

Project name

2020_Hall School Be Lean_Imp2b

As designed

Date: Thu Dec 03 11:10:16 2020

Administrative information

Building Details

Address: Address 1, City, Postcode

Owner Details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.12

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.12

BRUKL compliance check version: v5.6.a.1

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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	18.1
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	18.1
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.9
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	0.13	0.13	L1000001:Surf[1]
Floor	0.25	0.12	0.12	BS000000:Surf[0]
Roof	0.25	0.1	0.18	L000001E:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.17	1.2	L1000000:Surf[2]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	1.18	1.18	L1000004: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/(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- Nat Vent - Gas B

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	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- L00-L01 - MVHR ceiling + VRF_1.0 w Cooling - Gas B

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.93	0	1	0.8
Standard value	0.91*	2.55	N/A	1.6^	0.45
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.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

3- Extract only - Gas B

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	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.					

4- L02 - MVHR ceiling + VRF_1.3 w Cooling - Gas B

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	3.93	0	1.3	0.8
Standard value	0.91*	2.55	N/A	1.6^	0.45
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.					
^ Limiting SFP may be extended by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.					

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

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											
	Standard value	A	B	C	D	E	F	G	H	I	Zone	Standard
L-2.0_01_LOBBY	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-2.0_01_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_01_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_02_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_03_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_04_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_01_STAFF	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_01_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_02_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_01_LOBBY	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_03_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_05_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_06_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_07_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_01_SCIEN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_04_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L01.0_01_SCIEN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L01.0_02_SCIEN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L01.0_03_SCIEN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_02_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_01_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_03_SUPPO	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_01_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_01_SUPPO	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_02_SUPPO	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L01.0_04_SCIEN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.0_03_CLASS	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L00.0_01_OFFIC	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L-1.0_01_ENTRA	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.5_01_CHIMN	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.5_01_APREP	-	-	-	-	-	-	-	-	0.3	-	-	N/A
L02.5_01_ARTRO	-	-	-	-	-	-	-	-	0.3	-	-	N/A

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
L-2.0_01_WATER		75	-	-	70
L-2.0_01_STORE		75	-	-	22
L-2.0_01_STAIR		-	75	-	45
L-2.0_01_PLANT		75	-	-	44
L-2.0_01_SCORE		-	75	-	77
L-2.0_01_LIFTS		-	75	-	20
L-2.0_01_LOBBY		-	75	-	18

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
		60	60	22	
L-2.0_01_TOILE		-	75	-	101
L-2.0_01_ACCWC		-	75	-	29
L-2.0_01_CHANG		-	75	-	208
L-2.0_01_OFFIC		90	-	-	99
L-2.0_01_CORRI		-	75	-	40
L-1.0_01_PLANT		75	-	-	71
L-1.0_01_STAIR		-	75	-	69
L-1.0_01_ATRIUM		75	-	-	708
L-1.0_01_OFFIC		90	-	-	126
L-1.0_02_OFFIC		90	-	-	200
L-1.0_03_OFFIC		90	-	-	104
L-1.0_04_OFFIC		90	-	-	91
L-1.0_01_SCORE		-	75	-	63
L-1.0_01_LIFTS		-	75	-	21
L-1.0_02_SCORE		-	75	-	80
L-1.0_01_STAFF		-	90	-	112
L-1.0_02_PLANT		75	-	-	49
L-1.0_03_SCORE		-	75	-	60
L-1.0_01_ACCWC		-	75	-	39
L00.0_01_CLASS		90	-	-	234
L00.0_02_CLASS		90	-	-	264
L00.0_01_SCORE		-	75	-	6
L00.0_01_LOBBY		-	75	-	29
L00.0_01_LIFTS		-	75	-	26
L00.0_03_CLASS		90	-	-	213
L00.0_01_ACCWC		-	75	-	42
L00.0_01_PLANT		75	-	-	12
L00.0_02_SCORE		-	75	-	59
L00.0_05_CLASS		90	-	-	218
L00.0_06_CLASS		90	-	-	213
L00.0_07_CLASS		90	-	-	209
L00.0_01_STAIR		-	75	-	39
L01.0_01_STORE		75	-	-	11
L00.0_01_SCIEN		90	-	-	165
L00.0_01_CORRI		-	75	-	137
L00.0_04_CLASS		90	-	-	280
L01.0_02_STORE		75	-	-	12
L01.0_01_SCORE		-	75	-	6
L01.0_01_SCIEN		90	-	-	921
L01.0_02_SCIEN		90	-	-	977
L01.0_01_PLANT		75	-	-	12
L01.0_02_SCORE		-	75	-	52
L01.0_01_ACCWC		-	75	-	38

