

LIFTING OPERATIONS STANDARD



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1. Introduction

1. Introduction

1.1 Purpose

The purpose of this document is to detail the overall process for planning and carrying out lifting operations, and the standards for the safe management of lifting operations on Mace Construction projects. It should be read in conjunction with the supporting documents outlined in Table 1 below.

This document is based on industry best practice, lessons from incidents and to clarify where the regulations and British Standards could be interpreted in different ways.

It is intended that this document and project specific documentation will be available to all those undertaking lifting operations on Mace projects. This will enable them to allocate the necessary resources to comply.

1.2 Scope

The requirements of this document apply to all Construction projects where Mace have responsibility for planning, managing, monitoring and controlling of lifting activities as Principal Contractor.

The standards are applicable at all project phases from bid, mobilisation, delivery, handover and aftercare.

These standards apply to all lifting operations and include non-crane related lifting such as with chain blocks, Genie lifts, excavators etc. **Note:** Pallet trucks are not deemed to be lifting equipment and must be considered as work equipment.

Lifting operations is defined as “an operation concerned with the lifting or lowering of a load”, in line with UK Lifting Operations and Lifting Equipment Regulations (LOLER) 1998.

This document does not include the use of access cradles, building maintenance units (BMUs) etc. as these are used primarily as access equipment and are generally designed to carry operatives and small (hand) tools, however, Lifting requirements will apply. Further details can be found in the [Mace Work at Height Standard](#).

Where specialised lifting operations are required i.e. climbing up or down of tower cranes, strand-jacking, lifting from water (barges etc.), tandem lifting, helicopter placement etc, then advice must be sought from the Mace Lifting, Plant and Access Manager.

The requirements set out in this document are to supplement the requirements of the UK Lifting Operations & Lifting Equipment Regulations, BS7121 – Code of practice for the safe use of cranes, and BS7212 - Code of practice for the safe use of construction hoists.

There is no intention to repeat the requirements of these documents.

When operating outside the UK, then local, regional legal requirements and industry guidance must also be applied. Should there be a clash in requirements between this standard and local legal requirements, then please contact your local HSW Manager. Where a higher standard is stipulated then this should be followed.

2. Lifting Operations Process

2.1 Supporting information

Implementation of this Standard is supported by a series of templates. These are summarised in more detail in Table 1 and further referenced throughout this document.

Supporting Document	Overview
Lifting Operations Management Plan	<ul style="list-style-type: none"> The Lifting Operations Management Plan details how the specific project will manage all lifting operations, including: <ul style="list-style-type: none"> - project organisation and arrangements. - equipment being used. - site specific details i.e. ground conditions or restrictions such as railway lines. The plan is completed by the project and authorised for use by the Business Unit/Engine Lifting Operations Specialist, the Bid/Project Lead and the Project Lifting Manager. The plan must be reviewed monthly by the Project Lifting Manager or updated following significant changes. The current Lifting Operations Management Plan and appendices will be communicated at all stages of a project to all organisations undertaking lifting operations, or those that may be affected by them in relation to Mace projects.
Mace Lifting Plan	<ul style="list-style-type: none"> Lift plan template for use by Mace where we have responsibility for planning and managing the lift i.e. as part of Mace Logistics.
Contractor Lifting Plan	<ul style="list-style-type: none"> Contractors carrying out lifting activities at Mace projects must have a comprehensive lifting plan.
Personnel/Goods Hoist Plan	<ul style="list-style-type: none"> Contractors responsible for the installation and operation of hoists must have a comprehensive hoist plan.
Contractor Lifting Plan Review Checklist	<ul style="list-style-type: none"> The Contractor Lifting Plan Review Checklist can be used by the Mace Project/Construction/Package Manager to assess a lifting plan provided by the contractor involved in lifting operations.
Lifting Equipment (Appliances and Accessories) Checklist	<ul style="list-style-type: none"> This checklist is used to confirm that lifting equipment used on site is fit for purpose before initial use, and is supported by relevant examinations and checks. The Project Lifting Manager or competent deputy is responsible for completing these.
Records of those undertaking lifting operations.	<ul style="list-style-type: none"> Organisations undertaking lifting operations must maintain records and make available on request. Documents that must be available prior to lifting operations commencing are: <ul style="list-style-type: none"> - Contractor lifting plan. - Competency records for all those involved in lifting operations. - Thorough Examination (TE) certificates for all lifting equipment - Maintenance and servicing records of all lifting equipment. - Daily and weekly inspections of lifting equipment. All of the above are subject to inspections and audits which are to be recorded in YellowJacket.

Table 1: Supporting documents

Classification:

Classification - Public

2.2 Roles and Responsibilities

Table 2 below details the various roles and responsibilities involved in lifting operations. Additional information on typical numbers of each role required for tower cranes is detailed in Table 5:

Role	Responsibilities
Bid Lead	<ul style="list-style-type: none"> Engaging the support of the Business Unit/Engine Lifting Specialist as required and involve them in decisions where lifting operations impact the bid. Evaluating the bid logistics strategy and bid lifting strategy and considering these within the bid. Providing relevant details to the contractor pricing lifting operations to enable them to correctly value their works and comply with Mace requirements. Communicate key dates of significant lifting operations to the Lifting Specialist Group on contract award.
Project Lead	<p>Overall responsibility for:</p> <ul style="list-style-type: none"> Compliance of this Standard and checking the project meets these throughout delivery. The appointment of a competent Project Lifting Manager. The provision of relevant details to the contractor undertaking lifting operations to enable them to correctly value and plan their works to comply with Mace requirements.
Temporary Works Coordinator	<ul style="list-style-type: none"> Confirm that the temporary works requirements for lifting operations are adequately designed, installed, inspected, maintained and removed. All temporary works must be in line with the Mace Temporary Works Procedure. Examples include: <ul style="list-style-type: none"> Tower crane foundations (gravity, piled & steel grillage). Tower crane ties. Mobile crane outrigger foundations. Crawler crane working platform. Temporary lifting beams, gantries, etc where designed & fabricated bespoke to the project. Assessment of ground conditions & underground structures. Assessment of lifting equipment on suspended slabs and associated back propping.
Business Unit/Engine Lifting Specialist	<ul style="list-style-type: none"> Providing support to the bid lead and assisting in the production of the Lifting Operations Management Plan to enable the contractor pricing lifting operations to correctly value their work and comply with Mace requirements. Providing support and advice to projects and liaising with the Project Lifting Managers. Carrying out project inspections and audits to establish levels of compliance with the requirements of the standards and procedure. Liaising with the Mace Lifting, Plant and Access Manager and actively contributing to the Mace Lifting Specialist Group. For details of the Mace Lifting Specialist Group, see the Lifting Operations Infomace Page. Supporting and where required, undertaking lifting operations incident investigations. Assisting with the sharing of knowledge and lessons learnt. Providing support to projects in planning and execution of lifting operations when there are significant risks e.g. erection/dismantling/climbing of tower cranes or complex lifts with any lifting equipment.

Table 2: Roles and Responsibilities

2.2 Roles and Responsibilities

Role	Responsibilities
Mace Project Lifting Manager	<ul style="list-style-type: none"> Attending a handover of the bid lifting strategy set out in the bid with the Business Unit/Engine Lifting Specialist. Liaising with the Business Unit/Engine Lifting Specialist and seeking their support where required. Liaising with the Business Unit/Engine Lifting Specialist when there are high risk lifting operations e.g. erection/dismantling/climbing of tower cranes or complex lifts, inform the Business Unit/Engine Lifting Specialist. Developing the Lifting Operations Management Plan and reviewing monthly. Attending pre-mobilisation meetings with the contractors undertaking lifting operations. Convening meetings with the supply chain and the project lifting operations team and setting out these requirements in the Lifting Operations Management Plan. Liaising with other disciplines that may impact on lifting operations e.g. design, engineering, Temporary Works Coordinator and MEP. Check and confirm tower crane requirements have been completed, e.g. base design completed, routine checks carried out, erection and dismantle methodology in place, etc. Carrying out inspections and audits of the contractors undertaking lifting operations for suitability of the works being carried out, compliance with the Lifting Operations Management Plan and the Mace Standards and recording these on YellowJacket. Reviewing the lifting plans provided by the contractor undertaking lifting operations for suitability for the works being carried out and compliance with Mace requirements. These lifting plans will often form part of the risk assessment and method statement for the task. Notify the Lifting Specialist Group and Engine Lifting Specialist of any erection/dismantling/climbing of tower cranes or complex lifts using any lifting equipment, tandem lifts, etc.
Mace Project/ Construction/ Package Manager	<ul style="list-style-type: none"> Where lifting operations are part of a construction activity, they are responsible for reviewing and accepting lifting plans. Engage the support of the Project Lifting Manager to review and comment on lifting plans.
Mace Lifting, Plant and Access Manager	<ul style="list-style-type: none"> Coordinating, managing and supporting the Mace Lifting Specialist Group's activities. Supporting and where required, undertaking lifting operations incident investigations. Reviewing and accepting knowledge sharing and embed into updates to this procedure & associated documents. Liaising with the Business Unit/Engine Lifting Specialist and support parts of the business without direct access to lifting operations specialists. Representing Mace with external organisations, bodies and trade groups i.e. Mace supply chain, HSE, CPA, CITB, Build UK, IPAF. Supporting the Mace Supply Chain Management and Procurement functions.
Mace Lifting Specialist Group (For details of the Mace Lifting Specialist Group, see the Lifting Operations Infomace Page .)	<ul style="list-style-type: none"> Reviewing, assessing and evaluating information from incident investigations, performance data, knowledge shares, good practice, legislation and guidance changes, innovation, new technology and industry sources. Recommending amendments to the Management of Lifting Operations Standards and supporting materials. Leading the communication and embedding of changes to the Management of Lifting Operations Standards, documents and training as appropriate.

