

ENGLISH HERITAGE ADVICE NOTE**THEFT OF METAL ROOF COVERINGS FROM CHURCHES
AND OTHER HISTORIC BUILDINGS**

October 2008

INTRODUCTION

Thieves are targeting many types of metal, typically lead and copper but increasingly also steel. Whilst roofs are the most likely targets, particularly on churches, other sources of metal such as rainwater goods, lightning conductors and garden statues are all at risk. This Advice Note gives guidance on dealing with the theft of metals from historic buildings and sites. It mainly concentrates on lead roofs on churches, but the guidance will be relevant to other metals and buildings. Preventing potential theft is obviously paramount, but advice is also given on dealing with its unfortunate aftermath.

By the end of 2007, Ecclesiastical, the main insurer of churches, reported claims of over ten million Pounds (see www.ecclesiastical.com/theftofmetal for their advice on prevention). Lead sheet was the main target, but a significant proportion of this cost was making good damage caused by the thieves and the subsequent ingress of water. The dramatic increase in theft has come about because of spiralling prices caused by worldwide demand for lead-acid batteries, both for vehicles and UPS (uninterrupted power supplies) and more recently because of speculator activity this rising market price has attracted. Significant amounts of lead have been stock-piled and kept from the market to encourage prices to rise. Prices started to fall by the start of 2008 as new sources of supply opened up.

This problem is not new. In the early 1980s churches were targeted, but a concerted campaign by the insurers to encourage church authorities to carry out simple preventative measures proved successful and the numbers of attacks fell dramatically.

English Heritage is extremely concerned about the current problem. Some people feel that the inherent sustainability of metals, such as the fact that they are continually recycled, is a critical weakness because they become a target. There is pressure to use other less expensive materials, such as stainless steel, which are not so attractive to thieves. However, there are very strong reasons why authentic materials such as sand-cast and rolled lead sheet are regarded as being the most appropriate for important historic buildings. This is not just based on philosophical grounds; there is much compelling justification in terms of technical performance (see Box 1).

English Heritage will continue to encourage the use of authentic and appropriate metals, particularly on roofs. However, there will be instances when a change of material will be accepted; examples include a building that has already been a target and where there is no reasonable way of implementing preventative measures. Each case will be considered on its own merits.

BOX 1: Lead and stainless steel roofing materials**Advantages of lead**

- Authentic material
- Highly resistant to atmospheric and bi-metallic corrosion
- Proven longevity (apart from theft); often over a century
- Aesthetically attractive
- Can be easily shaped and worked to any manner of difficult details without fracturing
- Much easier to shape on roofs with complicated detailing than cut/fix of hard metals
- Best performer on low pitched roofs with less risk of water ingress because it is dressed more tightly
- Likely to be more secure in extreme weather conditions anticipated by climate change
- Highly sustainable – all roofing lead sheet is fully recyclable
- Easy to repair on site compared to stainless steel
- Has a value when it is recycled and is re-used (increasingly important)
- Hollow rolls can be difficult to remove – a deterrent to theft
- It is heavy so small amounts tend to be stolen in one visit

Disadvantages of lead

- Attractive to thieves and can be easy to remove so consequently more damage to the building
- Often more expensive to install than hard metals
- More skills needed in installation and repair than with hard metals
- Modern practice is to install new drips or enlarge existing ones which can remove historic detailing

Advantages of stainless steel

- Lightweight and cheaper to install in long lengths than lead, where there are few complicated details
- Good longevity; examples have survived for at least 50 years
- Longer sheet lengths allow retention of historic detailing
- Continuous refinement and development has improved longevity, appearance and ease of installation
- Terne coating now in tin, not lead, which is considered to be less hazardous in manufacturing and installation
- Less prone to thefts (and therefore further damage) because it is difficult to remove and cut and terne coating reduces its scrap value