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name	Standard value	Luminaire	Lamp	Display lamp	
		60	60	22	
L01.0_01_LIFTS		-	75	-	21
L01.0_03_SCIEN		90	-	-	947
L02.0_02_CLASS		90	-	-	326
L02.0_01_CLASS		90	-	-	204
L02.0_03_SUPPO		90	-	-	85
L02.0_01_OFFIC		90	-	-	118
L02.0_01_ACCWC		-	75	-	34
L02.0_01_LIFTS		-	75	-	22
L02.0_01_SUPPO		90	-	-	87
L02.0_02_SUPPO		90	-	-	87
L01.0_04_SCIEN		90	-	-	142
L02.0_02_SCORE		-	75	-	42
L02.0_03_CLASS		90	-	-	212
L02.0_02_STORE		75	-	-	10
L02.0_01_SCORE		-	75	-	6
L02.0_01_STORE		75	-	-	5
L-2.0_02_STORE		75	-	-	24
L-1.0_01_WHALL_UPPER		-	90	-	20
L-1.0_01_WHALL_LOWER		-	90	-	1425
L00.0_01_OFFIC		90	-	-	144
L-1.0_01_ENTRA		-	75	-	104
L00.0_01_ATRIU (Stack)		-	75	-	26
L00.0_01_ATRIU		-	75	-	240
L01.0_01_ATRIU (Stack)		-	75	-	7
L01.0_01_ATRIU		-	75	-	193
L02.0_01_ATRIU		-	75	-	175
L02.0_01_ATRIU (Stack)		-	75	-	7
L02.5_01_CHIMN		90	-	-	30
L02.5_01_APREP		90	-	-	81
L02.5_01_ARTRO		90	-	-	527

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?
L-2.0_01_LOBBY	N/A	N/A
L-2.0_01_OFFIC	N/A	N/A
L-1.0_01_ATRIU	NO (-99.5%)	NO
L-1.0_01_OFFIC	NO (-54.6%)	NO
L-1.0_02_OFFIC	NO (-73%)	YES
L-1.0_03_OFFIC	N/A	N/A
L-1.0_04_OFFIC	NO (-75.9%)	YES
L-1.0_01_STAFF	NO (-77.9%)	YES
L00.0_01_CLASS	NO (-57.6%)	YES
L00.0_02_CLASS	NO (-73.5%)	YES

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00.0_01_LOBBY	N/A	N/A
L00.0_03_CLASS	NO (-59.2%)	YES
L00.0_05_CLASS	NO (-82.7%)	NO
L00.0_06_CLASS	NO (-81.2%)	NO
L00.0_07_CLASS	NO (-87.9%)	YES
L00.0_01_SCIEN	N/A	N/A
L00.0_04_CLASS	NO (-88%)	NO
L01.0_01_SCIEN	NO (-52%)	YES
L01.0_02_SCIEN	NO (-66%)	YES
L01.0_03_SCIEN	NO (-73.6%)	YES
L02.0_02_CLASS	NO (-71.6%)	YES
L02.0_01_CLASS	NO (-63%)	YES
L02.0_03_SUPPO	N/A	N/A
L02.0_01_OFFIC	NO (-79.8%)	YES
L02.0_01_SUPPO	NO (-53.3%)	NO
L02.0_02_SUPPO	NO (-51.7%)	NO
L01.0_04_SCIEN	N/A	N/A
L02.0_03_CLASS	NO (-33.2%)	YES
L-1.0_01_WHALL_UPPER	NO (-28.2%)	NO
L-1.0_01_WHALL_LOWER	NO (-93.5%)	NO
L00.0_01_OFFIC	NO (-29.9%)	NO
L-1.0_01_ENTRA	NO (-8.3%)	NO
L02.5_01_CHIMN	N/A	N/A
L02.5_01_APREP	N/A	N/A
L02.5_01_ARTRO	NO (-69%)	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]	2174	2174
External area [m ²]	3206.9	3206.9
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	4
Average conductance [W/K]	782.41	1286.4
Average U-value [W/m ² K]	0.24	0.4
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
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
9 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
91 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	10.35	16.14
Cooling	2.2	1.81
Auxiliary	9.5	7.55
Lighting	8.35	14.77
Hot water	16.16	11.27
Equipment*	17	17
TOTAL**	46.56	51.54

* 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	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]	54.09	74.8
Primary energy* [kWh/m ²]	92.36	105.68
Total emissions [kg/m ²]	15.9	18.1

* 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] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	25.1	56.3	8.9	5.1	18.5	0.78	3.05	0.91	3.93
Notional	37.5	54	12.1	4	14.9	0.86	3.79	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	30	51.2	10.8	4.6	15.9	0.77	3.11	0.91	3.93
Notional	47.2	53	15.2	3.9	15.1	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	13.1	0	4.5	0	2.5	0.81	0	0.91	0
Notional	43.2	0	13.9	0	1.2	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	40.2	0	13.7	0	2.2	0.81	0	0.91	0
Notional	62.8	0	20.2	0	1.1	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/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 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	0.13	L1000001:Surf[1]
Floor	0.2	0.12	BS000000:Surf[0]
Roof	0.15	0.1	BS000000:Surf[1]
Windows, roof windows, and rooflights	1.5	0.9	L000000E:Surf[0]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	1.18	L1000004:Surf[6]
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