REPORT ON INSURANCE & FIRE SAFETY IN THATCHED PROPERTIES

for

THE DEPARTMENT of HOUSING, LOCAL GOVERNMENT & HERITAGE

November 2022

EXECUTIVE SUMMARY

The Department of Housing, Local Government and Heritage's strategy for vernacular buildings, *A Living Tradition*, recognises that obtaining affordable insurance is a persistent problem for owners and occupants of thatched properties and recognises the need for consistent, authoritative advice for owners and occupants, fire services, insurers and others.

In recent years, and since Brexit, the number of companies offering insurance for thatched properties has declined, part of a wider pattern within the insurance industry. In May 2022, OBF, the only domestic firm offering insurance for thatched properties to new applicants, had to stop offering new policies as its underwriter had reached its quota. It is understood that the reason for this was the level of recent claims in Ireland. Since then, many new applicants for insurance have not been able to obtain insurance for their thatched properties or have been offered insurance on unaffordable terms. There is a need to encourage new insurance companies into the Irish market to provide cover for thatched properties. This in turn may see a reduction in insurance premiums.

Consultation with property owners through a questionnaire survey produced a variety of useful data that has informed the current report. It was found that 40% of owners were aged 55-69 while 30% were over 70 years of age. This indicates that there is an aging profile of property owners, and this could result in thatched properties falling out of use if new owners cannot obtain insurance for mortgage purposes. With regard to existing insurance premiums, 35% were under €1,000 p.a. while a further 24% were between €1,000 and €1,500 p.a. Only 16% of existing premiums were over €2,500. However, for applicants seeking new quotes, 54% of the premiums were in excess of €2,500. This clearly indicates that there is a serious issue with affordability for new applicants.

Research has been undertaken by the writer with regard to fire safety in thatched properties. It is noted that there has been a substantial number of fires in thatched properties in Ireland in recent years. Consultation with fire officers indicates that at least 72 thatched properties have had fires in the last five years. Many of these fires appear to have been caused by chimney fires, often in conjunction with the use of solid fuel stoves. Studies in the UK have identified that the use of solid fuel stoves represents a real threat to thatched properties. One forensic study identified the use of stoves as the cause of a fire in 65% of fire incidents. By comparison, electrical faults were the cause in less than 5%.

Authoritative bodies, such as the Fire Protection Association, now strongly advise that 'Wood burning and multi-fuelled stoves are NOT recommended for use in thatched buildings as they have been demonstrated to present a greater risk to the thatch than other forms of heating INCLUDING traditional open fires.' This is largely due to the higher temperatures and stronger gas velocities that build up within flues serving stoves and the increased potential for large burning embers to be ejected from the chimney where they can land on the thatch and start a fire. Open fires burn at a much lower temperature and consequently there is less risk of embers being ejected from the flue in this way. Therefore, the use of wood burning and multi-fuelled stoves in thatched properties in Ireland should generally be discouraged. The selection of fuel for use in open fires has an important part to play in fire safety. Burning wet or poorly seasoned timber, or waste building materials, can lead to the build-up of tar deposits in flues. These tarry deposits are highly flammable and if ejected from a chimney have the potential to ignite thatch. Only dry, seasoned fuel should be burned in open fires.

A variety of relatively straightforward measures can be taken to improve fire safety. Regular cleaning of chimneys is essential. Where the advice not to use solid fuel stoves is disregarded, flues serving stoves should be inspected by CCTV survey at regular intervals. It should be understood that stainless steel flue liners have a relatively limited lifespan. The use of spark arrestors is no longer recommended – if they are to be retained, they should be cleaned every three months. Bird guards have an important role in fire safety and should be provided on all operable flues and chimneys. The use of fire-retardant sprays has potential to enhance fire safety in thatched properties. This report includes a fire safety checklist for owners and occupants of thatched buildings.

If an owner or occupant continues to use solid fuel stoves, strict safety and operating measures should be adopted at all times, in line with new guidance from the Fire Protection Association in the UK.

Most chimneys on traditional thatched buildings in Ireland are relatively low. The height of a chimney plays a role in ensuring that embers and sparks emanating from the chimney are carried high above the roof surface and blown away from the building and do not fall back on to the roof. There may be a benefit to raising the height of a chimney on a thatched building, to encourage sparks or embers to be blown away from the roof.

There is a need for specialist training in fighting thatch fires by fire services. Outline advice has been provided but it is recommended that Standard Operating Guidelines (SOG) for thatch fires be prepared in consultation with the DHLGH and senior fire officers.

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1. INTRODUCTION

The Department of Housing, Local Government and Heritage launched 'A Living Tradition: A Strategy to Enhance the Understanding, Minding and Handing on of Our Built Vernacular Heritage' in 2021. This recognises that the built vernacular heritage is a significant part of our cultural heritage and that the need for a strategy comes from the tendency, common to many other countries, for vernacular building traditions to be forgotten, to lose their usefulness, or to be cast aside.

The Strategy will be implemented over a three-year period, under three themes — understanding, minding and handing-on — with the aim of significantly improving the prospects for our built vernacular heritage. Each theme will be addressed by a number of actions. Action 6 aims to Enhance the Protection and Conservation of Historic Thatched Roofs. Action 6 notes that 'Insurance, in particular, has proved to be a constant problem for many owners and occupants. There is also a need for consistent, authoritative advice for owners and occupants, fire services, insurers and others.' The method identified for this is to 'Investigate and work to resolve the urgent issue of affordability of insurance for thatched buildings; examine other relevant issues, including thatching standards, fire prevention guidance and availability of appropriate thatching materials.'

This report has been prepared in response to this action. The report should only be seen as a first step towards tackling what is a very complex situation. The report has been prepared in consultation with staff at the Department of Housing, Local Government and Heritage.

2. INSURANCE – AN INTRODUCTION TO INSURING HISTORIC BUILDINGS

Insurance is an important factor in risk management for all buildings and serves to protect a building owner's investment in a property. Buildings of all types, not least thatched buildings, are vulnerable to a number of risks, such as flooding, impact damage, arson and most particularly, fire for its potential to cause complete or almost complete loss.

Insurance is a contract between an insurance company and a policy holder (the Insured), whereby the insurance company undertakes to provide compensation for a loss or damage in return for the payment of an insurance premium. Building owners are not generally obliged to insure their properties. An exception to this is where mortgage lenders require that mortgage holders insure any building on which there is a mortgage, although this is a commercial decision and not required by law.

2.1. Obtaining Insurance

The insurance of historic buildings, such as thatched buildings, is a specialised area, and advice from a suitably qualified and experienced consultant, insurer or broker is often necessary. The relationship between an insurance broker and a property owner can be the key to securing successful insurance for a thatched property. Where possible, a meeting between the property owner and broker on site can be very helpful and allows the broker to gather relevant information relating to the building's location, history, condition, occupancy and use as well as fire safety and security provisions.

A first step is to decide what elements of the property are to be insured. In some cases, a property owner may choose not to insure outbuildings, walls, fences, hard standing, etc., where they feel there is limited risk of damage to such features. This could assist in reducing premiums.

In most cases, insurance is provided on a total reinstatement basis. In a situation where a total loss occurs, this should provide the owner with sufficient funds to completely rebuild the property to the same design and quality, while using the same materials as before. Available funds should also include allowance for compliance with current legislation and building regulations, as and where appropriate. Such cover will also address a situation where partial loss occurs, which in the case of non-thatched buildings tends to be more common than total loss. However, total, or near total, loss appears to be more common in thatched buildings.

2.2. Reinstatement Values

It is the responsibility of the property owner, to ensure that a building is insured for a sum that would be adequate to undertake the reinstatement and repair of the building resulting from a loss to include temporary works, demolition of parts of the building, site clearance, removal of debris, propping or support of parts of a building and possibly adjoining buildings, as well as professional fees and any charges associated with reinstating the building. The reinstatement value should be sufficient to reinstate the building in accordance with the design, quality, and style of the building prior to the loss. It is very important to recognise that the reinstatement value does not correlate with the market value of a building. The reinstatement value and market value of a building are often widely divergent. In many cases, a building owner would be advised to seek professional advice when calculating the full reinstatement costs for insurance purposes. Reinstatement values should also be reviewed on a regular basis, particularly during periods of high inflation. Reinstatement values should generally be updated annually in line with the construction cost index – details of which can be obtained from the Society of Chartered Surveyors Ireland (SCSI). It should be noted that the SCSI's house insurance calculator is intended for modern speculative built houses and is not suitable for assessing the reinstatement value of a traditional thatched property. It is advisable that professional valuations are updated every five years.

2.3. Condition of Average

A 'condition of average' is commonly included in insurance policies. This is intended to protect an insurance company where a property is underinsured – in other words it is not insured for its full reinstatement value. The condition of average means that an insurance company will only settle a claim for loss in the same proportion that the sum for which a building is insured bears to the actual rebuilding cost as a whole. For example, if a building's correct reinstatement value is \in 300,000, but the building is insured for \notin 200,000, then the building is only insured for two-thirds of its actual reinstatement value. In this case, if damage amounting to \notin 100,000 is caused to the building, the insurance company is legally and contractually entitled to only provide a settlement of \notin 66,000 – in other words, two-thirds of the loss. The application of average by an insurance company can result in the settled claim not being adequate to repair the damage and can result in significant delays as well as hardship for a property owner. It is therefore important to ensure that a building is insured for its full reinstatement value and that this value is reviewed regularly.

2.4. Conditions and Exclusions

Most policies will contain various standard conditions and sometimes a list of exclusions. The Insured should always carefully read the content and wording of a policy and should note all restrictive exclusions and how they might affect any future claim. Different insurance companies will impose varying conditions and exclusions. These can also vary from individual policy to policy depending on specific circumstances relating to an individual property, the owner or occupier and the use of the property.

As part of this study, standard conditions set out in questionnaires and policy wording for ten insurance companies operating in Ireland and the UK were reviewed. These identified a number of commonalities which are summarised as follows:

Presence of a solid fuel stove or open fire – all ten companies sought this information.

Height of chimney above thatch – seven companies sought this information. Four of them stipulated minimum heights ranging from 1.2 to 1.8m.

Presence of a flue liner in chimney – seven companies sought this information. Three companies specifically required that flues are professionally lined and insulated.

Have the flues been inspected by chimney engineers – seven companies sought this information. Five companies had specific requirements that the flues are inspected either every three or five years.

Regularity of flue sweeping – all companies sought this information and generally required flues to be swept twice a year.

Presence of spark guards – eight firms sought this information. Several companies noted that the use of spark guards is no longer recommended. Two companies required that spark guards are cleaned every 3 months, while another two companies required that they are cleaned twice a year.

Presence of heat detectors within the thatched roof – five companies sought this information.

Testing of electrical installations – all companies sought this information. Seven companies had specific requirements that electrical installations be tested at regular intervals of either five or ten years.

Presence of fire extinguishers and blankets - most companies sought this information.

Presence of smoke detectors – nine companies sought information relating to the presence and number of smoke detectors. Seven firms specifically asked if smoke detectors are provided in attic spaces.

Has the thatch been inspected by a thatcher – six firms sought this information. Two firms required that inspections were carried out every five years.

When was the roof last thatched – six companies sought this information.

