

Heat pump commissioning Hints & tips for homebuilders

Advice for planning successful commissioning of heat pumps in low density homes

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Introduction

Commissioning is a critical step in the successful delivery of homes with heat pumps. When executed well, it ensures the heating system performs as designed, reducing the risk of customer complaints, expensive rework and a cold home.



Conventional gas boiler systems are inherently more tolerant. Should there be instances of poor installation, weak commissioning or underperforming building fabric, a gas boiler's higher flow temperature may make these shortcomings less obvious to householders. They would, however, still pay more to heat their homes.

By contrast, heat pump schemes operate with lower flow temperatures and tighter design margins. As a result, where there are higher-than-expected heat loads or an underperforming heating system, this is more immediately apparent once the home is occupied - typically through cold homes or noticeably increased running costs.

In short, low-temperature heating from lower-capacity heat sources demands well-coordinated heating and fabric design, backed up by accurate installation, construction and commissioning.

Commissioning is critical not only to configure and set to work an efficient system, but also to provide a valuable final opportunity to pick up any design or installation errors and rectify these before they lead to customer dissatisfaction, rework or costly claims. Commissioning should not be an afterthought. Planning for commissioning success starts early, as the designs are developed and the heat pump manufacturer is confirmed.

This guide intentionally does not provide technical commissioning instruction, but rather draws on real lessons learned by homebuilders and addresses the key factors leading up to, and during, commissioning that are known to strongly affect outcomes.

Hints & tips: quick commissioning pointers for heat pumps

If you just read one thing...

- Do not treat heat pump schemes in the same way as those with gas boilers.
- Plan for commissioning success early. The foundations for successful commissioning are laid in the design and procurement phases.
- A high quality, collaboratively developed and coordinated design is needed – good commissioning can't make up for poor design.
- The design must be tightly controlled through construction and installation. Any deviation must be agreed by the responsible heating designer.
- Only use competent, experienced commissioning engineers who have relevant qualifications and are trained on the products to be commissioned.
- Use the heat pump manufacturer, responsible heating designer and site management teams to ensure a rigorous commissioning process is maintained across the whole site.
- The commissioning engineer should take personal responsibility for setting to work a high performing system and ensuring any design or installation errors are corrected before signing off.
- Require the commissioning engineer to sign the commissioning sheet to confirm the whole heat pump system is installed and commissioned correctly.
- Ensure complete handover information is produced that satisfies the manufacturer, building control and warranty provider requirements.

Commissioning essentials

1 Set up for success at procurement stage

The foundations for successful commissioning are laid during the procurement stages of a project. This is not limited to engaging a competent and experienced commissioning engineer (see item 3), but also includes embedding requirements of the heat pump manufacturer, design team and key installation trades in contracts and agreements to ensure that a rigorous commissioning process is maintained.

It is essential to establish a capable design team early in the project, including a single responsible heating designer to oversee the heating system design (see item 2). It is important to factor the need

for on-site witnessing by the design team at the procurement stage as well.

Likewise, require the heat pump manufacturer to attend a proportion of plots being commissioned, and agree any associated costs as part of the manufacturer selection process.

The homebuilder should also take care to embed commissioning requirements, including those relating to compliance and external accreditation (such as MCS), into contracts and check that responsibilities are clearly defined.

DO:

- ✓ appoint a single responsible heating designer early and define clear responsibilities.
- ✓ put in place a capable, collaborative design team.
- ✓ contractually require the manufacturer and responsible heating designer to visit site on a regular basis to verify the ongoing installation and commissioning standards.

DON'T:

- ✗ omit risk mitigation measures and certification scheme requirements from designer and installer contracts.

[Read the heat pump procurement hints & tips ⁷](#)

Or search 'procurement' in the Knowledge Centre

2 Good design and installation is a prerequisite

Good commissioning cannot compensate for poor design, unrealistic design criteria, installation errors or unapproved deviations. This means that the design and installation must be well considered, coordinated and controlled.

High performing heat pump systems require a holistic approach to design, with tolerances and interoperability of components carefully considered. A single responsible heating designer should be appointed as part of a multi-disciplinary design team, to undertake, develop, and finalise the project

heating design, and take ownership of it through to handover.

Installation must be carried out precisely in accordance with the design, and to a high quality. Heating system installers must be competent and experienced, and trained on the tasks that they are carrying out. Less experienced individuals must be properly supervised. Deviations from the design without responsible heating designer approval should not be accepted.

DO:

- ✓ ensure the heating system design is fully coordinated with the energy assessor, the fabric, plumbing and controls design, and has had input from the procurement team.
- ✓ ensure installers are competent, experienced and precisely follow the approved design.
- ✓ ensure all proposed changes are approved by the responsible heating designer.

DON'T:

- ✗ expect commissioning to fix design errors or poor installation.

Commissioning essentials

3 Ensure commissioning engineers are competent, experienced and appropriately trained

It is critical that the homebuilder satisfies themselves of the competency of the commissioning engineers. Commissioning must be carried out by competent, experienced and appropriately trained engineers, or individuals who are directly supervised by someone who is, until the necessary experience is gained.

