

Definitions of 'open' and 'closed' panel as applicable to prefabricated panelised building systems

(August 2024) (Second issue – supersedes July 2022)

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Supersession

This second issue dated August 2024 supersedes the first issue dated July 2022.

Applicable sites

Warranty sites registered with NHBC

Applicable Regions

This Technical Guidance Note applies to England, Wales, Scotland, and Northern Ireland.

Background and NHBC Standards

MMC Category 2 Light gauge steel and timber frame building systems are typically constructed from panels manufactured offsite under factory-controlled conditions. The extent of prefabrication can vary, with panels being as simple as studs and sheathing, and as advanced as including external cladding, internal linings, windows and services; the greater the level of offsite prefabrication, the harder it can be to undertake key inspection of critical junctions and components on site. In addition, the greater the level of factory prefabrication, the greater the potential risks associated with exposure to moisture during construction.

In order for the design and construction of closed panel systems to be adequately checked when inspection on site is not possible, detailed system documentation, enhanced factory production controls and inspection, and quality assurance systems are required.

Key Technical Considerations

Whilst the extent of offsite prefabrication can vary significantly, light gauge steel and timber frame building systems are typically categorised by NHBC as either 'open panel' or 'closed panel'. For the purpose of Warranty provision, NHBC's definitions are set out below.

Note: The guidance contained in the Technical Guidance Note relates to prefabricated structure building systems for use in the construction of residential buildings (purpose group 1) with no storey over 18m in height.

The guidance contained in this TGN is not applicable to non-loadbearing proprietary internal wall systems and spandrel panels to pitched roofs formed using trusses.

Open Panel

Flat two-dimensional panelised units fabricated offsite in a factory environment used to form wall and floor structures.

Open panel assemblies typically include:

- A structural frame of studs and joists
- Floor decking and sheathing boards as required.

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Additionally, open panel assemblies may also include:

- A fixed breather membrane to external walls
- Insulation (between the studs only)
- A transparent air and vapour control layer (AVCL) in order that the construction/insulation can be viewed on site (Note: if a non-transparent air and vapour control layer is used, the system will be considered by NHBC as being closed panel)
- Battens forming a service zone
- Temporary weather protection.

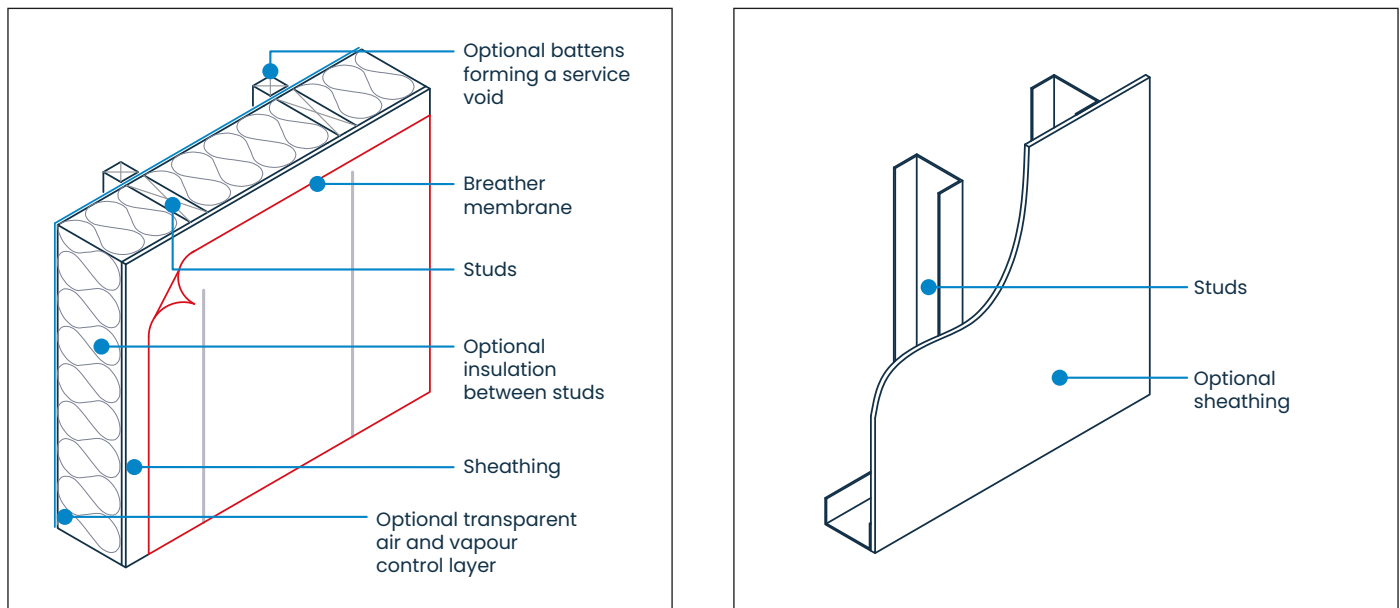


Figure 1: Examples of open panel systems including studs and sheathing boards as required, as well as optional breather membrane, insulation between studs, transparent AVCL and battens forming a service void.

Guidance on the construction of open panel light gauge steel and timber frame buildings can be found in NHBC Standards Chapter 6.10 ‘Light steel framed walls’ and Chapter 6.2 ‘Timber frame external walls’.

Closed Panel

Closed panel systems are also defined as flat two-dimensional panelised units fabricated offsite in a factory environment used to form wall and floor structures, but in addition to the items set out above for open panel systems, where any one of the following items are fitted in the factory NHBC will consider the system to be closed panel:

- Non-transparent air and vapour control layer
- Sheathing boards to both faces of panels
- Internal linings (such as plasterboard)
- Continuous insulation installed to either the inner or outer face of the panels
- External cladding or finishes
- Windows and doors
- Fixed services such as plumbing pipes and electrical cables
- Cavity barriers and/or fire-stopping.