Use of flame-retardant sprays on thatch – four companies sought this information.

Restrictions on the use of barbecues in proximity to the house – three companies stipulated conditions in this regard.

Restrictions on bonfires in proximity to the house – five companies stipulated conditions in this regard.

It is evident that while there are a larger number of insurance companies offering insurance for thatched properties in the UK, this is on the basis that property owners comply with a range of standard conditions. Compliance with these standard conditions is likely to reduce the incidence of thatch fires and ultimately this is likely to reduce premiums. It would be beneficial if a common set of guidelines could be reached between insurers, brokers, property owners and the relevant authorities as to the most appropriate and effective fire safety standards for thatched properties in Ireland. Creating a standard underwriting baseline could in turn help to reduce premiums in Ireland.

2.5. Importance of affinity/group insurance schemes

The Department of Finance is the relevant department responsible for the wider insurance industry. The Department has emphasised the role that group insurance schemes can have in resolving specialist pinch points within the insurance sector. Such schemes have been successfully introduced in other areas identified by underwriters as 'high-risk', such as inflatable hire, equestrian and activity sports. Group insurance schemes offer many advantages. They provide collective purchasing power for property owners. They offer a centralised point of contact for insurers which can ease administration pressures. By demonstrating adherence to obligatory safety standards, it is usually possible to control premiums. Implementation of safety standards by property owners and close engagement with insurers and brokers is crucial to the success of group insurance schemes.

Further guidance on Insuring Historic Building is available in the DHLGH Advice Series publication, *Disaster - A Guide to Prevention and Preparedness in the Historic Built Environment - Disaster-A-guide-to-preparedness.pdf (buildingsofireland.ie)*

3. SUGGESTIONS FOR FIRE PREVENTION IN THATCHED PROPERTIES

Owners and occupiers of thatched properties have an important role in making such buildings safer. Many seemingly harmless day-to-day activities can pose a risk to a thatched property. It is important that property owners understand their own property's fire risks and use that information to reduce the risk of fire. Owners and occupiers of thatched buildings need to display a greater degree of vigilance than most other property owners. In many cases, it is better for an owner or occupier to take a tailor-made approach to making their thatch property safer, rather than a blanket application of best practice measures. Owners can consider the specific risks that relate to their property and weigh up the benefits of introducing different fire safety measures. Owners and occupiers should also consider the significance of their thatched property, as some interventions may require planning permission or consent from the local authority, where such buildings are protected structures. Fire safety measures should always be considered on a case-by-case basis, particularly when considering a historic thatched property. Nevertheless, many of the measures outlined below have wide application and are relevant to almost all thatched properties.

Chimney fires can occur in chimneys serving either an open fire or a stove and can occur in lined and unlined flues. They generally occur where a build-up of soot or tarry deposits in the chimney ignites. In the case of thatched roofs, there is a risk of sparks and lumps of burning tar being ejected onto the roof surface and there is a high likelihood of a chimney fire progressing to involve the thatch itself. Where the linings of the flue or chimney are damaged or in poor condition, such as in old brick chimneys, the flames may come in contact with the thatch, and cause the thatch to ignite from the underside.

High priority measures have been identified through a review of relevant research, as set out in chapter five.

3.1. High Priority Measures

3.1.1. Wood Burning and Multi-Fuelled Burning Stoves

On foot of investigations and testing undertaken in 2018¹, the Fire Protection Association in the UK has published *New Guidance for owners of thatched buildings with wood burning and multi-fuelled burning stoves* - FPA-Guidance.pdf (thatchadvicecentre.co.uk). At the outset, the guidance states that '*Wood burning and multi fuelled stoves are NOT recommended for use in thatched buildings as they have been demonstrated to present a greater risk to the thatch than other forms of heating INCLUDING traditional open fires.* 'It is the opinion of the present author, that this guidance should be adopted in Ireland. Where property owners wish to continue using such stoves, the new guidance as set out in Appendix 1 of this report, should be rigorously adhered to.

¹ Fire Protection Association *Fires in Thatched Properties with Wood Burning Stoves*. Historic England Research Report Series no. 49-2018

3.1.2. Cleaning Chimneys & Flues

Regular cleaning of chimneys and flues to remove soot and tar deposits is an essential fire safety measure. Soot and tar are combustible materials and not just a by-product of the burning of fuel. The *Fire Safety at Home* booklet, available on the Department of Housing, Local Government and Heritage's website, recommends that flues serving wood-burning stoves should be cleaned four times a year. Solid fuel open fires should be cleaned once a year if using smokeless fuel and twice a year if using coal.

The build-up of tarry deposits in a chimney flue is a common cause of chimney fires. There are chemical flue cleaning products available which help to remove tar from a flue. The product is sprinkled on the embers in the fire or stove last thing at night and more importantly, the night before a flue is swept. The product acts to dry out the tar deposits causing them to break up and loosen when the flue is swept. The treatment should be repeated at regular intervals to prevent new deposits forming – possibly once a month for an open fire and fortnightly for a stove. Routine sweeping and cleaning of the flue is still required. However, caution needs to be taken when using such products with stainless steel flue liners as the product is corrosive and could damage the flue liner. At the outset, a building owner/occupier should be aiming to minimise tar deposits by only burning well-seasoned dry timber - the use of chemical flue cleaners to remove tar deposits should not be seen as a panacea.

3.1.3. Chimney Height

Building Regulations in Ireland - TGD J Section 2.3.3. and Diagram 4 - states that where a flue serving a solid fuel appliance discharges '... on or near roofs with surfaces which are readily ignitable, such as thatch or shingle roofs, the clearance between flue and roof should be ... ' at least 1.8m above the roof surface. Where a solid fuel stove is being installed in a building it is a requirement that this regulation is fully complied with – otherwise the installation will be non-compliant. It is unclear how often chimneys are raised when solid fuel stoves are installed in thatched properties in Ireland. In the case of protected structures, raising the chimney will generally require planning permission. It should be noted that planning permission may not be granted where it is deemed that such a change would impact negatively on the significance and character of the property.

A chimney can be raised by adding a chimney pot and/or raising the height of the stack with a few additional courses of brick. Where a pot is being added to a chimney, it should be no more than 600mm high, as gases might condense on the inside of the cold chimney pot.

3.1.4 Chimney Bird Guards

Bird guards should be fitted to all chimney pots or flue outlets, irrespective of whether the flues are used or not. This will prevent the build-up of nesting material which can act as a moisture reservoir and a habitat for vermin or insects and can cause harm to the building fabric as well as building occupants. Bird guards with solid 'rain' caps, which direct the flue gases sideways, should not be fitted on thatched roofs as they may deflect burning embers onto the thatch, rather than letting them rise vertically on the thermal currents.

3.1.5 Chimney Spark Arresters

Spark arrestors are fine mesh cages/grilles which sit on the top of pots or flues. Spark arrestors require cleaning every three months, and if maintenance cannot be guaranteed, they should be removed. Without regular maintenance, a spark arrestor can become a fire hazard.

3.1.6. Heat Detectors

Heat detectors consist of sensors which are inserted into the thatch around the chimney and connected back to a control panel. They are connected to an audible alarm and give an early warning of overheating in thatch and the potential risk of a fire. Once the alarm is triggered, steps can be taken to reduce the temperature of the chimney, for instance, by extinguishing the fire in the grate or stove, inspecting the flue/chimney, dousing the thatch with a hose pipe, or phoning the fire service.

3.1.7. Inspecting Chimneys & Flues

Owing to the real risk of a chimney fire spreading to the thatch and causing potentially catastrophic damage, chimneys should be inspected periodically for signs of wear and tear. Chimneys are exposed to wind and weather externally, and the effects of hot acidic gases internally, so they are particularly susceptible to deterioration. The deterioration and erosion of mortar joints or rendered finishes to the exterior of the chimney can allow rainwater to enter the chimney where it can cause damp problems. Regular sweeping can also damage the old linings of a chimney. Historically chimneys were usually constructed from bricks with the inside face of the flue being given a coat of lime plaster, a process known as parging. The coat of lime plaster helped to seal the brickwork and protected the brickwork from the hot gases in the flue. It also provided a smooth surface which made for a more efficient flow of gases up through the flue and reduced the potential for soot to settle on rough brickwork. Over time the parging will inevitably break down. Vigorous chimney cleaning can damage the parging, causing it to break up or fall away. Where the parging has been lost or damaged, brickwork can become loose and unstable, and holes or gaps can open up between the bricks - brushing can also dislodge individual bricks. Damage to old flues like this is a very common occurrence in old chimneys. The gaps and open joints which can form in the brick flues can allow smoke and gases to escape into roof space or into the thatch where it could start a fire.

Dark brown stains on a chimneybreast, above a fireplace opening, or in a roof space, is a common sign that there is a problem with the brickwork lining the flue. The stains are caused by tarry deposits in the flue, which leach through the brickwork where the parging has failed or worn away. Owners should always take note of such staining. Building owner/occupiers should also take note of any signs of smoke blackening or staining of roof timbers and/or soot on surfaces and cobwebs in an attic space, as this is further evidence of a defect in the linings of the chimney. Such defects could allow a chimney fire to spread into the thatch, with devastating results. Where such staining is evident, it is recommended that the interior of the chimney is inspected by a chimney engineer using a CCTV camera. Ideally, the fireplace or stove would not be used until such an inspection has been undertaken and any necessary repairs have been made good. Smoke tests to BS 6461 can also be undertaken to establish if smoke is seeping through the walls of the chimney – this would again indicate that there are defects in the chimney should be inspected for signs of eroded mortar joints,

where the brickwork is exposed, or cracks in rendered chimneys. Any such defects should be remedied at the earliest opportunity.

Whenever the roof is re-thatched or re-ridged, it is good practice to strip back the thatch around the chimney so the brick and stonework to the chimney can be inspected at close quarters. The thatch should also be inspected for any evidence of charring. If gaps are found between the brick and stonework, these should be pointed up using a lime-based mortar or mortar to match existing mortar, before recommencing thatching.

Flue liners to solid fuel stoves should be cleaned regularly and should be inspected by a chimney engineer using a CCTV survey at least every three years for build-up of tarry deposits, wear and tear and physical damage. Stainless steel flue liners will not last for ever and will often require replacement after ten years or so, particularly if there is a build-up of tarry deposits as a result of burning inappropriate or wet fuel or incorrect operation of the stove.

Purchasers of a thatched property with an open fire, but in particular one with a solid fuel stove, should always have the chimney and flue inspected by a chimney engineer before using the fireplace or stove.

The condition of hearth stones should also be considered. Burning embers from an open fire can work their way into cracks in a hearth and can cause fires to the underside of a suspended timber floor.

Chimney engineers should preferably be members of the National Association of Chimney Engineers (NACE) or be HETAS trained or approved.

3.2. Other Measures

While the high priority measures have been identified above, based on the evidence about how fires start in thatched buildings, below are other measures which also form part of good fire safety practice in general.

3.2.1. Fire-resistant flexible membranes

Consideration on a case-by-case basis should be given to the use of fire-resistant flexible membranes when fully re-thatching older thatched roof structures. The membrane protects the thatch from a fire in the rooms below and also protects the rooms below from a fire in the thatch. The barrier can also serve to protect the building interior from water damage in the event of a fire.

