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GLOSSARY

Glossary

ADL2A	Building Regulations Approved Document L2A
BER	Building CO_2 Emission Rate
BMS	Building Management System
BREEAM	Building Research Establishment Environmental Assessment Methodology
BRF	Biological Research Facility
BRUKL	Building Regulations United Kingdom Part L
CCHP	Combined Cooling Heat and Power
CHP	Combined Heat and Power
CHPQI	Combined Heat and Power Quality Index
CHPQA	Combined Heat and Power Quality Assurance
CIBSE	Chartered Institution of Building Services Engineers
CL	Containment Level
CRAC	Computer Room Air Conditioning
DHW	Domestic Hot Water
ECA	Enhanced Capital Allowance
EDFE	EDF Energy
EPC	Energy Performance Certificate
ETPL	Energy Technology Product List
EU	European Union
GLA	Greater London Authority
IES	Integrated Environmental Solutions
IT	Information Technology
LBC	London Borough of Camden
LDA	London Development Agency
LED	Light-Emitting Diode
LHTW	Low Temperature Hot Water
LZC	Low and Zero Carbon
M&E	Mechanical and Electrical
MRC	Medical Research Council
NCM	National Calculation Methodology
NMR	Nuclear Magnetic Regulator
PPS	Planning Policy Statement
PV	Photovoltaic
RO	Reverse Osmosis
RUDP	Replacement Unitary Development Plan
SPG	Supplementary Planning Guidance
TER	Target CO_2 Emission Rate
TRY	Test Reference Year
UCL	University College London
UKCMRI	UK Centre for Medical Research and Innovation
UPS	Uninterruptible Power Supply
VE	Virtual Environment
VSD	Variable Speed Drive

APPENDICES

Appendix

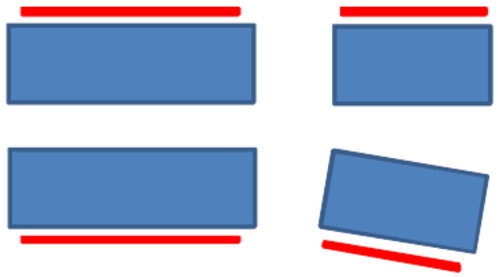
Appendix

Glazed construction data

The glazed areas of the building have been modelled based on SunGard Super Neutral SN62 glass which has been used on all areas of the building.

The SN62 glass consists of a double glazed unit with a Net U Value (including frame) of 1.6W/m2K and a G valve (BS EN 410) of 0.34. Due the high proportion of glass in the building it is extremely important that these values are taken as a minimum and are inclusive of the frame and that any fins that may form part of the frame do not detract from these values.

Although the majority of the double gazed unit is clear glass, a certain percentage of fritting has been applied to the inner pain of the glass along external corridors to the lab areas on levels 2 to 5 in the location shown below.



This has been modelled as 5 strips each 1m high consisting of the following percentage of clear and fritted glass.

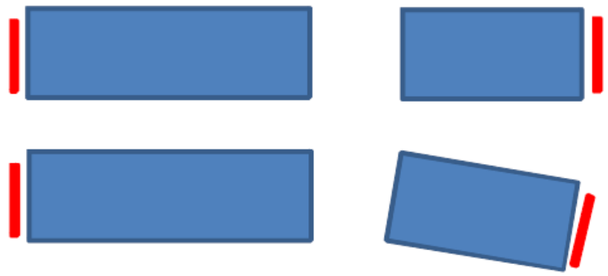
Glass type SN62 – 75% fritting
Glass type SN62 – 50% fritting
Glass type SN62 – 25% fritting
Glass type SN62 – 0% fritting
Glass type SN62 – 50% fritting

The following Net U Value (including frame) and the G valve (BS EN 410) have been taken for the fritted glass, based on correspondence between HOK & SunGard.

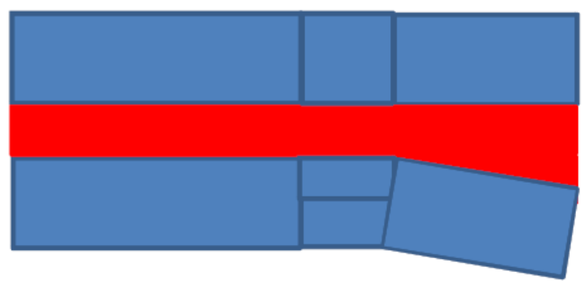
SN62 GLASS % OF FRITTING	NET U VALUE (INCLUDING FRAME)	G VALUE (BS EN 410)
0% (CLEAR GLASS)	1.6W/M2K	0.34
25%	1.6W/M2K	0.33
50%	1.6W/M2K	0.31
75%	1.6W/M2K	0.29

200mm deep external horizontal fins at 1m centres have been included in front of the glass on the external corridors. We understand this will be further refined during detail design.

