BCSA Guide to the Management of Site Lifting Operations

BCSA Publication No. 47/09

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The British Constructional Steelwork Association Limited was formed in 1906 and is the national organisation for the steel construction industry; its Member companies undertake the design, fabrication and erection of steelwork for all forms of construction in building and civil engineering; its Associate Members are those principal companies involved in the supply to all or some members of components, materials or products. Corporate Members are clients, professional offices, etc which support the development of national specifications, design, fabrication and erection techniques, and overall industry efficiency and best practice.

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SUMMARY

This document is a guide for Steelwork Contractors responsible for the lifting and positioning of steel and steelwork after fabrication and at site locations. It also provides guidance to Clients and Principal Contractors. It describes the management procedures and methods to be adopted for access and working arrangements and is intended to serve as a standard reference when drafting site- and project-specific method statements.

The aim of this guidance document is to improve health and safety during lifting and positioning of steelwork on sites. This guide aims to ensure that a consistent approach is taken to health and safety by those planning for, in control of, or undertaking such work.

This document is intended to aid compliance with the *Health and Safety at Work etc Act*, the *Management of Health and Safety at Work Regulations* and specifically the *Lifting Operations and Lifting Equipment Regulations* and the *Provision and Use of Work Equipment Regulations*.

CONTENTS

1 INTRODUCTION

1.1 GENERAL

This safe practice guide details how lifting operations are planned and organised. It has been developed to meet the requirements of the Lifting Operations and Lifting Equipment Regulations [LOLER], in particular Regulation 8, which states:

1. Every employer shall ensure that every lifting operation involving lifting accessories is:

a. Properly planned by a competent person;

b. Appropriately supervised; and

c. Carried out in a safe manner.

2. In this regulation "lifting operation," means an operation concerned with the lifting or lowering of a load.

Lifting operations within this safe practice guide include the use of cranes and lorry loaders (e.g. Hiabs). This safe practice guide also deals with lifting accessories such as chains, ropes, slings, hooks, shackles and eyebolts.

1.2 BCSA RECOMMENDATIONS

For lifting operations and execution of steelwork generally, the BCSA advocates that the single most important step that contributes towards safe practice is to ensure that competent persons are mobilised. This is because such persons will observe the following precautions concerning the work in general and tasks in particular:

PRECAUTIONS

Do not commence work until it is clear what needs to be done.

Do not undertake work outside the limits of your competence.

Do not undertake tasks without the necessary tools and equipment.

Be clear about the arrangements for supervision in terms of the chain of command.

Do not deviate from what has been planned without checking with those in the chain of command.

Ensure that the area around the worksite is kept clear of hazards.

Watch out for hazardous activities being undertaken by other operatives, including others in your own gang.

Ensure that others not involved in the task do not encroach into an exclusion zone around the worksite.

Selection of a competent Steelwork Contractor is a necessary precondition towards ensuring that competent persons are mobilised to undertake the steel erection – whether these be employed by the Steelwork Contractor directly or by a specialist subcontractor. The Steelwork Contractor must observe the following preconditions:

PRECONDITIONS

Ensure that the scope of work is within the limits of competence of the firm.

Develop suitable method statements for the erection work in general and for specific tasks as necessary.

Agree the chain of command for site work with the Principal Contractor.

Provide appropriate supervision to manage the work on site.

Provide the necessary resources of manpower, plant and equipment.

Agree how exclusion zones should be operated to keep others away from hazards arising from steel erection.

2 DEFINITIONS

Lifting Operations - operations concerning the manoeuvring of a load including the picking up, lifting, lowering and positioning of a load.

Lifting Equipment - work equipment for undertaking lifting operations including attachments used for anchoring, fixing or supporting load during lifting operations.

Lifting Accessories - work accessories for attaching loads to machinery for lifting.

Loads - the items to be lifted, this includes lifting of personnel.

3 REFERENCES

Regulations:

- *Lifting Operations and Lifting Equipment Regulations (LOLER)*
- *Provision and Use of Work Equipment Regulations (PUWER)*
- *Construction (Design and Management) Regulations (CDMR)*
- *The Supply of Machinery (Safety) Regulations (SMSR)*
- *The Health and Safety at Work Act (HSWA)*

Publications produced by the BCSA:

BCSA Safe Site Handover Certificate (SSHC)

Other publications:

BS 7121-1 *Code of practice for safe use of cranes – General*

BS 7121-2 *Code of practice for safe use of cranes – Inspection, testing and examination*

BS 7121-3 *Code of practice for safe use of cranes – Mobile cranes*

BS 7121-5 *Code of practice for safe use of cranes – Tower cranes*

Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved code of practice and guidance (L113)

Simple Guide to LOLER INDG290

CIRIA C703: 2003 Crane stability on site

4 RESPONSIBILITIES

4.1 EMPLOYER

The Employer is responsible for ensuring that lifting operations within his scope of work are carried out safely and must identify one person to be in control of the lifting operation who will act on behalf of the management.

