NHER Rating Worksheet : Design - Draft

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Client

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Address Unit 15 Makepeace Mansions Unit 15-LB Holly Lodge Estate, Camden, Greater London, NW1

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1. Overall dwelling dimensions

	Area (m^2)		Average storey height (m)		Volume (m^3)	
Ground Floor	42.99	(1a) ×	2.60	=	111.77	(1)
Total floor area (1a)+(2a)+(3a)+(4a)+(4b)+(4d)+(4f)+(4h) =	42.99	(5)				
Dwelling volume			(1)+(2)+(3)+(4)+(4c)+(4e)+(4g)+(4i) =		111.77	(6)

2. Ventilation rate

			m^3 per hour	
Number of chimneys	0	× 40 =	0	(7)
Number of open flues	0	× 20 =	0	(8)
Number of intermittent fans or passive vents	0	× 10 =	0	(9)
Number of flueless gas fires	0	× 40 =	0	(9a)

			Air changes per hour	
Infiltration due to chimneys, flues and fans = (7)+(8)+(9)+(9a) =	0	÷ box (6) =	0.00	(10)

If a pressurisation test has been carried out, proceed to box (19)

Number of storeys in the dwelling	1	(11)	
Additional infiltration	[(11) - 1] × 0.1 =	N/A	(12)
Structural infiltration: *0.25 for steel or timber frame or 0.35 for masonry construction*		N/A	(13)
If suspended wooden floor, *enter 0.2 (unsealed) or 0.1 (sealed)*, else enter 0		N/A	(14)
If no draught lobby, enter 0.05, else enter 0		N/A	(15)
Percentage of windows and doors draught stripped	N/A	(16)	
Enter 100 in box (16) for new dwellings which are to comply with Building Regulations			
Window infiltration	0.25 - [0.2 × (16) ÷ 100] =	N/A	(17)
Infiltration rate	(10)+(12)+(13)+(14)+(15)+(17) =	N/A	(18)

If based on air permeability value, then [q_{50} ÷ 20] + (10) in box (19), otherwise (19) = (18) 0.50 (19)

Air permeability value applies if a pressurisation test has been done or the design air permeability is being used

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Number of sides on which sheltered *(Enter 2 in box (20) for new dwellings where location is not shown)*		2	(20)
Shelter factor	1 - [0.075 × (20)] =	0.85	(21)
Adjusted infiltration rate	(19) × (21) =	0.38	(22)
Calculate effective air change rate for the applicable case			
If balanced whole house mechanical ventilation system	air throughput (ach) =	0.30	(22a)
If balanced with heat recovery	efficiency in % allowing for in-use factor =	79.05	(22b)
a) If balanced whole house mechanical ventilation with heat recovery	(22) + (22a) × [1 – (22b) / 100] =	0.45	(23)
b) If balanced whole house mechanical ventilation without heat recovery	(22) + (22a) =	N/A	(23a)
c) If whole house extract ventilation or positive input ventilation from outside ***if (22) < 0.25, then (23b) = 0.5; otherwise (23b) = 0.25 + (22)***		N/A	(23b)
d) If natural ventilation or whole house positive input ventilation from loft ***if (22) ≥ 1, then (24) = (22); otherwise (24) = 0.5 + [(22)² × 0.5]***		N/A	(24)
Effective air change rate - enter (23) or (23a) or (23b) or (24) in box (25)		0.45	(25)

3. Heat losses and heat loss parameter

ELEMENT	Area (m²)		U - value		AXU (W/K)	
Windows *	9.30	×	1.77	=	16.42	(27)
Walls	31.55	×	0.31	=	9.87	(29)
Walls	20.77	×	0.25	=	5.19	(29)
Roof	42.99	×	0.30	=	12.90	(30)
Total area of elements ΣA, m²	104.61	(32)				

* *for windows and rooflights, use effective window U-value calculated as given in paragraph 3.2*

Fabric heat loss, W/K	(26)+(27)+(27a)+(27b)+(28)+(29)+(29a)+(30)+(30a)+(31) =	44.39	(33)
Thermal bridges - Σ (lxΨ) calculated using Appendix K *if details of thermal bridging are not known calculate y× (32) [see Appendix K] and enter in box (34)*		15.69	(34)
Total fabric heat loss	(33)+(34) =	60.08	(35)
Ventilation heat loss	(25) × 0.33 × (6) =	16.43	(36)
Heat loss coefficient, W/K	(35)+(36) =	76.51	(37)
Heat loss parameter (HLP), W/m²K	(37) ÷ (5) =	1.78	(38)

