LIFTING OPERATIONS AND LIFTING EQUIPMENT

There is specific legislation concerning the use and maintenance of lifting equipment. The Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 set out a standard to be reached to ensure that lifting operations are carried out in safe manner. It is important that when addressing the requirements of LOLER that the Provision and Use of Work Equipment Regulations (PUWER) (Section 2.37) are also considered. The text printed in bold italics indicates an Approved Code of Practice has been issued for that regulation and managers must ensure they comply with it.

The specific requirements of LOLER are:

1. General Duties (Regulation 3) The scope of the regulations is wide and covers all lifting equipment including:

Cranes	Vehicle inspection hoists	Lifts and hoists
Dumb waiters	Ropes and slings	Bath hoists and slings
Passenger lifts	Hooks and shackles	Vehicle tail lifts

A. Ergonomic Risks ***When selecting lifting equipment employers must consider any ergonomic risks***. Operating positions, working heights, reach distances etc should be considered, operation of the equipment should not place undue strain on the user. Operators should not be expected to exert undue force or stretch or reach beyond their normal limits. These issues should be considered when undertaking risk assessments.

B. Material of Manufacture ***Employers should only select lifting equipment that is made of materials which are suitable for the conditions under which it will be used***. This section requires lifting equipment to be able to withstand the working conditions in which it will be used and not be adversely affected by corrosion or the affect of high or low temperatures.

C. Means of Access ***Where access or egress is required from any part of lifting equipment employers must ensure that there is a safe means of doing so***. Consideration must be given to the consequences of falling from a height or into/onto any dangerous substances while gaining access to lifting equipment. Safe and proper access should be provided to reach the operating position and also for the purposes of erecting, dismantling, inspecting, maintaining or repairing the lifting equipment.

D. Protection Against Slips, Trips and Falls ***Where a person is required to be present on any part of the lifting equipment, eg for operational, maintenance or inspection purposes the working place, particularly if a platform, for that activity should be such as to minimise the risk of accidents arising from slips trips and falls.*** These requirements concern those parts of lifting equipment where people may need to be present in order to operate, maintain, inspect and/or carry out repairs. Factors to be considered will include the likelihood of people slipping on accumulations of liquid or dust and the risk of people or equipment falling more than two metres, particularly if other people may be walking or working below the lifting equipment.

E. Operator Protection ***Where operators of lifting equipment may be adversely affected by the environment in which they are working they should be provided with adequate protection***. Situations to be considered where the operators may need protection would be:

1) Where they are exposed to the weather.

2) Where there are high nuisance or discomfort levels of air borne contaminants.

3) Where they may be exposed to high noise levels.

F. Effects of High Wind ***Where lifting equipment and/or its load may be affected by high wind the equipment should be fitted with appropriate devices so as to detect dangerous situations and allow measures to be taken to cease using the equipment***. Where lifting equipment can become unstable if used in high wind conditions measures should be put in place to determine the wind speed and its affects. The most common way of providing an instantaneous indication of wind speed is to fix an anemometer to the lifting equipment, this will enable the operator to assess whether it is safe to use the lifting equipment provided he/she has been provided with information regarding the maximum wind speed in which the equipment can be operated. The shape/size of the load will also need to be considered when assessing the affect that high wind levels may have on it and the lifting equipment. If it is necessary to cease using lifting equipment measures must be taken to ensure the lifting equipment and the load are left in a safe condition.

2. Strength and Stability (Regulation 4)

A. Adequate Strength ***Employers must assess whether the lifting equipment has adequate strength for its proposed use. Account should be taken of the combination of forces to which the lifting equipment will be subjected as well as the weight of any associated accessories used in the lifting operation***

Lifting equipment selected should not be unduly susceptible to any of the foreseeable failure modes likely to arise in service, for example fracture, wear or fatigue. Lifting equipment used should provide an appropriate factor of safety against foreseeable failure modes.

Lifting equipment should have adequate strength to undertake the tasks for which it will be used; particular attention should be paid to mounting and fixing points. A competent person should ensure that the strength and stability of the lifting equipment continues to be adequate for the tasks that the equipment is intended to be used for.