In particular the Employer must:

- Nominate formally in writing a Competent Person who is suitably trained and experienced to ensure safe lifting operations.
- Provide adequate resources to enable lifting operations to be carried out safely.
- Ensure that all appointees i.e. supervisors, crane operators and operatives with duties under this procedure are trained, competent and aware of those duties.
- Confirm by regular monitoring that lifting procedures are being properly implemented.

The organisational arrangements commonly used for steel construction are that the Steelwork Contractor decides the methods to be used for execution and controls their implementation – sometimes using other contractors to mobilise personnel, to provide craneage or to undertake contract lifts. In these circumstances the Steelwork Contractor is the Employer.

4.2 COMPETENT PERSON

The person planning the operation must have the necessary experience, skills and knowledge of the particular type of lift to be carried out so as to be able to discharge the duties required by LOLER. The necessary experience, skills and knowledge will include those of the 'Appointed Person' in accordance with the section 4.3 of BS 7121-1 *Code of practice for the safe use of cranes – General*.

4.3 APPOINTED PERSON (AP)

The AP is responsible for ensuring the establishment and documentation of safe systems of work for specific lifting operations on site.

A summary of the main responsibilities is to ensure that:

- Each lifting operation or series of similar lifting operations is assessed to provide such planning, selection of lifting appliances and lifting equipment instruction and supervision as is necessary for the task to be undertaken safely.
- All cranes, lifting appliances and lifting equipment have been tested, thoroughly examined and inspected in accordance with statutory requirements and that the relevant reports, certificates and registers are up to date and available on site.
- There is an effective procedure for reporting defects and incidents and taking any corrective actions necessary.
- All crane operators and slinger/signallers are competent and that evidence of such competence is available on site.
- Lifting operations do not conflict with the safety of any other activities on site.

The AP, in assessing a lifting operation, is responsible for ensuring that it will be carried out in accordance with the safe system of work. The AP may decide to undertake the duties and responsibilities of supervision if he has the necessary experience and training and considers it appropriate. Alternatively he must appoint another suitably trained and experienced person to undertake these duties on his behalf. This person is known as the Crane Supervisor (CS) and is typically the site foreman/chargehand or equivalent.

The AP is responsible for communicating the safe system of work to the CS.

In situations involving large or complex lifts, such as unusually shaped components or sub-assembled units or operations such as tandem lifts, the AP shall ensure the lifting operation is correctly planned and supervised and must be available for advisory purposes during the operation.

The AP duties, but not the responsibilities, can be delegated to another person where it is considered appropriate to do so by the AP.

4.4 CRANE SUPERVISOR (CS)

The CS may, under the direction of the AP (for further details see section 6), also amend some specific tasks within the safe system of work for some categories of lift.

Lifting operations must be carried under appropriate supervision, this means supervision at a level proportionate to the risk, taking into account the nature of the work and the competence of the personnel involved in the particular lifting operation.

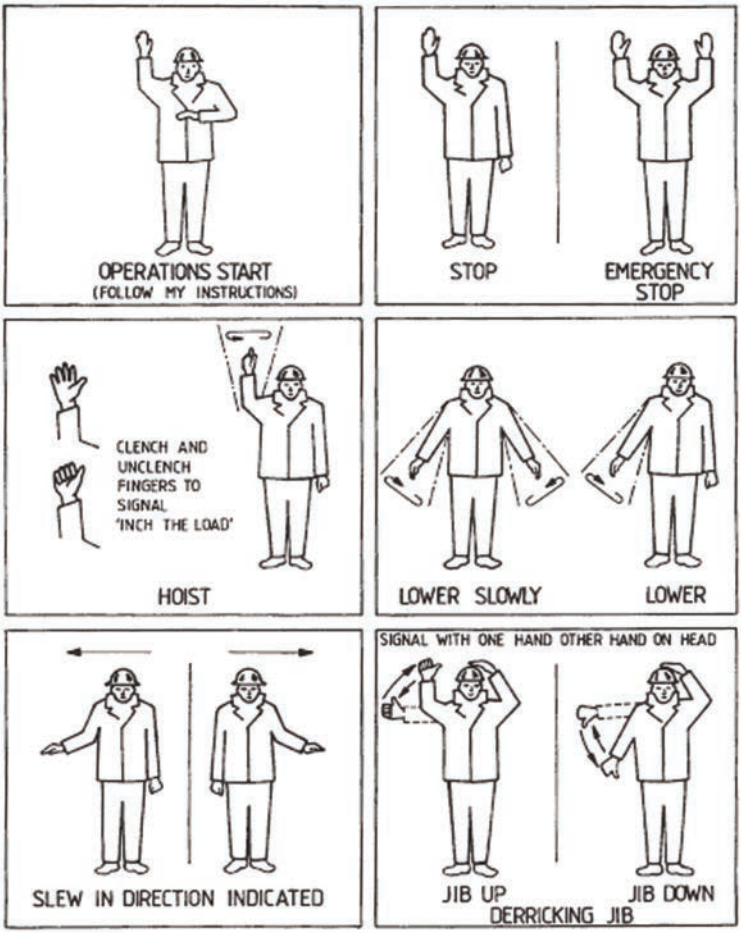
For example, basic lifts, such as unloading and positioning steel components during erection work that are deemed by the CS not to be standard or complex lifts, need not be under the direct supervision of the CS and for each basic lift a slinger/signaller may be instructed to supervise (see 6.1 for categorisation of lift types).

