

Technical Extra

October 2016 | Issue 21

In this issue:

NHBC STANDARDS

Standards 2017 – what's new?	page 3
Focusing on correct stepped cavity tray installation	page 5
Continued focus on pitched roofs	page 8

GUIDANCE AND GOOD PRACTICE

Extract terminals in rainscreen cladding	page 11
Solar panels and the performance of pitched roofs	page 12
Risk Guides	page 14
NHBC Foundation	page 15

INFORMATION AND SUPPORT

Information and support	page 18
-------------------------	---------

Foreword



Welcome to Technical Extra 21

I'm delighted to announce that the next edition of NHBC Standards is now available (please read the article on page 3 for more information). NHBC Standards 2017 introduces a new chapter on render. I recommend you review the new edition and familiarise yourself with this chapter and updated technical content at the earliest opportunity.

Two areas have dominated NHBC claims experience in years 3-10. NHBC has focused on pitched roofs and external walls over recent years, so it's worthwhile taking stock of these two critical areas. Articles in this edition of Technical Extra highlight the issues and some of the recent and ongoing work to ensure standards continue to improve.

In recent editions of Technical Extra, I've highlighted the launch of NHBC OnSite. This new technical resource for registered site managers has already attracted hundreds of users, and the resources available continue to grow. We've recently added the technical assessment module. Site managers can gain CPD whilst demonstrating their technical ability and knowledge of the NHBC Standards. The assessment focuses on different areas of the build and helps site managers identify areas of strength and focus. Looking at the 'big picture' will also help NHBC identify where to direct further training and education.

Although it's early days, we can already see some excellent learning opportunities. Here are a couple of questions that stand out as having been answered incorrectly a significant number of times:

Question: Garden areas should be suitable for the intended purpose. Up to what distance should topsoil be provided with a minimum thickness of 100mm?

Answer: Topsoil should be provided up to 20m – alarmingly, a number of responses have suggested there is no requirement!

Question: The main ductwork within a mechanical ventilation and heat recovery (MVHR) system should be in suitable rigid or semi-rigid material and flexible ducting should not be more than 300mm in length – true or false?

Answer: True – flexible ducting should not be more than 300mm in length. A significant number of responses suggested that flexible lengths in excess of this are acceptable; they are not.

Feedback from the technical assessment will feature in future editions of Technical Extra. For now, I'd encourage all site managers to visit NHBC OnSite at www.nhbcitemanager.co.uk to register and take the assessment.

Other articles in this edition of Technical Extra include details of NHBC Risk Guides, providing concise, practical guidance in meeting NHBC requirements in critical areas of the construction process.

NHBC is aware of an increasing number of issues where extract terminals serving mechanical extract ventilation (MEV) or MVHR systems are discharging exhaust air within the cavity behind rainscreen panels. This edition of Technical Extra includes an article that considers the implications of this arrangement.

We also feature the latest from NHBC Foundation, including details of a short video featuring LEGO animation, aimed directly at young people and their parents to highlight the many benefits of a career in house building.

I hope you find this edition of Technical Extra, and the additional information it highlights, to be of benefit.

Mark Jones

Head of House-Building Standards



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

INTRODUCTION

2016 saw the introduction of a brand new format for NHBC Standards. This included the innovative use of technology to make the Standards more accessible and engaging to use than ever before. Building on this success, Standards 2017 includes a number of technical updates and revisions, including the new Chapter 6.11 'Render'.

Standards 2017 has been published online in Standards Plus format and is freely available via www.nhbc.co.uk. To enable offline access, a printed copy of Chapter 6.11 is included with this edition of Technical Extra along with details of other updates, supplementing the existing Standards 2016.

By working with industry to develop practical guidance that addresses technical issues and helps to prevent defects, we are confident that NHBC Standards will continue to support you in the delivery of high-quality new homes.

REQUIREMENTS

Standards 2017 contains new or revised guidance in a number of areas. More significant changes include the following:

Chapter 3.3 'Timber preservation (natural solid timber)':

- Table 1 has been updated to recognise the use of water-based organic preservative as an acceptable timber treatment.

Chapter 5.4 'Waterproofing of basements and other below ground structures':

- Helping industry to get this critical part of the build right and reduce the significant rate of failure identified through our claims activities remains one of our top priorities.
- The introduction of Chapter 5.4 marked a significant step in this campaign, helping to drive standards and bring about improvement.
- Recognising the marked change in practice for the application of waterproofing that the introduction of Chapter 5.4 initiated, and to help provide further clarity on what is required to comply, a number of minor updates have been made to this chapter.

Chapter 6.1 'External masonry walls':

- Stone veneer cladding systems come in a number of forms. Typically, they are either natural or reconstituted stone. They can be directly applied

to masonry substrates with mechanical fixings or adhesive, or applied as a slip system on a backing board.

- NHBC has noticed an increased use of these products recently and, whilst most manufacturers can verify the likely performance of their systems, there are others that can't.
- Standards 2017 introduces guidance that will help to ensure that only suitable systems with known likely performance are used in the construction of homes with an NHBC warranty.

Chapter 6.11 'Render':

- As detailed in Technical Extra 20, April 2016, Standards 2017 includes the launch of a new chapter which will set benchmark standards and provide helpful guidance for the application of render and rendering systems. The guidance covers a number of technical issues, including:
 - mix design
 - compatibility between render and its backing
 - accommodation of movement
 - weather conditions at the time of application.

Chapter 7.1 'Flat roofs and balconies':

- For many years, NHBC Standards have led the way in ensuring that balconies are only constructed



REQUIREMENTS (CONTINUED)

with suitably durable materials. Further recognising the importance of getting this right, revised guidance for the use of timber in balcony constructions has been introduced.

Chapter 7.2 'Pitched roofs':

- As detailed in the April 2016 edition of Technical Extra, in addition to the current guidance in NHBC Standards, supporting documents to Building Regulations and other authoritative documents, Standards 2017 includes an option for fixing lateral restraint straps to longitudinal binders.
- A number of smaller amendments have been made to ensure that the chapter is consistent and in alignment with the latest version of BS 5534.

Chapter 8.1 'Internal services':

- As detailed on page 11, NHBC has come across a number of designs where ventilation terminals have been concealed behind rainscreen cladding panels. This has led to questions about the performance of the ventilation system and the durability of surrounding materials.

- To address this, Standards 2017 contains guidance that makes it clear that extract terminals from ventilation systems should discharge to open air.