B. Adequate Stability ***Employers should ensure the lifting equipment has adequate stability for its proposed use. Employers should take into account any combination of destabilising forces that may adversely affect the stability of lifting equipment. Where appropriate suitable effective measures to provide sufficient resistance to overturning in order to ensure the adequate stability of the lifting equipment. Where the safe use of lifting equipment depends on the use or positioning of stabilising arrangements, the equipment should not be used unless these are in place and operating effectively.***

A number of factors can affect the stability of lifting equipment, these include:

1) The strength of the ground or the surface on which the lifting equipment is positioned/located.
2) Stability of the surface under load conditions eg if the lifting equipment is too close to an excavation the ground may subside or collapse.
3) Whether the surface on which the lifting equipment operates is on a slope, and the angle of that slope.
4) The size and nature of the load.
5) How the load is intended to be lifted.
6) The maximum wind loading that may occur.

Various methods or combinations of methods can be used to improve the stability of lifting equipment, these include:

- Designing a suitable base on which to site the lifting equipment.

- Using anchorage systems.
- Using counterbalancing weights.
- Using ballast, outriggers or stabilisers

C. Mobile Lifting Equipment ***Employers should ensure that lifting equipment which is mobile or which is dismantled and reassembled at different locations is used in such a way as to ensure its stability during its use under all foreseeable conditions. Particular account be should be taken of the nature of the ground and other surfaces on which the equipment will be used. Mobile lifting equipment fitted with pneumatic tyres should not be used unless the tyres are inflated to the correct pressure. Suitable means should be provided to check this.***

Examples of mobile lifting equipment include:

1) Mobile Cranes

2) Fork lift trucks

3. Lifting Equipment Used for Lifting Persons (Regulation 5)

The raising and lowering of people by work equipment which is not specifically designed for the purposes should only be undertaken in exceptional circumstances, where it is not practicable to gain access by less hazardous means. Where it is necessary to use such work equipment then it should be ensured that all necessary precautions are taken to ensure safety, including appropriate supervision.

Examples of lifting machinery which is not specifically designed for lifting people but which could be used if the necessary precautions are taken include forklift trucks and cranes. Even when suitably designed carriers or working platforms are provided these arrangements will not provide the same level of protection of safety as purpose-built equipment such as a mobile work elevating work platform.

Regulation 5 also applies to carriers such as a lift car.

Any person in such a car should be suitably protected from being injured by something outside it. To achieve this the car should be fully enclosed when in use.

Employers should take appropriate precautions to prevent someone entering or leaving the car being struck by it. There should be a suitable enclosure around the car and, where necessary, appropriate protective devices to prevent access to danger zones. Any door or gate which is necessary in order to gain access or egress to/from the car should open so as to prevent any person falling accidentally from the car. Employers should ensure that in the event of malfunction of the lifting equipment that persons being lifted are not exposed to danger and a reliable means of rescue is available

All motorised doors fitted to lift cars should be equipped with a suitable device to prevent users being crushed by them when entering or leaving. The doors fitted to lift cars should be full length and designed and installed so that the car cannot move unless the doors are closed and comes to a halt if the doors are opened. Lift cars must also have devices to prevent free-fall which should be independent of the car. If a person becomes trapped in a carrier they should be able to summon assistance. In most circumstances an emergency means of lowering the carrier to a safe position will be required

Where a person is working in a carrier which is not fully enclosed and might fall 2 metres or more, the carrier should be fitted with suitable edge protection, this should also be fitted where a person might fall less than 2 metres where there are factors which would increase the likelihood of a fall or serious injury. Any edge protection should be suitable for the purpose for which it is used and should be securely fixed to the carrier. The floor of any carrier on which persons need to be present should be slip-resistant.

As part of the general risk assessment process managers should assess the risks arising from other work equipment, structures and objects which persons being lifted may strike. Fully enclosed carriers and falling object protection can reduce the risks in such circumstances

4. Positioning and Installation (Regulation 6)

Lifting equipment should be positioned or installed to minimise the need to lift loads over people. In particular, lifting equipment should be positioned and installed to prevent crushing when it is in extreme positions.

A load moving along a fixed path, such as a conventional lift or hoist, should be efficiently protected by a suitable and substantial enclosure, or some equally effective measure, to minimise the risk of a person being struck by the equipment or load.

