

Part L2A Compliance Report

Penrhyn Road,
Knowsley

Provisional As
Designed

February 22



Revision Record

Revision	Description	Date	Prepared by	Checked by	Approved by
01	Preliminary issue for information	24/02/22	AS	MS	MS

Disclaimer

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We disclaim any responsibility to the client and others of any matters outside the scope above.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Yonder Limited can take no responsibility for differences between the computer simulations and the actual performance of the completed building due to the inherent complexity and variability of the physics in a building and its environment.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or part thereof, is made known. Any such party relies on the report at its own risk.

Executive Summary

This report details the provisional as designed assessment of Penrhyn Road, Knowsley under Part L2A of the Building Regulations 2013. The BREEAM Preassessment indicates the building should achieve an Excellent rating.

Assuming the building is constructed in a manner consistent with the assumptions made in this report, the following results are predicted:

The Building Emission Rate (BER) for this building is 13.3 kgCO₂/m²/annum and the Target Emission Rate is 21 kgCO₂/m²/annum; therefore, this building achieves a pass under Criterion 1.

CO₂ emission rate calculations show that the predicted Building Emissions Rate (BER) improves upon the Target Emissions Rate (TER) by 36.6%.

There are no instances of the solar gain limit being exceeded.

Preliminary Energy Performance Certificate (EPC) 2013 methodology predicts a rating of A, with an asset rating of 24.

Based on the results presented in this report, this building would be expected to achieve 4no. Ene01 credits under the BREEAM 2018 assessment methodology.

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1 Introduction

The purpose of this report is to demonstrate that the proposed building will comply with Part L2A (2013) of Building Regulations.

The model input data is based upon the information provided and as detailed throughout this document and in Appendix A.

Accreditation Details	
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Assessor Number:	LCEA138924
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1.1 Methodology

IES Virtual Environment dynamic thermal simulation software version 2021.4.0.0 has been used to carry out the calculations and simulations required to demonstrate compliance with Criteria 1 & 3, Part L of the Building Regulations.

The simulations for criterion 1 CO₂ emission calculations have been carried out utilising the Apache calculation engine, which is an approved calculation method validated for ADL2a Compliance Calculations. The BRUKL Compliance Check Version is v5.6.b.0.

The CO₂ emission rate calculations use the National Calculation Methodology (NCM) standard activity templates which are assigned to each activity zone for the purpose of Building Regulations CO₂ compliance. These templates set out the occupancy profiles usage, internal gains and plant operation in each zone.

1.2 External Weather Data

The Chartered Institute of Building Services Engineers (CIBSE) weather files (TRY) are used mainly to show compliance with UK Building Regulations. They contain whole-year weather variables for various locations throughout the UK designed for use in dynamic thermal simulation.

TRY data, Test Reference Year, contains 'typical' weather data for the selected location, and is used primarily for assessment of criterion 1 (CO₂ emissions) of Building Regulations Part L (England / Wales) and Section 6 (Scotland).

MANCHESTER weather data has been used in this calculation as this weather location is the closest to the project location.

2 Model Data

The thermal model has been built using the input data within this section. A comprehensive overview of the thermal model input data can be found in Appendix 4.1.

2.1 Incoming Drawing Register

Table 2.1: Incoming drawing register

Drawing title	Discipline	Drawing number	Revision
Location Plan	Architectural	6982 – 009	A
Site Layout Plan	Architectural	6982 – 010	C
Proposed External Finishes Plan	Architectural	6982 – 011	D
Proposed Building Plans	Architectural	6982 – 012	B
Proposed Roof Plan	Architectural	6982 – 014	B
Proposed Elevations	Architectural	6982 – 015	B
Proposed Sections	Architectural	6982 - 016	B

2.2 Input Data

Table 2.2: Fabric input data

Element	Description	Proposed area-weighted u-value (W/m ² .K)	Area-weighted average (Table 3, AD L2A (a))
External Walls		0.35	0.35
Internal Walls	Warehouse	0.35	n/a
Internal Walls	Office	1.68	n/a
Ground-Contact Floors	Warehouse	0.09	0.25
Ground-Contact Floors	Office	0.39	0.25
Internal Floors		1.31	n/a
Roof		1.30	0.25
External Walls		0.35	0.35

