22 September 2010

Health and Safety Authority

Draft

(Revised Part) Guide to Chapter 2 of Part 2 of the General Application Regulations 2007: USE OF WORK EQUIPMENT

Contents

Introduction

This Guide is aimed at safety and health practitioners, employers, managers, employees, safety representatives and others to give guidance on Chapter 2 of Part 2 and the related Schedule 1 to the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007) as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2007 (S.I. No. 732 of 2007) and the Safety, Health and Welfare at Work (General Application) (Amendment)(No. 3) Regulations 2010 (S.I. No. … of 2010) relating to the use of work equipment. The objective of the guide is to give general guidance aimed at the prevention of occupational accidents or ill health. *It is not intended as a legal interpretation of the legislation.* Neither is it a detailed technical document that covers all the implications of any given Regulation. What may be covered in a few lines in a Regulation may be the subject of a lengthy technical standard or code of practice.

In this Guide the text of the Regulations is shown in italics.

The General Application Regulations 2007, as amended, are made under the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) referred to elsewhere in this Guide as "the Act" or the "2005 Act".

Chapter 2 of Part 2 of the Regulations, as amended, transposes Directive 2009/104/EC of the European Parliament and of the Council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work (codified version), by substituting new provisions for Regulations 27 to 61. Directive 2009/104/EC consolidates, without substantive amendment, the texts of Council Directive 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work, as amended by Council Directive 95/63/EC of 5 December 1995. Accordingly, the amended Regulations are "technical" amendments that do not involve any substantive changes to the duties set out originally in S.I. No. 299 of 2007 as amended by S.I. No. 732 of 2007.

The definition of work equipment, i.e. "*any machinery, appliance, apparatus, tool or installation for use at work"* in Regulation 2 is all inclusive. It ranges from complex machinery such as a printing machine to hand tools such as a hammer.

The provisions of the Regulations and Schedule 1 are only applicable to the extent that they are relevant to the work equipment in question.

There are some topics which are relevant not only to work equipment but also fall under a number of other Parts of the Regulations such as Electricity (Part 3), Work at Height (Part 4), Noise and Vibration (Part 5) and Explosive Atmospheres (Part 8).

The Use of Work Equipment Regulations apply to equipment in use; they do not cover the duties of those placing equipment on the market for the first time, including issues of CE marking and declarations of conformity.

Some of the Regulations overlap in scope, reflecting their different origins.

Chapter 2 of Part 2 of the General Application Regulations 2007 covers Regulations 27 to 61. However, in addition to the definition of work equipment, Regulation 2 also defines "lifting equipment" as "*work equipment for lifting, lowering loads or pile driving and includes anything used for anchoring, fixing or supporting such equipment*".

The scope of potential workplaces covered by Chapter 2 of Part 2 of the Regulations is much broader than that addressed in Chapter 1 of Part 2 relating to the workplace.

Regulation 27: Interpretation for Chapter 2
(as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2007 (S.I. No. 732 of 2007))

27. *In this Chapter:*

"carrier" means the device by which persons or goods, or both, are supported in order to be lifted, lowered or moved;

"danger zone" means any zone within or around work equipment in which an employee is subject to a risk to his or her safety or health;

"EC declaration of conformity" refers to a declaration of conformity issued pursuant to Directive 98/37/EC or Directive 2006/42/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to machinery;

"exposed employee" means any employee wholly or partially in a danger zone;

"fishing vessel" means a vessel to which the Safety, Health and Welfare at Work (Fishing Vessels) Regulations 1999 (S.I. No. 325 of 1999) apply;

"hoist or lift" means a lifting machine which has its direction of movement restricted by a guide or guides but, for the purpose of this Chapter, does not include—

> *(a) a fork lift truck, order picker, self-propelled variable reach truck or similar type equipment,*
>
> *(b) platform lifts for use by persons with impaired mobility,*
>
> *(c) lifting equipment intended for lifting performers during artistic performances, or*
>
> *(d) lifting equipment fitted in means of transport;*
> (as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2007)

"lifting accessories" include clamps and similar attachments, chain slings, rope slings, rings, hooks, shackles, swivels, spreader beams, spreader frames and any other item placed between lifting equipment and the load or on the load in order to attach it, but excluding features of the load used for its lifting;

"load" includes a person;

"non-integrated cage or basket" means one which is not equipped with controls that control its movement;

"selection, installation and use of work equipment" means any activity involving work equipment, including starting or stopping the equipment, its use, transport, repair, modification, maintenance and servicing and cleaning;

"thorough examination" includes testing if—

> *(a) a competent person considers it to be necessary for the purpose of the examination, or*
>
> *(b) testing is required pursuant to Regulation 52 and Schedule 1.*

Some of the implications of the definitions will be explored in the sections of this Guide dealing with particular Regulations.