4.5 SLINGER/SIGNALLER

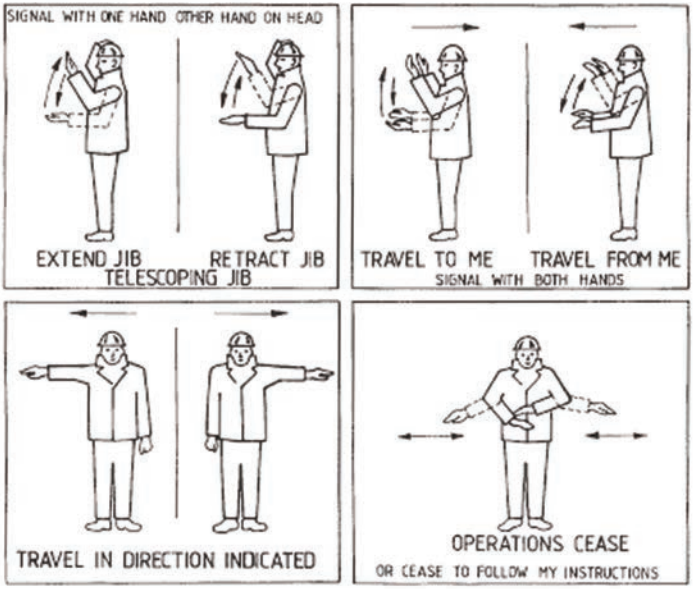
The slinger/signaller is responsible for attaching and detaching the load from the lifting accessories and for the use of the correct lifting equipment and accessories in accordance with the established safe system of work.

The slinger/signaller must carry out a pre-use visual check of the lifting equipment to be used. Defects must be reported to the CS who has to ensure that defective equipment is quarantined for repair or destroyed and the site records amended accordingly.

The slinger/signaller initiates and directs the safe movement of lifting accessories and load by relaying the correct signals to the crane operator using those recommended in Figure 3 of BS 7121 -1. When instructed by the CS to do so, the slinger/signaller supervises basic lifts.



NOTE: The signaller should stand in a secure position where he can see the load and can be seen clearly by the driver and should face the driver if possible. Each signal should be distinct and clear.



Slinger

4.6 CRANE OPERATOR

The crane operator (or crane driver) is the person that operates the crane for the purposes of moving and positioning the load, assembling and appropriate rigging of the crane e.g. number of falls, choice of hook-block, counterweights etc.

The crane operator is responsible for:

- The correct use/operation of the lifting accessories in accordance with the manufacturer's instructions and within the stated safe system of work.
- Carrying out (and recording where required) inspections of the lifting accessories used.
- Operating in accordance with signals from the slinger/signaller. At any one time, he should only respond to the signals from one slinger/signaller who should be clearly identified beforehand.

4.7 CONTRACT LIFTS

It may be considered appropriate by the Employer to employ a crane owner to carry out a contract lift. It should be made clear in these circumstances that the responsibilities for the lift are then handed over to the crane owner including the responsibilities of the AP, CS and slinger/signaller.

In such instances, however, the Employer ensures that:

- The 'contractor' is competent to undertake the assigned tasks.
- The 'contractor' is provided with all information and service he requires to facilitate compliance with the relevant parts of BS 7121 and that this provision is confirmed in writing.
- The work is carried out in accordance with BS 7121.
- The 'contractor' has an appointed person with a competence level commensurate with the magnitude and complexity of the lift.
- The 'contractor' produces a suitable method statement and risk assessment for the lifting operation.
- All personnel involved in the lifting operation are competent in the tasks allocated to them.
- Lifting equipment and accessories are supplied with appropriate certification, as evidence of having undergone required tests, thorough examination and weekly inspections.

