



BOPAS

Buildoffsite Property
Assurance Scheme

HEMSPAN[®]

OUR MISSION

To develop the bio-based, circular systems to capture and store atmospheric carbon in buildings, and deliver climate-positive community living at scale.

HEMSPAN® is a bio-based construction technology specialist, offering design and build solutions that futureproof communities.

At the forefront of creating **Climate Positive** homes, **HEMSPAN®** aspires to **decarbonise the UK's built environment through innovative, bio-based building systems.**

HEMSPAN®'s BIOHAUS® system focuses on building homes with **negative whole life carbon emissions**, achieved using industrial hemp-based building products and pioneering **mass production capabilities**. We are setting a new benchmark for **carbon performance** in house building, **promoting the use of industrial hemp** and **advancing modern construction methods.**

HEMSPAN® projects drive future developments in **bio-based consumer products**. In collaboration with engineering and distribution partners **HEMSPAN® aims to make bio-based materials a primary choice in the industry, offering durable and energy-efficient solutions.**

HEMSPAN® is committed to supporting UK industrial hemp farming, enhancing local economies and meeting the growing demand for environmentally conscious housing.

75% + Reduction in
Energy Costs

Lifecycle Embodied Carbon Target

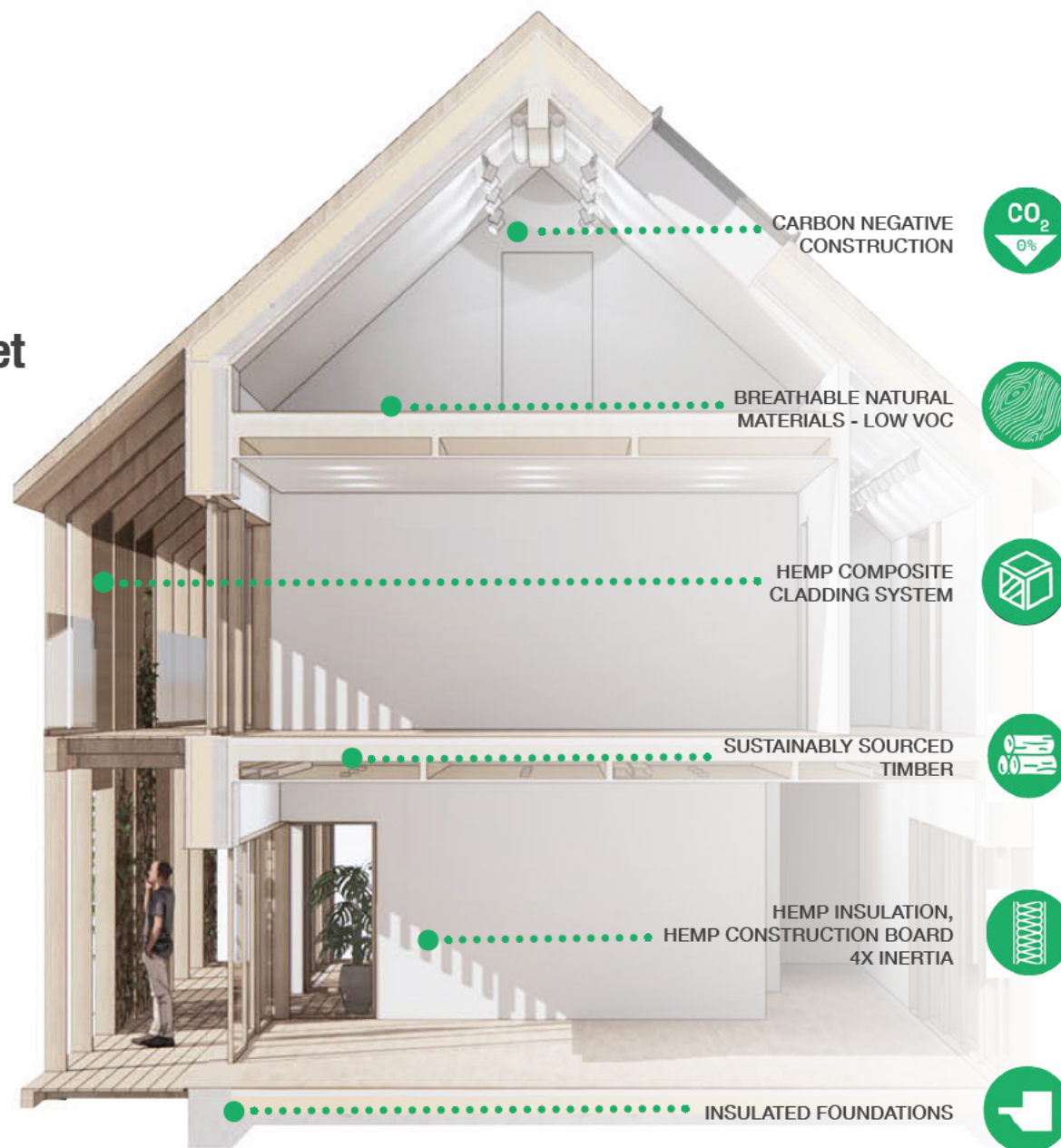
0.1tCO₂e/m²

Overall U-Value

0.100W/m²k

BOPAS

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Current issue date: 02 May 2024
Expiry date: 01 May 2028
Certificate identity number: PRJ11100422463-2

Certificate of Accreditation

Buildoffsite Property Assurance Scheme (BOPAS)

Hemspan Ltd

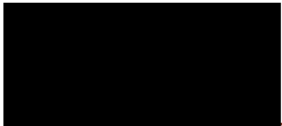
has been awarded Full Accreditation by LRQA Limited to the following:-

The Hemspan Ltd BIOHAUS® Building System

The scope of approval includes the assessment of the following, systems, processes and competencies:

- Design (Project Management)
- Manufacture (Project Management)
- Construction (Project Management)
- and
- 60 year durability and maintenance assessment

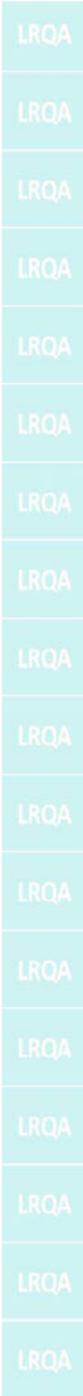
This Approval is subject to:
Satisfactory Surveillance Assessments



Yohan De Silva
Senior Assessor (Utilities & IS)
Issued by: LRQA Limited



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BIOHAUS® is an innovative whole-house system that seamlessly integrates health, comfort, energy efficiency, and environmental responsibility.

