



DPS Sussex Ltd
Energy Services

Sustainability Assessment

WORTHING BOROUGH COUNCIL
24 SEP 2010
CONSENT GRANTED
SUBJECT TO CONDITIONS

Prepared for

Mr M Vroobel

For the development at

40 Ladydell Road
Worthing
West Sussex

The Design and Construction of 2 New Houses.

24th June 2010

Materials

In order to satisfy the requirement to Responsibly source all materials, Mr Vroobell's building contractor used a supplier that only supplies materials that are responsibly sourced, and the supplier has provided Chain of Custody [COC] and Environmental Management System [EMS] certification, as evidence to support this.

All timber products have PEFC or FSC certification and all other materials have EMS certification.

Waste

Commercial

A Site Waste Management Plan and has ensured that all site waste is sorted after it leaves the site.
Rabbit skips have provide Documental evidence to support this.

Residential

To maintain the commitment to recycle waste, there has been a recycling triple section bin provided in the kitchen area and the location of the site benefits from a very good Local Authority waste collection scheme and recycled waste is collected fortnightly.

Food Waste

Compost bins have been provided for each dwelling in the garden area.

Pollution

A Worcester Bosch Greenstar CDi30 boiler has been installed which is a SEDBUK A rated, 90.30% efficiency boiler and has a Nox rating of 33.3 mg/Kwh.

All insulation products are responsibly sourced and are environmentally friendly and all have an Ozone Depleting Potential [ODP] of Zero and a Global Warning Potential [GWP] <5.

Health and Wellbeing

All rooms have been designed to offer a lighter feel and have a daylight factor of at least 2%. Improved sound insulation/proofing has been added to improve the sound attenuation levels between the properties and has achieved 5db improvement over the Building Regulations Approved Document E.

Energy/Co2 Emissions

Building regulations compliance is the first target for CO2 emissions and consideration was given in how to improve the Building Regulations target during the design stage of this project and to achieve a 5% improvement the following details have been implemented throughout the development.

- Improved Insulation within the building fabric.
- An Air Pressure Test of 8$m^3/h/m^2$ @50Pa.
- Windows and Door U-Values of 1.5.
- A-rated class 5 Worcester Boiler with a Dry Nox level <40mg/kwh.
- 100% low energy internal and external lighting have been provided.

The SAP calculations have been completed in accordance with the working drawings and have been provided as evidence.

In addition to the building fabric improvements to further improve the developments Co2 footprint the following have been implemented :

- Cycle storage.
- Home office provision.
- All white goods have been provided and are A rated.

Internal Water

Internal water usage has been reduced by the Specification of restricted flow rated products and the installation of :

- Basin Taps with a flow rate of 4litres/min.
- Showers with a flow rate of 6 litre/min.
- Toilet cistern with a dual flush at 4.0 / 2.5 litres.
- Bath with a capacity to overflow of 149 litres

The above measures reduce the water usage, to 88.70 litres per person / per day and is an improvement over the current building regulations part G.

External Water

200litre Water Butts have been installed on the downpipes to attenuate rainwater from the roofs. and to enable the reuse for the garden areas.

Management

The contractor has committed to setting targets for Co2/Energy arising from site activities on a monthly basis and has monitored this in order to reduce unnecessary usage.

The contractor has also committed to monitoring Water usage arising from site activities and to set targets on a monthly basis to reduce unnecessary usage.

The contractor has involved the Architectural Liaison Officer [ALO] / Crime Prevention Design Advisor [CPDA] from the local Police Force to achieve a Secure By Design Certificate.

Summary

"Mr Vroobel's original ambition was to design the two houses to comply with Code Level 3 of the Code for Sustainable Homes Assessment. Unfortunately, due to the limitations of the site itself, it has not been possible to satisfy the Code requirements concerning Surface Water Run Off although the contractor has still installed water butts on the downpipes to enable some form of rainwater attenuation from the roofs. In addition, it proved entirely inappropriate from a design and visual amenity perspective to introduce the amount of photovoltaic panels on the roof space of the two dwellings to meet the Code's requirements on energy/Co2 emissions. Despite the environmental benefits of such an approach, it is considered that this would not have been acceptable to Worthing Borough Council from a planning perspective in this particular case given its impact on the street scene.

If these two issues could have been addressed by the development, I have little doubt that, in my experience, as an assessor for the Code for Sustainable Homes, this development would have achieved a Code Level 3 of the Code for Sustainable Homes Assessment.

In this respect, I can confirm that this development does still achieve a very high level of sustainability throughout – particularly in the context of energy efficiency of the dwellings and the minimisation of greenhouse gas emissions and waste generation."

Completed By

[redacted]