These arrangements are summarised in the tables from BS 7127-1 below:

EMPLOYING ORGANISATION

The organisation requiring the load to be moved

HIRED CRANE

(Hired and Managed)

The Employer shall:

- Carry out all work in accordance with BS 7121
- Supply the Appointed Person
- Plan the lift and operate a safe system of work
- Ensure that the crane hired is of a suitable type and capacity
- Check the credentials of the crane hire company and certification supplied

The crane owner has a duty to:

- Provide a crane that is properly maintained, tested and certified
- Provide a competent driver

CONTRACT LIFT

(Fully Contracted)

The Employer shall specify:

- That all work is to be undertaken in accordance with BS 7121
- That the contractor is to supply the Appointed Person
- What information and/or services will be provided to the lift contractor by the employing organisation

The lift contractor is responsible for:

- Supplying the Appointed Person
- Planning the lift, and safe operation of a safe system of work
- Organisation and control of the lifting operation

5 GROUND CONDITIONS

Crane Positioning, an example of what can go wrong

Ground conditions are critical when lifting operations are carried out and the AP must be satisfied that the ground can take the load bearing pressures and ensure that any necessary work to prepare the ground has taken place prior to the crane positioning being finalised. The Principal Contractor is responsible for the ground preparation and must confirm in writing that the conditions are acceptable for the lifting operation. The BCSA Safe Site Handover Certificate (SSHC) gives Principal Contractors and Steelwork Contractors assistance in confirming and recording that the appropriate actions have been taken prior to lifting operations taking place.

Different types of cranes will impose different requirements for ground conditions. It will be necessary to ensure the ground conditions are suitable i.e. the working surface must be level and capable of supporting the bearing pressures imposed by the tracks/wheels or outrigger loads. For all mobile cranes, the bearing pressures will vary as the crane slews.

Crawler cranes can also be used to travel with their loads and this means that the AP must be satisfied with the ground conditions for the whole of route to be used. A survey undertaken for CIRIA of major crane manufacturers' quoted figures concluded that the following values are the maximum theoretical outrigger loads on each support for typical mobile cranes:

30 tonne capacity truck-mounted telescopic:	33 tonnes
50 tonne capacity all-terrain telescopic:	40 tonnes
80 tonne capacity all-terrain telescopic:	61 tonnes
120 tonne capacity all-terrain telescopic:	80 tonnes
160 tonne capacity all-terrain telescopic:	95 tonnes

NOTE: The above figures are for guidance only. For accurate outrigger loadings for mobile cranes in your particular application, consult the crane manufacturer direct or via the hirer

Source: CIRIA C703: 2003 Crane stability on site

6 IDENTIFICATION, ASSESSMENT AND CATEGORISATION OF LIFTING OPERATIONS

The AP in conjunction with the Principal Contractor identifies in a schedule, as far as possible, the lifting operations to be carried out during the contract. The AP then assesses these operations by risk assessment and categorises them as follows:

6.1 BASIC LIFT

This is a lifting operation where the weight of the load can be simply established, and there are no hazards or obstructions within the area of operation.

Positive lifting bracket in use

Examples of basic lifts:

- A 25t mobile crane standing on a suitable concrete slab servicing steel erectors with sectional steelwork on a site with good access/egress.
- Offloading bundled steelwork components and palleted small items from a deliver vehicle onto firm surrounding ground.
- Use of a telehandler on firm ground to distribute bundled or individual components from site storage to the work front.

6.2 STANDARD LIFT

This is a lifting operation where there are hazards, either within the working area of the crane or on the access route to the working area, but no multiple crane lifting is required.

Standard Lift

Examples of standard lifts are:

- A mobile crawler crane lifting and travelling with large steel components to a work front.
- Use of a tower crane in any situation.
- Rigging/de-rigging of crawler cranes.
- A 100t mobile crane lifting sub-assembled steelwork units or mechanical and electrical plant onto the roof of a building, in close proximity to other structures necessitating the use of radio communications.
- Lifting of personnel.

6.3 COMPLEX LIFT

This is a lifting operation that requires more than one crane to lift the load, or cranes using load enhancement accessories (such as counterweights), or when the lifting operation is at a location with exceptional hazards.

Truss lifted by counterbalanced crane

Examples of complex lifts are:

- Tandem lifts undertaken with mobile cranes, including crawler cranes but excluding tandem lifts undertaken with EOT cranes in workshops etc.
- A 1000t mobile crane operating on a purpose-designed platform, removing an existing bridge deck and installing a replacement during a railway possession.
- A lift operation involving the initial use of a purpose-designed lifting frame.
- A lift in a hazardous chemical plant location.

