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PART L COMPLIANCE REPORT

FOR

WAREHOUSE DEVELOPMENT

AT

KINGSWOOD ROAD

FOR

ROCKFACE DEVELOPMENTS

Date of Issue: 23/06/2022 Version: 1.0

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ISO 14001 CERTIFICATION EUROPE
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Document History

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0.0	Part L Compliance assessment	DJ	CD	24/02/2022
1.0	Part L Compliance assessment	JG	CD	23/06/2022

Contents

1. Executive Summary

With consideration to the EU energy performance of Buildings Directive (EPBD) and the Building Regulations Technical Guidance Document, Part L (NZEB) the building services design strategy for this development utilise sustainable design options and energy efficient systems that are technically, environmentally and economically feasible for a project of this kind.

The strategy targets a low energy and environmentally friendly building. This report will demonstrate that the design philosophy for the proposed development will employ a holistic approach to the construction of the building.

The design team recognises the need for the building to be designed and operated in a manner that reduces the energy consumption and carbon emission of the building. This objective will be achieved in an economical manner whilst maintaining an internal environment that is comfortable for occupants and visitors.

To meet the target set out for the proposed development, the energy modelling software used in the analysis is DesignBuilder v6.1.8 which utilises the SBEMie 5.5.h.2 calculation engine. The analysis was undertaken to identify the most suitable design in terms of energy efficiency and recued carbon output. The proposed design outlined in this report demonstrates that the development will be compliant with Part L of the Building Regulations (Nearly Zero Energy Buildings) and will achieve a Building Energy Rating (BER) of A2.

The CO_2 emission rate from the proposed building is less than that of the reference building used in the Part L assessment. The calculated primary energy consumption rate of the proposed building is also less than that of the reference building.

2. Introduction

Axiseng was commissioned by Rockface Developments Limited to undertake a Part L – NZEB / BER analysis on the proposed development at Kingswood Road, Citywest Business Park, Co. Dublin.

Rockface Developments Limited intend to apply for permission for development at a 2.56 Ha site at Kingswood Road and Kingswood Avenue, Citywest Business Campus, Dublin 24. The lands are generally bounded to the south-east by Kingswood Avenue, south-west and north-west by existing built development and to the north-east by Kingswood Road.

The development will comprise the provision of a warehouse with ancillary office and staff facilities and associated development. The warehouse will have a maximum height of 18 metres with a gross floor area of 11,691 sq m including a warehouse area (10,604 sq m), ancillary staff facilities (499 sq m) and ancillary office area (588 sq m).

The development will also include: a vehicular and pedestrian entrance to the site from Kingswood Road, a separate HGV entrance from Kingswood Avenue; 64 No. ancillary car parking spaces; covered bicycle parking; HGV parking and yards; level access goods doors; dock levellers; access gates; hard and soft landscaping; canopy; lighting; boundary treatments; ESB substation; plant; and all associated site development works above and below ground.

The building includes the following energy conservation measures to achieve the most energy efficient performance possible;

- High-performance construction envelope including low u-values, low solar transmittance and high light transmittance
- Low air permeability/ air infiltration rates limited to 5 m^3/ hr/ m^2
- Energy-efficient Variable Refrigerant Flow for heating and cooling
- Air source heat pump for generating service hot water
- Mechanical ventilation with high efficiency heat recovery
- Low specific fan power values on AHUs and fan coil units
- Low installed lighting power & intelligent lighting control including photoelectric sensors.

The sustainable design of the proposed development ensures the overall building performs efficiently and meets the NZEB challenges. This report details the proposed design solution used in the analysis to show compliance with Technical Guidance Document TGD Part L and NZEB regulations.

3. Construction

The following constructions have been created based on the elemental u-values set out in Table 1, of the Building Regulation Part L;

Building Element	Targeted u-value (w/m²K)
Exposed Floor	0.21
Warehouse Floor	2.0
Office External Wall	0.21
Warehouse Cladding Wall	0.21
Internal Wall to Warehouse	0.21
Office Roof	0.20
Warehouse Roof	0.20
Exposed Internal Floor to unheated area	0.21
Door / Access Vehicle	1.6/1.5
Window_00	1.6 (0.45 g-value)

The details of the assigned constructions are illustrated under *Appendices, Assigned construction details,* in this report.

3.1 Thermal Bridging

The following default thermal bridging coefficients were used;

	Junctions involving metal cladding	QA accredited	Junctions NOT involving metal cladding	QA accredited
Type of junction	Psi (W/(m·K))		Psi (W/(m·K))	
Roof-wall	0.420	☐	0.180000	☐
Wall-ground floor	1.730	☐	0.240000	☐
Wall-wall (corner)	0.380	☐	0.140000	☐
Wall-floor (not ground)	0.040	☐	0.110000	☐
Lintel above window/door	1.910	☐	0.450000	☐
Sill below window	1.910	☐	0.080000	☐
Jamb at window/door	1.910	☐	0.090000	☐

The building air permeability was set to the 5 m³/(h.m²) @ 50 pa to comply with Section 1.3.4 of the Building Regulations TGD Part L.