Chapter 10.2 'Drives, paths and landscaping':

- NHBC Standards contains guidance for the preparation of garden areas. Recent weather conditions have resulted in a noticeable increase in gardens suffering from waterlogging.
- Whilst it may not be possible to prevent waterlogging of the whole garden area, particularly where the natural ground conditions are susceptible to retaining water, construction activities can compact the ground, increasing the possibility of waterlogging.
- The guidance for the preparation of garden areas found in Clauses 10.2.8 and 10.2.9 has been updated and includes new information to ensure that appropriate action, such as rotavating, is undertaken to restore the drainage characteristics of soil that has been compacted during construction.

YOU NEED TO...

- Review NHBC Standards 2017 and familiarise yourself with the updated technical content.
- Contact Standards and Technical if you have any queries.

NHBC STANDARDS

Focusing on correct stepped cavity tray installation



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

INTRODUCTION

This article highlights NHBC's requirements on stepped trays, what guidance is available to help you install them correctly and how we will be prioritising this over the coming months.

REQUIREMENTS

Over the last 18 months, NHBC (via nationwide seminars) has been increasing industry awareness of defects to external walls and promoting a better understanding of how they can be avoided. One of the main areas being the installation of cavity trays and DPCs.

The issues surrounding cavity trays include them being installed at the incorrect height, unsuitability of the material/product used, and trays not linking with flashings or being omitted completely. Further analysis in relation to external walls, and NHBC's ongoing campaign to raise the standard of pitched roofs, also shows a significant increase in flashing and upstand failures at abutments. This highlights that a clear understanding between trades as to who will do what is necessary to ensure correct installation and satisfactory construction quality.

Stepped cavity trays

Before we explain the process of how to install a stepped cavity tray, it is important to understand NHBC's requirements for such trays. The text below has been taken from Chapter 6.1.17 of the NHBC Standards.

"Where the roof abuts at an angle with the wall, preformed stepped cavity trays should be provided."

As such, to follow the guidance within NHBC Standards, if you have any stepped abutments on your site, you should be using preformed stepped cavity trays to form the junctions. If any other method is to be used, it will need to be agreed, together with the method by which you will ensure correct installation, with your inspector **prior to commencement of work.**

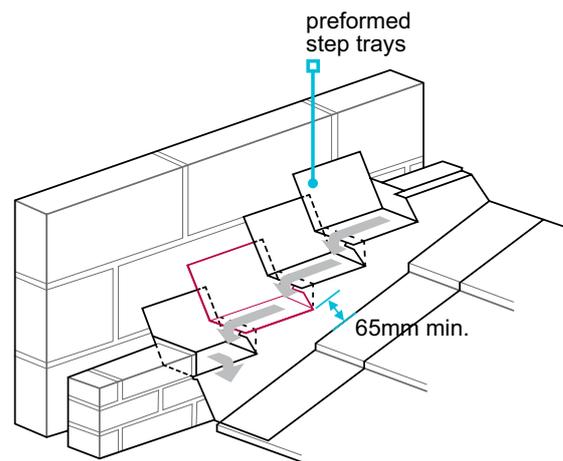


Fig 1 Stepped cavity trays

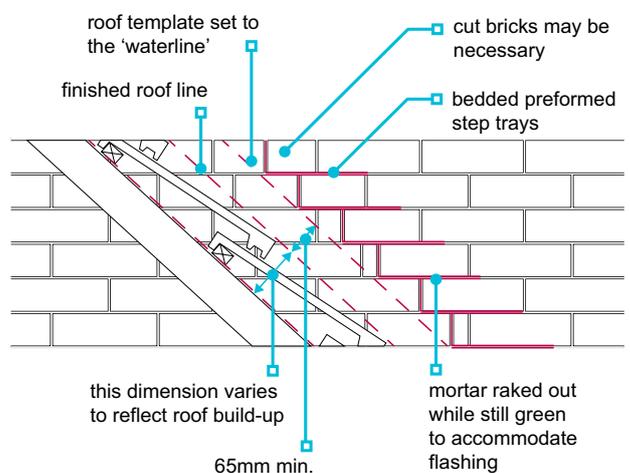


Fig 2 Stepped cavity tray installation

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



REQUIREMENTS (CONTINUED)

To install a stepped cavity tray correctly, careful consideration should be given to how it is set out. For this to be successful, trade collaboration is paramount. It is good practice to use a template, e.g. an appropriate roof truss or frame (with guide lines), to assist with setting out the stepped trays. A rule of thumb is that the back of the tray should sit on the 'waterline' and be 150–180mm above the truss. If the heel of the tray is positioned past the waterline, it will discharge behind the flashing and into the dwelling (NHBC Standards require stepped trays to be positioned 65mm above the top of the finished roof line). In over 90% of instances, to ensure that the heel of the stepped tray sits on the waterline, bricks will need to be cut to fit the tray and continue the brick bond. Using an appropriate truss/frame should enable bricklayers to install stepped trays in the correct position and alignment.

In addition, to minimise the risk of water ingress below the abutment, there is further guidance that should be adhered to:

- The lowest tray should project beyond the eaves line of the roof, be a 'starter tray' (stop end at both ends) and have a weep hole to allow water to drain from the cavity.
- Each intermediate tray must overlap the previous, with the stop end closest to the roof line.
- A ridge tray, with open ends, should be provided at the ridge.
- Depending on the exposure of the site, additional weep holes may be required along the run of the cavity trays.
- Mortar should be raked out whilst still green to allow the flashing to be tucked **under** the cavity tray by a minimum of 25mm.
- Tile selection will dictate if a secret gutter, soakers or proprietary soakers, or a cover flashing is required at the abutment. Please see 'NHBC Risk Guide - Pitched roof coverings' for further information.

Further guidance and next steps

In order to assist the industry to reduce the number of defects in superstructures due to incorrectly installed stepped cavity trays, NHBC inspectors will be undertaking a number of initiatives throughout autumn.

In October, our inspectors will commence consultative inspections on sites where stepped cavity trays are being installed. It is hoped we can visit in excess of 1,000 sites.

During the consultative inspection, any issues that

require attention or rectification will be recorded as Direct Interventions (DIs). These items will not form part of our standard recording procedures or be included in any builder reports (thus removing any perception of penalties).

