

SAP Assessment Technical Guide



Practical, affordable systems to help meet
the Code for Sustainable Homes



Alpha's CSH Level 3 solution

Faced with meeting national standards such as the Code for Sustainable Homes, there's a growing emphasis on finding alternative heating and hot water solutions that deliver greater energy efficiency and reduce CO₂ emissions.

Alpha's unique solution, incorporating the award-winning SolarSmart and GasSaver heat recovery unit, helps you achieve CSH Level 3 without having to radically rethink heating system specification, or change the fabric of the building.

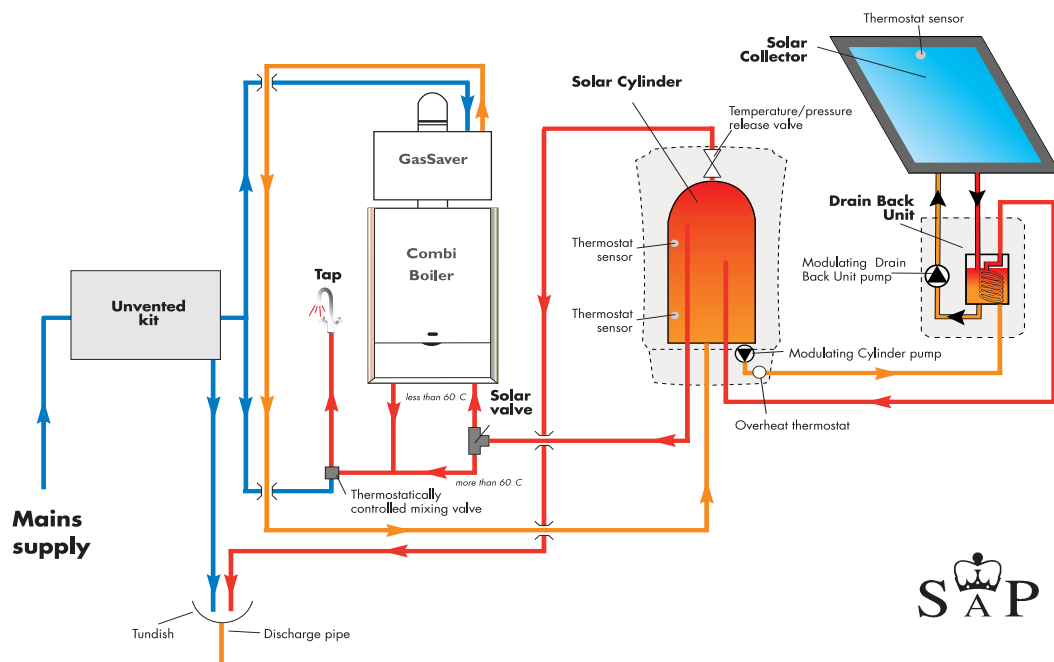
This affordable solution, which is fully recognised in SAP Appendix Q

as well as being WRAS approved, will help you significantly improve energy efficiency and Dwelling Emission Rates.

At the heart of the system is our innovative Solar Valve which enables it to operate with a combination

boiler, providing far better energy efficiency than the traditional system boiler and unvented cylinder approach more commonly specified. This system has become the preferred CSH Level 3 heating solution for a number of the UK's leading house builders and developers.

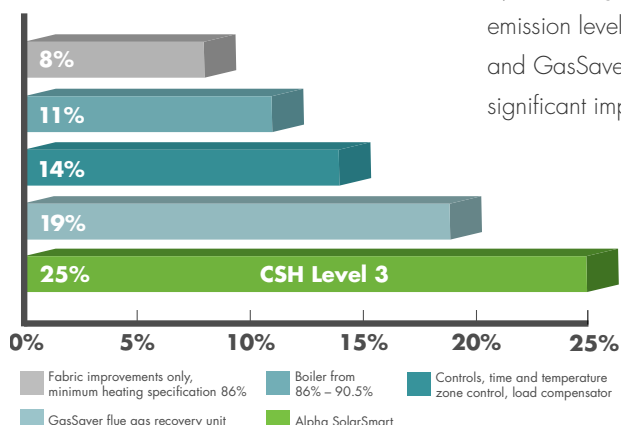
SolarSmart with GasSaver and high efficiency boiler



SAP Appendix Q example

This graph demonstrates how Alpha Heating Innovation can help you easily and affordably achieve Level 3 of the CSH.

