

S21 Measures for the control of metal theft



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1 Introduction

Deficient security measures, for metals with an attractive scrap-value, that are stored in accessible areas around buildings or forming the exterior surface of buildings, make them a target for thieves. Aluminium, copper, nickel, bronze, lead and other “non-ferrous metals”, typically have a higher scrap-price per tonne, than for ferrous metals (i.e. metals formed substantially of iron), making non-ferrous metals particularly attractive. Examples of items often targeted by thieves include, copper cables and pipes, lead roof coverings, bronze plaques and artwork, and manhole covers.

This guide considers the security options to deal with theft of metals, chiefly from yard areas or attached to the exterior of a buildings.

Location	Examples
In the open	Cable stored on reels or drums or connected and live (electricity supply, telecommunications etc), or signs, gates and catalytic converters from vehicles
Attached to, or part of an unoccupied building or premises	Metal roof-coverings, fittings, pipework, tubing, air conditioning plant, lightning conductors, gates, fences, grids, manhole covers
Located in normally unmanned premises or installations	Metals found in sub stations, transformers, wind farm plant;
Attached to, or part of an occupied building or premises (notably premises which are unattended for extended periods such as schools and churches)	Metal roof coverings, fittings, boilers, pipework, air conditioning plant, lightning conductors, gates, fences, grids, chamber covers
Found inside business premises	Metal raw material, work in progress, components, stock

Table 1: Typical metals-theft targets

The starting point in the risk management process is to undertake a security risk assessment consisting of risk identification, analysis and evaluation, including review of the potential consequences, and resulting business interruption and reputational risks.

Once the exposure is measured and understood it may be possible to alter the profile of the risk in terms of the target it represents to the potential thief and avoid the need to implement other countermeasures. This may be achievable through the removal, relocation or reduction of the metal at risk. One strategy is the use of substitute materials. Other strategies are ensuring that materials for installation on site arrive at agreed times to coincide with installation, or that metal stocks are delivered “just in time”, avoiding the need for on-site storage. Procedures can be set up whereby metal is ordered in accurate quantities and on an as-needed basis so that surplus is not available on the premises.

If possible, scrap metal should be out of view and collected frequently to minimise the interest to opportunists. Residual risk needs to be evaluated and made subject to controls and protections, such as those identified in the next section.

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Recommended solutions for specific situations

Situation	Issues	Generic solution	Specific measures (examples)
Roof metal	<ul style="list-style-type: none"> • Access • Surveillance • Removal 	Roof access prevention solutions	Perimeter fencing Access prevention Anti-climb paint Remove, relocate, or immobilise (in a safe location) objects that will form climbing aids, e.g. cabins, containers, waste bins
		Roof access detection systems	Movement detectors, vibration detectors etc.
		Substitute materials	Terne* coated stainless steel
Metal stored outside	<ul style="list-style-type: none"> • Security of the enclosure 	External video surveillance	Video Surveillance Systems (VSS) [monitored/recorded]
		Electronic intruder detection	External detection system (beams, vibration sensors etc); detector-activated VSS
		Temporary alarm systems	Portable, battery powered intruder alarm
		Perimeter fencing	2.4m high steel palisade fencing
		Removal / reduction	
Unoccupied premises	<ul style="list-style-type: none"> • Absence of supervision/surveillance 	Temporary alarm systems	Portable, battery powered intruder alarm
		External video surveillance	VSS [monitored/recorded]
		External electronic intruder detection	External detection system (beams, vibration sensors etc); detector-activated VSS
		Perimeter fencing	2.4m welded mesh fencing
		Removal/reduction	
Cable theft	<ul style="list-style-type: none"> • Prevalence • Ease of removal • Absence of supervision/surveillance • Cables (and other metal components) in unoccupied support facilities (e.g. substations) 	Underground cable theft detection	Chamber access detector, cable severance detector, vibration detectors etc
		Underground cable theft prevention	Lockable covers Cable clamps Locks/padlocks/anchors etc
		Substitute materials	Fibre optic, aluminium
All situations		Asset marking and recovery systems	Overt: label, marker, tape etc
			Covert: wireless security tag, micro dots; forensic paint, grease, etc
			Intruder tagging [spray]

Note: * Terne (dull) coated stainless steel (TCSS) is a durable alternative to lead

3.1 Site perimeter

Given the amount of force and determination that metal thieves bring to bear a secure perimeter barrier should always be provided for metal in the open.