The glazing on NW,SW, NE and SE end facades on levels 2-5 has recessed 150mm into the terracotta wall in the location shown below.



The roof lights have also been modelled in the location shown below which are based on SunGard Super Neutral SN62 glass. The SN62 glass consists of a double glazed unit with a Net U Value (including frame) of 2.2W/m2K and a G valve (BS EN 410) of 0.34.



Appendix

Thermal Templates

The following building templates have been defined and assigned to the various rooms in the model. An NCM activity and a system characteristics including renewable have been defined for each of the different thermal templates.

Thermal Template	NCM Activity	System Characteristics
Atrium	NCM Indus: Circulation Area	General CV system - Atrium, Writeup, Tertiary Area
Atrium High level	NCM Indus: Circulation Area	General CV system - Atrium, Writeup, Tertiary Area
Circulation Area	NCM Indus: Circulation Area	General CV system - Atrium, Writeup, Tertiary Area
Auditorium	NCM Court: Lecture Theatre/Assembly area	Lecture Theatre - CV System
Restaurant /Seating Area	NCM Indus: Eating/Drinking Area	General FCU system - Offices, Meeting Rooms, Restaurant, SER
BRF	NCM Indus: Laboratory	BRF CV system
BRF Tertiary	NCM Laund: Laundry	BRF Tertiary CV system
CL3	NCM Indus: Laboratory	CL3 CV System
CL3+	NCM Indus: Laboratory	CL3+ CV System
Data Centre	NCM Misc24Hr: Data Centre	Data Centre - FCU system
Imaging	NCM Indus: Laboratory	Imaging CV System
Kitchen	NCM Indus: Food Preparation Area	Kitchen CV system
Loading Bay	NCM Indus: Warehouse storage	Loading Bay Mech System
Meeting Room	NCM Indus: Meeting Room	General FCU system - Offices, Meeting Rooms, Restaurant,SER
Office	NCM Indus: Open plan office	General FCU system - Offices, Meeting Rooms, Restaurant,SER
Plantroom Untreated Space	NCM Unheated Space	None
Plantroom Mech Vent	NCM Indus: Plantroom	Plantroom Mech System
Primary Labs	NCM Indus: Laboratory	Primary/Secondary Lab-single duct VAV
Primary Write-up	NCM Indus: Open plan office	General FCU system - Offices, Meeting Rooms, Restaurant,SER
Secondary Labs	NCM Indus: Laboratory	Primary/Secondary Lab-single duct VAV
Tertiary area	NCM Indus: Laboratory	General CV system - Atrium, Writeup, Tertiary Area
SER	NCM Misc24Hr:IT	General FCU system - Offices, Meeting Rooms, Restaurant,SER
Riser	NCM Unheated Space	None
Toilets	NCM Indus: Toilet	None
Workshop	NCM Indus: Workshop-small scale	General CV system - Atrium, Writeup, Tertiary Area

Appendix

System Characteristics

The following Systems characteristics have been set up and assigned to the building templates. The main system inputs have been defined for each system

General CV System: Atrium, Write-up, Tertiary areas

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System : LTHW Bolier, CHP, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

BRF CV System

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System : LTHW Bolier, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power-2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

BRF Tertiary CV System

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power -2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

CL3 CV System

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5
Renewables: CHP & PV

CL3+ CV System

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

Data Centre - FCU system

UK NCM System Type: Fan coil systems
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 20, Generator Nominal EER – 20, SSEER: 20.7
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power- 2W/l/s
Ventilation: No Heat Recovery
Renewables: CHP & PV

General FCU system - Offices, Meeting Rooms, Restaurant, SER

UK NCM System Type: Fan coil systems
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power - 2W/l/s
Ventilation: No Heat Recovery
Renewables: CHP & PV

Imaging CV system

UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System : LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

Appendix

Kitchen CV system
UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2W/l/s
Ventilation: No Heat Recovery
Renewables: CHP & PV

Lecture theatre CV system
UK NCM System Type: Constant volume system (variable fresh air rate)
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.5W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

Primary/Secondary Lab Single Duct VAV
UK NCM System Type: Single-duct VAV
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2.3W/l/s
Ventilation: Heat Recovery- Run around coil, Ratio 0.5.
Renewables: CHP & PV