Regulation 28: Duties of employer, use of work equipment

28. *An employer shall ensure that—*

(a) any work equipment provided for use by employees at a place of work complies, as appropriate, with the provisions of any relevant enactment implementing any relevant Directive of the European Communities relating to work equipment with respect to safety and health,

There are EU Directives that deal with the placing on the EU market, for the first time, of goods such as machinery, lifts, simple pressure vessels and pressure equipment, personal protective equipment and electrical equipment. These Directives also deal with the importing into the EU of second-hand equipment where the importer becomes responsible for compliance with the Directives. The Directives cover essential health and safety requirements, CE marking, declarations of conformity and the need for third-party conformity assessment.

Regulation 28(a) requires employers to ensure that any new equipment, or any second-hand equipment imported from outside the EU, which they are providing complies with the requirements of these Directives. Useful information can be found on the EU websites dedicated to the particular Directives.

The Regulation does not require employers to change their existing equipment to meet the same standards as new equipment, although these standards can be a source of guidance for dealing with particular problems.

(b) in selecting the work equipment, account is taken of the specific working conditions, characteristics and hazards in the place of work having regard to the safety and health of the employees and any additional hazards posed by the use of such work equipment,

(c) the necessary measures are taken so that the work equipment is installed and located and is suitable for the work to be carried out, or is properly adapted for that purpose, and may be used by employees without risk to their safety and health,

There are many situations, involving, for instance, wet, flammable, explosive, noisy, dusty or dirty atmospheres, where special care is needed in selecting and installing work equipment so as not to place employees at risk. Consideration should also be given to the physical demands of the work, the number of people involved, the nature of the workplace and the range of hazards it presents. In short, the equipment should be suitable for the purpose for which it is used.

The use of equipment with inadequate provisions cannot be justified on the basis that it was supplied in that way. It should be adapted to meet the legal requirements before being put into use, or not used until so adapted.

(d) where it is not possible fully to ensure that work equipment can be used by employees without risk to their safety or health, appropriate measures are taken to minimise any such risk,

There are many circumstances in which it is not possible to eliminate entirely at source the hazards arising from the use of work equipment, for instance in the case of moving machinery, high-speed cutting equipment or vibrating machinery. In order to minimise the risks, it is necessary to consider guarding of dangerous parts, detection of dangerous situations, design of controls, provision of safe systems of work, use of protective equipment and any other necessary measures.

(e) sufficient space to reduce such risks is provided between moving parts of work equipment and fixed or moving parts in its environment,

Machinery layout should take account of the risk of impact and crush injuries from moving parts of machines. Guidance on minimum clearance distances to avoid crush injuries is given in EN 349, Safety of Machinery – Minimum gaps to avoid crushing of parts of the human body. prEN ISO 13854 (Safety of Machinery – Minimum gaps to avoid crushing of parts of the human body) which is tagged to replace EN 349[1].

(f) where the use of work equipment is likely to involve a specific risk to the safety or health of employees—

> *(i) the use of such work equipment is restricted to those employees required to use it, and*
>
> *(ii) in cases of work involving repairs, modifications, maintenance or servicing of such work equipment, the employees concerned are competent to carry out such work,*

Two themes are covered by Regulation 28(f): dangerous equipment is only to be used by those who are assigned to use it and those who service such equipment must be competent to do so. There are certain types of equipment which in their use give rise to hazards, such that specific training is necessary for their safe operation, e.g. forklift trucks and chainsaws. In such cases, the employer must confine the use of the equipment to those employees properly trained to operate it and must put in place control measures to ensure this.

See also Section 10 of the 2005 Act in relation to the instruction and training of employees.

Where necessary, provision should be made to ensure that sufficient people are trained to provide cover for illness and annual leave, as otherwise there will be an increased risk of equipment being used by untrained employees.

In many cases, the servicing and repair of equipment may be contracted out to companies particularly competent in these areas.

(g) the working posture and position of employees while using work equipment, and any ergonomic requirements, are taken into account having regard to the safety and health of the employees,

While Regulation 18(c) deals with the provision of seating for jobs where this is possible, thought also has to be given to those situations where employees are required to bend or twist their bodies or adopt awkward positions in order to do their work. Operators should not be expected to exert undue force or to stretch or reach beyond their normal strength or physical reach limitations to carry out tasks.

This is particularly important for highly repetitive work, e.g. working on supermarket checkouts or high-speed "pick and place" operations.

Where the working posture is uncomfortable, measures should be taken to reduce the strain by:

- Machine or job redesign,
- Provision of better means of access, and
- Use of lifting aids or equipment positioning devices.

There are a range of harmonised EN standards which address different ergonomic aspects of machinery.

(h) areas and points for working on, or maintenance of, work equipment are suitably lit having regard to the operation to be carried out,

Regulation 28(h) requires employers to consider the conditions under which maintenance is going to be carried out and the degree of lighting necessary for the task. Some equipment may carry its own lighting whereas, in many cases, there will be reliance on area and portable lighting. The lighting level has to be sufficient so that the maintenance personnel can see and be seen and the means of lighting should not itself pose a hazard, e.g. do not use an ordinary lamp in an explosive atmosphere.