Table 2: Roles and Responsibilities

Classification:

Classification - Public

2.2 Roles and Responsibilities

Role	Responsibilities
Contractors undertaking lifting operations	<ul style="list-style-type: none"> Carry out the lifting operations to the Lifting Operations & Lifting Equipment Regulations, BS7121 – Code of practice for the safe use of cranes, and BS7212 - Code of practice for the safe use of construction hoists and other relevant legislation. Carry out the lifting operations in line with this Standard and associated documents.
<p>Lifting Operations team</p> <p>(The lifting operations team for the project is deemed to be any person involved in the specific lifting activity. See BS7121 – Code of practice for the safe use of cranes for the defined titles, roles and responsibilities)</p>	<p>Members of the lifting operations team are expected to cooperate with the Mace Lifting Manager and attend briefings and meetings as directed.</p> <p>Senior Appointed Person - On large construction projects where multiple lifting operations are carried out by various contractors, Mace must appoint a Senior Appointed Person. This role may be fulfilled by Mace directly or by a contractor on behalf of Mace. The Senior AP is a resident on site responsible for controlling all lifting activities. All other AP's are subservient to this AP.</p> <p>The individual completing this role needs to be independent and impartial from the trade contractors.</p> <p>Appointed Person (AP) – The person responsible for the safe planning of the lifting operation and producing the safe system of work for their activities. This is usually a contractor role unless Mace is responsible for the lifting activity.</p> <p>Responsibilities include:</p> <ul style="list-style-type: none"> Reviewing the performance of contractor lifting teams, discuss with the sub-contractor and report any concerns to the Mace lifting manager. Reviewing contractor lifting operations to confirm they are being undertaken in line with the approved lifting plan. Liaising with all project contractors and maintain up to date lifting registers/schedules. The schedules are to include details of lifting equipment/accessories, including serial numbers, Safe Working Load (SWL), date and time of the last and next inspection, recording of defects and actions taken Complete monthly inspections to confirm lifting equipment and accessories being used on site are compliant and supported by up to date records. <p>Lifting Supervisor – The person responsible for supervising the lifting operation and safely operating the safe system of work.</p> <p>Slinger Signaller – The person responsible for attaching/detaching the load to and from the crane and directing crane movements during the lifting operation.</p> <p>Crane Operator – Responsible for operating the crane in accordance with training and manufacturer's instructions and receiving instructions from the slinger/signaller.</p> <p>Carrying out daily pre-use checks and weekly inspections of the crane, retain records and report any defects found.</p> <p>Crane/Lifting coordinator - Note this is not defined as a duty holder in BS7121, however is a role that is stated that may be required when more than one crane operating on site. The crane coordinator will plan and work with the lifting personnel to direct crane movements to prevent collisions with other cranes and loads. The crane coordinator should also be employed when other items of plant such as concrete placing booms, mobile working platforms, telehandlers and piling rigs are being used where they might encroach into the operating radius of the crane/s. This is not a standalone role and should be performed as part of the Project AP/Crane Supervisor role.</p>

Table 2: Roles and Responsibilities

2.3 Process

The process for management of lifting operations is provided in Fig 1 below.

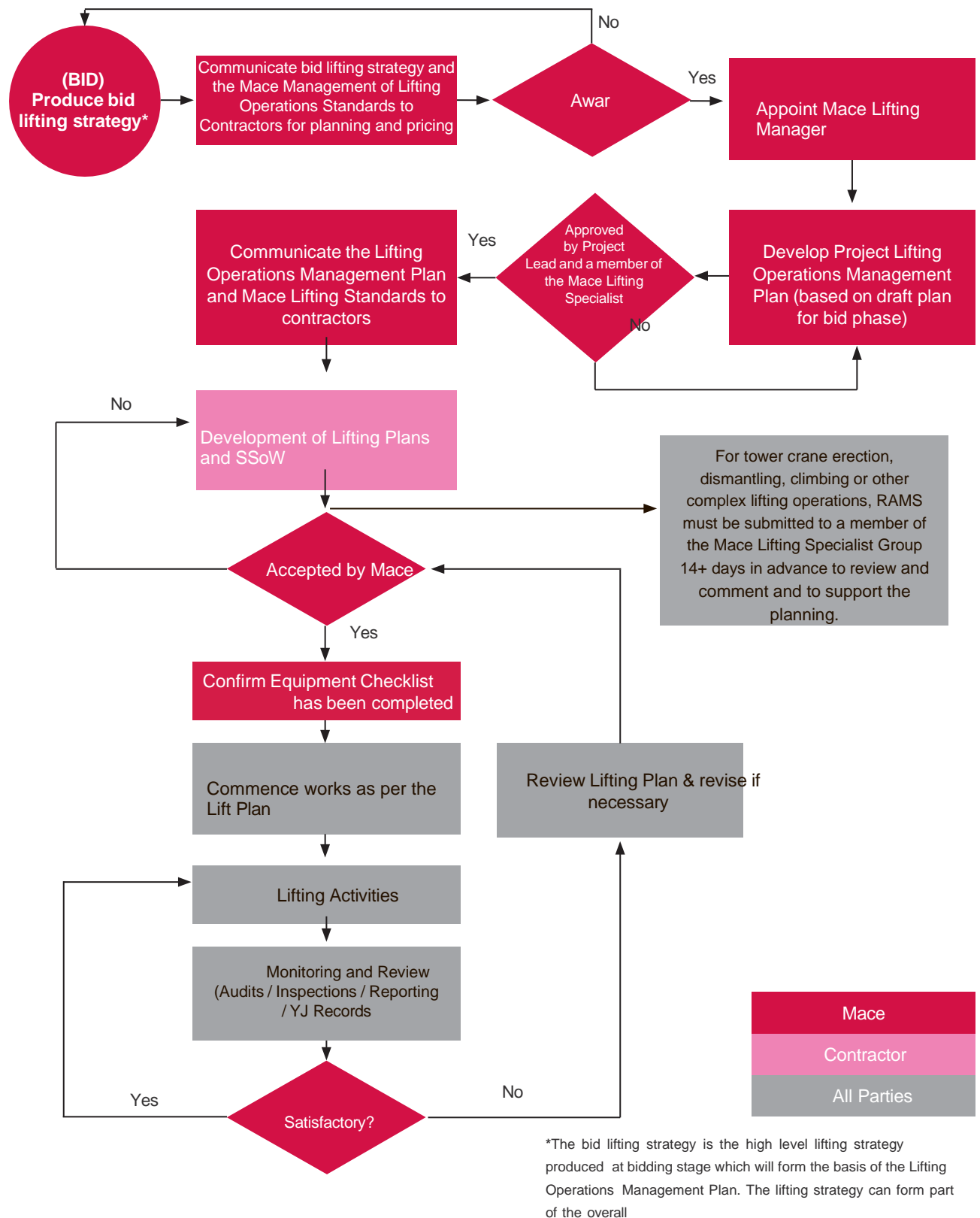


Figure 1: Management of lifting operations flow chart

2.4 Procedure

2.4.1 Bidding phase

During the bidding phase of work, the following is required:

- The Bid Lead will engage with the Business Unit/Engine Lifting Specialist as required, to provide the expert advice confirming the offer to the Client is fully compliant with this Standard. If a Business Unit/Engine does not have this resource then advice must be sought from the Mace Lifting, Plant and Access Manager.
- The Bid Lead will coordinate with other disciplines to engage with the Business Unit/Engine Lifting Specialist especially the design, engineering, Temporary Works and MEP teams as their decisions may impact on lifting operations. Also to be considered are requirements where Mace are undertaking offsite manufacture.
- A pre construction risk assessment of the significant issues will be undertaken, which may require the support of the supply chain and specialist lifting companies. The Business Unit/Engine Lifting Specialist will develop the high level detail as part of the bid logistics strategy or produce a bid lifting strategy and request the crane history from the crane provider. The detail and extent of this planning will depend on the specific bid.
- The bid lifting strategy* for the project and this Standard must be communicated to any contractors tendering for packages involving lifting activities.
- On contract award, dates of significant lifting operations e.g. erection/dismantling/climbing of tower cranes or complex lifts using any lifting equipment, tandem lifts, etc needs to be communicated to the Lifting Specialist Group.

*The bid lifting strategy is the high level lifting strategy produced at bidding stage which will form the basis of the Lifting Operations Management Plan. The lifting strategy can form part of the overall logistics strategy used to support the bid.

2.4.2 Appointment of a Project Lifting Manager

The Project Lead will appoint the Project Lifting Manager in line with the [Mace Appointed Coordinators Procedure](#).

Note: With smaller projects this person may have responsibility for more than one project. It may also be that the Business Unit/Engine Lifting Specialist is appointed to fulfil this role.

2.4.3 Project lifting operations team

- During the delivery phase the Business Unit/Engine Lifting Specialist and the Project Lifting Manager will identify the required structure of the project lifting operations team and detail it in the Lifting Operations Management Plan. This will be based on the requirements set out in BS7121 – Code of practice for the safe use of cranes and the Mace requirements.
- The structure of the lifting operations team will be assessed regularly when the Lifting Operations Management Plan is reviewed.

2.4.4 Development of a Lifting Operations Management Plan

The Project Lifting Manager and Business Unit/Engine Lifting Specialist will review the bid level lifting plan set out in the bid. This will form the basis of the final Project Lifting Operations Management Plan.

The Project Lifting Manager is responsible for maintaining the Lifting Operations Management Plan and appendices, with a review at least monthly or where there are changes in operations. Reviews should include stakeholders such as temporary works coordinator, supply chain partners, etc. and use the construction programme to identify activities involving lifting operations.

2.4 Procedure

2.4.5 Lifting plans and safe system of work (SSoW)

- Organisations undertaking lifting operations on Mace Projects must submit a lifting plan that complies with this Standard and the Lifting Operations Management Plan. A schedule of common lifts is required and must be included in their lifting plan.
- Lifts not included on the schedule of common lifts need to be identified in advance and supported by a separate lift plan.
- Lifting plans must be submitted as part of the SSoW for the task.
- The Mace Manager responsible for the works must:
 - review, comment and accept all lifting plans and sign the submittal front sheet as required by the Mace Risk Management process.
 - identify and arrange for other functions to review the lifting plans e.g. temporary works coordinator as required.
 - identify and arrange for the Mace Lifting Manager to review and comment.
- When there are any tower crane erection/dismantling/climbing operations or complex lifts using any lifting equipment, tandem lifts, etc. the Project Lifting Manager must notify a member of the Lifting Specialist Group at least 14 days in advance to support the planning. The Lifting Specialist Group will either provide a member of the team to be present when the activity is undertaken or assist in procuring an external AP to be present. When using an external AP, a Mace Lifting Manager must be present during the operation.

