

Project name

Music and Media Block Extension**As designed****Date:** Wed Jun 28 16:41:11 2017**Administrative information****Building Details****Address:** Leighton Park School, Reading, RG2 7ED**Owner Details****Name:** Leighton Park School**Telephone number:** 0118 987 9600**Address:** Shinfield Rd, Reading, RG2 7ED**Certification tool****Calculation engine:** Apache**Calculation engine version:** 7.0.6**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.6**BRUKL compliance check version:** v5.2.g.3**Certifier details****Name:** Gerard Thacker**Telephone number:** 01793 822044**Address:** Method Consulting LLP Berkeley House Hunts
Rise South Marston Park, Swindon, SN3 4TG**Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target**

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.7
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.7
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 the building services should achieve reasonable overall standards of energy efficiency

Values not achieving 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	0.15	0.23	20000001:Surf[25]
Floor	0.25	0.15	0.15	10000000:Surf[15]
Roof	0.25	0.18	0.18	0_000013:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.5	1.5	0_000013:Surf[1]
Personnel doors	2.2	1.95	2	0_000013:Surf[8]
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

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- Gas boiler with radiators - NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.98	-	0	0	-
Standard value	0.91*	N/A	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 gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- Gas boiler - U/F heating NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0	0	-
Standard value	0.91*	N/A	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 gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

3- Gas boiler with radiators and HRU

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.98	-	0.06	0	0.9
Standard value	0.91*	N/A	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 gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

1- Hot water

	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		Zone	Standard
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1			
0.06 AccWC	-	-	0.5	-	-	-	-	-	-	-	-	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
0.02 Reception Servery	-	-	0.4	-	-	-	-	-	-	-	N/A
0.11 Female WC	-	-	0.5	-	-	-	-	-	-	-	N/A
0.09 Male WC	-	-	0.5	-	-	-	-	-	-	-	N/A
0.19 Live Lounge	-	-	-	0.7	-	-	-	-	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value	60	60	22		
0.31 Classroom	111	-	-	255	
0.30 MPR	91	-	-	89	
0.29 MPR	91	-	-	89	
0.28 MPR	91	-	-	90	
0.27 MPR	91	-	-	84	
0.26 MPR	91	-	-	84	
0.25 MPR	91	-	-	87	
0.24 MPR	91	-	-	83	
0.23 MPR	91	-	-	84	
0.12 Electrical St	111	-	-	6	
0.13 Cleaner's St	111	-	-	7	
0.14 Office	111	-	-	110	
0.06 AccWC	-	73	-	41	
0.02 Reception Servery	-	70	-	209	
0.03 Store	73	-	-	14	
0.11 Female WC	-	73	-	155	
0.09 Male WC	-	73	-	106	
Balcony	-	90	-	22	
Stairs	-	90	-	11	
2.01 Balcony	-	90	-	58	
2.03 Store	111	-	-	14	
0.17 Classroom	111	-	-	364	
0.19 Live Lounge	111	-	-	254	
0.21 Store	85	-	-	8	
0.18 Lobby	-	85	-	17	
0.22 Classroom	111	-	-	338	
0.22 Plant	111	-	-	58	
0.15 Circulation	-	85	-	111	
2.02 Media Room	111	-	-	226	
0.16 Circulation	-	85	-	55	
0.07 Music Lobby	-	73	-	50	
1.01 Foyer	-	90	-	471	
0.05 Corridor	-	73	-	52	

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?
0.31 Classroom	NO (-78.7%)	NO
0.30 MPR	NO (-68.3%)	NO
0.29 MPR	NO (-66.7%)	NO
0.28 MPR	NO (-64.4%)	NO
0.27 MPR	NO (-70.3%)	NO
0.26 MPR	NO (-69.5%)	NO
0.25 MPR	NO (-71.4%)	NO
0.24 MPR	NO (-68.3%)	NO
0.23 MPR	NO (-86.1%)	NO
0.14 Office	NO (-76.6%)	YES
0.17 Classroom	NO (-45.5%)	YES
0.19 Live Lounge	NO (-66.6%)	YES
0.22 Classroom	NO (-75.9%)	YES
2.02 Media Room	NO (-69.7%)	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]	966.5	966.5
External area [m ²]	2528.7	2528.7
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	913.51	919.19
Average U-value [W/m ² K]	0.36	0.36
Alpha value* [%]	9.62	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
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
100 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	29.98	26.98
Cooling	0	0
Auxiliary	2.45	1.63
Lighting	5.51	14.2
Hot water	5.45	5.99
Equipment*	15.29	15.29
TOTAL **	43.39	48.8

* 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]	92.99	83.74
Primary energy* [kWh/m ²]	76.72	86.88
Total emissions [kg/m ²]	13.3	15.7

* 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] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	30.2	0	9.6	0	6.5	0.87	0	0.98	0
	Notional	34.6	0	11.1	0	4.7	0.86	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	86.3	0	28.2	0	3.1	0.85	0	0.95	0
	Notional	71.4	0	23	0	2.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	147	0	46.9	0	1.2	0.87	0	0.98	0
	Notional	141.1	0	45.5	0	0.7	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 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	0.15	0_000013:Surf[2]
Floor	0.2	0.15	0_000013:Surf[3]
Roof	0.15	0.18	0_000013:Surf[0]
Windows, roof windows, and rooflights	1.5	1.5	0_000013:Surf[1]
Personnel doors	1.5	0.77	20000001:Surf[22]
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/(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