# Technical Extra

February 2012 | Issue 06

In this issue:



NHBC

# NHBC STANDARDS

## Low or zero carbon technologies – Chapter 3.1 one year on

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

### INTRODUCTION

As the UK house-building industry continues towards the reduced carbon emissions of 2016 and embraces the emerging technologies that will be required to meet some of these objectives, it seems a very good time to reflect on the 12 months since Chapter 3.1 'Low or zero carbon technologies' (LZC) was introduced into NHBC Standards.

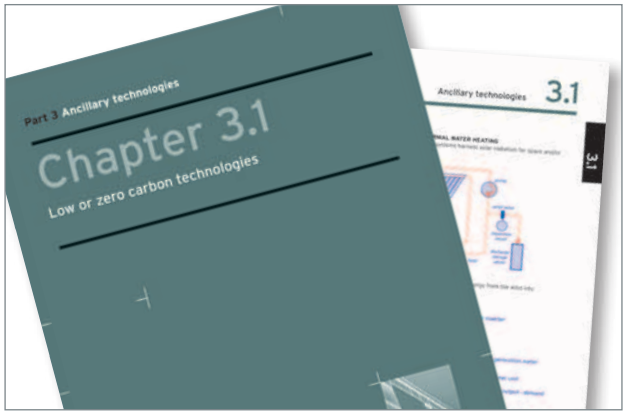
### STANDARDS CHAPTER

Chapter 3.1 'Low or zero carbon technologies' (LZC).

### REQUIREMENTS

The Chapter was introduced to provide meaningful benchmarks for the design, manufacture and installation of microgeneration technologies with a view to improving the management of technical risk for homeowners, builders and NHBC.

The term 'Low or zero carbon technologies' is generally applied to renewable sources of energy, and also to technologies which are significantly more efficient than traditional solutions or which emit less carbon in providing heating, cooling or power.




Standards Chapter 3.1

Influenced by the availability of funding, the following technologies have, to a greater or lesser extent, been installed in homes covered by NHBC:

- Biomass boilers
- Heat pumps
- Solar photovoltaics (electric)
- Solar thermal water heating
- Wind turbines.

The Chapter was introduced to provide support to the requirements of the Microgeneration Certification Scheme (MCS) and any suitable alternative assessment scheme acceptable to NHBC.

The availability of satisfactory certification in accordance with clause D3 of the Chapter has been a recurring issue over the 12-month period, with too few systems having undergone satisfactory independent assessment. It is well worth reinforcing that any LZC technology installed in homes covered by NHBC should have current certification confirming satisfactory assessment by an appropriate independent technical approvals authority. Certification in accordance with the MCS is normally accepted by NHBC, although others could also be accepted if they are considered to provide a suitable alternative.

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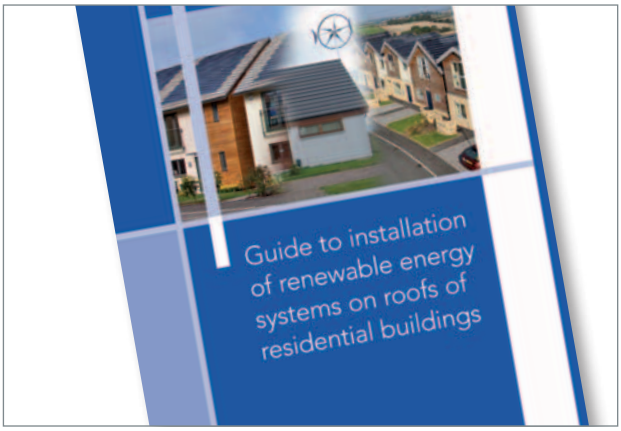
## REQUIREMENTS (CONTINUED)

An associated issue is the suitability of installers in accordance with clause S2 of the Chapter and, again, it is well worth reinforcing that operatives should be competent and familiar with the system being installed and have evidence of being trained in accordance with MCS installer standards or any suitable scheme acceptable to NHBC. NHBC inspection staff may want to check this on site.

Another recurring issue relates to the adequacy of fixing the technologies to the building, particularly roof mounted systems. The issues here are twofold:

- firstly to ensure that fixings, supports, bracketry and mounting frames are designed and installed to accommodate all static and dynamic loads, and
- secondly to ensure that all interfaces with the building are designed and installed to ensure that water or moisture is prevented from reaching the interior, or any part of the structure that could be adversely affected by its presence.

Recognising the potential problems associated with fixing technologies to roofs, the NHBC Foundation has published a research report titled 'Guide to installation of renewable energy systems on roofs of residential buildings' which provides excellent guidance about this issue. The guide is available as a free download from **www.nhbcfoundation.org**.




NHBC Foundation publication NF30

The issue of underperformance of systems has been raised on a number of occasions and, again, it is worth reinforcing that, in accordance with clause D4(c) of Chapter 3.1, systems should be designed, manufactured and installed to ensure satisfactory performance. Where the LZC technology contributes towards the space and water heating of a home, the performance requirements set out in Standards Chapter 8.1 'Internal services' must be taken into account.

Roof mounted solar photovoltaics

Turning to the issues of testing, commissioning and handover requirements as set out in clauses S10 and S11 of Chapter 3.1, feedback suggests that the industry may have some way to go to achieve this fully.

At completion, it is absolutely vital that appropriate and understandable user instructions, completed certification for both manufacture and installation, contact details in the event of problems, maintenance and service requirements, together with warranties and guarantees, including any available insurance, are handed to the homeowner to ensure that systems continue to be used correctly to ensure maximum performance.

## YOU NEED TO...

- Ensure that the design, manufacture and installation of LZC technologies, including the relevant handover requirements, are carried out in accordance with NHBC Standards Chapter 3.1.

# NHBC STANDARDS

## Residual cavities

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

### INTRODUCTION

One of the most frequently asked questions of NHBC Standards and Technical is why a 50mm residual cavity is required when partial fill insulation is used in fair-faced masonry cavity walls in areas up to and including severe exposure to wind-driven rain. This requirement rises to 75mm in areas of very severe exposure.