4. Water heating energy requirement

	kWh/year	
Energy content of hot water used from Table 1 column (b)	1336.55	(39)
Distribution loss from Table 1 column (c) *If instantaneous water heating at point of use, enter "0" in boxes (40) to (45)* *For community heating use Table 1 (c) whether or not hot water tank is present*	235.86	(40)
Water storage loss:		

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a) If manufacturer's declared loss factor is known (kWh/day):		N/A	(41)
Temperature factor from Table 2b		N/A	(41a)
Energy lost from water storage, kWh/year	(41)×(41a)×365 =	N/A	(42)
b) If manufacturer's declared cylinder loss factor is not known:			
Cylinder volume (litres) including any solar storage within same cylinder *If community heating and no tank in dwelling, enter 110 litres in box (43)* *Otherwise, if no stored hot water (this includes instantaneous combi boilers), enter '0' in box (43)*		N/A	(43)
Hot water storage loss factor from Table 2 (kWh/litre/day) *If community heating and no tank in dwelling, use cylinder loss from Table 2 for 50 mm factory insulation in box (44)*		0.00	(44)
Volume factor from Table 2a		0.00	(44a)
Temperature factor from Table 2b		0.00	(44b)
Energy lost from water storage, kWh/year	(43)×(44)×(44a)×(44b)×365 =	0.00	(45)
Enter (42) or (45) in box (46)		0.00	(46)
If cylinder contains dedicated solar storage, box (47) = (46) × [(43) - (H11)] / (43), else (47) = (46)		0.00	(47)
Primary circuit loss from Table 3		0.00	(48)
Combi loss from Table 3a (enter "0" if no combi boiler)		443.16	(49)
Solar DHW input calculated using Appendix H (enter "0" if no solar collector)		0.00	(50)
Output from water heater, kWh/year	(39)+(40)+(47)+(48)+(49)-(50) =	2015.58	(51)
Heat gains from water heating *include (47) in calculation of (52) only if cylinder is in the dwelling or hot water is from community heating*	0.25 × [(39)+(49)]+0.8×[(40)+(47)+(48)] =	633.62	(52)

5. Internal gains

		Watts	
Lights, appliances, cooking and metabolic (Table 5)		392.59	(53)
Reduction of internal gains due to low energy lighting (calculated in Appendix L)		30.44	(53a)
Additional gains from Table 5a		0.00	(53b)
Water heating	(52) ÷ 8.76 =	72.33	(54)
Total internal gains	(53) + (53b) + (54) - (53a) =	434.48	(55)

6. Solar gains

	Access factor Table 6d		Area m²		Flux Table 6a		g Table 6b		FF Table 6c		Gains (W)	
East	0.77	×	1.56	×	48.48	x 0.9 x	0.72	×	0.70	=	26.42	(59)
South	0.77	×	7.74	×	72.72	x 0.9 x	0.72	×	0.70	=	196.62	(62)

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Total solar gains:	[(56) + ... + (64)] =	223.03	(65)

Note: for new dwellings where overshading is not known, the solar access factor is '0.77'

Total gains, W	(55) + (65) =	657.52	(66)
Gain/loss ratio (GLR)	(66) ÷ (37) =	8.59	(67)
Utilisation factor (Table 7, using GLR in box (67))		0.88	(68)
Useful gains, W	(66) × (68) =	576.55	(69)
Gains Zone 1, G1		345.93	(NHER)
Gains Zone 2, G2		230.62	(NHER)

7. Mean internal temperature

			° C	
Living area fraction (0 to 1.0)	living room area ÷ (5) =		0.55	(75)
Interzone heat coefficient			101.14	(NHER)
Mean external temperature			3.54	(NHER)
		Zone1	**Zone2**	
Specific loss		42.07	34.44	(NHER)
Demand temperature		21.00	20.24	(NHER)
Mean internal temperature		19.18	18.55	(NHER)

8. Degree days

	Zone1	**Zone2**	
Base temperature	11.53	10.03	(NHER)
Degree-days	1010.72	769.52	(NHER)

9. Space heating requirements

	Zone1	**Zone2**	
Space heating requirement (useful), kWh/year	1643.67	161.54	(NHER)
Total space heating requirement (useful), kWh/year		1805.21	(81)

For range cooker boilers where efficiency is obtained from the Boiler Efficiency Database or manufacturer's declared value, multiply the result in box (81) by (1 - Φ_{case}/Φ_{water}) where Φ_{case} is the heat emission from the case of the range cooker at fullload (in kW); and Φ_{water} is the heat transferred to water at full load (in kW).Φ_{case} and Φ_{water} are obtained from the database record for the range cooker boiler or manufacturer's declared value.