Mr S Hodges

NFOPP ADEA3
BREEAM Commercial
Code for Sustainable Homes

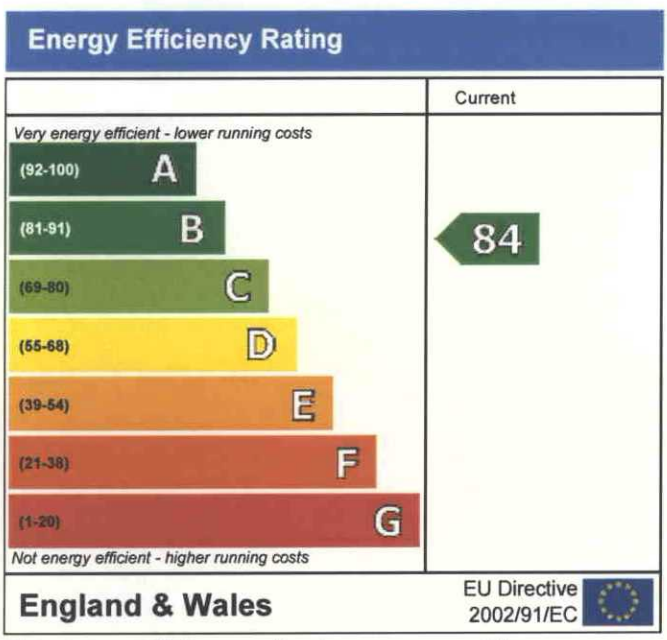
Predicted Energy Assessment

Plot 1, 40, Ladydell Road,
Worthing,
West Sussex

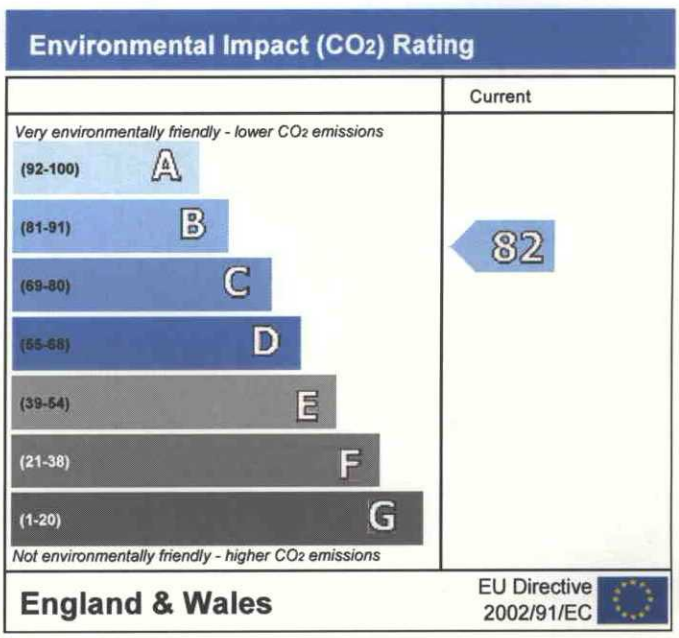
Dwelling type:	Semi-detached house
Date of assessment:	26 November 2009
Produced by:	DPS Sussex Ltd
Total floor area:	90 m²

This document is a Predicted Energy Assessment required to be included in a Home Information Pack for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, the Pack should be updated to include information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2005 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 (CO_2) 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.

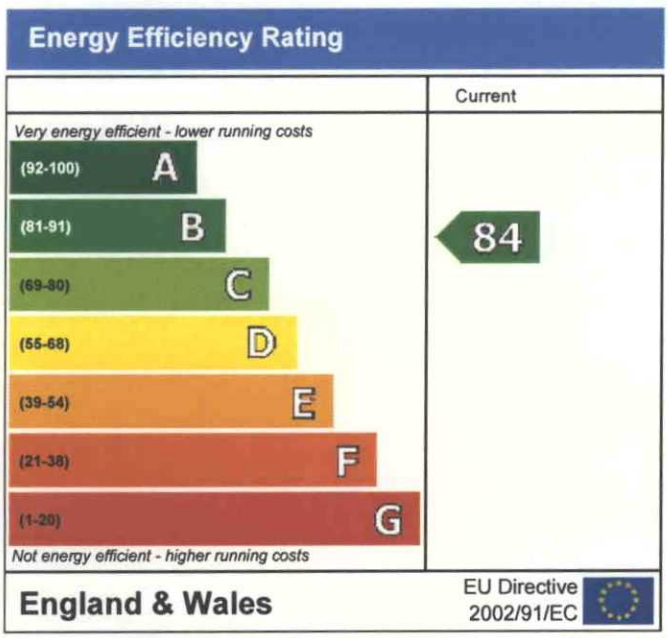
Predicted Energy Assessment

Plot 2, 40, Ladydell Road,
Worthing,
West Sussex

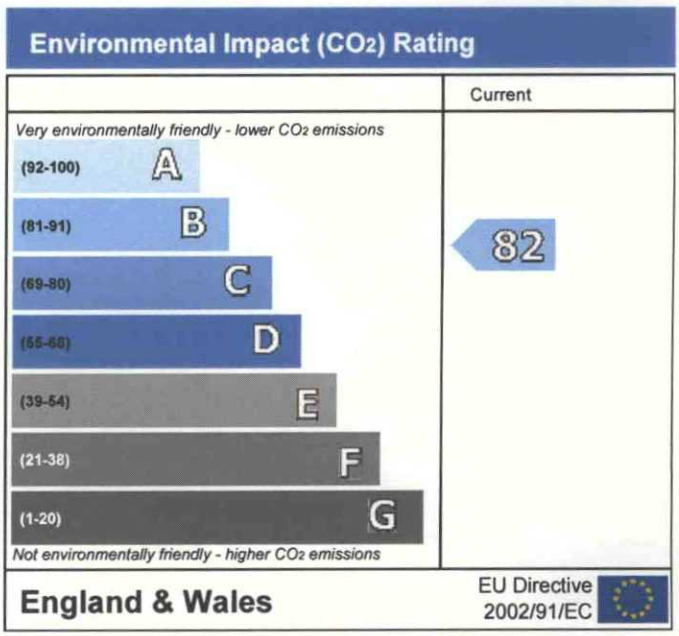
Dwelling type:	Semi-detached house
Date of assessment:	12 January 2009
Produced by:	DPS Sussex Ltd
Total floor area:	90 m²

This document is a Predicted Energy Assessment required to be included in a Home Information Pack for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, the Pack should be updated to include information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2005 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 (CO_2) 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.

