

Thinking about installing a CCTV security system?

Why do I need to consider this topic?

When combined with other appropriate security measures, having a suitable Closed Circuit Television (CCTV) security system installed is one possible way of reducing the chances of your business becoming a victim of crime.

What aspects do I need to consider?

- For security reasons, CCTV can serve one or more purposes. You need to decide what you want your system to do. The purpose of the system will dictate the type of equipment needed. When you are buying an "off the shelf" system, e.g. from a shop, it is always best to see the system working first so that you can get a good idea of the quality of picture the product can provide. Don't forget that the lighting levels in the shop may be a lot better than where you intend to use it. Where an extensive system is proposed, the larger national CCTV installation companies will often provide an on-site demonstration service. If the demonstration is during daylight hours, you will not have any idea what quality of picture you will get at night. There may be a charge for any demonstration, so check first.

The quality of recording equipment may not always match the picture that you see on the monitor. Where high resolution recording is needed, discuss this with the quoting companies. Recording may be on a video tape recorder or a computer hard drive. For capacity reasons, recording systems are often configured to work in "time lapse" mode, unlike a domestic video recorder which records images as they happen in "real time", usually at 25 frames per second. In a time lapse setting, images are recorded at selected greater time intervals, producing a series of snapshot-like images. The scene between these snap-shots is not recorded. The shorter the intervals (higher number of frames per second), the less time a video tape will last, whilst for digital recording, more memory capacity will be required for a given period of time. Make sure that you understand what quality of recording you will get for the settings proposed, number of cameras to be fitted and the capacity of the recorder to be used.

- For anything other than the simplest of systems, it is best to have the system installed by a company accredited by NSI or SSAIB for the installation of CCTV systems. If the system is to be detector-activated with monitoring by a remote monitoring centre, the system also needs to be installed to British Standard 8418:2003: Installation and remote monitoring of detector-activated CCTV systems- Code of Practice.
- Many CCTV systems now use colour images for better identification of suspects, vehicles etc. For night-time use, however, low-light monochrome cameras are often better. Some manufacturers now offer models that operate in full colour mode during the day and monochrome at night. If you compare different makes and models of equipment you will see that their performance can vary widely, e.g. one camera might give a poor quality low-resolution picture; another, a high quality, high-resolution one. Similarly, how pictures are transmitted from the system to the point where they are being monitored can also vary. For local on-site transmissions, radio, infra red light, and microwaves are sometimes used, as well as a variety of wire and fibre optic cables, some of which are better than others in being able to carry video signals without an undue effect on picture quality.

For long-distance transmissions, e.g. to a remote monitoring centre, an ordinary telephone line is often used. However, this (depending upon the product used) may only transmit a new picture at intervals of some seconds; others using ISDN telephone lines are able to send pictures somewhat faster. There are similar differences for internet-accessed systems, depending upon the type of connection used. Make sure you understand what the system proposed can and cannot do.

- If you are having a movement detector-activated system installed, there is a wide range of external quality detectors available, working in different ways and with different detection ranges. Ask to be shown a number of options, particularly if the manufacturer offers various models. Make sure the ones you are being offered best suit your circumstances. For

remotely monitored systems, ask what would happen if the telephone line were to be cut before the intruders entered your site. Not all CCTV installers will offer to have the telephone line (needed for picture transmission) constantly monitored against cutting. Similarly, ask how cables between the cameras and the other equipment will be routed around your premises. Check that the cable type proposed is suitable for the distance that it is to cover, i.e. without undue effect on picture quality. For wire-free connections to cameras, e.g. microwave beam type, ask what effect weather and environmental conditions may have on picture quality.

What key actions do I need to take?

- Try to see the actual equipment being considered working in the position it will be used, under the poorest lighting conditions likely to prevail. Ensure that the quality (resolution) of the pictures produced by the recording equipment and cameras is acceptable for your purposes. Where infra red lights are to be used with the cameras (at night), check that installation will include set-up of the cameras focusing at night with the lights working. Check with your local authority to see if planning permission will be required, before ordering.
- For premises where there is a risk of a hold-up, consider providing a second recording device in a suitable concealed and secured position. Where you want recordings to be considered as evidence in a prosecution, seek advice from the local police crime prevention officer before placing an order.

Have the system installed by a company accredited by NSI or SSAIB for the installation of CCTV systems. For systems using a remote monitoring centre, use the fastest picture transmission system you can afford and have the telephone line it uses monitored. Note: some of the services provided by BT (to installers) for this purpose are currently being changed. Check what is available before placing an order.