Immediately after the consultative inspection, a detailed report is compiled. This includes photographs and lists any builder actions identified, including timescales for reinspection, where necessary. Both the site manager and the building inspector then sign the report, and a copy is logged in the site record book.

Following these inspections, November will see the rollout of an external wall survey. The last survey of this kind was completed in early 2015; therefore, now is the perfect opportunity to see what improvements have been made on sites across the UK following the successful external wall seminars that ran between October 2015 and April of this year.

In 2015, NHBC published a number of 3-D models of critical construction details, on the 3D Viewer

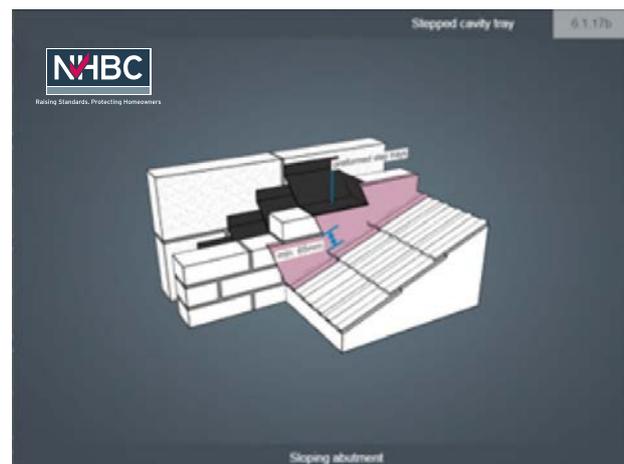


Fig 3 3-D model



Fig 4 Animated illustration showing installation of stepped cavity trays



REQUIREMENTS (CONTINUED)

companion app, available on iOS and Android mobile devices via the App Store and Google Play. We're also currently developing an animated version of the critical stepped cavity tray detail to clarify the installation process.

NHBC has also produced a suite of Risk Guides (see page 14), including one for cavity trays, that identify known problem areas and provide best practice guidance on how to ensure correct construction in

accordance with NHBC Standards.

We will publish the findings of the consultative inspections and survey in a future edition of Technical Extra.

YOU NEED TO...

- Review your construction details and make sure that all trades involved understand the importance of getting the detail right.
- Make sure that installation is right first time - physically check the detail as constructed, paying particular attention to the first unit constructed for each house type or by different subcontractors.
- Ensure that there is a clear understanding and co-ordination of individual trades' responsibilities; this is vital in achieving correct installation and satisfactory construction quality.
- Look out for the consultative inspections on stepped trays - due to commence in October - and use them to help you and your site team to identify and resolve any specific issues.
- Keep up to date with the latest guidance and tools available to support you at NHBC OnSite (www.nhbcsitemanager.co.uk).
- Remember that the external wall survey will take place throughout November.

NHBC STANDARDS

Continued focus on pitched roofs



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

INTRODUCTION

In 2011, NHBC launched an industry-wide campaign to help raise standards of pitched roofs on new homes across the UK in a bid to reduce claims and recurring problems. Here, we examine how the situation has improved, what exactly has been done and how we can further increase standards.

REQUIREMENTS

Back in 2011, NHBC claims figures made for unhappy reading in relation to pitched roofs. By analysing our claims, we discovered that more than one in every 60 homes built in the year 2000 had a valid pitched roof claim; this amounted to 60% of all claims that NHBC received in 2010. Critically, over half of all pitched roof claims related to mortar issues.

In terms of cost, NHBC spent more than £11m on pitched roof claims, but repairs undertaken directly by builders mean that the total cost is much more. Conservative estimates at the time pointed to a wider industry cost of around £30m. Additionally, thousands of homeowners were affected by disruptive works to repair the damage.

It was clear that many of these claims could have been avoided with improved design, materials and workmanship. With the help of industry professionals, including the National Federation of Roofing Contractors, we completely reviewed the content of Standards Chapter 7.2 'Pitched roofs' and identified a number of key changes which, it was anticipated, would improve quality and, in due course, help to prevent further expensive and disruptive remedial work.

After an initial period of raising awareness via a comprehensive engagement campaign which included free pitched roof training seminars, NHBC introduced the revised Chapter 7.2 in January 2012.

The right mortar mix

A key element of the initial campaign was a strong emphasis on achieving the correct mortar mix. The roofing mortar mix should be 1:3 cement:sand with plasticiser, with the mix based on sharp sand with soft sand added to achieve good workability. Because

sands will vary, roofers were urged to make slight adjustments to accommodate regional differences. However, the proportion of sharp sand must not be less than one third of the total sand content. Alternatively, proprietary roofing mortar mixes that are shown to have similar strength, durability and workmanship are acceptable. However, adapted mixes, such as silo mortar or factory-produced retarded bricklaying mortars with additional cement added, are not acceptable.

Mechanical fixing of ridge and hip tiles

For many years, it was traditional to bed ridge and hip tiles in mortar to secure them to the roof, and experience shows that pitched roofs will be subject to some movement during the life of the property. Mortar is generally not tolerant of that movement and can easily crack or de-bond, making ridge and hip tiles vulnerable when subjected to high winds.

Therefore, since 2012, NHBC has required all bedded ridge and hip tiles to be mechanically fixed.

In addition to this, and to help address failure in deep sections of mortar bedding, where ridges and hip tiles are bedded on mortar to rolled tiles, concealed or decorative dentil tiles should be fully bedded into all joints in excess of 25mm thick.

Another change to Chapter 7.2 addressed mortar placement to verges, which NHBC has seen to be susceptible to the effects of thermal movement, freeze/thaw action and failure due to incorrect mortar placement.

Where verge tiles and slates are to be wet bedded, they should be bedded on a 100mm-wide bed of mortar on an undercloak, with the mortar placed in



REQUIREMENTS (CONTINUED)

one operation, i.e. formed by either bedding and pointing immediately or bedding and then pointing following initial 'stiffening' of the mix.

There were other changes with regards to tile suitability, fixing (nailing and clipping), acceptable overhang and tile batten length.

This guidance, combined with the aforementioned revised mortar mixes, should greatly reduce the risk of claims where wet systems are used.

