Manchester Fort Retail Park, A3 Unit

Energy Statement

Ref: 966-R001 Rev 1 Date: 10th December 2013

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Revision Record

Date	Reference	Revision	Prepared By	Checked By
18.11.2013	966-R001	0	JP	CPW
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1.0 Introduction

The purpose of this document is to provide an Energy Statement on the calculated energy consumption for the anticipated building services installations within a proposed restaurant unit at Manchester Fort Shopping Park, Manchester.

The basis of this Energy Statement is the BRUKL Output Document from the Simplified Building Energy Model (SBEM) used to determine compliance with the Building Regulations Part L2A (2010).

2.0 Building Fabric Overview

The proposed building is a single storey restaurant unit comprising of approximately 3,500 ft^2.

The building is generally a steel frame construction with masonry walls and full height curtain walling systems to maximise views and natural daylight.

The following building U Values have been employed during in the Part L Assessment;

Building Element	**Proposed Building U Value**	**BR Part L2A U Values**	**Notional Building U Values**
Ground Floor	**0.20 W/m²K**	0.25 W/m²K	0.22 W/m²K
Flat Roof	**0.16 W/m²K**	0.25 W/m²K	0.18 W/m²K
Curtain Walling (Windows)	**1.70 W/m²K**	2.20 W/m²K	1.80 W/m²K
Glazed Doors	**1.70 W/m²K**	3.50 W/m²K (High Usage)	2.20 W/m²K (High Usage)
External Walls	**0.35 W/m²K**	0.35 W/m²K	0.26 W/m²K

The proposed building U Values for the main building elements e.g. Curtain Walling and glazed entrance door systems, roof and ground floor offer an improvement over the Building Regulations Part L2A Limiting Fabric Parameters, noted in Table 4 of Part L 2A and the Notional Building U Values.

3.0 Building Services Overview

For the purposes of the assessment the mechanical building services plant have been assumed to be as follows:

Heating System

Source: Air Source Heat Pump VRF Simultaneous Heating & Cooling (Electric)
400% Seasonal Efficiency

Cooling System

Source: Air Source Heat Pump VRF Simultaneous Heating & Cooling (Electric)
VRF System: Seasonal EER = 600%
Nominal EER = 450%

Heat Recovery, Controls & Metering

Air source heat pumps: Local time and temperature controls
Heat Recovery Supply and Extract (Dining Room) assumed at 80% efficiency
Variable seasonal efficiency assumed for supply & extract to dining room

Ventilation – Dining Room

Ventilation Type: Mechanical Supply & Extract including heat recovery
Mechanical Exhaust: 0.5 l/s/m^2
Specific Fan Power: 0.9 W/l/s (supply & extract)
Scope of Extract system: Serves a single room
No demand controlled ventilation

Ventilation – Kitchen

5 Air Changes per hour
Ventilation Type: Mechanical Supply & Extract
Mechanical Exhaust: 4.3 l/s/m^2
Specific Fan Power: 1 W/l/s (supply & extract)
Scope of Extract system: Serves a single room
No demand controlled ventilation

Ventilation – Toilets

Ventilation Type: Mechanical Extract
Mechanical Exhaust: 1.5 l/s/m^2
Specific Fan Power: 0.9 W/l/s (extract only)
Scope of Extract system: Serves a single room
No demand controlled ventilation

Infiltration Air Permeability

5m^3/h/m^2 at 50Pa

Lighting

Full lighting design carried out with the following parameters:
Total wattage: 7.5 W/m^2
Design Illuminance: 300 lux

Display Lighting: Display Lighting uses efficient lamps
Average Lamp & Ballast Efficiency for display lighting – 50 lumens/W

Lighting Control

Manual Lighting control

General Domestic Hot Water

DHW System 1

Gas fired water heater – Assumed 1 No. Andrews Maxxflo CWH 300 Litre Cylinder
Generator Efficiency: 98%
Storage Volume: 300 Litres
Standby Heat Loss: 780 MJ/Month

4.0 Energy Consumption

The proposed building achieves a Part L 2A 2010 "Pass", whereby the Actual (Building) Emission Rate (BER) is less than or equal to the Target Emission Rate (TER).