3.2.2. Fire-Retardant Sprays

Fire retardants which are sprayed on a thatched roof have a role to play in reducing the potential for burning embers to cause the thatch to ignite. Where a fire has started, they may buy time while waiting for the fire service to arrive on site. The sprays usually consist of silicon-based compounds which are sprayed on the external surface of the thatch. These fire-retardant sprays are not the same as copper sulphate or bluestone sprays which are applied to thatch as herbicides to treat moss growth. Due to the leaching effects of the weather, and the natural wearing of the thatch surface, the life expectancy of such sprays may only be about five years and therefore re-treatment is recommended every five years. While some thatchers have concerns that such sprays reduce the lifespan of the thatch, firm evidence for this is not available. However, it may be better for owners and occupiers to take a 'better safe than sorry' approach and consider the use of fire-retardant sprays as a means of reducing fire risk.

3.2.3. Roof Spaces & Attics

The roof space or attic in a thatched property should be regarded as a high-risk area, The interior of an unlined thatched roof is dry, dusty, and flammable and there is a serious risk that a fire originating here could spread to the thatch, with devastating consequences. Smoke detectors should be provided in the roof space to provide an early warning of any fire in the roof space or the thatch itself. If there is more than one roof space, or the roof space is divided into two or more compartments, a smoke detector should be provided in each roof space. Smoke detectors should always be placed at the highest level within the roof space, to ensure early detection of a fire. Smoke detectors should also be interlinked so they trigger the alarms in the rest of the house.

Ideally, the roof space should not be used for storage. At the very least, the storage of combustible materials, known as the 'fire load', should be kept to an absolute minimum. Where old thatch and dust drops into the roof space, this should be cleared away periodically to reduce the fire load.

Access hatches, with a minimum size of $900 \ge 600$ mm, should be provided to each roof space to allow a firefighter with breathing apparatus to enter the roof space for fire-fighting purposes.

Particular care should be taken to inspect wiring in roof spaces for signs of damage or vermin attack. Bare uPVC wiring should never be left exposed in thatched roofs as vermin, such as mice, rats, squirrels, stoats and pine martens, will commonly gnaw on these wires. Damaged/gnawed cables can overheat and start a fire. Wiring should be contained in metal conduits, as plastic conduits are also at risk of being gnawed by vermin. Ideally, electrical installations and wiring should be kept entirely out of the roof space where it is out of sight and potentially out of mind. The use of halogen bulbs should always be avoided in roof spaces, owing to their tendency to heat up. Any lights in the roof space should be of the bulkhead type and should be fitted to a freestanding post so that it is not in contact with the roof timbers or thatch and cannot be damaged during routine thatch repairs. Switches should be positioned on the landing and not in the roof space, to reduce the risk of sparks. Many timber preservative treatments and insecticides are flammable and, therefore, their use in the roof spaces of thatched properties should be avoided as far as possible.

3.2.4. Kitchen Safety Practices

While most kitchen fires can be contained, there is an added risk where these occur in thatched properties. The Department of Housing, Local Government and Heritage have published a short booklet, *Fire Safety at Home*. This provides straightforward guidance on reducing the risk of fires in kitchens. It recommends that cookers and extractor fans are cleaned regularly as grease is a fire risk. Cookers should be turned off when not in use and should never be used to dry cloths. Chip pans are a high fire risk and, preferably, should not be used in thatched properties. Flammable items, such as tea towels, oven gloves and curtains, should be kept away from cookers and toasters. A fire blanket and fire extinguisher should always be provided in a kitchen. In addition, it is advisable never to leave the kitchen when cooking with fat and always to keep an eye on young children in such circumstances, given the risk that pots may be overturned.

3.2.5. Electrical Safety Practices

The most common causes of electrical fires are overloaded sockets, faulty appliances, and defective/outdated wiring and fuse boards. Thatched property owners and occupiers can take simple steps to reduce the risk of electrical fires as follows:

3.2.5.1. Appliances

Unplug appliances at night or when not being used. Only use appliances, such as dishwashers, washing machines and tumble dryers when the house is occupied and during the daytime, as these are a well-known fire risk. Keep appliances and cables away from water. Follow the manufacturer's instructions when using appliances. Charge appliances like laptops and phones on a hard surface – i.e. not on a bed or sofa, or near flammable materials, such as curtains or clothing.

3.2.5.2. Sockets & cables

Do not overload sockets and extension leads. Inspect sockets and switches for scorch marks. Plugs and sockets that heat up or trip regularly should not be used until they have been inspected by an electrician. Check cables and leads for signs of damage and fraying and replace if necessary. Keep cables away from sources of heat.

3.2.5.3. Adapters & extension leads

Avoid the use of block plug adapters, as these can over heat. Use bar extension leads instead. Keep extension leads unfurled to prevent them heating up.

3.2.5.4. Lighting

Keep lamps and bulbs away from curtains and other fabric. Use LED lighting or bulbs as these do not tend to overheat. Replace halogen downlighters with LEDs and avoid inserting downlighters in old lathand-plaster ceilings or into ceilings directly under thatch. If recessed downlighters are to be used, intumescent cones should be provided above them. Ensure all external halogen security lamps are positioned at least 1m away from a thatched roof.

3.2.5.5. Electric heaters

Keep electric heaters at least 1m away from furniture and curtains. Never dry clothing on an electric heater. Turn off and unplug heaters before going to bed. If the heater has signs of damage or scorch marks, do not use it. Always follow the manufacturer's instructions.

3.2.5.6. Electric blankets

Replace electric blankets every ten years. Only operate these overnight if fitted with a thermostatic control. Check blankets regularly for signs of wear and tear. Store electric blankets flat; do not fold or crease them as this can damage the wires in the blanket with consequent safety risks to the user.

3.2.5.7. Wiring in attics

Ensure that wiring in attic spaces is contained in metal trunking or conduits to prevent damage by vermin. Ideally, wiring should be kept out of roof spaces in thatched properties, owing to potential fire risk. Cables not in steel trunking or conduit should be positioned or otherwise protected to avoid damage caused by thatchers' fixings when re-thatching/repairs are being carried out. Cables and wiring should not be installed immediately under, through or over thatch. No electric wiring systems should be installed closer than 300mm to any wire netting applied to the thatch.

3.2.5.8. Incoming Power Supply

If the incoming supply is an overhead line, check with the ESB to ensure that it is the insulated type. This is important as firefighters will not be able to tackle a fire with live mains overhead.

3.2.6. Stored Materials

Flammable and combustible materials, such as oil for lawn mowers, farm machinery and other equipment, paint and aerosols, should all be stored in a way that minimises the risk to the thatched property. Ideally, such materials would be disposed of after use and should not be allowed to accumulate. Fuel, such as logs, but also wood pellets, should also be stored at a safe distance from the thatched property.

3.2.7. Building Works

Buildings often face an increased risk when building works or repairs are being undertaken. These risks are heightened when the subject building is thatched. Fire detection systems may be disconnected during such works, for instance. It is, therefore, extremely important to implement safe working practices when building works or repairs are being undertaken at a thatched property. In many cases, builders may be required to provide a specific risk management strategy.

Any operation which produces heat or sparks or involves open flames (known as hot works) should be avoided as far as possible. Many serious fires in historic buildings have been caused by contractors using heat-producing equipment. This includes operations such as arc welding, cutting equipment, blowlamps, bitumen boilers. For instance, when painting joinery, never use hot-air paint strippers or blow torches to remove old paint. Insurance companies may specifically preclude hot works at a thatched property and building owners should familiarise themselves with related wording in their policies. If hot works are allowed, then a system of hot works permits should be initiated whereby such works are monitored both during and after the particular activity for any evidence of flame or spark spread. Hot works should always be avoided in roof spaces. Smoking should also be forbidden on building sites. The use and storage of flammable materials during building should also be carefully managed to reduce risks. Fire extinguishers should be provided on site during the course of building works. Care should also be taken when using mechanical grinders to cut chases in brickwork when installing new flashings at chimneys owing to the risk of spark generation.

3.2.8. Holiday Rentals

Where a thatched property is offered as a holiday rental, it is important to recognise that the holiday makers or tenants may not be familiar with the fire safety risks associated with such buildings. Operators should ensure that adequate fire safety guidance is provided to all occupiers. This may include a simple operating manual, but also leaflets and signage. Given the heightened risk, it is recommended that solid fuel stoves are not operated in holiday rentals. Many tenant/holiday makers may not be familiar with the safe operation of such stoves and may inadvertently cause a chimney or thatch fire. Open fires are perhaps a lower risk, but they still represent a risk, and ideally would not be permitted.

4. SUGGESTIONS FOR FIRE MITIGATION IN THATCHED PROPERTIES

4.1. Owners/Occupiers

4.1.1. Fire (Smoke) Detection Systems

A fire detection and alarm system can significantly increase the level of fire safety in any property, not least a thatched property. Fire detection systems usually consist of a combination of smoke detectors which detect smoke, and heat sensors which detect a change in temperature in a room, and then trigger an alarm warning to building occupants. Such detectors play a crucial role in fire safety. Early warning of a fire or presence of smoke is the best means of ensuring human safety. Smoke, rather than heat or flames, causes most fire deaths and it can take as little as three minutes to die from breathing in smoke.

Technical Guidance Document (TGD) B of the Building Regulations deals with fire safety in buildings. TGD B Volume 2 deals specifically with dwellings. Section 1.3.6. of Volume 2 deals specifically with fire detection and alarm systems in dwelling houses. While the building regulations are aimed primarily at new buildings, they should be regarded as best practice for all existing buildings, including thatched properties. Fire detection systems should conform to I.S. 3218:2013: *Fire Detection and Alarm Systems for Building: System Design, Installation Commissioning, Servicing and Maintenance*. Section 1.3.6.1. advises that where there are multiple smoke and heat detectors, these 'shall be interconnected so that detection of fire by any one unit provides an audible alarm from each.' That is, if one smoke detector alarm goes off, the other alarms in a house will also go off, ensuring that occupants in different parts of a house are warned of a fire/smoke risk at the earliest opportunity.

Section 1.3.6.2 of TGD B Volume 2 identifies two principal categories of fire detection and alarm systems as follows:

LD2 - incorporates interconnected detectors in all circulation areas that form part of the escape route and in all rooms or areas, such as kitchens and living rooms, that present a high fire risk and in all bedrooms.

LD1 - incorporates interconnected detectors in all rooms as per the LD2 system but includes all spaces and areas such as attics and roof spaces in which a fire might start other than toilets, bathrooms and shower rooms.

Given the potentially high risk if a fire was to break out in a thatched property, particularly within a roof space, an LD1 system is the most appropriate level of fire detection for use in such buildings. Heat detectors should be provided in kitchens, to avoid smoke detectors being set off accidentally.

There are two principal types of smoke detector – ionisation detectors and optical detectors – and these respond to and detect smoke in different ways. The building regulations recommend that a mixture of these alarms is provided with as a minimum, an optical detector on the ground-floor of a house, and an ionisation detector on the first-floor.