Small cut tiles

Small cut tiles are difficult to fix and are vulnerable to slipping or being dislodged by wind. Therefore, Chapter 7.2 was revised again in 2013, with guidance aimed at avoiding the use of small cut tiles:

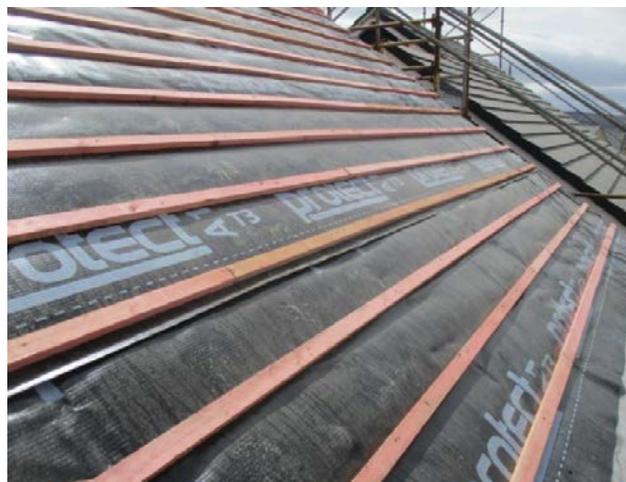
- Cut plain tiles are not acceptable, and purpose-made plain tile-and-a-half should be used.
- Natural slate verges should be formed with full slates and either slate-and-a-half or half slates that are a minimum of 150mm wide.
- Where interlocking tiles are used to form verges, they should be at least half the tile width and fixed in accordance with BS 5534 (it is good practice to locate cut tiles on the more secure right-hand verge where possible).

Industry changes

The revisions in 2014 to BS 5534 '*Slating and tiling for pitched roofs and vertical cladding, Code of practice*' generally brought it in line with NHBC Standards (in terms of mechanical fixings of bedded ridge and hip tiles, mortar mix ratios and small cut tiles).

One key element here related to the specification and use of roof underlays. We have encouraged industry to become familiar with the revisions and to incorporate them into roof designs and construction as soon as is practicable, i.e. ensure that underlays are suitable for the intended location by using the 'zonal classification' system (suitable for most roof designs) or by calculation; make sure that laps in underlays are adequately secured; and finally, the Zonal Method of fixing should no longer be used, with all fixing specifications now to be provided by the tile manufacturer in line with the revised British Standard.

The British Standard also requires all tiles to be twice fixed at verges to resist wind uplift. One of these mechanical fixings can be a tile clip, or it can be a dry fix capping system where it can be shown to provide adequate resistance to wind loads. A new British Standard is currently being drafted for dry fix systems for ridges, hips and verges, and will include tests for resistance to wind loading.



Latest information

In August 2015, a pitched roof covering survey was completed on around 3,400 sites in order to help NHBC understand how well the industry has adopted these changes.

We were also able to compare against the last two roofing surveys in 2010 and 2012 respectively, as well as gathering valuable information from new questions.

In summary, we found that this was a 'good news' story, which will ultimately lead to reductions in defects and costs. Key points uncovered from the survey include;

- an increase in site-specific fixing schedules from 31% of sites in 2010 to 41% two years later and, finally, 61% in 2015
- an increase from 58% to 96% of small cut tiles that are either mechanically fixed or bonded with manufacturer-recommended adhesive
- in 76% of all sites surveyed, perimeter tiles mechanically fixed twice
- an increase in the use of dry systems across the board.

The increasing proportion of sites moving to dry systems, reducing or removing some of the risks previously highlighted with wet work, follows an approach that has been adopted in Scotland for quite some time (which historically has lower pitched roof claims than England and Wales).

However, it should be noted that, when using dry systems, it is vital to ensure that the correct system is specified for the pitch and that the tile and dry system components are compatible. Also, don't forget to keep your eye out for the eagerly awaited new British Standard briefly discussed above.



REQUIREMENTS (CONTINUED)



Despite the results of the 2015 survey mainly being positive, inevitably, there are some areas for further improvement. Two notable points are:

■ **Incorrect mortar mix**

Unfortunately, there was a 6% increase in sites using the wrong mix. The correct mix should be 1:3 cement:sand with plasticiser, with the mix based on sharp sand with soft sand added to achieve good workability. The proportion of sharp sand must not be less than one third of the total sand content.

■ **Mechanical fixing of the last ridge or hip tile**

Where ridge or hip tiles are mechanically fixed in the joint, the last ridge or hip tile is required to have an additional mechanical fixing.

Where a pitched roof abuts a wall at an angle, a stepped flashing linked to the stepped cavity tray must be provided. NHBC has seen an increase in the incorrect installation of flashings where slates, flat interlocking tiles or plain tiles are used. In this scenario, a secret gutter or soakers should be incorporated into the design, as a cover flashing is not acceptable.

However, the percentage of roofing claims that relate

to mortar has significantly reduced since NHBC first launched the campaign to reduce pitched roof claims and raise overall build standards. In 2011, this figure was at 79% but, over the following years, it fell to 51% (2015).

Summary

The industry has undoubtedly made good progress over the last five years, although it is too early to predict the levels of claim reductions moving forward and the true effect of all the work to raise awareness and improve standards. What is clear is that, in relation to pitched roof claims, early-year performance of homes benefiting from NHBC's warranty cover are attracting a lower number of claims than in older generations.

The 10 years of cover provided by NHBC's Buildmark warranty means that, despite all of this, we'll continue to see historic pitched roof claims coming through for some time to come.

However, we feel we are on the right track and will continue working in collaboration with the National Federation of Roofing Contractors and the Roofing Tile Alliance to help promote and improve roofing standards to ensure that significant pitched roof problems become a thing of the past.

YOU NEED TO...

- Ongoing focus on pitched roof coverings is essential to ensure improvements continue.
- When using dry systems, it is vital to ensure that the correct system is specified for the pitch and that the tile and dry system components are compatible.
- Claims experience has highlighted that issues with dormers specifically, and abutment detailing generally, are apparent and represent an increasing proportion of roof claims in recent years. Good design and high levels of workmanship are critical in these areas.
- Ensure that underlays are suitable for the intended location by using the zonal classification system (suitable for most roof designs) or by calculation, and make sure that laps in underlays are adequately secured.
- The Zonal Method of fixing should no longer be used, with all fixing specifications now to be provided by the tile manufacturer in line with the revised British Standard.

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

GUIDANCE AND GOOD PRACTICE

Extract terminals in rainscreen cladding



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

INTRODUCTION

NHBC is aware of an increasing number of issues where extract terminals serving MEV or MVHR systems are discharging exhaust air within the cavity behind rainscreen panels. This article considers the implications of this arrangement.