Table 2.3: Glazing input data

Element	Description	g-value (BS EN 410)	Light transmittance (LT)
General Glazing		0.35	0.38
Glazed Doors		0.35	0.38
Rooflights		0.55	0.58

Table 2.4: Air permeability input data

Air Permeability	Description	This building (Design Value)	Worst acceptable standard
m ³ /(h.m ²) @ 50 Pa		3	10

HVAC Details

Table 2.5: HVAC systems & efficiencies

System	Heating Seasonal Efficiency	Cooling Seasonal Efficiency	SFP (W/l/s)	Auto Metering & Monitoring	Alarms for out-of-range values	Heat Recovery Efficiency
HVAC 01: Generic HTG NV	1.00	-	-	Yes	No	-
HVAC 02: Generic HTG EV	1.00	-	0.50	Yes	No	-
HVAC 03: Generic VRF MVHR	3.50	3.50	1.60	Yes	No	0.70
HVAC 04: VRF NV	3.50	3.50	-	Yes	No	-

The office areas are conditioned by a VRF system with accompanying Mechanical Ventilation Heat Recovery (MVHR) or, in ancillary areas, electric panel heaters with a combination of natural and mechanical ventilation.

The warehouse is unheated and ventilated by natural ventilation.

Domestic Hot Water

Table 2.6: DHW systems & efficiencies

System	Delivery Efficiency	Generator Type	Fuel Type	Storage Volume (l)	Storage Losses (kWh/l/day)
DHW 1: Elec Stand Alone Water Heater	1	Water Heater	Electric	100	0.04

Table 2.7: DHW secondary circulation

System	Secondary Circulation	Circulation Losses (W/m)	Pump Power (kW)	Loop Length (m)	Time Switch
DHW 1: Elec Stand Alone Water Heater	Yes	10.00	0.20	134.3	yes

Renewables

Needs to be 10% of the developments total predicted regulated energy consumption.

PV amount assumed in the model is therefore 31,326 kWh.

General & Display Lighting Efficacy

Refer to Appendix A: Input Data for all lighting efficacies, display lighting efficacies and controls.

The Contractor shall provide a schedule of fixed internal lighting confirming that the building average efficacy luminaire lumens per circuit-watt, as required by Part L2A 2013 of the Building Regulations.

Power Factor Correction

Table 2.8: Power factor correction equipment

Building/Zone	Description	PFC equipment installed?	Electric power factor
Whole building		No	<0.90

Metering

Table 2.9: Systems metering & warning

System	Description	Auto metering & monitoring	Alarms for out-of-range values
Lighting		Yes	No

Thermal Bridging

In a DSM analysis an additional 10% heat loss is added to make an allowance for the extra conduction via non-repeating thermal bridges. For this reason, you should observe an Alpha value of 10% in the Technical Data Sheet within the BRUKL document. The differentiation between metal clad and non-metal clad constructions is only made when following the EN ISO 14683 method which is only applicable to an SBEM calculation. Note from the paragraph above that it is not a requirement of the NCM Modelling guide to use a method that satisfies EN ISO 14683.

3 Part L Criteria

All text in grey italic writing is extracted from Approved Document L2A 2013 to help illustrate the relevant criterion. All references to documents and tables can be found within Approved Document L2.

3.1 Criterion 1 – Achieving the BER

1.4 Criteria 1: in accordance with regulation 26 the calculated CO₂ emission rate for the building (the Building CO₂ Emission Rate, BER) must not be greater than the Target CO₂ Emission Rate (TER), which is determined by following the procedures set out in paragraphs 2.7 to 2.36.