(i) work equipment parts at high or very low temperature are, where appropriate, protected to avoid the risk of employees coming into contact or coming too close,

If a hot or very cold piece of equipment is readily accessible to those passing by, then protective measures must be taken, either by the provision of insulation or a physical barrier. The advantage of insulation is that protection is maintained if people must work close to the hazard.

If the parts are only accessible at certain times, e.g. when a guard is opened or a panel is removed, then an assessment must be made as to whether the type of work to be done requires protection of the hot/cold parts.

(j) work equipment bears warnings and markings essential to ensure the safety and health of employees,

This general provision is aimed at warning employees about hazards that may not be obvious and giving information to enable safe use of equipment. While other provisions of the General Application Regulations 2007, such as those dealing with electricity or lifting equipment, specify particular details that must be provided, Regulation 28(j) requires consideration of "warnings" and "markings" for any equipment. The level of detail required is determined by the context in which the equipment is used and the experience and training of the operators.

(k) employees have safe means of access to, and egress from, and are able to remain safely in, all the areas necessary for production, adjustment and maintenance operations,

Regulation 28(k) covers two key issues: namely that employees must have a safe means of access to a work area and, having got there, must be safe in that location. Safety is to be secured irrespective of the time required for the task.

The means of access must be of sound design and construction, properly maintained and securely fixed, or be stable if it is temporary. Where frequent or prolonged access is required, or where the work may involve awkward manipulation, permanent access and platforms should be provided.

When using safety harnesses and fall arrest devices, secure anchorage points must be provided, safety lines should be short enough to prevent injury from falls and steps must be taken to ensure that such safety equipment is used. See also the provisions of Part 4 of the General Application Regulations 2007 relating to work at height.

(l) work equipment is used only for operations and under conditions for which it is appropriate,

"Conditions" may relate to operating limits, the degree of supervision, weather, ground stability, flammable atmospheres, nature of material being worked on etc. The equipment manufacturer's guidance should be consulted in determining appropriate conditions of use. If in doubt, direct contact should be made with the manufacturer or agent where possible.

(m) all work equipment is appropriate for protecting employees against the risk of the work equipment catching fire or overheating, or of discharges of gas, dust, liquid, vapour or other substances produced, used or stored in the work equipment,

Under Regulation 28(m), issues for consideration may include:

- Correct sizing of equipment,
- Provision of cooling air for motors,

- Overload protection,
- High temperature alarms and trip switches,
- Lubrication,
- Materials of construction suitable for products handled,
- Ignition of process materials,
- Design, provision and location of vents and overflows, and
- Provision of fume and dust extraction.

See also Regulation 33(b).

(n) all work equipment is appropriate for preventing the risk of explosion of the work equipment or of substances produced, used or stored in the work equipment,

There are several mechanisms that can lead to explosions such as:

- The overheating of a liquid/vapour in a confined space,
- A runaway chemical reaction,
- Ignition of a flammable dust cloud, and
- Discharge from high pressure plant to unprotected low pressure plant.

Explosions have been reported in steam boilers, hot-water boilers, chemical reactors and storage tanks, flour silos, dust (combustible) collectors, mills for grinding powders and drying plant in the food industry.

The primary focus should be the prevention of explosions by means of proper selection of materials and good control systems. However, recognising that explosions can happen, requires the fitting of explosion relief/suppression systems so that overpressures do not lead to the catastrophic destruction of plant.

The issue of "explosive atmospheres at places of work" is addressed in greater detail in Part 8 of the General Application Regulations 2007.

(o) work equipment is erected or dismantled under safe conditions in particular observing any instructions which may have been provided by the manufacturer,

The work must be planned and any hazards identified before the job begins. Subjects to consider include:

- Stability during erection/dismantling,
- Safe means of access to parts,
- Adequate clearance distances to facilitate manoeuvring,
- Safe provision/disconnection of services,
- Hazards from stored energy in spring/hydraulic systems, and
- Presence of dangerous substances.

See also Regulation 30 concerning inspection of work equipment after installation.

(p) work equipment which may be struck by lightning while being used is protected by devices or appropriate means against the effects of lightning, and

I.S. EN 62305-1:2006 presents the general principles to be followed for protection of structures against lightning, including the protection of persons and services connected to the structure. Part 2 of the standard deals with risk management; Part 3 with physical damage to structures and life hazards and Part 4 with electrical and electronic systems within structures.

(q) all forms of energy, substances and articles used or produced with work equipment are supplied or removed in a safe manner.

The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001) place a duty on every employer to determine whether any hazardous chemical agents are present at the workplace and to assess any risk to the safety and health of employees arising from the presence of those chemical agents, taking the following into consideration:

- Their hazardous properties,
- Information provided by the supplier of the hazardous chemical agent, including information contained in the relevant safety data sheet and any additional information as may reasonably be required to complete the assessment,
- The level, type and duration of exposure,
- The circumstances of work involving such agents and the quantities stored and in use in the workplace,
- Any occupational exposure limit value or biological limit value contained in an approved code of practice,
- The effect of preventive measures taken,
- Where available, the conclusions from health surveillance already undertaken, and
- Any activity, including maintenance and accidental release, in respect of which it is foreseeable that there is a potential for significant exposures.

