



# NHBC's technical newsletter

December 2005 Issue 34

# STANDARDS EXTRA

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NHBC has encountered problems with corbelling on site, we take a look at acceptable methods of this masonry detail

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# Electrical safety in steel framed walls

When electrical cables are installed in steel framed walls and partitions they must be located so that they are either protected from mechanical damage or are installed in 'safe' zones.

The sketch below shows situations where cables may be run in walls less than 50mm from the surface. This is in accordance with clause 522-06-06 of BS 7671 "Requirements for electrical installations".



Cables need to be installed by a competent person who is familiar with the requirements of BS 7671. Leaving cable tails dangling from the ceiling and hoping the dry liner will correctly install them in the partition is not acceptable. He may be an expert in dry lining but is unlikely to have been

trained in how to position cables safely, and to provide grommets to prevent chafing, where they pass through the head or base rails, or a stud.

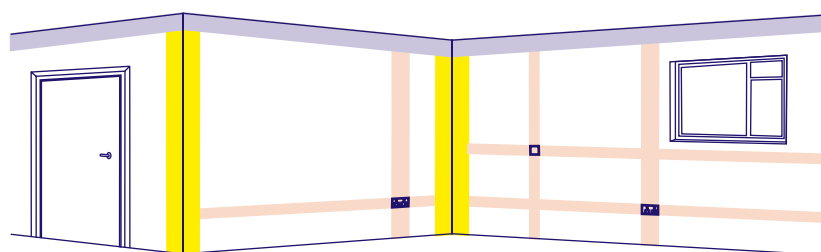
Cables can easily be damaged during construction by drill bits or fixings and the cable position may be inadvertently moved out of the 'safe' zone. Following trades and eventually the homeowner will rely on the correct positioning of cables when they come to fix things to the walls.

The electrical contractor must be satisfied that the installation meets with BS 7671 in order for him to sign the completion certificate. He needs to be certain that cables are correctly installed and in the right location to do this. Leaving it to chance is not an option.

## Action

Builders need to be aware of the safe zones and check to see that cables are correctly located before the boarding is fixed.

## "Safe" zones for electrical cables



- Zone either horizontally or vertically to a switch or socket outlet
- Zone within 150mm of the top of the wall
- Zone within 150mm of an angle formed by adjacent walls

# Wanted - steel frame project certifiers

NHBC Standards Chapter 6.10 'Light steel framed walls and floors' was published in April 2005 and became effective in July 2005.

A project certificate is needed to certify that the design of the specific buildings meets with the requirements of the NHBC Standards and this should be available to NHBC on site.

We are currently recruiting steel frame certifiers to join our list. Applications will be considered from professionally qualified civil and structural engineers with at least three years' experience in the design of light steel framing.

If you are interested please contact NHBC Technical.





# Structural Insulated Panel Systems

With growth in the use of modern methods of construction (MMC) in the new homes market, in part fuelled by the ODPM 'Design for Manufacture' competition (£60,000 home competition), this article features one particular form of MMC, Structural Insulated Panel Systems (SIPS).

SIPS are engineered building panels, manufactured in a controlled environment and shipped to site ready for erection. There are many variations in the type of SIPS available, but typically they comprise an inner rigid insulating core of expanded polystyrene (EPS) or polyurethane sandwiched between two outer skins of board e.g. oriented strand board (OSB) or cement-based board. The board is normally bonded to the insulation with proprietary adhesive using a press to ensure a bond over the entire surface area.

Variations can include the use of different boards or insulation, the addition of strategic timber studs into the insulation core, and alternative methods for fixing the board to the core. The finished panels need to be handled with care after manufacture to prevent damage and possible de-bonding of the materials.

SIPS can provide the external load-bearing walls and roof of a building, together with its load-bearing and non load-bearing internal walls. SIPS can also be used to form the external infill walls of structural concrete or hot rolled steel framed buildings.



Homes with SIPS walls usually have upper floors formed with I-joists, metal web joists or timber joists, and these should be designed in accordance with NHBC Standards Chapter 6.4 'Timber and concrete upper floors'.