Should there be any doubt in categorising a lift; the AP should err on the side of caution.

6.4 SAFE SYSTEM OF WORK

The AP ensures that a safe system of work is established in the planning for each lifting operation, irrespective of whether it is an individual lift or a group of repetitive operations. The manner in which this is done is dependent on the category of lifting operation.

Tandem Lift using matched cranes

In all cases, however, the safe system of work must address the following:

- The selection, provision and use of suitable lifting accessories.
- The maintenance, examination and where necessary testing of the lifting accessories.
- The provision of properly trained and competent personnel who have been briefed on their responsibilities with respect to the Health and Safety at Work etc. Act , and other relevant health and safety legislation including LOLER and PUWER .
- Ensuring that all personnel can communicate clearly in the same language.
- Providing adequate supervision by properly trained and competent personnel having the necessary authority within a defined chain of command.
- Ensuring that all necessary test certificates and other documents are available.
- The prevention of unauthorised movement or use of equipment at all times.
- The safety of persons not involved in the lifting operation.
- Lifting of persons is carried out in accordance with BS7121-3 (Annex D)

A lifting operation is taken to include any necessary preparation of the site and erection and dismantling of the crane(s).

6.5 USE OF TOWER CRANES WITH A MAN-BASKET

In circumstances where the crane is provided by the Principal Contractor (usually a tower crane) and the personnel using and working from a suspended basket are employed by the Steelwork Contractor, the Employer has a duty of care to ensure that every reasonable check is made to ensure its employees are not put to unnecessary risk .

Some additional concerns regarding the monitoring and maintenance of tower cranes have been identified that Steelwork Contractors need to address as part of their pre-use check before putting their employees to work in personnel-carrying baskets, particularly when the crane is provided by the Principal Contractor or another organisation. Further information on the safe use of tower cranes is given in BS 7121–5.

Before using any crane for carrying personnel refer to section 10.

7 BASIC OR STANDARD LIFT PLAN

The AP produces the lift plan and may delegate duties to a competent person under his direction.

For basic and some standard lifts (routine operations) one generic plan is enough. It must take account of the worst-case scenario and this should not be exceeded without the APs' knowledge and approval. It needs to be reviewed regularly to ensure its continuing validity. Lift plans may be included in the method statement for the total operation to avoid repetition.

A basic or standard lift plan may be incorporated into a complete erection method statement. The plan also typically deals with issues such as setting up the crane at an appropriate radius, preparing lay down areas, use of tag lines etc. It can cover a series of standard lifts by planning for the worst-case scenario and confirming similar conditions for all lesser lifts. This is particularly relevant to:

- Work involving common components with different elements or materials (e.g. weight and shape).
- Specific operations involving common components with differing section sizes and lengths.

NOTE: Complex lifting operations must have a specific detailed lift plan and should be included in a method statement. A Task Specific Method Statement (TSMS) pro-forma suitable for this purpose is available from BCSA.

All lift plans must identify all members of the lifting team, the AP/CS and be accompanied by a risk assessment.

See Appendix A for the basic lift plan pro-forma.

7.1 RISK ASSESSMENTS

The risk assessment focuses on the risks to be addressed within the lift plan, including in particular the controls for significant risks associated with proximity hazards. Both the lift plan and risk assessment should consider the practicalities of automatic or semi-automatic systems that can be employed such as remote attachment devices that enable working at height to be eliminated or reduced.

Examples being:

- The requirement to hook onto a cabin lifting eye from a ladder and not go on the roof to do so.
- An access route in close proximity to a lifting operation.
- Provision of suitable lighting to avoid poor visibility from working in artificial light.

7.2 SITE APPLICATION OF THE LIFT PLAN

The initial planning has determined which lifting accessories are suitable for the range of tasks that will be carried out and ensures a documented safe system of work that is to be implemented.

For basic and standard lifting operations which are subject to a single lift plan for a number of similar lifting operations, an on-site review must be undertaken to ensure that due consideration of any site-specific risks or requirements are taken into account so that the basic/standard lifts can be carried out safely with the lifting accessories provided. This is undertaken by the slinger/signaller or crane operator in the case of basic lifts, and by the CS for standard lifts.
The persons carrying out an on-site assessment must have appropriate knowledge and expertise.

Complex lifts will each be subject to an individual lift plan of sufficient detail to explain how the accessories are to be used. The plan should state that any deviation from the plan to be approved by the AP.