See also the HSA's guides and Code of Practice to the Chemical Agents Regulations.

The supply or removal of articles can involve both ergonomic issues and prevention of contact with dangerous machinery parts. In the case of some machines, particular attention to guard design is required to enable the safe clearance of blockages.

Regulation 30: Inspection of work equipment

30. *An employer shall ensure that—*

(a) where the safety of work equipment depends on the installation conditions—

> *(i) an initial inspection is carried out after installation is completed and before it is first put into service, and*

(ii) an inspection is carried out after assembly at any new site or in any new location, and that the work equipment is installed correctly and is operating properly,

(b) in the case of work equipment which is exposed to conditions causing deterioration liable to result in a danger to safety or health—

(i) periodic inspections and, where appropriate, testing is carried out,

(ii) special inspections are carried out when exceptional circumstances arise which are liable to make the work equipment unsafe, including modification work, accidents, natural phenomena or prolonged inactivity, and

(iii) deterioration is detected and remedied in good time,

(c) inspections carried out under paragraphs (a) and (b) are carried out by a competent person and are appropriate to the nature, location and use of the work equipment,

(d) the results of inspections carried out under paragraphs (a) and (b) are recorded and kept available for 5 years from the date of inspection, for inspection by an inspector, and access to these records is made available to users of the work equipment upon request, and

(e) when work equipment is used in another place of work, it is accompanied by evidence of the last inspection carried out under paragraphs (a) and (b).

Regulation 30 is far reaching in its scope and is not limited to any particular piece of equipment. It covers the requirements for inspection and the availability of inspection records. It relates to both work equipment which is permanently installed at a location and to that which is moved from place to place requiring assembly each time. In either case equipment should not go into use until it has been inspected by a competent person to ensure that it has been properly installed and is safe for operation. Evidence of such inspections must be recorded and kept available for Health and Safety Authority inspection. All work equipment is subject to varying levels of deterioration. Deterioration could be due to a range of factors, including corrosion, chemical attack, erosion, friction, fatigue, impact damage etc., which in turn can lead to erratic machine behaviour, structural failure, loss of containment of dangerous substances, failure to maintain adequate protection around dangerous parts and so on. Reference to equipment includes any associated monitoring and alarm systems.

Employers are required to set up programmes to maintain the integrity of work equipment by a system of ongoing monitoring which will detect deterioration in sufficient time to allow remedial measures to be taken. The inspection frequency should be based on how quickly the work equipment, or its parts, are likely to deteriorate and therefore give rise to unacceptable risk. In some cases, such as steam boilers in factories, there are statutory duties which determine the minimum level of inspection and testing. On occasion, testing will be required; this may be called for in the manufacturer's instructions, specified in a Regulation or guidance document or required by the competent person.

Inspection results should be stored in a secure manner and be readily retrievable when required. While Regulation 30 does not prescribe the details to be examined or the format of the inspection results, these details may be prescribed under other Regulations for certain types of plant. Advice may also be found in relevant standards or codes of practice.

The scheme of inspections must take into account the known failure mechanisms of the work equipment. In general, records should contain information on the:

- Type and model of equipment,
- Means of identification,
- Location,
- Date of inspection,
- Personnel who carried out the inspection,
- Extent of inspection or test,
- Faults found,
- Remedial measures required, including deadlines for action, and
- Details of remedial action that has been taken.

The employees who use the equipment are entitled to see the inspection reports.

Evidence of the last inspection may take the form of a copy of the report for large items of plant and some form of labelling or tagging for smaller items.

See also Regulation 52 which is specific to the examination and testing of lifting equipment.

Regulation 42: Work equipment for lifting loads

42. *An employer shall ensure that—*

(a) all lifting operations are properly planned, appropriately supervised and carried out to protect the safety of employees,

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

The plan must be based on a proper risk assessment, preparation of method statements, identification of the resources and skills required, instituting procedures and assigning 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.

(b) when work equipment for lifting loads is installed permanently, its strength and stability during use is ensured, having regard to the loads to be lifted and the stress induced at the mounting or fixing points of the structure,

It is necessary to ensure that the lifting equipment has sufficient strength with particular attention given to the mounting or fixing points so that the combination of structure and equipment is adequate for any likely task. Engineering calculations are necessary before cranes or associated runway beams are attached to structures.

Part 6 of EN 1993 provides principles and application rules for the structural design of crane runway beams and other crane-supporting structures, including columns and other members made of steel. The provisions of Part 6 supplement, modify or supersede the equivalent provisions in EN 1993-1-I, to which reference should also be made. It covers overhead crane runways inside buildings and outdoor overhead crane runways. Crane runways for stacker cranes in high-bay warehouses are not covered in this document, even though some of its provisions might be adopted for such runways. It covers crane runway beams for: overhead travelling cranes, either supported on top of the runway beams or underslung below the runway beams, and for monorail hoist blocks. Ancillary items, including crane rails, structural end stops, support brackets, surge connectors and surge girders, are also covered. However, crane rails not mounted on steel structures and rails for other purposes are excluded.

