NFRC
Health & Safety Guidance (HSGS01)

NFRC
LEADING ROOFING EXCELLENCE

Health and Safety in Roof Work: An Overview

INTRODUCTION

As members of NFRC you will know, working on roofs is a high-risk activity as it involves working at height. Roof work accounts for a quarter of all fatalities in the construction industry, falls from an unprotected edge or through fragile materials, such as roof lights and asbestos cement roofing sheets, account for most of these deaths. However, it's important to remember that not all those who are killed while working on roofs are trained roofers, many people accessing roofs are maintenance workers. These accidents occur across the whole range of roof work from the simplest repairs to large-scale construction projects.

The HSE have recently released the fifth edition of *HSG33: Health and safety in roof work* to support the construction industry address the fatalities and accidents caused by working on roofs and guidance on how to plan and work safely on roofs. NFRC had extensive involvement with this revision of HSG33 and the purpose of this guidance is to give an overview of what is a very important HSE document for our sector.

Understanding the key topics in this guidance will provide you with knowledge and understanding of the safety requirements of working at height. It is also pertinent to raise the awareness of the importance of complying with HSG33 with building owners, clients, architects and principal contractors. This in turn will reinforce to them the importance of selecting roofing contractors with the skills, knowledge, experience, and training to carry out roof work on their projects with safe working practices that comply with the law.

Please note:

This guide is an overview of HSG33 and is not intended to be a replacement If the contractor or their clients requires further clarification, HSG33 can be **downloaded from the HSE website**[1].

PLANNING ROOF WORKS

Planning is vital to ensure safety in any size of building or roof work project, from short-duration minor work, such as surveying or replacing a few tiles on a house; to the major refurbishment of an existing property. Planning by all parties involved helps to make sure the work is carried out safely, efficiently and without undue delay. Roof work usually involves work at height, and it is important to prevent or minimise risk when planning this work.

Hierarchy for work at height

The *Work at Height Regulations 2005* set out a hierarchy of measures which must be followed systematically. Anyone in control of planning the work must:

- Always consider measures that protect everyone who is at risk;
- Always consider passive systems such as edge protection;
- Make sure work is carried out only when weather conditions do not put the health and safety of workers in danger.

AVOID work at height where they can

Use work equipment or other measures to **PREVENT** falls where they cannot avoid working at height

Where they cannot eliminate the risk of a fall, use work equipment or other measures to **MINIMISE** the distances and consequences of a fall should one occur

Training and competency

Roof work is a hazardous activity, so it is essential that anyone wishing to have roof work carried out makes sure that the roofing contractors they choose are competent to do so. The roofing contractor should be able to demonstrate:

- Sufficient knowledge of the roof work they are being asked to carry out and the risks it will involve.
- Current and sufficient experience of the latest techniques, standards and materials to enable them to carry the work out safely, including any relevant training or qualifications.

It is important that contractors have up-to-date skills, knowledge, experience and training. Although experience is a major factor, if it is based on poor or inadequate initial training or out-of-date knowledge it can be worthless. Roofing contractors and their operatives must understand the reasons why safe working practices are necessary.

Risk assessments and method statements

A competent person should carry out a risk assessment before work starts on a roof. It needs to be appropriate to the scale and complexity of the work being undertaken. In all cases, the competent person that is undertaking the risk assessment should make sure that all the hazards are identified, the degree of risk is determined, and appropriate control measures are put in place.

Once the risk assessment has been compiled then the use of a method statement is a useful way of recording the hazards involved in specific work at height tasks and communicating the risk and precautions required to everyone involved in the work. It should identify working positions and access routes to and on the roof, and show:

- How falls are to be prevented, or where this is not possible, minimised.
- How danger to people working below, and to the public, from falling materials is to be controlled.
- How risks to health will be controlled.
- How other risks identified at planning and survey stages are to be controlled.
- What equipment will be needed.
- What competence and/or training is needed.
- Who will supervise the job and control the residual risks.
- How changes in the work will be dealt with without affecting safe working.