GUIDANCE

From a technical view, there appears to be general consensus that extract terminals typically exhausting warm, moist air should discharge to open air and not within the cavity behind rainscreen cladding.

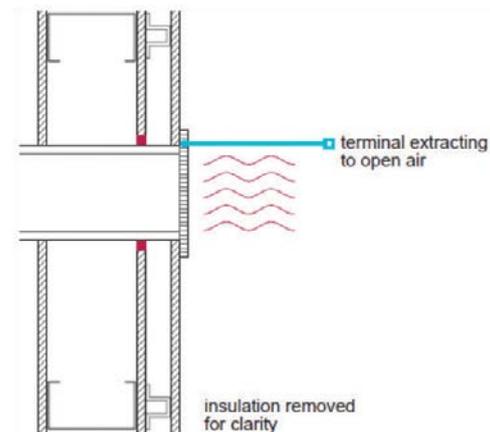
Discharging warm, moist air behind the cladding can cause condensation within the cladding system and a potential issue with long-term durability and in-service performance.

However, it is also appreciated that problems exist where penetrating through to the outer face of the building, mainly relating to questionable aesthetic appearance and the effect of limited airflow resistance of the extract terminals.

Bespoke grilles which match the colour of the rainscreen cladding system are often produced for larger projects, perhaps as a result of planning intervention. However, while this allows discharge to open air, quite often the airflow resistance of the bespoke grilles is not known and, where this figure is higher than required, it can have an adverse effect on the performance of the ventilation system.

To enable the designer of the ventilation system to establish the exact airflow resistance of a terminal to enable satisfactory performance of the system, the resistance values should be gained by testing in accordance with **BS EN 13141-2 'Ventilation for buildings: Performance testing of components/**

products for residential ventilation. Exhaust and supply air terminal devices'.



Therefore, in summary, it is advised that extract terminals terminate to open air through purpose-made terminals on the outer face of the building, with the terminals having been tested in accordance with BS EN 13141-2 and having a resistance value low enough to ensure the satisfactory performance of the ventilation system.

Installing the extract terminals within the rainscreen cladding may have an adverse effect on the long-term durability and in-service performance of the building and its ventilation system.

YOU NEED TO...

- Terminate extract ventilation directly to open air using terminals that have been demonstrated to be suitable by test.

GUIDANCE AND GOOD PRACTICE

Solar panels and the performance of pitched roofs



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

INTRODUCTION

Recent updates to the Microgeneration Certification Scheme (MCS) and the introduction of BS 5534:2014 'Slating and tiling for pitched roofs and vertical cladding. Code of practice' are impacting the way solar panels should be installed in new homes.

GUIDANCE

MCS

Since May 2016, solar panels installed on pitched roofs to comply with MCS have been required to use roof fixing kits and components that have been tested according to the MCS 012 standard.



This is intended to ensure that solar installers have all the information they need to demonstrate compliance with Building Regulations, so that the installation:

- does not impair the weather tightness of the roof
- has sufficient resistance to wind suction forces for the location
- has an adequate resistance to the external spread of flame.

Systems and system components that are used to install solar panels above a pitched roof covering (Figure 1a) are tested only for wind resistance, as long as they can demonstrate that the roof covering below is not affected by the installation (for example, that the gaps between tiles are not increased). By contrast, systems that provide the roof covering (roof-integrated systems, Figures 1b–d) are tested for wind resistance, water ingress and external spread of flame.

It is important to recognise that MCS 012 takes a 'measure and declare' approach. The test certificate merely provides the installer with declared performance values. There's no minimum standard, and no pass or fail. Consequently, just saying that a fixing system has got MCS 012 is not enough to be sure that the system complies with regulations.

For example, the wind resistance of the product might be so high that it can be used almost anywhere, or it

might be so low that you can only really use the system in areas with the lowest wind speeds. The fire rating might mean you can use the system anywhere on the roof, or it might mean you can only use it for a small area in the middle of the roof.

The solar installer must calculate the wind loads for the location (taking into account the local wind speed, site altitude and topography, building height and roof configuration) and choose only components or kits with a declared wind resistance that exceeds those wind loads.

The same goes for the fire rating. Roof integrated products are tested and classified using methods described in BS 476-3:2004 or DD ENV 1187:2002 T4. The requirements deal principally with the fire spread across the surface of the roof when exposed to fire from the outside. Depending on the declared fire performance of the components, Part B4 of Approved Document B from the Building Regulations (England and Wales) places limits on how much of the roof can be given over to a particular type of integrated solar panel and how close to the boundary they can be installed. There are also limits on how close to a party wall the panels can be fitted when parts of the roof structure pass over the wall.

Some tray-type systems for roof integrated solar are 'universal' in the sense that they can be used with interchangeable standard solar panels (see Figure 1c). Unless significant areas of the tray remain exposed upon completion of the installation, the fire rating of the solar panel is the key element in meeting the fire spread requirements in this type of installation. As many trays are made of plastic, they do not hold any specific fire rating.

As such, if an installer were to use a system like this with an unrated solar panel, subject to the area of the panel, the proportion of the roof taken up by it and its



GUIDANCE (CONTINUED)

distance from a neighbouring property, the installation may not be deemed as meeting the performance requirements of Building Regulations. It is therefore important that tray products of this type are used only with the panels with which they have been tested, or are substantially covered by a fire-rated solar panel. In both cases, the limits on size and location must be observed for the particular fire designation.

In some cases, it is also necessary to provide fire resistance from the underside of the roof covering. This should be considered on a case-by-case basis.

Code of practice for slating and tiling

BS 5534:2014 'Slating and tiling for pitched roofs and vertical cladding. Code of Practice' was published in August 2014. See Technical Extra issue 15 for full details of the new standard.

Roofs fixed to the new standard have changed in two ways that impact the installation of solar:

- Every tile has at least one mechanical fixing.
- Roofing membrane laps are likely to be taped.

Above-roof solar was often fixed after the roof covering had been laid. The solar contractor would slide up a tile in order to fix a bracket to the rafter below, notch the tile over the bracket so that it sat flush and replace it. Electrical cables were brought into the building by sliding the cables up between laps in the membrane and passing the cable under a notched tile (with a protective sleeving).