Smoke detectors should be fitted to the ceiling, as close to the centre of a room as possible, but at least 300mm away from any light fittings. The Department of Housing, Local Government and Heritage recommends that alarms are tested once a week by pushing and holding the test button until it beeps. Batteries should be changed once a year and detectors should be replaced every ten years.

An additional level of safety can be provided by connecting the fire detection system to a remote alarm monitoring service. In the event, the fire detection system is activated and there are no occupants in the house, the alarm monitoring service will phone the building owner/occupant and/or the local fire service. While this could result in false alarms and call outs by a fire service, given the nature of thatched properties it is better to be safe than sorry. Monitored alarms are particularly beneficial where a thatched property is not a permanent home, where the building is in a remote location, or where a permanent home is not occupied for lengthy periods of the day, i.e. when occupants are at work.

4.1.2. Fire Extinguishers & Fire Blankets

It is recommended that suitable fire extinguishers and fire blankets are provided within all thatched properties. Fire extinguishers are given a code rating according to the size and type of fire they are able to extinguish. Code A is the correct type for extinguishing fires involving paper, wood, fabrics, and furniture, etc., but such extinguishers are not suitable for extinguishing electrical fires. A Size 13A extinguisher would probably be suitable for most thatched properties.

It is recommended that all thatched properties are provided with a 13A extinguisher, together with a 2.5kg dry powder extinguisher for electrical fires and a fire blanket. In the absence of a dry powder extinguisher, a fire blanket can be thrown over any small electrical device that is on fire. These should be positioned near the exit from the house in clear view of occupants – some of whom may not be familiar with the house. Extinguishers should be serviced periodically in line with manufacturer's recommendations. Out-of-date extinguishers may not be operational at exactly the time they are needed the most.

4.1.3. Chimney Fires

The tell-tale signs of a chimney fire include:

- A loud roaring noise, caused by the massive amounts of air being sucked up into the chimney
- Sparks, embers, and flames shooting from the chimney top
- Burning embers may fall down the chimney
- A glowing or vibrating appliance outlet or connector
- A rapid rise in temperature indicated by the stove thermometer
- Flames visible through any tiny cracks in the outlet or connector
- Smoke or smells noticeable in adjoining rooms or the attic space
- The chimney breast or flue pipe heating up in either the same room or other rooms they pass through

Where a chimney fire in any building is discovered by an owner/occupant, they should ensure that the stove door and vents are closed, close the door to the room containing the fireplace/stove to reduce the supply of oxygen, ring the fire service, and evacuate the house. A safety-first approach should always be taken by owners/occupiers if they try to tackle a chimney fire. In the case of an open fire, it may be possible to extinguish the fire in the hearth with a fire extinguisher or a bucket of sand. Externally, it would be prudent to start dampening the thatch around the chimney with water from a hose to reduce the risk of embers and sparks igniting the thatch if this can be done without risk to the occupants.

Once the chimney fire has been safely extinguished, it is recommended that the fire service remains at the property for at least one hour to check for any signs that the fire has spread into the thatch. Before reusing the fireplace or stove, the chimney and/or flue should always be inspected by a chimney engineer using a CCTV survey to determine if any damage has been caused to the chimney/flue. In the case of stainless-steel flue liners, it may be necessary to replace the flue liner after a chimney fire, particularly as the metal will have experienced both the heat of the fire and the cold shock of water used to extinguish the fire.

A chimney fire extinguisher is available which can stop a chimney fire without using water. It can reportedly stop a chimney fire in about 25 seconds. It does this by reducing the chimney temperatures as well as the oxygen levels in the chimney and has been in use in the USA for 40 years. The author cannot comment, however, on the effectiveness of this product.

4.1.4. Hose Pipes

A hose, sufficiently long to reach all parts of a building, and connected to a tap, should be available at all times. It is better that the hose is permanently connected to the tap to avoid any delays. This can be used by a building owner/occupier while waiting on the fire service to arrive. The hose can be used directly on any flames, but also to dampen the thatch and reduce the risk of ignition in the event of a chimney fire, bonfire, crop fire, wildfire, a fire at a neighbouring property or a vehicle fire, all of which might emit large burning embers which could cause the thatch to ignite. The hose should ideally be connected to the mains supply to ensure adequate pressure. If the mains water supply has low pressure and is unlikely to be able to direct water to the top of the roof – it is worthwhile doing a trial run to see if the pressure is adequate – consideration should be given to providing a high-pressure water hose or a high pressure washer machine of the sort used for cleaning driveways and cars. External taps should be lagged to prevent them freezing in cold weather, when the risk of a thatch fire is greatest.

4.1.5. Netting to Thatch

Where wire mesh netting is fixed to the outside of the thatch to protect it from vermin and birds, it is important that it is laid so it runs from ridge to eaves, and not side to side. This will ensure that it can be removed quickly by fire crews in the event of a fire. The edges of the netting should abut each other and not be overlapped, as this would delay removal of the netting and hinder fire-fighting operations. The edges of the netting should be secured by twisting the netting together using a metal hook.

4.2. Fire Services

There is limited guidance to Irish fire services for dealing with fires in thatched properties. The Fire Fighter Handbook, Senior Officer's Handbook and Standard Operation Guidelines provided by the DHLG&H at gov.ie - Fire safety in Ireland (www.gov.ie) do not contain any specific guidance on dealing with thatch fires. It is, of course, recognised that thatched properties make up a very small percentage of the overall number of domestic and commercial buildings in Ireland. Nevertheless, the preparation of Standard Operating Guidance for fighting thatch fires is strongly recommended.

The National Fire Chiefs Council in the UK provides some guidance on fires in thatched roofs – see <u>Fires in thatched roofs - FIB | NFCC CPO (ukfrs.com</u>). In the UK, the Institution of Fire Engineers (Specialist Interest Group for Heritage Buildings) has produced a '*Guide to Fire Fighting in Thatched Buildings*' (publication date unknown), in collaboration with English Heritage and Ecclesiastical Insurance. This is a practical and easily accessible guide for firefighters and those concerned with reducing the risk of fires in thatched properties.

A common approach to tackling a fire in a thatched roof is to form a break in the thatched roof ahead of the spreading flame. As the fire can spread unseen in the depth of the thatch, it can be difficult to determine where to make the break for it to be effective. In some cases, a fire will be so advanced, or the roof will be so small, that forming a fire break will be ineffective and the fire service will have to concentrate on pulling the burning thatch off the roof. The guide notes that 'The removal of thatch to create a fire break has the unfortunate consequence of introducing oxygen to the dry substrate and if it is too close to the already burning material the fire will spread even more rapidly rendering the fire break ineffective.' It is therefore important to ensure that any fire breaks are positioned at a sufficient distance from the actual fire to avoid introducing oxygen to the fire. Fire breaks should run from the ridge to the eaves for the full depth of the thatch. Fire breaks should also be of sufficient width to stop a fire jumping across. This, of course, may not always be possible with small houses.

It is noted that Thermal Imaging Cameras can be a useful aid when trying to establish the location of presence of a fire, but as thatch is a very effective form of insulation, it may hide the presence of a heat source from the camera. Inserting metal rods or probes into the thatch and leaving them to see if they heat up may, therefore, be a more effective means of fire detection in deep layers of thatch.

It is important that mesh on the roof is removed to allow for removal of burning thatch and when forming fire breaks. It should be noted that there is a risk of wire mesh becoming 'live' if it comes in contact with an un-insulated electrical supply close to the thatch.

Firefighters should review the stability of the roof structure and tall chimneys as these could be at risk of collapse during a fire where the thatch has been removed. Clay-based walls could also be at risk of collapse if large quantities of water are used.

The use of PPE is important to protect firefighters from smoke, but also thatch cinders, and fungal or mould spores from old thatch.

Use of water alone will not successfully extinguish a fire or prevent fire spread due to the nature of thatch, which is designed to shed water quickly off the roof. As a result, the water does not soak into the depth of the thatch. Fire can and will often spread through the lower layers or depth of the thatch. Sometimes there will be little external signs of this fire spread, and the fire can reappear further along the roof.

Aerial firefighting appliances are preferable to the use of roof ladders, as the latter may not provide a safe level of stability on a burning thatch roof.

Compressed Air Foam Systems (CAFS) can be used to create a fire break. The foam should be injected using a lance inserted into the thatch at regular intervals from the ridge down to the eaves and, preferably, on both sides of the roof. It is important that the lance is as thick as the thatch layers as otherwise a fire may spread through the lowermost layers of thatch and bypass the fire break. The survey of local fire authorities revealed that CAFS is used by fire services in Carlow, Longford, Louth, Laois, Donegal and Galway. It is not clear if CAFS is used by, or available to, all county fire services.

Small hand-controlled branches or hose reels with pulse spray jets can be used to tackle the fire and this will reduce potential water damage to property, and conserve water supplies.

Particular care has to be taken not to puncture or damage any fire-resisting board under the thatch. If such board is punctured, oxygen will be introduced to the underside of the thatch, causing it to burn more rapidly. Breaking through, or forming openings, in ceilings within the building can have a similar effect, but may allow a fire to be tackled from below.

When dealing with chimney fires, the firefighting crew should remain on site for at least one hour after a chimney fire has been extinguished to watch for signs of re-ignition. As noted above, thermal imaging cameras and metal probes can be used to locate an undetected fire at depth within the thatch. In the case of a serious chimney fire, consideration should be given to stripping the thatch around the chimney to reduce the risk of fire spread or escalation.

The National Society of Master Thatchers (NSMT) in the UK, in collaboration with the Hampshire Fire and Rescue Service have produced a video aimed at fire services to assist them in tackling fires in thatched properties. A link to this video is provided here - <u>Fire Service Training Video | How To Deal</u> <u>With Fires | NSMT (nsmtltd.co.uk)</u>. An aim of the video is to explain to firefighters how a thatched roof is constructed. This will give firefighters a better understanding of how to take burning thatch off a roof or form a fire break during a fire with a view to minimising damage to the building.

Property owners can assist the fire crew by having certain information to hand, such as the exact location of the nearest usable water supply, the location of any gas bottles, fuel tanks and overhead power cables, and whether the building is protected by a fire-rated barrier under the thatch.

5. RESEARCH FINDINGS

5.1. The Impact of Solid Fuel Stoves

Consultation with OBF identified a correlation between the presence/use of solid fuel stove and fire damage claims in thatched houses in Ireland. This has been acknowledged in the UK for many years. One UK study noted that 'The recent advent of the multi-fuel stove and its combination with inappropriate chimney linings has delivered a significant destructive threat to thatched heritage that will destroy many homes, and which, if not understood and controlled, will render thatched buildings uninsurable.'² The study furthermore advised that 'The simplest and most obvious advice to those asking about installing multi-fuel stoves in thatched properties is: Don't!'³ The National Society of Master Thatchers Ltd advise owners not to install or use a wood-burning stove and have been recommending this since at least 2008.