Full SAP Calculation Printout

Users Ref: 931/LRW/Plot 1 **Issued on:** 25.June.2010

Prop Type Ref:

Property: Plot 1, 40, Ladydell Road, Worthing, West Sussex **DER:** 22.00

TER: 22.93

SAP Rating: 84 B **SAP Energy Cost:** £205.39 **CO2 Emissions:** 1.80 t/year

EI Rating: 82 B **Energy used:** 121 kWh/m2/year **Ene1:** 0 **ZC:** 0.00

Surveyor: 3650-0007, Simon Hodges, Tel: 01273 846576
Address: Unit 19, Turner Dumbrells, North End, Ditchling
Client: 24, Plans

Software Version: EES SAP 2005.018.03, October 2009 (Design System), BRE SAP Worksheet 9.81
SAP version: 9.81 Regs Region: England and Wales (Part L1A 2006), Calculation Type: New Build

CALCULATION DETAILS for survey reference no '931/LRW/Plot 1' Page: 1

SAP2005 - 9.81 input data (DesignData) -

```
Regs Region:                    England
Calculation Type:               NewDwellingAsDesigned
Region:                         SE South East England (16)
Orientation:                    W  West
PropType:                       H  House, S  Semi Detached
Storeys:                        3
Property Age:                   2010
Sheltered Sides:                1
Sunlight Shade:                 A Average or unknown
Wall Perimeter:                 20.30 m, 20.30 m, 12.65 m
Floor Area:                     38.70 m2, 38.70 m2, 12.22 m2
Living Floor Area:              16.47 m2, fraction:0.00
Storey Height:                  2.40 m, 2.55 m, 2.21 m
Conservatory:                   None
Doors
    Front Door:                 Solid PVC, uvalue: 1.50 (M), area: 2.12 m2, argon: No, solar tran
    Side Door:                  Double,Low E,Soft Coat, Glazed PVC, 16 mm, uvalue: 1.50 (M), area
Windows
    Ground Floor Front Windows:Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M),
    Ground Floor Side Windows: Double,Low E,Soft Coat, PVC, 16 mm, North (270°), uvalue: 1.50 (M
    Ground Floor Rear Windows: Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
    First Floor Front Windows: Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M),
    First Floor Side Windows:  Double,Low E,Soft Coat, PVC, 16 mm, North (270°), uvalue: 1.50 (M
    First Floor Rear Windows:  Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
    Second Floor Front (dormer) :Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M)
Draught Lobby:                  No
Draught Proofing:               100%
Roof Lights
    Second Floor Rear (velux): Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
Pressure Test:                  Air permeability 10.0 m³/h.m² (assumed)
Mechanical Ventilation:         None, Windows open during hot weather: Windows fully open
                                Cross ventilation possible: Yes
Fans, Chimneys, Flues:          3, 0, 0
Lighting:                       Light fittings: 10,  L.E.L. fittings: 10,  External lights: Yes,
Main Wall Type:                 U: 0.23 A: 77.61 m2
Extented Wall Types:            U: 0.26 A: 4.80 m2, U: 0.21 A: 9.50 m2
Timber Frame Wall Area:         0
Roof Pitched                    U: 0.10 A: 29.48 m2
Roof Sloped                     U: 0.15 A: 13.09 m2
Roof Flat                       U: 0.24 A: 2.24 m2
Main Floor Type:                U: 0.22 A: 38.70 m2
Thermal Mass:                   Simple Thermal Mass Parameter calculation: 12.00
                                Ground Floor Mass: Medium - solid floor
                                External Wall Mass: Medium - masonry walls (cavity fill or extern
                                Separating Wall Mass: Medium - masonry walls with plasterboard on
                                Internal Partition Mass: Medium - masonry partitions with plaster
```

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Timber Floor:	No Timber Floor
Fixed Air Conditioning:	No
Main Heating:	BGB Post 98 Gas condens. (incl combis) with auto ign. F.A.F., Pum
Main Heating Manufacturer:	Worcester, Greenstar Cdi, 30 Cdi Conventional, 90.30%
Heating Controls:	CBD Programmer, room thermostat and TRVs
	Boiler interlock - Yes
Underfloor Heating:	None
Combi Type:	NoCombi
Secondary Heating:	None
Manufacturer:	
Thermal Store:	None
Hot Water Heating:	HWP From the primary heating system
Solar Water Heating:	None
Thermal Store:	None
Hot Water Cylinder:	Yes, in heated space, With stat
	Water heating separately timed: Yes
Hot Water Cylinder Insulation:	Foam, Thickness: 80 mm, Pipes insulated
Hot Water Cylinder Volume:	150.00 litres
Community Heating:	None
CHP Unit:	
Electricity Tariff:	S - Standard
Thermal Bridges:	DefaultRobustConstr, Thermal bridging factor y = 0.08
PV Cells:	None
Energy Saved:	
Energy Used:	
Terrain Type:	Urban
Number of Wind Turbines:	0

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

SAP calculation (New Dwelling as Designed)

1. Overall dwelling dimensions			
Ground floor	38.700 * 2.400	92.8800	
First floor	38.700 * 2.550	98.6850	
Second floor	12.220 * 2.210	27.0062	
Total floor area	89.620		(5)
Total house volume		218.5712	(6)
2. Ventilation rate			
Number of chimneys	0 * 40	0	(7)
Number of flues	0 * 20	0	(8)
Number of fans	3 * 10	30	(9)
Flueless gas fire	0 * 40	0	(9a)
Infiltration		0.1373	(10)
Pressure test value		10.0000	(q50)
Infiltration rate		0.6373	(19)
Sides sheltered		1	(20)
Shelter factor		0.9250	(21)
Adjusted infiltration rate		0.5895	(22)
Air change natural ventilation		0.6737	(24)
Effective air change rate		0.6737	(25)
3. Heat losses and heat loss parameter			
Front Door	2.1200 * 1.50	3.1800	(26)
Side Door	1.8700 * 1.50	2.8050	(26)
Ground Floor Front Windows	2.6800 * (1.50) 1.42	3.7925	(27)
Ground Floor Side Windows	1.0100 * (1.50) 1.42	1.4292	(27)
Ground Floor Rear Windows	6.5300 * (1.50) 1.42	9.2406	(27)
First Floor Front Windows	3.2800 * (1.50) 1.42	4.6415	(27)
First Floor Side Windows	2.1100 * (1.50) 1.42	2.9858	(27)
First Floor Rear Windows	3.2800 * (1.50) 1.42	4.6415	(27)
Windows Second Floor Front (dormer)	1.1000 * (1.50) 1.42	1.5566	(27)
Roof windows Second Floor Rear (velux)	0.5000 * (1.50) 1.42	0.7075	(27)
Floor Ground	38.7000 * 0.22	8.5140	(28)
Walls Main Rendered	77.6100 * 0.23	17.8503	(29)
Walls Dormer	4.8000 * 0.26	1.2480	(29)
Walls RIR Stud	9.5000 * 0.21	1.9950	(29)
Roof Pitched	29.4800 * 0.10	2.9480	(30)
Roof Sloped	13.0900 * 0.15	1.9635	(30)
Roof Flat	2.2400 * 0.24	0.5376	(30)
Total area of elements		199.9000	(32)
Fabric heat loss		70.0367	(33)
Appendix K: Thermal bridging		0.0800	(y)
Effect of thermal bridges		15.9920	(34)
Total fabric heat loss		86.0287	(35)
Ventilation heat loss		48.5953	(36)
Heat loss coefficient		134.6240	(37)
Heat loss parameter (HLP)		1.5022	(38)
4. Water heating energy requirements			
Energy content of heated water		1971.1134	(39)
Distribution loss		347.8435	(40)
Cylinder volume		150.0000	(43)
Cylinder loss factor (kWh/litre/day)		0.0115	(44)