7.3 COMMUNICATION

The AP approves all lift plans/method statements. The AP or CS briefs all those involved in the operation on the safe system of work described in the lift plan/method statement. All briefings must be recorded.

NOTE: BCSA's recommendations on competence and the chain of command are repeated in this guide as the basis for sound communication.

7.4 PRE-USE CHECKS

The competent delegated person (e.g. CS) shall undertake pre-use checks of all lifting accessories.

The following should be checked:

- Certificate of test for lifting equipment;
- Certificate of thorough examination for lifting equipment and accessories;
- Register of weekly inspections for lifting equipment;

Check sheets need to be completed and maintained in the appropriate record folder for the site.

If the operators are not known to the CS then the following should also be checked:

- Plant operators certificate of competence and performance if unknown;
- Operators of lifting accessories are competent;
- Slinger/signallers certificate of competence and performance if unknown.

8 REPORTS OF THOROUGH EXAMINATION/TEST CERTIFICATES

The crane user should ensure the crane is taken out of use for the period of time for the competent person (Crane Engineer) to carry out the thorough examination. Further details on inspection, testing and examination are given in BS 7121-2.

It is a regulatory requirement that any conditions found during the thorough examination that gives existing or imminent risk to persons should be reported directly to the Health & Safety Executive (HSE) by the Crane Engineer.

All current reports of thorough examinations or test certificates for cranes and accessories for lifting should be kept either on site or with the crane if it moves from one site to another.

The Approved Code of Practice on the safe use of lifting equipment under LOLER (HSE's L113 publication) reminds practitioners that regulation 9 of LOLER applies to accessories for lifting, as well as to significant and large items of plant such as mobile elevating work platforms (MEWPs).

The extent of the initial thorough examination may depend upon the extent of the information available to the competent person on which to base a judgement. In the case of new equipment the 'thorough examination' is considered to have been carried out by the manufacturer or supplier and confirmed in the Declaration of Conformity. In such a case no immediate further thorough examination is required. Used equipment which is supplied with a current report of thorough examination does not require a further thorough examination before first use at the new premises. However, if equipment has to be 'installed' then the requirements of regulation 9(2) need to be considered.

A thorough examination is always required after substantial or significant modification or repair.

9 LIFTING TECHNIQUES AND AIDS

A wide variety of lifting accessories are available including positive lifting aids and shackles that can be purchased from lifting accessory suppliers for use with constructional steelwork and associated trades.

Positive lifting aids such as lifting brackets are often manufactured by the Steelwork Contractor to assist in the location and placement of the steel components during construction operations. The brackets should be designed by a competent engineer and should be supported with Technical Files.

The use of traditional lifting methods such as the choke (or double choke) hitch can also be used for lifting loads and positional work. Guidance on the use of chains and strops is available from the manufacturers.

All lifting accessories must be included in the equipment inspection programme outlined in previous section 7.4 and 8 above.

Choke Hitch

10 LIFTING OF PERSONNEL

The Approved Code of Practice (L113) gives the following information:

The crane used should be adequate and suitable for the task, have a freefall capability lock-out and should be used equipped with appropriate devices such as a hoisting limiter, lowering limiter, rated capacity indicator and rated capacity limiter. The carrier should be adequately attached to the crane (eg by a shackle or a hook with a latch). The crane and carrier should be inspected every day by a competent person. The crane and associated equipment should be suitably de-rated and the crane should be operated in accordance with the recommendations in BS 7121.

If lifting equipment is not marked to indicate that it can be used to lift people it should only be used if a risk assessment has confirmed it can be used safely and adequate precautions are taken. It should then be appropriately marked to indicate that it is for lifting people and the number of people it can lift safely.

The British Standard BS 7121 -2 Safe use of cranes. Section 11 gives the additional recommendations for cranes that are used for lifting persons and suspended baskets. Cranes and other accessories that are used to lift persons and the personnel carrier should either be thoroughly examined at least every 6 months or in accordance with a written scheme of thorough examination. Also Annex E gives an example of personnel carrier pre-use check form that should be used on a regular basis as established by your safety management system.

On the completion of the thorough examination (either 12 monthly when the crane is not used for carrying personnel or six monthly when used for carrying personnel) a list is compiled by the competent person of repairs (if necessary) that are required, this list should also identify what needs immediate attention and a timescale in which to carry out the repairs.

Some additional concerns have been identified that construction contractors need to address as part of their pre-use check before putting their personnel to work in personnel carriers, particularly when the main contractor or another organisation provides the crane.