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

Note: when space and water heating is provided by community heating use the alternative worksheet 9b

Space heating:

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Fraction of heat from secondary/supplementary system (*use value from Table 11, Table 12a or Appendix F)*	0.00	(82)
Efficiency of main heating system, %	85.20	(83)
(SEDBUK or from Table 4a or 4b, adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table 4c)		
Efficiency of secondary/supplementary heating system, % (use value from Table 4a or Appendix E)	0.00	(84)
Space heating fuel (main) requirement, kWh/year [1- (82)] × (81) ×100 ÷ (83) =	2118.80	(85)
Space heating fuel (secondary), kWh/year (82) × (81) ×100 ÷ (84) =	N/A	(85a)

Water heating:

Efficiency of water heater, %	85.20	(86)
(SEDBUK or from Table 4a or 4b, adjusted where appropriate by the amount shown in the 'efficiency adjustment' column of Table 4c)		
Energy required for water heating, kWh/year (51) × 100 ÷ (86) =	2365.70	(86a)

Electricity for pumps and fans:	**kWh/year**	
each central heating pump, (Table 4f)	130.00	(87a)
each boiler with a fan-assisted flue (Table 4f)	45.00	(87b)
warm air heating system fans (Table 4f)	0.00	(87c)
mechanical ventilation -balanced, extract or positive input from outside (Table 4f)	54.98	(87d)
maintaining keep-hot facility for gas combi boiler (Table 4f)	0.00	(87e)
pump for solar water heating (Table 4f)	0.00	(87f)
Total electricity for the above equipment, kWh/year	229.98	(87)
Electricity for pumps,fans lights and appliances:	2038.13	(NHER)

Cooking:

Cooking fuel requirement (Electricity), kWh/year	303.42	(NHER)
Cooking fuel requirement (Other fuel), kWh/year	533.06	(NHER)

10a. Fuel costs - individual heating systems

	Fuel kWh/year		**Fuel price** (Table 12)		**Fuel cost** £/year	
Space heating - main system	(85)	×	1.87	×0.01 =	39.56	(88)
Space heating - secondary	(85a)	×	N/A	× 0.01 =	0.00	(89)

Water heating

Water heating cost (electric, off-peak tariff)

On-peak fraction (Table 13, or Appendix F for electric CPSUs)				0.00		(90)
Off-peak fraction		1.0 - (90) =		1.00		(90a)
			Fuel price			
On-peak cost	(86a) × (90)	×	N/A	× 0.01 =	0.00	(91)

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Off-peak cost		(86a) × (90a)	×	N/A	× 0.01 =	0.00	(91a)
Water heating cost (other fuel)		(86a)	×	1.87	× 0.01 =	44.17	(91b)
Pump,fan,lights and appliances energy cost							
On-peak fraction					1.00		
Off-peak fraction					0.00		
				Fuel price			
On-peak cost	2038.13	×	1.00	× 7.96	× 0.01 =	162.32	(NHER)
Off-peak cost	2038.13	×	0.00	× -1.00	× 0.01 =	0.00	(NHER)
Cooking							
Cooking cost (Electricity)			303.42	× 7.96	× 0.01 =	24.16	(NHER)
Cooking cost (Other fuel)			533.06	× 1.87	× 0.01 =	9.95	(NHER)
Additional standing charges						76.24	(94)
Renewable and energy-saving technologies (Appendices M and N)							
PV							
Energy produced or saved, kWh/year			N/A (95)				
Cost of energy produced or saved, £/year			(95)	× N/A	× 0.01 =	N/A	(95a)
Wind							
Energy produced or saved, kWh/year			N/A (95b1)				
Cost of energy produced or saved, £/year			(95b1)	× N/A	× 0.01 =	N/A	(95b)
Micro CHP							
Energy produced or saved, kWh/year			N/A (95c1)				
Cost of energy produced or saved, £/year			(95c1)	× N/A	× 0.01 =	N/A	(95c)
Energy consumed by the technology, kWh/year			N/A (96)				
Cost of energy consumed, £/year			(96)	× N/A	×0.01 =	N/A	(96a)
Special features (Appendix Q)							
Energy produced or saved, kWh/year			N/A (s1)				
Cost of energy produced or saved, £/year			(s1)	× N/A	× 0.01 =	N/A	(s1a)
Energy consumed by the technology, kWh/year			N/A (s2)				
Cost of energy consumed, £/year			(s2)	× N/A	×0.01 =	N/A	(s2a)
Total energy cost	(88)+(89)+(91)+(91a)+(91b)+(92)+(93)+(94)-(95a)-(95b)-(95c)+(96a)-(s1a)+(s2a)				=	356.40	(97)