Fragility

Falling through a fragile roof is one of the main causes of accidents during roof work, occurring in both the construction of new roofs and maintenance of old ones, so it is important to consider fragility when planning any roof work task. Although the installation of *'non-fragile'* roofs, including roof lights, in new buildings is now commonplace, people who work on roofs should not be complacent. In particular, the following are likely to be fragile, although this list is not exhaustive:

- Old roof lights.
- Old liner panels on built-up sheeted roofs.
- Non-reinforced fibre cement sheets.
- Corroded metal sheets, either as the primary waterproofing system or as the structural deck supporting a membrane roofing system.
- Glass *(including wired glass)*.
- Rotted chipboard or similar.
- Wood wool slabs.
- Some slates and tiles. *(Please note that BS8000 Part 6 states that operatives should not walk on any completed slated or tiled roofs without the use of adequate protection)*.

Safe access

Where it has been determined that access to the roof is required, safe access to a work area requires careful planning, particularly where work progresses along the roof. Typical methods to access roofs are:

- General access scaffolds.
- Stair towers.
- Fixed or mobile scaffold towers.
- Mobile access equipment *(Mobile Elevating Work Platforms)*.
- Ladders.
- Access hatches.

Emergency rescue procedures

Under the *Work at Height Regulations 2005* you must consider emergency procedures so that people can be escued. There must be a plan in place that outlines how someone would be recovered if they fall. The method of rescue needs to be proportionate to the risk and you should not rely on the emergency services. The method of rescue may be simple, such as putting a ladder up to a net and allowing the fallen person to descend, or lowering a worker hanging on a deployed lanyard onto the surface below.

The rescue plan should include:

- Details of the rescue equipment to be used.
- Configuration of the equipment for different types of rescue.
- Identification of anchor points where necessary.
- Limitations of the plan for adverse weather such as high winds.
- The need for trained and competent rescue personnel.

Materials handling

Well-planned materials handling has a significant impact on roof safety; for example, it can:

- Minimise the amount of time spent working at height.
- Reduce the amount of travelling around the roof to collect materials.
- Reduce injuries caused by handling heavy and unwieldy components.
- Increase productivity.
- Reduce waste.

Every lifting appliance should be properly installed, maintained, inspected and, at all times, operated within its safe working load. All lifting appliances need a thorough examination. On smaller roofing jobs, small lifting appliances such as a gin wheel may be used.

Industrial hoist

Falling materials

The public, as well as other workers, can be at risk when materials fall from roofs. These materials include roof sheets, fixings, tools, roof tiles and roofing membranes. At the planning stage of any job, consider what measures are needed to protect the public and other workers. This is particularly important where members of the public pass close to or below roof work. Where work has to be done and danger still exists, you may need to consider a pavement closure or diversion to make sure that the public are not put at risk for the duration of the work.

Weather conditions

You should anticipate adverse weather conditions and take suitable precautions. The *Work at Height Regulations 2005* specifically require that you consider weather conditions when planning any work at height. Rain, ice or snow can make a secure footing as slippery as a skating rink. A roof should always be inspected before work starts to see if conditions have changed and to check whether it is safe to work. A sudden gust of wind can lead to loss of balance. Do not fix roof sheets and, in some circumstances, roofing membrane in windy weather– people can easily be thrown off balance while carrying a sheet up to or on the roof, particularly when handling large sheeting materials during work on industrial buildings. **NFRC's guide Roofing and cladding in windy conditions**[2] provides more detail on how to assess the effects of high wind when working at height.

Working near gas flues

If you are working near a gas flue or extraction vent you should establish what gases, fumes or vapours the system discharges and assess what controls are needed. Anyone undertaking roof work around a flue must make sure their work does not affect the flue or gas appliance in any way. **NFRC have released guidance on working on or near internal gas flues[3].**

TYPES OF WORK

There are many reasons why someone may need to work on a roof, ranging from minor inspection to major re-roofing works. As a result, there are various safeguards to consider, depending on the type of work planned, it's also important to remember that all roof work is potentially dangerous, however short-lived.

Inspection and survey

Inspection is often necessary where a problem has been identified or before refurbishment. It should always be done with care and by people trained and experienced in assessing the risks involved. Initially, in accordance with the work at height hierarchy, avoid work at height where possible. Where you cannot avoid work at height, access to the roof should be planned and any risks associated with the work should be risk assessed and mitigated. Using technology, such as drones can avoid the need to access the roof, the NFRC **guide to drone operation**[4] will provide more information on this subject.

