DESIGN NOTE 02

PROJECT: 6700 SHURGARD CAMDEN
TITLE: PART-L COMPLIANCE REV 00

DN02

CREATED BY:	COREY FURNACE	**DATE:**	08.02.2021
CHECKED BY:	BERNIE CARR	**DATE:**	08.02.2021
APPROVED BY:	FELIPE CASTRO	**DATE:**	08.02.2021

1.0 Executive Summary

This design note presents an update of the carbon emissions for the Shurgard Camden, warehouse and storage facility against Part L2A and the Policy 5.2 of the London Plan. Furthermore, the results have been completed to validate Condition 7 as per below:

The development hereby approved shall be constructed in accordance with the approved energy statement (prepared by Butler Consulting Engineers dated 15/11/2019) to achieve a 34.35% reduction in carbon dioxide emissions beyond Part L 2013 Building Regulations in line with the energy hierarchy, and a 66.3% reduction in carbon dioxide emissions through renewable technologies. Prior to occupation, evidence demonstrating that the approved measures have been implemented shall be submitted to and approved in writing by the Local Planning Authority and shall be retained and maintained thereafter.

The results confirm that the Shurgard Camden building currently under construction achieves a 108.9% reduction in carbon emissions beyond Part L with the photovoltaic system installed providing a 110.2% reduction in carbon emissions. The development therefore is on target to compliance with Condition 7. The buildings final Energy Performance Certificate and As Constructed BRUKL Part L compliance report will be provided at practical completion.

2.0 Part L Energy Modelling

It is a requirement under Part-L2A that the calculated CO_2 emissions of a building (known as the BER) are less than or equal to a benchmark emission rate (known as the TER). The CO_2 emissions account for the energy used to heat, cool, ventilate, light, and provide hot water to the internal spaces of a building. The Part-L2A CO_2 emission were calculated by applying the as installed fabric thermal performance and system's outlined in Table 1.

TABLE 1 – AS CONSTRUCTED ENERGY PERFORMANCE FEATURES

Element of system	Performance
Wall U-value	0.20 W/m²K
Floor U-value	0.20 W/m²K
Roof U-value	0.18 W/m²K
Window Overall U-value/ Light Transmittance/ g-value	1.25 W/m²K / 71% / 0.4
Personnel doors Overall U-value	1.4 W/m²K
Fabric air permeability	5 m³/h.m² @ 50Pa
Heating System	Low surface temperature Electric Radiant Panel to WC's
Cooling System	None
Ventilation System	Mechanical remote extract ventilation SFP – 0.3 to WC's.
Domestic Hot Water	Point of use water heaters
Lighting system	LED lighting throughout
Photovoltaics/ other renewables	PV - 24m² (SUNPOWER E Series SPR-E20-327-COM 20.1% EFFICIENT)

TER: - Target Emission Rate, this is the rate that needs to be achieved as a minimum to achieve compliance with Part-L2A. This is determined via the Government's standard calculation procedure.

BER: - Building Emission Rate, this is the rate that is achieved under the scenario being considered.

BER ≤ TER to achieve Part-L2A compliance.

3.0 RESULTS

Table 2 below presents the Part L TER and BER for the building currently under construction. The results confirm that the BER is 108.9% lower than the TER and thus achieves compliance with the Condition 7 requirement fir reduction in carbon dioxide emissions beyond Part L 2013.

TABLE 2 - PART-L2A COMPLIANCE RESULTS

Description	Part L Emissions
As Built Part L TER	37.9 kgCO2/m²
As Built Part L BER	-3.4 kgCO2/m²
Percentage improvement on Part L	108.9 %

Table 3 below presents the carbon emission abatement provided by the renewable technology installed (i.e. 24m² of PV panels). The results confirm that the PV array currently being installed will provide 110.2% reduction in carbon emissions. This achieves compliance with the Condition 7 requirement to reduce emissions through renewable technologies.

TABLE 3 - CO_2 EMISSIONS REDUCTION FROM PV ARRAY

Description	Part L Emissions
As Built Part L carbon emissions with PV (BER)	-3.4 kgCO2/m²
As Built Part L carbon emissions without PV (BER)	33.2 kgCO2/m²
Percentage abatement provided by installed PV	110.2 %

4.0 Conclusions

The results from the as built Part L modelling confirms that the Shurgard Camden currently under construction is on target to achieve compliance against the carbon emission reduction criteria of Condition 7. The buildings Energy Performance Certificate and As Constructed BRUKL Part L compliance report will be provided at practical completion.