With a roof installed in accordance with the new version of the code of practice, fitting solar panels in this way (while maintaining the fixing specification) offers very significant practical challenges:

- Removing tiles without damaging them has

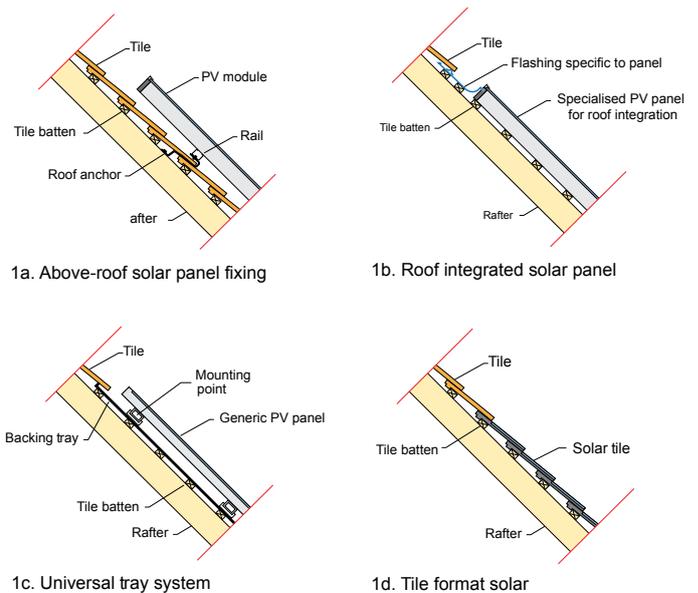
become much more difficult.

- Replacing a single tile into a completed roof with a mechanical fixing is likely to involve adhesive.
- Taped laps cannot be peeled apart. Routing cable to the ridge vent would require the removal of a whole column of tiles.

It seems likely that the only practical way to sequence the installation of an above-roof solar system while adequately protecting the roof fixing specification is for the solar installer to fix brackets and route cables after the membrane and battens are applied, then to return to fix the rails and solar panels after the roof covering is laid.

Roof integrated solar systems can still be fitted in a single site visit, as they are installed before the roof is tiled.

Figure 1. Types of solar panel installation



YOU NEED TO...

- Take care to protect the tile fixing specification when installing above-roof solar. Solar fixing hooks and cable runs should be installed before the tiles. If they are installed afterwards, replaced tiles must be individually refixed in accordance with the tile manufacturer's instructions.
- Ensure that the solar contractor has calculated the wind loads and specified products with an MCS 012 certificate showing a declared wind resistance in excess of these loads.
- For roof-integrated solar, check the fire rating. If the system does not achieve an 'AA', 'AB' or 'AC' rating, it must be installed further than the approved distance from the boundary, and there could be limits on the continuous area of solar.
- Check that roof-integrated solar systems are installed only with the solar panel models listed as fire tested on the MCS 012 certificate.

GUIDANCE AND GOOD PRACTICE

Risk Guides



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

INTRODUCTION

NHBC Risk Guides have been developed to highlight areas of build that are commonly poorly designed or constructed and result in defects or claims. They also provide some guidance on how to avoid problems.

GUIDANCE

NHBC Risk Guides are issued to our building inspectors. They'll refer to them at their pre-start meeting and may then use them as work progresses on site, depending on the specific site requirements.

Where useful information already exists, the guides will refer to these additional resources. Where existing information doesn't exist, the guides may include an

element of technical detailing to assist in interpretation and understanding.

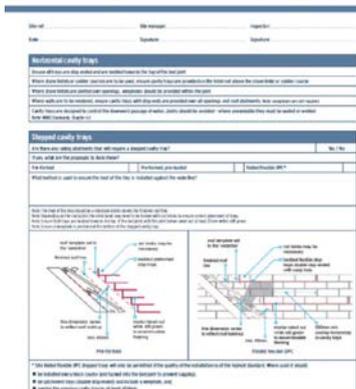
When using the guides, remember that they're designed as a discussion document, not a fully exhaustive checklist or compilation of all applicable technical details.

NHBC Risk Guides have been included as supporting documents in our online version of the Standards: Standards Plus. New or updated guides will be added to Standards Plus when they are published.

The current suite of Risk Guides covers the following critical building details:

- Waterproofing basements and other below ground structures.
- Fire considerations (blocks).
- Parapets and copings.
- Cavity trays/DPCs - superstructure.
- Heave precautions.
- Ground supported slabs.
- Balconies.
- Pitched roof covering.
- Rendering.
- Radon/gas protection.

NHBC Risk Guide
Cavity trays/DPCs - Superstructure (Revised 05/16)
(Refer to Technical Extra 15)



YOU NEED TO...

- Review the guides prior to the pre-start meeting and seek clarification of any areas of concern with your building inspector during the pre-start meeting and/or as the site progresses.
- Access the guides via NHBC Standards, freely available at www.nhbc.co.uk. Site managers have also got direct links to all current Risk Guides through NHBC OnSite: www.nhbcsitemanager.co.uk.

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

GUIDANCE AND GOOD PRACTICE

NHBC Foundation



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

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.

GUIDANCE

Home comforts: guidance on using ventilation, heating and renewable energy systems NF68

It is understood that many people have considerable difficulty in understanding the purpose, operation and maintenance requirements of systems commonly installed in new homes. This may lead to incorrect operation of these systems, reducing energy efficiency, and, in some cases, there are potential consequences for the health and safety of residents, e.g. poor indoor air quality.

This new guidance, developed in association with a consumer panel, is intended to help address these issues. With clear text and graphics, it explains how to operate and maintain the following nine technologies:

- Ventilation:
 - Natural ventilation (trickle vents and extract fans).
 - MEV.
 - MVHR.
- Solar energy systems:
 - Solar photovoltaic.
 - Solar hot water.



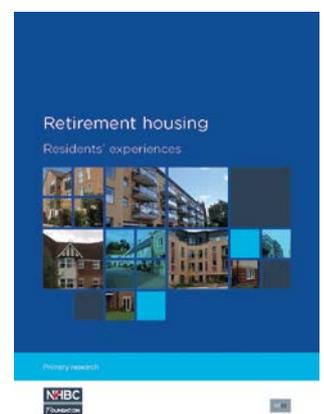
- Heat pumps:
 - Air source.
 - Ground source.
- Heating controls:
 - Single zone.
 - Multiple zones.

The material now forms part of the information available to new home owners on the NHBC Home User Guide (HUG) portal, and it is also available for house builders and Housing Associations to download for use in their own publications.