Loading Bay Mech System
UK NCM System Type: Single-duct VAV
Heating System: LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2W/l/s
Ventilation: No Heat Recovery
Renewables: CHP & PV

Plantroom Mech System
Heating System : LTHW Boiler, Generator Fuel – Nat Gas, Generator Seasonal Efficiency – 0.85, SCOP – 0.8KW/KW.
Cooling System: Air Cooled Chiller, Chiller Fuel- Electricity, Generator Seasonal EER – 6.8, Generator Nominal EER – 7.2, SSEER: 5.5
Ductwork & AHU system: Duct CEN Leakage- Class B, AHU CEN leakage – Class L1, Specific Fan Power 2W/l/s
Ventilation: No Heat Recovery
Renewables: CHP & PV

Appendix

APPENDIX B

IES BRUKL Output

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L

Project name

UKCMRI

Baseline Scheme

As designed

Date: Thu Jul 29 16:41:21 2010

Administrative information

Building Details

Address: London, NW1

Certification tool

Calculation engine: Apache

Calculation engine version: 6.0.6

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 6.0.6

BRUKL compliance check version: v3.5.a.0

Owner Details

Name: Owner

Telephone number: Phone

Address: , , Postcode

Certifier details

Name: URS

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: Predicted CO2 emission from proposed building does not exceed the target

1.1	Calculated CO2 emission rate from notional building	54.2 KgCO2/m2.annum
1.2	Improvement factor	0.2
1.3	LZC benchmark	0.1
1.4	Target CO2 Emission Rate (TER)	39.1 KgCO2/m2.annum
1.5	Building CO2 Emission Rate (BER)	38.9 KgCO2/m2.annum
1.6	Are emissions from building less than or equal to the target?	BER =< TER
1.7	Are as built details the same as used in BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services systems should be no worse than the design limits

2.1 Are the U-values better than the design limits? Better than design limits

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Limit}$	$U_{i\text{-}Calc}$	Surface where this maximum value occurs*
Wall**	0.35	0.22	0.7	0.59	B2ML0006:Surf[4]
Floor	0.25	0.2	0.7	0.25	B2ML0009:Surf[0]
Roof	0.25	0.25	0.35	0.25	B1CR0004:Surf[0]
Windows***, roof windows, and rooflights	2.2	2	3.3	2.1	L0CR0026:Surf[3]
Personnel doors	2.2	0	3	0	No Personnel doors in building
Vehicle access & similar large doors	1.5	0	4	0	No Vehicle access doors in building
High usage entrance doors	6	0	6	0	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m2K)] $U_{i\text{-}Limit}$ = Limiting individual element U-values [W/(m2K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m2K)] $U_{i\text{-}Calc}$ = Calculated individual element U-values [W/(m2K)]

* There might be more than one surface exceeding the limiting standards.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standards are similar to those for windows.

*** Display windows and similar glazing are not required to meet the standard given in this table.

2.2 Is air permeability no greater than the worst acceptable standard? No greater than worst acceptable standard

Air Permeability	Worst acceptable standard	This building (Design value)
m3/(h.m2) at 50 Pa	10	10

2.3 Are all building services standards acceptable?

2.3a-1 BRF CV system HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3b- "No HWS in project, or hot water is provided by HVAC system"

2.3a-2 CL3+ CV System HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3a-3 General CV system - Atrium, Writeup, Tertiary Area HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3a-4 Plantroom Mech System HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2	2

2.3a-5 Primary/Secondary Lab- single duct VAV — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.3

2.3a-6 BRF Tertiary CV system — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3a-7 General FCU system - Offices, Meeting Rooms, Restaurant, SER — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2	2

2.3a-8 Imaging CV System — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3a-9 Lecture Theatre - CV System — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5

2.3a-10 Kitchen CV system — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2	2

2.3a-11 Loading Bay Mech System — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2	2

2.3a-12 CL3 CV System — HVAC system standard is acceptable

Efficiency check	Limiting heat source seasonal efficiency	This building
Heat source efficiency	0.84	0.84
0.84 is the overall limiting efficiency for a single or a multiple boiler system. For a multiple boiler system the limiting efficiency for any individual boiler is 0.80.		
Efficiency check	**Limiting Cooling Nominal efficiency**	**This building**
Cooling efficiency	2.25	4.4
Efficiency check	**Limiting Specific Fan Power**	**This building**
SFP	2.5	2.5