4. Lighting & Control

The following lighting design measures are proposed.

Room	Design Illuminance (Lux)	Installed Power Wattage (w/m2)	Control Type				
			Occupancy controls	Parasitic Power (w/m2)	Photoelectric	Sensor type	Parasitic Power (w/m2)
Open Plan Office / Office	500	7	AUTO-ON-OFF	0.10	Dimming	Addressable	0.1
Toilet	200	6	AUTO-ON-OFF	0.10	-	-	-
Lobby / Corridor	200	6	AUTO-ON-OFF	0.10	-	-	-
Tea Station	300	7	AUTO-ON-OFF	0.10	-	-	-
Warehouse	300	3	-	-	-	-	-
Canteen	400	7	AUTO-ON-OFF	0.10	-	-	-
Changing Facilities	200	6	AUTO-ON-OFF	0.10	-	-	-
Storage	200	6	AUTO-ON-OFF	0.10	-	-	-
Meeting	500	7	AUTO-ON-OFF	0.10	-	-	-
Reception	300	7	AUTO-ON-OFF	0.10	-	-	-

All spaces except for warehouse will be fitted with presence detection automatic sensors to switch off the lighting when the rooms are unoccupied. In addition, the open plan office areas will also include daylight control to reduce artificial lighting energy when sufficient natural daylight is detected via multi-sensors.

5. HVAC

HVAC system design and equipment selection has been considered to ensure that minimal energy requirements are realised in the building. The following table is a list of proposed HVAC systems and the their designations;

Room	HVAC System	Ventilation Type	Heat Recovery Unit	Specific Fan Power (W/l/s)
Offices (office areas, meeting room, canteen, kitchens)	VRF	Centralised Mech Vent	75% Plate Heat Ex	1.5
Showers / Store / Lockers	Elec radiator	Centralised Mech Vent	-	1.5
Toilets (Office block)	Elec Radiator	Centralised Mech Exhaust Vent	-	1.5
Toilet block (warehouse)	Elec Radiator	Local Mechanical Exhaust	-	0.35
Stairs, Corridor Lobby,	Elec Radiator	Room air circulation	-	-

The proposed HVAC systems are selected based upon their performance in providing heating, cooling, and hot water generation at optimal efficiencies. All office areas and tea stations are to be installed with a mechanically ventilated heat recovery unit served by heating and chilled water from the Variable Refrigerant Flow System. The Electric radiators are to be located in stairways, corridors, toilets, and wet changing rooms.

Heating Plant System	Cooling Plant System	Domestic Hot Water

Generator Type 1 – local room heater Heat Source – Storage electric heater Seasonal Efficiency – 1 Fuel Type – Electricity Pump Type – NA Serve units – Electric radiator Generator Type 2 – Split Unit (VRF) Heat Source – Heat Pump Air Source Seasonal Efficiency – 4.5 Fuel Type – Electricity Pump Type – NA	Generator Type 2 – Split Unit (VRF) Heat Source – Heat Pump Air Source EER / SEER – 5.0 / 7.2 Fuel Type – Electricity	Generator Type 1 – Heat pump (air source) Seasonal Efficiency – 2.85 Fuel Type – Electricity Overall Seasonal Efficiency (SCoP) – 2.85 Storage Volume (litres) – 1000 Storage losses (KWh/(l.day)) – 0.00470 Circulation losses (W/m) – 10 Loop Length (metres) – 100 Pump Power (kW) – 0.2 Time Switch – Yes Generator Type 2 – Instantaneous under sink water heater Seasonal Efficiency – 1.0 Fuel Type – Electricity

The VRF system provides low-temperature hot water for space heating with a seasonal coefficient of performance (sCOP) of over 450%. The generation of high temperature hot water will be utilised through hydro box or heat pump technology with a domestic hot water tank connected to the heat pump achieving an sCOP of over 285%.

The following control types have been applied to all systems;

Metering Provision	System Controls
Provision for Metering – Yes Metering "Out of range" – Yes Electric Power Factor - > 0.95	Central Time Control – Yes Optimum Start / Stop Control – Yes Local Time Control – Na Local Temperature Control – Yes Weather Compensation Control - Yes

Central VRF Control will be designed to monitor & optimise energy usage. The energy management system is expected to review and adjust the operating efficiencies and strategy for the various building services to minimise overall energy use carbon emission thus saving the cost.

