

Tower Crane Operator's Handbook



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Introduction

Every successful lifting operation is the result of planning and teamwork. The definition of teamwork is "a united effort by all to achieve the ultimate goal". All lifting operations must be undertaken by a trained and competent team using a safe system of work established prior to the start of any lifting operation.

You as the tower crane operator play a vital role in the team and the aim of this guide is to give you essential practical advice to help you carry out this role successfully.

Should you have any doubt or questions regarding the information contained in this guide you must take this up with your employer before proceeding with lifting operations.



**If in doubt...
ASK!**



1. The Lifting Team

The lifting teams may consist of an appointed person, supervisors, crane coordinator, tower crane operators and slinger/signallers. The complexity and size of the job will determine the team structure. Teams will change but the rules should not.



Appointed Person

The competent person appointed to have overall control of all lifting operations on site. Their responsibilities will include:-

- The overall planning of lifting operations
- Carrying out risk assessments
- The production of Method Statements
- The completion of the site “Lift Plan”
- Authorisation of the crane coordinator, crane supervisors and slingers/signallers
- Maintaining records of thorough examinations, inspections and function tests
- Ensuring that all members of the lifting team are fully briefed before lifting operations begin

Changes to the safe system of work can only be authorised and implemented by the appointed person; they have the ultimate responsibility for ensuring that the lifting operation is carried out safely. The appointed person's duties, but not their responsibilities, may be delegated.

On construction sites where lifting operations are carried out by various subcontractors the Principal Contractor should appoint the Appointed Person for the site. Each of the sub-contractors on site may employ individuals who have undergone appointed person training but the Principal Contractor's appointed person will retain overall responsibility for lifting operations on that site.

Crane Coordinator

The person who plans and directs the sequence of operations of cranes to ensure that they do not collide with other cranes, loads and other equipment such as concrete placing booms, telehandlers, and piling rigs.

Sites where the risk of aerial collision is low will not always require a crane coordinator.

Crane Supervisor

The person who controls the lifting operation, and ensures that it is carried out in accordance with the appointed person's safe system of work.

Tower Crane Operator

The person who is operating the crane for the purpose of positioning loads or erection of the crane. Because of their elevated location on site they are often regarded as the team leader. This is not the case; it is always the appointed person.

Slinger/Signaller

The person responsible for:-

- Attaching and detaching the load to and from the crane
- The use of correct lifting gear
- Initiating and directing the safe movement of the crane and load

Multiple Roles

Depending on the size, complexity and associated risk of the lifting operation, one person can undertake more than one role. For example the Appointed Person can, if suitably qualified and experienced, also act as the Crane Supervisor and Slinger/Signaller at the same time. The only person who cannot combine roles is the Tower crane operator whose only task should be the safe operation of the crane.

Note: *The Crane Supervisor cannot take on the role of the Appointed Person.*

2. Responsibilities of the Principal Contractor (Site)

The person in control of any site on which you are operating a tower crane has the responsibility to ensure that health and safety on the site is managed effectively, this includes:-

- Welfare facilities
- First aid
- Fire and evacuation procedures
- Rescue and emergency procedures
- Site security
- Crane security and access control - When maintenance of a tower crane is taking place the maintenance team have full control of the tower crane
- Safe access and egress to and from the crane foundation, including removal of standing water, to enable checks to be carried out



EXAMPLE OF A FLOODED TOWER FOUNDATION

- Safe access and egress to and from the crane mast for access to the cab



POOR ACCESS TO THE CRANE MAST

- Safe access up and down the mast, to and from the cab



RESTRICTION OF LADDER WIDTH BY CABLES

- A safe system of work, including a site specific lifting plan/method statement and any associated risk assessment. You must be familiar with the lifting plan, including any emergency procedures, before starting lifting operations

3. Responsibilities of the Crane Operator

As the tower crane operator your responsibilities are:-

- To operate the crane in a safe and efficient manner in accordance with the manufacturer's instructions and the site specific lifting plan
- To follow all site safety rules, including the wearing of PPE
- To carry out basic maintenance duties, including pre and post start checks as specified by your employer and in accordance with the manufacturer's instructions
- To keep all areas of the crane, including the crane cab, walkways, rest platforms and back jib, clear of unwanted and unhygienic materials