### STANDARDS CHAPTER

NHBC Standards Chapter 6.1 'External masonry walls'.

### REQUIREMENTS

To a designer, it does look attractive if the 50mm residual cavity (an air space) can be reduced to, say, 25mm, thus increasing the thickness of insulation for no increase in the footprint of the wall. But on the other side of the equation is the significant claims cost and disruption to homeowners when water ingress across the cavity occurs.

The 50mm residual cavity has been a long-standing requirement of NHBC and stems from the days when non-insulated cavities in masonry walls were only 50mm wide. This enabled the bricklayer to produce a clean cavity as he was able to strike off the excess mortar on the cavity face and prevent it falling down and potentially blocking the cavity. The 50mm cavity also permitted a degree of tolerance in wall tie drip positioning and cavity tray and dpc detailing.

That principle still applies today, even for partial fill. It is just as important that the insulation is not damaged or dislodged by the bricklayer's trowel when striking off the cavity face of the outer leaf and also that the detailing mentioned above has a reasonable chance of success. NHBC still considers that this cannot be achieved if the residual cavity is 25mm and it would almost certainly lead to water ingress and dampness.

The recommended residual cavity in the Building Regulations is 50mm unless otherwise specified as part of an alternative third-party certification. Even though NHBC does not accept a 25mm residual cavity, it is still worth clarifying that some BBA certificates for partial fill insulation do refer to a cavity width of **not less than** 25mm. However, it is our view that to achieve a cavity of not less than 25mm, taking account of workmanship and material tolerances, the design needs to specify a 50mm residual cavity to be within the scope and terms of the certificate.

### YOU NEED TO...

- Ensure you have a 50mm residual cavity when using partial cavity fill in fair-faced masonry cavity walls. In England and Wales, this is for areas up to severe exposure to wind driven rain. Full details of cavity widths are given in NHBC Standards Chapter 6.1 'External masonry walls'.

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# Vapour permeable roof underlays

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

## INTRODUCTION

In NHBC Standards 2011, a requirement for high-level roof void ventilation when using vapour permeable roof underlays was added to clause 7.2 – D11.

## STANDARDS CHAPTER

NHBC Standards Chapter 7.2 'Pitched roofs'.

## REQUIREMENTS

Standards Extra 48 October 2010 included an article on condensation problems in roof spaces. The article referred to condensation related to vapour permeable roof underlays in unvented roofs during cold, frosty weather, particularly when a building is drying out.

Condensation resulting from inadequate ventilation

The article explained that, when using vapour permeable roof underlays, there is a need for some ventilation. This was all in accordance with guidance given in BS 5250 'Code of practice for the control of condensation in buildings'. It was confirmed that, from 1 January 2011, NHBC Standards would be adopting the BS 5250 guidance and would require a ventilation gap, to be installed at high level, equivalent to a 5mm continuous slot at, or near, the ridge.

All vapour permeable roof underlays permit the movement of vapour through the membrane, but generally do not permit the passage of air. However, there are some vapour permeable roof underlays that permit both vapour and air to pass through them. The third-party assessments for vapour permeable roof underlays will confirm whether an underlay is both vapour and air permeable.

Where an underlay is certified as both vapour and air open, the manufacturer should be asked to confirm its air permeability. Where the air permeability of the underlay can be shown to provide suitable ventilation, i.e. at least the equivalent of a continuous 5mm high-level slot, NHBC will accept that underlay without the need to provide any further ventilation.

## YOU NEED TO...

- Provide high-level ventilation equivalent to a continuous 5mm slot the length of the ridge, when using a vapour permeable roof underlay. Alternatively, use a vapour **and** air permeable membrane that can provide at least the same amount of ventilation on its own.

For **technical advice and support**, call **01908 747384** or visit **www.nhbc.co.uk**

# NHBC STANDARDS

## When doors and windows become walls

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

### INTRODUCTION

A question frequently asked of our technical staff relates to façades being formed with multiple door and window frames (including spandrel panels) coupled vertically and/or horizontally.

We have serious concerns about some of these arrangements and their ability to provide satisfactory in-service performance in accordance with NHBC Standards, as they currently fall into a gap somewhere between Chapters 6.7 'Doors, windows and glazing' and Chapter 6.9 'Curtain walling and cladding'.

So at what point should multiple door and window frames (including spandrel panels) cease to be considered as doors and windows and be considered in the same manner as a fully functioning curtain walling system? This is not easy to answer.

### STANDARDS CHAPTER

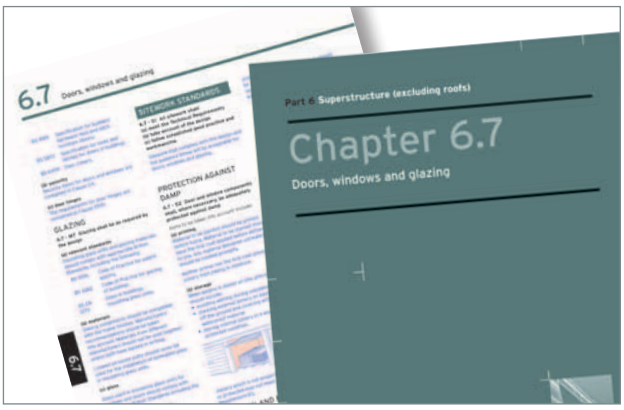
NHBC Standards Chapter 6.7 'Doors, windows and glazing' and Chapter 6.9 'Curtain walling and cladding'.

### REQUIREMENTS

A door or window would normally be defined as an opening in a wall or roof, sealed where appropriate with glazing and held by a supporting frame. NHBC Standards Chapter 6.7 'Doors, windows and glazing' provides guidance on the design, specification and installation of doors and windows.

Accepting there are many variations, a curtain walling system would normally be defined as a non-load-bearing frame comprising vertical and horizontal structural members that are connected together and anchored to the building structure to form a space enclosing envelope. NHBC Standards Chapter 6.9 'Curtain walling and cladding' provides guidance on the design, specification and installation of curtain walling.

