



in partnership with



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MAIN ROAD ECO VILLAGE, UNSTONE, DERBYSHIRE

THE UNIVERSITY OF SHEFFIELD

A 35 dwelling new-build social housing project with terraced and detached houses. One of the mid-terrace houses has been chosen for this study which consists of a one-bedroom unit on the ground floor and a two-bedroom unit on the first and second floor. The project utilises thermal continuity with zero thermal bridges and continuous air tightness to achieve PassivHaus standard for both units as depicted in the PHPP verification sheet.

THERMAL ENVELOPE STRATEGIES:

- Roofers**
 - 140mm thermal insulation between rafters along with an additional 120mm insulation on top.
- Roof to Exterior Wall Connection**
 - Thermal insulation in the eaves directly connect to the roof insulation.
 - The timber frame itself is wrapped in an additional layer of insulation to avoid thermal bridging.
- Window to Wall Connection**
 - No lintels spanning across the cavity.
 - Use of Compact Fram at the top and bottom of the window frame to allow screw fixing of the insulation to the structure to support the window of it.
 - Use of PassivHaus A-certified low e triple glazing windows with timber framing.

- Internal Floors to Exterior Wall Connection**
 - Balloon framing technique (uninterrupted and continuous wall studs past the floor with the floor).
- Exterior Wall to Foundation Connection**
 - All slab enclosed within the EPS insulation.
 - The U-shaped edge profile ensures continuity between the wall insulation and base to top insulating modules.
- Roof to Exterior Wall Connection**
 - Roof joists wrapped in insulation with additional 120mm insulation on top ensuring continuity with the overall 260mm insulation of the exterior walls.

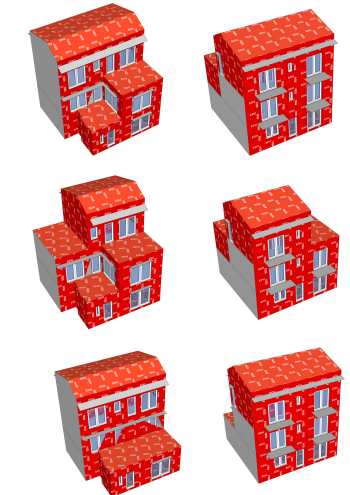


DESIGN ALTERNATIVES

Heat Loss Form Factor: 3.03
Annual Heat Demand (kWh/m².yr): **15.9**

Heat Loss Form Factor: 3.29
Annual Heat Demand (kWh/m².yr): **18.1**

Heat Loss Form Factor: 3.17
Annual Heat Demand (kWh/m².yr): **16.2**



LIVING ROOM RENDER



SELECTED UNIT ELEVATION



SITE PLAN

UNIT - 1 : ONE BEDROOM APARTMENT (Ground Level)

UNIT 1 LOCATION

THERMAL ENVELOPE

TFA

ANNUAL HEAT DEMAND

12.4 kWh/m².yr

UNIT - 2 : TWO BEDROOM APARTMENT (First & Second Level)

UNIT 2 LOCATION

THERMAL ENVELOPE

TFA

ANNUAL HEAT DEMAND

15.6 kWh/m².yr

Assemblies (default)

Code	Area group	Assembly no.	Assembly name	Total thickness (m)	U-value (W/m ² K)
7	External Door	8104	exterior_door	0.05	0.50
8	External Wall - Annexed	8104	exterior_wall	0.47	0.10
9	External Wall - Ground	8104	exterior_wall	0.47	0.10
10	Roofing - Annexed	8104	roof	0.40	0.09
11	Floor slab (Basement ceiling)	8104	floor	0.10	0.11
12	Floor slab (Basement floor)	8104	floor	0.10	0.11
13	Partition Wall to neighbour	8104	wall_neighbour	0.47	0.10

Assemblies (user-defined)

Code	Area group	Assembly no.	Assembly name	Total thickness (m)	U-value (W/m ² K)
8104	exterior_door	8104	exterior_door	0.05	0.50
8104	exterior_wall	8104	exterior_wall	0.47	0.10
8104	exterior_wall	8104	exterior_wall	0.47	0.10
8104	roof	8104	roof	0.40	0.09
8104	floor	8104	floor	0.10	0.11
8104	floor	8104	floor	0.10	0.11
8104	wall_neighbour	8104	wall_neighbour	0.47	0.10

Heat balance

Category	Value (kWh/m ² .yr)
Transmission heat loss (opaque surfaces)	13.8
Transmission heat loss (thermal bridges)	11.9
Ventilation heat losses (windows)	7.6
Non-useful heat gains	15.5
Specific area heat demand	15.0
Internal heat gains	16.8
Solar heat gains	12.4

Project overview

EDUCATIONAL LICENCE, NOT FOR PROFESSIONAL USE (expires in 107 days)

Climate: Huddington Dwelling

Annual heat demand (Q_a): 12.4 kWh/m².a

Treated Floor Area (TFA): 187 m² (Drawn TFA surfaces)

Thermal envelope area: 53.2 m² (Drawn TFA surfaces)

Heat Loss Form Factor: 3.13

Projected building footprint: --m²

Number of windows: 9

Number of thermal surfaces: 12

Number of thermal bridges: None defined

Thermal envelope checks: The thermal envelope appears to be complete!