In the case of lifting equipment which follows a fixed path, but whose maximum height of travel above ground is no more than 2 m where you should provide an enclosure where practicable. Where this is not practicable, you should provide a barrier or gate or other equally effective means, to prevent any person being endangered by the underside of the lifting equipment or any fitting attached to it. Employers should position or install lifting equipment with a travelling or slewing motion to prevent trapping points. Where this is not possible employers should take effective measures to prevent access of persons to such trapping points.

As part of the planning of lifting operations required under LOLER employers need to address whether equipment has been installed or positioned to ensure that the risks of the equipment or its load, injuring people is minimised. One of the control measures to satisfy this requirement would be to ensure that the dimensions of passageways or paths provided for access are such that they are sufficient so that any person using them will not be put at risk form any lifting operation.

Appropriate measures should be taken to prevent freely a suspended load from moving in an uncontrolled manner where the risks justify it. Where appropriate, lifting equipment should be fitted with suitable devices to minimise any risk of the load falling freely. Employers should ensure that where, in the event of a power failure, the lifting equipment will not be able to maintain its hold on a load, appropriate measures are in place to prevent persons being exposed to any consequential risk.

This section of the regulations aims to ensure that loads are under control at all times to minimise the risk to people in the vicinity of lifting operations. Various methods can be used to minimise the risk of loads falling out of control these include:

A. Multiple ropes/chains

B. Safety gear

C. Safety nets for palletised loads

D. Lifting mechanisms with a high factor of safety or strength

The requirements extend to the prevention of a load being released unintentionally, pneumatic, hydraulic, vacuum, or magnetic equipment may need to be adapted or have a back-up power supply that takes over in the event of power failure. People should be warned of any risk arising from a power failure.

Hooks and other similar devices provided for lifting should be of a type that reduces the risk of the load becoming displaced from the hook or other devices.

Wherever possible, hooks should be fitted with safety catches or be shaped to avoid the accidental displacement of the sling, where this is not possible other suitable preventive measures should be taken.

Where two or more items of lifting machinery are used they should be installed or positioned so as to prevent the loads and/or parts of the equipment coming into contact with each other.

In order to avoid collisions between items of lifting equipment or their loads, items of lifting equipment should be positioned or installed so that their operating paths do not overlap. Appropriate precautions should also be taken to prevent lifting equipment or loads striking other structures or vehicles during the lifting operation.

Suitable and substantial gates or equally effective means should be provided at any access gate and /or egress points to any hoistway or shaft enclosure.
Any such gate, or equally effective means should be fitted with efficient interlocking devices such that:

A. The gate cannot be opened except when the lifting equipment at the landing.

B. The lifting equipment cannot be moved away from the landing until the gate is closed. If is not reasonably practicable to fit such devices arrangements should be made to ensure that the gate is kept closed and fastened, except when the lifting equipment is at rest at the landing. Any gate needs to be of a suitable height to prevent people toppling over or reaching over it and be of adequate strength.

Employers should adequately fence shafts or hoistways where people may fall down them. Gates and doors should be fitted with interlocks which prevent the lift moving until the gates are closed. Any enclosure or gate should normally be at least 2 m high and be constructed so as not to present trapping or shearing hazards, especially to children.

5. Marking of Lifting Equipment (Regulation 7)

Employers must ensure that the safe working load (SWL) is marked on all lifting equipment.
A safe working load is a value or set of values based on the strength and/or stability of the equipment when lifting.

Employers should ensure that where lifting machinery has a safe working load which varies with its operating radius or is dependent upon how it is configured, it is either clearly marked or information is provided to indicate to the user the corresponding safe working load. Any markings should be clearly visible or the information be readily available to the operator or user.

Where there is a significant hazard arising from the machinery it should be provided with appropriate equipment or devices such as rated capacity indicators and rated capacity limiters.