25% reduction in CO₂ emissions



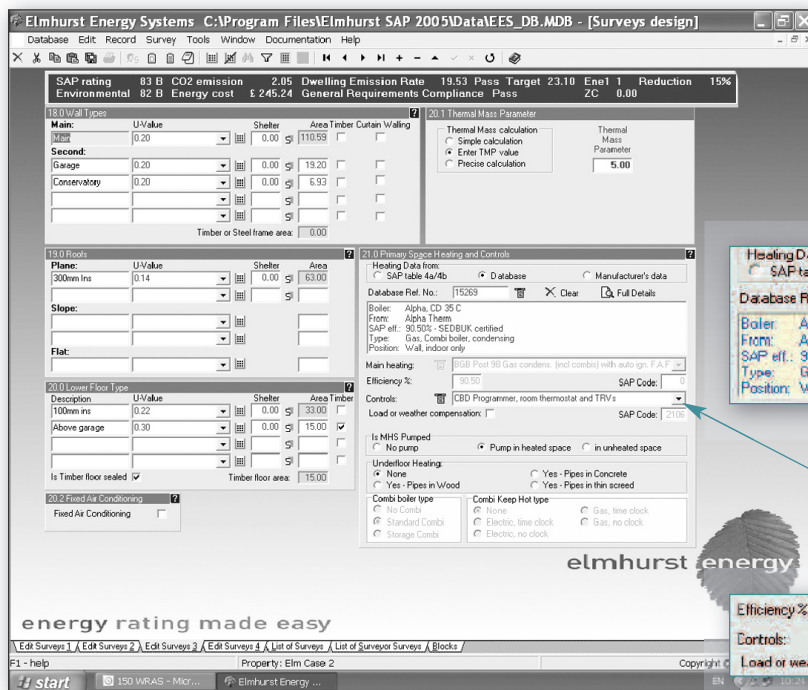
By achieving a 25% reduction in CO₂ emission levels, the unique SolarSmart and GasSaver solution makes a significant impact on sustainability.

Listed below are a number of alternative products that can also be added into SAP, in conjunction with GasSaver and SolarSmart to help achieve Code Levels 3 and 4.

- Photovoltaic
- Load compensators
- Time and temperature control
- Mechanical ventilation
- Positive input vents instead of extractor fans

Step-by-step guide

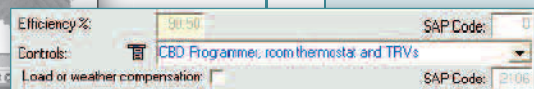
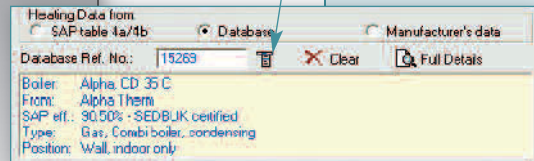
Step 1: Boilers and Controls



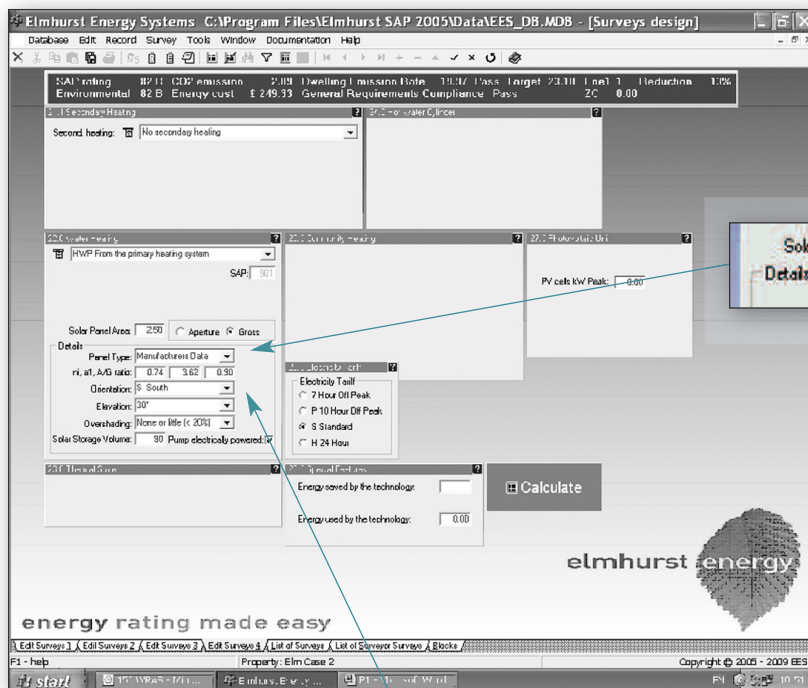
A Click here and type 'Alpha' in the search box.