Like timber frame construction, the adequacy of connections between the panels, and between the panels and other components, are absolutely vital to the structural performance, durability and weather-tightness of the building.

Careful planning of internal services is extremely important to ensure that wherever possible there is no disturbance to the load-bearing wall panels. Where this is unavoidable, consideration must be given on how to overcome the possible adverse effects on structural, thermal and acoustic performance.

External cladding to the SIPS structure should be designed in accordance with NHBC Standards Chapter 6.9 'Curtain walling and cladding' and in all circumstances a minimum 15mm drained and ventilated cavity is required between the cladding and the panels. As with timber frame, a breather membrane is needed to provide temporary protection during the construction process.

To satisfy NHBC Technical Requirement R3, SIPS are required to have a design life of at least 60 years, and consistent with our requirements for other proprietary building systems, SIPS will need to achieve satisfactory independent assessment before we can accept their use on homes covered by Buildmark.

The independent assessment should be carried out by an appropriate technical approvals authority accepted by NHBC, including BBA (British Board of Agreement), BRE (Building Research Establishment) certification, or BM TRADA (Timber Research and Development Association).

We would expect the independent assessment to be thorough and cover a range of issues including structure, fire, thermal and acoustic performance, air tightness, durability and weather resistance (cladding), fabrication, delivery, storage and erection.

## Action

If you are considering using SIPS for any part of a home to be covered by the Buildmark, make sure that the design, fabrication and construction comply with NHBC Standards. Furthermore make sure that the panels have undergone appropriate independent assessment to confirm they will achieve satisfactory in-service performance for a design life of at least 60 years.

# Corbelling

Corbelling or 'oversailing' is a masonry detail where the courses of masonry units project beyond the face of the course below as a series of cantilevers. It is used to achieve functional and decorative effects.

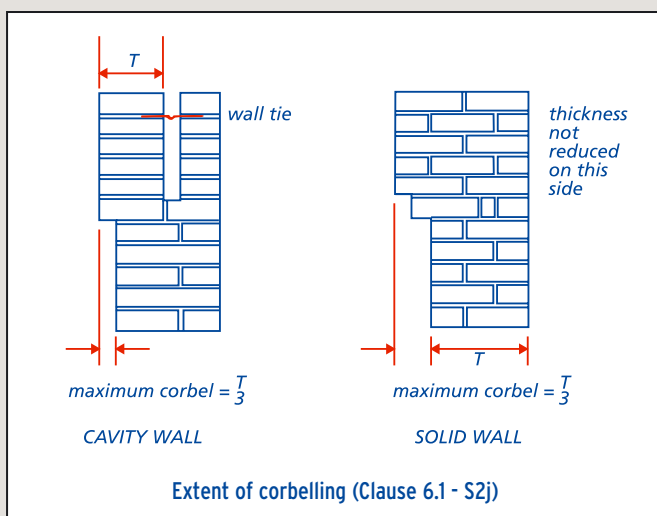


The corbelled masonry eaves detail shown above is rotating about its base as a result of its eccentric self-weight and the weight of the proportion of the roof construction that it is carrying.

Corbel details must be carefully considered and simple guidance is provided in NHBC and British Standards in order to:

- ensure the stability of the corbelled portion of masonry and provide an adequate factor of safety against overturning
- avoid local crushing of the masonry
- limit the eccentricity of loading to the supporting part of the wall
- prevent tension developing in the masonry where it has not been designed for

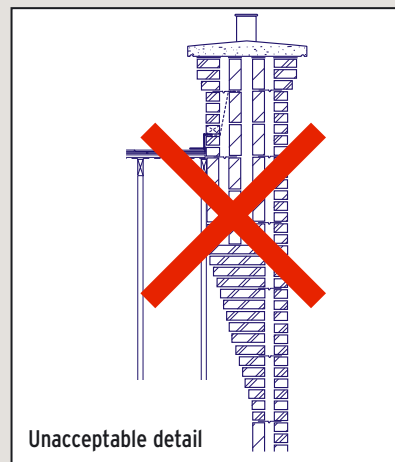
Where courses are corbelled, the extent of the corbelling is limited as shown in the figure below unless the work is otherwise supported or reinforced.