EXAMPLE 1 OF UNHYGIENIC MATERIALS

- To ensure that all loose materials such as rope spray, grease canisters and spare components are stored securely and clear of walkways etc



EXAMPLE 2 OF UNHYGIENIC MATERIALS

- To immediately report any breakdowns or faults with the crane to your supervisor on site and also, wherever possible, to the crane owner



EXAMPLES OF POOR HOUSEKEEPING

- To immediately report any possible situations or incidents that could endanger the health, safety and welfare of anyone on or in the vicinity of the site to your supervisor on site (this may not necessarily be connected with the lifting operation)

- To report any potential absences from work both your supervisor on site and your employer, giving as much notice as possible to enable alternative arrangements to be made
- To accurately complete all documents, such as timesheets, daily and weekly check sheets, and CPCS logbook, as required by your employer and the site
- To ensure that you are not under the influence of drugs or alcohol when reporting for duty. Being under the influence of drugs and alcohol is generally considered to be gross misconduct resulting in dismissal
- To operate the tower crane (if required) during erection, alteration, maintenance and dismantling by strictly following the directions of the person in charge of the operation
- Not to operate any override keys/limit switches unless specifically instructed to do so by the crane owner for the purposes of fault diagnosis or installation operations



4. Operator Qualifications and Health

The Provision and Work Equipment Regulations 1998 (PUWER) require that:

“Every employer shall ensure that all persons who use work equipment have received adequate training for purposes of health and safety, including training in the methods which may be adopted when using the work equipment, any risks which such use may entail and precautions to be taken.”

In the construction industry this requirement is often met by the Construction Plant Competence Scheme (CPCS) and machine specific familiarisation from the crane owner.

A tower crane operator's job is demanding in both skill and concentration. It cannot be carried out properly if you are not medically fit, have problems with your eyesight, hearing, or with alcohol or drugs. You must ensure



that your state of health does not make you a risk to yourself and others working with or near you.

If you have doubts about your health, you should speak to your employer and doctor.



You are required by the Working Time

Regulations to take rest breaks during your working day. It is important that

breaks are taken to ensure that you can maintain concentration and combat fatigue.

Lone Working

Working alone on site presents particular hazards and you should ensure that whenever you are on site that there is adequate supervision, together with First Aid and Welfare facilities.

5. Resolution of Issues on Site

As a tower crane operator there could be times, through no fault of your own, when you may be involved in contentious situations, which, if not handled correctly, may interrupt the safe and smooth working of the site.

As mentioned previously should you have any concerns you must raise these immediately with your supervisor on site and where necessary, with your employer. Your concerns should be stated in a calm, rational and diplomatic manner without allowing the use of emotive language or behaviour.

Nothing is ever gained by having a slanging match or resorting to violence. Violence is generally considered to be gross misconduct resulting in dismissal.



NOTHING IS GAINED BY VIOLENCE

6. Lifting Operations

When carrying out lifting operations with a tower crane the following points must be adhered to:-

- A tower crane is designed for lifting and placing of loads it should **never** be used for:-
 - Lifting loads that are in excess of the crane's Rated Capacity (Safe Working Load)



Bad Practice X



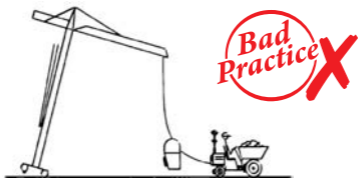
**LIFTING A LOAD OF UNKNOWN WEIGHT
CAN HAVE DISASTROUS CONSEQUENCES**

- Lifting of embedded or fixed down objects e.g. sheet piles
- Tandem or multiple lifting with tower or any other cranes or plant/machinery



LIFTING SHEET PILES WITH A TOWER CRANE

- Dragging loads which are out of radius



- Snatching the load
- Lifting of personnel except when using purpose designed manriding cages with a site specific manriding method statement
- Certain lifting operations such as the lifting of persons, blind lifting and operating in hazardous environments, require particular care and attention. The appointed person should be familiar with these and plan the lift and inform the crane team accordingly



EXAMPLE OF A MANRIDING CAGE

- Strong winds may swing suspended loads (crates, panels, etc) out of balance and radius making the tower crane unstable. Further information is given in the following section dealing with the effect of wind on tower cranes
- Extreme care should be taken with luffing jib cranes when working in high winds with the jib at minimum radius as the jib can be blown backwards with serious consequences
- Lifting operations will also be affected by other environmental conditions such as rain, snow, hail, lightening and poor light.