(c) lifting equipment designed for low frequency use is not installed where its anticipated use will render the equipment unsuitable,

The specification of the lifting equipment should be checked in terms of the frequency which the manufacturer has assigned for the safe use of the equipment. Lifts designed for occasional use should not be used as the main lift in busy workplaces where there is a high demand for lift use.

(d) machinery for lifting loads is clearly marked to indicate its safe working load and, where appropriate, is fitted with a load plate giving the safe working load for each configuration of the machinery,

For simple gantry cranes which have a single safe working load, this information can be marked in large letters on the side of the gantry. For other machines, where the safe working load depends on the configuration or working position of the machine, a diagram showing the relationship between positions and safe working loads must be provided. See also Regulation 43 for cranes, Regulation 46 for lifts and hoists and Regulation 55 for excavators.

(e) work equipment which is not designed for lifting persons is appropriately and clearly marked to this effect,

Equipment designed for lifting persons has a set of controls which may not be necessary if it is designed for lifting goods only. Where the machine is intended for goods only, there must be clear signage to this effect. One example of this topic is the distinction between goods and passenger lifts.

(f) every drum or pulley round which the chain or wire rope of any lifting equipment is carried is of suitable diameter and construction for the chain or rope used,

Damage will occur if there is a mismatch between the lifting chain or ropes and the equipment onto which it is being wound. Replacement of drums or pulleys should be in accordance with the manufacturer's instructions.

(g) every chain or rope which terminates at the winding drum of any lifting equipment is properly secured thereto and at least two turns of such chains or rope remain on such drum in every operating position of the equipment,

This simple provision is to ensure that the chain or rope will always be properly secured and cannot be totally unwound.

(h) permanently installed work equipment is installed in such a way as to reduce the risk of the load—

(i) striking employees,

(ii) unintentionally drifting dangerously or falling freely, and

(iii) being released unintentionally,

Lifting equipment should be installed so as to minimise the need to lift loads over people and should also be positioned and installed to prevent crushing when it is in its extreme positions. The measures that must be taken to control the risks will depend on the type of equipment and where and how it is used.

Breaking systems on hoists and powered trolleys must be maintained in good working order. Runway beams supporting lifting equipment should be level and of sufficient stiffness to prevent equipment drifting or running away.

It is necessary to ensure that loads are under control at all times to minimise risks to persons in the vicinity of the lifting operation. The aim is to prevent uncontrolled free fall. It is not, however, intended to prohibit operations which involve a controlled free fall, e.g. piling where risks to people from such operations can be almost eliminated.

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 that have safety catches fitted or are shaped to prevent the accidental displacement of the sling etc. should be used. Where this is not possible, an alternative acceptable method is to secure the throat of the hook by mousing. If vertical plate clamps are used, it is important that they do not open if the load strikes a surface.

Vacuum and magnetic lift systems should incorporate features to minimise risk in the event of loss of power or loss of vacuum.

If for some reason the lifting equipment will not be able to maintain its hold on the load in the event of power failure, appropriate measures must be in place to prevent persons being exposed to any consequential risks.

(i) work equipment which is mobile or can be dismantled and which is designed for lifting loads is used in such a way as to ensure the stability of the work equipment during use under all foreseeable conditions, taking into account the nature of the ground,

Examples of mobile lifting equipment include mobile cranes, forklift trucks and forwarders and cable cranes in forestry. Examples of lifting equipment which can be dismantled and reassembled include tower cranes, construction site hoists and mast-climbing work platforms.

In fixed workplaces it is important to ensure that the slope and strength of the floor surface is suitable for any lifting equipment operating there. Where equipment goes from site to site, the suitability of the ground conditions has to be ascertained and the use of stabilisers ensured where necessary.

Where equipment is dismantled, particular care is required with the fasteners (nuts and bolts) to ensure that they are not damaged or excessively worn and that they are properly torqued in the assembly operation. Only fasteners specified by the manufacturer should be used.

Any modifications to lifting equipment, such as fitting Christmas decorations and messages or advertising hoardings etc. to a tower crane, should only be carried out after careful consideration of the risks that may arise due to changes in the wind loading and of the potential effect on the stability of the lifting equipment.

It is important to ensure that the lifting equipment has adequate stability for its proposed use. Account must be taken of any combination of destabilising forces that may adversely affect the stability of the lifting equipment, which may include:

- Strength of the ground or surface on which the lifting equipment is positioned or located, e.g. spreader plates may be needed so that they can safely support the weight of the equipment and the maximum load to be fitted,
- Stability of the surface under load conditions, e.g. if the lifting equipment is too close to an excavation, the ground may slowly subside or suddenly collapse,
- Whether the surface on which the lifting equipment operates is on a slope and the angle of any slope – this imposes horizontal as well as vertical forces,
- Size and nature of the load, e.g. whether the load itself is unstable,
- How the load is intended to be lifted, and
- Maximum wind loading that may occur.