Criteria	Emission rate (kgCO ₂ /m ² /annum)
1.1 CO ₂ emission rate notional building	21
1.2 Target CO ₂ Emissions Rating (TER)	21
1.3 Building CO ₂ Emissions Rating (BER)	13.3
1.4 Are emissions from building less than or equal to the target?	Yes
1.5 Are as built details the same as used in BER calculations?	Separate submission

3.2 Criterion 2 – Limits on design flexibility

Building Fabric

2.39 Table 3 sets out the limiting standards for the properties of fabric elements of the building. The stated value represents the area-weighted average value for all elements of that type. In general, achievement of the TER is likely to need better fabric performance than that set out in table 3.

Table 3.1: Element U-values

Element	U _a -Limit (W/m ² /K)	U _a -Calc (W/m ² /K)	U _i -Calc (W/m ² /K)
Wall	0.35	0.35	0.35
Floor	0.25	0.25	0.25
Roof	0.25	0.25	0.25
Windows	2.20	1.5	1.5
Personnel doors	2.20	2.2	2.2
Vehicle access & similar large doors	1.50	1.5	1.5
High usage entrance doors	3.50	-	-

Table 3.2: Building Air Permeability

Air Permeability	Worst Acceptable Standard	This Building
m ³ /h/m ² at 50 Pa	10	3

Building Services Systems

Controls

2.43 System should be provided with appropriate controls to enable the achievement of reasonable standards of energy efficiency in use. In normal circumstances, the following features would be appropriate for heating, ventilation and air-conditioning controls:

- The system should be subdivided into separate control zones to correspond to each area of the building that has a significantly different solar exposure, or pattern or type of use; and
- Each separate control zone should be capable of independent timing and temperature control and, where appropriate, ventilation and air recirculation rate; and
- The provision of the service should respond to the requirements of the space it serves. If both heating and cooling are provided, they should be controlled so as not to operate simultaneously; and
- Central plant should operate only as and the zone systems require it. The default condition should be off.

2.44 In addition to these general control provisions, the systems should meet specific control and efficiency standards as set out in the paragraphs below.

System efficiencies

2.45 Each fixed building service should be at least as efficient as the worst acceptable value for the particular type of appliance as set out in the Non-Domestic Building Services Compliance Guide. If the type of appliance is not covered by the Guide, then reasonable provision would be to demonstrate that the proposed system is not less efficient than a comparable system that is covered by the Guide.

NOTE: To not inhibit innovation

2.46 The efficiency claimed for the fixed building service should be based in the appropriate test standard as set out in the Non-Domestic Building Services Compliance Guide and the test data should be certified by a notified body. It would be reasonable for BCB's to accept such data at face value. In the absence of such quality-assured data, the BCB should satisfy that the claimed performance is justified.

Energy Metering

2.47 Reasonable provision for energy meters would be to install energy metering systems that enable:

at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories (heating, lighting, etc.). Detailed guidance on how this can be achieved is given in CIBSE TM 39; and the performance of any LZC system to be separately monitored; and in buildings with a total useful floor area greater than 1000m², automatic meter reading and data collection facilities.

2.48 The metering provisions should be designed such as to facilitate the benchmarking or energy performance as set out in CIBSE TM 46 Energy Benchmarks.

Metering Strategy Document to CIBSE TM39 to be provided by the Electrical Contractor.

Centralised Switching of Appliances

2.49 Consideration should be given to the provision of centralised switches to allow the facilities manager to switch off appliances when they are not needed (e.g. overnight and at weekends). Where appropriate, these should be automated (with manual override) so that energy savings are maximised.

NOTE: A centralised switch would be more reliable than depending on each individual occupant to switch off their (e.g.) computer.

3.3 Criterion 3 – Limiting solar gains in summer

2.50 This section sets out the approach to limiting heat gains as required by paragraph L1(a)(i) of schedule 1 to the Building Regulations.

2.51 The following guidance applies to all buildings, irrespective of whether they are air conditioned or not. The intention is to limit solar gains during the summer period to either:

- a. reduce the need for air-conditioning; or
- b. reduce the installed capacity of any air-conditioning system that is installed.

2.52 If the criterion set out below is satisfied in the context of a naturally ventilated building, this is NOT evidence that the internal environment of the building will be satisfactory, since many factors that are not covered by the compliance assessment procedure will have a bearing on the incidence of overheating (incidental gains, thermal capacity, ventilation provisions, etc.).