Where changing the operating radius leads to a corresponding variation in the SWL
risk assessments should indicate the need for load-limiting devices to stop the operation if the SWL is in danger of being exceeded or an indicating device that provides a visual and/or audible warning that the SWL is in danger of being exceeded. Examples of the type of lifting machinery where its configuration can affect the SWL include:

A. A fork-lift truck fitted with an attachment.

B. An excavator used as a crane.

C. A telescopic reach truck.

The lifting equipment should be clearly marked with information about how the configuration affects the SWL, this can be in the form of an indicator, plate, chart or certificate which is readily available to the operator. If it is not possible to provide a value for the SWL for all configurations the capacity of the equipment should allow for a factor of safety (this is known as derating). Where this is necessary it should only be carried out by a competent person).

6. Organisation of Lifting Operations (Regulation 8)

Lifting operations involving lifting equipment must be properly planned by a competent person, appropriately supervised and carried out in a safe way.

The person planning the operation should have adequate practical and theoretical knowledge and experience of planning and lifting operations.

The plan will need to address the risks identified by the risk assessment and identify the resources required, the procedures and the responsibilities so that any lifting operation is carried out safely.

The plan should ensure that the lifting equipment remains safe for the range of lifting operations for which the equipment might be used.

Where two or more items of lifting equipment are used simultaneously to lift a load**, **where appropriate a written plan should be drawn up and applied to ensure safety.

The factors which should be considered when selecting lifting equipment should include:

A. The load to be lifted

B. Its weight, shape, centre of gravity and availability of lifting points

C. Where the load is presently positioned and where it will be positioned after the lifting operation.

D. How often the lifting equipment will be used to carry out the task.

E. The environment in which the lifting equipment will be used.

F. The personnel available and their knowledge, training and expertise.

An example of a simple plan for the routine use of an overhead crane would be:

1. Assess the weight of the load.
2. Choose the correct accessory for lifting.
3. Check the anticipated path of the load to make sure it is not obstructed.
4. Prepare a suitable place to set down the load.
5. Fit the sling to the load.
6. Make the lift.
7. Release the slings and clear up.

For routine lifting operations an initial plan may only be required once but it may need to be reviewed occasionally to ensure the nothing has changed to make the plan invalid. Examples of routine lifting operations would include:

A. Fork-lift trucks in a warehouse.

B. A mobile elevated work platform used for regular maintenance.

C. A vehicle tail lift.

D. A patient hoist.

Regulation 8 also requires a number of other factors to be considered when organising a lifting operation, these being:

A. ***Working under suspended loads:*** where practicable loads should not be carried or suspended over areas occupied by persons. Where this is not practicable employers should establish a safe system of work which minimises the risks to persons below the load.

B. ***Visibility:*** If the operator of lifting equipment cannot observe the full path of the load, either directly or by means of auxiliary devices, the employer should ensure that a responsible person has appropriate means of communicating to guide the operator. Measures should be taken to prevent the load striking anything or any person.

C. ***Attaching/Detaching and Securing Loads:*** Employers should ensure that any lifting accessories used for securing the loads are compatible with the load, taking into account any attachment points on the load, the environmental conditions in which the accessories will be used and their configuration of use. Appropriate measures should be taken to stop the load disintegrating while being moved. The load should not be moved unless the person who attached or detached it gives authorisation to do so.

D. ***Environment:*** The use of lifting equipment in the open air should be halted where weather conditions deteriorate to the point that it could affect the integrity of the lifting equipment or expose persons to danger.

E. ***Location:*** Lifting equipment should only be used where there is sufficient headroom.

F. ***Overturning:*** Lifting equipment should not be used in a manner likely to cause it to overturn, appropriate measure should be taken to prevent lifting equipment from tilting, overturning and where necessary moving or slipping.

G. ***Proximity Hazards:*** Employers should ensure that suitable measures are taken to minimise the risks from lifting equipment due to its proximity to other objects. This section requires employers to consider the risks which should be taken into account when considering proximity hazards such as overhead power lines, trench work or excavations, low bridges, warehouse racking etc.

H. ***Derating:*** Where appropriate the safe working load of lifting equipment should be reduced to take into account the environment and mode in which it is being used.

I. ***Lifting of Persons:*** Employers should ensure that where persons are lifted by lifting equipment primarily designed for lifting loads other then persons, the control position of the lifting equipment is manned at all times and the persons being lifted have a reliable means of communication with the equipment operator. In the event of failure of the lifting equipment persons being lifted should not be exposed to danger and a reliable means of rescue should be available.