With a view to improving the management of technical risk, NHBC set up a Task Group from the industry to identify what changes could be made to Standards and how best they could be implemented. The Task Group included representatives from manufacturers, certification bodies, other standard setting organisations and NHBC staff.




The Task Group agreed that:

1. Coupled door and window assemblies (including spandrel panels) that span one storey or more, or are not contained between a structural floor and ceiling, are very similar in their function to curtain walling and, therefore, the guidance set out in Chapter 6.9 'Curtain walling and cladding' should be used as a benchmark for acceptance.

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## REQUIREMENTS (CONTINUED)

2. Coupled door and window assemblies (including spandrel panels) that are contained between a structural floor and ceiling within a single storey can be considered in accordance with Chapter 6.7 'Doors, windows and glazing'.
3. Additional guidance should be added in Chapter 6.7 to ensure the coupling joint between door and window frames (including spandrel panels) contained within a storey is part of an engineered system formed using appropriate materials.

By adopting the principles set out in points 1 to 3 above, and by making a few relatively minor changes to both Chapters as shown below, the technical risk when using multiple door and window assemblies can be significantly reduced. The revised guidance will be published in the 2013 edition of NHBC Standards, which will be distributed later in the year.


### For systems comprising coupled door and window assemblies (including spandrel panels) that span one storey or more

Coupled door and window frames (including spandrel panels) that span one or more storeys or are not contained between a structural floor and ceiling will, in future, need to be assessed and certificated to ensure suitable design, satisfactory in-service performance and appropriate long-term durability, in accordance with Chapter 6.9. To ensure satisfactory weatherproofing, the assessment should include testing of the proposed joint details at interfaces with the building and also the coupling joint between door and window frames.

Testing should be carried out in accordance with recognised Standards. Additional items to be taken into account in the assessment include loads, provision for movement, brackets and fixings, wair infiltration, condensation, acoustic performance, tolerances and durability. The certification should be made available to NHBC in advance of the system arriving on site.

Hose testing (or suitable sparge bar or similar) should be carried out post-installation to determine the as-built weather resistance, including all joints and interfaces designed to be permanently closed and watertight, in accordance with Standards Chapter 6.9 clause S10. NHBC should be given the opportunity to see the test and will want a copy of the test results.

### For systems comprising coupled door and window assemblies (including spandrel panels) that are contained between a structural floor and ceiling within a single storey

The coupling joint between frames should be part of an engineered system and be formed using materials in accordance with the door and window manufacturer's recommendations.

## YOU NEED TO...

**If you are designing, manufacturing or installing a façade formed with coupled door and window frames (including spandrel panels), please note the revised guidance contained above, which should be adopted at the earliest opportunity in advance of them being published in the 2013 edition of the Standards.**

For **technical advice and support**, call **01908 747384** or visit **www.nhbc.co.uk**

# GUIDANCE AND GOOD PRACTICE

## Façade systems – NHBC Technical Requirements for testing and certification

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

### INTRODUCTION

It is now six years since the introduction of Chapter 6.9 'Curtain walling and cladding' into the NHBC Standards and therefore a good time to review some of the areas that continue to cause problems for designers, installers, builders and NHBC. Two issues are the testing and certification requirements for cladding systems and the acceptance criteria for site water testing of curtain walling and cladding systems. The following article looks at these issues in detail and sets out our revised recommendations to improve the current situation.

### STANDARDS CHAPTER

NHBC Standards Chapter 6.9 'Curtain walling and cladding'.

### GUIDANCE

#### Cladding systems

Clause D7 of NHBC Standards Chapter 6.9 'Curtain walling and cladding' sets out our requirements for testing and certification of cladding systems. However, up until now we have sometimes accepted evidence from testing as an alternative to full independent assessment.

Unfortunately, we have noted an increasing number of examples where the test evidence submitted to NHBC as a substitute for independent assessment is not appropriate and falls some way short of demonstrating that satisfactory in-service performance will be achieved. Consequently, a great deal of additional work has been generated for all parties in establishing a satisfactory outcome.

To avoid this problem, we consider that satisfactory independent assessment in accordance with the first paragraph of D7 should now become our benchmark for acceptance of cladding systems, with additional project-specific testing being carried out as and where required.

Looking at the issue in a little more detail, NHBC Standards Chapter 6.9 requires accredited performance assessment, together with all test documentation and certification to be made available to NHBC before cladding installation begins on site. The assessment should be carried out in accordance with recognised standards to demonstrate the likelihood of satisfactory in-service performance in accordance with the project design. Naturally, the actual use of a cladding system must be within the scope of the accredited certification and test documentation.

There would not be a need to carry out such assessment where the proposed system is identical to one previously tested. But where the cladding system layout and configuration differs significantly from previous design, further assessment by way of type testing is required.

Where a project façade design requirement requires very large panels arranged in a vertical arrangement i.e. typically, full storey-height units, the aspect ratio

## GUIDANCE (CONTINUED)

(W/H) could involve individual panels up to 1,500mm wide x 3,000mm high. These cladding panel types should be tested on a sample of similar size and configuration to those to be used on the proposed building façade.

Without benchmark prototype testing, there is a risk that design justification by desk calculation alone will not pick up the actual behaviour over the range of performance required to cover both serviceability and safety requirements. It is possible that systems could fail to perform as predicted solely by basic calculation methods which are extrapolated from results obtained from an over-simplified test sample.

Very large panels may be more prone to becoming dislodged or undergo permanent deflection when exposed to the full range of pressures representative of UK wind loading environments and storm conditions.

NHBC is not requesting type testing as necessary for every project but, where the design differs significantly in terms of dimensions, fabrication, components and fixing system layout, manufacturers should be able to provide benchmark testing which proves any calculated performance assumptions. In effect, we would rather that these performance issues were proven and fully resolved on a test site than on actual buildings where significant disruption occurs if systems fail to perform as predicted.