Disadvantages of stainless steel

- Whole sheet usually needs replacing – minor repair not possible apart from soldering small patches
- Still best to use lead for flashings
- Laid traditionally it is more prone to leaks as it does not dress tightly, particularly on low pitches at height – as cited by contractors, but may be due to workmanship
- Extreme rainfall can lead to swamping of seams at the base of sheets unless adequate apron flashings are fitted; the on-site profiling machine for 38mm seams needed for extremely low pitches is not yet available. Other areas can suffer from inadequate seaming
- Tape and mastics regularly used have relatively short lifetimes
- May not last as long as lead – manufacturers say 60 years
- Can suffer from pitting & brown discoloration – needs regular washing; although the 316 grade which is now widely used appears to perform well
- Replacement sheets may not be the same – constantly changing design and composition of coatings over time
- Mistaken for lead on roof and attacked
- Can be noisy in rain – a soft underlayer, such as geotextile, can lessen this effect
- Questionable whether it does satisfactorily replicate lead visually – lead is no longer used for terne coating
- More susceptible to effects of dramatic weather events – particularly wind lift

Stainless steel is currently about 40-50% cheaper than lead. However laying it is more expensive on a roof with traditional detailing as the substrate will have to be altered to receive 'long strip' fabrications. This alteration can outweigh the price difference between the materials.

CRIME PREVENTION

CRIMINAL ACTIVITY

In order to prevent the theft of metals it is important to understand the circumstances which lead to them being stolen. These are threefold:

- the asset value,
- its vulnerability &
- the threat posed by criminals.

The first two can be dealt with together by assessing risks to the site. Consider the value of the asset - the type of metal, its quantity and ease of removal are all important. Inspect the building and grounds, quantify the metals, where they are located and assess the ease of access of a vehicle to reach the material targeted.

How easy is it to climb onto roofs? Would a thief be seen? A sample risk assessment can be found in Appendix I.

The criminals carrying out this crime broadly fall into three categories:

- Chaotic offenders - typically youths carrying out low-level opportunist crimes, stealing only what they can carry by hand
- Local career criminals – more organised, use vehicles and steal in greater quantities
- Organised criminals – travel long distances to target most lucrative sites.

The metals are disposed of via two main routes, either by selling to scrap-metal dealers or by shipping them abroad in containers. Organised criminals arrange or carry out their own smelting.

Buildings at risk from metal theft are varied; it is not only the insecure ones that are threatened. Typically, buildings with highly valuable fittings and fixtures are most likely to be targeted by organised thieves, irrespective of their location. Organised thieves will plan an attack, finding ways to overcome security measures, if possible. Note that chaotic offenders are likely to be less choosy and may target any vulnerable and accessible source.

The police are increasingly aware of the problem and are mounting a number of operations to intercept materials. Nonetheless, the prime responsibility for preventing theft usually lies with the building occupier.

SECURITY MEASURES

Possible security measures are listed below, starting with the lower cost options, however these are most effective when used in combination, rather than in isolation.

Awareness and surveillance

- Contact your local Crime Prevention Officer and make sure the police are aware of your circumstances and the value of any metals on the site. Try and find out how they deal with such problems and ask their advice about prevention. Check whether or not there are particular problems with metal theft in the locality.
- Maximise surveillance levels of the property, including cutting back tall trees and vegetation around buildings, which could provide a screen to hide criminal activities. Consult the local authority to find out what approvals (if any) are needed.
- Consider the installation of security lighting, particularly at roof level where metal roof coverings are present. Advice on siting lights should be obtained from a security expert, to ensure they do not create shadow areas where a thief can operate or escape unseen. Fittings should be inaccessible and/or vandal resistant. However caution is required; avoid lighting areas that are

secluded and not overlooked – you might be assisting the thieves' activity. You might also encourage youths to congregate, causing nuisance and acts of vandalism. Check what consents may be needed with the local authority and your architect/surveyor.

- Encourage members of the local community to keep a vigilant eye on the building and to report any suspicious activity immediately to the police, particularly the unexpected arrival of workmen. If suspicious individuals are approached and give a plausible answer, ask for proof of identity. If none is offered take the number of their vehicle and alert the police.

