

ENERGY & SUSTAINABILITY STATEMENT

ERECTION OF WAREHOUSE WITH ANCILLARY OFFICE.

OLDLANDS FARM,
NEWLANDS ROAD,
BOGNOR REGIS, PO22 9FJ

Client

LYSANDER

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WAREHOUSE WITH ANCILLARY OFFICE,

OLDLANDS FARM, BOGNOR REGIS

Document No. 10383/ENE-01

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WAREHOUSE WITH ANCILLARY OFFICE,

OLDLANDS FARM, BOGNOR REGIS

Document No. 10383/ENE-01

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1. Description

Kelly Taylor & Associates has been appointed by Lysander to prepare an energy report to comply with Arun District Council Plan Policy ECC SP2 and support an application for full planning permission for a proposed development at Oldlands Farm, Off Newlands Farm, Bognor Regis PO22 9FJ.

The application relates to the planning application for the site seeking (1) full planning permission for the Erection of a warehouse (Use Class B8) with ancillary office, associated vehicle parking, van storage, plant, ancillary structures, lighting, landscaping and infrastructure works including earthworks to facilitate flood compensation area

This report/calculation has been produced to show compliance with Criteria 1 (CO₂ emissions) & Criteria 3 (Limiting solar gains) of the Building Regulations Part L2A-2013. A provisional energy performance certificate has also been produced to give the likely asset rating of the building after fit-out is completed.

The dynamic simulation modelling has been completed using TAS (Thermal Analysis Software) version 9.5.1. Incorporating the new building regulations & NCM (National Calculation Methodology) modelling guidance 2013. All internal conditions including equipment and occupancy gains and all set points are taken from the standard NCM activities database v5.2.7 the CIBSE TRY (Test Reference Year) weather location file used was 'Southampton' as the nearest weather file from the CIBSE postcode location checker.

The building is of metal frame construction with insulated metal cladding panels to the external walls & roof, solid pre-cast ground floor slab. This building is 13.9m in height to the external roof ridge level and has a main office block with one floor (first floor) of office space including open offices, break rooms, lockers, toilets etc. The ground floor office has reception/toilets in the North West Corner, and plant deck above the first floor office for HVAC plant, the ground floor office South West corner has a stair and truckers rest area, in the warehouse there is one further area for toilets on the North elevation and store areas on the East elevation.

Double glazed window units are located mainly on the North & South elevations of the first floor offices, the north side of the warehouse has vehicle level access doors for van deliveries, the west side of the warehouse has dock leveller doors for HGV deliveries. There is a van storage area to the north of the warehouse building and a large canopy on the northern side of the building all treated as external areas and not part of the Part L2a 2013 assessment.

A fully fitted out warehouse and offices have been modelled to indicate the minimum services requirement installed by the incoming tenant to make sure the building complies with the Part L2a 2013 and to comply with the planning requirements.

The various assumed building services are shown in the services description below, which includes for the warehouse area to be fully heated with gas-fired air handling units and the lighting to be high efficiency LED type high bay luminaires with presence detection, the internal NCM condition utilised is Ware_WareStore 24 hrs use. Note because of the 24hrs use and lighting with no daylight dimming as no roof lights are being installed the heating load is very low.

The occupied office areas will be ventilated by a fresh air/return air ducted systems complete with ceiling diffusers/valves connected to a heat recovery air handling units with electric heater batteries. The main toilet/lockers area will be ventilated by a fresh air/return air ducted system complete with ceiling diffusers/valves via a heat recovery air handling unit with electric heater batteries. Other toilets to have extract only ventilation and electric panels heaters.

The lighting will be provided by means of modular and LED luminaires complete with DALI drivers as detailed on the scheme drawings. The lighting shall be PIR/Photocell controlled via lighting control marshalling boxes (daylight dimming control in offices/breakrooms etc. with windows). The entire lighting installation in the office areas will be modular, design values/controls as indicated in section 3.

This report has been produced by Gary Westwell of Kelly Taylor & Associates a fully accredited Level 5 non-domestic energy assessor using Quidos (Assessor ID – QUID205478).

2 **Planning**

The Arun District Council Plan Policy ECC SP2 states:

Policy ECC SP2

Energy and climate change mitigation

All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

- a. Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;
- b. Use design and layout to promote energy efficiency; and
- c. Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.

All major developments⁽⁴⁰⁾ must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider 'allowable solutions' where it is clearly demonstrated that the provision of on site renewable or low carbon energy generation is unviable or not feasible.

Where planning permission is required to retrofit energy efficiency measures into existing development, schemes will be permitted, subject to the Design and Built Heritage policies.

In assessing the achievement of these standards the Council will consider:

- Site constraints;
- Technical viability;
- Financial viability; and
- Delivery of additional benefits.

