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<b>GUIDANCE NOTE</b>	<b>PERMITS - HOT-WORKS</b>	<b>Code: B002</b>	<b>Issue: B</b>
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## INTRODUCTION

In order to reduce the risk of fire on company premises all hot-work activities and those likely to generate sparks or flames will be controlled by implementing a hot-work permit system.

These permits will be issued on a daily basis by the company's nominated responsible person.

It is the responsibility of the employee carrying out any hot-works to request a permit from the responsible person in good time prior to carrying out the work. The hot-work permit checklist shall be completed by the responsible person and signed by them and the person conducting the hot-works.

One copy is to be held by the person conducting the works and one is to be filed by the responsible person.

Upon completion the hot-worker is to return their copy of the permit to the responsible person. The permit is no longer active and no further hot-work may be carried out until a new permit is issued.

The responsible person is to ensure that, 1 hour after the permit is returned, a fire watchman checks the area to ensure that there is no residual fire problem before signing and closing the permit.

## PERMIT CHECKLIST

The responsible person must ensure that all of the relevant control measures listed on the permit are in place and should also consider whether the following additional controls are required:

- Any special firefighting requirements? (Refer to COSHH data sheets.)
- Will fire routes or exits be blocked?
- Is a method statement required and have operatives been briefed?

If so they should be detailed in the "additional precautions" section of the permit.

## CANCELLATION CHECKLIST

The permit is cancelled when the permit holder has cleared the work area of all materials and equipment and has finished any hot-work activities. The permit is then signed by the permit holder and handed to the issuing responsible person. One hour after receiving the signed permit the responsible person shall inspect the work area and ensure the following:

- All hot-works to which the permit relates have ceased.
- The area has been checked and is free from residual fire risk.
- All gas cylinders and flammable materials have been removed to a safe store.

When satisfied that the area is free of fire hazards the responsible person will sign off and close the permit.



### HOT-WORKS PERMIT

**Contract:**

**Permit number:**

**This permit is valid from:    hours to:    hours on (date):**

**Issued by:**

**Issued to:**

**This permit covers hot-works:**

**Location:**

ISSUE CHECKLIST	Y/N	N/A	SIGNED
Has a risk assessment been carried out?			
Are operatives trained in the use of the equipment?			
Will non-combustible screens/sheets be erected?			
Is the area clear of all combustible materials?			
Will a fire watcher be necessary and provided?			
Have the correct type of fire-extinguishers been provided?			
Are extinguishers fully charged and inspected?			
Are flashback arrestors fitted to gas cylinders?			
Has a fireproof container been provided for discarded welding rods?			
Has personal protective equipment been provided?			
<b>Additional Precautions</b>			
<b>AUTHORISATION</b>			
Signed:	Time:	Date:	
<b>RECEIPT</b>			
I have read this form and understand the special precautions to be taken prior to and during hot-works.			
Signed:	Time:	Date:	
<b>CANCELLATION</b>			
I have completed the work detailed above and left the site in a safe condition.			
Signed:	Time:	Date:	
I have inspected the work area above and cancel this hot-work permit.			
Signed:	Time:	Date:	

*Hot-Works Permit*



<b>GUIDANCE NOTE</b>	<b>PERMITS - DIG OR ENTER EXCAVATIONS</b>	<b>Code: B003</b>	<b>Issue: C</b>
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## **PERMITS-TO-WORK**

For work in excavations and areas where work activities overlap with certain other hazardous circumstances, a permit-to-work system shall be prepared and used.

Excavations present a number of hazards; such as the risk of the sides of the excavation collapsing and the risk of people, vehicles, plant, equipment or materials, etc. falling in.

Undermining other nearby structures and hitting underground services are amongst the risks with the most potential to cause harm.

The permit system should incorporate the appointment of a responsible person to issue and authorise permits. To be considered competent for the role, the responsible person must have a strong understanding of the work environment, safety precautions and emergency procedures.

This system is to ensure that the correct procedures have been adopted prior to commencing the task.

## **ISSUING AND CANCELLATION PROCEDURE**

The company will nominate a responsible person who shall issue the permits on a daily basis.

The permit checklist shall be completed by the responsible person and signed by them and the person conducting the works. One copy is to be held by the person conducting the works and one is to be filed by the responsible person.

