# The Future Homes Standard 2025: dwelling notional buildings for consultation

## Consultation – December 2023

This draft guidance accompanies the December 2023 consultation on *The Future Homes and Buildings Standards: 2023 consultation on changes to Part L (conservation of fuel and power) of the Building Regulations for dwellings and non-domestic buildings*. The Government is primarily seeking views on the standards for new dwellings and non-domestic buildings.

# Contents

# Section 1: The main notional buildings for dwellings

1.1 The two consultation options for the main notional building for dwellings are shown in Table 1 below. These options are for dwellings not connected to heat networks.

1.2 Each variable for the notional building has been categorised. Categories describe both of:

a) if standardised properties are assigned to the variable in the notional building

b) what the user can input as the actual value.

This category is the final column of Table 1. The colour coding of these categories are also within the notional option columns of Table 1.

1.3 The categories are one of the following:

| Category | Category description |
|---|---|
| A | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building. |
| B | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building. |
| C | a) Value is assigned for the variable in the notional building.<br>b) The HEM defines the parameter in the actual building. |
| D | a) Value is assigned for the variable in the notional building, dependent on characteristics of the building.<br>b) User defines the variable in the actual building. |
| E | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, but there is a limit on this value. |
| F | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building, but there is a limit on this value. |

| **Table 1: Main notional building for dwellings** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Module / Element / Section** | **Field** | **Unit** | **Notional Option 1** | **Notional Option 2** | **Comments** | **Category** | **Category description summary** |
| External Conditions (Weather) | ALL | various | Same as actual | Same as actual | Weather conditions based on the local weather. For implementation users would be provided with a map. There is a consultation question on this proposed new approach in the Future Homes and Building Standard consultation. | A | Same as actual |
| Distant Shading | ALL | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Gains | ALL | various | Same as actual | Same as actual | | A | Same as actual |
| General | Cold Water Source | - | Same as actual | Same as actual | | A | Same as actual |
| General | Number of Storeys in the Building | | Same as actual | Same as actual | | A | Same as actual |
| General | Number of Wetrooms | | Same as actual | Same as actual | | A | Same as actual |
| General | Number of bedrooms | - | Same as actual | Same as actual | | A | Same as actual |

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|---|---|---|---|---|---|---|---|
| General | Electricity Tariff | - | Standard Tariff | Standard Tariff | It may be beneficial for occupants to have an off-peak tariff. Guidance on the actual tariff recommended might be included in the Home User Guide template 2025. | B | Assign in notional. User defines actual |
| General | Cooking Fuel | - | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Volume | m3 | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Lighting Capacity | lm | =1418 * (Zone TFA * N_occupants) ** 0.41 | =1418 * (Zone TFA * N_occupants) ** 0.41 | Calculated using the FHS wrapper assumption. | C | Assign in notional. FHS defines actual |
| Whole Dwelling | Lighting Efficacy | lm/W | 120 | 120 | This value aligns with the recent government consultation *New ecodesign requirements for lighting products.* The final value in the notional building will be set taking account of feedback to this consultation. | B | Assign in notional. User defines actual |
| Living Area | Assigned heating system | | Notional HeatSource | Notional HeatSource | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Living Area | Assigned cooling system | | Notional CoolingSource | Notional CoolingSource | | B | Assign in notional. User defines actual |
| Rest of Dwelling | Assigned heating system | - | Notional HeatSource | Notional HeatSource | | B | Assign in notional. User defines actual |
| Rest of Dwelling | Assigned cooling system | - | Notional CoolingSource | Notional CoolingSource | | B | Assign in notional. User defines actual |
| Infiltration | Storey | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Shelter | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Build type | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Test Type | 50Pa / 4Pa | 50Pa | 50Pa | Airtightness is set using the blower door test at 50Pa. | B | Assign in notional. User defines actual |
| Infiltration | Test Result | m3/m2. hr | 4 | 5 | To be converted to ACH by the Home Energy Model core engine. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Infiltration | Enveloped Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Total Volume | m3 | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Sheltered Sides | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | No. Open Chimneys | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Open Flues | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Closed Fires | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues D | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues E | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Blocked Chimneys | - | 0 | 0 | | B | Assign in notional. |

