.4008	20.7543	21.1353	21.4047	21.6863
Average = Sum(39)m / 12 =	48.7449	48.5904	48.4389	47.7272	47.5941	46.9743	46.9743	46.8595	47.2130	47.5941	47.8634	48.1450

(39) 47.7266

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0501	1.0468	1.0435	1.0282	1.0253	1.0119	1.0119	1.0095	1.0171	1.0253	1.0311	1.0372
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

(40) 1.0281

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

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	50.8026	50.0391	48.9266	46.7980	45.2272	43.4754	42.4796	43.5837	44.7940	46.6749	48.8492	50.6079
Hot water usage for baths	21.9700	21.6437	21.1842	20.3370	19.7027	18.9993	18.6193	19.0756	19.5724	20.3250	21.1897	21.8957
Hot water usage for other uses	30.8668	29.7444	28.6219	27.4995	26.3771	25.2547	25.2547	26.3771	27.4995	28.6219	29.7444	30.8668
Average daily hot water use (litres/day)	103.6394	101.4272	98.7328	94.6346	91.3069	87.7293	86.3536	89.0364	91.8659	95.6219	99.7833	103.3705

Energy conte	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	164.1395	144.4310	151.7486	129.5500	122.9167	107.8734	104.4372	110.2456	113.2798	129.7580	142.1596	161.8532
Distribution loss (46)m = 0.15 x (45)m	24.6209	21.6647	22.7623	19.4325	18.4375	16.1810	15.6656	16.5368	16.9920	19.4637	21.3239	24.2780

Water storage loss:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	50.9589	46.0274	50.3132	46.6691	46.5290	43.2638	44.0048	45.3720	45.3037	48.7279	49.2082	50.9589
Total heat required for water heating calculated for each month	215.0984	190.4584	202.0618	176.2191	169.4457	151.1371	148.4420	155.6176	158.5836	178.4859	191.3678	212.8121
WWHRS	-23.2248	-20.5402	-21.5085	-17.8099	-16.5982	-14.2032	-13.3132	-14.1573	-14.6952	-17.3240	-19.6260	-22.7947
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	191.8736	169.9182	180.5532	158.4092	152.8475	136.9339	135.1288	141.4603	143.8884	161.1619	171.7418	190.0174
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											1933.9342

Electric shower(s) (64a) 0.0000  
 Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = (64a) 0.0000  
 Heat gains from water heating, kWh/month (65) 66.5559

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735	79.2735
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	70.3048	77.8374	70.3048	72.6483	70.3048	72.6483	70.3048	70.3048	72.6483	70.3048	72.6483	70.3048
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	137.9478	139.3793	135.7720	128.0926	118.3988	109.2879	103.2013	101.7698	105.3770	113.0565	122.7503	131.8612
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274	30.9274
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188	-63.4188
Water heating gains (Table 5)	90.4786	88.5865	84.7241	76.0315	70.5673	64.8387	61.4605	64.5157	68.0437	74.3636	82.7363	89.4569
Total internal gains	348.5133	355.5853	340.5829	326.5544	309.0529	293.5569	281.7486	283.3723	292.8511	307.5069	327.9169	341.4049

#### 6. Solar gains

[Jan]	Area m <sup>2</sup>	Solar flux Table 6a W/m <sup>2</sup>	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	117.8945 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-764.8083 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3161.8393 (238)

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**12a. Carbon dioxide emissions - Individual heating systems including micro-CHP**  
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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1392.7720	0.2100	292.4821 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2329.9811	0.2100	489.2960 (264)
Space and water heating			781.7781 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	117.8945	0.1443	17.0158 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-379.5319	0.1338	-50.7720
PV Unit electricity exported	-385.2764	0.1255	-48.3603
Total			-99.1323 (269)
Total CO2, kg/year			711.5909 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.3300 (273)

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**13a. Primary energy - Individual heating systems including micro-CHP**  
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	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1392.7720	1.1300	1573.8324 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2329.9811	1.1300	2632.8786 (278)
Space and water heating			4206.7110 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	117.8945	1.5338	180.8305 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-379.5319	1.4944	-567.1592
PV Unit electricity exported	-385.2764	0.4607	-177.5091
Total			-744.6683 (283)
Total Primary energy kWh/year			3772.9739 (286)
Target Primary Energy Rate (TPER)			81.2800 (287)