Therefore, the scheme has been designed to incorporate low and zero carbon energy sources which will reduce the predicted CO² emissions of the development by 10%, the predicted CO² emissions calculated includes for all the areas fitted out with services and is calculated using Building Regulations Part L2a 2013 methodology and compared against the building regulations notional building.

The renewable/low carbon energy sources which have been considered is a photovoltaic system on the main building roof as there is sufficient space to install a large system.

3 Design Stage Information

The Part L 2013 & ENE01 calculations were undertaken using the following Construction U-Value information all to be confirmed by the design team:-

Building Fabric:-

Walls	0.23 w/m ² k	
Solid Floor	0.20 w/m ² k	
Roof	0.16 w/m ² k	
Windows (no blinds)	1.40 w/m ² k	(Light Transmittance Value 0.70, Total Solar G-Value 0.50)
Windows Frames	2.20 w/m ² k	
Personnel/Warehouse Doors	2.00 w/m ² k	
Level Access Doors	1.50 w/m ² k	
Dock Leveller Doors	1.50 w/m ² k	
Vehicle Door Glazing	1.40 w/m ² k	

Air permeability 1.5 m³/hr.m²

The Part L 2013 & ENE01 calculations were undertaken using the following assumed fit-out building services information:-

Lighting Automatic monitoring & targeting with out of range values – No

HVAC Automatic monitoring & targeting with out of range values – No

Power Factor Correction – No

Office's

All office occupied area's (GF Reception, FF Open Offices, FF Meeting Rooms, FF Breakrooms, FF Offices, FF Training Rooms) heated/cooled by an air source reverse cycle heat pump VRF/VRV (Variable Refrigerant Flow/Volume) heat recovery system comprising external condensers and indoor ceiling cassette units with system SCOP (Seasonal Co-Efficient of Performance) of 4.5 for heating & SEER (Seasonal Energy Efficiency Ratio) of 5.5 for cooling.

All office other area's including circulation areas, toilets heated via wall mounted electric panel heaters at 100% efficiency, lockers heated via electric heater battery in supply air ductwork at 100% efficiency.

Office fresh air & return air ventilation to occupied area's is provided via heat recovery air handling units with SFP (Specific Fan Power) of 1.8 and 73% recovery efficiency,

Office main toilets/lockers fresh air & return air ventilation using 6 ACH provided via a heat recovery air handling unit with SFP of 1.8 and 73% recovery efficiency.

Office small toilets in south west location extract only ventilation using 6 ACH provided via toilet extract fan on plantdeck with SFP of 0.5.

Main Office hot water services supplied via an air source heatpump system/cylinder with a COP of 3.0, remote welfare facilities shall be supplied via point of use electric water heaters

Lighting to open offices, small offices, meeting rooms & training room to be LED type with daylight dimming control in zones with external windows & PIR in other zones at 130lm/cw @ 500lux

Lighting to break rooms to be LED type with daylight dimming control in zones with external windows & PIR in other zones at 120lm/cw @ 200lux

Lighting to toilets taken as LED type with PIR control at 100lm/cw @ 200lux

Lighting to lockers taken as LED type with PIR control at 130lm/cw @ 200lux

Lighting to corridors, lobby's taken as LED type with PIR control at 100lm/cw @ 200lux

Lighting to stairwells taken as LED type with PIR control at 130lm/cw @ 150lux

Warehouse

Warehouse area's heated from gas fired AHU with 91% burner efficiency and an SFP of 1.6 w/l/s

Warehouse small debrief area heated from electric radiant panels at 100% efficiency

Warehouse dock loading area heated from gas radiant panels at 91% efficiency

Warehouse toilet/circulation areas heated via wall mounted electric panel heaters at 100% efficiency

Warehouse toilets ventilated via in-line extract only fans with SFP's of 0.5 w/l/s at 6 ACH.

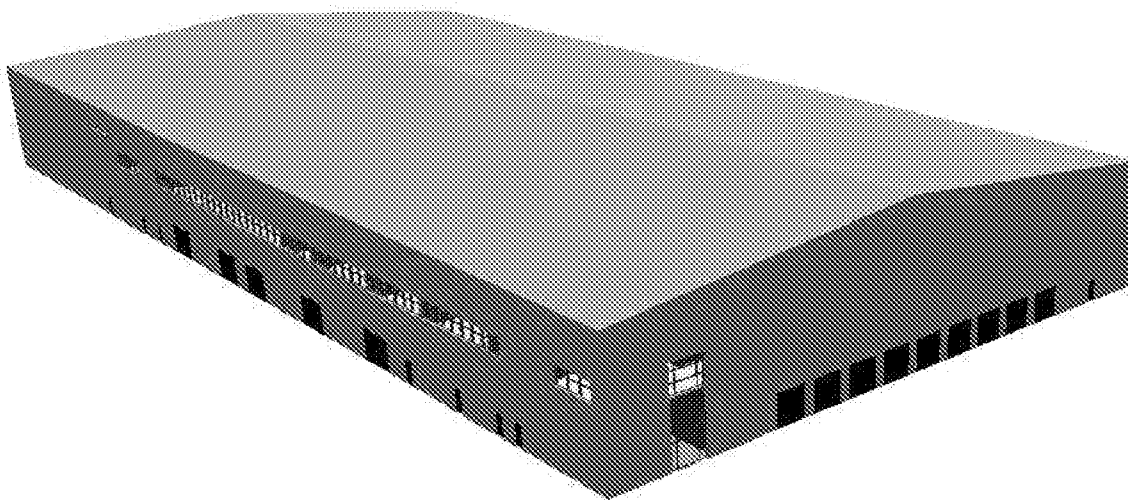
Warehouse toilets hot water services supplied via electric point of use water heaters