7. Wind and Taking the Crane Out of Service

The tower crane's manual will specify the maximum wind speed at which the tower crane is to be taken out of service and the precautions to be taken when putting the tower crane in the out of service condition. You must observe this limit at all times.

It must be emphasised that the wind speed given in the tower crane manual, at which the crane must be taken out of service is a maximum and not a minimum. For example just because a crane's out-of-service windspeed is 45 mph this does not mean that you can safely lift any load in a 44 mph wind! You may decide to take the crane out of service at a lower speed due to the type of load being lifted or difficulty in controlling the crane.

You as the operator have the primary responsibility for making the decision, in conjunction with the appointed person or crane supervisor. Your decision to take the crane out of service should not be overridden by site management under any circumstances.

If your decision is disputed by the site or you are put under pressure to continue working in high winds you must immediately contact your employer.

NOTE: *Wind speeds are given in a variety of units and a conversion chart is included in Section 11 on page 27.*

The Effect of Wind on Loads on the Hook

Strong winds may swing suspended loads (crates, panels, etc) out of balance and radius, making the tower crane unstable. If you as the operator feel that you cannot maintain full control of the load, it should not be lifted. For large, light loads such as shutters, this situation may occur some way below the tower crane's design wind speed.

NOTE: *Manriding operations must not be carried out in wind speeds in excess of 7m/s (25km/h)*

High Wind Conditions and Taking the Tower Crane Out of Service

It is important that you monitor the wind speed constantly using the anemometer display in the cab. This will give you early warning of rising wind speeds and enable you to take action to take the tower crane out of service and descend the tower whilst it is still safe to do so. If the wind is gusting around the limiting wind speed it may be appropriate, following consultation with your supervisor, to remain in the cab whilst establishing if the wind speed is rising or falling.

You should report the wind speed to your supervisor on site on a regular basis. Where the wind speed is rising this will allow the site plenty of opportunity to plan concrete deliveries etc before the crane has to be taken out of service.

The anemometer or other windspeed indicator must be included in the daily pre-use checks.

Putting the crane in the out-of-service condition generally includes ensuring that the jib is free to “weather vane” when out of service so that the minimum wind area is presented to the prevailing wind. On luffing jib tower cranes it is also important that the jib is left at the correct out of service radius (specified by the crane manufacturer, which is not always the minimum radius. This will ensure that there is sufficient wind area to enable the crane to “weather vane”.

When taking the crane out of service on multi crane sites you must ensure that the crane in free slew will not enter the area of other cranes that are still operating.

Tower cranes must not be left out of service with a load on the hook and the hook must always be fully raised.



THE EFFECT OF VERY HIGH WINDS

8. Precautions

Transfer of Equipment

From time to time you may need to take small tools and various other items up to, and down from, the cabs and machinery decks of tower cranes. It is essential that this is accomplished safely, with minimum risk to you and those below.

The primary means of accomplishing this task is by the use of a rucksack worn on the chest of the person ascending the tower.

If loads are too heavy or bulky to be transferred using the rucksack method, a properly planned alternative safe system should be used.

Communications

Good communications are an essential part of lifting operations. It is essential that all members of the lifting team are able to communicate effectively in the same language. Any faulty



communication equipment must be reported immediately and lifting operations suspended until the faults are rectified.

Electrical Equipment in Tower Crane Cabs

Care should be taken with the use of electrical equipment in tower crane cabs to ensure that the risks of fire and electric shock are adequately addressed. Entertainment equipment may also pose a risk of distraction during lifting operations. You should follow your site/employers rules.