Retirement housing: residents' experiences NF69

The UK has a rapidly ageing population, with the number of people aged over 65 set to grow by at least 20% in the 10 years to 2024. Against that background, this project explores the world of retirement housing to find out what residents who have taken the plunge think of it, through a study of 284 people living in six retirement developments.

Overall, the findings are very positive, with nine out of 10 residents saying they love living in their retirement housing or enjoy it most of the time. There were, however, some issues raised by residents, such as the need for more car parking, better designed kitchens and improved controls on heating systems.



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

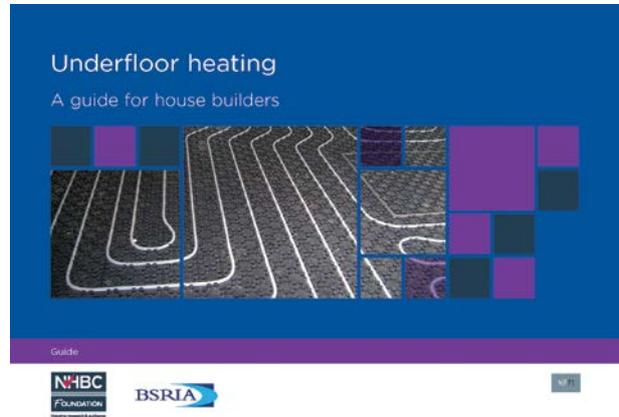
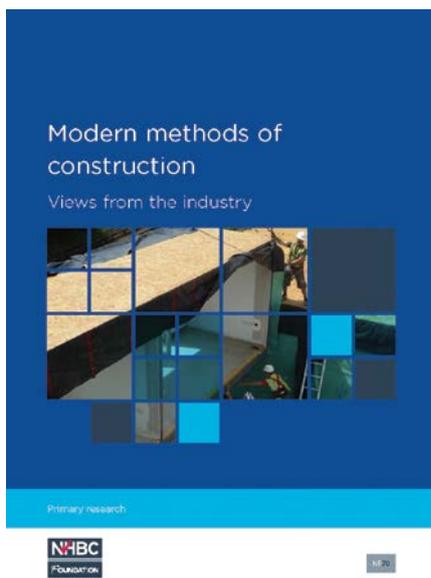


GUIDANCE (CONTINUED)

Modern methods of construction (MMC): views from the industry NF70

This research involved three industry focus groups and a survey of 135 house builders and Housing Association senior personnel. Its findings include:

- The majority of the organisations surveyed have made use of MMC: 98% of large and medium-sized house builders and Housing Associations have used or considered at least one form of MMC in the last three years.
- The most widely adopted form of MMC is 'sub-assemblies and components', with two-thirds having used it for at least one home during 2015. This category includes items such as door sets, timber I-beams, prefabricated chimneys and prefabricated dormers.
- The majority of organisations surveyed consider themselves to be 'late adopters' or 'followers' of volumetric construction, pod and panelised forms of MMC, watching the success of others before making the decision to move away from conventional cavity masonry construction.
- Most participants expect the role of MMC to grow or remain static over the next three years; only 3% expected it to decline. Over half expected the use of panelised systems, in particular, to increase during that period.
- Drivers to increased use include overcoming skills shortages, faster build, increasing output and improving build quality.



Underfloor heating: a guide for house builders NF71

Underfloor heating can have design, comfort and economic advantages, so it is not surprising that its use in new build homes has increased in recent years. This guide sets out good practice guidance for house builders and designers who are less experienced in underfloor heating but may be considering its use.

The guidance draws on design insights from BSRIA and NHBC's practical experience of underfloor heating installed in new homes, and highlights the key considerations during the design, installation and handover of 'wet' underfloor heating systems. By following the guidance, designers and builders can ensure that the performance of installed systems meet consumer expectations and provide trouble-free, convenient and efficient heating as part of the overall building services equipment installation within homes.



GUIDANCE (CONTINUED)

Exciting opportunities await: careers in house building for young people

This is a short video aimed directly at young people and their parents to highlight the many benefits of a career in house building, including: great training opportunities, a wide career choice with good earning potential and rewarding work creating a lasting legacy. It follows NHBC Foundation's *A career of choice: attracting talented young people into house-building* report (NF61), published last year, which found that the UK house-building industry needs to challenge misconceptions if it is to attract and recruit young people.

The film, featuring LEGO animation and drone footage of a housing development in Milton Keynes, was launched via Twitter, Facebook, Instagram, LinkedIn and YouTube; within the first three weeks of its release, it was viewed approximately 250,000 times.



The right light: selecting low-energy lighting - introduction for designers and house builders

This practical guide compares the different categories of low-energy lamps and sets out the considerations that are important in the selection of LED lamps, which offer increasingly efficient and economic lighting solutions. Also included are recommendations for lighting levels for different rooms in the home.

The project was supported and funded by the NHBC Foundation and the guide prepared and published by the Energy Saving Trust (EST).

YOU NEED TO...

- Take a look at www.nhbcfoundation.org and use the guidance in the design and construction of your new homes.

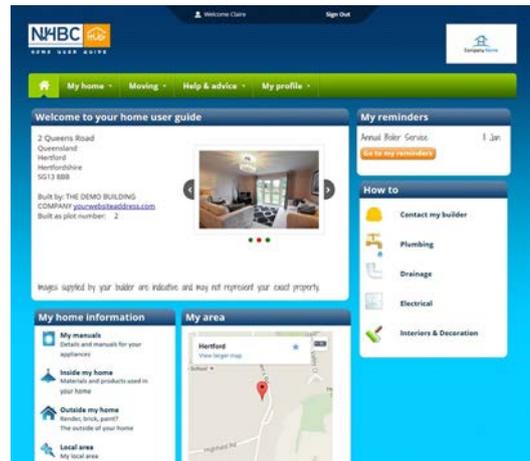


HUG

The NHBC HUG is proving to be very popular with new home buyers across the UK. Not only are a number of house builders offering one to their new home buyers, we are now offering HUGs to all home buyers who purchase an NHBC registered home – free! We are seeing an increase in homebuyers taking advantage of the HUG and are using many of the features, such as the ‘Settling in’ information and the ‘How to’ guides on maintenance in their new home.

We’ve also added some interesting information to the HUG about new home technologies, such as solar energy and ventilation, and we will soon be launching a new and improved interactive moving-in checklist.