Powered access for inspecting a large fragile roof

Refurbishment and re-roofing

Roof refurbishment can be complex, is always high-hazard and demands careful planning—a high proportion of accidents occur where this work is being carried out:

- On any refurbishment or re-roofing job, all surfaces should be treated as fragile unless a competent person has confirmed otherwise.
- The precautions to prevent people falling through fragile parts of the roof should be clearly identified. They do not have to be complex, but they must be effective.
- Where practical, replace roof lights from below, using a proprietary replacement and fixing system or work from above by remaining in a MEWP cage.
- Close liaison with the client will be necessary where premises remain occupied during refurbishment.
- A structural survey may be required to confirm the strength or stability of roof members; and
- A risk assessment should be carried out when deciding whether to refurbish or replace fragile roof coverings.

Hot work

Hot works is described as *'any process that generates flames, sparks or heat'.* It is important to consider at the design stage whether such works can be designed out to reduce risk, particularly where buildings are occupied. For example, can cold applied roofing products be used to replace those that require hot application? Common hot work processes in roofing include:

- Cutting.
- Grinding.
- Lead welding.
- Torch-on roofing.
- Bitumen boilers and hot-melt systems.
- Drying substrates with a torch before application of the roof system.

Providing the right equipment, keeping it in good condition and ensuring operatives have the required skills knowledge and training will help to reduce accidents to workers, buildings and the public.

Roof fires caused by gas torches are a common occurrence, therefore it is paramount that NFRC **Safe2Torch**[5] principles are implemented at the design stage of a waterproofing system, and strictly adhered to throughout the planning and construction phase in order to prevent fires during the installation of the waterproofing system.

Maintenance and cleaning

Many accidents occur during maintenance and cleaning of roofs. Often little attention is paid to this short-term, low-value work. It is often done by people with no experience in work at height and on older roofs where additional control measures may be needed to make sure the risk of incident is sufficiently low. Anyone tasked with maintaining or cleaning a roof should be competent to carry out the work. Inexperienced workers will need formal training on health and safety, specifically regarding the hazards associated with roofing.

Short-duration work

To be classed as 'short-duration' work the task must have been assessed as low-risk and only taking a short amount of time. Though short-duration work is measured in minutes rather than hours, the task must still be risk-assessed with the appropriate precautions and controls implemented. It might include tasks such as inspection or replacing a few roof tiles. It may not be reasonably practicable to install the same level of safeguards as for longer tasks, such as a full independent scaffold or even edge protection for such work, but you will need to provide something in its place. The decision on the precautions to take will depend on an overall assessment of the risks involved. You should consider:

- Duration of the work.
- Complexity of the work.
- Pitch of the roof.
- Type of roofing material *(slate, tile or waterproof membrane).*
- Condition of the roof.
- Weather conditions.
- Risk to workers putting up edge protection.
- Risk to other workers and the public.

The NFRC have produced a dedicated guidance note for short duration work[6].

TYPES OF ROOF

Flat roofs

Flat roofs are generally accepted as being up to 10° in pitch and are usually waterproofed with a membrane such as reinforced bitumen membrane (RBM), roofing felt, single-ply membrane, liquid membranes or profiled metal sheeting.
On flat roofs, falls most frequently occur:

- From the edge of a completed roof.
- During surveying, inspection or construction.
- From the edge where work is being carried out.
- Through openings or gaps.
- Through surfaces that are slippery or have become fragile, for example, strawboard, unfixed profiled metal decking or aged roof lights.

Where the design of the roof does not provide permanent edge protection, such as a suitably strong parapet wall of at least 950 mm in height, temporary edge protection will be required.

Temporary flat-roof edge protection**

Slated and tiled (pitched) roofs

A scaffold platform at eaves level provides a good standard of edge protection, a working platform and storage space for materials. The working platform should be as close as possible to the eaves and brick guards will be necessary if materials such as roof slates, are stacked above toe board height.

Roofers should avoid walking on the laid roof covering because tile/slate roof coverings, including ridges, hips and inclined valleys are not designed to be walked on and offer no firm footholds. This will mean bringing valleys, ridge and hip tiles through as the roof is covered and working in a planned way to cut down foot traffic on the finished roof. The method of work used should take into consideration the fact that a greater proportion of the roof tiles will be fixed to the tile battens as required by the current British Standard BS 5534:2014 + A2:2018 so it will be no longer possible to push tiles up to provide a foothold on the roof batten.