Furthermore, the Fire Protection Association in the UK state that 'Wood burning and multi-fuelled stoves are NOT recommended for use in thatched buildings as they have been demonstrated to present a greater risk to the thatch than other forms of heating INCLUDING traditional open fires.'⁴ This statement has been made on foot of studies undertaken at the Fire Protection Association's Research Laboratory as part of a study jointly funded by Historic England and NFU Mutual Insurance.⁵

Solid fuel stoves burn fuel at a much higher temperature than open fires. The gases which rise through the chimney, whether it is lined with a modern flue liner, or not, are consequently much hotter than in the case of an open fire. These hotter gases pose a significant fire safety threat. They can cause soot and tar deposits in a flue to ignite, and the gases can spread through defective chimney linings into the thatch and cause the thatch to ignite. The hotter gases also rise through the flue at a greater velocity than is the case in an open fire. This in turn can cause embers and sparks to be ejected out through the top of the chimney where they can then potentially land on the thatch and cause the thatch to ignite. This happens far less in open fires as the gas velocity is lower and embers tend to fall back down the flue into the open fire where they are safely consumed.

All in all, an open fire is a safer, albeit less efficient way of burning fuel and heating a room, because as the fire draws air into the room, cold draughts are generated and the volume of the colder room air mixed with flue gases means that less heat is going up the chimney and the problem is reduced. Thus,

² Angold, Roger and Sanders, Marjorie. *Managing Fire Risk in Historic Thatched Buildings*. Journal of Architectural Conservation. Vol. 13. No. 3. Nov 2007, pp. 57, 60.

³ Angold. 2007. p. 65.

⁴ Fire Protection Association. *New Guidance for owners of thatched buildings with wood burning and multifuelled stoves*. 2018.

⁵ Fire Protection Association. *Fires in Thatched Properties with Wood Burning Stoves*. Historic England Research Report Series no. 49-2018.

open fires with cooler flue gases are safer than stoves. Ultimately, the use of solid fuel and multi-fuel stoves in thatched buildings presents an inherent fire risk.

5.2. Burgoyne's Forensic Analysis of 148 Fires between 2008 and 2016

Publicly available data relating to the cause(s) of fires in thatched buildings in the United Kingdom is relatively limited. No such data is available in Ireland at present. Therefore, the findings of a study undertaken by Burgoyne's Consulting Scientists and Engineers is particularly important.⁶ Between 2008 and 2016 they have investigated 148 fires in thatched properties. The first phase of this study, undertaken between 2008 and 2013 found that of 103 fires:

- 82 fires originated in the thatch itself
- 66 fires occurred where a solid fuel or wood burning stove was in use
- 13 fires occurred where an open fire was in use
- 67 fires occurred where a flue liner had been installed
- 58 fires occurred where the chimney was less than 1.8m high

Further studies between 2013 and 2016 found similar patterns.

In addition, the time between the lighting of the stove or fire and the discovery of the fire was also examined and out of 80 fires for which timings were known:

- 31 fires occurred within 30 minutes of lighting
- 9 fires between 30 and 60 minutes
- 12 between 60 and 90 minutes

Thus, 52 of the 80 fires occurred within 90 minutes of the lighting of the stove or fire. It was noted that in several cases, fuel had been added to the appliance within 60 minutes of the fire being discovered. It was noted that as fires tend most often to be discovered within a relatively short time after lighting a fire, this would indicate that 'these fires in particular are best explained by embers produced during the lighting process, rather than heat transfer through the chimney structure to the thatch, which would require a prolonged period of operation.' This would indicate that the previously held belief that "more than 90% of fires in thatched properties are caused by faults in the flue or chimney" is not valid.

The causes of the fires in the study sample of 103 were found to be as follows:

- 64 fires ejected embers landing on the thatch and setting it alight
- 11 fires fire in the chimney

⁶ Benjamin, Keith of Burgoynes. *A survey of 148 fires between December 2008 and May 2016*. 2016. <u>Burgoynes</u>. Burgoynes is a firm of forensic investigators who investigate approximately 3,000 fires a year mainly on behalf of insurers, of which 15 relate to thatched properties

2 fires - chimney defect

5 fires - electrical fault

 $1 \,\, fire-bonfire$

18 fires – other – including fires caused in a garage, by a tumble dryer, downlighter, arson and hot works, such as welding/soldering elsewhere in the property

2 fires - unknown

The presence of flue liners and low chimneys in a large number of the fires was also noted. In 67 of the 103 fires, flue liners had been installed. While the installation of flue liners is often advocated for safety reasons, 'liners ironically have an increased tendency to carry embers from the fire on to the roof, especially when combined with the low chimneys often found in thatched properties.' The combination of a lack of cold air that would normally enter a chimney flue where an open fire is used, and the small diameter of modern flues compared with a traditional chimney, results in a strong draught soon after lighting. This draught can carry large embers from the fire out through to the chimney top where it can land on the thatch. With open fires, the draught is normally not sufficient to lift such embers the full height of the chimney flue and they fall back down into the fire where they are burned up.

In summary, Burgoynes have identified:

- A direct correlation between thatch fires and the use of solid fuel stoves even where flue liners are present
- A direct correlation with the presence of low chimneys, i.e. less than 1.8m high
- A correlation with dry weather, when the thatch is dry
- That spark guards do not necessarily prevent thatch fires and are clearly not 100% effective
- The provision of a flue liner will not necessarily prevent thatch fires and are clearly not 100% effective
- That most fires arise from ejected embers and not a defect in the chimney or heat conducted from the chimney through to the thatch

The report concluded that 'The evidence from this survey provides a strong association between thatch fires that started in the thatch and the use of wood burning stoves with lined chimneys below the current recommended height. It further supports the view that the majority of fires associated with chimneys arise from ejected embers, often generated during lighting the fire, rather than defects in chimneys or heat conducted through the structure.'

5.3. Fire Protection Association and English Heritage Study 2018

In light of the ongoing concern about the correlation between thatch fires and the use of solid fuel stoves, a study was undertaken by Dr James Glockling of the Fire Protection Association (FPA) - <u>Fires in Thatched Properties with Wood-Burning Stoves | Historic England</u>. This was jointly funded by Historic England and the National Farmers Union Mutual Insurance Society Limited. The study 'is confined to fire-raising in thatched properties from the operation of wood burning stoves. It does not address fire ingress resulting from external fire sources or other internal ignition sources.'

5.3.1. Mechanisms for Fire Raising/Ignition

The study considered and categorised potential mechanisms for 'fire-raising' in, or ignition, of thatch as follows:

a. Physical

Fire caused by hot/burning condensed material (tar) falling 'from the underside of a 'Chinese hat' rain guard, or spark arrestor on to the thatch. Unlike a spark emanating from the chimney such deposits will be heavy with much higher energy densities. Contributing factors to tar build up might include inappropriate fuel selection, product design and poor maintenance of the flue. Initiation might commence through poor stove management (high temperatures and high velocities).'

b. Direct Spark Ignition

'Emission of sparks, embers, and hot solid materials from the chimney which then fall back onto the thatch with enough energy at given conditions to ignite the thatch. Contributing factors to emission might include fuel type, fuel disturbance and the stove ventilation regime. Ignition propensity might be influenced by weather conditions, thatch condition, age, and type.'

c. 'Near [chimney] pot' fires

'Flames and fire product emission at the chimney which may ignite the thatch by radiation or dropping of flaming material. This may work in association with physical mechanisms described above. Examples include a chimney fire (ignition of soot/tar lining) or birds nest/blockage fire.'

d. Convection

This 'applies to the transfer of heat associated with the movement of hot flue gases in the flue to the thatch which it will heat and possibly ignite. Convective heat transfer depends upon there being a pathway for gases to flow and as such, in the case of this study, it specifically refers to circumstances where the brickwork, mortar, and or lining is imperfect, thereby allowing the thatch to be heated directly by the fire gases, or gases heated on the other side of a perfect liner. The 'desire' of gases to flow through any given path depends very much on the pressure regimes of the system and as such restrictions and blockages, soot built up over time (i.e. annulus of sweeping residue), or instantaneously (bird nest), may be important factors for consideration.' In reviewing this factor, the FPA considered examples of un-lined flues, blocked/restricted flues, lined uninsulated flues and flues with defective/damaged uninsulated liners.

e. Conduction

'Conduction refers to a mode of heat transfer that takes place through solid materials. In the case of this study, it refers to circumstances where brickwork and mortar in the chimney are free from defects and

conduction is the only way of directly heating the thatch. The rate at which heat is transported depends upon the physical properties of the solid and how the structure is made. Brick and stone are relatively poor conductors of heat, and will be slow to absorb heat, and slow to lose it.'

5.3.2. Study Methodology

The FPA developed a full-size rig with chimney, stove and thatched roof panels and monitored temperature as well as emission of sparks and embers. The stoves were operated at maximum capacity to a degree that was even unrealistic, so it captured worst case scenarios. The stoves were heated to such a temperature that special heat resistant garments had to be worn when operating and refuelling the stoves.

General conclusions found:

- 1. Sparks can issue quite readily during the ignition period when, under maximum likely ventilation, the lightweight fuels used for kindling may lift on the high gas velocities that occur within a narrow flue.
- 2. Some ignition methods and fuels, such as paper and card, create more sparks than others.
- 3. Some ignition methods create sparks of longer lifespan and weight which can reach well below the chimney exit point following emission this was particularly noticeable when using heavier paper materials, such as cardboard.
- 4. Some stoves might be more likely to eject sparks than others depending on the ability to introduce large quantities of air under the fuel bed (e.g. through an ash-pan door).
- 5. The process of riddling and refuelling increases the frequency of spark issue owing to the disturbance of lighter fuels in the fire bed and the breaking up of larger fuel types following combustion.
- 6. Birds' nests in the flue can be a significant safety hazard given their potential to turn to charcoal, which can produce heavy burning embers which are more likely to ignite thatch.
- 'Flue-top devices termed 'spark arrestors' seem to have little or no impact on spark mitigation. In fact, they may encourage emitted sparks to remain in closer proximity to the thatch.'
- 8. Thermal conductivity tests found that the temperature on the outside of the chimney where it is in contact with the thatch rarely exceeded 80°C. Therefore, 'the widely accepted idea that heat transfer by conduction (i.e. 'Heat Transfer Theory') is the predominant mode of fire raising in thatched buildings was not supported by the test data.'
- 9. 'To minimise the risk of fire raising, it is important that users follow the correct operating procedures for their stove and understand the safe limits of its operation. A stove pipe thermometer is a highly effective means of monitoring the safety state of a stove.'

The final overriding statement of the study was that 'Wood-burning and multi-fuelled stoves are NOT recommended for use for thatched buildings as they have been demonstrated to present a greater risk to the thatch than other forms of heating INCLUDING traditional open fires.'

5.4. Impact of Fuel Selection

The burning of inappropriate fuels and/or wet or poorly seasoned timber is a contributory factor to thatch fires.

Open fires and solid fuel stoves should not be used for the burning or disposal of waste materials, such as paper, cardboard, etc. in the manner of an incinerator, as this can increase the risk of accidental fires. Sparks or fragments of such lightweight materials can travel further, potentially up a flue and out onto a thatched roof. Burning of treated or painted timber or building waste timber should also be avoided as this can release noxious gases or lead to deposits in the flue/chimney.

The safest fuel is properly seasoned (in other words dry) timber. When first cut down, timber can have a moisture content of 65-90%, depending on the species. Seasoning the timber will remove this moisture. It is recommended that only timber with a moisture content of less than 20% is burned. Small hand-held moisture detectors can be used to measure the moisture content of timber and are widely used by owners/occupiers in Continental Europe. Natural air drying can take as long as 2 years. Alternatively, timber can be artificially dried in kilns.

