

Project name

2015-01-20-Great Russel Street-Model 01

As designed

Date: Wed May 06 16:26:54 2015

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.1

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.1

BRUKL compliance check version: v5.2.b.1

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 CO₂ 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	40.9
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	40.9
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	30.6
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

Values which do not meet standards in the 2013 Non-Domestic Building Services Compliance Guide are displayed in red.

2.a Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	-	-	UNKNOWN
Floor	0.25	0.22	0.22	LV00000C:Surf[4]
Roof	0.25	0.18	0.18	LV000049:Surf[3]
Windows***, roof windows, and rooflights	2.2	-	-	No windows or rooflights in building
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* 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

2.b 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	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP | Heating and Cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.9	5	0	0	0.8
Standard value	2.5*	3.2	N/A	N/A	0.65
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* 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- ASHP Heating | Natural Ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.9	-	0.15	0	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* 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.					

"No HWS in project, or hot water is provided by HVAC system"

1- CHECK2-CHP

	CHPQA quality index	CHP electrical efficiency
This building	0	0
Standard value	Not provided	N/A

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
Level -01: Back of House	63	-	-	848
Level -01: Circulation 02	-	214	-	89
Level -01: Circulation 03	-	215	-	70
Level -01: Circulation 04	-	212	-	76
Level -01: Circulation 05	-	206	-	227
Level -01: Circulation 06	-	195	-	72
Level -01: Circulation 07	-	191	-	643
Level -01: Escape Lobby 01	-	225	-	24
Level -01: Escape Lobby 02	-	218	-	22
Level -01: Escape Stair 01	-	194	-	34
Level -01: Escape Stair 02	-	181	-	43
Level -01: Lift Lobby / Circulation	-	159	-	109
Level -01: Maids	54	-	-	62
Level -01: Maids	63	-	-	24
Level -01: Maids	75	-	-	16

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
		60	60	22	
Level -01: Maids		66	-	-	41
Level -01: Maids		73	-	-	19
Level -01: Reception		-	110	15	1016
Level -01: Room		-	181	-	31
Level -01: Room		-	188	-	28
Level -01: Room		-	163	-	44
Level -01: Room 109		-	165	-	41
Level -01: Room 11		-	184	-	29
Level -01: Room 110		-	179	-	31
Level -01: Room 111		-	180	-	28
Level -01: Room 112		-	165	-	40
Level -01: Room 113		-	179	-	31
Level -01: Room 114		-	174	-	31
Level -01: Room 115		-	175	-	32
Level -01: Room 117		-	184	-	29
Level -01: Room 118		-	185	-	28
Level -01: Room 119		-	187	-	28
Level -01: Room 12		-	184	-	29
Level -01: Room 120		-	186	-	29
Level -01: Room 122		-	185	-	28
Level -01: Room 123		-	193	-	24
Level -01: Room 124		-	189	-	26
Level -01: Room 125		-	188	-	26
Level -01: Room 13		-	185	-	28
Level -01: Room 14		-	193	-	24
Level -01: Room 17		-	193	-	24
Level -01: Room 18		-	186	-	28
Level -01: Room 20		-	186	-	28
Level -01: Room 22		-	193	-	24
Level -01: Room 23		-	177	-	32
Level -01: Room 24		-	179	-	31
Level -01: Room 25		-	186	-	26
Level -01: Room 26		-	186	-	26
Level -01: Room 27		-	185	-	26
Level -01: Room 28		-	178	-	31
Level -01: Room 29		-	185	-	26
Level -01: Room 30		-	177	-	30
Level -01: Room 31		-	177	-	30
Level -01: Room 32		-	163	-	42
Level -01: Room 33		-	176	-	30
Level -01: Room 34		-	176	-	30
Level -01: Room 35		-	177	-	30
Level -01: Room 36		-	177	-	30