NOTE: Therefore, the developer should work with the design team to specify what constitutes an acceptable indoor environment in the particular case, and carry out the necessary design assessments to develop solutions that meet the agreed brief. Some ways of assessing overheating risk are given in CIBSE TM37 Design for improved solar shading control and, for education buildings, in Building Bulletin 101 ventilation of school buildings.

2.53 For the purposes of Part L, reasonable provision for limiting solar gain through the building fabric would be demonstrated by showing that, for each space in the building that is either occupied or mechanically cooled, the solar gains through the glazing aggregated over the period from April to September inclusive are no greater than would occur through one of the following reference glazing systems with a defined total solar energy transmittance (g-value) calculated according to BE EN 410:

- a. For every space that is defined in the NCM database as being side lit, the reference case is an east-facing facade with full-width glazing to a height of 1.0m having a framing factor of 10% and a normal solar energy transmittance (g-value) of 0.68.
- b. For every space that is defined in the NCM database as being top lit, and whose average zone height is not greater than 6m, the reference case is a horizontal roof of the same total area that is 10% glazed as viewed from the inside

out and having rooflights that have a framing factor of 25% and a normal solar energy transmittance (g-value) of 0.68.

- c. For every space that is defined in the NCM database as being top lit, and whose average zone height is greater than 6m, the reference case is a horizontal roof of the same total area that is 20% glazed as viewed from the inside out and having rooflights that have a framing factor of 15% and a normal solar energy transmittance (g-value) of 0.46.*
- d. For the purpose of this specific guidance, an occupied space means a space that is intended to be occupied by the same person for a substantial part of the day. This excludes circulation spaces, and other areas of transient occupancy, such as toilets, as well as spaces that are intended for occupation (e.g. display windows).*

There are no instances of the solar gain limit being exceeded.

4 Appendices

4.1 Thermal Model Input Data

Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engineer:	Adam Smith

Site Details

CIBSE Weather File:	Manchester
Orientation (North angle from vertical):	356.5
Building Type:	B8: Warehouse/storage (Warehouse)
Name:	
Address Line 1	Penryhn Road
Address Line 2	Knowsley
Address Line 3	Merseyside
Address Line 4	
City:	
Postcode:	
UPRN:	

Building Owner

Name:
Telephone:
Street Address:
City:
Postcode:

Building Details

PFC equipment installed?:	No
Electric power factor:	<0.90
Lighting systems metered?:	Yes
Warns for out-of-range values?:	No
Project Complexity:	Level 5

Simulation Settings

Calculation Method:	Apache
Time Step:	10 minutes
Reporting Interval:	30 minutes
Preconditioning:	20 days

Notes

Cells shaded in light grey have drop down boxes for selections

Cells shaded in light purple are automatically copied or calculated

Cells shaded in Yellow are assumptions made at this stage of the assessment

Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engineer:	Adam Smith

Ref.	Zone Name	NCM Activity
1	Reception	NCM Ware: Reception
2	Stairs	NCM Ware: Circulation Area
3	Void	Internal Void or Warm Roof
4	Store	NCM Ware: Cupboard
5	WC	NCM Ware: Toilet
6	Warehouse	NCM Ware: 24x7 Warehouse Storage
7	Shower	NCM Ware: Changing Facilities
8	Office	NCM Ware: Office
9	Lobby	NCM Ware: Circulation Area
10	Cleaners Store	NCM Ware: Cupboard
11	Kitchenette	NCM Ware: Office (Warehouse: Tea)
12		
13		
14		

Notes

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Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engineer:	Adam Smith

Element	Description	Proposed area-weighted u-value (W/m ² .K)	Area-weighted average (Table 3, AD L2A (a))
External Walls		0.35	0.35
Internal Walls	Warehouse	0.35	n/a
Internal Walls	Office	1.68	n/a
Ground-Contact Floors	Warehouse	0.09	0.25
Ground-Contact Floors	Office	0.39	0.25
Internal Floors		1.31	n/a
Roof		1.30	0.25
Windows		1.50	2.20
Pedestrian doors		2.20	2.20
Glazed doors		1.50	2.20
Vehicle access and similar large doors		1.50	n/a