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|---|---|---|---|---|---|---|---|
| | | | | | | | User defines actual |
| Infiltration | Extract Fans | - | 0 | =IF(Number of Extract Fans < Number Of WetRooms, "Number Of WetRooms", "Same As Actual") | This reflects the Approved document F standard for extract fans in each kitchen, utility room, bathroom and sanitary accommodation. | F | Same as actual, with a limit |
| Infiltration | Passive Vents | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | Gas Fires | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Ventilation | Ventilation Type | - | dMEV | Natural ventilation | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ventilation | Required ACH | ACH | =MAX(AD F Minimum Ventilation Rate Method A,AD F Minimum Ventilation Rate Method B)/Dwelling Volume * 3600 / 1000 | =MAX(AD F Minimum Ventilation Rate Method A,AD F Minimum Ventilation Rate Method B)/Dwelling Volume * 3600 / 1000 | This reflects the Approved document F standard for minimum whole dwelling ventilation rates. | B | Assign in notional. User defines actual |
| Ventilation | Specific Fan Power | W/l.s | Continuous decentralised mechanical extract ventilation systems: 0.15 W/(L.s) | n/a | These specific fan powers have been selected using an analysis of product data from the PCDB. The proposed standards are set at a level that 50% of products on the PCDB are better than these standards. | B | Assign in notional. User defines actual |
| Ventilation | MVHR location | in/out | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Heat Recovery Efficiency | % | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct thickness | mm | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct cross-section area | m2 | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Intake duct length | m | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Output duct length | m | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct Insulation thickness | mm | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Insulation thermal conductivity | W/m.K | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ventilation | Insulation is reflective? | Yes/no | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| External Walls | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Width | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Wall Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Wall Area, "Same as Actual") | The notional external wall area is usually the same as the actual external wall area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has windows, any notional glazing resizing would impact the wall area. | F | Same as actual, with a limit |
| External Walls | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| External Walls | U-value | W/m2.K | 0.18 | 0.18 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| External Walls | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Width | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| External Doors | U-value | W/m2.K | 1 | 1 | | B | Assign in notional. User defines actual |
| External Doors | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| External Doors | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Walls (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Internal Ceiling (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Ceiling (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer to the element for calculating the effects of thermal mass. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Internal Floor (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Roof (insulated at rafters) | Base Height | m | Same as actual for room in roof | Same as actual for room in roof | This Module / Element / Section: Roof (insulated at rafters), is used to set notional building standards for roofs that are heated spaces i.e. a room in roof. The below *Roof (insulated at ceiling)* is to be used to set notional building standards for all other roofs. | A | Same as actual |
| Roof (insulated at rafters) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, any notional glazing resizing would impact the roof area. | F | Same as actual, with a limit |
| Roof (insulated at rafters) | Pitch | deg | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Orientation | deg | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roof (insulated at rafters) | U-value | W/m2.K | If Roof is unheated space: heat loss is calculated as if insulated at ceiling level.<br><br>If an occupied and heated space i.e. room in roof 0.11 | If Roof is unheated space: heat loss is calculated as if insulated at ceiling level.<br><br>If an occupied and heated space i.e. room in roof 0.11 | | B | Assign in notional. User defines actual |
| Roof (insulated at rafters) | Solar Absorption Coefficient | - | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Areal Heat Capacity | J/m2.K | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Mass Distribution Class | - | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roof (insulated at ceiling) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | **Comment 1:** The standard for all roofs that are not heated spaces are set using the this Module / Element / Section: Roof (insulated at ceiling) i.e. of a roof insulated at the ceiling level. This does not apply to room in roof.<br><br>Designers compensate for any extra heat loss of a roof insulated at rafters level if this is the design.<br><br>**Comment 2:** The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, any notional glazing resizing would impact the roof area. | F | Same as actual, with a limit |
| Roof (insulated at ceiling) | Pitch | deg | Same as actual | Same as actual | As above. | A | Same as actual |
| All roofs | U-value | W/m2.K | 0.11 | 0.11 | As above. | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Roof (insulated at ceiling) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | As above. | A | Same as actual |
| Roof (insulated at ceiling) | Mass Distribution Class | - | Same as actual | Same as actual | As above. | A | Same as actual |
| Ceiling to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | U-value | W/m2.K | 0.11 | 0.11 | | B | Assign in notional. User defines actual |
| Ceiling to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ceiling to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | U-value | W/m2.K | 0.18 | 0.18 | | B | Assign in notional. User defines actual |
| Wall to Unheated Space | Thermal Resistance of Unheated Space | m.K/W | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Floor to Unheated Space | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Floor to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Exposed Floor | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Party Wall (no heat loss) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | U-value | W/m2.K | Same as actual | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have no heat loss through a party wall. | A | Same as actual |
| Party Wall (no heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | U-value | W/m2.K | Same as actual | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have heat loss through a party wall. | A | Same as actual |
| Party Wall (heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Height | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Width | m | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Window / Glazed Door | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Window Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Window Area, "Same as Actual") | The glazing is limited in the notional building as 25% of the total floor area. This value is modified if a rooflight is installed. | F | Same as actual, with a limit |
| Window / Glazed Door | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | U-value | W/m2.K | 1.2 | 1.2 | | B | Assign in notional. User defines actual |
| Window / Glazed Door | G-value | - | Same as actual | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |
| Window / Glazed Door | Frame Area Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - type | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - depth | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - distance | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Base Height | m | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rooflight | Height | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Width | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Rooflight Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Rooflight Area, "Same as Actual") | The maximum area of the window / glazed door (25% of the total floor area) in the notional building is modified using the area of the rooflight.<br><br>This reduction in area reflects the worse performing U-value of the rooflight due to its orientation. | F | Same as actual, with a limit |
| Rooflight | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | U-value | W/m2.K | 1.7 | 1.7 | U-value (this will need to be inclusive of surface boundary HTC so BR443 compliant).<br>This is a horizontal U-value. | B | Assign in notional. User defines actual |
| Rooflight | G-value | - | Same as actual | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rooflight | Frame Area Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - type | - | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - depth | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - distance | m | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Exposed Perimeter | m | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Ground Floor | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Total Thermal Resistance | m2.K/W | 6.12 | 6.12 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ground Floor | Linear Heat Transmittance | W/m.K | 0.16 | 0.16 | | B | Assign in notional. User defines actual |
| Ground Floor | Internal Periodic Heat Transfer Coefficient | W/K | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | External Periodic Heat Transfer Coefficient | W/K | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Length | m | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | type | - | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Linear Thermal Transmittance | W/m.K | Refer to SAP10 table R2 | Refer to SAP10 table R2 | | B | Assign in notional. User defines actual |
| Point Thermal Bridges | Heat Transfer Coefficient | W/K | 0 | 0 | Point thermal bridges should be declared where not included in U-value or linear thermal bridges. Minimal point bridges should be used and designer should calculate if any are present. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | ALL | Various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Heat Source | Type | - | "HeatPump" | "HeatPump" | | B | Assign in notional. User defines actual |
| Heat Source | Energy Supply | - | "MainsElectricity" | "MainsElectricity" | | B | Assign in notional. User defines actual |
| Heat Source | Source Type | - | "OutsideAir" | "OutsideAir" | | B | Assign in notional. User defines actual |
| Heat Source | Heat network carbon emission factor | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | Heat network carbon emission factor (including out of scope emissions) | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | Heat network primary energy factor | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | Sink Type | - | "Water" | "Water" | | B | Assign in notional. User defines actual |
| Heat Source | Power of Backup Heater | kW | 3 | 3 | | B | Assign in notional. User defines actual |
| Heat Source | Backup Heater Control | | "Top Up only" | "Top Up only" | | B | Assign in notional. User defines actual |
| Heat Source | Backup Heater Time Delay | hours | 1 | 1 | | B | Assign in notional. User defines actual |
| Heat Source | Communal Distribution losses | W/dwelling | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | Modulating Control? | | TRUE | TRUE | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Heat Source | Min modulation rate 35 | | 0.4 | 0.4 | | B | Assign in notional. User defines actual |
| Heat Source | min modulation rate 55 | | 0.4 | 0.4 | | B | Assign in notional. User defines actual |
| Heat Source | time constant onoff operation | | 120 | 120 | | B | Assign in notional. User defines actual |
| Heat Source | temp return feed max | | 60 | 60 | | B | Assign in notional. User defines actual |
| Heat Source | temp lower operating limit | | -10 | -10 | | B | Assign in notional. User defines actual |
| Heat Source | min temp diff flow return for hp to operate | | 0 | 0 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | var flow temp ctrl during test | | TRUE | TRUE | | B | Assign in notional. User defines actual |
| Heat Source | power heating circ pump | kW | =Capacity (Test Letter F @55oC) * 0.003 | =Capacity (Test Letter F @55oC) * 0.003 | | B | Assign in notional. User defines actual |
| Heat Source | power source circ pump | kW | 0.01 | 0.01 | | B | Assign in notional. User defines actual |
| Heat Source | power standby | kW | 0.01 | 0.01 | | B | Assign in notional. User defines actual |
| Heat Source | power crankcase heater | kW | 0.01 | 0.01 | | B | Assign in notional. User defines actual |
| Heat Source | power off | kW | 0 | 0 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter A - Flow temp | oC | 34 | 34 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Source temp | oC | -7 | -7 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Coefficient of Performance | | 2.79 | 2.79 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Capacity | | =Notional Heat Pump Capacity * 1.00 | =Notional Heat Pump Capacity * 1.00 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Flow temp | oC | 30 | 30 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter B - Source temp | oC | 2 | 2 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Coefficient of Performance | | 4.29 | 4.29 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Capacity | | =Notional Heat Pump Capacity * 0.62 | =Notional Heat Pump Capacity * 0.62 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C -Flow temp | oC | 27 | 27 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Source temp | oC | 7 | 7 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter C - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Coefficient of Performance | | 5.91 | 5.91 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Capacity | | =Notional Heat Pump Capacity * 0.55 | =Notional Heat Pump Capacity * 0.55 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D -Flow temp | oC | 24 | 24 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Source temp | oC | 12 | 12 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter D - Coefficient of Performance | | 8.02 | 8.02 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Capacity | | =Notional Heat Pump Capacity * 0.47 | =Notional Heat Pump Capacity * 0.47 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F -Flow temp | oC | 35 | 35 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Source temp | oC | -10 | -10 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Coefficient of Performance | | 2.49 | 2.49 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter F - Capacity | | =Notional Heat Pump Capacity * 1.05 | =Notional Heat Pump Capacity * 1.05 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Flow temp | oC | 52 | 52 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Source temp | oC | -7 | -7 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Coefficient of Performance | | 2.03 | 2.03 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Capacity | | =Notional Heat Pump Capacity * 0.99 | =Notional Heat Pump Capacity * 0.99 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter B - Flow temp | oC | 42 | 42 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Source temp | oC | 2 | 2 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Coefficient of Performance | | 3.12 | 3.12 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Capacity | | =Notional Heat Pump Capacity * 0.60 | =Notional Heat Pump Capacity * 0.60 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C -Flow temp | oC | 36 | 36 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter C - Source temp | oC | 7 | 7 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Coefficient of Performance | | 4.41 | 4.41 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Capacity | | =Notional Heat Pump Capacity * 0.49 | =Notional Heat Pump Capacity * 0.49 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D -Flow temp | oC | 30 | 30 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Source temp | oC | 12 | 12 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter D - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Coefficient of Performance | | 6.3 | 6.3 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Capacity | | =Notional Heat Pump Capacity * 0.51 | =Notional Heat Pump Capacity * 0.51 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F -Flow temp | oC | 55 | 55 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Source temp | oC | -10 | -10 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Degradation coefficient | | 0.9 | 0.9 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter F - Coefficient of Performance | | 1.87 | 1.87 | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Capacity | | =Notional Heat Pump Capacity * 1.03 | =Notional Heat Pump Capacity * 1.03 | | B | Assign in notional. User defines actual |
| Living Area Heating | ALL | various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Living Area Heating | Type | - | "WetDistribution" | "WetDistribution" | | B | Assign in notional. User defines actual |
| Living Area Heating | Rated Power | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Living Area Heating | Advanced Start | hours | 1 | 1 | | B | Assign in notional. User defines actual |
| Living Area Heating | Thermal Mass | kJ/K | =51.8*NZone | =51.8*NZone | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Living Area Heating | C Constant | | =(1.89*NZone)/(50^1.34) | =(1.89*NZone)/(50^1.34) | | B | Assign in notional. User defines actual |
| Living Area Heating | Design Temp Diff | K | 5 | 5 | | B | Assign in notional. User defines actual |
| Living Area Heating | Convective Fraction | - | 0.7 | 0.7 | | B | Assign in notional. User defines actual |
| Living Area Heating | Design Flow Temperature | deg C | 45 | 45 | | B | Assign in notional. User defines actual |
| Living Area Heating | Minimum External Temperature | deg C | 0 | 0 | | B | Assign in notional. User defines actual |
| Living Area Heating | Minimum Flow Temperature | deg C | 21 | 21 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Living Area Heating | Maximum External Temperature | degC | 20 | 20 | | B | Assign in notional. User defines actual |
| Living Area Heating | Set-back Temperature | deg C | 18 | 18 | | B | Assign in notional. User defines actual |
| Living Area Heating | Ecodesign Control Class | - | 2 | 2 | | B | Assign in notional. User defines actual |
| Living Area Heating | Heat Source | - | Notional Source (above) | Notional Source (above) | | B | Assign in notional. User defines actual |
| Living Area Heating | Control | - | Space Heating Hours - Living Area | Space Heating Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | ALL | various | Remove actual systems Install notional spec (below) | Remove actual systems Install notional spec (below) | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Type | - | "WetDistribution" | "WetDistribution" | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Rest of Dwelling Heating | Rated Power | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Advanced Start | h | 1 | 1 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Thermal Mass | kJ/K | =51.8*NZone | =51.8*NZone | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | C Constant | | =(1.89*NZone)/(50^1.34) | =(1.89*NZone)/(50^1.34) | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Design Temp Diff | K | 5 | 5 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Convective Fraction | - | 0.7 | 0.7 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rest of Dwelling Heating | Design Flow Temperature | deg C | 45 | 45 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Minimum External Temperature | deg C | 0 | 0 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Minimum Flow Temperature | deg C | 21 | 21 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Maximum External Temperature | degC | 20 | 20 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Set-back Temperature | deg C | 18 | 18 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Ecodesign Control Class | - | 2 | 2 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Heat Source | - | Notional Source (above) | Notional Source (above) | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Rest of Dwelling Heating | Control | - | Space Heating Hours - Non-living Area | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Heating Control Object | | Space Heating Hours - Living Area | Space Heating Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Heating Control Object | | Space Heating Hours - Non-living Area | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | Water Heating Hours | Water Heating Hours | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | Legionella Cycle | Legionella Cycle | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Living Area | Window Opening Schedule - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Non-living Area | Window Opening Schedule - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Cooling Control Object | | Space Cooling Hours - Living Area | Space Cooling Hours - Living Area | | C | Assign in notional. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | FHS defines actual |
| Controls | Cooling Control Object | | Space Cooling Hours - Non-living Area | Space Cooling Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Hot Water Source | ALL | various | Remove actual systems Install notional spec (below) | Remove actual systems Install notional spec (below) | | B | Assign in notional. User defines actual |
| Hot Water Source | Type | - | "StorageTank" | "StorageTank" | | B | Assign in notional. User defines actual |
| Hot Water Source | Efficiency | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source | Energy Supply | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source | Temp Output | | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source | Power_max | kW | n/a | n/a | | B | Assign in notional. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | User defines actual |
| Hot Water Source | Volume | litres | Same as Actual. If no cylinder present - Lookup from AD L Table 5.1 | Same as Actual. If no cylinder present - Lookup from AD L Table 5.1 | A profile of daily domestic hot water demands over a year is generated by the HEM: FHS assessment, dependent on standard occupancy of a dwelling. (Standard occupancy of a dwelling is dependent on the number of bedrooms and total floor area.) The FHS domestic hot water demand for sizing is the 75th percentile of daily demands for a dwelling. Sizing methodology (based on BS EN 12831-3) is applied to the FHS domestic hot water demand. | F | Same as actual, with a limit |
| Hot Water Source | Daily Losses | kWh/24 h | =(0.005+0.55/(120+4)) *([HW Cylinder Volume in litres])*(120/[HW Cylinder Volume in litres])^(1/3)*(0.6*0.9) | =(0.005+0.55/(120+4)) *([HW Cylinder Volume in litres])*(120/[HW Cylinder Volume in litres])^(1/3)*(0.6*0.9) | Cylinder has 120mm insulation Cylinder, factory insulated: L = 0.005 + 0.55/(t + 4.0) Volume factor can be calculated using the equation VF = (120 / Vc)^1/3 Temperature factor for indirect cylinder = 0.6 Temperature Factor by 0.9 if there is separate time control of domestic hot water (boiler systems, warm air systems and heat pump systems) | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| StorageTank - heat source | Heat Pump Reference | - | Notional spec (above) | Notional spec (above) | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Heater Position | - | 0.1 | 0.1 | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Thermostat Position | - | 0.1 | 0.1 | | B | Assign in notional. User defines actual |
| StorageTank - heat source | HW-only Heat Pump? | T/F | FALSE | FALSE | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Flow Temp Upper Limit | deg C | 60 | 60 | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Immersion Heater (backup) | T/F | FALSE | FALSE | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Immersion Heater Power | kW | n/a | n/a | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| StorageTank - heat source | Immersion Heater Position | | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Thermostat Position | | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Internal Diameter | mm | =MAX(20, "Same As Actual") | =MAX(20, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Source - primary pipework | External Diameter | mm | =MAX(22, "Same As Actual") | =MAX(22, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Source - primary pipework | Length | m | =MIN(0.05 * "Dwelling Floor Area", "Same As Actual") | =MIN(0.05 * "Dwelling Floor Area", "Same As Actual") | A standard has been set in order to encourage compact pipework design. | F | Same as actual, with a limit |
| Hot Water Source - primary pipework | Insulation thermal conductivity | W/m.K | 0.035 | 0.035 | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Source - primary pipework | Insulation thickness | mm | =IF(Primary Pipework Internal Diameter =<25, "25mm", "35mm") | =IF(Primary Pipework Internal Diameter =<25, "25mm", "35mm") | Primary pipework uses the BS5422 2023 enhanced level thickness of insulation for domestic heating and hot water systems. | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Insulation surface reflective? | T/F | F | F | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (internal) | Internal Diameter | mm | =MAX(13, "Same As Actual") | =MAX(13, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | External Diameter | mm | =MAX(15, "Same As Actual") | =MAX(15, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | Length | m | =MIN(0.2 * "Dwelling Floor Area", "Same As Actual") | =MIN(0.2 * "Dwelling Floor Area", "Same As Actual") | A standard has been set in order to encourage compact pipework design. | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | Insulation thermal conductivity | W/m.K | 0.035 | 0.035 | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (internal) | Insulation thickness | mm | =IF(Primary Pipework Internal Diameter =<25, "20mm", "24mm") | =IF(Primary Pipework Internal Diameter =<25, "20mm", "24mm") | Aligns with minimum standards in ADL1 | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Hot Water Distribution (internal) | Insulation surface reflective? | T/F | F | F | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Internal Diameter | mm | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | External Diameter | mm | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Length | m | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Insulation thermal conductivity | W/m.K | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Insulation thickness | mm | 0 | 0 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Distribution (external) | Insulation surface reflective? | T/F | 0 | 0 | | B | Assign in notional. User defines actual |
| Shower | Type | various | "MixerShower" | "MixerShower" | Based on Part G Maximum fitting consumption optional requirement level | B | Assign in notional. User defines actual |
| Shower | Flow Rate | litres/min | 8<br>Actual is a minimum of 8 | 8<br>Actual is a minimum of 8 | Based on Part G Maximum fitting consumption optional requirement level. Minimum value on actual is in line with SAP 10.2. It recognises that shower heads can be easily changed by the occupant if they are unhappy with a low flow rate. | E | Assign in notional. With a limit on actual |
| Shower | Rated Power | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Shower | Assign WWHRS | - | Notional WWHR Specification | Notional WWHR Specification | Based on Part G Maximum fitting consumption optional requirement level. | B | Assign in notional. User defines actual |
| Bath | Volume | litres | 73 | 73 | Based on SAP 10 assumptions. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bath | Flow Rate | litres/min | 12 | 12 | | B | Assign in notional. User defines actual |
| Other DHW Outlets | Flow Rate | litres/min | 6 | 6 | Based on Part G Maximum fitting consumption optional requirement level | B | Assign in notional. User defines actual |
| WWHRS | ALL | various | WWHRS is included in the notional if the dwelling has more than one story.<br><br>Where more than one story: System B | None | This part of the notional is only included for dwellings that have more than one story i.e. not single story flats or bungalows. See the Future Homes and Building Standard consultation for further information. **NOTE it is not possible to differentiate between flats and maisonettes/duplexes. This means that two storey notional dwellings within communal blocks will not have WWHRs. The intent is that such dwellings will have WWHR in the notional.** | D | Assign in notional - dependent on the building. User defines actual |
| WWHRS | Efficiency | | 50% | n/a | The efficiency has been set to reflect vertical system B waste water heat recovery. | D | Assign in notional - dependent on the building. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| WWHRS | Utilisation Factor | | 0.98 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Air Conditioning | ALL | Various | "AirConditioning" or None | "AirConditioning" or None | An air conditioning system can be used in the notional building if a Part O assessment demonstrates that air conditioning is necessary. | B | Assign in notional. User defines actual |
| Air Conditioning | EnergySupply | | "mains elec" | "mains elec" | | B | Assign in notional. User defines actual |
| Air Conditioning | Part O Cooling Requirement | | Same as actual | Same as actual | | A | Same as actual |
| Air Conditioning | Cooling capacity | kW | Same as actual | Same as actual | Part O modelling is used to size the cooling capacity. | A | Same as actual |
| Air Conditioning | Efficiency | - | 5.1 | 5.1 | | B | Assign in notional. User defines actual |
| Air Conditioning | Convective Fraction | - | 0.95 | 0.95 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Electric Battery | ALL | Various | Remove actual systems | Remove actual systems | | B | Assign in notional. User defines actual |
| Electric Battery | Capacity | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Electric Battery | Charge/Discharge Efficiency | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Solar PV | ALL | various | =IF(Number of Storeys <=15, TRUE, FALSE) | None | This part of the notional is only included on low and mid rise homes: it is removed on blocks of flats over 15 stories. See the Future Homes and Building Standard consultation for further information.<br><br>A tiered block is not available in the consultation modelling tool.<br><br>A new input for roof base height for part of the building that the dwelling is in may be provided in future. | D | Assign in notional - dependent on the building. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Solar PV | Peak Power | kWp | =IF(dwelling type = "house", dwelling Floor Area * 0.4 / 4.5, dwelling Floor Area * 0.4 / (4.5 * Number of Storeys in the Building) | n/a | Solar panels have a peak generation area of 4.5 m2/kWp (i.e. peak power at STC of 0.22 kWp/m2). | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Ventilation Strategy | - | Moderately Ventilated | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Pitch | deg | 45 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | shading | | Same as actual | n/a | | A | Same as actual |
| Solar PV | base height | m | =IF(dwelling type = "house", MAX(Base Height of All Elements), (dwelling Volume / dwelling Floor Area + 0.3) * | n/a | | D | Assign in notional - dependent on the building. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Number of Storeys in the Building) | | | | defines actual |
| Solar PV | PV Width | | =PV Height * 2 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | PV Height | | =((Capacity of PV Array * 4.5) / 2) ^ 0.5 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Orientation | deg | S | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| PV Diverter | ALL | - | None | None | | B | Assign in notional. User defines actual |
| PV Diverter | Assign to System | - | None | None | | B | Assign in notional. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | User defines actual |