3.1.1 Fencing

Perimeter fencing should be a minimum height of 2.4m. The most common types of security fence are:

- welded mesh fencing to BS 1722-10: a small mesh size frustrates finger holds and climbing
- open mesh steel panel fencing (expanded metal) to BS 1722-14
- steel palisade to BS 1722-12: vertical steel rods, with the top end flattened, split and splayed into sharpened points to deter climbing.

Barbed wire or razor tape further deters climbing, but occupiers' liability issues need to be considered and suitable warning signs displayed.

Gates must be of the same height, material and strength as the fencing. Hinges should be designed to prevent the gate from being lifted. Gates are best secured by welded high security proprietary locking bar(s) and padlock(s) to BS EN 12320, Grade 5 or 6.

Planning permission may be required for certain types of fencing/gates – this being especially likely if listed building/conservation area status applies. Check with the relevant planning authority.

Where there is vehicular access to the perimeter, particularly in isolated locations, the risk of ram raid attacks should be considered. A purpose designed vehicle barrier such as a trench, high kerb or large concrete obstacles outside the fence, or a series of substantial steel posts just inside the perimeter, are potential solutions. Further advice is provided in RISC Authority S10, *Guidance for protection of premises against vehicle attack (ram raid)*.

3.1.2 External electronic intruder detection

Certain detection systems, usually intruder alarm systems (IAS) protecting assets inside buildings, can qualify for a police URN (Unique Reference Number) which entitles them to a level 1 (immediate) police response in the event of an activation.

Such systems must be installed by a company approved by a United Kingdom Accreditation Service (UKAS) listed inspection body. Currently the NSI (National Security Inspectorate) and SSAIB (Security Systems and Alarm Inspection Board) are approved.

Refer to RISC Authority *Site Security Briefing Note – External and perimeter security systems*, for further advice.

3.2 Exterior Lighting

Exterior lighting is a good deterrent and can be an effective measure. But in remote, unsupervised locations, the presence of lighting may actually assist the thief.

Refer to RISC Authority *Site Security Briefing Note – External security lighting*, for further advice.

3.3 External video surveillance

Video surveillance systems (VSS, formerly known as CCTV) used specifically to tackle metal theft can be an effective solution, but the intentions need to be clear, e.g.

- to monitor assets and their approaches, to initiate a response
- to make record of events that could be used to identify thieves
- to deter thieves

Normally implemented in the open, detector-activated (DA) VSS systems blend IAS technology with VSS. They provide flexible and adaptable protection against metal theft.

Refer to RISC Authority Site Security Briefing Note External and perimeter security systems, for further advice.

3.4 Temporary alarm systems (TAS)

Temporary alarm systems are available both for internal and external applications, most being designed to be battery powered only.

Systems usually comprise a portable control / power unit and various wire free intruder alarm sensors, although some use various forms of audio or visual detection and alarm confirmation.

Most systems provide silent notification of activations to a monitoring centre (alarm receiving centre, ARC) via a GSM network, but some have an option to use additional local warning devices. Some products have the option to send periodic test calls to and from site, to check the operational status of the system and the means of notification. Notified faults should include 'low battery'.

As these systems do not meet police rules, they do not qualify for a URN and thus a routine emergency police response. However, once a keyholder or response service attends site they can request police attendance via normal means if required.

Such systems may be purchased, but the great majority are rented. Many of the companies specialising in this field provide a commercial response and keyholding service.

Temporary alarms are a cost effective and proven way of providing protection against metal theft in selected situations that are without adequate conventional security or mains electricity. However, their effectiveness will depend on many factors and competent advice should be sought.

The SSAIB publish a *Code of Practice for temporary alarm systems* "SS 2004", providing guidance for those specifying, designing, installing, commissioning and repairing these systems.

3.5 Manned security services and access control

Manned security guarding works best when it meshes with a premises' physical and technical measures. So, for example, the value of a perimeter fence is greatly improved when monitored by manned security guarding.