### Summary of certification and testing requirements

- Certification – Wherever possible, NHBC requires independent certification of manufacturer's products and systems to indicate quality of manufacture, mode of use and design application relating to relevant standards. The cladding system certificate should include an assessment covering the product/component range, configurations and a fixing system typically required for connection to building façades.
- Testing – Air and water testing of prototype sample curtain walling systems should be carried out in accordance with, and pass, the CWCT Standard (test sequences A or B) including the normal upper limit positive and negative test pressures. Where the maximum calculated design wind pressure is above 2,400 Pascals, the test pressure should be increased to 0.25 x the design wind pressure. The 'prototype' should remain watertight during and after the test. At a test pressure of 600 Pascals, an air infiltration rate no higher than 1.5m$^3$/hr/m$^2$ for fixed glazed panels is permissible, provided there is no evidence of concentrated leakage. Wind resistance, serviceability and safety testing, including impact resistance testing, should be carried out in accordance with the CWCT Standard. **The cladding panels tested should comprise similar size, configuration and fixing system to those to be used on the building.**

# Façade Systems – NHBC Technical Requirements for testing and certification

## GUIDANCE (CONTINUED)

### Site water testing

The requirements for site water testing are set out in the Sitework section of NHBC Standards Chapter 6.9 'Curtain walling and cladding'. There is some misunderstanding about the purpose of site testing and it is worth reinforcing that site water testing is complementary to the testing and certification mentioned previously and certainly does not replace the requirement for it.

Hose testing on curtain walling system

Another issue that continually causes problems is where site water testing is carried out with the internal linings and other obstructions in place, which means that any form of leakage cannot be adequately viewed. Associated reports often contain wording such as 'no leakage observed' which is rather meaningless and does very little to confirm that the system is satisfactory. Therefore, we will be looking for site water testing to be carried out without internal linings in place, which will allow proper viewing of the vulnerable areas.

Finally, turning to performance within the context of SAP 2009 calculations, the thermal performance of these systems needs to be considered at an early stage in the design process, to ensure the dwelling's target emission rate is achieved and there is not a high likelihood of overheating during the summer months. Key data to be provided to the SAP assessor in this respect is the overall U-value of the façade, solar transmittance factors for the glazing and psi values for the interfaces between the traditional building elements and the curtain wall.

Specific items to consider when looking at energy performance of curtain walling:

- Ensure that both the U-value for the glazing and the façade is provided; often just the U-value through the glazing is discussed.
- Ensure façade and spandrel panels meet U-value requirements.
- Thermal bridging junctions between the curtain walling and the traditional building elements will need to have psi values calculated.
- Thermal bridging details between intermediate floors and the system need to be carefully considered.
- Detailed overheating analysis may be required to ensure the risk of overheating is low where large areas of glazing are present.

## YOU NEED TO...

**If you are designing, manufacturing or installing curtain walling or cladding systems, you need to be aware of the requirements set out in NHBC Standards Chapter 6.9 'Curtain walling and cladding' and pay particular attention to the testing and certification processes set out in this article.**

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# Long span profile decking composite floors

**Who should read this:** Technical and construction directors, managers and consultants.

## INTRODUCTION

NHBC has been investigating instances of unusually high deflections of composite floors constructed using steel profiled decking. In two instances investigated, a difference in level of 35mm was recorded across a room on a 180mm deep slab spanning 5.5m. This was significantly above the limit given in NHBC Standards Chapter 1.2 'A consistent approach to finishes' of 4mm per meter for spans up to 6m.

## GUIDANCE

Composite profiled steel decking is a common form of construction in commercial developments but is less widespread in the residential sector, although it is being increasingly used on a number of developments. When used in commercial projects, composite floors are generally designed to be continuous, whereas in residential developments, they tend to be simply supported and therefore discontinuous.

Discussions have taken place with representative, from both the Metal Cladding and Roofing Manufacturers Association (MCRMA) and the Steel Construction Institute (SCI) to explore the issue and agree a way forward to ensure that problems of excessive deflection do not occur.

Composite floor under construction

Investigations have included a full-scale load test on a 150mm deep composite floor spanning 5m within a semi-detached property in Scotland. This involved erecting a support system under the floor on which measurement points were attached and the use of water filled bags to load the floor. Load and displacement were then measured against time to investigate how the slab performed. The measured short-term deflection under the design-imposed loading was less than 5mm.

Framework under floor to measure deflection

It was concluded that, while such floors are structurally adequate, there can be an issue with regard to deflections of discontinuous long span slabs, due to the effects of creep and shrinkage of the concrete. Creep effects are sensitive to a number of factors, including early-age loading from stored materials and early removal of temporary props, whilst shrinkage alone could account for as much as 30% of the calculated total deflection under dead and imposed loads combined. The two effects could result in deflections significantly higher than that allowed for in the codes. As a consequence, some long span composite floors can fail to meet the requirements of the NHBC Standards Chapter 1.2.

Design of composite slabs is covered in both BS EN 1994-1-1 (EC 4) and BS 5950-4. The design guidance

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## GUIDANCE (CONTINUED)

given in these codes does not fully take into account concrete creep and shrinkage, since their effects are less pronounced on continuous spans. However, in residential applications with simply supported spans of up to 6m, the effects of creep and shrinkage on long-term deflections can be significant.

To limit the designed deflection of simply supported composite floors to a value which takes account of the long-term effects of creep and shrinkage, composite floor designs using profile steel decking should comply with the following requirements:

- A simple approach based on limiting the span-to-depth ratios for slabs, or by undertaking a detailed design which takes these effects into account, or limiting the total deflection below that is currently specified in the design codes.
- In the simple approach, the span/depth ratio of the simply supported slab is limited as follows:
  - Where composite action between the steel decking and concrete is assumed and single bar reinforcement is provided in the ribs, the limit to be taken is 28. Where no bar reinforcement is provided, a limit of 26 is to be used.
  - If no composite action is assumed, so design at the ultimate limit state (ULS) is based on a reinforced concrete slab, the span/depth limit to be taken is 30. The area of the steel profile decking can be taken into account in the modification factor for the amount of tension reinforcement provided.
- If a detailed design approach is adopted:
  - When shrinkage effects are taken into account, the total deflection should be limited to 24mm or span/250, whichever is the lesser. If shrinkage effects are ignored in the design, the total deflection should not exceed 16mm or span/375.