- Completed lift plans act as an authorisation to proceed in line with the [Mace Permit and Authorisation to Proceed Procedure](#).

2.4.6 Lifting equipment checklists

The [Lifting Equipment \(Appliances and Accessories\) Checklist](#) must be completed for all lifting appliances and accessories prior to initial use on site by the Project Lifting Manager or competent deputy

Note: accessories can be covered under one single checklist.

2.4.7 Wind speed/wind conditions

Weather conditions and in particular wind speed should be considered when operating cranes. An anemometer must be fitted to all tower cranes, mobile cranes and crawler cranes to enable the wind speed to be accurately monitored. Anemometers must have read outs in the project office for the Mace Project Lifting Manager to view or be available for review on a live-feed dedicated website with access for the Mace lifting team management.

Table 3 below details the actions that should be taken at various wind speeds.

WIND ALERT LEVELS				
READINESS CODE	AVERAGE WIND SPEED	GUST SPEED	ACTIVITY GUIDANCE	GENERAL GUIDANCE
GREEN	Below 17mph (27kph) (7.7m/sec)	25mph (40kph) or above (11.5m/sec)	Safe for all site operations	<ul style="list-style-type: none"> Maintain good housekeeping and scaffolds Take extreme care with laying roofing sheets 20m or more long - specialist assessment necessary
YELLOW	17mph (27kph) or above (7.7m/sec)	26mph (42kph) or above (11.8m/sec)	Cease laying or handling sheeting and decking over 5m long and the laying or handling of lightweight materials (glass fibre, insulation boards, liner trays, etc)	<ul style="list-style-type: none"> Check ground level storage/housekeeping. On exposed sites take extreme care with all roofing operations. Maintain housekeeping.
BLUE	23mph (37kph) or above (10.3m/sec)	35mph (56kph) or above (15.5m/sec)	Cease built-up felt roofing, mastic asphalts, slating and tiling, sheeting and decking	<ul style="list-style-type: none"> Check roofs for loose objects, housekeeping. Extra care with crane handling of shutters, sheet materials.
RED	Average 38mph (61kph) or above Or Average 30mph (48kph) with gusts of →	45mph (72kph) or above	Cease crane and hoist use where exposed. Mobile cranes may have lower limits (see manufacturers manual). Cease formwork decking.	<ul style="list-style-type: none"> Check scaffolds, roof areas, exposed/open floor plates for loose materials, missing ties. Secure scaffold boards, sheeting, security of ties, etc Check security of hoardings/fence panels etc.
BLACK	Average 45mph or gusts of	50mph (80kph) or above	Cease all external works or exposed activities	<ul style="list-style-type: none"> Assess safety of access to internal works. Check if there are external materials that could be blown around such as sheet materials and rubbish.

Table 3: Wind alert levels

IF IN DOUBT STOP WORK.

2.5. Communication

2.5.1 Mace Lifting specialist group

- The group is coordinated by the Mace Lifting, Plant and Access Manager. Attendees at meetings are the Business Unit/Engine Lifting Specialists.
- The role of the group is to:
 - set and raise standards within Mace and the supply chain for lifting operations.
 - focus on matters relating to lifting, being proactive in seeking innovation and providing solutions.
 - Propose procedure, standards, and guidance changes to the HSW HSMS steering group.
 - Share knowledge to the wider Mace organisation.
 - Support or take the lead in incident investigation.
 - Provide active support to industry groups, the HSE and other organisations to both provide input, and to maintain Mace's leading-edge lifting knowledge and standards.

2.5.2 Project lifting meetings

- Meeting frequency will be detailed within the Lifting Operations Management Plan.
- The frequency and required attendees of meetings and briefings will be set out in the plan. These may be specific to the lifting operations team or for the wider Mace and contractors involved in lifting operations.
- Examples of meetings are set out in the [Key Health, Safety and Wellbeing standards](#).
- Attendance for those companies involved in lifting operations is mandatory. Contractors that do not attend the relevant meetings are not permitted to commence their activities.

2.5.3 Methods of communication

- Communication methods used on the project will be detailed in the Lifting Operations Management Plan.
- Signals may be by hand, or radio. Hand signals must be in accordance with BS 7121.
- Where the signaller cannot position themselves clearly visible to the operator and to accurately position the load, the signals may be relayed through a second nominated signaller.
- If the method of signalling is changed in the middle of the lift, the operator must first be instructed to stop all movements and the change must be discussed and formalised.
- If at any time the operator has difficulty with understanding or receiving signals, they must stop.

2.6. Incidents, monitoring and review

2.6.1 Incidents

All incidents and near misses must be reported in line with the [Mace Incident Reporting and Investigation](#) procedure.

2.6.2 Monitoring and review

Lifting operations must be monitored and reviewed in line with the requirements in Table 4 below. Projects are required to have a broader Audit and Inspection Schedule which includes these requirements, inline with the [Mace HSW Framework and Compliance Standard](#).

Activity	Overview	Responsibility	Frequency	Records
Lifting Operations Audit	Compliance of Lifting Operations Management Plan and the Lifting Standards	Mace Project Team who have completed the Mace Lifting Training	Three monthly	YellowJacket
Lifting Inspections of on-site activities	Conducted based on lifting activities on the project	Mace Project Team who have completed the Mace Lifting Training	Monthly	YellowJacket
Statutory inspections required by Mace Lifting Operations standards	Thorough Examinations (TE), daily and weekly inspections for lifting equipment	Contractors	Daily/Weekly , 6 monthly or annual	Contractors filing system
Temporary Works Inspection - Inspection of crane bases such as reinforced concrete bases, ballasted bases on plinths, steel grillages, etc.	Inspections to include a detailed visual inspection plus survey to confirm position/level of base.	Mace Temporary Works Coordinator/ Supervisor	Daily for first week, then weekly thereafter	Project filing system, i.e Aconex/BIM360
Lifting coordination meetings	<p>Schedule planned crane lifting operations</p> <p>Review health & safety method statements for planned lifting operations</p> <p>Approve crane lifting operations commencement</p> <p>Agree actions for unsatisfactory RAMS</p> <p>Review performance standards of previous week's crane lifting operations</p>	<p>Mace Management - Chair</p> <p>Appointed Person</p> <p>Crane Coordinator</p> <p>Crane Lifting Supervisor</p>	Weekly	Project filing system i.e Aconex/BIM360

Table 4: Audit and Inspection requirements.

3. Lifting Operations Standard

3.1 Management of lifting operations

Lifting operations are 'an operation concerned with the lifting or lowering of a load' as defined by Lifting Operations and Lifting Equipment Regulations (LOLER).

- All those who are undertaking lifting operations will attend a specific lifting team induction prior to carrying out any lifting related activity. Delivered by the Project Mace Lifting Manager, the lifting team induction will be appropriate to the project and the lifting activities.
- Where lifting operations are being undertaken by an organisation on a Mace project, a pre-mobilisation meeting must include the Project Mace Lifting Manager, HSW Manager and the Mace Appointed Person where appropriate. It is the responsibility of the Mace manager for that activity to inform the Project Mace Lifting Manager of the meeting.
- All installers, operators and users of any accessories for lifting installed or brought onto site, must be trained and familiarised with the specific make and model proposed, and the manufacturers instruction manual should be available and complied with.
- Risk assessments, method statements and lifting plans must be submitted to the Mace Manager in line with the RAMS approval/risk process defined in the [Mace HSW Risk Management Standard](#). A project document management system will be used for uploading these documents e.g. Conject, Aconex, etc.
- For erection/dismantling/climbing of tower cranes or complex lifts using any lifting equipment, tandem lifts, etc. RAMS must be submitted to a member of the Mace Lifting Specialist Group 14+ days in advance (in line with the Mace Risk Standard) to review and comment on and to support the planning. The Lifting Specialist Group will either provide a member of the team to be present when the activity is undertaken or assist in procuring an external AP to be present. When using an external AP, a Mace Lifting Manager must be present during the operation.
- The Mace manager responsible for the works must review and accept the lift plan, with advice from the Mace Lifting Manager. Mace managers accepting lifting plans must have undertaken the Mace Lifting Managers course detailed on the Mace [HSW training matrix](#).
- For non-routine, large or complex loads where the exact weight and/or the centre of gravity of an object to be lifted is not known, then the lifting plan needs to consider the use of enhanced factors of unknown loads and approval off site by the Mace Engine HSW Lead/Business Unit Director. This may also include temporary works assessments of the load, i.e. demolition. These must be established prior to the lift commencing and preferably off site. Engineers calculations can be used to estimate these critical details, however these cannot be assumed as precise and must be tested in a safe environment with load cells and the clear marking of the centre of gravity with appropriate written information provided. The Appointed Person who is writing the lifting plan is responsible for seeing this is carried out satisfactorily. Where more complex lifts (as defined in BS7121 – Code of practice for the safe use of cranes) are taking place, the assistance of a member of the Mace Lifting Specialist Group must be sought.
- All contractor lifting operations must be undertaken as the requirements of Lifting Operations and Lifting Equipment Regulations (LOLER). Additionally, lifts associated with cranes to be undertaken as the requirements of BS7121 – Code of practice for the safe use of cranes.
- The Mace Supply Chain Management system must be used by the Project Lead to check the status of contractors/suppliers of lifting equipment on a Mace site, e.g. the supplier of mobile cranes used to erect tower cranes or other specialised requirements. Where the company is not on the Supply Chain Management System, an alternative supplier is to be sought.
- Lifting equipment must be serviced and maintained in line with manufacturers and legal requirements. Records must be available on request for inspection.
- Only approved manufacturer's parts must be used for the maintenance and repair of all lifting equipment, including hoists.
- All lifting equipment must be operated in line with the manufacturer's instructions.
- Where equipment is used that is fitted with outriggers, the work must be planned, managed and implemented to prevent injury from the operation of the outriggers, particularly where these outriggers function in the proximity of any fixed operator controls.

Loads and lifting accessories must not be left suspended from any lifting equipment unless the operator is actively in control of the lift.

3.1 Management of lifting operations

3.1.1 Crane hire and contract lifts

Lifting equipment is normally supplied on either a crane hire or contract lift. Figure 2 below details the requirements for the employing organization and crane supplier dependant on whether it's a crane hire or contract lift approach. Where crane hire only is used then Mace may have additional responsibilities for planning and supervising the works.