Before using a crane for carrying personnel:

- *Check the thorough examination has taken place within the last six months.*
- *Confirm what repairs were identified during the thorough examination and that they have where necessary been carried out.*
- *Ensure the Crane Driver inspections take place and that they are sufficiently detailed.*
- *Provide the users with training and support to ensure they are aware of the necessary checks required before using personnel carriers.*
- *Check the weather forecast and continue to monitor during the operation.*

Man Basket

It is appreciated that the cranes may not be your own, however the personnel working from the suspended basket are, and you have a duty of care to ensure that every reasonable check is made to ensure they are not put to unnecessary risk.

When in the confines of the personnel carrier workers should be attached by a suitable work restraint system to a suitable anchorage point within the carrier.

11 SUBCONTRACTORS

Systems for the control of lifting operations by subcontractors are subject to verification and approval by the AP. In particular the AP must seek assurance that those implementing each stage of the lifting operation from planning through to implementation are competent to do so.

It is important that subcontractors are made aware of lifting operation requirements during the tendering process and this is then confirmed on subcontract orders and at pre-start meetings in order not to compromise the safety of lifting operations on site.

12 TRAINING

Training of personnel should be treated as an important element of the overall safe planning and supervision of lift operations. Therefore Employers should:

- Use appropriate procedures to ensure that suitable potential trainees are selected.
- Provide adequate basic training in the principles of crane driving and slinging.
- Train employees in the use of the particular cranes or lifting accessories, which they are expected to use, and instruct them in the job they are required to do, and any particular hazards of the site where they could work.
- Use only employees that have reached an adequate standard in their training and show themselves to be competent.
- Provide adequate supervision so that the competence of operators and slingers can be monitored and the need for refresher training can be assessed.

Further training information is available from Annexes of BS 7121-1.

Driver & Slinger

13 ALTERNATIVE LIFTING PRACTICES

In the case of basic lifting operations e.g. bucket attachments and the use of a telehandler or fork lift to pick up pallets of material or the plant used with lifting accessories to carry out basic lifts, it will be necessary to refer to the manufacturer's guidance as to the appropriate safety limits etc.

An experienced telehandler or fork lift operator need not be under the direct supervision of the AP/CS for each basic lift. The CS can delegate supervision of the lifts to the operator if deemed competent. If working close to overhead cables or other proximity hazards, a slinger/signaller should be instructed to supervise.

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APPENDIX A

BASIC LIFT PLAN PRO-FORMA

COMPANY:		REFERENCE NO.
SITE/PROJECT:		DATE:
TYPE OF LIFTING EQUIPMENT:		
TYPE OF LIFT:	single/worst case	
TYPE OF LIFTING OPERATION:		
DETAILS OF WORKING AREA/WHERE EQUIPMENT WILL BE SITED OR REGULARLY OPERATED [ATTACH SKETCH IF APPROPRIATE]:		
NAME OF HIRE COMPANY [IF APPLICABLE]:		
NAME OF LIFT SUPERVISOR:		
NAME OF SLINGER/SIGNALLER [IF MULTIPLE SERIES OF LIFTS AT DIFFERENT LOCATION NAME OR SLINGER/SIGNALLER]:	a] b] c]	
METHOD OF COMMUNICATION:	radio/hand signals/other [please specify]	

LIFT DETAILS	**A**	**B**	**C**	**D**
DESCRIPTION OF LOAD TO BE LIFTED				
MAX WEIGHT OF LOAD AS ADVISED	kg	kg	kg	kg
RADIUS AT WHICH LOAD IS TO BE PLACED	m	m	m	m
BOOM LENGTH TO BE USED [IF APPLICABLE]	m	m	m	m
SAFE WORKING LOAD CAPACITY AT GIVEN RADIUS	kg	kg	kg	kg
WEIGHT OF HOOK BLOCK/S LIFTING EQUIPMENT AND EXTENSIONS [IF AVAILABLE]	kg	kg	kg	kg
MAXIMUM AVAILABLE LIFTING CAPACITY FOR LOAD TO BE LIFTED	kg	kg	kg	kg
ACCEPTABLE	yes/no	yes/no	yes/no	yes/no

DETAILS OF LIFTING EQUIPMENT [ATTACH SKETCH IF APPROPRIATE]:	SWL

DETAILS OF RISK ASSESSMENT:

NOTE: When used at a particular location, this lift plan MUST be accompanied by an assessment of the risk present by the proximity hazards identified below]

ADJACENT STRUCTURES	☐	OVERHEAD CABLES	☐
SERVICE COVERS	☐	UNDERGROUND SERVICES	☐
OTHER LIFTING EQUIPMENT	☐	GROUND CONDITIONS	☐
ACCESS/EGRESS ROUTES	☐	THIRD PARTIES NEARBY	☐
RAILWAY LINES	☐	EXCAVATIONS	☐
WIDTH RESTRICTIONS	☐	OTHER HAZARDS Specify:	☐

AUTHORISED BY:	[Lifting operations Appointed Person or Crane Supervisor]
DATE:	

On reception of lifting equipment the supervisor/slinger must ensure the following checks are made and recorded on the appropriate form.