Warehouse area lighting to be High Efficiency LED type with PIR control – 130lm/cw @ 300lux

Warehouse undercroft lighting to be High Efficiency LED type with PIR control – 130lm/cw @ 300lux

Warehouse toilets/lockers lighting to be High Efficiency LED type with PIR control – 100lm/cw @ 200lux

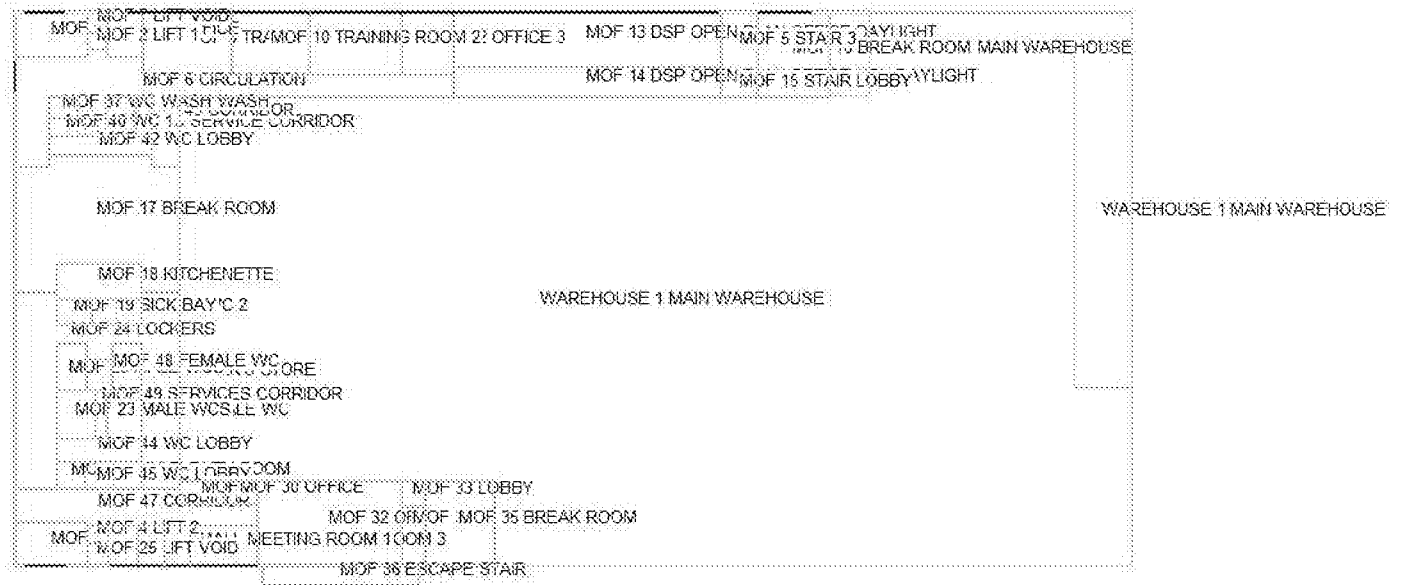
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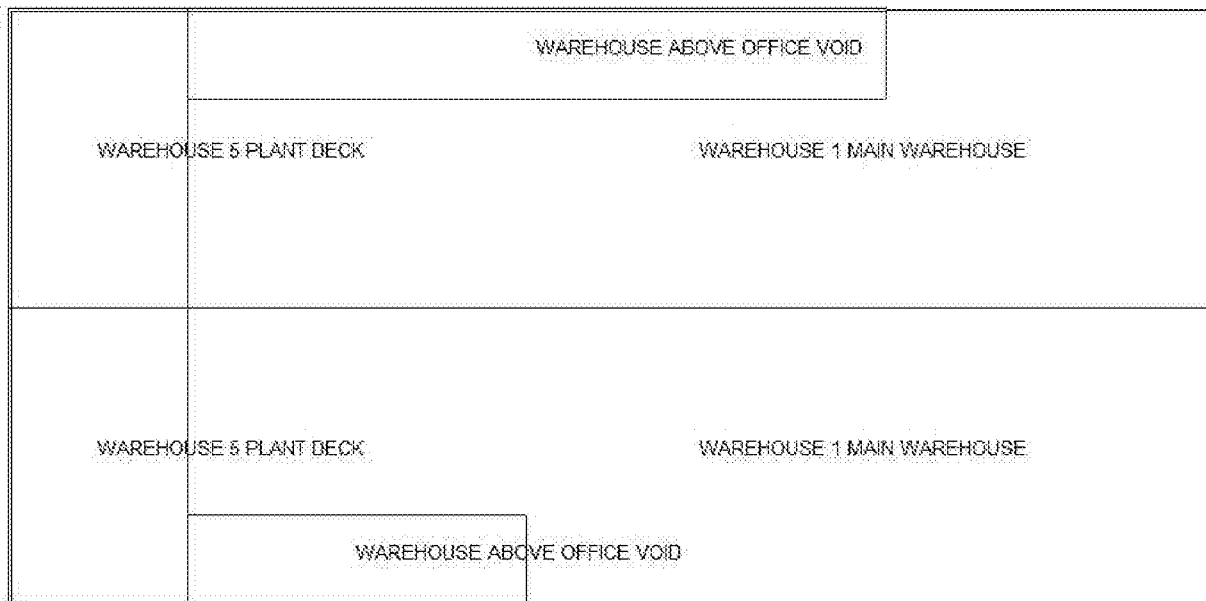
ELEVATIONAL VIEW