The best way of engaging with the community will vary, but might include leafleting local households, giving brief presentations to groups that use church premises and displaying posters.

A particularly resourceful churchwarden has created and is prominently displaying his own warning notice, requesting that members of the public call the police if they see vans or workmen around the building between 6 p.m. and 8 a.m., as they are probably stealing the lead roof!

Physical security measures

Part of any security strategy involves making it more difficult to get at the valuable items, as well as limiting the escape routes open to a thief caught in the act.

- Make the thieves' job more difficult by removing any easy access onto building roofs, such as water butts, waste bins and tall trees located in close proximity to the building. If tall trees need to be trimmed or taken down remember to find out if consent is needed from the local authority.
- If there is statuary or other furniture, make sure it is well anchored to the ground or its background. Steel armatures or dowels can be fitted retrospectively but it is advisable to consult a security specialist on what should be used. A suitably experienced craftsman/tradesman could do this work, although it should be undertaken by a conservator if the item is fragile, valuable or of historical importance. Listed Building Consent may be required.
- Consider planting beds of dense prickly bushes or trees. Prickly planting can be used in a variety of ways. Most commonly they are used to reinforce existing boundaries, for instance by growing alongside perimeter fences. They could also be used more strategically and make access routes onto roofs less attractive. Use wide, low beds where it is important to retain good views. Climbers or ramblers might be more appropriate over taller walls. However, this should not be made so hazardous that routine maintenance access is impaired!
- Store ladders in a secure place to prevent their unauthorised use. This is particularly important when building works involving the use of scaffolding

are taking place. Your insurer must be advised in advance of any building work being undertaken.

- Conduct regular checks of roofs so the theft of roofing materials is detected at the earliest opportunity. This will also identify action to prevent rainwater from entering the building, causing further losses. Don't forget, the great weight of lead means that thieves often only remove a small amount at a time and expect to make a number of repeat visits. Being aware that the roof is a active target gives the police an opportunity to apprehend the thieves.
- Apply anti-climb paint to drain pipes and roof guttering to restrict access to roofing. The paint should not be applied below a height of 2 m, and a warning notice indicating it has been applied should be prominently displayed.
- Protect the lower section of lightning conductor ribbons using a metal cage or sheath securely fixed to the fabric of the building.
- Keep gates locked and generally restrict vehicular access to the site. Consider installing telescopic bollards, or similar devices. Remove any easy means of transporting stolen goods, such as wheelbarrows and wheelie bins, to a secure storage area.

Property marking metal goods

There are two techniques available when using marking products:

- 1) There are a variety of products available to uniquely identify items so that if they are stolen and recovered they can be traced back to their owner. SmartWater® is an academically-proven crime reduction strategy based on forensic technology which includes property marking. It has been adopted widely by the police in the UK. As a result of the overt police support, it has been adopted by Scottish Power, United Utilities, CE Networks to protect copper cable and Ecclesiastical Insurance Group to protect the lead roofs of client churches. The police are carrying out spot checks on scrap metal looking for SmartWater®, making it risky for thieves to keep stolen material. There have been over 500 successful prosecutions in UK as a result of SmartWater® and it retains a 100% conviction rate. An explanatory video can be found at:
<http://www.smartwater.com/Video.aspx>
- 2) The marking material can also be applied as a grease that provides transference from the metal to the thief. This means that both the item to be protected and the thief are likely to be marked and linked with the crime-scene. Because of its cost, it would not normally be applied as blanket coverage; rather it would be applied in areas where access is most likely to occur. Two companies provide this product:
 - www.selectadna.co.uk
 - www.redwebsecurity.com

All these products are invisible to the naked eye, but fluoresce under ultraviolet light. The starting price for the applied products is around £500.

(Where security marking is to be applied at height a risk assessment should be completed to identify a safe system of work which needs to be followed during its application.)

It is vital that warning notices are prominently displayed around the property, alerting thieves that security marking has been used. This will act as a deterrent.