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Level -01: Room 37		-	175	-	32
Level -01: Room 38		-	164	-	40
Level -01: Room 39		-	177	-	30
Level -01: Room 40		-	181	-	33
Level -01: Room 41		-	179	-	34
Level -01: Room 42		-	186	-	26
Level -01: Room 43		-	184	-	27
Level -01: Room 44		-	164	-	43
Level -01: Room 45		-	157	-	51
Level -01: Room 46		-	159	-	48
Level -01: Room 47		-	168	-	38
Level -01: Room 48		-	168	-	38
Level -01: Room 49		-	159	-	48
Level -01: Room 50		-	158	-	49
Level -01: Room 51		-	158	-	50
Level -01: Room 52		-	168	-	39
Level -01: Room 60		-	156	-	54
Level -01: Room 61		-	172	-	37
Level -01: Room 68		-	181	-	30
Level -01: Room 69		-	173	-	40
Level -01: Room 70		-	190	-	24
Level -01: Room 71		-	213	-	25
Level -01: Room 72		-	177	-	30
Level -01: Room 73		-	177	-	30
Level -01: Room 74		-	177	-	30
Level -01: Room 75		-	177	-	30
Level -01: Room 77		-	171	-	33
Level -01: Room 78		-	175	-	31
Level -01: Room 83		-	166	-	41
Level -01: Room 86		-	185	-	29
Level -01: Room 87		-	193	-	24
Level -01: Room 88		-	193	-	24
Level -01: Room 89		-	185	-	29
Level -01: Room 90		-	193	-	24
Level -01: Room 91		-	193	-	24
Level -01: Room 92		-	159	-	48
Level -02: Back of House		64	-	-	802
Level -02: Back of House		62	-	-	1046
Level -02: Circulation		-	195	-	434
Level -02: Circulation		-	215	-	127
Level -02: Circulation 02		-	212	-	111
Level -02: Circulation 03		-	215	-	70
Level -02: Circulation 04		-	217	-	74

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Level -02: Circulation 05		-	207	-	224
Level -02: Circulation 06		-	195	-	72
Level -02: Circulation 07		-	190	-	207
Level -02: Escape Lobby 01		-	225	-	24
Level -02: Escape Lobby 02		-	218	-	22
Level -02: Escape Stair 01		-	194	-	34
Level -02: Escape Stair 02		-	181	-	43
Level -02: Lift Lobby / Circulation		-	160	-	109
Level -02: Maids		74	-	-	19
Level -02: Maids		66	-	-	41
Level -02: Maids		80	-	-	17
Level -02: Maids		64	-	-	23
Level -02: Maids		77	-	-	13
Level -02: Reception		-	110	15	1016
Level -02: Room		-	171	-	35
Level -02: Room		-	183	-	30
Level -02: Room		-	184	-	30
Level -02: Room		-	188	-	26
Level -02: Room		-	183	-	30
Level -02: Room		-	184	-	30
Level -02: Room		-	168	-	39
Level -02: Room		-	189	-	26
Level -02: Room		-	171	-	33
Level -02: Room		-	157	-	51
Level -02: Room		-	159	-	48
Level -02: Room		-	168	-	38
Level -02: Room		-	168	-	38
Level -02: Room		-	159	-	48
Level -02: Room		-	164	-	43
Level -02: Room		-	184	-	27
Level -02: Room		-	173	-	36
Level -02: Room		-	165	-	40
Level -02: Room		-	178	-	32
Level -02: Room		-	171	-	42
Level -02: Room		-	187	-	25
Level -02: Room		-	164	-	40
Level -02: Room		-	177	-	30
Level -02: Room		-	177	-	30
Level -02: Room		-	177	-	30
Level -02: Room		-	177	-	30
Level -02: Room		-	196	-	25
Level -02: Room		-	177	-	30
Level -02: Room		-	177	-	30