- Ask if the system will need additional security lights in order to operate at optimum performance levels. Ensure that any external movement detectors will not be installed in positions where they are likely to be blocked. Make sure that any external cameras located in positions where they are vulnerable to vandalism are either vandal-resistant or in vandal-resistant housings. Check whether cameras in housings will need (or have) heater units and/or wiper blades for their vision panels.
- Where electrical installation work is necessary, ensure that the CCTV company uses a competent electrician for any necessary additional electrical installation work. Make sure that they are qualified and approved for the purpose of Building Regulations. In hazardous areas of commercial premises where flammable or explosive atmospheres may be present, ensure that a risk assessment has been completed for the Dangerous Substances & Explosive Substances Regulations (DSEAR). If the area has been "zoned" under DSEAR, ensure that the equipment will be suitable for the "zone" involved and has been selected in accordance with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations.
- Arrange a maintenance and service contract for the system. Check first how quickly the company agrees to attend your premises in the event of a fault. Check with the Information Commissioner's Office (ICO) to see if the Data Protection Act will apply to your CCTV system. Where the CCTV system is to be monitored by agency or contract security officers, check (for the purpose of the Private Security Industry Act 2001) with the Security Industry Authority (SIA) that they are licensed persons. Also check with the SIA to see if any CCTV consultant you are considering using is (or, if not, needs to be) licensed by them. Finally, before placing an order, provide your insurance broker with full details of the system proposed, so that they can check that it will be acceptable.
- For your assistance we have include a Glossary of CCTV Related Terms at the end of this Technical Guidance Note.

Glossary of terms of used in conjunction with CCTV systems

AGC - Automatic gain control - electronic circuit used to produce more of a picture in low light conditions, usually at the cost of a more "grainy" image. When looking at camera specifications ignore performance with AGC working.

ALARM ACTIVATED VCR - A video recorder set to start recording on receipt of an alarm signal. The time taken for the recorder to start up and start recording images can vary. Check.

AMBIENT LIGHT LEVEL - The general level of light within an area.

ANGLE OF VIEW - The extent to which a camera can see from side to side (i.e. the angle) without moving. The angle depends on the exact camera format and lens combination used.

APERTURE (of a lens) - The size of opening in a camera lens through which light passes. The larger the opening (as controlled by the iris), the more light that is able to pass through. The lower the "F" number of a lens, the larger its maximum aperture will usually be, e.g. an f1.4 lens will need 50% more light than an f1.2 lens for the same amount of energy on its sensor. The transparency ratio (of the lens) is an indicator of its efficiency, e.g. a f1.4 lens with a "T" number of 0.85 would pass more light than one with a "T" number of 0.6.

ASPECT RATIO - The ratio between image height and width, e.g. 3:4

AUTOMATIC IRIS (AI) - Like the iris in your own eye, this feature of the camera opens and closes to compensate for very bright light or low light levels.

AUTOMATIC LEVEL CONTROL (ALC) - Where fitted to a camera, it allows the system to compensate for very bright or dark areas within view in order to make the overall image more visible.

BACK LIGHT COMPENSTATION - Where fitted to a camera, it automatically adjusts the image to compensate for bright background light.

CCD (Charge coupled device) - A type of light-gathering microchip used in modern CCTV cameras. Typical format sizes you may see mentioned are - 1/2", 1/3" or 1/4".

CCTV (Closed Circuit Television) - A system consisting of camera equipment, monitoring and associated equipment for transmission and controlling purposes, which might be necessary for the surveillance of a defined secure area.

CONDITIONAL REFRESHMENT - A method used by some picture transmission systems to update images quicker by only changing the areas (of the picture) that alter. The more changes, involved the slower the "refresh" rate, i.e. time to send a new complete picture.

DAY/NIGHT CAMERA - Usually refers to a camera that uses different methods for capturing images during daylight and night-time, e.g. colour and monochrome respectively.

DEPTH OF FIELD - The amount (distance) in view that is in focus. Depth of field will vary according to the focal length of the lens, its aperture, and the distance that an object being focused upon is from the camera.

DIGITAL VIDEO RECORDER (DVR) - Recording device used to save images on a computer-like hard drive. Now often used instead of tape-based VHS video recorders.

DUPLEX - Term used in relation to video multiplexers. Usually means that two actions, such as viewing or recording, can be undertaken at once (as opposed to a Simplex, which will allow one).