On most sloping roofs, suitable roof ladders or crawling boards will be essential, in addition to edge protection. Where a high standard of edge protection is provided, it may be safe to work without a roof ladder. This may apply if the pitch is shallow and the surface provides particularly good footholds and is non-fragile. In each case you need to base the decision on a risk assessment. When using roof ladders or crawling boards they should be:

- Designed and fabricated to be fit for purpose.
- Strong enough to support workers when spanning across the supports for the roof covering.
- Long enough to span the supports *(at least three rafters).*
- Secured or placed to prevent accidental movement.

Mechanical handling of large roof sheets***

HEALTH RISKS

Falls and other safety issues are not the only risks linked to roof work. There are some significant health risks as well. The most important ones are:

- Manual handling.
- Harmful dusts and chemicals.
- Vibration, noise and sun exposure.

Manual handling

Manual handling covers a wide variety of tasks including lifting, lowering, pushing, pulling and carrying. Common roof work tasks involve:

- Loading out roof materials.
- Carrying mortar to roof level.
- Laying large roofing sheets.

If any of these tasks are not done properly there is a risk of accidents, injury and effects on health. This includes work-related musculoskeletal disorders (MSDs) such as back pain, upper and lower limb pain, and repetitive strain injuries of various sorts. Manual handling is one of the most common causes of ill health at work. To help prevent MSDs try to avoid manual handling as far as possible.

Harmful dusts and chemicals

Roof work can involve exposure to many different dangerous dusts and chemicals, which might be harmful on contact or give off toxic fumes and vapours. Avoid using and generating such hazardous substances where possible. Where this is not possible, use the least hazardous product availablethat will still perform satisfactorily and control the work to minimise the exposure to any harmful substances. Sometimes exposure cannot be avoided; so to protect people it is very important to choose the safest method of work, considering the method of application. Remember also to use PPE such as masks and gloves, where appropriate, although this should always be as a final barrier, and provide workers with the appropriate information, instruction and training for the product that is being used.

Asbestos

Asbestos is the single biggest cause of work-related death in the UK. Asbestos-related diseases currently kill over 5,000 people a year in Britain. However, when asbestos is in good condition and is not disturbed or damaged there is a negligible risk. When disturbed or damaged, it can become a danger to health because asbestos fibres are released into the air and people can breathe them in. Although it is now illegal to use asbestos in the construction or refurbishment of any premises, many thousands of tonnes of it were used in the past in products like insulation for fireproof panels and in asbestos cement roofing material. Much of this material may still be in place. However, buildings built after 2,000 are unlikely to contain asbestos-containing materials (ACM). **NFRC has developed an asbestos awareness e-learning[7]** course aimed specifically at the roofing contractor, which is available to members at a discounted rate.

Lead

Lead remains a versatile and widely used material in roof work. It is used for flashing, rainwater goods and making difficult junctions watertight, as well as a roof covering in some instances. Working with lead can put workers' health at risk, causing symptoms including headaches, stomach pains and anaemia. Other serious health effects include kidney, nerve and brain damage and infertility.

Roof workers can be exposed to lead when:

- Carrying out hot work, cutting or joining lead materials.
- Removing or repairing old lead roofs.

Take into account any risks from lead before starting work. Where possible use alternatives such as glass-reinforced plastic (GRP), PVC, felt and plastics. Put in place steps to control exposure where lead is used. These include:

- Good welfare, including hot water, soap and towel for washing hands and face.
- A place to eat and drink away from the work area.
- Work methods that reduce the risk of exposure to lead fume and dust.
- Instruction and training for workers so that they understand the risks and the purpose of the control measures.

Silica

Silica is found in many types of stone and in concrete, including roof tiles. In dust form it will be released during cutting or grinding. Inhaling silica dust can lead to serious diseases, including lung cancer, and it is estimated that more than 500 workers die each year from these diseases due to silica exposure in the construction industry.

Even short periods of roof tile cutting can create high levels of silica dust. Where possible, cutting should be eliminated by using half, or one-and-a-half-size tiles. Where site cutting is needed, use water to stop the dust getting into the air. Modern cut-off saws have an attachment for a water hose.