In both cases, the employing organisation is responsible for the ground conditions.

3.1.2 Test and Thorough Examination (TE)

Thorough Examination (TE)* requirements apply to ALL lifting equipment, which includes tower, mobile and spider cranes, excavators used as cranes, telehandlers, construction hoists etc.

The Test and Thorough Examination Certificate for all lifting equipment must be checked and all items in date.

Note: If the Thorough Examination Certificate highlights a defect found during the examination, then written confirmation should be kept with the Thorough Examination Certificate to confirm the defect has been rectified.

In the case of an "A" defect (one which could cause failure) then the equipment must be removed from use immediately.

NOTE: * In the UK this may be the LOLER examination certificate. Regional variations may exist in other geographies.

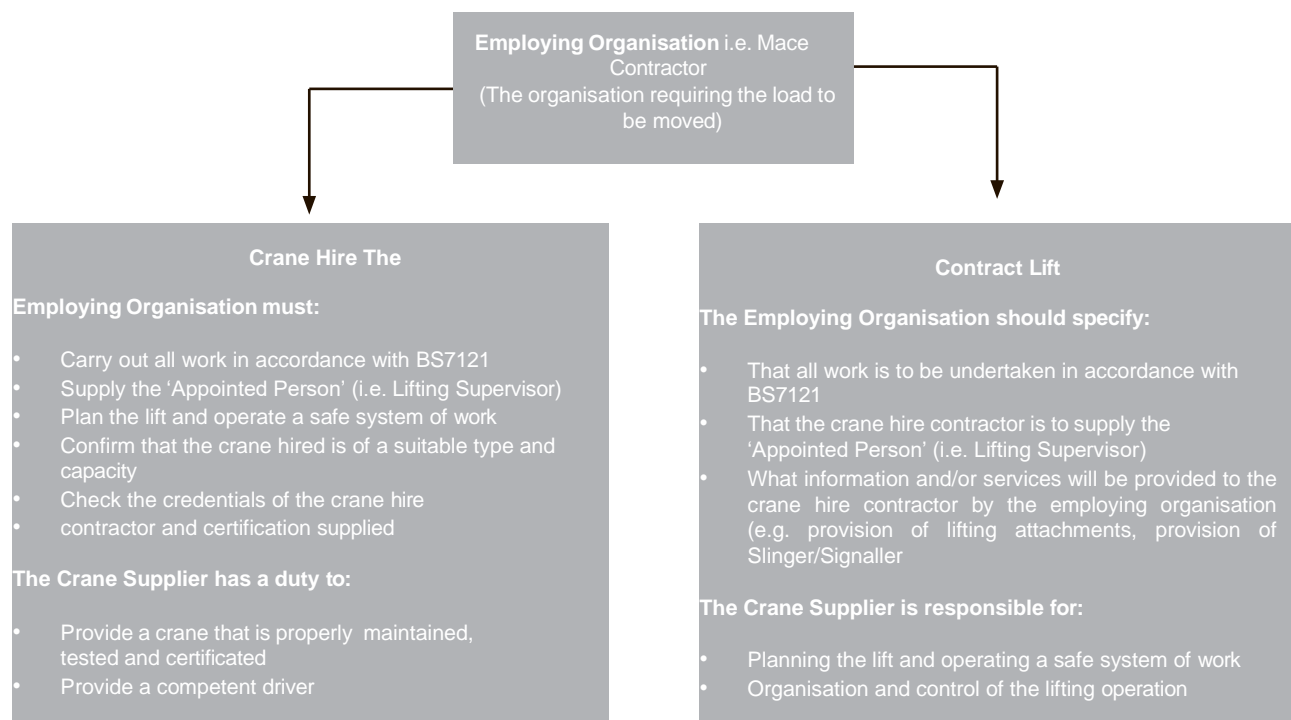


Figure 2: Employing organisation responsibilities for crane hire and contract lifts

3.2. Training and Competency

Individuals involved in lifting operations should meet or exceed the requirements of the [Build UK Training Standard](#). **NOTE:** Where projects are located outside of the UK, then local industry and legal requirements should be met. Those persons fulfilling the roles of Operator, Slinger Signaller,

Crane Supervisor and Appointed Person must hold the relevant competence card as required by the Build UK Training Standard e.g. Construction Plant Competence Scheme.

- The Project Mace Lifting Manager is required to complete the lifting operations training identified on the [Mace HSW training matrix](#).
- Crane, excavator, telehandler / fork-lift and lorry-loader lifting plans must be prepared by an Appointed Person. SSoW's (lifting plans) for genie lifts, chain blocks etc. must be prepared by a Competent Person.
- The number of red trained operator CPCS cards for any lifting related role will not exceed one to each blue competent operator CPCS card for the same categories. This is to provide a high level of competence on the project and provide support to newly trained persons until they have the experience to apply for a blue competent operator card.
- If an Appointed Person planning lifting operations based on the project has the blue competent operator CPCS card, the Crane Supervisor may hold a red trained operator card. If the Appointed Person is not present on site, then the project's Crane Supervisor must hold a blue competent operator CPCS card.



Figure 3: CPCS Operator Cards

- On induction, red trained operator CPCS card holders must provide evidence that they are working towards the competent operator blue CPCS card, generally via a recognised NVQ in the UK, or equivalent. If there is no evidence then they will not be allowed to work on the Mace project. It is the responsibility of the Mace manager responsible for the works to check that the employer is managing this process.
- Other competency cards are accepted under the Build UK training scheme for items of lifting equipment. For example NPORS, Allmi (lorry loaders), RTITB for Moffatt forklifts, IPAF (for mobile elevated work platforms) but must carry the CSCS Logo to be accepted (see Figure 3). Questions regarding competency cards can be raised with a member of the Mace Lifting Specialists Group. However if it involves deviating from the Build UK training standard then this must be reviewed against the Build UK requirements and signed off by the Engine HSW Lead.
- Unless there is clear evidence (such as log books) provided to the Mace Project Lifting Manager that an individual operating lifting equipment has previously used the specific item, then familiarisation training will be required. This will be required in addition to competency cards. Where familiarisation training is required, the organisation carrying out the lifting operation must arrange for the appropriate training to be carried out and must be able to demonstrate that it is suitable for that equipment.
- Some lifting equipment is not covered by a competency card. Examples are chain blocks and Genie lifts. There must be evidence provided to the Project Mace Lifting Manager that familiarisation training for that specific item of equipment has been carried out.

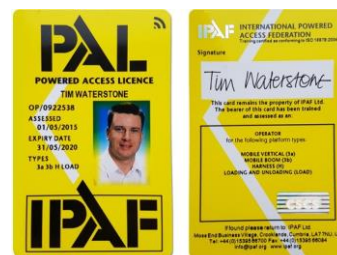


Figure 4: IPAF card (cscs.uk.com)

3.3. Lifting accessories

A lifting accessory means work equipment for attaching loads to appliances for lifting. It includes items such as chains, slings, shackles, stillage, lifting beams and blocks. They may be a single item (e.g. a shackle) or an assembly of items (e.g. lifting beam and slings). The [Lifting Equipment \(Appliances and Accessories\) Checklist](#) must be completed for all lifting accessories prior to initial use on site.

- Where loads have integral lifting points, such as hoarding blocks, cladding panels, items of plant, etc., the fixing point must be designed by a competent person to withstand the weight of the load, in line with temporary works procedure.
- All loads must be double wrapped unless positive/fixed lifting points are used.
- Contractors must provide a dedicated store for lifting accessories and they must be tagged to show clearly when the last inspection was completed.
- All lifting accessories should be clearly marked with an individual identification marking (stamp or tag), such as a Serial Number, and the Safe Working Load (SWL)
- Fibre or webbing slings which have been used, must not be older than 6 months. If they have been stored and not used, and proof of this can be provided to the Project Mace Lifting Manager, then the six months starts from date of first use. In this case the owner must clearly identify the destroy date on the tag of the accessory.
- If 'single use' slings are used, they must be removed from the load and either destroyed or secured so that they cannot be re-used, immediately after one lift.
- Tag lines must be anti-tangle, anti-burn and in good condition, i.e. free from knots, mare tails, etc. and connect to the load by safety hook. An example is manufactured by Tagattach (figure 7 & 8).
- All lifting and/or attachment hooks must be fitted with a working safety catch.

Flexible intermediate bulk containers (FIBC) of any shape or size are not acceptable to lift items such as scaffold components, reinforcing bar links and other items that may damage the bags. Stillages are accepted for small items (figure 9). FIBC must only be used to hold dry, flowing materials for example sand, gravel, soil, aggregate, and stones. The management of fabric bags must be in line with industry standards, e.g. Construction Plant Association in the UK.



Figure 7: Tag line



Figure 8: Tower crane carrying load with correct tag line

Lifting more than one load on the same accessory (e.g. bundles of steel on different legs of the same set of chains) is not permitted on Mace Projects

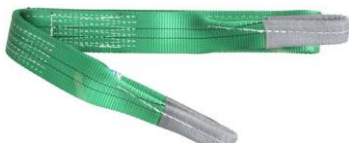


Figure 5: Webbing slings



Figure 6: Bow shackle

Brick forks with nets are not accepted on Mace Projects. Caged pallet lifters are a suitable alternative.



Figure 9: FIBC stillage

3.3. Lifting accessories

3.3.1 Gin wheel

The use of gin wheels is prohibited on Mace projects unless they are of the 'braked' type, which, if the fall-rope is released, the brake will be automatically applied and the lowering action will be halted.

Where gin wheels are approved for use:

- There must be an exclusion zone below the suspended load, and the user at ground level must be in a position of safety at all times, generally located at an angle of around 30° from the landing position.
- Gin wheels have a relatively low Safe Working Load (SWL) which must be agreed with the temporary-works engineer - refer to CISRS training for acceptable loads.
- Use of a gin wheel must be included in any scaffold design and all related temporary works.



