MACHINERY GUARDING

Your Practical Guide

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Introduction

The Provision and Use of Work Equipment Regulations place duties on you as an employer to ensure that, when you provide work equipment, you take account of the working conditions and hazards in your premises, as well as any additional hazards posed by the equipment itself.

Work equipment must also be suitable for the use to which it is put and properly maintained. Where there are specific risks from work equipment, its use should be restricted to specified employees who have been provided with adequate information, instruction and training.

These duties are backed up by specific requirements on the stability, operating controls and guarding of work equipment and in particular machinery. There are many machines or parts of machines that can cause injury to the employees using them, and it is important to make sure that these are safe to operate.

Eliminating the source of harm altogether is not always possible, so the risks of injury must be controlled. In most cases, controlling these risks means safeguarding those parts of machines that have the potential to cause injury.

Typical Hazards

There are many ways serious injury can occur when machinery is being used in the workplace. The most common mechanical hazards are:

- entanglement in rotating parts
- being caught between two parts moving past one another in a shearing action
- being crushed between machinery or parts as they move towards a fixed part or structure.

Other hazards include:

- employees can be struck by moving parts of machinery
- they may come into contact with sharp edges, leading to cuts or severing type injuries
- material may be ejected from machinery
- parts of the body can be drawn into or trapped between the running parts of rollers, belts and pulley drives
- stabbing or puncture wounds can be inflicted by sharply pointed parts or tools
- friction or abrasion injuries are possible from contact with rough moving surfaces or parts
- a number of non-mechanical hazards can also be present when equipment is operated, such as electricity, chemicals, dusts and fumes, radiation, noise, vibration, pressure and vacuum
- extremes of high and low temperature, or fire, causing burns or scalds may also occur
- when access is required into or onto certain larger types of machinery, this can lead to slips, trips, falls and hazards from obstructions and projections.

Principles

To assess the adequacy of machinery guarding – to eliminate or reduce the hazards – there are a number of European and British Standards, as well as industry guidance for guarding specific types of machinery, that you will need to consult.

There are however a number of general principles:

- all guards must be of suitable design and construction
- they should be strong, resilient, difficult to defeat or override, and securely fixed in position
- where there is frequent access to a danger zone, it is normally preferable to interlock the guard with a device that isolates the power supply and arrests dangerous machine movements when the guard is opened
- guards must be effective in preventing access to danger zones and require regular checks to ensure that fingers, arms, feet or bodies cannot reach into such zones
- Finally, guards must be maintained in position whenever the machine is operating or dangerous parts are in motion. This will involve not only providing the guards themselves but also training, supervision and employee discipline.

Basic Types of Guards

Fixed Guards

Fixed guards are designed to prevent access to the dangerous parts of a machine by providing a physical barrier that prevents both intentional or unintentional access. Where an opening is necessary in a fixed guard for the purpose of feeding in material by hand, it must not allow access to the danger zone. In most cases this is achieved by ensuring that the opening is situated at a sufficient distance from the dangerous machine parts.

It should not be possible to displace or remove fixed guarding; the method of fixing is of vital importance to the integrity of the guard and the safety of the loperator. All fixed guards should be kept in place either permanently by welding etc. or by means of fasteners such as screws or nuts and bolts, making removal and/or opening impossible without the use of tools.

Adjustable Guards

These are movable guards that are adjustable for particular operations and normally remain fixed during use. Some guards require the intervention of an operator to be placed into position; it is vitally important that these types of guard are always fitted to the machine and then correctly positioned and used every time it is operated. In some cases self-adjusting guards are used but these only provide a partial solution to the problems associated with manually adjustable guards. Self-adjusting guards are, when properly maintained, normally preferable to those needing routine manual adjustment.

The operators of machines with adjustable guards must be carefully trained and supervised, as there will always be some access to dangerous parts. They must be given instructions on how exactly the guards must be used, and they must demonstrate that they are competent and reliable.

Finally, all types of adjustable guards should be used in association with other protective devices such as push sticks, chain mail gloves, component jigs, guides or vices.

Interlocked Guards

Interlocked guards are thus designed to give ready access to the machine's danger zone whilst ensuring the safety of the operator.

When a machine is running, an interlocked guard remains shut. Opening the guard has the effect of making the danger area safe.

It must be impossible to open interlocked guards without stopping the machine. To be effective, guard interlocking requires that the machine cannot be started unless the guard is in position.

Special care needs to be taken when machine parts may continue to run on or have stored energy as part of their operating mechanism, a result of the momentum of heavy moving parts, stored hydraulic or pneumatic pressure or gravity release. In such cases braking devices or time delay interlocks will be required.

This type of guarding system can be readily defeated when undertaking maintenance, setting up, repair work etc.

Therefore such interlocking mechanisms must be reliable, capable of resisting interference, difficult to defeat and as far as possible the system should not 'fail to danger'.

Trip Devices

These are designed to stop machinery and make it safe before or as the person approaches the danger zone. They include sensitive screens and barriers, telescopic arms, photoelectric safeguards, trip wires and pressure sensitive mats. They should incorporate a re-set mechanism which prevents the machine from being restarted before the tripping mechanism is released and the machine controls are operated.

Some trip devices are arranged so that the movement of the work piece, swarf or operator activates them if they enter the danger zone. These should always therefore be fitted to the machine, maintained in working order and be correctly positioned and used every time the machine is operated. As this type of guard requires the operator to place it in position, it is imperative that operators are properly trained in its use and adequately supervised.

Two-handed Controls

These require operators to have both hands in a safe place before the dangerous parts can be activated. It should not be possible to operate both controls with one hand, or with one hand and another part of the body, or by easily bridging them with a tool. To activate the machine, the two controls need to be sequenced so that they operate together with little or no time delay between them. It should also not be possible to reactivate the machine until both controls have been returned to the 'off' position. With this kind of control the operator must not be able to activate the machine and then reach the danger zone whilst a danger still exists.

Please remember that two-handed controls are designed to protect the operator only, so that people who are not operating the machine need to be suitably protected from the dangerous parts.

Maintenance

During the course of their use, guards or their constituent parts may fail or become damaged because they, or the material used in their construction, are not adequate for the job they are required to perform. Where guarding is provided, it must therefore be maintained in efficient working order, regularly inspected, well maintained, kept clean and replaced when damaged.

To complement this, operators should be appropriately trained and provided with safe operating procedures which include the requirement for them to check the guarding themselves. The procedures should also detail the precautions to be taken whilst accessing danger zones during normal use, as well as when setting up, carrying out maintenance, repair or breakdowns, and removing blockages.

Risk Assessment

All machines should be the subject of a risk assessment to identify the potential hazards and evaluate the effectiveness of the safeguards provided.

The following checklist shows some of the issues that you should cover when making such an assessment.

- How could employees be hurt? For example, from sharp edges, traps, rotating parts, cleaning, maintenance.
- How obvious are the hazards?
- Under what circumstances will employees need to gain access to the dangerous parts of a machine?
- How often do they need to do this? How close to the dangerous parts do they need to get? And how long does the process take?
- Is the machinery running or isolated at the time? Are there likely to be any other particular hazards at the time?
- How easy is it to approach the danger area?
- How far is access restricted by guarding or position?
- To what extent can access be gained by removing or defeating safeguards?
- Are the operators at risk competent? Do they have a clear perception of dangers?
- Do the operators have the skills and motivation to take the full precautions that are necessary to avoid risk or injury?
- Is human error likely to create a danger?
- How can the risks be minimised?
- What controls are used to ensure that precautions are maintained?

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ACLD017R (01/06) (10648)

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