Assemblies (default)

Code	Area group	Assembly no.	Assembly name	Total thickness (m)	U-value (W/m ² K)
7	External Door	8104	exterior_door	0.05	0.50
8	External Wall - Annexed	8104	exterior_wall	0.47	0.10
9	External Wall - Ground	8104	exterior_wall	0.47	0.10
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8104	roof	8104	roof	0.40	0.09
8104	floor	8104	floor	0.10	0.11
8104	floor	8104	floor	0.10	0.11
8104	wall_neighbour	8104	wall_neighbour	0.47	0.10

Heat balance

Category	Value (kWh/m ² .yr)
Transmission heat loss (opaque surfaces)	3.2
Transmission heat loss (thermal bridges)	28.4
Ventilation heat losses (windows)	7.3
Non-useful heat gains	14.2
Specific area heat demand	15.6
Internal heat gains	17.5
Solar heat gains	15.0

Project overview

EDUCATIONAL LICENCE, NOT FOR PROFESSIONAL USE (expires in 107 days)

Climate: Huddington Dwelling

Annual heat demand (Q_a): 15.6 kWh/m².a

Treated Floor Area (TFA): 74.2 m² (Drawn TFA surfaces)

Thermal envelope area: 228 m²

Heat Loss Form Factor: 3.09

Projected building footprint: --m²

Number of windows: 24

Number of thermal surfaces: 15

Number of thermal bridges: None defined

Thermal envelope checks: The thermal envelope appears to be complete!

Passive House Verification

Photo or Drawing: Building: SYMA Main Road

Street: Main Road

Postcode/City: S18 4AB | Shelton

Province/Country: Derbyshire | GB United Kingdom | Britain

Building type: Residential

Climate data set: GB0012p-Huddington

Altitude of location: 108 m

Home owner / Client: SYMA

Street: 142 Rockingham St

Postcode/City: S14 4BB | Sheffield

Province/Country: South Yorkshire | GB United Kingdom | Britain

Architecture: Shahab, Shailee, Monisha, Vishnukant

Street: Western Bank, Arts Tower

Postcode/City: S10 2TN | Sheffield

Province/Country: South Yorkshire | GB United Kingdom | Britain

Energy consultancy: Street: Postcode/City: Province/Country:

Year of construction: 2020

Interior temperature winter [°C]: 20.0

Interior temperature summer [°C]: 26.0

Internal heat gains (HG) heating case [W/m²]: 3.0

HG cooling case [W/m²]: 2.8

Specific capacity (SWK) per m² TFA: 40

Mechanical cooling:

Project data imported from designPH 2.0.07

PHPP display code:

HEATING DEMAND: 12 kWh/m².yr

HEATING LOAD: 10 W/m²

PRIMARY ENERGY DEMAND: 102 kWh/m².yr

Criteria table:

Criteria	Value	Alternative criteria	Alternative value	Fulfilled?
Space heating	12	15	10	yes
Space cooling	-	-	-	yes
Frequency of overheating (> 25 °C) %	4	10	-	yes
Frequency excessively high humidity (> 12 g/kg) %	0	20	-	yes
Airtightness	0.6	0.5	0.6	yes
Non-renewable Primary Energy (PE)	102	120	-	yes
Primary Energy Renewable (PER)	86	-	-	yes

Passive House Classic? yes

Passive House Verification

Photo or Drawing: Building: SYMA Main Road

Street: Main Road

Postcode/City: S18 4AB | Shelton

Province/Country: Derbyshire | GB United Kingdom | Britain

Building type: Residential

Climate data set: GB0012p-Huddington

Altitude of location: 108 m

Home owner / Client: SYMA

Street: 142 Rockingham St

Postcode/City: S14 4BB | Sheffield

Province/Country: South Yorkshire | GB United Kingdom | Britain

Architecture: Shahab, Shailee, Monisha, Vishnukant

Street: Western Bank, Arts Tower

Postcode/City: S10 2TN | Sheffield

Province/Country: South Yorkshire | GB United Kingdom | Britain

Energy consultancy: Street: Postcode/City: Province/Country:

Year of construction: 2020

Interior temperature winter [°C]: 20.0

Interior temperature summer [°C]: 26.0

Internal heat gains (HG) heating case [W/m²]: 2.8

HG cooling case [W/m²]: 2.8

Specific capacity (SWK) per m² TFA: 40

Mechanical cooling:

Project data imported from designPH 2.0.07

PHPP display code:

HEATING DEMAND: 13 kWh/m².yr

HEATING LOAD: 12 W/m²

PRIMARY ENERGY DEMAND: 112 kWh/m².yr

Criteria table:

Criteria	Value	Alternative criteria	Alternative value	Fulfilled?
Space heating	13	15	10	yes
Space cooling	-	-	-	yes
Frequency of overheating (> 25 °C) %	1	10	-	yes
Frequency excessively high humidity (> 12 g/kg) %	0	20	-	yes
Airtightness	0.6	0.5	0.6	yes
Non-renewable Primary Energy (PE)	112	120	-	yes
Primary Energy Renewable (PER)	87	-	-	yes

Passive House Classic? yes