Individual commissioning engineers must have appropriate heat pump and low-temperature heating qualifications, or if having progressed from working with gas boilers, supplemented their experience with specific low temperature heating training. Commissioning engineers should have attended manufacturer training courses specific to the equipment being commissioned.

Certification schemes like the Microgeneration Certification Scheme (MCS) are helpful to establish company-level capabilities, but crucially they do not assess the competency of individual engineers working within them. It is important therefore that homebuilders also assess and understand the track record of the company undertaking the commissioning, and establish the competency of the commissioning engineers carrying out the work.

Evidence of continual professional development and ongoing programmes to upskill engineers to work with heat pumps can be used to support an assessment of competency.

DO:

- ✓ ensure commissioning is only undertaken by competent and experienced individuals with relevant qualifications and manufacturer-specific training.
- ✓ ensure less experienced engineers are directly supervised by a competent and experienced individual.
- ✓ seek evidence of company internal training programmes and CPD.

DON'T:

- ✗ rely on company-level accreditation to demonstrate individual commissioning engineer competence.
- ✗ assume gas boiler experience automatically transfers to heat pumps.

[Read the heat pump procurement hints & tips [↗]](#)

Or search 'procurement' in the Knowledge Centre

4 Put in place the resources needed to monitor commissioning effectively

Even with a competent and professional commissioning engineer in place, a degree of oversight from the homebuilder's site management team is essential. The homebuilder should ensure that a competent member of the site team shadows a good proportion of commissioning activities. Some homebuilders go further, training their staff in heat pump commissioning and shadowing the engineer's progress to verify that every system is set up correctly.

To provide third party commissioning oversight, attendance from the heat pump manufacturer and responsible heating designer across a proportion of plots should be arranged to ensure standards are maintained and systemic errors are avoided. The levels of oversight should be defined contractually, with attention given to the start of each phase and at regular points throughout the programme.

DO:

- ✓ ensure that the heat pump manufacturer and responsible heating designer witness an appropriate proportion of commissioning sessions, especially at the beginning of each phase of build and new heating design.
- ✓ ensure appropriately trained site team members actively shadow and scrutinise commissioning activities.

[Read the site manager's hints & tips to heat pumps [↗]](#)

Or search 'site manager' in the Knowledge Centre

Commissioning essentials

5 Establish good commissioning practice

The commissioning engineer must understand their personal responsibility, not only for setting to work a high performing, compliant system, but also as the professional responsible for identifying any residual design or installation errors that might lead to safety risks, poor performance, or customer complaints.

A key responsibility of the commissioning engineer is to assess the system holistically prior to handover and ask the question “will anything stop this system from working as expected and in a way that best serves the householders over the long term?”

To answer this question, the engineer must verify that all components and supporting systems are in place to enable commissioning and successful operation and maintenance in occupation. These checks should go beyond the heat pump and controls to include internet connectivity (if required), the full plumbing installation, pipework insulation, the hot water cylinder, the electrical installation, condensate drainage, and mounting system.

While technical requirements and commissioning tasks will vary according to the specific system installed, good practice process requirements are similar across all heat pump schemes. The commissioning engineer must:

- Be named on the commissioning sheet (in addition to the installation company’s Technical Supervisor if installed under MCS).
- Take responsibility for confirming that the installation is as per the design (and take appropriate steps to ensure this).
- Confirm the system has been correctly commissioned according to the heat pump manufacturer, warranty provider, building control and certification scheme requirements and complete necessary paperwork accordingly.
- Ensure that all necessary handover information has been left for inclusion in the homeowner pack, including: commissioning forms and checklists, maintenance requirements, manufacturer warranty details, user manuals and other documentation necessary for MCS.
- Leave the controls set ready for a householder to move in.

DO:

- ✓ ensure the commissioning engineer takes responsibility for install, commissioning and setting to work of the heat pump system.
- ✓ ensure holistic checks of heating, plumbing, electrics and connectivity are carried out.
- ✓ require the commissioning engineer to sign the commissioning sheet.
- ✓ require the commissioning engineer to confirm compliance with design, building control, warranty provider and certification scheme requirements and ensure documentation is in place.

DON'T:

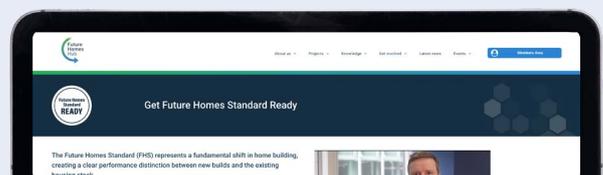
- ✗ permit errors or deviations from the agreed design to remain in place at handover.
- ✗ accept controls being left in a configuration unsuitable for move-in.

Explore the Future Homes Standard Essentials

This guide has been published as part of the Future Homes Standard Ready campaign. Visit the **Knowledge Centre** to access further resources on commissioning and the wider series.

[Explore the FHS Essentials](#) ↗

Or search 'essentials' in the Knowledge Centre



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