Upon completion, the worker is to return their copy of the permit to the responsible person. The permit is then cancelled.

The responsible person is to ensure that, on or before the permit expires, the permit is returned and that all is well. This will require the responsible person to ensure that a physical check on the work area is undertaken.

## **CANCELLATION CHECKLIST**

The permit is cancelled when the two parts are put together and the following circumstances exist:

- All works to which the permit relates have ceased.
- The area has been checked and is free from residual risk.

The responsible person shall sign that this is the case.



**PERMIT TO DIG/ENTER EXCAVATION**

**Contract:**

**Permit number:**

**This permit is valid from:    hours to:    hours on (date):**

**Issued by:**

**Issued to:**

**Location:**

<b>WORK TO BE CARRIED OUT AND REASON PERMIT IS REQUIRED:</b>			
<b>SAFETY CHECKLIST:</b>	<b>YES</b>	<b>NO</b>	<b>N/A</b>
Has a risk assessment been carried out for the works?			
Has a daily inspection prior to shift been carried out and recorded?			
Are all underground services marked/isolated/protected?			
Are the operatives competent to carry out the task?			
Has a safe access/egress system been provided?			
Are excavation sides adequately supported or battered back?			
Are measures to keep plant and equipment away from edges in place?			
Is suitable guarding to prevent others falling into excavation in place?			
Are operatives provided with suitable personal protective equipment?			
<b>AUTHORISATION</b>			
Signed:	Time:	Date:	
<b>RECEIPT</b>			
I have read this form and understand the special precautions to be taken prior to and upon entry.			
Signed:	Time:	Date:	
<b>CANCELLATION</b>			
I have finished/stopped work in the area stated above and have left the area safe/secure to the public and other workers.			
Signed:	Time:	Date:	
I have inspected the work area above and cancel this permit to dig/enter excavation.			
Signed:	Time:	Date:	



<b>GUIDANCE NOTE</b>	<b>LONE WORKING ON HOST EMPLOYERS SITES</b>	<b>Code: B005</b>	<b>Issue: B</b>
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## **LONE WORKERS**

There is no general prohibition to employees working alone with the exception of a few special circumstances where, due to the risk and hazard, there is a prohibition, e.g. for divers. However, lone workers may, obviously, be exposed to special risks and there is a need to put in place special arrangements to address those risks.

There are two major areas of risk for lone workers:

- The possibility of being unable to summon assistance if they have an accident or if they are incapacitated in some other way.
- Their vulnerability to violence.

The risk assessment carried out under the Management of Health and Safety at Work Regulations ought to properly examine the special circumstance of lone workers. The control measures recommended by this assessment should be enforced.

The sort of concerns that should be examined in the risk assessment includes:

- What might go wrong?
- How serious might it be?
- Would the worker be able to summon help?
- How would you check that they are OK?
- Are they going to come across circumstances in which they will attempt to do something that requires two people?
- Are they mentally and physically suited to working alone?
- What instruction have they received?
- Is that instruction in writing?
- What training have they received?
- How are you going to supervise them?
- What first aid arrangements should be made?

This list is not exhaustive.

After considering these things and putting into place such precautions as you can, you must assess whether it is safe or unsafe for a particular worker to work alone.



<b>GUIDANCE NOTE</b>	<b>NOISE AT WORK</b>	<b>Code: B008</b>	<b>Issue: B</b>
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## INTRODUCTION

Permanent hearing damage can be caused instantly by sudden, extremely loud, explosive noises, e.g. from guns or cartridge-operated machines. However, hearing loss is usually gradual, caused by prolonged exposure to noise.

Some people may develop tinnitus (ringing, whistling, buzzing or humming in the ears), a distressing condition which can lead to disturbed sleep.

## IS THERE A NOISE PROBLEM IN YOUR WORKPLACE?

There is likely to be a noise problem if any of the following apply:

- Noise levels are intrusive for most of the working day.
- Employees have to raise their voices to carry out a normal conversation when about 2 metres apart for at least part of the day.
- Employees use noisy powered tools or machinery for more than half-an-hour each day.
- Activities include construction, demolition or road repair; woodworking; plastics processing; engineering; textile manufacture; general fabrication; forging, pressing or stamping; paper or board making; canning or bottling; foundry works.
- There are impact noises due to hammering, drop forging, pneumatic impact tools, etc.
- Cartridge-operated tools or detonators, or guns are used.