Figure 10: block and tackle

3.3.2 Chain blocks/block and tackle

When using chain blocks or block & tackle (manual or electrically operated), the following must be applied:

- It must be attached to an appropriate overhead fixing point via the top hook.
- The attachment point must be assessed and signed off by Temporary Works Coordinator as sufficient to support the imposed loads of the equipment and whatever is being lifted, i.e. pull-out tests, designed lifting-beam etc.
- If attached to an 'A frame' (see Figure 11), the point loadings of the frame legs must be established and the floor capable of withstanding any applied loads.
- If attached via a webbing/nylon sling wrapped around/through a steel or concrete beam, sharp edges must be protected against abrading the sling.
- If the chain block is used to level a load, i.e. as part of a rigging arrangement, it will be subject to a 6-monthly Thorough Examination (TE) as a lifting accessory.
- Never choke chain blocks onto itself.
- Bow shackle must be used where 2 or more accessories.
- Minimum 15% dynamic loading (LEEA) if lifting at an angle. Crane checked it can be used at an angle (chain blocks).
- Lifting beams can be temporary, as used for lift installation works during the construction process, or permanent as used in completed plantrooms etc. All must have a Safe Working Load (SWL) and unique ID number displayed, and are subject to regular Thorough Examination (TE) testing.

All open ended lifting beams must be fitted with a physical stop block prior to use.

- In all cases, the Mace Temporary Works Procedure must be complied with, and the Project TWC consulted. Temporary lifting beams, temporary slab loadings, etc all constitute items of temporary works. Note that bespoke, fabricated or modular lifting equipment will require load testing prior to use.



Figure 11: 'A' Frame



Figure 12: Chain-block attached to lifting beam



Figure 13: Lifting beam attached to wall re-bar

3.3 Lifting accessories

3.3.3 Chandelier lifting

Chandelier lifting is prohibited on all Mace projects except for structural steel erection, following the BCSA Code or Practice for Erection of Multi Storey Buildings and must be carried out under the following conditions:

- RAMS / Lifting Plan to be reviewed and accepted by a member of the Lifting Specialist Group following review by the site construction team.
- Must be carried out correctly with strict adherence to the agreed attachment/slinging stipulations and monitored by the supervisor/ AP/Mace team.
- Maximum 2 loads. Loads must have clear vertical separation of 2m minimum, dedicated accessories, and 2 chains of required length attached to master link.
- Loads attached by either a designed, purpose-made and positively attached, load-tested and certificated lifting accessory, otherwise attached by the lifting chains passing through perforations in the steelwork and choked back on themselves.
- The longer load must be below the shorter (upper) load where applicable.
- There should always be an exclusion zone when loading, unloading and erecting steel.

3.3.4 Piling rig secondary hook

This hook is primarily used to lift reinforcement cages into position once the concrete has been poured into the pile.

The piling rig itself falls under the UK Provision and Use of Work Equipment Regulations (PUWER).

The hook and associated lifting equipment would require a 12 monthly Thorough Examination.



Figure 14: Rotary bored-piling rig showing secondary lifting hook in stowed position on the mast

3.4 Tower cranes

When procuring tower cranes, this must be in line with [WP1310 Tower Cranes tender scope of works document](#).

All works must be compliant with the Mace Temporary Works procedure. With respect to tower cranes, this includes:

- Base design
- Grillage design (if supported on permanent structure)
- Tie positions, type and design.
- Assessment of permanent works to support the loads imposed by both the crane foundation and ties.
- Assessment of structure/core where crane is supported on the permanent works. this will include both local and global checks.
- All ties forces must be communicated back to the permanent works engineer.

A visual inspection of all crane welds by a competent person (where the crane is over 10 years old this must be certified testing organisation) must

also be carried out prior to bringing the crane to site. Written evidence must be provided to show this has taken place. In addition, main structural and mechanical components should be CE marked (or equivalent) and UKCA for all equipment from January 2021 (there is a period of grace until January 2022) and certificates produced to confirm this. A pre-delivery inspection report must be produced by the crane supplier and signed off before erection on site confirming the requirements have been complied with.

The quality of the paint finish on the mast should be adequate to allow visual defects to be identified should any exist.

When tower cranes are being erected, dismantled or being climbed, then a member of the Mace Lifting Specialist Group must be engaged by the Project Lead to provide support during planning and when the activity takes place. The following requirements must be met:

- The names and competencies of the team carrying out this work must be supplied to the Project Mace Lifting Manager 48 hours in advance of the activity.
- The erection/dismantling Supervisor carrying out these works must be a direct employee of the tower crane company.
- There will be at least one planning meeting prior to any work occurring. This must include the Project Mace Lifting Manager. Any actions identified must be monitored through to completion.
- Adequate number of crane operators and relief operators must be provided, inline with BS7121 part 5 and industry guidance, i.e CPA Tower Crane guidance for UK.
- Activities such as testing, climbing, erection and dismantling will be planned and risk assessments and method statement produced. These must identify when the safety systems will be needed to be turned off, when and for how long.
- The Project Mace Lifting Manager will forward the risk assessments and method statement to the BU/Engine Lifting Specialist for their review and comment.

Tower crane lower window must have a grill in front of it that does not allow a foot to accidentally come in to contact with the window.

Operators of tower cranes should only take instructions from a signaller that is known to them and is formally appointed. The crane operator should not undertake any actions unless receiving a continuous instruction from the signaller. Audio recording of such instruction/conversation must be made available on request following any incident.

Audible whistle or horn for banksmen to use at point of lift/lowering. These may be electronic or squeezable and must be provided by the employer.

Tower crane owners will provide hook block cameras. Their use by operators must be subject to a risk assessment and should be based on the understanding that these are secondary devices. The recorded footage will be made available to Mace on request.

Unobstructed access and illumination to the tower crane mast must be provided for the safety of the operator.

The base of the crane must be accessible for inspection. It must not be obscured by stored materials or water.

Materials, boxes, equipment etc must not be stored around the tower crane hoarding to prevent climbing access. The hoarding must be a minimum of 3.0 metre high anti-climb mesh with a 45 degree extension to the top panel.

The door must have a digital lock on the outside and able to be opened without the use of the code for emergency exit from the inside. [See Mace VS92 Tower crane base security](#) (figure 17). Refer to the [Mace Fire Standard](#) for additional fire precautions.

Tandem/multiple crane lifts are not permitted with Tower Cranes.

3.4 Tower cranes

The electrical isolation panel for the tower crane must be secure inside the crane base hoarding to avoid unauthorised use. Isolations and supply must only be carried out by a competent person. Refer to the [Mace](#)

[Electrical Safety Rules and Procedures](#).

Tower Cranes will be fitted with anti-climb panels with fin plates installed between platform and panel with lockable trap door above the highest tie or for free standing tower cranes, at a height agreed during the planning process.

The building end of the tower crane tie positions must be secured to prevent them from being potentially used to access the tower crane mast.

All tower cranes must be fitted with medium intensity aircraft warning lights as a minimum at the highest point i.e. top of 'A' frame and Jib nose - luffing jib. Top of 'A frame', jib nose and machine-deck; - saddleback or 'flat-top' crane. Where working in close proximity of airspace, contact the local aviation authority i.e. Civil Aviation Authority in the UK.

All lights must be lit at night (defined as half hour after sunset and half hour before sunrise) and during inclement weather as determined by Appointed Person/Site Manager.

All lamps should be secured and tethered.

A daily monitoring regime must be in place to monitor compliance, and any unserviceable lamps should be replaced as soon as possible after failure and in any event within 24hrs.

No crane is to be left unattended with a load or accessories on the hook.

All cranes must be parked as per manufacturers instruction at the end of the shift or if being left unattended for a period of time.

Tower cranes, mobile cranes and crawler cranes must have an anemometer fitted to the crane at its highest fixed point and is verified that wind is accessible to the measuring point from 360 degrees of horizontal access. Tower crane anemometers must have read outs in the project office.

No lifting is to take place until all members of the lifting team have been briefed on their roles and responsibilities

Adequate electrical earthing is achieved. The resistance path between the bottom of the tower and earth should be measured and should not exceed a value of 10ohms.

Adequate lightning protection/earthing must be provided in accordance with BS7121 Part 5 in addition to the level of protection referred to above.

A machine history file must be kept on site by the user to record all maintenance activities carried out on the crane whilst it is erected on that site.

A durable, legible and accurate duty board must be supplied with the crane and visible at the base.

During erection, all bolted structural connections must only be tightened using calibrated and fully certified torque equipment with documentary sign off acquired to verify that this has been carried out. Bolts must not be tightened by flogging.

Where possible all structural bolts must be marked by a suitable means to enable a weekly visual check to be carried out to ensure that movement (loosening) has not occurred.

Weekly Visual Checks of the structural bolted connections (where accessible) by the crane operator must be incorporated into the Risk Assessment and Method Statement.

The requirement for Weekly Visual Checks of the structural bolted connections by the crane operator shall be included within the lifting team briefings and lifting co-ordination meetings and records retained.

All slew ring bolts must be checked for the correct torque prior to first erection on site and are visually checked, where possible, thereafter. Confirmation of this is to be supplied to Mace.

The age, condition and fitness for purpose of the hoist rope(s) and any others on the crane must be verified and documented by the crane supplier. The documents must be available on site. New ropes must be fitted if there is any doubt as to the condition and fitness for purpose. The certificates for the new rope must be supplied to the project team.

The design of the fixing arrangements for ancillary equipment light boxes (illuminated signs), signs, aircraft warning beacons, floodlights etc., must be provided to a structural designer by the crane supplier for verification prior to installation, and evidence has been provided that it has been fixed to this design.

Downrating of rated capacity will be required where adjacent to 'sensitive' assets, i.e. railways by 25% etc. otherwise as per installation/test limits.



Figure 15: Tower crane with anti climb panel

3.4 Tower cranes

3.4.1 Zoning & Anti Collision systems

- Hook block hoist limiter, zoning and anti-collision systems must not be turned off without control/ approval and for the minimum required duration.
- Zoning and anti-collision systems are left in the 'on' position with the keys removed and held in a key safe controlled by the project leader. The key must be accessible to the most senior person on site at any particular time. Before any zoning or anti-collision systems are deactivated, written authorisation must be obtained from the business unit director following approval of a specific risk assessment and method statement. Zoning or anti-collision system(s) must be reactivated as soon as the task is complete.
- Hook block hoist limiter must have key control to turn on and off, provided by the crane owner. The key must be readily available to key people i.e. crane operator, for emergency situations.
- The anti-collision and zoning system must be checked daily and recorded using a fixed point as reference.

