BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

181217 Retail Model 4

As designed

Date: Tue Dec 18 16:58:26 2018

Administrative information

Building Details

Address: Harrow Street, ROCHDALE, OL

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	27.1
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	27.1
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	27.1
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.22	0.22	WL000003:Surf[0]
Floor	0.25	0.15	0.15	WL000003:Surf[12]
Roof	0.25	0.15	0.15	WL000003:Surf[6]
Windows***, roof windows, and rooflights	2.2	1.2	1.2	WL000001:Surf[1]
Personnel doors	2.2	1.6	1.6	WL000003:Surf[10]
Vehicle access & similar large doors	1.5	1.5	1.5	WL000003:Surf[9]
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

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

$U_{a\text{-}Calc}$ = 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

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- 04 ASHP Cassette

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	3.5	0	0	-
Standard value	2.5*	3.2	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 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- 02 Electric Radiator Extract Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	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- 01 Electric Radiator Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	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- 03 POU DHWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
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		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Kitchen	0.3	-	-	-	-	-	-	-	-	-	N/A
WC	0.3	-	-	-	-	-	-	-	-	-	N/A
WC	0.3	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Retail Showrom	-	95	50	1555
Kitchen	95	-	-	218
Office	95	-	-	208
Stair	-	95	-	14
Store	95	-	-	63
WC	-	95	-	22
WC	-	95	-	22

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?
Retail Showrom	NO (-79.1%)	NO
Kitchen	NO (-89.3%)	NO
Office	NO (-69.3%)	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?	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 [m^2]	318.9	318.9
External area [m^2]	644.1	644.1
Weather	MAN	MAN
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	156.33	262.89
Average U-value [W/m^2K]	0.24	0.41
Alpha value* [%]	11.48	10

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

Building Use

% Area	Building Type
100	**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
	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/m^2]

	Actual	Notional
Heating	19.95	28.53
Cooling	2	3.1
Auxiliary	1.08	1.36
Lighting	27.06	28.02
Hot water	2.11	2
Equipment*	20.57	20.57
TOTAL**	**52.19**	**63.01**

* 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/m^2]

	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	Notional
Heating + cooling demand [MJ/m^2]	126.15	160.64
Primary energy* [kWh/m^2]	167.93	154.72
Total emissions [kg/m^2]	27.1	27.1

* 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] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	136.8	0	38	0	0	1	0	1	0
	Notional	0	0	0	0	0	0	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	108.9	0	30.3	0	8.3	1	0	1	0
	Notional	148.9	0	48	0	0	0.86	0	---	---
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	73.4	49.7	4.9	3.9	0	4.19	3.55	4.5	5
	Notional	157.1	0	50.6	0	10.6	0.86	0	---	---
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	87.6	82.1	9.5	6	0	2.56	3.79	---	---

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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.22	WL000003:Surf[0]
Floor	0.2	0.15	WL000003:Surf[12]
Roof	0.15	0.15	WL000003:Surf[6]
Windows, roof windows, and rooflights	1.5	1.2	WL000001:Surf[1]
Personnel doors	1.5	1.6	WL000003:Surf[10]
Vehicle access & similar large doors	1.5	1.5	WL000003:Surf[9]
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = 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

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Project Information

Reference
Date 17 December 2018
Client NK Architectural Services Project NEW Unit
Rochdale
OL11

Construction Type

Element : Solid ground floor - Ground floor
Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m^2K/W)	Pitch (°)	Bridge details Air gaps (Level, Delta U")
Inside surface	-	-	0.170		
Screed - cast (BS5250)	65.0	1.401	0.046		
GA4000 - 100mm	100.0	0.022	4.545		
Ground	-	-	0.040		
Total thickness	**165.0mm**				

Ground Floor Details

Floor type : Solid floor
Calculation method : EN ISO 13370:2007
Perimeter : 54.17 m Area : 161.50 m^2
P/A : 0.335 Characteristic dimension, B' : 5.963
Thermal conductivity of ground: : 1.500 W/mK Width of walls, w: : 0.300 m
Edge insulation position : None

U-value = 0.15W/m^2K

U-value, Combined Method : 0.147W/m^2K (upper/lower limit 4.801 / 4.801m^2K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m^2K

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Construction Type

Element : Wall - New Wall
Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Pitch (°)	Bridge details Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.040		
Brick, Medium wt external	102.5	0.752	0.136		17.185% Mortar (102.5mm)
Xtratherm Full Fill CavityTherm CT/PIR (includes 5mm unvented airspace)	90.0	0.022	4.150		L:0 0.000W/m²K
Blockwork, dense Exposed 2300kg/m³ 440 x 215mm	100.0	0.980	0.102		6.568% Mortar (100.0mm)
Inside surface resistance	-	-	0.130		
Total thickness	**292.5mm**				

U-value = 0.22W/m²K

U-value, Combined Method : 0.220W/m²K (upper/lower limit 4.554 / 4.553m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

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Reference
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OL11

Construction Type

Element : Pitched roof, ceiling at rafter line - Pitched Roof
Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Pitch (°)	Bridge details Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.040		
Airspace between tiles and roofing felt (inc. resistance of tiles) (BS5250)	-	-	0.120		
Breather membrane (BS5250)	-	-	-		
Cavity >=25mm, roof (CIBS)	50.0	-	0.440		9.000% Softwood (50.0mm)
GA4000 - 100mm	100.0	0.022	4.545		9.000% Softwood (100.0mm)
GA4000 - 50mm	50.0	0.022	2.273		
Plasterboard (BS5250)	12.5	0.170	0.074		
Inside surface resistance	-	-	0.100		
Total thickness	**212.5mm**				

U-value = 0.15W/m²K

U-value, Combined Method : 0.152W/m²K (upper/lower limit 6.954 / 6.194m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

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