APPENDIX

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

6700 Shurgard Camden Part-L

As designed

Date: Tue Feb 09 09:24:58 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, kgCO_2/m^2.annum	37.9
Target CO_2 emission rate (TER), kgCO_2/m^2.annum	37.9
Building CO_2 emission rate (BER), kgCO_2/m^2.annum	-3.4
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	BS000000:Surf[2]
Floor	0.25	0.2	0.2	BS000000:Surf[0]
Roof	0.25	0.18	0.18	BS000000:Surf[1]
Windows***, roof windows, and rooflights	2.2	-	-	No windows or rooflights in building
Personnel doors	2.2	-	-	No Personnel doors in building
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
$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m^{2}K)] $U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m^{2}K)] * There might be more than one surface where the m ximum U value oc urs. ** Automatic U-value check by the tool does not appl to curtain walls wh se limitin standard is similar to that for windows. *** Display windows and similar glazing are excluded from the U-value cl eck. N.B.: Neither roof ventilators (inc. smoke vents) nor s imming pool basin are moc lled or checked against the limiting standards by the tool.			$U_{i\text{-}Calc}$ = C lculated maximum individual element U-values [W/(m^{2}K)]	

Air Permeability	Worst acceptable standard	This building
m^3/(h.m^2) at 50 Pa	10	5

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- 6700 Main Elec Panel + Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- 6700 VRF/VRV System

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	1.25	0	0	0.7
Standard value	2.5*	1	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 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- 6700 Electric Point of use DHW

	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**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Store	-	-	-	1.4	-	-	-	-	-	-	N/A
Reception	-	-	-	1.4	-	-	-	-	-	-	N/A
Office	-	-	-	1.4	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			
	Luminaire	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Accessible WC	-	75	-	33
Store	65	-	-	10

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Reception	-	65	85	202
Office	65	-	-	120

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?
Store	N/A	N/A
Reception	N/A	N/A
Office	N/A	N/A

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?	NO
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]	55.5	55.5
External area [m^2]	242.9	242.9
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	7
Average conductance [W/K]	47.46	113.86
Average U-value [W/m^2K]	0.2	0.47
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
100	**B8 Storage or Distribution**
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	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/m^2]

	Actual	Notional
Heating	17.45	37.73
Cooling	11.99	12.19
Auxiliary	6.33	3.91
Lighting	26.77	24.37
Hot water	3.12	3.26
Equipment*	19.7	19.7
TOTAL**	**65.66**	**81.45**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	70.54	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	168.25	424.27
Primary energy* [kWh/m^2]	196.52	209.9
Total emissions [kg/m^2]	-3.4	37.9

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	406.9	0	141.3	0	1.1	0.8	0	1	0
	Notional	701.2	0	225.9	0	1.3	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	118.9	32.8	8.9	12.8	6.7	3.73	0.71	4	1
	Notional	227.3	177.8	24.7	13	4.1	2.56	3.79	----	----

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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	BS000000:Surf[2]
Floor	0.2	0.2	BS000000:Surf[0]
Roof	0.15	0.18	BS000000:Surf[1]
Windows, roof windows, and rooflights	1.5	-	No windows or rooflights in building
Personnel doors	1.5	-	No Personnel doors in building
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
$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)]			$U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the m	nimum U	value occ	rs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	5

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

6700 Shurgard Camden Part-L (No PV)

As designed

Date: Tue Feb 09 09:26:37 2021

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.13

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.13

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building must not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	37.9
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	37.9
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	33.2
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	BS000000:Surf[2]
Floor	0.25	0.2	0.2	BS000000:Surf[0]
Roof	0.25	0.18	0.18	BS000000:Surf[1]
Windows***, roof windows, and rooflights	2.2	-	-	No windows or rooflights in building
Personnel doors	2.2	-	-	No Personnel doors in building
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

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

* 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 where 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 basin 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	5

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- 6700 Main Elec Panel + Extract

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	0	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- 6700 VRF/VRV System

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	1.25	0	0	0.7
Standard value	2.5*	1	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 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- 6700 Electric Point of use DHW

	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**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Store	-	-	-	1.4	-	-	-	-	-	-	N/A
Reception	-	-	-	1.4	-	-	-	-	-	-	N/A
Office	-	-	-	1.4	-	-	-	-	-	-	N/A

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			
	Luminaire	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Accessible WC	-	75	-	33
Store	65	-	-	10

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
Reception	-	65	85	202
Office	65	-	-	120

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?
Store	N/A	N/A
Reception	N/A	N/A
Office	N/A	N/A

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?	NO
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]	55.5	55.5
External area [m^2]	242.9	242.9
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	7
Average conductance [W/K]	47.46	113.86
Average U-value [W/m^2K]	0.2	0.47
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
100 B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
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
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D2 General Assembly and Leisure, Night Clubs, and Theatres
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Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	17.45	37.73
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TOTAL**	**65.66**	**81.45**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	168.25	424.27
Primary energy* [kWh/m^2]	196.52	209.9
Total emissions [kg/m^2]	33.2	37.9

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	406.9	0	141.3	0	1.1	0.8	0	1	0
	Notional	701.2	0	225.9	0	1.3	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
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Key to terms

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Cool SSEER = Cooling system seasonal energy efficiency ratio
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Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
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* There might be more than one surface where the m	nimum U	value occ	rs.

Air Permeability	Typical value	This building
$m^3/(h.m^2)$ at 50 Pa	5	5