- Certificate of test for lifting equipment
- Certificate of thorough examination for lifting equipment and equipment
- Register of weekly inspection for lifting equipment
- Plant operator's certificate of competence and performance (if unknown to AP/CS)
- Slinger/signallers certificate of competence and performance (if unknown to AP/CS)
- Other equipment specific checks specified on the relevant form

APPENDIX B

DESIGN INFORMATION FOR LIFTING BRACKETS

Lifting brackets are manufactured and used to lift and position constructional steelwork during haulage and the site erection of structures. The lifting brackets are intended to be used as an aid to construction and not as part of the permanent structure.

The manufacture and safe use of lifting brackets must be designed to the appropriate standard and comply with LOLER, PUWER, SMSR and CDMR.

The brackets must be designed by a competent engineer and the design should be recorded in a Technical File. The Technical File should be maintained during the period of use of the lifting brackets and any relevant information on the safe use of the brackets should be made known to the users.

Under the CDMR designers have an obligation to design out foreseeable risks where possible. When designing and manufacturing lifting brackets and drafting the instructions, the manufacturer's designer must consider both the intended use and the reasonably foreseeable misuse of the bracket.

If all of the hazards due to abnormal use or misuse cannot be eliminated, then instructions must be provided to draw the user's attention to ways — which experience has shown might occur — in which the lifting bracket(s) should not be used.

The Machinery Directive part 4.3.2. outlines the following requirements for lifting accessories: identify the manufacturer, identify the materials the brackets are made from, the maximum working load and CE mark.

The requirement to CE mark fully applies if brackets are placed independently onto the market for general sale. If a single or limited use bracket is supplied directly to the manufacturer, or made by the manufacturer, CE marking is not required and section 7 and 8 below may not be applicable.

The Technical File must address the following issues as relevant:

1. Calculations must included that have been carried out to a recognised design standard (e.g. BS 5950) by a competent designer.
2. Consideration should be given to increasing the basic design load to allow for other factors that may increase the load e.g. out of plane loading, 'snatch' loadings, lifting off the centre of gravity etc.
3. Consideration should be given to any effect the lifting bracket may have on the load to be lifted (e.g. effect of loads from a bracket attached to flange on a web–to-flange weld).
4. The material to be used for fabrication of the brackets must be specified.
5. The specification for the bolts to be used must be identified.
6. Non destructive testing (NDT) requirements must be specified.
7. Each bracket must be stamped (or clearly marked if only intended to be used for single or limited number of lifts) with its Safe Working Load (SWL) or Working Load Limit (WLL).
8. Each bracket must be stamped with a unique number to enable it to be inspected to the requirements of LOLER.
9. Information must be provided to the users on the safe use of the brackets, including any limitations on their use.

LOLER addresses the following to the user of lifting equipment:

1. You should assess whether the lifting equipment has adequate strength for the 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.
2. The 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.
3. The lifting equipment used should provide an appropriate factor of safety against failure under foreseeable failure modes.
4. The lifting equipment should have adequate strength but you should pay particular attention to the mounting or fixing points. The mounting or fixing points not only include where the lifting equipment is secured to another surface but also where parts of the lifting equipment are fixed together.
5. In addition to the downward force of the weight of the load, you should consider additional forces, e.g. any wind loading since this may place extra stresses on the lifting equipment.
6. 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.

The essential safety requirements of the SMSR with respect to mechanical strength are:

1. Lifting accessories and removable components must be capable of withstanding the stresses to which they are subjected, both in and, where applicable, out of use, under the installation and operating conditions provided for by the manufacturer, and in all relevant configurations, with due regard, where appropriate, to the effects of atmospheric factors and forces exerted by persons. This requirement must also be satisfied during transport, assembly and dismantling.
2. Lifting accessories must be designed and constructed so as to prevent failure from fatigue or wear, taking due account of their intended use. The materials used must be chosen on the basis of the working environments provided for by the manufacturer, with special reference to corrosion, abrasion, impacts, cold brittleness and ageing.
3. Lifting accessories must be designed and constructed to withstand the overload in the static tests without permanent deformation or patent defect. The calculation must take account of the values of the static test coefficient chosen to guarantee an adequate level of safety; that coefficient has, as a general rule, the following values:

(a) manually-operated machinery and lifting accessories: 1.5;

(b) other machinery: 1.25.

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