BIOHAUS® is classed as a **Category 2 Modern Methods of Construction (MMC)** system, as defined by the UK Government's MMC definition framework. Employing pre-manufactured 2D primary structures, incorporating over **75% hemp alongside structural timber**, to create **Climate-Positive homes**.

Once the insulated groundworks are complete, the **BIOHAUS®** superstructure is completed **twice as fast as conventional construction methods**.

By embracing **passive house principles**, MMC and reinforcing them with **bio-based materials and renewable technologies**, **BIOHAUS®** delivers sustainable, high-performance living environments that prioritise the occupants

BIOHAUS® provides **2-hour fire protection** across key elements, ensuring a high standard of performance for the superstructure.

As a **BOPAS-accredited** system, **BIOHAUS®** provides a **structural solution for residential and public buildings up to three storeys**, with further scope to develop designs for buildings up to five storeys or 18 metres (finished floor level of top floor).

BIOHAUS® provides **structural flexibility**, allowing for **larger openings, expansive floor spans, and adaptable layouts**.

BIOHAUS® creates **low-energy, Climate-Positive homes** that exceed regulatory targets, future-proofing developments for sustainable success and well-being, while significantly reducing carbon impact.

BIOHAUS® APPLICATIONS

- **Residential** housing, including **housing developments** and **self-build projects**
- **Commercial** buildings and offices
- **Low-rise apartment complexes**
- **Student accommodation**
- **Industrial Units** and **Warehouses**



The **BIOHAUS® system** maximises Modern Methods of Construction (MMC) by combining **precision-engineered offsite manufacturing with sustainable innovation**.

Unlike other MMC solutions, it offers **flexibility, efficiency, and environmental benefits**—delivering homes that are built faster, perform better, and integrate seamlessly into their surroundings.

FASTER CONSTRUCTION, SMARTER DELIVERY

With the UK requiring **320,000 new homes annually**, speed is critical. **BIOHAUS® is constructed twice as quickly as traditional methods**, thanks to its **offsite manufacturing process**. This accelerates delivery, **reduces on-site disruption**, and **enhances safety**, making it an ideal solution for forward-thinking developers.

ARCHITECTURAL FLEXIBILITY WITH A FAÇADE-AGNOSTIC SYSTEM

Unlike some MMC solutions, **BIOHAUS® is façade agnostic**, meaning it supports a wide range of **external cladding options** to complement **local architectural styles**. This ensures developments respect their surroundings while benefiting from the efficiency of precision-engineered construction.