- A list of Alpha boiler models will be displayed.
- Pick the appropriate one and the information will display in the yellow box.

B Using the drop-down menu, select the controls that have been installed.



Step 2: Water Heating



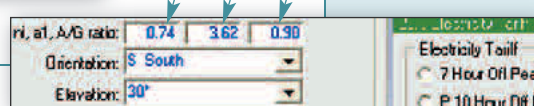
A Input the total collector surface area as shown in the Performance Technical Data table at the back of this brochure.

B Select Manufacturer's Data from the drop-down menu.

C Zero loss collector efficiency.

D Collector heat loss coefficient.

E Aperture to gross collector area ratio.



Step 3: Run SAP Calculation

Adobe Reader - [Elm Case 2 - Full SAP calculation printout.pdf]

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Save a Copy Search Select 66% Help Adobe Reader 7.0

CALCULATION DETAILS for survey reference no 'Elm Case 2' Page: 3

SAP calculation (New Dwelling as Designed)

1. Overall house dimensions

Ground floor	90.000 * 2.400	216.00	
First floor	87.200 * 2.600	226.72	
Total floor area	177.200		(5)
Total house volume		442.72	(6)

2. Ventilation rate

Number of chimneys	0 * 40	0	
Number of flues	0 * 20	0	
Number of fans	0 * 10	0	
Flueless gas fire	0 * 40	0	
Infiltration		0.00	(10)
Pressure test value		6.00	(q50)
Infiltration rate		0.30	(19)
Sides sheltered		2	(20)
Shelter factor		0.85	(21)
Adjusted infiltration rate		0.26	(22)
Air change natural ventilation		0.53	(24)
Effective air change rate		0.53	(25)

3. Heat losses

Doors Front	1.890 * 1.800	3.40	
Doors French	3.150 * 1.800	5.67	
Doors Kitchen	1.890 * 1.800	3.40	
Doors Heat Loss total		12.47	(26)
Windows Win1	7.200 * 1/[(1/ 1.800)+0.04]	12.09	
Windows Win2	1.260 * 1/[(1/ 1.800)+0.04]	2.12	
Windows Win3	6.630 * 1/[(1/ 1.800)+0.04]	11.13	
Windows Win4	1.260 * 1/[(1/ 1.800)+0.04]	2.12	
Windows Heat Loss total		27.45	(27)
Roof Lights Heat Loss total		0.00	(27)
Ground floor 1	75.000 * 0.220	16.50	
Ground floor 2	15.000 * 0.300	4.50	
Ground floor Heat Loss total		21.00	(28)
Main External wall type	110.590 * 0.200	22.12	(29)
Wall Garage	19.200 * 0.200	3.84	
Wall Conservatory	6.930 * 0.200	1.39	
Secondary walls Loss total		5.23	(29a)
Roof 300mm Ins	90.000 * 0.140	12.60	(30)
Roof Loss total		12.60	(30)
Total area of elements		340.00	(32)
Fabric heat loss		100.87	(33)
Appendix K: Thermal bridging		0.08	(y)
Effect of thermal bridges		27.20	(34)
Total fabric heat loss		128.07	(35)
Ventilation heat loss		77.80	(36)
Heat loss coefficient		205.87	(37)
Heat loss parameter (HLP)		1.16	(38)

4. Water heating energy requirements

Energy of heated water	2960.06	(39)
Distribution loss	522.36	(40)
Hot Water storage loss factor	0.0000	(44)

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Example of SAP Report (excluding GasSaver).