Methods to improve the stability of lifting equipment include designing a suitable base on which to position the lifting equipment, using an anchorage system, using counterbalancing weights and using ballast, outriggers or stabilisers.

(j) lifting equipment is not used beyond its safe working load except when being tested under the direction of a competent person,

Equipment operators should know the safe working loads for the different configurations of their machines and the weight of any objects to be lifted. Good planning should ensure that no machine is loaded beyond the safe working load. The only occasion where it is permissible to exceed the safe working load is if the equipment is being tested by a competent person, in which case additional precautions are required.

(k) unless required for the effective operation of the work, measures are taken to ensure that employees are not present under suspended loads,

(l) loads are not moved above unprotected workplaces usually occupied by employees, and

(m) if the hazards referred to in paragraphs (k) and (l) cannot be avoided, appropriate procedures are laid down and applied where work cannot be carried out properly any other way.

Regulation 42(k) and (l) require the organisation of a workplace so that no person is required to work under a suspended load whether it is stationary or moving. If unavoidable, the time a person is under a suspended load should be minimised where possible. Regulation 42(m) allows for situations where this is not always possible, as in the case of a tower crane on a busy construction site. In such circumstances it is necessary to ensure that adequate measures have been taken to reduce the risk from equipment failure or break-up of the load. Such measures include mechanical measures to hold equipment in place in the event of hose or chain failure, additional protection such as netting around a load to secure loose items, use of back-up lifting accessories, barriers restricting entry and provision of head protection.

Regulation 43: Cranes

43. *(1) An employer shall ensure that, without prejudice to Regulations 42 and 45,*

(a) every crane of variable operating radius, before it is taken into use—

> *(i) has plainly marked upon it or within the cab the safe working load at various radii of the jib, trolley or crab, and in the case of a crane with a derricking jib, the maximum radius at which the jib may be worked,*
>
> *(ii) is fitted with a suitable accurate automatic safe load indicator or rated capacity indicator, clearly visible to the driver showing at any time the radius of the jib, trolley or crab and the safe working load corresponding to that radius unless–*
>
> > *(I) it is a guy derrick crane (being a crane of which the mast is held upright solely by means of ropes with the necessary fittings and tightening screws),*

(II) it is a hand crane which is being solely used for erecting or dismantling another crane, or

(III) it has been assigned by a competent person a safe working load of 1,000 kg or less, and

(iii) has an automatic safe load indicator or rated capacity indicator, if required under subparagraph (ii), which is—

(I) properly maintained,

(II) correctly used, and

(III) tested by a competent person after erection, installation or alteration of the crane for the purpose of any work before the crane is taken into use or returned to use as the case may be,

The safe working load (SWL) is the maximum load, as assessed by a competent person, which a crane may raise, lower or suspend under the particular service conditions. On some machines, such as tower and mobile cranes, the SWL value will decrease the further out the load is suspended.

The crane driver needs information on the safe working load for any position of his or her machine.

If, for any reason, the machine has been derated, the change in SWL values must be communicated to the driver.

In addition, the driver must be automatically alerted if the machine is approaching the limits of its safe operation. This is done by means of an automatic safe load indicator, also known as a rated capacity indicator.

Under the machinery-related Directives, for machines supplied for the first time to the European market after 1 January 1995 there is a requirement for machinery with a working maximum load not less than 1,000 kg or an overturning moment not less than 40,000 Nm to be fitted with devices to both warn the driver and prevent dangerous movements of the load. Such devices are known as rated capacity limiters.

(b) in the case of a crane which is on occasion dismantled or partially dismantled any jib or boom which is separated from the crane in dismantling is clearly marked so as to indicate the crane of which it is a part,

Cranes are inspected and certified as complete units and the integrity of this checking process will be undermined if parts from different machines are mixed up.

(c) cranes with derricking jibs are provided with—

(i) such means as will minimise the risk of the accidental raising or lowering of the jib, and

(ii) a jib that does not exceed the maximum radius specified by the manufacturer, or by a competent person in a report pursuant to Regulation 53,

Accidental movement of the jib can best be prevented by the provision of separate motors for hoisting and derricking. The jib length must not be extended beyond the specified design value unless approved in writing by the manufacturer or a competent person.

(d) a crane travelling on rails is provided with deflector plates to remove from the rails any loose material likely to cause danger,

The use of deflector plates is not a substitute for good housekeeping. The area around crane tracks should kept clear of loose material.