# Section 2: The notional buildings for dwellings connected to heat networks

2.1 The two consultation options for the notional building for dwellings connected to heat networks are shown in Table 2 below.

2.2 Each variable for the notional building has been categorised. Categories describe both of:

a) if standardised properties are assigned to the variable in the notional building

b) what the user can input as the actual value.

This category is the final column of Table 2. The colour coding of these categories are also within the notional option columns of Table 2.

2.3 The categories are one of the following:

| Category | Category description |
|---|---|
| A | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building. |
| B | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building. |
| C | a) Value is assigned for the variable in the notional building.<br>b) The HEM defines the parameter in the actual building. |
| D | a) Value is assigned for the variable in the notional building, dependent on characteristics of the building.<br>b) User defines the variable in the actual building. |
| E | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, but there is a limit on this value. |
| F | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building, but there is a limit on this value. |

| **Table 2: Notional building for dwellings connected to heat networks** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Module / Element / Section** | **Field** | **Unit** | **Notional Option 1 Heat networks** | **Notional Option 2 Heat networks** | **Comments** | **Category** | **Category description summary** |
| External Conditions (Weather) | ALL | various | Same as actual | Same as actual | Weather conditions based on the local weather. For implementation users would be provided with a map. There is a consultation question on this proposed new approach in the Future Homes and Building Standard consultation. | A | Same as actual |
| Distant Shading | ALL | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Gains | ALL | various | Same as actual | Same as actual | | A | Same as actual |
| General | Cold Water Source | - | Same as actual | Same as actual | | A | Same as actual |
| General | Number of Storeys in the Building | | Same as actual | Same as actual | | A | Same as actual |
| General | Number of Wetrooms | | Same as actual | Same as actual | | A | Same as actual |
| General | Number of bedrooms | - | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| General | Electricity Tariff | - | Standard Tariff | Standard Tariff | It may be beneficial for occupants to have an off-peak tariff. Guidance on the actual tariff recommended might be included in the Home User Guide template 2025. | B | Assign in notional. User defines actual |
| General | Cooking Fuel | - | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Volume | m3 | Same as actual | Same as actual | | A | Same as actual |
| Whole Dwelling | Lighting Capacity | lm | =1418 * (Zone TFA * N_occupants) ** 0.41 | =1418 * (Zone TFA * N_occupants) ** 0.41 | Calculated using the FHS wrapper assumption. | C | Assign in notional. FHS defines actual |
| Whole Dwelling | Lighting Efficacy | lm/W | 120 | 120 | This value aligns with the recent government consultation *New ecodesign requirements for lighting products.* The final value in the notional building will be set taking account of feedback to this consultation. | B | Assign in notional. User defines actual |
| Living Area | Assigned heating system | | Notional HeatSource | Notional HeatSource | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Living Area | Assigned cooling system | | Notional CoolingSource | Notional CoolingSource | | B | Assign in notional. User defines actual |
| Rest of Dwelling | Assigned heating system | - | Notional HeatSource | Notional HeatSource | | B | Assign in notional. User defines actual |
| Rest of Dwelling | Assigned cooling system | - | Notional CoolingSource | Notional CoolingSource | | B | Assign in notional. User defines actual |
| Infiltration | Storey | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Shelter | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Build type | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Test Type | 50Pa / 4Pa | 50Pa | 50Pa | Airtightness is set using the blower door test at 50Pa. | B | Assign in notional. User defines actual |
| Infiltration | Test Result | m3/m2. hr | 4 | 5 | To be converted to ACH by the Home Energy Model core engine. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Infiltration | Enveloped Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Total Volume | m3 | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | Sheltered Sides | - | Same as actual | Same as actual | | A | Same as actual |
| Infiltration | No. Open Chimneys | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Open Flues | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Closed Fires | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues D | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues E | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Blocked Chimneys | - | 0 | 0 | | B | Assign in notional. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | User defines actual |
| Infiltration | Extract Fans | - | 0 | =IF(Number of Extract Fans < Number Of WetRooms, "Number Of WetRooms", "Same As Actual") | This reflects the Approved document F standard for extract fans in each kitchen, utility room, bathroom and sanitary accommodation. | F | Same as actual, with a limit |
| Infiltration | Passive Vents | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Infiltration | Gas Fires | - | 0 | 0 | | B | Assign in notional. User defines actual |
| Ventilation | Ventilation Type | - | dMEV | Natural ventilation | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ventilation | Required ACH | ACH | =MAX(AD F Minimum Ventilation Rate Method A,AD F Minimum Ventilation Rate Method B)/Dwelling Volume * 3600 / 1000 | =MAX(AD F Minimum Ventilation Rate Method A,AD F Minimum Ventilation Rate Method B)/Dwelling Volume * 3600 / 1000 | This reflects the Approved document F standard for minimum whole dwelling ventilation rates. | B | Assign in notional. User defines actual |
| Ventilation | Specific Fan Power | W/l.s | Continuous decentralised mechanical extract ventilation systems: 0.15 W/(L.s) | n/a | These specific fan powers have been selected using an analysis of product data from the PCDB. The proposed standards are set at a level that 50% of products on the PCDB are better than these standards. | B | Assign in notional. User defines actual |
| Ventilation | MVHR location | in/out | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Heat Recovery Efficiency | % | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct thickness | mm | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct cross-section area | m2 | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Intake duct length | m | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Output duct length | m | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Duct Insulation thickness | mm | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| Ventilation | Insulation thermal conductivity | W/m.K | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ventilation | Insulation is reflective? | Yes/no | Same as actual | Same as actual | Parameter is for when MVHR is installed only. | A | Same as actual |
| External Walls | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Width | m | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Wall Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Wall Area, "Same as Actual") | The notional external wall area is usually the same as the actual external wall area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has windows, any notional glazing resizing would impact the wall area. | F | Same as actual, with a limit |
| External Walls | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| External Walls | U-value | W/m2.K | 0.18 | 0.18 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| External Walls | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| External Walls | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Height | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Width | m | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| External Doors | U-value | W/m2.K | 1 | 1 | | B | Assign in notional. User defines actual |
| External Doors | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| External Doors | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| External Doors | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Walls (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Internal Ceiling (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Ceiling (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | U-value | W/m2.K | Same as actual | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer to the element for calculating the effects of thermal mass. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Internal Floor (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Roof (insulated at rafters) | Base Height | m | Same as actual for room in roof | Same as actual for room in roof | This Module / Element / Section: Roof (insulated at rafters), is used to set notional building standards for roofs that are heated spaces i.e. a room in roof. The below *Roof (insulated at ceiling)* is to be used to set notional building standards for all other roofs. | A | Same as actual |
| Roof (insulated at rafters) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, any notional glazing resizing would impact the roof area. | F | Same as actual, with a limit |
| Roof (insulated at rafters) | Pitch | deg | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Orientation | deg | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roof (insulated at rafters) | U-value | W/m2.K | If Roof is unheated space: heat loss is calculated as if insulated at ceiling level.<br><br>If an occupied and heated space i.e. room in roof 0.11 | If Roof is unheated space: heat loss is calculated as if insulated at ceiling level.<br><br>If an occupied and heated space i.e. room in roof 0.11 | | B | Assign in notional. User defines actual |
| Roof (insulated at rafters) | Solar Absorption Coefficient | - | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Areal Heat Capacity | J/m2.K | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Mass Distribution Class | - | Same as actual for room in roof | Same as actual for room in roof | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roof (insulated at ceiling) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | **Comment 1:** The standard for all roofs that are not heated spaces are set using the this Module / Element / Section: Roof (insulated at ceiling) i.e. of a roof insulated at the ceiling level. This does not apply to room in roof.<br><br>Designers compensate for any extra heat loss of a roof insulated at rafters level if this is the design.<br><br>**Comment 2:** The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, any notional glazing resizing would impact the roof area. | F | Same as actual, with a limit |
| Roof (insulated at ceiling) | Pitch | deg | Same as actual | Same as actual | As above. | A | Same as actual |
| All roofs | U-value | W/m2.K | 0.11 | 0.11 | As above. | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Roof (insulated at ceiling) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | As above. | A | Same as actual |
| Roof (insulated at ceiling) | Mass Distribution Class | - | Same as actual | Same as actual | As above. | A | Same as actual |
| Ceiling to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | U-value | W/m2.K | 0.11 | 0.11 | | B | Assign in notional. User defines actual |
| Ceiling to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ceiling to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | U-value | W/m2.K | 0.18 | 0.18 | | B | Assign in notional. User defines actual |
| Wall to Unheated Space | Thermal Resistance of Unheated Space | m.K/W | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Floor to Unheated Space | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Floor to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Exposed Floor | Solar Absorption Coefficient | - | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Exposed Floor | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Party Wall (no heat loss) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | U-value | W/m2.K | Same as actual | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have no heat loss through a party wall. | A | Same as actual |
| Party Wall (no heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | U-value | W/m2.K | Same as actual | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have heat loss through a party wall. | A | Same as actual |
| Party Wall (heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Base Height | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Height | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Width | m | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Window / Glazed Door | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Window Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Window Area, "Same as Actual") | The glazing is limited in the notional building as 25% of the total floor area. This value is modified if a rooflight is installed. | F | Same as actual, with a limit |
| Window / Glazed Door | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | U-value | W/m2.K | 1.2 | 1.2 | | B | Assign in notional. User defines actual |
| Window / Glazed Door | G-value | - | Same as actual | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |
| Window / Glazed Door | Frame Area Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - type | - | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - depth | m | Same as actual | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - distance | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Base Height | m | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rooflight | Height | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Width | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Rooflight Area, "Same as Actual") | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Rooflight Area, "Same as Actual") | The maximum area of the window / glazed door (25% of the total floor area) in the notional building is modified using the area of the rooflight.<br><br>This reduction in area reflects the worse performing U-value of the rooflight due to its orientation. | F | Same as actual, with a limit |
| Rooflight | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Orientation | deg | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | U-value | W/m2.K | 1.7 | 1.7 | U-value (this will need to be inclusive of surface boundary HTC so BR443 compliant).<br>This is a horizontal U-value. | B | Assign in notional. User defines actual |
| Rooflight | G-value | - | Same as actual | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rooflight | Frame Area Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - type | - | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - depth | m | Same as actual | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - distance | m | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Area | m2 | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Pitch | deg | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Exposed Perimeter | m | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | U-value | W/m2.K | 0.13 | 0.13 | | B | Assign in notional. User defines actual |
| Ground Floor | Areal Heat Capacity | J/m2.K | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Mass Distribution Class | - | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | Total Thermal Resistance | m2.K/W | 6.12 | 6.12 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ground Floor | Linear Heat Transmittance | W/m.K | 0.16 | 0.16 | | B | Assign in notional. User defines actual |
| Ground Floor | Internal Periodic Heat Transfer Coefficient | W/K | Same as actual | Same as actual | | A | Same as actual |
| Ground Floor | External Periodic Heat Transfer Coefficient | W/K | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Length | m | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | type | - | Same as actual | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Linear Thermal Transmittance | W/m.K | Refer to SAP10 table R2 | Refer to SAP10 table R2 | | B | Assign in notional. User defines actual |
| Point Thermal Bridges | Heat Transfer Coefficient | W/K | 0 | 0 | Point thermal bridges should be declared where not included in U-value or linear thermal bridges. Minimal point bridges should be used and designer should calculate if any are present. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | ALL | Various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Heat Source | Type | - | HIU | HIU | | B | Assign in notional. User defines actual |
| Heat Source | Energy Supply | - | Heat network | Heat network | | B | Assign in notional. User defines actual |
| Heat Source | Source Type | - | Heat network | Heat network | | B | Assign in notional. User defines actual |
| Heat Source | Heat network carbon emission factor | | 0.033 | 0.033 | | B | Assign in notional. User defines actual |
| Heat Source | Heat network carbon emission factor (including out of scope emissions) | | 0.033 | 0.033 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | Heat network primary energy factor | | 0.75 | 0.75 | | B | Assign in notional. User defines actual |