## THE LEGAL REQUIREMENTS

Under the Control of Noise at Work Regulations employers are required to:

- Assess the risks to employees from noise at work.
- Take action to reduce the noise exposure that produces those risks.
- Provide employees with hearing protection if the noise exposure cannot be reduced enough by using other methods.
- Make sure the legal limits on noise exposure are not exceeded.
- Provide employees with information, instruction and training.
- Carry out health surveillance where there is a risk to health.

Employees are required to:

- Co-operate with their employer, use any noise control devices, e.g. noise enclosures, and follow any working methods that are put in place.
- Use any hearing protection they are given, wear it properly and make sure they wear it all the time when doing noisy work and when in hearing protection areas.
- Look after their hearing protection.
- Report any problems with their hearing protection or noise control devices.
- Inform their employer or safety representative if they have any ear trouble.

The noise exposure limits are:

- Lower exposure action values:
  - Daily or weekly exposure of 80dB
  - Peak sound pressure of 135dB
- Upper exposure action values:
  - Daily or weekly exposure of 85dB
  - Peak sound pressure of 137dB
- Exposure limit values (which must not be exceeded):
  - Daily or weekly exposure of 87dB
  - Peak sound pressure of 140dB

## **CONTROLLING THE RISKS FROM NOISE**

Wherever there is noise at work employers should be looking for alternative processes, equipment and/or working methods which would make the work quieter or reduce employees' exposure. Employers should also be keeping up with what is good practice or the standard for noise control within their industry.

Where your assessment shows that your employees are likely to be exposed at or above the upper exposure action values a planned programme of noise control must be put in place.

Consider the following:

- Use a different, quieter process or quieter equipment.
- Introduce a low-noise purchasing policy for machinery and equipment.
- Introduce engineering controls, e.g. avoid metal-on-metal impacts such as line chutes with abrasion-resistant rubber; reduce drop heights; add material to reduce vibration (damping); isolate vibrating machinery or components from their surroundings with anti-vibration mounts or flexible couplings; fit silencers to air exhausts and blowing nozzles.
- Modify the paths by which the noise travels through the air to the people exposed, e.g. erect enclosures around machines to reduce the amount of noise emitted into the workplace or environment, use barriers and screens to block the direct path of sound or position noise sources further away from workers.
- Design and lay out the workplace for low noise emission, e.g. use absorptive materials within the building to reduce reflected sound such as open cell foam or mineral wool; keep noisy machinery and processes away from quieter areas; design the workflow to keep noisy machinery out of areas where people spend most of their time.
- Limit the time spent in noisy areas - every halving of the time spent in a noisy area will reduce noise exposure by 3dB.

## **HEARING PROTECTION EQUIPMENT**

Hearing protection should be issued to employees:

- Where extra protection is needed above that which can be achieved using other noise controls as described above.
- As a short-term measure, while other methods of controlling noise are being developed.

Hearing protection equipment must:

- Give enough protection - aim at least to get below 85dB at the ear.
- Be suitable for the working environment, e.g. consider if it will need to be worn with other protective equipment such as hard hats, dust masks and eye protection.
- Be comfortable and hygienic.

Hearing protection equipment must not:

- Overprotect, i.e. cut out too much noise, as this can cause isolation which may present other hazards. It may also lead to unwillingness by employees to wear it.

## **HOW IS NOISE MEASURED?**

Noise is measured in decibels (dB). An A-weighting, sometimes written as dB(A), is used to measure average noise levels and a C-weighting, or dB(C), to measure peak, impact or explosive noises.

The basic instrument is a sound level meter. A dosimeter (personal sound exposure meter) worn by the employee can also be used. Dual-purpose instruments are also available which can operate as both sound level meters and dosimeters.

A calibrator to check the meter's accuracy and a windshield to protect the microphone against air movement and dirt are essential accessories.

Where the sound pressure level is steady for long periods non-integrating sound level meters, which give a simple indication of A-weighted sound pressure level, may be used for noise assessments. Where the sound pressure level is not steady an integrating sound level meter is essential.

A sound calibrator should be used to check the meter's accuracy each day before and after making any measurements. Calibrators give a tone at a specified sound pressure level and frequency for a specified microphone type using an appropriate adaptor. Make sure you have the right calibrator with the right adaptors for your microphone.