11a. NHER rating - individual heating systems

NHER rating	10.50

12a. Total CO2 for individual heating systems (including micro-CHP) and community heating without CHP

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Individual heating system:	**Energy** kWh/year		**Emission factor** kg CO_2/kWh		**Emissions** kgCO_2/year	
Space heating main from box (85)	2118.80	×	0.194	=	411.05	(101)
Space heating secondary from box (85a)	N/A	×	N/A	=	0.00	(102)
Energy for water heating from box (86a)	2365.70	×	0.194	=	458.95	(103)
Energy for water heating (51) or [(87b*) × 100 ÷ (104)] =	N/A	×	N/A	=	0.00	(106)
Space and water heating	[(101) + (102) + (103)] or [(105) + (106)] =				869.99	(107)
Energy for water heating (Type 1 fraction) × (87*) × 100 ÷ (104a) =	N/A	×	N/A	=	0.00	(106a)
Energy for water heating (Type 2 fraction) × (87*) × 100 ÷ (104b) =	N/A	×	N/A	=	0.00	(106b)
Space and water heating	[(105a) + (106a) + (105b) + (106b)] =				869.99	(107)
Electricity for pumps,fans,lights and appliances	2038.13	×	0.422	=	860.09	(NHER)
Cooking						
Energy for cooking (Electricity)	303.42	×	0.42	=	128.04	(NHER)
Energy for cooking (Other fuel)	533.06	×	0.19	=	103.41	(NHER)
Energy produced or saved in dwelling (Appendices M and N)						
PV energy produced or saved (95) or (95*)		×	N/A	=	N/A	(110)
Wind energy produced or saved (95b1) or (95b1*)		×	N/A	=	N/A	(110b)
Micro-CHP energy produced or saved (95c1) or (95c1*)		×	N/A	=	N/A	(110c)
Micro-CHP energy consumed (96) or (96*)		×	N/A	=	0.00	(111)
Energy produced or saved in dwelling (Appendix Q) (s1) or (s1*)		×	N/A	=	0.00	(s1a)
Energy consumed by the technology (Appendix Q) (s2) or (s2*)		×	N/A	=	0.00	(s2a)
Total CO_2 kg/year (107) + (108) + (109) - (110) + (111) - (s1a) + (s2a)				=	1960.54	(112)
Total CO_2 (kg/m2/year) (112) ÷ (5)				=	45.60	(113)

13a. Primary energy, for individual heating systems (including micro-CHP) and community heating without CHP

Individual heating system:	**Energy** kWh/year		**Primary energy factor**		**Primary energy** (kWh/year)
Space heating main from box (85)	2118.80	×	1.150	=	2436.61
Space heating secondary from box (85a)	N/A	×	N/A	=	0.00
Energy for water heating from box (86a)	2365.70	×	1.150	=	2720.56
Energy for water heating (87b*) × 100 ÷ (104) =	N/A	×	N/A	=	0.00
Space and water heating					5157.17
Energy for water heating (Type 1 fraction) × (87*) × 100 ÷ (104a) =	N/A	×	N/A	=	0.00

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Energy for water heating	(Type 2 fraction) × (87*) × 100 ÷ (104b)	=	N/A	×	N/A	=	0.00	
Space and water heating						=	5157.17	
Primary energy for pumps,fans,lights and appliances			2038.13	×	2.80	=	5706.77	(NHER)
Cooking								
Primary energy for cooking (Electricity)			303.42	×	2.80	=	849.57	(NHER)
Primary energy for cooking (Other fuel)			533.06	×	1.15	=	613.02	(NHER)
Energy produced or saved in dwelling (Appendices M and N)								
PV energy produced or saved		(95) or (95*)		×	N/A	=	N/A	
Wind energy produced or saved		(95b1) or (95b1*)		×	N/A	=	N/A	
Micro-CHP energy produced or saved		(95c1) or (95c1*)		×	N/A	=	N/A	
Micro-CHP energy consumed		(96) or (96*)		×	N/A	=	0.00	
Energy produced or saved in dwelling (Appendix Q)		(s1) or (s1*)		×	N/A	=	0.00	
Energy consumed by the above technology (Appendix Q)		(s2) or (s2*)		×	N/A	=	0.00	
Primary energy kWh/year							12326.53	
Primary energy kWh/m²/year							286.73	

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