TER (Target Emission Rate): 71.60
BER (Actual Emission Rate): 69.30
CO_2 Emission Compliance Result: PASS

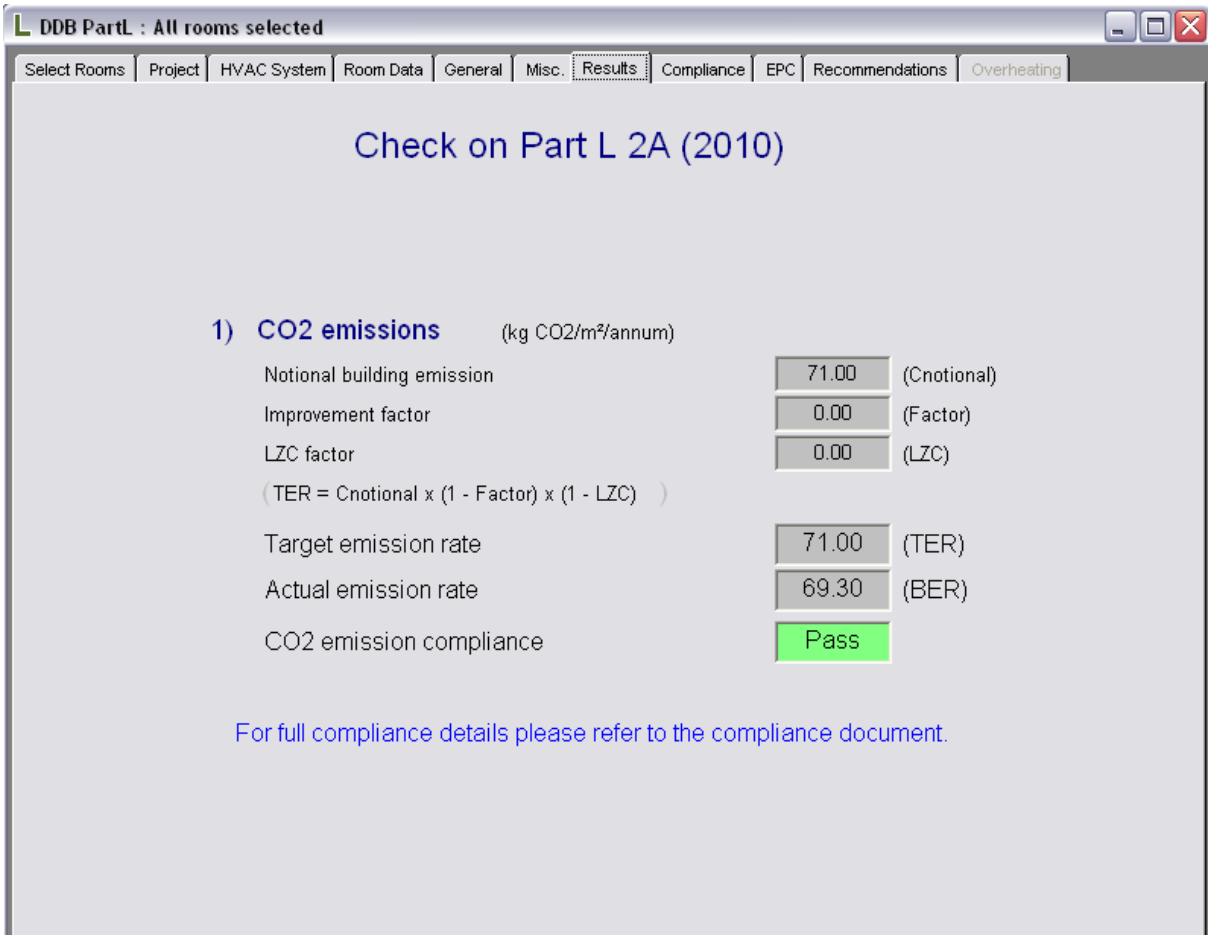
The Energy Consumption by end use is calculated, using the SBEM calculation methodology is:

End Use	Energy Consumption (kWh/m^2)
Heating	7.92
Cooling	24.66
Auxiliary	21.75
Lighting	44.78
Hot Water	93.57
Total	**192.67**

It is proposed that the heating and cooling is provided by an Air Source Heat Pump (ASHP) system, which totals 32.58 kWh/m^2, represents 16.9% of the total energy consumption for the building which is provided by a Low Carbon Technology.

Air Source Heat Pumps are considered to be a Low Carbon Technology by a number of Government agencies including the Energy Saving Trust which is taken from the European Union's Renewable Energy Directive of 2009 and the Low Carbon Buildings Programme.