Dry timber also burns more efficiently than wet timber and releases more energy or heat output. The Society of Master Thatchers states that when burning timber with a 60% moisture content, you need to burn three times the timber, to get the same heat output that would be achieved by burning timber with a 25% moisture content.

Timber should always be stored in a way that allows air circulation around it and protects it from rain, snow and flooding. It is preferable to store and season timber outdoors as it can sweat when stored indoors and sap drawn to the surface tends to condense on the surface of timber rather than evaporating.

The burning of wet timber can result in the build-up of tar or creosote in the chimney, irrespective of whether the chimney is lined or not. When wet timber is burned, the water vapour that is released can combine with the gases and particulates that go up the flue to form a creosote-like substance that hardens to form tar on the internal surfaces of the chimney or flue liner.

Shutting a stove down to 'slumber mode' will also increase the amount of soot and tar produced as there is an incomplete combustion of the fuel as it is starved of the oxygen needed to ensure a clean burn of the fuel. This tar is flammable and can cause chimney fires. This tar build-up can also restrict or block flues and chimneys. This tar is acidic in nature and can also cause metal flue liners to corrode. This can result in holes or perforations forming in the flue liner, allowing heat and hot gases to escape into the chimney, and potentially into the thatch. The tar deposits can readily ignite in the right conditions and thus can cause a fire in the flue or chimney, which in turn can spread to the thatch.

It has not been possible to identify verifiable data relating to the burning of peat in stoves. Creosote is released by burning peat and tar-like deposits are often found in old open chimneys where peat has been burned for long periods and therefore it is assumed that tar deposits could form in flue liners where peat is burned, particularly if the peat is not fully dry. It is noted that commercially available peat briquettes are artificially dried. By contrast peat or turf cut locally by families and neighbours is dried naturally and tends to retain a high level of moisture. It should be noted that peat should not be burned in wood burning stoves. Peat should only be burned in multi-fuel stoves and only after seeking confirmation from the stove manufacturer owing to the risk of the stove over-heating.

If the smoke emitted from a chimney is black, it is a clear sign that the timber is too wet, or inappropriate materials are being burned. If the glass to the door to a stove is blackened, it is highly likely that tar is also building up in the flue/chimney. Staining or deposits on bird guards and spark arrestors are another sign that either inappropriate fuel is being burned or that the stove is not being operated correctly and that tar is likely to be building up in the flue. When sweeping chimneys or flues, the debris should be inspected for signs of tar build-up. Soot should be a fine granular powder, but tar will break away as lumps. If lumps are found, further inspection/maintenance work is necessary.

Given the risk that tar deposits can ignite and cause chimney fires, it is recommended that where stoves are in use, that chimney flues are inspected every three years for evidence of tar deposits or damage to the flue liner.

5.5. Flue Liners

Extreme care needs to be taken when installing flue liners in old single-skin brick chimneys that were never designed to cope with flue gases at high temperatures. In many cases, flue liners are not installed correctly. Incorrectly installed flue liners can cause fires. In Ireland, it is unclear if flue liners are always installed in full accordance with the Building Regulations.

In Ireland, TGD J of the Building Regulations sets out guidance for the installation of heat-generating appliances as well as flues and flue liners. It should be noted that where a new heat-generating appliance, such as a stove or boiler, or for that matter a new flue liner, is installed in any building, thatched or not, any such installation must comply with TGD J. All flue liners should comply with TGD J. The following sections of TGD J are noted as relevant to the current study.

'Section 1.4.8 Repair or reuse of existing flues or chimneys

1.4.8.1 Where it is proposed to bring a flue in an existing chimney back into use or to re-use a flue with a different type or rating of appliance, the flue and chimney should be checked and if necessary altered to ensure that they satisfy the requirements for the proposed use.'

1.4.8.2 Defective flues may be relined using materials and components described in Sections 2, 3 or 4 depending on the type of appliance proposed. Chimneys should be swept before relining to remove deposits. A flue may also need to be relined to reduce the flue area to suit the intended appliance as oversize flues can be unsafe.

1.4.8.3 Where a metal liner exists and the appliance is being replaced the condition of the metal liner should be checked and replaced where necessary.

1.4.8.4 Rigid stainless steel flue liners and flexible flue liners, appropriately designated in accordance with I.S. EN 1856-2:2009 to suit the appliance and fuel type, may be used to reline a chimney.

Technical Guidance Document J sets out the requirements for distances between a chimney and combustible material, such as thatch or structural timbers. Section 2.5.6 Combustible material states that:

Combustible material should be separated from a masonry chimney or a flue block chimney by at least the following distance:

(a) 200 mm from a flue, or

(b) 40 mm from the outer surface of a chimney or fireplace recess unless it is a floorboard, skirting, dado or picture rail, mantelshelf or architrave.

Metal fixings in contact with combustible materials should be at least 50 mm from a flue (see Diagram 6). 7



With some smaller chimneys, it is not possible to install a flue liner and maintain a 200mm distance between the inside edge of the flue liner and the combustible thatch without adding the 40mm air gap around the outside edge of the chimney. On larger chimneys where a distance between the inner surface of the flue liner and outer surface of the chimney stack of 200mm or larger can be achieved TGD J permits combustible materials to touch the outside of the brickwork.

⁷ TGD J: Heat Producing Appliances. 2014. p. 22.

It can be difficult to fit flexible flue liners in such a way that they are located in the centre of an old chimney flue, without touching the sides of the old chimney flue and that the 200mm dimension is maintained on all sides of the chimney that are in contact with combustibles. Often the flue liner will slump or snake and lean against the old chimney flue. Most flexible liners, being supplied coiled, are likely to make contact with the stack at several points, particularly in narrow and angled chimneys where spacers cannot be used. In such circumstances, the flue liner will be within 200mm of the combustible thatch. Contact with the old flue in only one location is sufficient to permit heat transfer into the thatch. If the liner snakes to a position closer than the allowed 200mm to combustibles, the chimney will not comply with TGD J; in effect, it will not comply with the building regulations, and may cause a localised hot spot that could possibly cause a fire.

It should be noted that steel flue liners, whether they are single or double skinned, flexible or rigid and insulated, will give little protection against the effects of a chimney fire, particularly where a chimney fire is caused by the build-up of tarry deposits within the flue liner. The flue liners will often be damaged by the high temperatures produced during the chimney fire and may need replacement afterwards. It is unclear how often this occurs following the extinguishment of chimney fires.

In the UK, the Institution of Fire Engineers states that 'Single skin flexible liners are unsuitable for wood burning stoves and where fitted should be replaced as soon as possible with a suitably insulated liner.'⁸ The Institution advises that double-skin flexible liners that have a spirally wound outer skin and a smooth inner flue can be used in re-lining old chimneys, but notes that their life can be reduced to under 5 years where there is a build-up of corrosive soot and tar.

Both flexible and rigid metal flue liners have relatively limited design lives of perhaps 10-15 years, but that is entirely dependent on them being installed in accordance with the manufacturer's instructions and that they are used correctly with appropriately seasoned/dry fuels. In many cases, flue liners will have deteriorated and no longer be performing safely and may be a real fire hazard. Solid flue liners made from pumice, fire clay, ceramic or refractory concrete have longer design lives and are better able to withstand the heat from a chimney fire than metal liners. However, installing solid flue liners tends to be more expensive, more invasive and damaging to the building fabric and it may be necessary to break out sections of the chimney to allow for their installation.

Section 2.5.10 of TGD J, dealing with Rigid or Flexible Flue Liners, states that

'Stainless steel rigid or flexible flue liners complying with the appropriate designation of I.S. EN 1856-2:2009 and meeting the performance level specified in sub-section 2.5.7 may be used in an existing chimney.

Flexible metal flue liners should be installed in one complete length without joints within the chimney. When being installed for a solid fuel appliance in a flue lined chimney it should be sealed at the top and

⁸ Institution of Fire Engineers. *A Guide to Fire Safety in Thatched Buildings*. 2018. p. 12.

bottom, the space between the chimney and the liner should be filled with an appropriate insulating material (see sub-section 2.5.3), unless this is contrary to the manufacturer's instructions.

Flexible flue liners may not be appropriate for large non-lined chimneys without specialist advice.' Many chimneys in traditional thatched properties would fall into this last category. Stand-alone metal 'system chimneys' should comply fully with Section 2.5.7., 2.5.8 and 2.5.9.

It is unclear if flues in Ireland are generally insulated in accordance with TGD J Section 2.5.10. Where a flue liner is installed in an old chimney and the chimney is sealed without provision for ventilation, hot air can build up around the flue liner. The flue liner can heat the air trapped in the confined space of the chimney to a temperature high enough that heat transmitted by thermal conductivity through the brick wall of the chimney into the thatch could be sufficient to ignite the thatch.⁹ While the FPA report has found that thermal conductivity is far less of a hazard than previously believed, thermal convection, where hot gases pass through faulty chimney linings has the potential in extreme cases to cause thatch to ignite deep below the surface of the roof.

It was noted that many insurance companies in the UK require that flues are inspected by a registered chimney engineer on a periodic basis (usually 3-5 years). Such inspections use a CCTV camera to inspect the interior and exterior of the flue liner for evidence of physical damage and build-up of soot or tar deposits. These inspections are not the same as routine chimney sweeping. It is unclear if such inspections are regularly carried out in Ireland, and it is, therefore, not possible to comment on the general condition of flue liners in thatched buildings in Ireland.

5.6. Heat Detectors

It is unclear how widespread the use of heat sensors is in Ireland. Installation costs and annual maintenance/testing programmes are likely to mitigate against their use. It is essential that they are installed correctly and maintained to prevent fault alarms and/or ineffective detection of changes in temperature within the thatch.

5.7. Spark Arrestors

Spark arrestors are fine mesh cages/grilles which sit on the top of pots or flues. They are intended to catch smouldering embers exiting the flue and prevent them landing on the thatch roof. They also prevent rain coming down the chimney, can improve chimney draw, and prevent birds nesting in a chimney.

⁹ Angold. 2007. pp.68-9

However, the Fire Protection Association study found that it was questionable whether spark arrestors had any impact on spark mitigation and reduction of fire risk.¹⁰ During tests a number of different spark arrestors were tested, including open-topped arrestors and capped arrestors. In each case, sparks were seen to be emitted from the chimney top, even where a spark arrestor was in place. Notably, where capped arrestors were tested, it was found that 'with gases directed horizontally by the cap the sparks tend to swirl around in the proximity of the device and thereby remain closer to the thatch', thus potentially increasing the risk of ignition of the thatch.

There is also a tendency for the mesh on the arrestor to clog up with tar deposits where inappropriate or wet fuel is burned. This can, in fact, increase the risk of fire due to the potential for this combustible material to catch light and then drop onto the thatch. ¹¹ Thatched property owners should be vigilant about inspecting spark arrestors and should take note if the spark arrestor is dirty or appears to be clogged with tarry deposits. Insurance companies commonly set conditions regarding the cleaning of spark arrestors typically every three months or twice a year. In practice it is unclear how often spark arrestors on thatched buildings are cleaned in Ireland and it would seem highly unlikely that spark arrestors are being cleaned every three months. It is also noted that there is considerable potential to cause damage to the thatch during such cleaning operations if not done carefully.

