

Project name

New Sports Hall**As designed****Date:** Fri Oct 30 15:13:31 2020**Administrative information****Building Details****Address:** Openshaw College, Ashton Old Road,
Manchester, M11 2WH**Certification tool****Calculation engine:** SBEM**Calculation engine version:** v5.6.a.2**Interface to calculation engine:** Virtual Environment**Interface to calculation engine version:** v7.0.12**BRUKL compliance check version:** v5.6.a.1**Owner Details****Name:** Manchester College**Telephone number:****Address:** Openshaw College, Manchester, M11 2WH**Certifier details****Name:** Quality Engineering Design Ltd**Telephone number:** 0161 236 5050**Address:** 77 Tib Street, Manchester, M4 5JJ**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	75.3
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	75.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	67.7
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	0.18	0.18	BL000000_W1
Floor	0.25	0.15	0.15	BL000000_F
Roof	0.25	0.16	0.16	RF000000A_C
Windows***, roof windows, and rooflights	2.2	1.6	1.6	SP000012_W1_O0
Personnel doors	2.2	2.2	2.2	B000000E_W3_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	2.2	2.2	B0000000_W2_O2
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	4

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 Radiant Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	0.65	-	-
Standard value	0.86	N/A	0.55	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- Classroom & Gym VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.53	4.22	-	-	-
Standard value	2.5*	2.6	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.

1- SYST0003-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.96	0.015
Standard value	0.8	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	
SP27 - Team Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_27 - Team Changing Toilets	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_41 - Accessible Shower	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_26 - Team Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_26 - Team Changing Toilets	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_28 - Official Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_29 - Official Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_30 - Official Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_31 - Official Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	

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	
SP_19 - Sports Centre Office	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_35 - Staff Workroom	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
B_005 - Female WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
B_005 - Female WC Corridor	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_25 - Female Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_39 - ACC SHR/WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
B_006 - Male WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
B_006 - Male WC Corridor	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_24 - Male Changing	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_40 - ACC SHR/WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP17 - Sports Hall Store	-	-	0.4	0.9	-	-	-	-	-	0.68	0.45	
B_207 - Accessible WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
B_208 - WC	-	-	-	0.9	-	-	-	-	-	0.68	0.45	
SP_37 - Theory Room IT	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_12 - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_13 - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_36 - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_02 - Strength & Conditioning	-	-	-	0.9	-	-	-	-	-	0.82	0.5	
SP_07 - Media/Vid/Analysis/Lecture	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_20 - Meeting/ Tutorial Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_21 - Meeting/ Tutorial Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_22 - Meeting/ Tutorial Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_08 - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_09 - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_ - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_ - Theory Room	-	-	-	0.6	-	-	-	-	-	0.82	0.5	
SP_01 - Gym	-	-	-	0.9	-	-	-	-	-	0.82	0.5	
SP_03 - Studio	-	-	-	0.9	-	-	-	-	-	0.82	0.5	
SP_04 - Sports Laboratory	-	-	-	0.6	-	-	-	-	-	0.82	0.5	

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
Standard value		60	60	22	
B_L01 - Stair 1		-	100	-	52
B_L08 - Water Storage Plant		100	-	-	129
B_L13 - Boiler Plant		100	-	-	152
B_L09 - Electrical Switch Room		100	-	-	50
B_L10 - Corridor		-	100	-	35
B_L03 - Stair Lobby		-	100	-	19
B_L02 - Stair Lobby		-	100	-	28
SP27 - Team Changing		-	100	-	75
SP_27 - Team Changing Toilets		-	100	-	51
SP_41 - Accessible Shower		-	100	-	47

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
B_L12 - Cleaners		100	-	-	12
B_L05 - Corridor		-	100	-	70
B_L06 - Corridor		-	100	-	27
SP_26 - Team Changing		-	100	-	72
SP_26 - Team Changing Toilets		-	100	-	51
SP_28 - Official Changing		-	100	-	27
SP_29 - Official Changing		-	100	-	27
SP_30 - Official Changing		-	100	-	27
SP_31 - Official Changing		-	100	-	27
B_L07 - Corridor		-	100	-	37
SP_19 - Sports Centre Office		100	-	-	138
SP_35 - Staff Workroom		100	-	-	185
B_001 - Entrance Lobby		-	100	15	105
B_002 - Entrance Foyer		-	100	15	198
B_007 - Stair 1		-	100	-	61
B_008 - Stair Lobby		-	100	-	29
B_004 - Entrance Lobby		-	100	-	79
B_003 - Corridor		-	100	-	108
B_005 - Female WC		-	100	-	145
B_005 - Female WC Corridor		-	100	-	45
SP_25 - Female Changing		-	100	-	161
SP_39 - ACC SHR/WC		-	100	-	54
B_006 - Male WC		-	100	-	150
B_006 - Male WC Corridor		-	100	-	45
SP_24 - Male Changing		-	100	-	165
SP_40 - ACC SHR/WC		-	100	-	54
B_004 - Corridor		-	100	-	72
B_004 - Corridor		-	100	-	141
B_016 - Cleaners Cupboard		100	-	-	16
B_017 - Comms		100	-	-	70
SP17 - Sports Hall Store		100	-	-	75
B_207 - Accessible WC		-	100	-	39
B_208 - WC		-	100	-	35
SP_16 - Sports Hall		-	100	-	4446
B_304 - Plantroom		100	-	-	692
B_301 - Stair		-	100	-	68
B_305 - Stair		-	100	-	69
B_011 - Stair 2		-	100	-	66
SP_37 - Theory Room IT		100	-	-	283
SP_12 - Theory Room		100	-	-	239
SP_13 - Theory Room		100	-	-	235
SP_36 - Theory Room		100	-	-	239
SP_02 - Strength & Conditioning		-	100	-	209