LIGHTWEIGHT, DRY CONSTRUCTION FOR SUSTAINABLE DEVELOPMENT

BIOHAUS® uses **lightweight, sustainably sourced materials** and a **dry installation process**, reducing **water usage, construction waste, and embodied carbon**, also reducing foundation loads and cost benefits. This makes it a more **environmentally responsible choice** compared to traditional wet-build or heavyweight MMC alternatives.

DESIGNED FOR MODERN LIVING

Where other MMC systems impose design constraints, **BIOHAUS® provides structural flexibility**, allowing for **larger openings, expansive floor spans, and adaptable layouts**. This enables homes to meet the demands of contemporary family life without compromising on aesthetics or performance.

LOWER ENERGY COSTS, GREATER EFFICIENCY

BIOHAUS® homes are **net-positive energy dwellings**, producing more energy annually from **renewable sources** than they consume. This leads to **75% + lower energy costs**, reducing reliance on fossil fuels and providing long-term economic benefits for homeowners.

With its **unmatched speed, sustainability, design adaptability, and energy efficiency**, **BIOHAUS® sets a new standard for MMC housing in the UK**—delivering homes that are as efficient as they are elegant.

HEMSPAN® is dedicated to advancing carbon removal efforts and spearheading groundbreaking innovations in construction through the cutting-edge design and performance of the BIOHAUS® System.

As a closed -panel system, the roof construction offers superior insulation and flexibility in the loft area; adding an extra room or storage.



Exceptional acoustic quality is achieved with natural hemp insulation, protecting from unwanted sounds in and outdoors.



The typical whole house build-up delivers a **U-VALUE of 0.100W/m²k**, creating a pleasant environment in both summer and winter.



On average a **BIOHAUS® building produces more energy from renewable sources** than it imports from external sources. This is shown in the projected assessment in our **case study**.



Near Zero Whole Life Embodied Carbon Emissions

-Locking up more carbon than it emits in the build phase, with a lifecycle embodied carbon target of **0.1tCO₂e/m²**. RIBA target is: +625 kgCO₂e/m² for domestic houses by 2030.



BIOHAUS® homes are designed to **optimise daylight penetration**, providing numerous health benefits to occupants.



Bio-Material Construction - Bio-based materials, structural timber and industrial hemp insulation used as much as possible throughout the build.



The system is designed to allow large glazed areas within its standard configuration. Equally, the design can incorporate various forms of solar shading to avoid the risk of overheating.

Waste Water Heat Recovery (WWHR) where waste water from showers and baths is used to pre-heat cold water entering the hot water cylinder.



By reducing or **eliminating harmful chemicals**, such as volatile organic compounds (VOCs) in construction, **BIOHAUS®** provides a solution that promotes breathable finishing products.

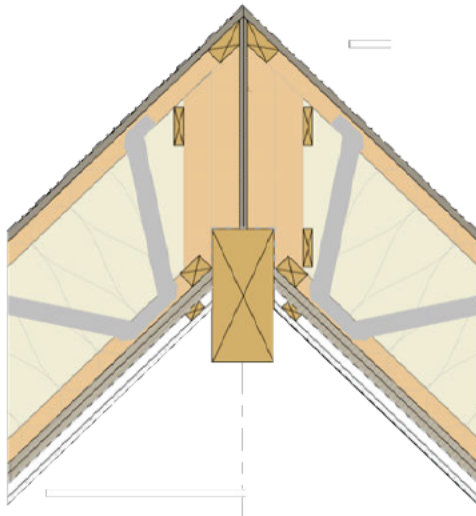


A **Mechanical Ventilation Heat Recovery System (MVHR)** to regulate humidity and provide the constant flow of clean, fresh air. Good indoor air quality can **prevent respiratory ailments** and contribute to overall well-being.

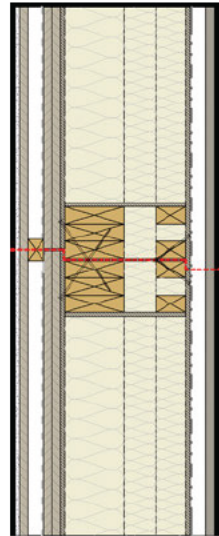


Smart Home Technology centrally manages lighting, heating, door entry, music and television systems, providing optimised energy performance.