Any variation from the above should be designed by a suitably qualified chartered engineer in accordance with British Standards and Codes of Practice and submitted to NHBC for assessment.

Corbelling is a detail that is sometimes also used to provide support for dummy chimneys.

If not correctly supported, a large chimney, which may weigh around 3 tonnes, could be just waiting to fall through the roof.



A system, such as the one shown to the left, would not be acceptable to NHBC as it varies from the basic guidance and relies on the roof members and connections to provide support for which they have not been designed.

An engineered gallows bracket can provide a substantial platform to support the dummy brick chimney.



However in the example shown on the previous page the supporting wall is not adequate to carry the eccentric load produced by the dummy chimney. In addition the roof structure, which is being asked to prop the chimney, has not been designed for this purpose. This detail is potentially dangerous and would not be acceptable.



Engineered steel support system

The structural steel beam shown opposite provides support for the chimney breast. In turn, this beam is supported by steel beams that span parallel with the roof trusses and bear onto the walls carrying the roof trusses.

The interrupted roof truss is supported by a timber beam which spans back onto doubled up roof trusses either side of the chimney breast. Calculations for the structural members, padstones and supporting masonry can fully justify this acceptable solution.

It should be noted that additional fire resistance to the supporting steelwork details would not be required for houses up to 3 storeys.

#### Action

Ensure that the corbel details conform to the guidance provided by NHBC Chapter 6.1 - S2(j) or provide, in accordance with Technical Requirement R5, the engineer's design and details that provides full engineering justification for the proposal.

## Keeping up appearances

Staining of external walls of homes is at best unsightly and at worst the start of water penetration to the fabric and ultimately to the inside of the building.

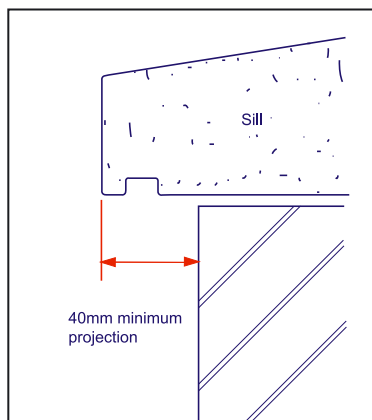
Rain falling evenly on the external walls will generally not be the cause of a staining problem. However, where the water is more concentrated, typically below window sills, walls can become saturated. Over time this can change the appearance of the building and potentially lead to complaints from homeowners. The type and colour of bricks used for the external walls can highlight the problem, with lighter coloured bricks showing up any dampness more than darker ones.

The problem is not confined to wall areas beneath sills, it can also occur to parapet walls and gable parapets.

The best way of reducing staining is to have sills, copings etc, which project beyond the wall below and are provided with a suitable throating or drip. This should ensure that the water drips clear of the wall and does not cause unsightly damp patches to form. The projection should be at least 40mm and the throating should be clear of the face of the wall.

We are aware that in certain parts of the country, the vernacular includes stone sills set flush with the dressed stonework beneath. Where this is established practice in the local area, it is acceptable to NHBC; in other situations we would normally expect a projecting sill with a throating to be provided.

In parapet walls and gable parapets, it is just as important for water to be shed clear of the masonry below and the 40mm minimum projection works here too. Where coping stones have throatings incorporated, it is important that they are continuous and not obstructed by mortar.



Sill with projection and throating

#### Action

Don't allow staining to spoil the appearance of the homes you are building. Adopt good sill and parapet detailing to help avoid stains.



# Letterbox heights

Back injuries, as many of us know all too well, are not always the result of lifting heavy items: often they are the result of bending awkwardly to do something.