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
SP_07 - Media/Vid/Analysis/Lecture		100	-	-	314
SP_20 - Meeting/ Tutorial Room		100	-	-	138
SP_21 - Meeting/ Tutorial Room		100	-	-	138
SP_22 - Meeting/ Tutorial Room		100	-	-	147
SP_08 - Theory Room		100	-	-	273
SP_09 - Theory Room		100	-	-	273
SP_ - Theory Room		100	-	-	273
SP_ - Theory Room		100	-	-	286
B_201 - Stair		-	100	-	56
B_211 - Cleaners		100	-	-	11
B_202 - Stair		-	100	-	23
B_204 - Corridor		-	100	-	145
B_205 - Stair Lobby		-	100	-	23
B_206 - Stair		-	100	-	57
SP_01 - Gym		-	100	-	542
SP_03 - Studio		-	100	-	271
SP_04 - Sports Laboratory		100	-	-	364

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?
SP_19 - Sports Centre Office	NO (-12.2%)	YES
SP_35 - Staff Workroom	NO (-4%)	YES
B_001 - Entrance Lobby	NO (-28%)	YES
B_002 - Entrance Foyer	N/A	N/A
SP_16 - Sports Hall	N/A	N/A
SP_37 - Theory Room IT	NO (-63.7%)	NO
SP_12 - Theory Room	NO (-27.8%)	NO
SP_13 - Theory Room	NO (-27.8%)	NO
SP_36 - Theory Room	NO (-27.8%)	NO
SP_02 - Strength & Conditioning	NO (-4%)	YES
SP_07 - Media/Vid/Analysis/Lecture	N/A	N/A
SP_20 - Meeting/ Tutorial Room	N/A	N/A
SP_21 - Meeting/ Tutorial Room	N/A	N/A
SP_22 - Meeting/ Tutorial Room	N/A	N/A
SP_08 - Theory Room	NO (-31.3%)	NO
SP_09 - Theory Room	NO (-30.3%)	NO
SP_ - Theory Room	NO (-30.3%)	NO
SP_ - Theory Room	NO (-69.5%)	NO
B_201 - Stair	NO (-64.5%)	NO
B_211 - Cleaners	N/A	N/A
B_202 - Stair	N/A	N/A
B_204 - Corridor	N/A	N/A
B_205 - Stair Lobby	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
B_206 - Stair	N/A	N/A
SP_01 - Gym	NO (-2.7%)	NO
SP_03 - Studio	NO (-61.7%)	NO
SP_04 - Sports Laboratory	NO (-6.6%)	YES

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]	3536.7	3536.7
External area [m ²]	5344.4	5344.4
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	4	4
Average conductance [W/K]	1606.77	2020.26
Average U-value [W/m ² K]	0.3	0.38
Alpha value* [%]	14.54	16.85

* 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
100 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/m²]

	Actual	Notional
Heating	13.87	19.15
Cooling	2.25	3.92
Auxiliary	4.33	3.62
Lighting	12.89	14.3
Hot water	251.67	275.3
Equipment*	51.74	51.74
TOTAL **	285.01	316.29

* 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]	135.07	166.57
Primary energy* [kWh/m ²]	385.24	428.33
Total emissions [kg/m ²]	67.7	75.3

* 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] Flued radiant heater, [HS] Radiant heater, [HFT] Natural Gas, [CFT] Electricity										
	Actual	48.6	37	17.8	0	1.1	0.76	0	0.9	0
	Notional	75	67.5	24.9	0	1.1	0.82	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	85.5	156.3	5.3	7.1	10.7	4.44	6.1	4.53	8.16
	Notional	58.1	160.6	6.6	12.4	9.1	2.43	3.6	----	----

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-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.18	BL000000_W1
Floor	0.2	0.15	BL000000_F
Roof	0.15	0.16	RF00000A_C
Windows, roof windows, and rooflights	1.5	1.6	SP000012_W1_O0
Personnel doors	1.5	2.2	B000000E_W3_O0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	2.2	B0000000_W2_O2
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	4