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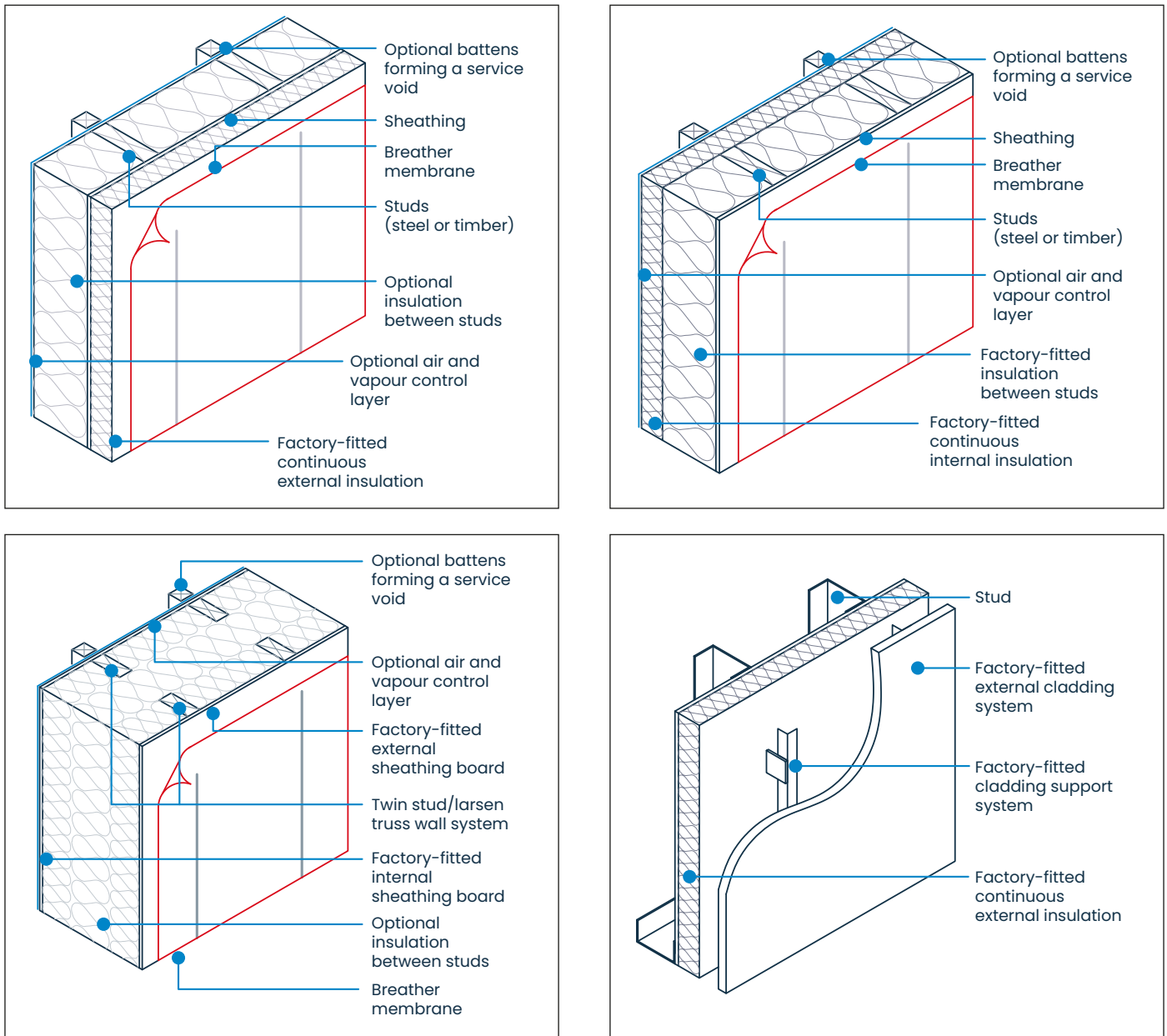


Figure 2: Examples of closed panel systems incorporating factory-fitted continuous internal and/or external insulation, a factory-fitted external cladding system, or novel forms of structural framing incorporating factory-fitted inner and outer sheathing layers.

Where a light gauge steel or timber frame building system utilises closed panels, it should be treated as a proprietary building system under NHBC Standards Chapter 2.1 Technical Requirement R3, and be subject to satisfactory assessment by an appropriate independent technical approvals authority accepted by NHBC or be assessed under the NHBC Accepts service – see www.nhbc.co.uk/accepts.

Guidance on independent technical approvals authorities accepted by NHBC is provided in Technical Guidance Note TGN 2.1/01.

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Other building systems

Volumetric building systems, and building systems incorporating structural insulated panels (SIPs) or precast concrete sandwich panels are considered to be proprietary building systems and should also be subject to satisfactory assessment by an appropriate independent technical approvals authority accepted by NHBC or be assessed under the NHBC Accepts service – see www.nhbc.co.uk/accepts.

Guidance on requirements for roof cassette systems is provided in Technical Guidance Note 7.2/31.

Guidance on requirements for cross-laminated timber systems is provided in Technical Guidance Note 6.2/06.

Guidance on requirements for prefabricated panelised non-loadbearing proprietary internal wall systems is provided in NHBC Standards Clause 6.3.11 'Construction of proprietary systems'.

Guidance on requirements for prefabricated panelised spandrel panels to cold roofs formed using trusses is provided in NHBC Standards Clause 7.2.24 'Spandrel panels in cold roofs' and Technical Guidance Note 7.2/25.



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