It may come as a surprise that about 3,000 postal workers suffer from back injuries every year. Not all of those come from delivering letters but some are attributed to stooping to deliver mail where the letterbox is in the bottom of the door, whilst carrying a satchel of mail.

NHBC has been asked to make house builders aware of a European Standard (BS EN 13724) which recommends that the aperture for mail should be between 700mm and 1700mm above the doorstep. For groups of letterboxes, typically in blocks of flats, the range is between 400mm and 1800mm.

Although this BS EN is not part of the NHBC Standards it is worth thinking about the height of the letterboxes in your next development, and spare a thought for the postal worker who will be delivering the mail for many years to come.

## Building for tomorrow 2006

With so much changing in the industry, it's never easy to keep up-to-date.

NHBC's 'Building for tomorrow' seminars for 2006 are being held at 12 venues around the UK during February and March, and are an enjoyable and cost-effective way to keep informed.

This year's programme includes:

- Changes to Parts F and L of the Building Regulations.
- Customer satisfaction issues, including managing customer disputes, homeowner surveys, a builder's view on customer service and 'did you blame the builder' - interactive.
- Plus, NHBC's new online services.

### Venues

21-Feb	Cambridge Belfry, Cambourne
22-Feb	Motor Cycle Museum, Birmingham
23-Feb	East Midlands Conference Centre, Nottingham
28-Feb	Vauxhall Recreational Centre, Luton
01-Mar	Blue Mountain Golf Centre, Binfield
02-Mar	River Centre, Tonbridge, Kent
07-Mar	Redworth Hall, Co Durham
08-Mar	Galpharm Stadium, Huddersfield
09-Mar	Reebok Stadium, Bolton
14-Mar	The Solent, Fareham
15-Mar	Cardiff Millennium Stadium
16-Mar	Tortworth Hall, Wootton Under Edge, Nr Bristol

To book or for more details please contact Nicky Clements on 01908 746715, email [nclements@nhbc.co.uk](mailto:nclements@nhbc.co.uk) or visit our website at: [www.nhbcbuilder.co.uk/bft](http://www.nhbcbuilder.co.uk/bft).

# NHBC Training

NHBC continues to help builders with health and safety issues by supporting them with training courses on the topical issues of vibration and noise at work.

Changes to the Control of Vibration at Work Regulations 2005 took effect in July this year and changes to the Control of Noise at Work Regulations 2005 are happening in early 2006. As a result, there is an increased focus on employers' responsibility in these areas.

Our course on 'Vibration and Noise at Work' offers a deeper understanding to those responsible for managing the risks and hazards associated with vibration and noise in the workplace. With many in the construction industry exposed to excessive levels of vibration and noise, there is a clear risk of employees developing health problems. This course provides essential information on how to comply with the regulations and meet your responsibility to protect employees from long term damage.

This course is being run regionally on various dates throughout February and March 2006.

For further information or to make a booking please contact Louise Heal on 0870 241 4323 or email [lheal@nhbc.co.uk](mailto:lheal@nhbc.co.uk).



#### Facts

- Over 13 million people are at risk from high levels of noise in the work place
- Two million workers are exposed to levels of vibration where there are clear risks of developing disease
- 170,000 people in the UK suffer deafness, tinnitus, or other ear conditions as a result of exposure to excessive noise at work
- The construction industry has one of the highest rates of newly assessed cases of HAV (12.3 cases per 100,000 employees)

# NHBC launches new website for builders and developers

NHBC has launched a new website designed specifically to meet the needs of builders, developers and other construction industry professional groups at [www.nhbcbuilder.co.uk](http://www.nhbcbuilder.co.uk).

The site contains useful information on NHBC and the house-building industry, as well as details of the products and services we offer. It is easy to navigate, meaning that all the information required is just a 'mouse-click' away.

A key feature is the facility to register for our 'e-news' service to get the latest information emailed to you directly. In addition, the new site allows you to:

- use the 'course finder' facility to find training courses that are relevant to you and your staff
- keep up-to-date with the Pride in the Job competition, through the 'News and events' section
- buy on-line at the e-shop, containing everything from our Technical Standards, health and safety products through to site promotional items
- download free 'NHBC Publications' including warranty and technical information.