Part L 2010 Results Screen



5.0 Appendices

Appendix 1 – BRUKL Output Document

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

A3 Unit Manchester Fort Shopping Park — As built

Date: Mon Nov 18 09:40:35 2013

Administrative information

Building Details

Address: Unit A3, Manchester Fort Shopping Park, Cheetham Hill Road, Manchester, M8 8EP

Certification tool

Calculation engine: SBEM

Calculation engine version: v4.1.e.5

Interface to calculation engine: Design Database

Interface to calculation engine version: v25.05

BRUKL compliance check version: v4.1.e.5

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Craig Paul Woods

Telephone number: Information not provided by the user

Address: Crookes Walker Consulting Limited, Alberton House, 30 St. Mary's Parsonage, MANCHESTER, M3 2WJ

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	71
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	71
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	69.3
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

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

2.a Building fabric

Element	$U_{i\text{-Limit}}$	$U_{i\text{-Calc}}$	$U_{i\text{-Calc}}$	Surface where the maximum value occurs*
Wall**	0.35	0.35	0.35	DINING Wall 1
Floor	0.25	-	-	"No heat loss floors"
Roof	0.25	0.25	0.25	DINING Exposed Roof 1
Windows***, roof windows, and rooflights	2.2	1.7	1.7	DINING Window 1 (1)
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{i\text{-Limit}}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{i\text{-Calc}}$ = Calculated area-weighted average U-values [W/(m²K)] $U_{i\text{-Calc}}$ = 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	5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

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 to 0.95

1- HVAC 1

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
4	4.5	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

1- DHW 1

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
0.98	0.006

Local mechanical ventilation and exhaust

Zone	**Supply/extract SFP [W/(l/s)]**	**HR seasonal efficiency**	**Exhaust SFP [W/(l/s)]**
DINING	0.9	0.8	0.9
KITCHEN	1	-	1
TOILETS	-	-	0.9

General lighting and display lighting

Zone	**General lighting [W]**	**Display lamps efficacy [lm/W]**
DINING	1570	50
ENTRANCE	60	-
KITCHEN	490	-
TOILETS	190	-

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?**
DINING	YES (+78.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the 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?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	309.4	309.4
External area [m²]	589.2	589.2
Weather	MAN	MAN
Infiltration [m³/hm²@ 50Pa]	5	5
Average conductance [W/K]	332.83	295.45
Average U-value [W/m²K]	0.56	0.5
Alpha value* [%]	14.54	12.06

* 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
100	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: 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	7.92	8.09
Cooling	24.66	20.75
Auxiliary	21.75	15.78
Lighting	44.78	57.06
Hot water	93.57	99.64
Equipment*	135.5	135.5
TOTAL**	**192.67**	**201.31**

* Energy used by equipment does not count towards the total for 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	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m²]	759.97	557.18
Primary energy* [kWh/m²]	381.93	391.1
Total emissions [kg/m²]	69.3	71

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	156.5	557.4	11.7	36.3	14.8	3.73	4.26	4	6
	Notional	104.3	396.4	11.9	30.6	13.1	2.43	3.6	----	----
[ST] No Heating or Cooling										
	Actual	687.8	622.8	0	0	0	0	0	0	0
	Notional	603.4	200.4	0	0	0	0	0	----	----
[ST] No Heating or Cooling										
	Actual	243.3	775	0	0	51.5	0	0	0	0
	Notional	44	747	0	0	30.6	0	0	----	----
[ST] No Heating or Cooling										
	Actual	180.1	99.8	0	0	9.4	0	0	0	0
	Notional	198.4	133.5	0	0	4.2	0	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 BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.35	DINING Wall 1
Floor	0.2	-	"No heat loss floors"
Roof	0.15	0.25	DINING Exposed Roof 1
Windows, roof windows, and rooflights	1.5	1.7	DINING Window 1 (1)
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = 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	5

Thermal bridges

There is at least one junction in the project whose linear thermal transmittance has been defined as having been calculated following a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State.