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Level -02: Room		-	185	-	29
Level -02: Room		-	193	-	24
Level -02: Room		-	185	-	29
Level -02: Room		-	193	-	24
Level -02: Room		-	180	-	28
Level -02: Room		-	179	-	31
Level -02: Room		-	165	-	41
Level -02: Room		-	193	-	24
Level -02: Room		-	181	-	33
Level -02: Room		-	177	-	30
Level -02: Room		-	186	-	27
Level -02: Room		-	186	-	28
Level -02: Room		-	173	-	35
Level -02: Room		-	163	-	41
Level -02: Room		-	163	-	41
Level -02: Room		-	177	-	30
Level -02: Room		-	179	-	28
Level -02: Room		-	181	-	28
Level -02: Room		-	181	-	28
Level -02: Room		-	181	-	28
Level -02: Room		-	181	-	28
Level -02: Room		-	176	-	30
Level -02: Room		-	181	-	30
Level -02: Room		-	182	-	29
Level -02: Room		-	170	-	38
Level -02: Room		-	183	-	33
Level -02: Room		-	176	-	30
Level -02: Room		-	160	-	50
Level -02: Room		-	163	-	42
Level -02: Room		-	164	-	43
Level -02: Room		-	177	-	30
Level -02: Room		-	177	-	30
Level -02: Room		-	185	-	26
Level -02: Room		-	178	-	31
Level -02: Room		-	185	-	26
Level -02: Room		-	186	-	26
Level -02: Room		-	186	-	26
Level -02: Room		-	179	-	31
Level -02: Room		-	177	-	32
Level -02: Room		-	193	-	24
Level -02: Room		-	186	-	28
Level -02: Room		-	193	-	24
Level -02: Room		-	193	-	24

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Level -02: Room		-	185	-	28
Level -02: Room		-	184	-	30
Level -02: Room		-	168	-	39
Level -02: Room		-	185	-	29
Level -02: Room		-	179	-	31
Level -02: Room		-	174	-	31
Level -02: Room		-	160	-	49
Level -02: Room		-	158	-	50
Level -02: Room		-	185	-	29
Level -02: Room		-	158	-	49
Level -02: Room		-	186	-	28
Level -02: Room		-	166	-	39
Level -02: Room		-	184	-	30
Level -02: Room		-	175	-	32
Level -02: Room		-	185	-	28
Level -02: Room		-	171	-	36
Level -02: Room		-	186	-	28
Level -02: Room		-	179	-	34
Level -02: Room		-	173	-	35

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?
Level -01: Back of House	N/A	N/A
Level -01: Circulation 02	N/A	N/A
Level -01: Circulation 03	N/A	N/A
Level -01: Circulation 04	N/A	N/A
Level -01: Circulation 05	N/A	N/A
Level -01: Circulation 06	N/A	N/A
Level -01: Circulation 07	N/A	N/A
Level -01: Maids	N/A	N/A
Level -01: Maids	N/A	N/A
Level -01: Maids	N/A	N/A
Level -01: Maids	N/A	N/A
Level -01: Maids	N/A	N/A
Level -01: Reception	N/A	N/A
Level -01: Room	N/A	N/A
Level -01: Room	N/A	N/A
Level -01: Room	N/A	N/A
Level -01: Room 109	N/A	N/A
Level -01: Room 11	N/A	N/A
Level -01: Room 110	N/A	N/A
Level -01: Room 111	N/A	N/A
Level -01: Room 112	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Level -01: Room 113	N/A	N/A
Level -01: Room 114	N/A	N/A
Level -01: Room 115	N/A	N/A
Level -01: Room 117	N/A	N/A
Level -01: Room 118	N/A	N/A
Level -01: Room 119	N/A	N/A
Level -01: Room 12	N/A	N/A
Level -01: Room 120	N/A	N/A
Level -01: Room 122	N/A	N/A
Level -01: Room 123	N/A	N/A
Level -01: Room 124	N/A	N/A
Level -01: Room 125	N/A	N/A
Level -01: Room 13	N/A	N/A
Level -01: Room 14	N/A	N/A
Level -01: Room 17	N/A	N/A
Level -01: Room 18	N/A	N/A
Level -01: Room 20	N/A	N/A
Level -01: Room 22	N/A	N/A
Level -01: Room 23	N/A	N/A
Level -01: Room 24	N/A	N/A
Level -01: Room 25	N/A	N/A
Level -01: Room 26	N/A	N/A
Level -01: Room 27	N/A	N/A
Level -01: Room 28	N/A	N/A
Level -01: Room 29	N/A	N/A
Level -01: Room 30	N/A	N/A
Level -01: Room 31	N/A	N/A
Level -01: Room 32	N/A	N/A
Level -01: Room 33	N/A	N/A
Level -01: Room 34	N/A	N/A
Level -01: Room 35	N/A	N/A
Level -01: Room 36	N/A	N/A
Level -01: Room 37	N/A	N/A
Level -01: Room 38	N/A	N/A
Level -01: Room 39	N/A	N/A
Level -01: Room 40	N/A	N/A
Level -01: Room 41	N/A	N/A
Level -01: Room 42	N/A	N/A
Level -01: Room 43	N/A	N/A
Level -01: Room 44	N/A	N/A
Level -01: Room 45	N/A	N/A
Level -01: Room 46	N/A	N/A
Level -01: Room 47	N/A	N/A
Level -01: Room 48	N/A	N/A
Level -01: Room 49	N/A	N/A
Level -01: Room 50	N/A	N/A
Level -01: Room 51	N/A	N/A
Level -01: Room 52	N/A	N/A
Level -01: Room 60	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Level -01: Room 61	N/A	N/A
Level -01: Room 68	N/A	N/A
Level -01: Room 69	N/A	N/A
Level -01: Room 70	N/A	N/A
Level -01: Room 71	N/A	N/A
Level -01: Room 72	N/A	N/A
Level -01: Room 73	N/A	N/A
Level -01: Room 74	N/A	N/A
Level -01: Room 75	N/A	N/A
Level -01: Room 77	N/A	N/A
Level -01: Room 78	N/A	N/A
Level -01: Room 83	N/A	N/A
Level -01: Room 86	N/A	N/A
Level -01: Room 87	N/A	N/A
Level -01: Room 88	N/A	N/A
Level -01: Room 89	N/A	N/A
Level -01: Room 90	N/A	N/A
Level -01: Room 91	N/A	N/A
Level -01: Room 92	N/A	N/A
Level -02: Back of House	N/A	N/A
Level -02: Back of House	N/A	N/A
Level -02: Circulation	N/A	N/A
Level -02: Circulation	N/A	N/A
Level -02: Circulation 02	N/A	N/A
Level -02: Circulation 03	N/A	N/A
Level -02: Circulation 04	N/A	N/A
Level -02: Circulation 05	N/A	N/A
Level -02: Circulation 06	N/A	N/A
Level -02: Circulation 07	N/A	N/A
Level -02: Maids	N/A	N/A
Level -02: Maids	N/A	N/A
Level -02: Maids	N/A	N/A
Level -02: Maids	N/A	N/A
Level -02: Maids	N/A	N/A
Level -02: Reception	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A
Level -02: Room	N/A	N/A