In both approaches, steel mesh reinforcement (minimum 0.2% of the gross cross-sectional area of concrete above the ribs) should be provided in the topping as crack control reinforcement and to distribute local point loads. Where fibre reinforcement is used instead of the mesh, the span/depth ratio in the simple approach should be restricted to 26 whilst, where composite action is proposed, third-party accreditation will be required.

## YOU NEED TO...

- Follow the above guidance to limit deflection of simply supported composite floors to a value which takes account of the long-term effects of creep and shrinkage.

# Rooms at the top – light gauge steel frame construction

**Who should read this:** Technical and construction directors and managers, architects, designers and site managers.

## INTRODUCTION

This article looks at issues relating to NHBC Standards Chapter 6.10 'Light steel framed walls and floors' and our Technical Requirements relating to penthouse apartment units constructed with light gauge steelwork.

## GUIDANCE

High-rise developments often include bespoke 'signature design' elements as part of the building, to create more exclusive accommodation. The topmost storeys of residential and mixed use high-rise buildings frequently include bespoke penthouses, most of which will differ from the remainder of the buildings in an apartment block. This may be accomplished by using novel construction that combines different architectural and design approaches, intended to create distinctive accommodation and appearance.

However, and typically where design and build projects are concerned, a penthouse design may not be fully specified or confirmed until well after the main part of the building structure has passed normal key stages of design acceptance.

So, for design covering penthouse units, important information is likely to be made available much later than information which is generated to cover the primary building composition. This key information includes construction-ready drawings and final structural engineer's checks. In effect, these rooftop apartments will be treated virtually as a separate building which is designed to be structurally connected to the top of the main accommodation block storey, i.e. roof slab. As a result, the penthouse construction and structural system design types can follow a very different approach to that of the main primary structure below. In this way, architects can provide signature design for the topmost apartments and use any additional freedom allowed in the planning process to practice a more interpretive exclusive design approach.

Consequently, for larger developments, we now see these parts of the building using innovative structural systems on a regular basis. This includes using light gauge steel frame (LGSF) design to provide cost-effective and relatively lightweight construction. The LGSF form of construction can be fast-build and give advantage in terms of reduced imposed loading exerted on the mainframe of the multi-storey building situated beneath. However, it remains very important that this part of the development is not overlooked when it comes to meeting relevant design requirements, including wind loading, robustness and weathertightness, plus all relevant parts of the Building Regulations and NHBC Standards.

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## Rooms at the top – light gauge steel frame construction

## GUIDANCE (CONTINUED)

The benchmark for defining fitness for purpose is contained within NHBC Standards 2011 Part 1 – General information, where technical requirements are clearly set out; e.g. in relation to any framed structure or system the following applies:

- **NHBC Technical Requirement R3** – requires that all materials, products and building systems shall be suitable for their intended purpose.
- **NHBC Technical Requirement R5** – requires that structural design shall be carried out by suitably qualified persons in accordance with British Standards and Codes of Practice and that structural design shall take account of the durability requirement in Technical Requirement R3.

Specific information is contained within NHBC Standards Part 6 – Superstructure and Part 7 – Roofs. The various chapters in Parts 6 and 7 describe technical responsibilities for those involved in building design and construction. Some of these requirements will necessarily relate to what is required for a penthouse building – even those types incorporating techniques which may not always follow a conventional, well-understood, approach.

The Steel Construction Institute (SCI) operates an accreditation scheme which NHBC recognises for non-commercial building systems based on light gauge steel framing. NHBC Standards Chapter 6.10 'Light steel framed walls and floors' refers to this, and we recognise certificated systems that are assessed by professional engineers registered with NHBC via the SCI scheme. But even where such units are designed on a more bespoke basis, we require a 'systems approach' to be followed in order to show that all relevant checks have been carried by a suitably qualified person.

Applications to become a light gauge steel frame certifier should be made to NHBC Standards & Technical, NHBC House, Knowlhill, Milton Keynes MK5 8FP.

In terms of the whole design, NHBC will always look for current good practice to be followed in all respects. In particular, when referring to Codes of Practice for LGSF construction, BS 5950 includes detailed design rules to be followed. This standard also gives appropriate general guidance in Section 1 which is very useful for reference. For example:

**BS 5950 – Part 5 Section 1.1 states that:**

The aim of structural design is to provide, with due regard to economy, a structure capable of fulfilling its intended function and sustaining the design loads for its intended life. The design should facilitate fabrication, erection and future maintenance. The structure should behave as a single three-dimensional entity.

When constructing external and internal walls, roofs and floors using light steel framing, a design approach that follows appropriate standards and good practice guidance will normally be acceptable to NHBC. However, it needs to be evident that the correct approaches have been followed. Therefore, prior to commencing construction of top-storey penthouse units, information is required by NHBC to describe the specified building framework and full basis of design to be followed.

This design information package should also include necessary construction required to support the chosen systems to be used in the external building envelope, e.g. cladding, curtain walling and specialist glazing installations to be incorporated within the penthouse construction.

## GUIDANCE (CONTINUED)

### YOU NEED TO...

At the earliest opportunity, when information becomes available, you will need to liaise with:

- **The NHBC building inspector** – explain what is intended for this part of the building that is different from elsewhere.
- **The NHBC project surveyor** – provide drawings and supporting design information for NHBC to evaluate with respect to NHBC Standards requirements and Building Regulations compliance etc.
- **The NHBC technical project manager** – provide suitably packaged information which covers the full penthouse design, i.e. framing system, basis of design, building envelope products and systems, waterproofing interfaces including the base connecting to the primary building.