DIGITAL VIDEO STORAGE AND TRANSMISSION (DVST) - system that compresses video pictures to a fraction of their original size for speed of transmission (or storage) purposes.

DWELL TIME - The time period a video switcher unit will take the image from a CCTV camera before moving on to another one.

FIELD OF VIEW - The extent of an image area produced by a camera/lens combination.

FOCAL LENGTH - A measurement (in millimetres) between part of the lens and the point where it is focusing the received light. The shorter the focal length the longer wider the angle of view. Long focal lengths (like a telescope) have a narrow angle of view but more magnification.

F STOP (of a lens) - The ratio between focal length and effective lens diameter (f/A). The lower the "F" number the greater the amount of light that can pass through it.

ILLUMINANCE - The measurement of light in lumens per square metre, the unit of which is the "lux".

IP RATING - An international rating system, described in BS EN 65029, for enclosures (e.g. such as might be used outside), used to indicate the extent to which they are resistant to penetration by, say, by dust or water.

INFRA RED LIGHTING - Light not visible to the naked eye used with some CCTV system used to illuminate an area for the cameras. Note: although the IR light is not visible, the IR lamp units are often visible on the camera mountings.

LUX - The density of light when measured in lumens/sq metre; often used as an indicator of the sensitivity of CCTV cameras. The lower the LUX number the more a camera can see in the dark.

MATRIX SWITCHER - Device used to switch images from cameras from one monitor (or recorder) to another.

MONOCHROME - A black and white image (rather than a colour one).

MULTIPLEXER - An electronic system used to receive and handle images from a number of cameras (often between 4 -16) at once, typically used to feed multiple display screens (monitors) or multiple images on a single screen and recording devices.

PAN & TILT - A camera mounting that can be moved, by remote control, vertically and horizontally (to some extent).

PEAK WHITE INVERTER - An electronic circuit designed to change white light, which exceeds a pre-set intensity, to black. Sometimes used to enable reading of a car registration number when the car headlights are on.

PRE-SETS - A feature which will cause, upon receipt of a signal (e.g. from an alarm detection device) a camera to pan, tilt or zoom towards a pre-programmed point (typically up to 16 points per camera on a large system) within its field of view.

QUAD SPLITTER - A device used to enable the images from four cameras to be displayed on one monitor at the same time.

RESOLUTION (of a picture) - in the past, measured in the number of lines used to make up the image on the screen (and so the number of pixels). A typical camera resolution would have been 350 lines (450 lines in a high resolution model). Where the resolution for a camera is quoted in the number of the number of horizontal and vertical pixels, an approximation to convert horizontal pixels to equivalent lines is TV LINES = PIXELS X 0.7, i.e. 750 pixels is approximately 525 lines.

SENSITIVITY (of a camera) - may be quoted as the amount of light (in LUX) needed to produce some sort of video signal (picture), although not necessarily a useful one.

SIMPLEX - Term used in relation to video multiplexers. Usually means that only one action, such as viewing or recording, can be undertaken at once (as opposed to a Duplex which will allow two).

SIGNAL TO NOISE RATIO - where expressed in decibels (dB) for a particular camera, it gives an indication of picture quality (e.g. lack of grain/snow in the picture), e.g. < 40dB picture may be "snowy" or grainy. > 50 dB may give a reasonable to good picture without significant amounts of "snow".

SLOW SCAN - An old method of sending images via an ordinary telephone line; often received as a series of static photo-like images (rather than real-time video).

TIME LAPSE VCR - An old specialist type of video recorder programmed to record for long periods (often hundreds of hours) on an ordinary video tape. However, these machines only record images at intervals, e.g. 3 frames per second (for a 72 hour setting) instead of 25 frames per second for real time video. Systems can be arranged to record in real-time upon receipt of an alarm signal.

TRANSPARENCY RATIO (of the lens) - an indicator of its efficiency, e.g. a f1.4 lens with a "T" number of 0.85 should pass more light than an equivalent one with a "T" number of 0.6.

TRIPLEX - A type of Multiplexer unit which allows simultaneously viewing of both live and recorded images at the same time.

VARIFOCAL LENS - A lens whose focal length (and so viewing angle) can be manually adjusted to suit the circumstances.

VIDEO MOTION DETECTION (VMD) - A means of detecting movement, within the field of view of the camera, by programming it to react to certain changes in the makeup of the picture, as they occur. Some systems allow parts of the field of view to be ignored.

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