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Volume factor from Table 2a	0.9283	(44a)
Temperature factor from Table 2b	0.5400	(44b)
Energy lost from water storage, kWh/year	316.9327	(45)
Energy lost from cylinder in kWh/year	316.9327	(47)
Primary circuit loss	360.0000	(48)
Output from water heater	2995.8896	(51)
Gains from water heating	1312.5993	(52)

5. Internal gains

Lighting, appliances, cooking and metabolic (Table 5)	526.1670	(53)
Reduction of internal gains due to LE lighting (Appendix L)		
Correction factor for low-energy outlets	0.5000	(C1)
Window 1 0.9 * 2.680 * 0.80 * 0.7 * 0.83 / 89.620	0.0125	
Window 2 0.9 * 1.010 * 0.80 * 0.7 * 0.83 / 89.620	0.0047	
Window 3 0.9 * 6.530 * 0.80 * 0.7 * 0.83 / 89.620	0.0305	
Window 4 0.9 * 3.280 * 0.80 * 0.7 * 0.83 / 89.620	0.0153	
Window 5 0.9 * 2.110 * 0.80 * 0.7 * 0.83 / 89.620	0.0098	
Window 6 0.9 * 3.280 * 0.80 * 0.7 * 0.83 / 89.620	0.0153	
Window 7 0.9 * 1.100 * 0.80 * 0.7 * 0.83 / 89.620	0.0051	
Rooflight 1 0.9 * 0.500 * 0.80 * 0.7 * 1.00 / 89.620	0.0028	
Ratio of glass area to floor area	0.0961	(GL)
Correction factor for daylighting	0.9600	(C2)
Annual energy used for lighting in the house	400.0637	(EL)
Reduction in lighting use due to low energy lights	400.0637	(deltaEL)
Low energy lighting	-60.0096	(53a)
Additional gains - central heating pump	10.0000	
Additional gains (Table 5a)	10.0000	(53b)
Water heating	149.8401	(54)
Total internal gains	625.9975	(55)

6. Solar gains

	Area (m2)	Flux	g	FF	Access Factor	Gains (W)	
Windows 'W '	0.9 * 2.6800 *	48 *	0.63 *	0.7000 *	0.77	39.3141	(62)
Windows (1) 'N '	0.9 * 1.0100 *	29 *	0.63 *	0.7000 *	0.77	8.9514	(56)
Windows (2) 'E '	0.9 * 6.5300 *	48 *	0.63 *	0.7000 *	0.77	95.7913	(58)
Windows (3) 'W '	0.9 * 3.2800 *	48 *	0.63 *	0.7000 *	0.77	48.1157	(62)
Windows (4) 'N '	0.9 * 2.1100 *	29 *	0.63 *	0.7000 *	0.77	18.7005	(56)
Windows (5) 'E '	0.9 * 3.2800 *	48 *	0.63 *	0.7000 *	0.77	48.1157	(58)
Windows (6) 'W '	0.9 * 1.1000 *	48 *	0.63 *	0.7000 *	0.77	16.1364	(62)
Roof windows 'E '	0.9 * 0.5000 *	48 *	0.63 *	0.7000 *	1.00	9.5256	(64)
Total solar gains						284.6506	(65)
Total gains, W						910.6482	(66)
Gains/loss ratio (GLR)						6.7644	(67)
Utilisation factor						0.9301	(68)
Useful gains, W						847.0134	(69)

7. Mean internal temperature

Mean internal temperature of living zone (heating type = 1)	18.8799	(70)
Temperature addjustment	0.0000	(71)
Adjustment for gains	0.4583	(72)
Adjusted room temperature	19.3382	(73)
Temperature difference between zones	1.4903	(74)
Living area fraction	0.1838	(75)
Rest of house floor fraction	0.8162	(76)
Mean internal temperature	18.1218	(77)

8. Degree-days

Temperature raise from gains	6.2917	(78)
Base temperature	11.8301	(79)
Degree days	1309.3115	(80)

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

Space heating requirement (useful)	4230.3531	(81)