Element	Description	g-value (BS EN 410)	Light transmittance (LT)
General Glazing		0.35	0.38
Glazed Doors		0.35	0.38
Rooflights		0.55	0.58

Air Permeability	Description	This building (Design Value)	Worst acceptable standard
m ³ /(h.m ²) @ 50 Pa		3	10

Notes

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Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engineer:	Adam Smith

	HVAC system name	HVAC 01: VRF MVHR	HVAC 02: EPH EV	HVAC 03: EPH NV	DHW 01: SAWH
HVAC System Details	NCM System Type	Split or multi-split system	Other local room heater - unfanned	Other local room heater - unfanned	Split or multi-split system
Heating	Heat source	Heat pump (electric): air source	Direct or storage electric heater	Direct or storage electric heater	Direct or storage electric heater
	Fuel	Electricity	Electricity	Electricity	Electricity
	Does system use CHP?	No	No	No	No
	Heat Gen. SEER	3.5	1	1	1
Cooling	Pack chiller type	Heat pump (electric)	-	-	-
	Pack chiller power	Up to 100kW	-	-	-
	SEER	4	-	-	-
	EER	3.5	-	-	-
	Mixed Mode	-	-	-	-
System Adjustment	Ductwork Leakage Tested	Class worse than A, or not tested	Class worse than A, or not tested	-	-
	AHU Leakage Tested	Class worse than 3, or not compliant	Class worse than 3, or not compliant	-	-
	SFP (W/l/s)	1.6	0.5	-	-
	Variable Speed Pumps	-	Variable speed differentia 1 sensor across pump	-	-
Metering Provision	Met.	Yes	Yes	Yes	Yes
	Alarm for out of range	No	No	No	No
Ventilation	Cooling/vent. Mechanism	Air conditioning	-	Natural ventilation	-
	Air Supply Mechanism	Central balanced	-	-	-
	Heat Recovery Method	Plate heat exchanger	-	-	-
	Heat Recovery Efficiency	70%	-	-	-
Zonal Ventilation & Extract (Entered at Zone Level)	Mechanical supply?	Yes	No	No	No
	Specific fan power (W/l/s)	1.6	-	-	-
	Local mechanical exhaust?	No	Yes	No	No
	Specific fan power (W/l/s)	-	0.5	-	-
	Extract flow rate	-	10ACH	-	-
	Extract remote from room?	-	Yes	-	-
	Demand controlled ventilation	Speed / CO2	N/A	-	-

Notes

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Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engineer	Adam Smith

Apache System Title: DHW 1: Elec
Stand Alone
Water
Heater

Associated Room Type: Room/Zone

System	Parameter	
	DHW Delivery Efficiency	100.0%
	Generator Type	Water Heater
	Fuel Type	Natural Gas
	Does the system have stor	Yes
	Storage Volume (litres)	100
Domestic Hot Wat	Storage Losses (kWh/l day	0.04
	Does the system have secondary circulation?	yes
	Circulation Losses (W/m)	10
	Pump Power (kW)	0.2
	Loop Length (m)	134.3
	Time Switch?	yes

Panel

Area (m²)
Azimuth (° clockwise from North)
Tilt (° from horizontal)
Shading Factor
Degradation Factor
Conversion Efficiency at
Ambient Temperature
First Order Heat Loss
Coefficient (W/m²K)

Solar Water Heat: Second Order Heat Loss
Coefficient (W/m²K)
Flow Rate (l/h.m²)
Pump Power (kW)
Heat Exchanger Effectiveness

Cylinder

Volume (Litres)

Storage Loss at max.
temperature (kWh/l.day)

Notes

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Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engin	Adam Smith