Some meters have an internal electronic calibration. The internal calibration only checks the accuracy of the instrument electronics and does not provide a check of the meter's microphone. However, it can be a useful cross-check of the accuracy of the meter and calibrator.

When assessing a person's noise exposure make measurements at every location that they work in or pass through during the working day and note the time spent at each location.

Operators may need to be present while the measurements are made, e.g. to control the machine. Measurements should be made with the microphone positioned close enough to the operator's head to obtain a reliable assessment of the noise to which they are exposed but preferably not so close that reflections cause errors. The results are unlikely to be significantly affected by reflections if the microphone is kept at least 4cm away from an operator. The microphone should be placed on the side where the noise levels are highest.

To avoid making large numbers of measurements, e.g. where the sound pressure level is changing or if the person is moving within a noisy area, it is advisable to assume the worst case and measure at the noisiest location or during the loudest periods.

The noise level to which an individual employee is exposed will normally change throughout the day because, for example, different machines or materials might be used at different times. You must take sufficient noise measurements to account for all these changes, recording the sound level and the person's exposure time at each noise level.

The time required depends on the nature of the work. A reading may take just 20 seconds or it may take several hours.

**NOISE ASSESSMENT CHECKLIST**

The table below shows what you should or could expect to see in three different standards of noise assessment. To meet the minimum legal requirements the assessment should contain at least the information indicated in the “adequate” column below.

<b>Content:</b>		<b>Adequate</b>	<b>Good</b>	<b>Excellent</b>
Purpose of assessment (legal basis)			√	√
Identification of those employees likely to be at risk of hearing damage (either names of employees, named groups of employees or named tasks)		√	√	√
Daily personal noise exposure ( $L_{EP,d}$ ) of those likely to be exposed at or above the <u>lower exposure action values</u> (calculated from levels of noise and times of exposure during working day)		√	√	√
Levels of noise and times of exposure during working day used to calculate $L_{EP,d}$			√	√
Peak noise exposure of those likely to be exposed at or above the <u>peak sound pressure levels</u>		√	√	√
Indication of employer’s and employees’ legal duties relevant to levels of exposure		√	√	√
Identification of sources of noise giving rise to the risk		√	√	√
Summary of existing noise control measures			√	√
Comment on effectiveness of existing noise control measures				√
Suggestions for priorities for control of noise (where necessary)			√	√
Hearing protection	State whether what is currently in use is adequate	√	√	√
	Suggestions for suitable alternatives	√	√	√
	Which areas require marking as <u>hearing protection zones</u> (and correct sign to use)	√	√	√
	Reference to criteria (BS EN 458) for selection of “suitable” hearing protectors			√
Name of person responsible for the assessment		√	√	√
List of equipment used			√	√
Description of work activities assessed		√	√	√

*Noise Assessment Checklist (1 of 2)*

<b>Content:</b>	<b>Adequate</b>	<b>Good</b>	<b>Excellent</b>
Photographs		√	√
Annotated sketch plans of work areas		√	√
Health surveillance (hearing checks) information (required where employees are likely to be regularly exposed above the <u>upper exposure action values</u> or are at risk for any reason, e.g. they already suffer from hearing loss or are particularly sensitive to damage)		√	√
Suggested noise control solutions			√
Reference to and/or copies of relevant published noise control solutions, e.g. HSE industry-specific guidance		√	√
Reference to and/or copies of general published guidance and information on noise, i.e. to facilitate training of employees	√	√	√
Employee training materials, e.g. a handout			√
Advice on low-noise purchasing policy			√
Glossary of terms		√	√

*Noise Assessment Checklist (2 of 2)*

## REFERENCES

HSE guidance on how to carry out a noise assessment: L108 - "Reducing Noise at Work"

HSE guidance for employers: INDG362 - "Noise at Work"

HSE guidance for employees: INDG363 - "Protect Your Hearing or Lose It"

HSE website: [www.hse.gov.uk/noise](http://www.hse.gov.uk/noise)

<b>GUIDANCE NOTE</b>	<b>PREVENTING ACCIDENTS TO CHILDREN ON CONSTRUCTION SITES</b>	<b>Code: B009</b>	<b>Issue: B</b>
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## STATUTORY REQUIREMENTS

Section 3 of the Health and Safety at Work etc Act 1974 requires every employer or every self-employed person to conduct their undertaking so as to ensure, so far as is reasonably practicable, that people not in their employment, including members of the public and children, are not exposed to risks to their health or safety.