Database boiler reference number : 10356

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Model name : Greenstar Cdi			
Manufacturer: Worcester Bosch Group			
MHS efficiency		90.3000	
Main system efficiency		90.3000	(83)
Space heating fuel - main HS		4684.7764	(85)
Space heating fuel - secondary HS		0.0000	(85a)
Efficiency of water heater		90.3000	(86) (from SED
Energy required for water heating		2995.8896	
Energy used for water heating		3317.7072	(86a)
For each central heating pump		130.0000	(87a)
For each boiler with F.A.F		45.0000	(87b)
Electricity for pumps and fans		175.0000	(87)
Electricity for pumps and fans - total		175.0000	
Electricity for lighting (100% fixed LEL)		400.0637	(87g)
10a. Fuel costs - individual heating systems			
MHS heating cost	4684.7764 * 1.6300	76.3619	(88)
SHS heating cost	0.0000 * 0.0000	0.0000	(89)
Water heating cost	3317.7072 * 1.6300	54.0786	(91)
Pump/fan energy	175.0000 * 7.1200	12.4600	(92)
Lighting energy	400.0637 * 7.1200	28.4845	(93)
Additional standing charges		34.0000	(94)
Total energy cost		205.3850	(97)
Total energy cost using Sedbuk db prices		419.9793	
11a. SAP rating			
Energy cost deflator		0.9100	(98)
Energy cost factor (ECF)		1.1655	(99)
ECF unrounded = 1.16550561121079			
SAP value		83.7295	(99a)
SAP value unrounded = 83.7295416674974			
SAP Energy rating		84	(100)
SAP Energy rating band		B	
12a. Carbon dioxide emissions			
MHS heating CO2 - box (85)	4684.7764 * 0.1940	908.8466	(101)
WHS heating CO2 - box (86a)	3317.7072 * 0.1940	643.6352	(103)
Space and water heating CO2		1552.4818	(107)
Pumps and fans CO2 - box (87)	175.0000 * 0.4220	73.8500	(108)
Electricity for lighting	400.0637 * 0.4220	168.8269	(109)
Total CO2 emissions in kg/year		1795.1587	(112)
CO2 emissions per m?		20.0308	
Dwelling's Carbon Factor		13.3350	(CF)
EI value		82.1311	(113a)
EI rating		82	(114)
EI band		B	
13a. Primary energy			
MHS heating P.E. - box (85)	4684.7764 * 1.1500	5387.4928	
WHS heating P.E. - box (86a)	3317.7072 * 1.1500	3815.3633	
Space and water heating P.E.		9202.8562	(107)
Pumps and fans P.E. - box (87)	175.0000 * 2.8000	490.0000	(108)
Electricity for lighting	400.0637 * 2.8000	1120.1783	(109)
Primary energy kWh/year		10813.0345	(112)
Primary energy kWh/m2/year		120.6543	

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Full SAP Calculation Printout

Users Ref: 931/LRW/Plot 2 **Issued on:** 25.June.2010

Prop Type Ref:

Property: Plot 2, 40, Ladydell Road, Worthing, West Sussex **DER:** 21.76

TER: 22.93

SAP Rating: 84 B **SAP Energy Cost:** £203.70 **CO2 Emissions:** 1.78 t/year

EI Rating: 82 B **Energy used:** 119 kWh/m2/year **Ene1:** 0 **ZC:** 0.00

Surveyor: 3650-0007, Simon Hodges, Tel: 01273 846576
Address: Unit 19, Turner Dumbrells, North End, Ditchling
Client: 24, Plans

Software Version: EES SAP 2005.018.03, October 2009 (Design System), BRE SAP Worksheet 9.81
SAP version: 9.81 Regs Region: England and Wales (Part L1A 2006), Calculation Type: New Build

CALCULATION DETAILS for survey reference no '931/LRW/Plot 2' Page: 1

SAP2005 - 9.81 input data (DesignData) -

```
Regs Region:                    England
Calculation Type:               NewDwellingAsDesigned
Region:                         SE South East England (16)
Orientation:                    W  West
PropType:                       H  House, S  Semi Detached
Storeys:                        3
Property Age:                   2010
Sheltered Sides:                1
Sunlight Shade:                 A Average or unknown
Wall Perimeter:                 20.30 m, 20.30 m, 12.65 m
Floor Area:                     38.70 m2, 38.70 m2, 12.22 m2
Living Floor Area:              16.47 m2, fraction:0.00
Storey Height:                  2.40 m, 2.55 m, 2.21 m
Conservatory:                   None
Doors
    Front  Door:                Solid PVC, uvalue: 1.50 (M), area: 2.12 m2, argon: No, solar tran
    Side Door:                  Double,Low E,Soft Coat, Glazed PVC, 16 mm, uvalue: 1.50 (M), area
Windows
    Ground Floor Front Window:  Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M),
    Ground Floor Side Window:   Double,Low E,Soft Coat, PVC, 16 mm, South (90°), uvalue: 1.50 (M)
    Ground Floor Rear Window:   Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
    First Floor Front Window:   Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M),
    First Floor Side Window:    Double,Low E,Soft Coat, PVC, 16 mm, South (90°), uvalue: 1.80 (T)
    First Floor Rear Window:    Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
    Second Floor Front (Dormer):Double,Low E,Soft Coat, PVC, 16 mm, West (0°), uvalue: 1.50 (M),
Draught Lobby:                  No
Draught Proofing:               100%
Roof Lights
    Second Floor Rear (Velux):  Double,Low E,Soft Coat, PVC, 16 mm, East (180°), uvalue: 1.50 (M)
Pressure Test:                  Air permeability 10.0 m³/h.m² (assumed)
Mechanical Ventilation:         None, Windows open during hot weather: Windows fully open
                                Cross ventilation possible: Yes
Fans, Chimneys, Flues:          3, 0, 0
Lighting:                       Light fittings: 10,  L.E.L. fittings: 10,  External lights: Yes,
Main Wall Type:                 U: 0.23 A: 77.61 m2
Extented Wall Types:            U: 0.26 A: 4.80 m2, U: 0.21 A: 9.50 m2
Timber Frame Wall Area:         0
Roof Pitched                    U: 0.10 A: 29.48 m2
Roof Sloped                     U: 0.15 A: 13.09 m2
Roof Flat                       U: 0.24 A: 2.24 m2
Main Floor Type:                U: 0.22 A: 38.70 m2
Thermal Mass:                   Simple Thermal Mass Parameter calculation: 12.00
                                Ground Floor Mass: Medium - solid floor
                                External Wall Mass: Medium - masonry walls (cavity fill or extern
                                Separating Wall Mass: Medium - masonry walls with plasterboard on
                                Internal Partition Mass: Medium - masonry partitions with plaster
```