Zone Name	Efficacy	Photoelect ric Control Type (Switching / Dimming)	Photoelect ric Sensor Type (Standalon e / Addressabl e)	Back Sensor? (Yes / No)	Parasitic power (W/m ²)	Occ. Sensing	Parasitic power (W/m ²)
Reception	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Stairs	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Void	-	-	-	-	-	None (Foc = 1.0)	-
Store	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
WC	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Warehouse	100	Dimming	Standalone	Yes	0.01	Auto-on-off (Foc = 0.1)	0.01
Shower	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Office	100	Dimming	Standalone	No	0.1	Auto-on-off (Foc = 0.1)	0.1
Lobby	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Cleaners Stor	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Kitchenette	100	-	-	-	0.1	Auto-on-off (Foc = 0.1)	0.1
Display Lighting	100						

Notes

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Project Name:	Penrhyn Road, Knowsley
Project Nr:	2502
Project Engine	Adam Smith

System	Parameter	
PVS Generator	PV array type	Mono Active
	Derive performance parameters from PV array type?	Yes
	PV module efficiency	0.201
	Reference irradiance for NOCT (W/m^2)	1000
	Nominal cell temp. (NOCT) ($^{\circ}\text{C}$)	42
	Temp. Coefficient for module efficiency	-0.36
	Degradation factor	0.99
	Shading factor	1
	Electrical conversion efficiency	0.96
	Area (m^2)	200
	Azimuth ($^{\circ}$ clockwise from North)	180
	Inclination ($^{\circ}$ from horizontal)	0
Wind Generator	Hub height (m)	None proposed
	Rated power (kW)	
CHP Generator	Fuel type	None proposed
	Performance at rated output:	
	Heat output (kW)	
	Thermal efficiency	
	power efficiency	
	Performance at minimum output:	
	Fraction of rated heat output	
	Thermal efficiency	
	power efficiency	
	Profile for heat matching strategy	

Notes

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4.2 BRUKL Output Document

Project name

Shell and Core

Penryhn Road

As designed

Date: Thu Feb 24 14:07:56 2022

Administrative information

Building Details

Address: Penryhn Road, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

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

Certifier details

Name: Nathan Evans

Telephone number: 01134 931 280

Address: Third Floor, Concordia Works, 30 Sovereign Street, Leeds, LS1 4BA

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	21
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	21
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	13.3
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	0.35	0.35	00000000:Surf[11]
Floor	0.25	0.11	0.39	00000000:Surf[0]
Roof	0.25	0.25	0.25	00000012:Surf[49]
Windows***, roof windows, and rooflights	2.2	1.5	1.5	00000012:Surf[29]
Personnel doors	2.2	2.08	2.2	00000012:Surf[1]
Vehicle access & similar large doors	1.5	1.5	1.5	00000012:Surf[6]
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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	3

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- HVAC 01 - VRF MVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	3.5	0	0	0.7
Standard value	2.5*	2.6	N/A	N/A	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.					

2- HVAC 03 - EPH NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.67	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- HVAC 02 - EPH EV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.67	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

1- DHW 01 - SAWH

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.04
Standard value	1	N/A

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		
00.00 Reception		-	-	-	1.6	-	-	-	-	-	-	N/A
00.05 Visitor Toilet		-	-	0.5	-	-	-	-	-	-	-	N/A
00.06 DWC		-	-	0.5	-	-	-	-	-	-	-	N/A
01.00 Office		-	-	-	1.6	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
01.05 WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
01.06 WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
01.07 WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
01.08 WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
01.10 Kitchenette	-	-	-	1.6	-	-	-	-	-	-	N/A	
01.11 Open Plan Office	-	-	-	1.6	-	-	-	-	-	-	N/A	

Shell and core configuration

Zone	Assumed shell?
00.00 Reception	NO
00.01 Stairs	NO
00.03 Store	NO
00.05 Visitor Toilet	NO
00.06 DWC	NO
00.07 Warehouse Undercroft	NO
00.08 Distribution Centre	NO
00.09 Shower	NO
01.00 Office	NO
01.01 Lobby	NO
01.02 Stairs	NO
01.05 WC	NO
01.06 WC	NO
01.07 WC	NO
01.08 WC	NO
01.09 Cleaners Store	NO
01.10 Kitchenette	NO
01.11 Open Plan Office	NO