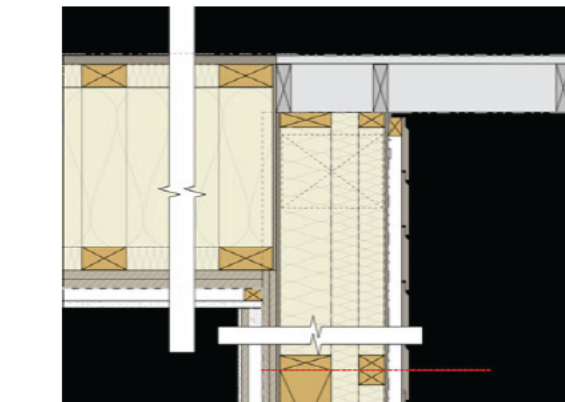




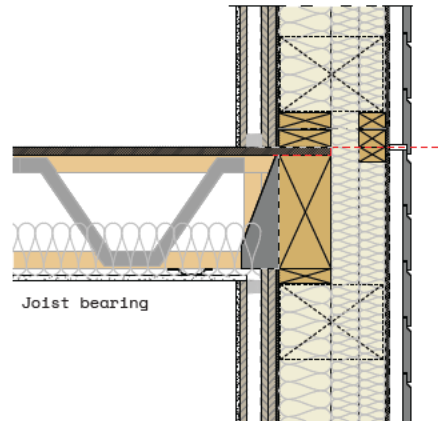
Roof cassette with ridge beam below



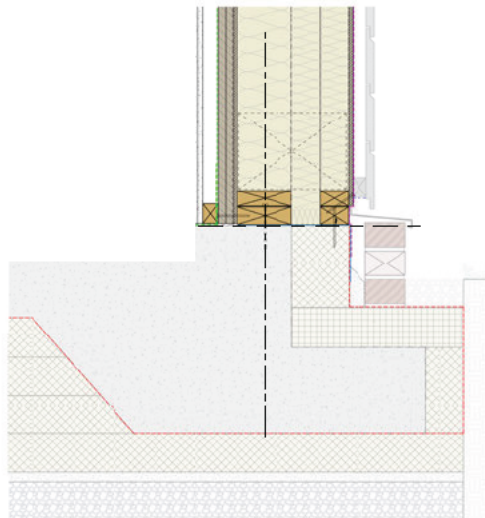
Panel join



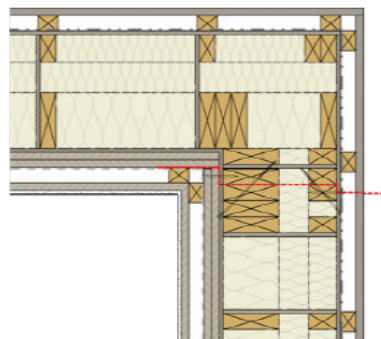
Typical verge



Joist bearing



External Sole Plate Junction



Corner junction

BIOHAUS® uses precision-engineered, panellised offsite construction to deliver high performance, climate-positive homes.

Factory-Engineered Accuracy of the 2D panellised timber frame system ensures millimetre precision, improving structural integrity, airtightness, and energy efficiency.

Optimised Component Integration: Standardised wall, floor, and roof elements allow for predictable, high-quality installations that exceed UK building performance standards.

Unlike traditional construction, controlled manufacturing conditions eliminate common onsite errors, ensuring consistent, repeatable results.

By combining precision MMC manufacturing, superior and sustainable material selection, and an integrated whole-house design approach, BIOHAUS® delivers future-proofed, low-carbon homes that set a new industry benchmark in the UK housing sector.

Overall U-Value

0.100W/m²K

KEY PERFORMANCE TARGETS

LIFECYCLE EMBODIED CARBON TARGET

0.1t CO₂e/m²



Embodied carbon refers to the total carbon emissions generated throughout a building material's lifecycle—from extraction and manufacturing to construction, use, and disposal.

As operational emissions decrease with energy-efficient buildings, embodied carbon accounts for a growing share of a building's environmental impact. Reducing it is essential to lowering overall carbon footprints and combating climate change.

BIOHAUS® is designed to minimise embodied carbon through the use of bio-based materials, which naturally sequester carbon. Achieving an industry-leading whole lifecycle embodied carbon target of 0.1t CO₂e/m²*—exceeding the 2030 RIBA target—**BIOHAUS®** locks in more carbon than it emits, setting a new standard for truly sustainable construction.

EXCEPTIONAL THERMAL PERFORMANCE:

U-VALUE 0.100W/M²K



The **BIOHAUS®** whole-house U-value sets a thermal performance standard that ensures year-round ambient temperatures, reducing heating and cooling demand for a more comfortable, cost-effective home.