Step 4: Inputting GasSaver Data into Appendix Q

Adobe Reader - [SAPQ_FGHR Calculation_04d_01_DEC_2008 (2)]

SAP Appendix Q calculation process for Flue Gas Heat Recovery System (FGHR) or Passive Flue Gas Heat Recovery Device (PFGHRD)

SAP Assessment Reference

Step 1 : Record details of FGHRs (NB: Select the brand and model on worksheet "Select FGHRs")

FGHRs index number (taken from "Select FGHRs")	101	Box Q01
FGHRs brand name	Zenex GasSaver	
FGHRs model name	GS-1	
This FGHRs is intended for use with a boiler using the fuel	Mains gas	
This FGHRs is intended for use with a boiler of type(s)	Regular Combi (storage) Combi instantaneous - no keep hot facility Combi instantaneous - with a keep hot facility	

Step 2 : Identify boiler and enter details in green cells below. Fuel and boiler type must match those for which the FGHRs is applicable, otherwise no savings will be credited.

Boiler brand name	Alpha	
Boiler model name	CD3SC	
Fuel (select answer from box)	Mains gas	Box Q02
Boiler type (select answer from box) ‡	Combi instantaneous - no keep hot facility	Box Q03
Is it a condensing or non-condensing boiler? (select answer from box)	Condensing	Box Q04

‡ If unsure of boiler type: if Q09 = 0 and Q08 = 0 then it is storage combi. For keep-hot status check your SAP calculator water heating section.

Step 3 : Enter data into the SAP calculator, ignoring any boiler efficiency adjustments in Table 4c (section 1). This means underfloor heating or load/weather compensation must not be selected.

Step 4 : Obtain data from the SAP calculator (box number in red) and enter in the green-cells below.

Total floor area (m ²)	box (5)	177.2	Box Q05
Volume of hot water store (litres) †	box (43)	0	Box Q06
Temperature factor †	box (44b)	0	Box Q07
Water storage heat loss (kWh/year) †	box (47)	0	Box Q08
Primary circuit heat loss (kWh/year) (select from answer from drop downbox) ‡	box (48)	0	Box Q09
Combi loss (kWh/year), if any, ‡	box (49)	0	Box Q10
Contribution from any solar water heating ‡	box (50)	0	Box Q11
Space heating requirement (useful)	box (81)	6.722	Box Q12
Fraction of heat from secondary/supplementary system ‡	box (82)	0.1	Box Q13
Electricity used by keep hot facility ‡	box (87e)	0	Box Q14

† If box (41) is greater than zero obtain the volume from the same source as the manufacturers declared storage loss factor and not from box 43.
‡ A value must be entered even if it is zero. If the SAP calculator box is blank enter zero also.
* Q06 and Q08 must be either both zero (instantaneous combi) or both positive (regular or storage combi).

Step 5 : Results from the energy saving calculation are shown in the yellow boxes below. Copy them into the Special Features section of the SAP calculator, as indicated.

Energy saved (kWh), to be entered in box (95)	Box Q15	678 kWh
Fuel for the above	Box Q16	Mains gas
Additional energy consumed (kWh), to be entered in box (96)	Box Q17	0 kWh
Fuel for the above	Box Q18	Mains gas

IMPORTANT NOTES
(1) If the boiler brand or model is changed, the energy saving must be re-calculated.
(2) If an error message appears above, or the energy saving (Box Q15) is zero, then an assessment of savings cannot be made.
Errors are reported when not all input data has been entered, the FGHRs and boiler type are not compatible, floor area is less than 30m², and other consistency checks as indicated.

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IMPORTANT NOTE:

The 'FGHRs Data & Calculation Spreadsheet' can be downloaded from www.sap-appendixq.org.uk under the 'How to Use The Data' tab.

A Ensure you have selected index number '101' in the 'Select FGHRs' tab, which will automatically calculate the saving for you to load back into SAP.