6. Renewables

Renewable technologies have been employed to offset and exceed the requirements of the building regulations TGD Part L. The heating and cooling in the office building are to be met by A variable refrigerant flow VRF system with a designed sCOP over 450% which is recognised as a form of renewable energy technology. The Domestic Hot Water is met by a heat pump system and therefore, is also identified as renewable energy technology.

7. Result

The following NZEB/Part L & BER has been calculated with results provided below;

7.1 BRIRL Document

Output from Building Regulation Ireland (BRIRL) Document

BRIRL Output Document

Compliance Assessment with the Building Regulations (Ireland) TGD-Part L 2017

This report demonstrates compliance with specific aspects of Part L of the Building Regulations. Compliance with all aspects of Part L is a legal requirement. Demonstration of how compliance with every aspect is achieved may be sought from the Building Control Authority.

Kingswood Road Warehouse

Date: Thu Feb 24 17:09:28 2022

Administrative information

Building Details

Address: Kingswood Road, Citywest Business Park, Co. Dublin,

NEAP

Calculation engine: SBEMIE

Calculation engine version: v5.5.h.2

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8

BRIRL compliance check version: v5.5.h.2

Client Details

Name:

Telephone number:

Address:

Energy Assessor Details

Name: BPC Engineers

Telephone number: +353 86 075 7122

Email: info@bpcengineers.com

Address: 19-22 Baggot Street Lower, Dublin 2, D02 X658

Primary Energy Consumption, CO2 Emissions, and Renewable Energy Ratio

The compliance criteria in the TGD-L have been met.

Calculated CO2 emission rate from Reference building	15.7 kgCO2/m2.annum
Calculated CO2 emission rate from Actual building	13.9 kgCO2/m2.annum
Carbon Performance Coefficient (CPC)	0.88
Maximum Permitted Carbon Performance Coefficient (MPCPC)	**1.15**
Calculated primary energy consumption rate from Reference building	81.3 kWh/m2.annum
Calculated primary energy consumption rate from Actual building	70.6 kWh/m2.annum
Energy Performance Coefficient (EPC)	0.87
Maximum Permitted Energy Performance Coefficient (MPEPC)	**1**
Renewable Energy Ratio (RER)	0.11
Minimum Renewable Energy Ratio	**0.1**

Heat Transmission through Building Fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Limit}$	$U_{i\text{-}Calc}$	Surface with maximum U-value*
Walls**	0.21	0.21	0.6	0.21	OFFICE L0 - TOILETS MAIN_W_5
Floors (ground and exposed)	0.21	0.15	0.6	0.21	OFFICE L0 - TOILET_SHOWER 1_S_3
Pitched roofs	0.16	-	0.3	-	"No heat loss pitched roofs"
Flat roofs	0.2	0.15	0.3	0.15	OFFICE L2 - STAIR_R_4
Windows, roof windows, and rooflights	1.6	1.6	3	1.6	OFFICE L0 - STAIR_G_6
Personnel doors	1.6	-	3	-	"No ext. personnel doors"
Vehicle access & similar large doors	1.5	-	3	-	"No ext. vehicle access doors"
High usage entrance doors	3	-	3	-	"No ext. high usage entrance doors"

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

* There might be more than one surface with the maximum U-value. ** Automatic U-value check by the tool does not apply to curtain walls whose area-weighted average and individual limiting standards are 1.8 and 3 W/m2K, respectively.

Air Permeability	Upper Limit	This Building's Value
m3/(h.m2) at 50 Pa	5	5

7.2 BER document

DesignBuilder SBEM v6.1.8 (SBEMIE v5.5.h.2)

Provisional Building Energy Rating (BER)

Provisional BER for the building detailed below is: **A2**

Kingswood Road
Citywest Business Park
Co. Dublin

The Building Energy Rating (BER) is an indicator of the energy performance of this building. It covers energy use for space heating and cooling, water heating, ventilation and lighting, calculated on the basis of standard operating patterns. It is accompanied by a CO_2 emissions indicator. These indicators are expressed as respective ratios of primary energy use and CO_2 emissions, relative to what would apply for a similar building generally satisfying the Building Regulations 2005. 'A' rated properties are the most energy efficient and will tend to have the lowest energy bills.

BER Number:	voidvoidvoid	Date of Issue:	24 Feb 2022
Useful Floor Area (m^2):	11753.3	Valid Until:	23 Feb 2024
Main Heating Fuel:	Grid Supplied Electricity	BER Assessor No.:	123456
Building Environment:	Heating and Mechanical Ventilation	Assessor Company No.:	123456
Building Type:	Storage or Distribution	Assessor Scheme:	SEAI

Building Energy Rating (Indicator)
MOST EFFICIENT

< 0.17	A1
≥ 0.17	A2
≥ 0.34	A3
≥ 0.50	B1
≥ 0.67	B2
≥ 0.84	B3
≥ 1.00	C1
≥ 1.17	C2
≥ 1.34	C3
≥ 1.50	D1
≥ 1.75	D2
≥ 2.00	E1
≥ 2.25	E2
≥ 2.50	F
≥ 3.00	G

A2
71 kWh/m^2/yr
0.31

LEAST EFFICIENT

Carbon Dioxide (CO_2) Emissions Indicator

BEST
0
1.0
2.0
WORST
>3.0

Calculated annual CO_2 emissions
14 kgCO_2/m^2/yr
0.31

The less CO_2 produced, the less the building contributes to global warming.