| Heat Source | Sink Type | - | "Water" | "Water" | | B | Assign in notional. User defines actual |
| Heat Source | Power of Backup Heater | kW | "None" | "None" | | B | Assign in notional. User defines actual |
| Heat Source | Backup Heater Control | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | Backup Heater Time Delay | hours | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | Communal Distribution losses | W/dwelling | 62 | 62 | | B | Assign in notional. User defines actual |
| Heat Source | Modulating Control? | | n/a | n/a | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Heat Source | Min modulation rate 35 | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | min modulation rate 55 | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | time constant onoff operation | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | temp return feed max | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | temp lower operating limit | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | min temp diff flow return for hp to operate | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | var flow temp ctrl during test | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | power heating circ pump | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | power source circ pump | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | power standby | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | power crankcase heater | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | power off | kW | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter A - Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter A - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter B - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter B - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter C - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter C - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter D - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter D - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 35oC Test Letter F - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter F - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter A - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter B - Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter B - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter C - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter C - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter D - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter D - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F -Flow temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Source temp | oC | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Degradation coefficient | | n/a | n/a | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter F - Coefficient of Performance | | n/a | n/a | | B | Assign in notional. User defines actual |
| Heat Source | 55oC Test Letter F - Capacity | | n/a | n/a | | B | Assign in notional. User defines actual |
| Living Area Heating | ALL | various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Living Area Heating | Type | - | "WetDistribution" | "WetDistribution" | | B | Assign in notional. User defines actual |
| Living Area Heating | Rated Power | kW | 45 | 45 | | B | Assign in notional. User defines actual |
| Living Area Heating | Advanced Start | hours | 1 | 1 | | B | Assign in notional. User defines actual |
| Living Area Heating | Thermal Mass | kJ/K | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Living Area Heating | C Constant | | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Design Temp Diff | K | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Convective Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Design Flow Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Minimum External Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Minimum Flow Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Maximum External Temperature | degC | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Set-back Temperature | deg C | n/a | n/a | | B | Assign in notional. User defines actual |
| Living Area Heating | Ecodesign Control Class | - | Same as actual | Same as actual | | A | Same as actual |
| Living Area Heating | Heat Source | - | Notional Source (above) | Notional Source (above) | | B | Assign in notional. User defines actual |
| Living Area Heating | Control | - | Space Heating Hours - Living Area | Space Heating Hours - Living Area | | C | Assign in notional. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | FHS defines actual |
| Rest of Dwelling Heating | ALL | various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Type | - | "WetDistribution" | "WetDistribution" | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Rated Power | kW | 45 | 45 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Advanced Start | h | 1 | 1 | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Thermal Mass | kJ/K | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | C Constant | | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Design Temp Diff | K | Same as actual | Same as actual | | A | Same as actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rest of Dwelling Heating | Convective Fraction | - | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Design Flow Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Minimum External Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Minimum Flow Temperature | deg C | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Maximum External Temperature | degC | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Set-back Temperature | deg C | n/a | n/a | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Ecodesign Control Class | - | Same as actual | Same as actual | | A | Same as actual |
| Rest of Dwelling Heating | Heat Source | - | Notional Source (above) | Notional Source (above) | | B | Assign in notional. User defines actual |
| Rest of Dwelling Heating | Control | - | Space Heating Hours - Non-living Area | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Controls | Heating Control Object | | Space Heating Hours - Living Area | Space Heating Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Heating Control Object | | Space Heating Hours - Non-living Area | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | Water Heating Hours | Water Heating Hours | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | Legionella Cycle | Legionella Cycle | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Living Area | Window Opening Schedule - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Non-living Area | Window Opening Schedule - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Cooling Control Object | | Space Cooling Hours - Living Area | Space Cooling Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Cooling Control Object | | Space Cooling Hours - Non-living Area | Space Cooling Hours - Non-living Area | | C | Assign in notional. FHS defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Source | ALL | various | Remove actual systems<br>Install notional spec (below) | Remove actual systems<br>Install notional spec (below) | | B | Assign in notional. User defines actual |
| Hot Water Source | Type | - | "HIU" | "HIU" | | B | Assign in notional. User defines actual |
| Hot Water Source | Efficiency | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source | Energy Supply | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source | Temp Output | | 55 | 55 | | B | Assign in notional. User defines actual |
| Hot Water Source | Power_max | kW | 45 | 45 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Source | Volume | litres | none | none | A profile of daily domestic hot water demands over a year is generated by the HEM: FHS assessment, dependent on standard occupancy of a dwelling. (Standard occupancy of a dwelling is dependent on the number of bedrooms and total floor area.) The FHS domestic hot water demand for sizing is the 75th percentile of daily demands for a dwelling. Sizing methodology (based on BS EN 12831-3) is applied to the FHS domestic hot water demand. | B | Assign in notional. User defines actual |
| Hot Water Source | Daily Losses | kWh/24 h | 0.8 | 0.8 | Cylinder has 120mm insulation Cylinder, factory insulated: L = 0.005 + 0.55/(t + 4.0) Volume factor can be calculated using the equation VF = (120 / Vc)^1/3 Temperature factor for indirect cylinder = 0.6 Temperature Factor by 0.9 if there is separate time control of domestic hot water (boiler systems, warm air systems and heat pump systems) | B | Assign in notional. User defines actual |
| StorageTank - heat source | Heat Pump Reference | - | None | None | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| StorageTank - heat source | Heater Position | - | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Thermostat Position | - | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | HW-only Heat Pump? | T/F | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Flow Temp Upper Limit | deg C | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Immersion Heater (backup) | T/F | FALSE | FALSE | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Immersion Heater Power | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| StorageTank - heat source | Immersion Heater Position | | n/a | n/a | | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| StorageTank - heat source | Thermostat Position | | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Internal Diameter | mm | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | External Diameter | mm | n/a | n/a | | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Length | m | 0 | 0 | A standard has been set in order to encourage compact pipework design. | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Insulation thermal conductivity | W/m.K | n/a | n/a | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Source - primary pipework | Insulation thickness | mm | n/a | n/a | Primary pipework uses the BS5422 2023 enhanced level thickness of insulation for domestic heating and hot water systems. | B | Assign in notional. User defines actual |
| Hot Water Source - primary pipework | Insulation surface reflective? | T/F | n/a | n/a | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (internal) | Internal Diameter | mm | =MAX(13, "Same As Actual") | =MAX(13, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | External Diameter | mm | =MAX(15, "Same As Actual") | =MAX(15, "Same As Actual") | | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | Length | m | =MIN(0.2 * "Dwelling Floor Area", "Same As Actual") | =MIN(0.2 * "Dwelling Floor Area", "Same As Actual") | A standard has been set in order to encourage compact pipework design. | F | Same as actual, with a limit |
| Hot Water Distribution (internal) | Insulation thermal conductivity | W/m.K | 0.035 | 0.035 | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (internal) | Insulation thickness | mm | =IF(Primary Pipework Internal Diameter =<25, "20mm", "24mm") | =IF(Primary Pipework Internal Diameter =<25, "20mm", "24mm") | Aligns with minimum standards in ADL1 | B | Assign in notional. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | defines actual |
| Hot Water Distribution (internal) | Insulation surface reflective? | T/F | F | F | Aligns with minimum standards in ADL1 | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Internal Diameter | mm | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | External Diameter | mm | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Length | m | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Insulation thermal conductivity | W/m.K | 0 | 0 | | B | Assign in notional. User defines actual |
| Hot Water Distribution (external) | Insulation thickness | mm | 0 | 0 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hot Water Distribution (external) | Insulation surface reflective? | T/F | 0 | 0 | | B | Assign in notional. User defines actual |
| Shower | Type | various | "MixerShower" | "MixerShower" | Based on Part G Maximum fitting consumption optional requirement level | B | Assign in notional. User defines actual |
| Shower | Flow Rate | litres/min | 8<br>Actual is a minimum of 8 | 8<br>Actual is a minimum of 8 | Based on Part G Maximum fitting consumption optional requirement level. Minimum value on actual is in line with SAP 10.2. It recognises that shower heads can be easily changed by the occupant if they are unhappy with a low flow rate. | E | Assign in notional. With a limit on actual |
| Shower | Rated Power | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Shower | Assign WWHRS | - | Notional WWHR Specification | Notional WWHR Specification | Based on Part G Maximum fitting consumption optional requirement level. | B | Assign in notional. User defines actual |
| Bath | Volume | litres | 73 | 73 | Based on SAP 10 assumptions. | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bath | Flow Rate | litres/min | 12 | 12 | | B | Assign in notional. User defines actual |
| Other DHW Outlets | Flow Rate | litres/min | 6 | 6 | Based on Part G Maximum fitting consumption optional requirement level | B | Assign in notional. User defines actual |
| WWHRS | ALL | various | WWHRS is included in the notional if the dwelling has more than one story.<br><br>Where more than one story: System B | None | This part of the notional is only included for dwellings that have more than one story i.e. not single story flats or bungalows. See the Future Homes and Building Standard consultation for further information. **NOTE it is not possible to differentiate between flats and maisonettes/duplexes. This means that two storey notional dwellings within communal blocks will not have WWHRs. The intent is that such dwellings will have WWHR in the notional.** | D | Assign in notional - dependent on the building. User defines actual |
| WWHRS | Efficiency | | 50% | n/a | The efficiency has been set to reflect vertical system B waste water heat recovery. | D | Assign in notional - dependent on the building. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| WWHRS | Utilisation Factor | | 0.98 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Air Conditioning | ALL | Various | "AirConditioning" or None | "AirConditioning" or None | An air conditioning system can be used in the notional building if a Part O assessment demonstrates that air conditioning is necessary. | B | Assign in notional. User defines actual |
| Air Conditioning | EnergySupply | | "mains elec" | "mains elec" | | B | Assign in notional. User defines actual |
| Air Conditioning | Part O Cooling Requirement | | Same as actual | Same as actual | | A | Same as actual |
| Air Conditioning | Cooling capacity | kW | Same as actual | Same as actual | Part O modelling is used to size the cooling capacity. | A | Same as actual |
| Air Conditioning | Efficiency | - | 5.1 | 5.1 | | B | Assign in notional. User defines actual |
| Air Conditioning | Convective Fraction | - | 0.95 | 0.95 | | B | Assign in notional. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Electric Battery | ALL | Various | Remove actual systems | Remove actual systems | | B | Assign in notional. User defines actual |
| Electric Battery | Capacity | kW | n/a | n/a | | B | Assign in notional. User defines actual |
| Electric Battery | Charge/Discharge Efficiency | - | n/a | n/a | | B | Assign in notional. User defines actual |
| Solar PV | ALL | various | =IF(Number of Storeys <=15, TRUE, FALSE) | None | This part of the notional is only included on low and mid rise homes: it is removed on blocks of flats over 15 stories. See the Future Homes and Building Standard consultation for further information.<br><br>A tiered block is not available in the consultation modelling tool.<br><br>A new input for roof base height for part of the building that the dwelling is in may be provided in future. | D | Assign in notional - dependent on the building. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Solar PV | Peak Power | kWp | =IF(dwelling type = "house", dwelling Floor Area * 0.4 / 4.5, dwelling Floor Area * 0.4 / (4.5 * Number of Storeys in the Building) | n/a | Solar panels have a peak generation area of 4.5 m2/kWp (i.e. peak power at STC of 0.22 kWp/m2). | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Ventilation Strategy | - | Moderately Ventilated | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Pitch | deg | 45 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | shading | | Same as actual | n/a | | A | Same as actual |
| Solar PV | base height | m | =IF(dwelling type = "house", MAX(Base Height of All Elements), (dwelling Volume / dwelling Floor Area + 0.3) * | n/a | | D | Assign in notional - dependent on the building. User |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Number of Storeys in the Building) | | | | defines actual |
| Solar PV | PV Width | | =PV Height * 2 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | PV Height | | =((Capacity of PV Array * 4.5) / 2) ^ 0.5 | n/a | | D | Assign in notional - dependent on the building. User defines actual |
| Solar PV | Orientation | deg | S | n/a | | D | Assign in notional - dependent on the building. User defines actual |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PV Diverter | ALL | - | None | None | | B | Assign in notional. User defines actual |
| PV Diverter | Assign to System | - | None | None | | B | Assign in notional. User defines actual |