Proprietary access control systems provide a practical and secure solution to automate access to only authorised personnel, avoiding or reducing the costs of manned security.

Refer to RISC Authority *Site Security Briefing Note Manned guarding*, for further advice.

3.6 Intruder alarm systems

Traditional intruder alarm systems for buildings and their contents are well established as a basic building block of business premises security. Certification by an accredited inspectorate in the United Kingdom allows a system to benefit from a police Unique Reference Number (URN).

Refer to RISC Authority: *S34 Intruder alarm systems: Ten-step guide for purchasers*.

3.7 Installed-cable theft prevention

3.7.1 Secure access covers

Metal covers in yards, paths and roads are a target for thieves, in their own right and may provide access to copper cables. Lockable access covers are available that are strong covers with robust integral locking arrangements, to resist opening with standard tools. Alternatively, secondary security covers increase the time and effort required to gain access to a service chamber, using proprietary assemblies secured by special bolts or locks.

Access covers that have achieved certification to the Loss Prevention Certification Board Loss Prevention Standard LPS 1175, are available.

3.7.2 Other passive cable theft prevention solutions

Options to prevent copper cable and metal component removal:

- Traditional anchoring methods (a 'nut and bolt' approach) or proprietary devices of various types that frustrate the simple dismantling of valuable copper components such as ground bars.
- Cable clamps with purpose-designed security fittings intended to prevent the cable being easily pulled out of the ground or a duct or conduit.
- Tack welding of access points, burying cable pull and junction boxes.
- Upgraded physical security, such as padlocks, for substations, plant rooms and cabinet access points.

3.7.3 Underground cable theft detection

Several proprietary solutions are available for cable theft detection. Typically, they consist of alarm systems that detect when:

- a cable chamber or duct is opened; a light sensor inside the enclosure triggers the system if daylight or torchlight enters
- a security zone established near the cable-run is entered or disturbed; buried miniature motion/disturbance detectors and associated cameras watch for movement, shock, or vibration
- a cable is severed or disconnected
 - fibre optic strand is run, or integrated with, the cable and monitored by a detection device that can detect both severance and its location, or through analysis of sounds and vibrations that detect disturbance
 - monitoring signal superimposed on live or dead cables detects severance or disconnection

The method of notifying an alarm condition to the monitoring point with such systems typically consists of a battery-powered radio or GSM transmitter sending alerts/images to the monitoring point.

Bearing in mind the long the distances copper cables are run, it is usually only economic to deploy the protective measures mentioned above to key risk areas.

3.7.4 Inhibiting roof access

Access to roofs can be deterred and impeded by installing noticeable physical measures such as barbed or razor wire along roof edges or anti-climb spikes to down-pipes. Some other available measures to deter and obstruct roof access are described below.

3.7.4.1 Anti-vandal paint

Painting down-pipes and roofing with non-setting paint, sometimes called 'anti-climb' paint, deters and hinders access.

3.7.4.2 Roof access detection systems

Church insurers recommend the use of passive infrared (PIR) motion detectors, similar to those used in IAS, fanning out zones of movement detection across the surface of roofing and linked wirelessly to control equipment. These devices are specifically configured for the outside environment in such a way that false alarms from the movements of wildlife are minimised. When the alarm is triggered, strobe lights or audible alarms may be employed to warn off intruders. Simultaneously an alert is transmitted to a monitoring centre (ARC) and keyholders are informed.

Another method specially designed for roof surveillance is detection cable which is secured to metal-clad areas with a weather resistant, externally rated adhesive. Each zone, terminates in a small wireless transmitter that sends its signals to the control equipment inside the building. Severance or severe vibration will trigger an alert. Similar results are given with individual vibration detectors attached to the underside of the roof substrate. Depending on the substrate characteristics, each detector can cover a radius of about 2m.

Where physical roof access deterrents are deployed, occupiers' liability issues need to be considered and suitable warning signs displayed.

3.7.5 Asset marking and recovery systems

3.7.5.1 Physical marking

Marking allows a security operation or the police to trace back any subsequently recovered lost or stolen asset to its original owner. Examples include the attachment of secure labels, embedding identifiers such as a micro dots or continuous ID tape (for cable), printing or embossing the asset or simply inscribing or etching the asset with characters (e.g. a post code, name or code word) with an overt or covert marker.