B Enter values as given on the SAP report from Step 3.

or (box number in red) and enter in t	
box (5)	
box (43)	
box (44b)	
box (47)	
m drop downbox) ‡ box (48)	
box (49)	
box (50)	
box (81)	
box (82)	
box (87e)	

same source as the manufacturers declared storage
calculator box is blank enter zero also.

C The energy saving for GasSaver is automatically calculated.

Box Q15	678 kWh
Box Q16	Mains gas
Box Q17	0 kWh
Box Q18	Mains gas

Step 5: Adding GasSaver to SAP Calculation

A Input value given in Appendix Q spreadsheet.

B Click 'Calculate'.

C Once recalculated, the Alpha CSH solution will show an 18% CO₂ reduction, depending on house type.

SAP rating	83 B	CO ₂ emission	1.96	Dwelling Emission Rate	18.79	Pass Target	23.10	Ene1 2	Reduction	18%
Environmental	83 B	Energy cost	£ 238.28	General Requirements Compliance	Pass			ZC	0.00	

Step 6: Complete SAP Calculations

Continue SAP calculations for the property in order to achieve 25% CO₂ reduction

Actual SAP rating:	83
Environmental Rating:	83
Dwelling Emission Rate:	18.79
Target Emission Rate:	23.10

Technical Data

SAP – Performance Technical Data

Solar Cylinder – Material		Stainless Steel
DHW Storage Cylinder Volume		91L
DBU Heat Exchanger – Material		Copper
Covers/Insulation Material		EPP
Global Warming Potential	GWP	Zero
Ozone Depletion Potential	ODP	Zero
Solar Cylinder Nominal Insulation Thickness		50mm
Standing Energy Loss of Solar Cylinder		0.92 kWh/24hr - 0.43 watts/litre
Energy Performance		3.5GJ/yr
Total Collector Surface Area		2.5m ²
Collector Aperture Area		2.27m ²
Aperture to Gross Collector Area Ratio		0.9
Zero Loss Collector Efficiency	(no)	74%
Collector Heat Loss Coefficient	(a1)	3.629W/m ² k

Alpha boiler efficiency and products of combustion data

Combi Boilers	SEDBUK Efficiency			Combustion Data – Natural Gas – G20					
	Efficiency Band	Natural Gas SAP Seasonal Efficiency %	LPG SAP Seasonal Efficiency %	NOX			CO ²	CO	
				Class	PPM	Mg/kWh	%	PPM	Mg/kWh
CD25C	A	90.2	91.9	5	22	39	9.4	47	50
CD28C	A	90.3	91.6	5	21	36	9.3	28	30
CD35C	A	90.5	92.4	5	13	22	9.3	22	24
CD25X	A	90.1	91.3	5	22	39	9.4	15	16
CD28X	A	90.1	91.2	5	22	39	9.4	5	6

System Boilers

CD12S	A	90.1	91.2	5	13	23	9.4	8	9
CD20S	A	90.1	91.5	5	18	31	9.4	7	7
CD28S	A	90.1	91.6	5	20	35	9.4	8	8
CD50S	A	90.4	91.4	5	22	38	9.3	35	37
CD70S	A	90.0	91.3	5	8	14	9.4	43	46

Regular Boilers

CD13R	A	90.1	91.1	5	19	34	9.2	14	15
CD18R	A	90.1	91.2	5	21	37	9.2	31	33
CD24R	A	90.3	91.3	5	18	32	9.2	24	26

Storage Combi Boilers

CD50	A	91.2	92.5	5	18	31	9.5	20	22
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Head Office:

Nepicar House
London Road
Wrotham Heath
Kent
TN15 7RS

Scotland:

Unit 8
Crest Business Centre
2 Glen Tye Road
Stirling
FK7 7LH

Ireland:

Alpha Therm (Ireland) Ltd
Peamount Business Centre
Newcastle
County Dublin

Useful numbers:

Order/Delivery Enquiries	01622 711014
Sales Order Fax Number	0844 412 4857
Sales Order Email Address	orders@alpha-innovation.co.uk
General Sales Enquiries	01732 783001
General Enquiries – Ireland	01 621 2939
Technical Helpline	0870 3001 964
Training Academy	0870 3001 963

www.alpha-innovation.co.uk