IMPORTANT: This provisional BER is calculated on the basis of pre-construction plans and specifications provided to the BER assessor, and using the version of the assessment software quoted above. The BER assigned to this building on completion may be different, in the event of changes to those plans or specifications, or to the assessment software.

8. Limiting the Effects of Solar gain in Summer

In accordance with TGD Part L section 1.3.5 Limiting the effects of solar gain in summer, the solar gain limit exceedance must be checked. According to the BRIRL report a number of issues were identified in the open plan office areas. Blinds with a shading coefficient of 0.35 will be required to address this issue. Zones requiring blinds are shown below. Further detailed analysis can be performed using dynamic thermal simulation software to assess the impact of changes to glazing location, percentages, and specifications.

Solar Gain in Summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
WAREHOUSE - Zone 1	NO (-21.9%)	NO
OFFICE L0 - TOILET_SHOWER 1	N/A	N/A
OFFICE L0 - LOCKERS 1	N/A	N/A
OFFICE L0 - TOILETS MAIN	N/A	N/A
OFFICE L0 - LOBBY 1	N/A	N/A
OFFICE L0 - TOILET_SHOWER	N/A	N/A
OFFICE L0 - LOCKERS	N/A	N/A
OFFICE L0 - LOBBY 2	N/A	N/A
OFFICE L0 - STAIR	N/A	N/A
OFFICE L0 - LOBBY 3	N/A	N/A
OFFICE L0 - LOBBY	N/A	N/A
OFFICE L0 - TOILET	N/A	N/A
OFFICE L1 - LOBBY	N/A	N/A
OFFICE L1 - TOILETS 1	N/A	N/A
OFFICE L1 - TOILETS	N/A	N/A
OFFICE L1 - STAIR	N/A	N/A
OFFICE L2 - STAIR	N/A	N/A
OFFICE L2 - LOBBY	N/A	N/A
OFFICE L2 - TOILETS 1	N/A	N/A
OFFICE L2 - TOILETS	N/A	N/A
TOILET BLOCK - TOILETS	N/A	N/A
TOILET BLOCK - LOBBY	N/A	N/A
OFFICE L0 - CANTEEN	NO (-60.7%)	YES
OFFICE L0 - KITCHEN	N/A	N/A
OFFICE L0 - COMMS	N/A	N/A
OFFICE L0 - BOARD ROOM	N/A	N/A
OFFICE L0 - OPEN PLAN OFFICE 1	N/A	N/A
OFFICE L0 - OPEN PLAN OFFICE	NO (-59.7%)	YES
OFFICE L1 - KITCHEN	N/A	N/A
OFFICE L1 - OPEN PLAN OFFICE 1 Z2	N/A	N/A
OFFICE L1 - OPEN PLAN OFFICE 1 Z1	NO (-60.2%)	YES
OFFICE L1 - OPEN PLAN OFFICE 2 Z2	N/A	N/A
OFFICE L1 - OPEN PLAN OFFICE 2 Z1	NO (-69.4%)	YES
OFFICE L2 - KITCHEN	N/A	N/A
OFFICE L2 - OPEN PLAN OFFICE 2 Z2	N/A	N/A
OFFICE L2 - OPEN PLAN OFFICE 2 Z1	NO (-69.4%)	YES
OFFICE L2 - OPEN PLAN OFFICE 1 Z2	N/A	N/A
OFFICE L2 - OPEN PLAN OFFICE 1 Z1	NO (-60.2%)	YES

9. Conclusion

The passive measures included such as reducing fabric heat loss and improving the airtightness significantly contribute towards reducing the loads on the systems within the building. The active measures have been designed to reduce the primary energy consumption through intelligent control and highly efficient plant and equipment.

The results in the Part L compliance assessment show that the proposed development has an Energy Performance Coefficient (EPC) less than the Maximum Permitted EPC (MPEPC) of 1.0. The building also has a Carbon Performance Coefficient (CPC) less than the Maximum Permitted CPC (MPCP) of 1.15. The result shows that the proposed development has a Renewable Energy Ratio of 0.11 (11%) which exceeds the target under Part L.

The proposed building achieves the NZEB performance specification for energy and carbon dioxide emissions and therefore is compliant with the performance criteria as set out in section 1.1.2, of the Building Regulation 2017 Part L for buildings other than Dwellings.