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Timber Floor:	No Timber Floor
Fixed Air Conditioning:	No
Main Heating:	BGB Post 98 Gas condens. (incl combis) with auto ign. F.A.F., Pum
Main Heating Manufacturer:	Worcester, Greenstar Cdi, 30 Cdi Conventional, 90.30%
Heating Controls:	CBD Programmer, room thermostat and TRVs
	Boiler interlock - Yes
Underfloor Heating:	None
Combi Type:	NoCombi
Secondary Heating:	None
Manufacturer:	
Thermal Store:	None
Hot Water Heating:	HWP From the primary heating system
Solar Water Heating:	None
Thermal Store:	None
Hot Water Cylinder:	Yes, in heated space, With stat
	Water heating separately timed: Yes
Hot Water Cylinder Insulation:	Foam, Thickness: 80 mm, Pipes insulated
Hot Water Cylinder Volume:	150.00 litres
Community Heating:	None
CHP Unit:	
Electricity Tariff:	S - Standard
Thermal Bridges:	DefaultRobustConstr, Thermal bridging factor y = 0.08
PV Cells:	None
Energy Saved:	
Energy Used:	
Terrain Type:	Urban
Number of Wind Turbines:	0

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

SAP calculation (New Dwelling as Designed)

1. Overall dwelling dimensions			
Ground floor	38.700 * 2.400	92.8800	
First floor	38.700 * 2.550	98.6850	
Second floor	12.220 * 2.210	27.0062	
Total floor area	89.620		(5)
Total house volume		218.5712	(6)
2. Ventilation rate			
Number of chimneys	0 * 40	0	(7)
Number of flues	0 * 20	0	(8)
Number of fans	3 * 10	30	(9)
Flueless gas fire	0 * 40	0	(9a)
Infiltration		0.1373	(10)
Pressure test value		10.0000	(q50)
Infiltration rate		0.6373	(19)
Sides sheltered		1	(20)
Shelter factor		0.9250	(21)
Adjusted infiltration rate		0.5895	(22)
Air change natural ventilation		0.6737	(24)
Effective air change rate		0.6737	(25)
3. Heat losses and heat loss parameter			
Front Door	2.1200 * 1.50	3.1800	(26)
Side Door	1.8700 * 1.50	2.8050	(26)
Ground Floor Front Window	2.6800 * (1.50) 1.42	3.7925	(27)
Ground Floor Side Window	1.0100 * (1.50) 1.42	1.4292	(27)
Ground Floor Rear Window	6.5300 * (1.50) 1.42	9.2406	(27)
First Floor Front Window	3.2800 * (1.50) 1.42	4.6415	(27)
First Floor Side Window	2.1100 * (1.80) 1.68	3.5429	(27)
First Floor Rear Window	3.2800 * (1.50) 1.42	4.6415	(27)
Windows Second Floor Front (Dormer)	1.1000 * (1.50) 1.42	1.5566	(27)
Roof windows Second Floor Rear (Velux)	0.5000 * (1.50) 1.42	0.7075	(27)
Floor Ground	38.7000 * 0.22	8.5140	(28)
Walls Main Rendered	77.6100 * 0.23	17.8503	(29)
Walls Dormer	4.8000 * 0.26	1.2480	(29)
Walls RIR Stud	9.5000 * 0.21	1.9950	(29)
Roof Pitched	29.4800 * 0.10	2.9480	(30)
Roof Sloped	13.0900 * 0.15	1.9635	(30)
Roof Flat	2.2400 * 0.24	0.5376	(30)
Total area of elements		199.9000	(32)
Fabric heat loss		70.5937	(33)
Appendix K: Thermal bridging		0.0800	(y)
Effect of thermal bridges		15.9920	(34)
Total fabric heat loss		86.5857	(35)
Ventilation heat loss		48.5953	(36)
Heat loss coefficient		135.1810	(37)
Heat loss parameter (HLP)		1.5084	(38)
4. Water heating energy requirements			
Energy content of heated water		1971.1134	(39)
Distribution loss		347.8435	(40)
Cylinder volume		150.0000	(43)
Cylinder loss factor (kWh/litre/day)		0.0115	(44)

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Volume factor from Table 2a	0.9283	(44a)
Temperature factor from Table 2b	0.5400	(44b)
Energy lost from water storage, kWh/year	316.9327	(45)
Energy lost from cylinder in kWh/year	316.9327	(47)
Primary circuit loss	360.0000	(48)
Output from water heater	2995.8896	(51)
Gains from water heating	1312.5993	(52)

5. Internal gains

Lighting, appliances, cooking and metabolic (Table 5)	526.1670	(53)
Reduction of internal gains due to LE lighting (Appendix L)		
Correction factor for low-energy outlets	0.5000	(C1)
Window 1 0.9 * 2.680 * 0.80 * 0.7 * 0.83 / 89.620	0.0125	
Window 2 0.9 * 1.010 * 0.80 * 0.7 * 0.83 / 89.620	0.0047	
Window 3 0.9 * 6.530 * 0.80 * 0.7 * 0.83 / 89.620	0.0305	
Window 4 0.9 * 3.280 * 0.80 * 0.7 * 0.83 / 89.620	0.0153	
Window 5 0.9 * 2.110 * 0.80 * 0.7 * 0.83 / 89.620	0.0098	
Window 6 0.9 * 3.280 * 0.80 * 0.7 * 0.83 / 89.620	0.0153	
Window 7 0.9 * 1.100 * 0.80 * 0.7 * 0.83 / 89.620	0.0051	
Rooflight 1 0.9 * 0.500 * 0.80 * 0.7 * 1.00 / 89.620	0.0028	
Ratio of glass area to floor area	0.0961	(GL)
Correction factor for daylighting	0.9600	(C2)
Annual energy used for lighting in the house	400.0637	(EL)
Reduction in lighting use due to low energy lights	400.0637	(deltaEL)
Low energy lighting	-60.0096	(53a)
Additional gains - central heating pump	10.0000	
Additional gains (Table 5a)	10.0000	(53b)
Water heating	149.8401	(54)
Total internal gains	625.9975	(55)