3.4.2 Tower Crane Rescue

- The Project Mace Lifting Manager will confirm that a tower crane rescue team is present at all times whilst the cranes are in operation. Allowances must be made for holidays and outside of project normal working hours.
- The rescue team should consist of a minimum of three persons one of which must be a first aider.
- Emergency drills must be completed at least every 3 months. These must involve all members of the rescue team and confirm they have reviewed and tested their application of the SSoW for Tower Crane rescue.
- Records of emergency drills must be retained and referenced in the project lifting plan.
- All rescue team personnel must undergo training that includes the understanding of how to use the rescue kit available on the project, associated hazards (including medical issues) and a practical assessment to demonstrate understanding and ability to affect a safe rescue.
- A tower crane rescue kit must be provided with the tower crane at the closest appropriate location to the tower crane. It must be complete, correctly maintained, accessible to the rescue team and kept in a weather proof location i.e on the crane back jib. The rescue kit must have the components that have EN conformity.

3.4.3 Live Monitoring

- The anti-collision system, block camera and anemometer must have read outs in the project office for the Mace Project Lifting Manager to view or be available for review on a live-feed dedicated website with access for the Mace lifting team management.

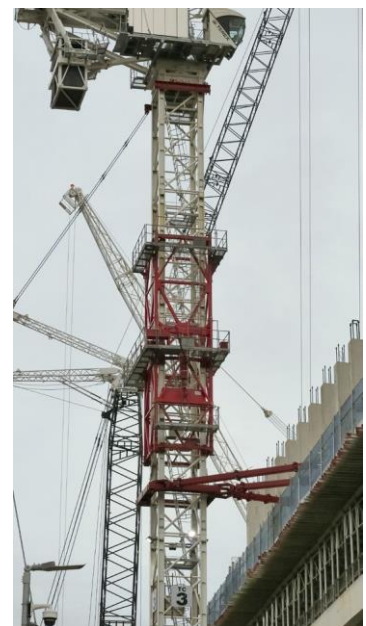

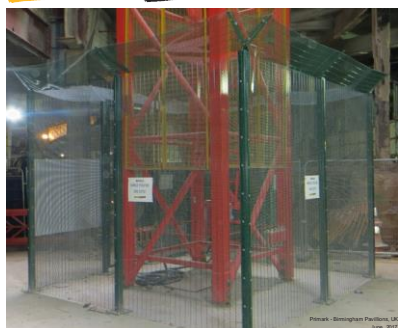


Figure 16: Tower crane climbing frame and tie

Visual standard 

Safety first. Second nature.



Tower crane base security

What good looks like:

- 3m high anti-climb steel mesh demountable panels with digilock access gate
- 5m clear zone around base enclosure
- 45 degree extension to top of panels
- No flammable materials stored in immediate vicinity
- Well illuminated
- Clear and safe access/egress for operator

macegroup.com

Figure 17: VS92 Tower crane base security

3.4 Tower cranes

3.4.4 Tower Crane Personnel Requirements

Table 5 below details the number of Mace and Contractor personnel required for different numbers of tower cranes and contractors. Table 6 below details the minimum number of operators required for continuous single shift operation of a given number of tower cranes in line with BS7121.

# of tower cranes	# of contractors	Personnel Requirement	
		Mace	Each Contractor
One	One	<p>2x Project Mace lifting managers (including 1 deputy) with the Management of Lifting Operations (Cranes) 3 day Course.</p> <p>1x Senior Appointed Person (CPCS A61) resident on site controlling all lifting activities. This can be bought individually or as part of the crane package. All other AP's are subservient to this AP..</p>	<p>1x Appointed Person (CPCS A61) on or off site – will prepare all lifting plans for submission.</p> <p>1x Crane Supervisor (CPCS A62) required on site and can double up as a slinger/signaller (CPCS A40) but if lifting over distances or from lower to higher levels then minimum 2 slinger/signallers required.</p> <p>Note: It is possible under certain circumstances to have someone doing all 3 roles but not concurrently.</p>
One	Multiple contractors	<p>2x Project Mace lifting managers (including 1 deputy) with the Management of Lifting Operations (cranes) 3 day course.</p> <p>1x Senior Appointed Person (CPCS A61) resident on site controlling all lifting activities. This can be bought individually or as part of the crane package. All other AP's are subservient to this AP.</p> <p>1x Crane coordinator where other items such as concrete placing booms and mobile cranes will interfere with the safe operation of the tower crane.</p>	<p>1x Appointed Person (CPCS A61) on or off site – will prepare all lifting plans for submission.</p> <p>1x Crane Supervisor (CPCS A62) required on site and can double up as a slinger/ signaller (CPCS A40) but if lifting over distances or from lower to higher levels then minimum 2 slinger/signallers required.</p>
Two cranes	One contractor	<p>2x Project Mace lifting managers (including 1 deputy) with the Management of Lifting Operations (Cranes) 3 day course.</p> <p>1x Senior Appointed Person (CPCS A61) resident on site controlling all lifting activities. This can be bought individually or as part of the crane package. All other AP's are subservient to this AP.</p> <p>1x Crane coordinator where other items such as concrete placing booms and mobile cranes will interfere with the safe operation of the tower crane.</p>	<p>1x Appointed Person (CPCS A61) on or off site – will prepare all lifting plans for submission.</p> <p>2x Crane Supervisor (CPCS A62) required on site and can double up as a slinger/ signaller (CPCS A40) but if lifting over distances or from lower to higher levels then minimum 2 slinger/ signallers are required.</p>

Table 5: Personnel requirements for tower cranes

3.4 Tower cranes

# of tower cranes	# of contractors	Personnel Requirement	
		Mace	Each Contractor
Two cranes	Multiple contractors	<p>2 x Project Mace lifting managers (including 1 Deputy) with the Management of Lifting Operations (Cranes) 3 day Course.</p> <p>1 x Senior Appointed Person (CPCS A61) resident on site controlling all lifting activities. This can be bought individually or as part of the crane package. All other AP's are subservient to this AP.</p> <p>1x Crane coordinator where other items such as concrete placing booms and mobile cranes will interfere with the safe operation of the tower crane.</p>	<p>1x Appointed Person (CPCS A61) on or off site – will prepare all lifting plans for submission.</p> <p>2x Crane Supervisor (CPCS A62) required on site and can double up as a slinger/ signaller (CPCS A40) but if lifting over distances or from lower to higher levels then minimum 2 slinger/ signallers are required.</p>
Three or more cranes	Multiple contractors	<p>Note: This must be risk assessed and additional personnel will be required. The minimum requirements are:</p> <p>2 x Project Mace lifting managers (including 1 deputy) with the Management of Lifting Operations (Cranes) 3 day course.</p> <p>1 x Senior Appointed Person (CPCS A61) resident on site controlling all lifting activities. This can be bought individually or as part of the crane package. All other AP's are subservient to this AP.</p> <p>1x Crane supervisor to work alongside Senior AP to assist for multiples of 3 cranes.</p>	<p>1x Appointed Person (CPCS A61) on or off site – will prepare all lifting plans for submission.</p> <p>2x Crane Supervisor (CPCS A62) for each crane required on site and can double up as a slinger/ signaller (CPCS A40) but if lifting over distances or from lower to higher levels then minimum 2 slinger/ signallers are required.</p>

Table 5: Personnel requirements for tower cranes

Number of tower cranes	Number of operators
1	2
2	3
3	5
4	6
5	7
6	9

Table 6: Number of operators required for tower cranes



Figure 18: Multi tower crane sites

Planning and execution of how any crane erection or dismantling in a public area will be managed should consider the process outlined in figure 20 below.

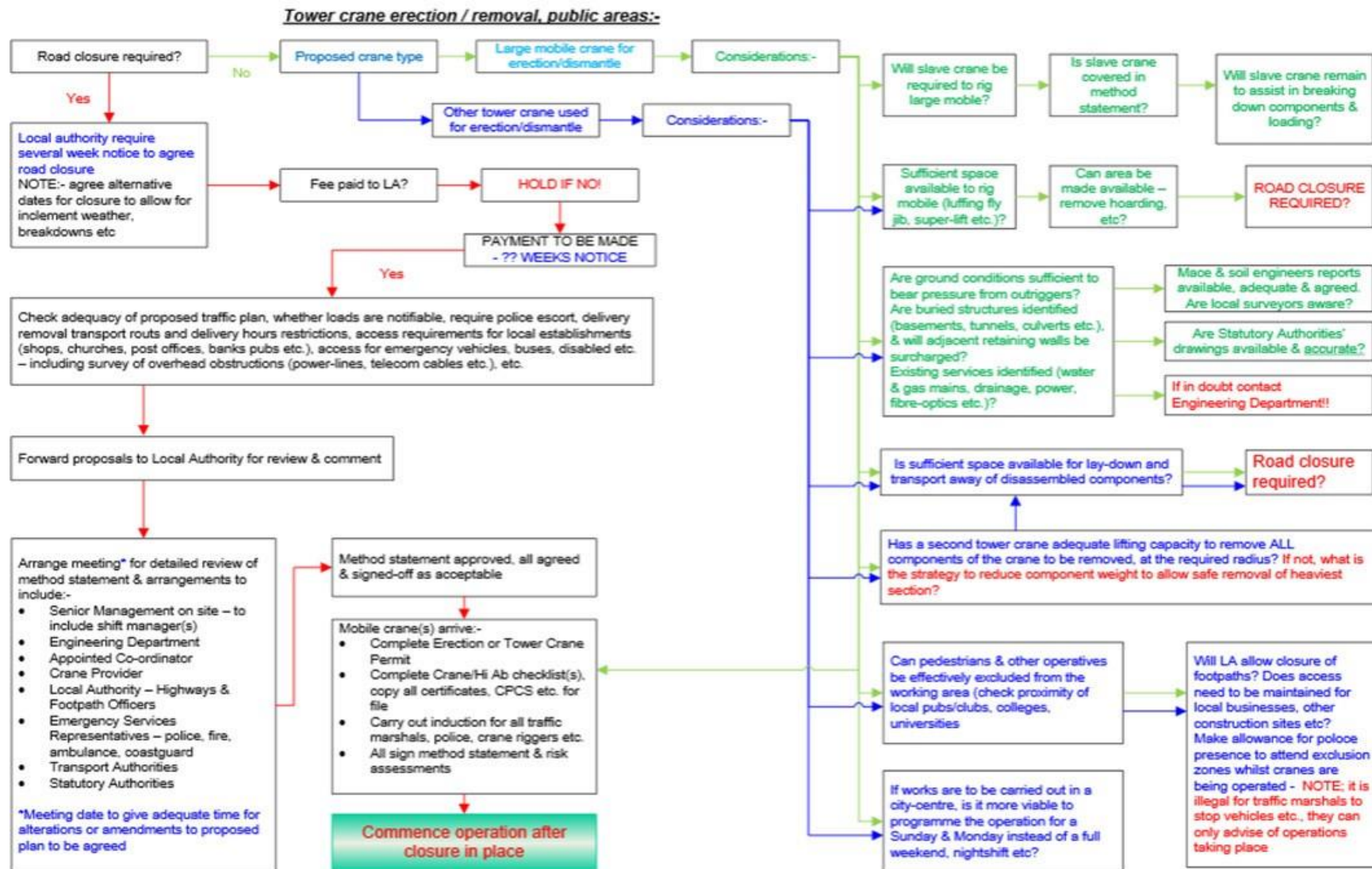


Figure 20: Process for erection and dismantling in a public area

3.5 Other Cranes/Lifting Equipment

All cranes supplied for use on Mace projects must be fit for purpose. Contractors and crane hire companies must be able to demonstrate this with appropriate evidence such as Thorough Examinations, Test Certificates, EC Declaration of Conformity and planning, appropriate to how the crane will be used. This needs to be supported by a completed [Lifting Equipment \(Appliances and Accessories\) Checklist](#) prior to initial use.