5.8. Bird Guards

Birds particularly jackdaws, can build a nest in a chimney extremely quickly, often in a matter of days. Many building owners will be completely unaware of this activity, particularly if the thatched property is not occupied on a permanent basis, e.g. if it is used as a holiday home. Metal bird guards will prevent the construction of nests in chimneys and can be used on flues for both open fires and solid fuel stoves.

Bird guards should be cleaned periodically to prevent the build-up of combustible tar deposits which can also restrict the passage of flue gases. Where the bird guard is notably dirty with soot or tar, it can be indicative of a number of serious issues, such as the burning of inappropriate materials, wet timber or the build-up of soot or tar within the flue which in turn could result in a chimney fire. It is a general recommendation that all chimney/flue outlets are provided with bird guards.

5.9. Fire Retardant Sprays

When applied correctly, a fire retardant can slow the spread of a flame and prevent sparks or embers establishing in the thatch and causing it to ignite. Note: these sprays are not the same as blue stone sprays which act as a fungicide. The retardant will 'foam up' or intumesce to form a carbonised char, which binds the thatch stems together, cutting off the supply of oxygen to the fire, delaying the spread

¹⁰ Fire Protection Association. *Fires in Thatched Properties with Wood Burning Stoves*. Historic England Research Report Series no. 49-2018. pp. 41-45

¹¹ SPAB. Fireplaces, Flues and Chimneys, p. 28

of flame, and lowering the radiated heat output. The idea of the spray is to 'buy more time', so that the fire service have a greater chance of extinguishing a fire before it fully develops.

The spray is applied directly to the external surface of the thatched roof and penetrates the stems of the thatch, forming a thin protective layer on the surface of the thatch stems. It is not known to what depth the spray penetrates, but one supplier indicates that it penetrates up to 75mm. The spray is applied at an upward angle and under pressure to ensure that it penetrates into the thatch and doesn't just run off the roof. Suppliers generally issues a Certificate of Completion which is valid for 5 years after which reapplication is required. Suppliers state that their product is environmentally friendly, contains preservatives and retards bacterial, fungal and vegetative growth, such as moss. They also state that fire penetration may be delayed for over 30 minutes, with no spread of flame. These fire retardant sprays have been tested in accordance with BS476 Part 3 or ENV 1187:2002 – Test 4.¹²

There is some debate as to whether these sprays shorten the lifespan of the thatch itself, but there is no firm evidence for this and no trials or tests appear to have been undertaken in this regard. The potential to reduce the risk of fire might be regarded as a sufficient incentive to accept some impact on the lifespan of thatch and, therefore, the potential need to renew/repair thatch on a more frequent basis.

5.10. The 'Dorset Model'

The Dorset Model is a code of practice from the Dorset Building Control Technical Committee, for newly built thatched properties and extensions to existing thatched buildings where the distance to the boundary is less than 12 metres. The 'Dorset Model' has been jointly produced by local authorities across Dorset in conjunction with Dorset Fire & Rescue Service, the National Society of Master Thatchers, and following consultation with the National Inspection Council for Electrical Installation Contracting and the Building Research Establishment Ltd. The model is based on a premise that the thatch can be made sacrificial in the event of fire and recommends that a rigid separating barrier of at least 30 minutes fire resistance (insulation and integrity) is installed under the thatch. This then protects the thatch from a fire in the rooms below and also protects the rooms below from a fire in the thatch. The barrier can also serve to protect the building interior from water damage in the event of a fire.

In order to comply with the Dorset Model, a number of requirements have to be met, as follows (please note that all references are to British regulations, as this model was developed in the UK):

- 1. Rafters are to be overlaid with a minimum 30 minute (60 minute is optimum) fire barrier (integrity and insulation) and this barrier should also be water resisting; 50 x 25mm battens are recommended on a micro-porous boarding to allow the thatch to breathe.
- 2. The chimney, including the pot, should terminate at least 1.8m above the height of the ridge. Due to the risk of condensation forming within the flue as hot gases cool, the chimney pots itself should be no more than 600mm high.

¹² Institution of Fire Engineers. A Guide to Fire Safety in Thatched Buildings. 2018. p. 17.

- 3. A domestic mains and battery powered interlinked smoke alarm system will be required with one smoke alarm fitted in the roof void. The system should generally be in accordance with that specified in Approved Document B to B.S. 5839 Pt. 6: 2004
- 4. A terrace of thatched properties may not consist of more than three thatched dwellings together.
- 5. The use of intumescent mastic is required to help seal the fire barrier along all its junctions.
- 6. The written comments of the adjoining property owner may be requested by the local authority for consideration.

The Dorset Building Control department may require additional measures in some cases, such as:

- 1. The provision of a loft hatch is recommended for fire-fighting purposes. The minimum recommended size is 600mm x 900mm.
- 2. Advice should be sought from an approved electrical contractor regarding the most appropriate type of wiring system. Effects from rodent damage and straw debris need to be considered and the National Inspection Council for Electrical Installation Contracting have issued guidance to their members.
- 3. It is NOT recommended to install recessed lighting into the ceilings below the thatch. Light fittings within the roof space to be in a bulkhead fitting. External floodlights should not be located under the eaves of the thatch.
- 4. Spark arrestors on the flues are NOT recommended because they can clog and restrict the flow of flue gases.
- 5. It is recommended that an external water tap supplied from the rising main is fitted with a hose capable of reaching all parts of the roof.
- 6. Any metal plumbing in the roof space should use compression joints to avoid the use of blow torches.

It is very important that building owners and the fire service understand the purpose of the fire-rated barrier under the thatch. If the fire rated barrier is pierced or damaged, it will negate the purpose of the barrier as it will allow fire to spread either from the thatch to the interior or from the interior to the thatch. The breach may also feed oxygen to the fire and will also allow water into the building interior.

It is recommended that the Dorset model should be adopted for all new thatched buildings in Ireland. It should also be adopted where a thatched roof is being replaced or reinstated in its entirety (thatch and roof timbers). Where a thatched property is modern, or has a modern roof structure, the Dorset model can also be adopted in Ireland.

5.11. Flexible Fire-Resistant Membranes

While the Dorset Model relies on the use of a rigid fire rated barrier, flexible fire-resistant membranes are also available. These flexible membranes can be used where the roof rafters are not straight or level, making the use of rigid fire boards impractical and are marketed as being water resistant and breathable. Such membranes could also be used in an Irish context.

The membrane should ideally offer a 60-minute fire barrier in accordance with BS476 Part 3 for penetration or ENV 1187:2002 – Test 4. It should be noted that the use of a flexible fire-resistant material as a fire-resisting barrier in new buildings is not considered acceptable for the purposes of the Dorset Model.

As the membrane is laid under the thatch, the underside of the thatch will not be visible from the building interior. This could, therefore, adversely impact the special character and significance of historic thatched buildings and therefore any proposal to integrate such membranes must be made on a case-by-case basis. Where a thatched property is a protected structure, planning permission may be required where the use of such membranes may affect the character of the subject building.

Consideration on a case-by-case basis should be given to the use of fire-resistant flexible membranes when fully re-thatching older thatched roof structures.

5.12. Active Fire Suppression Systems

Fire suppression systems, such as sprinkler systems and misting systems, have a part to play in fighting fires in buildings, both modern and historic, large and small. They use a liquid, such as water, or a gas, to extinguish a fire once it is detected. They usually operate on a localised basis, i.e. a fire located in an individual room will not activate the sprinklers throughout a building, but only in direct proximity to the fire. The advantages of such a system are that a fire is extinguished quickly, if not immediately, and that damage caused by fire, smoke as well as water is dramatically reduced.

In the case of a thatched property, a sprinkler or misting system could be used to extinguish a fire locally within the interior before it spreads to other parts of the building, or to the thatched roof. Sprinklers or water heads can also be mounted on the exterior of a roof so they extinguish a fire that starts on the roof surface as soon as it is detected. Such a system has been installed at Queen Charlotte's Cottage at Kew Gardens in London. Similar 'drencher' systems are used in South Africa, where there is a greater risk to thatched buildings from grass or wild fires. Due to the cost of installation and maintenance, sprinkler systems are not regarded as a practical fire safety measure for most thatched buildings but they may have relevance when considering the fire safety of highly significant thatched buildings.

An alternative fire suppression system uses canisters containing an aerosol chemical particulate to fight a fire through chemical action on the fire. The particulate stays in suspension in the air and fills the attic void. The system is installed in an attic or roof space within a house and is connected to a heat sensor which, when triggered, causes the canister to release the particulate spray into the air. This system is designed to tackle a fire that starts in an attic or has spread to the attic from elsewhere. Its application is, therefore, limited, and it is noted that if the fire has started on the external surface of the thatched roof, it is likely that the fire will have developed in severity by the time the fire reaches the roof space. Again, it is likely to buy time and it may of course help in protecting life. The suppliers claim it is easy to install, environmentally friendly and has a 20-year design life.

6. CONSULTATION WITH FIRE OFFICERS

Information has been received from 27 local authorities. Summary findings include the following:

- Respondents reported a total of 72 fires in thatched buildings over the last five years, of which 63 related to domestic premises, 4 to outbuildings and 5 to commercial premises.
- As specific details relating to thatch fires are not routinely collected on a national basis, it is not possible to determine if there has been a recent increase in the incidence of fires.
- However, several respondents noted that most fires were related to chimney and stove fires.
- Fire services do not generally investigate the cause(s) of fires.
- Unless a fire is caught early, a standard approach to firefighting would be to pull the burning thatch off the roof and to prevent fire spread. This can be a laborious and potentially dangerous process, particularly if aerial appliances are not available.
- Some respondents suggested that an effective way of extinguishing fires in thatched roofs can be to inject CAFS (Compressed Air Foam System) into the thatch using a lance. However sometimes it is too dangerous to have firefighters climb onto the roof using ladders to carry out this task.
- Several respondents suggested that fog nail or fog spike branches may be an effective means of dealing with fires. These are lances can be used to pierce the thatch and deliver a fine water mist which can rapidly absorb heat from hot flames and smoke. This can slow the spread of fire.
- Firefighters generally do not receive specific training in dealing with thatch fires given the relatively small number of thatched buildings in the Ireland and the low incidence of thatch fires overall. All respondents felt that some specific training would be welcome.
- As a means of reducing risk, several respondents recommended not burning solid fuel in stoves or open fires; ensuring that stoves are fitted correctly; not burning wet or unseasoned timber; provision of heat detectors in proximity to the chimneys; and increasing the height of chimneys
- Complete loss of a thatched property appears to be a common occurrence.
- It is the author's opinion that additional training in fighting fires in thatched buildings together with the adoption of enhanced safety measures by building owner/occupiers, should help reduce the prevalence of total loss occurring.
- The occasional practice of pushing in walls should be reviewed on a case-by-case basis.