J. ***Overload:*** The safe working load should not be exceeded except where, for the purpose of a test, a competent person requires it.

K. ***Pre-use Check:*** Employers should ensure that their employees have appropriate training and instruction so that they are able to ensure that the lifting equipment is safe to use by means of carrying out pre-use checks.

7. Thorough Examination and Inspection (Regulation 9)

Lifting equipment must be thoroughly examined for defects before it is put into use.
Lifting equipment obtained form a third party must be accompanied by physical evidence of the last thorough examination before it is used in a new employer's premises.

Employers should ensure that the person carrying out a thorough examination has such appropriate theoretical and practical knowledge and experience of the lifting equipment to be thoroughly examined as will enable them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the lifting equipment.

Employers should identify equipment which requires a thorough examination and ensure it is thoroughly examined. The risks which could arise from the failure of the lifting equipment will determine how thorough the examination needs to be.

Lifting equipment must also be thoroughly examined to ensure correct installation and safe operation after it has been installed and before being put into service for the first time, or after it has been relocated, if its safety is dependent on its installation.
Where lifting equipment is exposed to conditions that may cause deterioration likely to cause danger, it must be thoroughly examined:

A. For lifting equipment used for lifting people - at least every 6 months.

B. For other lifting equipment - at least every 12 months.

In both cases the competent person must draw up an examination scheme, ie a suitable scheme that determines the frequency of the thorough examination taking into account, the condition of the equipment, the environment in which it is used and the number of lifting operations and loads lifted.

Employers should inform the competent person of any changes in use of the lifting equipment which may affect the examination scheme either where the changes have occurred since the last examination or will occur before the next examination.

8. <u>Reports and Defects</u>

   The person undertaking a thorough examination must notify the employer immediately of any defects that are, or could be, a danger to people, and, as soon as practicable submit a written and signed report to the employer and if appropriate the person hiring or leasing the lifting equipment.

   If there is an existing or imminent risk of serious personal injury due to a defect in lifting equipment, HSE, or any other enforcing authority must be informed.

   The information required to be included in a thorough examination report is as follows:

   1. Name and address of the employer.
   2. Address of the premises at which the thorough examination was made.
   3. Lifting equipment identity marks, including date of manufacture if known.
   4. Date of the last thorough examination.
   5. Safe working loads, stating those associated with equipment configuration.

6. Where the thorough examination relates to the installation or assembly of the lifting equipment, notification of that fact and that it has been installed correctly and is safe to operate.

7. Information as to whether the thorough examination relates to a 6 or 12 monthly examination carried out under an examination scheme, or an examination carried out in cases of exceptional circumstances where the safety of the lifting equipment may have been jeopardised. The report should also state that the lifting equipment is safe to operate.

8. Details and identification of any parts found to be defective, including a description of the defect, where the defect is or could become a danger to people.

9. Details of any necessary repairs, renewals or alterations to correct a defect.

10. In cases where the defect *may* represent a danger to people the following must be included:
    - The time in which the defect could become a danger
    - Details of repairs, renewals or alterations necessary to correct the defect
    - The latest day on which the next thorough examination must be carried out
    - Details of any tests if these are included in the thorough examination
    - The date

11. Name, address, qualifications and employment status of the person making the report-if the person is an employee then the name and address of his or her employer must be included.

12. Name and address of the person signing or authenticating the report.

13. Report date.

Defects noted during an inspection of the lifting equipment which pose or may pose a danger to people must also be notified to the employer immediately. A written record of the inspection must be made.

Employers may not use any lifting equipment notified as having a defect before the defect is corrected. In cases where the defect could *become* a danger, the lifting equipment may not be used after the time specified in the report (ie The time after which the defect is deemed by the competent person to be dangerous) until the defect is corrected.

9. Keeping of Information (Regulation 11)

Thorough examination reports for lifting equipment must be retained until the lifting equipment ceases to be used, while the thorough examination report for lifting equipment accessories must be kept for two years. Thorough examination reports relating to the installation or assembly of lifting equipment must be kept until the equipment ceases to be used. An examination report that relates to the deterioration in condition of lifting equipment must be kept until the next report is made, or two years, whichever is the later.