To offset the higher U-values of glazing, the walls, roof, and floors exceed the 0.100 W/m²K target, ensuring the overall building envelope delivers outstanding insulation.

Current UK Building Regulations (Part L 2021): External walls require 0.18 W/m²K (**BIOHAUS®** outperforms this by nearly 45%).

Future Homes Standard (2025), which demands 0.15 W/m²K or lower for walls—**BIOHAUS®** is already setting a higher standard today.

NATURAL & BIO MATERIAL CONSTRUCTION



BIOHAUS® uses the whole industrial hemp plant, only natural fibre insulation, structural timber, and limited metal fixings in its construction. Additionally, there is a significant reduction in the use of plastics and other harmful materials, aiming to minimise and, where possible, eliminate the use of toxic chemicals.

FIRE TESTING



BIOHAUS® external load-bearing walls of the closed panel system were independently fire tested achieving a **two hour fire rating**.

Fire testing of all relevant elements of the **BIOHAUS®** system demonstrate they exceed the requirements of the Building Regulations.



South west perspective view



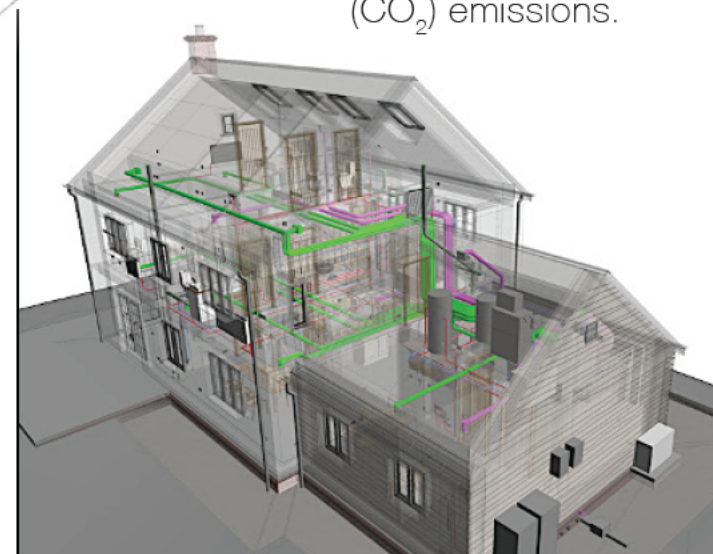
Our first fully **BOPAS** certified **BIOHAUS®** home will complete in Spring 2026.

The client brief required an efficiency that sets the standard for further projects, with viable sustainable qualities and superior performance.

The initial predicted energy assessment uses Government approved [SAP 10](#) methodology, and is rated in terms of energy use per m² of floor area. The energy efficiency is based on fuel costs and the environmental impact based on carbon dioxide (CO₂) emissions.



South east perspective view



Revit model showing MVHR

The table below categorises life cycle embodied carbon (LCEC) emissions in buildings, measured in kg CO₂e per square metre (KG CO₂e/SQM), across different building types. The colour-coded bands indicate performance, ranging from **BIOHAUS®** (best) to **G** (worst).

This indicates that the project house will significantly outperform RIBA's 2030 target by a minimum of **80% lower emissions**.

This table shows the potential of cutting-edge sustainable design to significantly reduce the carbon footprint of buildings well beyond established targets.

Life Cycle Embodied Carbon, A1-5,. B1-5, C1-4

Band	Office	Residential (6+ storeys)	Education	Retail
BIOHAUS®	<100	<100	<100	<100
A++	<150	<150	<125	<125
A+	<345	<300	<260	<250
A	<530	<450	<400	<380
B (RIBA 2030 TARGET)	<750	<625	<540	<535
C	<970	<800	<675	<690
D	<1180	<1000	<835	<870
E	<1400	<1200	<1000	<1050
F	<1625	<1400	<1175	<1250
G	<1900	<1600	<1350	<1450

SIGNIFICANT CARBON REDUCTION –

Achieving BIOHAUS® standards indicates that the carbon emissions from the project house will significantly outperform RIBA's 2030 sustainability benchmark, contributing to decarbonisation.

MARKET LEADERSHIP

If adopted widely, such low-carbon buildings could push the industry toward even more ambitious carbon reduction goals.

EXCEEDING SUSTAINABILITY GOALS

The project house aligns with ultra-low carbon construction, setting a benchmark beyond current and future sustainability expectations.

REGULATORY AND CERTIFICATION BENEFITS

Such superior performance can support achieving green building certifications (e.g., LEED, BREEAM) and align with net-zero carbon ambitions.