Glues and solvents

There are a variety of roofing products that use or contain glues and solvents. They can present risks through:

- Breathing in vapours.
- Contact with the skin or eyes.
- Eating and drinking food with contaminated hands.

The main effects are:

- Irritation of the skin, eyes and lungs
- Headache
- Nausea
- Dizziness
- Light-headedness.

Exposure can also damage co-ordination and increase the likelihood of accidents such as falling off ladders. Workers may lose concentration on important/difficult tasks and those affected may react more slowly to dangerous situations. Very high exposures can cause unconsciousness and even death; for example, where adhesives are used in unventilated confined spaces or when there is a significant spillage. Many of these substances are highly flammable.

Vibration

Workers may be exposed to hand–arm vibration (HAV) when operating hand-held power tools such as cut-off saws or hammer drills. Regular and frequent exposure to HAV can lead to permanent ill health. Damage may occur to blood vessels, nerves and musculoskeletal structures. HAV can cause a range of painful and distressing symptoms including hand–arm vibration syndrome (HAVS) and carpal tunnel syndrome.

Noise

Frequent exposure to high noise levels causes irreversible damage to an individual's hearing, which may be accompanied by tinnitus *(a sensation of noises or ringing in the ears)*. The longer the exposure and the higher the noise level, the sooner this damage will become noticeable. Manufacturers and suppliers of equipment have to provide information on the noise that their equipment produces. Although loud noise is obvious, if someone must shout to be heard at two metres away for part of the day, then there is likely to be damaging noise exposure and ear protection should be worn.

Sun exposure

Roof workers will be significantly exposed to sunlight. They are therefore at particular risk from heat exhaustion and the effects of ultraviolet (UV) radiation on the skin. Cancer of the skin is one of the most common form of cancer, and simple precautions can significantly reduce the risks of skin cancer and heat exhaustion. For example:

- Wearing suitable clothing, such as long sleeves and trousers made from high-wicking material with UV protection as well as head protection.
- Using sunscreens of at least protection Factor 15.
- Taking suitable rest periods or rotating work to avoid lengthy exposures during the middle of the day.
- Regularly drinking water.
- Wearing UV-resistant eye protection.

SUMMARY

As stated at the beginning of this Guidance Note, this is just a short summary of the varied content within *HSG33*, which goes into more detail on not only on the topics set out in this Guidance Note, but also other topics such as the *Construction Design and Management (CDM) Regulations 2015*, issues for method statements in roof work, use of safety nets, use of personal fall protection systems, fragility testing, demolition involving asbestos cement roof sheets and edge protection. It is therefore important that you refer back to *HSG33* if you or the building owner, client, architect or principal contractor you work with, require more detailed guidance.

Further information

[1] HSG33 Health and Safety in Roof Work: https://www.hse.gov.uk/pubns/priced/hsg33.pdf

[2] NFRC guide to Roofing and Cladding in Windy Conditions: https://www.nfrc.co.uk/docs/default-source/publications/member-technical/windy-conditions-6-dec-2017.pdf

[3] NFRC Guidance Note 24 on working near gas flues: https://www.nfrc.co.uk/docs/default-source/publications/member-technical/mrk044-gn24-gas-flue-guidance.pdf

[4] NFRC guide to drone operation: https://www.nfrc.co.uk/docs/default-source/publications/member-technical/guide-to-commercial-drone-operation-4-jan-2018.pdf

[5] NFRC Safe2Torch principles: https://www.nfrc.co.uk/docs/default-source/publications/member-technical/guide-to-commercial-drone-operation-4-jan-2018.pdf?sfvrsn=2

[6] NFRC Guidance Note 11 on short duration work: https://www.nfrc.co.uk/docs/default-source/publications/member-technical/gn11-short-duration-roof-repairs---feb-2020.pdf

[7] NFRC asbestos training course: https://www.nfrc.co.uk/nfrc-members/training

Published by

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October 2022

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*Industrial hoist (image courtesy of HSS). **Temporary flat-roof edge protection (image courtesy of the Edge Protection Federation). ***Mechanical handling of large roof sheets (images courtesy of Advisory Committee on Roof Safety)

MRK048: v1.1a 10/2022