If you have any doubts as to whether NHBC requires additional information, talk to your normal NHBC contact and/or Standards and Technical on 01908 747384.

# GUIDANCE AND GOOD PRACTICE

## NHBC Foundation

**Who should read this:** Everyone.

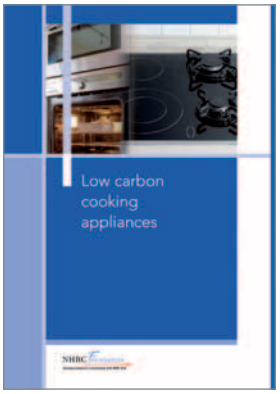
## INTRODUCTION

Supporting the industry with high-quality research and practical guidance, all NHBC Foundation reports are available to download free of charge at **www.nhbcfoundation.org**.

Here are summaries of the latest reports.

## GUIDANCE

### NF33 Low carbon cooking appliances




This report examines the part that low carbon cooking appliances can play in reducing $CO_2$ emissions from new and existing homes. Although they have very limited inclusion in the Building Regulations, with no mention in Part L1A, they do figure in the Code for Sustainable Homes Level 6, but without an officially sanctioned method to reflect efficiency savings.

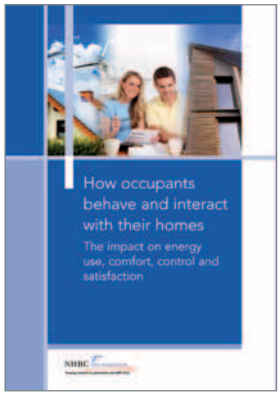
The report considers the use of hobs and ovens using a variety of technologies and fuels, including electricity, gas and biogas. It also includes details of consumer likes, dislikes and perceptions from the survey and discusses consumer preferences in the desired type of appliance to be installed, as consumer acceptability remains a key consideration.

### NF34 Operational and embodied $CO_2$ in new build housing

As the energy efficiency of homes improves, the carbon emissions resulting from the use of homes for space heating, hot water and lighting, etc. will be minimal, but to achieve that performance, more materials will have been used in the construction process. Until now, focus has been almost entirely on the carbon emissions resulting from using homes, but the balance between those operational carbon emissions and emissions from producing and installing the materials – the embodied carbon – needs to be considered.


This report looks into the likely split between embodied and operational $CO_2$ by examining a range of carbon reduction scenarios as delivered through typical new house types.

### NF35 How occupants behave and interact with their homes




Through incentives such as the Feed-in Tariff and the forthcoming Green Deal, consumers are becoming increasingly aware about the benefits of new homes as the most energy-efficient – but this is as reliant on human interaction and behaviour as technology in reducing energy use and delivering financial savings.

This publication reviews current and previous research carried out with users of low and zero carbon homes. It summarises how the energy use of

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## GUIDANCE (CONTINUED)

homes is significantly affected by the actions of their owners, considers the perceptions of homeowners to micro-renewable technologies, and assesses the relationship between occupant behaviour and energy efficiency.

### NF36 Fire performance of new residential buildings


In recent years, NHBC Foundation has seen an increasing number of non-traditional residential buildings built, ranging from factory-built modular systems through to innovative site-built constructions. This move towards non-traditional construction has mostly been brought about by the need to achieve both construction efficiency and better energy performance from the finished building. But could the increasing use of thermal insulating products – some of which are combustible – result in constructions being more susceptible to disproportionate damage in the event of fire?

To present a balanced view of the risks involved, this guide provides information on the risks and best practice guidance for designers, builders and those involved in the fire safety aspect of new homes where they relate specifically to Building Regulations 2000 for England and Wales.

### NF37 Part F 2010: where to start


The 2010 edition of Approved Document F sets out the various strategies that should, if executed correctly, ensure good ventilation regardless of the level of airtightness. This new publication follows a similar format to Part L 2010 – where to start, guiding designers and house builders to decide which strategies are most appropriate for their developments.

It explains, in simple terms, ways for new homes to comply with the revised Part F and works through the possible solutions on a range of common house and apartment types. The guide also explains some of the terminology in Part F and gives a broad understanding of the changes this will entail in practice. It points the builder and the designer towards the relevant tables and data that must be consulted, as well as the important requirements for installation and commissioning.

## YOU NEED TO...

This article is for general interest. There are no actionable requirements, although readers are advised to note the findings of the reports.

# INFORMATION AND SUPPORT

## Index of *Technical Extra* articles February 2011 – February 2012

**The first edition of *Technical Extra* was published in February 2011.**

One year on, in this sixth edition, we provide a summary of the contents of the first six issues. This list will be available on the *Technical Extra* section of the NHBC website (**www.nhbc.co.uk/TechExtra**), and will be updated on the website as further editions are published.

### Have your say

We hope you find *Technical Extra* useful and would welcome your feedback. Please tell us what you think by completing a short survey at **www.nhbc.co.uk/TechExtra**.

| NHBC STANDARDS | Article | Edition | Date |
|---|---|---|---|
| What's going wrong with pitched roofs? | Chapter 7.2 'Pitched roofs' | Issue 01 | Feb-11 |
| NHBC Standards 2011 | General | Issue 01 | Feb-11 |
| Independent assessments | General | Issue 01 | Feb-11 |
| Basements and waterproofing | Chapter 4.1 and 5.1 | Issue 02 | Apr-11 |
| Technical Guidance | NHBC Technical Guidance series | Issue 02 | Apr-11 |
| Chapter 7.2 'Pitched roofs' | Chapter 7.2 'Pitched roofs' | Issue 04 | Oct-11 |
| Tiling battens to pitched roofs | Chapter 7.2 'Pitched roofs' | Issue 04 | Oct-11 |
| Door locks on the main entrance door to homes | Chapter 6.7 'Doors, windows and glazing' | Issue 04 | Oct-11 |
| Introducing revised Chapter 7.2 'Pitched roofs' | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Pitched roofs – a high proportion of claims | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Roof mortar | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Mechanical fixing of ridge and hip tiles | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Dentil tiles in ridges and hips | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Interlocking tiles | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Verge arrangements | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Summary of changes | Chapter 7.2 'Pitched roofs' | Issue 05 | Nov-11 |
| Low or zero carbon technologies – Chapter 3.1 one year on | Chapter 3.1 'Low or zero carbon technologies' (LZC) | Issue 06 | Feb-12 |
| Residual cavities | Chapter 6.1 'External masonry walls' | Issue 06 | Feb-12 |
| Vapour permeable and air permeable underlays | Chapter 7.2 'Pitched roofs' | Issue 06 | Feb-12 |