(e) where the safety of work equipment depends on the installation conditions on a construction site—

(i) after each assembly of a tower crane or after any adjustment to any member which may affect the strength or stability of the crane, and before it is put into use, it is subject to a static test with a test coefficient of 1.25 and a dynamic test with a test coefficient of 1.1, taking account of any direction from the machine manufacturer, and

(ii) where the stability of a crane is secured by means of removable weights, a diagram or notice indicating the amount and position of such weights is affixed on the crane so that it can be readily seen and each such removable weight is clearly marked with its correct weight, and

The test coefficient ratios chosen reflect the values given in the Machinery Directives 98/37/EC and 2006/42/EC. The dynamic test refers to the machine being operated in all its configurations to check that the machine and its safety features are functioning properly.

The competent person may decide, upon information supplied by the manufacturer, to use a lower ratio and in such circumstances the competent person must consider whether it is appropriate to specify a lower SWL.
Removable ballast weights are fitted/attached to some machines to ensure their stability, and visible information on their weight and positioning is required.

(f) notwithstanding any other provisions of this Chapter, lifting equipment used on a construction site is examined weekly by the user as regards features related to its safe working and a record of the results is kept in a suitable form which is kept available for inspection by an inspector for 3 months from the date of examination.

Regulation 43(1)(f) requires the weekly examination of lifting equipment used on a construction site. The purpose of the examination is to ensure that the machine is in proper working order and to confirm that no major defects have been identified.

This examination, often done by the machine operator, is not the same in scope or detail as that done for the periodic statutory examination required by Regulation 52.

The weekly examination should include a full functional test of the machine to verify operation of the limit switches but does not require overload testing. The examination concerns those matters related to the safe working of the equipment. The Regulations do not prescribe a particular form but state that a suitable form be used. The contents of such a form should include:

- Information to identify the equipment,
- Date of examination,
- Signature and position of person carrying out the inspection,
- A checklist of the items examined including:
    - Inspection of the rated capacity indicator/limiter confirming that it is in working order,
    - Confirmation that no known major defects in wire, rope and chain systems have appeared in normal operation,
    - Confirmation that all limit switches are operating correctly, i.e. hoist limit, derrick limit etc.,
    - Confirmation that all ropes are correctly positioned on their sheaves,
    - Visual inspection of structure for major damage,
    - Visual inspection of hooks and other load lifting attachments,
    - Visual inspection of hydraulic systems for obvious damage,
    - Visual inspection of electrical systems for obvious damage,
    - Visual inspection of fuel lines for obvious damage,
    - Confirmation that brakes and clutches are in working order,
    - Confirmation that the operator's cab is in suitable condition,
    - Confirmation that controls are in working order,
    - Where provided, confirmation that the anemometer is in working order, and
    - Any other matters recommended by the manufacturer or equipment user.

(2) The use of an excavator, telehandler, loader or combined excavator/loader as a crane is subject to Part C of Schedule 1.

Part C of Schedule 1 to the General Application Regulations 2007 covers the circumstances where lifting equipment must be tested. Regulation 55 also covers these machines. If an excavator or loader is used to lift objects other than soil, sand or similar material, it is regarded as a crane to which the provisions for cranes apply as set out in Regulation 55.

Regulation 53: Reports by competent persons

53. *(1) A competent person carrying out an examination under Regulation 52 shall—*

(a) prepare a report of the result of every examination and test as referred to in Regulation 52 containing the particulars that are set out in Part E of Schedule 1,

(b) where work equipment is examined pursuant to Regulation 52 and the examination reveals that the equipment can only be used safely if certain repairs are carried out or if the person making the examination foresees a need for such repairs—

(i) inform in writing the owner and user of the need for such repairs or the potential need,

(ii) not later than 20 days after the completion of the examination, send a copy of the report of the examination to the Authority where immediate cessation of the work has been advised, and

(iii) in the case of potential need for repairs, specify the period within which, in his or her opinion, the repairs shall be carried out.

(2) A competent person carrying out an examination under Regulation 52(3) may specify a period less than that in column 2 of Parts B or C of Schedule 1 if in that person's opinion a more frequent examination is required but, if this is done, he or she shall provide the reason for the opinion in writing to the owner and user of the work equipment.

Regulation 53 sets out a range of duties for any competent person who conducts statutory examinations of lifting equipment. Such examinations are separate from maintenance examinations.

The competent person may be an employee of the organisation or external to it. If the person is an employee, he or she has to be in a position to exercise independent judgement.

If the Health and Safety Authority has reason to believe that the examinations and/or the reports of such examinations are not adequate, it has the power to require re-examinations to be conducted by another entity. It may also do the same if it is not satisfied as to the ability of the competent person.

Repairs should not be carried out in the course of statutory examinations and the report of an examination must reflect the conditions as found.

A copy of the report must be sent to the Health and Safety Authority where immediate cessation of work has been advised. Work should cease if there are defects in safety-related instrumentation or if the defect poses an immediate threat to the stability or strength of the equipment or its ability to control a load.

If, when lifting equipment is being examined by a competent person under Regulation 55 (3), the safe working loads cannot be determined, this should be highlighted on the report prepared under Regulation 53 (1) (a) and assigned a zero value, meaning the equipment is not approved for use.

In this situation the employer should be advised by the competent person of the necessary action to take to determine the safe working loads.