Historically, children are most at risk of injury from the following activities:

- Falling through openings such as manholes, stairwells or into excavations, pits, etc.
- Riding on mobile plant, e.g. dumper trucks, which run out of control.
- Being hit by mobile plant while playing near it.
- Falling from or being hit by builders' hoists.
- Climbing on to stacks of material which then collapse.
- Playing with manhole rings and cable drums which run away and roll over the children.
- Tunnelling into piled sand which is undermined and collapses onto the tunnels, causing suffocation.
- Climbing onto, and then falling from, scaffolds or from/through roofs or other elevated areas.

Where sites are located close to schools, housing estates, etc. it will be useful to liaise with school heads, tenants associations and so on to discuss ways in which children can be informed of the dangers and be discouraged from trespassing. For example, visits to schools by contractors to talk to the children and show them a suitable film have proved effective in reducing accidents and vandalism on site. The local police force may be prepared to participate in similar activities.

Construction sites have the appeal of adventure playgrounds to many children; it is no easy task to provide measures which effectively prevent a determined child undertaking the hazardous activities mentioned above. However, bearing in mind the danger to young life, site occupiers should not let this deter them. The following precautions are reasonably practicable steps which site occupiers can take to prevent children endangering themselves.

## PERIMETER FENCING

At all construction sites where it is reasonably practicable, a fence should be erected to enclose all construction activities. In assessing whether erecting a fence is reasonably practicable, site occupiers should weigh the degree of risk against the difficulty and cost of erection and maintenance. Unless the risk is insignificant when compared to the cost, etc. a fence should be erected. Given the hazards of construction sites and that it is children who are at risk, the degree of risk is high for most sites. Thus, for example, any demolition site, new build, redevelopment or major refurbishment should be fenced where these sites are located in or near urban areas. Minor refurbishment and other jobs of short duration (even less than 24 hours) may have to be fenced, depending on the nature of the risk and the location of the site.

The fence should not be less than 2 metres high and, because it should not be capable of being easily climbed, it should be either close-boarded or covered with mesh not exceeding 30mm in size. Support poles should be firmly anchored.

Access openings should be gated and kept locked when the site is unoccupied. A watch on the gates should be kept when they are open. Fencing should be properly maintained and materials should not be placed or stacked near the fence in a way which provides easily climbed access over the fence. Suitable warning notices should be fixed to the fencing.

## **PRECAUTIONS WHERE THE PERIMETER FENCING IS NOT EFFECTIVE OR POSSIBLE**

The site occupier may find that children are getting on to the site despite the provision of a perimeter fence, or, it may not be reasonably practicable to erect a perimeter fence on some construction sites. Each case should be judged on its merits but obvious examples of sites which may not be fenced are very long excavations on motorway sites and a new housing estate which is partly occupied (though, in some cases, problems can be avoided by better planning of the parcels of work).

In such cases the following precautions should be taken:

### **Guarding of Edges of Excavations, etc.**

Measures to protect site workers from falling into excavations, etc. or over open edges, such as at stairwells, are required under the Construction (Design and Management) Regulations and the Work at Height Regulations respectively. To protect children against these dangers the measures should be augmented as follows:

- All excavations, pits, etc. and especially those where water is likely to accumulate should be filled or securely covered immediately work in them ceases. If leaving them open is unavoidable their edges should be fenced by a barrier of chestnut paling, or similar, to a height of at least 1 metre from the ground. The fencing should be adequately supported:
  - Where an open edge, such as at a stairwell, has been protected with a guardrail and toe board, the space between the guardrail and toe board should be closed with a barrier of sheeting or other suitable material;
  - Where covers have been used to guard open edges, perhaps at manholes or small floor openings, it is important that they are effectively secured, as children are likely to try and remove such covers to investigate what lies below.

### **Vehicles and Plant**

All vehicles and plant with moving parts, e.g. hoists, should be effectively immobilised when left unattended. If possible, such equipment should be locked in a separate enclosure when the site is unoccupied.