7. CONSULTATION WITH OWNER/OCCUPIERS OF THATCHED PROPERTIES

A notable element of the current study was the circulation of a questionnaire to owners and occupiers of thatched properties in Ireland. The purpose was to gather information relating to thatched buildings in Ireland, including patterns of ownership and occupancy, the presence of specific safety features in these buildings, the prevalence of fires in thatched buildings, details of insurance premiums, and specific conditions set by insurance companies. A total of 482 responses were received, possibly representing about a quarter of the surviving thatched buildings. Not all respondents answered all relevant questions, and this is noted below as appropriate. Only 53% of the respondents have house insurance. Some of the principal findings of the survey are as follows:

7.1. Type of property

There were 477 responses to this question.



7.2. Age of thatched property

There were 477 responses to this question.



7.3. Roof covering type

There were 470 responses to this question.



7.4 Does your thatched property have any of the following?



There were 475 responses to this question.

7.5. Do you or your thatcher apply a fire-retardant spray to the roof?

There were 444 responses to this question.



7.6. How long have you or your family owned the property?

There were 449 responses to this question.



7.7. Age profile of occupant/owner

There were 474 responses to this question.



7.8. Are you interested in being contacted about forming a thatched property owners' group



There were 465 responses to this question.

7.9. Was it difficult to get insurance?

There were 248 responses to this question.



7.10. Number of years with your current insurer?

There were 251 responses to this question.



7.11. Is the thatched building insured in its own right, or along with farm buildings, farm machinery, etc.?

There were 248 responses to this question.



7.12. How much is your current premium?

There were 243 responses to this question.



7.13. For how much is your house insured?

There were 241 responses to this question.



7.14. How much has your premium increased in recent years?

There were 211 responses to this question.



7.15. Has the insurance company specified any of the following conditions or fire safety measures?

There were 198 responses to this question.



7.16. If you received a quote, what was the annual premium quoted?

It is assumed that respondents in this situation did not already have insurance in place. There were a total of 70 responses to this question.



7.17. Why were you unable to take out property insurance?

There were 90 responses to this question.



APPENDIX 1 FOR THE FIRE PROTECTION ASSOCIATION'S GUIDANCE IN RELATION TO SOLID FUEL STOVES

The FPA guidance comprises a set of actions that should be taken by householders to reduce the risk of fire in thatched roofs from wood-burning and multi-fuel stoves. These actions are in addition to the stove manufacturer's operating instructions, applicable building regulations and any insurance policy conditions.

1. Chimney Height & Sweeping

'Sparks and embers, apart from those generated by chimney fires, are generally of low energy with a short lifespan. Increasing the distance between the top of the chimney and the thatch (by raising the height of the chimney, adding a chimney pot, or reducing the thickness of the thatch) will result in fewer active sparks reaching the thatch thereby reducing the probability of ignition. Tar and soot build-up can lead to chimney fires resulting in extreme flue gas temperatures and burning material being emitted from the chimney top. Chimney fires may cause ignition of building fabric and contents, damage chimney liner and brickwork, and may set fire to thatch directly by radiation or by ejecting burning material that lands on the thatch.'

2. Bird Guards

'The introduction of a nest of twigs into the chimney provides an assured and proven means of generating heavy, high intensity burning brands, issuing from the chimney that could set thatch alight even after long distances of travel from the pot top. Sweeping alone will not mitigate this risk as birds may build a nest after the chimney has been swept. The chosen device must not impair the function of the chimney; be capable of blocking under any circumstances; and must not impair normal chimney sweeping activities.'

3. Chimney Liners

'All stove chimneys should be lined, ideally with twin-walled insulated **rigid** [emphasis added – see below] stainless liner. Where not possible due to chimney geometry and access issues, a quality twinwalled flexible stainless liner should be used in its place. The transport of hot fire gases and sparks to internal thatch layers via imperfect chimney brickwork has been demonstrated to be an assured means of starting in-thatch fires. The risk from this mechanism of fire raising may be wholly mitigated by the provision of a liner.'

Single-skin flue liners should never be used with wood-burning or multi-fuel stoves, and particularly not in thatched buildings, as they do not provide adequate thermal separation from exhaust gases to the existing flue. Flexible flue liners should never be allowed to touch the internal sides of the chimney. It should be recognised that stainless steel flue liners have a limited lifespan and require periodic replacement. Where a chimney fire has occurred, the flue liner should always be replaced, owing to potential damage. Rigid pumice, clay, ceramic and concrete liners, backfilled with a suitable granular insulation, are recommended above stainless steel liners, as they are more durable.

4. Lighting Stoves

'During ignition, when the stove controls may be set to a maximum ventilation to get the fire going, there is the potential to lift heavy burning materials, such as paper and card, from the fire box and for it to be ejected from the chimney over the thatch. The use of firelighters and kindling in preference to paper and card will reduce the risk. The wood burning stove should NEVER be used as an incinerator, e.g., for sensitive paperwork and rubbish.'

5. Ignition & Refuelling

'When the ventilation to the stove is increased to boost the fire during ignition or refuelling it is essential that the stove is attended until the controls are re-adjusted to their normal settings. Failure to do so may result in very high uncontrolled stove and chimney temperatures in association with high flue gas velocities. These factors may act to initiate chimney fires (if tar and soot is present), lift burning material out of the chimney, and raise fires through gas escape under thatch if the brickwork is imperfect and the chimney unlined.'

6. Stove Pipe Temperature Gauge

'Stove temperature monitoring is an essential user aid to understanding if the stove is working within its safe limits. Operating at too low a temperature risks coating the chimney with soot and tars which may later lead to chimney fires. Operating at too high a temperature risks fire raising through the ejection of burning material; the starting of chimney fires if tar and soot has built up; and the internal ignition of thatch through faulty brickwork if the chimney is unlined. All members of the household should be aware of the meaning of the gauge sections and know how to control the stove to maintain ideal operating limits.'

7. Fuel Selection

In addition, it is strongly recommended that only dry, well-seasoned timber should be burned in woodburning stoves. Wood should ideally be cut in year one, stored in year two and used in year three. Users of stoves should check that wood moisture content is below 20%, using a moisture meter which can be obtained from any builder's merchant. An alternative is to buy kiln-dried wood from a reputable supplier and to store it in dry conditions. Wet timber or waste building timber should not be burned in stoves. Wet logs can cause a chimney to cool, condensation to occur and a tarry residue to be formed on the flue walls. Coal, peat or turf should not be burned in wood-burning stoves unless the stove is a specific multi-fuel type stove.

8. How Safe Is Your Stove & Flue?

Given concerns about the operation of solid fuel stoves, the National Society of Master Thatchers in the UK have developed a questionnaire which owners can use to assess the risk level of their stove and chimney/flue. Owners and occupiers of thatched properties which have and use stoves, are strongly recommended to complete this questionnaire so that they can determine how safe their current

installation is. For each yes (Y) answer a score should be allocated as per the score column for each Y answer and then the scores totalled at the end of the table.

Score Results = 0 - 10 Low Risk; 11 - 20 Med Risk; 21 - 30 high Risk, 31 + Very High Risk. For each question to which the answer is not known, a score of 6 should be given for each answer. Where a high or very high-risk score is achieved, it is recommended that the use of the stove is immediately suspended and that the stove and flue are inspected by a qualified chimney engineer.

Appliance			Score
Wood-burning stove (more than 6 years old)	Y	N	+ 4
Wood-burning stove (less than 6 years old)	Y	N	+ 3
Flue			<u> </u>
Stove present, no flue liner	Y	N	+ 6
Solid fuel flexible flue liner	Y	N	+ 5
Rigid single wall flue liner	Y	N	+ 5
Rigid twin-wall insulated flue liner (more than 11 years old)	Y	N	+ 4
Rigid twin-wall insulated flue liner (less than 11 years old)	Y	N	+ 2
Nature of flue liner/chimney unknown	Y	N	+ 6
Insulation			-1
Clay/pumice solid block liner	Y	N	- 2
Stack vented top & bottom	Y	N	- 2
Termination	1	1	1
Chimney less than 1.8m above roof surface	Y	N	+ 5
Spark arrestor	Y	N	+ 5
No bird guard	Y	N	+ 4
Other type of cowl	Y	N	+ 4
Fuel	1		.L
Unseasoned wood, or waste building timber	Y	N	+ 8
Seasoned wood	Y	N	+ 3
Smokeless fuel	Y	N	+ 2
Gas/oil	Y	N	0
Other	1	1	4
Tar on inside of flue	Y	N	+ 5

Tar on inside of chimney	Y	N	+ 5
Chimney/flue not swept regularly	Y	N	+ 4
Appliance installed incorrectly	Y	Ν	+ 3
Rope seals damaged/not replaced	Y	N	+ 4
Appliance installed incorrectly	Y	Ν	+ 20
Flue system touching/too close to inside brick	Y	N	+ 15
Chimney brickwork in poor condition	Y	N	+ 5
Clean bird guard fitted	Y	Ν	- 3
Tar coated spark arrestor	Y	N	+ 4
Multi-layered thatch (straw)	Y	N	+ 8
Total Score			

BIBLIOGRAPHY

While much has been written online and in print on the subject of fires in thatched properties, the following sources were found to provide the most up-to-date and useful data.

Benjamin, Keith. *A survey of 148 fires between December 2008 and May 2016*. (Burgoynes Consulting Scientists and Engineers, 2016).

Department of Housing, Local Government and Heritage Advice Series. Disaster: A Guide to Prevention and Preparedness in the Historic Built Environment (2015).

Department of Housing, Local Government and Heritage, A Living Tradition: a strategy to enhance the understanding, minding and handing on of our built vernacular heritage (2021)

Fire Protection Association. *New Guidance for owners of thatched buildings with wood bring and multi-fuelled stoves* (2018).

Fire Protection Association. *Fires in Thatched Properties with Wood Burning Stoves*. Historic England Research Report Series, no. 49 (2018).

Institution of Fire Engineers. Guide to Fire Safety in Thatched Buildings (2018).

Institution of Fire Engineers. Guide to Firefighting in Thatched Buildings (2018).

WEB-BASED SOURCES OF FURTHER INFORMATION

Department of Housing, Local Government and Heritage: gov.ie - Fire safety in Ireland (www.gov.ie)

Department of Housing, Local Government and Heritage: <u>gov.ie - Technical Guidance Document B-</u> <u>Fire Safety - Volume 2 Dwelling Houses (www.gov.ie)</u>

Department of Housing, Local Government and Heritage: <u>gov.ie - Technical Guidance Document J -</u> <u>Heat Producing Appliances (www.gov.ie)</u>

Heritage Council: Thatched Properties - Heritage Council

HETAS (Heating Equipment Testing & Approval Scheme) - <u>HETAS | Working together for a cleaner</u> safer environment

Historic England: Reducing the Risk of Fires in Thatched Properties with Wood- | Historic England

National Society of Master Thatchers: <u>Thatched Roof Repair | National Society of Master Thatchers</u> (nsmtltd.co.uk)

National Association of Chimney Engineers - NACE | National Association of Chimney Engineers

Thatch Advice Centre UK: Thatch Advice Centre - Free Thatching Help and Information

Thatching Info.Com: <u>Thatching Info.com | A comprehensive resource for the art of thatching</u>

Thatching Advisory Services: Thatching Advisory Services | Fire Barriers & Systems | UK

Thatch-Safe: Thatch-Safe - Fire Safety & Insulation Product for Thatch