# Section 3: The notional building for calculating the fabric energy efficiency rate

3.1 The consultation proposal for calculating the target fabric energy efficiency rate for dwellings is shown in Table 3 below.

3.2 Each variable for the notional building has been categorised. Categories describe both of:

a) if standardised properties are assigned to the variable in the notional building

b) what the user can input as the actual value.

This category is the final column of Table 3. The colour coding of these categories are also within the notional option columns of Table 3.

3.3 The categories are one of the following:

| Category | Category description |
|---|---|
| A | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building. |
| B | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building. |
| C | a) Value is assigned for the variable in the notional building.<br>b) The HEM defines the parameter in the actual building. |
| D | a) Value is assigned for the variable in the notional building, dependent on characteristics of the building.<br>b) User defines the variable in the actual building. |
| E | a) Value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, but there is a limit on this value. |
| F | a) No value is assigned for the variable in the notional building.<br>b) User defines the variable in the actual building, this is used in the notional building, but there is a limit on this value. |

| **Table 3: Fabric energy efficiency notional building for dwellings** | | | | | | |
|---|---|---|---|---|---|---|
| **Module / Element / Section** | **Field** | **Unit** | **FEE** | **Comments** | **Category** | **Category description summary** |
| External Conditions (Weather) | ALL | various | Same as actual | Weather conditions based on the local weather. For implementation users would be provided with a map. There is a consultation question on this proposed new approach in the Future Homes and Building Standard consultation. | A | Same as actual |
| Distant Shading | ALL | - | Same as actual | | A | Same as actual |
| Internal Gains | ALL | various | Same as actual | | A | Same as actual |
| General | Cold Water Source | - | Same as actual | | A | Same as actual |
| General | Number of Storeys in the Building | | Same as actual | | A | Same as actual |
| General | Number of Wetrooms | | Same as actual | | A | Same as actual |
| General | Number of bedrooms | - | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| General | Electricity Tariff | - | Standard Tariff | It may be beneficial for occupants to have an off-peak tariff. Guidance on the actual tariff recommended might be included in the Home User Guide template 2025. | C | Assign in notional. FHS defines actual |
| General | Cooking Fuel | - | Same as actual | | A | Same as actual |
| Whole Dwelling | Area | m2 | Same as actual | | A | Same as actual |
| Whole Dwelling | Volume | m3 | Same as actual | | A | Same as actual |
| Whole Dwelling | Lighting Capacity | lm | =1418 * (Zone TFA * N_occupants) ** 0.41 | Calculated using the FHS wrapper assumption. | C | Assign in notional. FHS defines actual |
| Whole Dwelling | Lighting Efficacy | lm/W | 120 | This value aligns with the recent government consultation *New ecodesign requirements for lighting products.* The final value in the notional building will be set taking account of feedback to this consultation. | C | Assign in notional. FHS defines actual |
| Living Area | Assigned heating system | | Notional HeatSource | | C | Assign in notional. FHS defines actual |
| Living Area | Assigned cooling system | | Notional CoolingSource | | C | Assign in notional. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | FHS defines actual |
| Rest of Dwelling | Assigned heating system | - | Notional HeatSource | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling | Assigned cooling system | - | Notional CoolingSource | | C | Assign in notional. FHS defines actual |
| Infiltration | Storey | - | Same as actual | | A | Same as actual |
| Infiltration | Shelter | - | Same as actual | | A | Same as actual |
| Infiltration | Build type | - | Same as actual | | A | Same as actual |
| Infiltration | Test Type | 50Pa / 4Pa | 50Pa | Airtightness is set using the blower door test at 50Pa. | B | Assign in notional. User defines actual |
| Infiltration | Test Result | m3/m2.hr | To match Option 1 or Option 2 notional building<br><br>Option 1: 4 m3/m2.hr<br><br>Option 2: 5 m3/m2.hr | To be converted to ACH by the Home Energy Model core engine. | B | Assign in notional. User defines actual |
| Infiltration | Enveloped Area | m2 | Same as actual | | A | Same as actual |
| Infiltration | Total Volume | m3 | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Infiltration | Sheltered Sides | - | Same as actual | | A | Same as actual |
| Infiltration | No. Open Chimneys | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Open Flues | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Closed Fires | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues D | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Flues E | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | No. Blocked Chimneys | - | 0 | | B | Assign in notional. User defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Infiltration | Extract Fans | - | 0 | This reflects the Approved document F standard for extract fans in each kitchen, utility room, bathroom and sanitary accommodation. | C | Assign in notional. FHS defines actual |
| Infiltration | Passive Vents | - | 0 | | B | Assign in notional. User defines actual |
| Infiltration | Gas Fires | - | 0 | | B | Assign in notional. User defines actual |
| Ventilation | Ventilation Type | - | dMEV | | C | Assign in notional. FHS defines actual |
| Ventilation | Required ACH | ACH | =MAX(AD F Minimum Ventilation Rate Method A,AD F Minimum Ventilation Rate Method B)/Dwelling Volume * 3600 / 1000 | This reflects the Approved document F standard for minimum whole dwelling ventilation rates. | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ventilation | Specific Fan Power | W/l.s | Continuous decentralised mechanical extract ventilation systems: 0.15 W/(L.s) | These specific fan powers have been selected using an analysis of product data from the PCDB. The proposed standards are set at a level that 50% of products on the PCDB are better than these standards. | C | Assign in notional. FHS defines actual |
| Ventilation | MVHR location | in/out | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Heat Recovery Efficiency | % | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Duct thickness | mm | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Duct cross-section area | m2 | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Intake duct length | m | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Output duct length | m | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ventilation | Duct Insulation thickness | mm | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Insulation thermal conductivity | W/m.K | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| Ventilation | Insulation is reflective? | Yes/no | n/a | Parameter is for when MVHR is installed only. | C | Assign in notional. FHS defines actual |
| External Walls | Base Height | m | Same as actual | | A | Same as actual |
| External Walls | Height | m | Same as actual | | A | Same as actual |
| External Walls | Width | m | Same as actual | | A | Same as actual |
| External Walls | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Wall Area, "Same as Actual") | The notional external wall area is usually the same as the actual external wall area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has windows, any notional glazing resizing would impact the wall area. | F | Same as actual, with a limit |