GROUND FLOOR ZONE PLAN



FIRST FLOOR ZONE PLAN



ROOF LEVEL ZONE PLAN

Criteria 1 (CO2 Emissions) – Part L2A-2013

The calculation was run allowing for values/services as set out in the design stage information, the building passes the Building Regulations 2013 mainly due to using LED lighting throughout and a good efficiency on the VRF/VRV heatpump system, the calculation shows an overall BER (Building Emission Rate) of 19.2 kgCO₂/m²/pa over the Building Regulations Building TER (Target Emission Rate) of 24 kgCO₂/m²/pa giving an overall pass rate of 20%, The resulting BRUKL (Building Regulations United Kingdom PartL) front sheet shown below.

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

Warehouse Oldlands Farm

As designed

Date: Mon May 10 14:01:47 2021

Administrative information

Building Details

Address: Oldlands Farm, Newlands Road, Bognor Regis,
BN9 5LA

Certification tool

Calculation engine: TAS

Calculation engine version: v9.5.1

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.5.0

Certifier details

Name: Gary Westwell

Telephone number: 01752332880

Address: 1 Ashleigh Way, PLYMOUTH, PL75JX

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	19.2
Are emissions from the building less than or equal to the target?	BER <= TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{s, limit}	U _{s, calc}	U _{s, max}	Surface where the maximum value occurs*
Wall**	0.35	0.23	0.23	External Cladding Wall (75mm)
Floor	0.25	0.2	0.2	Ground Floor
Roof	0.25	0.16	0.16	Roof
Windows***, roof windows, and rooflights	2.2	1.58	1.58	Main Entrance Glazed row 1 - 1
Personnel doors	2.2	2	2	Personnel Door (single)
Vehicle access & similar large doors	1.5	1.5	1.5	Dock Door Lower 01
High usage entrance doors	2.5	1.5	1.5	Main Entrance Glazed Door

U_{s, limit} = Limiting area-weighted average U-values [W/(m²K)]

U_{s, calc} = Calculated area-weighted average U-values [W/(m²K)]

U_{s, max} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	1.5

Criteria 1 (CO2 Emissions) – Part L2A-2013-With Photovoltaic Renewables

The calculation was run allowing for values/services as set out in the design stage with an additional renewable 60kWp photovoltaic system (approx. 360m² of panels at 18% efficiency) trying to achieve a renewable reduction in emissions, the calculation shows an overall building emission rate (BER) of 16.6 kgCO₂/m²/pa over the original building emission rate (BER) of 19.2kgCO₂/m²/pa giving an overall CO₂ saving of 13.5%, The resulting BRUKL front sheet shown below.