Electrical systems

- Consider installing intruder detection to external roof areas, and any scaffolding, using devices designed to operate efficiently in an external environment. Alternatively, consider installing vibration detection to the underside of the roof substrate. Depending on the substrate characteristics, each detector will cover a radius of about 2 m. However, remember that each device will need to be accessible for maintenance. Wire-free movement detectors may be the most appropriate for protecting historic buildings. They are also more quickly deployed.

BOX 2: Alarms

Alarm signalling should be automatically linked to a 24 hour manned alarm receiving centre, or directed to the telephones of appointed keyholders. However, not all PCCs will be able to manage/afford sophisticated alarms. Bells/sirens on their own may be effective in built up areas, where a reasonable level of surveillance can be expected. Additionally, the alarm could activate a flashing floodlight. This approach will require a good level of community participation. Ensure that all keyholders are briefed by their local Crime Prevention Officer on their appropriate response.

Alarm systems should be installed and maintained by an NSI or SSAIB approved company. To find details of approved companies in your area visit www.nsi.org.uk and www.ssaib.org.

- Consider installing a closed circuit television (CCTV) system, incorporating movement detection, linked to a remote video monitoring station. This could also include loudspeakers. The operator will be able to warn-off intruders and call police to site. Systems should comply with BS 8418. Display prominent warning notices around the site. Remember that some form of lighting will be required in most cases. As a guide, even a simple system is likely to cost at least £12,000, plus £3,500 annual monitoring and maintenance cost.

- In some cases, less sophisticated monitored CCTV (costing around £4,000) has proved to be effective as a deterrent, as have others, where cameras simply watch vehicular approaches and record vehicle number plates. Beware that if thieves are climbing on the roof and the cameras are accessible, they might steal the cameras as well as the lead!

Temporary building works

Scaffolding

- Before installing any scaffold it is important to check your building insurance policy. Some policies have clauses that **specifically exclude** cover for roofing materials whilst scaffolding is in place. This makes it even more important to protect the scaffolding in order to prevent theft. As well as an intruder alarm protection on the scaffolding, the following precautions will also help reduce the risk of thefts from roofs:
 - Scaffolding should only be erected where needed for any particular phase of work, where practical. ‘Phased’ scaffolding reduces the vulnerability of the whole building.
 - Corrugated iron sheeting or solid timber boarding should be bolted around the base of the scaffold to a height of 3.5 m to deter climbers.
 - All ladders must be removed to a secure point at close of work each day. If for some exceptional reason it is necessary to leave a ladder in place, make sure protective sheeting overlaps the sides of the ladder as well as the rungs to a height of 3.5 m, which is securely locked or fixed in place.
 - All old lead or copper should be removed from site at the end of the day. Only enough new material for each day’s work should be brought to site. Notices should display this fact.
 - Heras® -type fencing panels should be erected around the work site to a height of at least 2 m.
 - The local police should be advised of building work.
 - Church staff, all members of the PCC, parishioners, ‘tenants’ and other users of the facilities should be requested to keep the premises under surveillance.
 - Consider using security patrols or manned guarding, undertaken by National Security Inspectorate (NSI) approved and licensed security personnel. For details of local NSI approved companies visit www.nsi.org.uk.

AFTER A THEFT OCCURS

Action on discovering theft

In the event of a theft of metal you should immediately:

- Notify the police
- Notify your insurance company

- Notify your architect or surveyor to inspect the damage
- Ask a contractor to inspect the damage and surrounding area and implement temporary repairs to prevent water ingress
- Contact your local Crime Prevention Officer for advice on minimising the prospect of further attacks

BOX 3: Insurance

Buildings which are insured by Ecclesiastical have support from the Lead Contractors Association (LCA) following theft of lead from the roof. An LCA member visits promptly after notification to advise and recommend repair. An estimate is sent to the loss adjusters who authorise the work to be carried out to a programme agreed with the client. The account is sent to Ecclesiastical via the LCA for settlement.