| REGULATION AND COMPLIANCE | Article | Edition | Date |
|---|---|---|---|
| The party wall bypass – how to comply | Part L 2010 | Issue 01 | Feb-11 |
| The Flood and Water Management Act – what does this mean for house builders? | Flood and Water Management Act (FWMA) | Issue 01 | Feb-11 |
| Flues in voids – new Technical Bulletin, TB 008 | Gas safety | Issue 01 | Feb-11 |
| What Code 2010 and FEES mean for house builders | Code 2010 and Part L 2010 | Issue 02 | Apr-11 |
| Approved Document Part L 2010 – key changes and transitional provisions | Part L 2010 | Issue 03 | Sep-11 |

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# Index of *Technical Extra* articles February 2011 – February 2012

| REGULATION AND COMPLIANCE | Article | Edition | Date |
|---|---|---|---|
| Target Emission Rate and Dwelling Emission Rate (SAP calculations) | Part L 2010 | Issue 03 | Sep-11 |
| Limiting U-values | Part L 2010 | Issue 03 | Sep-11 |
| Thermal Mass Parameter | Part L 2010 | Issue 03 | Sep-11 |
| Thermal bridging at junctions | Part L 2010 | Issue 03 | Sep-11 |
| Air permeability testing | Part L 2010 | Issue 03 | Sep-11 |
| Heat loss through party walls | Part L 2010 | Issue 03 | Sep-11 |
| Fixed building services | Part L 2010 | Issue 03 | Sep-11 |
| Lighting | Part L 2010 | Issue 03 | Sep-11 |
| Commissioning of heating and hot water systems | Part L 2010 | Issue 03 | Sep-11 |
| Provision of information to homebuyers | Part L 2010 | Issue 03 | Sep-11 |
| Swimming pools | Part L 2010 | Issue 03 | Sep-11 |
| Sound Insulation & Airtightness – Scottish Building Standards | Sound Insulation & Airtightness | Issue 04 | Oct-11 |
| The Flood and Water Management Act | Flood and Water Management Act (FWMA) | Issue 04 | Oct-11 |
| Guidance on updates to Building Regulations Parts F and J in England and Wales | Part F and J 2010 | Issue 04 | Oct-11 |

| GUIDANCE AND GOOD PRACTICE | Article | Edition | Date |
|---|---|---|---|
| Porch posts uncovered | Guidance for construction of porches | Issue 01 | Feb-11 |
| NHBC Foundation | NHBC Foundation publications – NF23, NF24, NF25 & NF26 | Issue 01 | Feb-11 |
| Brookwood Farm, Woking | Case study | Issue 01 | Feb-11 |
| Natural building materials – of growing interest? | Natural building materials | Issue 01 | Feb-11 |
| Sustainability signpost | Latest news | Issue 01 | Feb-11 |
| The Definition of Waste: Development Industry Code of Practice version 2 | Code of Practice | Issue 02 | Apr-11 |
| NHBC Foundation | NHBC Foundation publications – NF27, NF28 & NF29 | Issue 02 | Apr-11 |
| Any colour but yellow | Premature yellowing of paint | Issue 02 | Apr-11 |
| NHBC Foundation | NHBC Foundation publications – NF28 & NF16 | Issue 03 | Sep-11 |
| Selecting and placing hardcore | BRE Digest DG522 | Issue 04 | Oct-11 |
| Good construction practice versus requirements for accessible thresholds | Finished ground levels relative to dpc | Issue 04 | Oct-11 |
| Fixing requirements for guttering and fascias | Potential damage from snow and ice | Issue 04 | Oct-11 |
| Cast stone | Technical Manual for Cast Stone | Issue 04 | Oct-11 |
| Façade systems – NHBC Technical Requirements for testing and certification | Guidance in support of NHBC Standards Chapter 6.9 | Issue 06 | Feb-12 |
| Long span profile decking composite floors | Limiting deflection of composite floors constructed using steel profiled decking | Issue 06 | Feb-12 |
| Rooms at the top – light gauge steel frame construction | Additional considerations to upper floors constructed in light steel frame | Issue 06 | Feb-12 |
| NHBC Foundation | NHBC Foundation publications – NF33, NF34, NF35, NF36 & NF37 | Issue 06 | Feb-12 |

| INFORMATION AND SUPPORT | Article | Edition | Date |
|---|---|---|---|
| Each edition of *Technical Extra* provides the latest information on relevant services, training courses, technical events etc. | | | |
| Complying with Part L 2010 | | Issue 03 | Sep-11 |

For **technical advice and support**, call **01908 747384** or visit **www.nhbc.co.uk**

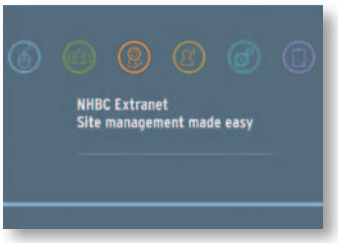
# INFORMATION AND SUPPORT

## NHBC EXTRANET – EFFICIENT MANAGEMENT OF SITE DOCUMENTS AND DATA

The Extranet has been designed to help you manage and monitor NHBC Warranty, Building Control and Sustainability service provision. Through the Extranet, you can:

- submit appropriate technical information and drawings securely
- submit non-site specific documents
- access sustainability and energy reports
- download sustainability and energy rating certification.