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
00.00 Reception		-	100	100	173
00.01 Stairs		-	100	-	22
00.03 Store		100	-	-	5
00.05 Visitor Toilet		-	100	-	23
00.06 DWC		-	100	-	34
00.07 Warehouse Undercroft		100	-	-	1810
00.08 Distribution Centre		100	-	-	41903
00.09 Shower		-	100	-	8
01.00 Office		100	-	-	212
01.01 Lobby		-	100	-	49
01.02 Stairs		-	100	-	45
01.05 WC		-	100	-	23

General lighting and display lighting		Luminous efficacy [lm/W]		
Zone name		Luminaire	Lamp	Display lamp
	Standard value	60	60	22
01.06 WC		-	100	-
01.07 WC		-	100	-
01.08 WC		-	100	-
01.09 Cleaners Store		100	-	-
01.10 Kitchenette		100	-	-
01.11 Open Plan Office		100	-	-
				General lighting [W]
				25
				23
				25
				6
				49
				2293

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?
00.00 Reception	NO (-42%)	NO
00.07 Warehouse Undercroft	NO (-65.6%)	NO
00.08 Distribution Centre	NO (-12.4%)	NO
01.00 Office	NO (-47.5%)	NO
01.10 Kitchenette	NO (-73.5%)	NO
01.11 Open Plan Office	NO (-37.6%)	NO

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?	YES
Is evidence of such assessment available as a separate submission?	YES
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]	10512.2	10512.2
External area [m ²]	24643.7	24643.7
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	7469.29	6647.55
Average U-value [W/m ² K]	0.3	0.27
Alpha value* [%]	9.99	10

* 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	0.7	0.41
Cooling	0.62	0.63
Auxiliary	0.53	0.22
Lighting	19.65	36.52
Hot water	7.03	5.93
Equipment*	43.52	43.52
TOTAL **	28.53	43.71

* 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	2.98	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]	10.95	10.66
Primary energy* [kWh/m ²]	87.57	119.08
Total emissions [kg/m ²]	13.3	21

* 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] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	66.1	138.3	5.6	13.5	6.8	3.26	2.84	3.5	4
Notional	27.1	186.7	2.9	13.7	3.6	2.56	3.79	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	208.2	0	57.8	0	17	1	0	1	0
Notional	86.5	0	27.9	0	18.7	0.86	0	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	210.3	0	58.4	0	0	1	0	1	0
Notional	128.8	0	41.5	0	0	0.86	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	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 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	0.35	00000000:Surf[11]
Floor	0.2	0.09	00000012:Surf[0]
Roof	0.15	0.25	00000012:Surf[49]
Windows, roof windows, and rooflights	1.5	1.5	00000000:Surf[1]
Personnel doors	1.5	1.5	00000000:Surf[30]
Vehicle access & similar large doors	1.5	1.5	00000012:Surf[6]
High usage entrance doors	1.5	-	No High usage entrance doors in building
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	3

4.3 Energy Performance Certificate

Energy Performance Certificate

Non-Domestic Building



Penryhn Road
Knowsley
Address 3
Address 4
City
Postcode

Certificate Reference Number:

6021-6948-2763-7723-8844

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 in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



Net zero CO₂ emissions



This is how energy efficient the building is.



Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Air Conditioning
Total useful floor area (m ²):	10512.159
Building complexity:	Level 5
Building emission rate (kgCO ₂ /m ² per year):	19.68
Primary energy use (kWh/m ² per year):	125.55

Benchmarks

Buildings similar to this one could have ratings as follows:

26 If newly built

69 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software:	Virtual Environment v7.0.13 using calculation engine ApacheSim v7.0.13
Property Reference:	UPRN-000000000000
Assessor Name:	Nathan Evans
Assessor Number:	LCEA138924
Accreditation Scheme:	CIBSE Certification Limited
Assessor Qualifications:	NOS5
Employer/Trading Name:	Trading Name
Employer/Trading Address:	Trading Address
Issue Date:	24 Feb 2022
Valid Until:	23 Feb 2032 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 8537-0072-5227-1853-3172

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by CIBSE Certification Limited. You can obtain contact details of the Accreditation Scheme at www.cibsecertification.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.