| | | | | | | |
|---|---|---|---|---|---|---|
| External Walls | Pitch | deg | Same as actual | | A | Same as actual |
| External Walls | Orientation | deg | Same as actual | | A | Same as actual |
| External Walls | U-value | W/m2.K | 0.18 | | B | Assign in notional. User defines actual |
| External Walls | Solar Absorption Coefficient | - | Same as actual | | A | Same as actual |
| External Walls | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| External Walls | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| External Doors | Base Height | m | Same as actual | | A | Same as actual |
| External Doors | Height | m | Same as actual | | A | Same as actual |
| External Doors | Width | m | Same as actual | | A | Same as actual |
| External Doors | Area | m2 | Same as actual | | A | Same as actual |
| External Doors | Pitch | deg | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| External Doors | Orientation | deg | Same as actual | | A | Same as actual |
| External Doors | U-value | W/m2.K | 1 | | B | Assign in notional. User defines actual |
| External Doors | Solar Absorption Coefficient | - | Same as actual | | A | Same as actual |
| External Doors | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| External Doors | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Area | m2 | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Pitch | deg | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | U-value | W/m2.K | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Internal Walls (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Internal Walls (inter-zone) | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Area | m2 | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Pitch | deg | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | U-value | W/m2.K | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer into the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Ceiling (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Internal Ceiling (inter-zone) | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Area | m2 | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Internal Floor (inter-zone) | Pitch | deg | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | U-value | W/m2.K | Same as actual | No U-value has been set for internal elements. There is no heat transfer between zones; this value is to assess the rate of heat transfer to the element for calculating the effects of thermal mass. | A | Same as actual |
| Internal Floor (inter-zone) | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Internal Floor (inter-zone) | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Roof (insulated at rafters) | Base Height | m | Same as actual for room in roof | This Module / Element / Section: Roof (insulated at rafters), is used to set notional building standards for roofs that are heated spaces i.e. a room in roof. The below *Roof (insulated at ceiling)* is to be used to set notional building standards for all other roofs. | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Roof (insulated at rafters) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, any notional glazing resizing would impact the roof area. | F | Same as actual, with a limit |
| Roof (insulated at rafters) | Pitch | deg | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Orientation | deg | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | U-value | W/m2.K | If<br>Roof is unheated space: heat loss is calculated as if insulated at ceiling level.<br><br>If an occupied and heated space i.e. room in roof 0.11 | | B | Assign in notional. User defines actual |
| Roof (insulated at rafters) | Solar Absorption Coefficient | - | Same as actual for room in roof | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Roof (insulated at rafters) | Areal Heat Capacity | J/m2.K | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at rafters) | Mass Distribution Class | - | Same as actual for room in roof | | A | Same as actual |
| Roof (insulated at ceiling) | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Roof Area, "Same as Actual") | **Comment 1:** The standard for all roofs that are not heated spaces are set using the this Module / Element / Section: Roof (insulated at ceiling) i.e. of a roof insulated at the ceiling level. This does not apply to room in roof.<br><br>Designers compensate for any extra heat loss of a roof insulated at rafters level if this is the design.<br><br>**Comment 2:** The notional roof area is usually the same as the actual roof area.<br><br>In the scenario that more glazing than 25% of the total floor area is used in the actual building, the windows in the notional building are resized. All opaque elements in the notional building are also resized to replace this glazing. If the actual dwelling has rooflights, | F | Same as actual, with a limit |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | any notional glazing resizing would impact the roof area. | | |
| Roof (insulated at ceiling) | Pitch | deg | Same as actual | As above. | A | Same as actual |
| All roofs | U-value | W/m2.K | 0.11 | As above. | B | Assign in notional. User defines actual |
| Roof (insulated at ceiling) | Areal Heat Capacity | J/m2.K | Same as actual | As above. | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Roof (insulated at ceiling) | Mass Distribution Class | - | Same as actual | As above. | A | Same as actual |
| Ceiling to Unheated Space | Area | m2 | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | Pitch | deg | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | U-value | W/m2.K | 0.11 | | B | Assign in notional. User defines actual |
| Ceiling to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Ceiling to Unheated Space | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Area | m2 | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Wall to Unheated Space | Pitch | deg | Same as actual | | A | Same as actual |
| Wall to Unheated Space | U-value | W/m2.K | 0.18 | | B | Assign in notional. User defines actual |
| Wall to Unheated Space | Thermal Resistance of Unheated Space | m.K/W | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Wall to Unheated Space | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Area | m2 | Same as actual | | A | Same as actual |
| Floor to Unheated Space | Pitch | deg | Same as actual | | A | Same as actual |
| Floor to Unheated Space | U-value | W/m2.K | 0.13 | | B | Assign in notional. User defines actual |
| Floor to Unheated Space | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Floor to Unheated Space | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Exposed Floor | Base Height | m | Same as actual | | A | Same as actual |
| Exposed Floor | Area | m2 | Same as actual | | A | Same as actual |
| Exposed Floor | Pitch | deg | Same as actual | | A | Same as actual |
| Exposed Floor | U-value | W/m2.K | 0.13 | | B | Assign in notional. User defines actual |
| Exposed Floor | Solar Absorption Coefficient | - | Same as actual | | A | Same as actual |
| Exposed Floor | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Exposed Floor | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Area | m2 | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Pitch | deg | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | U-value | W/m2.K | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have no heat loss through a party wall. | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Party Wall (no heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Party Wall (no heat loss) | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Area | m2 | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Pitch | deg | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | U-value | W/m2.K | Same as actual | Draft ADL volume 1, section 2, states which wall constructions should claim to have heat loss through a party wall. | A | Same as actual |
| Party Wall (heat loss) | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Party Wall (heat loss) | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Window / Glazed Door | Base Height | m | Same as actual | | A | Same as actual |
| Window / Glazed Door | Height | m | Same as actual | | A | Same as actual |
| Window / Glazed Door | Width | m | Same as actual | | A | Same as actual |
| Window / Glazed Door | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Window Area, "Same as Actual") | The glazing is limited in the notional building as 25% of the total floor area. This value is modified if a rooflight is installed. | F | Same as actual, with a limit |
| Window / Glazed Door | Pitch | deg | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Window / Glazed Door | Orientation | deg | Same as actual | | A | Same as actual |
| Window / Glazed Door | U-value | W/m2.K | 1.2 | | B | Assign in notional. User defines actual |
| Window / Glazed Door | G-value | - | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |
| Window / Glazed Door | Frame Area Fraction | - | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - type | - | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - depth | m | Same as actual | | A | Same as actual |
| Window / Glazed Door | Window Shading - distance | m | Same as actual | | A | Same as actual |
| Rooflight | Base Height | m | Same as actual | | A | Same as actual |
| Rooflight | Height | m | Same as actual | | A | Same as actual |
| Rooflight | Width | m | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rooflight | Area | m2 | =IF(Total Glazing Area > (0.25 - Rooflight Correction Factor) *TFA , Resized Rooflight Area, "Same as Actual") | The maximum area of the window / glazed door (25% of the total floor area) in the notional building is modified using the area of the rooflight.<br><br>This reduction in area reflects the worse performing U-value of the rooflight due to its orientation. | F | Same as actual, with a limit |
| Rooflight | Pitch | deg | Same as actual | | A | Same as actual |
| Rooflight | Orientation | deg | Same as actual | | A | Same as actual |
| Rooflight | U-value | W/m2.K | 1.7 | U-value (this will need to be inclusive of surface boundary HTC so BR443 compliant).<br>This is a horizontal U-value. | B | Assign in notional. User defines actual |
| Rooflight | G-value | - | Same as actual | G-values are now set to the same as actual to recognise their potential benefit in reducing overheating risk. This reduces the risk of conflict between Part L and Part O. | A | Same as actual |
| Rooflight | Frame Area Fraction | - | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - type | - | Same as actual | | A | Same as actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rooflight | Window Shading - depth | m | Same as actual | | A | Same as actual |
| Rooflight | Window Shading - distance | m | Same as actual | | A | Same as actual |
| Ground Floor | Area | m2 | Same as actual | | A | Same as actual |
| Ground Floor | Pitch | deg | Same as actual | | A | Same as actual |
| Ground Floor | Exposed Perimeter | m | Same as actual | | A | Same as actual |
| Ground Floor | U-value | W/m2.K | 0.13 | | B | Assign in notional. User defines actual |
| Ground Floor | Areal Heat Capacity | J/m2.K | Same as actual | | A | Same as actual |
| Ground Floor | Mass Distribution Class | - | Same as actual | | A | Same as actual |
| Ground Floor | Total Thermal Resistance | m2.K/W | 6.12 | | B | Assign in notional. User defines actual |
| Ground Floor | Linear Heat Transmittance | W/m.K | 0.16 | | B | Assign in notional. User defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ground Floor | Internal Periodic Heat Transfer Coefficient | W/K | Same as actual | | A | Same as actual |
| Ground Floor | External Periodic Heat Transfer Coefficient | W/K | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Length | m | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | type | - | Same as actual | | A | Same as actual |
| Linear Thermal Bridges | Linear Thermal Transmittance | W/m.K | Refer to SAP10 table R2 | | B | Assign in notional. User defines actual |
| Point Thermal Bridges | Heat Transfer Coefficient | W/K | 0 | Point thermal bridges should be declared where not included in U-value or linear thermal bridges. Minimal point bridges should be used and designer should calculate if any are present. | B | Assign in notional. User defines actual |
| Heat Source | ALL | Various | Remove actual systems<br>Install notional spec (below) | | C | Assign in notional. FHS defines actual |
| Heat Source | Type | - | InstantElecHeater | | C | Assign in notional. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | FHS defines actual |
| Heat Source | Energy Supply | - | "MainsElectricity" | | C | Assign in notional. FHS defines actual |
| Heat Source | Source Type | - | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Heat network carbon emission factor | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Heat network carbon emission factor (including out of scope emissions) | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Heat network primary energy factor | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Sink Type | - | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Power of Backup Heater | kW | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | Backup Heater Control | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Backup Heater Time Delay | hours | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Communal Distribution losses | W/dwelling | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Modulating Control? | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | Min modulation rate 35 | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | min modulation rate 55 | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | time constant onoff operation | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | temp return feed max | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | temp lower operating limit | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | min temp diff flow return for hp to operate | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | var flow temp ctrl during test | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | power heating circ pump | kW | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | power source circ pump | kW | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | power standby | kW | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | power crankcase heater | kW | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | power off | kW | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter A - Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter A - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter A - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter A - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter A - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter B - Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter B - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter B - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter B - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter B - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter C -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter C - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter C - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter C - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter C - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter D -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter D - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter D - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter D - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter D - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter F -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 35oC Test Letter F - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter F - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter F - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 35oC Test Letter F - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter A - Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter A - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter A - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter A - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter A - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter B - Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter B - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter B - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter B - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter B - Capacity | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter C -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter C - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter C - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter C - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter C - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter D -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter D - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter D - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter D - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter D - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter F -Flow temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter F - Source temp | oC | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter F - Degradation coefficient | | n/a | | C | Assign in notional. FHS defines actual |
| Heat Source | 55oC Test Letter F - Coefficient of Performance | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Heat Source | 55oC Test Letter F - Capacity | | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | ALL | various | Remove actual systems<br>Install notional spec (below) | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Type | - | "InstantElectricHeater" | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Rated Power | kW | 10,000 | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Advanced Start | hours | 0 | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Thermal Mass | kJ/K | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | C Constant | | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Design Temp Diff | K | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Living Area Heating | Convective Fraction | - | 0.95 | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Design Flow Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Minimum External Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Minimum Flow Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Maximum External Temperature | degC | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Set-back Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Ecodesign Control Class | - | n/a | | C | Assign in notional. FHS defines actual |
| Living Area Heating | Heat Source | - | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Living Area Heating | Control | - | Space Heating Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | ALL | various | Remove actual systems<br>Install notional spec (below) | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Type | - | "InstantElectricHeater" | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Rated Power | kW | 10,000 | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Advanced Start | h | 0 | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Thermal Mass | kJ/K | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | C Constant | | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Design Temp Diff | K | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rest of Dwelling Heating | Convective Fraction | - | 0.95 | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Design Flow Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Minimum External Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Minimum Flow Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Maximum External Temperature | degC | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Set-back Temperature | deg C | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Ecodesign Control Class | - | n/a | | C | Assign in notional. FHS defines actual |
| Rest of Dwelling Heating | Heat Source | - | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rest of Dwelling Heating | Control | - | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Heating Control Object | | Space Heating Hours - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Heating Control Object | | Space Heating Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | Water Heating Hours | | C | Assign in notional. FHS defines actual |
| Controls | Water Heat Control Object | | n/a | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Living Area | | C | Assign in notional. FHS defines actual |
| Controls | Window Opening Control Object | | Window Opening Schedule - Non-living Area | | C | Assign in notional. FHS defines actual |
| Controls | Cooling Control Object | | Space Cooling Hours - Living Area | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Controls | Cooling Control Object | | Space Cooling Hours - Non-living Area | | C | Assign in notional. FHS defines actual |
| Hot Water Source | ALL | various | Remove actual systems<br>Install notional spec (below) | | C | Assign in notional. FHS defines actual |
| Hot Water Source | Type | - | "PointOfUse" | | C | Assign in notional. FHS defines actual |
| Hot Water Source | Efficiency | - | 100% | | C | Assign in notional. FHS defines actual |
| Hot Water Source | Energy Supply | - | "MainsElectricity" | | C | Assign in notional. FHS defines actual |
| Hot Water Source | Temp Output | | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Source | Power_max | kW | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot Water Source | Volume | litres | none | A profile of daily domestic hot water demands over a year is generated by the HEM: FHS assessment, dependent on standard occupancy of a dwelling. (Standard occupancy of a dwelling is dependent on the number of bedrooms and total floor area.) The FHS domestic hot water demand for sizing is the 75th percentile of daily demands for a dwelling. Sizing methodology (based on BS EN 12831-3) is applied to the FHS domestic hot water demand. | C | Assign in notional. FHS defines actual |
| Hot Water Source | Daily Losses | kWh/24 h | 0 | Cylinder has 120mm insulation Cylinder, factory insulated: L = 0.005 + 0.55/(t + 4.0) Volume factor can be calculated using the equation VF = (120 / Vc)^1/3 Temperature factor for indirect cylinder = 0.6 Temperature Factor by 0.9 if there is separate time control of domestic hot water (boiler systems, warm air systems and heat pump systems) | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Heat Pump Reference | - | none | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| StorageTank - heat source | Heater Position | - | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Thermostat Position | - | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | HW-only Heat Pump? | T/F | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Flow Temp Upper Limit | deg C | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Immersion Heater (backup) | T/F | FALSE | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Immersion Heater Power | kW | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Immersion Heater Position | | n/a | | C | Assign in notional. FHS defines actual |
| StorageTank - heat source | Thermostat Position | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot Water Source - primary pipework | Internal Diameter | mm | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Source - primary pipework | External Diameter | mm | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Source - primary pipework | Length | m | n/a | A standard has been set in order to encourage compact pipework design. | C | Assign in notional. FHS defines actual |
| Hot Water Source - primary pipework | Insulation thermal conductivity | W/m.K | n/a | Aligns with minimum standards in ADL1 | C | Assign in notional. FHS defines actual |
| Hot Water Source - primary pipework | Insulation thickness | mm | n/a | Primary pipework uses the BS5422 2023 enhanced level thickness of insulation for domestic heating and hot water systems. | C | Assign in notional. FHS defines actual |
| Hot Water Source - primary pipework | Insulation surface reflective? | T/F | n/a | Aligns with minimum standards in ADL1 | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (internal) | Internal Diameter | mm | n/a | | C | Assign in notional. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | FHS defines actual |
| Hot Water Distribution (internal) | External Diameter | mm | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (internal) | Length | m | n/a | A standard has been set in order to encourage compact pipework design. | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (internal) | Insulation thermal conductivity | W/m.K | n/a | Aligns with minimum standards in ADL1 | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (internal) | Insulation thickness | mm | n/a | Aligns with minimum standards in ADL1 | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (internal) | Insulation surface reflective? | T/F | n/a | Aligns with minimum standards in ADL1 | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (external) | Internal Diameter | mm | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (external) | External Diameter | mm | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Hot Water Distribution (external) | Length | m | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (external) | Insulation thermal conductivity | W/m.K | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (external) | Insulation thickness | mm | n/a | | C | Assign in notional. FHS defines actual |
| Hot Water Distribution (external) | Insulation surface reflective? | T/F | n/a | | C | Assign in notional. FHS defines actual |
| Shower | Type | various | "InstantElecShower" | Based on Part G Maximum fitting consumption optional requirement level | C | Assign in notional. FHS defines actual |
| Shower | Flow Rate | litres/min | n/a | Based on Part G Maximum fitting consumption optional requirement level. Minimum value on actual is in line with SAP 10.2. It recognises that shower heads can be easily changed by the occupant if they are unhappy with a low flow rate. | C | Assign in notional. FHS defines actual |
| Shower | Rated Power | kW | 9.3 | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Shower | Assign WWHRS | - | None | Based on Part G Maximum fitting consumption optional requirement level. | C | Assign in notional. FHS defines actual |
| Bath | Volume | litres | 73 | Based on SAP 10 assumptions. | C | Assign in notional. FHS defines actual |
| Bath | Flow Rate | litres/min | 12 | | C | Assign in notional. FHS defines actual |
| Other DHW Outlets | Flow Rate | litres/min | 6 | Based on Part G Maximum fitting consumption optional requirement level | C | Assign in notional. FHS defines actual |
| WWHRS | ALL | various | None | | C | Assign in notional. FHS defines actual |
| WWHRS | Efficiency | | n/a | The efficiency has been set to reflect vertical system B waste water heat recovery. | C | Assign in notional. FHS defines actual |
| WWHRS | Utilisation Factor | | n/a | | C | Assign in notional. FHS defines actual |
| Air Conditioning | ALL | Various | "AirConditioning" | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Air Conditioning | EnergySupply | | "mains elec" | | C | Assign in notional. FHS defines actual |
| Air Conditioning | Part O Cooling Requirement | | n/a | | C | Assign in notional. FHS defines actual |
| Air Conditioning | Cooling capacity | kW | 10,000 | | C | Assign in notional. FHS defines actual |
| Air Conditioning | Efficiency | - | 1 | | C | Assign in notional. FHS defines actual |
| Air Conditioning | Convective Fraction | - | 0.95 | | C | Assign in notional. FHS defines actual |
| Electric Battery | ALL | Various | Remove actual systems | | C | Assign in notional. FHS defines actual |
| Electric Battery | Capacity | kW | n/a | | C | Assign in notional. FHS defines actual |
| Electric Battery | Charge/Discharge Efficiency | - | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Solar PV | ALL | various | None | | C | Assign in notional. FHS defines actual |
| Solar PV | Peak Power | kWp | n/a | Solar panels have a peak generation area of 4.5 m2/kWp (i.e. peak power at STC of 0.22 kWp/m2). | C | Assign in notional. FHS defines actual |
| Solar PV | Ventilation Strategy | - | n/a | | C | Assign in notional. FHS defines actual |
| Solar PV | Pitch | deg | n/a | | C | Assign in notional. FHS defines actual |
| Solar PV | shading | | n/a | | C | Assign in notional. FHS defines actual |
| Solar PV | base height | m | n/a | | C | Assign in notional. FHS defines actual |
| Solar PV | PV Width | | n/a | | C | Assign in notional. FHS defines actual |