6. Solar gains

	Area (m2)	Flux	g	FF	Access Factor	Gains (W)	
Windows 'W '	0.9 * 2.6800 *	48 * 0.63	* 0.7000 *	0.77	39.3141	(62)	
Windows (1) 'S '	0.9 * 1.0100 *	72 * 0.63	* 0.7000 *	0.77	22.2242	(60)	
Windows (2) 'E '	0.9 * 6.5300 *	48 * 0.63	* 0.7000 *	0.77	95.7913	(58)	
Windows (3) 'W '	0.9 * 3.2800 *	48 * 0.63	* 0.7000 *	0.77	48.1157	(62)	
Windows (4) 'S '	0.9 * 2.1100 *	72 * 0.63	* 0.7000 *	0.77	46.4287	(60)	
Windows (5) 'E '	0.9 * 3.2800 *	48 * 0.63	* 0.7000 *	0.77	48.1157	(58)	
Windows (6) 'W '	0.9 * 1.1000 *	48 * 0.63	* 0.7000 *	0.77	16.1364	(62)	
Roof windows 'E '	0.9 * 0.5000 *	48 * 0.63	* 0.7000 *	1.00	9.5256	(64)	
Total solar gains					325.6517	(65)	
Total gains, W					951.6492	(66)	
Gains/loss ratio (GLR)					7.0398	(67)	
Utilisation factor					0.9225	(68)	
Useful gains, W					877.8528	(69)	

7. Mean internal temperature

Mean internal temperature of living zone (heating type = 1)	18.8795	(70)
Temperature addjustment	0.0000	(71)
Adjustment for gains	0.4988	(72)
Adjusted room temperature	19.3783	(73)
Temperature difference between zones	1.4913	(74)
Living area fraction	0.1838	(75)
Rest of house floor fraction	0.8162	(76)
Mean internal temperature	18.1610	(77)

8. Degree-days

Temperature raise from gains	6.4939	(78)
Base temperature	11.6671	(79)
Degree days	1275.0920	(80)

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

Space heating requirement (useful)	4136.8379	(81)

Database boiler reference number : 10356

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Model name : Greenstar Cdi			
Manufacturer: Worcester Bosch Group			
MHS efficiency		90.3000	
Main system efficiency		90.3000	(83)
Space heating fuel - main HS		4581.2158	(85)
Space heating fuel - secondary HS		0.0000	(85a)
Efficiency of water heater		90.3000	(86) (from SED
Energy required for water heating		2995.8896	
Energy used for water heating		3317.7072	(86a)
For each central heating pump		130.0000	(87a)
For each boiler with F.A.F		45.0000	(87b)
Electricity for pumps and fans		175.0000	(87)
Electricity for pumps and fans - total		175.0000	
Electricity for lighting (100% fixed LEL)		400.0637	(87g)
10a. Fuel costs - individual heating systems			
MHS heating cost	4581.2158 * 1.6300	74.6738	(88)
SHS heating cost	0.0000 * 0.0000	0.0000	(89)
Water heating cost	3317.7072 * 1.6300	54.0786	(91)
Pump/fan energy	175.0000 * 7.1200	12.4600	(92)
Lighting energy	400.0637 * 7.1200	28.4845	(93)
Additional standing charges		34.0000	(94)
Total energy cost		203.6970	(97)
Total energy cost using Sedbuk db prices		416.7689	
11a. SAP rating			
Energy cost deflator		0.9100	(98)
Energy cost factor (ECF)		1.1541	(99)
ECF unrounded = 1.15409487524845			
SAP value		83.8888	(99a)
SAP value unrounded = 83.8888355415317			
SAP Energy rating		84	(100)
SAP Energy rating band		B	
12a. Carbon dioxide emissions			
MHS heating CO2 - box (85)	4581.2158 * 0.1940	888.7559	(101)
WHS heating CO2 - box (86a)	3317.7072 * 0.1940	643.6352	(103)
Space and water heating CO2		1532.3911	(107)
Pumps and fans CO2 - box (87)	175.0000 * 0.4220	73.8500	(108)
Electricity for lighting	400.0637 * 0.4220	168.8269	(109)
Total CO2 emissions in kg/year		1775.0680	(112)
CO2 emissions per m?		19.8066	
Dwelling's Carbon Factor		13.1858	(CF)
EI value		82.3311	(113a)
EI rating		82	(114)
EI band		B	
13a. Primary energy			
MHS heating P.E. - box (85)	4581.2158 * 1.1500	5268.3982	
WHS heating P.E. - box (86a)	3317.7072 * 1.1500	3815.3633	
Space and water heating P.E.		9083.7616	(107)
Pumps and fans P.E. - box (87)	175.0000 * 2.8000	490.0000	(108)
Electricity for lighting	400.0637 * 2.8000	1120.1783	(109)
Primary energy kWh/year		10693.9399	(112)
Primary energy kWh/m2/year		119.3254	

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Tarmac

THE CODE FOR SUSTAINABLE HOMES 'RESPONSIBLE SOURCING OF MATERIALS'

THE USE OF TARMAC TOPBLOCK PRODUCTS

This aspect of sustainability performance is featured in *Category 3 Materials* of the Code for Sustainable Homes. The requirements for demonstrating Responsible Sourcing are summarised in the Technical Guide to the Code for Sustainable Homes, Category 3 Materials, Tables 1 and 2.

Tarmac Topblock operate a BSI Certified environmental management system (EMS) conforming to ISO 14001 for its Key Process as defined in the Technical Guidance to the Code for Sustainable Homes.
The Certificate No. is 507669, and if required a copy of the certificate can be downloaded from our web site www.topblock.co.uk.

The products manufactured at our manufacturing sites include Durox and Toplite aircrete blocks, and Hemelite and Topcrete aggregate blocks.

Topblock's supply chain processes as defined in the Technical Guidance also operate to similar environmental standards and details of their EMS certification are given in the Lists below. Copies of the Certificates listed can be made available on request.

The Lists will be updated periodically to reflect any changes in the status of our supplier's environmental management system.