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



HM Government

Project name

Warehouse Oldlands Farm 60KWP PV

As designed

Date: Mon May 10 13:10:43 2021

Administrative information

Building Details

Address: Oldlands Farm, Newlands Road, Bognor Regis,
BN8 3LA

Certification tool

Calculation engine: TAS

Calculation engine version: v9.5.1*

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.5.0

Certifier details

Name: Gary Westwell

Telephone number: 01752332860

Address: 1 Ashleigh Way, PLYMOUTH, PL75JX

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	16.6
Are emissions from the building less than or equal to the target?	BER <= TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{s-Limit}	U _{s-Case}	U _{s-Case}	Surface where the maximum value occurs*
Wall**	0.35	0.23	0.23	External Cladding Wall (75mm)
Floor	0.25	0.2	0.2	Ground Floor
Roof	0.25	0.16	0.16	Roof
Windows***, roof windows, and rooflights	2.2	1.58	1.66	Main Entrance Glazed row 1 - 1
Personnel doors	2.2	2	2	Personnel Door (single)
Vehicle access & similar large doors	1.5	1.5	1.5	Dock Door Lower 01
High usage entrance doors	3.5	1.5	1.5	Main Entrance Glazed Door

U_{s-Limit} = Limiting area-weighted average U-values [W/m²K]

U_{s-Case} = Calculated area-weighted average U-values [W/m²K]

U_{s-Case} = Calculated maximum individual element U-values [W/m²K]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to certain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modeled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	1.5

Criteria 3 (Limiting solar gains) - L2A-2013

The calculation was run allowing for values/services as set out above to all the glazed building occupied areas (Office Windows 1.40 w/m²k including G Value 0.50, LT value 0.70) the areas pass the solar gain check, output from BRUKL document shown below

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
MOG 1 RECEPTION	N/A	N/A
MOG 10 FA/MOTHERS ROOM	N/A	N/A
MOG 12 OFFICE	N/A	N/A
MOG 13 OFFICE	N/A	N/A
MOG 14 OFFICE	N/A	N/A
MOG 15 TRUCKERS REST	N/A	N/A
MOG 20 YARD MANAGER	N/A	N/A
WAREHOUSE 1 MAIN WAREHOUSE	N/A	N/A
WAREHOUSE 2 UNDER MEZZ AREA	N/A	N/A
WAREHOUSE 3 UNDER MEZZ AREA RADIANT	N/A	N/A
WAREHOUSE 6 STORE	N/A	N/A
WAREHOUSE 7 STORE	N/A	N/A
WAREHOUSE 8 STORE	N/A	N/A
WAREHOUSE 9 STORE	N/A	N/A
WAREHOUSE 10 STORE	N/A	N/A
WAREHOUSE 11 STORE	N/A	N/A
WAREHOUSE 12 SAFETY SCHOOL	N/A	N/A
MOF 8 OFFICE	NO (-74%)	NO
MOF 9 TRAINING ROOM 1	NO (-35%)	NO
MOF 10 TRAINING ROOM 2	NO (-35%)	NO
MOF 11 TRAINING ROOM 3	NO (-35%)	NO
MOF 12 OFFICE	NO (-34%)	NO
MOF 13 DSP OPEN PLAN OFFICE DAYLIGHT	NO (-45%)	NO
MOF 14 DSP OPEN PLAN OFFICE NON DAYLIGHT	NO (-77%)	NO
MOF 16 BREAK ROOM	NO (-58%)	NO
MOF 17 BREAK ROOM	N/A	N/A
MOF 18 KITCHENETTE	N/A	N/A
MOF 24 LOCKERS	N/A	N/A
MOF 26 SMALL MEETING ROOM 1	NO (-13%)	NO
MOF 27 SMALL MEETING ROOM 2	NO (-12%)	NO
MOF 28 SMALL MEETING ROOM 3	NO (-12%)	NO
MOF 29 CONFERENCE ROOM	NO (-9%)	NO
MOF 30 OFFICE	N/A	N/A
MOF 31 MULTI FAITH ROOM	N/A	N/A
MOF 32 OFFICE	N/A	N/A
MOF 35 BREAK ROOM	N/A	N/A
WAREHOUSE 20 UNDER MEZZ AREA	N/A	N/A

5 Summary of Results For Planning & Building Control

<u>Building</u>	<u>Notional Building TER (kgCO²/m²/pa)</u>	<u>Actual Building BER (kgCO²/m²/pa)</u>	<u>Carbon Saving %</u>
Warehouse & Ancillary Office Non- Renewables	24	19.2	20%
Warehouse & Ancillary Office with Additional 60kWP PV	19.2	16.6	13.5%

Therefore the proposed additional 60kWP roof mounted photovoltaic system will give a renewable carbon emission saving of 13.5% over the non-renewable PartL2013 building emission rate.

