

Project name

New Multi-Discipline Warehouse**As designed****Date:** Fri Oct 30 15:09:43 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	23
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	16.5
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	XT000000_W1
Floor	0.25	0.15	0.15	XT000000_F
Roof	0.25	0.16	0.16	XT000000_C
Windows***, roof windows, and rooflights	2.2	0.8	0.8	RF000005_C_O0
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	1.5	1.5	RF000005_W2_O0
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
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- Radiant Gas Heating

	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					NO

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
CE_13 - C&J Machine Shop	-	-	-	0.9	-	-	-	-	-		0.68	0.45

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
EXT_02 - Dust Extract	100	-	-	71
CE_17 - Brick & Plaster Materials Store	100	-	-	304
CE_13 - C&J Machine Shop	100	-	-	1334
CE_01/ CE_02 - Multi-Discipline Workshop	100	-	-	2997
CE_06 - Plumbing	100	-	-	2194
CE_22 - Plastering Workshop	100	-	-	1477

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?
CE_17 - Brick & Plaster Materials Store	N/A	N/A
CE_13 - C&J Machine Shop	NO (-17.8%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
CE_01/ CE_02 - Multi-Discipline Workshop	NO (-27.2%)	NO
CE_06 - Plumbing	NO (-36.2%)	NO
CE_22 - Plastering Workshop	YES (+106.5%)	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]	1036.6	1036.6
External area [m ²]	2757.8	2757.8
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	4	3
Average conductance [W/K]	591.64	824.05
Average U-value [W/m ² K]	0.21	0.3
Alpha value* [%]	11.18	9.02

* 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	19.66	31.78
Cooling	0	0
Auxiliary	0.33	0.25
Lighting	22.2	30.2
Hot water	4.06	3.16
Equipment*	18.62	18.62
TOTAL **	46.24	65.39

* 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]	97.28	131.63
Primary energy* [kWh/m ²]	96.36	133.77
Total emissions [kg/m ²]	16.5	23

* 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	50.9	46.3	19.7	0	0.3	0.72	0	0.9	0
	Notional	93.7	37.9	31.8	0	0.3	0.82	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 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	XT000000_W1
Floor	0.2	0.15	XT000000_F
Roof	0.15	0.16	XT000000_C
Windows, roof windows, and rooflights	1.5	0.8	RF000005_C_O0
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	1.5	RF000005_W2_O0
High usage entrance doors	1.5	-	"No external high usage entrance doors"
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