Changeover of Operators

During operator changeover the cab power supply must be isolated to avoid unintentional operation of controls.

Overriding of Anti-collision or Zoning Systems

Any anti-collision or zoning system, must not be overridden unless authorised by the appointed person.

Dropping of Waste Materials

Waste or other materials must not be dropped from the tower crane under any circumstances.

Duty Boards

Duty boards must be fixed on the tower crane mast so that they can be seen clearly from a distance. The presence and condition of the duty board must form part of the weekly inspection.



Bad Practice X



Good Practice ✓

Operation Manual

All operations should be carried out in accordance with the crane manufacturer's operating instructions, a copy of which should be with the crane at all times (these may be the appropriate section of the full manual).

Use of Mobile Phones

Mobile phones should not be used whilst lifting operations are taking place.

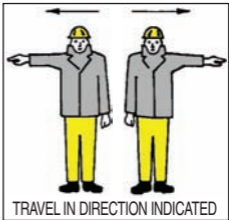
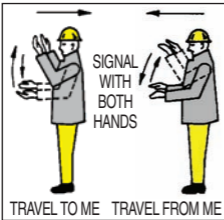
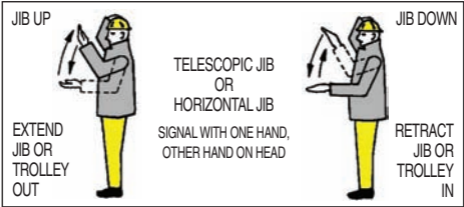
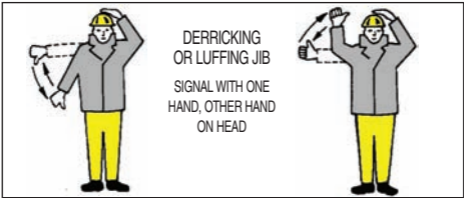
9. Sources of Further Information

Additional information on the Safe Use of Tower Cranes is available from the following sources:-

- The Construction Plant-hire Association (CPA) publishes a series of Technical Information Notes (TINs) giving guidance on specific aspects of tower crane operation. These TINs, which are continually being updated and added to, are available as free downloads on the CPA website at: www.cpa.uk.net
- The CPA also publishes Best Practice Guides to the safe use of top slew and self-erecting tower cranes which are available as free downloads on the CPA website at: www.cpa.uk.net
- The BS 7121 series of codes of practice on the safe use of cranes are available from BSI Standards at www.bsi-global.com
- General Health and Safety advice can be found on the HSE website at www.hse.gov.uk
- Information regarding the Construction Plant Competence Scheme (CPCS), including information on accredited training providers, can be obtained from the Construction Plant Certification Scheme Help Desk on: **0870 417 7274** or: www.citbconstructionskills.co.uk/cardschemes

10. Hand Signals





11. Windspeed Conversion Table

m/s	MPH	KPH	Beaufort Scale	
			No.	Description
4	9	14	3	Gentle breeze; leaves and twigs in motion.
6	13	22	4	Moderate breeze; raises dust and loose paper.
8	18	29	5	Fresh breeze; Small trees in leaf begin to sway.
10	22	36	6	Strong breeze; Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty.
12	27	43		
14	31	50	7	Near gale; Whole trees in motion; inconvenience felt when walking against wind.
16	36	58		
18	40	65	8	Gale; Breaks twigs off trees; generally impedes progress.
20	45	72		
22	49	79	9	Strong gale; Slight structural damage occurs (chimney pots and slates removed).
24	54	86		
26	58	94	10	Storm.

12. Receipt

I have received a copy of the CPA Tower Crane Operators' Safety Guide and agree to read it carefully and comply with the guidance and advice which is contained within it.

Signature _____

Full Name _____

Date _____

Name of Company or Organisation

Address _____

This receipt must be completed and returned to your employer.





WORKING IN PARTNERSHIP



CPA. 27/28 Newbury Street, Barbican, London EC1A 7HU
Tel: 020 7796 3366 Fax: 020 7796 3399
Email: enquiries@cpa.uk.net www.cpa.uk.net

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