6 Full Brukl Document with Photovoltaics

Project name

Warehouse Oldlands Farm 60KWP PV**As designed**

Date: Mon May 10 13:10:43 2021

Administrative information

Building Details

Address: Oldlands Farm, Newlands Road, Bognor Regis,
BN9 0LA

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.1

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Gary Westwell

Telephone number: 01752332890

Address: 1 Ashleigh Way, PLYMOUTH, PL75JX

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	16.6
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.23	0.23	External Cladding Wall (75mm)
Floor	0.25	0.2	0.2	Ground Floor
Roof	0.25	0.16	0.16	Roof
Windows***, roof windows, and rooflights	2.2	1.58	1.66	Main Entrance Glazed row 1 - 1
Personnel doors	2.2	2	2	Personnel Door (single)
Vehicle access & similar large doors	1.5	1.5	1.5	Dock Door Lower 01
High usage entrance doors	3.5	1.5	1.5	Main Entrance Glazed Door

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	1.5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- WH GF East Toilet Extract (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- Main Office GF Dis WC (MOG 4 DWC)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- All areas Elec HTG only

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

4- Main Office FF Toilet/Ablution Extract (4 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

5- Main Office AHU03 Elec HTG (SOUTH SIDE) (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	1.8	0.73
Standard value	N/A	N/A	N/A	1.1^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

6- Main Office AHU03 VRF (SOUTH SIDE) (7 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	5.5	-	1.8	0.73
Standard value	2.5*	2.6	N/A	1.1^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

7- Main Office AHU02 Lockers/Toilets (8 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	-	-	1.8	0.73
Standard value	N/A	N/A	N/A	1.1 [^]	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
[^] Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

8- Main Office AHU01 VRF (NORTH SIDE) (15 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	5.5	-	1.1	0.7
Standard value	2.5 [*]	2.6	N/A	1.1 [^]	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
[*] Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					
[^] Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

9- Ware Gnd WC's Extract only (5 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	0.91 [*]	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
[*] Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

10- Ware Radiant

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	-	0.9	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

11- Ware AHU (11 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	-	-	1.6	-
Standard value	N/A	N/A	N/A	1.1 [^]	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
[^] Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

1- Electric Water Heaters

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	2 [*]	N/A
[*] Standard shown is for all types except absorption and gas engine heat pumps.		

2- Heatpump Cylinder

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	3	0
Standard value	0.9 [*]	N/A
[*] Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.		

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1		
MOG 4 DWC		0.3	-	-	-	-	-	-	-	-	-	N/A
MOG 15 TRUCKERS REST		-	-	-	1.8	-	-	-	-	-	-	N/A
MOG 16 WC 1		-	-	0.5	-	-	-	-	-	-	-	N/A
MOG 17 WC 2		-	-	0.5	-	-	-	-	-	-	-	N/A
MOG 20 YARD MANAGER		-	-	-	1.8	-	-	-	-	-	-	N/A
WAREHOUSE 14 CLEANER'S STORE		-	-	0.5	-	-	-	-	-	-	-	N/A
WAREHOUSE 16 WCS		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 19 SICK BAY		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 20 DWC 1		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 21 DWC 2		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 22 CLEANER'S STORE		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 23 MALE WCS		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 24 LOCKERS		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 26 SMALL MEETING ROOM 1		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 27 SMALL MEETING ROOM 2		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 28 SMALL MEETING ROOM 3		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 29 CONFERENCE ROOM		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 30 OFFICE		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 31 MULTI FAITH ROOM		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 32 OFFICE		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 35 BREAK ROOM		-	-	-	1.8	-	-	-	-	-	-	N/A
MOF 37 WC WASH		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 38 WC WASH		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 40 WC 1		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 41 WC 2		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 46 WC		-	-	-	1.8	-	-	-	-	-	-	N/A
WAREHOUSE 22 WCS		-	-	0.5	-	-	-	-	-	-	-	N/A
WAREHOUSE 23 WC WASH		-	-	0.5	-	-	-	-	-	-	-	N/A
WAREHOUSE 24 WC WASH		-	-	0.5	-	-	-	-	-	-	-	N/A
MOF 48 FEMALE WC		-	-	-	1.8	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
MOG 1 RECEPTION		-	100	22	252
MOG 2 STAIR 1		-	130	-	98
MOG 4 DWC		-	100	-	44
MOG 5 STORE		100	-	-	37
MOG 6 EXIT LOBBY		-	100	-	68
MOG 7 STAIR 2		-	130	-	98
MOG 9 STAIR 3		-	130	-	83
MOG 10 FA/MOTHERS ROOM		130	-	-	190
MOG 11 LV SWITCHROOM		130	-	-	112
MOG 12 OFFICE		130	-	-	295
MOG 13 OFFICE		130	-	-	152
MOG 14 OFFICE		130	-	-	149
MOG 15 TRUCKERS REST		-	120	-	73
MOG 16 WC 1		-	100	-	26
MOG 17 WC 2		-	100	-	25
MOG 18 WC LOBBY		-	100	-	33
MOG 19 LIFT LOBBY		-	100	-	89
MOG 20 YARD MANAGER		130	-	-	314
WAREHOUSE 1 MAIN WAREHOUSE		130	-	-	19440
WAREHOUSE 2 UNDER MEZZ AREA		130	-	-	1894
WAREHOUSE 3 UNDER MEZZ AREA RADIANT		130	-	-	2543
WAREHOUSE 5 PLANT DECK		130	-	-	3888
WAREHOUSE 6 STORE		130	-	-	131
WAREHOUSE 7 STORE		130	-	-	140
WAREHOUSE 8 STORE		130	-	-	140
WAREHOUSE 9 STORE		130	-	-	141
WAREHOUSE 10 STORE		130	-	-	139
WAREHOUSE 11 STORE		130	-	-	140
WAREHOUSE 12 SAFETY SCHOOL		130	-	-	519
WAREHOUSE 13 SCUBBER DUMP		130	-	-	74
WAREHOUSE 14 CLEANER'S STORE		100	-	-	72
WAREHOUSE 15 CIRCULATION 1		-	100	-	147
WAREHOUSE 16 WCS		-	100	-	114
WAREHOUSE 17 CIRCULATION 2		-	100	-	147
WAREHOUSE 18 WC PLANT		100	-	-	52
MOF 1 STAIR 1		-	130	-	80
MOF 3 STAIR 2		-	130	-	80
MOF 5 STAIR 3		-	130	-	64
MOF 6 CIRCULATION		-	100	-	687
MOF 8 OFFICE		130	-	-	129
MOF 9 TRAINING ROOM 1		130	-	-	411
MOF 10 TRAINING ROOM 2		130	-	-	362