| | | | | | | |
|---|---|---|---|---|---|---|
| Solar PV | PV Height | | n/a | | C | Assign in notional. FHS defines actual |
| Solar PV | Orientation | deg | n/a | | C | Assign in notional. FHS defines actual |
| PV Diverter | ALL | - | None | | C | Assign in notional. FHS defines actual |
| PV Diverter | Assign to System | - | None | | C | Assign in notional. FHS defines actual |

# Appendix A: Emissions factors and primary energy factors in the Home Energy Model: Future Homes Standard assessment

**Table A1 Emissions factors and primary energy factors for different fuels in the Home Energy Model: Future Homes Standard assessment for new dwellings**

| Fuel | Emissions factor ($kgCO_2e/kwh$) | Emissions factor including out-of-scope emissions ($kgCO_2e/kwh$) | Primary energy factor (kWh/kWh delivered) |
|---|---|---|---|
| Electricity | 0.086 | 0.086 | 1.969 |
| Renewable electricity generated on-site | 0.0 | 0.0 | 1.0 |
| Mains gas | 0.214 | 0.214 | 1.120 |
| Bulk LPG | 0.240 | 0.240 | 1.104 |
| Bottled LPG (for main heating system) | 0.240 | 0.240 | 1.104 |
| Bottled LPG (for secondary heating) | 0.240 | 0.240 | 1.104 |
| LPG subject to Special Condition 11F | 0.240 | 0.240 | 1.104 |
| Biogas (including anaerobic digestion) | 0.029 | 0.228 | 1.442 |
| Heating oil | 0.298 | 0.298 | 1.136 |
| Bio-liquid HVO from used cooking oil | 0.041 | 0.300 | 1.010 |
| Bio-liquid FAME from animal/vegetable oils | 0.058 | 0.314 | 1.152 |
| B30k | 0.226 | 0.303 | 1.141 |
| Bioethanol from any biomass source | 0.072 | 0.330 | 1.348 |
| House coal | 0.398 | 0.398 | 1.094 |
| Anthracite | 0.398 | 0.398 | 1.094 |
| Manufactured smokeless fuel | 0.398 | 0.398 | 1.294 |
| Wood logs | 0.023 | 0.375 | 1.065 |
| Wood pellets (in bags for secondary heating) | 0.048 | 0.397 | 1.306 |
| Wood pellets (bulk supply for main heating) | 0.048 | 0.397 | 1.306 |
| Wood chips | 0.018 | 0.372 | 1.069 |
| Energy supply shortfall | 0.172 | 0.172 | 3.938 |

# Appendix B: Future Homes Standard Notional Heat Pump Sizing Methodology

## Introduction

The proposed Future Homes Standard notional dwelling options in Table 1 above include an air source heat pump serving both the dwelling heating and hot water demand. To ensure that a suitable heat pump performance is used in the notional dwelling, a system sizing logic has been developed and is used within the notional specification. This paper describes the heat pump sizing methodology.

## Basis of notional heat pump performance

A review of the SAP 10.2 Product Characteristics Database (PCDB) entries was undertaken to understand the range of performance across all heat pump models that are currently available for Part L 2021 compliance calculations. To ensure that a suitable heat pump system design is promoted by the Future Homes Standard, air source heat pump units with an Energy-related products (ErP)[1,2] rating of A++ were selected as the basis for the notional heat pump. Product Characteristics Database entries were filtered to include only ErP A++ rated units which were classified as Air-to-water and capable of serving space heating or combined space and water heating. The resulting sample comprised 98 heat pump products. The sample included a broad range of heat pump from units designed to serve small apartments (<3kW) to for large houses with higher rates of heat loss (>16kW).

[1] L_2013239EN.01000101.xml (europa.eu) COMMISSION DELEGATED REGULATION (EU) No 811/2013 of 18 February 2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device

[2] L_2013239EN.01013601.xml (europa.eu) COMMISSION REGULATION (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters

The SAP 10.2 PCDB presents the unit Coefficient of Performance (COP) at various plant size ratios (PSR), which is the relationship between the heat pump output for a given operating condition and the max heat pump output. The database presents the unit COP at the following PSRs:

- 0.2
- 0.5
- 0.8
- 1.0
- 1.2
- 1.5
- 2.0
- 2.5
- 3.0
- 4.0
- 5.0
- 6.0
- 7.0
- 8.0

The 98-unit sample was used to calculate the mean COP at each PSR. This mean COP figure was used to represent the average performance of heat pumps and be reflective of unit differences such as the refrigerant type used, refrigerant volume, compressor type. The sample mean was used to select six specific units, one from each capacity group:

- <5kW
- 5-7kW
- 7-9kW
- 9-11kW
- 12-16kW
- >16kW

To select the heat pump within each capacity group, the heat pump unit with the smallest statistical difference from the average COP for each PSR was selected. The statistic index used for this selection was the Coefficient of Variance for the Root Mean Square Error (CV(RMSE)). All of the six selected units were within 1.7% of the full sample mean COPs, which was considered to be a reasonable representation.

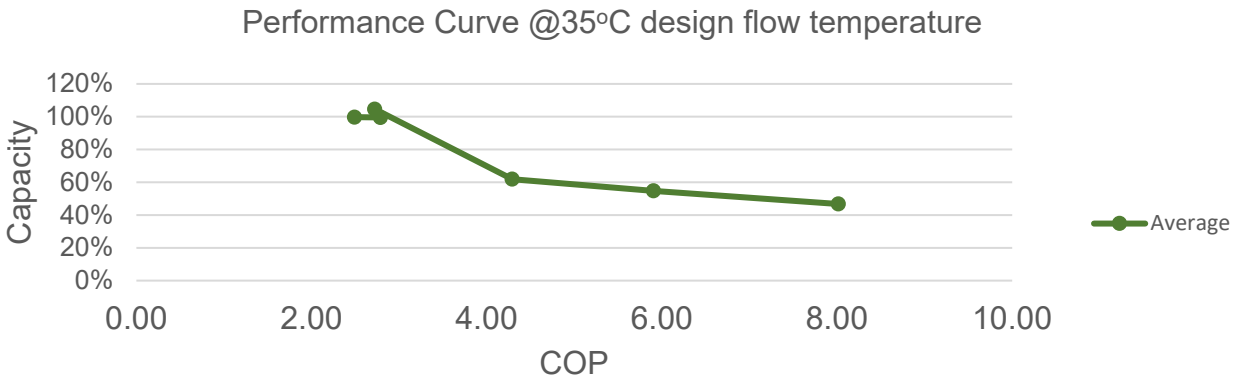
The mean of the maximum modulation rates was also obtained from the 98-unit sample. This was calculated to be 40 percent and has been adopted as the maximum modulation rate for the notional heat pump.

The EN 14825[3] test data for COP and percentage of the maximum output capacity of each unit was recorded for each of the six units. The data was used to calculate the mean value for the six-unit sample for each test case (listed as test letters A-F in EN 14825). The mean was calculated for both 55°C and 35°C flow temperature conditions. The mean value calculated for each test letter and at each flow temperature condition was used as the notional heat pump performance value.

Sensitivity testing was undertaken to verify that the heat pump capacity was not a significant variable for performance at any given test case. The variance observed between the six test cases and the mean value for the COP data was not considered significant; however, there was significant variance on the capacity, expressed as a percentage of maximum capacity. It was concluded that that the performance of heat pumps may be more sensitive to the unit's modulating range than the percentage of the Carnot efficiency achieved at a given operating condition.

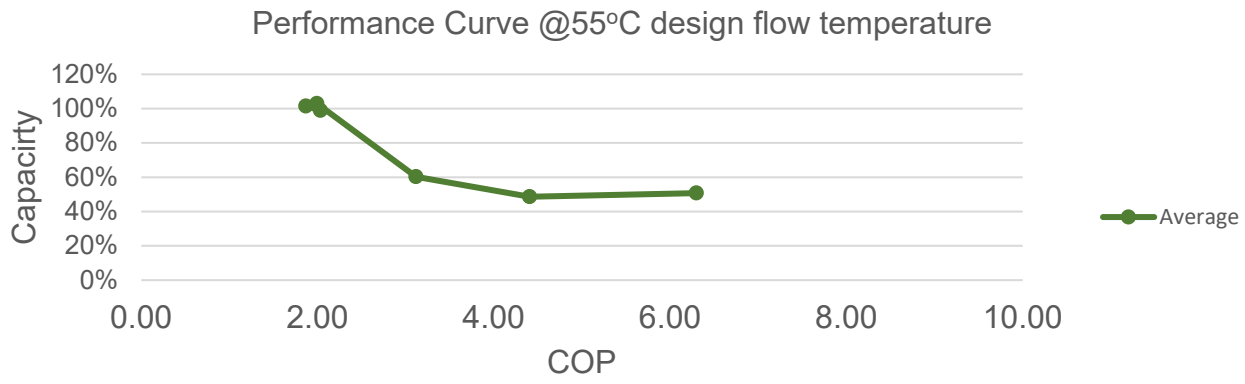
The mean EN 14825 percentage of the maximum output capacity was observed to be similar to the maximum modulation rate attained from the SAP 10.2 PCDB sample. The averaged performance curves for 55°C and 35°C design flow temperature conditions are presented in the figures below.