We are also developing new e-business facilities such as plot registration and offering management information online, providing real benefits in business efficiency.

[www.nhbcbuilder.co.uk](http://www.nhbcbuilder.co.uk)



## Questions & Answers

Below are the answers to questions we have recently been asked in NHBC Technical.

### Lateral restraint provided by gable ladders

#### Question

The gable ladder is being used to provide lateral restraint to the gable wall (instead of restraint straps). Is it acceptable to use the longitudinal trussed rafter bracing instead of blocking between the last trussed rafter and the wall?

#### Answer

It is acceptable to use the longitudinal bracing to provide lateral restraint. The bracing should be tight against the wall. Additional intermediate boards will need to be provided if longitudinal bracing is more than 2m apart. These should be tight against the wall and fixed over at least three trussed rafters.

In all cases where the gable ladder is providing restraint the gable soffit board should be cut carefully against the outer face of the wall and fixed securely.

# Questions & Answers

## Restraint straps to gable walls of garages

### Question

Are lateral restraint straps needed to the gable walls of masonry garages?

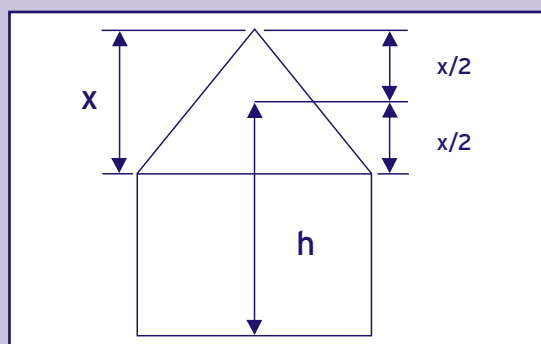
### Answer

- NHBC Standards clause 9.1 - D5(a) says that garage walls should have adequate lateral restraint against wind loading.
- NHBC Standards clause 7.2 - D4(c) refers to restraint strapping for gable walls of dwellings of masonry construction to provide lateral restraint.
- BS 8103 Parts 1 and 2 'Structural design of low-rise buildings' gives guidance on the provision of lateral restraint to masonry walls.

For garages of masonry construction, the gable should be restrained at rafter level with restraint straps.

For larger gable walls, restraint should also be provided at ceiling level. Larger gable walls are where the height (h) exceeds:

- 16 x thickness of the wall for single leaf walls
- 16 x (sum of thicknesses of leaves + 10mm) for cavity walls



Note: h should be measured from top of the foundation or from the underside of the floor slab where this provides effective lateral restraint.

The restraint at rafter level may be provided by restraint straps or by a gable ladder

Where straps are used they should have a minimum cross section of 30mm x 5mm and be fixed to the rafters with solid blocking (or be fixed to the longitudinal bracing) at 2m maximum centres.

For solid walls it will normally be necessary to fix the straps to the inside face with at least two 6mm x 30mm plug and screw fixings per strap.

Unless the design states otherwise the restraint straps should be provided at the following positions:

- Walls constructed of solid bricks - two restraint straps per roof slope at maximum 2m centres plus one extra strap near the apex of the gable.
- Walls constructed of perforated bricks or concrete/aerated concrete blocks - three restraint straps per roof slope at maximum 1.5m centres.

## Gaps around timber windows and timber door frames

### Question

When installing a timber window or timber door frame what is the recommended gap for the sealant between the frame and masonry?

### Answer

- BS 644 : Part 1 'Wood windows' gives guidance on installing timber windows.
- An effective seal around frames should improve weatherproofing and airtightness.

Timber windows and door frames can be installed abutting masonry. Where a gap is provided it should not exceed 10mm.

When the gap is less than 5mm the sealant should cover both the frame and the surrounding masonry by 6mm. When the gap is greater than 5mm a backing strip should be used behind the sealant and the sealant should have a depth of at least 6mm.