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
MOF 11 TRAINING ROOM 3		130	-	-	419
MOF 12 OFFICE		130	-	-	249
MOF 13 DSP OPEN PLAN OFFICE DAYLIGHT		130	-	-	1028
MOF 14 DSP OPEN PLAN OFFICE NON DAYLIGHT		130	-	-	581
MOF 15 STAIR LOBBY		-	100	-	38
MOF 16 BREAK ROOM		-	120	-	191
MOF 17 BREAK ROOM		-	120	-	603
MOF 18 KITCHENETTE		-	130	-	234
MOF 19 SICK BAY		-	130	-	51
MOF 20 DWC 1		-	100	-	35
MOF 21 DWC 2		-	100	-	34
MOF 22 CLEANER'S STORE		-	100	-	41
MOF 23 MALE WCS		-	100	-	141
MOF 24 LOCKERS		130	-	-	1074
MOF 26 SMALL MEETING ROOM 1		130	-	-	102
MOF 27 SMALL MEETING ROOM 2		130	-	-	96
MOF 28 SMALL MEETING ROOM 3		130	-	-	96
MOF 29 CONFERENCE ROOM		130	-	-	206
MOF 30 OFFICE		130	-	-	172
MOF 31 MULTI FAITH ROOM		130	-	-	76
MOF 32 OFFICE		130	-	-	877
MOF 33 LOBBY		-	100	-	34
MOF 34 CORRIDOR		-	100	-	64
MOF 35 BREAK ROOM		-	120	-	187
WAREHOUSE 19 WC LOBBY		-	100	-	55
MOF 37 WC WASH		-	100	-	36
MOF 38 WC WASH		-	100	-	36
MOF 39 WC SERVICE CORRIDOR		100	-	-	21
MOF 40 WC 1		-	100	-	38
MOF 41 WC 2		-	100	-	38
MOF 42 WC LOBBY		-	100	-	94
MOF 43 CORRIDOR		-	100	-	39
MOF 44 WC LOBBY		-	100	-	87
MOF 45 WC LOBBY		-	100	-	40
MOF 46 WC		-	100	-	38
WAREHOUSE 20 UNDER MEZZ AREA		130	-	-	1222
WAREHOUSE 22 WCS		-	100	-	109
WAREHOUSE 23 WC WASH		-	100	-	82
WAREHOUSE 24 WC WASH		-	100	-	86
MOF 47 CORRIDOR		-	100	-	307
MOF 48 FEMALE WC		-	100	-	134
MOF 49 SERVICES CORRIDOR		100	-	-	41
MOG 1 RECEPTION LOBBY		-	100	-	95