**Figure B1: Proposed notional dwelling air source heat pump performance curve for 35°C flow temperature condition**




[3] BS EN 14825:2022 Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling — Testing and rating at part load conditions and calculation of seasonal performance

**Figure B2: Proposed notional dwelling air source heat pump performance curve for 55°C flow temperature condition**




| **Table B1. Notional air source heat pump capacity and COP for 35°C flow temperature (test letter E is not used in HEM)** | | |
|---|---|---|
| Test Letter | Capacity | COP |
| ~~E~~ | ~~100%~~ | ~~2.492~~ |
| A | 100% | 2.79 |
| F | 105% | 2.72 |
| B | 62% | 4.29 |
| C | 55% | 5.91 |
| D | 47% | 8.02 |

| **Table B2. Notional air source heat pump capacity and COP for 55°C flow temperature (test letter E is not used in HEM)** | | |
|---|---|---|
| Test Letter | Capacity | COP |
| ~~E~~ | ~~101%~~ | ~~1.87~~ |
| A | 99% | 2.03 |
| F | 103% | 1.99 |
| B | 60% | 3.12 |
| C | 49% | 4.41 |
| D | 51% | 6.30 |

When calculating the performance of the notional air source heat pump, the HEM interpolates between the two curves to obtain the values for a 45°C flow temperature condition. When outputting at flow temperatures above 55°C the percentage of the Carnot efficiency that is achieved at a 55°C flow temperature condition the HEM assumed to be the same percentage for the 60°C flow temperature condition.

The notional air source heat pump is sized at 200%[4] of design demand. The design demand is calculated from the multiplication of whole dwelling heat transfer coefficient (HTC)[5] and the difference in temperature between the lowest dry bulb temperature value for any given hour within the applied weather file and the dwelling set point.

The following specification values, in Table B3, are to be applied to the notional air source heat pump; these will be combined with the performance data described above to provide a full notional heat pump specification. This specification will provide all data points that are required for an entry into the HEM PCDB, allowing a comparison between the notional heat pump and real heat pump products for use within any given dwelling.

[4] A factor of 2 is applied to the dwelling design demand to ensure that the heat pump is sufficiently sized for the intermittent application in the FHS. Actual dwellings will be able to simulate continuous operation through the application of a zone set back temperature equal to the FHS zone set point. If this approach is supplied, it is anticipated that better performance relative to the notional heat pump could be achieved with a smaller system.
[5] The whole dwelling heat transfer coefficient calculated by the Home Energy Model.

| Table B3. Notional heat pump specification | |
|---|---|
| Notional heat pump input parameter | Notional value |
| Energy supply | Mains electricity |
| Heat source | Outside Air |
| Heat sink | Water |
| Eco-design control class | II – Weather Compensation Controller |
| Weather compensation minimum external temperature [°C] | 0 |
| Weather compensation maximum external temperature [°C] | 20 |
| Weather compensation minimum indoor temperature [°C] | 21 |
| Weather compensation maximum indoor temperature [°C] | 45 |
| Power of backup heater [kW] | 3.00 |
| Backup heater control | Top Up only |
| Backup heater time delay [hours] | 1 |
| Modulating control | True |
| Minimum modulation rate @45°C [%] | 40 |
| Time constant for on/off operation [seconds] | 120 |
| Return feed maximum temperature [°C] | 60 |
| Minimum external operating temperature [°C] | -10 |
| Minimum temperature difference for operation | 0 |
| Variable flow temperature control during test | True |
| Power consumption of circulation pump [W] | 0.003*capacity for Test Letter F @55°C |
| Power consumption of source pump [W] | 10 |
| Power consumption of crankcase heater [W] | 10 |
| Power consumption in standby mode [W] | 10 |
| Power consumption when off [W] | 0 |

***Notional air source heat pump example***

*For a dwelling with a whole dwelling heat transfer coefficient of 80W/K, an internal Zone 1 set point of 21°C and the LEEDs TRY2020High50 minimum dry bulb temperature of -5.3°C, the heat pump capacity is calculated to be 4.21kW. Notional performance curve is applied to obtain the following EN14825 test data for 35oC and 55oC flow temperatures.*

| Table B4. Notional air source heat pump example performance curve | | | |
|---|---|---|---|
| EN 14825 test data | Test flow temperature 35oC | Test flow temperature 45oC | Test flow temperature 55oC |
| Test Letter A | Flow temp: 34°C<br>Source temp: -7°C<br>Degradation coefficient: 0.9<br>COP: 2.79<br>Capacity: 4.18 | Flow temp: 43°C<br>Source temp: -7°C<br>Degradation coefficient 0.9<br>COP: 2.41<br>Capacity: 4.17 | Flow temp: 52°C<br>Source temp: -7°C<br>Degradation coefficient: 0.9<br>COP: 2.03<br>Capacity: 4.16 |
| Test Letter B | Flow temp: 30°C<br>Source temp: -2°C<br>Degradation coefficient: 0.9<br>COP: 4.29<br>Capacity: 2.60 | Flow temp: 36°C<br>Source temp: -2°C<br>Degradation coefficient: 0.9<br>COP: 3.71<br>Capacity: 2.57 | Flow temp: 42°C<br>Source temp: -2°C<br>Degradation coefficient: 0.9<br>COP: 3.12<br>Capacity: 2.54 |
| Test Letter C | Flow temp: 27°C<br>Source temp: 7°C<br>Degradation coefficient: 0.9<br>COP: 5.91<br>Capacity: 2.31 | Flow temp: 32°C<br>Source temp: 7°C<br>Degradation coefficient: 0.9<br>COP: 5.16<br>Capacity: 2.18 | Flow temp: 36°C<br>Source temp: 7°C<br>Degradation coefficient: 0.9<br>COP: 4.41<br>Capacity: 2.05 |
| Test Letter D | Flow temp: 24°C<br>Source temp: 12°C<br>Degradation coefficient: 0.9<br>COP: 8.02<br>Capacity: 1.97 | Flow temp: 27°C<br>Source temp: 12°C<br>Degradation coefficient: 0.9<br>COP: 7.16<br>Capacity: 2.05 | Flow temp: 30°C<br>Source temp: 12°C<br>Degradation coefficient: 0.9<br>COP: 6.30<br>Capacity: 2.14 |
| Test Letter F | Flow temp: 35°C<br>Source temp: -10°C<br>Degradation coefficient: 0.9<br>COP: 2.49<br>Capacity: 4.20 | Flow temp: 45°C<br>Source temp: -10°C<br>Degradation coefficient: 0.9<br>COP: 2.18<br>Capacity: 4.23 | Flow temp: 55°C<br>Source temp: -10°C<br>Degradation coefficient: 0.9<br>COP: 1.87<br>Capacity: 4.27 |

## Heating distribution system design

The notional dwelling distribution system is a wet distribution system made up of radiators only; the pipework is only accounted for in the thermal mass calculations (i.e. it is not assumed to contribute to the power output of the system). The distribution system for each zone is sized using the zone design demand. This is to ensure that the distribution system capacity is sufficient to deliver the required heating.

The zone design demand is calculated using the same method as applied for the notional heat pump capacity calculation described above. I.e. the zone design demand is sized by

multiplying the HTC of the zone by the difference in temperature between the lowest dry bulb temperature value for any given hour within the applied weather file and the zone set point. The maximum emitter output for each zone is then calculated as 200% of the zone design demand.

To obtain the output power value of each radiator, the BS442[6] delta 50 value ($P_{dT50}$) for a given radiator is corrected to give the output at the notional temperature difference, which is defined as the difference between the distribution system flow temperature and the zone set point temperature. The formula for this correction is presented below:

$$P_{rad} = P_{dT50} / 50^{n} * dT^{n}$$

*$P_{rad}$ = Design output power for notional radiator*
*$P_{dT50}$ = Power output at delta of 50K*
*dT = max flow temperature - set point temperature*

The number of radiators in each zone is calculated by dividing the maximum emitter output power by the radiator output power and rounding up to the next integer, as indicated by the below formula:

$$N_{zone} \approx P_{zone} / P_{rad}$$

*$N_{zone}$ = Number of radiators required in zone*
*$P_{zone}$ = Zone design demand*
*$P_{rad}$ = Design output power for notional radiator*

The zone distribution system characteristics are calculated by multiplying the number of radiators in the zone by the notional information in Table B5. The distribution system thermal mass is calculated using the below formula:

$$C_{th} = C_{th\text{-}emitter} * N_{zone}$$

*$C_{th}$ = total zone distribution system thermal mass in kj/K*
*$C_{th\text{-}emitter}$ = combined emitter, pipework and internal water volume thermal mass*

[6] BS EN 442-1:2014 Radiators and convectors. Technical specifications and requirements

The distribution system C constant is calculated using the below formula:

$$c = (P_{dT50} * N_{zone}) / (50^{n})$$

*c = zone distribution system "C constant"*
*n = emitter n-coefficient*

***NOTE** this is not the proposed distribution design for the actual dwelling. A designer would follow the guidance material within MIS 3005, which requires the heat loss rate for each room to be calculated. The HEM does not account for individual rooms.*

| **Table B4. Emitter details** | |
|---|---|
| Notional Low Temperature Radiator Characteristics | Value |
| $P_{dt50}$ - dT50 output (BS442 standard) [kW] | 1.89* |
| Emitter length [m] | 1.0 |
| Emitter height [m] | 0.7 |
| Emitter heated surface [m2] | 9.15 |
| Emitter Thermal Mass [kj/K] | 50.2 |
| Pipework volume [l]** | 0.4 |
| Pipework thermal mass[kj/K] | 1.6 |
| $C_{th\text{-}emtter}$ Circuit thermal mass per emitter [kj/K] | 51.8 |
| Emitter n-coefficient | 1.34 |

** The assumed emitter type is a T22 convector radiator panel type which consists of 2 panels and 2 sets of convector fins.*
*** It is assumed that each emitter is served by 5 meters of flow and return pipework, with an internal diameter of 0.015m, the thermal mass of the pipework only accounts for the water volume within the pipes and not the thermal mass of the pipework itself.*

***Notional distribution system example***
For a design heat loss of 0.4kW in Zone 1 and 1.7kW in Zone 2 the total emitter circuit power output should be 4.2kW; the emitter maximum outputs are 0.8 kW and 3.4kW respectively. For a distribution system with a 45°C flow temperature and a 20°C internal room temperature, a single emitter is required for Zone 1 and four emitters are required for Zone 2 (assuming that the number of emitters is rounded up to the next integer). The Zone 1 distribution system characteristics include a thermal mass of 51.8 kj/K and a value of 0.01 for the C. The Zone 2 distribution system characteristics include a thermal mass of 207.2 kj/K and a value of 0.04 for C.

## Heating system control

The notional heating programme applies a one-hour pre-heating event to ensure that the heated zones are at temperature for the FHS heating hours. The length of the pre-heat event has been based on the notional setback and set point temperatures and is assumed to be sufficient to prevent significant amounts of unmet demand. The energy consumption associated with this pre-heating event, or 'advanced start,' are considered by the HEM. The unmet demand calculation of the HEM is not applied during the pre-heat event.

## Hot Water Storage Vessel sizing

No value is assigned for the size of the hot water storage vessel in the notional building. The user defines the variable in the actual building and this is used in the notional building. This is to reflect that the hot water storage vessel may need to be sized to meet the hot water demands of the household, which may have a significantly different occupancy to that assumed in the Home Energy Model: Future Homes Standard assessment.

Where no cylinder is specified in the actual dwelling the notional hot water storage vessel is to be sized using the FHS hot water demand profile. The Home Energy Model: Future Homes Standard assessment will calculate the daily hot water demand based on the expected dwelling occupancy rate. The 75$^{th}$ percentile of all daily hot water demands is to used for hot water storage vessel sizing. Guidance on sizing hot water storage vessels can be found in the draft Approved Document L: Volume 1, Table 5.1.