EMS Certification Details – Supply chain processes

A	**Durox & Toplite Aircrete Blocks**		
	Material	**Supplier**	**EMS Certification**
	Cement	Castle Cement Ltd	BSI – IMS91239
		Cemex Materials UK Ltd	SGS GB00/52224
	Sand	Cemex Materials UK Ltd	SGS GB00/52224
		WBB Minerals	CICS Cert 23480
	Lime	Cemex Materials UK Ltd	SGS GB00/52224
		Singleton Birch	BSI EMS 59687
		Buxton Lime Industries	BSI EMS 56965

Tarmac

EMS Certification Details – Supply chain processes

B	**Hemelite & Topcrete Aggregate Blocks**		
	Material	**Supplier**	**EMS Certification**
	Cement	BLI Cement, Buxton	BSI EMS 56965
		Lafarge Westbury	LRQ 0772899
		Cemex, Rugby Warwick	LRQ 0772605
		Cemex, Rochester, Kent	LRQ 0772605
	Aggregates	Tarmac Ltd (Midlands) Ballidon Quarry	BSI EMS 506166
		Tarmac Ltd (North-west) Dunald Mill Quarry	BSI EMS 506166
		Tarmac Southern Ltd Maxey Quarry	BSI EMS 506166
		Tarmac Ltd – Park Farm Quarry	BSI EMS 506166
		Tarmac Ltd – Coxhoe Quarry, Coxhoe, County Durham	BSI EMS 506166
		Tarmac Ltd – Barrasford Quarry Barrasford, Hexham, Northumberland	BSI EMS 506166
		Tarmac Ltd – Eysey Manor Quarry, Eysey, Nr Cricklade, Swindon	BSI EMS 506166
		Tarmac Ltd – Halecombe Quarry, Mells, Frome Somerset	BSI EMS 506166
		Tarmac Ltd – Heath End, Petworth, West Sussex	BSI EMS 506166
		Tarmac Ltd – Croxden Quarry, Cheadle Staffs	BSI EMS 506166
		Tarmac Ltd – Dene Quarry, Cromford, Matlock, Derbyshire	BSI EMS 506166
		Tarmac Ltd – Kington, Herefordshire	BSI EMS 506166
		Tarmac Ltd – Holme Hall Quarry, Stainton, Maltby	BSI EMS 506166
		Tarmac Buxton Lime Buxton, Derbyshire	BSI EMS 506166
		Brett Aggregates – Faversham, Kent	SIRA 010849

Further information can be obtained from Topblock Technical Services
Tel No: 0870 242 1489

Issued July 2008

Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2004

This is to certify that:

Hanson Building Products Limited
Stewartby Works
Stewartby
MK43 9LZ
United Kingdom

Holds Certificate No: **EMS 56644**
and operates an Environmental Management System which complies with the requirements of ISO 14001:2004 for the following scope:

Support services associated with the management of the EMS for the Hanson Building Products Division of Hanson plc. The main activities, products and services includes: 1. Winning of clay; 2. Manufacture and storage of clay bricks; 3. Manufacture of aerated, lightweight, concrete building blocks; 4. Manufacture of concrete building blocks. 5. Manufacture of pre-cast concrete building elements. 6. Bagging of aggregates and cementitious blends; 7. Dry-batching of ready-mixed mortar; 8. Design and manufacture of concrete paving and kerbing systems; 9. Manufacture of terracotta building products; 10. The manufacture of concrete flue systems.

For and on behalf of BSI:

[redacted]

Head of Compliance & Risk (UK)

Originally registered: **08/11/2000** Latest Issue: **19/06/2007** Expiry Date: **19/01/2011**

BSI UKAS ENVIRONMENTAL MANAGEMENT 003

This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
An electronic certificate can be authenticated online.
Printed copies can be validated at www.bsi-global.com/ClientDirectory

The British Standards Institution is incorporated by Royal Charter.
Management Systems (UK) Headquarters: P.O. Box 9000, Milton Keynes MK14 6WT. Tel: 0845 080 9000

BSI Management Systems

Certificate of Registration

FSC ACCREDITED

This is to certify that

Stamco Timber Limited

"the certified site"

has been certified in accordance with the requirements of the **Forest Stewardship Council A.C.**

and that

Stamco Timber Limited

of

Bexhill Road, St Leonards on Sea, Havenhurst mill, East Sussex

is hereby licensed to use the FSC Logo on and sell as FSC certified

Sawn & Machined timber, sheet material and timber based mouldings, finished goods

processed at and distributed from the certified site

Certificate Registration code:	SA-COC-1489
Issued by:	WOODMARK The Soil Association Bristol House 40-56 Victoria St Bristol BS1 6BY. UK
Issue date	9th January 2006
Valid until the Renewal Date:	**8th January 2011** Subject to successful annual surveillance
Signed on behalf of Woodmark by the Soil Association Certification Officer	[redacted]

 © Prepared by EcoSylva Ltd on behalf of Soil Association Certification Ltd
This Certificate is the property of Soil Association Certification Ltd and must be returned on request.
FSC Trademark © 1996 Forest Stewardship Council A.C. FSC-ACC-002

Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2004

This is to certify that:

British Gypsum Limited
Fenton Lane
Sherburn in Elmet
Leeds
LS25 6EZ
United Kingdom

Holds Certificate No: **EMS 531172**
and operates an Environmental Management System which complies with the requirements of ISO 14001:2004 for the following scope:

The manufacture and supply of plasterboard, plaster and related products.

For and on behalf of BSI:

[redacted]

Head of Compliance & Risk (UK)

Originally registered: **30/10/2007** Latest Issue: **05/11/2007** Expiry Date: **30/12/2010**

UKAS ENVIRONMENTAL MANAGEMENT 003

This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
An electronic certificate can be authenticated online.
Printed copies can be validated at www.bsi-global.com/ClientDirectory

The British Standards Institution is incorporated by Royal Charter.
Management Systems (UK) Headquarters: P.O. Box 9000, Milton Keynes MK14 6WT. Tel: 0845 080 9000

BSI Management Systems