Regulation 55: Safe working loads for excavators, loaders or combined excavators and loaders when used for object handling

55. *(1) In this Regulation, reference to "machine" is a reference to an "excavator, loader or combined excavator and loader when used for object handling".*

(2) An employer shall ensure that—

(a) before a machine to which this Regulation applies, being a machine not equipped for object handling in accordance with the relevant Directive or harmonized standard, is first used for object handling, a competent person—

> *(i) specifies the safe working load or loads which may be raised and lowered by the machine, or where its safe working load depends on the configuration of the machine, its safe working load for the different configurations are determined, and*
>
> *(ii) provides a signed certificate specifying the safe working load and any necessary safety provisions,*

(b) the certificate referred to in subparagraph (a)(ii) is kept available for inspection with the machine,

(c) a machine is not loaded beyond the relevant safe working load specified in the certificate required by subparagraph (a)(ii),

(d) the specified safe working load or loads and, where applicable the outrigger/jack position and the length of jib or boom to which the safe working loads relate is either plainly marked on the machine information relating safe working loads to the distance worked is displayed in a clearly visible position in the driver's cab,

(e) if, after the issue of the certificate required by subparagraph (a)(ii), a machine undergoes any substantial alteration or repair likely to affect the specified safe working loads, that certificate is cancelled and a new certificate is obtained,

(f) hydraulically-operated machines used in object handling operations with a rated lift capacity of not less than 1000 kg or an overturning moment of not less than 40,000 Nm are fitted with;

> *(i) check valves on the cylinders used for lifting or another means, to prevent a gravity fall of the load in the event of a hydraulic failure, and*
>
> *(ii) an acoustic or visual warning device which indicates to the operator when the rated lift capacity or corresponding load moment is reached,*

(g) means of identification are plainly marked on machines to which this Regulation applies, and

(h) machines to which this Regulation applies are examined and tested periodically in accordance with Parts B and C of Schedule 1.

Regulation 55 sets out the requirements for machines such as excavators and loaders if they are used to lift objects, e.g. trench boxes or pipes. In such cases they are regarded as being used for object handling and the provisions apply. Although these machines have a variable radius they are not considered as a mobile crane in the context of these Regulations. The Health and Safety Authority's view on the application of Regulation 55(f)(i) is that reference to "cylinders used for lifting" includes the cylinders for both the main boom and dipper arm. The "rated lift capacity" for an excavator being used for object handling should be determined according to ISO 10567: 1992. The warning device should continue to operate for as long as the load or load moment is being exceeded. The device may be such that it can be deactivated when the machine is not performing object handling operations. The control for activating/deactivating the warning device should be clearly indicated and be within easy reach of the operator.

SCHEDULE 1

Regulations 43, 46, 52, 53, 55

REQUIREMENTS FOR WORK EQUIPMENT

Part A — Exemption from certain provisions of Regulation 46

Part B — Period of thorough examination of lifting equipment, lifting accessory equipment or other miscellaneous equipment

Part C — Circumstances requiring testing of lifting equipment as part of a thorough examination
(as amended by the Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2007 (S.I. No. 732 of 2007))

Part D — Equipment that has a lifting function, is subject to Regulation 30 and is not subject to Regulation 52

(a) Bottle jack,

(b) Pallet truck,

(c) Tractor hitch,

(d) Height adjusting components of machine tools,

(e) Fixed machinery for raising/lowering pallets,

(f) Vehicle wheelchair hoist,

(g) Lifting equipment designed to lift wheelie bins of volume less than 360 litres,

(h) Escalators and conveyors, and

(i) Platform lifts for level changes of 1.2 m or less

Part E — Information to be contained in report of thorough examination

1. The name and address of the employer or owner for whom the thorough examination was made.

2. The address of the premises at which the thorough examination was made.

3. Particulars sufficient to identify the lifting equipment including, where known, its date of manufacture.

4. Date of this examination and date of the last thorough examination if known.

5. The safe working load of the lifting equipment or, where its safe working load depends on the configuration of the lifting equipment, its safe working load for the different configurations that have been determined.

6. The purpose of the examination including examination before putting into use for the first time, examination after installation or after assembly at a new site or in a new location, examination after repairs or alterations and periodic examination.

7. In relation to every thorough examination of lifting equipment—

(a) identification of any part found to have a defect which is or could become a danger to persons and a description of the defect;

(b) particulars of any repair, renewal or alteration required to remedy a defect found to be a danger to persons;

(c) in the case of a defect which is not yet but could become a danger to persons —

(i) the time by which it could become such danger;

(ii) particulars of any repair, renewal or alteration required to modify it;

(d) the latest date by which the next thorough examination must be carried out;

(e) where the thorough examination included testing, particulars of any test;

(f) identification of parts not accessible for examination.

8. The name, address and qualifications of the individual making the report and, where appropriate, the name and address of the individual's employer.

9. Where appropriate, the name and position of a person signing or authenticating the report on behalf of its author.

22 September 2010