### **Stacking of Materials**

All materials which could cause injury if they fell, e.g. paving slabs, timber, pipes, etc. should be stacked or stored in a way which prevents their easy displacement. Temporary but secure and stable racking should be used when appropriate.

Palletised loads of bricks, blocks, etc. should not be stored more than two pallets high. The condition of the strapping or shrink-wrapping around the load should be checked regularly. An upper pallet should be moved to ground level if the strapping is broken or the shrink-wrapping has deteriorated. Palletised loads may also become unstable due to loss of material from damaged packages, e.g. cement bags, within the load. Palletised loads should not be placed near to open edges of excavations on ground liable to give way.

Manhole rings, cable drums and similar articles should be stored end on, not side on, to prevent their rolling. For some articles it may be impracticable to store them end on; in which case they should be effectively chocked.

Heaps of sand, topsoil, etc. should be limited in size to minimise the consequences of their collapse should they be undermined by children digging at their base.

### **Access to Elevated Areas**

All ladders giving access to elevated areas should, when the site is unoccupied, have the first run removed and placed under lock and key. Alternatively, access could be prevented by padlocking scaffold boards to the ladder at ground level to cover the rungs.

Where there is an enhanced risk of children using scaffolds to climb to high levels, e.g. at scaffolds erected around occupied blocks of flats, access at ground level should be prevented by a barrier at least 1.5 metres high (such as chestnut paling) strapped to the base of the scaffold. If access to scaffold platforms through windows of occupied properties is possible, occupants should be asked to keep those windows closed, preferably locked shut. The use of brickguards, sheeting or other barriers, between the guardrails and toe boards, will reduce the chance of a fall should children manage to climb onto the scaffold platform.

To prevent debris chutes being used as slides when unattended, access to the upper ends of the chutes should be prevented, e.g. by providing a lockable cover or an effective barrier.

### **Electricity and Other Energy Sources**

At the end of work for the day, electrical supplies to all equipment which does not need to be energised when the site is unoccupied should be locked-off, or switched off at isolators in a locked building or enclosure. Supplies to equipment which is kept energised, e.g. floodlights, pumps, etc. should be installed in such a way that access to live conductors is not possible except by the use of tools. Additional protection such as wire cages, may be needed for light fittings where they are accessible, to prevent damage and contact with live parts.

Gas supplies should be similarly isolated or protected and cylinders of compressed gases of any kind should be placed in a locked, ventilated enclosure unless they are of such a size, so located or secured that they cannot be easily moved or the valves opened without the use of special tools. Special tools for electrical or gas supplies should be kept under lock and key when the site is unattended.

Tanks containing fuel, e.g. diesel for site plant, should be locked-off at the end of the working day to prevent unauthorised release of their contents.

Fires used to burn timber and other scrap on demolition sites should be extinguished before the site is vacated at the end of the working day.

### **Storage of Hazardous Materials**

Materials which are flammable, toxic or present some other hazard, e.g. cartridges for fixing tools, should also be locked away at the end of the working day.



<b>GUIDANCE NOTE</b>	<b>UPPER LIMB DISORDERS</b>	<b>Code: B010</b>	<b>Issue: C</b>
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## INTRODUCTION

Upper limb disorders (ULDs) generally relate to medical conditions which affect muscles, joints, tendons and ligaments. ULDs can be caused or worsened by poor work practices. As the term suggests, it relates to areas of the upper torso such as the neck, shoulders, arms, wrist and fingers. Repetitive strain injuries (RSI) and musculoskeletal disorder of the upper limbs are common terms which fall within the definition of ULDs.

Employees who adopt or are forced to adopt an awkward posture or who apply too much force to their bodies for long or frequent periods can be at an increased risk of developing ULDs.

The failure to deal directly to resolve problems created by ULDs can lead to serious ill health, lost of productivity, absenteeism and civil claims. Significant civil claims from ULD injuries are well-established.

Under the Management of Health and Safety at Work Regulations the employer must carry out a risk assessment to ensure that risks which could lead to ULDs are adequately controlled.

ULDs can occur in jobs that require an employee to carry out repetitive movements. Both office-based and manual workers can be at risk from ULDs. Employees involved in the following work activities can be at risk of developing ULDs:

- Manufacturing and production line assembly workers.
- Electronic and electrical assembly workers.
- Workers involved in word processing, data inputting and keyboard workers.
- Food processing workers.
- Packers.
- Textile machinists.
- Construction workers.
- Retail workers.