If you’d like to know more about the successes the HUG has brought to house builders, and the way in which it’s helping homebuyers, please visit www.nhbc.co.uk/hug to read our latest case studies.



TECHNICAL ASSESSMENTS ADDED TO NHBC ONSITE

Technical ability is an important aspect of being a site manager, which is why we have introduced a technical assessment as part of NHBC OnSite. The technical assessment counts as CPD and will help you test your knowledge of NHBC Standards. In addition to an overall score, you’ll see a breakdown against subject areas, helping you to identify any particular strengths or areas for focus.

NHBC OnSite has been designed specifically for site managers. It is free to access and, on it, you will find:

- help to interpret and implement NHBC Standards and Building Regulations through NHBC Standards Plus and NHBC Building Regulations Plus
- links to Pride in the Job resources, to see what the judges look for
- access to technical support from our in-house experts

- links to the latest and previous editions of Technical Extra
- regular industry news and updates specifically relevant to site managers
- details of our latest training events, including priority invitations to free training aimed at site managers.

You’ll also be able to build and maintain your own profile through NHBC OnSite; visit www.nhbcsitemanager.co.uk to log on.

HEALTH AND SAFETY AWARDS 2017 – ENTRIES NOW OPEN

Entries for the prestigious NHBC Health and Safety Awards are now open. This is the UK’s only health and safety awards scheme exclusively for home builders, and recognises and rewards the very best in health and safety standards.

Now in its eighth year, the Awards are helping to drive up safety standards in the industry by showcasing and sharing best practice. Winning an award demonstrates and celebrates your company’s health and safety practices to the industry and your peers.

Health and safety site inspection customers receive three free site entries; for more information visit www.nhbc.co.uk/hsawards.





NHBC EVENTS AND TRAINING

Building for tomorrow 2017

Region	Date
Southern	Tuesday 28 February
Scotland	Tuesday 7 March
North West	Thursday 9 March
South East	Thursday 16 March
East	Tuesday 21 March
South West	Thursday 23 March
West	Tuesday 28 March
North East	Thursday 30 March
Northern Ireland	Tuesday 4 April
London	Date to be confirmed

Further information and details on how to book is coming soon and will be available at www.nhbc.co.uk.

Other courses

Course	Venue	Date
Defects Prevention - three days	Milton Keynes	9, 16 and 23 November 2016
Defects Prevention Hot Topics - one day	Edinburgh	23 November 2016
Defects Prevention Hot Topics - one day	London	26 January 2017
Defects Prevention Hot Topics - one day	Milton Keynes	9 February 2017
Defects Prevention Hot Topics - one day	Edinburgh	7 February 2017
Defects Prevention Hot Topics - one day	Huddersfield	28 February 2017
Defects Prevention Hot Topics - one day	London	28 February 2017
Defects Prevention Hot Topics - one day	Kegworth	7 March 2017
Defects Prevention Hot Topics - one day	West Bromwich	8 March 2017
Defects Prevention Hot Topics - one day	Bristol	9 March 2017
Managing Timber Frame Construction - one day	Huddersfield	4 April 2017
Managing Timber Frame Construction - one day	Milton Keynes	12 April 2017
Managing Timber Frame Construction - one day	Edinburgh	20 April 2017
NHBC/APS Management of Pre-Construction Health & Safety - three days	London	16-18 November 2016
NHBC/APS Management of Pre-Construction Health & Safety - three days	London	21-23 February 2017
NHBC/APS Management of Pre-Construction Health & Safety - three days	Milton Keynes	28-30 March 2017
CDM Awareness	Milton Keynes	9 November 2016
CDM Awareness	Belfast	13 December 2016
CDM Awareness	Belfast	16 February 2017
NHBC/CITB Site Management Safety Training Scheme - five days	Milton Keynes	22,23,24,29 and 30 November 2016
NHBC/CITB Site Management Safety Training Scheme - five days	Huddersfield	1,7,8,13 and 14 December 2016
NHBC/CITB Site Management Safety Training Scheme - five days	London	17,18,24,25 and 26 January 2017
NHBC/CITB Site Management Safety Training Scheme - five days	Milton Keynes	8,9,14,15 and 16 February 2017
Management of Lifting Operations - one day	Bristol	1 December 2016
Management of Lifting Operations - one day	Huddersfield	10 January 2017
Control of Lifting Operations - two days	Bristol	7-8 December 2016
Control of Lifting Operations - two days	Huddersfield	11-12 January 2017

For more information, visit www.nhbc.co.uk/training or call 0344 633 1000 and ask for 'Training'.

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

Useful contacts for technical information and advice

NHBC technical advice and support

Tel: 01908 747384

Email: technical@nhbc.co.uk

Web: www.nhbc.co.uk/techzone

Technical Extra

Previous editions of Technical Extra are available on our website at www.nhbc.co.uk/Builders/ProductsandServices/TechZone/NHBCStandards/TechnicalExtra/.

NHBC Standards

Buy online at: www.nhbc.co.uk/nhbcshop/technicalstandards or access Standards Plus on the NHBC website at www.nhbc.co.uk/StandardsPlus.

Using your smartphone and QR reader, you can also scan the codes below to jump directly to Standards Plus 2016 or the NHBC 3D Viewer app (via the App Store and Google Play).

Standards Plus 2016



NHBC 3D Viewer app



Building Regulations

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

Building Control

For Building Control queries, please call 0344 633 1000 and ask for 'Customer Services'.

NHBC OnSite

For technical resources and career support for registered site managers, please visit www.nhbc.com/site-manager.

NHBC Foundation research

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

www.nhbcfoundation.org

Training

For information about training, please go to www.nhbc.co.uk/training, call 0344 633 1000 and ask for 'Training', or email training@nhbc.co.uk.

NHBC Clicks & Mortar e-newsletter

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

<http://www.nhbc.co.uk/newsandcomment/joinournewsletter/>

General enquiries

For all other enquiries, including ordering products and services, please call 0344 633 1000, and ask for 'Sales'.

Copyright© NHBC 2016

NHBC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority.

This leaflet has been printed on material which is produced from well-managed forests and is fully recyclable and biodegradable, ECF (elemental chlorine free) and is made to ISO 14001 Environmental Certification.



NHBC, NHBC House,
Davy Avenue, Knowlhill,
Milton Keynes,
Bucks MK5 8FP
Tel: 0344 633 1000
Fax: 0344 633 0022
www.nhbc.co.uk