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	4709	4709
External area [m ²]	3761.9	3761.9
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	802.61	0
Average U-value [W/m ² K]	0.21	0
Alpha value* [%]	10	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
B8 Storage or Distribution

100 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	0.96	2.64
Cooling	2.65	1.45
Auxiliary	5.72	6.62
Lighting	13.83	17.27
Hot water	37.36	52.69
Equipment*	14.22	14.2
TOTAL**	60.52	80.66

* 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 & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	48.8	44.02
Primary energy* [kWh/m ²]	295.87	407.03
Total emissions [kg/m ²]	30.6	40.9

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

HVAC Systems Performance

System Type	Heat dem MJ/m ²	Cool dem MJ/m ²	Heat con kWh/m ²	Cool con kWh/m ²	Aux con kWh/m ²	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	11.2	37.5	0.8	2.8	5.6	3.83	3.74	3.9	5
Notional	22.9	20.8	2.5	1.5	6.9	2.56	3.79	----	----
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	50.8	0	3.8	0	2	3.66	0	3.9	0
Notional	52.8	0	5.7	0	2	2.56	0	----	----

Key to terms

Heat dem [MJ/m ²]	= Heating energy demand
Cool dem [MJ/m ²]	= Cooling energy demand
Heat con [kWh/m ²]	= Heating energy consumption
Cool con [kWh/m ²]	= Cooling energy consumption
Aux con [kWh/m ²]	= 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-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	-	UNKNOWN
Floor	0.2	0.22	LV00000C:Surf[4]
Roof	0.15	0.18	LV000049:Surf[3]
Windows, roof windows, and rooflights	1.5	-	No windows or rooflights in building
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m ² K)]		U _{i-Min} = Minimum individual element U-values [W/(m ² K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m ³ /(h.m ²) at 50 Pa	5	3