## HUMAN FACTORS

Effective ways of controlling risk from ULDs are based on human factors which take into account individual capacities and limitations. This consideration is termed ergonomics.

## REPETITIVE OPERATIONS

Work which is repetitive and requires the employee to use the same set of muscles increases the risk of the employee developing ULDs. This is a significant factor because the more the operative is exposed to the task the more the risk of injury is increased.

The exposure to repetitive operations can be reduced by considering:

- Job rotation to allow employees to carry out other tasks, thus reducing the period of exposure.
- Removal of the person from the task by automation.
- Provision of adequate rest periods.

When considering assembly activities the following factors should be considered to improve the layout of the workstation which would allow the employee to adopt a neutral position when working:

- **Seating at workstations.** - Seated workstations lead to fewer stresses being applied to the employee's joints and muscles. Suitable seating, which can be adjusted in height and has adjustable back support that can be raised, lowered and tilted, should be provided. Swivel chairs with five-pointed caster bases are best suited for assembly type work. When employees are engaged in precision work a forward tilting seat and work surface can assist the operator in the assembly activity. Footrests should be provided to employees where necessary.
- **Standing at workstations.** - Standing workstations may be provided for the operation of machinery or production line assembly. Factors to be considered in reducing the risk of ULDs whilst using standing workstations are:
  - The provision of alternatives to conventional seating, such as lean or foldaway seats and sit-stand seats;
  - The provision of feeder tables to reduce the amount of bending and twisting;
  - Placing control panels within easy reach of the employee;
  - Ensuring mechanical handling devices are provided to eliminate any manual handling.
- **Layout of workstation.** - The layout of the workstation should eliminate the need for the employee to carry out repetitive reaching. Component picking bins should be placed within the individual's reach zone, ideally within 450mm of the front of the operator. Any components used in the assembly activity should be arranged in a semi-circle to ensure that the employee does not have to overreach, which could lead to a loss of support provided by the seat. Tools needed in the assembly activity can be suspended to reduce the need for the employee to reach outside the work zone. Racking provided for materials and finished items should be placed well within the individual's reach to prevent overstretching when large quantities of components are required in the assembly work.

## HAND TOOLS

Hand tools are used for most assembly activities. Use of excessive force by the employee when using hand tools can be a significant risk factor. Forces can also be applied to muscles and joints by handling heavy objects or when using tools which need to be impacted onto a material, such as hammering.

Local force and stress can be imposed on muscles, joints in the finger, arm and forearm when using tools held in the palm, such as pliers. Specifically designed hand tools which have been modified to ensure that employees adopt an ergonomic hand position are a solution to this problem.

Forces which need be applied by employees when carrying out assembly work can be reduced by:

- Careful selection of the correct tool.
- Routine sharpening of any cutting surfaces and faces.
- Routine inspection of the tool for wear and damage.
- Ensuring tools are provided with a suitable gripping surface.

## USE OF POWER TOOLS

A wide range of power tools are available and, where practical, these should be provided as an alternative to hand tools. The use of power tools can significantly reduce the force to which employees may be subjected to in their work activity.

However, the following factors need to be considered if selecting power tools over hand tools:

- Suitability of the power tools for the task.
- The need for increased maintenance and inspection arrangements.
- Additional risks created by the use of pneumatic or electrical powered tools.
- Increases in the weight of tools - this can be controlled by suspending or counterbalancing the tools.

## LIGHTING

Poor lighting can lead employees to adopt poor working postures in order to see their work. Typically this could lead to an employee developing muscular problems in the neck and shoulders if they find it difficult to see the work.

It is recommended that, for the following activities, average illumination, which is measured in Lux (Lx), should be:

<u>Activity</u>	<u>Average Lx</u>	<u>Minimum Lx</u>
Assembly of large components	100	50
Office work	200	100
Electronic assembly	500	200

## TRAINING

All workers and management need to be given basic training in the awareness of ULD issues. Specific training needs to be given to particular employees at specific risk from ULDs through their job or task.

General training should include:

- Early identification and awareness of the symptoms of ULDs.
- Work activities and tasks where risk factors are significant.
- Safe methods and practices to be adopted to prevent ULDs.