View a demo or sign up now at **www.nhbc.co.uk/extranet**




## BUILDING REGULATIONS – VISIT TECHZONE

Keeping up to date with regulatory change is always a challenge, highlighted recently by the significant amendments to Parts F, J and L.

To help you keep on top of developments, we have introduced TechZone, a specialist area on our website containing the latest information on all aspects of building control. You'll find the most up-to-date consultations on Building Regulations and a question and answer section containing practical advice and technical guidance from our in-house experts.

Visit: **www.nhbc.co.uk/techzone**

## SUSTAINABILITY AND ENERGY

If you need advice on complying with sustainability or energy targets, NHBC's expert consultants can help you achieve your targets cost-effectively, with solutions that are suitable for you.

As well as offering consultancy advice, NHBC can offer Code for Sustainable Homes and BREEAM Assessments as well as EPCs and SBEM.

To speak to one of our consultants, call **0844 633 1000** and ask for **'Sustainability'**.

## SITE WASTE MANAGEMENT PLANS (SWMP) AND THE CODE FOR SUSTAINABLE HOMES

It is sometimes overlooked that up to three credits under the Code for Sustainable Homes are available for the production and operation of a SWMP. These credits are:

- **Minimising construction waste**: one credit for having a compliant SWMP with procedures and commitments for reducing waste generated on site.
- **Diverting waste from landfill**: additional credits can be achieved for a compliant SWMP that includes procedures and commitments to sort and divert from landfill, and if it can also be proved that at least 50% or 85%, by weight or by volume, of the non-hazardous construction waste has been diverted from landfill.

There are also up to four credits available under BREEAM for non-domestic buildings.

Our large team of licensed code assessors and experienced SWMP consultants are available to help you with your Code requirements.


For **technical advice and support**, call **01908 747384** or visit **www.nhbc.co.uk**

## UPCOMING TECHNICAL EVENTS

**Building for tomorrow 2012**

Now in its 21st year, Building for tomorrow continues to inform the industry on topics that impact directly on today's house builders. For more information on the 2012 programme and booking form, visit **www.nhbc.co.uk/bft**

Building for tomorrow 2012 | 21 years

**Health and Safety Training – open course programme Spring 2012**

The Health and Safety open course training programme has been announced for Spring 2012, with courses on CDM Co-ordination, CDM Awareness, SMSTS (Site Management Safety Training Scheme) and SSSTS (Site Supervisor Safety Training Scheme) being run at locations around the country – details on the right.

For more information, or to book places, please go to **www.nhbc.co.uk/training**

**NHBC/APS Management of CDM Co-ordination**

| | |
|---|---|
| Manchester | 1, 2, 3 May 2012 |
| Milton Keynes | 15, 16, 17 May 2012 |
| Bristol | 29, 30, 31 May 2012 |

**CDM Awareness**

| | |
|---|---|
| Milton Keynes | 15 May 2012 |
| Manchester | 7 June 2012 |

**NHBC/CITB Site Management Safety Training Scheme**

| | |
|---|---|
| Milton Keynes | 3, 4, 10, 18, 19 July 2012 |

**NHBC/CITB Site Supervisor Safety Training Scheme**

| | |
|---|---|
| Milton Keynes | 9, 10 May 2012 |

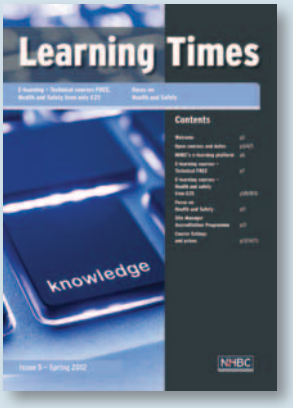
**NHBC runs technical training events throughout the year**

Available dates and venues of current courses may be viewed on our website at: **www.nhbc.co.uk/training**

For further details, including in-company training, call **0844 633 1000** and ask for **'Training'** or email: **training@nhbc.co.uk**.

For more information on training from NHBC, visit: **www.nhbc.co.uk/builders/training**

For early notification of future training courses, sign up to NHBC's free e-newsletter at: **www.nhbc.co.uk/newsandcomment/registerfore-news/**




For **technical advice and support**, call **01908 747384** or visit **www.nhbc.co.uk**

## NOTES:

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## Useful contacts for technical information and advice

### NHBC technical advice and support

Phone: 01908 747384
Email: technical@nhbc.co.uk
Web: www.nhbc.co.uk/builders/technicaladviceandsupport

### NHBC Standards

Buy online at:
www.nhbc.co.uk/nhbcshop/technicalstandards

### Building Regulations

For guidance on issues relating to Building Regulations, visit NHBC's TechZone at www.nhbc.co.uk/techzone

### Building Control

For Building Control queries, please call 0844 633 1000 and ask for 'Building Control', or email buildingcontroladmin@nhbc.co.uk.

### Engineering queries

For Engineering queries, please call 0844 633 1000 and ask for 'Engineering'.

### NHBC Foundation research

The NHBC Foundation facilitates research and shares relevant guidance and good practice with the house-building industry.

www.nhbcfoundation.org

### Zero Carbon Hub

The UK Government has set out an ambitious plan for all new homes to be zero carbon from 2016. The Zero Carbon Hub helps you understand the challenges, issues and opportunities involved in developing, building and marketing your low and zero carbon homes.

www.zerocarbonhub.org

### NHBC Clicks & Mortar e-newsletter

NHBC regularly distributes information on a range of industry topics, including new products and services, the building industry market, house-building news and house-building statistics. To receive this industry information, please register at:

www.nhbc.co.uk/newsandcomment/registerfore-news

### NHBC Housing Developments e-newsletter

Housing Developments is a new, free resource, developed specifically for the affordable housing sector and designed to report on current industry developments and issues, with expert insights into affordable and social housing.

To receive this e-newsletter, please register at:

www.nhbc.co.uk/housingassociations/affordablehousingnewsletter

### General enquiries

For all other enquiries, including ordering products and services, please call 0844 633 1000, and ask for 'Sales'.



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