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
MOG 1 RECEPTION	N/A	N/A
MOG 10 FA/MOTHERS ROOM	N/A	N/A
MOG 12 OFFICE	N/A	N/A
MOG 13 OFFICE	N/A	N/A
MOG 14 OFFICE	N/A	N/A
MOG 15 TRUCKERS REST	N/A	N/A
MOG 20 YARD MANAGER	N/A	N/A
WAREHOUSE 1 MAIN WAREHOUSE	N/A	N/A
WAREHOUSE 2 UNDER MEZZ AREA	N/A	N/A
WAREHOUSE 3 UNDER MEZZ AREA RADIANT	N/A	N/A
WAREHOUSE 6 STORE	N/A	N/A
WAREHOUSE 7 STORE	N/A	N/A
WAREHOUSE 8 STORE	N/A	N/A
WAREHOUSE 9 STORE	N/A	N/A
WAREHOUSE 10 STORE	N/A	N/A
WAREHOUSE 11 STORE	N/A	N/A
WAREHOUSE 12 SAFETY SCHOOL	N/A	N/A
MOF 8 OFFICE	NO (-74%)	NO
MOF 9 TRAINING ROOM 1	NO (-35%)	NO
MOF 10 TRAINING ROOM 2	NO (-35%)	NO
MOF 11 TRAINING ROOM 3	NO (-35%)	NO
MOF 12 OFFICE	NO (-34%)	NO
MOF 13 DSP OPEN PLAN OFFICE DAYLIGHT	NO (-45%)	NO
MOF 14 DSP OPEN PLAN OFFICE NON DAYLIGHT	NO (-77%)	NO
MOF 16 BREAK ROOM	NO (-50%)	NO
MOF 17 BREAK ROOM	N/A	N/A
MOF 18 KITCHENETTE	N/A	N/A
MOF 24 LOCKERS	N/A	N/A
MOF 26 SMALL MEETING ROOM 1	NO (-13%)	NO
MOF 27 SMALL MEETING ROOM 2	NO (-12%)	NO
MOF 28 SMALL MEETING ROOM 3	NO (-12%)	NO
MOF 29 CONFERENCE ROOM	NO (-9%)	NO
MOF 30 OFFICE	N/A	N/A
MOF 31 MULTI FAITH ROOM	N/A	N/A
MOF 32 OFFICE	N/A	N/A
MOF 35 BREAK ROOM	N/A	N/A
WAREHOUSE 20 UNDER MEZZ AREA	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	11454	11454
External area [m ²]	21022	21022
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	2	3
Average conductance [W/K]	4526	6786
Average U-value [W/m ² K]	0.22	0.32
Alpha value* [%]	2.94	2.94

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
100	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.2	0.9
Cooling	2.43	2.16
Auxiliary	7.13	6.38
Lighting	21.57	32.72
Hot water	5.67	5.66
Equipment*	67.24	67.24
TOTAL**	37.01	47.81

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	5.09	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	48.89	32.83
Primary energy* [kWh/m ²]	113.61	141.39
Total emissions [kg/m ²]	16.6	24

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity									
Actual	0	0	0	0	18.1	1	0	1	0
Notional	25.9	0	8.8	0	14.5	0.82	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	0	0	0	0	10.8	0	0	0	0
Notional	25.9	0	8.8	0	14.5	0.82	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	11.5	0	3.2	0	0	1	0	1	0
Notional	33.4	0	11.3	0	0	0.82	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	0.1	0	0	0	10.8	1	0	1	0
Notional	25.9	0	8.8	0	8.6	0.82	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	0.3	0	0.1	0	9.9	1	0	1	0
Notional	15.2	0	5.2	0	8.3	0.82	0	---	---
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0.2	428.4	0	21.6	8.9	4.5	5.5	4.5	5.5
Notional	7.8	235.4	0.9	18.2	4.6	2.43	3.6	---	---
[ST] Central heating using air distribution, [HS] Air heater, [HFT] Electricity, [CFT] Electricity									
Actual	0	0	0	0	9.5	0	0	0	0
Notional	1.9	0	0.7	0	7	0.82	0	---	---
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	0.2	390.9	0	19.7	6.1	4.5	5.5	4.5	5.5
Notional	7.1	248.1	0.8	19.2	5.2	2.43	3.6	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	3.1	0	0.9	0	21.6	1	0	1	0
Notional	27.6	0	9.4	0	17.3	0.82	0	---	---
[ST] Flued radiant heater, [HS] Direct gas firing, [HFT] Natural Gas, [CFT] Electricity									
Actual	0	0	0	0	0	0	0	0	0
Notional	0.1	0	0	0	0	0.86	0	---	---
[ST] Central heating using water: radiators, [HS] Direct gas firing, [HFT] Natural Gas, [CFT] Electricity									
Actual	0	0	0	0	9.6	0	0	0	0
Notional	0.1	0	0	0	9.5	0.86	0	---	---

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.23	External Wall
Floor	0.2	0.2	Ground Floor
Roof	0.15	0.16	Roof
Windows, roof windows, and rooflights	1.5	1.55	Main Entrance Glazed row 2 - 2
Personnel doors	1.5	2	Personnel Door (single)
Vehicle access & similar large doors	1.5	1.5	Sectional Overhead Door
High usage entrance doors	1.5	1.5	Main Entrance Glazed Door
U _{i-Typ} = Typical individual element U-values [W/(m²K)] U _{i-Min} = Minimum individual element U-values [W/(m²K)]			
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	1.5