Appendix 2 – Draft Energy Performance Certificate

Energy Performance Certificate

Non-Domestic Building

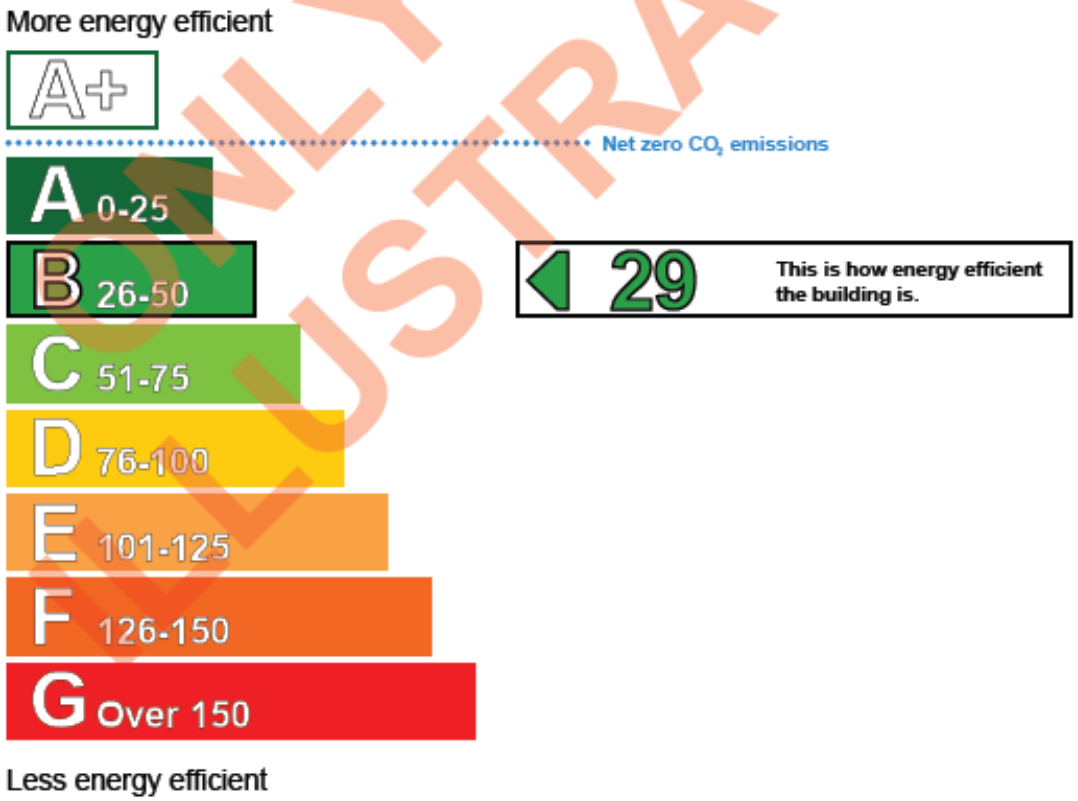
HM Government

Unit A3
Manchester Fort Shopping Park
Cheetham Hill Road
Manchester
M8 8EP

Certificate Reference Number:
0500-0037-0009-0099-0092

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd.

Energy Performance Asset Rating



Technical information

Main heating fuel:	Natural Gas
Building environment:	Air Conditioning
Total useful floor area (m^2):	309
Building complexity (NOS level):	4
Building emission rate ($kgCO_2/m^2$):	69.25

Benchmarks

Buildings similar to this one could have ratings as follows:

30 If newly built

79 If typical of the existing stock

ONLY FOR ILLUSTRATION

Administrative information

This is an Energy Performance Certificate as defined in SI2007:991 as amended

Assessment Software:	Design Database v25.05 using calculation engine SBEM v4.1.e.5
Property Reference:	000000000000
Assessor Name:	Craig Paul Woods
Assessor Number:	LCEA006783
Accreditation Scheme:	CIBSE Certification Ltd
Employer/Trading Name:	Crookes Walker Consulting Limited
Employer/Trading Address:	Information not provided by the user
Issue Date:	18 Nov 2013
Valid Until:	17 Nov 2023 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the property are contained in Report Reference Number: 0090-9090-0040-5090-0703

If you have a complaint or wish to confirm that the certificate is genuine

Details of the assessor and the relevant accreditation scheme are on the certificate. You can get contact details of the accreditation scheme from the Government's website at www.communities.gov.uk/epbd, together with details of the procedures for confirming authenticity of a certificate and for making a complaint.

ONLY FOR ILLUSTRATION

CARBON TRUST

For advice on how to take action and to find out about technical and financial assistance schemes to help make buildings more energy efficient visit **www.carbontrust.co.uk** or call us on **0800 085 2005**