The Loss Prevention Certification Board's Loss Prevention Standard LPS 1225, contains provisions specific to these products and services. A number of certificated products are available.

3.7.5.2 Forensic marking

'Forensic marking' generally relates to coding systems that, in addition to serving to identify the legitimate owner or original location of an asset, can link a suspect with the theft in a stronger way than other marking systems. This can materially assist the prosecution of an offender.

Such systems generally consist of a medium that itself serves as an overt or covert marker (e.g. a liquid that glows in ultra violet light) in which the forensic code is suspended. The presence of the medium alerts the security or law enforcement officer to the presence of the forensic marking. Typically, the forensic fluid is sprayed or painted onto assets. But there is also an application with triggering devices where the suspect is spattered or sprayed with the fluid, which then uniquely links the suspect to the offence – the material remaining detectable on skin and hair for several weeks.

Non-drying forensic 'gels' or 'greases' which transfer and stick to thieves handling marked assets are also available.

3.7.5.3 Secure database services

Marking that cannot be readily linked to the legal owner, must be supported by a secure database.

Such services should operate to recognised management and security standards. BS ISO/IEC 27001 provides a framework to organise manage and protect information assets, so that they remain safe and secure. In the UK, LPS 1224 contains provisions of a similar type, but specific to secure asset registration services

3.7.5.4 Wireless security tags

Wireless security tags, more usually associated with individual items of intrinsic or heritage value, can be used effectively to track the illegal movements of stolen metals.

3.7.6 Catalytic converter theft prevention

Although catalytic converter thefts are increasing and vehicles that sit high above the road are particularly vulnerable, there are steps that can be taken to protect vehicles.

To keep catalytic converters safe, car dealers can be asked for advice on locks or guards that are approved by the vehicle manufacturer and tested to "Sold Secure Gold". Alternatively, vehicles can be parked in a secure compound overnight and if this isn't possible, parked in an area that's well-lit and overlooked, positioned such that the converter can't be easily reached by potential thieves.

Converters should be marked with a forensic marker and suitably registered, to make it harder for thieves to dispose of stolen units.

References

BS 4737-4.3: *Intruder alarm systems in buildings. Codes of practice. Code of practice for exterior alarm systems.*

BS EN 12320: *Building hardware. Padlocks and padlock fittings. Requirements and test methods.*

BS ISO/IEC 27001: *Information technology. Security techniques. Information security management systems.*

BS 8418: *Installation and remote monitoring of detector-activated VSS systems. Code of practice.*

BS EN 62676-4: *Video surveillance systems for use in security applications. Application guidelines.*

BS 1722-10: *Fences. Specification for anti-intruder fences in chain link and welded mesh.*

BS 1722-12: *Fences. Steel palisade fences. Manufacturing and installation.*

BS 1722-14: *Fences. Specification for open mesh steel panel.*

SSAIB

Code of Practice for Temporary Alarm Systems.

LPCB

Loss Prevention Certification Board (BRE) Loss Prevention Standards:

- LPS 1175: *Requirements and testing procedures for the LPCB approval and listing of intruder resistant building components, strongpoints, security enclosures and free-standing barriers.*
- LPS 1224: *Requirements for companies providing secure asset registration services.*
- LPS 1225: *Requirements for the LPCB approval and listing of asset marking systems.*
- LPS 1277: *Requirements for LPCB certification and listing of Supervised Premises Transceivers.*

RISCAuthority documents

*Site Security Briefing Note – External and perimeter security systems**

*Site Security Briefing Note – External security lighting**

*Site Security Briefing Note Manned guarding**

BDM10: *Code of practice for the protection of empty buildings. Fire safety and security.*

S6: *Electronic security systems: guidance on keyholder selection and duties.*

S10: *Guidance for the protection of premises against attacks using vehicles (ram raids).*

S23 *Guidance for specifiers of VSS in security applications*

S34: *Intruder alarm systems: Ten-step guide for purchasers*

These RISCAuthority documents may be downloaded from: www.riscauthority.co.uk/

* <https://resources.riscauthority.co.uk/>

Historic England

Theft of Metal from Church Roofs: Replacement Materials.



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