An effective exclusion zone of physical barriers must be in place prior to work commencing.

3.5.1 Mobile Cranes

- An anemometer must be fitted to enable the wind speed to be accurately monitored.
- Mobile cranes should be directed into position by a qualified marshal in line with the [Mace Logistics Standard](#) and the approved lifting plan as agreed with the lifting supervisor responsible for the lift.
- Crane outrigger loadings and mat sizes must be designed and checked in accordance with the specific design and implementation risk classifications (in line with the [Mace Temporary Works Procedure](#)) prior to arrival on site to confirm the ground is capable of withstanding the imposed loads. Site testing may be required in advance of the lifting operation in order to verify the ground conditions if they are not known. Installation & inspection on site must be undertaken by the contractor Temporary Works Coordinator prior to the Mace Temporary Works Coordinator.
- Mobile cranes should only be operated to 80% of their rated capacity. Any load greater than this should be agreed in writing by a member of the Lifting Specialist Group.

Section B of the [Lifting Equipment \(Appliances and Accessories\) Checklist](#) must be completed prior to initial use and when the work location changes.

3.5.2 Spider Cranes

- Crane outrigger loadings and mat sizes must be designed and checked in accordance with the specific design and implementation risk classifications (in line with the [Mace Temporary Works Procedure](#)) prior to arrival on site to confirm the ground or supporting structure is capable of withstanding the imposed loads. Back propping may be required. Site testing may be required in advance of the lifting operation in order to verify the ground conditions if they are not known.
- Where these cranes are used for glass/cladding installation and the hook block is lowered below the base level of the crane (commonly referred to as below zero), a machine specific below zero duty chart must be provided.



Figure 21: crawler crane rigged with luffing jib

Crawler cranes with free-fall capability must not be used.

3.5.3 Crawler Cranes*

Crawler cranes will arrive on site and be assembled in-situ.

- An anemometer must be fitted to enable the wind speed to be accurately monitored.
- The crane working platform must be designed in accordance with the Mace Temporary Works Procedure.
- Track bearing pressures must be designed and checked in accordance with the specific design and implementation risk classifications (in line with the [Mace Temporary Works Procedure](#)) prior to arrival on site to confirm the ground is capable of withstanding the imposed loads.
- The supervisor for the rigging of the crane must provide a certificate indicating the crane has been assembled in the correct configuration and in accordance with manufacturers' instructions.
- Crawler cranes do not require a thorough examination every time they are assembled. The Test and Thorough Examination Certificate must be checked and in date (Minimum 12 months).
- Crawler cranes must not be used to carry manriders.
- Only cranes that have a duty chart for travelling with a load are permitted to do so.
- When a crawler crane is rigged with a luffing jib, this should be 'piked' if left unattended for any length of time or in adverse weather conditions.
- Dead man lever must be engaged when not in use.

***Note:** these requirements also apply to piling rigs. For piling rigs, a working platform certificate will be required.

3.5 Other Cranes/Lifting Equipment

3.5.1 Excavators

Semi-automatic quick hitches on excavators are prohibited on site.

Excavators where quick hitches are permanently mounted, must include the quick hitch in the thorough examination for the machine. Where the quick hitch can be moved from one machine to another, it is classed as an accessory and should be thoroughly examined every six months.

Any excavator used for lifting operations must have a rated object handling capacity table available inside the cab which will show the 'SWL' for each approved lifting configuration
e.g. with the tracks, across the tracks, below graded level and various radii.

If the rated lifting capacity for an excavator or the backhoe portion of a backhoe-loader is greater than 1 tonne (or the overturning moment is greater than 40000Nm) then the machine must be fitted with:

- a boom lowering control device on the raising (main) boom cylinder(s) and which meets the requirements of ISO 8643:1997
- an acoustic or visual warning device which indicates to the operator when the object handling capacity or corresponding load moment is reached.

NOTE: Loaders and the loader portion of a backhoe/loader do not require a boom lowering control device or acoustic/ visual warning devices.

NOTE: Where a risk assessment shows that there is a significant risk of overloading and/or overturning on machines with a rated capacity of 1 tonne or less, a Rated Capacity Indicator may be required. Hydraulically operated machines with a SWL of over 1 tonne, must be fitted with check valves or other devices to prevent the gravity fall of the load in the event of a hydraulic failure.

Chains or slings for lifting must not be placed on or around the teeth of the bucket.

Accessories for lifting may only be attached to a purpose-made point on the machine. The bucket should be removed when an excavator is used for lifting operations

An excavator used for lifting operations must be fitted with a load hooking device, i.e. a lifting point.

The supervisor should keep people well away from the lifting area, and confirm there is no one working below the lift, for example in a trench.

3.5.2 Lorry-loaders / loader cranes (HIAB)

Training is generally carried-out to the standards set under Association of Lorry Loaders and Importers (ALLMI) and/or Road Transport Industry Training Board (RTITB) requirements.

Lifting plans are to be prepared by an Appointed Person as these are cranes mounted on either a lorry bed or trailer.

Use of this equipment is covered in depth in BS7121 - 2-4-2013 Inspection, testing etc. Loader cranes, and BS7121-4; Safe use of lorry loaders.

These machines can be operated remotely by the operator.

All lifts to be undertaken must be from the rear of the vehicle to the ground. If lifting from rear of vehicle to any other place then a complex lifting plan is required.

Ground conditions must be suitable for the weight of the lorry-loader and load.

Outriggers must be used in accordance with the lifting plan and be adequately supported by steel/timber/nylacast mats in good condition. If using timber mats, nylacast should be put on top. Confirmation of ground conditions and liaison with the Project TWC.

Section B of the [Lifting Equipment \(Appliances and Accessories\) Checklist](#) must be completed once per company unless new operator.

3.5 Other Cranes/Lifting Equipment

3.5.3 Telehandlers and forklift trucks (various types; all-terrain, counterbalance, etc)

Telescopic handlers (telehandlers) are fitted with a telescoping boom with the capability of being elevated and telescoped simultaneously to place or receive a load at a remote radius. The machine may or may not be fitted with extendable outriggers to improve stability. Some machines are manufactured with interchangeable 'carriages' fitted with fork, crane attachments, etc.

- All forklifts used on site must have a Falling Object Protection System (FOPS)/Roll-Over Protection Structure (ROPS) and driver restraint system fitted. This must be used at all times.
- Where a telehandler is fitted with outriggers, these must be deployed onto solid ground when a load is being lifted and/or the boom is being extended to place or receive a load.
- The ground make up at areas where forklifts are likely to load out at height must be designed (following the TW Procedure) or proven to ensure that they can support the forklift and its heaviest possible load when loading out at full height.
- Lifting attachments should not be used on telehandlers / FLT's unless fork extensions, etc. in which case the manufacturers reduction in SWL must be applied.
- The operator must be able to see the landing position. If not, a competent Signaller holding the CPCS or NPORS A40 endorsement is to be used. NPORS must have CSCS logo on front.
- Operators of 360 telehandlers are required to hold CPCS A77 Telescopic Handler 360 slew and/or CPCS A60.
- Operators must hold CPCS category A17E for pick-and-carry duties (non-rough terrain). Slinger must hold CPCS category A40A.
- Telehandlers must be designed with 'Free-on-wheels' duties if they are required to carry a suspended load on an attachment specifically designed for that purpose, and approved by the machine manufacturer. All of these machines must have a lifting plan developed by an Appointed Person, and are subject to the same checks, inspections and examinations as all other lifting equipment.
- An audible alarm must sound when the machine is reversing. Forklifts should be fitted with audio and visual "Safe Load Indicators" (SLI), unless not practical to do so.
- Decals must be displayed in the cab that shows Safe Working Loads.
- Any vision aids, such as a camera or mirrors must be fitted, correctly adjusted, clean and undamaged to allow good visibility around the machine.

- Forklifts of most other types are fitted with a vertical mast which then enables a vertical load-path, with very limited 'plumbing-up' capabilities. These machines are less common on most construction sites as they are generally less versatile than the telehandler.
- A ground assessment must be carried out, e.g. flat and level and designed (if necessary).
- Operators must be trained and familiarised with the specific type, make, model and duties of their machine.



Figure 22: Electric telehandler with load



Figure 23: 360 telehandler

3.5 Other Cranes/Lifting Equipment

3.5.6.1 Travelling with a suspended load

Travelling with suspended loads involves travelling with the boom raised from the normal transport position, creating additional dynamic forces due to swinging of the suspended load.

Suspended loads should only be lifted under exceptional circumstances. Should travelling with suspended loads be required, this must only take place on flat, level ground (hard standing) and must be signed off by the BUD, a member of the Lifting Specialist Group and BU HSW Lead.