The aim of this scheme is to minimise response times by having a single nominated contractor who has already provided a written undertaking on commitments, response times etc. This means that the work:

- is carried out by regulated experts at pre-agreed rates
- avoids delays caused by competitive estimates
- guarantees quality of repairs/replacement

All LCA members are subject to vetting which means that they have to rectify any faults or risk losing their membership. All work is guaranteed for 25 years.

When a theft has occurred it is very likely that thieves will return unless security is improved.

- If lead is to be used for replacement, discuss security measures with the local Crime Prevention Officer. Consider all the preventative measures described above, including an intruder detection system to alert the police or keyholders. Make sure that notices advertise the system. If the new lead is subject of a grant from English Heritage, the cost of the system may be eligible for grant aid.
- If sheet lead is to be put back on a roof consider having it fixed using hollow rolled sheet rather than wood-core rolled sheet. The copper fixings used to secure hollow rolled sheet lead make it more difficult to remove. For further information on hollow rolls see *Rolled Lead Sheet – The Complete Manual 2003*. The Lead Sheet Association, page 32.
- If the metal roof is stolen then consider installing a ‘temporary’ roof such as felt or asphalt (5-10 years of life) until such time as the price of lead or

copper has stabilised and adequate security and deterrent measures can also be put in place (see Box 4 below).

BOX 4: Temporary roofing

A 'temporary' roof covering is unlikely to be practical in many cases. It could be visually inappropriate and will still be relatively expensive to install, even using a material such as felt, which should last for 10 years. However, felt is being used on buildings which were not insured prior to the theft, allowing owners to wait for a fall in the price of lead. The threat of further theft and consequent damage is also lessened before carrying out an appropriate repair. The use of temporary coverings is not restricted to those buildings which are uninsured.

- In exceptional cases it may not be feasible to replace a stolen roof covering with the same material, nor provide a temporary replacement. This will usually occur where adequate preventative measures cannot be put in place. Terne coated stainless steel is the most popular alternative to lead, or in the case of lightning conductors, aluminium instead of copper.

Changing the roof covering

There are significant environmental and conservation benefits by continuing to use lead on roofs. It is a highly sustainable material that can be easily cut and dressed to accommodate difficult roof details, it provides reliable protection against water ingress and can easily be repaired in the event of local damage. Although terne coated stainless steel does look like lead it has disadvantages which must be taken into account (see Box 1).

If alternative roof coverings are proposed then it is likely that planning permission will be required from the local planning authority. If the building is listed, Listed Building Consent may be required, unless it is exempt as a place of worship and thus subject to faculty or similar approvals. In the first instance you should always contact the local planning authority and the relevant church authorities.

When advising on a proposed change of roofing materials, English Heritage will consider each case on its own merits, but will start with the premise that replacement should be carried out with the authentic material on a 'like-for-like' basis. A change of material is only likely to be supported if: there is no prospect of implementing effective deterrent measures to prevent further thefts; or that part of the building is of insufficient historical or architectural merit to insist on re-using lead or copper.

APPENDIX I

Item	Management of risk				Check for
	Satisfactory condition?			Proposed action to be taken against	
	Yes	No	Don't know	No or Don't know	
Boundary treatment					Does the building have a well defined perimeter fence? Could a vehicle be brought on site? If so, how close to the building? Check for holes, gaps under gates and climbable sections of the fence.
Surveillance					Is the property overlooked by neighbours or passers by? Are overlooked areas adequately lit at night? Is it likely that a thief would be seen? Are secluded areas kept dark to discourage youths congregating? Have neighbours or building users been primed to report suspicious activity?
Grounds					Is the terrain flat and easy to move over or sloped/stepped? Are there valuable metals, such as statues or garden furniture?
Building access					Is there easy access to upper storeys via lean-to roofs, escape stairs or rainwater goods?
Metals					How easy are the metal assets to remove? How portable are the metal assets? How close are they to the likely points of vehicular entry?
Security systems and management					Does the building have an effective intruder alarm system? Is there a guaranteed response to activations? Is the building un-occupied for long periods? Is there CCTV? Are there security patrols? Are there any building works being carried out? Will these be supervised? How well known is the contractor?

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