- For sign off to be requested, as a minimum, the following requirements must be in place and incorporated within the SSOW:
 - A specific safe system of work must be produced by an appropriately trained appointed person, accepted, and incorporates:
 - The requirements of the Strategic Forum for Construction Plant Safety Group Good Practice Guide on the [Safe Use of Telehandlers in Construction](#) and, The Strategic Forum's, Good Practice Guide for [Lifting and Travelling with Suspended Loads using Telehandlers](#) guidance.

When using Telehandlers on site, traveling with suspended loads is prohibited on any incline or decline.

- Suspended loads should never be attached to chains or slings over the forks or carriage. Only a properly designed, tested, thoroughly examined and fitted attachment should be used to carry a suspended load.
- The boom should only be lifted enough to suspend the load 300-500mm max above the ground
- A machine specific underslung load duty chart is available,
- The load duty chart states this machine is rated for pick and carry duties,
- The operators holds NPORS (N138) Telehandler Suspended Loads or CPCS A17 Endorsement E qualifications.
- The appointed person, author of the lift plan must be in attendance.
- Stillages and palletized methods are to be considered first, at all times.

3.5.7 Genie Hoist/Roust- a-bout

When using Genie Hoists (pneumatic, electrical or manually operated) the following must be applied:

- Only used in the vertical plane and must never be pushed or pulled when loaded and elevated.
- The area below the lift must be a designated and maintained exclusion zone.
- Use of attachments from the hoist manufacturer to enable the safe elevation of different sized and shaped loads.
- The load being lifted must never be eccentrically loaded, i.e. onto a single-fork etc
- The base substrate must be firm and level, and capable of withstanding the imposed load.
- It is the hiring company's responsibility for carrying out all pre-use checks and inspections and completing all requisite checklists.
- A temporary works check may be required. Refer to Project Temporary Works Coordinator.



Figure 24: Genie hoist

3.5 Other Cranes/Lifting Equipment

3.5.8 MEWPs (mobile elevated work platforms)

When using MEWPs (commonly referred to as Scissor-lifts, Cherry pickers) as a working platform, the following must be applied:

- Working at height activity must be planned and carried out in line with the [Mace Work at Height Standard](#).
- Lift plan or SSOW for operation of a MEWP by a competent person.
- Supervisors must have completed a relevant course before putting anyone to work in a MEWP i.e. in the UK the IPAF 'MEWPs For Managers' course which is a Mace requirement.
- Operators must have completed a recognised training course and hold a valid license for the machine-type used i.e. in the UK the licensing body is IPAF (International Powered Access Federation).
- Operator must demonstrate familiarisation with the machine-type i.e. via a log-book.
- An emergency plan must be in place to rescue individuals in the MEWP if required. The emergency plan must include familiarity of the operation of the inbuilt emergency mechanism for the particular MEWP.
- Considerations to be evaluated before specifying which type of plant is required will include temporary-works (imposed loads, both static and dynamic), wind loadings, reach and height, space restrictions (doorways, overhead obstructions etc.), and power – these can be diesel, electrical or manually operated.
- If a MEWP is rated for outdoor use, then a means of reading wind speed must be stated, including who will be responsible, and frequency of readings
- If the manufacturer states differing wind speeds for person(s) carried or the configuration of the MEWP, then this must be stated
- Ground conditions must be suitable for the weight of the MEWP and load. Refer to Project Temporary Works Coordinator.
- The MEWP identification number must be completed and attached to the MEWP before works commence. This will consist of a unique letter/number combination as designated by each contractor. i.e. a contractor named A.N.Other. It could designate AN01, AN02 etc.
- Daily pre-use checks should be made and recorded on a log kept with the MEWP at all times.

3.5.9 Glass manipulator / vacuum lifter

Glass manipulations/Vacuum lifters are used for installing glazed or other non-porous sheet materials in a vertical orientation, these machines are designed with suction cups fitted with non-return valves. When using, the following must be applied:

- They can be used as a stand-alone unit, attached to a telehandler or hung from a crane hook.
- They must be operated in line with lifting regulations (i.e. LOLER) and the manufacturers instruction manual.
- Users must have familiarisation training with this equipment.
- It is the hiring company's responsibility for carrying out all pre-use checks and inspections and completing all requisite checklists.
- When using a vacuum lifter for lifting glass, lift a couple of inches off the ground and hold for few minutes to confirm it's activated correctly etc in case of power failure.



Figure 25: MEWP

3.5 Other Cranes/Lifting Equipment

3.5.10 Glass-boy / floor crane

When using a glass boy/floor crane then following must be applied:

- Users must have familiarisation training with this equipment.
- Counterweights **MUST BE** locked in place to prevent unauthorised removal.
- They must be operated in line with lifting regulations (i.e. LOLER) and the manufacturers instruction manual.
- Permissible floor loadings must be established and adhered to in line with the [Mace Temporary Works Procedure](#).
- It is the hiring company's responsibility for carrying out all pre-use checks and inspections and completing all requisite checklists.



Figure 27: Floor crane

3.5.11 Gantry Cranes

When using a gantry crane, the following must be applied:

- Operators must hold CPCS A64 (Remote Controlled) and completed specific familiarisation training.
- Stop blocks in place at the end of the tracks.
- Audible and visual warning (i.e. flashing beacon) when travelling.
- Track must be level.
- Erection needs to be by a competent organisation.
- Installation & inspection on site must be undertaken by the contractor TWC prior to the Mace TWC.
- Gantry cranes should only be operated to 80% of their rated capacity. Any load greater than this should be agreed in writing by a member of the Lifting Specialist Group.
- Pre use check of rails and direction of movement, including crossing points must be carried out.
- Bogies must be locked with rail clamps or storm anchors when crane is not in use, in high winds or when WAH in operating envelope.
- Coordination of WAH activities within the operating envelope of the crane to remove the chances of equipment, e.g MEWP, scaffolding, etc being contacted by the crane. This is to include LOTO (Lock Out. Tag Out) for crane with optional multi hasps for added reassurance.

The use of proximity sensors should be considered based on risk assessment.

3.5.12 Self erecting tower cranes

Self-erecting tower cranes should be treated as any mobile cranes with an exclusion zone under the jib when the crane is folding up.

3.6 Other lifting equipment

3.6.1 Construction hoists

When procuring construction hoists, this must be in line with [1320 Hoists scope of works document](#)

When using construction hoists the following must be applied:

- Working at height activity must be planned and carried out in line with the [Mace Work at Height Standard](#).
- Installation and operation of hoists must have a comprehensive hoist plan including an approved lifting plan.
- Be selected considering the people and material hoist location and the impact on the building when removal of the hoist is required.
- All hoist must be supported by an assessment which considers the size the car, load capacity and working height of the hoist based on the floor plate production requirements per trade. Common tower solutions can be considered to reduce the impact on the façade and enable hoist cars to be called using allocation calling systems which generate efficiencies.
- Bases, landings/run-offs and ties must be designed and checked in accordance with the Mace Temporary Works procedure. Loads imposed on the permanent works by the ties must be communicated back to the permanent works engineer.
- Travel path of the hoist cage is to be protected against any accidental intrusion of tools, materials etc.
- Landing gates must be full height and secured by safety interlocks etc. and fully enclosed to prevent anything falling from height.
- Access gates are to be kept clear and any loading ramps will be subject to temporary works design, inclines must be kept as shallow as possible and less than 1:12.
- All twin-mast hoists with independent drive units must be fitted with operational tilt-switches/levelling devices.
- Mechanical fail-to-safe devices must also be fitted and operational.
- Ramps and infills of sufficient strength to take any required load must be fitted to allow loading of the hoist without risk of falling or falling materials. This shall be the case at every level.
- Daily checks must be carried out by the hoist operator and all findings recorded. Defects must be reported immediately.
- Weekly checks must be carried out by a qualified hoist engineer/installer provided by the hoist supplier due to the more technical nature of these checks. All findings are to be recorded and defects must be reported immediately, and a 6 monthly Thorough Examination (TE).
- There must be a planned preventative maintenance regime in place. Bases & ties must be subject to routine inspection as defined by the temporary works designer.

Only electro-mechanical interlocks are to be used on both passenger and goods hoists landing gates.



Figure 28: Construction hoist

3.6 Other lifting equipment

- The hoist must be locked off where works are being carried out that will interfere with the safe working and traveling of a hoist or any works that may impact the hoistway. The company in control of the hoist will lock off the hoist with a padlock and retain their key. The company carrying out the work interfering with the hoist traveling will also lock off the hoist with a padlock and retain their key. This is so that the hoist cannot be moved until each company removes their padlock.
- No modifications to be made to hoists without the manufacturers and Mace Specialist Lifting Group approval.

Further information on management of hoist can be found in the [Hoist Briefing pack](#).

Hoist gates must meet the requirement of EN/BS 7212 Standard. In the rare circumstances that a “standard” hoist gate cannot be used then the following must take place:

- The hoist manufacture must be consulted regarding the provision of alternative “special” gates that meet all relevant EN and BS 7212 standards.
- Any non-standard gate provided by the manufacturer or hoist supplier must be assessed by the hoist manufacturer and confirmation obtained from them that the full installation meets EN /BS 7212 standards and is approved by them.
- A detailed submission for agreement with the HSW department, demonstrating how the proposed installation will meet the EN /BS 7212 standards and how safety will be maintained including emergency access.

Driverless passenger hoists are not permitted on Mace projects.

Driverless goods hoists are not permitted serving more than 2 levels.

3.6 Other lifting equipment

3.6.2 Mast-climbing work platforms (MCWP)

When using Mast-climbing platforms (MCWP) as a working platform, refer to the [Work at Height Standard](#)

- The requirements for installation and operation are broadly similar to that for a rack-and-pinion hoist but will need careful consideration of mast-tie locations and bases – temporary-works, wind-speeds and weather conditions, overhead hazards such as windows and balconies that open into the travel-path of the platform, adjacent overhead power lines and exclusion zones below will all require careful planning.
- All MCWPs must have a tilt-switch/levelling device fitted.
- Mechanical fail-to-safe devices must also be fitted and operational.
- There is a facility for two platforms to be operated on a common pair of masts, with sufficient safety interlocks in place to prevent a clash, and also permitting both platforms to be worked-from concurrently provided that operatives do not work directly above one another – this would be a special-case scenario.
- All other issues are similar to MEWPs in general – refer to BS7981:2017 CoP Safe use of MCWPs. (UK).

